darden architects

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ADDENDUM NO. 04 DATE: 07/30/25

PROJECT:
Mendota Elementary School -Inc. No.1: – Sitework for Modular Classroom Buildings
605 Bass Ave, Mendota, CA 93640

Revised Bid Date: August 6th, 2025 at 2:00 p.m.

OWNER:
Mendota Unified School District
115 McCabe Ave
Mendota, CA 93640

ARCHITECT:
DARDEN ARCHITECTS, INC.
Attention:
6790 N. West Avenue
Fresno, California 93711
T. (559) 448-8051
F. (559) 446-1765

DARDEN PROJECT NO. 2277
DSA File Nos. 10-89
DSA APPL. NO. 02-122955

It will be the responsibility of the General Contractor to submit the information contained in this addendum to all its subcontractors and suppliers. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

The following additions, deletions, and revisions to the SHEETS and Project Manual are hereby made and do become a part of these Contract Documents.

INDEX OF ADDENDA TRANSMITTED HEREWITH

PROJECT MANUAL:

SPECIFICATIONS:

CHANGES TO SPECIFICATIONS ..... AD4-SP01 THRU AD4-SP04

SHEETS:

CHANGES TO SHEETS:

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LANDSCAPE / IRRIGATION ..... AD4-L01 THRU AD4-L02
ARCHITECTURAL AD4-A01

ATTACHMENTS:

DOCUMENTS OR SPECIFICATIONS:

01 57 00 FUGITIVE DUST CONTROL ..... (Pages 1 thru 3)
01 57 23 STORM WATER POLLUTION PREVENTION PLAN ..... (Pages 1 thru 10)
STORM WATER POLLUTION PREVENTION PLAN ..... (Pages 1 thru 502)
32 18 13 SYNTHETIC TURF SURFACING ..... (Pages 1 thru 4)
32 18 16 PLAYGROUND RESILIENT SURFACING ..... (Pages 1 thru 6)
GEOTECHNICAL ENGINEERING INVESTIGATION AND GEOLOGIC SEISMIN HAZARDS EVALUATION REPORT ..... (Pages 1 thru 157)
INCREMENT 02 DRAWINGS (REFERENCE ONLY) ..... (Pages 1 thru 98)

SHEETS:

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LANDSCAPE / IRRIGATION ..... AD4-LX01 thru AD4-LX02.
ARCHITECTURAL AD4-AX01

PROJECT MANUAL:

SPECIFICATIONS:

CHANGES TO SPECIFICATIONS:

AD4-SP01 **Add Specification Section 01 57 00, FUGITIVE DUST CONTROL:**

1. Refer to attached 01 57 00, FUGITIVE DUST CONTROL

AD4-SP02 **Add Specification Section 01 57 23, STORM WATER POLLUTION PREVENTION PLAN:**

1. Refer to attached Specification Section 01 57 23 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
2. Add the attached documents STORM WATER POLLUTION PREVENTION PLAN.

AD4-SP03 **Add Specification Section 32 18 13, Synthetic Turf Surfacing:**

1. Refer to attached 32 18 13, Synthetic Turf Surfacing.

AD4-SP04 **Add Specification Section 32 18 16, Playground Resilient Surfacing:**

1. Refer to attached 32 18 16, Playground Resilient Surfacing

SHEETS:

CHANGES TO SHEETS:

CIVIL:

AD4-C01 **Refer to Sheet SD/C201, DEMOLITION PLAN:**

1. Refer to Sheet SD/C201, DEMOLITION PLAN. Revise per attached AD4-CX01. Revisions are as follows:
   i. Revised legend keynote 'RB'
   ii. Included legend keynote 'RD'

AD4-C02 **Refer to Sheet SD/C301, SITE PLAN:**

1. Refer to Sheet SD/C301, SITE PLAN. Revise per attached AD4-CX02. Revisions are as follows:
   i. Included legend keynotes 10-13
   ii. Included electrical concrete pad, fencing and gates
   iii. Included relocated backstop
   iv. Included play equipment
   v. Included play surfacing limits
   vi. Included synthetic turf surfacing limits

AD4-C03 **Refer to Sheet SD/C401, HORIZONTAL CONTROL PLAN:**

1. Refer to Sheet SD/C401, HORIZONTAL CONTROL PLAN. Revise per attached AD4-CX03. Revisions are as follows:
   i. Included electrical concrete pad fencing and gates control points and dimensions
   ii. Included relocated backstop control point and dimension
   iii. Revised control points and dimensions at play area south of Building 700

AD4-C04 **Refer to Sheet SD/C402, HORIZONTAL CONTROL PLAN TABLE:**

1. Refer to Sheet SD/C402, HORIZONTAL CONTROL PLAN TABLE. Revise per attached AD4-CX04. Revisions are as follows:
   i. Revised control points northing and easting coordinate.

AD4-C05 **Refer to Sheet SD/C501, GRADING AND DRAINAGE PLAN:**

1. Refer to Sheet SD/C501, GRADING AND DRAINAGE PLAN. Revise per attached AD4-CX05. Revisions are as follows:
   i. Included grading at the electrical concrete pad
   ii. Revised grading at the play area south of Building 700
   iii. Included play area perforated storm drain pipes and connection to existing storm drain system

AD4-C06 **Refer to Sheet SD/X101, DETAILS:**

1. Refer to Sheet SD/X101, DETAILS. Revise per attached AD4-CX06. Revisions are as follows:
   i. Revised detail [A/SDX101]
   ii. Revised detail [D/SD/X101]
   iii. Revised detail [E/SD/X101]
   iv. Revised detail [I/SD/X101]
   v. Revised detail [P/SD/X101]
   vi. Revised detail [Q/SD/X101]
   vii. Included detail [R/SD/X101]

AD4-C07 **Refer to Sheet SD/X102, DETAILS:**

1. Refer to Sheet SD/X102, DETAILS. Revise per attached AD4-CX07. Revisions are as follows:
   i. Included detail [H/SD/X102]

LANDSCAPE / IRRIGATION:

AD4-L01 Refer to Sheet SD/L101, IRRIGATION PLAN:

1. Refer to Sheet SD/L101, IRRIGATION PLAN. Revise per attached AD4-LX01. Revisions are as follows:
   i. Removed and replaced location of irrigation rotors near valves B-21 & B-22
   ii. Changed a head with half arc rotation to a quarter rotation
   iii. Added pipe hops
   iv. Revised lateral lines affected by concrete pad
   v. Revised valve connection for B-28
   vi. Revised B-29 Lateral line

AD4-L02 Refer to Sheet SD/L201, PLANTING PLAN:

1. Refer to Sheet SD/L201, PLANTING PLAN. Revise per attached AD4-LX02. Revisions are as follows:
   i. Revised turf to be synthetic turf and updated the quantities.

ARCHITECTURAL:

AD4-A01 Add Detail AD4-AX01, TYPICAL FOOTING DETAIL:

1. Refer to attached Detail AD4-AX01, TYPICAL FOOTING DETAIL.

END OF ADDENDUM NO. 04

SECTION 01 57 00 – FUGITIVE DUST CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, fees, and services necessary to comply with the San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII for dust control requirements.
   2. Contractor will determine the total disturbed surface area and the estimated bulk material moving volumes anticipated for the Project to determine if a Construction Notification or Dust Control Plan is required. Contractor shall prepare and submit a Construction Notification or Dust Control Plan to the SJVAPCD based on these expected Project conditions/activities.
   3. Non-residential Projects that will include five acres or more of disturbed surface area and/or will be moving, depositing, or relocating more than 2,500 cubic yards of bulk material on at least three days of the project are required to submit a Dust Control Plan to the SJVAPCD and receive approval prior to commencing earth moving activities.
   4. Non-residential projects that will include less five acres of disturbed surface area must submit a Construction Notification at least 48 hours prior to commencement of any earthmoving activities. No approval or response from the SJVAPCD is required.
   5. Contractor shall be solely responsible for payment of any fees or fines related to violations of SJVAPCD Regulation VIII from Project activities/conditions.
   6. All Contract requirements in Division 00 and 01 specifications.

B. This Section does not include:
   1. None.

C. Acronyms:
   1. SJVAPCD San Joaquin Valley Air Pollution Control District

1.2 REFERENCES

A. SJVAPCD Compliance Assistance Web Page on Dust Control:
   1. https://ww2.valleyair.org/compliance/dust-control/

B. SJVAPCD Regulation VIII
   1. https://ww2.valleyair.org/rules-and-planning/current-district-rules-and-regulations/regulation-viii-fugitive-pm10-prohibitions/

1.3 RELATED SECTIONS

A. Section 31 11 00 – Site Clearing

B. Section 31 20 00 – Earthwork

C. Section 01 57 23 – Stormwater Pollution Prevention Plan

1.4 SUBMITTALS

A. If applicable, Contractor shall submit to the SJVAPCD the Project Dust Control Plan at least 30 days prior to commencing earth moving activities.
B. If applicable, Contractor shall submit to the SJVAPCD the Project Construction Notification at least 48 hours prior to commencing earth moving activities.
C. Contractor shall submit to Owner the Project Dust Control Plan approved by the SJVAPCD or documentation of submission of a Construction Notification to SJVAPCD prior to commencing earth moving activities.

1.5 REQUIREMENTS

A. Comply with all requirements of SJVAPCD Regulation VIII throughout the life of this contract.

B. The Contractor shall be fully aware of the requirements of SJVAPCD Regulation VIII, the requirements of these specifications for preparing, implementing, maintaining, and enforcing the provisions of SJVAPCD Regulation VIII, and the impact that Regulation VIII will have on the operation, prosecution and cost of the work. A submittal of a bid on this project will be considered as prima facie evidence that the Contractor fully comprehends these requirements and impacts and has fully allowed for their effect on this project, both in time and cost. Failure to comply with SJVAPCD Regulation VIII is a violation of local regulations. Contractor hereby agrees to indemnify, defend and hold harmless Owner, its officers, agents, and employees from and against any and all claims, demands, losses or liabilities of any kind or nature which Owner, its officers, agents, and employees may sustain or incur for noncompliance with the Regulation VIII arising out of or in connection with the Project, except for liability resulting from the negligence or willful misconduct of Owner, its officers, agents or employees. Owner may seek damages from Contractor for delay in completing the Project in accordance herewith, including damage caused by Contractor’s failure to comply with Regulation VIII requirements.

1.6 QUALITY ASSURANCE

A. None.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Dust Management Practices (DMPs):
1. The Contractor is responsible for the providing and furnishing all DMPs, products, and practices necessary to comply with Regulation VIII. All materials and DMPs shall follow the requirements outlined in Regulation VIII, Rule 8021.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Dust Control Training Class Certificate:
1. At least one key individual representing the Contractor who prepares a Dust Control Plan must complete a Dust Control Training Class conducted by the SJVAPCD.

2. At least one key individual representing the Contractor who is tasked to implement the Dust Control Plan must complete a Dust Control Training Class conducted by the SJVAPCD.

3.2 CLEANING AND REMOVAL

A. All temporary DMPs shall be completely removed from the Project Site upon completion of construction.

3.3 RECORD KEEPING

A. If a Dust Control Plan applies to the Project, Contractor shall maintain records in accordance with the recordkeeping requirements of Regulation VIII, Rule 8011.

3.4 PAYMENT

A. Full compensation for all costs involved in preparing, submitting, implementing, and monitoring the implementation of Regulation VIII for this project, including training, performing corrective measures, providing all labor, materials, resources to maintain the site, and all required records for a Dust Control Plan (if applicable), and being full liable for all failures to fulfill the intent and requirements of the Regulation VIII set forth by the SJVAPCD, shall be included in the cost bid for the various items of work and no additional payment will be made therefor.

END OF SECTION

STORMWATER POLLUTION PREVENTION PLAN

for

Mendota Elementary School Classroom Additions

Project Location:
Mendota, CA)

RISK LEVEL: 1

Legally Responsible Person (LRP):
Mendota Unified School District
115 McCabe Avenue, Mendota, CA 93640
Jose Alcaide
559-655-4942

Project Address:
605 Bass Ave, Mendota, CA 93640

SWPPP Prepared by:

Blair, Church & Flynn
CONSULTING ENGINEERS
Michael Gennaro
451 Clovis Avenue #200, Clovis, CA 93612

SWPPP Preparation Date:
March 21, 2025

WDID #	**TBD**
Application ID	[#####]

Estimate Construction Dates
July 9, 2025 - November 30, 2026

Site Operation Hours
7 am – 5 pm, M-F

Contact	Name	Phone Number	License/Certification #
Qualified SWPPP Developer	Michael Gennaro	(559) 326-1400	#28547
Co-Qualified SWPPP Developer	Gabriel Ledesma	(559) 326-1400	#28909
Qualified SWPPP Practitioner			
QSP Trained Delegates			
QSP Trained Delegates			

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List of Acronyms

AS	Approved Signatory
ATS	Active Treatment System
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
CFR	Code of Federal Regulations
CGP	NPDES 2022 CGP for Storm Water Discharges Associated with Construction Activities
COC	Chain of Custody
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Plan
CWA	Clean Water Act
DAR	Duly Authorized Representative
DWQ	Division of Water Quality
EPA	Environmental Protection Agency
LRP	Legally Responsible Person
MRR	Monitoring and Reporting Requirements
MS4	Municipal Separate Storm Sewer System
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
PRDs	Permit Registration Documents
QPE	Qualifying Precipitation Event
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
RUSLE2	Revised Universal Soil Loss Equation, Version 2
RW	Receiving Water
RWQCB	Central Valley Regional Water Quality Control Board (Fresno Office)
SMARTS -	Storm Water Multi Application Reporting and Tracking System
SSC	Suspended Sediment Concentration
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
WDID	Waste Discharge Identification Number
WQO	Water Quality Objective

Qualified SWPPP Developer (QSD)

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name: Mendota Elementary School Classroom Additions

Project Number/ID: **TBD**

"This Stormwater Pollution Prevention Plan and its appendices were prepared under my direction to meet the requirements of the California Construction Stormwater General Permit (*Order No. 2022-0057-DWQ*). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below and will maintain up to date credentials for the duration of the project."

QSD Signature	*Date*
Michael Gennaro	28547
QSD Name	*QSD Certificate Number*
QSD, CPESC, Environmental Specialist at Blair, Church & Flynn Consulting Engineers	(559) 326-1400
Title and Affiliation	*Telephone Number*
mgennaro@bcf-engr.com	
Email	

March 21, 2025

Qualified SWPPP Practitioner (QSP)

Project Name: Mendota Elementary School Classroom Additions

Project Number/ID: **TBD**

The QSP identified below shall complete and oversee the implementation and documentation of the construction site monitoring plan elements (CSMP) contained in this Stormwater Pollution Prevention Plan and the California Construction Stormwater General Permit (*Order No. 2022-0057-DWQ*). The QSP shall complete all documentation truthfully and shall not misrepresent their qualifications or active certificate status while acting as the QSP for the Project.

TBD

QSP Signature | *Date*

QSP Name | *QSP Certificate Number*

Title and Affiliation | *Telephone Number*

Email

Amendment Log

Project Name: Mendota Elementary School Classroom Additions

Project Number/ID: **TBD**

Amendment No.	Date	Brief Description of Amendment (include section and page number)	Prepared and Approved By
			Name: QSD#
			Name: QSD#
			Name: QSD#

The SWPPP will be revised when:

- There is a 2022 CGP violation (2022 CGP Section VI.Q.1);
- There is a reduction or increase in total disturbed acreage (2022 CGP Section III.F.2. and F.4);
- BMPs are not effective and are not resulting in a reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges (2022 CGP Section VI.Q.1 and Attachment E Section III.C.5);
- There is a change in the project duration that changes the project Risk Type (2022 CGP Section III.F.1);
- Dischargers with projects where all construction activities (including passive treatment, active treatment systems, and/or active equipment) will be suspended for 30 days or more (2022 CGP Section III.G).

Section 1 SWPPP Requirements

1.1 INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) is designed to comply with California's *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (2022 CGP),* State Water Resources Control Board (State Water Board) *Order No. 2022-0057-DWQ (NPDES No. CAS000002)* (Appendix R). This SWPPP has been prepared following the 2022 CGP SWPPP Template for Traditional Projects provided in the California Stormwater Quality Association (CASQA) Stormwater *Best Management Practice (BMP) Handbook: Construction* (CASQA 2023).

This project is considered a traditional construction project.

In accordance with the 2022 CGP, Section IV.O, this SWPPP is designed to address the following:

- Identification of all pollutants, their sources, and control mechanisms, including sources of sediment associated with all construction activities (e.g., sediment, paint, cement, stucco, cleaners, site erosion);
- Pollutant source assessments, including a list of potential pollutant sources and identification of site areas where additional BMPs are necessary to reduce or prevent pollutants in stormwater and authorized non-stormwater discharges, per the minimum requirements when developing the pollutant source assessment;
- Description of site-specific BMPs implemented to reduce or eliminate stormwater pollution;
- Where not otherwise required to be under a Regional Water Quality Control Board (Regional Water Board) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;
- Site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard; and;
- Stabilization BMPs are installed to reduce or eliminate pollutants after construction is completed are effective and maintained; and
- Calculations and design details, as well as BMP controls, are complete and correct.

The Mendota Elementary School Classroom Additions project (Project, or Site) comprises approximately 1.55 acres, of which 1.55 acres will be disturbed. The Project is located at 605 Bass Ave, Mendota, CA 93640. The property is owned and being developed by Mendota Unified School District . The project's location is shown on the Site Maps in Appendix A.

The Project will construct three (3) one-story educational buildings at Mendota Elementary School. The Project also includes the construction of new concrete walkways, parking lot improvements, new landscaped areas, and associated utility improvements, including new storm drain connections to the campus stormwater system.

1.2 PERMIT REGISTRATION DOCUMENTS

Required Permit Registration Documents (PRDs) shall be submitted to the State Water Board via the Stormwater Multi Application and Report Tracking System (SMARTS) by the LRP or DAR. The project-specific PRDs include (2022 CGP Section III.A):

1. Notice of Intent (NOI);
2. Risk Level Determination (Construction Site Sediment and Receiving Water Risk Determination);
3. Site Drawings and Map;
4. SWPPP;
5. Applicable plans, calculations, and other supporting documentation for compliance with the Phase I or Phase II municipal separate storm sewer system (MS4) post construction requirements or the post-construction standards of the 2022 CGP:
    - Attachment or web-source containing the applicable Phase I or Phase II MS4 post construction requirements;
    - The post construction plans and calculations submitted to or approved by the applicable Phase I or Phase II MS4; and/or
    - Post-construction water balance calculation;
6. Dischargers proposing an alternate K-factor or LS-factor must submit documentation to support the site-specific factors, if applicable;
7. Active Treatment System (ATS) Plan, if applicable;
8. Passive Treatment Plan, if applicable;
9. Dewatering Plan, if applicable;
10. Annual Fee per the current 23 California Code of Regulations Chapter 9 fee schedule for National Pollutant Discharge Elimination System (NPDES) stormwater permits; and
11. Signed Certification Statement (LRP Certification is provided electronically with SMARTS PRD submittal).

Site Maps can be found in Appendix A. A copy of the submitted PRDs shall also be kept in Appendix B along with the Waste Discharge Identification (WDID) confirmation.

1.3 SWPPP AVAILABILITY AND IMPLEMENTATION

The SWPPP will be available at the construction site during working hours list on the title sheet and Section 7.5, while construction is occurring and shall be made available upon request by a federal, state, or municipal inspector. A current copy of the site-specific SWPPP and any site inspection reports required by the 2022 CGP may be kept in electronic format at the site so long as the information requested by a federal, state, or municipal inspector can be made available during an inspection. Legible maps in hard copy must be available at the site (2022 CGP Section IV.O.1.).

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the 2022 CGP.

1.4 SWPPP AMENDMENTS

The SWPPP will be revised when:

- If there is a 2022 CGP violation (2022 CGP Section VI.Q.1);
- There is a reduction or increase in total disturbed acreage (2022 CGP Section III.F.2 and F.4.);
- BMPs are not effective and are not resulting in a reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges (2022 CGP Section VI.Q.1 and Attachment D Section III.C.5);
- There is a change in the project duration that changes the project's risk level (2022 CGP Section III.F.1); or
- Dischargers with projects where all construction activities (including passive treatment, active treatment systems, and/or active equipment) will be suspended for 30 days or more (2022 CGP Section III.G.).

Additionally, the SWPPP will be amended when:

- There is a change in construction or operations that may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4) (2022 CGP Sections IV.O. and VI.Q.1); or

When deemed necessary by the QSD. The QSD has determined that the changes listed in Table 1-1 can be field determined by the QSP. All other changes will be made by the QSD as formal amendments to the SWPPP. Note that the 2022 CGP requires that the QSD revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations (2022 CGP Section V.C.2.).

The following items shall be included in each amendment:

- Who requested the amendment;
- The location of proposed change;
- The reason for change;
- The original BMP(s) proposed, if any;
- The new BMP(s) proposed; and
- QSD certification.

SWPPP amendments will be logged at the front of the SWPPP and SWPPP Amendment QSD certifications will be located in Appendix C. The SWPPP text will be revised, replaced and/or hand annotated as necessary to properly convey the amendment. SWPPP amendments must be made by a QSD. The following changes have been designated by the QSD as "to be field determined" and constitute minor changes that the QSP may implement based on field conditions.

Table 1-1 List of Changes to be Field Determined

Candidate changes for field location or determination by QSP (1)	Indicates changes that may be field located or field determined by QSP/Delegates
Increase quantity of Erosion or Sediment Control Measures	☒ Yes ☐ No
Relocate/Add stockpiles or stored materials	☒ Yes ☐ No
Relocate/Add toilets – Shall include a containment tray	☒ Yes ☐ No
Relocate vehicle storage and/or fueling locations	☒ Yes ☐ No
Relocate concrete waste management facilities	☒ Yes ☐ No
Relocate areas for waste storage	☒ Yes ☐ No
Relocate water storage and/or water transfer location	☒ Yes ☐ No
Changes to access points (entrance/exits)	☒ Yes ☐ No
Change type of Erosion or Sediment Control Measures – Changes may only include BMPs indicated within Section 3.1 of this SWPPP	☒ Yes ☐ No
Changes to location of Erosion or Sediment Control Measures	☒ Yes ☐ No
Minor changes to schedule or phases	☒ Yes ☐ No
Changes in construction materials	☒ Yes ☐ No
(1) Any field changes not identified for field location or field determination by the QSP must be made as an amendment by the QSD.	

1.5 RETENTION OF RECORDS

Paper or electronic records of documents required by this SWPPP will be retained for a minimum of three years from the date generated or date submitted, whichever is later, for the following items:

- SWPPP;
- Visual monitoring reports;
- Sampling equipment calibration records;
- pH and turbidity sampling field sheets;
- Analytical laboratory reports; and
- QSP training records of Contractor staff for BMP implementation, installation, and maintenance
- QSP delegate training records, if applicable

These records will be available at the Site until construction is complete. Records assisting in the determination of compliance with the 2022 CGP will be made available within a reasonable time to the Regional Water Board, State Water Board, or U.S. Environmental Protection Agency (EPA) upon request. Requests by the Regional Water Board for retention of records for a period longer than three years will be adhered to.

1.6 REQUIRED REPORTING

Completed inspection checklists are not required to be submitted to the Regional Water Board. However, completed inspection checklists will be kept with the SWPPP on-site or electronically and provided to the LRP upon termination of the SWPPP. The 2022 CGP requires that permittees prepare, certify, and electronically submit an Annual Report no later than September 1 of each year. Reporting requirements are identified in 2022 CGP Section VI.P. Annual reports will be filed in SMARTS and in accordance with information required by the online forms.

Planned changes in site construction activities that may result in non-compliance with the 2022 CGP are required to be provided in writing to the Regional Water Board and local stormwater agency in advance of the changes.

If a 2022 CGP discharge violation occurs, the QSP will immediately notify the LRP. The LRP will include information on the violation with the Annual Report. Corrective measures will be implemented immediately following identification of the discharge or written notice of non-compliance from the Regional Board. Discharges and corrective actions must be documented and include the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge;
- The cause or nature of the notice or order;
- The BMPs deployed before the discharge event, or prior to receiving notice or order; and
- The date of deployment and type of BMPs deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence.

The Project is located in the Central Valley (Fresno) Regional Water Quality Control Board which has no water bodies with TMDL NALs and/or NELs, so there are no applicable TMDL NALs and/or NELs for the Project.

The Project will not use an Active Treatment System so there are no applicable NELs for the Project.

The Regional Water Board will be notified via email 24 hours prior to the beginning of a planned dewatering discharge.

In the event of an emergency dewatering, the Regional Water Board and applicable MS4 are to be notified within 24 hours of a discharge occurring. An emergency is defined as the need to protect human life and health or prevent severe property damage.

Results of (pH and turbidity, etc.) monitoring will be electronically submitted through SMARTS for all field sampling results within 30 days of the completion of the precipitation event or within 10 days if the field sampling results demonstrate the exceedance of the pH and/or turbidity NALs.

See Section 7.7.4.5 for additional discussion of the reporting requirements including contacts for Regional Water Board and MS4 notifications.

The Project will not utilize Passive Treatment so there is no Passive Treatment Plan for the Project.

1.7 CHANGES TO PERMIT COVERAGE

The 2022 CGP allows for the reduction or increase of the total acreage covered under the 2022 CGP when: a portion of the project is complete and/or conditions for termination of coverage

have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

Modified PRDs will be filed electronically through a Change of Information (COI) within 30 days of a reduction or increase in total disturbed area if a change in permit-covered acreage is to be sought. The SWPPP will be modified appropriately and will be logged at the front of the SWPPP. SWPPP Amendments QSD Certifications will be located in Appendix C. COIs submitted electronically via SMARTS can be found in Appendix D.

1.8 NOTICE OF TERMINATION

A Notice of Termination (NOT) must be submitted electronically by the LRP or DAR via SMARTS to terminate coverage under the 2022 CGP.

According to the requirements of 2022 CGP Section III.H.4., the one or more of the following final stabilization method will be used to satisfy final stabilization condition requirements:

- 70 percent final cover method supported by pre- and post-project photographs demonstrating stabilization.
- RUSLE or RUSLE2 method with computation proof supported by pre- and post-project photographs demonstrating stabilization.
- Custom method for which Regional Water Board approval has been obtained, supported by documentation required by the Regional Water Board and pre- and post- project photographs demonstrating stabilization.

The Regional Water Board will consider a construction site complete when the conditions of the 2022 CGP Section III.H., have been met.

The discharger is required to submit the following in SMARTS:

- NOT SMARTS Form;
- QSP-prepared final NOT inspection which includes the QSP name and valid QSP certificate number;
- Final site map with photo orientation references;
- Photos demonstrating final stabilization and the applicable post-construction BMPs and/or low impact development; and
- A long-term maintenance plan for the post-construction stormwater runoff BMPs and/or low impact development features being implemented.

According to the 2022 CGP, the NOT will be automatically approved within 30 calendar days after the date the NOT was submitted, unless, within the 30 calendar days the Regional Water Board notifies the discharger through SMARTS that the Notice of Termination has been denied, returned, or accepted for review (2022 CGP Section III.H.7).

Note: If an Annual Report has not been filed in the current reporting year, an Annual Report will need to be submitted prior to the NOT.

Section 2 Project Information

2.1 PROJECT AND SITE DESCRIPTION

2.1.1 Site Description

The Mendota Elementary School Classroom Additions project site is Risk Level 1, comprises approximately 1.55, and is located at 605 Bass Ave, Mendota, CA 93640. The project site is located approximately 0.37 miles east of SR-33. The project site is located approximately 0.41 miles south of the Firebaugh Canal District Intake Canal. The project is located at 36.767640, -120.381368 and is identified on the Site Map in Appendix A.

2.1.2 Existing Conditions

As of the initial date of this SWPPP, the project site is a portion of a developed school, including a campus parking lot, paved campus walkways, landscaped areas, and associated utilities. The project site was previously agricultural land prior to the construction of Mendota Elementary School.

There are no known historical sources of potential contamination at the project site according to the Department of Toxic Substances Control (DTSC) *Envirostor* database (California Department of Toxic Substances Control, 2025).

There are no known Leaky Underground Storage Tanks (LUST), within 2,000 feet of the Project site, according to the SWRCB's GeoTracker database (State Water Resources Control Board (1), 2025).

2.1.3 Existing Drainage

The project site is relatively level. The elevation of the project site ranges from 159 - 162 feet above mean sea level (msl). Surface drainage at the site currently:

- is conveyed as sheetflow to existing campus stormdrain inlets,
- is conveyed as sheetflow to the surrounding campus road/parking lot, where it conveys as channelized flow to curb-gutter drain inlets,
- percolates into the soil.

Stormwater is conveyed through sheet flow, channelized flow, and is conveyed by the existing stormwater conveyance system. Existing site topography, drainage patterns, and stormwater conveyance systems are shown on Site Maps Figure 2 in Appendix A.

The project site discharges to a City of Mendota stormwater retention basin. The water quality impairments (303 (d) list and TMDLs identified in the 2022 CGP Table H-1 for the receiving waters are identified in the Table 2-1.

Table 2-1 Applicable 303(d) List Impairments and TMDLs

Receiving Water	Water Quality Impairment	
	303(d) list[1]	TMDL (2022 CGP Table H-1)
City of Mendota Stormwater Retention Basin	None	None

[1] (State Water Resources Control Board (2), 2022)

Additional compliance actions applicable to the project are discussed in more detail in Section 7.7.

2.1.4 Geology and Groundwater

The site is underlain by tranquility clay, saline-sodic, wet soils, which is characterized by clay from zero to 48 inches below surface level, and silty clay from 48 to 65 inches below surface level, according to the USDA Web Soils Survey (U.S. Division of Agriculture, 2025).

According to a groundwater monitoring well approximately 0.97 miles northwest (Site Code: 367552N1203732W002) with most recent measurements from September 16, 2024, groundwater occurs beneath the site at approximately 165.82 feet below ground surface. The groundwater gradient is toward the northeast (California Department of Water Resources, 2025).

2.1.5 Project Description

Project grading will occur on approximately 1.21 acres of the project, which comprises approximately 78.03 percent of the total area. The limits of grading are shown on Site Maps Figure 3 in Appendix A. Grading will include both cut and fill activities, with the total graded material estimated to be 2,924 cubic yards. Approximately 200 cubic yards of cut material will be exported during grading activities. Soil will be stockpiled in the staging area located in the north area of the site as shown on Site Maps Figure 3 in Appendix A. Construction activities will not be phased.

Table 2-2 Construction Site Estimates

	Acres	Percent of Site
Total Construction site area	1.55	100%
Area of disturbance	1.55	100%
Area of grading	1.55	100%

2.1.6 Developed Condition

Post-construction surface drainage will be collected in the following ways:

- Stormwater generated from the building roofs will convey as sheetflow and be collected by roof drains that connect to the campus underground stormwater conveyance system.
- Stormwater generated from concrete walkways and landscaped areas will be directed as sheet flow to new or existing stormdrain inlets that connect to the campus underground stormwater conveyance system.
- Stormwater generated in the southwest parking lot area will convey as sheetflow towards valley gutters and be conveyed as channelized flow to existing stormdrain inlets.
- Stormwater generated in the northern field will percolate into the surrounding soil or will be directed as sheetflow to new or existing stormdrain inlets that connect to the campus underground stormwater conveyance system

Stormwater generated at the Project site will ultimately discharge to a City of Mendota stormwater basin located to the north. Post-construction drainage patterns and conveyance systems are presented on Site Maps Figure 4i in Appendix A.

The changes of impervious areas/drainage patterns resulting from the Project and demonstration of the Project complying with the post-construction requirements of the local MS4 are presented in Appendix L.

2.2 PERMITS AND GOVERNING DOCUMENTS

In addition to the 2022 CGP, the following documents have been taken into account while preparing this SWPPP:

- Regional Water Board requirements
- Basin Plan requirements
- Contract Documents
- Air Quality regulations and permits
- State Water Board GeoTracker database (GeoTracker)
- Federal Endangered Species Act – Not applicable.
- National Historic Preservation Act/Requirements of the State Historic Preservation Office – Not applicable.
- State of California Endangered Species Act – Not applicable.
- Clean Water Act Section 401 Water Quality Certifications and 404 Permits – Not applicable.
- CA Department of Fish and Game 1600 Streambed Alteration Agreement – Not applicable.
- California Ocean Plan – Not applicable.

2.3 STORMWATER RUN-ON FROM OFFSITE AREAS

There is no anticipated offsite run-on to this construction site because the project site does not have any upgrade drainage areas. Drainage areas and associated stormwater conveyance facilities or BMPs are shown on Site Maps, Figures 2 through 4.i in Appendix A

2.4 FINDINGS OF THE CONSTRUCTION SITE SEDIMENT AND RECEIVING WATER RISK DETERMINATION

A construction site risk assessment has been performed for the project and the resultant risk level is Risk Level 1. The factors used to calculate risk level were determined by the use of the standard methods in the CGP.

- The R-value was determined from EPA's *Rainfall Erosivity Factor Calculator for Small Construction S*ites at: https://lew.epa.gov/ in accordance with the State Water Board Guidance for multi-year projects at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/smarts/construction/docs/rfactor_guide.pdf,
- K and LS factors used were provided by SMARTS for the Project region.

The risk level is based on project duration, location, proximity to impaired receiving waters, and soil conditions. A copy of the Risk Level determination submitted on SMARTS with the PRDs is included in Appendix B.

Table 2-3 and Table 2-4 summarize the sediment and receiving water risk factors and document the sources of information used to derive the factors.

Table 2-3 Summary of Sediment Risk

RUSLE Factor	Value	Method for Establishing Value
R	26.99	EPA's *Rainfall Erosivity Factor Calculator for Small Construction S*ites
K	0.37	SWRCB K-Factor Map, Generated by SMARTS
LS	0.13	SWRCB LS-Factor Map, Generated by SMARTS
Total Predicted Sediment Loss (tons/acre)		**1.298**
Overall Sediment Risk Low Sediment Risk < 15 tons/ acre Medium Sediment Risk >= 15 and < 75 tons/acre High Sediment Risk >= 75 tons/acre		☒ **Low** ☐ **Medium** ☐ **High**

The project site discharges into a City of Mendota stormwater retention basin.

Table 2-4 Summary of Receiving Water Risk

Receiving Water Name	303(d) Listed for Sediment Related Pollutant (1)	TMDL for Sediment Related Pollutant (1)	Beneficial Uses of COLD, SPAWN, and MIGRATORY (1)
City of Mendota Stormwater Retention Basin	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Overall Receiving Water Risk			☒ **Low** ☐ **High**
(1) If yes is selected for any option the Receiving Water Risk is High			

Risk Level 1 sites are subject to the narrative effluent limitations specified in the 2022 CGP, and may be subject to numeric effluent limits for applicable TMDLs, dewatering activities, active treatment systems and passive treatment systems used on site. The narrative effluent limitations require stormwater discharges associated with construction activity to minimize or prevent pollutants in stormwater and authorized non-stormwater through the use of controls, structures, and best management practices (BMPs). This SWPPP has been prepared to address Risk Level 1 requirements (2022 CGP Attachment D).Projects that discharge to a water body and or watershed listed in Table H-2 are subject to both the narrative and numeric effluent limitations imposed by the TMDL requirements in Attachment H. There are no water bodies with TMDLs in the Central Valley Regional Water Quality Control Board region (the region of the Project), therefore the Project is not subject to any TMDL requirements.

Table 2-7 TMDL Numeric Action Levels, Numeric Effluent Limits

TMDL	Parameter	Unit	Numeric Action Level	Numeric Effluent Limit
None	NA	NA	NA	NA

2.5 CONSTRUCTION SCHEDULE

The site sediment risk was determined based on construction taking place between:

Estimate Project Start Date: July 9, 2025

Estimate Project End Date: November 30, 2026

Modification or extension of the schedule (start and end dates) may affect risk determination and permit requirements. The LRP shall contact the QSD if the schedule changes during construction to address potential impact to the SWPPP. The estimated schedule for planned work can be found in Appendix E.

2.6 POTENTIAL CONSTRUCTION ACTIVITY AND POLLUTANT SOURCES

Appendix F includes a list of construction activities and associated materials that are anticipated to be used onsite as well as the pollutant source assessment form that was completed for the project. These activities and associated materials will or could potentially contribute pollutants, other than sediment, to stormwater runoff.

The anticipated activities and associated pollutants were used in Section 3 to select the BMPs for the project. Locations of anticipated pollutants and associated BMPs are shown on the Site Map in Appendix A.

Additionally, proper measures will be taken to ensure that trench spoils or any other soils disturbed during construction activities that are contaminated are not discharged with stormwater or non-stormwater discharges into storm drains or water bodies (except pursuant to a separate NPDES Permit). If contaminated soils are found on site, and the responsible party cannot be identified or fails to take action, soils will be sampled to determine proper handling and protect public safety. The appropriate local, State, and federal agencies along with the appropriate Regional Water Board will be notified when contaminated soils are observed.

For sampling requirements for non-visible pollutants associated with construction activity, please refer to Section 7.7.1. For a full and complete list of onsite pollutants, refer to the Safety Data Sheets (SDS), which are retained onsite at the construction trailer or are available electronically at the site.

2.7 TMDL REQUIREMENTS

Based on the project's receiving water and the pollutant source assessment, there are no applicable TMDLs for the Project.

Table 2-8 Project TMDLs

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related NAL or NEL	Compliance Actions
None	NA	NA	NA	NA

2.8 IDENTIFICATION OF NON-STORMWATER DISCHARGES

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the 2022 CGP and listed in the SWPPP, or authorized under a separate NPDES permit, are prohibited.

Non-stormwater discharges that are authorized from this project site include the following:

- De-chlorinated potable water sources and non-potable water sources such as:
  - fire-fighting activity,
  - fire hydrant system flushing,
  - irrigation of vegetative erosion control measures,
  - uncontaminated water line flushing,
  - pipe flushing and testing,
  - air conditioning and compressor condensate,

    - water to control dust, uncontaminated groundwater or spring water from construction dewatering activities in compliance with Attachment J of the 2022 CGP
- Non-stormwater discharges that meet the following conditions:
    - The discharge is not routed through site areas with exposed soil, except for water used for dust control or to vegetation irrigation to stabilize areas;
    - The discharge does not cause or contribute to an exceedance of water quality standards in the receiving water;
    - The discharge complies with other applicable requirements of the 2022 CGP including applicable action levels, effluent limitations, and monitoring and reporting requirements;
    - The discharge is not prohibited by an applicable regional or statewide water quality control plan;
    - The discharge is in accordance with other applicable State and Regional Water Board permits; and

These authorized non-stormwater discharges will be managed with the stormwater and non-stormwater BMPs described in Section 3 of this SWPPP and will be minimized under the direction of the QSP. Additionally, the non-stormwater discharges not applicable to this project are still allowable granted they do not contact potential pollutant sources.

Activities at this site that may result in unauthorized non-stormwater discharges include:

- Debris and trash
    - In accordance with State Water Board Resolution 2015-0019, the Trash Provisions of the Water Quality Control Plan for Ocean Waters of California and the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, as applicable to construction stormwater discharges;
- Wastewater from washout or cleanout of areas, structures or equipment with concrete, grout, stucco, paint, or other construction materials;
- Form-release oils and curing compounds;
- Fuels, oils, fluids, or other materials used in vehicle and equipment operation and maintenance;
- Soaps, solvents, or detergents (e.g., used in vehicle equipment washing or external building wash down); and
- Toxic or hazardous substances (e.g., asbestos, lead, mercury, or PCBs).

Steps will be taken, including the implementation of appropriate BMPs, to ensure that unauthorized discharges are eliminated, controlled, disposed, or treated on-site.

Discharges of construction materials and wastes, such as fuel or paint, resulting from dumping, spills, or direct contact with rainwater or stormwater runoff, are also prohibited.

2.9 REQUIRED SITE MAP INFORMATION

The construction project's Site Map(s) showing the project location, surface water boundaries, geographic features, construction site perimeter and general topography, locations of storm drain inlets that receive runoff from the project, and other requirements identified in 2022 CGP Sections IV.O.2. k. and l are located in Appendix A. Table 2-9 identifies Maps or Sheet Nos. where required elements are illustrated.

Table 2-9 Required Map Information

Included on Map/Plan Sheet No. [1]	Required Element
Pre-Earthwork Drawings	
All Figures	Site and project boundaries
Figure 2	Areas disturbed during geotechnical or other preconstruction investigation work
Figure 2	Existing roads and trails
Figure 2	Drainage areas
Figure 2	Discharge locations
Figure 2	Existing storm drain system if applicable
Figure 2	Proposed locations of storage areas for waste
Figure 2	Proposed locations of construction materials
Figure 2	Proposed locations of project staging areas
Figure 2	Proposed locations of stockpiles
Figure 2	Proposed locations of vehicles, equipment staging and vehicle maintenance
Figure 2	Proposed locations of loading/unloading materials
Figure 2	Proposed locations of site access (entrance/exits)
Figure 2	Proposed locations of fueling, water storage, water transfer for dust control
Figure 2	Proposed locations of demolition
Figure 2	Proposed locations of other construction support activities
Construction and Earthwork Drawing(s)	
Figures 3 and 4	Site layout (grading plans) including roads
Figures 3 and 4	Site and project boundaries
Figures 3 and 4	Drainage areas
Figures 3 and 4	Discharge locations
Figures 3 and 4	Sampling locations
Figures 3 and 4	Areas of soil disturbance (temporary or permanent)
Figures 3 and 4	Proposed active areas of soil disturbance (cut or fill)
Figures 3 and 4	Proposed locations of erosion control BMPs
Figures 3 and 4	Proposed locations of sediment control BMPs
Figures 3 and 4	Proposed locations of run-off BMPs
NA	Temporary and/or permanent run-on conveyance (if applicable)

Table 2-9 Required Map Information

Included on Map/Plan Sheet No. (1)	Required Element
NA	Proposed locations of active treatment systems(s) (if applicable)
Figures 3 and 4	Proposed locations of storage areas for waste
Figures 3 and 4	Proposed locations of construction materials
Figures 3 and 4	Proposed locations of project staging areas
Figures 3 and 4	Proposed locations of stockpiles
Figures 3 and 4	Proposed locations of vehicles, equipment and vehicle maintenance
Figures 3 and 4	Proposed locations of loading/unloading materials
Figures 3 and 4	Proposed locations of site access (entrance/exits)
Figures 3 and 4	Proposed locations of fueling, water storage, water transfer for dust control
Figures 3 and 4	Proposed locations of demolition
Figures 3 and 4	Proposed locations of other construction support activities
Figures 3 and 4	Site-specific procedures to implement final stabilization BMPs as soon as reasonably practicable

Notes: (1) Indicate maps or drawings that information is included on (e.g., Vicinity Map, Site Map, Drainage Plans, Grading Plans, Progress Maps.)

Section 3 Best Management Practices

3.1 SCHEDULE FOR BMP IMPLEMENTATION

BMPs will be implemented as per the schedule indicated in Table 3-1.

Table 3-1 BMP Implementation Schedule

	BMP	Location	Implementation	Duration
Erosion Control BMPs	EC-1, Scheduling	Entire Site	From pre-construction until final stabilization.	Entirety of Project
	EC-2, Preservation of Existing Vegetation	Areas not planned for disturbance, or that can be planned to be disturbed later to minimize disturbed soil areas.	Start of Construction of Project and prior to each disturbance of a new area.	Entirety of Project
	EC-3, Hydraulic Mulch	Areas not planned for disturbance for the next 14 days.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days.	1-3 days of initial spraying and re-applied as needed.
	EC-4, Hydroseed	Areas not planned for disturbance for the next 14 days, areas for final stabilization.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days; Final stabilization.	1-3 days of initial spraying and re-applied as needed.
	EC-5, Soil Binders	Areas not planned for disturbance for the next 14 days, inactive high dust generating areas.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days.	1-3 days of initial spraying and re-applied as needed.
	EC-6, Straw Mulch	Areas not planned for disturbance for the next 14 days.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days.	1-3 days of initial installation and re-applied as needed.
	EC-7, Geotextiles and Mats	Steep disturbed slopes, under trackout rocks, in disturbed stormwater conveyance channels.	Pre-earthwork (trackout installation), after completing grading of an area, pre-storm events, final stabilization.	As needed during on-going construction activities.
	EC-8, Wood Mulching	Areas planned for landscaping.	Final stabilization phase.	1-2 weeks.
	EC-9, Earth Dikes and Drainage Swales	At border of run-on areas or for anticipated disturbed flow concentration channels.	Prior to or early in grading phase to divert run-on. Ongoing based on QSPs during- and post-storm observations.	1-2 weeks of installation and ongoing maintenance.
	EC-10, Velocity Dissipation Devices	Designed stormwater outfalls/conveyance channels and observed temporary concentrated flow areas.	After completing construction of a new stormwater outfall. After disturbance of an existing concentrated flow channel or creation of a new channel.	1 week to install. Ongoing maintenance to remove accumulated sediment, trash, litter, etc.

Table 3-1 BMP Implementation Schedule

	BMP	Location	Implementation	Duration
	~~EC-11, Slope Drains~~	~~Designed slope drains.~~	~~After completing construction of a new drain and outfall.~~	~~1-3 weeks.~~
	~~EC-12, Streambank Stabilization~~	~~Stream banks, with applicable permits from USACE, SWRCB, and CDFW.~~	~~Prior to disturbing large upland areas that will increase stormwater discharge volume to stream.~~	~~1-2 weeks. Ongoing maintenance.~~
	EC-14, Compost Blanket	Areas not planned for disturbance for the next 14 days, final stabilization areas.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days; Final stabilization.	1-3 weeks.
	EC-15, Soil Preparation-Roughening	Areas not planned for disturbance for the next 14 days, final stabilization areas.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days; Final stabilization.	1-5 days for roughening. 1-2 weeks for soil amendments.
	EC-16, Non-Vegetative Stabilization	Areas requiring immediate stabilization, areas expected to be constantly disturbed (e.g. staging area, access routes), planned landscaping areas.	When disturbed soil areas require immediate stabilization (e.g. eroding slopes), when setting up staging area, final stabilization phase.	1 week. Ongoing maintenance.
Sediment Control BMPs	SE-1, Silt Fence	Flat areas below disturbed slopes. Site perimeter.	Prior to disturbing slopes. Prior to commencing grading (perimeter control).	1-2 weeks. Ongoing maintenance.
	~~SE-2, Sediment Basin~~	~~At designed sediment basin location for Project.~~	~~Prior to mass grading.~~	~~1-3 months. Ongoing maintenance.~~
	SE-3, Sediment Trap	Flat low areas receiving concentrated stormwater, especially prior to outfalls.	At start of grading.	1-5 days. Ongoing maintenance.
	SE-4, Check Dams	Concentrated flow channels.	Prior to upgrade land disturbance that discharges to flow channel. Immediately after disturbing flow channel.	1-2 days. Ongoing maintenance.
	SE-5, Fiber Rolls	Site/disturbed area perimeters, disturbed slope contours, around soil stockpiles.	Prior to grading of an area. Immediately after disturbing slopes. As needed around stockpiles.	1-2 weeks. Ongoing maintenance.
	SE-6, Gravel Bag Berm	Site/disturbed area perimeters, flat areas below disturbed slopes.	During Construction	1-2 days. Ongoing maintenance.
	SE-7, Street Sweeping	Internal paved site areas, off-site paved areas (site exists)	During Construction	Up-to twice per day, as needed.
	SE-8, Sandbag Barrier	Flat areas below disturbed slopes, along disturbed slope contours, stormwater diversion areas.	During Construction	1-2 days. Ongoing maintenance.

Table 3-1 BMP Implementation Schedule

	BMP	Location	Implementation	Duration
	~~SE-9, Straw Bale Barrier~~	~~Flat areas below disturbed slopes. Site perimeter.~~	~~Prior to disturbing slopes. Prior to commencing grading (perimeter control).~~	~~1-2 weeks. Ongoing maintenance.~~
	SE-10, Storm Drain Inlet Protection	Existing and new drain inlets	Prior to grading, immediately after installation of new drain inlets.	1-2 days. Frequent ongoing maintenance.
	~~SE-11, Active Treatment Systems~~	~~Per ATS plan.~~	~~Per ATS plan.~~	~~Per ATS plan.~~
	SE-12, Manufactured Linear Sediment Controls	Paved site perimeters, disturbed site perimeters, in flow channels as check structure, at flat areas below disturbed slopes.	Prior to grading and ongoing as needed.	1-2 weeks. Ongoing maintenance.
	SE-13, Compost Sock and Berm	Site/disturbed area perimeters, disturbed slope contours, drain inlets.	Prior to grading of an area. Immediately after disturbing slopes.	1-2 weeks. Ongoing maintenance.
	~~SE-14, Biofilter Bags~~	~~Areas needing immediate sediment control BMPs, including: perimeter controls, DI protections, and as a check dam.~~	~~During Construction~~	~~1 day. Ongoing maintenance and replacement.~~
Wind Erosion Control BMPs	WE-1, Wind Erosion Control	Disturbed site areas.	Every non-wet day of active construction.	2-4 times per day.
	EC-3, Hydraulic Mulch	Areas not planned for disturbance for the next 14 days.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days.	1-3 days of initial spraying and re-applied as needed.
	EC-4, Hydroseed	Areas not planned for disturbance for the next 14 days, areas for final stabilization.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days; Final stabilization.	1-3 days of initial spraying and re-applied as needed.
	EC-5, Soil Binders	Areas not planned for disturbance for the next 14 days, inactive high dust generating areas.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days.	1-3 days of initial spraying and re-applied as needed.
	EC-6, Straw Mulch	Areas not planned for disturbance for the next 14 days.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days.	1-3 days of initial installation and re-applied as needed.
	EC-15, Soil Preparation-Roughening (roughening only)	Areas not planned for disturbance for the next 14 days, final stabilization areas.	After ceasing land disturbance for an area not planned for disturbance for the next 14 days; Final stabilization.	1-5 days for roughening.

Table 3-1 BMP Implementation Schedule

	BMP	Location	Implementation	Duration
	EC-16, Non-Vegetative Stabilization	Areas requiring immediate stabilization, areas expected to be constantly disturbed (e.g. staging area, access routes), planned landscaping areas.	When frequently disturbed soil areas (e.g. staging area) is contributing to significant dust generation.	1 week. Ongoing maintenance.
Tracking Control BMPs	TC-1, Stabilized Construction Entrance and Exit	Site exits/entrances approved by landowner and relevant city, county, or Caltrans.	Start of Construction, prior to grading.	1 week. Ongoing maintenance. May be relocated for new phases.
	TC-2, Stabilized Construction Roadway	Site exits/entrances approved by QSD, landowner, and relevant city, county, or Caltrans.	Start of Construction, prior to grading.	2-3 weeks. Ongoing sweeping.
	~~TC-3, Entrance/Outlet Tire Wash~~	~~Inside site adjacent to exits/entrances.~~	~~Start of Construction, prior to grading. As needed to supplement TC-1.~~	~~2-3 weeks. Ongoing maintenance.~~
Non-Stormwater Control BMPs	NS-1, Water Conservation Practices	All potable/non-potable water sources, and water holding equipment, valves, and hoses.	During Construction	Ongoing.
	NS-2, Dewatering Operation	Site locations impacted by pooled stormwater and non-stormwater.	After rain events or other non-stormwater accumulation.	1 day of de-watering per de-watering event.
	NS-3, Paving and Grinding Operation	Areas designated or paving/grinding and paving/grinding equipment, material, and waste storage locations.	During paving/grinding operations.	From start of paving equipment arriving on-site until paving equipment has left site. During grinding operations and waste management.
	~~NS-4, Temporary Stream Crossing~~	~~Designated crossing locations, with applicable permits from USACE, SWRCB, and CDFW.~~	~~Prior to stream crossing~~	~~1-3 weeks.~~
	~~NS-5, Clear Water Diversion~~	~~Work areas in water bodies.~~	~~Prior to construction in water bodies~~	~~1-4 weeks. Ongoing maintenance.~~
	NS-6, Illicit Connection-Illegal Discharge Connection	Entire site.	During Construction	Ongoing.

Table 3-1 BMP Implementation Schedule

	BMP	Location	Implementation	Duration
	NS-7, Potable Water Irrigation Discharge Detection	All potable/non-potable water sources and equipment.	During Construction	Immediately after installing irrigation system. Ongoing.
	NS-8, Vehicle and Equipment Cleaning	Designated and designed vehicle/equipment washing location.	Prior to any on-site vehicle and equipment washing.	1-2 weeks to construct. Ongoing when washing.
	NS-9, Vehicle and Equipment Fueling	Designated fueling location.	Prior to any on-site fuel tank arriving on-site.	1 day to install. Ongoing when fueling.
	NS-10, Vehicle and Equipment Maintenance	Designated vehicle and equipment maintenance location.	Prior to any on-site vehicle and equipment maintenance.	1 day to install. Ongoing when fueling.
	~~NS-11, Pile Driving Operations~~	~~Pile driving and equipment storage locations~~	~~Prior to pile driving equipment arriving on-site~~	~~1 day to install. Ongoing.~~
	NS-12, Concrete Curing	Concrete curing compound use and storage location.	Prior to concrete curing compound arriving on-site, during use, and ongoing while storing compound on-site.	1 day to install. Ongoing.
	NS-13, Concrete Finishing	Planned concrete finishing locations.	Prior to starting concrete finishing, during use, and while material is stored on-site	1 day to install. Ongoing.
	~~NS-14, Material Over Water~~	~~Planned work areas over water, with applicable permits from USACE, SWRCB, and CDFW.~~	~~Prior to work over water and during.~~	~~Ongoing.~~
	~~NS-15, Demolition Adjacent to Water~~	~~Planned demolition areas adjacent to water~~	~~Prior to start of demolition and during.~~	~~1-5 days to install. Ongoing~~
	~~NS-16, Temporary Batch Plants~~	~~Designated temporary batch plant location.~~	~~At start of construction of temporary batch plant and ongoing during operation and storage.~~	~~Planning prior to batch plant construction and ongoing until all materials are removed from site.~~
Constructi on Material	WM-1, Material Delivery and Storage	Designated delivery and storage location.	Prior to material delivery, during delivery, and ongoing for storage.	Entirety of project
	WM-2, Material Use	Planned locations for each unique material use.	Prior to and during material use.	Entirety of project

Table 3-1 BMP Implementation Schedule

	BMP	Location	Implementation	Duration
	WM-3, Stockpile Management	Designated stockpile location and on-site soil source location.	Immediately after stockpiling materials. Prior to rain and wind events.	Entirety of project
	WM-4, Spill Prevention and Control	Entire site.	Initial spill training and ongoing.	Entirety of project
Waste Management Control BMPs	WM-5, Solid Waste Management	Designated solid waste storage locations and solid waste generating areas/activities.	Prior to generation of solid waste and during all of construction	Entirety of project
	WM-6, Hazardous Waste Management	Designated hazardous waste storage locations and hazardous waste generating areas/activities.	Prior to construction activities and during all of construction	Entirety of project
	~~WM-7, Contaminated Soil Management~~	~~Identified contaminated soil locations.~~	~~Prior to disturbance of contaminated soil areas and ongoing until disposal of hazard soil and final stabilization of hazard soil location.~~	~~Ongoing until all hazard soil is removed from site or stabilized.~~
	WM-8, Concrete Waste Management	Planned concrete, stucco, cement, and mortar use and storage locations, including wastes.	Prior to concrete, stucco, cement, and mortar use. Ongoing while storing dry materials and wastes.	Ongoing when concrete, stucco, cement, mortar, and resulting wastes are on-site.
	WM-9, Sanitary-Septic Waste Management	Designated portable outhouse storage locations.	All of construction with weekly maintenance.	Entirety of project
	WM-10, Liquid Waste Management	Designated liquid waste storage locations and liquid waste generating areas/activities.	Prior to generation of liquid waste and while liquid waste is stored/being generated on-site.	Ongoing with liquid waste stored on-site.

Erosion and sediment controls are required by the 2022 CGP to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the Site. Applicable BMPs are identified in this section for erosion control, sediment control, tracking control, and wind erosion control.

3.2.1 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles.

This construction project will implement the following practices to provide effective temporary and final erosion control during construction:

1. Preserve existing vegetation where required and when feasible.

2. The area of soil disturbing operations shall be controlled such that the Contractor is able to implement erosion control BMPs quickly and effectively.
3. Stabilize non-active areas within 14 days of cessation of construction activities or sooner if stipulated by local requirements.
4. Control erosion in concentrated flow paths by applying erosion control blankets, check dams, erosion control seeding, or alternate methods.
5. Prior to the completion of construction, apply permanent erosion control to remaining disturbed soil areas.

Sufficient erosion control materials shall be maintained onsite to allow implementation in conformance with this SWPPP.

The following erosion control BMP selection table, Table 3-2 indicates the BMPs that will be implemented to control erosion on the construction site. Fact Sheets for temporary erosion control BMPs are provided in Appendix G.

These temporary erosion control BMPs shall be implemented in conformance with the following guidelines and as outlined in the BMP Factsheets provided in Appendix G. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Table 3-2 Erosion Control BMPs

CASQA Fact Sheet	BMP Name	Considered for the Project [1]	BMP Used		If not used, state reason and alternate BMP, if applicable
			YES	NO	
EC-1	Scheduling	✓	✓		
EC-2	Preservation of Existing Vegetation	✓	✓		
EC-3	Hydraulic Mulch	✓[2]	✓		
EC-4	Hydroseed	✓[2]	✓		
EC-5	Soil Binders	✓[2]	✓		
EC-6	Straw Mulch	✓[2]	✓		
EC-7	Geotextiles and Mats	✓[2]	✓		
EC-8	Wood Mulching	✓[2]	✓		
EC-9	Earth Dike and Drainage Swales	✓[3]	✓		
EC-10	Velocity Dissipation Devices	✓[3]	✓		
EC-11	Slope Drains	✓[3]		✓	There are no outfalls to slopes that require BMP.
EC-12	Stream Bank Stabilization	✓		✓	Project does not drain to stream.
EC-14	Compost Blankets	✓[2]		✓	Not necessary for Project with mild slopes.
EC-15	Soil Preparation-Roughening	✓	✓		
EC-16	Non-Vegetated Stabilization	✓[2]	✓		
WE-1	Wind Erosion Control	✓	✓		

[1] The 2022 CGP Fact Sheet Section I.R.1.d.through I.R.1.i.describes various BMPs that should be considered for use on the construction site.
[2] The QSD shall ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the Risk Level requirements.
[3] All run-on and runoff from the construction site shall be managed for Risk Level 2 and 3 and Risk Level 1 if the evaluation of quantity and quality of run-on and runoff deems them necessary or visual inspections show that the site requires these controls. Run-on from offsite shall be directed away from all disturbed areas, diversion of offsite flows may require design/analysis by a licensed civil engineer and/or additional environmental permitting.

EC-1 Scheduling

Scheduling is a critical BMP for every Project. The contractor shall continually reevaluate and adjust the Project construction schedule by considering current and expected site conditions, the upcoming forecast, and reasonably predictable long-term weather events.

- On a macro-level, scheduling to start a Project or mass grading in months with less rainfall amounts takes no products or labor to significantly reduce would-be periods of high erosion on a Project site. The contractor shall consider the average monthly rainfall of the Project location to decide when to start mass grading for the Project. If the Contractor decides to have large areas of disturbed soil during high-rain fall periods, the Contractor shall utilize effective erosion and sediment controls to offset the higher erosion risk at the site.
- On a micro-level, scheduling additional land disturbance or use of polluting materials (asphalt concrete, concrete, stucco, painting, herbicide, fertilizer, etc.) when there is a forecast of no rain for a long period allows the contractor has time to complete the work of the Project and have time to install necessary BMPs and for polluting materials to cure, dry, stabilize, etc.. The contractor shall check the local NOAA forecast prior to disturbance of new soil areas and use of stormwater polluting materials that require time cure, dry, stabilize, etc.
- The contractor shall suspend non-emergency construction work during periods of extreme wind events over 40 MPH.
- The contractor shall minimize construction work at the job site during forecasted qualifying precipitation events as defined in the CGP and Section 7.3 of this SWPPP.

EC-2 Preservation of Existing Vegetation

The Contractor shall reduce the discharge of pollutants from the site by conserving as much of the existing vegetation as possible. If possible, vegetative buffer strips will be left adjacent to watercourses, impervious areas, drain inlets, and along the site perimeter. The purpose of minimizing the removal or injury of existing trees, vines, shrubs and grasses is that they naturally protect soil from erosion.

EC-3 Hydraulic Mulch

- The Contractor shall consider the application of hydraulic mulch to provide sediment control and temporary soil stabilization, or use an equivalently effective erosion control BMP as needed throughout the Project, and as shown in Appendix A: Site Maps, Figure 4. Hydraulic mulch may be used in the following locations:
    - On disturbed soils within the construction project limits that are not planned for disturbance for the next 14 days (CGP Appendix D Section II.D.f.).
    - On soil stockpiles

Suitable Applications

- Hydraulic Mulch is a medium-durability erosion control BMP intended for temporarily stabilizing disturbed soil areas. This BMP typically includes a soil binder similar to EC-5, but also includes mulch material (typically wood fiber) to provide soil cover in addition to binding soil particles.
- Hydraulic mulch shall be considered to be installed to flat to mild slopes of disturbed soil areas not expected to receive vehicle traffic.
- Hydraulic mulch can typically be expected to be re-installed once over a rainy season.
- Hydraulic mulch be more effective (especially on slopes) when paired with EC-15 Soil Roughening and preparation (specifically track walking or soil scarification) or SE-4 Fiber rolls on slopes.
- Hydraulic mulch is one possible erosion control BMP. Other erosion control BMP options to consider include: EC-4 Hydroseeding (temporary or permanent), EC-5 Soil Binders, EC-6 Straw Mulch, EC-7 Geotextile mats, EC-8 Wood Mulching, EC-14 Compost Blankets, EC-15 Soil

Preperation and Roughening, and/or EC-16 Non-vegetative Stabilization. The contractor shall consult with the Project QSP, QSD, and/or CASQA Construction BMP Handbook to determine the most effective erosion control BMPs for each new completed disturbed soil area that requires temporary or permanent stabilization per Section IV.O.2.d of the CGP.

Implementation

- Apply according to manufacturer recommendation.
- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking up and down the slopes.
- To be effective, hydraulic matrices require 24 hours to dry before rainfall occurs.
- May require a second application in order to remain effective for an entire rainy season.
- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Paper based hydraulic mulches alone shall not be used for erosion control.

EC-4 Hydroseed

Hydroseeding is an erosion control that typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, to temporarily or permanently protect exposed soils from erosion by water and wind.

Apply to areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

- The Contractor shall consider the application of hydroseed to provide sediment control and temporary (or permanent) soil stabilization, or use an equivalently effective erosion control BMP as needed throughout the Project, and as shown in Appendix A: Site Maps, Figure 4. Hydroseed may be used in the following locations:
    - On disturbed soils within the construction project limits that are not planned for disturbance for the next 14 days (CGP Appendix D Section II.D.f.).
    - On soil stockpiles

To select the appropriate matrix, an evaluation of site conditions shall be performed with respect to:

- Soil conditions; maintenance requirements; site topography; sensitive adjacent areas; season and climate; water availability; seed mix; and plans for permanent vegetation.
- The Contractor shall consider the use of hydroseed for temporary or permanent stabilization of areas of soil disturbed by the Project that do not have any improvements in the landscaping plans.
    - When using hydroseed, the Contractor and QSP shall consider the need to implement the additional BMPs of EC-7 Geotextile Mats, EC-Soil Preperation and roughening (for roughening and nutrient soil amendments), and SC-4 Fiber Rolls for steep slopes.
- If hydroseeding is not selected, disturbed soil areas shall achieve final stabilization by other methods including:
    - hand or drill seeding in conjunction with temporary soil cover of EC-6 Straw Mulch or EC-3 Hydraulic Mulch as needed to promote moisture needed for germination.
- Hydroseeding is one possible temporary erosion control BMP. Other temporary erosion control BMP options to consider include: EC-3 Hydro Mulch, EC-5 Soil Binders, EC-6 Straw Mulch, EC-7 Geotextile mats, EC-8 Wood Mulching, EC-14 Compost Blankets, EC-15 Soil Preperation and Roughening, and/or EC-16 Non-vegetative Stabilization. The contractor shall consult with the Project QSP, QSD, and/or CASQA Construction BMP Handbook to determine the most effective erosion control BMPs for each new completed disturbed soil area that requires temporary or permanent stabilization per CGP Appendix D Section II.D.f.

Implementation

- Avoid use of hydro-seeding in areas that would be incompatible with future earthwork activities and would have to be removed.
- Hydro-seeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydro-seeding must be used in conjunction with mulching and sediment controls on disturbed slopes.
- Hydro-seeding can be accomplished using a multiple step or one step process. The multiple step process ensures maximum direct contact of the seeds to soil. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, roughen the area to be seeded with the furrows trending along the contours.
- Apply straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained.
- Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer may be liquid, pellet or granular form.
- Follow up applications should be made as needed to cover weak spots and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

EC-5 Soil Binders

- The Contractor shall consider the application of soil binders to provide sediment control and temporary (or permanent) soil stabilization, or use an equivalently effective erosion control BMP as needed throughout the Project, and as shown in Appendix A: Site Maps, Figure 4. Soil binders may be used in the following locations:
    - On disturbed soils within the construction project limits that are not planned for disturbance for the next 14 days (CGP Appendix D Section II.D.f.).
- Soil binder is a relatively cheap and effective BMP for erosion control that can be installed quickly by the Contractor with minimal specialty equipment. Soil binder is appropriate for disturbed soil areas that will not experience vehicle traffic.
- Different soil binders should be considered for use of water erosion control and wind erosion control.
- Soil binder shall not be applied when there is any forecasted rain for the next 24-hours to prevent the discharge of pollutants from the soil binder product.
- Soil binder shall be applied according to the manufacturer's specifications.
- The Contractor and QSP shall consult with CASQA EC-5 and Appendix B of the CASQA Handbook to select an appropriate soil binder for the specific use situation of the Project and submit the proposed product to the QSD prior to use. The QSD shall respond to the Contractor within three working days (not including the day of submittal) for approval of the proposed soil binder product.
- Soil Binders is one possible erosion control BMP. Other erosion control BMP options to consider include: EC-3 Hydro Mulch, EC-4 Hydroseeding (temporary or permanent), EC-6 Straw Mulch, EC-7 Geotextile mats, EC-8 Wood Mulching, EC-14 Compost Blankets, EC-15 Soil Preperation and Roughening, and/or EC-16 Non-vegetative Stabilization. The contractor shall consult with the Project QSP, QSD, and/or CASQA Construction BMP Handbook to determine the most

effective erosion control BMPs for each new completed disturbed soil area that requires temporary or permanent stabilization per Section IV.O.2.d of the CGP.

EC-6 Straw Mulch

- The Contractor shall consider the application of straw mulch to provide sediment control and temporary (or permanent) soil stabilization, or use an equivalently effective erosion control BMP as needed throughout the Project, and as shown in Appendix A: Site Maps, Figure 4. Straw mulch may be used in the following locations:
    - On disturbed soils within the construction project limits that are not planned for disturbance for the next 14 days (CGP Appendix D Section II.D.f.).
- Straw mulch shall be considered to be installed to flat to mild slopes of disturbed soil areas not expected to receive vehicle traffic.
- The Contractor shall consider the use of straw mulch in conjunction for areas of seeding or hydroseeding to promote the growth of vegetation by improving soil moisture after seeding.
- The contractor shall only use a weed-free agricultural straw product.
- When applying straw mulch on sandy soil, the contractor shall pair straw mulch application with a soil binder. The Contractor and QSP shall consult with CASQA EC-5 and Appendix B of the CASQA Handbook to select an appropriate soil binder for the specific use situation of the Project and submit the proposed product to the QSD prior to use. The QSD shall respond to the Contractor within three working days (not including the day of submittal) for approval of the proposed soil binder product.
- If straw mulch is applied alone with no tackifier/binder, the Contractor shall at a minimum track walk over applied straw to into the soil, or use a crimper or punch roller to fully work straw into the soil. The Contractor shall plan for reapplication of straw as needed and consider the cost-benefits of working applied straw mulch into soil.
- Straw Mulch is one possible erosion control BMP. Other erosion control BMP options to consider include: EC-3 Hydro Mulch, EC-4 Hydroseeding (temporary or permanent), EC-5 Soil Binders, EC-7 Geotextile mats, EC-8 Wood Mulching, EC-14 Compost Blankets, EC-15 Soil Preperation and Roughening, and/or EC-16 Non-vegetative Stabilization. The contractor shall consult with the Project QSP, QSD, and/or CASQA Construction BMP Handbook to determine the most effective erosion control BMPs for each new completed disturbed soil area that requires temporary or permanent stabilization per Section IV.O.2.d of the CGP.

EC-7 Geotextiles and Mats

Geotextiles and mats come in a variety of materials and thicknesses for different use cases. The contractor shall different types of geotextiles for the following circumstances:

Polypropylene fabric

- Material should be a woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp); 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec–1 in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355.
- Traditional black polypropylene fabric shall be used for:
    - Lining of disturbed concentrated flow channels.
        - Soil areas shall be prepared by clearing of trash, plant material, and rocks for a smooth surface. Fabric shall be dug into the soil at top of slope, and installed with full contact to the soil to prevent stormwater from flowing under an installed mat.

        - Consider the addition of check dams per SE-4 to concentrated flow channels.
    - A reusable stockpile cover (or achieved by use of plastic tarps).
    - Underlining of trackout control rocks per TC-1.
    - Underlining of landscaping mulch materials (woodchips, gravel, decomposed granite, rip rap, etc.) temporarily installed for soil stabilization as a tool for removal or re-use of landscaped materials for the final landscaping design.
    - Immediate stabilization of disturbed slopes steeper than 3:1 (H:V) prior to rain events.
        - Disturbed slopes shall be prepared as a smooth surface by removing trash, plant material, and rocks.
        - Blanket shall be installed with overlap and staple spacing and type according to CASQA EC-7.

EC- 8 Wood Mulching

- The Contractor shall consider the use of wood mulching as an erosion control BMP to provide effective soil cover of disturbed areas that are not planned for disturbance for the next 14 days. If Wood Mulching is not selected, the Contractor shall implement an equivalent erosion control BMP for these areas throughout the Project.
- The Contractor shall consider the procuring wood chips that are a part of the landscaping design early for use as a recyclable temporary erosion control BMP throughout the Project. Disturbed soil areas needing immediate stabilization can be covered with polypropylene geotextile mats to facilitate collection of woodchips from temporary areas for re-use for the final landscaping design.
- Wood Mulching shall be used for final stabilization areas, as specified in the Project landscaping plan.
- Wood mulching shall not be used for slopes steeper than 5:1 (H:V).
- Wood mulching is one possible erosion control BMP. Other erosion control BMP options to consider include: EC-3 Hydro Mulch, EC-4 Hydroseeding (temporary or permanent), EC-5 Soil Binders, EC-6 Straw Mulch, EC-7 Geotextile mats, EC-14 Compost Blankets, EC-15 Soil Preparation and Roughening, and/or EC-16 Non-vegetative Stabilization. The contractor shall consult with the Project QSP, QSD, and/or CASQA Construction BMP Handbook to determine the most effective erosion control BMPs for each new completed disturbed soil area that requires temporary or permanent stabilization per CGP Appendix D Section II.D.f..

EC-9 Earth Dike and Drainage Swales

Earth dikes and drainage swales are erosion controls that consists of a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site and to divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another. Earth dikes and drainage swales may be used:

- To convey surface runoff down sloping land.
- To intercept and divert runoff to avoid sheet flow over sloped surfaces.
- To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel.
- To intercept runoff from paved surfaces.
- To prevent run-on to material and waste storage areas.
- Below steep grades where runoff begins to concentrate.
- Along roadways and facility improvements subject to flood drainage.

- At the top of slopes to divert run on from adjacent or undisturbed slopes.
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows.
- Divert sediment laden runoff into sediment basins or traps.

When earthen dikes and/or drainage swales are used at the Project site, the Contractor shall:

- Newly graded slopes should be protected from erosion by runoff.
- Carefully size and locate earth dikes, drainage swales.
- Excessively steep, unlined dikes and swales are subject to erosion and gully formation.
- Use a lined ditch for high flow velocities.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earthen Dikes

The Contractor shall Review civil drawings for specifications and construct earth dikes according to the specifications in the approved plan. Generally temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin (SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.

Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. Plastic sheeting may be used to line the dike however it has a short useful life and may need to be replaced more frequently. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain. If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	**Riprap Stabilization**
0.5%-1.0%	4 in Rock
1.1-2.0%	6 in Rock
2.1-4.0%	8 in Rock
4.1-5.0%	8 in – 12 in Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth or plastic sheeting may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual or approved civil drawings). Unless approved civil drawings or local drainage design criteria state otherwise, drainage swales should be designed as follows:

- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft.
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 percent, but not more than 15 percent.
- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.
- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 percent and use riprap or sod for swales with a slope between 5 and 15 percent. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing.
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

EC-10 Velocity Dissipation Devices

The Contractor shall reduce the discharge of pollutants from the site by construction and maintenance of velocity dissipation devices in disturbed concentrated stormwater conveyance channels and/or channels expected to convey turbid stormwater from disturbed areas. The purpose of velocity dissipations to prevent scour of the soil caused by concentrated, height velocity flows. This project will use rip rap, gravel bags, etc. to construct the velocity dissipation devices along concentrated stormwater flow paths with expected turbid runoff.

EC-16 Non-Vegetated Stabilization

- The Contractor shall consider the application of non-vegetative stabilization to provide sediment control and temporary (or permanent) soil stabilization, or use an equivalently effective erosion control BMP as needed throughout the Project, and as shown in Appendix A: Site Maps, Figure 4. Non-vegetative stabilization may be used in the following locations:
    - On disturbed soils within the construction project limits that are not planned for disturbance for the next 14 days (CGP Appendix D Section II.D.f.).
    - As specified in the Project plans.
- The purpose of non-vegetative stabilization methods is to provide exposed soils temporary or permanent stabilization from wind and water erosion.
- This project will use gravel, decomposed granite, rip-rap, etc. applied at 3”-4” in depth to areas identified in the Project landscaping plans and shown in Appendix A: Site Maps, Figures 4
- Non-vegetative Stabilization is possible erosion control BMP, with other options including: EC-3 Hydro Mulch, EC-4 Hydroseeding (temporary or permanent), EC-5 Soil Binders, EC-6 Straw Mulch, EC-7 Geotextile mats, EC-8 Wood Mulching, EC-14 Compost Blankets, and/or EC-15 Soil Preperation and Roughening. The contractor shall consult with the Project QSP, QSD, and/or CASQA Construction BMP Handbook to determine the most effective erosion control BMPs for

each new completed disturbed soil area that requires temporary or permanent stabilization per Section IV.O.2.d of the CGP.

WE-1 Wind Erosion Control

- The Contractor shall prevent dust nuisance generated from construction activities on the site by applying water and/or soil binder on exposed soil surfaces.
    - When selecting soil binder for wind erosion control, the contractor will refer to the BMP narrative for EC-5 Soil Binder above and the CASQA BMP Fact Sheet in Appendix G.
- The contractor will prevent the discharge of sediment by wind erosion in accordance with the San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII for fugitive dust control.
- Wind erosion control will be implemented in accordance to water conservation practices (see NS-1 found in Appendix G) as directed by the QSP.

3.2.2 Sediment Controls

Sediment controls are temporary or permanent structural measures that are intended to complement the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.

The following sediment control BMP selection table indicates the BMPs that will be implemented to control sediment on the construction site. Fact Sheets for temporary sediment control BMPs are provided in Appendix G.

These temporary sediment control BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix G. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Table 3-3 Temporary Sediment Control BMPs

CASQA Fact Sheet	BMP Name	Considered for the Project [1]	BMP used		If not used, state reason and alternate BMP, if applicable
			YES	NO	
SE-1	Silt Fence	✓[2] [3]	✓		
SE-2	Sediment Basin	✓		✓	Using sediment basin for Project excessively expensive. Cheaper sediment controls will be effective.
SE-3	Sediment Trap	✓	✓		
SE-4	Check Dams	✓		✓	No pervious flow channels to use BMP.
SE-5	Fiber Rolls	✓[2][3]	✓		
SE-6	Gravel Bag Berm	✓[3]	✓		
SE-7	Street Sweeping	✓	✓		
SE-8	Sandbag Barrier	✓	✓		
SE-9	Straw Bale Barrier	✓		✓	Excessive costs. Other linear sediment controls will be just as effective.
SE-10	Storm Drain Inlet Protection	✓ RL2&3	✓		
SE-11	ATS	✓		✓	Excessively expensive and challenging to implement.
SE-12	Manufactured Linear Sediment Controls	✓	✓		
SE-13	Compost Sock and Berm	✓[3]	✓		
SE-14	Biofilter Bags	✓[3]		✓	Not as durable or effective as Gravel Bags.
NA	Passive Treatment System	✓		✓	Excessively expensive and challenging to implement.
TC-1	Stabilized Construction Entrance and Exit	✓	✓		
TC-2	Stabilized Construction Roadway	✓	✓		
TC-3	Entrance Outlet Tire Wash	✓		✓	Excessively expensive and challenging to implement.

[1] The 2022 CGPs Fact Sheet Section I.R.1.d through I.R.1.i describes various BMPs that should be considered for use on the construction site.
[2] The QSD shall ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the Risk Level requirements.
[3] All run-on and runoff from the construction site shall be managed. Risk Level 2 and 3 shall provide linear sediment control along toe of slope, face of slope, and at the grade breaks of exposed slope.

EC-1 Silt Fence

- The QSP and Contractor shall consider the use of silt fence as a perimeter sediment control to comply with Section II.E.1.a of the CGP. If selected, the Contractor shall:
    - Install the silt fence in accordance with guidance shown in the CASQA Handbook Appendix G, and this BMP narrative section.
- If silt fence is not selected as a perimeter sediment control, the Contractor shall select and implement one of the following alternate BMPs: EC-5 Fiber Rolls, EC-6 Gravel Bag Berm, EC-12 Manufactured Linear Sediment Controls, and/or EC-13 Compost Socks.
- The Contractor shall maintain silt fence by repairing sagging, leaning, and holes. The Contractor shall maintain silt fence by removing accumulated sediment after rain events.

Materials

- Silt fence fabric should be woven polypropylene with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec-1 and 0.15 sec-I in conformance with the requirements in ASTM designation D4491.
- 2" X 2" wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.
- There are new products that may use prefabricated plastic holders for the silt fence and use bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement.

Implementation

- Trench and key in the bottom of the silt fence at a minimum of 12 in folded towards the direction of anticipated flow. Firmly compact backfilled material.
- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where a silt fence is determined to be not practicable due to specific site conditions, the silt fence may be constructed at the toe of the slope but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and difficult to maintain.
- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- Do not install silt fence as a perimeter control along slopes.
- Do not install silt fence at locations of anticipated concentrated flow.
- Always install silt fence along a level contour. Not doing so will divert and concentrate stormwater and create erosion.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence

EC-3 Sediment Trap

- The QSP and Contractor shall consider the use of sediment trap(s) for the Project at low site locations near stormwater discharge locations (site perimeters or drain inlets) to provide effective sediment control. If selected, the Contractor shall:
    - Install an appropriately sized sediment trap to temporarily contain stormwater from the anticipated run-on area,
    - Not use sediment traps for run-on areas larger than five acres.
    - Be used in conjunction with polypropylene fabrics per EC-7 and rip-rap per EC-16 to stabilize the designed outfall structure from scouring caused by concentrated discharge flow.
- The Contractor shall install sediment trap(s) as a form of drain inlet protection for drain inlets in disturbed drainage areas greater than one acre, where feasible based on site layout. Sediment traps are the most effective sediment control to remove sediment from high flows while preventing regional flooding.
- If the Contractor chooses not to implement sediment trap(s), the Contractor shall install and maintain effective sediment controls including: EC-1 Silt Fence, EC-5 Fiber Rolls, EC-6 Gravel Bag Berm, EC-12 Manufactured Linear Sediment Controls, and/or EC-13 Compost Socks.

EC-5 Fiber Rolls

- The QSP and Contractor shall consider the use of fiber rolls as a perimeter sediment control to comply with Section II.E.1.a of the CGP. If selected:
    - The Contractor shall install fiber rolls shown in Appendix A: Site Map, Figures 2 through 4 to site perimeters prior to commencing grading.
    - Fiber rolls are not appropriate as the only BMP at a site and shall be used in conjunction with other erosion and sediment control measures to reduce pollutant discharges.
    - Fiber rolls shall be installed with “j-hooks” upgrade to prevent stormwater from flowing around the fiber roll.
    - Fiber rolls shall be maintained by the contractor to ensure effective sediment control. The exact location of fiber rolls will be determined in the field by the QSP.
    - Fiber rolls must be secured (staked) to the ground in a trench that is ¼ to 1/3 of the thickness of the roll, with a width the same diameter as the as the roll.
    - Fiber rolls used on this project will be eight to twelve inches in diameter unless the QSP specifies otherwise.
    - The Contractor shall repair or replace fiber rolls that are split, torn, unraveling or slumping.
- If fiber rolls are not selected as a perimeter sediment control, the Contractor shall select and implement one of the following alternate BMPs: EC-1 Silt Fence, EC-6 Gravel Bag Berm, EC-12 Manufactured Linear Sediment Controls, and/or EC-13 Compost Socks.
- The Contractor shall not use fiber rolls as drain inlet protection.

EC-6 Gravel Bag Berm

- Gravel bag berms are typically more expensive and labor intensive than alternate linear sediment controls like fiber rolls and compost socks. Gravel bag berms (as well as compost socks) provide a more porous linear control that filters sediment and other pollutants out of stormwater where fiber rolls do not.
- The QSP and Contractor shall consider the use of gravel bag berms as a perimeter sediment control to comply with Section II.E.1.a of the CGP. If selected:

- The Contractor shall gravel bag berms shown in Appendix A: Site Map, Figures 2 through 4 to site perimeters prior to commencing grading.
- Gravel bag berms are not appropriate as the only BMP at a site and shall be used in conjunction with other erosion and sediment control measures to reduce pollutant discharges.
- Gravel bag berms shall be installed with "j-hooks" upgrade to prevent stormwater from flowing around the fiber roll.
- Gravel bag berms shall be maintained by the contractor to ensure effective sediment control. The exact location of fiber rolls will be determined in the field by the QSP.
- Fiber rolls must be secured (staked) to the ground in a trench that is ¼ to 1/3 of the thickness of the roll, with a width the same diameter as the as the roll.
- The Contractor shall size each gravel bag berm (height, width, shape) in accordance with EC-6 in the CASQA BMP Handbook found in Appendix G.
- The Contractor shall repair or replace gravel bags that are split, torn, or unraveling and remove any spilled gravel.

EC-7 Street Sweeping and Vacuuming

- The Contractor shall reduce the discharge of pollutants from the Project site by:
  - Sweeping and /or vacuuming the streets and roadways adjacent to the Project site. The Project site and off-site exits shall be inspected daily for track out.
  - Sweeping sediment observed on internal site pavement that drains to drain inlets or off-site areas prior to rain events.
  - Sweeping and/or vacuum the streets and roadways adjacent to the Project site in accordance with SJVAPCD's Regulation VIII on fugitive dust control.
- The Contractor shall limit speed of vehicles to control dust.

EC-8 Sandbag Barrier

- The Contractor shall use sandbag barriers as a BMP to:
  - Divert stormwater away from disturbed soil areas,
  - Divert stormwater away from steeper disturbed slopes,
  - Divert stormwater in a way that reduces drainage areas and resulting downgrade stormwater flow concentration,
  - As an optional material for use of constructing a sediment trap.
- The Contractor shall not install a linear sandbag barrier on a slope except along the slope contour.
- The Contractor shall replace damaged sandbags and remove any lost material.
- The Contractor shall use a pyramid approach when stacking sand bags, and follow the berm sizing (height, width, shape) listed in Appendix G: CASQA BMP Handbook.

EC-10 Storm Drain Inlet Protection

- Storm drain inlet protection will be used at all operational internal inlets to the storm drain system as shown on Appendix A: Site Map, Figures 2 through 4, and in accordance with the BMP Manual. Additional locations may be required based on actual field conditions/observations and such locations will be determined by the QSP.
- Inlets will be protected from stormwater discharge with the use of gravel bag berms, gravel bag j-weirs in gutters, sediment traps, silt fence, and/or pre-manufactured storm drain inlet inserts for drain inlet protections.

- Silt fence shall be the primary choice of drain inlet protection **where/when feasible**. Silt fence as a drain inlet protection shall be installed according to EC-10 in the CASQA BMP Handbook, found in Appendix G. Conditions that will require the use of silt fence for the Project include:
    - When storm drain inlets are located in a pervious surrounding that provides an area that will allow stormwater to pool without resulting in flooding that will cause a public hazard or property damage.
- Gravel bag berms and pre-manufactured storm drain inlet inserts shall be the secondary choice of drain inlet protections.
    - Gravel bag berms shall be sized to be up to 24" tall in a pyramid shape, but shorter if too high of a gravel bag berm would cause undesirable diversion of stormwater.
- Gravel bag j-weirs shall be placed in **all** gutters expected to convey turbid stormwater from disturbed site areas. The Contractor shall install two to three sets of gravel bag j-weirs along gutters where the j-weir spans the width of the concrete gutter and the length is at least three times as long as the width. The QSP shall determine the exact location and arrangement of j-weirs.
- Sediment traps shall be installed adjacent to drain inlets anticipated to receive stormwater from an area greater than approximately 1 acre, when feasible based on site layout.

- All storm drain inlet protections shall be inspected after rain events and maintained by removing accumulated sediment, re-arranging of materials, replacement of materials, etc.. Sediment traps shall be maintained after rain events to remove accumulated sediment to ensure deposited sediment is not resuspended into stormwater.
- Filter fabric shall not be used as a drain inlet protection.

EC-12 Manufactured Linear Sediment Controls

- The QSP and Contractor shall consider the use of manufactured linear sediment controls (MLSCs) as a substitute to EC-1 Silt Fence, EC-5 Fiber Rolls, EC-8 Gravel Bag Barrier, and EC-9 Sandbag Barrier. MCLSs come in a variety of products and should be considered for the following reasons:
    - Providing perimeter controls on pavement.
    - As a more re-usable perimeter control than fiber rolls and silt fence.
- The Contractor shall install any MLCSs according to the manufacturer's specification.

EC-13 Compost Sock and Berm

- The QSP and Contractor shall consider the use of compost socks and/or berms as a perimeter sediment control to comply with Section II.E.1.a of the CGP. If selected:
    - The Contractor shall install compost socks and/or berms as shown in Appendix A: Site Map, Figures 2 through 4 to site perimeters prior to commencing grading.
    - Compost socks and/or berms are not appropriate as the only BMP at a site and shall be used in conjunction with other erosion and sediment control measures to reduce pollutant discharges.
    - Compost socks and/or berms shall be installed with "j-hooks" upgrade to prevent stormwater from flowing around the compost socks and/or berms.
    - Compost socks and/or berms shall be maintained by the contractor to ensure effective sediment control. The exact location of compost socks and/or berms will be determined in the field by the QSP.
    - Compost socks shall not be punctured with stakes. Compost socks typically do not need to be secured with stakes or placed in trenches due to their weight.
    - The Contractor shall repair or replace compost socks and/or berms that are split, torn, unraveling or slumping.

- If compost socks and/or berms are not selected as a perimeter sediment control, the Contractor shall select and implement one of the following alternate BMPs: EC-1 Silt Fence, EC-5 Fiber Rolls, EC-6 Gravel Bag Berm, and/or EC-12 Manufactured Linear Sediment Controls.
- The QSP and Contractor shall consider the use of compost socks and/or berms for areas of slopes with expected high sheet flow amounts due to their filtering properties.
- The QSP and Contractor shall consider the use of compost socks and/or berms for slopes that are planned for vegetation establishment for final stabilization due to their ability to provide nutrients to soil.
- The Contractor shall not use compost socks as drain inlet protection due to their risk of discharging nutrients.
- The Contactor shall source compost and other materials in accordance with the guidance in Appendix G: CASQA BMP Factsheet.

TC-1 Stabilized Construction Entrance and Exit

- The Contractor shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent off-site tracking of sediment. A stabilized construction entrance is a pad of rip-rap underlain with polypropylene fabric. Stabilized Construction Entrance/Exits shall be implemented where existing pavement meets exposed disturbed soil areas of the project, as shown in Exhibit A: Site Maps, Figures 2 through 4, or in an equivalent location approved by the QSP, landowner, and any relevant City, County, or other right-of-way owners.
- The Contractor shall limit speed of vehicles to control dust. Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment. Remove aggregate, separate and dispose of sediment when construction entrance becomes clogged with sediment.

TC- 2 Stabilized Construction Roadway

The Contractor shall utilize the existing or new 100+ ft of pavement within the Project site as a stabilized construction exit for removing sediment from construction vehicles from the site, as shown in Appendix A: Site Maps, Figures 2 through 4. The Contractor shall monitor this exit throughout the day and sweep the pavement of sediment immediately if sediment has accumulated on the pavement and is contributing to airborne dust.

3.3 NON-STORMWATER CONTROLS AND WASTE AND MATERIALS MANAGEMENT

3.3.1 Non-Stormwater Controls

Non-stormwater discharges into storm drainage systems or waterways which are not authorized under the 2022 CGP are prohibited. Non-stormwater discharges for which a separate NPDES permit is required by the local Regional Water Board are prohibited unless coverage under the separate NPDES permit has been obtained for the discharge. The selection of non-stormwater BMPs is based on the list of construction activities with a potential for non-stormwater discharges identified in Section 2.7 of this SWPPP.

The following non-stormwater control BMP selection table indicates the BMPs that will be implemented to control sediment on the construction site. Fact Sheets for temporary non-stormwater control BMPs are provided in Appendix G.

Non-stormwater BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix G. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in

the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Table 3-4 Temporary Non-Stormwater BMPs

CASQA Fact Sheet	BMP Name	Considered for the Project [1]	BMP used		If not used, state reason and alternate BMP, if applicable
			YES	NO	
NS-1	Water Conservation Practices	✓	✓		
NS-2	Dewatering Operation	✓	✓		
NS-3	Paving and Grinding Operation	✓	✓		
NS-4	Temporary Stream Crossing	✓		✓	No stream crossings.
NS-5	Clear Water Diversion	✓		✓	No water diversions.
NS-6	Illicit Connection/Discharge	✓	✓		
NS-7	Potable Water/Irrigation	✓	✓		
NS-8	Vehicle and Equipment Cleaning	✓	✓		
NS-9	Vehicle and Equipment Fueling	✓	✓		
NS-10	Vehicle and Equipment Maintenance	✓	✓		
NS-11	Pile Driving Operation	✓		✓	No pile driving.
NS-12	Concrete Curing	✓	✓		
NS-13	Concrete Finishing	✓	✓		
NS-14	Material and Equipment Use Over Water	✓		✓	No equipment over water.
NS-15	Demolition Removal Adjacent to Water	✓		✓	No demolition adjacent to water.
NS-16	Temporary Batch Plants	✓		✓	No temporary batch plant.

[1] The 2022 CGP Fact Sheet Section I.R.1.d through I.R.1.i describes various BMPs that should be considered for use on the construction site.

NS-1 Water Conservation Practices

Water conservation practices are a non-stormwater discharge management measure that consists of activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Generally, the Contractor shall:

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Use nozzles on hoses that shut off when not in use.
- Washing of vehicles and equipment on the construction site is prohibited unless an emergency.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.
- Install sediment and erosion control measures to non-stormwater use areas as needed if there is the potential to cause erosion or scour.
- Repair water equipment as needed to prevent unintended discharges, including but not limited to:
    - Water trucks
    - Water reservoirs (water buffalos)
    - Irrigation systems
    - Hydrant/water source connections

NS-2 Dewatering Operation

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation must be removed from a work location so that construction work may be accomplished. Non-stormwater includes, but is not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area.

These practices are implemented for discharges of non-stormwater from construction sites. Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (stormwater) from depressed areas at a construction site. Stormwater mixed with non-stormwater should be managed as non-stormwater.

- Dewatering non stormwater cannot be discharged without prior notice to and approval from the RWQCB and local stormwater management agency. This includes stormwater that is co-mingled

with groundwater or other non-stormwater sources. Once the discharge is allowed, appropriate BMPs must be implemented to ensure the discharge complies with all permit requirements and regional and watershed specific requirements.

- RWQCB may require a separate NPDES permit prior to the dewatering discharge of non-stormwater. These permits will have specific testing, monitoring, and discharge requirements and can take significant time to obtain.
- The QSP will coordinate monitoring and permit compliance.
- Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges must not cause erosion at the discharge point.
- The QSP and Contractor shall review the CASQA BMP Factsheet in Appendix G to determine the appropriate equipment needed to conduct off-site dewatering operations in a manor that prevents the violation of water quality standards. One or more of the following equipment shall considered for use:
    - Weir tanks, dewatering tanks, gravity bag filter, sand media particulate filter, and pressurized bag filter.

NS-3 Paving and Grinding Operation

The Contractor shall prevent or reduce the discharge of pollutants from paving operations, using measures to prevent run-on and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

These procedures shall be implemented where paving, surfacing, resurfacing, or saw cutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

- **Avoid paving during the wet season when feasible.**
- **Reschedule paving and grinding activities if rain is in the forecast.**
- Store materials away from drainage courses to prevent stormwater run-on (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. Materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC and AC waste should be in conformance with WM-8, Concrete Waste Management.

Saw cutting, grinding, and pavement removal

- The Contractor shall shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to prevent any discharge of slurry.
- When paving involves AC, the Contractor shall follow the following steps prevent the discharge of grinding residue, un-compacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
    - AC grindings, pieces, or chunks used in embankments or shoulder backing must not be allowed to enter any storm drains or watercourses. This shall be accomplished by the use of effective sediment control BMPs.

    - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt must be recycled or disposed.

- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations shall be picked up by means of a vacuum attachment to the grinding machine, shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Dig out activities should not be conducted in the rain.
- Collect dig out material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.
- If dig out material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
- Old asphalt must be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to aggregate base stockpile or dispose of properly.
- Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if allowed by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate must not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized.
- Drainage inlet structures and manholes shall be covered with filter fabric during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or manufacturer's specified curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use.
- Clean up spills with absorbent materials rather than burying. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks, and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.

NS- 6 Illicit Connection/Discharge

This is a non-stormwater management control that includes procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

This BMP applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered, or illegally dumped material is found on the construction site.

- The QSP and Contractor shall review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- The QSP shall inspect the site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions.
- Unlabeled and unidentifiable material should be treated as hazardous.
- **Solids -** Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids -** signs of illegal liquid dumping or discharge can include:
    - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils,
    - Pungent odors coming from the drainage systems,
    - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes,
    - Abnormal water flow during the dry weather season.
- **Urban Areas -** Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
    - Abnormal water flow during the dry weather season,
    - Unusual flows in sub drain systems used for dewatering,
    - Pungent odors coming from the drainage systems,
    - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes,
    - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects.
- **Rural Areas -** Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include: - Abnormal water flow during the non-irrigation season - Non-standard junction structures - Broken concrete or other disturbances at or near junction structures
- **Cleanup and Removal -** The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the Project proponent and local stormwater management agency for further information.

NS-7 Potable Water/Irrigation

This is a non-stormwater management control for potable water/irrigation that consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation

water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Implement this BMP whenever potable water or irrigation water discharges occur to or from a construction site.

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.
- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

NS-8 Vehicle and Equipment Cleaning

- The Contractor shall not clean vehicles or equipment with water and/or soaps on-site. The Contractor shall wash all equipment off-site (with the exception of concrete truck washout).
- The Contractor shall use dry cleaning methods (rags) for cleaning equipment of grease and residues. Used rags shall be stored in watertight containers for re-use or disposed of as hazardous waste.
- If equipment must be washed with water on-site, the Contractor shall follow the proceedures outlined in Appendix G: CASQA BMP Handbook.

NS-9 Vehicle and Equipment Fueling

Vehicle and equipment fueling procedures and practices are designed to prevent fuel spills and leaks and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel and implementing spill controls.

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

- Onsite vehicle and equipment fueling shall only be used where it is impractical to send vehicles and equipment offsite for fueling.
- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage “topping-off” of fuel tanks.
- Absorbent spill cleanup materials and spill kits shall be available in fueling areas and on fueling trucks, and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.

- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- When fueling must take place onsite, designate an area away from drainage courses to be used.
- Dedicated fueling areas shall be protected from stormwater run-on and run-off, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent run-on, run-off, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by the SJVAPCD.
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks

NS-10 Vehicle and Equipment Maintenance

This is a non-stormwater management measure used to prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair.

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must be done onsite, use designated areas, located away from drainage courses.
- Dedicated maintenance areas should be protected from storm water run-on and run-off and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Look for leaks of fluids or oil from vehicles and equipment, at start up and repair immediately or place out of service with drip pans of buckets to contain the leaked material. Properly dispose of leaked material

- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.

NS-12 Concrete Curing

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. Proper procedures reduce or eliminate the contamination of stormwater runoff during concrete curing.

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

- For chemical concrete curing:
    - Avoid over spray of curing compounds.
    - Minimize the drift of chemical cure as much as possible by applying the curing compound close to the concrete surface.
    - Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.
    - Use proper storage and handling techniques for concrete curing compounds. Refer to WM- 1, Material Delivery and Storage.
    - Protect drain inlets prior to the application of curing compounds.
    - Refer to WM-4, Spill Prevention and Control.
- For water concrete curing:
    - Direct cure water away from inlets and watercourses to collection areas for infiltration or other means of removal in accordance with all applicable permits.
    - Collect cure water at the top of slopes and transport or dispose of water in a non-erodible manner.
    - Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

NS-13 Concrete Finishing

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate non stormwater management measures can minimize the impact that concrete finishing methods may have on stormwater and non-stormwater discharges.

These procedures apply to all construction locations where concrete finishing operations are performed.

- Divert blasting water to a collection/containment area.
- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering).
- Protect inlets during sandblasting operations.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

3.3.2 Materials Management and Waste Management

Materials management control practices consist of implementing procedural and structural BMPs for handling, storing, and using construction materials to prevent the release of those materials into stormwater discharges. The amount and type of construction materials to be utilized at the Site will depend upon the type of construction and the length of the construction period. The materials may be used continuously, such as fuel for vehicles and equipment, or the materials may be used for a discrete period, such as soil binders for temporary stabilization.

Waste management consist of implementing procedural and structural BMPs for handling, storing, and ensuring proper disposal of wastes to prevent the release of those wastes into stormwater discharges.

Materials and waste management pollution control BMPs will be implemented to minimize stormwater contact with construction materials, wastes, and service areas; and to prevent materials and wastes from being discharged off-site. The primary mechanisms for stormwater contact that shall be addressed include:

- Direct contact with precipitation
- Contact with stormwater run-on and runoff
- Wind dispersion of loose materials
- Direct discharge to the storm drain system through spills or dumping
- Extended contact with some materials and wastes, such as asphalt cold mix and treated wood products, which can leach pollutants into stormwater.

A list of construction activities is provided in Section 2.6. The following Materials and Waste Management BMP selection table, Table 3-5, indicates the BMPs that shall be implemented to handle materials and control construction site wastes associated with these construction activities. Fact Sheets for Materials and Waste Management BMPs are provided in Appendix G.

Material management BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix G. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Table 3-5 Temporary Materials Management BMPs

CASQA Fact Sheet	BMP Name	Considered for Project [1]	BMP used		If not used, state reason and alternate BMP, if applicable
			YES	NO	
WM-01	Material Delivery and Storage	✓	✓		
WM-02	Material Use	✓	✓		
WM-03	Stockpile Management	✓	✓		
WM-04	Spill Prevention and Control	✓	✓		
WM-05	Solid Waste Management	✓	✓		
WM-06	Hazardous Waste Management	✓	✓		
WM-07	Contaminated Soil Management			✓	There is no identified contaminated soil at the Project site.
WM-08	Concrete Waste Management	✓	✓		
WM-09	Sanitary-Septic Waste Management	✓	✓		
WM-10	Liquid Waste Management	✓	✓		

[1] The 2022 CGP Fact Sheet Section I.R.1.d through I.R.1.i describes various BMPs that should be considered for use on the construction site.

WM-1 Material Delivery and Storage

This waste management and pollution control measure is used to prevent, reduce, or eliminate the discharge of pollutants by minimizing the storage of hazardous materials on site, storing materials in a designated area, installing secondary containment, and conducting regular inspections.

Material delivery and storage control measures apply to soil stabilizers and binders; Pesticides and herbicides; Fertilizers; Detergents; Plaster, Petroleum products such as fuel, oil, and grease; Asphalt and concrete components; Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds; Concrete compounds; and other materials that may be detrimental if released to the environment.

Delivery & Storage

- Generally, construction materials should be stored off the ground, under cover, and, in temporary containment areas in certain cases.
- Material Safety Data Sheets (MSDS) shall be available for all materials stored on-site in the on-site job trailer.
- Designate areas on site for material delivery and storage areas.
- Material delivery and storage areas shall be located near the construction entrances, away from drainage areas, watercourses, and heavy traffic areas if possible.
- Place containment areas in an area which will be paved if possible.
- Install a stabilized entrance at the entrance to the storage area if vehicles or equipment will enter from a paved surface to an unpaved storage area.
- Stockpiles shall be protected in accordance with WM-3, Stockpile Management.
- Materials shall be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced as soon as possible.
- Materials should be stored indoors within existing structures or sheds when available. If this is not feasible, materials shall be covered by a fully secured impervious tarp.
- If stored outside, cover and store liquids, chemicals, boxed materials, drums, and materials with the potential to migrate during a storm on pallets, away from water courses and in secondary containment such as earthen dikes, horse troughs, or even a children's wading pool or "bus boy trays" for non-reactive materials such as detergents, oil, grease, and paints.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be placed in temporary secondary containment facilities for storage.

Containment Facility

- A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility shall be impervious to the materials stored for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.

- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Throughout the rainy season, each temporary containment facility shall be covered during nonworking days, prior to, and during rain events.

Hazardous or Regulated Materials

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Chemicals should be kept in their original labeled containers.
- An ample supply of appropriate spill clean-up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous materials.
- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. See WM-7, Contaminated Soil Management in Appendix G: CASQA BMP Handbook. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.

Spills

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7,
- Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

WM-2 Material Use

This waste management and materials pollution control is implemented to prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products if available, and minimizing hazardous material uses onsite.

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides,
- Fertilizers,
- Detergents,
- Petroleum products such as fuel, oil, and grease,
- Asphalt and other concrete components,
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds,
- Other materials that may be detrimental if released to the environment.

The following steps should be taken to minimize risk of stormwater pollution from material use:

- Reduce and minimize use of hazardous materials onsite when practical.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals. Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioner's license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed.
- Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydro seeding. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains.
- Keep Material Safety Data Sheets (MSDS) for all materials on site.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint in a containment area. Never clean paintbrushes or rinse pain containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or other lined liquid waste container.
- For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, nontreated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible.
- Keep an ample supply of spill clean-up material near use areas.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

WM-3 Stockpile Management

Stockpile management procedures and practices is a waste management and materials pollution control Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Implement in all stockpiles of soil and other loose materials.

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect all stockpiles from stormwater run on using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, sandbag, or gravel bags.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.

- All stockpiles are required to be protected immediately if they are not scheduled to be used within 14 days.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.
- Stockpiles of concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, and aggregate sub base shall be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of polluting materials

- Asphalt cold mix, fly ash, stucco, and hydrated lime stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.
- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff

WM-4 Spill Prevention and Control

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees. This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see WM-5 Liquid Waste Management and WM-10 solid Waste Management.

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals
- Fuels
- Lubricants
- Other petroleum distillates

Implementation

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, and substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater run-on during rainfall to the extent that it doesn't compromise clean-up activities.
- Do not bury or wash spills with water.
- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well-organized, and equipped with ample clean supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See WM-5 Waste Management and WM-7 contaminated soils in this section for specific information.
- Report all spills to the Project QSP immediately. A spill may trigger stormwater sampling for non-visible pollutants.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled at the discovery of the spill.
- Contain the spread of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Notify the project foreman immediately.
- Recover spilled materials.
- Clean the contaminated area and properly dispose of contaminated materials.

- If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
- If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
- If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities. Spills should be cleaned up immediately.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
    - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper City or County officials. All emergency phone numbers will be posted at the construction site.
    - Contact the site superintendent. For spills of federal reportable quantities, (examples are listed below) in conformance with the requirements in 40 CFR parts 110,119, and 302, the site superintendent will notify the National Response Center at (800) 424-8802. The superintendent will notify the Regional Water Quality Control Board and any other applicable agencies.
- The services of a spill contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
- Notification should first be made by telephone and followed up with a written report.
- Other agencies which may need to be consulted include, but are not limited to, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Sampling

- If there is evidence that the spilled material was discharged offsite, follow the appropriate sampling protocol (stormwater, non-stormwater or non-visible discharges) located in the CSMP.

Vehicle and Equipment Maintenance

- If maintenance must be performed onsite, use a designated area and secondary containment, located away from drainage courses, to prevent the run on of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.

- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around.
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must be performed onsite, designate areas located away from drainage courses to prevent the run on of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Typical Reportable Quantities for Construction Sites

Material	**Released to**	**Quantity**
Engine Oil, Fuel Hydraulic & Brake Fluid	Land	25 Gallons
Engine Oil, Fuel Hydraulic & Brake Fluid	Water	Visible Sheen
Gasoline	Land or Water	32 Gallons
Anti-Freeze	Land or Water	5000 lbs (539 Gallons)
Engine Degreaser	Land or Water	100 lbs (10 Gallons)

WM-5 Solid Waste Management

Solid waste management procedures and practices are a waste management and pollution control designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Provide an adequate number of containers for the amount of trash that will be generated from the site with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Trash receptacles with lids shall be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Solid waste storage areas should be located away from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Stormwater run-on shall be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Collect site trash daily, especially during rainy and windy conditions and cover receptacles at the end of each business day or while not in use.

- Collected litter and debris should not be stored next to inlets, drainage systems, or watercourses.
- Waste containers, dumpsters, & trash receptacles must be covered at the end of the work day and in the event of rain or significant wind.
- Arrange for regular waste collection before containers overflow.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines shall be a priority.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Clean up immediately if a waste container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal facilities.
- Littering on the project site is prohibited.

WM-6 Hazardous Waste Management

This hazardous waste management measure is a waster management and pollution control measure that applies to all construction projects to prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of associates and subcontractors.

Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products, Asphalt Products, Concrete Curing Compounds, Pesticides, Palliatives, Acids, Septic Wastes, Paints, Stains, Solvents, Wood Preservatives, Roofing Tar and any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302.

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Implementation

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers shall be stored in temporary containment facilities that comply with the following requirements:
    - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
    - Minimize production or generation of hazardous materials and hazardous waste on the job site.

    - Use containment berms in fueling and maintenance areas and where the potential for spills is high.
    - Segregate potentially hazardous waste from non-hazardous construction site debris.
    - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
    - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
    - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
    - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
    - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
    - Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
    - Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.
    - Drums should not be overfilled, and wastes should not be mixed.
    - Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil-based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. “Paint out” brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
    - Place hazardous waste containers in secondary containment.
    - Do not allow potentially hazardous waste materials to accumulate on the ground.
    - Do not mix wastes.
    - Use the entire product before disposing of the container.

- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

WM-8 Concrete Waste Management

The use of concrete waste managing measures including, concrete washouts, are wase management and pollution controls that prevent or reduce the discharge of pollutants to stormwater from concrete waste products conducting washout offsite or onsite in a designated area.

Suitable Applications

Concrete waste management procedures and practices shall be implemented on the Project where:

- Concrete is used as a construction material or where concrete dust and debris results from demolition activities.
- Slurries containing Portland cement concrete or asphalt concrete are generated, such as from saw cutting, coring, grinding, grinding, and hydro-concrete demolition.
- Concrete trucks and other concrete coated equipment area washed on site.
- Mortar-mixing stations and equipment.

Implementation

- Concrete washout containers shall consist of water tight plastic tubs over a bermed liner for secondary containment that accommodates access by concrete trucks.
- Arrange for pumping or accumulated slurry/water capacity is 75%.
- Place downstream as far as possible from storm drains, open ditches, and waterbodies.
- Place in a location that allows convenient access for concrete trucks, preferably near the area where concrete is being poured.
- Place far from construction traffic to reduce the likelihood of damage.
- The size and number of concrete washout facilities shall be appropriate for the anticipated amount of concrete waste.
- To prevent leaks, use prefabricated concrete washout containers that are watertight.
- Store dry and wet materials under cover and away from drainage areas.
- Avoid mixing of excess amounts of fresh concrete.
- Perform washout of concrete trucks offsite or in designated washout areas.
- Do not wash out concrete trucks into the soils, into storm drains, open ditches, streets, or water bodies.
- Do not dump excess concrete on non-designated concrete waste areas.

Concrete Slurry Wastes

- Residue from grinding operations should be picked up by means of vacuum attachment.
- Saw cutting residue shall not be allowed to flow across pavement and should not be left on the surface of pavement. See NS-3 Paving and Grinding Operations.
- Slurry residue should be vacuumed and disposed in a temporary put. Dispose of dry slurry residue in accordance with solid waste management WM-5.

WM-9 Sanitary-Septic Waste Management

Proper sanitary and septic waste management are waste management and material pollution controls that prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, an arranging for regular service and disposal.

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Implementation

- Shall be located away from drainage facilities, watercourses, and from traffic circulation.
- Provide a sufficient quantity of facilities to accommodate the workforce.
- Ensure containment of sanitation facilities to prevent discharge of pollutants to the stormwater drainage system or the receiving water.
- When subjected to high winds or risk of high winds, temporary sanitary facilities shall be secured to prevent overturning.
- Sanitary facilities should be located in a convenient location.
- Sanitary or septic wastes shall be treated or disposed of in accordance with state and local requirements.
- Sanitary facilities shall be maintained in good working order by a licensed service.

- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- Do not discharge or bury sanitary waste within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.

WM-10 Liquid Waste Management

Liquid waste management is a waste management and materials pollution control that includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes

Liquid waste management is applicable to construction projects that generate any of the following nonhazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids.
- Grease-free and oil-free wastewater and rinse water.
- Dredgings.
- Other non-stormwater liquid discharges not permitted by separate permits.

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or concrete slurry residue (WM-8, Concrete Waste Management).
- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire-fighting activities.

Implementation

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredge material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.
- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.
- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

3.4 TMDL-RELATED BMPS

There are no required TMDL-related BMPs for the Project since the Project does not discharge to a water body with TMDLs.

3.5 POST CONSTRUCTION STORMWATER MANAGEMENT MEASURES

Post construction BMPs are permanent measures installed during construction, designed to reduce or eliminate pollutant discharges from the site after construction is completed.

This site is subject to the post-construction requirements of an existing NPDES Phase I or Phase II MS4. ☒ Yes ☐ No

The post construction runoff reduction requirements have been satisfied through the City of Mendota MS4 program, this project is exempt from 2022 CGP Provision IV.N.3. The MS4's post construction requirements and the post-construction plans and calculations approved by the MS4 were uploaded as part of the PRDs as required by 2022 CGP Provision IV.N.2. The approved Long-Term Maintenance Plan will be uploaded with the NOT.

Section 4 BMP Inspection and Maintenance

4.1 BMP INSPECTION AND MAINTENANCE

The 2022 CGP requires routine weekly inspections of BMPs, along with inspections before, during, and after qualifying precipitation events. A BMP inspection checklist must be filled out for inspections and maintained on-site with the SWPPP. The inspection checklist must include the necessary information covered in Section 7.6. A blank BMP Inspection Form can be found in Appendix H. Completed forms will be kept in Appendix N.

Maintenance, repair, or design and implementation of new BMPs alternatives will be begin withing 72 hours of the identification of failures or other shortcomings. Corrections will be completed as soon as possible, prior to the next forecasted precipitation event (2022 CGP Appendix D Section II.J).

The QSP will verify that all BMP maintenance and repairs were appropriately implemented during the next visual inspection following completion.

The QSP may delegate BMP maintenance and repair verification to an appropriately trained QSP Delegate.

Specific details for maintenance, inspection, and repair of Construction Site BMPs can be found in the BMP Factsheets in Appendix G.

Section 5 Training

Appendix J identifies the QSPs and QSP Delegates for the project. To promote stormwater management awareness specific for this project, periodic training of job-site personnel will be included as part of routine project meetings (e.g., daily/weekly tailgate safety meetings), or task specific training as needed. Refresher training will be provided as necessary.

The QSP will be responsible for providing this information at the meetings, and subsequently completing the Training Reporting Form shown in Appendix I, which identify the site-specific stormwater topics covered as well as the names of site personnel who attended the meeting.

The QSP may delegate specific tasks to trained QSP Delegates who have received the following training based on the guidelines developed by the Construction General Permit Training Team.

1. **Foundational training** for all QSP Delegate(s) regarding stormwater compliance roles and responsibilities, forecast information, and documentation and reporting procedures; and
2. **Site-specific training** regarding visual inspections, sampling procedures, and/or SWPPP and BMP implementation activities relevant to the responsibilities assigned to the QSP Delegate(s).

The delegate cannot perform the QSD and QSP inspections required in Section V.C.4 or Section V.D.2, respectively.

Documentation of training activities will be retained in Appendix I.

Section 6 Responsible Parties and Operators

6.1 RESPONSIBLE PARTIES

DAR(s) who are responsible for SWPPP implementation and have authority to sign permit-related documents are listed below. The DAR(s) assigned to this project are:

Name	Title	Phone Number
Jose Alcaide	Signatory of the LRP	559-655-4942

QSD(s) identified for the project are identified in Appendix J. The QSD will have primary responsibility for assessing how construction activities will affect sediment transport, erosion, and other discharges of pollutants in stormwater runoff throughout the project. The QSD is required to revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations. The QSD is required to perform the following on-site visual inspections:

- Within 30 days of construction activities commencing on site;
- Within 30 days when a new QSD is assigned to the project;
- Twice annually, once August through October and once January through March;
- Within 14 calendar days after a numeric action level exceedance; and
- Within the time period requested in writing from Regional Water Board staff.

QSPs and QSP Delegates identified for the project are identified in Appendix J. The QSP will have primary responsibility and significant authority for the implementation, maintenance, and inspection/monitoring of SWPPP requirements. The QSP will be available at all times throughout the duration of the project.

Duties of the QSP include but are not limited to:

- Implementing all elements of the 2022 CGP and SWPPP, including, but not limited to:
    - Performing the following on-site visual inspections:
        - One inspection per calendar month; other weekly inspections in the month can be delegated to a trained QSP Delegate under the specific direction of the QSP.
        - Within 72 hours prior to a forecasted qualifying precipitation event, to inspect any areas of concern and to verify the status of any deficient BMPs, or other identified issues at the site. If extended forecast precipitation data (greater than 72 hours) is available from the *National Weather Service*, then the Pre-Precipitation Event inspection may be done up to 120 hours in advance.
        - Within 14 days after a NAL exceedance, the QSP shall visually inspect the drainage area for exceedance and document any areas of concern.
        - Prior to the submittal for the NOT or COI (for acreage changes) for all or part of the site.

- Ensuring that all BMPs are implemented, inspected, and properly maintained;
- Ensure that the SMARTS generated WDID Number Notification form is posted on-site, in a location viewable by the public or readily available upon request, and the dates are correct and match the dates listed in SMARTS.

- Implementing non-stormwater management, and materials and waste management activities such as: monitoring discharges; general Site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems, etc.;
- Ensuring elimination of unauthorized discharges.
- The QSPs shall be assigned authority by the LRP to mobilize crews in order to make immediate repairs to the control measures.
- Coordinate with the Contractor(s) to assure the necessary corrections/repairs are made immediately and that the project complies with the SWPPP, the 2022 CGP, and approved plans at all times.
- Notifying the LRP or Duly Authorized Representative immediately of off-site discharges or other non-compliance events.
- Providing foundation and site-specific training to QSP Delegates and overseeing QSP Delegate work. Tasks that may be delegated to appropriately trained QSP-delegates include:
  - Performing non-stormwater and stormwater visual observations and inspections;
  - Performing stormwater sampling and analysis, as required; and
  - Performing routine inspections and observations.

Table 6-1. QSP and QSP Delegate Authorized Inspections

	Weekly BMP and NSW	Pre-QPE	Daily-QPE Visual Inspections	Post-QPE Visual Inspections	Post NAL Exceedances	Monthly BMP and NSW	NOT
QSP	X	X	X	X	X	X	X
QSP Delegate	X		X	X			

6.2 CONTRACTOR LIST

Contractor Name:	TBD, Contractor information will be added via COI once known.
Title:	
Contractor Company:	
Address	
Phone Number:	
Phone Number (24/7)	

Section 7 Construction Site Monitoring Program

7.1 Purpose

This Construction Site Monitoring Program was developed to address the following objectives:

1. To demonstrate that the site is in compliance with the Discharge Prohibitions.
2. To determine whether non-visible pollutants discharged from the construction site and are causing or contributing to exceedances of water quality objectives;
3. To determine whether immediate corrective actions, additional BMP implementation, or SWPPP revisions are necessary to reduce pollutants in stormwater discharges and authorized non-stormwater discharges;
4. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in stormwater discharges and authorized non-stormwater discharges.

7.2 Applicability of Permit Requirements

This project has been determined to be a Risk Level 1 project. The 2022 CGP identifies the following types of monitoring as being applicable for a Risk Level 1 project.

Risk Level 1

- Visual inspections of BMPs;
- Visual monitoring of the site related to qualifying precipitation events;
- Visual monitoring of the site for non-stormwater discharges;
- Sampling and analysis of construction site runoff for non-visible pollutants identified during the pollutant source assessments when applicable; and
- Sampling and analysis of construction site runoff as required by the Regional Water Board when applicable.

7.3. Weather and Precipitation Event Tracking

Visual monitoring and inspections requirements of the 2022 CGP are triggered by a Qualifying Precipitation Event. The 2022 CGP defines a Qualifying Precipitation Event as any weather pattern that is forecast to have a 50 percent or greater Probability of Precipitation (PoP) and a Quantitative Precipitation Forecast (QPF) of 0.5 inches or more within a 24-hour period. The event begins with the 24-hour period when 0.5 inches has been forecast and continues on subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast.

7.3.1 Weather Tracking

The QSP should daily consult the National Oceanographic and Atmospheric Administration (NOAA) for the Forecast Weather Table Interface. These forecasts can be obtained at http://forecast.weather.gov. Weather reports should be printed and maintained with the SWPPP in Appendix M. Record the date and time the forecast was printed.

7.3.2 Rain Gauges

The QSP shall install a rain gauge on the project site. Locate the gauge in an open area away from obstructions such as trees or overhangs. Mount the gauge on a post at a height of 3 to 5 feet with the gauge extending several inches beyond the post. Make sure that the top of the

gauge is level. Make sure the post is not in an area where rainwater can indirectly splash from sheds, equipment, trailers, etc.

The rain gauge(s) shall be read daily during normal site scheduled hours by the Contractor. The rain gauge should be read at approximately the same time every day and the date and time of each reading recorded. An example rain gauge log sheet is provided in Appendix O. Retain rain gauge readings in Appendix N. Follow the rain gauge instructions to obtain accurate measurements.

Once the rain gauge reading has been recorded, accumulated rain shall be emptied, and the gauge reset.

For comparison with the site rain gauge, the nearest appropriate governmental rain gauge(s) is located at the staging area shown in Appendix A: Site Maps, Figures 2-4.

7.4 Monitoring Locations

Monitoring locations are shown on the Site Maps in Appendix A. Monitoring locations are described in the Sections 7.6 and 7.7.

Whenever changes in the construction site might affect the appropriateness of sampling locations, the sampling locations shall be revised accordingly. All such revisions shall be implemented as soon as feasible and the SWPPP amended. Temporary changes that result in a one-time additional sampling location do not require a SWPPP amendment.

7.5 Safety and Monitoring Exemptions

Safety practices for sample collection will be in accordance with the Contractor's Project health and safety plan. A summary of the safety requirements that apply to sampling personnel is provided below.

- Wear all required PPE at all times.
- Be careful of slips, trips, and falls during wet site conditions.

This project is not required to collect samples or conduct visual observations (inspections) under the following conditions (see Section III.B of the 2022 CGP):

- During dangerous weather conditions such as electrical storms, flooding, and high winds above 40 miles per hour;
- Outside of scheduled site operating hours; or

When the site is not accessible to personnel. Scheduled site business hours are: 7 am – 5 pm, M-F

If monitoring (visual monitoring or sample collection) of the site is unsafe because of the dangerous conditions noted above, then the QSP shall document the conditions for why an exception to performing the monitoring was necessary. The exemption documentation will be filed in Appendix N and must be included in the Annual Report.

7.6 Visual Monitoring

Visual monitoring includes observations and inspections. Inspections of BMPs are required to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Visual observations of the site are required to observe storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources.

Table 7-1 identifies the required frequency of visual observations and inspections. Inspections and observations will be conducted at the locations identified in Section 7.6.3.

Table 7-1 Summary of Visual Monitoring and Inspections

Type of Inspection	Frequency
Routine Inspections[1]	
Site Entrances/Exits	Daily
Hazardous Material/Waste storage areas	Daily
BMP Inspections	Weekly[2]
Qualifying Precipitation Event Triggered Inspections	
Site Inspections Prior to a Qualifying Precipitation Event	Within 72 hours of a qualifying precipitation event or up to 120 hours prior if supported with forecast [2]
BMP Inspections During an Extended Qualifying Precipitation Event	Once every 24-hour period of a qualifying precipitation event[3]
Site Inspections Following a Qualifying Precipitation Event	Within 96 hours of a qualifying precipitation event[2]

[1] Inspections are required during scheduled site operating hours.

[2] Most BMPs must be inspected weekly; those identified below must be inspected more frequently.

[3] Inspections are required during scheduled site operating hours on days that the forecast predicts at least 0.25 inches of precipitation once the qualifying precipitation event commences.

7.6.1 Routine Observations and Inspections

Routine site inspections and visual monitoring are necessary to confirm that the project is in compliance with the requirements of the 2022 CGP.

7.6.1.1 Routine BMP Inspections

Inspections of BMPs are conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.

7.6.1.2 Non-Stormwater Discharge Observations

Each drainage area will be inspected for the presence of or indications of prior unauthorized and authorized non-stormwater discharges. Inspections will record:

- Presence or evidence of any non-stormwater discharge (authorized or unauthorized);
- Identification and elimination of unauthorized non-stormwater discharges
- Pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.); and
- Source of discharge.

7.6.2 Qualifying Precipitation Event Triggered Observations and Inspections

Visual observations of the site and inspections of BMPs are required prior to a qualifying precipitation event; following a qualifying precipitation event, and every 24-hour period during a qualifying precipitation event. Pre-Qualifying Precipitation Event inspections will be conducted after consulting NOAA and determining that a precipitation event with a 50 percent or greater PoP and a QPF of 0.5 inches or more precipitation within a 24-hour period has been predicted by the National Weather Service Forecast Office.

7.6.2.1 Visual Observations Prior to a Forecasted Qualifying Precipitation Event

Within 72 hours prior to a qualifying precipitation event or up to 120 hours prior if extended forecast precipitation data is available, a stormwater visual monitoring site inspection will include observations of the following locations:

- All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions.
- All BMPs to identify whether they have been properly implemented per the SWPPP and implement appropriate corrective actions, as necessary.
- All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.

The QSP must conduct the inspection prior to the qualifying precipitation event. Consistent with the requirements for a qualifying precipitation event, pre-rain BMP inspections and visual monitoring will be triggered by a NOAA forecast that indicates a 50 percent or greater probability of 0.5 inches of precipitation or more in a 24-hour period in the project area.

7.6.2.2 BMP Inspections During a Qualifying Precipitation Event

During an extended qualifying precipitation event BMP inspections will be conducted at least once every 24 hours. Qualifying precipitation events are extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation. The BMP inspections are to identify and record:

- If BMPs were adequately designed, implemented and effective.
- BMPs that require repair or replacement due to damage.
- Additional BMPs that need to be implemented and revise the SWPPP accordingly.

If the construction site is not accessible during the rain event, the visual inspections shall be performed at all relevant outfalls, discharge points, downstream locations. The inspections should record any projected maintenance activities.

7.6.2.3 Visual Observations Following a Qualifying Precipitation Event

Within 96 hours following the end of a qualifying precipitation event a stormwater visual monitoring site inspection is required to observe:

- If BMPs were adequately designed, implemented and effective.
- BMPs that require repair or replacement due to damage.
- Additional BMPs that need to be implemented and revise the SWPPP accordingly.

7.6.3 Visual Monitoring Procedures

Visual monitoring shall be conducted by the QSP or QSP Delegates.

The name(s) and contact number(s) of the QSPs or QSP Delegates assigned to conduct visual observations are listed below and their training qualifications are provided in Appendix J.

Assigned QSP:	TBD. To be updated via COI	Phone #:
Assigned QSP Delegate:		Phone #:
Assigned QSP Delegate:		Phone #:

Stormwater observations shall be documented on the *Visual Inspection Field Log Sheet* (see Appendix O). BMP inspections shall be documented on the site-specific BMP inspection checklist and include photographs of areas of concern along with the QSP's description of the problem.

The QSP shall within 24 hours of the inspection submit copies of the completed inspection report to the Contractor.

The QSP shall be responsible for keeping a digital record of visual monitoring inspections, and shall provide their records to the QSD or Landowner upon request.

The completed reports will be kept in Appendix N. Results of visual monitoring must be summarized and reported in the Annual Report.

7.6.4 Visual Monitoring Follow-Up and Reporting

Maintenance, repairs, and correction of deficiencies, including design changes to BMPs, identified by the observations or inspections, including required repairs or maintenance of BMPs, shall be initiated within 72 hours of identification and completed as soon as possible, prior to the next forecasted precipitation event.

When design changes to BMPs are required, the SWPPP shall be amended to reflect the changes.

Deficiencies identified in site inspection reports and correction of deficiencies will be tracked on the *Inspection Field Log Sheet* or *BMP Inspection Report* shall be kept in Appendix N. QSP Delegates shall report issues identified during inspections that require corrective action to the QSP within 24 hours of the observation.

The QSP shall within 24 hours of the inspection submit copies of the completed *Inspection Field Log Sheet* or *BMP Inspection Report* with the corrective actions to the Contractor.

The QSP shall be responsible for keeping a digital record of visual monitoring inspections, and shall provide their records to the QSD or Landowner upon request.

Results of visual monitoring must be summarized and reported in the Annual Report.

7.6.5 Visual Monitoring and Sampling Locations

The inspections and observations identified in Sections 7.6.1 and 7.6.2 will be conducted at the locations identified in this section.

BMP locations are shown on the Site Maps in Appendix A.

Due to grading activities and the installation of new surface or underground stormwater conveyance systems, drainage areas and associated discharge/sampling locations of the Project site will change throughout construction. The SWPPP identifies three main conditions for pre-earthwork, earthwork, and construction/post-stormwater conveyance system construction for the purposes of identifying the main drainage areas and associated discharge/sampling

locations of the Project for monitoring. These three main drainage conditions are presented in Site Maps in Appendix A.

The QSP and trained Delegates shall use the drainage conditions presented in Site Maps in Appendix A as a guide for understanding site drainage and then field verify the accurate drainage areas and discharge/sampling locations during the event of a release of a non-visible pollutant based on their observations of the current drainage conditions at the site.

The number of drainage areas and associated discharge/sampling locations that have a potential to discharge non-visible pollutants from anticipated construction activities and known soil conditions are summarized below:

Pre-earthwork Site Condition:

There is a total of ten drainage areas. Zero drainage areas are planned for landscaping activities that could contribute non-visible pollutants from soil amendments and herbicide application. Zero drainage areas area identified with contaminated soil by historic usage of the site. Zero drainage areas and associated discharge/sampling locations could be impacted from run-on that could combine with discharges from the site being sampled for non-visible pollutants. Run-on sampling locations for these drainage areas are identified to determine if run-on to sampling locations are a source of non-project related non-visible pollutants.

Zero sampling location has been identified for the collection of an uncontaminated sample of runoff as a background sample for comparison with the samples being analyzed for non-visible pollutants. These locations will be selected within the same sampled drainage area by the QSP such that the sample will not have come in contact with the operations, activities, or areas identified in Section 7.7.1 or with disturbed soils areas.

Earthwork Site Condition:

There is a total of nine (9) drainage areas. Zero drainage areas are planned for landscaping activities that could contribute non-visible pollutants from soil amendments and herbicide application. Zero drainage areas area identified with contaminated soil by historic usage of the site. Zero drainage areas and associated discharge/sampling locations could be impacted from run-on that could combine with discharges from the site being sampled for non-visible pollutants. Run-on sampling locations for these drainage areas are identified to determine if run-on to sampling locations are a source of non-project related non-visible pollutants.

Zero sampling location has been identified for the collection of an uncontaminated sample of runoff as a background sample for comparison with the samples being analyzed for non-visible pollutants. These locations will be selected within the same sampled drainage area by the QSP such that the sample will not have come in contact with the operations, activities, or areas identified in Section 7.7.1 or with disturbed soils areas.

Construction/Post-stormwater System Construction Site Condition:

There is a total of 18 drainage areas. A total of 12 of drainage areas are planned for landscaping activities that could contribute non-visible pollutants from soil amendments and herbicide application. Zero drainage areas area identified with contaminated soil by historic usage of the site. Zero drainage areas and associated discharge/sampling locations could be impacted from run-on that could combine with discharges from the site being sampled for non-visible pollutants. Run-on sampling locations for these drainage areas are identified to determine if run-on to sampling locations are a source of non-project related non-visible pollutants.

Zero sampling location has been identified for the collection of an uncontaminated sample of runoff as a background sample for comparison with the samples being analyzed for non-visible pollutants. These locations will be selected within the same sampled drainage area by the QSP such that the sample will not have come in contact with the operations, activities, or areas identified in Section 7.7.1 or with disturbed soils areas.

Details of the three main drainage conditions summarizing, drainage areas and associated discharge locations, and sampling locations are presented in Table 7-2 below.

Table 7-2 Drainage Areas, Discharge Locations, and Non-Visible Pollutant Sample Locations

Pre-Earthwork Site Condition				
Sample Location Identifier	**Drainage Area Location/Description**	**Discharge/Sample Location Description**	**Sample Lat/Long** (Decimal Degrees)	**Runoff or Run-on**
SL 1	DA01: Southeast sidewalk and pavement	Southeast parking lot curb 1	(36.766996, -120.380683)	Runoff
SL 2	DA02: Southeast parking lot sidewalk and curb	Southeast parking lot curb 2	36.767154, -120.380799)	Runoff
SL 3	DA03: Southeast parking lot, planter, and east portable classroom building	Valley gutter in southeast parking lot	(36.767381, -120.380853)	Runoff
SL 4	DA04: Northeast basketball courts, paved walkways, and west portable classroom	Existing drain inlet west of portable classroom	(36.767341, -120.381357)	Runoff
SL 5	DA05: Southwest planter and pavement	East edge of planter	(36.767080, -120.381262)	Runoff
SL 6	DA06: West AC pavement	West AC pavement	(36.767140, -120.381472)	Runoff
SL 7	DA07: Northwest basketball courts	Perimeter of site near basketball courts	(36.767333, -120.381436)	Runoff
SL 8	DA08: Northwest Vegetated Field	Northwest corner of AC paved area	(36.767451, -120.381894)	Runoff
SL 9	DA09: Northwest corner of site	Existing drain inlet in northwest paved area	(36.767516, -120.382116)	Runoff
SL 10	DA10: North vegetated field	East edge of north vegetated field.	(36.767887, -120.381028)	Runoff
Earthwork Site Condition				
Sample Location Identifier	**Drainage Area Location/Description**	**Discharge/Sample Location Description**	**Sample Lat/Long** (Decimal Degrees	**Runoff or Run-on**
SL 1	DA01: Southeast parking lot pavement, sidewalk, & curb 1	Southeast parking lot curb	(36.766996, -120.380683)	Runoff

SL 2	DA02: Southeast parking lot pavement, sidewalk, & curb 2	Valley gutter in southeast parking lot	(36.767381, -120.380853)	Runoff
SL 3	DA03: West asphalt pavement area	West asphalt pavement area site perimeter	(36.767333, -120.381436)	Runoff
SL 4	DA04: Southwest planter and pavement	East edge of planter	(36.767080, -120.381262)	Runoff
SL 5	DA05: Southwest asphalt pavement	Southwest AC pavement	(36.767140, -120.381472)	Runoff
SL 6	DA06: South building foundation area	Southwest of building foundations	(36.767356, -120.381566)	Runoff
SL 7	DA07: North building foundation area	Northwest project perimeter	(36.767688, -120.381808)	Runoff
SL 8	DA08: Northwest corner of site	Existing drain inlet in northwest paved area	(36.767516, -120.382116)	Runoff
SL 9	DA09: North vegetated field & Staging Area	Southeast Corner of staging Area	(36.767887, -120.381028)	Runoff
SL 10	DA10: East building foundation area	Northeast of construction entrance	(36.767781, -120.380957)	Runoff
Construction/Post-Stormwater System Site Condition				
Sample Location Identifier	**Drainage Area Location/Description**	**Discharge/Sample Location Description**	**Sample Lat/Long** (Decimal Degrees	**Runoff or Run-on**
SL 1	DA01: Southeast parking lot pavement, sidewalk, & curb	Southeast parking lot curb	(36.766996, -120.380683)	Runoff
SL 2	DA02: Southeast parking lot pavement, sidewalk, curb, & planter	Valley gutter in southeast parking lot	(36.767381, -120.380853)	Runoff
SL 3	DA03: South planter & pavement	Drain inlet north of planters	(36.767370, -120.381246)	Runoff
SL 4	DA04: West pavement & planter	Site perimeter west of planters	(36.767300, -120.381381)	Runoff
SL 5	DA05: Southwest planter and pavement	East edge of planter	(36.767080, -120.381262)	Runoff
SL 6	DA06: West AC pavement	West AC pavement	(36.767140, -120.381472)	Runoff

SL 7	DA07: Southwest pavement	New drain inlet in southeast pavement area	(36.767354, -120.381309)	Runoff
SL 8	DA08: East building foundation area & northeast planter	Northeast of construction entrance	(36.767781, -120.380957)	Runoff
SL 9	DA09: Building foundation & planter area 1	New drain inlet in building foundation & planter area 1	(36.767463, -120.381299)	Runoff
SL 10	DA10: Building foundation & planter area 2	New drain inlet in building foundation & planter area 2	(36.767525, -120.381324)	Runoff
SL 11	DA11: Building foundation & planter area 3	New drain inlet in building foundation & planter area 3	(36.767489, -120.381481)	Runoff
SL 12	DA12: Building foundation & planter area 4	New drain inlet in building foundation & planter area 4	(36.767408, -120.381460)	Runoff
SL 13	DA13: West building foundation area & pavement	Drain inlet west of building foundation area	(36.767545, -120.381652)	Runoff
SL 14	DA14: Northwest asphalt pavement area	North edge of asphalt pavement	(36.767688, -120.381808)	Runoff
SL 15	DA15: Northwest corner of site	Drain inlet in northwest paved area	(36.767516, -120.382116)	Runoff
SL 16	DA16: Northwest of building foundation area	Drain inlet northwest of building foundation area	(36.767678, -120.381586)	Runoff
SL 17	DA17: Northeast of building foundation area	Drain inlet northeast of building foundation area	(36.767709, -120.381405)	Runoff
SL 18	DA18: North vegetated field	Southeast Corner of field	(36.767887, -120.381028)	Runoff

Stormwater storage or containment area(s) that may be dewatered or discharge after heavy rainfall are shown on the Site Maps in Appendix A and listed in Table 7-3 below for each site condition.

Table 7-3 Stormwater Storage and Containment Areas (Dewatering Locations)

Pre-Earthwork Site Condition	
Location No.	**Location**
	None
Earthwork Site Condition	
	None
Construction/Post-Stormwater System Site Condition	
	None

7.7 Sampling and Analysis Plan for Non-Visible Pollutants in Stormwater Runoff Discharges

This Sampling and Analysis Plan for Non-Visible Pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater runoff discharges from the project site.

Sampling for non-visible pollutants, including those associated with TMDLs, will be conducted when (1) a breach, leakage, malfunction, or spill is observed; and (2) the leak or spill has not been cleaned up prior to the rain event; and (3) there is the potential for discharge of non-visible pollutants to surface waters or drainage system.

The QSP and trained Delegates are responsible for completing the following non-visible pollutant monitoring requirements:

- The QSP and trained Delegates shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would be visually detectable in storm water;
- The QSP and trained Delegates is not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event;
- The QSP and trained Delegates shall ensure that water samples are large enough to characterize the site conditions;
- The QSP and trained Delegates shall collect samples at all discharge locations that can be safely accessed;
- The QSP and trained Delegates shall collect samples during the first two hours of discharge from rain events that occur during business hours which generate runoff;
- The QSP and trained Delegates shall analyze samples for the non-visible pollutant parameters, if applicable (see the list of parameters identified in Table 7-5 – Potential

Non-Visible Pollutants and Water Quality Indicator Constituents Based on the Pollutant Source Assessment);

- The QSP and trained Delegates shall collect a sample of storm water that has not come in contact with the disturbed soil or materials stored or used onsite (uncontaminated sample) for comparison with the discharge sample;
- The QSP and trained Delegates shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis;
- For laboratory analyses, all sampling sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. SCE shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specifications; and
- The QSP and trained Delegates shall keep all field/or analytical data with the SWPPP document.

Table 7-4 summarizes the potential non-visible pollutants identified in the pollutant source assessment Sections 2.6 and 2.7 and the water quality constituent or indicator for that pollutant. Drainage areas for each site condition and associated discharge/sampling locations are identified in Table 7-2 and shown in the Site Maps in Appendix A.

Table 7-4 Potential Non-Visible Pollutants and Water Quality Indicator Constituents Based on the Pollutant Source Assessment

Pollutant	Water Quality Indicator or Constituent	Source/Reason from Pollutant Source Assessment	TMDL Pollutant	Pre-Grading Site Drainage Area	Earth-work Site Drainage Area	Post-Grading Site Drainage Area
PCBs (from demolished structures from 1950-1980)	PCBs	Building Demolition	No	3, 4	3, 4	None
Lead Paint	Pb	Building Demolition	No	None	None	None
Gypsum / Lime amendments	pH	Grading / Earthwork	No	None	All	None
Contaminated soil	Constituents specific to known contaminants, check with Laboratory	Grading / Earthwork	No	None	None	None
Sealant (Methyl methacrylate)	SVOC	Concrete Masonry Work	No	None	None	1-13, 18
Curing compounds	VOCs, SVOCs, pH	Concrete Masonry Work	No	None	None	1-13, 18
Ash, slag, sand	pH, Al, Ca, Va, Zn	Concrete Masonry Work	No	None	None	1-13, 18
Treated Wood	Cu, CR, As, Zn	Carpentry Work	No	None	None	8-13, 18
Particle Board	Formaldehyde	Carpentry Work	No	None	None	8-13, 18
Untreated Wood	BOD	Carpentry Work	No	None	None	8-13, 18
Drywall	Cu, Al, CA, VA, Zn	Building Construction	No	None	None	8-13, 18
Solder, flux, pipe fitting	Cu, Pb, Sn, Sn	Plumbing	No	None	None	2-5, 7-12, 18
Roofing Compound	Cu, Pb, VOC	Roofing	No	None	None	8-13, 18
Insulation	Al, Zn	Insulation	No	None	None	8-13, 18
Resins, Thinners, Paint Strippers, Lacquers, varnishes, enamels, Sealants, Adhesives	COD, SVOCs, VOCs, Metals, Phenols	Painting	No	None	None	1-13, 18
Chlorinated water	Residual Chlorine, Chloramines	Utility Line Testing and Flushing	No	None	None	2-5, 7-12
Pesticides/ Herbicides	Product dependent, see label and check with Laboratory	Vegetation Management	No	None	None	2-5, 8-12,, 16-18
Vegetation Stockpiles	BOD	Vegetation Management	No	10	9	18
Fertilizers	TKN, NO_3, BOD, COD, DOC, Sulfate,	Landscaping	No	None	None	2-5, 8-12,, 16-18

Table 7-4 Potential Non-Visible Pollutants and Water Quality Indicator Constituents Based on the Pollutant Source Assessment

Pollutant	Water Quality Indicator or Constituent	Source/Reason from Pollutant Source Assessment	TMDL Pollutant	Pre-Grading Site Drainage Area	Earth-work Site Drainage Area	Post-Grading Site Drainage Area
	NH_3, Phosphate Potassium					
Aluminum Sulfate	AL, TDS, Sulfate	Landscaping/soil amendments	No	None	None	2-5, 8-12, 16-18
Liquid Waste	Constituents specific to materials, check with Laboratory	Liquid Waste	No	All	All	All
Sewer line breaks and Portable Toilets	BOD, Total/Fecal coliform	Sanitary Waste	No	10	9	2-5, 7-12, 18
Polymer/Co-polymers	TKN, NO_3, BOD, COD, DOC, Sulfate, Ni	Soil Preparation / Amendments / Dust Control	No	None	All	All
Lignin sulfate	TDS, Alkalinity	Soil Amendments/ Dust Control	No	None	All	All
Psyllium	COD, TOC	Soil Amendments/ Dust Control	No	None	All	All
Guar/Plant Gums	COD, TOC, Ni	Soil Amendments/ Dust Control	No	None	All	All
Batteries	Sulfuric Acid, Pb, pH	Vehicle and Equipment Use	No	All	All	All
Freon	Freon	Heating, Ventilation, Air Conditions	No	All	All	All

7.7.1 Sampling Schedule

Samples for the potential non-visible pollutant(s) and a sufficiently large unaffected background sample shall be collected during the first eight hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples shall be collected during the site's scheduled hours and shall be collected regardless of the time of year and phase of the construction.

Collection of discharge samples for non-visible pollutant monitoring will be triggered only when any of the following conditions are observed during site inspections conducted prior to or during a rain event.

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) protected by temporary cover and containment that prevents stormwater contact and runoff from the storage area.

- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- A construction activity, including but not limited to those in Section 2.6, with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) BMPs were observed to be breached, malfunctioning, or improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- Stormwater runoff from an area contaminated by historical usage of the site has been observed to combine with stormwater runoff from the site, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.

7.7.2 Sampling Locations

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence or use, accessibility for sampling, and personnel safety. Planned non-visible pollutant sampling locations are shown on the Site Maps in Appendix A and include in the locations identified in Table 7-2 above.

If a stormwater visual monitoring site inspection conducted prior to or during a storm event identifies the presence of a material storage, waste storage, operations area with spills, or the potential for the discharge of non-visible pollutants to surface waters or a storm drain system that is at a location not listed above and has not been identified on the Site Maps, sampling locations will be selected by the QSP using the same rationale as that used to identify planned locations. Non-visible pollutant sampling locations shall be documented by the QSP on the pre-rain event inspection form prior to a forecasted qualifying precipitation event and the *Effluent Sampling Field Log Sheet*, which are provided in Appendix O.

7.7.3 Monitoring Preparation

Non-visible pollutant samples will be collected by:

QSP	☒ Yes	☐ No
QSP Delegate	☒ Yes	☐ No

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. The QSP or QSP Delegates responsible for sampling will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project site will include, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, and *Effluent Sampling Field Log Sheets* and Chain of Custody (CoC) forms, which are provided in Appendix O.

7.7.3.1 Analytical Constituents

Table 7-7 lists the specific sources and types of potential non-visible pollutants based on the project pollutant source assessment and the water quality indicator constituent(s) for that pollutant. Table 7-5 provides the specific analytical methods and reporting limits for the potential non-visible pollutants. Analytical methods were selected in compliance with U.S. EPA sufficiently sensitive method requirements in 40 Code of Federal Regulations Part 136, as evidenced by the method detection limit and minimum level.

7.7.4 Sample Collection

Samples of discharge shall be collected at the designated non-visible pollutant sampling locations identified in Table 7-2 and shown on the Site Maps in Appendix A or in the locations determined by observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and historical site usage areas that triggered the sampling event.

Only the QSP, or QSP Delegates trained on sample collection identified in Section 7.7.1.3 shall collect samples. Grab samples will be collected and preserved in accordance with the methods identified in Table 7-5. Samples will be collected by following the steps outlined below:

1. Place a laboratory provided sampling container directly into a stream of water down-gradient and within close proximity to the potential non-visible pollutant discharge location;
2. Transfer the collected sample into the sample bottles (supplied by the lab for the appropriate parameters being monitored) filling the bottles completely (or as instructed by the laboratory);
3. The up-gradient (uncontaminated) background samples will be collected first, prior to collecting the down-gradient sample, in order to minimize cross-contamination; and
4. Sampling personnel will collect the water up-gradient of where they are standing.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of powder-free nitrile gloves prior to the collection and handling of each sample at each location;
- Not contaminate the inside of the sample bottle by allowing it to come into contact with any material other than the water sample;
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection;
- Not leave the cooler lid open for an extended period of time once samples are placed inside;
- Not sample near a running vehicle where exhaust fumes may impact the sample;
- Not touch the exposed end of a sampling tube, if applicable;
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles;
- Not eat, smoke, or drink during sample collection nor sneeze or cough in the direction of an open sample bottle;
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample;

- Decontaminate sampling equipment prior to sample collection using a tri-sodium phosphate (TSP) solution water wash and triple rinse with distilled or de-ionized water; and
- Dispose of decontamination water/soaps appropriately (i.e., do not discharge to the storm drain system or receiving water).

Note, that depending upon the specific analytical test, some containers may contain preservatives. These containers should **never** be dipped into the stream but filled indirectly from the collection container.

7.7.4.1 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed in Section 7.7.7, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

Table 7-5 Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Containers	Sample Preservation	Reporting Limit	Maximum Holding Time
SVOCs	EPA 625	1 x 1 L	Glass-amber	Store at 4°C	10 ug/L	7 days
VOCs	EPA 601/602	3 X 40 mL	VOA - Glass	Store at 4°C, HCL to pH<2	1 ug/L	14 days
BOD	EPA 405.1	1 x 500 mL	Polypropylene	Store at 4°C	1 mg/L	48 hours
COD	EPA 410.4	1 X 250mL	Glass - Amber	Store at 4°C, H_2SO_4 to pH<2	5 mg/L	28 days
DO	SM 4500-OG	1 x 250 mL	Glass-Amber	Store at 4°C	Check Lab	8 hours
NO_3	EPA 353.2	1 x 250 mL	Glass-Amber	Store at 4°C, H_2SO_4	0.05 mg/L	28 days
NH_3	EPA 350.1	1 x 250 mL	Glass-Amber	Store at 4°C, H_2SO_4	0.01 mg/L	
TKN	EPA 351.1	1 x 250 mL	Glass-Amber	Store at 4°C, H_2SO_4 to pH<2	0.1 mg/L	28 days
Coliform, Fecal	FDA BAM CH 4	1 x 100 mL	Glass/Polypropylene	Store at or below 10°C	0.1 mg/L	8 hours
Coliform, Total	SM 9221B	1 x 100 mL	Glass/Polypropylene	Store at or below 10°C	0.1 mg/L	8 hours
Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Na, Th, Va, Zn)	EPA 200.8/1631	1 x 250 mL	Polypropylene	Store at 4°C, HNO_3 to pH<2	0.1 mg/L	6 months
Chromium VI	EPA 7196	1 x 500 mL	Polypropylene	Store at 4°C	1 g/L	24 hours
Ortho Phenyl Phenol	HPLC FLUORESCENCE	1 x 1L	Tenax GC Tube	Store at 4°C	1 mg/L	8 hours
pH	SM 4500B	1 x 100 mL	Polypropylene	None	Unit less	15 minutes
Formaldehyde	EPA 1667A	1 x 20 mL	Glass-Amber	Store at 4°C	50 ug/L	5 days
PCBs	EPA 608	1 x 1 L	Glass-Amber	Store at 4°C, H_2SO_4 to pH 5-9	0.25 ug/L	40 days

7.7.5 Sample Analysis

Samples shall be analyzed using the analytical methods identified in the Table 7-5.

Samples will be analyzed by:

Laboratory Name:	BSK Associates – Fresno
Street Address:	1414 Stanislaus St,
City, State Zip:	Fresno, CA 93706
Telephone Number:	(559) 497-2888
Point of Contact:	Lisa Cardenas
ELAP Certification Number:	04227CA

Samples will be delivered to the laboratory by:

Driven by QSP/QSP Delegate/Contractor	☒	Yes	☐	No
Picked up by Laboratory Courier	☐	Yes	☒	No
Shipped	☐	Yes	☒	No

7.7.6 Sample Handling

All samples for laboratory analysis must be maintained between 0-6 degrees Celsius during delivery to the laboratory. Samples must be kept on ice, or refrigerated, from sample collection through delivery to the laboratory. Place samples to be shipped inside coolers with ice. Make sure the sample bottles are well packaged to prevent breakage and secure cooler lids with packaging tape.

Ship samples that will be laboratory analyzed to the analytical laboratory right away. Hold times are measured from the time the sample is collected to the time the sample is analyzed. The 2022 CGP requires that samples be received by the analytical laboratory within 48 hours of the physical sampling (unless required sooner by the analytical laboratory to meet all hold times).

7.7.7 Sample Documentation Procedures

All original data documented on sample container identification labels, *Effluent Sampling Field Log Sheet* (Appendix O), and CoCs shall be recorded using waterproof ink. These shall be considered accountable documents. If an error is made on an accountable document, the individual shall make corrections by lining through the error and entering the correct information. The erroneous information shall not be obliterated. All corrections shall be initialed and dated.

Duplicate samples shall be identified consistent with the numbering system for other samples to prevent the laboratory from identifying duplicate samples. Duplicate samples shall be identified in the Effluent Sampling Field Log Sheet.

Sample documentation procedures include the following:

Sample Bottle Identification Labels: Sampling personnel shall attach an identification label to each sample bottle. Sample identification shall uniquely identify each sample location. (These location identifiers should be listed in the tables in the SWPPP.)

Field Log Sheets: Sampling personnel shall complete the *Effluent Sampling Field Log Sheet* and *Receiving Water Sampling Field Log Sheet* (Appendix O) for each sampling event, as appropriate.

Chain of Custody: Sampling personnel shall complete the CoC for each sampling event for which samples are collected for laboratory analysis. The sampler will sign the CoC (Appendix O) when the sample(s) is turned over to the testing laboratory or courier.

7.7.8 QA/QC Samples

QA/QC samples provide an indication of the accuracy and precision of the sample collection; sample handling; field measurements; and analytical laboratory methods. The following types of QA/QC will be conducted for this project:

☒ Field Duplicates at a frequency of 5 percent or 1 duplicate minimum per sampling event (Required for all sampling plans with field measurements or laboratory analysis)

☐ Equipment Blanks
(Only needed if the equipment used to collect samples could add the pollutants to sample)

☒ Field Blanks
(Only required if sampling method calls for field blanks)

☒ Travel Blanks
(Required for sampling plans that include VOC laboratory analysis)

7.7.8.1 Field Duplicates

Field duplicates provide verification of laboratory or field analysis and sample collection. Duplicate samples shall be collected, handled, and analyzed using the same protocols as primary samples. The sample location where field duplicates are collected shall be randomly selected from the discharge locations. Duplicate samples shall be collected immediately after the primary sample has been collected. Duplicate samples must be collected in the same manner and as close in time as possible to the original sample. Duplicate samples shall not influence any evaluations or conclusion.

7.7.8.2 Equipment Blanks

Equipment blanks provide verification that equipment has not introduced a pollutant into the sample. Equipment blanks are typically collected when:

- New equipment is used;
- Equipment that has been cleaned after use at a contaminated site;
- Equipment that is not dedicated for surface water sampling is used; or
- Whenever a new lot of filters is used when sampling metals.

7.7.8.3 Field Blanks

Field blanks assess potential sample contamination levels that occur during field sampling activities. De-ionized water field blanks are taken to the field, transferred to the appropriate container, and treated the same as the corresponding sample type during the course of a sampling event.

7.7.8.4 Travel Blanks

Travel blanks assess the potential for cross-contamination of volatile constituents between sample containers during shipment from the field to the laboratory. De-ionized water blanks are taken along for the trip and held unopened in the same cooler with the VOC samples.

7.7.9 Quality Assurance and Quality Control

An effective Quality Assurance and Quality Control (QA/QC) plan shall be implemented as part of the CSMP to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs;
- Clean sampling techniques;
- CoCs;
- QA/QC Samples; and
- Data verification.

Each of these procedures is discussed in more detail in the following sections.

7.7.10 Chain of Custody

The sample CoC is an important documentation step that tracks samples from collection through analysis to ensure the validity of the sample. Sample CoC procedures include the following:

- Proper labeling of samples;
- Use of CoC forms for all samples; and
- Prompt sample delivery to the analytical laboratory.

Analytical laboratories usually provide CoC forms to be filled out for sample containers. An example CoC is included in Appendix O.

7.7.11 Data Verification

After results are received from the analytical laboratory, the QSP or QSP Delegates shall verify the data to ensure that it is complete, accurate, and the appropriate QA/QC requirements were met. Data must be verified as soon as the data reports are received. Data verification shall include:

- Check the CoC and laboratory reports.
  Make sure all requested analyses were performed and all samples are accounted for in the reports.
- Check laboratory reports to make sure hold times were met and that the reporting levels meet or are lower than the reporting levels agreed to in the contract.
- Check data for outlier values and follow up with the laboratory.
  Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory. The QSP or QSP Delegates should especially note data that is an order of magnitude or more different than similar locations or is inconsistent with previous data from the same location.
- Check laboratory QA/QC results.
  EPA establishes QA/QC checks and acceptable criteria for laboratory analyses. These data are typically reported along with the sample results. The QSP or QSP Delegates shall evaluate the reported QA/QC data to check for contamination (method, field, and

equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results.

- Check the data set for outlier values and, accordingly, confirm results and re-analyze samples where appropriate.
  Sample re-analysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out of the accepted range. Sample results may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met and confirms this in writing.

Field data including inspections and observations must be verified as soon as the field logs are received, typically at the end of the sampling event. Field data verification shall include:

- Check field logs to make sure all required measurements were completed and appropriately documented;
- Check reported values that appear out of the typical range or inconsistent; Follow-up immediately to identify potential reporting or equipment problems, if appropriate, recalibrate equipment after sampling;
- Verify equipment calibrations;
- Review observations noted on the field logs; and
- Review notations of any errors and actions taken to correct the equipment or recording errors.

7.7.12 Data Evaluation and Reporting

The QSP shall complete an evaluation of the water quality sample analytical results based on a comparison of the results to the unaffected sample.

Runoff/downgradient results shall be compared with the associated upgradient/unaffected results and any associated run-on results. Should the runoff/downgradient sample show an increased level of the tested analyte relative to the unaffected background sample, which cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences shall be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate BMPs shall be repaired or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs shall be recorded as an amendment to the SWPPP.

The QSP is responsible for reporting:

- Analytical results of non-visible pollutant monitoring shall be submitted to the QSD within 5 days of obtaining the analytical results.

The QSD is responsible for reporting:

- Analytical results of non-visible pollutant monitoring shall be submitted to SMARTS by the QSD within 10 days of obtaining the analytical results.

The 2022 CGP prohibits the storm water discharges that contain hazardous substances equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities shall be immediately reported to the Regional Water Board and other agencies as required by 40 C.F.R. §§ 117.3 and 302.4.

7.8 Sampling and Analysis Plan for Dewatering Discharges

Dewatering activities associated with this project *are not* subject to a separate NPDES permit and will be discharged under this WDID. Dewatering discharges authorized include mechanical pumping or syphoning of non-potable water from sources including, but not limited to: groundwater removal specifically related to the construction activities from excavations, trenches, foundations, vaults, **and/or** stormwater collected in impoundments (e.g., trenches, ponds, puddles, low points on the active site, or other similar accumulation points).

Dewatering Activities for the Project Site:

☐ No dewatering activities are planned for this project.

☐ Dewatering activities planned for this project will be conducted and monitored according to the requirements of the following NPDES Permit: [insert name and order number of the permit.]

☒ Dewatering activities may occur for this project and will be conducted and monitored according to the requirements of the 2022 CGP Attachment J.

This Sampling and Analysis Plan for dewatering discharges describes the sampling and analysis strategy and schedule for monitoring dewatering discharges in accordance with the requirements of the 2022 CGP.

Dewatering of non-stormwater or non-groundwater sources (other than de-chlorinated potable water) is prohibited. Dewatering of stormwater with presence of an oily sheen, odor, or discoloration is prohibited. Dewatering of stormwater that is suspected to have contacted non-visible pollutants due to a spill, breach, or malfunction shall also be sampled for non-visible pollutants according to Section 7.7 of this SWPPP.

7.8.1 Dewatering Reporting Requirements

At least 24 hours prior to the beginning of a dewatering discharge, the QSP or trained Delegates shall notify the applicable Regional Water Board stormwater and local MS4 staff via email of the anticipated dewatering discharge, and copy the LRP and QSD.

The Project QSP will update the field SWPPP at least 24 hours prior to the beginning of a dewatering discharge. The Project QSD will upload a formal COI with the amended SWPPP, to SMARTS within 14 days. The SWPPP will be amendment to include all requirements established in Attachment J, Section D.4 of the 2022 CGP.

7.8.2 Dewatering Numeric Action Levels (NALs)

Dewatering activities covered by the CGP are subject to the pH and turbidity NALs in Table 7-6 below. A NAL exceedance occurs when a single sample exceeds the turbidity NAL or is outside of the pH range shown in Table 7-6. Dewatering sampling is to be performed within the first hour of commencement of discharge and daily each day that the discharge continues.

Table 7-6: Dewatering Numeric Action Levels (NALs)

Parameter	Unit	Numeric Action Levels
pH	pH units	Lower NAL < 6.5, Upper NAL > 8.5
Turbidity	NTU	>250 NTU

If a pH or Turbidity exceedance occurs, dewatering activities will **cease immediately** until either: (1) enough time and dry weather has allowed sediment in stored water to settle or pH to neutralize, as advised by the QSP (2) additional BMPs have been implemented to prevent the NAL exceedance.

If a pH or Turbidity exceedance occurs, within five (5) calendar days, the project QSP will investigate the cause of the exceedance and identify corrective actions and notify the QSD and LRP. Within ten (10) days, the QSD will enter field measurements demonstrating the exceedance into SMARTS. If necessary, the QSD will revise the SWPPP to incorporate immediate corrective actions to prevent further exceedances of the numeric action levels for pH and turbidity.

7.8.3 Dewatering Schedule

As of the initial draft if this SWPPP there are no planned dewatering activities for the Project. The need for dewatering from the Project site may arise based on impoundment of low points in the Project site and a desire by the Contractor to continue construction activities in impounded areas.

If dewatering activities that result in discharge off-site are planned to commence, dewatering activities and sample analysis shall comply with this Section 7.6.

7.8.4 Dewatering Locations and Discharge Locations, and Sampling Locations

If the Contractor desires to pump or siphon impounded stormwater at the Project site, the QSP and trained Delegates shall first consider if on-site pervious areas could be utilized for on-site stormwater storage and percolation (without resulting in discharging off-site) rather than discharging impounded stormwater off-site. This moving of stormwater throughout the site is not considered dewatering and therefore does not require the reporting or sampling requirements outlined in this Section 7.6.

Since the need for dewatering operations are dependent on minor changes to the construction schedule and future precipitation events, the dewatering locations, discharge locations, and sampling locations are unknown as of the initial authoring of this SWPPP. If the Contractor/QSP identifies planned dewatering activities, the field copy of Site Maps in Appendix A and Table 7-7 will be updated by the QSP or Trained Delegates with dewatering locations, discharge locations, and sampling locations prior to starting dewatering operations.

Dewatering discharge locations shall be selected to prevent dewatering discharge from contacting construction materials and equipment. Outlet locations are prohibited from using waters of the United States as part of the treatment area for all areas or points where dewatering is discharged. Velocity reduction BMPs/devices shall be implemented to prevent scour down-gradient from the outlet location. Sampling locations will represent the water quality of dewatering water as it leaves the Project site.

The QSP shall notify the QSD and the LRP of these operations and locations prior to starting dewatering operations (as well as the regional Water Board as discussed in Section 7.8.1).

The QSD will submit a COI to SMARTS with these new operations and locations. This will include selecting dewatering outlet locations to prevent the dewatering discharge from coming in contacting with construction materials or equipment

7.8.5 Dewatering Sampling Schedule

Sampling of dewatering discharges will be conducted within the first hour of the commencement of discharge and daily each day that the discharge continues. Dewatering operations shall not

commence without the knowledge of the QSP, and shall not commence without the presence of the QSP of QSP trained delegates who are prepared to conduct dewatering discharge sampling for turbidity and pH.

7.8.6. Sample Locations

Sampling locations are based on the planned dewatering locations. Planned dewatering sampling locations are listed in Table 7-7 and shown on the Site Maps in Appendix A.

The number of dewatering sampling location(s) on the project site and the contractor's yard are unknown as of the date of drafting this SWPPP. If the Contractor decides to conduct dewatering operations at the site, the QSP shall identify the dewatering discharge locations and the QSP or QSP delegates shall conduct sampling dewatering discharge for turbidity and pH.

Table 7-7 Turbidity and pH Dewatering Sample Locations

Sample Location Identifier	Sample Location Description	Sample Location Latitude and Longitude (Decimal Degrees)
Unknown, TBD	Unknown, TBD	Unknown, TBD

In the event that dewatering is required at a location not listed in Table 7-7, and has not been identified on the Site Maps, sampling locations will be selected by the QSP using the same rationale as that used to identify planned locations. Dewatering sampling locations shall be documented by the QSP or QSP delegates on the *Effluent Sampling Field Log Sheet*, which are provided in Appendix O.

7.8.7 Monitoring Preparation

Dewatering samples will be collected by:

QSP	TBD	☒	Yes	☐	No
QSD Delegate	TBD	☒	Yes	☐	No

An adequate stock of monitoring supplies and equipment for monitoring turbidity and will be available on the project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. The QSP or QSP Delegates will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project site will include, but are not limited to, field meters, extra batteries, clean powder-free nitrile gloves, sample collection equipment, appropriate sample containers, paper towels, personal rain gear, and *Effluent Sampling Field Log Sheets* and CoC forms provided in Appendix O.

The QSP or QSP Delegates will obtain and maintain the field-testing instruments, as identified in Section 7.7.2.6, for analyzing samples in the field.

7.8.8 Dewatering Sample Collection

Dewatering samples shall be collected at the designated sampling locations determined by the QSP or identified in Table 7-7 and shown on the Site Maps in Appendix A.

Grab samples for turbidity and pH will be collected by following the steps outlined below:

1. Place the pH meter or secondary sample container directly into the stream of flow;
2. Sampling personnel will collect the water up-gradient of where they are standing.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Pre-rinse the meter probe or secondary sample container with deionized water or within the flow of runoff;
- Not sample near a running vehicle where exhaust fumes may impact the sample;
- Not touch the exposed end of the meter's probe;
- Not touching inside secondary sampling containers;
- Avoid allowing rainwater to drip from rain gear or other surfaces into secondary sampling containers; and
- Not eat, smoke, or drink during sample collection nor sneeze or cough in the direction of the meter probe or secondary sampling container.

For pH and turbidity samples collected for field analysis, the collection shall be in accordance with SWAMP QAPrP[1] protocols and analysis, and equipment calibration shall be in accordance with field instrument manufacturer's specifications. Table 7-8 below lists the type of instruments used in the field for these parameters.

Table 7-8: Field Analysis Instrumentation

Field Instrument	EPA Analytical Method	Parameter	MDL
pH Meter	150.1	pH	0.2
Turbidity Meter	180.1	Turbidity	1

- The instruments will be maintained in accordance with manufacturer's instructions.
- The instrument(s) will be calibrated before each sampling event.
- Maintenance and calibration records will be maintained with the SWPPP.

Immediately following collection, samples for field analysis shall be tested in accordance with the field instrument manufacturer's instructions and results recorded on the Effluent Sampling Field Log Sheet located in Appendix D.

7.8.9 Dewatering Sampling Field Analyses

Discharges from the site are subject to Numeric Action Level (NALs) for pH and turbidity as shown in Table 7-9 below.

[1] Sampling personnel shall be trained to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring program (SWAMP) 2017 Quality Assurance Program Plan (QAPrP)

Table 7-9: Numeric Action Levels

Parameter	Unit	Numeric Action Levels
pH	pH units	Lower NAL < 6.5 Upper NAL > 8.5
Turbidity	NTU	>250 NTU

Compliance with the NAL for pH and turbidity is based on a single sample evaluation. An NAL exceedance occurs when any sample exceeds the turbidity NAL or is outside of the pH range shown in Table 7-9.

Turbidity and pH measurements must be conducted immediately. Do not store turbidity or pH samples for later measurement.

The QSP or Delegates shall complete the *Effluent Sampling Field Log Sheets* found in Appendix O while conducting dewatering sample analysis.

7.8.10 Data Evaluation and Reporting

At least 24 hours prior to the beginning of a dewatering discharge, the QSP or QSP Delegate shall notify the Regional Water Board via email of the anticipated dewatering discharge. The QSP or QSP Delegate shall copy the LRP and QSD on these notification emails.

The QSP shall within five calendar days of the sample collection submit copies of the completed *Effluent Sampling Field Log Sheets* to the LRP and QSD.

Compliance with the NALs for pH and turbidity in dewatering discharges is based on a single sample evaluation. A NAL exceedance occurs when any sample exceeds the turbidity NAL or is outside of the pH range shown in Table 7-9.

If the dewatering sampling results show that an NAL was exceeded, the QSP or QSP Delegate shall instruct the Contractor to immediately cease dewatering discharges. If the discharge is necessary to protect human life and health or prevent severe property damage and cannot be ceased, the QSP or QSP Delegates shall notify the Regional Water Board and the Local Stormwater Agency within 24 hours.

Table 7-10 Dewatering Notification Contacts

Agency	Name	Email
Regional Water Board	Fresno Branch Office	R5f_stormwater@waterboards.ca.gov
the City of Mendota	Christian Gonzales	christian@cityofmendota.com

If an NAL for pH or turbidity was exceeded during dewatering operations, the QSP or trained delegates shall inform the QSD and LRP within 5 days and send a copy of the completed *Effluent Sampling Field Log Sheets*.

Exceedances of NALs shall be electronically reported to the State Water Board by the LRP or DAR through SMARTS within 10 days of the NAL exceedance measurement.

7.8.11 Dewatering NAL Corrective Actions

Upon receiving notice that dewatering operations caused a NAL exceedance, the QSD shall investigate the cause of the exceedance and identify corrective actions for dewatering operations.

Following a NAL exceedance, the QSD shall revise the SWPPP to incorporate corrective actions to prevent further exceedances within 10 days of the NAL exceedance measurement.

7.9 Sampling and Analysis Plan for Other Pollutants Required by the Regional Water Board

The Regional Water Board has not specified monitoring for additional pollutants.

7.10 Training of Sampling Personnel

QSP Delegates assigned to conduct sampling shall be trained by the QSP to collect, maintain, and ship samples in accordance with the 2022 CGP Sample Collection and Handling Instructions and supplemental information as needed. Training records of QSP Delegates assigned to sample are provided in Appendix I.

The QSP and QSP Delegates have received the following stormwater sampling training:

Name	Training
TBD and updated via COI	

The QSP and QSP Delegates have the following stormwater sampling experience:

Name	Experience
TBD and updated via COI	

7.11 Records Retention

All records of stormwater monitoring information and copies of reports (including Annual Reports) must be retained for a period of at least three years from date of submittal or longer if required by the Regional Water Board.

Results of visual monitoring, field measurements, and laboratory analyses must be kept in the SWPPP along with CoCs, and other documentation related to the monitoring.

Records are to be kept onsite while construction is ongoing. Records to be retained include:

- The date, place, and time of inspections, sampling, visual observations, and/or measurements, including precipitation;
- The individual(s) who performed the inspections, sampling, visual observation, and/or field measurements;
- The date and approximate time of field measurements and laboratory analyses;
- The individual(s) who performed the laboratory analyses;
- A summary of all analytical results, the method detection limits and reporting limits, and the analytical techniques or methods used;
- Rain gauge readings from site inspections;
- QA/QC records and results;

- Calibration records;
- Visual observation and sample collection exception records;
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations, or inspections;
- Dewatering notifications to the Regional Water Board;
- Dewatering exception notifications to the Regional Water Board and local stormwater agency;

Section 8 References

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Appendix A: Site Maps and Drawings

LOCATION MAP
NOT TO SCALE

PROJECT SITE
SCALE: 1"= 500'

SITE LOCATION: 605 BASS AVE | MENDOTA, CA | 36.767640, -120.381368 | FIGURE: 1A

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
LOCATION AND VICINITY MAPS

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 1
OF 7 SHEETS

Drawing: C:\Users\mreynaud\AppData\Local\Temp\AcPublish_35928\2240172_Mendota Elementary School_SWPPP Figures.dwg; Figure 1A Plot by: mreynaud Mar 21, 2025 - 10:12am

CONSTRUCTION SYMBOL LEGEND:

- PROTECT PROPOSED DRAIN INLET PER CASQA SE-10
- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING SWALE/DRAINAGE DITCH/FLOWLINE/GUTTER
- PROPOSED STORM DRAIN PIPELINE
- SWALE/DRAINAGE/DITCH/CULVERT/FLOWLINE/VALLEY GUTTER
- PROPOSED CHAIN LINK FENCE
- PROPOSED WATER PIPELINE
- PROPOSED SEWER PIPELINE
- PROPOSED ASPHALT CONCRETE (NON-ROOF IMPERVIOUS AREAS)
- PROPOSED CONCRETE (NON-ROOF IMPERVIOUS AREAS)
- PROPOSED BUILDING (ROOF IMPERVIOUS AREA)
- PROPOSED LANDSCAPING (PERVIOUS AREAS)
- AREAS OF NON-BUILT LAND DISTURBANCE FOR FINAL STABILIZATION. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1

EARTHWORK SYMBOL LEGEND:

- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING SWALE/DRAINAGE DITCH/FLOWLINE/GUTTER
- PROPOSED WATER PIPELINE
- PROPOSED SEWER PIPELINE
- AREAS OF DEMOLITION. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF NON-BUILT LAND DISTURBANCE. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF PROPOSED FILL. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF PROPOSED CUT. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF PROPOSED MINOR GRADING. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1

DRAINAGE AREA/NON-VISIBLE SAMPLING SYMBOL LEGEND:

- DRAINAGE AREA "X" BOUNDARY
- ## — DRAINAGE AREA NUMBER
- SL## — QSD IDENTIFIED DISCHARGE AND SAMPLING LOCATION. THE QSP SHALL FIELD VERIFY THE EXACT LOCATION OF DISCHARGE FOR A REPRESENTATIVE STORMWATER SAMPLE FOR NON-VISIBLE POLLUTANT SAMPLING.

STAGING AREA ITEMS:

- (1) CONCRETE WASHOUT LOCATION PER CASQA WM-08
- (2) LOCATION OF JOB TRAILER CONTAINING SPILL KIT AND ONSITE SWPPP
- (3) LOCATION OF RAIN GAUGE
- (4) MATERIAL STORAGE LOCATION PER CASQA WM-01
- (5) OVERNIGHT EQUIPMENT/VEHICLE STORAGE AND MAINTENANCE PER CASQA NS-8, NS-9 AND NS-10
- (6) RESTROOMS AND SANITARY FACILITIES PER CASQA WM-09
- (7) SOLID WASTE STORAGE LOCATION PER CASQA WM-05
- (8) STOCKPILE STORAGE LOCATION PER CASQW WM-03
- (WS) WATER SUPPLY LOCATION PER CASQA NS-1

PRE-EARTHWORK SYMBOL LEGEND:

- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- PROTECT EXISTING DRAIN INLET TO BE DEMOLISHED PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING STORMWATER GUTTER
- EXISTING ASPHALT (NON-ROOF IMPERVIOUS AREAS)
- EXISTING CONCRETE (NON-ROOFTOP IMPERVIOUS AREAS)
- EXISTING ROOFTOP IMPERVIOUS AREAS
- EXISTING PERVIOUS AREAS
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1
- PRE-CONSTRUCTION GEOTECHNICAL INVESTIGATION BORING LOCATION

NOTES TO CONTRACTOR:

1. REFER TO SECTION 3 OF THE PROJECT SWPPP FOR THE BMP IMPLEMENTATION SCHEDULE AND A COMPLETE NARRATIVE ON APPLICABLE BMPS FOR THE PROJECT. REFER TO DETAILS SHOWN ON FIGURE 1C AND THE CASQA CONSTRUCTION BMP HANDBOOK IN APPENDIX G FOR TECHNICAL DETAILS ON ALL BMPS.
2. IN ADDITION TO THE BMPS DEPICTED HEREON, THE CONTRACTOR AND QSP SHALL BE RESPONSIBLE FOR IMPLEMENTING ADDITIONAL BMPS LISTED IN SECTION 3 OF THE PROJECT SWPPP APPENDIX G, AND THOSE SUMMARIZED IN FIGURE 1C. CONTRACTOR SHALL CONSULT WITH QSP TO SELECT, IMPLEMENT, AND MAINTAIN EFFECTIVE BMPS FOR ALL CONSTRUCTION POLLUTANTS ORIGINATING FROM THE SITE THROUGHOUT THE LIFE OF THE PROJECT, IN ACCORDANCE WITH THE TEXT AND INTENT OF THE CGP.
3. THE CONTRACTOR AND QSP SHALL IDENTIFY DISTURBED AREAS THAT ARE NOT PLANNED FOR DISTURBANCE WITHIN THE NEXT 14 DAYS AND IMMEDIATELY TEMPORARILY (OR PERMANENTLY) STABILIZE THESE AREAS USING EFFECTIVE EROSION CONTROL BMPS AS DISCUSSED IN SECTION 3.2 OF THE SWPPP.
4. SUFFICIENT QUANTITIES OF TEMPORARY SEDIMENT CONTROL MATERIALS SHALL BE MAINTAINED ON-SITE THROUGHOUT THE DURATION OF THE PROJECT. ALLOWING FOR IMPLEMENTATION OF TEMPORARY SEDIMENT CONTROLS IN THE EVENT OF PREDICTED RAIN AND FOR RAPID RESPONSE DUE TO FAILURES OR EMERGENCY, IN CONFORMANCE WITH OTHER CGP REQUIREMENTS AS DESCRIBED IN THE PROJECT SWPPP.
5. STREET SURFACES SHALL BE SWEPT BY THE CONTRACTOR PER CASQA SE-7. VISIBLE SEDIMENT TRACKING SHALL BE SWEPT OR VACUUMED ON A DAILY BASIS.
6. DUST CONTROL PRACTICES SHALL CONFORM WITH THE LOCAL AIR DISTRICT AND CASQA WE-1.
7. IF CONSTRUCTION IS PHASED, BMPS MAY BE INSTALLED ONLY WITHIN ACTIVE AREAS OF CONSTRUCTION. ONCE EACH PHASE OF CONSTRUCTION IS COMPLETE AND PROJECT AREA IS STABILIZED, BMPS MAY BE REMOVED WITHIN THE STABILIZED AREA.
8. THE QSP SHALL CONTINUALLY UPDATE FIGURE 2-4 WITH THE ACTUAL LOCATIONS OF ALL BMPS, AND MAINTAIN A CURRENT COPY IN THE SITE SWPPP BINDER OR ACTIVE DIGITAL VERSION ACCESSIBLE ON-SITE. IF THE IMPLEMENTED BMPS ARE SIGNIFICANTLY DIFFERENT FROM THOSE INDICATED IN THE SWPPP, THE QSP SHALL CONTACT THE QSD TO REQUEST A SWPPP AMENDMENT BE PREPARED AND SUBMITTED TO THE WATER BOARD.
9. THE INDICATED STAGING AREAS ARE ASSUMED FOR SCHEMATIC PURPOSES ONLY, AND SHOULD BE COORDINATED WITH THE OWNER. DEPICTION OF STAGING AREAS SHALL NOT GUARANTEE USE OF THOSE AREAS WITHOUT PRIOR PERMISSION. THE QSP SHALL CONTINUALLY UPDATE THESE FIGURES WITH THE ACTUAL LOCATIONS OF ALL STAGING, AND MAINTAIN A CURRENT COPY IN THE SITE SWPPP BINDER. ALL STAGING AREAS SHALL BE FULLY STABILIZED BEFORE CLOSEOUT.
10. THE CONTRACTOR SHALL PLAN AND ACHIEVE FINAL STABILIZATION FOR ALL AREAS DISTURBED BY PROJECT ACTIVITIES WITHIN 90 DAYS OF COMPLETING CONSTRUCTION ACTIVITIES. FOR THE PURPOSES OF THIS PROJECT ACCEPTABLE FINAL STABILIZATION CONDITIONS INCLUDES 70% OR GREATER UNIFORM VEGETATIVE COVER OR NON-VEGETATIVE STABILIZATION PER CASQA EC-15.
11. REFER TO THE CONSTRUCTION DRAWINGS FOR MORE DETAIL.

SITE LOCATION: 605 BASS AVE | MENDOTA, CA | 36.767640, -120.381368 | FIGURE: 1B

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
LEGENDS AND NOTES

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 2
OF 7 SHEETS

Drawing: C:\Users\mreynaud\AppData\Local\Temp\AcPublish_35928\2240172_Mendota Elementary School_SWPPP Figures.dwg; Figure 1B Plot by: mreynaud Mar 21, 2025 - 10:12am

EROSION AND SEDIMENT CONTROL BMPS

CASQA BMP#	BMP REQUIREMENT SUMMARY
EC-1	SCHEDULE CLEARING AND GRUBBING DURING DRY WEATHER, WHEN FEASIBLE.
EC-3, EC-4, EC-5, EC-6, EC-7, EC-8, EC-14, EC-15, EC-16	IMPLEMENT EROSION CONTROL BMPS TO DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS.
WE-1	WATER DRY DISTURBED SOIL DAILY TO MITIGATE DUST PER SJVAPCD DUST CONTROL REQUIREMENTS. ESTABLISH CRUST AT END OF WEEK BY WATERING DISTURBED AREAS AND RESTRICTING VEHICLE ACCESS.
SE-10	PROTECT STORM DRAIN INLETS, TRENCH DRAINS, GUTTERS, DITCHES, AND DRAINAGE COURSES WITH APPROPRIATE BMPS, SUCH AS GRAVEL BAGS, INLET FILTER, BERMS, ETC. (SEE DETAILS SE-10a & SE-10b)
SE-1, SE-2, SE-3, SE-4, SE-5, SE-6, SE-8, SE-12, SE-13	PREVENT SEDIMENT FROM MIGRATING OFFSITE BY INSTALLING AND MAINTAINING SEDIMENT CONTROLS, SUCH AS FIBER ROLLS, SILT FENCES, CURB CUT BACKS, SEDIMENT BASINS, ETC.
WM-7	IF ANY OF THE FOLLOWING CONDITIONS ARE OBSERVED, TEST FOR CONTAMINATION AND CONTACT LOCAL COUNTY ENVIRONMENTAL HEALTH DEPARTMENT, REGIONAL WATER QUALITY CONTROL BOARD, AND LOCAL MUNICIPAL INSPECTOR: UNUSUAL SOIL CONDITIONS, DISCOLORATION, OR ODOR, ABANDONED UNDERGROUND TANKS ABANDONED WELLS, BURIED BARRELS, DEBRIS, OR TRASH.
TC-1, TC-2	ESTABLISH AND MAINTAIN EFFECTIVE STABILIZED CONSTRUCTION EXIT AT ALL CONSTRUCTION EXITS TO SUFFICIENTLY CONTROL TRACKING OFF SITE (SEE DETAIL TC-1).
SE-7	SWEEP OR VACUUM ANY SEDIMENT STREET TRACKING IMMEDIATELY UPON OBSERVATION. NEVER HOSE DOWN STREETS TO CLEAN UP TRACKING.

SPILL PREVENTION AND CONTROL BMPS

CASQA BMP#	BMP REQUIREMENT SUMMARY
WM-4, WM-6	KEEP SPILL KIT AVAILABLE AT SITE AT ALL TIMES (ABSORBENT, SPILL BOOMS, DISPOSAL BAGS, PPE). TRAIN STAFF ON SPILL CLEANUP RESPONSIBILITY AND PROCEDURES.
WM-4, WM-6, NS-10	INSPECT VEHICLES AND EQUIPMENT FREQUENTLY FOR AND REPAIR LEAKS PROMPTLY. USE DRIP PANS TO CATCH LEAKS UNTIL REPAIRS ARE MADE.
WM-4, WM-6	CLEAN UP SPILLS OR LEAKS IMMEDIATELY AND DISPOSE OF CLEANUP MATERIALS PROPERLY.
WM-4, WM-6	DO NOT HOSE DOWN SURFACES WHERE FLUIDS HAVE SPILLED. USE DRY CLEANUP METHODS (ABSORBENT MATERIALS).
WM-4, WM-6	SWEEP UP SPILLED DRY MATERIALS IMMEDIATELY (CONCRETE, MORTAR, DRYWALL PLASTER ETC.). DO NOT WASH THEM AWAY WITH WATER, OR BURY THEM.
WM-4, WM-6, WM-7	CLEAN UP SPILLS ON DIRT AREAS BY DIGGING UP AND PROPERLY DISPOSING OF CONTAMINATED SOIL.
WM-4, WM-6	REPORT SIGNIFICANT SPILLS IMMEDIATELY. YOU ARE REQUIRED BY LAW TO REPORT ALL SIGNIFICANT RELEASES OF HAZARDOUS MATERIALS, INCLUDING OIL. TO REPORT A SPILL: DIAL 911.

PAINTING AND PAINT REMOVAL BMPS

CASQA BMP#	BMP REQUIREMENT SUMMARY
WM-6, WM-10	NEVER CLEAN BRUSHES OR RINSE PAINT CONTAINERS INTO STREET, GUTTER, STORM DRAIN, SOIL, OR SURFACE WATERS.
WM-6, WM-10	FOR WATER-BASED PAINTS, PAINT OUT BRUSHES TO THE EXTENT POSSIBLE. RINSE TO THE SANITARY SEWER ONCE YOU HAVE GAINED PERMISSION FROM THE LOCAL WASTEWATER TREATMENT AUTHORITY. NEVER POUR PAINT DOWN A DRAIN OR ONTO SOIL.
WM-6, WM-10	FOR OIL-BASED PAINTS, PAINT OUT BRUSHES TO THE EXTENT POSSIBLE AND CLEAN WITH THINNER OR SOLVENT IN A PROPER CONTAINER. FILTER AND REUSE THINNERS AND SOLVENTS. DISPOSE OF RESIDUE AND UNUSABLE THINNER/SOLVENTS AS HAZARDOUS WASTE.
WM-5, WM-6,	CHEMICAL PAINT STRIPPING RESIDUE AND CHIPS AND DUST FROM PAINTS CONTAINING LEAD OR TRIBUTYLTIN MUST BE DISPOSED OF AS HAZARDOUS WASTE.
WM-5, WM-6,	PAINT CHIPS AND DUST FROM NON-HAZARDOUS DRY STRIPPING AND SAND BLASTING MAY BE SWEPT UP OR COLLECTED IN PLASTIC DROP CLOTHS AND DISPOSED OF AS TRASH.

ASPHALT, CONCRETE, MORTAR, STUCCO BMPS

CASQA BMP#	BMP REQUIREMENT SUMMARY
NS-3, NS-12, NS-13	DO NOT PAVE, SEAL COAT, OR POUR CONCRETE IN WET WEATHER, OR WHEN RAIN IS FORECAST BEFORE FRESH PAVEMENT/CONCRETE WILL HAVE TIME TO CURE.
NS-3, NS-12, NS-13	COVER STORM DRAIN INLETS AND MANHOLES WHEN APPLYING SEAL COAT, TACK COAT, SLURRY SEAL, FOG SEAL, ETC.
WM-5	COLLECT AND RECYCLE OR APPROPRIATELY DISPOSE OF EXCESS ABRASIVE GRAVEL OR SAND. DO NOT SWEEP OR WASH IT INTO GUTTERS.
NS-3, NS-12, NS-13, WM-8	DO NOT USE WATER TO WASH DOWN FRESH ASPHALT OR CONCRETE PAVEMENT.
NS-3, WM-8	COMPLETELY COVER OR BARRICADE STORM DRAIN INLETS WHEN SAW CUTTING. USE DRAIN INLET PLUG OR SAND BAGS TO KEEP SLURRY OUT OF THE STORM DRAIN SYSTEM.
NS-3, WM-8	ABOSORB, OR VACUUM SAW-CUT SLURRY AND DISPOSE OF ALL WASTE AS SOON AS YOU ARE FINISHED IN ONE LOCATION OR AT THE END OF EACH WORK DAY (WHICHEVER IS SOONER).
NS-3, WM-8	IF SAWCUT SLURRY ENTERS A CATCH BASIN, CLEAN IT UP IMMEDIATELY.
WM-1	STORE CONCRETE, GROUT, MORTAR, STUCCO, ETC. UNDER COVER AND RAISED OFF GROUND, AND AWAY FROM DRAINAGE COURSES. THESE MATERIALS MUST NEVER REACH A STORM DRAIN.
WM-4, WM-8	ALL WASHOUT AND EXCESS WASTE MATERIAL FROM CONCRETE MORTAR, GROUT, STUCCO, PLASTER, DRYWALL, ETC. MUST BE STORED IN CONTAINMENT BIN/BUCKET. THESE WASTES MAY NOT BE DISPOSED ON SOIL OR DRAINAGE COURSES. SELECT A CONTAINER LARGE ENOUGH FOR THE JOB AND LEAVE FREEBOARD TO PREVENT SPILLS OF CONTAINER. COVER CONTAINERS FOR ALL RAIN EVENTS.
WM-4, WM-8	COLLECT THE WASH WATER FROM WASHING EXPOSED AGGREGATE CONCRETE AND REMOVE IT FOR APPROPRIATE DISPOSAL OFFSITE.
WM-2, WM-5, WM-8	PLACE TARP UNDER SOIL OF MORTAR, STUCCO, PLASTER, ETC. MIXING STATIONS AND UNDER APPLICATION AREAS. CONTAIN THESE MATERIALS ON TARP FROM SCRAPING FROM OVER-APPLICATION. COLLECT AND DISPOSE MATERIALS ACCUMULATED ON TARP IMMEDIATELY AFTER CURING.

RUN-ON AND DEWATERING BMPS

CASQA BMP#	BMP REQUIREMENT SUMMARY
SE-8, EC-9	EFFECTIVELY DIVERT RUN-ON TO DISTURBED AREAS BY USE OF SANDBAG BERMS OR DIVERSION PIPE/HOSE. WHEN DIVERSION IS INFEASIBLE, SCHEDULE WORK DISTURBANCE TO RUN-ON AREAS DURING DRY WEATHER IF FEASIBLE. IF RUN-ON TO DISTURBED AREAS IS UNAVOIDABLE, IMPLEMENT A COMBINATION OF EFFECTIVE EROSION AND SEDIMENT CONTROLS TO MINIMIZE POLLUTANT TRANSPORT FROM RUN-ON.
NS-2	WHEN DEWATERING OFF-SITE, NOTIFY AND OBTAIN APPROVAL FROM THE LOCAL MUNICIPALITY AND REGIONAL WATER QUALITY CONTROL BOARD BEFORE DISCHARGING IMPOUNDED WATER OFF-SITE. SEE SECTION 7 OF THE PROJECT SWPPP FOR SITE-SPECIFIC DEWATERING PERMIT/SAMPLING REQUIREMENTS.
EC-10	UTILIZE VELOCITY DISSIPATION DEVICES WHEN DEWATERING TO PERVIOUS AREAS.
NS-2, WM-7	IN AREAS OF KNOWN CONTAMINATION, TESTING IS REQUIRED PRIOR TO REUSE OR DISCHARGE OF GROUNDWATER OR IMPOUNDED STORMWATER. CONSULT WITH THE ENGINEER AND MUNICIPAL STAFF TO DETERMINE WHETHER TESTING IS REQUIRED AND HOW TO INTERPRET RESULTS. CONTAMINATED GROUNDWATER OR IMPOUNDED WATER MUST BE TREATED OR HAULED OFFSITE FOR PROPER DISPOSAL.

EQUIPMENT MAINTENANCE AND PARKING BMPS

CASQA BMP#	BMP REQUIREMENT SUMMARY
NS-8, NS-9, NS-10	DESIGNATE AN AREA, FITTED WITH APPROPRIATE BMPS, FOR VEHICLE AND EQUIPMENT PARKING AND STORAGE.
NS-8, NS-9, NS-10	PERFORM MAJOR MAINTENANCE, REPAIR JOBS, AND VEHICLE AND EQUIPMENT WASHING OFF-SITE.
NS-9, NS-10	IF REFUELING OR VEHICLE MAINTENANCE MUST BE DONE ONSITE, WORK IN A BERMED AREA AWAY FROM STORM DRAINS AND OVER A DRIP PAN BIG ENOUGH TO COLLECT FLUIDS. RECYCLE OR DISPOSE OF FLUIDS AS HAZARDOUS WASTE.
NS-8	IF VEHICLE OR EQUIPMENT CLEANING MUST BE DONE ONSITE, CLEAN WITH WATER ONLY IN A BERMED AREA THAT WILL NOT ALLOW RINSE WATER TO RUN INTO GUTTERS, STREETS, STORM DRAINS, OR SURFACE WATERS
NS-8	DO NOT CLEAN VEHICLES OR EQUIPMENT ON-SITE USING SOAPS, SOLVENTS, DEGREASERS, STEAM CLEANING EQUIPMENT, ETC.

MATERIAL & WASTE MANAGEMENT BMPS

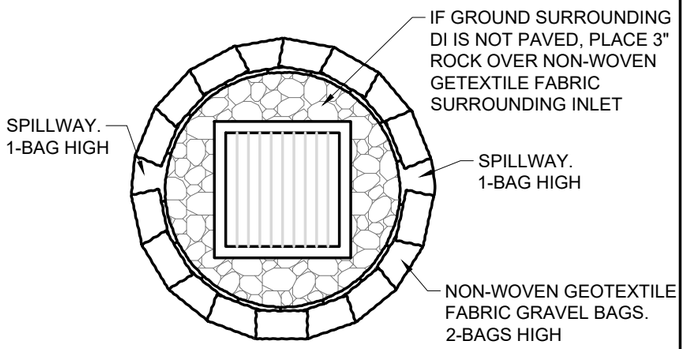
CASQA BMP#	BMP REQUIREMENT SUMMARY
WM-1, WM-3	BERM AND SECURELY COVER STOCKPILES OF SAND, DIRT, OR OTHER CONSTRUCTION MATERIALS WITH TARPS WHEN RAIN IS FORECAST OR IF STOCKPILES ARE NOT ACTIVELY BEING USED. FOR BEST RESULTS, THIS SHOULD BE DONE AT THE END OF THE WORK DAY THROUGHOUT CONSTRUCTION WHEN FEASIBLE.
WM-5, WM-6	BERM AND SECURELY COVER STOCKPILES OF ALL DEMOLISHED BUILDING RUBBLE.
WM-4, WM-6, WM-10	LABEL ALL HAZARDOUS MATERIALS AND HAZARDOUS WASTES (SUCH AS PESTICIDES, PAINTS, THINNERS, SOLVENTS, FUEL, OIL, AND ANTIFREEZE) IN ACCORDANCE WITH CITY, COUNTY, STATE AND FEDERAL REGULATIONS.
WM-4, WM-6, WM-10	STORE HAZARDOUS MATERIALS AND WASTES IN WATER TIGHT CONTAINERS, STORE IN APPROPRIATE SECONDARY CONTAINMENT, AND COVER THEM AT THE END OF EVERY WORK DAY OR DURING WET WEATHER OR WHEN RAIN IS FORECAST.
WM-2,WM-4, WM-6, WM-10, NS-12, NS-13	FOLLOW MANUFACTURER'S APPLICATION INSTRUCTIONS FOR HAZARDOUS MATERIALS AND BE CAREFUL NOT TO USE MORE THAN NECESSARY. DO NOT APPLY CHEMICALS OUTDOORS WHEN RAIN IS FORECAST WITHIN 24 HOURS.
WM-6	ARRANGE APPROPRIATE DISPOSAL OF ALL HAZARDOUS WASTES.
WM-5	COVER WASTE DISPOSAL CONTAINERS SECURELY WITH TARPS AT THE END OF EVERY WORK DAY AND DURING WET WEATHER.
WM-5	DISPOSE OF ALL CONSTRUCTION AND DOMESTIC TRASH IN WASTE CONTAINERS AT END OF EACH WORK DAY.
WM-9	CLEAN OR REPLACE PORTABLE TOILETS, AND INSPECT THEM FREQUENTLY FOR LEAKS AND SPILLS. ADD SECONDARY CONTAINMENT AND LOCATE THEM AWAY FROM STORM DRAIN INLETS. ENSURE TOILETS ARE PROTECTED FROM TIPPING FROM HIGH WIND.
WM-5	WHEN CUTTING OR GRINDING METAL OR PLASTIC MATERIALS (PVC PIPE, SIDING, ETC.) PLACE DROPCLOTH OR TARP TO CONTAIN INORGANIC (TRASH) SHARDS/SHAVINGS/DUST. DISPOSE COLLECTED MATERIALS AFTER COMPLETING CUTTING/GRINDING ACTIVITY.

LANDSCAPING BMPS

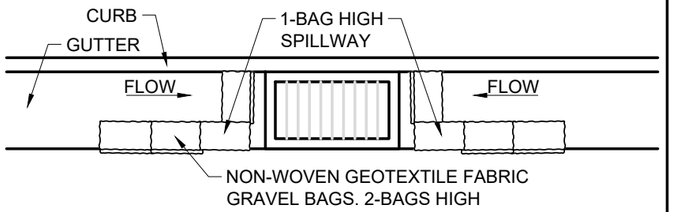
CASQA BMP#	BMP REQUIREMENT SUMMARY
WM-1, WM-3	CONTAIN STOCKPILED LANDSCAPING MATERIALS BY STORING THEM UNDER TARPS AND BERMED FROM RUN-ON WHEN THEY ARE NOT ACTIVELY BEING USED.
WM-1, WM-3	STORE ERODIBLE LANDSCAPE MATERIAL ON PALLETS. COVER OR STORE THESE MATERIALS WHEN THEY ARE NOT ACTIVELY BEING USED OR APPLIED.
WM-1, WM-3	DISCONTINUE APPLICATION OF ANY ERODIBLE LANDSCAPE MATERIAL WITHIN 2 DAYS BEFORE A FORECAST RAIN EVENT OR DURING WET WEATHER.
NS-7	COORDINATE WITH OWNER TO MODIFY EXISTING IRRIGATION SYSTEMS IN/AROUND PROJECT SITE TO ENSURE IRRIGATION WATER IS NOT A SOURCE OF NON-STORMWATER INTO DISTURBED AREAS.

ADDITIONAL BMP GUIDANCE DETAILS

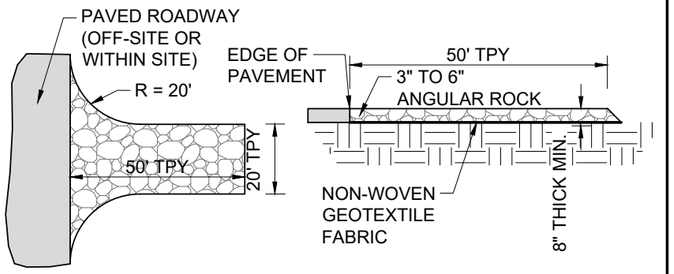
BMP DETAILS SHOWN BELOW PROVIDE ADDITIONAL BMP GUIDANCE NOT INCLUDED IN THE CASQA BMP FACTSHEET. ALL OTHER BMPS SHALL FOLLOW GUIDANCE IN THE FACTHEET IN APPENDIX G OF THE PROJECT SWPPP.



SE 10a *LEVEL GRADE DRAIN INLET PROTECTION*
NOT TO SCALE



SE 10b *CURB & GUTTER DRAIN INLET PROTECTION*
NOT TO SCALE



NOTES:
1. CONSTRUCTION EXIT SHALL BE KEPT IN GOOD CONDITION BY OCCASIONAL TOP DRESSING AND/OR ROUGHENING.
2. "RUMBLE PLATES" MAY BE ADDED AND COUNT TOWARDS 50' FT REQUIREMENT.
3. CONTRACTOR SHALL INSPECT EXIT WEEKLY AND DURING RAIN EVENTS.
4. CONTRACTOR SHALL SWEEP TRACKOUT WEEKLY AND PRIOR TO RAIN EVENTS PER CASQA SE-7 AND PER SJVAPCD DUST CONTROL REQUIREMENTS

TC 1 *STABILIZED CONSTRUCTION EXIT*
NOT TO SCALE

SITE LOCATION: 605 BASS AVE | MENDOTA, CA | 36.767640, -120.381368 — FIGURE: 1C

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
BMP SUMMARY AND DETAILS

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 3
OF 7 SHEETS

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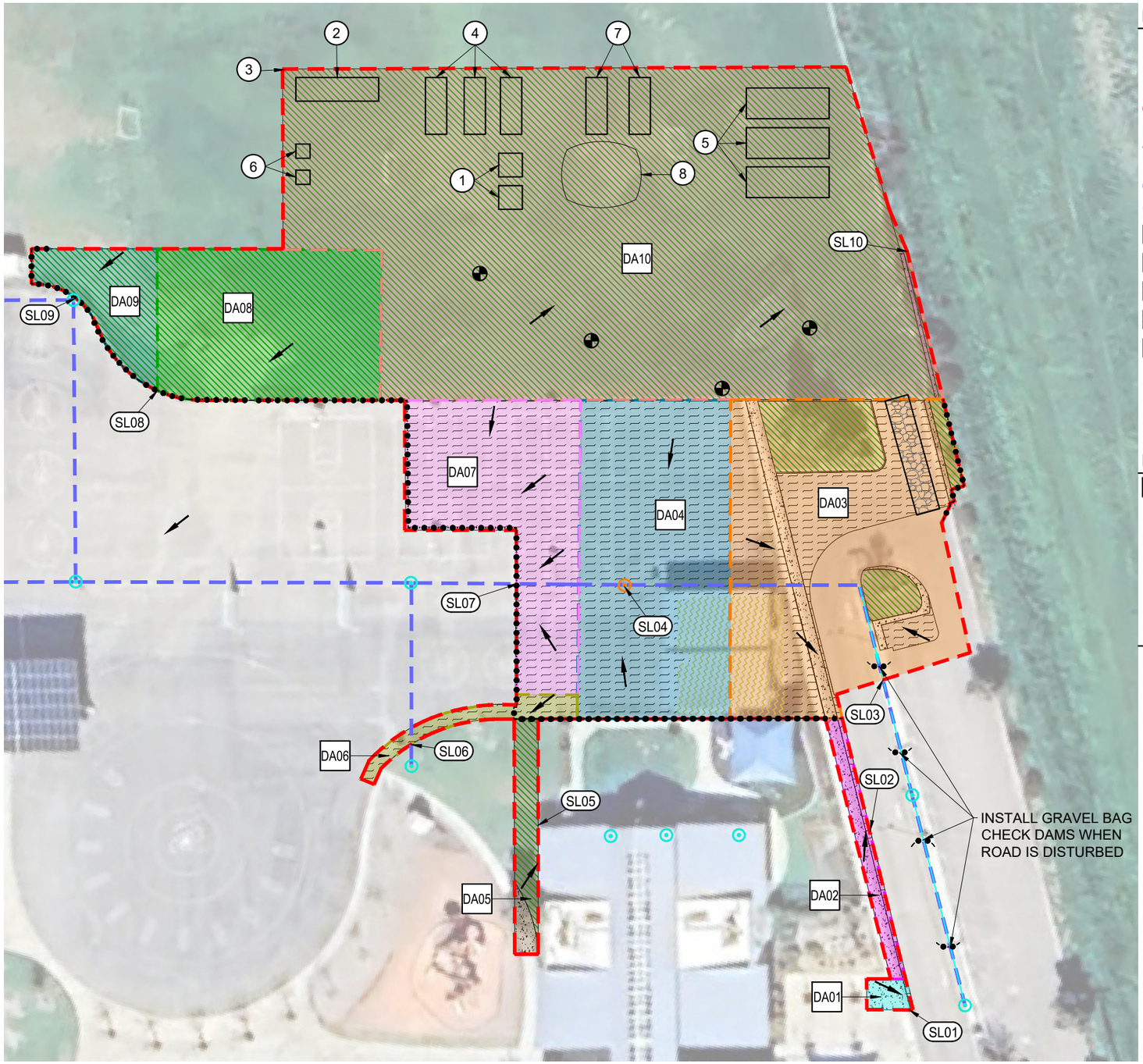

PRE-EARTHWORK SYMBOL LEGEND:

- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- PROTECT EXISTING DRAIN INLET TO BE DEMOLISHED PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING STORMWATER GUTTER
- EXISTING ASPHALT (NON-ROOF IMPERVIOUS AREAS)
- EXISTING CONCRETE (NON-ROOFTOP IMPERVIOUS AREAS)
- EXISTING ROOFTOP IMPERVIOUS AREAS
- EXISTING PERVIOUS AREAS
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1
- PRE-CONSTRUCTION GEOTECHNICAL INVESTIGATION BORING LOCATION

DRAINAGE AREA/NON-VISIBLE SAMPLING SYMBOL LEGEND:

- DRAINAGE AREA "X" BOUNDARY
- ## — DRAINAGE AREA NUMBER
- SL## — QSD IDENTIFIED DISCHARGE AND SAMPLING LOCATION. THE QSP SHALL FIELD VERIFY THE EXACT LOCATION OF DISCHARGE FOR A REPRESENTATIVE STORMWATER SAMPLE FOR NON-VISIBLE POLLUTANT SAMPLING.

STAGING AREA ITEMS:

1. CONCRETE WASHOUT LOCATION PER CASQA WM-08
2. LOCATION OF JOB TRAILER CONTAINING SPILL KIT AND ONSITE SWPPP
3. LOCATION OF RAIN GAUGE
4. MATERIAL STORAGE LOCATION PER CASQA WM-01
5. OVERNIGHT EQUIPMENT/VEHICLE STORAGE AND MAINTENANCE PER CASQA NS-8, NS-9 AND NS-10
6. RESTROOMS AND SANITARY FACILITIES PER CASQA WM-09
7. SOLID WASTE STORAGE LOCATION PER CASQA WM-05
8. STOCKPILE STORAGE LOCATION PER CASQW WM-03

N

0 10 25 50 75 100
SCALE IN FEET

SITE LOCATION: 605 BASS AVE | MENDOTA, CA | 36.767640, -120.381368 — FIGURE: 2

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
PRE-EARTHWORK SITE MAP

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 4
OF 7 SHEETS

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EARTHWORK SYMBOL LEGEND:

- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING SWALE/DRAINAGE DITCH/FLOWLINE/GUTTER
- PROPOSED WATER PIPELINE
- PROPOSED SEWER PIPELINE
- AREAS OF DEMOLITION. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF NON-BUILT LAND DISTURBANCE. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF PROPOSED FILL. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF PROPOSED CUT. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- AREAS OF PROPOSED MINOR GRADING. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1

DRAINAGE AREA/NON-VISIBLE SAMPLING SYMBOL LEGEND:

- DRAINAGE AREA "X" BOUNDARY
- ## — DRAINAGE AREA NUMBER
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STAGING AREA ITEMS:

1. CONCRETE WASHOUT LOCATION PER CASQA WM-08
2. LOCATION OF JOB TRAILER CONTAINING SPILL KIT AND ONSITE SWPPP
3. LOCATION OF RAIN GAUGE
4. MATERIAL STORAGE LOCATION PER CASQA WM-01
5. OVERNIGHT EQUIPMENT/VEHICLE STORAGE AND MAINTENANCE PER CASQA NS-8, NS-9 AND NS-10
6. RESTROOMS AND SANITARY FACILITIES PER CASQA WM-09
7. SOLID WASTE STORAGE LOCATION PER CASQA WM-05
8. STOCKPILE STORAGE LOCATION PER CASQW WM-03

N

0 10 25 50 75 100
SCALE IN FEET

SITE LOCATION: 605 BASS AVE | MENDOTA, CA | 36.767640, -120.381368 | FIGURE: 3

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
EARTHWORK SITE MAP

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 5
OF 7 SHEETS

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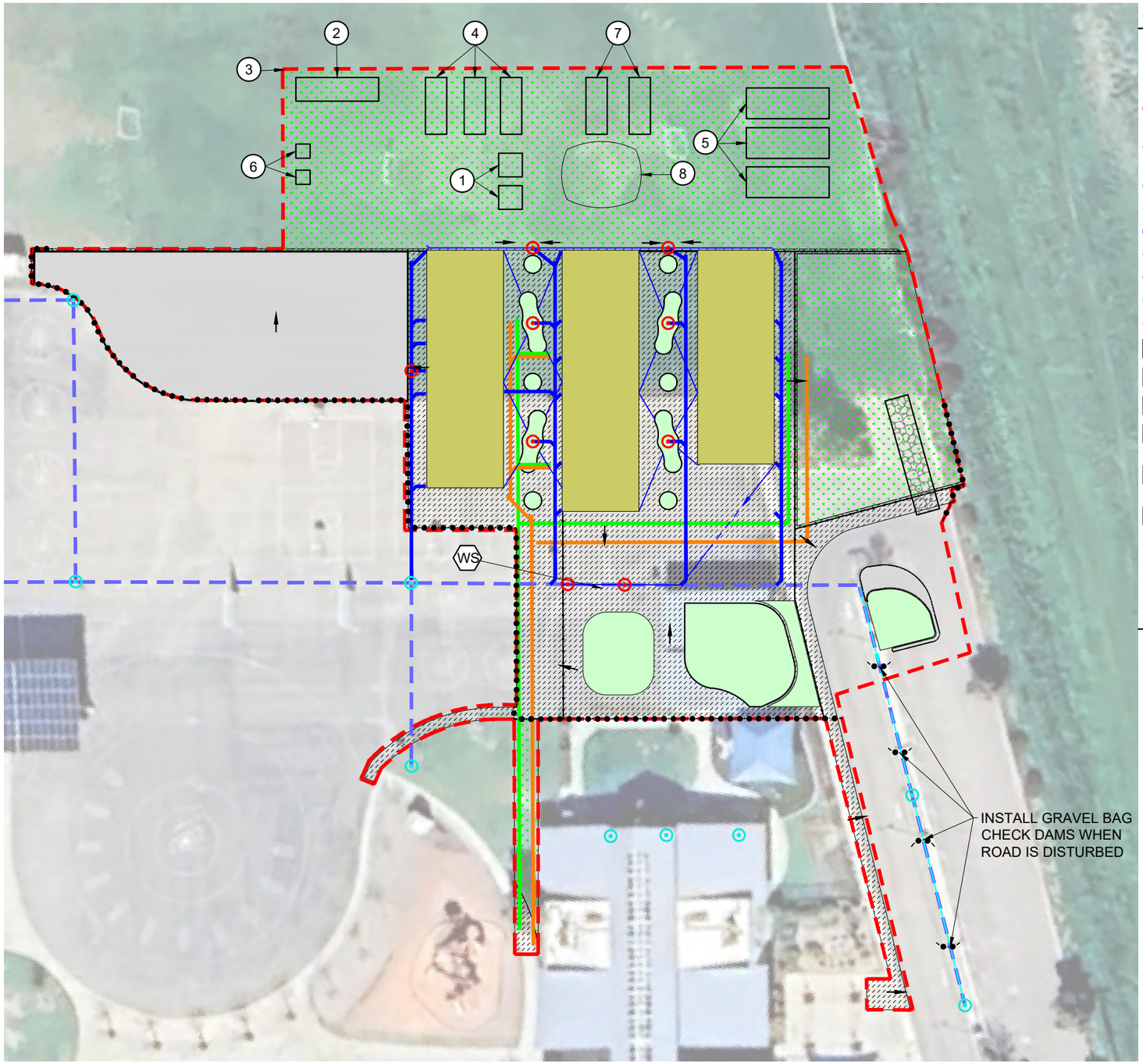

CONSTRUCTION SYMBOL LEGEND:

- PROTECT PROPOSED DRAIN INLET PER CASQA SE-10
- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING SWALE/DRAINAGE DITCH/FLOWLINE/GUTTER
- PROPOSED STORM DRAIN PIPELINE
- SWALE/DRAINAGE/DITCH/CULVERT/FLOWLINE/VALLEY GUTTER
- PROPOSED CHAIN LINK FENCE
- PROPOSED WATER PIPELINE
- PROPOSED SEWER PIPELINE
- PROPOSED ASPHALT CONCRETE (NON-ROOF IMPERVIOUS AREAS)
- PROPOSED CONCRETE (NON-ROOF IMPERVIOUS AREAS)
- PROPOSED BUILDING (ROOF IMPERVIOUS AREA)
- PROPOSED LANDSCAPING (PERVIOUS AREAS)
- AREAS OF NON-BUILT LAND DISTURBANCE FOR FINAL STABILIZATION. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1

STAGING AREA ITEMS:

1. CONCRETE WASHOUT LOCATION PER CASQA WM-08
2. LOCATION OF JOB TRAILER CONTAINING SPILL KIT AND ONSITE SWPPP
3. LOCATION OF RAIN GAUGE
4. MATERIAL STORAGE LOCATION PER CASQA WM-01
5. OVERNIGHT EQUIPMENT/VEHICLE STORAGE AND MAINTENANCE PER CASQA NS-8, NS-9 AND NS-10
6. RESTROOMS AND SANITARY FACILITIES PER CASQA WM-09
7. SOLID WASTE STORAGE LOCATION PER CASQA WM-05
8. STOCKPILE STORAGE LOCATION PER CASQW WM-03
- WS. WATER SUPPLY LOCATION PER CASQA NS-1

N

0 10 25 50 75 100
SCALE IN FEET

SITE LOCATION: 605 BASS AVE | MENDOTA, CA | 36.767640, -120.381368 | FIGURE: 4

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
CONSTRUCTION SITE MAP

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 6
OF 7 SHEETS

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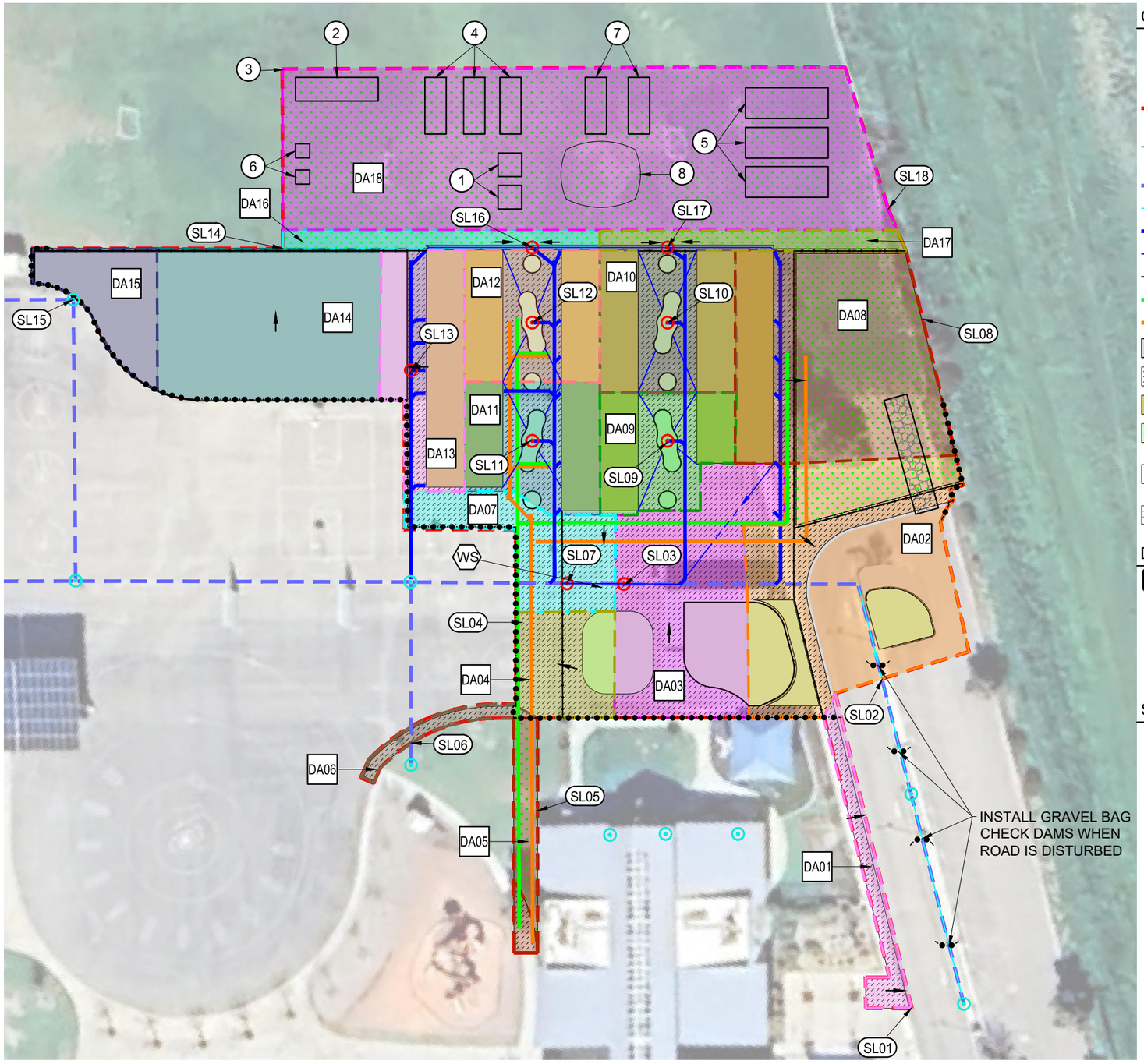

CONSTRUCTION SYMBOL LEGEND:

- PROTECT PROPOSED DRAIN INLET PER CASQA SE-10
- PROTECT EXISTING DRAIN INLET PER CASQA SE-10
- SURFACE FLOW DIRECTION
- PROJECT BOUNDARY
- LOCATION OF LINEAR SEDIMENT CONTROL BMPS. REFER TO NOTE 1 AND 2. EXACT LOCATIONS OF THE SEDIMENT CONTROL BMP'S SHALL BE COORDINATED WITH THE QSP PRIOR TO INSTALLATION OR REMOVAL.
- EXISTING STORM DRAIN PIPELINE
- EXISTING SWALE/DRAINAGE DITCH/FLOWLINE/GUTTER
- PROPOSED STORM DRAIN PIPELINE
- SWALE/DRAINAGE/DITCH/CULVERT/FLOWLINE/VALLEY GUTTER
- PROPOSED CHAIN LINK FENCE
- PROPOSED WATER PIPELINE
- PROPOSED SEWER PIPELINE
- PROPOSED ASPHALT CONCRETE (NON-ROOF IMPERVIOUS AREAS)
- PROPOSED CONCRETE (NON-ROOF IMPERVIOUS AREAS)
- PROPOSED BUILDING (ROOF IMPERVIOUS AREA)
- PROPOSED LANDSCAPING (PERVIOUS AREAS)
- AREAS OF NON-BUILT LAND DISTURBANCE FOR FINAL STABILIZATION. DISTURBED SOIL AREAS NOT PLANNED FOR CONSTRUCTION ACTIVITIES OVER THE NEXT 14 DAYS SHALL BE STABILIZED BY USE OF EROSION CONTROL BMPS. SEE NOTE 3 ON FIGURE 1B.
- LOCATION OF STABILIZED CONSTRUCTION ENTRANCE/EXIT PER CASQA TC-1

DRAINAGE AREA/NON-VISIBLE SAMPLING SYMBOL LEGEND:

- DRAINAGE AREA "X" BOUNDARY
- ## — DRAINAGE AREA NUMBER
- SL## — QSD IDENTIFIED DISCHARGE AND SAMPLING LOCATION. THE QSP SHALL FIELD VERIFY THE EXACT LOCATION OF DISCHARGE FOR A REPRESENTATIVE STORMWATER SAMPLE FOR NON-VISIBLE POLLUTANT SAMPLING.

STAGING AREA ITEMS:

1. CONCRETE WASHOUT LOCATION PER CASQA WM-08
2. LOCATION OF JOB TRAILER CONTAINING SPILL KIT AND ONSITE SWPPP
3. LOCATION OF RAIN GAUGE
4. MATERIAL STORAGE LOCATION PER CASQA WM-01
5. OVERNIGHT EQUIPMENT/VEHICLE STORAGE AND MAINTENANCE PER CASQA NS-8, NS-9 AND NS-10
6. RESTROOMS AND SANITARY FACILITIES PER CASQA WM-09
7. SOLID WASTE STORAGE LOCATION PER CASQA WM-05
8. STOCKPILE STORAGE LOCATION PER CASQW WM-03
- WS — WATER SUPPLY LOCATION PER CASQA NS-1

N

0 10 25 50 75 100
SCALE IN FEET

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FIGURE: 4.i

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MENDOTA UNIFIED SCHOOL DISTRICT

STORM WATER POLLUTION PREVENTION PLAN

MENDOTA ELEMENTARY SCHOOL CLASSROOM ADDITIONS
DRAINAGE AREA AND SAMPLING SITE MAP - CONSTRUCTION

DR. BY MR
CH. BY MG
DATE 03-13-2025
SCALE: AS NOTED

SHEET NO. 7
OF 7 SHEETS

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Appendix B: Permit Registration Documents

Permit Registration Documents included in this Appendix:

Location in SWPPP	**Permit Registration Document** (in addition to a copy of the SWPPP)
Appendix A	Site Maps and Drawings
Appendix B	Notice of Intent
Appendix B	Risk Level Determination
N/A	Certification (LRP Certification is provided electronically with SMARTS PRD submittal)
Appendix Q	Post-Construction Requirements, if applicable
Appendix L	Post-Construction Water Balance Calculator, if applicable
Appendix B	Copy of Annual Fee Receipt
N/A	ATS Design Documents, if applicable
N/A	Passive Treatment Design Documents, if applicable

Stormwater Multiple Application and Report Tracking System

You are logged in as Michael Gennaro. If this account does not belong to you, please log out.

Permit Type: Traditional:Construction - NOI **Application ID:** **Status:** Not Submitted

Sediment Risk | Receiving Water Risk | Combined Risk

1. SEDIMENT RISK FACTOR CALCULATION

Instructions: Enter R, K, and LS factor values. System will calculate watershed erosion estimates and segment sediment risk factor.

A) R Factor Value: ***(What's this?)** 26.99 Erosivity Calculator Help

Populate K and LS using GIS layer data

B) K Factor Value: (weighted average, by area, for all site soils) ***(What's this?)** 0.37

C) LS Factor: (weighted average, by area, for all slopes) ***(What's this?)** 0.13

Watershed Erosion Estimate (=R*K*LS) in tons/acre 1.298219

Project Sediment Risk Factor: **(What's this?)** **Low**

Save & Continue

Fields marked with * are mandatory fields.

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Stormwater Multiple Application and Report Tracking System

You are logged in as Michael Gennaro. If this account does not belong to you, please log out.

Permit Type: Traditional:Construction - NOI **Application ID:** **Status:** Not Submitted

Sediment Risk | Receiving Water Risk | Combined Risk

2. RECEIVING WATER RISK FACTOR CALCULATION

Statewide Map of High Receiving Water Risk Watersheds

A. Watershed Characteristics

A.1.(a) Does the disturbed area discharge directly or indirectly to a 303(d) listed waterbody impaired by sediment?

OR

A.1.(b) Is the disturbed area located within a sub-watershed draining to a 303(d) listed waterbody impaired by sediment?

OR

A.2. Is the disturbed area located within a planning watershed draining to a waterbody with designated beneficial uses of COLD, SPAWN AND MIGRATORY?

Receiving Water Risk (answer to above questions): No | Populate Receiving Water Risk

Project Receiving Water Risk Factor: Low

Save & Continue

Fields marked with * are mandatory fields.

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Stormwater Multiple Application and Report Tracking System

You are logged in as Michael Gennaro. If this account does not belong to you, please log out.

Permit Type: Traditional:Construction - NOI **Application ID:** **Status:** Not Submitted

Owner Information
On-Site Contact Information
Site Information
Additional Site Information
Risk
TMDL
Post Construction
QSD Information
Attachments
Billing Information
Certification
Linked Users

Sediment Risk | Receiving Water Risk | **Combined Risk**

3. COMBINED RISK LEVEL MATRIX

Receiving Water Risk \ Sediment Risk	Low	Medium	High
Low	Level1	Level2	
High		Level2	Level3

Project Sediment Risk: Low

Project Receiving Water Risk: Low

Project Combined Risk: **Level1**

Continue

Fields marked with * are mandatory fields.

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Rainfall Erosivity Factor Calculator for Small Construction

Introduction

EPA's stormwater regulations allow NPDES permitting authorities to waive NPDES permitting requirements for stormwater discharges from small construction sites if:

- the construction site disturbs less than five acres, and
- the rainfall erosivity factor ("R" in the revised universal soil loss equation, or RUSLE) value is less than five during the period of construction activity.

If your small construction project is located in an area where EPA is the permitting authority and your R factor is less than five, you qualify for a low erosivity waiver (LEW) from NPDES stormwater permitting. If your small construction project does not qualify for a waiver, then NPDES stormwater permit coverage is required. Follow the steps below to calculate your R-Factor.

LEW certifications are submitted through the NPDES eReporting Tool or "CGP-NeT". Several states that are authorized to implement the NPDES permitting program also accept LEWs. Check with your state NPDES permitting authority for more information.

- Submit your LEW through EPA's eReporting Tool <https://www.epa.gov/npdes/submitting-notice-intent-noi-notice-termination-not-or-low-erosivity-waiver-lew-under>
- List of states, Indian country, and territories where EPA is the permitting authority (pdf) <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-b-areas-of-permit-cover.pdf>
- Construction Rainfall Erosivity Waiver Fact Sheet <https://www.epa.gov/npdes/construction-rainfall-erosivity-waiver-fact-sheet>
- Small Construction Waivers and Instructions (pdf) <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-c-waivers.pdf>

The R-factor calculation can also be integrated directly into custom applications using the R-Factor web service <https://epa.gov/api-docs/>.

Steps to Calculate an R Factor for your Small Construction Project

1 Select the estimated start and end dates of construction by clicking the calendar icons below and using the dropdown calendar. The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date:

07/09/2025

End Date:

07/08/2026

2 Locate your small construction project by entering the address in the search box or by clicking on the map.

Location:

36.767640,-120.381368 **Search**

3 Click the "Calculate R Factor" button below.

Calculate R Factor

Facility Information

Start Date: 07/09/2025	**Latitude:** 36.7676
End Date: 07/08/2026	**Longitude:** -120.3814

Calculation Results

Rainfall erosivity factor (R Factor) = 22.34

A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage. If you are located in an area where EPA is the permitting authority (pdf) <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-b-areas-of-permit-cover.pdf>, you must submit a Notice of Intent (NOI) through the NPDES eReporting Tool (NeT) <https://www.epa.gov/npdes/submitting-notice-intent-noi-notice-termination-not-or-low-erosivity-waiver-lew-under>.Otherwise, you must seek coverage under your state's CGP.

For questions or comments, email EPA's CGP staff at cgp@epa.gov.

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Rainfall Erosivity Factor Calculator for Small Construction

Introduction

EPA's stormwater regulations allow NPDES permitting authorities to waive NPDES permitting requirements for stormwater discharges from small construction sites if:

- the construction site disturbs less than five acres, and
- the rainfall erosivity factor ("R" in the revised universal soil loss equation, or RUSLE) value is less than five during the period of construction activity.

If your small construction project is located in an area where EPA is the permitting authority and your R factor is less than five, you qualify for a low erosivity waiver (LEW) from NPDES stormwater permitting. If your small construction project does not qualify for a waiver, then NPDES stormwater permit coverage is required. Follow the steps below to calculate your R-Factor.

LEW certifications are submitted through the NPDES eReporting Tool or "CGP-NeT". Several states that are authorized to implement the NPDES permitting program also accept LEWs. Check with your state NPDES permitting authority for more information.

- Submit your LEW through EPA's eReporting Tool <https://www.epa.gov/npdes/submitting-notice-intent-noi-notice-termination-not-or-low-erosivity-waiver-lew-under>
- List of states, Indian country, and territories where EPA is the permitting authority (pdf) <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-b-areas-of-permit-cover.pdf>
- Construction Rainfall Erosivity Waiver Fact Sheet <https://www.epa.gov/npdes/construction-rainfall-erosivity-waiver-fact-sheet>
- Small Construction Waivers and Instructions (pdf) <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-c-waivers.pdf>

The R-factor calculation can also be integrated directly into custom applications using the R-Factor web service <https://epa.gov/api-docs/>.

Steps to Calculate an R Factor for your Small Construction Project

1 Select the estimated start and end dates of construction by clicking the calendar icons below and using the dropdown calendar. The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date:

07/09/2026

End Date:

11/30/2026

2 Locate your small construction project by entering the address in the search box or by clicking on the map.

Location:

36.767640,-120.381368 **Search**

3 Click the "Calculate R Factor" button below.

Calculate R Factor

Facility Information

Start Date: 07/09/2026	**Latitude:** 36.7676
End Date: 11/30/2026	**Longitude:** -120.3814

Calculation Results

Rainfall erosivity factor (R Factor) = **4.65**

A rainfall erosivity factor of less than 5.0 has been calculated for your site and period of construction. If you are located in an area where EPA is the permitting authority (pdf) <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-b-areas-of-permit-cover.pdf>, you can submit a LEW through EPA's NPDES eReporting Tool (NeT)

<https://www.epa.gov/npdes/submitting-notice-intent-noi-notice-termination-not-or-low-erosivity-waiver-lew-under>. Otherwise, contact your state permitting authority to determine if you are eligible for a waiver from NPDES permitting requirements.

If you submitted a LEW through EPA's NeT and your construction activity ultimately extends past the project completion date you specified above, you must recalculate the R factor using the original start date and a new project completion date. If the recalculated R factor is still less than 5.0, you must submit a modification to your LEW through NeT before the end of the original construction period. If the new R factor is 5.0 or greater, you must submit a Notice of Intent (NOI) instead to be covered by the Construction General Permit (CGP) before the original project completion date.

For questions or comments, email EPA's CGP staff at cgp@epa.gov.

Appendix C: SWPPP Amendment QSD Certifications

SWPPP Amendment No. _____

Project Name: Mendota Elementary School Classroom Additions

Project Number: **TBD**

Qualified SWPPP Developer's Certification of the Stormwater Pollution Prevention Plan Amendment

"This Stormwater Pollution Prevention Plan and its appendices were prepared under my direction to meet the requirements of the 2022 CGP (SWRCB Order No. 2022-0057-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

QSD's Signature	Date
QSD Name	QSD Certificate Number
Title and Affiliation	Telephone
Address	Email

Appendix D: Submitted Changes of Information

Log of Updated PRDs

The 2022 CGP allows for the reduction or increase of the total acreage when a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

A Change of Information (COI) shall be filed electronically within the timeframe shown in the table below. The SWPPP shall be modified appropriately, with revisions and amendments recorded in the SWPPP Amendment Log at the front of the SWPPP. COIs submitted electronically via SMARTS can be found in this Appendix.

Reason for Filing COI	**Timeline for Filing COI**
Reduction or increase in total disturbed area	Within 30 days of the reduction or increase
Updating site specific BMPs	Within 14 days of design change
Change construction start or end date	At least 14 days prior to the date to be changed
Post-construction plans updated or approved by the municipal stormwater permittee	Within 14 days of approval

---

This appendix includes all of the following updated PRDs (check all that apply):

☐ Change of Information;

☐ Revised Site Map;

☐ Revised Risk Assessment;

☐ New landowner's information (name, address, phone number, email address); and

☐ New signed certification statement.

Signature of [Authorized Representative of] Legally Responsible Person or Duly Authorized Representative	Date
Name of [Authorized Representative of] Legally Responsible Person or Duly Authorized Representative	Telephone Number

Appendix E: Construction Schedule

Appendix F: Construction Activities, Materials Used, and Associated Pollutants

Table F.a POLLUTANTS ASSOCIATED WITH CONSTRUCTION ACTIVITIES

General Work Activity/ Products With Potential Stormwater Pollutants	Specific Work Activity/Products With Potential Stormwater Pollutants	Pollutant Categories
Adhesives	• Adhesives, glues, resins, epoxy synthetics, PVC cement • Caulks, sealers, putty, sealing agents and • Coal tars (naphtha, pitch)	Oil and Grease, Synthetic Organics
Asphalt paving/curbs	• Hot and cold mix asphalt	Oil and Grease
Cleaners	• Polishes (metal, ceramic, tile) • Etching agents • Cleaners, ammonia, lye, caustic sodas, bleaching agents and chromate salts	Metals, Synthetic Organics
Concrete / Masonry	• Cement and brick dust • Colored chalks • Concrete curing compounds • Glazing compounds • Surfaces cleaners • Saw cut slurries • Tile cutting	Metals, Synthetic Organics
Drywall	• Saw-cutting drywall	Metals
Framing/Carpentry	• Sawdust, particle board dust, and treated woods • Saw cut slurries	Metals, Synthetic Organics
Heating, Ventilation, Air Conditioning	• Demolition or construction of air condition and heating systems	Metals, Synthetic Organics
Insulation	• Demolition or construction involving insulation, venting systems	Metals, Synthetic Organics
Liquid waste	• Wash waters • Irrigation line testing/flushing	Metals, Synthetic Organics
Painting	• Paint thinners, acetone, methyl ethyl ketone, stripper paints, lacquers, varnish, enamels, turpentine, gum spirit, solvents, dyes, stripping pigments and sanding	Metals, Synthetic Organics
Planting / Vegetation Management	• Vegetation control (pesticides/herbicides) • Planting • Plant maintenance • Vegetation removal	Nutrients, Metals, Synthetic Organics
Plumbing	• Solder (lead, tin), flux (zinc chloride), pipe fitting • Galvanized metal in nails, fences, and electric wiring	Metals, Synthetic Organics

Table F.a POLLUTANTS ASSOCIATED WITH CONSTRUCTION ACTIVITIES

General Work Activity/ Products With Potential Stormwater Pollutants	Specific Work Activity/Products With Potential Stormwater Pollutants	Pollutant Categories
Pools/fountains	• Chlorinated water	Synthetic Organics
Removal of existing structures	• Demolition of asphalt, concrete, masonry, framing, roofing, metal structures.	Metals, Oil and Grease, Synthetic Organics
Roofing	• Flashing • Saw cut slurries (tile cutting) • Shingle scrap and debris	Metals, Oil and Grease, Synthetic Organics
Sanitary waste	• Portable toilets • Disturbance of existing sewer lines.	Nutrients
Soil preparation/amendments	• Use of soil additives/amendments	Nutrients
Solid waste	• Litter, trash and debris • Vegetation	Gross Pollutants
Utility line testing and flushing	• Hydrostatic test water • Pipe flushing	Synthetic Organics
Vehicle and equipment use	• Equipment operation • Equipment maintenance • Equipment washing • Equipment fueling	Oil and Grease
Building Demolition	• Demolition debris built between 1950-1980 • Demolition debris from buildings with lead paint	Lead PCBs
1 Synthetic Organics are defined in Table 1.2 of the CASQA Stormwater BMP Handbook: Construction as adhesives, cleaners, sealants, solvents, etc. These are generally categorized as VOCs or SVOCs.		

Table F.1 Pollutant Source Assessment Form

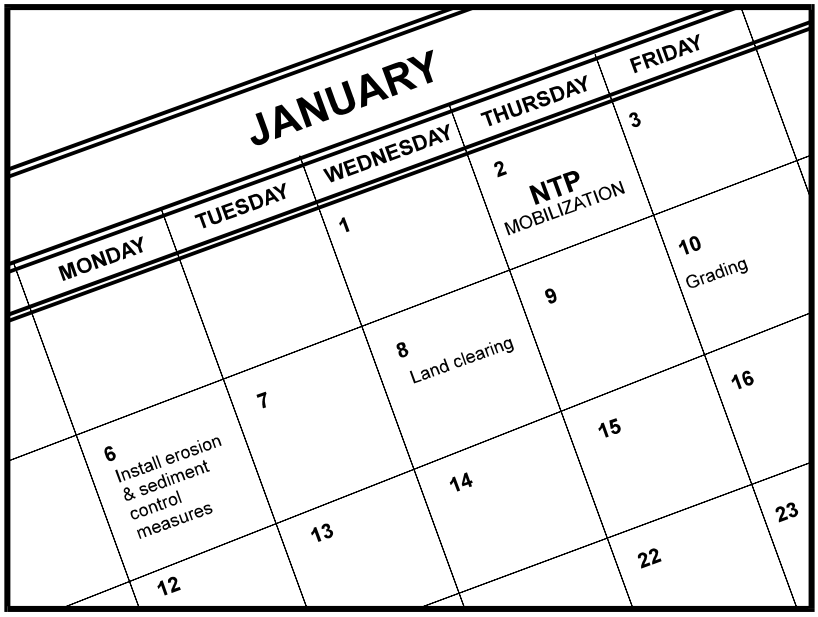
Phase	Activity	Associated Materials or Pollutants	Pollutant Category (1)
Demolition and Pre- Development Site Preparation Phase	Geotechnical investigations	Sediment	TSS
	Building, structure, and facility demolition (facilities from 1950-1980)	PCBs	Synthetic Organics
	Building and pipe Demolition (facilities from 1930-1977)	Asbestos	Hazardous pollutant
	Building/painted facility Demolition (facilities from pre-1978)	Lead paint	Metals
	Building Demolition	Sediment, trash	Sediment, gross pollutant
	Vehicle Equipment Operation and Storage	Fuel, Oil, Grease	Oil & grease
	Vehicle Equipment Operation and Storage	Freon, battery acid	Synthetic organics, metals
	Concrete cutting/grinding	sediment, concrete dust and slurry	Sediment, pH, metals
	Vegetation clearing and storage	Stockpiled vegetation	Nutrients
	General Operations	Trash, Sanitary waste	Gross pollutants, nutrients, bacteria, viruses
Grading and Land Development	Grading	Sediment	Sediment
	Vegetation clearing and storage	Stockpiled vegetation	Nutrients
	Vehicle Equipment Operation and Storage	Fuel, oil, Grease	Oil & grease
	Vehicle Equipment Operation and Storage	Freon, battery acid	Synthetic organics, metals
	Vegetation clearing and storage	Stockpiled vegetation	Nutrients
	General Operations	Trash, Sanitary waste	Gross pollutants, nutrients, bacteria, viruses
Streets and Utilities Phase	Material Delivery	Varies based on materials	Varies based on materials
	Trenching and Soil Management	Sediment	Sediment
	Install pipelines, laterals, conduits	Joint and form lubricants, PVC shards/dust	Synthetic organics, gross Pollutants
	Adhesives	Adhesives, flues, resins, epoxy synthetic, PVC cement Caulks, sealers, putty, sealing agents.	Oil & grease, synthetic organics
	Asphalt Concrete Paving Operations	Sediment, bituminous chemicals	Sediment, oil & grease
	Concrete Paving and Operations	Curing Concrete, Concrete washout waste	Sediment, metals, pH
	Install emulsion sealer	Hydrocarbons	Oil & grease

	Paint pavement striping and markings	Paint	Synthetic organics, nutrients
	Vegetation clearing and storage	Stockpiled vegetation	Nutrients
	Vehicle Equipment Operation and Storage	Fuel, oil, Grease	Oil & grease
	Vehicle Equipment Operation and Storage	Freon, battery acid	Synthetic organics, metals
	General Operations	Trash, Sanitary waste	Gross pollutants, nutrients, bacteria, viruses
	Utility line flushing	Chlorinated water	Synthetic organics
Vertical Construction Phase	Welding	Solder (lead, tin), flux (zinc chloride), pipe fitting	Metals, synthetic organics
	Framing/Carpentry	Sawdust, particle board dust, and treated woods	Metals, synthetic organics
	Drywall	Saw-cutting drywall	Metals
	Heating, ventilation, Air conditioning	Construction of HVAC systems	Metals, synthetic organics, oil and grease
	Insulation Installation	Insulation materials	Metals, synthetic organics
	Painting	Paint thinners, acetone, methyl ethyl ketone, stripper paints, lacquers, varnish, enamels, turpentine, gum spirit, solvents, dyes, stripping pigments and sanding	Metals, Synthetic Organics
	Pools/fountains	Chlorinated water	Synthetic organics
	Roofing	Flashing, saw cut slurries (tiles), Shingle scrap and debris, roof sealants	Metals, oil and grease, synthetic organics
	Plumbing	Solder (lead, tin), flux (zinc chloride),	Metals
	Vehicle Equipment Operation and Storage	Fuel, oil, Grease	Oil & grease
	Vehicle Equipment Operation and Storage	Freon, battery acid	Synthetic organics, metals
	General Operations	Trash, Sanitary waste	Gross pollutants, nutrients, bacteria, viruses
	Utility line flushing	Chlorinated water	Synthetic organics
Final Landscaping and Site Stabilization Phase	Planting / Vegetation Management	Vegetation control (pesticides/herbicides), planting, plant maintenance, vegetation removal	Nutrients, Metals, Synthetic Organics
	Soil preparation/amendments	Use of compost, chemical fertilizer, pH soil amendments	Nutrients, pH
	Vehicle Equipment Operation and Storage	Fuel, oil, Grease	Oil & grease
	Vehicle Equipment Operation and Storage	Freon, battery acid	Synthetic organics, metals
	General Operations	Trash, Sanitary waste	Gross pollutants, nutrients, bacteria, viruses

(1) Categories per CASQA BMP Handbook (i.e., Sediment, Nutrients, Bacteria and Viruses, Oil and Grease, Metals, Synthetic Organics, Pesticides, Gross Pollutants, and Vector Production).

Appendix G: CASQA Stormwater BMP Handbook: Construction Fact Sheets

Scheduling EC-1



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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CALIFORNIA STORMWATER QUALITY ASSOCIATION®

to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs
  - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
  - Sequence trenching activities so that most open portions are closed before new trenching begins.
  - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.
- Avoid soil disturbance during periods with high wind velocities.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques

should be compared with the other less effective erosion and sedimentation controls to achieve a cost-effective balance.

Inspection and Maintenance

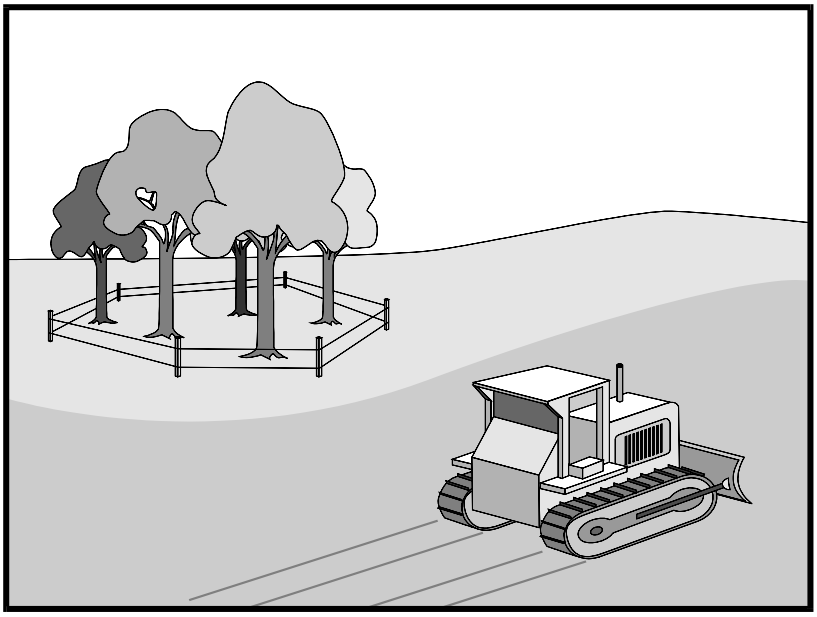
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation of Existing Vegetation EC-2



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.
- Protecting existing vegetation buffers and swales.

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Preservation of Existing Vegetation EC-2

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
  - Orange colored plastic mesh fencing works well.
  - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

- Consider pruning or mowing vegetation instead of removing it to allow for regrowth.
- If possible, retain vegetation buffer around the site and adjacent waterways.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of $10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization:

- Fertilize trees in the late fall or early spring. Although to note, many native species do not require fertilization.

- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.

- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

References

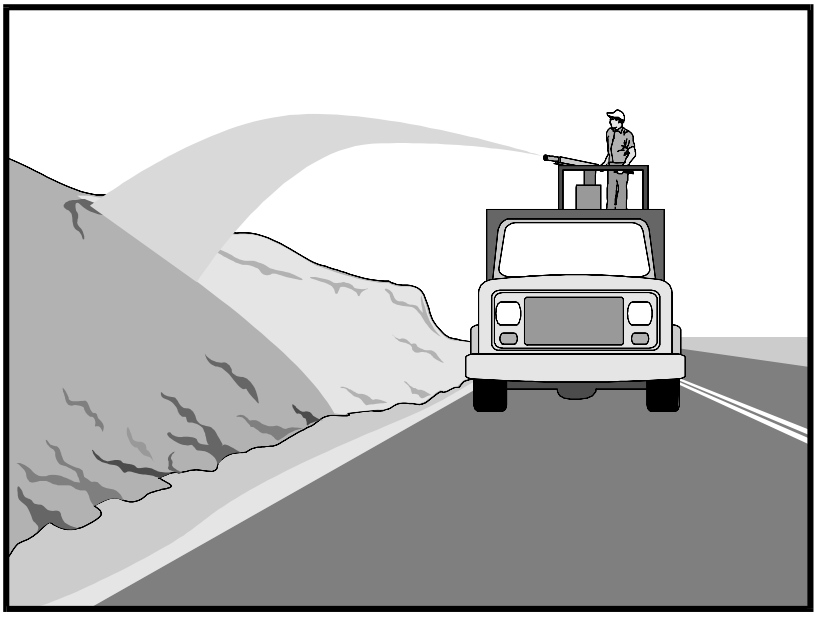
County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Hydraulic Mulch EC-3



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-4 Hydroseeding
EC-5 Soil Binders
EC-6 Straw Mulch
EC-7 Geotextiles and Mats
EC-8 Wood Mulching
EC-14 Compost Blanket
EC-16 Non-Vegetative Stabilization

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Description and Purpose

Hydraulic Mulch consists of various types of fibrous materials mixed with water and sprayed onto the soil surface in slurry form to provide a layer of temporary protection from wind and water erosion.

Suitable Applications

Hydraulic mulch as a temporary, stand alone, erosion control BMP is suitable for disturbed areas that require temporary protection from wind and water erosion until permanent soil stabilization activities commence. Examples include:

- Rough-graded areas that will remain inactive for longer than permit-required thresholds (e.g., 14 days) or otherwise require stabilization to minimize erosion or prevent sediment discharges.
- Soil stockpiles.
- Slopes with exposed soil between existing vegetation such as trees or shrubs.
- Slopes planted with live, container-grown vegetation or plugs.
- Slopes burned by wildfire.
- To stabilize earthen berms
- Areas seeded by broadcasting or drilling

- Temporary stabilization during high wind conditions

Hydraulic mulch can also be applied to augment other erosion control BMPs such as:

- In conjunction with straw mulch (see EC-6 Straw Mulch) where the rate of hydraulic mulch is reduced to 100-500 lbs per acre and the slurry is applied over the straw as a tackifying agent to hold the straw in place.
- Supplemental application of soil amendments, such as fertilizer, lime, gypsum, soil bio-stimulants or compost.

Limitations

In general, hydraulic mulch is not limited by slope length, gradient or soil type. However, the following limitations typically apply:

- Most hydraulic mulch applications, particularly bonded fiber matrices (BFMs), require at least 24 hours to dry before rainfall occurs.
- Temporary applications (i.e., without a vegetative component) may require a second application in order to remain effective for an entire rainy season.
- Treatment areas must be accessible to hydraulic mulching equipment.
- Availability of water sources in remote areas for mixing and application.
- As a stand-alone temporary BMP, hydraulic mulches may need to be re-applied to maintain their erosion control effectiveness, typically after 6-12 months depending on the type of mulch used.
- Availability of hydraulic mulching equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Cellulose fiber mulches alone may not perform well on steep slopes or in course soils.
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, compost, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown, and some may have water quality impacts due to their chemical makeup. Refer to specific chemical properties identified in the product Safety Data Sheet (may not include ecological information); products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to factsheet EC-05 for further guidance on selecting soil binders.
- A water supply is needed to refill hydro mulch equipment tank.
- Cannot be disturbed by walking or driving on the surface after application.
- Recommend using in conjunction with other BMPs (i.e., fiber rolls, etc.).

Implementation

- Where feasible, it is preferable to prepare soil surfaces prior to application by roughening embankments and fill areas with a crimping or punching type roller or by track walking.
- The majority of hydraulic mulch applications do not necessarily require surface/soil preparation (See EC-15 Soil Preparation) although in almost every case where re-vegetation is included as part of the practice, soil preparation can be beneficial. One of the advantages of hydraulic mulch over other erosion control methods is that it can be applied in areas where soil preparation is precluded by site conditions, such as steep slopes, rocky soils, or inaccessibility.
- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Hydraulic mulching is generally performed utilizing specialized machines that have a large water-holding/mixing tank and some form of mechanical agitation or other recirculation method to keep water, mulch and soil amendments in suspension. The mixed hydraulic slurry can be applied from a tower sprayer on top of the machine or by extending a hose to areas remote from the machine.
- Where possible apply hydraulic mulch from multiple directions to adequately cover the soil. Application from a single direction can result in shadowing, uneven coverage and failure of the BMP.
- Hydraulic mulch can also include a vegetative component, such as seed, rhizomes, or stolons (see EC-4 Hydraulic Seed).
- Typical hydraulic mulch application rates range from 2,000 pounds per acre for standard mulches (SMs) to 3,500 lbs. per acre for BFMs. However, the required amount of hydraulic mulch to provide adequate coverage of exposed topsoil may appear to exceed the standard rates when the roughness of the soil surface is changed due to soil preparation methods (see EC-15 Soil Preparation) or by slope gradient.
- Other factors such as existing soil moisture and soil texture can have a profound effect on the amount of hydraulic mulch required (i.e. application rate) applied to achieve an erosion-resistant covering.
- Avoid use of mulch without a tackifier component, especially on slopes.
- Mulches used in the hydraulic mulch slurry can include:
  - Cellulose fiber (paper- or corn-based)
  - Wood fibers
  - Cotton
  - Synthetics
  - Compost (see EC-14, Compost Blanket)
  - Straw

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Categories of Hydraulic Mulches

Standard Hydraulic Mulch (SM)

Standard hydraulic mulches are generally applied at a rate of 2,000 lbs. per acre and are manufactured containing around 5% tackifier (i.e. soil binder), usually a plant-derived guar or psyllium type. Most standard mulches are green in color derived from food-color based dyes.

Hydraulic Matrices (HM) and Stabilized Fiber Matrices (SFM)

Hydraulic matrices and stabilized fiber matrices are slurries which contain increased levels of tackifiers/soil binders; usually 10% or more by weight. HMs and SFMs have improved performance compared to a standard hydraulic mulch (SM) because of the additional percentage of tackifier and because of their higher application rates, typically 2,500 – 4,000 lbs. per acre. Hydraulic matrices can include a mixture of fibers, for example, a 50/50 blend of paper and wood fiber. In the case of an SFM, the tackifier/soil binder is specified as a polyacrylamide (PAM).

Bonded Fiber Matrix (BFM)

Bonded fiber matrices (BFMs) are hydraulically-applied systems of fibers, adhesives (typically guar- or polymer-based) and chemical cross-links. Upon drying, the slurry forms an erosion-resistant blanket that prevents soil erosion and promotes vegetation establishment. The cross-linked adhesive in the BFM should be biodegradable and should not dissolve or disperse upon re-wetting. BFMs are typically applied at rates from 3,000 to 4,000 lbs. per acre based on the manufacturer's recommendation. BFMs should not be applied immediately before, during or immediately after rainfall or if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Hydraulic Compost Matrix (HCM)

Hydraulic compost matrix (HCM) is a field-derived practice whereby finely graded or sifted compost is introduced into the hydraulic mulch slurry. A guar-type tackifier can be added for steeper slope applications as well as any specified seed mixtures. An HCM can help to accelerate seed germination and growth. HCMs are particularly useful as an in-fill for three-dimensional re-vegetation geocomposites, such as turf reinforcement mats (TRM) (see EC-7 Geotextiles and Mats).

Costs

Average installed costs for hydraulic mulch categories are is provided in Table 1, below.

Table
HYDRAULIC MULCH BMPs
INSTALLED COSTS

BMP	Installed Cost/Acre
Standard Hydraulic Mulching (SM)	$2,100 - $4,700 per acre
Hydraulic Matrices (HM) and Stabilized Fiber Matrices	
Guar-based	$2,600 - $5,200 per acre
PAM-based	$3,200 - $7,200 per acre
Bonded Fiber Matrix (BFM)	$5,000 - $8,800 per acre
Hydraulic Compost Matrix (HCM)	$3,800 - $4,500 per acre

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Compare the number of bags or weight of applied mulch to the area treated to determine actual application rates and compliance with specifications.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Controlling Erosion of Construction Sites, Agricultural Information #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, an Inventory of Current Practices Draft, US EPA, April 1990.

Soil Erosion by Water, Agriculture Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

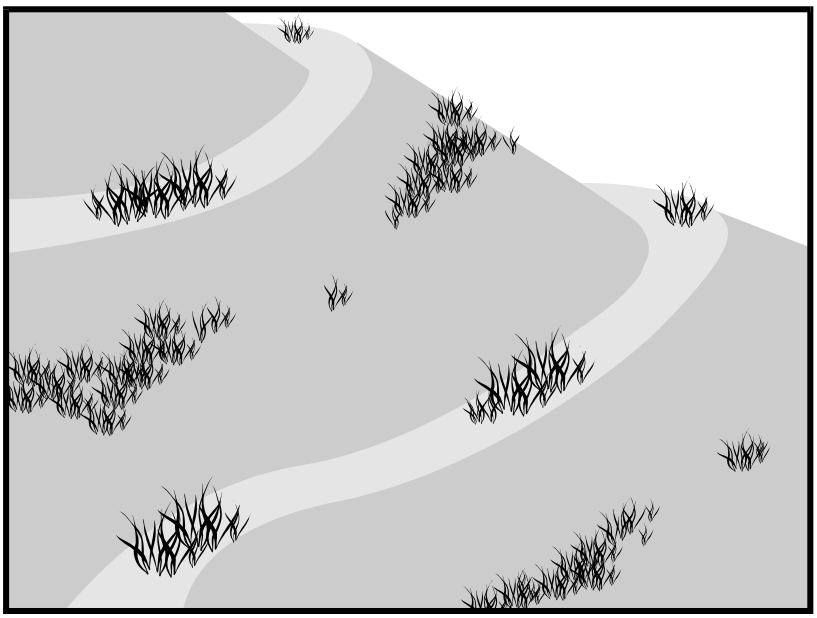
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Hydroseeding EC-4



Description and Purpose

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, and water with the possible addition of tackifier, compost, mycorrhizae inoculant, fertilizer, and/or soil conditioner, to temporarily protect exposed soils from erosion by water and wind. Hydraulic seeding, or hydroseeding, is simply the method by which temporary or permanent seed is applied to the soil surface and temporary erosion control is established by means of the mulch component.

Suitable Applications

Hydroseeding is suitable for disturbed areas requiring temporary protection until permanent stabilization is established, for disturbed areas that will be re-disturbed following an extended period of inactivity, or to apply permanent stabilization measures. Hydroseeding without mulch or other cover (e.g., EC-7, Geotextiles and Mats) is not a stand-alone erosion control BMP and should be combined with additional measures until vegetation establishment.

Typical applications for hydroseeding include:

- Disturbed soil/graded areas where permanent stabilization or continued earthwork is not anticipated prior to seed germination.
- Cleared and graded areas exposed to seasonal rains or temporary irrigation.
- To vegetate swales and earthen berms.

Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

EC-14 Compost Blanket

EC-16 Non-Vegetative Stabilization

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- Areas not subject to heavy wear by construction equipment or high traffic.

Limitations

- Availability of hydroseeding equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Hydraulic seed should be applied with hydraulic mulch or a stand-alone hydroseed application should be followed by one of the following:
    - Straw mulch (see Straw Mulch EC-6)
    - Rolled erosion control products (see Geotextiles and Mats EC-7)
    - Application of Compost Blanket (see Compost Blanket EC-14)

  Hydraulic seed may be used alone only on small flat surfaces when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control.
- Hydraulic seed without mulch does not provide immediate erosion control.
- Temporary seeding may not be appropriate for steep slopes (i.e., slopes readily prone to rill erosion or without sufficient topsoil).
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation may not be appropriate for short term inactivity (i.e., less than 3-6 months).
- Vegetation may not establish when hydroseed is applied to very compact soils.
- Mulch may inhibit germination when applied at high rates.
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown, and some may have water quality impacts due to their chemical makeup. Additionally, these constituents may require non-visible pollutant monitoring. Refer to specific chemical properties identified in the product's Safety Data Sheet (SDS), although, note that not all SDS's provide ecological information; products should be evaluated for project-specific implementation by the QSD. Refer to fact sheet EC-05, Soil Binders, for further guidance on selecting soil binders.

Implementation

In order to select appropriate hydraulic seed mixtures, an evaluation of site conditions should be performed with respect to:

- Soil conditions
- Site topography and exposure (sun/wind)
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS), Resource Conservation Districts and Agricultural Extension Service can provide information on appropriate seed mixes.

The following steps should be followed for implementation:

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying (See EC-15, Soil Preparation) the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.
- Avoid use of hydraulic seed in areas where the BMP would be incompatible with future earthwork activities.
- Hydraulic seed can be applied using a multiple step or one step process.
  - In a multiple step process, hydraulic seed is applied first, followed by mulch or a Rolled Erosion Control Product (RECP).
  - In the one step process, hydraulic seed is applied with hydraulic mulch in a hydraulic matrix. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- All hydraulically seeded areas should have mulch, or alternate erosion control cover to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds should be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag should be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container should be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed should be pellet inoculated. Inoculant sources should be species specific and should be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer should conform to the requirements of the California Food and Agricultural Code, which can be found at: http://www.leginfo.ca.gov/.html/fac_table_of_contents.html. Fertilizer should be pelleted or granular form.
- Follow up applications should be made as needed to cover areas of poor coverage or germination/vegetation establishment and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Costs

Average cost for installation and maintenance may vary from as low as $2,400 per acre for flat slopes and stable soils, to $5,200 per acre for moderate to steep slopes and/or erosive soils. Cost of seed mixtures vary based on types of required vegetation.

BMP	Installed Cost per Acre
Hydraulic Seed	$2,400-$5,200

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

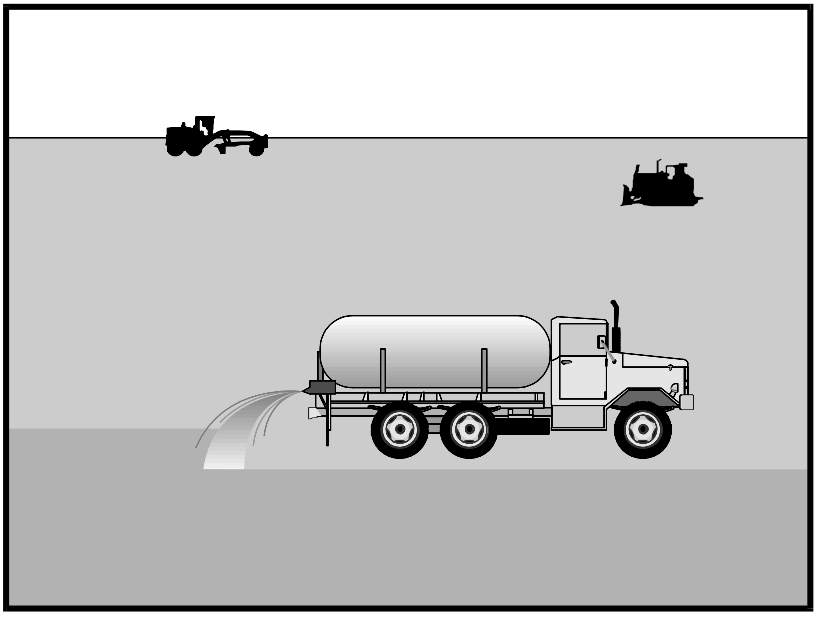
References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Soil Binders EC-5



Categories

EC	Erosion Control	☑
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Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

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Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time.
- Soil stockpiles.
- Temporary haul roads prior to placement of crushed rock.
- Compacted soil road base.
- Construction staging, materials storage, and layout areas.
- Slopes and areas requiring stabilization prior to rain.
- Disturbed areas subject to high winds.

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.
- Soil binders may not sufficiently penetrate compacted soils.
- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of some chemical soil binders are relatively unknown, and some may have water quality impacts due to their chemical makeup. Additionally, these chemicals may require non-visible pollutant monitoring. Products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to the product Material Safety Data Sheet for chemical properties.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.
- Site soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Safety Data Sheet (SDS) from the manufacturer to ensure non-toxicity (note however, the SDS may not include ecological information).
- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.
    - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.

- Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.

- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Some soil binders are designed for application to roads.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application is related to the functional longevity of the binder, which can be affected by subgrade conditions, surface type, climate, and maintenance schedule.
- Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material-Based (Short Lived, <6 months) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material-Based (Long Lived, 6-12 months) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1-part emulsion
- For sandy soil: 10 parts water to 1-part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1-part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with the manufacturer's recommendations and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

Poly-Acrylamide (PAM) and Copolymer of Acrylamide**:** Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

- Limitations specific to PAM are as follows:
  - Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
  - The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.
  - PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".
  - PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum-based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.
- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd^2 or according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 6 to 12 in.
  - Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
  - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
  - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd^2.

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre
Plant-Material-Based (Short Lived) Binders	$900-$1,200
Plant-Material-Based (Long Lived) Binders	$1,500-$1,900
Polymeric Emulsion Blend Binders	$900-$1,900
Cementitious-Based Binders	$1,000-$1,500

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	**Plant Material Based (Long Lived)**	**Polymeric Emulsion Blends**	**Cementitious-Based Binders**
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

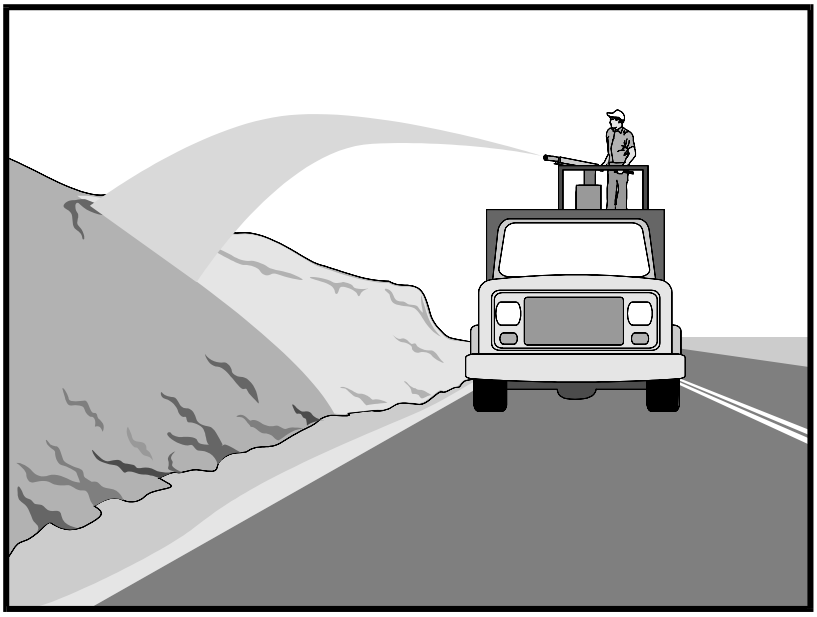
Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Straw Mulch EC-6



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-5 Soil Binders

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

EC-14 Compost Blanket

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Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch can be specified for the following applications:

- As a stand-alone BMP on disturbed areas until soils can be prepared for permanent vegetation. The longevity of straw mulch is typically less than six months.
- Applied in combination with temporary seeding strategies
- Applied in combination with permanent seeding strategies to enhance plant establishment and final soil stabilization
- Applied around containerized plantings to control erosion until the plants become established to provide permanent stabilization

Limitations

Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.

- There is a potential for introduction of weed seed and unwanted plant material if weed-free agricultural straw is not specified.
- Straw mulch applied by hand is more time intensive and potentially costly.
- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- "Punching" of straw does not work in sandy soils, necessitating the use of tackifiers.
- Potential fugitive dust control issues associated with straw applications can occur. Application of a stabilizing emulsion or a water stream at the same time straw is being blown can reduce this problem.
- Use of plastic netting should be avoided in areas where wildlife may be entrapped and may be prohibited for projects in certain areas with sensitive wildlife species, especially reptiles and amphibians.

Implementation

- Straw should be derived from weed-free wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw should be used.
- Use tackifier to anchor straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking can be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier should not be applied during or immediately before rainfall.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Application Procedures

- When using a tackifier to anchor the straw mulch, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- Apply straw at a rate of between 3,000 and 4,000 lb./acre, either by machine or by hand distribution and provide 100% ground cover. A lighter application is used for flat surfaces and a heavier application is used for slopes.
- Evenly distribute straw mulch on the soil surface.
- Anchoring straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating) can be used in lieu of a tackifier.

- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.

  - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier should be selected based on longevity and ability to hold the fibers in place. A tackifier is typically applied at a rate of 125 lb./acre. In windy conditions, the rates are typically 180 lb./acre.

  - On very small areas, a spade or shovel can be used to punch in straw mulch.

  - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coulter, known commercially as a "crimper."

Costs

Average annual cost for installation and maintenance is included in the table below. Application by hand is more time intensive and potentially more costly.

BMP	Unit Cost per Acre
Straw mulch, crimped or punched	$3,150-$6,900
Straw mulch with tackifier	$2,300-$6,200

Source: Cost information received from individual product suppliers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives. Straw mulch as a stand-alone BMP is temporary and is not suited for long-term erosion control.

- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.

- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

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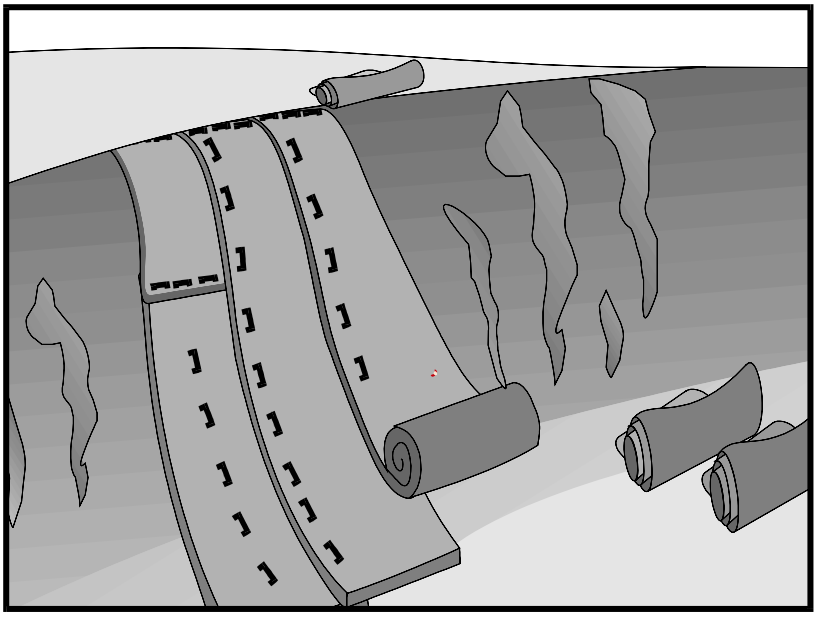
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Geotextiles and Mats EC-7



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Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

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Description and Purpose

Rolled Erosion Control Products (RECPs), also known as erosion control matting or blankets, can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high, and vegetation will be slow to establish. Mattings are also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs should be considered in the following situations:

- Steep slopes, generally steeper than 3:1 (H:V).
- Long slopes.
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.

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- Disturbed areas where temporary cover is needed, or plants are slow to establish or will not establish.
- Channels with flows exceeding 3.3 ft/s.
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies.

Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g., channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature and/or sunlight.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- The use of plastic sheeting should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until other measures, such as seeding and mulching, may be installed.
    - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
    - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- According to the State Water Board's *CGP Review, Issue #2*, only RECPs that either do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials, such as jute, sisal, or coir fiber should be used due to plastic pollution and wildlife concerns. If a plastic-netted product is used for temporary stabilization, it must be promptly removed when no longer needed and removed or replaced with non-plastic netted RECPs for final stabilization.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting. As per State Water Board guidance, RECPs that

contain plastic netting are discouraged for temporary controls and are not acceptable alternatives for permanent controls. RECPs that do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber should be used.

- RECPs may have limitations in extremely windy climates; they are susceptible to wind damage and displacement. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.

Implementation

Material Selection

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

- The following natural and synthetic RECPs are commonly used:

Geotextiles

- Material can be a woven or a non-woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.

- Plastic sheeting should have a minimum thickness of 6 mils and must be keyed in at the top of slope (when used as a temporary slope protection) and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil (when used as a temporary slope protection).

- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired

immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable. See typical installation details at the end of this fact sheet.

  - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd^2, ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

  - **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

  - **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5

lb/yd^2. Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd^2. Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well. Only biodegradable RECPs can remain on a site applying for a Notice of Termination due to plastic pollution and wild life concerns (State Waterboard, 2016). RECPs containing plastic that are used on a site must be disposed of for final stabilization.

  - **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than ¼ in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Bonded synthetic fibers** consist of a three-dimensional geometric nylon (or other synthetic) matting. Typically, it has more than 90 percent open area, which facilitates

root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding/Planting

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots shall be installed as required by the manufacturer.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd^2. Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd^2. Check manufacturer's specifications to determine if a higher density staple pattern is required.

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.

- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement mat (TRM))

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake ½-3/4 inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		Installed Cost per Acre
Biodegradable	Jute Mesh	$7,700-$9,000
	Curled Wood Fiber	$10,200-$13,400
	Straw	$10,200-$13,400
	Wood Fiber	$10,200-$13,400
	Coconut Fiber	$16,600-$18,000
	Coconut Fiber Mesh	$38,400-$42,200
	Straw Coconut Fiber	$12,800-$15,400
Non-Biodegradable	Plastic Netting	$2,600-$2,800
	Plastic Mesh	$3,800-$4,500
	Synthetic Fiber with Netting	$43,500-$51,200
	Bonded Synthetic Fibers	$57,600-$70,400
	Combination with Biodegradable	$38,400-$46,100

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.

References

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Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

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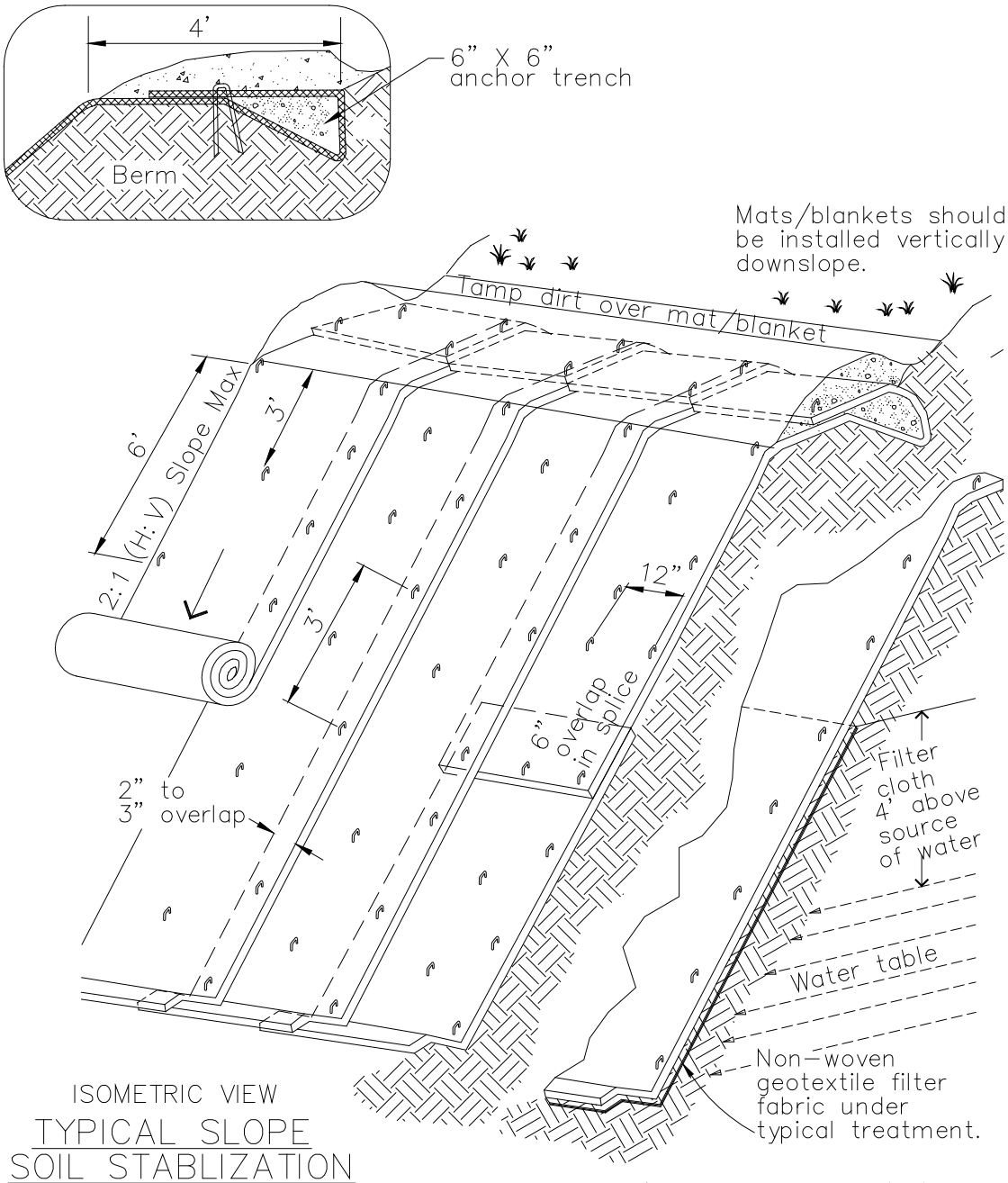


ISOMETRIC VIEW

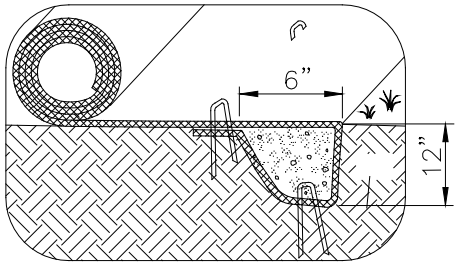
TYPICAL SLOPE
SOIL STABLIZATION
NTS

WET SLOPE LINING
NTS

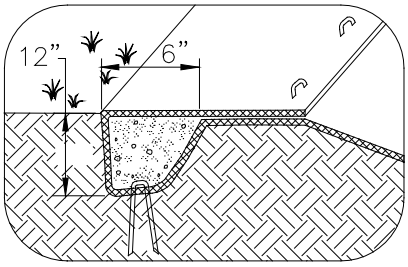
NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL



INITIAL CHANNEL ANCHOR TRENCH
NTS



TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH
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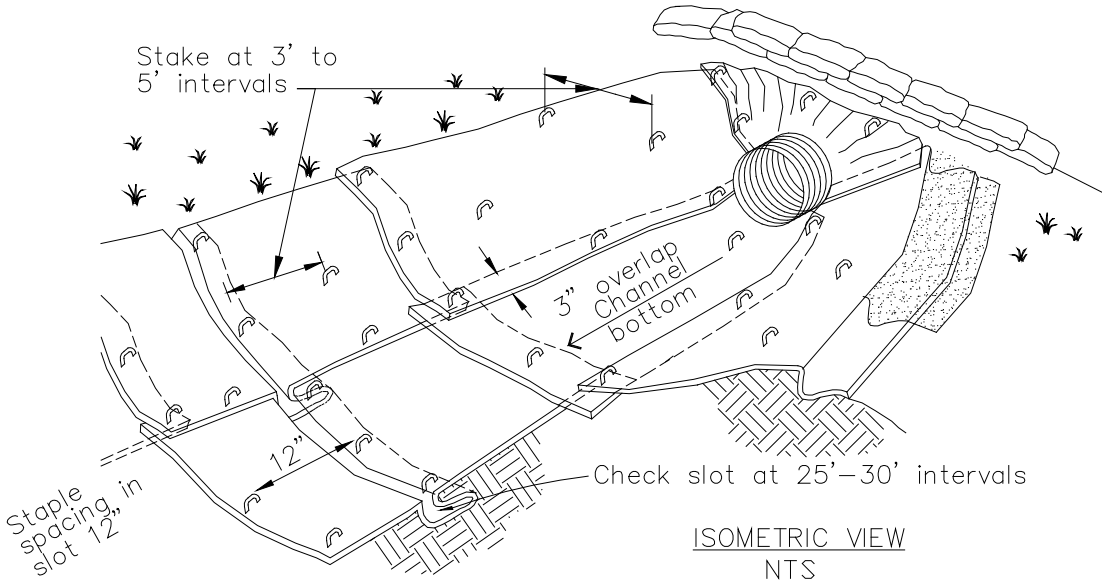
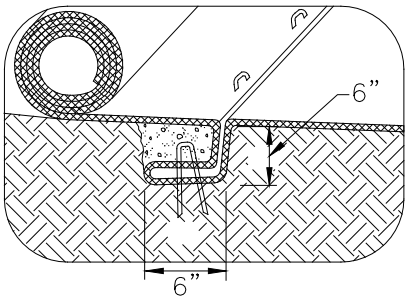
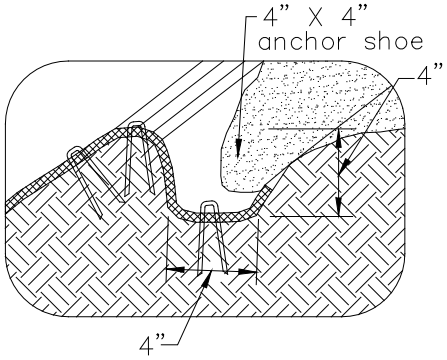


ISOMETRIC VIEW
NTS



INTERMITTENT CHECK SLOT
NTS



LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL

Wood Mulching EC-8

Description and Purpose

Wood mulching consists of applying a mixture of shredded wood mulch or bark to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Suitable Applications

Wood mulching is suitable for disturbed soil areas requiring temporary protection until permanent stabilization is established. Wood mulch may also be used for final stabilization; generally, used in a landscape setting or areas that will have pedestrian traffic.

Limitations

- Best suited to flat areas or gentle slopes or 5:1 (H:V) or flatter. Not suitable for use on slopes steeper than 3:1 (H:V). For slopes steeper than 3:1, consider the use of Compost Blankets (EC-14).
- Wood mulch may introduce unwanted species if it contains seed, although it may also be used to prevent weed growth if it is seed-free.
- Not suitable for areas exposed to concentrated flows.
- If used for temporary stabilization, wood mulch may need to be removed prior to further earthwork.

Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

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Implementation

Mulch Selection

There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses.

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a device such as a punching type roller or by track walking. The construction application procedures for mulches vary significantly depending upon the type of mulching method specified. Two methods are highlighted here:

- Green Material: This type of mulch is produced by the recycling of vegetation trimmings such as grass, shredded shrubs, and trees. Chipped brush from on-site vegetation clearing activities may be used (this may require stockpiling and reapplying after earthwork is complete). Methods of application are generally by hand although pneumatic methods are available.
  - Green material can be used as a temporary ground cover with or without seeding.
  - The green material should be evenly distributed on site to a depth of not more than 2 in.
- Shredded Wood: Suitable for ground cover in ornamental or revegetated plantings.
  - Shredded wood/bark is conditionally suitable. See note under limitations.
  - Distribute by hand or use pneumatic methods.
  - Evenly distribute the mulch across the soil surface to a depth of 2 to 3 in.
- Avoid mulch placement onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Assuming a 2-in. layer of wholesale landscaping-grade wood mulch, the average one-time cost for installation may range from $15,000 – $23,000 per acre[1]. Costs can increase if the source is not close to the project site.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

[1] Costs based on estimates provided by the California Department of Transportation's *Soil Stabilization BMP Research for Erosion and Sediment Controls Cost Survey Technical Memorandum*, CTSW-TM-07-172.35.1, July 2007 (available at: http://www.dot.ca.gov/hq/LandArch/16_la_design/guidance/estimating/Soil_Stabilization_Pricing.pdf) and adjusted for inflation from 1997 to 2016.

- Regardless of the mulching technique selected, the key consideration in inspection and maintenance is that the mulch needs to last long enough to achieve erosion control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it should last the length of time the site will remain barren or until final re-grading and revegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on longevity and integrity of the mulch.
- Reapply mulch when bare earth becomes visible.

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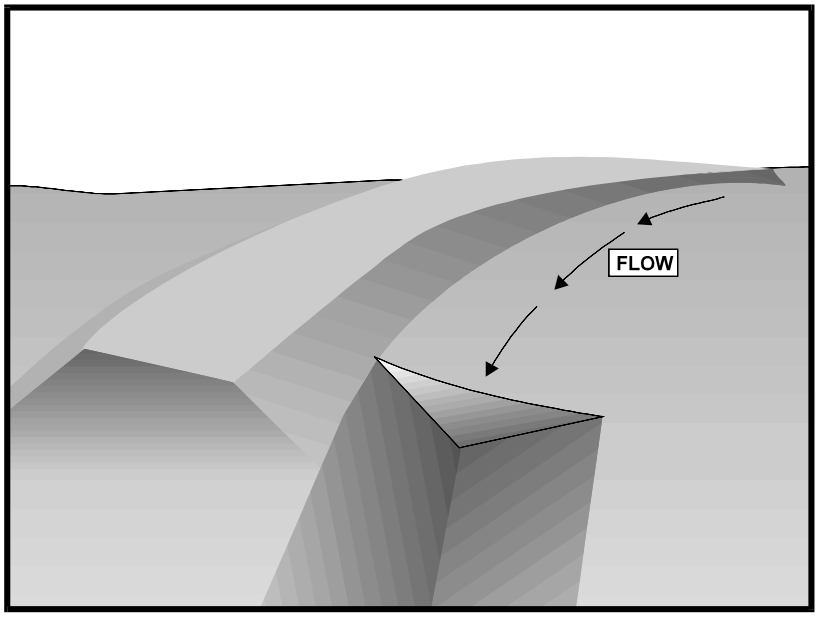
Earth Dikes and Drainage Swales EC-9



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
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WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
  - To convey surface runoff down sloping land
  - To intercept and divert runoff to avoid sheet flow over sloped surfaces
  - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
  - To intercept runoff from paved surfaces
  - To intercept and divert run-on
  - Below steep grades where runoff begins to concentrate

- Along roadways and facility improvements subject to flood drainage
- At the top of slopes to divert runon from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations and should not be used in areas with slopes steeper than 10%.

Earth Dikes and Drainage Swales EC-9

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.

- May be covered with hydro mulch, hydroseed, wood mulch, compost blanket, or RECP for stabilization.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin (SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.
- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost-effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft.
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 %, but not more than 15 %.

- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.
- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 % and use rip-rap or sod for swales with a slope between 5 and 15 %. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from $19 to $70 per ft. for both earthwork and stabilization and depends on availability of material, site location, and access (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- Small dikes: $3 - $8/linear ft.; Large dikes: $3/yd^3 (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.

- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

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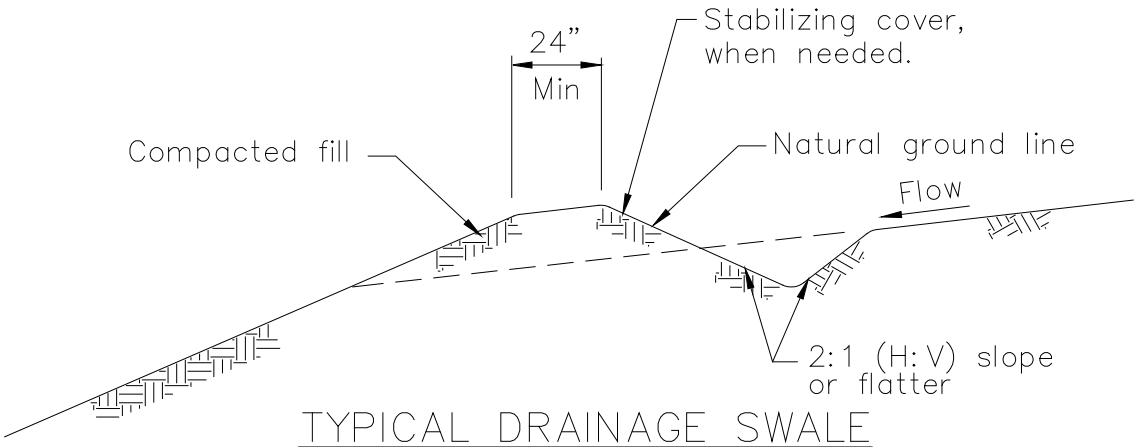
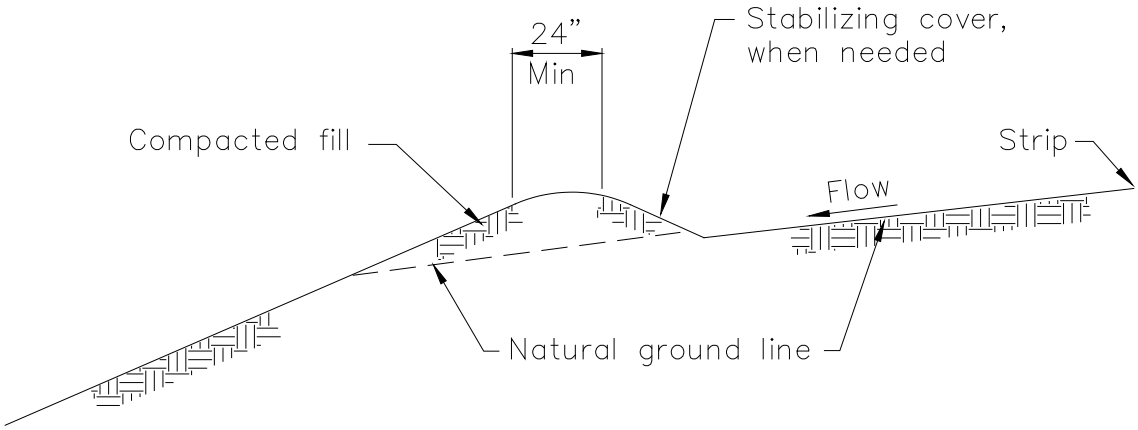


TYPICAL DRAINAGE SWALE
NOT TO SCALE

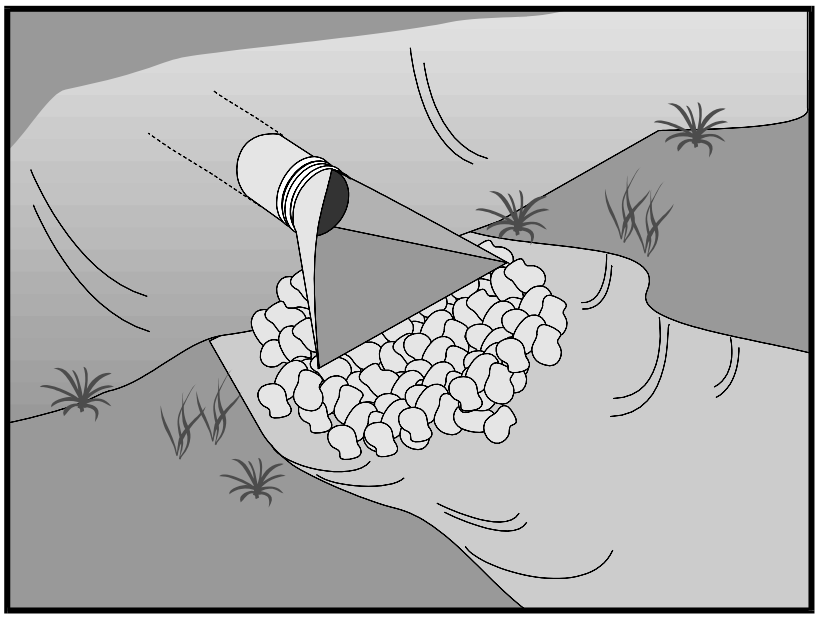
NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE
NOT TO SCALE

Velocity Dissipation Devices EC-10



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Suitable Applications

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert runon during construction.

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances

Limitations

- Large storms or high flows can wash away the rock outlet protection and leave the area susceptible to erosion.

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- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in velocity dissipation devices.

Implementation

General

Outlet protection is needed where discharge velocities and energies at the outlets of culverts, conduits or channels are sufficient to erode the immediate downstream reach. This practice protects the outlet from developing small eroded pools (plange pools) and protects against gully erosion resulting from scouring at a culvert mouth.

Design and Layout

As with most channel design projects, depth of flow, roughness, gradient, side slopes, discharge rate, and velocity should be considered in the outlet design. Compliance to local and state regulations should also be considered while working in environmentally sensitive streambeds. General recommendations for rock size and length of outlet protection mat are shown in the rock outlet protection figure in this BMP and should be considered minimums. The apron length and rock size gradation are determined using a combination of the discharge pipe diameter and estimate discharge rate: Select the longest apron length and largest rock size suggested by the pipe size and discharge rate. Where flows are conveyed in open channels such as ditches and swales, use the estimated discharge rate for selecting the apron length and rock size. Flows should be same as the culvert or channel design flow but never the less than the peak 5-year flow for temporary structures planned for one rainy season, or the 10-year peak flow for temporary structures planned for two or three rainy seasons.

- There are many types of energy dissipaters, with rock being the one that is represented in the attached figure.
- Best results are obtained when sound, durable, and angular rock is used.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction. Grouted or wired tied rock riprap can minimize maintenance requirements.
- Rock outlet protection is usually less expensive and easier to install than concrete aprons or energy dissipaters. It also serves to trap sediment and reduce flow velocities.
- Carefully place riprap to avoid damaging the filter fabric.

- Stone 4 in. to 6 in. may be carefully dumped onto filter fabric from a height not to exceed 12 in.

- Stone 8 in. to 12 in. must be hand placed onto filter fabric, or the filter fabric may be covered with 4 in. of gravel and the 8 in. to 12 in. rock may be dumped from a height not to exceed 16 in.

- Stone greater than 12 in. shall only be dumped onto filter fabric protected with a layer of gravel with a thickness equal to one half the D_{50} rock size, and the dump height limited to twice the depth of the gravel protection layer thickness.

- For proper operation of apron: Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.

- Outlets on slopes steeper than 10 percent should have additional protection.

Costs

Costs are low if material is readily available. If material is imported, costs will be higher. Average installed cost is $250 per device.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.

- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material.

- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.

- Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

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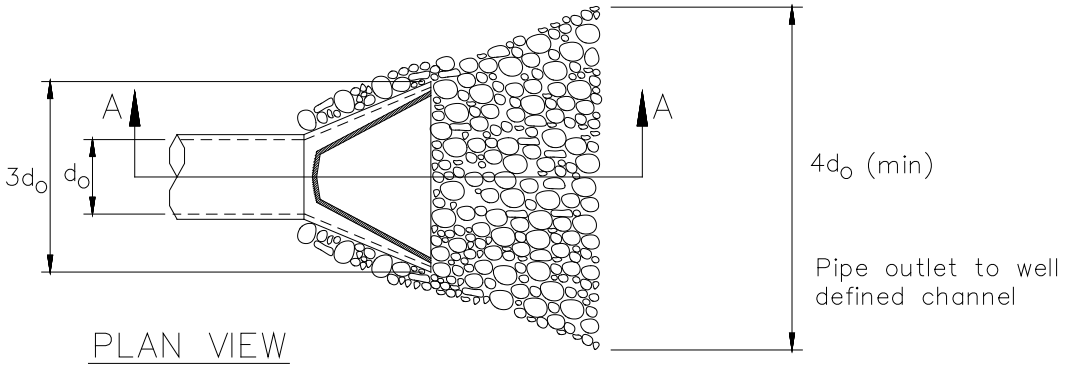
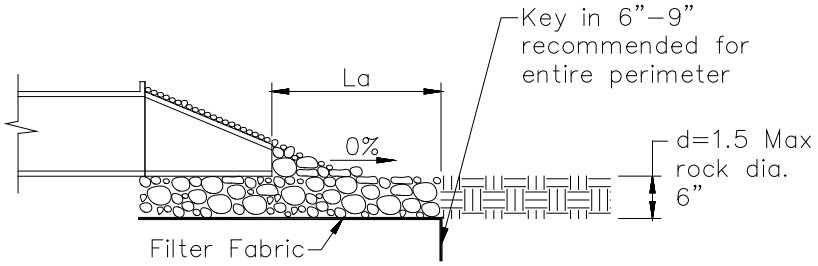


PLAN VIEW

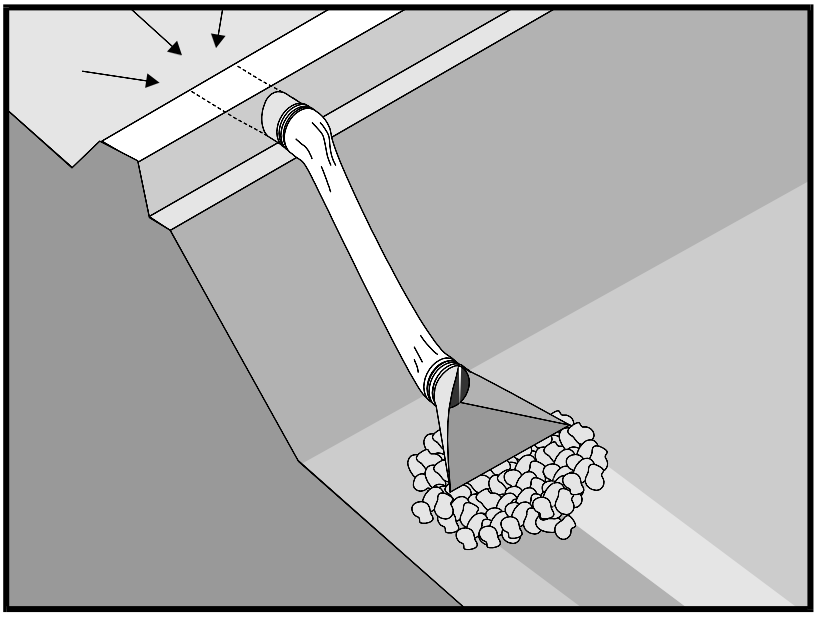


SECTION A–A

Pipe Diameter inches	Discharge ft³/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

Slope Drains EC-11



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-9 Earth Dike, Drainage Swales

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Description and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Suitable Applications

- Where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion.
- Drainage for top of slope diversion dikes or swales.
- Drainage for top of cut and fill slopes where water can accumulate.
- Emergency spillway for a sediment basin.

Limitations

Installation is critical for effective use of the pipe slope drain to minimize potential gully erosion.

- Maximum drainage area per slope drain is 10 acres. (For large areas use a paved chute, rock lined channel, or additional pipes.)
- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

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  - During large storms, pipe slope drains may become clogged or over charged, forcing water around the pipe and causing extreme slope erosion.
  - If the sectional downdrain is not sized correctly, the runoff can spill over the drain sides causing gully erosion and potential failure of the structure.

- Dissipation of high flow velocities at the pipe outlet is required to avoid downstream erosion.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in energy dissipaters associated with slope drain outlets.

Implementation

General

The slope drain is applicable for any construction site where concentrated surface runoff can accumulate and must be conveyed down the slope in order to prevent erosion. The slope drain is effective because it prevents the stormwater from flowing directly down the slope by confining all the runoff into an enclosed pipe or channel. Due to the time lag between grading slopes and installation of permanent stormwater collection systems and slope stabilization measures, temporary provisions to intercept runoff are sometimes necessary. Particularly in steep terrain, slope drains can protect unstabilized areas from erosion.

Installation

The slope drain may be a rigid pipe, such as corrugated metal, a flexible conduit, or a lined terrace drain with the inlet placed on the top of a slope and the outlet at the bottom of the slope. This BMP typically is used in combination with a diversion control, such as an earth dike or drainage swale at the top of the slope.

The following criteria must be considered when siting slope drains.

- Permanent structures included in the project plans can often serve as construction BMPs if implemented early. However, the permanent structure must meet or exceed the criteria for the temporary structure.
- Inlet structures must be securely entrenched and compacted to avoid severe gully erosion.
- Slope drains must be securely anchored to the slope and must be adequately sized to carry the capacity of the design storm and associated forces.
- Outlets must be stabilized with riprap, concrete or other type of energy dissipator, or directed into a stable sediment trap or basin. See EC-10, Velocity Dissipation Devices.
- Debris racks are recommended at the inlet. Debris racks located several feet upstream of the inlet can usually be larger than racks at the inlet, and thus provide enhanced debris protection and less plugging.
- Safety racks are also recommended at the inlet and outlet of pipes where children or animals could become entrapped.
- Secure inlet and surround with dikes to prevent gully erosion and anchor pipe to slope.

- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock lined channel or a series of pipes.
- Size to convey at least the peak flow of a 10-year storm. The design storm is conservative due to the potential impact of system failures.
- Maximum slope generally limited to 2:1 (H:V) as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP EC-9, Earth Dikes and Drainage Swales. Top of interceptor dikes should be 12 in. higher than the top of the slope drain.
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials include both metal and plastic pipe, either corrugated or smooth wall. Concrete pipe can also be used.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.
  - Compact soil around and under entrance, outlet, and along length of pipe.
  - Securely anchor and stabilize pipe and appurtenances into soil.
  - Check to ensure that pipe connections are watertight.
  - Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
  - Protect outlet of slope drains using a flared end section when outlet discharges to a flexible energy dissipation device.
  - A flared end section installed at the inlet will improve flow into the slope drain and prevent erosion at the pipe entrance. Use a flared end section with a 6 in. minimum toe plate to help prevent undercutting. The flared section should slope towards the pipe inlet.

Design and Layout

The capacity for temporary drains should be sufficient to convey at least the peak runoff from a 10-year rainfall event. The pipe size may be computed using the Rational Method or a method established by the local municipality. Higher flows must be safely stored or routed to prevent any offsite concentration of flow and any erosion of the slope. The design storm is purposely conservative due to the potential impacts associated with system failures.

As a guide, temporary pipe slope drains should not be sized smaller than shown in the following table:

Minimum Pipe Diameter (Inches)	Maximum Drainage Area (Acres)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

Larger drainage areas can be treated if the area can be subdivided into areas of 10 acres or less and each area is treated as a separate drainage. Drainage areas exceeding 10 acres must be designed by a Registered Civil Engineer and approved by the agency that issued the grading permit.

Materials:

Soil type, rainfall patterns, construction schedule, local requirements, and available supply are some of the factors to be considered when selecting materials. The following types of slope drains are commonly used:

- **Rigid Pipe:** This type of slope drain is also known as a pipe drop. The pipe usually consists of corrugated metal pipe or rigid plastic pipe. The pipe is placed on undisturbed or compacted soil and secured onto the slope surface or buried in a trench. Concrete thrust blocks must be used when warranted by the calculated thrust forces. Collars should be properly installed and secured with metal strappings or watertight collars.

- **Flexible Pipe**: The flexible pipe slope drain consists of a flexible tube of heavy-duty plastic, rubber, or composite material. The tube material is securely anchored onto the slope surface. The tube should be securely fastened to the metal inlet and outlet conduit sections with metal strappings or watertight collars.

- **Section Downdrains**: The section downdrain consists of pre-fabricated, section conduit of half round or third round material. The sectional downdrain performs similar to a flume or chute. The pipe must be placed on undisturbed or compacted soil and secured into the slope.

- **Concrete-lined Terrace Drain:** This is a concrete channel for draining water from a terrace on a slope to the next level. These drains are typically specified as permanent structures and if installed early, can serve as slope drains during construction, which should be designed according to local drainage design criteria.

Costs

- Cost varies based on pipe selection and selected outlet protection.

Corrugated Steel Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12”	$25 per LF
15”	$28.00
18”	$33.00
24”	$41.00
30”	$64.00
PVC Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12”	$31.00
14”	$63.00
16”	$65.00
18”	$69.00
20”	$84.00
24”	$119.00
30”	$166.00

Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.

- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.

- Insert inlet for clogging or undercutting. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or rip rap around the inlet to prevent further undercutting.

- Inspect pipes for leakage. Repair leaks and restore damaged slopes.

- Inspect slope drainage for accumulations of debris and sediment.
- Remove built up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Pipe anchors must be checked to ensure that the pipe remains anchored to the slope. Install additional anchors if pipe movement is detected.

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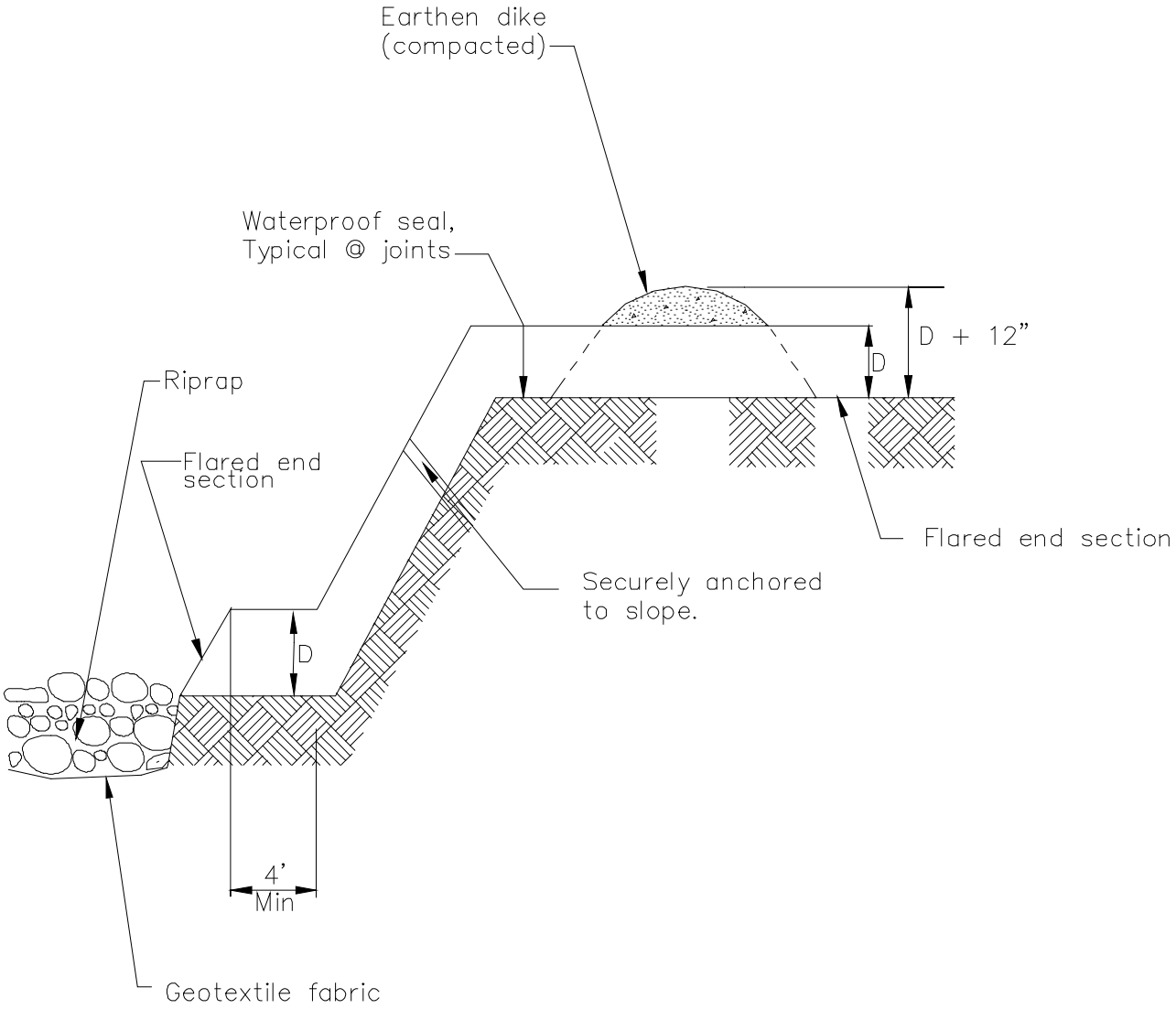

TYPICAL SLOPE DRAIN
NOT TO SCALE

Streambank Stabilization EC-12

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

Combination of erosion and sediment controls.

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Description and Purpose

Stream channels, streambanks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse affects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on watercourses. Streams on the 303(d) list and listed for sediment may require numerous measures to prevent any increases in sediment load to the stream.

Suitable Applications

These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas.

Limitations

Specific permit requirements or mitigation measures such as Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game supercede the guidance in this BMP.

- If numerical based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. Streams listed as 303(d) impaired for sediment, silt, or turbidity, are required to

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conduct sampling to verify that there is no net increase in sediment load due to construction activities.

Implementation

Planning

- Proper planning, design, and construction techniques can minimize impacts normally associated with in stream construction activities. Poor planning can adversely affect soil, fish, wildlife resources, land uses, or land users. Planning should take into account: scheduling; avoidance of in-stream construction; minimizing disturbance area and construction time period; using pre-disturbed areas; selecting crossing location; and selecting equipment.

Scheduling

- Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with EC-1, Scheduling. Scheduling considerations will be different when working near perennial streams vs. ephemeral streams and are as follows.

- When in-stream construction is conducted in a perennial stream, work should optimally be performed during the rainy season. This is because in the summer, any sediment-containing water that is discharged into the watercourse will cause a large change in both water clarity and water chemistry. During the rainy season, there is typically more and faster flowing water in the stream, so discharges are diluted faster. However, should in-stream work be scheduled for summer, establishing an isolation area, or diverting the stream, will significantly decrease the amount of sediment stirred up by construction work. Construction work near perennial streams should optimally be performed during the dry season (see below).

- When working in or near ephemeral streams, work should be performed during the dry season. By their very nature, ephemeral streams are usually dry in the summer, and therefore, in-stream construction activities will not cause significant water quality problems. However, when tying up the site at the end of the project, wash any fines (see Washing Fines) that accumulated in the channel back into the bed material, to decrease pollution from the first rainstorm of the season.

- When working near ephemeral or perennial streams, erosion and sediment controls (see silt fences, straw bale barriers, etc.) should be implemented to keep sediment out of stream channel.

Minimize Disturbance

- Minimize disturbance through: selection of the narrowest crossing location; limiting the number of equipment trips across a stream during construction; and, minimizing the number and size of work areas (equipment staging areas and spoil storage areas). Place work areas at least 50 ft from stream channel. Field reconnaissance should be conducted during the planning stage to identify work areas.

Use of Pre-Disturbed Areas

- Locate project sites and work areas in areas disturbed by prior construction or other activity when possible.

Selection of Project Site

- Avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock.
- Select project site that minimizes disturbance to aquatic species or habitat.

Equipment Selection

- Select equipment that reduces the amount of pressure exerted on the ground surface, and therefore, reduces erosion potential and/or use overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 lb/in^2, where possible. Low ground pressure equipment includes: wide or high flotation tires (34 to 72 in. wide); dual tires; bogie axle systems; tracked machines; lightweight equipment; and, central tire inflation systems.

Streambank Stabilization

Preservation of Existing Vegetation

- Preserve existing vegetation in accordance with EC-2, Preservation of Existing Vegetation. In a streambank environment, preservation of existing vegetation provides the following benefits.

Water Quality Protection

- Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 ft. On gradual slopes, most of the filtering occurs within the first 30 ft. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits.

Streambank Stabilization

- The root system of riparian vegetation stabilizes streambanks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (infiltration, evapo transpiration, interception) and increases bank stability.

Riparian Habitat

- Buffers of diverse riparian vegetation provide food and shelter for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider than those recommended for water quality concerns (100 to 1500 ft).
- When working near watercourses, it is important to understand the work site's placement in the watershed. Riparian vegetation in headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation upstream is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat, downstream of the work site.

Limitations

- Local county and municipal ordinances regarding width, extent and type of vegetative buffer required may exceed the specifications provided here; these ordinances should be investigated prior to construction.

Streambank Stabilization Specific Installation

- As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 ft plus four times the percent slope of the land, measured between the road and the top of stream bank.

Hydraulic Mulch

- Apply hydraulic mulch on disturbed streambanks above mean high water level in accordance with EC-3, Hydraulic Mulch to provide temporary soil stabilization.

Limitations

- Do not place hydraulic mulch or tackifiers below the mean high-water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication (eutrophication is an algal bloom caused by excessively high nutrient levels in the water).

Hydroseeding

- Hydroseed disturbed streambanks in accordance with EC-4, Hydroseeding.

Limitations

- Do not place tackifiers or fertilizers below the mean high-water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication.

Soil Binders

- Apply soil binders to disturbed streambanks in accordance with EC-5, Soil Binders.

Limitations

- Do not place soil binders below the mean high-water level. Soil binder must be environmentally benign and non-toxic to aquatic organisms.

Straw Mulch

- Apply straw mulch to disturbed streambanks in accordance with EC-6, Straw Mulch.

Limitations

- Do not place straw mulch below the mean high-water level, as this material could wash into the channel and impact water quality or possibly cause eutrophication.

Geotextiles and Mats

- Install geotextiles and mats as described in EC-7, Geotextiles and Mats, to stabilize disturbed channels and streambanks. Not all applications should be in the channel, for example, certain geotextile netting may snag fish gills and are not appropriate in fish bearing streams. Geotextile fabrics that are not biodegradable are not appropriate for in stream use. Additionally, geotextile fabric or blankets placed in channels must be adequate to sustain anticipated hydraulic forces.

Earth Dikes, Drainage Swales, and Lined Ditches

- Convey, intercept, or divert runoff from disturbed streambanks using EC-9, Earth Dikes and Drainage Swales.

Limitations

- Do not place earth dikes in watercourses, as these structures are only suited for intercepting sheet flow and should not be used to intercept concentrated flow.

- Appropriately sized velocity dissipation devices (EC-10) must be placed at outlets to minimize erosion and scour.

Velocity Dissipation Devices

- Place velocity dissipation devices at outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels in accordance with EC-10, Velocity Dissipation Devices.

Slope Drains

- Use slope drains to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area in accordance with EC-11, Slope Drains.

Limitations

- Appropriately sized outlet protection and velocity dissipation devices (EC-10) must be placed at outlets to minimize erosion and scour.

Streambank Sediment Control

Silt Fences

- Install silt fences in accordance with SE-1, Silt Fence, to control sediment. Silt fences should only be installed where sediment laden water can pond, thus allowing the sediment to settle out.

Fiber Rolls

- Install fiber rolls in accordance with SE-5, Fiber Rolls, along contour of slopes above the high-water level to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. In a stream environment, fiber rolls should be used in conjunction with other sediment control methods such as SE-1, Silt Fence or SE-9 Straw Bale Barrier. Install silt fence, straw bale barrier, or other erosion control method along toe of slope above the high-water level.

Gravel Bag Berm

- A gravel bag berm or barrier can be utilized to intercept and slow the flow of sediment laden sheet flow runoff in accordance with SE-6, Gravel Bag Berm. In a stream environment gravel bag barrier can allow sediment to settle from runoff before water leaves the construction site and can be used to isolate the work area from the live stream.

Limitations

- Gravel bag barriers are not recommended as a perimeter sediment control practice around streams.

Straw Bale Barrier

- Install straw bale barriers in accordance with SE-9, Straw Bale Barrier, to control sediment. Straw bale barriers should only be installed where sediment laden water can pond, thus allowing the sediment to settle out. Install a silt fence in accordance with SE-1, Silt Fence,

on down slope side of straw bale barrier closest to stream channel to provide added sediment control.

Rock Filter

Description and Purpose

Rock filters are temporary erosion control barriers composed of rock that is anchored in place. Rock filters detain the sediment laden runoff, retain the sediment, and release the water as sheet flow at a reduced velocity. Typical rock filter installations are illustrated at the end of this BMP.

Applications

- Near the toe of slopes that may be subject to flow and rill erosion.

Limitations

- Inappropriate for contributing drainage areas greater than 5 acres.
- Requires sufficient space for ponded water.
- Ineffective for diverting runoff because filters allow water to slowly seep through.
- Rock filter berms are difficult to remove when construction is complete.
- Unsuitable in developed areas or locations where aesthetics is a concern.

Specifications

- Rock: open graded rock, 0.75 to 5 in. for concentrated flow applications.
- Woven wire sheathing: 1 in. diameter, hexagonal mesh, galvanized 20gauge (used with rock filters in areas of concentrated flow).
- In construction traffic areas, maximum rock berm heights should be 12 in. Berms should be constructed every 300 ft on slopes less than 5%, every 200 ft on slopes between 5% and 10%, and every 100 ft on slopes greater than 10%.

Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Reshape berms as needed and replace lost or dislodged rock, and filter fabric.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

K-rail

Description and Purpose

This is temporary sediment control that uses K-rails to form the sediment deposition area, or to isolate the near bank construction area. Install K-rails at toe of slope in accordance with procedures described in NS-5, Clear Water Diversion.

Barriers are placed end to end in a pre-designed configuration and gravel filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications

- This technique is useful at the toe of embankments, cuts or fills slopes.

Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight.

Implementation

- Refer to NS-5, Clear Water Diversion, for implementation requirements.

Instream Construction Sediment Control

There are three different options currently available for reducing turbidity while working in a stream or river. The stream can be isolated from the area in which work is occurring by means of a water barrier, the stream can be diverted around the work site through a pipe or temporary channel, or one can employ construction practices that minimize sediment suspension.

Whatever technique is implemented, an important thing to remember is that dilution can sometimes be the solution. A probable "worst time" to release high TSS into a stream system might be when the stream is very low; summer low flow, for example. During these times, the flow may be low while the biological activity in the stream is very high. Conversely, the addition of high TSS or sediment during a big storm discharge might have a relatively low impact, because the stream is already turbid, and the stream energy is capable of transporting both suspended solids, and large quantities of bedload through the system. The optimum time to "pull" in-stream structures may be during the rising limb of a storm hydrograph.

Techniques to minimize Total Suspended Solids (TSS)

- **Padding** - Padding laid in the stream below the work site may trap some solids that are deposited in the stream during construction. After work is done, the padding is removed from the stream, and placed on the bank to assist in re-vegetation.

- **Clean, washed gravel** - Using clean, washed gravel decreases solid suspension, as there are fewer small particles deposited in the stream.

- **Excavation using a large bucket** - Each time a bucket of soil is placed in the stream, a portion is suspended. Approximately the same amount is suspended whether a small amount of soil is placed in the stream, or a large amount. Therefore, using a large excavator bucket instead of a small one, will reduce the total amount of soil that washes downstream.

- **Use of dozer for backfilling** - Using a dozer for backfilling instead of a backhoe follows the same principles – the fewer times soil is deposited in the stream, the less soil will be suspended.

- **Partial dewatering with a pump** - Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment.

Washing Fines

Definition and Purpose

- Washing fines is an "in-channel" sediment control method, which uses water, either from a water truck or hydrant, to wash stream fines that were brought to the surface of the channel bed during restoration, back into the interstitial spaces of the gravel and cobbles.

- The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flow. Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt sized particles) that are already in the stream, usually below bankfull discharge elevation. Subsequent re-watering of the channel can result in a plume of turbidity and sedimentation.

- This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders and those fines, are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.

Appropriate Applications

- This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed "in the dry", and which subsequently become re-watered.

Limitations

- The stream must have sufficient gravel and cobble substrate composition.

- The use of this technique requires consideration of time of year and timing of expected stream flows.

- The optimum time for the use of this technique is in the fall, prior to winter flows.

- Consultation with, and approval from the Department of Fish and Game and the Regional Water Quality Control Board may be required.

Implementation

- Apply sufficient water to wash fines, but not cause further erosion or runoff.

- Apply water slowly and evenly to prevent runoff and erosion.

- Consult with Department of Fish and Game and the Regional Water Quality Control Board for specific water quality requirements of applied water (e.g. chlorine).

Inspection and Maintenance

- None necessary

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events until final stabilization is achieved.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, An Inventory of Current Practices (Draft), UESPA, 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

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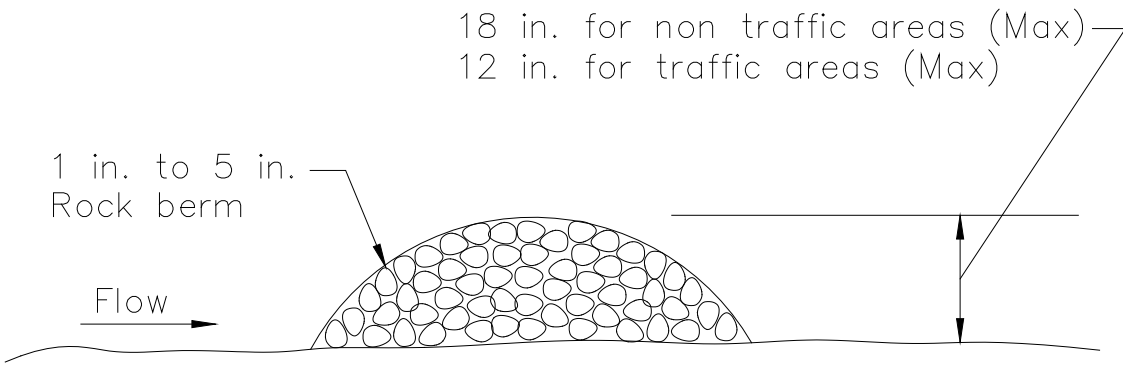

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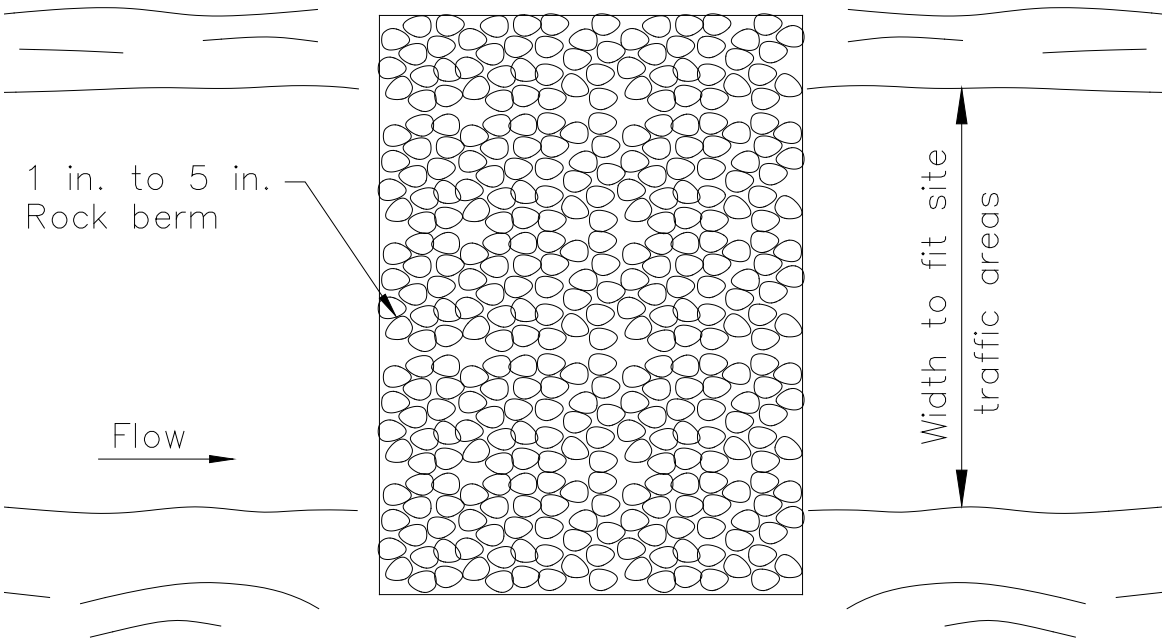

PLAN

TYPICAL ROCK FILTER
NOT TO SCALE

Compost Blanket EC-14

Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-5 Soil Binders

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

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Description and Purpose

A compost blanket is applied to slopes and earth disturbed areas to prevent erosion, and in some cases, increase infiltration and/or establish vegetation. The compost blanket can be applied by hand, conveyor system, compost spreader, or pneumatic delivery (blower) system. The blanket thickness is determined from the slope steepness and anticipated precipitation. A compost blanket protects the soil surface from raindrop erosion, particularly rills and gullies that may form under other methods of erosion control.

A compost blanket, if properly installed, can be very successful at vegetation establishment, weed suppression and erosion control. The compost blanket comes into direct contact with the underlying soil, reducing rill formation. Furthermore, compost provides organic matter and nutrients important for vegetation growth. The compost blanket provides soil structure that allows water to infiltrate the soil surface and retain moisture, which also promotes seed germination and vegetation growth, in addition to reducing runoff.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Green waste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly, compost selection is an important design consideration in the application of this type of erosion control.

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Suitable Applications

A compost blanket is appropriate for slopes and earth disturbed areas requiring protection until permanent stabilization is established. A compost blanket can also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment. Examples include:

- Rough-graded areas that will remain inactive for longer than 14 days
- Soil stockpiles
- Slopes with exposed soil between existing vegetation such as trees or shrubs
- Slopes planted with live, container-grown vegetation
- Disturbed areas where plants are slow to develop

A compost blanket is typically used on slopes of 2:1 (H:V) or gentler. However, a compost blanket can be effective when applied to slopes as steep as 1:1 (H:V) with appropriate design considerations including slope length, blanket thickness, adding components such as a tackifier, or using compost blankets in conjunction with other techniques, such as compost socks and berms or fiber rolls.

Compost can be pre-seeded prior to application to the soil (recommended by the EPA for construction site stormwater runoff control) or seeded after the blanket has been installed. The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons (USEPA, 1998).

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Carefully consider the qualifications and experience of any compost producer/supplier.
- A compost blanket applied by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost-effective method of application.
- When blowers are used, the treatment areas should be within 300 ft of a road or surface capable of supporting trucks.
- Wind may limit application of compost and result in application to undesired locations.
- Compost blankets should not be applied in areas of concentrated flows.
- Steeper slopes may require additional blanket thickness and other stability measures such as using tackifiers or slope interruption devices (compost socks and berms, or fiber rolls). The same applies for sites with high precipitation totals or during the rainy season.

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in Table 1 below, taken from Caltrans Standard Special Provision 10-1 (SSP 10-1), Erosion Control (Compost Blanket).

- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.

- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.

- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet season, drier composts can be used as the compost will absorb moisture from the ambient air.

- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.

- Compost should be high-quality mature compost. Immature compost can potentially leach nutrients.

- Compost should not be derived from mixed municipal solid waste and should be free of visible contaminants.

- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.

- Compost should not possess objectionable odors.

- Compost should be weed free.

Table 1. Physical/Chemical Requirements of Compost
Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

Property	Test Method	Requirement
pH	*TMECC 04.11-A Elastomeric pH 1:5 Slurry Method pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30-60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	 80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	100% Passing, 3 inches 90-100% Passing, 1 inch 65-100% Passing, 3/4 inch 0 - 75% Passing, 1/4 inch Maximum length 6 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Plastic, Glass and Metal % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles) % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to compost application, prepare the slope by removing loose rocks, roots, stumps, and other debris greater than 2" in diameter. Prepare the slope area surface by scarifying or track walking/roughening if necessary.
- Select method to apply the compost blanket. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.
- A compost blanket thickness of 1" to 4" should be applied to slopes of 2:1 (H:V) or gentler, based on site-specific conditions. Increase blanket thickness with increased slope steepness and/or during installation during the rainy season (for example, 2" to 3" should be used for a

3:1 slope, while 1" to 2" can be used for a 4:1 slope). Erosion control using a compost blanket is not recommended for slopes greater than 1:1 (H:V).

- For steeper slopes, tackifiers should be utilized and/or other stabilization techniques employed. For example, compost socks or berms can be installed at intervals over the compost blanket (in a similar manner as Fiber Rolls, SE-5).
- Compost socks or berms (or equivalent linear sediment control BMP) should be placed at the top and/or bottom of the slope for additional erosion control performance.
- For optimum vegetation establishment, a blanket thickness of 1" to 2" is recommended. If vegetation establishment is not the primary function of the compost blanket, a thicker blanket may be recommended based on slope or rainfall conditions.
- Evenly distribute compost on the soil surface to the desired blanket thickness (1/2" to 4" as calculated prior based on-site conditions and objectives). Even distribution is an important factor in preventing future rill and gully erosion.
- The compost blanket should extend 3 to 6 feet over the top of the shoulder of the slope. A compost sock or compost berm can be used at the top of the slope as an auxiliary technique to prevent runoff from flowing underneath the compost blanket.
- Use additional anchoring and erosion control BMPs in conjunction of the compost blanket as needed.

Costs

The cost associated with a compost blanket is similar to that of a straw mat and generally less expensive than a geotextile blanket (USEPA, 2009). Caltrans has provided a recent estimate for $5,600 to $9,000 per acre for application of an unseeded 1-inch compost blanket (Caltrans Compost Specifications, 2009. Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.). Vendor costs indicate that proprietary blends of compost that are seeded and contain a nutrient rich "tackifier" can cost approximately $0.45 per square foot, or approximately $19,200 per acre for a 2-inch blanket (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.). Application by hand is more time intensive and likely more costly.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident, another layer of compost should be reapplied as soon as possible. It may be necessary to install an additional type of stormwater BMP at the top of slope or as a slope interrupter to control flow, such as a fiber roll (SE-5) or compost sock (SE-11).
- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

- Limit or prohibit foot traffic to minimize damage to BMP or impede vegetation establishment.

References

An Analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

Characteristics of Compost: Moisture Holding and Water Quality Improvement, Center for Research in Water Resources, Kirchoff, C., Malina, J., and Barrett, M., 2003.

Compost Utilization for Erosion Control, The University of Georgia College of Agricultural and Environmental Sciences, pubs.caes.uga.edu/caespubs/pubcd/B1200.htm, Faucette, B. and Risse, M., 2009.

Demonstration Project Using Yard Debris Compost for Erosion Control, Final Report, presented to Metropolitan Service District, W&H Pacific, 1993.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, 2005.

Standard Special Provision 10-1, Erosion Control (Compost Blanket), California Department of Transportation (Caltrans). 2007 Update.

Evaluation of Environmental Benefits and Impacts of Compost and Industry Standard Erosion and Sediment Controls Measures Used in Construction Activities, Dissertation, Institute of Ecology, University of Georgia, Faucette, B., 2004.

Filter Sock Presentation provided at Erosion, Sediment Control and Stormwater Management with Compost BMPs Workshop, U.S. Composting Council 13th Annual Conference and Trade Show, McCoy, S., 2005.

National Pollutant Discharge Elimination System (NPDES), Compost Blankets, U.S. Environmental Protection Agency (USEPA). http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=118, 2009.

Standard Specifications for Transportation Materials and Methods of Sampling and Testing Designation M10-03, Compost for Erosion/Sediment Control (Compost Blankets), Provisional, American Association of State Highway Transportation Officials (AASHTO), 2003.

Stormwater Best Management Practices (BMPs) Field Trials of Erosion Control Compost in Reclamation of Rock Quarry Operations, Nonpoint Source Protection Program CWA §319(h), Texas Commission on Environmental Quality, Adams, T., McFarland, A., Hauck, L., Barrett, M., and Eck, B., 2008.

Soil Preparation/Roughening EC-15

Description and Purpose

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This can include soil testing (for seed base, soil characteristics, or nutrients), as well as roughening surface soils by mechanical methods (including sheepsfoot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soil for additional BMPs, or to break up sheet flow. Soil Preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments, to enhance vegetative establishment.

Suitable Applications

Soil preparation: Soil preparation is essential to proper vegetative establishment. In particular, soil preparation (i.e. tilling, raking, and amendment) is suitable for use in combination with any soil stabilization method, including Rolled Erosion Control Products (RECPs) or sod. Soil preparation should not be confused with roughening.

Roughening: Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces. Soil preparation is most effective when used in combination with erosion controls. Soil Roughening is suitable for use as a complementary process for controlling erosion on a site. Roughening is not intended to be used as a stand-alone BMP, and should be used with perimeter controls, additional erosion control measures, grade breaks, and vegetative establishment for maximum effectiveness. Roughening is intended to only affect surface soils and should not compromise slope stability or overall compaction. Suitable applications for soil roughening include:

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-7 Geotextiles and Mats

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- Along any disturbed slopes, including temporary stockpiles, sediment basins, or compacted soil diversion berms and swales.

- Roughening should be used in combination with hydraulically applied stabilization methods, compost blanket, or straw mulch; but should not be used in combination with RECPs or sod because roughening is intended to leave terraces on the slope.

Limitations

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on the faces of slopes.

- In such cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation - such as hydraulic mulching and seeding applications - should be employed.

- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening, i.e., RECPs should not be used with soil roughening due to a "bridging" effect, which suspends the blanket above the seed bed.

- Surface roughness has an effect on the amount of mulch material that needs to be applied, which shows up as a general increase in mulch material due to an increase in surface area (Topographic Index -see EC-3 Hydraulic Mulch).

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

General

A roughened surface can significantly reduce erosion. Based on tests done at the San Diego State Erosion Research Laboratory, various roughening techniques on slopes can result in a 12 - 76% reduction in the erosion rate versus smooth slopes.

Materials

Minimal materials are required unless amendments and/or seed are added to the soil. The majority of soil roughening/preparation can be done with equipment that is on hand at a normal construction site, such as bull dozers and compaction equipment.

Installation Guidelines

Soil Preparation

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.

- Based upon soil testing conducted, apply additional soil amendments (e.g., fertilizers, additional seed) to the soil to help with germination. Follow EC-4, Hydroseeding, when selecting and applying seed and fertilizers.

Cut Slope Roughening:

- Stair-step grade or groove the cut slopes that are steeper than 3:1.
- Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.
- Do not make individual vertical cuts more than 2 ft. (0.6 m) high in soft materials or more than 3 ft. (0.9 m) high in rocky materials.
- Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

- Place on fill slopes with a gradient steeper than 3:1 in lifts not to exceed 8 in. (0.2 m), and make sure each lift is properly compacted.
- Ensure that the face of the slope consists of loose, uncompacted fill 4-6 in. (0.1-0.2 m) deep.
- Use grooving or tracking to roughen the face of the slopes, if necessary.
- Do not blade or scrape the final slope face.

Roughening for Slopes to be Mowed:

- Slopes that require mowing activities should not be steeper than 3:1.
- Roughen these areas to shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.
- Make grooves close together (less than 10 in.), and not less than 1 in. deep, and perpendicular to the direction of runoff (i.e., parallel to the slope contours).
- Excessive roughness is undesirable where mowing is planned.

Roughening with Tracked Machinery:

- Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.
- Seed and mulch roughened areas as soon as possible to obtain optimum seed germination and growth.

Costs

Costs are based on the additional labor of tracking or preparation of the slope plus the cost of any required soil amendment materials.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check the seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.
- Inspect BMPs weekly during normal operations, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Non-Vegetative Stabilization EC-16

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TR	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Non-vegetative stabilization methods are used for temporary or permanent stabilization of areas prone to erosion and should be used only where vegetative options are not feasible; examples include:

- Areas of vehicular or pedestrian traffic such as roads or paths;
- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
- Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
- Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions.

Decomposed Granite (DG) is a permanent erosion protection method that consists of a layer of stabilized decomposed granite placed over an erodible surface.

Degradable Mulches of various types (see EC-3, EC-6, EC-8) can be used for temporary non-vegetative stabilization; examples include straw mulch, compost, wood chips or hydraulic mulch.

Geotextiles and Mats can be used for temporary non-vegetative stabilization (see EC-7). These BMPs are typically manufactured from degradable or synthetic materials and are

designed and specified based on their functional longevity, i.e., how long they will persist and provide erosion protection. All geotextiles and mats should be replaced when they exceed their functional longevity or when permanent stabilization methods are instituted.

Gravel Mulch is a non-degradable erosion control product that is composed of washed and screened coarse to very coarse gravel, 16 mm to 64 mm (0.6" - 2.5"), similar to an AASHTO No. 3 coarse aggregate.

Rock Slope Protection consists of utilizing large rock or rip-rap (4"- 24") to stabilize slopes with a high erosion potential and those subject to scour along waterways.

Soil Binders can be used for temporary non-vegetative stabilization (see EC-5). The key to their use is functional longevity. In most cases, the soil binder will need to be routinely monitored and re-applied to maintain an erosion-resistant coverage.

Suitable Applications

Non-vegetated stabilization methods are suitable for use on disturbed soil areas and on material stockpiles that need to be temporarily or permanently protected from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

Decomposed Granite (DG) and Gravel Mulch are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.

Degradable Mulches can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets for more information.

Geotextiles and Mats can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 mos – 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats.

Rock Slope Protection can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

Soil Binders can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information.

Limitations

General

- Refer to EC-3, EC-6, EC-8, and EC-14 for limitations on use of mulches. Refer to EC-7 for limitations on use of geotextiles and mats. Refer to EC-5 for limitations on use of Soil Binders.

Decomposed Granite

- Not available in some geographic regions.
- If not tackified, material may be susceptible to erosion even on slight slopes (e.g., 30:1 [H:V]).
- Installed costs may be more expensive than vegetative stabilization methods.

Gravel Mulch

- Availability is limited in some geographic regions.
- If not properly screened and washed, can contain fine material that can erode and/or create dust problems.
- If inadequately sized, material may be susceptible to erosion on sloped areas.
- Pore spaces fill with dirt and debris over time; may provide a growing medium for weeds.

Rock Slope Protection

- Installation is labor intensive.
- Installed costs can be significantly higher than vegetative stabilization methods.
- Rounded stones may not be used on slopes greater than 2:1 [H:V].

Implementation

General

Non-vegetated stabilization should be used in accordance with the following general guidance:

- Should be used in conjunction with other BMPs, including drainage, erosion controls and sediment controls.
- Refer to EC-3, EC-6, EC-8, and EC-14 for implementation details for mulches. Refer to EC-7 for implementation details for geotextiles and mats. Refer to EC-5 for implementation details for soil binders.
- Non-vegetated stabilization measures should be implemented as soon as the disturbance in the areas they are intended to protect has ceased.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Decomposed Granite Stabilization

- If used for a road or path should be installed on a prepared base.
- Should be mixed with a stabilizer if used for roads or pathways, or on slope applications.
- Though porous it is recommended to prevent standing water on or next to a decomposed granite road or pathway.

Gravel Mulch

- Should be sized based on slope, rainfall, and upgradient run-on conditions. Stone size should be increased as potential for erosion increases (steeper slopes, high intensity rainfall).
- If permanent, a weed control fabric should be placed prior to installation.
- Should be installed at a minimum 2" depth.
- Should completely cover all exposed surfaces.

Rock Slope Protection

- Rock slope protection installation should follow Caltrans Standard Specification 72-2: Rock Slope Protection. Refer to the specification for rock conformity requirements and installation methods.
- When using rock slope protection, rock size and installation method should be specified by an Engineer.
- A geotextile fabric should be placed prior to installation.

Costs

- Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques. In addition, availability of certain materials will vary by region/location, which will also affect the cost. Costs of mulches, geotextiles and mats, and soil binders are presented in their respective fact sheets. Costs for decomposed granite, gravel mulch stabilization and rock slope protection may be higher depending on location and availability of materials. Caltrans has provided an estimate for gravel mulch of \$13 - \$20/yd^2 in flat areas and \$14 - \$30/yd^2 on side slopes (adjusted for inflation, 2016 dollars).

Inspection and Maintenance

General

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.
- Refer to EC-3, EC-6, EC-8, and EC-14 for inspection and maintenance requirements for mulches. Refer to EC-7 for inspection and maintenance requirements for geotextiles and mats. Refer to EC-5 for inspection and maintenance requirements for soil binders.

Decomposed Granite and Gravel Mulch Stabilization

- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion. Inspect upgradient drainage controls and repair/modify as necessary.

- Should remain stable under loose surface material. Any significant problem areas should be repaired to restore uniformity to the installation.

References

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Design of Roadside Channels with Flexible Linings, Hydraulic Engineering Circular Number 15, Third Edition, Federal Highway Administration, 2007.

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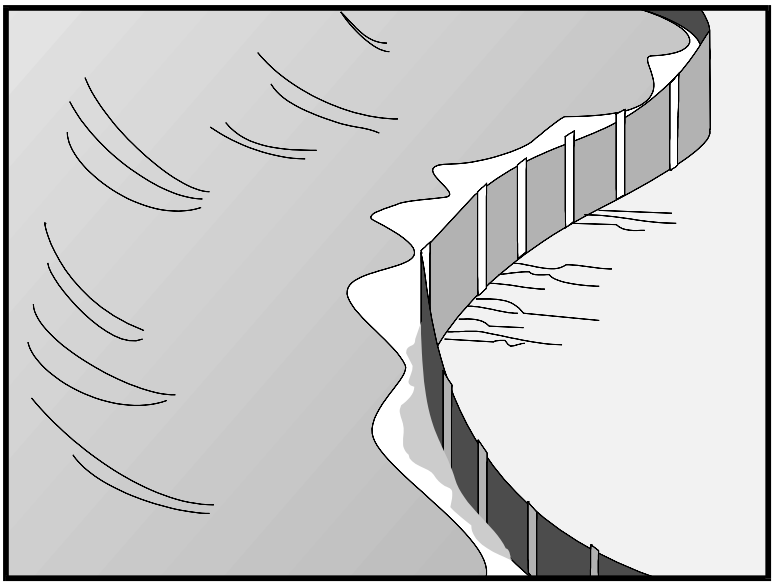
Silt Fence SE-1



Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (Storm Drain Inlet Protection, SE-10). Silt fences should not be used in locations where the flow is concentrated. Silt fences should always be used in combination with erosion controls. Suitable applications include:

- At perimeter of a project (although they should not be installed up and down slopes).
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

Targeted Constituents

Sediment (coarse sediment)	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm SE-12 Manufactured Linear Sediment Controls

SE-13 Compost Socks and Berms

SE-14 Biofilter Bags

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard.
- Do not use silt fence to divert water flows or place across any contour line.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Must be trenched and keyed in.
- According to the State Water Board's *CGP Review, Issue #2* (2014), silt fences reinforced with metal or plastic mesh should be avoided due to plastic pollution and wildlife concerns.
- Not intended for use as a substitute for Fiber Rolls (SE-5), when fiber rolls are being used as a slope interruption device.
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap coarse sediment by intercepting and detaining sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Silt fence should be used in combination with erosion controls up-slope in order to provide the most effective sediment control.
- Silt fence alone is not effective at reducing turbidity. (Barrett and Malina, 2004)
- Designers should consider diverting sediment laden water to a temporary sediment basin or trap. (EPA, 2012)
- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft. at any point along the silt fence.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft.^{2} of ponding area should be provided for every acre draining to the fence.
- Efficiency of silt fences is primarily dependent on the detention time of the runoff behind the control. (Barrett and Malina, 2004)

- The drainage area above any fence should not exceed a quarter of an acre. (Rule of Thumb-100-feet of silt fence per 10,000 ft.^{2} of disturbed area.) (EPA, 2012)
- The maximum length of slope draining to any point along the silt fence should be 100 ft. per ft of silt fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area draining to the silt fence is permanently stabilized, after which, the silt fence fabric and posts should be removed and properly disposed.
- J-hooks, which have ends turning up the slope to break up long runs of fence and provide multiple storage areas that work like mini-retention areas, may be used to increase the effectiveness of silt fence.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

In areas where high winds are anticipated the fence should be supported by a plastic or wire mesh. The geotextile fabric of the silt fence should contain ultraviolet inhibitors and stabilizers to provide longevity equivalent to the project life or replacement schedule.

- Layout in accordance with the attached figures.
- For slopes that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to protect silt fence from rocks (e.g., rockfall netting) ensure the integrity of the silt fence installation.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
  - Fabric is reinforced with wire backing or additional support.
  - Posts are spaced closer than pre-manufactured, standard silt fence products.
- Use is generally limited to areas affected by high winds.
- Area draining to fence produces moderate sediment loads.

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. The fabric should conform to the requirements in ASTM designation D6461.

- Wooden stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15-gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts instead of wood stakes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft. apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench.

- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.

- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with native material and compacted.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.

- Cross barriers should be a minimum of 1/3 and a maximum of ½ the height of the linear barrier.

- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 in. into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
    - Ease of installation (most often done with a 2-person crew).
    - Minimal soil disturbance.
    - Better level of compaction along fence, less susceptible to undercutting
    - Uniform installation.
- Limitations:
    - Does not work in shallow or rocky soils.
    - Complete removal of geotextile material after use is difficult.
    - Be cautious when digging near potential underground utilities.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is $7 per linear foot based on vendor research. Range of cost is $3.50 - $9.10 per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.

- Silt fences should be left in place until the upgradient area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.
- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

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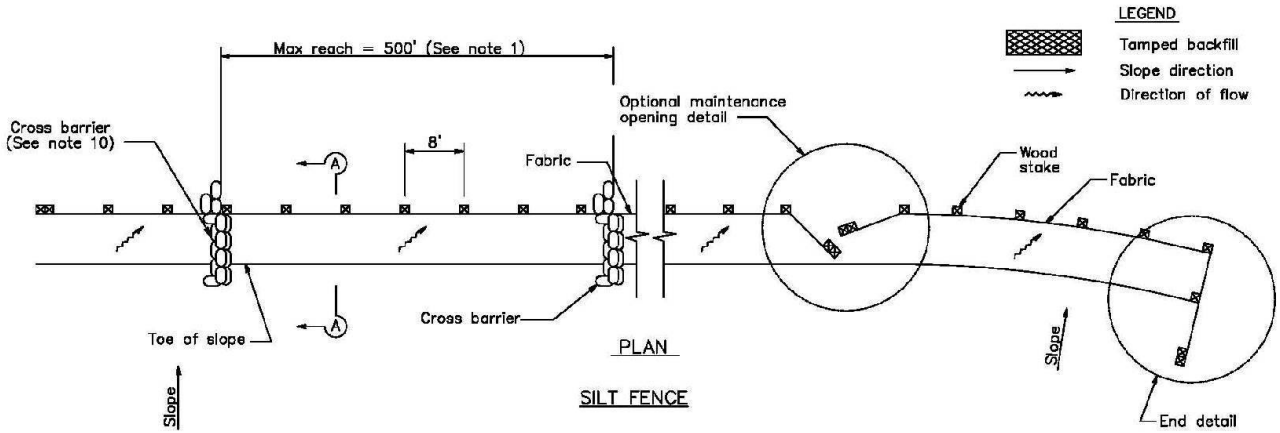
Silt Fence SE-1

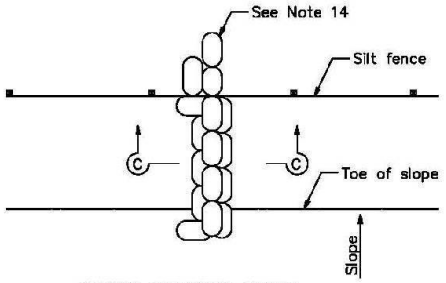


PLAN

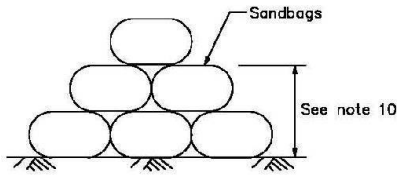
SILT FENCE

NOTES

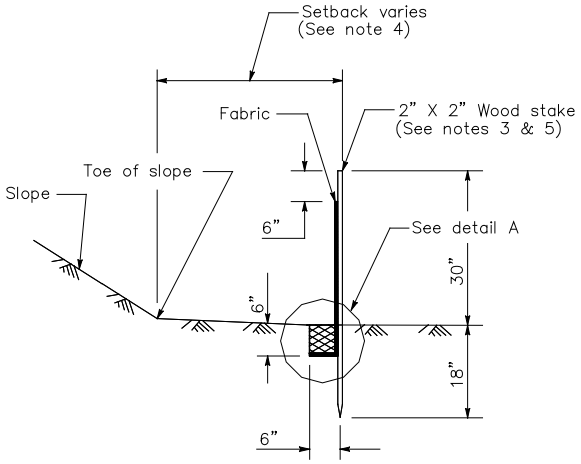
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'–0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow–through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3–4 bags to cross barrier on downgradient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.



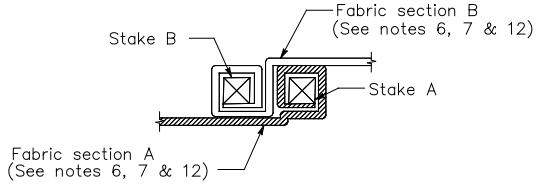
CROSS BARRIER DETAIL



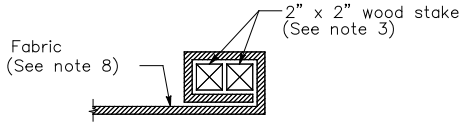
SECTION C–C



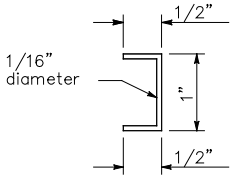
SECTION A–A



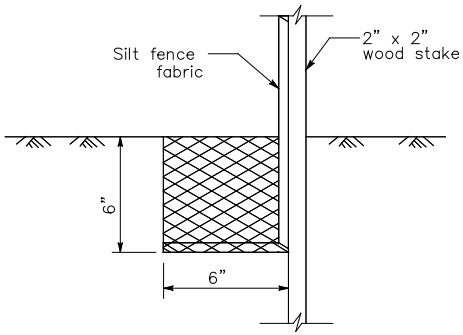
JOINING SECTION DETAIL (TOP VIEW)



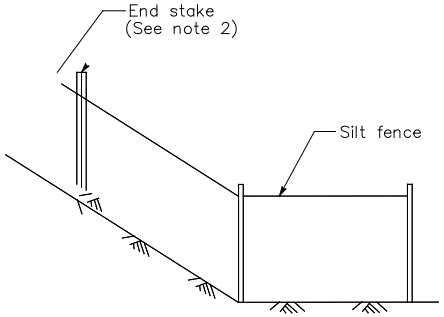
END STAKE DETAIL (TOP VIEW)



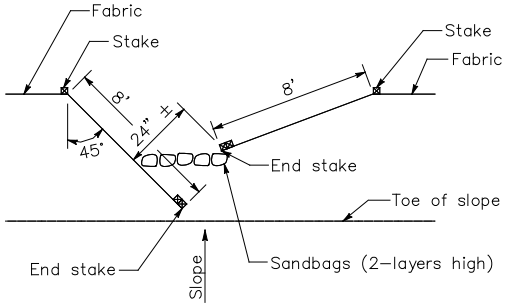
STAPLE DETAIL
(SEE NOTE 9)



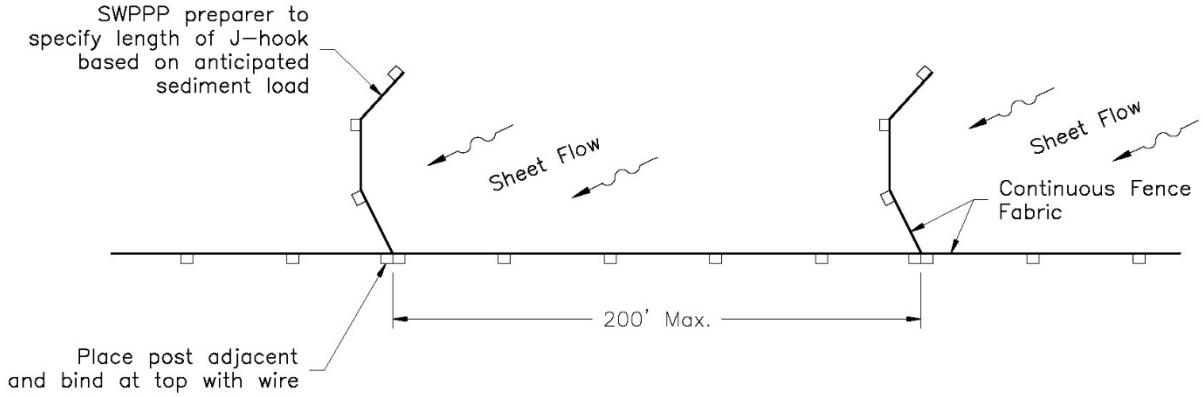
DETAIL A



END DETAIL

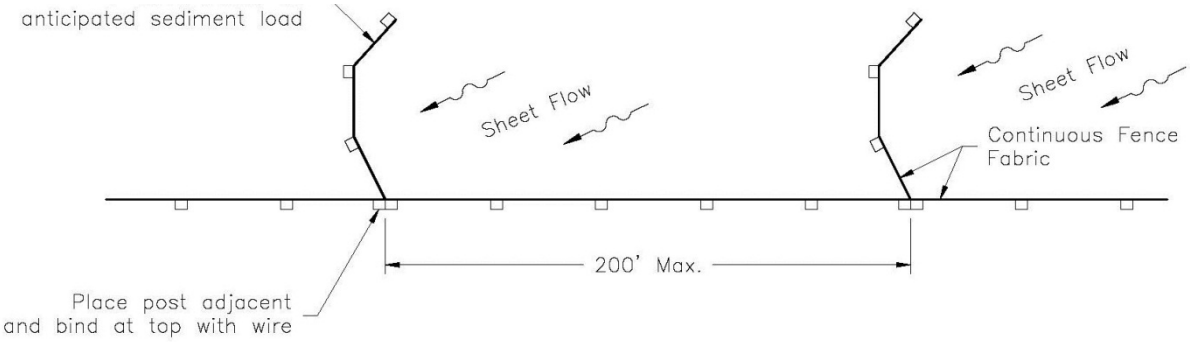


OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)



Plan

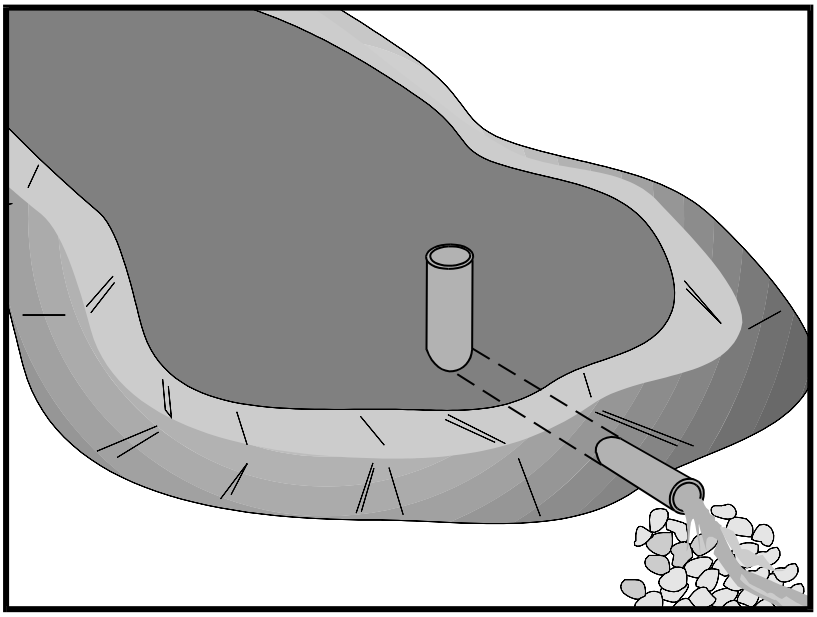
J–HOOK



Plan

J–HOOK

Sediment Basin SE-2



Description and Purpose

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is released.

Sediment basin design guidance presented in this fact sheet is intended to provide options, methods, and techniques to optimize temporary sediment basin performance and basin sediment removal. Basin design guidance provided in this fact sheet is not intended to guarantee basin effluent compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment basins should be used in conjunction with a comprehensive system of BMPs that includes:

- Diverting runoff from undisturbed areas away from the basin
- Erosion control practices to minimize disturbed areas on-site and to provide temporary stabilization and interim sediment controls (e.g., stockpile perimeter control, check dams, perimeter controls around individual lots) to reduce the basin's influent sediment concentration.

At some sites, sediment basin design enhancements may be required to adequately remove sediment. Traditional

Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-3 Sediment Trap (for smaller areas)

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(a.k.a. "physical") enhancements such as alternative outlet configurations or flow deflection baffles increase detention time and other techniques such as outlet skimmers preferentially drain flows with lower sediment concentrations. These "physical" enhancement techniques are described in this fact sheet. To further enhance sediment removal particularly at sites with fine soils or turbidity sensitive receiving waters, some projects may need to consider implementing Active Treatment Systems (ATS) whereby coagulants and flocculants are used to enhance settling and removal of suspended sediments. Guidance on implementing ATS is provided in SE-11.

Suitable Applications

Sediment basins may be suitable for use on larger projects with sufficient space for constructing the basin. Sediment basins should be considered for use:

- Where sediment-laden water may enter the drainage system or watercourses
- On construction projects with disturbed areas during the rainy season
- At the outlet of disturbed watersheds between 5 acres and 75 acres and evaluated on a site by site basis
- Where post construction detention basins are required
- In association with dikes, temporary channels, and pipes used to convey runoff from disturbed areas

Limitations

Sediment basins must be installed only within the property limits and where failure of the structure will not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. In addition, sediment basins are attractive to children and can be very dangerous. Local ordinances regarding health and safety must be adhered to. If fencing of the basin is required, the type of fence and its location should be shown in the SWPPP and in the construction specifications.

- As a general guideline, sediment basins are suitable for drainage areas of 5 acres or more, but not appropriate for drainage areas greater than 75 acres. However, the tributary area should be evaluated on a site by site basis.
- Sediment basins may become an "attractive nuisance" and care must be taken to adhere to all safety practices. If safety is a concern, basin may require protective fencing.
- Sediment basins designed according to this fact sheet are only effective in removing sediment down to about the silt size fraction. Sediment-laden runoff with smaller size fractions (fine silt and clay) may not be adequately treated unless chemical (or other appropriate method) treatment is used in addition to the sediment basin.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft or more must obtain approval from California Department of Water Resources Division of Safety of Dams (http://www.water.ca.gov/damsafety/).

- Water that stands in sediment basins longer than 96 hours may become a source of mosquitoes (and midges), particularly along perimeter edges, in shallow zones, in scour or below-grade pools, around inlet pipes, along low-flow channels, and among protected habitats created by emergent or floating vegetation (e.g. cattails, water hyacinth), algal mats, riprap, etc.
- Basins require large surface areas to permit settling of sediment. Size may be limited by the available area.

Implementation

General

A sediment basin is a controlled stormwater release structure formed by excavation or by construction of an embankment of compacted soil across a drainage way, or other suitable location. It is intended to trap sediment before it leaves the construction site. The basin is a temporary measure expected to be used during active construction in most cases and is to be maintained until the site area is permanently protected against erosion or a permanent detention basin is constructed.

Sediment basins are suitable for nearly all types of construction projects. Whenever possible, construct the sediment basins before clearing and grading work begins. Basins should be located at the stormwater outlet from the site but not in any natural or undisturbed stream. A typical application would include temporary dikes, pipes, and/or channels to convey runoff to the basin inlet.

Many development projects in California are required by local ordinances to provide a stormwater detention basin for post-construction flood control, desilting, or stormwater pollution control. A temporary sediment basin may be constructed by rough grading the post-construction control basins early in the project.

Sediment basins if properly designed and maintained can trap a significant amount of the sediment that flows into them. However, traditional basins do not remove all inflowing sediment. Therefore, they should be used in conjunction with erosion control practices such as temporary seeding, mulching, diversion dikes, etc., to reduce the amount of sediment flowing into the basin.

Planning

To improve the effectiveness of the basin, it should be located to intercept runoff from the largest possible amount of disturbed area. Locations best suited for a sediment basin are generally in lower elevation areas of the site (or basin tributary area) where site drainage would not require significant diversion or other means to direct water to the basin but outside jurisdictional waterways. However, as necessary, drainage into the basin can be improved by the use of earth dikes and drainage swales (see BMP EC-9). . The basin should not be located where its failure would result in the loss of life or interruption of the use or service of public utilities or roads.

Construct before clearing and grading work begins when feasible.

- Do not locate the basin in a jurisdictional stream.

- Basin sites should be located where failure of the structure will not cause loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft must obtain approval from the Division of Dam Safety. Local dam safety requirements may be more stringent.
- Limit the contributing area to the sediment basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- The basin should be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, and (3) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.

Design

When designing a sediment basin, designers should evaluate the site constraints that could affect the efficiency of the BMP. Some of these constraints include: the relationship between basin capacity, anticipated sediment load, and freeboard, available footprint for the basin, maintenance frequency and access, and hydraulic capacity and efficiency of the temporary outlet infrastructure. Sediment basins should be designed to maximize sediment removal and to consider sediment load retained by the basin as it affects basin performance.

Three Basin Design Options (Part A) are presented below along with a Typical Sediment/Detention Basin Design Methodology (Part B). Regardless of the design option that is selected, designers also need to evaluate the sediment basin capacity with respect to sediment accumulation (See "*Step 3. Evaluate the Capacity of the Sediment Basin") and* should incorporate approaches identified in "*Step 4. Other Design Considerations*" to enhance basin performance.

A) Basin Design Options:

Option 1:

Design sediment basin(s) using the standard equation:

$$A_s = \frac{1.2Q}{V_s} \qquad \text{(Eq. 1)}$$

Where:

A_s = Minimum surface area for trapping soil particles of a certain size

V_s = Settling velocity of the design particle size chosen (V_s = 0.00028 ft/s for a design particle size of 0.01 mm at 68°F)

1.2 = Factor of safety recommended by USEPA to account for the reduction in basin efficiency caused due to turbulence and other non ideal conditions.

$Q = CIA$ (Eq.2)

Where

Q = Peak basin influent flow rate measured in cubic feet per second (ft^3/s)

C = Runoff coefficient (unitless)

I = Peak rainfall intensity for the 10-year, 6-hour rain event (in/hr)

A = Area draining into the sediment basin in acres

The design particle size should be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01 mm [or 0.0004 in.]) particle, and the Vs used should be 100 percent of the calculated settling velocity.

This sizing basin method is dependent on the outlet structure design or the total basin length with an appropriate outlet. If the designer chooses to utilize the outlet structure to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a minimum of twice the basin width; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity). If the designer chooses to utilize the basin length (with appropriate basin outlet) to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a specifically designed to capture 100% of the design particle size; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity).

Basin design guidance provided herein assumes standard water properties (e.g., estimated average water temperature, kinematic viscosity, etc.) as a basis of the design. Designers can use an alternative design (Option 3) with site specific water properties as long as the design is as protective as Option 1.

The design guidance uses the peak influent flow rate to size sediment basins. Designers can use an alternative design (Option 3) with site specific average flow rates as long as the design is as protective as Option 1.

The basin should be located on the site where it can be maintained on a year-round basis and should be maintained on a schedule to retain the 2 ft of capacity.

Option 2:

Design pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 1.

Option 3:

The use of an equivalent surface area design or equation provided that the design efficiency is as protective or more protective of water quality than Option 1.

B) Typical Sediment/Detention Basin Design Methodology:

Design of a sediment basin requires the designer to have an understanding of the site constraints, knowledge of the local soil (e.g., particle size distribution of potentially contributing soils), drainage area of the basin, and local hydrology. Designers should not assume that a sediment basin for location A is applicable to location B. Therefore, designers can use this factsheet as guidance but will need to apply professional judgment and knowledge of the site to design an effective and efficient sediment basin. The following provides a general overview of typical design methodologies:

Step 1. Hydrologic Design

- Evaluate the site constraints and assess the drainage area for the sediment basin. Designers should consider on- and off-site flows as well as changes in the drainage area associated with site construction/disturbance. To minimize additional construction during the course of the project, the designer should consider identifying the maximum drainage area when calculating the basin dimensions.

- If a local hydrology manual is not available, it is recommended to follow standard rational method procedures to estimate the flow rate. The references section of this factsheet provides a reference to standard hydrology textbooks that can provide standard methodologies. If local rainfall depths are not available, values can be obtained from standard precipitation frequency maps from NOAA (downloaded from http://www.wrcc.dri.edu/pcpnfreq.html).

Step 2. Hydraulic Design

- Calculate the surface area required for the sediment basin using Equation 1. In which the flow rate is estimated for a 10-yr 6-hr event using rational method procedure listed in local hydrology manual and Vs is estimated using Stokes Law presented in Equation 3.

$$V_s = 2.81d^2 \qquad \text{(Eq.3)}$$

Where

V_s = Settling velocity in feet per second at 68˚F

d = diameter of sediment particle in millimeters (smallest soil grain size determined by wet sieve analysis or fine silt (0.01 mm [or 0.0004 in.])

- In general, the basin outlet design requires an iterative trial and error approach that considered the maximum water surface elevation, the elevation versus volume (stage-storage) relationship, the elevation verses basin outflow (a.k.a.-discharge) relationship, and the estimated inflow hydrograph. To adequately design the basins to settle sediment, the outlet configuration and associated outflow rates can be estimated by numerous methodologies. The following provides some guidance for design the basin outlet:

  - An outlet should have more than one orifice.

  - An outlet design typically utilizes multiple horizontal rows of orifices (approximately 3 or more) with at least 2 orifices per row (see Figures 1 and 2 at the end of this fact sheet).

- Orifices can vary in shape.
- Select the appropriate orifice diameter and number of perforations per row with the objective of minimizing the number of rows while maximizing the detention time.
- The diameter of each orifice is typically a maximum of 3-4 inches and a minimum of 0.25-0.5 inches.
- If a rectangular orifice is used, it is recommended to have minimum height of 0.5 inches and a maximum height of 6 inches.
- Rows are typically spaced at three times the diameter center to center vertically with a minimum distance of approximately 4 inches on center and a maximum distance of 1 foot on center.
- To estimate the outflow rate, each row is calculated separately based on the flow through a single orifice then multiplied by the number of orifices in the row. This step is repeated for each of the rows. Once all of the orifices are estimated, the total outflow rate versus elevation (stage-discharge curve) is developed to evaluate the detention time within the basin.
- Flow through a single orifice can be estimated using an Equation 4:

$$Q = BC' A(2gH)^{0.5} \qquad \text{(Eq.4)}$$

Where
Q = Outflow rate in ft^3/s
C′ = Orifice coefficient (unitless)
A = Area of the orifice (ft^2)
g = acceleration due to gravity (ft^3/s)
H = Head above the orifice (ft)
B = Anticipated Blockage or clogging factor (unitless), It is dependent on anticipated sediment and debris load, trash rack configuration etc, so the value is dependent on design engineer's professional judgment and/or local requirements (B is never greater than 1 and a value of 0.5 is generally used)

  - Care must be taken in the selection of orifice coefficient ("C′"); 0.60 is most often recommended and used. However, based on actual tests, Young and Graziano (1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission", recommends the following:
    - C′ = 0.66 for thin materials; where the thickness is equal to or less than the orifice diameter, or
    - C′ = 0.80 when the material is thicker than the orifice diameter
- If different sizes of orifices are used along the riser then they have to be sized such that not more than 50 percent of the design storm event drains in one-third of the drawdown time (to provide adequate settling time for events smaller than the design storm event)

and the entire volume drains within 96 hours or as regulated by the local vector control agency. If a basin fails to drain within 96 hours, the basin must be pumped dry.

- Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.

- Floating Outlet Skimmer: The floating skimmer (see Figure 3 at the end of this fact sheet is an alternative outlet configuration (patented) that drains water from upper portion of the water column. This configuration has been used for temporary and permanent basins and can improve basin performance by eliminating bottom orifices which have the potential of discharging solids. Some design considerations for this alternative outlet device includes the addition of a sand filter or perforated under drain at the low point in the basin and near the floating skimmer. These secondary drains allow the basin to fully drain. More detailed guidelines for sizing the skimmer can be downloaded from http://www.fairclothskimmer.com/.

- Hold and Release Valve: An ideal sediment/detention basin would hold all flows to the design storm level for sufficient time to settle solids, and then slowly release the storm water. Implementing a reliable valve system for releasing detention basins is critical to eliminate the potential for flooding in such a system. Some variations of hold and release valves include manual valves, bladder devices or electrically operated valves. When a precipitation event is forecast, the valve would be close for the duration of the storm and appropriate settling time. When the settling duration is met (approximately 24 or 48 hours), the valve would be opened and allow the stormwater to be released at a rate that does not resuspend settled solids and in a non-erosive manner. If this type of system is used the valve should be designed to empty the entire basin within 96 hours or as stipulated by local vector control regulations.

Step 3. Evaluate the Capacity of the Sediment Basin

- Typically, sediment basins do not perform as designed when they are not properly maintained or the sediment yield to the basin is larger than expected. As part of a good sediment basin design, designers should consider maintenance cycles, estimated soil loss and/or sediment yield, and basin sediment storage volume. The two equations below can be used to quantify the amount of soil entering the basin.

- The Revised Universal Soil Loss Equation (RUSLE, Eq.5) can be used to estimate annual soil loss and the Modified Universal Soil Equation (MUSLE, Eq.6) can be used to estimate sediment yield from a single storm event.

$$A = R \times K \times LS \times C \times P \qquad \text{(Eq.5)}$$

$$Y = 95\left(Q \times q_p\right)^{0.56} \times K \times LS \times C \times P \qquad \text{(Eq.6)}$$

Where:

A = annual soil loss, tons/acre-year

R = rainfall erosion index, in 100 ft. Tons/acre.in/hr.

K = soil erodibility factor, tons/acre per unit of R

LS = slope length and steepness factor (unitless)

C = vegetative cover factor (unitless)

P = erosion control practice factor (unitless)

Y = single storm sediment yield in tons

Q = runoff volume in acre-feet

q_p = peak flow in cfs

- Detailed descriptions and methodologies for estimating the soil loss can be obtained from standard hydrology text books (See References section).
- Determination of the appropriate equation should consider construction duration and local environmental factors (soils, hydrology, etc.). For example, if a basin is planned for a project duration of 1 year and the designer specifies one maintenance cycle, RUSLE could be used to estimate the soil loss and thereby the designer could indicate that the sediment storage volume would be half of the soil loss value estimated. As an example, for use of MUSLE, a project may have a short construction duration thereby requiring fewer maintenance cycles and a reduced sediment storage volume. MUSLE would be used to estimate the anticipated soil loss based on a specific storm event to evaluate the sediment storage volume and appropriate maintenance frequency.
- The soil loss estimates are an essential step in the design, and it is essential that the designer provide construction contractors with enough information to understand maintenance frequency and/or depths within the basin that would trigger maintenance. Providing maintenance methods, frequency and specification should be included in design bid documents such as the SWPPP Site Map.
- Once the designer has quantified the amount of soil entering the basin, the depth required for sediment storage can be determined by dividing the estimated sediment loss by the surface area of the basin.

Step 4. Other Design Considerations

- Consider designing the volume of the settling zone for the total storm volume associated with the 2-year event or other appropriate design storms specified by the local agency. This volume can be used as a guide for sizing the basin without iterative routing calculations. The depth of the settling zone can be estimated by dividing the estimated 2-yr storm volume by the surface area of the basin.
- The basin volume consists of two zones:
  - A sediment storage zone at least 1 ft deep.
  - A settling zone at least 2 ft deep.

- The basin depth must be no less than 3 ft (not including freeboard).

- Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The outlet should be designed to drain the basin within 24 to 96 hours (also referred to as "drawdown time"). The 24-hour limit is specified to provide adequate settling time; the 96-hour limit is specified to mitigate vector control concerns.

- Confirmation of the basin performance can be evaluated by routing the design storm (10-yr 6-hr, or as directed by local regulations) through the basin based on the basin volume (stage-storage curve) and the outlet design (stage-discharge curve based on the orifice configuration or equivalent outlet design).

- Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event.

  - Include an emergency spillway to accommodate flows not carried by the principal spillway. The spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap (or equivalent protection) on fill slopes.

  - The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 ft in length.

- Rock, vegetation or appropriate erosion control should be used to protect the basin inlet, outlet, and slopes against erosion.

- The total depth of the sediment basin should include the depth required for sediment storage, depth required for settling zone and freeboard of at least 1 foot or as regulated by local flood control agency for a flood event specified by the local agency.

- The basin alignment should be designed such that the length of the basin is more than twice the width of the basin; the length should be determined by measuring the distance between the inlet and the outlet. If the site topography does not allow for this configuration baffles should be installed so that the ratio is satisfied. If a basin has more than one inflow point, any inflow point that conveys more than 30 percent of the total peak inflow rate has to meet the required length to width ratio.

- An alternative basin sizing method proposed by Fifield (2004) can be consulted to estimate an alternative length to width ratio and basin configuration. These methods can be considered as part of Option 3 which allows for alternative designs that are protective or more protective of water quality.

- Baffles (see Figure 4 at the end of this fact sheet) can be considered at project sites where the existing topography or site constraints limit the length to width ratio. Baffles should be constructed of earthen berms or other structural material within the basin to divert flow in the basin, thus increasing the effective flow length from the basin inlet to the outlet riser. Baffles also reduce the change of short circuiting and allows for settling throughout the basin.

- Baffles are typically constructed from the invert of the basin to the crest of the emergency spillway (i.e., design event flows are meant to flow around the baffles and flows greater than the design event would flow over the baffles to the emergency spillway).
- Use of other materials for construction of basin baffles (such as silt fence) may not be appropriate based on the material specifications and will require frequent maintenance (maintain after every storm event). Maintenance may not be feasible when required due to flooded conditions resulting from frequent (i.e., back to back) storm events. Use of alternative baffle materials should not deviate from the intended purpose of the material, as described by the manufacturer.
- Sediment basins are best used in conjunction with erosion controls.
- Basins with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.
- A forebay, constructed upstream of the basin, may be provided to remove debris and larger particles.
- The outflow from the sediment basin should be provided with velocity dissipation devices (see BMP EC-10) to prevent erosion and scouring of the embankment and channel.
- The principal outlet should consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.
- A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.
- The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel). Provide anti-seep collars on the barrel.
- Cleanout level should be clearly marked on the riser pipe.

Installation

- Securely anchor and install an anti-seep collar on the outlet pipe/riser and provide an emergency spillway for passing major floods (see local flood control agency).
- Areas under embankments must be cleared and stripped of vegetation.

- Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern.

Costs

The cost of a sediment basin is highly variable and is dependent of the site configuration. To decrease basin construction costs, designers should consider using existing site features such as berms or depressed area to site the sediment basin. Designers should also consider potential savings associated with designing the basin to minimize the number of maintenance cycles and siting the basin in a location where a permanent BMP (e.g., extended detention basin) is required for the project site.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level and as required by local requirements. It is recommended that at a minimum, basins be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check inlet and outlet area for erosion and stabilize if required.
- Check fencing for damage and repair as needed.
- Sediment that accumulates in the basin must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage volume. Sediment removed during maintenance should be managed properly. The sediment should be appropriately evaluated and used or disposed of accordingly. Options include: incorporating sediment into earthwork on the site (only if there is no risk that sediment is contaminated); or off-site export/disposal at an appropriate location (e.g., sediment characterization and disposal to an appropriate landfill).
- Remove standing water from basin within 96 hours after accumulation.
- If the basin does not drain adequately (e.g., due to storms that are more frequent or larger than the design storm or other unforeseen site conditions), dewatering should be conducted in accordance with appropriate dewatering BMPs (see NS-2) and in accordance with local permits as applicable.
- To minimize vector production:
  - Remove accumulation of live and dead floating vegetation in basins during every inspection.
  - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

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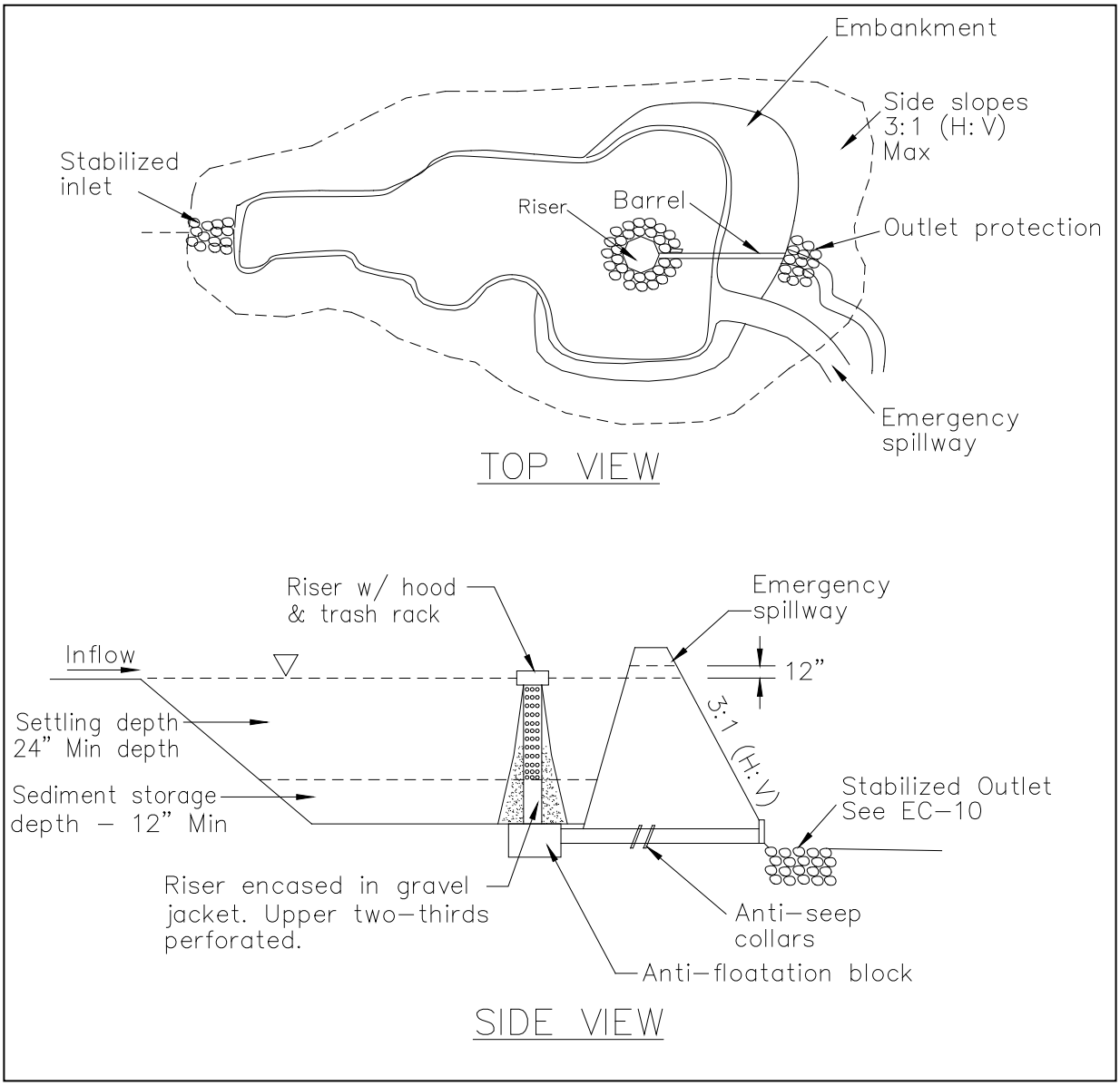


FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE

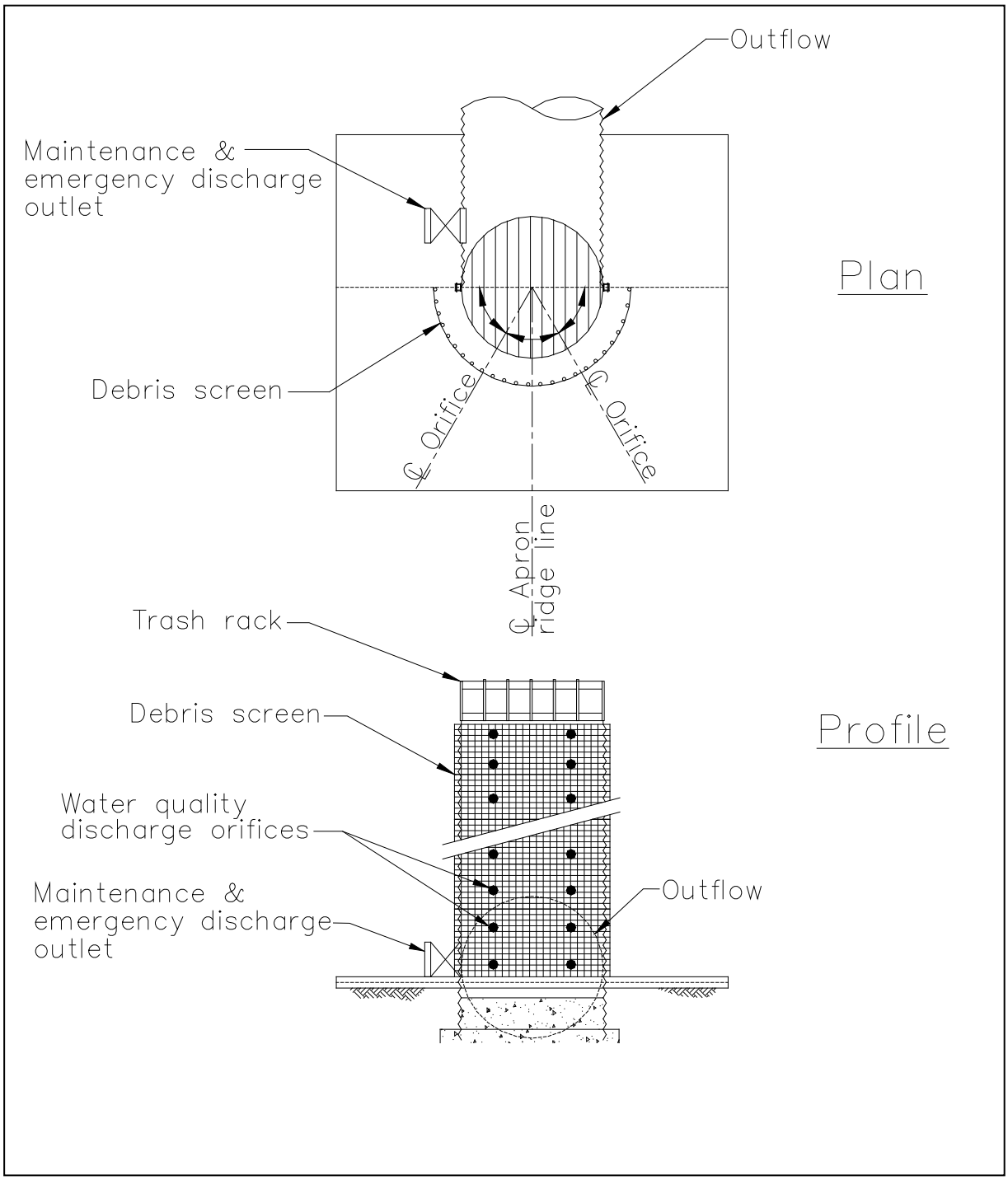


FIGURE 2: MULTIPLE ORIFICE OUTLET RISER

NOT TO SCALE

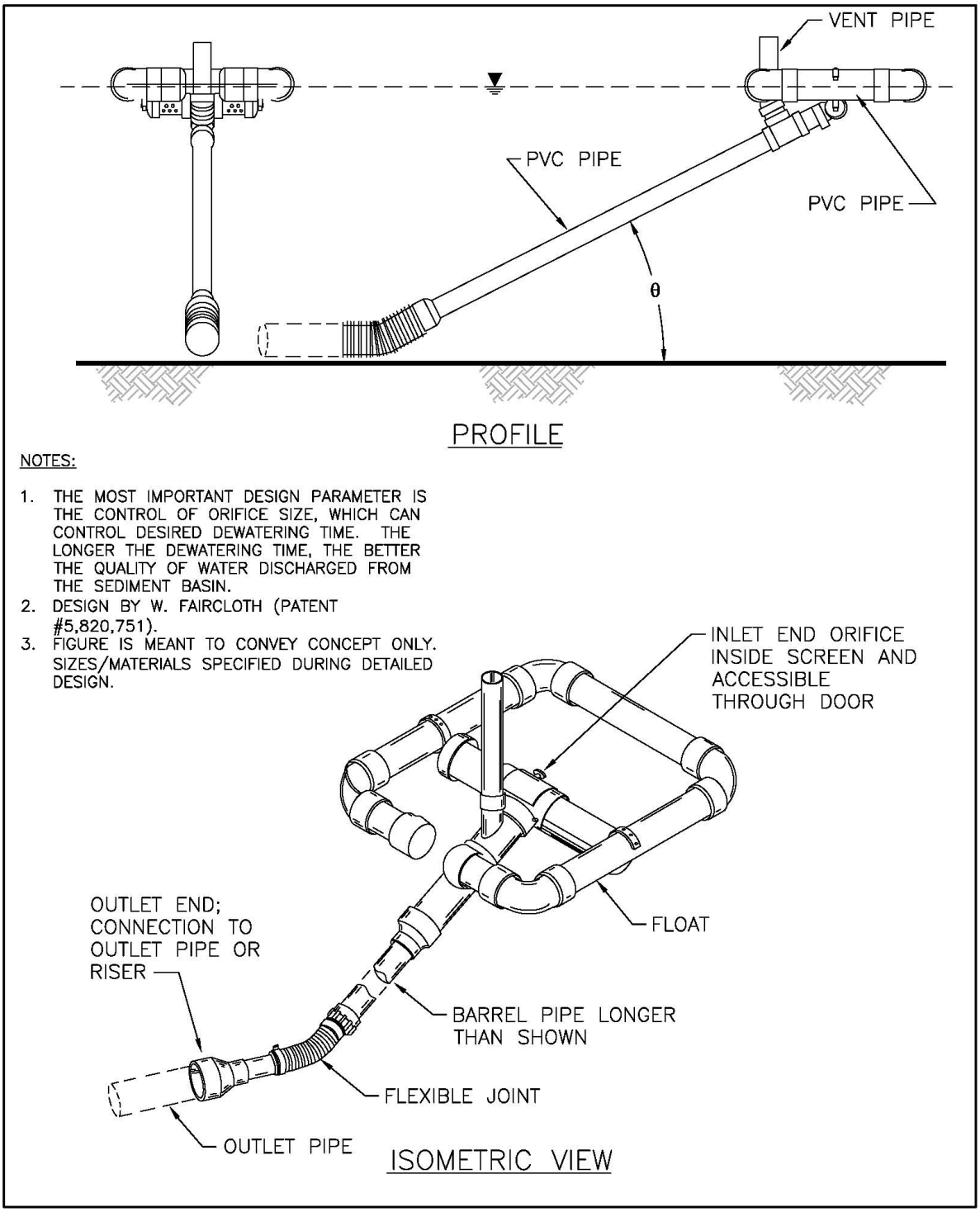


FIGURE 3: TYPICAL SKIMMER

NOT TO SCALE

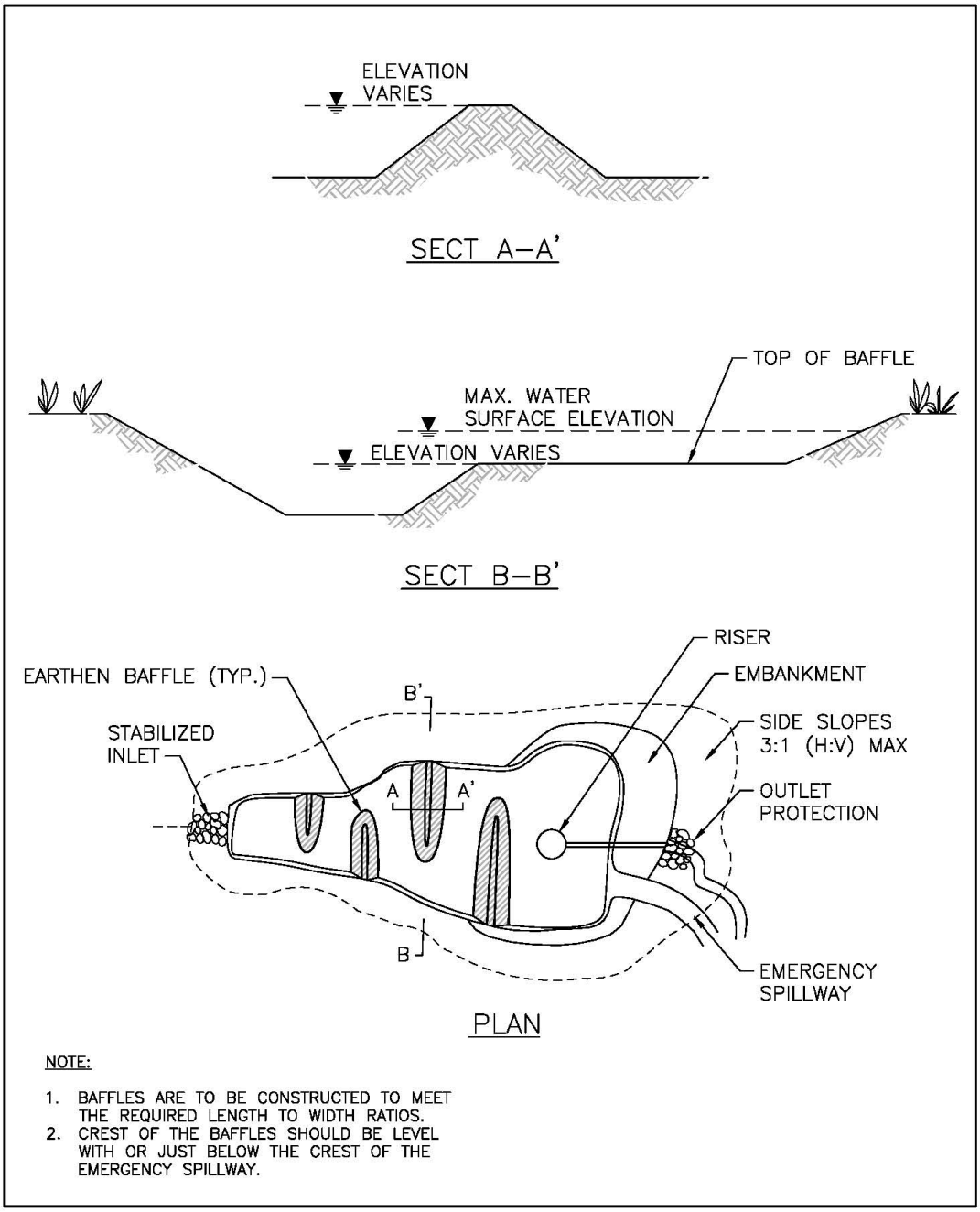
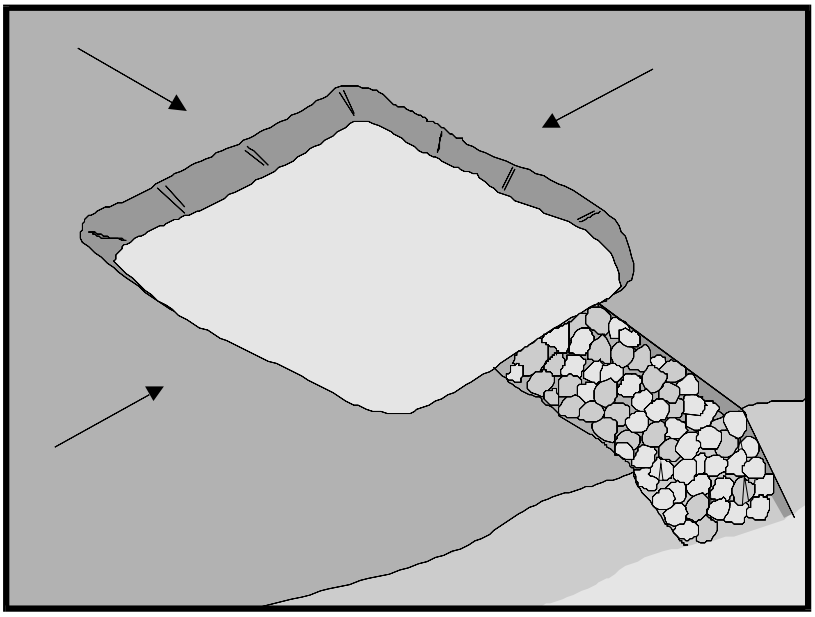


FIGURE 4: TYPICAL TEMPORARY SEDIMENT BASIN WITH BAFFLES

NOT TO SCALE

Sediment Trap SE-3



Categories		
EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

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Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged by gravity flow. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Trap design guidance provided in this fact sheet is not intended to guarantee compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment traps should be used in conjunction with a comprehensive system of BMPs.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be

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placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.

- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume

the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criterion for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.

- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.
- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation is $15 ft ^{2} and plus additional costs for the design and maintenance.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 96 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs per NS-2 shall be implemented at all times during dewatering activities.

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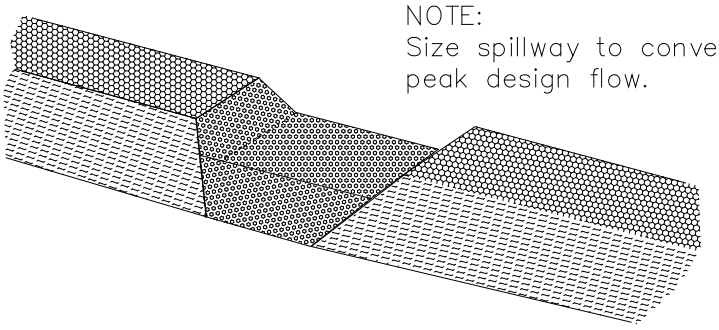
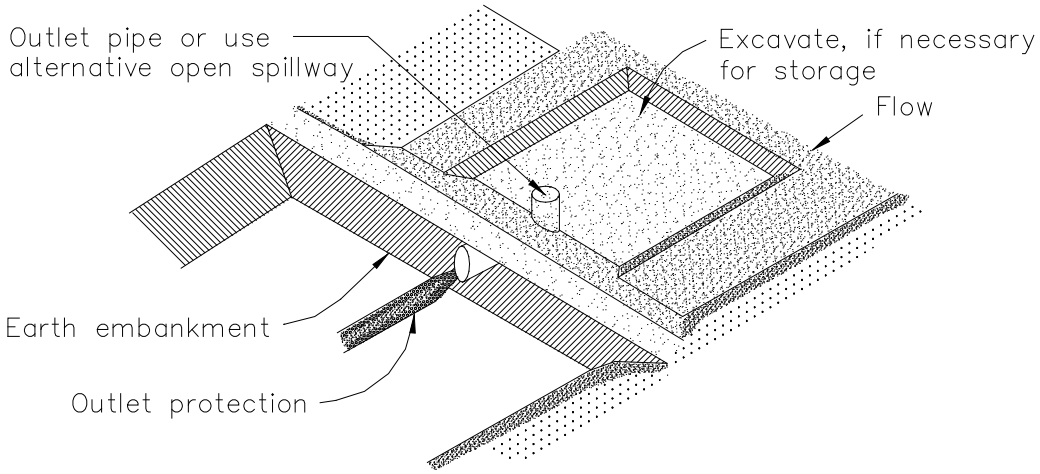
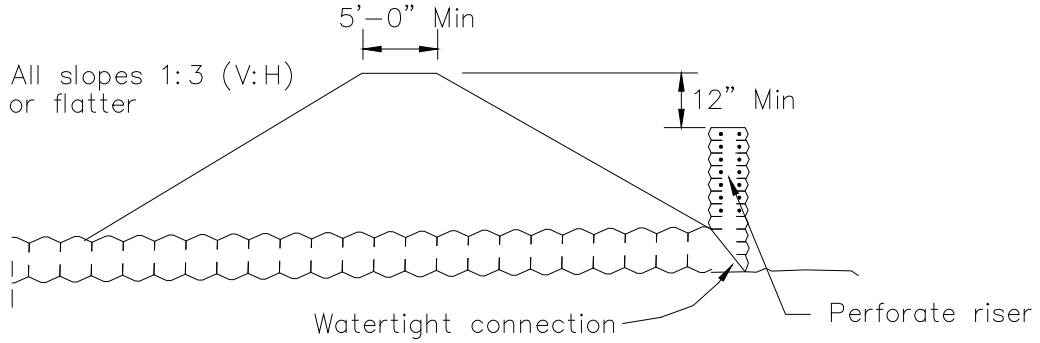


TYPICAL OPEN SPILLWAY

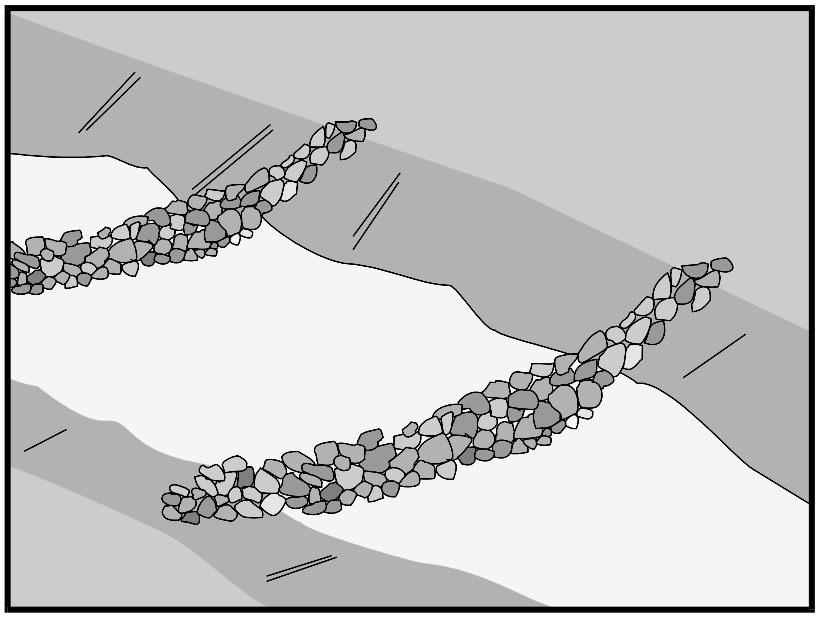




EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

Check Dams SE-4



Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- To act as a grade control structure.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

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Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a "permanent" ditch or swale being constructed early and used as a "temporary" conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don't use check dams. Consider alternative BMPs, or.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see "Spacing Between Check Dams" detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of

the ditch or swale (see "Typical Rock Check Dam" detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see "Gravel Bag Check Dam" detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer's instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.
- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.
- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.
- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.
- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.
- Upper rows or gravel and sand bags shall overlap joints in lower rows.
- Fiber rolls should be trenched in, backfilled, and firmly staked in place.
- Install along a level contour.
- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

References

Draft – Sedimentation and Erosion Control, and Inventory of Current Practices, USEPA, April 1990.

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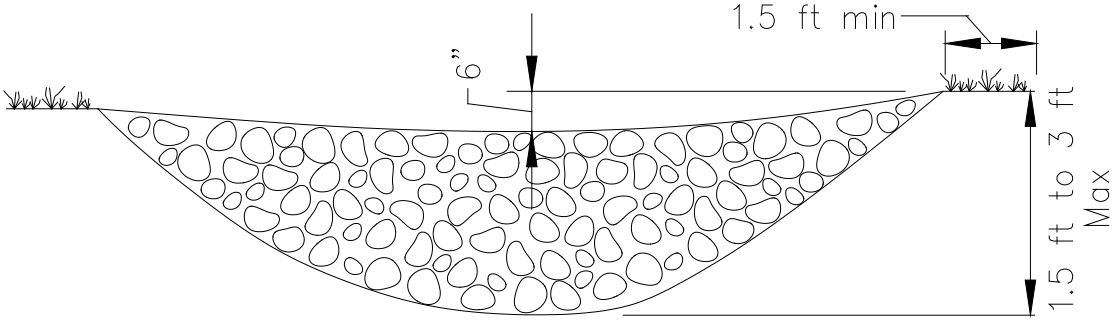
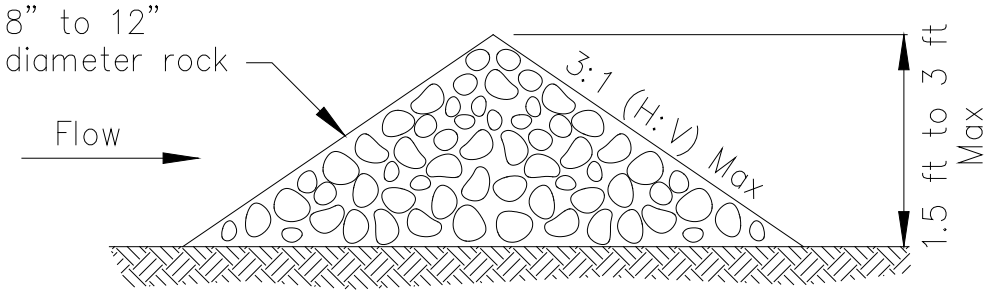
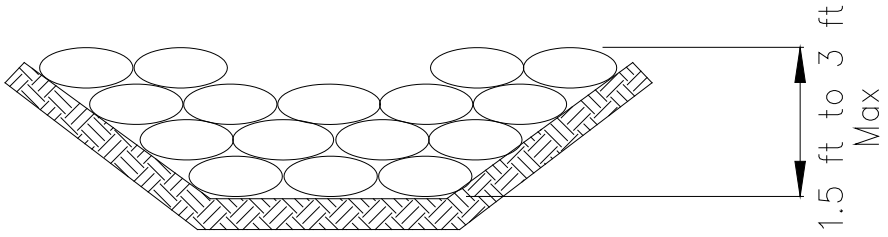


ELEVATION

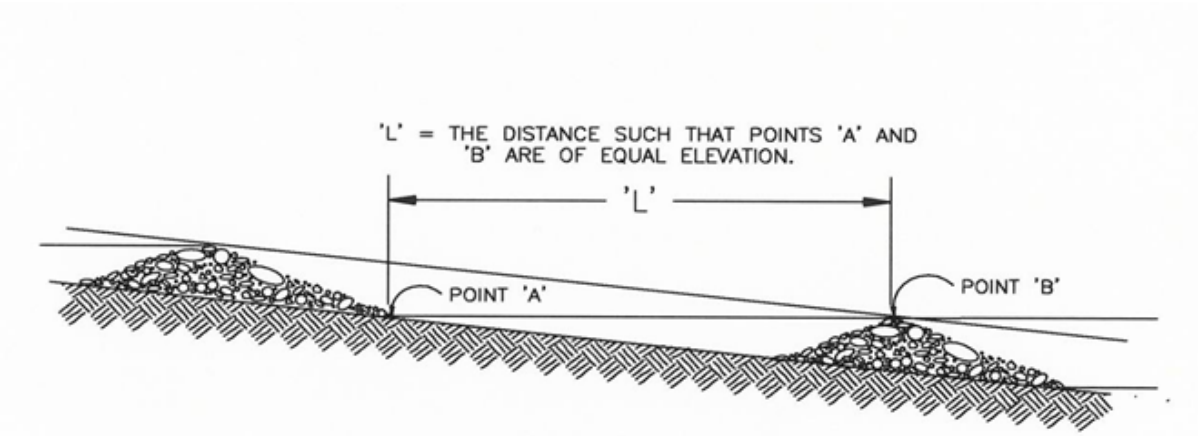


TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE

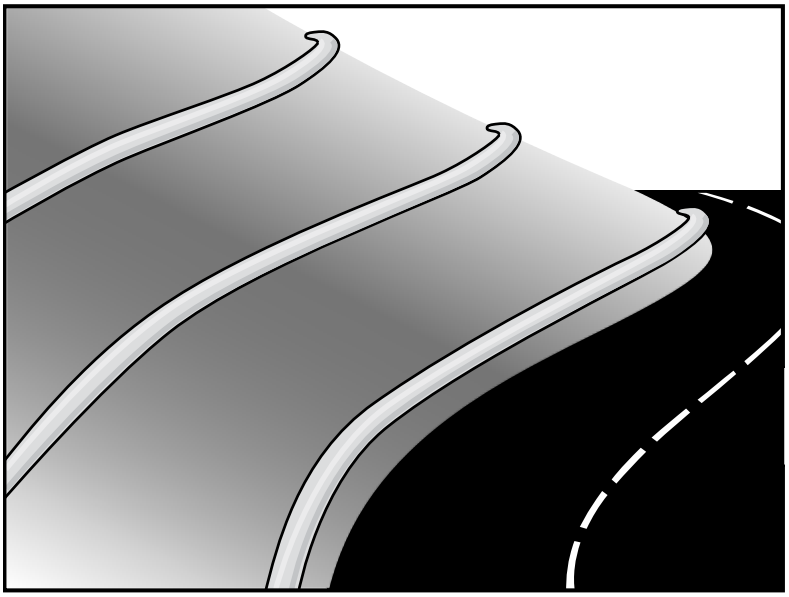


GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE



SPACING BETWEEN CHECK DAMS

Fiber Rolls SE-5



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

A fiber roll (also known as wattles or logs) consists of straw, coir, curled wood fiber, or other biodegradable materials bound into a tight tubular roll wrapped by plastic netting, which can be photodegradable, or natural fiber, such as jute, cotton, or sisal. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

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- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.

Limitations

- Fiber rolls should be used in conjunction with erosion control, such as hydroseed, RECPs, etc.
- Only biodegradable fiber rolls containing no plastic can remain on a site applying for a Notice of Termination due to plastic pollution and wildlife concerns (State Water Board, 2016). Fiber rolls containing plastic that are used on a site must be disposed of for final stabilization.
- Fiber rolls are not effective unless trenched in and staked. If not properly staked and trenched in, fiber rolls will not work as intended and could be transported by high flows.
- Not intended for use in high flow situations (i.e., for concentrated flows).
- Difficult to move once saturated.
- Fiber rolls have a limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months, depending upon local conditions and roll material.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed-free rice straw, flax, curled wood fiber, or coir bound into a tight tubular roll by netting or natural fiber (see *Limitations* above regarding plastic netting).
- Typical fiber rolls vary in diameter from 6 in. to 20 in. Larger diameter rolls are available as well. The larger the roll, the higher the sediment retention capacity.
- Typical fiber rolls lengths are 4, 10, 20 and 25 ft., although other lengths are likely available.

Installation

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be ¼ to 1/3 of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.
- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.

  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.

  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.

- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Fiber rolls encased with plastic netting or containing any plastic material will need to be removed from the site for final stabilization. Fiber rolls used in a permanent application are to be encased with a non-plastic material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance; therefore, during the BMP planning phase, the areas where fiber rolls will be used on final slopes, only fiber rolls wrapped in non-plastic material should be selected.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for straw fiber rolls range from $26 - $38 per 25-ft. roll[1] and curled wood fiber rolls range from $30 - $40 per roll[2].

Material costs for PAM impregnated fiber rolls range between $9.00-$12.00 per linear foot, based upon vendor research[1] .

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

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General Construction – Frequently Asked Questions, Storm Water Program website, State Water Resources Control Board, 2009 updated in 2016. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_const_faq.shtml.

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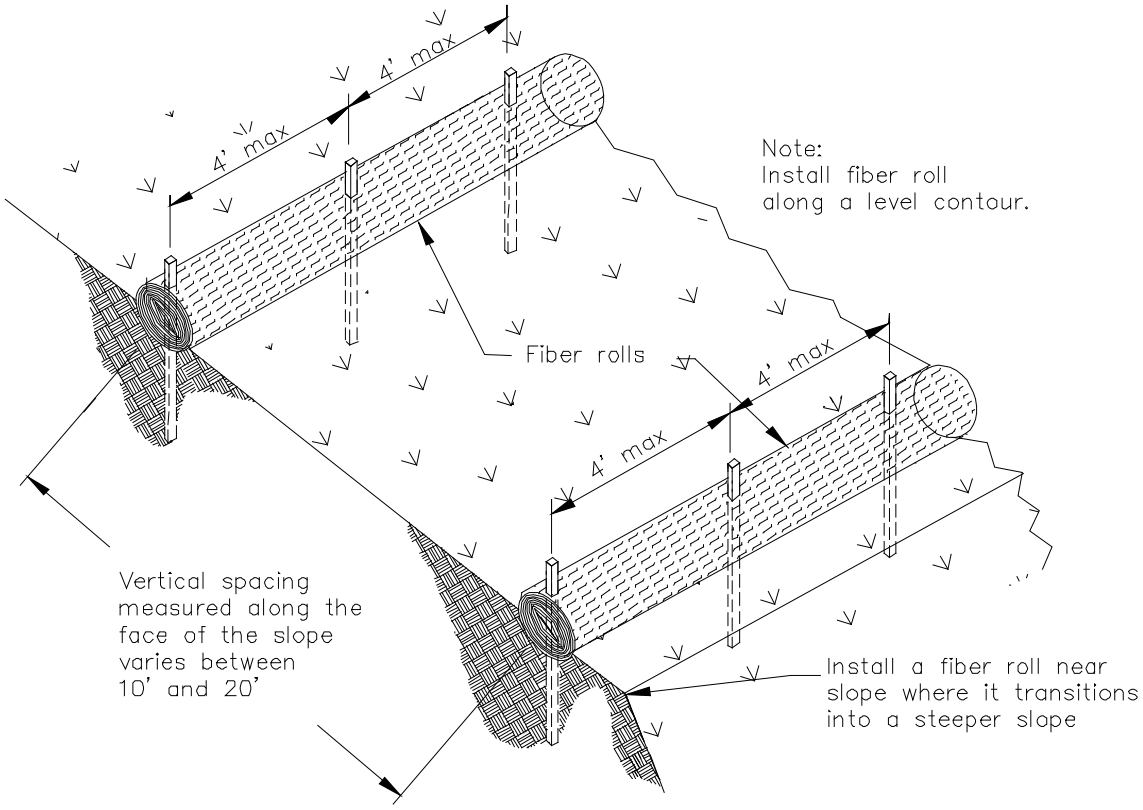
[1] Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.
[2] Costs estimated based on vendor query by Tetra Tech, Inc. 2016.



TYPICAL FIBER ROLL INSTALLATION
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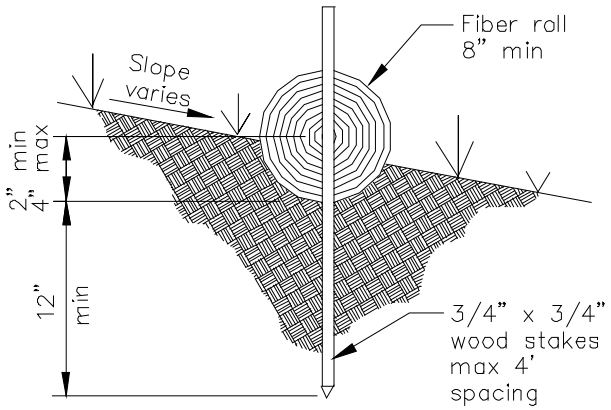

ENTRENCHMENT DETAIL
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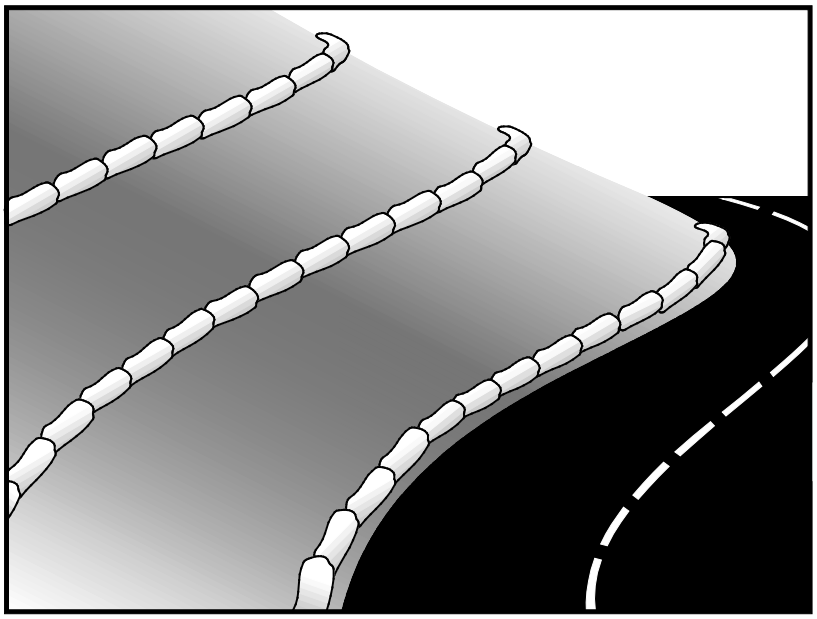
Gravel Bag Berm SE-6



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As a linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited, and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction
  - Top width = 12 in. minimum for one- or two-layer construction
  - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction.
  - Top width = 12 in. minimum for one- or two-layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.

- ***Fill Material:*** Fill material should be 0.5 to 1 in. Crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. $3.20-$3.80 per filled gravel bag is standard based upon vendor research (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.

- Reshape or replace gravel bags as needed.

- Repair washouts or other damage as needed.

- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.

- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

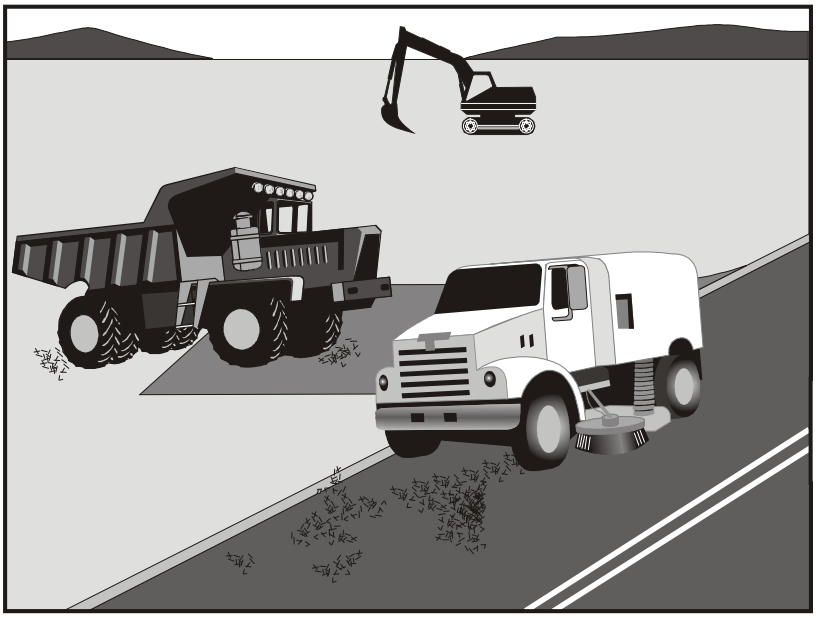
Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Street Sweeping and Vacuuming SE-7



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

- Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).
- Sweeping may be less effective for fine particle soils (i.e., clay).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused and perhaps save money.
- Inspect potential sediment tracking locations daily.

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- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $ 650/day to $2,500/day[1], plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

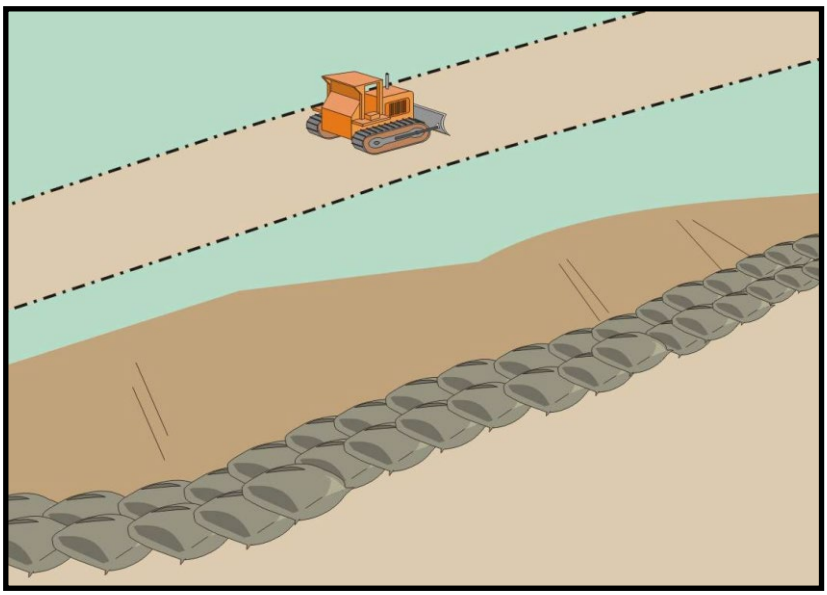
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

[1] Based on contractor query conducted by Tetra Tech, Inc. November 2016.

Sandbag Barrier SE-8



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes.
  - As sediment traps at culvert/pipe outlets.
  - Below other small cleared areas.
  - Along the perimeter of a site.
  - Down slope of exposed soil areas.
  - Around temporary stockpiles and spoil areas.
  - Parallel to a roadway to keep sediment off paved areas.
  - Along streams and channels.

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

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- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
  - At the top of slopes to divert runoff away from disturbed slopes.
  - As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited, and bags will need to be replaced when there are signs of damage or wear.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction
  - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- ***Sandbag Material:*** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- ***Sandbag Size:*** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.

- ***Fill Material:*** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) or similar permeable material free from clay and deleterious material, such as recycled concrete or asphalt.

Costs

Empty sandbags cost $0.25 - $0.75. Average cost of fill material is $8 per yd^3. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at $1.50 - $2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

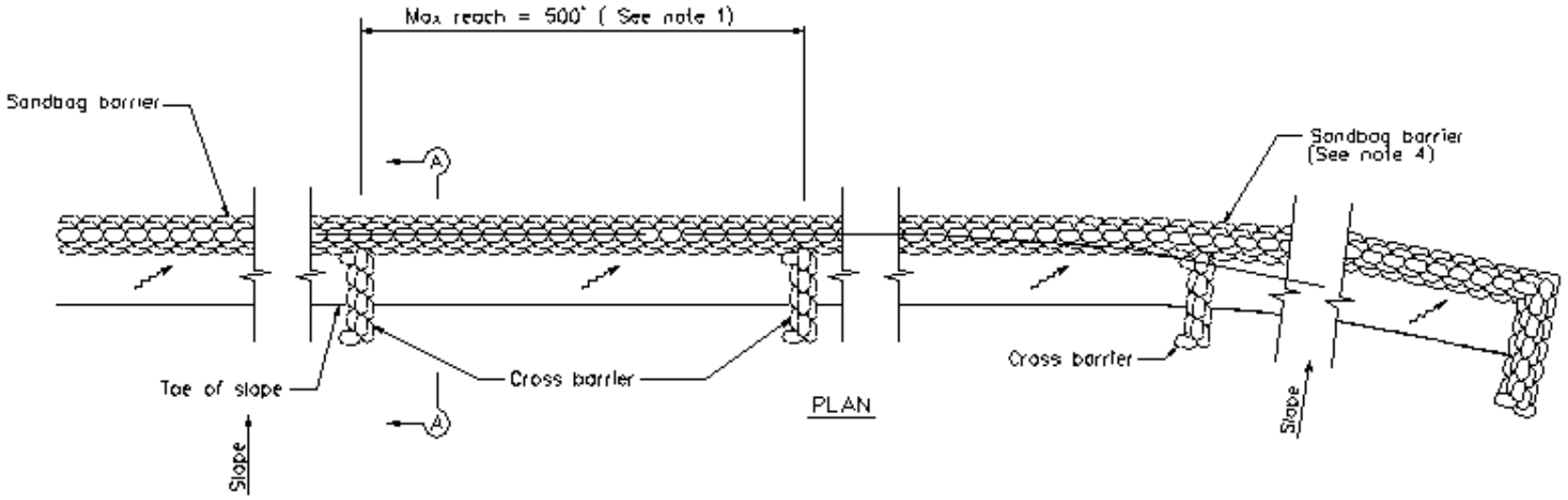
References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

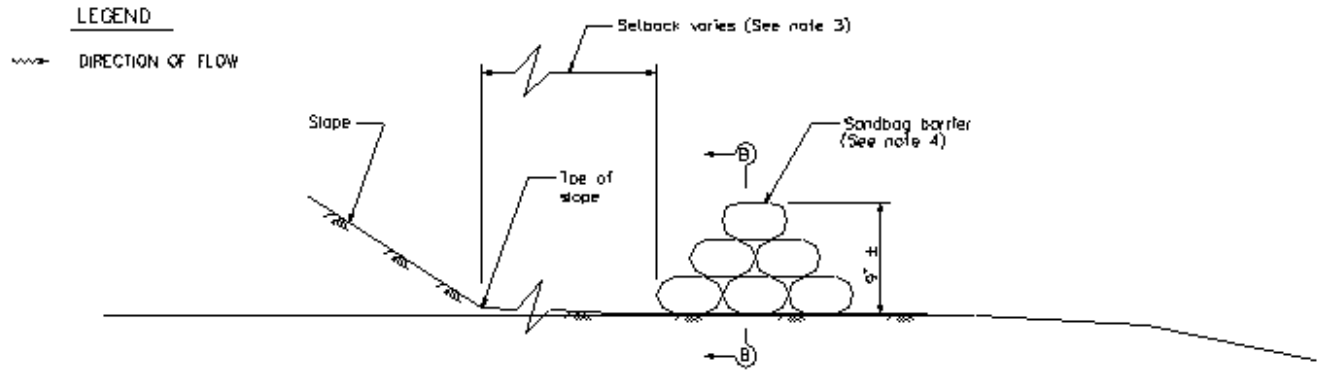
Sandbag Barrier SE-8



SANDBAG BARRIER

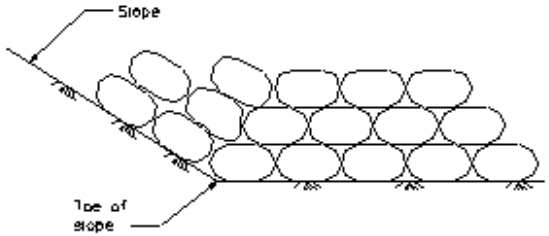
NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. Place sandbags tightly
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.

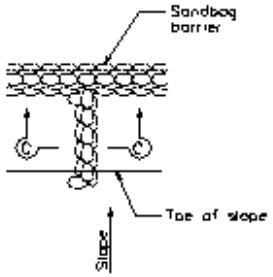


SECTION A–A

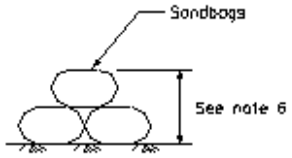
SECTION B–B



END DETAIL

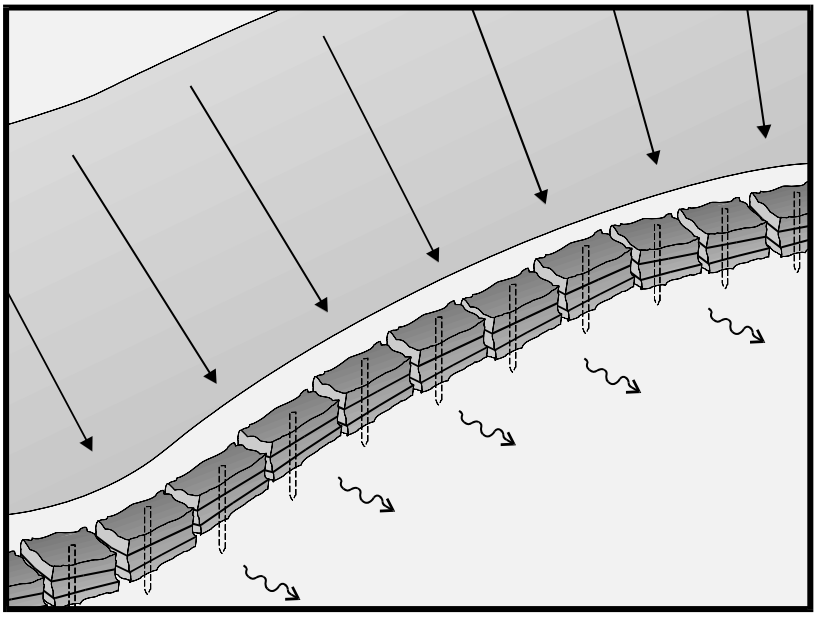


CROSS BARRIER DETAIL



SECTION C–C

Straw Bale Barrier SE-9



Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet-flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
  - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
  - Slopes greater than 10:1 (H:V): Not recommended.

- Turn the ends of the straw bale barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.
- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.
- Maximum flow path to the barrier should be limited to 100 ft.
- Straw bale barriers should consist of two parallel rows.
    - Butt ends of bales tightly
    - Stagger butt joints between front and back row
    - Each row of bales must be trenched in and firmly staked
- Straw bale barriers are limited in height to one bale laid on its side.
- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.
- See attached figure for installation details.

Materials

- ***Straw Bale Size:*** Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.
- ***Bale Bindings:*** Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.
- ***Stakes:*** Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost $5 - $7 each. Adequate labor should be budgeted for installation and maintenance.

Inspection and Maintenance

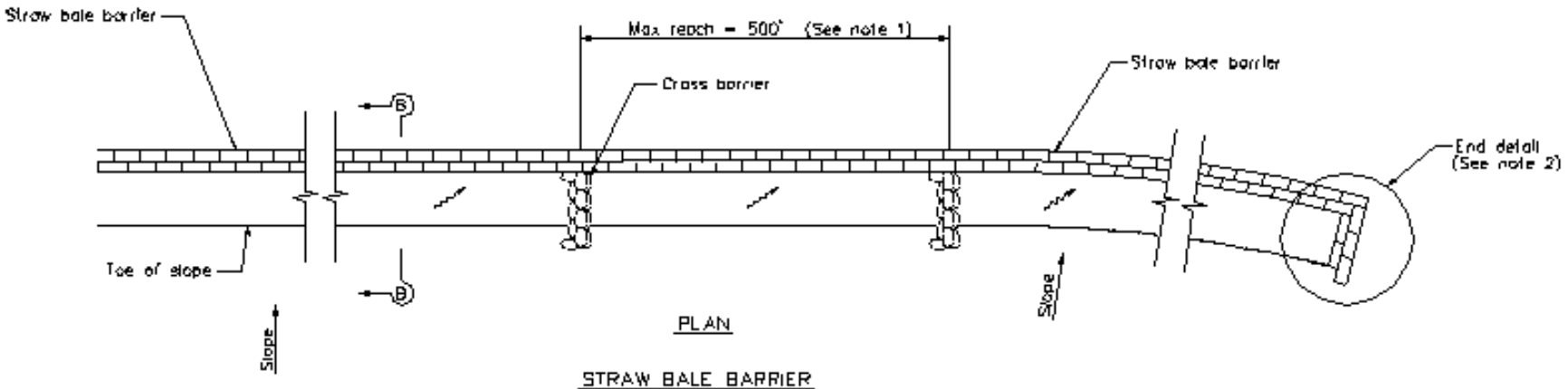
Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.
- Replace or repair damaged bales as needed.
- Repair washouts or other damages as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Straw Bale Barrier SE-9



PLAN

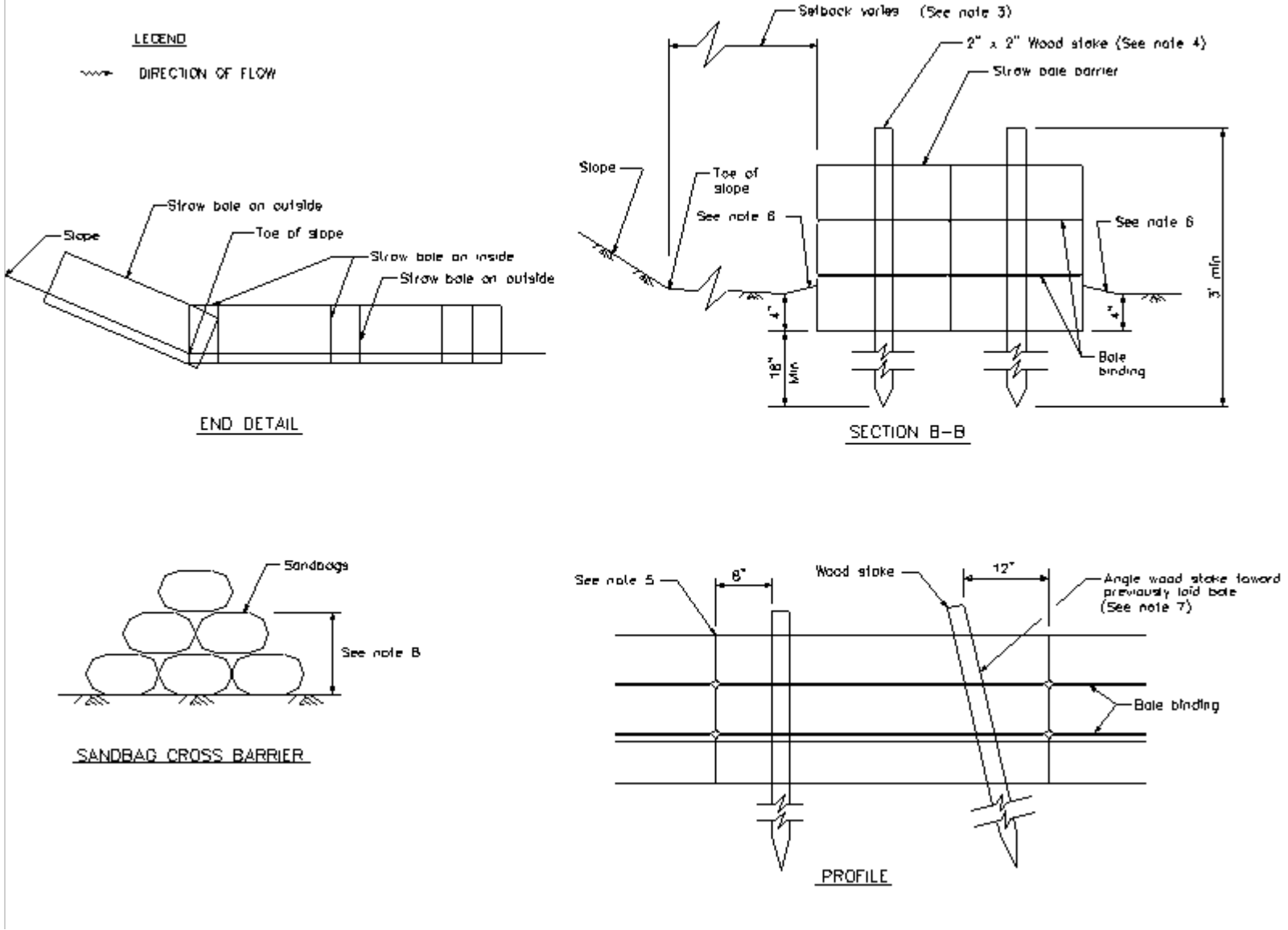
STRAW BALE BARRIER

NOTES

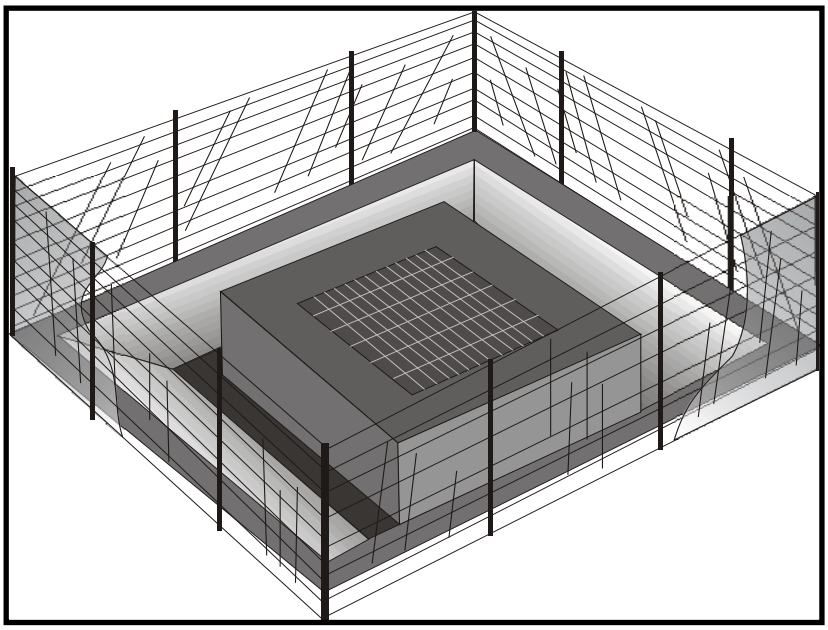
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.

LEGEND

DIRECTION OF FLOW


LEGEND
DIRECTION OF FLOW
Straw bale on outside
Slope
Toe of slope
Straw bale on inside
Straw bale on outside
END DETAIL
Setback varies (See note 3)
2" x 2" Wood stake (See note 4)
Straw bale barrier
Slope
Toe of slope
See note 6
See note 6
4"
4"
18" Min
3' min
Bale binding
SECTION B-B
Sandbags
See note 8
SANDBAG CROSS BARRIER
See note 5
8"
Wood stake
12"
Angle wood stake toward previously laid bale (See note 7)
Bale binding
PROFILE

Storm Drain Inlet Protection SE-10



Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

SE-13 Compost Socks and Berms

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Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
  - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
  - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.
- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.

- Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).

- Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.

- Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.

- Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.

- Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.

- Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.

- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.

- Provide area around the inlet for water to pond without flooding structures and property.

- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.

- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Silt Fence -*** Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.

  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.

  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.

  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.

  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

5. Backfill the trench with gravel or compacted earth all the way around.

- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap -*** Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd^3/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.

- ***DI Protection Type 3 - Gravel bag -*** Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.

  1. Construct on gently sloping street.

  2. Leave room upstream of barrier for water to pond and sediment to settle.

  3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.

  4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10-year storm) should not overtop the curb.

- ***DI Protection Type 4 – Block and Gravel Filter -*** Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.

  1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.

  2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.

  3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.

  4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

- ***DI Protection Type 5 – Temporary Geotextile Insert (proprietary) –*** Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable, and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- ***DI Protection Type 6 - Biofilter bags*** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.

    1. Construct in a gently sloping area.
    2. Biofilter bags should be placed around inlets to intercept runoff flows.
    3. All bag joints should overlap by 6 in.
    4. Leave room upstream for water to pond and for sediment to settle out.
    5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.

- ***DI Protection Type 7 – Compost Socks*** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one-year useful life) is $200 per inlet.
- Temporary geotextile inserts are proprietary, and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from $50-75 plus installation, but costs can exceed $100. This cost does not include maintenance.
- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

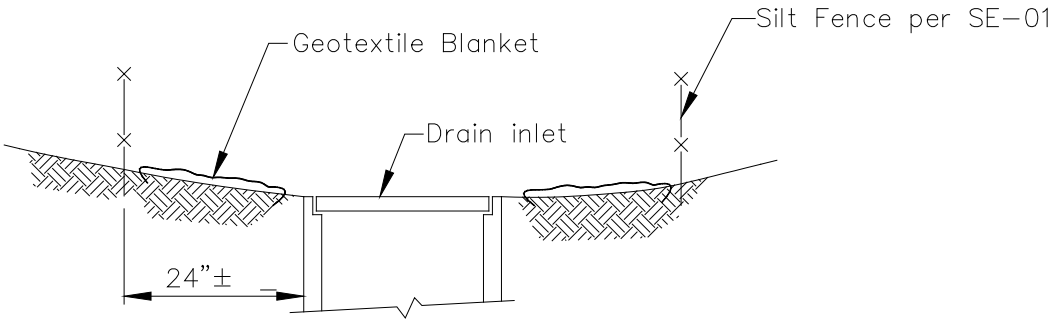
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
    - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

References

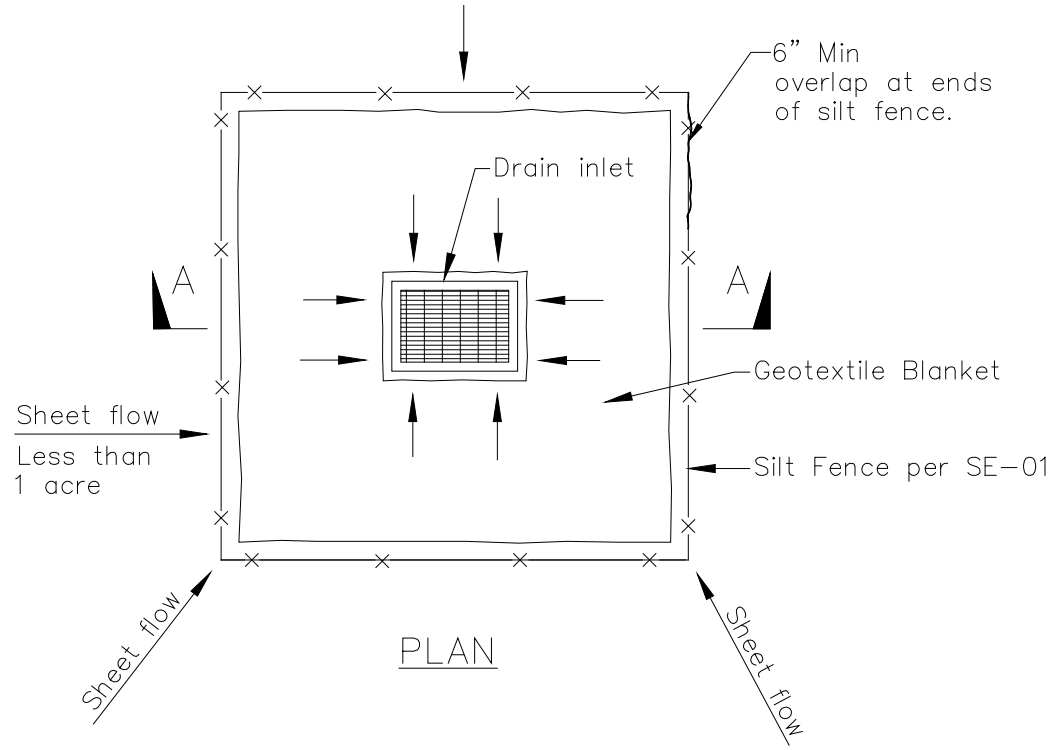
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



SECTION A–A

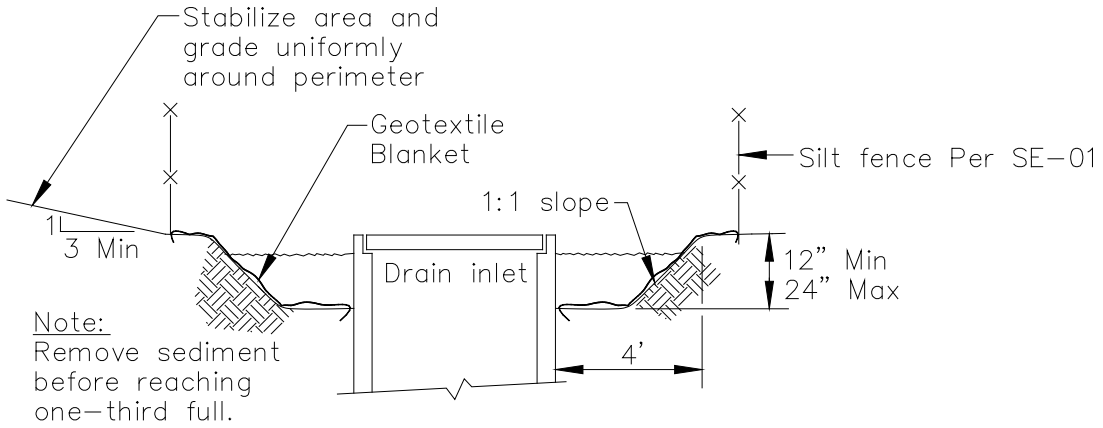


PLAN

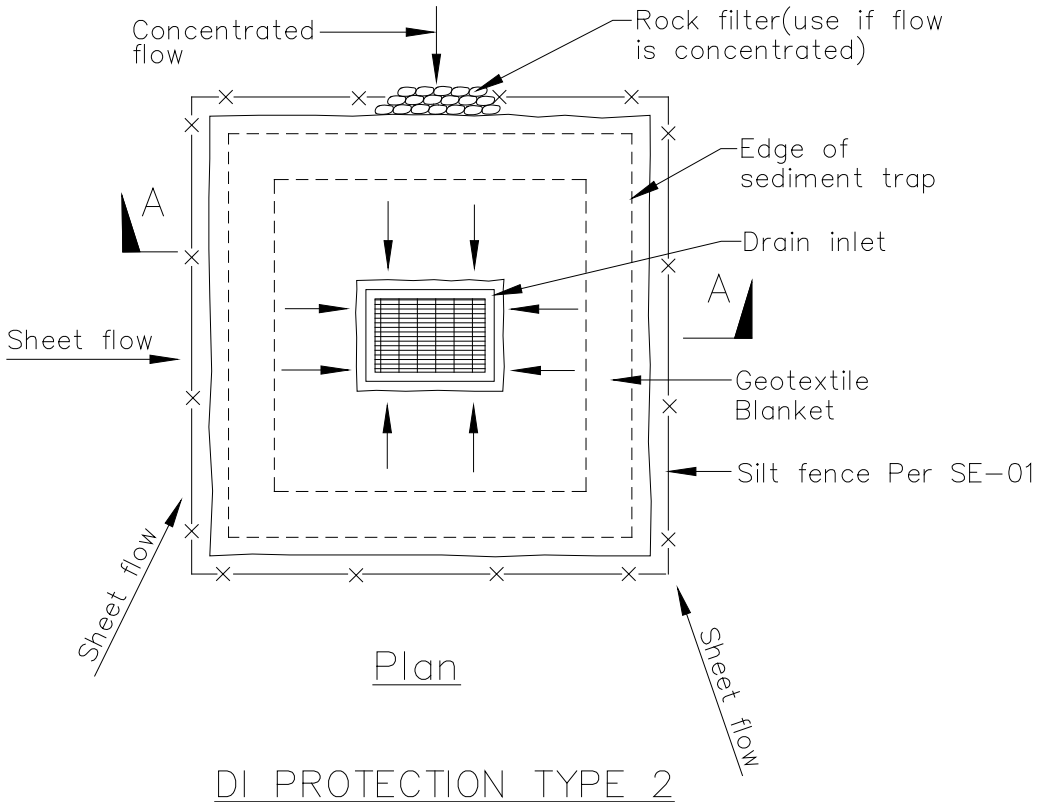
DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.



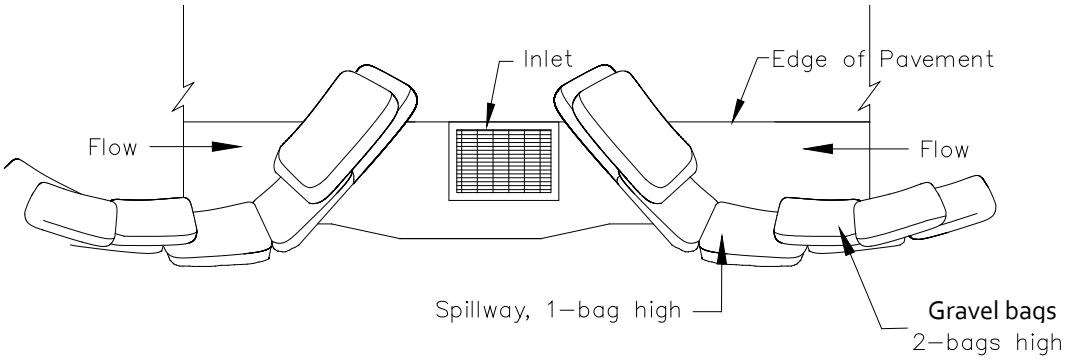
Section A–A



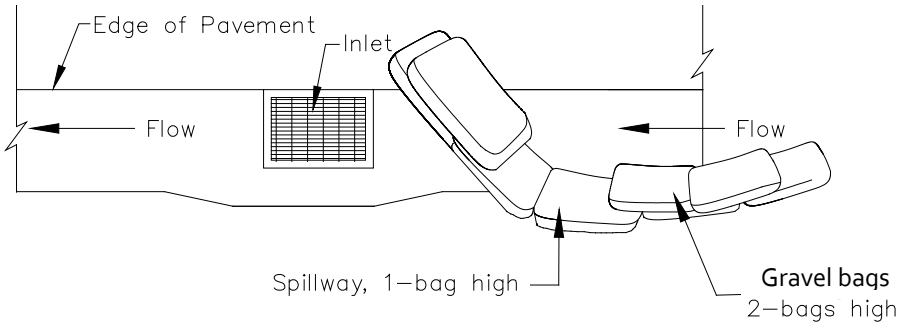
Plan

DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

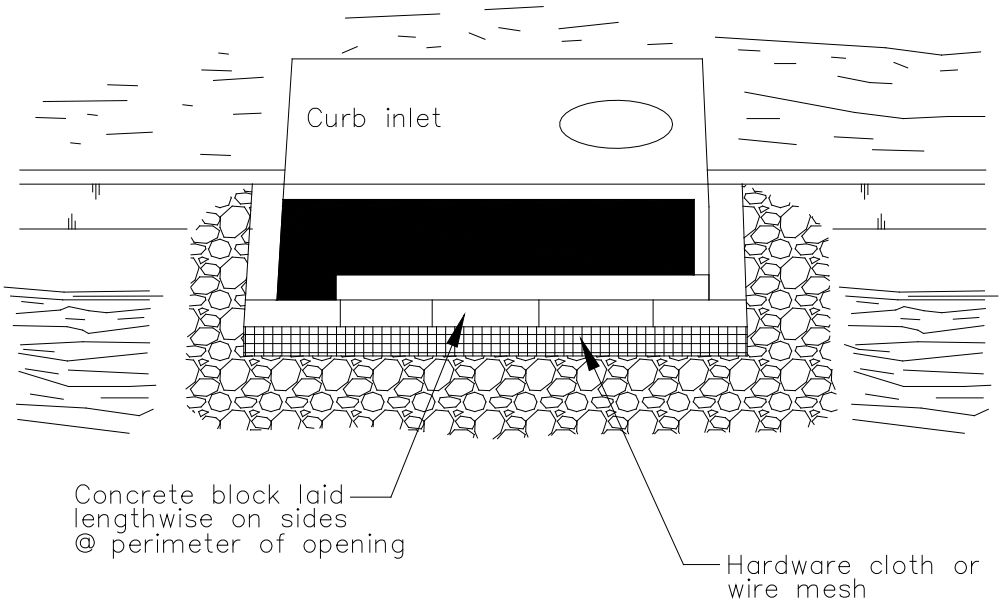


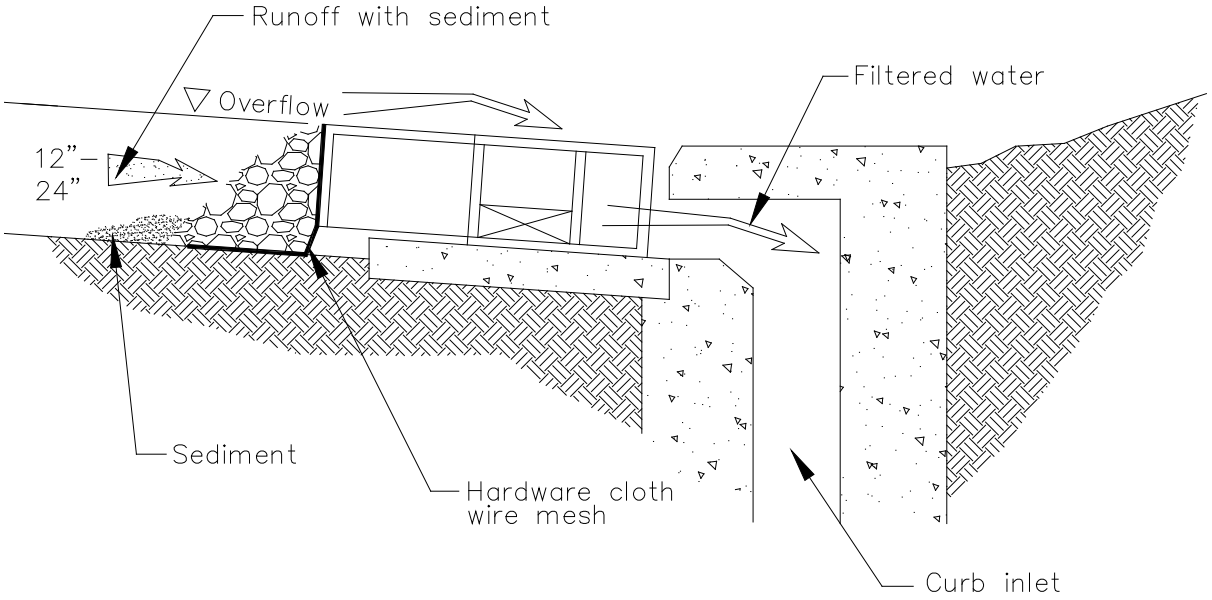
TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

1. Intended for short–term use.
2. Use to inhibit non–storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.

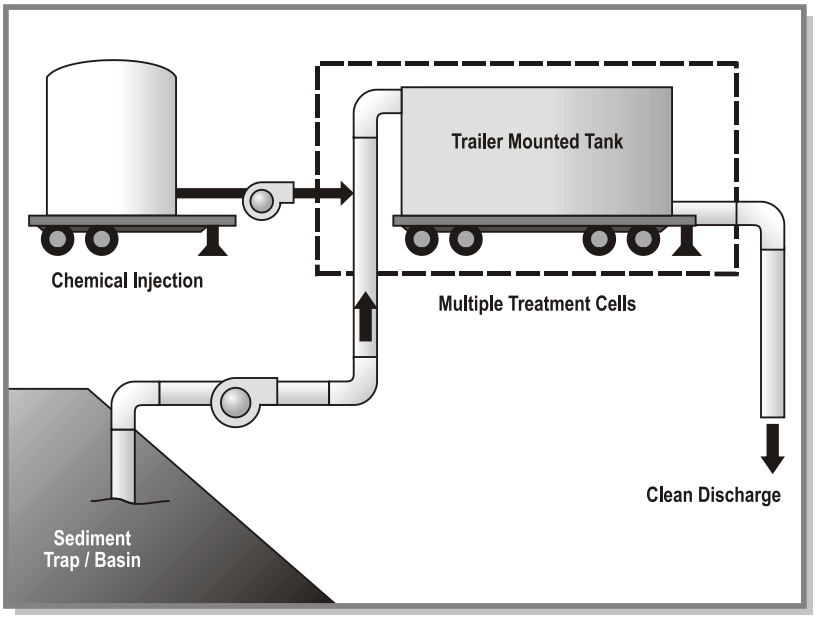
DI PROTECTION TYPE 3
NOT TO SCALE





DI PROTECTION – TYPE 4
NOT TO SCALE

Active Treatment Systems SE-11



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Active Treatment Systems (ATS) reduce turbidity of construction site runoff by introducing chemicals to stormwater through direct dosing or an electrical current to enhance flocculation, coagulation, and settling of the suspended sediment. Coagulants and flocculants are used to enhance settling and removal of suspended sediments and generally include inorganic salts and polymers (USACE, 2001). The increased flocculation aids in sedimentation and ability to remove fine suspended sediments, thus reducing stormwater runoff turbidity and improving water quality.

Suitable Applications

ATS can reliably provide exceptional reductions of turbidity and associated pollutants and should be considered where turbid discharges to sediment and turbidity sensitive waters cannot be avoided using traditional BMPs. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.

Limitations

Dischargers choosing to utilize chemical treatment in an ATS must follow all guidelines of the Construction General Permit Attachment F – Active Treatment System Requirements. General limitations are as follows:

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- Numeric Effluent Limit (NEL) for all discharges (10 NTU daily flow-weighted average)
- Limited availability of chemical residual testing procedures that meet permit requirements for flow-through treatment
- Specific field and classroom ATS training required to operate equipment
- Batch treatment requires extensive toxicity testing of effluent
- Batch treatment requires large footprint to accommodate treatment cells
- Requires additional filtration to remove residual floc and treatment chemicals prior to discharge
- Petroleum based polymers should not be used
- Requires site-specific design and equipment
- Limited discharge rates depending on receiving water body
- Labor intensive operation and maintenance
- ATS costs are higher on a unit basis for smaller sites that would be expected to have a lower volume of treated runoff
- ATS costs are seasonably variable due to increases or decreases in rainfall volumes

Implementation

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling but are ineffective at removing smaller particulates such as clay and fine silt. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). ATS may be used to reduce the turbidity of stormwater runoff. With an ATS, very high turbidities can be reduced to levels comparable to what is found in streams during dry weather.

Criteria for ATS Product Use

Chemically treated stormwater discharged from construction sites must be non-toxic to aquatic organisms. The following protocol should be used to evaluate chemicals proposed for stormwater treatment at construction sites. Authorization to use a chemical in the field based on this protocol does not relieve the applicant from responsibility for meeting all discharge and receiving water criteria applicable to a site.

- An ATS Plan, which includes an Operation and Maintenance component, a Monitoring, Sampling and Reporting component, a Health and Safety component, and a Spill Prevention component must be prepared and submitted to the Regional Water Quality Control Board (RWQCB).

- Treatment chemicals should be approved by EPA for potable water use or otherwise be demonstrated to be protective of human health and the environment. Chemical residual or whole effluent toxicity testing is required.

- Prior to field use of chemical treatment, jar tests are to be conducted to demonstrate that turbidity reduction necessary to meet the NELs and receiving water criteria can be achieved. Test conditions, including but not limited to raw water quality and jar test procedures, should be indicative of field conditions. Although these small-scale tests cannot be expected to reproduce performance under field conditions, they are indicative of treatment capability. A minimum of six site-specific jar tests must be conducted per chemical.

- The proposed maximum dosage should be at least a factor of five lower than the no observed effects concentration (NOEC).

- Effluent discharge from an ATS to a receiving water is conditional upon the favorable results of full-scale whole effluent bioassay/toxicity testing for batch treatment systems and upon chemical residuals testing for flow-through systems.

- Contact the RWQCB for a list of treatment chemicals that may be pre-approved for use.

Active Treatment System Design Considerations

The design and operation of an ATS should take into consideration the factors that determine optimum, cost-effective performance. While site characteristics will influence system design, it is important to recognize the following overriding considerations:

- The right chemical must be used at the right dosage. A dosage that is either too low or too high will not produce the lowest turbidity. There is an optimum dosage rate. This is a situation where the adage “adding more is always better” is not the case.

- The coagulant must be mixed rapidly into the water to insure proper dispersion.

- The mixing system for batch treatment must be sized to provide adequate mixing for the design storage volume. Lack of adequate mixing during the flocculation phase results in flocs that are too small and/or insufficiently dense. Too much mixing can rapidly destroy floc as it is formed.

- Care must be taken in the design of the withdrawal system to minimize outflow velocities and to prevent floc discharge. The discharge should be directed through a filtration system such as sand, bag, or cartridge filter that would catch any unintended floc discharge.

- ATS is also regulated for pH of the discharge. A pH-adjusting chemical should be added into the treated water to control pH if the selected coagulant requires alteration of the pH of the discharge outside of the acceptable range.

Active Treatment System Design

ATS can be designed as batch treatment systems using either ponds or portable trailer-mounted tanks, or as flow-through systems using any number of proprietary designed systems.

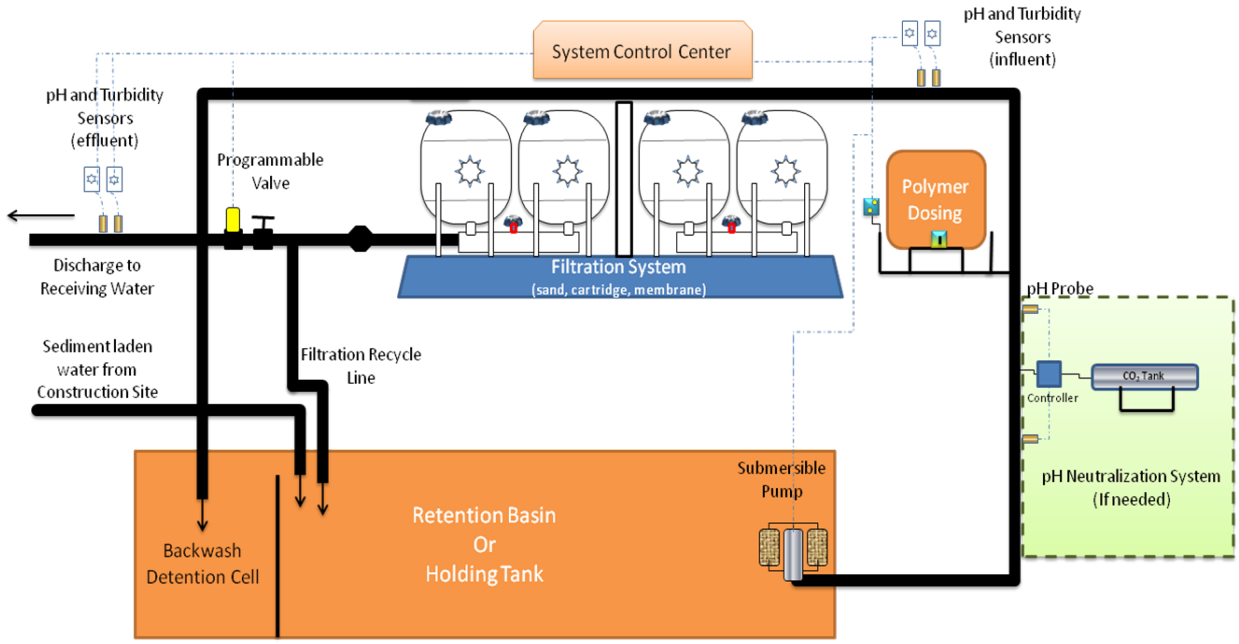

Figure has been adapted from Port of Seattle response to Washington Dept. of Ecology Action Order 2948

Batch Treatment

Batch Treatment systems consist of the stormwater collection system (either temporary diversion or the permanent site drainage system); a sediment basin, trap or holding tanks; pumps; a chemical feed system; treatment cells; and, interconnecting piping.

Batch treatment systems should use a minimum of two lined treatment cells. Multiple treatment cells allow for clarification of treated water while other cells are being filled or emptied. Treatment cells may be basins, traps, or tanks. Portable tanks may also be suitable for some sites.

The following equipment should be located in a secured, covered location:

- The chemical injector
- Secondary contaminant for acid, caustic, buffering compound, and treatment chemical
- Emergency shower and eyewash
- Monitoring equipment which consists of a pH meter and a turbidimeter (if not already within the instrumentation panel of the chemical injector)

Flow-through Treatment

At a minimum, a flow-through ATS system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), an untreated stormwater storage pond or holding tank, and a chemically enhanced filtration system.

Stormwater is collected at interception point(s) on the site and is diverted by gravity or by pumping to an untreated stormwater storage pond or other untreated stormwater holding area.

The stormwater is stored until treatment occurs. It is important that the holding pond be large enough to provide adequate storage.

Stormwater is then pumped from the untreated stormwater storage pond to the chemically enhanced filtration system where polymer is added. Adjustments to pH may be necessary before chemical addition. The filtration system continually monitors the stormwater for turbidity and pH. If the discharge water is out of the acceptable turbidity or pH range, the water is recycled to the untreated stormwater pond (or holding tank) where it can be retreated. Flow through systems must ensure that:

- Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days of continuous data.
- Instrumentation systems are interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH.
- Upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.
- The instrumentation system provides a method for controlling coagulant dose, to prevent potential overdosing.

Sizing Criteria

An ATS shall be designed and approved by a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ); a California registered civil engineer; or any other California registered engineer.

ATS must be designed to capture and treat (within 72 hours) runoff from the 10-year 24-hour storm event. The runoff volume of the watershed area to be treated from this size storm event is required to be calculated using the Rational Method with a runoff coefficient of 1.

If sediment basins are used to capture flow-through or batch treatment, see SE-2, Sediment Basin, for design criteria. Bypass should be provided around the ATS to accommodate extreme storm events. Primary settling should be encouraged in the sediment basin/storage pond. A forebay with access for maintenance may be beneficial.

The permissible discharge rate governed by potential downstream effect should be used to calculate the recommended size of the treatment cells. Local requirements related to Phase I or Phase II NPDES permit thresholds should be considered in developing maximum discharge rates the ATS Plan.

Costs

Costs for ATS may be significant due to equipment rental requirements and cost of chemicals. ATS cost is lower on a treated unit-basis for large construction sites with large volumes of runoff.

Inspection and Maintenance

ATS must be operated and maintained by individuals with experience in their use and trained in accordance with training requirements below. ATS should be monitored continuously while in

use. A designated responsible person shall be on site daily at all times during treatment operations. Daily on-site visual monitoring of the system for proper performance shall be conducted and recorded in the project data log. The name, phone number, and training documentation of the person responsible for system operation and monitoring shall be included in the project data log.

The following monitoring requirements and results should be recorded in the data log:

Operational and Compliance Monitoring

- Effluent flow rate and volume shall be continuously monitored and recorded at 15- minute or less intervals.
- Influent and effluent pH must be continuously monitored and recorded at 15-minute or less intervals.
- Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at 15-minute or less intervals.
- The type and amount of chemical used for pH adjustment, if any, shall be monitored and recorded.
- Dose rate of chemical used in the ATS system (expressed in mg/L) shall be monitored and reported 15-minutes after startup and every 8 hours of operation.
- Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records shall be maintained onsite.
- Effluent shall be monitored and recorded for residual chemical/additive levels.
- If a residual chemical/additive test does not exist and the ATS is operating in a batch treatment mode of operation refer to the toxicity monitoring requirements below.

Toxicity Monitoring

Batch Treatment

Toxicity testing for systems operated in batch treatment mode should be made in accordance with the following:

- Acute toxicity testing on effluent samples representing effluent from each batch prior to discharge shall be undertaken. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.
- Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas*. Rainbow trout, *Oncorhynchus mykiss,* may be used as a substitute for fathead minnow.

All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

Flow-through Treatment

Toxicity testing for systems operated in flow-through treatment mode should be made in accordance with the following:

- A residual chemical test method shall be used that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold concentration (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used. The MATC is equal to the geometric mean of the No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant.
- The residual chemical test method shall produce a result within one hour of sampling.
- A California State certified laboratory shall validate the selected residual chemical test. Specifically, the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.

Numeric Effluent Limit (NEL) Compliance:

All chemically treated stormwater must be sampled and tested for compliance with pH and turbidity limits. These limits have been established by the Construction General Permit. Sampling and testing for other pollutants may also be necessary at some sites. Turbidity limits have been set as 10 NTU as a daily flow-weighted average or 20 NTU from a single sample. pH must be within the range of 6.0 to 9.0 standard units. It is often possible to discharge treated stormwater that has a lower turbidity than the receiving water and that matches the pH.

Treated stormwater samples and measurements should be taken from the discharge pipe or another location representative of the nature of the treated stormwater discharge. Samples used for determining compliance with the water quality standards in the receiving water should not be taken from the treatment pond prior to decanting. Compliance with the water quality standards is determined in the receiving water.

Operator Training:

Operators shall have training specific to using an ATS and liquid coagulants for stormwater discharges in California. The training shall be in the form of a formal class with a certificate and requirements for testing and certificate renewal. Training shall include a minimum of eight hours classroom and 32 hours field training.

Standard BMPs:

Erosion and sediment control BMPs should be implemented throughout the site to prevent erosion and discharge of sediment to the ATS. Some types of chemical coagulation and flocculation are only achievable in water below a certain turbidity; therefore, minimizing the amount of sediment reaching the system will increase the likelihood of meeting effluent limits and will potentially lower costs of chemical dosing.

Sediment Removal and Disposal

- Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage (i.e., volume) capability.
- Handling and disposal of all solids generated during ATS operations shall be done in accordance with all local, state, and federal laws and regulations.
- If sediment is determined to be non-toxic, it may be incorporated into the site away from drainages.

References

Engineering and Design – Precipitation/Coagulation/Flocculation. United States Army Corps of Engineers, EM 1110-1-4012, 2001.

Evaluation of Active Treatment Systems (ATS) for Construction Site Runoff. California Building and Industry Association (prepared by Geosyntec Consultants), 2008.

Stormwater Management Manual for Western Washington, Volume II – Construction Stormwater Pollution Prevention, Washington State Department of Ecology, August 2001.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Manufactured Linear Sediment Controls (MLSC) SE-12

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

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Description and Purpose

Manufactured linear sediment controls (MLSC) are pre-manufactured devices that are typically specified and installed for drainage and sediment control on the perimeter of disturbed sites or stockpiles and as check dams within channels. Typically, MLSCs can be reused.

This fact sheet is intended to provide guidance on BMP selection and implementation of proprietary or vendor-supplied products, for sediment control. Products should be evaluated for project-specific implementation and used if determined to be appropriate by the SWPPP Preparer.

Suitable Applications

MLSCs are generally used in areas as a substitute for fiber rolls and silt fences in sediment control applications to slow down runoff water, divert drainage or contain fines and sediment. MLSCs are a linear control and application suitability varies based on the specific product type. They may be suitable:

- On paved surfaces for perimeter protection.
- As check structures in channels.
- Along the perimeter of disturbed sites in lieu of silt fence.

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- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles or material/equipment storage areas.
- At the interface between graveled driveways and pavement.
- Along the toe of exposed and erodible slopes.

Limitations

- Limitations vary by product. Product manufacturer's printed product use instructions should be reviewed by the SWPPP Preparer to determine the project-specific applicability of MLSCs.

Implementation

General

When appropriately placed, MLSCs intercept and slow sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The device is porous, which allows the ponded runoff to flow slowly through the device, releasing the runoff as sheet flows. Generally, MLSCs should be used in conjunction with temporary soil stabilization controls up-slope to provide an effective combination of erosion and sediment control.

Design and Layout

- MLSCs used on soil should be trenched or attached to the ground per manufacturer specifications in a manner that precludes runoff or ponded water from flowing around or under the device.
- MLSCs designed for use on asphalt or concrete may be attached using a variety of methods, including nailing the device to the pavement, or using a high strength adhesive.
- Follow manufacturer written specifications when installing MLSCs.
- Allow sufficient space up-slope from the silt dike to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, MLSCs should be set back 3 feet from the slope toe to facilitate cleaning. Where site conditions do not allow set back, the sediment control may be constructed on the toe of the slope. To prevent flows behind the barrier, sand or gravel bags can be placed perpendicular and between the sediment control and slope to serve as a barrier to parallel flow.
- Drainage area should not exceed 5 acres.

Materials

- Several manufactured products are available. The following search terms or combination of terms can be used with an internet search engine to find manufactured linear sediment controls:

- "silt barrier"
- "reusable silt fence"
- "silt fence alternative" or
- "perimeter sediment control"

Costs

Manufacturers should be contacted directly for current pricing.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Reshape or replace sections of damaged MLSCs as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove MLSCs when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of properly.

References

City of Elko Construction Site Best Management Practices Handbook, December 2005.

Construction Site Best Management Practices Handbook, June 2008 Update, Truckee Meadows Regional Stormwater Quality Management Program, June 2008.

Complying with the Edwards Aquifer Rules Technical Guidance on Best Management Practices, Texas Commission on Environmental Quality, Revised July 2005, Addendum Sheet, January26, 2011.

Stormwater Management Manual for Western Washington Volume II, Construction Stormwater Pollution Prevention, Washington State Department of Ecology, February 2005.

Compost Socks and Berms SE-13

Description and Purpose

Compost socks and berms act as three-dimensional biodegradable filtering structures to intercept runoff where sheet flow occurs and are generally placed at the site perimeter or at intervals on sloped areas. Compost socks are generally a mesh sock containing compost and a compost berm is a dike of compost, trapezoidal in cross section. When employed to intercept sheet flow, both BMPs are placed perpendicular to the flow of runoff, allowing filtered runoff to pass through the compost and retaining sediment (and potentially other pollutants). A compost sock can be assembled on site by filling a mesh sock (e.g. with a pneumatic blower). The compost berm should be constructed using a backhoe or equivalent and/or a pneumatic delivery (blower) system and should be properly compacted. Compost socks and berms act as filters, reduce runoff velocities, and in some cases, aid in establishing vegetation.

Compost is organic, biodegradable, and renewable. Compost provides soil structure that allows water to infiltrate the compost medium which helps prevent rill erosion and the retained moisture promotes seed germination and vegetation growth, in addition to providing organic matter and nutrients important for fostering vegetation. Compost improves soil quality and productivity, as well as erosion and sediment control.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

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The compost of the compost sock or berm can be selected that targets site specific objectives in capturing sediment and other pollutants, supporting vegetation, or additional erosion control.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Green waste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly compost selection is an important design consideration in the application of this type of erosion and sediment control.

Suitable Applications

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow (compost berms should only be used at the top of slopes or on slopes 4:1 (H:V) or flatter, all other slope applications should use compost socks)
- Along the perimeter of a project
- As check dams in unlined ditches (compost socks only)
- Down-slope of exposed soil areas
- At operational storm drains as a form of inlet protection (compost socks only)
- Around temporary stockpiles

Compost socks and berms do not require special trenching or BMP removal compared to other sediment control methods (e.g. silt fence or fiber rolls). Compost socks and berms can remain in place after earth disturbing activities are completed or the compost components can be spread over the site providing nutrients for plant growth and augmenting soil structure. BMPs that remain in place are particularly advantageous below embankments, especially adjacent streams, by limiting re-entry and the disturbance to sensitive areas.

Compost can be pre-seeded prior to application (recommended by the EPA for construction site stormwater runoff control and required for compost socks) or seeded after installation (for compost berms only). The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons.

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Compost should be obtained from a supplier certified by the California Integrated Waste Management Board or compost should otherwise meet the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7. Carefully consider the qualifications and experience of any compost producer/supplier.

- Application by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost-effective method of assembly.
- Compost socks and berms should not be employed at the base of slopes greater than 2:1 (H:V). They can be employed with other erosion control methods for steeper slopes.
- Difficult to move once saturated.
- Compost berms should not be applied in areas of concentrated flows.
- Compost socks and berms are easy to fix; however, they are susceptible to damage by frequent traffic. Compost socks can be used around heavy machinery, but regular disturbance decreases sock performance.

Implementation

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in **Table 1**, taken from Caltrans *Standard Specifications* (2015).
- The Caltrans SSP, Section 21-2.02Q, *Compost Socks*, states that the sock used to retain the compost must be composed of natural, biodegradable products, such as cotton, jute, sisal, burlap or coir.
- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.
- Compost medium parameter specifications for compost socks and berms have been developed to assist in compost selection, such as those provided by the American Association of State Highway Transportation Officials (AASHTO).
- Particle size is important parameter for selecting compost. Well consolidated, coarser grades of compost (e.g., small and large pieces) perform better for filtration objectives, while finer grades better support vegetation. Particle size of the compost should be selected based on site conditions, such as expected precipitation, and filtration goals and / or long-term plant nutrients.
- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet

season, drier composts can be used as the compost will absorb moisture from the ambient air.

- If vegetation establishment is a desired function of the compost, a compost sample should be inspected by a qualified individual. Vegetation has different nutrient and moisture needs.
- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.
- Compost should not be derived from mixed municipal solid waste and should be reasonably free of visible contaminates.
- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Compost should not possess objectionable odors.
- Compost should be weed free.

Table 1. Physical/Chemical Requirements of Compost
Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

Property	Test Method	Requirement
pH	TMECC 04.11-A	6.0–8.5
Soluble Salts	TMECC 04.10-A	0-10.0
Moisture Content	TMECC 03.09-A	30-60
Organic Matter Content	TMECC 05.07-A	30–100
Maturity	TMECC 05.05-A	80 or Above 80 or Above
Stability	TMECC 05.08-B	8 or below
Particle size for fine compost: dry weight Pass 5/8-inch sieve (min, %) Pass 3/8-inch sieve (min, %)	TMECC 02.02-B	 95 70
Particle size for medium compost: dry weight Pass 2-inch sieve (min, %) Pass 1-inch sieve (max, %)	TMECC 02.02-B	 95 30
Particle size for coarse compost: dry weight Pass 2-1/2-inch sieve (min, %) Pass 3/8-inch sieve (max, %)	TMECC 02.02-B	 99 40
Pathogen Fecal Coliform Bacteria MPN/1-gram dry wt.	TMECC 07.01-B	< 1,000
Pathogen Salmonella MPN/4 grams dry wt.	TMECC 07.01-B	< 3
Physical Contaminants (% dry weight) Plastics, glass, and metal	TMECC 02.02-C	Combined Total: < 1.0
Physical Contaminants (% dry weight) Sharps	TMECC 02.02-C	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to application, prepare locations for socks and berms by removing brush and thick vegetation. The compost of the sock and/or berm should be allowed to come in full contact with the ground surface.

- Select method to apply the compost sock or berm. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.

- The compost of the berm should be distributed evenly to the surface, compacted, and shaped trapezoidal in cross section. Berm design is generally consisting of a base two times the height. AASHTO specification MP 9-03 provides compost berm dimensions based on anticipated site precipitation (AASHTO, 2003 and USEPA, 2009). State agencies, such as Oregon Department of Environmental Quality (ODEQ) have developed berm dimension based on slope steepness and length (ODEQ, 2004).

- Compost socks can be assembled on site by filling mesh socks with the selected compost. Mesh socks can be tied at one end, filled, and then tied at the other end. The ends of socks can be interlocked until the desired length is achieved. The sock diameter is a function of slope steepness and length. Again, ASSHTO provides specifications for various parameters. Compost socks range from 8" to 18" but are typically 12" to 18" in diameter.

- Compost socks are typically placed in contours perpendicular to sheet flow. They can also be placed in V formation on a slope. Compost socks need to be anchored, typically stakes, through the center of the sock. To prevent water flowing around them, the ends of compost socks should be placed upslope.

- Locate compost socks and berms on level contours spaced as follows:

  - Slope inclination of 4:1 (H:V) or flatter: Socks and/or berms should be placed at a maximum interval of 20 ft.

  - Slope inclination between 4:1 and 2:1 (H:V): Socks should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

  - Slope inclination 2:1 (H:V) or greater: Socks should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Place perimeter socks and berms using a j-hook installation. Use of vegetation will also provide additional anchoring.

- Compost socks and berms can be placed around the perimeter of an affected area, like a silt fence, if the area is flat or on a contour. Do not place these socks and berms where ponded water could become an issue.

- If used at the toe of slopes, the compost sock or berm should at a minimum of 5 to 10 feet away.

- Use additional anchoring and erosion control BMPs in conjunction of the compost socks and berms as needed.

- Consider using compost berms or socks as necessary at the top and/or bottom of the slope for additional erosion control performance.

- Compost socks and berms can also be effective over rocky and frozen ground if installed properly.

- It is recommended that the drainage areas of these compost BMPs do not exceed 0.25 acre per 100 feet placement interval and runoff does not exceed 1 cubic foot per second.

Costs

Recently obtained vendor costs indicated $4.50 per linear foot for compost berm application and $2.50 per linear foot for 8" socks and $3.20 per linear foot for 12"socks (Adjusted for inflation ,2016 dollars, by Tetra Tech, Inc.). Costs do not include final compost sock or berm functions at the end of construction activities, including spreading or removal, if required. ODEQ estimates that compost berms cost 30 percent less than silt fences to install.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Once damage is identified, mend or reapply the sock or berm as needed. Washed out areas should be replaced. If the sock or berm height is breached during a storm, an additional sock can be stacked to increase the sock height and similarly the berm dimensions can be increased, as applicable. An additional sock or berm may be installed upslope, as needed. It may be necessary to apply an additional type of stormwater BMP, such as a compost blanket.

- Sediment contained by the sock or berm should be removed prior reaching 1/3 of the exposed height of the BMP. The sediment can be stabilized with the compost sock or berm with vegetation at the end of construction activities.

- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

- Limit traffic to minimize damage to BMPs or impede vegetation establishment.

References

An analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

Characteristics of Compost: Moisture Holding and Water Quality Improvement, Center for Research in Water Resources, Kirchoff, C., Malina, J., and Barrett, M., 2003.

Compost Utilization for Erosion Control, The University of Georgia College of Agricultural and Environmental Sciences, pubs.caes.uga.edu/caespubs/pubcd/B1200.htm, Faucette, B. and Risse, M., 2001.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), 2015. Available online at: http://www.dot.ca.gov/hq/esc/oe/construction_contract_standards/std_specs/2015_StdSpecs/2015_StdSpecs.pdf.

Evaluation of Environmental Benefits and Impacts of Compost and Industry Standard Erosion and Sediment Controls Measures Used in Construction Activities, Dissertation, Institute of Ecology, University of Georgia, Faucette, B., 2004.

National Pollutant Discharge Elimination System (NPDES), Compost Blankets, U.S. Environmental Protection Agency (USEPA). http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=118, 2009.

Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Designation MP-9, Compost for Erosion/Sediment Control (Filter Berms), Provisional, American Association of State Highway Transportation Officials (AASHTO), 2003.

Stormwater Best Management Practices (BMPs) Field Trials of Erosion Control Compost in Reclamation of Rock Quarry Operations, Nonpoint Source Protection Program CWA §319(h), Texas Commission on Environmental Quality, Adams, T., McFarland, A., Hauck, L., Barrett, M., and Eck, B., 2008.

Biofilter Bags SE-14

Categories

EC	Erosion Control	
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-4 Check Dams

SE-5 Fiber Roll

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-10 Storm Drain Inlet Protection

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Description and Purpose

Biofilter bags, or bio-bags, are a multi-purpose sediment control BMP consisting of a plastic mesh bag filled with 100% recycled wood product waste. Biofilter bags come in a variety of sizes (30" x 18" and 30" x 9" being common) and generally have between 1-2 cubic yards of recycled wood waste (or wood chips). Biofilter bags work by detaining flow and allowing a slow rate of discharge through the wood media. This action removes suspended sediment through gravity settling of the detained water and filtration within the bag.

Suitable Applications

Biofilter bags are a short-term BMP that can be rapidly deployed, maintained, and replaced. Biofilter bags can be an effective short-term solution to place in developed rills to prevent further erosion until permanent measures can be established. Suitable short-term applications include:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - Below other small cleared areas
  - Along the perimeter of a site (with low-expected flow)
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas

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  - Along streams and channels

- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
  - At the top of slopes to divert runoff away from disturbed slopes
  - As check dams across mildly sloped construction roads
- Inlet Protection (See SE-10)
- Supplement to silt fences or other sediment control devices

Limitations

- Short life-span (maximum usefulness of 2-3 months and should be replaced more frequently if needed); regular maintenance and replacement required to ensure effectiveness. Bags will rapidly fill with sediment and reduce permeability.
- Easily damaged by construction vehicles.
- If not properly staked, will fail on slope applications.
- If improperly installed can allow undercutting or side-cutting flow.
- Not effective where water velocities or volumes are high.
- Potentially buoyant and easily displaced if not properly installed.

Implementation

General

Biofilter bags are a relatively low cost temporary BMP that are easily deployed and have a simple installation that can be performed by hand. Without proper installation, however, biofilter bags can fail due to their light weight, potential displacement, and multiple joint locations. One of the benefits of utilizing biofilter bags is that the media (wood-product) can be recycled or used onsite when no longer needed (where acceptable).

Design and Layout – Linear control

- Locate biofilter bags on level contours.
  - Slopes between 20:1 and 4:1 (H:V): Biofilter bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slopes between 4:1 and 2:1 (H:V): Biofilter bags should be placed at a maximum interval of 15 ft, with the first row near the slope toe.
  - Slopes 2:1 (H:V) or steeper: Biofilter bags should be placed at a maximum interval of 10 ft., with the first row placed the slope toe.

- Turn the ends of the biofilter bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the biofilter bag berm to allow ponding, and to provide room for sediment storage.
- Stake biofilter bags into a 1 to 2 in. deep trench with a width equal to the bag.
  - Drive one stake at each end of the bag.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- Biofilter bags should be overlapped (6 in.), not abutted.

Costs

Pre-filled biofilter bags cost approximately $3.20-$4.50 per bag, dependent upon size (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Biofilter bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace biofilter bags as needed.
- Repair washouts or other damage as needed.
- Sediment that is retained by the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove biofilter bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Biofilter media may be used on-site, if allowed.

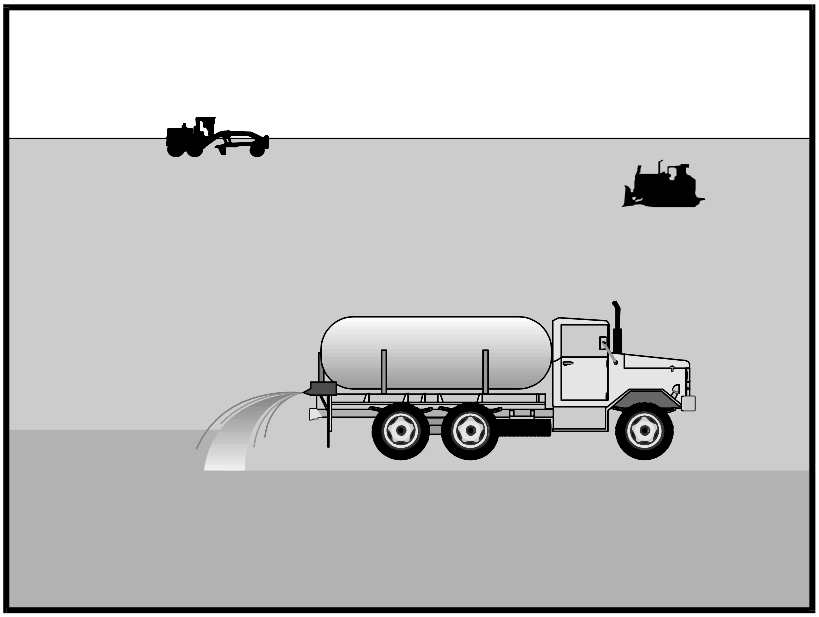
References

Catalog of Stormwater Best Management Practices for Idaho Cities and Counties. Volume 2, Section 7, BMP 34 – Biofilter Bags, Idaho Department of Environmental Quality, 2005.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Wind Erosion Control WE-1



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking, and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water-based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

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- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyl, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	x	x	x	x	x			x
Disturbed Areas Subject to Traffic			x	x	x	x		x
Material Stockpiles		x	x	x			x	x
Demolition			x			x	x	
Clearing/ Excavation			x	x				x
Truck Traffic on Unpaved Roads			x	x	x	x	x	
Tracking					x	x		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

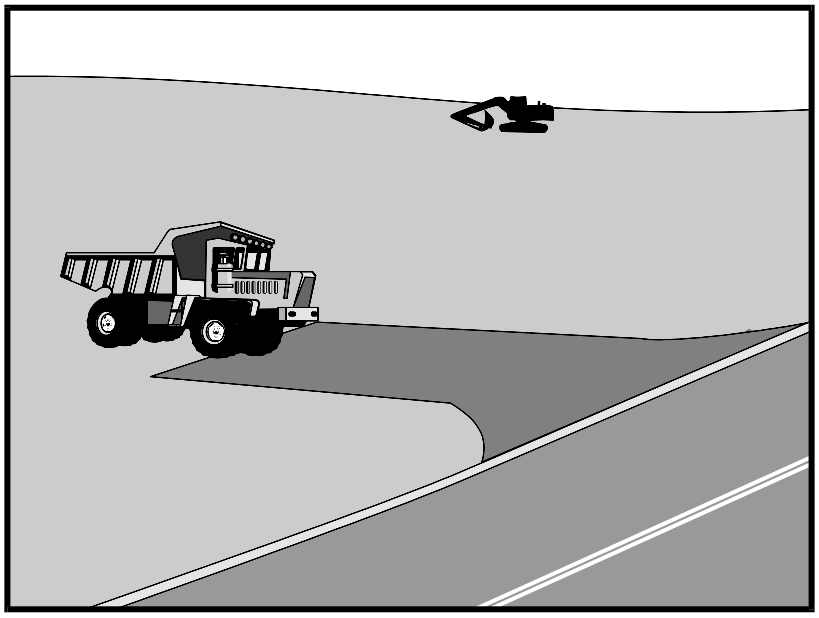
California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stabilized Construction Entrance/Exit TC-1



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

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Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

Stabilized Construction Entrance/Exit TC-1

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,500 to $6,100 each, averaging $3,100 per entrance. Costs will increase with addition of washing rack and sediment trap. With wash rack, costs range from $1,500 - $7,700 each, averaging $4,600 per entrance (All costs adjusted for inflation, 2016 dollars, by Tetra Tech Inc.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

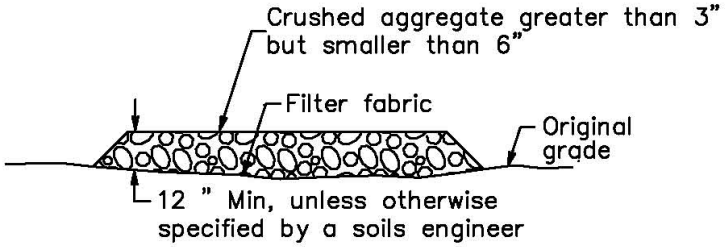
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Stabilized Construction Entrance/Exit TC-1



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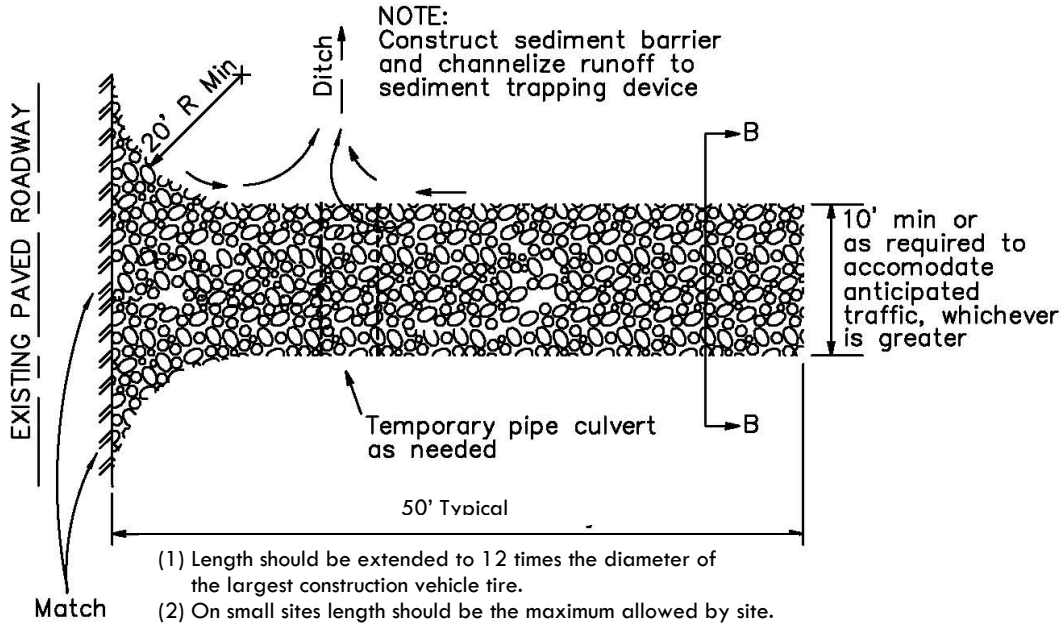

(1) Length should be extended to 12 times the diameter of the largest construction vehicle tire.
(2) On small sites length should be the maximum allowed by site.

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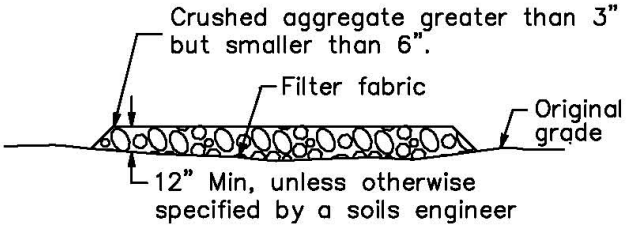
Stabilized Construction Entrance/Exit TC-1



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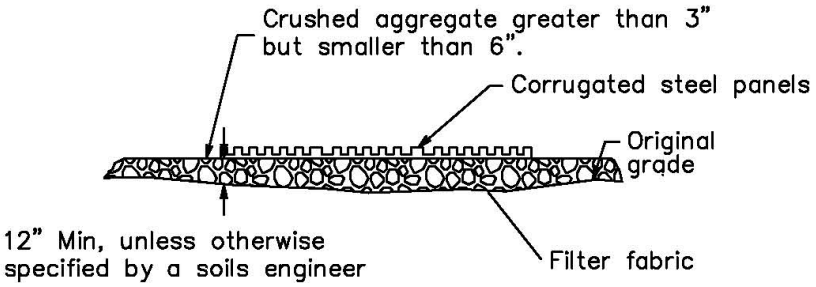

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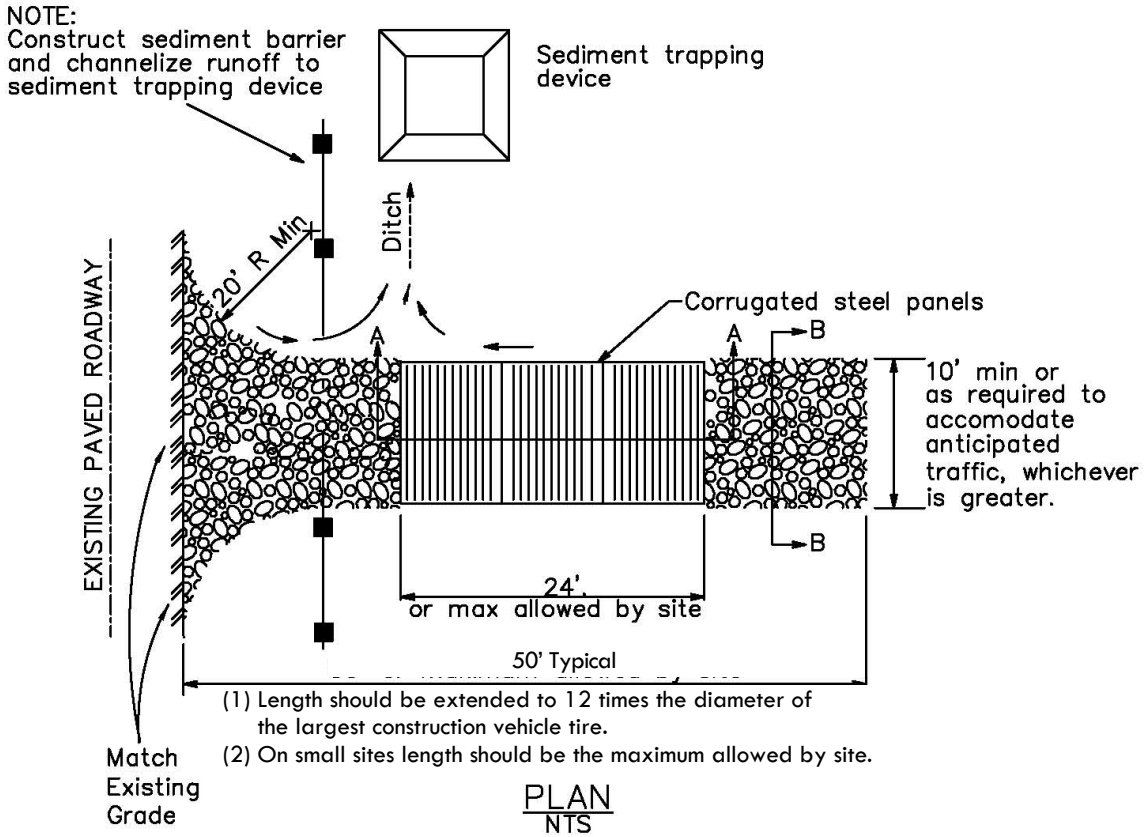

PLAN
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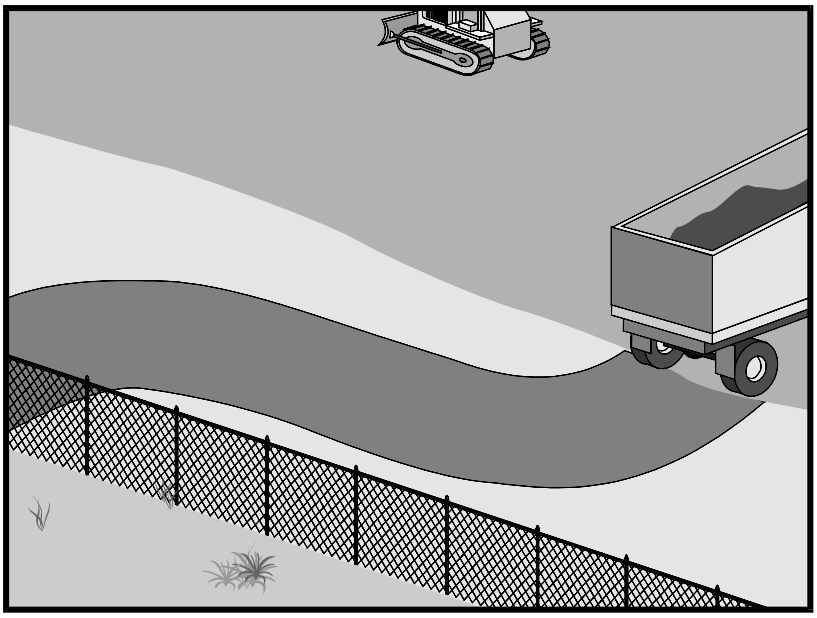
Stabilized Construction Roadway TC-2



Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
  - Phased construction projects and offsite road access
  - Construction during wet weather
- Construction roadways and detour roads:
  - Where mud tracking is a problem during wet weather
  - Where dust is a problem during dry weather
  - Adjacent to water bodies
  - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.

Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.
- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.
- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

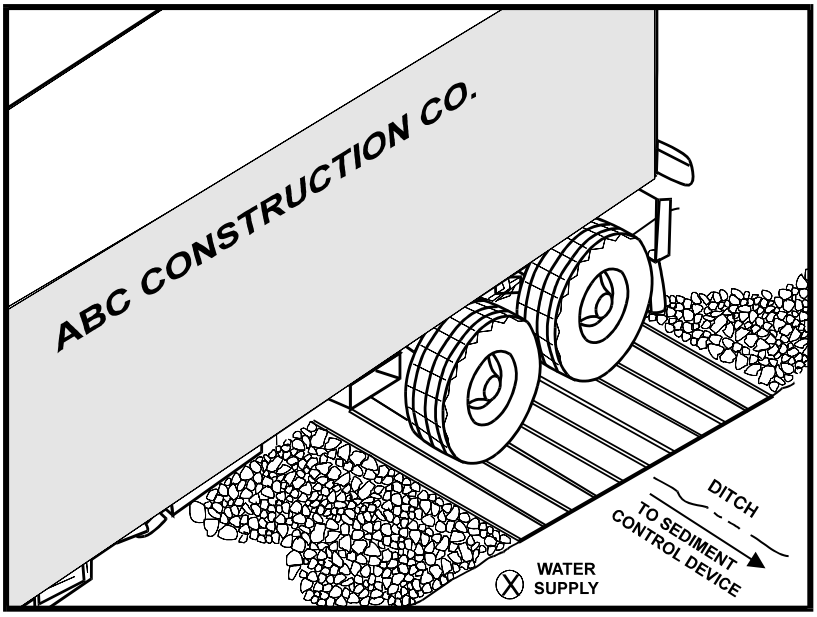
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Entrance/Outlet Tire Wash TC-3



Description and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit

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- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.
- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.
- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

References

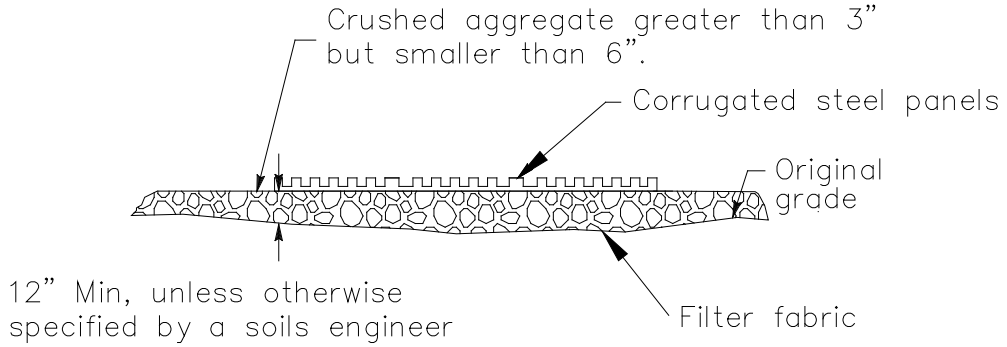
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



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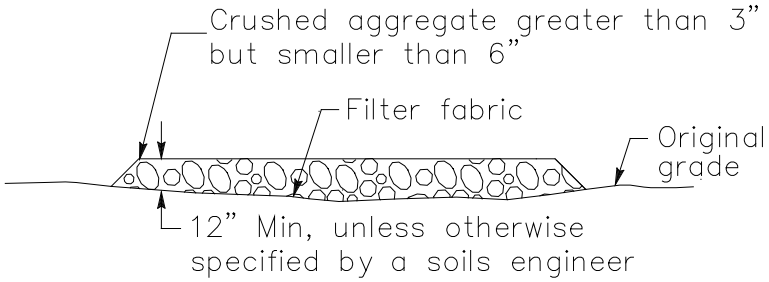

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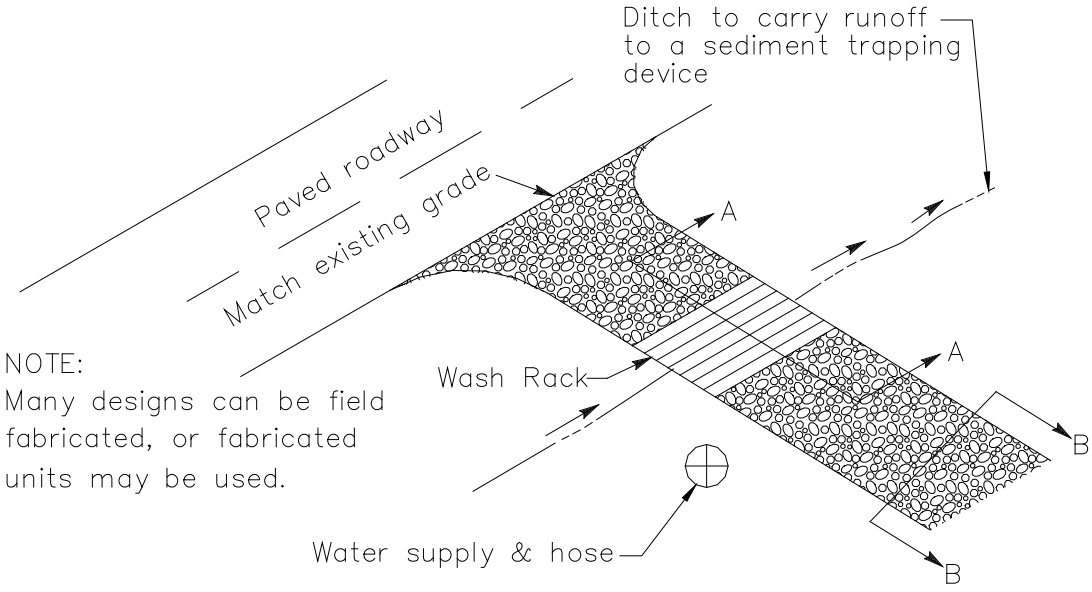


TYPICAL TIRE WASH
NOT TO SCALE

Section 4
Non-Stormwater Management and Material Management BMPs

4.1 Non-Stormwater Management BMPs

The discharge of materials other than stormwater and authorized non-stormwater discharges is prohibited by NPDES regulations as well as other local codes and ordinances. It is recognized that certain authorized non-stormwater discharges may be necessary for the completion of construction projects. Such discharges include, but are not limited to, irrigation of vegetative erosion control measures, and pipe flushing and testing.

Non-stormwater management BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharge. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as "good housekeeping practices," which involve keeping a clean, orderly construction site.

Non-stormwater management BMPs also include procedures and practices designed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling, and maintenance operations to stormwater drainage systems or to watercourses.

Table 4-1 of this handbook lists the non-stormwater management BMPs. All these BMPs must be implemented depending on the conditions and applicability of deployment described as part of the BMP. The key to implementing these BMPs is to maintain a clean site and keep water, runoff, and run-on away from potential pollutants, including bare soil. In general, conduct construction activities so that: potential pollutants are not discharged directly to drainage systems; generation of potential pollutants is limited; and pollutants that are generated are contained and cleaned up immediately and are therefore not available for later discharge. These BMPs are fundamental to water quality protection and all sites must implement non-stormwater BMPs appropriate for the construction activities being performed.

Table 4-1 Non-Stormwater Management BMPs

BMP#	BMP Name
NS-1	Water Conservation Practices[2]
NS-2	Dewatering Operations[1, 3]
NS-3	Paving and Grinding Operations[1, 3]
NS-4	Temporary Stream Crossing[1, 2]
NS-5	Clear Water Diversion[2]
NS-6	Illicit Connection/Discharge[1, 2]
NS-7	Potable Water/Irrigation[1, 2]
NS-8	Vehicle and Equipment Cleaning[1, 2]
NS-9	Vehicle and Equipment Fueling[1, 2]
NS-10	Vehicle and Equipment Maintenance[1, 2]
NS-11	Pile Driving Operations[1, 2]
NS-12	Concrete Curing[1, 3]
NS-13	Concrete Finishing[1, 3]
NS-14	Material Over Water[1, 2]
NS-15	Demolition Adjacent to Water[1, 2]
NS-16	Temporary Batch Plants[1, 3]

1) BMP fact sheet updated in 2009
2) BMP fact sheet updated in 2011
3) BMP fact sheet updated in 2012

It is recommended that owners and contractors be vigilant regarding implementation of these BMPs, including making their implementation a condition of continued employment, and part of all prime and subcontract agreements. By doing so, the chance of inadvertent violation by an uncaring individual can be prevented, potentially saving thousands of dollars in fines and project delays. Also, if procedures are not properly implemented and/or if BMPs are compromised then the discharge may be subject to additional sampling and analysis requirements for non-visible pollutants contained in the General Permit. (See Section 2.5.4.2. of this handbook)

4.2 Waste Management and Materials Pollution Control BMPs

Waste management and materials pollution control BMPs, like non-stormwater management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day-to-day operations of the construction site, and are under the control of the contractor, and are additional "good housekeeping practices," which involve keeping a clean, orderly construction site. These BMPs are fundamental to water quality protection and all sites must implement waste management and/or materials pollution control non-stormwater BMPs appropriate for the construction activities being performed.

Table 4-2 Waste Management and Materials Pollution Control BMPs

BMP#	BMP Name
WM-1	Material Delivery and Storage[1]
WM-2	Material Use[1]
WM-3	Stockpile Management[1, 2, 3]
WM-4	Spill Prevention and Control[1, 2]
WM-5	Solid Waste Management[1, 2]
WM-6	Hazardous Waste Management[1, 2]
WM-7	Contaminated Soil Management[1, 2]
WM-8	Concrete Waste Management[1, 3]
WM-9	Sanitary/ Septic Waste Management[1]
WM-10	Liquid Waste Management[1]

1) BMP fact sheet updated in 2009
2) BMP fact sheet updated in 2011
3) BMP fact sheet updated in 2012

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into stormwater runoff or discharges through proper management of the following types of wastes:

- Solid
- Sanitary
- Concrete
- Hazardous
- Equipment-related wastes

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs in the handling of, storing, and the using of construction materials. The BMPs are intended to prevent the release of pollutants during stormwater and non-stormwater

discharges. The objective is to prevent or reduce the opportunity for contamination of stormwater runoff from construction materials by covering and/or providing secondary containment of storage areas and/or by taking adequate precautions when handling materials. These controls must be implemented for all applicable activities, material usage, and site conditions. The discharge of construction materials or wastes from a site is prohibited.

Table 4-2 of this handbook lists the waste management and materials pollution control BMPs. It is important to note that these BMPs should be implemented depending on the conditions/applicability of deployment described as part of the BMP.

4.3 Fact Sheet Format

A BMP fact sheet is a short document that presents detailed information about a particular BMP. Typically, each fact sheet contains the information outlined in Figure 4-1 of this handbook. Completed fact sheets for each of the above activities are provided in Section 4.4 of this handbook.

The fact sheets also contain side bar presentations with information on BMP categories, targeted constituents, removal effectiveness, and potential alternatives.

Example NS-xx Fact Sheet

Description and Purpose

Suitable Applications

Limitations

Implementation

Costs

Inspection and Maintenance

References

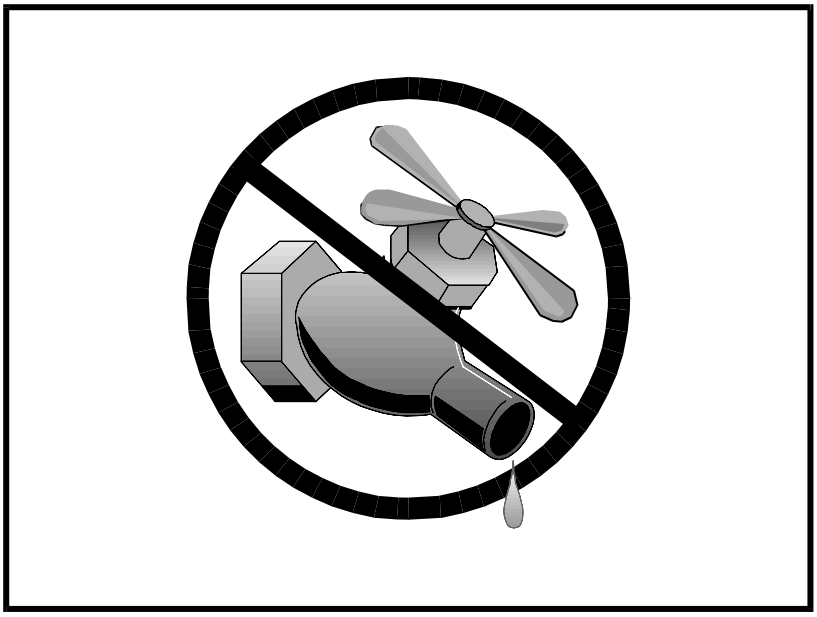
Figure 4-1
Example Fact Sheet

4.4 BMP Fact Sheets

BMP fact sheets for non-stormwater management and waste management and materials pollution control follow. The BMP fact sheets are individually page numbered and are suitable for inclusions in SWPPPs. Copies of the fact sheets can be individually downloaded from the CASQA Online BMP Handbook at http://www.casqa.org.

BMP fact sheets are guidance and intended to provide a range of information about the BMPs. The BMP fact sheets should not be interpreted as General Permit requirements. CASQA recognizes that there may be alternative public domain and/or proprietary practices performing similar function. Alternative products should be evaluated for project-specific implementation and used if determined to be appropriate by the QSD. Fact sheets do not address site-specific implementation application needs and modifications. The QSD should provide site specific implementation requirements in the SWPPP.

Water Conservation Practices NS-1



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

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- Direct construction water runoff to areas where it can soak into the ground or be collected and used.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

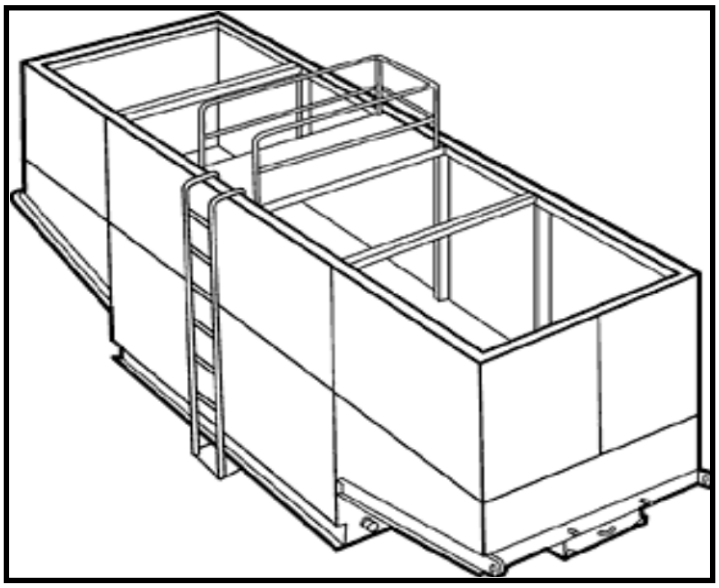
Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
    - Water trucks
    - Water reservoirs (water buffalos)
    - Irrigation systems
    - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Dewatering Operations NS-2



Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

SE-5: Fiber Roll

SE-6: Gravel Bag Berm

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Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

The General Permit incorporates Numeric Action Levels (NAL) for turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedances of the General Permit requirements or Basin Plan standards.

The dewatering operations described in this fact sheet are not Active Treatment Systems (ATS) and do not include the use of chemical coagulations, chemical flocculation or electrocoagulation.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated

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precipitation (stormwater) from depressed areas at a construction site.

Stormwater mixed with non-stormwater should be managed as non-stormwater.

Limitations

- Dewatering operations will require and should comply with applicable local and project-specific permits and regulations. In some areas, all dewatering activities, regardless of the discharge volume, require a dewatering permit.
- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this fact sheet primarily address sediment. Other secondary pollutant removal benefits are discussed where applicable.
- The controls detailed in this fact sheet only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Avoid dewatering discharges where possible by using the water for dust control.

Implementation

- A Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP).
- Regional Water Quality Control Board (RWQCB) Regions may require notification and approval prior to any discharge of water from construction sites.
- The destination of discharge from dewatering activities will typically determine the type of permit required for the discharge. For example, when discharging to a water of the U.S., a dewatering permit may be required through the site's governing RWQCB. When discharging to a sanitary sewer or Municipal Separate Storm Sewer System (MS4), a permit may need to be obtained from the owner of the sanitary sewer or MS4 in addition to obtaining an RWQCB dewatering permit. Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges should not cause erosion at the discharge point. Appropriate BMPs should be implemented to maintain compliance with all applicable permits.
- Maintain dewatering records in accordance with all local and project-specific permits and regulations.

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. The sediment particle size and permit or receiving water limitations on sediment or turbidity are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate. Use of other enhanced treatment methods (i.e., introduction of chemicals or electric current to enhance flocculation and removal of sediment) must comply with: 1) for storm drain or surface water discharges, the requirements for Active Treatment Systems (see SE-11); or 2) for sanitary sewer discharges, the requirements of applicable sanitary sewer discharge permits.

Sediment Basin (see also SE-2)

Description:

- A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3) and have a designed outlet structure.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, silt, some metals that settle out with the sediment.

Implementation:

- Excavation and construction of related facilities is required.
- Temporary sediment basins should be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outlet, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Sediment Trap (See also SE-3)

Description:

- A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2) and do not have a designed outlet (but do have a spillway or overflow).

Appropriate Applications:

Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

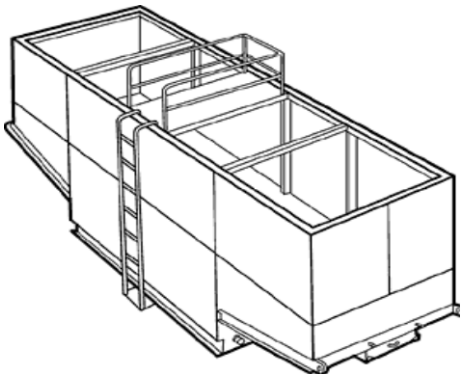
Implementation:

- Excavation and construction of related facilities is required.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

Maintenance:

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Weir Tanks



Description:

- A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:

- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.
- Treatment capacity (i.e., volume and number of tanks) should provide at a minimum the required volume for discrete particle settling for treatment design flows.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by a licensed waste disposal company.

Dewatering Tanks

Description:

- A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:

- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

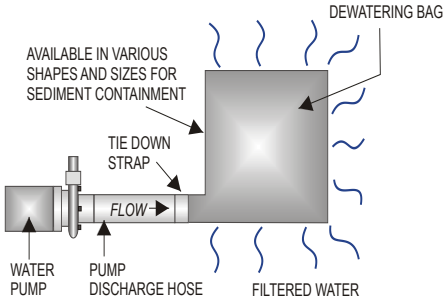
Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by licensed waste disposal company.

Gravity Bag Filter



Description:

- A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects gravel, sand, silt, and fines.

Appropriate Applications:

- Effective for the removal of sediments (gravel, sand, silt, and fines). Some metals are removed with the sediment.

Implementation:

- Water is pumped into one side of the bag and seeps through the top, bottom, and sides of the bag.
- Place filter bag on pavement or a gravel bed or paved surface. Avoid placing a dewatering bag on unprotected bare soil. If placing the bag on bare soil is unavoidable, a secondary barrier should be used, such as a rock filter bed placed beneath and beyond the edges of the bag to, prevent erosion and capture sediments that escape the bag.
- Perimeter control around the downstream end of the bag should be implemented. Secondary sediment controls are important especially in the initial stages of discharge, which tend to allow fines to pass through the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier (as applicable) is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- Caution should be taken when removing and disposing of the bag, to prevent the release of captured sediment
- Properly dispose of the bag offsite. If sediment is removed from the bag prior to disposal (bags can potentially be reused depending upon their condition), dispose of sediment in accordance with the general maintenance procedures described at the end of this BMP Fact Sheet.

Sand Media Particulate Filter

Description:

- Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.
- Sand filters can be used for stand-alone treatment or in conjunction with bag and cartridge filtration if further treatment is required.
- Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.
- Venders generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use and cleaned when head loss reaches target levels.
- If cleaned by backwashing, the backwash water may need to be hauled away for disposal or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

Pressurized Bag Filter

Description:

- A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.

- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filter bags require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Cartridge Filter

Description:

- Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:

- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.

- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:

- The cartridges require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Costs

- Sediment control costs vary considerably depending on the dewatering and sediment treatment system that is selected. Pressurized filters tend to be more expensive than gravity settling but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months) and can range from $460 per month for a 1,000-gallon tank to $3,400 per month for a 10,000-gallon tank (adjusted for inflation, 2016 dollars, by Tetra Tech Inc.). Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

- Inspect and verify that dewatering BMPs are in place and functioning prior to the commencement of activities requiring dewatering.

- Inspect dewatering BMPs daily while dewatering activities are being conducted.

- Inspect all equipment before use. Monitor dewatering operations to ensure they do not cause offsite discharge or erosion.
- Sample dewatering discharges as required by the General Permit.
- Unit-specific maintenance requirements are included with the description of each unit.
- Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized or disposed of at a disposal site as approved by the owner.
- Sediment that is commingled with other pollutants should be disposed of in accordance with all applicable laws and regulations and as approved by the owner.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

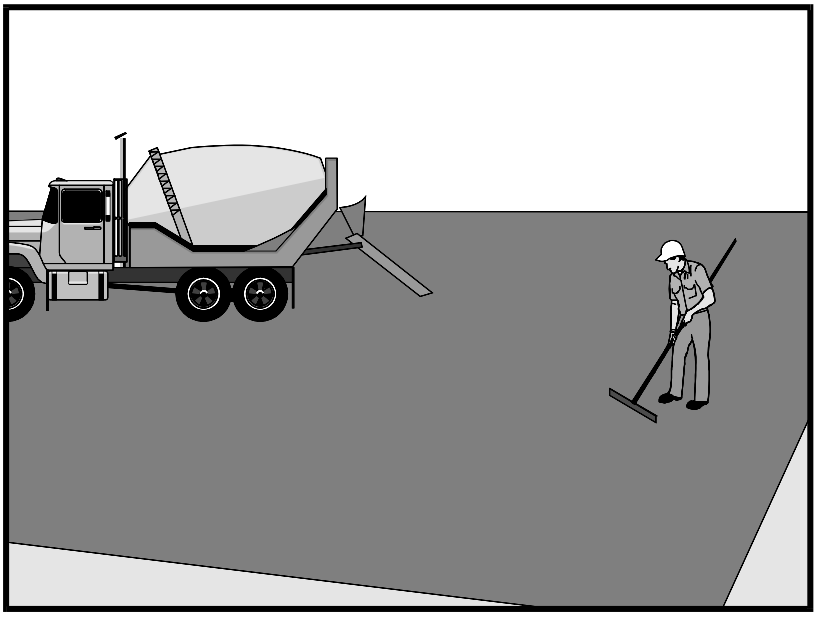
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003; Updated March 2004.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Labor Surcharge & Equipment Rental Rates, April 1, 2002 through March 31, 2003, California Department of Transportation (Caltrans).

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Paving and Grinding Operations NS-3



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☒

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

  Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

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Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
  - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of)or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
  - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:

  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.

  - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).

- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.

- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.

- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.

- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.

- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

References

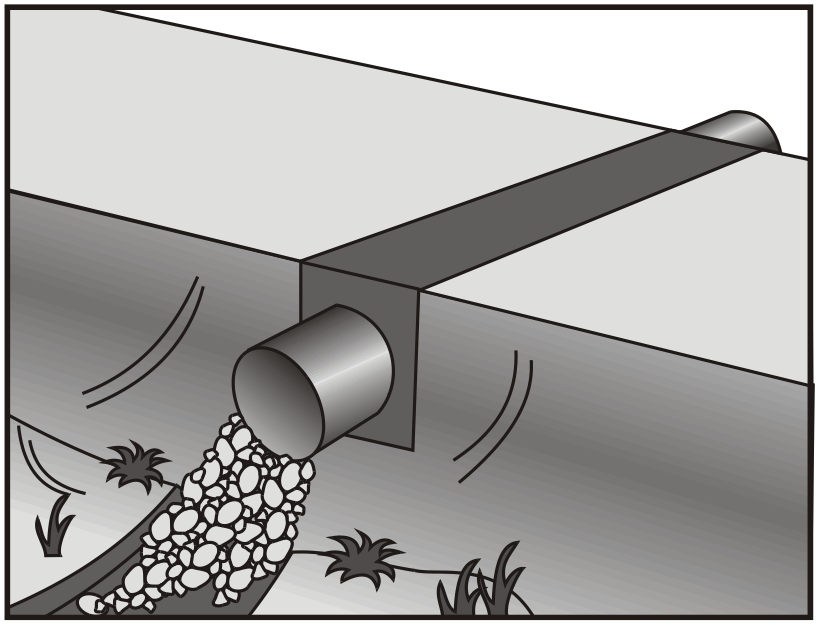
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Temporary Stream Crossing NS-4



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

A temporary stream crossing is a temporary culvert, ford or bridge placed across a waterway to provide access for construction purposes for a period of less than one year. Temporary access crossings are not intended to maintain traffic for the public. The temporary access will eliminate erosion and downstream sedimentation caused by vehicles.

Suitable Applications

Temporary stream crossings should be installed at all designated crossings of perennial and intermittent streams on the construction site, as well as for dry channels that may be significantly eroded by construction traffic.

Temporary streams crossings are installed at sites:

- Where appropriate permits have been secured (404 Permits, and 401 Certifications)
- Where construction equipment or vehicles need to frequently cross a waterway
- When alternate access routes impose significant constraints
- When crossing perennial streams or waterways causes significant erosion
- Where construction activities will not last longer than one year

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- Where appropriate permits have been obtained for the stream crossing

Limitations

The following limitations may apply:

- Installation and removal will usually disturb the waterway.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Installation may require dewatering or temporary diversion of the stream. See NS-2, Dewatering Operations and NS-5, Clear Water Diversion.
- Installation may cause a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.
- Use of natural or other gravel in the stream for construction of Cellular Confinement System (CCS) ford crossing will be contingent upon approval by fisheries agencies.
- Ford crossings may degrade water quality due to contact with vehicles and equipment.
- May be expensive for a temporary improvement.
- Requires other BMPs to minimize soil disturbance during installation and removal.
- Fords should only be used in dry weather.

Implementation

General

The purpose of this BMP is to provide a safe, erosion-free access across a stream for construction equipment. Minimum standards and specifications for the design, construction, maintenance, and removal of the structure should be established by an engineer registered in California. Temporary stream crossings may be necessary to prevent construction equipment from causing erosion of the stream and tracking sediment and other pollutants into the stream.

Temporary stream crossings are used as access points to construction sites when other detour routes may be too long or burdensome for the construction equipment. Often heavy construction equipment must cross streams or creeks, and detour routes may impose too many constraints such as being too narrow or poor soil strength for the equipment loadings. Additionally, the contractor may find a temporary stream crossing more economical for light–duty vehicles to use for frequent crossings and may have less environmental impact than construction of a temporary access road.

Location of the temporary stream crossing should address:

- Site selection where erosion potential is low.

- Areas where the side slopes from site runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings should be considered:

- **Culverts** – A temporary culvert is effective in controlling erosion but will cause erosion during installation and removal. A temporary culvert can be easily constructed and allows for heavy equipment loads.

- **Fords** - Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams, and low-flow perennial streams. CCS, a type of ford crossing, is also appropriate for use in streams that would benefit from an influx of gravels. A temporary ford provides little sediment and erosion control and is ineffective in controlling erosion in the stream channel. A temporary ford is the least expensive stream crossing and allows for maximum load limits. It also offers very low maintenance. Fords are more appropriate during the dry ice season and in arid areas of California.

- **Bridges** - Appropriate for streams with high flow velocities, steep gradients and where temporary restrictions in the channel are not allowed.

Design

During the long summer construction season in much of California, rainfall is infrequent, and many streams are dry. Under these conditions, a temporary ford may be sufficient. A ford is not appropriate if construction will continue through the winter rainy season, if summer thunderstorms are likely, or if the stream flows during most of the year. Temporary culverts and bridges should then be considered and, if used, should be sized to pass a significant design storm (i.e., at least a 10-year storm). The temporary stream crossing should be protected against erosion, both to prevent excessive sedimentation in the stream and to prevent washout of the crossing.

Design and installation requires knowledge of stream flows and soil strength. Designs should be prepared under direction of, and approved by, a registered civil engineer and for bridges, a registered structural engineer. Both hydraulic and construction loading requirements should be considered with the following:

- Comply with any special requirements for culvert and bridge crossings, particularly if the temporary stream crossing will remain through the rainy season.

- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor should be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.

- Install sediment traps immediately downstream of crossings to capture sediments. See SE-3, Sediment Trap.

- Avoid oil or other potentially hazardous materials for surface treatment.

- Culverts are relatively easy to construct and able to support heavy equipment loads.

- Fords are the least expensive of the crossings, with maximum load limits.

- CCS crossing structures consist of clean, washed gravel and cellular confinement system blocks. CCS are appropriate for streams that would benefit from an influx of gravel; for example, salmonid streams, streams or rivers below reservoirs, and urban, channelized streams. Many urban stream systems are gravel-deprived due to human influences, such as dams, gravel mines, and concrete channels.
- CCS allow designers to use either angular or naturally occurring rounded gravel, because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique, because of the habitat improvement it will provide after removal of the CCS.
- A gravel depth of 6 to 12 in. for a CCS structure is sufficient to support most construction equipment.
- An advantage of a CCS crossing structure is that relatively little rock or gravel is needed, because the CCS provides the stability.
- Bridges are generally more expensive to design and construct but provide the least disturbance of the streambed and constriction of the waterway flows.

Construction and Use

- Stabilize construction roadways, adjacent work area, and stream bottom against erosion.
- Construct during dry periods to minimize stream disturbance and reduce costs.
- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.
- Install temporary erosion control BMPs in accordance with erosion control BMP fact sheets to minimize erosion of embankment into flow lines.
- Any temporary artificial obstruction placed within flowing water should only be built from material, such as clean gravel or sandbags, that will not introduce sediment or silt into the watercourse.
- Temporary water body crossings and encroachments should be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments should be clean, rounded river cobble.
- Vehicles and equipment should not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed.
- The exterior of vehicles and equipment that will encroach on the water body within the project should be maintained free of grease, oil, fuel, and residues.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate soil stabilization measures.

- Riparian vegetation, when removed pursuant to the provisions of the work, should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble must be removed upon completion of project activities.

- Conceptual temporary stream crossings are shown in the attached figures.

Costs

Caltrans Construction Cost index for temporary bridge crossings is $58-$122/ft^2 (costs adjusted for inflation, 2016 dollars, by Tetra Tech Inc.).

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Check for blockage in the channel, sediment buildup or trapped debris in culverts, blockage behind fords or under bridges.

- Check for erosion of abutments, channel scour, riprap displacement, or piping in the soil.

- Check for structural weakening of the temporary crossings, such as cracks, and undermining of foundations and abutments.

- Remove sediment that collects behind fords, in culverts, and under bridges periodically.

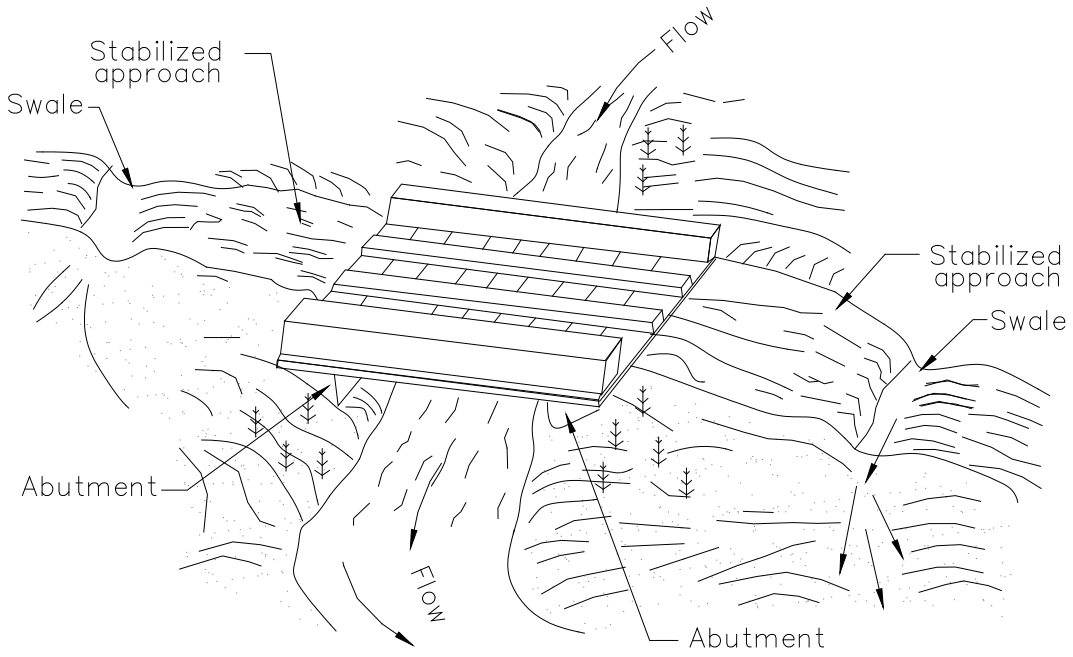
- Replace lost or displaced aggregate from inlets and outlets of culverts and cellular confinement systems.

- Remove temporary crossing promptly when it is no longer needed.

References

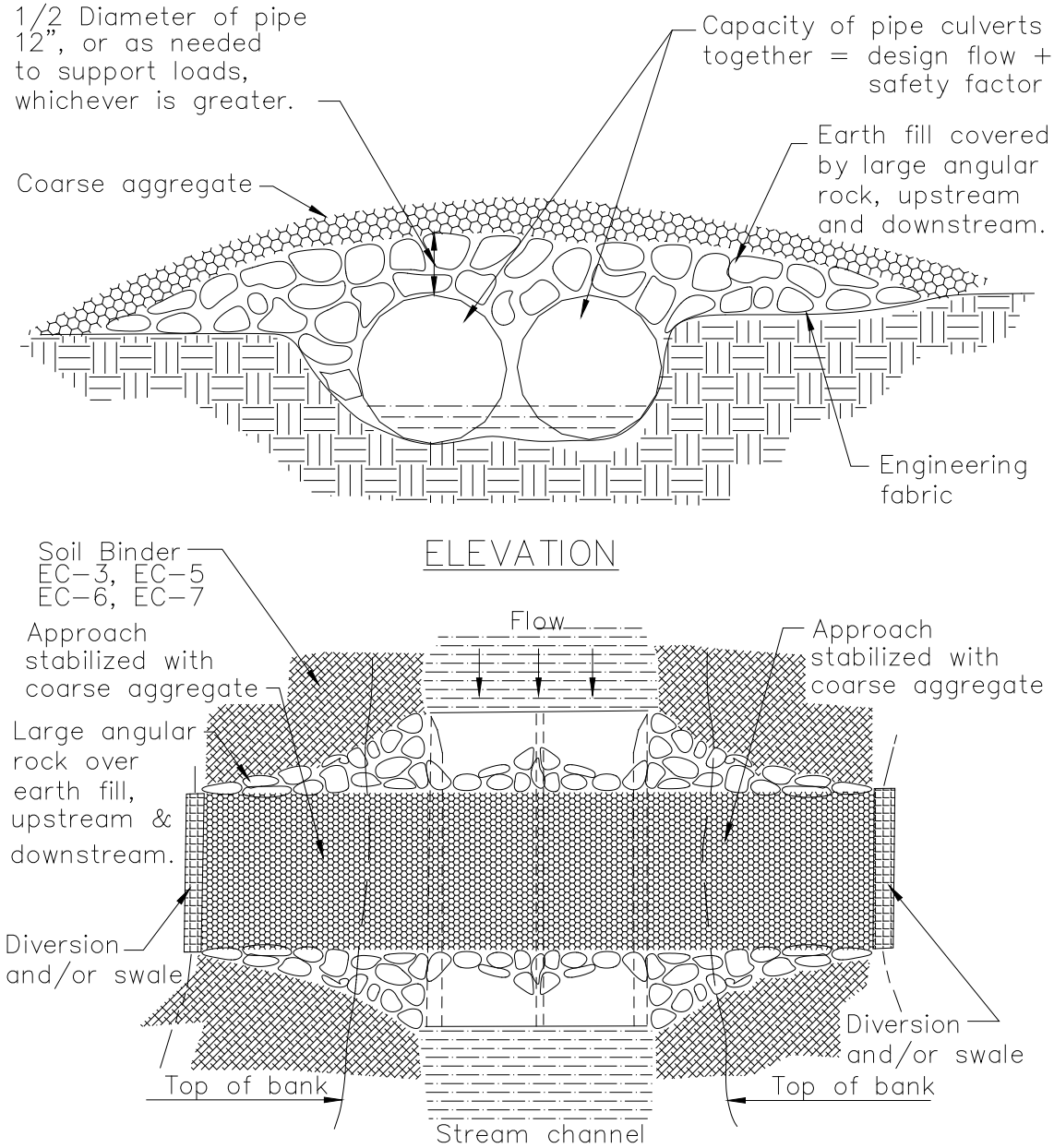
California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TL03, October 2000.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

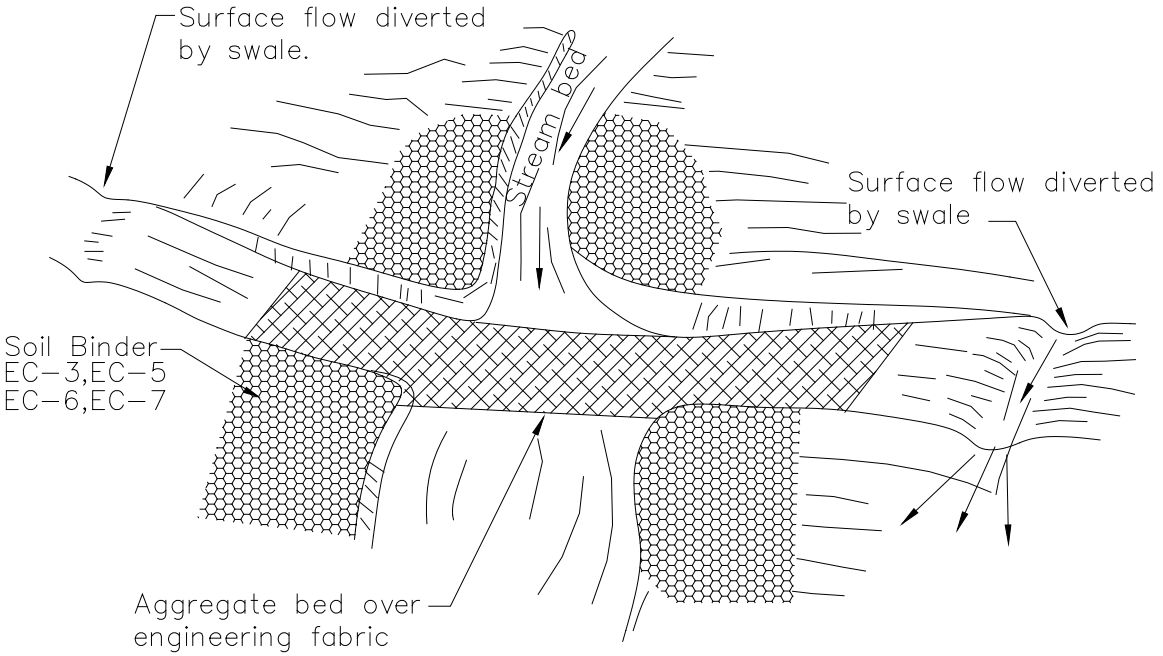


NOTE:
Surface flow of road diverted by swale and/or dike.

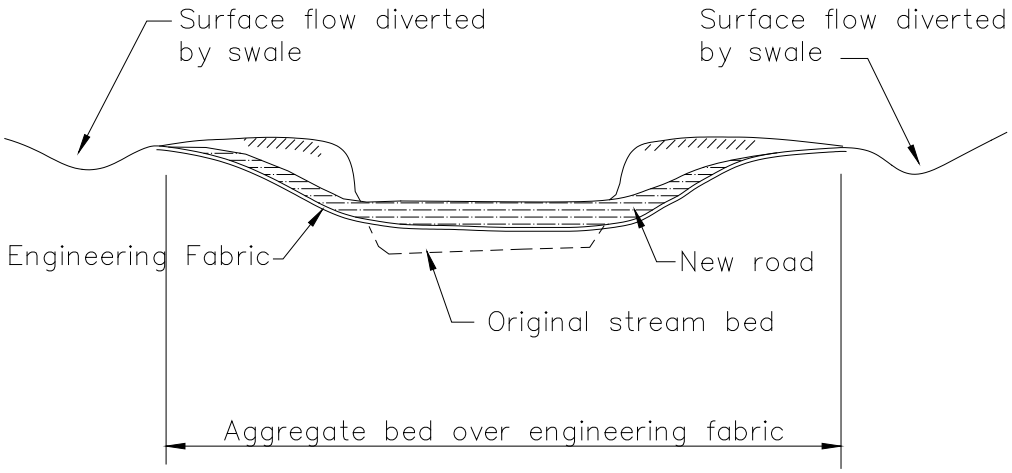
TYPICAL BRIDGE CROSSING
NOT TO SCALE



TYPICAL CULVERT CROSSING
NOT TO SCALE

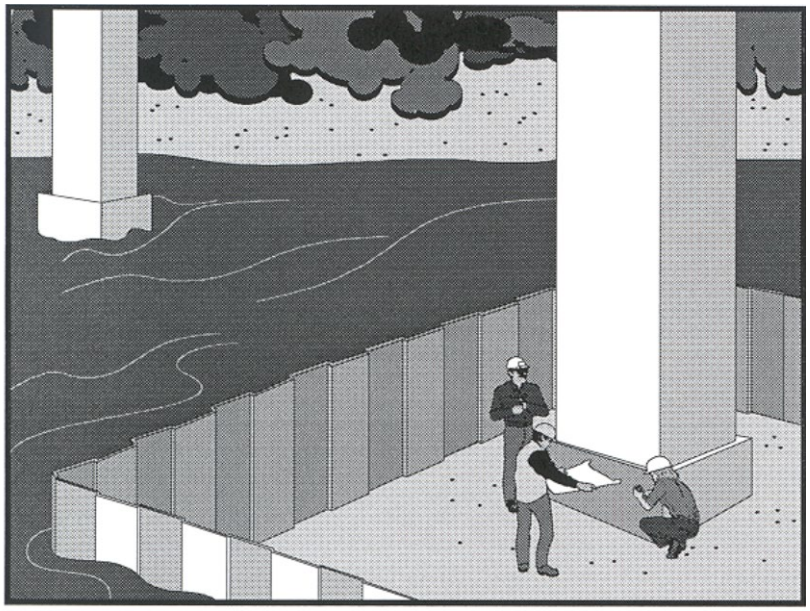


Aggregate approch
1:5 (V:H) Maximum slope on road



TYPICAL FORD CROSSING
NOT TO SCALE

Clear Water Diversion NS-5



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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
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Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion. Clear water diversions are used in a waterway to enclose a construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

Suitable Applications

A clear water diversion is typically implemented where appropriate permits (1601 Agreement) have been secured and work must be performed in a flowing stream or water body.

- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Pumped diversions are suitable for intermittent and low flow streams.
- Excavation of a temporary bypass channel or passing the flow through a heavy pipe (called a “flume”) with a trench

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excavated under it, is appropriate for the diversion of streams less than 20 ft wide, with flow rates less than 100 cfs.

- Clear water diversions incorporating clean washed gravel may be appropriate for use in salmonid spawning streams.

Limitations

- Diversion and encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Diversion and encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.
- Diversion or isolation activities are not appropriate in channels where there is insufficient stream flow to support aquatic species in the area dewatered as a result of the diversion.
- Diversion or isolation activities are inappropriate in deep water unless designed or reviewed by an engineer registered in California.
- Diversion or isolation activities should not completely dam stream flow.
- Dewatering and removal may require additional sediment control or water treatment. See NS-2, Dewatering Operations.
- Not appropriate if installation, maintenance, and removal of the structures will disturb sensitive aquatic species of concern.

Implementation

General

- Implement guidelines presented in EC-12, Streambank Stabilization to minimize impacts to streambanks.
- Where working areas encroach on flowing streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams should be held to a minimum.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc.
- Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue, and water levels should be below the fuel tanks, gearboxes, and axles of the equipment unless lubricants and fuels are sealed such that inundation by water will not result in discharges of fuels, oils, greases, or hydraulic fluids.

- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of the crane/ excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe should not enter the water body except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps located within or adjacent to a water body, should be positioned over drip pans.
- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water should, at all times, be allowed to pass downstream to maintain aquatic life.
- Equipment should not be parked below the high-water mark unless allowed by a permit.
- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate erosion control measures.
- Riparian vegetation approved for trimming as part of the project should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble should be removed upon completion of project activities.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- Where possible, avoid or minimize diversion and encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.

Temporary Diversions and Encroachments

- Construct diversion channels in accordance with EC-9, Earth Dikes and Drainage Swales.
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with EC-7, Geotextiles and Mats, or use rock slope protection.
- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment and slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also EC-10, Velocity Dissipation Devices.

Temporary Dry Construction Areas

- When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment-settling device, such as a portable tank or settling basin, before returning water to the water body. See also NS-2, Dewatering Operations.

- Any substance used to assemble or maintain diversion structures, such as form oil, should be non-toxic and non-hazardous.

- Any material used to minimize seepage underneath diversion structures, such as grout, should be non-toxic, non-hazardous, and as close to a neutral pH as possible.

Comparison of Diversion and Isolation Techniques:

- Gravel bags are relatively inexpensive, but installation and removal can be labor intensive. It is also difficult to dewater the isolated area. Sandbags should not be used for this technique in rivers or streams, as sand should never be put into or adjacent to a stream, even if encapsulated in geotextile.

- Gravel Bag Berms (SE-6) used in conjunction with an impermeable membrane are cost effective and can be dewatered relatively easily. If spawning gravel is used, the impermeable membrane can be removed from the stream, and the gravel can be spread out and left as salmonid spawning habitat if approved in the permit. Only clean, washed gravel should be used for both the gravel bag and gravel berm techniques.

- Cofferdams are relatively expensive, but frequently allow full dewatering. Also, many options now available are relatively easy to install.

- Sheet pile enclosures are a much more expensive solution but do allow full dewatering. This technique is not well suited to small streams, but can be effective on large rivers or lakes, and where staging and heavy equipment access areas are available.

- K-rails are an isolation method that does not allow full dewatering, but can be used in small to large watercourses, and in fast-water situations.

- A relatively inexpensive isolation method is filter fabric isolation. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place. This method should be used in relatively calm water and can be used in smaller streams. Note that this is not a dewatering method, but rather a sediment isolation method.

- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They can also be used for in-stream construction, when dewatering an area is not required.

- When used in watercourses or streams, cofferdams must be used in accordance with permit requirements.

- Manufactured diversion structures should be installed following manufacturer's specifications.

- Filter fabric and turbidity curtain isolation installation methods can be found in the specific technique descriptions that follow.

Filter Fabric Isolation Technique

Definition and Purpose

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel bags, and steel t-posts.

Appropriate Applications

- Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.
- Filter fabric isolation is relatively inexpensive. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place.
- If spawning gravel is used, all other components of the isolation can be removed from the stream, and the gravel may be spread out and left as salmonid spawning habitat if approved in the permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.
- This method should be used in relatively calm water and can be used in smaller streams. This is not a dewatering method, but rather a sediment isolation method.
- Water levels inside and outside the fabric curtain must be about the same, as differential heads will cause the curtain to collapse.

Limitations

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.
- Filter fabrics are not appropriate for projects where dewatering is necessary.
- Filter fabrics are not appropriate to completely dam stream flow.

Design and Installation

- For the filter fabric isolation method, a non-woven or heavy-duty fabric is recommended over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.
- Anchor filter fabric with gravel bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream, where it can provide aquatic habitat benefits. If a sandbag splits open in a watercourse, the sand could cause a decrease in water quality, and could bury sensitive aquatic habitat.
- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 18 ft for ease of handling (otherwise, it gets too heavy to move).

- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the silt fence fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.
- Pull the fabric up and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the silt fence to the post with three diagonal nylon ties.
- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.

Inspection and Maintenance

- Immediately repair any gaps, holes or scour.
- Remove and properly dispose of sediment buildup.
- Remove BMP upon completion of construction activity. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

Turbidity Curtain Isolation Technique

Definition and Purpose

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.

Appropriate Applications

Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the sediment particles will fall out of suspension.

Limitations

- Turbidity curtains should not be used in flowing water; they are best suited for use in ponds, lakes, and very slow-moving rivers.
- Turbidity curtains should not be placed across the width of a channel.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the resuspension of particles and by accidental dumping by the removal equipment.

Design and Installation

- Turbidity curtains should be oriented parallel to the direction of flow.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is

desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 ft.

- The top of the curtain should consist of flexible flotation buoys, and the bottom should be held down by a load line incorporated into the curtain fabric. The fabric should be a brightly colored impervious mesh.
- The curtain should be held in place by anchors placed at least every 100 ft.
- First, place the anchors, then tow the fabric out in a furled condition, and connect to the anchors. The anchors should be connected to the flotation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.
- Consideration must be given to the probable outcome of the removal procedure. It must be determined if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.
- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain.

Maintenance and Inspection:

- The curtain should be inspected for holes or other problems, and any repairs needed should be made promptly.
- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

K-rail River Isolation

Definition and Purpose

This temporary sediment control or stream isolation method uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications

The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.

- This technique is also useful at the toe of embankments and cut or fill slopes.

Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight.

Design and Installation

- To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface for K-rails to sit. Washed gravel should always be used.
- Place the bottom two K-rails adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third K-rail on top of the bottom two. There should be sufficient gravel bags between the bottom K-rails such that the top rail is supported by the gravel. Place plastic sheeting around the K-rails, and secure at the bottom with gravel bags.
- Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current.

Inspection and Maintenance:

- The barrier should be inspected, and any leaks, holes, or other problems should be addressed immediately.
- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

Stream Diversions

The selection of which stream diversion technique to use will depend upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

Advantages of a Pumped Diversion

- Downstream sediment transport can be nearly eliminated.
- Dewatering of the work area is possible.
- Pipes can be moved around to allow construction operations.
- The dams can serve as temporary access to the site.
- Increased flows can be managed by adding more pumping capacity.

Disadvantages of a Pumped Diversion

- Flow volume is limited by pump capacity.
- A pumped diversion requires 24-hour monitoring of pumps.
- Sudden rain could overtop dams.
- Erosion at the outlet.

- Minor in-stream disturbance is required to install and remove dams.

Advantages of Excavated Channels and Flumes

- Excavated channels isolate work from water flow and allow dewatering.
- Excavated channels can handle larger flows than pumps.

Disadvantages of Excavated Channels and Flumes

- Bypass channel or flume must be sized to handle flows, including possible floods.
- Channels must be protected from erosion.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

Design and Installation

- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Pump capacity must be sufficient for design flow.
- A standby pump is required in case a primary pump fails.
- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.

When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached and the excavated channel is stable, breach the upstream end and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

Inspection and Maintenance

- Pumped diversions require 24-hour monitoring of pumps.
- Inspect embankments and diversion channels for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Remove holes, gaps, or scour.
- Upon completion of work, the diversion or isolation structure should be removed, and flow should be redirected through the new culvert or back into the original stream channel. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

Costs

Costs of clear water diversion vary considerably and can be very high.

Inspection and Maintenance

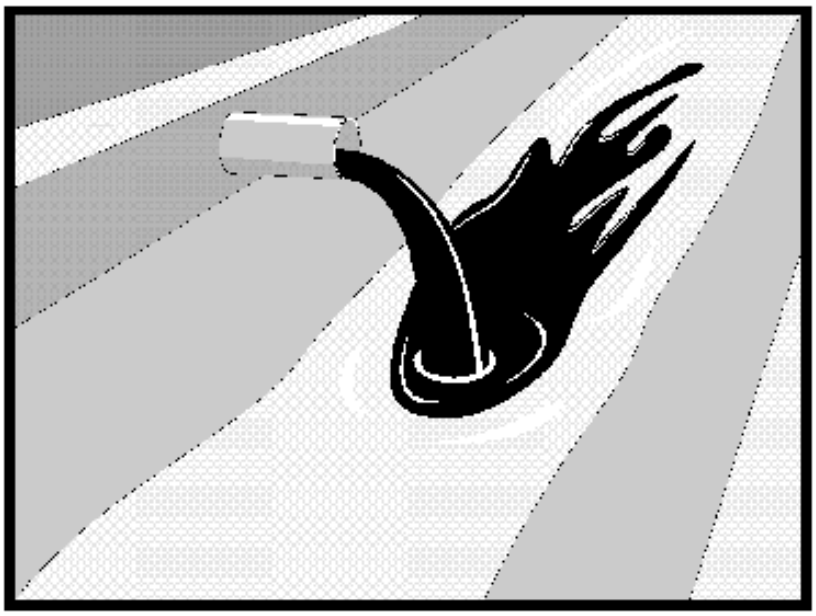
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Refer to BMP-specific inspection and maintenance requirements.

References

California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TL03, October 2000.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Illicit Connection/Discharge NS-6



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered, or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

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- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General –** unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season
  - Unusual flows in sub drain systems used for dewatering
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the non-irrigation season
  - Non-standard junction structures
  - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job-related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

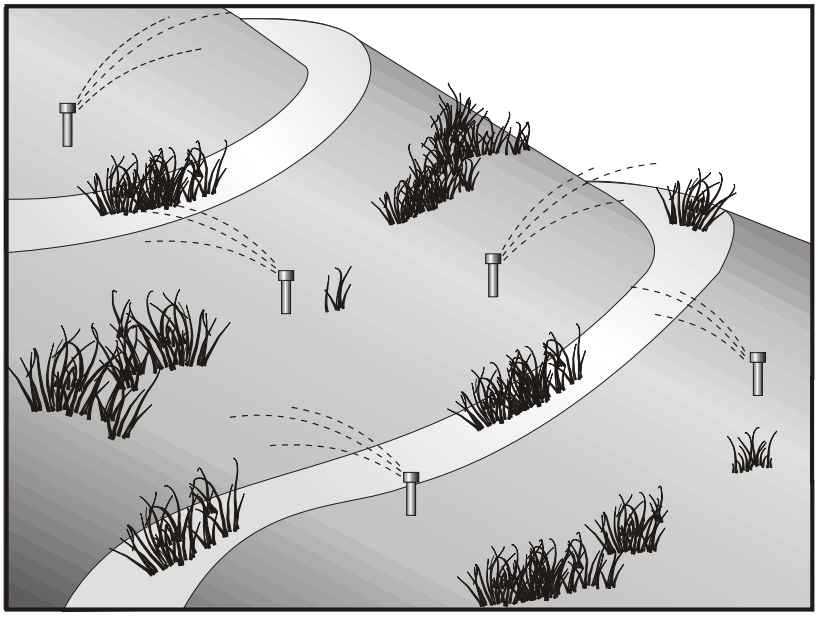
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Potable Water/Irrigation NS-7



Description and Purpose

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Suitable Applications

Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

Limitations

None identified.

Implementation

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	☑

Potential Alternatives

None

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- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Repair broken water lines as soon as possible.

- Inspect irrigated areas regularly for signs of erosion and/or discharge.

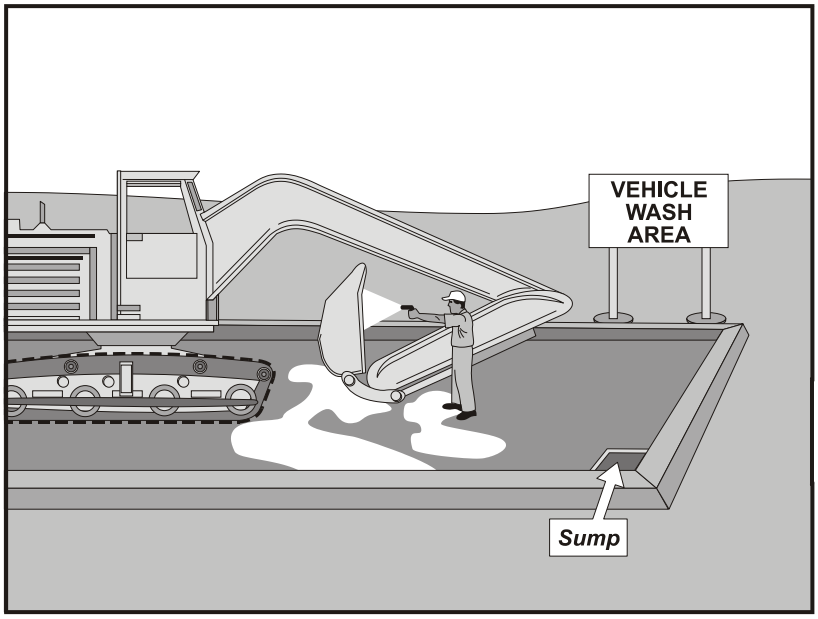
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning NS-8



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Inspection and Maintenance

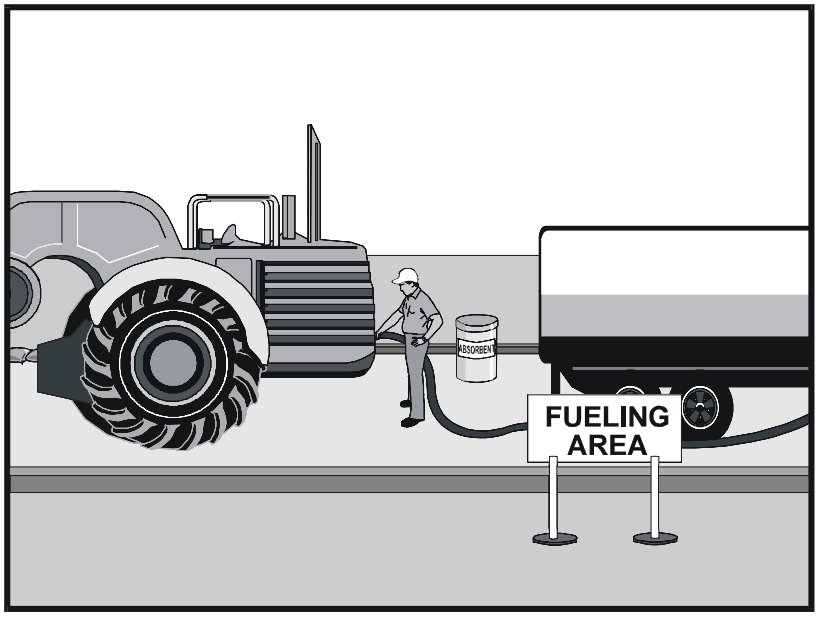
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Fueling NS-9



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.

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- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately, or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

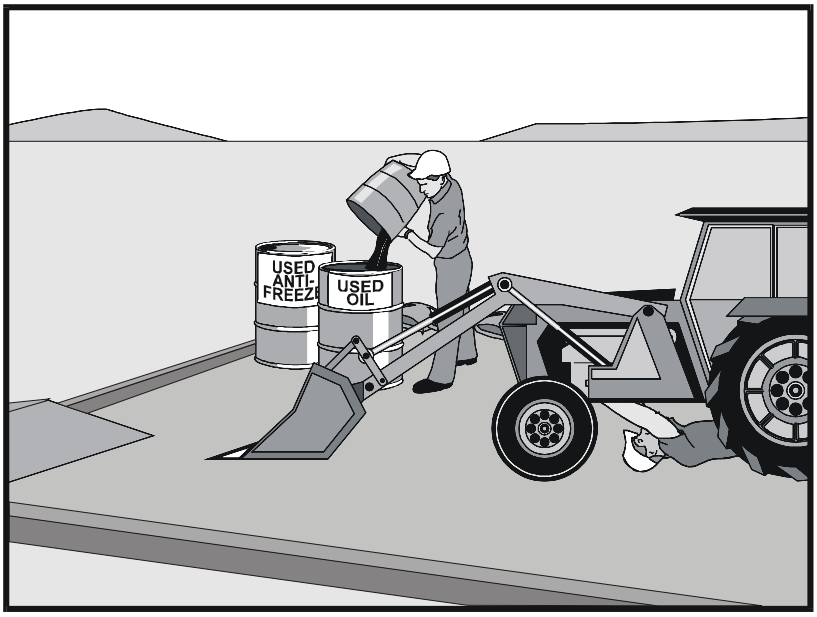
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8,

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Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Vehicle & Equipment Maintenance NS-10

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately, or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

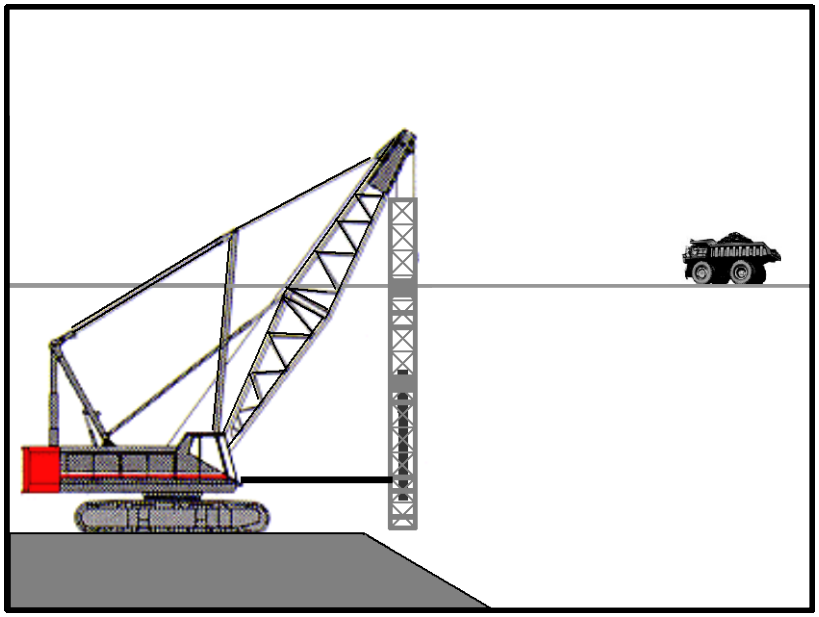
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Pile Driving Operations NS-11



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Suitable Applications

These procedures apply to all construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place, including operations using pile shells as well as construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Implementation

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and storage. Refer to NS-8, Vehicle and Equipment Cleaning, NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

- Have spill kits and cleanup materials available at all locations of pile driving. Refer to WM-4, Spill Prevention and Control.
- Equipment that is stored or in use in streambeds, or on docks, barges, or other structures over water bodies should be kept leak free.
- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads. The storage or use of equipment in streambeds or other bodies of water must comply with all applicable permits.
- Implement other BMPs as applicable, such as NS-2, Dewatering Operations, WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.
- When not in use, store pile-driving equipment away from concentrated flows of stormwater, drainage courses, and inlets. Protect hammers and other hydraulic attachments from runon and runoff by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.
- Use less hazardous products, e.g., vegetable oil, when practicable.

Costs

All of the above measures can be low cost.

Inspection and Maintenance

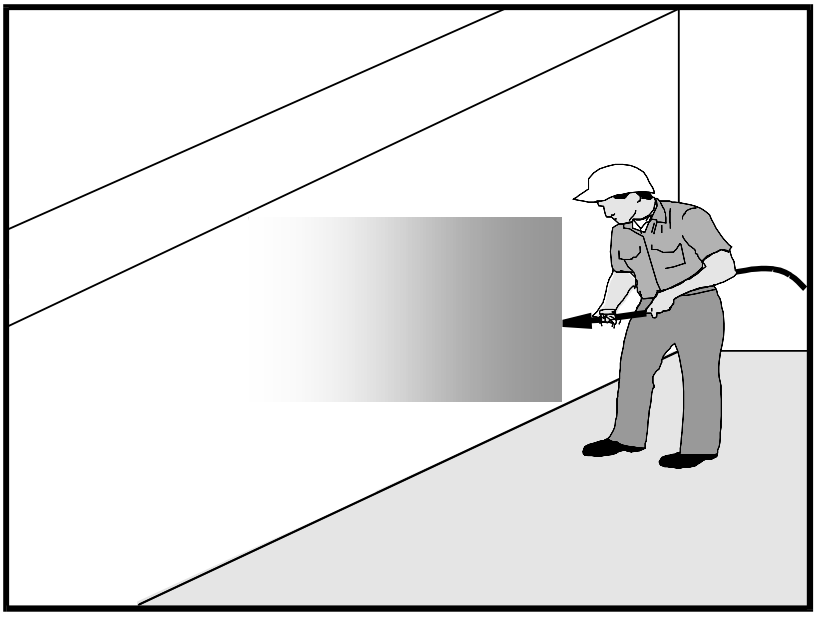
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect equipment every day at startup and repair equipment as needed (i.e., worn or damaged hoses, fittings, and gaskets). Recheck equipment at shift changes or at the end of the day and scheduled repairs as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Concrete Curing NS-12



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

Chemical Curing

- Avoid over spray of curing compounds.
- Minimize the drift by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

References

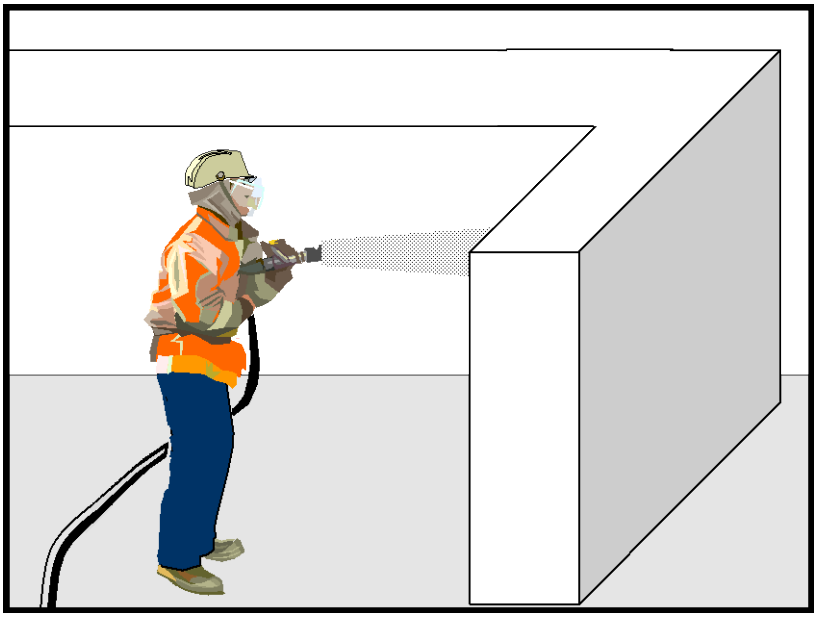
Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non-Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Concrete Finishing NS-13



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	☑

Potential Alternatives

None

Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high-pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

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Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Education

- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

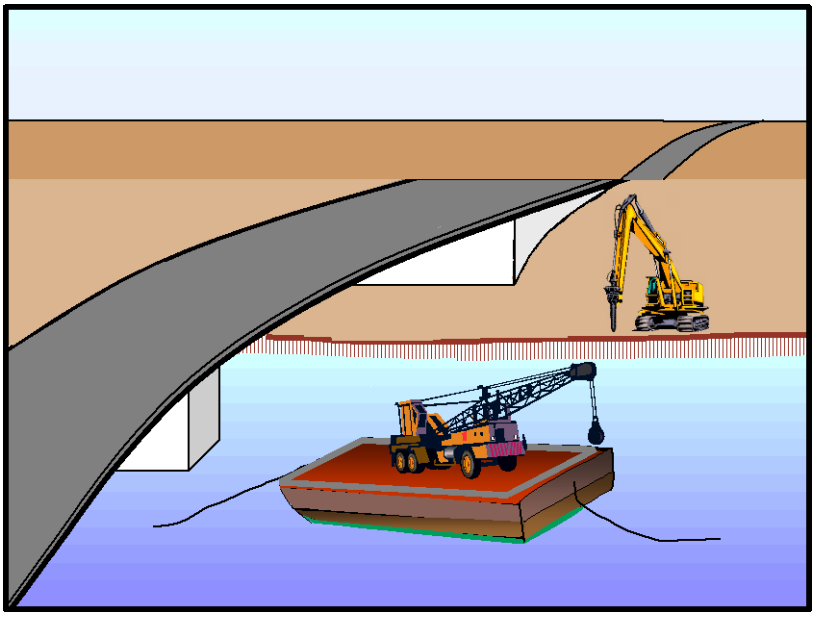
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Material Over Water NS-14



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse.

Suitable Applications

Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse including waters of the United States. These procedures should be implemented for construction materials and wastes (solid and liquid), soil or dredging materials, or any other materials that may cause or contribute to exceedances of water quality standards.

Limitations

Dredge and fill activities are regulated by the US Army Corps of Engineers and Regional Boards under Section 404/401 of the Clean Water Act.

Implementation

- Refer to WM-1, Material Delivery and Storage and WM-4, Spill Prevention and Control.
- Use drip pans and absorbent materials for equipment and vehicles and ensure that an adequate supply of spill clean up materials is available.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over

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water bodies when the vehicle or equipment is expected to be idle for more than 1 hour.

- Maintain equipment in accordance with NS-10, Vehicle and Equipment Maintenance. If a leaking line cannot be repaired, remove equipment from over the water.
- Provide watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from leaving the barge, platform, dock, etc.
- Secure all materials to prevent discharges to receiving waters via wind.
- Identify types of spill control measures to be employed, including the storage of such materials and equipment. Ensure that staff is trained regarding the use of the materials, deployment and access of control measures, and reporting measures.
- In case of spills, contact the local Regional Board as soon as possible but within 48 hours.
- Refer to WM-5, Solid Waste Management (non-hazardous) and WM-6, Hazardous Waste Management. Ensure the timely and proper removal of accumulated wastes
- Comply with all necessary permits required for construction within or near the watercourse, such as Regional Water Quality Control Board, U.S. Army Corps of Engineers, Department of Fish and Game or and other local permitting.
- Discharges to waterways should be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures contained in SWPPP.

Costs

These measures are generally of low to moderate cost. Exceptions are areas for temporary storage of materials, engine fluids, or wastewater pump out.

Inspection and Maintenance

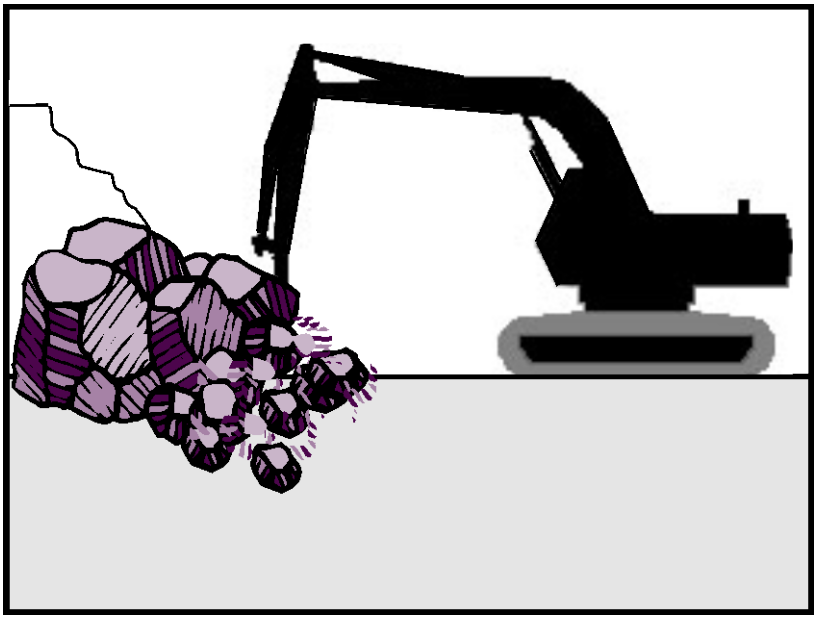
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Ensure that employees and subcontractors implement the appropriate measures for storage and use of materials and equipment.
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the water courses, including waters of the United States.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Demolition Adjacent to Water NS-15



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Suitable Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

Limitations

None identified.

Implementation

- Refer to NS-5, Clear Water Diversion, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the owner.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with WM-3, Stockpile Management.
- Ensure safe passage of wildlife, as necessary.

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- Discharges to waterways shall be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.

- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to BMP WM-6, Hazardous Waste Management. For demolition work involving soil excavation around lead-painted structures, refer to WM-7, Contaminated Soil Management.

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runon and runoff.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Temporary Batch Plants NS-16

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

The construction of roads, bridges, retaining walls, and other large structures in remote areas, often requires temporary batch plant facilities to manufacture Portland Cement Concrete (PCC) or asphalt cement (AC). Temporary batch plant facilities typically consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; above ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. Proper control and use of equipment, materials, and waste products from temporary batch plant facilities will reduce the discharge of potential pollutants to the storm drain system or watercourses, reduce air emissions, and mitigate noise impacts.

The General Permit draft incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements). Many types of batch plant materials, including mortar, concrete, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows which may cause an exceedance of the General Permit requirements.

Suitable Applications

These procedures typically apply to construction sites where temporary batch plant facilities are used; however, some of the

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practices described are applicable to construction sites with general concrete use.

Limitations

The General Permit for discharges of stormwater associated with industrial activities (General Industrial Permit) may be applicable to temporary batch plants.

Specific permit requirements or mitigation measures such as Air Resources Board (ARB), Air Quality Management District (AQMD), Air Pollution Control District (APCD, Regional Water Quality Control Board (RWQCB), county ordinances and city ordinances may require alternative mitigation measures for temporary batch plants. Contact the local regulatory agencies to determine if a permit is required.

Implementation

Planning

- Temporary batch plants may be subject to the General Industrial Permit. To obtain a copy of this permit and the application forms, visit http://www.waterboards.ca.gov or contact the State Water Resources Control Board.
- Proper planning, design, and construction of temporary batch plants should be implemented to minimize potential water quality, air pollution, and noise impacts associated with temporary batch plants.
- BMPs and a Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP). BMPs should be implemented, inspected, and maintained in accordance with these plans.
- Temporary batch plants should be managed to comply with AQMD Statewide Registration Program and/or local AQMD Portable Equipment Registration requirements.
- Construct temporary batch plants downwind of existing developments whenever possible.
- Placement of access roads should be planned to mitigate water and air quality impacts.

Layout and Design

- Temporary batch plants should be properly located and designed to mitigate water quality impacts to receiving water bodies. Batch plants should be located away from watercourses, drainage courses, and drain inlets. Batch plants should be located to minimize the potential for stormwater runon onto the site.
- Temporary batch plant facilities (including associated stationary equipment and stockpiles) should be located at least 300 ft from any recreational area, school, residence, or other structure not associated with the construction project.
- Construct continuous interior AC or PCC berms around batch plant equipment (mixing equipment, silos, concrete drop points, conveyor belts, admixture tanks, etc.) to facilitate proper containment and cleanup of releases. Rollover or flip top curbs or dikes should be placed at ingress and egress points (SE-12, Temporary Silt Dike).
- Direct runoff from the paved or unpaved portion of the batch plant into a sump and pipe to a lined washout area or dewatering tank.

- Direct stormwater and non-stormwater runoff from unpaved portions of batch plant facility to catchment ponds or tanks.
- Construct and remove concrete washout facilities in accordance with WM-8, Concrete Waste Management.
- Layout of a typical batch plant and associated BMP is located at the end of this BMP fact sheet.

Operational Procedures

- Washout of concrete trucks should be conducted in a designated area in accordance with WM-8, Concrete Waste Management.
- Do not dispose of concrete into drain inlets, the stormwater drainage system, or watercourses.
- Washing of concrete mixing and transport equipment (including concrete truck washout) should occur in a designated area in accordance with WM-8, Concrete Waste Management.
- Washing equipment, tools, or vehicles to remove PCC should be conducted in accordance with NS-7, Potable Water/Irrigation, NS-8, Vehicle and Equipment Cleaning, and WM-8, Concrete Waste Management.
- All dry material transfer points should be ducted through a fabric or cartridge type filter unless there are no visible emissions from the transfer point.
- Equip all bulk storage silos, including auxiliary bulk storage trailers, with fabric or cartridge type filter(s).
- Maintain silo vent filters in proper operating condition.
- Equip silos and auxiliary bulk storage trailers with dust-tight service hatches.
- Fabric dust collection system should be capable of controlling particulate matter in accordance with the California Air Resources Control Board and local Air Pollution Control District Regulations.
- Fabric dust collectors (except for vent filters) should be equipped with an operational pressure differential gauge to measure the pressure drop across the filters.
- All transfer points should be equipped with a wet suppression system to control fugitive particulate emissions unless there are no visible emissions.
- All conveyors should be covered, unless the material being transferred results in no visible emissions.
- There should be no visible emissions beyond the property line, while the equipment is being operated.
- Collect dust emissions from the loading of open-bodied trucks, at the drip point of dry batch plants, or dust emissions from the drum feed for central mix plants.

- Equip silos and auxiliary bulk storage trailers with a visible and/or audible warning mechanism to warn operators that the silo or trailer is full.

- All open-bodied vehicles transporting material should be loaded with a final layer of wet sand and the truck should be covered with a tarp to reduce emissions.

Tracking Control

- Plant roads (batch truck and material delivery truck roads) and areas between stockpiles and conveyor hoppers should be stabilized (TC-2, Stabilized Construction Roadway), watered, treated with dust-suppressant chemicals (WE-1, Wind Erosion Control), or paved with a cohesive hard surface that can be repeatedly swept, maintained intact, and cleaned as necessary to control dust emissions.

- Trucks should not track PCC from plants onto public roads. Use appropriate practices from TC-1, Stabilized Construction Entrance/Exit, to prevent tracking.

Materials Storage

- WM-1, Material Delivery and Storage, should be implemented at all batch plants using concrete components or compounds. An effective strategy is to cover and contain materials.

- WM-2, Material Use should be conducted in a way to minimize or eliminate the discharge of materials to storm drain system or watercourse.

- Ensure that finer materials are not dispersed into the air during operations, such as unloading of cement delivery trucks.

- Stockpiles should be covered and enclosed with perimeter sediment barriers per WM-3, Stockpile Management. Uncovered stockpiles should be sprayed with water and/or dust-suppressant chemicals as necessary to control dust emissions, unless the stockpiled material results in no visible emissions. An operable stockpile watering system should be onsite at all times.

- Store bagged and boxed materials on pallets and cover or store in a completely enclosed storage area on non-working days and prior to rain.

- Minimize stockpiles of demolished PCC by recycling them in a timely manner.

- Provide secondary containment for liquid materials (WM-1, Material Delivery and Storage, WM-10, Liquid Waste Management). Containment should provide sufficient volume to contain precipitation from a 25-year storm plus 10% of the aggregate volume of all containers or plus 100% of the largest container, whichever is greater.

- Handle solid and liquid waste in accordance with WM-5, Solid Waste Management, WM-10, Liquid Waste Management, and WM-8, Concrete Waste Management.

- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per WM-4, Spill Prevention and Control.

- Immediately contain and clean up spilled cement and fly ash and contain.

Equipment Maintenance

- Equipment should be maintained to prevent fluid leaks and spills per NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.
- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per WM-4, Spill Prevention and Control.
- Incorporate other BMPs such as WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.

Costs

Costs will vary depending on the size of the facility and combination of BMPs implemented.

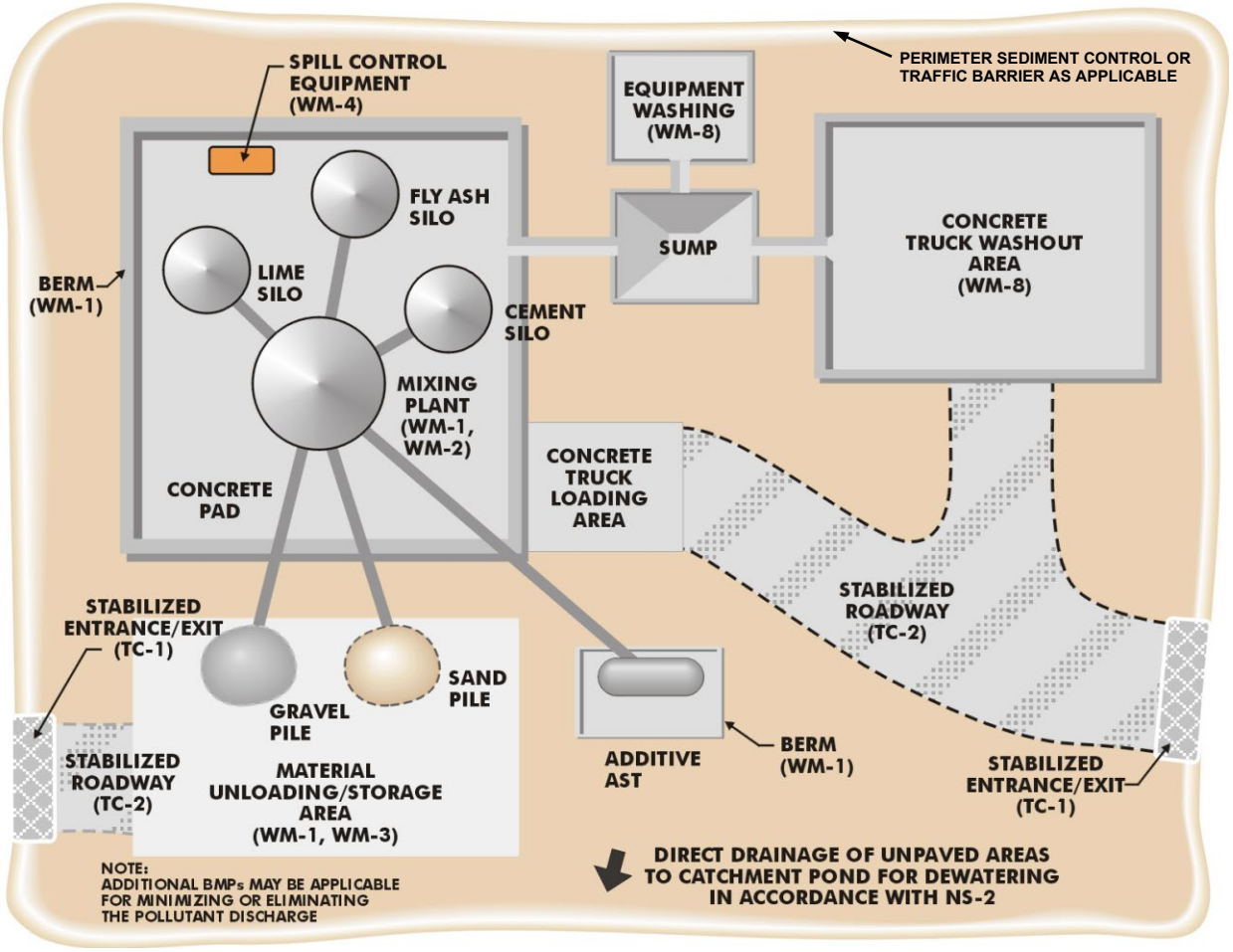
Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts cementitious materials or fly ash as required by the General Permit.
- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).
- Inspect and maintain a Stabilized Construction Entrance/Exit (TC-1) as needed.
- Inspect and maintain stabilized haul roads as needed (TC-2, Stabilized Construction Roadway).
- Inspect and maintain materials and waste storage areas as needed.

References

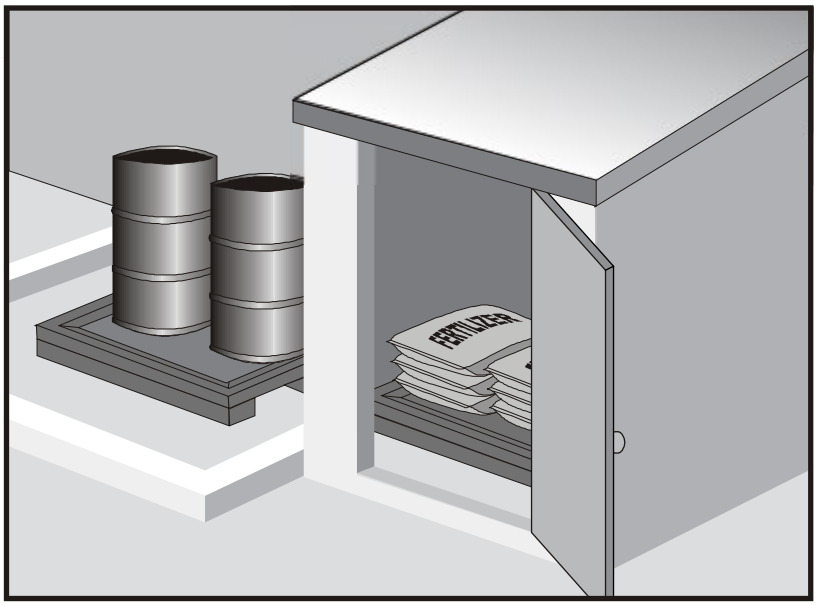
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Typical Temporary Batch

Material Delivery and Storage WM-1



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
    - Avoid transport near drainage paths or waterways.
    - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
    - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

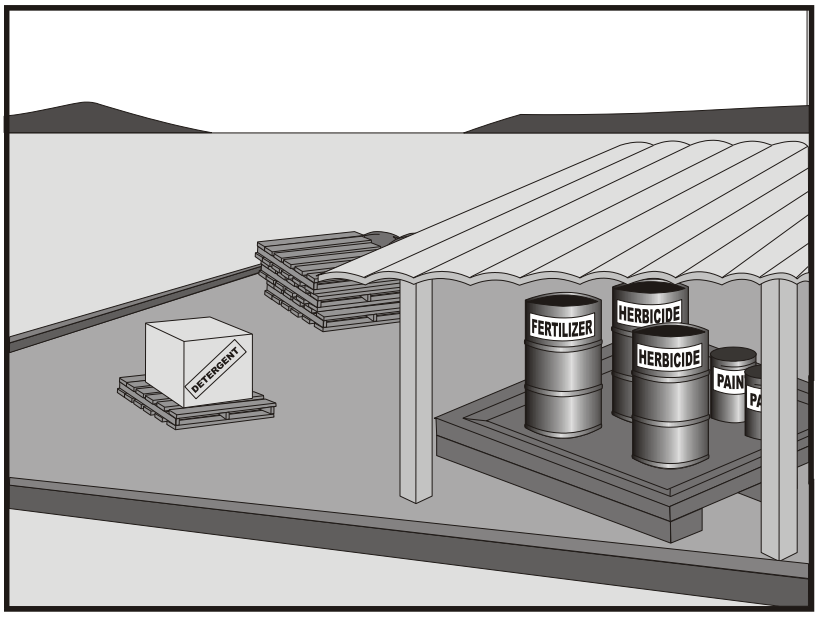
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use WM-2



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

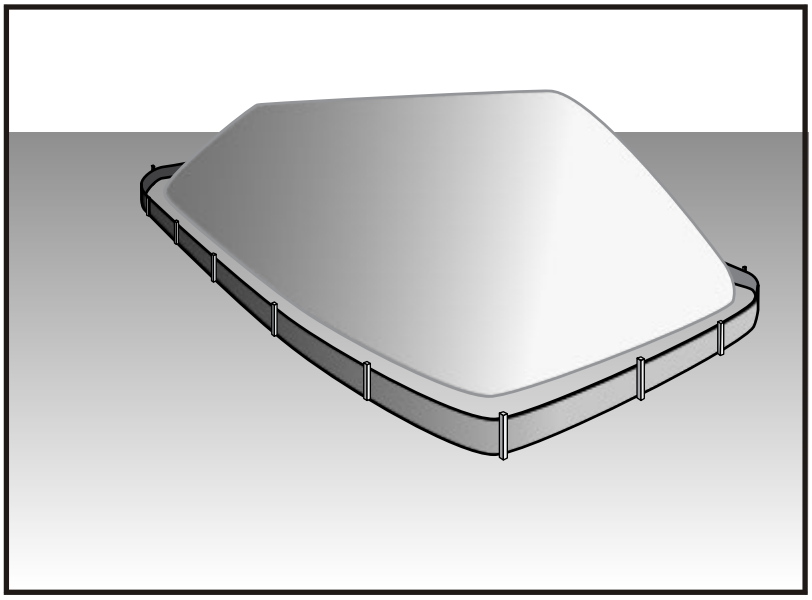
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Stockpile Management WM-3



Treat Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater run-on using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of treated wood

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

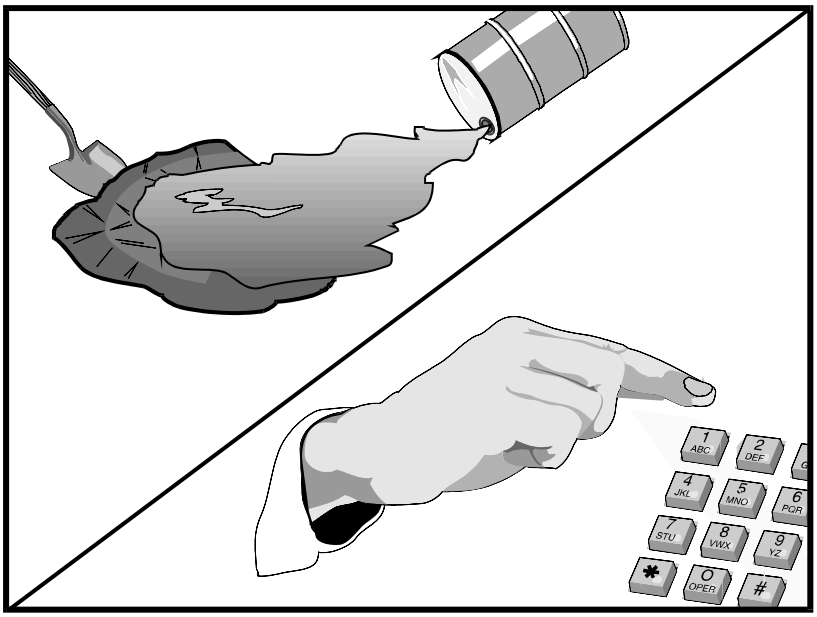
Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Spill Prevention and Control WM-4



Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases, it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spill's contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

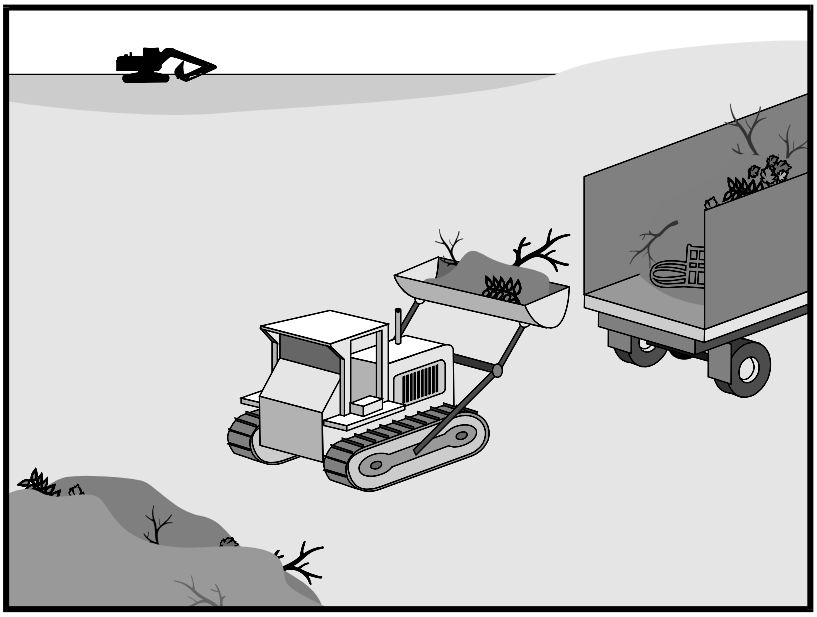
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

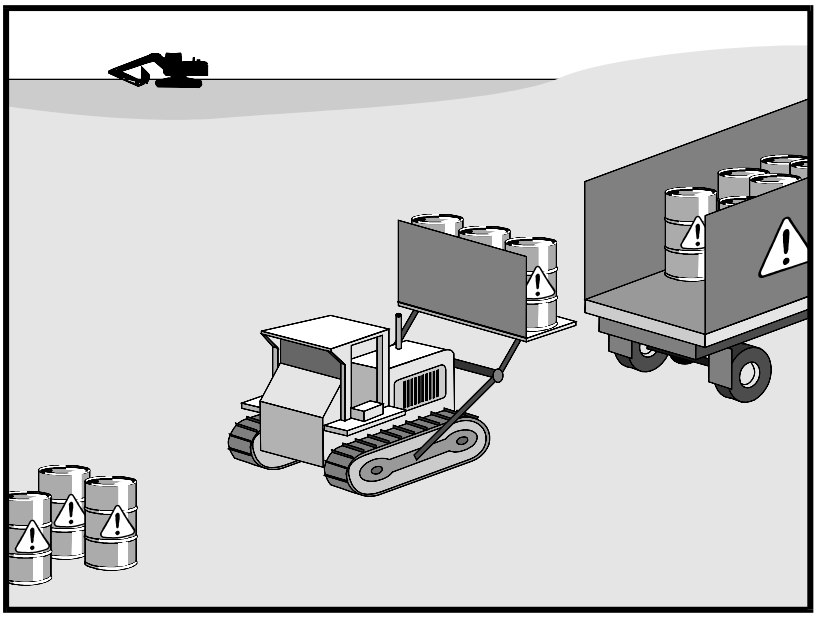
References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Hazardous Waste Management WM-6



Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acids
- Septic Wastes
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
  - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

  - Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

  - Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

- Drums should not be overfilled, and wastes should not be mixed.

- Unless watertight, containers of dry waste should be stored on pallets.

- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

- Paint brushes and equipment for water and oil-based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.

- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. “Paint out” brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

- The following actions should be taken with respect to temporary contaminant:

  - Ensure that adequate hazardous waste storage volume is available.

  - Ensure that hazardous waste collection containers are conveniently located.

  - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

  - Minimize production or generation of hazardous materials and hazardous waste on the job site.

  - Use containment berms in fueling and maintenance areas and where the potential for spills is high.

  - Segregate potentially hazardous waste from non-hazardous construction site debris.

  - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

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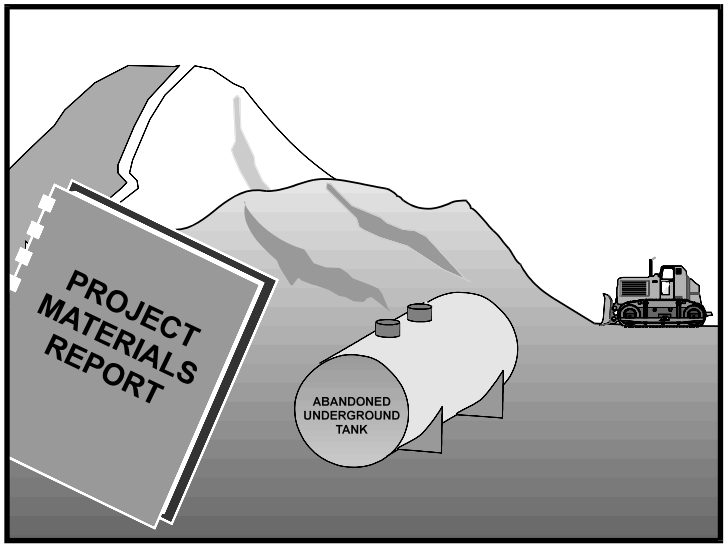
Contaminated Soil Management WM-7



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities
  - Detected or undetected spills and leaks
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
  - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.
  - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT)
  - United States Environmental Protection Agency (USEPA)
  - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

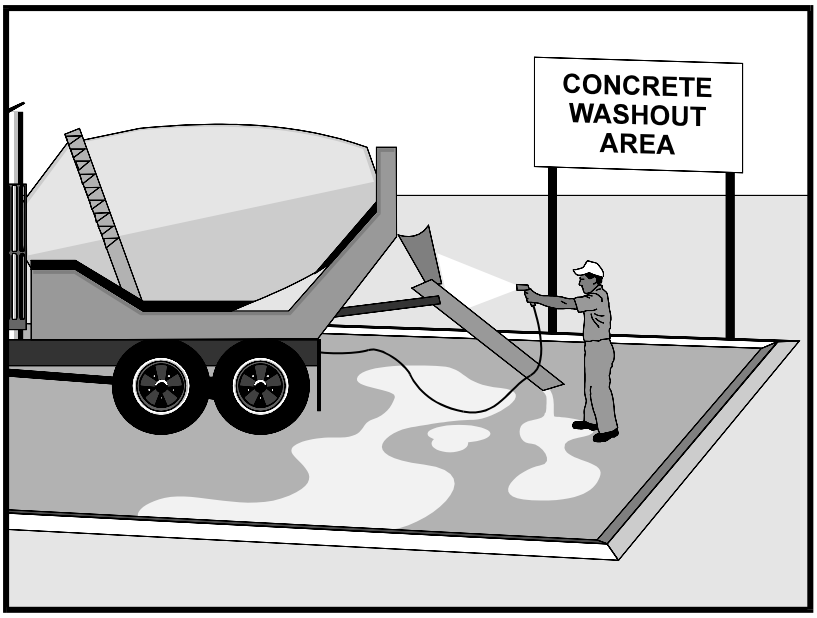
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Waste Management WM-8



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
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Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing Portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

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- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
    - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
    - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
    - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
    - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
    - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
    - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
    - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a “roll-off”; this concrete washout facility should be properly sealed to prevent leakage and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
    - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
    - Lath and flagging should be commercial type.
    - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.

- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

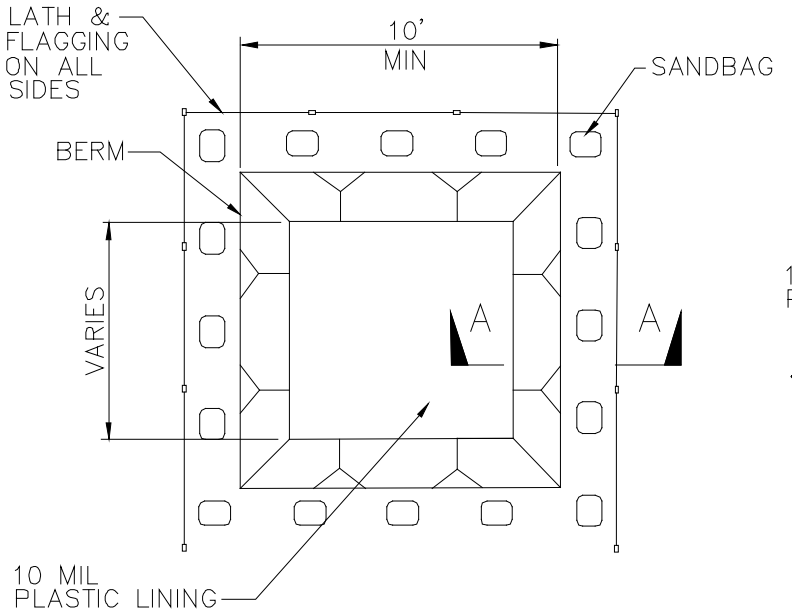
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



PLAN
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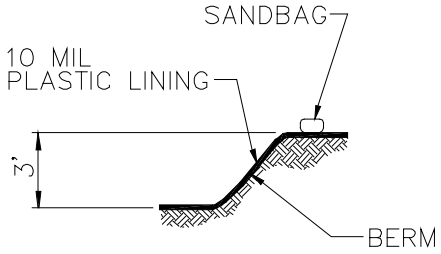
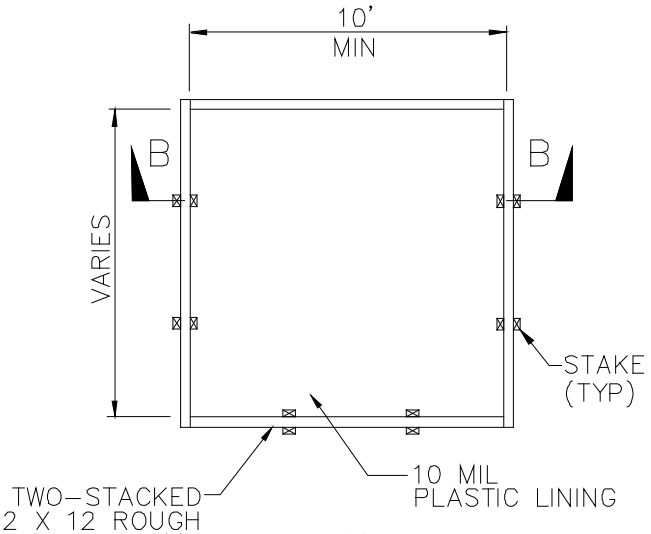


SECTION A–A
NOT TO SCALE



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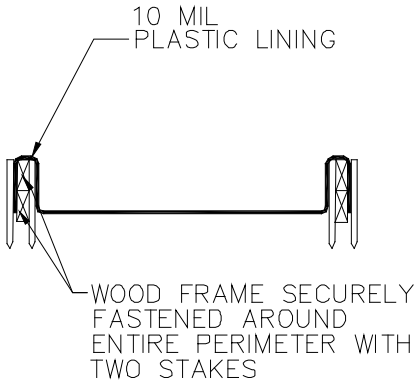
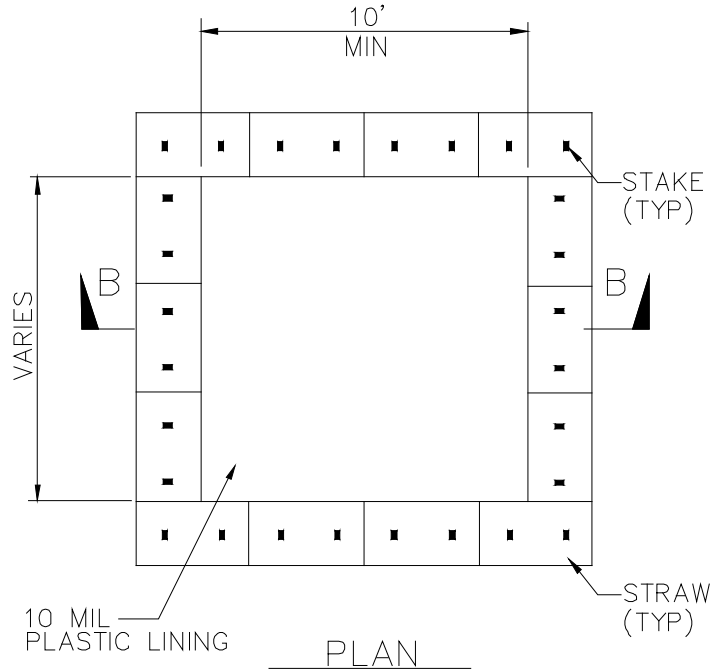
TYPE "ABOVE GRADE"



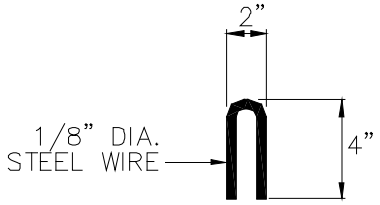
SECTION B–B
NOT TO SCALE

NOTES

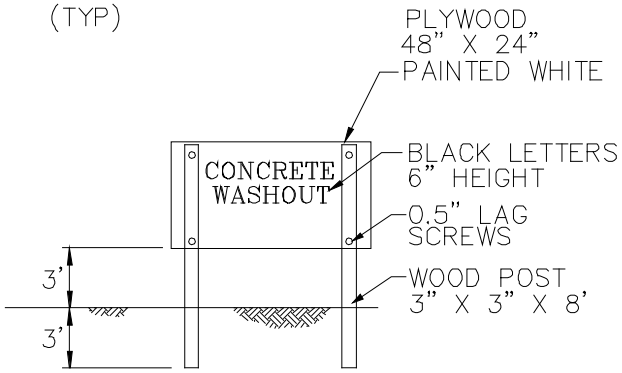
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



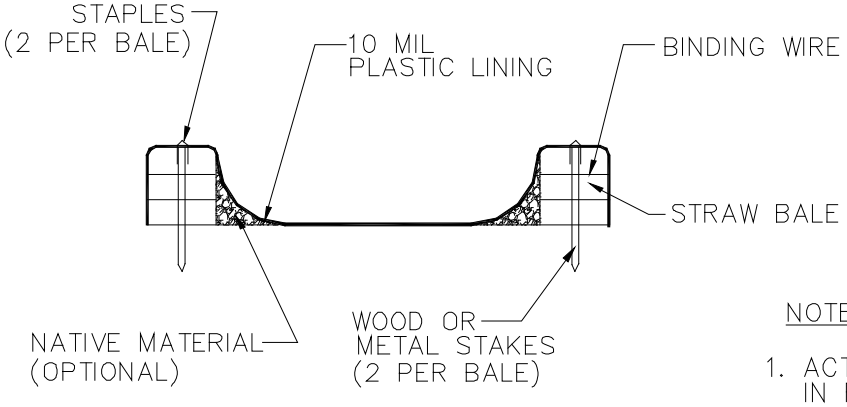
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

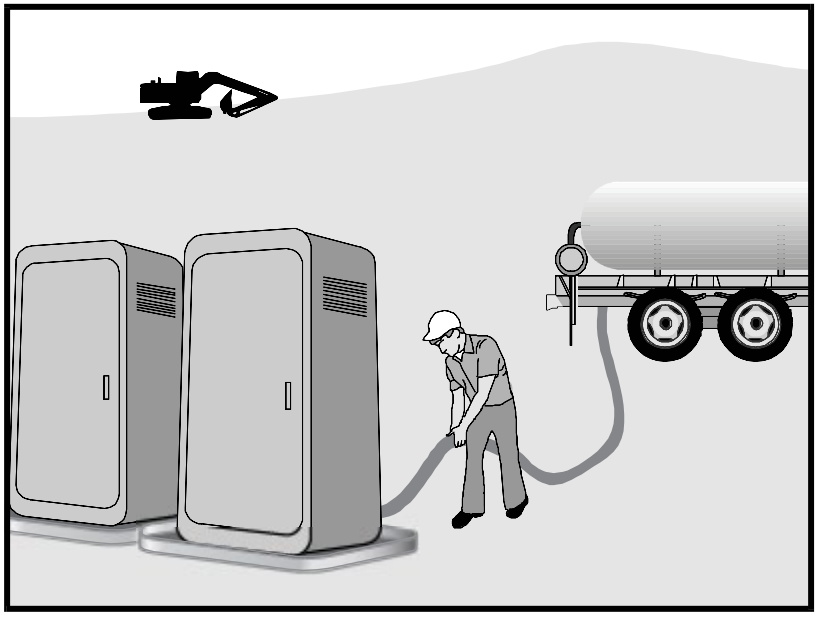


SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management WM-9



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

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Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

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- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

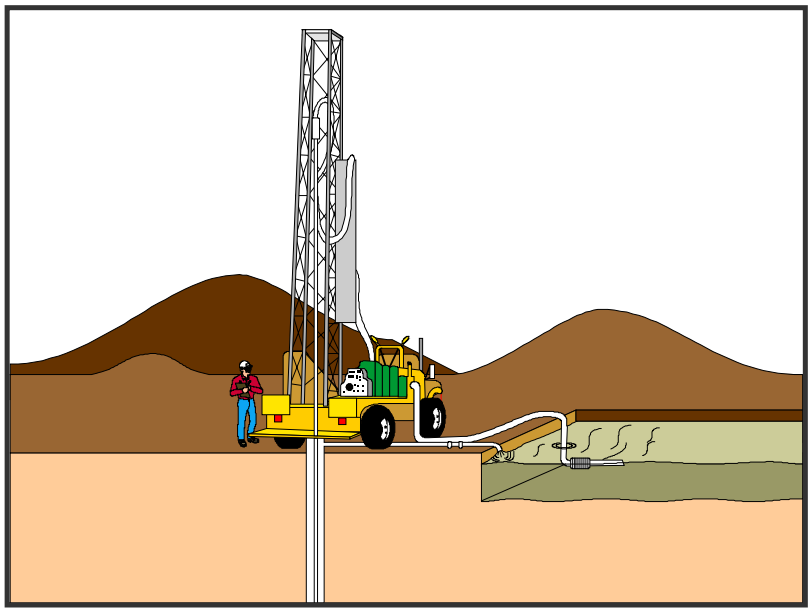
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Liquid Waste Management WM-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

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concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.

- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.

- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.

- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.

- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.

- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Section 5
Glossary and List of Acronyms

5.1 Glossary

303(d) Listed: Water bodies listed as impaired as per Section 303(d) of the 1972 CWA.

Active Areas of Construction: All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas of construction are considered active areas (unless temporarily defined as inactive areas) until final stabilization is complete.

Active Treatment System (ATS): A treatment technology that employs chemical coagulation, chemical flocculation, or electrocoagulation to reduce turbidity caused by fine suspended sediment, and/or to control pH levels. An active treatment system relies on enclosed computerized systems with pumps, filters, and real-time controls.

Acute Toxicity: Acute toxicity in water is caused by chemical stimuli that rapidly induce a negative effect on aquatic life; in aquatic toxicity tests, acute toxicity is demonstrated by an effect observed within 96 hours or less.

Acute Toxicity Test: Laboratory test in which an organism of interest (e.g., fathead minnow or rainbow trout) is placed in a water sample. By tracking the organism's survival, the lab can determine whether the sample water is toxic.

Aquatic: The water environment. Plants and animals that live in the water are referred to as being aquatic.

Bacteria: See pathogens.

Beneficial Uses: As defined in the California Water Code, beneficial uses of the waters of the State that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. See also COLD, MIGR, and SPWN.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of waters of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Biofilter Bags: Plastic mesh bag filled with 100% recycled wood product waste. They come in a variety of sizes and are used to detain flow and allowing a slow rate of discharge through the wood media.

Cartridge Filter: Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed.

Catch Basin (Also known as Inlet): Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavement.

Check Dam: A small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams are used to reduce the effective slope of the channel and flow velocity, which allows sediment to settle out of suspension.

Clay A particle size class consisting of sediment particles less than 0.002 mm in diameter.

Clean Water Act (CWA): (33 U.S.C. 1251 et seq.) requirements of the NPDES program are defined under Sections 307, 402, 318 and 405 of the CWA.

COLD: Abbreviation for the Cold Freshwater Habitat Beneficial Use, which designates uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Compost: Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste; it is organic and biodegradable and can be left on-site.

Compost Berm: A dike of compost with a trapezoidal cross-section used to intercept sheet flow when placed perpendicular to runoff flow.

Compost Blanket: A layer of compost applied at the appropriate thickness onto slopes and earth disturbed areas to prevent erosion, and in some cases, increase infiltration and/or establish vegetation. Provides organic matter and nutrients important for plant growth.

Compost Sock: Mesh sock containing compost used as a three-dimensional biodegradable filtering structure to intercept runoff where sheet flow occurs.

Concrete Curing: Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete Finishing: General term for methods used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Applications include sand blasting, shot blasting, grinding, or high-pressure water blasting.

Construction Activity: Includes clearing, grading, excavation, and contractor activities that result in soil disturbance.

Denuded: Land stripped of vegetation or land that has had its vegetation worn down due to the impacts from the elements or humans.

Detention: The temporary storage of stormwater to improve quality or reduce the volumetric flow rate of discharge or both.

Dewatering: The process of removing excess water in an excavation or impoundment by pumping or other mechanical means.

Dewatering Bag: See gravity bag filter.

Dewatering Operations: Practices that manage the discharge of pollutants when non-stormwater and/or stormwater must be removed from a work location to proceed with construction work or to provide vector control.

Dewatering Tank: A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Discharge: A release or flow of stormwater or other substance from a conveyance system or storage container. Broader – includes release to storm drains, etc.

Discharge Location: A common outlet from a construction site drainage area where stormwater, authorized non-stormwater, or dewatering discharge leaves the site or project boundary, or enters any on-site waters of the United States (e.g., a creek running through a site).

Disking: A mechanical method of roughening the upper layer of soil to reduce competing vegetation, improve water infiltration, and prepare for planting.

Effluent Limitations: Any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion: The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs: Are vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, rolled erosion control product, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Fiber Rolls: A tight tubular roll made of straw, coir, or other biodegradable materials wrapped in netting which can be photodegradable or natural. Used along the contour or at the toe of a slope to intercept runoff, reduce flow velocity, and release the runoff as sheet flow, and provide some removal of sediment from the runoff.

Fines: Refers to soil particles (sediment) that fall within the clay or silt size fractions.

Forecasted Precipitation Event: Forecasted precipitation event is any weather pattern that is forecasted to have a 50 percent or greater chance of producing 0.5 inches of precipitation in a 24-hour period in the project area. The discharger shall obtain precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at https://forecast.weather.gov). Precipitation events end when there are two sequential 24-hour periods with less than 0.25 inches of precipitation forecast for each period.

(Construction) General Permit: A National Pollutant Discharge Elimination System (NPDES) permit issued by the State Water Resources Control Board for the discharge of stormwater associated with construction activity from soil disturbance of one acre or more.

Grading: The cutting or filling of the land surface to a desired slope or elevation.

Gravel Bag Berm: Series of gravel-filled bags placed on a level contour to intercept sheet flow.

Gravity Bag Filter: A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects gravel, sand, silt, and fines.

Gross Pollutants: Typically refers to visible pollutants such as trash, debris, and floatables, which may create an aesthetic "eye sore" in waterways, but may also include heavy metals, pesticides, and bacteria in stormwater. Gross pollutants also include plant debris (such as leaves and lawn-clippings), animal excrement, street litter, and other organic matter.

Gully Erosion: Erosion that occurs where the volume of runoff is concentrated, flowing water cuts deep into the soil bringing together separate rills into larger channels called gullies. Gully erosion acts like rill erosion on a larger scale.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special U.S. EPA or State lists. Regulated under the federal Resource Conservation and Recovery Act and the California Health and Safety Code.

Hydraulic Mulch: Hydraulic mulch consists of various types of fibrous materials mixed with water and sprayed onto the soil surface in slurry form to provide a layer of temporary protection from wind and water erosion.

Hydroseeding: Typically consists of applying a mixture of a hydraulic mulch, seed, fertilizer, and stabilizing emulsion with a hydraulic mulcher, to temporarily protect exposed soils from erosion by water and wind.

Illicit Discharges: Any discharge to an MS4 or receiving water that is not in compliance with applicable laws and regulations, e.g., is not discharged pursuant to an NPDES permit or applicable exemption or waiver.

Impervious Surface: Ground cover that prevents the infiltration of water into the soil, such as pavement and buildings.

Inactive Areas of Construction: Areas of construction activity that have been disturbed but which are not currently being worked and are not scheduled to be re-disturbed for at least 14 days.

Inactive Project: A project where all construction activities (including passive treatment technology, active treatment systems, and/or active equipment), are fully stabilized and will be suspended for 30 days or more.

Industrial General Permit: The NPDES General Permit (No. CAS000001) issued by the State Water Resources Control Board for discharge of stormwater associated with industrial activity. Available online at http://www.waterboards.ca.gov/water_issues/programs/stormwater/industrial.shtml.

Inlet: An entrance into a ditch, storm drain, or other waterway.

Integrated Pest Management (IPM): An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism.

Leaching: Infiltration or percolation below the soil surface, which is perceived as a loss. Typically refers to fertilizers or salts being pushed below the plant rooting zone by rain or irrigation water.

Legally Responsible Person (LRP): The Legally Responsible Person is a representative of a permittee and signatory that is legally designated to sign, certify, and electronically submit any documents required by the General Permit, the State or Regional Water Board, or U.S. EPA.

Linear Underground/Overhead Project (LUP): Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities.

MIGR: Abbreviation for the Migration of Aquatic Organisms Beneficial Use, which designates uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying stormwater; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW) as defined at Title 40 of the Code of Federal Regulations (CFR) 122.2. A "Small MS4" is defined as an MS4 that is not a permitted MS4under the Phase I regulations. This definition of a Small MS4 applies to MS4 operated within cities and counties as well as other public storm drain operators that have a system of storm sewers.

Non-Point Source Pollution: Pollution that originates from diffuse contamination that does not originate from a single discrete source and specifically does not come from a point source as defined by the CWA. Non-point source pollution can originate from aerial diffuse sources, agriculture, forests, and runoff that does not flow through an MS4, industrial, or construction operation subject to an NPDES permit.

Non-stormwater Discharge: Non-stormwater discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, dust control over-wetting, or pipe testing water.

Notice of Intent (NOI): Part of the required Permit Registration Documents, which provides information on the owner, location, type of project, and certifies that the owner will comply with the conditions of the General Permit.

Notice of Termination (NOT): Formal notice to SWRCB submitted by owner/developer that a construction project is complete and the project has met the conditions to terminate the permit.

NPDES Permit: NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402, and 405 of the CWA. In California, the State Water Resources Control Board (SWRCB) has issued a General Permit for stormwater discharges associated with construction activities (see Appendix A).

Numeric Action Level (NAL): A numeric action level (e.g., a pH range, turbidity value, or concentration) is a level that triggers a required evaluation of the effectiveness of best management practices implemented on the subject construction site, and the required implementation of additional corrective actions necessary to reduce the subject pollutant below the numeric action level. The numeric action level compliance location applies to each sample location and/or corresponding discharge location.

Numeric Effluent Limitation (NEL): A technology-based or water quality-based limit (e.g., pH range, turbidity value, or concentration) established for discharges covered under the General Permit. The numeric effluent limitation compliance location(s) applies to each sample and/or discharge location at the point of discharge from an active treatment system or construction site with TMDL requirements, as applicable.

Nutrients: Compounds necessary for plant and animal growth. In regards to water quality, the term usually refers to nitrogen and phosphorus compounds. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply or recreational opportunities. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, excessive algae growth leads to oxygen depletion which can be fatal to fish and aquatic life. Also, un-ionized ammonia (one of the forms of nitrogen) can be toxic to fish.

Oil and Grease: Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants and waste oil disposal.

Organics: Compounds that are carbon based. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed.

Outfall: The end point where storm drains discharge water into a waterway.

Passive Treatment: Passive treatment is the application of natural or synthetic chemicals and products to reduce turbidity in discharges through coagulation and flocculation. Passive treatment does not rely on computerized, enclosed systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the construction site. Passive treatment products are available in a variety of forms and may be land-applied for soil stabilization (e.g., bonded fiber matrixes, hydromulches) or water-applied for sediment removal (e.g., liquid treatment chemicals, powders, slow-releasing solid blocks/socks). General Permit Attachment G applies to the use of water-applied passive

treatment products that remove suspended solids such as sediment from stormwater without using an active treatment system.

Pathogens: Refers to bacteria and viruses that cause disease. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer leaks and overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.

Permit Registration Documents (PRDs): A formal notice to SWRCB submitted by the owner of a construction site that said owner seeks coverage under the General Permit for discharges associated with construction activities.

Pesticide: Any substance used to eliminate pests. Pesticides include herbicides, fungicides, rodenticides, and insecticides.

pH: A measure of the acidic or basic nature of a solution. The typical pH scale ranges from 0 to 14, with pure water being neutral and having a pH of 7. Values above 7 are considered basic and pH values less than 7 are acidic, relative to how far they deviate from neutral (pH=7).

(Construction) Phases: The General Permit recognizes five distinct phases of construction activities: (1) Demolition and Pre-development Site Preparation Phase, (2) Grading and Land Development Phase, (3) Streets and Utilities Phase, (4) Vertical Construction Phase, and (5) Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants and some General Permit requirements are tailored to the construction phase.

Photodegradable: A material that breaks down or degrades in sunlight.

Planning Watershed: Planning watershed was defined by the Calwater watershed classification system as a watershed ranging in size from approximately 3,000 to 10,000 acres. The Calwater watershed classification system has since been merged with the national Watershed Boundary Dataset (WBD). For the purposes of this permit, Calwater planning watersheds are assumed to be roughly equivalent to the WBD's Hydrologic Unit Code, 12 digit subwatersheds (HUC-12). See: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/receivingwaterrisk.pdf.

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention (P2): Practices and actions that reduce or eliminate the generation of pollutants.

Polyacrylamide (PAM): Substance available in a variety of forms used to aggregate soil particles allowing them to settle out of suspension.

Precipitation: Any form of rain or snow.

Pressurized Bag Filter: A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Pretreatment: Treatment of waste stream before it is discharged to a collection system.

Qualified SWPPP Developer (QSD): Individual who is a qualified stormwater professional authorized by the discharger to develop and revise SWPPPs. Effective September 1, 2023, a QSD shall have one of the following credentials:

a. A California registered professional civil engineer; or
b. A California registered professional geologist or engineering geologist; or
c. A California registered landscape architect; or
d. A professional hydrologist registered through the American Institute of Hydrology; or
e. A Certified Professional in Erosion and Sediment Control (CPESC) registered through EnviroCert International, Inc.; or
f. A Certified Professional in Storm Water Quality (CPSWQ) registered through EnviroCert International, Inc.; or
g. Any prerequisite course approved by the State Water Board's Division of Water Quality Deputy Director in accordance with General Permit Section V.G.

Effective September 2, 2011, a QSD shall have attended an SWRCB-sponsored or approved QSD training course.

Qualified SWPPP Practitioner (QSP): Individual who is a qualified stormwater professional authorized by the discharger to conduct non-stormwater and stormwater visual observations, sampling, and implementation of all elements of the SWPPP. Effective September 1, 2023, a QSP shall have attended an SWRCB-sponsored or approved QSP training course and shall be either a QSD or have one of the following credentials:

a. A Certified Erosion, Sediment and Storm Water Inspector (CESSWI) registered through EnviroCert International, Inc.; or
b. A Certified Inspector of Sediment and Erosion Control (CISEC) registered through Certified Inspector of Sediment and Erosion Control, Inc.; or
c. A Construction Management degree from an accredited 4-year institution that includes coursework that covers the underlying principles of erosion and sediment control and practices of reducing pollution in stormwater; or
d. Any prerequisite course approved by the State Water Board's Division of Water Quality Deputy Director in accordance with General Permit Section V.H.

Qualified SWPPP Practitioner Delegate (QSP Delegate): An individual assigned responsibility by the QSP for the implementation of specific elements of the SWPPP who has completed the required foundational and site-specific training provided by the QSP.

Qualifying Precipitation Event (QPE): Qualifying precipitation event is any weather pattern that is forecast to have a 50 percent or greater Probability of Precipitation (PoP) and a

Quantitative Precipitation Forecast (QPF) of 0.5 inches or more within a 24-hour period. The event begins with the 24-hour period when 0.5 inches has been forecast and continues on subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast.

Quantitative Precipitation Forecast (QPF): Quantitative Precipitation Forecast is the forecast that includes precipitation and snow accumulation measurements. This information can be obtained from the NOAA Forecast.

Receiving Water: A river, lake, stream, estuary, bay, or ocean into which runoff is discharged.

Receiving Water Monitoring Trigger: Thresholds for particular effluent water quality measurements that trigger receiving water monitoring for a subset of construction projects. The General Permit includes receiving water triggers for pH and turbidity.

Responsible Discharger: Responsible dischargers are dischargers who:

a. Discharge stormwater and authorized non-stormwater directly, or through a municipal separate sewer system (MS4) or other conveyance, to impaired water bodies or watersheds identified in a U.S. EPA-approved TMDL with a waste load allocation assigned to construction stormwater sources; and
b. Have identified, through the site-specific pollutant source assessment, that one or more pollutants specific to the TMDL are present on-site with the potential to enter construction stormwater discharges.

Retention: The storage of stormwater to prevent it from leaving the development site.

Revised Universal Soil Loss Equation (RUSLE): A formula for determining soil loss in tons per acre according to different site specific variables. The equation is written as follows:

$$A=(R)(K)(LS)(C)(P)$$

Where:
R = rainfall-runoff erosivity factor
K = soil erodibility factor
LS = length-slope factor
C = cover factor
P = management operations and support practices

Rill Erosion: Rills are channels small enough to be smoothed over by normal tillage. Rill erosion takes place when water concentrates in these small channels and carries sediment in the water flow.

Riparian: Refers to the habitat located adjacent to rivers or streams.

Rolled Erosion Control Products (RECPs): These products, also known as geotextiles and mats, can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface.

Roughening: Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces.

Runoff: Water originating from rainfall, melted snow, and other sources (e.g., sprinkler irrigation) that flows over the land surface to drainage facilities, rivers, streams, springs, seeps, ponds, lakes, and wetlands.

Run-on: Discharges that originate offsite and flow onto the property of a separate project site.

Sand: A soil particle between 0.05 and 2.0 mm in diameter.

Sandbag Barrier: Series of sand-filled bags placed on a level contour to intercept or divert sheet flows of water.

Sand Media Particulate Filter: Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.

Scour: The erosive and digging action in a watercourse caused by flowing water.

Secondary Containment: A device or control measure in addition to the primary containment that is used to stop a discharge of pollutants or hazardous material from leaving a specified area.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediment: Sediment is solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Basin: A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging.

Sediment Control: Sediment controls are treatment control practices that trap soil particles after erosion by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.). Sediment control measures are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them.

Sediment Transport Capacity: The capability of a channel to move sediment, this varies under different flow conditions.

Sediment Trap: A temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging.

Sheet Erosion: Sheet erosion is relatively uniform erosion from the entire soil surface.

Significant Materials: Includes, but not limited to, raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw

materials used in food processing or production; hazardous substances designed under Section 101(14) of CERLCA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

Significant Quantities: The volume, concentrations, or mass of a pollutant in stormwater discharge that can cause or threaten to cause pollution, contamination, or nuisance that adversely impact human health or the environment and cause or contribute to a violation of any applicable water quality standards for receiving water.

Silt: A soil particle size class consisting of particles between 0.05 and 0.002 mm in diameter. These particles are smaller than sand and larger than clay.

Silt Fence: A silt fence is used to detain sediment-laden water, promoting sedimentation behind the fence. Silt fences are made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support.

Soil Binder: Material applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites. Soil binders are typically applied to disturbed areas requiring short term temporary protection.

Soil Preparation: Steps taken to prepare soil for planting or the installation of a BMP. Soil preparation may include tilling, raking, or the addition of a soil amendment.

Source Control BMPs: Operational practices that reduce potential pollutants at the source.

Source Reduction (also source control): The technique of stopping and/or reducing pollutants at their point of generation so that they do not come into contact with stormwater.

SPWN: Abbreviation for the Spawning, Reproduction, and/or Early Development Beneficial Use, which designates uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Stockpile Management: Procedures and practices that are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate subbase or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Storm Drains: Above- and below-ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Stormwater: Stormwater is rain, snowmelt, or any other liquid or solid precipitation that may result in runoff, and drainage from a site. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Stormwater Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying stormwater from an area that is directly related to manufacturing, processing, or raw materials storage activities at an industrial plant.

Stormwater Pollution Prevention Plan (SWPPP): A written plan that documents the series of phases and activities that, first, characterizes your site, and then prompts you to select and carry out actions which prevent the pollution of stormwater discharges.

Straw Mulch: Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper, or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Temporary Batch Plant: During the construction of large structures or in remote locations, a temporary batch plant may be necessary to manufacture Portland Cement Concrete (PCC) or AC. Temporary batch plant facilities typically consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; above ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout.

Temporary Silt Dike: Pre-manufactured device that is installed for semi-permanent drainage and sediment control on the perimeter of disturbed sites or stockpiles of materials or as check dams within channels.

Total Maximum Daily Load (TMDL): A TMDL is the sum of the maximum amount of a pollutant that a waterbody can receive per day and still meet state water quality standards. It is the sum of the individual Waste Load Allocations (WLAs) for point sources, the load allocations for nonpoint and natural background sources, and the margin of safety.

Toxicity: Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Tracking Control: Tracking control refers to methods of preventing or reducing the tracking of sediment off-site by vehicles leaving the construction area.

Traditional Construction Project: Most construction projects, including but not limited to commercial, residential, industrial, institutional, and highway construction project. Does not include those projects defined as LUPs.

Trash: All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

Treatment Control BMPs: Treatment methods to remove pollutants from stormwater.

Turbidity: The optical condition and cloudiness of water caused by suspended or dissolved particles or colloids. Turbidity is quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU) with a calibrated turbidity meter.

Urban Runoff: Stormwater from city streets and adjacent domestic or commercial properties that carries pollutants of various kinds into the sewer systems and receiving waters.

Vector: Organism that spreads disease (e.g., mosquitos and rodents).

Vegetation: Living plant matter.

Virus: See pathogens.

Wadable Stream: Streams that can be sampled by field crews wearing chest waders (generally less than 0.5 m-1.0 meters deep)

Waste Management: Source control management practices that prevent pollution by limiting or reducing potential pollutants at their source, before they come into contact with stormwater. Practices under this category can be thought of as "good housekeeping" and include procedural and structural BMPs for handing, storing, and disposing of wastes generated by a construction project.

Weir Tank: A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Wetland: An area of land that has water-saturated soils for long periods of time and water loving vegetation. Wetlands are typically flooded for part of the year, forming a transitional area between aquatic and terrestrial environments.

Wind Erosion Control: Methods used to minimize wind erosion. Controls consist of applying water or other dust palliatives to prevent or alleviate dust nuisance.

5.2 List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Concrete
ADL	Aerially Deposited Lead
AIMP	Impervious Area
AINF	Infiltration Area
ANSI	American National Standards Institute
APCD	Air Pollution Control District
APHA	American Public Health Association
APWA	American Public Works Association
AQMD	Air Quality Management District
ARB	Air Resources Board
ARS	Agricultural Research Service
ASTM	American Society for Testing Materials
ATS	Active Treatment System
AWWA	American Water Works Association
BAT	Best Available Technology (economically available)
BCT	Best Conventional Technology (pollution control)
BFM	Bonded Fiber Matrix
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
CA	Contractor Activities
CAL-OSHA	California Division of Occupational Safety and Health Administration
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CCS	Cellular Confinement System
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CESSWI	Certified Erosion, Sediment, and Storm Water Inspector
CFR	Code of Federal Regulations
CISEC	Certified Inspector of Erosion and Sediment Control
COC	Chain of Custody

COE	United States Army Corps of Engineers, also known as, USACE
CPESC	Certified Professional in Erosion and Sediment Control
CPI	Coalescing Plate Interceptor
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CWA	Clean Water Act (Federal Water Pollution Control Act of 1972 as amended in 1987)
DCIA	Directly Connected Impervious Area
DFG	(California) Department of Fish and Game
DG	Decomposed Granite
DHS	Department of Health Services
DTSC	California Department of Toxic Substances Control
EC	Erosion Control
EEC	Effect Effluent Concentration
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELG	Effluent Limitation Guideline
ELAP	Environmental Laboratory Accreditation Program
EMC	Event Mean Concentration
EOS	Equivalent Opening Size
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GIS	Geographical Information System
Hazmat	Hazardous Material
HCM	Hydraulic Compost Matrix
HDPE	High-Density Polyethylene
HM	Hydraulic Matrix
HSG	Hydrologic Soil Groups
IPM	Integrated Pest Management

LOEC	Lowest Observed Effect Concentration
LOI	Loss-On-Ignition
LUP	Linear Underground/Overhead Project
LRP	Legally Responsible Person
MATC	Maximum Allowable Threshold Concentration
MBAS	Methylene Blue Activated Substances
MBFM	Mechanically-Bonded Fiber Matrix
MEP	Maximum Extent Practicable
MDL	Method Detection Limit
MLSC	Manufactured Linear Sediment Control
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MSRP	Monitoring, Sampling & Reporting Plan
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NELAP	National Environmental Laboratory Accreditation Program
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRC	National Response Center
NRCS	Natural Resources Conservation Service
NS	Non-stormwater Management
NSF	National Science Foundation
NTU	Nephelometric Turbidity Unit
NURP	National Urban Runoff Program
O&G	Oil and Grease

O&M	Operations and Maintenance
OSDS	On-site Disposal System
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PAHs	Poly-Aromatic Hydrocarbons
PAM	Polyacrylamide
PCBs	Polychlorinated Biphenyls
PCC	Portland Cement Concrete
PH	Professional Hydrologist
PLS	Pure Live Seed
PPT	Pollution Prevention Team
PoP	Probability of Precipitation
POTW	Publicly Owned Treatment Works
PRD	Permit Registration Document
PSD	Particle Size Distribution
PTS	Passive Treatment System
QA	Quality Assurance
QC	Quality Control
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
QPE	Qualifying Precipitation Event
QPF	Quantitative Precipitation Forecast
RCRA	Resource Conservation and Recovery Act
RECP	Rolled Erosion Control Product
RUSLE	Revised Universal Soil Loss Equation
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCP	Scientific Collecting Permit
SE	Sediment Control
SIC	Standard Industrial Classification
SFM	Stabilized Fiber Matrix

SM	Standard Mulch
SMARTS	Storm Water Multiple Application and Report Tracking System
SPCC	Spill Prevention Control and Countermeasure
SSC	Suspended Sediment Concentration
SUSMP	Standard Urban Stormwater Mitigation Plan
SVOC	Semi-Volatile Organic Compound
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TC	Tracking Control
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TMECC	Test Methods for the Examination of Composting and Compost
TOC	Total Organic Carbon
TRM	Turf Reinforcement Mat
TSP	Trisodium phosphate
TSS	Total Suspended Solids
UFC	Uniform Fire Code
USACE	United States Army Corps of Engineers, also known as, COE
USC	United States Code
USCC	United States Compost Council
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
UV	Ultraviolet
VOCs	Volatile Organic Compounds
WDID	Waste Discharge Identification (Number)
WDR	Water Discharge Requirement
WE	Wind Erosion Control
WEF	Water Environment Federation
WET	Whole Effluent Toxicity
WM	Waste Management

Appendix H: BMP Inspection Form

BMP INSPECTION REPORT

Date and Time of Inspection:	Date Report Written:

Inspection Type: (Circle one)	Weekly *Complete Parts I,II,III and VII*	Pre-Qualifying Precipitation Event (QPE) *Complete Parts I,II,III,IV and VII*	During QPE *Complete Parts I, II, III, V, and VII*	Post-QPE *Complete Parts I,II,III,VI and VII*	*Inactive Project Complete Parts I,II,III and VII*

Part I. General Information

Site Information

Construction Site Name: Mendota Elementary School Classroom Additions	
Construction stage and completed activities:	Approximate area of site that is exposed:

Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:

Weather

Estimate storm beginning: (date and time)	Estimate storm duration: (hours)
Estimate time since last storm: (days or hours)	Rain gauge reading and location: (in)

Is a "Qualifying Precipitation Event" predicted or did one occur (i.e., any weather pattern with a 50% chance of 0.5" or more within a 24-hr period when 0.5" has been forecast and continues on subsequent 24-hour periods when 0.25" of precipitation or more is forecast)? (Y/N)
If yes, summarize forecast:

Exception Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as electrical storms, flooding, and high winds above 40 miles per hour.

Inspector Information

Inspector Name:	Inspector Title:
Inspector Certification:	Date:

Part II. BMP Observations. Describe deficiencies in Part III.

Minimum BMPs for Risk Level _____ Sites	Adequately designed, implemented and effective (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Part II. BMP Observations Continued. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Adequately designed,	Action Required (yes/no)	Action Implemented (Date)

	implemented and effective (yes, no, N/A)		
Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Inspect immediate access roads prior to forecasted precipitation			
Linear sediment control along toe of slope, face of slope an at grade breaks (Risk Level 2 & 3 Only)			
Limit construction activity to and from site to entrances and exits that employ effective controls to prevent offsite tracking (Risk Level 2 & 3 Only)			
Ensure all storm, drain inlets and perimeter controls, runoff control BMPs and pollutants controls at entrances and exits are maintained and protected from activities the reduce their effectiveness (Risk Level 2 & 3 Only)			
Run-On and Run-Off Controls			

Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project SWPPP and BMP plan up to date, available onsite and being properly implemented?			
Is the posting of the project's unique WDID number, waiver identification number, and site and project contact information publicly accessible?			

Part III. Descriptions of BMP Deficiencies		
Deficiency	**Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.**	
	Start Date	**Action**
1.		
2.		
3.		
4.		

Part IV. Additional Pre-QPE Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).	
	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	
Notes:	

Part V. Additional During-QPE Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.
Outfall, Discharge Point, or Other Downstream Location

Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-QPE Observations. Visually observe (inspect) stormwater discharges at all discharge locations within 96 hours after each qualifying precipitation event, and observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying precipitation event producing precipitation of ½ inch or more at the time of discharge. Complete Part VII (Corrective Actions) as needed.	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if SWPPP change is required.	
Required Actions	**Implementation Date**

Appendix I: Training Forms

Contractor Personnel Training Log

Stormwater Management Training Log and Documentation

Project Name: Mendota Elementary School Classroom Additions

WDID#: **TBD**

Stormwater Management Topic: (check as appropriate)

☐ Good Housekeeping BMPs ☐ Erosion Control BMPs

☐ Sediment Control BMPs ☐ Tracking Control

☐ Non-Stormwater Management BMPs ☐ Waste Management & Pollution Control BMPs

☐ BMP Implementation Activities ☐ Advanced BMPs

☐ Identification of QSPs and QSP Delegates

Training Objective: _____

Date: _____ Instructor: _____

Training Length (hours): _____

Attendee Roster (Attach additional forms if necessary)

Name	Company	Phone

QSP Delegate Training Log

Stormwater Management Training Log and Documentation

Project Name: Mendota Elementary School Classroom Additions

WDID#: **TBD**

QSP Delegate Name: _____

Delegated Responsibilities:

☐ Stormwater Visual Inspections

☐ Sampling

☐ BMP Inspections

☐ BMP Maintenance and Repair

Foundational Training

Topic	Date Completed	QSP Trainer
☐ Roles and Responsibilities		
☐ Forecast Information		
☐ Documentation and Reporting Procedures		

Site-Specific Training

Topic	Date Completed	QSP Trainer
☐ Visual Inspections		
☐ Sample Collection Procedures		
☐ Sample Reporting Procedures		
☐ BMP Implementation		

As needed, attach proof of external training (e.g., course completion certificates, credentials for the QSP Delegate).

Appendix J: Responsible Parties

Identification of QSP and QSP Delegates

Project Name: Mendota Elementary School Classroom Additions

WDID#: **TBD**

The following are QSPs and QSP Delegates associated with this project

Name of Personnel(1)	QSP Number, or state "Delegate"	Company	Date

(1) If additional QSPs or QSP Delegates are required on the job site add additional lines

Appendix K: Contractors and Subcontractors

Prime Contractor/Construction Management Company:

Contractor Company:	
Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractors:

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
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Phone Number:	
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Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
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Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Sub-Contractor Company:	
Scope of Work:	
Sub-Contractor Lead Name:	
Title:	
Address	
Phone Number:	
Phone Number (24/7)	

Appendix L: Post-Construction Calculations/ Demonstration

Appendix M: Weather Reports

The discharger must obtain the precipitation forecast information from the National Weather Service Forecast Office (http://forecast.weather.gov). A printed copy with the date and time of printing should be retained in this Appendix.

Appendix N: Monitoring Records

Place completed BMP Inspection Forms, photographic documentation, Effluent Sampling, Receiving Water, and Dewatering Field Logs, Monitoring Exceptions, NAL Exceedance Reports, and Receiving Water Monitoring Trigger Exceptions in this appendix.

Appendix O: Storm Event/Dewatering Monitoring Forms

Rain Gauge Log Sheet				
Construction Site Name:				
WDID #:				
Date (mm/dd/yy)	Time (24-hr)	Initials	Rainfall Depth (Inches)	Notes:

Risk Level 1, 2, 3 ***Visual Inspection Field Log Sheet***					
Date and Time of Inspection:				Report Date:	
Inspection Type:	☐ Weekly	☐ Pre Qualifying Precipitation Event (QPE)	☐ During QPE	☐ Post QPE	☐ Dewatering Discharge
Site Information					
Construction Site Name:					
Construction stage and completed activities:				Approximate area of exposed site:	
Weather and Observations					
Date Rain Predicted to Occur:			Predicted % chance of precipitation (PoP): Predicted quantity of precipitation (QPF):		
Estimate storm beginning: (date and time)		Estimate storm duration:_____ (hours)	Estimate time since last storm: _____ (days or hours)	Rain gauge reading:_____ (inches)	
Observations: If yes identify location					
Odors	Yes ☐	No ☐			
Floating material	Yes ☐	No ☐			
Suspended Material	Yes ☐	No ☐			
Sheen	Yes ☐	No ☐			
Discolorations	Yes ☐	No ☐			
Turbidity	Yes ☐	No ☐			
Site Inspections					
Outfalls or BMPs Evaluated			**Deficiencies Noted**		
(add additional sheets or attached detailed BMP Inspection Checklists)					
Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:		
Corrective Actions Identified (note if SWPPP change is needed)					
Inspector Information					
Inspector Name:			Inspector Title:		
Signature:				Date:	

Risk Level 1, 2, 3 ***Effluent Sampling Field Log Sheets***			
Construction Site Name:		Date:	Time Start:
Sampler:			
Sampling Event Type:	☐ Stormwater	☐ Dewatering Discharge	☐ Non-visible pollutant
Field Meter Calibration			
pH Meter ID No./Desc.: Calibration Date/Time:		Turbidity Meter ID No./Desc.: Calibration Date/Time:	

Field pH and Turbidity Measurements			
Discharge Location Description	pH	Turbidity	Time

Grab Samples Collected		
Discharge Location Description	Sample Type	Time

Additional Sampling Notes:
Time End:

Risk Level 3 ***Receiving Water Sampling Field Log Sheets***		
Construction Site Name:	Date:	Time Start:
Sampler:		
Receiving Water Description and Observations		
Receiving Water Name/ID:		
Observations:		
Odors	Yes ☐	No ☐
Floating material	Yes ☐	No ☐
Suspended Material	Yes ☐	No ☐
Sheen	Yes ☐	No ☐
Discolorations	Yes ☐	No ☐
Turbidity	Yes ☐	No ☐
Field Meter Calibration		
pH Meter ID No./Desc.: Calibration Date/Time:	Turbidity Meter ID No./Desc.: Calibration Date/Time:	

Field pH and Turbidity Measurements			
Upstream Location			
Type	Result	Time	Notes
pH			
Turbidity			
Downstream Location			
Type	Result	Time	Notes
pH			
Turbidity			
Additional Sampling Notes:			
Time End:			

NAL Exceedance Evaluation Summary Report	Page __ of __
Project Name	
Project WDID	
Project Location	
Date of Exceedance	
Type of Exceedance	**NAL ☐ pH ☐ Turbidity** **☐ Other (specify) _____**
Measurement or Analytical Method	**☐ Field meter** **(Sensitivity: _____)** **☐ Lab method (specify) _____** **(Minimum Level: _____)** **(MDL: _____)**
Calculated Daily Average	**☐ pH _____ pH units** **☐ Turbidity _____ NTU**
Rain Gauge Measurement	**_____ inches**
Visual Observations on Day of Exceedance	

NAL Exceedance Evaluation Summary Report	Page __ of __
Description of BMPs in Place at Time of Event	
Initial Assessment of Cause	
Corrective Actions Taken (deployed after exceedance)	
Additional Corrective Actions Proposed	
Report Completed By	_____ **(Print Name, Title)**
Signature	_____

CHAIN-OF-CUSTODY **DATE:** **Lab ID:**

DESTINATION LAB: ATTN: **ADDRESS:** **Office Phone:** **Cell Phone:**							REQUESTED ANALYSIS				Notes:
SAMPLED BY:											
Contact:											
Project Name											
Client Sample ID	**Sample Date**	**Sample Time**	**Sample Matrix**	**Container #**	**Container Type**	**Container Pres.**					

SENDER COMMENTS:	**RELINQUISHED BY**	
	Signature:	
	Print:	
	Company:	
	Date:	TIME:
LABORATORY COMMENTS:	**RECEIVED BY**	
	Signature:	
	Print:	
	Company:	
	Date:	TIME:

Appendix P: Field Meter Instructions

Appendix Q: Supplemental Information

Appendix R: Construction General Permit

Copies of the Construction Stormwater General Permit may be downloaded from the State Water Board website at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

SECTION 01 57 23 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Provide all material, labor, and services necessary to: comply with the State of California Construction General Permit Order 2022-0057-DWQ (CGP); implement the Project Storm Water Pollution Prevention Plan (SWPPP); and install, maintain, and implement required Best Management Practices (BMP) according to the SWPPP and California Stormwater Quality Association (CASQA) Construction BMP Handbook.
2. Retain a certified Qualified SWPPP Practitioner (QSP) to implement all Construction Site Monitoring Program (CSMP) elements of the SWPPP, or delegate appropriate roles to trained Contractor staff.
3. Complete and maintain all inspections, sampling, weather monitoring, and recordkeeping required by the CGP, commensurate with a Risk Level 1 SWPPP.
4. Ensure that all conditions are met for SWPPP termination including, but not limited to: fully stabilizing all disturbed areas of the site; removing temporary BMPs, construction materials/wastes, and equipment; cleaning the site of any storm water pollutants, within 90-days of completing outdoor construction activities; and notifying the Owner and QSD when acceptable termination conditions have been achieved.
5. All Contract requirements in Division 00 and 01 specifications.

B. This Section does not include:
1. The Owner shall retain a Qualified SWPPP Developer (QSD) to prepare the SWPPP document.
2. The Owner shall submit the Notice of Intent (NOI), SWPPP, Changes of Information (COI), and Annual Reports, Notice of Termination (NOT) to the SWRCB on SMARTS.
3. The Owner shall complete all required QSD inspections.
4. The Owner shall pay the NOI application fee and annual renewal fees.
5. The Owner shall maintain the role of LRP and all responsibilities associated, except where those responsibilities are assigned to the Contractor within these specifications.
6. The Owner shall complete online digital certification of online reporting on SMARTS.
7. After the Contractor has met all conditions for SWPPP termination, Owner shall complete the NOT and obtain approval from SWRCB. If the NOT is returned by SWRCB due to unacceptable site conditions, Contractor shall implement any redresses specified by the SWRCB.
8. Owner shall ensure that the Project design has incorporated all post-construction requirements specified by the CGP, MS4 permittee, and local agency stormwater regulations.

C. Acronyms:
1. BMP Best Management Practices
2. CGP Construction General Permit
3. CSMP Construction Site Monitoring Program

4.	CASQA	California Stormwater Quality Association
5.	EPA	Environmental Protection Agency
6.	ELAP	Environmental Laboratory Accreditation Program
7.	NOI	Notice of Intent
8.	NOT	Notice of Termination
9.	COI	Change of Information
10.	MS4	Municipal Separate Storm Sewer System
11.	NPDES	National Pollution Discharge Elimination System
12.	QSD	Qualified SWPPP Developer
13.	QSP	Qualified SWPPP Practitioner
14.	LRP	Legally Responsible Person
15.	PRD	Permit Registration Documents
16.	SMARTS	Stormwater Multiple Application and Report Tracking System
17.	SWPPP	Storm Water Pollution Prevention Plan
18.	SWRCB	State Water Resources Control Board
19.	RWQCB	Regional Water Quality Control Board

1.2 REFERENCES

A. Construction General Permit:
   1. 2022-0057-DWQ Construction General Permit
   2. https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction/general_permit_reissuance.html

B. Project SWPPP Document
   1. Available on SMARTS once approved by SWRCB
   2. Available by request from the Owner.

C. CASQA Construction BMP Handbook:
   1. https://www.casqa.org/resources/bmp-handbooks
   2. Appendix G of the Project SWPPP.

1.3 RELATED SECTIONS

A. Section 31 11 00 – Site Clearing

B. Section 31 20 00 – Earthwork

C. Section 33 41 00 – Storm Drainage

D. Section 01 57 00 – Fugitive Dust Control

1.4 SUBMITTALS

A. All submittals shall be in accordance with the submittal requirements of these specifications.

B. The Contractor shall provide to the Owner and QSD, the name, certificate, and contact information of their retained QSP within 30 days of starting construction.

C. The Contractor shall provide to the Owner and QSD, completed training records for QSP

delegation to Contractor staff members within 30 days of starting construction, if applicable.

D. The Contractor shall provide to the Owner and QSD, completed SWPPP training records of all active Contractor and sub-contractor staff members who's work may contribute stormwater pollutants within 30 days of starting construction.

E. The Contractor shall provide to the Owner and QSD, the current construction schedule within 30 days of starting construction.

F. The Contractor shall provide, to Owner and QSD, a list of sub-contractors within 30 days of starting construction.

G. The Contractor shall submit, to the Owner and QSD, field meter manuals and information for pH and turbidity, if applicable if de-watering is anticipated for the Project, within 30 days of starting construction.

H. The Contractor shall submit, to the Owner and QSD, any proposed product to be used at the site as soil binder or tackifier for the purposes of erosion control for approval.

I. The Contractor, QSP, or QSP Delegates shall submit to the Owner and QSD analytical laboratory results from stormwater sampling to the Owner and QSD within 48 hours of receiving analytical results from the laboratory.

J. The Contractor, QSP, or QSP Delegates shall submit to the Owner and QSD the dewatering field sampling results in the form of the Effluent Sampling Field Log within 24 hours of completing dewatering field sampling.

K. The Contractor shall provide, to Owner and QSD, documentation of implementing all SWPPP requirements, for each Annual Report, within 30 calendar days of the end of each reporting period (reporting period is July 1 through June 30 of each year), or upon requesting to terminate the Project SWPPP.

L. Upon request from the Owner or Owner's agents, Contractor shall provide all documentation that is required throughout construction including, but not limited to, CSMP records, sampling records, non-stormwater spill and discharge events, on-site rain logs, daily NOAA forecast records, QSP-signed inspection reports for delegated reports, completed QSP delegation training records, and completed contractor/sub-contractor SWPPP training records.

1.5 REQUIREMENTS

A. General:
   1. Contractor is responsible for understanding and carrying out all provisions of the SWPPP, CGP, and any requirements from local agencies (except as excluded above in 1.1.B., where Owner responsibilities are specified).
   2. The requirements of the CGP, SWPPP, MS4 permittee, and any other local regulations related to stormwater pollution prevention shall be reviewed by Contractor, prior to initiating any ground disturbance or other activities that could lead to stormwater pollution, for a full understanding of the intent, objectives, and

implementation.

3. Contractor responsibilities begin immediately upon execution of the contract containing these specifications and continue until the SWPPP has been terminated with SWRCB.
4. Specific requirements include, but are not limited to:
   a. Daily weather monitoring and record keeping to identify upcoming storm events and required qualifying precipitation event-related inspections.
   b. Installation of an on-site rain gauge and daily rain gauge reading recording.
   c. Installation, implementation, and maintenance of BMPs, and prevention of prohibited activities and unauthorized non-stormwater discharges.
   d. Completing and reporting to the QSD all non-visible pollutant release sampling and dewatering sampling.
   e. Ensure that all subcontractors and agents are trained to understand and implement their relevant responsibilities under the CGP, SWPPP, and these specifications.
   f. Pay any penalties, fines, and corrective action costs resulting from failure to comply with SWPPP, CGP, and local agency requirements, and hold the Owner/LRP harmless from any such failures.
   g. Ensure that all conditions are met for SWPPP termination including, but not limited to: fully stabilizing all disturbed areas of the site; removing temporary BMPs, construction materials, and equipment; cleaning the site of any storm water pollutants; and notifying Owner and QSD of acceptable termination conditions.
5. The SWPPP is an aid to the Contractor in complying with the CGP. CGP requirements shall take precedence over anything contained in the SWPPP, Contractor shall notify the Owner and QSD of any conflicts between the SWPPP and CGP, and no such conflicts shall relieve the Contractor of any responsibilities for execution of these specifications.
6. See the approved SWPPP for the determined Project Risk level. The requirements associated with the project's Risk level shall be found in the SWPPP.

B. Retaining a Qualified SWPPP Practitioner (QSP)
1. The Contractor shall retain a certified QSP who will have responsibility and oversight for the implementation of the CSMP elements of the SWPPP and CGP.
2. Contractor shall maintain documentation in the on-site SWPPP and digitally that proves a certified QSP conducted oversight of all SWPPP and CGP compliance activities including, but not limited to:
   a. CSMP inspections, training, weather forecast monitoring and recordkeeping, on-site rain gauge records, de-watering and non-visible pollutant discharge sampling, and recordkeeping. The responsibilities of the Contractor's QSP are explained in Part 3, Section 3.1 of these SWPPP specifications.

C. Non-visible pollutant discharge sampling:
1. The Contractor's QSP shall train Contractor staff members on non-visible pollutant observation and sampling procedures of the CGP and Section 7 of the Project SWPPP. The QSP and QSP trained delegates shall conduct non-visible sampling when required by site observations and activities according to the CGP.
2. The Contractor shall be prepared with a pH field meter, calibration fluid, and clean non-visible pollutant sample bottles and preservatives based on the current non-visible pollutants on-site, as identified in Section 7 of the Project SWPPP.
3. The Contractor shall be prepared to preserve stormwater samples on ice to 4° Celsius

immediately after taking stormwater samples and until being driven, picked-up, or shipped to an ELAP certified laboratory.

4. The Contractor shall pay for all costs related to non-visible pollutant sampling and laboratory analysis.
5. A QSP-trained and delegated Contractor staff member or the QSP shall:
    a. Always be available on-site within one hour during site operation hours to conduct non-visible pollutant discharge sampling as required by the CGP.
    b. Complete the non-visible pollutant sampling procedures identified in Section 7 of the Project SWPPP and according to the CGP immediately after the discovery of exposure of non-visible pollutants to stormwater that have a potential to discharge off-site.
    c. Take non-visible pollutant samples of effluent from waste dumpsters left uncovered during rainfall during site operation hours that have a potential to discharge off-site.
    d. Take non-visible pollutant samples of runoff from demolished building materials left uncovered during rainfall during site operation hours that have a potential to discharge off-site.
6. The Contractor or QSP shall report analytical laboratory results from stormwater sampling to the Owner and QSD within 48 hours of receiving analytical results from the laboratory.

D. De-watering discharge sampling
1. Prior to conducting dewatering operations via pump or siphon that could result in discharge off-site, the Contractor shall contact the QSP to ensure that dewatering discharge can be sampled for pH and turbidity in accordance with the Appendix J of the CGP and Section 7 of the Project SWPPP.
2. The Contractor, QSP, or QSP trained delegates shall notify the Regional Water Quality Control Board via email 24-hours prior to the start of planned dewatering operations.
3. The Contractor, QSP, or QSP Delegates shall provide the completed Effluent Field Sampling Log to the QSD and LRP within 24 hours of completing de-watering discharge sampling.
4. The Contractor shall immediately cease dewatering operations if dewatering samples yield a result higher than 250 NTUs or is outside of the pH range for 6.5-8.5. The Contractor shall wait for sediment to settle/pH to neutralize or utilize BMPs to bring water for dewatering to be within the acceptable ranges of turbidity or pH when resuming dewatering operations.

E. The Contractor shall be responsible for achieving Final Stabilization, as defined by the CGP, for all areas disturbed by Project construction activities in order to terminate the SWPPP within 90-days of completing construction activities, including areas without landscaping plans.
1. The Contractor shall re-establish any existing vegetation disturbed by the Project with the same vegetation type as was disturbed.
2. The Contractor shall achieve Final Stabilization for all graded areas with no landscaping plan and disturbed pre-existing non-landscaped vegetation disturbed by the Project with either non-vegetative stabilization as defined by the CASQA Construction BMP Handbook or by use of seeding/hydroseeding with a native erosion control seed mix.

F. The Contractor shall be fully aware of the requirements for the full execution of the

SWPPP; the requirements of these specifications for implementing, maintaining, and enforcing the provisions of the SWPPP; and the impact that the SWPPP will have on the operation, prosecution and cost of the work. A submittal of a bid on this project will be considered as prima facie evidence that the Contractor fully comprehends these requirements and impacts and has fully allowed for their effect on this project, both in time and cost. Failure to comply with the CGP is a violation of federal and state law. Contractor hereby agrees to indemnify, defend and hold harmless Owner, its officers, agents, and employees from and against any and all claims, demands, losses or liabilities of any kind or nature which Owner, its officers, agents, and employees may sustain or incur for noncompliance with the Permit arising out of or in connection with the Project, except for liability resulting from the negligence or willful misconduct of Owner, its officers, agents or employees. Owner may seek damages from Contractor for delay in completing the Project in accordance herewith, including damage caused by Contractor's failure to comply with Permit requirements.

1.6 QUALITY ASSURANCE

A. Certified SWPPP Professionals:
   1. Qualified SWPPP Developer (QSD)
      a. The Owner shall retain a certified QSD.
      b. The QSD's name, certification number, and contact information shall be listed within the SWPPP document.
   2. Qualified SWPPP Practitioner (QSP)
      a. The Contractor shall retain a certified QSP.
      b. The QSP's name, certification number, and contact information shall be provided to the Project QSD and in the on-site SWPPP.

B. Regulatory Requirements:
   1. Contractor shall comply with the lawful requirements of any applicable municipality, county, drainage district, municipal storm water management program and other local agencies regarding discharges of storm water to separate storm drain system or other watercourses under their jurisdiction, including but not limited to the following:
      a. EPA Environmental Protection Agency.
      b. SWRCB State Water Resources Control Board.
      c. RWQCB Regional Water Quality Control Board.
   2. All stormwater compliance shall be in accordance with local regulations:
      a. County of Fresno.
      b. City of Mendota.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Best Management Practices (BMPs):
   1. The Contractor is responsible for the providing and furnishing all BMPs, products, and practices necessary to comply with the SWPPP and CGP. All materials and BMPs shall follow the CASQA Construction BMP Handbook and installed as described within the fact sheets, unless otherwise instructed by a qualified

professional representing the Owner.

2. The Contractor must provide, implement, and carry out all BMPs required to comply with the CGP, regardless of the BMPs contained in the SWPPP, and shall notify Owner and QSD of any conflicts between the SWPPP and CGP.
3. The Contractor shall comply with the erosion control BMP requirements of the CGP, stating that BMPs must be initiated immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days (CGP Appendix D Section II.D.f).
4. Prior to substantially altering BMPs recommended in the SWPPP, Contractor shall notify the Owner and QSD for review of the alternative BMPs and to obtain instructions for documenting the changes.
5. Contractor shall consult with the QSP to ensure all BMPs are appropriate, feasible, effective, and correctly implemented.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Monitoring by the Contractor's QSP:
   1. Implement the CSMP and document all records in the SWPPP as required by the CGP, including, but not limited to: weekly, pre-storm, during-storm, post-storm, daily weather monitoring, training of responsible contractor and subcontractor personnel, dewatering sampling and analysis, and incidental non-visible pollutant discharge sampling and laboratory analysis.
      a. CSMP inspection reports:
         1) The QSP or QSP trained delegates shall include photographs showing all disturbed areas, BMPs, BMP deficiencies, material storage locations, stormwater containment areas, and active construction areas. All photographs shall include comments noting any BMP corrective actions and completed corrective actions.
         2) All CSMP inspection reports shall be completed in accordance with CGP requirements.
         3) The QSP or QSP trained delegates shall document in their CSMP Inspection reports when all outdoor construction activities have ceased.
      b. QSP Training Records:
         1) The QSP or QSP trained delegates shall administer and document training of all contractor and subcontractor staff responsible for BMP implementation, instillation, and maintenance and document it in the SWPPP.
         2) If QSP delegates any weekly, during-storm, and post-storm inspections and/or stormwater sampling requirements to Contractor personnel, the QSP shall conduct a foundational training and site-specific training in accordance with CGP requirements.
            a) If CSMP inspection have been delegated, the QSP shall review and sign all documentation completed by the trained QSP delegate.
      c. Weather Monitoring:
         1) The QSP or QSP trained delegates shall save records of daily weather monitoring of the nearest NOAA weather station.
         2) The QSP or QSP trained delegates shall record the daily on-site rain gauge reading and retain the records for the duration of the Project.
      d. Incidental Non-Visible Pollutant Discharge Sampling:

1) The QSP or QSP trained delegates shall perform any stormwater and non-stormwater sampling, as required by the CGP. If any samples are sent offsite for laboratory analysis, QSP will identify a designated ELAP-certified laboratory and coordinate sample procurement, transportation, analysis, and recordkeeping. If QSP delegates any of these duties to Contractor personnel, QSP shall provide training and document the training in the SWPPP. QSP shall provide sampling results to the QSD and the Owner within 24 hours of obtaining results.

e. De-watering Discharge Sampling

1) Prior to conducting dewatering operations via pump or siphon that could result in discharge off-site, the Contractor shall contact the QSP to ensure that dewatering discharge can be sampled for pH and turbidity in accordance with the Appendix J of the CGP. The contractor shall notify via email the RWQCB and the local MS4 (if applicable) 24 hours or more prior to conducting dewatering operations. The Contractor shall cease dewatering operations if dewatering samples yield a result higher than 250 NTUs or is outside of the pH range for 6.5-8.5. The Contractor shall wait for sediment to settle/pH to neutralize or utilize BMPs to bring water for dewatering to be within the acceptable ranges of turbidity or pH when resuming dewatering operations.

2) De-watering sample results shall be recorded in the Effluent Field Sampling Log and retained in the on-site SWPPP.

3) After obtaining de-watering sampling results that exceed acceptable ranges for turbidity and pH, the Contractor QSP shall submit the completed Effluent Filed Sampling Log to the Owner and the QSD within 24 hours.

f. The QSP shall consult with the Contractor to understand the construction schedule and identify site areas where erosion control BMPs must be initialized immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days in accordance with CGP Appendix D Section II.D.f.

2. New CSMP records outlined above in Part 3, Section 3.1.A shall be provided by the QSP to the QSD and Owner on a bi-monthly basis while the SWPPP NOI is active. New CSMP records shall be sent in the first week of odd numbered months.
3. The QSP shall identify required amendments to the SWPPP based on construction activity and notify the QSD and Owner.
4. The QSP shall identify when the site area has achieved “final stabilization” per the CGP definition, and inform the QSD and Owner.
5. The Contractor’s QSP shall advise the Contractor on achieving final stabilization of all areas disturbed by the Project within 90-days of outdoor construction activities ceasing. The Contractor shall be responsible for achieving final stabilization, as defined by the CGP, for all areas disturbed by Project activities, including areas without landscaping plans.
6. For the full monitoring requirements refer to the SWPPP and CGP.

B. Monitoring by Owner

1. The Owner has the right to monitor and oversee the Contractor’s implementation and maintenance of the BMPs and SWPPP.
2. Should the Owner determine that the Contractor’s efforts fail to meet the requirements of the CGP and the SWPPP, the Owner reserves the right to employ any and/or all of the following actions:

a. Notify the SWRCB of the perceived failure of the Contractor to comply with

the CGP and SWPPP.

b. Withhold an amount of money from the Contractor's Payment Request, equal to the Owner's estimate of the value of the work required to implement and maintain the required BMPs, as well as provide the required inspection, training, and testing forms.

c. If the SWPPP is not terminated within 90-days of outdoor construction activities ceasing, withhold monies due the Contractor under this Contract, in an amount sufficient to complete the work, pay any additional fees due the State, and close out the SWPPP in compliance with the General Permit.

C. Availability and access to the SWPPP:

1. As required by the SWPPP and CGP, the Contractor shall keep a minimum of one copy of the SWPPP, addenda, all PRDS, all inspection reports and all SWPPP records in the following locations:
   a. Contractor's Project Site Field Office.
   b. Contractor's General Business Office.
2. The SWPPP shall be made available for public inspection at any time during normal business hours.
3. All SWPPP records shall be made available to the Owner and their agents when requested.
4. The Contractor shall maintain the SWPPP NOI of Appendix B, SWPPP Site Maps of Appendix A in a hard copy at the Project site.
5. The Contractor shall keep posted the Project WDID# at a publicly viewable location until the SWPPP has been terminated, per CGP requirements.

3.2 CLEANING AND REMOVAL

A. Removal of BMPs

1. All temporary BMPs shall be completely removed from the Project Site prior to filing of the NOT.
2. The removal of any and all BMPs shall be coordinated and approved by the Contractor's QSP.
3. All permanent BMPs shall remain on the Project Site, unless directed otherwise by Owner. The Owner will be responsible for ongoing inspection and maintenance after final acceptance.

B. Under written agreement and with the approval of the Owner, the Contractor may assign maintenance and removal responsibilities of the project BMPs to a subsequent Contractor for later work phases at the Project Site.

3.3 RECORD KEEPING

A. Paper and electronic records of all CSMP inspections, testing, training reports, all PRDs, inspection records, site photos, and all other SWPPP related records, shall be retained by the Contractor over until the termination of the SWPPP. Upon the acceptance of the Notice of Termination by the SWRCB, the Contractor shall provide all digital and hard copy records to the Owner.

3.4 PAYMENT

A. Full compensation for all costs involved in implementing, and monitoring the implementation of the SWPPP for this project, including inspections, testing, and training, performing corrective measures as required to better implement the SWPPP, providing all labor, materials, and resources to maintain the SWPPP and all required records of the SWPPP, and being full liable for all failures to fulfill the intent and requirements of the

CGP set forth by the SWRCB, shall be included in the cost bid for the various items of work and no additional payment will be made therefor.

END OF SECTION

SECTION 32 18 13 - SYNTHETIC TURF SURFACING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of the General and Supplementary Conditions and Division 01 apply to this section.

B. Section Includes:
1. Composite wood nailer at the perimeter concrete header for a non-resilient system without a poured-in-place resilient mat.
2. Synthetic turf carpet with tufted polyethylene and nylon fibers
3. Coated Sand infill system

C. Related Sections:
1. Section 31 20 00: Earthwork.
2. Section 31 23 33: Trench & Backfilling.
3. Section 32 11 26: Aggregate Base.
4. Section 32 18 16: Playground Resilient Surfacing.
5. Section 33 40 00: Storm Drainage.

1.02 SUBMITTALS

A. Submit in accordance with Section 013300.

B. Submit the following:
1. Complete list of products and materials with installation specifications, product data and safety sheets.
2. Testing reports from an independent laboratory of at least the following characteristics of the synthetic turf product:
   a. Pile material and density
   b. Pile stitch and gage
   c. Pile height
   d. Weight of the full carpet system
3. A 6 inch square sample of the synthetic turf product.
4. Test data for Water Permeability (vertical drainage) per ASTM F1551/DIN 18-035.
5. Shop drawing of the carpet layout showing all seams using full 15’ width rolls.
6. Product warranty documents and contact information for all components.
7. Letter of Acceptance from the synthetic turf manufacturer for compliance of the constructed aggregate base and resilient mat (where occurs) layers with the synthetic turf manufacturer’s warranty.
8. Owner’s maintenance recommendations.

1.03 QUALITY ASSURANCE

A The synthetic turf surfacing company shall not had a surety or bonding company finish work or repair failures on any contract within the last ten years, or have been barred from performing work for any public Agency or District within the last ten years.

B. The aggregate base and curbs shall be inspected by the Synthetic Turf Surfacing Contractor's licensed surveyor by means of a laser level and both design and actual elevations plotted on a 10-foot grid. The elevation survey shall serve as the basis for the acceptance of the aggregate base.

C. The subgrade elevation tolerance shall conform to the requirements of the Earthwork section. The base aggregate layer shall be laser controlled graded true to line and slope, and elevations shall be within 0.02' plus or minus.

D. Compaction of the base courses shall be tested by the Owner's geotechnical engineer. The cost of any retesting due to compliance failure shall be paid by the contractor.

E. The completed surface, either aggregate base or resilient poured-in-place mat shall be accepted in writing by the synthetic turf manufacturer prior to the installation of the synthetic turf surfacing.

1.04 DELIVERY STORAGE AND HANDLING

A. Deliver materials in original unopened packages with manufacturing labels intact. Store materials in sealed containers and at temperatures recommended by the product manufacturers.

1.05 EXISTING CONDITIONS

A. The resilient mat installer shall be responsible for any damage to the aggregate base after all deficiencies, if any, have been corrected as noted on the Certificate of Base Acceptance. The installation of perimeter storm drains or other field accessories within the contiguous turf limits or immediately adjacent thereto are to be coordinated with the General Contractor for compatibility with the resilient mat and/or synthetic turf system installation.

1.06 WARRANTY

A. The synthetic turf carpet shall have a minimum 5 year warranty for the replacement and/or repair of the materials and workmanship, including seams.

B. Infill material shall be "topped off" to replace lost material at yearly intervals, and at least at two year intervals per the manufacturer's warranty requirements.

PART 2 - PRODUCTS

2.01 COMPOSITE WOOD NAILER

A. Non-resilient Surfacing: the perimeter composite wood nailer shall be a minimum 2x4 sized composite wood (Trex), structural HDPE lumber product, or approved equal.

2.04 RESILIENT POURED-IN-PLACE MAT

A. See Section 32 18 16

2.05 SYNTHETIC TURF CARPET

A. The synthetic turf carpet shall be a tufted polyethylene or polyethylene/nylon yarn product with the following characteristics:

1. Polyethylene monofilament yarn, 10000 denier, 1.5”-1.6” pile height with a secondary textured thatch zone. Face weight shall be a minimum 60 oz per sq. yd.
2. The primary backing shall be a woven polypropylene at a minimum 6 oz per sq. yd.. Secondary polyurethane backing shall be a minimum 22 oz per sq. yd.
3. Total carpet weight shall be a minimum 88 oz per sq. yd.
4. Yarn stitch gauge shall be maximum 0.5 inch, and stitch rate a maximum 2.7 per inch (3/8”).
5. The backing shall have perforations that allows a minimum 30 inches per hour drainage.
6. Seams shall use urethane adhesive and seam tape along the entire seam.
7. Carpet color shall be a single uniform color shade as selected by the Owner.

2.06 INFILL SYSTEM

A. The infill shall be a coated antimicrobial silicon dioxide, “Envirofill” by Artificial Turf Supply with a 16 year warranty as a standard of quality, or equal.

B. Crumb rubber infill material is not allowed.

PART 3 - EXECUTION

3.01 AGGREGATE BASE

A. See Section 32 11 26.

3.02 RESILIENT POURED-IN-PLACE MAT

A. See Section 32 18 16.

3.04 COMPOSITE WOOD NAILER

A. Verify with the synthetic turf manufacturer the proper dimension from the top of the concrete header to the top of the nailer, taking into account the synthetic turf infill

depth. The nailer shall be installed so that the top surface of the infill is flush to the top of the adjacent finish surface.

B. The nailer shall be attached to the concrete header with 0.5” diameter anchor bolts or redhead bolts at spacing from corners or board joints as detailed.

3.03 SYNTHETIC TURF CARPET

A. The synthetic turf rolls shall be installed using full width rolls to the greatest extent feasible to minimize seams.

B. Seams shall be flat, tight and permanent with no separation or fraying.

C. The entire perimeter of the non-resilient carpet shall be secured to the edge nailer, where occurs, per the manufacturer’s specifications.

3.04 INFILL SYSTEM

A. Place the infill materials in multiple uniform lifts to the manufacturer’s prescribed depth so as to minimize fiber entrapment. Exposed yarn height shall be approximately 0.5 inch, adjusted to the manufacturer’s specification.

B. Elevation of the top of the infill layer shall be flush to the top elevation of the adjacent surface.

3.06 PROTECTION OF WORK

A. Protect the Work of this section from all unnecessary traffic until the synthetic turf installation is complete.

3.07 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

B. Clean all surfaces in the area of work in order to leave the work area in a clean, immaculate condition ready for immediate occupancy and use by the Owner, contingent upon Final Acceptance.

C. All usable remnants of the carpet and/or infill shall be secured and turned over to the Owner, and placed at a location of the Owner’s choosing.

D. The finished playing surface shall appear as mowed grass with no irregularities and shall afford excellent traction for athletic shoes of all types.

END OF SECTION

SECTION 32 18 16 - PLAYGROUND RESILIENT SURFACING

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes: Resilient playground protective surfacing. The surfacing system includes a synthetic turf carpet with infill over a poured-in-place SBR resilient mat.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 11 68 13 - Playground Equipment.
3. Section 32 11 26 – Aggregate Base.
4. Section 32 13 13 - Site Concrete Improvements.
5. Section 32 18 13 – Synthetic Turf Surfacing
6. Section 33 41 00 - Storm Drainage.

1.02 REFERENCES

A. American Society for Testing and Materials International (ASTM) - The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D2859 – Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
3. ASTM F355 - Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials.
4. ASTM F1292 – Standard Specification for Impact Attenuation of Surfacing Materials within the Use Zone of Playground Equipment.
5. ASTM F1487 – Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.
6. ASTM F1951 - Standard Specification for Determination of Accessibility of Surface Systems under and Around Playground Equipment.

1.03 DEFINITIONS

A. Critical Height: Standard measure of shock attenuation. According to CPSC (Consumer Safety Product Commission) No. 325, critical height is defined as “the fall height below which a life-threatening head injury would not be expected to occur.”

B. Fall Height: According to ASTM F1487, fall height is defined as “the vertical distance between a designated play equipment and the protective surfacing beneath it.” The fall height of playground equipment should not exceed the critical height of the protective surfacing beneath it.

C. Use Zone: As defined by ASTM F1487.

D. Certified Playground Safety Inspector (CPSI): According to CCR Title 22 a Certified Playground Safety Inspector shall possess a current Certified Playground Safety Inspector certificate issued by National Playground Safety Institute.

1.04 SUBMITTALS

A. Shop and Coordination Drawings: Submit layout plans and elevations drawn to scale for the coordination of playground equipment with playground protective surfacing system. Indicate playground equipment locations, use zones, fall heights, extent of protective surfacing, depths of material, and critical heights, sub-base materials, hardware, penetration and edge details, and drainage.

B. Color Samples: Submit manufacturer's minimum 4-inch squares of top surfacing (samples) indicating the full range of colors available.

C. Product Data: Submit manufacturer's descriptive data and installation instructions.

D. Certificate of Compliance: Submit manufacturer's certificate of compliance indicating that the surfacing system complies with the requirements of ASTM F1292 and F1951.

E. Certified Resiliency Testing: Submit certified testing statement indicating that the poured-in-place safety mat with Synthetic Turf top surfacing meets the requirements of ASTM F1292 for a head-first fall from the highest designated play surface of the installed play equipment.

F. Maintenance Instructions: Submit maintenance, repair and cleaning instructions.

G. Installer Certification: Manufacturer shall submit certified statement indicating the following:

1. Installer is trained, approved and/or certified for the installation of the manufacturer's specified playground protective surfacing.

2. Installer has at least five years experience installing manufacturer's playground protective surfacing of similar type to that specified.

1.05 PERFORMANCE REQUIREMENTS

A. Safety: Safety surfacing within playground equipment use zones shall meet or exceed the performance requirements of CPSC and ASTM F1292, that a surface yield both, a peak deceleration of no more that 200g, and a Head Injury Criteria (HIC) value of no more than 1,000g, for a head-first fall from the highest designated play surface of playground equipment installed. The highest designated play surface of playground equipment shall be as specified by the manufacturer. The installer is responsible for obtaining a determination from the playground protective surfacing manufacturer of the required product depth to meet the performance requirements for play equipment.

B. Accessibility: Playground Surfacing intended to serve as accessible paths of travel for persons with disabilities shall be firm, stable and slip resistant and shall meet the requirements of FED STD 795, 28CFR Part 36, ASTM F1487, ASTM F1292, and ASTM F1951.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Continuously engaged in manufacturing playground protective surfacing system of a similar type to that specified, with a minimum of five years successful experience.

2. Installer: Shall be approved by the manufacturer and shall have a minimum of five years successful experience installing playground protective surfacing of similar type to that specified.

B. Regulatory Requirements:

1. Accessibility: ADAAG and CBC Chapter 11B.

2. U.S. Consumer Product Safety Commission (CPSC) - Handbook for Public Playground Safety, latest edition, U.S. Consumer Product Safety Commission, Bethesda, MD 20814 Telephone (301) 504-7923.

C. Certifications: Submit certified statement indicating that protective surfacing system meets the requirements of ASTM F1292 for a head-first fall from the highest designated play surface of the installed play equipment. The impact attenuating qualities of the protective surfacing system shall not be diminished in the surface areas covering hardware. Testing of product shall include tests conducted over hardware. The statement shall be dated after the Effective Date of the Contract, shall state Contractor name and address, and shall name the Project and location. The statement shall also provide the name, address, and telephone number of the testing agency, the date of the test, and the test results.

D. Source Limitations: Provide secondary materials including adhesives, anchoring materials, filler/sealant materials, and repair materials of type and from source recommended by manufacturer.

E. Coordination: Coordinate installation of playground protective surfacing with installation of playground equipment, including accurate use zones and fall heights, specified in Section 11 68 13 - Playground Equipment and Structures.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver manufactured materials in original package with seals unbroken and bearing manufacturer’s labels.

B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer’s written instructions for minimum and maximum temperature requirements for storage.

C. Store units on flat surfaces.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not install playground protective surfacing over wet or excessively damp substrates if prohibited by manufacturer’s written instructions.

B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground tile system to be installed according to manufacturer’s written instructions.

C. Field Measurements: Where playground protective surfacing is indicated to fit to other work, verify dimensions of other work by field measurements prior to installing the work of this section.

D. Adhesives:

1. Install adhesives only when temperatures of surfaces to be adhered to and ambient air temperatures are within range permitted by manufacturer's written instructions.

2. Close area to traffic during tile surfacing installation and for time period after installation as recommended by manufacturer.

3. Do not install products over concrete slabs until slabs have cured and are sufficiently dry and surfaces are within acceptable pH range to bond with adhesive, as recommended by surfacing manufacturer.

E. Playground Safety Surfacing

1. Install Playground protective surfacing system only when ambient air temperatures during installation and for time period after installation are within range permitted by manufacturer's recommended procedures.

2. Close area to traffic during installation. Traffic shall be kept off of surfacing for a time period after installation as recommended by manufacturer.

a) For work at existing school sites, Contractor shall install a minimum 6 foot high fence at least 10 feet away from area and around perimeter to prevent entry by school students and staff. Gates into area shall be locked when jobsite is unoccupied and materials and associated equipment shall be kept inside of fence or storage container when left onsite.

3. Protect Playground protective surfacing and accessory materials from damage and exposure to adverse weather conditions.

1.10 WARRANTY

A. Product and General Liability: Manufacturer of Playground Surfacing System shall provide Owner Certificate of Insurance, covering both product and general liability, of not less than $1,000,000. The issuing underwriter shall be AA rated.

B. Materials and Fabrication:

1. Manufacturer shall provide Owner written warranty that guarantees the cushioned resilient playground protective mat for not less than ten (10) years against defective materials and fabrication.

a. Warranty shall include provisions that include, but is not limited to, cracking and shedding.

b. Manufacturer shall provide a two year warranty against color fading.

2. Warranty repairs shall be conducted without cost to Owner. Prorated warranties are not acceptable.

D. Performance: Warranty shall guaranty that the cushioned resilient playground protective surfacing system will retain its original impact attenuation rating for a period of not less than ten years and meet performance requirements of ASTM F1292. Impact attenuation rating shall be tested per ASTM F1292 after manufacturer replaces or repairs any surfacing top layer or resilient pad.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer’s product shall be as shown on the drawings.

2.02 MATERIALS

A. Poured-In-Place Resilient mat:

1. Primer and Binder: 100% single component Aliphatic polyurethane binding agent.

2. Impact Course: 100% recycled black styrene budadine rubber (SBR) and polyurethane binder.

B. Wear Course: Synthetic Turf Surfacing per Section 32 18 13

C. Adhesive: Manufacturer recommended and compatible with protective surfacing system.

D. Concrete: Per Section 32 13 13 - Site Concrete Improvements.

E. Aggregate Base: Per Section 32 11 26 Aggregate Base.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions for compliance with requirements for sub-grade, substrate conditions and drainage, for compliance with playground protective surfacing manufacturer’s requirements, and other installation conditions affecting performance.

B. Hard-Surface Substrates: Verify that substrates are satisfactory for playground protective surfacing installation and that substrate surfaces are dry, cured, and uniformly sloped to drain within recommended tolerances according to playground protective surfacing manufacturer’s written requirements for cross-section profile.

1. Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground protective surfacing or that may interfere with adhesive bond.

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

3.02 PREPARATION

A. General: Prepare, fill, patch, clean, remove high spots and ridges, and remove incompatible coatings from substrates to receive surfacing products according to playground protective surfacing manufacturer’s written recommendations. Verify that substrates are sound and free from high spots, ridges, holes and depressions.

B. Concrete Substrates: Provide leveling and patching materials and install according to manufacturer’s written instructions. Fill holes and depressions.

3.03 INSTALLATION

A. General:

1. Comply with playground protective surfacing manufacturer's written recommendations.
2. Installation of protective surfacing must comply with zone requirements of the latest additions of the "Consumer Product Safety Commission – Handbook for Public Playground Safety – Publication No. 325" and ASTM F1487.
3. Protective surfacing shall be installed only after the playground equipment and subsurface have been installed and have passed inspection.
4. The area to be surfaced shall be void of any depressions that would cause the protective surfacing to lay in an uneven fashion and expose surfacing edges or leave depressions.
5. Protective surfacing shall maintain its required thickness for the entire fall zone around the equipment. Tapered edges must begin after the required fall zones are met.
6. The area where work is being performed shall be made inaccessible to children by the use of 6-foot high chain-link fence with weighted or embedded posts.
7. Adhesives will not be allowed on adjacent surfaces. Spills or excess adhesive shall be immediately cleaned up.
8. Set time for poured-in-place surfacing shall be a minimum of 72 hours.

B. Flush Installation

1. Playground protective surfacing shall be installed with a reinforced concrete header around the entire perimeter to act as an attachment point.
2. Playground protective surfacing and concrete header shall be finished flush with adjacent finish surfaces.
3. Adhesives will not be allowed on exposed surfaces. Spills or excess adhesive shall be immediately cleaned up.

3.04 SITE TESTS

A. Upon completion of installation, Contractor shall have surface system tested by an independent testing laboratory in accordance with ASTM F355 and provide certification that installed surfacing meets requirements of ASTM F1292.

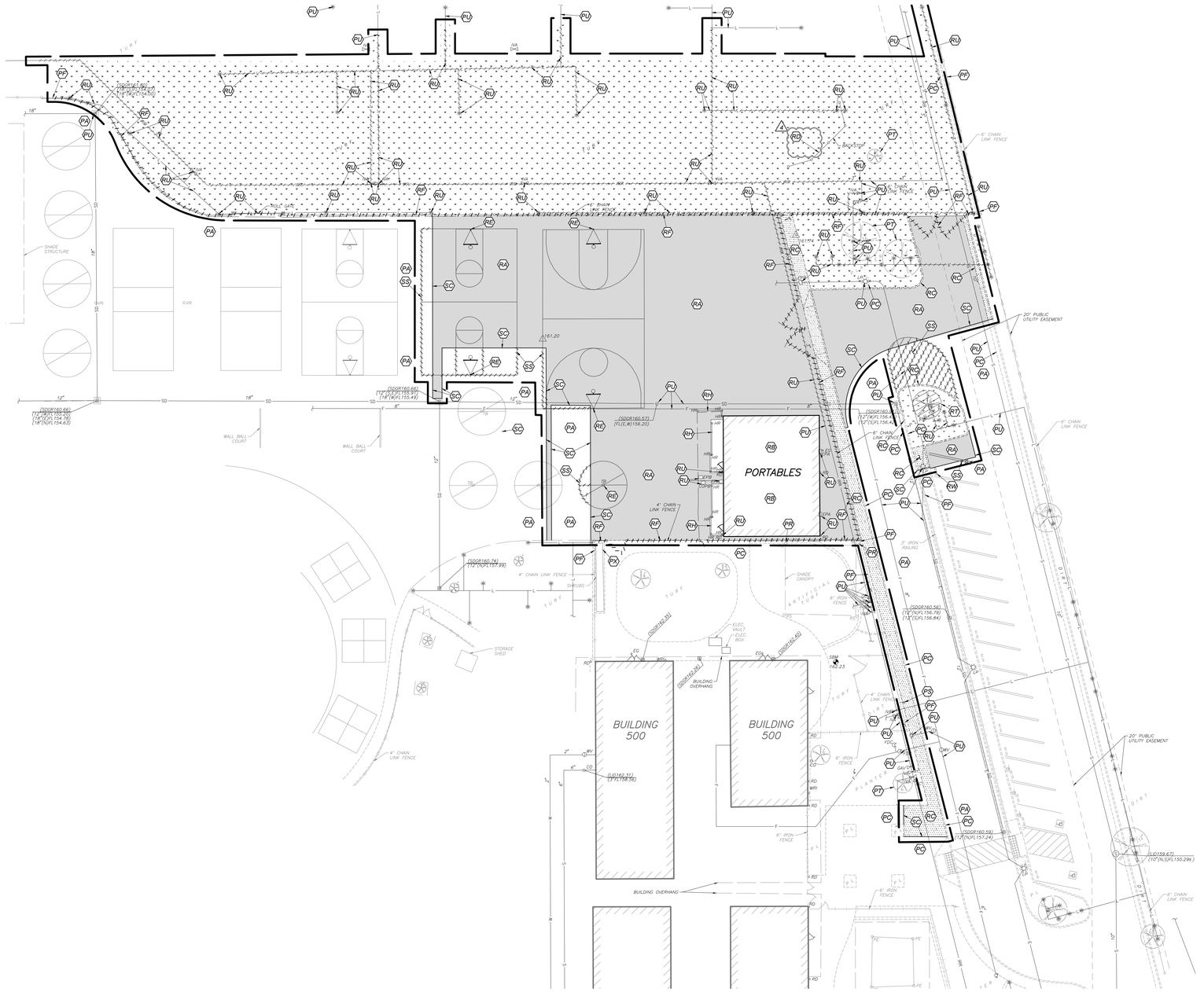
3.05 CLEANING

A. Prevent any type of traffic over system for at least 48 hours after installation. Protect playground surface system until Substantial Completion.

B. During installation of adhesively applied products, immediately remove visible adhesive from surfaces as Work progresses. Provide cleaner recommended by playground surface system manufacturer.

C. Clean playground surface systems as recommended in writing by playground surface system manufacturer. Provide cleaning materials and procedures recommended in writing by system manufacturer.

END OF SECTION

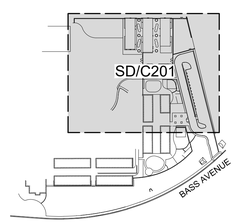


DEMOLITION LEGEND:

- APPROXIMATE LIMIT OF DEMOLITION. REMOVE EXISTING IMPROVEMENTS AS NECESSARY TO CONSTRUCT NEW IMPROVEMENTS SHOWN ON THESE PLANS UNLESS OTHERWISE NOTED ON THE PLAN. THE REMOVAL OF IMPROVEMENTS MUST BE COORDINATED WITH ALL PLAN SHEETS. CONTRACTOR MUST ALSO COORDINATE REMOVAL OF IMPROVEMENTS WITH UTILITY AGENCIES. PROTECT ALL IMPROVEMENTS NOT DESIGNATED FOR REMOVAL. SEE NOTE 1
- LIMITS OF VEGETATION REMOVAL, 4" MINIMUM DEPTH
- LIMITS OF CONCRETE IMPROVEMENT REMOVAL
- LIMITS OF ASPHALTIC CONCRETE IMPROVEMENT REMOVAL
- (PA) PROTECT ASPHALT CONCRETE PAVEMENT TO REMAIN
- (PC) PROTECT CONCRETE IMPROVEMENTS TO REMAIN
- (PF) PROTECT FENCE TO REMAIN
- (PR) PROTECT ROOF SUPPORT
- (PS) PROTECT SIGN TO REMAIN
- (PT) PROTECT TREE AND ROOTS TO REMAIN
- (PU) PROTECT UTILITY TO REMAIN
- (PX) PROTECT SHRUBS TO REMAIN
- (RA) REMOVE AND LAWFULLY DISPOSE OF ASPHALT CONCRETE PAVEMENT STRUCTURAL SECTION
- 4 (RB) OWNER TO RETURN BUILDING TO VENDOR
- (RC) REMOVE AND LAWFULLY DISPOSE OF CONCRETE IMPROVEMENTS
- 3 (RD) REMOVE AND RELOCATE BACKSTOP. SEE SHEET SD/C401 FOR LOCATION
- (RE) REMOVE AND SALVAGE ATHLETIC EQUIPMENT TO OWNER
- (RF) REMOVE AND LAWFULLY DISPOSE OF CHAIN LINK FENCE FABRIC, POSTS AND FOOTINGS
- (RH) REMOVE AND LAWFULLY DISPOSE OF HANDRAIL
- (RT) REMOVE AND LAWFULLY DISPOSE OF TREE AND ROOTS
- (RU) REMOVE AND LAWFULLY DISPOSE OF UTILITY
- (RW) REMOVE AND LAWFULLY DISPOSE OF CONCRETE WHEELSTOP
- (SC) SAWCUT
- (SS) SANDBLAST STRIPING
- REMOVE TREE
- LIMIT OF CHAIN LINK FENCE REMOVAL
- LIMIT OF IRRIGATION MAIN LINE REMOVAL/ABANDONMENT
- LIMIT OF IRRIGATION LATERAL LINE REMOVAL/ABANDONMENT
- LIMIT OF STRIPING REMOVAL

GENERAL DEMOLITION NOTES:

1. THE "LIMIT OF DEMOLITION" SHOWN IS APPROXIMATE AND IS GENERALLY CONSIDERED TO BE THE MINIMUM REMOVAL REQUIREMENTS. CONTRACTOR MUST COORDINATE AS NOTED IN THE LEGEND.
2. CONTRACTOR SHALL LEGALLY DISPOSE OF ALL DEMOLISHED MATERIALS OFF SITE.
3. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITY IMPROVEMENTS NOT SPECIFICALLY DESIGNATED FOR REMOVAL.
4. THE ON-SITE UNDERGROUND UTILITIES SHOWN ON THIS SHEET ARE AT APPROXIMATE LOCATIONS. THE EXTENT, LOCATIONS AND SIZES ARE UNKNOWN. THE CONTRACTOR SHALL POTHOLE TO LOCATE AND VERIFY THE UNDERGROUND UTILITY LINES PRIOR TO REMOVAL.
5. CONTRACTOR TO PROTECT AND PRESERVE IN PLACE ANY FOUND SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE RESET BY A CALIFORNIA LICENSED SURVEYOR AND THE APPROPRIATE PAPERWORK FILED WITH THE CITY OR COUNTY, AT CONTRACTOR'S EXPENSE.
6. ALL HAZARDOUS MATERIALS ENCOUNTERED DURING SITE DEMOLITION SHALL BE REMEDIATED AND DISPOSED OF PER STATE AND EPA REQUIREMENTS.
7. CONTRACTOR SHALL CONTACT AND COORDINATE WITH ALL UTILITY AGENCIES PRIOR TO THE START OF ANY DEMOLITION OR CONSTRUCTION.
8. ANY EXISTING UTILITIES AND/OR IMPROVEMENTS WHICH ARE TO REMAIN, THAT BECOME DAMAGED DURING CONSTRUCTION SHALL BE COMPLETELY RESTORED TO THE SATISFACTION OF THE OWNER AND AGENCY HAVING AUTHORITY, AT THE CONTRACTOR'S SOLE EXPENSE.
9. REMOVE EXISTING IMPROVEMENTS AS NECESSARY TO CONSTRUCT NEW IMPROVEMENTS SHOWN ON THESE PLANS.
   a) FOR CONCRETE REMOVAL, REMOVE TO THE NEXT NEAREST TOOLED JOINT OR EXPANSION JOINT OF IMPROVEMENTS DESIGNATED TO REMAIN.
   b) FOR ASPHALTIC PAVEMENT REMOVAL, SAWCUT TO A STRAIGHT, CLEAN EDGE AT LOCATIONS INDICATED ON THE PLANS.
10. REFER TO ELECTRICAL, IRRIGATION, AND ARCHITECTURAL PLANS FOR ADDITIONAL DEMOLITION AND COORDINATION.
11. COMPLIANCE WITH FIRE SAFETY DURING CONSTRUCTION WILL BE ENFORCED.



KEYMAP

SCALE: N 1"=20'

0 5 20 40
SCALE IN FEET

Know what's below. Call before you dig.

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

General Notes

Blair, Church & Flynn CONSULTING ENGINEERS
Blair, Church & Flynn Consulting Engineers
451 Clovis Avenue, Suite 200
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REGISTERED PROFESSIONAL ENGINEER — MAE R. BASS — No. 47033 — CIVIL — STATE OF CALIFORNIA
4/17/25 Date Signed:
Consultant

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640
Project

DEMOLITION PLAN
Drawing

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ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT — GRANT E. DODDER — No. C-20,307 — Exp. 6-30-25 — STATE OF CALIFORNIA
Architect

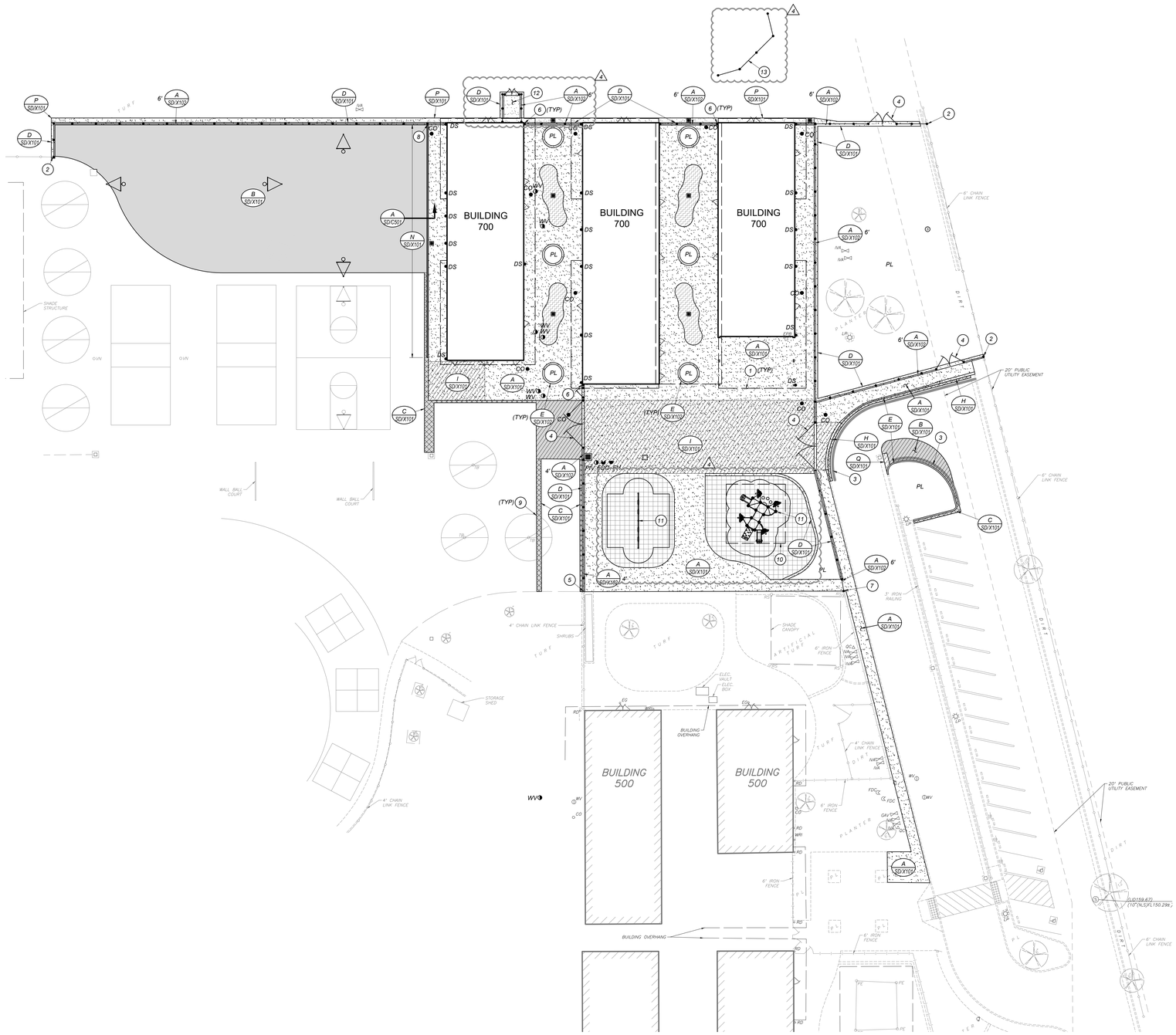
No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

Revision

	Designed By:	Copyright 2025 Darden Architects
Scale: AS NOTED	Drawn By:	
Project Number: 2277	Checked By:	
Date: 4/22/2025	Reviewed By:	

SD/C201
AD4-CX01
Sheet: 3 of: _____

Drawing: P:\224\224-0172\Site\productiondrawings\224172_DE01.dwg; C201 — BCF.CTB
Plot by: sgoons Jul 22, 2025 - 2:35pm

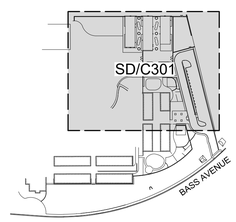


SITE LEGEND:

- LIMITS OF CONCRETE IMPROVEMENTS
- LIMITS OF ASPHALT PLUG IMPROVEMENTS [C/SD/X101]
- LIMITS OF ASPHALTIC CONCRETE PAVEMENT STRUCTURAL SECTION PER DETAIL [B/SD/X101]
- LIMITS OF HEAVY DUTY ASPHALTIC CONCRETE PAVEMENT STRUCTURAL SECTION PER DETAIL [B/SD/X101]
- LIMITS OF HEAVY DUTY CONCRETE IMPROVEMENTS PER DETAIL [I/SD/X101]
- LIMITS OF PLAYGROUND SURFACING PER DETAIL [H/SD/X102]
- LIMITS OF SYNTHETIC TURF PER DETAIL [R/SD/X101]
- LIMITS OF PAINTED CURB
- PL — PLANTER
- (1) — BUILDING OVERHANG
- (2) — CONNECT EXISTING FENCE FABRIC TO POST PER DETAIL [A/SD/X102]
- (3) — PAINT TOP AND FACE OF CURB RED WITH 4" HIGH WHITE LETTERING, "NO PARKING - FIRE LANE", AT 30' ON CENTER. WHERE NO CURB EXISTS, PAINT ASPHALT
- (4) — DOUBLE DRIVE GATE PER DETAIL [A/SD/X102]
- (5) — CONNECT NEW FENCE FABRIC TO POST PER DETAIL [A/SD/X102]
- (6) — INSTALL CHAIN LINK FENCE POST SO THAT THERE IS A 4" MAXIMUM SEPARATION FROM THE BUILDING
- (7) — INSTALL NEW FENCE POST PER DETAIL [A/SD/X102]
- (8) — INSTALL END OF GUARDRAIL SO THAT THERE IS A 4" MAXIMUM SEPARATION FROM THE CHAIN LINK FENCE
- (9) — RESTRIPE PLAYAREA STRIPING AFFECTED BY SITE IMPROVEMENTS TO MATCH EXISTING
- (10) — SHADE STRUCTURE, SEE ARCHITECTURAL PLANS
- (11) — PLAY EQUIPMENT FURNISHED AND INSTALLED BY OWNER. COORDINATE WITH OWNER FOR PLAY EQUIPMENT INSTALLATION
- (12) — ELECTRICAL EQUIPMENT PAD, SEE ELECTRICAL PLANS
- (13) — CONSTRUCT 18"X48" FOOTINGS FOR RELOCATED BACKSTOP POSTS

GENERAL SITE NOTES:

1. ALL CONCRETE MOWSTRIPS, RAMPS AND SIDEWALKS SHALL HAVE WEAKENED PLANE JOINTS AT 10 FEET MAXIMUM ON CENTER AND EXPANSION JOINTS AT 30 FEET MAXIMUM ON CENTER PER DETAIL [A/SD/X101]
2. INSTALL DOWELED CONNECTION AT JOINT OF NEW CONCRETE TO EXISTING CONCRETE PER DETAIL [G/SD/X101]
3. NO CONCRETE MAY BE POURED UNTIL THE FORMS HAVE BEEN REVIEWED AND APPROVED BY THE PROJECT INSPECTOR.
4. ALL BURIED METALLIC OBJECTS SHALL HAVE A PROTECTIVE COATING OR BE WRAPPED WITH APPROVED PROTECTIVE WRAP.
5. ADJUST EXISTING SPRINKLER HEADS AND LATERAL LINES AS REQUIRED BY NEW IMPROVEMENTS, OR AS SHOWN ON THE IRRIGATION PLANS.
6. 2 WORKING DAYS BEFORE COMMENCING EXCAVATION OPERATIONS WITHIN THE STREET RIGHT-OF-WAY AND/OR UTILITY EASEMENTS, ALL EXISTING UNDERGROUND FACILITIES SHALL HAVE BEEN LOCATED BY UNDERGROUND SERVICES ALERT (USA). CALL 1-800-642-2444
7. ANY SURVEY MONUMENTS WITHIN THE AREA OF CONSTRUCTION SHALL BE PRESERVED OR RESET BY A PERSON LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF CALIFORNIA. REPLACEMENT TO BE AT CONTRACTOR'S SOLE EXPENSE.
8. REPAIR ALL DAMAGED AND/OR OFF-GRADE CONCRETE STREET IMPROVEMENTS AS DETERMINED BY THE AGENCY HAVING JURISDICTION PRIOR TO OCCUPANCY
9. NO PAVEMENT STRIPING IS ALLOWED PRIOR TO SEAL COAT REVIEW BY ENGINEER, AND WRITTEN APPROVAL TO PROCEED BY ENGINEER.
10. OBTAIN ALL REQUIRED PERMITS AND APPROVALS FROM AGENCY HAVING JURISDICTION FOR WORK WITHIN THE PUBLIC RIGHT OF WAY
11. SEE ARCHITECTURAL SITE PLANS FOR ITEMS NOT SPECIFIED ON THIS SHEET



KEYMAP

SCALE: N 1"=20'

0 5 20 40
SCALE IN FEET

811 Know what's below. Call before you dig.

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

General Notes

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Clovis, California 93612
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Fax (559) 326-1500

REGISTERED PROFESSIONAL ENGINEER — LANE R. BRADY — No. 47033 — CIVIL — STATE OF CALIFORNIA

Consultant

6/17/25
Date Signed:

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

SITE PLAN

Drawing

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LICENSED ARCHITECT — GREGORY E. DOOSLAN — No. C-20,307 — REN. 6-30-26 — STATE OF CALIFORNIA

Architect

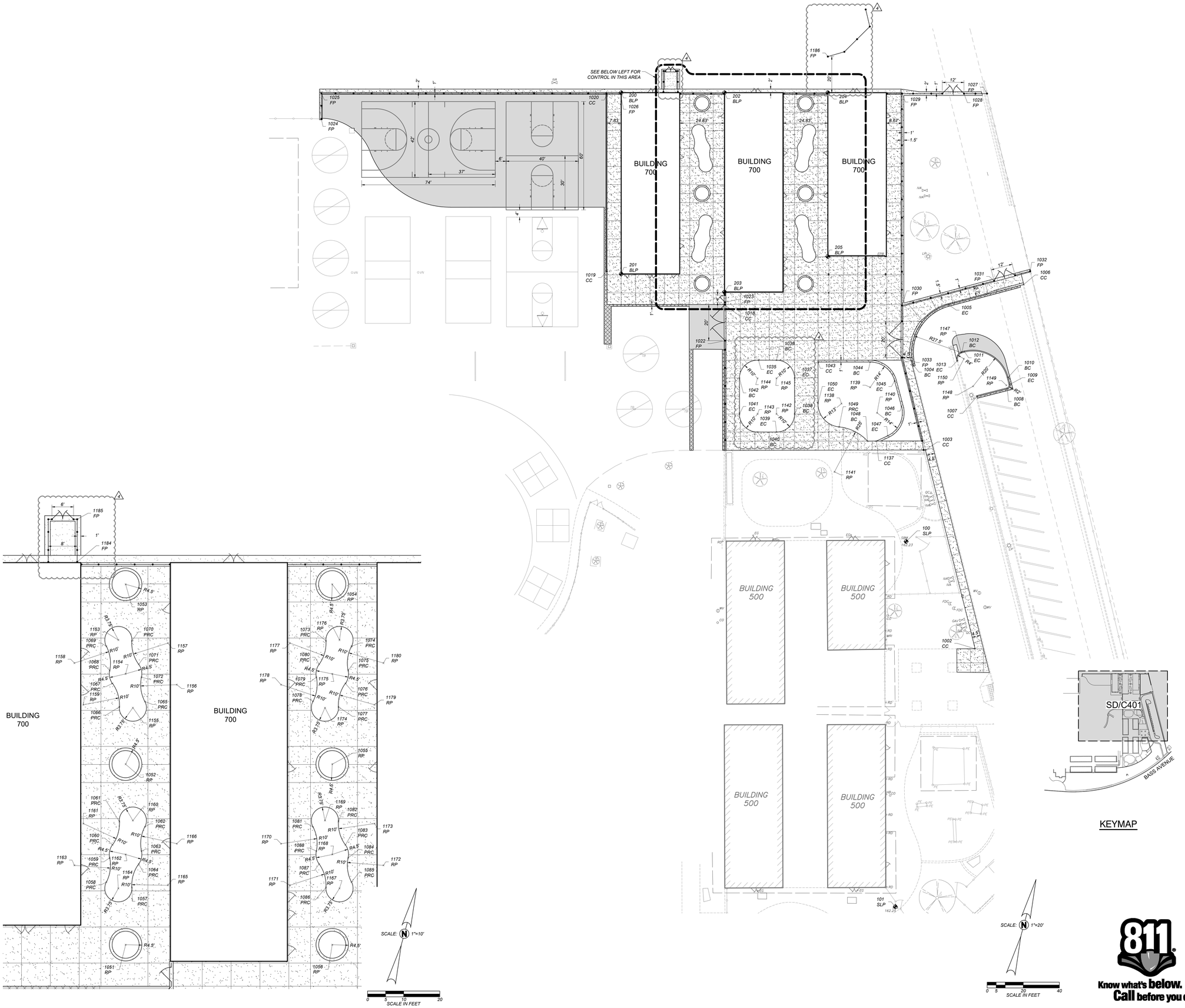
No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

Revision

	Designed By: DG	Copyright 2025 Darden Architects
Scale: AS NOTED	Drawn By: SD	
Project Number: 2277	Checked By: LRB	
Date: 4/22/2025	Reviewed By: JB	

SD/C301
AD4-CX02
Sheet: 4 of: 10

Drawing: P:\224\224-0172\Site\productiondrawings\224172_SD1.dwg; C301 - BCF.CTB
Plot by: dgoona Jul 22, 2025 - 2:35pm



KEYMAP

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

GENERAL HORIZONTAL CONTROL NOTES:

1. *ALIGNMENT OF THE SITE LAYOUT IS BASED ON AN ASSUMED COORDINATE SYSTEM.*
2. *DIMENSIONS AND POINTS ARE TO CENTER OF FENCE POSTS, FACE OF BUILDINGS, TOP FACE OF CURB, OR EDGE OF CONCRETE. UNLESS SHOWN OTHERWISE.*
3. *SITE LAYOUT 100 IS A SPIKE AND TIN LOCATED IN THE TURF APPROXIMATELY 12' NORTHEASTERLY OF THE NORTHEASTERN CORNER OF BUILDING 500.*
4. *SITE LAYOUT 101 IS A CHISELED 'X' LOCATED ON CONCRETE SIDEWALK APPROXIMATELY 12' SOUTH OF THE SOUTHEASTERN CORNER OF BUILDING 500 NEAR THE CHAIN LINK FENCE GATE.*

HORIZONTAL CONTROL LEGEND:

1000 LCP	*LAYOUT COORDINATE POINT*
100 SLP	*SITE LAYOUT POINT*
200 BLP	*BUILDING LAYOUT POINT*
CC	*CORNER CONCRETE*
BC	*BEGIN CURVE*
EC	*END CURVE*
FP	*FENCE POST*
PRC	*POINT OF REVERSE CURVE*
RP	*RADIUS POINT*

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REGISTERED PROFESSIONAL ENGINEER — LANE R. BYLER — No. 47033 — CIVIL — STATE OF CALIFORNIA

4/17/25
Date Signed:

Consultant

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Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

HORIZONTAL CONTROL PLAN

Drawing

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LICENSED ARCHITECT — GRANT E. DODSON — No. C-20,307 — Exp. 6-30-25 — STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

Revision

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Designed By: DG
Drawn By: SD
Checked By: LRB
Reviewed By: JB

Scale: AS NOTED
Project Number: 2277
Date: 4/22/2025

SD/C401
AD4-CX03
Sheet: 5 of: 10

Drawing: P:\224\224-0172\Site\productiondrawings\224172_HC01.dwg; C401 - BCF.CTB
Plot by: dgoong Jul 22, 2025 - 2:35pm

NORTHING EASTING TABLE				
POINT	NORTHING	EASTING	ABV	DESCRIPTION
100	2165303.65	6157214.13	SLP	SITE LAYOUT POINT
101	2165106.70	6157260.73	SLP	SITE LAYOUT POINT
200	2165502.87	6156997.37	BLP	BUILDING LAYOUT POINT
201	2165405.90	6157023.35	BLP	BUILDING LAYOUT POINT
202	2165517.69	6157052.65	BLP	BUILDING LAYOUT POINT
203	2165411.05	6157081.22	BLP	BUILDING LAYOUT POINT
204	2165532.50	6157107.93	BLP	BUILDING LAYOUT POINT
205	2165444.84	6157131.41	BLP	BUILDING LAYOUT POINT
1002	2165256.15	6157266.42	CC	CORNER CONCRETE
1003	2165355.31	6157211.33	CC	CORNER CONCRETE
1004	2165399.20	6157192.53	BC	BEGIN CURVE
1005	2165436.43	6157202.83	EC	END CURVE
1006	2165457.99	6157240.26	CC	CORNER CONCRETE
1007	2165391.33	6157231.22	CC	CORNER CONCRETE
1008	2165399.80	6157246.35	BC	BEGIN CURVE
1009	2165402.53	6157247.12	EC	END CURVE
1010	2165406.03	6157245.16	BC	BEGIN CURVE
1011	2165413.70	6157217.94	EC	END CURVE
1012	2165413.12	6157216.90	BC	BEGIN CURVE
1013	2165407.44	6157215.49	EC	END CURVE
1018	2165404.31	6157082.77	CC	CORNER CONCRETE
1019	2165405.37	6157015.37	CC	CORNER CONCRETE
1020	2165499.98	6156990.02	CC	CORNER CONCRETE
1022	2165385.13	6157088.48	FP	FENCE POST
1023	2165405.65	6157082.93	FP	FENCE POST
1024	2165445.84	6156840.71	FP	FENCE POST
1025	2165459.50	6156837.04	FP	FENCE POST
1026	2165502.39	6156997.08	FP	FENCE POST

POINT	NORTHING	EASTING	ABV	DESCRIPTION
1027	2165554.85	6157193.22	FP	FENCE POST
1028	2165551.54	6157180.88	FP	FENCE POST
1029	2165542.65	6157147.72	FP	FENCE POST
1030	2165429.30	6157178.09	FP	FENCE POST
1031	2165455.73	6157223.85	FP	FENCE POST
1032	2165466.04	6157241.72	FP	FENCE POST
1033	2165401.48	6157185.54	FP	FENCE POST
1035	2165379.43	6157109.15	EC	END CURVE
1036	2165382.01	6157118.81	BC	BEGIN CURVE
1037	2165374.94	6157131.05	EC	END CURVE
1038	2165355.85	6157136.17	BC	BEGIN CURVE
1039	2165343.60	6157129.10	EC	END CURVE
1040	2165340.88	6157118.96	BC	BEGIN CURVE
1041	2165347.95	6157106.71	EC	END CURVE
1042	2165367.05	6157101.59	BC	BEGIN CURVE
1043	2165387.00	6157141.28	CC	CORNER CONCRETE
1044	2165394.48	6157169.19	BC	BEGIN CURVE
1045	2165387.96	6157184.94	EC	END CURVE
1046	2165375.26	6157192.27	BC	BEGIN CURVE
1047	2165357.54	6157189.14	EC	END CURVE
1048	2165351.81	6157179.05	BC	BEGIN CURVE
1049	2165355.29	6157161.86	PRC	POINT OF REVERSE CURVE
1050	2165364.88	6157147.21	EC	END CURVE
1051	2165412.27	6157068.04	RP	RADIUS POINT
1052	2165460.56	6157055.10	RP	RADIUS POINT
1053	2165508.68	6157042.21	RP	RADIUS POINT
1054	2165523.49	6157097.49	RP	RADIUS POINT
1055	2165475.37	6157110.38	RP	RADIUS POINT

POINT	NORTHING	EASTING	ABV	DESCRIPTION
1056	2165427.08	6157123.31	RP	RADIUS POINT
1057	2165428.03	6157065.61	PRC	POINT OF REVERSE CURVE
1058	2165427.65	6157058.40	PRC	POINT OF REVERSE CURVE
1059	2165434.37	6157057.55	PRC	POINT OF REVERSE CURVE
1060	2165438.04	6157057.37	PRC	POINT OF REVERSE CURVE
1061	2165444.80	6157057.53	PRC	POINT OF REVERSE CURVE
1062	2165445.16	6157064.74	PRC	POINT OF REVERSE CURVE
1063	2165438.44	6157065.58	PRC	POINT OF REVERSE CURVE
1064	2165434.80	6157065.76	PRC	POINT OF REVERSE CURVE
1065	2165478.72	6157055.75	PRC	POINT OF REVERSE CURVE
1066	2165475.42	6157049.32	PRC	POINT OF REVERSE CURVE
1067	2165481.20	6157045.80	PRC	POINT OF REVERSE CURVE
1068	2165484.47	6157044.13	PRC	POINT OF REVERSE CURVE
1069	2165490.71	6157041.50	PRC	POINT OF REVERSE CURVE
1070	2165493.99	6157047.94	PRC	POINT OF REVERSE CURVE
1071	2165488.21	6157051.45	PRC	POINT OF REVERSE CURVE
1072	2165484.95	6157053.12	PRC	POINT OF REVERSE CURVE
1073	2165507.91	6157099.86	PRC	POINT OF REVERSE CURVE
1074	2165508.28	6157107.08	PRC	POINT OF REVERSE CURVE
1075	2165501.56	6157107.92	PRC	POINT OF REVERSE CURVE
1076	2165497.90	6157108.11	PRC	POINT OF REVERSE CURVE
1077	2165491.13	6157107.95	PRC	POINT OF REVERSE CURVE
1078	2165490.77	6157100.73	PRC	POINT OF REVERSE CURVE
1079	2165497.49	6157099.90	PRC	POINT OF REVERSE CURVE
1080	2165501.14	6157099.71	PRC	POINT OF REVERSE CURVE
1081	2165457.21	6157109.72	PRC	POINT OF REVERSE CURVE
1082	2165460.51	6157116.15	PRC	POINT OF REVERSE CURVE
1083	2165454.73	6157119.68	PRC	POINT OF REVERSE CURVE

POINT	NORTHING	EASTING	ABV	DESCRIPTION
1084	2165451.46	6157121.35	PRC	POINT OF REVERSE CURVE
1085	2165445.23	6157123.97	PRC	POINT OF REVERSE CURVE
1086	2165441.94	6157117.54	PRC	POINT OF REVERSE CURVE
1087	2165447.73	6157114.03	PRC	POINT OF REVERSE CURVE
1088	2165450.98	6157112.36	PRC	POINT OF REVERSE CURVE
1137	2165353.11	6157183.86	CC	CORNER CONCRETE
1138	2165368.12	6157159.80	RP	RADIUS POINT
1139	2165380.96	6157172.81	RP	RADIUS POINT
1140	2165368.26	6157180.14	RP	RADIUS POINT
1141	2165330.60	6157165.81	RP	RADIUS POINT
1142	2165353.26	6157126.51	RP	RADIUS POINT
1143	2165350.54	6157116.37	RP	RADIUS POINT
1144	2165369.64	6157111.25	RP	RADIUS POINT
1145	2165372.35	6157121.40	RP	RADIUS POINT
1147	2165412.60	6157216.55	RP	RADIUS POINT
1148	2165396.25	6157227.71	RP	RADIUS POINT
1149	2165401.55	6157245.37	RP	RADIUS POINT
1150	2165409.63	6157218.85	RP	RADIUS POINT
1153	2165493.25	6157044.26	RP	RADIUS POINT
1154	2165484.71	6157048.62	RP	RADIUS POINT
1155	2165476.18	6157053.00	RP	RADIUS POINT
1156	2165485.50	6157063.10	RP	RADIUS POINT
1157	2165495.98	6157057.74	RP	RADIUS POINT
1158	2165483.94	6157034.14	RP	RADIUS POINT
1159	2165473.41	6157039.53	RP	RADIUS POINT
1160	2165445.99	6157061.09	RP	RADIUS POINT
1161	2165441.64	6157048.04	RP	RADIUS POINT
1162	2165436.41	6157061.56	RP	RADIUS POINT

POINT	NORTHING	EASTING	ABV	DESCRIPTION
1163	2165429.84	6157048.64	RP	RADIUS POINT
1164	2165426.84	6157062.06	RP	RADIUS POINT
1165	2165431.20	6157075.10	RP	RADIUS POINT
1166	2165442.96	6157074.50	RP	RADIUS POINT
1167	2165442.69	6157121.21	RP	RADIUS POINT
1168	2165451.23	6157116.85	RP	RADIUS POINT
1169	2165459.76	6157112.48	RP	RADIUS POINT
1170	2165450.43	6157102.38	RP	RADIUS POINT
1171	2165439.95	6157107.74	RP	RADIUS POINT
1172	2165451.99	6157131.33	RP	RADIUS POINT
1173	2165462.52	6157125.95	RP	RADIUS POINT
1174	2165489.95	6157104.39	RP	RADIUS POINT
1175	2165499.52	6157103.92	RP	RADIUS POINT
1176	2165509.10	6157103.42	RP	RADIUS POINT
1177	2165504.73	6157090.38	RP	RADIUS POINT
1178	2165492.97	6157090.98	RP	RADIUS POINT
1179	2165494.29	6157117.44	RP	RADIUS POINT
1180	2165506.10	6157116.84	RP	RADIUS POINT
1184	2165511.19	6157027.64	FP	FENCE POST
1185	2165522.59	6157024.59	FP	FENCE POST
1186	2165551.82	6157102.75	FP	FENCE POST

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

General Notes

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REGISTERED PROFESSIONAL ENGINEER — LANE R. BRADFORD — No. 47033 — CIVIL — STATE OF CALIFORNIA

Consultant

6/17/25
Date Signed:

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Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

HORIZONTAL CONTROL PLAN TABLE

Drawing

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LICENSED ARCHITECT — GEOFF E. DOOSJE — No. C-20,307 — Exp. 6-30-26 — STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
1	ADDENDUM 4	07/24/2025

Revision

Designed By: DG
Drawn By: SD
Checked By: LRB
Reviewed By: JB

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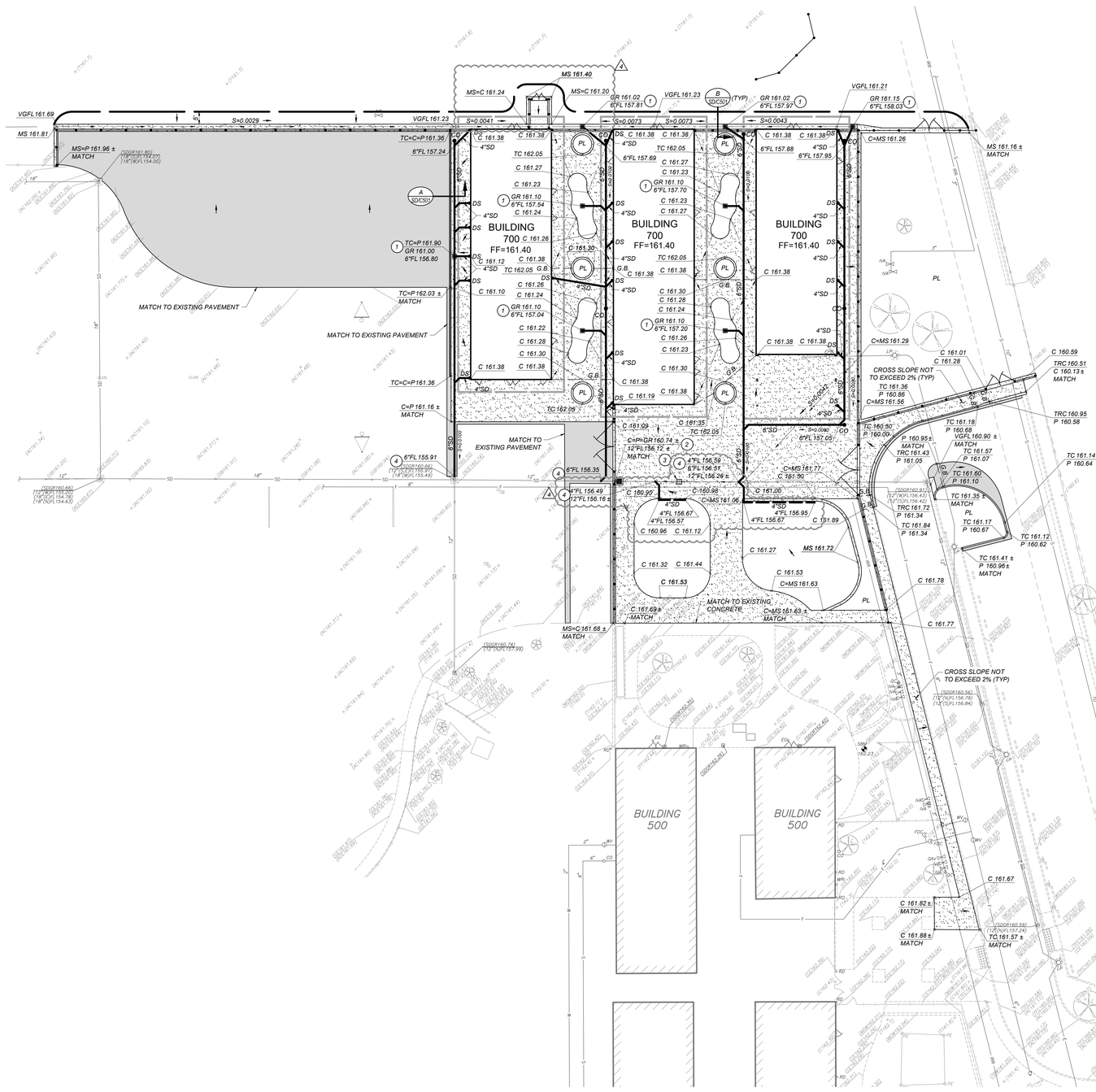
Scale: AS NOTED
Project Number: 2277
Date: 4/22/2025

SD/C402
AD4-CX04
Sheet: 6 of: 10

Drawing: P:\2241224-0172\Site\productiondrawings\224172_HC01.dwg; C402 - BCF.CTB
Plot by: dgoong Jul 22, 2025 - 2:36pm



GRADING AND DRAINAGE LEGEND:

C	CONCRETE
FF	FINISHED FLOOR
FL	FLOWLINE
GR	STORM DRAIN GRATE
MS	MOWSTRIP
P	PAVEMENT
TC	TOP OF CURB
TRC	TOP OF ROLL CURB
VGFL	VALLEY GUTTER FLOWLINE
(344.9)	EXISTING ELEVATION
328.78	NEW FINISHED GRADE
	DIRECTION OF SURFACE DRAINAGE
	BUILDING OVER-EXCAVATION LIMITS; SEE DETAIL [M/SD/X101]
G.B.	GRADE BREAK
	LIMITS OF GRADING
S=0.0050	PIPE SLOPE AND DIRECTION OF FLOW
	SWALE AND DIRECTION OF FLOW
1	P6 STORM DRAIN INLET PER DETAIL [D/SD/X102]
2	U23 STORM DRAIN INLET PER DETAIL [O/SD/X101]
3	INSTALL SOLID TRAFFIC RATED LID AND ADJUST TO GRADE
4	MAKE WATER-TIGHT CONNECTION TO EXISTING STORM DRAIN PIPE OR INLET
●CO	SURFACE CLEANOUT PER DETAIL [I/SD/X101]
●DS	DOWNSPOUT, SEE PLUMBING PLANS. PROVIDE APPROPRIATE FITTING TO TRANSITION FROM DOWNSPOUT TO UNDERGROUND STORM DRAIN PIPING
SD	STORM DRAIN PIPELINE; SIZE AS NOTED. TRENCH AND BACKFILL PER DETAIL [K/SD/X101]
4 SD	PERFORATED STORM DRAIN PIPELINE; SIZE AS NOTED.
S=0.0020	FLOWLINE SLOPE AND DIRECTION OF FLOW

GENERAL GRADING AND DRAINAGE NOTES:

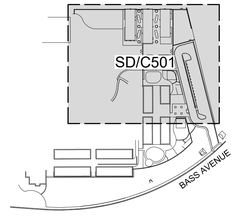
THE REQUIREMENTS AND INFORMATION SET OUT BELOW ARE PROVIDED FOR THE CONTRACTOR'S CONVENIENCE AND DO NOT ENCOMPASS ALL PROJECT REQUIREMENTS DESCRIBED BY THE PROJECT PLANS AND SPECIFICATIONS AND/OR APPLICABLE LAWS, REGULATIONS AND/OR BUILDING CODES.

1. *CONSTRUCTION OF ALL PROJECT SITE IMPROVEMENTS SUBJECT TO ADA ACCESS COMPLIANCE, INCLUDING ACCESSIBLE PATH OF TRAVEL, CURB RETURNS, PARKING STALL(S) AND UNLOADING AREAS, BARRIER FREE AMENITIES AND/OR OTHER APPLICABLE SITE IMPROVEMENTS SHALL CONFORM TO THE AMERICANS WITH DISABILITIES ACT, CALIFORNIA TITLE 24, THE CALIFORNIA BUILDING CODE, CURRENT EDITION(S).*
2. *CONTRACTOR SHALL FIELD VERIFY ALL GRADES AND SLOPES PRIOR TO THE PLACEMENT OF CONCRETE AND/OR PAVEMENT FOR CONFORMANCE WITH ADA ACCESS COMPLIANCE REQUIREMENTS. EXAMPLES OF MINIMUM AND MAXIMUM LIMITS RELATED TO ADA ACCESS COMPLIANCE INCLUDE, BUT ARE NOT LIMITED TO:*
   a) *ACCESSIBLE PATH OF TRAVEL CROSS-SLOPE SHALL NOT EXCEED 2%*
   b) *ACCESSIBLE PATH OF TRAVEL LONGITUDINAL SLOPES SHALL NOT EXCEED 5%*
   c) *RAMP LONGITUDINAL SLOPES SHALL NOT EXCEED 8.33%*
   d) *ACCESSIBLE WALKS SHALL NOT HAVE LESS THAN 48 INCHES IN UNOBSTRUCTED WIDTH*
   e) *ACCESSIBLE PARKING SPACES AND ACCESS AISLES SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION*
   f) *LANDINGS AT THE TOP AND BOTTOM OF ACCESSIBLE RAMPS SHALL NOT EXCEED 2% SLOPE IN ANY DIRECTION*
   g) *GUTTERS AND ROAD SURFACES DIRECTLY ADJACENT TO AND WITHIN 2 FEET OF A CURB RAMP SHALL HAVE A COUNTER SLOPE NOT TO EXCEED 5%*
3. *CONTRACTOR MUST IMMEDIATELY NOTIFY THE ENGINEER OF RECORD, IDENTIFIED BY THE PROFESSIONAL ENGINEERING SEAL AND SIGNATURE ON THESE PLANS, OF ANY SITE CONDITION(S) AND/OR DESIGN INFORMATION THAT PREVENTS THE CONTRACTOR FROM COMPLYING WITH THE LAWS, REGULATIONS AND/OR BUILDING CODES GOVERNING ADA ACCESS COMPLIANCE.*
4. *GROUND SLOPES AWAY FROM BUILDING PADS IN LANDSCAPED OR DIRT AREAS SHALL BE NO LESS THAN 5% FOR AT LEAST TEN (10) FEET, OR AS OTHERWISE NOTED ON THE PLANS.*
5. *DRAINAGE SHALL NOT BE ALLOWED ONTO ADJACENT PROPERTY.*
6. *ALL FILL MATERIAL USED TO SUPPORT THE FOUNDATIONS OF ANY BUILDING OR STRUCTURE SHALL BE PLACED UNDER THE DIRECTION OF A LICENSED GEOTECHNICAL ENGINEER, AND IN COMPLIANCE WITH THE PROJECT SPECIFICATIONS. A SOILS COMPACTION REPORT SHALL BE SUBMITTED TO THE ENGINEER OF RECORD AS REQUIRED BY THE PROJECT SPECIFICATIONS.*
7. *THE CONTRACTOR SHALL IMPLEMENT DUST CONTROL MEASURES AS REQUIRED BY THE PROJECT SPECIFICATIONS, AND BY GOVERNING PUBLIC AGENCIES.*
8. *THE CONTRACTOR SHALL IMPLEMENT A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY THE PROJECT SPECIFICATIONS AND THE STATE WATER RESOURCES CONTROL BOARD'S CONSTRUCTION GENERAL PERMIT. IMPLEMENT BEST MANAGEMENT PRACTICES WITHIN PUBLIC RIGHT OF WAY PER LOCAL JURISDICTION REQUIREMENTS.*
9. *AS A FIRST ORDER OF WORK, THE CONTRACTOR SHALL POT HOLE THE EXISTING UTILITY LINES AT THE POINT OF CONNECTION TO VERIFY THE LOCATION, SIZE, PIPE MATERIAL AND ELEVATION SO THAT THE ENGINEER CAN MAKE ELEVATION AND/OR ALIGNMENT ADJUSTMENTS IF NECESSARY. SHOULD POT HOLING DISCOVER ANY DISCREPANCIES, CONTACT THE ENGINEER AND OBTAIN WRITTEN DIRECTION BEFORE PROCEEDING.*
10. *ADJUST UTILITY LIDS WITHIN NEW CONSTRUCTION AREA TO FINISHED GRADE PER DETAIL [L/SD/X101]. REPLACE ALL BROKEN LIDS WITH NEW. PROVIDE TRAFFIC RATED LIDS AND BOXES WITHIN AREAS SUBJECT TO VEHICULAR TRAFFIC.*
11. *WATER TEST PAVEMENT WITHIN NEW IMPROVEMENT AREA. REPLACE PAVEMENT WHERE BIRD BATHS OCCUR AFTER TEST AS DIRECTED BY THE INSPECTOR OR ENGINEER.*
12. *MINIMUM SLOPE ON IMPERVIOUS SURFACES PERPENDICULAR TO ADJACENT STRUCTURE(S), WITHIN ADA PATH, SHALL BE 1% MINIMUM AND 2% MAXIMUM. WHERE DOOR AND GATE LANDINGS OCCUR THE CROSS SLOPE SHALL BE 2% MAXIMUM IN ALL DIRECTIONS.*

SITE BENCHMARK:

SPIKE IN TURF APPROXIMATELY 12' EAST FROM THE NORTHEASTERN CORNER OF BUILDING 500

ELEV.= 162.23 NAVD88



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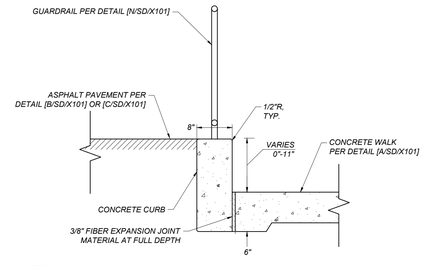

A SD/C501 CROSS SECTION
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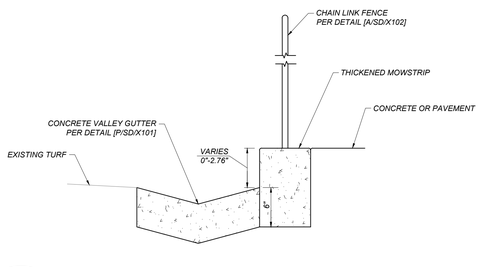

B SD/C501 CROSS SECTION
NOT TO SCALE

SCALE: N 1"=20'
0 5 20 40
SCALE IN FEET

811 Know what's below. Call before you dig.

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

General Notes

Blair, Church & Flynn CONSULTING ENGINEERS
Blair, Church & Flynn Consulting Engineers
451 Clovis Avenue, Suite 200
Clovis, California 93612
Tel (559) 326-1400
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REGISTERED PROFESSIONAL ENGINEER JAMES R. BLAIR No. 57033 CIVIL STATE OF CALIFORNIA

Consultant

6/17/25
Date Signed

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

GRADING AND DRAINAGE PLAN

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT ROBERT E. DARDEN No. C-20,307 Exp. 6-30-26 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

Revision

		Designed By: DG	Copyright 2025 Darden Architects
Scale:	AS NOTED	Drawn By: SD	
Project Number:	2277	Checked By: LRB	
Date:	4/22/2025	Reviewed By: JB	

SD/C501
AD4-CX05
Sheet: 7 of: 10

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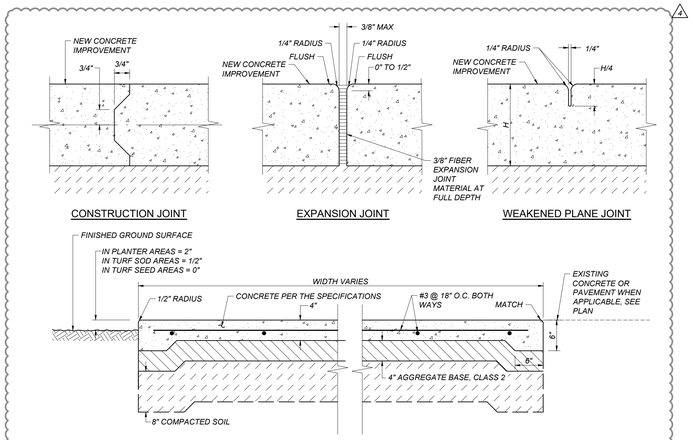
Plot by: dgoons Jul 22, 2025 — 2:36pm



A SD/X101 CONCRETE WALK
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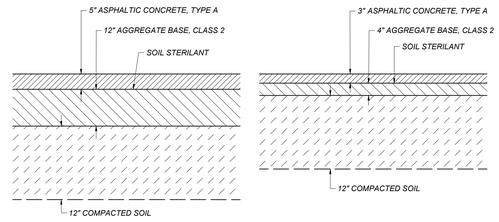

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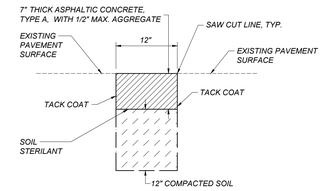

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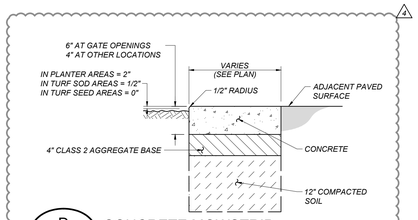

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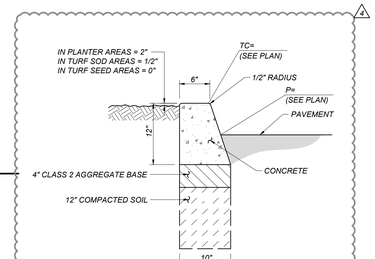

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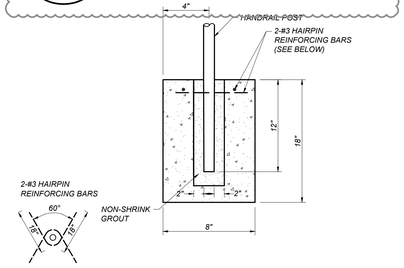
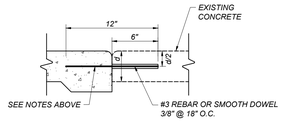


F SD/X101 GUARDRAIL FOOTING
NOT TO SCALE

NOTES:

1. DRILL HOLE 1/8" LARGER THAN DOWEL DIAMETER.
2. CLEAN HOLE THOROUGHLY OF DUST AND FRAGMENTS WITH WATER, WIRE BRUSH, AND AIR.
3. FILL HOLE WITH APPROVED ADHESIVE BEFORE INSERTING DOWEL INTO EXISTING CONCRETE.
4. WHERE SMOOTH DOWEL IS USED, APPLY BOND BREAKER TO SIDE IN NEW CONCRETE AS REQUIRED TO ALLOW HORIZONTAL MOVEMENT OF CONCRETE.
5. WHERE DEFORMED REBAR DOWEL IS USED, PROVIDE APPROVED WRAP ON SIDE IN NEW CONCRETE AS REQUIRED TO ALLOW HORIZONTAL MOVEMENT OF CONCRETE.



G SD/X101 DOWEL BAR
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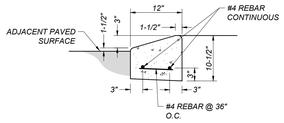
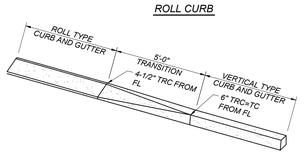
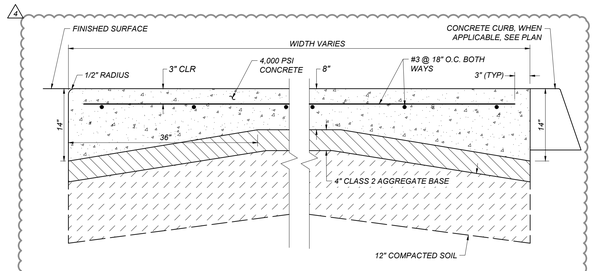


ROLL CURB



ROLL CURB TO VERTICAL CURB TRANSITION

H SD/X101 CONCRETE ROLL CURB
NOT TO SCALE



I SD/X101 HEAVY DUTY CONCRETE PAVEMENT STRUCTURAL SECTION
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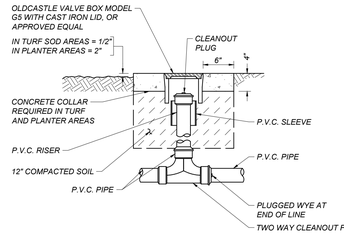
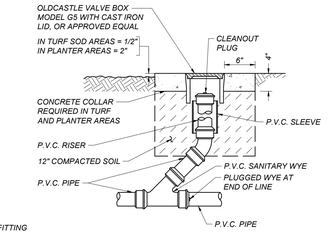


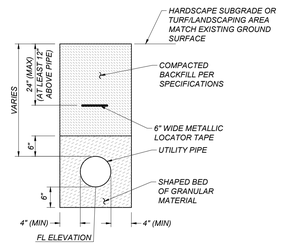
TWO-WAY



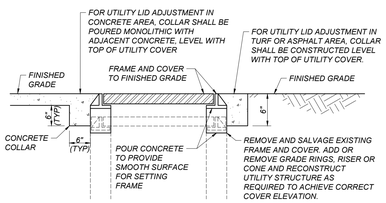
ONE-WAY

NOTES:
1. USE ONE-WAY CLEANOUTS AT ALL ANGLE POINTS
2. TWO-WAY CLEANOUTS AT ALL OTHER LOCATIONS
3. 6" THICK CONCRETE COLLAR IN VEHICULAR TRAFFIC AREAS

J SD/X101 SURFACE CLEANOUT
NOT TO SCALE



K SD/X101 TRENCH DETAIL FOR UTILITY LINES
NOT TO SCALE



L SD/X101 ADJUST UTILITY LID
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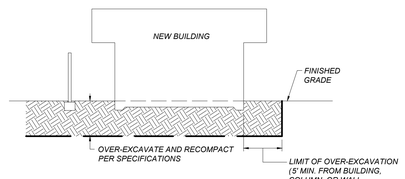

M SD/X101 OVER-EXCAVATION
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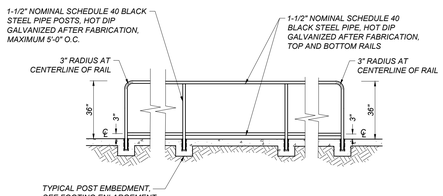

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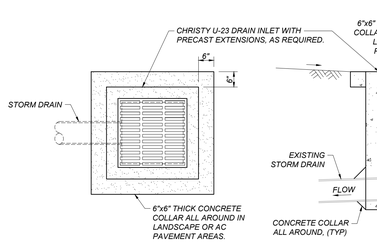
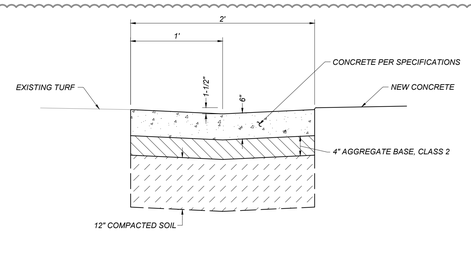
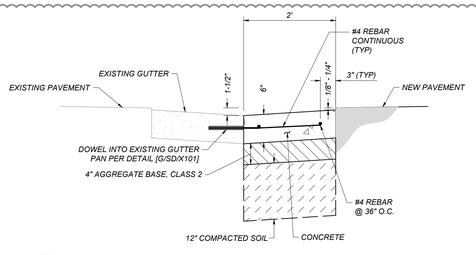


O SD/X101 U-23 DRAIN INLET WITH CONCRETE COLLAR
NOT TO SCALE



P SD/X101 CONCRETE VALLEY GUTTER
NOT TO SCALE



Q SD/X101 REINFORCED CONCRETE VALLEY GUTTER
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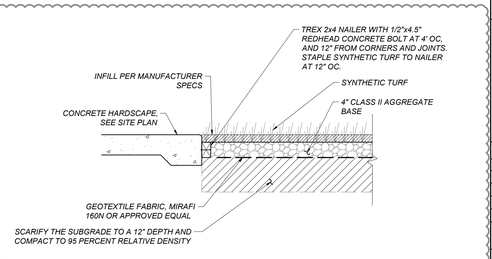

R SD/X101 NON-RESILIENT SURFACING WITH SYNTHETIC TURF & NAILER
NOT TO SCALE

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

General Notes

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Fax (559) 326-1500
REGISTERED PROFESSIONAL ENGINEER LANE R. BLAIR No. 47033 CIVIL STATE OF CALIFORNIA

Consultant

4/17/25
Date Signed

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

DETAILS

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT PIERRE R. DARDEN No. C-20,307 Exp. 6-30-26 STATE OF CALIFORNIA

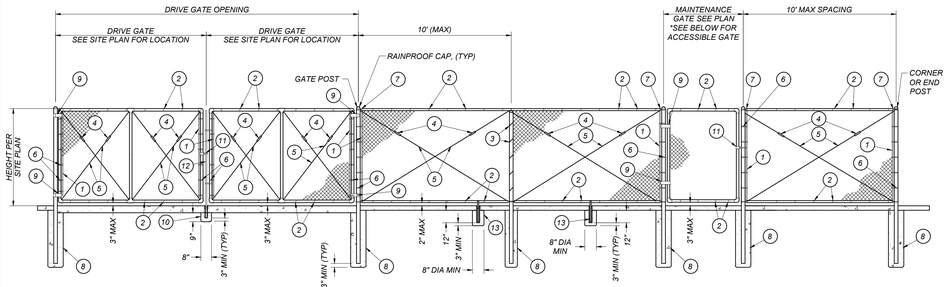
Architect

No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

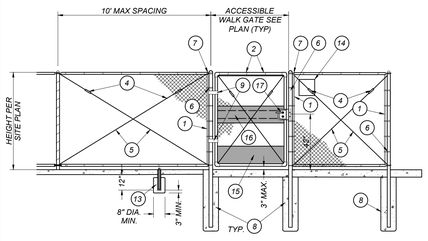
Revision

		Designed By: DG	Copyright 2025 Darden Architects
Scale:	AS NOTED	Drawn By: SD	
Project Number:	2277	Checked By: LRB	SD/X101
Date:	4/22/2025	Reviewed By: JB	AD4-CX06
			Sheet: 9 of: 10

Drawing: P:\224\224-0172\Site\production\drawings\224172_DT01.dwg; X101 — BCF.CTB
Plot by: dgoens — Jul 22, 2025 — 2:36pm



FENCE AND GATE ELEVATIONS



ACCESSIBLE PEDESTRIAN GATE

CHAIN LINK FENCE SIZING SCHEDULE - OPEN FABRIC

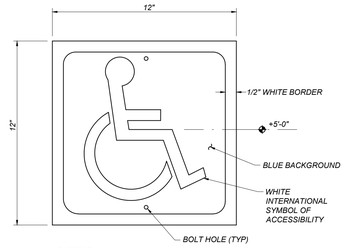
FENCE HEIGHT	END, ANGLE, CORNER POSTS			LINE POSTS			SINGLE LEAF MAN GATE POSTS			DOUBLE GATE POSTS			COMMENT
	POST DIAMETER	FOOTING DIAMETER	FOOTING DEPTH	POST DIAMETER	FOOTING DIAMETER	FOOTING DEPTH	POST DIAMETER	FOOTING DIAMETER	FOOTING DEPTH	POST DIAMETER	FOOTING DIAMETER	FOOTING DEPTH	
4'	2-7/8" O.D.	12"	4'-0"	2-3/8" O.D.	12"	3'-3"	2-7/8" O.D.	12"	4'-0"	6" O.D.	15"	5'-0"	1.66" O.D. TOP AND BOTTOM RAIL, SCHEDULE 40
6'	2-7/8" O.D.	12"	4'-0"	2-3/8" O.D.	12"	3'-3"	2-7/8" O.D.	12"	4'-0"	6" O.D.	15"	5'-0"	

OPEN FABRIC CHAIN LINK FENCE AND GATE LEGEND:

1. 1/8" X 3/4" GALVANIZED STEEL STRETCHER BAR.
2. 9 GAUGE (0.148" DIA) GALVANIZED STEEL TIE WIRES OR HOG RINGS AT 15" MAXIMUM SPACING. MINIMUM OF 8 TIE WIRES PER EACH 10' HORIZONTAL RAIL.
3. 6 GAUGE (0.192" DIA) GALVANIZED STEEL POST CLIPS AT 14" MAXIMUM SPACING. MINIMUM 3 POST CLIPS FOR EACH 4' POST.
4. GALVANIZED ADJUSTABLE TURNBUCKLE FOR 3/8" DIAMETER TRUSS ROD.
5. 3/8" DIAMETER GALVANIZED STEEL ADJUSTABLE TRUSS ROD. TRUSS RODS REQUIRED FOR ALL GATE POST PANELS, END OR CORNER POST PANELS.
6. 1/8" THICK GALVANIZED STEEL STRETCHER BAR TENSION BAND AT 12" MAXIMUM SPACING. MINIMUM OF 4 TENSION BANDS FOR EACH 4' POST SECTION.
7. GALVANIZED RAIL ENDS.
8. CONCRETE FOOTING, TYPICAL.
9. HINGES PER THE SPECIFICATION.
10. GALVANIZED STEEL PIPE SLEEVE FOR GATE DROP ROD.
11. LOCKABLE FORK LATCH PER SPECIFICATIONS
12. CENTER GATE DROP POST AND LATCH
13. INSTALL GATE HOLDBACK FOR ALL GATES.
14. ACCESSIBLE GATE SIGN PER DETAIL [B/SD/X102]
15. 10" HIGH, 1/8" THICK STEEL PLATES WELDED ON BOTH SIDES OF THE GATE AT BOTTOM FULL WIDTH OF THE GATE. THE KICK PLATE AND WELDS SHALL BE GALVANIZED FOR CORROSION RESISTANCE.
16. 24" HIGH, CENTER ON LATCH, 1/8" THICK STEEL PLATES WELDED ON THE NON FABRIC SIDE, THE FULL WIDTH OF THE GATE. THE PLATE AND WELDS SHALL BE GALVANIZED FOR CORROSION RESISTANCE PER THE SPECIFICATION.
17. ALL WALK GATES SHALL HAVE ADA/ CBC COMPLIANT ACCESSIBLE HARDWARE WHEN LOCATED WITHIN ACCESSIBLE PATH OF TRAVEL. GATE LATCH SHALL REQUIRE A MAXIMUM OF 5 LBS OF PRESSURE TO OPERATE. PROVIDE GATE NIGHT LATCH AND HARDWARE PER SPECIFICATIONS AT EXIT GATES.

OPEN FABRIC CHAIN LINK FENCE AND GATE NOTES:

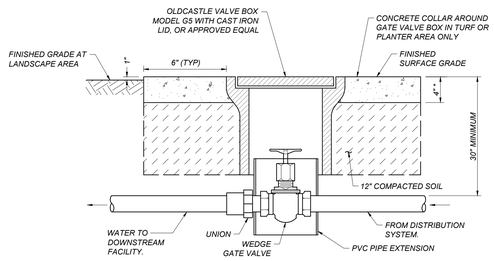
1. GATE FRAME SHALL BE 2" O.D. GALVANIZED STEEL (2.72 LB/FT).
2. FENCE FABRIC SHALL BE 2" X 2" MESH X 9 GAUGE GALVANIZED FENCE FABRIC WITH KNUCKLED TOP AND BOTTOM SELVAGE. FENCE FABRIC TO BE GALVANIZED BEFORE WEAVING (GBW)
3. ALL FENCES ADJACENT TO ATHLETIC FIELDS, COURTS, BALLFIELDS, OR RUNNING TRACKS SHALL HAVE 1.66" O.D. BOTTOM RAILS INSTEAD OF TENSION WIRE
4. MATCH OWNER'S LOCKSET GATE HARDWARE AND KEYING SYSTEM FOR ALL KEYED GATES.
5. WALK GATE POST SIZE LIMITED TO 6 FOOT WIDTH OR LESS. SEE DRIVE GATE SIZING FOR LARGER LEAF WIDTHS.
6. DOUBLE TRUSS RODS ARE REQUIRED IN PANELS ADJACENT TO GATE POSTS AND AT ALL FENCE CORNERS AND END PANELS.
7. ALL GATE CORNERS AND SUPPORT POINTS SHALL BE FASTENED TOGETHER AND REINFORCED WITH MALLEABLE IRON FITTINGS DESIGNED FOR THAT PURPOSE. WELDED CONNECTIONS WILL NOT BE ALLOWED.
8. TACK WELD ALL GATE HINGES AND LATCH COLLARS TO POST.
9. ALL AREAS AFFECTED BY WELDING, TRIMMED ENDS OF BOLTS, STRETCHER BARS, TRUSS RODS OR ANY EXPOSED STEEL SHALL BE PAINTED (GALVANIZED) PER CONTRACT SPECIFICATIONS.
10. CONTRACTOR TO PROVIDE AND INSTALL GATE HOLDBACK FOR EACH GATE. HOLDBACK TO BE INSTALLED IN FENCE MOWSTRIP UNLESS OTHERWISE NOTED.
11. ALL ACCESSIBLE GATES SHALL HAVE:
    a. HANDLES, PULLS, LATCHES, LOCKS AND OTHER OPERABLE PARTS ON DOORS AND GATES SHALL COMPLY CBC SECTION 11B-404.2.7 OPERABLE PARTS OF SUCH HARDWARE SHALL BE 34 INCHES MINIMUM AND 44 INCHES MAXIMUM ABOVE THE FINISH FLOOR OR GROUND. THE MAXIMUM FORCED TO ACTIVATE OPERABLE PARTS SHALL BE 5LBS PER CBC 11B-309.4.
    b. SWINGING DOOR AND GATE SURFACES WITHIN 10 INCHES OF THE FINISH FLOOR OR GROUND MEASURED VERTICALLY SHALL HAVE A SMOOTH SURFACE ON BOTH SIDES EXTENDING THE FULL WIDTH OF THE DOOR OR GATE. PARTS CREATING HORIZONTAL OR VERTICAL JOINTS IN THESE SURFACES SHALL BE WITHIN 1/16 INCH OF THE SAME PLANE AS THE OTHER AND BE FREE OF SHARP OR ABRASIVE EDGES. CAVITIES CREATED BY ADDED KICK PLATES SHALL BE CAPPED.
12. CLOSERS SHALL BE ADJUSTED SO THAT FROM AN OPEN POSITION OF 90 DEGREES, THE TIME REQUIRED TO MOVE THE DOOR TO A POSITION OF 12 DEGREES FROM THE LATCH IS 5 SECONDS MINIMUM PER CBC 11B-404.2.8.1.
13. GATE SPRING HINGES SHALL BE ADJUSTED SO THAT FROM AN OPEN POSITION OF 70 DEGREES, THE TIME REQUIRED TO MOVE THE DOOR TO THE CLOSED POSITION IS 1.5 SECONDS MINIMUM PER CBC 11B-404.2.8.2.
14. ACCESSIBLE GATE SHALL HAVE A MINIMUM CLEAR OPENING OF 32 INCHES AND A MAXIMUM CLEAR OPENING OF 48 INCHES PER CBC 11B-404.2.3
15. THE MAXIMUM FORCE TO PUSH OR PULL OPEN A GATE SHALL BE 5 LBS. (11B-404.2.9)



NOTES:

1. SIGN BY "STOP SIGNS AND MORE", MODEL SKU:PAR-1124 WITH WEATHER AND GRAFFITI PROTECTION OR APPROVED EQUAL.
2. BACKING PLATE 12"x12"x16 GAUGE METAL PLATE, SANDWICH CHAIN LINK FABRIC BETWEEN SIGN AND BACKING PLATE. FASTEN TOGETHER WITH TAMPER RESISTANT THRU BOLTS SIMILAR TO DETAIL [C/SD/X102].

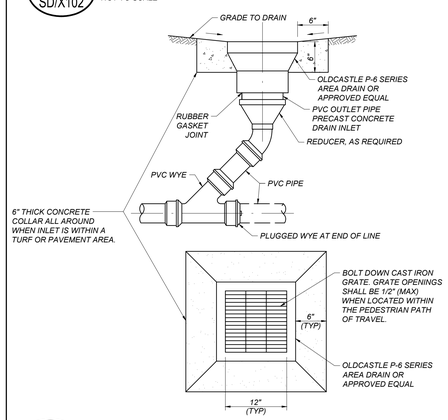
B SD/X102 ENTRY ACCESSIBILITY SIGN
NOT TO SCALE



2" AND SMALLER

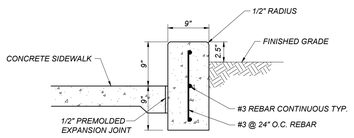
NOTE:
* COLLAR TO BE 6" THICK IN VEHICULAR TRAFFIC AREAS

A SD/X102 CHAIN LINK FENCE AND GATES
NOT TO SCALE



C SD/X102 GATE VALVE AND LID
NOT TO SCALE

D SD/X102 P-6 SERIES AREA DRAIN
NOT TO SCALE

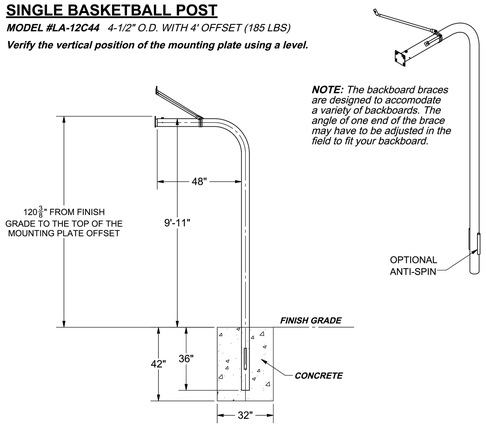


E SD/X102 PLANTER CURB
NOT TO SCALE

SINGLE BASKETBALL POST

MODEL #LA-12C44 *4-1/2" O.D. WITH 4' OFFSET (185 LBS)*

Verify the vertical position of the mounting plate using a level.



NOTE: *The backboard braces are designed to accomodate a variety of backboards. The angle of one end of the brace may have to be adjusted in the field to fit your backboard.*

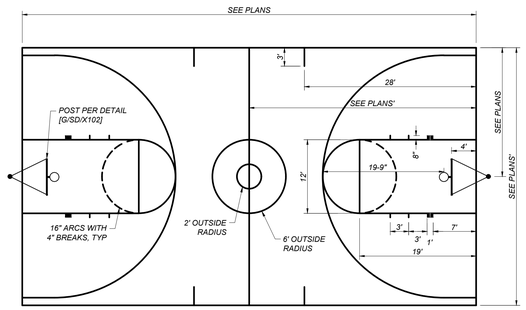
SPECIFICATIONS:

Material: The support post is a single length of 4-1/2" O.D. galvanized steel formed to provide a 4 ft. offset. The backboard mount is a 6-1/4" x 6-1/2" steel plate welded to the sleeve adapter and mounted to the support post with a set screw and drive pins.

A pair of 1" O.D. galvanized steel diagonal braces is mounted between the backboard and the post. The braces bolt to the backboard and are secured to the post with a pair of brace bands formed to fit the post diameter.

All welds are ground smooth and either treated with cold-galvanizing compound or prepared for powder coating, depending on the finish selected. All the hardware is zinc-plated for long rust-free service.

Steelcraft ELEMENTS FOR LIFE OUTSIDE www.LASTEELCRAFT.com 1-800-371-2438	Date: 8/29/23	SPECIFICATION / INSTALLATION INSTRUCTIONS
	Rev:	SINGLE POST GOOSENECK
	Drawn: CW	MODEL NO.
	Sheet: 1 of 2	LA-12C44-SPEC

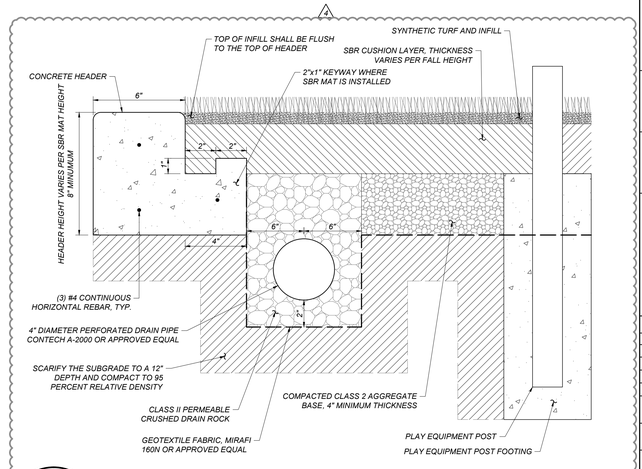


PLAYCOURT NOTES:

1. ALL COURT LINES ARE TO BE 2" IN WIDTH.
2. BASKETBALL COURTS SHALL BE STRIPED WHITE.
3. BACKBOARD SHALL MATCH EXISTING ON SITE MODEL AND CONTAIN AN ORANGE TARGET.
4. ALL GAME COURT DIMENSIONS ARE TO THE INSIDE OF COURT LINES, WITH THE EXCEPTION OF THE CENTERLINES.
5. CONTRACTOR IS RESPONSIBLE FOR GAME COURT LAYOUTS AND LOCATING POSTS, AS NEEDED.

F SD/X102 BASKETBALL COURT
NOT TO SCALE

G SD/X102 SINGLE BASKETBALL POST
NOT TO SCALE



H SD/X102 RESILIENT PLAYGROUND SURFACING WITH SYNTHETIC TURF & HEADER
NOT TO SCALE

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

General Notes

Blair, Church & Flynn CONSULTING ENGINEERS
Blair, Church & Flynn Consulting Engineers
451 Clovis Avenue, Suite 200
Clovis, California 93612
Tel (559) 326-1400
Fax (559) 326-1500

REGISTERED PROFESSIONAL ENGINEER — LYNE R. BLAIR — No. 57033 — CIVIL — STATE OF CALIFORNIA

Consultant — 4/17/25 Date Signed:

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

DETAILS

Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT — GRANT E. DODSON — No. C-20,307 — Exp. 6-30-25 — STATE OF CALIFORNIA

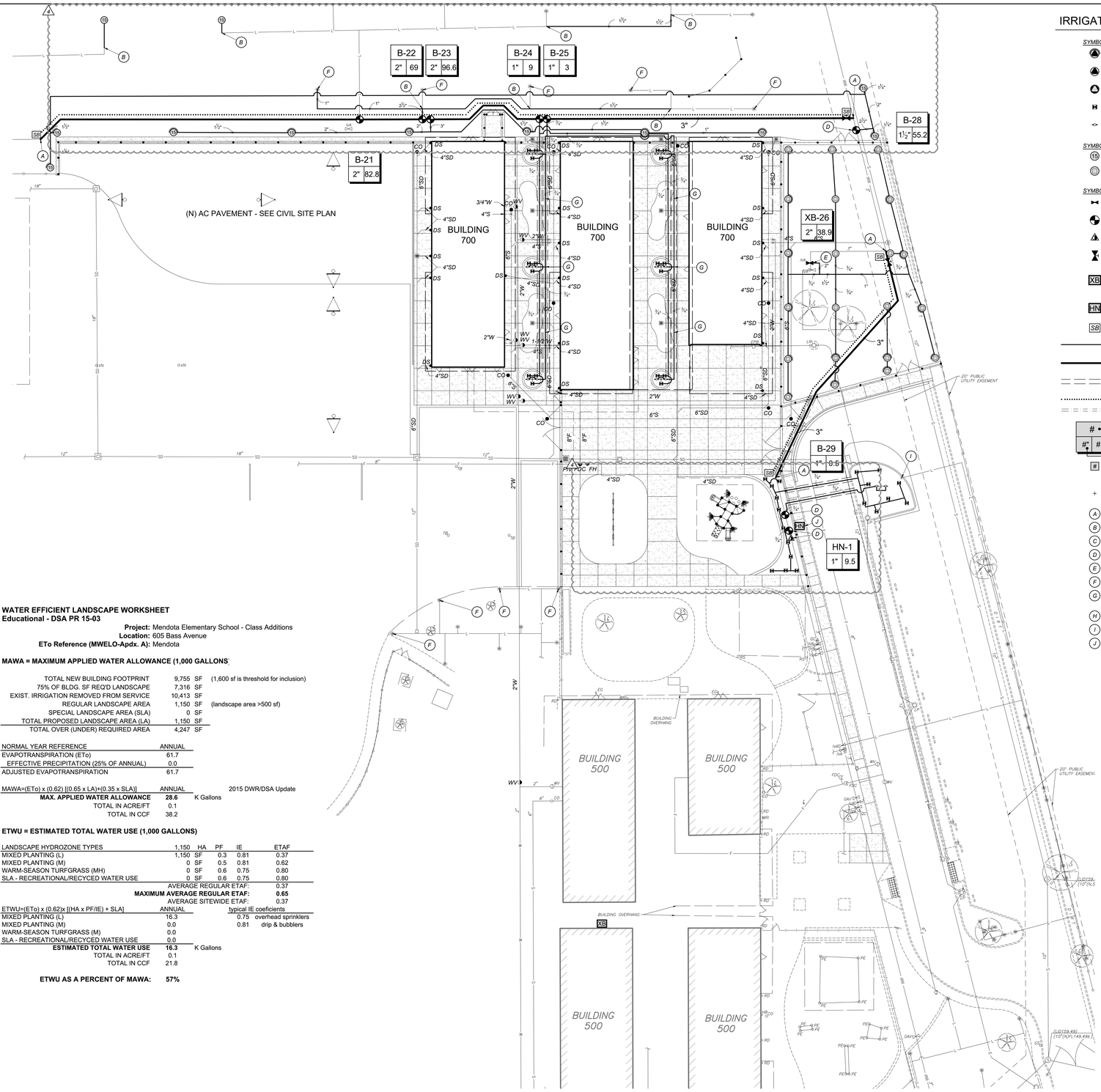
Architect

No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

Revision

	Designed By: DG	Copyright 2025 Darden Architects
Scale: AS NOTED	Drawn By: SD	SD/X102
Project Number: 2277	Checked By: LRB	AD4-CX07
Date: 4/22/2025	Reviewed By: JB	Sheet: 10 of: 10

Drawing: P:\2241\224-0172\Site\productiondrawings\224172_0701.dwg; X102 - BCF.CTB
Plot by: dgoona Jul 22, 2025 - 2:36pm



IRRIGATION LEGEND:

FLOW FOR ADJUSTABLE NOZZLES ARE LISTED FOR 180 DEGREE ARCS

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	ARC	PSI	GPM	RADIUS	DETAIL
	TURF ROTATOR M HUNTER MP1000 PROS-04-PRS40-CV-R	90-210	40	0.48	14'	I/SD/L102
	TURF ROTATOR O HUNTER MP1000 PROS-04-PRS40-CV-R	360	40	0.48	14'	I/SD/L102
	TURF ROTATOR K HUNTER MP2000 PROS-04-PRS40-CV-R	90-210	40	0.47	19'	I/SD/L102
	SHRUB BUBBLER 50H HUNTER PROS-04-PRS30-CV-R-MSBN	180	30	0.5	1'	K/SD/L102
	TREE BUBBLERS 25 HUNTER RZWS-18-25-CV-R	360	30	0.25	3'	L/SD/L102

SYMBOL	MANUFACTURER/MODEL	PSI	GPM	RADIUS	DETAIL
15	TURF ROTOR - HUNTER I-40 15	50	13.8	54'	J/SD/L102
	TURF ROTOR - HUNTER MPR 25	45	0.61	25'	J/SD/L102

SYMBOL	MANUFACTURER/MODEL/DESCRIPTION	DETAIL
	EXISTING REMOTE CONTROL VALVE HUNTER ICV-G-R	
	REMOTE CONTROL VALVE HUNTER ICV-G-R	H/SD/L102
	QUICK COUPLER VALVE RAIN BIRD 33-DNP	M/SD/L102
	GATE VALVE LEEMCO LMV-338B	F/SD/L102
XB	EXISTING IRRIGATION CONTROLLER 'B' HUNTER IC-600-PL WITH FOUR ICM-600 MODULES. WALL MOUNTED ON NORTH EXTERIOR OF BLDG. 400. 27/30 STATIONS	
HN	HUNTER NODE HUNTER NODE-200. SEE KEYNOTE "J" FOR ADDITIONAL INFORMATION.	
SB	SPLICE BOX	N/SD/L102
	IRRIGATION LATERAL LINE: PVC CLASS 200 SDR 21 SOLVENT WELD, PURPLE PIPE, SIZE AS NOTED	C/SD/L102
	IRRIGATION MAINLINE: PVC CLASS 315 SDR 13.5 GASKETED, BELL-END, 18" DEEP	A/SD/L102
	PIPE SLEEVE: PVC SCHEDULE 40 PURPLE PIPE, TWICE PIPE SIZE	D/SD/L102
	CONTROL WIRE PLUS ONE (1) COMMON WIRE	E/SD/L102
	CONTROL WIRE SLEEVE	D/SD/L102
#	VALVE NUMBER	
#" #	VALVE FLOW (GPM) VALVE SIZE	
#	NUMBER OF SPARE CONTROL WIRE PLUS ONE (1) SPARE COMMON WIRE. PROVIDE A 10 FOOT LOOP IN VALVE BOX	
+	PROPOSED TREE, SEE PLANTING PLAN ON SHEET L201 FOR VARIETY AND SIZE	
A	CONNECT NEW MAIN LINE TO EXISTING MAIN LINE. RUN NEW CONTROL WIRE AS NEEDED	
B	CONNECT NEW LATERAL LINE TO EXISTING LATERAL LINE	
C	CONNECT NEW LATERAL LINE TO EXISTING IRRIGATION HEAD	
D	CONNECT NEW REMOTE CONTROL VALVE ON EXISTING MAIN LINE PROVIDE CONTROL WIRE AS NEEDED.	
E	CONNECT NEW LATERAL TO EXISTING REMOTE CONTROL VALVE	
F	ADJUST HEADS/NOZZLES FOR NEW IMPROVEMENTS. SEE GENERAL IRRIGATION NOTE #17	
G	PIPE SHOWN OUTSIDE OF PLANTER FOR CLARITY. INSTALL PIPE WITHIN PLANTER. SEE GENERAL IRRIGATION NOTE #8	
H	INSTALL NEW HEAD ON EXISTING LATERAL LINE	
I	CAP EXISTING IRRIGATION	
J	VERIFY SPARE WIRE FOR NEW VALVE. IF NO SPARE WIRE IS AVAILABLE, PROVIDE HUNTER NODE-200 IN IRRIGATION VALVE BOX HN-1.	

WATER EFFICIENT LANDSCAPE WORKSHEET
Educational - DSA PR 15-03

Project: Mendota Elementary School - Class Additions
Location: 605 Bass Avenue
ETo Reference (MWELO-Apdx. A): Mendota

MAWA = MAXIMUM APPLIED WATER ALLOWANCE (1,000 GALLONS)

TOTAL NEW BUILDING FOOTPRINT	9,755 SF	(1,600 sf is threshold for inclusion)
75% OF BLDG. SF REQ'D LANDSCAPE	7,316 SF	
EXIST. IRRIGATION REMOVED FROM SERVICE	10,413 SF	
REGULAR LANDSCAPE AREA	1,150 SF	(landscape area >500 sf)
SPECIAL LANDSCAPE AREA (SLA)	0 SF	
TOTAL PROPOSED LANDSCAPE AREA (LA)	1,150 SF	
TOTAL OVER (UNDER) REQUIRED AREA	4,247 SF	

NORMAL YEAR REFERENCE	ANNUAL
EVAPOTRANSPIRATION (ETo)	61.7
EFFECTIVE PRECIPITATION (25% OF ANNUAL)	0.0
ADJUSTED EVAPOTRANSPIRATION	61.7

MAWA=(ETo) x (0.62) [(0.65 x LA)+(0.35 x SLA)]	ANNUAL		2015 DWR/DSA Update
MAX. APPLIED WATER ALLOWANCE	**28.6**	K Gallons	
TOTAL IN ACRE/FT	0.1		
TOTAL IN CCF	38.2		

ETWU = ESTIMATED TOTAL WATER USE (1,000 GALLONS)

LANDSCAPE HYDROZONE TYPES	1,150 HA	PF	IE	ETAF
MIXED PLANTING (L)	1,150 SF	0.3	0.81	0.37
MIXED PLANTING (M)	0 SF	0.5	0.81	0.62
WARM-SEASON TURFGRASS (MH)	0 SF	0.6	0.75	0.80
SLA - RECREATIONAL/RECYCED WATER USE	0 SF	0.6	0.75	0.80
	AVERAGE REGULAR ETAF:			0.37
	MAXIMUM AVERAGE REGULAR ETAF:			**0.65**
	AVERAGE SITEWIDE ETAF:			0.37

ETWU=(ETo) x (0.62)x [(HA x PF/IE) + SLA]	ANNUAL		typical IE coeficients
MIXED PLANTING (L)	16.3		0.75 overhead sprinklers
MIXED PLANTING (M)	0.0		0.81 drip & bubblers
WARM-SEASON TURFGRASS (M)	0.0		
SLA - RECREATIONAL/RECYCED WATER USE	0.0		
ESTIMATED TOTAL WATER USE	**16.3**	K Gallons	
TOTAL IN ACRE/FT	0.1		
TOTAL IN CCF	21.8		

ETWU AS A PERCENT OF MAWA: 57%

IRRIGATION SYSTEM OBSERVATION LOG				
		REVIEWED & ACCEPTED BY OWNER'S REPRESENTATIVE		
ITEM NO.	*WORK ITEM DESCRIPTION*	*PRINT NAME*	*SIGNATURE*	*DATE*
IR-1	EXISTING SYSTEM OPERATION & PRESSURE CHECK			
IR-2	PIPING/WIRE SLEEVES UNDER PAVEMENT			
IR-3	MAIN LINE INSTALLATION & PRESSURE TEST			
IR-4	VALVE INSTALLATIONS			
IR-5	IRRIGATION COVERAGE PRIOR TO PLANTING			
IR-6	CONTROL EQUIPMENT INSTALLATION	N/A	N/A	
IR-7	BOOSTER PUMP INSTALLATION & START-UP (MANUF.)	N/A	N/A	
IR-8	FINAL SYSTEM OPERATION REVIEW			

NOTE: THE ORIGINAL VERSION OF THIS LOG SHALL BE MAINTAINED ON THE AS-BUILT RECORD DRAWING SET.
WORK ITEMS MAY NOT BE REVIEWED IF PRIOR WORK ITEMS HAVE NOT BEEN ACCEPTED.

POINT OF CONNECTION

WATER SERVICE SIZE/MAX FLOW: 3" / 100 GPM

WATER METER SIZE/75% MAX FLOW: 3" / 375 GPM

MAXIMUM STATION FLOW: 96.6 GPM

IRRIGATION BACKFLOW SIZE: 3"

IRRIGATION WATER SOURCE: FRESNO COUNTY, POTABLE

OPERATING STATIC PRESSURE: 62 PSI. SEE IRRIGATION GENERAL NOTE #3

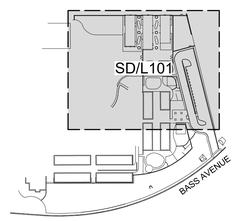
DESIGN OPERATING PRESSURE: 30 PSI BUBBLERS
40 PSI MP ROTATORS
45 PSI MPR ROTORS
50 PSI ROTORS

EXISTING VFD BOOSTER PUMP PARAMETERS:

SUPPLY PIPE SIZE:	3"
DISCHARGE PIPE SIZE:	3"
SUPPLY PRESSURE:	62 PSI
MAXIMUM DISCHARGE PRESSURE:	100 PSI
ACTIVATION MODE:	PROGRAM START (CONTRACTOR SHALL VERIFY)

SCALE: N 1"=20'

0 5 20 40
SCALE IN FEET



KEYMAP

Know what's below. Call before you dig.

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

IRRIGATION SYSTEM BID ALLOWANCE:

CONTRACTOR SHALL INCLUDE A BID ALLOWANCE IN THE AMOUNT OF $3,000 FOR THE REPLACEMENT OF EXISTING OR THE INSTALLATION OF NEW SPRINKLER HEADS, VALVES, PIPING AND OTHER EQUIPMENT AND ACCESSORIES NECESSARY FOR THE PROPER OPERATION OF THE EXISTING SYSTEM WHERE NOT SPECIFICALLY SHOWN ON THE DRAWINGS FOR REPLACEMENT OR NEW INSTALLATION.

WATER CONSERVATION COMPLIANCE STATEMENT:

I HAVE COMPLIED WITH THE CRITERIA OF THE LANDSCAPE WATER CONSERVATION ORDINANCE AND GUIDELINES, AND HAVE APPLIED THEM FOR THE EFFICIENT USE OF WATER IN THE IRRIGATION DESIGN PLAN.

DAVID W. BRILEY, RLA 2787

CONTRACTOR SPECIAL IRRIGATION NOTES:

1. *THE CONTRACTOR SHALL PERFORM AN OPERATIONAL ASSESSMENT OF THE EXISTING IRRIGATION SYSTEM WITHIN THE AREA OF WORK WITH THE OWNER'S REPRESENTATIVE PRIOR TO THE START OF CONSTRUCTION OPERATIONS.*
2. *THE CONTRACTOR SHALL ENSURE THAT ALL EXISTING PLANTING SCHEDULED TO REMAIN SHALL CONTINUE TO BE IRRIGATED THROUGHOUT THE COURSE OF CONSTRUCTION OPERATIONS. ANY DAMAGE TO THE EXISTING IRRIGATION SYSTEM THAT IMPACTS EXISTING PLANTING TO REMAIN SHALL BE IMMEDIATELY REPAIRED TO THE OWNER'S SATISFACTION.*
3. *PRIOR TO THE START OF ANY SHRUB, GROUND COVER, AND/OR TURFGRASS PLANTING, AN OPERATIONAL REVIEW OF THE IRRIGATION SYSTEM SHALL BE PERFORMED FOR PROPER COVERAGE AND SOIL MOISTURE DEPTH BY THE OWNER'S REPRESENTATIVE. ALL CORRECTIONS AND/OR ADJUSTMENTS SHALL BE COMPLETED AND VERIFIED BY THE OWNER'S REPRESENTATIVE BEFORE GROUND LEVEL PLANTING MAY COMMENCE.*
4. *THE ORIGINAL IRRIGATION SYSTEM OBSERVATION LOG SHALL BE MAINTAINED ON THE AS-BUILT RECORD DRAWING SET.*
5. *THE AS-BUILT RECORD DRAWING SET AND OTHER CLOSE-OUT ITEMS SHALL BE SUBMITTED AND ACCEPTED PRIOR TO THE SCHEDULING OF A FINAL ACCEPTANCE REVIEW.*
6. *UNLESS NOTED OTHERWISE, SALVAGE AND RETURN TO THE OWNER ALL IRRIGATION VALVES, HEADS AND OTHER EQUIPMENT COMPONENTS REMOVED AS PART OF THE WORK. SALVAGED COMPONENTS SHALL BE CLEAN AND IN WORKING CONDITION UNLESS NOTED AS NON-OPERATIONAL DURING THE OPERATIONAL ASSESSMENT.*

SEE SHEET L102 FOR IRRIGATION NOTES, MWELO CALCS AND DETAILS

General Notes

Blair, Church & Flynn CONSULTING ENGINEERS
Blair, Church & Flynn Consulting Engineers
451 Clovis Avenue, Suite 200
Clovis, California 93612
Tel (559) 326-1400
Fax (559) 326-1500

LICENSED LANDSCAPE ARCHITECT DAVID W. BRILEY No. 2787 12/31/26 RENEWAL DATE STATE OF CALIFORNIA

Consultant

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

IRRIGATION PLAN

Drawing

darden architects
ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT DARRYL E. DOSSER No. C-20,307 Exp. 8-30-27 STATE OF CALIFORNIA

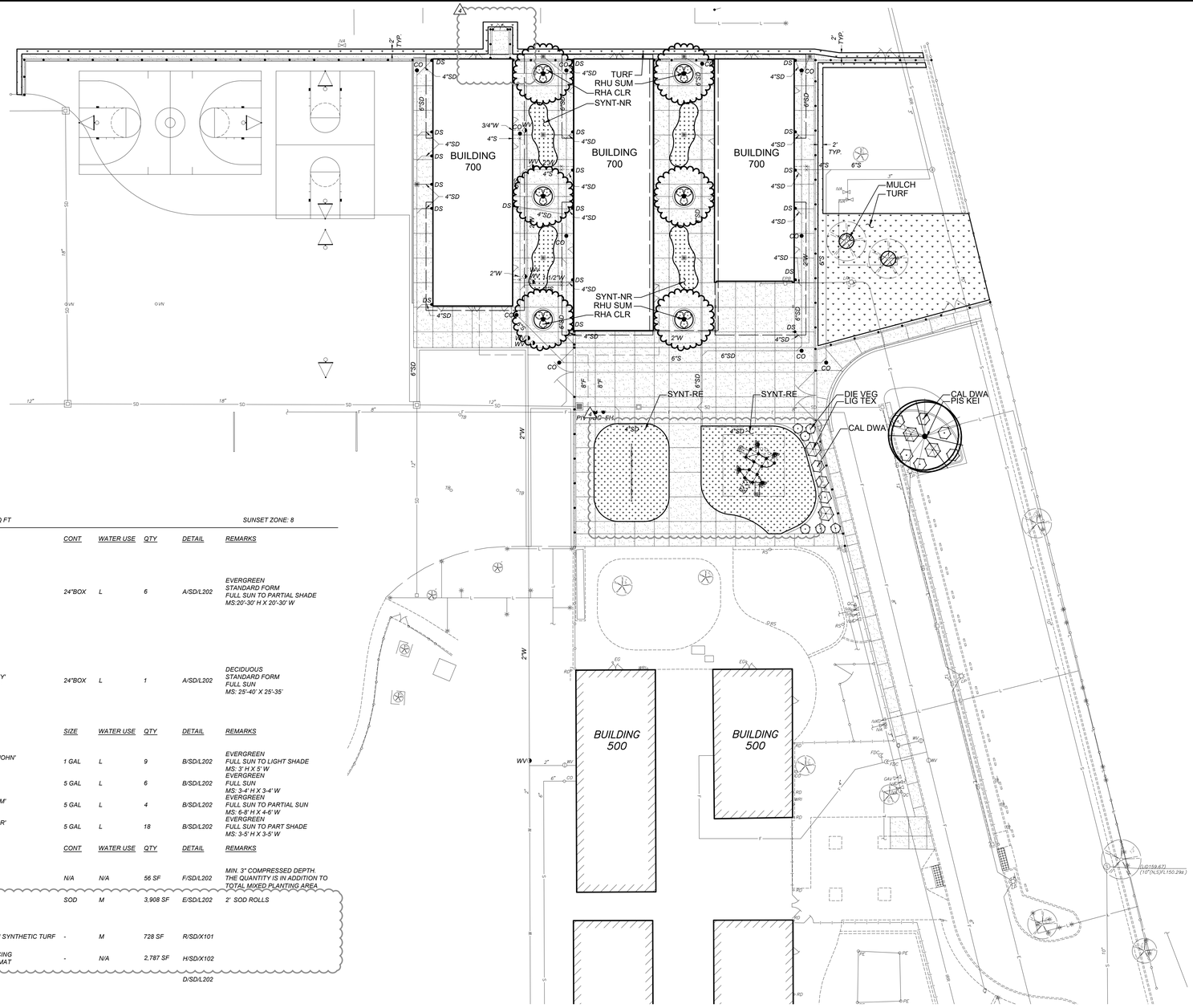
Architect

No.	Revision/Submission	Date
1	ADDENDUM 4	07/24/2025

Revision

	Designed By: DZ	Copyright 2025 Darden Architects
Scale: AS NOTED	Drawn By: DZ	
Project Number: 2277	Checked By: CMH	SD/L101
Date: 4/22/2025	Reviewed By: DWB	AD4-LX01
		Sheet: 01 of: 03

Drawing: P:\2241_224-0172\Site\productiondrawings\224172_IR01.dwg; L101 - BCF;CTB
Plot by: dgoona Jul 22, 2025 - 2:36pm



PLANT LEGEND:

TOTAL MIXED PLANTING AREA: 1,178 SQ FT — *SUNSET ZONE: 8*

SYMBOL	CODE	BOTANICAL / COMMON NAME	CONT	WATER USE	QTY	DETAIL	REMARKS
TREES							
	RHU SUM	SEARSIA LANCEA AFRICAN SUMAC	24"BOX	L	6	A/SD/L202	EVERGREEN STANDARD FORM FULL SUN TO PARTIAL SHADE MS:20'-30' H X 20'-30' W
LARGE TREES							
	PIS KEI	PISTACIA CHINENSIS 'KEITH DAVEY' KEITH DAVEY CHINESE PISTACHE	24"BOX	L	1	A/SD/L202	DECIDUOUS STANDARD FORM FULL SUN MS: 25'-40' X 25'-35'
SYMBOL	**CODE**	**BOTANICAL / COMMON NAME**	**SIZE**	**WATER USE**	**QTY**	**DETAIL**	**REMARKS**
SHRUBS							
	CAL DWA	CALLISTEMON VIMINALIS 'LITTLE JOHN' DWARF WEEPING BOTTLEBRUSH	1 GAL	L	9	B/SD/L202	EVERGREEN FULL SUN TO LIGHT SHADE MS: 3' H X 5' W
	DIE VEG	DIETES VEGETA AFRICAN IRIS	5 GAL	L	6	B/SD/L202	EVERGREEN FULL SUN MS: 3-4' H X 3-4' W
	LIG TEX	LIGUSTRUM JAPONICUM 'TEXANUM' TEXAS JAPANESE PRIVET	5 GAL	L	4	B/SD/L202	EVERGREEN FULL SUN TO PARTIAL SUN MS: 6-8' H X 4-6' W
	RHA CLR	RHAPHIOLEPIS UMBELLATA 'MINOR' CLARA INDIAN HAWTHORN	5 GAL	L	18	B/SD/L202	EVERGREEN FULL SUN TO PART SHADE MS: 3-5' H X 3-5' W
SYMBOL	**CODE**	**BOTANICAL / COMMON NAME**	**CONT**	**WATER USE**	**QTY**	**DETAIL**	**REMARKS**
GROUND COVERS							
	MULCH	WOOD MULCH WALK-ON BARK TYPE	N/A	N/A	56 SF	F/SD/L202	MIN. 3" COMPRESSED DEPTH. THE QUANTITY IS IN ADDITION TO TOTAL MIXED PLANTING AREA
	TURF	'CELEBRATION' BERMUDAGRASS	SOD	M	3,908 SF	E/SD/L202	2" SOD ROLLS
TURF							
	SYNT-NR	NON-RESILIENT SURFACING WITH SYNTHETIC TURF	-	M	728 SF	R/SD/X101	
	SYNT-RE	RESILIENT PLAYGROUND SURFACING WITH SYNTHETIC TURF AND SBR MAT	-	N/A	2,787 SF	H/SD/X102	
		ROOT BARRIER UB24-2				D/SD/L202	

TREE SIZE AND QUALITY STANDARDS

AMERICAN STANDARDS FOR NURSERY STOCK (ANSI Z60.1) AND GUIDELINE SPECIFICATIONS FOR NURSERY TREE QUALITY (URBAN TREE FOUNDATION) SHALL APPLY

	TYPES 1 & 2 SHADE TREES			TYPE 3 SMALL UPRIGHT TREES**			TYPE 4 SMALL SPREADING TREES***		
CONTAINER SIZE	MIN. CALIPER	MAX. CALIPER	TYPE 1 MIN./MAX. HEIGHT*	MIN. CALIPER	MAX. CALIPER	MIN./MAX. HEIGHT	MIN. CALIPER	MAX. CALIPER	MIN./MAX. HEIGHT
15 GALLON	0.75	2.0	7-10 FT	0.75	2.0	6-8 FT	0.75	2.0	4-8 FT
24" BOX	1.25	3.0	8-12 FT	1.25	3.0	8-10 FT	1.25	3.0	6-10 FT
36" BOX	1.75	3.5	10-16 FT	1.75	3.5	10-14 FT	1.75	3.5	7-12 FT
42" BOX	2.0	4.0	12-20 FT	2.0	4.0	12-18 FT	2.0	4.0	8-14 FT
48" BOX	2.5	5.0	14-26 FT	2.5	5.0	14-22 FT	2.5	5.0	9-16 FT

* TYPE 2 TREE HEIGHTS SHALL NOT BE LESS THAN TWO-THIRDS THE LISTED HEIGHT RANGE.

** TYPE 3 TREES SHALL HAVE A MINIMUM OF SEVEN BRANCHES

*** TYPE 4 TREES SHALL HAVE A MINIMUM OF EIGHT BRANCHES

CALIPER MEASUREMENT FOR CLUMP OR MULTI-STEM TREES IS ONE-HALF THE SUM OF THE THREE LARGEST TRUNK CALIPERS

CALIPER MEASUREMENT: FOR <4" TRUNK IS +6" ABOVE ROOTBALL (NOT INCLUDING ROOTSTOCK). >4" TRUNK IS +12"

TREES SHALL HAVE A CENTRAL LEADER. NEW LEADERS LESS THAN HALF THE DIAMETER OF A HEADED LEADER, BROKEN OR CO-DOMINATE LEADERS ARE NOT ACCEPTABLE

SCAFFOLD BRANCHES SHALL BE LESS THAN 2/3 THE DIAMETER OF THE TRUNK, WITHOUT INCLUDED BARK AT ATTACHMENT. SCAFFOLD BRANCHES SHALL BE BALANCED, WELL SPACED VERTICALLY, AND WITH A RADIALLY BLANK SECTOR NO GREATER THAN 1/3 OF THE CANOPY CIRCUMFERENCE.

TEMPORARY BRANCHES ON THE LOWER TRUNK SHALL BE LESS THAN 3/8 INCH DIAMETER, AND THE CLEAR TRUNK HEIGHT SHALL BE NO MORE THAN 40% OF THE TOTAL TREE HEIGHT.

THE ROOT COLLAR AND ROOTBALL SHALL BE FREE OF DEFECTS INCLUDING CIRCLING, KINKED AND GIRDLING ROOTS. ROOTS THE EDGE AND BOTTOM OF THE CONTAINER SHALL BE LESS THAN 1/4 INCH DIAMETER, AND UNIFORM THROUGHOUT THE CONTAINER.

TREE CANOPY WIDTH SHALL BE A MINIMUM OF 25% OF THE STANDARD FORM TREE HEIGHT.

DO NOT HEAD BACK OR PRUNE TREES UNLESS APPROVED AND/OR DIRECTED TO BY THE LANDSCAPE ARCHITECT

LANDSCAPE SHADE CALCULATIONS *SHADING PER CALGREEN 5.106.12*

SITE SHADING - LANDSCAPE & HARDSCAPE	QUANTITY PROPOSED (SF)	PERCENT REQUIRED	SHADE AREA REQUIRED (SF)
LANDSCAPED AREA (EXCLUDING SPECIAL USE & PARKING LANDSCAPE AREAS)	1,178	20	236
UNCOVERED HARDSCAPE AREA (EXCLUDING PARKING HARDSCAPE AREAS)	2,408	20	482
TOTAL SITE SHADE REQUIRED			717
PROVIDED SHADE TREES	**PROVIDED SHADE AREA**	**NO. TREES**	
VERY LARGE (40' dia.= 1256 SF)	0	0	
LARGE (35' dia.= 962 SF)	0	0	
MEDIUM (30' dia.= 707 SF)	0	0	
SMALL (20' dia.= 314 SF)	1,884	6	
TOTALS	1,884	6	
OVER (UNDER) LANDSCAPE & HARDSCAPE SHADE REQUIREMENT			**1,167**

LANDSCAPE PLANTING AREA REQUIREMENT:

NEW BUILDING FOOTPRINT:	9,755	S.F.
REQUIRED MWELO COMPLIANT PLANTING:	7,316	S.F.
EXISTING IRRIGATION AREA SCHEDULED FOR REMOVAL:	10,413	S.F.
PROPOSED NEW COMPLIANT PLANTING:	3,072	S.F.
TOTAL MWELO COMPLIANT PLANTING:	13,485	S.F.
EXCESS / DEFICIT OF PROPOSED COMPLIANT PLANTING:	6,169	S.F.

LANDSCAPE PLANTING OBSERVATION LOG

ITEM NO.	WORK ITEM DESCRIPTION	REVIEWED & ACCEPTED BY OWNER'S REPRESENTATIVE: PRINT NAME	SIGNATURE	DATE
PL-1	REPORT & PROTECTION OF EXISTING TREES			
PL-2	RIPPING OF PLANTING AREAS			
PL-3	SOIL CONDITIONING & TILLAGE DEPTH			
PL-4	IRRIGATION COVERAGE PRIOR TO PLANTING			
PL-5	FINISH GRADING PRIOR TO PLANTING			
PL-6	TREES - INITIAL QUALITY & LAYOUT			
PL-7	PLANTS - INITIAL QUALITY & LAYOUT			
PL-8	GRANULAR PRE-EMERGENT HERBICIDE IN MULCHED AREAS			
PL-9	WOOD MULCH DEPTH			

NOTES: THE ORIGINAL VERSION OF THIS LOG SHALL BE MAINTAINED ON THE AS-BUILT RECORD DRAWING SET.
WORK ITEMS MAY NOT BE REVIEWED IF PRIOR WORK ITEMS HAVE NOT BEEN ACCEPTED.

SCALE: N 1"=20'

0 5 20 40
SCALE IN FEET

KEYMAP

Know what's below. Call before you dig.

DSA File No.: 10-89

DSA Application No.: 02-122955

Agency Approval

CONTRACTOR SPECIAL PLANTING NOTES:

1. *AN ASSESSMENT AND VALUATION OF ONSITE EXISTING TREES SCHEDULED TO REMAIN IN THE AREA OF WORK SHALL BE PERFORMED BY THE CONTRACTOR'S ARBORIST PRIOR TO THE START OF CONSTRUCTION OPERATIONS PER THE 'EXISTING LANDSCAPE PROTECTION' SPECIFICATION.*
2. *THE CONTRACTOR SHALL RIP, CONDITION AND TILL THE ENTIRE EXTENT OF ALL PLANTING AREAS RECEIVING NEW PLANTS PER THE PLANTING NOTES AND 'LANDSCAPE PLANTING' SPECIFICATIONS.*
3. *ALL EXISTING MIXED PLANTING AREAS RECEIVING NEW WOOD MULCH SHALL BE MANUALLY TILLED TO A MINIMUM DEPTH OF 4 INCHES, CLODS BROKEN UP TO A MAXIMUM 1 INCH DIAMETER. FINISH GRADED TO 2 INCHES BELOW ADJACENT SURFACES AND UTILITY/IRRIGATION BOXES WITHIN 12 INCHES OF THE HARDSCAPE EDGE, AND A PRE-EMERGENT HERBICIDE APPLIED PRIOR TO WOOD MULCH INSTALLATION. PROTECT EXISTING PLANTING DURING WOOD MULCH PREPARATION AND INSTALLATION.*
4. *THE ORIGINAL PLANTING OBSERVATION LOG SHALL BE MAINTAINED ON THE AS-BUILT RECORD DRAWING SET.*
5. *THE AS-BUILT RECORD DRAWING SET AND MAINTENANCE MANUAL SHALL BE SUBMITTED AND ACCEPTED PRIOR TO THE SCHEDULING OF A FINAL ACCEPTANCE REVIEW.*

LANDSCAPE PLANTING BID ALLOWANCE:

CONTRACTOR SHALL INCLUDE A BID ALLOWANCE IN THE AMOUNT OF $1,000 FOR THE REMOVAL AND REPLACEMENT OF EXISTING PLANTS/TURFGRASS AND/OR THE INSTALLATION OF NEW PLANTS/TURFGRASS WHERE NOT SPECIFICALLY SHOWN ON THE DRAWINGS FOR REPLACEMENT OR INSTALLATION.

WATER CONSERVATION COMPLIANCE STATEMENT:

I HAVE COMPLIED WITH THE CRITERIA OF THE LANDSCAPE WATER CONSERVATION ORDINANCE AND GUIDELINES, AND HAVE APPLIED THEM FOR THE EFFICIENT USE OF WATER IN THE PLANTING DESIGN PLAN.

DAVID W. BRILEY, RLA 2787

SEE SHEET L202 FOR PLANTING LEGEND, NOTES, AND DETAILS

General Notes

Blair, Church & Flynn CONSULTING ENGINEERS
Blair, Church & Flynn Consulting Engineers
451 Clovis Avenue, Suite 200
Clovis, California 93612
Tel (559) 326-1400
Fax (559) 326-1500

Consultant

Mendota Elementary School - Classroom Additions
Mendota Unified School District
605 Bass Avenue, Mendota CA 93640

Project

PLANTING PLAN

Drawing

darden architects
ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

Architect

No.	Revision/Submission	Date
4	ADDENDUM 4	07/24/2025

Revision

Designed By: DZ
Drawn By: DZ
Checked By: CMH
Reviewed By: DWB

Scale: AS NOTED
Project Number: 2277
Date: 4/22/2025

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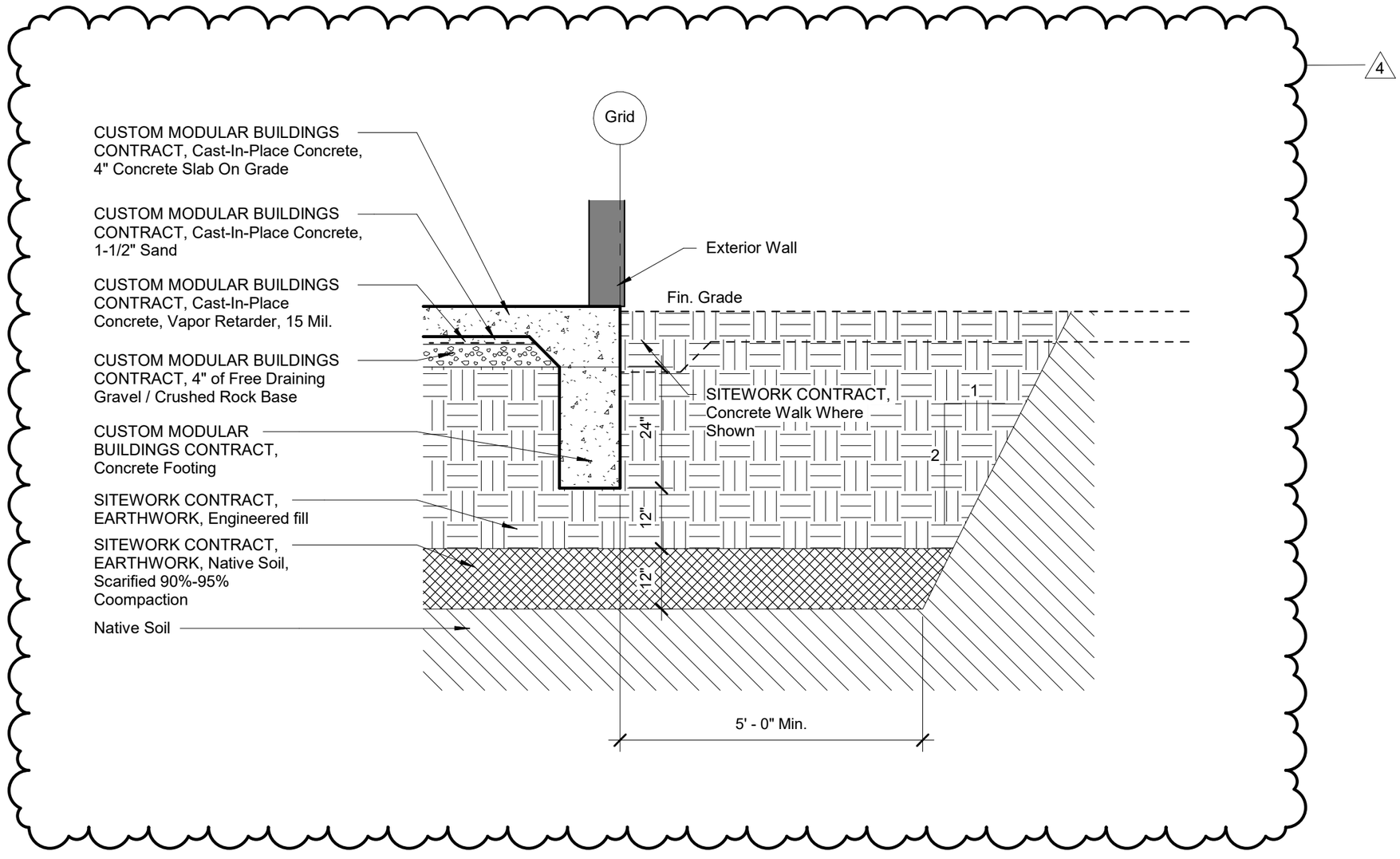
SD/L201
AD4-LX02
Sheet: 03 of: 03

Drawing: P:\2241_224-0172\Site\productiondrawings\224172_LA01.dwg; L201 — BCF.CTB
Plot by: dgoens Jul 22, 2025 - 2:36pm



DSA File No: 10-89
DSA Appl No: 02-122955

Typical Footing Detail

Mendota Elementary School - Inc. No. 01:
Sitework for Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640

darden architects

ARCHITECTURE · PLANNING · INTERIORS

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Designed By:	RM	Project Number:	2277
Drawn By:	RM	Scale:	1/2" = 1'-0"
Checked By:	GD	Copyright 2025 Darden Architects	
Reviewed By:	GD		
Date:	7/30/25		

AD4-AX01

7/30/2025 10:54:00 AM
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GEOTECHNICAL ENGINEERING INVESTIGATION AND GEOLOGIC SEISMIC HAZARDS EVALUATION REPORT

PROPOSED NEW CLASSROOMS
MENDOTA ELEMENTARY SCHOOL
605 BASS AVENUE
MENDOTA, CALIFORNIA 93640

BSK PROJECT G24000166

PREPARED FOR:

MENDOTA UNIFIED SCHOOL DISTRICT
115 MCCABE AVENUE
MENDOTA, CALIFORNIA 93640

APRIL 10, 2024

GEOTECHNICAL ENGINEERING INVESTIGATION AND GEOLOGIC SEISMIC HAZARDS EVALUATION REPORT

PROPOSED NEW CLASSROOMS
MENDOTA ELEMENTARY SCHOOL
605 BASS AVENUE
MENDOTA, CALIFORNIA 93640

Prepared for:

Mendota Unified School District
115 McCabe Avenue
Mendota, California 93640

BSK Project: G24000166

April 10, 2024

Prepared by:

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DISTRIBUTION: Jose Alcaide, Mendota USD (pdf)
Richard Martinez, Darden Architects (pdf)

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Figure 1: Site Vicinity Map
Figure 2: Boring/CPT Location Map

Appendices

Appendix A: Field Exploration
Appendix B: Laboratory
Appendix C: Geologic and Seismic Hazard Evaluation

1 INTRODUCTION

1.1 General

This report presents the results of our Geotechnical Engineering Investigation and geologic seismic hazards evaluation for the proposed new classroom structures to be located within Mendota Elementary School in Mendota, California, as shown on the Site Vicinity Map, Figure 1. The geotechnical engineering investigation was conducted in general accordance with the scope of services outlined in BSK Proposal G24000166, dated February 9, 2024. The proposed improvements and exploratory borings are shown on Figure 2, Boring/CPT Location Map.

In the event that significant changes occur in the design or location of the proposed structure, the conclusions and recommendations presented in the report will not be considered valid unless the changes are reviewed by BSK and the conclusions and recommendations are modified or verified in writing, as necessary.

1.2 Project Description

BSK understands that the project consists of the design and construction of new classrooms at Mendota Elementary School in Mendota, California. We understand, based on email correspondence, that the structures in the site will occupy an anticipated area of approximately 13,000 square feet in plan area. Floor slab loads were not provided but anticipated to be less than 2,000 psf with minimal grading. Additional construction is anticipated to include a parking lot, concrete walkways and landscaping.

1.3 Purpose and Scope of Services

The purpose of the geotechnical investigation is to assess soil conditions at the project site and provide geotechnical engineering recommendations for use by the project designers during preparation of the project plans and specifications for the proposed improvements. The scope of the investigation included a field exploration, laboratory testing, engineering analysis, and report preparation. Pavement design was not requested by the client and will not be provided in this report.

2 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Exploration

The field exploration, conducted on March 12, 2024, and consisted of a site reconnaissance, private utility marking with ground penetrating radar (GPR), drilling two (2) exploratory test borings from depths of 5 to 10 feet bgs, and completion of two (2) CPT soundings to depths of 50 feet. The borings were drilled within or adjacent to the proposed area of improvement using hand auger equipment. The approximate boring and CPT locations are presented on Figure 2. Details of the field exploration and the boring logs are provided in Appendix A. CPT results are presented in Appendix C.

2.2 Laboratory Testing

Laboratory testing of selected soil samples were performed to evaluate certain physical, chemical, and engineering characteristics and properties. The testing program included: in-situ moisture and density, gradation, shear strength, collapse potential, expansion index, and corrosion potential. The in-situ moisture and dry density test results are presented on the boring logs in Appendix A. Descriptions of the laboratory test methods and test results are provided in Appendix B.

3 SITE CONDITIONS

3.1 Site Description

The project site is located within the Mendota Elementary School Campus at 605 Bass Avenue in Mendota, California. The proposed structures will be on the north side of the existing campus in an area that is currently grassy athletic fields and asphalt paved basketball courts. The project site was bounded to the north by athletic fields and an approximately 7-foot-deep unlined basin which was approximately 280 feet northwest of the site. To the east was Bass Avenue with agricultural fields beyond. To the south and west were school facilities with residential areas beyond. A large tree is located within the proposed play and classroom areas.

3.2 Subsurface Conditions

The subsurface soil generally consisted predominantly of low plasticity clays and silts with a layer of silty sand from between 1 and 3 feet bgs to the maximum depth of exploration (50 feet bgs.). The boring logs in Appendix A provide a more detailed description of the soils encountered in the borings, including the applicable Unified Soil Classification System symbols. The approximate locations of the soil borings are shown on the Boring Location Map (Figure 2).

Soils encountered had low potential for collapse and expansion. See Appendix B for laboratory testing results.

3.3 Groundwater

Groundwater was encountered at as shallow as approximately 15 feet bgs during the field exploration on March 12, 2024. A more thorough description of groundwater conditions is presented in Appendix C.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based upon the data collected during this investigation and from a geotechnical engineering standpoint, it is our opinion that there are no soil conditions that would preclude the construction of the proposed improvements provided that the recommendations presented in this report are incorporated into the

project design and construction. The planned improvements may be supported on shallow reinforced isolated or continuous concrete spread footings.

4.2 Soil Corrosivity

A surface soil sample obtained from the Site was tested to provide a preliminary screening of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts. The test results are presented in Appendix B.

Based on test results, on-site near-surface soils have moderate soluble sulfates and chloride contents and a very low minimum resistivity, and are alkaline. Due to a moderate chloride content, the on-site soils are considered to have a high corrosion potential with respect to buried concrete, however, adverse effects are not anticipated as long as proper site drainage does not allow ponding water to make contact with buried concrete. Due to a very low minimum resistivity, the onsite soils are considered to be potentially very severely corrosive to unprotected metal in contact with the soil.

BSK recommends that a Type II cement be used in the formulation of concrete and that buried reinforcing steel protection be provided with a minimum concrete cover required by the American Concrete Institute (ACI) Building Code for Structural Concrete, ACI 318, Chapter 20. Buried metal conduits must have protective coatings in accordance with the manufacturer's specifications. If detailed recommendations for corrosion protection are desired, a corrosion specialist should be consulted.

4.3 Site Preparation and Earthwork Construction

The following procedures must be implemented during site preparation for the proposed improvements. It should be noted that references to maximum dry density, optimum moisture content, and relative compaction are based on ASTM D1557 (latest test revision) laboratory test procedures.

1. Prior to any site grading, all miscellaneous surface obstructions must be removed from the improvement area. Near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped to a depth of at least 3-inches to expose a clean soil surface. Where trees or bushes are to be removed, the associated roots are expected to extend 3 feet or more below existing grade, as such, deeper excavation may be necessary for root removal. Roots larger than ½-inch in diameter must be removed. Surface strippings must not be incorporated into engineered fill unless the organic content is less than 3 percent by weight (ASTM D2974).
2. Within the area of the planned improvements, remove existing concrete curbs, sidewalks, underground utilities, and debris to expose a clean soil surface free of deleterious material.

   Existing utilities or irrigation pipes must be removed to a point at least 5-feet horizontally outside the proposed building area. Resultant cavities must be backfilled with engineered fill. Abandoned

pipelines to remain that are less than 2 inches in diameter must be capped at the cutoff point, while pipelines greater than 2 inches in diameter must be filled with a 1-sack sand-cement slurry.

Existing concrete may be crushed and used as base material, provided it sufficiently crushed to less than 3 inch diameter.

3. Soil disturbed as a result of demolition, undocumented fill deemed to possess inadequate compaction or uniformity, debris, and abandoned underground structures must be excavated to expose undisturbed native soil or suitable fill.

4. Following the required demolition, stripping, and/or removal of underground structures, the exposed soil surface in areas to support fill or proposed improvements must be over-excavated a minimum of 12 inches below existing site grade or 12 inches below the proposed foundations, which ever depth is greater. The exposed subgrade must be scarified a minimum of 6 inches, uniformly moisture conditioned to at least 2 percent above optimum moisture, and compacted to at least 90 percent relative compaction, but no more than 95 percent relative compaction. Soft or pliant areas must be over-excavated to firm native soil. Earthwork must extend at least 5-feet laterally beyond the outside edge of proposed improvements and areas to receive fill.

5. Non-expansive excavated soils, free of deleterious substances (organic matter, demolition debris, tree roots, etc.) and with less than 3 percent organic content by weight, may be returned to the excavations as engineered fill. Engineered fill must be placed in uniform layers not exceeding 8-inches in loose thickness, moisture-conditioned to at or above optimum moisture content and compacted to at least 92 percent of the maximum dry density. The upper 12 inches of engineered fill placed as backfill under pavement sections must be compacted to at least 95 percent of the maximum dry density. Acceptance of engineered fill placement must be based on both moisture content at time of compaction and relative compaction.

6. Imported fill materials must be free of deleterious substances and have less than 3 percent organic content by weight. The project specifications must require the contractor to contact BSK for review of the proposed import fill materials for conformance with these recommendations at least two weeks prior to importing to the site, whether from on-site or off-site borrow areas. Imported fill soils must be non-hazardous and be derived from a single, consistent soil type source conforming to the following criteria:

Maximum Particle Size:	3-inches
Percent Passing #4 Sieve:	65 – 100
Percent Passing #200 Sieve:	20 – 45
Plasticity Index:	less than 12
Expansion Index:	< 20
Low Corrosion Potential:	
Soluble Sulfates:	< 1,500 mg/kg
Soluble Chlorides:	< 300 mg/kg
Soil Resistivity:	> 2,000 ohm-cm

Grading operations must be scheduled as to avoid working during periods of inclement weather. Should these operations be performed during or shortly following periods of inclement weather, unstable soil conditions may result in the soils exhibiting a "pumping" condition. This condition is caused by excess moisture, in combination with compaction, resulting in saturation and near zero air voids in the soils. If this condition occurs, the affected soils must be over-excavated to the depth at which stable soils are encountered and replaced with suitable soils compacted as engineered fill. Alternatively, the Contractor may proceed with grading operations after utilizing a method to stabilize the soil subgrade, which must be subject to review by BSK prior to implementation.

The Department of Toxic Substance Control (DTSC) has detailed guidelines for the testing of import soils to school sites. These guidelines take into account the past and present land usage at a borrow pit, the acreage of the borrow pit and the volume of import soil to establish the amount of chemical testing of import fill recommended. BSK must be contacted for review and analytical testing of proposed import fill materials for conformance with these recommendations at least 15 days prior to transporting fill to the site.

4.4 Shallow Foundations

The proposed building and retaining walls may be supported on reinforced concrete spread footings bearing on engineered fill. The allowable bearing pressure applies to the dead load plus live load (DL + LL), and is presented for lighter and maximum loading, and may be increased by 1/3 for short duration wind or seismic loads. The foundation must be designed with reinforcing steel as recommended by the project Structural Engineer. The allowable bearing capacity presented below considers a safety factor of 3. Footing design must follow the criteria listed below:

TABLE 2
SHALLOW FOOTING BEARING CAPACITY

Footing Embedment (1) (inches)	Minimum Footing Width (inches)		Allowable Bearing Capacity (psf)	
	Continuous Footing	Isolated Spread Footing	Continuous Footing	Isolated Spread Footing
12	12	24	3,000	3,000

Note (1) – Measure with respect to the lowest adjacent subgrade surface

The estimated total and differential settlement for the recommended spread footings shown below assumes maximum wall and column loads of 2 kip/ft and 14 kips, respectively.

TABLE 3 ANTICIPATED SETTLEMENT			
Footing Type	**Post-Construction Settlement (inches)**	**Differential Settlement (inches)**	**Angular Distortion**
Continuous	1.0	--	0.005
Isolated	1.0	0.5	--

Isolated footing differential settlement is based on adjacent similarly loaded footings spaced at 30-feet. The settlement values given above are applicable to the maximum loading conditions. For loads other than the design maximum loads, the settlements can be adjusted proportionally. Due to the nature of the foundation soils, a significant fraction of the settlement is expected to occur following the end of construction as the design building loads area applied.

4.5 Lateral Earth Pressures and Frictional Resistance

Lateral loads applied against foundations may be resisted by a combination of passive resistance against the vertical faces of the foundations and friction between the foundation bottom and the supporting subgrade. The parameters shown in the table below are for drained conditions of select engineered fill or undisturbed native soil.

TABLE 4 Recommended Lateral Earth Pressures	
Lateral Pressure Condition	Equivalent Fluid Density
Active Pressure (psf/ft)	75
At-Rest Pressure (psf/ft)	95
Passive Pressure (psf/ft)	190

An unfactored coefficient of friction of 0.23 may be used between soil subgrade and the cast in place foundation bottoms. Alternatively an adhesion value of 650 psf may be used for cohesive soils. The coefficient of friction and passive earth pressure values given above represent ultimate soil strength values. BSK recommends that a safety factor consistent with the design conditions be included in their usage. For resistance against lateral sliding that is countered solely by the passive earth pressure against footings or friction along the bottom of footings, a minimum safety factor of 1.5 is recommended. For stability against lateral sliding that is resisted by combined passive pressure and frictional resistance, a minimum safety factor of 2.0 is recommended. For lateral resistance against seismic loading conditions, a minimum safety factor of 1.2 is recommended. We based these lateral resistance values on the assumption that the concrete for the foundations is either placed directly against undisturbed soils or that the voids created from the use of forms are backfilled with engineered fill or other approved materials, such as lean concrete. Passive resistance in the upper foot of soil cover below finished grades

should be neglected unless the ground surface is confined by concrete slabs, pavements, or other such positive protection.

4.6 Pole Type Foundations

Structures such as lighting, signs, etc. may be supported on pole type foundations. This type of foundation must be designed in accordance with Section 1807A.3 of the 2019 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 95 psf per foot of embedment be used to develop parameters S_1 and S_3 rather than one of the values given in Table 1806A.2. This value includes a factor of safety of 2 and may be increased as indicated by 1806A.3 and the footnotes to Table 1806A.2. Unless the area surrounding the pole foundation is paved or covered with concrete flatwork, the upper 24 inches of soil should be ignored when calculating the minimum depth of embedment.

The following table provides expressions for the allowable and ultimate axial capacity using friction to resist axial loads. The skin friction within the upper two feet of embedded length must be ignored in unpaved areas. The total settlement of pier foundations designed in accordance with these recommendations should not exceed one-half inch.

Table 5: Friction Resistance for Vertical Loads	
Allowable (lbs)	**Ultimate (lbs)**
$16\ DL^2$	$40\ DL^2$

Note (1) – D is pile diameter (feet), and L is the total embedment length feet).

Prior to placing concrete, loose or disturbed soils must be removed from the bottom of the drilled pier excavations using a flat bottom clean-out bucket or other pre-approved method. A representative of BSK must observe the drilling and clean-out associated with the construction of pier foundations in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. Relatively cohesionless soils were observed within the borings. To aid in the excavation for pole footings, consideration should be given to utilizing casing or mud drilling techniques to prevent/minimize potential caving. A representative of BSK must observe the drilling and clean-out associated with the construction of pier foundations in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

Pier deflection may govern the design lateral resistance. If provided with pier geometry, lateral load, and loading eccentricity, the estimated pier head deflection can be provided.

4.7 Concrete Slabs-on-Grade

Non-structural concrete slab-on-grade must be a minimum of 4-inches thick and must be supported on a compacted subgrade prepared in accordance with the "Site Preparation and Earthwork Construction" section of this report. Existing onsite surface soils are considered to have a low expansion potential for

design purposes. In order to regulate cracking of the slabs, construction joints and/or saw-cut control joints must be provided in each direction at a maximum spacing of 10 feet on centers along with steel reinforcement as recommended by the project's Structural Engineer. Control joints must have a minimum depth of one-quarter of the slab thickness. It is recommended that steel reinforcement used in concrete slabs-on-grade consist of steel rebar. Structural concrete slabs-on-grade may be designed using an unadjusted long-term Modulus of Subgrade Reaction (Ks) of 150 pounds per cubic inch (pci) constructed on a properly compacted subgrade or engineered fill. This value is based on the correlations to soil strength using one foot by one foot plate-load tests and should therefore be scaled (adjusted) to the actual slab width. For sandy soils, the adjusted Ks value can be obtained by multiplying the value provided above by $[(B+B_1)/(2B)]^2$, where B is the slab width in feet and B_1 is 1 foot (width of a one foot by one foot plate-load test apparatus).

Interior concrete slabs must be successively underlain by: 1-½ inches of washed concrete sand; a durable vapor retarder; and a smooth, compacted subgrade surface. The vapor retarder must meet the requirements of ASTM E1745 Class A and have a water vapor transmission rate (WVTR) of less than or equal to 0.012 Perms as tested by ASTM E96. Examples of acceptable vapor retarder products include: Stego Wrap (15-mil) Vapor Barrier by STEGO INDUSTRIES LLC; W.R. Meadows Premoulded Membrane with Plasmatic Core; and Zero-Perm by Alumiseal. Because of the importance of the vapor retarder, joints must be carefully spliced and taped.

If migration of subgrade moisture through the slab is not a concern, then the use of a vapor retarder and overlying sand may be reconsidered. The slab subgrade must be kept in a moist condition until the vapor retarder or concrete slab is placed. BSK's representative must be called to the site to review soil and moisture conditions immediately prior to placing the vapor retarder or concrete slab.

As indicated in the PCA Engineering Bulletin 119, Concrete Floors and Moisture, and applicable ACI Committee reports (see ACI 360R-06, Design of Slabs-on-Ground, dated October 2006 and ACI 302.1R-04, Guide for Concrete Floor and Slab Construction, dated June 2004), the sand layer between the vapor retarder and concrete floor slab may be omitted. The advantage of this option is that it can reduce the amount of moisture that can be transmitted through the slab (especially if the sand layer becomes moist or wet prior to placing the concrete); however, the risk of slab "curling" is much greater. The "curling" may result from a sharp contrast in moisture-drying conditions between the exposed slab surface and the surface in contact with the membrane. As recommended in the referenced ACI Committee reports, measures must be taken to reduce the risk of "curling" such as reducing the joint spacing, using a low shrinkage mix design, and reinforcing the concrete slab. In order to regulate cracking of the slab, we recommend that full depth construction joints and control joints be provided in each direction with slab thickness and steel reinforcing recommended by the structural engineer.

Excessive landscape water or leaking utility lines could create elevated moisture conditions under concrete slabs, which could result in adverse moisture or mildew conditions in floor slabs or walls. Accordingly, care must be taken to avoid excess irrigation around the structures, as well as to

periodically monitor for leaking utility lines. Likewise, positive surface drainage must be provided around the perimeter of the structures as discussed in the "Surface Drainage Control" Section 4.10.

The adverse effects of moisture vapor transmission on flooring materials can be substantially reduced by the use of a low porosity concrete. This can be achieved by specifying a low water-cement ratio (0.45 or less by weight) a minimum compressive strength of 4,000 psi at 28 days, and a minimum of 7 days wet-curing.

4.8 Excavation Stability

Soils encountered within the upper 10-feet are generally Type C soil in accordance with OSHA (Occupational Safety and Health Administration). Temporary excavations for the project construction must be left open for as short a time as possible and must be protected from water runoff. Slope height, slope inclination, and excavation depths (including utility trench excavations) must in no case exceed those specified in local, state, or federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations 29 CFR Part 1926, or successor regulations). These excavation recommendations are based on soil characteristics derived from the borings. Variations in soil conditions will likely be encountered during excavation. At the time of construction, BSK must be afforded the opportunity to observe and document sloping and shoring conditions, and the opportunity to provide review of actual field conditions to account for condition variations not otherwise anticipated in the preparation of these recommendations.

4.9 Utility Trench Excavation and Backfill

Pipes and conduits must be bedded and shaded in accordance with the requirements of the pipe manufacturer. Where no specific requirements exist, we recommend a minimum of 6-inches of sand bedding material for pipe installations 12 to 24-inches in diameter. For pipe diameters smaller than 12-inches, the bedding thickness may be reduced to 4-inches. The bedding material and envelope (up to 6-inches above the pipe) must consist of sand (Sand Equivalent greater than 30), be placed in loose lifts not exceeding 8-inches in thickness, compacted to at least 90 percent of the maximum dry density, and moisture conditioned to within 2 percent of optimum moisture content. Water jetting to attain compaction must not be allowed.

Adequate excavation width must be provided to permit uniform compaction on both sides of utility lines installed within the trench. The trench backfill material may consist of engineered fill. Trench backfill outside the building footprint must be placed in loose lifts not to exceed 8-inches in loose thickness, compacted to at least 90 percent of the maximum dry density, and moisture conditioned to within 2 percent of optimum moisture content. The upper 12-inches of trench backfill below pavement sections must be compacted to at least 95 percent of the maximum dry density. Conduits extending through or below footings must be "sleeved" as determined by the Project Structural Engineer. Utility trench

backfill beneath the building areas must be backfilled in accordance with Section 4.3 (Site Preparation and Earthwork Construction).

4.10 Surface Drainage Control

Final grading around site improvements must provide for positive and enduring drainage. Ponding of water must not be allowed on or near the building or paved surfaces. Saturation of the soils immediately adjacent to or below the building area must not be allowed. Irrigation water must be applied in amounts not exceeding those required to offset evaporation, sustain plant life, and maintain a relatively uniform moisture profile around and below, site improvements.

5 PLANS AND SPECIFICATIONS REVIEW

BSK recommends that it be retained to review the draft plans and specifications for the project, with regard to foundations, and earthwork, prior to their being finalized and issued for construction bidding.

6 CONSTRUCTION TESTING AND OBSERVATIONS

Geotechnical testing and observation during construction is a vital extension of this geotechnical investigation. BSK recommends that it be retained for those services. Field review during site preparation and grading allows for evaluation of the exposed soil conditions and confirmation or revision of the assumptions and extrapolations made in formulating the design parameters and recommendations. BSK's observations must be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. BSK must also be called to the site to observe foundation excavations, prior to placement of reinforcing steel or concrete, in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. BSK must also be called to the site to observe placement of foundation and slab concrete.

If a firm other than BSK is retained for these services during construction, that firm must notify the owner, project designers, governmental building officials, and BSK that the firm has assumed the responsibility for all phases (i.e., both design and construction) of the project within the purview of the geotechnical engineer. Notification must indicate that the firm has reviewed this report and any subsequent addenda, and that it either agrees with BSK's conclusions and recommendations, or that it will provide independent recommendations.

7 LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test borings performed at the locations shown on Figure 2. The report does not reflect variations which may occur between or beyond the borings. The nature and extent of such variations may not become

evident until additional exploration and testing is performed or construction is initiated. If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-site observations during the excavation period and noting the characteristics of the variations.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observation program during the construction phase. BSK assumes no responsibility for construction compliance with the design concepts or recommendations unless it has been retained to perform the testing and observation services during construction as described above.

The findings of this report are valid as of the present. However, changes in the conditions of the site can occur with the passage of time, whether caused by natural processes or the work of man, on this property or adjacent property. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, governmental policy or the broadening of knowledge.

BSK has prepared this report for the exclusive use of the Client and members of the project design team. The report has been prepared in accordance with generally accepted geotechnical engineering practices which existed in Fresno County at the time the report was written. No other warranties either express or implied are made as to the professional advice provided under the terms of BSK's agreement with Client and included in this report.

FIGURES

REFERENCE IMAGE: Google Earth

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SITE VICINITY MAP

Mendota ES New Classroom, Parking
Mendota, California

FIGURE 1

JOB NO. G24-000-166
DATE March 13, 2024
DR. BY TG
CH. BY NP
SCALE AS SHOWN
SHEET NO. 1
OF 1 SHEETS

C:\Users\tgonzalez\BSK Associates\BSK Documents - GEO\G24000166-Mendota ES New Classrooms, Parking\Graphics\G24000166.dwg User:tgonzalez Plotted:Mar 13, 2024 - 8:56pm Last Save:Feb 26, 2024 - 10:06pm

LEGEND:

B-2 APPROXIMATE BORING AND CPT LOCATIONS

REFERENCE IMAGE: Google Earth

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BORING/CPT LOCATION MAP

Mendota ES New Classroom, Parking
Mendota, California

FIGURE 2

JOB NO. G24-000-166
DATE March 13, 2024
DR. BY TG
CH. BY NP
SCALE AS SHOWN
SHEET NO. 1 OF 1 SHEETS

C:\Users\tgonzalez\BSK Associates\BSK Documents - GEO\G24000166-Mendota ES New Classrooms, Parking\Graphics\G24000166.dwg User:tgonzalez Plotted:Mar 13, 2024 - 8:55pm Last Save:Feb 26, 2024 - 10:06pm

APPENDIX A

FIELD EXPLORATION

APPENDIX A
Field Exploration

The field exploration, conducted on March 12, 2024, and consisted of a site reconnaissance, private utility marking with ground penetrating radar (GPR), drilling two (2) exploratory test borings from depths of 5 to 10 feet bgs, and completion of two (2) CPT soundings to depths of 50 feet. The borings were drilled within or adjacent to the proposed area of improvement using hand auger equipment. The approximate boring and CPT locations are presented on Figure 2. Details of the field exploration and the boring logs are provided in Appendix A. The CPT logs are presented in Appendix C.

The soil materials encountered in the test borings were visually classified in the field, and the logs were recorded during the drilling and sampling operations. Visual classification of the materials encountered in the test borings was made in general accordance with the Unified Soil Classification System (ASTM D 2488) and further verified by ASTM D2487 for selected samples. A soil classification chart is presented herein. Boring logs are presented herein and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff based on observations made at the time of drilling, while the actual boundaries between soil types may be gradual and soil conditions may vary at other locations.

It should be noted that the use of terms such as “loose”, “medium dense”, “dense” or “very dense” to describe the consistency of a soil is based on sampler blow count and is not necessarily reflective of the in-place density or unit weight of the soils being sampled. The relationship between sampler blow count and consistency is provided in the following Tables A-1 and A-2 for coarse grained (sandy and gravelly) soils and fine grained (silty and clayey) soils, respectively.

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

■	Modified California	RV	R-Value
⊠	Standard Penetration Test (SPT)	SA	Sieve Analysis
☒	Split Spoon	SW	Swell Test
◪	Pushed Shelby Tube	TC	Cyclic Triaxial
▯	Auger Cuttings	TX	Unconsolidated Undrained Triaxial
✋	Grab Sample	TV	Torvane Shear
⊘	Sample Attempt with No Recovery	UC	Unconfined Compression
CA	Chemical Analysis	(1.2)	(Shear Strength, ksf)
CN	Consolidation	WA	Wash Analysis
CP	Compaction	(20)	(with % Passing No. 200 Sieve)
DS	Direct Shear	▽	Water Level at Time of Drilling
PM	Permeability	▼	Water Level after Drilling(with date measured)
PP	Pocket Penetrometer		

SOIL CLASSIFICATION CHART AND LOG KEY

Figure A-1

BSK ASSOCIATES

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Project: Mendota ES New Classroom Parking

Location: Mendota, CA

Project No.: G24000166

Logged By: J. Leu

Checked By: N. Popenoe

Boring: **B- 1**

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
1–10				91.7	22.3			CL	**Sandy CLAY (CL)** - brown, moist, fine to medium grained sand. ... less sand ... increased sand, yellow brown	
10									Boring terminated at approximately 10 feet bgs. No groundwater encountered. Boring backfilled with soil cuttings.	

Drilling Contractor: BSK Associates
Drilling Method: Hand Auger
Drilling Equipment: Hand Auger
Date Started: 3/12/24
Date Completed: 3/12/24

Surface Elevation:
Sample Method: 2.5" Modified California Sampler
Groundwater Depth: Not Encountered
Completion Depth: 10 Feet
Borehole Diameter: 4"

* See key sheet for symbols and abbreviations used above.

GEO BORING LOGS.GPJ BSK.GDT 3/27/24

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Project: Mendota ES New Classroom Parking

Location: Mendota, CA

Project No.: G24000166

Logged By: J. Leu

Checked By: N. Popenoe

Boring: **B- 2**

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
1						45		SM	**Silty Sand (SM)** - medium dense, brown, moist, fine to coarse grained sand.	
2				96.1	27.3			CL	**Sandy CLAY (CL)** - brown, moist, fine grained sand.	
3						69				
4										
5									Boring terminated at approximately 5 feet bgs. No groundwater encountered. Boring backfilled with soil cuttings.	
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										

Drilling Contractor: BSK Associates
Drilling Method: Hand Auger
Drilling Equipment: Hand Auger
Date Started: 3/12/24
Date Completed: 3/12/24

Surface Elevation:
Sample Method: 2.5" Modified California Sampler
Groundwater Depth: Not Encountered
Completion Depth: 5 Feet
Borehole Diameter: 4"

* See key sheet for symbols and abbreviations used above.

GEO BORING LOGS.GPJ BSK.GDT 3/27/24

APPENDIX B

LABORATORY TESTING

APPENDIX B
Laboratory Testing

The results of laboratory testing performed in conjunction with this project are contained in this Appendix. The following laboratory tests were performed on soil samples in general conformance with applicable standards.

In-Situ Moisture and Density

The field moisture content and in-place dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The field moisture content, as a percentage of dry weight of the soils, was determined by weighing the samples before and after oven drying in accordance with ASTM D2216 test procedures. Dry densities, in pounds per cubic foot, were also determined for undisturbed core samples in accordance with ASTM D2937 test procedures. Test results are presented on the boring logs in Appendix A.

Gradation

Two (2) Sieve Analysis tests were performed on a selected soil samples in the area of planned construction. The test was performed in general accordance with Test Method ASTM D422. The results of the tests are presented on Figures B-1 and B-2.

Direct Shear Test

One (1) direct shear test was performed on test specimens trimmed from a selected soil sample. The three-point shear test was performed in general accordance with ASTM D3080, Direct Shear Test for Soil under Consolidated Drained Conditions. The test specimens, each 2.42 inches in diameter and 1 inch in height, were saturated then subjected to shear along a plane at mid-height after allowing for pore pressure dissipation. The test results are presented on Figure B-3.

Collapse Potential Test

One (1) Collapse Potential Test was performed on a relatively undisturbed soil sample to evaluate collapse potential characteristics. The test was performed in general accordance with ASTM D5333. The sample was initially loaded under as-received moisture content to a selected stress level, loaded to a load of 2000 psf, saturated, and lastly loaded to a maximum load of 4000 psf. The test results are presented on Figure B-4.

Expansion Index Test

One (1) expansion index test was performed in general accordance with ASTM D-4829. The specimen was moisturized and compacted to a dry density and moisture content corresponding to a degree of saturation between 48 to 52 percent, was subjected to a 1-PSI normal load and then saturated. The

vertical movement of the specimen was monitored during the process. The test results are presented on Figure B-5.

Soil Corrosivity

The results of chemical analyses performed on a bulk soil sample using California Test Method (CT) 643 (for minimum resistivity and pH) and CT 417 and 422 (for soluble sulfate and chlorides, respectively) are presented in Table B-1.

TABLE B-1
SUMMARY OF CHEMICAL TEST RESULTS

Test Boring	Sample Depth	pH	Sulfate (mg/kg)	Chloride (mg/kg)	Minimum Resistivity (ohms-cm)
B-1	0 - 2'	8.2	1100	110	60

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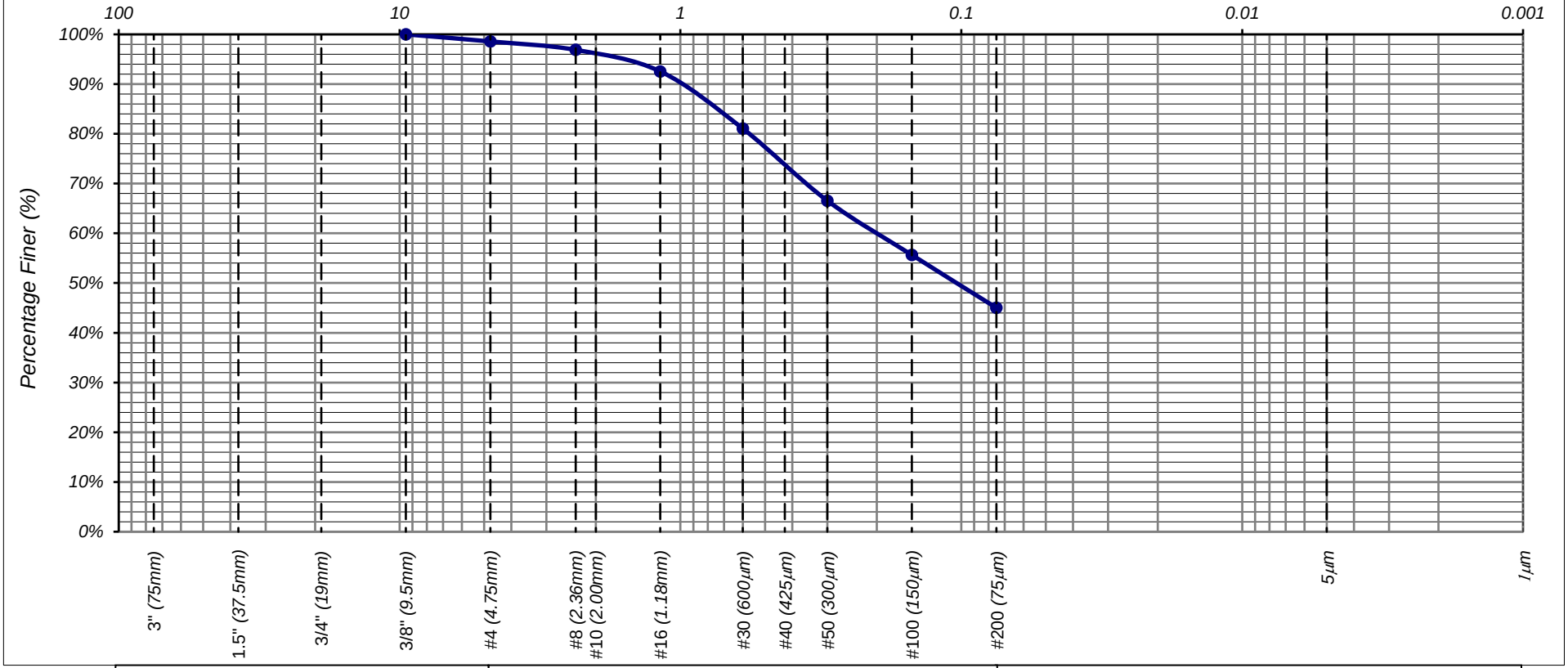
Gradation Analysis Report
ASTM D-422 / ASTM C-136

FIGURE B-1

Project Name:	Mendota ES	**Project Number:**	G24000166	**Report Date:**	3/15/24
Sample Location:	B - 2 @ 0 - 2'	**Sample Lab ID:**		**Sample Date:**	3/12/24
Sample Description:	Silty Sand (SM)			**Test Date:**	3/14/24

Particle Size Distribution Diagram



Clear Square Openings (ASTM C-136)			US Standard Series (ASTM D-422)			Hydrometer Readings (ASTM D-422)
Cobble	Gravel		Sand			Silt (Non-Plastic) to Clay (Plastic)
	Coarse	Fine	Coarse	Medium	Fine	

% Gravel = 1% **% Sand = 54%** **% Fines = 45%**

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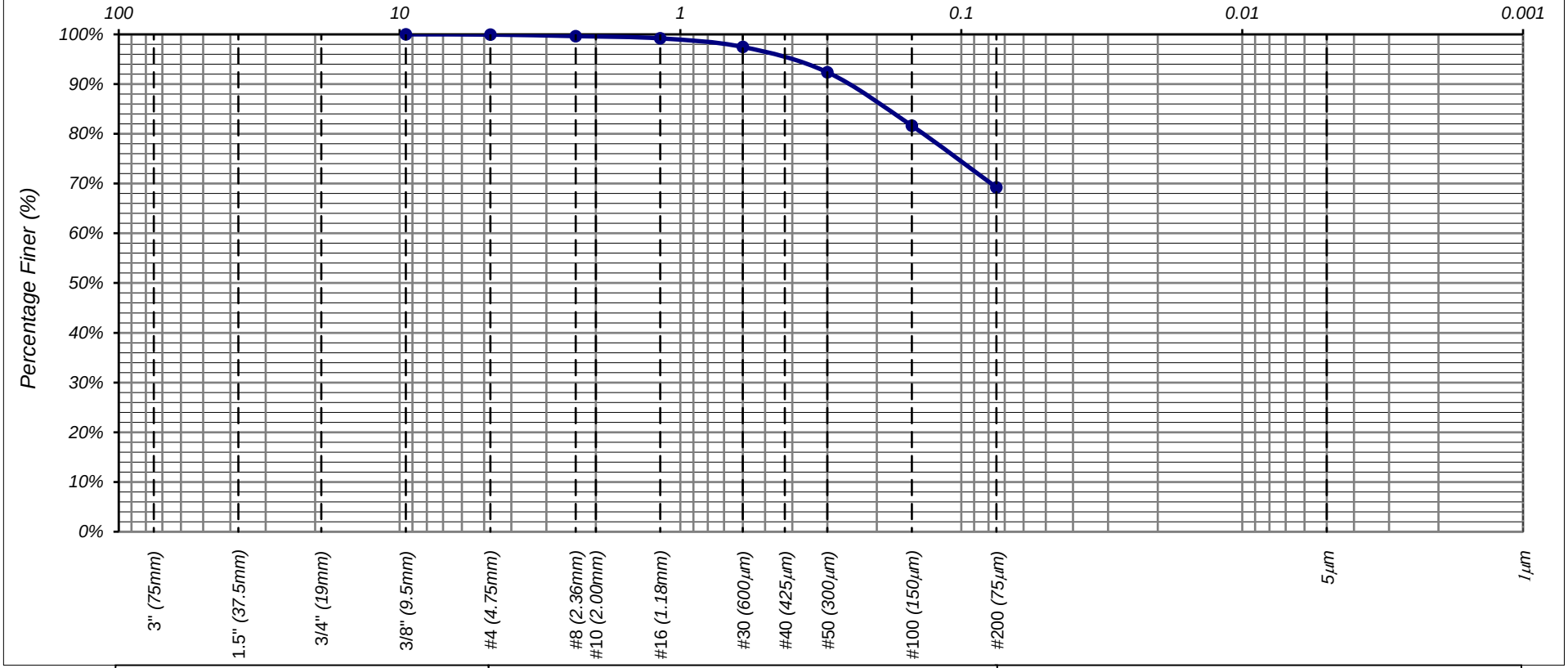
Gradation Analysis Report
ASTM D-422 / ASTM C-136

FIGURE B-2

Project Name:	Mendota ES	**Project Number:**	G24000166	**Report Date:**	3/15/24
Sample Location:	B - 4 @ 2' - 5'	**Sample Lab ID:**	N/A	**Sample Date:**	3/12/24
Sample Description:	Sandy Clay (CL)			**Test Date:**	3/14/24

Particle Size Distribution Diagram



Clear Square Openings (ASTM C-136)			US Standard Series (ASTM D-422)			Hydrometer Readings (ASTM D-422)
Cobble	Gravel		Sand			Silt (Non-Plastic) to Clay (Plastic)
	Coarse	Fine	Coarse	Medium	Fine	

% Gravel = 0% **% Sand = 31%** **% Fines = 69%**

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Direct Shear Test

ASTM D-3080

FIGURE B-3

Project Name:	Mendota Elementary School	**Sampled By:**	J. Leu	**Sample Date:**	3/12/24
		Tested By:	D. Messfin	**Test Date:**	3/14/24
Project Number:	G24000166	**Lab Tracking ID:**	N/A	**Report Date:**	3/27/24
Sample Location:	B-1 @ 2'	**Sample Description:**	Sandy Clay (CL)		

SHEAR STRENGTH DIAGRAM

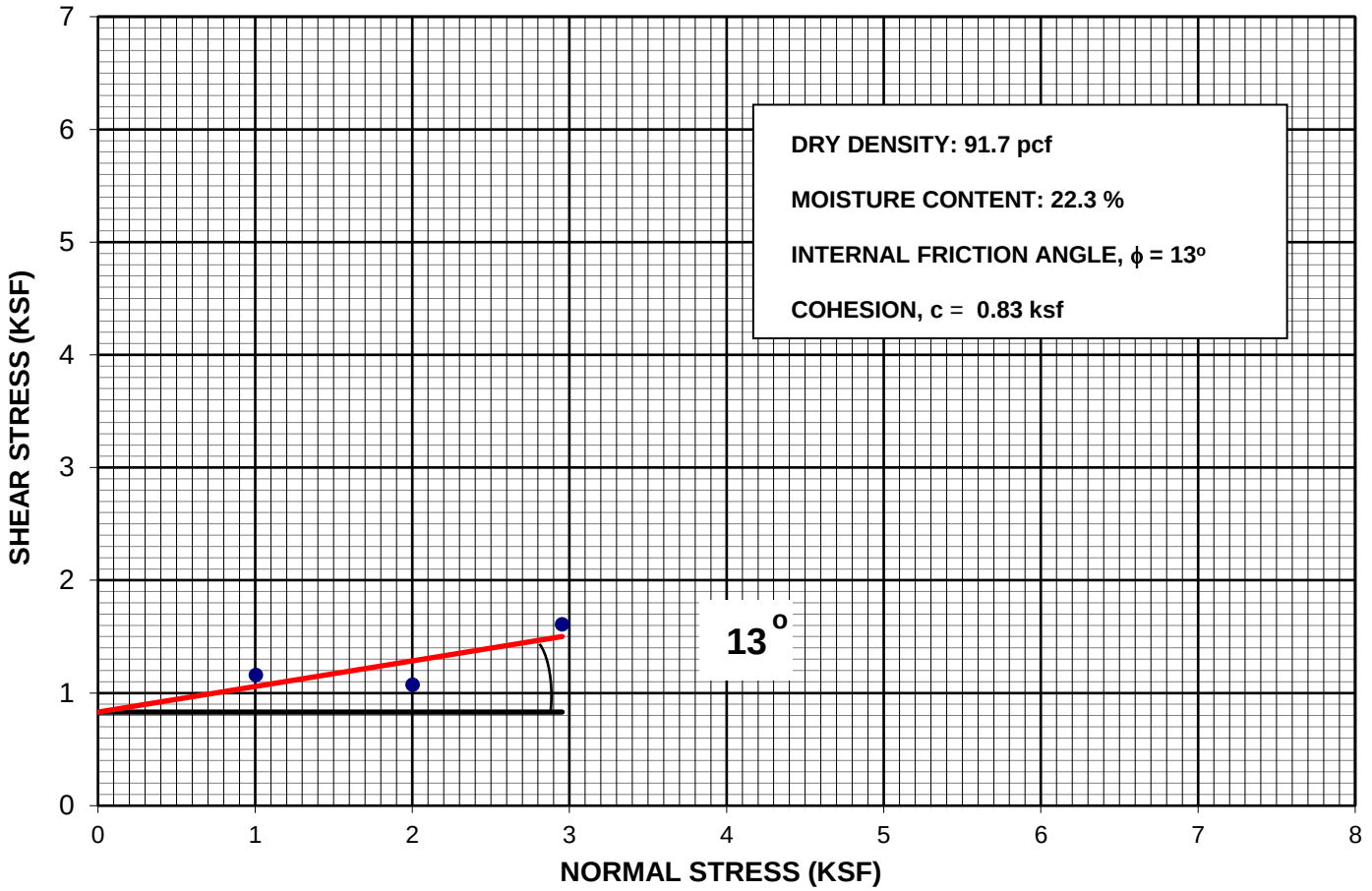

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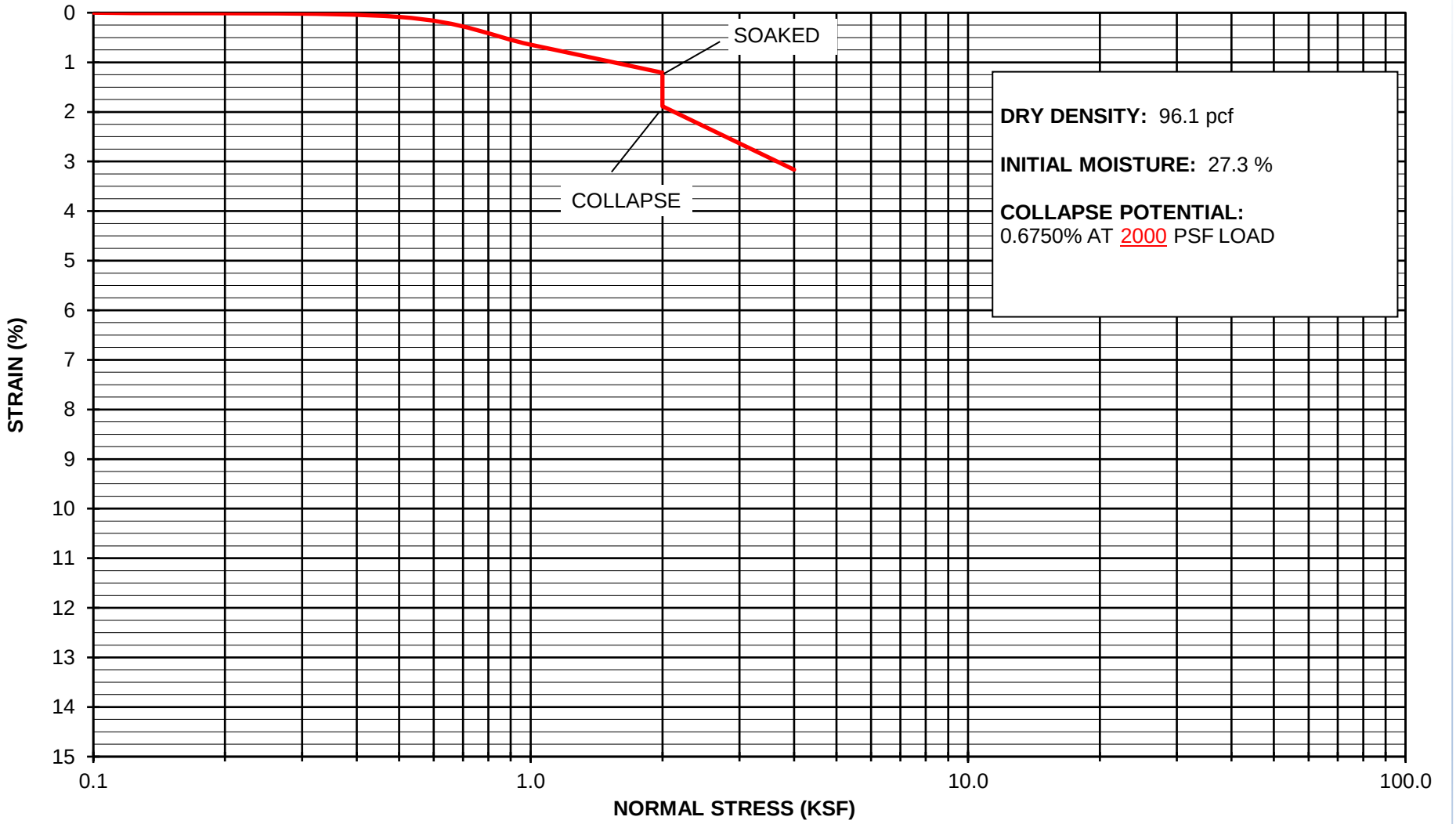
FIGURE B-4

COLLAPSE POTENTIAL
ASTM D-5333

Project Name:	Mendota - ES	**Sampled By:**	J.Leu	**Sample Date:**	3/12/24
		Tested By:	D.Messfin	**Test Date:**	3/14/24
Project Number:	G24000166	**Lab Tracking ID:**	N/A	**Report Date:**	3/15/24
Sample Location:	B - 2 @ 2'	**Sample Description:**	Sandy Clay (CL)		



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Expansion Index of Soils

ASTM D 4829 / UBC Standard 18-2

FIGURE B-5

Project Name:	**Mendota ES**	**Report Date:**	3/27/24
Project Number:	G24-000-166	**Sample Date:**	3/12/24
Lab Tracking ID:	N/A	**Test Date:**	3/21/24
Sample Location:	B -1 @ 0 - 2'		
Sample Source	Bulk		
Sampled By:	J.L	**Tested By:** D.Messfin	**Reviewed By:** N. Popenoe

TEST DATA

INITIAL SET-UP DATA			
Sample + Tare Weight (g)	771.1		
Tare Weight (g)	375.2	**FINAL TAKE-DOWN DATA**	
		Moisture Content Data	
Wet Weight + Tare	127.3	Wet Weight + Tare	807.1
Dry Weight + Tare	117.06	Dry Weight + Tare	732.1
Tare Weight (g)	21.12	Tare Weight (g)	376.9
Moisture Content (%)	10.6%	Moisture Content (%)	21.1%
Initial Volume (ft^3)	0.007272	Final Volume (ft^3)	0.007495
Remolded Wet Density (pcf)	120.0	Final Wet Density (pcf)	127.5
Remolded Dry Density (pcf)	108.5	Final Dry Density (pcf)	105.3
Degree of Saturation	**52**	**Degree of Saturation**	**95**

EXPANSION READINGS

Initial Gauge Reading (in)	0.3637
Final Gauge Reading (in)	0.3944
Expansion (in)	0.0307

Expansion Index	**31**

Classification of Expansive Soil

EI	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

APPENDIX C

GEOLOGIC AND SEISMIC HAZARD EVALUATION

APPENDIX C
GEOLOGIC AND SEISMIC HAZARDS ASSESSMENT
MENDOTA ELEMENTARY SCHOOL NEW CLASSROOMS
605 BASS AVENUE
MENDOTA, CALIFORNIA

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LIQUEFACTION ANALYSIS

C1. INTRODUCTION

This report presents the geologic and seismic hazards assessment prepared in accordance with the 2022 California Building Code (CBC), CCR Title 24, Chapters 16A and 18A requirements for a Geotechnical/Engineering Geologic Report. This report focuses solely on the planned new structures and is not intended to assess the geologic and seismic hazards for the rest of the school campus. The assessment was performed in conformance with California Geological Survey (CGS) Note 48 (2022).

C1.1 Purpose and Scope of Services

The purpose of the geologic and seismic hazards assessment is to provide the Client with an evaluation of potential geologic or seismic hazards which may be present at the site or due to regional influences. BSK's scope of services for this assessment included the following:

1. Review of published geologic literature and past investigations at the Site;
2. Evaluation of the data collected and preparation of a geologic cross section;
3. Evaluation of potential geologic hazards that could affect the site;
4. Determination of Site Class and seismic design parameters; and
5. A liquefaction and seismic settlement analysis.

The observations and conclusions presented in this report specifically exclude the assessment of environmental characteristics, particularly those involving hazardous substances, and a high-pressure pipeline risk evaluation.

C1.2 Site Location

Mendota Elementary School is located at 605 Bass Avenue, Mendota, Fresno County, California. The planned new classroom buildings will be located along the north edge of asphalt-paved playground (Site), north and east of the existing main school buildings and parking lot. Based on our review of historical aerial photographs, the Site was previously utilized for agriculture land until the construction of the campus circa 2014. The surrounding area consists of a mixture of farmland and residential properties. The campus is bordered by residential properties to the northwest, commercial properties to the west, an open field to the east, Bass Avenue to the south, and a drainage swale to the north.

The approximate center location coordinates of the planned new buildings are:

Latitude: 36.767701º
Longitude: -120.381323º

C1.3 Site Topography

As shown on Figure C-1, Topographic Map, the Site and surrounding area topography is relatively flat and according to Google Earth, the Site has a ground surface elevation of approximately 159 feet. The San Joaquin River and the concrete-lined channel San Luis Drain are respectively located approximately 1 mile and 0.5-mile east of the Site. The drainage swale located approximately 250 feet north of the Site is estimated to be about 7 feet deep.

C1.4 Groundwater Conditions

The Site is within the Delta-Mendota sub-basin of the San Joaquin Basin Hydrologic Study Area. The study area encompassed approximately the southern two-thirds of the Great Valley. Within the Study Area, 39 groundwater basins and areas of potential storage have been identified. The boundaries of these areas are based largely on hydrologic as well as political considerations. The Delta-Mendota sub-basin has been identified by the California Department of Water Resources (CDWR) as a critically overdrafted basin (CDWR, 2018).

Free groundwater was not encountered in our hand auger borings but was measured in the CPT holes through pore pressure dissipation testing at approximate depths of approximately 16 feet and 17 feet BGS for CPT-2 and CPT-1, respectively. To ascertain groundwater levels for the area during other time periods, groundwater elevation data from the California Department of Water Resources (CDWR) were obtained from the period of 1948 to 1962. The water level hydrograph from state well number 13S15E30N001M located approximately 1800 feet southwest of the Site is presented on Figure C-2. The hydrograph indicates that the shallowest historic depth to groundwater in the general area of the Site was approximately 1 foot BGS in September 1953.

Please note that the groundwater level may fluctuate both seasonally and from year to year due to variations in rainfall, temperature, pumping from wells and possibly as the result of other factors that were not evident at the time of our investigation.

C2.0 GEOLOGY AND SEISMICITY

C2.1 Site Geology

The Site is located in the Great Valley geomorphic province. The Great Valley geomorphic province is an elongated basin approximately 50 miles wide and 400 miles long located in the central part of California. The province is bounded between the Sierra Nevada and Coast Ranges to the east and west, respectively. The Site lies within the structural region identified by Bartow (1991) as the San Joaquin Valley portion of the southern Sierran block. This area forms a broad syncline with deposits of marine and overlying continental sediments, Jurassic to Holocene in age. The thickness of the sediments increases to the west and reach a thickness of as much as 20,000 feet on the west side of the San Joaquin Valley syncline. East

of the Site, the relatively flat geomorphology transitions into the foothills of the Sierra Nevada, generally consisting of pre-Cretaceous metamorphic rocks, Mesozoic ultramafic rocks, and Mesozoic granitic rocks.

According to Jennings and Strand (1958), the Site is underlain by Recent basin deposits in the Great Valley (map symbol Qb), which are generally comprised of poorly sorted stream and basin deposits; clay to boulder size. The sediment was deposited during flood stages of major streams in the area between natural stream levees and fans. A portion of Jennings et al. (1965) geologic map is presented in Figure C-3, Geologic Map.

Nearby active and potential active faults include the Great valley Fault located roughly 17 miles southwest of the Site, the Ortigalita Fault located about 27 miles west of the Site, and the San Andreas Fault located approximately 42 miles southwest of the Site.

C2.1 Subsurface Conditions

Subsurface conditions are described in the 2024 geotechnical investigation report prepared by BSK Associates (BSK) and to which this geologic and seismic hazards report is appended. The Site was the subject of a subsurface field investigation consisting of manually advancing two (2) soil borings, labeled B-1 through B-2, to a completed depth of approximately 5 feet to 10 BGS and advancing two (2) Cone Penetration tests (CPT), labeled CPT-1 and CPT-2, to a depth of approximately 50 feet BGS each (see Figure C-4, Site Map). The subsurface units generally consist of sandy clay, silty clay and clay to the maximum explored depth of 50 feet BGS. Two thin, discontinuous layers of sand, silty sand and sandy silt were encountered at depths ranging from 1 to 3 feet and 10 to 12 feet BGS in CPT-1. A more detailed description of the soils encountered can be found in the boring log in Appendix A.

C3.0 GEOLOGIC/SEISMIC HAZARDS

The types of geologic and seismic hazards assessed include surface ground fault rupture, liquefaction, seismically induced settlement, slope failure, flood hazards and inundation hazards.

C3.1 Fault Rupture Hazard Zones in California

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act, as summarized in CGS Special Publication 42 (2018), is to "address the hazard of surface fault rupture through the regulation of development in areas near Holocene-active faults and prevent the construction of structures for human occupancy across traces of active faults." As indicated by Special Publication 42, "the State Geologist (Chief of the California Geological Survey) is required to delineate 'Earthquake Fault Zones (EFZ)' along known Holocene-active faults in California. The EFZs are distributed as 'Earthquake Fault Zone maps.' The zones are regulatory in nature and are one class of 'Earthquake Zones of Required Investigation', which includes other geologic hazards such as liquefaction and earthquake-induced landslides. Cities and counties affected by the zones

must regulate certain development 'projects' within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting."

According to the CGS, the Site is not located in an Alquist-Priolo Fault-Rupture Hazard Zone. The closest Fault-Rupture Hazard Zone is associated with the Ortigalita Fault, approximately 27½ miles west of the Site (CDMG, 1986). Based on the distance to the closest Alquist-Priolo Fault-Rupture Hazard Zone for the Ortigalita Fault, the potential for surface rupture to occur at the Site to be low.

C3.2 State of California Seismic Hazard Zones (Liquefaction and Landslides)

Zones of Required Investigation referred to as "Seismic Hazard Zones" (SHZ) in CCR Article 10, Section 3722, are areas shown on Seismic Hazard Zone Maps where site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements.

The Site is within the Firebaugh 7.5 Minute Quadrangle in Fresno County. The Fresno County General Plan (Fresno, County General Plan, 2000), did not identify geologic hazard zones associated with liquefaction and landslides in the general area of the Site.

C3.3 Slope Stability and Potential for Slope Failure

The project area is essentially flat with little to no topographic relief. Based on the low topographic relief and lack of slopes at and near the Site, we consider the potential for landslides and slope failures (seismically induced or otherwise) to affect the Site to be low.

C3.4 Flood and Inundation Hazards

An evaluation of flooding at the Site includes review of potential hazards from flooding during periods of heavy precipitation and flooding due to a catastrophic dam breach from up-gradient surface impoundments.

C3.4.1 Flood Hazards

Federal Emergency Management Agency (FEMA) flood hazard data was obtained to present information regarding the potential for flooding at the Site. As shown on Figure C-6 according to FEMA Flood Hazard Map Layer GIS data, NFHL 06019C, effective date 01/11/2024, the Site lies in Zone X, area of minimal flooding outside the 500-year and 100-year floodplains. Zone A, areas with a 1% annual chance (100-year flood), is located immediately northeast of the Site.

C3.4.2 Inundation Hazards - Dams

According to the GIS data obtained from CDWR (2020) and Dam Inundation GIS data from California Emergency Management Agency, dated 2013 (Federal Jurisdiction Dams), the Site is located in the pathways of Friant Dam Inundation, Crane Valley, and Pine Flat Inundation Areas.

C3.5 Volcanic Hazards

According to USGS Bulletin 1847, dated 1989, the Site is not located in an area which would be subject to hazards from volcanic eruptions (Miller, 1989).

C3.6 Corrosion

Please refer to the section titled "Soil Corrosivity" in the geotechnical report for discussion of the corrosivity of the site soils.

C3.7 Expansive Soils

As discussed in the geotechnical report, the near-surface soils encountered within the borings throughout the Site are sandy clay. Laboratory tests indicate the soil exhibits a low expansion potential.

C3.8 Land Subsidence

Four types of subsidence are known to occur in the San Joaquin Valley (Galloway, 1999). In order of decreasing magnitude they are:
(1) Subsidence caused by aquifer system compaction due to the lowering of ground-water levels by sustained ground-water overdraft;
(2) Subsidence caused by the hydrocompaction of moisture-deficient deposits above the water table;
(3) Subsidence related to fluid withdrawal from oil and gas fields; and
(4) Subsidence related to crustal neotectonic movements.

According to the California Department of Water Resources (2020), the Site is located in the San Joaquin Valley – Delta-Mendota basin and is positioned within the San Joaquin Valley subsidence area (USGS, 2018). According to CDWR Sustainability Groundwater Management Act Data Viewer (2023), a GPS station located approximately 2½ miles southeast of the Site has experienced approximately 1.15 feet (approximately 13¾ inches) of subsidence-related vertical settlement since May 2004. The Site is not located in an area known to be susceptible to subsidence due to petroleum. The Site is located in an area in which soils are known to be impacted by groundwater overdraft.

C4. SEISMIC HAZARD ASSESSMENT

C4.1 Seismic Source Deaggregation

Figure C-8 presents a fault map showing the major faults that may impact the Site in the future. Seismically induced ground motion at a site can be caused by earthquakes on any of the sources surrounding it. Deaggregation of the seismic hazard was performed by using the USGS Interactive Deaggregation website. The deaggregation determination, at the maximum considered earthquake (MCE) hazard level, results in distance, magnitude and epsilon (ground-motion uncertainty) for each source that contributes to the hazard. Each source has a corresponding epsilon, which is the probabilistic value relative to the mean value of ground motion for that source.

Results of the deaggregation based on a probabilistic model developed by the USGS (Dynamic: Conterminous U.S. 2014 (update) (v4.2.0)) indicates that the most extreme seismic source that contributes to the peak ground acceleration at the Site is from a rupture of the San Andreas Fault. The modal magnitude of 5.5 at a distance of 10.5 km is consistent with the general design earthquake ground motion. For liquefaction and seismic settlement calculations, a magnitude of 5.5 should be used.

C4.2 Historical Seismicity

The Site and its vicinity are located in an area characterized by moderate seismic activity. A number of large earthquakes have occurred within the Site region during historic time (since 1800). The Historical Earthquakes map, Figure C-9, presents earthquake magnitudes of significant earthquakes based on the National Seismic Hazard Model (NSHM) Earthquake Catalogs. This earthquake catalog is for the Western United States and provides a listing for all known M ≥ 2.5 earthquakes. Some of the significant regional earthquake events include the 1983 Coalinga earthquake that originated near the Great Valley Thrust fault approximately 37 miles south of the Site and the 1857 M7.9 Fort Tejon earthquake situated near the San Andreas fault approximately 72¼ miles south from the Site. In general, the Site has been subjected to low intensity ground motion, primarily from moderate to large earthquakes in the region.

In March 2015, scientists and engineers released a new earthquake forecast for the State of California, which was compiled by the USGS, the Southern California Earthquake Center, and the CGS with support from the California Earthquake Authority (Field et al., 2014). It updates the earthquake forecast made for the southern half of California by the 2007 Working Group for California Earthquake Probabilities. According to this recent study, there is a 93 percent probability that one or more magnitude M6.7 or greater earthquakes will occur in the southern half of California between 2014 and 2044.

C4.3 Earthquake Ground Motion, 2022 California Building Code

C4.3.1 Site Class

Based on Section 1613A.3.2 of the 2022 California Building Code (CBC), the Site shall be classified as Site Class A, B, C, D, E or F based on the Site soil properties and in accordance with Chapter 20 of ASCE 7-16. Based on the on the time-average shear wave velocities (Vs30) of 176.4 meters/second (578.7 feet/second), as measured from the seismic cone test for CPT-1 and extrapolated per Boore (2004), per Table 20.3-1 of ASCE 7-16, we classify the Site as Class E (< 600 ft/s; Soft Clay Soil).

C4.3.2 Seismic Design Criteria

The 2022 California Building Code (CBC) utilizes ground motion based on the Risk-Targeted Maximum Considered Earthquake (MCE_R) that is defined in the 2022 CBC as the most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with adjustment for targeted risk. Ground motion parameters in the 2022 CBC are based on ASCE 7-16, Chapter 11.

The United States Geologic Survey (USGS) has prepared maps presenting the Risk-Targeted MCE spectral acceleration (5% damping) for periods of 0.2 seconds (S_S) and 1.0 seconds (S_1). The value of S_s and S_1 can be obtained from the OSHPD Seismic Design Maps available at:
https://seismicmaps.org/

Table C-1 below presents the spectral acceleration parameters produced for Site Class E by the OSHPD Gound Motion Parameter Application and Chapter 16 of the 2022 CBC based on ASCE 7-16.

TABLE C-1
SPECTRAL ACCELERATION PARAMETERS
(Lat: 36.767701, Lon: -120.381323)

Seismic Design Parameter	Value		Reference
Site Class	E		ASCE 7-16, Table 20.3-1
MCE_R Mapped Spectral Acceleration (g)	S_S = 0.892	S_1 = 0.321	USGS Mapped Values
Site Coefficients (Site Class E)	F_a = 1.300	F_v = 2.800[A]	ASCE 7-16, Table 11.4-1 & -2 **(Supplement 3)**
MCE_R Mapped Spectral Acceleration Adjusted for Site Class Effects (g)	S_{MS} = 1.16	S_{M1} = 0.899	ASCE 7-16, Eq. 11.4-1 & -2
Design Spectral Acceleration (g)	S_{DS} = 0.773	S_{D1} = 0.599	ASCE 7-16, Eq. 11.4-3 & -4
Site Short Period – T_S (Seconds)	T_S = 0.775		$T_S = S_{D1}/S_{DS}$
Site Long Period T_L (Seconds)	12		USGS Mapped Value

Definitions:
MCE_R = Risk-Targeted Maximum Considered Earthquake
MCE_G = Maximum Considered Earthquake Geometric Mean
Notes:

A. See requirements for site-specific ground motions in ASCE 7-16, Section 11.4.8. This value of F_V shall be used only for calculation of T_S, determination of Seismic Design Category, linear interpolation for intermediate value of S_1, and when taking the exception under Items 1 and 2 of Section 11.4.8 for the calculation of S_{D1}.
B. Exception #2 of Section 11.4.8 shall be taken. Otherwise, a site-specific ground motion analysis per ASCE 7-16 Section 21.2 is required.

C4.3.4 Geometric Mean Peak Ground Acceleration

As per Section 1803A.5.12 of the 2022 CBC, peak ground acceleration (PGA) utilized for dynamic lateral earth pressures and liquefaction, shall be based on a site-specific study (ASCE 7-16, Section 21.5) or ASCE 7-16, Section 11.8.3. The OSHPD Seismic Design Maps, based on ASCE 7-16, Section 11.8.3, produced the values shown in Table C-2 based on Site Class E.

TABLE C-2 GEOMETRIC MEAN PEAK GROUND ACCELERATION MAXIMUM CONSIDERED EARTHQUAKE		
Criteria	**Value**	**Reference**
Mapped Peak Ground Acceleration (g)	PGA = 0.377	USGS Mapped Value
Site Coefficients (Site Class E)	F_{PGA} = 1.445	ASCE 7 Table 11.8-1
Geometric Mean PGA (g)	PGA_M = 0.545	ASCE 7 Equation 11.8-1

C4.4 Seismically Induced Ground Failure

C4.4.1 Liquefaction

Soil liquefaction is a condition where saturated, granular soils undergo a substantial loss of strength and deformation due to pore pressure increase resulting from cyclic stress application induced by earthquakes. In the process, the soil acquires mobility sufficient to permit both horizontal and vertical movements if the soil mass is not confined. Soils most susceptible to liquefaction are saturated, loose, clean, uniformly graded, and fine-grained sand, and some lean clay deposits. If liquefaction occurs, foundations resting on or within the liquefiable layer may undergo settlements and/or a loss of bearing capacity.

In order for liquefaction triggering to occur due to ground shaking, it is generally accepted that four conditions will exist:

- The subsurface soils are in a relatively loose state.
- The soils are saturated.
- The soils have low plasticity.
- Ground shaking is of sufficient intensity to act as a triggering mechanism.

In addition, after soil liquefies, dissipation of the excess pore pressure can produce volume changes within the liquefied soil layer, which can result in ground surface settlement.

We performed liquefaction analyses for the CPTs using the methods proposed by Boulanger and Idriss (2014). For our analyses, we used peak ground acceleration of 0.55g associated with an earthquake magnitude of 5.5. Free groundwater was observed in our CPTs at 14.7 feet and 16 feet BGS, but the shallowest groundwater observed near the Site was 1-foot BGS. For our analysis, groundwater was conservatively assumed to be at a depth of 1 foot BGS. Our analyses of the CPTs estimates between 1.6 and 1.8 inches of total liquefaction-induced settlement based on the design level seismic event. Differential settlement of the foundations over a horizontal distance of 30 feet is estimated to be less than ¼ inches.

C4.4.2 Lateral Spreading

Lateral spreading is a potential hazard commonly associated with liquefaction where extensional ground cracking and settlement occur as a response to temporary lateral migration of subsurface liquefied soils during a design seismic event. These phenomena typically occur adjacent to free faces such as slopes and creek channels. A drainage swale/basin is located approximately 250 feet north of the Site and is estimated to be about 7 feet deep. The liquefiable layer observed at a depth 1 to 3 feet in CPT-1 is discontinuous and not prevalent throughout the Site; therefore, we conclude that the potential for lateral spreading to occur at the Site is low.

C4.4.3 Dynamic Compaction (Dry Sands Settlement)

Another type of seismically-induced ground failure, which can occur as a result of seismic shaking, is dynamic compaction, or seismic settlement. Such phenomena typically occur in unsaturated, loose granular material or uncompacted fill soils. Using the methods provided in LiqSVs 2.3.2.5, we estimate that the seismic settlement of dry sand during a design-level earthquake will be between negligible.

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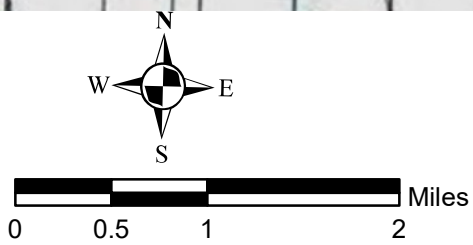

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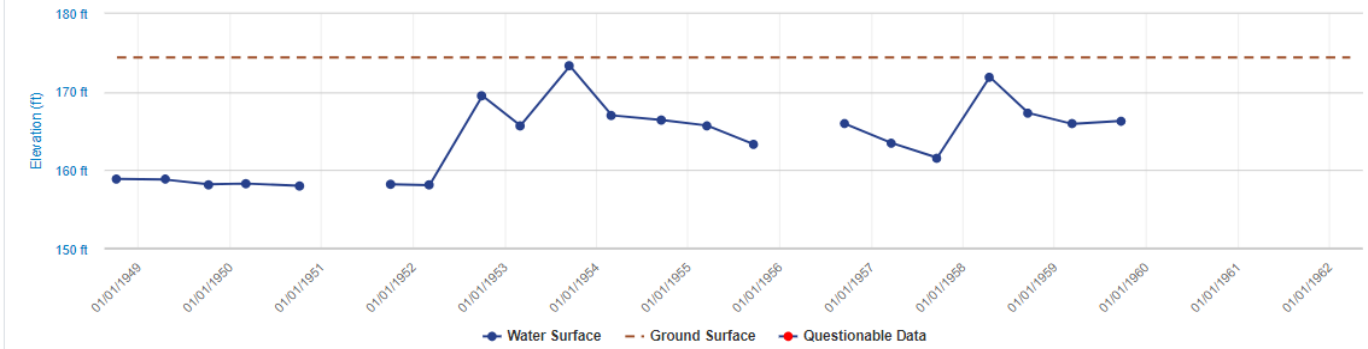
Geologic/Seismic Hazards Assessment
Mendota ES - New Classrooms
605 Bass Avenue
Mendota, Fresno County, California

Figure C-1
Topographic Map
BSK Project G24000166

Groundwater Levels for Well 367641N1203860W001



Measurement Date (PST)	Reference Point Elevation	Ground Surface Elevation	Distance from RP to WS	Groundwater Elevation	Ground Surface to Water Surface	Measurement Issue	Submitting Organization	Collecting Organization	Water Level Measurement Comments
09/15/1953 00:00:00	175.100	174.400	1.79	173.31	1.09		Department of Water Resou...	Bureau of Reclamation	
04/16/1958 00:00:00	175.100	174.400	3.19	171.91	2.49		Department of Water Resou...	Bureau of Reclamation	
10/01/1952 00:00:00	175.100	174.400	5.59	169.51	4.89		Department of Water Resou...	Bureau of Reclamation	
09/17/1958 00:00:00	175.100	174.400	7.79	167.31	7.09		Department of Water Resou...	Bureau of Reclamation	
03/01/1954 00:00:00	175.100	174.400	8.09	167.01	7.39		Department of Water Resou...	Bureau of Reclamation	
09/15/1954 00:00:00	175.100	174.400	8.69	166.41	7.99		Department of Water Resou...	Bureau of Reclamation	
09/22/1959 00:00:00	175.100	174.400	8.79	166.31	8.09		Department of Water Resou...	Bureau of Reclamation	

State Well Number: 13S15E30N001M
Latitude (NAD83): 36.7641
Longitude (NAD83): -120.386
Groundwater Basin (code): Delta-Mendota (5-022.07)
Reference Point Elevation (NAVD88 ft): 175.100
Ground Surface Elevation (NAVD88 ft): 174.400

Reference: https://wdl.water.ca.gov/waterdatalibrary/

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Mendota ES - New Classrooms
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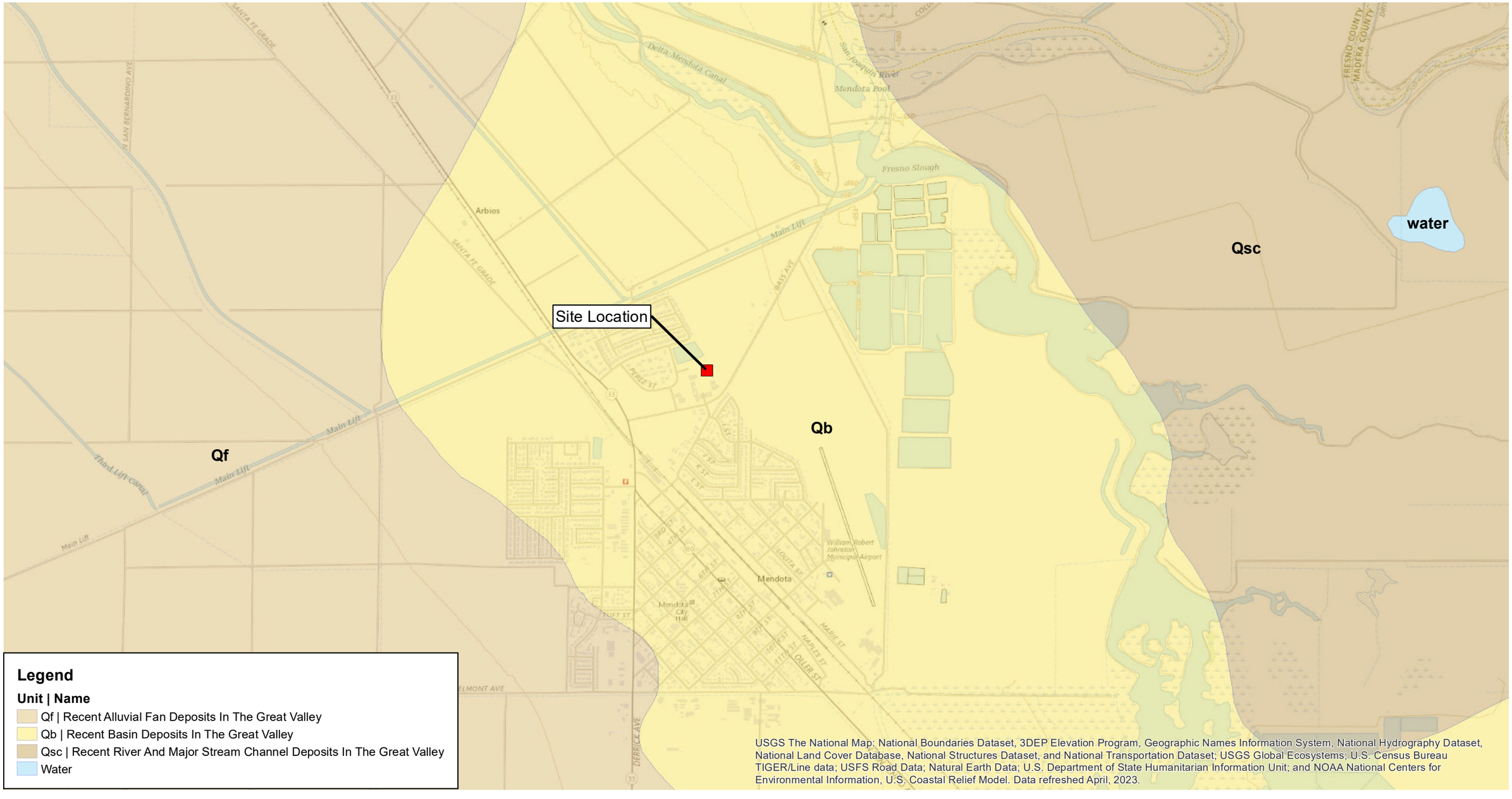
Figure C-2
Area Hydrograph
BSK Project G24000166



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N
W E
S

0 1,000 2,000 4,000 Feet

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Geologic/Seismic Hazards Assessment
Mendota ES - New Classrooms
605 Bass Avenue
Mendota, Fresno County, California

Figure C-3
Geologic Map
BSK Project G24000166

Legend

- Soil Boring Location
- Cone Pentration Test Location
- Approximate Building Footprint
- Cross Section Line

N
W E
S

0 75 150 300 Feet

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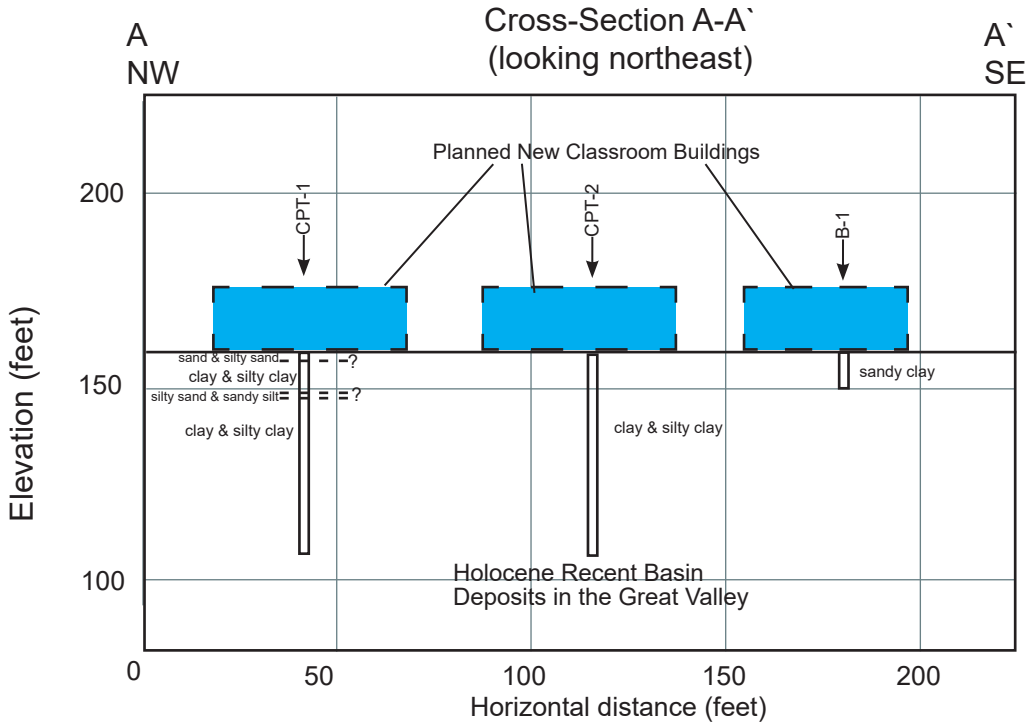
Geologic/Seismic Hazards Assessment
Mendota ES - New Classrooms
605 Bass Avenue
Mendota, Fresno County, California

Figure C-4
Site Map
BSK Project G24000166



LEGEND

Soil boring/CPT location

Unit contact

Groundwater Level

Note: Locations are approximate

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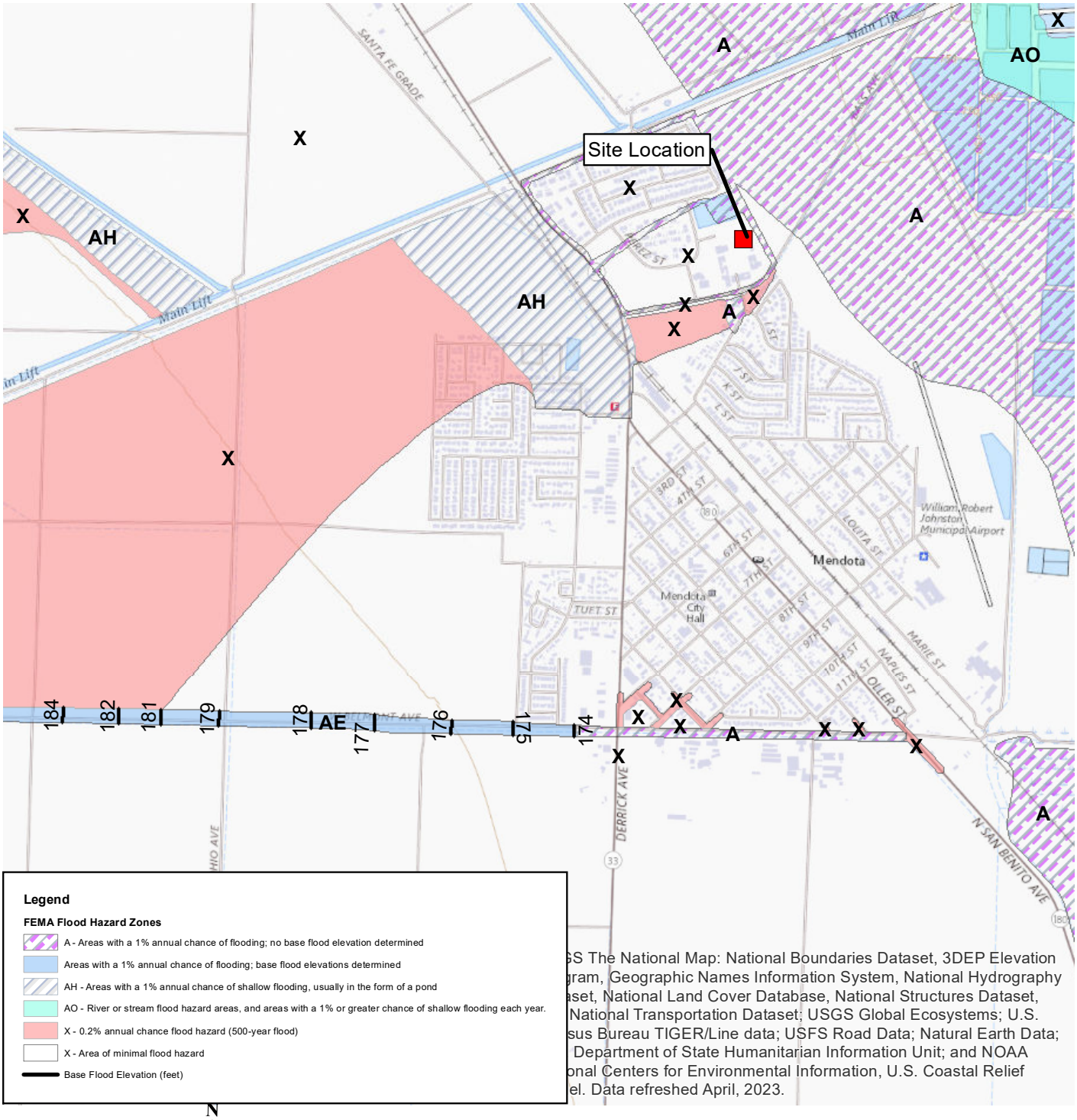
Scale 1 inch : 50 feet

Geologic/Seismic Hazard Assessment
Mendota ES - New Classrooms
605 Bass Avenue
Mendota, Fresno County, California

Figure C-5
Geologic Cross Section A-A`
BSK Project G24000166



GS The National Map: National Boundaries Dataset, 3DEP Elevation gram, Geographic Names Information System, National Hydrography set, National Land Cover Database, National Structures Dataset, National Transportation Dataset; USGS Global Ecosystems; U.S. sus Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; Department of State Humanitarian Information Unit; and NOAA onal Centers for Environmental Information, U.S. Coastal Relief el. Data refreshed April, 2023.

References: Federal Emergency Management Agency (FEMA), Flood Hazard Layer NFHL_06019C, Effect. Date 01/11/2024

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Geologic/Seismic Hazards Assessment
Mendota ES - New Classrooms
605 Bass Avenue
Mendota, Fresno County, California

Figure C-6
FEMA Flood Zones
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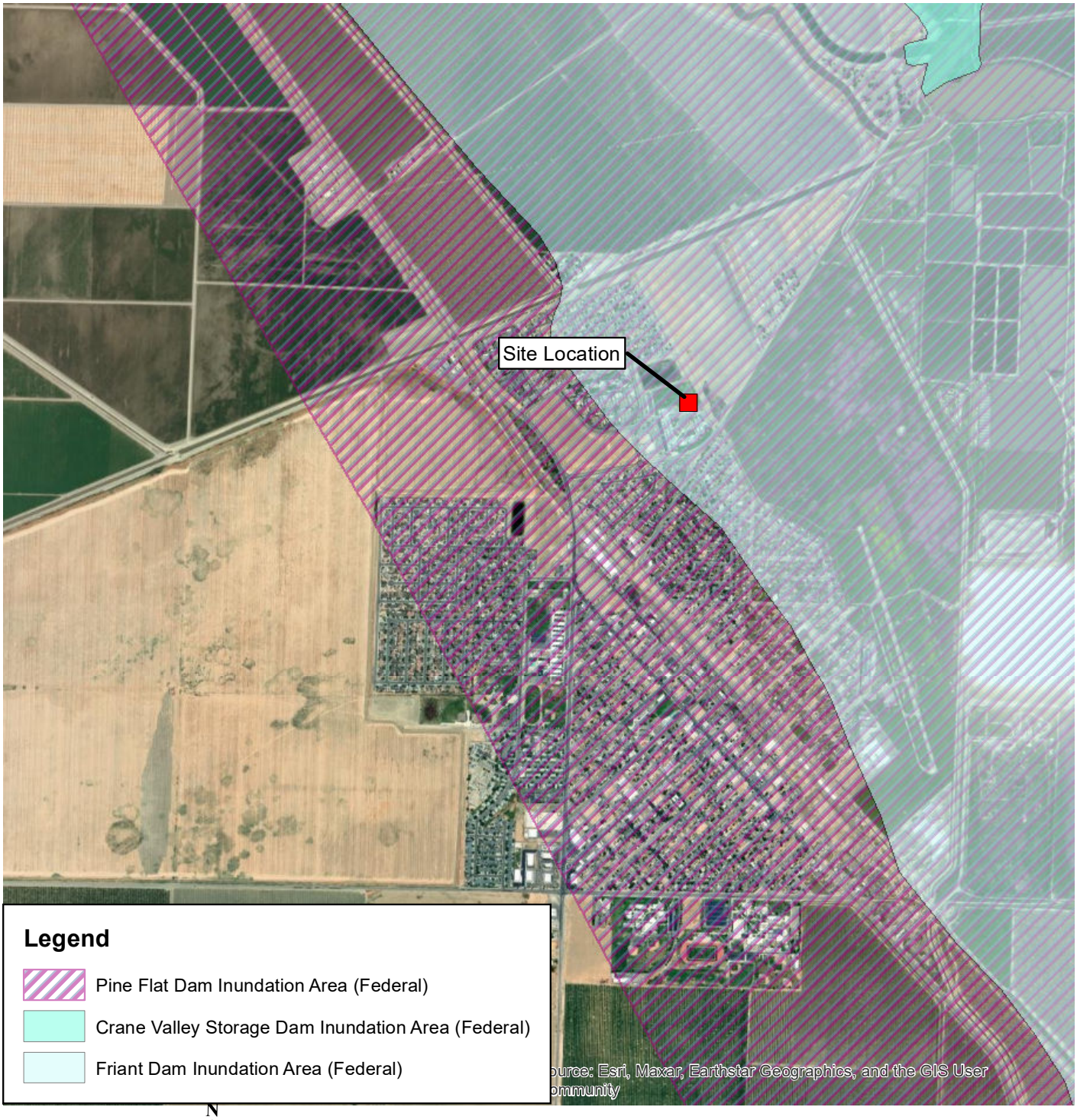

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Mendota, Fresno County, California

Figure C-7
Dam Innundation Zones
BSK Project G24000166

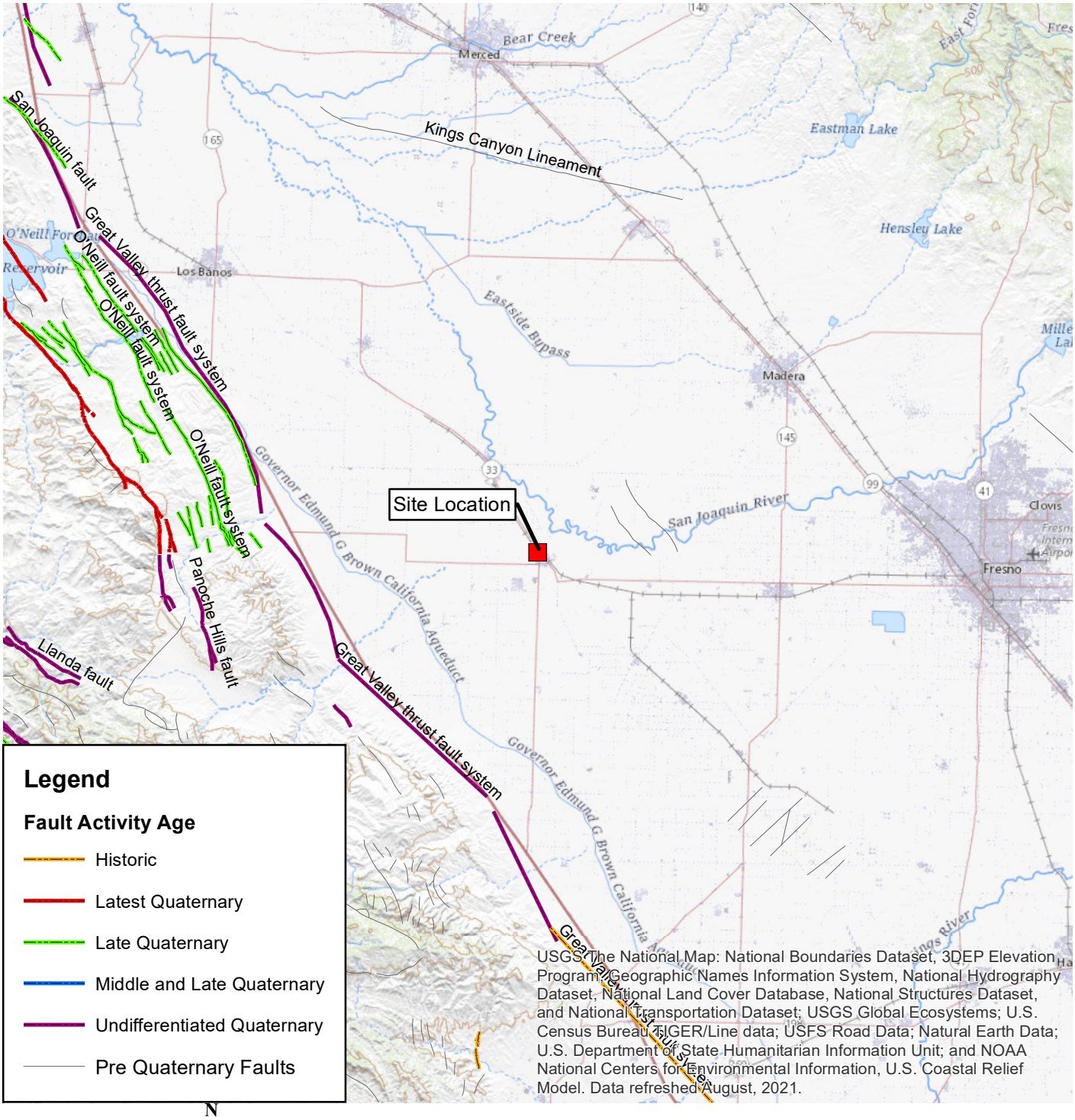

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Figure C-8
Area Fault Map
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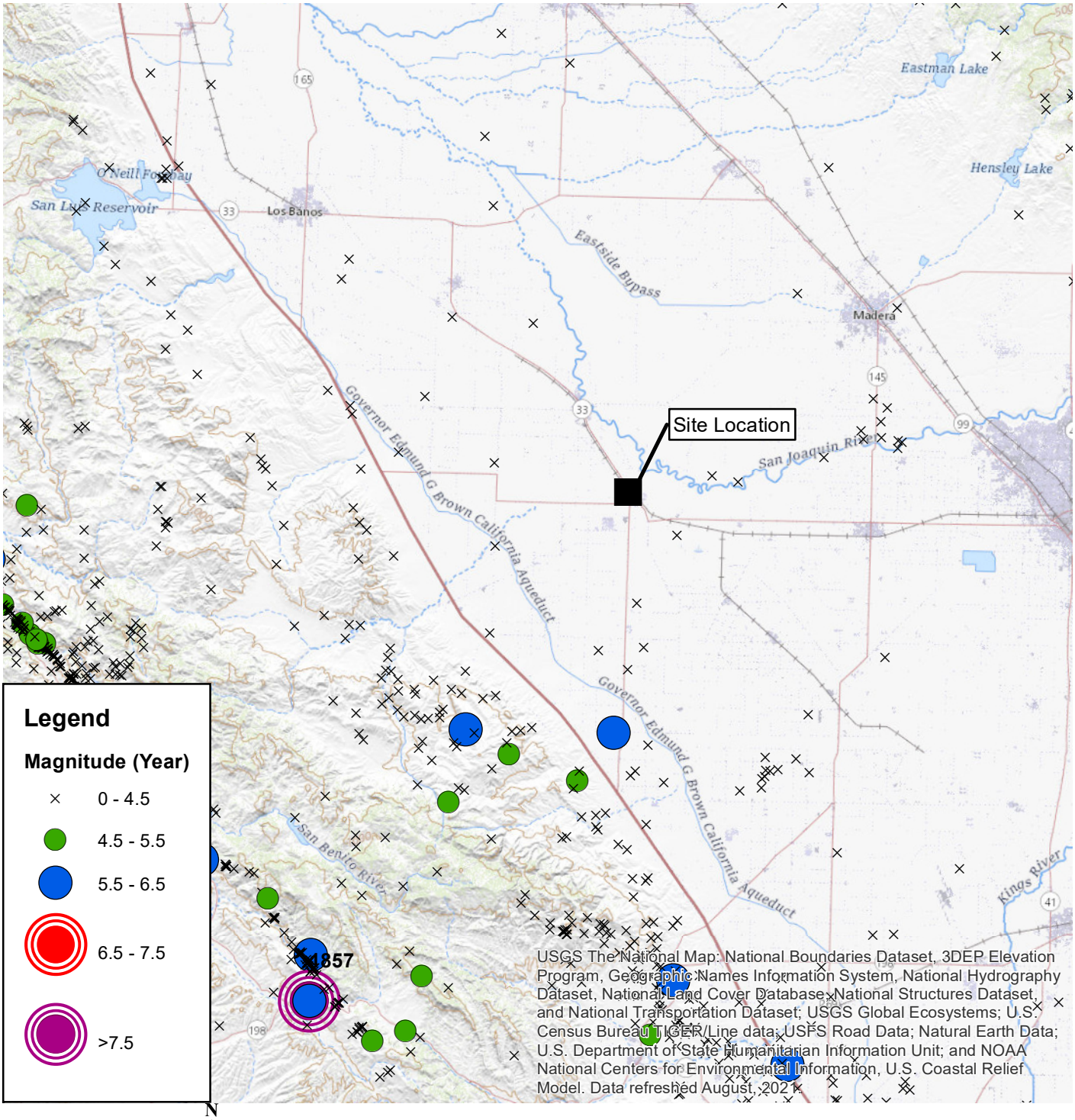

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Mendota ES - New Classrooms
605 Bass Avenue
Mendota, Fresno County, California

Figure C-9
Historical Earthquakes
BSK Project G24000166

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CPT-02 - Basic results

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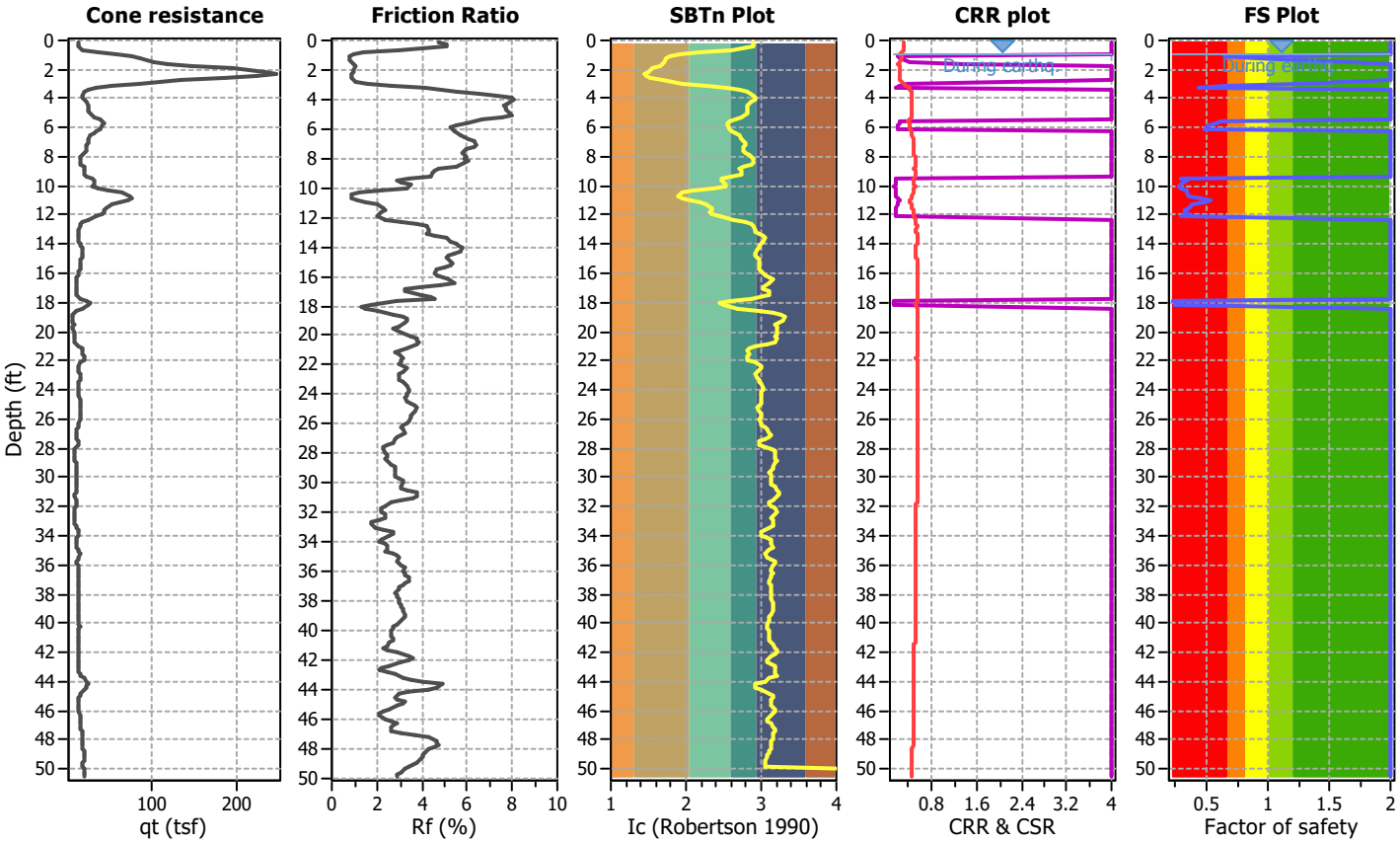
LIQUEFACTION ANALYSIS REPORT

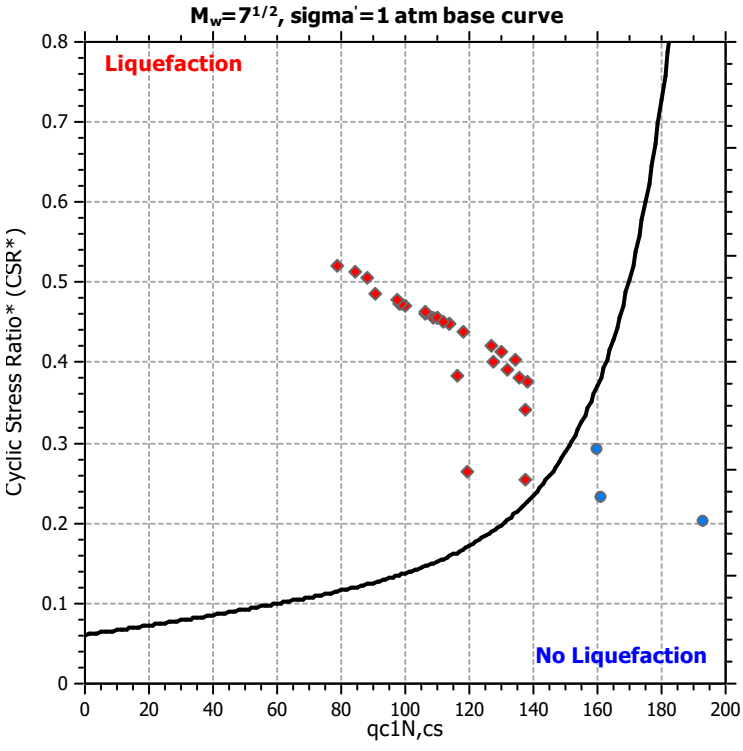
Project title : **Location :**

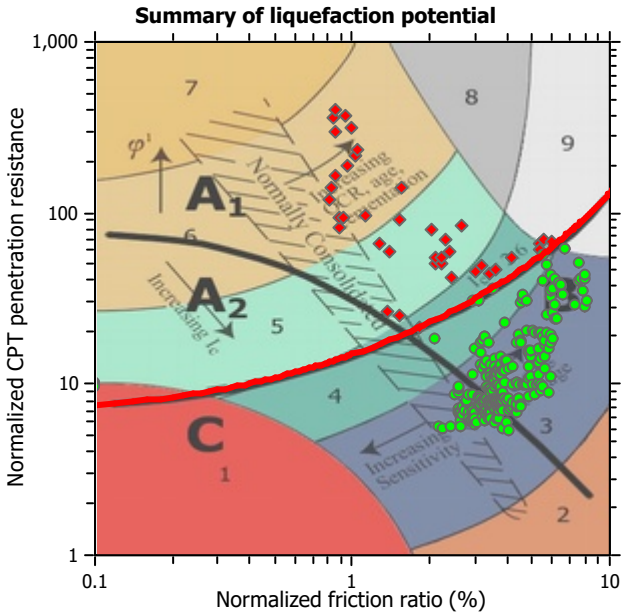
CPT file : CPT-01 - Basic

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	14.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.55	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

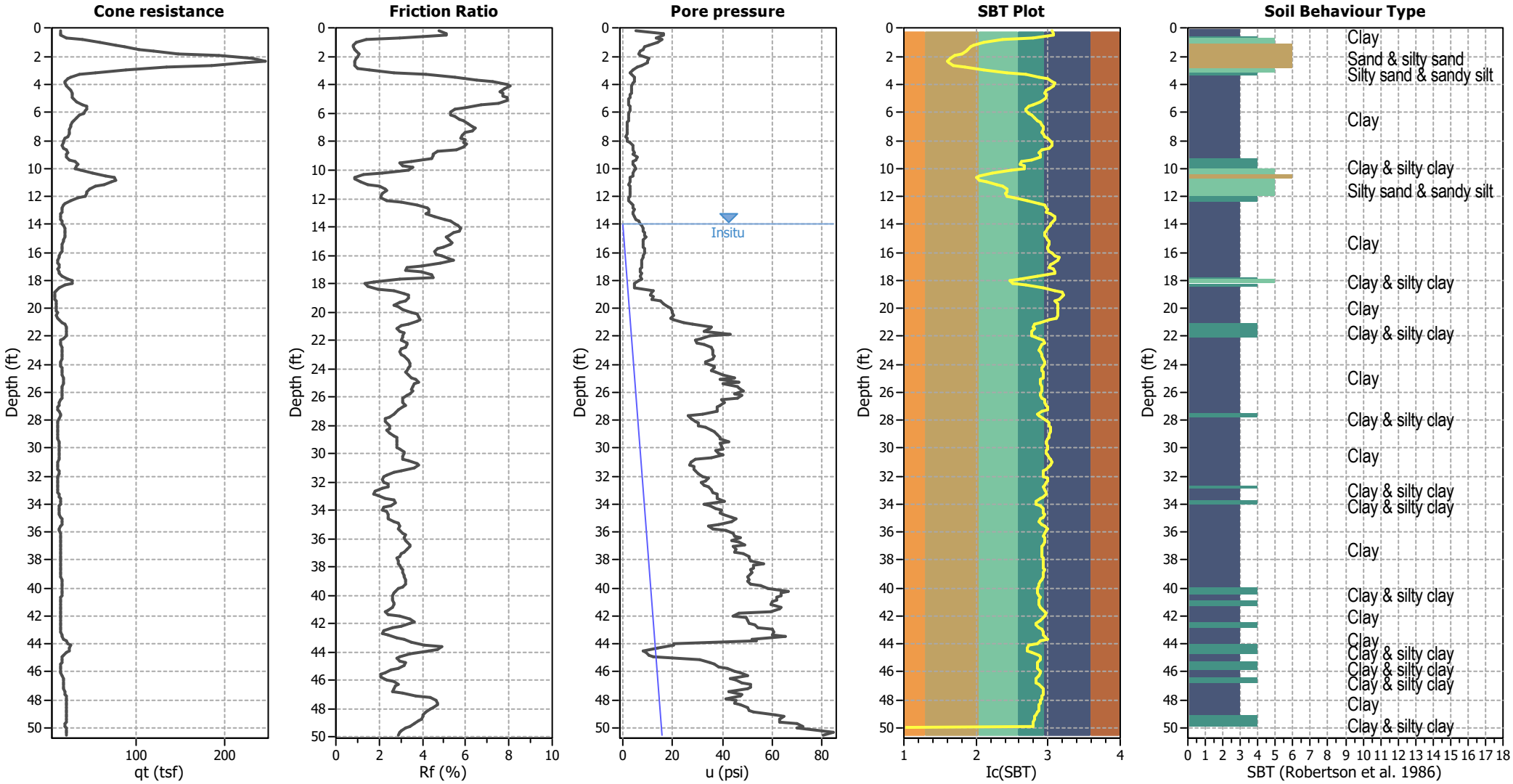






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



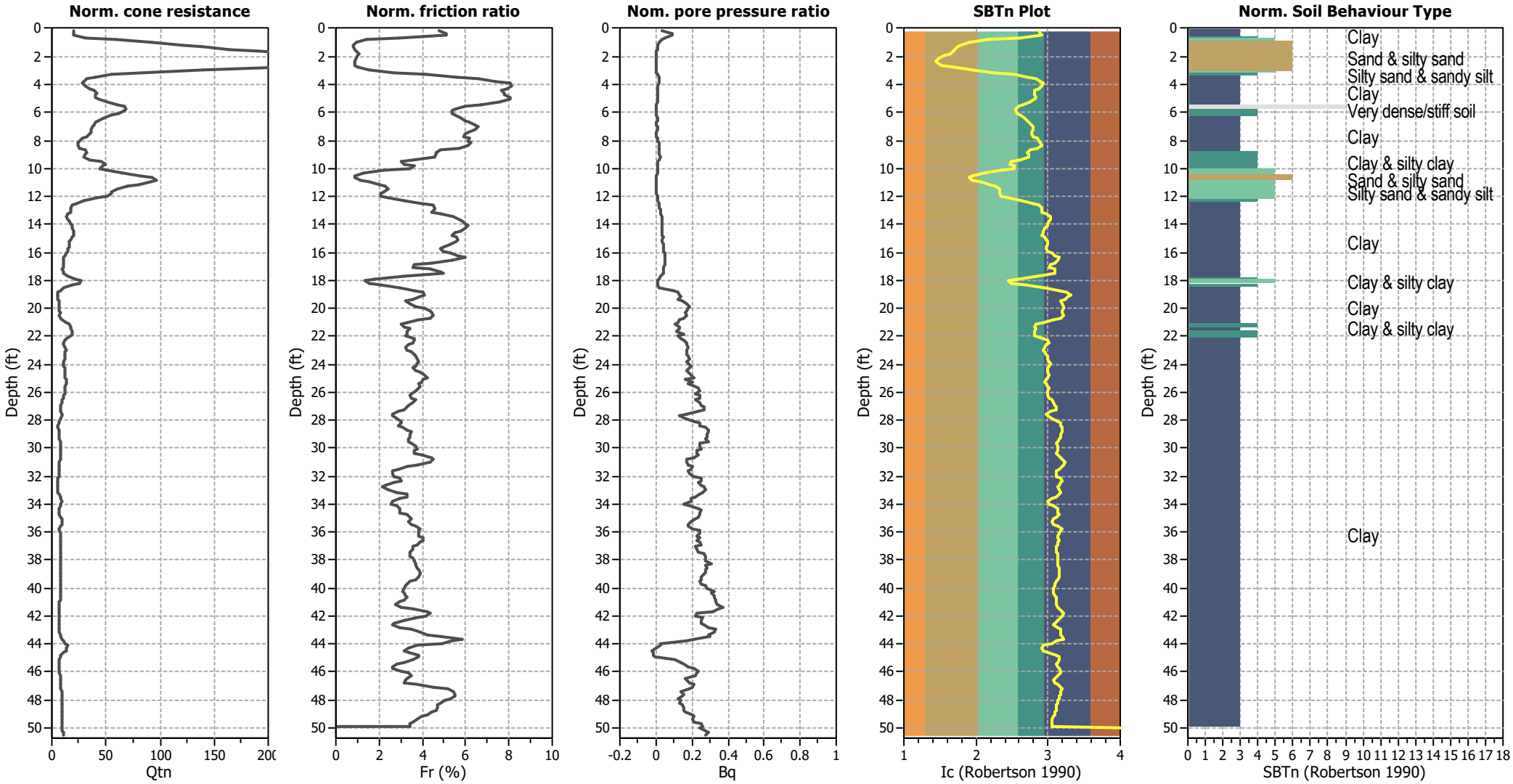
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



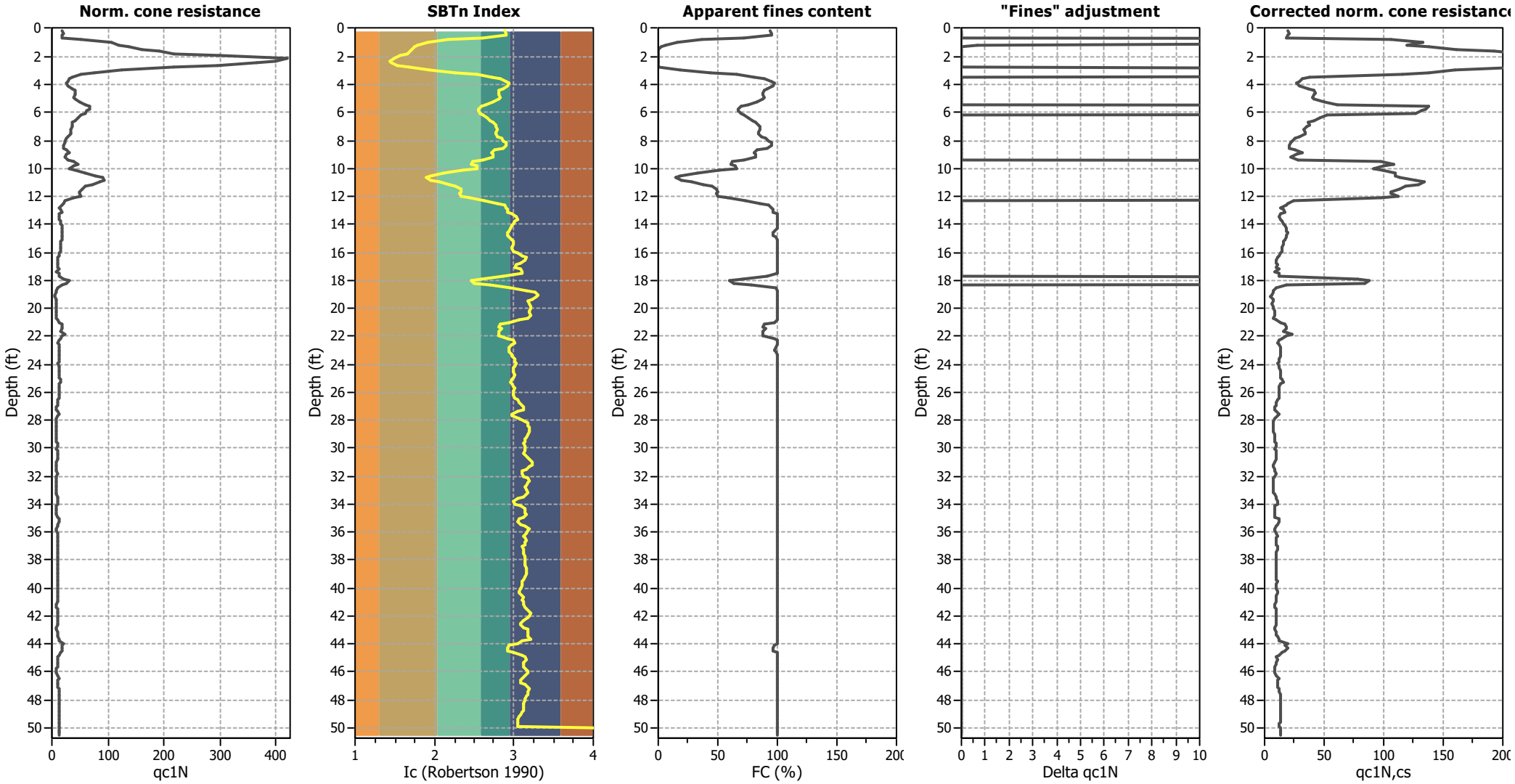
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

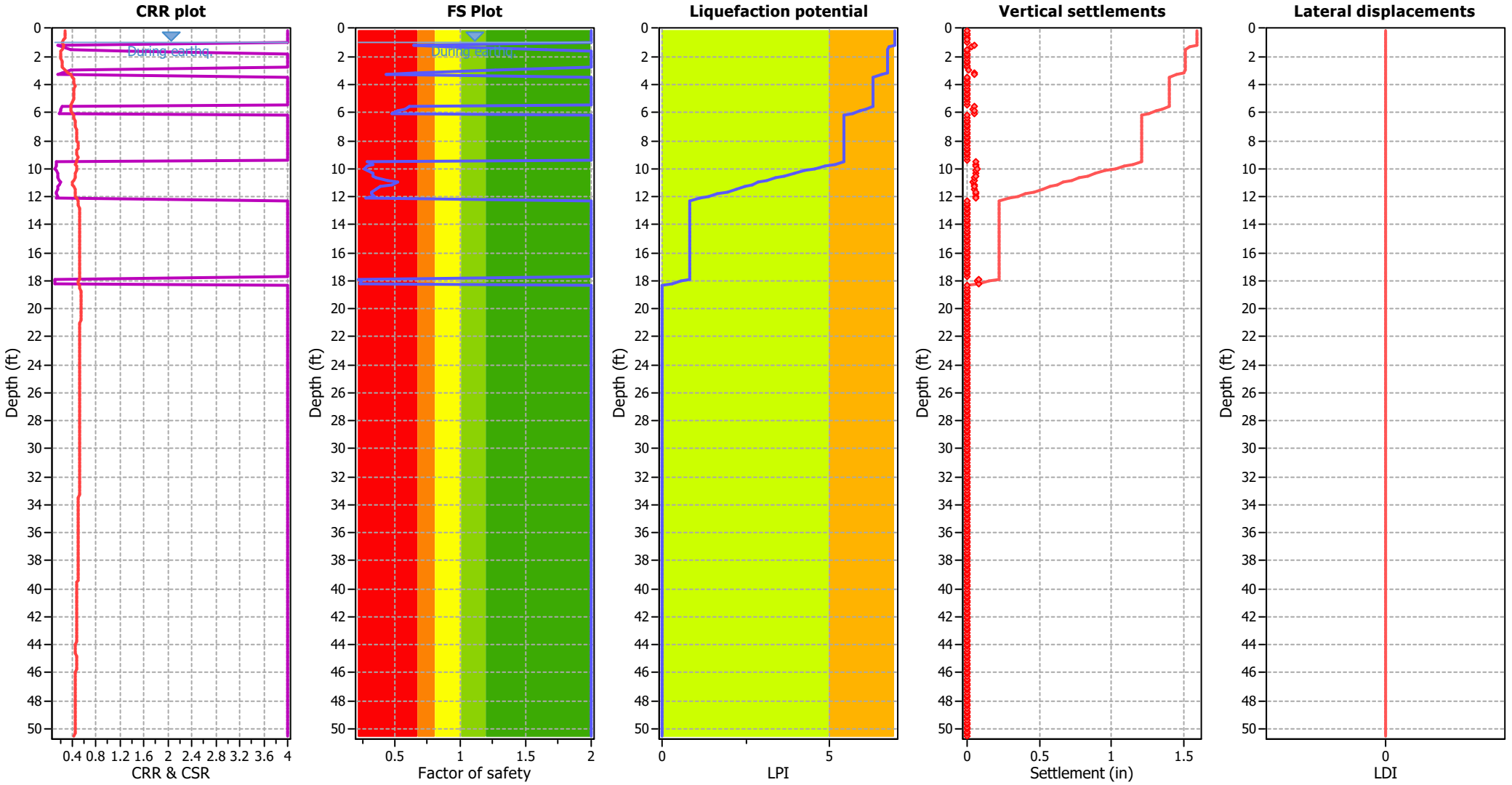
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

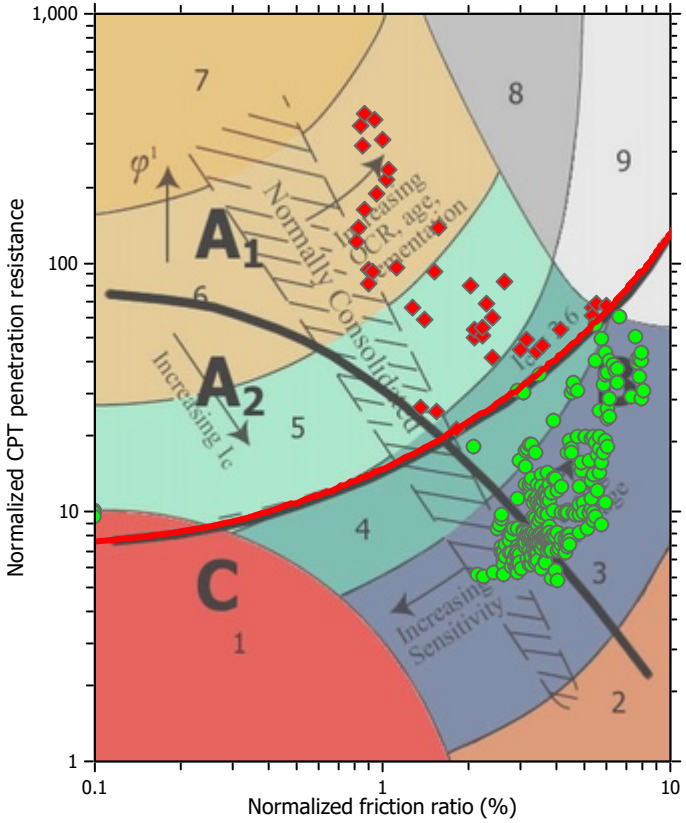
F.S. color scheme

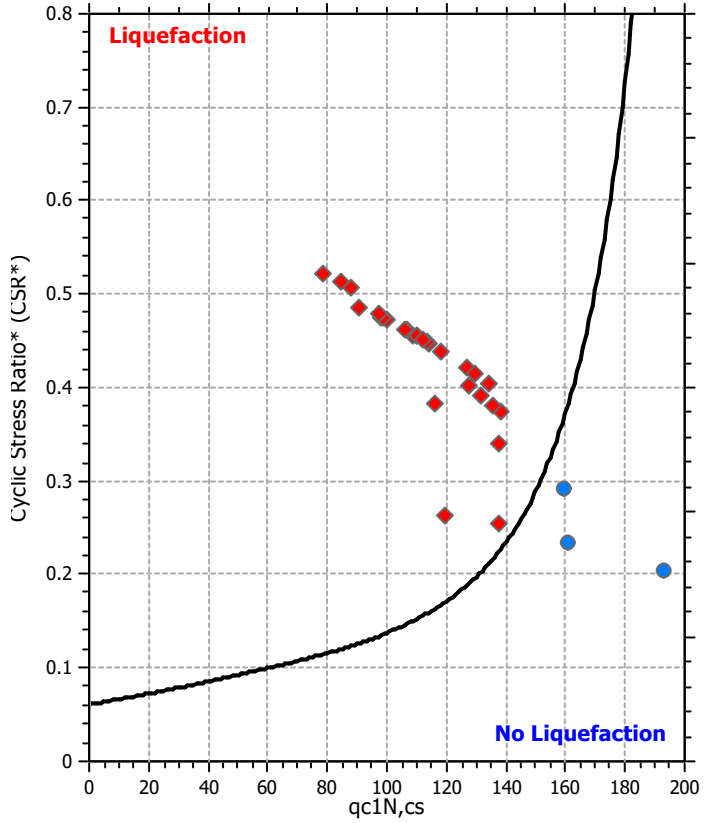
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

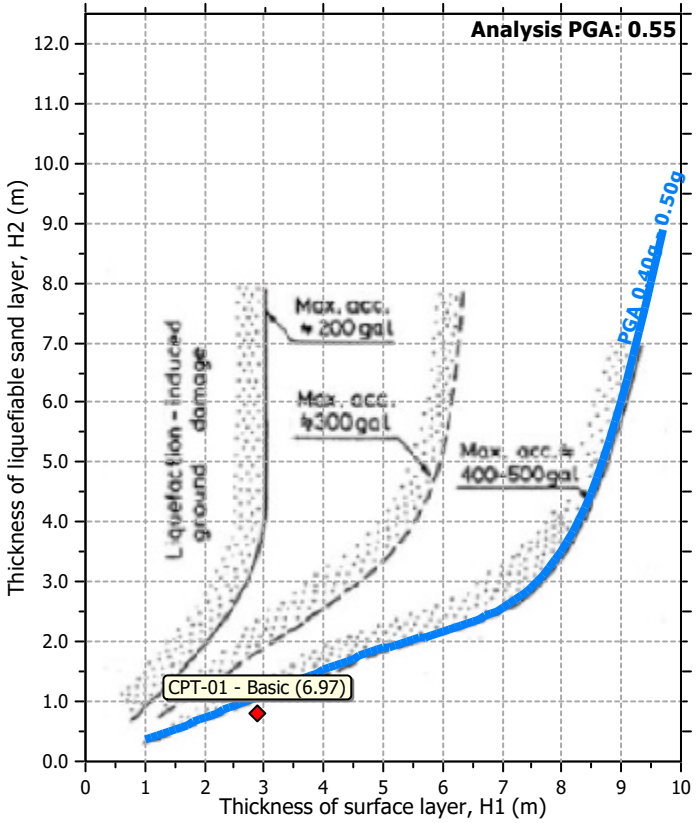
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



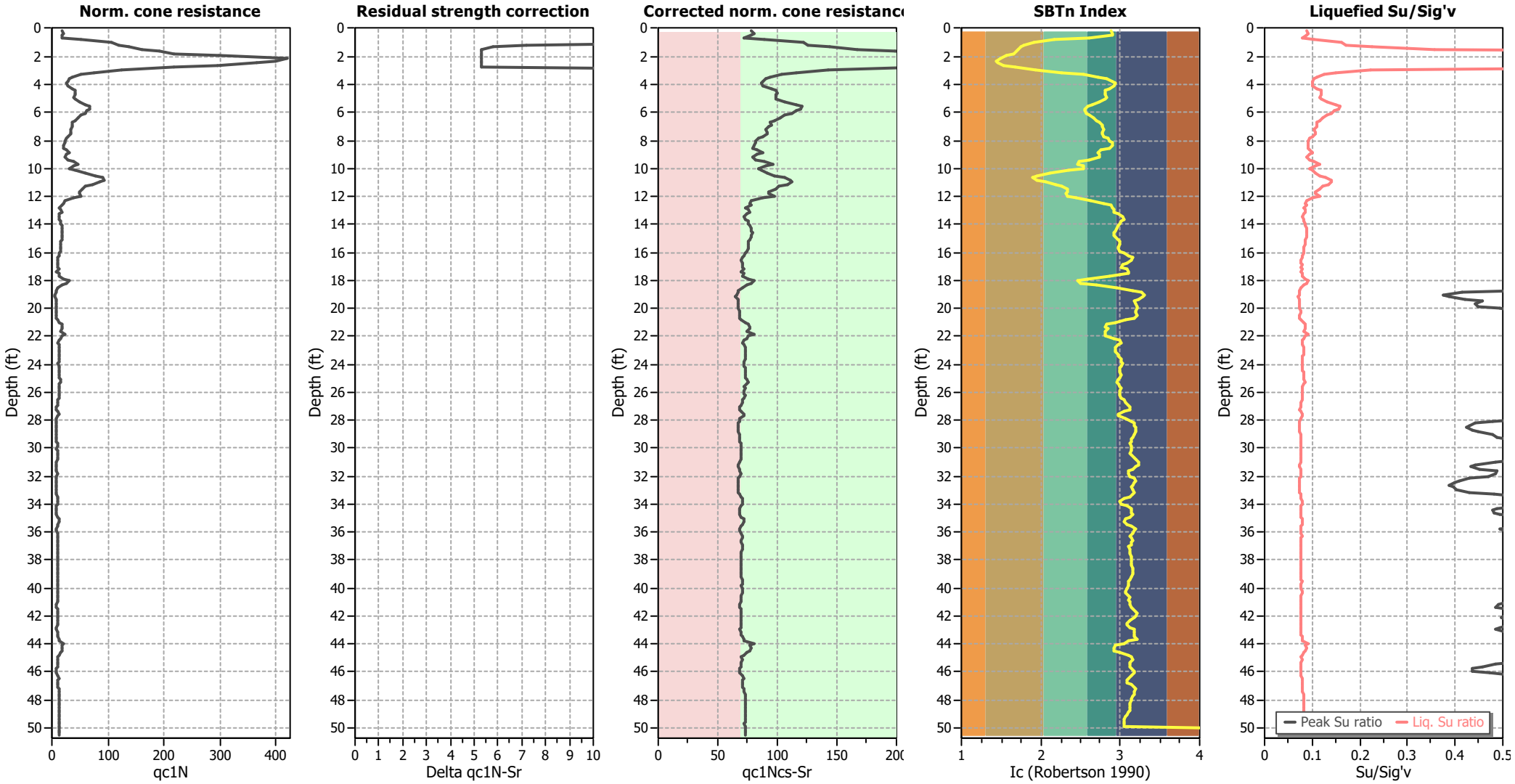




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	12.01	0.55	5.18	50.87	112.65
2	0.33	13.10	0.69	16.07	52.01	113.13
3	0.49	11.90	0.67	16.04	52.37	113.07
4	0.66	11.48	0.54	13.22	35.86	113.25
5	0.82	32.92	0.48	15.97	18.20	114.25
6	0.98	66.29	0.53	14.08	10.71	115.57
7	1.15	73.86	0.59	10.68	7.86	117.20
8	1.31	85.73	0.71	8.75	7.05	118.75
9	1.48	100.33	0.86	8.08	6.22	120.62
10	1.64	120.28	1.07	6.73	5.94	122.86
11	1.80	135.62	1.48	6.27	5.27	125.59
12	1.97	186.32	2.06	7.08	3.72	127.95
13	2.13	261.87	2.26	10.29	2.73	129.26
14	2.30	248.78	2.22	9.72	2.11	129.23
15	2.46	230.63	1.90	9.92	2.36	128.07
16	2.62	190.25	1.51	7.33	3.18	126.41
17	2.79	135.72	1.36	5.82	5.69	124.64
18	2.95	78.05	1.30	3.96	11.29	123.34
19	3.12	46.71	1.38	3.03	21.00	122.34
20	3.28	32.22	1.49	3.55	31.97	121.43
21	3.44	23.28	1.38	4.81	41.06	120.55
22	3.61	19.78	1.30	4.68	47.51	119.74
23	3.77	18.17	1.32	4.38	51.71	119.47
24	3.94	16.83	1.38	4.26	54.13	119.78
25	4.10	17.96	1.52	3.33	52.91	120.61
26	4.27	22.40	1.71	3.27	49.74	121.76
27	4.43	25.45	1.92	3.47	47.11	122.73
28	4.59	26.34	2.02	3.27	46.65	123.25
29	4.76	25.66	2.04	2.97	46.82	123.20
30	4.92	24.93	1.89	2.83	47.48	123.31
31	5.09	25.72	2.13	2.60	46.39	123.98
32	5.25	30.95	2.47	2.55	42.91	125.10
33	5.41	38.58	2.59	2.28	38.11	125.95
34	5.58	44.22	2.55	2.65	34.65	126.14
35	5.74	43.85	2.39	2.65	33.06	125.81
36	5.91	41.89	2.20	2.74	33.01	125.20
37	6.07	39.57	2.06	2.57	34.10	124.48
38	6.23	34.62	1.92	2.49	36.00	123.70
39	6.40	30.74	1.77	2.30	38.53	122.76
40	6.56	27.12	1.58	2.13	41.00	121.90
41	6.73	24.49	1.52	1.83	42.67	121.42
42	6.89	25.14	1.57	1.77	44.10	121.26
43	7.05	23.80	1.55	1.92	44.97	121.11
44	7.22	22.33	1.47	1.71	45.21	120.70
45	7.38	23.03	1.36	1.52	44.35	120.23
46	7.55	23.39	1.29	1.59	44.38	119.79
47	7.71	20.52	1.26	1.41	45.73	118.97
48	7.87	17.90	1.04	1.60	48.68	117.98

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	16.12	0.97	1.67	50.33	116.94
50	8.20	15.51	0.92	3.06	52.12	116.45
51	8.37	14.67	0.91	3.97	52.18	116.11
52	8.53	15.16	0.86	4.34	49.55	116.37
53	8.69	18.95	0.95	4.30	43.36	116.81
54	8.86	23.79	0.92	4.83	41.43	117.25
55	9.02	19.60	0.96	4.36	42.10	116.84
56	9.19	16.49	0.83	5.64	42.55	116.26
57	9.35	21.23	0.75	5.36	35.99	116.05
58	9.51	29.70	0.76	4.16	30.01	117.44
59	9.68	37.11	1.08	4.31	29.47	118.84
60	9.84	30.88	1.19	4.62	31.95	119.36
61	10.01	25.24	1.03	5.10	32.07	118.55
62	10.17	33.14	0.78	4.66	24.69	117.19
63	10.33	49.17	0.53	3.95	16.34	116.32
64	10.50	65.34	0.56	3.83	11.54	116.16
65	10.66	76.23	0.59	2.75	10.46	117.60
66	10.83	78.99	0.80	2.78	11.72	119.62
67	10.99	73.39	1.15	2.74	14.57	121.23
68	11.15	62.54	1.28	2.60	18.51	122.01
69	11.32	51.16	1.33	3.07	21.47	121.39
70	11.48	46.45	1.03	2.95	23.62	120.33
71	11.65	41.62	0.94	2.68	23.68	119.07
72	11.81	42.04	0.87	2.64	23.29	118.63
73	11.98	45.86	0.87	3.14	24.13	117.94
74	12.14	33.50	0.75	2.46	28.38	117.14
75	12.30	20.95	0.76	2.49	36.76	115.64
76	12.47	17.12	0.66	3.65	45.08	114.64
77	12.63	16.50	0.65	3.87	50.66	113.82
78	12.80	12.34	0.65	3.85	52.44	113.38
79	12.96	14.53	0.58	4.39	53.27	113.11
80	13.12	15.36	0.60	4.09	52.80	112.93
81	13.29	12.62	0.60	4.17	56.70	112.72
82	13.45	10.98	0.58	4.68	61.04	112.72
83	13.62	12.34	0.65	5.00	61.29	113.43
84	13.78	13.96	0.76	6.43	59.77	114.63
85	13.94	14.78	0.86	6.77	58.28	115.67
86	14.11	16.19	0.92	7.42	57.38	116.49
87	14.27	17.00	1.00	8.06	55.89	116.94
88	14.44	17.60	0.98	8.32	54.47	117.03
89	14.60	18.12	0.92	8.60	53.46	116.80
90	14.76	17.61	0.90	8.90	53.42	116.54
91	14.93	17.01	0.89	9.18	55.05	116.39
92	15.09	16.08	0.90	8.27	56.59	116.05
93	15.26	15.28	0.82	8.10	57.55	115.47
94	15.42	14.79	0.73	7.95	57.49	114.70
95	15.58	14.41	0.68	8.32	56.92	114.03
96	15.75	14.38	0.64	8.57	57.06	113.66

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	13.94	0.64	8.63	58.54	113.37
98	16.08	12.65	0.63	8.50	61.68	113.16
99	16.24	11.64	0.63	8.43	65.32	112.71
100	16.40	10.71	0.58	8.10	69.21	112.11
101	16.57	9.42	0.54	7.33	68.43	110.71
102	16.73	10.03	0.35	7.66	64.93	109.28
103	16.90	10.63	0.32	7.34	60.86	108.00
104	17.06	10.01	0.34	7.41	59.45	108.32
105	17.22	11.46	0.38	6.76	65.00	109.23
106	17.39	8.76	0.48	6.86	65.66	110.59
107	17.55	11.75	0.56	7.40	65.58	111.06
108	17.72	12.32	0.46	6.93	49.64	111.02
109	17.88	21.28	0.32	7.70	35.26	110.55
110	18.04	30.79	0.34	6.28	28.69	110.51
111	18.21	27.05	0.38	4.93	30.63	110.95
112	18.37	18.16	0.40	4.73	40.05	110.06
113	18.54	10.29	0.32	4.92	55.27	107.96
114	18.70	6.75	0.24	12.00	69.31	105.44
115	18.86	7.03	0.21	11.84	77.89	103.94
116	19.03	5.77	0.22	11.26	81.63	103.16
117	19.19	5.12	0.19	12.31	79.53	103.12
118	19.36	7.63	0.20	11.89	75.46	103.30
119	19.52	7.14	0.22	15.05	70.93	103.37
120	19.68	6.73	0.18	16.55	73.20	103.54
121	19.85	6.94	0.22	18.31	74.04	104.26
122	20.01	7.49	0.28	19.24	73.48	105.92
123	20.18	8.55	0.33	19.53	72.94	107.06
124	20.34	8.41	0.34	19.61	72.49	107.42
125	20.51	8.14	0.32	20.19	73.69	107.38
126	20.67	8.07	0.33	19.14	71.78	107.63
127	20.83	9.57	0.36	20.61	63.14	108.75
128	21.00	14.08	0.41	24.31	54.00	110.56
129	21.16	17.86	0.52	27.77	47.84	112.02
130	21.33	19.11	0.54	35.75	46.84	113.20
131	21.49	18.44	0.62	34.97	48.37	113.59
132	21.65	17.01	0.62	32.63	46.23	114.15
133	21.82	23.61	0.63	43.15	46.41	114.19
134	21.98	18.45	0.63	34.93	46.76	113.67
135	22.15	15.14	0.51	31.44	53.54	112.26
136	22.31	12.42	0.43	29.32	57.68	110.67
137	22.47	11.61	0.39	29.95	59.25	109.81
138	22.64	12.46	0.39	32.47	57.03	109.80
139	22.80	14.09	0.41	35.65	54.88	110.33
140	22.97	14.40	0.45	36.08	54.00	110.90
141	23.13	14.44	0.47	36.34	55.02	111.27
142	23.29	14.03	0.48	35.91	56.26	111.38
143	23.46	13.62	0.48	36.45	57.38	111.33
144	23.62	13.47	0.47	35.95	58.71	111.14

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	12.71	0.46	33.04	59.86	110.85
146	23.95	12.31	0.44	33.46	60.28	110.53
147	24.11	12.64	0.42	36.63	59.32	110.59
148	24.28	13.58	0.46	36.56	58.01	110.79
149	24.44	13.79	0.46	35.37	57.95	111.33
150	24.61	13.84	0.51	37.21	58.60	111.75
151	24.77	13.94	0.54	40.03	59.11	112.41
152	24.93	14.68	0.59	44.75	58.67	112.98
153	25.10	15.52	0.62	38.82	56.31	113.30
154	25.26	16.90	0.58	46.38	55.86	113.24
155	25.43	15.15	0.57	40.05	56.50	112.63
156	25.59	13.49	0.50	46.28	58.64	112.11
157	25.75	13.92	0.50	46.64	58.96	111.56
158	25.92	13.72	0.47	48.19	58.59	111.35
159	26.08	13.52	0.46	44.69	57.54	110.94
160	26.25	14.06	0.42	47.54	58.01	110.67
161	26.41	12.93	0.43	46.25	59.05	110.50
162	26.57	12.50	0.44	39.54	61.96	110.03
163	26.74	11.21	0.37	40.56	63.49	109.05
164	26.90	10.46	0.30	38.89	65.23	107.70
165	27.07	9.52	0.28	38.01	67.14	106.71
166	27.23	8.94	0.27	37.88	66.69	106.44
167	27.39	10.44	0.27	37.81	61.30	107.00
168	27.56	13.56	0.31	31.89	56.84	107.43
169	27.72	12.95	0.29	26.13	57.45	107.21
170	27.89	9.87	0.25	27.29	62.73	106.35
171	28.05	8.91	0.25	28.99	68.64	105.21
172	28.22	8.39	0.21	30.44	70.85	104.53
173	28.38	8.14	0.20	30.32	70.85	104.03
174	28.54	8.39	0.21	33.08	72.41	104.35
175	28.71	8.05	0.24	35.39	72.79	105.05
176	28.87	8.68	0.26	36.55	72.93	105.81
177	29.04	9.14	0.28	37.89	70.95	106.31
178	29.20	9.52	0.28	39.09	70.39	106.54
179	29.36	9.24	0.28	39.23	69.05	106.79
180	29.53	10.11	0.30	42.69	67.87	107.31
181	29.69	10.88	0.33	39.18	66.79	108.06
182	29.86	10.93	0.36	39.36	67.88	108.57
183	30.02	10.33	0.37	40.12	68.26	108.71
184	30.18	10.96	0.35	37.21	68.06	108.42
185	30.35	10.71	0.32	38.24	67.10	108.62
186	30.51	11.26	0.39	40.04	68.65	109.43
187	30.68	11.35	0.47	35.78	70.86	110.26
188	30.84	10.88	0.46	29.33	72.83	109.86
189	31.00	9.83	0.34	27.55	75.30	108.59
190	31.17	8.58	0.30	26.75	74.87	106.61
191	31.33	8.76	0.22	28.63	72.96	105.59
192	31.50	9.56	0.23	28.63	69.53	104.95

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	9.46	0.23	29.16	65.90	105.12
194	31.82	10.82	0.22	30.27	65.86	105.00
195	31.99	9.46	0.22	32.00	67.21	104.95
196	32.15	8.68	0.23	34.13	71.46	104.88
197	32.32	8.73	0.23	33.29	72.92	104.46
198	32.48	8.44	0.19	31.62	71.54	103.47
199	32.64	8.33	0.15	32.34	69.71	102.00
200	32.81	8.12	0.13	34.08	68.41	101.89
201	32.97	8.89	0.18	35.69	69.79	102.98
202	33.14	8.79	0.22	36.18	70.63	104.71
203	33.30	9.57	0.26	37.82	69.98	106.89
204	33.46	11.82	0.38	38.03	66.82	108.01
205	33.63	12.12	0.33	38.11	62.03	108.41
206	33.79	13.34	0.28	40.49	58.64	107.81
207	33.96	13.49	0.29	32.52	59.32	107.22
208	34.12	10.76	0.27	34.82	63.77	107.01
209	34.28	10.09	0.28	37.56	67.82	106.33
210	34.45	10.14	0.24	39.78	68.19	106.21
211	34.61	10.42	0.26	39.23	68.05	106.22
212	34.78	10.20	0.28	40.35	69.30	107.33
213	34.94	10.93	0.36	43.66	66.51	108.87
214	35.10	14.27	0.43	45.56	63.62	110.15
215	35.27	14.34	0.44	43.93	61.60	110.58
216	35.43	13.44	0.41	38.20	64.14	110.14
217	35.60	11.75	0.38	34.41	68.45	109.32
218	35.76	10.29	0.35	36.11	72.43	108.79
219	35.93	10.38	0.36	41.09	71.58	108.83
220	36.09	12.20	0.38	44.11	69.41	109.71
221	36.25	12.82	0.46	44.77	67.64	110.39
222	36.42	12.60	0.45	47.26	68.54	110.78
223	36.58	12.36	0.45	43.69	69.29	110.51
224	36.75	11.92	0.42	46.61	68.73	110.23
225	36.91	12.54	0.40	48.65	67.90	110.14
226	37.07	12.82	0.43	44.23	66.23	109.96
227	37.24	12.83	0.38	45.34	66.58	109.74
228	37.40	12.07	0.37	45.04	66.85	109.16
229	37.57	11.70	0.35	48.61	67.73	108.98
230	37.73	11.97	0.36	50.46	67.84	108.98
231	37.89	11.99	0.37	50.51	68.45	109.25
232	38.06	11.77	0.39	51.53	68.27	109.55
233	38.22	12.55	0.40	56.25	68.43	109.82
234	38.39	12.37	0.41	52.51	68.46	109.83
235	38.55	11.82	0.39	52.56	69.63	109.78
236	38.71	11.87	0.40	51.38	69.98	109.84
237	38.88	12.32	0.42	51.67	69.72	110.12
238	39.04	12.53	0.43	51.30	69.38	110.33
239	39.21	12.53	0.43	49.87	68.84	110.36
240	39.37	12.81	0.42	50.89	67.51	110.30

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	13.41	0.41	50.26	66.05	109.97
242	39.70	13.04	0.37	50.98	65.27	109.59
243	39.86	12.73	0.36	55.14	65.25	109.38
244	40.03	13.02	0.38	58.43	63.85	109.53
245	40.19	14.16	0.38	66.44	63.26	109.70
246	40.35	13.45	0.38	63.25	63.63	109.62
247	40.52	12.59	0.37	63.42	65.51	109.39
248	40.68	12.53	0.36	61.65	66.54	109.20
249	40.85	12.51	0.36	61.69	66.31	108.76
250	41.01	12.14	0.31	59.89	66.46	108.01
251	41.17	11.36	0.27	59.54	66.53	107.10
252	41.34	11.14	0.26	63.73	68.06	107.60
253	41.50	11.94	0.37	62.97	70.15	109.36
254	41.67	12.80	0.50	59.59	72.32	110.83
255	41.83	12.49	0.50	46.42	73.50	111.08
256	41.99	11.96	0.42	44.40	73.27	110.44
257	42.16	12.11	0.39	49.35	71.60	109.59
258	42.32	12.18	0.36	50.35	67.62	108.66
259	42.49	12.97	0.27	50.91	64.39	107.80
260	42.65	12.94	0.27	52.77	64.20	107.35
261	42.81	11.62	0.31	54.24	67.55	107.93
262	42.98	11.57	0.35	60.13	70.79	108.93
263	43.14	12.40	0.41	60.86	71.67	110.16
264	43.31	13.00	0.49	59.81	71.09	111.62
265	43.47	14.44	0.59	65.17	71.87	113.31
266	43.64	15.26	0.76	51.87	73.80	115.31
267	43.80	15.90	1.02	53.35	66.01	116.93
268	43.96	26.03	0.98	20.61	61.54	117.33
269	44.13	21.97	0.82	20.11	54.00	116.77
270	44.29	24.89	0.71	14.07	53.09	115.32
271	44.46	22.74	0.56	7.99	53.50	114.47
272	44.62	19.01	0.62	9.30	58.37	113.34
273	44.78	15.86	0.52	10.50	66.00	112.32
274	44.95	13.09	0.43	12.34	68.87	111.14
275	45.11	14.26	0.43	30.61	69.35	110.05
276	45.28	13.32	0.35	34.97	67.39	109.22
277	45.44	12.76	0.30	36.50	67.23	107.85
278	45.60	12.11	0.26	38.61	67.67	106.79
279	45.77	11.43	0.24	41.97	68.87	106.44
280	45.93	11.48	0.27	45.01	71.20	107.33
281	46.10	11.92	0.36	47.00	70.86	108.86
282	46.26	13.84	0.42	49.91	68.39	110.32
283	46.42	15.63	0.46	43.39	65.54	110.65
284	46.59	14.76	0.39	45.36	64.20	110.65
285	46.75	15.03	0.41	47.68	64.80	110.30
286	46.92	14.43	0.41	51.04	67.92	111.52
287	47.08	14.65	0.61	51.49	70.72	113.10
288	47.24	16.05	0.74	50.16	72.17	114.68

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	16.85	0.80	42.59	71.63	115.71
290	47.57	17.59	0.89	47.51	70.73	116.15
291	47.74	18.03	0.86	47.03	69.90	116.45
292	47.90	18.46	0.88	41.53	68.96	116.27
293	48.06	18.14	0.82	45.19	68.00	115.99
294	48.23	18.33	0.76	44.66	67.58	115.54
295	48.39	17.70	0.74	47.21	67.00	115.35
296	48.56	18.24	0.76	50.27	66.90	115.40
297	48.72	18.55	0.77	50.42	66.43	115.42
298	48.88	18.24	0.74	52.22	65.53	115.17
299	49.05	18.42	0.68	61.27	64.42	114.81
300	49.21	18.61	0.66	64.67	63.12	114.47
301	49.38	18.63	0.64	62.94	62.39	114.04
302	49.54	18.15	0.57	62.72	62.23	113.42
303	49.70	17.22	0.52	69.76	62.24	112.93
304	49.87	17.40	0.54	72.01	62.35	112.83
305	50.03	17.79	0.55	70.02	100.00	87.36
306	50.20	18.80	-269829.61	80.05	100.00	87.36
307	50.36	18.98	-269829.61	84.46	100.00	87.36
308	50.52	18.78	-269829.61	80.59	100.00	87.36

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.16	0.01	0.00	0.01	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.06	1.00	0.385	1.69	0.228	1.10	1.00	0.264	No
8	1.31	0.08	0.01	0.07	1.00	0.410	1.69	0.243	1.10	1.00	0.255	No
9	1.48	0.09	0.01	0.07	1.00	0.434	1.69	0.257	1.10	1.00	0.233	No
10	1.64	0.10	0.02	0.08	1.00	0.452	1.69	0.268	1.10	1.00	0.202	No
11	1.80	0.11	0.02	0.08	1.00	0.469	1.69	0.278	1.10	1.00	0.210	No
12	1.97	0.12	0.03	0.09	1.00	0.483	1.69	0.286	1.10	1.00	0.216	No
13	2.13	0.13	0.04	0.09	1.00	0.495	1.69	0.293	1.10	1.00	0.221	No
14	2.30	0.14	0.04	0.10	1.00	0.506	1.69	0.300	1.10	1.00	0.226	No
15	2.46	0.15	0.05	0.10	1.00	0.515	1.69	0.305	1.10	1.00	0.231	No
16	2.62	0.16	0.05	0.11	1.00	0.524	1.69	0.311	1.10	1.00	0.234	No
17	2.79	0.17	0.06	0.11	0.99	0.532	1.69	0.315	1.10	1.00	0.238	No
18	2.95	0.18	0.06	0.12	0.99	0.539	1.69	0.320	1.10	1.00	0.292	No
19	3.12	0.19	0.07	0.12	0.99	0.547	1.69	0.324	1.10	1.00	0.340	No
20	3.28	0.20	0.07	0.13	0.99	0.553	1.69	0.328	1.10	1.00	0.384	No
21	3.44	0.21	0.08	0.13	0.99	0.559	1.69	0.331	1.10	1.00	0.414	No
22	3.61	0.22	0.08	0.14	0.99	0.565	1.69	0.335	1.10	1.00	0.427	No
23	3.77	0.23	0.09	0.14	0.99	0.570	1.69	0.338	1.10	1.00	0.435	No
24	3.94	0.24	0.09	0.15	0.99	0.575	1.69	0.341	1.10	1.00	0.442	No
25	4.10	0.25	0.10	0.15	0.99	0.579	1.69	0.344	1.10	1.00	0.443	No
26	4.27	0.26	0.10	0.16	0.99	0.584	1.69	0.346	1.10	1.00	0.433	No
27	4.43	0.27	0.11	0.16	0.99	0.587	1.69	0.348	1.10	1.00	0.425	No
28	4.59	0.28	0.11	0.17	0.98	0.590	1.69	0.350	1.10	1.00	0.425	No
29	4.76	0.29	0.12	0.17	0.98	0.593	1.69	0.352	1.10	1.00	0.429	No
30	4.92	0.30	0.12	0.18	0.98	0.596	1.69	0.353	1.10	1.00	0.434	No
31	5.09	0.31	0.13	0.18	0.98	0.599	1.69	0.355	1.10	1.00	0.433	No
32	5.25	0.32	0.13	0.19	0.98	0.601	1.69	0.356	1.10	1.00	0.416	No
33	5.41	0.33	0.14	0.19	0.98	0.603	1.69	0.357	1.10	1.00	0.391	No
34	5.58	0.34	0.14	0.20	0.98	0.605	1.69	0.359	1.10	1.00	0.375	No
35	5.74	0.35	0.15	0.20	0.98	0.606	1.69	0.360	1.10	1.00	0.381	No
36	5.91	0.36	0.15	0.21	0.98	0.608	1.69	0.361	1.10	1.00	0.391	No
37	6.07	0.37	0.16	0.21	0.98	0.610	1.69	0.361	1.10	1.00	0.401	No
38	6.23	0.38	0.16	0.22	0.98	0.611	1.69	0.362	1.10	1.00	0.420	No
39	6.40	0.39	0.17	0.22	0.97	0.613	1.69	0.363	1.10	1.00	0.434	No
40	6.56	0.40	0.17	0.23	0.97	0.614	1.69	0.364	1.10	1.00	0.447	No
41	6.73	0.41	0.18	0.23	0.97	0.616	1.69	0.365	1.10	1.00	0.456	No
42	6.89	0.42	0.18	0.24	0.97	0.617	1.69	0.366	1.10	1.00	0.456	No
43	7.05	0.43	0.19	0.24	0.97	0.618	1.69	0.367	1.10	1.00	0.461	No
44	7.22	0.44	0.19	0.25	0.97	0.620	1.69	0.367	1.10	1.00	0.467	No
45	7.38	0.45	0.20	0.25	0.97	0.621	1.69	0.368	1.10	1.00	0.467	No
46	7.55	0.46	0.20	0.26	0.97	0.622	1.69	0.369	1.10	1.00	0.468	No
47	7.71	0.47	0.21	0.26	0.97	0.623	1.69	0.370	1.10	1.00	0.476	No
48	7.87	0.48	0.21	0.26	0.97	0.625	1.69	0.370	1.10	1.00	0.484	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.04	0.49	0.22	0.27	0.96	0.626	1.69	0.371	1.10	1.00	0.489	No
50	8.20	0.50	0.22	0.27	0.96	0.627	1.69	0.372	1.10	1.00	0.492	No
51	8.37	0.51	0.23	0.28	0.96	0.628	1.69	0.373	1.10	1.00	0.495	No
52	8.53	0.52	0.23	0.28	0.96	0.629	1.69	0.373	1.10	1.00	0.495	No
53	8.69	0.53	0.24	0.29	0.96	0.630	1.69	0.374	1.10	1.00	0.489	No
54	8.86	0.54	0.25	0.29	0.96	0.631	1.69	0.374	1.10	1.00	0.479	No
55	9.02	0.55	0.25	0.30	0.96	0.632	1.69	0.375	1.10	1.00	0.490	No
56	9.19	0.56	0.26	0.30	0.96	0.633	1.69	0.375	1.10	1.00	0.498	No
57	9.35	0.57	0.26	0.30	0.96	0.634	1.69	0.376	1.10	1.00	0.490	No
58	9.51	0.57	0.27	0.31	0.95	0.634	1.69	0.376	1.10	1.00	0.474	No
59	9.68	0.58	0.27	0.31	0.95	0.635	1.69	0.376	1.10	1.00	0.456	No
60	9.84	0.59	0.28	0.32	0.95	0.635	1.69	0.377	1.10	1.00	0.472	No
61	10.01	0.60	0.28	0.32	0.95	0.636	1.69	0.377	1.10	1.00	0.487	No
62	10.17	0.61	0.29	0.33	0.95	0.636	1.69	0.377	1.10	1.00	0.475	No
63	10.33	0.62	0.29	0.33	0.95	0.637	1.69	0.378	1.10	1.00	0.455	No
64	10.50	0.63	0.30	0.34	0.95	0.637	1.69	0.378	1.10	1.00	0.455	No
65	10.66	0.64	0.30	0.34	0.95	0.638	1.69	0.378	1.10	1.00	0.447	No
66	10.83	0.65	0.31	0.35	0.95	0.638	1.69	0.378	1.10	1.00	0.421	No
67	10.99	0.66	0.31	0.35	0.94	0.638	1.69	0.378	1.10	1.00	0.405	No
68	11.15	0.67	0.32	0.36	0.94	0.638	1.69	0.378	1.10	1.00	0.414	No
69	11.32	0.68	0.32	0.36	0.94	0.638	1.69	0.378	1.10	1.00	0.439	No
70	11.48	0.69	0.33	0.36	0.94	0.638	1.69	0.378	1.10	1.00	0.448	No
71	11.65	0.70	0.33	0.37	0.94	0.638	1.69	0.378	1.10	1.00	0.462	No
72	11.81	0.71	0.34	0.37	0.94	0.638	1.69	0.378	1.10	1.00	0.462	No
73	11.98	0.72	0.34	0.38	0.94	0.638	1.69	0.378	1.10	1.00	0.452	No
74	12.14	0.73	0.35	0.38	0.94	0.638	1.69	0.378	1.10	1.00	0.478	No
75	12.30	0.74	0.35	0.39	0.94	0.638	1.69	0.379	1.09	1.00	0.504	No
76	12.47	0.75	0.36	0.39	0.93	0.639	1.69	0.379	1.09	1.00	0.511	No
77	12.63	0.76	0.36	0.40	0.93	0.639	1.69	0.379	1.09	1.00	0.512	No
78	12.80	0.77	0.37	0.40	0.93	0.639	1.69	0.379	1.08	1.00	0.521	No
79	12.96	0.78	0.37	0.40	0.93	0.639	1.69	0.379	1.08	1.00	0.518	No
80	13.12	0.79	0.38	0.41	0.93	0.640	1.69	0.379	1.08	1.00	0.517	No
81	13.29	0.80	0.38	0.41	0.93	0.640	1.69	0.379	1.08	1.00	0.523	No
82	13.45	0.81	0.39	0.42	0.93	0.640	1.69	0.380	1.08	1.00	0.527	No
83	13.62	0.81	0.39	0.42	0.93	0.640	1.69	0.380	1.08	1.00	0.525	No
84	13.78	0.82	0.40	0.43	0.92	0.640	1.69	0.380	1.08	1.00	0.522	No
85	13.94	0.83	0.40	0.43	0.92	0.640	1.69	0.380	1.08	1.00	0.521	No
86	14.11	0.84	0.41	0.43	0.92	0.640	1.69	0.380	1.08	1.00	0.519	No
87	14.27	0.85	0.41	0.44	0.92	0.640	1.69	0.379	1.08	1.00	0.517	No
88	14.44	0.86	0.42	0.44	0.92	0.640	1.69	0.379	1.08	1.00	0.517	No
89	14.60	0.87	0.42	0.45	0.92	0.640	1.69	0.379	1.08	1.00	0.516	No
90	14.76	0.88	0.43	0.45	0.92	0.639	1.69	0.379	1.08	1.00	0.518	No
91	14.93	0.89	0.43	0.46	0.92	0.639	1.69	0.379	1.07	1.00	0.519	No
92	15.09	0.90	0.44	0.46	0.91	0.639	1.69	0.379	1.07	1.00	0.521	No
93	15.26	0.91	0.44	0.47	0.91	0.639	1.69	0.379	1.07	1.00	0.523	No
94	15.42	0.92	0.45	0.47	0.91	0.639	1.69	0.379	1.07	1.00	0.524	No
95	15.58	0.93	0.45	0.47	0.91	0.638	1.69	0.379	1.07	1.00	0.525	No
96	15.75	0.94	0.46	0.48	0.91	0.638	1.69	0.378	1.07	1.00	0.526	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	15.91	0.95	0.47	0.48	0.91	0.638	1.69	0.378	1.07	1.00	0.527	No
98	16.08	0.96	0.47	0.49	0.91	0.638	1.69	0.378	1.07	1.00	0.529	No
99	16.24	0.97	0.48	0.49	0.91	0.638	1.69	0.378	1.06	1.00	0.532	No
100	16.40	0.97	0.48	0.49	0.90	0.638	1.69	0.378	1.06	1.00	0.533	No
101	16.57	0.98	0.49	0.50	0.90	0.638	1.69	0.378	1.06	1.00	0.536	No
102	16.73	0.99	0.49	0.50	0.90	0.638	1.69	0.378	1.06	1.00	0.535	No
103	16.90	1.00	0.50	0.51	0.90	0.638	1.69	0.378	1.06	1.00	0.535	No
104	17.06	1.01	0.50	0.51	0.90	0.638	1.69	0.378	1.06	1.00	0.536	No
105	17.22	1.02	0.51	0.51	0.90	0.638	1.69	0.378	1.06	1.00	0.534	No
106	17.39	1.03	0.51	0.52	0.90	0.638	1.69	0.378	1.06	1.00	0.538	No
107	17.55	1.04	0.52	0.52	0.90	0.637	1.69	0.378	1.06	1.00	0.534	No
108	17.72	1.05	0.52	0.53	0.89	0.637	1.69	0.378	1.06	1.00	0.534	No
109	17.88	1.06	0.53	0.53	0.89	0.637	1.69	0.378	1.06	1.00	0.522	No
110	18.04	1.06	0.53	0.53	0.89	0.637	1.69	0.378	1.07	1.00	0.507	No
111	18.21	1.07	0.54	0.54	0.89	0.637	1.69	0.377	1.06	1.00	0.513	No
112	18.37	1.08	0.54	0.54	0.89	0.636	1.69	0.377	1.06	1.00	0.527	No
113	18.54	1.09	0.55	0.55	0.89	0.636	1.69	0.377	1.05	1.00	0.537	No
114	18.70	1.10	0.55	0.55	0.89	0.636	1.69	0.377	1.05	1.00	0.543	No
115	18.86	1.11	0.56	0.55	0.89	0.636	1.69	0.377	1.05	1.00	0.543	No
116	19.03	1.12	0.56	0.56	0.88	0.636	1.69	0.377	1.05	1.00	0.545	No
117	19.19	1.13	0.57	0.56	0.88	0.636	1.69	0.377	1.05	1.00	0.546	No
118	19.36	1.13	0.57	0.56	0.88	0.636	1.69	0.377	1.05	1.00	0.543	No
119	19.52	1.14	0.58	0.57	0.88	0.636	1.69	0.377	1.05	1.00	0.544	No
120	19.68	1.15	0.58	0.57	0.88	0.636	1.69	0.377	1.05	1.00	0.545	No
121	19.85	1.16	0.59	0.57	0.88	0.636	1.69	0.377	1.05	1.00	0.545	No
122	20.01	1.17	0.59	0.58	0.88	0.636	1.69	0.377	1.05	1.00	0.544	No
123	20.18	1.18	0.60	0.58	0.87	0.636	1.69	0.377	1.05	1.00	0.542	No
124	20.34	1.19	0.60	0.58	0.87	0.636	1.69	0.377	1.05	1.00	0.543	No
125	20.51	1.20	0.61	0.59	0.87	0.635	1.69	0.377	1.05	1.00	0.543	No
126	20.67	1.20	0.61	0.59	0.87	0.635	1.69	0.376	1.05	1.00	0.543	No
127	20.83	1.21	0.62	0.59	0.87	0.635	1.69	0.376	1.05	1.00	0.541	No
128	21.00	1.22	0.62	0.60	0.87	0.634	1.69	0.376	1.05	1.00	0.534	No
129	21.16	1.23	0.63	0.60	0.87	0.634	1.69	0.376	1.05	1.00	0.529	No
130	21.33	1.24	0.63	0.61	0.87	0.633	1.69	0.375	1.05	1.00	0.527	No
131	21.49	1.25	0.64	0.61	0.86	0.632	1.69	0.375	1.05	1.00	0.528	No
132	21.65	1.26	0.64	0.61	0.86	0.632	1.69	0.375	1.05	1.00	0.530	No
133	21.82	1.27	0.65	0.62	0.86	0.631	1.69	0.374	1.05	1.00	0.518	No
134	21.98	1.28	0.65	0.62	0.86	0.631	1.69	0.374	1.05	1.00	0.528	No
135	22.15	1.29	0.66	0.63	0.86	0.630	1.69	0.373	1.04	1.00	0.532	No
136	22.31	1.30	0.66	0.63	0.86	0.629	1.69	0.373	1.04	1.00	0.535	No
137	22.47	1.31	0.67	0.64	0.86	0.629	1.69	0.373	1.04	1.00	0.537	No
138	22.64	1.31	0.68	0.64	0.85	0.628	1.69	0.373	1.04	1.00	0.535	No
139	22.80	1.32	0.68	0.64	0.85	0.628	1.69	0.372	1.04	1.00	0.533	No
140	22.97	1.33	0.69	0.65	0.85	0.627	1.69	0.372	1.04	1.00	0.532	No
141	23.13	1.34	0.69	0.65	0.85	0.627	1.69	0.372	1.04	1.00	0.532	No
142	23.29	1.35	0.70	0.65	0.85	0.626	1.69	0.371	1.04	1.00	0.532	No
143	23.46	1.36	0.70	0.66	0.85	0.626	1.69	0.371	1.04	1.00	0.533	No
144	23.62	1.37	0.71	0.66	0.85	0.625	1.69	0.371	1.04	1.00	0.533	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.79	1.38	0.71	0.67	0.85	0.624	1.69	0.370	1.04	1.00	0.533	No
146	23.95	1.39	0.72	0.67	0.84	0.624	1.69	0.370	1.04	1.00	0.534	No
147	24.11	1.40	0.72	0.67	0.84	0.623	1.69	0.369	1.04	1.00	0.533	No
148	24.28	1.41	0.73	0.68	0.84	0.622	1.69	0.369	1.04	1.00	0.531	No
149	24.44	1.41	0.73	0.68	0.84	0.622	1.69	0.369	1.04	1.00	0.531	No
150	24.61	1.42	0.74	0.69	0.84	0.621	1.69	0.368	1.04	1.00	0.531	No
151	24.77	1.43	0.74	0.69	0.84	0.620	1.69	0.368	1.04	1.00	0.530	No
152	24.93	1.44	0.75	0.70	0.84	0.620	1.69	0.367	1.04	1.00	0.529	No
153	25.10	1.45	0.75	0.70	0.83	0.619	1.69	0.367	1.04	1.00	0.527	No
154	25.26	1.46	0.76	0.70	0.83	0.618	1.69	0.367	1.04	1.00	0.525	No
155	25.43	1.47	0.76	0.71	0.83	0.618	1.69	0.366	1.03	1.00	0.527	No
156	25.59	1.48	0.77	0.71	0.83	0.617	1.69	0.366	1.03	1.00	0.529	No
157	25.75	1.49	0.77	0.72	0.83	0.616	1.69	0.365	1.03	1.00	0.528	No
158	25.92	1.50	0.78	0.72	0.83	0.615	1.69	0.365	1.03	1.00	0.528	No
159	26.08	1.51	0.78	0.72	0.83	0.615	1.69	0.364	1.03	1.00	0.528	No
160	26.25	1.52	0.79	0.73	0.82	0.614	1.69	0.364	1.03	1.00	0.527	No
161	26.41	1.52	0.79	0.73	0.82	0.613	1.69	0.364	1.03	1.00	0.528	No
162	26.57	1.53	0.80	0.74	0.82	0.613	1.69	0.363	1.03	1.00	0.529	No
163	26.74	1.54	0.80	0.74	0.82	0.612	1.69	0.363	1.03	1.00	0.530	No
164	26.90	1.55	0.81	0.74	0.82	0.611	1.69	0.363	1.03	1.00	0.531	No
165	27.07	1.56	0.81	0.75	0.82	0.611	1.69	0.362	1.03	1.00	0.531	No
166	27.23	1.57	0.82	0.75	0.82	0.610	1.69	0.362	1.03	1.00	0.532	No
167	27.39	1.58	0.82	0.75	0.82	0.610	1.69	0.361	1.03	1.00	0.530	No
168	27.56	1.59	0.83	0.76	0.81	0.609	1.69	0.361	1.03	1.00	0.525	No
169	27.72	1.60	0.83	0.76	0.81	0.608	1.69	0.361	1.03	1.00	0.526	No
170	27.89	1.60	0.84	0.77	0.81	0.608	1.69	0.360	1.03	1.00	0.529	No
171	28.05	1.61	0.84	0.77	0.81	0.607	1.69	0.360	1.03	1.00	0.530	No
172	28.22	1.62	0.85	0.77	0.81	0.607	1.69	0.360	1.03	1.00	0.531	No
173	28.38	1.63	0.85	0.78	0.81	0.606	1.69	0.359	1.02	1.00	0.531	No
174	28.54	1.64	0.86	0.78	0.81	0.606	1.69	0.359	1.02	1.00	0.530	No
175	28.71	1.65	0.86	0.78	0.80	0.605	1.69	0.359	1.02	1.00	0.530	No
176	28.87	1.66	0.87	0.79	0.80	0.604	1.69	0.358	1.02	1.00	0.529	No
177	29.04	1.66	0.87	0.79	0.80	0.604	1.69	0.358	1.02	1.00	0.528	No
178	29.20	1.67	0.88	0.79	0.80	0.603	1.69	0.358	1.02	1.00	0.527	No
179	29.36	1.68	0.88	0.80	0.80	0.603	1.69	0.357	1.02	1.00	0.527	No
180	29.53	1.69	0.89	0.80	0.80	0.602	1.69	0.357	1.02	1.00	0.526	No
181	29.69	1.70	0.90	0.80	0.80	0.601	1.69	0.356	1.02	1.00	0.525	No
182	29.86	1.71	0.90	0.81	0.79	0.600	1.69	0.356	1.02	1.00	0.524	No
183	30.02	1.72	0.91	0.81	0.79	0.600	1.69	0.356	1.02	1.00	0.525	No
184	30.18	1.73	0.91	0.82	0.79	0.599	1.69	0.355	1.02	1.00	0.523	No
185	30.35	1.74	0.92	0.82	0.79	0.598	1.69	0.355	1.02	1.00	0.523	No
186	30.51	1.74	0.92	0.82	0.79	0.597	1.69	0.354	1.02	1.00	0.522	No
187	30.68	1.75	0.93	0.83	0.79	0.597	1.69	0.354	1.02	1.00	0.522	No
188	30.84	1.76	0.93	0.83	0.79	0.596	1.69	0.353	1.02	1.00	0.522	No
189	31.00	1.77	0.94	0.83	0.78	0.595	1.69	0.353	1.02	1.00	0.522	No
190	31.17	1.78	0.94	0.84	0.78	0.594	1.69	0.352	1.02	1.00	0.523	No
191	31.33	1.79	0.95	0.84	0.78	0.594	1.69	0.352	1.02	1.00	0.523	No
192	31.50	1.80	0.95	0.85	0.78	0.593	1.69	0.352	1.02	1.00	0.521	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.66	1.81	0.96	0.85	0.78	0.592	1.69	0.351	1.02	1.00	0.521	No
194	31.82	1.81	0.96	0.85	0.78	0.592	1.69	0.351	1.02	1.00	0.519	No
195	31.99	1.82	0.97	0.86	0.78	0.591	1.69	0.350	1.02	1.00	0.520	No
196	32.15	1.83	0.97	0.86	0.77	0.590	1.69	0.350	1.02	1.00	0.521	No
197	32.32	1.84	0.98	0.86	0.77	0.590	1.69	0.350	1.02	1.00	0.520	No
198	32.48	1.85	0.98	0.87	0.77	0.589	1.69	0.349	1.02	1.00	0.520	No
199	32.64	1.86	0.99	0.87	0.77	0.588	1.69	0.349	1.02	1.00	0.520	No
200	32.81	1.87	0.99	0.87	0.77	0.588	1.69	0.348	1.02	1.00	0.520	No
201	32.97	1.87	1.00	0.88	0.77	0.587	1.69	0.348	1.02	1.00	0.519	No
202	33.14	1.88	1.00	0.88	0.77	0.586	1.69	0.348	1.01	1.00	0.518	No
203	33.30	1.89	1.01	0.88	0.77	0.586	1.69	0.347	1.01	1.00	0.517	No
204	33.46	1.90	1.01	0.89	0.76	0.585	1.69	0.347	1.01	1.00	0.514	No
205	33.63	1.91	1.02	0.89	0.76	0.584	1.69	0.346	1.01	1.00	0.513	No
206	33.79	1.92	1.02	0.89	0.76	0.583	1.69	0.346	1.01	1.00	0.511	No
207	33.96	1.93	1.03	0.90	0.76	0.582	1.69	0.345	1.01	1.00	0.511	No
208	34.12	1.94	1.03	0.90	0.76	0.582	1.69	0.345	1.01	1.00	0.513	No
209	34.28	1.94	1.04	0.91	0.76	0.581	1.69	0.344	1.01	1.00	0.513	No
210	34.45	1.95	1.04	0.91	0.76	0.580	1.69	0.344	1.01	1.00	0.513	No
211	34.61	1.96	1.05	0.91	0.75	0.579	1.69	0.344	1.01	1.00	0.512	No
212	34.78	1.97	1.05	0.92	0.75	0.579	1.69	0.343	1.01	1.00	0.512	No
213	34.94	1.98	1.06	0.92	0.75	0.578	1.69	0.343	1.01	1.00	0.510	No
214	35.10	1.99	1.06	0.92	0.75	0.577	1.69	0.342	1.01	1.00	0.506	No
215	35.27	2.00	1.07	0.93	0.75	0.576	1.69	0.341	1.01	1.00	0.506	No
216	35.43	2.01	1.07	0.93	0.75	0.575	1.69	0.341	1.01	1.00	0.506	No
217	35.60	2.02	1.08	0.94	0.75	0.574	1.69	0.340	1.01	1.00	0.507	No
218	35.76	2.02	1.08	0.94	0.74	0.573	1.69	0.340	1.01	1.00	0.508	No
219	35.93	2.03	1.09	0.94	0.74	0.572	1.69	0.339	1.01	1.00	0.507	No
220	36.09	2.04	1.09	0.95	0.74	0.572	1.69	0.339	1.01	1.00	0.505	No
221	36.25	2.05	1.10	0.95	0.74	0.571	1.69	0.338	1.01	1.00	0.504	No
222	36.42	2.06	1.11	0.96	0.74	0.570	1.69	0.338	1.01	1.00	0.503	No
223	36.58	2.07	1.11	0.96	0.74	0.569	1.69	0.337	1.01	1.00	0.503	No
224	36.75	2.08	1.12	0.96	0.74	0.568	1.69	0.337	1.01	1.00	0.503	No
225	36.91	2.09	1.12	0.97	0.73	0.567	1.69	0.336	1.01	1.00	0.502	No
226	37.07	2.10	1.13	0.97	0.73	0.566	1.69	0.336	1.01	1.00	0.501	No
227	37.24	2.11	1.13	0.97	0.73	0.565	1.69	0.335	1.01	1.00	0.500	No
228	37.40	2.11	1.14	0.98	0.73	0.564	1.69	0.335	1.01	1.00	0.500	No
229	37.57	2.12	1.14	0.98	0.73	0.564	1.69	0.334	1.01	1.00	0.500	No
230	37.73	2.13	1.15	0.99	0.73	0.563	1.69	0.334	1.01	1.00	0.499	No
231	37.89	2.14	1.15	0.99	0.73	0.562	1.69	0.333	1.01	1.00	0.499	No
232	38.06	2.15	1.16	0.99	0.73	0.561	1.69	0.333	1.01	1.00	0.498	No
233	38.22	2.16	1.16	1.00	0.72	0.560	1.69	0.332	1.00	1.00	0.497	No
234	38.39	2.17	1.17	1.00	0.72	0.559	1.69	0.331	1.00	1.00	0.496	No
235	38.55	2.18	1.17	1.01	0.72	0.558	1.69	0.331	1.00	1.00	0.496	No
236	38.71	2.19	1.18	1.01	0.72	0.557	1.69	0.330	1.00	1.00	0.496	No
237	38.88	2.20	1.18	1.01	0.72	0.556	1.69	0.330	1.00	1.00	0.494	No
238	39.04	2.20	1.19	1.02	0.72	0.555	1.69	0.329	1.00	1.00	0.494	No
239	39.21	2.21	1.19	1.02	0.72	0.555	1.69	0.329	1.00	1.00	0.493	No
240	39.37	2.22	1.20	1.03	0.71	0.554	1.69	0.328	1.00	1.00	0.492	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.53	2.23	1.20	1.03	0.71	0.553	1.69	0.328	1.00	1.00	0.491	No
242	39.70	2.24	1.21	1.03	0.71	0.552	1.69	0.327	1.00	1.00	0.491	No
243	39.86	2.25	1.21	1.04	0.71	0.551	1.69	0.327	1.00	1.00	0.490	No
244	40.03	2.26	1.22	1.04	0.71	0.550	1.69	0.326	1.00	1.00	0.489	No
245	40.19	2.27	1.22	1.04	0.71	0.549	1.69	0.326	1.00	1.00	0.488	No
246	40.35	2.28	1.23	1.05	0.71	0.548	1.69	0.325	1.00	1.00	0.488	No
247	40.52	2.29	1.23	1.05	0.70	0.547	1.69	0.325	1.00	1.00	0.488	No
248	40.68	2.29	1.24	1.06	0.70	0.546	1.69	0.324	1.00	1.00	0.487	No
249	40.85	2.30	1.24	1.06	0.70	0.546	1.69	0.323	1.00	1.00	0.487	No
250	41.01	2.31	1.25	1.06	0.70	0.545	1.69	0.323	1.00	1.00	0.486	No
251	41.17	2.32	1.25	1.07	0.70	0.544	1.69	0.322	1.00	1.00	0.486	No
252	41.34	2.33	1.26	1.07	0.70	0.543	1.69	0.322	1.00	1.00	0.486	No
253	41.50	2.34	1.26	1.07	0.70	0.542	1.69	0.321	1.00	1.00	0.485	No
254	41.67	2.35	1.27	1.08	0.70	0.541	1.69	0.321	1.00	1.00	0.483	No
255	41.83	2.36	1.27	1.08	0.69	0.540	1.69	0.320	1.00	1.00	0.483	No
256	41.99	2.37	1.28	1.09	0.69	0.539	1.69	0.320	1.00	1.00	0.483	No
257	42.16	2.37	1.28	1.09	0.69	0.538	1.69	0.319	1.00	1.00	0.482	No
258	42.32	2.38	1.29	1.09	0.69	0.538	1.69	0.319	1.00	1.00	0.481	No
259	42.49	2.39	1.29	1.10	0.69	0.537	1.69	0.318	1.00	1.00	0.480	No
260	42.65	2.40	1.30	1.10	0.69	0.536	1.69	0.318	1.00	1.00	0.479	No
261	42.81	2.41	1.30	1.11	0.69	0.535	1.69	0.317	1.00	1.00	0.480	No
262	42.98	2.42	1.31	1.11	0.69	0.534	1.69	0.317	1.00	1.00	0.479	No
263	43.14	2.43	1.31	1.11	0.68	0.533	1.69	0.316	1.00	1.00	0.478	No
264	43.31	2.44	1.32	1.12	0.68	0.532	1.69	0.316	1.00	1.00	0.477	No
265	43.47	2.45	1.33	1.12	0.68	0.531	1.69	0.315	1.00	1.00	0.475	No
266	43.64	2.46	1.33	1.13	0.68	0.530	1.69	0.314	0.99	1.00	0.473	No
267	43.80	2.47	1.34	1.13	0.68	0.529	1.69	0.314	0.99	1.00	0.472	No
268	43.96	2.48	1.34	1.13	0.68	0.528	1.69	0.313	0.99	1.00	0.461	No
269	44.13	2.48	1.35	1.14	0.68	0.527	1.69	0.312	0.99	1.00	0.465	No
270	44.29	2.49	1.35	1.14	0.67	0.526	1.69	0.312	0.99	1.00	0.461	No
271	44.46	2.50	1.36	1.15	0.67	0.525	1.69	0.311	0.99	1.00	0.463	No
272	44.62	2.51	1.36	1.15	0.67	0.524	1.69	0.311	0.99	1.00	0.465	No
273	44.78	2.52	1.37	1.16	0.67	0.523	1.69	0.310	0.99	1.00	0.468	No
274	44.95	2.53	1.37	1.16	0.67	0.522	1.69	0.310	0.99	1.00	0.469	No
275	45.11	2.54	1.38	1.16	0.67	0.521	1.69	0.309	0.99	1.00	0.468	No
276	45.28	2.55	1.38	1.17	0.67	0.520	1.69	0.308	0.99	1.00	0.468	No
277	45.44	2.56	1.39	1.17	0.67	0.519	1.69	0.308	0.99	1.00	0.467	No
278	45.60	2.57	1.39	1.18	0.66	0.519	1.69	0.308	0.99	1.00	0.467	No
279	45.77	2.58	1.40	1.18	0.66	0.518	1.69	0.307	0.99	1.00	0.467	No
280	45.93	2.58	1.40	1.18	0.66	0.517	1.69	0.307	0.99	1.00	0.467	No
281	46.10	2.59	1.41	1.19	0.66	0.516	1.69	0.306	0.99	1.00	0.466	No
282	46.26	2.60	1.41	1.19	0.66	0.515	1.69	0.305	0.99	1.00	0.463	No
283	46.42	2.61	1.42	1.19	0.66	0.514	1.69	0.305	0.99	1.00	0.461	No
284	46.59	2.62	1.42	1.20	0.66	0.513	1.69	0.304	0.99	1.00	0.461	No
285	46.75	2.63	1.43	1.20	0.66	0.512	1.69	0.304	0.99	1.00	0.460	No
286	46.92	2.64	1.43	1.21	0.65	0.511	1.69	0.303	0.99	1.00	0.460	No
287	47.08	2.65	1.44	1.21	0.65	0.511	1.69	0.303	0.99	1.00	0.459	No
288	47.24	2.66	1.44	1.21	0.65	0.510	1.69	0.302	0.99	1.00	0.458	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	47.41	2.67	1.45	1.22	0.65	0.509	1.69	0.302	0.99	1.00	0.456	No
290	47.57	2.68	1.45	1.22	0.65	0.508	1.69	0.301	0.99	1.00	0.455	No
291	47.74	2.69	1.46	1.23	0.65	0.507	1.69	0.300	0.99	1.00	0.454	No
292	47.90	2.70	1.46	1.23	0.65	0.506	1.69	0.300	0.99	1.00	0.453	No
293	48.06	2.70	1.47	1.24	0.65	0.505	1.69	0.299	0.99	1.00	0.452	No
294	48.23	2.71	1.47	1.24	0.64	0.504	1.69	0.299	0.99	1.00	0.451	No
295	48.39	2.72	1.48	1.25	0.64	0.503	1.69	0.298	0.99	1.00	0.451	No
296	48.56	2.73	1.48	1.25	0.64	0.502	1.69	0.297	0.99	1.00	0.450	No
297	48.72	2.74	1.49	1.25	0.64	0.501	1.69	0.297	0.99	1.00	0.449	No
298	48.88	2.75	1.49	1.26	0.64	0.500	1.69	0.296	0.99	1.00	0.448	No
299	49.05	2.76	1.50	1.26	0.64	0.499	1.69	0.296	0.98	1.00	0.448	No
300	49.21	2.77	1.50	1.27	0.64	0.498	1.69	0.295	0.98	1.00	0.447	No
301	49.38	2.78	1.51	1.27	0.64	0.497	1.69	0.295	0.98	1.00	0.446	No
302	49.54	2.79	1.51	1.28	0.63	0.496	1.69	0.294	0.98	1.00	0.446	No
303	49.70	2.80	1.52	1.28	0.63	0.495	1.69	0.293	0.98	1.00	0.446	No
304	49.87	2.81	1.52	1.28	0.63	0.494	1.69	0.293	0.98	1.00	0.445	No
305	50.03	2.82	1.53	1.29	0.63	0.494	1.69	0.293	0.98	1.00	0.444	No
306	50.20	2.82	1.54	1.29	0.63	0.493	1.69	0.292	0.98	1.00	0.443	No
307	50.36	2.83	1.54	1.29	0.63	0.493	1.69	0.292	0.98	1.00	0.443	No
308	50.52	2.84	1.55	1.29	0.63	0.492	1.69	0.292	0.98	1.00	0.442	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.16	12.50	93.54	2.88	0.55	1.70	19.30	0.00	19.30	4.000	No	Yes	2.00
2	0.33	12.52	95.01	2.90	0.54	1.70	21.05	0.00	21.05	4.000	No	Yes	2.00
3	0.49	12.38	95.47	2.91	0.55	1.70	19.12	0.00	19.12	4.000	No	Yes	2.00
4	0.66	18.98	71.82	2.61	0.56	1.70	18.44	0.00	18.44	4.000	No	Yes	2.00
5	0.82	37.10	37.08	2.18	0.49	1.70	52.89	52.60	105.49	4.000	No	No	2.00
6	0.98	57.89	16.04	1.91	0.43	1.70	106.50	26.84	133.34	4.000	No	No	2.00
7	1.15	75.45	6.01	1.79	0.46	1.70	118.67	0.65	119.32	0.170	No	No	0.64
8	1.31	86.77	2.86	1.75	0.42	1.70	137.74	0.00	137.74	0.225	No	No	0.88
9	1.48	102.23	0.00	1.71	0.39	1.70	161.19	0.00	161.19	0.384	No	No	1.65
10	1.64	118.84	0.00	1.69	0.34	1.70	193.25	0.00	193.25	1.320	No	No	2.00
11	1.80	147.50	0.00	1.65	0.31	1.70	217.89	0.00	217.89	4.000	No	No	2.00
12	1.97	194.72	0.00	1.56	0.26	1.70	299.35	0.00	299.35	4.000	No	No	2.00
13	2.13	232.45	0.00	1.49	0.26	1.70	420.73	0.00	420.73	4.000	No	No	2.00
14	2.30	247.24	0.00	1.45	0.26	1.70	399.70	0.00	399.70	4.000	No	No	2.00
15	2.46	223.35	0.00	1.47	0.26	1.68	366.54	0.00	366.54	4.000	No	No	2.00
16	2.62	185.64	0.00	1.52	0.26	1.65	297.13	0.00	297.13	4.000	No	No	2.00
17	2.79	134.76	0.00	1.68	0.31	1.70	218.05	0.00	218.05	4.000	No	No	2.00
18	2.95	86.89	17.91	1.94	0.39	1.70	125.40	34.51	159.91	0.371	No	No	1.27
19	3.12	52.38	43.65	2.26	0.42	1.70	75.05	62.48	137.52	0.224	No	No	0.66
20	3.28	34.12	65.28	2.53	0.46	1.70	51.77	64.63	116.40	0.164	No	No	0.43
21	3.44	25.16	79.90	2.71	0.50	1.70	37.40	0.00	37.40	4.000	No	Yes	2.00
22	3.61	20.48	89.08	2.83	0.51	1.70	31.78	0.00	31.78	4.000	No	Yes	2.00
23	3.77	18.32	94.63	2.90	0.52	1.70	29.19	0.00	29.19	4.000	No	Yes	2.00
24	3.94	17.71	97.69	2.93	0.52	1.70	27.04	0.00	27.04	4.000	No	Yes	2.00
25	4.10	19.12	96.16	2.91	0.52	1.70	28.86	0.00	28.86	4.000	No	Yes	2.00
26	4.27	21.99	92.06	2.86	0.50	1.70	35.99	0.00	35.99	4.000	No	Yes	2.00
27	4.43	24.78	88.54	2.82	0.48	1.70	40.89	0.00	40.89	4.000	No	Yes	2.00
28	4.59	25.86	87.91	2.81	0.48	1.70	42.32	0.00	42.32	4.000	No	Yes	2.00
29	4.76	25.69	88.14	2.81	0.48	1.70	41.23	0.00	41.23	4.000	No	Yes	2.00
30	4.92	25.48	89.04	2.83	0.49	1.70	40.05	0.00	40.05	4.000	No	Yes	2.00
31	5.09	27.24	87.54	2.81	0.48	1.70	41.32	0.00	41.32	4.000	No	Yes	2.00
32	5.25	31.79	82.63	2.75	0.46	1.70	49.73	0.00	49.73	4.000	No	Yes	2.00
33	5.41	37.95	75.40	2.65	0.44	1.67	60.85	0.00	60.85	4.000	No	Yes	2.00
34	5.58	42.25	69.84	2.59	0.43	1.62	67.76	70.32	138.09	0.226	No	No	0.60
35	5.74	43.36	67.15	2.55	0.43	1.61	66.52	69.33	135.85	0.218	No	No	0.57
36	5.91	41.81	67.07	2.55	0.43	1.60	63.26	68.37	131.62	0.203	No	No	0.52
37	6.07	38.73	68.92	2.57	0.44	1.59	59.55	67.73	127.27	0.190	No	No	0.47
38	6.23	35.01	72.04	2.61	0.46	1.60	52.42	0.00	52.42	4.000	No	Yes	2.00
39	6.40	30.86	76.06	2.66	0.47	1.60	46.58	0.00	46.58	4.000	No	Yes	2.00
40	6.56	27.48	79.82	2.71	0.49	1.61	41.14	0.00	41.14	4.000	No	Yes	2.00
41	6.73	25.61	82.28	2.74	0.50	1.60	37.05	0.00	37.05	4.000	No	Yes	2.00
42	6.89	24.50	84.34	2.77	0.49	1.58	37.52	0.00	37.52	4.000	No	Yes	2.00
43	7.05	23.78	85.58	2.78	0.50	1.57	35.33	0.00	35.33	4.000	No	Yes	2.00
44	7.22	23.08	85.91	2.79	0.51	1.56	32.97	0.00	32.97	4.000	No	Yes	2.00
45	7.38	22.94	84.69	2.77	0.51	1.54	33.59	0.00	33.59	4.000	No	Yes	2.00
46	7.55	22.34	84.74	2.77	0.51	1.53	33.72	0.00	33.72	4.000	No	Yes	2.00
47	7.71	20.63	86.64	2.80	0.52	1.52	29.55	0.00	29.55	4.000	No	Yes	2.00
48	7.87	18.20	90.65	2.85	0.53	1.52	25.73	0.00	25.73	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.04	16.54	92.85	2.87	0.54	1.51	23.07	0.00	23.07	4.000	No	Yes	2.00
50	8.20	15.48	95.15	2.90	0.54	1.50	22.02	0.00	22.02	4.000	No	Yes	2.00
51	8.37	15.17	95.24	2.90	0.54	1.49	20.68	0.00	20.68	4.000	No	Yes	2.00
52	8.53	16.32	91.82	2.86	0.54	1.48	21.14	0.00	21.14	4.000	No	Yes	2.00
53	8.69	19.36	83.28	2.75	0.53	1.45	25.93	0.00	25.93	4.000	No	Yes	2.00
54	8.86	20.84	80.45	2.72	0.51	1.42	31.85	0.00	31.85	4.000	No	Yes	2.00
55	9.02	20.03	81.44	2.73	0.53	1.42	26.30	0.00	26.30	4.000	No	Yes	2.00
56	9.19	19.18	82.11	2.74	0.54	1.42	22.11	0.00	22.11	4.000	No	Yes	2.00
57	9.35	22.55	72.03	2.61	0.53	1.39	27.95	0.00	27.95	4.000	No	Yes	2.00
58	9.51	29.41	61.79	2.48	0.50	1.36	38.16	59.89	98.04	0.135	No	No	0.28
59	9.68	32.63	60.80	2.47	0.48	1.33	46.62	62.01	108.63	0.150	No	No	0.33
60	9.84	31.14	65.23	2.53	0.50	1.33	38.91	60.94	99.85	0.137	No	No	0.29
61	10.01	29.82	65.44	2.53	0.52	1.34	31.91	58.98	90.88	0.127	No	No	0.26
62	10.17	35.92	51.55	2.36	0.50	1.31	41.16	57.51	98.67	0.136	No	No	0.29
63	10.33	49.28	32.39	2.12	0.48	1.29	59.84	50.00	109.85	0.152	No	No	0.33
64	10.50	63.63	18.72	1.95	0.48	1.28	78.91	31.14	110.05	0.152	No	No	0.33
65	10.66	73.56	15.22	1.90	0.47	1.26	91.06	22.94	113.99	0.159	No	No	0.36
66	10.83	76.24	19.27	1.95	0.44	1.24	92.56	34.21	126.77	0.188	No	No	0.45
67	10.99	71.68	27.63	2.06	0.43	1.22	84.90	49.23	134.12	0.211	No	No	0.52
68	11.15	62.40	37.84	2.19	0.44	1.22	72.14	57.69	129.83	0.197	No	No	0.48
69	11.32	53.42	44.70	2.27	0.46	1.22	59.18	59.08	118.26	0.168	No	No	0.38
70	11.48	46.45	49.34	2.33	0.47	1.22	53.60	59.92	113.52	0.158	No	No	0.35
71	11.65	43.41	49.46	2.33	0.48	1.22	47.98	58.49	106.47	0.147	No	No	0.32
72	11.81	43.21	48.65	2.32	0.48	1.21	48.16	58.18	106.34	0.146	No	No	0.32
73	11.98	40.51	50.40	2.34	0.47	1.20	51.95	59.93	111.88	0.155	No	No	0.34
74	12.14	33.48	58.78	2.45	0.50	1.21	38.16	59.07	97.24	0.134	No	No	0.28
75	12.30	23.90	73.27	2.63	0.54	1.21	24.02	0.00	24.02	4.000	No	Yes	2.00
76	12.47	18.24	85.73	2.78	0.55	1.21	19.56	0.00	19.56	4.000	No	Yes	2.00
77	12.63	15.37	93.27	2.88	0.55	1.20	18.73	0.00	18.73	4.000	No	Yes	2.00
78	12.80	14.51	95.57	2.91	0.57	1.20	13.99	0.00	13.99	4.000	No	Yes	2.00
79	12.96	14.14	96.62	2.92	0.56	1.19	16.32	0.00	16.32	4.000	No	Yes	2.00
80	13.12	14.23	96.02	2.91	0.56	1.18	17.12	0.00	17.12	4.000	No	Yes	2.00
81	13.29	13.05	100.00	2.97	0.57	1.18	14.01	0.00	14.01	4.000	No	Yes	2.00
82	13.45	12.05	100.00	3.04	0.57	1.17	12.14	0.00	12.14	4.000	No	Yes	2.00
83	13.62	12.50	100.00	3.04	0.57	1.16	13.53	0.00	13.53	4.000	No	Yes	2.00
84	13.78	13.78	100.00	3.02	0.56	1.15	15.19	0.00	15.19	4.000	No	Yes	2.00
85	13.94	15.08	100.00	3.00	0.56	1.14	15.97	0.00	15.97	4.000	No	Yes	2.00
86	14.11	16.10	100.00	2.98	0.55	1.14	17.40	0.00	17.40	4.000	No	Yes	2.00
87	14.27	17.04	99.88	2.96	0.55	1.13	18.20	0.00	18.20	4.000	No	Yes	2.00
88	14.44	17.69	98.12	2.94	0.55	1.13	18.78	0.00	18.78	4.000	No	Yes	2.00
89	14.60	17.90	96.86	2.92	0.55	1.13	19.28	0.00	19.28	4.000	No	Yes	2.00
90	14.76	17.71	96.81	2.92	0.55	1.12	18.69	0.00	18.69	4.000	No	Yes	2.00
91	14.93	17.03	98.84	2.95	0.55	1.12	18.01	0.00	18.01	4.000	No	Yes	2.00
92	15.09	16.25	100.00	2.97	0.56	1.12	16.99	0.00	16.99	4.000	No	Yes	2.00
93	15.26	15.50	100.00	2.99	0.56	1.12	16.10	0.00	16.10	4.000	No	Yes	2.00
94	15.42	14.94	100.00	2.99	0.56	1.11	15.55	0.00	15.55	4.000	No	Yes	2.00
95	15.58	14.65	100.00	2.98	0.56	1.11	15.12	0.00	15.12	4.000	No	Yes	2.00
96	15.75	14.37	100.00	2.98	0.56	1.11	15.04	0.00	15.04	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	15.91	13.78	100.00	3.00	0.57	1.10	14.55	0.00	14.55	4.000	No	Yes	2.00
98	16.08	12.87	100.00	3.05	0.57	1.10	13.18	0.00	13.18	4.000	No	Yes	2.00
99	16.24	11.79	100.00	3.10	0.57	1.10	12.10	0.00	12.10	4.000	No	Yes	2.00
100	16.40	10.70	100.00	3.15	0.58	1.10	11.12	0.00	11.12	4.000	No	Yes	2.00
101	16.57	10.16	100.00	3.14	0.58	1.10	9.76	0.00	9.76	4.000	No	Yes	2.00
102	16.73	10.13	100.00	3.09	0.58	1.09	10.36	0.00	10.36	4.000	No	Yes	2.00
103	16.90	10.33	100.00	3.03	0.58	1.09	10.95	0.00	10.95	4.000	No	Yes	2.00
104	17.06	10.80	100.00	3.01	0.58	1.09	10.29	0.00	10.29	4.000	No	Yes	2.00
105	17.22	10.18	100.00	3.09	0.58	1.08	11.75	0.00	11.75	4.000	No	Yes	2.00
106	17.39	10.76	100.00	3.10	0.59	1.08	8.97	0.00	8.97	4.000	No	Yes	2.00
107	17.55	11.05	100.00	3.10	0.57	1.08	11.98	0.00	11.98	4.000	No	Yes	2.00
108	17.72	15.22	91.94	2.86	0.57	1.08	12.53	0.00	12.53	4.000	No	Yes	2.00
109	17.88	21.56	70.84	2.60	0.55	1.07	21.53	57.04	78.57	0.115	No	No	0.22
110	18.04	26.46	59.36	2.45	0.53	1.06	30.99	57.23	88.22	0.124	No	No	0.24
111	18.21	25.41	62.91	2.50	0.54	1.06	27.19	57.05	84.25	0.120	No	No	0.23
112	18.37	18.57	78.39	2.69	0.56	1.06	18.26	0.00	18.26	4.000	No	Yes	2.00
113	18.54	11.84	99.11	2.95	0.58	1.06	10.35	0.00	10.35	4.000	No	Yes	2.00
114	18.70	8.16	100.00	3.15	0.60	1.06	6.78	0.00	6.78	4.000	No	Yes	2.00
115	18.86	6.69	100.00	3.26	0.59	1.06	7.05	0.00	7.05	4.000	No	Yes	2.00
116	19.03	6.14	100.00	3.31	0.60	1.06	5.78	0.00	5.78	4.000	No	Yes	2.00
117	19.19	6.34	100.00	3.28	0.60	1.06	5.12	0.00	5.12	4.000	No	Yes	2.00
118	19.36	6.82	100.00	3.23	0.59	1.05	7.60	0.00	7.60	4.000	No	Yes	2.00
119	19.52	7.38	100.00	3.17	0.59	1.05	7.10	0.00	7.10	4.000	No	Yes	2.00
120	19.68	7.18	100.00	3.20	0.60	1.05	6.68	0.00	6.68	4.000	No	Yes	2.00
121	19.85	7.31	100.00	3.21	0.59	1.05	6.87	0.00	6.87	4.000	No	Yes	2.00
122	20.01	7.93	100.00	3.21	0.59	1.05	7.40	0.00	7.40	4.000	No	Yes	2.00
123	20.18	8.43	100.00	3.20	0.59	1.04	8.43	0.00	8.43	4.000	No	Yes	2.00
124	20.34	8.65	100.00	3.19	0.59	1.04	8.27	0.00	8.27	4.000	No	Yes	2.00
125	20.51	8.49	100.00	3.21	0.59	1.04	7.99	0.00	7.99	4.000	No	Yes	2.00
126	20.67	8.88	100.00	3.18	0.59	1.04	7.90	0.00	7.90	4.000	No	Yes	2.00
127	20.83	10.88	100.00	3.07	0.58	1.03	9.35	0.00	9.35	4.000	No	Yes	2.00
128	21.00	14.19	97.54	2.93	0.57	1.03	13.71	0.00	13.71	4.000	No	Yes	2.00
129	21.16	17.44	89.53	2.83	0.56	1.03	17.34	0.00	17.34	4.000	No	Yes	2.00
130	21.33	18.94	88.17	2.81	0.55	1.02	18.51	0.00	18.51	4.000	No	Yes	2.00
131	21.49	18.68	90.24	2.84	0.56	1.02	17.82	0.00	17.82	4.000	No	Yes	2.00
132	21.65	20.22	87.33	2.80	0.56	1.02	16.41	0.00	16.41	4.000	No	Yes	2.00
133	21.82	20.22	87.58	2.81	0.54	1.02	22.70	0.00	22.70	4.000	No	Yes	2.00
134	21.98	19.59	88.06	2.81	0.56	1.02	17.71	0.00	17.71	4.000	No	Yes	2.00
135	22.15	15.80	96.96	2.92	0.57	1.01	14.50	0.00	14.50	4.000	No	Yes	2.00
136	22.31	13.49	100.00	2.99	0.58	1.01	11.88	0.00	11.88	4.000	No	Yes	2.00
137	22.47	12.60	100.00	3.01	0.58	1.01	11.08	0.00	11.08	4.000	No	Yes	2.00
138	22.64	13.19	100.00	2.98	0.58	1.01	11.86	0.00	11.86	4.000	No	Yes	2.00
139	22.80	14.15	98.63	2.95	0.57	1.01	13.38	0.00	13.38	4.000	No	Yes	2.00
140	22.97	14.83	97.54	2.93	0.57	1.00	13.65	0.00	13.65	4.000	No	Yes	2.00
141	23.13	14.81	98.80	2.95	0.57	1.00	13.66	0.00	13.66	4.000	No	Yes	2.00
142	23.29	14.55	100.00	2.97	0.57	1.00	13.24	0.00	13.24	4.000	No	Yes	2.00
143	23.46	14.23	100.00	2.98	0.57	1.00	12.83	0.00	12.83	4.000	No	Yes	2.00
144	23.62	13.77	100.00	3.00	0.57	0.99	12.66	0.00	12.66	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	23.79	13.32	100.00	3.02	0.57	0.99	11.92	0.00	11.92	4.000	No	Yes	2.00
146	23.95	13.05	100.00	3.03	0.58	0.99	11.52	0.00	11.52	4.000	No	Yes	2.00
147	24.11	13.36	100.00	3.01	0.58	0.99	11.80	0.00	11.80	4.000	No	Yes	2.00
148	24.28	13.86	100.00	2.99	0.57	0.99	12.65	0.00	12.65	4.000	No	Yes	2.00
149	24.44	14.26	100.00	2.99	0.57	0.98	12.82	0.00	12.82	4.000	No	Yes	2.00
150	24.61	14.40	100.00	3.00	0.57	0.98	12.84	0.00	12.84	4.000	No	Yes	2.00
151	24.77	14.74	100.00	3.01	0.57	0.98	12.91	0.00	12.91	4.000	No	Yes	2.00
152	24.93	15.31	100.00	3.00	0.57	0.98	13.57	0.00	13.57	4.000	No	Yes	2.00
153	25.10	16.32	100.00	2.97	0.57	0.98	14.31	0.00	14.31	4.000	No	Yes	2.00
154	25.26	16.46	99.84	2.96	0.56	0.97	15.56	0.00	15.56	4.000	No	Yes	2.00
155	25.43	15.82	100.00	2.97	0.57	0.97	13.91	0.00	13.91	4.000	No	Yes	2.00
156	25.59	14.82	100.00	3.00	0.57	0.97	12.36	0.00	12.36	4.000	No	Yes	2.00
157	25.75	14.39	100.00	3.01	0.57	0.97	12.73	0.00	12.73	4.000	No	Yes	2.00
158	25.92	14.39	100.00	3.00	0.57	0.97	12.52	0.00	12.52	4.000	No	Yes	2.00
159	26.08	14.44	100.00	2.99	0.57	0.96	12.31	0.00	12.31	4.000	No	Yes	2.00
160	26.25	14.17	100.00	2.99	0.57	0.96	12.78	0.00	12.78	4.000	No	Yes	2.00
161	26.41	13.80	100.00	3.01	0.58	0.96	11.72	0.00	11.72	4.000	No	Yes	2.00
162	26.57	12.82	100.00	3.05	0.58	0.96	11.31	0.00	11.31	4.000	No	Yes	2.00
163	26.74	11.96	100.00	3.07	0.58	0.96	10.12	0.00	10.12	4.000	No	Yes	2.00
164	26.90	10.96	100.00	3.10	0.58	0.95	9.42	0.00	9.42	4.000	No	Yes	2.00
165	27.07	10.19	100.00	3.12	0.59	0.95	8.56	0.00	8.56	4.000	No	Yes	2.00
166	27.23	10.18	100.00	3.12	0.59	0.95	8.02	0.00	8.02	4.000	No	Yes	2.00
167	27.39	11.50	100.00	3.04	0.58	0.95	9.35	0.00	9.35	4.000	No	Yes	2.00
168	27.56	12.78	100.00	2.98	0.57	0.95	12.14	0.00	12.14	4.000	No	Yes	2.00
169	27.72	12.54	100.00	2.98	0.58	0.95	11.57	0.00	11.57	4.000	No	Yes	2.00
170	27.89	10.97	100.00	3.06	0.59	0.94	8.79	0.00	8.79	4.000	No	Yes	2.00
171	28.05	9.47	100.00	3.14	0.59	0.94	7.92	0.00	7.92	4.000	No	Yes	2.00
172	28.22	8.91	100.00	3.17	0.59	0.94	7.44	0.00	7.44	4.000	No	Yes	2.00
173	28.38	8.76	100.00	3.17	0.59	0.94	7.21	0.00	7.21	4.000	No	Yes	2.00
174	28.54	8.67	100.00	3.19	0.59	0.94	7.42	0.00	7.42	4.000	No	Yes	2.00
175	28.71	8.88	100.00	3.20	0.59	0.93	7.10	0.00	7.10	4.000	No	Yes	2.00
176	28.87	9.15	100.00	3.20	0.59	0.93	7.65	0.00	7.65	4.000	No	Yes	2.00
177	29.04	9.66	100.00	3.17	0.59	0.93	8.04	0.00	8.04	4.000	No	Yes	2.00
178	29.20	9.86	100.00	3.17	0.59	0.93	8.36	0.00	8.36	4.000	No	Yes	2.00
179	29.36	10.20	100.00	3.15	0.59	0.93	8.10	0.00	8.10	4.000	No	Yes	2.00
180	29.53	10.66	100.00	3.13	0.59	0.93	8.85	0.00	8.85	4.000	No	Yes	2.00
181	29.69	11.22	100.00	3.12	0.58	0.92	9.51	0.00	9.51	4.000	No	Yes	2.00
182	29.86	11.28	100.00	3.13	0.58	0.92	9.53	0.00	9.53	4.000	No	Yes	2.00
183	30.02	11.30	100.00	3.14	0.59	0.92	8.99	0.00	8.99	4.000	No	Yes	2.00
184	30.18	11.22	100.00	3.14	0.58	0.92	9.53	0.00	9.53	4.000	No	Yes	2.00
185	30.35	11.53	100.00	3.12	0.59	0.92	9.29	0.00	9.29	4.000	No	Yes	2.00
186	30.51	11.65	100.00	3.14	0.58	0.92	9.75	0.00	9.75	4.000	No	Yes	2.00
187	30.68	11.67	100.00	3.17	0.58	0.91	9.81	0.00	9.81	4.000	No	Yes	2.00
188	30.84	11.13	100.00	3.20	0.58	0.91	9.39	0.00	9.39	4.000	No	Yes	2.00
189	31.00	10.16	100.00	3.23	0.59	0.91	8.46	0.00	8.46	4.000	No	Yes	2.00
190	31.17	9.45	100.00	3.22	0.59	0.91	7.37	0.00	7.37	4.000	No	Yes	2.00
191	31.33	9.37	100.00	3.20	0.59	0.91	7.51	0.00	7.51	4.000	No	Yes	2.00
192	31.50	9.67	100.00	3.15	0.59	0.91	8.19	0.00	8.19	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	31.66	10.37	100.00	3.11	0.59	0.90	8.09	0.00	8.09	4.000	No	Yes	2.00
194	31.82	10.35	100.00	3.11	0.59	0.90	9.24	0.00	9.24	4.000	No	Yes	2.00
195	31.99	10.12	100.00	3.12	0.59	0.90	8.06	0.00	8.06	4.000	No	Yes	2.00
196	32.15	9.43	100.00	3.18	0.59	0.90	7.38	0.00	7.38	4.000	No	Yes	2.00
197	32.32	9.09	100.00	3.20	0.59	0.90	7.41	0.00	7.41	4.000	No	Yes	2.00
198	32.48	8.97	100.00	3.18	0.59	0.90	7.15	0.00	7.15	4.000	No	Yes	2.00
199	32.64	8.77	100.00	3.16	0.59	0.90	7.05	0.00	7.05	4.000	No	Yes	2.00
200	32.81	8.94	100.00	3.14	0.59	0.89	6.86	0.00	6.86	4.000	No	Yes	2.00
201	32.97	9.11	100.00	3.16	0.59	0.89	7.50	0.00	7.50	4.000	No	Yes	2.00
202	33.14	9.61	100.00	3.17	0.59	0.89	7.40	0.00	7.40	4.000	No	Yes	2.00
203	33.30	10.60	100.00	3.16	0.59	0.89	8.05	0.00	8.05	4.000	No	Yes	2.00
204	33.46	11.72	100.00	3.12	0.58	0.89	9.94	0.00	9.94	4.000	No	Yes	2.00
205	33.63	12.99	100.00	3.05	0.58	0.89	10.18	0.00	10.18	4.000	No	Yes	2.00
206	33.79	13.52	100.00	3.00	0.58	0.89	11.19	0.00	11.19	4.000	No	Yes	2.00
207	33.96	13.05	100.00	3.01	0.58	0.89	11.30	0.00	11.30	4.000	No	Yes	2.00
208	34.12	11.95	100.00	3.08	0.59	0.88	8.98	0.00	8.98	4.000	No	Yes	2.00
209	34.28	10.87	100.00	3.13	0.59	0.88	8.41	0.00	8.41	4.000	No	Yes	2.00
210	34.45	10.78	100.00	3.14	0.59	0.88	8.43	0.00	8.43	4.000	No	Yes	2.00
211	34.61	10.83	100.00	3.14	0.59	0.88	8.66	0.00	8.66	4.000	No	Yes	2.00
212	34.78	11.11	100.00	3.15	0.59	0.88	8.46	0.00	8.46	4.000	No	Yes	2.00
213	34.94	12.42	100.00	3.11	0.59	0.88	9.05	0.00	9.05	4.000	No	Yes	2.00
214	35.10	13.82	100.00	3.07	0.58	0.88	11.83	0.00	11.83	4.000	No	Yes	2.00
215	35.27	14.63	100.00	3.05	0.58	0.88	11.86	0.00	11.86	4.000	No	Yes	2.00
216	35.43	13.74	100.00	3.08	0.58	0.87	11.09	0.00	11.09	4.000	No	Yes	2.00
217	35.60	12.35	100.00	3.14	0.58	0.87	9.67	0.00	9.67	4.000	No	Yes	2.00
218	35.76	11.34	100.00	3.19	0.59	0.87	8.44	0.00	8.44	4.000	No	Yes	2.00
219	35.93	11.54	100.00	3.18	0.59	0.87	8.50	0.00	8.50	4.000	No	Yes	2.00
220	36.09	12.42	100.00	3.15	0.58	0.87	9.99	0.00	9.99	4.000	No	Yes	2.00
221	36.25	13.19	100.00	3.13	0.58	0.87	10.49	0.00	10.49	4.000	No	Yes	2.00
222	36.42	13.24	100.00	3.14	0.58	0.86	10.29	0.00	10.29	4.000	No	Yes	2.00
223	36.58	12.95	100.00	3.15	0.58	0.86	10.07	0.00	10.07	4.000	No	Yes	2.00
224	36.75	12.94	100.00	3.14	0.58	0.86	9.69	0.00	9.69	4.000	No	Yes	2.00
225	36.91	13.10	100.00	3.13	0.58	0.86	10.19	0.00	10.19	4.000	No	Yes	2.00
226	37.07	13.39	100.00	3.11	0.58	0.86	10.40	0.00	10.40	4.000	No	Yes	2.00
227	37.24	13.22	100.00	3.12	0.58	0.86	10.39	0.00	10.39	4.000	No	Yes	2.00
228	37.40	12.87	100.00	3.12	0.58	0.86	9.75	0.00	9.75	4.000	No	Yes	2.00
229	37.57	12.61	100.00	3.13	0.58	0.85	9.44	0.00	9.44	4.000	No	Yes	2.00
230	37.73	12.60	100.00	3.13	0.58	0.85	9.64	0.00	9.64	4.000	No	Yes	2.00
231	37.89	12.64	100.00	3.14	0.58	0.85	9.64	0.00	9.64	4.000	No	Yes	2.00
232	38.06	12.86	100.00	3.14	0.58	0.85	9.45	0.00	9.45	4.000	No	Yes	2.00
233	38.22	13.00	100.00	3.14	0.58	0.85	10.06	0.00	10.06	4.000	No	Yes	2.00
234	38.39	13.02	100.00	3.14	0.58	0.85	9.90	0.00	9.90	4.000	No	Yes	2.00
235	38.55	12.77	100.00	3.16	0.58	0.85	9.44	0.00	9.44	4.000	No	Yes	2.00
236	38.71	12.75	100.00	3.16	0.58	0.84	9.47	0.00	9.47	4.000	No	Yes	2.00
237	38.88	12.98	100.00	3.16	0.58	0.84	9.81	0.00	9.81	4.000	No	Yes	2.00
238	39.04	13.19	100.00	3.15	0.58	0.84	9.97	0.00	9.97	4.000	No	Yes	2.00
239	39.21	13.35	100.00	3.15	0.58	0.84	9.95	0.00	9.95	4.000	No	Yes	2.00
240	39.37	13.64	100.00	3.13	0.58	0.84	10.16	0.00	10.16	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	39.53	13.82	100.00	3.11	0.58	0.84	10.62	0.00	10.62	4.000	No	Yes	2.00
242	39.70	13.81	100.00	3.10	0.58	0.84	10.31	0.00	10.31	4.000	No	Yes	2.00
243	39.86	13.72	100.00	3.10	0.58	0.84	10.05	0.00	10.05	4.000	No	Yes	2.00
244	40.03	14.17	100.00	3.08	0.58	0.83	10.26	0.00	10.26	4.000	No	Yes	2.00
245	40.19	14.45	100.00	3.07	0.58	0.83	11.15	0.00	11.15	4.000	No	Yes	2.00
246	40.35	14.33	100.00	3.07	0.58	0.83	10.57	0.00	10.57	4.000	No	Yes	2.00
247	40.52	13.76	100.00	3.10	0.58	0.83	9.87	0.00	9.87	4.000	No	Yes	2.00
248	40.68	13.44	100.00	3.11	0.58	0.83	9.81	0.00	9.81	4.000	No	Yes	2.00
249	40.85	13.27	100.00	3.11	0.58	0.83	9.78	0.00	9.78	4.000	No	Yes	2.00
250	41.01	12.87	100.00	3.11	0.58	0.83	9.47	0.00	9.47	4.000	No	Yes	2.00
251	41.17	12.43	100.00	3.11	0.59	0.82	8.84	0.00	8.84	4.000	No	Yes	2.00
252	41.34	12.37	100.00	3.14	0.59	0.82	8.66	0.00	8.66	4.000	No	Yes	2.00
253	41.50	12.85	100.00	3.16	0.59	0.82	9.27	0.00	9.27	4.000	No	Yes	2.00
254	41.67	13.22	100.00	3.19	0.58	0.82	9.93	0.00	9.93	4.000	No	Yes	2.00
255	41.83	13.14	100.00	3.21	0.58	0.82	9.67	0.00	9.67	4.000	No	Yes	2.00
256	41.99	12.86	100.00	3.20	0.59	0.82	9.24	0.00	9.24	4.000	No	Yes	2.00
257	42.16	12.78	100.00	3.18	0.58	0.82	9.35	0.00	9.35	4.000	No	Yes	2.00
258	42.32	13.14	100.00	3.13	0.58	0.82	9.39	0.00	9.39	4.000	No	Yes	2.00
259	42.49	13.44	100.00	3.08	0.58	0.81	9.99	0.00	9.99	4.000	No	Yes	2.00
260	42.65	13.27	100.00	3.08	0.58	0.81	9.95	0.00	9.95	4.000	No	Yes	2.00
261	42.81	12.85	100.00	3.13	0.59	0.81	8.91	0.00	8.91	4.000	No	Yes	2.00
262	42.98	12.70	100.00	3.17	0.59	0.81	8.86	0.00	8.86	4.000	No	Yes	2.00
263	43.14	13.19	100.00	3.18	0.58	0.81	9.49	0.00	9.49	4.000	No	Yes	2.00
264	43.31	14.17	100.00	3.18	0.58	0.81	9.94	0.00	9.94	4.000	No	Yes	2.00
265	43.47	15.08	100.00	3.19	0.58	0.81	11.04	0.00	11.04	4.000	No	Yes	2.00
266	43.64	16.02	100.00	3.21	0.58	0.81	11.66	0.00	11.66	4.000	No	Yes	2.00
267	43.80	19.67	100.00	3.11	0.57	0.81	12.13	0.00	12.13	4.000	No	Yes	2.00
268	43.96	21.75	100.00	3.04	0.55	0.81	20.04	0.00	20.04	4.000	No	Yes	2.00
269	44.13	24.56	97.53	2.93	0.56	0.81	16.81	0.00	16.81	4.000	No	Yes	2.00
270	44.29	23.40	96.40	2.92	0.55	0.81	19.08	0.00	19.08	4.000	No	Yes	2.00
271	44.46	22.36	96.90	2.92	0.56	0.81	17.36	0.00	17.36	4.000	No	Yes	2.00
272	44.62	19.34	100.00	3.00	0.57	0.80	14.44	0.00	14.44	4.000	No	Yes	2.00
273	44.78	16.14	100.00	3.11	0.57	0.80	11.98	0.00	11.98	4.000	No	Yes	2.00
274	44.95	14.66	100.00	3.15	0.58	0.80	9.84	0.00	9.84	4.000	No	Yes	2.00
275	45.11	13.93	100.00	3.15	0.58	0.80	10.72	0.00	10.72	4.000	No	Yes	2.00
276	45.28	13.94	100.00	3.13	0.58	0.79	9.99	0.00	9.99	4.000	No	Yes	2.00
277	45.44	13.26	100.00	3.12	0.58	0.79	9.55	0.00	9.55	4.000	No	Yes	2.00
278	45.60	12.66	100.00	3.13	0.59	0.79	9.05	0.00	9.05	4.000	No	Yes	2.00
279	45.77	12.28	100.00	3.15	0.59	0.79	8.52	0.00	8.52	4.000	No	Yes	2.00
280	45.93	12.25	100.00	3.18	0.59	0.79	8.55	0.00	8.55	4.000	No	Yes	2.00
281	46.10	13.09	100.00	3.17	0.59	0.79	8.86	0.00	8.86	4.000	No	Yes	2.00
282	46.26	14.47	100.00	3.14	0.58	0.79	10.30	0.00	10.30	4.000	No	Yes	2.00
283	46.42	15.41	100.00	3.10	0.58	0.79	11.64	0.00	11.64	4.000	No	Yes	2.00
284	46.59	15.79	100.00	3.08	0.58	0.79	10.97	0.00	10.97	4.000	No	Yes	2.00
285	46.75	15.43	100.00	3.09	0.58	0.79	11.15	0.00	11.15	4.000	No	Yes	2.00
286	46.92	15.42	100.00	3.13	0.58	0.78	10.69	0.00	10.69	4.000	No	Yes	2.00
287	47.08	15.78	100.00	3.17	0.58	0.78	10.83	0.00	10.83	4.000	No	Yes	2.00
288	47.24	16.54	100.00	3.19	0.58	0.78	11.87	0.00	11.87	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	47.41	17.50	100.00	3.18	0.57	0.78	12.46	0.00	12.46	4.000	No	Yes	2.00
290	47.57	18.15	100.00	3.17	0.57	0.78	13.00	0.00	13.00	4.000	No	Yes	2.00
291	47.74	18.68	100.00	3.16	0.57	0.78	13.31	0.00	13.31	4.000	No	Yes	2.00
292	47.90	18.85	100.00	3.15	0.57	0.78	13.61	0.00	13.61	4.000	No	Yes	2.00
293	48.06	18.94	100.00	3.13	0.57	0.78	13.35	0.00	13.35	4.000	No	Yes	2.00
294	48.23	18.71	100.00	3.13	0.57	0.78	13.47	0.00	13.47	4.000	No	Yes	2.00
295	48.39	18.77	100.00	3.12	0.57	0.78	12.98	0.00	12.98	4.000	No	Yes	2.00
296	48.56	18.87	100.00	3.12	0.57	0.78	13.36	0.00	13.36	4.000	No	Yes	2.00
297	48.72	19.08	100.00	3.11	0.57	0.77	13.57	0.00	13.57	4.000	No	Yes	2.00
298	48.88	19.19	100.00	3.10	0.57	0.77	13.32	0.00	13.32	4.000	No	Yes	2.00
299	49.05	19.28	100.00	3.09	0.57	0.77	13.43	0.00	13.43	4.000	No	Yes	2.00
300	49.21	19.46	100.00	3.07	0.57	0.77	13.56	0.00	13.56	4.000	No	Yes	2.00
301	49.38	19.38	100.00	3.06	0.57	0.77	13.55	0.00	13.55	4.000	No	Yes	2.00
302	49.54	18.94	100.00	3.05	0.57	0.77	13.17	0.00	13.17	4.000	No	Yes	2.00
303	49.70	18.57	100.00	3.05	0.57	0.77	12.47	0.00	12.47	4.000	No	Yes	2.00
304	49.87	18.49	100.00	3.06	0.57	0.77	12.58	0.00	12.58	4.000	No	Yes	2.00
305	50.03	19.06	100.00	4.06	0.57	0.76	12.86	0.00	12.86	4.000	No	Yes	2.00
306	50.20	19.65	100.00	4.06	0.57	0.77	13.60	0.00	13.60	4.000	No	Yes	2.00
307	50.36	20.03	100.00	4.06	0.57	0.77	13.72	0.00	13.72	4.000	No	Yes	2.00
308	50.52	20.03	100.00	4.06	0.57	0.76	13.57	0.00	13.57	4.000	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.17	0.00	0.33	2.00	0.00	0.00	0.17	0.00
0.49	2.00	0.00	0.00	0.16	0.00	0.66	2.00	0.00	0.00	0.17	0.00
0.82	2.00	0.00	0.00	0.16	0.00	0.98	2.00	0.00	0.00	0.16	0.00
1.15	0.64	0.00	0.00	0.17	0.18	1.31	0.88	0.00	0.00	0.16	0.06
1.48	1.65	0.00	0.00	0.17	0.00	1.64	2.00	0.00	0.00	0.16	0.00
1.80	2.00	0.00	0.00	0.16	0.00	1.97	2.00	0.00	0.00	0.17	0.00
2.13	2.00	0.00	0.00	0.16	0.00	2.30	2.00	0.00	0.00	0.17	0.00
2.46	2.00	0.00	0.00	0.16	0.00	2.62	2.00	0.00	0.00	0.16	0.00
2.79	2.00	0.00	0.00	0.17	0.00	2.95	1.27	0.00	0.00	0.16	0.00
3.12	0.66	0.00	0.00	0.17	0.17	3.28	0.43	0.00	0.00	0.16	0.27
3.44	2.00	0.00	0.00	0.16	0.00	3.61	2.00	0.00	0.00	0.17	0.00
3.77	2.00	0.00	0.00	0.16	0.00	3.94	2.00	0.00	0.00	0.17	0.00
4.10	2.00	0.00	0.00	0.16	0.00	4.27	2.00	0.00	0.00	0.17	0.00
4.43	2.00	0.00	0.00	0.16	0.00	4.59	2.00	0.00	0.00	0.16	0.00
4.76	2.00	0.00	0.00	0.17	0.00	4.92	2.00	0.00	0.00	0.16	0.00
5.09	2.00	0.00	0.00	0.17	0.00	5.25	2.00	0.00	0.00	0.16	0.00
5.41	2.00	0.00	0.00	0.16	0.00	5.58	0.60	0.00	0.00	0.17	0.19
5.74	0.57	0.00	0.00	0.16	0.19	5.91	0.52	0.00	0.00	0.17	0.23
6.07	0.47	0.00	0.00	0.16	0.23	6.23	2.00	0.00	0.00	0.16	0.00
6.40	2.00	0.00	0.00	0.17	0.00	6.56	2.00	0.00	0.00	0.16	0.00
6.73	2.00	0.00	0.00	0.17	0.00	6.89	2.00	0.00	0.00	0.16	0.00
7.05	2.00	0.00	0.00	0.16	0.00	7.22	2.00	0.00	0.00	0.17	0.00
7.38	2.00	0.00	0.00	0.16	0.00	7.55	2.00	0.00	0.00	0.17	0.00
7.71	2.00	0.00	0.00	0.16	0.00	7.87	2.00	0.00	0.00	0.16	0.00
8.04	2.00	0.00	0.00	0.17	0.00	8.20	2.00	0.00	0.00	0.16	0.00
8.37	2.00	0.00	0.00	0.17	0.00	8.53	2.00	0.00	0.00	0.16	0.00
8.69	2.00	0.00	0.00	0.16	0.00	8.86	2.00	0.00	0.00	0.17	0.00
9.02	2.00	0.00	0.00	0.16	0.00	9.19	2.00	0.00	0.00	0.17	0.00
9.35	2.00	0.00	0.00	0.16	0.00	9.51	0.28	0.72	0.31	0.16	0.30
9.68	0.33	0.67	0.34	0.17	0.30	9.84	0.29	0.71	0.32	0.16	0.29
10.01	0.26	0.74	0.30	0.17	0.32	10.17	0.29	0.71	0.32	0.16	0.29
10.33	0.33	0.67	0.34	0.16	0.27	10.50	0.33	0.67	0.34	0.17	0.29
10.66	0.36	0.64	0.35	0.16	0.26	10.83	0.45	0.55	0.42	0.17	0.24
10.99	0.52	0.48	0.51	0.16	0.19	11.15	0.48	0.52	0.45	0.16	0.21
11.32	0.38	0.62	0.37	0.17	0.26	11.48	0.35	0.65	0.35	0.16	0.26
11.65	0.32	0.68	0.33	0.17	0.29	11.81	0.32	0.68	0.33	0.16	0.27
11.98	0.34	0.66	0.35	0.17	0.28	12.14	0.28	0.72	0.31	0.16	0.29
12.30	2.00	0.00	0.00	0.16	0.00	12.47	2.00	0.00	0.00	0.17	0.00
12.63	2.00	0.00	0.00	0.16	0.00	12.80	2.00	0.00	0.00	0.17	0.00
12.96	2.00	0.00	0.00	0.16	0.00	13.12	2.00	0.00	0.00	0.16	0.00
13.29	2.00	0.00	0.00	0.17	0.00	13.45	2.00	0.00	0.00	0.16	0.00
13.62	2.00	0.00	0.00	0.17	0.00	13.78	2.00	0.00	0.00	0.16	0.00
13.94	2.00	0.00	0.00	0.16	0.00	14.11	2.00	0.00	0.00	0.17	0.00
14.27	2.00	0.00	0.00	0.16	0.00	14.44	2.00	0.00	0.00	0.17	0.00
14.60	2.00	0.00	0.00	0.16	0.00	14.76	2.00	0.00	0.00	0.16	0.00
14.93	2.00	0.00	0.00	0.17	0.00	15.09	2.00	0.00	0.00	0.16	0.00
15.26	2.00	0.00	0.00	0.17	0.00	15.42	2.00	0.00	0.00	0.16	0.00
15.58	2.00	0.00	0.00	0.16	0.00	15.75	2.00	0.00	0.00	0.17	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	2.00	0.00	0.00	0.16	0.00	16.08	2.00	0.00	0.00	0.17	0.00
16.24	2.00	0.00	0.00	0.16	0.00	16.40	2.00	0.00	0.00	0.16	0.00
16.57	2.00	0.00	0.00	0.17	0.00	16.73	2.00	0.00	0.00	0.16	0.00
16.90	2.00	0.00	0.00	0.17	0.00	17.06	2.00	0.00	0.00	0.16	0.00
17.22	2.00	0.00	0.00	0.16	0.00	17.39	2.00	0.00	0.00	0.17	0.00
17.55	2.00	0.00	0.00	0.16	0.00	17.72	2.00	0.00	0.00	0.17	0.00
17.88	0.22	0.78	0.28	0.16	0.28	18.04	0.24	0.76	0.30	0.16	0.27
18.21	0.23	0.77	0.29	0.17	0.29	18.37	2.00	0.00	0.00	0.16	0.00
18.54	2.00	0.00	0.00	0.17	0.00	18.70	2.00	0.00	0.00	0.16	0.00
18.86	2.00	0.00	0.00	0.16	0.00	19.03	2.00	0.00	0.00	0.17	0.00
19.19	2.00	0.00	0.00	0.16	0.00	19.36	2.00	0.00	0.00	0.17	0.00
19.52	2.00	0.00	0.00	0.16	0.00	19.68	2.00	0.00	0.00	0.16	0.00
19.85	2.00	0.00	0.00	0.17	0.00	20.01	2.00	0.00	0.00	0.16	0.00
20.18	2.00	0.00	0.00	0.17	0.00	20.34	2.00	0.00	0.00	0.16	0.00
20.51	2.00	0.00	0.00	0.17	0.00	20.67	2.00	0.00	0.00	0.16	0.00
20.83	2.00	0.00	0.00	0.16	0.00	21.00	2.00	0.00	0.00	0.17	0.00
21.16	2.00	0.00	0.00	0.16	0.00	21.33	2.00	0.00	0.00	0.17	0.00
21.49	2.00	0.00	0.00	0.16	0.00	21.65	2.00	0.00	0.00	0.16	0.00
21.82	2.00	0.00	0.00	0.17	0.00	21.98	2.00	0.00	0.00	0.16	0.00
22.15	2.00	0.00	0.00	0.17	0.00	22.31	2.00	0.00	0.00	0.16	0.00
22.47	2.00	0.00	0.00	0.16	0.00	22.64	2.00	0.00	0.00	0.17	0.00
22.80	2.00	0.00	0.00	0.16	0.00	22.97	2.00	0.00	0.00	0.17	0.00
23.13	2.00	0.00	0.00	0.16	0.00	23.29	2.00	0.00	0.00	0.16	0.00
23.46	2.00	0.00	0.00	0.17	0.00	23.62	2.00	0.00	0.00	0.16	0.00
23.79	2.00	0.00	0.00	0.17	0.00	23.95	2.00	0.00	0.00	0.16	0.00
24.11	2.00	0.00	0.00	0.16	0.00	24.28	2.00	0.00	0.00	0.17	0.00
24.44	2.00	0.00	0.00	0.16	0.00	24.61	2.00	0.00	0.00	0.17	0.00
24.77	2.00	0.00	0.00	0.16	0.00	24.93	2.00	0.00	0.00	0.16	0.00
25.10	2.00	0.00	0.00	0.17	0.00	25.26	2.00	0.00	0.00	0.16	0.00
25.43	2.00	0.00	0.00	0.17	0.00	25.59	2.00	0.00	0.00	0.16	0.00
25.75	2.00	0.00	0.00	0.16	0.00	25.92	2.00	0.00	0.00	0.17	0.00
26.08	2.00	0.00	0.00	0.16	0.00	26.25	2.00	0.00	0.00	0.17	0.00
26.41	2.00	0.00	0.00	0.16	0.00	26.57	2.00	0.00	0.00	0.16	0.00
26.74	2.00	0.00	0.00	0.17	0.00	26.90	2.00	0.00	0.00	0.16	0.00
27.07	2.00	0.00	0.00	0.17	0.00	27.23	2.00	0.00	0.00	0.16	0.00
27.39	2.00	0.00	0.00	0.16	0.00	27.56	2.00	0.00	0.00	0.17	0.00
27.72	2.00	0.00	0.00	0.16	0.00	27.89	2.00	0.00	0.00	0.17	0.00
28.05	2.00	0.00	0.00	0.16	0.00	28.22	2.00	0.00	0.00	0.17	0.00
28.38	2.00	0.00	0.00	0.16	0.00	28.54	2.00	0.00	0.00	0.16	0.00
28.71	2.00	0.00	0.00	0.17	0.00	28.87	2.00	0.00	0.00	0.16	0.00
29.04	2.00	0.00	0.00	0.17	0.00	29.20	2.00	0.00	0.00	0.16	0.00
29.36	2.00	0.00	0.00	0.16	0.00	29.53	2.00	0.00	0.00	0.17	0.00
29.69	2.00	0.00	0.00	0.16	0.00	29.86	2.00	0.00	0.00	0.17	0.00
30.02	2.00	0.00	0.00	0.16	0.00	30.18	2.00	0.00	0.00	0.16	0.00
30.35	2.00	0.00	0.00	0.17	0.00	30.51	2.00	0.00	0.00	0.16	0.00
30.68	2.00	0.00	0.00	0.17	0.00	30.84	2.00	0.00	0.00	0.16	0.00
31.00	2.00	0.00	0.00	0.16	0.00	31.17	2.00	0.00	0.00	0.17	0.00
31.33	2.00	0.00	0.00	0.16	0.00	31.50	2.00	0.00	0.00	0.17	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.16	0.00	31.82	2.00	0.00	0.00	0.16	0.00
31.99	2.00	0.00	0.00	0.17	0.00	32.15	2.00	0.00	0.00	0.16	0.00
32.32	2.00	0.00	0.00	0.17	0.00	32.48	2.00	0.00	0.00	0.16	0.00
32.64	2.00	0.00	0.00	0.16	0.00	32.81	2.00	0.00	0.00	0.17	0.00
32.97	2.00	0.00	0.00	0.16	0.00	33.14	2.00	0.00	0.00	0.17	0.00
33.30	2.00	0.00	0.00	0.16	0.00	33.46	2.00	0.00	0.00	0.16	0.00
33.63	2.00	0.00	0.00	0.17	0.00	33.79	2.00	0.00	0.00	0.16	0.00
33.96	2.00	0.00	0.00	0.17	0.00	34.12	2.00	0.00	0.00	0.16	0.00
34.28	2.00	0.00	0.00	0.16	0.00	34.45	2.00	0.00	0.00	0.17	0.00
34.61	2.00	0.00	0.00	0.16	0.00	34.78	2.00	0.00	0.00	0.17	0.00
34.94	2.00	0.00	0.00	0.16	0.00	35.10	2.00	0.00	0.00	0.16	0.00
35.27	2.00	0.00	0.00	0.17	0.00	35.43	2.00	0.00	0.00	0.16	0.00
35.60	2.00	0.00	0.00	0.17	0.00	35.76	2.00	0.00	0.00	0.16	0.00
35.93	2.00	0.00	0.00	0.17	0.00	36.09	2.00	0.00	0.00	0.16	0.00
36.25	2.00	0.00	0.00	0.16	0.00	36.42	2.00	0.00	0.00	0.17	0.00
36.58	2.00	0.00	0.00	0.16	0.00	36.75	2.00	0.00	0.00	0.17	0.00
36.91	2.00	0.00	0.00	0.16	0.00	37.07	2.00	0.00	0.00	0.16	0.00
37.24	2.00	0.00	0.00	0.17	0.00	37.40	2.00	0.00	0.00	0.16	0.00
37.57	2.00	0.00	0.00	0.17	0.00	37.73	2.00	0.00	0.00	0.16	0.00
37.89	2.00	0.00	0.00	0.16	0.00	38.06	2.00	0.00	0.00	0.17	0.00
38.22	2.00	0.00	0.00	0.16	0.00	38.39	2.00	0.00	0.00	0.17	0.00
38.55	2.00	0.00	0.00	0.16	0.00	38.71	2.00	0.00	0.00	0.16	0.00
38.88	2.00	0.00	0.00	0.17	0.00	39.04	2.00	0.00	0.00	0.16	0.00
39.21	2.00	0.00	0.00	0.17	0.00	39.37	2.00	0.00	0.00	0.16	0.00
39.53	2.00	0.00	0.00	0.16	0.00	39.70	2.00	0.00	0.00	0.17	0.00
39.86	2.00	0.00	0.00	0.16	0.00	40.03	2.00	0.00	0.00	0.17	0.00
40.19	2.00	0.00	0.00	0.16	0.00	40.35	2.00	0.00	0.00	0.16	0.00
40.52	2.00	0.00	0.00	0.17	0.00	40.68	2.00	0.00	0.00	0.16	0.00
40.85	2.00	0.00	0.00	0.17	0.00	41.01	2.00	0.00	0.00	0.16	0.00
41.17	2.00	0.00	0.00	0.16	0.00	41.34	2.00	0.00	0.00	0.17	0.00
41.50	2.00	0.00	0.00	0.16	0.00	41.67	2.00	0.00	0.00	0.17	0.00
41.83	2.00	0.00	0.00	0.16	0.00	41.99	2.00	0.00	0.00	0.16	0.00
42.16	2.00	0.00	0.00	0.17	0.00	42.32	2.00	0.00	0.00	0.16	0.00
42.49	2.00	0.00	0.00	0.17	0.00	42.65	2.00	0.00	0.00	0.16	0.00
42.81	2.00	0.00	0.00	0.16	0.00	42.98	2.00	0.00	0.00	0.17	0.00
43.14	2.00	0.00	0.00	0.16	0.00	43.31	2.00	0.00	0.00	0.17	0.00
43.47	2.00	0.00	0.00	0.16	0.00	43.64	2.00	0.00	0.00	0.17	0.00
43.80	2.00	0.00	0.00	0.16	0.00	43.96	2.00	0.00	0.00	0.16	0.00
44.13	2.00	0.00	0.00	0.17	0.00	44.29	2.00	0.00	0.00	0.16	0.00
44.46	2.00	0.00	0.00	0.17	0.00	44.62	2.00	0.00	0.00	0.16	0.00
44.78	2.00	0.00	0.00	0.16	0.00	44.95	2.00	0.00	0.00	0.17	0.00
45.11	2.00	0.00	0.00	0.16	0.00	45.28	2.00	0.00	0.00	0.17	0.00
45.44	2.00	0.00	0.00	0.16	0.00	45.60	2.00	0.00	0.00	0.16	0.00
45.77	2.00	0.00	0.00	0.17	0.00	45.93	2.00	0.00	0.00	0.16	0.00
46.10	2.00	0.00	0.00	0.17	0.00	46.26	2.00	0.00	0.00	0.16	0.00
46.42	2.00	0.00	0.00	0.16	0.00	46.59	2.00	0.00	0.00	0.17	0.00
46.75	2.00	0.00	0.00	0.16	0.00	46.92	2.00	0.00	0.00	0.17	0.00
47.08	2.00	0.00	0.00	0.16	0.00	47.24	2.00	0.00	0.00	0.16	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.17	0.00	47.57	2.00	0.00	0.00	0.16	0.00
47.74	2.00	0.00	0.00	0.17	0.00	47.90	2.00	0.00	0.00	0.16	0.00
48.06	2.00	0.00	0.00	0.16	0.00	48.23	2.00	0.00	0.00	0.17	0.00
48.39	2.00	0.00	0.00	0.16	0.00	48.56	2.00	0.00	0.00	0.17	0.00
48.72	2.00	0.00	0.00	0.16	0.00	48.88	2.00	0.00	0.00	0.16	0.00
49.05	2.00	0.00	0.00	0.17	0.00	49.21	2.00	0.00	0.00	0.16	0.00
49.38	2.00	0.00	0.00	0.17	0.00	49.54	2.00	0.00	0.00	0.16	0.00
49.70	2.00	0.00	0.00	0.16	0.00	49.87	2.00	0.00	0.00	0.17	0.00
50.03	2.00	0.00	0.00	0.16	0.00	50.20	2.00	0.00	0.00	0.17	0.00
50.36	2.00	0.00	0.00	0.16	0.00	50.52	2.00	0.00	0.00	0.16	0.00

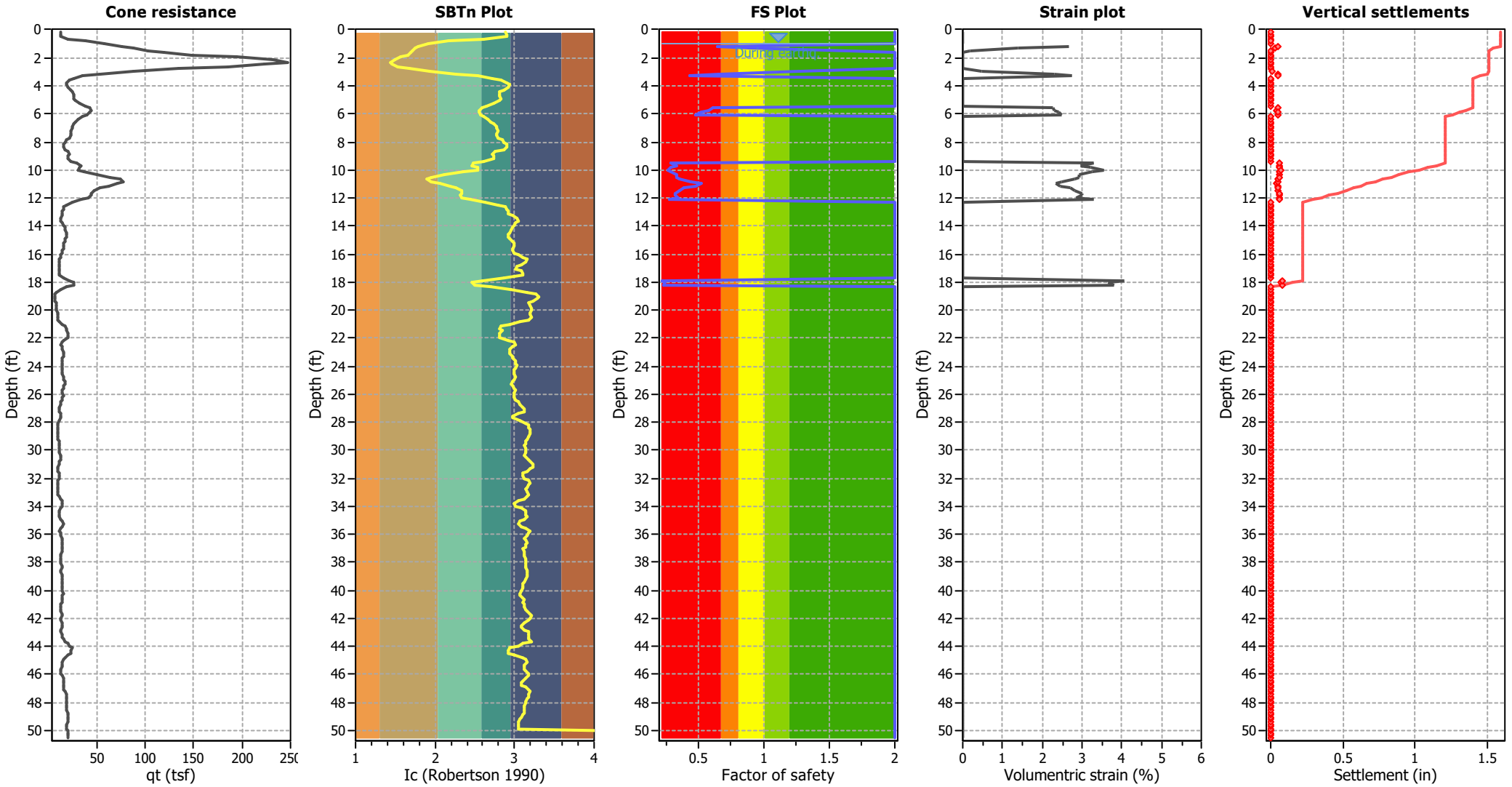
Overall liquefaction potential: 6.97

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.16	2.88	20.07	6.94	139.33	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.33	2.90	20.08	7.21	144.71	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.49	2.91	19.84	7.29	144.68	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.66	2.61	30.44	3.84	116.94	0	0	0.29	0.000	0.00	0.00	0.00	0.000
0.82	2.18	59.54	1.56	92.75	21	525	0.26	0.004	0.00	2.41	0.00	0.000
0.98	1.91	92.91	1.25	115.73	23	587	0.23	0.004	0.00	2.41	0.00	0.000

Total estimated settlement: 0.00

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
1.15	119.32	0.64	2.67	1.00	0.05	1.31	137.74	0.88	1.39	1.00	0.03
1.48	161.19	1.65	0.17	1.00	0.00	1.64	193.25	2.00	0.00	1.00	0.00
1.80	217.89	2.00	0.00	1.00	0.00	1.97	299.35	2.00	0.00	1.00	0.00
2.13	420.73	2.00	0.00	1.00	0.00	2.30	399.70	2.00	0.00	1.00	0.00
2.46	366.54	2.00	0.00	1.00	0.00	2.62	297.13	2.00	0.00	1.00	0.00
2.79	218.05	2.00	0.00	1.00	0.00	2.95	159.91	1.27	0.47	1.00	0.01
3.12	137.52	0.66	2.29	1.00	0.05	3.28	116.40	0.43	2.74	1.00	0.05
3.44	37.40	2.00	0.00	1.00	0.00	3.61	31.78	2.00	0.00	1.00	0.00
3.77	29.19	2.00	0.00	1.00	0.00	3.94	27.04	2.00	0.00	1.00	0.00
4.10	28.86	2.00	0.00	1.00	0.00	4.27	35.99	2.00	0.00	1.00	0.00
4.43	40.89	2.00	0.00	1.00	0.00	4.59	42.32	2.00	0.00	1.00	0.00
4.76	41.23	2.00	0.00	1.00	0.00	4.92	40.05	2.00	0.00	1.00	0.00
5.09	41.32	2.00	0.00	1.00	0.00	5.25	49.73	2.00	0.00	1.00	0.00
5.41	60.85	2.00	0.00	1.00	0.00	5.58	138.09	0.60	2.28	1.00	0.05
5.74	135.85	0.57	2.32	1.00	0.04	5.91	131.62	0.52	2.40	1.00	0.05
6.07	127.27	0.47	2.49	1.00	0.05	6.23	52.42	2.00	0.00	1.00	0.00
6.40	46.58	2.00	0.00	1.00	0.00	6.56	41.14	2.00	0.00	1.00	0.00
6.73	37.05	2.00	0.00	1.00	0.00	6.89	37.52	2.00	0.00	1.00	0.00
7.05	35.33	2.00	0.00	1.00	0.00	7.22	32.97	2.00	0.00	1.00	0.00
7.38	33.59	2.00	0.00	1.00	0.00	7.55	33.72	2.00	0.00	1.00	0.00
7.71	29.55	2.00	0.00	1.00	0.00	7.87	25.73	2.00	0.00	1.00	0.00
8.04	23.07	2.00	0.00	1.00	0.00	8.20	22.02	2.00	0.00	1.00	0.00
8.37	20.68	2.00	0.00	1.00	0.00	8.53	21.14	2.00	0.00	1.00	0.00
8.69	25.93	2.00	0.00	1.00	0.00	8.86	31.85	2.00	0.00	1.00	0.00
9.02	26.30	2.00	0.00	1.00	0.00	9.19	22.11	2.00	0.00	1.00	0.00
9.35	27.95	2.00	0.00	1.00	0.00	9.51	98.04	0.28	3.28	1.00	0.06
9.68	108.63	0.33	2.95	1.00	0.06	9.84	99.85	0.29	3.22	1.00	0.06
10.01	90.88	0.26	3.54	1.00	0.07	10.17	98.67	0.29	3.26	1.00	0.06
10.33	109.85	0.33	2.92	1.00	0.06	10.50	110.05	0.33	2.91	1.00	0.06

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
10.66	113.99	0.36	2.80	1.00	0.05	10.83	126.77	0.45	2.50	1.00	0.05
10.99	134.12	0.52	2.35	1.00	0.05	11.15	129.83	0.48	2.44	1.00	0.05
11.32	118.26	0.38	2.70	1.00	0.06	11.48	113.52	0.35	2.82	1.00	0.05
11.65	106.47	0.32	3.01	1.00	0.06	11.81	106.34	0.32	3.02	1.00	0.06
11.98	111.88	0.34	2.86	1.00	0.06	12.14	97.24	0.28	3.31	1.00	0.06
12.30	24.02	2.00	0.00	1.00	0.00	12.47	19.56	2.00	0.00	1.00	0.00
12.63	18.73	2.00	0.00	1.00	0.00	12.80	13.99	2.00	0.00	1.00	0.00
12.96	16.32	2.00	0.00	1.00	0.00	13.12	17.12	2.00	0.00	1.00	0.00
13.29	14.01	2.00	0.00	1.00	0.00	13.45	12.14	2.00	0.00	1.00	0.00
13.62	13.53	2.00	0.00	1.00	0.00	13.78	15.19	2.00	0.00	1.00	0.00
13.94	15.97	2.00	0.00	1.00	0.00	14.11	17.40	2.00	0.00	1.00	0.00
14.27	18.20	2.00	0.00	1.00	0.00	14.44	18.78	2.00	0.00	1.00	0.00
14.60	19.28	2.00	0.00	1.00	0.00	14.76	18.69	2.00	0.00	1.00	0.00
14.93	18.01	2.00	0.00	1.00	0.00	15.09	16.99	2.00	0.00	1.00	0.00
15.26	16.10	2.00	0.00	1.00	0.00	15.42	15.55	2.00	0.00	1.00	0.00
15.58	15.12	2.00	0.00	1.00	0.00	15.75	15.04	2.00	0.00	1.00	0.00
15.91	14.55	2.00	0.00	1.00	0.00	16.08	13.18	2.00	0.00	1.00	0.00
16.24	12.10	2.00	0.00	1.00	0.00	16.40	11.12	2.00	0.00	1.00	0.00
16.57	9.76	2.00	0.00	1.00	0.00	16.73	10.36	2.00	0.00	1.00	0.00
16.90	10.95	2.00	0.00	1.00	0.00	17.06	10.29	2.00	0.00	1.00	0.00
17.22	11.75	2.00	0.00	1.00	0.00	17.39	8.97	2.00	0.00	1.00	0.00
17.55	11.98	2.00	0.00	1.00	0.00	17.72	12.53	2.00	0.00	1.00	0.00
17.88	78.57	0.22	4.08	1.00	0.08	18.04	88.22	0.24	3.64	1.00	0.07
18.21	84.25	0.23	3.81	1.00	0.08	18.37	18.26	2.00	0.00	1.00	0.00
18.54	10.35	2.00	0.00	1.00	0.00	18.70	6.78	2.00	0.00	1.00	0.00
18.86	7.05	2.00	0.00	1.00	0.00	19.03	5.78	2.00	0.00	1.00	0.00
19.19	5.12	2.00	0.00	1.00	0.00	19.36	7.60	2.00	0.00	1.00	0.00
19.52	7.10	2.00	0.00	1.00	0.00	19.68	6.68	2.00	0.00	1.00	0.00
19.85	6.87	2.00	0.00	1.00	0.00	20.01	7.40	2.00	0.00	1.00	0.00
20.18	8.43	2.00	0.00	1.00	0.00	20.34	8.27	2.00	0.00	1.00	0.00
20.51	7.99	2.00	0.00	1.00	0.00	20.67	7.90	2.00	0.00	1.00	0.00
20.83	9.35	2.00	0.00	1.00	0.00	21.00	13.71	2.00	0.00	1.00	0.00
21.16	17.34	2.00	0.00	1.00	0.00	21.33	18.51	2.00	0.00	1.00	0.00
21.49	17.82	2.00	0.00	1.00	0.00	21.65	16.41	2.00	0.00	1.00	0.00
21.82	22.70	2.00	0.00	1.00	0.00	21.98	17.71	2.00	0.00	1.00	0.00
22.15	14.50	2.00	0.00	1.00	0.00	22.31	11.88	2.00	0.00	1.00	0.00
22.47	11.08	2.00	0.00	1.00	0.00	22.64	11.86	2.00	0.00	1.00	0.00
22.80	13.38	2.00	0.00	1.00	0.00	22.97	13.65	2.00	0.00	1.00	0.00
23.13	13.66	2.00	0.00	1.00	0.00	23.29	13.24	2.00	0.00	1.00	0.00
23.46	12.83	2.00	0.00	1.00	0.00	23.62	12.66	2.00	0.00	1.00	0.00
23.79	11.92	2.00	0.00	1.00	0.00	23.95	11.52	2.00	0.00	1.00	0.00
24.11	11.80	2.00	0.00	1.00	0.00	24.28	12.65	2.00	0.00	1.00	0.00
24.44	12.82	2.00	0.00	1.00	0.00	24.61	12.84	2.00	0.00	1.00	0.00
24.77	12.91	2.00	0.00	1.00	0.00	24.93	13.57	2.00	0.00	1.00	0.00
25.10	14.31	2.00	0.00	1.00	0.00	25.26	15.56	2.00	0.00	1.00	0.00
25.43	13.91	2.00	0.00	1.00	0.00	25.59	12.36	2.00	0.00	1.00	0.00
25.75	12.73	2.00	0.00	1.00	0.00	25.92	12.52	2.00	0.00	1.00	0.00
26.08	12.31	2.00	0.00	1.00	0.00	26.25	12.78	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
26.41	11.72	2.00	0.00	1.00	0.00	26.57	11.31	2.00	0.00	1.00	0.00
26.74	10.12	2.00	0.00	1.00	0.00	26.90	9.42	2.00	0.00	1.00	0.00
27.07	8.56	2.00	0.00	1.00	0.00	27.23	8.02	2.00	0.00	1.00	0.00
27.39	9.35	2.00	0.00	1.00	0.00	27.56	12.14	2.00	0.00	1.00	0.00
27.72	11.57	2.00	0.00	1.00	0.00	27.89	8.79	2.00	0.00	1.00	0.00
28.05	7.92	2.00	0.00	1.00	0.00	28.22	7.44	2.00	0.00	1.00	0.00
28.38	7.21	2.00	0.00	1.00	0.00	28.54	7.42	2.00	0.00	1.00	0.00
28.71	7.10	2.00	0.00	1.00	0.00	28.87	7.65	2.00	0.00	1.00	0.00
29.04	8.04	2.00	0.00	1.00	0.00	29.20	8.36	2.00	0.00	1.00	0.00
29.36	8.10	2.00	0.00	1.00	0.00	29.53	8.85	2.00	0.00	1.00	0.00
29.69	9.51	2.00	0.00	1.00	0.00	29.86	9.53	2.00	0.00	1.00	0.00
30.02	8.99	2.00	0.00	1.00	0.00	30.18	9.53	2.00	0.00	1.00	0.00
30.35	9.29	2.00	0.00	1.00	0.00	30.51	9.75	2.00	0.00	1.00	0.00
30.68	9.81	2.00	0.00	1.00	0.00	30.84	9.39	2.00	0.00	1.00	0.00
31.00	8.46	2.00	0.00	1.00	0.00	31.17	7.37	2.00	0.00	1.00	0.00
31.33	7.51	2.00	0.00	1.00	0.00	31.50	8.19	2.00	0.00	1.00	0.00
31.66	8.09	2.00	0.00	1.00	0.00	31.82	9.24	2.00	0.00	1.00	0.00
31.99	8.06	2.00	0.00	1.00	0.00	32.15	7.38	2.00	0.00	1.00	0.00
32.32	7.41	2.00	0.00	1.00	0.00	32.48	7.15	2.00	0.00	1.00	0.00
32.64	7.05	2.00	0.00	1.00	0.00	32.81	6.86	2.00	0.00	1.00	0.00
32.97	7.50	2.00	0.00	1.00	0.00	33.14	7.40	2.00	0.00	1.00	0.00
33.30	8.05	2.00	0.00	1.00	0.00	33.46	9.94	2.00	0.00	1.00	0.00
33.63	10.18	2.00	0.00	1.00	0.00	33.79	11.19	2.00	0.00	1.00	0.00
33.96	11.30	2.00	0.00	1.00	0.00	34.12	8.98	2.00	0.00	1.00	0.00
34.28	8.41	2.00	0.00	1.00	0.00	34.45	8.43	2.00	0.00	1.00	0.00
34.61	8.66	2.00	0.00	1.00	0.00	34.78	8.46	2.00	0.00	1.00	0.00
34.94	9.05	2.00	0.00	1.00	0.00	35.10	11.83	2.00	0.00	1.00	0.00
35.27	11.86	2.00	0.00	1.00	0.00	35.43	11.09	2.00	0.00	1.00	0.00
35.60	9.67	2.00	0.00	1.00	0.00	35.76	8.44	2.00	0.00	1.00	0.00
35.93	8.50	2.00	0.00	1.00	0.00	36.09	9.99	2.00	0.00	1.00	0.00
36.25	10.49	2.00	0.00	1.00	0.00	36.42	10.29	2.00	0.00	1.00	0.00
36.58	10.07	2.00	0.00	1.00	0.00	36.75	9.69	2.00	0.00	1.00	0.00
36.91	10.19	2.00	0.00	1.00	0.00	37.07	10.40	2.00	0.00	1.00	0.00
37.24	10.39	2.00	0.00	1.00	0.00	37.40	9.75	2.00	0.00	1.00	0.00
37.57	9.44	2.00	0.00	1.00	0.00	37.73	9.64	2.00	0.00	1.00	0.00
37.89	9.64	2.00	0.00	1.00	0.00	38.06	9.45	2.00	0.00	1.00	0.00
38.22	10.06	2.00	0.00	1.00	0.00	38.39	9.90	2.00	0.00	1.00	0.00
38.55	9.44	2.00	0.00	1.00	0.00	38.71	9.47	2.00	0.00	1.00	0.00
38.88	9.81	2.00	0.00	1.00	0.00	39.04	9.97	2.00	0.00	1.00	0.00
39.21	9.95	2.00	0.00	1.00	0.00	39.37	10.16	2.00	0.00	1.00	0.00
39.53	10.62	2.00	0.00	1.00	0.00	39.70	10.31	2.00	0.00	1.00	0.00
39.86	10.05	2.00	0.00	1.00	0.00	40.03	10.26	2.00	0.00	1.00	0.00
40.19	11.15	2.00	0.00	1.00	0.00	40.35	10.57	2.00	0.00	1.00	0.00
40.52	9.87	2.00	0.00	1.00	0.00	40.68	9.81	2.00	0.00	1.00	0.00
40.85	9.78	2.00	0.00	1.00	0.00	41.01	9.47	2.00	0.00	1.00	0.00
41.17	8.84	2.00	0.00	1.00	0.00	41.34	8.66	2.00	0.00	1.00	0.00
41.50	9.27	2.00	0.00	1.00	0.00	41.67	9.93	2.00	0.00	1.00	0.00
41.83	9.67	2.00	0.00	1.00	0.00	41.99	9.24	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
42.16	9.35	2.00	0.00	1.00	0.00	42.32	9.39	2.00	0.00	1.00	0.00
42.49	9.99	2.00	0.00	1.00	0.00	42.65	9.95	2.00	0.00	1.00	0.00
42.81	8.91	2.00	0.00	1.00	0.00	42.98	8.86	2.00	0.00	1.00	0.00
43.14	9.49	2.00	0.00	1.00	0.00	43.31	9.94	2.00	0.00	1.00	0.00
43.47	11.04	2.00	0.00	1.00	0.00	43.64	11.66	2.00	0.00	1.00	0.00
43.80	12.13	2.00	0.00	1.00	0.00	43.96	20.04	2.00	0.00	1.00	0.00
44.13	16.81	2.00	0.00	1.00	0.00	44.29	19.08	2.00	0.00	1.00	0.00
44.46	17.36	2.00	0.00	1.00	0.00	44.62	14.44	2.00	0.00	1.00	0.00
44.78	11.98	2.00	0.00	1.00	0.00	44.95	9.84	2.00	0.00	1.00	0.00
45.11	10.72	2.00	0.00	1.00	0.00	45.28	9.99	2.00	0.00	1.00	0.00
45.44	9.55	2.00	0.00	1.00	0.00	45.60	9.05	2.00	0.00	1.00	0.00
45.77	8.52	2.00	0.00	1.00	0.00	45.93	8.55	2.00	0.00	1.00	0.00
46.10	8.86	2.00	0.00	1.00	0.00	46.26	10.30	2.00	0.00	1.00	0.00
46.42	11.64	2.00	0.00	1.00	0.00	46.59	10.97	2.00	0.00	1.00	0.00
46.75	11.15	2.00	0.00	1.00	0.00	46.92	10.69	2.00	0.00	1.00	0.00
47.08	10.83	2.00	0.00	1.00	0.00	47.24	11.87	2.00	0.00	1.00	0.00
47.41	12.46	2.00	0.00	1.00	0.00	47.57	13.00	2.00	0.00	1.00	0.00
47.74	13.31	2.00	0.00	1.00	0.00	47.90	13.61	2.00	0.00	1.00	0.00
48.06	13.35	2.00	0.00	1.00	0.00	48.23	13.47	2.00	0.00	1.00	0.00
48.39	12.98	2.00	0.00	1.00	0.00	48.56	13.36	2.00	0.00	1.00	0.00
48.72	13.57	2.00	0.00	1.00	0.00	48.88	13.32	2.00	0.00	1.00	0.00
49.05	13.43	2.00	0.00	1.00	0.00	49.21	13.56	2.00	0.00	1.00	0.00
49.38	13.55	2.00	0.00	1.00	0.00	49.54	13.17	2.00	0.00	1.00	0.00
49.70	12.47	2.00	0.00	1.00	0.00	49.87	12.58	2.00	0.00	1.00	0.00
50.03	12.86	2.00	0.00	1.00	0.00	50.20	13.60	2.00	0.00	1.00	0.00
50.36	13.72	2.00	0.00	1.00	0.00	50.52	13.57	2.00	0.00	1.00	0.00

Total estimated settlement: 1.59

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

:: Strength loss calculation Idriss & Boulanger (2008) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	12.50	20.07	6.94	139.33	2.88	0.09	0.62
0.33	12.52	20.08	7.21	144.71	2.90	0.09	0.62
0.49	12.38	19.84	7.29	144.68	2.91	0.09	0.62
0.66	18.98	30.44	3.84	116.94	2.61	0.08	0.62
0.82	37.10	59.54	1.56	92.75	2.18	0.10	0.76
0.98	57.89	92.91	1.25	115.73	1.91	0.16	0.80
1.15	75.45	121.12	1.14	137.87	1.79	0.17	0.78
1.31	86.77	139.29	1.08	150.67	1.75	0.23	0.81
1.48	102.23	164.10	1.00	164.10	1.71	0.36	0.84
1.64	118.84	190.79	1.00	190.79	1.69	0.91	0.88
1.80	147.50	236.82	1.00	236.82	1.65	0.96	0.91
1.97	194.72	312.65	1.00	312.65	1.56	1.00	0.98
2.13	232.45	373.27	1.00	373.27	1.49	1.03	1.06
2.30	247.24	397.00	1.00	397.00	1.45	1.04	1.05
2.46	223.35	358.61	1.00	358.61	1.47	1.02	1.03
2.62	185.64	298.01	1.00	298.01	1.52	0.99	0.98
2.79	134.76	216.23	1.00	216.23	1.68	0.94	0.91
2.95	86.89	139.31	1.26	175.66	1.94	0.22	0.84
3.12	52.38	83.85	1.78	149.15	2.26	0.15	0.81
3.28	34.12	54.51	3.18	173.42	2.53	0.13	0.78
3.44	25.16	40.08	4.83	193.43	2.71	0.11	0.62
3.61	20.48	32.55	6.18	201.29	2.83	0.10	0.62
3.77	18.32	29.07	7.14	207.52	2.90	0.10	0.62
3.94	17.71	28.07	7.71	216.46	2.93	0.10	0.62
4.10	19.12	30.31	7.42	224.91	2.91	0.10	0.62
4.27	21.99	34.91	6.68	233.29	2.86	0.11	0.62
4.43	24.78	39.38	6.10	240.07	2.82	0.12	0.62
4.59	25.86	41.11	6.00	246.47	2.81	0.12	0.62
4.76	25.69	40.81	6.03	246.15	2.81	0.12	0.62
4.92	25.48	40.45	6.18	249.91	2.83	0.12	0.62
5.09	27.24	43.27	5.94	256.92	2.81	0.12	0.62
5.25	31.79	50.56	5.20	262.97	2.75	0.13	0.62
5.41	37.95	60.45	4.25	257.15	2.65	0.15	0.66
5.58	42.25	67.34	3.63	244.37	2.59	0.16	0.81
5.74	43.36	69.10	3.36	232.05	2.55	0.15	0.81
5.91	41.81	66.59	3.35	223.08	2.55	0.15	0.80
6.07	38.73	61.63	3.53	217.83	2.57	0.14	0.79
6.23	35.01	55.64	3.87	215.12	2.61	0.13	0.63
6.40	30.86	48.95	4.33	212.17	2.66	0.12	0.62
6.56	27.48	43.51	4.81	209.46	2.71	0.12	0.62
6.73	25.61	40.49	5.15	208.59	2.74	0.11	0.62
6.89	24.50	38.69	5.45	210.85	2.77	0.11	0.62
7.05	23.78	37.52	5.63	211.38	2.78	0.11	0.62
7.22	23.08	36.37	5.69	206.78	2.79	0.10	0.62
7.38	22.94	36.13	5.50	198.79	2.77	0.11	0.62
7.55	22.34	35.15	5.51	193.61	2.77	0.11	0.62
7.71	20.63	32.38	5.80	187.71	2.80	0.10	0.62
7.87	18.20	28.48	6.44	183.50	2.85	0.10	0.62

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	16.54	25.79	6.82	175.88	2.87	0.09	0.62
8.20	15.48	24.06	7.23	174.06	2.90	0.09	0.62
8.37	15.17	23.55	7.25	170.75	2.90	0.09	0.62
8.53	16.32	25.39	6.64	168.63	2.86	0.09	0.62
8.69	19.36	30.27	5.29	160.24	2.75	0.09	0.62
8.86	20.84	32.63	4.90	159.87	2.72	0.10	0.62
9.02	20.03	31.31	5.04	157.63	2.73	0.09	0.62
9.19	19.18	29.92	5.13	153.46	2.74	0.09	0.62
9.35	22.55	35.32	3.87	136.50	2.61	0.09	0.62
9.51	29.41	45.09	2.88	129.71	2.48	0.10	0.74
9.68	32.63	49.26	2.80	137.72	2.47	0.11	0.76
9.84	31.14	46.93	3.18	149.10	2.53	0.11	0.75
10.01	29.82	44.29	3.20	141.57	2.53	0.10	0.73
10.17	35.92	50.95	2.16	110.13	2.36	0.10	0.75
10.33	49.28	66.14	1.45	95.63	2.12	0.11	0.77
10.50	63.63	81.95	1.27	103.88	1.95	0.12	0.77
10.66	73.56	93.24	1.24	115.50	1.90	0.13	0.77
10.83	76.24	96.66	1.27	122.97	1.95	0.14	0.79
10.99	71.68	91.69	1.36	125.05	2.06	0.14	0.80
11.15	62.40	80.71	1.58	127.47	2.19	0.13	0.80
11.32	53.42	69.21	1.82	126.10	2.27	0.12	0.78
11.48	46.45	60.00	2.04	122.43	2.33	0.12	0.77
11.65	43.41	55.39	2.05	113.39	2.33	0.11	0.76
11.81	43.21	54.49	2.01	109.26	2.32	0.11	0.76
11.98	40.51	50.63	2.10	106.17	2.34	0.11	0.77
12.14	33.48	41.88	2.64	110.52	2.45	0.10	0.74
12.30	23.90	30.05	4.00	120.35	2.63	0.09	0.62
12.47	18.24	22.90	5.66	129.53	2.78	0.09	0.62
12.63	15.37	19.15	6.89	132.01	2.88	0.09	0.62
12.80	14.51	17.85	7.31	130.48	2.91	0.08	0.62
12.96	14.14	17.18	7.51	128.95	2.92	0.08	0.62
13.12	14.23	17.08	7.39	126.26	2.91	0.09	0.62
13.29	13.05	15.39	8.34	128.33	2.97	0.08	0.62
13.45	12.05	13.96	9.44	131.77	3.04	0.08	1.00
13.62	12.50	14.35	9.50	136.32	3.04	0.08	1.02
13.78	13.78	15.72	9.11	143.27	3.02	0.08	1.12
13.94	15.08	17.09	8.73	149.25	3.00	0.08	0.62
14.11	16.10	18.17	8.51	154.55	2.98	0.09	0.62
14.27	17.04	19.18	8.14	156.14	2.96	0.09	0.62
14.44	17.69	19.83	7.79	154.53	2.94	0.09	0.62
14.60	17.90	19.96	7.55	150.73	2.92	0.09	0.62
14.76	17.71	19.63	7.54	148.03	2.92	0.09	0.62
14.93	17.03	18.72	7.93	148.50	2.95	0.09	0.62
15.09	16.25	17.72	8.31	147.24	2.97	0.09	0.62
15.26	15.50	16.76	8.55	143.26	2.99	0.09	0.62
15.42	14.94	16.03	8.53	136.79	2.99	0.08	0.62
15.58	14.65	15.60	8.39	130.95	2.98	0.08	0.62
15.75	14.37	15.20	8.43	128.10	2.98	0.08	0.62

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	13.78	14.46	8.80	127.21	3.00	0.08	1.03
16.08	12.87	13.35	9.60	128.26	3.05	0.08	0.95
16.24	11.79	12.08	10.57	127.71	3.10	0.08	0.86
16.40	10.70	10.81	11.65	125.92	3.15	0.08	0.77
16.57	10.16	10.16	11.43	116.04	3.14	0.08	0.73
16.73	10.13	10.07	10.47	105.39	3.09	0.08	0.72
16.90	10.33	10.23	9.39	96.12	3.03	0.08	0.73
17.06	10.80	10.70	9.03	96.61	3.01	0.08	0.76
17.22	10.18	9.97	10.48	104.48	3.09	0.08	0.71
17.39	10.76	10.54	10.66	112.40	3.10	0.08	0.75
17.55	11.05	10.80	10.64	114.90	3.10	0.08	0.77
17.72	15.22	15.19	6.66	101.23	2.86	0.08	0.62
17.88	21.56	21.62	3.74	80.76	2.60	0.08	0.70
18.04	26.46	26.51	2.68	71.14	2.45	0.09	0.72
18.21	25.41	25.36	2.97	75.33	2.50	0.09	0.72
18.37	18.57	18.31	4.63	84.71	2.69	0.08	0.62
18.54	11.84	11.30	7.99	90.27	2.95	0.08	0.62
18.70	8.16	7.40	11.67	86.39	3.15	0.07	0.53
18.86	6.69	5.82	14.20	82.70	3.26	0.07	0.42
19.03	6.14	5.23	15.36	80.36	3.31	0.07	0.37
19.19	6.34	5.41	14.70	79.57	3.28	0.07	0.39
19.36	6.82	5.87	13.46	79.07	3.23	0.07	0.42
19.52	7.38	6.42	12.13	77.90	3.17	0.07	0.46
19.68	7.18	6.18	12.79	79.11	3.20	0.07	0.44
19.85	7.31	6.29	13.04	82.06	3.21	0.07	0.45
20.01	7.93	6.89	12.87	88.76	3.21	0.07	0.49
20.18	8.43	7.36	12.72	93.63	3.20	0.08	0.53
20.34	8.65	7.55	12.58	95.03	3.19	0.08	0.54
20.51	8.49	7.35	12.94	95.08	3.21	0.07	0.52
20.67	8.88	7.71	12.38	95.40	3.18	0.07	0.55
20.83	10.88	9.67	9.99	96.59	3.07	0.08	0.69
21.00	14.19	12.91	7.68	99.18	2.93	0.08	0.62
21.16	17.44	16.06	6.26	100.51	2.83	0.08	0.62
21.33	18.94	17.47	6.04	105.45	2.81	0.09	0.62
21.49	18.68	17.14	6.38	109.28	2.84	0.09	0.62
21.65	20.22	18.56	5.90	109.58	2.80	0.08	0.62
21.82	20.22	18.48	5.94	109.80	2.81	0.09	0.62
21.98	19.59	17.79	6.02	107.06	2.81	0.08	0.62
22.15	15.80	14.04	7.57	106.30	2.92	0.08	0.62
22.31	13.49	11.76	8.58	100.93	2.99	0.08	0.62
22.47	12.60	10.86	8.98	97.47	3.01	0.08	0.78
22.64	13.19	11.37	8.42	95.70	2.98	0.08	0.62
22.80	14.15	12.23	7.89	96.53	2.95	0.08	0.62
22.97	14.83	12.82	7.68	98.47	2.93	0.08	0.62
23.13	14.81	12.75	7.93	101.03	2.95	0.08	0.62
23.29	14.55	12.45	8.23	102.42	2.97	0.08	0.62
23.46	14.23	12.08	8.51	102.79	2.98	0.08	0.62
23.62	13.77	11.61	8.84	102.62	3.00	0.08	0.83

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	13.32	11.13	9.13	101.67	3.02	0.08	0.80
23.95	13.05	10.83	9.24	100.09	3.03	0.08	0.77
24.11	13.36	11.07	8.99	99.56	3.01	0.08	0.79
24.28	13.86	11.48	8.66	99.48	2.99	0.08	0.62
24.44	14.26	11.80	8.65	102.09	2.99	0.08	0.62
24.61	14.40	11.87	8.81	104.62	3.00	0.08	0.85
24.77	14.74	12.13	8.94	108.49	3.01	0.08	0.87
24.93	15.31	12.60	8.83	111.22	3.00	0.08	0.90
25.10	16.32	13.46	8.24	110.92	2.97	0.08	0.62
25.26	16.46	13.52	8.13	109.95	2.96	0.08	0.62
25.43	15.82	12.89	8.29	106.80	2.97	0.08	0.62
25.59	14.82	11.94	8.82	105.40	3.00	0.08	0.85
25.75	14.39	11.50	8.91	102.44	3.01	0.08	0.82
25.92	14.39	11.46	8.81	100.93	3.00	0.08	0.82
26.08	14.44	11.45	8.55	97.90	2.99	0.08	0.62
26.25	14.17	11.16	8.66	96.72	2.99	0.08	0.62
26.41	13.80	10.80	8.93	96.38	3.01	0.08	0.77
26.57	12.82	9.89	9.68	95.71	3.05	0.08	0.71
26.74	11.96	9.10	10.08	91.73	3.07	0.08	0.65
26.90	10.96	8.19	10.55	86.39	3.10	0.08	0.59
27.07	10.19	7.49	11.07	82.90	3.12	0.08	0.53
27.23	10.18	7.45	10.95	81.53	3.12	0.07	0.53
27.39	11.50	8.55	9.51	81.31	3.04	0.08	0.61
27.56	12.78	9.62	8.37	80.54	2.98	0.08	0.62
27.72	12.54	9.38	8.52	79.92	2.98	0.08	0.62
27.89	10.97	8.00	9.88	79.06	3.06	0.08	0.57
28.05	9.47	6.69	11.48	76.89	3.14	0.07	0.48
28.22	8.91	6.19	12.11	74.96	3.17	0.07	0.44
28.38	8.76	6.03	12.11	73.09	3.17	0.07	0.43
28.54	8.67	5.94	12.56	74.55	3.19	0.07	0.42
28.71	8.88	6.09	12.67	77.12	3.20	0.07	0.43
28.87	9.15	6.29	12.71	79.96	3.20	0.07	0.45
29.04	9.66	6.69	12.14	81.19	3.17	0.07	0.48
29.20	9.86	6.83	11.98	81.79	3.17	0.08	0.49
29.36	10.20	7.09	11.60	82.24	3.15	0.07	0.51
29.53	10.66	7.43	11.27	83.80	3.13	0.08	0.53
29.69	11.22	7.87	10.97	86.37	3.12	0.08	0.56
29.86	11.28	7.89	11.27	88.93	3.13	0.08	0.56
30.02	11.30	7.87	11.38	89.59	3.14	0.08	0.56
30.18	11.22	7.78	11.32	88.06	3.14	0.08	0.56
30.35	11.53	8.00	11.06	88.43	3.12	0.08	0.57
30.51	11.65	8.07	11.49	92.65	3.14	0.08	0.58
30.68	11.67	8.04	12.11	97.43	3.17	0.08	0.57
30.84	11.13	7.58	12.68	96.10	3.20	0.08	0.54
31.00	10.16	6.77	13.41	90.77	3.23	0.08	0.48
31.17	9.45	6.17	13.29	81.96	3.22	0.07	0.44
31.33	9.37	6.08	12.72	77.32	3.20	0.07	0.43
31.50	9.67	6.30	11.74	73.90	3.15	0.07	0.45

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	10.37	6.83	10.73	73.24	3.11	0.07	0.49
31.82	10.35	6.79	10.72	72.74	3.11	0.08	0.48
31.99	10.12	6.57	11.09	72.89	3.12	0.07	0.47
32.15	9.43	6.01	12.29	73.84	3.18	0.07	0.43
32.32	9.09	5.72	12.71	72.66	3.20	0.07	0.41
32.48	8.97	5.60	12.31	68.90	3.18	0.07	0.40
32.64	8.77	5.42	11.79	63.89	3.16	0.07	0.39
32.81	8.94	5.53	11.42	63.18	3.14	0.07	0.40
32.97	9.11	5.65	11.81	66.66	3.16	0.07	0.40
33.14	9.61	6.01	12.05	72.45	3.17	0.07	0.43
33.30	10.60	6.76	11.86	80.15	3.16	0.07	0.48
33.46	11.72	7.60	10.98	83.42	3.12	0.08	0.54
33.63	12.99	8.55	9.70	82.86	3.05	0.08	0.61
33.79	13.52	8.92	8.82	78.72	3.00	0.08	0.64
33.96	13.05	8.53	9.00	76.74	3.01	0.08	0.61
34.12	11.95	7.66	10.15	77.79	3.08	0.08	0.55
34.28	10.87	6.81	11.26	76.65	3.13	0.08	0.49
34.45	10.78	6.71	11.36	76.25	3.14	0.08	0.48
34.61	10.83	6.73	11.32	76.15	3.14	0.08	0.48
34.78	11.11	6.91	11.67	80.68	3.15	0.08	0.49
34.94	12.42	7.88	10.90	85.83	3.11	0.08	0.56
35.10	13.82	8.90	10.11	90.02	3.07	0.08	0.64
35.27	14.63	9.47	9.58	90.79	3.05	0.08	0.68
35.43	13.74	8.77	10.25	89.94	3.08	0.08	0.63
35.60	12.35	7.70	11.43	88.06	3.14	0.08	0.55
35.76	11.34	6.93	12.57	87.06	3.19	0.08	0.49
35.93	11.54	7.05	12.32	86.83	3.18	0.08	0.50
36.09	12.42	7.67	11.70	89.82	3.15	0.08	0.55
36.25	13.19	8.21	11.21	92.05	3.13	0.08	0.59
36.42	13.24	8.22	11.46	94.18	3.14	0.08	0.59
36.58	12.95	7.98	11.67	93.06	3.15	0.08	0.57
36.75	12.94	7.94	11.51	91.36	3.14	0.08	0.57
36.91	13.10	8.02	11.28	90.48	3.13	0.08	0.57
37.07	13.39	8.21	10.82	88.81	3.11	0.08	0.59
37.24	13.22	8.05	10.91	87.88	3.12	0.08	0.58
37.40	12.87	7.77	10.99	85.37	3.12	0.08	0.55
37.57	12.61	7.55	11.23	84.82	3.13	0.08	0.54
37.73	12.60	7.52	11.26	84.75	3.13	0.08	0.54
37.89	12.64	7.53	11.43	86.03	3.14	0.08	0.54
38.06	12.86	7.65	11.38	87.13	3.14	0.08	0.55
38.22	13.00	7.73	11.43	88.28	3.14	0.08	0.55
38.39	13.02	7.71	11.44	88.18	3.14	0.08	0.55
38.55	12.77	7.51	11.76	88.31	3.16	0.08	0.54
38.71	12.75	7.47	11.86	88.58	3.16	0.08	0.53
38.88	12.98	7.60	11.79	89.62	3.16	0.08	0.54
39.04	13.19	7.72	11.70	90.33	3.15	0.08	0.55
39.21	13.35	7.81	11.54	90.12	3.15	0.08	0.56
39.37	13.64	7.98	11.17	89.16	3.13	0.08	0.57

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.53	13.82	8.08	10.77	86.98	3.11	0.08	0.58
39.70	13.81	8.04	10.56	84.92	3.10	0.08	0.57
39.86	13.72	7.95	10.55	83.92	3.10	0.08	0.57
40.03	14.17	8.23	10.18	83.80	3.08	0.08	0.59
40.19	14.45	8.40	10.02	84.16	3.07	0.08	0.60
40.35	14.33	8.29	10.12	83.86	3.07	0.08	0.59
40.52	13.76	7.87	10.62	83.62	3.10	0.08	0.56
40.68	13.44	7.63	10.90	83.14	3.11	0.08	0.54
40.85	13.27	7.49	10.84	81.15	3.11	0.08	0.53
41.01	12.87	7.19	10.88	78.22	3.11	0.08	0.51
41.17	12.43	6.86	10.90	74.81	3.11	0.08	0.49
41.34	12.37	6.80	11.32	77.03	3.14	0.08	0.49
41.50	12.85	7.10	11.91	84.61	3.16	0.08	0.51
41.67	13.22	7.32	12.54	91.83	3.19	0.08	0.52
41.83	13.14	7.24	12.88	93.29	3.21	0.08	0.52
41.99	12.86	7.03	12.81	90.10	3.20	0.08	0.50
42.16	12.78	6.95	12.33	85.68	3.18	0.08	0.50
42.32	13.14	7.17	11.20	80.35	3.13	0.08	0.51
42.49	13.44	7.34	10.32	75.80	3.08	0.08	0.52
42.65	13.27	7.21	10.27	74.04	3.08	0.08	0.51
42.81	12.85	6.91	11.18	77.24	3.13	0.08	0.49
42.98	12.70	6.79	12.09	82.11	3.17	0.08	0.48
43.14	13.19	7.09	12.35	87.49	3.18	0.08	0.51
43.31	14.17	7.71	12.18	93.86	3.18	0.08	0.55
43.47	15.08	8.27	12.41	102.65	3.19	0.08	0.59
43.64	16.02	8.85	12.97	114.84	3.21	0.08	0.63
43.80	19.67	11.20	10.76	120.51	3.11	0.08	0.80
43.96	21.75	12.51	9.57	119.75	3.04	0.09	0.89
44.13	24.56	14.29	7.68	109.72	2.93	0.09	0.62
44.29	23.40	13.50	7.46	100.74	2.92	0.09	0.62
44.46	22.36	12.78	7.56	96.64	2.92	0.09	0.62
44.62	19.34	10.80	8.76	94.57	3.00	0.08	0.62
44.78	16.14	8.72	10.76	93.81	3.11	0.08	0.62
44.95	14.66	7.75	11.55	89.47	3.15	0.08	0.55
45.11	13.93	7.26	11.69	84.81	3.15	0.08	0.52
45.28	13.94	7.24	11.14	80.60	3.13	0.08	0.52
45.44	13.26	6.78	11.09	75.26	3.12	0.08	0.48
45.60	12.66	6.39	11.22	71.63	3.13	0.08	0.46
45.77	12.28	6.12	11.55	70.71	3.15	0.08	0.44
45.93	12.25	6.09	12.21	74.35	3.18	0.08	0.43
46.10	13.09	6.60	12.12	79.91	3.17	0.08	0.47
46.26	14.47	7.44	11.42	84.90	3.14	0.08	0.53
46.42	15.41	8.00	10.63	85.04	3.10	0.08	0.57
46.59	15.79	8.21	10.27	84.37	3.08	0.08	0.59
46.75	15.43	7.96	10.43	83.07	3.09	0.08	0.57
46.92	15.42	7.93	11.29	89.52	3.13	0.08	0.57
47.08	15.78	8.12	12.08	98.11	3.17	0.08	0.58
47.24	16.54	8.57	12.49	107.06	3.19	0.08	0.61

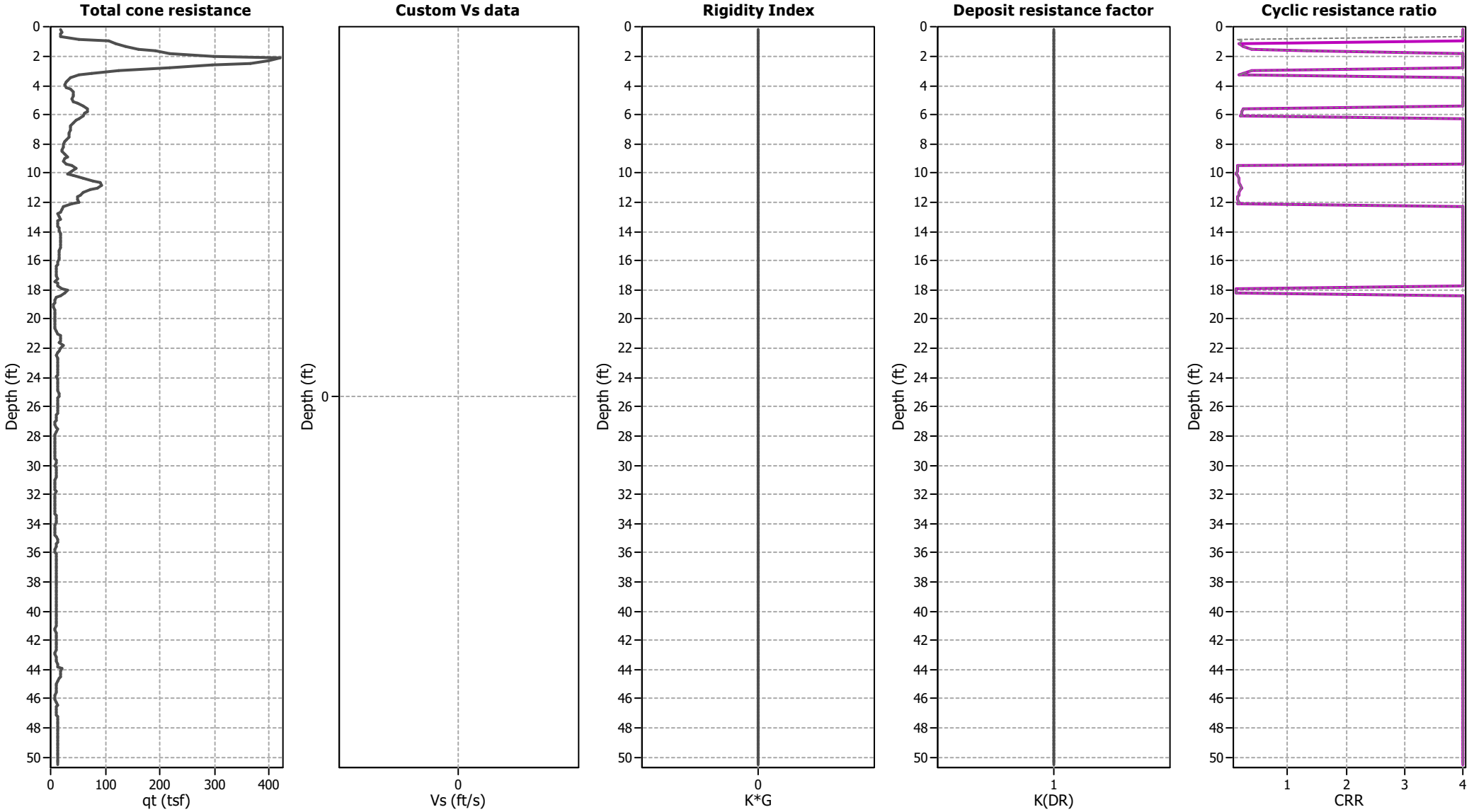
:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	17.50	9.13	12.34	112.66	3.18	0.08	0.65
47.57	18.15	9.50	12.08	114.72	3.17	0.08	0.68
47.74	18.68	9.79	11.84	115.93	3.16	0.08	0.70
47.90	18.85	9.86	11.57	114.18	3.15	0.08	0.70
48.06	18.94	9.89	11.31	111.81	3.13	0.08	0.71
48.23	18.71	9.72	11.19	108.74	3.13	0.08	0.69
48.39	18.77	9.72	11.03	107.23	3.12	0.08	0.69
48.56	18.87	9.75	11.00	107.28	3.12	0.08	0.70
48.72	19.08	9.84	10.87	107.03	3.11	0.08	0.70
48.88	19.19	9.88	10.63	105.00	3.10	0.08	0.71
49.05	19.28	9.90	10.33	102.25	3.09	0.08	0.71
49.21	19.46	9.98	9.98	99.62	3.07	0.08	0.71
49.38	19.38	9.90	9.79	96.90	3.06	0.08	0.71
49.54	18.94	9.61	9.75	93.65	3.05	0.08	0.69
49.70	18.57	9.36	9.75	91.28	3.05	0.08	0.67
49.87	18.49	9.28	9.78	90.75	3.06	0.08	0.66
50.03	19.06	9.61	54.25	521.15	4.06	0.08	0.69
50.20	19.65	9.94	54.25	539.04	4.06	0.08	0.71
50.36	20.03	10.15	54.25	550.37	4.06	0.08	0.72
50.52	20.03	10.13	54.25	549.37	4.06	0.08	0.72

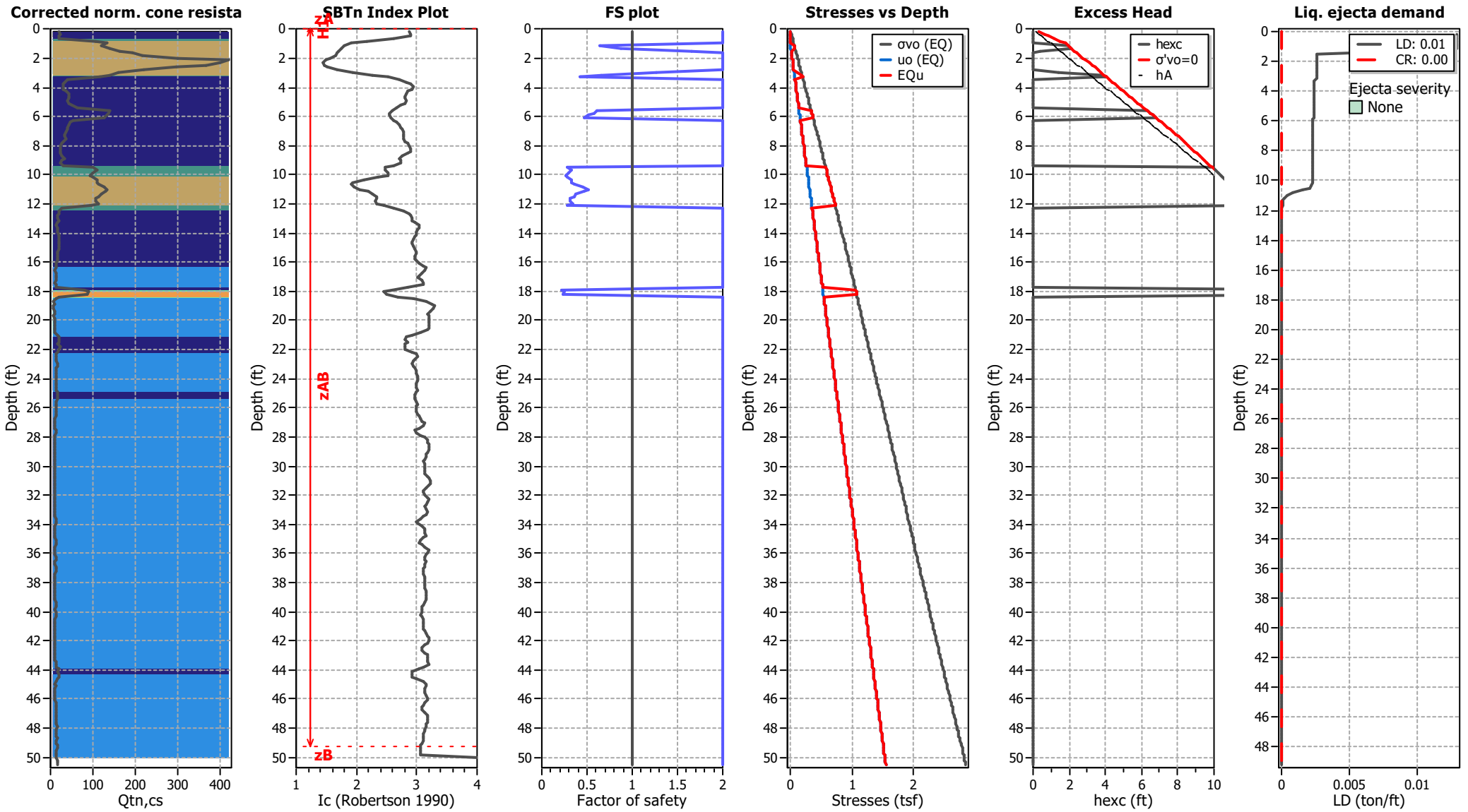
Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

Aging Calculation Estimation



Ejecta Severity Estimation



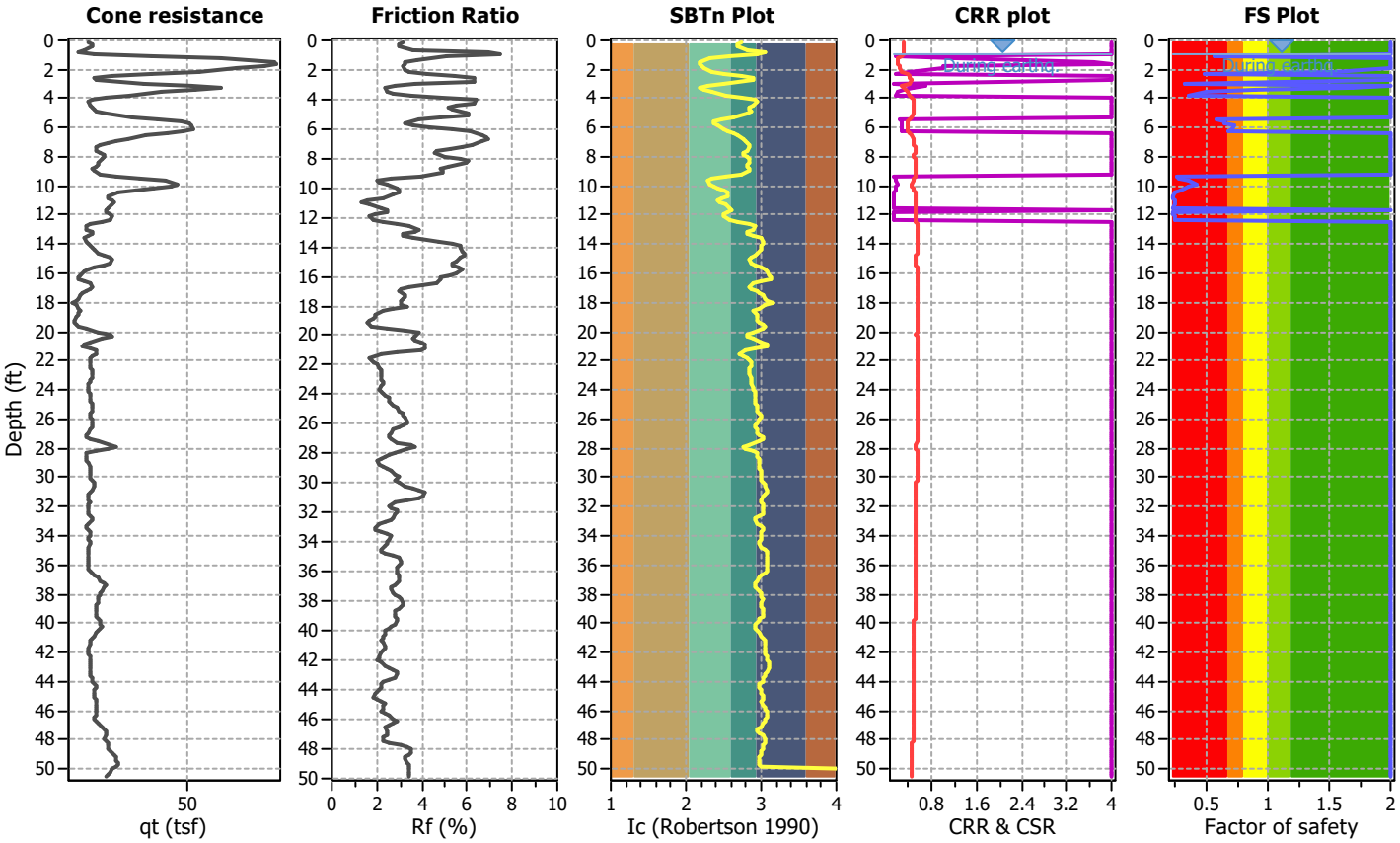
LIQUEFACTION ANALYSIS REPORT

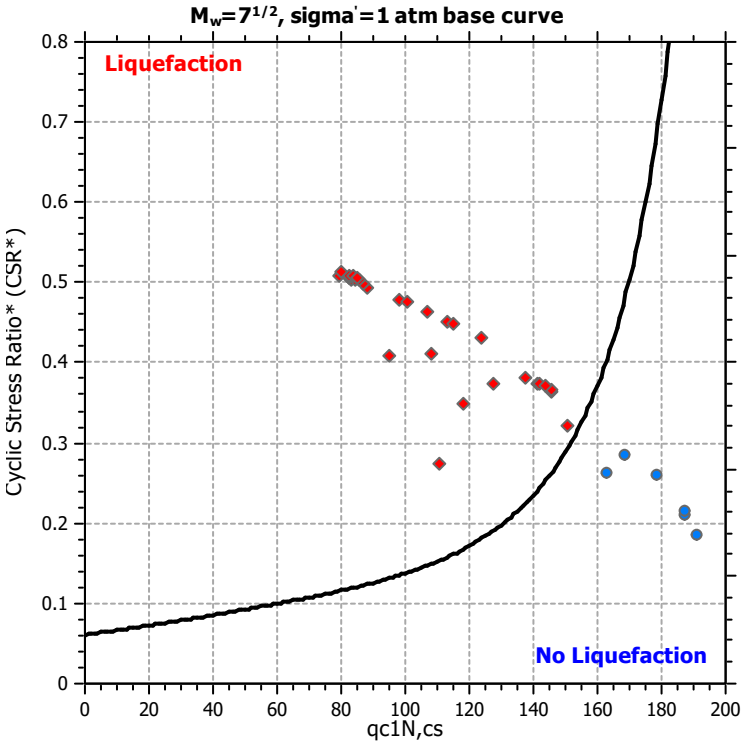
Project title : **Location :**

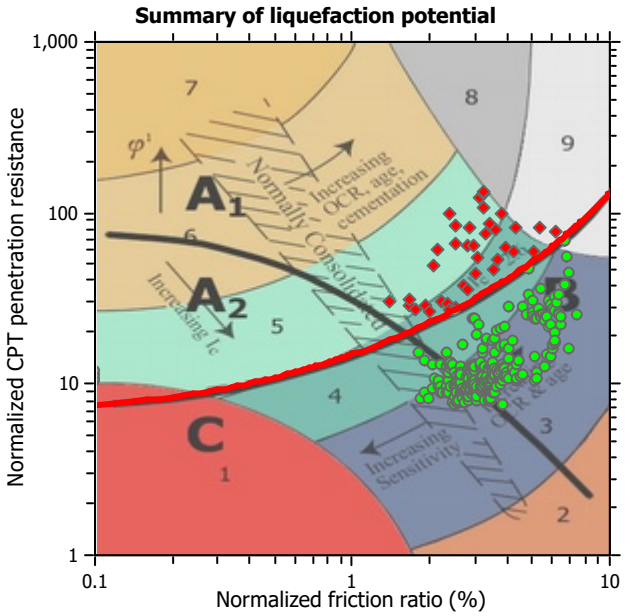
CPT file : CPT-02 - Basic

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	14.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	5.50	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.55	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

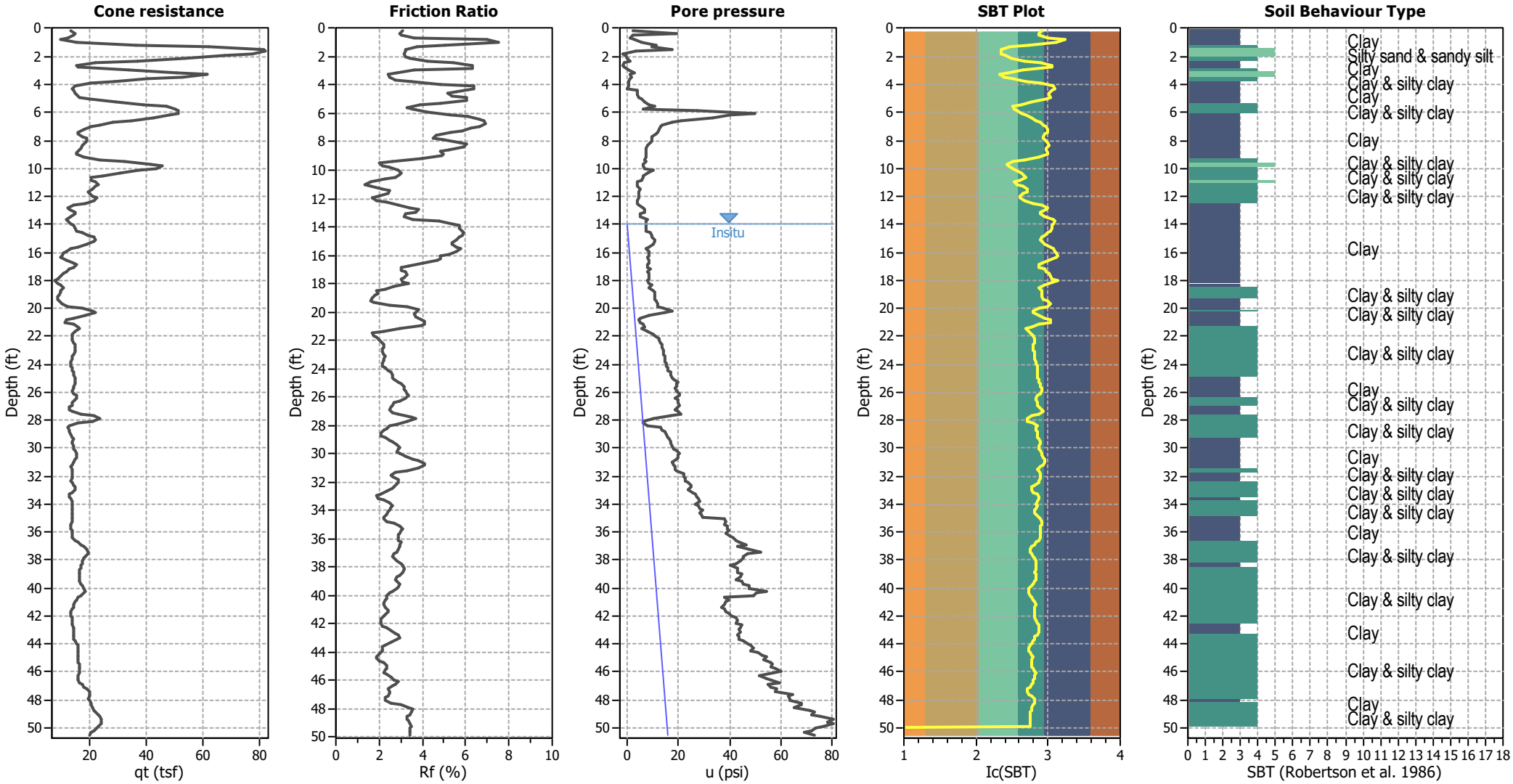






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



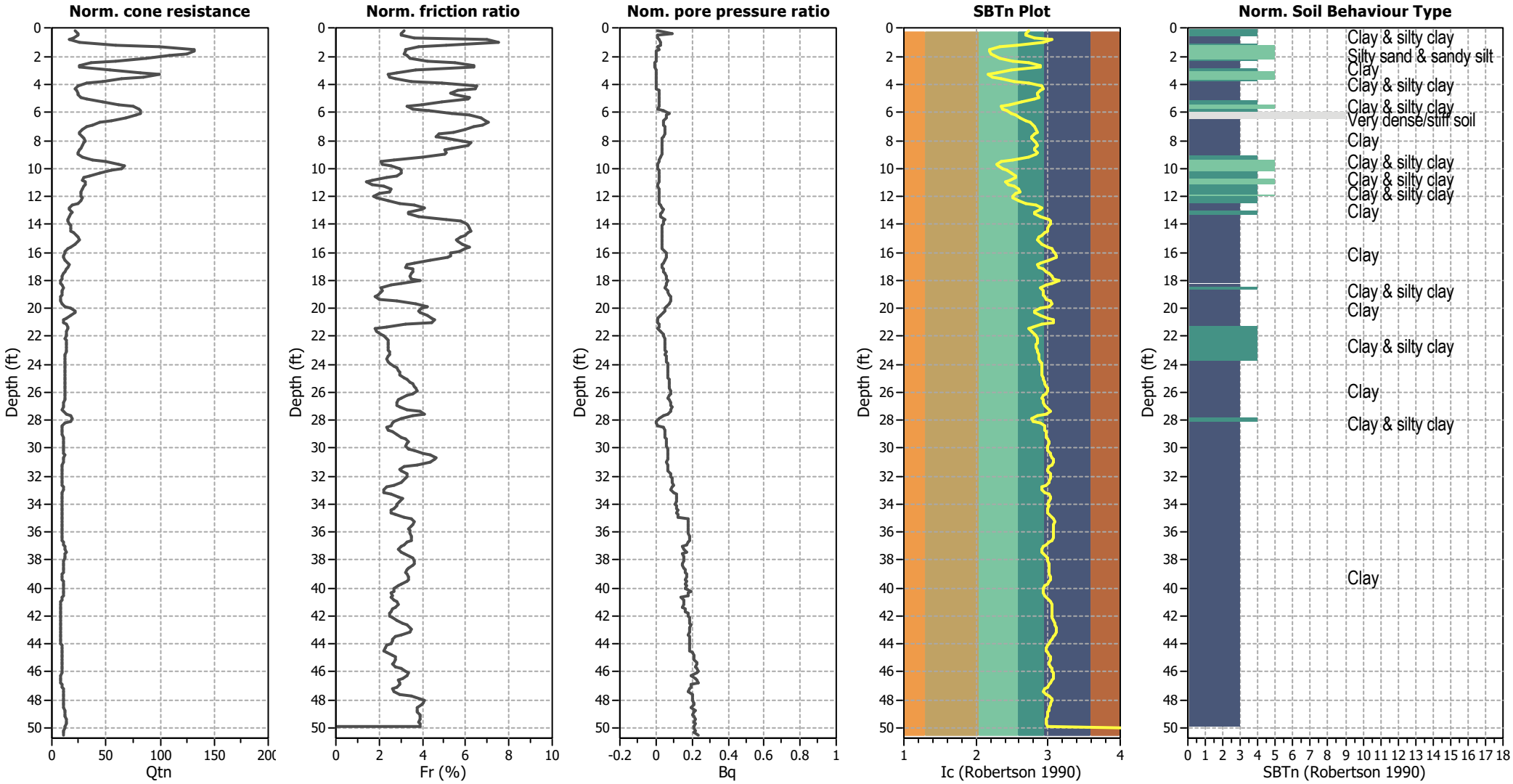
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

CPT basic interpretation plots (normalized)



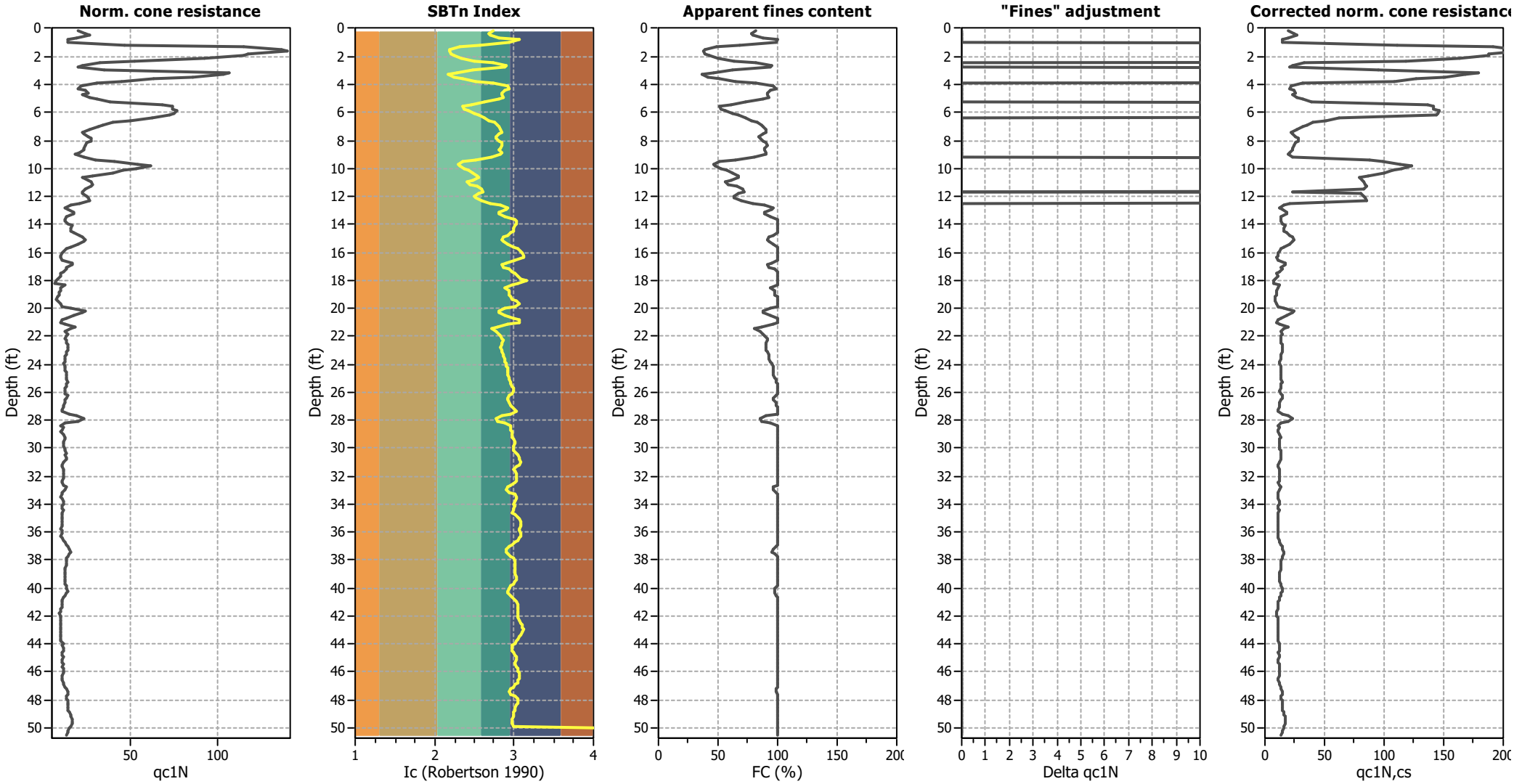
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

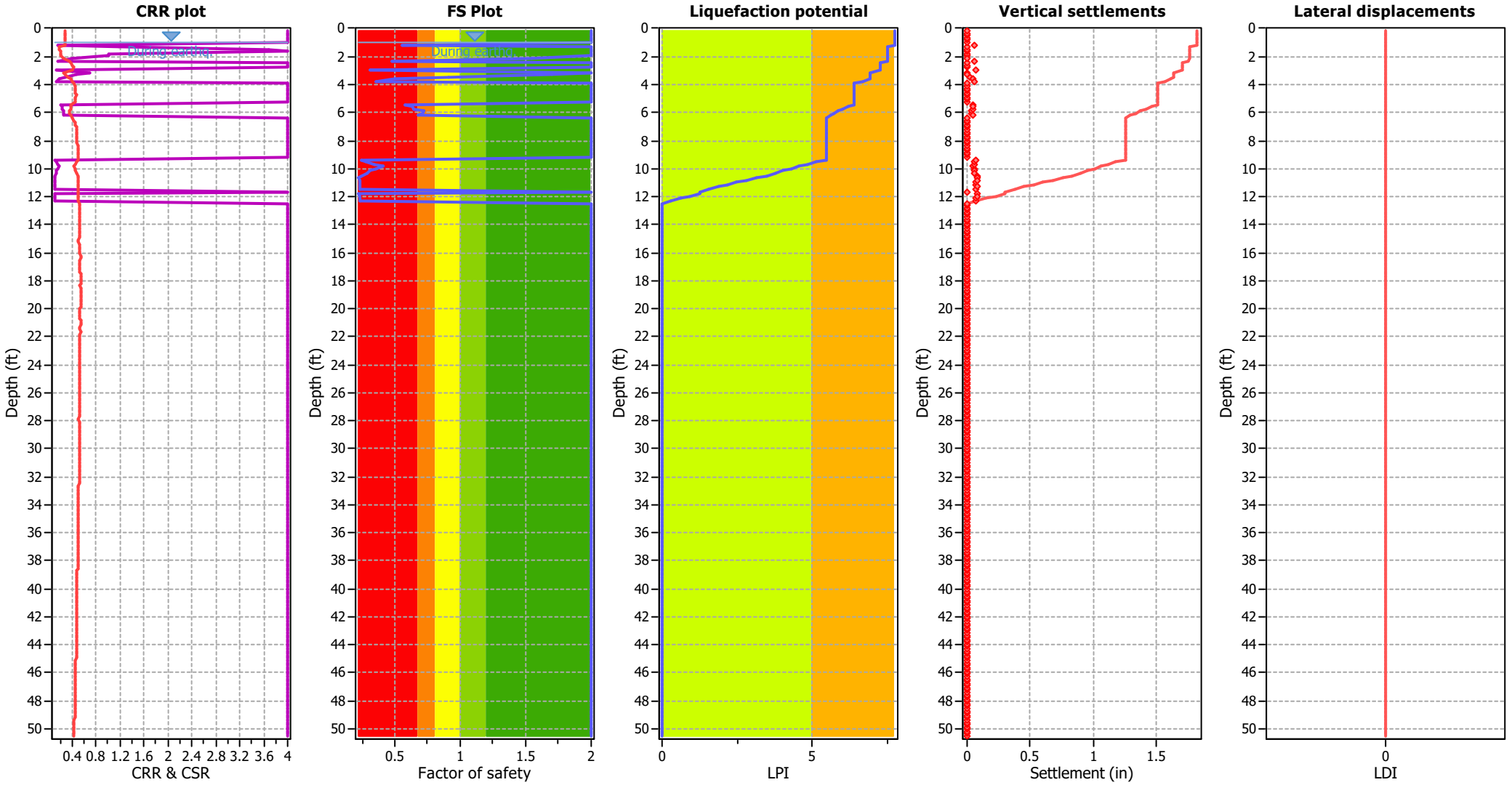
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

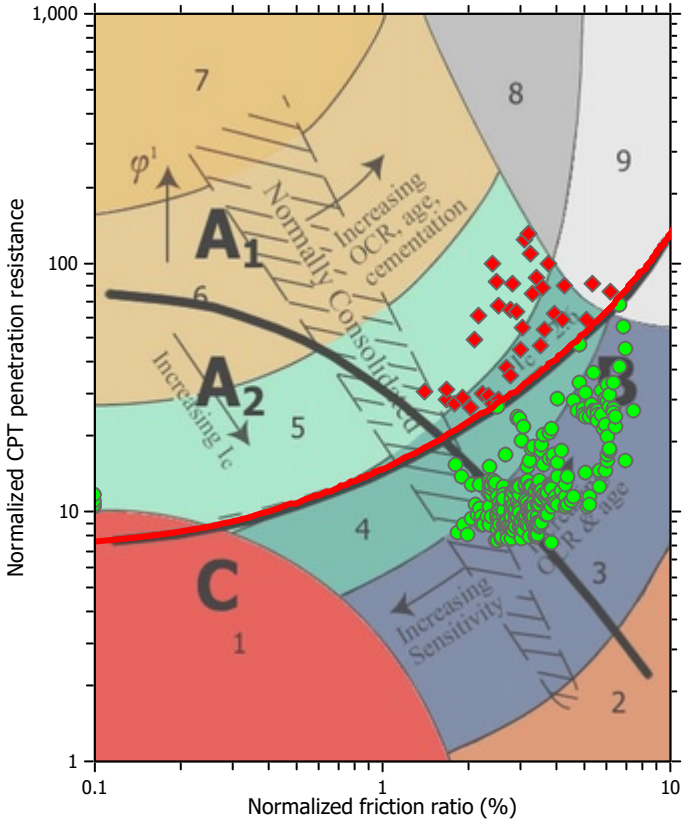
F.S. color scheme

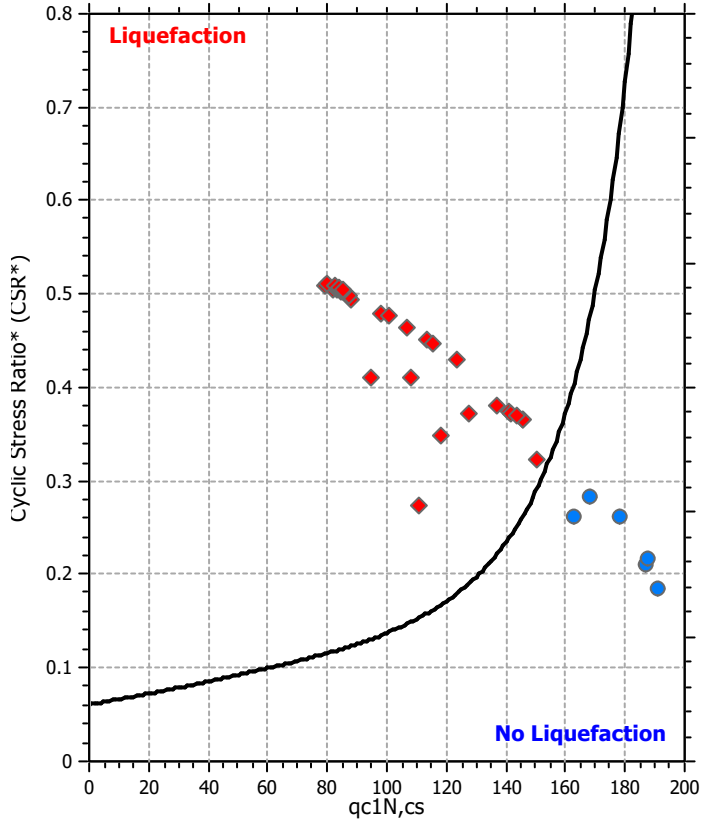
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

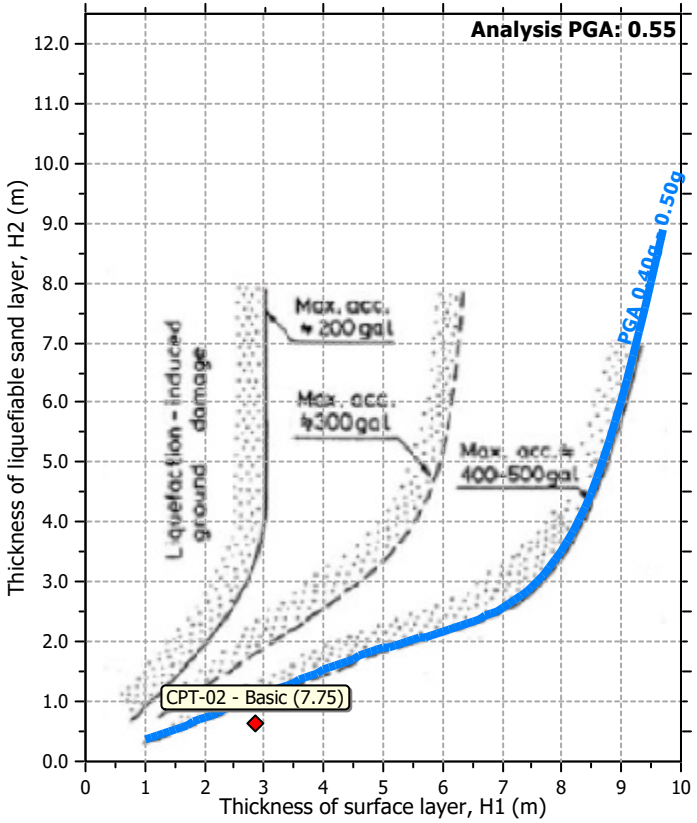
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



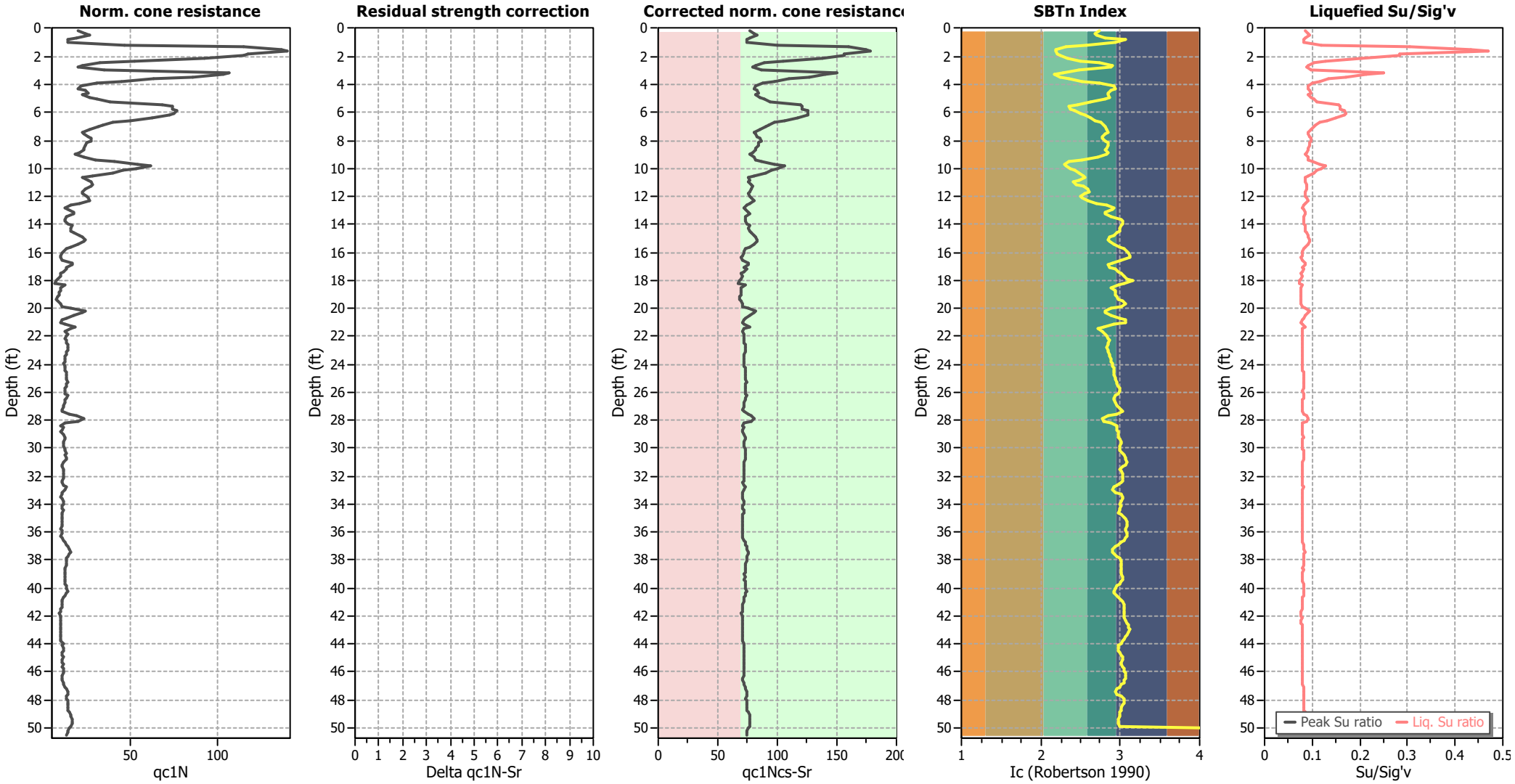




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	5.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.55	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	14.00 ft	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	12.45	0.40	2.08	42.38	110.34
2	0.33	15.47	0.47	19.42	39.96	110.97
3	0.49	16.65	0.47	2.08	40.25	110.89
4	0.66	11.94	0.39	1.04	46.27	110.71
5	0.82	9.02	0.51	2.52	62.83	113.29
6	0.98	9.11	1.20	5.69	54.71	118.26
7	1.15	29.13	1.85	11.21	33.82	123.60
8	1.31	71.62	2.53	9.72	23.41	126.63
9	1.48	85.42	2.70	17.64	18.76	128.04
10	1.64	87.31	2.61	3.29	18.74	128.13
11	1.80	73.49	2.61	-1.89	18.96	127.37
12	1.97	71.90	2.06	-0.54	20.71	126.33
13	2.13	57.72	1.94	-0.07	23.65	124.57
14	2.30	33.15	1.59	1.10	31.00	122.34
15	2.46	20.36	1.15	-1.42	42.57	119.36
16	2.62	14.08	0.94	-1.89	51.81	116.97
17	2.79	12.88	0.90	-1.44	51.10	117.33
18	2.95	22.11	1.26	0.25	30.23	120.40
19	3.12	66.52	1.54	2.82	22.01	122.59
20	3.28	64.74	1.55	1.07	18.24	123.19
21	3.44	53.81	1.35	1.67	20.23	121.96
22	3.61	39.80	1.05	0.72	24.35	120.16
23	3.77	28.31	0.97	0.59	31.73	118.62
24	3.94	19.38	1.03	0.63	42.23	117.57
25	4.10	13.91	0.97	0.14	52.81	116.75
26	4.27	12.57	0.93	-0.07	54.71	115.75
27	4.43	15.08	0.74	3.76	51.04	115.31
28	4.59	16.26	0.77	3.74	49.11	115.15
29	4.76	14.10	0.85	4.05	49.20	115.77
30	4.92	16.61	0.92	4.56	50.12	117.27
31	5.09	19.37	1.28	5.37	46.52	119.04
32	5.25	24.34	1.45	6.41	36.56	121.06
33	5.41	44.01	1.52	8.08	29.34	122.29
34	5.58	48.61	1.60	10.64	24.69	122.94
35	5.74	49.53	1.56	6.34	25.06	124.07
36	5.91	51.92	2.20	27.08	27.23	125.59
37	6.07	51.18	2.79	49.91	30.39	127.28
38	6.23	49.93	3.25	40.26	33.28	127.69
39	6.40	42.77	2.85	33.59	36.37	127.04
40	6.56	33.96	2.39	20.67	39.80	125.30
41	6.73	26.94	1.92	17.42	43.37	123.33
42	6.89	23.07	1.56	13.71	45.36	121.41
43	7.05	21.28	1.29	13.07	46.80	119.64
44	7.22	17.71	1.07	12.43	48.12	117.75
45	7.38	14.94	0.81	11.65	48.51	116.01
46	7.55	15.79	0.71	10.95	46.32	115.04
47	7.71	17.64	0.75	9.28	44.15	115.73
48	7.87	19.62	0.96	9.35	44.44	117.12

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	19.79	1.15	9.26	46.65	118.16
50	8.20	18.04	1.18	8.89	48.44	118.30
51	8.37	17.76	1.06	7.79	49.12	117.61
52	8.53	16.85	0.90	7.05	47.26	116.45
53	8.69	16.90	0.74	7.14	47.04	115.47
54	8.86	15.29	0.76	7.01	48.56	114.97
55	9.02	13.90	0.79	7.37	48.12	115.00
56	9.19	17.47	0.74	7.14	41.73	114.87
57	9.35	22.71	0.61	6.68	31.28	114.72
58	9.51	31.68	0.56	7.03	24.44	115.81
59	9.68	43.44	0.83	6.28	22.14	118.56
60	9.84	50.38	1.29	6.18	22.89	120.58
61	10.01	43.60	1.31	6.89	25.24	121.24
62	10.17	37.21	1.21	9.95	27.56	120.05
63	10.33	32.34	0.88	7.82	30.16	117.98
64	10.50	23.03	0.65	5.89	32.67	115.15
65	10.66	18.14	0.48	5.94	33.16	112.15
66	10.83	21.00	0.28	5.35	29.64	109.63
67	10.99	22.82	0.24	4.07	26.89	109.13
68	11.15	23.32	0.39	3.76	28.49	110.78
69	11.32	22.96	0.50	3.95	32.27	112.59
70	11.48	20.77	0.57	4.91	34.92	112.87
71	11.65	19.26	0.48	4.54	35.91	112.25
72	11.81	19.53	0.40	4.57	33.08	110.79
73	11.98	21.90	0.30	4.29	30.92	110.41
74	12.14	22.85	0.40	4.16	31.10	111.54
75	12.30	23.18	0.56	3.95	34.82	112.69
76	12.47	18.37	0.54	3.63	40.29	112.81
77	12.63	14.16	0.50	4.38	47.86	111.74
78	12.80	11.15	0.46	5.80	53.15	111.25
79	12.96	12.56	0.51	6.57	51.71	111.41
80	13.12	15.94	0.51	6.45	47.06	111.50
81	13.29	16.22	0.42	4.92	47.12	111.40
82	13.45	12.55	0.49	5.03	51.31	111.43
83	13.62	12.01	0.56	7.76	59.29	112.49
84	13.78	11.99	0.71	7.17	61.14	113.64
85	13.94	13.59	0.77	7.14	60.29	114.92
86	14.11	15.54	0.88	6.94	58.96	115.62
87	14.27	14.86	0.89	7.41	58.54	116.10
88	14.44	15.25	0.91	7.49	58.12	116.47
89	14.60	16.96	0.99	8.93	55.72	117.39
90	14.76	19.87	1.16	9.48	52.99	118.38
91	14.93	21.53	1.22	9.62	50.42	119.11
92	15.09	23.12	1.22	10.75	49.17	119.24
93	15.26	22.42	1.18	10.71	50.05	118.95
94	15.42	19.32	1.12	9.81	53.40	118.00
95	15.58	15.55	0.92	8.46	58.43	116.51
96	15.75	12.92	0.75	7.28	62.09	114.52

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	11.70	0.58	8.58	64.29	112.91
98	16.08	10.95	0.55	8.42	65.21	111.47
99	16.24	9.97	0.46	8.35	67.24	110.78
100	16.40	9.56	0.47	8.02	67.14	110.51
101	16.57	10.68	0.50	8.60	59.21	111.27
102	16.73	16.27	0.52	8.59	51.80	111.70
103	16.90	16.69	0.47	7.65	48.99	111.48
104	17.06	13.20	0.43	7.88	50.10	110.75
105	17.22	13.62	0.41	8.97	54.46	110.24
106	17.39	11.85	0.43	7.85	57.05	109.35
107	17.55	9.75	0.32	8.50	59.45	108.25
108	17.72	10.36	0.28	8.27	61.58	106.94
109	17.88	8.84	0.29	8.21	64.14	106.34
110	18.04	7.73	0.27	7.90	70.26	105.66
111	18.21	6.92	0.24	8.15	61.89	105.43
112	18.37	12.46	0.23	9.29	56.49	105.03
113	18.54	10.32	0.21	8.53	51.33	104.71
114	18.70	9.97	0.19	9.99	53.90	104.03
115	18.86	9.84	0.19	10.48	54.21	103.30
116	19.03	9.25	0.16	10.61	54.46	102.34
117	19.19	8.74	0.13	10.79	55.56	101.39
118	19.36	8.24	0.14	10.67	56.98	101.86
119	19.52	9.05	0.19	11.36	60.92	104.96
120	19.68	10.20	0.36	11.97	62.79	108.08
121	19.85	11.31	0.47	11.85	59.72	111.32
122	20.01	16.33	0.65	14.29	51.04	114.15
123	20.18	24.60	0.84	17.55	46.33	115.90
124	20.34	22.89	0.84	14.47	46.29	116.37
125	20.51	18.19	0.78	8.58	51.38	115.08
126	20.67	13.91	0.57	5.04	57.76	113.09
127	20.83	11.67	0.45	4.41	63.24	111.23
128	21.00	10.56	0.47	4.86	63.59	110.65
129	21.16	12.77	0.47	5.80	52.92	110.42
130	21.33	19.51	0.32	6.74	45.50	109.54
131	21.49	16.46	0.28	5.56	41.66	107.82
132	21.65	13.68	0.24	7.83	44.55	107.12
133	21.82	14.69	0.27	10.18	46.96	107.07
134	21.98	13.88	0.29	10.46	47.92	107.61
135	22.15	13.78	0.30	12.13	49.27	108.00
136	22.31	14.19	0.32	12.34	49.37	108.35
137	22.47	14.52	0.33	12.82	48.74	108.57
138	22.64	14.90	0.32	13.36	48.28	108.69
139	22.80	14.98	0.33	13.73	48.12	108.79
140	22.97	14.96	0.34	14.00	48.64	108.93
141	23.13	14.75	0.34	14.08	49.34	108.89
142	23.29	14.30	0.33	13.87	49.88	108.62
143	23.46	13.98	0.31	14.38	50.23	108.17
144	23.62	13.66	0.29	14.45	50.63	107.79

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	13.31	0.29	14.59	51.41	107.66
146	23.95	13.13	0.30	14.98	52.21	107.98
147	24.11	13.62	0.33	15.47	52.68	108.56
148	24.28	14.03	0.36	15.71	53.32	109.25
149	24.44	13.94	0.39	15.69	53.18	109.49
150	24.61	14.28	0.36	16.79	53.18	109.86
151	24.77	14.84	0.41	16.73	53.24	110.07
152	24.93	14.39	0.42	17.60	53.96	110.63
153	25.10	14.84	0.45	18.10	54.57	111.11
154	25.26	15.32	0.49	19.49	55.15	111.49
155	25.43	14.75	0.49	19.41	55.71	111.58
156	25.59	14.60	0.47	19.18	56.84	111.47
157	25.75	14.18	0.48	18.73	57.92	111.36
158	25.92	13.69	0.48	19.08	58.60	111.39
159	26.08	14.17	0.48	20.16	56.87	111.37
160	26.25	15.70	0.46	20.19	54.68	111.20
161	26.41	15.44	0.43	18.72	53.14	110.61
162	26.57	14.48	0.37	19.63	53.49	109.91
163	26.74	14.03	0.36	19.72	54.56	109.27
164	26.90	13.30	0.35	20.10	55.25	108.93
165	27.07	13.34	0.33	19.68	57.18	108.75
166	27.23	12.25	0.35	18.70	59.76	109.38
167	27.39	12.52	0.45	19.87	60.62	111.56
168	27.56	16.76	0.68	20.90	56.05	114.05
169	27.72	22.11	0.81	16.85	48.55	115.42
170	27.89	26.02	0.68	10.17	44.50	115.09
171	28.05	22.31	0.53	6.28	45.33	113.01
172	28.22	14.36	0.37	6.14	50.97	110.12
173	28.38	11.79	0.26	7.72	55.62	107.60
174	28.54	13.17	0.25	13.04	55.73	106.61
175	28.71	12.64	0.27	13.52	55.89	106.92
176	28.87	12.14	0.29	14.58	57.34	107.61
177	29.04	13.24	0.33	15.29	57.17	108.66
178	29.20	14.61	0.39	15.92	56.83	109.61
179	29.36	14.20	0.41	16.45	57.58	110.33
180	29.53	14.06	0.44	16.79	58.80	110.41
181	29.69	13.81	0.41	16.92	58.74	110.22
182	29.86	13.96	0.38	17.51	58.18	110.19
183	30.02	14.54	0.43	18.24	58.22	110.77
184	30.18	14.97	0.50	19.19	58.60	111.76
185	30.35	15.71	0.55	20.37	60.17	112.68
186	30.51	15.19	0.62	20.01	61.32	113.34
187	30.68	15.47	0.65	19.89	62.76	113.71
188	30.84	15.41	0.65	19.37	63.30	113.47
189	31.00	14.33	0.57	17.59	63.80	112.57
190	31.17	13.30	0.46	17.85	62.80	110.95
191	31.33	13.14	0.34	18.86	60.07	109.58
192	31.50	13.99	0.34	18.88	58.54	109.07

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	13.65	0.38	19.33	58.70	109.52
194	31.82	13.86	0.40	22.11	60.34	110.01
195	31.99	13.61	0.42	22.24	60.56	110.07
196	32.15	13.63	0.39	22.73	60.49	109.87
197	32.32	13.63	0.37	22.74	60.01	109.40
198	32.48	13.20	0.35	23.52	59.39	109.21
199	32.64	13.83	0.36	24.86	56.22	108.92
200	32.81	15.76	0.31	24.93	53.38	108.50
201	32.97	15.05	0.28	23.87	52.67	107.73
202	33.14	13.12	0.27	25.45	54.79	107.13
203	33.30	12.85	0.26	26.37	58.87	107.50
204	33.46	12.45	0.34	26.89	60.97	108.37
205	33.63	13.04	0.38	27.46	60.85	109.18
206	33.79	14.37	0.36	28.07	59.33	109.41
207	33.96	14.14	0.36	26.45	58.52	109.15
208	34.12	13.31	0.34	27.93	59.04	108.82
209	34.28	13.42	0.32	28.29	58.63	108.52
210	34.45	13.98	0.32	29.31	57.52	108.15
211	34.61	13.64	0.29	28.43	57.43	108.16
212	34.78	13.58	0.32	28.97	59.16	108.59
213	34.94	13.41	0.38	29.59	61.55	109.55
214	35.10	13.43	0.43	38.12	63.49	110.22
215	35.27	13.25	0.43	38.80	64.32	110.51
216	35.43	13.28	0.43	37.89	64.29	110.32
217	35.60	13.18	0.40	39.02	64.14	110.14
218	35.76	13.11	0.40	38.99	63.44	109.91
219	35.93	13.44	0.39	39.42	63.47	110.05
220	36.09	13.50	0.42	38.28	63.84	110.04
221	36.25	12.87	0.40	40.36	64.30	110.28
222	36.42	13.60	0.43	41.13	63.58	110.45
223	36.58	14.36	0.44	42.76	61.83	111.04
224	36.75	15.41	0.48	43.89	59.22	111.42
225	36.91	16.65	0.47	46.27	56.95	111.84
226	37.07	17.55	0.49	42.90	54.55	112.03
227	37.24	18.44	0.49	47.36	52.62	112.48
228	37.40	20.03	0.53	52.07	52.51	112.96
229	37.57	19.03	0.58	46.79	53.57	113.31
230	37.73	18.21	0.57	45.31	56.03	113.32
231	37.89	17.38	0.56	45.55	57.62	113.19
232	38.06	17.11	0.57	44.40	58.69	113.09
233	38.22	16.99	0.56	42.64	59.17	112.98
234	38.39	16.78	0.54	40.38	59.56	112.61
235	38.55	15.99	0.50	43.07	59.19	112.10
236	38.71	16.28	0.46	42.96	59.22	111.66
237	38.88	15.80	0.46	43.26	59.13	111.43
238	39.04	15.66	0.46	44.54	59.77	111.52
239	39.21	15.95	0.48	44.06	60.44	111.72
240	39.37	15.72	0.50	42.58	60.16	111.74

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	16.04	0.46	44.75	59.58	111.66
242	39.70	16.39	0.46	45.12	57.50	111.30
243	39.86	16.95	0.42	47.52	55.92	111.33
244	40.03	17.76	0.45	47.56	53.89	111.13
245	40.19	18.08	0.41	54.64	53.71	111.27
246	40.35	17.55	0.44	50.44	53.84	110.82
247	40.52	16.60	0.38	49.40	55.29	110.26
248	40.68	15.60	0.34	38.22	56.70	109.54
249	40.85	14.86	0.35	39.70	58.99	109.42
250	41.01	14.52	0.38	38.43	60.90	109.48
251	41.17	14.17	0.36	37.85	61.63	109.30
252	41.34	14.05	0.33	36.64	61.54	108.68
253	41.50	13.56	0.30	37.94	61.74	108.16
254	41.67	13.19	0.30	38.32	62.15	107.61
255	41.83	12.85	0.27	39.85	62.26	107.42
256	41.99	13.20	0.28	40.73	61.86	107.44
257	42.16	13.53	0.30	42.39	62.20	107.98
258	42.32	13.52	0.33	43.10	63.46	108.69
259	42.49	13.50	0.37	42.66	64.87	109.33
260	42.65	13.63	0.39	44.75	65.72	109.87
261	42.81	13.90	0.41	44.33	66.29	110.39
262	42.98	14.06	0.45	43.89	66.46	110.58
263	43.14	13.94	0.42	44.11	66.13	110.34
264	43.31	13.80	0.37	42.89	64.47	109.45
265	43.47	13.78	0.31	43.79	62.89	108.59
266	43.64	13.71	0.30	43.92	62.28	108.28
267	43.80	13.78	0.33	45.27	60.98	108.61
268	43.96	15.40	0.34	47.17	59.68	108.84
269	44.13	15.24	0.32	48.09	57.36	108.80
270	44.29	15.79	0.31	49.49	56.52	108.51
271	44.46	15.68	0.30	48.44	56.42	108.43
272	44.62	15.22	0.31	51.31	57.70	108.79
273	44.78	15.34	0.36	52.66	59.04	109.45
274	44.95	15.74	0.39	54.19	60.28	109.98
275	45.11	15.22	0.39	53.31	60.16	109.92
276	45.28	15.35	0.35	56.12	59.74	109.80
277	45.44	15.93	0.37	56.85	59.36	109.75
278	45.60	15.50	0.38	56.04	60.10	110.15
279	45.77	15.54	0.41	57.60	61.63	110.69
280	45.93	15.69	0.46	59.91	62.43	111.28
281	46.10	16.08	0.48	57.27	63.45	111.65
282	46.26	15.58	0.48	51.71	63.37	111.25
283	46.42	15.08	0.39	54.35	63.19	110.57
284	46.59	14.95	0.37	56.11	61.74	110.10
285	46.75	15.86	0.40	59.82	61.43	110.59
286	46.92	16.42	0.46	55.30	59.76	111.19
287	47.08	17.87	0.45	56.27	57.89	111.48
288	47.24	18.50	0.43	58.62	55.18	111.44

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	19.37	0.43	57.96	54.53	111.97
290	47.57	19.94	0.53	64.67	56.21	112.88
291	47.74	18.89	0.61	62.78	59.40	113.92
292	47.90	18.49	0.68	63.47	61.59	114.55
293	48.06	19.29	0.70	63.42	62.22	115.08
294	48.23	19.66	0.75	68.09	61.28	115.25
295	48.39	20.02	0.71	67.87	60.57	115.25
296	48.56	20.18	0.69	65.16	59.42	115.00
297	48.72	20.35	0.67	71.63	58.77	115.24
298	48.88	21.52	0.76	73.04	58.16	115.72
299	49.05	22.41	0.81	72.30	57.93	116.34
300	49.21	22.67	0.84	75.42	57.47	116.54
301	49.38	22.78	0.81	80.65	56.96	116.67
302	49.54	23.59	0.84	78.58	56.67	116.69
303	49.70	23.18	0.84	80.57	56.89	116.69
304	49.87	22.60	0.81	76.70	57.86	116.40
305	50.03	21.49	0.77	73.65	100.00	87.36
306	50.20	20.50	-269829.60	72.19	100.00	87.36
307	50.36	19.84	-269829.60	69.34	100.00	87.36
308	50.52	19.17	-269829.60	73.46	100.00	87.36

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.16	0.01	0.00	0.01	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.357	1.69	0.212	1.10	1.00	2.000	No
7	1.15	0.07	0.00	0.06	1.00	0.385	1.69	0.228	1.10	1.00	0.274	No
8	1.31	0.08	0.01	0.07	1.00	0.410	1.69	0.243	1.10	1.00	0.183	No
9	1.48	0.09	0.01	0.07	1.00	0.432	1.69	0.256	1.10	1.00	0.193	No
10	1.64	0.10	0.02	0.08	1.00	0.450	1.69	0.267	1.10	1.00	0.202	No
11	1.80	0.11	0.02	0.08	1.00	0.466	1.69	0.276	1.10	1.00	0.209	No
12	1.97	0.12	0.03	0.09	1.00	0.481	1.69	0.285	1.10	1.00	0.215	No
13	2.13	0.13	0.04	0.09	1.00	0.493	1.69	0.292	1.10	1.00	0.261	No
14	2.30	0.14	0.04	0.10	1.00	0.505	1.69	0.299	1.10	1.00	0.348	No
15	2.46	0.15	0.05	0.10	1.00	0.515	1.69	0.305	1.10	1.00	0.389	No
16	2.62	0.16	0.05	0.11	1.00	0.525	1.69	0.311	1.10	1.00	0.411	No
17	2.79	0.17	0.06	0.11	0.99	0.534	1.69	0.317	1.10	1.00	0.421	No
18	2.95	0.18	0.06	0.12	0.99	0.542	1.69	0.321	1.10	1.00	0.410	No
19	3.12	0.19	0.07	0.12	0.99	0.549	1.69	0.326	1.10	1.00	0.260	No
20	3.28	0.20	0.07	0.13	0.99	0.555	1.69	0.329	1.10	1.00	0.283	No
21	3.44	0.21	0.08	0.13	0.99	0.561	1.69	0.333	1.10	1.00	0.323	No
22	3.61	0.22	0.08	0.14	0.99	0.567	1.69	0.336	1.10	1.00	0.373	No
23	3.77	0.23	0.09	0.14	0.99	0.572	1.69	0.339	1.10	1.00	0.412	No
24	3.94	0.24	0.09	0.14	0.99	0.578	1.69	0.342	1.10	1.00	0.439	No
25	4.10	0.25	0.10	0.15	0.99	0.582	1.69	0.345	1.10	1.00	0.456	No
26	4.27	0.26	0.10	0.15	0.99	0.587	1.69	0.348	1.10	1.00	0.463	No
27	4.43	0.26	0.11	0.16	0.99	0.592	1.69	0.351	1.10	1.00	0.460	No
28	4.59	0.27	0.11	0.16	0.98	0.596	1.69	0.353	1.10	1.00	0.461	No
29	4.76	0.28	0.12	0.17	0.98	0.600	1.69	0.355	1.10	1.00	0.469	No
30	4.92	0.29	0.12	0.17	0.98	0.603	1.69	0.357	1.10	1.00	0.465	No
31	5.09	0.30	0.13	0.18	0.98	0.606	1.69	0.359	1.10	1.00	0.460	No
32	5.25	0.31	0.13	0.18	0.98	0.609	1.69	0.361	1.10	1.00	0.449	No
33	5.41	0.32	0.14	0.19	0.98	0.611	1.69	0.362	1.10	1.00	0.381	No
34	5.58	0.33	0.14	0.19	0.98	0.613	1.69	0.363	1.10	1.00	0.374	No
35	5.74	0.34	0.15	0.20	0.98	0.615	1.69	0.364	1.10	1.00	0.373	No
36	5.91	0.35	0.15	0.20	0.98	0.616	1.69	0.365	1.10	1.00	0.365	No
37	6.07	0.36	0.16	0.21	0.98	0.617	1.69	0.366	1.10	1.00	0.367	No
38	6.23	0.37	0.16	0.21	0.98	0.618	1.69	0.367	1.10	1.00	0.371	No
39	6.40	0.39	0.17	0.22	0.97	0.619	1.69	0.367	1.10	1.00	0.397	No
40	6.56	0.40	0.17	0.22	0.97	0.620	1.69	0.368	1.10	1.00	0.428	No
41	6.73	0.41	0.18	0.23	0.97	0.622	1.69	0.369	1.10	1.00	0.452	No
42	6.89	0.42	0.18	0.23	0.97	0.623	1.69	0.369	1.10	1.00	0.465	No
43	7.05	0.42	0.19	0.24	0.97	0.624	1.69	0.370	1.10	1.00	0.472	No
44	7.22	0.43	0.19	0.24	0.97	0.626	1.69	0.371	1.10	1.00	0.483	No
45	7.38	0.44	0.20	0.25	0.97	0.627	1.69	0.372	1.10	1.00	0.491	No
46	7.55	0.45	0.20	0.25	0.97	0.629	1.69	0.373	1.10	1.00	0.491	No
47	7.71	0.46	0.21	0.25	0.97	0.630	1.69	0.374	1.10	1.00	0.489	No
48	7.87	0.47	0.21	0.26	0.97	0.631	1.69	0.374	1.10	1.00	0.485	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.04	0.48	0.22	0.26	0.96	0.632	1.69	0.375	1.10	1.00	0.486	No
50	8.20	0.49	0.22	0.27	0.96	0.633	1.69	0.376	1.10	1.00	0.491	No
51	8.37	0.50	0.23	0.27	0.96	0.634	1.69	0.376	1.10	1.00	0.493	No
52	8.53	0.51	0.23	0.28	0.96	0.635	1.69	0.377	1.10	1.00	0.496	No
53	8.69	0.52	0.24	0.28	0.96	0.636	1.69	0.377	1.10	1.00	0.497	No
54	8.86	0.53	0.25	0.29	0.96	0.637	1.69	0.378	1.10	1.00	0.502	No
55	9.02	0.54	0.25	0.29	0.96	0.638	1.69	0.379	1.10	1.00	0.506	No
56	9.19	0.55	0.26	0.29	0.96	0.639	1.69	0.379	1.10	1.00	0.501	No
57	9.35	0.56	0.26	0.30	0.96	0.640	1.69	0.380	1.10	1.00	0.494	No
58	9.51	0.57	0.27	0.30	0.95	0.641	1.69	0.380	1.10	1.00	0.479	No
59	9.68	0.58	0.27	0.31	0.95	0.641	1.69	0.380	1.10	1.00	0.451	No
60	9.84	0.59	0.28	0.31	0.95	0.642	1.69	0.380	1.10	1.00	0.430	No
61	10.01	0.60	0.28	0.32	0.95	0.642	1.69	0.380	1.10	1.00	0.448	No
62	10.17	0.61	0.29	0.32	0.95	0.642	1.69	0.381	1.10	1.00	0.464	No
63	10.33	0.62	0.29	0.33	0.95	0.642	1.69	0.381	1.10	1.00	0.476	No
64	10.50	0.63	0.30	0.33	0.95	0.643	1.69	0.381	1.10	1.00	0.498	No
65	10.66	0.64	0.30	0.33	0.95	0.644	1.69	0.382	1.10	1.00	0.508	No
66	10.83	0.64	0.31	0.34	0.95	0.644	1.69	0.382	1.10	1.00	0.505	No
67	10.99	0.65	0.31	0.34	0.94	0.645	1.69	0.383	1.10	1.00	0.505	No
68	11.15	0.66	0.32	0.35	0.94	0.646	1.69	0.383	1.10	1.00	0.503	No
69	11.32	0.67	0.32	0.35	0.94	0.646	1.69	0.383	1.10	1.00	0.503	No
70	11.48	0.68	0.33	0.35	0.94	0.647	1.69	0.384	1.10	1.00	0.507	No
71	11.65	0.69	0.33	0.36	0.94	0.647	1.69	0.384	1.10	1.00	0.510	No
72	11.81	0.70	0.34	0.36	0.94	0.648	1.69	0.384	1.10	1.00	0.512	No
73	11.98	0.71	0.34	0.37	0.94	0.648	1.69	0.384	1.10	1.00	0.509	No
74	12.14	0.72	0.35	0.37	0.94	0.649	1.69	0.385	1.10	1.00	0.508	No
75	12.30	0.73	0.35	0.37	0.94	0.649	1.69	0.385	1.10	1.00	0.506	No
76	12.47	0.74	0.36	0.38	0.93	0.649	1.69	0.385	1.09	1.00	0.516	No
77	12.63	0.75	0.36	0.38	0.93	0.650	1.69	0.385	1.09	1.00	0.525	No
78	12.80	0.75	0.37	0.39	0.93	0.650	1.69	0.385	1.08	1.00	0.531	No
79	12.96	0.76	0.37	0.39	0.93	0.650	1.69	0.386	1.09	1.00	0.529	No
80	13.12	0.77	0.38	0.39	0.93	0.651	1.69	0.386	1.09	1.00	0.524	No
81	13.29	0.78	0.38	0.40	0.93	0.651	1.69	0.386	1.09	1.00	0.524	No
82	13.45	0.79	0.39	0.40	0.93	0.651	1.69	0.386	1.08	1.00	0.531	No
83	13.62	0.80	0.39	0.41	0.93	0.651	1.69	0.386	1.08	1.00	0.532	No
84	13.78	0.81	0.40	0.41	0.92	0.651	1.69	0.386	1.08	1.00	0.533	No
85	13.94	0.82	0.40	0.42	0.92	0.651	1.69	0.386	1.08	1.00	0.530	No
86	14.11	0.83	0.41	0.42	0.92	0.651	1.69	0.386	1.08	1.00	0.527	No
87	14.27	0.84	0.41	0.42	0.92	0.651	1.69	0.386	1.08	1.00	0.529	No
88	14.44	0.85	0.42	0.43	0.92	0.650	1.69	0.386	1.08	1.00	0.528	No
89	14.60	0.86	0.42	0.43	0.92	0.650	1.69	0.385	1.08	1.00	0.525	No
90	14.76	0.87	0.43	0.44	0.92	0.650	1.69	0.385	1.08	1.00	0.519	No
91	14.93	0.88	0.43	0.44	0.92	0.649	1.69	0.385	1.08	1.00	0.516	No
92	15.09	0.89	0.44	0.45	0.91	0.649	1.69	0.385	1.08	1.00	0.513	No
93	15.26	0.90	0.44	0.45	0.91	0.648	1.69	0.384	1.08	1.00	0.515	No
94	15.42	0.91	0.45	0.46	0.91	0.648	1.69	0.384	1.08	1.00	0.521	No
95	15.58	0.92	0.45	0.46	0.91	0.647	1.69	0.384	1.07	1.00	0.529	No
96	15.75	0.93	0.46	0.46	0.91	0.647	1.69	0.384	1.07	1.00	0.534	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	15.91	0.93	0.47	0.47	0.91	0.647	1.69	0.384	1.07	1.00	0.537	No
98	16.08	0.94	0.47	0.47	0.91	0.647	1.69	0.384	1.07	1.00	0.538	No
99	16.24	0.95	0.48	0.48	0.91	0.647	1.69	0.383	1.07	1.00	0.540	No
100	16.40	0.96	0.48	0.48	0.90	0.647	1.69	0.383	1.06	1.00	0.541	No
101	16.57	0.97	0.49	0.48	0.90	0.646	1.69	0.383	1.06	1.00	0.540	No
102	16.73	0.98	0.49	0.49	0.90	0.646	1.69	0.383	1.07	1.00	0.530	No
103	16.90	0.99	0.50	0.49	0.90	0.646	1.69	0.383	1.07	1.00	0.530	No
104	17.06	1.00	0.50	0.50	0.90	0.646	1.69	0.383	1.06	1.00	0.537	No
105	17.22	1.01	0.51	0.50	0.90	0.646	1.69	0.383	1.06	1.00	0.536	No
106	17.39	1.02	0.51	0.50	0.90	0.646	1.69	0.383	1.06	1.00	0.539	No
107	17.55	1.02	0.52	0.51	0.90	0.645	1.69	0.383	1.06	1.00	0.543	No
108	17.72	1.03	0.52	0.51	0.89	0.645	1.69	0.383	1.06	1.00	0.542	No
109	17.88	1.04	0.53	0.52	0.89	0.645	1.69	0.383	1.06	1.00	0.545	No
110	18.04	1.05	0.53	0.52	0.89	0.645	1.69	0.383	1.06	1.00	0.547	No
111	18.21	1.06	0.54	0.52	0.89	0.645	1.69	0.383	1.06	1.00	0.548	No
112	18.37	1.07	0.54	0.53	0.89	0.645	1.69	0.383	1.06	1.00	0.540	No
113	18.54	1.08	0.55	0.53	0.89	0.645	1.69	0.383	1.06	1.00	0.544	No
114	18.70	1.09	0.55	0.53	0.89	0.645	1.69	0.383	1.06	1.00	0.545	No
115	18.86	1.09	0.56	0.54	0.89	0.645	1.69	0.383	1.06	1.00	0.545	No
116	19.03	1.10	0.56	0.54	0.88	0.645	1.69	0.383	1.05	1.00	0.546	No
117	19.19	1.11	0.57	0.54	0.88	0.645	1.69	0.383	1.05	1.00	0.547	No
118	19.36	1.12	0.57	0.55	0.88	0.646	1.69	0.383	1.05	1.00	0.549	No
119	19.52	1.13	0.58	0.55	0.88	0.645	1.69	0.383	1.05	1.00	0.547	No
120	19.68	1.14	0.58	0.55	0.88	0.645	1.69	0.383	1.05	1.00	0.546	No
121	19.85	1.15	0.59	0.56	0.88	0.645	1.69	0.382	1.05	1.00	0.544	No
122	20.01	1.15	0.59	0.56	0.88	0.644	1.69	0.382	1.06	1.00	0.536	No
123	20.18	1.16	0.60	0.57	0.87	0.643	1.69	0.381	1.06	1.00	0.521	No
124	20.34	1.17	0.60	0.57	0.87	0.643	1.69	0.381	1.06	1.00	0.524	No
125	20.51	1.18	0.61	0.57	0.87	0.642	1.69	0.381	1.05	1.00	0.532	No
126	20.67	1.19	0.61	0.58	0.87	0.641	1.69	0.380	1.05	1.00	0.539	No
127	20.83	1.20	0.62	0.58	0.87	0.641	1.69	0.380	1.05	1.00	0.542	No
128	21.00	1.21	0.62	0.59	0.87	0.640	1.69	0.380	1.05	1.00	0.544	No
129	21.16	1.22	0.63	0.59	0.87	0.640	1.69	0.379	1.05	1.00	0.541	No
130	21.33	1.23	0.63	0.59	0.87	0.639	1.69	0.379	1.05	1.00	0.531	No
131	21.49	1.24	0.64	0.60	0.86	0.639	1.69	0.379	1.05	1.00	0.537	No
132	21.65	1.25	0.64	0.60	0.86	0.639	1.69	0.379	1.05	1.00	0.541	No
133	21.82	1.26	0.65	0.61	0.86	0.638	1.69	0.378	1.05	1.00	0.539	No
134	21.98	1.26	0.65	0.61	0.86	0.638	1.69	0.378	1.05	1.00	0.540	No
135	22.15	1.27	0.66	0.61	0.86	0.637	1.69	0.378	1.05	1.00	0.540	No
136	22.31	1.28	0.66	0.62	0.86	0.637	1.69	0.378	1.05	1.00	0.539	No
137	22.47	1.29	0.67	0.62	0.86	0.636	1.69	0.377	1.05	1.00	0.538	No
138	22.64	1.30	0.68	0.62	0.85	0.636	1.69	0.377	1.04	1.00	0.538	No
139	22.80	1.31	0.68	0.63	0.85	0.635	1.69	0.377	1.04	1.00	0.537	No
140	22.97	1.32	0.69	0.63	0.85	0.635	1.69	0.376	1.04	1.00	0.537	No
141	23.13	1.33	0.69	0.64	0.85	0.634	1.69	0.376	1.04	1.00	0.537	No
142	23.29	1.34	0.70	0.64	0.85	0.634	1.69	0.376	1.04	1.00	0.538	No
143	23.46	1.34	0.70	0.64	0.85	0.633	1.69	0.375	1.04	1.00	0.538	No
144	23.62	1.35	0.71	0.65	0.85	0.633	1.69	0.375	1.04	1.00	0.538	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.79	1.36	0.71	0.65	0.85	0.632	1.69	0.375	1.04	1.00	0.539	No
146	23.95	1.37	0.72	0.65	0.84	0.632	1.69	0.375	1.04	1.00	0.539	No
147	24.11	1.38	0.72	0.66	0.84	0.631	1.69	0.374	1.04	1.00	0.538	No
148	24.28	1.39	0.73	0.66	0.84	0.630	1.69	0.374	1.04	1.00	0.537	No
149	24.44	1.40	0.73	0.67	0.84	0.630	1.69	0.373	1.04	1.00	0.537	No
150	24.61	1.41	0.74	0.67	0.84	0.629	1.69	0.373	1.04	1.00	0.536	No
151	24.77	1.42	0.74	0.67	0.84	0.629	1.69	0.373	1.04	1.00	0.535	No
152	24.93	1.42	0.75	0.68	0.84	0.628	1.69	0.372	1.04	1.00	0.535	No
153	25.10	1.43	0.75	0.68	0.83	0.627	1.69	0.372	1.04	1.00	0.534	No
154	25.26	1.44	0.76	0.69	0.83	0.626	1.69	0.371	1.04	1.00	0.533	No
155	25.43	1.45	0.76	0.69	0.83	0.626	1.69	0.371	1.04	1.00	0.533	No
156	25.59	1.46	0.77	0.69	0.83	0.625	1.69	0.371	1.04	1.00	0.533	No
157	25.75	1.47	0.77	0.70	0.83	0.624	1.69	0.370	1.04	1.00	0.533	No
158	25.92	1.48	0.78	0.70	0.83	0.623	1.69	0.370	1.03	1.00	0.534	No
159	26.08	1.49	0.78	0.71	0.83	0.623	1.69	0.369	1.03	1.00	0.533	No
160	26.25	1.50	0.79	0.71	0.82	0.622	1.69	0.369	1.03	1.00	0.530	No
161	26.41	1.51	0.79	0.71	0.82	0.621	1.69	0.368	1.03	1.00	0.531	No
162	26.57	1.52	0.80	0.72	0.82	0.620	1.69	0.368	1.03	1.00	0.532	No
163	26.74	1.52	0.80	0.72	0.82	0.620	1.69	0.367	1.03	1.00	0.532	No
164	26.90	1.53	0.81	0.73	0.82	0.619	1.69	0.367	1.03	1.00	0.532	No
165	27.07	1.54	0.81	0.73	0.82	0.618	1.69	0.367	1.03	1.00	0.532	No
166	27.23	1.55	0.82	0.73	0.82	0.618	1.69	0.366	1.03	1.00	0.533	No
167	27.39	1.56	0.82	0.74	0.82	0.617	1.69	0.366	1.03	1.00	0.532	No
168	27.56	1.57	0.83	0.74	0.81	0.616	1.69	0.365	1.03	1.00	0.526	No
169	27.72	1.58	0.83	0.75	0.81	0.615	1.69	0.365	1.03	1.00	0.518	No
170	27.89	1.59	0.84	0.75	0.81	0.614	1.69	0.364	1.03	1.00	0.512	No
171	28.05	1.60	0.84	0.75	0.81	0.613	1.69	0.364	1.03	1.00	0.518	No
172	28.22	1.61	0.85	0.76	0.81	0.612	1.69	0.363	1.03	1.00	0.528	No
173	28.38	1.62	0.85	0.76	0.81	0.612	1.69	0.363	1.03	1.00	0.530	No
174	28.54	1.62	0.86	0.77	0.81	0.611	1.69	0.362	1.03	1.00	0.528	No
175	28.71	1.63	0.86	0.77	0.80	0.610	1.69	0.362	1.03	1.00	0.529	No
176	28.87	1.64	0.87	0.77	0.80	0.610	1.69	0.362	1.03	1.00	0.529	No
177	29.04	1.65	0.87	0.78	0.80	0.609	1.69	0.361	1.03	1.00	0.527	No
178	29.20	1.66	0.88	0.78	0.80	0.608	1.69	0.361	1.03	1.00	0.525	No
179	29.36	1.67	0.88	0.78	0.80	0.607	1.69	0.360	1.03	1.00	0.525	No
180	29.53	1.68	0.89	0.79	0.80	0.607	1.69	0.360	1.02	1.00	0.525	No
181	29.69	1.69	0.90	0.79	0.80	0.606	1.69	0.359	1.02	1.00	0.525	No
182	29.86	1.70	0.90	0.80	0.79	0.605	1.69	0.359	1.02	1.00	0.524	No
183	30.02	1.71	0.91	0.80	0.79	0.604	1.69	0.358	1.02	1.00	0.523	No
184	30.18	1.71	0.91	0.80	0.79	0.603	1.69	0.358	1.02	1.00	0.522	No
185	30.35	1.72	0.92	0.81	0.79	0.602	1.69	0.357	1.02	1.00	0.520	No
186	30.51	1.73	0.92	0.81	0.79	0.601	1.69	0.357	1.02	1.00	0.520	No
187	30.68	1.74	0.93	0.82	0.79	0.600	1.69	0.356	1.02	1.00	0.519	No
188	30.84	1.75	0.93	0.82	0.79	0.600	1.69	0.355	1.02	1.00	0.519	No
189	31.00	1.76	0.94	0.83	0.78	0.599	1.69	0.355	1.02	1.00	0.520	No
190	31.17	1.77	0.94	0.83	0.78	0.598	1.69	0.354	1.02	1.00	0.520	No
191	31.33	1.78	0.95	0.83	0.78	0.597	1.69	0.354	1.02	1.00	0.520	No
192	31.50	1.79	0.95	0.84	0.78	0.596	1.69	0.353	1.02	1.00	0.519	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.66	1.80	0.96	0.84	0.78	0.595	1.69	0.353	1.02	1.00	0.519	No
194	31.82	1.81	0.96	0.84	0.78	0.595	1.69	0.353	1.02	1.00	0.518	No
195	31.99	1.82	0.97	0.85	0.78	0.594	1.69	0.352	1.02	1.00	0.518	No
196	32.15	1.82	0.97	0.85	0.77	0.593	1.69	0.352	1.02	1.00	0.517	No
197	32.32	1.83	0.98	0.86	0.77	0.592	1.69	0.351	1.02	1.00	0.517	No
198	32.48	1.84	0.98	0.86	0.77	0.591	1.69	0.351	1.02	1.00	0.517	No
199	32.64	1.85	0.99	0.86	0.77	0.590	1.69	0.350	1.02	1.00	0.515	No
200	32.81	1.86	0.99	0.87	0.77	0.590	1.69	0.350	1.02	1.00	0.513	No
201	32.97	1.87	1.00	0.87	0.77	0.589	1.69	0.349	1.02	1.00	0.513	No
202	33.14	1.88	1.00	0.88	0.77	0.588	1.69	0.349	1.02	1.00	0.515	No
203	33.30	1.89	1.01	0.88	0.77	0.587	1.69	0.348	1.02	1.00	0.515	No
204	33.46	1.90	1.01	0.88	0.76	0.586	1.69	0.348	1.01	1.00	0.514	No
205	33.63	1.90	1.02	0.89	0.76	0.586	1.69	0.347	1.01	1.00	0.513	No
206	33.79	1.91	1.02	0.89	0.76	0.585	1.69	0.347	1.01	1.00	0.511	No
207	33.96	1.92	1.03	0.89	0.76	0.584	1.69	0.346	1.01	1.00	0.511	No
208	34.12	1.93	1.03	0.90	0.76	0.583	1.69	0.346	1.01	1.00	0.511	No
209	34.28	1.94	1.04	0.90	0.76	0.582	1.69	0.345	1.01	1.00	0.511	No
210	34.45	1.95	1.04	0.91	0.76	0.581	1.69	0.345	1.01	1.00	0.510	No
211	34.61	1.96	1.05	0.91	0.75	0.581	1.69	0.344	1.01	1.00	0.509	No
212	34.78	1.97	1.05	0.91	0.75	0.580	1.69	0.344	1.01	1.00	0.509	No
213	34.94	1.98	1.06	0.92	0.75	0.579	1.69	0.343	1.01	1.00	0.509	No
214	35.10	1.98	1.06	0.92	0.75	0.578	1.69	0.343	1.01	1.00	0.508	No
215	35.27	1.99	1.07	0.92	0.75	0.577	1.69	0.342	1.01	1.00	0.508	No
216	35.43	2.00	1.07	0.93	0.75	0.576	1.69	0.342	1.01	1.00	0.507	No
217	35.60	2.01	1.08	0.93	0.75	0.575	1.69	0.341	1.01	1.00	0.506	No
218	35.76	2.02	1.08	0.94	0.74	0.574	1.69	0.341	1.01	1.00	0.506	No
219	35.93	2.03	1.09	0.94	0.74	0.573	1.69	0.340	1.01	1.00	0.505	No
220	36.09	2.04	1.09	0.94	0.74	0.573	1.69	0.339	1.01	1.00	0.504	No
221	36.25	2.05	1.10	0.95	0.74	0.572	1.69	0.339	1.01	1.00	0.504	No
222	36.42	2.06	1.11	0.95	0.74	0.571	1.69	0.338	1.01	1.00	0.503	No
223	36.58	2.07	1.11	0.96	0.74	0.570	1.69	0.338	1.01	1.00	0.502	No
224	36.75	2.08	1.12	0.96	0.74	0.569	1.69	0.337	1.01	1.00	0.500	No
225	36.91	2.08	1.12	0.96	0.73	0.568	1.69	0.337	1.01	1.00	0.498	No
226	37.07	2.09	1.13	0.97	0.73	0.567	1.69	0.336	1.01	1.00	0.496	No
227	37.24	2.10	1.13	0.97	0.73	0.566	1.69	0.336	1.01	1.00	0.495	No
228	37.40	2.11	1.14	0.98	0.73	0.565	1.69	0.335	1.01	1.00	0.492	No
229	37.57	2.12	1.14	0.98	0.73	0.564	1.69	0.334	1.01	1.00	0.493	No
230	37.73	2.13	1.15	0.98	0.73	0.563	1.69	0.334	1.01	1.00	0.493	No
231	37.89	2.14	1.15	0.99	0.73	0.562	1.69	0.333	1.01	1.00	0.493	No
232	38.06	2.15	1.16	0.99	0.73	0.561	1.69	0.333	1.01	1.00	0.493	No
233	38.22	2.16	1.16	1.00	0.72	0.560	1.69	0.332	1.01	1.00	0.492	No
234	38.39	2.17	1.17	1.00	0.72	0.559	1.69	0.331	1.00	1.00	0.492	No
235	38.55	2.18	1.17	1.01	0.72	0.558	1.69	0.331	1.00	1.00	0.492	No
236	38.71	2.19	1.18	1.01	0.72	0.557	1.69	0.330	1.00	1.00	0.491	No
237	38.88	2.20	1.18	1.01	0.72	0.556	1.69	0.330	1.00	1.00	0.491	No
238	39.04	2.20	1.19	1.02	0.72	0.555	1.69	0.329	1.00	1.00	0.490	No
239	39.21	2.21	1.19	1.02	0.72	0.554	1.69	0.329	1.00	1.00	0.489	No
240	39.37	2.22	1.20	1.03	0.71	0.553	1.69	0.328	1.00	1.00	0.489	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.53	2.23	1.20	1.03	0.71	0.553	1.69	0.328	1.00	1.00	0.488	No
242	39.70	2.24	1.21	1.03	0.71	0.552	1.69	0.327	1.00	1.00	0.487	No
243	39.86	2.25	1.21	1.04	0.71	0.551	1.69	0.326	1.00	1.00	0.486	No
244	40.03	2.26	1.22	1.04	0.71	0.550	1.69	0.326	1.00	1.00	0.485	No
245	40.19	2.27	1.22	1.05	0.71	0.549	1.69	0.325	1.00	1.00	0.484	No
246	40.35	2.28	1.23	1.05	0.71	0.548	1.69	0.325	1.00	1.00	0.484	No
247	40.52	2.29	1.23	1.05	0.70	0.547	1.69	0.324	1.00	1.00	0.484	No
248	40.68	2.30	1.24	1.06	0.70	0.546	1.69	0.324	1.00	1.00	0.484	No
249	40.85	2.30	1.24	1.06	0.70	0.545	1.69	0.323	1.00	1.00	0.484	No
250	41.01	2.31	1.25	1.07	0.70	0.544	1.69	0.323	1.00	1.00	0.484	No
251	41.17	2.32	1.25	1.07	0.70	0.543	1.69	0.322	1.00	1.00	0.484	No
252	41.34	2.33	1.26	1.07	0.70	0.542	1.69	0.322	1.00	1.00	0.483	No
253	41.50	2.34	1.26	1.08	0.70	0.542	1.69	0.321	1.00	1.00	0.483	No
254	41.67	2.35	1.27	1.08	0.70	0.541	1.69	0.321	1.00	1.00	0.483	No
255	41.83	2.36	1.27	1.08	0.69	0.540	1.69	0.320	1.00	1.00	0.482	No
256	41.99	2.37	1.28	1.09	0.69	0.539	1.69	0.320	1.00	1.00	0.481	No
257	42.16	2.38	1.28	1.09	0.69	0.538	1.69	0.319	1.00	1.00	0.480	No
258	42.32	2.38	1.29	1.10	0.69	0.537	1.69	0.319	1.00	1.00	0.480	No
259	42.49	2.39	1.29	1.10	0.69	0.536	1.69	0.318	1.00	1.00	0.479	No
260	42.65	2.40	1.30	1.10	0.69	0.535	1.69	0.317	1.00	1.00	0.478	No
261	42.81	2.41	1.30	1.11	0.69	0.535	1.69	0.317	1.00	1.00	0.478	No
262	42.98	2.42	1.31	1.11	0.69	0.534	1.69	0.316	1.00	1.00	0.477	No
263	43.14	2.43	1.31	1.11	0.68	0.533	1.69	0.316	1.00	1.00	0.476	No
264	43.31	2.44	1.32	1.12	0.68	0.532	1.69	0.315	1.00	1.00	0.476	No
265	43.47	2.45	1.33	1.12	0.68	0.531	1.69	0.315	1.00	1.00	0.475	No
266	43.64	2.46	1.33	1.13	0.68	0.530	1.69	0.314	0.99	1.00	0.474	No
267	43.80	2.47	1.34	1.13	0.68	0.529	1.69	0.314	0.99	1.00	0.474	No
268	43.96	2.47	1.34	1.13	0.68	0.528	1.69	0.313	0.99	1.00	0.472	No
269	44.13	2.48	1.35	1.14	0.68	0.527	1.69	0.313	0.99	1.00	0.471	No
270	44.29	2.49	1.35	1.14	0.67	0.526	1.69	0.312	0.99	1.00	0.470	No
271	44.46	2.50	1.36	1.15	0.67	0.526	1.69	0.312	0.99	1.00	0.470	No
272	44.62	2.51	1.36	1.15	0.67	0.525	1.69	0.311	0.99	1.00	0.469	No
273	44.78	2.52	1.37	1.15	0.67	0.524	1.69	0.311	0.99	1.00	0.469	No
274	44.95	2.53	1.37	1.16	0.67	0.523	1.69	0.310	0.99	1.00	0.468	No
275	45.11	2.54	1.38	1.16	0.67	0.522	1.69	0.310	0.99	1.00	0.467	No
276	45.28	2.55	1.38	1.16	0.67	0.521	1.69	0.309	0.99	1.00	0.467	No
277	45.44	2.56	1.39	1.17	0.67	0.520	1.69	0.308	0.99	1.00	0.465	No
278	45.60	2.56	1.39	1.17	0.66	0.519	1.69	0.308	0.99	1.00	0.465	No
279	45.77	2.57	1.40	1.18	0.66	0.518	1.69	0.307	0.99	1.00	0.464	No
280	45.93	2.58	1.40	1.18	0.66	0.517	1.69	0.307	0.99	1.00	0.464	No
281	46.10	2.59	1.41	1.18	0.66	0.516	1.69	0.306	0.99	1.00	0.463	No
282	46.26	2.60	1.41	1.19	0.66	0.516	1.69	0.306	0.99	1.00	0.462	No
283	46.42	2.61	1.42	1.19	0.66	0.515	1.69	0.305	0.99	1.00	0.462	No
284	46.59	2.62	1.42	1.20	0.66	0.514	1.69	0.305	0.99	1.00	0.461	No
285	46.75	2.63	1.43	1.20	0.66	0.513	1.69	0.304	0.99	1.00	0.460	No
286	46.92	2.64	1.43	1.20	0.65	0.512	1.69	0.304	0.99	1.00	0.459	No
287	47.08	2.65	1.44	1.21	0.65	0.511	1.69	0.303	0.99	1.00	0.457	No
288	47.24	2.65	1.44	1.21	0.65	0.510	1.69	0.302	0.99	1.00	0.456	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	47.41	2.66	1.45	1.22	0.65	0.509	1.69	0.302	0.99	1.00	0.454	No
290	47.57	2.67	1.45	1.22	0.65	0.508	1.69	0.301	0.99	1.00	0.453	No
291	47.74	2.68	1.46	1.22	0.65	0.507	1.69	0.301	0.99	1.00	0.453	No
292	47.90	2.69	1.46	1.23	0.65	0.506	1.69	0.300	0.99	1.00	0.453	No
293	48.06	2.70	1.47	1.23	0.65	0.505	1.69	0.300	0.99	1.00	0.452	No
294	48.23	2.71	1.47	1.24	0.64	0.504	1.69	0.299	0.99	1.00	0.451	No
295	48.39	2.72	1.48	1.24	0.64	0.503	1.69	0.298	0.99	1.00	0.450	No
296	48.56	2.73	1.48	1.25	0.64	0.502	1.69	0.298	0.99	1.00	0.449	No
297	48.72	2.74	1.49	1.25	0.64	0.501	1.69	0.297	0.99	1.00	0.448	No
298	48.88	2.75	1.49	1.25	0.64	0.500	1.69	0.297	0.99	1.00	0.446	No
299	49.05	2.76	1.50	1.26	0.64	0.499	1.69	0.296	0.98	1.00	0.445	No
300	49.21	2.77	1.50	1.26	0.64	0.498	1.69	0.296	0.98	1.00	0.444	No
301	49.38	2.78	1.51	1.27	0.64	0.497	1.69	0.295	0.98	1.00	0.443	No
302	49.54	2.79	1.51	1.27	0.63	0.496	1.69	0.294	0.98	1.00	0.441	No
303	49.70	2.80	1.52	1.28	0.63	0.495	1.69	0.294	0.98	1.00	0.441	No
304	49.87	2.81	1.52	1.28	0.63	0.494	1.69	0.293	0.98	1.00	0.441	No
305	50.03	2.81	1.53	1.28	0.63	0.494	1.69	0.293	0.98	1.00	0.441	No
306	50.20	2.82	1.54	1.29	0.63	0.493	1.69	0.293	0.98	1.00	0.442	No
307	50.36	2.83	1.54	1.29	0.63	0.493	1.69	0.292	0.98	1.00	0.442	No
308	50.52	2.83	1.55	1.29	0.63	0.492	1.69	0.292	0.98	1.00	0.442	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.16	13.57	81.85	2.74	0.55	1.70	20.00	0.00	20.00	4.000	No	Yes	2.00
2	0.33	14.97	78.25	2.69	0.54	1.70	24.85	0.00	24.85	4.000	No	Yes	2.00
3	0.49	14.79	78.69	2.70	0.53	1.70	26.75	0.00	26.75	4.000	No	Yes	2.00
4	0.66	12.56	87.39	2.80	0.55	1.70	19.18	0.00	19.18	4.000	No	Yes	2.00
5	0.82	10.07	100.00	3.06	0.57	1.70	14.49	0.00	14.49	4.000	No	Yes	2.00
6	0.98	15.85	98.42	2.94	0.57	1.70	14.64	0.00	14.64	4.000	No	Yes	2.00
7	1.15	36.75	68.44	2.57	0.48	1.70	46.80	63.92	110.72	0.153	No	No	0.56
8	1.31	62.24	48.91	2.32	0.34	1.70	115.07	75.87	190.94	1.178	No	No	2.00
9	1.48	81.60	38.44	2.19	0.32	1.70	137.24	73.56	210.80	3.679	No	No	2.00
10	1.64	82.16	38.39	2.19	0.31	1.70	140.28	74.23	214.50	4.000	No	No	2.00
11	1.80	77.57	38.91	2.20	0.35	1.70	118.07	69.45	187.53	1.003	No	No	2.00
12	1.97	67.69	42.98	2.25	0.35	1.70	115.52	72.16	187.67	1.010	No	No	2.00
13	2.13	54.26	49.41	2.33	0.38	1.70	92.74	70.27	163.00	0.405	No	No	1.55
14	2.30	37.07	63.56	2.51	0.46	1.70	53.26	64.63	117.89	0.167	No	No	0.48
15	2.46	22.52	82.13	2.74	0.51	1.70	32.71	0.00	32.71	4.000	No	Yes	2.00
16	2.62	15.75	94.76	2.90	0.54	1.70	22.62	0.00	22.62	4.000	No	Yes	2.00
17	2.79	16.34	93.84	2.89	0.54	1.70	20.69	0.00	20.69	4.000	No	Yes	2.00
18	2.95	33.84	62.18	2.49	0.51	1.70	35.52	59.24	94.76	0.131	No	No	0.32
19	3.12	51.14	45.90	2.29	0.36	1.70	106.87	71.95	178.83	0.694	No	No	2.00
20	3.28	61.72	37.17	2.18	0.37	1.70	104.01	64.55	168.56	0.481	No	No	1.70
21	3.44	52.80	41.90	2.24	0.40	1.70	86.45	64.17	150.63	0.293	No	No	0.91
22	3.61	40.65	50.87	2.35	0.44	1.70	63.94	63.32	127.27	0.190	No	No	0.51
23	3.77	29.17	64.85	2.52	0.48	1.70	45.48	62.73	108.21	0.149	No	No	0.36
24	3.94	20.54	81.63	2.73	0.51	1.70	31.14	0.00	31.14	4.000	No	Yes	2.00
25	4.10	15.29	96.03	2.91	0.54	1.70	22.35	0.00	22.35	4.000	No	Yes	2.00
26	4.27	13.87	98.42	2.94	0.55	1.70	20.20	0.00	20.20	4.000	No	Yes	2.00
27	4.43	14.67	93.76	2.88	0.53	1.70	24.23	0.00	24.23	4.000	No	Yes	2.00
28	4.59	15.20	91.23	2.85	0.53	1.70	26.12	0.00	26.12	4.000	No	Yes	2.00
29	4.76	15.72	91.35	2.85	0.54	1.70	22.65	0.00	22.65	4.000	No	Yes	2.00
30	4.92	16.76	92.57	2.87	0.53	1.70	26.69	0.00	26.69	4.000	No	Yes	2.00
31	5.09	20.19	87.72	2.81	0.51	1.70	31.12	0.00	31.12	4.000	No	Yes	2.00
32	5.25	29.34	72.95	2.62	0.49	1.70	39.11	0.00	39.11	4.000	No	Yes	2.00
33	5.41	39.11	60.56	2.47	0.43	1.66	68.97	68.22	137.19	0.223	No	No	0.59
34	5.58	47.50	51.55	2.36	0.42	1.62	74.63	66.48	141.11	0.240	No	No	0.64
35	5.74	50.23	52.31	2.37	0.42	1.60	74.85	66.86	141.71	0.242	No	No	0.65
36	5.91	51.28	56.58	2.42	0.41	1.57	76.84	69.09	145.93	0.264	No	No	0.72
37	6.07	51.57	62.48	2.49	0.41	1.55	74.94	70.49	145.43	0.261	No	No	0.71
38	6.23	48.55	67.52	2.56	0.41	1.54	72.51	71.15	143.67	0.252	No	No	0.68
39	6.40	42.67	72.64	2.62	0.43	1.55	62.67	0.00	62.67	4.000	No	Yes	2.00
40	6.56	34.90	78.00	2.69	0.46	1.58	50.62	0.00	50.62	4.000	No	Yes	2.00
41	6.73	28.24	83.30	2.75	0.49	1.60	40.61	0.00	40.61	4.000	No	Yes	2.00
42	6.89	23.98	86.12	2.79	0.50	1.60	34.88	0.00	34.88	4.000	No	Yes	2.00
43	7.05	20.87	88.12	2.81	0.51	1.59	32.03	0.00	32.03	4.000	No	Yes	2.00
44	7.22	18.15	89.90	2.84	0.53	1.60	26.72	0.00	26.72	4.000	No	Yes	2.00
45	7.38	16.31	90.43	2.84	0.54	1.60	22.55	0.00	22.55	4.000	No	Yes	2.00
46	7.55	16.28	87.46	2.81	0.54	1.58	23.51	0.00	23.51	4.000	No	Yes	2.00
47	7.71	17.83	84.41	2.77	0.53	1.55	25.84	0.00	25.84	4.000	No	Yes	2.00
48	7.87	19.15	84.82	2.77	0.52	1.52	28.26	0.00	28.26	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.04	19.28	87.91	2.81	0.52	1.51	28.18	0.00	28.18	4.000	No	Yes	2.00
50	8.20	18.65	90.34	2.84	0.53	1.50	25.57	0.00	25.57	4.000	No	Yes	2.00
51	8.37	17.66	91.24	2.85	0.53	1.49	24.94	0.00	24.94	4.000	No	Yes	2.00
52	8.53	17.28	88.74	2.82	0.54	1.48	23.53	0.00	23.53	4.000	No	Yes	2.00
53	8.69	16.45	88.45	2.82	0.54	1.46	23.38	0.00	23.38	4.000	No	Yes	2.00
54	8.86	15.47	90.49	2.84	0.54	1.46	21.05	0.00	21.05	4.000	No	Yes	2.00
55	9.02	15.66	89.90	2.84	0.55	1.45	19.05	0.00	19.05	4.000	No	Yes	2.00
56	9.19	18.13	80.91	2.72	0.54	1.42	23.51	0.00	23.51	4.000	No	Yes	2.00
57	9.35	24.05	64.05	2.51	0.53	1.40	30.03	58.13	88.15	0.124	No	No	0.25
58	9.51	32.71	51.05	2.35	0.50	1.37	40.93	57.26	98.20	0.135	No	No	0.28
59	9.68	41.93	46.18	2.29	0.47	1.33	54.57	58.68	113.25	0.158	No	No	0.35
60	9.84	45.90	47.79	2.31	0.45	1.30	62.06	61.42	123.49	0.180	No	No	0.42
61	10.01	43.84	52.66	2.37	0.47	1.31	53.78	61.33	115.12	0.161	No	No	0.36
62	10.17	37.84	57.23	2.43	0.48	1.31	45.99	60.79	106.78	0.147	No	No	0.32
63	10.33	30.97	62.06	2.49	0.50	1.31	39.97	60.47	100.43	0.138	No	No	0.29
64	10.50	24.60	66.49	2.54	0.53	1.32	28.71	58.28	86.99	0.123	No	No	0.25
65	10.66	20.81	67.33	2.55	0.55	1.32	22.66	56.71	79.38	0.115	No	No	0.23
66	10.83	20.73	61.11	2.48	0.54	1.31	25.94	56.26	82.20	0.118	No	No	0.23
67	10.99	22.44	55.93	2.41	0.54	1.30	27.94	55.41	83.35	0.119	No	No	0.24
68	11.15	23.09	58.98	2.45	0.53	1.28	28.30	56.38	84.68	0.120	No	No	0.24
69	11.32	22.41	65.79	2.53	0.53	1.27	27.63	57.82	85.45	0.121	No	No	0.24
70	11.48	21.06	70.28	2.59	0.54	1.27	24.89	57.92	82.81	0.119	No	No	0.23
71	11.65	19.92	71.91	2.61	0.54	1.26	22.96	0.00	22.96	4.000	No	Yes	2.00
72	11.81	20.29	67.19	2.55	0.55	1.25	23.14	56.82	79.96	0.116	No	No	0.23
73	11.98	21.49	63.42	2.51	0.54	1.24	25.69	56.75	82.44	0.118	No	No	0.23
74	12.14	22.70	63.74	2.51	0.54	1.23	26.60	57.08	83.67	0.119	No	No	0.24
75	12.30	21.52	70.11	2.59	0.53	1.22	26.76	58.43	85.19	0.121	No	No	0.24
76	12.47	18.63	78.76	2.70	0.55	1.22	21.17	0.00	21.17	4.000	No	Yes	2.00
77	12.63	14.63	89.55	2.83	0.56	1.22	16.29	0.00	16.29	4.000	No	Yes	2.00
78	12.80	12.70	96.46	2.92	0.57	1.21	12.79	0.00	12.79	4.000	No	Yes	2.00
79	12.96	13.31	94.63	2.90	0.57	1.20	14.28	0.00	14.28	4.000	No	Yes	2.00
80	13.12	14.99	88.47	2.82	0.56	1.19	17.94	0.00	17.94	4.000	No	Yes	2.00
81	13.29	14.98	88.55	2.82	0.56	1.18	18.13	0.00	18.13	4.000	No	Yes	2.00
82	13.45	13.68	94.11	2.89	0.57	1.18	13.99	0.00	13.99	4.000	No	Yes	2.00
83	13.62	12.28	100.00	3.01	0.57	1.17	13.30	0.00	13.30	4.000	No	Yes	2.00
84	13.78	12.64	100.00	3.04	0.57	1.16	13.20	0.00	13.20	4.000	No	Yes	2.00
85	13.94	13.81	100.00	3.03	0.56	1.16	14.84	0.00	14.84	4.000	No	Yes	2.00
86	14.11	14.77	100.00	3.01	0.56	1.15	16.87	0.00	16.87	4.000	No	Yes	2.00
87	14.27	15.32	100.00	3.00	0.56	1.15	16.09	0.00	16.09	4.000	No	Yes	2.00
88	14.44	15.80	100.00	2.99	0.56	1.14	16.46	0.00	16.46	4.000	No	Yes	2.00
89	14.60	17.48	99.67	2.96	0.55	1.14	18.22	0.00	18.22	4.000	No	Yes	2.00
90	14.76	19.59	96.27	2.92	0.54	1.13	21.24	0.00	21.24	4.000	No	Yes	2.00
91	14.93	21.65	92.96	2.87	0.54	1.13	22.92	0.00	22.92	4.000	No	Yes	2.00
92	15.09	22.51	91.31	2.85	0.53	1.12	24.52	0.00	24.52	4.000	No	Yes	2.00
93	15.26	21.77	92.47	2.87	0.54	1.12	23.72	0.00	23.72	4.000	No	Yes	2.00
94	15.42	19.24	96.78	2.92	0.55	1.12	20.42	0.00	20.42	4.000	No	Yes	2.00
95	15.58	16.05	100.00	3.00	0.56	1.12	16.44	0.00	16.44	4.000	No	Yes	2.00
96	15.75	13.51	100.00	3.05	0.57	1.12	13.64	0.00	13.64	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	15.91	11.97	100.00	3.08	0.57	1.12	12.33	0.00	12.33	4.000	No	Yes	2.00
98	16.08	11.00	100.00	3.10	0.58	1.11	11.52	0.00	11.52	4.000	No	Yes	2.00
99	16.24	10.28	100.00	3.12	0.58	1.11	10.47	0.00	10.47	4.000	No	Yes	2.00
100	16.40	10.19	100.00	3.12	0.58	1.11	10.02	0.00	10.02	4.000	No	Yes	2.00
101	16.57	12.29	100.00	3.01	0.58	1.10	11.15	0.00	11.15	4.000	No	Yes	2.00
102	16.73	14.67	94.74	2.90	0.56	1.10	16.89	0.00	16.89	4.000	No	Yes	2.00
103	16.90	15.50	91.07	2.85	0.56	1.10	17.28	0.00	17.28	4.000	No	Yes	2.00
104	17.06	14.62	92.54	2.87	0.57	1.09	13.66	0.00	13.66	4.000	No	Yes	2.00
105	17.22	13.01	98.11	2.94	0.57	1.09	14.05	0.00	14.05	4.000	No	Yes	2.00
106	17.39	11.86	100.00	2.98	0.57	1.09	12.21	0.00	12.21	4.000	No	Yes	2.00
107	17.55	10.77	100.00	3.01	0.58	1.09	10.03	0.00	10.03	4.000	No	Yes	2.00
108	17.72	9.77	100.00	3.05	0.58	1.09	10.63	0.00	10.63	4.000	No	Yes	2.00
109	17.88	9.09	100.00	3.08	0.59	1.08	9.06	0.00	9.06	4.000	No	Yes	2.00
110	18.04	7.95	100.00	3.16	0.59	1.08	7.91	0.00	7.91	4.000	No	Yes	2.00
111	18.21	9.16	100.00	3.05	0.59	1.08	7.07	0.00	7.07	4.000	No	Yes	2.00
112	18.37	10.02	100.00	2.97	0.57	1.08	12.66	0.00	12.66	4.000	No	Yes	2.00
113	18.54	11.05	94.14	2.89	0.58	1.07	10.48	0.00	10.48	4.000	No	Yes	2.00
114	18.70	10.18	97.41	2.93	0.58	1.07	10.10	0.00	10.10	4.000	No	Yes	2.00
115	18.86	9.84	97.80	2.94	0.58	1.07	9.95	0.00	9.95	4.000	No	Yes	2.00
116	19.03	9.43	98.11	2.94	0.59	1.07	9.34	0.00	9.34	4.000	No	Yes	2.00
117	19.19	8.90	99.46	2.96	0.59	1.07	8.81	0.00	8.81	4.000	No	Yes	2.00
118	19.36	8.83	100.00	2.98	0.59	1.06	8.29	0.00	8.29	4.000	No	Yes	2.00
119	19.52	9.33	100.00	3.04	0.59	1.06	9.08	0.00	9.08	4.000	No	Yes	2.00
120	19.68	10.36	100.00	3.06	0.58	1.06	10.21	0.00	10.21	4.000	No	Yes	2.00
121	19.85	12.80	100.00	3.02	0.58	1.06	11.29	0.00	11.29	4.000	No	Yes	2.00
122	20.01	17.62	93.76	2.88	0.56	1.05	16.23	0.00	16.23	4.000	No	Yes	2.00
123	20.18	21.50	87.47	2.81	0.53	1.05	24.33	0.00	24.33	4.000	No	Yes	2.00
124	20.34	22.09	87.42	2.81	0.54	1.04	22.60	0.00	22.60	4.000	No	Yes	2.00
125	20.51	18.46	94.21	2.89	0.55	1.04	17.93	0.00	17.93	4.000	No	Yes	2.00
126	20.67	14.68	100.00	2.99	0.57	1.04	13.69	0.00	13.69	4.000	No	Yes	2.00
127	20.83	12.12	100.00	3.07	0.58	1.04	11.47	0.00	11.47	4.000	No	Yes	2.00
128	21.00	11.74	100.00	3.07	0.58	1.04	10.36	0.00	10.36	4.000	No	Yes	2.00
129	21.16	14.36	96.17	2.91	0.57	1.04	12.49	0.00	12.49	4.000	No	Yes	2.00
130	21.33	16.33	86.31	2.79	0.55	1.03	19.02	0.00	19.02	4.000	No	Yes	2.00
131	21.49	16.65	80.80	2.72	0.57	1.03	16.02	0.00	16.02	4.000	No	Yes	2.00
132	21.65	15.06	84.98	2.77	0.57	1.03	13.30	0.00	13.30	4.000	No	Yes	2.00
133	21.82	14.22	88.33	2.82	0.57	1.03	14.24	0.00	14.24	4.000	No	Yes	2.00
134	21.98	14.27	89.63	2.83	0.57	1.02	13.43	0.00	13.43	4.000	No	Yes	2.00
135	22.15	14.12	91.44	2.86	0.57	1.02	13.31	0.00	13.31	4.000	No	Yes	2.00
136	22.31	14.34	91.57	2.86	0.57	1.02	13.67	0.00	13.67	4.000	No	Yes	2.00
137	22.47	14.72	90.73	2.85	0.57	1.02	13.96	0.00	13.96	4.000	No	Yes	2.00
138	22.64	14.99	90.12	2.84	0.57	1.02	14.30	0.00	14.30	4.000	No	Yes	2.00
139	22.80	15.14	89.91	2.84	0.57	1.01	14.34	0.00	14.34	4.000	No	Yes	2.00
140	22.97	15.10	90.61	2.85	0.57	1.01	14.29	0.00	14.29	4.000	No	Yes	2.00
141	23.13	14.87	91.53	2.86	0.57	1.01	14.06	0.00	14.06	4.000	No	Yes	2.00
142	23.29	14.55	92.25	2.87	0.57	1.01	13.61	0.00	13.61	4.000	No	Yes	2.00
143	23.46	14.18	92.70	2.87	0.57	1.00	13.28	0.00	13.28	4.000	No	Yes	2.00
144	23.62	13.86	93.23	2.88	0.57	1.00	12.95	0.00	12.95	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	23.79	13.58	94.24	2.89	0.57	1.00	12.59	0.00	12.59	4.000	No	Yes	2.00
146	23.95	13.57	95.27	2.90	0.57	1.00	12.39	0.00	12.39	4.000	No	Yes	2.00
147	24.11	13.81	95.87	2.91	0.57	1.00	12.83	0.00	12.83	4.000	No	Yes	2.00
148	24.28	14.09	96.68	2.92	0.57	0.99	13.19	0.00	13.19	4.000	No	Yes	2.00
149	24.44	14.31	96.51	2.92	0.57	0.99	13.08	0.00	13.08	4.000	No	Yes	2.00
150	24.61	14.59	96.51	2.92	0.57	0.99	13.37	0.00	13.37	4.000	No	Yes	2.00
151	24.77	14.75	96.57	2.92	0.57	0.99	13.87	0.00	13.87	4.000	No	Yes	2.00
152	24.93	14.94	97.49	2.93	0.57	0.99	13.42	0.00	13.42	4.000	No	Yes	2.00
153	25.10	15.11	98.25	2.94	0.57	0.98	13.81	0.00	13.81	4.000	No	Yes	2.00
154	25.26	15.24	98.96	2.95	0.57	0.98	14.23	0.00	14.23	4.000	No	Yes	2.00
155	25.43	15.17	99.66	2.96	0.57	0.98	13.67	0.00	13.67	4.000	No	Yes	2.00
156	25.59	14.79	100.00	2.98	0.57	0.98	13.50	0.00	13.50	4.000	No	Yes	2.00
157	25.75	14.43	100.00	2.99	0.57	0.98	13.08	0.00	13.08	4.000	No	Yes	2.00
158	25.92	14.29	100.00	3.00	0.57	0.97	12.60	0.00	12.60	4.000	No	Yes	2.00
159	26.08	14.81	100.00	2.98	0.57	0.97	13.02	0.00	13.02	4.000	No	Yes	2.00
160	26.25	15.39	98.39	2.94	0.57	0.97	14.40	0.00	14.40	4.000	No	Yes	2.00
161	26.41	15.49	96.46	2.92	0.57	0.97	14.13	0.00	14.13	4.000	No	Yes	2.00
162	26.57	14.93	96.90	2.92	0.57	0.97	13.22	0.00	13.22	4.000	No	Yes	2.00
163	26.74	14.22	98.24	2.94	0.57	0.96	12.79	0.00	12.79	4.000	No	Yes	2.00
164	26.90	13.84	99.09	2.95	0.57	0.96	12.10	0.00	12.10	4.000	No	Yes	2.00
165	27.07	13.24	100.00	2.98	0.57	0.96	12.11	0.00	12.11	4.000	No	Yes	2.00
166	27.23	12.98	100.00	3.02	0.58	0.96	11.10	0.00	11.10	4.000	No	Yes	2.00
167	27.39	14.13	100.00	3.03	0.58	0.96	11.32	0.00	11.32	4.000	No	Yes	2.00
168	27.56	17.41	100.00	2.96	0.56	0.96	15.13	0.00	15.13	4.000	No	Yes	2.00
169	27.72	21.86	90.49	2.84	0.55	0.95	19.95	0.00	19.95	4.000	No	Yes	2.00
170	27.89	23.64	84.90	2.77	0.54	0.95	23.45	0.00	23.45	4.000	No	Yes	2.00
171	28.05	21.01	86.07	2.79	0.55	0.95	20.05	0.00	20.05	4.000	No	Yes	2.00
172	28.22	16.25	93.67	2.88	0.57	0.95	12.85	0.00	12.85	4.000	No	Yes	2.00
173	28.38	13.24	99.55	2.96	0.58	0.94	10.52	0.00	10.52	4.000	No	Yes	2.00
174	28.54	12.70	99.67	2.96	0.58	0.94	11.74	0.00	11.74	4.000	No	Yes	2.00
175	28.71	12.85	99.87	2.96	0.58	0.94	11.24	0.00	11.24	4.000	No	Yes	2.00
176	28.87	12.88	100.00	2.98	0.58	0.94	10.78	0.00	10.78	4.000	No	Yes	2.00
177	29.04	13.55	100.00	2.98	0.58	0.94	11.74	0.00	11.74	4.000	No	Yes	2.00
178	29.20	14.25	100.00	2.98	0.57	0.94	12.93	0.00	12.93	4.000	No	Yes	2.00
179	29.36	14.53	100.00	2.99	0.57	0.93	12.55	0.00	12.55	4.000	No	Yes	2.00
180	29.53	14.26	100.00	3.00	0.57	0.93	12.40	0.00	12.40	4.000	No	Yes	2.00
181	29.69	14.19	100.00	3.00	0.57	0.93	12.15	0.00	12.15	4.000	No	Yes	2.00
182	29.86	14.36	100.00	3.00	0.57	0.93	12.26	0.00	12.26	4.000	No	Yes	2.00
183	30.02	14.75	100.00	3.00	0.57	0.93	12.75	0.00	12.75	4.000	No	Yes	2.00
184	30.18	15.35	100.00	3.00	0.57	0.93	13.11	0.00	13.11	4.000	No	Yes	2.00
185	30.35	15.58	100.00	3.02	0.57	0.92	13.73	0.00	13.73	4.000	No	Yes	2.00
186	30.51	15.75	100.00	3.04	0.57	0.92	13.25	0.00	13.25	4.000	No	Yes	2.00
187	30.68	15.64	100.00	3.06	0.57	0.92	13.47	0.00	13.47	4.000	No	Yes	2.00
188	30.84	15.34	100.00	3.07	0.57	0.92	13.39	0.00	13.39	4.000	No	Yes	2.00
189	31.00	14.61	100.00	3.08	0.57	0.92	12.42	0.00	12.42	4.000	No	Yes	2.00
190	31.17	13.85	100.00	3.06	0.58	0.91	11.50	0.00	11.50	4.000	No	Yes	2.00
191	31.33	13.74	100.00	3.02	0.58	0.91	11.34	0.00	11.34	4.000	No	Yes	2.00
192	31.50	13.87	100.00	3.00	0.57	0.91	12.06	0.00	12.06	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	31.66	14.12	100.00	3.00	0.58	0.91	11.74	0.00	11.74	4.000	No	Yes	2.00
194	31.82	14.01	100.00	3.03	0.57	0.91	11.90	0.00	11.90	4.000	No	Yes	2.00
195	31.99	14.02	100.00	3.03	0.58	0.91	11.66	0.00	11.66	4.000	No	Yes	2.00
196	32.15	13.95	100.00	3.03	0.58	0.91	11.66	0.00	11.66	4.000	No	Yes	2.00
197	32.32	13.82	100.00	3.02	0.58	0.90	11.64	0.00	11.64	4.000	No	Yes	2.00
198	32.48	13.89	100.00	3.01	0.58	0.90	11.25	0.00	11.25	4.000	No	Yes	2.00
199	32.64	14.62	100.00	2.97	0.58	0.90	11.77	0.00	11.77	4.000	No	Yes	2.00
200	32.81	15.23	96.76	2.92	0.57	0.90	13.40	0.00	13.40	4.000	No	Yes	2.00
201	32.97	15.00	95.86	2.91	0.57	0.90	12.77	0.00	12.77	4.000	No	Yes	2.00
202	33.14	14.04	98.52	2.94	0.58	0.90	11.10	0.00	11.10	4.000	No	Yes	2.00
203	33.30	13.18	100.00	3.01	0.58	0.89	10.85	0.00	10.85	4.000	No	Yes	2.00
204	33.46	13.17	100.00	3.04	0.58	0.89	10.50	0.00	10.50	4.000	No	Yes	2.00
205	33.63	13.68	100.00	3.03	0.58	0.89	10.98	0.00	10.98	4.000	No	Yes	2.00
206	33.79	14.24	100.00	3.01	0.57	0.89	12.09	0.00	12.09	4.000	No	Yes	2.00
207	33.96	14.34	100.00	3.00	0.58	0.89	11.87	0.00	11.87	4.000	No	Yes	2.00
208	34.12	14.02	100.00	3.01	0.58	0.89	11.15	0.00	11.15	4.000	No	Yes	2.00
209	34.28	13.98	100.00	3.00	0.58	0.89	11.22	0.00	11.22	4.000	No	Yes	2.00
210	34.45	14.09	100.00	2.99	0.58	0.88	11.68	0.00	11.68	4.000	No	Yes	2.00
211	34.61	14.15	100.00	2.98	0.58	0.88	11.37	0.00	11.37	4.000	No	Yes	2.00
212	34.78	13.96	100.00	3.01	0.58	0.88	11.30	0.00	11.30	4.000	No	Yes	2.00
213	34.94	13.94	100.00	3.04	0.58	0.88	11.14	0.00	11.14	4.000	No	Yes	2.00
214	35.10	13.87	100.00	3.07	0.58	0.88	11.14	0.00	11.14	4.000	No	Yes	2.00
215	35.27	13.87	100.00	3.08	0.58	0.88	10.97	0.00	10.97	4.000	No	Yes	2.00
216	35.43	13.79	100.00	3.08	0.58	0.87	10.97	0.00	10.97	4.000	No	Yes	2.00
217	35.60	13.75	100.00	3.08	0.58	0.87	10.87	0.00	10.87	4.000	No	Yes	2.00
218	35.76	13.81	100.00	3.07	0.58	0.87	10.80	0.00	10.80	4.000	No	Yes	2.00
219	35.93	13.91	100.00	3.07	0.58	0.87	11.05	0.00	11.05	4.000	No	Yes	2.00
220	36.09	13.84	100.00	3.08	0.58	0.87	11.08	0.00	11.08	4.000	No	Yes	2.00
221	36.25	13.90	100.00	3.08	0.58	0.87	10.54	0.00	10.54	4.000	No	Yes	2.00
222	36.42	14.21	100.00	3.07	0.58	0.87	11.13	0.00	11.13	4.000	No	Yes	2.00
223	36.58	15.07	100.00	3.05	0.58	0.86	11.74	0.00	11.74	4.000	No	Yes	2.00
224	36.75	16.11	100.00	3.01	0.57	0.86	12.58	0.00	12.58	4.000	No	Yes	2.00
225	36.91	17.18	100.00	2.98	0.57	0.86	13.59	0.00	13.59	4.000	No	Yes	2.00
226	37.07	18.20	98.22	2.94	0.57	0.86	14.31	0.00	14.31	4.000	No	Yes	2.00
227	37.24	19.36	95.79	2.91	0.56	0.86	15.01	0.00	15.01	4.000	No	Yes	2.00
228	37.40	19.87	95.65	2.91	0.56	0.86	16.30	0.00	16.30	4.000	No	Yes	2.00
229	37.57	19.78	97.00	2.92	0.56	0.86	15.45	0.00	15.45	4.000	No	Yes	2.00
230	37.73	18.87	100.00	2.96	0.56	0.86	14.75	0.00	14.75	4.000	No	Yes	2.00
231	37.89	18.22	100.00	2.99	0.57	0.86	14.04	0.00	14.04	4.000	No	Yes	2.00
232	38.06	17.80	100.00	3.00	0.57	0.85	13.80	0.00	13.80	4.000	No	Yes	2.00
233	38.22	17.57	100.00	3.01	0.57	0.85	13.68	0.00	13.68	4.000	No	Yes	2.00
234	38.39	17.19	100.00	3.02	0.57	0.85	13.48	0.00	13.48	4.000	No	Yes	2.00
235	38.55	16.96	100.00	3.01	0.57	0.85	12.82	0.00	12.82	4.000	No	Yes	2.00
236	38.71	16.64	100.00	3.01	0.57	0.85	13.03	0.00	13.03	4.000	No	Yes	2.00
237	38.88	16.54	100.00	3.01	0.57	0.85	12.62	0.00	12.62	4.000	No	Yes	2.00
238	39.04	16.44	100.00	3.02	0.57	0.84	12.49	0.00	12.49	4.000	No	Yes	2.00
239	39.21	16.41	100.00	3.03	0.57	0.84	12.70	0.00	12.70	4.000	No	Yes	2.00
240	39.37	16.53	100.00	3.02	0.57	0.84	12.50	0.00	12.50	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	39.53	16.69	100.00	3.02	0.57	0.84	12.73	0.00	12.73	4.000	No	Yes	2.00
242	39.70	17.12	100.00	2.99	0.57	0.84	12.99	0.00	12.99	4.000	No	Yes	2.00
243	39.86	17.71	99.91	2.96	0.57	0.84	13.42	0.00	13.42	4.000	No	Yes	2.00
244	40.03	18.32	97.40	2.93	0.57	0.84	14.05	0.00	14.05	4.000	No	Yes	2.00
245	40.19	18.53	97.17	2.93	0.57	0.84	14.28	0.00	14.28	4.000	No	Yes	2.00
246	40.35	18.15	97.33	2.93	0.57	0.83	13.84	0.00	13.84	4.000	No	Yes	2.00
247	40.52	17.25	99.14	2.95	0.57	0.83	13.06	0.00	13.06	4.000	No	Yes	2.00
248	40.68	16.30	100.00	2.97	0.57	0.83	12.24	0.00	12.24	4.000	No	Yes	2.00
249	40.85	15.55	100.00	3.01	0.58	0.83	11.63	0.00	11.63	4.000	No	Yes	2.00
250	41.01	15.07	100.00	3.04	0.58	0.83	11.35	0.00	11.35	4.000	No	Yes	2.00
251	41.17	14.79	100.00	3.05	0.58	0.83	11.05	0.00	11.05	4.000	No	Yes	2.00
252	41.34	14.47	100.00	3.04	0.58	0.82	10.94	0.00	10.94	4.000	No	Yes	2.00
253	41.50	14.14	100.00	3.05	0.58	0.82	10.54	0.00	10.54	4.000	No	Yes	2.00
254	41.67	13.76	100.00	3.05	0.58	0.82	10.23	0.00	10.23	4.000	No	Yes	2.00
255	41.83	13.65	100.00	3.05	0.58	0.82	9.95	0.00	9.95	4.000	No	Yes	2.00
256	41.99	13.78	100.00	3.05	0.58	0.82	10.21	0.00	10.21	4.000	No	Yes	2.00
257	42.16	14.02	100.00	3.05	0.58	0.82	10.45	0.00	10.45	4.000	No	Yes	2.00
258	42.32	14.13	100.00	3.07	0.58	0.82	10.43	0.00	10.43	4.000	No	Yes	2.00
259	42.49	14.18	100.00	3.09	0.58	0.81	10.40	0.00	10.40	4.000	No	Yes	2.00
260	42.65	14.31	100.00	3.10	0.58	0.81	10.48	0.00	10.48	4.000	No	Yes	2.00
261	42.81	14.50	100.00	3.11	0.58	0.81	10.68	0.00	10.68	4.000	No	Yes	2.00
262	42.98	14.60	100.00	3.11	0.58	0.81	10.79	0.00	10.79	4.000	No	Yes	2.00
263	43.14	14.56	100.00	3.11	0.58	0.81	10.68	0.00	10.68	4.000	No	Yes	2.00
264	43.31	14.47	100.00	3.09	0.58	0.81	10.55	0.00	10.55	4.000	No	Yes	2.00
265	43.47	14.39	100.00	3.06	0.58	0.81	10.52	0.00	10.52	4.000	No	Yes	2.00
266	43.64	14.39	100.00	3.06	0.58	0.81	10.45	0.00	10.45	4.000	No	Yes	2.00
267	43.80	14.95	100.00	3.04	0.58	0.81	10.49	0.00	10.49	4.000	No	Yes	2.00
268	43.96	15.48	100.00	3.02	0.58	0.81	11.73	0.00	11.73	4.000	No	Yes	2.00
269	44.13	16.17	100.00	2.98	0.58	0.80	11.59	0.00	11.59	4.000	No	Yes	2.00
270	44.29	16.27	100.00	2.97	0.57	0.80	12.00	0.00	12.00	4.000	No	Yes	2.00
271	44.46	16.28	100.00	2.97	0.57	0.80	11.89	0.00	11.89	4.000	No	Yes	2.00
272	44.62	16.14	100.00	2.99	0.58	0.80	11.52	0.00	11.52	4.000	No	Yes	2.00
273	44.78	16.19	100.00	3.01	0.58	0.80	11.60	0.00	11.60	4.000	No	Yes	2.00
274	44.95	16.20	100.00	3.03	0.58	0.80	11.89	0.00	11.89	4.000	No	Yes	2.00
275	45.11	16.22	100.00	3.02	0.58	0.80	11.47	0.00	11.47	4.000	No	Yes	2.00
276	45.28	16.30	100.00	3.02	0.58	0.80	11.55	0.00	11.55	4.000	No	Yes	2.00
277	45.44	16.40	100.00	3.01	0.57	0.80	11.98	0.00	11.98	4.000	No	Yes	2.00
278	45.60	16.48	100.00	3.02	0.58	0.79	11.64	0.00	11.64	4.000	No	Yes	2.00
279	45.77	16.41	100.00	3.05	0.58	0.79	11.65	0.00	11.65	4.000	No	Yes	2.00
280	45.93	16.61	100.00	3.06	0.58	0.79	11.75	0.00	11.75	4.000	No	Yes	2.00
281	46.10	16.59	100.00	3.07	0.57	0.79	12.03	0.00	12.03	4.000	No	Yes	2.00
282	46.26	16.36	100.00	3.07	0.58	0.79	11.63	0.00	11.63	4.000	No	Yes	2.00
283	46.42	15.98	100.00	3.07	0.58	0.79	11.23	0.00	11.23	4.000	No	Yes	2.00
284	46.59	16.11	100.00	3.05	0.58	0.79	11.12	0.00	11.12	4.000	No	Yes	2.00
285	46.75	16.57	100.00	3.04	0.58	0.79	11.79	0.00	11.79	4.000	No	Yes	2.00
286	46.92	17.54	100.00	3.02	0.57	0.79	12.20	0.00	12.20	4.000	No	Yes	2.00
287	47.08	18.41	100.00	2.99	0.57	0.79	13.28	0.00	13.28	4.000	No	Yes	2.00
288	47.24	19.41	99.00	2.95	0.57	0.79	13.74	0.00	13.74	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	47.41	20.14	98.19	2.94	0.57	0.79	14.37	0.00	14.37	4.000	No	Yes	2.00
290	47.57	20.29	100.00	2.97	0.56	0.78	14.79	0.00	14.79	4.000	No	Yes	2.00
291	47.74	20.02	100.00	3.01	0.57	0.78	13.97	0.00	13.97	4.000	No	Yes	2.00
292	47.90	19.80	100.00	3.05	0.57	0.78	13.65	0.00	13.65	4.000	No	Yes	2.00
293	48.06	20.08	100.00	3.05	0.57	0.78	14.23	0.00	14.23	4.000	No	Yes	2.00
294	48.23	20.61	100.00	3.04	0.57	0.78	14.49	0.00	14.49	4.000	No	Yes	2.00
295	48.39	20.92	100.00	3.03	0.56	0.78	14.74	0.00	14.74	4.000	No	Yes	2.00
296	48.56	21.17	100.00	3.01	0.56	0.78	14.83	0.00	14.83	4.000	No	Yes	2.00
297	48.72	21.69	100.00	3.00	0.56	0.78	14.94	0.00	14.94	4.000	No	Yes	2.00
298	48.88	22.47	100.00	3.00	0.56	0.78	15.80	0.00	15.80	4.000	No	Yes	2.00
299	49.05	23.26	100.00	2.99	0.56	0.78	16.44	0.00	16.44	4.000	No	Yes	2.00
300	49.21	23.72	100.00	2.98	0.56	0.78	16.61	0.00	16.61	4.000	No	Yes	2.00
301	49.38	24.14	100.00	2.98	0.56	0.77	16.67	0.00	16.67	4.000	No	Yes	2.00
302	49.54	24.33	100.00	2.97	0.56	0.77	17.26	0.00	17.26	4.000	No	Yes	2.00
303	49.70	24.26	100.00	2.98	0.56	0.77	16.92	0.00	16.92	4.000	No	Yes	2.00
304	49.87	23.53	100.00	2.99	0.56	0.77	16.46	0.00	16.46	4.000	No	Yes	2.00
305	50.03	22.60	100.00	4.06	0.56	0.77	15.62	0.00	15.62	4.000	No	Yes	2.00
306	50.20	21.64	100.00	4.06	0.56	0.77	14.87	0.00	14.87	4.000	No	Yes	2.00
307	50.36	20.87	100.00	4.06	0.57	0.77	14.37	0.00	14.37	4.000	No	Yes	2.00
308	50.52	20.43	100.00	4.06	0.57	0.77	13.86	0.00	13.86	4.000	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
0.16	2.00	0.00	0.00	0.17	0.00	0.33	2.00	0.00	0.00	0.17	0.00
0.49	2.00	0.00	0.00	0.16	0.00	0.66	2.00	0.00	0.00	0.17	0.00
0.82	2.00	0.00	0.00	0.16	0.00	0.98	2.00	0.00	0.00	0.16	0.00
1.15	0.56	0.00	0.00	0.17	0.22	1.31	2.00	0.00	0.00	0.16	0.00
1.48	2.00	0.00	0.00	0.17	0.00	1.64	2.00	0.00	0.00	0.16	0.00
1.80	2.00	0.00	0.00	0.16	0.00	1.97	2.00	0.00	0.00	0.17	0.00
2.13	1.55	0.00	0.00	0.16	0.00	2.30	0.48	0.00	0.00	0.17	0.26
2.46	2.00	0.00	0.00	0.16	0.00	2.62	2.00	0.00	0.00	0.16	0.00
2.79	2.00	0.00	0.00	0.17	0.00	2.95	0.32	0.00	0.00	0.16	0.32
3.12	2.00	0.00	0.00	0.17	0.00	3.28	1.70	0.00	0.00	0.16	0.00
3.44	0.91	0.00	0.00	0.16	0.04	3.61	0.51	0.00	0.00	0.17	0.24
3.77	0.36	0.00	0.00	0.16	0.29	3.94	2.00	0.00	0.00	0.17	0.00
4.10	2.00	0.00	0.00	0.16	0.00	4.27	2.00	0.00	0.00	0.17	0.00
4.43	2.00	0.00	0.00	0.16	0.00	4.59	2.00	0.00	0.00	0.16	0.00
4.76	2.00	0.00	0.00	0.17	0.00	4.92	2.00	0.00	0.00	0.16	0.00
5.09	2.00	0.00	0.00	0.17	0.00	5.25	2.00	0.00	0.00	0.16	0.00
5.41	0.59	0.00	0.00	0.16	0.19	5.58	0.64	0.00	0.00	0.17	0.17
5.74	0.65	0.00	0.00	0.16	0.16	5.91	0.72	0.00	0.00	0.17	0.13
6.07	0.71	0.00	0.00	0.16	0.13	6.23	0.68	0.00	0.00	0.16	0.14
6.40	2.00	0.00	0.00	0.17	0.00	6.56	2.00	0.00	0.00	0.16	0.00
6.73	2.00	0.00	0.00	0.17	0.00	6.89	2.00	0.00	0.00	0.16	0.00
7.05	2.00	0.00	0.00	0.16	0.00	7.22	2.00	0.00	0.00	0.17	0.00
7.38	2.00	0.00	0.00	0.16	0.00	7.55	2.00	0.00	0.00	0.17	0.00
7.71	2.00	0.00	0.00	0.16	0.00	7.87	2.00	0.00	0.00	0.16	0.00
8.04	2.00	0.00	0.00	0.17	0.00	8.20	2.00	0.00	0.00	0.16	0.00
8.37	2.00	0.00	0.00	0.17	0.00	8.53	2.00	0.00	0.00	0.16	0.00
8.69	2.00	0.00	0.00	0.16	0.00	8.86	2.00	0.00	0.00	0.17	0.00
9.02	2.00	0.00	0.00	0.16	0.00	9.19	2.00	0.00	0.00	0.17	0.00
9.35	0.25	0.75	0.30	0.16	0.31	9.51	0.28	0.72	0.31	0.16	0.30
9.68	0.35	0.65	0.35	0.17	0.29	9.84	0.42	0.58	0.40	0.16	0.24
10.01	0.36	0.64	0.36	0.17	0.28	10.17	0.32	0.68	0.33	0.16	0.28
10.33	0.29	0.71	0.32	0.16	0.29	10.50	0.25	0.75	0.30	0.17	0.33
10.66	0.23	0.77	0.29	0.16	0.32	10.83	0.23	0.77	0.29	0.17	0.33
10.99	0.24	0.76	0.29	0.16	0.31	11.15	0.24	0.76	0.29	0.16	0.31
11.32	0.24	0.76	0.29	0.17	0.33	11.48	0.23	0.77	0.29	0.16	0.31
11.65	2.00	0.00	0.00	0.17	0.00	11.81	0.23	0.77	0.29	0.16	0.31
11.98	0.23	0.77	0.29	0.17	0.33	12.14	0.24	0.76	0.29	0.16	0.30
12.30	0.24	0.76	0.29	0.16	0.30	12.47	2.00	0.00	0.00	0.17	0.00
12.63	2.00	0.00	0.00	0.16	0.00	12.80	2.00	0.00	0.00	0.17	0.00
12.96	2.00	0.00	0.00	0.16	0.00	13.12	2.00	0.00	0.00	0.16	0.00
13.29	2.00	0.00	0.00	0.17	0.00	13.45	2.00	0.00	0.00	0.16	0.00
13.62	2.00	0.00	0.00	0.17	0.00	13.78	2.00	0.00	0.00	0.16	0.00
13.94	2.00	0.00	0.00	0.16	0.00	14.11	2.00	0.00	0.00	0.17	0.00
14.27	2.00	0.00	0.00	0.16	0.00	14.44	2.00	0.00	0.00	0.17	0.00
14.60	2.00	0.00	0.00	0.16	0.00	14.76	2.00	0.00	0.00	0.16	0.00
14.93	2.00	0.00	0.00	0.17	0.00	15.09	2.00	0.00	0.00	0.16	0.00
15.26	2.00	0.00	0.00	0.17	0.00	15.42	2.00	0.00	0.00	0.16	0.00
15.58	2.00	0.00	0.00	0.16	0.00	15.75	2.00	0.00	0.00	0.17	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
15.91	2.00	0.00	0.00	0.16	0.00	16.08	2.00	0.00	0.00	0.17	0.00
16.24	2.00	0.00	0.00	0.16	0.00	16.40	2.00	0.00	0.00	0.16	0.00
16.57	2.00	0.00	0.00	0.17	0.00	16.73	2.00	0.00	0.00	0.16	0.00
16.90	2.00	0.00	0.00	0.17	0.00	17.06	2.00	0.00	0.00	0.16	0.00
17.22	2.00	0.00	0.00	0.16	0.00	17.39	2.00	0.00	0.00	0.17	0.00
17.55	2.00	0.00	0.00	0.16	0.00	17.72	2.00	0.00	0.00	0.17	0.00
17.88	2.00	0.00	0.00	0.16	0.00	18.04	2.00	0.00	0.00	0.16	0.00
18.21	2.00	0.00	0.00	0.17	0.00	18.37	2.00	0.00	0.00	0.16	0.00
18.54	2.00	0.00	0.00	0.17	0.00	18.70	2.00	0.00	0.00	0.16	0.00
18.86	2.00	0.00	0.00	0.16	0.00	19.03	2.00	0.00	0.00	0.17	0.00
19.19	2.00	0.00	0.00	0.16	0.00	19.36	2.00	0.00	0.00	0.17	0.00
19.52	2.00	0.00	0.00	0.16	0.00	19.68	2.00	0.00	0.00	0.16	0.00
19.85	2.00	0.00	0.00	0.17	0.00	20.01	2.00	0.00	0.00	0.16	0.00
20.18	2.00	0.00	0.00	0.17	0.00	20.34	2.00	0.00	0.00	0.16	0.00
20.51	2.00	0.00	0.00	0.17	0.00	20.67	2.00	0.00	0.00	0.16	0.00
20.83	2.00	0.00	0.00	0.16	0.00	21.00	2.00	0.00	0.00	0.17	0.00
21.16	2.00	0.00	0.00	0.16	0.00	21.33	2.00	0.00	0.00	0.17	0.00
21.49	2.00	0.00	0.00	0.16	0.00	21.65	2.00	0.00	0.00	0.16	0.00
21.82	2.00	0.00	0.00	0.17	0.00	21.98	2.00	0.00	0.00	0.16	0.00
22.15	2.00	0.00	0.00	0.17	0.00	22.31	2.00	0.00	0.00	0.16	0.00
22.47	2.00	0.00	0.00	0.16	0.00	22.64	2.00	0.00	0.00	0.17	0.00
22.80	2.00	0.00	0.00	0.16	0.00	22.97	2.00	0.00	0.00	0.17	0.00
23.13	2.00	0.00	0.00	0.16	0.00	23.29	2.00	0.00	0.00	0.16	0.00
23.46	2.00	0.00	0.00	0.17	0.00	23.62	2.00	0.00	0.00	0.16	0.00
23.79	2.00	0.00	0.00	0.17	0.00	23.95	2.00	0.00	0.00	0.16	0.00
24.11	2.00	0.00	0.00	0.16	0.00	24.28	2.00	0.00	0.00	0.17	0.00
24.44	2.00	0.00	0.00	0.16	0.00	24.61	2.00	0.00	0.00	0.17	0.00
24.77	2.00	0.00	0.00	0.16	0.00	24.93	2.00	0.00	0.00	0.16	0.00
25.10	2.00	0.00	0.00	0.17	0.00	25.26	2.00	0.00	0.00	0.16	0.00
25.43	2.00	0.00	0.00	0.17	0.00	25.59	2.00	0.00	0.00	0.16	0.00
25.75	2.00	0.00	0.00	0.16	0.00	25.92	2.00	0.00	0.00	0.17	0.00
26.08	2.00	0.00	0.00	0.16	0.00	26.25	2.00	0.00	0.00	0.17	0.00
26.41	2.00	0.00	0.00	0.16	0.00	26.57	2.00	0.00	0.00	0.16	0.00
26.74	2.00	0.00	0.00	0.17	0.00	26.90	2.00	0.00	0.00	0.16	0.00
27.07	2.00	0.00	0.00	0.17	0.00	27.23	2.00	0.00	0.00	0.16	0.00
27.39	2.00	0.00	0.00	0.16	0.00	27.56	2.00	0.00	0.00	0.17	0.00
27.72	2.00	0.00	0.00	0.16	0.00	27.89	2.00	0.00	0.00	0.17	0.00
28.05	2.00	0.00	0.00	0.16	0.00	28.22	2.00	0.00	0.00	0.17	0.00
28.38	2.00	0.00	0.00	0.16	0.00	28.54	2.00	0.00	0.00	0.16	0.00
28.71	2.00	0.00	0.00	0.17	0.00	28.87	2.00	0.00	0.00	0.16	0.00
29.04	2.00	0.00	0.00	0.17	0.00	29.20	2.00	0.00	0.00	0.16	0.00
29.36	2.00	0.00	0.00	0.16	0.00	29.53	2.00	0.00	0.00	0.17	0.00
29.69	2.00	0.00	0.00	0.16	0.00	29.86	2.00	0.00	0.00	0.17	0.00
30.02	2.00	0.00	0.00	0.16	0.00	30.18	2.00	0.00	0.00	0.16	0.00
30.35	2.00	0.00	0.00	0.17	0.00	30.51	2.00	0.00	0.00	0.16	0.00
30.68	2.00	0.00	0.00	0.17	0.00	30.84	2.00	0.00	0.00	0.16	0.00
31.00	2.00	0.00	0.00	0.16	0.00	31.17	2.00	0.00	0.00	0.17	0.00
31.33	2.00	0.00	0.00	0.16	0.00	31.50	2.00	0.00	0.00	0.17	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
31.66	2.00	0.00	0.00	0.16	0.00	31.82	2.00	0.00	0.00	0.16	0.00
31.99	2.00	0.00	0.00	0.17	0.00	32.15	2.00	0.00	0.00	0.16	0.00
32.32	2.00	0.00	0.00	0.17	0.00	32.48	2.00	0.00	0.00	0.16	0.00
32.64	2.00	0.00	0.00	0.16	0.00	32.81	2.00	0.00	0.00	0.17	0.00
32.97	2.00	0.00	0.00	0.16	0.00	33.14	2.00	0.00	0.00	0.17	0.00
33.30	2.00	0.00	0.00	0.16	0.00	33.46	2.00	0.00	0.00	0.16	0.00
33.63	2.00	0.00	0.00	0.17	0.00	33.79	2.00	0.00	0.00	0.16	0.00
33.96	2.00	0.00	0.00	0.17	0.00	34.12	2.00	0.00	0.00	0.16	0.00
34.28	2.00	0.00	0.00	0.16	0.00	34.45	2.00	0.00	0.00	0.17	0.00
34.61	2.00	0.00	0.00	0.16	0.00	34.78	2.00	0.00	0.00	0.17	0.00
34.94	2.00	0.00	0.00	0.16	0.00	35.10	2.00	0.00	0.00	0.16	0.00
35.27	2.00	0.00	0.00	0.17	0.00	35.43	2.00	0.00	0.00	0.16	0.00
35.60	2.00	0.00	0.00	0.17	0.00	35.76	2.00	0.00	0.00	0.16	0.00
35.93	2.00	0.00	0.00	0.17	0.00	36.09	2.00	0.00	0.00	0.16	0.00
36.25	2.00	0.00	0.00	0.16	0.00	36.42	2.00	0.00	0.00	0.17	0.00
36.58	2.00	0.00	0.00	0.16	0.00	36.75	2.00	0.00	0.00	0.17	0.00
36.91	2.00	0.00	0.00	0.16	0.00	37.07	2.00	0.00	0.00	0.16	0.00
37.24	2.00	0.00	0.00	0.17	0.00	37.40	2.00	0.00	0.00	0.16	0.00
37.57	2.00	0.00	0.00	0.17	0.00	37.73	2.00	0.00	0.00	0.16	0.00
37.89	2.00	0.00	0.00	0.16	0.00	38.06	2.00	0.00	0.00	0.17	0.00
38.22	2.00	0.00	0.00	0.16	0.00	38.39	2.00	0.00	0.00	0.17	0.00
38.55	2.00	0.00	0.00	0.16	0.00	38.71	2.00	0.00	0.00	0.16	0.00
38.88	2.00	0.00	0.00	0.17	0.00	39.04	2.00	0.00	0.00	0.16	0.00
39.21	2.00	0.00	0.00	0.17	0.00	39.37	2.00	0.00	0.00	0.16	0.00
39.53	2.00	0.00	0.00	0.16	0.00	39.70	2.00	0.00	0.00	0.17	0.00
39.86	2.00	0.00	0.00	0.16	0.00	40.03	2.00	0.00	0.00	0.17	0.00
40.19	2.00	0.00	0.00	0.16	0.00	40.35	2.00	0.00	0.00	0.16	0.00
40.52	2.00	0.00	0.00	0.17	0.00	40.68	2.00	0.00	0.00	0.16	0.00
40.85	2.00	0.00	0.00	0.17	0.00	41.01	2.00	0.00	0.00	0.16	0.00
41.17	2.00	0.00	0.00	0.16	0.00	41.34	2.00	0.00	0.00	0.17	0.00
41.50	2.00	0.00	0.00	0.16	0.00	41.67	2.00	0.00	0.00	0.17	0.00
41.83	2.00	0.00	0.00	0.16	0.00	41.99	2.00	0.00	0.00	0.16	0.00
42.16	2.00	0.00	0.00	0.17	0.00	42.32	2.00	0.00	0.00	0.16	0.00
42.49	2.00	0.00	0.00	0.17	0.00	42.65	2.00	0.00	0.00	0.16	0.00
42.81	2.00	0.00	0.00	0.16	0.00	42.98	2.00	0.00	0.00	0.17	0.00
43.14	2.00	0.00	0.00	0.16	0.00	43.31	2.00	0.00	0.00	0.17	0.00
43.47	2.00	0.00	0.00	0.16	0.00	43.64	2.00	0.00	0.00	0.17	0.00
43.80	2.00	0.00	0.00	0.16	0.00	43.96	2.00	0.00	0.00	0.16	0.00
44.13	2.00	0.00	0.00	0.17	0.00	44.29	2.00	0.00	0.00	0.16	0.00
44.46	2.00	0.00	0.00	0.17	0.00	44.62	2.00	0.00	0.00	0.16	0.00
44.78	2.00	0.00	0.00	0.16	0.00	44.95	2.00	0.00	0.00	0.17	0.00
45.11	2.00	0.00	0.00	0.16	0.00	45.28	2.00	0.00	0.00	0.17	0.00
45.44	2.00	0.00	0.00	0.16	0.00	45.60	2.00	0.00	0.00	0.16	0.00
45.77	2.00	0.00	0.00	0.17	0.00	45.93	2.00	0.00	0.00	0.16	0.00
46.10	2.00	0.00	0.00	0.17	0.00	46.26	2.00	0.00	0.00	0.16	0.00
46.42	2.00	0.00	0.00	0.16	0.00	46.59	2.00	0.00	0.00	0.17	0.00
46.75	2.00	0.00	0.00	0.16	0.00	46.92	2.00	0.00	0.00	0.17	0.00
47.08	2.00	0.00	0.00	0.16	0.00	47.24	2.00	0.00	0.00	0.16	0.00

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}	Depth (ft)	FS	m(FS)	H_1*m(FS)	d_z	LPI_{ISH}
47.41	2.00	0.00	0.00	0.17	0.00	47.57	2.00	0.00	0.00	0.16	0.00
47.74	2.00	0.00	0.00	0.17	0.00	47.90	2.00	0.00	0.00	0.16	0.00
48.06	2.00	0.00	0.00	0.16	0.00	48.23	2.00	0.00	0.00	0.17	0.00
48.39	2.00	0.00	0.00	0.16	0.00	48.56	2.00	0.00	0.00	0.17	0.00
48.72	2.00	0.00	0.00	0.16	0.00	48.88	2.00	0.00	0.00	0.16	0.00
49.05	2.00	0.00	0.00	0.17	0.00	49.21	2.00	0.00	0.00	0.16	0.00
49.38	2.00	0.00	0.00	0.17	0.00	49.54	2.00	0.00	0.00	0.16	0.00
49.70	2.00	0.00	0.00	0.16	0.00	49.87	2.00	0.00	0.00	0.17	0.00
50.03	2.00	0.00	0.00	0.16	0.00	50.20	2.00	0.00	0.00	0.17	0.00
50.36	2.00	0.00	0.00	0.16	0.00	50.52	2.00	0.00	0.00	0.16	0.00

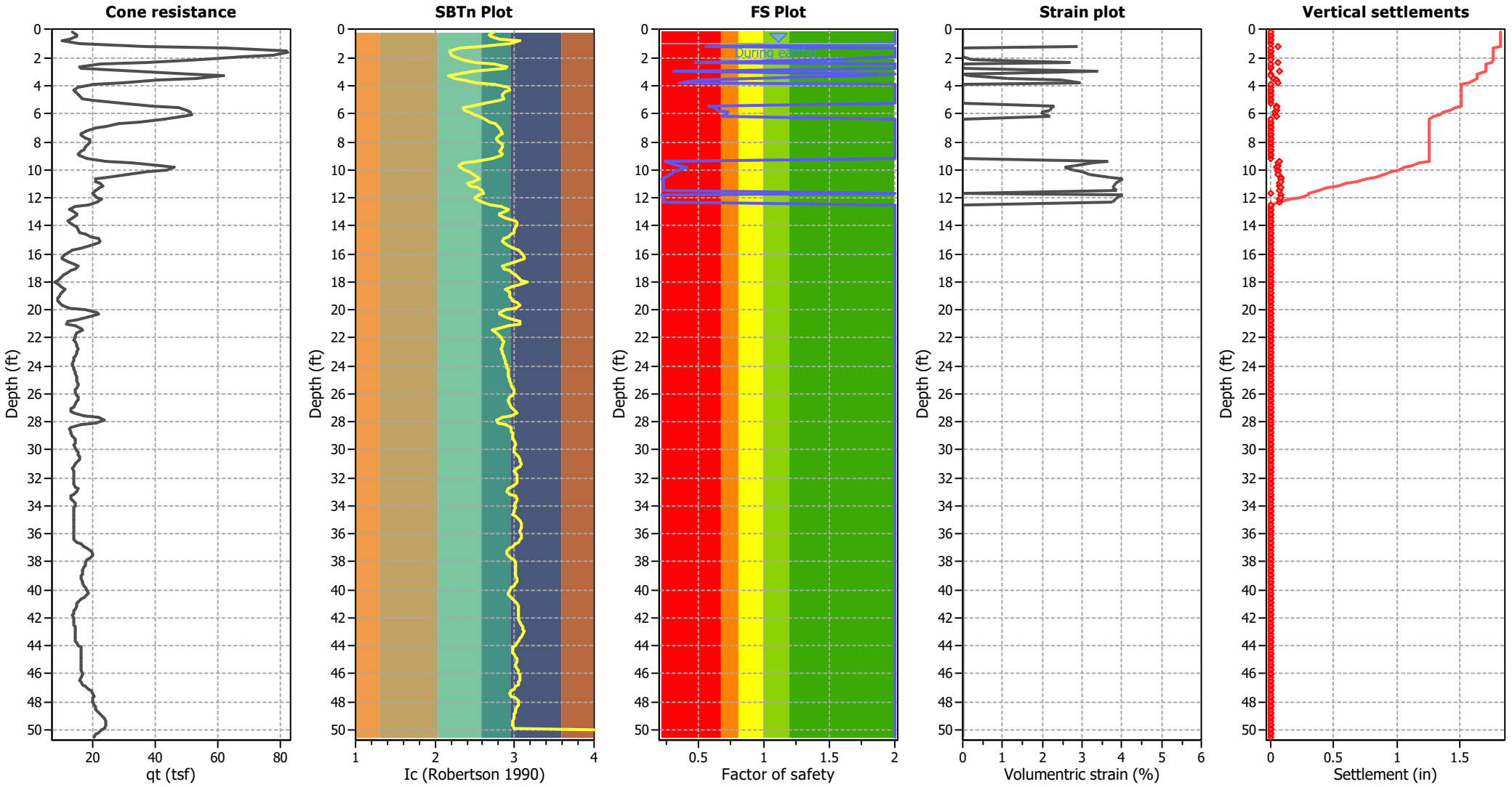
Overall liquefaction potential: 7.75

LPI_{ISH} > 5.0 - Liquefaction manifestation is expected

Abbreviations

FS: Calculated factor of safety for test point
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.16	2.74	21.79	5.09	110.95	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.33	2.69	24.02	4.61	110.72	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.49	2.70	23.73	4.67	110.72	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.66	2.80	20.13	5.91	119.02	0	0	0.28	0.000	0.00	0.00	0.00	0.000
0.82	3.06	16.10	9.91	159.52	0	0	0.29	0.000	0.00	0.00	0.00	0.000
0.98	2.94	25.37	7.85	199.19	0	0	0.29	0.000	0.00	0.00	0.00	0.000

Total estimated settlement: 0.00

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
1.15	110.72	0.56	2.89	1.00	0.06	1.31	190.94	2.00	0.00	1.00	0.00
1.48	210.80	2.00	0.00	1.00	0.00	1.64	214.50	2.00	0.00	1.00	0.00
1.80	187.53	2.00	0.00	1.00	0.00	1.97	187.67	2.00	0.00	1.00	0.00
2.13	163.00	1.55	0.23	1.00	0.00	2.30	117.89	0.48	2.71	1.00	0.06
2.46	32.71	2.00	0.00	1.00	0.00	2.62	22.62	2.00	0.00	1.00	0.00
2.79	20.69	2.00	0.00	1.00	0.00	2.95	94.76	0.32	3.39	1.00	0.07
3.12	178.83	2.00	0.00	1.00	0.00	3.28	168.56	1.70	0.14	1.00	0.00
3.44	150.63	0.91	1.12	1.00	0.02	3.61	127.27	0.51	2.49	1.00	0.05
3.77	108.21	0.36	2.96	1.00	0.06	3.94	31.14	2.00	0.00	1.00	0.00
4.10	22.35	2.00	0.00	1.00	0.00	4.27	20.20	2.00	0.00	1.00	0.00
4.43	24.23	2.00	0.00	1.00	0.00	4.59	26.12	2.00	0.00	1.00	0.00
4.76	22.65	2.00	0.00	1.00	0.00	4.92	26.69	2.00	0.00	1.00	0.00
5.09	31.12	2.00	0.00	1.00	0.00	5.25	39.11	2.00	0.00	1.00	0.00
5.41	137.19	0.59	2.29	1.00	0.04	5.58	141.11	0.64	2.22	1.00	0.05
5.74	141.71	0.65	2.21	1.00	0.04	5.91	145.93	0.72	1.97	1.00	0.04
6.07	145.43	0.71	2.06	1.00	0.04	6.23	143.67	0.68	2.18	1.00	0.04
6.40	62.67	2.00	0.00	1.00	0.00	6.56	50.62	2.00	0.00	1.00	0.00
6.73	40.61	2.00	0.00	1.00	0.00	6.89	34.88	2.00	0.00	1.00	0.00
7.05	32.03	2.00	0.00	1.00	0.00	7.22	26.72	2.00	0.00	1.00	0.00
7.38	22.55	2.00	0.00	1.00	0.00	7.55	23.51	2.00	0.00	1.00	0.00
7.71	25.84	2.00	0.00	1.00	0.00	7.87	28.26	2.00	0.00	1.00	0.00
8.04	28.18	2.00	0.00	1.00	0.00	8.20	25.57	2.00	0.00	1.00	0.00
8.37	24.94	2.00	0.00	1.00	0.00	8.53	23.53	2.00	0.00	1.00	0.00
8.69	23.38	2.00	0.00	1.00	0.00	8.86	21.05	2.00	0.00	1.00	0.00
9.02	19.05	2.00	0.00	1.00	0.00	9.19	23.51	2.00	0.00	1.00	0.00
9.35	88.15	0.25	3.65	1.00	0.07	9.51	98.20	0.28	3.27	1.00	0.06
9.68	113.25	0.35	2.82	1.00	0.06	9.84	123.49	0.42	2.57	1.00	0.05
10.01	115.12	0.36	2.78	1.00	0.06	10.17	106.78	0.32	3.00	1.00	0.06
10.33	100.43	0.29	3.20	1.00	0.06	10.50	86.99	0.25	3.70	1.00	0.08

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
10.66	79.38	0.23	4.04	1.00	0.08	10.83	82.20	0.23	3.91	1.00	0.08
10.99	83.35	0.24	3.85	1.00	0.07	11.15	84.68	0.24	3.79	1.00	0.07
11.32	85.45	0.24	3.76	1.00	0.08	11.48	82.81	0.23	3.88	1.00	0.07
11.65	22.96	2.00	0.00	1.00	0.00	11.81	79.96	0.23	4.01	1.00	0.08
11.98	82.44	0.23	3.89	1.00	0.08	12.14	83.67	0.24	3.84	1.00	0.07
12.30	85.19	0.24	3.77	1.00	0.07	12.47	21.17	2.00	0.00	1.00	0.00
12.63	16.29	2.00	0.00	1.00	0.00	12.80	12.79	2.00	0.00	1.00	0.00
12.96	14.28	2.00	0.00	1.00	0.00	13.12	17.94	2.00	0.00	1.00	0.00
13.29	18.13	2.00	0.00	1.00	0.00	13.45	13.99	2.00	0.00	1.00	0.00
13.62	13.30	2.00	0.00	1.00	0.00	13.78	13.20	2.00	0.00	1.00	0.00
13.94	14.84	2.00	0.00	1.00	0.00	14.11	16.87	2.00	0.00	1.00	0.00
14.27	16.09	2.00	0.00	1.00	0.00	14.44	16.46	2.00	0.00	1.00	0.00
14.60	18.22	2.00	0.00	1.00	0.00	14.76	21.24	2.00	0.00	1.00	0.00
14.93	22.92	2.00	0.00	1.00	0.00	15.09	24.52	2.00	0.00	1.00	0.00
15.26	23.72	2.00	0.00	1.00	0.00	15.42	20.42	2.00	0.00	1.00	0.00
15.58	16.44	2.00	0.00	1.00	0.00	15.75	13.64	2.00	0.00	1.00	0.00
15.91	12.33	2.00	0.00	1.00	0.00	16.08	11.52	2.00	0.00	1.00	0.00
16.24	10.47	2.00	0.00	1.00	0.00	16.40	10.02	2.00	0.00	1.00	0.00
16.57	11.15	2.00	0.00	1.00	0.00	16.73	16.89	2.00	0.00	1.00	0.00
16.90	17.28	2.00	0.00	1.00	0.00	17.06	13.66	2.00	0.00	1.00	0.00
17.22	14.05	2.00	0.00	1.00	0.00	17.39	12.21	2.00	0.00	1.00	0.00
17.55	10.03	2.00	0.00	1.00	0.00	17.72	10.63	2.00	0.00	1.00	0.00
17.88	9.06	2.00	0.00	1.00	0.00	18.04	7.91	2.00	0.00	1.00	0.00
18.21	7.07	2.00	0.00	1.00	0.00	18.37	12.66	2.00	0.00	1.00	0.00
18.54	10.48	2.00	0.00	1.00	0.00	18.70	10.10	2.00	0.00	1.00	0.00
18.86	9.95	2.00	0.00	1.00	0.00	19.03	9.34	2.00	0.00	1.00	0.00
19.19	8.81	2.00	0.00	1.00	0.00	19.36	8.29	2.00	0.00	1.00	0.00
19.52	9.08	2.00	0.00	1.00	0.00	19.68	10.21	2.00	0.00	1.00	0.00
19.85	11.29	2.00	0.00	1.00	0.00	20.01	16.23	2.00	0.00	1.00	0.00
20.18	24.33	2.00	0.00	1.00	0.00	20.34	22.60	2.00	0.00	1.00	0.00
20.51	17.93	2.00	0.00	1.00	0.00	20.67	13.69	2.00	0.00	1.00	0.00
20.83	11.47	2.00	0.00	1.00	0.00	21.00	10.36	2.00	0.00	1.00	0.00
21.16	12.49	2.00	0.00	1.00	0.00	21.33	19.02	2.00	0.00	1.00	0.00
21.49	16.02	2.00	0.00	1.00	0.00	21.65	13.30	2.00	0.00	1.00	0.00
21.82	14.24	2.00	0.00	1.00	0.00	21.98	13.43	2.00	0.00	1.00	0.00
22.15	13.31	2.00	0.00	1.00	0.00	22.31	13.67	2.00	0.00	1.00	0.00
22.47	13.96	2.00	0.00	1.00	0.00	22.64	14.30	2.00	0.00	1.00	0.00
22.80	14.34	2.00	0.00	1.00	0.00	22.97	14.29	2.00	0.00	1.00	0.00
23.13	14.06	2.00	0.00	1.00	0.00	23.29	13.61	2.00	0.00	1.00	0.00
23.46	13.28	2.00	0.00	1.00	0.00	23.62	12.95	2.00	0.00	1.00	0.00
23.79	12.59	2.00	0.00	1.00	0.00	23.95	12.39	2.00	0.00	1.00	0.00
24.11	12.83	2.00	0.00	1.00	0.00	24.28	13.19	2.00	0.00	1.00	0.00
24.44	13.08	2.00	0.00	1.00	0.00	24.61	13.37	2.00	0.00	1.00	0.00
24.77	13.87	2.00	0.00	1.00	0.00	24.93	13.42	2.00	0.00	1.00	0.00
25.10	13.81	2.00	0.00	1.00	0.00	25.26	14.23	2.00	0.00	1.00	0.00
25.43	13.67	2.00	0.00	1.00	0.00	25.59	13.50	2.00	0.00	1.00	0.00
25.75	13.08	2.00	0.00	1.00	0.00	25.92	12.60	2.00	0.00	1.00	0.00
26.08	13.02	2.00	0.00	1.00	0.00	26.25	14.40	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
26.41	14.13	2.00	0.00	1.00	0.00	26.57	13.22	2.00	0.00	1.00	0.00
26.74	12.79	2.00	0.00	1.00	0.00	26.90	12.10	2.00	0.00	1.00	0.00
27.07	12.11	2.00	0.00	1.00	0.00	27.23	11.10	2.00	0.00	1.00	0.00
27.39	11.32	2.00	0.00	1.00	0.00	27.56	15.13	2.00	0.00	1.00	0.00
27.72	19.95	2.00	0.00	1.00	0.00	27.89	23.45	2.00	0.00	1.00	0.00
28.05	20.05	2.00	0.00	1.00	0.00	28.22	12.85	2.00	0.00	1.00	0.00
28.38	10.52	2.00	0.00	1.00	0.00	28.54	11.74	2.00	0.00	1.00	0.00
28.71	11.24	2.00	0.00	1.00	0.00	28.87	10.78	2.00	0.00	1.00	0.00
29.04	11.74	2.00	0.00	1.00	0.00	29.20	12.93	2.00	0.00	1.00	0.00
29.36	12.55	2.00	0.00	1.00	0.00	29.53	12.40	2.00	0.00	1.00	0.00
29.69	12.15	2.00	0.00	1.00	0.00	29.86	12.26	2.00	0.00	1.00	0.00
30.02	12.75	2.00	0.00	1.00	0.00	30.18	13.11	2.00	0.00	1.00	0.00
30.35	13.73	2.00	0.00	1.00	0.00	30.51	13.25	2.00	0.00	1.00	0.00
30.68	13.47	2.00	0.00	1.00	0.00	30.84	13.39	2.00	0.00	1.00	0.00
31.00	12.42	2.00	0.00	1.00	0.00	31.17	11.50	2.00	0.00	1.00	0.00
31.33	11.34	2.00	0.00	1.00	0.00	31.50	12.06	2.00	0.00	1.00	0.00
31.66	11.74	2.00	0.00	1.00	0.00	31.82	11.90	2.00	0.00	1.00	0.00
31.99	11.66	2.00	0.00	1.00	0.00	32.15	11.66	2.00	0.00	1.00	0.00
32.32	11.64	2.00	0.00	1.00	0.00	32.48	11.25	2.00	0.00	1.00	0.00
32.64	11.77	2.00	0.00	1.00	0.00	32.81	13.40	2.00	0.00	1.00	0.00
32.97	12.77	2.00	0.00	1.00	0.00	33.14	11.10	2.00	0.00	1.00	0.00
33.30	10.85	2.00	0.00	1.00	0.00	33.46	10.50	2.00	0.00	1.00	0.00
33.63	10.98	2.00	0.00	1.00	0.00	33.79	12.09	2.00	0.00	1.00	0.00
33.96	11.87	2.00	0.00	1.00	0.00	34.12	11.15	2.00	0.00	1.00	0.00
34.28	11.22	2.00	0.00	1.00	0.00	34.45	11.68	2.00	0.00	1.00	0.00
34.61	11.37	2.00	0.00	1.00	0.00	34.78	11.30	2.00	0.00	1.00	0.00
34.94	11.14	2.00	0.00	1.00	0.00	35.10	11.14	2.00	0.00	1.00	0.00
35.27	10.97	2.00	0.00	1.00	0.00	35.43	10.97	2.00	0.00	1.00	0.00
35.60	10.87	2.00	0.00	1.00	0.00	35.76	10.80	2.00	0.00	1.00	0.00
35.93	11.05	2.00	0.00	1.00	0.00	36.09	11.08	2.00	0.00	1.00	0.00
36.25	10.54	2.00	0.00	1.00	0.00	36.42	11.13	2.00	0.00	1.00	0.00
36.58	11.74	2.00	0.00	1.00	0.00	36.75	12.58	2.00	0.00	1.00	0.00
36.91	13.59	2.00	0.00	1.00	0.00	37.07	14.31	2.00	0.00	1.00	0.00
37.24	15.01	2.00	0.00	1.00	0.00	37.40	16.30	2.00	0.00	1.00	0.00
37.57	15.45	2.00	0.00	1.00	0.00	37.73	14.75	2.00	0.00	1.00	0.00
37.89	14.04	2.00	0.00	1.00	0.00	38.06	13.80	2.00	0.00	1.00	0.00
38.22	13.68	2.00	0.00	1.00	0.00	38.39	13.48	2.00	0.00	1.00	0.00
38.55	12.82	2.00	0.00	1.00	0.00	38.71	13.03	2.00	0.00	1.00	0.00
38.88	12.62	2.00	0.00	1.00	0.00	39.04	12.49	2.00	0.00	1.00	0.00
39.21	12.70	2.00	0.00	1.00	0.00	39.37	12.50	2.00	0.00	1.00	0.00
39.53	12.73	2.00	0.00	1.00	0.00	39.70	12.99	2.00	0.00	1.00	0.00
39.86	13.42	2.00	0.00	1.00	0.00	40.03	14.05	2.00	0.00	1.00	0.00
40.19	14.28	2.00	0.00	1.00	0.00	40.35	13.84	2.00	0.00	1.00	0.00
40.52	13.06	2.00	0.00	1.00	0.00	40.68	12.24	2.00	0.00	1.00	0.00
40.85	11.63	2.00	0.00	1.00	0.00	41.01	11.35	2.00	0.00	1.00	0.00
41.17	11.05	2.00	0.00	1.00	0.00	41.34	10.94	2.00	0.00	1.00	0.00
41.50	10.54	2.00	0.00	1.00	0.00	41.67	10.23	2.00	0.00	1.00	0.00
41.83	9.95	2.00	0.00	1.00	0.00	41.99	10.21	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
42.16	10.45	2.00	0.00	1.00	0.00	42.32	10.43	2.00	0.00	1.00	0.00
42.49	10.40	2.00	0.00	1.00	0.00	42.65	10.48	2.00	0.00	1.00	0.00
42.81	10.68	2.00	0.00	1.00	0.00	42.98	10.79	2.00	0.00	1.00	0.00
43.14	10.68	2.00	0.00	1.00	0.00	43.31	10.55	2.00	0.00	1.00	0.00
43.47	10.52	2.00	0.00	1.00	0.00	43.64	10.45	2.00	0.00	1.00	0.00
43.80	10.49	2.00	0.00	1.00	0.00	43.96	11.73	2.00	0.00	1.00	0.00
44.13	11.59	2.00	0.00	1.00	0.00	44.29	12.00	2.00	0.00	1.00	0.00
44.46	11.89	2.00	0.00	1.00	0.00	44.62	11.52	2.00	0.00	1.00	0.00
44.78	11.60	2.00	0.00	1.00	0.00	44.95	11.89	2.00	0.00	1.00	0.00
45.11	11.47	2.00	0.00	1.00	0.00	45.28	11.55	2.00	0.00	1.00	0.00
45.44	11.98	2.00	0.00	1.00	0.00	45.60	11.64	2.00	0.00	1.00	0.00
45.77	11.65	2.00	0.00	1.00	0.00	45.93	11.75	2.00	0.00	1.00	0.00
46.10	12.03	2.00	0.00	1.00	0.00	46.26	11.63	2.00	0.00	1.00	0.00
46.42	11.23	2.00	0.00	1.00	0.00	46.59	11.12	2.00	0.00	1.00	0.00
46.75	11.79	2.00	0.00	1.00	0.00	46.92	12.20	2.00	0.00	1.00	0.00
47.08	13.28	2.00	0.00	1.00	0.00	47.24	13.74	2.00	0.00	1.00	0.00
47.41	14.37	2.00	0.00	1.00	0.00	47.57	14.79	2.00	0.00	1.00	0.00
47.74	13.97	2.00	0.00	1.00	0.00	47.90	13.65	2.00	0.00	1.00	0.00
48.06	14.23	2.00	0.00	1.00	0.00	48.23	14.49	2.00	0.00	1.00	0.00
48.39	14.74	2.00	0.00	1.00	0.00	48.56	14.83	2.00	0.00	1.00	0.00
48.72	14.94	2.00	0.00	1.00	0.00	48.88	15.80	2.00	0.00	1.00	0.00
49.05	16.44	2.00	0.00	1.00	0.00	49.21	16.61	2.00	0.00	1.00	0.00
49.38	16.67	2.00	0.00	1.00	0.00	49.54	17.26	2.00	0.00	1.00	0.00
49.70	16.92	2.00	0.00	1.00	0.00	49.87	16.46	2.00	0.00	1.00	0.00
50.03	15.62	2.00	0.00	1.00	0.00	50.20	14.87	2.00	0.00	1.00	0.00
50.36	14.37	2.00	0.00	1.00	0.00	50.52	13.86	2.00	0.00	1.00	0.00

Total estimated settlement: 1.82

Abbreviations

$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
FS: Factor of safety against liquefaction
e_v (%): Post-liquefaction volumentric strain
DF: e_v depth weighting factor
Settlement: Calculated settlement

:: Strength loss calculation Idriss & Boulanger (2008) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	13.57	21.79	5.09	110.95	2.74	0.09	0.62
0.33	14.97	24.02	4.61	110.72	2.69	0.09	0.62
0.49	14.79	23.73	4.67	110.72	2.70	0.09	0.62
0.66	12.56	20.13	5.91	119.02	2.80	0.09	0.62
0.82	10.07	16.10	9.91	159.52	3.06	0.08	15.70
0.98	15.85	25.37	7.85	199.19	2.94	0.08	0.62
1.15	36.75	58.94	3.49	205.43	2.57	0.12	0.77
1.31	62.24	99.88	2.02	201.58	2.32	0.31	0.88
1.48	81.60	130.96	1.60	209.13	2.19	0.43	0.90
1.64	82.16	131.85	1.60	210.34	2.19	0.47	0.90
1.80	77.57	124.46	1.61	200.52	2.20	0.28	0.87
1.97	67.69	108.57	1.75	190.27	2.25	0.29	0.87
2.13	54.26	86.97	2.04	177.79	2.33	0.20	0.84
2.30	37.07	59.34	3.03	179.64	2.51	0.13	0.78
2.46	22.52	35.94	5.13	184.43	2.74	0.10	0.62
2.62	15.75	25.05	7.16	179.43	2.90	0.09	0.62
2.79	16.34	25.99	7.00	181.81	2.89	0.09	0.62
2.95	33.84	54.09	2.91	157.36	2.49	0.10	0.74
3.12	51.14	81.87	1.87	153.42	2.29	0.25	0.86
3.28	61.72	98.84	1.56	154.21	2.18	0.21	0.85
3.44	52.80	84.50	1.71	144.66	2.24	0.17	0.83
3.61	40.65	64.97	2.12	137.93	2.35	0.14	0.79
3.77	29.17	46.51	3.14	146.13	2.52	0.12	0.76
3.94	20.54	32.62	5.06	165.11	2.73	0.10	0.62
4.10	15.29	24.17	7.40	178.76	2.91	0.09	0.62
4.27	13.87	21.88	7.85	171.75	2.94	0.09	0.62
4.43	14.67	23.15	6.98	161.62	2.88	0.09	0.62
4.59	15.20	23.98	6.54	156.89	2.85	0.10	0.62
4.76	15.72	24.79	6.56	162.67	2.85	0.09	0.62
4.92	16.76	26.46	6.77	179.14	2.87	0.10	0.62
5.09	20.19	31.94	5.97	190.57	2.81	0.10	0.62
5.25	29.34	46.63	3.97	185.02	2.62	0.11	0.62
5.41	39.11	62.31	2.78	173.00	2.47	0.15	0.81
5.58	47.50	75.79	2.16	163.85	2.36	0.16	0.81
5.74	50.23	80.15	2.21	176.83	2.37	0.16	0.82
5.91	51.28	81.81	2.48	202.95	2.42	0.17	0.82
6.07	51.57	82.27	2.93	241.42	2.49	0.17	0.82
6.23	48.55	77.41	3.39	262.78	2.56	0.17	0.82
6.40	42.67	67.94	3.93	267.20	2.62	0.15	0.66
6.56	34.90	55.44	4.58	253.77	2.69	0.13	0.63
6.73	28.24	44.72	5.30	236.89	2.75	0.12	0.62
6.89	23.98	37.85	5.72	216.40	2.79	0.11	0.62
7.05	20.87	32.86	6.03	198.07	2.81	0.10	0.62
7.22	18.15	28.47	6.32	179.90	2.84	0.10	0.62
7.38	16.31	25.50	6.41	163.37	2.84	0.09	0.62
7.55	16.28	25.42	5.92	150.60	2.81	0.09	0.62
7.71	17.83	27.89	5.46	152.29	2.77	0.09	0.62
7.87	19.15	30.01	5.52	165.65	2.77	0.10	0.62

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	19.28	30.20	6.00	181.09	2.81	0.10	0.62
8.20	18.65	29.18	6.39	186.50	2.84	0.10	0.62
8.37	17.66	27.57	6.54	180.43	2.85	0.10	0.62
8.53	17.28	26.93	6.13	165.07	2.82	0.09	0.62
8.69	16.45	25.59	6.08	155.62	2.82	0.09	0.62
8.86	15.47	24.00	6.42	153.99	2.84	0.09	0.62
9.02	15.66	24.29	6.32	153.47	2.84	0.09	0.62
9.19	18.13	28.24	4.96	140.14	2.72	0.09	0.62
9.35	24.05	37.75	3.07	115.91	2.51	0.09	0.72
9.51	32.71	49.14	2.13	104.83	2.35	0.10	0.74
9.68	41.93	61.50	1.89	116.02	2.29	0.12	0.77
9.84	45.90	66.88	1.96	131.27	2.31	0.13	0.79
10.01	43.84	63.85	2.23	142.20	2.37	0.12	0.77
10.17	37.84	54.96	2.53	138.84	2.43	0.11	0.76
10.33	30.97	44.83	2.90	129.95	2.49	0.11	0.75
10.50	24.60	35.34	3.29	116.43	2.54	0.09	0.72
10.66	20.81	29.45	3.38	99.41	2.55	0.08	0.71
10.83	20.73	28.54	2.82	80.50	2.48	0.09	0.71
10.99	22.44	30.27	2.44	73.72	2.41	0.08	0.71
11.15	23.09	31.04	2.65	82.39	2.45	0.09	0.72
11.32	22.41	30.19	3.23	97.47	2.53	0.09	0.72
11.48	21.06	28.25	3.68	103.86	2.59	0.09	0.71
11.65	19.92	26.43	3.85	101.79	2.61	0.09	0.62
11.81	20.29	26.39	3.36	88.74	2.55	0.08	0.71
11.98	21.49	27.48	3.01	82.83	2.51	0.09	0.71
12.14	22.70	28.79	3.04	87.61	2.51	0.09	0.72
12.30	21.52	27.26	3.66	99.70	2.59	0.09	0.72
12.47	18.63	23.54	4.67	110.02	2.70	0.09	0.62
12.63	14.63	18.39	6.26	115.16	2.83	0.08	0.62
12.80	12.70	15.82	7.48	118.25	2.92	0.08	0.62
12.96	13.31	16.37	7.14	116.81	2.90	0.08	0.62
13.12	14.99	18.18	6.08	110.60	2.82	0.08	0.62
13.29	14.98	17.94	6.10	109.41	2.82	0.09	0.62
13.45	13.68	16.24	7.04	114.36	2.89	0.08	0.62
13.62	12.28	14.34	8.99	128.86	3.01	0.08	1.02
13.78	12.64	14.61	9.46	138.20	3.04	0.08	1.04
13.94	13.81	15.86	9.24	146.63	3.03	0.08	1.13
14.11	14.77	16.89	8.90	150.39	3.01	0.09	1.21
14.27	15.32	17.46	8.80	153.58	3.00	0.09	1.25
14.44	15.80	17.93	8.69	155.84	2.99	0.09	0.62
14.60	17.48	19.83	8.10	160.56	2.96	0.09	0.62
14.76	19.59	22.21	7.44	165.21	2.92	0.09	0.62
14.93	21.65	24.42	6.84	167.04	2.87	0.09	0.62
15.09	22.51	25.24	6.55	165.42	2.85	0.09	0.62
15.26	21.77	24.27	6.75	163.89	2.87	0.09	0.62
15.42	19.24	21.27	7.54	160.31	2.92	0.09	0.62
15.58	16.05	17.48	8.77	153.31	3.00	0.09	0.62
15.75	13.51	14.45	9.71	140.36	3.05	0.08	1.03

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	11.97	12.62	10.29	129.96	3.08	0.08	0.90
16.08	11.00	11.44	10.54	120.60	3.10	0.08	0.82
16.24	10.28	10.57	11.10	117.27	3.12	0.08	0.75
16.40	10.19	10.41	11.07	115.25	3.12	0.08	0.74
16.57	12.29	12.71	8.97	114.01	3.01	0.08	0.91
16.73	14.67	15.29	7.16	109.46	2.90	0.09	0.62
16.90	15.50	16.09	6.51	104.83	2.85	0.08	0.62
17.06	14.62	15.06	6.77	101.91	2.87	0.08	0.62
17.22	13.01	13.24	7.79	103.17	2.94	0.08	0.62
17.39	11.86	11.91	8.42	100.36	2.98	0.08	0.62
17.55	10.77	10.66	9.03	96.28	3.01	0.08	0.76
17.72	9.77	9.52	9.58	91.16	3.05	0.08	0.68
17.88	9.09	8.74	10.25	89.62	3.08	0.08	0.62
18.04	7.95	7.46	11.94	89.05	3.16	0.07	0.53
18.21	9.16	8.72	9.66	84.25	3.05	0.07	0.62
18.37	10.02	9.61	8.29	79.64	2.97	0.08	0.62
18.54	11.05	10.66	7.05	75.11	2.89	0.08	0.62
18.70	10.18	9.69	7.66	74.20	2.93	0.08	0.62
18.86	9.84	9.28	7.73	71.75	2.94	0.08	0.62
19.03	9.43	8.81	7.79	68.63	2.94	0.08	0.62
19.19	8.90	8.21	8.06	66.14	2.96	0.08	0.62
19.36	8.83	8.11	8.41	68.14	2.98	0.08	0.62
19.52	9.33	8.58	9.41	80.73	3.04	0.08	0.61
19.68	10.36	9.61	9.89	95.12	3.06	0.08	0.69
19.85	12.80	12.10	9.10	110.06	3.02	0.08	0.86
20.01	17.62	17.02	6.98	118.81	2.88	0.08	0.62
20.18	21.50	20.86	5.93	123.62	2.81	0.09	0.62
20.34	22.09	21.37	5.92	126.44	2.81	0.09	0.62
20.51	18.46	17.62	7.06	124.44	2.89	0.09	0.62
20.67	14.68	13.69	8.60	117.81	2.99	0.08	0.62
20.83	12.12	11.04	10.01	110.56	3.07	0.08	0.79
21.00	11.74	10.61	10.11	107.21	3.07	0.08	0.76
21.16	14.36	13.19	7.42	97.90	2.91	0.08	0.62
21.33	16.33	15.06	5.75	86.55	2.79	0.09	0.62
21.49	16.65	15.29	4.95	75.66	2.72	0.08	0.62
21.65	15.06	13.67	5.54	75.81	2.77	0.08	0.62
21.82	14.22	12.80	6.06	77.61	2.82	0.08	0.62
21.98	14.27	12.80	6.27	80.34	2.83	0.08	0.62
22.15	14.12	12.60	6.58	82.85	2.86	0.08	0.62
22.31	14.34	12.77	6.60	84.24	2.86	0.08	0.62
22.47	14.72	13.08	6.46	84.46	2.85	0.08	0.62
22.64	14.99	13.28	6.35	84.40	2.84	0.08	0.62
22.80	15.14	13.37	6.32	84.53	2.84	0.08	0.62
22.97	15.10	13.27	6.44	85.41	2.85	0.08	0.62
23.13	14.87	13.00	6.59	85.71	2.86	0.08	0.62
23.29	14.55	12.64	6.72	84.86	2.87	0.08	0.62
23.46	14.18	12.24	6.80	83.15	2.87	0.08	0.62
23.62	13.86	11.88	6.89	81.80	2.88	0.08	0.62

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	13.58	11.56	7.07	81.71	2.89	0.08	0.62
23.95	13.57	11.50	7.25	83.46	2.90	0.08	0.62
24.11	13.81	11.69	7.37	86.08	2.91	0.08	0.62
24.28	14.09	11.89	7.52	89.39	2.92	0.08	0.62
24.44	14.31	12.05	7.48	90.20	2.92	0.08	0.62
24.61	14.59	12.25	7.49	91.72	2.92	0.08	0.62
24.77	14.75	12.35	7.50	92.59	2.92	0.08	0.62
24.93	14.94	12.47	7.67	95.70	2.93	0.08	0.62
25.10	15.11	12.58	7.82	98.34	2.94	0.08	0.62
25.26	15.24	12.64	7.96	100.61	2.95	0.08	0.62
25.43	15.17	12.52	8.10	101.33	2.96	0.08	0.62
25.59	14.79	12.12	8.37	101.43	2.98	0.08	0.62
25.75	14.43	11.74	8.64	101.48	2.99	0.08	0.62
25.92	14.29	11.57	8.81	101.91	3.00	0.08	0.83
26.08	14.81	11.98	8.38	100.38	2.98	0.08	0.62
26.25	15.39	12.45	7.84	97.64	2.94	0.08	0.62
26.41	15.49	12.49	7.48	93.34	2.92	0.08	0.62
26.57	14.93	11.94	7.56	90.25	2.92	0.08	0.62
26.74	14.22	11.26	7.82	88.01	2.94	0.08	0.62
26.90	13.84	10.88	7.98	86.86	2.95	0.08	0.62
27.07	13.24	10.31	8.46	87.18	2.98	0.08	0.62
27.23	12.98	10.04	9.11	91.41	3.02	0.08	0.72
27.39	14.13	11.00	9.33	102.58	3.03	0.08	0.79
27.56	17.41	13.80	8.18	112.89	2.96	0.08	0.62
27.72	21.86	17.63	6.42	113.11	2.84	0.09	0.62
27.89	23.64	19.14	5.53	105.90	2.77	0.09	0.62
28.05	21.01	16.78	5.71	95.81	2.79	0.09	0.62
28.22	16.25	12.58	6.97	87.62	2.88	0.08	0.62
28.38	13.24	9.95	8.07	80.34	2.96	0.08	0.62
28.54	12.70	9.45	8.10	76.57	2.96	0.08	0.62
28.71	12.85	9.54	8.14	77.66	2.96	0.08	0.62
28.87	12.88	9.54	8.50	81.03	2.98	0.08	0.62
29.04	13.55	10.06	8.45	85.06	2.98	0.08	0.62
29.20	14.25	10.61	8.37	88.79	2.98	0.08	0.62
29.36	14.53	10.80	8.56	92.44	2.99	0.08	0.62
29.53	14.26	10.54	8.86	93.41	3.00	0.08	0.75
29.69	14.19	10.43	8.85	92.34	3.00	0.08	0.75
29.86	14.36	10.53	8.71	91.68	3.00	0.08	0.62
30.02	14.75	10.82	8.72	94.32	3.00	0.08	0.62
30.18	15.35	11.27	8.81	99.31	3.00	0.08	0.80
30.35	15.58	11.41	9.21	105.08	3.02	0.08	0.81
30.51	15.75	11.50	9.51	109.39	3.04	0.08	0.82
30.68	15.64	11.37	9.89	112.38	3.06	0.08	0.81
30.84	15.34	11.08	10.03	111.13	3.07	0.08	0.79
31.00	14.61	10.44	10.16	106.10	3.08	0.08	0.75
31.17	13.85	9.78	9.90	96.82	3.06	0.08	0.70
31.33	13.74	9.66	9.19	88.74	3.02	0.08	0.69
31.50	13.87	9.72	8.80	85.52	3.00	0.08	0.69

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	14.12	9.89	8.84	87.40	3.00	0.08	0.71
31.82	14.01	9.76	9.26	90.37	3.03	0.08	0.70
31.99	14.02	9.73	9.31	90.64	3.03	0.08	0.70
32.15	13.95	9.64	9.29	89.57	3.03	0.08	0.69
32.32	13.82	9.50	9.17	87.09	3.02	0.08	0.68
32.48	13.89	9.52	9.01	85.82	3.01	0.08	0.68
32.64	14.62	10.05	8.22	82.64	2.97	0.08	0.62
32.81	15.23	10.50	7.53	79.11	2.92	0.08	0.62
32.97	15.00	10.28	7.36	75.71	2.91	0.08	0.62
33.14	14.04	9.49	7.87	74.71	2.94	0.08	0.62
33.30	13.18	8.80	8.88	78.12	3.01	0.08	0.63
33.46	13.17	8.75	9.42	82.43	3.04	0.08	0.63
33.63	13.68	9.11	9.39	85.57	3.03	0.08	0.65
33.79	14.24	9.51	9.00	85.62	3.01	0.08	0.68
33.96	14.34	9.55	8.79	83.98	3.00	0.08	0.68
34.12	14.02	9.27	8.93	82.77	3.01	0.08	0.66
34.28	13.98	9.21	8.82	81.23	3.00	0.08	0.66
34.45	14.09	9.26	8.54	79.11	2.99	0.08	0.62
34.61	14.15	9.27	8.52	78.99	2.98	0.08	0.62
34.78	13.96	9.09	8.96	81.45	3.01	0.08	0.65
34.94	13.94	9.04	9.57	86.55	3.04	0.08	0.65
35.10	13.87	8.96	10.08	90.37	3.07	0.08	0.64
35.27	13.87	8.93	10.30	91.97	3.08	0.08	0.64
35.43	13.79	8.84	10.30	90.97	3.08	0.08	0.63
35.60	13.75	8.77	10.26	89.91	3.08	0.08	0.63
35.76	13.81	8.78	10.07	88.41	3.07	0.08	0.63
35.93	13.91	8.82	10.08	88.92	3.07	0.08	0.63
36.09	13.84	8.74	10.17	88.91	3.08	0.08	0.62
36.25	13.90	8.75	10.30	90.13	3.08	0.08	0.63
36.42	14.21	8.95	10.11	90.41	3.07	0.08	0.64
36.58	15.07	9.55	9.64	92.08	3.05	0.08	0.68
36.75	16.11	10.28	8.97	92.18	3.01	0.08	0.73
36.91	17.18	11.02	8.40	92.52	2.98	0.08	0.62
37.07	18.20	11.72	7.81	91.59	2.94	0.08	0.62
37.24	19.36	12.52	7.35	92.03	2.91	0.08	0.62
37.40	19.87	12.85	7.33	94.10	2.91	0.08	0.62
37.57	19.78	12.74	7.58	96.51	2.92	0.08	0.62
37.73	18.87	12.04	8.17	98.38	2.96	0.08	0.62
37.89	18.22	11.53	8.57	98.74	2.99	0.08	0.62
38.06	17.80	11.18	8.84	98.83	3.00	0.08	0.80
38.22	17.57	10.99	8.96	98.41	3.01	0.08	0.78
38.39	17.19	10.68	9.06	96.68	3.02	0.08	0.76
38.55	16.96	10.47	8.96	93.85	3.01	0.08	0.75
38.71	16.64	10.22	8.97	91.65	3.01	0.08	0.73
38.88	16.54	10.11	8.95	90.43	3.01	0.08	0.72
39.04	16.44	10.00	9.11	91.09	3.02	0.08	0.71
39.21	16.41	9.94	9.28	92.28	3.03	0.08	0.71
39.37	16.53	10.00	9.21	92.08	3.02	0.08	0.71

:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.53	16.69	10.07	9.06	91.24	3.02	0.08	0.72
39.70	17.12	10.34	8.54	88.22	2.99	0.08	0.62
39.86	17.71	10.71	8.15	87.22	2.96	0.08	0.62
40.03	18.32	11.09	7.65	84.90	2.93	0.08	0.62
40.19	18.53	11.20	7.61	85.25	2.93	0.08	0.62
40.35	18.15	10.91	7.64	83.34	2.93	0.08	0.62
40.52	17.25	10.25	7.99	81.92	2.95	0.08	0.62
40.68	16.30	9.57	8.34	79.78	2.97	0.08	0.62
40.85	15.55	9.03	8.91	80.46	3.01	0.08	0.64
41.01	15.07	8.67	9.40	81.55	3.04	0.08	0.62
41.17	14.79	8.45	9.59	81.07	3.05	0.08	0.60
41.34	14.47	8.21	9.57	78.51	3.04	0.08	0.59
41.50	14.14	7.96	9.62	76.59	3.05	0.08	0.57
41.67	13.76	7.68	9.73	74.66	3.05	0.08	0.55
41.83	13.65	7.58	9.76	73.95	3.05	0.08	0.54
41.99	13.78	7.65	9.65	73.79	3.05	0.08	0.55
42.16	14.02	7.78	9.74	75.77	3.05	0.08	0.56
42.32	14.13	7.83	10.07	78.84	3.07	0.08	0.56
42.49	14.18	7.83	10.45	81.82	3.09	0.08	0.56
42.65	14.31	7.89	10.68	84.28	3.10	0.08	0.56
42.81	14.50	7.99	10.84	86.61	3.11	0.08	0.57
42.98	14.60	8.03	10.88	87.39	3.11	0.08	0.57
43.14	14.56	7.98	10.79	86.11	3.11	0.08	0.57
43.31	14.47	7.89	10.34	81.60	3.09	0.08	0.56
43.47	14.39	7.81	9.92	77.53	3.06	0.08	0.56
43.64	14.39	7.79	9.76	76.06	3.06	0.08	0.56
43.80	14.95	8.13	9.42	76.60	3.04	0.08	0.58
43.96	15.48	8.45	9.09	76.78	3.02	0.08	0.60
44.13	16.17	8.87	8.50	75.41	2.98	0.08	0.62
44.29	16.27	8.91	8.29	73.85	2.97	0.08	0.62
44.46	16.28	8.88	8.27	73.45	2.97	0.08	0.62
44.62	16.14	8.77	8.59	75.30	2.99	0.08	0.62
44.78	16.19	8.77	8.92	78.29	3.01	0.08	0.63
44.95	16.20	8.75	9.24	80.87	3.03	0.08	0.63
45.11	16.22	8.74	9.21	80.47	3.02	0.08	0.62
45.28	16.30	8.76	9.10	79.70	3.02	0.08	0.63
45.44	16.40	8.80	9.01	79.23	3.01	0.08	0.63
45.60	16.48	8.82	9.19	81.06	3.02	0.08	0.63
45.77	16.41	8.75	9.59	83.88	3.05	0.08	0.62
45.93	16.61	8.84	9.80	86.67	3.06	0.08	0.63
46.10	16.59	8.81	10.07	88.67	3.07	0.08	0.63
46.26	16.36	8.63	10.05	86.75	3.07	0.08	0.62
46.42	15.98	8.37	10.00	83.70	3.07	0.08	0.60
46.59	16.11	8.42	9.62	81.04	3.05	0.08	0.60
46.75	16.57	8.68	9.54	82.79	3.04	0.08	0.62
46.92	17.54	9.26	9.11	84.31	3.02	0.08	0.66
47.08	18.41	9.77	8.64	84.36	2.99	0.08	0.62
47.24	19.41	10.36	7.97	82.49	2.95	0.08	0.62

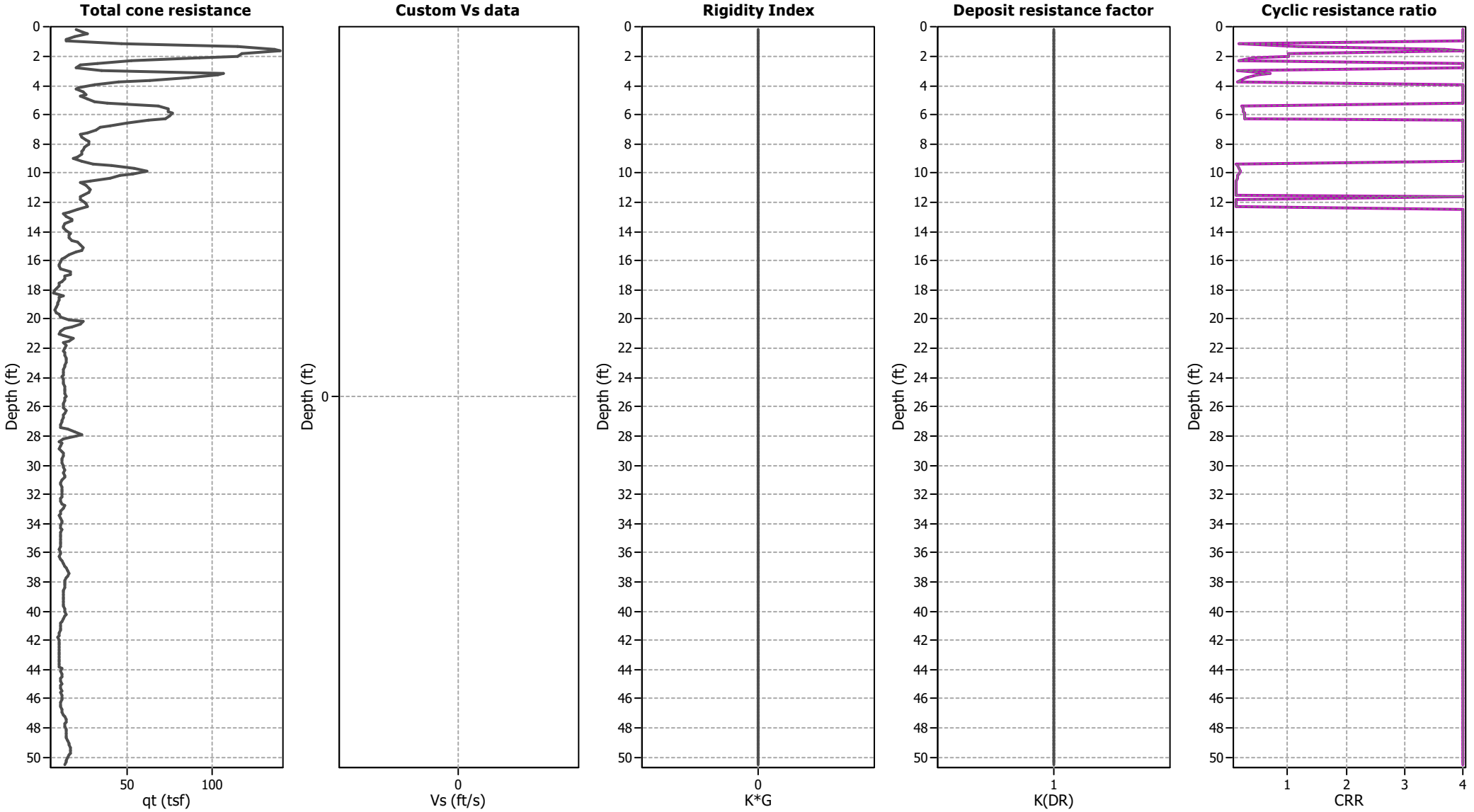
:: Strength loss calculation (Idriss & Boulanger (2008) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	20.14	10.77	7.81	84.11	2.94	0.08	0.62
47.57	20.29	10.83	8.22	89.02	2.97	0.08	0.62
47.74	20.02	10.63	9.01	95.87	3.01	0.08	0.76
47.90	19.80	10.47	9.58	100.28	3.05	0.08	0.75
48.06	20.08	10.61	9.74	103.34	3.05	0.08	0.76
48.23	20.61	10.89	9.50	103.49	3.04	0.08	0.78
48.39	20.92	11.05	9.32	102.90	3.03	0.08	0.79
48.56	21.17	11.16	9.02	100.68	3.01	0.08	0.80
48.72	21.69	11.44	8.86	101.32	3.00	0.08	0.82
48.88	22.47	11.87	8.70	103.35	3.00	0.08	0.62
49.05	23.26	12.31	8.64	106.42	2.99	0.09	0.62
49.21	23.72	12.55	8.53	107.03	2.98	0.09	0.62
49.38	24.14	12.76	8.40	107.20	2.98	0.09	0.62
49.54	24.33	12.84	8.33	106.94	2.97	0.09	0.62
49.70	24.26	12.75	8.39	106.93	2.98	0.09	0.62
49.87	23.53	12.28	8.63	105.97	2.99	0.09	0.62
50.03	22.60	11.71	54.25	635.32	4.06	0.08	0.84
50.20	21.64	11.13	54.25	603.65	4.06	0.08	0.79
50.36	20.87	10.65	54.25	577.91	4.06	0.08	0.76
50.52	20.43	10.38	54.25	563.02	4.06	0.08	0.74

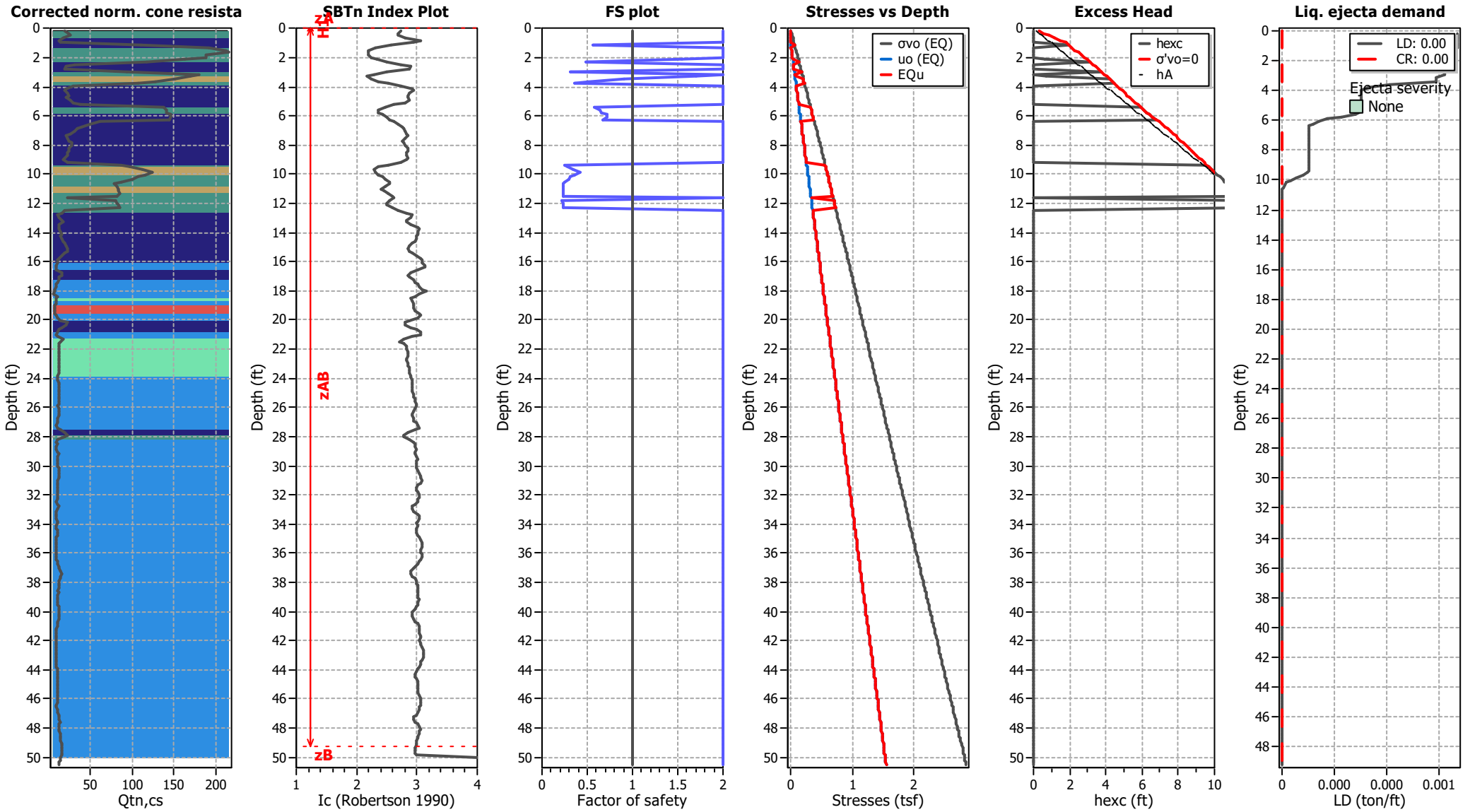
Abbreviations

q_t: Total cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Adjusted and corrected cone resistance due to fines
I_c: Soil behavior type index
$S_{u(liq)}/\sigma'_v$: Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$: Calculated peak undrained strength ratio

Aging Calculation Estimation

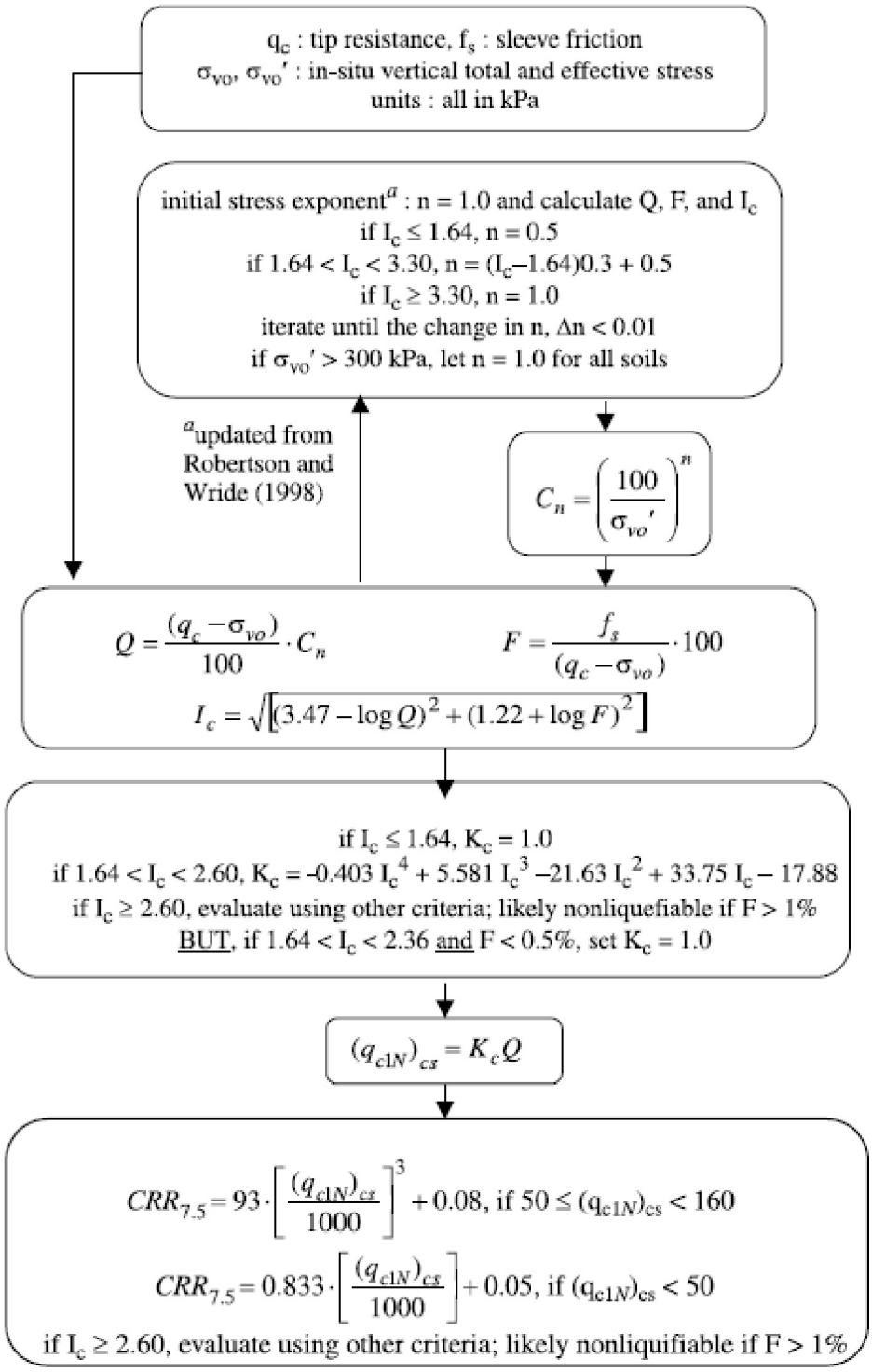


Ejecta Severity Estimation



Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

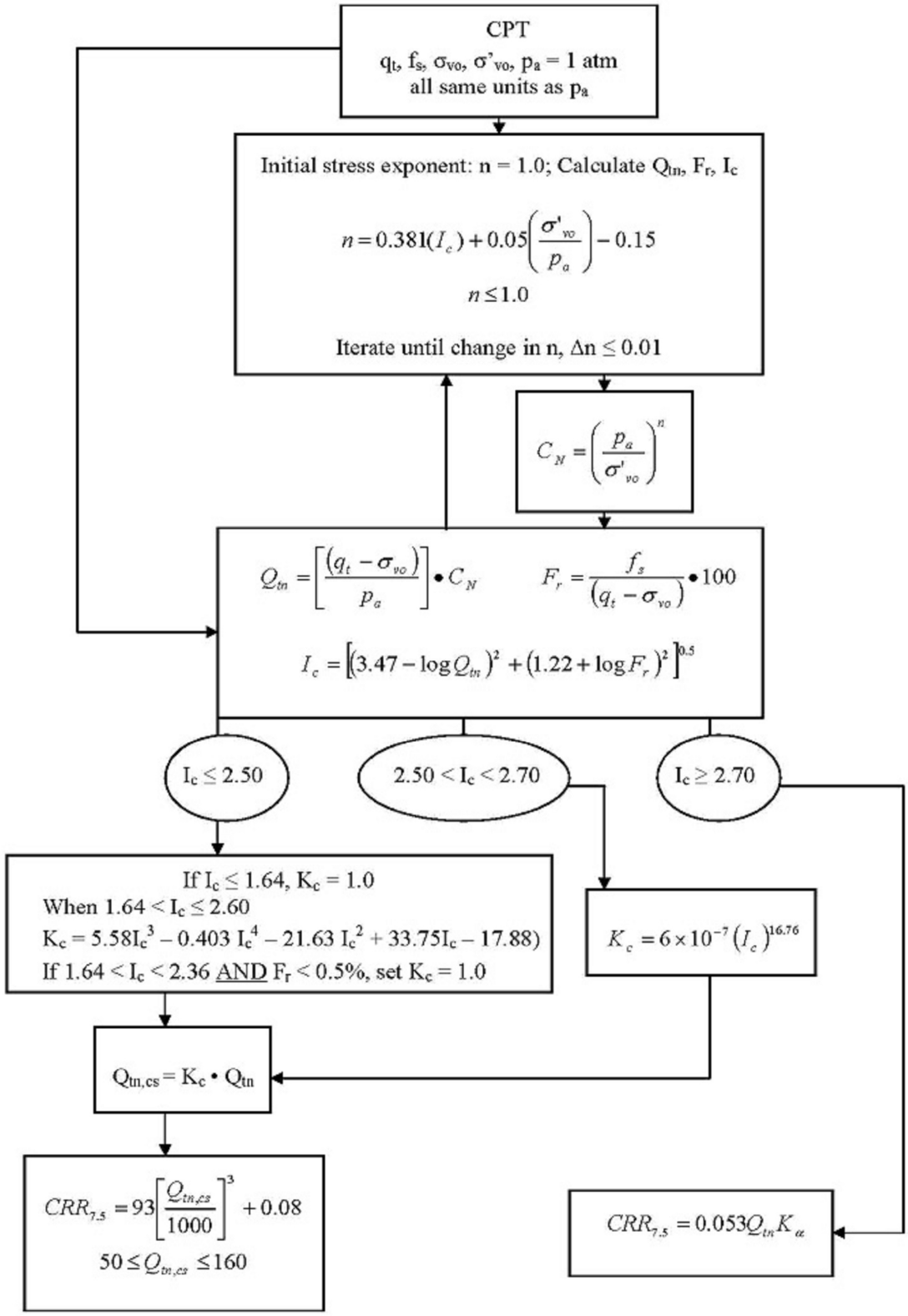
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

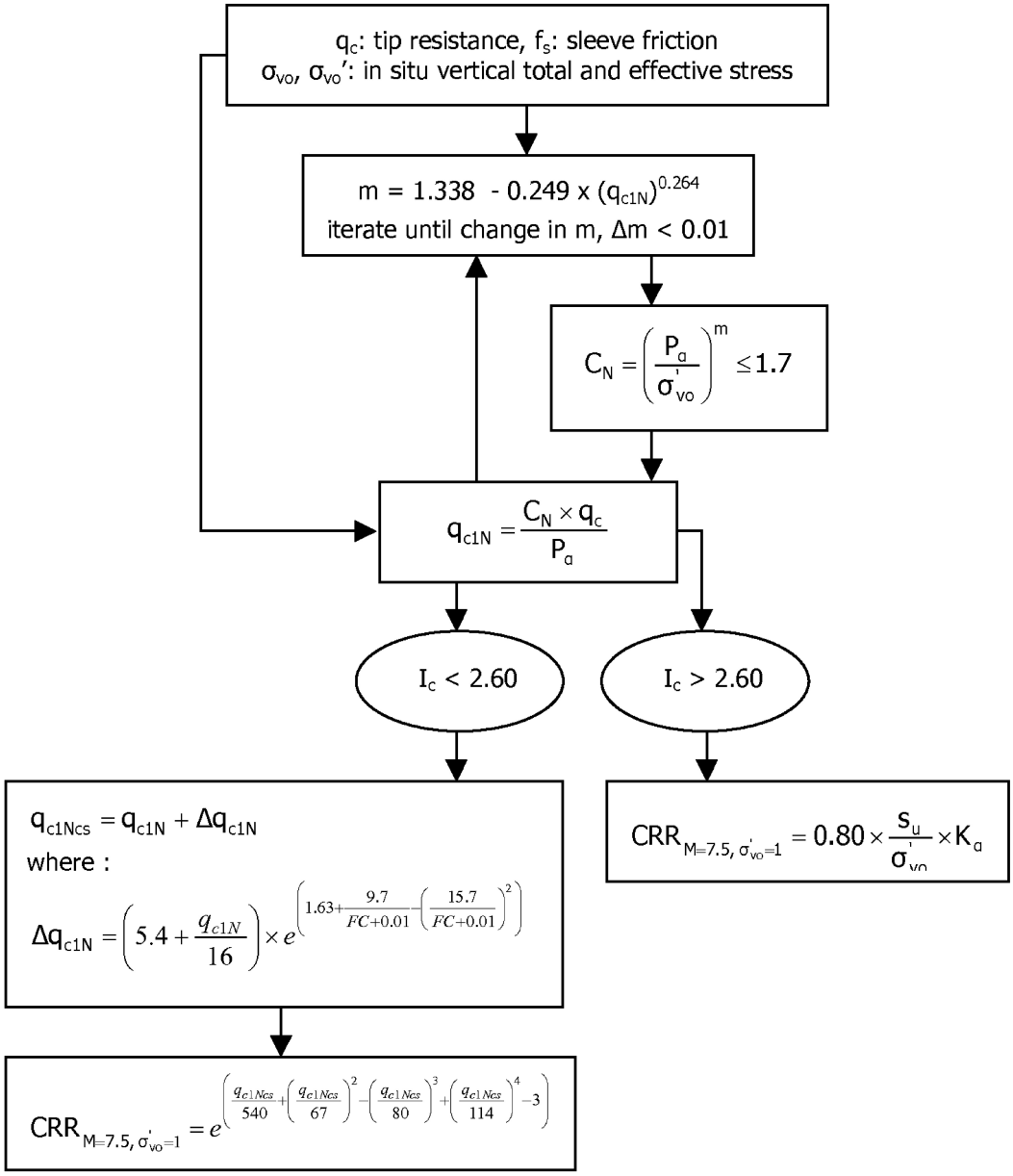
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

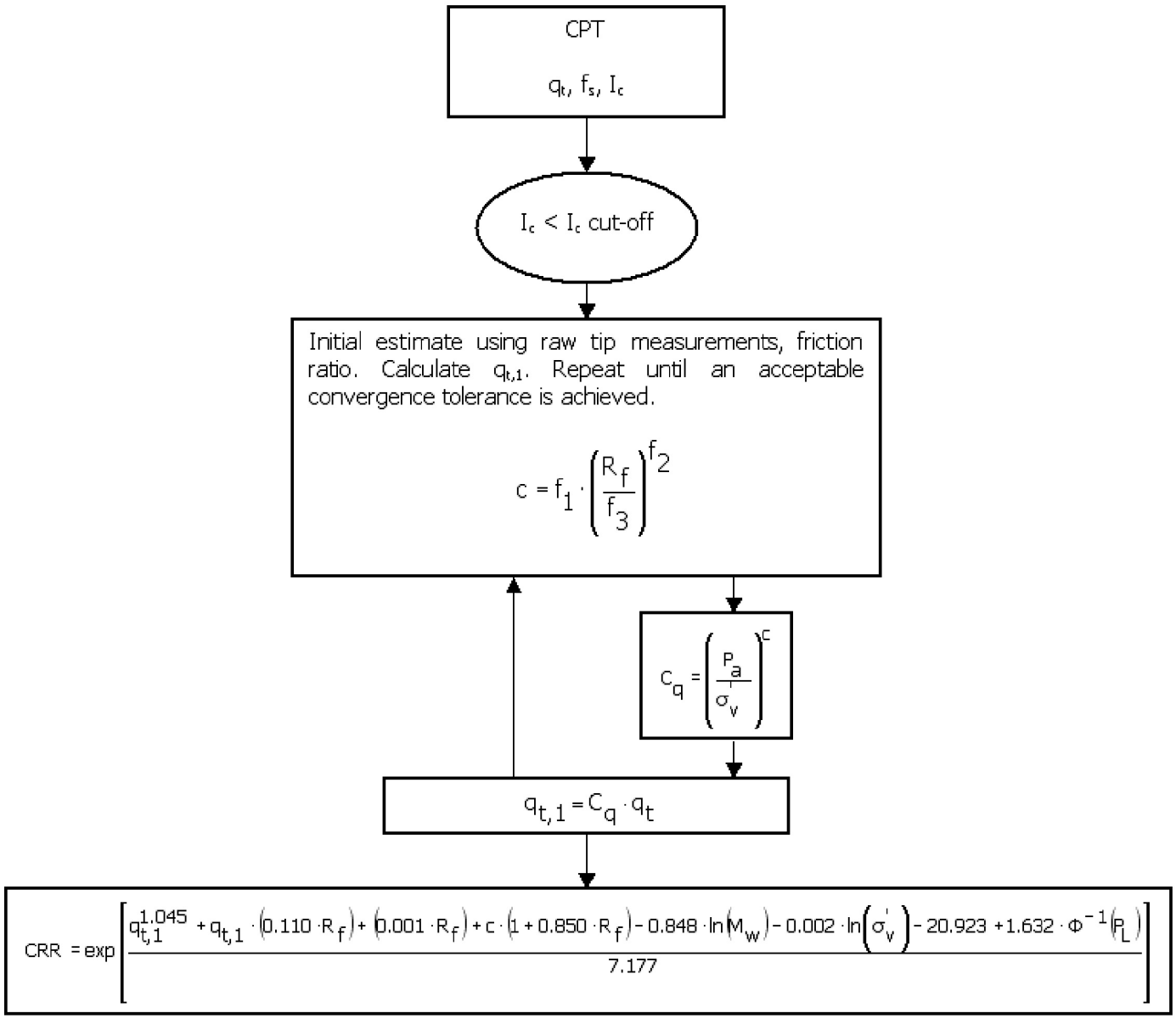


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65 \frac{\sigma_v}{\sigma'_v} \frac{a_{max}}{g} r_d \frac{1}{MSF} \frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z) + \beta(z) \cdot M\right]$$

$$\alpha(z) = -1.012 - 1.126 \sin\left(\frac{z}{11.73} + 5.133\right)$$

$$\beta(z) = 0.106 + 0.118 \sin\left(\frac{z}{11.28} + 5.142\right)$$

$$K_\sigma = 1 - C_\sigma \ln\left(\frac{\sigma'_v}{P_a}\right) \le 1.1$$

$$C_\sigma = \frac{1}{37.3 - 8.27\left(q_{c1Ncs}\right)^{0.264}} \le 0.3$$

$$MSF = 1 + \left(MSF_{max} - 1\right)\left(8.64 \exp\left(\frac{-M}{4}\right) - 1.325\right)$$

$$MSF_{max} = 1.09 + \left(\frac{q_{c1Ncs}}{180}\right)^3 \le 2.2$$

σ'_v *and* σ_v *at start of earthquake shaking*

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113} + \left(\frac{q_{c1Ncs}}{1000}\right)^2 - \left(\frac{q_{c1Ncs}}{140}\right)^3 + \left(\frac{q_{c1Ncs}}{137}\right)^4 - 2.80\right)$$

$$q_{c1Ncs} = q_{c1N} + \Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9 + \frac{q_{c1N}}{14.6}\right) \exp\left(1.63 - \frac{9.7}{FC+2} - \left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne} \frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m \le 1.7$$

$$m = 1.338 - 0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264 \le m \le 0.782$$

$$FC = 80\left(I_C + C_{FC}\right) - 137 \quad with \quad 0\% \le FC \le 100\%$$

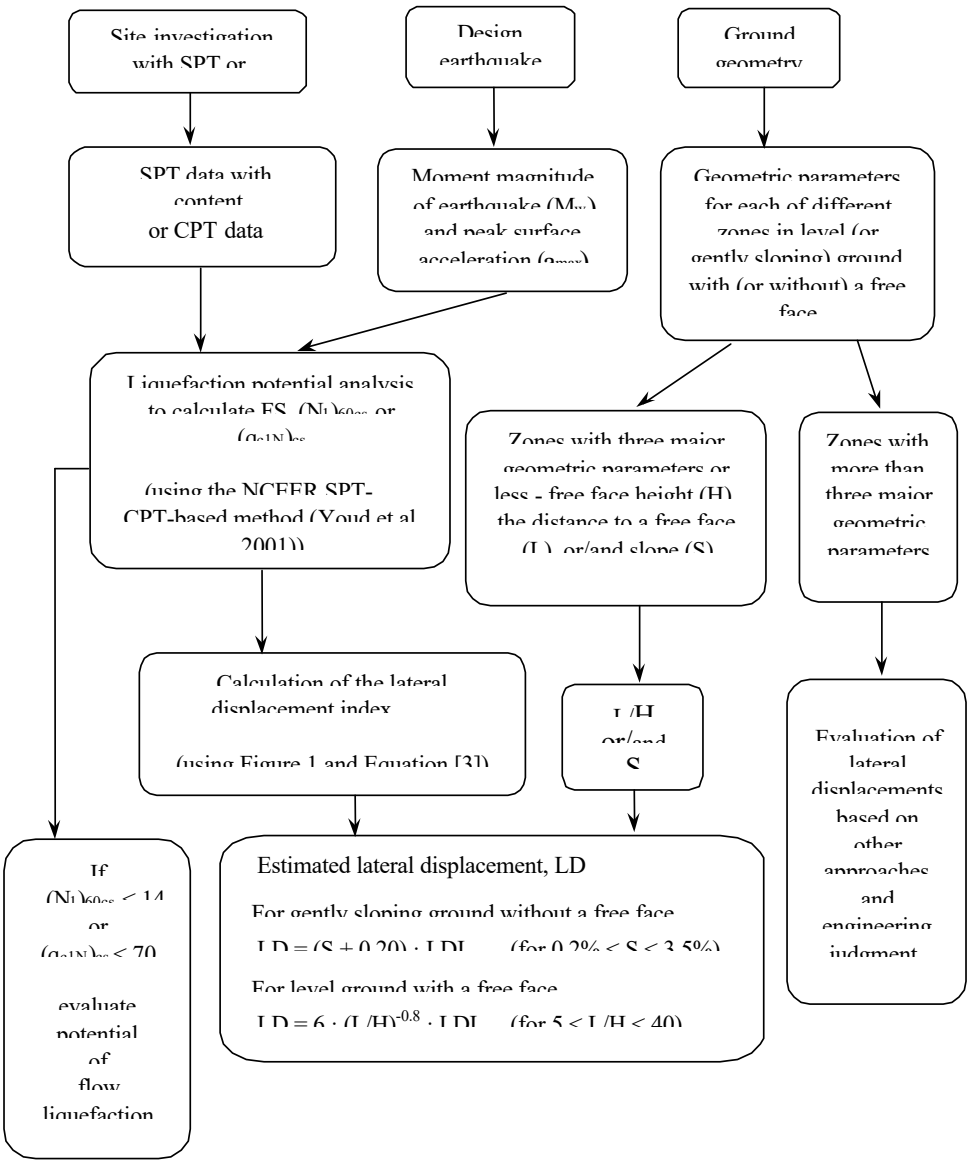
$$I_c = \left[\left(3.47 - \log\left(Q\right)\right)^2 + \left(1.22 + \log\left(F\right)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c - \sigma_{vc}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vc}}\right)^n \; with \; 0.5 \le n \le 1.0 \; per \; Robertson \; \& \; Wride \; (1998)$$

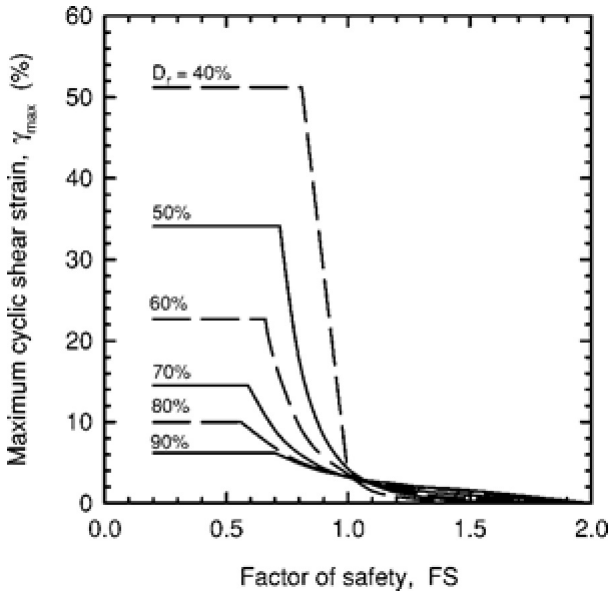
$$F = \left(\frac{f_s}{q_c - \sigma_{vc}}\right) \cdot 100\%$$

σ'_v *at time of CPT sounding*

Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



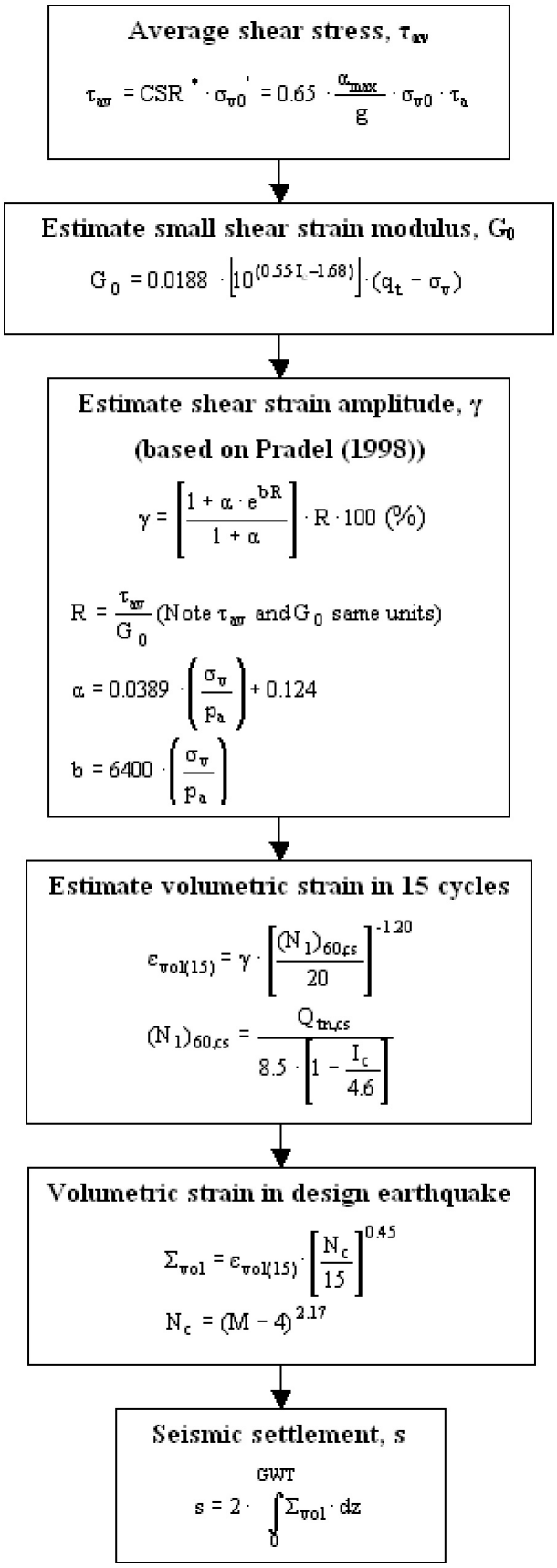
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

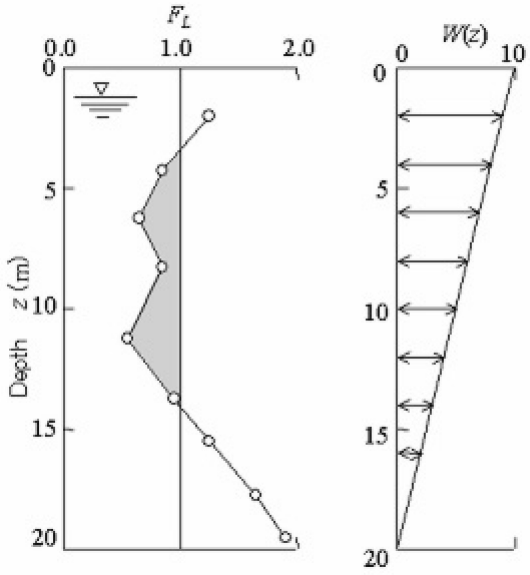
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) + 4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B + 0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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- R. E. S. Moss, R. B. Seed, R. E. Kayen, J. P. Stewart, A. Der Kiureghian, K. O. Cetin, CPT-Based Probabilistic and Deterministic Assessment of In Situ Seismic Soil Liquefaction Potential, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 132, No. 8, August 1, 2006

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INCREMENT NO. 1

GENERAL INFORMATION

G000	COVER SHEET
G101	REGULATORY SITE PLAN
G102	REGULATORY FLOOR PLANS AND EXISTING PARKING LAYOUT

CIVIL

TYPICAL INFORMATION

SD/X101	DETAILS
SD/X102	DETAILS

SITE DEVELOPMENT

SD/C100	TOPOGRAPHIC SURVEY LEGEND AND NOTES
SD/C101	TOPOGRAPHIC SURVEY
SD/C201	DEMOLITION PLAN
SD/C301	SITE PLAN
SD/C401	HORIZONTAL CONTROL PLAN
SD/C402	HORIZONTAL CONTROL PLAN TABLE
SD/C501	GRADING AND DRAINAGE PLAN
SD/C601	UTILITY PLAN

LANDSCAPE

SD/L101	IRRIGATION PLAN
SD/L102	IRRIGATION DETAILS
SD/L201	PLANTING PLAN
SD/L202	PLANTING DETAILS

ELECTRICAL

SD/E101	SITE DEVELOPMENT - SITE OVERALL ELECTRICAL PLAN
SD/E102	SITE DEVELOPMENT - SITE ELECTRICAL PLAN
X/E101	TYPICAL INFORMATION - ELECTRICAL SYSTEMS - SYMBOLS, NOTES, AND DETAILS
X/E102	TYPICAL INFORMATION - ELECTRICAL SYSTEMS - DETAILS AND DIAGRAMS

FIRE PROTECTION

SD/F101	FIRE PROTECTION SITE PLAN
SD/F102	FIRE PROTECTION VICINITY SITE PLAN
X/F101	FIRE PROTECTION UNDERGROUND DETAILS
X/F102	FIRE PROTECTION CITY STANDARDS

(25 - SHEETS TOTAL)

INCREMENT NO. 2

GENERAL INFORMATION

G000-2	COVER SHEET
G101-2	REGULATORY SITE PLAN (for reference only)
G102-2	REGULATORY FLOOR PLANS AND EXISTING PARKING LAYOUT (for reference only)

COVER DRAWING

T-0	COVER SHEET WITH DRAWING INDEX, DESIGN LOADS, BUILDING DESCRIPTION & CODE REFERENCES

ARCHITECTURAL DRAWINGS

A-1	OVERALL FLOOR PLANS
A-1.1	ENLARGED FLOOR PLANS
A-1.2	ENLARGED FLOOR PLANS
A-2	OVERALL CEILING PLANS
A-2.1	ENLARGED CEILING PLANS
A-2.2	ENLARGED CEILING PLANS
A-2.3	CANOPY CEILING PLAN
A-2A	CEILING DETAILS
A-2B	CEILING DETAILS
A-3	ARCHITECTURAL CROSS-SECTIONS
A-3.1	ARCHITECTURAL CROSS-SECTIONS
A-3.2	ARCHITECTURAL CROSS-SECTIONS
A-3.3	ARCHITECTURAL CROSS-SECTIONS
A-3.4	ARCHITECTURAL CROSS-SECTIONS
A-4	ARCHITECTURAL DETAILS
A-4.1	ARCHITECTURAL DETAILS
A-5	EXTERIOR ELEVATIONS
A-5.1	EXTERIOR ELEVATIONS
A-6	INTERIOR ELEVATIONS SINGLE BLDG.
A-6.1	INTERIOR ELEVATIONS CANOPY BLDG.
A-6.2	INTERIOR ELEVATIONS CANOPY BLDG.
A-7	INTERIOR FINISH SCHEDULES
A-7A	DOOR & WINDOW TYPES, SIGNAGE DETAILS & ACCESSIBLE MOUNTING HEIGHTS
A-7B	DOOR SCHEDULES
A-8	OVERALL ROOF PLAN
A-8.1	CANOPY ROOF PLAN
A-9	ARCHITECTURAL CROSS-SECTIONS

FOUNDATION DRAWINGS

SF-1	FOUNDATION PLAN
SF-2.1	FOUNDATION DETAILS
SF-2.2	FOUNDATION DETAILS
SF-2.3	FOUNDATION DETAILS

STRUCTURAL DRAWINGS

S-0	LIGHT GA. STEEL MEMBER SCHEDULE
S-1	CANOPY FRAMING PLAN
S-1.1	ROOF FRAMING PLAN
S-1.2	ROOF FRAMING PLAN
S-2	STRUCTURAL DETAILS
S-2A	STRUCTURAL DETAILS
S-3	STRUCTURAL CROSS-SECTION CLASSROOM
S-3.1	STRUCTURAL CROSS-SECTION TK KINDERGARTEN
S-3.2	WALKWAY CANOPY SECTION
S-3A	STRUCTURAL CROSS-SECTIONS AT CANOPY
S-3A.1	STRUCTURAL CROSS-SECTIONS AT CANOPY
S-3A.2	WALKWAY CANOPY STRUCTURAL DETAILS
S-3A.3	WALKWAY CANOPY STRUCTURAL DETAILS
S-4	WALL ANCHOR DETAILS
S-4.1	STRUCTURAL & MISC. DETAILS
S-5	WALL FRAMING ELEVATIONS SINGLE BLD'G.
S-5.1	WALL FRAMING ELEVATIONS DOUBLE BLD'G.

CAL-GREEN DRAWINGS

CG-1	CAL-GREEN COMPLIANCE DOCUMENTATION
CG-2	CAL-GREEN COMPLIANCE DOCUMENTATION
CG-3	CAL-GREEN COMPLIANCE DOCUMENTATION

MECHANICAL DRAWINGS

M0.1	MECHANICAL LEGEND, SCHEDULES AND NOTES
M2.1	MECHANICAL OVERALL FLOOR PLANS
M2.2	ENLARGED MECHANICAL PLANS & SECTIONS
M2.3	MECHANICAL OVERALL PIPING PLANS
M3.1	MECHANICAL OVERALL ROOF PLANS
M5.1	MECHANICAL DETAILS
M5.2	MECHANICAL DETAILS

PLUMBING DRAWINGS

P0.1	PLUMBING LEGEND, SCHEDULES AND NOTES
P2.1	PLUMBING OVERALL FLOOR PLANS - WASTE AND VENT
P2.2	PLUMBING OVERALL FLOOR PLANS - HOT AND COLD WATER
P5.1	PLUMBING DETAILS

TITLE 24 COMPLIANCE DRAWINGS

T-24A	TITLE 24 COMPLIANCE
T-24B	TITLE 24 COMPLIANCE
T-24C	TITLE 24 COMPLIANCE

ELECTRICAL DRAWINGS

E001	GENERAL NOTES
E002	ELECTRICAL DETAILS
E003	LIGHTING DETAILS
E100	LIGHTING PLAN
E200	ELECTRICAL PLAN
E201	ROOF ELECTRICAL PLAN
ET24A	COMPLIANCE
ET24B	COMPLIANCE
ET24C	COMPLIANCE
ET24D	COMPLIANCE
ET24E	COMPLIANCE

FIRE SPRINKLER DRAWINGS

FP-0.0	GENERAL NOTES AND RISER DETAIL
FP-0.1	SITE UNDERGROUND
FP-0.2	HANGER BRACING & PIPING DETAILS
FP-1.0	OVERHEAD PIPING PLAN & SECTIONS
FP-2.0	REFLECTED CEILING PLAN

ELECTRICAL

SD/E101	SITE DEVELOPMENT - SITE OVERALL ELECTRICAL PLAN
SD/E102	SITE DEVELOPMENT - SITE ELECTRICAL PLAN
X/E101	TYPICAL INFORMATION - ELECTRICAL SYSTEMS - SYMBOLS, NOTES, AND DETAILS
X/E102	TYPICAL INFORMATION - ELECTRICAL SYSTEMS - DETAILS AND DIAGRAMS
X/E201	TYPICAL INFORMATION - FIRE ALARM SYSTEM - SYMBOLS, NOTES, DETAILS, AND FA REFERENCE SITE PLAN
X/E202	TYPICAL INFORMATION - FIRE ALARM SYSTEM - SINGLE LINE DIAGRAM AND CALCULATIONS
X/E203	TYPICAL INFORMATION - FIRE ALARM SYSTEM - CALCULATIONS
X/E301	TITLE 24 COMPLIANCE - BLDG 700A, 700B DOCUMENTATION
X/E302	TITLE 24 COMPLIANCE - BUILDINGS 700B, 700C DOCUMENTATION
A/E101	BUILDINGS 700A AND 700B - ELECTRICAL PLANS
A/E201	BUILDING 700C - ELECTRICAL PLANS

(98 - SHEETS TOTAL)

NOTES:

The California Energy Code Section 10-103 requires Acceptance Testing on all newly installed lighting controls, mechanical systems, envelopes, and process equipment after installation and before project completion. An Acceptance Test is a functional performance test to help ensure that newly installed equipment is operating and in compliance with the Energy Code.

Lighting controls acceptance tests must be performed by a certified lighting controls Acceptance Test Technician (ATT).

Mechanical system acceptance tests must be performed by a certified mechanical ATT for projects submitted on or after October 1, 2021.

Envelope and process equipment acceptance tests shall be performed by the installing contractor, engineer/architect of record or the owner's agent.

A listing of certified ATT can be found at: https://www.energy.ca.gov/programs-and-topics/programs/acceptance-test-technician-certification-provider-program/acceptance.

The Acceptance Testing procedures must be repeated, and deficiencies must be corrected by the builder or installing contractor until the construction/installation of the specified systems conform and pass the required acceptance criteria.

Project inspectors will collect the forms to confirm that the required Acceptance Tests have been completed.

STATEMENT OF GENERAL CONFORMANCE

Application No.: 02-122955 INC. 02

File No.: 10-89

The drawings identified as follows:

☒ All drawing sheets included in this set not bearing my stamp and signature.

☐ Drawing sheets denoted in the sheet index as follows: _____

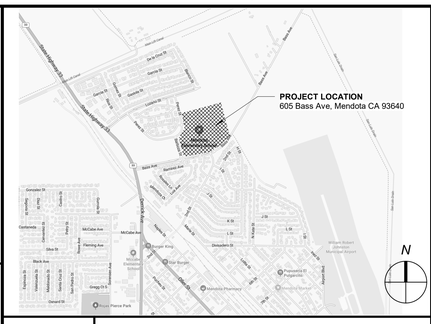
☐ Drawing sheets included under the following PC approval(s): _____

have been prepared by other design professionals or consultants who are licensed and authorized to prepare such drawings (plans) in this state. They have been examined by me for:

1. Design intent and appear to meet the appropriate requirements of Title 24, California Code of Regulations and the project specifications prepared by me, and
2. Coordination with my drawings (plans) and specifications and are acceptable for incorporation into the construction of this project.

Per Title 24, Part 1, Section 4-316(b): This Statement of General Conformance shall not be construed as relieving me of my rights, duties, and responsibilities under Sections17302 and 81138 of the Education Code and Sections 4-336, 4-341 and 4-344 of Title 24, Part 1.

Signature		Date
		04/30/25
Grant E. Dodson	C-20,307	6-30-25
Printed Name	**License Number**	**Expiration Date**



N14 | Vicinity Map

Not to Scale

All work shall be performed in accordance with current applicable codes and standards including, but not limited to, the following:

California Code of Regulations (CCR)
CCR-T5: Title 5-Education
CCR-T8: Title 8-Industrial Safety
CCR-T19: Title 19-Public Safety
CCR-Title 24:

Building Codes and Standards:

2022 California Building Standards Administrative Code (Part 1, Title 24, CCR)

2022 California Building Code, Volumes 1 and 2 (Part 2, Title 24, CCR)

2022 California Electrical Code (Part 3, Title 24, CCR)

2022 California Mechanical Code (Part 4, Title 24, CCR)

2022 California Plumbing Code (Part 5, Title 24, CCR)

2022 California Energy Code (Part 6, Title 24, CCR)

2022 California Elevator Safety Construction Code (Part 7, Title 24, CCR)

2022 California Fire Code, Part 9, Title 24, CCR)

2022 California Referenced Standards Code (Part 12, Title 24, CCR)

2022 California Green Building Standards Code

NFPA 13, 2022 Edition, The Installation of Automatic Sprinkler Systems

NFPA 14, 2019 Edition, Installation of Standpipe

NFPA 24, 2022 Edition, Installation of Private Fire Service Mains and their Appurtenances

NFPA 72, 2022 Edition, National Fire Alarm Code

Division of the State Architect (DSA):
SSS: Structural Safety Section
ACS: Access Compliance Section
FLS: Fire Life Safety
Interpretation of Regulation Manual

J14 | Applicable Codes

Notes:

1. The Contractor Shall Be Responsible For The Preparation and Submittal Of The Deferred Approval Items To The Division Of The State Architect (DSA) For Review and Approval Prior To The Installation. The Submittal Shall Comply With The Requirements Of Specification Section 013300: Submittals.
2. Fabrication and installation of Deferred Approval items shall not be started until Contractor's drawing, specifications, and engineering calculations for the actual system(s) to be installed have been reviewed by the Architect and/or the Structural Engineer, and approved by the DSA.

Description of Deferred Item
- None

G14 | Deferred Approval

INCREMENT NO. 1: Site Improvements

Improvements Associated Earthwork for New Modular Building Pad, Concrete Walk Path of Travel Improvements, Chain-Linked Fencing and Gates Replacement.

INCREMENT NO. 2: Modular Buildings

Construction of Modular Buildings

E14 | Project Description

FIRE SAFETY DURING CONSTRUCTION:
Contractor shall observe compliance with CBC Chapter 35 and CFC Chapter 33 - Fire Safety During construction and Demolition.

INTENT OF DRAWINGS:
The intent of these drawings and specification is that the work of the alteration, rehabilitation, or reconstruction is to be in accordance with Title 24, CCR. Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the contract documents wherein the finished work will not comply with Title 24, CCR, a construction change document (CCD), or a separate set of plans and specifications, detailing and specifying the required work shall be submitted to and approved by DSA before proceeding with the work. (Section 4-317(c), Part 1 Title 24, CCR). Changes to the approved drawings and specifications shall be made by an addendum or a construction change document (CCD) approved by the Division of the State Architect, as required by Section 4-338, PART 1, Title 24, CCR and DSA IR A-6.

SUBSTITUTIONS
Substitutions affecting DSA-regulated items shall be considered as construction documents (CCD's) and shall be approved prior to fabrication and installation per DSA IR A-6 and Section 338(c) Part 1, Title 24 CCR

CHANGES TO DRAWINGS:
Changes to the approved drawings and specifications shall be made by an Addendum or a Construction Change Documents (CCD) Approved by The Division of the State Architect, as required by Section 4-338, Part 1, Title 24, CCR.

LOCAL CODES:
Grading, drainage improvements, road and access requirements and environmental health considerations shall comply with all local ordinances.

PROJECT INSPECTOR:
A "DSA certified" Class 2 project inspector is required for this project. A "DSA certified" project inspector employed by the District (Owner) and approved by DSA shall provide continuous inspection of the work. The duties of the inspector are defined in Section 4-342, Part 1, Title 24, CCR.

TESTING LABORATORY:
A DSA accepted testing laboratory directly employed by the District (Owner) shall conduct all the required tests and inspections for the project.
No Demolition shall begin until plans including demolition work have been approved by DSA.

B14 | General Notes

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

ELECTRICAL
HCS ENGINEERING, INC.
4512 FEATHER RIVER DRIVE #F
STOCKTON, CA 95219
(209) 478-8270

MECHANICAL
TURLEY & ASSOCIATES
2431 CAPITOL AVE.
SACRAMENTO, CA 95816
T (916) 325-1065

STRUCTURAL
KAM YAN & ASSOCIATES
433 HEGENBERGER ROAD.
SUITE 200
OAKLAND, CA 94621
T (909) 613-0234

MODULAR MANU.
MEEHLEIS MODULAR BUILDINGS, INC.
500 E. LOVE AVE.
LODI, CA 95240
(209) 334-4637

ELECTRICAL
Hardin-Davidson Engineering
356 Pollasky Ave. Suite 200
Clovis, CA 93612
T (559) 323-4565
F (559) 323-4928

LANDSCAPE
Blair, Church & Flynn
451 Clovis Ave, Ste 200
Clovis, CA 93612
T (559) 326-1400
F (559) 326-1500

CIVIL
Blair, Church & Flynn
451 Clovis Ave. Ste 200
Clovis, CA 93612
T (559) 326-1400
F (559) 326-1500

ARCHITECTURAL
Darden Architects, Inc.
6790 N. West Avenue
Fresno, CA 93711
T (559) 448-8051
F (559) 446-1765

Mendota Elementary School - Inc. No. 02:
Modular Classroom Buildings

Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Darden Project Number: 2277
Date: 04/30/25

FOR REFERENCE ONLY

Project Information

darden architects
ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT
GRANT E. DODSON
No. C-20307
Exp. 6-30-25
STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date

Revision

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G000-2

Sheet: 1 of: 98

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BLDG. NO.	BUILDING PER ASSUMED PROPERTY LINE	OCCUPANCY GROUP (Section 305)	CONSTRUCTION TYPE (TABLE 601)	FIRE SPRINKLER SYSTEM	BASIC ALLOWABLE AREA CBC TABLE 506.2	ALLOWABLE AREA INCREASE FACTOR $I_f = (F/P - 0.25) \times W/30$ CBC 506.3	AUTOMATIC SPRINKLER SYSTEM INCREASE	INCREASED ALLOWABLE AREA $A_{aa} = A_a + (NS \times I_f)$	ACTUAL BUILDING AREA (FLOOR AREA + COVERED AREA)	FIRE FLOW AND DURATION (CFC Table BB105.1)	DSA APPLICATION NUMBER	APPLICABLE BUILDING CODE	REMARKS
700 (A&B)	Classrooms	E	Type V-B	Fully Fire Sprinklered	9,500 SF	No Side Yard Increase Required	28,500	N/A	6,400 + 4,552 = 10,952	1698 GPM at 20 PSI for 2 hrs	02-122955 INCREMENT 2	CBC 2022	
	Building								10,952 SF				
700 (C)	Classrooms	E	Type V-B	Fully Fire Sprinklered	9,500 SF	No Side Yard Increase Required	28,500	N/A	3,200 + 882 = 4,082	1698 GPM at 20 PSI for 2 hrs	02-122955 INCREMENT 2	CBC 2022	
	Building								4,082 SF				

P6 — Building Data Table

NTS

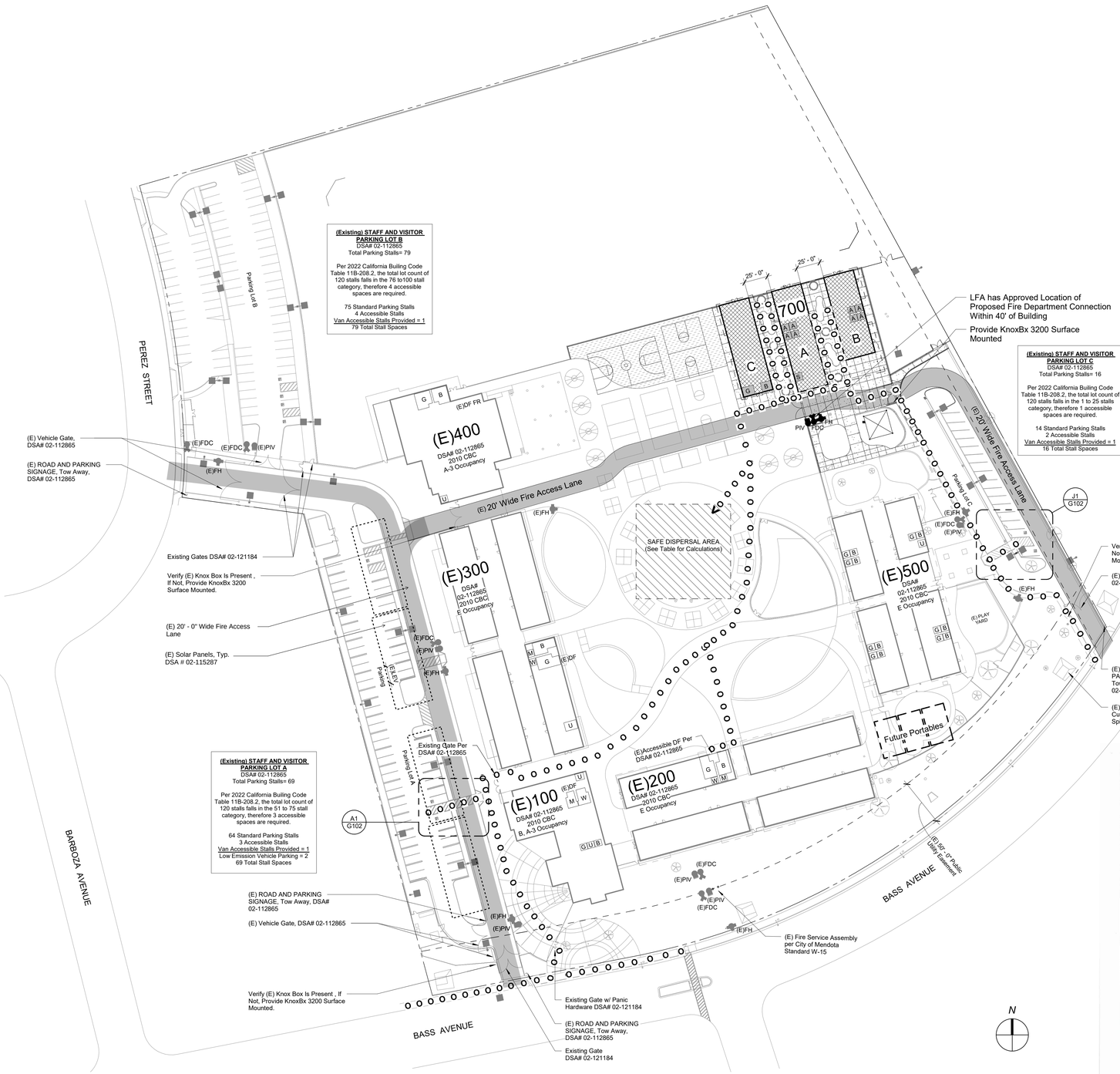
(Existing) Under CBC 2010

BLDG. NO.	BUILDING PER ASSUMED PROPERTY LINE	OCCUPANCY GROUP (Section 303)	CONSTRUCTION TYPE (TABLE 601)	FIRE SPRINKLER SYSTEM	DSA APPLICATION NUMBER	DSA APPROVAL DATES	REMARKS
100	Administration & Staff	B	Type V-B	Fully Fire Sprinklered	DSA 02-112865	2013	4
	Library	A-3	Type V-B	Fully Fire Sprinklered	DSA 02-112865	2013	
	Building				DSA 02-112865	2013	
200	Classrooms	E	Type V-B	Fully Fire Sprinklered	DSA 02-112865	2013	
	Building				DSA 02-112865	2013	
300	Classrooms	E	Type V-B	Fully Fire Sprinklered	DSA 02-112865	2013	2
	Building				DSA 02-112865	2013	
400	Multipurpose (Non-Seperated)	A-3	Type V-B	Fully Fire Sprinklered	DSA 02-112865	2013	2,3
	Building				DSA 02-112865	2013	
500	Classrooms	E	Type V-B	Fully Fire Sprinklered	DSA 02-112865	2013	2,3
	Building				DSA 02-112865	2013	

N13 — Existing Building Data Table

1/4" = 1'-0"

SAFE DISPERSAL AREA	AREA REQUIRED (sq.ft.)	AREA PROVIDED (sq.ft.)
800 Existing Students x (5 sq.ft. / person) Per DSA# 02-112865	4,000 sq.ft.	
404 New Occupants x (5 sq.ft. / person)	2,020 sq.ft.	
Total:	6,020 sq.ft.	Existing safe dispersal area DSA# 02-112865 10,000 sq.ft.



WATER FLOW REQUEST

This form is to be used by fire sprinkler contractors to request the water flow for the project location specified. Complete Section 1 and send to Fresno County Fire Protection District. This form, with both Sections 1 and 2 completed, must be submitted to Fresno County Fire Protection District with the fire sprinkler plans.

SECTION 1

REPORT DATE: 2/20/2024	COMPANY REQUESTING FLOW INFORMATION: Mendota Unified School District
COMPANY ADDRESS: 115 McCabe Ave	CITY: Mendota / STATE: CA
COMPANY PHONE NUMBER: 559-655-4942	FAX NUMBER: 559-655-4944
CONTACT PERSON: Jose Alcaide	EMAIL: (Contact Person) jalcaide@mendotaschools.org
PROJECT NAME: Mendota Elementary School	PROJECT LOCATION: 605 Bass Ave Mendota, CA
STREET WHERE WATER SERVICE WILL BE OBTAINED FROM: Bass Ave	

Do not write below this line – To be completed by Fresno County Fire Protection District

SECTION 2

LOCATION OF TESTED HYDRANT: Outside of Main Entrance		
DATE HYDRANT FLOWED: 3/28/2024	TIME HYDRANT FLOWED: 11:30	HYDRANT NUMBER or ID: N/A
STATIC: 63 PSI	RESIDUAL: 45 PSI	PITOT: 40 PSI
FLOW: 1698 GPM @ 20 PSI	COMMENTS:	
INFORMATION SENT BY: ☐ Fax ☐ Phone ☐ Mail • E-Mail By: John Blalock		Date: 4/2/2024

Revision: 3/30/11

DSA 810

FIRE & LIFE SAFETY SITE CONDITIONS SUBMITTAL

Division of the State Architect (DSA) documents referenced within this publication are available on the DSA Forms or DSA Publications webpages.

To facilitate the Division of the State Architect's (DSA) fire and life safety plan review of project site conditions, DSA requires the design professional to provide the following information at time of project submittal for projects consisting of construction of a new campus, construction of new building(s), additions to existing buildings, and for site alternate design means for fire department emergency vehicle access, and fire suppression water supply.

Information associated with compliance items 1 through 3 below is to be provided for all project types indicated above. Information associated with items 4 through 7 is to be completed when an alternate means is utilized. Acknowledgement by the school district and signature from the Local Fire Authority (LFA) is only required when an alternate design means is being requested.

The Project Information and Fire & Life Safety Information sections are to be completed for all projects and imaged onto the fire access site plan. When an alternate design/means is proposed, all sections on pages 1 and 2 are to be completed and imaged on the fire access site plan.

For additional information refer to the instructions at the end of this form and DSA Policy *PL 09-01: Fire Flow for Buildings.*

PROJECT INFORMATION	
School District/Owner	Mendota Unified School District
Project Name/School	Mendota Elementary School - Modular Classroom Buildings
Project Address	605 Bass Ave, Mendota Elementary School

FIRE & LIFE SAFETY INFORMATION				
1.	Has a fire hydrant flow test been performed within the past 12 months? (If yes, provide a copy of the test data.)	Yes ☑	No ☐	
2.	Was the fire hydrant water flow test performed as part of this LFA review?	Yes ☑	No ☐	
3.	Is the project located within a designated fire hazard severity zone (FHSZ) as established by Cal-Fire? (If yes, indicate FHSZ classification below.)	Yes ☐	No ☑	
	Refer to the following website for FHSZ locations: Fire Hazard Severity Zones in State Responsibility Area	Moderate ☐	High ☐	Very High ☐
	Wildland Interface Area (WFA) (If any designations are checked, project design must meet the requirements of CBC Chapter 7A.)			WFA ☐

DGS DSA 810 (revised 12/29/20) DEPARTMENT OF GENERAL SERVICES Page 1 of 4
DIVISION OF THE STATE ARCHITECT STATE OF CALIFORNIA

DSA 810
FIRE & LIFE SAFETY SITE CONDITIONS SUBMITTAL

CONDITION MEANS AND METHODS RESOLUTION		ALTERNATE ACCEPTED		
		Yes	No	N/A
4.	Emergency vehicle access roadways do not meet CFC requirements.			✔
4a.	**Acceptable Alternate:** Emergency vehicle and personnel access as proposed by the project architect is acceptable for providing fire suppression and protection of life and property.			
5.	**Fire Hydrants:** Number and spacing does not meet CFC requirements.			✔
5a.	**Acceptable Alternate:** Number of fire hydrants and spacing as proposed by the project architect is acceptable for fire suppression and protection of life and property.			
6.	**Fire Hydrants:** Water flow and pressure are less than CFC minimum.			✔
6a.	**Acceptable Alternate:** The available flow and pressure is acceptable for providing fire suppression and protection of life and property.			
7.	Location of fire department connection(s) serving fire sprinkler systems or standpipe systems does not meet CFC requirements.			✔
7a.	**Acceptable Alternate:** The location of fire department connection serving the fire sprinkler system and/or standpipe system is acceptable for providing fire suppression and protection of life and property.	✔		

School District Acceptance of Acceptable Design Alternates

By signing this form, the school district acknowledges and accepts the proposed design as an alternative to California Building Code (CBC) and California Fire Code (CFC) minimum requirements, as indicated by one or more of the conditions indicated at items 4a, 5a, 6a or 7a, for providing fire and life safety protection of life and property.

Accepted by: Jose M. Alcaide Title: CBO

Signature: Jose M. Alcaide Date: 5-21-2025

LOCAL FIRE AUTHORITY (LFA) INFORMATION			
LFA Agency Name:	FRESNO COUNTY FIRE PROTECTION DISTRICT		
LFA Review Official:	TIMOTHY S. TAM		
Title:	PLANS EXAMINER	Work Phone:	559-274-3925
Work Email:	TST-TAM@GMAIL.COM		

LFA Reviewer's Signature: Date: 2/7/25

THE AVAILABLE FIRE FLOW AND FDC PLACEMENT ARE ACCEPTABLE

DGS DSA 810 (revised 12/29/20) DEPARTMENT OF GENERAL SERVICES Page 2 of 4
DIVISION OF THE STATE ARCHITECT STATE OF CALIFORNIA

FRESNO COUNTY FIRE
PROTECTION DISTRICT

210 South Academy Avenue
Sanger, California 93657
Telephone: (559) 493-4359
Fax: (559) 875-7451
www.fresnocountyfire.org

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

SYMBOLS

- Accessible Path of Travel
- Existing Fire Truck Access Lane
- FH — PLUMBING, Fire Hydrant (FH)
- FDC — PLUMBING, Fire Department Connection (FDC) (Siamese)
- PIV — PLUMBING, Post Indicator Valve (PIV),
- ELECTRICAL, Light Pole
- Accessible Restroom Location: B = Boys, G = Girls, M = Men, W = Women, A = All Gender "Students", S = Staff
- PER THIS APPLICATION
- AS APPROVED BY PREVIOUS APPLICATION
- Existing Building not included in this project
- New Addition and Existing Building included in this project

ABBREVIATIONS

DF ACCESSABLE DRINKING FOUNTAIN LOCATION (-HA = High Adult) (-LA = Low Adult)

NOTES

1. Site Gates, Site Ramps, and Site Stair locations in the "Path of Travel" are indicated on Drawing REGULATORY COMPLAINCE SITE PLAN and FLOOR PLAN
2. The Path of Travel slopes shall not exceed a running slope of 1:20 (5%) The Path of Travel slopes shall not exceed a Cross Slope of 1:50 (2%). The Path of Travel shall not have overhead obstructions within 80" above the walking surface or obstructions protruding more than 4" between 27" and 80" above the walking surface.
3. All new concrete surface within the "Path of Travel" shall have a non-slip medium broom finish as called for in Specification Section CAST-IN-PLACE CONCRETE. A heavy broom finish shall be used on all slopes greater than 6%.

REMARKS

"Design Professional in General Responsible Charge Statement: The POT identified in these construction documents meets the requirements of the current applicable California Building Code (CBC) accessibility provisions **for path of travel requirements for alterations, additions and structural repairs.** As part of the design of this project, the POT was examined and any elements, components or portions of the POT that were determined to be noncompliant with the CBC have been identified and the corrective work necessary to bring them into compliance has been included within the scope of this project's work through details, drawings and specifications incorporated into these construction documents. Any noncompliant elements, components or portions of the POT that will not be corrected by this project based on valuation threshold limitations or a finding of unreasonable hardship are indicated in these construction documents.

During construction, if POT items within the scope of the project represented as CBC compliant are found to be nonconforming beyond reasonable construction tolerances, the items shall be brought into compliance with the CBC as a part of this project by means of a construction change document."

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640

Project

GENERAL INFORMATION
REGULATORY SITE PLAN

Drawing

darden architects
ARCHITECTURE
PLANNING
INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT ROBERT E. DARDEN No. C-26307 Exp. 6-30-25 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date

Revision

Designed By: GD
Drawn By: RM
Checked By: GD
Reviewed By: GD

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Scale: As indicated
Project Number: 2277
Date: 05/22/25

G101-2

A1
1" = 50'-0"
REGULATORY SITE PLAN

5/22/2025 8:43:54 AM
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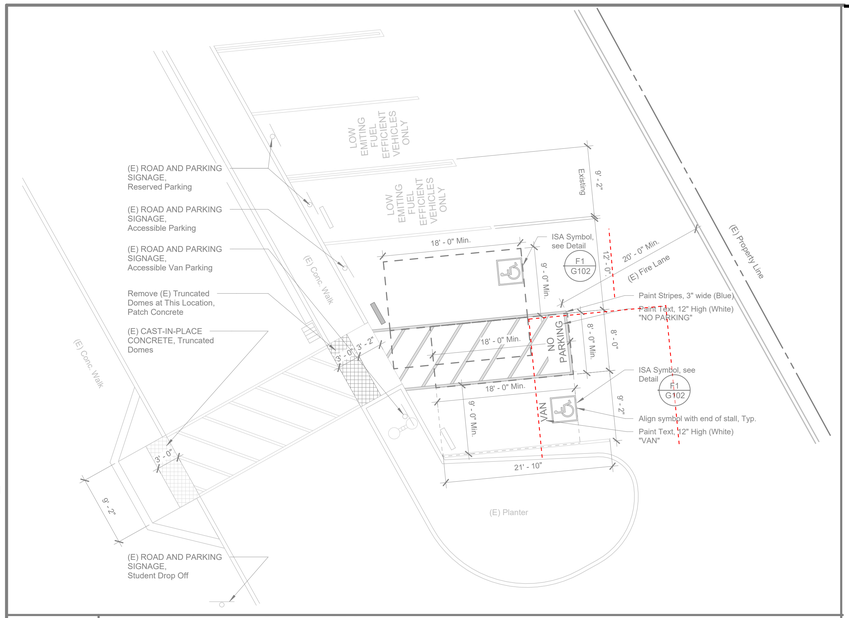
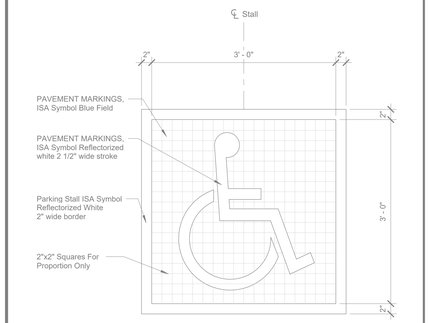
FOR REFERENCE ONLY



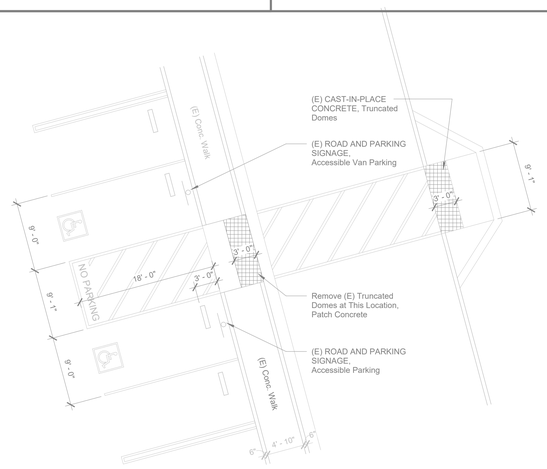
J1
1/8" = 1'-0"

(Existing) Staff and Visitor Parking - LOT C,
DSA# 02-112865 Reference Only



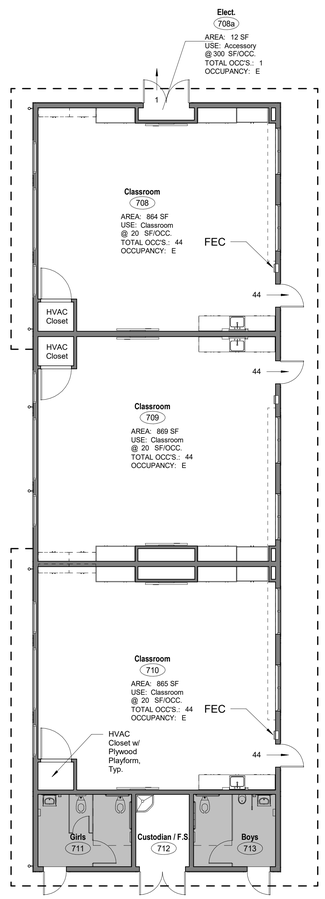
F1
1" = 1'-0"

PAVMENT,
ISA Symbol @ Parking Stall



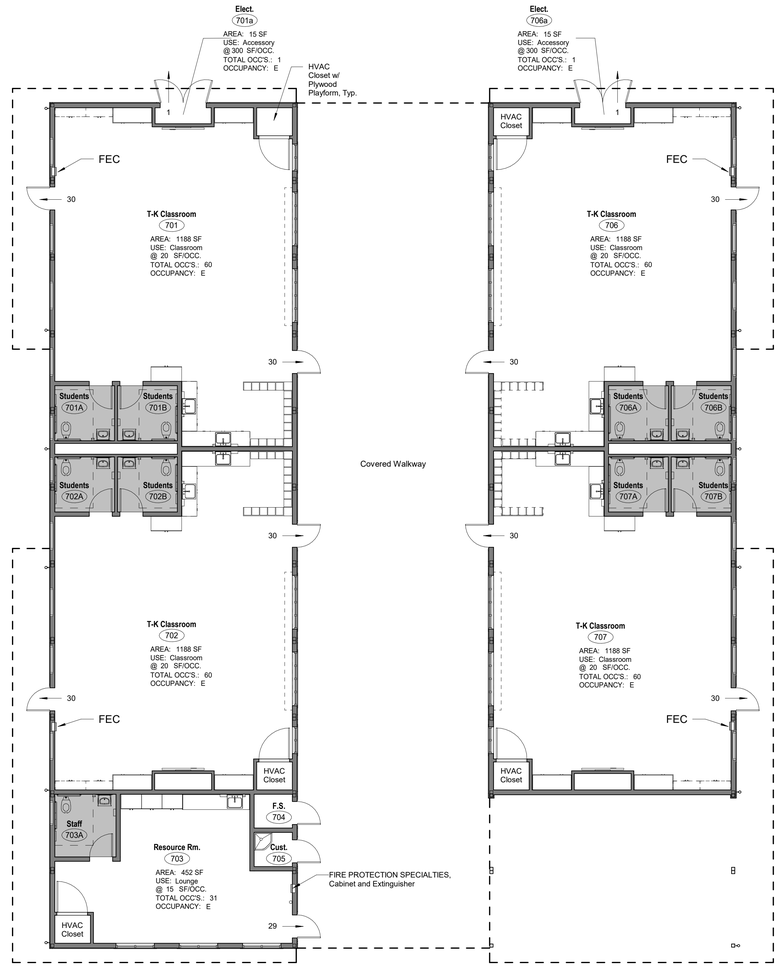
A1
1/8" = 1'-0"

(Existing) Staff and Visitor Parking - LOT A,
DSA# 02-112865 Reference Only



A7
1/8" = 1'-0"

Regulatory Floor Plan - Building 700C



A11
1/8" = 1'-0"

Regulatory Floor Plan - Building 700A and 700B

DSA File No.:
10-89

DSA Application No.:
02-122955

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

SYMBOLS

→ Indicates Exit Occupant Loading

A Indicates Required Accessible Clearance Space

B G
Accessible Restroom Location:
B = Boys
G = Girls
M = Men
W = Women
A = All Gender "Students"
S = Staff

ABBREVIATIONS

DF ACCESSIBLE DRINKING FOUNTAIN LOCATION
(-HA = High Adult)
(-LA = Low Adult)

FEC FIRE PROTECTION SPECIALTIES, Fire Extinguisher and Cabinet. Provide Fire Rated Cabinet at Rated Walls.

J18
No Scale

Regulatory Compliance Floor Plan Legend

REFERENCE ONLY

FOR R

General Notes

Consultant

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

GENERAL INFORMATION
REGULATORY FLOOR PLANS AND EXISTING PARKING LAYOUT
Drawing

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ARCHITECTURE
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www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT
DAVID E. DARDEN
No. C-26197
Exp. 6-30-26
STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date

Revision

Designed Designer
Drawn By: Author
Checked tChecker
Reviewed Approver

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Scale: 1/8" = 1'-0"
Project Number: 2277
Date: 04/30/25

G102-2

5/21/2025 4:35:34 PM
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PROJECT NAME AND ADDRESS:

INCREMENT NO. 2
MENDOTA ELEM. SCHOOL CLASSROOMS FOR MENDOTA UNIFIED SCHOOL DISTRICT
(MENDOTA 2)
605 BASS AVENUE MENDOTA, CA 93640

GEOTECHNICAL INFORMATION

SEE GEOTECHNICAL ENGINEERING INVESTIGATION AND GEOLOGIC HAZARDS EVALUATION REPORT: PROPOSED NEW CLASSROOMS MENDOTA ELEM. SCHOOL AS PREPARED BY BSK ASSOCIATES & DATED APRIL Ø, 2024 PREPARED FOR MENDOTA UNIFIED SCHOOL DISTRICT, BSK PROJECT NO. G24000166

INCREMENTAL SCOPE OF WORK

INCREMENT 1: (SITE IMPROVEMENTS)
IMPROVEMENTS ASSOCIATED WITH EARTHWORK FOR NEW MODULAR BUILDING PAD, CONCRETE WALK, PATH OF TRAVEL IMPROVEMENTS, CHAIN-LINKED FENCING AND GATES REPLACEMENT.

INCREMENT 2: (MODULAR BUILDINGS)
CONSTRUCTION OF (2) MODULAR BUILDINGS 700-C & 700-K

DEFERRED APPROVAL ITEMS:

1. NONE

NOTE:

FABRICATION OF DEFERRRED SUBMITTAL ITEMS SHALL NOT BE STARTED UNTIL CONTRACTOR'S DRAWINGS, SPECIFICATIONS AND ENGINEERING CALCULATIONS FOR THE ACTUAL SYSTEMS TO BE INSTALLED HAVE BEEN ACCEPTED AND SIGNED BY THE ARCHITECT OR STRUCTURAL ENGINEER OF RECORD AND HAVE BEEN APPROVED BY DSA

ADDITIONAL INFORMATION:

SELECTION OF THE PROJECT INSPECTOR & TESTING AGENCY SHALL BE BY THE DISTRICT AND SHALL BE APPROVED BY DSA AND THE ARCHITECT/ENGINEER OF RECORD

COST OF THE PROJECT INSPECTOR (TITLE 24, PART 1 | SECTION 4-333(b)) & TESTING AGENCY (TITLE 24, PART 1 SECTION 4-335) SHALL BE BY THE SCHOOL DISTRICT.

APPLICABLE CODES

2022 CALIFORNIA ADMINISTRATIVE CODE (PART 1, TITLE 24, CCR)

2022 CALIFORNIA BUILDING CODE, VOLUMES 1 AND 2 (PART 2, TITLE 24, CCR) (2021 EDITION INTERNATIONAL BUILDING CODE WITH 2022 CALIFORNIA AMENDMENTS)

2022 CALIFORNIA ELECTRICAL CODE (PART 3, TITLE 24, CCR) (2020 EDITION NATIONAL ELECTRICAL CODE WITH 2022 CALIFORNIA AMENDMENTS)

2022 CALIFORNIA MECHANICAL CODE (PART 4, TITLE 24, CCR) (2021 EDITION IAPMO UNIFORM MECHANICAL CODE WITH 2022 CALIFORNIA AMENDMENTS)

2022 CALIFORNIA PLUMBING CODE (PART 5, TITLE 24, CCR) (2021 EDITION IAPMO UNIFORM PLUMBING CODE WITH 2022 CALIFORNIA AMENDMENTS)

2022 CALIFORNIA ENERGY CODE (PART 6, TITLE 24, CCR)

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE (PART 11, TITLE 24, CCR)

2022 CALIFORNIA FIRE CODE (PART 9, TITLE 24, CCR) (2021 EDITION INTERNATIONAL FIRE CODE WITH 2022 CALIFORNIA AMENDMENTS)

2022 CALIFORNIA REFERENCED STANDARDS CODE (PART 12, TITLE 24, CCR)

NFPA 13, 2022 EDITION, THE INSTALLATION OF AUTOMATIC SPRINKLER SYSTEMS, AS AMENDED

NFPA 72, 2022 EDITION, NATIONAL FIRE ALARM CODE, AS AMENDED

NFPA 14, 2019 EDITION, INSTALLATION OF STANDPIPE, PRIVATE HYDRANT AND HOSE SYSTEMS

NFPA 24, 2022 EDITION, INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES

MMBI ABBREVIATIONS

A.B.	AGGREGATE BASE OR ANCHOR BOLT	F.A.	FIRE ALARM	N.	NORTH	T & B	TOP AND BOTTOM
A/C	ASPHALTIC CONCRETE	F.D.	FLOOR DRAIN	N.I.C.	NOT IN CONTRACT	T & G	TONGUE AND GROOVE
A.D.	AREA DRAIN	F.E.	FIRE EXTINGUISHER	N.T.S.	NOT TO SCALE	T.O.B.	TOP OF BLOCK
A.S.T.M.	AMERICAN SOCIETY FOR TESTING AND MATERIALS	F.F.	FINISH FLOOR	NO.	NUMBER	T.O.C.	TOP OF CURB OR CONCRETE
		F.G.	FINISH GRADE			T.O.S.	TOP OF SLAB
ACOUST.	ACOUSTICAL	F.H.	FLAT HEAD	O/	OVER	T.P.D.	TOILET PAPER DISPENSER
ADD.	ADDITIONAL	F.N.	FIELD NAILING	O.C.	ON CENTER	TEL.	TELEPHONE
ALT.	ALTERNATE	F.O.B.	FACE OF BLOCK	O.D.	OUTSIDE DIMENSION OR DIAMETER	THRESH.	THRESHOLD
ALUM.	ALUMINUM	F.O.C.	FACE OF CURB OR CONCRETE	O.H.	OVERHANG	TYP.	TYPICAL
ARCH.	ARCHITECTURAL	F.O.S.	FACE OF STUD	OBS.	OBSCURE		
AUTO.	AUTOMATIC	FIN.	FINISH	O.F.C.I.	OWNER FURNISHED AND CONTRACTOR INSTALLED	U.B.C.	UNIFORM BUILDING CODE
		FLR.	FLOOR			U.L.	UNDERWRITERS LABORATORY
BD.	BOARD	FOUND.	FOUNDATION	OPEN.	OPENING	U.O.N.	UNLESS OTHERWISE NOTED
BLD'G.	BUILDING	FRP.	FIBERGLASS REINFORCED PANEL	OPP.	OPPOSITE		
BLK.	BLOCK	FT.	FEET			V.C.T.	VINYL COMPOSITION TILE
BLK'G.	BLOCKING	FTG.	FOOTING	P.L.	PROPERTY LINE	VERT.	VERTICAL
BM.	BEAM			P. LAM.	PLASTIC LAMINATED		
BOT.	BOTTOM	G.I.	GALVANIZED IRON	P.P.	PARTIAL PENETRATION	W.	WEST
C.B.C.	CALIFORNIA BUILDING CODE	GA.	GAUGE	P.S.F.	POUNDS PER SQUARE FOOT	W/	WITH
C.B.	CATCH BASIN	GALV.	GALVANIZED	P.S.I.	POUNDS PER SQUARE INCH	W/O	WITH OUT
C.C.R.	CALIFORNIA CODE OF REGULATIONS	GR.	GRADE	P.T.D.F.	PRESSURE TREATED DOUGLAS FIR	W.C.	WATER CLOSET
C.E.F.	CEILING EXHAUST FAN	GYP.	GYPSUM	PERF.	PERFORATED	W.H.	WATER HEATER
C.I.	CAST IRON	GYP. BD.	GYPSUM BOARD	PL.	PLATE	W.P.	WATER PROOF
C.J.	CONSTRUCTION JOINT			PLYWD.	PLYWOOD	W.S.	WOOD SCREWS
C.L.	CHAIN LINK	H.B.	HOSE BIB	PORT.	PORTABLE	WD.	WOOD
C.O.T.G.	CLEAN OUT TO GRADE	H.C.	HOLLOW CORE	PR.	PAIR	W.SCT.	WAINSCOAT
C.P.	COMPLETE PENETRATION	H.D.	HOT DIPPED	PRE-FAB.	PRE FABRICATED		
CAB.	CABINET	HD. WD.	HARD WOOD	P.H.	PANIC HARDWARE		
CER.	CERAMIC	HORIZ.	HORIZONTAL				
CHK. BD.	CHALK BOARD	HR.	HOUR	R.A.G.	RETURN AIR GRILL		
CLG.	CEILING	HSS.	HOLLOW STEEL SECTION	RB.	RUBBER BASE		
COL.	COLUMN	HT.	HEIGHT	RD.	ROOF DRAIN		
CONC.	CONCRETE			R.O.	ROUGH OPENING		
CONT.	CONTINUOS	I.C.C.	INTERNATIONAL CODE COUNCIL	RWL.	RAIN WATER LEADER		
D.F.	DRINKING FOUNTAIN OR DOUGLAS FIR	ID.	INSIDE DIMENSION OR DIAMETER	REINF.	REINFORCING		
D.I.	DRAIN INLET	IN.	INCH	REQ'D	REQUIRED		
D.S.	DOWN SPOUT	INFO.	INFORMATION	RET.	RETURN		
DBL.	DOUBLE	INSUL.	INSULATION	RM.	ROOM		
DET.	DETAIL	INT.	INTERIOR	RWD.	REDWOOD		
DIA.	DIAMETER						
DIM.	DIMENSION	JAN.	JANITOR	S.	SOUTH		
DN.	DOWN	JST.	JOIST	S.A.D.	SUPPLY AIR DIFFUSER		
DR.	DOOR			S.A.R.	SUPPLY AIR REGISTER		
DRWG. OR DWG	DRAWING	K.D.	KNOCK DOWN	S.C.	SOLID CORE		
				S.C.D.	SEAT COVER DISPENSER		
E.	EAST	L.B.	LAG BOLT	S.D.	STORM DRAIN OR SOAP DISPENSER		
E.J.	EXPANSION JOINT	LAV.	LAVATORY	SH.	SHEET METAL		
E.N.	EDGE NAILING	LB.	POUND	S.M.S.	SHEET METAL SCREW		
E.S.	EACH SIDE	LT. WT.	LIGHT WEIGHT	S.N.D.	SANITARY NAPKIN DISPENSER		
E.W.	EACH WAY			S.N.R.	SANITARY NAPKIN RECEPTACLE		
EA.	EACH	M.B.	MACHINE BOLT	SCHED.	SCHEDULE		
EL. OR ELEV.	ELEVATION	M.D.O.	MEDIUM DENSITY OVERLAY	SERV.	SERVICE		
ELECT.	ELECTRICAL	MH.	MAN HOLE	SHT.	SHEET		
EQ.	EQUAL	MACH.	MACHINE	SIM.	SIMILAR		
EQUIP.	EQUIPMENT	MAX.	MAXIMUM	SL.	SLIDING		
EXIST.	EXISTING	MECH.	MECHANICAL	SPEC.	SPECIFICATION		
EXP.	EXPANSION	MEMB.	MEMBRANE	SQ.	SQUARE		
EXT.	EXTERIOR	MFR.	MANUFACTURER	STD.	STANDARD		
EXTNG.	EXTINGUISHER	MIN.	MINIMUM	ST.F. PL.	STIFFENER PLATE		
		MISC.	MISCELLANEOUS	STOR.	STORAGE		
		MTD.	MOUNTED	STRUCT.	STRUCTURAL		
		MTL.	METAL				

MMBI SYMBOLS

- (4) — WINDOW TYPE A ON FLOOR PLAN & SCHEDULE
- (A) — DOOR TYPE A ON FLOOR PLAN & SCHEDULE
- (3) — REFERS TO NOTE NO. 3
- (4 / A-4) — REFERS TO DETAIL NO.4 ON SHEET A-4
- 99|234 — MODULE NO. 99|234

BUILDING 700-C DESCRIPTION (SINGLE TYPICAL CLASSROOM BUILDING)

BULDING: (100'-0"x32'-0" ONE STORY FIRE SPRINKLED BULDING WITH 10'-0"x32'-0" MODULES)

3200 SQ. FT.
OCCUPANT LOAD FACTOR PER CBC TABLE 1004.5 - BULDING PROPOSED OCCUPANT LOAD = 191

CONSTRUCTION TYPE: V-B CONSTRUCTION
OCCUPANCY TYPE: E OCCUPANCY
RIGID FRAME BULDING (BOTH DIRECTIONS)

ROOF COVERED AREA: 4081 S.F.
TOTAL BLDG. AREA: 3200 S.F.
ALLOWABLE AREA: 24000 S.F.

BUILDING 700-C DESIGN LOADS (SINGLE TYPICAL CLASSROOM BUILDING)

OCCUPANCY CATEGORY = III
SITE CLASS = E (PER GEOTECHNICAL REPORT)
RELIABILITY/REDUNDANCY FACTOR per ASCE 7 SEC. 12.3.4.2 ρ = 1.0

MCE Spectral Response Acceleration @ Short Period,	S_s	0.832	Per Geotechnical Report
Site Coefficient,	F_a	1.300	Per Geotechnical Report
Adjusted MCE S.R. Acceleration @ Short Period,	S_{MS}	1.160	Per Geotechnical Report
Design S.R. Acceleration @ Short Period,	S_{DS}	0.773	Per Geotechnical Report
MCE Spectral Response Acceleration @ 1 sec. Period,	S_1	0.321	Per Geotechnical Report
Site Coefficient,	F_V	2.800	Per Geotechnical Report
Adjusted MCE S.R. Acceleration @ 1 sec. Period,	S_{M1}	0.899	Per Geotechnical Report
Design S.R. Acceleration @ 1 sec. Period,	S_{D1}	0.599	Per Geotechnical Report
Seismic Design Category,	SDC	D	ASCE 7-16 Table 12.6-1 & 2
Importance Factor,	I	1.25	2022 CBC Table 1604.5.5
Seismic Force Resisting System Coefficient,	R	3.5	ASCE 7-16 Table 12.2-1
ordinary moment frame system	C_d	3.0	
	Ω_0	3	ASCE 7-16 Table 12.2-1 Line A16
	C_t	0.028	
	x	0.8	
	H_n(ft)	12	
	T_a (s)	0.20	
	K	1	

ROOF LIVE LOAD: (TYP. U.O.N.) 20 P.S.F. (REDUCIBLE FOR TRIBUTARY AREA).
FLOOR LIVE LOAD (TYP. U.O.N.) 100 P.S.F.

BUILDING 700-K DESCRIPTION (DOUBLE KINDERGAREN CLASSROOM BUILDING)

BULDING: (10'-0"x32'-0" ONE STORY FIRE SPRINKLED BULDING WITH 10'-0"x32'-0" MODULES)
AND A
(90'-0"x32'-0" ONE STORY FIRE SPRINKLED BULDING WITH 10'-0"x32'-0" MODULES)

6400 SQ. FT.
OCCUPANT LOAD FACTOR PER CBC TABLE 1004.5 - BULDING PROPOSED OCCUPANT LOAD = 246

CONSTRUCTION TYPE: V-B CONSTRUCTION
OCCUPANCY TYPE: E OCCUPANCY
RIGID FRAME BULDING (BOTH DIRECTIONS)

ROOF COVERED AREA: 6952 S.F.
TOTAL BLDG. AREA: 6400 S.F.
ALLOWABLE AREA: 24000 S.F.

BUILDING 700-K DESIGN LOADS (DOUBLE KINDERGAREN CLASSROOM BUILDING)

OCCUPANCY CATEGORY = III
SITE CLASS = E (PER GEOTECHNICAL REPORT)
RELIABILITY/REDUNDANCY FACTOR per ASCE 7 SEC. 12.3.4.2 ρ = 1.0

MCE Spectral Response Acceleration @ Short Period,	S_s	0.832	Per Geotechnical Report
Site Coefficient,	F_a	1.300	Per Geotechnical Report
Adjusted MCE S.R. Acceleration @ Short Period,	S_{MS}	1.160	Per Geotechnical Report
Design S.R. Acceleration @ Short Period,	S_{DS}	0.773	Per Geotechnical Report
MCE Spectral Response Acceleration @ 1 sec. Period,	S_1	0.321	Per Geotechnical Report
Site Coefficient,	F_V	2.800	Per Geotechnical Report
Adjusted MCE S.R. Acceleration @ 1 sec. Period,	S_{M1}	0.899	Per Geotechnical Report
Design S.R. Acceleration @ 1 sec. Period,	S_{D1}	0.599	Per Geotechnical Report
Seismic Design Category,	SDC	D	ASCE 7-16 Table 12.6-1 & 2
Importance Factor,	I	1.25	2022 CBC Table 1604.5.5
Seismic Force Resisting System Coefficient,	R	3.5	ASCE 7-16 Table 12.2-1
ordinary moment frame system	C_d	3.0	
	Ω_0	3	ASCE 7-16 Table 12.2-1 Line A16
	C_t	0.028	
	x	0.8	
	H_n(ft)	18	
	T_a (s)	0.28	
	K	1	

ROOF LIVE LOAD: (TYP. U.O.N.) 20 P.S.F. (REDUCIBLE FOR TRIBUTARY AREA).
FLOOR LIVE LOAD (TYP. U.O.N.) 100 P.S.F.

DRAWING INDEX

SHEET	DESCRIPTION
	COVER DRAWING
T-0	COVER SHEET WITH DRAWING INDEX, DESIGN LOADS, BULDING DESCRIPTION & CODE REFERENCES
	ARCHITECTURAL DRAWINGS
A-1	OVERALL FLOOR PLANS
A-1A	EXITING FLOOR PLANS
A-1.1	ENLARGED FLOOR PLANS
A-1.2	ENLARGED FLOOR PLANS
A-2	OVERALL CEILING PLANS
A-2.1	ENLARGED CEILING PLANS
A-2.2	ENLARGED CEILING PLANS
A-2.3	CANOPY CEILING PLAN
A-2A	CEILING DETAILS
A-2B	SOFFIT DETAILS
A-3	ARCHITECTURAL CROSS-SECTIONS
A-3.1	ARCHITECTURAL CROSS-SECTIONS
A-3.2	ARCHITECTURAL CROSS-SECTIONS
A-3.3	ARCHITECTURAL CROSS-SECTIONS
A-3.4	ARCHITECTURAL CROSS-SECTIONS
A-3.5	ARCHITECTURAL CROSS-SECTIONS
A-4	ARCHITECTURAL DETAILS
A-4.1	ARCHITECTURAL DETAILS
A-5	EXTERIOR ELEVATIONS
A-5.1	EXTERIOR ELEVATIONS
A-6	NTERIOR ELEVATIONS SINGLE BLDG.
A-6.1	NTERIOR ELEVATIONS CANOPY BLDG.
A-6.2	NTERIOR ELEVATIONS CANOPY BLDG.
A-7	NTERIOR FINISH SCHEDULES
A-7A	DOOR & WINDOW TYPES, SIGNAGE DETAILS & ACCESSIBLE MOUNTING HEIGHTS
A-7B	DOOR SCHEDULES
A-8	OVERALL ROOF PLAN
A-8.1	CANOPY ROOF PLAN
A-9	ARCHITECTURAL CROSS-SECTIONS
	FOUNDATION DRAWINGS
SF-1	FOUNDATION PLAN
SF-2.1	FOUNDATION DETAILS
SF-2.2	FOUNDATION DETAILS
SF-2.3	FOUNDATION DETAILS
	STRUCTURAL DRAWINGS
S-0	LIGHT GA. STEEL MEMBER SCHEDULE
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S-1.2	ROOF FRAMING PLAN
S-2	STRUCTURAL DETAILS
S-2A	STRUCTURAL DETAILS
S-3	STRUCTURAL CROSS SECTION
S-3.1	STRUCTURAL CROSS SECTION
S-3.2	WALKWAY CANOPY SECTION
S-3A	STRUCTURAL CROSS-SECTIONS AT CANOPY
S-3A.1	STRUCTURAL CROSS-SECTIONS AT CANOPY
S-3A.2	WALKWAY CANOPY STRUCTURAL DETAILS
S-3A.3	WALKWAY CANOPY STRUCTURAL DETAILS
S-4	WALL ANCHOR DETAILS
S-4.1	STRUCTURAL & MISC. DETAILS
S-5	WALL FRAMING ELEVATIONS SINGLE BLD'G.
S-5.1	WALL FRAMING ELEVATIONS DOUBLE BLD'G.
	CAL-GREEN DRAWINGS
CG-1	CAL-GREEN COMPLIANCE DOCUMENTATION
CG-2	CAL-GREEN COMPLIANCE DOCUMENTATION
CG-3	CAL-GREEN COMPLIANCE DOCUMENTATION

SHEET	DESCRIPTION
	MECHANICAL DRAWINGS
M-0.1	MECHANICAL LEGEND, SCHEDULES AND NOTES
M-2.1	MECHANICAL OVERALL FLOOR PLANS
M-2.2	ENLARGED MECHANICAL PLANS & SECTIONS
M-3.3	MECHANICAL OVERALL PIPING PLANS
M-3.1	MECHANICAL OVERALL ROOF PLANS
M-5.1	MECHANICAL DETAILS
M-5.2	MECHANICAL DETAILS
	PLUMBING DRAWINGS
P-0.1	PLUMBING LEGEND, SCHEDULES AND NOTES
P-2.1	PLUMBING OVERALL FLOOR PLANS - WASTE AND VENT
P-2.2	PLUMBING OVERALL FLOOR PLANS - HOT AND COLD WATER
P-5.1	PLUMBING DETAILS
	TITLE 24 COMPLIANCE DRAWINGS
T-24A	TITLE 24 COMPLIANCE
T-24B	TITLE 24 COMPLIANCE
T-24C	TITLE 24 COMPLIANCE
	ELECTRICAL DRAWINGS
E-0.1	GENERAL NOTES
E-0.2	ELECTRICAL DETAILS
E-0.3	LIGHTING DETAILS
E-1.0	LIGHTING PLAN
E-2.0	ELECTRICAL PLAN
E-2.1	ROOF ELECTRICAL PLAN
ET-2.4A	COMPLIANCE
ET-2.4B	COMPLIANCE
ET-2.4C	COMPLIANCE
ET-2.4D	COMPLIANCE
ET-2.4E	COMPLIANCE
	FIRE SPRINKLER DRAWINGS
FP-0.0	GENERAL NOTES AND RISER DETAIL
FP-0.1	SITE UNDERGROUND PLAN
FP-0.2	HANGER BRACING & PIPING DETAILS
FP-1.0	OVERHEAD PIPING PLAN
FP-2.0	REFLECTED CEILING PLAN
	(84- SHEETS TOTAL)

PROJECT TEAM DIRECTORY

OWNER: MENDOTA UNIFIED SCHOOL DISTRICT
115 McCABE AVENUE
MENDOTA, CA 93640
CONTACT: JOSE ALCAIDE
PHONE: (559) 655-4942
EMAIL: jalcaide@mendotaschools.org

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OAKLAND, CA 94621
CONTACT: DOUG DENG
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MECHANICAL ENGINEER: TURLEY & ASSOCIATES
1760 CREEKSIDE OAKS DR. SUITE 120
SACRAMENTO, CA 95833
CONTACT: NIRAV SHAH
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EMAIL: NShah@turleymech.com

ELECTRICAL ENGINEER: HCS ENGINEERING, INC.
4512 FEATHER RIVER DRIVE "F"
STOCKTON, CA 95219
CONTACT: RICHARD SMITH
(209) 478-8210
EMAIL: richard@hcs-eng.com

GENERAL NOTES

ALL WORK SHALL CONFORM TO 2022 TITLE 24, CALIFORNIA CODE OF REGULATIONS (CCR)

CHANGES TO THE APPROVED DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY AN ADDENDUM OR A CONSTRUCTION CHANGE DOCUMENT (CCD) APPROVED BY THE DIVISION OF THE STATE ARCHITECT, AS REQUIRED BY SECTION 4-338, PART 1, TITLE 24, CCR

A "DSA CERTIFIED" PROJECT INSPECTOR EMPLOYED BY THE DISTRICT (OWNER) AND APPROVED BY THE DSA SHALL PROVIDE CONTINUOS INSPECTION OF THE WORK. THE DUTIES OF THE INSPECTOR ARE DEFINED IN SECTION 4-342, PART 1, TITLE 24, CCR.

A DSA ACCEPTED TESTING LABORATORY DIRECTLY EMPLOYED BY THE DISTRICT (OWNER) SHALL CONDUCT ALL THE REQUIRED TESTS AND INSPECTIONS FOR THE PROJECT.

GRADING PLANS, DRAINAGE IMPROVEMENTS, ROAD AND ACCESS REQUIREMENTS AND ENVIRONMENTAL HEALTH CONSIDERATIONS SHALL COMPLY WITH ALL LOCAL ORDINANCES.

VICINITY MAP

MENDOTA ELEM. SCHOOL CAMPUS
605 BASS AVE.
MENDOTA, CA 93640

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93640

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(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

STRUCTURAL ENGINEER
KAM WING S YAN
No. S 5112
Exp. 6/30/2025
STRUCTURAL
STATE OF CALIFORNIA

Kam Yan & Associates
Structural Engineers
433 Hegenberger Rd. Ste. 204
Oakland, California 94621
(TEL) (510) 562-0581
(FAX) (510) 562-0584

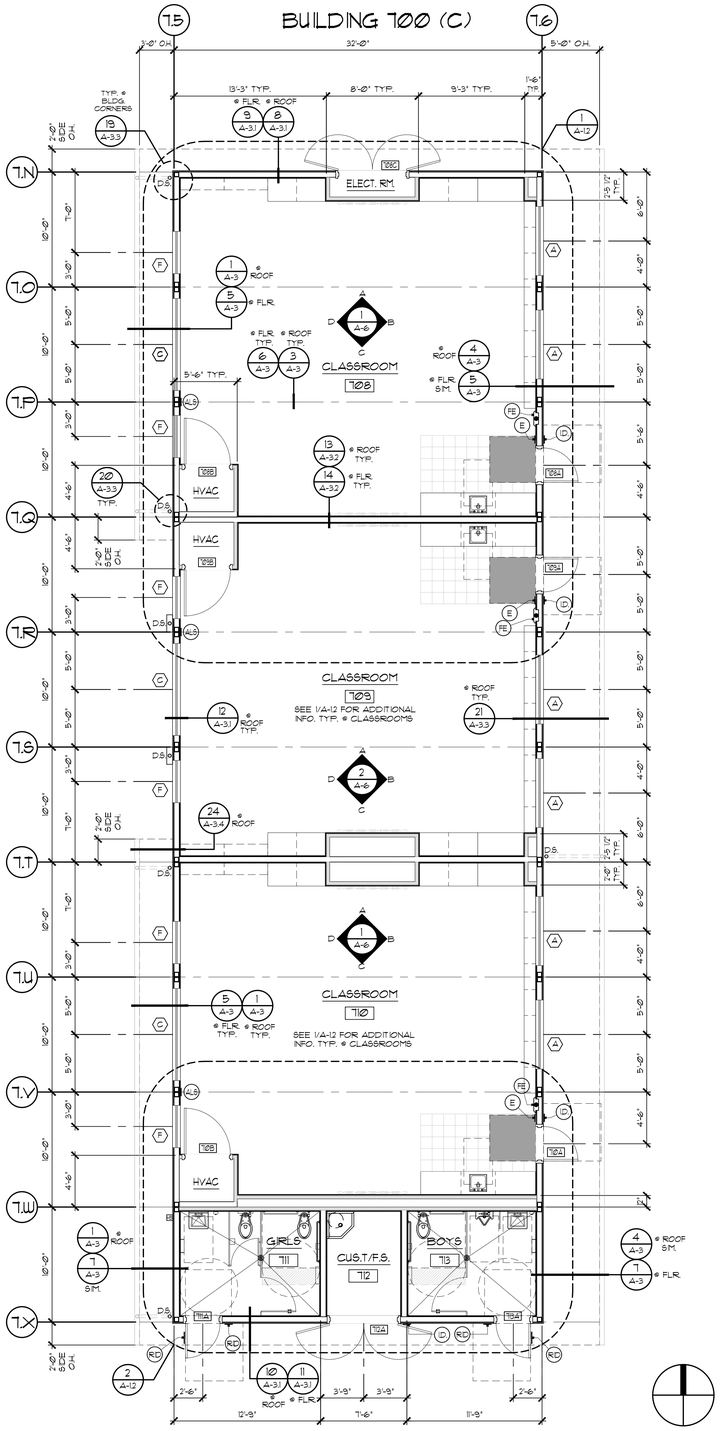
DRAWN: BLB
CHECKED: MM
REVISIONS:

.	.

DATE FEB. 6, 2025
JOB NO. 24769

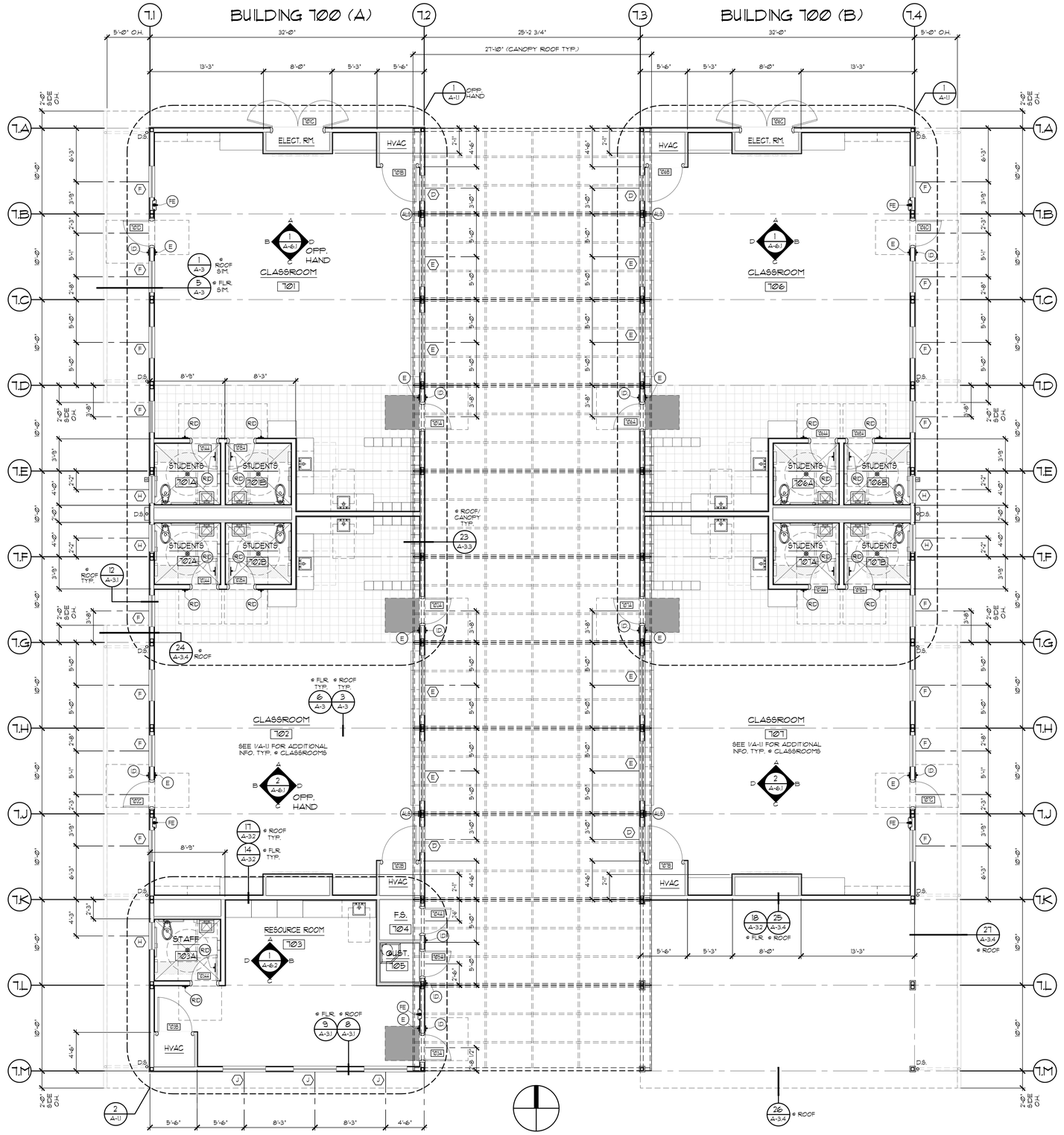
SHEET TITLE
COVER SHEET WITH DRAWING INDEX, DESIGN LOADS, BUILDING DESCRIPTIONS & CODE REFERENCES

SHEET NO.
T-0



TYP. CLASSROOM FLOOR PLAN - BUILDING 700 (C)

SCALE: 3/16"=1'-0" C



TK KINDERGARTEN FLOOR PLAN - BUILDINGS 700 (A) & 700 (B)

SCALE: 3/16"=1'-0" K

GENERAL NOTES

1. SEE SHEET A-7.A FOR ADDITIONAL INFORMATION & DIMENSIONS @ ACCESSIBLE FIXTURES & ACCESSORIES TYP.
2. ALL SURFACE MOUNTED DISPENSERS ETC. ALONG THE PATH OF TRAVEL OR IN CIRCULATION AREA SHALL HAVE A MAX. 4" PROJECTION FROM WALL TYP. PER 2022 CBC SECTION 11B-307.2
3. SEE SHT. S-4, DTLS. 6, 7, 8 & 9 FOR TYP. INT. WALL ANCHORAGE @ FLOOR AND DTLS. 10, 11 & 12 FOR TYP. INT. WALL ANCHORAGE @ CEILING
4. PROVIDE ROOM IDENTIFICATION SIGNAGE FOR ALL PERMANENT ROOMS & SPACES PER 2022 CBC SECTION 11B-703, 11B-703.4.2 (SEE SHEET A-7.A)
5. ALL ENTRANCES, PATHWAYS, DRINKING FOUNTAINS, RESTROOMS, EQUIPMENT AND FIXTURES PER ACCESSIBILITY STANDARDS.
6. INTERIOR SURFACE TO CONFORM TO 2022 CBC SECTION 11B.302
7. SEE INTERIOR ELEVATIONS FOR INTERIOR FINISHES, FIXTURES NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET
8. SEE EXTERIOR ELEVATIONS FOR EXTERIOR FINISHES, NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET
9. SEE INTERIOR ROOM FINISH SCHEDULE SHEET A-7 FOR INTERIOR FINISHES NOT SHOWN ON THIS SHEET

FLOOR PLAN LEGEND

- XXX 1. DOOR IDENTIFICATION, SEE SHEET A-7.A FOR DOOR TYPES & DOOR SCHEDULES
- XX 2. WINDOW IDENTIFICATION, SEE SHEET A-7.A FOR WINDOW TYPES
- (E) 3. PROVIDE TACTILE "EXIT" SIGNAGE PER 2022 CBC SECTION 1013, 11B-703, 11B-703.1, 11B-1035 WHERE SHOWN AT EXTERIOR EXIT DOORS (SEE DTL. 4/A-7.A).
- (ID) 4. PROVIDE ROOM IDENTIFICATION SIGNAGE FOR ALL OCCUPIABLE ROOMS & SPACES PER 2022 CBC SECTION 11B-703, 11B-703.4.2 (SEE DTLS. 1 & 2/A-7.A)
- (RD) 5. PROVIDE RESTROOM IDENTIFICATION SYMBOL PER 2022 CBC SECTION 11B-703, 11B-703.7.2.6 (SEE DTL. 3/A-7.A)
- (FE) 6. SEMI RECESSED FIRE EXTINGUISHER 34-40BC PER 2022 CBC SECTION 9206, TYP. - SEE DTL. 9/A-4.1
- (ALS) 7. ASSISTIVE LISTENING SYSTEM SIGNAGE PER 2022 CBC SECTION 11B-703.7.2.4. SEE DET. 5/A-7.A
  (24 x 44 OCCS. = 1 OR 2 MIN. DEVICES REQD. FOR EA CLASSROOM '108, '109 & '110)
  (24 x 60 OCCS. = 2 OR 3 MIN. DEVICES REQD. FOR EA CLASSROOM '101, '102, '106 & '107)
  25% MIN. OF RECEIVERS PROVIDED IN EA. ROOM, BUT NO FEWER THAN 2, SHALL BE HEARING AID COMPATIBLE.

WALL LEGEND

- 2x4 WOOD STUDS @ 16" O.C. WALL TYP. U.O.N. SEE STRUCT. DWGS.
- 2x6 WOOD STUDS @ 16" O.C. WALL TYP. U.O.N. SEE STRUCT. DWGS.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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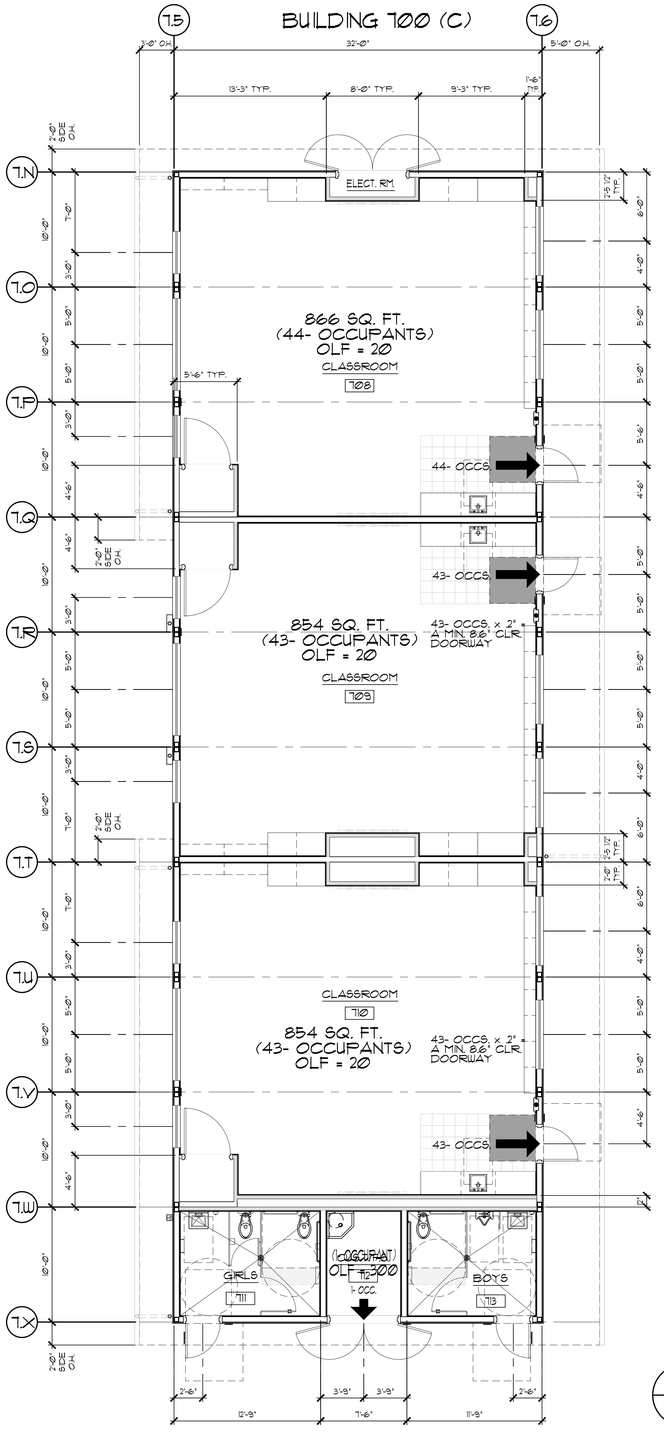
LICENSED ARCHITECT
GEORGE E. MEEHLEIS
No. C-26287
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

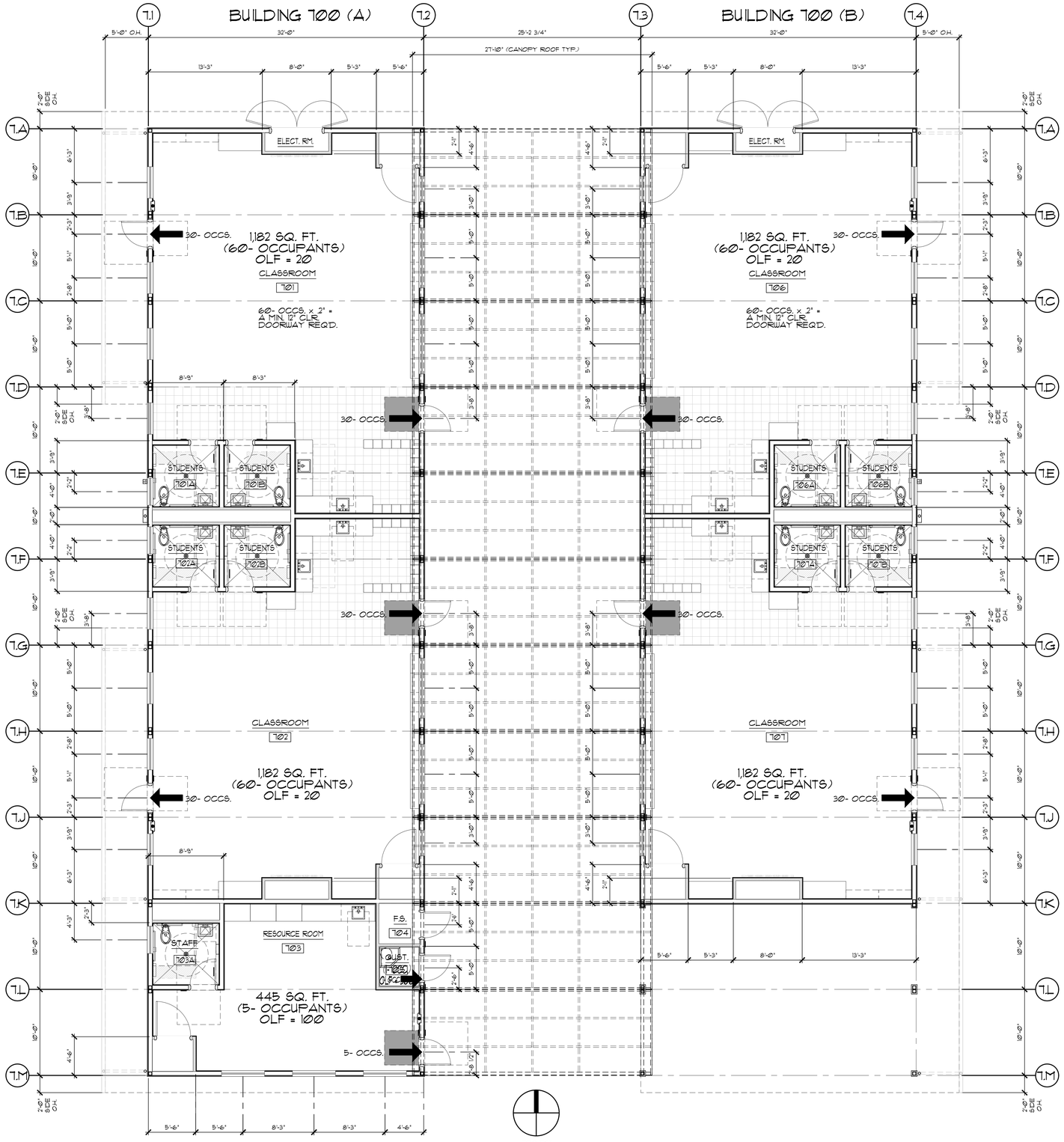
SHEET TITLE
OVERALL FLOOR PLANS

SHEET NO.
A-1



TYP. CLASSROOM EXITING PLAN - BUILDING 700 (C)

SCALE: 3/16"=1'-0" C



TK KINDERGARTEN EXITING PLAN - BUILDINGS 700 (A) & 700 (B)

SCALE: 3/16"=1'-0" K

GENERAL NOTES

1. SEE SHEET A-1 FOR ADDITIONAL INFORMATION NOT SHOWN.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

FOR REFERENCE ONLY

INCREMENT #2

NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1601 BASS AVENUE, MENDOTA, CA 93640

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NV. LIC. NO. 37887

LICENSED ARCHITECT
ROBERT E. GODWIN
No. C-031307
Exp. 8-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

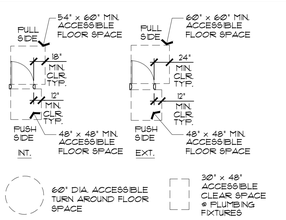
SHEET TITLE
OVERALL EXITING PLANS

SHEET NO.
A-1A

GENERAL NOTES

1. SEE SHEET A-7A FOR ADDITIONAL INFORMATION & DIMENSIONS @ ACCESSIBLE FIXTURES & ACCESSORIES TYP.
2. ALL SURFACE MOUNTED DISPENSERS ETC. ALONG THE PATH OF TRAVEL OR IN CIRCULATION AREA SHALL HAVE A MAX. 4" PROJECTION FROM WALL TYP. PER 2022 CBC SECTION 11B-308.2
3. SEE SHT. S-4, DTLS. 8 & 9 FOR TYP. INT. WALL ANCHORAGE @ FLOOR AND DTLS. 10, 11 & 12 FOR TYP. INT. WALL ANCHORAGE @ CEILING
4. PROVIDE ROOM IDENTIFICATION SIGNAGE FOR ALL PERMANENT ROOMS & SPACES PER 2022 CBC SECTION 11B-703, 11B-703.4.2 (SEE SHEET A-7A)
5. ALL ENTRANCES, PATHWAYS, DRINKING FOUNTAINS, RESTROOMS, EQUIPMENT AND FIXTURES PER ACCESSIBILITY STANDARDS.
6. INTERIOR SURFACE TO CONFORM TO 2022 CBC SECTION 11B.302
7. SEE INTERIOR ELEVATIONS FOR INTERIOR FINISHES, FIXTURES NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET
8. SEE EXTERIOR ELEVATIONS FOR EXTERIOR FINISHES, NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET
9. SEE INTERIOR ROOM FINISH SCHEDULE SHEET A-7.1 FOR INTERIOR FINISHES NOT SHOWN ON THIS SHEET

ACCESSIBLE CLEAR SPACE



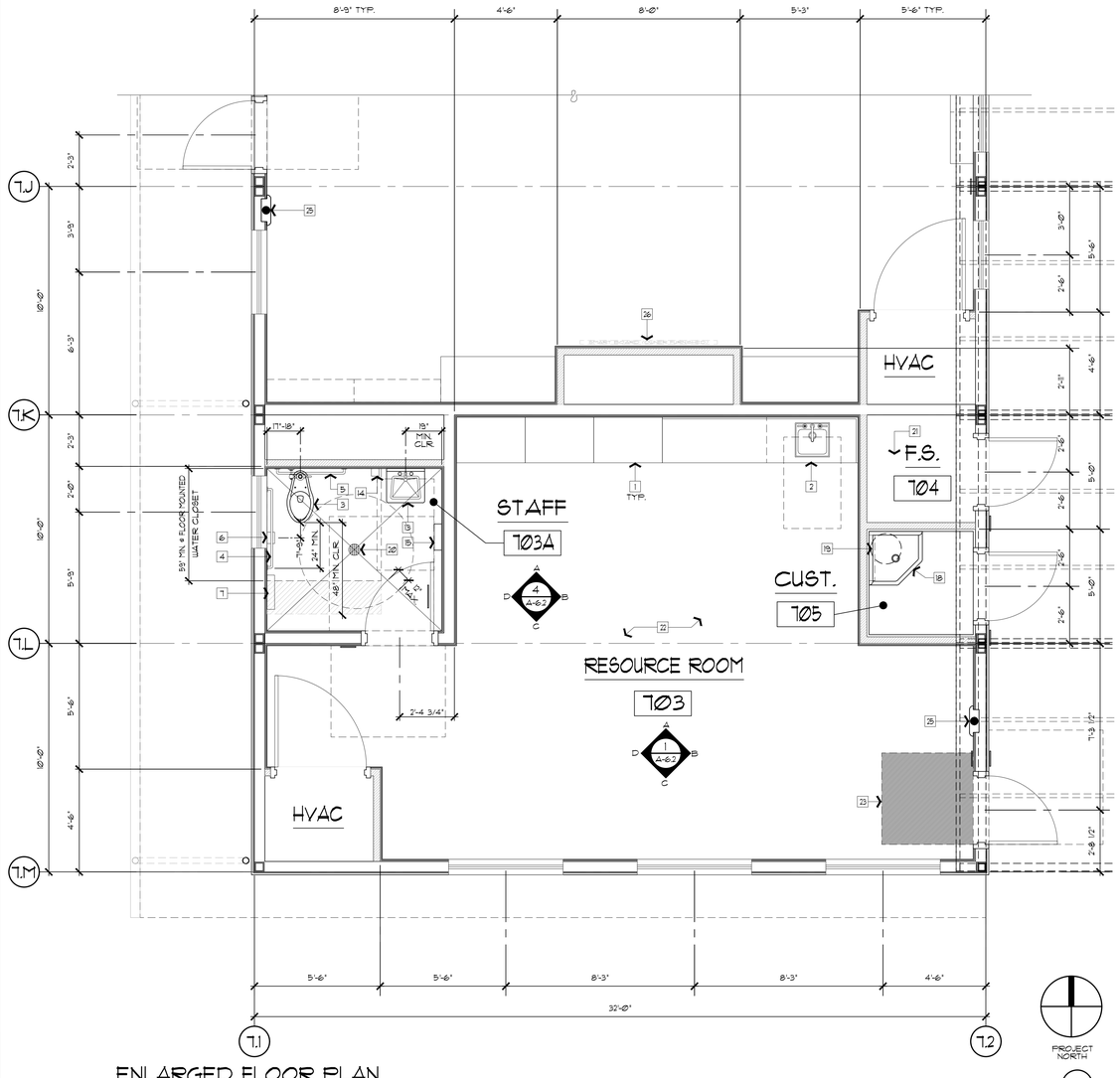
WALL LEGEND

2x4 WOOD STUDS @ 16" O.C. WALL TYP. U.O.N.

2x6 WOOD STUDS @ 16" O.C. WALL TYP. U.O.N.

KEYNOTES

1. PLASTIC LAMINATE CASEWORK, SEE INTERIOR ELEVATIONS
2. ACCESSIBLE PLASTIC LAMINATE CASEWORK AND SINK SEE INTERIOR ELEVATIONS & PLUMBING DRAWINGS
3. ACCESSIBLE FLOOR MOUNT TOILET WITH FLUSH ACTIVATOR @ OPEN SIDE, SEE PLUMBING DRAWINGS
4. 42" LONG x 1 1/4"ø GRAB BAR, SEE DTL. 10/A-4.1
5. 36" LONG x 1 1/4"ø GRAB BAR, SEE DTL. 10/A-4.1
6. SURFACE MOUNTED TOILET PAPER DISP.
7. SURFACE MOUNTED TOILET SEAT COVER DISP.
8. TOILET PARTITION, TYP.
9. 36" DOOR W/ W-PULL DOOR HANDLE, (BOTH SIDES)
10. STANDARD FLOOR MOUNT TOILET, SEE PLUMBING DRAWINGS
11. ACCESSIBLE WALL-HUNG URINAL, SEE PLUMBING DRAWINGS
12. NOT USED
13. ACCESSIBLE LAVATORY SINK, SEE PLUMBING DWGS.
14. SURFACE MOUNTED SOAP DISP.
15. SURFACE MOUNTED PAPER TOWEL DISP. O.F.C.I.
16. NOT USED
17. NOT USED
18. MOP SINK, SEE PLUMBING DRAWINGS
19. SHELF MOUNTED ELEC. WATER HEATER - SEE PLUMBING DRAWINGS
20. FLOOR DRAIN, SEE PLUMBING DRAWINGS (SLOPE FLOOR TO FLOOR DRAIN 2% MAX. IN ANY DIRECTION, TYP.)
21. FIRE SPRINKLER RISER, SEE FIRE SPRINKLER DWGS
22. CARPET, SEE NT. FINISH SCHEDULES, SHEET A-7
23. WALK-OFF CARPET (48"x48" MIN. TYP. @ CLR. NT. FLOOR SPACE OF DOOR)
24. VINYL COMPOSITION TILE, (VCT.) SEE NT. FINISH SCHEDULES, SHEET A-7
25. SEMI-RECESSED FIRE EXTINGUISHER, SEE DTL. 9/A-4.1
26. SMART BOARD, (OWNER FURNISHED & INSTALLED) SHOWN DASHED, SEE DTL. 15/S-4 FOR BLOCKING



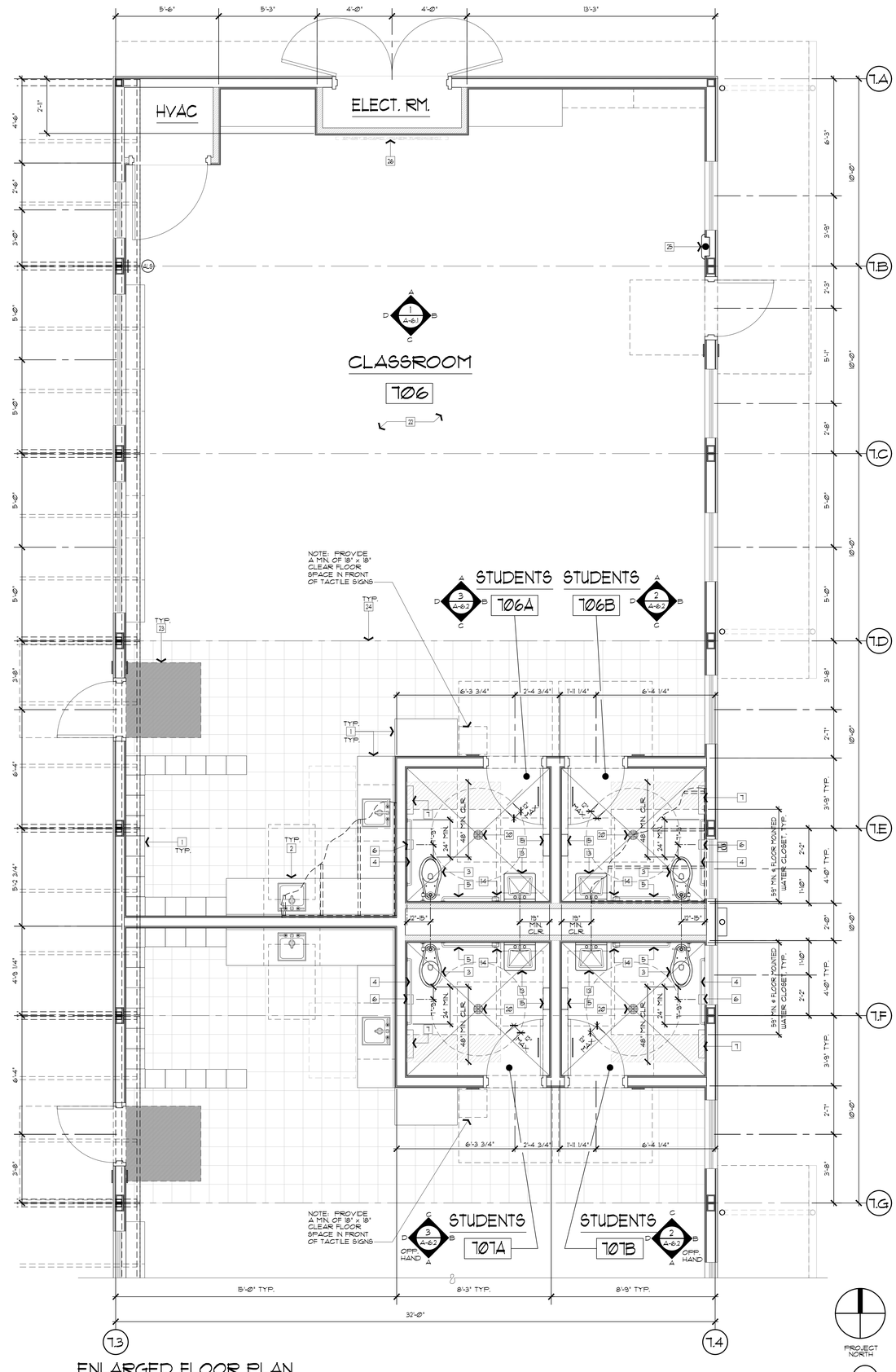
ENLARGED FLOOR PLAN

SCALE: 3/8"=1'-0"

2

NOTE:

SEE SHEET A-7A TYP. FOR ADDITIONAL INFORMATION & DIMENSIONS @ ACCESSIBLE FIXTURES & ACCESSORIES (USE ADULT HTS. FOR THIS PLAN TYP.)



ENLARGED FLOOR PLAN

SCALE: 3/8"=1'-0"

1

NOTE:

SEE SHEET A-7A TYP. FOR ADDITIONAL INFORMATION & DIMENSIONS @ ACCESSIBLE FIXTURES & ACCESSORIES (USE AGE 9-8 HTS. FOR RESTROOMS ON THIS PLAN TYP.)

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2

NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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REFERENCE ONLY

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

FOR PERMIT

LICENSED ARCHITECT
CHRISTOPHER E. BOSWORTH
No. C-34,207
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

ENLARGED FLOOR PLANS

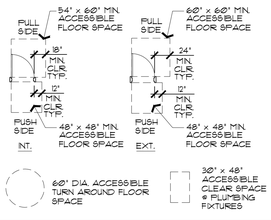
SHEET NO.

A-1.1

GENERAL NOTES

1. SEE SHEET A-7A FOR ADDITIONAL INFORMATION & DIMENSIONS @ ACCESSIBLE FIXTURES & ACCESSORIES TYP.
2. ALL SURFACE MOUNTED DISPENSERS ETC. ALONG THE PATH OF TRAVEL OR IN CIRCULATION AREA SHALL HAVE A MAX. 4" PROJECTION FROM WALL TYP. PER 2022 CBC SECTION 11B-307.2
3. SEE SHT. S-4, DTLS. 8 & 9 FOR TYP. INT. WALL ANCHORAGE @ FLOOR AND DTLS. 10, 11 & 12 FOR TYP. INT. WALL ANCHORAGE @ CEILING
4. PROVIDE ROOM IDENTIFICATION SIGNAGE FOR ALL PERMANENT ROOMS & SPACES PER 2022 CBC SECTION 11B-703, 11B-703.4.2 (SEE SHEET A-7A)
5. ALL ENTRANCES, PATHWAYS, DRINKING FOUNTAINS, RESTROOMS, EQUIPMENT AND FIXTURES PER ACCESSIBILITY STANDARDS.
6. INTERIOR SURFACE TO CONFORM TO 2022 CBC SECTION 11B-302
7. SEE INTERIOR ELEVATIONS FOR INTERIOR FINISHES, FIXTURES NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET
8. SEE EXTERIOR ELEVATIONS FOR EXTERIOR FINISHES, NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET
9. SEE INTERIOR ROOM FINISH SCHEDULE SHEET A-7 FOR INTERIOR FINISHES NOT SHOWN ON THIS SHEET

ACCESSIBLE CLEAR SPACE



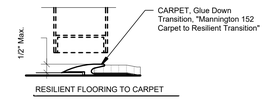
WALL LEGEND

2x4 WOOD STUDS @ 16" O.C. WALL TYP. U.O.N. SEE STRUCT. DWGS.

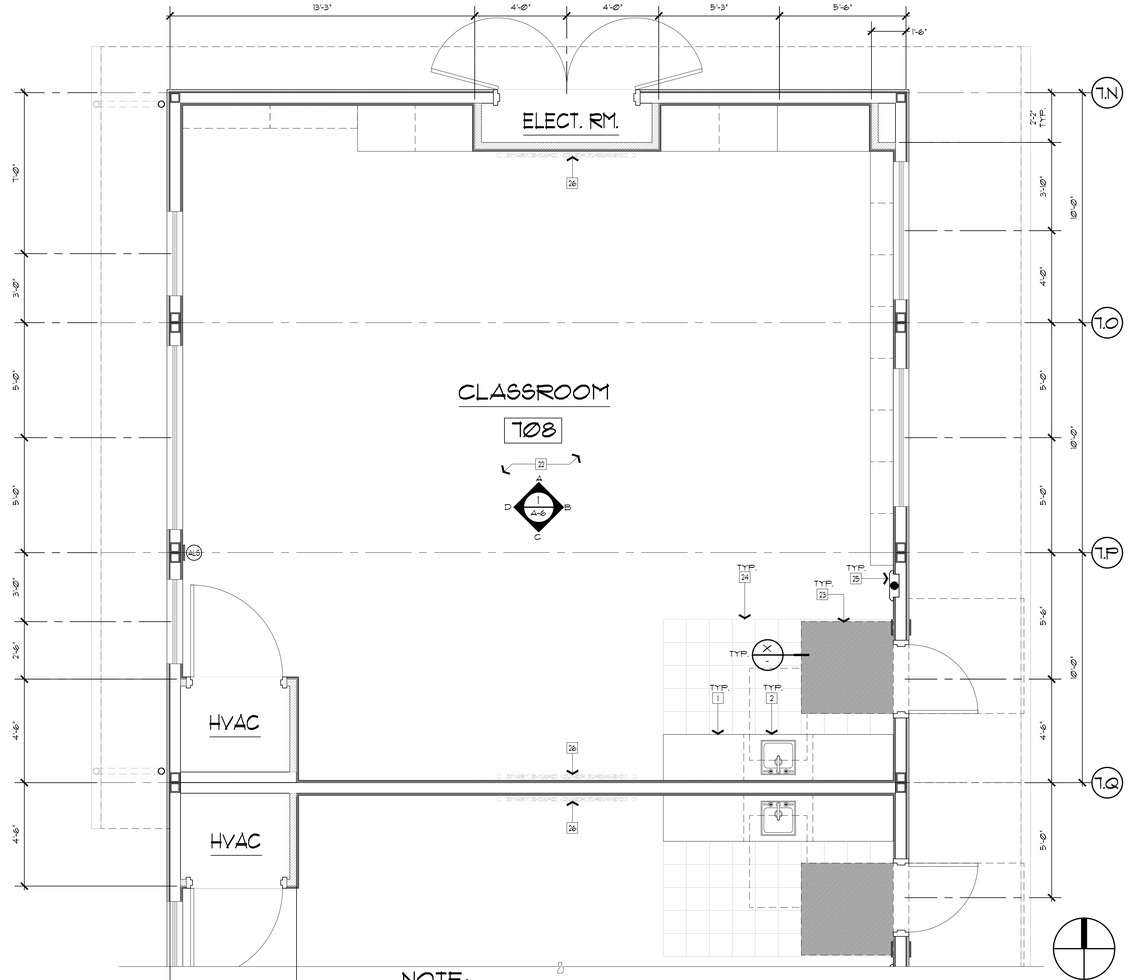
2x6 WOOD STUDS @ 16" O.C. WALL TYP. U.O.N. SEE STRUCT. DWGS.

KEYNOTES

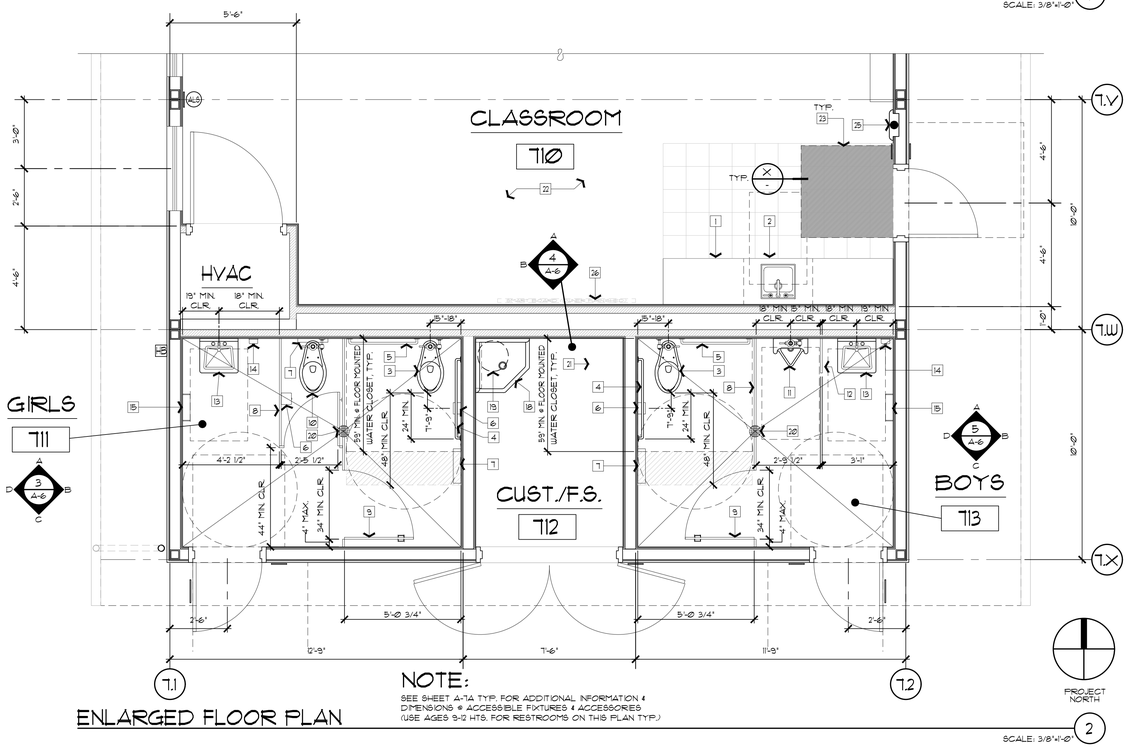
1. PLASTIC LAMINATE CASEWORK, SEE INTERIOR ELEVATIONS
2. ACCESSIBLE PLASTIC LAMINATE CASEWORK AND SINK SEE INTERIOR ELEVATIONS & PLUMBING DRAWINGS
3. ACCESSIBLE FLOOR MOUNT TOILET WITH FLUSH ACTIVATOR @ OPEN SIDE, SEE PLUMBING DRAWINGS
4. 42" LONG x 1 1/4"ø GRAB BAR, SEE DTL. 10/A-4.1
5. 36" LONG x 1 1/4"ø GRAB BAR, SEE DTL. 10/A-4.1
6. SURFACE MOUNTED TOILET PAPER DISP.
7. SURFACE MOUNTED TOILET SEAT COVER DISP.
8. TOILET PARTITION, TYP.
9. 36" DOOR W/ U-PULL DOOR HANDLE. (BOTH SIDES)
10. STANDARD WALL-HUNG TOILET, SEE PLUMBING DRAWINGS
11. ACCESSIBLE WALL-HUNG URINAL, SEE PLUMBING DRAWINGS
12. URINAL PRIVACY SCREEN (24" MAX. DEPTH)
13. ACCESSIBLE LAVATORY SINK, SEE PLUMBING DWGS.
14. SURFACE MOUNTED SOAP DISP.
15. SURFACE MOUNTED HAND DRYER, "XLERATOR" XL-W W/ RECESS KIT
16. NOT USED
17. SURFACE MOUNTED SANITARY NAPKIN DISPOSAL
18. MOP SINK, SEE PLUMBING DRAWINGS
19. SHELF MOUNTED ELEC. WATER HEATER - SEE PLUMBING DRAWINGS
20. FLOOR DRAIN, SEE PLUMBING DRAWINGS (SLOPE FLOOR TO FLOOR DRAIN 2% MAX. IN ANY DIRECTION, TYP.)
21. FIRE SPRINKLER RISER, SEE FIRE SPRINKLER DWGS
22. CARPET, SEE INT. FINISH SCHEDULES, SHEET A-7
23. WALK-OFF CARPET (48"x48" MIN. TYP. @ CLR. INT. FLOOR SPACE OF DOOR)
24. VINYL COMPOSITION TILE, (VCT,) SEE INT. FINISH SCHEDULES, SHEET A-7
25. SEMI-RECESSED FIRE EXTINGUISHER, SEE DTL. 9/A-4.1
26. SMART BOARD, (OWNER FURNISHED & INSTALLED) SHOWN DASHED, SEE DTL. 5/S-4 FOR BLOCKING
27. SURFACE MOUNTED PAPER TOWEL DISPENSER (OWNER FURNISHED CONTRACTOR INSTALLED)



TYP. DETAIL @ FLOORING TRANSITION (X)
SCALE: 3"=1'-0"



ENLARGED FLOOR PLAN
SCALE: 3/8"=1'-0" (1)



ENLARGED FLOOR PLAN
SCALE: 3/8"=1'-0" (2)

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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MEEHLEF MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4537
CA. LIC. NO. 477488
NV. LIC. NO. 37887

FOR REFERENCE ONLY

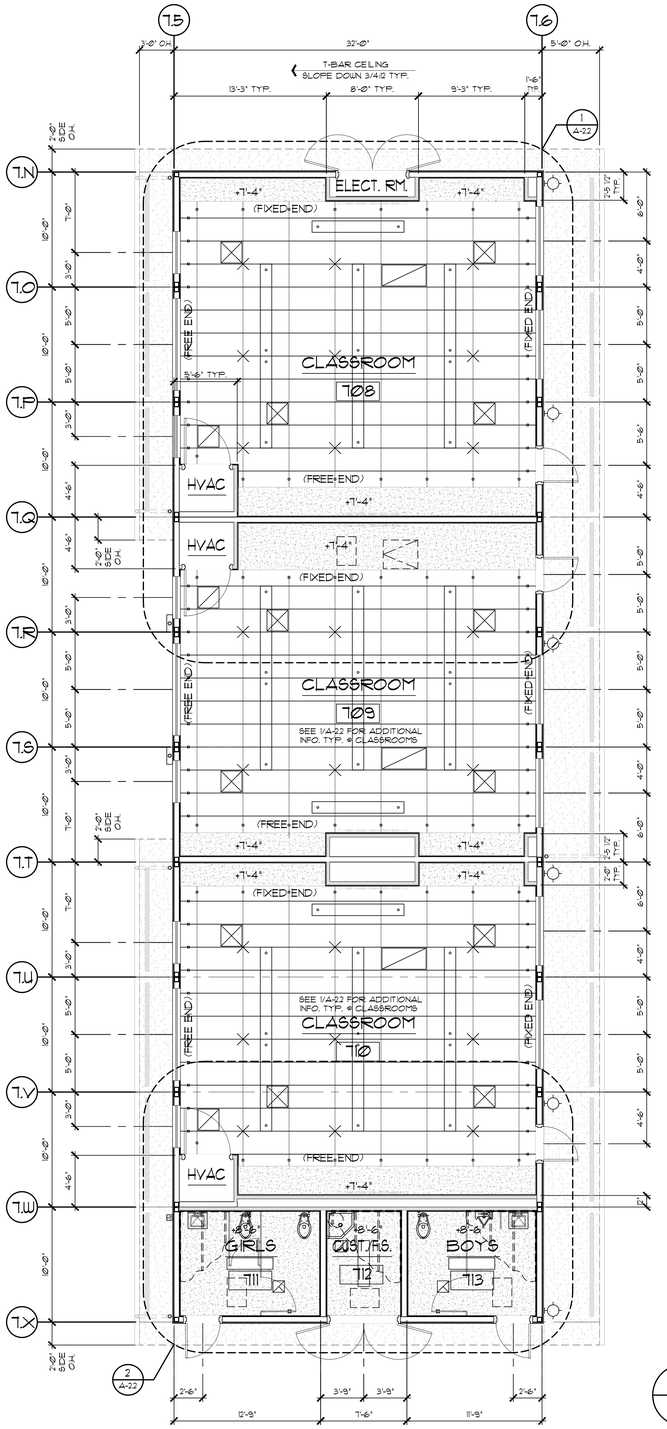
LICENSED ARCHITECT
Edward E. Meehlef
No. C-20135
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
ENLARGED FLOOR PLANS

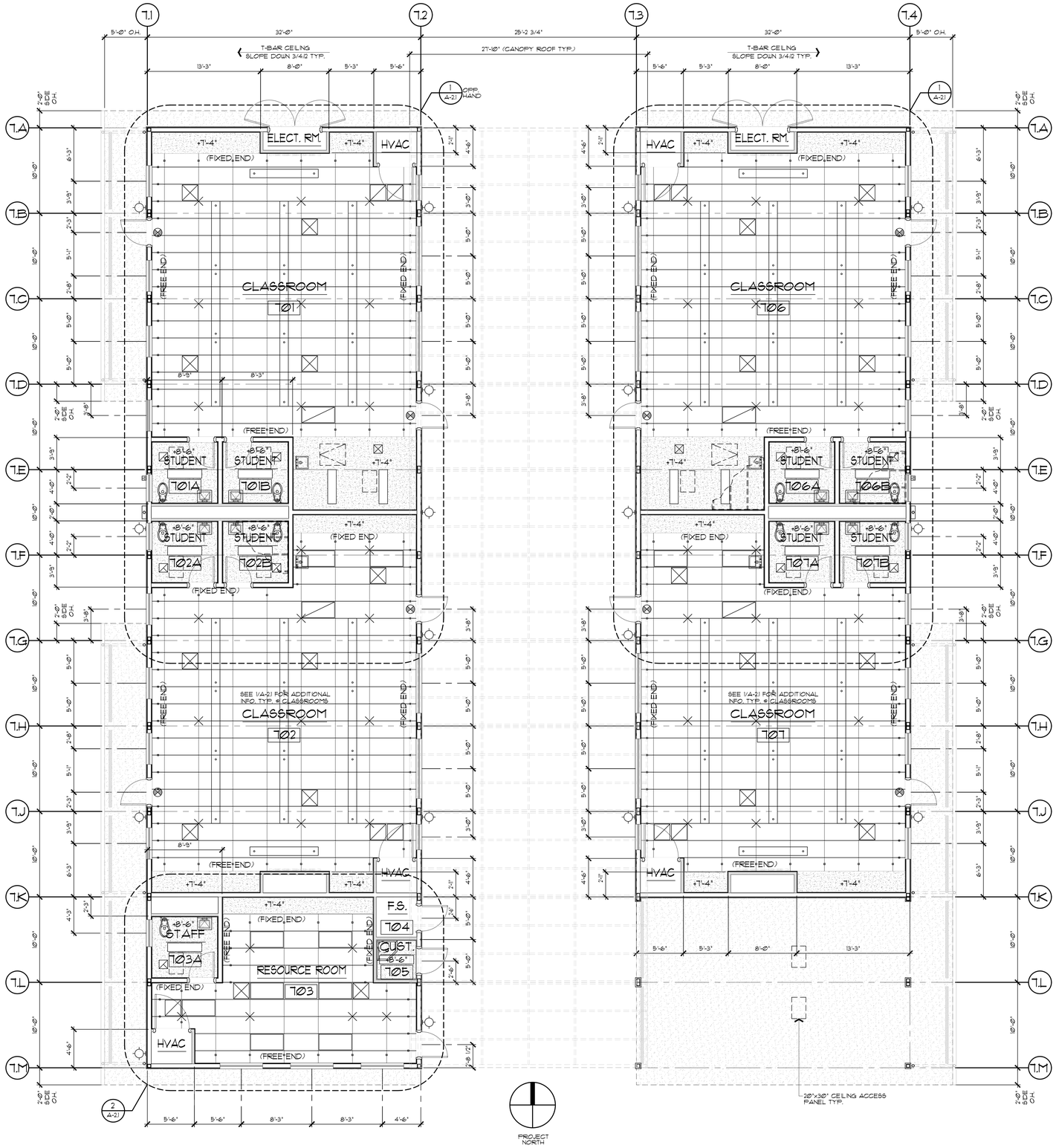
SHEET NO.
A-1.2



PROJECT NORTH

TYP. CLASSROOM CEILING PLAN

SCALE: 3/16"=1'-0" C



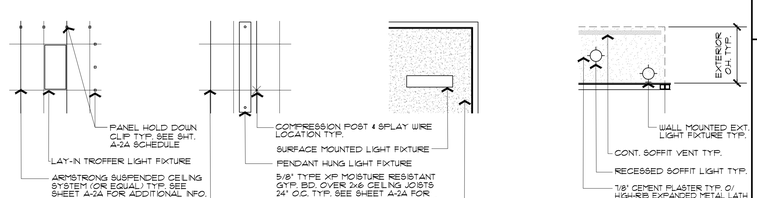
PROJECT NORTH

TK KINDERGARTEN CEILING PLAN

SCALE: 3/16"=1'-0" K

20"X30" CEILING ACCESS PANEL TYP.

LEGEND:



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DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2

NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1650 BASS AVENUE, MENDOTA, CA 93640

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1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4657
CA. LIC. NO. 472488
NV. LIC. NO. 37887

LICENSED ARCHITECT
ROBERT E. DODDS
No. C-20307
Exp. 6-30-25
STATE OF CALIFORNIA

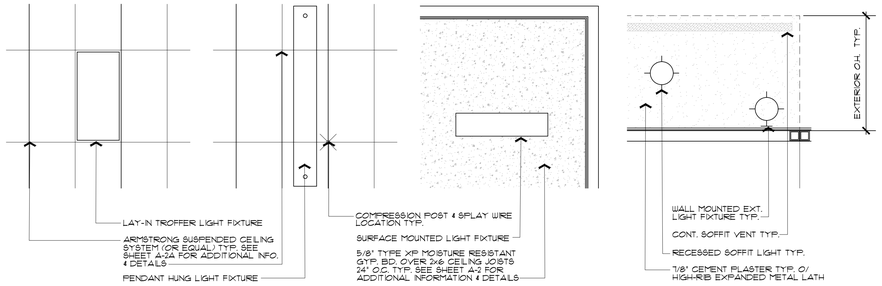
DRAWN: BLB
CHECKED: MM
REVISIONS:

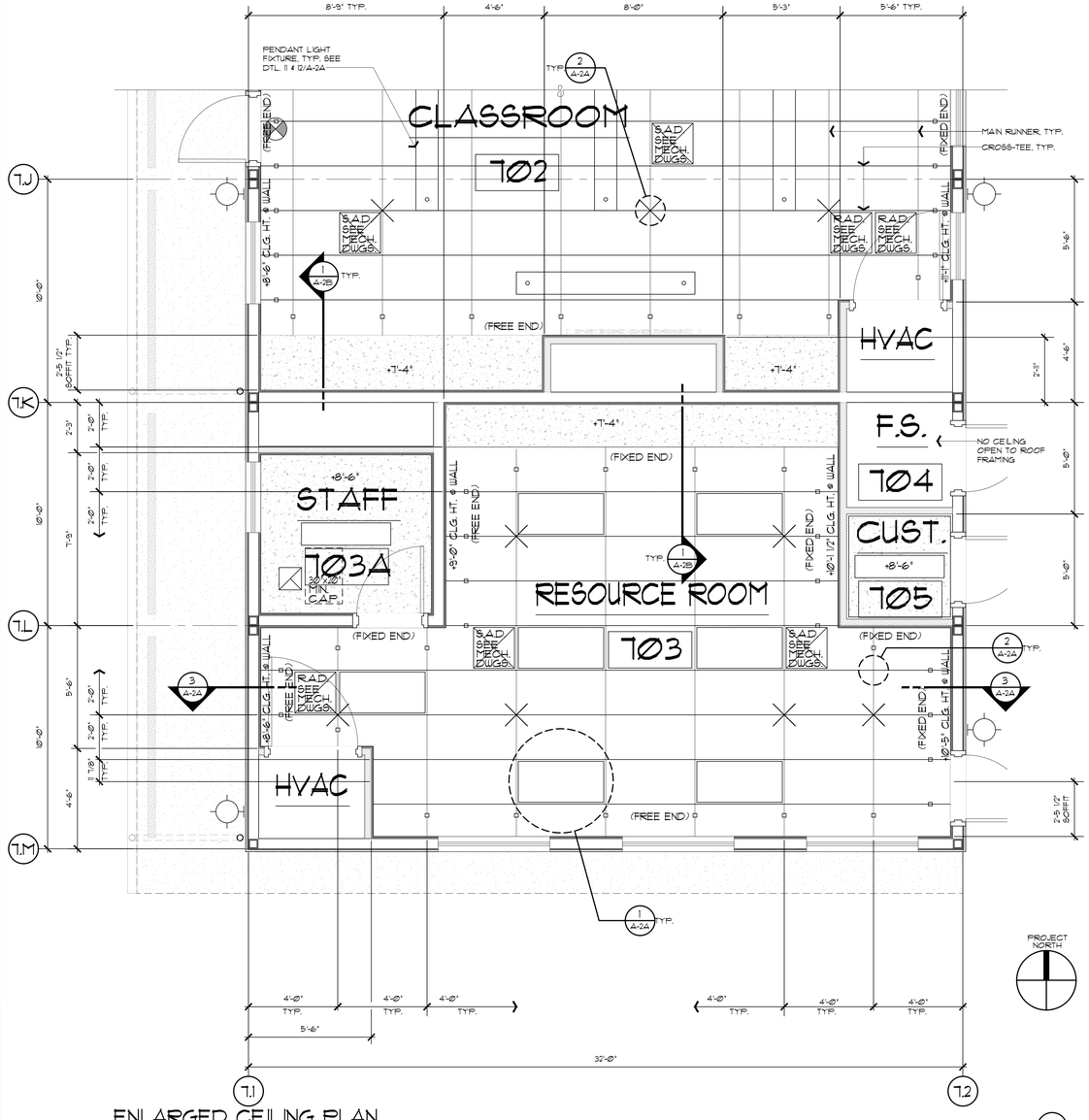
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
OVERALL CEILING PLANS

SHEET NO.
A-2

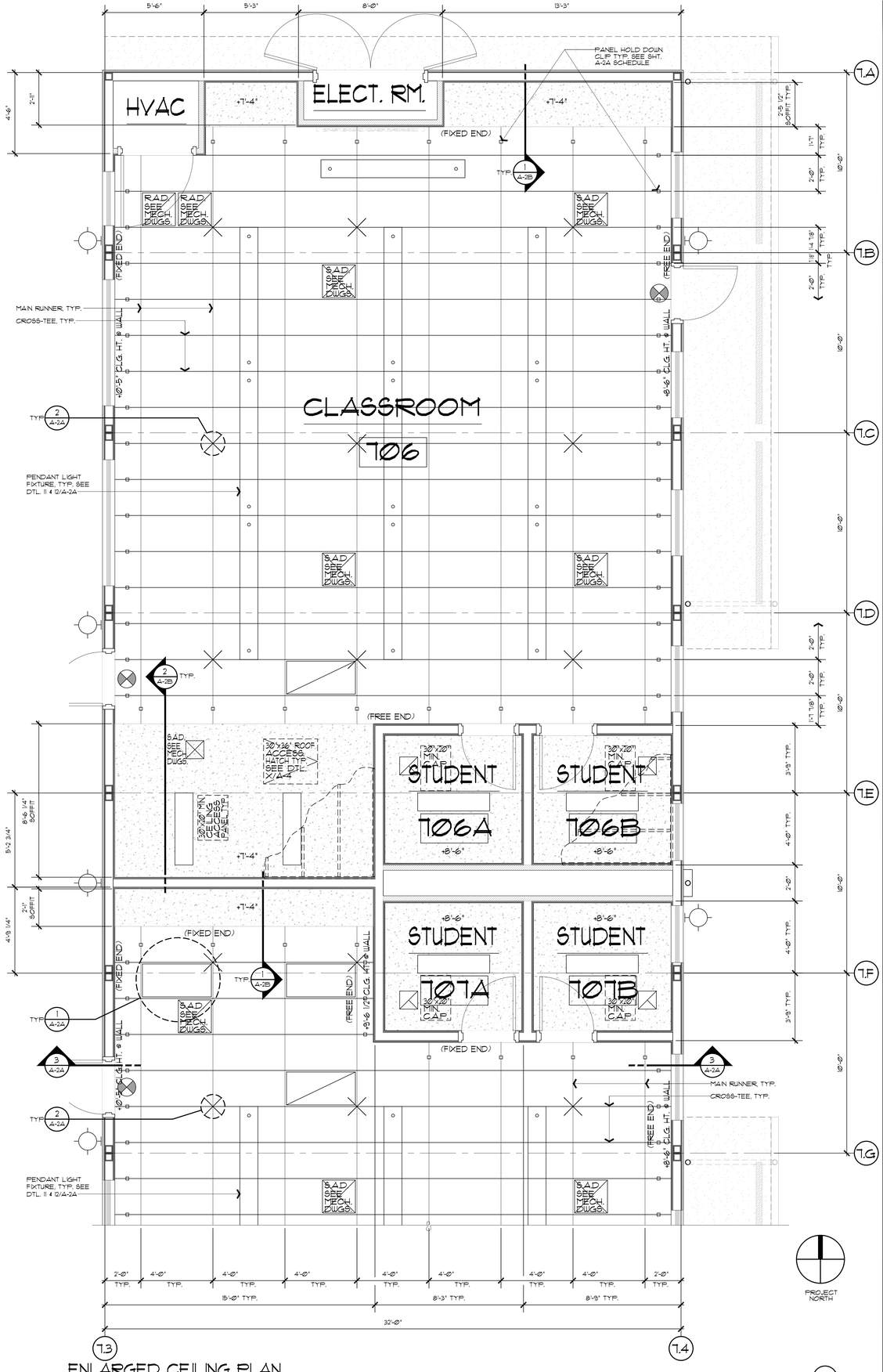
LEGEND:





ENLARGED CEILING PLAN

SCALE: 3/8"=1'-0" 2



ENLARGED CEILING PLAN

SCALE: 3/8"=1'-0" 1

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

LICENSED ARCHITECT
ROBERT E. DOSSEY
No. C-26127
Exp. 8-31-25
STATE OF CALIFORNIA

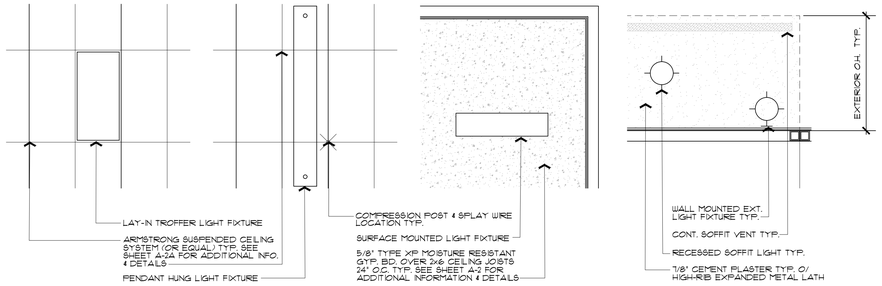
DRAWN: BLB
CHECKED: MM
REVISIONS:

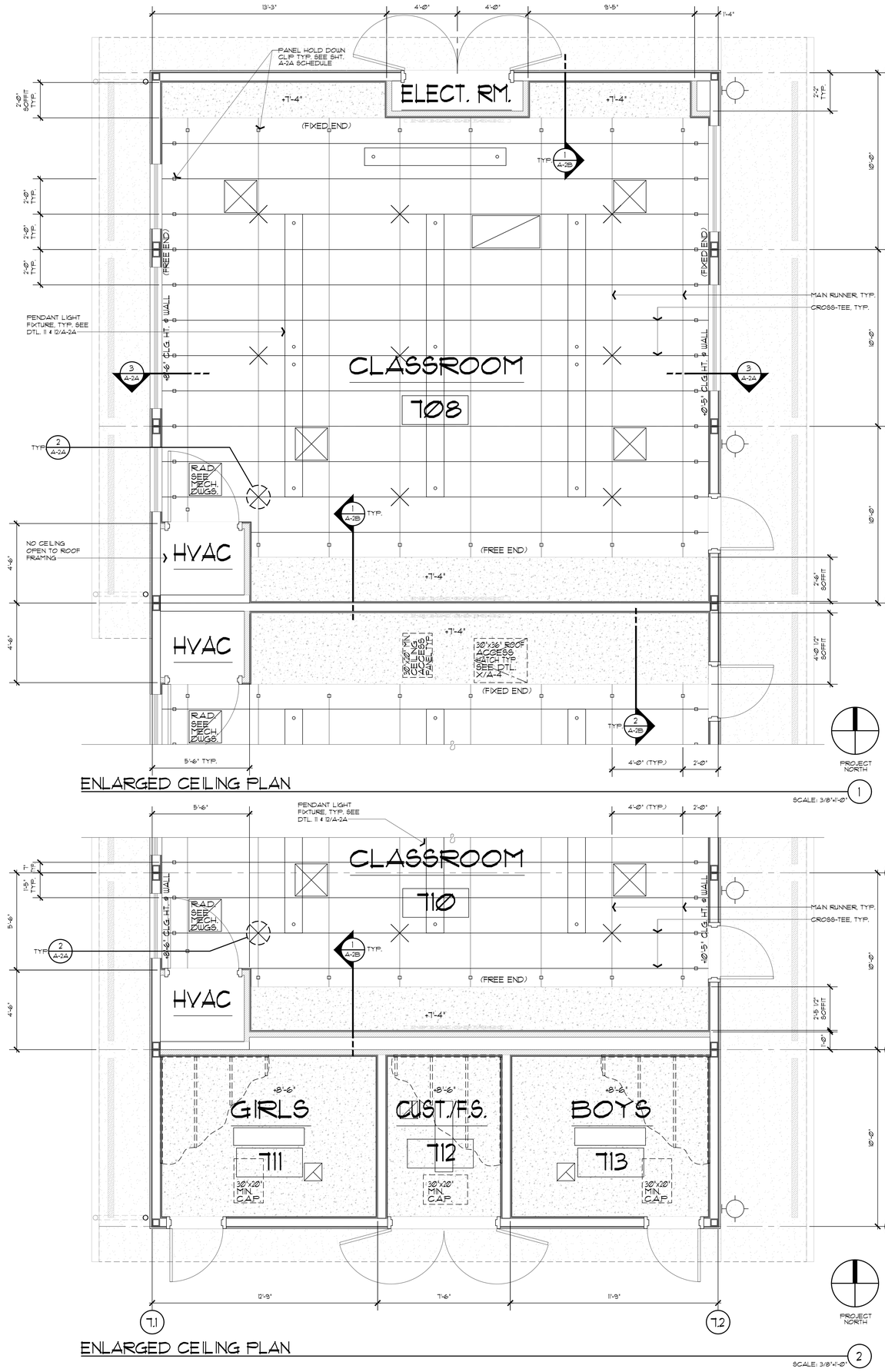
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
ENLARGED CEILING PLANS

SHEET NO.
A-2.1

LEGEND:





ENLARGED CEILING PLAN

SCALE: 3/8"=1'-0" 1

ENLARGED CEILING PLAN

SCALE: 3/8"=1'-0" 2

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4637
CA. LIC. NO. 477488
NV. LIC. NO. 37887

LICENSED ARCHITECT
GEORGE E. ROGERS
No. C-26207
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

.	.

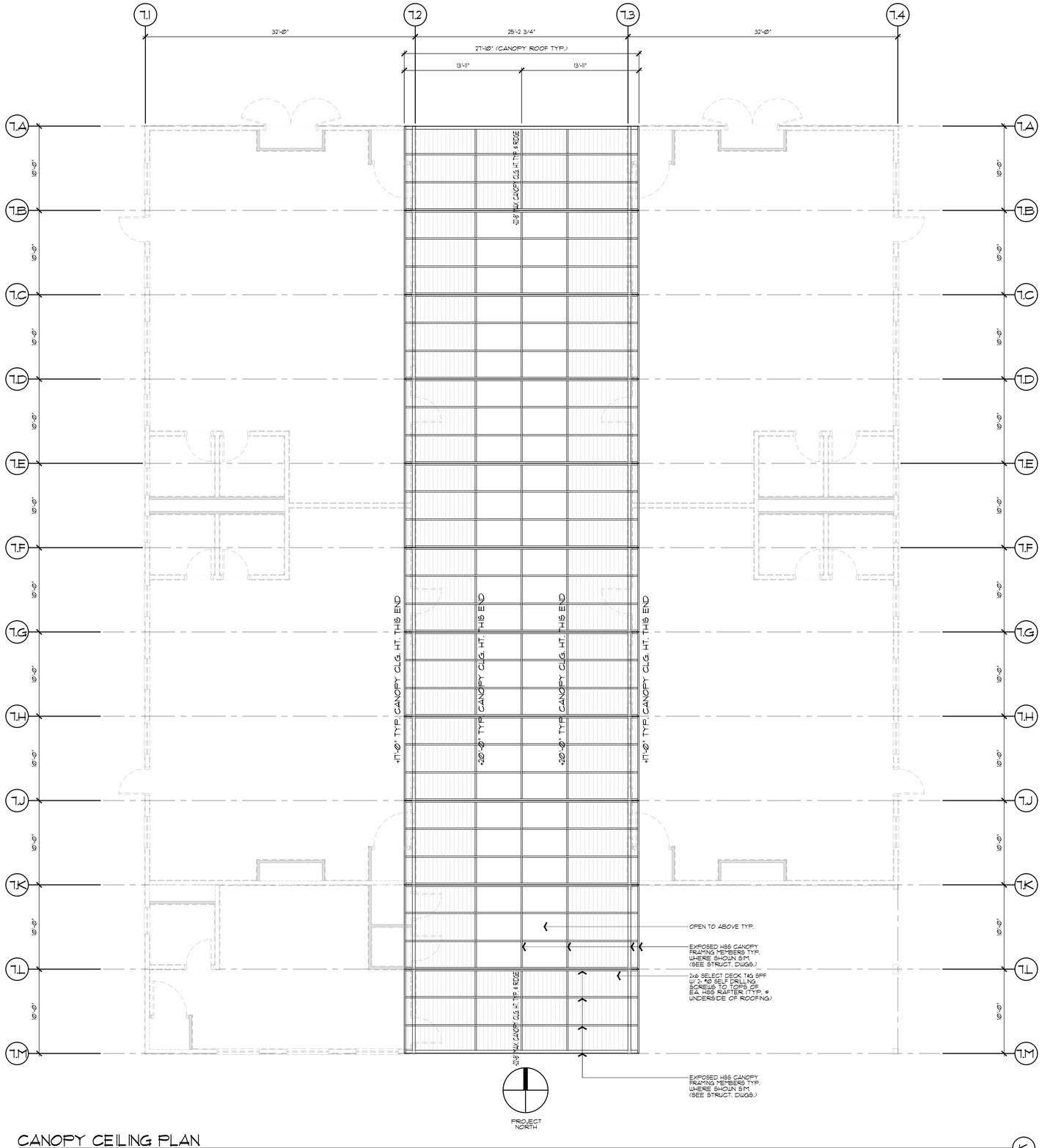
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

ENLARGED CEILING PLANS

SHEET NO.

A-2.2



CANOPY CEILING PLAN

SCALE: 3/16"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

REFERENCE ONLY

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

FOR PERMIT

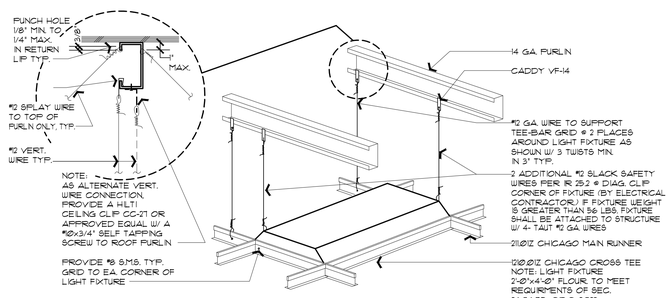
LICENSED ARCHITECT
MICHAEL E. MEEHLEIS
No. C-26187
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
CANOPY CEILING PLAN

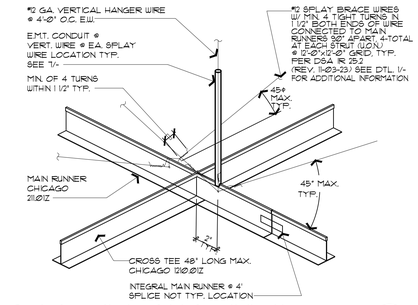
SHEET NO.
A-2.3



LIGHT FIXTURE @ CEILING

SCALE: 1-1/2"=1'-0"

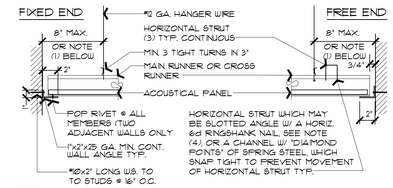
1



SPLAY WIRE ATTACHMENT

SCALE: 1-1/2"=1'-0"

2

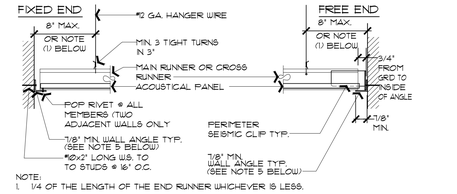


NOTE:
1. 1/4 OF THE LENGTH OF THE END RUNNER WHICHEVER IS LESS.
2. SPACE LATERAL FORCE BRACING ASSEMBLIES AT A 12'-0"x12'-0" GRID AND WITHIN 6'-0" OF WALLS TYP.
3. NOTCHING OF HORIZ. STRUTS IS PERMITTED ONLY @ INTERSECTIONS WITH MAIN RUNNERS OR CROSS TEES.
4. NAIL @ ENDS OF HORIZ. STRUTS SHALL BE PLACED WITH HEAD TOWARDS CENTERLINE OF SPAN OF STRUT.
5. SEE DETAIL 3A/- FOR ALTERNATE TO 2" WALL ANGLE

CEILING GRID @ WALL

SCALE: 1-1/2"=1'-0"

3



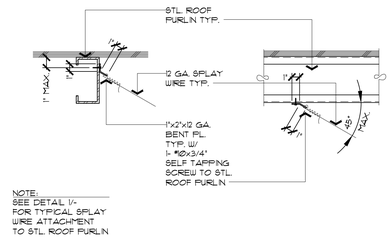
NOTE:
1. 1/4 OF THE LENGTH OF THE END RUNNER WHICHEVER IS LESS.
2. SPACE LATERAL FORCE BRACING ASSEMBLIES AT A 12'-0"x12'-0" GRID AND WITHIN 6'-0" OF WALLS TYP.
3. HORIZONTAL STRUTS ARE NOT REQUIRED WHERE PERIMETER SEISMIC CLIPS ARE USED TYP.
4. CHICAGO, SEE ICC REPORT NO. ESR-2631, REISSUED JUNE 2024 FOR ADDITIONAL INFORMATION USG-DONN, SEE ICC REPORT NO. ESR-1222, REISSUED DEC. 2024 FOR ADDITIONAL INFORMATION ARMSTRONG, SEE ICC REPORT NO. ESR-1308, REISSUED DEC. 2024 FOR ADDITIONAL INFORMATION CERTAINTEED, SEE ICC REPORT NO. ESR-3336, REVISED DEC. 2024 FOR ADDITIONAL INFORMATION
5. @ CHICAGO CEILINGS (PER ICC REPORT NO. ESR-2631) PROVIDE 15/16" MIN. WALL ANGLES TYP.

ALT. CEILING GRID @ WALL

SCALE: 1-1/2"=1'-0"

3A

EITHER DETAIL 3 OR 3A TO BE USED FOR T- BAR CEILINGS, HOWEVER DO NOT MIX THESE DETAILS ON THE SAME CEILING.



ALT. SPLAY WIRE BRACING

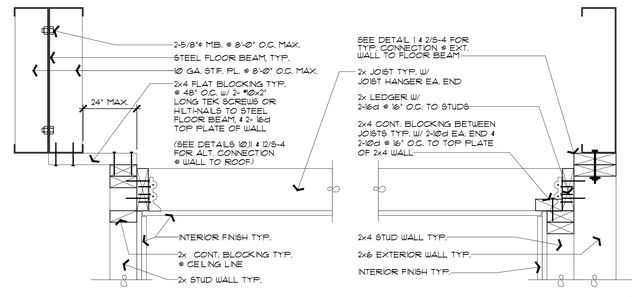
SCALE: 1-1/2"=1'-0"

4

NOT USED

SCALE: 3"=1'-0"

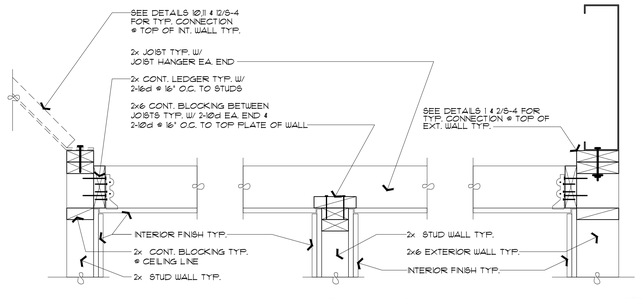
4A



TYPICAL WALL ANCHOR DETAILS @ JOISTED CEILING

SCALE: 1-1/2"=1'-0"

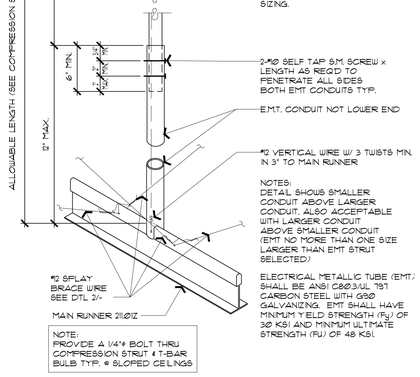
5



TYPICAL WALL ANCHOR DETAILS @ JOISTED CEILING

SCALE: 1-1/2"=1'-0"

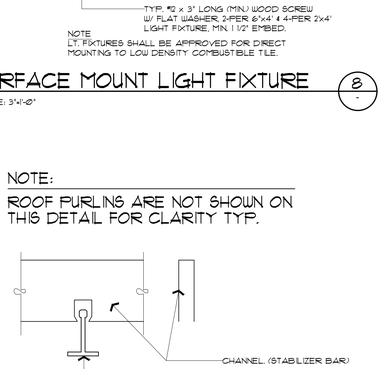
6



COMPRESSION STRUT DETAIL

SCALE: 1-1/2"=1'-0"

7

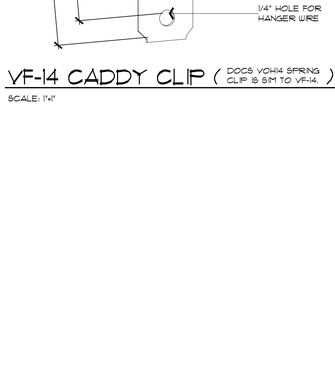


NOTE
LT. FIXTURES SHALL BE APPROVED FOR DIRECT MOUNTING TO LOW DENSITY COMBUSTIBLE TILE.

SURFACE MOUNT LIGHT FIXTURE

SCALE: 3"=1'-0"

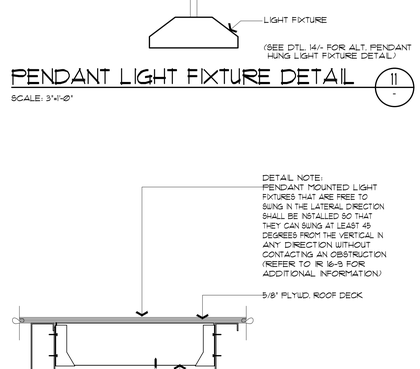
8



VF-14 CADDY CLIP (DOCS VCH14 SPRING CLIP IS S.M. TO VF-14.)

SCALE: 1"=1'

10



(SEE DTL. 14/- FOR ALT. PENDANT HUNG LIGHT FIXTURE DETAIL)

PENDANT LIGHT FIXTURE DETAIL

SCALE: 3"=1'-0"

11

NOTE:

AS AN ALTERNATE TO THE "CHICAGO 1200 SERIES" CEILING SYSTEM SHOWN ON DETAIL 3A/- PROVIDE A "DONN DX" CEILING SYSTEM WITH THE FOLLOWING COMPONENTS:

MAIN RUNNER	DX26	USG / DONN HEAVY DUTY SYSTEM TYP. PER ASCE 7-16 13.5.6.2.2.
CROSS RUNNER	DX424	
CROSS RUNNER	DX422	
WALL ANGLE	M9	

OR AN "ARMSTRONG" CEILING SYSTEM WITH THE FOLLOWING COMPONENTS:

MAIN RUNNER	7301	ARMSTRONG HEAVY DUTY SYSTEM TYP. PER ASCE 7-16 13.5.6.2.2.
CROSS RUNNER	7340	
CROSS RUNNER	7328	
WALL ANGLE	7809	

TYP. PANEL HOLD DOWN CLIP SCHEDULE

MANUFACTURER	TILE THICKNESS	ITEM #	DESCRIPTION
ARMSTRONG	5/8"	UHDCA	UNIVERSAL HOLD DOWN CLIP
ARMSTRONG	5/8"	EHDCTSA	EXTERIOR HOLD DOWN CLIP
USG	5/8" OR 3/4"	VIS	VARIABLE LOCKING HOLD DOWN CLIP
CERTAINTEED	5/8" OR 3/4"	AHD	ADJUSTABLE HOLD DOWN CLIP
ROCKFON/CMC	5/8" OR 3/4"	935ØØ	UNIVERSAL HOLD DOWN CLIP

CEILING JOIST SPAN SCHEDULE

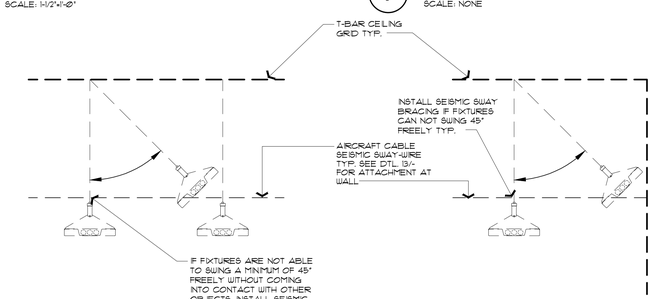
(PER 2022 CBC 2308.7.1.1)

(UNINHABITABLE ATTIC WITHOUT STORAGE, LIVE LOAD = 10 PSF, L/Δ 240)

JOIST SIZE(in)	JOIST SPACING(in)	JOIST SPAN	SIMPSON JOIST HANGER
2x10 DF#2	24" O.C.	22'-11"	U210
2x10 DF#2	16" O.C.	24'-0"	U210
2x8 DF#2	24" O.C.	18'-9"	U26
2x8 DF#2	16" O.C.	23'-0"	U26
2x6 DF#2	24" O.C.	14'-10"	U26
2x6 DF#2	16" O.C.	17'-8"	U26

TYP. COMPRESSION STRUT TABLE

MATERIAL:	ALLOWABLE LENGTHS:
1/2"ø EMT CONDUIT (Ø.Ø42" WALL THICKNESS)	3'-11" MAX.
3/4"ø EMT CONDUIT (Ø.Ø49" WALL THICKNESS)	6'-4" MAX.
1"ø EMT CONDUIT (Ø.Ø57" WALL THICKNESS)	9'-9" MAX.
1 1/4"ø EMT CONDUIT (Ø.Ø65" WALL THICKNESS)	12'-9" MAX.
1 1/2"ø EMT CONDUIT (Ø.Ø65" WALL THICKNESS)	14'-9" MAX.
2"ø EMT CONDUIT (Ø.Ø65" WALL THICKNESS)	18'-10" MAX.



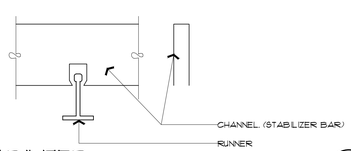
TYP. PENDANT HUNG FIXTURE BRACING DETAIL

SCALE: 1"=1'-0"

12

NOTE:

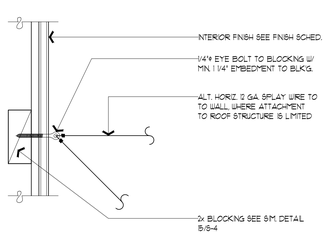
ROOF PURLINS ARE NOT SHOWN ON THIS DETAIL FOR CLARITY TYP.



STABILIZER

SCALE: NONE

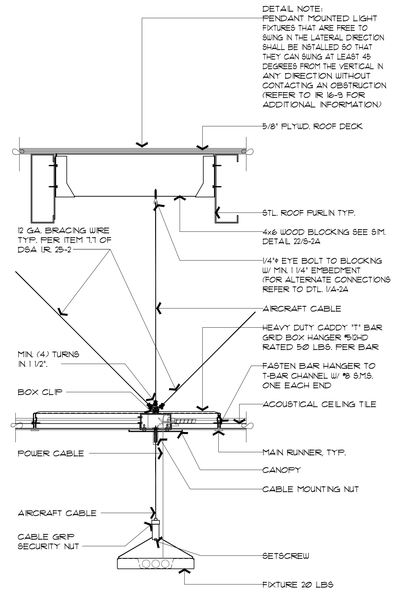
9



WIRE BRACING DTL. AT WALL

SCALE: 3"=1'-0"

13



PENDANT MOUNTED LIGHT FIXTURE

SCALE: 1-1/2"=1'-0"

14

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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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(209) 334-4637
CA. LIC. NO. 477488
NV. LIC. NO. 37887

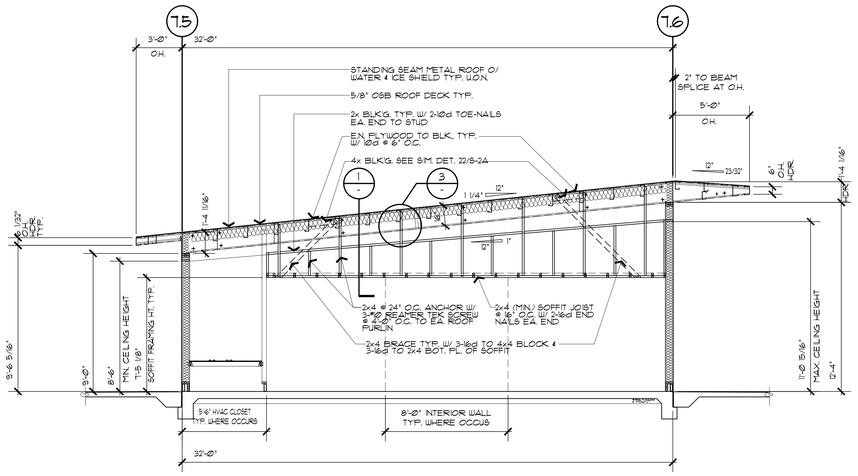
LICENSED ARCHITECT
GEORGE E. ROGERS
No. C-26207
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
CEILING DETAILS

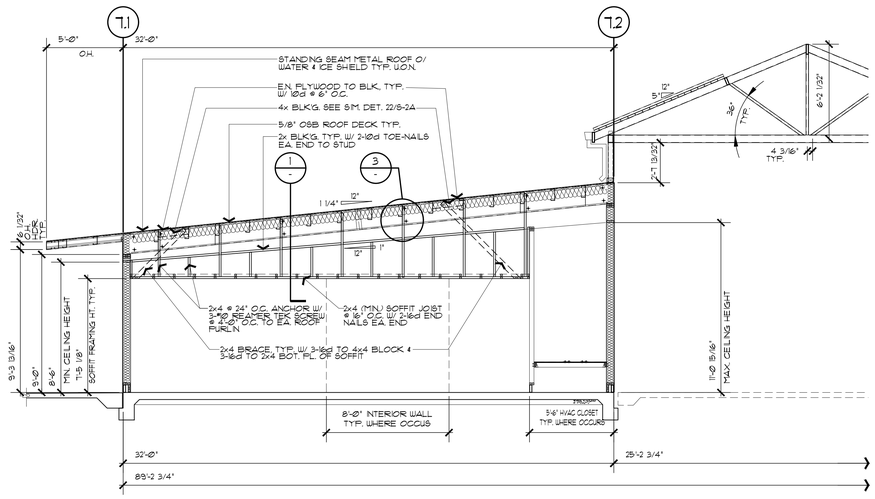
SHEET NO.
A-2A



ARCHITECTURAL CROSS-SECTION @ INTERIOR SOFFIT

A

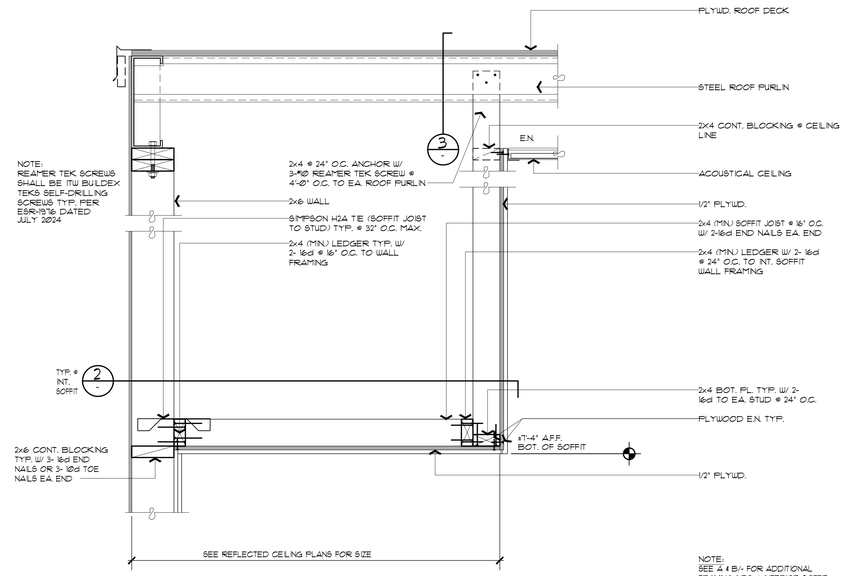
SCALE 1/4"=1'-0"



ARCHITECTURAL CROSS-SECTION @ INTERIOR SOFFIT

B

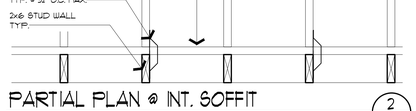
SCALE 1/4"=1'-0"



SECTION @ INTERIOR SOFFIT

SCALE: 1-1/2"=1'-0"

1



PARTIAL PLAN @ INT. SOFFIT

SCALE: 1"=1'-0"

2

SECTION @ INTERIOR SOFFIT

SCALE: 1"=1'-0"

3

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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
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1303 E. LODI AVE.
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(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

FOR

LICENSED ARCHITECT
ROBERT E. GOSSLER
No. C-26,201
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

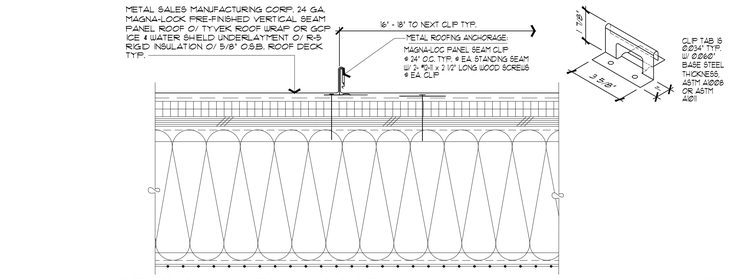
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

SOFFIT DETAILS

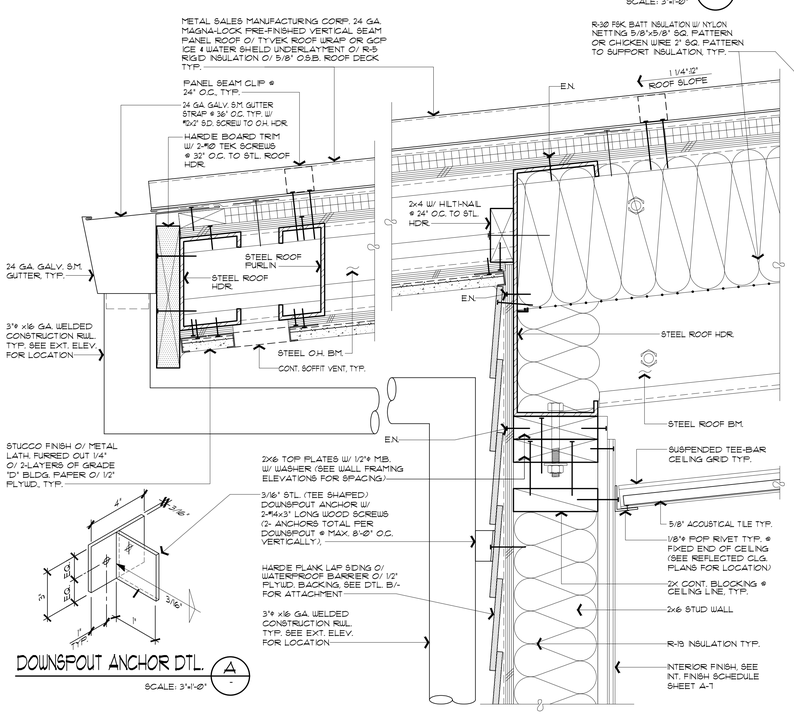
SHEET NO.

A-2B



SECTION @ METAL ROOFING

SCALE: 3"=1'-0"



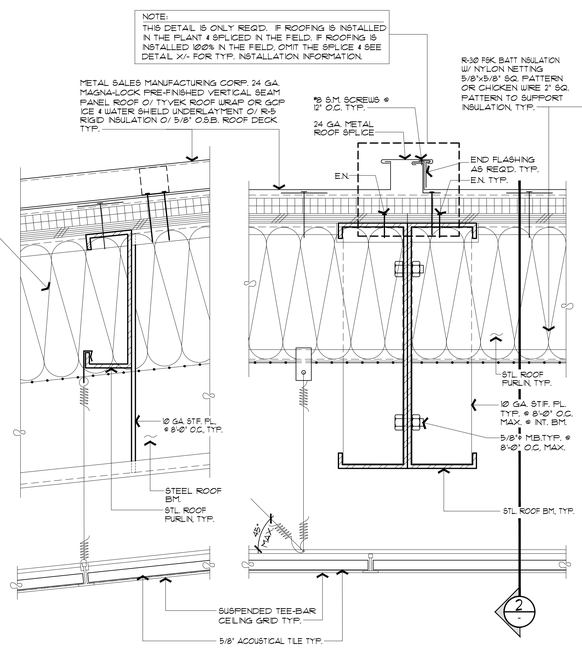
DOWNSPOUT ANCHOR DTL. (A)

SCALE: 3"=1'-0"

END WALL @ ROOF (1)

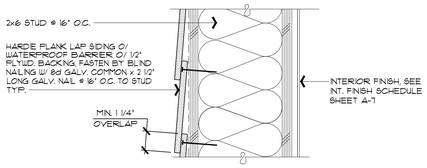
SCALE: 3"=1'-0"

NOTE:
THIS DETAIL IS ONLY REQ'D. IF ROOFING IS INSTALLED IN THE FLAT & SPLICED IN THE FIELD. IF ROOFING IS INSTALLED @ 0% IN THE FIELD, OMIT THE SPLICE & SEE DETAIL X/- FOR TYP. INSTALLATION INFORMATION.



ROOF PURLIN (2)

SCALE: 3"=1'-0"

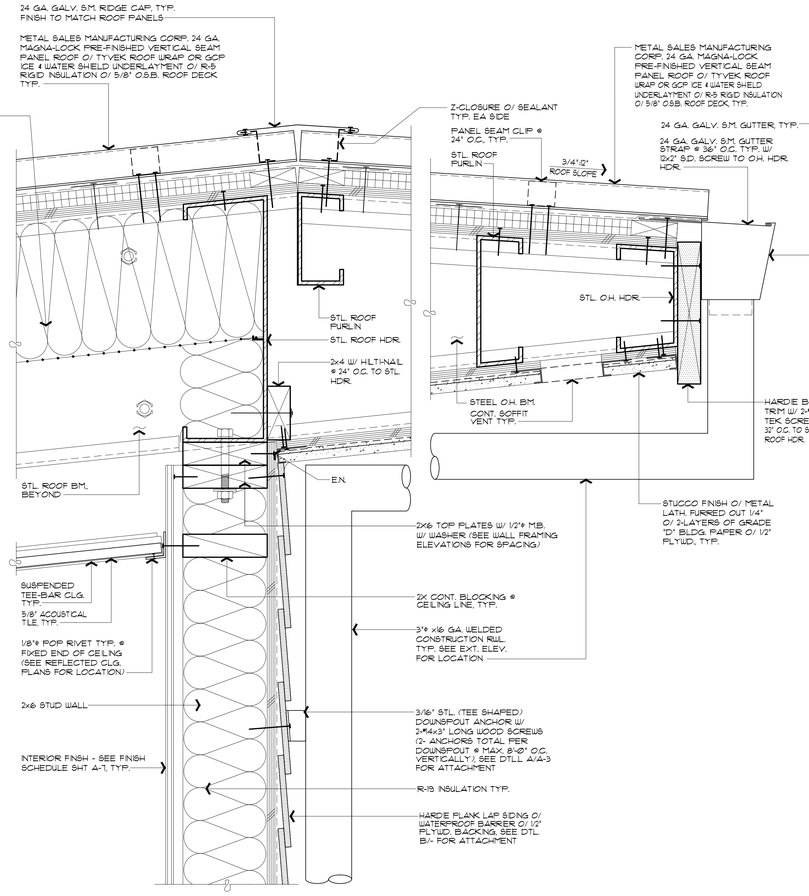


SIDING ATTACHMENT (B)

SCALE 3"=1'-0"

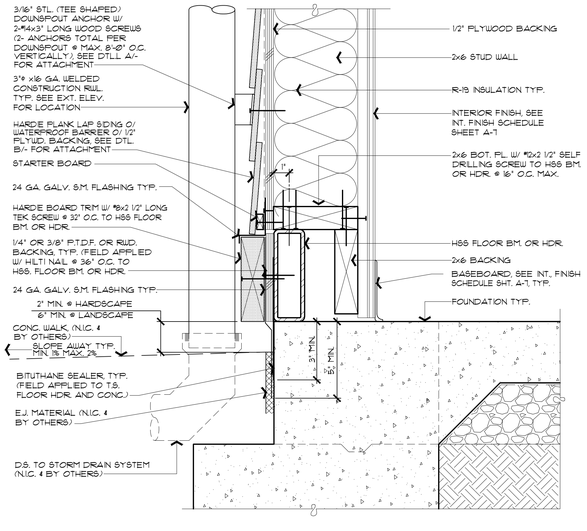
ROOF INT. MODLINE (3)

SCALE: 3"=1'-0"



END WALL @ ROOF O.H. (4)

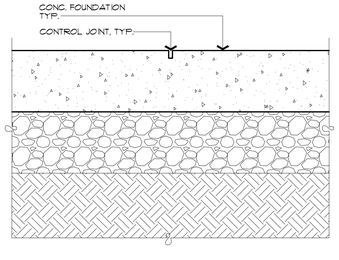
SCALE: 3"=1'-0"



END WALL @ FLOOR (5)

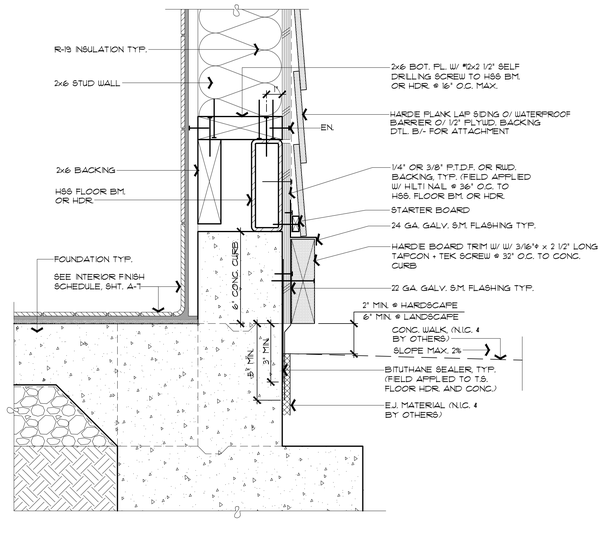
SCALE: 3"=1'-0"

NOTE:
PROVIDE FIRE BLOCKING TYP. AS REQUIRED BY SECTION 718.2 OF THE 2022 C.B.C.



FLOOR @ MODLINE (6)

SCALE: 3"=1'-0"



END WALL @ FLOOR (7)

SCALE: 3"=1'-0"

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INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
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FOR PERMIT

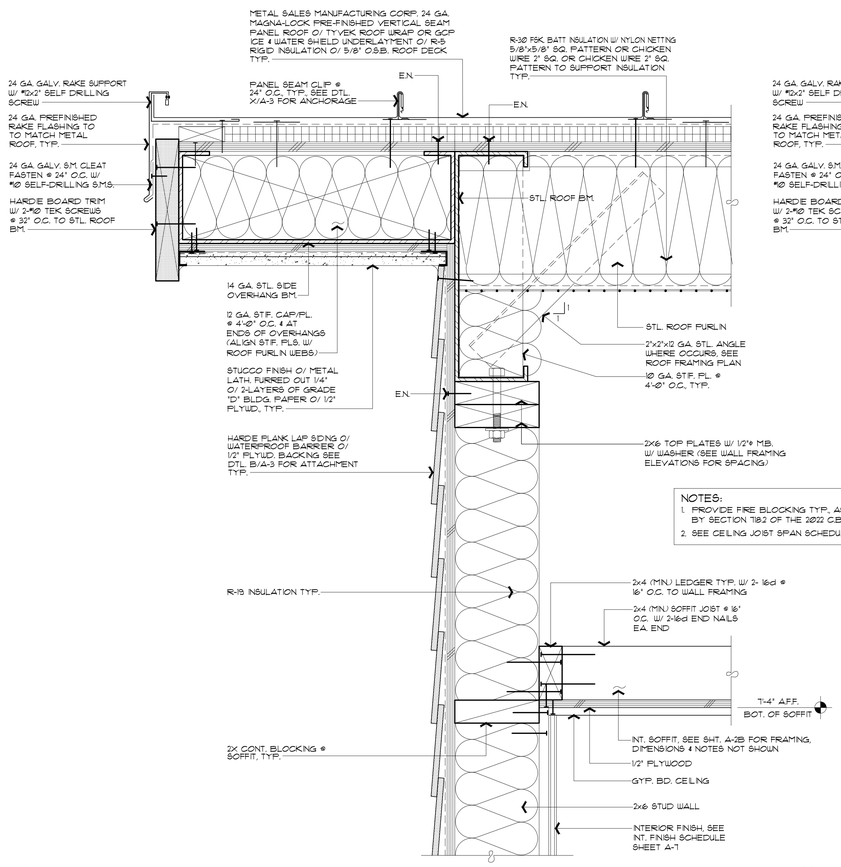
LICENSED ARCHITECT
GEORGE E. RIVERO
No. C-30187
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

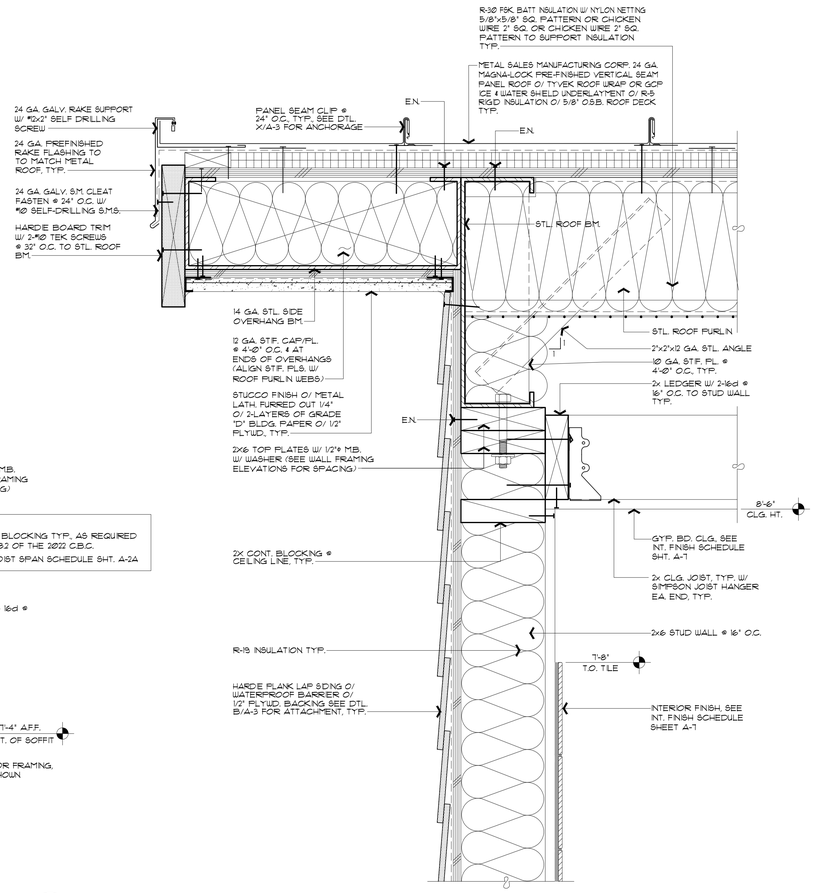
SHEET TITLE
ARCHITECTURAL CROSS-SECTIONS

SHEET NO.
A-3



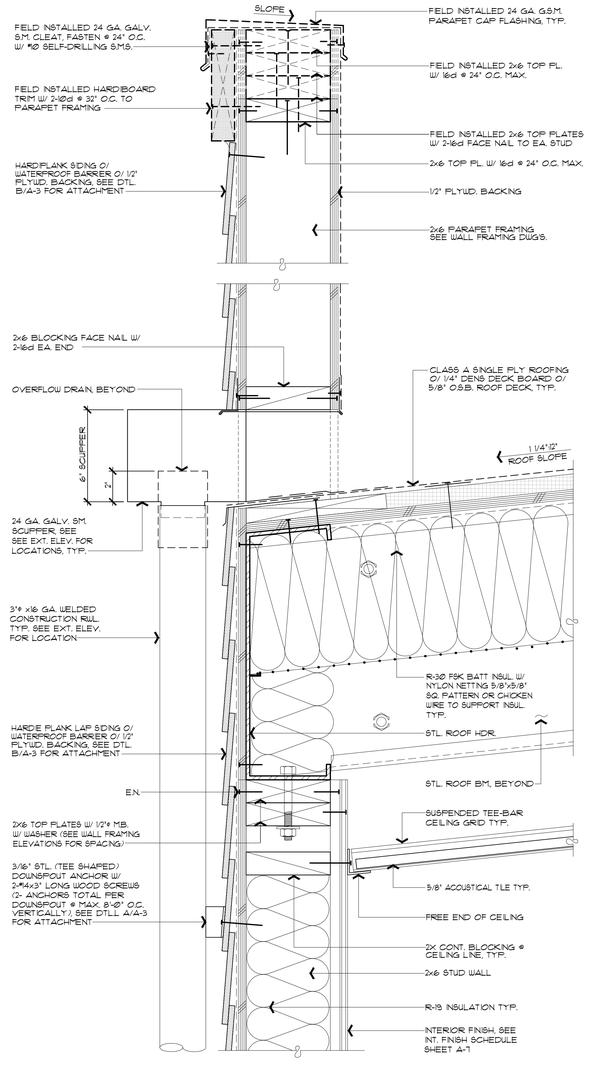
SIDE WALL @ ROOF @ INT. SOFFIT

8 — SCALE: 3"=1'-0"



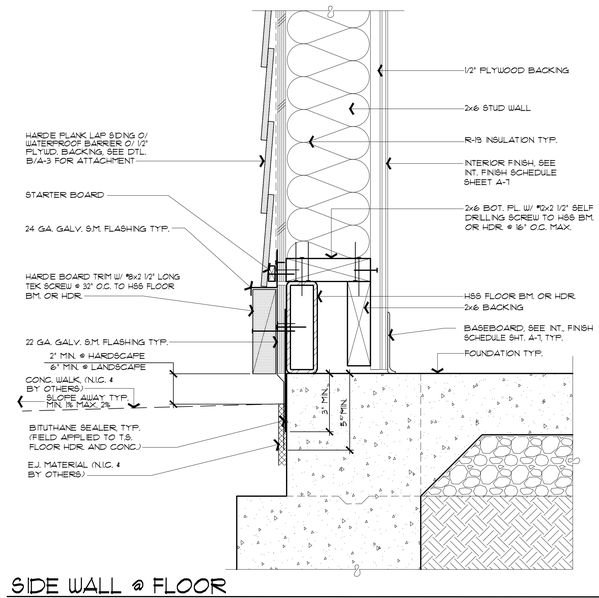
SIDE WALL @ ROOF

10 — SCALE: 3"=1'-0"



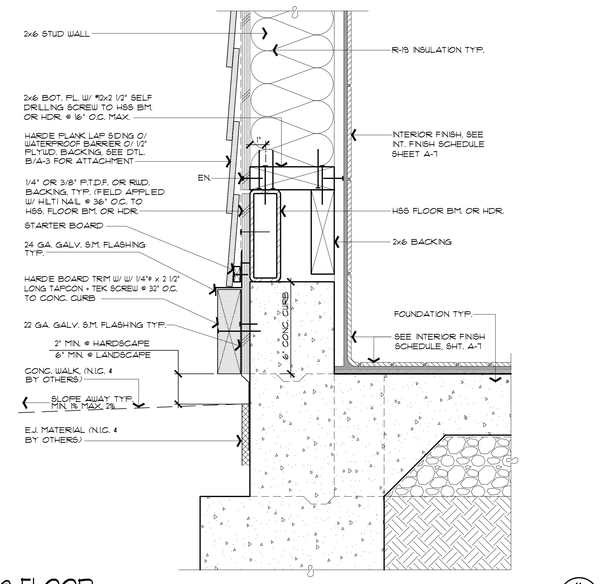
END WALL @ PARAPET

12 — SCALE: 3"=1'-0"



SIDE WALL @ FLOOR

9 — SCALE: 3"=1'-0"



SIDE WALL @ FLOOR

11 — SCALE: 3"=1'-0"

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LICENSED ARCHITECT
ROBERT E. DOOLEY
No. C-26207
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
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REVISIONS:

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DATE FEB. 6, 2025
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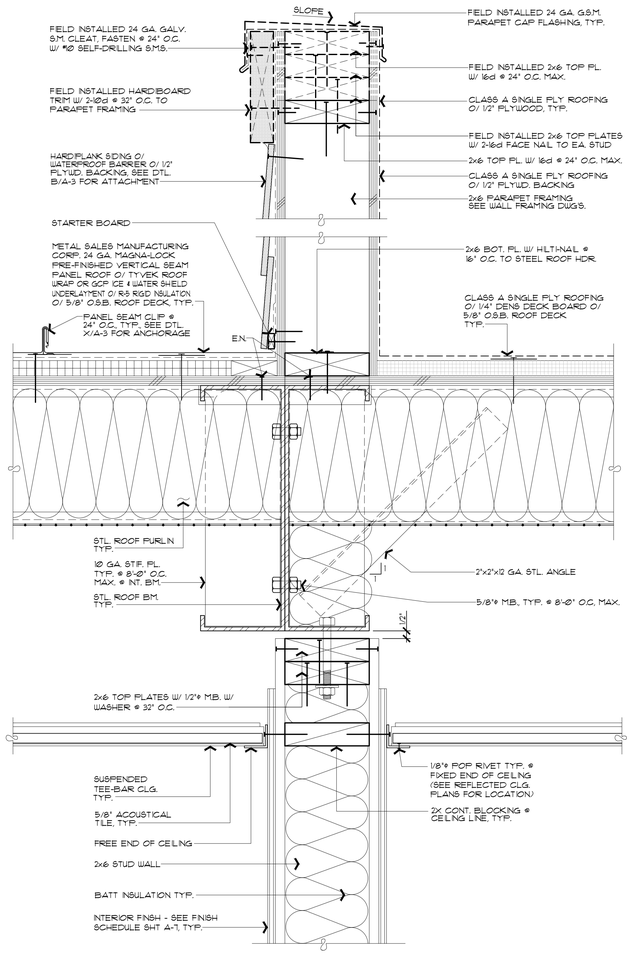
SHEET TITLE
ARCHITECTURAL CROSS-SECTIONS

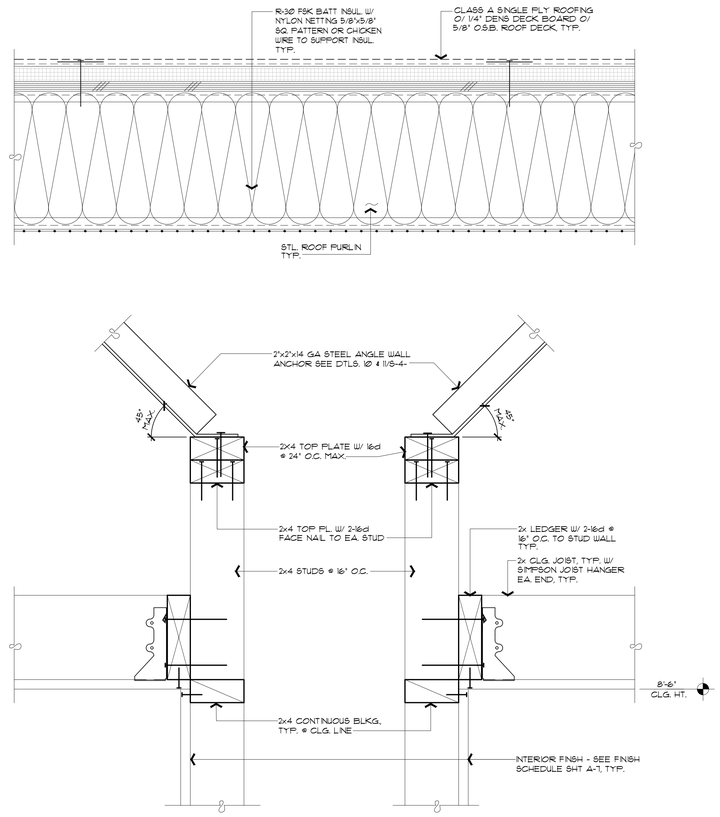
SHEET NO.
A-3.1



ROOF @ INT. MODLINE

SCALE: 3"=1'-0"

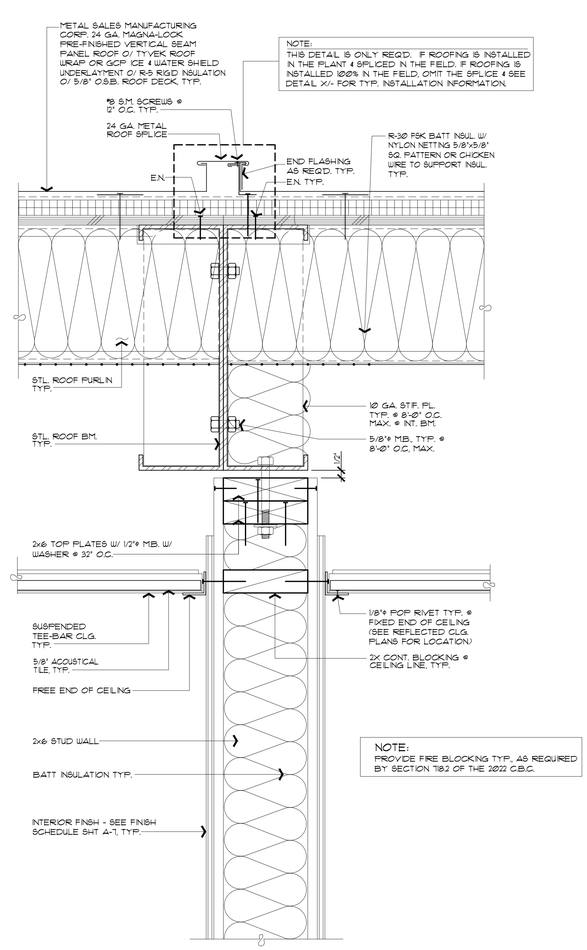
17



INT. WALL @ ROOF - (PLUMBING CHASE)

SCALE: 3"=1'-0"

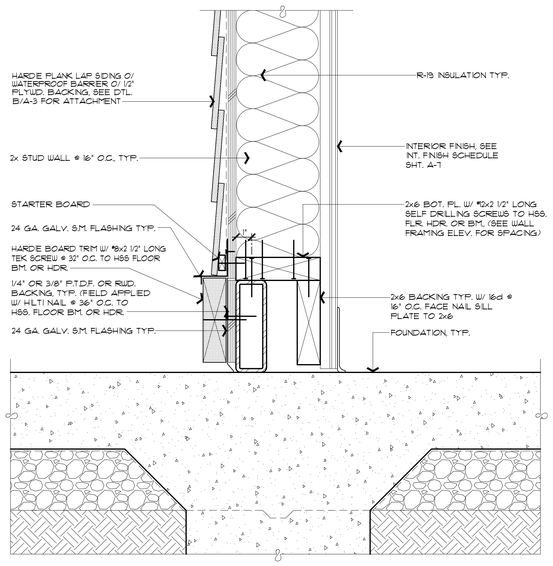
15



ROOF @ INT. MODLINE

SCALE: 3"=1'-0"

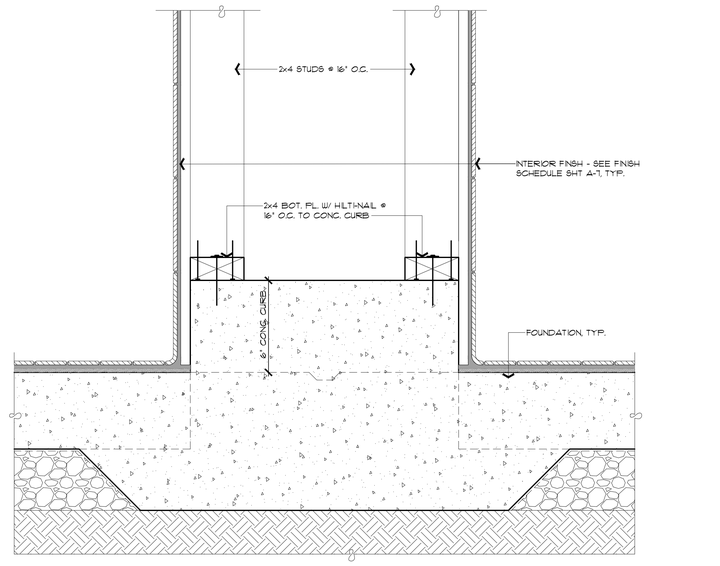
13



SIDE WALL @ FLOOR

SCALE: 3"=1'-0"

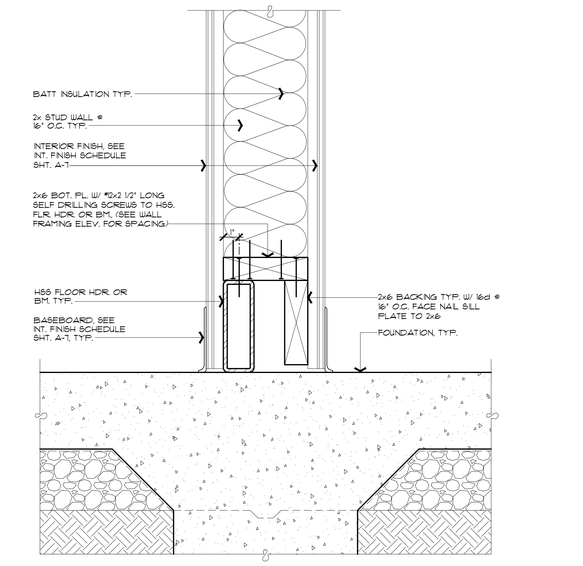
18



INT. WALL @ FLOOR - (PLUMBING CHASE)

SCALE: 3"=1'-0"

16



FLOOR @ INT. MODLINE

SCALE: 3"=1'-0"

14

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 477488
NV. LIC. NO. 37887

LICENSED ARCHITECT
BRENT E. PRESS
No. C-26187
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

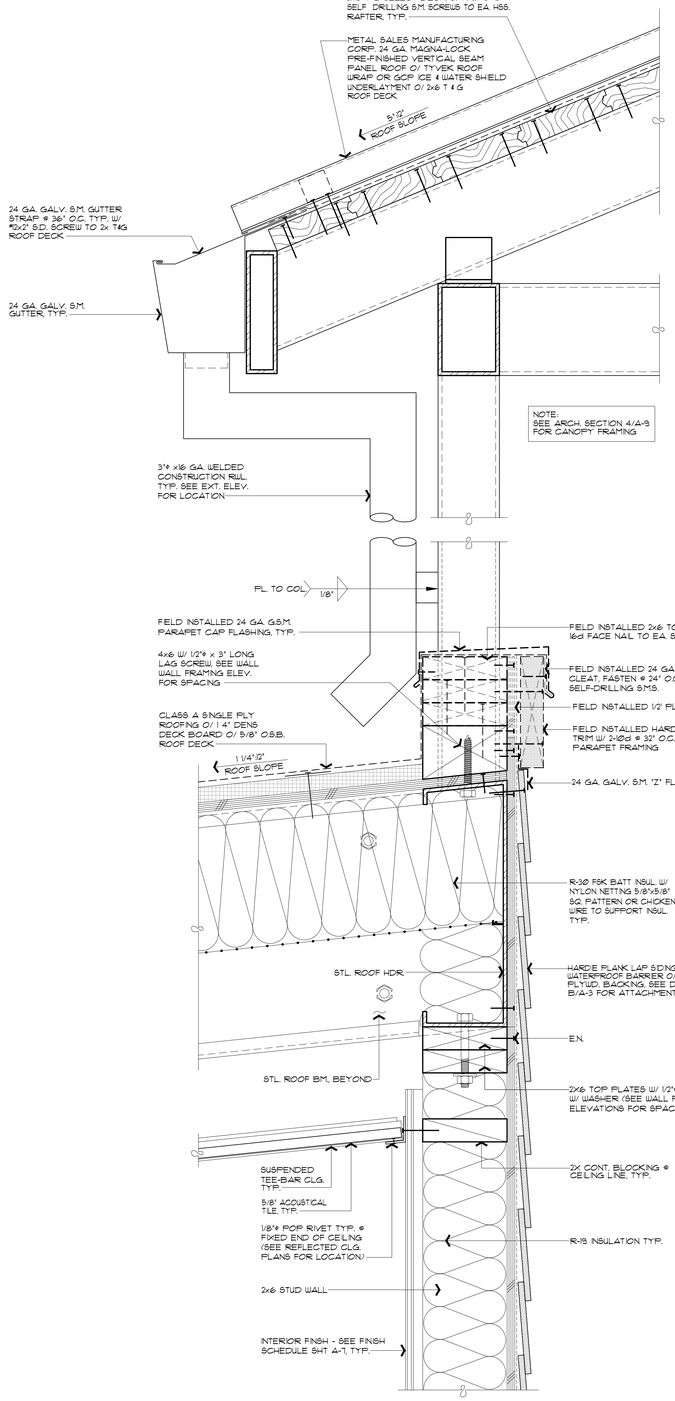
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

ARCHITECTURAL CROSS-SECTIONS

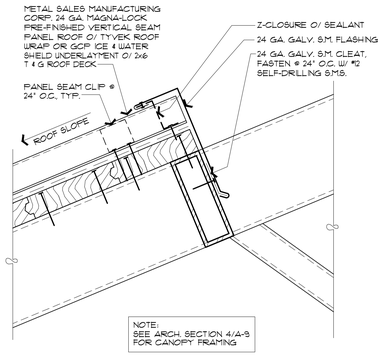
SHEET NO.

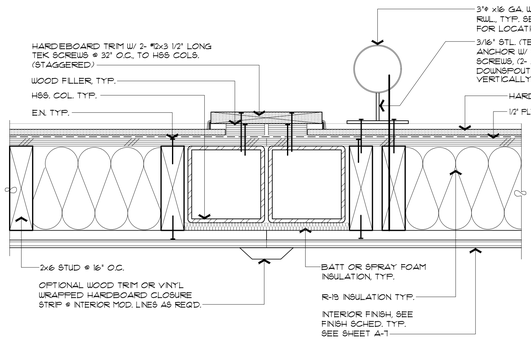
A-3.2



DETAIL @ CANOPY

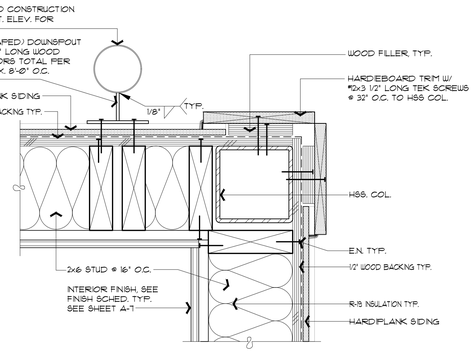
SCALE 3"=1'-0" — 22





DETAIL @ EXT. WALL - MODLINES

SCALE 3"=1'-0" — 20



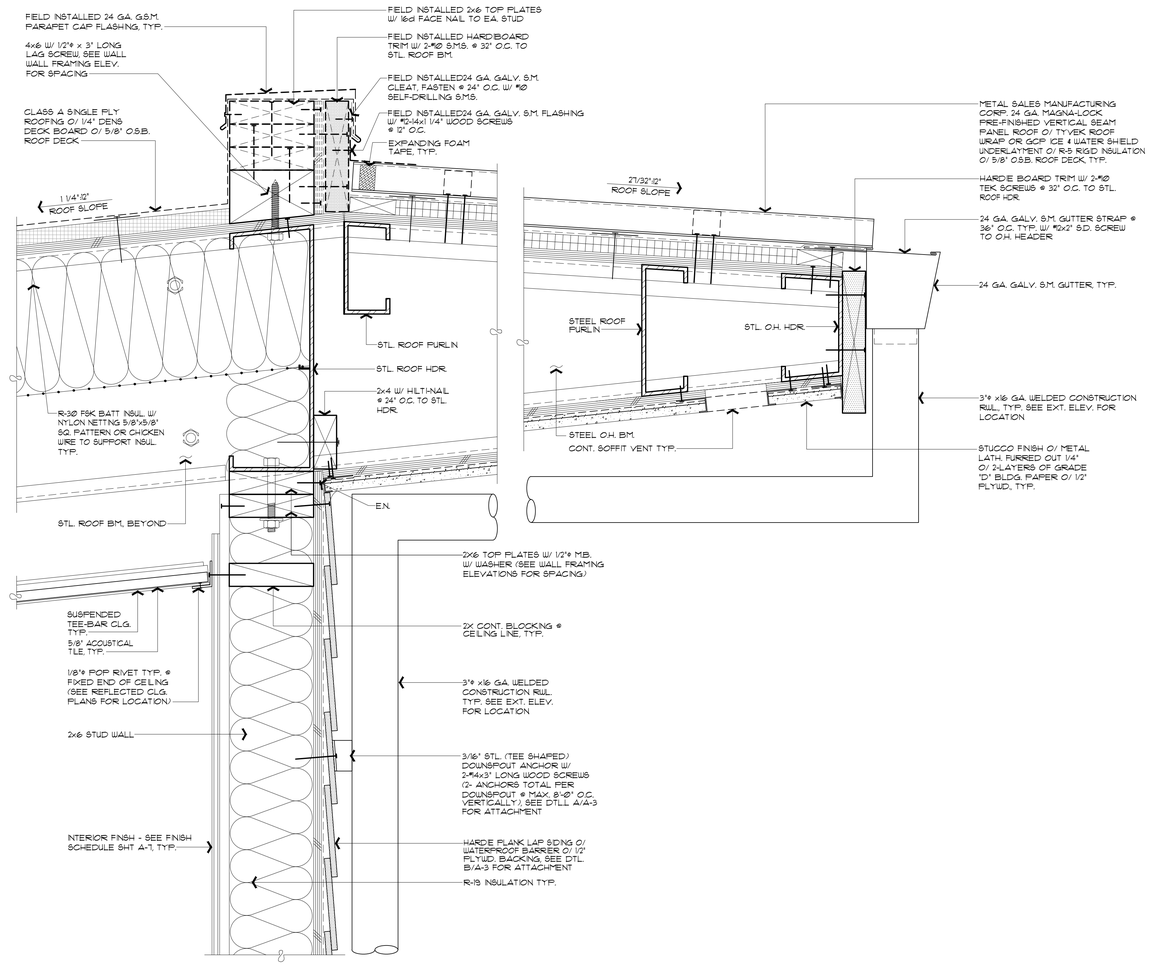
TYP. CORNER

SCALE 3"=1'-0" — 19

NOTE:
PROVIDE FIRE BLOCKING TYP., AS REQUIRED BY SECTION 718.2 OF THE 2022 C.B.C.

END WALL @ ROOF/CANOPY

SCALE: 3"=1'-0" — 23



END WALL @ ROOF O.H.

SCALE: 3"=1'-0" — 21

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4637
CA. LIC. NO. 477488
NV. LIC. NO. 37887

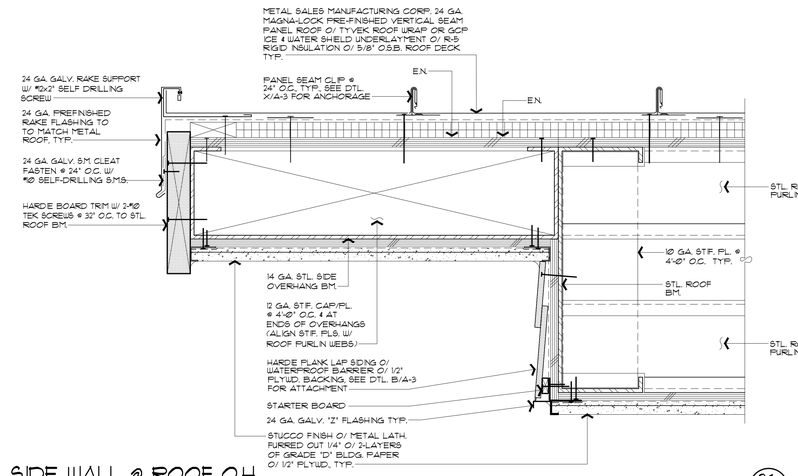
LICENSED ARCHITECT
GEORGE E. ROSSER
No. C-26307
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE: FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
ARCHITECTURAL CROSS-SECTIONS

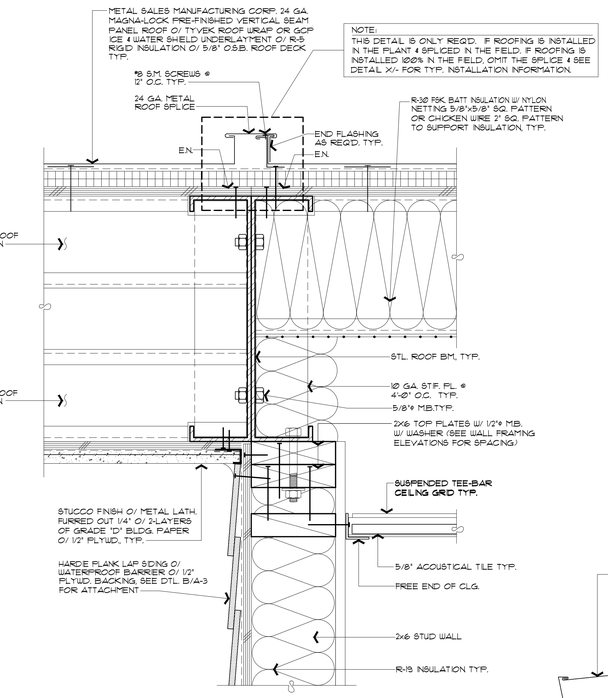
SHEET NO.
A-3.3



SIDE WALL @ ROOF O.H.

SCALE: 3"=1'-0"

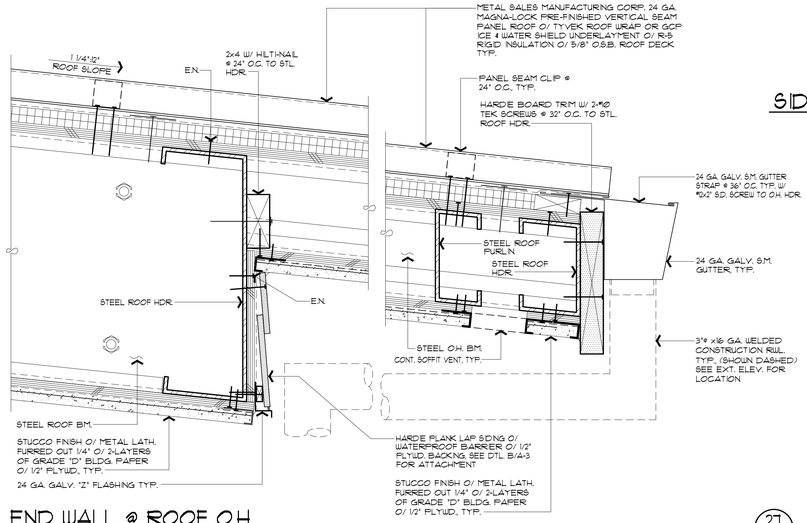
26



SIDE WALL @ ROOF O.H.

SCALE: 3"=1'-0"

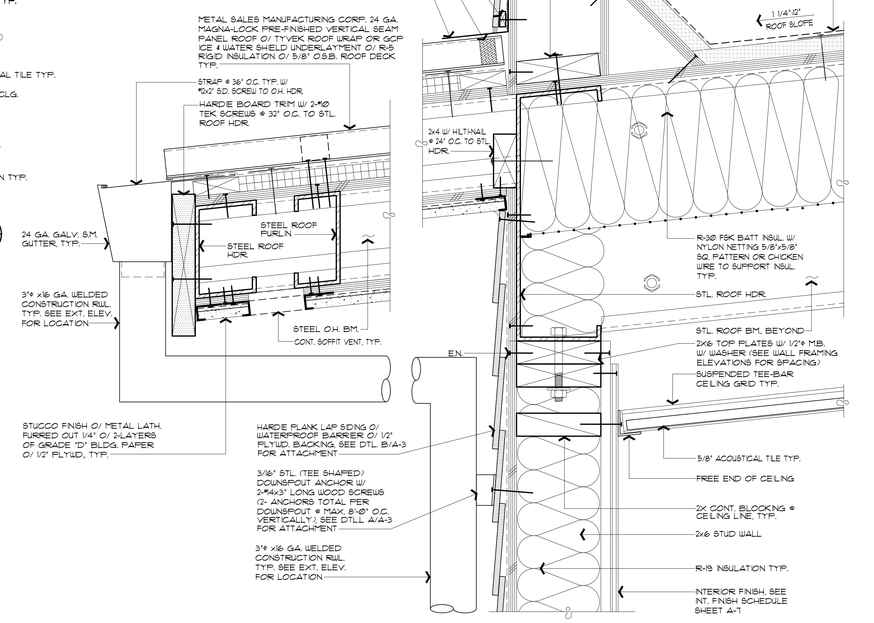
25



END WALL @ ROOF O.H.

SCALE: 3"=1'-0"

27



END WALL @ PARAPET/O.H.

SCALE: 3"=1'-0"

24

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVE. MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 427488
NV. LIC. NO. 37887

FOR PERMIT

LICENSED ARCHITECT
BRIAN E. BOSSOW
No. C-031307
Exp. 8-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

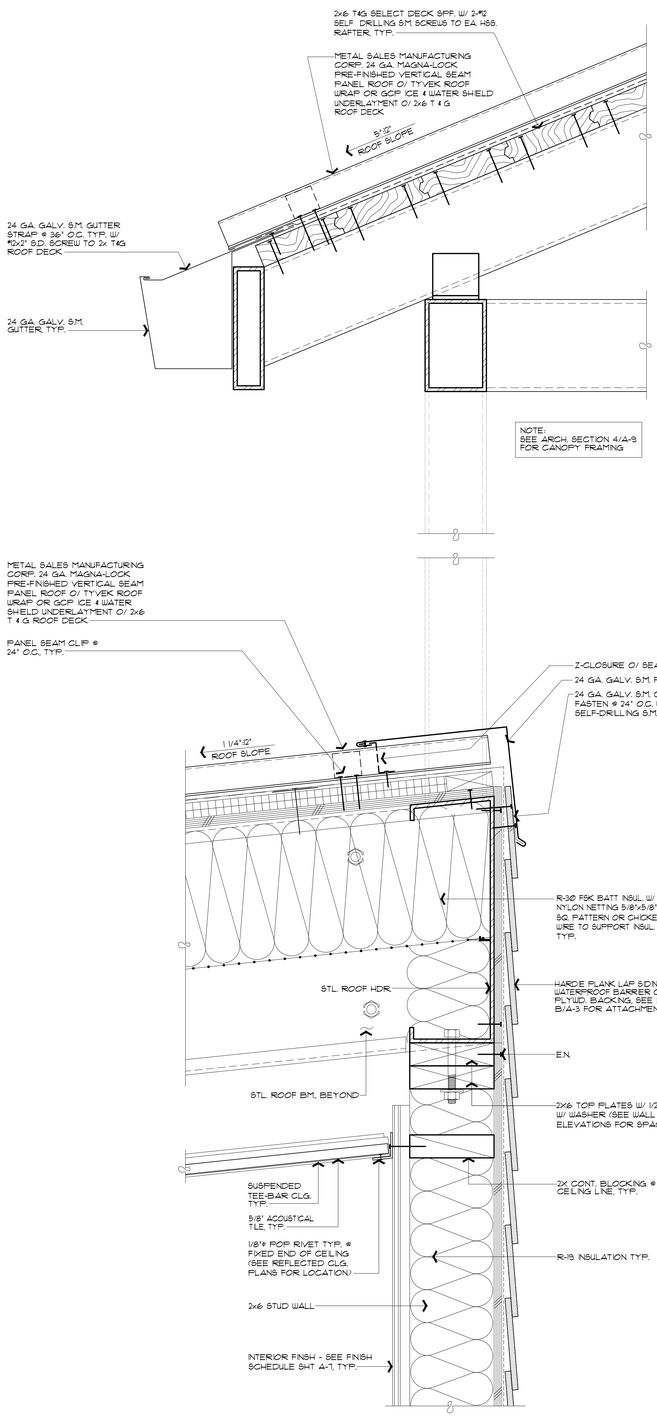
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

ARCHITECTURAL CROSS-SECTIONS

SHEET NO.

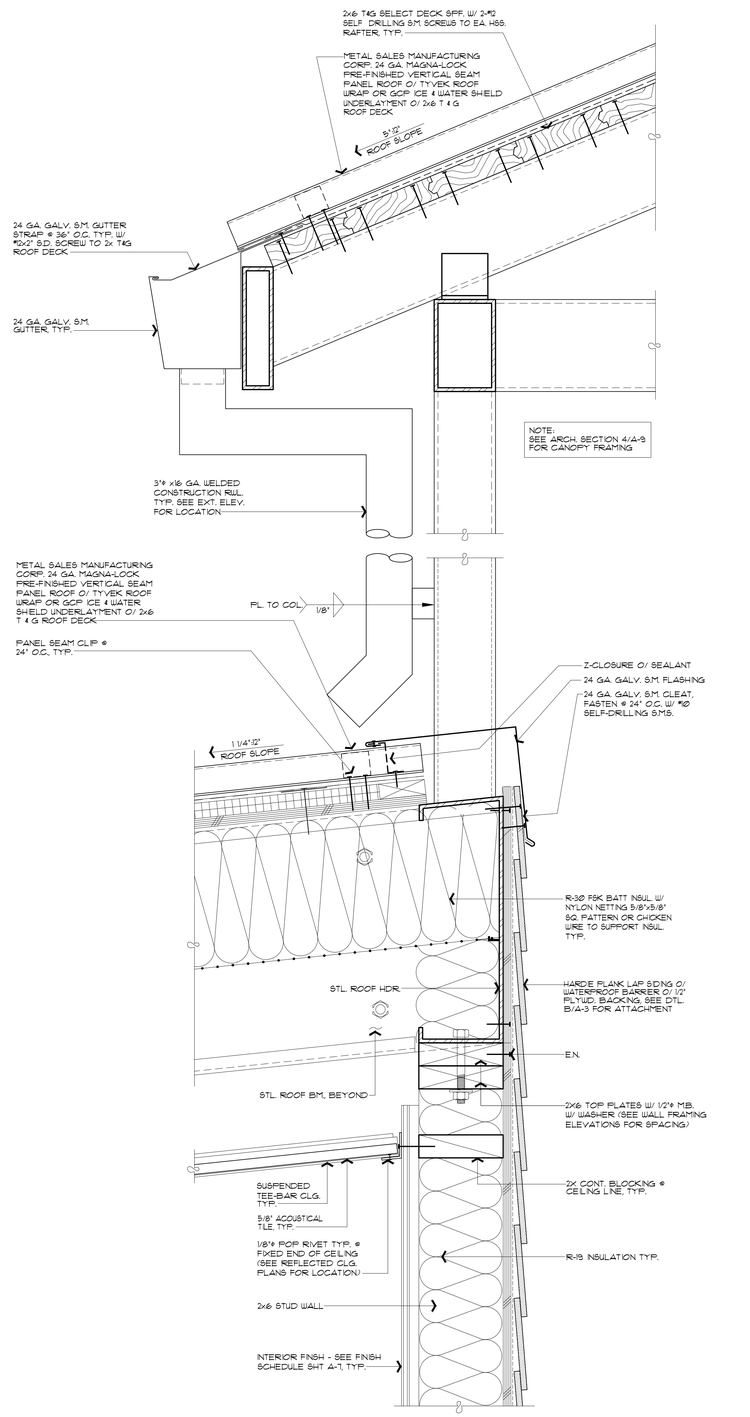
A-3.4



END WALL @ ROOF/CANOPY

29

SCALE: 3"=1'-0"



END WALL @ METAL ROOF & CANOPY COLUMN

28

SCALE: 3"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4837
CA. LIC. NO. 427488
NV. LIC. NO. 37887

FOR

LICENSED ARCHITECT
BRENT E. GOODSELL
No. C-31307
Exp. 6-30-25
STATE OF CALIFORNIA

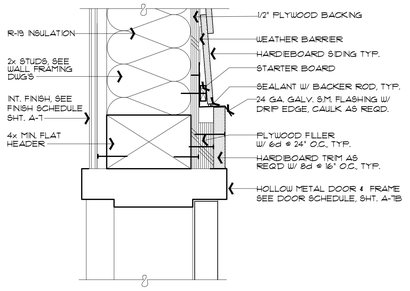
DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
ARCHITECTURAL CROSS-SECTIONS

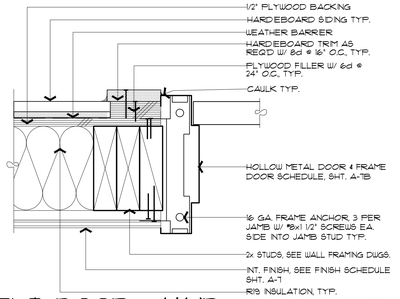
SHEET NO.
A-3.5



EXT. DOOR - HEAD

1 -

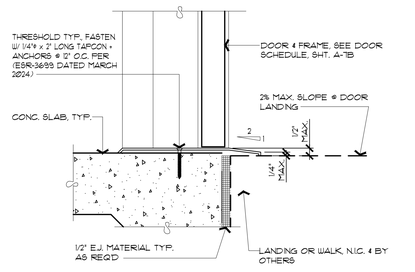
SCALE: 3"=1'-0"



EXT. DOOR - JAMB

2 -

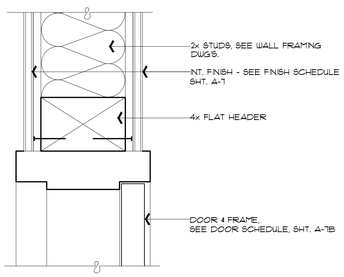
SCALE: 3"=1'-0"



EXT. DOOR - BOTTOM

3 -

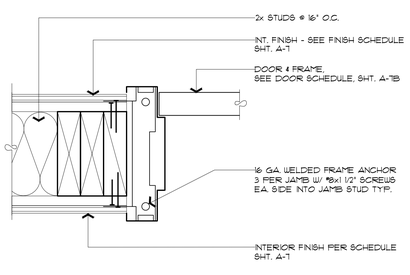
SCALE: 3"=1'-0"



INT. DOOR - HEAD

4 -

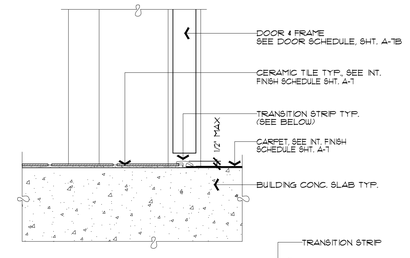
SCALE: 3"=1'-0"



INT. DOOR - JAMB

5 -

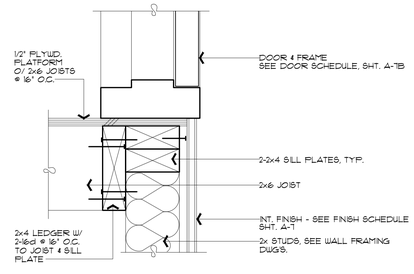
SCALE: 3"=1'-0"



INT. DOOR BOTTOM @ RESTROOM

6 -

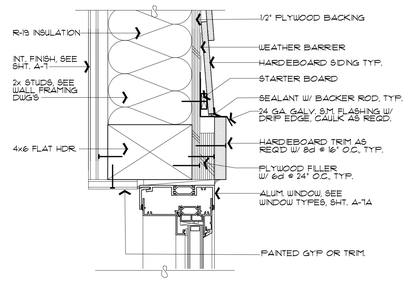
SCALE: 3"=1'-0"



INT. HVAC DOOR BOTTOM

7 -

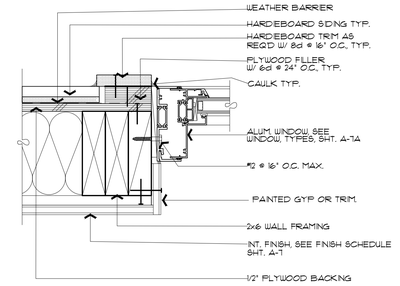
SCALE: 3"=1'-0"



EXT. FIXED WINDOW - HEADER

8 -

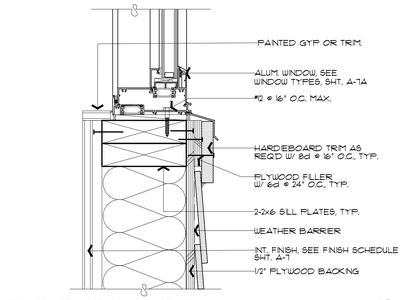
SCALE: 3"=1'-0"



EXT. FIXED WINDOW - JAMB

9 -

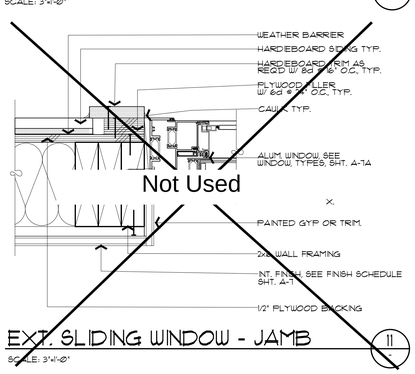
SCALE: 3"=1'-0"



EXT. FIXED WINDOW - SILL

10 -

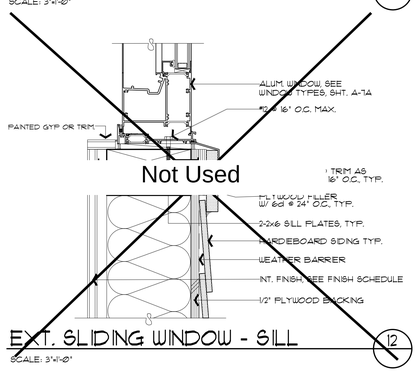
SCALE: 3"=1'-0"



EXT. SLIDING WINDOW - JAMB

11 -

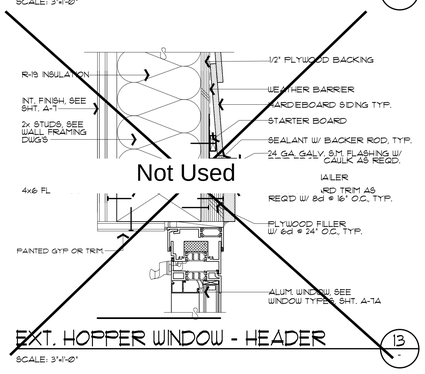
SCALE: 3"=1'-0"



EXT. SLIDING WINDOW - SILL

12 -

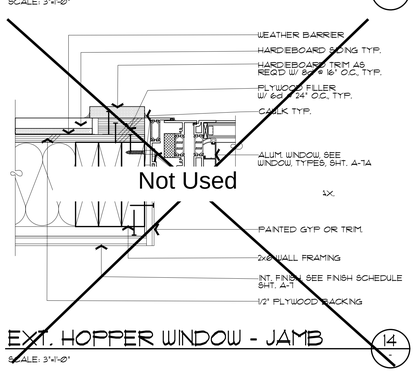
SCALE: 3"=1'-0"



EXT. HOPPER WINDOW - HEADER

13 -

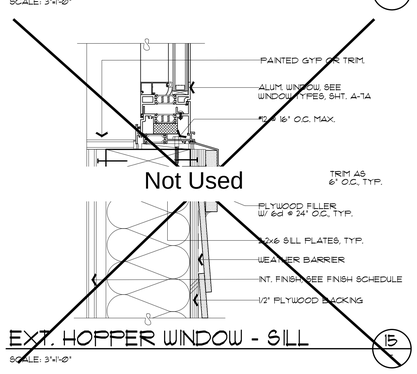
SCALE: 3"=1'-0"



EXT. HOPPER WINDOW - JAMB

14 -

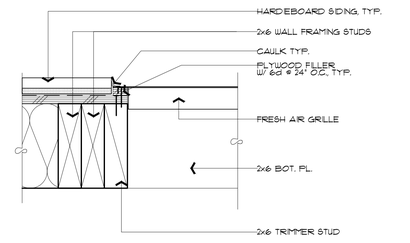
SCALE: 3"=1'-0"



EXT. HOPPER WINDOW - SILL

15 -

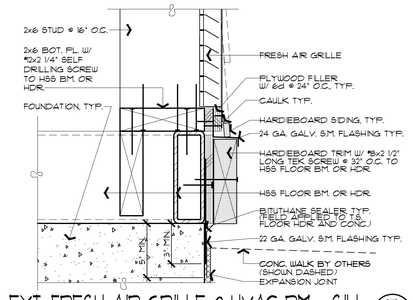
SCALE: 3"=1'-0"



EXT. FRESH AIR GRILLE @ HVAC RM. - JAMB

16 -

SCALE: 3"=1'-0"



EXT. FRESH AIR GRILLE @ HVAC RM. - SILL

17 -

SCALE: 3"=1'-0"

MINIMUM EMBEDMENT FOR FASTENERS	
FASTENER	MINIMUM EMBEDMENT
#8 SCREW	1 1/4"
#10 SCREW	1 1/4"
#12 SCREW	1 1/2"
#14 SCREW	1 1/2"
3/8"ø	1 1/2"
3/16"ø	1"
7/16"ø	1 3/4"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 473488
NV. LIC. NO. 37887

LICENSED ARCHITECT
ROBERT E. DOSKOCIL
No. C-26207
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

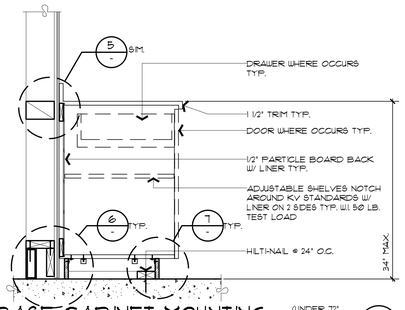
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

ARCHITECTURAL DETAILS

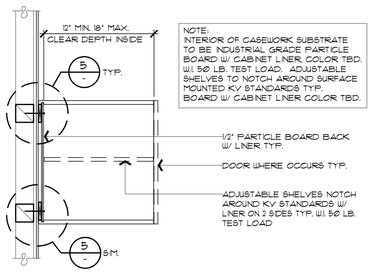
SHEET NO.

A-4



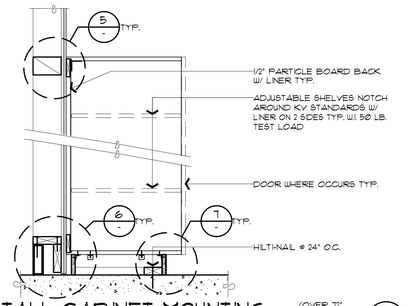
BASE CABINET MOUNTING (UNDER 72" TALL) 1

SCALE: 1"=1'-0"



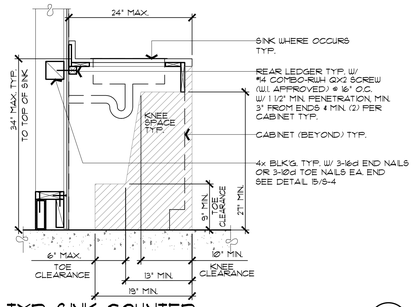
WALL HUNG SHELF/CABINET MOUNTING 2

SCALE: 1"=1'-0"



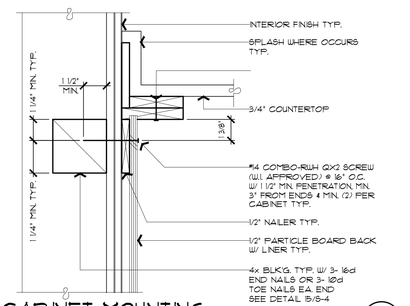
TALL CABINET MOUNTING (OVER 72" TALL) 3

SCALE: 1"=1'-0"



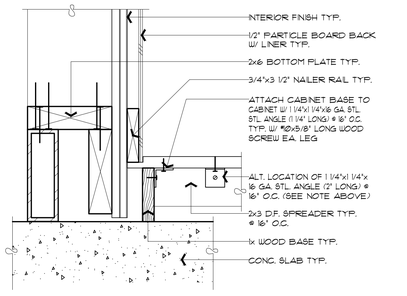
TYP. SINK COUNTER 4

SCALE: 1"=1'-0"



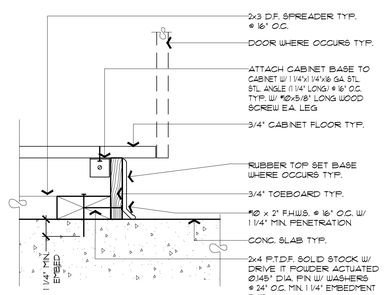
CABINET MOUNTING 5

SCALE: 3"=1'-0"



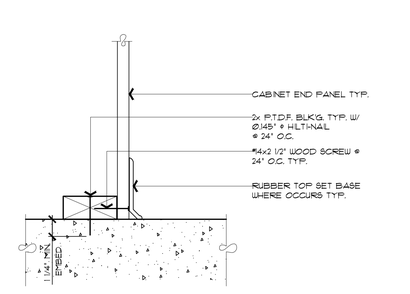
CABINET BOTTOM @ WALL 6

SCALE: 3"=1'-0"



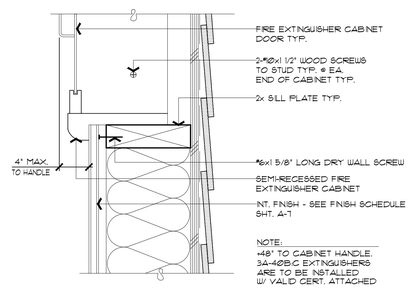
CABINET BASE 7

SCALE: 3"=1'-0"



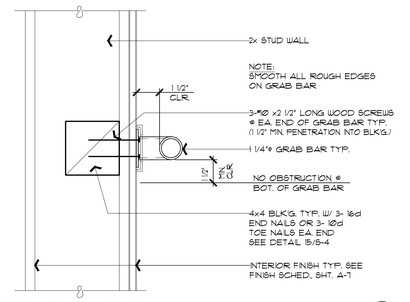
CABINET BASE @ END PANEL 8

SCALE: 3"=1'-0"



SEMI-RECESSED FIRE EXTINGUISHER CABINET 9

SCALE: 3"=1'-0"



GRAB BAR DETAIL 10

SCALE: 3"=1'-0"

ROOF HATCH DETAIL 11

SCALE: 3/4"=1'-0"

SMART BOARD MOUNTING 12

SCALE: 3"=1'-0"

MINIMUM EMBEDMENT FOR FASTENERS	
FASTENER	MINIMUM EMBEDMENT
#8 SCREW	1 1/4"
#10 SCREW	1 1/4"
#12 SCREW	1 1/2"
#14 SCREW	1 1/2"
3/8"ø	1 1/2"
3/16"ø	1"
7/16"ø	1 3/4"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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REFERENCE ONLY

MEEHLEIN MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4637
CA. LIC. NO. 472488
NV. LIC. NO. 37887

FOR

LICENSED ARCHITECT
GEORGE E. ROGERS
No. C-29187
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

.	.

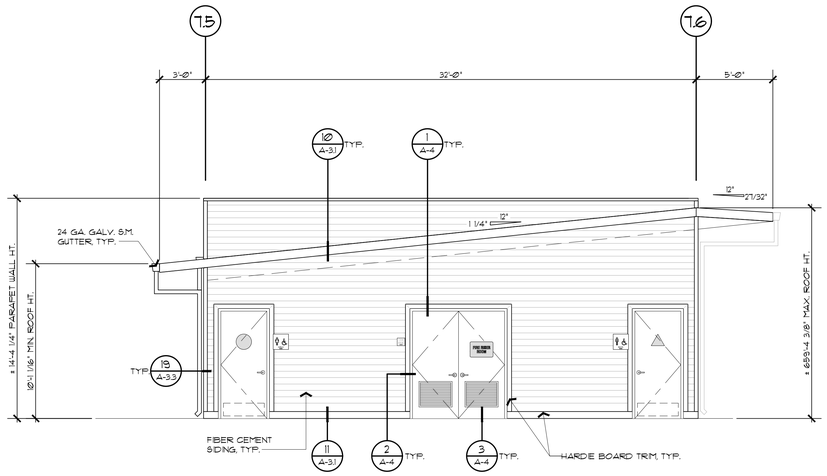
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

ARCHITECTURAL DETAILS

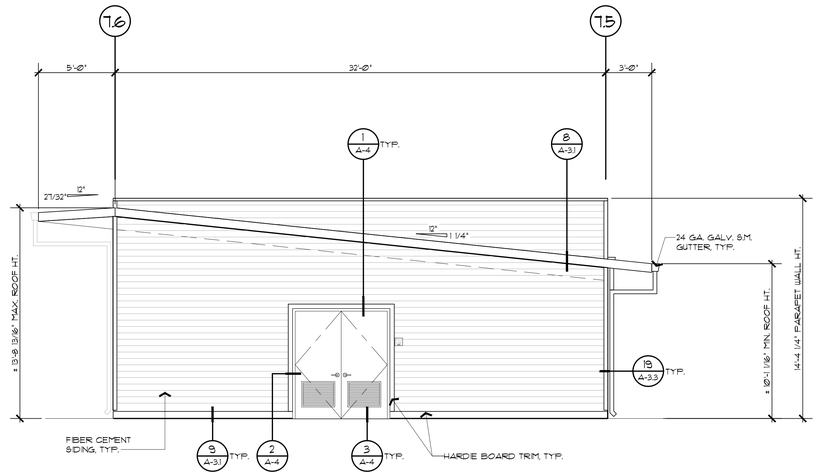
SHEET NO.

A-4.1



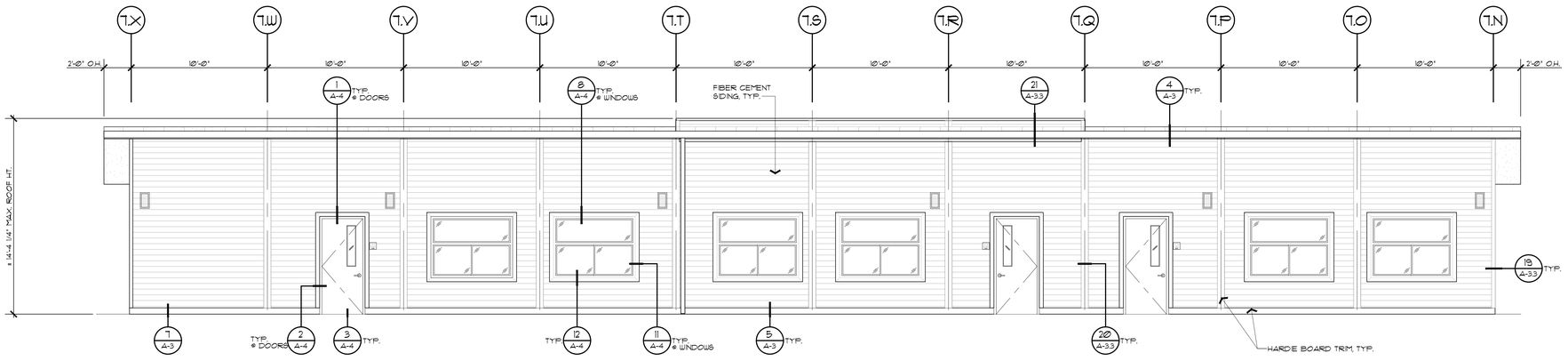
EXTERIOR ELEVATION (SINGLE BUILDING) SOUTH

SCALE 1/4"=1'-Ø" 1



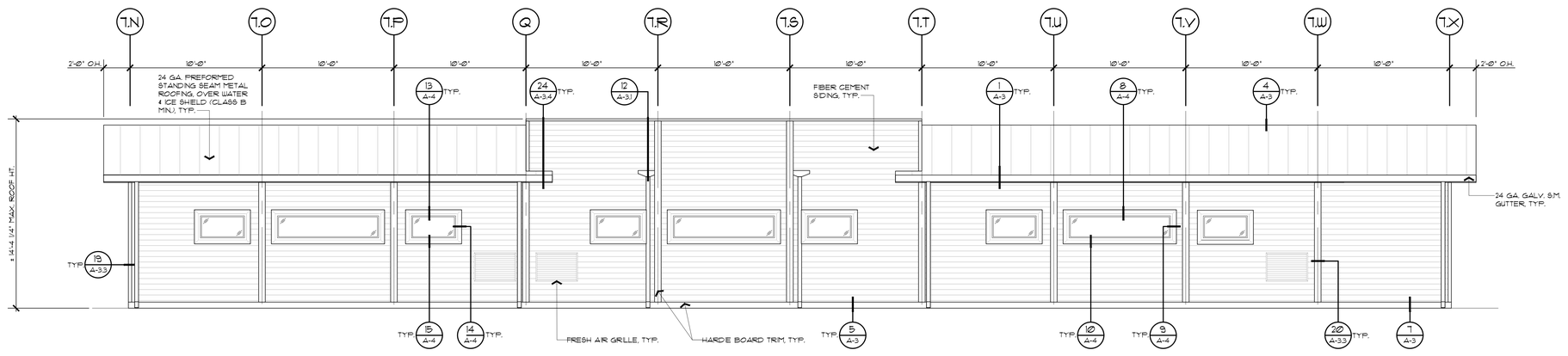
EXTERIOR ELEVATION (SINGLE BUILDING) NORTH

SCALE 1/4"=1'-Ø" 2



EXTERIOR ELEVATION (SINGLE BUILDING) EAST

SCALE 1/4"=1'-Ø" 3



EXTERIOR ELEVATION (SINGLE BUILDING) WEST

SCALE 1/4"=1'-Ø" 4

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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FOR PERMIT

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4637
CA. LIC. NO. 427488
NV. LIC. NO. 37887

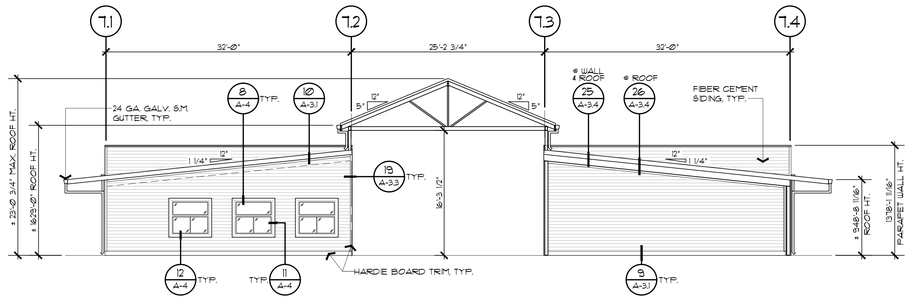
LICENSED ARCHITECT
JOHN E. GOODWIN
No. C-031307
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

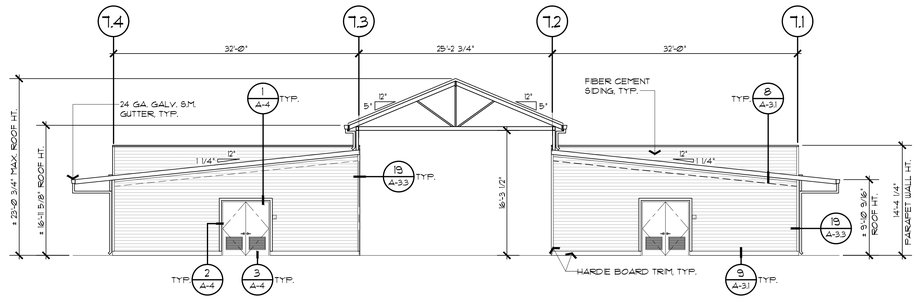
SHEET TITLE
EXTERIOR ELEVATION SINGLE BLDG.

SHEET NO.
A-5



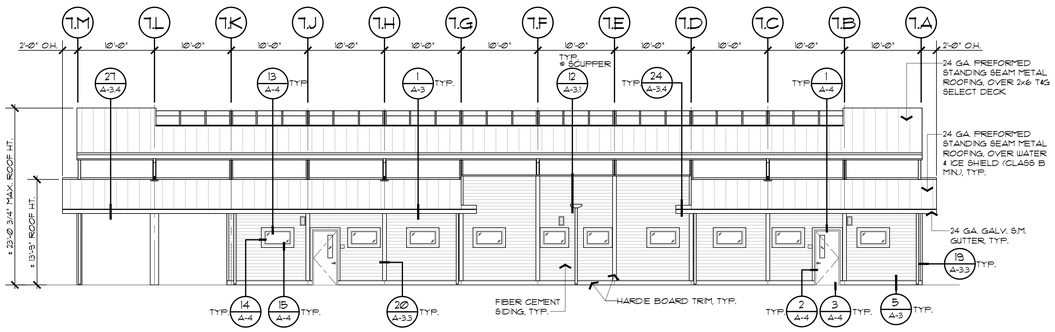
EXTERIOR ELEVATION SOUTH

SCALE 1/8"=1'-0" (1)



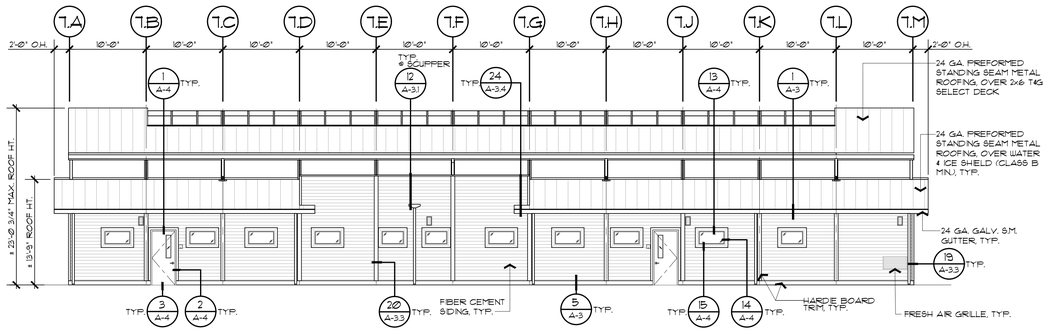
EXTERIOR ELEVATION NORTH

SCALE 1/8"=1'-0" (2)



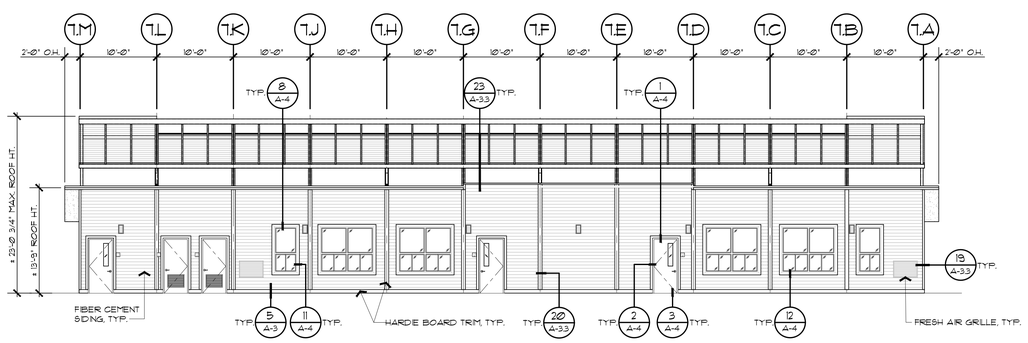
EXTERIOR ELEVATION EAST

SCALE 1/8"=1'-0" (3)



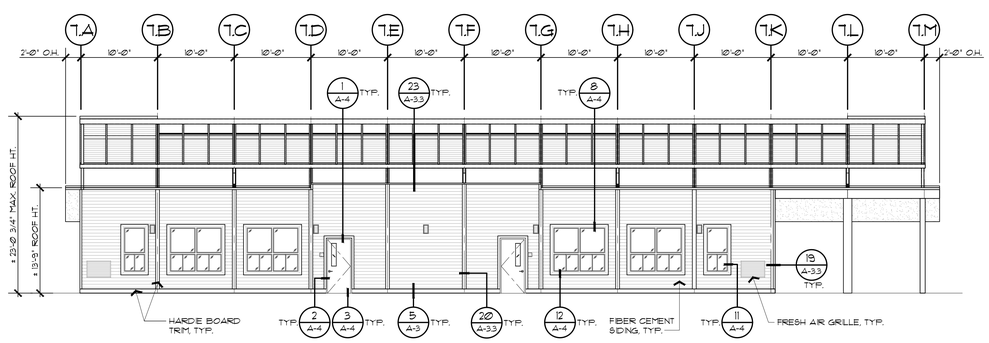
EXTERIOR ELEVATION WEST

SCALE 1/8"=1'-0" (4)



EXTERIOR ELEVATION EAST @ WALKWAY

SCALE 1/8"=1'-0" (5)



EXTERIOR ELEVATION WEST @ WALKWAY

SCALE 1/8"=1'-0" (6)

Project Navigator F:\PROJECT FILES\MENDOTA 2024\DWG\A-5.1.dwg 3/19/2025 10:43 AM

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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REFERENCE ONLY

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MEEHLEIN MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4637
CA. LIC. NO. 422488
NV. LIC. NO. 37887

LICENSED ARCHITECT
GREGORY E. GOODRICH
No. C-29125
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN:	BLB
CHECKED:	MM

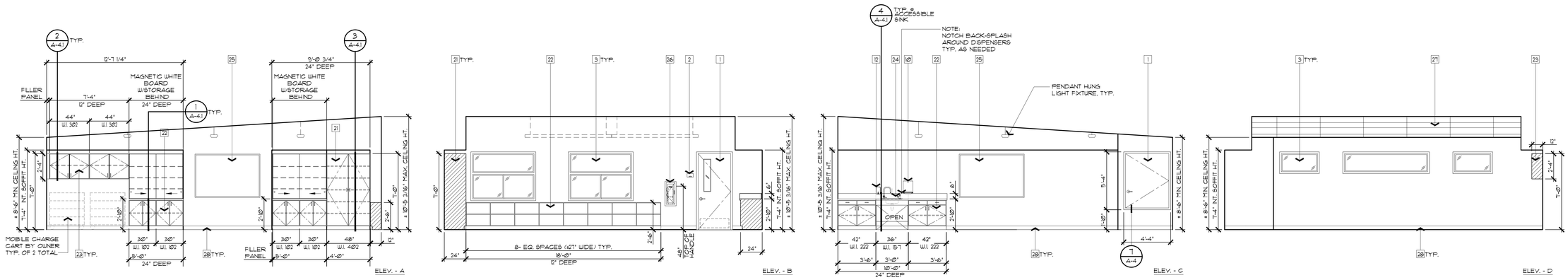
REVISIONS:

.	.

DATE	FEB. 6, 2025
JOB NO.	24769

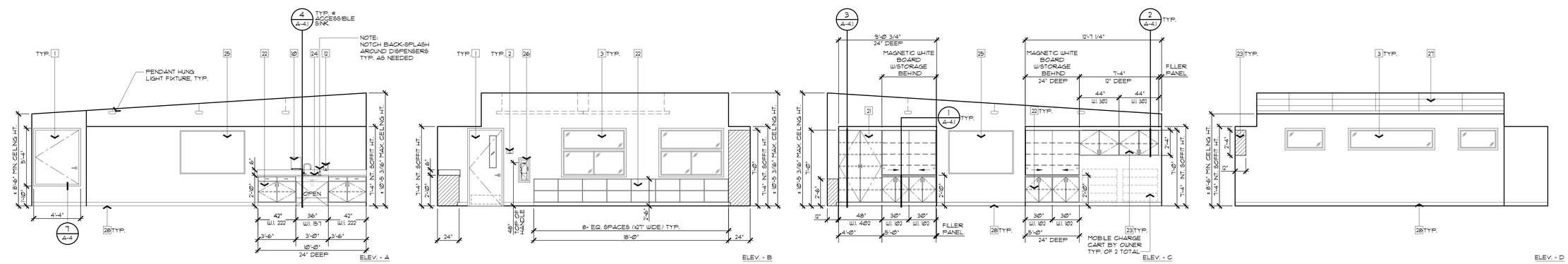
SHEET TITLE
EXTERIOR ELEVATION DOUBLE BLDG.

SHEET NO.
A-5.1



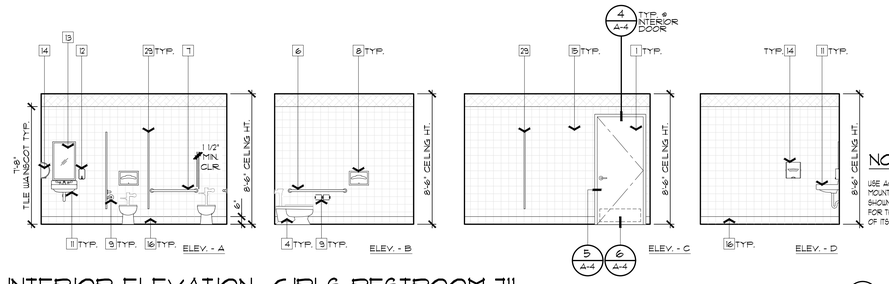
INTERIOR ELEVATION CLASSROOM 708 & 710

SCALE 1/4"=1'-Ø" (1)



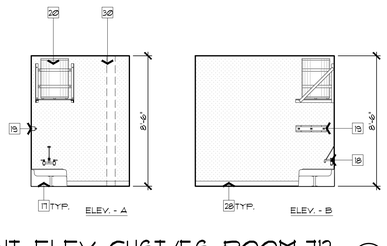
INTERIOR ELEVATION CLASSROOM 709

SCALE 1/4"=1'-Ø" (2)



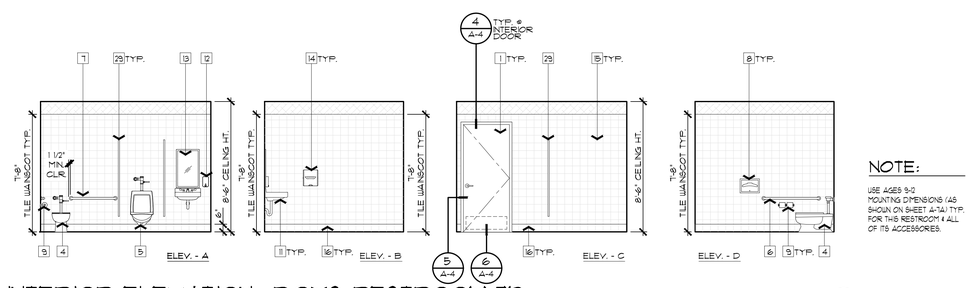
INTERIOR ELEVATION GIRLS RESTROOM 711

SCALE 1/4"=1'-Ø" (3)



INT. ELEV. CUST./F.S. ROOM 712

SCALE 1/4"=1'-Ø" (4)



INTERIOR ELEVATION BOYS RESTROOM 713

SCALE 1/4"=1'-Ø" (5)

GENERAL NOTES

1. SEE SHEET A-7A FOR ACCESSIBLE MOUNTING HEIGHTS & DIMENSIONS NOT SHOWN FOR ALL PLUMBING FIXTURES AND ACCESSORIES.
2. SEE PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR SCHEDULES, FIXTURES, NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET.

KEY NOTES

1. DOOR & FRAME, SEE SHT. A-7A FOR SIZE & TYPE SEE DOOR SCHEDULE, SHEET. A-7B
2. DOOR SIGNAGE, SEE SHT. A-7A
3. ALUMINUM FRAME WINDOW, SEE WINDOW TYPES, SHEET A-7A
4. ACCESSIBLE FLOOR MOUNT TOILET WITH FLUSH ACTIVATOR @ OPEN SIDE, SEE PLUMBING DRAWINGS
5. ACCESSIBLE WALL-HUNG URINAL SEE PLUMBING DWGS.
6. 42" LONG x 1 1/4"ø GRAB BAR - SEE DTL. 10/A-4.1 FOR MOUNTING
7. 36" LONG x 1 1/4"ø GRAB BAR - SEE DTL. 10/A-4.1 FOR MOUNTING
8. SURFACE MOUNTED TOILET SEAT COVER
9. SURFACE MOUNTED TOILET PAPER DISPENSER
10. SURFACE MOUNTED PAPER TOWEL DISPENSER
11. ACCESSIBLE LAVATORY, SEE PLUMBING DWGS.
12. SURFACE MOUNTED SOAP DISPENSER
13. SURFACE MOUNTED MIRROR
14. SURFACE MOUNTED HAND DRYER, "XLERATOR" XL-W W/ RECESS KIT
15. 6x6 CERAMIC TILE, SEE INT. WALL FINISH SCHEDULE SHT. A-7
16. 6" CERAMIC TILE COVED BASE W/ FINISHED SHOE, SEE INT. WALL FINISH SCHEDULE SHT. A-7
17. MOP SINK, SEE PLUMBING DRAWINGS
18. MOP SINK FAUCET, SEE PLUMBING DRAWINGS
19. MOP RACK, SEE PLUMBING DRAWINGS
20. WATER HEATER, SEE FOOD SERVICE DWGS.
21. PLASTIC LAMINATE TALL CABINET, SEE SHEET A-4.1 FOR BLOCKING
22. PLASTIC LAMINATE CASEWORK, SEE SHEET A-4.1 FOR BLOCKING
23. WALL HUNG PLASTIC LAMINATE CABINETS, SEE SHEET A-4.1 FOR MOUNT
24. ACCESSIBLE SINK W/ COUNTER TOP, 6" BACKSPLASH & APRON, SEE DTL. 4/A-4.1 & PLUMBING DWGS.
25. SMART BOARD (OWNER FURNISHED & INSTALLED) (4" MAX. PROJECTION FROM INT. WALL FINISH TYP.)
26. SEMI RECESSED FIRE EXTINGUISHER, SEE DETAIL 9/A-4.1
27. SLOPED SUSPENDED ACOUSTICAL T-BAR CEILING
28. RUBBER TORSET BASEBOARD, SEE INT. WALL FINISH SCHEDULE, SHEET. A-7
29. TOILET PARTITION
30. FIRE RISER PIPE (SHOWN DASHED) SEE FIRE SPRINKLER DWGS.

LEGEND

- FRP O/ GYP. BD. OR PLYWD. BACKING, SEE INT. FINISH SCHEDULE, SHT. A-7
- PAINTED GYP. BOARD, SEE INT. FINISH SCHEDULE, SHT. A-7
- 1/2" PREFABRICATED VINYL COVERED TACKBOARD O/ GYP. BD. OR PLYWD. BACKING, SEE INT. FINISH SCHEDULE, SHT. A-7
- 6x6 CERAMIC TILE, SEE INT. FINISH SCHEDULE, SHT. A-7

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

REFERENCE ONLY

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4637
CA. LIC. NO. 422488
NV. LIC. NO. 37887

FOR REFERENCE ONLY

LICENSED ARCHITECT
CLIFFORD E. DOBBS
No. C-29137
Exp. 8-31-25
STATE OF CALIFORNIA

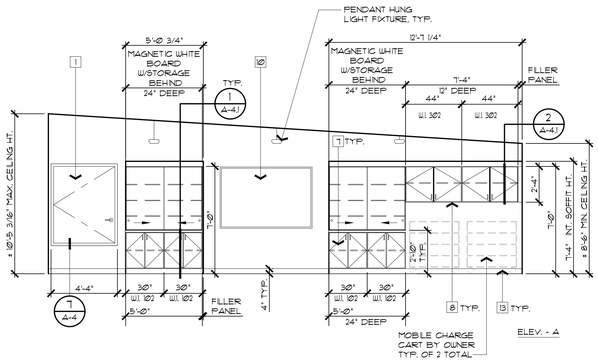
DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

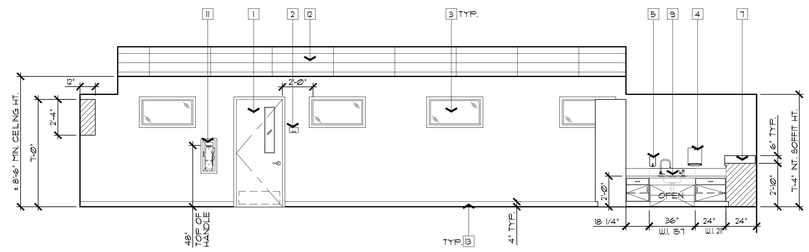
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
INTERIOR ELEVATIONS SINGLE BLDG.

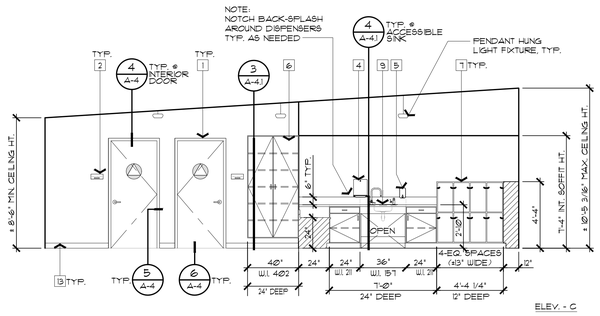
SHEET NO.
A-6



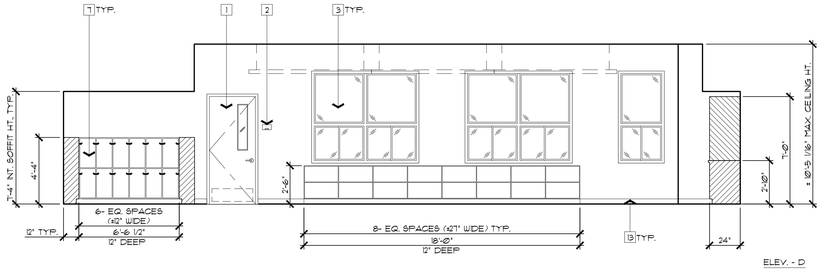
ELEV. - A



ELEV. - B



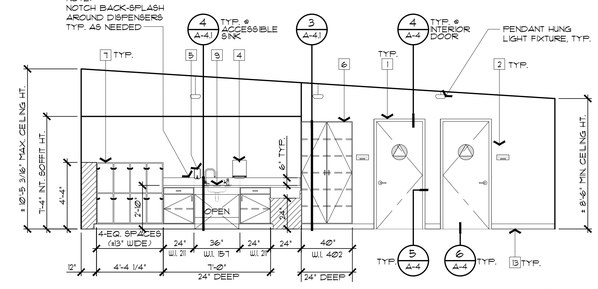
ELEV. - C



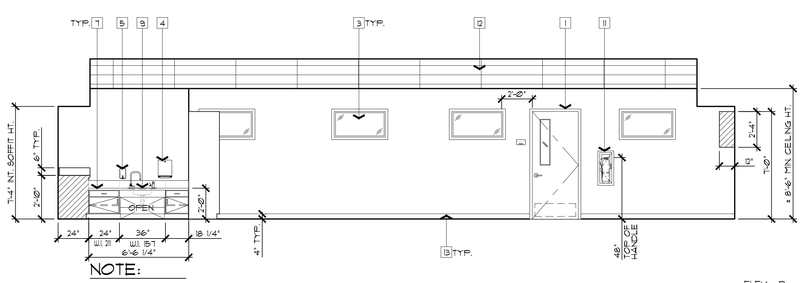
ELEV. - D

INTERIOR ELEVATION CLASSROOM 706, OPP. HAND @ 701

SCALE 1/4"=1'-Ø" 1

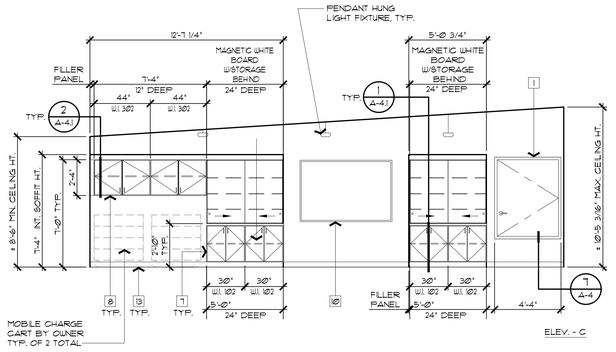


ELEV. - A

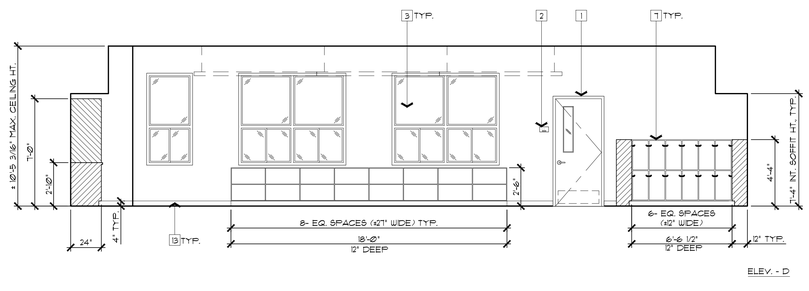


ELEV. - B

NOTE:
USE AGES 5-8 MOUNTING DIMENSIONS (AS SHOWN ON SHEET A-7A) TYP. FOR THIS COUNTER & ALL OF ITS ACCESSORIES.



ELEV. - C



ELEV. - D

INTERIOR ELEVATION CLASSROOM 707, OPP. HAND @ 702

SCALE 1/4"=1'-Ø" 2

GENERAL NOTES

1. SEE SHEET A-7A FOR ACCESSIBLE MOUNTING HEIGHTS & DIMENSIONS NOT SHOWN FOR ALL PLUMBING FIXTURES AND ACCESSORIES.
2. SEE PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR SCHEDULES, FIXTURES, NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET.

KEY NOTES

1. DOOR & FRAME, SEE SHT. A-7A FOR SIZE & TYPE SEE DOOR SCHEDULE, SHEET. A-7B
2. DOOR SIGNAGE, SEE SHT. A-7A
3. ALUMINUM FRAME WINDOW, SEE WINDOW TYPES, SHEET A-7A
4. SURFACE MOUNTED PAPER TOWEL DISPENSER
5. SURFACE MOUNTED SOAP DISPENSER
6. PLASTIC LAMINATE TALL CABINET, SEE SHEET A-4.1 FOR BLOCKING
7. PLASTIC LAMINATE CASEWORK, SEE SHEET A-4.1 FOR BLOCKING
8. WALL HUNG PLASTIC LAMINATE CABINETS, SEE SHEET A-4.1 FOR MOUNT
9. ACCESSIBLE SINK W/ COUNTER TOP, 6" BACKSPLASH & APRON, SEE DTL. 4/A-4.1 & PLUMBING DWGS.
10. SMART BOARD (OWNER FURNISHED & INSTALLED) (4" MAX. PROJECTION FROM NT. WALL FINISH TYP.)
11. SEMI RECESSED FIRE EXTINGUISHER, SEE DETAIL 9/A-4.1
12. SLOPED SUSPENDED ACOUSTICAL T-BAR CEILING
13. RUBBER TOPSET BASEBOARD, SEE INT. WALL FINISH SCHEDULE, SHEET. A-7.1

LEGEND

- FRP O/ GYP BD. OR PLYWD. BACKING, SEE INT. FINISH SCHEDULE, SHT. A-7.1
- PAINTED GYP. BOARD, SEE INT. FINISH SCHEDULE, SHT. A-7.1
- 1/2" PREFABRICATED VINYL COVERED TACKBOARD O/ GYP. BD. OR PLYWD. BACKING, SEE INT. FINISH SCHEDULE, SHT. A-7.1

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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(209) 334-4637
CA. LIC. NO. 472488
NV. LIC. NO. 37887

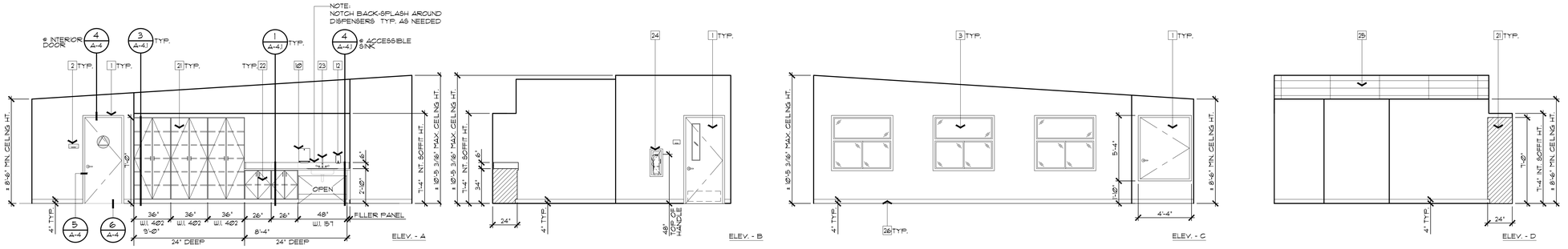
LICENSED ARCHITECT
JAMES D. MEEHLEIS
No. C-24,377
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

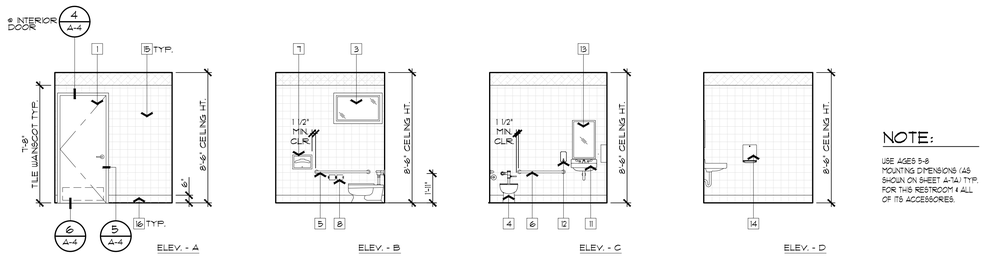
SHEET TITLE
INTERIOR ELEVATIONS CANOPY BLDG.

SHEET NO.
A-6.1



INTERIOR ELEVATION RESOURCE ROOM 103

SCALE 1/4"=1'-0" (1)

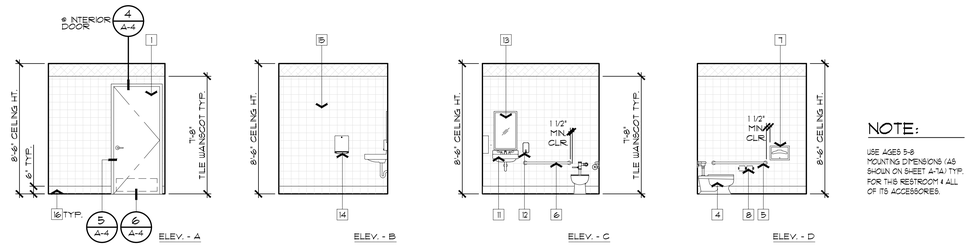


NOTE:

USE AGES 5-8 MOUNTING DIMENSIONS (AS SHOWN ON SHEET A-7A) TYP. FOR THIS RESTROOM & ALL OF ITS ACCESSORIES.

STUDENT RESTROOMS 106B, 102A, OPP. HAND. @ 107B, 101A

SCALE 1/4"=1'-0" (2)

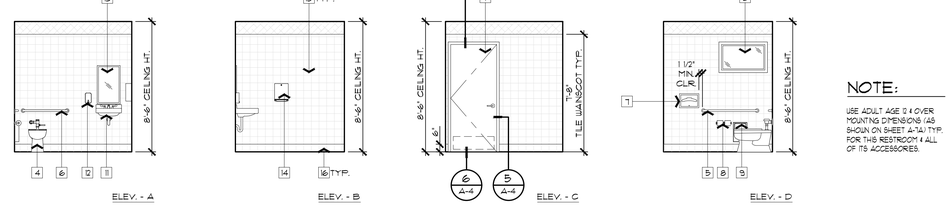


NOTE:

USE AGES 5-8 MOUNTING DIMENSIONS (AS SHOWN ON SHEET A-7A) TYP. FOR THIS RESTROOM & ALL OF ITS ACCESSORIES.

STUDENT RESTROOMS 106A, 102B OPP. HAND. @ 107A, 101B

SCALE 1/4"=1'-0" (3)

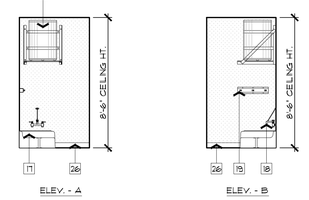


NOTE:

USE ADULT AGE 12 & OVER MOUNTING DIMENSIONS (AS SHOWN ON SHEET A-7A) TYP. FOR THIS RESTROOM & ALL OF ITS ACCESSORIES.

STAFF RESTROOM 103A

SCALE 1/4"=1'-0" (4)



CUSTODIAN ROOM 105

SCALE 1/4"=1'-0" (5)

GENERAL NOTES

1. SEE SHEET A-7A FOR ACCESSIBLE MOUNTING HEIGHTS & DIMENSIONS NOT SHOWN FOR ALL PLUMBING FIXTURES AND ACCESSORIES.
2. SEE PLUMBING, MECHANICAL AND ELECTRICAL DRAWINGS FOR SCHEDULES, FIXTURES, NOTES AND DIMENSIONS NOT SHOWN ON THIS SHEET.

KEY NOTES

1. DOOR & FRAME, SEE SHT. A-7A FOR SIZE & TYPE SEE DOOR SCHEDULE, SHEET, A-7B
2. DOOR SIGNAGE, SEE SHTEET A-7A
3. ALUMINUM FRAME WINDOW, SEE WINDOW TYPES, SHEET A-7A
4. ACCESSIBLE FLOOR MOUNT TOILET WITH FLUSH ACTIVATOR @ OPEN SIDE, SEE PLUMBING DRAWINGS
5. 42" LONG x 1 1/4"ø GRAB BAR - SEE DTL. 10/A-4.1 FOR MOUNTING
6. 36" LONG x 1 1/4"ø GRAB BAR - SEE DTL. 10/A-4.1 FOR MOUNTING
7. SURFACE MOUNTED TOILET SEAT COVER
8. SURFACE MOUNTED TOILET PAPER DISPENSER
9. SANITARY NAPKIN RECEPTACLE
10. SURFACE MOUNTED PAPER TOWEL DISPENSER
11. ACCESSIBLE LAVATORY, SEE PLUMBING DWGS.
12. SURFACE MOUNTED SOAP DISPENSER
13. SURFACE MOUNTED MIRROR
14. SURFACE MOUNTED PAPER TOWEL DISPENSER
15. 6x6 CERAMIC TILE, SEE NT. WALL FINISH SCHEDULE SHT. A-7
16. 6" CERAMIC TILE COVED BASE W/ FINISHED SHOE, SEE INT. WALL FINISH SCHEDULE SHT. A-7
17. MOP SINK, SEE PLUMBING DRAWINGS
18. MOP SINK FAUCET, SEE PLUMBING DRAWINGS
19. MOP RACK, SEE PLUMBING DRAWINGS
20. WATER HEATER, SEE FOOD SERVICE DWGS.
21. PLASTIC LAMINATE TALL CABINET, SEE SHEET A-4.1 FOR BLOCKING
22. PLASTIC LAMINATE CASEWORK, SEE SHEET A-4.1 FOR BLOCKING
23. ACCESSIBLE SINK W/ COUNTER TOP, 6" BACKSPLASH & APRON, SEE DTL. 4/A-4.1 & PLUMBING DWGS.
24. SEMI RECESSED FIRE EXTINGUISHER, SEE DETAIL 9/A-4.1
25. SLOPED SUSPENDED ACOUSTICAL T-BAR CEILING
26. RUBBER TOPSET BASEBOARD, SEE NT. WALL FINISH SCHEDULE, SHEET, A-7

LEGEND

- FRP O/ GYP BD. OR PLYWD. BACKING, SEE NT. FINISH SCHEDULE, SHT. A-7
- PAINTED GYP. BOARD, SEE NT. FINISH SCHEDULE, SHT. A-7
- 1/2" PREFABRICATED VNYL COVERED TACKBOARD O/ GYP. BD. OR PLYWD. BACKING, SEE NT. FINISH SCHEDULE, SHT. A-7
- 6x6 CERAMIC TILE, SEE NT. FINISH SCHEDULE, SHT. A-7

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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FOR REFERENCE ONLY

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(209) 334-7677
CA. LIC. NO. 423488
NV. LIC. NO. 37887

LICENSED ARCHITECT GREGORY E. ROGERS No. C-26307 Exp. 6-30-26 STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
INTERIOR ELEVATIONS CANOPY BLDG.

SHEET NO.
A-6.2

TYPICAL CLASSROOM BUILDING INTERIOR FINISH SCHEDULE

RM. NO.	ROOM NAME:	FLOOR MATERIAL:	BASE:		WALL MATERIAL				CEILING:	
			MATERIAL:	HT.	NORTH	SOUTH	EAST	WEST	MATERIAL:	HT.
108	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
	ELECT. ROOM	SEALED CONCRETE	NONE	N/A	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	NONE	N/A
	TYP. HVAC CLOSET	PLYWOOD PLATFORM	NONE	N/A	PAINTED GYP. BD.	PAINTED GYP. BD.	PAINTED GYP. BD.	PAINTED GYP. BD.	NONE	N/A
109	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
110	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
111	GIRLS TOILET	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
112	CUSTODIAL FIRE RISER	SEALED CONCRETE	NONE	N/A	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED GYP. BD.	8'-6"
113	BOYS TOILET	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"

TK KINDER CLASSROOM BUILDING INTERIOR FINISH SCHEDULE

RM. NO.	ROOM NAME:	FLOOR MATERIAL:	BASE:		WALL MATERIAL				CEILING:	
			MATERIAL:	HT.	NORTH	SOUTH	EAST	WEST	MATERIAL:	HT.
101	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
101A	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
101B	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
	ELECT. ROOM	SEALED CONCRETE	NONE	N/A	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	NONE	N/A
	TYP. HVAC CLOSET	PLYWOOD PLATFORM	NONE	N/A	PAINTED GYP. BD.	PAINTED GYP. BD.	PAINTED GYP. BD.	PAINTED GYP. BD.	NONE	N/A
102	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
102A	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
102B	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
103	RESOURCE RM.	1/8" 26 OZ/YD. CARPET	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
103A	STAFF TOILET	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
104	FIRE RISER	SEALED CONCRETE	NONE	N/A	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	NONE	N/A
105	CUSTODIAL	SEALED CONCRETE	NONE	N/A	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED PLYWOOD	PAINTED GYP. BD.	8'-6"
106	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
106A	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
106B	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
107	CLASSROOM	1/8" 26 OZ/YD. CARPET 4 V.C.T. (SEE FLOOR PLAN FOR LOCATIONS)	RUBBER TOPSET	4"	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	1/2" VNYL COVERED TACKBOARD OVER GYP. BD. OR PLYWD. BACKNG	5/8" ACOUSTICAL TILES IN A SUSPENDED T-BAR CELNG GRD	VARES 8'-6" MIN. TO 9 1/2" MAX.
107A	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"
107B	STUDENTS RESTROOM	CERAMIC TILE	CERAMIC TILE	N/A	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	7'-8" TALL WAINSCOT OF CERAMIC TILE W/ PAINTED GYP. BD. ABOVE	PAINTED GYP. BD.	8'-6"

TYP. FINISH MATERIAL NOTES:

1. CEILING FINISHES TO HAVE A FLAME SPREAD OF 0-25, AND A SMOKE DENSITY LESS THAN 450.
2. WALL FINISHES TO HAVE A FLAME SPREAD RATING OFCLASS III: 76-200, AND A SMOKE DENSITY LESS THAN 450.
3. FLOOR FINISHES TO HAVE A SMOKE DENSITY LESS THAN 450, AND A COEFICIENT OF FRICTION AT LEAST 0.05 PER A.S.T.M. D2407.

LOW-EMITTING MATERIAL NOTES:

1. ALL ADHESIVES, SEALANTS AND CAULKING ARE REQUIRED TO MEET HPI CREDIT EQ2.0.DP1 REQUIREMENTS.
2. ALL PAINTS AND COATINGS ARE REQUIRED TO MEET HPI CREDIT EQ2.0.DP2 REQUIREMENTS.
3. ALL RESILIENT FLOORINGS AND/OR CARPET ARE REQUIRED TO TO MEET CREDIT EQ2.0.DP3 REQUIREMENTS.
4. ALL COMPOSITE WOODS ARE REQUIRED TO MEET HPI CREDIT EQ2.0.DP4 REQUIREMENTS.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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NV. LIC. NO. 37887

LICENSED ARCHITECT
MICHAEL E. MEEHLEIS
No. C-26187
Exp. 6-30-26
STATE OF CALIFORNIA

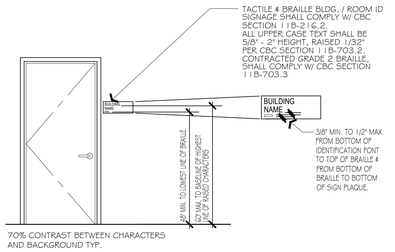
DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

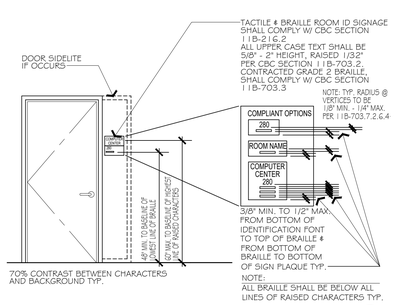
SHEET TITLE
INTERIOR FINISH SCHEDULE

SHEET NO.
A-7



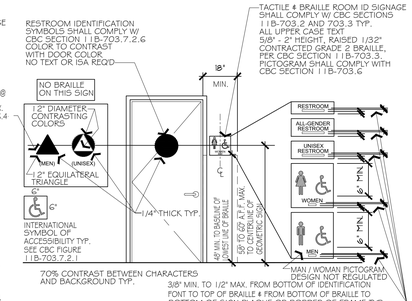
BUILDING ENTRANCE

SCALE: 3/8"=1'-0" (ROOM EXTERIOR) 1



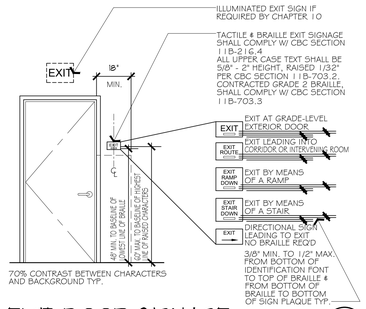
ROOM ID. SIGNAGE

SCALE: 3/8"=1'-0" (ROOM EXTERIOR) 2



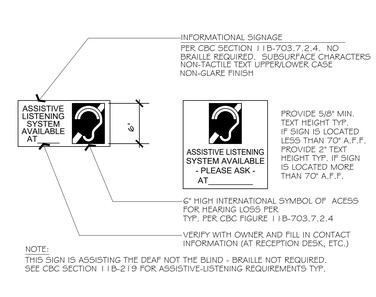
RESTROOM SIGNAGE

SCALE: 3/8"=1'-0" (ROOM EXTERIOR) 3



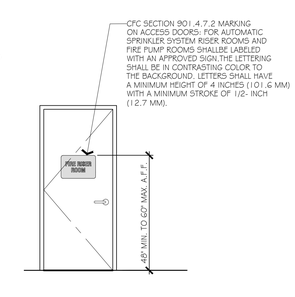
EXIT DOOR SIGNAGE

SCALE: 3/8"=1'-0" 4



ASSISTIVE LISTENING SIGNAGE

SCALE: 3/8"=1'-0" 5



FIRE SPRINKLER RISER ROOM SIGNAGE

SCALE: 3/8"=1'-0" (ROOM EXTERIOR) 6

ADDITIONAL SIGN NOTES:

FINISH AND CONTRAST:

1. CHARACTERS AND THEIR BACKGROUNDS SHALL HAVE A NON-GLARE FINISH. CHARACTERS AND SYMBOLS SHALL CONTRAST WITH THEIR BACKGROUND, EITHER LIGHT ON A DARK BACKGROUND OR DARK ON A LIGHT BACKGROUND PER CBC SECTION 11B-1033.1.

CHARACTER PROPORTIONS:

2. VISUAL CHARACTERS ON SIGNS SHALL BE SELECTED FROM FONTS WHERE THE WIDTH OF THE UPPERCASE LETTER "O" IS 55 PERCENT MINIMUM AND 110 PERCENT MAXIMUM OF THE HEIGHT OF THE UPPERCASE LETTER "I" PER CBC SECTION 11B-1033.4. STROKE THICKNESS OF THE UPPERCASE LETTER "I" SHALL BE 10 PERCENT MINIMUM AND 30 PERCENT MAXIMUM OF THE HEIGHT OF THE CHARACTER PER CBC SECTION 11B-1033.5.1.

RAISED CHARACTERS:

3. RAISED CHARACTERS ON SIGNS SHALL BE SELECTED FROM FONTS WHERE THE WIDTH OF THE UPPERCASE LETTER "O" IS 60 PERCENT MINIMUM AND 110 PERCENT MAXIMUM OF THE HEIGHT OF THE UPPERCASE LETTER "I" PER CBC SECTION 11B-1033.2. STROKE THICKNESS OF THE UPPERCASE LETTER "I" SHALL BE 15 PERCENT MAXIMUM OF THE HEIGHT OF THE CHARACTER PER CBC SECTION 11B-1033.2.

4. MOUNTING LOCATION AND HEIGHT:

SIGNS WITH RAISED CHARACTERS AND BRAILLE SHALL BE LOCATED 48" MINIMUM ABOVE THE FINISH FLOOR OR GROUND SURFACE, MEASURED FROM THE BASELINE OF THE LOWEST LINE OF BRAILLE AND 60" MAXIMUM ABOVE FINISH FLOOR OR GROUND SURFACE, MEASURED FROM THE BASELINE OF THE HIGHEST LINE OF RAISED CHARACTERS PER CBC SECTION 11B-1034.

GENERAL NOTES:

1. SEE EXTERIOR ELEVATIONS FOR DOOR & WINDOW DETAIL REFERENCES NOT SHOWN ON THIS SHEET.
2. OVERALL DIMENSIONS ARE NOMINAL, AND SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR.
3. ALL GLAZING TO BE AS PER THE SPECIFICATIONS.
4. DOOR KICK PLATES SHALL BE SMOOTH UNINTERRUPTED SURFACE 10" HIGH ON PUSH SIDE OF DOOR

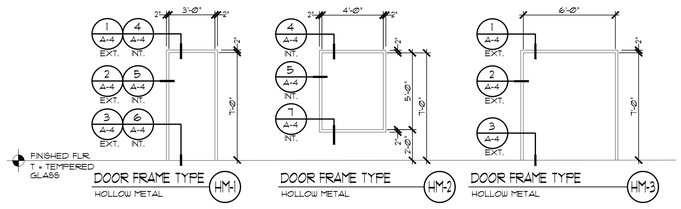
WINDOW GLAZING NOTES:

SAFETY GLAZING IS REQUIRED AT GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL ADJACENT TO A DOOR WHERE THE NEAREST VERTICAL EDGE OF THE GLAZING IS WITHIN A 24-INCH ARC OF EITHER VERTICAL EDGE OF THE DOOR IN A CLOSED POSITION AND WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60-INCHES ABOVE THE WALKING SURFACE.

WINDOW GLAZING TO HAVE AN OVERALL U-FACTOR OF Ø32 OVERALL S.H.G.C. OF Ø25 & OVERALL V.T. OF Ø50

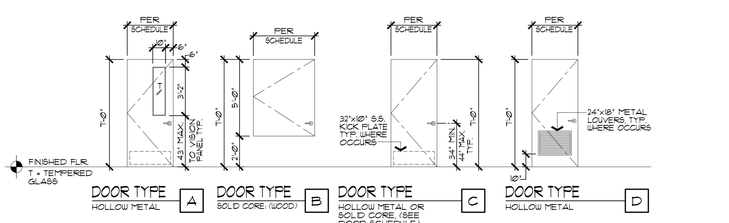
DOOR CODE COMPLIANCE:

1. EXIT DOORS SHALL BE OPERABLE FROM THE INSIDE WITHOUT THE USE OF A KEY OR ANY SPECIAL KNOWLEDGE OR EFFORT.
2. INSTALL FLOOR STOPS IN LOCATION NOT TO CAUSE TRIPPING HAZARD IN PATH OF TRAVEL 4" MAX. FROM WALL.
3. HARDWARE AT EXTERIOR DOOR OF CLASSROOMS AND ROOMS WITH OCCUPANT LOADS GREATER THAN 4 SHALL BE EQUIPED WITH HARDWARE THAT IS LOCKABLE FROM THE INSIDE PER CBC 1010.1.11



DOOR FRAME TYPES

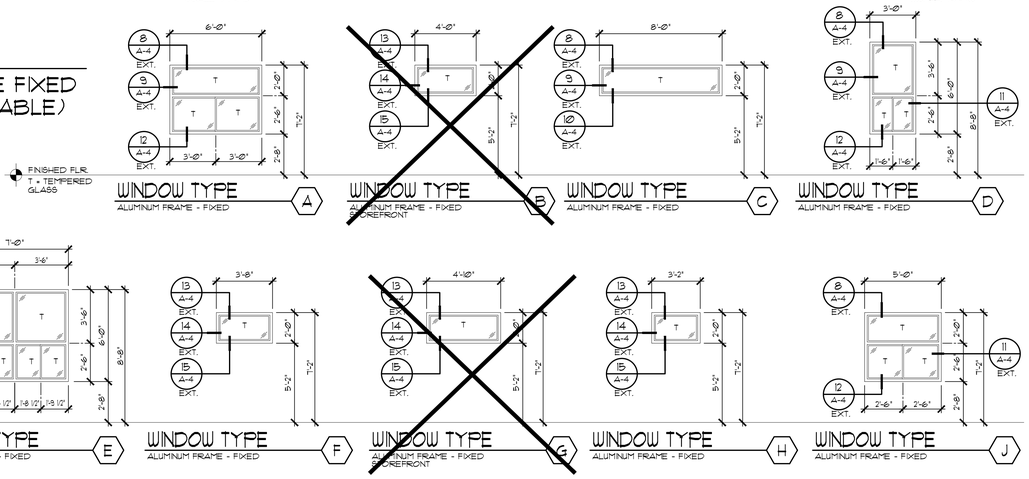
SCALE: 1/4"=1'-0"



DOOR TYPES

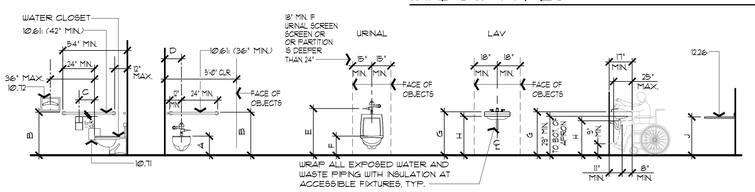
SCALE: 1/4"=1'-0"

NOTE:
ALL WINDOWS ARE FIXED TYPE (NON-OPERABLE) TYP.

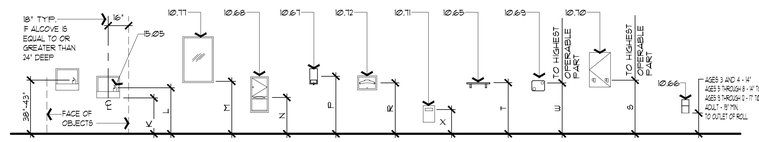


WINDOW TYPES

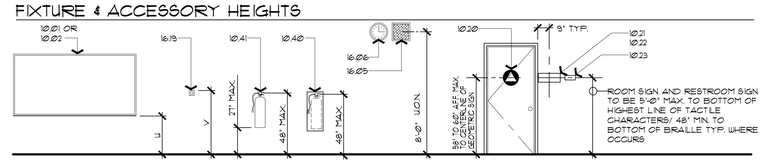
SCALE: 1/4"=1'-0"



FIXTURE & ACCESSORY HEIGHTS



FIXTURE & ACCESSORY HEIGHTS



FURNITURE & EQUIPMENT HEIGHTS — ROOM SIGNAGE ELEVATION

TYPICAL MOUNTING HEIGHTS & ATTACHMENT REFERENCES

SCALE: 1/4"=1'-0" 7

DIM	ITEM OR KEYNOTE	ADULT AGE OVER 12		AGES 9-12		AGES 5-8		AGES 3-4	
		STANDARD	ACCESSIBLE	STANDARD	ACCESSIBLE	STANDARD	ACCESSIBLE	ACCESSIBLE	
A	WATER CLOSET (TOP OF SEAT)	15"	17"-19"	15"	15"-17"	15"	12"-15"	11"-12"	
B	GRAB BAR (TO TOP OF GRAB BAR)	-	33"-36"	-	25"-27"	-	20"-25"	18"-20"	
C	TOILET TISSUE DISPENSER (TO WATER CLOSET)	7" - 9"	7" - 9"	7" - 9"	7" - 9"	7" - 9"	7" - 9"	7" - 9"	
D	WATER CLOSET (CENTER TO WALL)	18"	17" - 18"	17"	15"-18"	15"	12"-15"	12"	
E	URINAL (TOP OF FLUSH HANDLE)	-	44" MAX.	-	37" MAX.	-	32" MAX.	32" MAX.	
F	URINAL (TOP OF LIP)	24"	17" MAX.	17"	15" MAX.	-	15" MAX.	15" MAX.	
G	LAV. (TOP OF SINK)	34"	34" MAX.	34"	31" MAX.	34"	31" MAX.	31" MAX.	
H	LAV. (KNEE CLEARANCE)	27"	27" MIN.	-	24"MIN	-	24"MIN	N/A FOR SIDE APPROACH	
J	DESKTOP	30"	30"	27"	30"	24"	30"	30"	
K	DRINKING FOUNTAIN (KNEE CLEARANCE)	-	27" MIN.	-	N/A FOR SIDE APPROACH	-	N/A FOR SIDE APPROACH	N/A FOR SIDE APPROACH	
L	DRINKING FOUNTAIN (¢ OF BUBBLER)	38" MIN. 43" MAX.	36" MAX.	28"	30" MAX. FOR SIDE APPROACH	28"	30" MAX. FOR SIDE APPROACH	30" MAX. FOR SIDE APPROACH	
M	MIRROR (TO BOTTOM OF REFLECTIVE SURFACE)	40"	40" MAX.**	36"	34" MAX.	36"	32" MAX.	32" MAX.	
N	PAPER TOWEL DISPENSER	40"	40" MAX. *	36"	36" MAX.	36"	32" MAX.	32" MAX.	
P	SOAP DISPENSER	40"	40" MAX. *	36"	36" MAX.	36"	32" MAX.	32" MAX.	
R	SEAT COVER DISPENSER	40"	40" MAX. *	40"	36" MAX.	40"	32" MAX.	32" MAX.	
S	SANITARY NAPKIN DISPENSER	40"	40" MAX. *	-	36" MAX.	-	-	-	
T	SHELVES	46"	40" MAX.	-	36" MAX.	-	32" MAX.	32" MAX.	
U	CHALKBOARD MARKERBOARD	36"	-	30"	-	30"	-	-	
V	CALL BUTTON	48"	48" MAX. *	48"	48"	-	-	-	
W	ELECTRIC HAND DRYER	40"	40" *	36"	36"	32"	32"	32"	
X	SANITARY NAPKIN RECEPTACLE	-	19" MIN. *	-	-	-	-	-	

NOTE: DIMENSIONS FOR WATER CLOSET ARE TO TOP OF SEAT, SEAT IS NOMINAL 3/4" THICK.
* TO OPERABLE MECHANISM
** WHERE MIRROR IS NOT MOUNTED ABOVE A LAVATORY OR COUNTER BOTTOM OF REFLECTIVE EDGE IS 35" A.F.F. MAX.

MOUNTING HEIGHTS

8

Ø1.01 CHALKBOARD
Ø1.02 MARKERBOARD
Ø1.20 TOILET ROOM SIGN
Ø1.21 TOILET ROOM IDENTIFICATION SIGN
Ø1.22 ROOM IDENTIFICATION SIGN, SEE DTL. 10/-
Ø1.23 ASSISTIVE LISTENING DEVICE SIGN
Ø1.40 FIRE EXTINGUISHER AND CABINET
Ø1.41 FIRE EXTINGUISHER: WALL MOUNTED
Ø1.61 GRAB BAR
Ø1.65 SHELVES
Ø1.66 TOILET TISSUE DISPENSER
Ø1.67 SOAP DISPENSER
Ø1.68 PAPER TOWEL DISPENSER
Ø1.69 ELECTRIC HAND DRYER
Ø1.70 SANITARY NAPKIN DISPENSER
Ø1.71 SANITARY NAPKIN RECEPTACLE (12" MAX. IN FRONT OF TOILET)
Ø1.72 SEAT COVER DISPENSER
Ø1.77 MIRROR
12.26 DESKTOP/ WRITING SURFACE
15.Ø5 DRINKING FOUNTAIN
16.Ø5 SPEAKER
16.Ø6 CLOCK, BATTERY
16.13 CALL BUTTON

TYPICAL MOUNTING HEIGHT KEYNOTES:

9

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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(209) 334-4837
CA. LIC. NO. 427488
NV. LIC. NO. 37887

FOR PERMIT

LICENSED ARCHITECT JOHN E. GOODELL No. C-031307 REN. 8-30-25 STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

DOOR & WINDOW TYPES SIGNAGE DETAILS AND ACCESSIBLE MOUNTING HEIGHTS

SHEET NO.

A-7A

DOOR HARDWARE GROUPS:

HDW SET 1

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
3	Hinges	5BB1 4 1/2" x 4 1/2" NRP	32D	IVS
1	Lockset	ND95PD RHO	626	SCH
1	Closer	4041 EDA	AL	LCN
1	Floor Stop	1214CK	26D	TRM
1	Kickplate	KO050 10" x 34"	630	TRM
1	Threshold	272A x 36"	AL	Pem
1	Door Sweep	3452AV x 36"	AL	Pem
1	Weatherstrip	3340 36 x 84		COL

HDW SET 1A

Each Opening to Receive

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
3	Hinges	5BB1 4 1/2" x 4 1/2" NRP	32D	IVS
1	Exit Device	CD99L-2 x 996L x 06	626	Von D
2	Rim Cylinder	20-057	26D	SCH
1	Mortise Cylinder	20-061	626	SCH
1	Closer	4041 EDA	AL	LCN
1	Floor Stop	1214CK	26D	TRM
1	Kickplate	KO050 10" x 34"	630	TRM
1	Threshold	272A x 36"	AL	Pem
1	Door Sweep	3452AV x 36"	AL	Pem
1	Weatherstrip	3340 36 x 84		COL

HDW SET 2A

Each Opening to Receive

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
3	Hinges	5BB1 4 1/2" x 4 1/2" NRP	32D	IVS
1	Dead Bolt	B663P	626	SCH
1	Closer	4041 EDA	AL	LCN
1	Push Plate	1001-1	32D	TRM
1	Pull	1010-2	32D	TRM
1	Kickplate	KO050 10" x 34"	630	TRM
1	Floor Stop	1214CK	26D	TRM
1	Threshold	272A x 36"	AL	Pem
1	Door Sweep	3452AV x 36"	AL	Pem
1	Weatherstrip	3340 36 x 84		COL

HDW SET 5 (NOT USED)

HDW SET 6

Each Opening to Receive

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
3	Hinges	5PB1 4 1/2" x 4 1/2"	32D	IVS
1	Lockset	ND80PD RHO	626	SCH
1	Wall Stop	1270CV	26D	TRM
3	Silencers	1229A	GRY	TRM

HDW SET 7

Each Opening to Receive

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
3	Hinges	5PB1 4 1/2" x 4 1/2"	32D	IVS
1	Lockset	ND80PD RHO	626	SCH
1	Wall Stop	1270CV	26D	TRM
3	Silencers	1229A	GRY	TRM

HDW SET 3

Each Opening to Receive

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
6	Hinges	5PB1 4 1/2" x 4 1/2"	32D	IVS
1	Lockset	ND96PD RHO	626	SCH
1	Floor Stop	1214CK	26D	TRM
2	Manul Flushbolts	3917	26D	TRM
1	Threshold	272A x 72"	AL	Pem
2	Door Sweep	3452AV x 36"	AL	Pem
1	Weatherstrip	3340 72 x 84		COL

HDW SET 4

Each Opening to Receive

QTY	DESC.	PRODUCT NO.	FIN.	MANF.
3	Hinges	5PB1 4 1/2" x 4 1/2"	32D	IVS
1	Lockset	ND96PD RHO	626	SCH
1	Floor Stop	1214CK	26D	TRM
1	Threshold	272A x 30"	AL	Pem
1	Door Sweep	3452AV x 30"	AL	Pem
1	Weatherstrip	3340 30 x 84		COL

DOOR SCHEDULE - TK KINDERGARTEN BUILDING -

SEE SPECS FOR DOOR HARDWARE

DOOR NO.	ROOM NAME:	WIDTH	HEIGHT	THICKNESS	DOOR TYPE	MATERIAL	FINISH	GLAZING	RATING	FRAME TYPE	MATERIAL	FINISH	HARDWARE GROUP NO.	REQUIRED SIGNAGE TYPE	REMARKS
101A	CLASSROOM 101	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1A	2, 4	P.H.
101B	CLASSROOM 101	4'-0"	5'-0"	1 3/4"	B	S.C.	PT	-	-	HM-2	H.M.	PT	7	-	-
101C	ELECT. ROOM	PAIR 3'-0"	7'-0"	1 3/4"	D	H.M.	PT	-	-	HM-3	H.M.	PT	3	2	24"x18" LOUVER
101D	CLASSROOM 101	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1A	2, 4	P.H.
101AA	STUDENTS 101A	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
101BB	STUDENTS 101B	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
102A	CLASSROOM 102	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1A	2, 4	P.H.
102B	CLASSROOM 102	4'-0"	5'-0"	1 3/4"	B	S.C.	PT	-	-	HM-2	H.M.	PT	7	-	-
102C	CLASSROOM 102	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1A	2, 4	P.H.
102AA	STUDENTS 102A	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
102BB	STUDENTS 102B	3'-0"	7'-0"	1 3/4"	C	S.C.	FF	-	-	HM-1	H.M.	PT	6	3	-
103A	RESOURCE ROOM 103	3'-0"	7'-0"	1 3/4"	A	H.M.	FF	T	-	HM-1	H.M.	PT	1	2, 4	-
103B	RESOURCE ROOM 103	4'-0"	5'-0"	1 3/4"	B	S.C.	FF	-	-	HM-2	H.M.	PT	7	-	-
103AA	STAFF 103A	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
104A	FIRE SPRINKLER 104	3'-0"	7'-0"	1 3/4"	D	H.M.	PT	-	-	HM-1	H.M.	PT	4	6	24"x18" LOUVER
105A	CUST. 105	3'-0"	7'-0"	1 3/4"	D	H.M.	PT	-	-	HM-1	H.M.	PT	4	3	24"x18" LOUVER
106A	CLASSROOM 106	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1A	2, 4	P.H.
106B	CLASSROOM 106	4'-0"	5'-0"	1 3/4"	B	S.C.	PT	-	-	HM-2	H.M.	PT	7	-	-
106C	ELECT. ROOM	PAIR 3'-0"	7'-0"	1 3/4"	D	H.M.	PT	-	-	HM-3	H.M.	PT	3	2	24"x18" LOUVER
106D	CLASSROOM 106	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	-	-	HM-1	H.M.	PT	1A	2, 4	P.H.
106AA	STUDENTS 106A	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
106BB	STUDENTS 106B	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
107A	CLASSROOM 107	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	-	-	HM-1	H.M.	PT	1A	2, 4	P.H.
107B	CLASSROOM 107	4'-0"	5'-0"	1 3/4"	B	S.C.	PT	-	-	HM-2	H.M.	PT	7	-	-
107C	CLASSROOM 107	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	-	-	HM-1	H.M.	PT	1A	2, 4	P.H.
107AA	STUDENTS 107A	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-
107BB	STUDENTS 107B	3'-0"	7'-0"	1 3/4"	C	S.C.	PT	-	-	HM-1	H.M.	PT	6	3	-

DOOR SCHEDULE - TYP. CLASSROOM BUILDING -

SEE SPECS FOR DOOR HARDWARE

DOOR NO.	ROOM NAME:	WIDTH	HEIGHT	THICKNESS	DOOR TYPE	MATERIAL	FINISH	GLAZING	RATING	FRAME TYPE	MATERIAL	FINISH	HARDWARE GROUP NO.	REQUIRED SIGNAGE TYPE	REMARKS
108A	CLASSROOM 108	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1	2, 4	-
108B	CLASSROOM 108	4'-0"	5'-0"	1 3/4"	B	S.C.	PT	-	-	HM-2	H.M.	PT	7	-	-
108C	ELECT. ROOM	PAIR 3'-0"	7'-0"	1 3/4"	D	H.M.	PT	-	-	HM-3	H.M.	PT	3	2	24"x18" LOUVER
109A	CLASSROOM 109	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	T	-	HM-1	H.M.	PT	1	2, 4	-
109B	CLASSROOM 109	4'-0"	5'-0"	1 3/4"	B	S.C.	PT	-	-	HM-2	H.M.	PT	7	-	-
110A	CLASSROOM 110	3'-0"	7'-0"	1 3/4"	A	H.M.	PT	-	-	HM-1	H.M.	PT	1	2,4	-
110B	CLASSROOM 110	4'-0"	5'-0"	1 3/4"	B	H.M.	PT	T	-	HM-1	H.M.	PT	7	-	-
111A	GIRLS 111	3'-0"	7'-0"	1 3/4"	C	H.M.	PT	-	-	HM-1	H.M.	PT	2A	3	-
112A	CUST./FIRE SPRINKLER 112	PAIR 3'-0"	7'-0"	1 3/4"	D	H.M.	PT	T	-	HM-3	H.M.	PT	3	6	24"x18" LOUVER
113A	BOYS 113	3'-0"	7'-0"	1 3/4"	C	H.M.	PT	-	-	HM-1	H.M.	PT	2A	3	-

ABBREVIATIONS

H.M.	HOLLOW METAL
S.C.	SOLID CORE - (WOOD)
PT	PAINT
T	TEMPERED GLASS

NOTES

1.	DOOR SIGNAGE, SEE SHEET A-7A DETAILS 1 THRU 6 - (PROVIDED BY SITE CONTRACTOR)
2.	PROVIDE FIRE RISER ROOM SIGNAGE. LETTERS SHALL HAVE A MINIMUM HEIGHT OF 4" WITH A MINIMUM STROKE OF 3/8" PER 2022 CFC 5811.4.2
3.	
4.	DOOR CLOSERS SHALL BE INSTALLED TO PERMIT DOORS TO SWING 180 DEGREES
5.	
6.	

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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LODI, CA 95240
(209) 334-4837
CA. LIC. NO. 422488
NV. LIC. NO. 37887

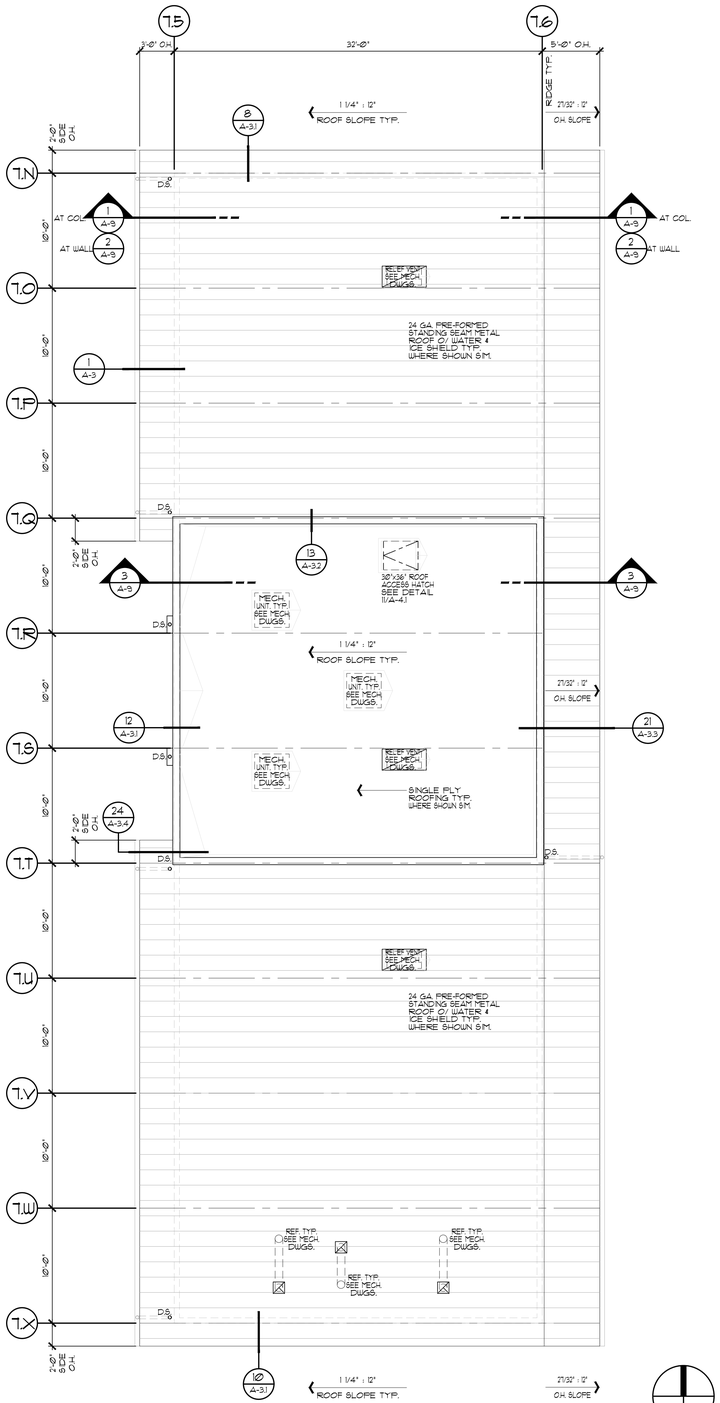
FOR

LICENSED ARCHITECT
ROBERT E. DOBROTH, JR.
No. C-26120
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

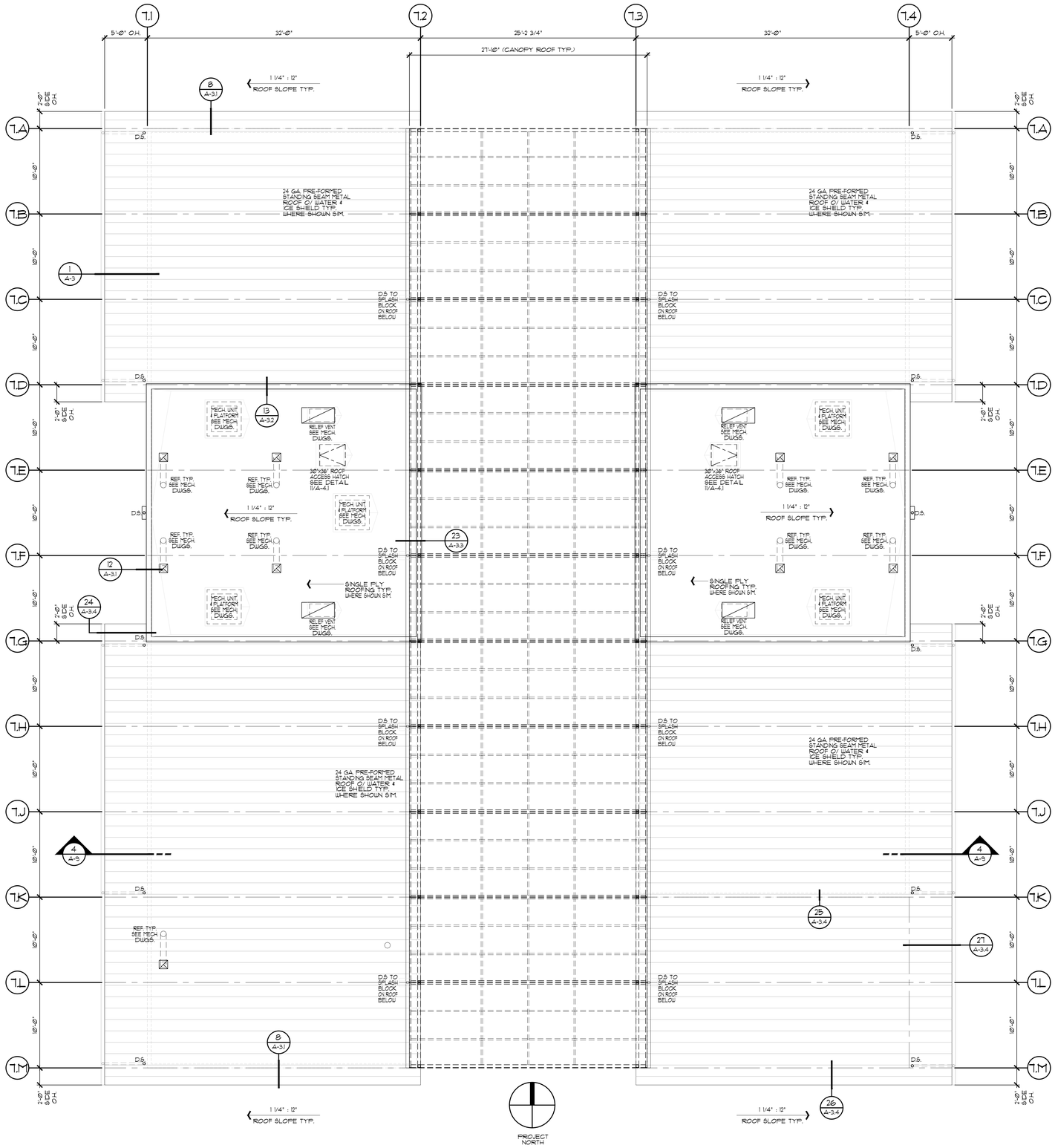
-	-

DATE FEB. 6, 2025
JOB NO. 24769
SHEET TITLE
DOOR SCHEDULES
SHEET NO.
A-7B



TYP. CLASSROOM ROOF PLAN

SCALE: 3/16"=1'-0"



TK KINDERGARTEN ROOF PLAN

SCALE: 3/16"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1601 BASS AVENUE, MENDOTA, CA 93640

REFERENCE ONLY

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MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 422488
NV. LIC. NO. 37887

FOR

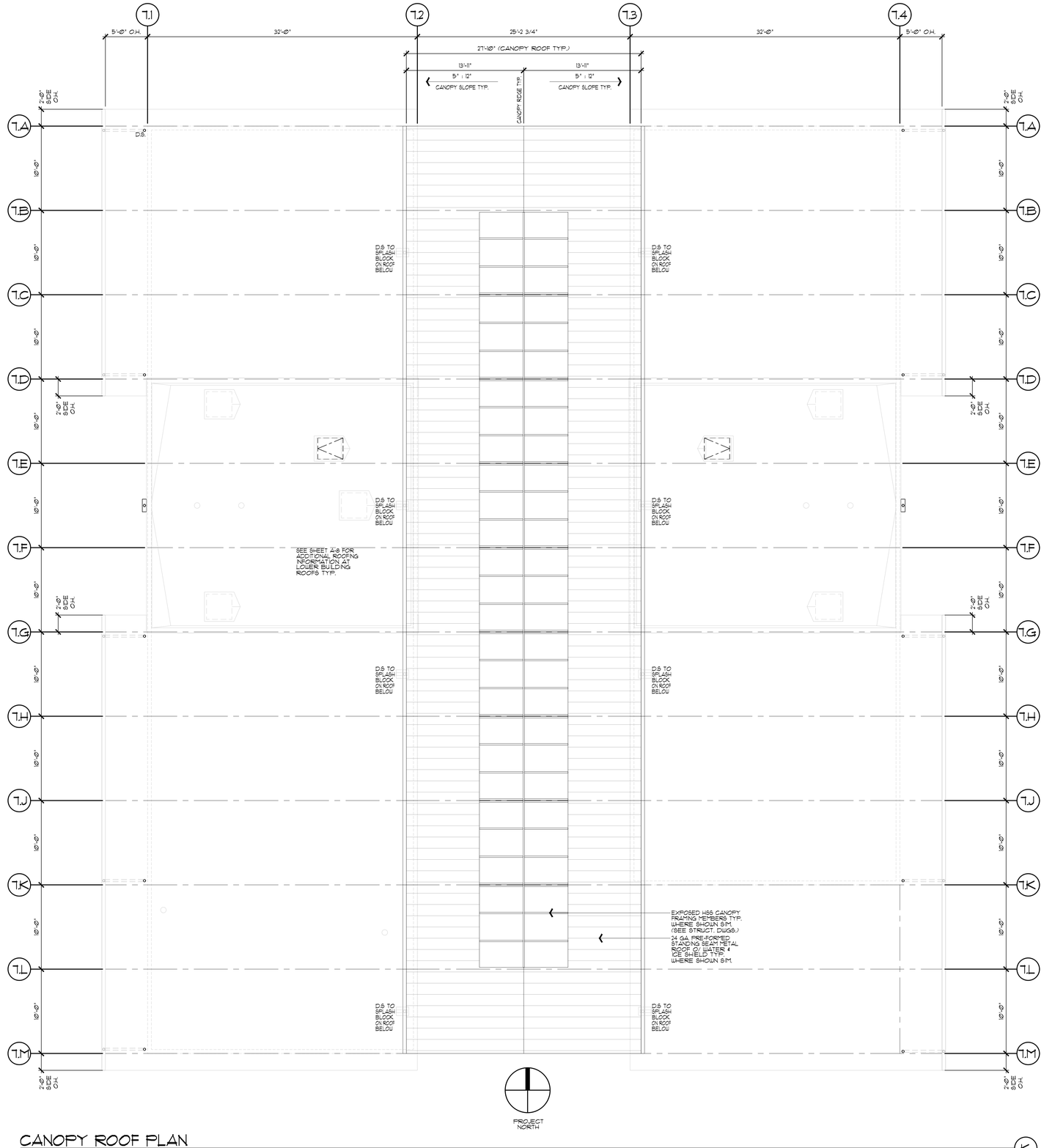
LICENSED ARCHITECT
GREGORY E. GOODWIN
No. C-26307
Exp. 8-31-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
OVERALL ROOF PLANS

SHEET NO.
A-8



CANOPY ROOF PLAN

SCALE: 3/16"=1'-0"

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DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
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NV. LIC. NO. 37887

FOR PERMIT

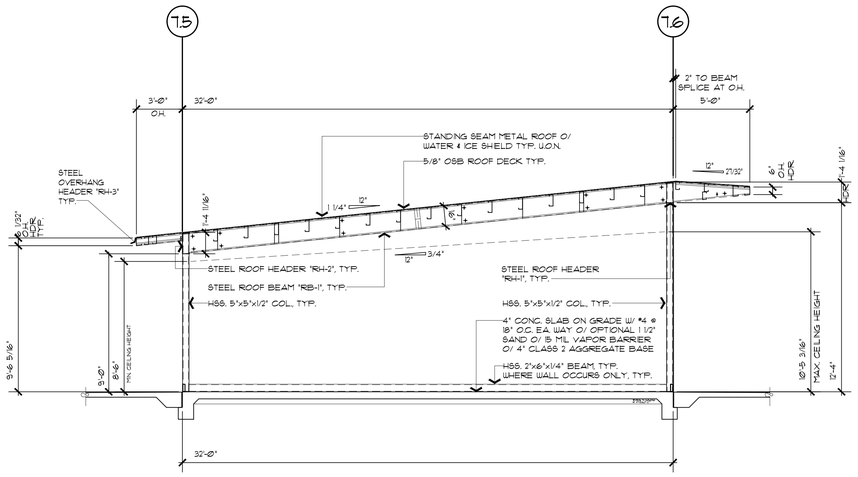
LICENSED ARCHITECT
GEORGE E. RIVERO
No. C34307
Exp. 6-30-26
STATE OF CALIFORNIA

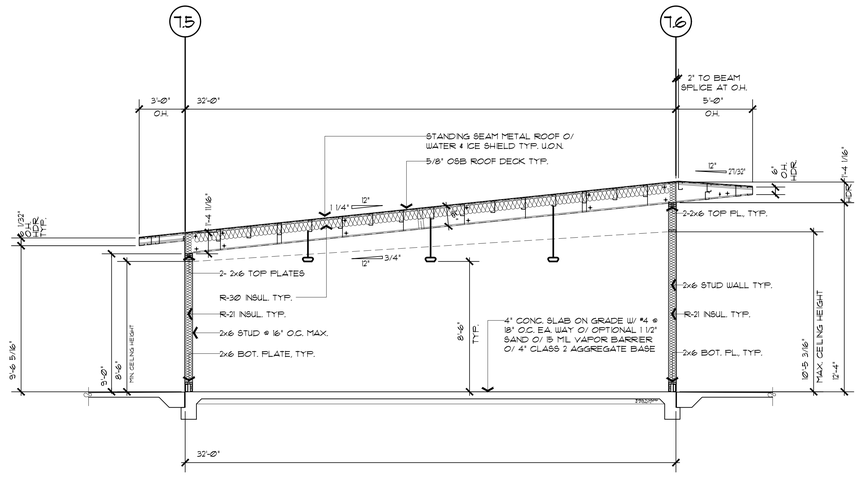
DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
CANOPY ROOF PLAN

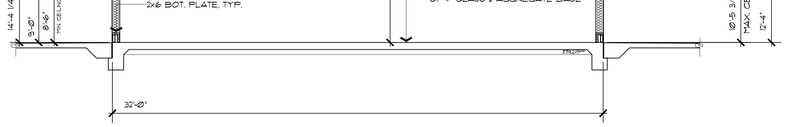
SHEET NO.
A-8.1





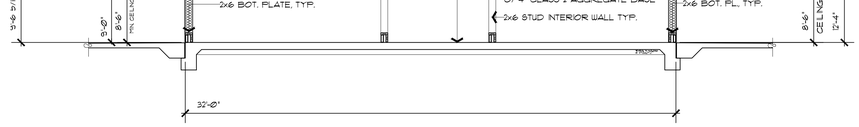
TYPICAL ARCHITECTURAL CROSS-SECTION (1)

SCALE 1/4"=1'-Ø"



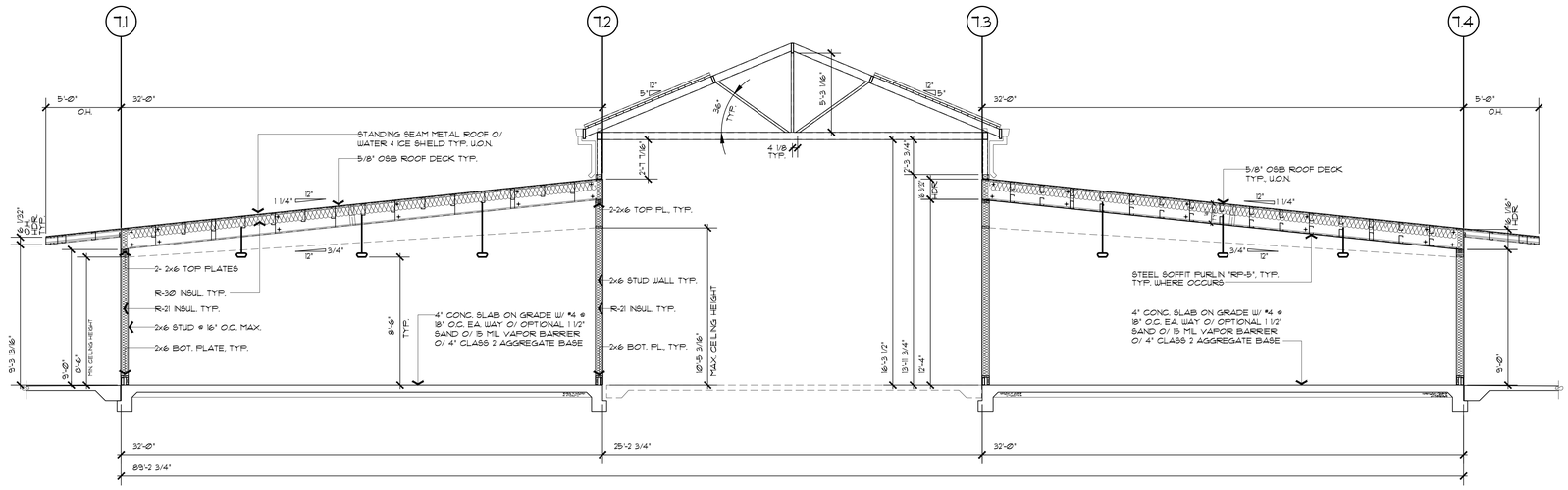
TYPICAL ARCHITECTURAL CROSS-SECTION (2)

SCALE 1/4"=1'-Ø"



TYPICAL ARCHITECTURAL CROSS-SECTION (3)

SCALE 1/4"=1'-Ø"



ARCHITECTURAL CROSS-SECTION @ TOILET ROOMS (HARD LID) (X)

SCALE 1/4"=1'-Ø"

TYPICAL ARCHITECTURAL CROSS-SECTION (4)

SCALE 1/4"=1'-Ø"

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NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1601 BASS AVENUE, MENDOTA, CA 93640

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CA. LIC. NO. 472488
NV. LIC. NO. 37887

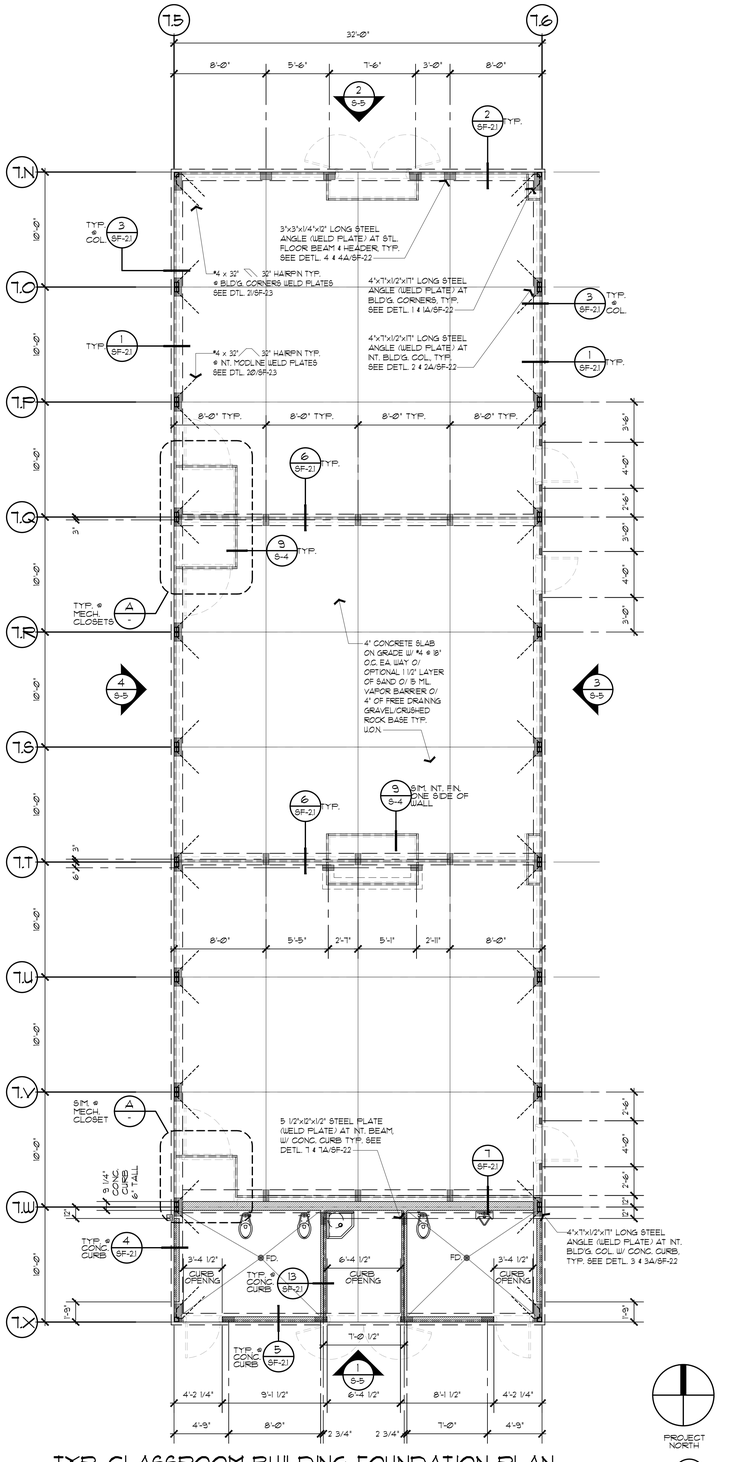
LICENSED ARCHITECT
GEORGE E. ROGERS
No. C-34187
Exp. 6-30-26
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

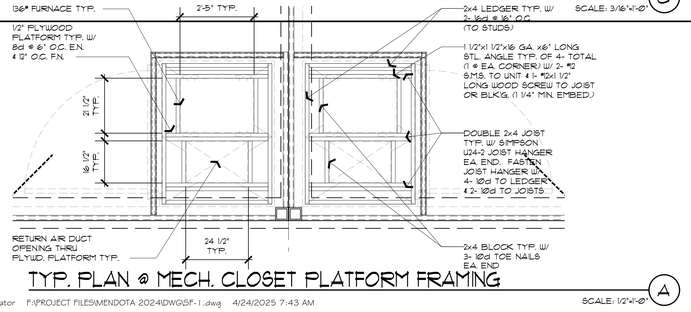
SHEET TITLE
ARCHITECTURAL CROSS-SECTION

SHEET NO.
A-9



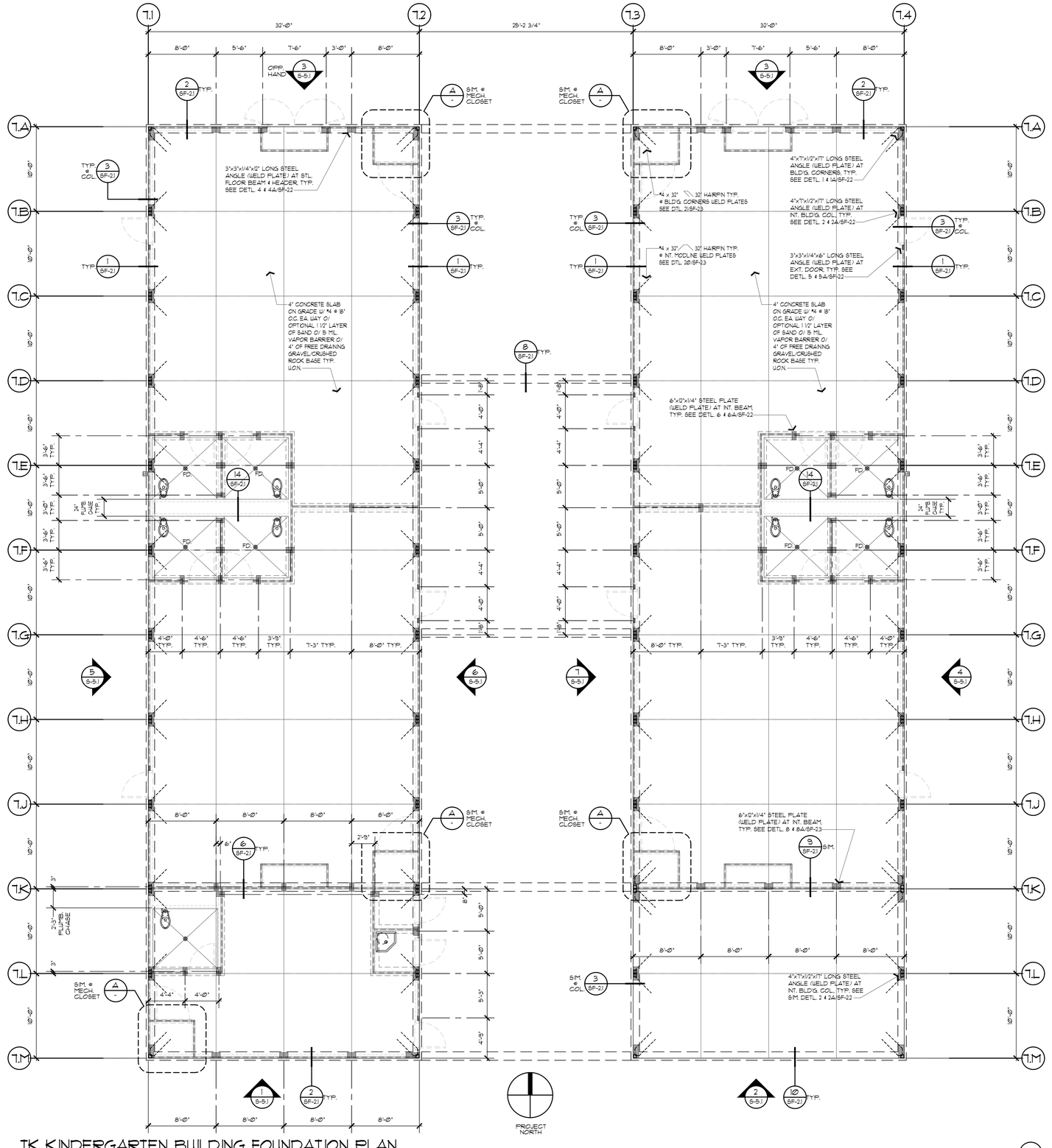
TYP. CLASSROOM BUILDING FOUNDATION PLAN

SCALE: 3/16"=1'-0" C



TYP. PLAN @ MECH. CLOSET PLATFORM FRAMING

SCALE: 1/2"=1'-0" A



TK KINDERGARTEN BUILDING FOUNDATION PLAN

SCALE: 3/16"=1'-0" K

LEGEND:

- 2x WALL FRAMING OVER HSS, 2"x6"x1/4" FLOOR BEAM OR HEADER
- 2x WALL FRAMING OVER HSS, 2"x6"x1/4" FLOOR BEAM OR HEADER W/ 6" HIGH CONC. CURB

FOUNDATION PLAN NOTES:

1. SEE FLOOR PLANS FOR NT. WALL LAYOUT DIMENSIONS TYP.
2. PROVIDE CONTROL JOINTS (SAWCUT, ZIP STRIP, OR CONSTRUCTION JOINT) @ MODLINES AND @ 10'-0" O.C. MAX. PERPENDICULAR TO MODLINES TYP. SEE DETAIL 6B/SF-23
3. SEE SHEET SF-23 FOR TYPICAL REINFORCING DETAILS AND FOR ADDITIONAL FOUNDATION DETAILS.
4. FOR FLOOR BEAM SPLICE (WHERE REQUIRED) SEE DETAIL 33/S-2A
5. FLOOR SLOPE TO FLOOR DRAINS 2% MAX.
6. FOR FLOOR BEAM AND COLUMN CONNECTION, SEE DETAILS 15 & 27/S-2A.
7. FOR FLOOR BEAM AND FLOOR BEAM CONNECTION, SEE DETAILS 30 & 31/S-2A.

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160 BASS AVENUE, MENDOTA, CA 93640

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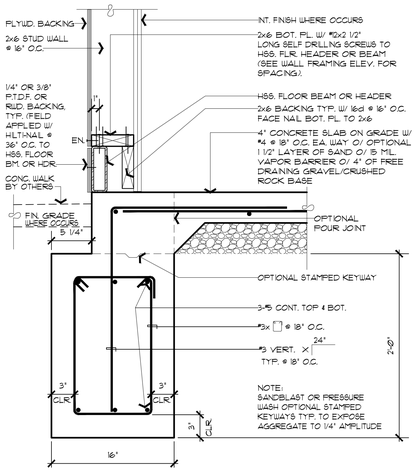
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

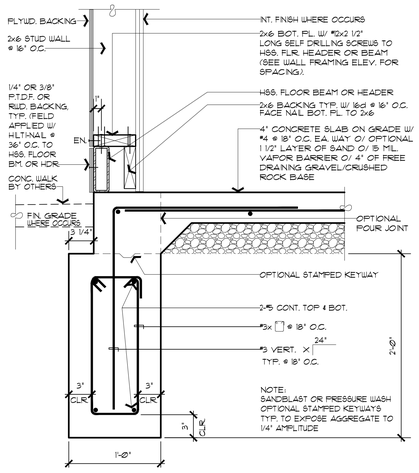
SHEET TITLE
FOUNDATION PLAN

SHEET NO.
SF-1



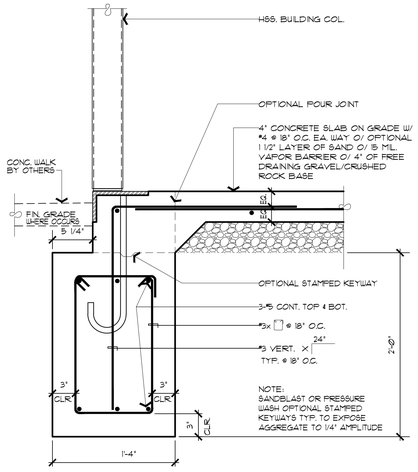
TYPICAL EXT. FOOTING @ END WALL (1)

SCALE: 1-1/2"=1'-0"



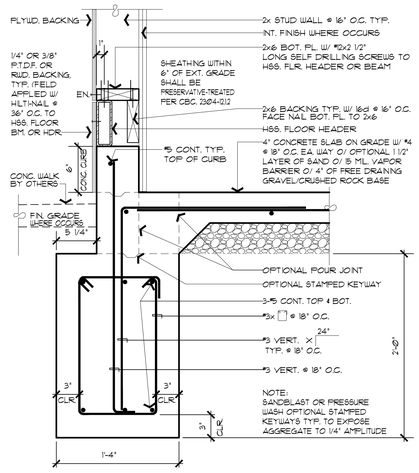
TYPICAL EXT. FOOTING @ SIDE WALL (2)

SCALE: 1-1/2"=1'-0"



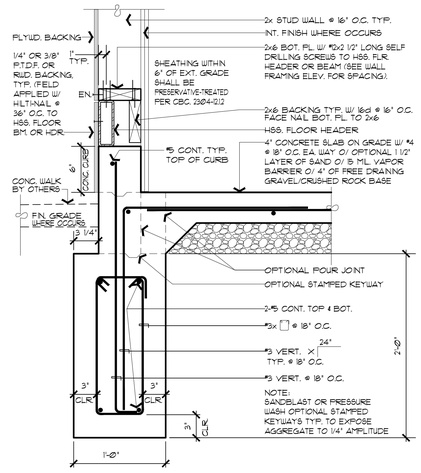
TYPICAL EXT. FOOTING AT END WALL COL. (3)

SCALE: 1-1/2"=1'-0"



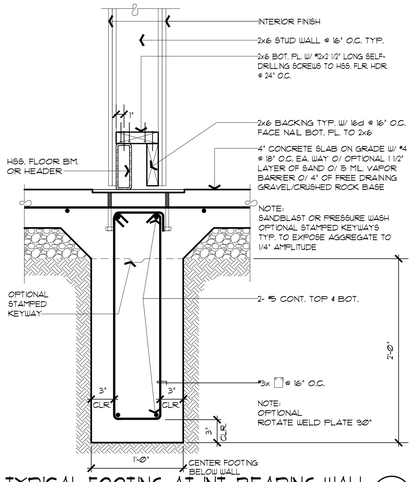
END WALL EXT. FOOTING W/ CONC. CURB (4)

SCALE: 1-1/2"=1'-0"



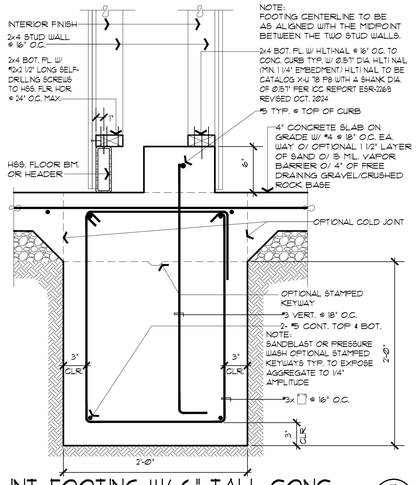
SIDE WALL EXT. FOOTING W/ CONC. CURB (5)

SCALE: 1-1/2"=1'-0"



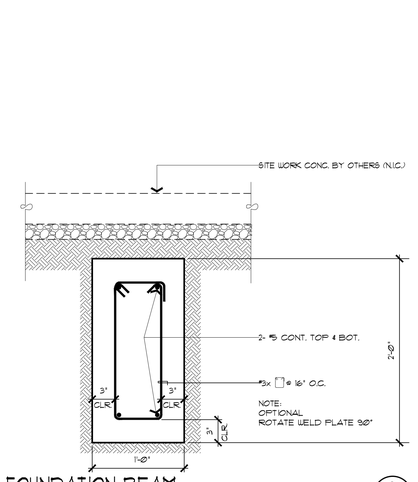
TYPICAL FOOTING AT INT. BEARING WALL (6)

SCALE: 1-1/2"=1'-0"



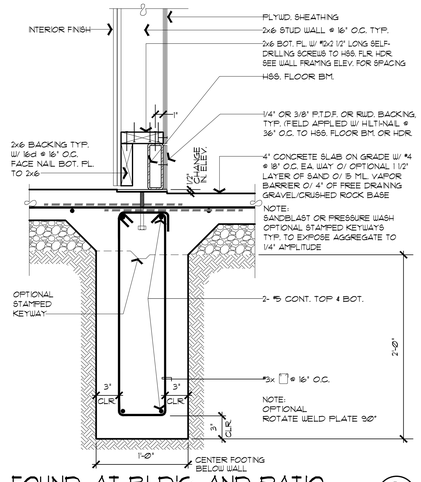
INT. FOOTING W/ 6" TALL CONC. (7)

SCALE: 1-1/2"=1'-0"



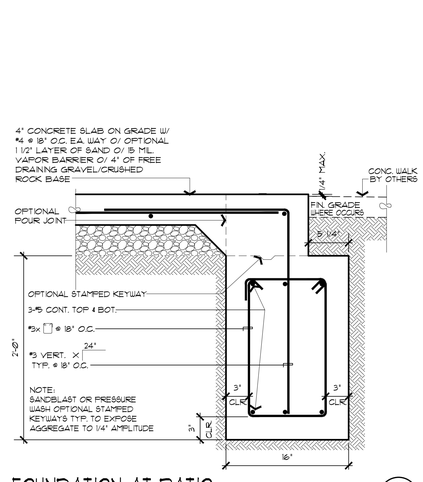
FOUNDATION BEAM (8)

SCALE: 1-1/2"=1'-0"



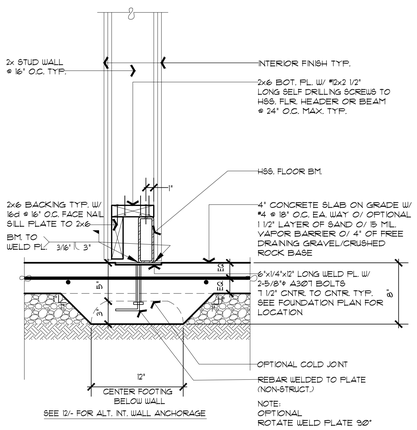
FOUND. AT BLD'G. AND PATIO (9)

SCALE: 1-1/2"=1'-0"



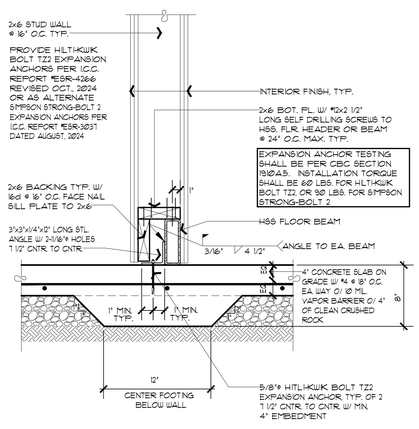
FOUNDATION AT PATIO (10)

SCALE: 1-1/2"=1'-0"



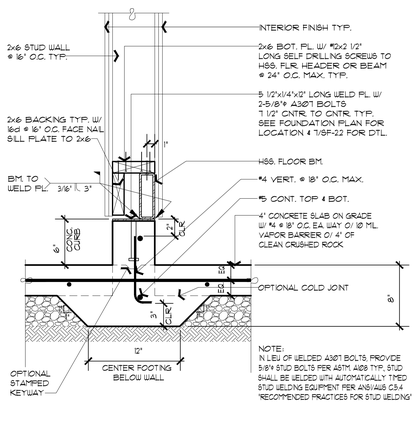
TYPICAL INT. FOOTING AT NON-BEARING WALL (11)

SCALE: 1-1/2"=1'-0"



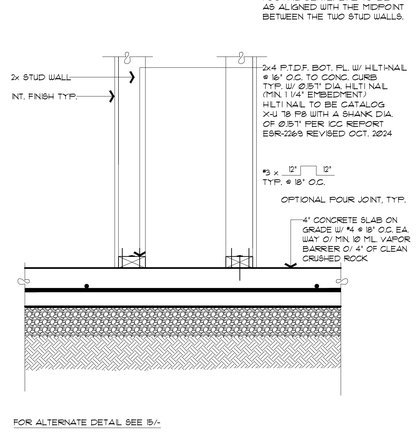
ALTERNATE INT. FOOTING AT NON-BEARING WALL (12)

SCALE: 1-1/2"=1'-0"



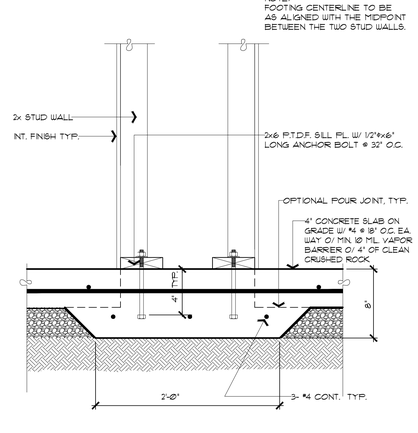
FOUND. @ 2x6 INTERIOR WALL W/ CONC. CURB (13)

SCALE: 1-1/2"=1'-0"



TYP. PLUMBING CHASE (14)

SCALE: 1-1/2"=1'-0"



ALTERNATE THICKENED SLAB AT PLUMBING CHASE (15)

SCALE: 1-1/2"=1'-0"

NOTE:
TOP OF FOOTING ELEV. TO BE AT LOWEST ADJACENT GRADE. ELEVATION

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DRAWN: BLB
CHECKED: MM

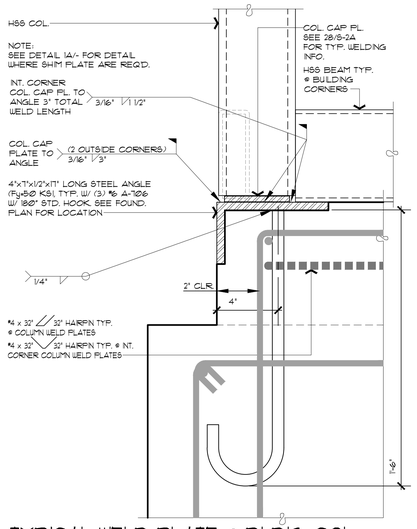
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
FOUNDATION DETAILS

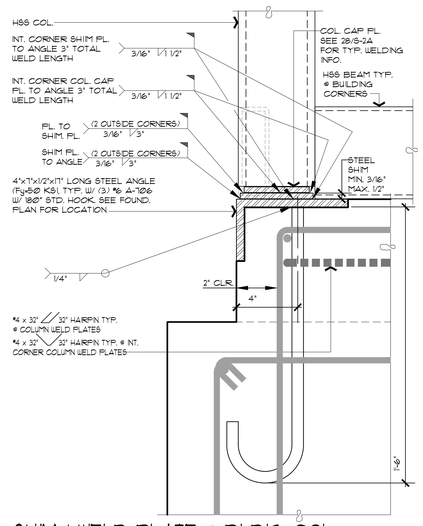
SHEET NO.
SF-2.1



TYPICAL WELD PLATE @ BLD'G. COL. AT BLD'G. CORNERS

1 -

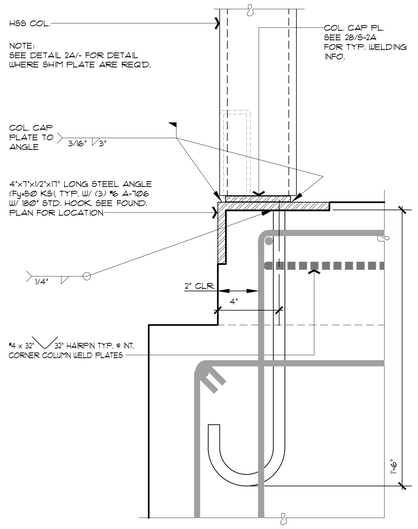
SCALE: 3"=1'-0"



SHIM & WELD PLATE @ BLD'G. COL. AT BLD'G. CORNERS

1A -

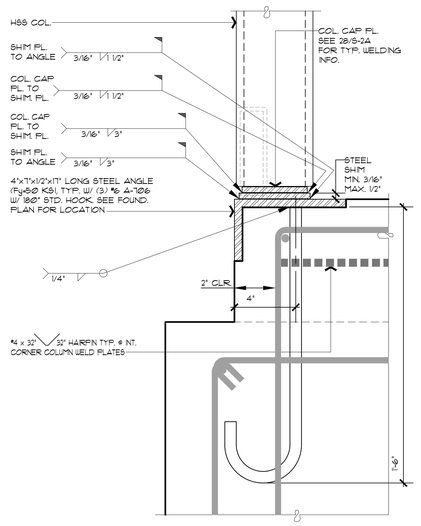
SCALE: 3"=1'-0"



TYPICAL WELD PLATE @ BLD'G. COL.

2 -

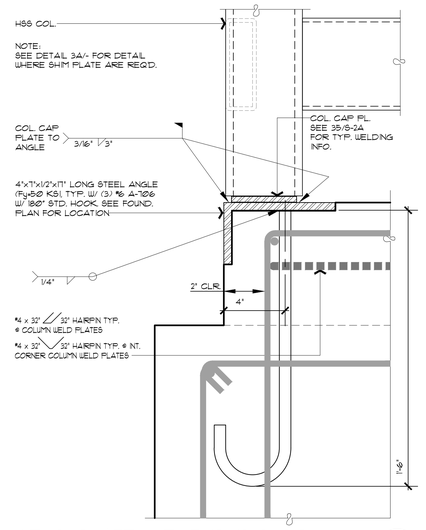
SCALE: 3"=1'-0"



SHIM & WELD PLATE @ BLD'G. COL.

2A -

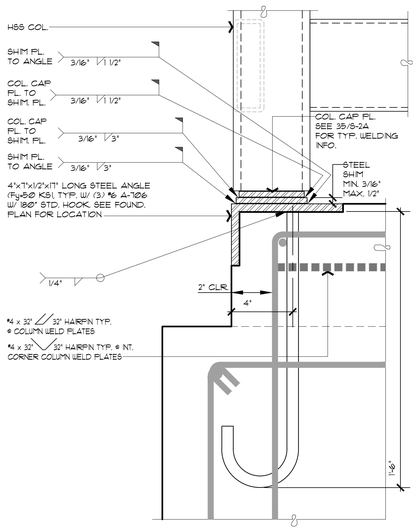
SCALE: 3"=1'-0"



WELD PLATE @ EXT. BLD'G. COL.

3 -

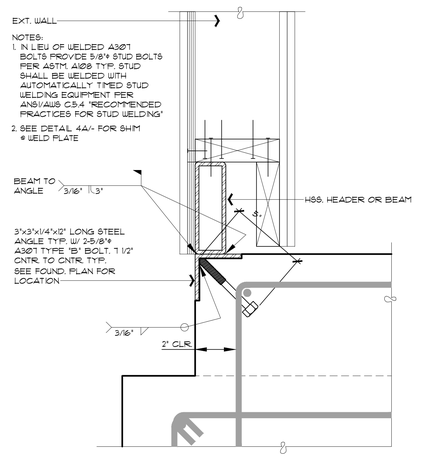
SCALE: 3"=1'-0"



SHIM & WELD PLATE @ EXT. BLD'G. COL.

3A -

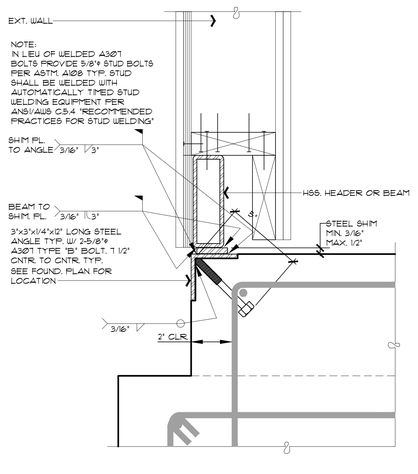
SCALE: 3"=1'-0"



TYPICAL WELD PLATE AT FLOOR BEAM

4 -

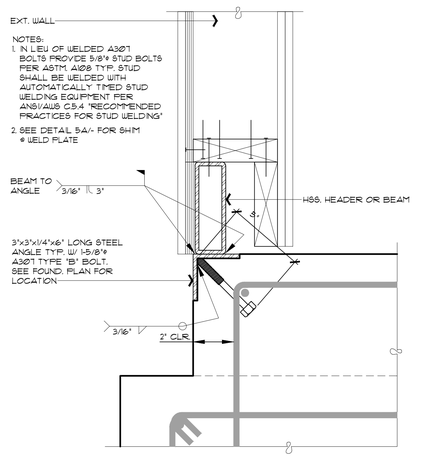
SCALE: 3"=1'-0"



SHIM & WELD PLATE AT FLOOR BEAM

4A -

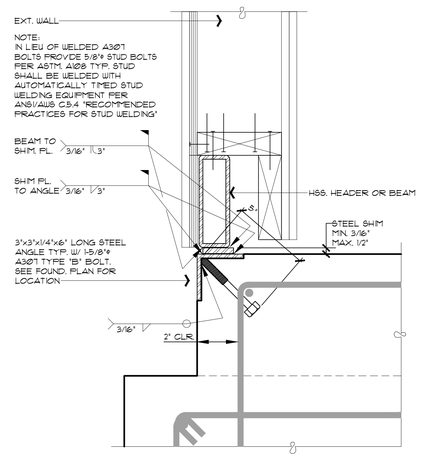
SCALE: 3"=1'-0"



TYPICAL WELD PLATE NEAR EXT. DOOR

5 -

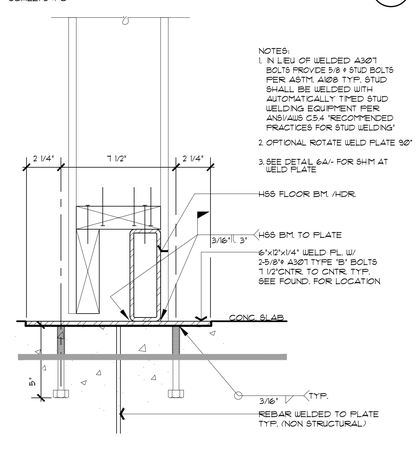
SCALE: 3"=1'-0"



SHIM & WELD PLATE NEAR EXT. DOOR

5A -

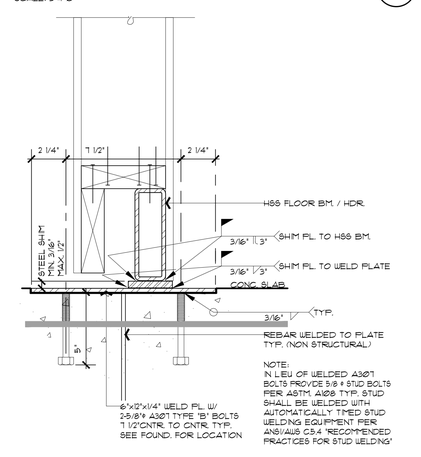
SCALE: 3"=1'-0"



WELD PLATE AT INT. BEAM

6 -

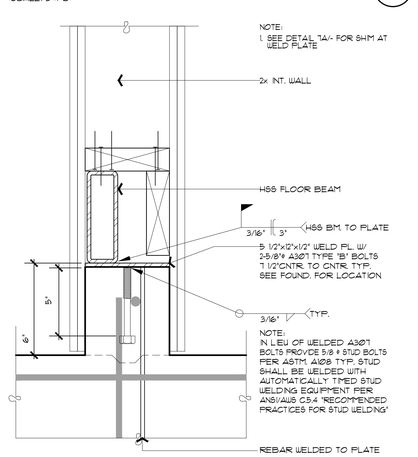
SCALE: 3"=1'-0"



SHIM & WELD PLATE AT BEAM

6A -

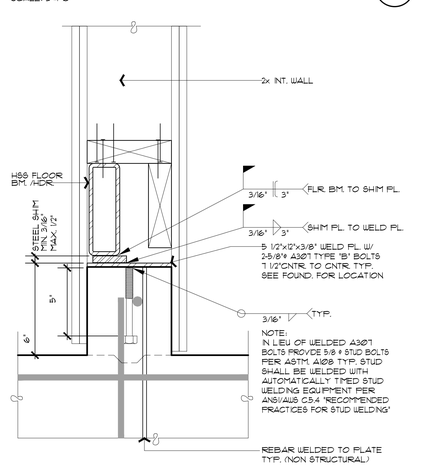
SCALE: 3"=1'-0"



TYPICAL INT. WELD PLATE AT CONC CURB

7 -

SCALE: 3"=1'-0"



TYPICAL INT. WELD PLATE AT CONC. CURB

7A -

SCALE: 3"=1'-0"

NOTES:

1. SEE DETAILS 20 & 21/SF-2.3 FOR PLAN VIEW AT FOUNDATION WELD PLATES AT BUILDING COLUMNS.
2. STEEL SHIM PLATE TO BE 4 3/4"x4 3/4" ADJUST AS NEEDED TO ACHIVE THE NOTED 3/16" FILLET WELD.

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APP: 02-122955 INC: 02
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SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

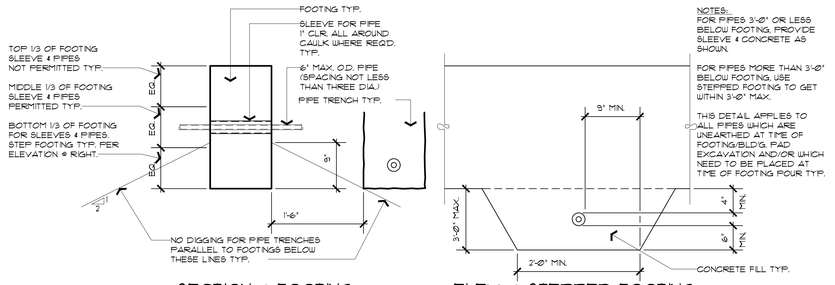
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

FOUNDATION DETAILS

SHEET NO.

SF-2.2



SECTION @ FOOTING

NOTES:
FOR PIPES 3'-0" OR LESS BELOW FOOTING, PROVDE SLEEVE 4 CONCRETE AS SHOWN.

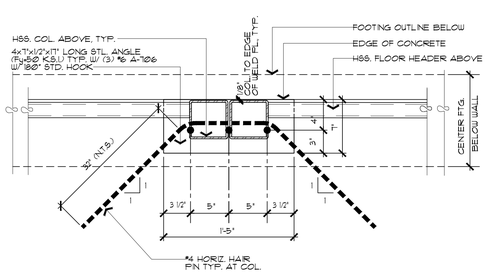
FOR PIPES MORE THAN 3'-0" BELOW FOOTING, USE STEPPED FOOTING TO GET WITHIN 3'-0" MAX.

THIS DETAIL APPLIES TO ALL PIPES WHICH ARE UNEARTHED AT TIME OF FOOTING/BLD'G. PAD EXCAVATION AND/OR WHICH NEED TO BE PLACED AT TIME OF FOOTING POUR TYP.

ELEV. @ STEPPED FOOTING

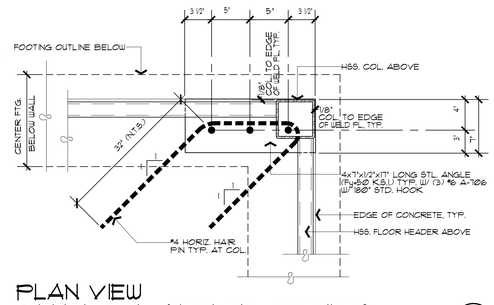
DETAIL @ FOOTING EXCAVATIONS

SCALE: 1"=1'-0" — 60



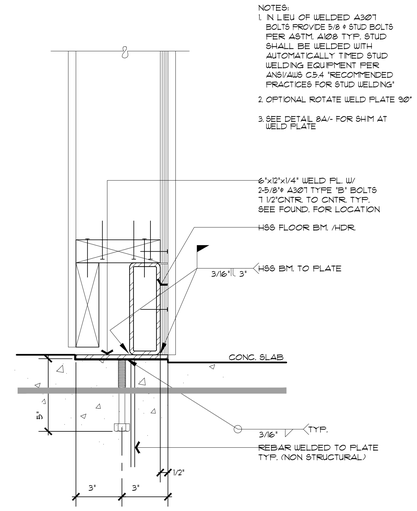
PLAN VIEW WELD PLATE AT INT. MODLINES

SCALE: 1-1/2"=1'-0" — 20



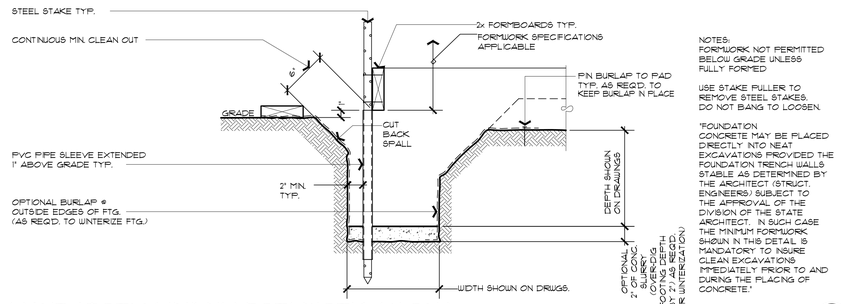
PLAN VIEW @ EMBED PL. AT BLD'G. CORNERS

SCALE: 1-1/2"=1'-0" — 21



WELD PLATE AT EXT. BEAM

SCALE: 3"=1'-0" — 8



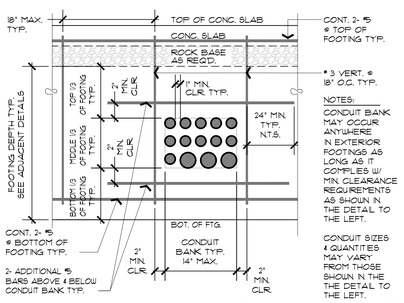
NOTES:
FORMWORK NOT PERMITTED BELOW GRADE UNLESS FULLY FORMED

USE STAKE FULLER TO REMOVE STEEL STAKES. DO NOT BANG TO LOOSEN.

"FOUNDATION CONCRETE MAY BE PLACED DIRECTLY INTO NEAT EXCAVATIONS PROVIDED THE FOUNDATION TRENCH WALLS STABLE AS DETERMINED BY THE ARCHITECT (STRUCT. ENGINEER) SUBJECT TO THE APPROVAL OF THE DIVISION OF THE STATE ARCHITECT. IN SUCH CASE THE MINIMUM FORMWORK SHOWN IN THIS DETAIL IS MANDATORY TO INSURE CLEAN EXCAVATIONS IMMEDIATELY PRIOR TO AND DURING THE PLACING OF CONCRETE."

MANDATORY MINIMUM FORMWORK (U.O.N.)

SCALE: 1-1/2"=1'-0" — 61

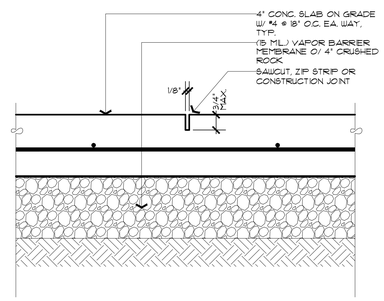


NOTES:
CONDUIT BANK MAY OCCUR ANYWHERE IN EXTERIOR FOOTINGS AS LONG AS IT COMPLIES W/ MIN. CLEARANCE REQUIREMENTS AS SHOWN IN THE DETAIL TO THE LEFT.

CONDUIT SIZES & QUANTITIES MAY VARY FROM THOSE SHOWN IN THE DETAIL TO THE LEFT.

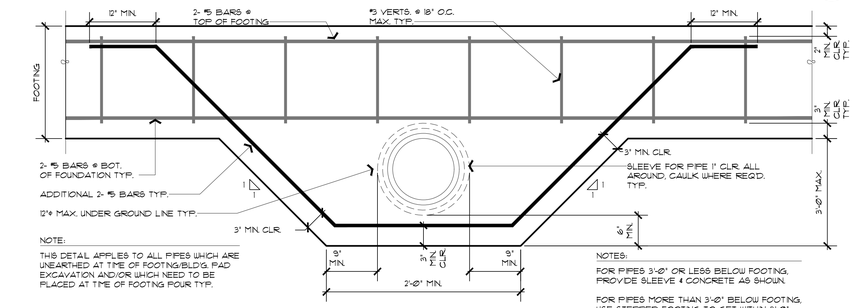
ELEV. OF FOOTING @ CONDUIT BANK

SCALE: 1"=1'-0" (THIS DETAIL ALSO APPLIES TO PLUMBING PIPING) — 65



CONTROL JOINT

SCALE: 3"=1'-0" — 66



NOTE:
THIS DETAIL APPLIES TO ALL PIPES WHICH ARE UNEARTHED AT TIME OF FOOTING/BLD'G. PAD EXCAVATION AND/OR WHICH NEED TO BE PLACED AT TIME OF FOOTING POUR TYP.

NOTES:
FOR PIPES 3'-0" OR LESS BELOW FOOTING, PROVDE SLEEVE 4 CONCRETE AS SHOWN.

FOR PIPES MORE THAN 3'-0" BELOW FOOTING, USE STEPPED FOOTING TO GET WITHIN 3'-0" MAX.

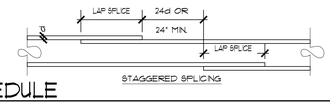
ELEVATION @ STEPPED FOOTING

SCALE: 1"=1'-0" — 63

CLASS A LAP SPLICE SCHEDULE

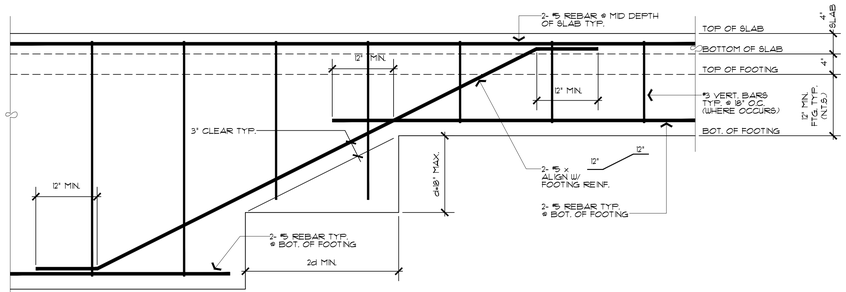
BAR	AREA (SQ. IN.)	Ø.11		Ø.20		Ø.31		Ø.44	
	DIAMETER db	Ø.375		Ø.500		Ø.625		Ø.750	
	NORMAL WEIGHT CONCRETE (pcf)	#3		#4		#5		#6	
		F y = 40 KSI		F y = 40 KSI		F y = 60 KSI		F y = 60 KSI	
		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.
	4000	13"	10"	17"	13"	32"	24"	37"	29"

NOTES:
1. ALL VALUES SHOWN IN SCHEDULE ARE IN INCHES U.N.O.
2. NOT USED.
3. TOP BARS ARE HORIZONTAL BARS W/ MORE THAN 12" OF CONCRETE CAST BELOW THE BARS.
4. BOTTOM BARS ARE THE VERTICAL BARS & HORIZONTAL BARS W/ LESS THAN 12" OF CONCRETE CAST BELOW HORIZONTAL BARS.
5. ALL LAP SPLICES SHALL BE STAGGERED AS SHOWN BELOW.
6. SPLICE ONLY 1/2 HORIZONTAL BAR (OF 2 BARS) AT TENSION SPLICE LOCATIONS FOR A CLASS A SPLICE (SEE BELOW).



TYPICAL REINFORCING LAP SCHEDULE

SCALE: N.T.S. — A



TYP. STEPPED FOOTING DETAIL

SCALE: 1"=1'-0" — 64

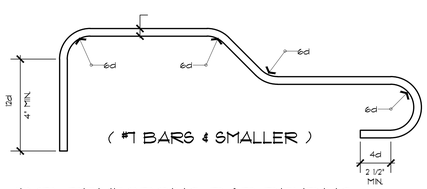
CLASS B LAP SPLICE SCHEDULE

BAR	AREA (SQ. IN.)	Ø.11		Ø.20		Ø.31		Ø.44	
	DIAMETER db	Ø.375		Ø.500		Ø.625		Ø.750	
	NORMAL WEIGHT CONCRETE (pcf)	#3		#4		#5		#6	
		F y = 40 KSI		F y = 40 KSI		F y = 60 KSI		F y = 60 KSI	
		TOP	BOTT.	TOP	BOTT.	TOP	BOTT.	TOP	BOTT.
	4000	17" 47db	13" 36db	23" 46db	17" 34db	41" 66db	31" 50db	49" 66db	37" 49db

NOTES:
1. ALL VALUES SHOWN IN SCHEDULE ARE IN INCHES U.N.O.
2. NOT USED.
3. TOP BARS ARE HORIZONTAL BARS W/ MORE THAN 12" OF CONCRETE CAST BELOW THE BARS.
4. BOTTOM BARS ARE THE VERTICAL BARS & HORIZONTAL BARS W/ LESS THAN 12" OF CONCRETE CAST BELOW HORIZONTAL BARS.
5. HORIZONTAL BARS CAN BE SPLICED ANYWHERE FOR A CLASS B SPLICE.
6. ALL TENSION BARS AT ANY LOCATION CAN BE SPLICED AS A CLASS B SPLICE (STAGGERING OF SPLICES IS NOT REQUIRED).

TYPICAL REINFORCING LAP SCHEDULE

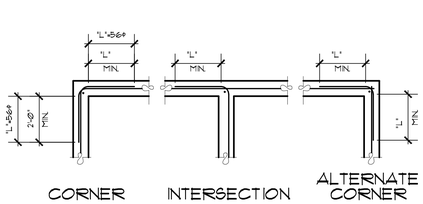
SCALE: N.T.S. — B



(#7 BARS & SMALLER)

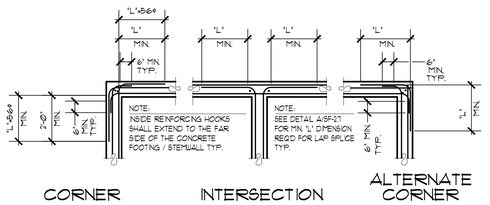
TYP. REINFORCING BAR BENDING

NO SCALE — 67



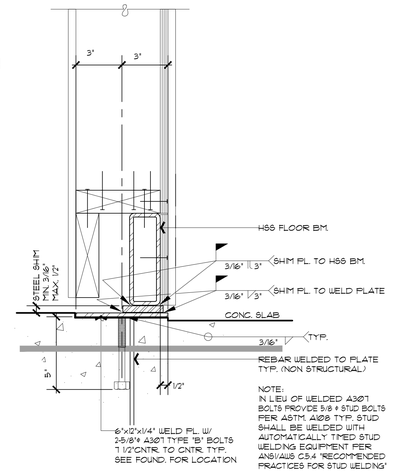
TYP. SINGLE LAYER REINFORCING

NO SCALE — 68



TYP. DOUBLE LAYER REINFORCING

NO SCALE — 69



NOTE:
IN LIEU OF WELDED A307 BOLTS PROVIDE 5/8 4 STUD BOLTS PER ASTM. A108 TYP. STUD SHALL BE WELDED WITH AUTOMATICALLY TIMED STUD WELDING EQUIPMENT PER ANSI/AWS C5.4 "RECOMMENDED PRACTICES FOR STUD WELDING"

SHIM & WELD PLATE AT EXT. BEAM

SCALE: 3"=1'-0" — 8A

SOIL, FOUNDATION, AND CONCRETE NOTES:

SEE THE GEOTECHNICAL ENGINEERING REPORT FOR PROPOSED NEW CLASSROOMS AT MENDOTA ELEMENTARY SCHOOL.
605 BASS AVE. MENDOTA, CALIFORNIA 93640
PREPARED BY: BSK ASSOCIATES: BSK PROJECT NO. G14000166
DATED: APRIL 10, 2024.

1. SOIL TYPE AND FOUNDATION:
   A. SOIL BEARING VALUE: 3,000 P.S.F. (FOR DEAD PLUS LIVE LOADS)
   B. MINIMUM DEPTH
   ALL FOOTING SHALL EXTEND A MINIMUM OF 12 INCHES INTO NATURAL GROUND OR 12 INCHES INTO APPROVED, COMPACTED FILL.
2. COMPACTED FILL:
   ALL FILL MATERIAL SHALL BE COMPACTED IN PLACE TO A MINIMUM RELATIVE DENSITY OF 90%, AREA TO RECEIVE FILL SHALL BE CLEARED AND SCARIFIED.
3. CONCRETE:
   ALL CONCRETE SHALL HAVE A MINIMUM STRENGTH OF F'C = 4,000 P.S.I. AFTER 28 DAYS PER TITLE 24 WITH WEIGH MASTER'S CERTIFICATE AND TEST CYLINDERS TO BE PROVIDED. ALL CEMENT SHALL BE TYPE I OR TYPE II PER A.S.T.M. C-150. AGGREGATE SHALL BE 3/4" TO 1" MAXIMUM SIZE BUT NOT MORE THAN 3/4 OF MIN. CLEAR BAR SPACING. WATER CEMENT RATIO TO = 0.45 OR LESS BY WEIGHT, TYP. PER GEOTECH REPORT
4. REINFORCING STEEL:
   A. MATERIAL:
   #4 AND SMALLER REINFORCING STEEL SHALL BE BILLET STEEL PER A.S.T.M. A615 GRADE 40
   #5 REINFORCING STEEL SHALL BE BILLET STEEL PER A.S.T.M. A615 GRADE 60
   B. SPLICES:
   ALL SPLICES AT SLAB-ON-GRADE & FOOTINGS SHALL BE LAPPED PER DETAIL A/- OR ALTERNATIVELY PER DETAIL B/-
   C. REINFORCING FABRICATION AND PLACEMENT:
   FABRICATION AND PLACING OF REINFORCING STEEL SHALL CONFORM TO THE CODE OF STANDARD PRACTICE" AND SPECIFICATIONS FOR PLACING REINFORCEMENT" OF THE CONCRETE REINFORCING STEEL INSTITUTE.
   D. MINIMUM COVERAGE:
   ALL REINFORCING SHALL HAVE THE FOLLOWING MINIMUM COVERAGE WITH CONCRETE.

LOCATION	AMOUNT
FORMED EARTH	2"
UNFORMED EARTH	3"
S.O.G. EXPOSED TO WEATHER	1 1/2" FOR #5 & SMALLER BARS 2" FOR #6 & LARGER BARS
S.O.G. NOT EXPOSED TO WEATHER	3/4" FOR #11 & SMALLER

EACH SHIPMENT TO THE FABRICATOR OF REINFORCING STEEL MUST BE ACCOMPANIED BY CERTIFIED MIL TEST REPORTS.

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INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
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STRUCTURAL ENGINEER

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No. 2
Exp. 6-30-2025
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Structural Engineers
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DRAWN: BLB
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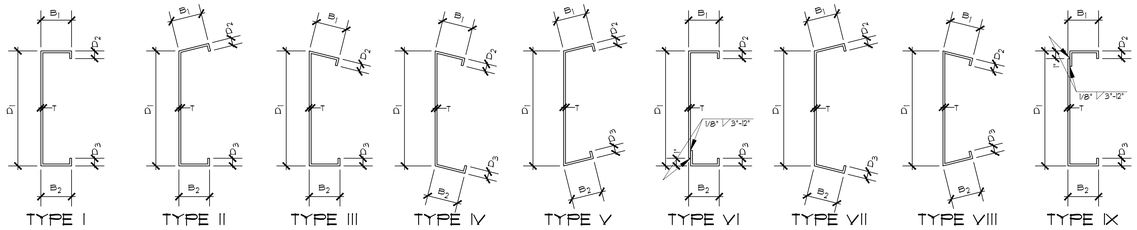
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
FOUNDATION DETAILS

SHEET NO.
SF-2.3



LIGHT GUAGE STEEL MEMBER SCHEDULE

MEMBER		D_1	B_1	B_2	D_2	D_3	T	GA.	TYPE	COMMENTS
ROOF BEAM	"RB-1"	16"	5 1/2"	5 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	I	FY-5Ø K.S.I.
OVERHANG BEAM	"RB-2"	6"	5 1/2"	5 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	VI	FY-5Ø K.S.I.
OVERHANG BEAM	"RB-3"	6"	4 1/2"	4 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	I	FY-5Ø K.S.I.
SIDE OVERHANG BEAM	"RB-4"	24"	6"	6"	2" MIN.	2" MIN.	Ø.75"	14	I	FY-5Ø K.S.I.
OVERHANG BEAM	"RB-5"	VARIES 16" MAX. 6" MIN.	4 1/2"	4 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	IX	FY-5Ø K.S.I.
ROOF HEADER (HIGH END)	"RH-1"	16 1/16"	5 1/2"	5 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	III	FY-5Ø K.S.I.
ROOF HEADER (LOW END)	"RH-2"	16 1/16"	5 1/2"	5 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	II	FY-5Ø K.S.I.
OVERHANG HEADER (LOW END)	"RH-3"	8 1/16"	4"	4"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	V	FY-5Ø K.S.I.
OVERHANG HEADER (HIGH END)	"RH-4"	8 7/16"	4"	4"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	VII	FY-5Ø K.S.I.
ROOF HEADER (HIGH END)	"RH-5"	16 1/16"	5 1/2"	5 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	IV	FY-5Ø K.S.I.
ROOF HEADER (LOW END)	"RH-6"	16 1/16"	5 1/2"	5 1/2"	1Ø3" MIN.	1Ø3" MIN.	.135"	1Ø	V	FY-5Ø K.S.I.
ROOF PURLIN	"RP-1"	9"	3"	3"	.75" MIN.	.75" MIN.	Ø.75"	14	III	FY-5Ø K.S.I.
OVERHANG PURLIN	"RP-2"	8 1/16"	3"	3"	.75" MIN.	.75" MIN.	Ø.75"	14	IV	FY-5Ø K.S.I.
ROOF PURLIN	"RP-3"	6"	3"	3"	.75" MIN.	.75" MIN.	Ø.75"	14	VIII	FY-5Ø K.S.I.
ROOF PURLIN	"RP-4"	6"	3"	3"	.75" MIN.	.75" MIN.	Ø.75"	14	IV	FY-5Ø K.S.I.
ROOF PURLIN	"RP-5"	6"	3"	3"	.75" MIN.	.75" MIN.	Ø.75"	14	IV	FY-5Ø K.S.I.
O.H. PURLIN	"RP-6"	8 1/4"	4"	4"	.75" MIN.	.75" MIN.	Ø.75"	14	VIII	FY-5Ø K.S.I.

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FOR MENDOTA UNIFIED SCHOOL DISTRICT
1601 BASS AVENUE, MENDOTA, CA 93640

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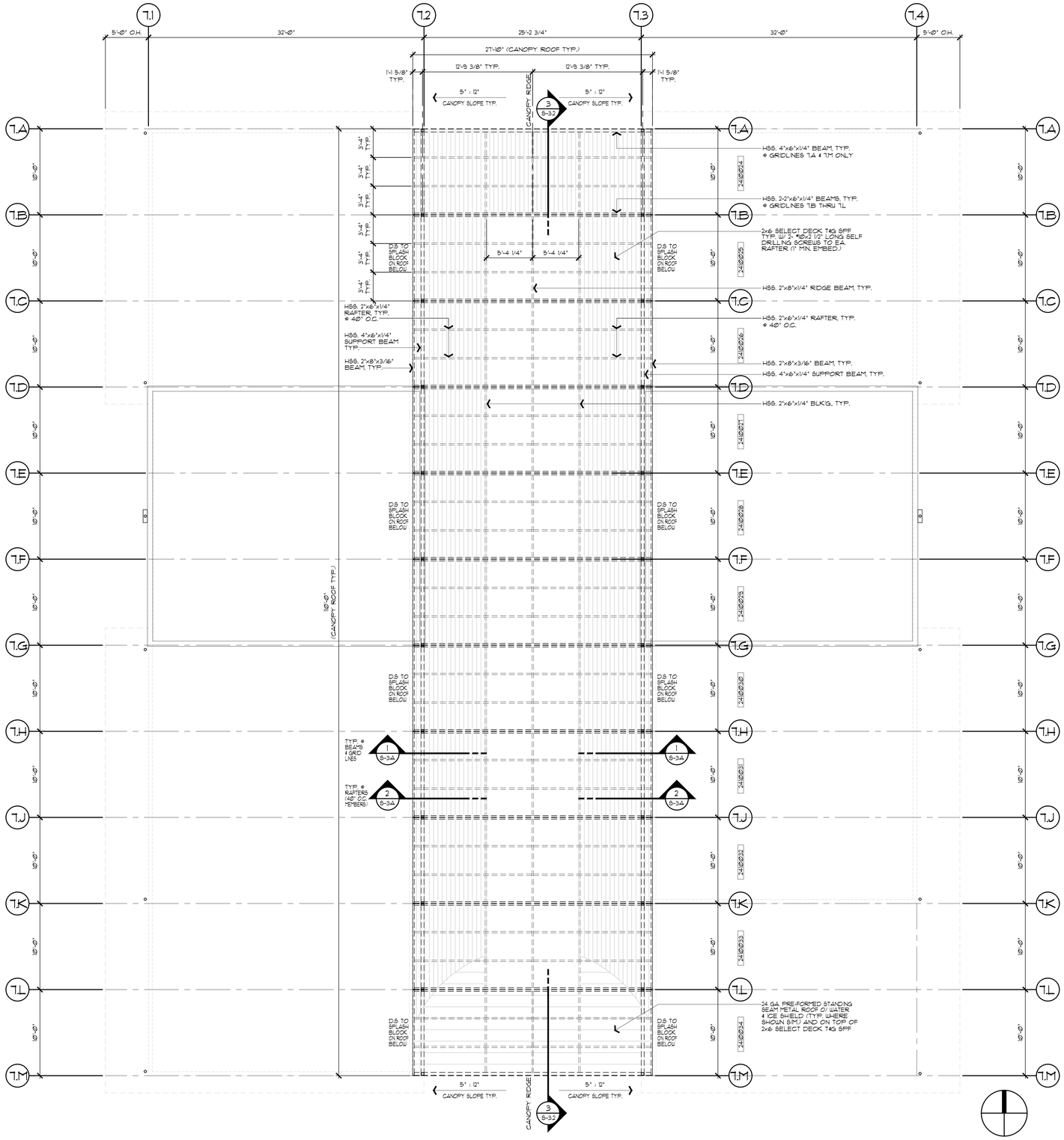
DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE

LIGHT STEEL MEMBER SCHEDULE

SHEET NO.

S-0



TK KINDERGARTEN CANOPY PLAN

SCALE: 3/16"=1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

FOR REFERENCE ONLY

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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NV. LIC. NO. 37887

STRUCTURAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER
KAM WING YAN
No. S-3112
Exp. 8/31/26
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STATE OF CALIFORNIA

Kam Yan & Associates
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433 Hegenberger Rd. Ste. 204
Oakland, California 94621
(TEL.) (510) 562-0581
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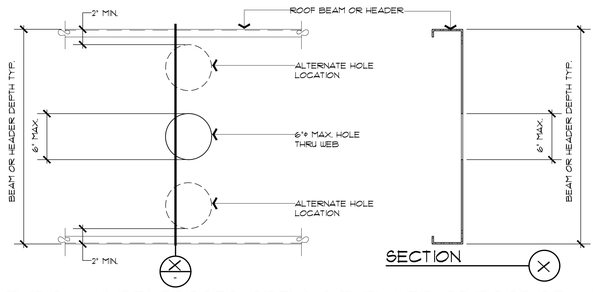
DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
CANOPY FRAMING PLAN

SHEET NO.
S-1



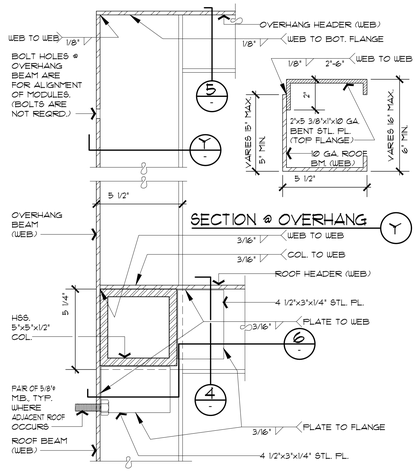
NOTE:
MAX DIAMETER HOLE IN WEB OF BEAM OR HEADER = 6" CENTERED ON BEAM DEPTH
(HOLE DIAMETER CAN VARY TO A MAXIMUM OF 6" IN DIAMETER EDGE OF HOLE CAN BE NO CLOSER THAN 2" TO TOP OR BOTTOM FLANGE.)

MULTIPLE HOLES IN WEBS OF BEAMS OR HEADERS SHALL BE SPACED A MIN. OF 48" O.C. HORIZONTALLY TYP.

TYPICAL UNREINFORCED OPENING THRU WEB OF ROOF BEAM OR HEADER

2

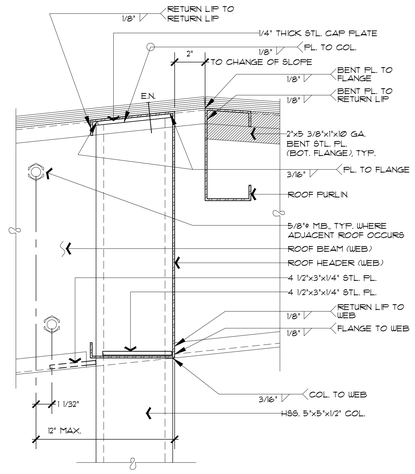
SCALE: 1-1/2"=1'-0"



PLAN AT COL. AT OVERHANG

3

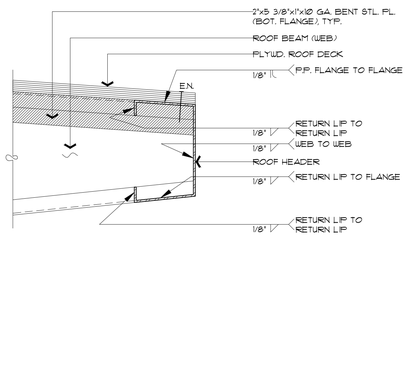
SCALE: 3"=1'-0"



SECTION OF OVERHANG COL.

4

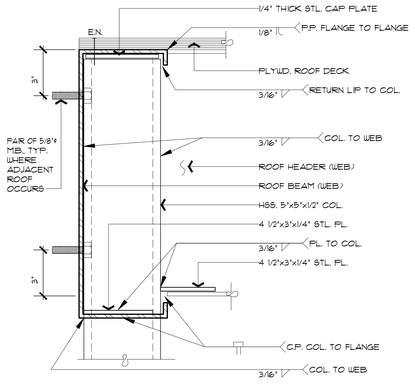
SCALE: 3"=1'-0"



ROOF OVERHANG HEADER

5

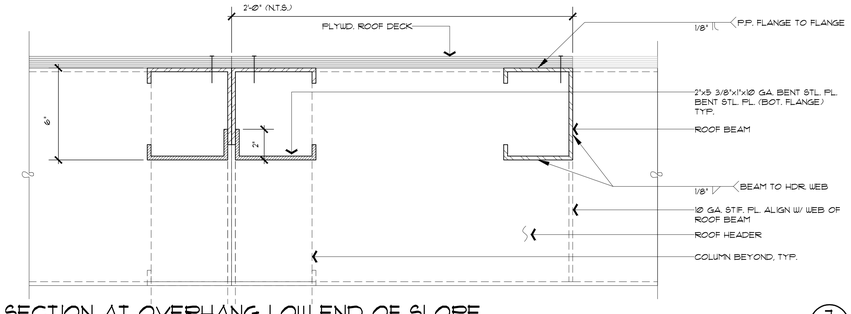
SCALE: 3"=1'-0"



SECTION OF ROOF COLUMN

6

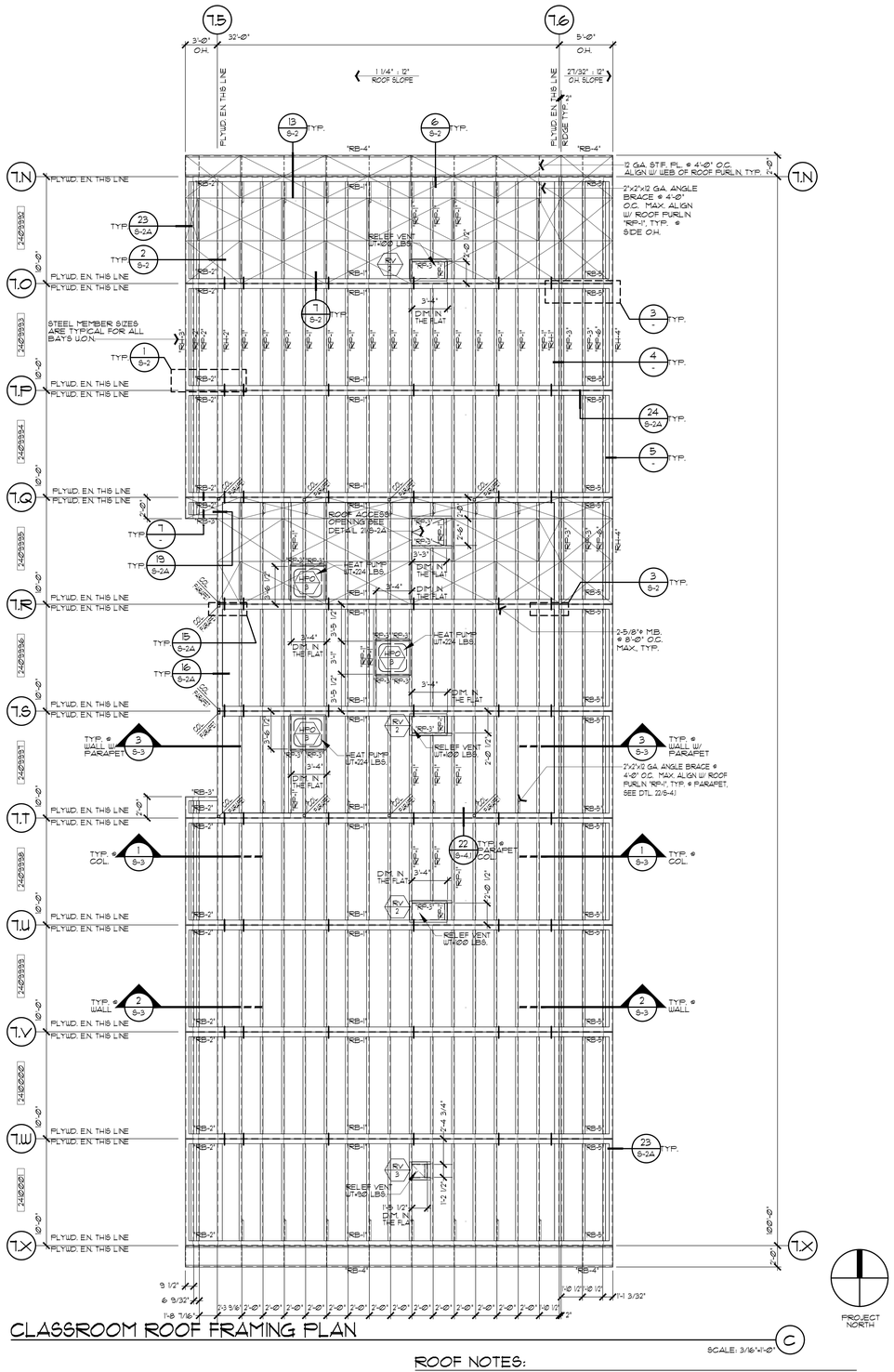
SCALE: 3"=1'-0"



SECTION AT OVERHANG LOW END OF SLOPE

7

SCALE: 3"=1'-0"



CLASSROOM ROOF FRAMING PLAN

C

SCALE: 3/16"=1'-0"

ROOF NOTES:

1. 5/8" OR 19/32 STRUCT. I EXPOSURE I OSB PANELS 32/16 SPAN RATING ¢ PER PS-2 TYP. W/ SQUARE EDGES APA, PS1/PTL OR TECO TYP. W/ "NAILPRO" OR "JAACO" FASTENERS @ 6" O.C. EN. & 6" O.C. FN. TYP. U.O.N. ALL FASTENERS TO BE Ø.145"ø x 1 1/2" LONG TYP. P/N NO. NP1459 SEE I.C.C. REPORT #ESR-2361 DATED SEPT. 2023.
2. ALL ROOF PURLIN DIMENSIONS ARE MEASURED ALONG THE DIAGONAL SLOPE OF THE ROOF TYP. U.O.N.
3. ALL DIMENSIONS ARE TO THE WEB OF ROOF BEAMS, HEADERS AND PURLINS EXCEPT WHERE SHOWN AT ROOF ACCESS OPENINGS
4. MIN. ROOF OSB PANEL WIDTH = 24" PLACE PANELS PERPENDICULAR TO ROOF PURLINS TYP. U.O.N.
5. SEE SHEET S-0 FOR LIGHT STEEL MEMBER SCHEDULE.

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DATE: 05/28/2025

INCREMENT #2
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FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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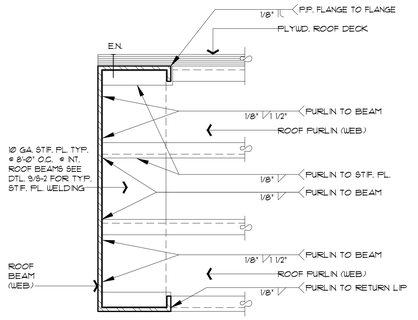
DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

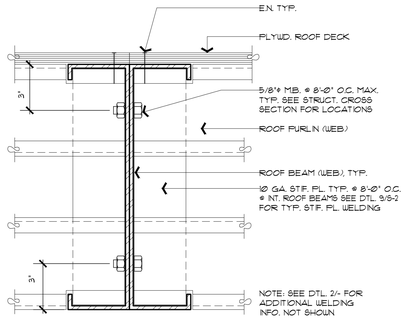
SHEET TITLE
ROOF FRAMING PLAN

SHEET NO.
S-1.1



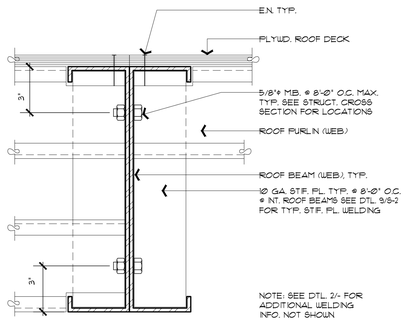
ROOF BEAM @ PURLIN

SCALE: 3"=1'-0" — 2 / -



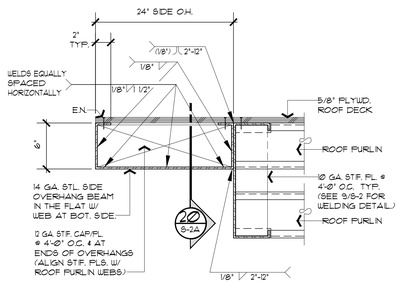
BEAM TO BEAM TIE @ ROOF

SCALE: 3"=1'-0" — 3 / -



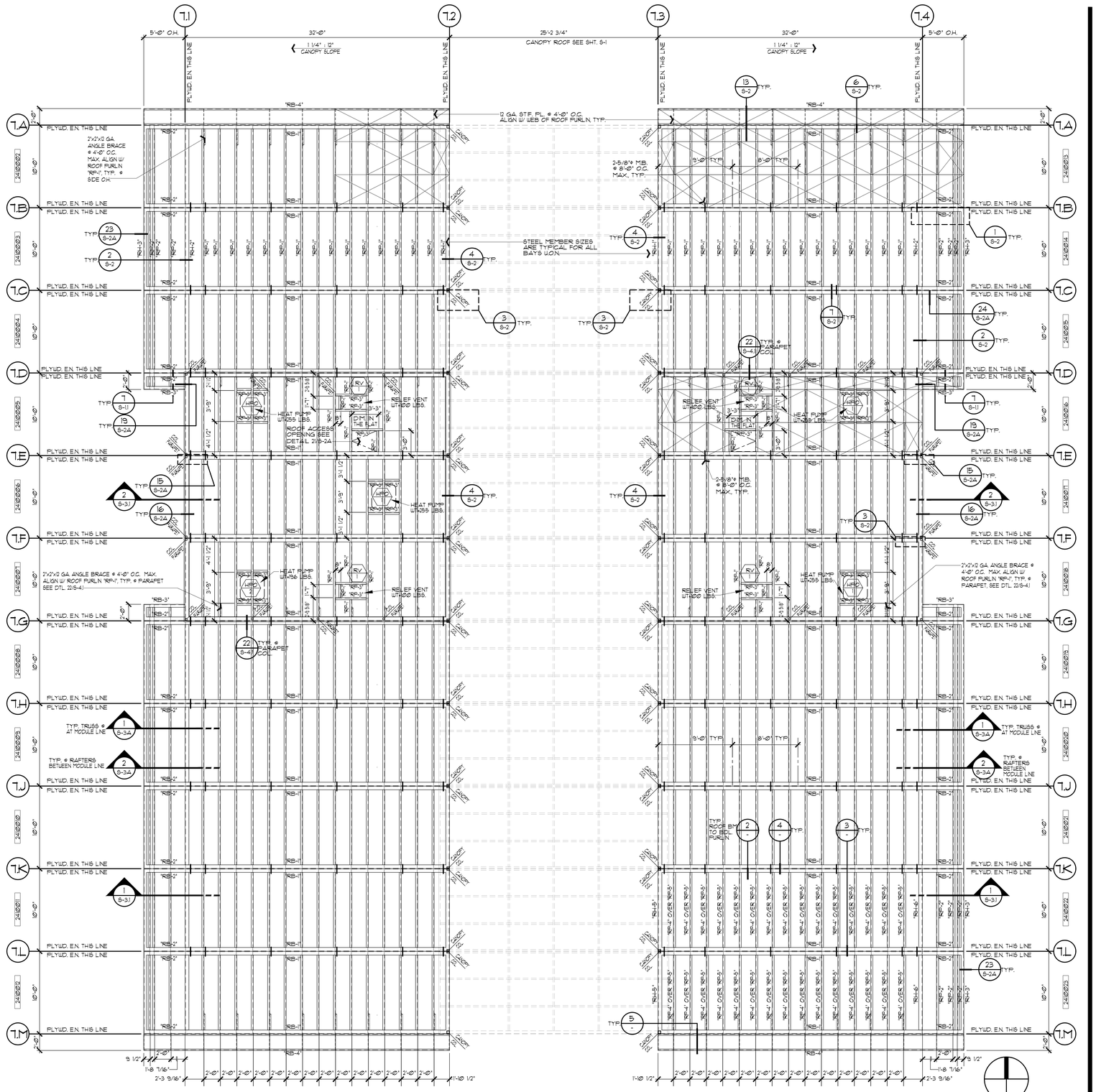
BEAM TO BEAM TIE @ ROOF

SCALE: 3"=1'-0" — 4 / -



SIDE OVERHANG DETAIL

SCALE: 1 1/2"=1'-0" — 5 / -



TK KINDERGARTEN ROOF FRAMING PLAN

SCALE: 3/16"=1'-0" — K

ROOF NOTES:

1. 5/8" OR 19/32 STRUCT. I EXPOSURE I OSB PANELS 32/16 SPAN RATING # PER PS-2 TYP. W/ SQUARE EDGES APA, PS1/PRTL, OR TECO TYP. W/ "NAILPRO" OR "JAACO" FASTENERS @ 6" O.C. E.N. & 6" O.C. F.N. TYP. U.O.N. ALL FASTENERS TO BE Ø.145"± x 1 1/2" LONG TYP. P/N NO. NP1453 SEE I.C.C. REPORT #ESR-2361 DATED SEPT. 2023.
2. ALL ROOF PURLIN DIMENSIONS ARE MEASURED ALONG THE DIAGONAL SLOPE OF THE ROOF TYP. U.O.N.
3. ALL DIMENSIONS ARE TO THE WEB OF ROOF BEAMS, HEADERS AND PURLINS EXCEPT WHERE SHOWN AT ROOF ACCESS OPENINGS
4. MIN. ROOF OSB PANEL WIDTH = 24" PLACE PANELS PERPENDICULAR TO ROOF PURLINS TYP. U.O.N.
5. SEE SHEET S-@ FOR LIGHT STEEL MEMBER SCHEDULE.

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DRAWN: BLB
CHECKED: MM

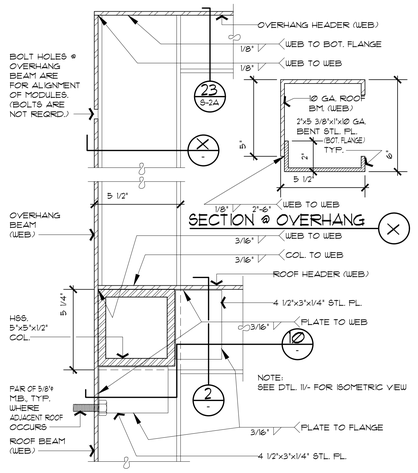
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
ROOF FRAMING PLAN

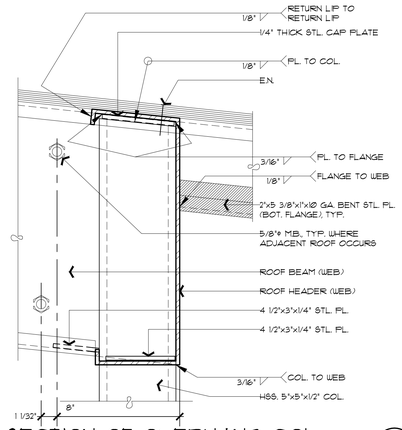
SHEET NO.
S-1.2



PLAN AT COL. AT OVERHANG

1

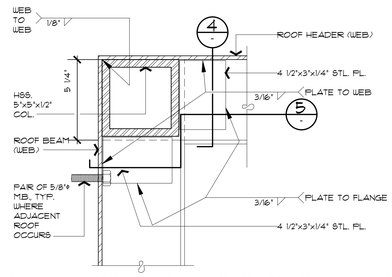
SCALE: 3"=1'-0"



SECTION OF OVERHANG COL.

2

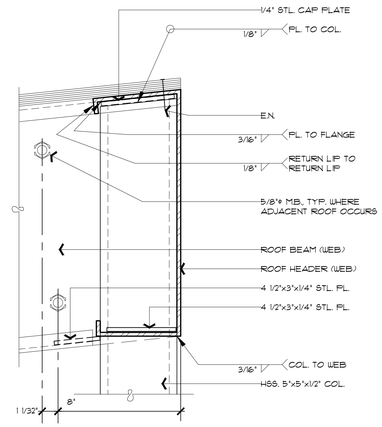
SCALE: 3"=1'-0"



PLAN AT COL. (HIGH END OF ROOF)

3

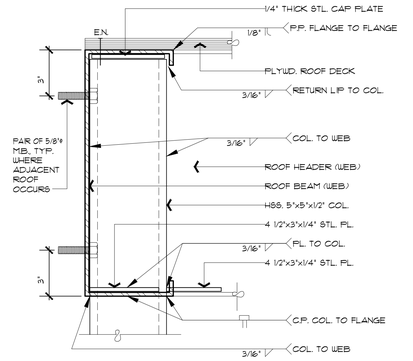
SCALE: 3"=1'-0"



SECTION OF COL. HIGH END OF ROOF)

4

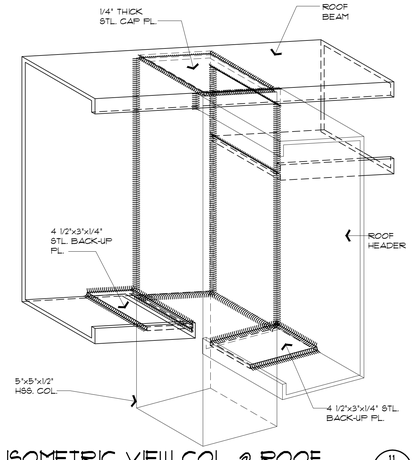
SCALE: 3"=1'-0"



SECTION OF ROOF @ COL.

5

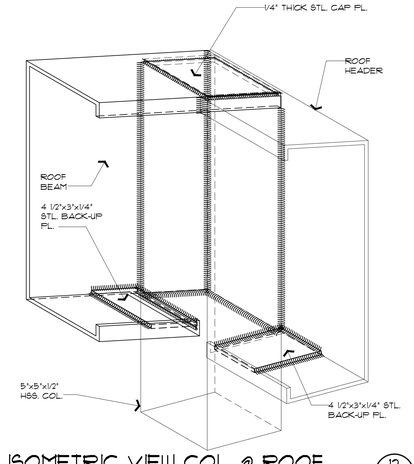
SCALE: 3"=1'-0"



ISOMETRIC VIEW COL. @ ROOF

11

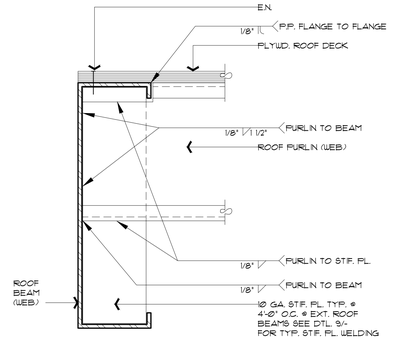
SCALE: 3"=1'-0"



ISOMETRIC VIEW COL. @ ROOF

12

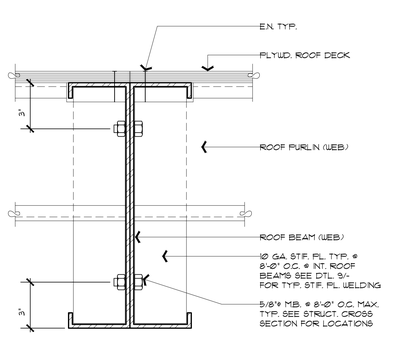
SCALE: 3"=1'-0"



ROOF BEAM @ PURLIN

6

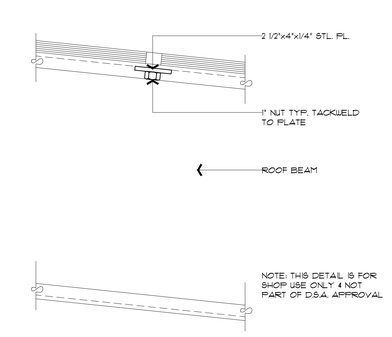
SCALE: 3"=1'-0"



BEAM TO BEAM TIE @ ROOF

7

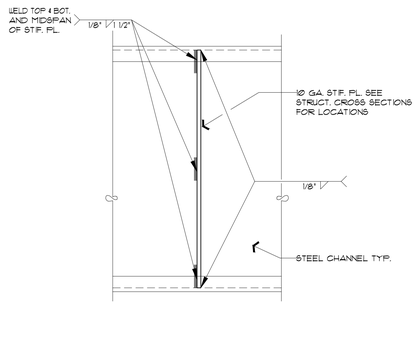
SCALE: 3"=1'-0"



LIFTING NUT @ PURLIN

8

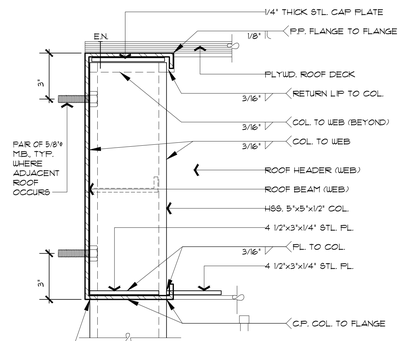
SCALE: 3"=1'-0"



TYP. STIF. PLATE WELDING

9

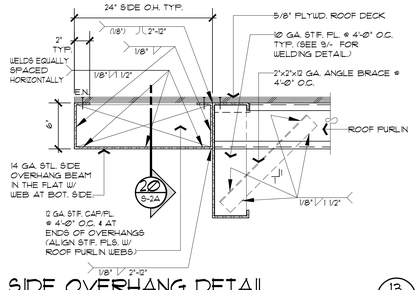
SCALE: 3"=1'-0"



SECTION OF ROOF @ COL.

10

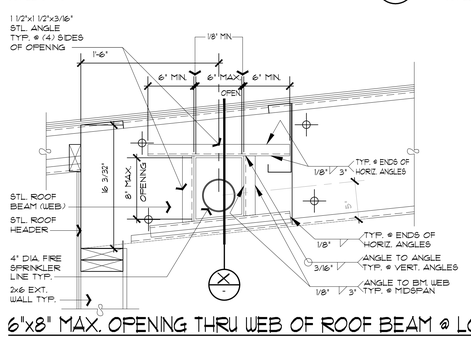
SCALE: 3"=1'-0"



SIDE OVERHANG DETAIL

13

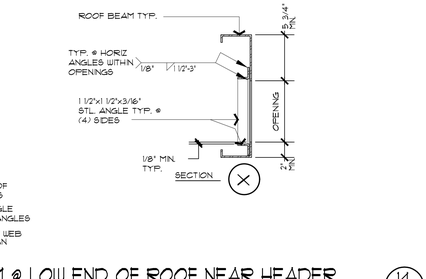
SCALE: 1-1/2"=1'-0"



6"x8" MAX. OPENING THRU WEB OF ROOF BEAM @ LOW END OF ROOF NEAR HEADER

14

SCALE: 1-1/2"=1'-0"



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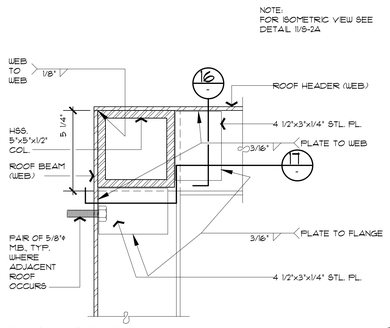
JOB NO. 24769

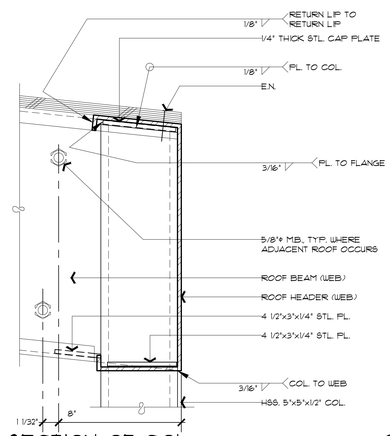
SHEET TITLE
STRUCTURAL DETAILS

SHEET NO.
S-2



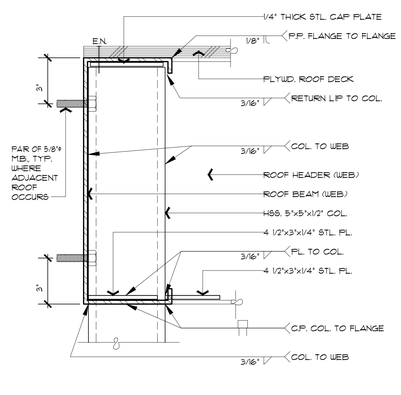
PLAN AT COL. (LOW END OF ROOF) 15

SCALE: 3"=1'-0"



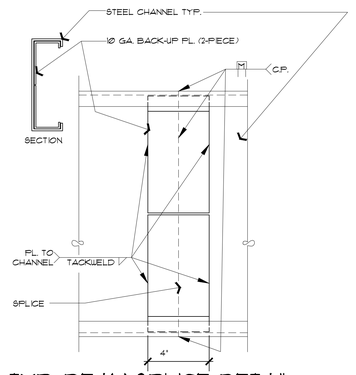
SECTION OF COL. (LOW END OF ROOF) 16

SCALE: 3"=1'-0"



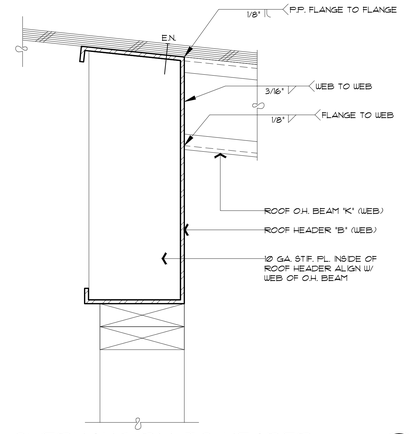
SECTION OF ROOF @ COL. (LOW END OF ROOF) 17

SCALE: 3"=1'-0"



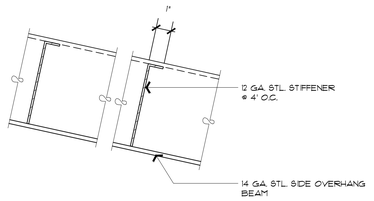
TYP. BEAM SPLICE DETAIL 18

SCALE: 3"=1'-0"



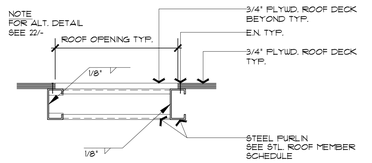
OVERHANG BM. TO HEADER 19

SCALE: 3"=1'-0"



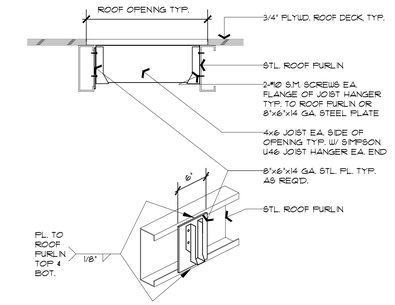
STIFFENER @ SIDE O.H. 20

SCALE: 3"=1'-0"



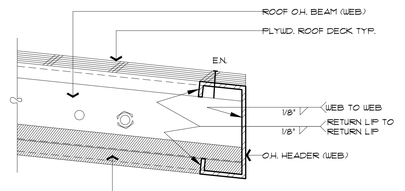
STL. ROOF PURLIN BLK'G. 21

SCALE: 1"=1'-0"



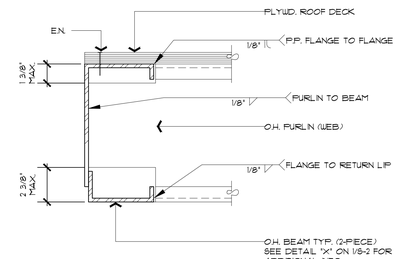
ALT. WOOD BLK'G. @ ROOF 22

SCALE: 1"=1'-0"



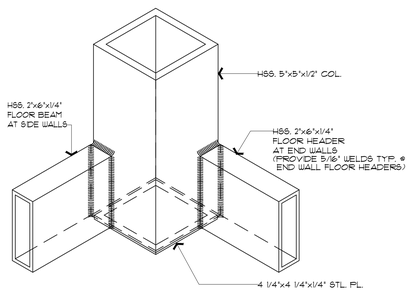
OVERHANG HEADER 23

SCALE: 3"=1'-0"



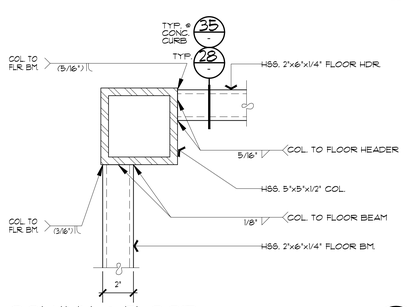
O.H. BEAM @ O.H. PURLIN 24

SCALE: 3"=1'-0"



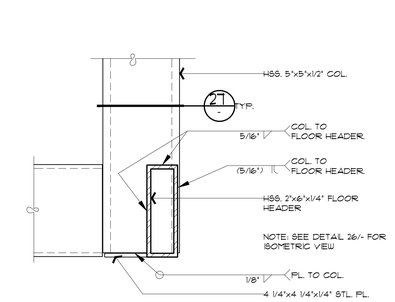
ISOMETRIC VIEW COL. @ FLOOR 26

SCALE: 3"=1'-0"



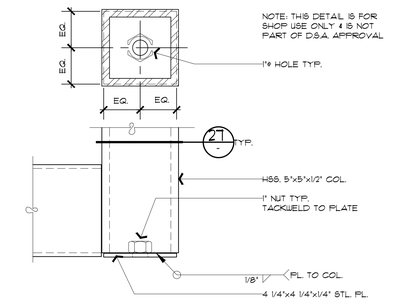
COLUMN @ FLOOR 27

SCALE: 3"=1'-0"



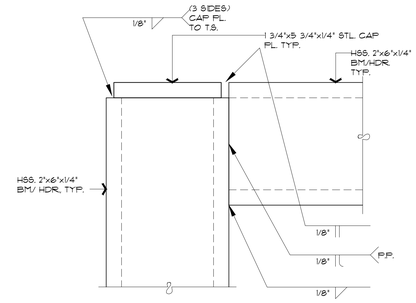
SECTION @ COL. @ FLOOR 28

SCALE: 3"=1'-0"



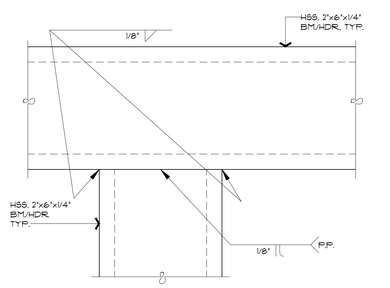
SHIPPING TIE DOWN 29

SCALE: 3"=1'-0"



TYP. T.S. TO T.S. WELDING @ FLOORS 30

SCALE: 1"=1'



TYP. T.S. TO T.S. WELDING @ FLOORS 31

SCALE: 1"=1'

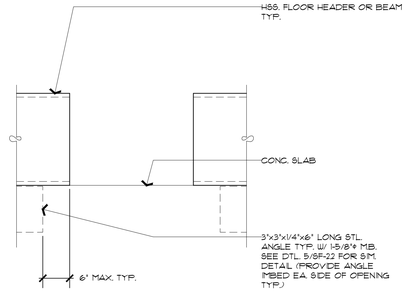
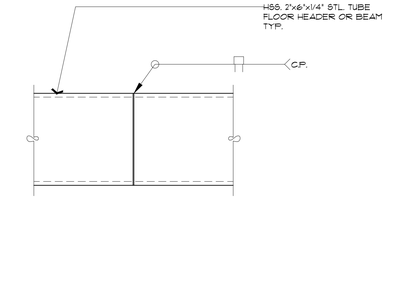


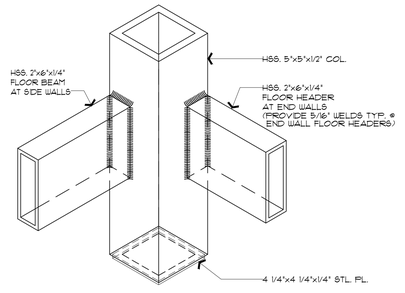
PLATE @ HDR/BM. OPENING 32

SCALE: 3"=1'-0"



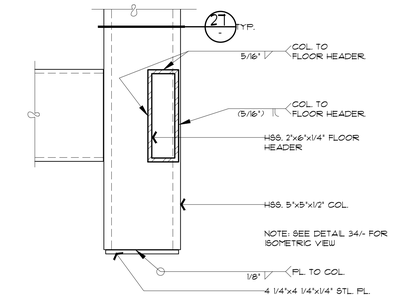
TYP. FLOOR BEAM SPLICE 33

SCALE: 3" = 1'-0"



ISOMETRIC VIEW COL. @ FLOOR 34

SCALE: 3"=1'-0"



SECTION @ COL. @ FLOOR 35

SCALE: 3"=1'-0"

NOTE:
FOR CLARITY FLOOR HEADER OCCURS AT END WALLS. AND FLOOR BEAM OCCURS AT SIDE WALLS, TYPICAL.

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INCREMENT #2
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FOR MENDOTA UNIFIED SCHOOL DISTRICT
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NV. LIC. NO. 37887

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DRAWN: BLB
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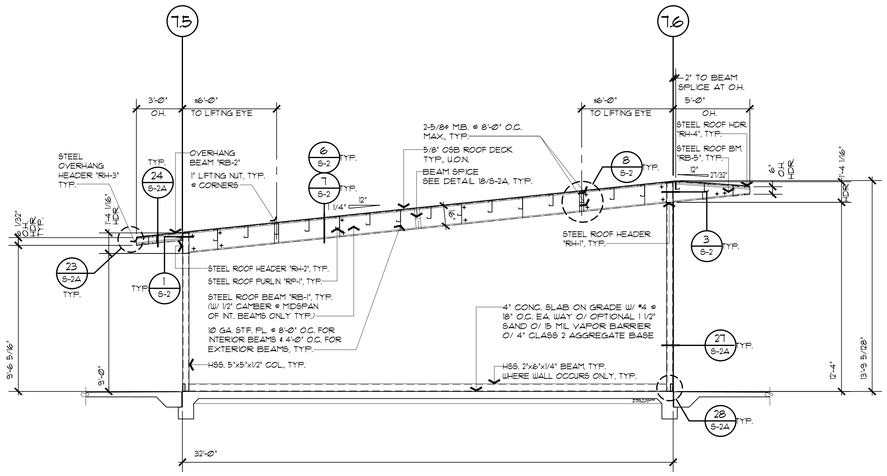
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

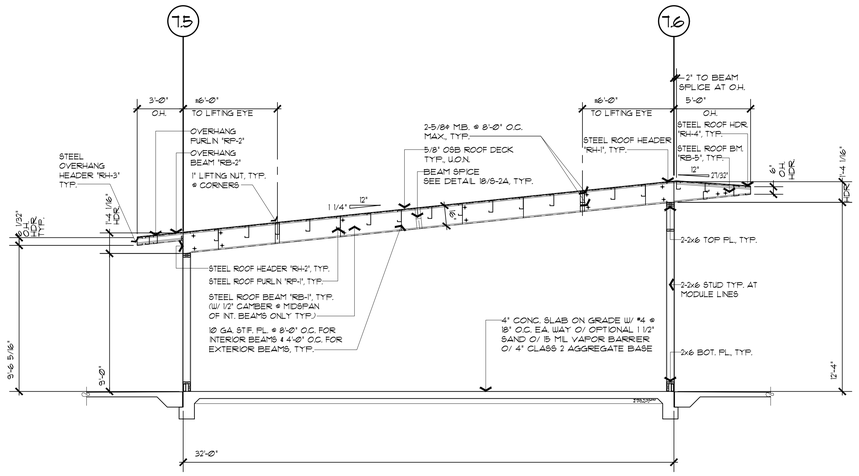
SHEET TITLE
STRUCTURAL DETAILS

SHEET NO.
S-2A



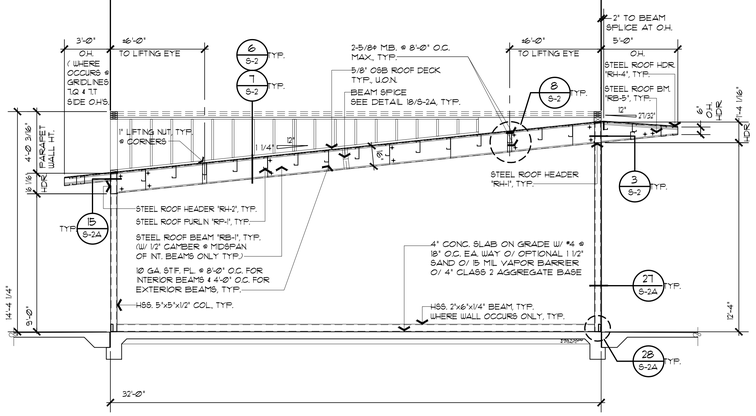
TYPICAL STRUCTURAL CROSS-SECTION

SCALE 1/4"=1'-Ø" — 1 / -



TYPICAL STRUCTURAL CROSS-SECTION

SCALE 1/4"=1'-Ø" — 2 / -



TYPICAL STRUCTURAL CROSS-SECTION

SCALE 1/4"=1'-Ø" — 3 / -

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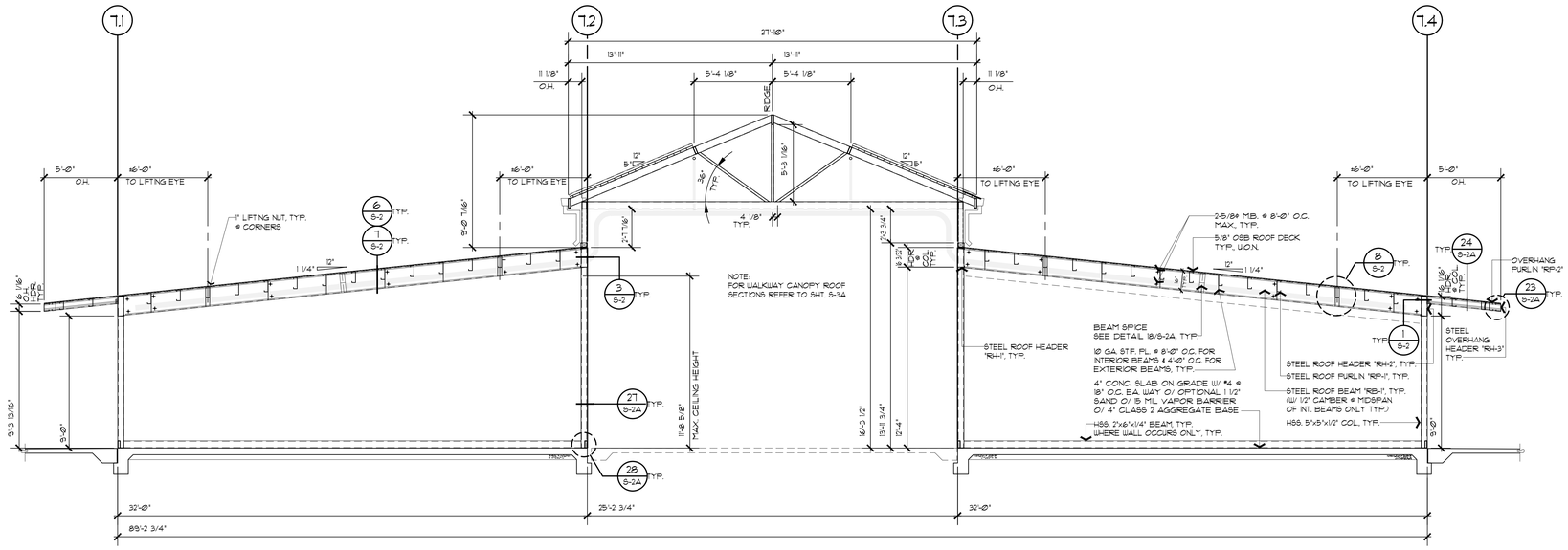
SHEET TITLE

STRUCTURAL CROSS-SECTION CLASSROOM

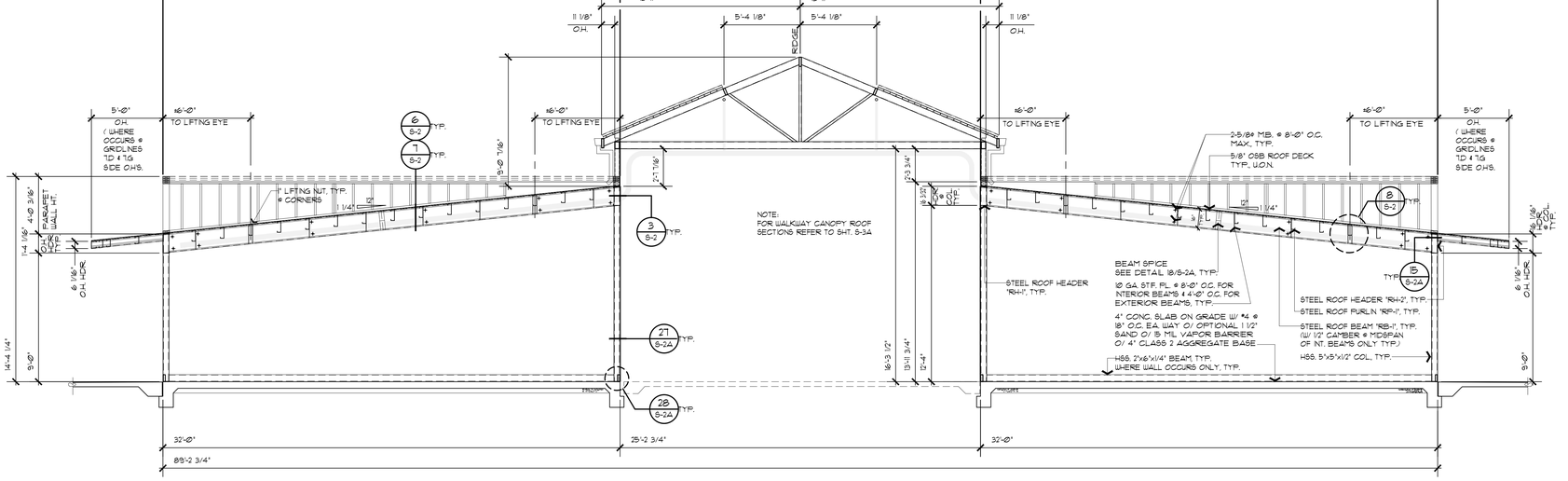
SHEET NO.

S-3



TYPICAL STRUCTURAL CROSS-SECTION

SCALE 1/4"=1'-0" — 1



TYPICAL STRUCTURAL CROSS-SECTION

SCALE 1/4"=1'-0" — 2

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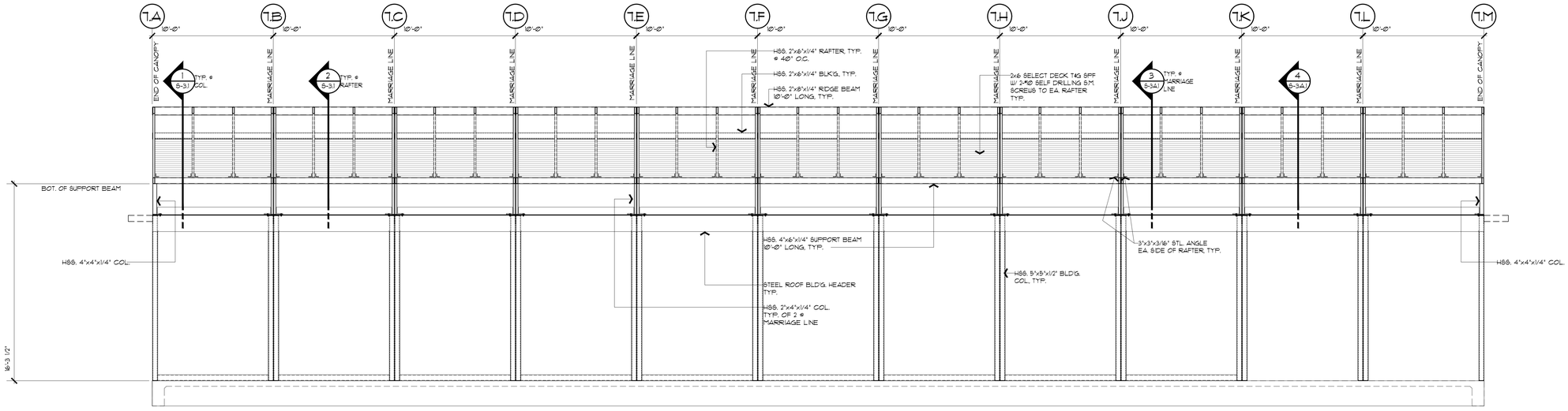
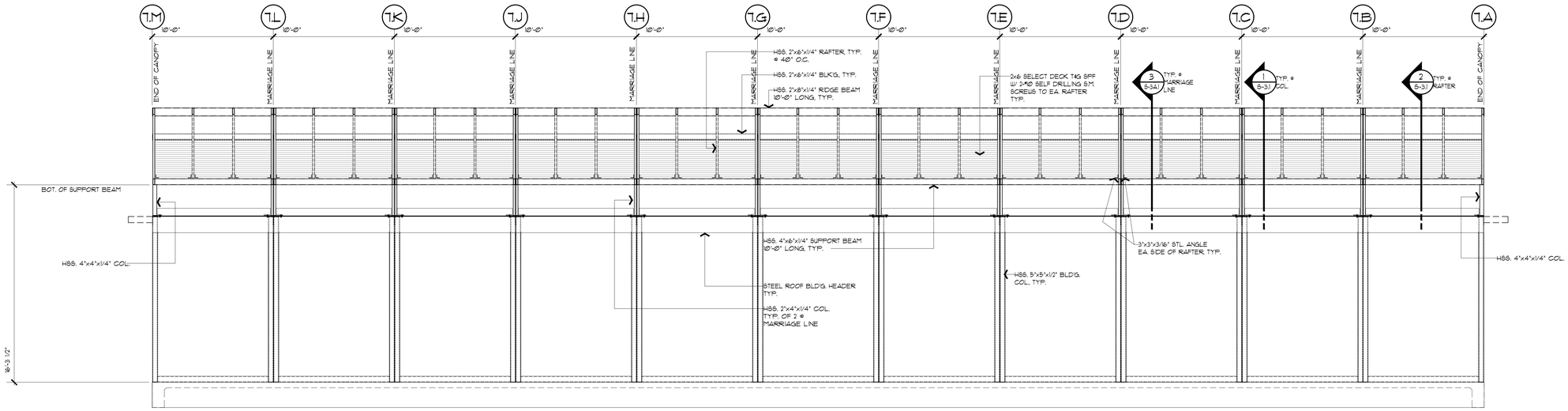
SHEET TITLE
STRUCTURAL CROSS-SECTION TK KINDERGARTEN

SHEET NO.
S-3.1



WALKWAY CANOPY STRUCTURAL FRAMING ELEVATION

SCALE: 1/4"=1'-Ø" — 3



WALKWAY CANOPY STRUCTURAL FRAMING ELEVATION

SCALE: 1/4"=1'-Ø" — 4

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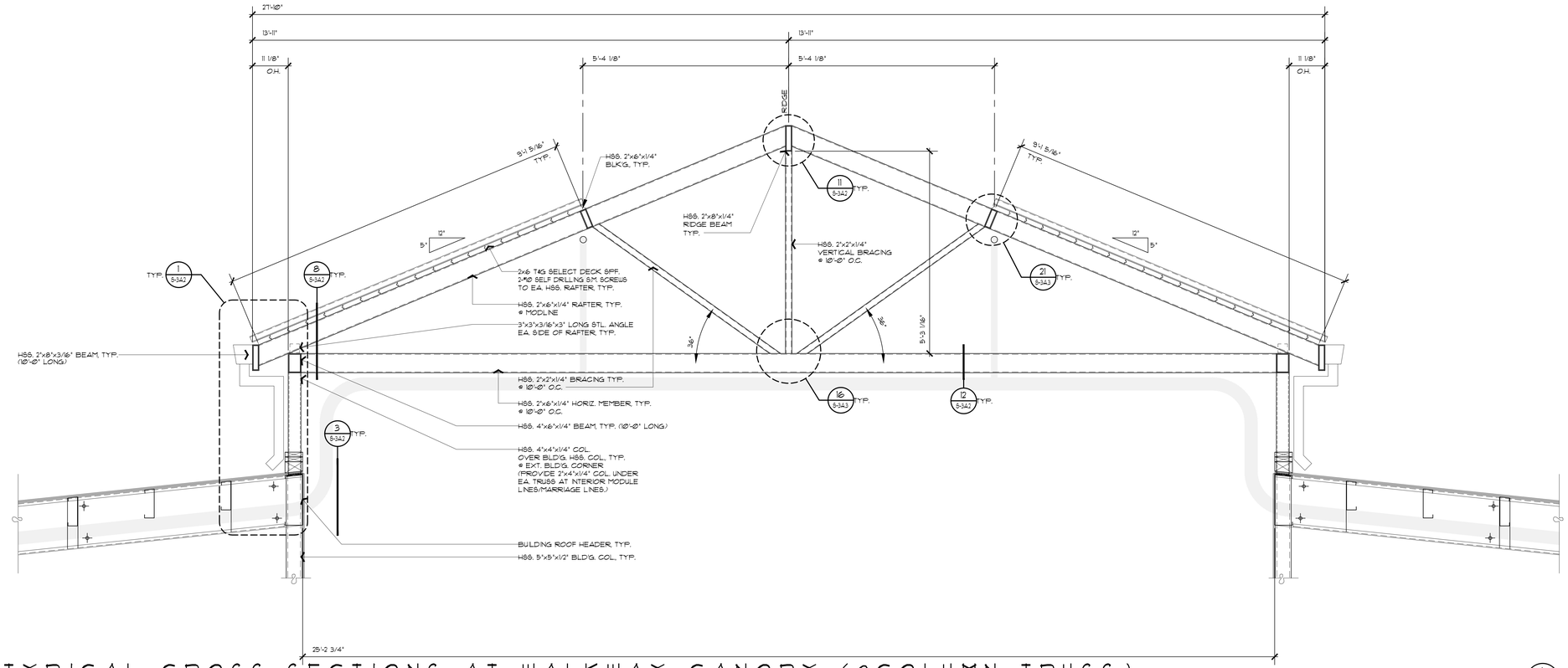
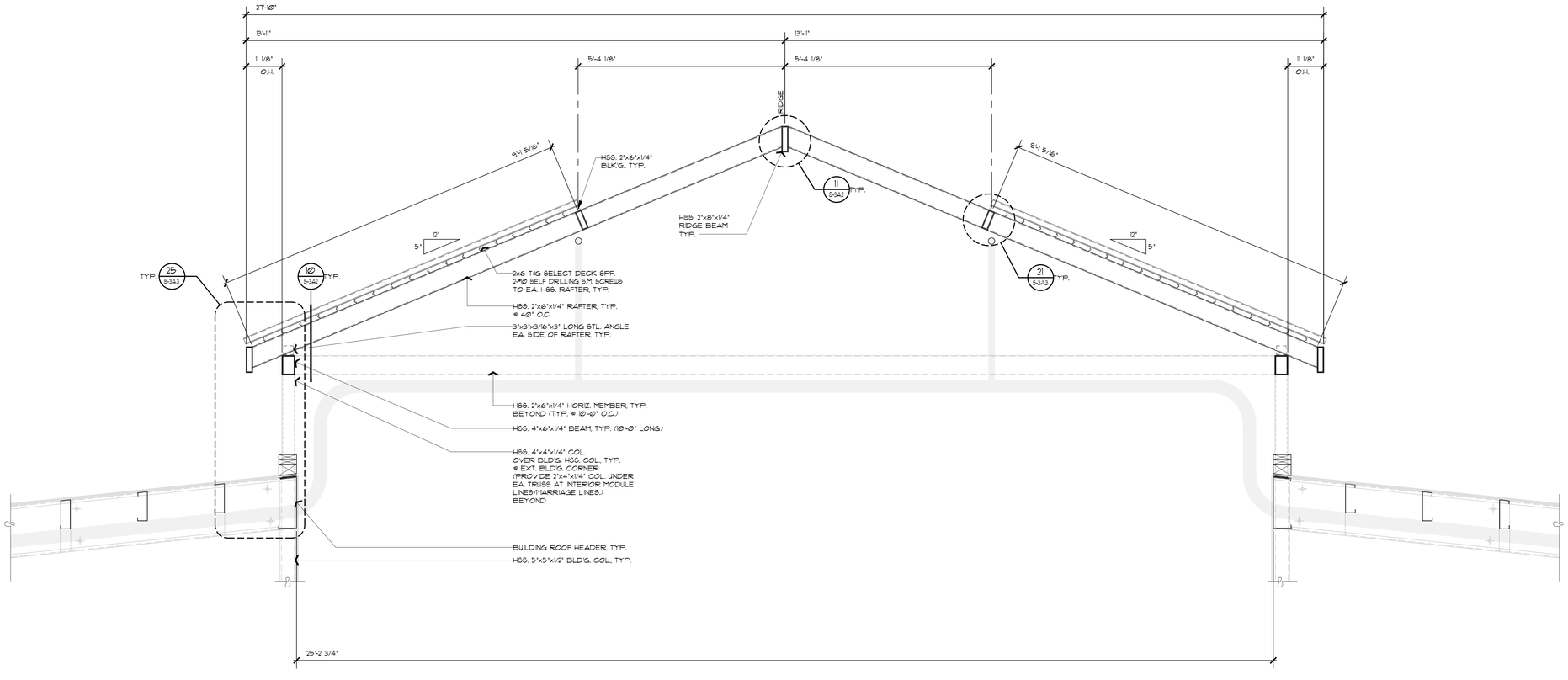
SHEET TITLE
WALKWAY CANOPY SECTION

SHEET NO.
S-3.2



TYPICAL CROSS-SECTIONS AT WALKWAY CANOPY (@COLUMN TRUSS)

SCALE 3/4"=1'-Ø" 1 -



TYPICAL CROSS-SECTIONS AT WALKWAY CANOPY (@ RAFTERS)

SCALE 3/4"=1'-Ø" 2 -

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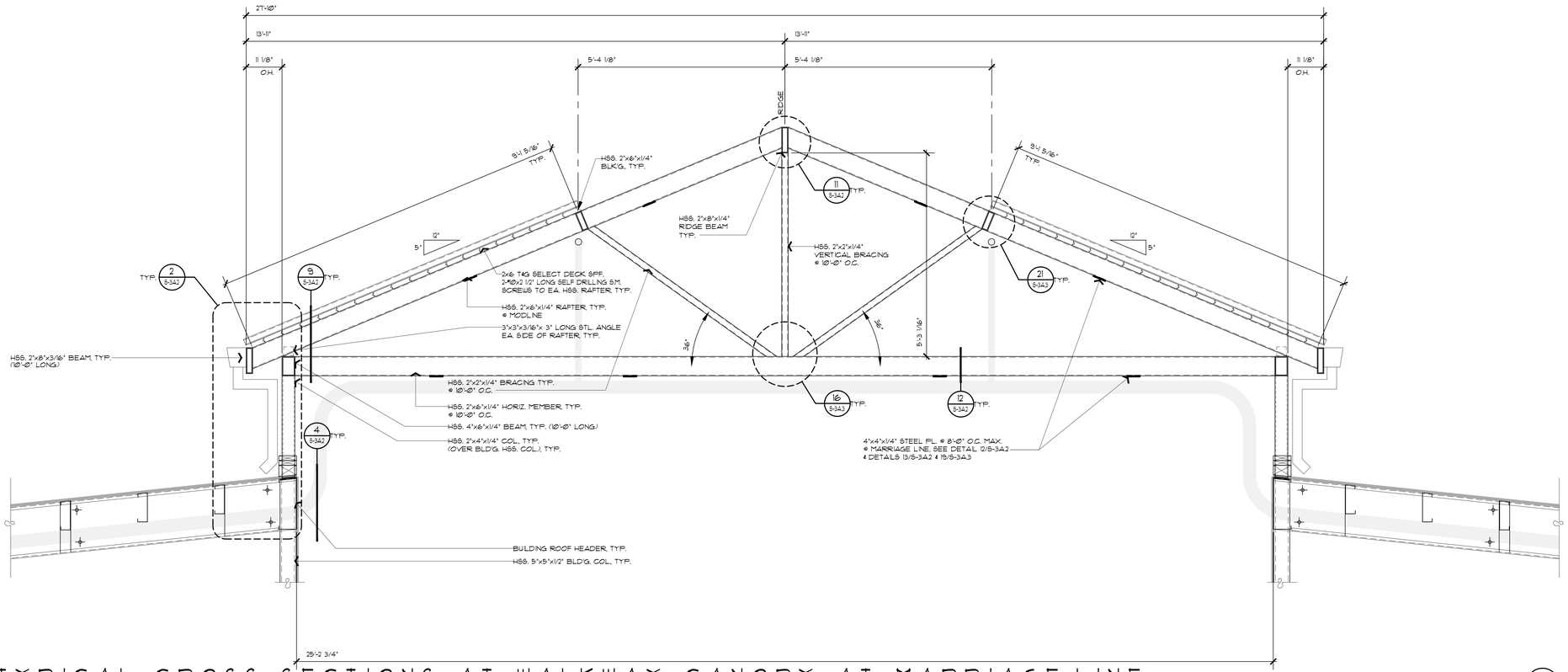
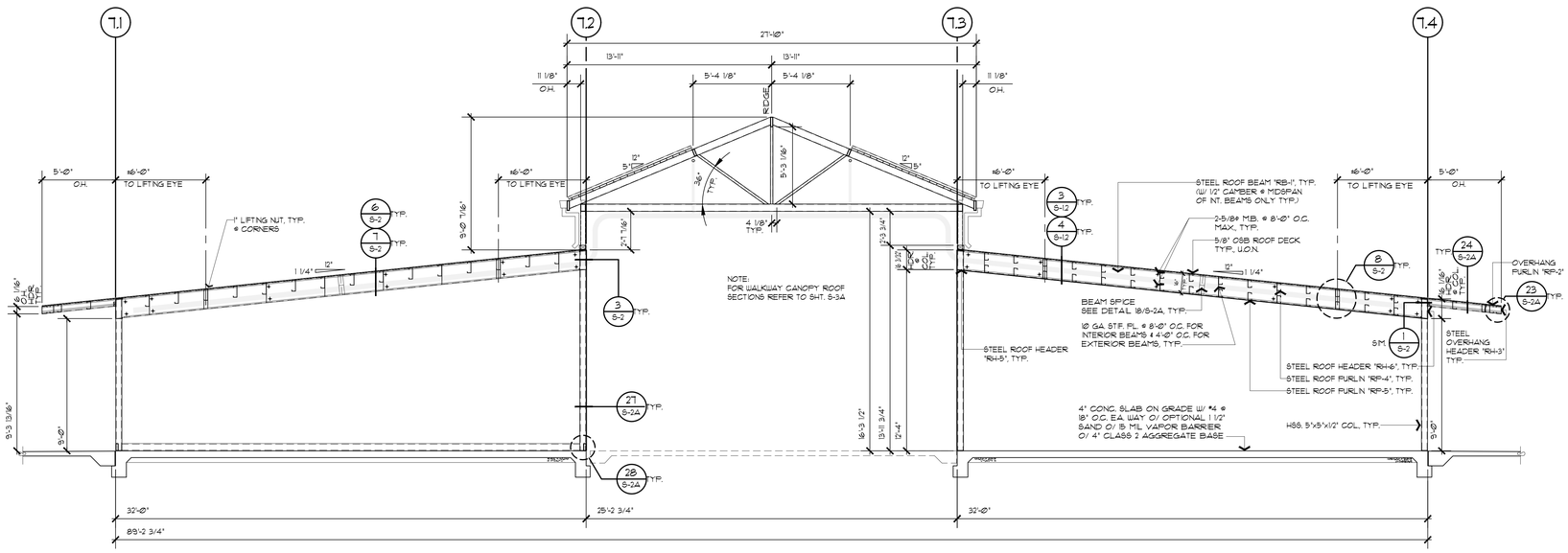
SHEET TITLE
STRUCTURAL CROSS-SECTIONS AT CANOPY

SHEET NO.
S-3A



TYPICAL CROSS-SECTIONS AT WALKWAY CANOPY AT MARRIAGE LINE

SCALE 3/4"=1'-Ø" 3



TYPICAL CROSS-SECTIONS AT WALKWAY CANOPY

SCALE 3/8"=1'-Ø" 4

Project Navigator F:\PROJECT FILES\MENDOTA 2024\DWG\S-3A.1.dwg 2/14/2025 1:02 PM

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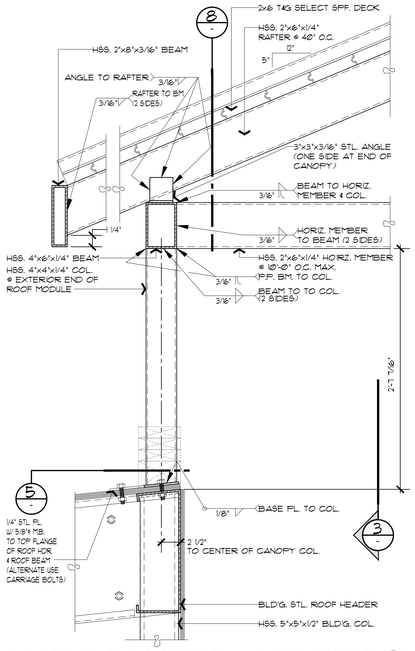
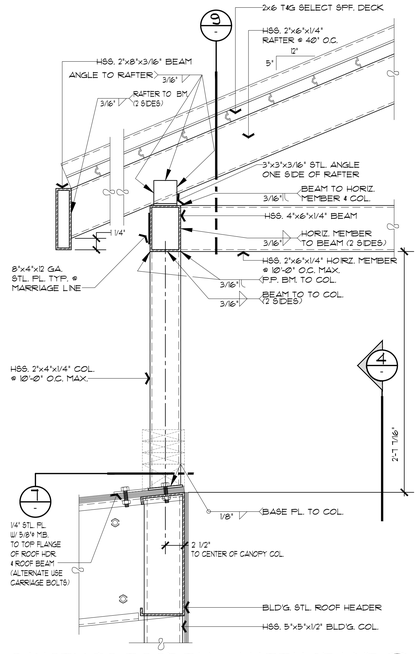
SHEET TITLE
STRUCTURAL CROSS-SECTIONS AT CANOPY

SHEET NO.
S-3A.1



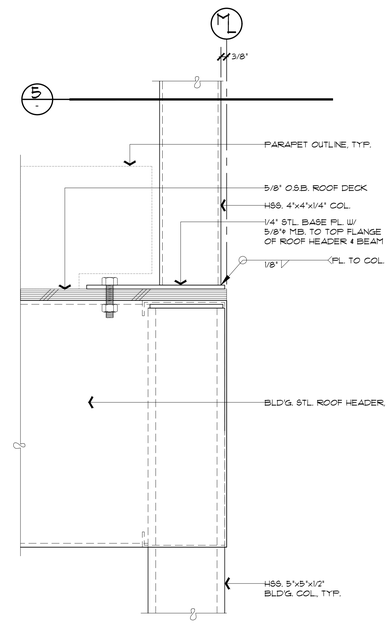
CANOPY TO BLD'G. ROOF BM. AT EXT. CORNER 1

SCALE: 1-1/2"=1'-0"



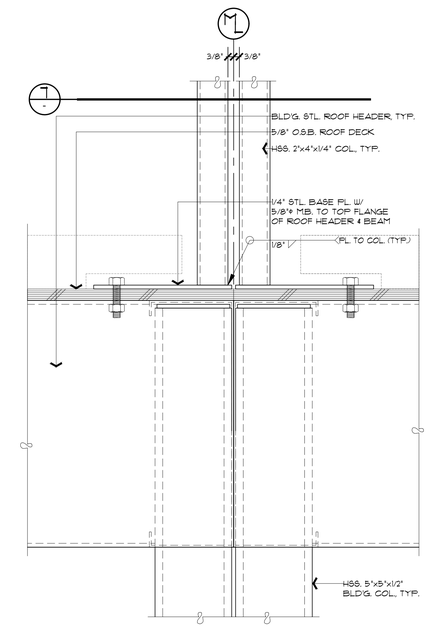
CANOPY TO ROOF BM. @ MARRIAGE LINE 2

SCALE: 1-1/2"=1'-0"



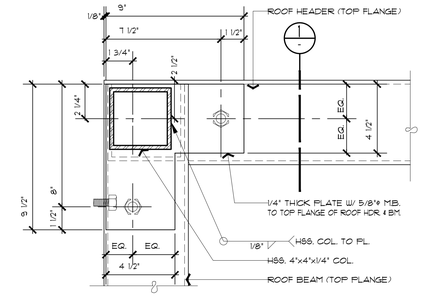
CANOPY COL. TO ROOF BEAM 3

SCALE: 3"=1'-0"



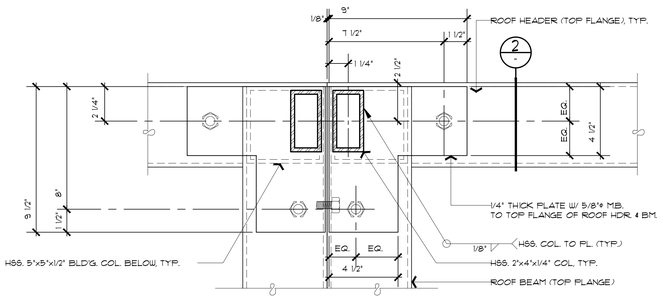
CANOPY COL. TO INT. ROOF BEAM AT MARRIAGE LINE 4

SCALE: 3"=1'-0"



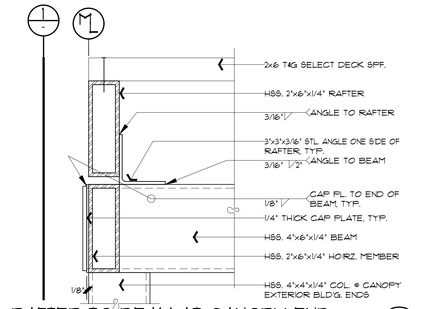
CANOPY COL. TO BUILDING 5

SCALE: 3"=1'-0"



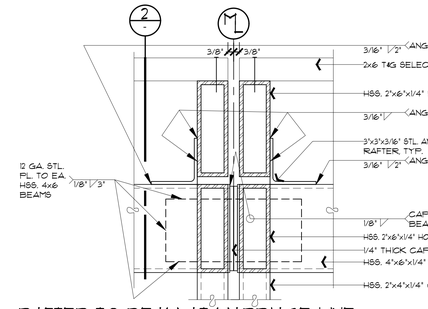
CANOPY COL. TO BUILDING @ MARRIAGE LINE 7

SCALE: 3"=1'-0"



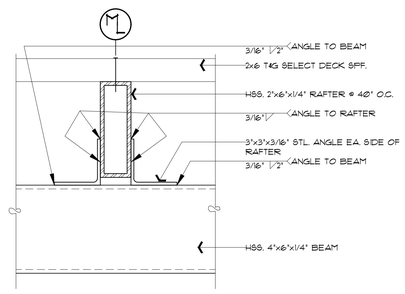
RAFTER TO BEAM AT CANOPY END 8

SCALE: 3"=1'-0"



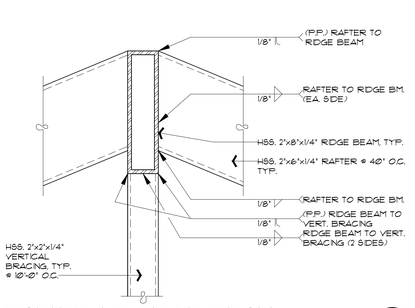
RAFTER TO BEAM AT MARRIAGE LINE 9

SCALE: 3"=1'-0"



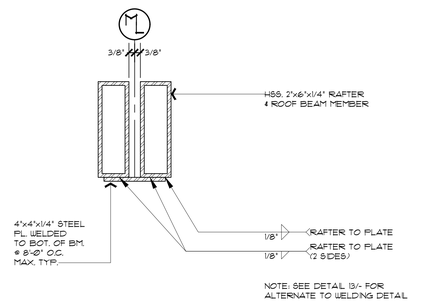
RAFTER TO BEAM 10

SCALE: 3"=1'-0"



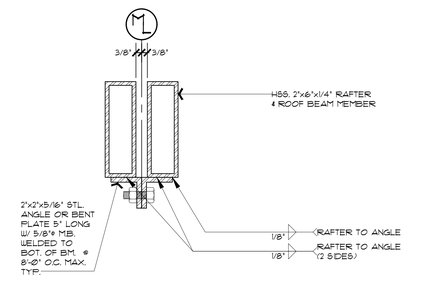
RAFTER TO RIDGE BEAM 11

SCALE: 3"=1'-0"



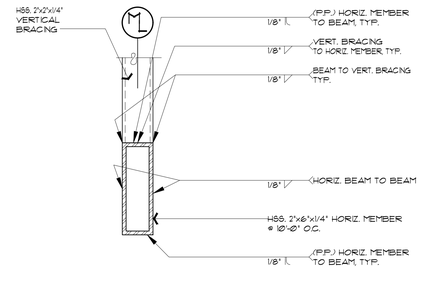
RAFTER TO RAFTER TIE AT MARRIAGE LINE 12

SCALE: 3"=1'-0"



ALT. BEAM TO BEAM TIE AT MARRIAGE LINE 13

SCALE: 3"=1'-0"



BOTTOM BEAM AT MODULE LINE 14

SCALE: 3"=1'-0"

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INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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CA. LIC. NO. 427488
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STRUCTURAL ENGINEER
REGISTERED PROFESSIONAL ENGINEER
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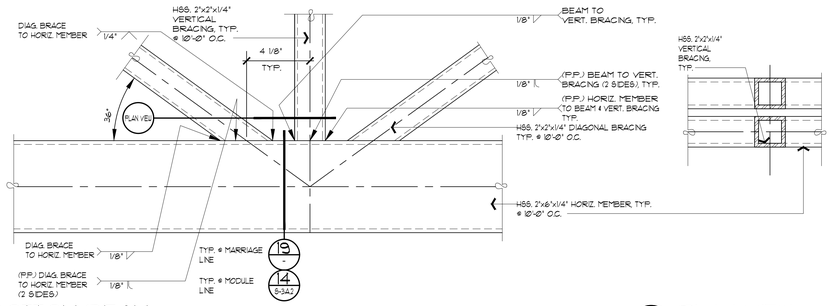
DRAWN: BLB
CHECKED: MM
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
WALKWAY CANOPY STRUCTURAL DETAILS

SHEET NO.
S-3A.2

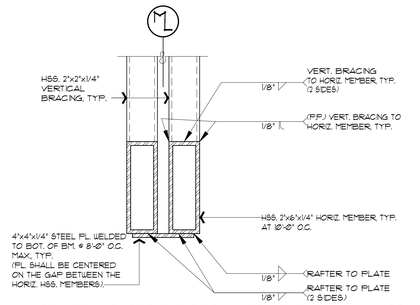


BOTTOM BEAM

SCALE: 3"=1'-0"

16 - PLAN VIEW

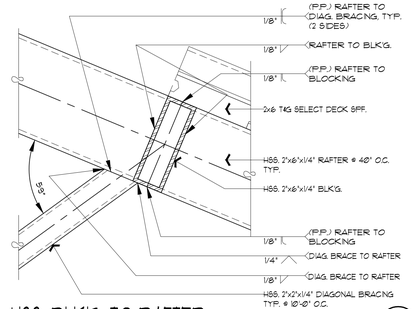
SCALE: 3"=1'-0"



BOTTOM BEAM AT MARRIAGE LINE

SCALE: 3"=1'-0"

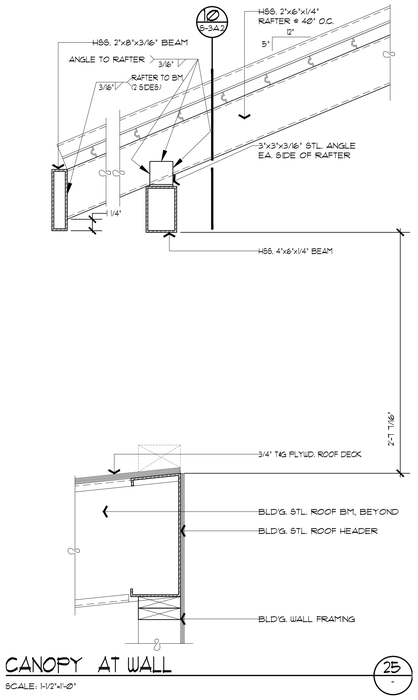
19 -



HSS. BLK'G. TO RAFTER

SCALE: 3"=1'-0"

21 -



CANOPY AT WALL

SCALE: 1-1/2"=1'-0"

25 -

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REVISIONS:

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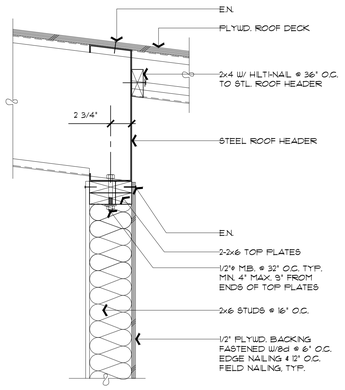
SHEET TITLE

WALKWAY CANOPY STRUCTURAL DETAILS

SHEET NO.

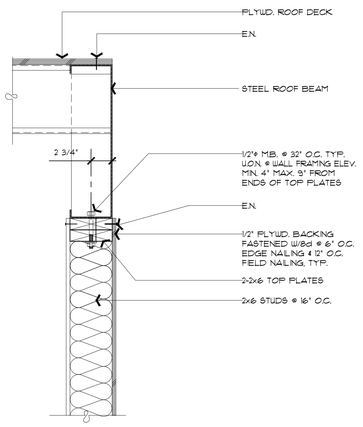
S-3A.3

NOTES:	
- #12 TEK SCREWS SHALL BE ITW BUILDEX TEKS SELF-DRILLING FASTENERS (#12-14 x 2 1/2" LONG HEX WASHER HEAD) TYP. PER ICC REPORT NO. ESR-1976 DATED JULY 2024.	- SEE STRUCTURAL NOTES SHT. S-4.1 FOR TOP PL. TO TOP PL. NAILING.



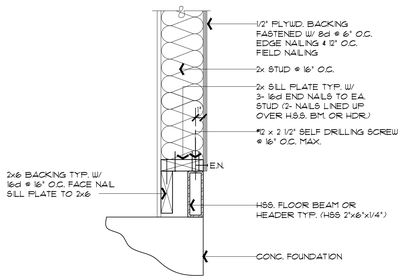
END WALL ANCHOR @ ROOF (1)

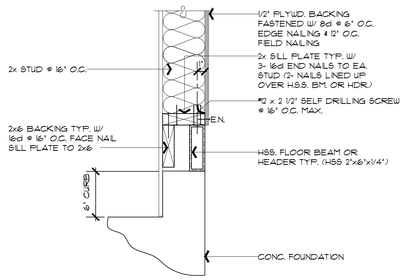
SCALE: 1-1/2"=1'-0"

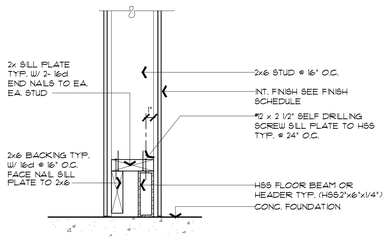


SIDE WALL ANCHOR @ ROOF (2)

SCALE: 1-1/2"=1'-0"

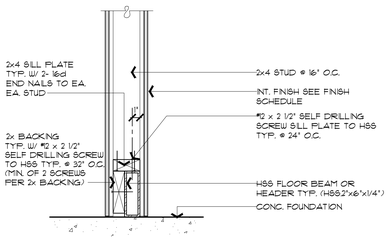






INT. WALL ANCHOR @ FLOOR (8)

SCALE: 1-1/2"=1'-0"

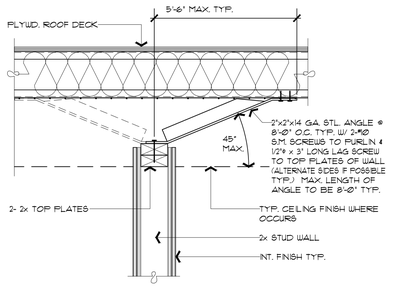


INT. WALL ANCHOR @ FLOOR (9)

SCALE: 1-1/2"=1'-0"

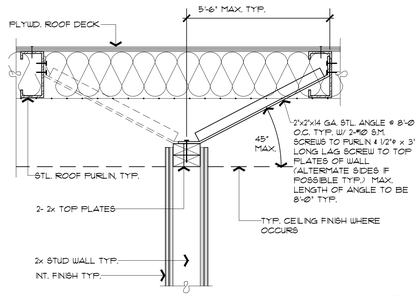
WALL ANCHOR @ FLOOR (6)

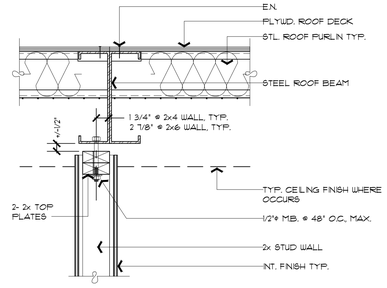
SCALE: 1-1/2"=1'-0"



WALL ANCHOR @ FLOOR BEAM (7)

SCALE: 1-1/2"=1'-0"





INT. WALL ANCHOR @ CLG. (10)

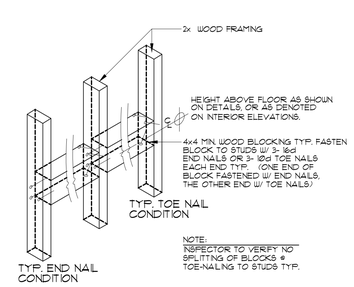
SCALE: 1-1/2"=1'-0"

INT. WALL ANCHOR @ CLG. (11)

SCALE: 1-1/2"=1'-0"

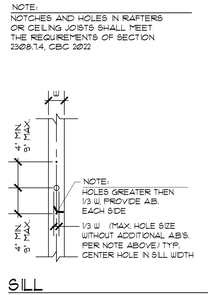
INT. WALL ANCHOR @ CLG. (12)

SCALE: 1-1/2"=1'-0"

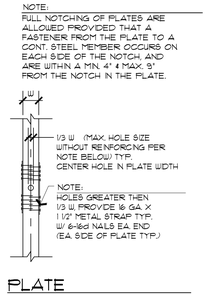


TYP. 4x BLOCKING ATTACHMENT (15)

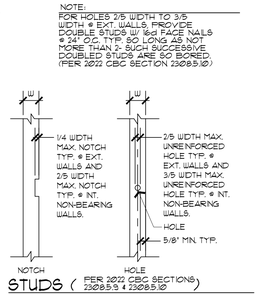
SCALE: 1"=1'-0"



SILL



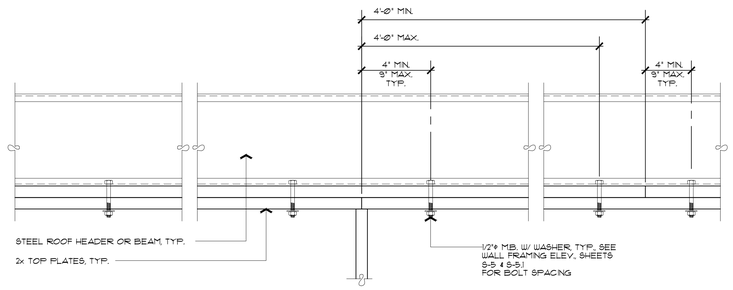
PLATE



STUDS (PER 2022 CBC SECTIONS 2308.5.3 & 2308.5.10)

NOTCHES AND HOLES IN WOOD FRAMING (16)

NOT TO SCALE



TYPICAL TOP PLATE SPLICE (17)

SCALE: 1-1/2"=1'-0"

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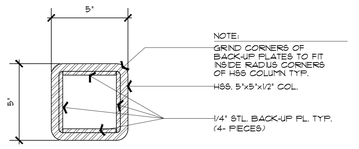
DATE FEB. 6, 2025
JOB NO. 24769

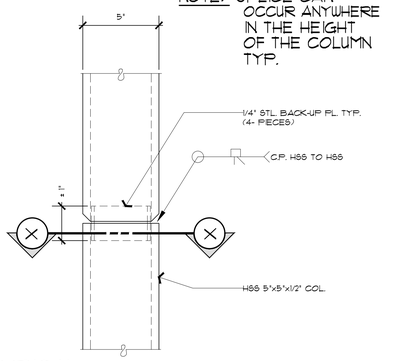
SHEET TITLE
WALL ANCHOR DETAILS

SHEET NO.
S-4

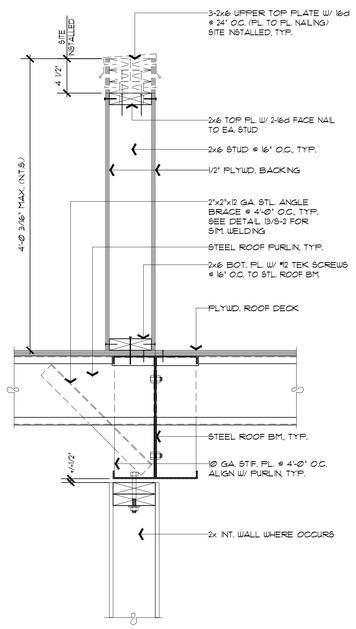


SECTION @ HSS COLUMN SPLICE (X)

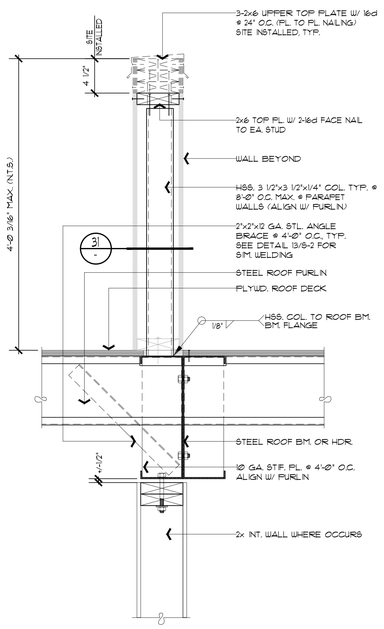
NOTE: SPLICE CAN OCCUR ANYWHERE IN THE HEIGHT OF THE COLUMN TYP.



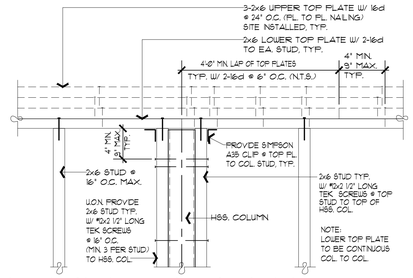
TYPICAL ELEV. @ HSS COLUMN SPLICE — 20
SCALE: 3"=1'-0"



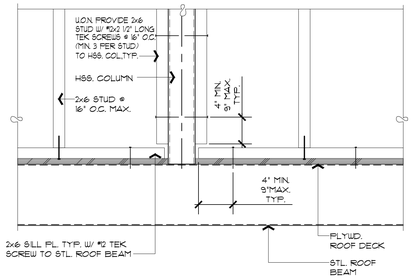
PARAPET WALL DETAIL — 21
SCALE: 1-1/2"=1'-0"



PARAPET @ STL. COL. — 22
SCALE: 1-1/2"=1'-0"



TYPICAL TOP OF PARAPET FRAMING TO HSS. COL. (SIDE WALL) — 23
SCALE: 1-1/2"=1'-0"



TYPICAL BOT. OF PARAPET FRAMING TO HSS. COL. (SIDE WALL) — 24
SCALE: 1-1/2"=1'-0"

STRUCTURAL NOTES:

GENERAL:
DETAILS & NOTES SHOWN ARE TYPICAL & SHALL APPLY UNLESS OTHERWISE SHOWN OR NOTED. DETAILS NOT FULLY SHOWN SHALL BE OF SAME NATURE AS SHOWN FOR SIMILAR CONSTRUCTION.

STEEL:
A. FABRICATION & WORKMANSHIP SHALL CONFORM TO CBC CHAPTER 22A

B. STRUCTURAL STEEL SHALL CONFORM TO THE A.S.T.M. A-36. STEEL TUBING SHALL CONFORM TO A.S.T.M. A-500 GRADE B.

MATERIAL	fy
A.S.T.M. A-36	36KSI
ASTM A-500 GRADE B.	46KSI

C. LIGHT GAGE STEEL SHALL CONFORM TO THE A.S.T.M. A1011/A GRADE 50 & 55 OR A.S.T.M. A572 GRADE 50 & 55. ELEMENTS SHALL NOT DEVIATE MORE THAN 5% FROM NOMINAL U.S. GAGE (1 GA. - Ø.178", 10 GA. - Ø.1345", 12 GA. - Ø.105", & 14 GA. - Ø.075") SEE PROPERTY TABLE.

D. MATERIAL TEST OF BEAMS, PURLINS, HSS COLUMNS, MISC. ANGLES & PLATES SHALL BE TESTED IN ACCORDANCE WITH TITLE 24 CALIFORNIA CODE OF REGULATIONS, & C.B.C. SECTION 2202A1, 2022 EDITION.

E. CFS STRUCTURAL MEMBERS SHALL HAVE A PROTECTIVE COATING PER 2022 CBC, 2203A2, AND PER AISI S230, TABLE A4-1.

WELDING:
STRUCTURAL WELDING SHALL BE BY THE 'GAS METAL ARC WELDING', 'SHIELDED METAL ARC WELDING'
(STICK WELDING) OR BY THE 'FLUX CORED ARC WELDING' PROCESS PER AWS. D1.1 D1.3 STRUCTURAL WELDING CODE-STEEL, AND SHALL BE PERFORMED BY 'AWS CERTIFIED WELDERS' IN THE SHOP OF A LICENSED FABRICATOR. WELDING ELECTRODES SHALL BE E70XX FOR STRUCTURAL STEEL AND E60XX FOR LIGHT GAGE STEEL TYP.

BOLTS:
COMMON BOLTS SHALL CONFORM TO A.S.T.M. A-307. RETIGHTEN ALL BOLTS BEFORE CLOSING WALLS IN.
ALL ANCHOR BOLTS TO HAVE HEX HEAD OR A HEX NUT TYP. ANCHOR BOLTS SHALL CONFORM TO A.S.T.M. A-307.
ALL BOLT HOLE SIZES SHALL BE BOLT DIA. + (1/32" TO 1/16")

LAG BOLTS:
A. THE LEAD HOLE FOR THE SHANK SHALL HAVE THE SAME DIAMETER & DEPTH AS THE UNTHREADED SHANK.
B. THE LEAD HOLE FOR THE THREADED PORTION SHALL HAVE A DIAMETER EQUAL TO 60% OF THE SHANK AND LENGTH AT LEAST EQUAL TO THE THREADED PORTION.
C. THE BOLT SHALL BE INSERTED BY TURNING WITH A WRENCH, NOT BY DRIVING WITH A HAMMER. SOAP OR OTHER LUBRICANT SHALL BE USED.
D. RETIGHTEN ALL BOLTS BEFORE CLOSING WALLS IN.

LUMBER:
A. FRAMING ALL FRAMING SHALL BE GRADE MARKED BY AN APPROVED GRADING AGENCY & SHALL CONSIST OF DOUGLAS FIR & OR BETTER TYP. FOR HEADERS, STUDS, SILLS, PLATES, BLOCKING ETC.
B. PLYWOOD ALL PANELS SHALL BE GRADE MARKED & SHALL BEAR "APA", "PROFESSIONAL SERVICES INDUSTRIES, INC." PITTSBURG TESTING LABORATORY", OR "TECO" TRADEMARK LEGIBLY APPLIED. ALL PLYWOOD SHALL BE GRADE MARKED IN ACCORDANCE W/ PS 1-09. ALL STRUCTURAL PLYWOOD SHALL HAVE AN EXPOSURE 1 RATING. ROOF PLYWOOD SHALL BE CDX. WALL PLYWOOD/BACKING SHALL CDX OR ORIENTED STRAND BOARD.
C. WOOD FOUNDATIONS (IF REQUIRED) NOT USED
D. UNLESS OTHERWISE SPECIFIED, ALL LUMBER HANGERS TO BE SIMPSON.
E. ALL BOLT HOLE SIZES SHALL BE BOLT DIA. + (1/32" TO 1/16")

NAILING: (NAILS MAY BE COMMON OR BOX, EXCEPT WHERE NOTED AS COMMON)
ALL FASTENERS FOR PRESSURE TREATED LUMBER SHALL BE HOT-DIPPED ZINC COATED GALVANIZED, STAINLESS STEEL, SILICON BRONZE OR COPPER. ALL EXPOSED NAILS TO BE ZINC COATED FASTENERS, ALUMINUM ALLOY WIRE FASTENERS, OR STAINLESS STEEL FASTENERS. NAILING TO BE AS PER TABLE 2304.10.1, TITLE 24 NAILING SCHEDULE AND C.B.C. 2022. MIN. WEIGHT OF GALVANIZING ON NAILS SHALL BE 1.0 OZ. PER SQ. FT.

FASTENING SCHEDULE

ROOF

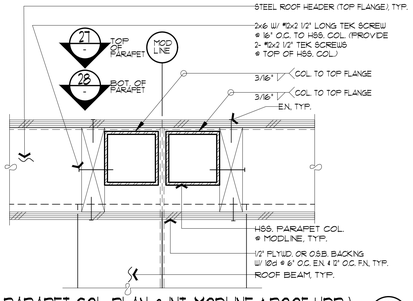
1.	BLOCKING BETWEEN CEILING JOISTS, RAFTERS OR TRUSSES	3-8d COMMON (2 1/2"x0.131") OR 3-10d BOX (3"x0.128") @ EACH END, TOENAIL
	BLOCKING BETWEEN RAFTERS OR TRUSS NOT AT THE WALL TOP PLATE, TO RAFTER OR TRUSS	2-8d COMMON (2 1/2"x0.131") OR 3-3"x0.131" NAILS @ EACH END, TOENAIL 2-8d COMMON (3 1/2"x0.162") OR 3-3"x0.131" NAILS @ EACH END NAIL
	FLAT BLOCKING TO TRUSS & WEB FILLER	16d COMMON (3 1/2"x0.162") @ 6" O.C. OR 3"x0.131" NAILS @ 6" O.C. @ FACE NAIL
2.	CEILING JOISTS TO TOP PLATE	3-8d COMMON (2 1/2"x0.131") OR 3-10d BOX (3"x0.128") @ EACH JOIST, TOENAIL
3.	CEILING JOISTS NOT ATTACHED TO PARALLEL RAFTER, LAPS OVER PARTITION (NO THRUST) (SEE SECTION 2308.7.3.1, TABLE 2308.7.3.1)	3-16d COMMON (3 1/2"x0.162") OR 4-10d BOX (3"x0.128"), FACE NAIL
4.	CEILING JOIST ATTACHED TO PARALLEL RAFTER (HEEL JOINT) (SEE SECTION 2308.7.3.1, TABLE 2308.7.3.1)	PER TABLE 2308.7.3.1, FACE NAIL
5.	COLLAR TIE TO RAFTER	3-8d COMMON (3"x0.148") OR 4-10d BOX (3"x0.128"), FACE NAIL
6.	RAFTER OR ROOF TRUSS TO TOP PLATE (SEE SECTION 2308.7.3, TABLE 2308.7.3.1)	3-8d COMMON (3"x0.148") OR 3-16d BOX (3 1/2"x0.135"), TOENAIL
7.	ROOF RAFTERS TO RIDGE VALLEY OR HIP RAFTERS / OR ROOF RAFTER TO 2" RIDGE BEAM	3-16d COMMON (3 1/2"x0.162") OR 3-10d BOX (3"x0.128"), END NAIL 3-8d COMMON (3 1/2"x0.148") OR 3-16d BOX (3 1/2"x0.135"), TOENAIL
	WALL	
8.	STUD TO STUD (NOT AT BRACED WALL PANEL)	16d COMMON (3 1/2"x0.162") @ 24" O.C., FACE NAIL 10d BOX (3"x0.128") OR 3"x0.131" NAILS @ 16" O.C., FACE NAIL
9.	STUD TO STUD & ABUTTING STUDS @ INTERSECTING WALL CORNERS (AT BRACED WALL PANELS)	16d COMMON (3 1/2"x0.162") @ 16" O.C., FACE NAIL OR 16d BOX (3 1/2"x0.135") @ 12" O.C., FACE NAIL OR 3"x0.131" NAILS @ 12" O.C., FACE NAIL
10.	BUILT UP HEADER (2" TO 2" HEADER)	16d COMMON (3 1/2"x0.162") @ 16" O.C. EACH EDGE, FACE NAIL OR 16d BOX (3 1/2"x0.135") @ 12" O.C. EACH EDGE, FACE NAIL
11.	CONTINUOUS HEADER TO STUD	4-8d COMMON (2 1/2"x0.131") OR 4-10d BOX (3"x0.128"), TOENAIL
12.	TOP PLATE TO TOP PLATE	16d COMMON (3 1/2"x0.162") @ 16" O.C. FACE NAIL OR 16d BOX (3"x0.128") @ 12" O.C. @ FACE NAIL
13.	TOP PLATE TO TOP PLATE, @ END JOINTS	8-16d COMMON (3 1/2"x0.162") OR 12-10d BOX (3"x0.128") @ EACH SIDE OF END JOINT, FACE NAIL (MIN. 24" LAP SPLICE LENGTH EACH SIDE OF END JOINT)
14.	BOTTOM PLATE TO JOIST, RIM JOIST, BAND JOIST OR BLOCKING (NOT @ BRACED WALL PANELS)	16d COMMON (3 1/2"x0.162") @ 16" O.C., FACE NAIL OR 16d BOX (3 1/2"x0.135") @ 12" O.C., FACE NAIL
15.	BOTTOM PLATE TO JOIST, RIM JOIST, BAND JOIST OR BLOCKING @ BRACED WALL PANELS	3-16d COMMON (3 1/2"x0.162" OR 3-16d BOX (3 1/2"x0.135") @ 16" O.C., FACE NAIL
16.	STUD TO TOP OR BOTTOM PLATE	4-8d COMMON (2 1/2"x0.131") OR 4-10d BOX (3"x0.128"), TOENAIL 3-16d COMMON (3 1/2"x0.162") OR 3-16d BOX (3"x0.128"), END NAIL 3-16d COMMON (3 1/2"x0.162" END NAILS OR 8-8d COMMON (3"x 0.131" TOENAILS @ 3-16
17.	TOP OR BOTTOM PLATE TO STUD	2-16d COMMON (3 1/2"x0.162") OR 3-10d BOX (3"x0.128"), END NAIL 3-8d COMMON (3 1/2"x 0.162" END NAILS OR 8-8d COMMON (3"x 0.131" TOENAILS @ 3-16
18.	TOP PLATES LAP @ CORNERS & INTERSECTIONS	2-16d COMMON (3 1/2"x0.162") OR 3-10d BOX (3"x0.128"), FACE NAIL
19.	1" BRACE TO EACH STUD & PLATE	2-8d COMMON (2 1/2"x0.131") OR 2-10d BOX (3"x0.128"), FACE NAIL
20.	1"x6" SHEATHING TO EACH BEARING	2-8d COMMON (2 1/2"x0.131") OR 2-10d BOX (3"x0.128"), FACE NAIL
21.	1"x8" & WIDER SHEATHING TO EACH BEARING	3-8d COMMON (2 1/2"x0.131") OR 3-10d BOX (3"x0.128"), FACE NAIL
	FLOOR	
22.	JOIST TO SILL, TOP PLATE OR GIRDER	3-8d COMMON (2 1/2"x0.131") OR FLOOR 3-10d BOX (3"x.128"), TOENAIL
23.	RIM JOIST, BAND JOIST, OR BLOCKING TO TOP PLATE, SILL OR OTHER FRAMING BELOW	8d COMMON (2 1/2"x0.131") OR 10d BOX (3"x0.128") @ 6" O.C., TOENAIL
24.	1"x6" SUBFLOOR OR LESS TO EACH JOIST	2-8d COMMON (2 1/2"x0.131") OR 2-10d BOX (3"x0.128"), FACE NAIL
25.	2" SUBFLOOR TO JOIST OR GIRDER	2-16d COMMON (3 1/2"x0.162"), FACE NAIL
26.	2" PLANKS (PLANK & BEAM - FLOOR & ROOF)	3-16d COMMON (3 1/2"x0.162") @ EACH BEARING, FACE NAIL
27.	BUILT UP GIRDER & BEAMS, 2" LUMBER LAYERS	20d COMMON (4"x0.192") @ 32" O.C., FACE NAIL @ TOP & BOTTOM STAGGERED ON OPPOSITE SIDES 10d BOX (3"x0.128") OR 3"x0.131" NAILS @ 24" O.C., FACE NAIL @ TOP & BOTTOM STAGGERED ON BOTH SIDES 3-20d COMMON (4"x0.192") OR 3-10d BOX (3"x0.128") @ ENDS & @ EACH SPLICE, FACE NAIL
28.	LEGER STRIP SUPPORTING JOISTS OR RAFTERS	3-16d COMMON (3 1/2"x0.162") OR 4-10d BOX (3"x0.128") @ EACH JOIST OR RAFTER, FACE NAIL
29.	JOIST TO BAND JOIST OR RIM JOINT	3-16d COMMON (3 1/2"x0.162") OR 4-10d BOX (3"x0.128"), END NAIL
30.	BRIDGING OR BLOCKING TO JOIST, RAFTER OR TRUSS	2-8d COMMON (2 1/2"x0.131) OR 2-10d BOX (3"x0.128") @ EACH END, TOENAIL

WALL SHEATHING

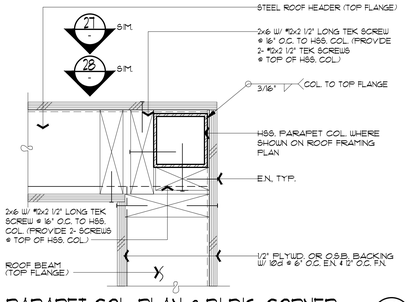
31.	PLYWOOD/OSB BACKING	8d COMMON (2 1/2" x Ø.131") @ 6" O.C. EN. & 8d @ 12" O.C. FN.

BUILDING CODES:
ALL CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO THE STATE OF CALIFORNIA CODE OF REGULATIONS, TITLE 24, PARTS 1 & 2 AND C.B.C. 2022 EDITION. A COPY OF THE ABOVE MENTIONED CODES SHALL BE MADE AVAILABLE AT THE PLANT AND SITE.

HILTI NAILS:
UNLESS OTHERWISE NOTED ALL HILTI NAILS USED SHALL BE CATALOG #X-U 57 P8 W/ A SHANK DIAMETER OF Ø.157", (AT 3/8" OR 1/2" PLYWOOD TO 1/4" HSS PROVIDE CATALOG #X-U 32 P8 S5 W/ A SHANK DIAMETER OF Ø.145". AT 2x WOOD MEMBERS TO 3/8" HSS PROVIDE CATALOG # X-DNI 19P8 W/ A SHANK DIAMETER OF Ø.145".) TYP. PER ICC REPORT #ESR-3269 RE-ISSUED DATE FEBRUARY 2024.



PARAPET @ STL. COL. — 25
SCALE: 1-1/2"=1'-0"



PARAPET @ WALL — 26
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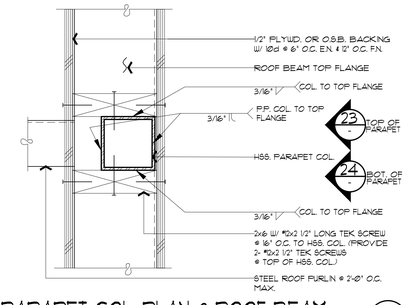
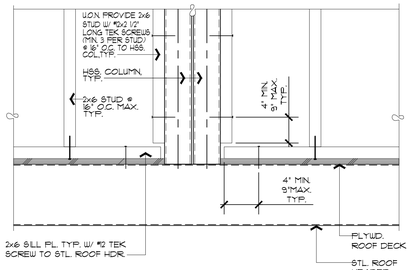


TYPICAL TOP OF PARAPET FRAMING TO HSS. COL. (END WALL) — 27
SCALE: 1-1/2"=1'-0"



TYPICAL BOT. OF PARAPET FRAMING TO HSS. COL. (END WALL) — 28
SCALE: 1-1/2"=1'-0"

PARAPET COL. PLAN @ INT. MODLINE & ROOF HDR. — 29
SCALE: 3"=1'-0"

PARAPET COL. PLAN @ BLD'G. CORNER — 30
SCALE: 3"=1'-0"

PARAPET COL. PLAN @ ROOF BEAM — 31
SCALE: 3"=1'-0"

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APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
160 BASS AVENUE, MENDOTA, CA 93640

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CHECKED: MM

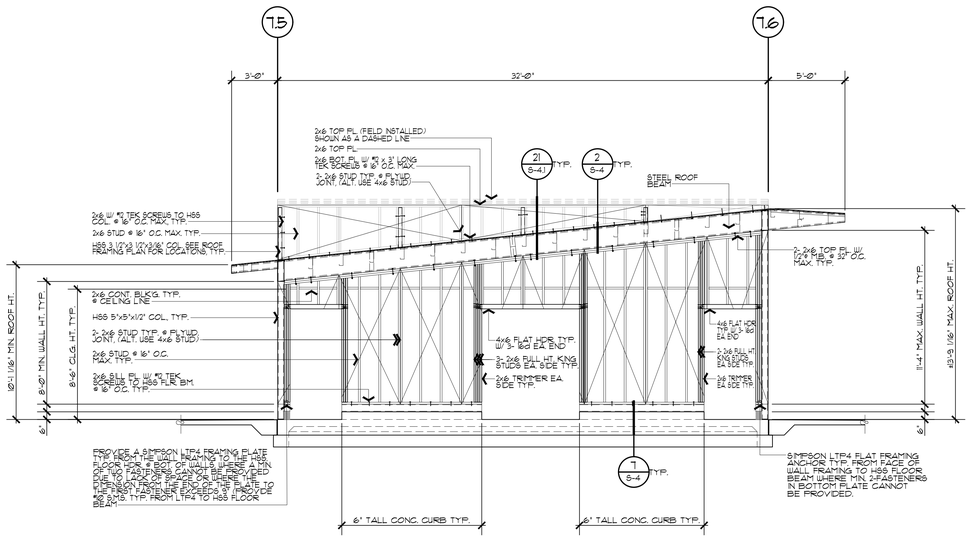
REVISIONS:

-	-

DATE FEB. 6, 2025
JOB NO. 24769

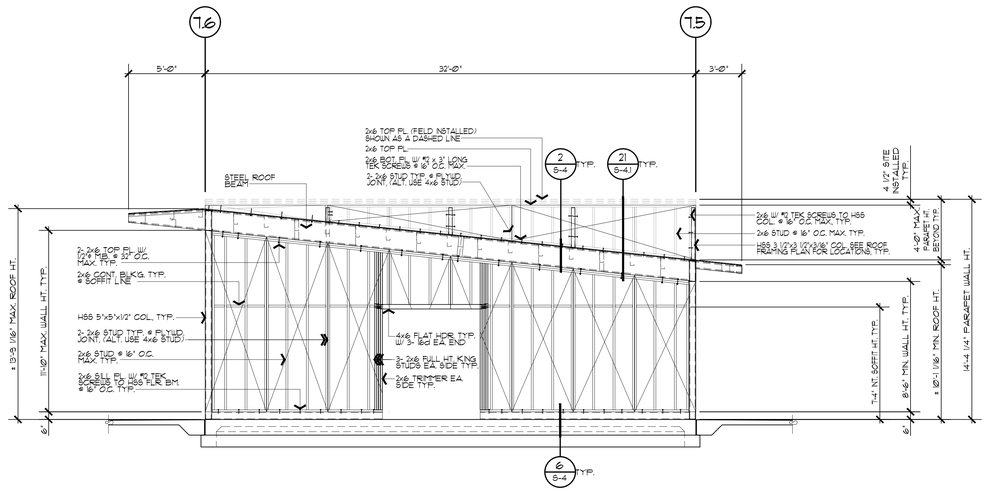
SHEET TITLE
STRUCTURAL & MISC. DETAILS

SHEET NO.
S-4.1



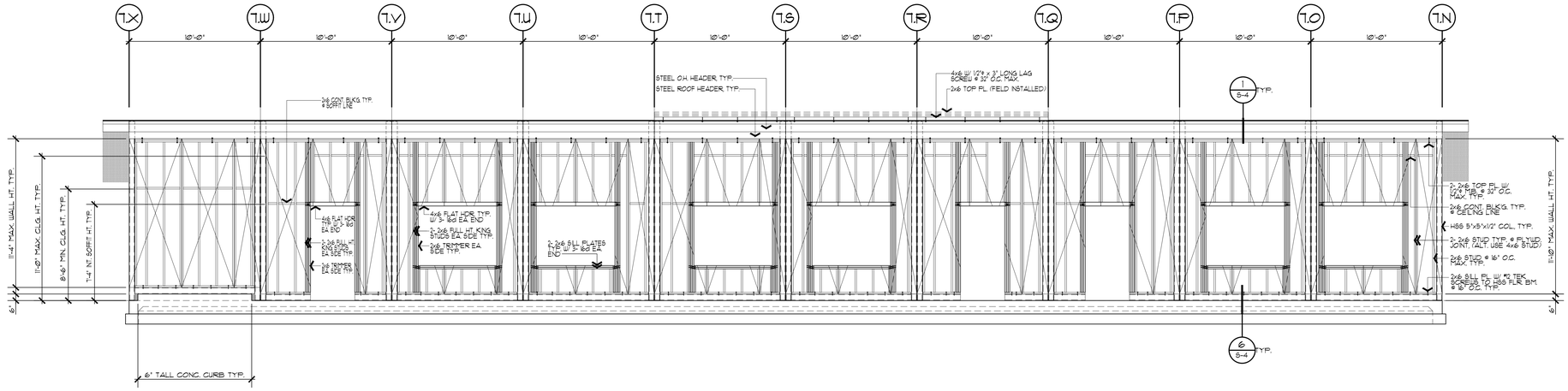
EXTERIOR WALL FRAMING ELEVATION (SINGLE BUILDING) SOUTH 1

SCALE 1/4"=1'-0"



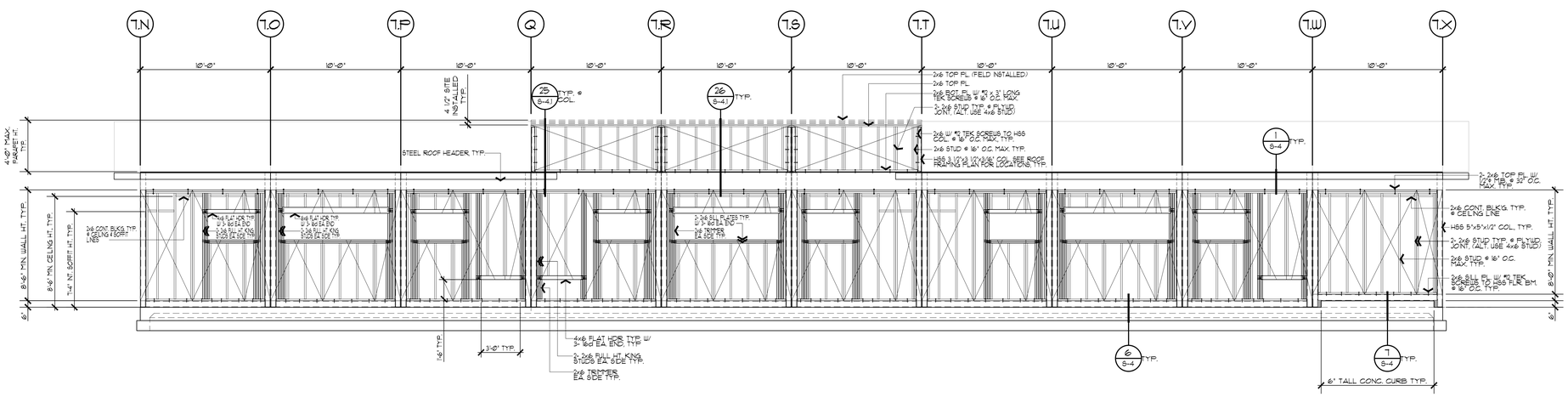
EXTERIOR WALL FRAMING ELEVATION (SINGLE BUILDING) NORTH 2

SCALE 1/4"=1'-0"



EXTERIOR WALL FRAMING ELEVATION (SINGLE BUILDING) EAST 3

SCALE 1/4"=1'-0"



EXTERIOR WALL FRAMING ELEVATION (SINGLE BUILDING) WEST 4

SCALE 1/4"=1'-0"

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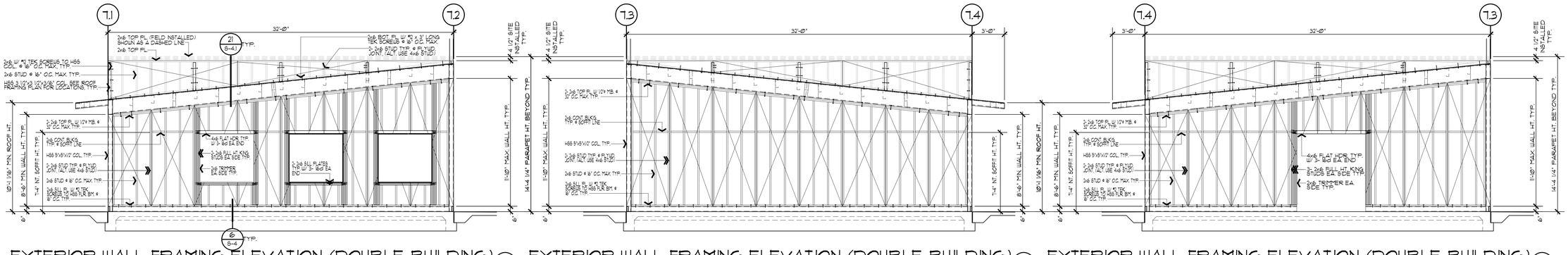
DATE FEB. 6, 2025
JOB NO. 24769

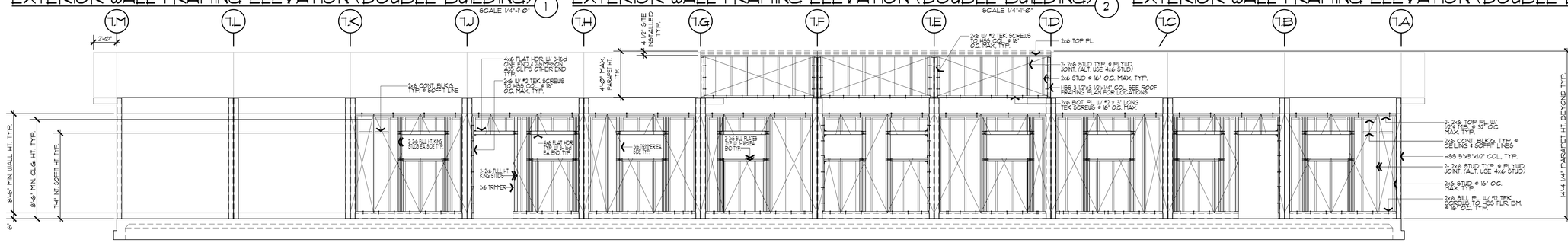
SHEET TITLE
WALL FRAMING ELEVATIONS SINGLE BLD'G.

SHEET NO.
S-5



EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 1

SCALE 1/4"=1'-0"



EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 2

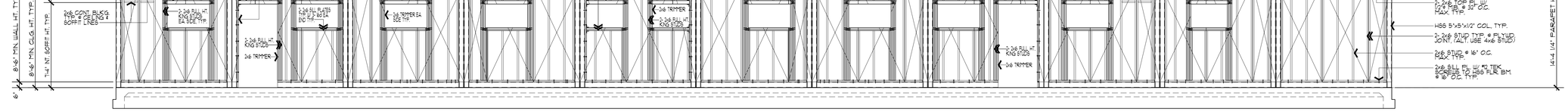
SCALE 1/4"=1'-0"

EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 3

SCALE 1/4"=1'-0"

EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 4

SCALE 1/4"=1'-0"



EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 5

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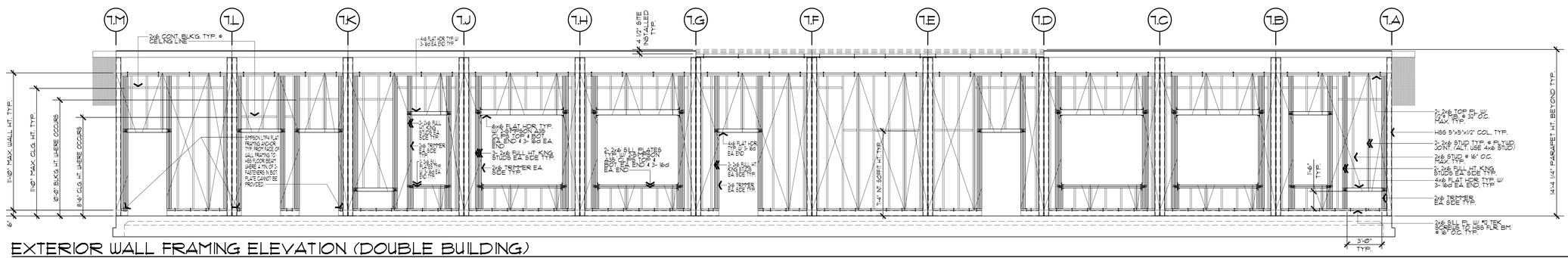

EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 6

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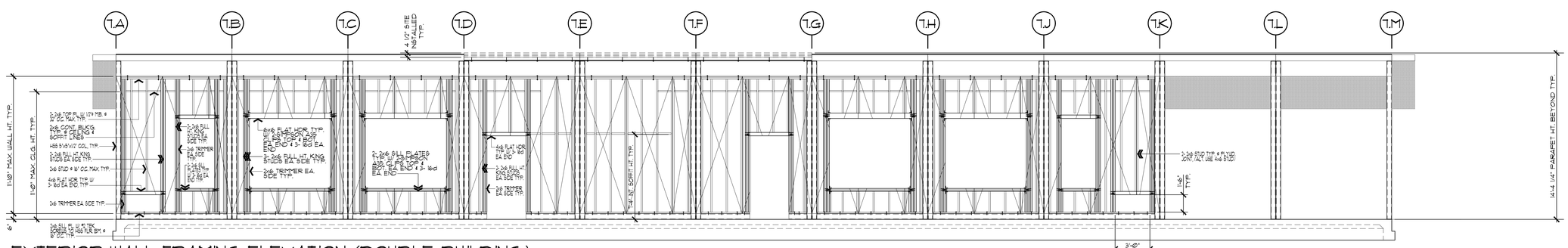

EXTERIOR WALL FRAMING ELEVATION (DOUBLE BUILDING) 7

SCALE 1/4"=1'-0"

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SHEET TITLE
WALL FRAMING ELEVATIONS DOUBLE BLD'G.

SHEET NO.
S-5.1

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 1 (January 2023)

Y = YES
N/A = NOT APPLICABLE
RESPON. PARTY = RESPONSIBLE PARTY (ie: ARCHITECT, ENGINEER, OWNER, CONTRACTOR, INSPECTOR ETC.)

CHAPTER 3
GREEN BUILDING
SECTION 301 GENERAL

301.1 SCOPE. Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.

301.3 NONRESIDENTIAL ADDITIONS AND ALTERATIONS. [BSC-CG] The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of $200,000 or above (for occupancies within the authority of California Building Standards Commission). Code sections relevant to additions and alterations shall only apply to the portions of the building being added or altered within the scope of the permitted work.

A code section will be designated by a banner to indicate where the code section only applies to newly constructed buildings [N] or to additions and/or alterations [A]. When the code section applies to both, no banner will be used.

301.3.1 Nonresidential additions and alterations that cause updates to plumbing fixtures only:

Note: On and after January 1, 2014, certain commercial real property, as defined in Civil Code Section 1101.3, shall have its noncompliant plumbing fixtures replaced with appropriate water-conserving plumbing fixtures under specific circumstances. See Civil Code Section 1101.1 *et seq.* for definitions, types of commercial real property affected, effective dates, circumstances necessitating replacement of noncompliant plumbing fixtures, and duties and responsibilities for ensuring compliance.

301.3.2 Waste Diversion. The requirements of Section 5.408 shall be required for additions and alterations whenever a permit is required for work.

301.4 PUBLIC SCHOOLS AND COMMUNITY COLLEGES. (see GBSC)
301.5 HEALTH FACILITIES. (see GBSC)

SECTION 302 MIXED OCCUPANCY BUILDINGS

302.1 MIXED OCCUPANCY BUILDINGS. In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

SECTION 303 PHASED PROJECTS

303.1 PHASED PROJECTS. For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.

303.1.1 Initial Tenant improvements. The provisions of this code shall apply only to the initial tenant improvements to a project. Subsequent tenant improvements shall comply with the scoping provisions in Section 301.3 non-residential additions and alterations.

ABBREVIATION DEFINITIONS:

HCD	Department of Housing and Community Development
BSC	California Building Standards Commission
DSA-SS	Division of the State Architect, Structural Safety
OSHPD	Office of Statewide Health Planning and Development
LR	Low Rise
HR	High Rise
AA	Additions and Alterations
N	New

CHAPTER 5
NONRESIDENTIAL MANDATORY MEASURES
DIVISION 5.1 PLANNING AND DESIGN

SECTION 5.101 GENERAL

5.101.1 SCOPE
The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

SECTION 5.102 DEFINITIONS

5.102.1 DEFINITIONS
The following terms are defined in Chapter 2 *(and are included here for reference)*

CUTOFF LUMINAIRES. Luminaires whose light distribution is such that the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at an angle of 90 degrees above nadir, and 100 (10 percent) at a vertical angle of 80 degrees above nadir. This applies to all lateral angles around the luminaire.

LOW-EMITTING AND FUEL EFFICIENT VEHICLES.
Eligible vehicles are limited to the following:

1. Zero emission vehicle (ZEV), enhanced advanced technology PZEV (enhanced AT ZEV) or transitional zero emission vehicles (TZEV) regulated under CCR, Title 13, Section 1962.
2. High-efficiency vehicles, regulated by U.S. EPA, bearing a fuel economy and greenhouse gas rating od 9 oe 10 as regulated under 40 CFR Section 600 Subpart D.

NEIGHBORHOOD ELECTRIC VEHICLE (NEV). A motor vehicle that meets the definition of "low-speed vehicle" either in Section 385.5 of the Vehicle Code or in 49CFR571.500 (as it existed on July 1, 2000), and is certified to zero-emission vehicle standards.

TENANT-OCCUPANTS. Building occupants who inhabit a building during its normal hours of operation as permanent occupants, such as employees, as distinguished from customers and other transient visitors.

VANPOOL VEHICLE. Eligible vehicles are limited to any motor vehicle, other than a motortruck or truck tractor, designed for carrying more than 10 but not more than 15 persons including the driver, which is maintained and used primarily for the nonprofit work-related transportation of adults for the purpose of ridesharing.

Note: Source: Vehicle Code, Division 1, Section 668

ZEV. Any vehicle certified to zero-emission standards.

SECTION 5.106 SITE DEVELOPMENT

5.106.1 STORM WATER POLLUTION PREVENTION FOR PROJECTS THAT DISTURB LESS THAN ONE ACRE OF LAND. Newly constructed projects and additions which disturb less than one acre of land, and are not part of a larger common plan of development or sale, shall prevent the pollution of storm water runoff from the construction activities through one or more of the following measures:

5.106.1.1 Local ordinance. Comply with a lawfully enacted storm water management and/or erosion control ordinance.

5.106.1.2 Best Management Practices (BMPs). Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMPs.

1. Soil loss BMPs that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
   a. Scheduling construction activity during dry weather, when possible.
   b. Preservation of natural features, vegetation, soil, and buffers around surface waters.
   c. Drainage swales or lined ditches to control stormwater flow.
   d. Mulching or hydroseeding to stabilize disturbed soils.
   e. Erosion control to protect slopes.
   f. Protection of storm drain inlets (gravel bags or catch basin inserts).
   g. Perimeter sediment control (perimeter silt fence, fiber rolls).
   h. Sediment trap or sediment basin to retain sediment on site.
   i. Stabilized construction exits.
   j. Wind erosion control.
   k. Other soil loss BMPs acceptable to the enforcing agency.
2. Good housekeeping BMPs to manage construction equipment, materials, non-stormwater discharges and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:
   a. Dewatering activities.
   b. Material handling and waste management.
   c. Building materials stockpile management.
   d. Management of washout areas (concrete, paints, stucco, etc.).
   e. Control of vehicle/equipment fueling to contractor's staging area.
   f. Vehicle and equipment cleaning performed off site.
   g Spill prevention and control.
   h. Other housekeeping BMPs acceptable to the enforcing agency.

5.106.2 STORMWATER POLLUTION PREVENTION FOR PROJECTS THAT DISTURB ONE OR MORE ACRES OF LAND. Comply with all lawfully enacted stormwater discharge regulations for projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of a larger common plan of development sale.

Note: Projects that (1) disturb one acre or more of land, or (2) disturb less than one acre of land but are part of the larger common plan of development or sale must comply with the post-construction requirements detailed in the applicable National Pollutant Discharge Elimination System (NPDES) General permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities issued by the State Water Resources Control Board or the Lahontan Regional Water Quality Control Board (for projects in the Lake Tahoe Hydrologic Unit).

The NPDES permits require postconstruction runoff (post-project hydrology) to match the preconstruction runoff (pre-project hydrology) with the installation of postconstruction stormwater management measures. The NPDES permits emphasize runoff reduction through on-site stormwater use, interception, evapotranspiration, and infiltration through nonstructural controls, such as Low Impact Development (LID) practices, and conversation design measures. Stormwater volume that cannot be addressed using nonstructural practices is required to be captured in structural practices and be approved by the enforcing agency.

Refer to the current applicable permits on the State Water Resources Control Board website at: www.waterboards.ca.gov/constructionstormwater. Consideration to the stormwater runoff management measures should be given during the initial design process for appropriate integration into site development.

5.106.4 BICYCLE PARKING. For buildings within the authority of California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings within the authority of the Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2

5.106.4.1 Bicycle parking. [BSC-CG] Comply with Sections 5.106.4.1.1 and 5.106.4.1.2; or meet the applicable local ordinance, whichever is stricter.

5.106.4.1.1 Short-term bicycle parking. If the new project or an addition or alteration is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5% of new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.
Exception: Additions or alterations which add nine or less visitor vehicular parking spaces.

5.106.4.1.2 Long-term bicycle parking. For new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

5.106.4.1.3 For additions or alterations that add 10 or more tenant-occupant vehicular parking spaces, provide secure bicycle parking for 5 percent of the tenant vehicular parking spaces being added, with a minimum of one bicycle parking facility.

5.106.4.1.4 For new shell buildings in phased projects provide secure bicycle parking for 5 percent of the anticipated tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility.

5.106.4.1.5 Acceptable bicycle parking facility for Sections 5.106.4.1.2, 5.106.4.1.3, and 5.106.4.1.4 shall be convenient from the street and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

Note: Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

5.106.4.2 Bicycle parking. [DSA-SS] For public schools and community colleges, comply with Sections 5.106.4.2.1 and 5.106.4.2.2

5.106.4.2.1 Student bicycle parking. Provide permanently anchored bicycle racks conveniently accessed with a minimum of four two-bike capacity racks per new building.
5.106.4.2.2 Staff bicycle parking. Provide permanent, secure bicycle parking conveniently accessed with a minimum of two staff bicycle parking spaces per new building. Acceptable bicycle parking facilities shall be convenient from the street or staff parking area and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

5.106.5.3 Electric vehicle (EV) charging. [N] Construction to provide electric vehicle infrastructure and facilitate electric vehicle charging shall comply with Section 5.106.5.3.1 and shall be provided in accordance with regulations in the California Building Code and the California Electrical Code.

Exceptions:
1. On a case-by-case basis where the local enforcing agency has determined compliance with this section is not feasible based upon one of the following conditions:
   a. Where there is no local utility power supply
   b. Where the local utility is unable to supply adequate power.
   c. Where there is evidence suitable to the local enforcement agency substantiating the local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.
2. Parking spaces accessible only by automated mechanical car parking systems are not required to comply with this code section

5.106.5.3.1 EV capable spaces.
[N] EV capable spaces shall be provided in accordance with Table 5.106.5.3.1 and the following requirements:
1. Raceways complying with the California Electrical Code and no less that 1-inch (25 mm) diameter shall be provided and shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the EV capable and into a suitable listed cabinet, box,enclosure or equivalent. A common raceway may be used to serve multiple EV charging spaces.
2. A service panel or subpanel (s) shall be provided with panel space and electrical load capacity for a dedicated 208/240 volt, 40-ampere minimum branch circuit for each EV capable space, with delivery of 30-ampere minimum to an installed EVSE at each EVCS.
3. The electrical system and any on-site distribution transformers shall have sufficient capacity to supply full rated amperage at each EV capable space.
4. The service panel or subpanel circuit directory shall identify the reserved overcurrent protective devices space(s) as "EV CAPABLE". The raceway termination location shall be permanently and visibly marked as "EV CAPABLE."

Note: A parking space served by electric vehicle supply equipment or designed as a future EV charging space shall count as at least one standard automobile parking space only for the purpose of complying with any applicable minimum parking space requirements established by an enforcement agency. See vehicle Code Section 22511.2 for further details.

TABLE 5.106.5.3.1

TOTAL NUMBER OF ACTUAL PARKING SPACES	NUMBER OF REQUIRED EV CAPABLE SPACES	NUMBER OF EVCS (EV CAPABLE SPACES PROVIDED WITH EVSE)^2
0-9	0	0
10-25	2	0
26-50	8	2
51-75	13	3
76-100	17	4
101-150	25	6
151-200	35	9
201 AND OVER	20% of total[1]	25% of EV capable spaces[1]

1. Where there is insufficient electrical supply.
2. The number of required EVCS (EV capable spaces provided with EVSE) in column 3 count towards the total number of required EV capable spaces shown in column 2.

5.106.5.3.2 Electric vehicle charging stations (EVCS)
EV capable spaces shall be provided with EVSE to create EVCS in the number indicated in Table 5.106.5.3.1. The EVCS required by Table 5.106.5.3.1 may be provided with EVSE in any combination of Level 2 and Direct Current Fast Charging (DCFC), except that at least one Level 2 EVSE shall be provided.

One EV charger with multiple connectors capable of charging multiple EVs simultaneously shall be permitted if the electrical load capacity required by Section 5.106.5.3.1 for each EV capable space is accumulatively supplied to the EV charger.

The installation of each DCFC EVSE shall be permitted to reduce the minimum number of required EV capable spaces without EVSE by five and reduce proportionally the required electrical load capacity to the service panel or subpanel.

5.106.5.3.3 Use of automatic load management systems (ALMS).
ALMS shall be permitted for EVCS. When ALMS is installed, the required electrical load capacity specified in Section 5.106.5.3.1 for each EVCS may be reduced when serviced by an EVSE controlled by an ALMS. Each EVSE controlled by an ALMS shall deliver a minimum 30 amperes to an EV when charging one vehicle and shall deliver a minimum 3.3 kW while simultaneously charging multiple EVs.

5.106.5.3.4 Accessible EVCS.
When EVSE is installed, accessible EVSC shall be provided in accordance with the *California Building Code*, Chapter 11B, Section 11B-228.3.
Note: For EVCS signs, refer to Caltrans Traffic Operations Policy Directive 13-01 (Zero Emission Vehicle Signs and Pavement Markings) or its successor(s).

5.106.5.4 Electric Vehicle (EV) charging: medium-duty and heavy-duty. [N]
Construction shall comply with section 5.106.5.4.1 to facilitate future installation of electric vehicle supply equipment (EVSE). Construction for warehouses, grocery stores and retail stores with planned off-street loading spaces shall also comply with Section 5.106.5.4.1 for future installation of medium- and heavy-duty EVSE.
Exceptions:
1. On a case-by-case basis where the local enforcing agency has determined compliance with this section is not feasible based upon one of the following conditions:
   a. Where there is no local utility power supply.
   b. Where the local utility is unable to supply adequate power.
   c. Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code*, the *California Electrical Code* and as follows:

5.106.5.4.1 Electric vehicle charging readiness requirements for warehouse, grocery stores and retail stores with planned off-street loading spaces.
[N] In order to avoid future demolition when adding EV charging supply and distribution equipment, spare raceways(s) or busway(s) and adequate capacity for transformers(s), service panels(s) or subpanel(s) shall be installed at the time of construction in accordance with the California Electrical Code. Construction plans and specifications shall include but are not limited to, the following:
1. The transformer, main service equipment and subpanel shall meet the minimum power requirement in Table 5.106.5.4.1 to accommodate the dedicated branch circuits for the future installation of EVSE.
2. The construction documents shall indicate on or more location(s) convenient to the planned offstreet loading space(s) reserved for medium-and heavy-duty ZEV charging cabinets and charging dispensers, and a pathway reserved for routing of conduit from the termination of the raceway(s) or busway(s) to the charging cabinet(s) and dispenser(s) as shown in Table 5.106.5.4.1
3. Raceway(s) or busway(s) originating at a main service panel or a subpanel(s) serving the area where potential future medium-and heavy-duty EVSE will be located and shall terminate in close proximity to the potential future location of the charging equipments for medium- and heavy-duty vehicles.
4. The raceway(s) or busway(s) shall be sufficient size to carry the minimum additional system load to the future location of the charging for medium- and heavy-duty ZEVs as shown in Table 5.106.5.4.1.

TABLE 5.106.5.4.1 RACEWAY CONDUIT AND PANEL POWER REQUIREMENTS FOR MEDIUM- AND HEAVY-DUTY EVSE [N]

BUILDING TYPE	BUILDING SIZE (SQ. FT.)	NUMBER OF OFF-STREET LOADING SPACES	ADDITIONAL CAPACITY REQUIRED (KVA) FOR RACEWAY & BUSWAY AND TRANSFORMER & PANEL
Grocery	10,000 to 90,000	1 or 2	200
		3 or Greater	400
	Greater than 90,000	1 or Greater	400
Retail	10,000 to 135,000	1 or 2	200
		3 or Greater	400
	Greater than 135,000	1 or Greater	400
Warehouse	20,000 to 256,000	1 or 2	200
		3 or Greater	400
	Greater than 256,000	1 or Greater	400

5.106.8 LIGHT POLLUTION REDUCTION. [N]. I Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the California Energy Code for Lighting Zones 0-4 as defined in Chapter 10, Section 10-114 of the California Administrative Code; and
2. Backlight (B) ratings as defined in IES TM-15-11 (shown in Table A-1 in Chapter 8);
3. Uplight and Glare ratings as defined in California Energy Code (shown in Tables 130.2-A and 130.2-B in Chapter 8) and
4. Allowable BUG ratings not exceeding those shown in Table 5.106.8, [N] or Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.

Exceptions: [N]

1. Luminaires that qualify as exceptions in Sections 130.2 (b) and 140.7 of the California Energy Code.
2. Emergency lighting.
3. Building facade meeting the requirements in Table 140.7-B of the California Energy Code, Part 6.
4. Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.
5. Luminaires with less than 6,200 initial luminaire lumens.

TABLE 5.106.8 [N] MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS [1,2]

ALLOWABLE RATING	LIGHTING ZONE LZ0	LIGHTING ZONE LZ1	LIGHTING ZONE LZ2	LIGHTING ZONE LZ3	LIGHTING ZONE LZ4
MAXIMUM ALLOWABLE BACKLIGHT RATING [3]					
Luminaire greater than 2 mounting heights (MH) from property line	N/A	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1-2 MH from property line	N/A	B2	B3	B4	B4
Luminaire back hemisphere is 0.5-1 MH from property line	N/A	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	N/A	B0	B0	B1	B2
MAXIMUM ALLOWABLE UPLIGHT RATING (U)					
For area lighting [3]	N/A	U0	U0	U0	U0
For all other outdoor lighting,including decorative luminaires	N/A	U1	U2	U3	UR
MAXIMUM ALLOWABLE GLARE RATING [4] (G)					
MAXIMUM ALLOWABLE GLARE RATING [4] (G)	N/A	G1	G2	G3	G4
MAXIMUM ALLOWABLE GLARE RATING [4] (G)	N/A	G0	G1	G1	G2
MAXIMUM ALLOWABLE GLARE RATING [4] (G)	N/A	G0	G0	G1	G1
MAXIMUM ALLOWABLE GLARE RATING [4] (G)	N/A	G0	G0	G0	G1

1. IESNA Lighting Zones 0 and 5 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code.*

2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaries located in these areas shall meet *U*-value limits for "all other outdoor lighting"

5.106.8.1 Facing- Backlight
Luminaires within 2MH of a property line shall be oriented so that the nearest property line is behind the fixture, and shall comply with the backlight rating specified in Table 5.106.8 based on the lighting zone and distance to the nearest point of that property line.
Exception: Corners. If two property lines (or two segments of the same property line) have equidistant point to the luminaire, then the luminaire may be oriented so that the intersection of the two lines (the corner) is directly behind the luminaire. The luminaire shall still use the distance to the nearest points(s) on the property lines to determine the required backlight rating.

5.106.8.2 Facing-Glare.
For luminaires covered by 5.106.8.1, if a property line also exists within or extends into the front hemisphere within 2MH of the luminaire then the luminaire shall comply with the more stringent glare rating specified in Table 5.106.8 based on the lighting zone and distance to the nearest point on the nearest property line within the front hemisphere.

Note: [N]
1.See also *California Building Code*, Chapter 12, Section 1205.6 for college campus lighting requirements for parking facilities and walkways.
2.Refer to Chapter 8 (Compliance Forms, Worksheets and Reference Material) for IES TM-15-11 Table A-1, *California Energy Code* Tables 130.2-A and 130.2-B.
3. Refer to the *California Building Code* for requirements for additions and alterations.

5.106.10 GRADING AND PAVING. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales.
2. Water collection and disposal systems.
3. French drains.
4. Water retention gardens.
5. Other water measures which keep surface water away from buildings and aid in groundwater recharge.
Exception: Additions and alterations not altering the drainage path.

5.106.12 SHADE TREES [DSA-SS]. Shade Trees shall be planted to comply with Sections 5.106.12.1, 5.106.12.2, and 5.106.12.3. Percentages shown shall be measured at noon on the summer solstice. Landscape irrigation necessary to establish and maintain tree health shall comply with Section 5.304.6.

5.106.12.1 Surface parking areas. Shade tree plantings, minimum #10 container size or equal, shall be installed to provide shade over 50 percent of the parking area within 15 years.

Exceptions: Surface parking area covered by solar photovoltaic shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5 shall be permitted in whole or in part in lieu of shade tree planting.

5.106.12.2 Landscape areas. Shade trees plantings, minimum #10 container size or equal shall be installed to provide shade of 20% of the landscape area within 15 years.

Exceptions: Playfields for organized sport activity are not included in the total area calculation.

5.106.12.3. Hardscape areas. Shade tree plantings, minimum #10 container size or equal shall be installed to provide shade over 20 percent of the hardscape area within 15 years.

Exceptions:
1. Walks, hardscape areas covered by solar photovoltaic shade structures or shade structures with roofing materials that comply with Table A5.106.11.2.2 in Appendix A5 shall be permitted in whole or in part in lieu of shade tree planting.
2. Designated and marked play areas of organized sport activity are not included in the total area calculation.

DIVISION 5.2 ENERGY EFFICIENCY

SECTION 5.201 GENERAL

5.201.1 Scope [BSC-CG]. *California Energy Code [DSA-SS]*. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.

DIVISION 5.3 WATER EFFICIENCY AND CONSERVATION

SECTION 5.301 GENERAL

5.301.1 Scope. The provisions of this chapter shall establish the means of conserving water use indoors, outdoors and in wastewater conveyance.

SECTION 5.302 DEFINITIONS

5.302.1 Definitions. The following terms are defined in Chapter 2 *(and are included here for reference)*

EVAPOTRANSPIRATION ADJUSTMENT FACTOR (ETAF) [DSA-SS]. An adjustment factor when applied to reference evapotranspiration that adjusts for plant factors and irrigation efficiency, which ae two major influences on the amount of water that needs to be applied to the landscape.

FOOTPRINT AREA [DSA-SS]. The total area of the furthest exterior wall of the structure projected to natural grade, not including exterior areas such as stairs, covered walkways, patios and decks.

METERING FAUCET. A self-closing faucet that dispenses a specific volume of water for each actuation cycle. The volume or cycle duration can be fixed or adjustable.

GRAYWATER. Pursuant to Health and Safety Code Section 17922.12, "graywater" means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines and laundry tubs, but does not include waste water from kitchen sinks or dishwashers.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO). The California ordinance regulating landscape design, installation and maintenance practices that will ensure commercial, multifamily and other developer installed landscapes greater than 2500 square feet meet an irrigation water budget developed based on landscaped area and climatological parameters.

MODEL WATER EFFICIENT LANDSCAPE ORDINANCE (MWELO). [HCD] The California model ordinance (California Code of Regulations, Title 23, Division 2, Chapter 2.7), regulating landscape design, installation and maintenance practices. Local agencies are required to adopt the updated MWELO, or adopt a local ordinance at least as effective as the MWELO.

POTABLE WATER. Water that is drinkable and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards. See definition in the California Plumbing Code, Part 5.

POTABLE WATER. [HCD] Water that is satisfactory for drinking, culinary, and domestic purposes, and meets the U.S. Environmental Protection Agency (EPA) Drinking Water Standards and the requirements of the Health Authority Having Jurisdiction.

RECYCLED WATER. Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur [Water Code Section 13050 (n)]. Simply put, recycled water is water treated to remove waste matter attaining a quality that is suitable to use the water again.

SUBMETER. [HCD 1] A secondary device beyond a meter that measures water consumption of an individual rental unit within a multiunit residential structure or mixed-use residential and commercial structure. (See Civic Code Section 1954.202 (g) and Water code Section 517 for additional details.)

WATER BUDGET. Is the estimated total landscape irrigation water use which shall not exceed the maximum applied water allowance calculated in accordance with the Department of Water Resources Model Efficient Landscape Ordinance (MWELO).

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DATE FEB. 6, 2025
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SHEET TITLE
CALGREEN COMPLIANCE DOCUMENTATION

SHEET NO.
CG-1

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 2 (January 2023)

Y = YES
N/A = NOT APPLICABLE
RESPON. PARTY = RESPONSIBLE PARTY (ie: ARCHITECT, ENGINEER, OWNER, CONTRACTOR, INSPECTOR ETC.)

SECTION 5.303 INDOOR WATER USE

5.303.1 METERS. Separate submeters or metering devices shall be installed for the uses described in Sections 503.1.1 and 503.1.2.

5.303.1.1 Buildings in excess of 50,000 square feet. Separate submeters shall be installed as follows:

1. For each individual leased, rented or other tenant space within the building projected to consume more than 100 gal/day (380 L/day), including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.
2. Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:
   a. Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s).
   b. Makeup water for evaporative coolers greater than 6 gpm (0.04 L/s).
   c. Steam and hot water boilers with energy input more than 500,000 Btu/h (147 kW).

5.303.1.2 Excess consumption. A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

5.303.3 WATER CONSERVING PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

5.303.3.1 Water Closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3.2 Urinals.

5.303.3.2.1 Wall-mounted Urinals. The effective flush volume of wall-mounted urinals shall not exceed 0.125 gallons per flush.

5.303.3.2.2 Floor-mounted Urinals. The effective flush volume of floor-mounted or other urinals shall not exceed 0.5 gallons per flush.

5.303.3.3 Showerheads. [BSC-CG]

5.303.3.3.1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 1.8 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

5.303.3.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all the showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.8 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.
Note: A hand-held shower shall be considered a showerhead.

5.303.3.4 Faucets and fountains.

5.303.3.4.1 Nonresidential Lavatory faucets. Lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

5.303.3.4.2 Kitchen faucets. Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

5.303.3.4.3 Wash fountains. Wash fountains shall have a maximum flow rate of not more than1.8 gallons per minute/20 [rim space (inches) at 60 psi].

5.303.3.4.4 Metering faucets. Metering faucets shall not deliver more than 0.20 gallons per cycle.

5.303.3.4.5 Metering faucets for wash fountains. Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per minute/20 [rim space (inches) at 60 psi].

Note: Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

5.303.3.4.6 Pre-rinse spray value
When installed, shall meet the requirements in the *California Code of Regulations*, Title 20 (Appliance Efficiency Regulations), Section 1605.1 (h)(4) Table H-2, Section 1605.3 (h)(4)(A), and Section 1607 (d)(7), and shall be equipped with an integral automatic shutoff.

FOR REFERENCE ONLY: The following table and code section have been reprinted from the *California Code of Regulations*, Title 20 (Appliance Efficiency Regulations), Section 1605.1 (h)(4) and Section 1605.3 (h)(4)(A).

TABLE H-2

STANDARDS FOR COMMERCIAL PRE-RINSE SPRAY VALVES MANUFACTURED ON OR AFTER JANUARY 28, 2019

PRODUCT CLASS [spray force in ounce force (ozf)]	MAXIMUM FLOW RATE (gpm)
Product Class 1 (≤ 5.0 ozf)	1.00
Product Class 2 (> 5.0 ozf and ≤ 8.0 ozf)	1.20
Product Class 3 (> 8.0 ozf)	1.28

5.303.4 COMMERCIAL KITCHEN EQUIPMENT.

5.303.4.1 Food Waste Disposers. Disposers shall either modulate the use of water to no more than 1 gpm when the disposer is not in use (not actively grinding food waste/no-load) or shall automatically shut off after no more than 10 minutes of inactivity. Disposers shall use no more than 8 gpm of water.
Note: This code section does not affect local jurisdiction authority to prohibit or require disposer installation.

5.303.5 AREAS OF ADDITION OR ALTERATION. For those occupancies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Section 5.303.3 and 5.303.4 shall apply to new fixtures in additions or areas of alteration to the building.

5.303.6 STANDARDS FOR PLUMBING FIXTURES AND FITTINGS. Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1701.1 of the *California Plumbing Code* and in Chapter 6 of this code.

SECTION 5.304 OUTDOOR WATER USE

5.304.1 OUTDOOR POTABLE WATER USE IN LANDSCAPE AREAS. Nonresidential developments shall comply with a local water efficient landscape ordinance or the current California Department of Water Resources' Model Water Efficient Landscape Ordinance (MWELO), whichever is more stringent.

Notes:
1. The Model Water Efficient Landscape Ordinance (MWELO) is located in the California Code of Regulations, Title 23, Chapter 2.7, Division 2.
2. MWELO and supporting documents, including a water budget calculator, are available at: https://www.water.ca.gov/.

5.304.6 OUTDOOR POTABLE WATER USE IN LANDSCAPE AREAS. For public schools and community colleges, landscape projects as described in Sections 5.304.6.1 and 5.304.6.2 shall comply with the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, *California Code of Regulations*, except that the evapotranspiration adjustment factor (ETAF) shall be 0.65 with an additional water allowance for special landscape areas (SLA) of 0.35.

Exception: Any project with an aggregate landscape area of 2,500 square feet or less may comply with the prescriptive measures contained in Appendix D of the MWELO.

5.304.6.1 Newly constructed landscapes. New construction projects with an aggregate landscape area equal to or greater than 500 square feet.

5.304.6.2 Rehabilitated landscapes. Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 1,200 square feet.

DIVISION 5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION 5.401 GENERAL

5.401.1 SCOPE. The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials, and building commissioning or testing and adjusting.

SECTION 5.402 DEFINITIONS

5.402.1 DEFINITIONS. The following terms are defined in Chapter 2 *(and are included here for reference)*

ADJUST. To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

BALANCE. To proportion flows within the distribution system, including sub-mains, branches and terminals, according to design quantities.

BUILDING COMMISSIONING. A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.

ORGANIC WASTE. Food waste, green waste, landscape and pruning wste, nonhazardous wood waste, and food soiled paper waste that is mixed in with food waste.

TEST. A procedure to determine quantitative performance of a system or equipment

SECTION 5.407 WATER RESISTANCE AND MOISTURE MANAGEMENT

5.407.1 WEATHER PROTECTION. Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1402.2 (Weather Protection), manufacturer's installation instructions or local ordinance, whichever is more stringent.

5.407.2 MOISTURE CONTROL. Employ moisture control measures by the following methods.

5.407.2.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

5.407.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

5.407.2.2.1 Exterior door protection. Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth.
2. The door is protected by a roof overhang at least 4 feet in depth.
3. The door is recessed at least 4 feet.
4. Other methods which provide equivalent protection.

5.407.2.2.2 Flashing. Install flashings integrated with a drainage plane.

SECTION 5.408 CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

5.408.1 CONSTRUCTION WASTE MANAGEMENT. Recycle and/or salvage for reuse a minimum of 65% of the non-hazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

5.408.1.1 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance, submit a construction waste management plan that:

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction and demolition waste materials diverted shall be calculated by weight or volume, but not by both.

5.408.1.2 Waste Management Company. Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

Note: The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

Exceptions to Sections 5.408.1.1 and 5.408.1.2:

1. Excavated soil and land-clearing debris.
2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

5.408.1.3 Waste stream reduction alternative. The combined weight of new construction disposal that does not exceed two pounds per square foot of building area may be deemed to meet the 65% minimum requirement as approved by the enforcing agency.

5.408.1.4 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Sections 5.408.1.1, through 5.408.1.3. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

1. Sample forms found in "A Guide to the California Green Building Standards Code (Nonresidential)" located www.dgs.ca.gov/BSC/Resources/Page-Content/Building-Standards-Commission-Resources-List-Folder/CALGreen may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris processors can be located at the California Department of Resources Recycling and Recovery (CalRecycle).

5.408.2 UNIVERSAL WASTE. [A] Additions and alterations to a building or tenant space that meet the scoping provisions in Section 301.3 for nonresidential additions and alterations, shall require verification that Universal Waste items such as fluorescent lamps and ballast and mercury containing thermostats as well as other California prohibited Universal Waste materials are disposed of properly and are diverted from landfills. A list of prohibited Universal Waste materials shall be included in the construction documents.

Note: Refer to the Universal Waste Rule link at: http://www.dtsc.ca.gov/universalwaste/

5.408.3 EXCAVATED SOIL AND LAND CLEARING DEBRIS. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

Exception: Reuse, either on or off-site, of vegetation or soil contaminated by disease or pest infestation.

Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material.
2. For a map of know pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. (www.cdfa.ca.gov)

SECTION 5.410 BUILDING MAINTENANCE AND OPERATIONS

5.410.1 RECYCLING BY OCCUPANTS. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, organic waste, and metals or meet a lawfully enacted local recycling ordinance, if more restrictive.

Exception: Rural jurisdictions that meet and apply for the exemption in Public Resources Code 42649.82 (a)(2)(A) et seq. shall also be exempt from the organic waste portion of this section.

5.410.1.1 Additions. All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30% or more in floor area, shall provide recycling areas on site.

Exception: Additions within a tenant space resulting in less than a 30% increase in the tenant space floor area.

5.410.1.2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's web site.

5.410.2 COMMISSIONING. [N] New buildings 10,000 square feet and over. For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. For I-occupancies that are not regulated by OSHPD or for I-occupancies and L-occupancies that are not regulated y the California Energy Code Section 100.0 Scope, all requirements in Sections 5.410.2 through 5.410.2.6 shall apply.

Note: For energy-related systems under the scope (Section 100) of the California Energy Code, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting systems and controls, as well as water heating systems and controls, refer to California Energy Code Section 120.8 for commissioning requirements

Commissioning requirements shall include:

1. Owner's or Owner representative's project requirements.
2. Basis of design.
3. Commissioning measures shown in the construction documents.
4. Commissioning plan.
5. Functional performance testing.
6. Documentation and training.
7. Commissioning report.

Exceptions:

1. Unconditioned warehouses of any size.
2. Areas less than 10,000 square feet used for offices or other conditioned accessory spaces within unconditioned warehouses.
3. Tenant improvements less than 10,000 square feet as described in Section 303.1.1.
4. Open parking garages of any size, or open parking garage areas, of any size, within a structure.

Note: For the purposes of this section, unconditioned shall mean a building, area, or room which does not provide heating and or air conditioning.

Informational Notes:

1. IAS AC 476 is an accreditation criteria for organizations providing training and/or certification of commissioning personnel. AC 476 is available to the Authority Having Jurisdiction as a reference for qualifications of commissioning personnel. AC 476 does not certify individuals to conduct functional performance tests or to adjust and balance systems.

2. Functional performance testing for heating, ventilation, air conditioning systems and lighting controls must be performed in compliance with the *California Energy Code*.

5.410.2.1 Owner's or Owner Representative's Project Requirements (OPR). [N] The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:

1. Environmental and sustainability goals.
2. Building sustainable goals.
3. Indoor environmental quality requirements.
4. Project program, including facility functions and hours of operation, and need for after hours operation.
5. Equipment and systems expectations.
6. Building occupant and operation and maintenance (O&M) personnel expectations.

5.410.2.2 Basis of Design (BOD). [N] A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project. The Basis of Design document shall cover the following systems:

1. Renewable energy systems.
2. Landscape irrigation systems.
3. Water reuse systems.

5.410.2.3 Commissioning plan. [N] Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned. The commissioning plan shall include the following:

1. General project information.
2. Commissioning goals.
3. Systems to be commissioned. Plans to test systems and components shall include:
   a. An explanation of the original design intent.
   b. Equipment and systems to be tested, including the extent of tests.
   c. Functions to be tested.
   d. Conditions under which the test shall be performed.
   e. Measurable criteria for acceptable performance.
4. Commissioning team information.
5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning shall be included.

5.410.2.4 Functional performance testing. [N] Functional performance tests shall demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

5.410.2.5 Documentation and training. [N] A Systems Manual and Systems Operations Training are required, including Occupational Safety and Health Act (OSHA) requirements in *California Code of Regulations* (CCR), Title 8, Section 5142, and other related regulations.

5.410.2.5.1 Systems manual. [N] Documentation of the operational aspects of the building shall be completed within the systems manual and delivered to the building owner or representative. The systems manual shall include the following:

1. Site information, including facility description, history and current requirements.
2. Site contact information.
3. Basic operations and maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log.
4. Major systems.
5. Site equipment inventory and maintenance notes.
6. A copy of verifications required by the enforcing agency or this code.
7. Other resources and documentation, if applicable.

5.410.2.5.2 Systems operations training. [N] A program for training of the appropriate maintenance staff for each equipment type and/or system shall be developed and documented in the commissioning report and shall include the following:

1. System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces).
2. Review and demonstration of servicing/preventive maintenance.
3. Review of the information in the Systems Manual.
4. Review of the record drawings on the system/equipment.

5.410.2.6 Commissioning report. [N] A report of commissioning process activities undertaken through the design and construction phases of the building project shall be completed and provided to the owner or representative.

5.410.4 TESTING AND ADJUSTING. New buildings less than 10,000 square feet. Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

5.410.4.2 (Reserved)

Note: For energy-related systems under the scope (Section 100) of the California Energy Code, including heating, ventilation, air conditioning (HVAC) systems and controls, indoor lighting system and controls, as well as water heating systems and controls, refer to California Energy Code Section 120.8 for commissioning requirements and Sections 120.5, 120.6, 130.4, and 140.9(b)3 for additional testing requirements of specific systems.

5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include at a minimum, as applicable to the project:

1. Renewable energy systems.
2. Landscape irrigation systems.
3. Water reuse systems.

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with manufacturer's specifications and applicable standards on each system.

5.410.4.3.1 HVAC balancing. In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, the system shall be balanced in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.

5.410.4.5 Operation and maintenance (O & M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

5.410.4.5.1 Inspections and reports. Include a copy of all inspection verifications and reports required by the enforcing agency.

DIVISION 5.5 ENVIRONMENTAL QUALITY

SECTION 5.501 GENERAL

5.501.1 SCOPE. The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of a building's installers, occupants and neighbors.

SECTION 5.502 DEFINITIONS

5.502.1 DEFINITIONS. The following terms are defined in Chapter 2 *(and are included here for reference)*

ARTERIAL HIGHWAY. A general term denoting a highway primarily for through traffic usually on a continuous route.

A-WEIGHTED SOUND LEVEL (dBA). The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made.

1 BTU/HOUR. British thermal units per hour, also referred to as Btu. The amount of heat required to raise one pound of water one degree Fahrenheit per hour, a common measure of heat transfer rate. A ton of refrigeration is 12,000 Btu, the amount of heat required to melt a ton (2,000 pounds) of ice at 32º Fahrenheit.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL). A metric similar to the day-night average sound level (Ldn), except that a 5 decibel adjustment is added to the equivalent continuous sound exposure level for evening hours (7pm to 10pm) in addition to the 10 dB nighttime adjustment used in the Ldn.

COMPOSITE WOOD PRODUCTS. Composite wood products include hardwood plywood, particleboard and medium density fiberboard. "Composite wood products" does not include hardboard, structural plywood, structural panels, structural composite lumber, oriented strand board, glued laminated timber, timber, prefabricated wood I-joists or finger–jointed lumber, all as specified in California Code of Regulations (CCR), Title 17, Section 93120.1(a).

Note: See CCR, Title 17, Section 93120.1.

DAY-NIGHT AVERAGE SOUND LEVEL (Ldn). The A-weighted equivalent continuous sound exposure level for a 24-hour period, with a 10 dB adjustment added to sound levels occurring during nighttime hours (10p.m. to 7 a.m.).

DECIBEL (db). A measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power, sound intensity) with respect to a reference quantity.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For purposes of the *California Electrical Code*, off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

ELECTRIC VEHICLE CHARGING STATION(S) (EVCS)j. One or more spaces intended for charging electric vehicles.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

ENERGY EQUIVALENT (NOISE) LEVEL (Leq). The level of a steady noise which would have the same energy as the fluctuating noise level integrated over the time of period of interest.

EXPRESSWAY. An arterial highway for through traffic which may have partial control of access, but which may or may not be divided or have grade separations at intersections.

FREEWAY. A divided arterial highway with full control of access and with grade separations at intersections.

GLOBAL WARMING POTENTIAL (GWP). The radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time. Carbon dioxide is the reference compound with a GWP of one.

GLOBAL WARMING POTENTIAL VALUE (GWP VALUE). A 100-year GWP value published by the Intergovernmental Panel on Climate Change (IPCC) in either its Second Assessment Report (SAR) (IPCC, 1995); or its Fourth Assessment A-3 Report (AR4) (IPCC, 2007). The SAR GWP values are found in column "SAR (100-yr)" of Table 2.14.; the AR4 GWP values are found in column "100 yr" of Table 2.14.

HIGH-GWP REFRIGERANT. A compound used as a heat transfer fluid or gas that is: (a) a chlorofluorocarbon, a hdrochlorofluorocarbon, a hydrofluorocarbon, a perfluorocarbon, or any compound or blend of compounds, with a GWP value equal to or greater than 150, or (B) any ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, sec.82.3 (as amended March 10, 2009).

LONG RADIUS ELBOW. Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.5 times the pipe diameter.

LOW-GWP REFRIGERANT. A compound used as a heat transfer fluid or gas that: (A) has a GWP value less than 150, and (B) is not an ozone depleting substance as defined in Title 40 of the Code of Federal Regulations, Part 82, sec.82.3 (as amended March 10, 2009).

MERV. Filter minimum efficiency reporting value, based on ASHRAE 52.2–1999.

MAXIMUM INCREMENTAL REACTIVITY (MIR). The maximum change in weight of ozone formed by adding a compound to the "Base REactive Organic Gas (ROG) Mixture" per weight of compound added, expressed to hundredths of a gram (g O3/g ROC).

PRODUCT-WEIGHTED MIR (PWMIR). The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).

PSIG. Pounds per square inch, guage.

REACTIVE ORGANIC COMPOUND (ROC). Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.

SCHRADER ACCESS VALVES. Access fittings with a valve core installed.

SHORT RADIUS ELBOW. Pipe fitting installed between two lengths of pipe or tubing to allow a change of direction, with a radius 1.0 times the pipe diameter.

SUPERMARKET. For the purposes of Section 5.508.2, a supermarket is any retail food facility with 8,000 square feet or more conditioned area, and that utilizes either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units.

VOC. A volatile organic compound broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a)

Note: Where specific regulations are cited from different agencies such as SCAQMD, ARB, etc., the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

SECTION 5.503 FIREPLACES

5.503.1 FIREPLACES. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the California Energy Code, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstoves and pellet stoves shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits.

SECTION 5.504 POLLUTANT CONTROL

5.504.1 TEMPORARY VENTILATION. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30% based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilation equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

IDENTIFICATION STAMP
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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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LICENSED ARCHITECT
STEVEN E. GOSSETT
No. C-20307
Exp. 8-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
CALGREEN COMPLIANCE DOCUMENTATION

SHEET NO.
CG-2

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE
NONRESIDENTIAL MANDATORY MEASURES, SHEET 3 (January 2023)

Y = YES
N/A = NOT APPLICABLE
RESPON. PARTY = RESPONSIBLE PARTY (ie: ARCHITECT, ENGINEER, OWNER, CONTRACTOR, INSPECTOR ETC.)

Y	N/A	RESPON. PARTY
☒	☐	

5.504.4 FINISH MATERIAL POLLUTANT CONTROL. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

5.504.4.1 Adhesives, sealants and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

TABLE 5.504.4.1 - ADHESIVE VOC LIMIT[1,2]

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
INDOOR CARPET ADHESIVES	50
CARPET PAD ADHESIVES	50
OUTDOOR CARPET ADHESIVES	150
WOOD FLOORING ADHESIVES	100
RUBBER FLOOR ADHESIVES	60
SUBFLOOR ADHESIVES	50
CERAMIC TILE ADHESIVES	65
VCT & ASPHALT TILE ADHESIVES	50
DRYWALL & PANEL ADHESIVES	50
COVE BASE ADHESIVES	50
MULTIPURPOSE CONSTRUCTION ADHESIVES	70
STRUCTURAL GLAZING ADHESIVES	100
SINGLE-PLY ROOF MEMBRANE ADHESIVES	250
OTHER ADHESIVES NOT SPECIFICALLY LISTED	50
SPECIALTY APPLICATIONS	
PVC WELDING	510
CPVC WELDING	490
ABS WELDING	325
PLASTIC CEMENT WELDING	250
ADHESIVE PRIMER FOR PLASTIC	550
CONTACT ADHESIVE	80
SPECIAL PURPOSE CONTACT ADHESIVE	250
STRUCTURAL WOOD MEMBER ADHESIVE	140
TOP & TRIM ADHESIVE	250
SUBSTRATE SPECIFIC APPLICATIONS	
METAL TO METAL	30
PLASTIC FOAMS	50
POROUS MATERIAL (EXCEPT WOOD)	50
WOOD	30
FIBERGLASS	80

1. IF AN ADHESIVE IS USED TO BOND DISSIMILAR SUBSTRATES TOGETHER, THE ADHESIVE WITH THE HIGHEST VOC CONTENT SHALL BE ALLOWED.

2. FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THIS TABLE, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168, www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF

TABLE 5.504.4.2 - SEALANT VOC LIMIT

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	CURRENT VOC LIMIT
ARCHITECTURAL	250
MARINE DECK	760
NONMEMBRANE ROOF	300
ROADWAY	250
SINGLE-PLY ROOF MEMBRANE	450
OTHER	420
SEALANT PRIMERS	
ARCHITECTURAL	
NONPOROUS	250
POROUS	775
MODIFIED BITUMINOUS	500
MARINE DECK	760
OTHER	750

NOTE: FOR ADDITIONAL INFORMATION REGARDING METHODS TO MEASURE THE VOC CONTENT SPECIFIED IN THESE TABLES, SEE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT RULE 1168.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol Paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

Y	N/A	RESPON. PARTY
☐	☐	

TABLE 5.504.4.3 - CONT.

GRAMS OF VOC PER LITER OF COATING, LESS WATER & LESS EXEMPT COMPOUNDS

COATING CATEGORY	CURRENT VOC LIMIT
SPECIALTY COATINGS	
ALUMINUM ROOF COATINGS	400
BASEMENT SPECIALTY COATINGS	400
BITUMINOUS ROOF COATINGS	50
BITUMINOUS ROOF PRIMERS	350
BOND BREAKERS	350
CONCRETE CURING COMPOUNDS	350
CONCRETE/MASONRY SEALERS	100
DRIVEWAY SEALERS	50
DRY FOG COATINGS	150
FAUX FINISHING COATINGS	350
FIRE RESISTIVE COATINGS	350
FLOOR COATINGS	100
FORM-RELEASE COMPOUNDS	250
GRAPHIC ARTS COATINGS (SIGN PAINTS)	500
HIGH-TEMPERATURE COATINGS	420
INDUSTRIAL MAINTENANCE COATINGS	250
LOW SOLIDS COATINGS[1]	120
MAGNESITE CEMENT COATINGS	450
MASTIC TEXTURE COATINGS	100
METALLIC PIGMENTED COATINGS	500
MULTICOLOR COATINGS	250
PRETREATMENT WASH PRIMERS	420
PRIMERS, SEALERS, & UNDERCOATERS	100
REACTIVE PENETRATING SEALERS	350
RECYCLED COATINGS	250
ROOF COATINGS	50
RUST PREVENTATIVE COATINGS	250
SHELLACS:	
CLEAR	730
OPAQUE	550
SPECIALTY PRIMERS, SEALERS & UNDERCOATERS	100
STAINS	250
STONE CONSOLIDANTS	450
SWIMMING POOL COATINGS	340
TRAFFIC MARKING COATINGS	100
TUB & TILE REFINISH COATINGS	420
WATERPROOFING MEMBRANES	250
WOOD COATINGS	275
WOOD PRESERVATIVES	350
ZINC-RICH PRIMERS	340

1. GRAMS OF VOC PER LITER OF COATING, INCLUDING WATER & EXEMPT COMPOUNDS

2. THE SPECIFIED LIMITS REMAIN IN EFFECT UNLESS REVISED LIMITS ARE LISTED IN SUBSEQUENT COLUMNS IN THE TABLE.

3. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, ARCHITECTURAL COATINGS SUGGESTED CONTROL MEASURE, FEB. 1, 2008. MORE INFORMATION IS AVAILABLE FROM THE AIR RESOURCES BOARD.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification
2. Field verification of on-site product containers

5.504.4.4 Carpet Systems.
All carpet installed in the building interior shall meet the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Version 1.2, January 2017 (Emission testing method for California Specifications 01350).

See California Department of Public Health's website for certification programs and testing labs. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx#material

5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the California Department of Public Health,"Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers,"Version 1.2, January 2017 (Emission testing method for California Specifications 01350).

See California Department of Public Health's website for certification programs and testing labs. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx#material

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

5.504.4.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the buildings shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

5.504.4.5.3 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq.).
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
5. Other methods acceptable to the enforcing agency.

TABLE 5.504.4.5 - FORMALDEHYDE LIMITS[1]

MAXIMUM FORMALDEHYDE EMISSIONS IN PARTS PER MILLION

PRODUCT	CURRENT LIMIT
HARDWOOD PLYWOOD VENEER CORE	0.05
HARDWOOD PLYWOOD COMPOSITE CORE	0.05
PARTICLE BOARD	0.09
MEDIUM DENSITY FIBERBOARD	0.11
THIN MEDIUM DENSITY FIBERBOARD[2]	0.13

1. VALUES IN THIS TABLE ARE DERIVED FROM THOSE SPECIFIED BY THE CALIFORNIA AIR RESOURCES BOARD, AIR TOXICS CONTROL MEASURE FOR COMPOSITE WOOD AS TESTED IN ACCORDANCE WITH ASTM E 1333. FOR ADDITIONAL INFORMATION, SEE CALIFORNIA CODE OF REGULATIONS, TITLE 17, SECTIONS 93120 THROUGH 93120.12.

2. THIN MEDIUM DENSITY FIBERBOARD HAS A MAXIMUM THICKNESS OF 5/16 INCHES (8 MM).

Y	N/A	RESPON. PARTY
☐	☐	
☐	☒	
☒	☐	
☒	☐	
☒	☐	
☐	☐	
☒	☐	

5.504.4.6 Resilient flooring systems. Where resilient flooring is installed, at least 80 percent of floor area receiving resilient flooring shall meet the requirements of the California Department of Public Health,"Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Version 1.2, January 2017 (Emission testing method for California Specifications 01350)

See California Department of Public Health's website for certification programs and testing labs. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx#material

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

5.504.4.7 Thermal insulation
Comply with the requirements of the California Department of Public Health, "Standard Method of the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, "Version 1.2, January 1.2, January 2017 (Emission testing method for California Specification 01350).
See California Department of Public Health's website for certification programs and testing labs. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx#material

5.504.4.7.1 Verification of compliance.
Documentation shall be provided verifying that thermal insulation materials meet the pollutant emission limits.

5.504.4.8 Acoustical ceiling and wall panels.
Comply with the requirements of the California Department of Public Health, "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, " Version 1.2, January 2017 (Emission testing method for California Specification 01350).
See California Department of Public Health's website for certification programs and testing labs.

5.504.4.8.1 Verification of compliance. Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exceptions: Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

5.504.7 ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

SECTION 5.505 INDOOR MOISTURE CONTROL

5.505.1 INDOOR MOISTURE CONTROL. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1202 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures, see Section 5.407.2 of this code.

SECTION 5.506 INDOOR AIR QUALITY

5.506.1 OUTSIDE AIR DELIVERY. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the *California Energy Code*, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

5.506.2 CARBON DIOXIDE (CO_2) MONITORING. For buildings or additions equipped with demand control ventilation, CO_2 sensors and ventilation controls shall be specified and installed in accordance with the requirements of the California Energy Code, Section 120(c)(4).

5.506.3 Carbon dioxide (CO2) monitoring in classrooms.
(DSA-SS) Each public K-12 school classroom, as listed in Table 120.1-A of the *California Energy Code,* shall be equipped with a carbon dioxide monitor or sensor that meets the following requirements:

1. The monitor or sensor shall be permanently affixed in a tamper-proof manner in each classroom between 3 and 6 feet (914 mm and 1829 mm) above the floor and at least 5 feet (1524 mm) away from door and operable windows.
2. When the monitor or sensor is not integral to an Energy Management Control System (EMCS), the monitor or sensor shall display the carbon dioxide readings on the device. When the sensor is integral to an EMCS, the carbon dioxide readings shall be available to and regularly monitored by facility personnel.
3. A monitor shall provide notification though a visual indicator on the monitor when the carbon dioxide levels in the classroom have exceeded 1,100ppm. A sensor integral to an EMCS shall provide notification to facility personnel through a visual and/or audible indicator when the carbon dioxide levels in the classroom have exceeded 1,100ppm.
4. The monitor or sensor shall measure carbon dioxide levels at minimum 15- minute intervals and shall maintain a record of previous carbon dioxide measurements of not less than 30 days duration.
5. The monitor or sensor used to measure carbon dioxide levels shall have the capacity to measure carbon dioxide levels with a range of 400ppm to 2000ppm or greater.
6. The monitor or sensor shall be certified by the manufacturer to be accurate within 75ppm at 1,000ppm carbon dioxide concentration and shall be certified by the manufacturer to require calibration no more frequently than once every 5 years.

SECTION 5.507 ENVIRONMENTAL COMFORT

5.507.4 ACOUSTICAL CONTROL. Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E 413, or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exception: [DSA-SS] For public schools and community colleges, the requirements of this section and all subsections apply only to new construction.

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport.

   Exceptions:

   1. L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
   2. L_{dn} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.

2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

5.507.4.1.1. Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB L_{eq} - 1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance Method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (Leq-1Hr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site Features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of Compliance. An acoustical analysis documenting complying interior soundlevels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control: www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf.

SECTION 5.508 OUTDOOR AIR QUALITY

5.508.1 Ozone depletion and greenhouse gas reductions. Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

5.508.1.1 Chlorofluorocarbons (CFCs). Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

5.508.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

Y	N/A	RESPON. PARTY
☐	☒	

5.508.2 Supermarket refrigerant leak reduction. New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration systems include both new facilities and the replacement of existing refrigeration systems in existing facilities.

Exception: Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value less than 150 are not subject to this section. Low-GWP refrigerants are nonozone-depleting refrigerants that include ammonia, carbon dioxide (CO_2), and potentially other refrigerants.

5.508.2.1 Refrigerant piping. Piping compliant with the California Mechanical Code shall be installed to be accessible for leak protection and repairs. Piping runs using threaded pipe, copper tubing with an outside diameter (OD) less than 1/4 inch, flared tubing connections and short radius elbows shall not be used in refrigerant systems except as noted below.

5.508.2.1.1 Threaded pipe. Threaded connections are permitted at the compressor rack.

5.508.2.1.2 Copper pipe. Copper tubing with an OD less than 1/4 inch may be used in systems with a refrigerant charge of 5 pounds or less.

5.508.2.1.2.1 Anchorage. One-fouth-inch OD tubing shall be securely clamped to a rigid base to keep vibration levels below 8 mils.

5.508.2.1.3 Flared tubing connections. Double-flared tubing connections may be used for pressure controls, valve pilot lines and oil.

Exception: Single-flared tubing connections may be used with a multiring seal coated with industrial sealant suitable for use with refrigerants and tightened in accordance with manufacturer's recommendations.

5.508.2.1.4 Elbows. Short radius elbows are only permitted where space limitations prohibit use of long radius elbows.

5.508.2.2 Valves. Valves Valves and fittings shall comply with the *California Mechanical Code* and as follows.

5.508.2.2.1 Pressure relief valves. For vessels containing high-GWP refrigerant, a rupture disc shall be installed between the outlet of the vessel and the inlet of the pressure relief valve.

5.508.2.2.1.1 Pressure detection. A pressure gauge, pressure transducer or other device shall be installed in the space between the rupture disc and the relief valve inlet to indicate a disc rupture or discharge of the relief valve.

5.508.2.2.2 Access valves. Only Schrader access valves with a brass or steel body are permitted for use.

5.508.2.2.2.1 Valve caps. For systems with a refrigerant charge of 5 pounds or more, valve caps shall be brass or steel and not plastic.

5.508.2.2.2.2 Seal caps. If designed for it, the cap shall have a neoprene O-ring in place.

5.508.2.2.2.2.1 Chain tethers. Chain tethers to fit ovr the stem are required for valves designed to have seal caps.

Exception: Valves with seal caps that are not removed from the valve during stem operation.

5.508.2.3 Refrigerated service cases. Refrigerated service cases holding food products containing vinegar and salt shall have evaporator coils of corrosion-resistant material, such as stainless steel; or be coated to prevent corrosion from these substances.

5.508.2.3.1 Coil coating. Consideration shall be given to the heat transfer efficiency of coil coating to maximize energy efficiency.

5.508.2.4 Refrigerant receivers. Refrigerant receivers with capacities greater than 200 pounds shall be fitted with a device tha indicates the level of refrigerant in the receiver.

5.508.2.5 Pressure testing. The system shall be pressure tested during installation prior to evacuation and charging.

5.508.2.5.1 Minimum pressure. The system shall be charged with regulated dry nitrogen and appropriate tracer gas to bring system pressure up to 300 psig minimum.

5.508.2.5.2 Leaks. Check the system for leaks, repair any leaks, and retest for pressure using the same gauge.

5.508.2.5.3 Allowable pressure change. The system shall stand, unaltered, for 24 hours with no more than a +/- one pound pressure change from 300 psig, measured with the same gauge.

5.508.2.6 Evacuation. The system shall be evacuated after pressure testing and prior to charging.

5.508.2.6.1 First vacuum. Pull a system vacuum down to at least 1000 microns (+/- 50 microns), and hold for 30 minutes.

5.508.2.6.2 Second vacuum. Pull a second system vacuum to a minimum of 500 microns and hold for 30 minutes.

5.508.2.6.3 Third vacuum. Pull a third vacuum down to a minimum of 300 microns, and hold for 24 hours with a maximum drift of 100 microns over a 24-hour period.

CHAPTER 7
INSTALLER & SPECIAL INSPECTOR QUALIFICATIONS

702 QUALIFICATIONS

702.1 INSTALLER TRAINING. HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. Examples of acceptable HVAC training and certification programs include but are not limited to the following:

1. State certified apprenticeship programs.
2. Public utility training programs.
3. Training programs sponsored by trade, labor or statewide energy consulting or verification organizations.
4. Programs sponsored by manufacturing organizations.
5. Other programs acceptable to the enforcing agency.

702.2 SPECIAL INSPECTION [HCD]. When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector:

1. Certification by a national or regional green building program or standard publisher.
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

Notes:

1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS).

[BSC-CG] When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition, the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, as determined by the local agency.

Note: Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.

703 VERIFICATIONS

703.1 DOCUMENTATION. Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in the appropriate section or identified applicable checklist.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1160 BASS AVENUE, MENDOTA, CA 93640

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NV. LIC. NO. 37887

LICENSED ARCHITECT
ROBERT E. REBERTE
No. C-20307
Exp. 6-30-25
STATE OF CALIFORNIA

DRAWN: BLB
CHECKED: MM
REVISIONS:

DATE FEB. 6, 2025
JOB NO. 24769

SHEET TITLE
CALGREEN COMPLIANCE DOCUMENTATION

SHEET NO.
CG-3

HEAT PUMP OUTDOOR UNIT SCHEDULE

SYMBOL	MANUFACTURER	MODEL	NOMINAL TONS	TOTAL COOLING MBH	AMBIENT TEMP	EER2	SEER2	INTEGRATED HEATING MBH	AMB	COP @ 47°F	COMPRESSOR RLA	COMPRESSOR LRA	CONDENSER FLA	MCA	MAX FUSE (AMPS)	VOLT/PH	WEIGHT	REMARKS
HPO 1	CARRIER	27SCA560A003	5.0	55.21	105	12.0	14.5	37.6	24	3.74	23.7	157.0	1.5	31.1	50	208/1	255	1, 2, 3, 4, 5, 6, 7
HPO 2	CARRIER	27SCA524A003	2.0	22.8	105	12.0	15.2	15.16	24	3.64	10.3	64.4	0.6	13.5	20	208/1	196	1, 2, 3, 4, 5, 6, 7
HPO 3	CARRIER	27SCA542A003	3.5	39.65	105	12.0	14.3	27.79	24	4.02	19.0	123.0	1.05	24.9	40	208/1	224	1, 2, 3, 4, 5, 6, 7

PROVIDE:
1. CRANKCASE HEATER AT COMPRESSOR.
2. HARD START KIT (START CAPACITOR AND RELAY) AT OUTDOOR UNIT.
3. HARD START TXV AT INDOOR UNIT.
4. R – 454B REFRIGERANT, CLASS A2L.
5. LONG LINE SETS KIT. INSTALLING CONTRACTOR TO VERIFY REQUIRED LINE SIZES TO ENSURE PROPER OPERATION FOR LONG LINE SET APPLICATION.
6. LIQUID LINE SIGHT GLASS AND SOLENOID VALVE.
7. REFRIGERANT CHARGE PER MANUFACTURES WRITTEN INSTRUCTIONS.

HEAT PUMP INDOOR UNIT SCHEDULE

SYMBOL	MANUFACTURER	MODEL	MAX. ESP (IN. WG.)	MAX. S.A CFM	OSA CFM	COOLING CAPACITY EAT °Fdb/wb	COOLING CAPACITY LAT °Fdb/wb	COOLING CAPACITY TOTAL MBH	COOLING CAPACITY SENSIBLE MBH	HEATING CAPACITY EAT °Fdb/wb	HEATING CAPACITY LAT °Fdb/wb	HEATING CAPACITY TOTAL MBH	AUX HEAT KW	ELECTRICAL VOLT	PH	HZ	MCA	MAX	OPERATING WEIGHT LBS.	REMARKS
HPI 1	CARRIER	FJ5ANB D60L00	0.80	1800	480	82/66	58/57	HPO 1	45.1	66	87.5	37.4	11.3	208	1	60	45.6	50	210	1, 2, 3
HPI 2	CARRIER	FJ5ANX B24L00	0.80	800	190	82/66	58/57	HPO 2	17.5	66	86.7	15.1	6.0	208	1	60	40.6	45	131	1, 2, 3
HPI 3	CARRIER	FJ5ANB C48L00	0.80	1400	340	82/66	58/57	HPO 3	34.01	66	86.7	27.6	7.5	208	1	60	51.6	60	182.5	1, 2, 3

1. PROVIDE PROGRAMMABLE THERMOSTAT, BACNET IP COMPLIANT, WI-FI CONNECTED WITH CO2 MONITORING (IN-BUILT).
2. PROVIDE 2" THICK MERV 13 FILTER KIT.
3. FACTORY INSTALLED TXV (HARD SHUT OFF TYPE)

RELIEF VENT SCHEDULE

SYMBOL	MANUFACTURER	MODEL	CFM	SP (IN. WG.)	THROAT AREA	WEIGHT	REMARKS
RV 1	GREENHECK	FGR 18x36	1800	0.022	4.5	100 LBS	ROOF CURB
RV 2	GREENHECK	FGR 18x30	1400	0.019	3.72	100 LBS	ROOF CURB
RV 3	GREENHECK	FGR 14x14	400	0.012	1.36	90 LBS	ROOF CURB

CEILING EXHAUST FAN SCHEDULE

SYMBOL	MANUFACTURER	MODEL	FULL CFM	CONTINUOUS MIN	ESP (IN. WG.)	SONES MAX.	ELECTRICAL WATTS	ELECTRICAL VOLTS	ELECTRICAL PH	WEIGHT (LBS)	REMARKS
CEF 1	GREENHECK	SP-A200	100	N/A	0.375	2.0	25	120	1	25	1,2,3,4,5

PROVIDE:
1. BACK DRAFT DAMPER.
2. ENERGY STAR LABEL.
3. INTERLOCKED WITH LIGHT SWITCH
4. PROVIDE COMPLETE WITH SPEED CONTROLLER
5. PROVIDE WALL CAP OR ROOF CAP FOR DISCHARGE

DSA EQUIP. ANCHOR. & BRACING NOTES

M/E/P COMPONENT ANCHORAGE NOTES:

ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA-APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2022 CBC SECTIONS 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTERS 13, 26 AND 30.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (e.g. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRAVERSE AND LONGITUDINAL DIRECTIONS.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVING A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY THE DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

MEP DISTRIBUTION SYSTEM BRACING NOTE FOR PIPING, DUCTWORK AND ELECTRICAL CONDUIT:

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7 SECTIONS 13.6.5, 13.6.6, 13.6.7, AND 13.6.8; AND 2022 CBC SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING THE BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEMS ARE AS NOTED BELOW. THE MEP DESIGN PROFESSIONAL ENGINEER RESPONSIBLE FOR CONTENT ON THESE SHEETS HAS VERIFIED THAT THE DESIGN METHODS IDENTIFIED BELOW ARE IN ACCORDANCE WITH DSA IR 16-13.

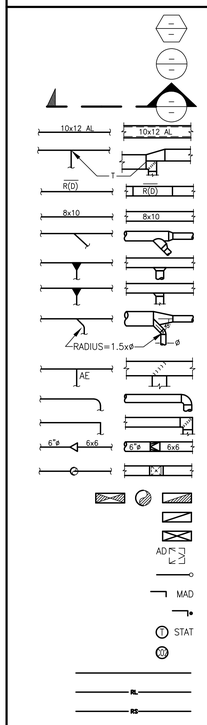
MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

☒ MP ☒ MD ☒ PP ☐ E – OPTION 1: PROJECT SPECIFIC DESIGN

☐ MP ☐ MD ☐ PP ☐ E – OPTION 2: DESIGN BASED ON OSHPD OPM, WITHIN PROJECT SUBMITTAL

☐ MP ☐ MD ☐ PP ☐ E – OPTION 3: DESIGN BASED ON OSHPD OPM, DEFERRED SUBMITTAL

MECHANICAL LEGEND



UNIT TYPE
UNIT NUMBER

DETAIL NUMBER
SHEET NUMBER ON WHICH DETAIL IS FOUND

SECTION NUMBER
SHEET ON WHICH SECTION IS FOUND

ACOUSTICALLY LINED DUCT – DIMENSIONS ARE OUTSIDE

BRANCH TAKE-OFF WITH SPLITTER DAMPER & W/ THROAT SIZE AS INDICATED. TRANSITION TO DUCT SIZES SHOWN.

DUCT RISE (DROP) IN DIRECTION OF AIR FLOW

DUCT – WIDTH x DEPTH

LATERAL WITH CONICAL TRANSITION TO DUCT SIZES INDICATED

CONICAL TEE FROM RECTANGULAR TO ROUND BRANCH

45° ENTRY TEE, RECTANGULAR BRANCH, RECTANGULAR MAIN

45° WYE, CONICAL MAIN AND BRANCH WITH 45° ELBOW, BRANCH 90° TO MAIN

TEE WITH ADJUSTABLE EXTRACTOR. RECTANGULAR MAIN, RECTANGULAR BRANCH

RADIUS ELL. SEE SPECS.

SQUARE ELL WITH TURNING VANES

TRANSITION ROUND TO RECTANGULAR

VERTICAL DUCT RISE OR DROP

DUCT DROP OR RISE THRU ROOF OR FLOOR

RETURN, OUTSIDE, OR EXHAUST AIR DUCT

SUPPLY DUCT

ACCESS DOOR

AUTOMATIC CONTROL DAMPER

MANUAL AIR DAMPER

VOLUME DAMPER WITH REMOTE BALANCING DEVICE

THERMOSTAT, MOUNT 48" AFF MAX. TO TOP OF BOX

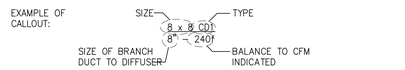
CO2 SENSOR

HOT GAS LINE

REFRIGERANT LIQUID

REFRIGERANT SUCTION

DIFFUSER, REGISTER, & GRILLE SCHEDULE



SYMBOL	DESCRIPTION
CD1	CEILING DIFFUSER – 1 "TITUS" MODEL MCD, MODULAR CORE, STEEL CONSTRUCTION, FRAME TYPE 3 FOR T-BAR INSTALLATION. DIFFUSER, SIZE AND BLOW PATTERN AS INDICATED ON DRAWINGS. FURNISH WITH AG-95 OPPOSED BLADE DAMPER AND OFF-WHITE FINISH.
CD2	CEILING DIFFUSER – 2 "TITUS" MODEL MCD, STEEL CONSTRUCTION, FRAME TYPE 6 FOR SURFACE MOUNTING. FURNISH WITH AG-95 OPPOSED BLADE DAMPER AND OFF-WHITE FINISH. SIZE AND BLOW PATTERN AS INDICATED ON DRAWINGS.
R1	RETURN REGISTER – 1 "TITUS" MODEL 50F, ½"x½"x1" EGG-CRATE GRID, ALUMINUM CONSTRUCTION, FRAME TYPE 3 FOR T-BAR INSTALLATION, OPPOSED BLADE DAMPER, OFF-WHITE PAINT, SIZE AS INDICATED ON DRAWINGS.
R2	RETURN REGISTER – 2 "TITUS" MODEL 50F, ½"x½"x1" EGG-CRATE GRID, ALUMINUM CONSTRUCTION, FRAME TYPE FOR SURFACE MOUNTING, OPPOSED BLADE DAMPER, OFF-WHITE PAINT, SIZE AS INDICATED ON DRAWINGS.

APPLICABLE CODES

CODES:

ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE REGULATIONS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

A) STATE OF CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24, BUILDING STANDARDS:
2022 EDITION OF THE CALIFORNIA BUILDING CODE.
2022 EDITION OF THE CALIFORNIA ELECTRICAL CODE.
2022 EDITION OF THE CALIFORNIA MECHANICAL CODE.
2022 EDITION OF THE CALIFORNIA PLUMBING CODE.
2022 EDITION OF THE CALIFORNIA ENERGY CODE.

B) NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) LIFE SAFETY CODE, CR.

MECHANICAL ABBREVIATIONS

AAV	AUTOMATIC AIR VENT
ABV	ABOVE
ABC, OH	ABOVE CEILING, OVERHEAD
AC	AIR CONDITIONING
AD	ACCESS DOOR
ADA	AMERICANS W/ DISABILITIES ACT
AE	AIR EXTRACTOR
AFF	ABOVE FINISHED FLOOR
AL	ACOUSTICALLY LINED
AHU	AIR HANDLING UNIT
APD	AIR PRESSURE DROP
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BR	BRANCH
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
CAV	CONSTANT AIR VOLUME
CD	CONDENSATE DRAIN
CFM, f	CUBIC FEET OF AIR PER MINUTE
CFS	CUBIC FEET PER SECOND
CL	CENTERLINE
CO	CLEANOUT
CONC.	CONCRETE
CONN.	CONNECT
CR	CONDENSATE RETURN (STEAM)
CS	CURRENT SENSOR
CU	CONDENSING UNIT
CU FT	CUBIC FEET
CU IN	CUBIC INCHES
CVB	CONSTANT VOLUME BOX
CW	COLD WATER
DB	DRY BULB
DF	DOUGLAS FIR
DIA, ø	DIAMETER
DSP	DUCT STATIC PRESSURE SENSOR
EA, OA, RA, SA	EXHAUST, OUTSIDE, RETURN & SUPPLY AIR
E.C.	ELECTRICAL CONTRACTOR
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
FA	FACE AREA (SQUARE FEET)
FC	FLEXIBLE CONNECTION
FLA	FULL LOAD AMPS
FPI	FINS PER INCH
FPM	FEET PER MINUTE
GALV.	GALVANIZED
GA	GAUGE
GC	GENERAL CONTRACTOR
GSM	GALVANIZED SHEET METAL
HP	HORSE POWER
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
HZ	FREQUENCY (HERTZ)
LBS	POUNDS
LRA	LOCKED ROTOR AMPS
LWT	LEAVING WATER TEMPERATURE
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MBH	BTU PER HOUR (THOUSAND)
MC	MECHANICAL CONTRACTOR
MIN	MINIMUM
MPS	MEDIUM PRESSURE STEAM
(N) (E)	NEW, EXISTING
N.C.	NORMALLY CLOSED
NEG	NEGATIVE
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OP	OPERATING
PH	PHASE
POC	POINT OF CONNECTION
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE TREATED
PTDF	PRESSURE TREATED DOUGLAS FIR
P&TRV	PRESSURE & TEMPERATURE RELIEF VALVE
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
(R) (D)	RISE, DROP
RD, OFL	ROOF DRAIN, OVERFLOW
REF	ROOF EXHAUST FAN
REQ'D	REQUIRED
RL	REFRIGERANT LIQUID
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
SAD	SEE ARCHITECTURAL DRAWINGS
SED	SEE ELECTRICAL DRAWINGS
SM	SHEET METAL
SMS	SHEET METAL SCREWS
SOV	SHUT OFF VALVE
SS	STAINLESS STEEL
SSD	SEE STRUCTURAL DRAWING
STL	STEEL
TA, FA	TO ABOVE, FROM ABOVE
TB, FB	TO BELOW, FROM BELOW
TBR	TO BE REMOVED
TCC	TEMPERATURE CONTROL CONTRACTOR
TCP	TEMPERATURE CONTROL PANEL
THK	THICK
TR	TO REMAIN
TSP	TOTAL STATIC PRESSURE
TV	TURNING VANES
TYP	TYPICAL
UG, UF	UNDERGROUND, UNDER FLOOR
UON	UNLESS OTHERWISE NOTED
UTR	UP THROUGH ROOF
VAC	VOLTS ALTERNATING CURRENT
VFD	VARIABLE FREQUENCY DRIVE
VIF	VERIFY IN FIELD
WB	WET BULB
WG	WATER GAUGE
WOG	WATER OIL GAS PRESSURE RATING
WP	WATER PRESSURE
WPD	WATER PRESSURE DROP
WT, AT	WATERTIGHT, AIRTIGHT

COMPLIANCE NOTES

MECHANICAL AND PLUMBING EQUIPMENT SHALL CONFORM TO THE FOLLOWING AS STATED IN THE ENERGY EFFICIENCY STANDARDS, 2022.

1. BE CERTIFIED BY THE MANUFACTURER AS COMPLYING WITH THE EFFICIENCY REQUIREMENTS AS PRESCRIBED IN SECTIONS:
   110.1 APPLIANCES REGULATED BY THE APPLIANCE EFFICIENCY STANDARDS:
   110.2 HVAC EQUIPMENT EFFICIENCY AND PACKAGED CONTROLS:
   110.3 SERVICE WATER HEATING EFFICIENCY AND CONTROLS:
   110.4 POOL AND SPA HEATING EFFICIENCY AND CONTROLS:
   110.5 RESTRICTIONS ON PILOT LIGHTS:
2. BE SPECIFIED AND INSTALLED IN ACCORDANCE WITH SECTIONS.
   120.1 REQUIREMENTS FOR VENTILATION:
   120.2 REQUIRED CONTROLS FOR HVAC SYSTEMS:
   120.2 (H) DEMAND SHED CONTROLS.
   120.2 (I) ECONOMIZER FAULT DETECTION & DIAGNOSTIC.
   120.3 REQUIREMENTS FOR PIPE INSULATION:
   120.4 REQUIREMENTS FOR DUCT INSULATION:
   120.5 REQUIREMENTS FOR MECHANICAL SYSTEMS
   120.8 BUILDING COMMISSIONING
   120.9 REQUIREMENTS FOR COMMERCIAL BOILERS
3. THE CALIFORNIA ENERGY CODE SECTION 10-103 REQUIRES ACCEPTANCE TESTING ON ALL NEWLY INSTALLED LIGHTING CONTROLS, MECHANICAL SYSTEMS, ENVELOPES, AND PROCESS EQUIPMENT AFTER INSTALLATION AND BEFORE PROJECT COMPLETION. AN ACCEPTANCE TEST IS A FUNCTIONAL PERFORMANCE TEST TO HELP ENSURE THAT NEWLY INSTALLED EQUIPMENT IS OPERATING AND IN COMPLIANCE WITH THE ENERGY CODE.

   LIGHTING CONTROLS ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED LIGHTING CONTROLS ACCEPTANCE TEST TECHNICIAN (ATT).
   MECHANICAL SYSTEM ACCEPTANCE TESTS MUST BE PERFORMED BY A CERTIFIED MECHANICAL ATT FOR PROJECTS SUBMITTED ON OR AFTER OCTOBER 1, 2021
   ENVELOPE AND PROCESS EQUIPMENT ACCEPTANCE TESTS SHALL BE PERFORMED BY THE INSTALLING CONTRACTOR, ENGINEER/ARCHITECT OF RECORD OR THE OWNER'S AGENT.

   A LISTING OF CERTIFIED ATT'S CAN BE FOUND AT
   HTTPS://WWW.ENERGY.CA.GOV/PROGRAMS-AND-TOPICS/PROGRAMS/ACCEPTANCE-TEST-TECHNICIAN-CERTIFICATION-PROVIDER-PROGRAM/ACCEPTANCE

   THE ACCEPTANCE TESTING PROCEDURES MUST BE REPEATED, AND DEFICIENCIES MUST BE CORRECTED BY THE BUILDER OR INSTALLING CONTRACTOR UNTIL THE CONSTRUCTION/INSTALLATION OF THE SPECIFIED SYSTEMS CONFORM AND PASS THE REQUIRED ACCEPTANCE CRITERIA.
   PROJECT INSPECTORS WILL BE COLLECTING THE FORMS TO CONFIRM THAT THE REQUIRED ACCEPTANCE TESTS HAVE BEEN COMPLETED.
4. PER 2022 CMC 603.4, FLEXIBLE DUCT MAY NOT EXCEED 5'-0" MAXIMUM LENGTH.
5. PER TITLE 24 SECTION 120.2(f), OUTSIDE AIR DAMPERS SHALL BE INSTALLED TO AUTOMATICALLY CLOSE UPON FAN SHUTDOWN.
6. PER TITLE 24 SECTION 120.4, ALL JOINTS AND SEAMS IN THE DUCT SYSTEM SHALL BE SEALED USING UL 181 TAPE OR MASTIC. HVAC EQUIPMENT SHALL BE SEALED TO THE RETURN AND SUPPLY PLENUM, DUCTS SHALL BE SEALED TO THE RETURN AND SUPPLY PLENUM, DUCTS SHALL BE SEALED TO THE BOOTS.
7. HORIZONTAL FLEX DUCTS SHALL BE SUPPORTED AT A MAXIMUM OF 4' INTERVALS, WITH HANGING STRAPS MIN. 1-1/2" WIDE. FLEX DUCTS MUST BE PULLED TIGHT WITH A MAX. SAG OF ½"/FT. FLEX DUCTS SHALL NOT BE KINKED OR CRUSHED. FLEX DUCTS SHALL USE A DRAWBAND TO ATTACH THE INNER CORE TO A METAL COLLAR.
8. PER ENERGY CODE SECTION 110.2(b). HEAT PUMPS USING SUPPLEMENTARY ELECTRIC RESISTANCE HEATING MUST USE A THERMOSTAT DESIGNED FOR HEAT PUMPS AND THE THERMOSTAT SHALL BE PROGRAMMED TO PREVENT SUPPLEMENTARY HEATER OPERATION WHEN THE HEATING LOAD CAN BE MET BY THE HEAT PUMP ALONE. THE CUT-ON TEMPERATURE FOR COMPRESSION HEATING MUST BE HIGHER THAN THE CUT-ON TEMPERATURE FOR SUPPLEMENTARY HEATING, AND THE CUT-OFF TEMPERATURE FOR COMPRESSION HEATING MUST BE HIGHER THAN THE CUT-OFF TEMPERATURE FOR SUPPLEMENTARY HEATING.
9. PER ENERGY CODE SECTION 120.2(e) MANUAL OVERRIDE CONTROLS ARE REQUIRED. ALL HVAC SYSTEMS SHALL HAVE A MANUAL OVERRIDE ACCESSIBLE TO THE OCCUPANTS THAT ALLOWS THEM TO TURN ON THE HVAC SYSTEM DURING NORMALLY UNOCCUPIED TIMES. THIS CAN BE A MANUAL OVERRIDE FOR UP TO 4 HOURS, OCCUPANCY SENSOR, OR A 4 HOUR MANUALLY OPERATED TIMER.

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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1601 BASS AVENUE, MENDOTA, CA 93640

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MEEHLEIS MODULAR BUILDINGS, INC.
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1303 E. LODI AVE.
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CA. LIC. NO. 472488
NV. LIC. NO. 37887

REGISTERED PROFESSIONAL ENGINEER
No. M
EXP 6/30/25
MECHANICAL
STATE OF CALIFORNIA

TURLEY & ASSOCIATES | MECHANICAL ENGINEERING GROUP, INC.
2401 Capitol Avenue
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Project Engineer	NS	Job Number	24232
Project Manager	NS	Plot Date: Feb 27, 2025 - 4:37pm	
Project Drafter	ZH	Login: NShah	

DRAWN: T&A
CHECKED: T&A
REVISIONS:

-	-

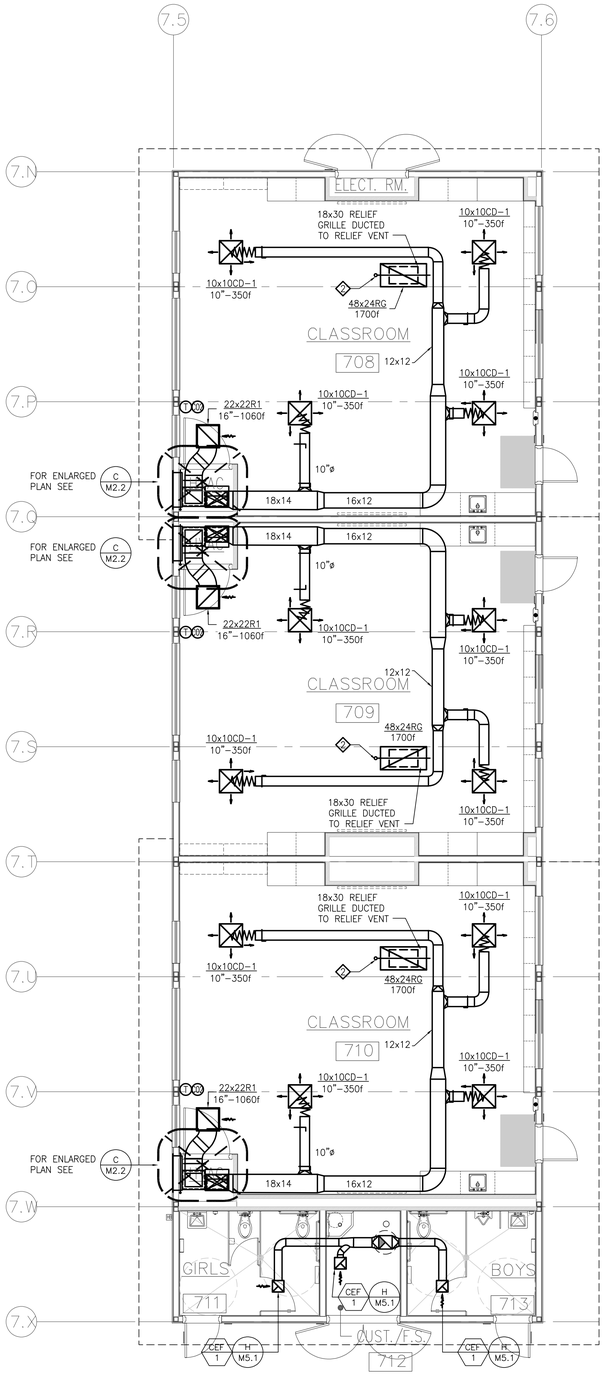
DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE
MECHANICAL LEGEND, SCHEDULES, AND NOTES

SHEET NO.
M0.1

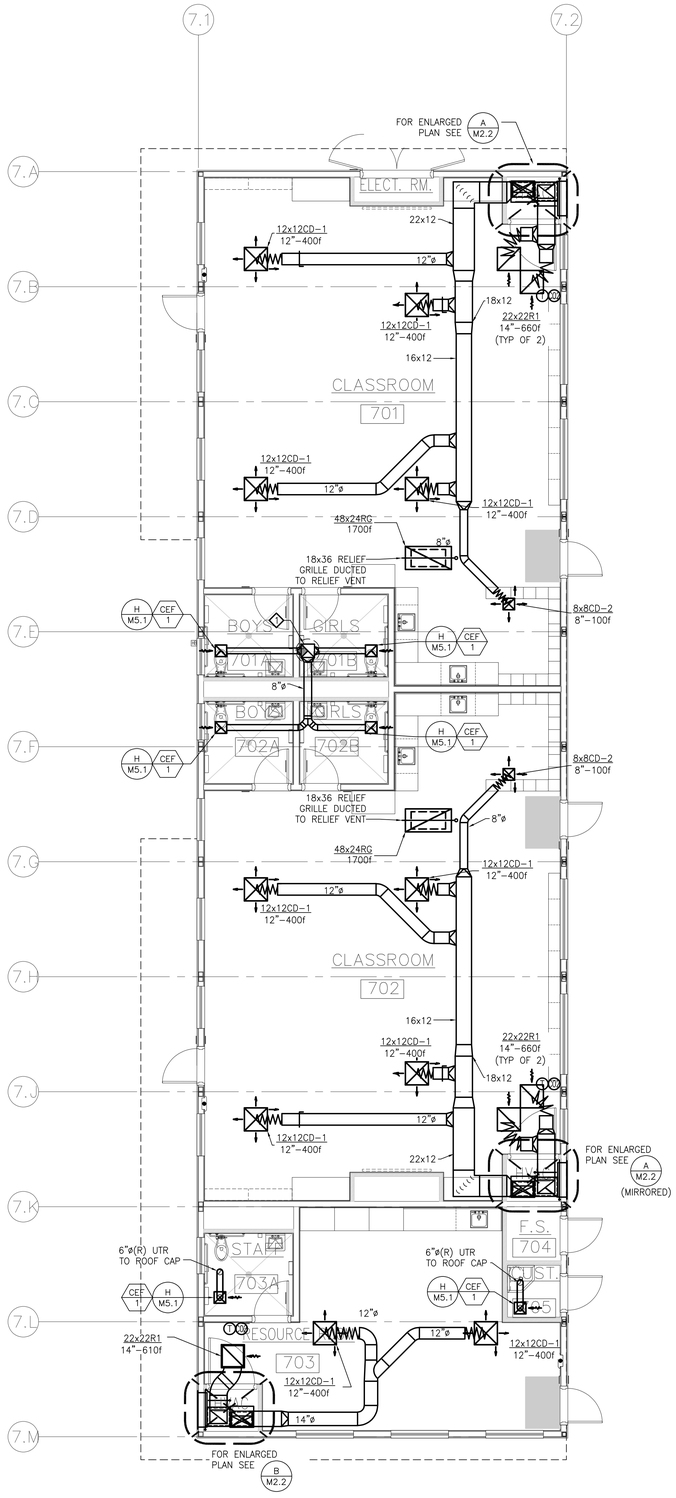
KEY NOTES

1. 14x14 EXHAUST DUCT UTR TO ROOF CAP
2. RELIEF MOTORIZED CONTROL DAMPER, INTERLOCKED WITH ECONOMIZER MODE



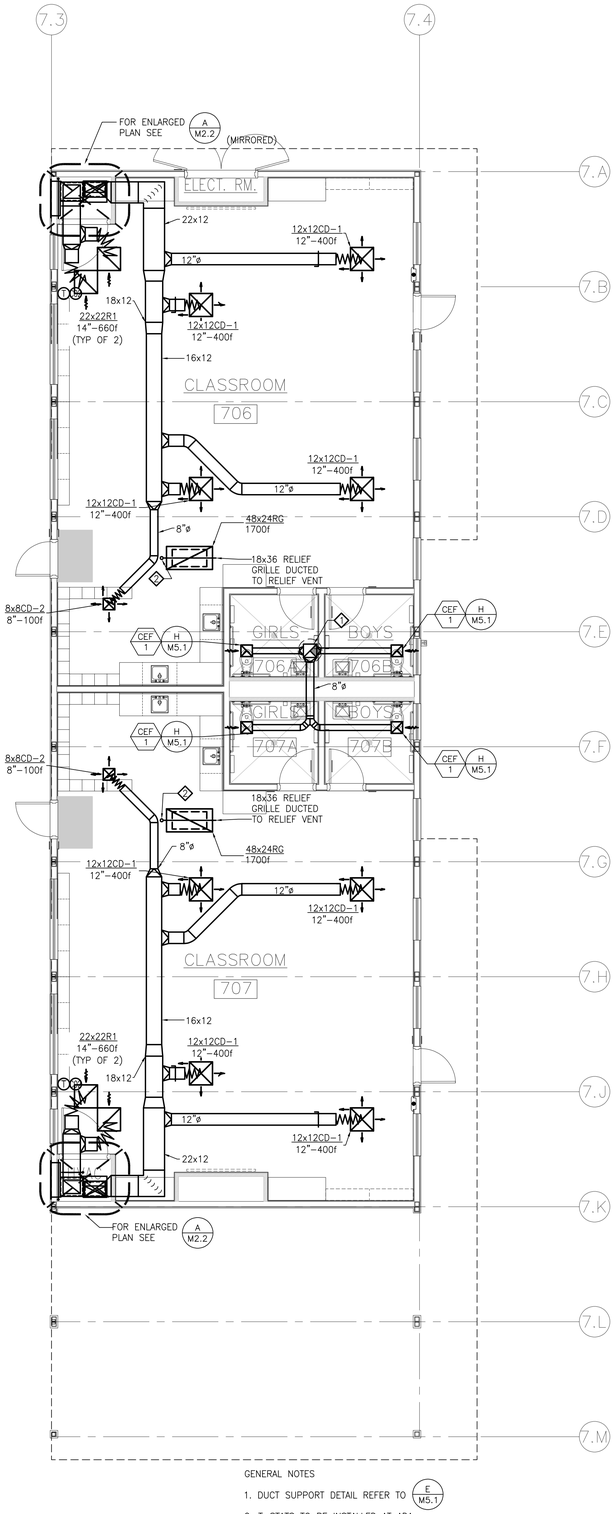
B OVERALL TYPICAL CLASSROOM MECHANICAL FLOOR PLAN

SCALE: 3/16" = 1'-0"



A OVERALL KIDERGARTEN MECHANICAL FLOOR PLAN

SCALE: 3/16" = 1'-0"



GENERAL NOTES

1. DUCT SUPPORT DETAIL REFER TO E M5.1
2. T-STATS TO BE INSTALLED AT ADA COMPLIANT HEIGHT (MAX 48" AFF AT TOP OF BOX). PROVIDE INSULATED BACK PLATES FOR ALL T-STATS INSTALLED AT EXTERIOR WALL.

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REGISTERED PROFESSIONAL ENGINEER
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MECHANICAL
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Project Engineer:	NS	Job Number:	24232
Project Manager:	NS	Plot Date:	Feb 27, 2025 - 4:37pm
Project Drafter:	ZH	Login:	NShah

DRAWN: T&A
CHECKED: T&A
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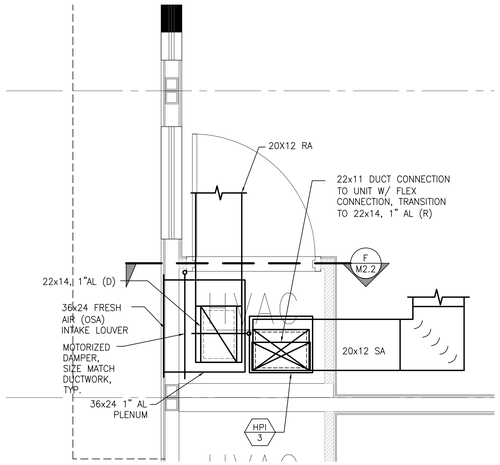
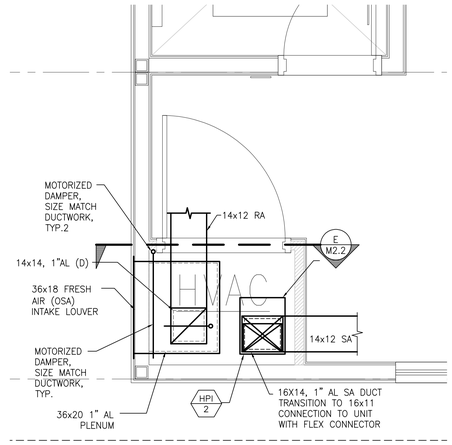
SHEET TITLE
MECHANICAL OVERALL FLOOR PLANS

SHEET NO.
M2.1



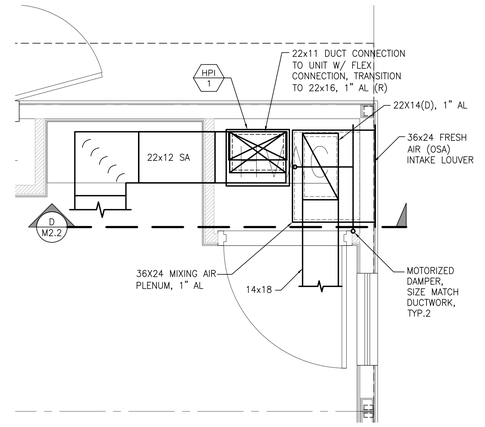
C ENLARGED MECHANICAL FLOOR PLAN

SCALE: 1/2" = 1'-0"



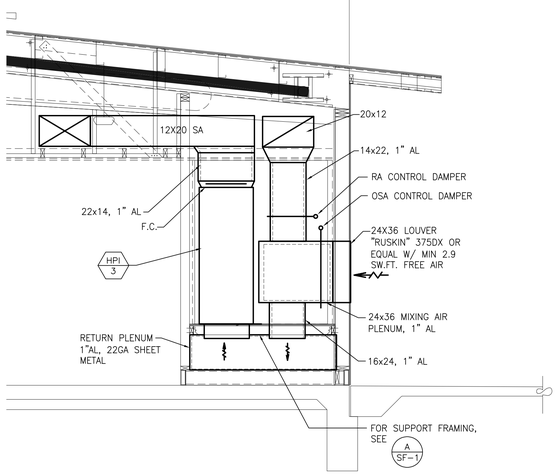
B ENLARGED MECHANICAL FLOOR PLAN

SCALE: 1/2" = 1'-0"



A ENLARGED MECHANICAL FLOOR PLAN

SCALE: 1/2" = 1'-0"



HPI-3

F ENLARGED MECHANICAL SECTION PLAN

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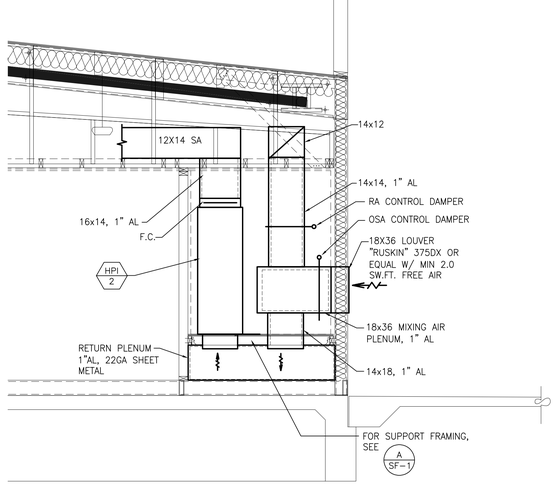

HPI-2

E ENLARGED MECHANICAL SECTION PLAN

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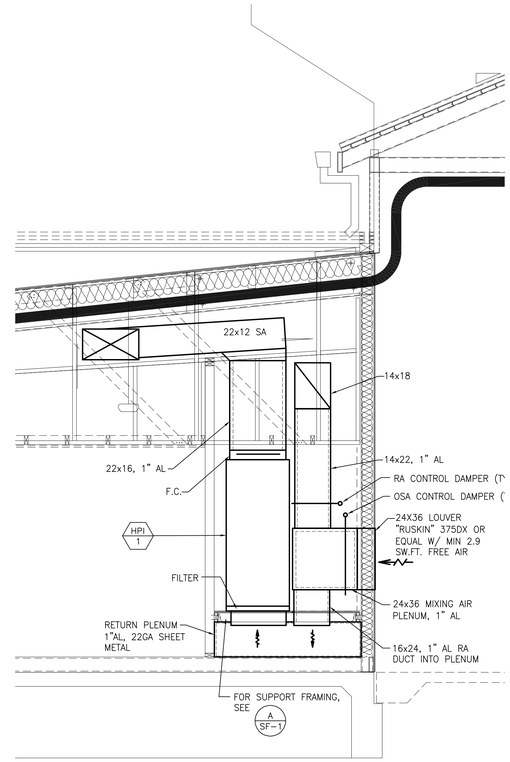

HPI-1

D ENLARGED MECHANICAL SECTION PLAN

SCALE: 1/2" = 1'-0"

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Project Drafter	ZH	Login: NSfish	

DRAWN: T&A
CHECKED: T&A
REVISIONS:

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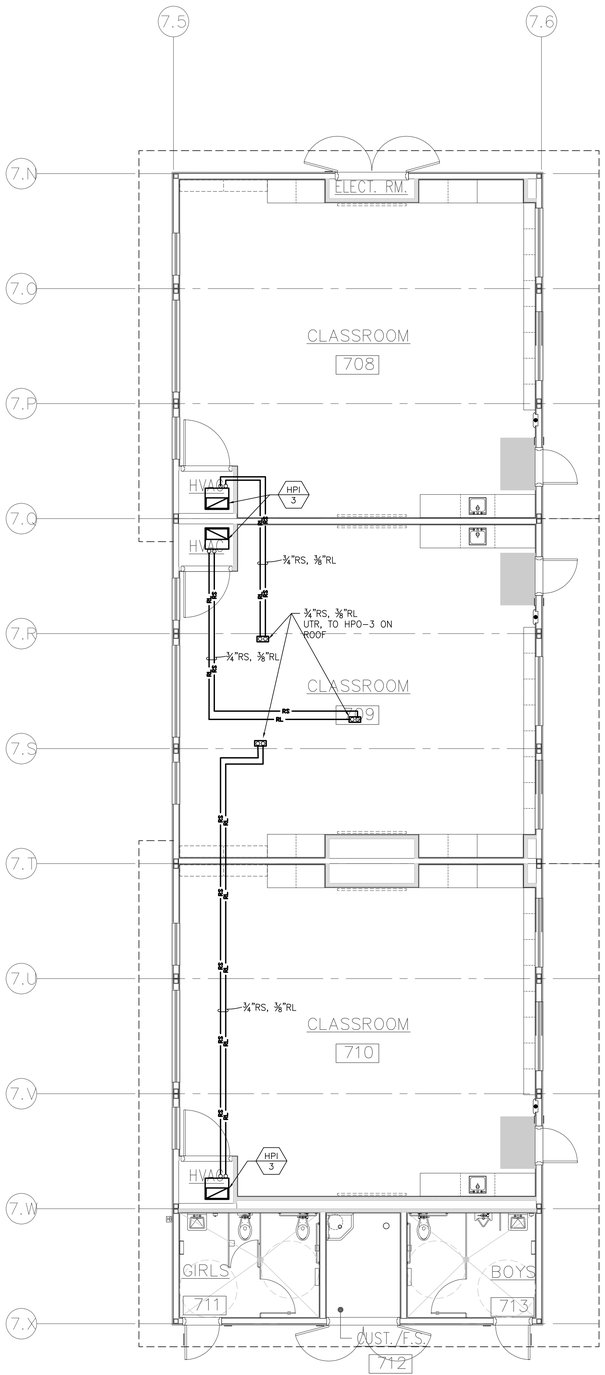
DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE

MECHANICAL OVERALL FLOOR PLANS

SHEET NO.

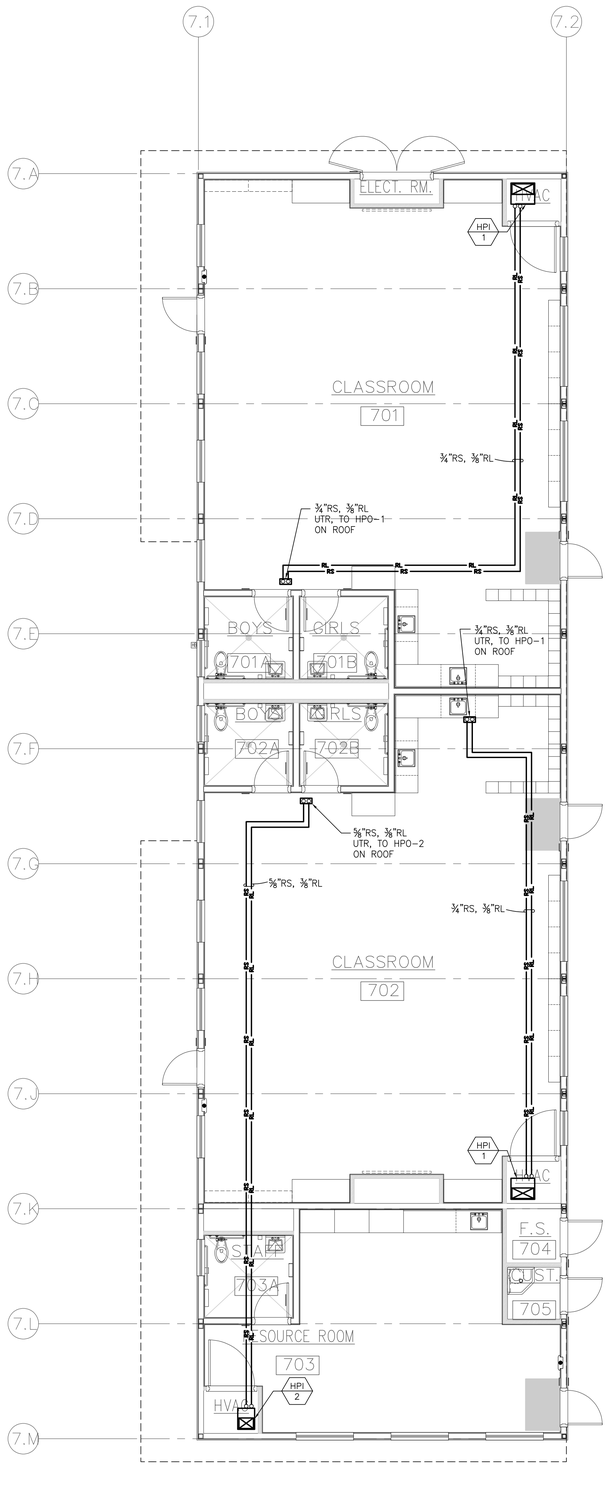
M2.2

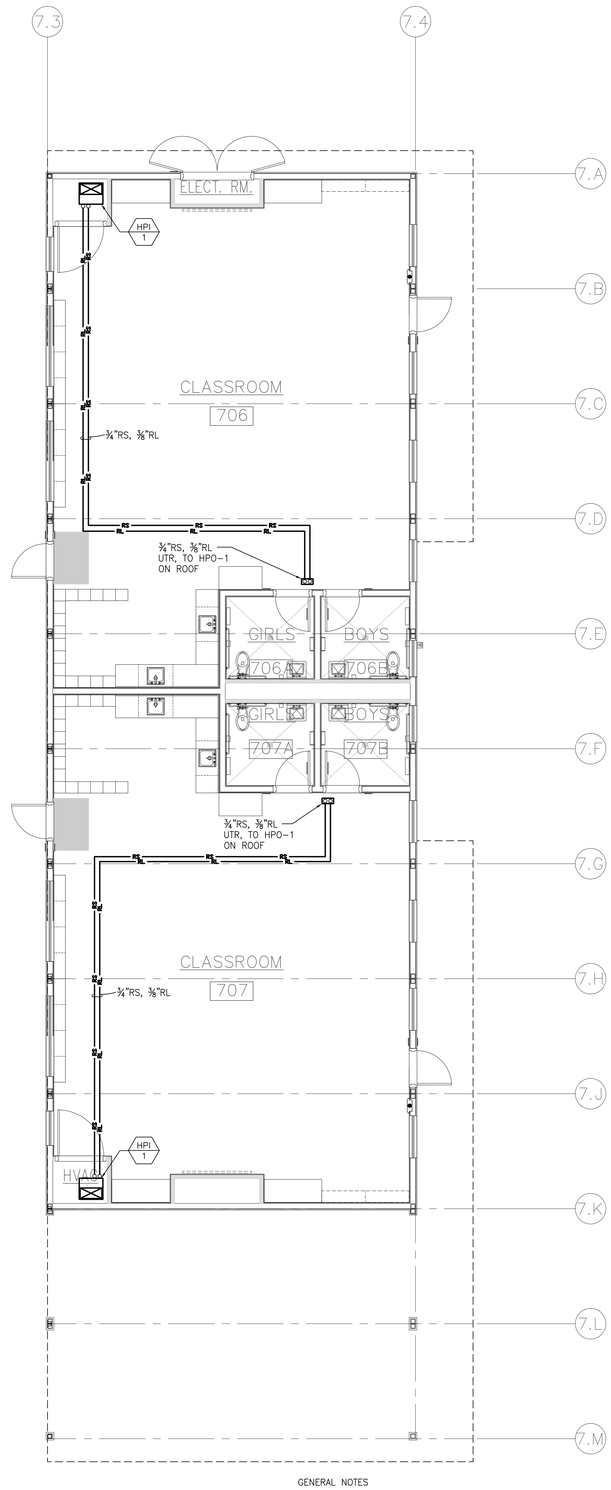


B

OVERALL TYPICAL CLASSROOM MECHANICAL PIPING FLOOR PLAN

SCALE: 3/16" = 1'-0"





A

OVERALL KIDERGARTEN MECHANICAL PIPING FLOOR PLAN

SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. REFRIGERANT PIPING SUPPORT DETAIL REFER TO C/P5.1

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

REFERENCE ONLY

FOR

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
60 BASS AVENUE, MENDOTA, CA 93640

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REGISTERED PROFESSIONAL ENGINEER
NIKOLAI J. SOSNIN
No. M 27[illegible]
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Project Engineer	NJS	Job Number	24232
Project Manager	NJS	Plot Date: Feb 27, 2025 - 4:38pm	
Project Drafter	JDH	Login: hdhan	

DRAWN: T&A
CHECKED: T&A

REVISIONS:

-	-

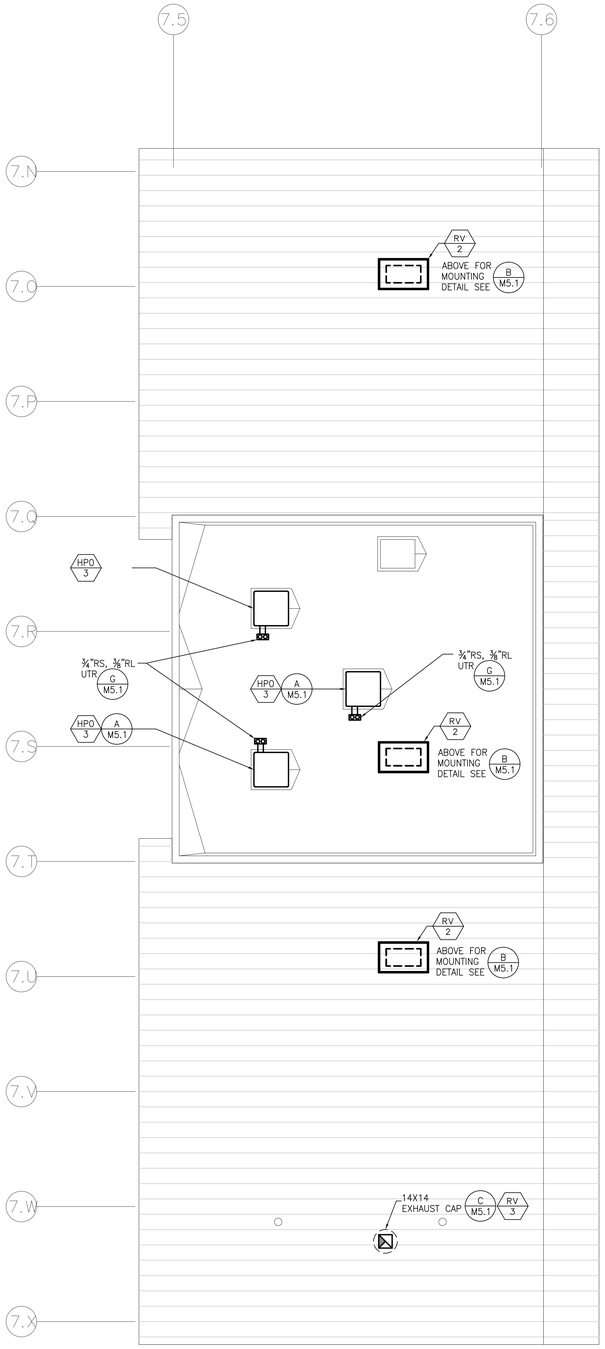
DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE

MECHANICAL OVERALL PIPING FLOOR PLANS

SHEET NO.

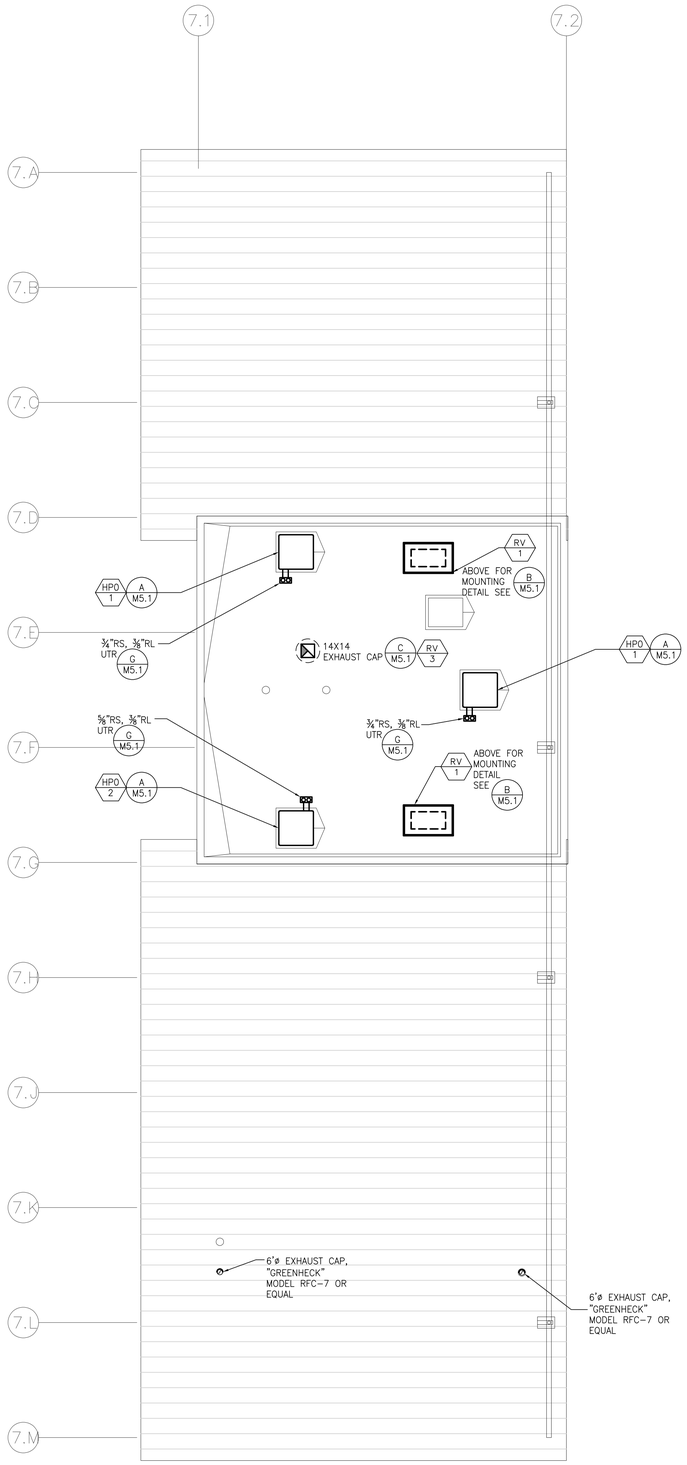
M2.3



B

OVERALL TYPICAL CLASSROOM MECHANICAL ROOF PLAN

SCALE: 3/16" = 1'-0"



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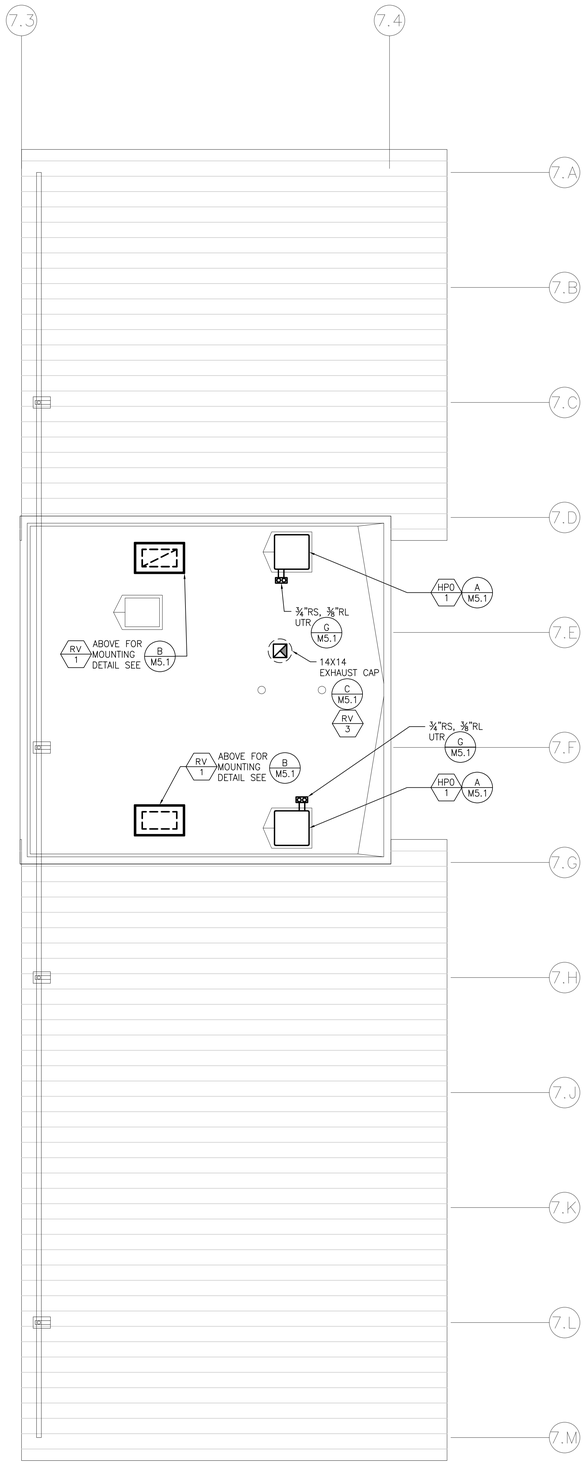
OVERALL KIDERGARTEN MECHANICAL ROOF PLAN

SCALE: 3/16" = 1'-0"



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INCREMENT #2
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REGISTERED PROFESSIONAL ENGINEER
No. M [illegible]
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Project Manager	NS	File Date	Feb 27, 2025 - 4:36pm
Project Drafter	ZH	Login	NSmith

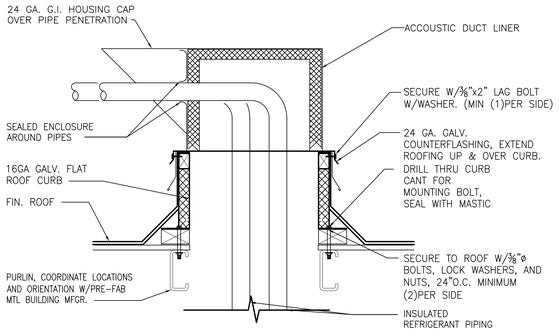
DRAWN: T&A
CHECKED: T&A
REVISIONS:

-	-

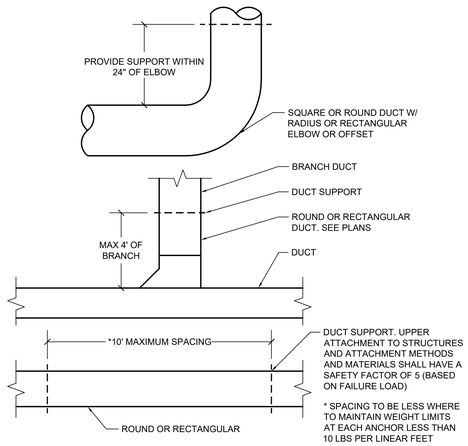
DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE
MECHANICAL OVERALL ROOF PLANS

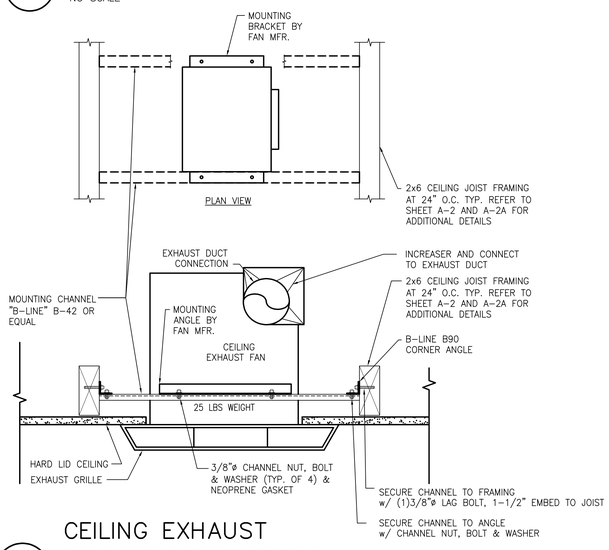
SHEET NO.
M3.1



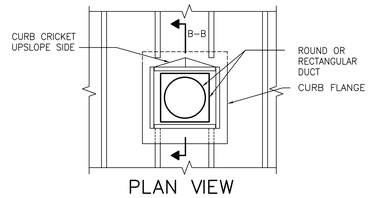
G PIPE THRU ROOF DETAIL
NO SCALE



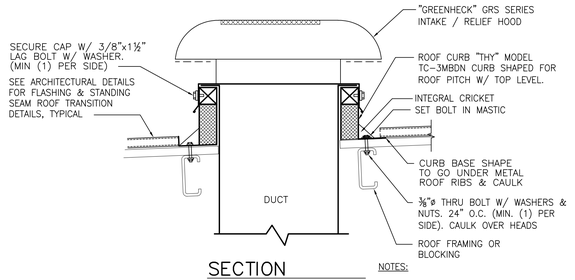
G DUCT SUPPORT LOCATION
PLAN VIEW – TYP ALL DUCTING
NO SCALE



H CEILING EXHAUST
FAN MOUNTING DETAIL
NO SCALE



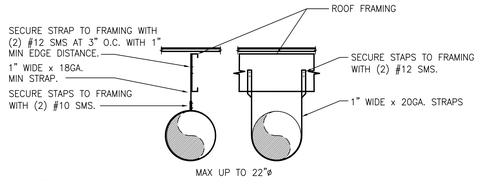
PLAN VIEW



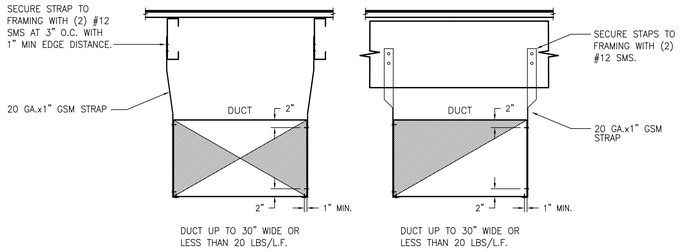
SECTION
B-B

NOTES:
1. COORDINATE THE STANDING SEAM PROFILE & WATERPROOFING REQUIREMENTS WITH ARCHITECTURAL DRAWINGS PRIOR TO ORDERING CURB.

C EXHAUST CAP
MOUNTING DETAIL – SLOPED ROOF
NO SCALE



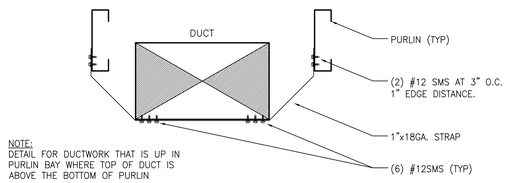
D ROUND DUCT HANGER DETAIL
NO SCALE



DUCT UP TO 30" WIDE OR LESS THAN 20 LBS/L.F.

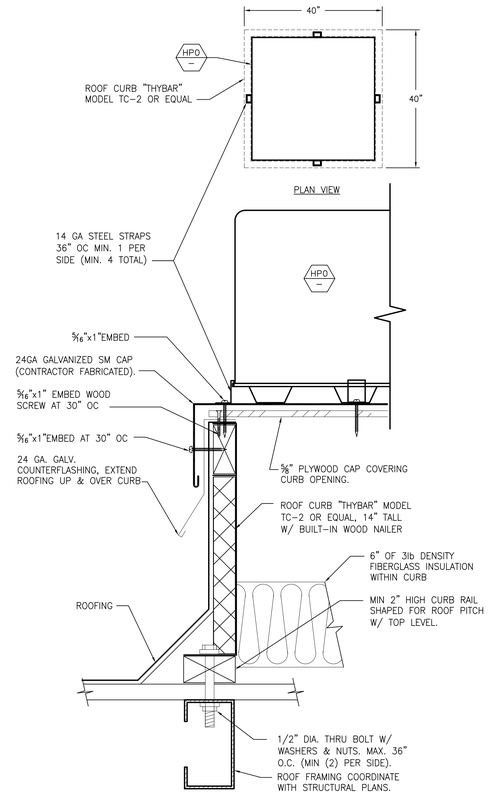
DUCT UP TO 30" WIDE OR LESS THAN 20 LBS/L.F.

NOTE:
1. SUPPORT DUCTWORK AT 8'-0" O.C.
2. PER 2022 CBC SEISMIC RESTRAINT IS NOT REQUIRED FOR RECTANGULAR DUCTS LESS THAN 6.0 SQ.FT CROSS SECTION OR WHICH LESS THAN 10 LB/FT. – ALL DUCT IN PROJECT IS <5.9 SQ.FT
3. PROVISIONS TO BE MADE TO AVOID IMPACT WITH ADJACENT ITEMS.

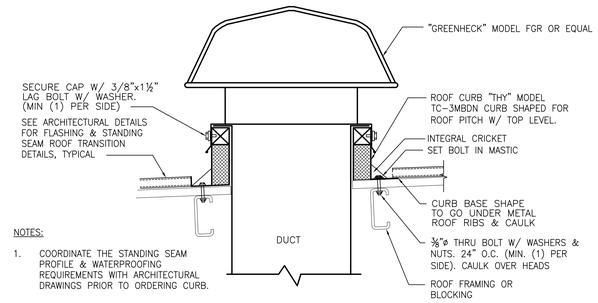


NOTE:
DETAIL FOR DUCTWORK THAT IS UP IN PURLIN BAY WHERE TOP OF DUCT IS ABOVE THE BOTTOM OF PURLIN

E RECTANGULAR DUCT HANGER DETAIL
NO SCALE



A HPO ROOF MOUNTED UNIT DETAIL
NO SCALE



NOTES:
1. COORDINATE THE STANDING SEAM PROFILE & WATERPROOFING REQUIREMENTS WITH ARCHITECTURAL DRAWINGS PRIOR TO ORDERING CURB.

PLAN VIEW SIMILAR TO DETAIL C/M5.1

B RELIEF HOOD MOUNTING DETAIL
NO SCALE

IDENTIFICATION STAMP
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APP: 02-122955 INC: 02
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INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
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1601 BASS AVENUE, MENDOTA, CA 93640

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REGISTERED PROFESSIONAL ENGINEER
No. M [redacted]
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Project Engineer	NS	Job Number	24232
Project Manager	NS	Plot Date - Feb 27, 2025 - 4:36pm	
Project Drafter	ZH	Login - NShah	

DRAWN: T&A
CHECKED: T&A
REVISIONS:

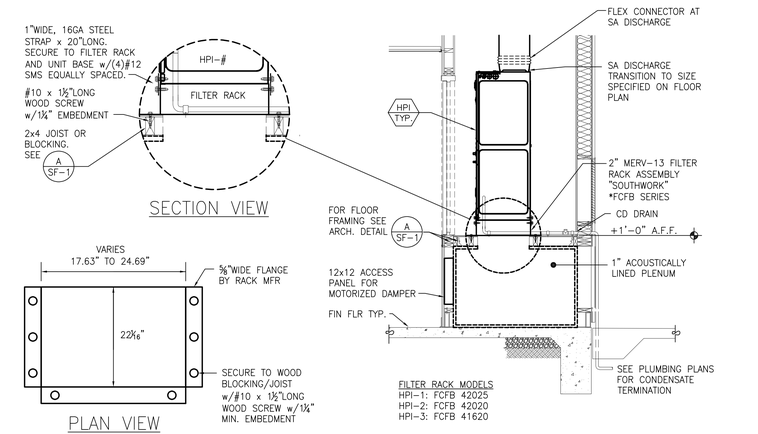
-	-

DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE
MECHANICAL DETAILS

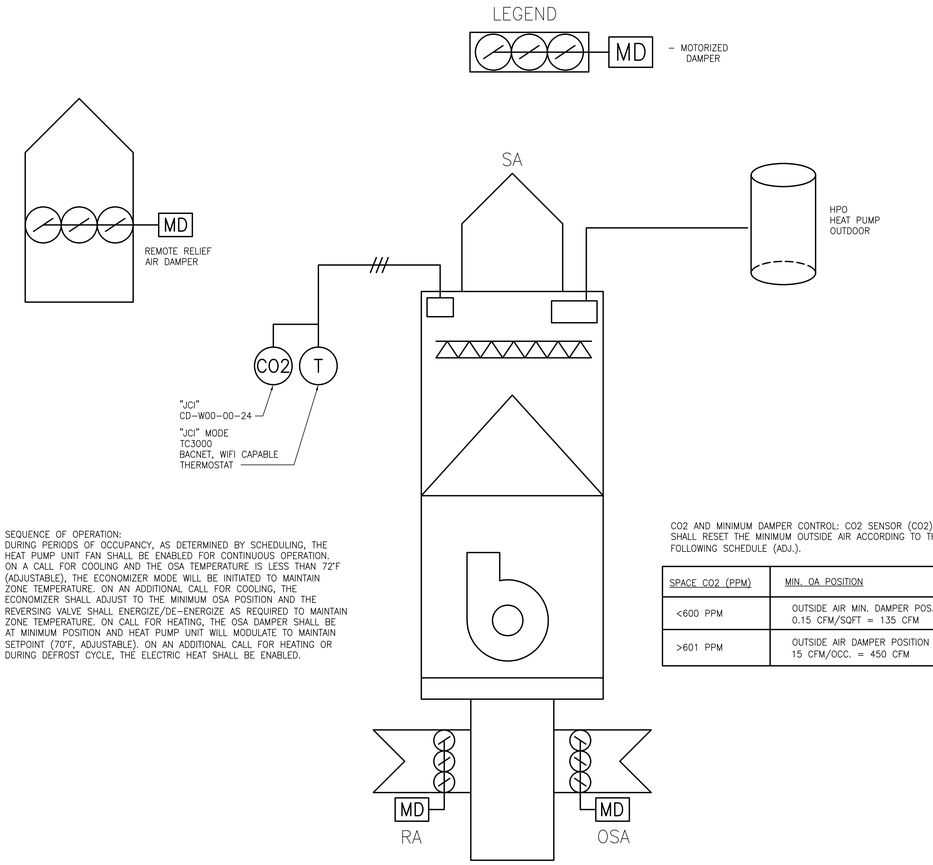
SHEET NO.
M5.1

REFERENCE ONLY



A HPI MOUNTING DETAIL

SCALE: NO SCALE



SEQUENCE OF OPERATION:
DURING PERIODS OF OCCUPANCY, AS DETERMINED BY SCHEDULING, THE HEAT PUMP UNIT FAN SHALL BE ENABLED FOR CONTINUOUS OPERATION. ON A CALL FOR COOLING AND THE OSA TEMPERATURE IS LESS THAN 72°F (ADJUSTABLE), THE ECONOMIZER MODE WILL BE INITIATED TO MAINTAIN ZONE TEMPERATURE. ON AN ADDITIONAL CALL FOR COOLING, THE ECONOMIZER SHALL ADJUST TO THE MINIMUM OSA POSITION AND THE REVERSING VALVE SHALL ENERGIZE/DE-ENERGIZE AS REQUIRED TO MAINTAIN ZONE TEMPERATURE. ON CALL FOR HEATING, THE OSA DAMPER SHALL BE AT MINIMUM POSITION AND HEAT PUMP UNIT WILL MODULATE TO MAINTAIN SETPOINT (70°F, ADJUSTABLE). ON AN ADDITIONAL CALL FOR HEATING OR DURING DEFROST CYCLE, THE ELECTRIC HEAT SHALL BE ENABLED.

CO2 AND MINIMUM DAMPER CONTROL: CO2 SENSOR (CO2) SHALL RESET THE MINIMUM OUTSIDE AIR ACCORDING TO THE FOLLOWING SCHEDULE (ADJ.).

SPACE CO2 (PPM)	MIN. OA POSITION
<600 PPM	OUTSIDE AIR MIN. DAMPER POS. – 0.15 CFM/SQFT = 135 CFM
>601 PPM	OUTSIDE AIR DAMPER POSITION – 15 CFM/OCC. = 450 CFM

B CONTROLS SCHEMATICS

NO SCALE

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Project Engineer	NS	Job Number	24232
Project Manager	NS	Plot Date: Feb 27, 2025 - 4:38pm	
Project Drafter	ZH	Login: NSteh	

DRAWN: T&A
CHECKED: T&A

REVISIONS:

-	-

DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE

MECHANICAL DETAILS

SHEET NO.

M5.2

PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE	S OR W	V	CW	HW	DESCRIPTION
WC-1	WATER CLOSET (ELEMENTARY)	4"	2"	1"	–	KOHLER MODEL K-96053, 1.28 GPF, FLOOR MOUNTED, ELONGATED BOWL, WHITE FINISH, SLOAN ROYAL # 111-1.28, FLUSH VALVE WITH HANDLE POINTED TOWARDS WIDE SIDE OF STALL, "OLSONITE # 95CC/SS EXTRA HEAVY DUTY SOLID PLASTIC OPEN-FRONT LESS COVER SEAT WITH STAINLESS STEEL HINGE POSTS, SELF-SUSTAINING CHECK HINGES, COMPLETE WITH SUPPLIES & STOPS
WC-2	WATER CLOSET ADA (STAFF)	4"	2"	1"	–	KOHLER MODEL K-4405, 1.28 GPF, FLOOR MOUNTED, ELONGATED BOWL, WHITE FINISH, SLOAN ROYAL # 111-1.28, FLUSH VALVE WITH HANDLE POINTED TOWARDS WIDE SIDE OF STALL, "OLSONITE # 95CC/SS EXTRA HEAVY DUTY SOLID PLASTIC OPEN-FRONT LESS COVER SEAT WITH STAINLESS STEEL HINGE POSTS, SELF-SUSTAINING CHECK HINGES, COMPLETE WITH SUPPLIES & STOPS. ADA COMPLIANT TOILET
WC-3	WATER CLOSET (KINDERGARTEN)	4"	2"	1"	–	AMERICAN STANDARDK-2599.001, MADERA YOUTH, 1.28 GPF, FLOOR MOUNTED 14" HIGH, ELONGATED BOWL, WHITE FINISH, SLOAN ROYAL # 111-1.28, FLUSH VALVE WITH HANDLE POINTED TOWARDS WIDE SIDE OF STALL, 5901.100SS EXTRA HEAVY DUTY SOLID PLASTIC OPEN-FRONT LESS COVER SEAT WITH STAINLESS STEEL HINGE POSTS, SELF-SUSTAINING CHECK HINGES, COMPLETE WITH SUPPLIES & STOPS.
UR-1	URINAL ADA	2"	1-1/2"	3/4"	–	KOHLER , K-4991-ET, BARDON, 0.125 GPF, WALL-HUNG, WASHOUT URINAL WITH STRAINER, SLOAN ROYAL #186-0.125, MANUAL FLUSH VALVE, PROVIDE WITH WALL CLEANOUT, SUPPLIES & STOPS. PROVIDE COMPLETE WITH J. R. SMITH 0636 OFF-FLOOR MOUNTED URINAL CARRIER. MOUNT AT ADA HEIGHT
L-1	LAVATORY ADA (ELEMENTARY SCHOOL KID)	2"	1-1/2"	1/2"	-	KOHLER K-2005, "KINGSTON" WALL-HUNG, 20"x18" VITREOUS CHINA WITH BACKSPLASH & WALL BRACKET, "CHICAGO" ECAST #857-E12665PSHABCP, 2.2GPM / 0.25 GAL/CYCLE METERING FAUCET. COLD WATER ONLY CONNECTION, McGUIRE 155WC OFFSET GRID DRAIN AND JAY R. SMITH 700-Z SUPPORT CARRIER WITH CONCEALED ARMS. PROVIDE WITH SUPPLIES, STOPS, 17 GA CHROME PLATED BRASS P-TRAP. SEE ARCHITECTURAL DRAWINGS FOR ACCESSIBLE MOUNTING HEIGHTS.
L-2	LAVATORY ADA (STAFF)	2"	1-1/2"	1/2"	1/2"	KOHLER K-2005, "KINGSTON" WALL-HUNG, 20"x18" VITREOUS CHINA WITH BACKSPLASH & WALL BRACKET, "CHICAGO" MODEL 420-E2805ABCP, 4" FIXED CENTER, 4-1/4" LEVER HANDLE, 0.5 GPM FAUCET. McGUIRE 155WC OFFSET GRID DRAIN AND JAY R. SMITH 700-Z SUPPORT CARRIER WITH CONCEALED ARMS. PROVIDE WITH SUPPLIES, STOPS, 17 GA CHROME PLATED BRASS P-TRAP. SEE ARCHITECTURAL DRAWINGS FOR ACCESSIBLE MOUNTING HEIGHTS. PROVIDE HOT AND COLD WATER CONNECTION FOR STAFF
L-3	LAVATORY (KINDERGARTEN)	2"	1-1/2"	1/2"	-	KOHLER K-2005, "KINGSTON" WALL-HUNG, 20"x18" VITREOUS CHINA WITH BACKSPLASH & WALL BRACKET, "CHICAGO" ECAST #857-E12665PSHABCP, 2.2GPM / 0.25 GAL/CYCLE METERING FAUCET. COLD WATER ONLY CONNECTION, McGUIRE 155WC OFFSET GRID DRAIN AND JAY R. SMITH 700-Z SUPPORT CARRIER WITH CONCEALED ARMS. PROVIDE WITH SUPPLIES, STOPS, 17 GA CHROME PLATED BRASS P-TRAP. SEE ARCHITECTURAL DRAWINGS FOR MOUNTING HEIGHTS.
HB-1	HOSE BIBB	–	–	1/2"	–	WOODFORD #B24P 3/4" INLET BRASS WALL HOSE FAUCET WITH LOCKSHIELD, NON-REMOVABLE VACUUM BREAKER, AND OPTIONAL LOOSE TEE KEY HANDLE. PROVIDE POLISHED CHROME FINISH FOR INDOORS, ROUGH CHROME FINISH FOR OUTDOORS. FURNISHED WITH RECESSED BOX
HB-2	HOSE BIBB	–	–	1/2"	–	WOODFORD #Y24 STANDPIPE STYLE 3/4" INLET BRASS HOSE FAUCET WITH LOCKSHIELD, AND NON-REMOVABLE VACUUM BREAKER. PROVIDE BRASS FINISH FOR OUTDOOR LOCATION. PROVIDE LOOSE TEE KEY HANDLE.. FOR ROOF MOUNTED HOSE BIBB
JS-1	JANITOR SINK	3"	2"	1/2"	1/2"	KOHLER WHITBY K-6710 CORNER STYLE FLOOR MOUNTED, 28"x 28"x12" DEEP ENAMELED CAST IRON WITH #K-8940 RIM GUARD, #K-9146 DRAIN STRAINER, CHICAGO MODEL 540-LDB97SWXFABCP WALL MOUNT POLISHED CHROME FAUCET WITH HOSE THREAD OUTLET, VACUUM BREAKER, INTEGRAL STOPS, INTEGRAL CHECK VALVES, AND WALL BRACE. FLORESTONE #MR-370 60" HOSE WITH HOOK, AND FLORSTONE MR-372 MOP HANGER.
FD-1	FLOOR DRAIN	2"	1-1/2"	TP	–	SMITH 2005Y-A05-HP-P050 COATED CAST IRON WITH 5" DIAMETER ROUND NICKEL BRONZE HEEL PROOF GRATE, DOUBLE DRAINAGE FLANGE, NO HUB OUTLET AND TRAP PRIMER CONNECTION.
FS-1	FLOOR SINK	2"	1-1/2"	–	–	J. R. SMITH FY 3100Y, 8½" TOP, 2" NO-HUB.
TP-1	TRAP PRIMER	–	–	1/2"	–	PRECISION PLUMBING PRODUCTS PR-500/PR, PROVIDE BALL VALVE.
CS-1	CLASSROOM SINK	2"	1-1/2"	1/2"	–	**JUST MODEL CRA-ADA-1931-A-GR, 19"x31"x5-1/2" DEEP BOWL, SINGLE COMPARTMENT, 18 GA., TYPE 304 STAINLESS STEEL WITH CENTRAL DRAIN, SELF RIMMING, J-35-SSF STRAINER, CHICAGO MODEL 350-GN8AE35ABCP, 1.5 GPM, LEVER HANDLE GOOSENECK FAUCET AT CENTER OF LEFT LEDGE, CHICAGO MODEL 748-665ABCP-E35-317XKABCP BUBBLER. PROVIDE SUPPLIES, STOPS AND 17 GA CHROME PLATED BRASS P-TRAP**
CS-2	CLASSROOM SINK	2"	1-1/2"	1/2"	–	**JUST MODEL CRA-ADA-1931-A-GR, 19"x31"x5-1/2" DEEP BOWL, SINGLE COMPARTMENT, 18 GA., TYPE 304 STAINLESS STEEL WITH CENTRAL DRAIN, SELF RIMMING, J-35-SSF STRAINER, CHICAGO MODEL 350-GN8AE35ABCP, 1.5 GPM, LEVER HANDLE GOOSENECK FAUCET AT CENTER OF LEFT LEDGE, CHICAGO MODEL 748-665ABCP-E35-317XKABCP BUBBLER. PROVIDE SUPPLIES, STOPS AND 17 GA CHROME PLATED BRASS P-TRAP**
WHA-1	WATER HAMMER ARRESTER	-	-	-	–	**"ZURN" 1700 SHOKTROL,300, PROVIDE ACCESS DOOR. 12 TO 32 FU CAPACITY.**
S-1	STAFF ROOM SINK	2"	1½"	¾"	½"	**JUST MODEL SLFADA2019AGR, 16"x16"x5-1/2" DEEP BOWL, (2) FAUCET HOLE, SINGLE COMPARTMENT, 18 GA., TYPE 304 STAINLESS STEEL WITH CENTRAL DRAIN, SELF RIMMING, J-35GS STRAINER, CHICAGO 2302-E35ABCP, SINGLE LEVER FAUCET WITH GOOSENECK SWING SPOUT, 1.5 GPM VANDAL PROOF AERATOR. PROVIDE SUPPLIES, STOPS AND 17 GA CHROME PLATED BRASS P-TRAP.**

DSA EQUIP. ANCHOR. & BRACING NOTES

M/E/P COMPONENT ANCHORAGE NOTES:

ALL MECHANICAL, PLUMBING AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA-APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2022 CBC SECTIONS 1617A.1.18 THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTERS 13, 26 AND 30.

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (e.g. HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 110/220 VOLT RECEPTACLES HAVING A FLEXIBLE CABLE.
3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRAVERSE AND LONGITUDINAL DIRECTIONS.

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVING A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY THE DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

MEP DISTRIBUTION SYSTEM BRACING NOTE FOR PIPING, DUCTWORK AND ELECTRICAL CONDUIT:

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7 SECTIONS 13.6.5, 13.6.6, 13.6.7, AND 13.6.8; AND 2022 CBC SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING THE BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEMS ARE AS NOTED BELOW. THE MEP DESIGN PROFESSIONAL ENGINEER RESPONSIBLE FOR CONTENT ON THESE SHEETS HAS VERIFIED THAT THE DESIGN METHODS IDENTIFIED BELOW ARE IN ACCORDANCE WITH DSA IR 16-13.

MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

☒ MP ☒ MD ☒ PP ☐ E – OPTION 1: PROJECT SPECIFIC DESIGN

☐ MP ☐ MD ☐ PP ☐ E – OPTION 2: DESIGN BASED ON OSHPD OPM, WITHIN PROJECT SUBMITTAL

☐ MP ☐ MD ☐ PP ☐ E – OPTION 3: DESIGN BASED ON OSHPD OPM, DEFERRED SUBMITTAL

PLUMBING ABBREVIATIONS

ABV	ABOVE
ABC, OH	ABOVE CEILING, OVERHEAD
AD	ACCESS DOOR
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
AIP	ABANDON IN PLACE
BR	BRANCH
CL	CENTERLINE
CO	CLEANOUT
CW	COLD WATER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RETURN
DIA, ø	DIAMETER
FC	FLEXIBLE CONNECTION
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FSR	FIRE SPRINKLER RISER
GCO	GRADE CLEANOUT
HW	HOT WATER
HWR	HOT WATER RETURN
I.E.	INVERT ELEVATION
(N) (E)	NEW, EXISTING
NIC	NOT IN CONTRACT
POC	POINT OF CONNECTION
P, TRV	PRESSURE & TEMPERATURE RELIEF VALVE
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
(R) (D)	RISE, DROP
RD, OFL	ROOF DRAIN, OVERFLOW
RI	ROUGH-IN
RO	RUN-OUT
SMS	SHEET METAL SCREWS
SOV	SHUT OFF VALVE
TA, FA	TO ABOVE, FROM ABOVE
TB, FB	TO BELOW, FROM BELOW
TBR	TO BE REMOVED
TP	TRAP PRIMER
UG, UF	UNDERGROUND, UNDERFLOOR
UON	UNLESS OTHERWISE NOTED
UTR	UP THROUGH ROOF
V, VR, VTR	VENT, VENT RISER, VENT THRU ROOF
WT	WATERTIGHT
WCO	WALL CLEANOUT

APPLICABLE CODES

ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE REGULATIONS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

A) STATE OF CALIFORNIA CODE OF REGULATIONS (CCR) TITLE 24,

2022 EDITION OF THE CALIFORNIA BUILDING CODE.
2022 EDITION OF THE CALIFORNIA ELECTRICAL CODE.
2022 EDITION OF THE CALIFORNIA FIRE CODE.
2022 EDITION OF THE CALIFORNIA MECHANICAL CODE.
2022 EDITION OF THE CALIFORNIA PLUMBING CODE.

B) NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) LIFE SAFETY CODE

PLUMBING FIXTURE CONNECTION SCHEDULE

FIXTURE NAME	SYMBOL	VENT	WASTE		COLD WATER		HOT WATER	
			BR	RI	BR	RI	BR	RI
FLOOR DRAIN	FD	1½"	2"	2"	–	–	–	–
FLOOR SINK	FS	1½"	2"	2"	–	–	–	–
HOSE BIBB	HB	–	–	–	¾"	¾"	–	–
LAVATORY	L	1½"	2"	1½"	¾"	½"	¾"	½"
JANITOR SINK	JS	2"	3"	3"	¾"	¾"	¾"	¾"
SINK	S	1½"	2"	1½"	¾"	½"	¾"	½"
URINAL	UR	1½"	2"	2"	1"	¾"	–	–
WATER CLOSET FLUSH VALVE (FV)	WC	2"	4"	4"	1¼	1"	–	–

PLUMBING EQUIPMENT SCHEDULE

EWH 1 & EWH 2 — ELECTRIC WATER HEATER – 1 AND 2:
"STATE" MODEL PCE-20-10MSA PATRIOT, 20 GALLON STORAGE, 23 GPH RECOVERY AT 80°F, 4500 WATT HEATING INPUT WITH 208 VOLT, 1 PHASE ELECTRICAL SERVICE AND FACTORY INSTALLED T&P RELIEF VALVE. WT. = 275LBS

CP 1 — CIRCULATING PUMP-1:
"B&G" MODEL NBF-18S LEAD FREE, 15ft.TDH, 1.0GPM FLOWRATE, 115V/1ø/60Hz, 90 WATTS. PROVIDE COMPLETE W/"B&G" AQS-¾ AQUASTAT AND TC-1 AUTOMATIC TIMER KIT. SERVES EWH-1

ET 1 & ET 2 — EXPANSION TANK – 1 AND 2:
"AMTROL" MODEL ST-5, DIAPHRAGM, PRE-PRESSURISED THERMAL EXPANSION TANK. 2.0 GPM VOLUME, 150 PSI WORKING PRESSURE.

PLUMBING LEGEND

CW	COLD WATER LINE
CD	CONDENSATE DRAIN
F	FIRE SERVICE LINE
G	GAS
HW	HOT WATER LINE
HWR	HOT WATER RETURN
OFL	OVERFLOW
RWL	RAINWATER LEADER
	RISE OR DROP IN DIRECTION OF FLOW
	SANITARY SOIL OR WASTE LINE
SCD	SECONDARY CONDENSATE DRAIN LINE
TP	TRAP PRIMER LINE
	VENT
	CLEANOUT & WALL CLEANOUT
	FIRE DEPARTMENT CONNECTION
	FLOOR/ GRADE CLEAN OUT
	FLOOR DRAIN
	HOSE BIBB/ WALL HYDRANT
	TRAP
	TRAP PRIMER
	BALANCING VALVE
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	FLEXIBLE CONNECTION
	GATE VALVE
	SHUT OFF COCK
	PRESSURE GAUGE
	PRESSURE REDUCING VALVE
	REDUCER
	PRESSURE & TEMPERATURE RELIEF VALVE
	SHUT OFF VALVE
	STRAINER
	STRAINER & DRAIN VALVE WITH HOSE FITTING
	SOLENOID VALVE
	THERMOMETER
	UNION

COMPLIANCE NOTES

MECHANICAL AND PLUMBING EQUIPMENT SHALL CONFORM TO THE FOLLOWING AS STATED IN THE ENERGY EFFICIENCY STANDARDS, 2022.

1. BE CERTIFIED BY THE MANUFACTURER AS COMPLYING WITH THE EFFICIENCY REQUIREMENTS AS PRESCRIBED IN SECTIONS:
   - 110.1 APPLIANCES REGULATED BY THE APPLIANCE EFFICIENCY STANDARDS:
   - 110.2 HVAC EQUIPMENT EFFICIENCY AND PACKAGED CONTROLS:
   - 110.3 SERVICE WATER HEATING EFFICIENCY AND CONTROLS:
   - 110.4 POOL AND SPA HEATING EFFICIENCY AND CONTROLS:
   - 110.5 RESTRICTIONS ON PILOT LIGHTS:
2. BE SPECIFIED AND INSTALLED IN ACCORDANCE WITH SECTIONS.
   - 120.1 REQUIREMENTS FOR VENTILATION:
   - 120.2 REQUIRED CONTROLS FOR HVAC SYSTEMS:
     - 102.2 (H) DEMAND SHED CONTROLS.
     - 120.2 (I) ECONOMIZER FAULT DETECTION & DIAGNOSTIC.
   - 120.3 REQUIREMENTS FOR PIPE INSULATION:
   - 120.4 REQUIREMENTS FOR DUCT INSULATION:
   - 120.5 REQUIREMENTS FOR MECHANICAL SYSTEMS
   - 120.8 BUILDING COMMISSIONING
   - 120.9 REQUIREMENTS FOR COMMERCIAL BOILERS

PIPING MATERIAL SCHEDULE

1. SOIL, STORM, WASTE AND VENT PIPE UNDERGROUND AND TO 6" ABOVE GROUND: SERVICE WEIGHT CAST IRON SOIL PIPE AND FITTINGS, ASPHALTIC COATED, CONFORMING TO CAST IRON SOIL PIPE INSTITUTE STANDARD #301 ASTM A-888 OR ASTM A-74 AND SO STAMPED. JOINTS SHALL BE NO-HUB CONFORMING TO CAST IRON SOIL PIPE INSTITUTE STANDARD #310; TY-SEAL OR EQUAL WITH GASKETS CONFORMING TO ASTM C 564 AND ASTM A74. SUSPENDED PIPE WITH NO-HUB JOINTS SHALL HAVE A SWAYBRACE AT 20'-0" MAXIMUM SPACING.
2. WASTE AND VENT PIPE ABOVE GROUND FROM LAVATORIES OR SINKS, RAINWATER LEADERS AND OVERFLOWS ABOVE THE FLOOR: CAST IRON SOIL PIPE AND FITTINGS WITH NO HUB JOINTS CONFORMING TO THE REQUIREMENTS OF CISPI STANDARD 301, ASTM A-888 OR ASTM A-74 FOR ALL PIPE AND FITTINGS. JOINTS SHALL CONFORM TO CISPI 310 AND SHALL BE HUBLESS COUPLINGS COMPOSED OF STAINLESS STEEL SHIELD, CLAMP ASSEMBLY AND ELASTOMERIC SEALING SLEEVE. DWV DRAINAGE TUBING AND FITTINGS ARE ACCEPTABLE WHEN APPROVED. CONDENSATE DRAINS SHALL BE TYPE L HARD COPPER, WITH LONG SWEEP ELBOWS AND CLEANOUT TEES AT EACH CHANGE IN DIRECTION. CONNECT CONDENSATE DRAINS TO AIR CONDITIONING UNITS WITH P-TRAP AND RUN TO AN APPROVED RECEPTOR AND DRY WELL. PROVIDE VIBRATION ELIMINATORS AT A.C. UNITS.
3. WATER PIPE (HOT AND COLD WATER): TYPE L COPPER TUBING, HARD TEMPER, WITH WROUGHT COPPER FITTINGS. CAPPED OR PLUGGED OUTLETS SHALL BE SCHEDULE 40 SCREWED BRASS. PROVIDE FULL SOLDER CUP FITTINGS.
4. GAS PIPE: SCHEDULE 40 BLACK STEEL WITH MALLEABLE IRON SCREWED FITTINGS ABOVE GRADE; WELDED BELOW GRADE WITH CLASS 150 WELDING FITTINGS. CONNECT TO EACH ITEM OF GAS-FIRED EQUIPMENT WITH DRIP LEG AND VALVE. PROVIDE FLEX CONNECTION IN APPROVED SIZES WHERE APPLICABLE

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NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1601 BASS AVENUE, MENDOTA, CA 93640

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Project Drafter	ZH	Login	NShah

DRAWN: T&A
CHECKED: T&A
REVISIONS:

.	.

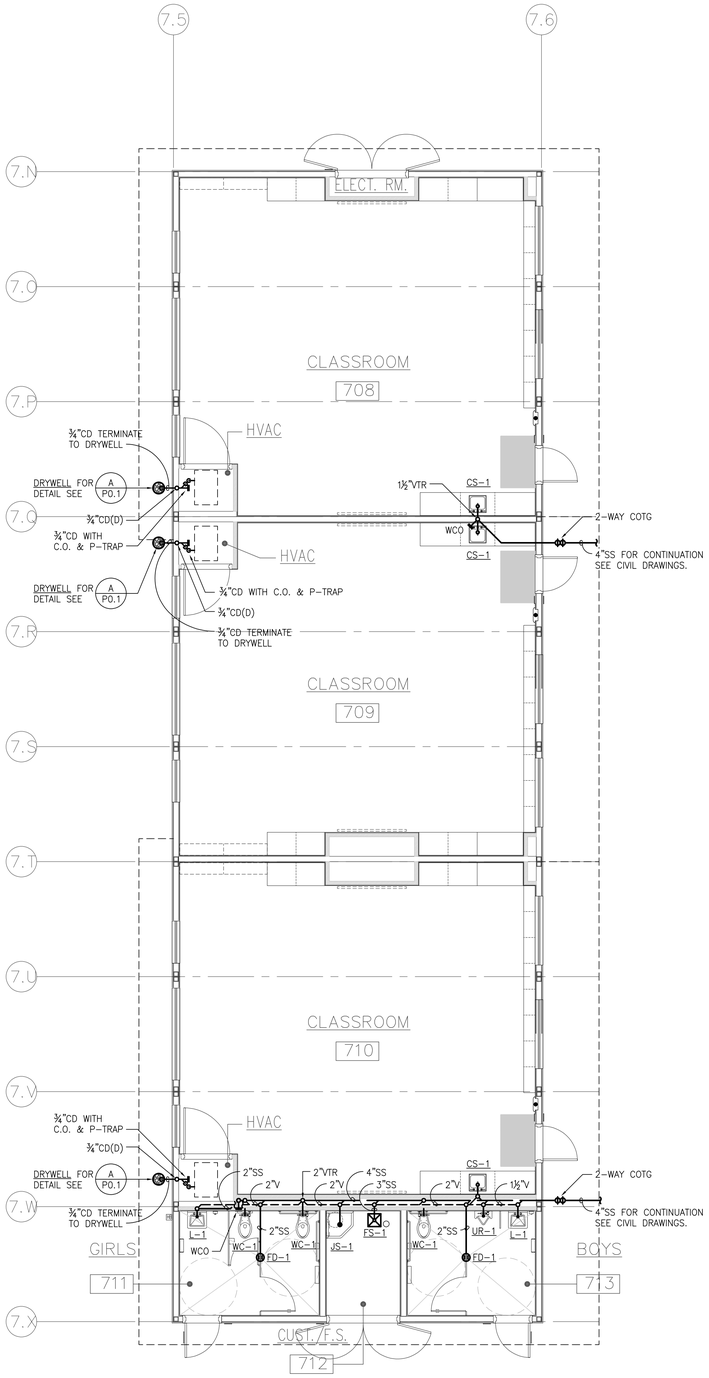
DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE
PLUMBING LEGEND, SCHEDULES, AND NOTES

SHEET NO.
P0.1

KEY NOTE:

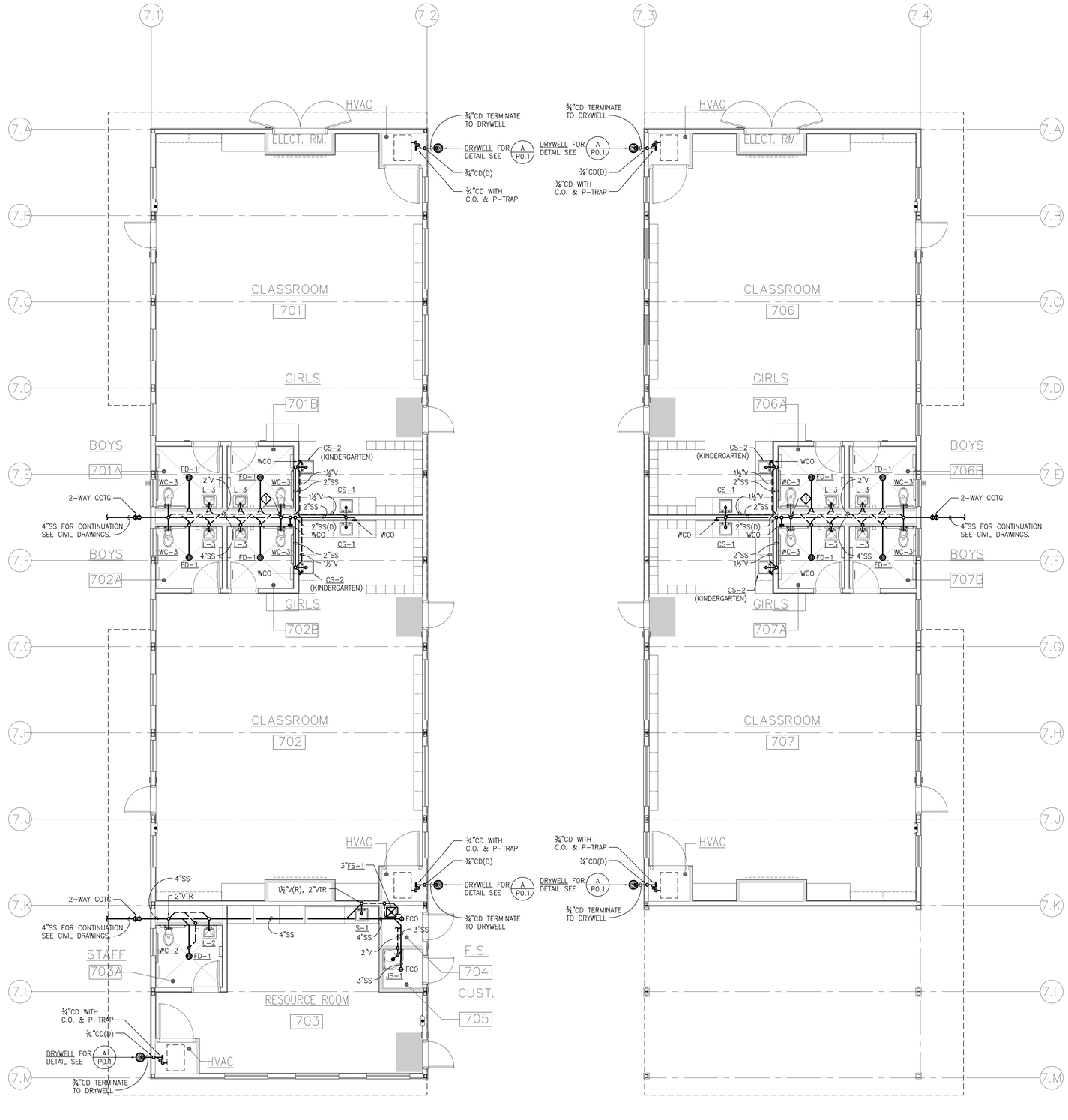
◇ 4" VENT THROUGH ROOF



B

OVERALL TYPICAL CLASSROOM WASTE & VENT PLUNBING FLOOR PLAN

SCALE: 3/16" = 1'-0"



A

OVERALL KINDERGARTEN WASTE & VENT PLUNBING FLOOR PLAN

SCALE: 3/16" = 1'-0"

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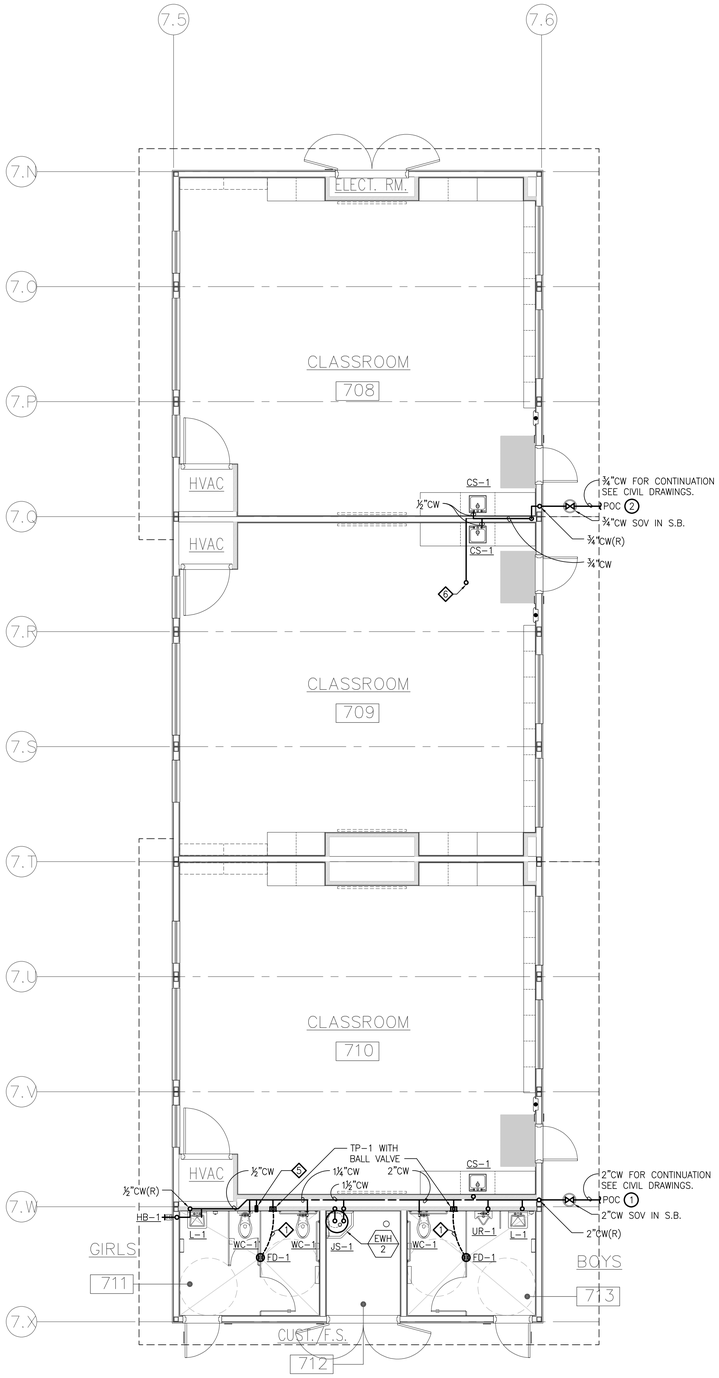
SHEET TITLE
PLUMBING OVERALL FLOOR PLANS - WASTE AND VENT

SHEET NO.
P2.1

REFERENCE ONLY

KEY NOTE:

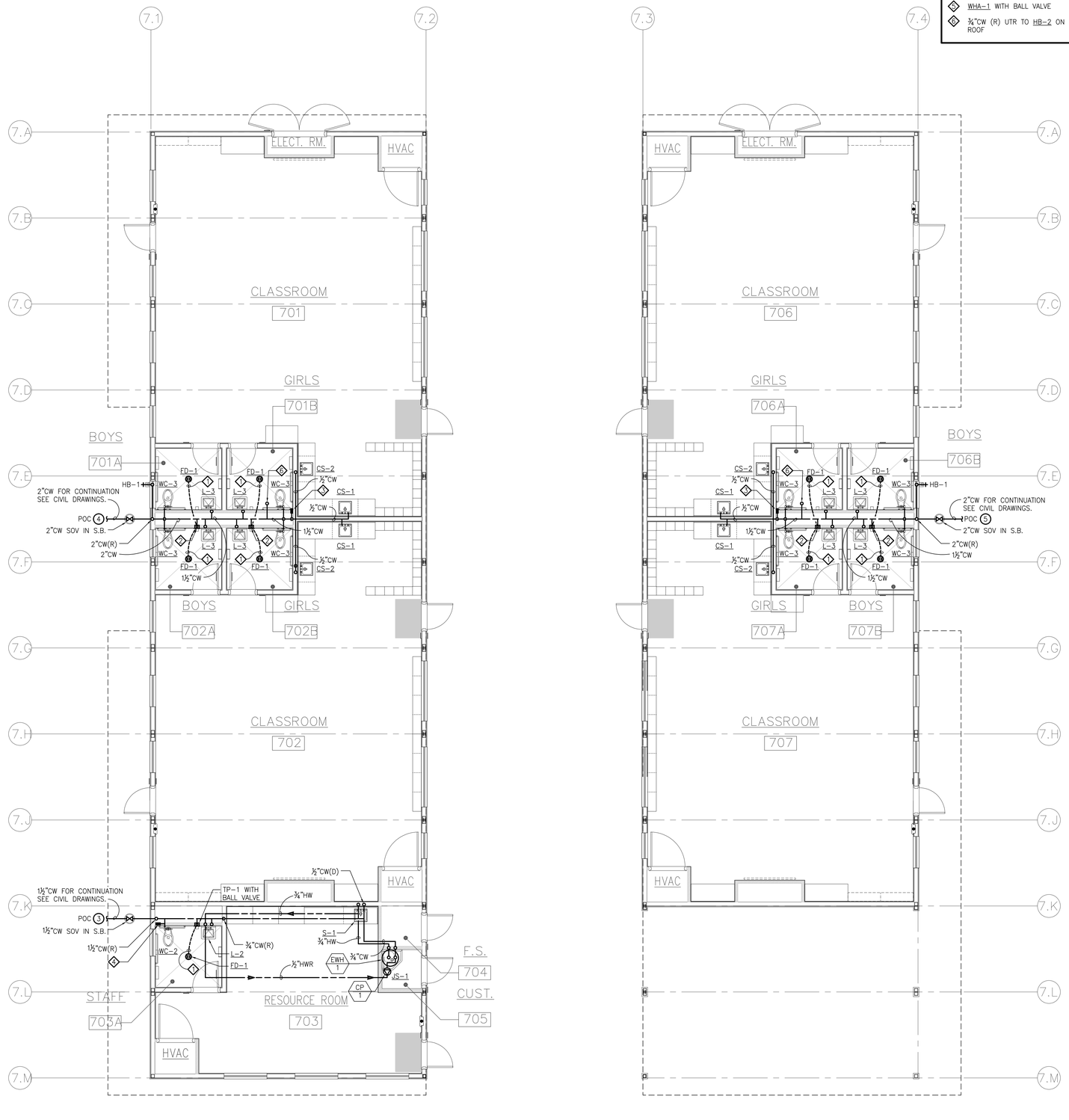
1. ½"CW UNDER SLAB
2. TP-2 WITH BALL VALVE
3. WHA-3 WITH BALL VALVE
4. WHA-2 WITH BALL VALVE
5. WHA-1 WITH BALL VALVE
6. ¾"CW (R) UTR TO HB-2 ON ROOF



B

OVERALL TYPICAL CLASSROOM HOT & COLD WATER PLUNBING FLOOR PLAN

SCALE: 3/16" = 1'-0"



A

OVERALL KINDERGARTEN HOT & COLD WATER PLUNBING FLOOR PLAN

SCALE: 3/16" = 1'-0"

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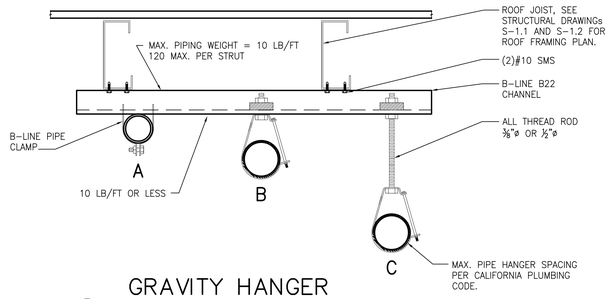
SHEET TITLE
PLUMBING OVERALL FLOOR PLANS - HOT AND COLD WATER

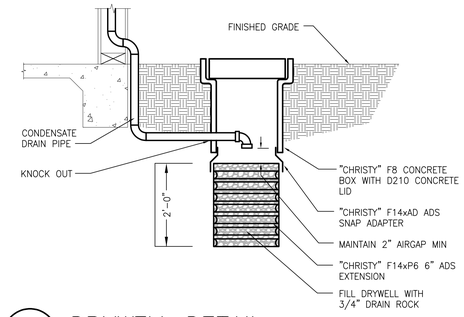
SHEET NO.
P2.2

REFERENCE ONLY



C GRAVITY HANGER PIPE ATTACHMENT DETAIL

NO SCALE



A DRYWELL DETAIL

NO SCALE

GENERAL NOTES:
1. SEE TABLE BELOW FOR GENERAL PIPE HANGER SPACING AND ROD SIZES.

PIPE SUPPORT SCHEDULE

HORIZONTAL STEEL PIPE

NOMINAL PIPE SIZE	ROD DIAMETER	MAX. SPACING	MAX. LBS
½ – 1¼	⅜	7'0"	1100
1½	⅜	9'0"	1100
2	⅜	10'0"	1100
2½	½	11'0"	1950
3	½	12'0"	1950
4	⅝	12'0"	3050

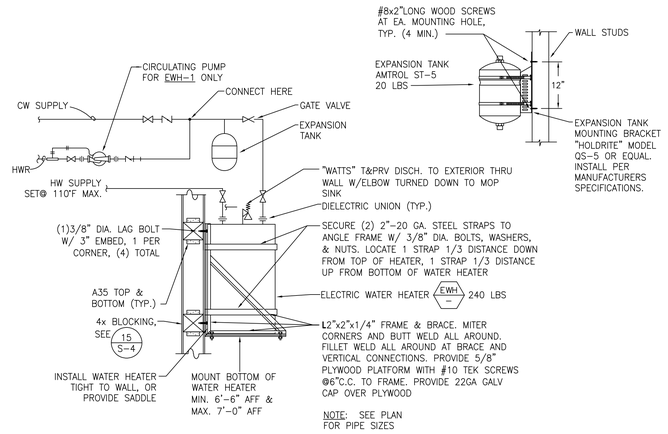
HORIZONTAL COPPER PIPE

NOMINAL PIPE SIZE	ROD DIAMETER	MAXIMUM SPACING	MAX. LBS
½ –¾	⅜	5'0"	1100
1	⅜	6'0"	1100
1¼	⅜	6'0"	1100
1½	⅜	6'0"	1100
2	⅜	8'0"	1100
2½	½	9'0"	1950
3	½	10'0"	1950

NOTES:
1. PROVIDE MEANS OF PREVENTING DISSIMILAR METAL CONTACT SUCH AS FELT OR NON ADHESIVE ISOLATION TAPE. GALVANIZED FELT ISOLATORS SIZED FOR COPPER TUBING MAY ALSO BE USED, TOLCO FIG.83.
2. SUPPORT HORIZONTAL CAST IRON ADJACENT TO EACH HUB, WITH 5 FEET MAXIMUM SPACING BETWEEN HANGERS.
3. INSTALL HANGERS TO PROVIDE A MINIMUM OF ½ INCH SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK.
4. HANGERS SHALL BE INSTALLED WITHIN 12" OF EACH HORIZONTAL ELBOW.

D ROD SIZE & SPACING SCHEDULE

NO SCALE



B ELECTRIC WATER HEATER DETAIL

NO SCALE

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FOR PERMIT

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PLUMBING DETAILS

SHEET NO.

P5.1

C5. SOURCE ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Receptacle	5.08	5.08	---
Process	2.32	2.32	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**22.41**	**22.12**	**0.29 (1.3%)**

[1] Notes: This table is not used for Energy Code Compliance.

C6. 'ABOVE CODE' QUALIFICATIONS

☐ This project is pursuing CalGreen Tier 1 ☐ This project is pursuing CalGreen Tier 2

C7. ENERGY USE SUMMARY

Energy Component	Standard Design Site (MWh)	Proposed Design Site (MWh)	Margin (MWh)	Standard Design Site (MBtu)	Proposed Design Site (MBtu)	Margin (MBtu)
Space Heating	2.7	3.4	-0.7	---	---	---
Space Cooling	16.3	14.1	2.2	---	---	---
Indoor Fans	30.2	21.9	8.3	---	---	---
Heat Rejection	---	---	---	---	---	---
Pumps & Misc.	---	---	---	---	---	---
Domestic Hot Water	8.5	13.1	-4.6	---	---	---
Indoor Lighting	10.4	10.4	0	---	---	---
Flexibility	---	---	---	---	---	---
EFFICIENCY TOTAL	**68.1**	**62.9**	**5.2**	**0**	**0**	**0**
Photovoltaics	-22	-16.6	-5.4	---	---	---
Batteries	0.2	0	0.2	---	---	---
ENERGY USE SUBTOTAL	**46.3**	**46.3**	**0**	**0**	**0**	**0**
Receptacle	23.1	23.1	0	---	---	---
Process	10.6	10.6	0	---	---	---
Other Ltg	---	---	---	---	---	---
Process Motors	---	---	---	---	---	---
ENERGY USE TOTAL	**80**	**80**	**0**	**0**	**0**	**0**

C8. ENERGY USE INTENSITY (EUI)

	Standard Design (kBtu/ft² / yr)	Proposed Design (kBtu/ft² / yr)	Margin (kBtu/ft² / yr)	Margin Percentage
GROSS EUI[1]	41.04	38.87	2.17	5.29
NET EUI[1]	32.19	32.19	0	0

[1] Notes: Gross EUI is Energy Use Total (not including PV)/Total Building Area. Net EUI is Energy Use Total (including PV)/Total Building Area.

D1. EXCEPTIONAL CONDITIONS

• The project uses the Simplified Geometry Performance Modeling Approach which is not capable of modeling daylighting controls and assumes the prescriptive Secondary Daylit Control requirements are met. PRESCRIPTIVE COMPLIANCE documentation (form NRCC-LTI-02-E) for the requirements of section 140.6(d) Automatic Daylighting Controls in Secondary Daylit Zones is required.
• PV/Battery Building Type has been modified from software defaults for one or more spaces. Review project's PV/Battery Building Type(s) with documentation author. Refer to Energy Code section 140.10 for Nonresidential or 170.2(g) for more information.

F1. REQUIRED PV SYSTEMS

01 DC System Size (kWdc)	02 Exception[1]	03 Module Type	04 Array Type	05 Power Electronics	06 CFI	07 Azimuth (deg)	08 Tilt Input	09 Array Angle (deg)	10 Tilt: (x in 12)	11 Inverter Eff. (%)	12 Annual Solar Access (%)
10		Standard (14-17%)	Fixed	none	false	180	Degrees	22	4.85	96	100

[1] See Table D1 for any PV exceptions used.

C2. TDV ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual TDV Energy Use, kBtu/ft² - yr)

COMPLIES[2]

Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)[1]
Space Heating	10.62	13.04	-2.42
Space Cooling	72.79	65.33	7.46
Indoor Fans	101.94	74.33	27.61
Heat Rejection	0	0	0
Pumps & Misc.	0	0	0
Domestic Hot Water	23.83	36.73	-12.9
Indoor Lighting	32	32	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**241.18**	**221.43**	**19.75 (8.2%)**
Photovoltaics	-51.13	-39.09	-12.04
Batteries	-4.29	-0.06	-4.23
TOTAL COMPLIANCE	**185.76**	**182.28**	**3.48 (1.9%)**

[1] Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C3. TDV ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (TDV)	Proposed Design (TDV)	Compliance Margin (TDV)[1]
Receptacle	67.88	67.88	---
Process	31.04	31.04	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**284.68**	**281.2**	**3.48 (1.2%)**

[1] Notes: This table is not used for Energy Code Compliance.

C4. SOURCE ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual SOURCE Energy Use, kBtu/ft² /yr)

COMPLIES[2]

Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Space Heating	1.4	1.74	-0.34
Space Cooling	2.92	2.61	0.31
Indoor Fans	8.61	6.41	2.2
Heat Rejection	0	0	0
Pumps & Misc.	0	0	0
Domestic Hot Water	2.07	2.75	-0.68
Indoor Lighting	2.57	2.57	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**17.57**	**16.08**	**1.49 (8.5%)**
Photovoltaics	-1.75	-1.32	-0.43
Batteries	-0.81	-0.04	-0.77
TOTAL COMPLIANCE	**15.01**	**14.72**	**0.29 (1.9%)**

[1] Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

Project Name: — **Date Prepared:** 2024-12-17

A. General Information

1	Project Name			
2	Run Title	Title 24 Analysis		
3	Project Location	605 Bass Avenue		
4	City	Mendota	5 Standards Version	Compliance 2022
6	Zip code	95351	7 Compliance Software (version)	EnergyPro 9.2
8	Climate Zone	13	9 Building Orientation (deg)	0
10	Building Type(s)	• Nonresidential	11 Weather File	MADERA_STYP20.epw
12	Project Scope	• New envelope and mechanical	13 Number of Dwelling Units	0
14	Total Conditioned Floor Area in Scope (ft²)	8480	15 Total # of hotel/motel rooms	0
16	Total Unconditioned Floor Area (ft²)	0	17 Fuel Type	Natural gas
18	Nonresidential Conditioned Floor Area	8480	19 Total # of Stories (Habitable Above Grade)	1
20	Residential Conditioned Floor Area	0		

B. PROJECT SUMMARY

Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within the permit application.

Building Components Complying via Performance						Building Components Complying Prescriptively	
Envelope (See Table G)	Nonres	Performance	Solar Thermal Water Heating (See Table I3)	☐	Performance	The following building components are ONLY eligible for prescriptive compliance and should be documented on the NRCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the NRCC-PRF-E).	
	MultiFam	Not Included		☒	Not Included		
Mechanical (See Table H)	Nonres	Performance	Covered Process: Commercial Kitchens (see Table J)	☐	Performance	Indoor Lighting (Unconditioned) 140.6 & 170.2(e)	NRCC-LTI-E is required
	MultiFam	Not Included		☒	Not Included	Outdoor Lighting 140.7 & 170.2(e)	NRCC-LTO-E is required
Domestic Hot Water (See Table I)	Nonres	Performance	Covered Process: Laboratory Exhaust (see Table J)	☐	Performance	Sign Lighting 140.8 & 170.2(e)	NRCC-LTS-E is required
	MultiFam	Not Included		☒	Not Included	**Building Components Complying with Mandatory Measures**	
Lighting (Indoor Conditioned, see Table K)	Nonres	Not Included	Photovoltaics (see Table F)	☒	Performance	Electrical power systems, commissioning, solar ready, elevator and escalator requirements are mandatory and should be documented on the NRCC form listed if applicable (i.e. compliance will not be shown on the NRCC-PRF-E.)	
	MultiFam	Not Included		☐	Not Included	Electrical Power Distribution 110.11	NRCC-ELC-E is required
			Battery (see Table F)	☒	Performance	Commissioning 120.8	NRCC-CXR-E is required
				☐	Not Included	Solar and Battery 110.10	NRCC-SAB-E is required

C1. COMPLIANCE SUMMARY

COMPLIES[3]

	Time Dependent Valuaton (TDV)		Source Energy Use
	Efficiency[1] (kBtu/ft² - yr)	Total[2] (kBtu/ft² - yr)	Total[2] (kBtu/ft² - yr)
Standard Design	241.18	185.76	15.01
Proposed Design	221.43	182.28	14.72
Compliance Margins	**19.75**	**3.48**	**0.29**
	Pass	**Pass**	**Pass**

[1] Efficiency measures include improvements like a better building envelope and more efficient equipment
[2] Compliance Totals include efficiency, photovoltaics and batteries
[3] New Construction, Complete Addition Scope: Building complies when all efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded
Existing, Addition and Alteration Scope: Building complies when efficiency compliance margin is greater than or equal to zero and unmet load hour limits are not exceeded

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93640

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REGISTERED PROFESSIONAL ENGINEER — STRUCTURAL — No. M [illegible] EXP. 6/30/25 — MECHANICAL

TURLEY & ASSOCIATES — MECHANICAL ENGINEERING GROUP, INC.
2431 Capitol Avenue, Sacramento, CA 95816 (916) 325-1085 FAX: (916) 325-1075 Email: office@turleymech.com

Project Engineer	NS	Job Number	24232
Project Manager	NS	Plot Date: Feb 27, 2025 - 4:42pm	
Project Drafter	ZH	Login: NSHah	

DRAWN: T&A
CHECKED: T&A
REVISIONS:

DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE
TITLE 24 COMPLIANCE

SHEET NO.
T-24A

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 16 of 19)

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
6-708 Classroom	Education - Classrooms (ages 9-18)	22.13	336.3	0	885	DCV
7-709 Classroom	Education - Classrooms (ages 9-18)	21.88	332.5	0	875	DCV
8-710 Classroom	Education - Classrooms (ages 9-18)	21.88	332.5	0	875	DCV

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	Min.	Min. Ratio	Power	Power Units	Cycles	
1-701 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,800	N/A	0	N/A	N/A	N/A	☐
2-702 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,800	N/A	0	N/A	N/A	N/A	☐
3-706 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,800	N/A	0	N/A	N/A	N/A	☐
4-707 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,800	N/A	0	N/A	N/A	N/A	☐
5-703 Resource Room-Trm	Uncontrolled	1	N/A	N/A	800	N/A	0	N/A	N/A	N/A	☐
6-708 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,400	N/A	0	N/A	N/A	N/A	☐
7-709 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,400	N/A	0	N/A	N/A	N/A	☐
8-710 Classroom-Trm	Uncontrolled	1	N/A	N/A	1,400	N/A	0	N/A	N/A	N/A	☐

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 13 of 19)

H1. DRY SYSTEM EQUIPMENT (FURNACES, AIR HANDLING UNITS, HEAT PUMPS, VRF, ECONOMIZERS ETC.)

01	02	03	04	05	06	07	08	09	10	11	12
Equipment Name	Equipment Type	Qty	Heating				Cooling			Economizer Type (if present)	Status[1]
			Total Heating Output (kBtu/h)	Supp Heat Output (kBtu/h)	Efficiency Unit	Efficiency	Total Cooling Output (kBtu/h)	Efficiency Unit	Efficiency		
701 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	37.6	0	COP HSPF2	3.45 7.5	55.21	EER2 SEER2	12 14.5	Fixed DB	N
702 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	37.6	0	COP HSPF2	3.45 7.5	55.21	EER2 SEER2	12 14.5	Fixed DB	N
706 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	37.6	0	COP HSPF2	3.45 7.5	55.21	EER2 SEER2	12 14.5	Fixed DB	N
707 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	37.6	0	COP HSPF2	3.45 7.5	55.21	EER2 SEER2	12 14.5	Fixed DB	N
703 704 705 (2 Ton)	Single Zone Heat Pump (SZHP) Air System	1	15.79	0	COP HSPF2	3.45 7.5	21.89	EER2 SEER2	12 15.2	Fixed DB	N
708 (3.5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	28.94	0	COP HSPF2	3.45 7.5	38.07	EER2 SEER2	12 14.3	Fixed DB	N
709 (3.5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	28.94	0	COP HSPF2	3.45 7.5	38.07	EER2 SEER2	12 14.3	Fixed DB	N
710 (3.5 Ton)	Single Zone Heat Pump (SZHP) Air System	1	28.94	0	COP HSPF2	3.45 7.5	38.07	EER2 SEER2	12 14.3	Fixed DB	N

[1] *Status: N - New, A - Altered, E - Existing*

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 10 of 19)

F1B. PV BATTERY BUILDING TYPE(S)

01	02	03
Building Occupancy Type* (From Table 140.10-A/B and 170.2-U/V)	Conditioned Floor Area (ft²)	Unconditioned Floor Area (ft²)
Grocery	0	0
High-Rise Multifamily	0	0
Office, Financial Institutions, Unleased Tenant Space	0	0
Retail	0	0
School	8480	0
Warehouse	0	0
Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater	0	0
None	0	0

**Building Occupancy Types are defined in Section 100.1 of the Energy Code*

F2. BATTERY SYSTEMS[1]

01	02	03	04	05	06	07
Control	Capacity (kWh)	Charging Efficiency	Charging Rate (kW)	Discharging Efficiency	Discharging Rate (kW)	Round Trip Efficiency
Basic	2	N/A	5	N/A	5	0.9

[1] *See Table D1 for any Battery exceptions used.*

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 17 of 19)

I1. WATER HEATER EQUIPMENT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Heater Element Type	Tank Type	Qty	Tank Vol (gal)	Rated Input	Rated Input Unit	Efficiency	Efficiency Unit	Tank Insulation R-value Int/Ext	Standby Loss Fraction	1st Hr. Rating or Flow Rate (gal)	Heat Pump Type	Tank Location or Ambient Condition
A O Smith PEC-302	Electricity	Storage	2	30	4.5	kW	0.93	UEF	N/A	N/A	80	N/A	N/A

L. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections made by Documentation Author indicate which Certificates of Installation must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Envelope	NRCI-ENV-01-E - Must be submitted for all buildings
Envelope	NRCI-ENV-E - Envelope (for all buildings)
Mechanical	NRCI-MCH-01-E - Must be submitted for all buildings
Mechanical	NRCI-MCH-E - For all buildings with Mechanical Systems
Plumbing	NRCI-PLB-01-E - Must be submitted for all buildings
Plumbing	NRCI-PLB-E - For all buildings with Plumbing Systems

M. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component	Form/Title
Envelope	NRCA-ENV-02-F - NRFC label verification for fenestration
Mechanical	NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap
Mechanical	NRCA-MCH-03-A - Constant Volume Single Zone HVAC
Mechanical	NRCA-MCH-05-A - Air Economizer Controls
Mechanical	NRCA-MCH-06-A Demand Control Ventilation Systems must be submitted for all systems required to employ demand controlled ventilation (refer to) can vary outside ventilation flow rates based on maintaining interior carbon dioxide (CO2) concentration setpoints.

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 14 of 19)

H3. NONRESIDENTIAL / COMMON USE AREA FAN SYSTEMS SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13
Name or Item Tag	Qty	Design OA CFM	Supply Fan				Return / Relief Fan					Status[1]
			CFM	Power	Power Units	Control	Fan Type	CFM	Power	Power Units	Control	
701 (5 Ton)	1	513	1,800	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
702 (5 Ton)	1	499.7	1,800	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
706 (5 Ton)	1	514.9	1,800	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
707 (5 Ton)	1	503.5	1,800	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
703 704 705 (2 Ton)	1	75	800	0.33	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
708 (3.5 Ton)	1	336.3	1,400	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
709 (3.5 Ton)	1	332.5	1,400	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
710 (3.5 Ton)	1	332.5	1,400	0.7	BHP	Constant Vol	N/A	N/A	N/A	N/A	N/A	N

[1] *Status: N - New, A - Altered, E - Existing*

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	Equipment Type	Interlocks per 140.4(n)[1]	Other Special Features and Controls
701 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
702 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
706 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
707 (5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
703 704 705 (2 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Fixed DB

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the NRCC-MCH-E.

[1] *Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.*

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 11 of 19)

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	Total Gross Surface Area (ft²)	Total Fenestration Area (ft²)	Window to Wall Ratio (%)
North-Facing[1]	1003	13.66	1.36
East-Facing[2]	3344.33	255.33	7.63
South-Facing[3]	878	169.5	19.31
West-Facing[4]	2747	166.99	6.08
Total	**7972.33**	**605.48**	**7.59**
Roof	8480	0	0

Notes
[1] *North-Facing is oriented to within 45 degrees of true north, including 45 00'00" east of north (NE), but excluding 45 00'00" west of north (NW),*
[2] *East-Facing is oriented to within 45 degrees of true east, including 45 00'00" south of east (SE), but excluding 45 00'00" north of east (NE),*
[3] *South-Facing is oriented to within 45 degrees of true south, including 45 00'00" west of south (SW), but excluding 45 00'00" east of south (SE),*
[4] *West-Facing is oriented to within 45 degrees of true west, including 45 00'00" north of west (NW), but excluding 45 00'00" south of west (SW),*

G4. NONRESIDENTIAL AIR BARRIER

01	02
Building Story Name	Air Barrier
Com-Floor 1	No air barrier

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 18 of 19)

M. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component	Form/Title
Mechanical	NRCA-MCH-12-A FDD for Packaged Direct Expansion Units

N. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

Selections made by Documentation Author indicate which Certificates of Verification must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

There are no Certificates of Verification applicable to this project

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 15 of 19)

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	Equipment Type	Interlocks per 140.4(n)[1]	Other Special Features and Controls
708 (3.5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
709 (3.5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
710 (3.5 Ton)	Single Zone Heat Pump (SZHP) Air System	N/A	Zone(s) With CO2 Sensor Vent. Control Fixed DB
Undefined Plant1 - SHW	Service Hot Water	N/A	Fixed Temperature Control

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the NRCC-MCH-E.

[1] *Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.*

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	Mechanical Ventilation				Conditioned Area (sf)	DCV or Occupant Sensor Controls, or Both
	Ventilation Function	# of People	Supply OA CFM	Exhaust CFM		
1-701 Classroom	Education - Classrooms (ages 9-18)	33.75	513	0	1350	DCV
2-702 Classroom	Education - Classrooms (ages 9-18)	32.88	499.7	0	1315	DCV
3-706 Classroom	Education - Classrooms (ages 9-18)	33.88	514.9	0	1355	DCV
4-707 Classroom	Education - Classrooms (ages 9-18)	33.13	503.5	0	1325	DCV
5-703 Resource Room	Office - Office space Misc - All others General - Occupiable storage rooms for liquids or gels	2.29	75	0	500	N/A

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD NRCC-PRF-E

Nonresidential Performance Compliance Method (Page 12 of 19)

G5. OPAQUE SURFACE ASSEMBLY SUMMARY

01	02	03	04	05	06		07	08	09	10
Surface Name	Construction Type	Area (ft²)	Framing Type	Cavity R-Value	Continuous R-Value		Units	Value	Description of Assembly Layers	Status[1]
					Interior	Exterior				
Wall8	Exterior Wall	7,972.33	Wood	21	N/A	N/A	U-factor	0.0687	Stucco - 7/8 in. Composite-1 Gypsum Board - 5/8 in.	N
Slab On Grade14	Underground Floor	8,480	N/A	0	N/A	N/A	F-factor	0.73	Slab Type =Unheated slab on grade Insulation Orientation =None Insulation R-Value =none	N
Roof16	Roof	8,480	Wood	30	N/A	N/A	U-factor	0.0353	AsphaltShingles0_25In Vapor permeable felt - 1/8 in. Plywood - 1/2 in. Air - Ceiling - 3/4 in. Composite-2 Gypsum Board - 1/2 in.	N

[1] *Status: N - New, A - Altered, E - Existing*

G7A. FENESTRATION ASSEMBLY SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06	07	08	09
Fenestration Assembly Name	Fenestration Type/ Product Type / Frame Type	Certification Method[1]	Assembly Method	Area (ft²)	Overall U-factor	Overall SHGC	Overall VT	Status[2]
Window	Vertical fenestration Fixed window N/A	NFRC	Manufactured	605.48	0.32	0.25	0.5	N

[1] *Notes: Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Center of Glass (COG) values are for the glass-only, determined by the manufacturer, and are shown for ease of verification. Site-built fenestration values are calculated per Nonresidential Appendix NA6 and are used in the analysis.*
[2] *Status: N - New, A - Altered, E - Existing*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
ON MENDOTA 2022
160 BASS AVENUE, MENDOTA, CA 93640

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A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY A. TURLEY
No. M
EXP. 6/30/25
MECHANICAL
STATE OF CALIFORNIA

TURLEY & ASSOCIATES | MECHANICAL ENGINEERING GROUP, INC.
2431 Capitol Avenue, Sacramento, CA 95816
(916) 325-1065 FAX: (916) 325-1075
Email: office@turleymech.com

Project Engineer	NJS	Job Number	24232
Project Manager	NJS	Plot Date	Feb 27, 2025 - 4:42pm
Project Drafter	JHH	Login	NShah

DRAWN: T&A
CHECKED: T&A
REVISIONS:

DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE
TITLE 24 COMPLIANCE

SHEET NO.
T-24B

CERTIFICATE OF COMPLIANCE		NRCC-CXR-E
Project Name: Mendota Elementary School	**Report Page:**	**(Page 6 of 6)**
Project Address: 605 Bass Avenue	**Date Prepared:**	12/17/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Nirav Shah	Documentation Author Signature:
Company: Turley & Associates	Signature Date:
Address: 2431 Capitol Avenue	CEA/ HERS Certification Identification (if applicable):
City/State/Zip: Sacramento CA 95816	Phone:

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
Company: Meehleis Modular Buidlings, Inc.	Date Signed: 2024-12-17
Address: 1303 E. Lodi Avenue	License:
City/State/Zip: Lodi CA 95240	Phone:

CERTIFICATE OF COMPLIANCE		NRCC-CXR-E
Project Name: Mendota Elementary School	**Report Page:**	**(Page 3 of 6)**
	Date Prepared:	12/17/2024

F. DESIGN REVIEW KICKOFF MEETING

This table indicates that the design reviewer meets the qualification requirements per Title 24, Part 1 Section 10-103(a)1 and demonstrates compliance with design review kickoff requirements per 120.8(d)2. This meeting should occur during the Schematic Design phase of the project.

Design Review Kickoff Meeting Details

01	Date of Design Review Kickoff Meeting		0001-01-01	
02	Meeting Attendees: (one person may play multiple roles)			
☐	Owner/Facility Manager:	☒	Design Reviewer(s)	Designer
☐	Project Manager:	☐	Design Architect/ Engineer(s):	
☐	Contractor:	☐	Certified Acceptance Test Tech(s):	
☐	Commissioning Provider:	☐	Energy/ T24 Part 6 Consultant:	

Design Reviewer Qualifications per Title 24 Part 1 Section 10-103(a)1

	The design reviewer(s) must be licensed professional engineers or licensed architects, or licensed contractors representing services performed by or under the direct supervision of a licensed engineer or architect, as specified in the provisions of Division 3 of the Business and Professions Code.	Do the Design Reviewer(s) meet these qualifications?	
03	In addition, for buildings with >= 10,000 ft² but < 50,000², the design reviewer(s) shall be a qualified in-house engineer or architect with no other project involvement or a third party engineer, architect, or contractor	Yes: ●	No: ○
04	The design reviewer(s) for this project will be:	Designer	

Preliminary Construction Schedule

		Start Date	Completion Date
05	Schematic Design	0001-01-01	0001-01-01
06	Design Development	0001-01-01	0001-01-01
07	Construction Documents	0001-01-01	0001-01-01
08	Construction	0001-01-01	0001-01-01
09	Building Turnover	0001-01-01	0001-01-01

Project Goals Related to Energy Efficiency

10	Operational Costs	
11	Desired Building Lifespan	
12	Equipment Lifecycle	
13	Project Energy Efficiency Goals	

CERTIFICATE OF COMPLIANCE		NRCC-CXR-E
Project Name: Mendota Elementary School	**Report Page:**	**(Page 4 of 6)**
	Date Prepared:	12/17/2024

F. DESIGN REVIEW KICKOFF MEETING

14	Envelope Goals	
15	HVAC System Goals	
16	Indoor Lighting System Goals	
17	Outdoor Lighting System Goals	
18	Water Heating System Goals	
19	Equipment and System Specifications	
20	Operations and Maintenance	

G. OWNER'S PROJECT REQUIREMENTS (OPR)

This section does not apply to this project.

H. BASIS OF DESIGN (BOD)

This section does not apply to this project.

I. CONSTRUCTION DOCUMENT DESIGN REVIEW CHECKLIST

This table is only completed if a design review document is not attached to permit application to demonstrate compliance with 120.8(b) and 120.8(e). For buildings with >= 10,000 ft² conditioned floor area, the design review will ensure the construction documents meet the Owner's Project Requirements (Table G.) and the Basis of Design Documents (Table H.). For buildings with < 10,000 ft² conditioned floor area, the design review will ensure the construction documents meet the goals documented in Table F. during the Design Review Kickoff.

		YES	NO
01	Attaching Completed Design Review Documentation?	●	○

J. COMMISSIONING PLAN

This section does not apply to this project.

CERTIFICATE OF COMPLIANCE		NRCC-CXR-E
Project Name: Mendota Elementary School	**Report Page:**	**(Page 5 of 6)**
	Date Prepared:	12/17/2024

K. FUNCTIONAL PERFORMANCE TESTING

This section does not apply to this project.

L. DOCUMENTATION AND TRAINING

This section does not apply to this project.

M. COMMISSIONING REPORT

This section does not apply to this project.

N. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

There are no forms required for this project.

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

There are no forms required for this project.

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD	NRCC-PRF-E
Nonresidential Performance Compliance Method	**(Page 19 of 19)**

Documentation Author's Declaration Statement

1. I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Nirav Shah	Documentation Author Signature:
Company: Turley & Associates	Signature Date:
Address: 2431 Capitol Avenue	CEA/HERS Certification Identification (if applicable):
City/State/Zip: Sacramento, CA 95816	Phone:

Responsible Person's Declaration statement

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I understand that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections, and I will take the necessary steps to accomplish this requirement.
6. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy, and I will take the necessary steps to accomplish these requirements.

Responsible Designer Name:	Responsible Designer Signature:	
Company: Meehleis Modular Buidlings, Inc.		
Address: 1303 E. Lodi Avenue	Date Signed:	
City/State/Zip: Lodi, CA 95240	License #:	
Phone:	Title:	Scope:
Responsible Designer Name: Nirav J. Shah	Responsible Designer Signature:	
Company: Turley & Associates		
Address: 2431 Capitol Avenue	Date Signed:	
City/State/Zip: Sacramento, CA 95816	License #:	
Phone:	Title:	Scope:

CERTIFICATE OF COMPLIANCE		NRCC-CXR-E
This document is used to demonstrate compliance with mandatory commissioning requirements in 120.8 for nonresidential buildings and hotel/motel or mixed-use buildings with nonresidential spaces. This document does not demonstrate compliance with commissioning requirements within Title 24, Part 11, which need to be documented separately if they apply.		
Project Name: Mendota Elementary School	**Report Page:**	**(Page 1 of 6)**
Project Address: 605 Bass Avenue	**Date Prepared:**	12/17/2024

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Building Size (ft²)	8480
02	Occupancy Type	Nonresidential	05		< 10,000 ft²
03	Project Type	Newly constructed	06		Unitary or packaged equipment each serving one zone
			07	Climate Zone	13

B. PROJECT SCOPE

Based on project information provided in Table A, Table B indicates which commissioning related requirements apply per 120.8. Table B is not editable by the user.

Commissioning Requirements per 120.8

01	Table F: Design Review Kickoff	120.8(d)1 and 120.8(d)2	The design review kickoff meeting establishes who will play the role of the design reviewer, the project schedule and identify owner's requirements. This meeting should be conducted during schematic design.
02	Table G: Owner's Project Requirements (OPR)	120.8(b)	This requirement does not apply.
03	Table H: Basis of Design (BOD)	120.8(c)	This requirement does not apply.
04	Table I: Design Review	120.8(d) and 120.8(e)	The design reviewer(s) reviews the construction documents for clarity, completeness, and adherence to the owner's goals. Commissioning measures must be included in the construction documents to facilitate the design review and commissioning process. For projects with >= 10,000 ft² of nonresidential conditioned floor area, the design review is for adherence with the Owner's Project Requirements (OPR) and Basis of Design (BOD). This should be conducted during design.
05	Table J: Commissioning Plan	120.8(f)	This requirement does not apply.
06	Table K: Functional Performance Testing	120.8(g)	This requirement does not apply.
07	Table L: Documentation and Training	120.8(h)	This requirement does not apply.
08	Table M: Commissioning Report	120.8(i)	This requirement does not apply.

CERTIFICATE OF COMPLIANCE		NRCC-CXR-E
Project Name: Mendota Elementary School	**Report Page:**	**(Page 2 of 6)**
	Date Prepared:	12/17/2024

C. COMPLIANCE RESULTS

Table C will indicate if the project data input into the compliance document is compliant with commissioning requirements per 120.8. This table is not editable by the user. If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

01	02	03	04	05	06	07	08	09
Design Kickoff Review	Owner's Project Requirements	Basis of Design	Design Review	Commissioning Plan	Functional Performance Testing	Documentation and Training	Commissioning Report	
Table F	Table G	Table H	Table I	Table J	Table K	Table L	Table M	
Yes	Yes							COMPLIES
10								COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93640

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REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
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LODI, CA. 95240
(209) 334-4837
CA. LIC. NO. 472488
NV. LIC. NO. 37887

REGISTERED PROFESSIONAL ENGINEER
NIRAV J. SHAH
No. M
EXP. 6/30/25
MECHANICAL
STATE OF CALIFORNIA

TURLEY & ASSOCIATES MECHANICAL ENGINEERING GROUP, INC.
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Project Engineer	NJS	Job Number	24232
Project Manager	NJS	Plot Date	Feb 27, 2025 - 4:43pm
Project Drafter	JDA	Login	NShah

DRAWN: T&A
CHECKED: T&A
REVISIONS:

-	-

DATE SEPT. 16, 2024
JOB NO. 24769

SHEET TITLE

TITLE 24 COMPLIANCE

SHEET NO.

T-24C

260500 ELECTRICAL WORK FOR COMMON RESULTS:

1. ELECTRICAL INSTALLATION SHALL COMPLY WITH TITLE 24, CALIFORNIA CODE OF REGULATIONS, INCLUDING THE FOLLOWING:
TITLE 24, CCR, PART 2, 2022 CBC
TITLE 24, CCR, PART 3, 2022 CEC
TITLE 24, CCR, PART 4, 2022 CMC
TITLE 24, CCR, PART 9, 2022 CFC
TITLE 24, CCR, PART 6, 2022 CALIFORNIA ENERGY CODE
TITLE 24, CCR, PART 11, 2022 CALIFORNIA GREEN BUILDING STANDARDS CODE
ALL APPLICABLE LOCAL CODES

2. THE ELECTRICAL SERVICES ARE EXISTING. THE ELECTRICAL CONTRACTOR SHALL FAMILIZE THEMSELVES WITH THE EXISTING CONDITONS, DISTRIBUTION AND SIGNAL SYSTEMS PRIOR TO BID.

3. CONTRACTOR SHALL PROCURE AND PAY FOR ALL PERMITS, LICENSES, ETC. REQUIRED TO CARRY ON AND COMPLETE THE WORK.

4. PROVIDE ALL LABOR, MATERIALS, TOOLS, PLANT EQUIPMENT, TRANSPORTATION AND PERFORM ALL OPERATIONS NECESSARY FOR ANY REASONABLE INCIDENTAL TO PROPER EXECUTION AND COMPLETION OF ALL "ELECTRICAL WORK" WHETHER SPECIFICALLY MENTIONED OR NOT; ALL AS INDICATED, SPECIFIED HEREIN, AND/OR IMPLIED THEREBY TO CARRY OUT THE APPARENT INTENT THEREOF.

5. ALL MATERIALS SHALL BE NEW AND LISTED WITH THE UNDERWRITERS' LABORATORIES, INC., SHALL MEET THEIR REQUIREMENTS AND SHALL BEAR THEIR LABEL WHEREVER STANDARDS HAVE BEEN ESTABLISHED AND LABEL SERVICE IS REGULARLY FURNISHED BY THAT AGENCY.

6. ELECTRICAL DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC AND ALTHOUGH THE SIZE AND LOCATIONS OF EQUIPMENT ARE SHOWN TO SCALE WHEREVER POSSIBLE, CONTRACTOR SHALL MAKE USE OF ALL DATA IN ALL CONTRACT DOCUMENTS AND VERIFY THIS INFORMATION AT THE SITE. CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT AND INSTALLING HIS WORK TO AVOID INTERFERENCE WITH OTHER TRADES.

7. WORK SHOWN ON THE DRAWINGS TO BE INSTALLED UNDERGROUND SHALL BE INSTALLED AT LEAST 24" BELOW GRADE UNLESS OTHERWISE NOTED. BACKFILL IN 6" THICK, PROPERLY MOISTENED LAYERS, SOLIDLY PACKED AND IRON TAMPED TO A DENSITY NOT LESS THAN THAT OF ADJACENT, UNDISTURBED EARTH. RESTORE SURFACES, ROADWAYS, WALKS, CURBS, WALLS AND EXISTING UNDERGROUND INSTALLATIONS TO ORIGINAL CONDITION IN AN ACCEPTABLE MANNER.

8. ALL ELECTRICAL EQUIPMENT EXPOSED TO THE WEATHER SHALL BE LISTED FOR EXTERIOR USE.

9. ALL U.L. LISTED EQUIPMENT SHALL BE INSTALLED AS PER THEIR LISTING OR LABELING.

10. IN LOCATIONS WHERE ELECTRICAL EQUIPMENT WOULD BE EXPOSED TO PHYSICAL DAMAGE, ENCLOSURES OR GUARDS SHALL BE SO ARRANGED AND OF SUCH STRENGTH AS TO PREVENT SUCH DAMAGE.

11. CONFLICTS BETWEEN SPECIFICATIONS AND PLANS:

a. ANY CONFLICT BETWEEN ELECTRICAL SPECIFICATIONS AND ELECTRICAL PLANS; OR BETWEEN ELECTRICAL PLANS AND PLANS OF ANOTHER DISCIPLINE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND A RESOLUTION RECEIVED PRIOR TO PROCUREMENT OR INSTALLATION OF THE ITEM IN QUESTION.

b. IF THE CONTRACTOR PROCEEDS WITH THE WORK WITHOUT RECEIVING ANY RESOLUTION TO THE CONFLICT HE/SHE DOES SO AT HIS/HER OWN RISK AND SHALL RECTIFY THE WORK TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER OR ENGINEER.

260500.01 HVAC SYSTEMS:

1. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT LOCATIONS OF ALL HVAC UNITS, DISCONNECTS AND DEVICES IN FIELD. COORDINATE ROOF PENETRATIONS FOR DISCONNECTS AND WEATHERPROOF OUTLETS WITH ELECTRICAL CONNECTION POINTS ON THE UNITS TO KEEP FLEXIBLE CONDUIT LENGTH TO A MINIMUM (36" MAXIMUM). VERIFY AND CONFIRM THE ACTUAL MOUNTING LOCATION ON THE HVAC UNIT FOR THE DISCONNECT. ALL SERVICING OUTLETS ON THE ROOF OR OUTDOORS FOR HVAC UNITS SHALL BE WP/GFI.

2. THE RATING OF THE DISCONNECT SHALL BE SUCH AS TO ENABLE THE LARGEST FUSE SIZE ON THE UNIT NAMEPLATE TO BE INSTALLED IN THE DISCONNECT. PROVIDE FUSES OF THIS RATING.

3. FURNISH AND INSTALL ALL LINE VOLTAGE CONDUITS AND LINE VOLTAGE WIRING (LOW VOLTAGE CONDUITS AND WIRING BY MECHANICAL) TO HVAC EQUIPMENT AND ASSOCIATED CONTROLS AND DEVICES AS SHOWN ON THE ELECTRICAL AND MECHANICAL PLANS, UNLESS OTHERWISE NOTED.

4. RUN ALL CONDUITS FOR ROOFTOP EQUIPMENT WITHIN CEILING SPACE BELOW. SURFACE CONDUIT RUNS ON THE ROOF ARE NOT PERMITTED ON THIS PROJECT.

5. DISCONNECTS SHALL NOT BE USED AS THROUGH RACEWAYS FOR WIRING NOT DIRECTLY SERVING THE DISCONNECTS. SERVICING OUTLETS SHALL NOT BE MOUNTED ON DISCONNECTS.

260500.02 SUBMITALLS:

1. PROVIDE THE FOLOWING SUBMITTALS FOR REVIEW AND APPROVAL. EACH SHALL BE SUBMITTED SEPARATELY TO AVOID DELAYS IN THE REVIEW OF ONE SUBMITTAL IN HOLDING UP REVIEW OF THE REMAINDER.

a. LIGHTING CONTROLS
b. BASIC ELECTRICAL MATERIALS
c. LIGHT FIXTURES

260500.03 WORKING CLEARANCES FOR ELECTRICAL SWITCHGEAR:

1. PROVIDE WORKING SPACES FOR ELECTRICAL PANELS AND SWITCHGEAR TO COMPLY WITH CEC 110.26.

2. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ALL TRADES INVOLVED TO ENSURE THE CLEARANCES REQUIRED BY ITEM 1 ABOVE ARE PROVIDED.

260526 GROUNDING:

1. GROUND AND BOND ALL EQUIPMENT AS REQUIRED BY GOVERNING CODES AND SPECIFICALLY INCLUDING SWITCHBOARD, PANELBOARDS, MOTOR CASES, METAL PIPING SYSTEMS, STRUCTURAL STEEL, ETC.

2. PROVIDE GROUND WIRES IN ALL FEEDERS AND BRANCH CIRCUITS, SIZE PER CEC TABLE 250.122

3. ALL GROUND WIRES SHALL BE INSULATED GROUND WIRES.

260529 INSTALLATION OF SUPPORT SYSTEMS

1. RACEWAYS, CABLE ASSEMBLIES, BOXES, CABINETS, AND FITTINGS SHALL BE SECURELY FASTENED IN PLACE PER CEC ARTICLE 300.11. SUPPORT WIRES THAT DO NOT PROVIDE SECURE SUPPORT SHALL NOT BE PERMITTED AS THE SOLE SUPPORT. SUPPORT WIRES AND ASSOCIATED FITTINGS THAT PROVIDE SECURE SUPPORT AND THAT ARE INSTALLED IN ADDITION TO THE CEILING GRID SUPPORT WIRES SHALL BE PERMITTED AS THE SOLE SUPPORT. WHERE INDEPENDENT SUPPORT WIRE ARE USED, THEY SHALL BE SECURED AT BOTH ENDS. CABLES AND RACEWAYS SHALL NOT BE SUPPORTED BY CEILING GRIDS.

2. FURNISH ALL NECESSARY FOUNDATIONS, SUPPORTS, BACKING, ETC., FOR ALL ELECTRICAL ENCLOSURES, CONDUITS AND EQUIPMENT.

3. ATTACH ALL BOXES, CABINETS, ETC. TO WOOD WITH WOOD OR LAG SCREWS, TO METAL WITH MACHINE SCREWS OR BOLTS AND TO CONCRETE WITH EXPANSION ANCHORS AND MACHINE SCREWS OR BOLTS.

2. RIGID STEEL CONDUIT SHALL BE SUPPORTED AT INTERVALS NOT GREATER THAN 10 FT, ELECTRICAL METALLIC TUBING AT INTERVALS NOT GREATER THAN 5 FT.

3. A SUPPORT SHALL BE PROVIDED NOT MORE THAN 3 FT. FROM ANY CHANGE IN DIRECTION. ADDITIONAL SUPPORTS TO THOSE SPECIFIED ABOVE SHALL BE INSTALLED WHERE REQUIRED TO SUIT JOB CONDITIONS AND TO PROVIDE A SECURE INSTALLATION. ALL HANGERS AND SUPPORTS SHALL BE THE PRODUCTS OF ONE MANUFACTURER.

260533 PULL OR JUNCTION BOXES:

1. INSTALL WHERE INDICATED, OR AS REQUIRED BY CODE, PULL BOXES AND JUNCTION BOXES OF SUFFICIENT SIZE AND CAPACITY TO FACILITATE ALL WIRING. BOXES SHALL BE SIZED TO PROPERLY ACCOMMODATE ALL CONDUCTORS ENTERING SAME.

2. BOXES SHALL BE OF THE SHAPE AND SIZE BEST SUITED FOR THE PARTICULAR APPLICATION AND SHALL BE SUPPORTED DIRECTLY TO STRUCTURAL MEMBERS, FRAMING OR BLOCKING BY MEANS OF SCREWS, ANCHORS, BOLTS OR EMBEDDED IN MASONRY.

A. SWITCH AND RECEPTACLE BOX SHALL BE ONE PIECE DRAWN OR STAMPED STEEL BOXES MINIMUM SIZE SHALL BE FOUR INCHES (4") SQARE. BOXES SHALL BE FITTED WITH FLUSH DEVICE COVERS, PLASTER RINGS, OR TILE SWITCH RINGS IN MASONRY IN AREA WHERE EXPOSED WIRING IS PERMISSIBLE, BOXES SHALL BEFITTED WITH SURFACE TYPE COVERS.

B. LIGHTING OUTLETS SHALL BE FOUR INCHES (4")OCTAGON, MINIMUM.

C. VOICE/DATA OUTLET BOXES SHALL BE 4_11/16"SQ.x2_1/8" DEEP MINIMUM, FITTED WITH PLASTER RINGS.

D. BOXES FOR SPECIAL EQUIPMENT SHALL BE SUITABLE F/R THE PARTICULAR EQUIPMENT.

E. BOXES SHALL BE LOCATED AND PLACED ACCORDING TO ARCHITECTURAL AND STRUCTURAL REQUIREMENTS.

260550 WIRING METHODS: LINE VOLTAGE SYSTEMS (120V AND ABOVE):

1. ALL WIRING SHALL BE INSTALLED IN CONDUITS. CONDUITS SHALL BE RUN CONCEALED IN WALLS AND CEILINGS WHERE FEASIBLE. ALL CONDUITS INSTALLED SURFACE ON WALL SHALL BE PAINTED TO MATCH WALL FINISH. MOUNT EXTERIOR CONDUITS ON WALL ON GALVANIZED UNISTRUTS. ALL SURFACE CONDUIT INSTALLATION/ RUNS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.

2. ALL CONDUITS RUN WITHIN INTERIOR FINISHED SPACES SUCH AS OFFICES, BREAKROOM, RESTROOM ETC. SHALL BE RUN CONCEALED.

3. ALL CONDUITS RUN IN DEDICATED ELECTRICAL AND MECHANICAL ROOMS SHALL BE RUN EXPOSED.

4. MINIMUM CONDUIT SIZE SHALL BE 1/2" ABOVE GRADE AND 3/4" UNDERGROUND.

5. MINIMUM ACCEPTABLE CONDUITS ARE:

A. GALVANIZED RIGID STEEL - FOR USE ON:
(1) EXTERIOR WALL SURFACES.

B. GALVANISED STEEL EMT FOR USE:
(1) CONCEALED IN INDOOR FINISHED SPACES.
(2) EXPOSED INSIDE ELECTRICAL & MECHANICAL ROOMS.

C. LIQUID TIGHT STEEL FLEX:
(1) FOR FINAL CONNECTION TO OUTDOOR EQUIPMENT. LENGTH SHALL NOT EXCEED 36".

D. FLEXIBLE STEEL CONDUIT:
(1) FOR INDOOR FINAL CONNECTION TO RECESSED LIGHT FIXTURES. LENGTH SHALL NOT EXCEED 72".
(2) FOR INDOOR FINAL CONNECTION TO HVAC EQUIPMENT. LENGTH SHALL NOT EXCEED 36".

E. "PVC" SCHEDULE 40:
(1) FOR CONDUITS RUN UNDERGROUND AND FOR UNDER BUILDING SLAB.
(2) CONDUIT STUBUPS THROUGH THE FLOOR OR GRADE SHALL BE IN .PVC WRAPPED RIGID STEEL CONDUIT. PVC WRAPPING SHALL EXTEND 6" ABOVE FINISHED FLOOR OR GRADE.
(3) NOT PERMITTED FOR WIRING ABOVE FINISHED FLOOR INSIDE BUILDINGS

F. ALUMINUM CONDUITS, IMC CONDUITS OR ALUMINUM FITTINGS ARE NOT APPROVED FOR USE ON THIS PROJECT.

G. ALL CONDUIT FITTINGS SHALL BE MALLEABLE IRON/STEEL.

H. COUPLING:
(1) EMT COUPLING - APPLETON TWC-CS SERIES
(2) EMT CONNECTOR - APPLETON TW-CSI SERIES
(3) FLEX CONDUIT CONNECTOR - T&B "TITE BITE", INSULATED
(4) LIQUID TIGHT FLEX CONDUIT CONNECTOR - APPLETON "STB" SERIES UP TO 2", "ST" SERIES OVER 2".

I. RIGID STEEL CONDUIT CONNECTED TO BOXES AND CABINETS SHALL BE FITTED WITH TWO LOCKNUTS AND INSULATING BUSHING, OA "A" SERIES. PROVIDE GROUNDING BUSHING OZ "BL" SERIES WHERE LOCKNUTS AND BUSHING IS NOT USED. CONDUITS CONNECTED TO BOXES EXPOSED TO WEATHER/MOISTURE SHALL BE FITTED WITH WATERTIGHT SEALING HUBS OF STEEL OR MALLEABLE IRON WITH SEALING RING AND INSULATED THREAT, T & B 370 SERIES.

J. TYPE NM AND NMC CABLES SHALL NOT BE USED ON THIS PROJECT.

K. THE PROJECT DRAWINGS ARE LAID OUT USING SOLID CONDUITS AND CABLES PULLED THROUGH SUCH CONDUITS. MC CABLES MAY BE UTILIZED AS DESCRIBED BELOW, WITH RESTRICTIONS NOTED.

(1) PRIOR APPROVAL OF OWNER/ARCHITECT REQUIRED.

(2) ALL SUPPORTS, ATTACHMENTS SPACING SHALL BE PER CEC 330.30.

(3) FOR MULTI-WIRE BRANCH CIRCUITS SUCH CABLES SHALL HAVE MULTIPLE NEUTRALS, ONE FOR EACH CIRCUIT.

6. CONDUCTORS SHALL BE COPPER CONDUCTORS TYPE THHN/THWN UNLESS OTHERWISE NOTED OR REQUIRED BY CODE.

7. ALL DEVICES, CONDUITS, RACEWAYS AND CABLES SHOWN ARE NEW TO BE PROVIDED UNLESS OTHERWISE NOTED.

8. FLASH AND COUNTERFLASH ALL ITEMS PASSING THROUGH THE ROOF.

9. THE OWNER RESERVES THE RIGHT TO RELOCATE ALL LIGHTING, OUTLETS AND SWITCHES BEFORE THEY ARE ROUGHED IN AT NO EXTRA COST.

260551 INSTALLATION OF RACEWAYS AND FITTINGS

1. CONCEAL RACEWAYS WITHIN CEILINGS, WALLS, AND FLOORS EXCEPT WHERE EXPOSED RACEWAYS ARE SPECIFICALLY PERMITTED.

2. WHERE CONDUIT IS ALLOWED TO BE EXPOSED, INSTALL THE CONDUIT PARALLEL WITH OR AT RIGHT ANGLES TO STRUCTURAL MEMBERS, WALLS, AND LINES OF THE BUILDING.

3. INSTALL WHERE INDICATED, OR AS REQUIRED BY CODE, PULLBOXES AND JUNCTION BOXES OF SUFFICIENT SIZE TO FACILITATE WIRING. BOXES SHALL BE SIZED TO PROPERLY ACCOMMODATE ALL CONDUCTORS ENTERING SAME.

4. DO NOT INSTALL CONDUIT OR TUBING WHICH HAS BEEN CRUSHED OR DEFORMED.

5. RUN CONDUCTORS OF SAME CIRCUIT IN SAME CONDUIT. RUN CONDUCTORS OF DIFFERENT VOLTAGE SYSTEMS IN SEPARATE CONDUITS.

6. INSTALL NO CONDUCTORS UNTIL WORK WHICH MIGHT CAUSE DAMAGE TO SUCH CONDUCTORS OR THE CONDUIT HAS BEEN COMPLETED.

7. KEEP ALL CONDUITS AT LEAST SIX INCHES AWAY FROM THE COVERING ON HOT WATER OR STEAM PIPES.

8. CAP RACEWAY ENDS DURING CONSTRUCTION. CLEAN OR REPLACE CONDUITS IN WHICH WATER OR FOREIGN MATTER HAVE ACCUMULATED, TO THE SATISFACTION OF THE ARCHITECT.

9. CONDUITS SHALL BE SUPPORTED WITH STRAPS, WITH GALVANIZED MALLEABLE SPLIT RING AND ROD FOR INDIVIDUAL RUNS OR WITH KINDORF OR UNISTRUT CHANNEL SUPPORTS FOR MULTIPLE RUNS. DISTANCE BETWEEN SUPPORTS SHALL NOT EXCEED 10 FEET. CONDUITS SHALL BE SUPPORTED INDEPENDENTLY OF ONE ANOTHER.

10. CONDUITS CONNECTED TO BOXES AND CABINETS SHALL BE FITTED WITH TWO LOCKNUTS AND INSULATED BUSHING, OA "A" SERIES.

11. CONDUITS NOT CONNECTED WITH LOCKNUTS AND BUSHINGS SHALL BE FITTED WITH GROUNDING BUSHING, OZ "BL" SERIES, U. L. APPROVED AND BONDED.

12. CONDUIT STRAPS FOR INDIVIDUAL RUNS SHALL BE SECURED BY TOGGLE BOLTS ON HOLLOW MASONRY, EXPANSION ANCHORS ON SOLID CONCRETE OR MASONRY, MACHINE SCREWS OR BOLTS ON METAL SURFACES AND WOOD SCREWS ON WOOD CONSTRUCTION. THE USE OF NAILS TO ANCHOR STRAPS ON WOOD CONSTRUCTION IS PROHIBITED. STRAPS SHALL BE TWO HOLE MALLEABLE IRON OR SNAP-TYPE STEEL WITH RIBBED BACK, GALVANIZED OR CADMIUM PLATED. THE USE

13. PLACEMENT OF ALL BOXES SHALL BE GOVERNED BY APPLICABLE ARCHITECTURAL AND STRUCTURAL REQUIREMENTS.

14. CONDUIT FITTINGS: EXCEPT WHERE OTHERWISE NOTED, CONDUIT FITTINGS SHALL BE APPLETON OR APPROVED EQUAL. UNILETS SHALL BE MALLEABLE IRON AND FITTED WITH COVERS AND GASKETS.

15. TELEPHONE AND SIGNAL CONDUIT BENDS WHERE REQUIRED SHALL HAVE A RADIUS OF TEN TIMES THE CONDUIT TRADE SIZE.

16. PROVIDE PULL TAPE IN ALL EMPTY CONDUITS.

260551.01 PENETRATIONS OF FIRE-RATED ASSEMBLIES:

1. PENETRATIONS OF PIPES, CONDUITS, ETC., IN WALLS AND CEILINGS REQUIRING PROTECTED OPENINGS SHALL BE FIRESTOPPED IN ACCORDANCE WITH CBC SECTION 714. FIRE STOP MATERIAL SHALL BE A TESTED ASSEMBLY APPROVED BY AUTHORITY HAVING JURISDICTION.

2. THROUGH PENETRATIONS AND MEMBRANE PENETRATIONS OF FIRE-RESISTANCE RATED WALLS SHALL COMPLY WITH CBC 714.3.

3. PENETRATIONS OF FIRE RESISTANCE RATED FLOOR, FLOOR/CEILING ASSEMBLY OR THE CEILING MEMBRANCE OF A ROOF/CEILING ASSEMBLY SHALL COMPLY WITH CBC 714.4.

4. ALL ELECTRICAL BOXES INSTALLED IN A FIRE-RESISTIVE SEPARATION SHALL BE AN "APPROVED BOX". AN "APPROVED BOX" IS AN ALL STEEL ELECTRICAL BOX WHICH IS UL LISTED FOR INSTALLATION IN A FIRE-RESISTIVE SEPARATION.

5. ELECTRICAL BOXES, INCLUDING BOXES FOR RECEPTACLES, IN RATED WALLS SHALL HAVE A MINIMUM OF 24" HORIZONTAL SEPARATION FROM THOSE IN ADJACENT ROOMS AT THE OTHER SIDE OF WALL IN ACCORDANCE WITH C.B.C. SECTION 714.3.2. IN CASE SUCH HORIZONTAL SEPARATION IS NOT POSSIBLE EACH BOX SHALL BE PROTECTED BY A LISTED FIRE-STOPPING PUTTY PAD AND BOX SHALL BE PROVIDED WITH A METAL COVERPLATE AND NOT PLASTIC OR NYLON.

6. WHERE CONDUIT SLEEVE IS USED FOR THE PROTECTION OF WIRING PENETRATIONS, UL LISTED FIRESTOP COMPOUND SHALL BE USED TO SEAL THE OPENING AROUND THE CONDUIT AND TO SEAL THE CONDUIT ENDS AFTER THE CABLE IS INSTALLED.

7. WHERE A CABLE OR A GROUP OF CABLES PENETRATES MEMBRANE OR CONTINUOUS BLOCKING, UL LISTED FIRESTOP COMPOUND SHALL BE USED TO SEAL THE OPENING AROUND THE CABLES.

8. SEE ARCHITECTURAL PLANS FOR LOCATION OF FIRE-RATED WALLS AND CEILING.

260553 NAMEPLATES & IDENTIFICATION:

1. INSTALL ENGRAVED NAMEPLATES FOR EACH PANELBOARD, CABINET, DISCONNECT, ETC. NAMEPLATES SHALL BE SECURELY FASTENED TO THE EQUIPMENT WITH #4 PHILLIPS ROUND HEAD CADMIUM PLATED SELF-TAPPING SCREWS, BRASS BOLT.

2. PROVIDE CIRCUIT LABEL INDICATING PANEL AND CIRCUIT NUMBER ON EACH COVERPLATE FOR EACH RECEPTACLE AND LIGHT SWITCH, MOTION SENSOR SWITCH. SUCH LABEL SHALL BE SELF ADHESIVE WHITE TAPE WITH BLACK LETTERS MADE ON A LABEL MAKER.

3. ALL CONTROLLED RECEPTACLES SHALL BE PERMANENTLY MARKED TO DIFFERENTIATE THEM FROM UNCONTROLLED RECEPTACLES PER CALIFORNIA ENERGY CODE SECTION 130.5(d)(3).

260573 ARC FLASH HAZARDS:

1. PROVIDE WARNING LABEL ON ELECTRICAL EQUIPMENT OF POSSIBLE ARC FLASH HAZARDS PER C.E.C. 110.16.

260800 TESTING:

1. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE FREE FROM SHORT CIRCUITS AND IMPROPER GROUNDS. TEST ALL WIRING AND CONNECTIONS FOR CONTINUITY AND GROUNDS BEFORE ANY FIXTURES OR EQUIPMENT ARE CONNECTED AND WHERE SUCH TESTS INDICATE FAULTY INSULATION OR OTHER DEFECTS, THEY SHALL BE LOCATED, REPAIRED AND RETESTED AT THE CONTRACTOR'S EXPENSE. PROVIDE ALL INSTRUMENTS TO MAKE SUCH TESTS.

2. DEMONSTRATE TO THE OWNER AND THE ARCHITECT, THAT THE ENTIRE INSTALLATION IS COMPLETE, IN PROPER OPERATING CONDITION AND THAT THE CONTRACT HAS BEEN PROPERLY AND FULLY EXECUTED.

260811 OPERATIONS AND MAINTENANCE (O&M) MANUALS:

1. PROVIDE AS-BUILT DRAWINGS.

A. UPON COMPLETION OF WORK COVERED BY THIS CONTRACT, PROVIDE AS-BUILT PLANS UPON WHICH SHALL BE SHOWN ALL CHANGES OF FEEDERS, PANELS, CIRCUITS, LIGHT FIXTURES, ETC., FOR THIS PROJECT AND INSTALLED UNDER THIS CONTRACT, WHICH ARE NOT IN ACCORD WITH THESE DRAWINGS FOR THE WORK.

B. ALL SYMBOLS AND DESIGNATIONS USED IN PREPARING "AS-BUILT" DRAWINGS SHALL MATCH THOSE USED IN CONTRACT DRAWINGS.

2. PROVIDE OF OPERATION AND MAINTENANCE MANUAL FOR POWER, AND LIGHTING SYSTEMS.

3. SCAN BOTH "AS-BUILT" PLANS AND O&M MANUAL ON TO A CD AND PROVIDE (3) COPIES OF THE CD TO OWNER PRIOR TO RELEASE OF FINAL PAYMENT.

260943 INTERIOR LIGHTING CONTROL SYSTEM:

1. PROVIDE A COMPLETE AND FULLY OPERATIONAL INTERIOR LIGHTING CONTROL SYSTEM FOR INTERIOR LIGHTING AS SPECIFIED HEREIN AND SHOWN ON THE DRAWINGS.

2. THE COMPLETE SYSTEM, INCLUDING ALL DEVICES SHALL BE IN COMPLIANCE WITH THE 2016 CALIFORNIA ENERGY CODE.

3. THE COMPLETE SYSTEM SHALL BE AS MANUFACTURED BY NLIGHT, WATTSTOPPER, OR GREENGATE CONSISTING OF:

A. LUMINAIRES WITH 0-10V DIMMING LED DRIVERS.

B. WALL DIMMER SWITCHES THAT COMMUNICATE THROUGH ROOM CONTROLLERS.

C OCCUPANCY SENSORS THAT COMMUNICATE THROUGH ROOM CONTROLLERS.

D WHERE LIGHT FIXTURES FALL UNDER THE PRIMARY AND SECONDARY DAYLIT ZONES AS DEFINED BY SECTION 130.1(d) AND THE TOTAL INSTALLED GENERAL LIGHTING POWER IN THE PRIMARY DAYLIT ZONE IS NOT LESS THAN 120W (EXCEPTION #1 TO SECTION 130.1(d)2) SUCH LIGHT FIXTURES SHALL BE PROVIDED WITH AUTOMATIC DAYLIGHTING CONTROLS IN ACCORDANCE WITH SECTION 130.1(d)(2)(D).

E. TIME BASED GATEWAY DEVICE THAT PROVIDES TIME-BASED SIGNAL TO ROOM CONTROLLERS FOR ALL SPACES THAT CONTROLLED BY MOTION SENSORS TO AUTOMATICALLY SHUT-OFF LIGHTS AT THE END OF DAY

4. ALL SYSTEM COMPONENTS SHALL BE UL LISTED. ALL SYSTEM CONTROL COMPONENTS SHALL BE APPROVED BY THE CALIFORNIA ENERGY COMMISSION.

5. ALL EQUIPMENT AND ITEMS OF CONTROL SHALL BE INSTALLED AND WIRED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

6. PROVIDE WALL OCCUPANCY SENSOR LIGHT SWITCHES WHERE SO SHOWN ON PLANS. SUCH OCCUPANCY SENSOR SWITCHES SHALL BE SINGLE LEVEL AUTOMATIC "ON"/AUTOMATIC "OFF" AS SHOWN ON PLANS. SENSORS SHALL COMPLY WITH SECTION 110.9 OF THE ENERGY CODE.

7. THE SYSTEM SHALL AUTOMATICALLY SWITCH OFF ALL LIGHTS WHEN CONTROLLED SPACE BECOMES UNOCCUPIED AND SWITCH ON LIGHTS WHEN THE SPACE IS RE-OCCUPIED. ALL SENSORS SHALL BE PROVIDED WITH USER ADJUSTABLE TIME DELAY (15 SEC. TO 20 MINUTES) FOR "SWITCH-OFF" FUNCTION AND ADJUSTABLE SENSITIVITY.

8. LOW VOLTAGE WIRING IS NOT REQUIRED TO BE IN CONDUIT EXCEPT IN HARDLID CEILINGS WHERE SUCH WIRES SHALL BE RUN IN CONDUIT.

262417 PANELBOARDS:

1. UNITS SHALL BE FLUSH OR SURFACE MOUNTED AS INDICATED ON THE PANEL SCHEDULE, WITH THE NUMBER AND SIZE OF BREAKERS AS INDICATED ON THE PANEL SCHEDULE. SINGLE POLE, TWO POLE, AND THREE POLE BREAKERS SHALL BE BOLT-ON TYPE. MULTIPLE POLE BREAKERS SHALL HAVE COMMON INTERNAL TRIP CONNECTION. SINGLE POLE BREAKERS SHALL NOT BE TIED AT HANDLES TO FORM MULTIPLE POLE BREAKERS. THE PANEL DOORS SHALL BE DOOR-IN-DOOR CONSTRUCTION AND SHALL HAVE FLUSH TYPE LOCKS, ALL LOCKS SHALL BE KEYED ALIKE AND HAVE TYPEWRITTEN DIRECTORIES INDICATING FIXTURES, EQUIPMENT, OR OUTLETS SERVICE BY EACH BREAKER. PANELS SHALL HAVE COPPER BUSSING.

262726 WIRING DEVICES:

1. UNITS SHALL BE EQUAL TO THE DEVICES SET FORTH HEREIN, IN STANDARD COLORS (BROWN, WHITE, GREY, BEIGE OR IVORY) AS SELECTED BY THE ARCHITECT:

A. WIRING DEVICES	LEVITON #	HUBBELL #	P & S #
SINGLE POLE SWITCH, 15A	1201-2	HBL1201	PS15AC1
DOUBLE POLE SWITCH, 15A	1202-2	HBL1202	PS15AC2
THREE WAY SWITCH, 15A	1203-2	HBL1203	PS15AC3
DUPLEX CONV. OUTLET, 15A	5262	HBL5262	5262
DUPLEX CONV. OUTLET, 20A	5362	HBL5362	5362
DUPLEX CONV. GFI OUTLET, 15A	6599	GF15	1595L
DUPLEX CONV. GFI OUTLET, 20A	6899	GF15 2095L	

2. THE CONTROLLED OUTLET SHALL HAVE PERMANENT UNIQUE MARKING PROVIDED BY THE MANUFACTURER OF THE RECEPTACLE.

3. THE MOUNTING HEIGHTS OF LIGHT SWITCHES, RECEPTACLES AND CONTROLS SHALL BE MAXIMUM 48" MEASURED TO THE TOP OF BOXES OR MINIMUM 16" TO THE BOTTOM OF BOXES. SEE "LEGEND" FOR ACTUAL MOUNTING HEIGHTS OF DEVICES. VERIFY HEIGHT WITH ARCHITECT WHERE AN ACTUAL MOUNTING HEIGHT IS NOT CALLED OUT ON PLANS.

4. SINGLE RECEPTACLE SERVED BY INDIVIDUAL 20A BRANCH CIRCUIT DEDICATED TO THE OUTLET SHALL BE 20A RATED PER CEC 210.21(B)(1). ALL OTHERS SHALL BE 15A RATED.

5. ALL 15A AND 20A, 120V OUTLETS IN KITCHEN SHALL BE GFCI PER CEC 210.8(B)(2). LOCATE SUCH OUTLETS SO THAT THEY ARE ACCESSIBLE AFTER APPLIANCES THAT ARE PLUGGED INTO THE OUTLETS ARE IN PLACE.

6. ALL RECEPTACLES INSTALLED OUTDOORS SHALL BE WEATHERPROOF AND HAVE GROUND FAULT CIRCUIT INTERRUPTER PROTECTION.

7. 120V, 15A AND 20A RECEPTACLES ARE NOW SUBJECT TO CALIFORNIA ENERGY CODE, SECTION 130.5(d). ALL SUCH OUTLETS SHALL BE CONSIDERED AS UNCONTROLLED EXCEPT THOSE WHICH ARE SPECIFICALLY CALLED OUT ON THE PLANS AS CONTROLLED. SEE "CONTROLLED 120V RECEPTACLES" PARAGRAPH BELOW.

262726.01 CONTROLLED 120V RECEPTACLES:

1. CALIFORNIA ENERGY CODE, SECTION 130.5(d) NOW REQUIRES THAT BOTH CONTROLLED AND UNCONTROLLED 120V OUTLETS FOR PLUG LOADS BE PROVIDED IN THE FOLLOWING LOCATIONS:

A. EACH PRIVATE OFFICE.
B. EACH OPEN OFFICE AREA.
C. RECEPTION LOBBY.
D. CONFERENCE ROOM.
E. KITCHENETTE AND BREAK ROOM IN OFFICE SPACES.
F. COPY ROOM.

2. CIRCUITS SERVING CONTROLLED RECEPTACLES SHALL BE AUTOMATICALLY BE SHUT-OFF IN ACCORDANCE WITH SECTION 130.1(c)1.

3. PROVIDE A SPLITWIRED DUPLEX RECEPTACLE WITH ONE HALF CONTROLLED AND ONE HALF UNCONTROLLED DUPLEX RECEPTACLE AS SHOWN ON THE PLANS. THIS RECEPTACLE SHALL BE SPLIT DUPLEX OUTLET AS MANUFACTURED BY SAME MANUFACTURER AS THE OCCUPANCY LIGHTING SENSOR SYSTEM WITH A 15-AMP RELAY-SWITCHED OUTLET AND A 15-AMP CONSTANT POWER OUTLET.

262726.02 DEVICE PLATES:

1. ALL DEVICE PLATES FOR INDOOR USE SHALL BE STAINLESS STEEL.

2. ALL DEVICE BOXES WHICH ARE INSTALLED IN FIRE RATED WALL ASSEMBLY AND IS PROVIDED WITH A FIRE-STOPPING PUTTY PAD SHALL HAVE A BRUSHED STAINLESS STEEL COVERPLATE IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUTTY PAD.

3. DEVICE COVERS FOR SURFACE MOUNTED BOXES SHALL BE 1/2" RAISED STEEL PLATES.

4. DEVICE COVERS FOR DEVICES LOCATED IN DAMP LOCATIONS SHALL COMPLY WITH CEC 406.9(A).

5. DEVICE COVERS FOR DEVICES LOCATED IN WET LOCATIONS SHALL COMPLY WITH CEC 406.9(B).

265100 LIGHTING:

1. ALL LUMINAIRES SHALL BE CERTIFIED BY THE MANUFACTURER TO THE CALIFORNIA ENERGY COMMISSION:

A. ALL LUMINAIRES SPECIFIED ON THIS PROJECT SHALL BE AS NOTED IN THE "LIGHT FIXTURE SCHEDULE" ON THESE PLANS. NO SUBSTITUTES ARE PERMITTED WITHOUT WRITTEN APPROVAL OF THE ENGINEER.

B. ALL INTERIOR LUMINAIRES SHALL BE PROVIDES WITH 0-10V DIMMING LED DRIVERS.

C. ALL EXTERIOR LUMINAIRES SHALL BE PROVIDED WITH 0-10V DIMMING LED DRIVERS WITH INTEGRAL MOTION SENSORS WHERE SO NOTED.

265300 EXIT AND MEANS OF EGRESS EMERGENCY LIGHTING:

1. PROVIDE EXIT SIGNS IN ACCORDANCE WITH CBC SECTION 1011.1. PROVIDE MEANS OF EGRESS ILLUMINATION IN ACCORDANCE WITH CBC SECTION 1006. PROVIDE FLOOR-LEVEL EXIT SIGNS PER CBC 1011.7 IF REQUIRED

2. ELECTRICAL CONTRACTOR SHALL RE-VERIFY PLACEMENT OF ALL EXIT SIGNS AS TO ENSURE THAT THEY ARE CLEARLY VISIBLE FROM ANY DIRECTION OF APPROACH WITHIN THE PATH OF EXIT TRAVEL TO

ELECTRICAL LEGEND

LIGHTING FIXTURES

FIXTURE NOTATIONS:
A,(b),C-12 FIXTURE TYPE "A", SWITCH "b", CIRCUIT C-12
(A LED) ALTERNATE DESIGNATION FOR SITE LIGHTING FIXTURES

LINEAR FIXTURE
- SQUARE = RECESSED
- CIRCLE =SURFACE

TASK LIGHT OR STRIP LIGHT

DOWNLIGHT, SQUARE = RECESSED

WALL MOUNT

CEILING EXHAUST FAN

POLE MOUNT AREA LIGHT

EMERGENCY LIGHTING

EXIT SIGN WITH 90 MIN BATTERY BACKUP

WALL MOUNT EMERGENCY LIGHT WITH 90 MIN BATTERY BACK

EXTERIOR LANDING EMERGENCY LIGHT. CONNECT TO INTERIOR EXIT SIGN FOR POWER.

FIXTURES WITH INTEGRAL EMERGENCY BALLAST

BASIC LIGHTING CONTROLS

LIGHT SWITCH, +48" TO TOP OF BOX
- D = DIMMER
- 3 = SWAY
- P = PILOT SWITCH
- os = LINE VOLTAGE OCCUPANCY SENSOR
- T = TIMMER
- VS = VACANCY SENSOR

WALL MOUNT OCCUPANCY SENSOR (LINE VOLTAGE)

TITLE 24 LIGHTING CONTROLS

LIGHT SWITCH

COMPONENTS OF DIMMING ROOM CONTROLLER
- US = LOW VOLTAGE OCCUPANCY SENSOR (CAT 5 OR AS REQUIRED)
- DRC = DIMMING ROOM CONTROLLER
- PE = LOW VOLTAGE DIMMING PHOTOCELL (CAT 5 OR AS REQUIRED)
- D = LOW VOLTAGE DIMMER (CAT 5 OR AS REQUIRED)
- R = PLUG LOAD CONTROLLER
- ADR = AUTOMATIC DEMAND RESPOSNE (FOR BUILDINGS OVER 10,000 SF)

NOTES:

1. FOR SUBMITTAL INCLUDE FACTORY CONTROL DRAWINGS.

2. CONDUCT A CONTROLS PRE-CONSTRUCTION MEETING WITH CONTROLS STARTUP TEAM. PROVIDE AGENDA AND ATTENDEES AS A SUBMITTAL. INCLUDE DEVICE I.D. TAGS, PROGRAMMING, CABLE ROUTING, PROGRAM AND TIME SCHEDULES AND DATE OF PROGRAMMING AND TESTING.

3. CONTRACTOR TO HAVE SYSTEM FACTORY SUPPORT FOR START UP, PROGRAMMING AND COMMISSIONING. VERIFY OPERATIONAL HOURS WITH OWNER PRIOR TO COMMISSIONING.

ELECTRICAL POWER

ALL LINE VOLTAGE WIRING IN CONDUIT, SEE GENERAL NOTES
TICKS = # OF #12 WIRE, SHORT = HOT, LONG = NEUTRAL, DOT = GROUND, UNLESS NOTED OTHERWISE

120V OUTLET, +18" TO BOTTOM OF BOX
- S = SIGN
- F = FLOOR
- GFI = GROUND FAULT INTERUPTER

COUNTER OUTLET. +44" TO TOP OF BOX.

QUADRUPLEX OUTLET

HALF SWITCHED OUTLETS

JUNCTION BOX WITH MOTOR TOGGLE DISCONNECT

JUCTION BOX

MOTOR / DISCONNECT

PANELBOARD

TRANSFORMER / SWITCHBOARD AS NOTED

COMMUNICATIONS

TELEPHONE BACKBOARD, PROVIDE #8 GND TO SERVICE GROUND

COMMUNICATIONS OUTLET, PHONE & DATA

PHONE ONLY OUTLET, PREWIRED WITH CAT 6 CABLE

DATA ONLY OUTLET JACK, PREWIRED WITH CAT 6 CABLE

IP SPEAKER

CLOCK SPEAKER (IP BASED)

WAP WIRELESS ACCESS POINT

TS TEACHER STATION

HDMI HMDI CONNECTOR IN FLUSH WALL PLATE

TV TV EXIST WITH COAX OUTLET, NEW WITH 2 DATA AND HDMI

ELECTRICAL LEGEND

DRAFTING NOTATIONS

N## KEY NOTE, SEE SCHEDULE

N## EQUIPMENT TAG, SEE SCHEDULE

A / E-2 REFERENCE TO A DETAIL VIEW "A" ON SHEET E-2

NEW ELECTRICAL CONDUIT AND WIRE

(e) (E) EXISTING DEVICE, TO REMAIN IN OPERATION

(r) (R) REMOVE DEVICE, KEEP REMAINDER OF CIRCUIT IN OPERATION

(RR) REMOVE, RELOCATE AND RECONNECT DEVICE ON EXISTING CIRCUIT, EXTEND CIRCUIT

ELECTRICAL ABBREVIATIONS:

AL = ALUMINUM
A = AMPERAGE
AIC = AMPS INTERRUPTING CAPACITY
AFF = ABOVE FINISHED FLOOR
AFG = ABOVE FINISHED GRADE
CKT = CIRCUIT
CO = CONDUIT ONLY
CU = COPPER
EC = ELECTRICAL CONTRACTOR
GC = GENERAL CONTRACTOR
GFI = GROUND FAULT INTERRUPTER
GND = GROUND
KW = KILOWATT
KVA = KILO-VOLT-AMPERE
LC = LIGHTING CONTACTOR
NO = NUMBER
NL = NIGHT LIGHT
PB = PULLBOX
SP = SPACE
UG = UNDERGROUND
UON = UNLESS OTHERWISE NOTED
V = VOLT
WP = WEATHERPROOF

ONE LINE DIAGRAM

BUS / SWITCHBOARD

PANEL

GROUND

M METER

CURRENT TRANSFORMER

POTENTIAL TRANSFORMER

DRY TYPE TRANSFORMER

MOTOR

CR1 RELAY
CR# = CONTROL RELAY
TDR = TIME DELAY RELAY
M = MOTOR STARTER
CONTACTOR RELAY
ETM = ELAPSE TIME METER

CONTACT (OPEN)

CONTACT (CLOSED)

VFD VARIABLE FREQ. DRIVE

MOTOR OVERLOAD HEATER

R INDICATOR LIGHT
(R) RED, (W) WHITE

*10 ANTENNA

50/3 CIRCUIT BREAKER 50 AMP RATED, 3 POLE

GFI = GROUND FAULT INTERRUPTER
AFCI = ARC FAULT CIRCUIT INTERRUPTER

DISCONNECT, RATED TO POWER SOURCE VOLTAGE AND AMPERAGE RATING FOR FUSE OR AS NOTED

60 FUSE, SIZE = 60 AMPS

AUTOMATIC TRANSFER SWITCH

G 50/3 ENGINE DRIVEN GENERATOR RATING AS NOTED AGAINST THE UNIT.

DRAW OUT DEVICE

52 ANSI RELAY

FIRE ALARM

1A 1X 1Y 1Z TSP#16 ADDRESSIBLE INPUT CIRCUIT
2#14 HARD WIRED NON-ADDRESSIBLE CIRCUITS
2#12 VISUAL CIRCUIT
2#14/SHIELDED AUDIBLE CIRCUIT

NOTE: ALL FIRE ALARM CABLES/ CONDUCTORS SHALL BE CSFM APPROVED.

FIRE ALARM CONTROL PANEL (FACP)

SMOKE DETECTOR

CO COMBINATION SMOKE /CO DETECTOR

DUCT SMOKE DETECTOR

HEAT DETECTOR

A HEAT DETECTOR IN ATTIC (194 DEGREE)

CO CARBON MONOXIDE DETECTOR

STROBE

COMBINATION SPEAKER/STROBE

EXTERIOR HORN

PULL STATION

MM INPUT MODULE

TCDR TONE GENERATOR

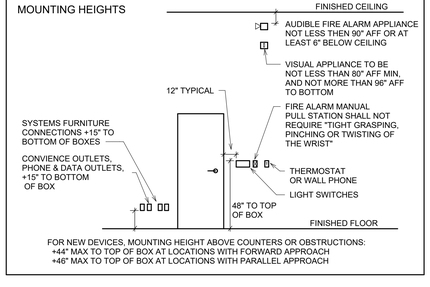
RM RISER MONITOR MODULE

FIRE ALARM ABBREVIATIONS:

CD = CANDELLA
DSD = DUCT SMOKE DETECTOR
EOL = END OF LINE RESISTOR
NAC = NOTIFICATION POWER SUPPLY
PIV = POST INDICATOR VALVE
TS = TAMPER SWITCH
WF = WATER FLOW SWITCH
WP = WEATHERPROOF

MARKINGS:
a### = CIRCUIT "a" DEVICE ###
15CD = 15 CANDELLA VISUAL DEVICE
1/2W = 1/2 WATT AUDIBLE DEVICE

MOUNTING HEIGHTS



FOR NEW DEVICES, MOUNTING HEIGHT ABOVE COUNTERS OR OBSTRUCTIONS:
+44" MAX TO TOP OF BOX AT LOCATIONS WITH FORWARD APPROACH
+46" MAX TO TOP OF BOX AT LOCATIONS WITH PARALLEL APPROACH

PANEL C1

Location: | **Volts:** 120/208 Wye | **A.I.C. Rating:** 22,000
Supply From: | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Mains Rating:** 225 A
Enclosure: NEMA 1 | **MCB Rating:** 225 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
C1-1	ROOF OUTLET	20 A	1	180 VA	360 VA					1	20 A	IDF	C1-2
C1-3	CIRC PUMP	15 A	1			240 VA	360 VA			1	20 A	Receptacle 703	C1-4
C1-5	701 RESTROOMS	20 A	1					344 VA	400 VA	1	20 A	EXT LIGHTING	C1-6
C1-7	LIGHTING 703	20 A	1	449 VA	0 VA					3	40 A	FUTURE SOLOAR	C1-8
C1-9	Lighting 701	20 A	1			820 VA	0 VA			--	--	--	C1-10
C1-11	Lighting 702	20 A	1					836 VA	0 VA	--	--	--	C1-12
C1-13	Receptacle 702	20 A	1	1260 VA	3234 VA					2	50 A	HPO1	C1-14
C1-15	Receptacle 703	20 A	1			1260 VA	3234 VA			--	--	--	C1-16
C1-17	HPO2	20 A	2					1404 VA	2250 VA	2	30 A	EWH	C1-18
C1-19	--	--	--	1404 VA	2250 VA					--	--	--	C1-20
C1-21	HPO1	50 A	2			3234 VA	0 VA			1	20 A	Spare	C1-22
C1-23	--	--	--					3234 VA	0 VA	1	20 A	Spare	C1-24
C1-25	HPI2	50 A	2	4223 VA	0 VA					1	20 A	Spare	C1-26
C1-27	--	--	--			4223 VA	0 VA			1	20 A	Spare	C1-28
C1-29	HPI1	50 A	2					4742 VA	0 VA	1	20 A	Spare	C1-30
C1-31	--	--	--	4742 VA	500 VA					1	20 A	HAND DRYER	C1-32
C1-33	HPI	50 A	2			4742 VA	500 VA			1	20 A	HAND DRYER	C1-34
C1-35	--	--	--					4742 VA	500 VA	1	20 A	HAND DRYER	C1-36
C1-37	FACP POWER ** RED HANDLE LOCK ON **	20 A	1	500 VA	1080 VA					1	20 A	Receptacle 701	C1-38
C1-39	HAND DRYER	20 A	1			500 VA	1080 VA			1	20 A	Receptacle 701	C1-40
C1-41	HAND DRYER	20 A	1					500 VA	1080 VA	1	20 A	Receptacle 702	C1-42
			Total Load:	20166 VA		20193 VA		20006 VA					
			Total Amps:	168 A		168 A		167 A					

Legend:

PANEL C2

Location: | **Volts:** 120/208 Wye | **A.I.C. Rating:** 22,000
Supply From: | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Mains Rating:** 200 A
Enclosure: NEMA 1 | **MCB Rating:** 200 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
C2-1	ROOF OUTLET	20 A	1	180 VA	360 VA					1	20 A	IDF	C2-2
C2-3	EXT LIGHTING	20 A	1			320 VA	500 VA			1	20 A	FACP POWER ** RED HANDLE LOCK ON **	C2-4
C2-5	Lighting 706 RR	20 A	1					344 VA	500 VA	1	20 A	HAND DRYER	C2-6
C2-7	Lighting	20 A	1	836 VA	1080 VA					1	20 A	Receptacle 706	C2-8
C2-9	Lighting 706	20 A	1			820 VA	1080 VA			1	20 A	Receptacle 707	C2-10
C2-11	Receptacle 707	20 A	1					1260 VA	3234 VA	2	50 A	HPO1	C2-12
C2-13	HAND DRYER	20 A	1	500 VA	3234 VA					--	--	--	C2-14
C2-15	Receptacle 706	20 A	1			1260 VA	4742 VA			2	50 A	HPI1	C2-16
C2-17	HPO2	50 A	2					3234 VA	4742 VA	--	--	--	C2-18
C2-19	--	--	--	3234 VA									C2-20
C2-21	HAND DRYER	20 A	1			500 VA	0 VA			1	20 A	Spare	C2-22
C2-23	HAND DRYER	20 A	1					500 VA	0 VA	1	20 A	Spare	C2-24
C2-25	HPI1	50 A	2	4742 VA	0 VA					1	20 A	Spare	C2-26
C2-27	--	--	--			4742 VA	0 VA			1	20 A	Spare	C2-28
C2-29									0 VA	1	20 A	Spare	C2-30
C2-31													C2-32
C2-33													C2-34
C2-35													C2-36
C2-37													C2-38
C2-39													C2-40
C2-41													C2-42
			Total Load:	14166 VA		13948 VA		13808 VA					
			Total Amps:	118 A		116 A		115 A					

Legend:

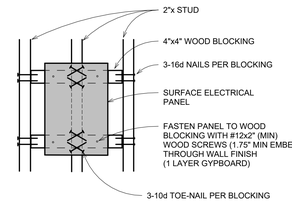
PANEL C3

Location: | **Volts:** 120/208 Wye | **A.I.C. Rating:** 22,000
Supply From: | **Phases:** 3 | **Mains Type:** MCB
Mounting: Surface | **Wires:** 4 | **Mains Rating:** 225 A
Enclosure: NEMA 1 | **MCB Rating:** 225 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
C3-1	ROOF OUTLET	20 A	1	180 VA	0 VA					3	40 A	FUTURE SOLOAR	C3-2
C3-3	Receptacle 712	20 A	1			180 VA	0 VA			--	--	--	C3-4
C3-5	EXT LIGHTING	20 A	1					240 VA	0 VA	--	--	--	C3-6
C3-7	FACP POWER ** RED HANDLE LOCK ON **	20 A	1	500 VA	1080 VA					1	20 A	Receptacle 708	C3-8
C3-9	IDF	20 A	1			360 VA	1050 VA			1	20 A	Lighting 708 709	C3-10
C3-11	Lighting 710	20 A	1					730 VA	900 VA	1	20 A	Receptacle 708	C3-12
C3-13	HAND DRYER	20 A	1	1200 VA	1080 VA					1	20 A	Receptacle 709	C3-14
C3-15	HAND DRYER	20 A	1			1200 VA	250 VA			2	30 A	EWH2	C3-16
C3-17	Receptacle 709	20 A	1					900 VA	250 VA	--	--	--	C3-18
C3-19													C3-20
C3-21	Receptacle 710	20 A	1			1080 VA	0 VA			1	20 A	Spare	C3-22
C3-23	Receptacle 710	20 A	1					1080 VA	0 VA	1	20 A	Spare	C3-24
C3-25	HPO3	40 A	2	2590 VA	0 VA					1	20 A	Spare	C3-26
C3-27	--	--	--			2590 VA	0 VA			1	20 A	Spare	C3-28
C3-29	HPO3	40 A	2					2590 VA	0 VA	1	20 A	Spare	C3-30
C3-31	--	--	--	2590 VA	5366 VA					2	60 A	HPI3	C3-32
C3-33	HPO3	40 A	2			2590 VA	5366 VA			--	--	--	C3-34
C3-35	--	--	--					2590 VA	5366 VA	2	60 A	HPI3	C3-36
C3-37					5366 VA					--	--	--	C3-38
C3-39	HPI3	60 A	2			5366 VA							C3-40
C3-41	--	--	--					5366 VA					C3-42
			Total Load:	19951 VA		20031 VA		19998 VA					
			Total Amps:	166 A		167 A		167 A					

Legend:



LIGHTING/OUTLET PANELS:
NOMINAL DIMENSIONS: 24"Hx20"Wx5.75"D
WEIGHT: 80 lbs.

1 SURFACE PANEL ON STUD WALL
SCALE: NTS

LABELS FOR FEEDERS ORIGINATING WITHIN DISTRIBUTION PANEL/SWITCHBOARDS:

NAME OF PANEL/EQUIPMENT SERVED
FEEDER WIRE SIZE

LABELS AT EQUIPMENT DISCONNECTS:

EQUIPMENT FED
FED FROM PANEL
FEEDER WIRE SIZE
VOLTS / AMPS / PHASES

LABELS FOR SWITCHBOARD/DISTRIBUTION PANELS & BRANCH CIRCUIT PANELS:

PANEL NAME
FEED FROM PANEL
FEEDER WIRE SIZE
VOLTS / AMPS / PHASES

NOTES:

1. NAMEPLATES SHALL BE CONSTRUCTED OF ENGRAVED BAKELITE - BLACK BACKGROUND WITH WHITE LETTERS.

2. MINIMUM SIZE TO BE 1"x3".

3. RIVET NAMEPLATES TO ENCLOSURE.

4. FILL-IN UNDERLINED NAMES AND VALUES FOR EACH NAMEPLATE TO INSTALLED.

5. ALL DISCONNECTS, PANELS, AND CIRCUIT BREAKERS INSTALLED UNDER THIS PROJECT SHALL HAVE A NAMEPLATE AS SHOWN HERE.

6. NAMEPLATES FOR EMERGENCY POWER FED EQUIPMENT SHALL HAVE RED BACKGROUND WITH WHITE LETTERS.

2 PANEL LABELS
SCALE: NTS

3 PANEL CLEARANCE
SCALE: NTS

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INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
1221 QUINCE AVENUE, MENDOTA, CA 93631

FOR PERMIT ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]887

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

RICHARD C. SMITH — No. E14303 Exp. 6-30-25 — ELECTRICAL — STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS

REVISIONS:

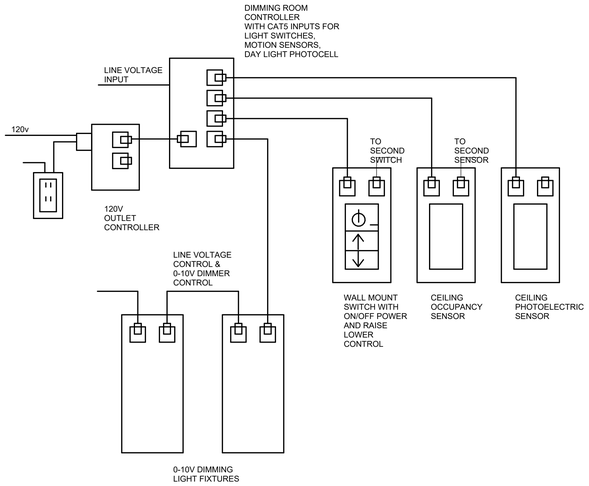
.	.

DATE 2/11/2025 9:48:44 AM
JOB NO. 24769

SHEET TITLE
ELECTRICAL DETAILS

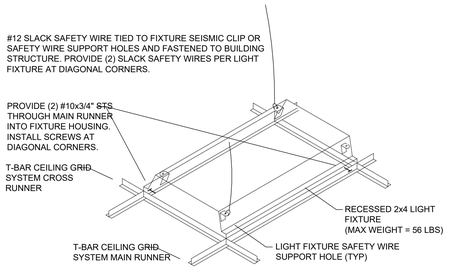
SHEET NO.
E002

Project Navigator path://johnr17/4 C:\Users\RichardSmith\Box\2022\meehleis Mendota2\Mendota Electrical.rvt



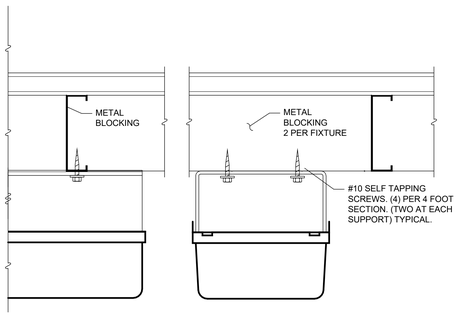
1 LIGHTING CONTROLS DETAIL
SCALE: NTS

FIXTURE SCHEDULE					
Type Mark	**Lamp**	**Description**	**Manufacturer**	**Model**	**Apparent Load**
A	LED	8' LINEAR LED PENDANT	LITHONIA		75 VA
AE	LED	SIMILAR TO "A" WITH EMERGENCY BALLAST	LITHONIA		75 VA
B	LED	4' LED 4000 LUMEN LED WRAP SURFACE MOUNT FIXTURE, 0-10 V DIMMING DRIVER, UNIVERSAL VOLTAGE	LITHONIA	STL4 40L EZ1 LP840	35 VA
C	LED	2'x4' 4800 LUMEN LED CENTER BASKET TROFFER WITH 0-10V DIMMING DRIVER, UNIVERSAL VOLTAGE	LITHONIA	2BLT4 48L ADP EZ1 LP840 N100	45 VA
D	LED	FLAT LED UTILITY FIXTURE	JUNO	JSF 11"	15 VA
EXIT	LED	COMBINATION EXIT SIGN/EGRESS LIGHT UNIT, 90 MINUTE BATTERY BACKUP, UNIVERSAL MOUNT	LITHONIA	LHQM SW1R120/277 ELN	1 VA
F	LED	WALL MOUNT AREA LIGHT WITH EMERGENCY BALLAST, +7'-6" TO BTTOM	LITHONIA	WDGE 2 LED P3 40K FT EMERGENCY	40 VA

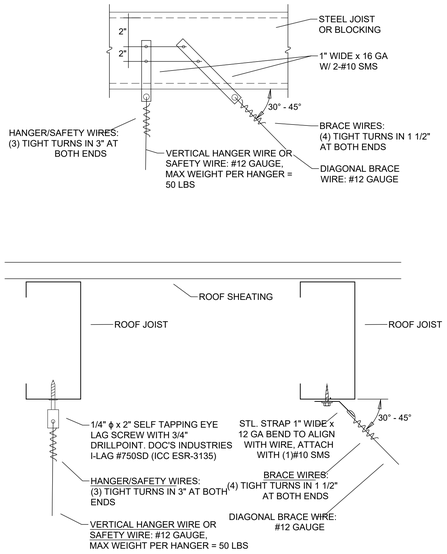


LIGHT FIXTURES WITH SIZE OF 2' x 4' OR LESS, WEIGHING GREATER THAN 10 LBS. BUT LESS THAN OR EQUAL TO 56 LBS MAY BE SUPPORTED DIRECTLY ON THE CEILING RUNNERS, BUT THEY SHALL HAVE A MINIMUM OF TWO (2) #12 GAUGE SLACK SAFETY WIRES CONNECTED FROM THE FIXTURE HOUSING AT DIAGONAL CORNERS TO THE STRUCTURE ABOVE.

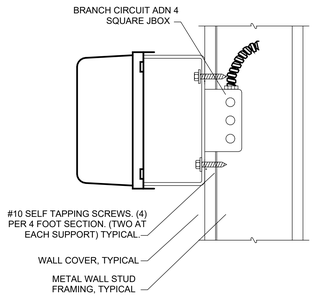
2 TROFFER MOUNTING
SCALE: NTS

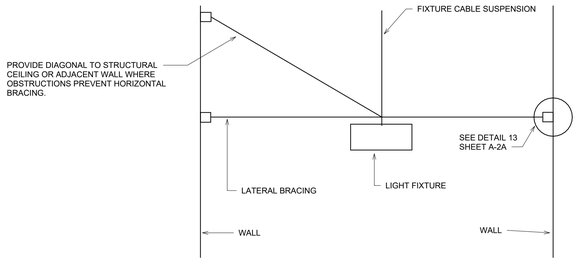


3 CEILING MOUNT LIGHT
SCALE: NTS



4 WALL MOUNT LIGHT
SCALE: NTS





5 LIGHT FIXTURE SEISMIC BRACING
SCALE: NTS

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INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
(6 CLASSROOM BUILDING) - MENDOTA, CA - 24311

FOR REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]

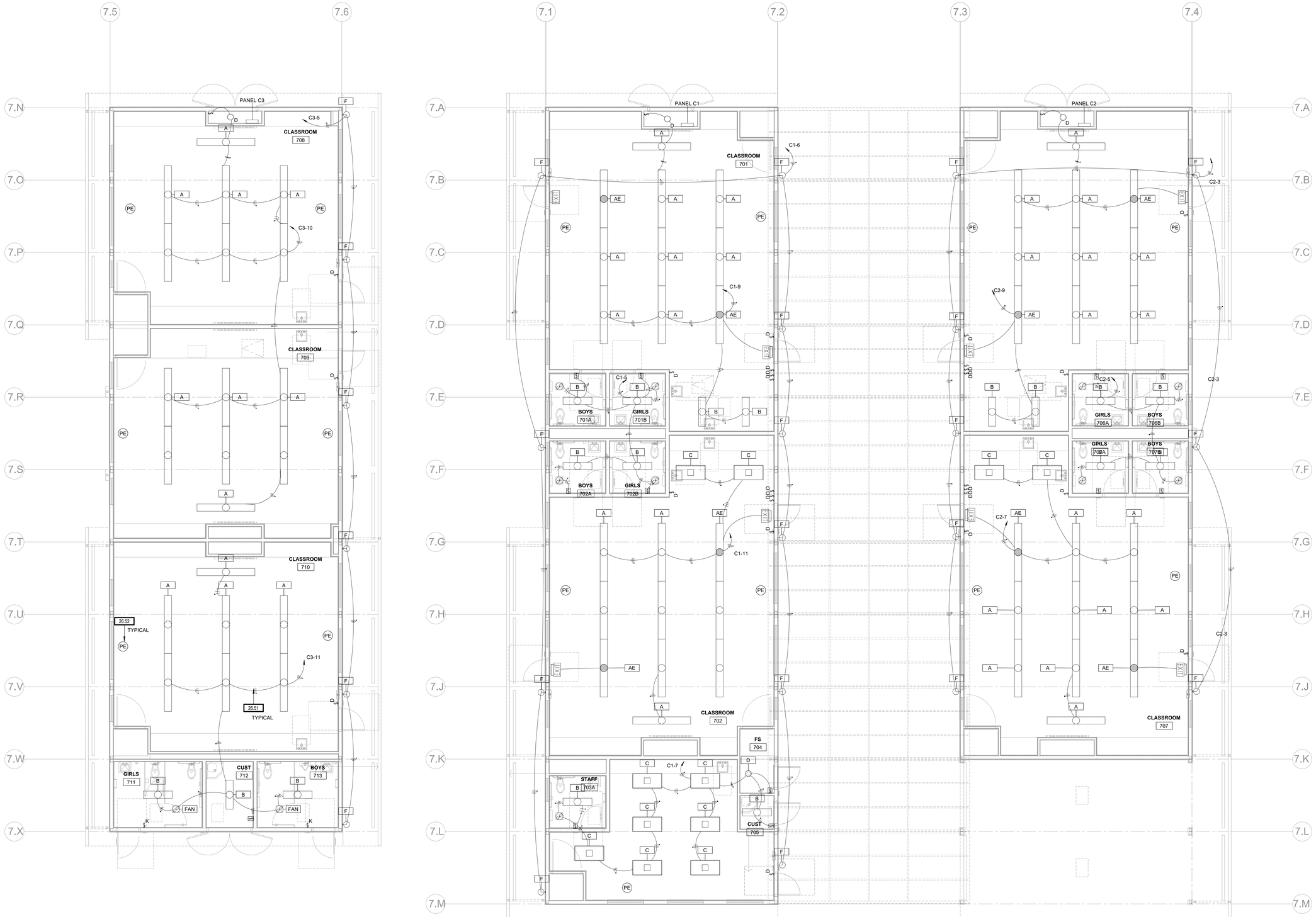
HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

DATE 2/11/2025 9:48:47 AM
JOB NO. 24769
SHEET TITLE
LIGHTING DETAILS

SHEET NO.
E003



1 LIGHTING PLAN

SCALE: 3/16" = 1'-0"

SHEET NOTES	
Key Value	Keynote Text
26.51	LIGHTING CIRCUIT TO CONTAIN HOT LEG, SWITCHED HOT LEG, NEUTRAL, GROUND, GREY AND VIOLET 0-10V DIMMING CONTROL.
26.52	INTERCONNECT ALL LIGHTING CONTROL DEVICES IN ROOM INCLUDING DIMMING SWICH(ES), DIMMING ROOM CONTROLLER, OCCUPANCY SENSOR, PLUG LOAD CONTROLLER (OFFICES & FANS), AND DAY LIGHT HAVESTING SENSOR (WHERE SHOWN).

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APP: 02-122955 INC: 02
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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
631 "A" STREET, MENDOTA, CA 93640

FOR REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]887

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

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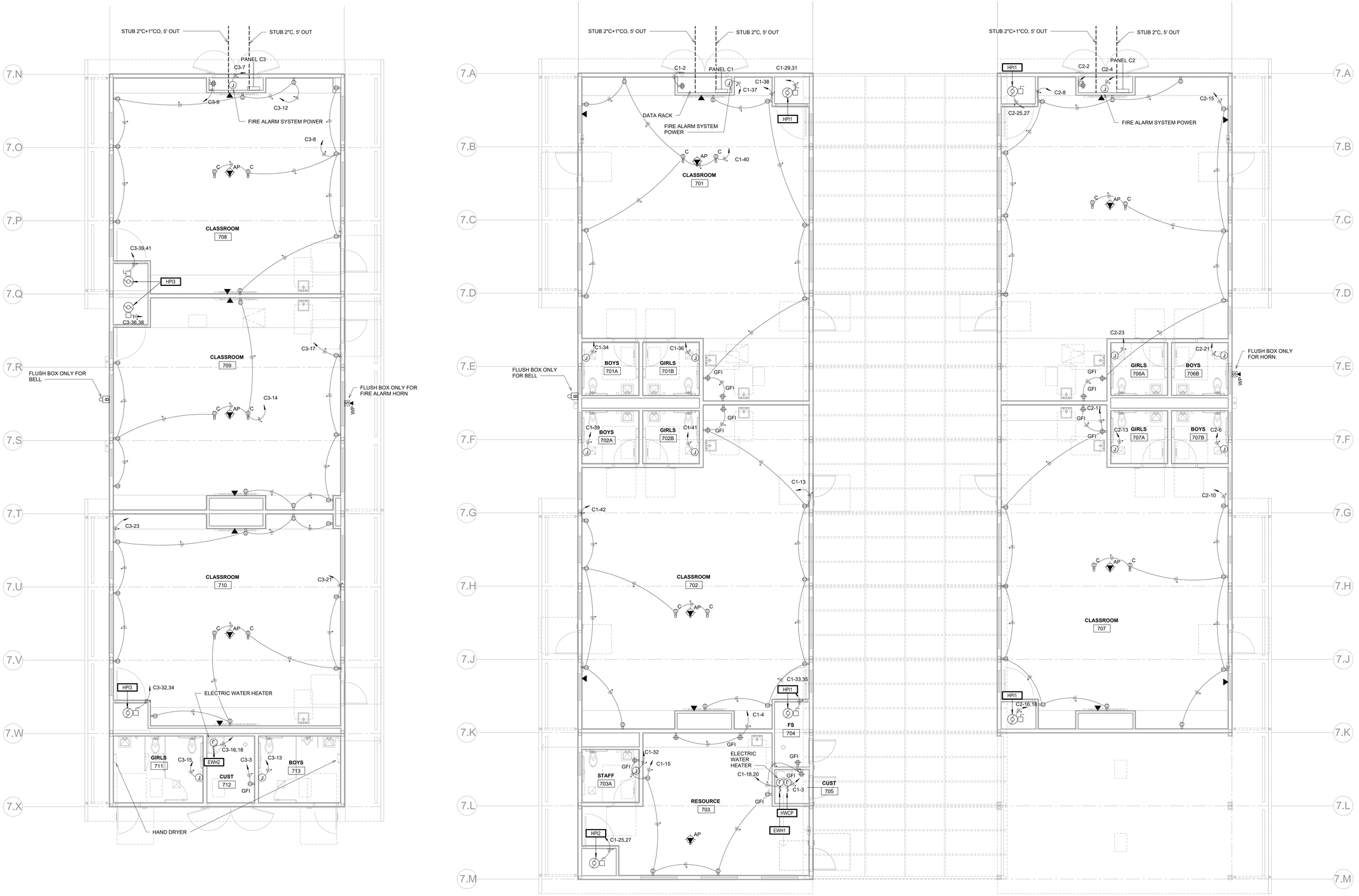
DATE 2/11/2025 9:48:50 AM
JOB NO. 24769

SHEET TITLE
LIGHTING PLAN

SHEET NO.
E100



1 ELECTRICAL PLAN

SCALE: 3/16" = 1'-0"

SHEET NOTES	
Key Value	Keynote Text
EWH1	ELECTRIC WATER HEATER, 208V, 1PH, 4500W, PROVIDE LOCAL DISCONNECT, 3/4"C-2#10+1#10 GND
EWH2	ELECTRIC WATER HEATER, 208V, 1PH, 4500W, PROVIDE LOCAL DISCONNECT, 3/4"C-2#10+1#10 GND
HPI1	FAN COIL, 208V, 1PH, 45.6 MCA, PROVIDE 60/2 DISC, 50A FUSES, 1"C-2#8+1#10 GND
HPI2	FAN COIL, 208V, 1PH, 40.6 MCA, PROVIDE 60/2 DISC, 45A FUSES, 1"C-2#8+1#10 GND
HPI3	FAN COIL, 208V, 1PH, 51.6 MCA, PROVIDE 60/2 DISC, 60A FUSES, 1"C-2#6+1#10 GND
HWCP	HOT WATER CIRCUIT PUMP, 120V, 2A, PROVIDE MOTOR TOGGLE DISCONNECT, CONNECT PER PLUMBING CONTROL DIAGRAMS, 1/2"C-2#12+1#12 GND

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DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
[illegible] AVENUE, MENDOTA, CA 93631

FOR REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]

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REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14305
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

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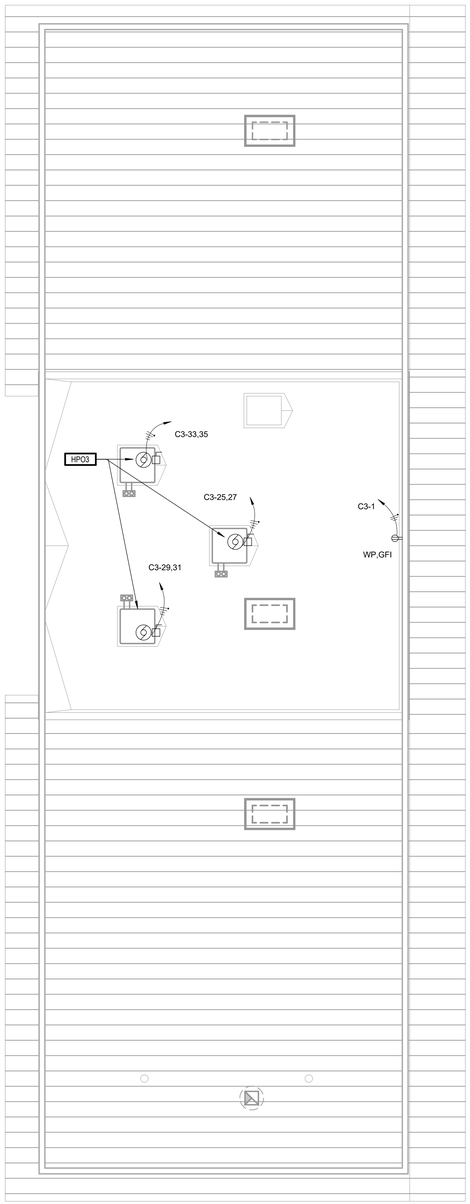
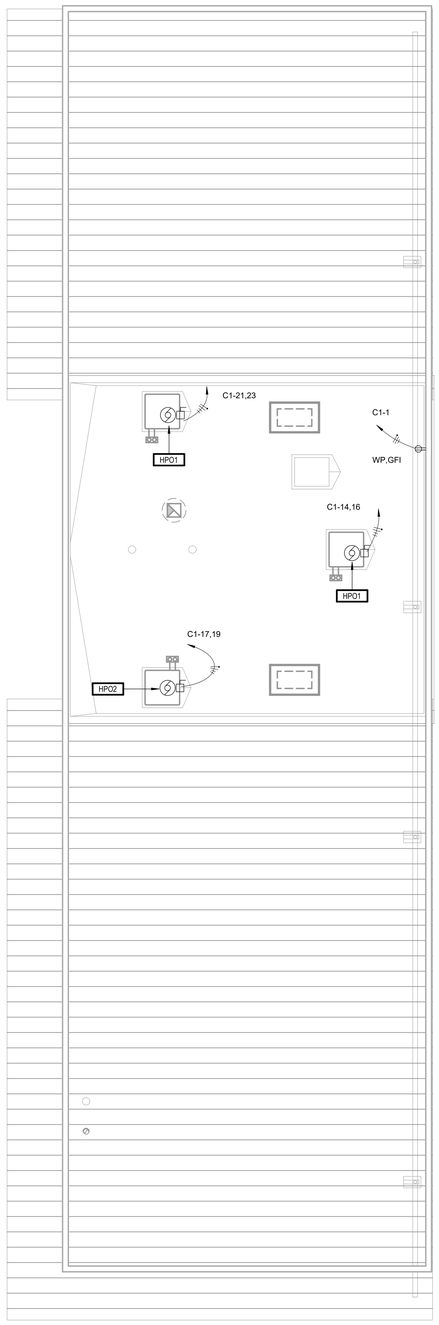
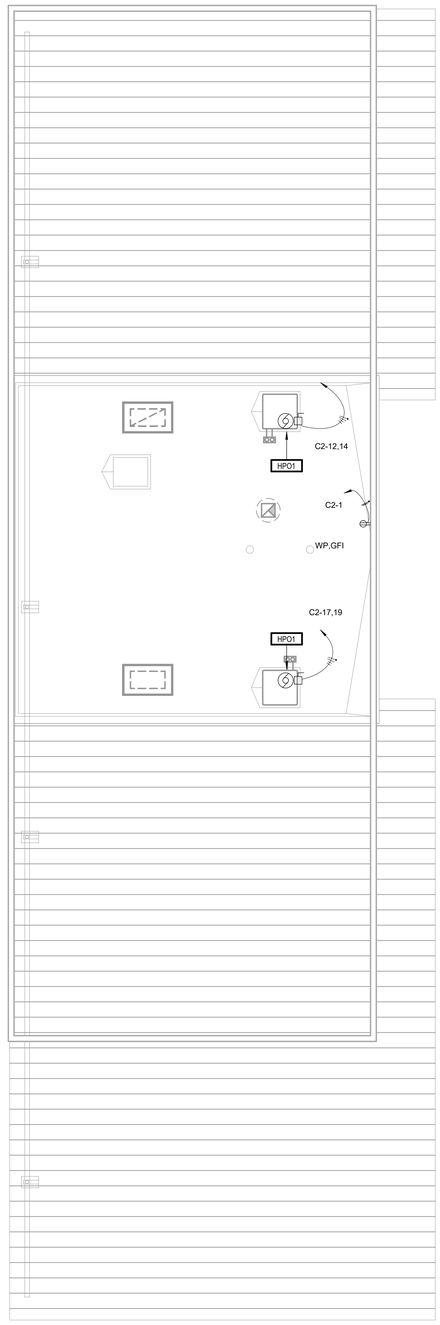
DATE 2/11/2025 9:48:53 AM
JOB NO. 24769
SHEET TITLE
ELECTRICAL PLAN

SHEET NO.
E200







SHEET NOTES	
Key Value	Keynote Text
HPO1	HEAT PUMP, 208V, 1PH, 31.1 MCA, PROVIDE 60/2 DISC, 50A FUSES, 1"C-2#8+1#10 GND
HPO2	HEAT PUMP, 208V, 1PH, 13.5 MCA, PROVIDE 30/2 DISC, 20A FUSES, 3/4"C-2#10+1#10 GND
HPO3	HEAT PUMP, 208V, 1PH, 24.9 MCA, PROVIDE 60/2 DISC, 40A FUSES, 1"C-2#8+1#10 GND

1 ROOF ELECTRICAL PLAN

SCALE: 3/16" = 1'-0"

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DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
631 "A" STREET, MENDOTA, CA 93640

FOR REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]887

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209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
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REVISIONS:

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DATE 2/11/2025 9:48:54 AM
JOB NO. 24769
SHEET TITLE
ROOF ELECTRICAL PLAN

SHEET NO.
E201

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 3 of 7)
	Date Prepared:	12/18/2024

F. INDOOR LIGHTING FIXTURE SCHEDULE

This table includes all planned permanent and portable lighting other than dwelling unit/ hotel/ motel room lighting. Multifamily dwelling unit and hotel/motel room lighting is documented in Table T. If using Table T to document lighting in multifamily common use areas providing shared provisions for living, eating, cooking or sanitation, those luminaires are not included here.

Designed Wattage: Conditioned Spaces

01	02	03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description	Modular (Track) Fixture	Small Aperture & Color Change[1]	Watts per luminaire[2]	How is Wattage determined	Total Number of Luminaires	Excluded per 140.6(a)3 / 170.2(e)2C	Design Watts	Field Inspector	
									Pass	Fail
A	8' LINEAR	No	NA	75	Mfr. Spec	20	No	1,500	☐	☐
B	LED WRAP	No	NA	35	Mfr. Spec	8	No	280	☐	☐
C	LED TROFFER	No	NA	35	Mfr. Spec	9	No	315	☐	☐
D	LED UTILITY FIXTURE	No	NA	15	Mfr. Spec	2	No	30	☐	☐
							Total Designed Watts: CONDITIONED SPACES	2,125		

[1]*FOOTNOTE: Design Watts for small aperture and color changing luminaires which qualify per 140.6(a)4B / 170.2(e)2D is adjusted to be 75% /80% of their rated wattage. Table F automatically makes this adjustment, the permit applicant should enter full rated wattage in column 05.*

[2]*Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b). Wattage used must be the maximum rated for the luminaire, not the lamp.*

G. MODULAR LIGHTING SYSTEMS

This section does not apply to this project.

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

This table includes lighting controls for conditioned and unconditioned spaces.

Building Level Controls

01	02	03	
		Field Inspector	
		Pass	Fail
Mandatory Demand Response 110.12(c)	Shut-off controls 130.1(c) / 160.5(b)4C	☐	☐
NA < 4,000W subject to multilevel	See Area/Space Level Controls		

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 6 of 7)
	Date Prepared:	12/18/2024

S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)

This section does not apply to this project.

T. DWELLING UNIT LIGHTING

This section does not apply to this project.

U. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selections have been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTI-E - Must be submitted for all buildings

V. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selections have been changed by the permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and any with "-A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified
NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	SCHOOL;
NRCA-LTI-03-A - Must be submitted for automatic daylight controls.	SCHOOL;

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 2 of 7)
	Date Prepared:	12/18/2024

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through N. Note: If any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see applicable Table referenced below.

Calculations of Total Allowed Lighting Power (Watts) 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv												Compliance Results		
01		02		03		04		05		06		07	08	09
General Hardscape Allowance 140.7(d)1 / 170.2(e)6 (See Table I)	+	Per Application 140.7(d)2 / 170.2(e)6 (See Table J)	+	Sales Frontage 140.7(d)2 (See Table K)	+	Ornamental 140.7(d)2 / 170.2(e)6 (See Table L)	+	Per Specific Area 140.7(d)2 / 170.2(e)6 (See Table M)	OR	Existing Power Allowance 141.0(b)2L / 180.2(b)4Bv (See Table N)	=	**Total Allowed** (Watts)	≥	**Total Actual** (Watts)	**07 must be >= 08**
330	+	---	+	---	+	---	+	---	OR	---	=	330	≥	308	COMPLIES
												Shielding Compliance (See Table G for Details)			N/A
												Controls Compliance (See Table H for Details)			COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 2 of 7)
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C. COMPLIANCE RESULTS

If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

Lighting in conditioned and unconditioned spaces must not be combined for compliance per 140.6(b)1 / 170.2(e)	Allowed Lighting Power per 140.6(b) / 170.2(e) (Watts)						Adjusted Lighting Power per 140.6(a) / 170.2(e) (Watts)						Compliance Results
	01	02	03	04	05		06	07		08			09
	Complete Building 140.6(c)1	Area Category 140.6(c)2 / 170.2(e)4	Area Category Additional 140.6(c)2G / 170.2(e)4Av (+)	Tailored 140.6(c)3 / 170.2(e)4B (+)	**Total Allowed** (Watts)		Total Designed (Watts)	Adjustments PAF Lighting Control Credits 140.6(a)2 / 170.2(e)1B (-)		**Total Adjusted** (Watts) *Includes Adjustments			**05 must be >= 08 140.6 / 170.2(e)**
	(See Table I)	(See Table I)	(See Table J)	(See Table K)			(See Table F)	(See Table P)					
Conditioned	2,149				=	2,149	≥	2,125	0	=	2125		COMPLIES
Unconditioned					=		≥			=			
											Controls Compliance (See Table H for Details)		COMPLIES
											Rated Power Reduction Compliance (See Table Q for Details)		

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 5 of 7)
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K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE

This section does not apply to this project.

L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY

This section does not apply to this project.

M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING

This section does not apply to this project.

N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED DECORATIVE /SPECIAL EFFECTS

This section does not apply to this project.

O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE

This section does not apply to this project.

P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))

This section does not apply to this project.

Q. RATED POWER REDUCTION COMPLIANCE FOR ONE-FOR-ONE ALTERATIONS

This section does not apply to this project.

R. 80% LIGHTING POWER FOR ALL ALTERATIONS - CONTROLS EXCEPTIONS

This section does not apply to this project.

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 1 of 7)
Project Address: 605 Bass Ave	Date Prepared:	12/18/2024

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Total Illuminated Hardscape Area (ft²)	4600
02	Climate Zone	13			
03	Outdoor Lighting Zone per Title 24 Part 1 10.114 or as designated by Authority Having Jurisdiction (AHJ):				
☐ LZ-0: Very Low - Undeveloped Parkland		☒ LZ-2: Moderate - Urban Clusters		☐ LZ-4: High - Must be reviewed by CA Energy Commission for Approval	
☐ LZ-1: Low - Rural Areas		☐ LZ-3: Moderately High - Urban Areas			
05	Occupancy Types within Project				
• Office					

B. PROJECT SCOPE

This table includes outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv for alterations.

My Project Consists of:

01	02	
☒ New Lighting System	Must Comply with Allowances from 140.7 / 170.2(e)6	
☐ Altered Lighting System	Is your alteration increasing the connected lighting load (Watts)?	○ Yes ○ No
03	04	05
% of Existing Luminaires Being Altered[1]	Sum Total of Luminaires Being Added or Altered	Calculation Method
☐ < 10% ☐ >= 10% and < 50% ☐ >= 50%		

Please proceed to Table F. Outdoor Lighting Fixture Schedule to define the project's luminaires.

[1] *FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100.*

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
This document is used to demonstrate compliance with requirements in 110.9, 110.12(c), 130.0, 130.1, 140.6 and 141.0(b)2 for indoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e)6 and 180.2(b)4 for indoor lighting scopes using the prescriptive path for multifamily occupancies. Multifamily includes dormitory and senior living facilities.		
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 1 of 7)
Project Address: 605 Bass Ave	Date Prepared:	12/18/2024

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Total Conditioned Floor Area (ft²)	3,582
02	Climate Zone	13	05	Total Unconditioned Floor Area (ft²)	0
03	Occupancy Types Within Project (select all that apply):		06	# of Stories (Habitable Above Grade)	1
• Office					

B. PROJECT SCOPE

This table includes any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.6 / 170.2(e) or 141.0(b)2 / 180.2(b)4 for alterations.

Scope of Work	Conditioned Spaces		Unconditioned Spaces	
01	02	03	04	05
My Project Consists of (check all that apply):	Calculation Method	Area (ft²)	Calculation Method	Area (ft²)
☒ New Lighting System	Complete Building Method	3582	Complete Building Method	0
☐ New Lighting System - Parking Garage				
Total Area of Work (ft²)	3582		0	

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 4 of 7)
	Date Prepared:	12/18/2024

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

Area Level Controls

04	05	06	07	08	09	10	11	12	
Area Description	Complete Building or Area Category Primary Function Area	Manual Area Controls 130.1(a) / 160.5(b)4A	Multi-Level Controls 130.1(b) / 160.5(b)4B	Shut-Off Controls 130.1(c) // 160.5(b)4C	Primary/Sky lit Daylighting 130.1(d) / 160.5(b)4D	Secondary Daylighting 130.1(d) / 160.5(b)4D	Interlocked Systems 140.6(a)1/ 170.2(e)2A	Field Inspector	
								Pass	Fail
SCHOOL	School or Classroom	Readily Accessible	Dimmer	Occupancy Sensor	Included	NA: General Ltg < 120W	No	☐	☐
								13	
								Plan Sheet Showing Daylit Zones:	
								E100	

I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS

Each area complying using the Complete Building or Area Category Methods per 140.6(b) are included in this table. Column 06 indicates if additional lighting power allowances per 140.6(c) or adjustments per 140.6(a) are being used .

Conditioned Spaces

01	02	03	04	05	06	
Area Description	Complete Building or Area Category Primary Function Area	Allowed Density (W/ft²)	Area (ft²)	Allowed Wattage (Watts)	Additional Allowance / Adjustment	
					Area Category	PAF
Whole Building	School or Classroom	0.6	3,582	2,149.2	No	No
		TOTALS:	3,582	2,149.2	See Tables J, or P for detail	

J. ADDITIONAL ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM

This section does not apply to this project.

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C1	Report Page:	(Page 7 of 7)
Project Address: 605 Bass Ave	Date Prepared:	12/18/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Richard Smith	Documentation Author Signature:
Company: HCS Engineering, Inc.	Signature Date: 2024-12-18
Address: 4512 Feather River Drive #F	CEA/ HERS Certification Identification (if applicable): PE 14303
City/State/Zip: Stockton CA 95219	Phone: 209-478-8270

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Richard Smith, PE	Responsible Designer Signature:
Company: HCS Engineering, Inc.	Date Signed: 2024-12-18
Address: 4512 Feather River Dr #F	License: E14303
City/State/Zip: Stockton CA 95219	Phone: 2094788270

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93631

PRELIMINARY NOT FOR CONSTRUCTION

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

DATE 2/11/2025 9:48:59 AM
JOB NO. 24769
SHEET TITLE
COMPLIANCE
SHEET NO.
ET24A

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	**Report Page:**	(Page 5 of 7)
	Date Prepared:	12/18/2024

I. LIGHTING POWER ALLOWANCE (per 140.7 / 170.2(e))

This table includes areas using allowance calculations per 140.7 / 170.2(e). General Hardscape Allowance is per Table 140.7-A/Table 170.2-A while "Use it or lose it" Allowances are per Table 140.7-B /Table 170.2-S. Indicate which allowances are being used to expand sections for user input. Luminaires that qualify for one of the "Use it or lose it" allowances shall not qualify for another "Use it or lose it" allowance. Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

01				
	"Use it or lose it" Allowance (select all that apply) (select all that apply)			
☒ General Hardscape Allowance Table I (below)	☐ Per Application Table J	☐ Sales Frontage Table K	☐ Ornamental Table L	☐ Per Specific Area Table M

Calculated General Hardscape Lighting Power Allowance per Table 140.7-A for Nonresidential & Hotel/Motel

02	03	04	05	06	07	08	09
Area Description	Area Wattage Allowance (AWA)			Linear Wattage Allowance (LWA)			Total General AWA + LWA (Watts)
	Illuminated Area (ft^2)	Allowed Density (W/ft^2)	Area Allowance (Watts)	Perimeter Length (lf)	Allowed Density (W/lf)	Linear Allowance (Watts)	
PEDESTRIAN	4600	0.019	87.4	284	0.2	42.6	130
					Initial Wattage Allowance for Entire Site (Watts):		200
					Instances of Initial Wattage Allowance (LZ 0 only)[1]		
					Total General Hardscape Allowance (Watts):		330

J. LIGHTING ALLOWANCE: PER APPLICATION

This section does not apply to this project.

K. LIGHTING ALLOWANCE: SALES FRONTAGE

This section does not apply to this project.

L. LIGHTING ALLOWANCE: ORNAMENTAL

This section does not apply to this project.

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
This document is used to demonstrate compliance with requirements in 110.9, 110.12(c), 130.0, 130.1, 140.6 and 141.0(b)2 for indoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e) and 180.2(b)4 for indoor lighting scopes using the prescriptive path for multifamily occupancies. Multifamily includes dormitory and senior living facilities.		
Project Name: Mendota Classroom Wing C2	**Report Page:**	(Page 1 of 7)
Project Address: 605 Bass Ave	**Date Prepared:**	12/18/2024

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Total Conditioned Floor Area (ft^2)	2,882
02	Climate Zone	13	05	Total Unconditioned Floor Area (ft^2)	0
03	Occupancy Types Within Project (select all that apply):		06	# of Stories (Habitable Above Grade)	1
● Office					

B. PROJECT SCOPE

This table includes any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.6 / 170.2(e) or 141.0(b)2 / 180.2(b)4 for alterations.

Scope of Work	Conditioned Spaces		Unconditioned Spaces	
01	02	03	04	05
My Project Consists of (check all that apply):	Calculation Method	Area (ft^2)	Calculation Method	Area (ft^2)
☒ New Lighting System	Complete Building Method	2882	Complete Building Method	0
☐ New Lighting System - Parking Garage				
Total Area of Work (ft^2)	2882		0	

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	**Report Page:**	(Page 4 of 7)
	Date Prepared:	12/18/2024

H. OUTDOOR LIGHTING CONTROLS

This table demonstrates compliance with controls requirements for all new or altered luminaires installed as part of the permit application. For alteration projects, luminaires which are existing to remain (ie untouched) and luminaires which are removed and reinstalled (wiring only) do not need to be included in this table even if they are within the spaces covered by the permit application.
Outdoor lighting for nonresidential buildings, parking garages and common service areas in multifamily buildings must be documented separately from outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit

Mandatory Controls for Nonresidential Occupancies, Parking Garages & Common Areas in Multifamily Buildings

01	02	03	04	05	
Area Description	Shut-Off 130.2(c)1 / 160.5(c)	Auto-Schedule 130.2(c)2 / 160.5(c)	Motion Sensor 130.2(c)3 / 160.5(c)	Field Inspector	
				Pass	Fail
PEDESTRIAN	Photocontrol	Provided	NA: Each Luminaire <= 40 Watts	☐	☐

[1] *FOOTNOTE: Text has been abbreviated, please refer to Table 160.5-A to confirm compliance with the specific light source technologies listed.*
[2] *Authority having jurisdiction may ask for cutsheets or other documentation to confirm compliance of light source.*
[3] *Recessed luminaires marked for use in fire-rated installations, and recessed luminaires installed in non-insulated ceilings are excepted from ii and iii.*

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	**Report Page:**	(Page 7 of 7)
Project Address: 605 Bass Ave	**Date Prepared:**	12/18/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Richard Smith	Documentation Author Signature:
Company: HCS Engineering, Inc.	Signature Date: 2024-12-18
Address: 4512 Feather River Drive #F	CEA/ HERS Certification Identification (if applicable): PE 14303
City/State/Zip: Stockton CA 95219	Phone: 209-478-8270

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Richard Smith, PE	Responsible Designer Signature:
Company: HCS Engineering, Inc.	Date Signed: 2024-12-18
Address: 4512 Feather River Dr #F	License: E14303
City/State/Zip: Stockton CA 95219	Phone: 2094788270

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C2	**Report Page:**	(Page 6 of 7)
	Date Prepared:	12/18/2024

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

Area Level Controls

04	05	06	07	08	09	10	11	12	
Area Description	Complete Building or Area Category Primary Function Area	Manual Area Controls 130.1(a) / 160.5(b)4A	Multi-Level Controls 130.1(b) / 160.5(b)4B	Shut-Off Controls 130.1(c) // 160.5(b)4C	Primary/Sky lit Daylighting 130.1(d) / 160.5(b)4D	Secondary Daylighting 130.1(d) / 160.5(b)4D	Interlocked Systems 140.6(a)1/ 170.2(e)2A	Field Inspector	
								Pass	Fail
SCHOOL	School or Classroom	Readily Accessible	Dimmer	Occupancy Sensor	Included	NA: General Ltg < 120W	No	☐	☐
					13				
					Plan Sheet Showing Daylit Zones:				
					E100				

I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS

Each area complying using the Complete Building or Area Category Methods per 140.6(b) are included in this table. Column 06 indicates if additional lighting power allowances per 140.6(c) or adjustments per 140.6(a) are being used .

Conditioned Spaces

01	02	03	04	05	06	
Area Description	Complete Building or Area Category Primary Function Area	Allowed Density (W/ft^2)	Area (ft^2)	Allowed Wattage (Watts)	Additional Allowance / Adjustment	
					Area Category	PAF
Whole Building	School or Classroom	0.6	2,882	1,729.2	No	No
		TOTALS:	2,882	1,729.2	See Tables J, or P for detail	

J. ADDITIONAL ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM

This section does not apply to this project.

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C2	**Report Page:**	(Page 4 of 7)
	Date Prepared:	12/18/2024

F. INDOOR LIGHTING FIXTURE SCHEDULE

This table includes all planned permanent and portable lighting other than dwelling unit/ hotel/ motel room lighting. Multifamily dwelling unit and hotel/motel room lighting is documented in Table T. If using Table T to document lighting in multifamily common use areas providing shared provisions for living, eating, cooking or sanitation, those luminaires are not included here.

Designed Wattage: Conditioned Spaces

01	02	03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description	Modular (Track) Fixture	Small Aperture & Color Change[1]	Watts per luminaire[2]	How is Wattage determined	Total Number of Luminaires	Excluded per 140.6(a)3 / 170.2(e)2C	Design Watts	Field Inspector	
									Pass	Fail
A	8' LINEAR	No	NA	75	Mfr. Spec	19	No	1,425	☐	☐
B	LED WRAP	No	NA	35	Mfr. Spec	6	No	210	☐	☐
C	LED TROFFER	No	NA	35	Mfr. Spec	2	No	70	☐	☐
D	LED UTILITY FIXTURE	No	NA	15	Mfr. Spec	1	No	15	☐	☐
					Total Designed Watts: CONDITIONED SPACES			1,720		

[1] *FOOTNOTE: Design Watts for small aperture and color changing luminaires which qualify per 140.6(a)4B / 170.2(e)2D is adjusted to be 75% /80% of their rated wattage. Table F automatically makes this adjustment, the permit applicant should enter full rated wattage in column 05.*
[2] *Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b). Wattage used must be the maximum rated for the luminaire, not the lamp.*

G. MODULAR LIGHTING SYSTEMS

This section does not apply to this project.

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

This table includes lighting controls for conditioned and unconditioned spaces.

Building Level Controls

01	02	03	
Mandatory Demand Response 110.12(c)	Shut-off controls 130.1(c) / 160.5(b)4C	Field Inspector	
		Pass	Fail
NA < 4,000W subject to multilevel	See Area/Space Level Controls	☐	☐

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	**Report Page:**	(Page 3 of 7)
	Date Prepared:	12/18/2024

F. OUTDOOR LIGHTING FIXTURE SCHEDULE

For new or altered lighting systems demonstrating compliance with 140.7 / 170.2(e)6 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per 141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included). Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

Designed Wattage:

01	02		03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description		Watts per luminaire[1, 2]	How is Wattage determined	Total Number Luminaires [2]	Luminaire Status[3]	Excluded per 140.7(a) / 170.2(e)6A	Design Watts	Cutoff Req. > 6,200 initial lumen output 130.2(b) / 160.5(c)1[4]	Field Inspector	
										Pass	Fail
F	EXTERIOR LED	☐ Linear	28	Mfr. Spec	11	New	☐	308	NA: < 6200 lumens	☐	☐
							Total Design Watts:	308			

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
EX: Luminaire is lighting a statue; EXCEPTION 2 to 130.2(b)

[1] *FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b)*
[2] *For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 05 instead of number of luminaires.*
[3] *Select "New" for new luminaires in a new outdoor lighting project, or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.*
[4] *Compliance with mandatory shielding requirements is required for luminaires with initial lumen output >= 6,200 unless exempted by 130.2(b)/ 160.5(c)*

G. SHIELDING REQUIREMENTS (BUG)

This section does not apply to this project.

STATE OF CALIFORNIA
Outdoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C1	**Report Page:**	(Page 6 of 7)
	Date Prepared:	12/18/2024

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

This section does not apply to this project.

N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)

This section does not apply to this project.

O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTO-E - Must be submitted for all buildings

P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified
NRCA-LTO-02-A - Must be submitted for all outdoor lighting controls except for alterations where controls are added to <= 20 luminaires.	PEDESTRIAN;

STATE OF CALIFORNIA
Indoor Lighting CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C2	**Report Page:**	(Page 2 of 7)
	Date Prepared:	12/18/2024

C. COMPLIANCE RESULTS

If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

Lighting in conditioned and unconditioned spaces must not be combined for compliance per 140.6(b)1 / 170.2(e)	Allowed Lighting Power per 140.6(b) / 170.2(e) (Watts)						Adjusted Lighting Power per 140.6(a) / 170.2(e) (Watts)				Compliance Results
	01	02	03	04	05		06	07		08	09
	Complete Building 140.6(c)1	Area Category 140.6(c)2 / 170.2(e)4	Area Category Additional 140.6(c)2G / 170.2(e)4Av (+)	Tailored 140.6(c)3 / 170.2(e)4B (+)			Total Designed (Watts)	Adjustments PAF Lighting Control Credits 140.6(a)2 / 170.2(e)1B (-)		**Total Adjusted** (Watts) *Includes Adjustments	**05 must be >= 08 140.6 / 170.2(e)**
	(See Table I)	(See Table I)	(See Table J)	(See Table K)			(See Table F)	(See Table P)			
Conditioned	1,729				=	1,729	≥ 1,720	0	=	1720	COMPLIES
Unconditioned					=		≥		=		
								Controls Compliance (See Table H for Details)			COMPLIES
								Rated Power Reduction Compliance (See Table Q for Details)			

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93631

REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

DATE 2/11/2025 9:49:08 AM
JOB NO. 24769
SHEET TITLE
COMPLIANCE

SHEET NO.
ET24B

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Richard Smith	Documentation Author Signature:
Company: HCS Engineering, Inc.	Signature Date: 2024-12-18
Address: 4512 Feather River Drive #F	CEA/ HERS Certification Identification (if applicable): PE 14303
City/State/Zip: Stockton CA 95219	Phone: 209-478-8270

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Richard Smith, PE	Responsible Designer Signature:
Company: HCS Engineering, Inc.	Date Signed: 2024-12-18
Address: 4512 Feather River Dr #F	License: E14303
City/State/Zip: Stockton CA 95219	Phone: 2094788270

F. OUTDOOR LIGHTING FIXTURE SCHEDULE

For new or altered lighting systems demonstrating compliance with 140.7 / 170.2(e)6 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per 141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included). Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

Designed Wattage:

01	02		03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description		Watts per luminaire[1, 2]	How is Wattage determined	Total Number Luminaires [2]	Luminaire Status[3]	Excluded per 140.7(a) / 170.2(e)6A	Design Watts	Cutoff Req. > 6,200 initial lumen output 130.2(b) / 160.5(c)[4]	Field Inspector	
										Pass	Fail
F	EXTERIOR LED	☐ Linear	28	Mfr. Spec	8	New	☐	224	NA: < 6200 lumens	☐	☐
							Total Design Watts:	224			

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
EX: Luminaire is lighting a statue; EXCEPTION 2 to 130.2(b)

[1] FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b)

[2] For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 05 instead of number of luminaires.

[3] Select "New" for new luminaires in a new outdoor lighting project, or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.

[4] Compliance with mandatory shielding requirements is required for luminaires with initial lumen output >= 6,200 unless exempted by 130.2(b)/ 160.5(c)

G. SHIELDING REQUIREMENTS (BUG)

This section does not apply to this project.

S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)

This section does not apply to this project.

T. DWELLING UNIT LIGHTING

This section does not apply to this project.

U. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selections have been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTI-E - Must be submitted for all buildings

V. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selections have been changed by the permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and any with "-A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified
NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	SCHOOL;
NRCA-LTI-03-A - Must be submitted for automatic daylight controls.	SCHOOL;

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through N. Note: If any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see applicable Table referenced below.

Calculations of Total Allowed Lighting Power (Watts) 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv												Compliance Results		
01		02		03		04		05		06		07		08	09
General Hardscape Allowance 140.7(d)1 / 170.2(e)6 (See Table I)	+	Per Application 140.7(d)2 / 170.2(e)6 (See Table J)	+	Sales Frontage 140.7(d)2 (See Table K)	+	Ornamental 140.7(d)2 / 170.2(e)6 (See Table L)	+	Per Specific Area 140.7(d)2 / 170.2(e)6 (See Table M)	OR	Existing Power Allowance 141.0(b)2L / 180.2(b)4Bv (See Table N)	=	**Total Allowed** (Watts)	≥	**Total Actual** (Watts)	**07 must be >= 08**
322	+	---	+	---	+	---	+	---	OR	---	=	322	≥	224	COMPLIES
Shielding Compliance (See Table G for Details)															N/A
Controls Compliance (See Table H for Details)															COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE

This section does not apply to this project.

L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY

This section does not apply to this project.

M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING

This section does not apply to this project.

N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED DECORATIVE /SPECIAL EFFECTS

This section does not apply to this project.

O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE

This section does not apply to this project.

P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))

This section does not apply to this project.

Q. RATED POWER REDUCTION COMPLIANCE FOR ONE-FOR-ONE ALTERATIONS

This section does not apply to this project.

R. 80% LIGHTING POWER FOR ALL ALTERATIONS - CONTROLS EXCEPTIONS

This section does not apply to this project.

This document is used to demonstrate compliance with requirements in 110.9, 130.0, 130.2, 140.7, and 141.0(b)2L for outdoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e)6, 180.1(a) and 180.2(b)4Bv for outdoor lighting scopes using the prescriptive path for multifamily and mixed-use occupancies. Multifamily includes dormitory and senior living facilities.

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Total Illuminated Hardscape Area (ft²)	4200
02	Climate Zone	13			
03	Outdoor Lighting Zone per Title 24 Part 1	10.114 or as designated by Authority Having Jurisdiction (AHJ):			
☐	LZ-0: Very Low - Undeveloped Parkland	☒ LZ-2: Moderate - Urban Clusters	☐ LZ-4: High - Must be reviewed by CA Energy Commission for Approval		
☐	LZ-1: Low - Rural Areas	☐ LZ-3: Moderately High - Urban Areas			
05	Occupancy Types within Project				
• Office					

B. PROJECT SCOPE

This table includes outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv for alterations.

My Project Consists of:

01	02
☒ New Lighting System	Must Comply with Allowances from 140.7 / 170.2(e)6
☐ Altered Lighting System	Is your alteration increasing the connected lighting load (Watts)? ○ Yes ○ No

03	04	05
% of Existing Luminaires Being Altered[1]	Sum Total of Luminaires Being Added or Altered	Calculation Method
☐ < 10% ☐ >= 10% and < 50% ☐ >= 50%		

Please proceed to Table F. Outdoor Lighting Fixture Schedule to define the project's luminaires.

[1] FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100.

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

This section does not apply to this project.

N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)

This section does not apply to this project.

O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTO-E - Must be submitted for all buildings

P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified
NRCA-LTO-02-A - Must be submitted for all outdoor lighting controls except for alterations where controls are added to <= 20 luminaires.	PEDESTRIAN;

I. LIGHTING POWER ALLOWANCE (per 140.7 / 170.2(e))

This table includes areas using allowance calculations per 140.7 / 170.2(e). General Hardscape Allowance is per Table 140.7-A/Table 170.2-R while "Use it or lose it" Allowances are per Table 140.7-B /Table 170.2-S. Indicate which allowances are being used to expand sections for user input. Luminaires that qualify for one of the "Use it or lose it" allowances shall not qualify for another "Use it or lose it" allowance.
Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

01				
	"Use it or lose it" Allowance (select all that apply) (select all that apply)			
☒ General Hardscape Allowance Table I (below)	☐ Per Application Table J	☐ Sales Frontage Table K	☐ Ornamental Table L	☐ Per Specific Area Table M

Calculated General Hardscape Lighting Power Allowance per Table 140.7-A for Nonresidential & Hotel/Motel

02	03	04	05	06	07	08	09
Area Description	Area Wattage Allowance (AWA)			Linear Wattage Allowance (LWA)			Total General AWA + LWA (Watts)
	Illuminated Area (ft²)	Allowed Density (W/ft²)	Area Allowance (Watts)	Perimeter Length (lf)	Allowed Density (W/lf)	Linear Allowance (Watts)	
PEDESTRIAN	4200	0.019	79.8	284	0.2	42.6	122
Initial Wattage Allowance for Entire Site (Watts):							200
Instances of Initial Wattage Allowance (LZ 0 only)[1]							
Total General Hardscape Allowance (Watts):							322

J. LIGHTING ALLOWANCE: PER APPLICATION

This section does not apply to this project.

K. LIGHTING ALLOWANCE: SALES FRONTAGE

This section does not apply to this project.

L. LIGHTING ALLOWANCE: ORNAMENTAL

This section does not apply to this project.

H. OUTDOOR LIGHTING CONTROLS

This table demonstrates compliance with controls requirements for all new or altered luminaires installed as part of the permit application. For alteration projects, luminaires which are existing to remain (ie untouched) and luminaires which are removed and reinstalled (wiring only) do not need to be included in this table even if they are within the spaces covered by the permit application.
Outdoor lighting for nonresidential buildings, parking garages and common service areas in multifamily buildings must be documented separately from outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit

Mandatory Controls for Nonresidential Occupancies, Parking Garages & Common Areas in Multifamily Buildings

01	02	03	04	05	
Area Description	Shut-Off 130.2(c)1 / 160.5(c)	Auto-Schedule 130.2(c)2 / 160.5(c)	Motion Sensor 130.2(c)3 / 160.5(c)	Field Inspector	
				Pass	Fail
PEDESTRIAN	Photocontrol	Provided	NA: Each Luminaire <= 40 Watts	☐	☐

[1] FOOTNOTE: Text has been abbreviated, please refer to Table 160.5-A to confirm compliance with the specific light source technologies listed.
[2] Authority having jurisdiction may ask for cutsheets or other documentation to confirm compliance of light source.
[3] Recessed luminaires marked for use in fire-rated installations, and recessed luminaires installed in non-insulated ceilings are excepted from ii and iii.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE MENDOTA, CA 93631

FOR REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4887
CA. LIC. NO. 473488
NV. LIC. NO. 77887

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

DATE 2/11/2025 9:49:13 AM
JOB NO. 24769
SHEET TITLE
COMPLIANCE
SHEET NO.
ET24C

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 2 of 7)**
	Date Prepared:	12/18/2024

C. COMPLIANCE RESULTS

If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance.

Lighting in conditioned and unconditioned spaces must not be combined for compliance per 140.6(b)1 / 170.2(e)	Allowed Lighting Power per 140.6(b) / 170.2(e) (Watts)						Adjusted Lighting Power per 140.6(a) / 170.2(e) (Watts)				Compliance Results
	01	02	03	04		05	06	07		08	09
	Complete Building 140.6(c)1	Area Category 140.6(c)2 / 170.2(e)4	Area Category Additional 140.6(c)2G / 170.2(e)4Av (+)	Tailored 140.6(c)3 / 170.2(e)4B (+)	=	**Total Allowed** (Watts)	Total Designed (Watts)	Adjustments PAF Lighting Control Credits 140.6(a)2 / 170.2(e)1B (-)	=	**Total Adjusted** (Watts) *Includes Adjustments	**05 must be >= 08 140.6 / 170.2(e)**
	(See Table I)	(See Table I)	(See Table J)	(See Table K)			(See Table F)	(See Table P)			
Conditioned	1,925				=	1,925	1,695	0	=	1695	COMPLIES
Unconditioned					=				=		
Controls Compliance (See Table H for Details)											COMPLIES
Rated Power Reduction Compliance (See Table Q for Details)											

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 5 of 7)**
	Date Prepared:	12/18/2024

K. TAILORED METHOD GENERAL LIGHTING POWER ALLOWANCE

This section does not apply to this project.

L. ADDITIONAL LIGHTING ALLOWANCE: TAILORED WALL DISPLAY

This section does not apply to this project.

M. ADDITIONAL LIGHTING ALLOWANCE: TAILORED FLOOR AND TASK LIGHTING

This section does not apply to this project.

N. ADDITIONAL LIGHTING ALLOWANCE: TAILORED DECORATIVE /SPECIAL EFFECTS

This section does not apply to this project.

O. ADDITIONAL LIGHTING ALLOWANCE: TAILORED VERY VALUABLE MERCHANDISE

This section does not apply to this project.

P. POWER ADJUSTMENT: LIGHTING CONTROL CREDIT (POWER ADJUSTMENT FACTOR (PAF))

This section does not apply to this project.

Q. RATED POWER REDUCTION COMPLIANCE FOR ONE-FOR-ONE ALTERATIONS

This section does not apply to this project.

R. 80% LIGHTING POWER FOR ALL ALTERATIONS - CONTROLS EXCEPTIONS

This section does not apply to this project.

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
This document is used to demonstrate compliance with requirements in 110.9, 130.0, 130.2, 140.7, and 141.0(b)2L for outdoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e)6, 180.1(a) and 180.2(b)4Bv for outdoor lighting scopes using the prescriptive path for multifamily and mixed-use occupancies. Multifamily includes dormitory and senior living facilities.		
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 1 of 7)**
Project Address: 605 Bass Ave	**Date Prepared:**	12/18/2024

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Total Illuminated Hardscape Area (ft²)	4200
02	Climate Zone	13			
03	Outdoor Lighting Zone per Title 24 Part 1 10.114 or as designated by Authority Having Jurisdiction (AHJ):				
☐	LZ-0: Very Low - Undeveloped Parkland	☒ LZ-2: Moderate - Urban Clusters	☐	LZ-4: High - Must be reviewed by CA Energy Commission for Approval	
☐	LZ-1: Low - Rural Areas	☐ LZ-3: Moderately High - Urban Areas			
05	Occupancy Types within Project				
• Office					

B. PROJECT SCOPE

This table includes outdoor lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv for alterations.

My Project Consists of:

01	02		
☒ New Lighting System	Must Comply with Allowances from 140.7 / 170.2(e)6		
☐ Altered Lighting System	Is your alteration increasing the connected lighting load (Watts)?	○ Yes	○ No
03	04	05	
% of Existing Luminaires Being Altered[1]	Sum Total of Luminaires Being Added or Altered	Calculation Method	
☐ < 10% ☐ >= 10% and < 50% ☐ >= 50%			

Please proceed to Table F. Outdoor Lighting Fixture Schedule to define the project's luminaires.

[1] *FOOTNOTES: % of Existing Luminaires Being Altered = (Sum Total of Luminaires Being Added or Altered / Existing Luminaires within the Scope of the Permit Application) x 100.*

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
This document is used to demonstrate compliance with requirements in 110.9, 110.12(c), 130.0, 130.1, 140.6 and 141.0(b)2 for indoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies. It is also used to document compliance with requirements in 160.5, 170.2(e) and 180.2(b)4 for indoor lighting scopes using the prescriptive path for multifamily occupancies. Multifamily includes dormitory and senior living facilities.		
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 1 of 7)**
Project Address: 605 Bass Ave	**Date Prepared:**	12/18/2024

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Total Conditioned Floor Area (ft²)	3,208
02	Climate Zone	13	05	Total Unconditioned Floor Area (ft²)	0
03	Occupancy Types Within Project (select all that apply):		06	# of Stories (Habitable Above Grade)	1
• Office					

B. PROJECT SCOPE

This table includes any lighting systems that are within the scope of the permit application and are demonstrating compliance using the prescriptive path outlined in 140.6 / 170.2(e) or 141.0(b)2 / 180.2(b)4 for alterations.

Scope of Work	Conditioned Spaces		Unconditioned Spaces	
01	02	03	04	05
My Project Consists of (check all that apply):	Calculation Method	Area (ft²)	Calculation Method	Area (ft²)
☒ New Lighting System	Complete Building Method	3208	Complete Building Method	0
☐ New Lighting System - Parking Garage				
Total Area of Work (ft²)	3208		0	

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 4 of 7)**
	Date Prepared:	12/18/2024

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

Area Level Controls

04	05	06	07	08	09	10	11	12	
Area Description	Complete Building or Area Category Primary Function Area	Manual Area Controls 130.1(a) / 160.5(b)4A	Multi-Level Controls 130.1(b) / 160.5(b)4B	Shut-Off Controls 130.1(c) // 160.5(b)4C	Primary/Sky lit Daylighting 130.1(d) / 160.5(b)4D	Secondary Daylighting 130.1(d) / 160.5(b)4D	Interlocked Systems 140.6(a)1/ 170.2(e)2A	Field Inspector	
								Pass	Fail
SCHOOL	School or Classroom	Readily Accessible	Dimmer	Occupancy Sensor	Included	NA: General Ltg < 120W	No	☐	☐
							13		
							Plan Sheet Showing Daylit Zones:		
							E100		

I. LIGHTING POWER ALLOWANCE: COMPLETE BUILDING OR AREA CATEGORY METHODS

Each area complying using the Complete Building or Area Category Methods per 140.6(b) are included in this table. Column 06 indicates if additional lighting power allowances per 140.6(c) or adjustments per 140.6(a) are being used .

Conditioned Spaces

01	02	03	04	05	06	
Area Description	Complete Building or Area Category Primary Function Area	Allowed Density (W/ft²)	Area (ft²)	Allowed Wattage (Watts)	Additional Allowance / Adjustment	
					Area Category	PAF
Whole Building	School or Classroom	0.6	3,208	1,924.8	No	No
		TOTALS:	3,208	1,924.8	See Tables J, or P for detail	

J. ADDITIONAL ALLOWANCE: AREA CATEGORY METHOD QUALIFYING LIGHTING SYSTEM

This section does not apply to this project.

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 7 of 7)**
Project Address: 605 Bass Ave	**Date Prepared:**	12/18/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Richard Smith	Documentation Author Signature:
Company: HCS Engineering, Inc.	Signature Date: 2024-12-18
Address: 4512 Feather River Drive #F	CEA/ HERS Certification Identification (if applicable): PE 14303
City/State/Zip: Stockton CA 95219	Phone: 209-478-8270

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Richard Smith, PE	Responsible Designer Signature:
Company: HCS Engineering, Inc.	Date Signed: 2024-12-18
Address: 4512 Feather River Dr #F	License: E14303
City/State/Zip: Stockton CA 95219	Phone: 2094788270

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 3 of 7)**
	Date Prepared:	12/18/2024

F. INDOOR LIGHTING FIXTURE SCHEDULE

This table includes all planned permanent and portable lighting other than dwelling unit/ hotel/ motel room lighting. Multifamily dwelling unit and hotel/motel room lighting is documented in Table T. If using Table T to document lighting in multifamily common use areas providing shared provisions for living, eating, cooking or sanitation, those luminaires are not included here.

Designed Wattage: Conditioned Spaces

01	02	03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description	Modular (Track) Fixture	Small Aperture & Color Change[1]	Watts per luminaire[2]	How is Wattage determined	Total Number of Luminaires	Excluded per 140.6(a)3 / 170.2(e)2C	Design Watts	Field Inspector	
									Pass	Fail
A	8' LINEAR	No	NA	75	Mfr. Spec	21	No	1,575	☐	☐
B	LED WRAP	No	NA	35	Mfr. Spec	3	No	105	☐	☐
D	LED UTILITY FIXTURE	No	NA	15	Mfr. Spec	1	No	15	☐	☐
							Total Designed Watts: CONDITIONED SPACES	1,695		

[1]*FOOTNOTE: Design Watts for small aperture and color changing luminaires which qualify per 140.6(a)4B / 170.2(e)2D is adjusted to be 75% /80% of their rated wattage. Table F automatically makes this adjustment, the permit applicant should enter full rated wattage in column 05.*

[2]*Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b). Wattage used must be the maximum rated for the luminaire, not the lamp.*

G. MODULAR LIGHTING SYSTEMS

This section does not apply to this project.

H. INDOOR LIGHTING CONTROLS (Not including PAFs)

This table includes lighting controls for conditioned and unconditioned spaces.

Building Level Controls

01	02	03	
		Field Inspector	
		Pass	Fail
Mandatory Demand Response 110.12(c)	Shut-off controls 130.1(c) / 160.5(b)4C		
NA < 4,000W subject to multilevel	See Area/Space Level Controls	☐	☐

STATE OF CALIFORNIA
Indoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTI-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 6 of 7)**
	Date Prepared:	12/18/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

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Company: HCS Engineering, Inc.	Signature Date: 2024-12-18
Address: 4512 Feather River Drive #F	CEA/ HERS Certification Identification (if applicable): PE 14303
City/State/Zip: Stockton CA 95219	Phone: 209-478-8270

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4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name: Richard Smith, PE	Responsible Designer Signature:
Company: HCS Engineering, Inc.	Date Signed: 2024-12-18
Address: 4512 Feather River Dr #F	License: E14303
City/State/Zip: Stockton CA 95219	Phone: 2094788270

S. DAYLIGHT DESIGN POWER ADJUSTMENT FACTOR (PAF)

This section does not apply to this project.

T. DWELLING UNIT LIGHTING

This section does not apply to this project.

U. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selections have been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTI-E - Must be submitted for all buildings

V. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selections have been changed by the permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and any with "-A" in the form name must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified
NRCA-LTI-02-A - Must be submitted for occupancy sensors and automatic time switch controls.	SCHOOL;
NRCA-LTI-03-A - Must be submitted for automatic daylight controls.	SCHOOL;

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93631

REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA. 95240
(209) 334-4
CA. LIC. NO. 473488
NV. LIC. NO. 0887

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

RICHARD C. SMITH No. E14303 Exp. 6-30-25 ELECTRICAL STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

DATE 2/11/2025 9:49:23 AM
JOB NO. 24769
SHEET TITLE
COMPLIANCE
SHEET NO.
ET24D

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 4 of 7)**
	Date Prepared:	12/18/2024

H. OUTDOOR LIGHTING CONTROLS

This table demonstrates compliance with controls requirements for all new or altered luminaires installed as part of the permit application. For alteration projects, luminaires which are existing to remain (ie untouched) and luminaires which are removed and reinstalled (wiring only) do not need to be included in this table even if they are within the spaces covered by the permit application.
Outdoor lighting for nonresidential buildings, parking garages and common service areas in multifamily buildings must be documented separately from outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit

Mandatory Controls for Nonresidential Occupancies, Parking Garages & Common Areas in Multifamily Buildings

01	02	03	04	05	
Area Description	Shut-Off 130.2(c)1 / 160.5(c)	Auto-Schedule 130.2(c)2 / 160.5(c)	Motion Sensor 130.2(c)3 / 160.5(c)	Field Inspector	
				Pass	Fail
PEDESTRIAN	Photocontrol	Provided	NA: Each Luminaire <= 40 Watts	☐	☐

[1] *FOOTNOTE: Text has been abbreviated, please refer to Table 160.5-A to confirm compliance with the specific light source technologies listed.*
[2] *Authority having jurisdiction may ask for cutsheets or other documentation to confirm compliance of light source.*
[3] *Recessed luminaires marked for use in fire-rated installations, and recessed luminaires installed in non-insulated ceilings are excepted from ii and iii.*

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 7 of 7)**
Project Address: 605 Bass Ave	**Date Prepared:**	12/18/2024

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Richard Smith	Documentation Author Signature:
Company: HCS Engineering, Inc.	Signature Date: 2024-12-18
Address: 4512 Feather River Drive #F	CEA/ HERS Certification Identification (if applicable): PE 14303
City/State/Zip: Stockton CA 95219	Phone: 209-478-8270

RESPONSIBLE PERSON'S DECLARATION STATEMENT

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1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
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Responsible Designer Name: Richard Smith, PE	Responsible Designer Signature:
Company: HCS Engineering, Inc.	Date Signed: 2024-12-18
Address: 4512 Feather River Dr #F	License: E14303
City/State/Zip: Stockton CA 95219	Phone: 2094788270

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 3 of 7)**
	Date Prepared:	12/18/2024

F. OUTDOOR LIGHTING FIXTURE SCHEDULE

For new or altered lighting systems demonstrating compliance with 140.7 / 170.2(e)6 all new luminaires being installed and any existing luminaires remaining or being moved within the spaces covered by the permit application are included in the Table below. For altered lighting systems using the Existing Power method per 141.0(b)2L only new luminaires being installed and replacement luminaires being installed as part of the project scope are included (ie, existing luminaires remaining or existing luminaires being moved are not included). Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

Designed Wattage:

01	02		03	04	05	06	07	08	09	10	
Name or Item Tag	Complete Luminaire Description		Watts per luminaire[1-2]	How is Wattage determined	Total Number Luminaires [2]	Luminaire Status[3]	Excluded per 140.7(a) / 170.2(e)6A	Design Watts	Cutoff Req. > 6,200 initial lumen output 130.2(b) / 160.5(c)1[4]	Field Inspector	
										Pass	Fail
F	EXTERIOR LED	☐ Linear	28	Mfr. Spec	6	New	☐	168	NA: < 6200 lumens	☐	☐
							Total Design Watts:	168			

* NOTES: Selections with a * require a note in the space below explaining how compliance is achieved.
EX: Luminaire is lighting a statue; EXCEPTION 2 to 130.2(b)

[1] *FOOTNOTES: Authority Having Jurisdiction may ask for Luminaire cut sheets to confirm wattage used for compliance per 130.0(c) / 160.5(b)*
[2] *For linear luminaires, wattage should be indicated as W/lf instead of Watts/luminaire. Total linear feet should be indicated in column 05 instead of number of luminaires.*
[3] *Select "New" for new luminaires in a new outdoor lighting project, or for added luminaires in an alteration. Select "Altered" for replacement luminaires in an alteration. Select "Existing to Remain" for existing luminaires within the project scope that are not being altered and are remaining. Select "Existing Reinstalled" for existing luminaires which are being removed and reinstalled as part of the project scope.*
[4] *Compliance with mandatory shielding requirements is required for luminaires with initial lumen output >= 6,200 unless exempted by 130.2(b)/ 160.5(c)*

G. SHIELDING REQUIREMENTS (BUG)

This section does not apply to this project.

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 6 of 7)**
	Date Prepared:	12/18/2024

M. LIGHTING ALLOWANCE: PER SPECIFIC AREA

This section does not apply to this project.

N. EXISTING CONDITIONS POWER ALLOWANCE (alterations only)

This section does not apply to this project.

O. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-LTO-E - Must be submitted for all buildings

P. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections have been made based on information provided in this document. If any selection has been changed by permit applicant, an explanation should be included in Table E. Additional Remarks. These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). For more information visit: http://www.energy.ca.gov/title24/attcp/providers.html

Form/Title	Systems/Spaces To Be Field Verified
NRCA-LTO-02-A - Must be submitted for all outdoor lighting controls except for alterations where controls are added to <= 20 luminaires.	PEDESTRIAN;

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 2 of 7)**
	Date Prepared:	12/18/2024

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through N. Note: if any cell on this table says "COMPLIES with Exceptional Conditions" refer to Table D. Exceptional Conditions for guidance or see applicable Table referenced below.

Calculations of Total Allowed Lighting Power (Watts) 140.7 / 170.2(e)6 or 141.0(b)2L / 180.2(b)4Bv													Compliance Results		
01		02		03		04		05		06		07	08	09	
General Hardscape Allowance 140.7(d)1 / 170.2(e)6 (See Table I)	+	Per Application 140.7(d)2 / 170.2(e)6 (See Table J)	+	Sales Frontage 140.7(d)2 (See Table K)	+	Ornamental 140.7(d)2 / 170.2(e)6 (See Table L)	+	Per Specific Area 140.7(d)2 / 170.2(e)6 (See Table M)	OR	Existing Power Allowance 141.0(b)2L / 180.2(b)4Bv (See Table N)	=	**Total Allowed** (Watts)	≥	**Total Actual** (Watts)	**07 must be >= 08**
322	+	---	+	---	+	---	+	---	OR	---	=	322	≥	168	COMPLIES
Shielding Compliance (See Table G for Details)															N/A
Controls Compliance (See Table H for Details)															COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

E. ADDITIONAL REMARKS

This table includes remarks made by the permit applicant to the Authority Having Jurisdiction.

STATE OF CALIFORNIA
Outdoor Lighting
CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE		NRCC-LTO-E
Project Name: Mendota Classroom Wing C3	**Report Page:**	**(Page 5 of 7)**
	Date Prepared:	12/18/2024

I. LIGHTING POWER ALLOWANCE (per 140.7 / 170.2(e))

This table includes areas using allowance calculations per 140.7 / 170.2(e). General Hardscape Allowance is per Table 140.7-A/Table 170.2-R while "Use it or lose it" Allowances are per Table 140.7-B /Table 170.2-S. Indicate which allowances are being used to expand sections for user input. Luminaires that qualify for one of the "Use it or lose it" allowances shall not qualify for another "Use it or lose it" allowance. Outdoor lighting attached to multifamily buildings and controlled from the inside of a dwelling unit are included in Table H. and are not included here. All other multifamily outdoor lighting is included here.

	01				
	"Use it or lose it" Allowance (select all that apply) (select all that apply)				
☒ General Hardscape Allowance Table I (below)	☐ Per Application Table J	☐ Sales Frontage Table K	☐ Ornamental Table L	☐ Per Specific Area Table M	

Calculated General Hardscape Lighting Power Allowance per Table 140.7-A for Nonresidential & Hotel/Motel

02	03	04	05	06	07	08	09
	Area Wattage Allowance (AWA)			Linear Wattage Allowance (LWA)			Total General AWA + LWA (Watts)
Area Description	Illuminated Area (ft²)	Allowed Density (W/ft²)	Area Allowance (Watts)	Perimeter Length (lf)	Allowed Density (W/lf)	Linear Allowance (Watts)	
PEDESTRIAN	4200	0.019	79.8	284	0.2	42.6	122
					Initial Wattage Allowance for Entire Site (Watts):		200
					Instances of Initial Wattage Allowance (LZ 0 only)[1]		
					Total General Hardscape Allowance (Watts):		322

J. LIGHTING ALLOWANCE: PER APPLICATION

This section does not apply to this project.

K. LIGHTING ALLOWANCE: SALES FRONTAGE

This section does not apply to this project.

L. LIGHTING ALLOWANCE: ORNAMENTAL

This section does not apply to this project.

L. LIGHTING ALLOWANCE: ORNAMENTAL

This section does not apply to this project.

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

INCREMENT #2
NEW CLASSROOMS @ MENDOTA ELEM. SCHOOL
FOR MENDOTA UNIFIED SCHOOL DISTRICT
605 BASS AVENUE, MENDOTA, CA 93631

REFERENCE ONLY

MEEHLEIS MODULAR BUILDINGS, INC.
A DESIGN BUILD COMPANY
1303 E. LODI AVE.
LODI, CA 95240
(209) 334-4[illegible]
CA. LIC. NO. 473488
NV. LIC. NO. [illegible]

HCS Engineering inc.
4512 Feather River Dr #F, Stockton, CA 95219
209-478-8270 | www.hcs-eng.com

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. SMITH
No. E14303
Exp. 6-30-25
ELECTRICAL
STATE OF CALIFORNIA

DRAWN: RCS
CHECKED: RCS
REVISIONS:

.	.

DATE 2/11/2025 9:49:27 AM
JOB NO. 24769
SHEET TITLE
COMPLIANCE
SHEET NO.
ET24E

FIRE PROTECTION PROJECT NOTES

1. THE AUTOMATIC WET PIPE SPRINKLER SYSTEMS SHALL CONFORM TO THE REQUIREMENTS OF THE 2022 EDITION OF NFPA 13 AND THE 2022 CBC AMENDMENTS.

2. A MINIMUM OF 48 HOURS NOTICE SHALL BE REQUIRED FOR ANY INSPECTION AND/OR TESTING.

3. INSTALLATION OF THE SPRINKLER SYSTEM SHALL NOT BE STARTED UNTIL COMPLETE PLANS AND SPECIFICATIONS (INCLUDING WATER SUPPLY INFORMATION AND TYPE OF EXISTING SPRINKLER SYSTEM, IF ANY) HAVE BEEN APPROVED BY THE DEPARTMENT THE STATE ARCHITECT (D.S.A.). A STAMPED SET OF APPROVED DRAWINGS SHALL BE ON THE JOB SITE AND USED FOR INSTALLATION. ANY DEVIATION FROM THE APPROVED PLANS, INCLUDING THE SUBSTITUTION OF ANY COMPONENTS SHALL BE APPROVED BY THE DSA. FAILURE TO COMPLY MAY RESULT IN A STOP WORK ORDER.

4. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE CODE OR RECOGNIZED SPRINKLER STANDARDS SHALL BE BROUGHT TO TO THE ATTENTION OF THE INSPECTOR OF RECORD.

5. UNDERGROUND SITE FIRE PROTECTION PIPING IS SHOWN FOR HYDRAULIC CALCULATION REFERENCE ONLY.

6. THE FIRE SPRINKLER SYSTEMS HAVE BEEN HYDRAULICALLY CALCULATED FOR :
   - LIGHT HAZARD OCCUPANCY AT A DESIGN DENSITY OF .10 GPM SF OVER 1500 SF.
   - ORDINARY GROUP I HAZARD OCCUPANCY AT A DESIGN DENSITY OF .15 GPM SF OVER 1500 SF.
   - ORDINARY GROUP II HAZARD OCCUPANCY AT A DESIGN DENSITY OF .20 GPM SF OVER 1500 SF.

7. 1" PIPE TO BE THREADED PIPING TO BE SCH-40, BLACK STEEL WITH CAST OR DUCTILE IRON FITTINGS. 1 1/2" -6" PIPING TO BE GROOVED END PIPING TO BE SCH-10, BLACK STEEL WITH GROOVED FITTINGS AND WELDED OUTLETS.

8. METHODS AND PROCEDURES FOR SHOP WELDING OF OUTLETS SHALL COMPLY WITH AWS B2.1.

DSA NOTES

1. NFPA 13 (2022) SEC. 6.10.2.1 UNDERGROUND MAINS AND LEAD-IN CONNECTIONS TO SYSTEM RISER SHALL BE COMPLETELY FLUSHED BEFORE CONNECTION IS MADE TO OVERHEAD SPRINKLER PIPING SYSTEMS (WITNESSED BY THE INSPECTOR OF RECORD).

2. NFPA 13 (2022) SEC. 6.10.2.2 ALL INTERIOR PIPING AND APPURTENANCES SUBJECTED TO SYSTEM WORKING PRESSURE SHALL BE HYDROSTATICALLY TESTED AT 200 PSI AND SHALL MAINTAIN THAT PRESSURE WITHOUT LOSS FOR 2 HOURS (WITNESSED BY THE INSPECTOR OF RECORD). LOCAL FIRE DEPARTMENT SHALL BE NOTIFIED OF DATE AND TESTING SO THAT THEY MAY OBSERVE TESTING.

3. NFPA 13 (2022) SEC. 16.2.7.5 PROVIDE SPARE SPRINKLER HEAD CABINET, SPRINKLER WRENCH, AND NO FEWER THAN 6 SPARE SPRINKLER HEADS MATCHING THE TYPES AND TEMPERATURE RATING IN EACH PROTECTED BUILDING FOR SYSTEMS LESS THAN 300 SPRINKLERS (12 SPARE SPRINKLER HEADS FOR SYSTEMS 300 TO 1000 SPRINKLERS).

4. NFPA 13 (2022) SEC. 18.6.3 THE END SPRINKLER ON A LINE SHALL BE RESTRAINED AGAINST EXCESSIVE VERTICAL AND LATERAL MOVEMENT.

5. NFPA 13 (2022) SEC. 18.6 PROVIDE RESTRAINT OF BRANCH LINES BY USE OF ONE OF THE FOLLOWING:
   A. A LISTED SWAY BRACE ASSEMBLY.
   B. A WRAPAROUND U-HOOK SATISFYING THE REQUIREMENTS OF 9.3.5.3.11.
   C. NUMBER 12, 440-LB. WIRE INSTALLED AT LEAST 45 DEGREES FROM THE VERTICAL PLANE AND ANCHORED ON BOTH SIDES OF THE PIPE.

6. NFPA 13 (2022) SEC. 28.2.3.1 SPRINKLER FLOW SWITCH SHALL BE TESTED BY IOR TO CONFIRM THAT WHEN THE INSPECTOR'S TEST VALVE IS ACTIVATED AN ALARM WILL SOUND NO LESS THAN 20 SECONDS AND NOT MORE THAN 90 SECONDS.

7. CBC SEC. 903.4.1 MAIN FIRE ALARM PANEL VALVE MONITORING AND WATER-FLOW ALARM AND TROUBLE SIGNALS SHALL BE DISTINCTLY DIFFERENT AND SHALL BE AUTOMATICALLY TRANSMITTED TO AN APPROVED CENTRAL STATION MONITORING COMPANY.

8. NFPA 13 (2022) SEC. 16.11.2 FLOW SWITCH SHALL BE CONNECTED TO A 10 INCH OUTSIDE ALARM BELL AT EACH RISER. APPROVED IDENTIFICATION SIGNS SHALL BE PROVIDED FOR OUTSIDE ALARM BELL "SPRINKLER FIRE ALARM - WHEN BELL RINGS CALL 911 / FIRE DEPARTMENT".

9. NFPA 13 (2022) FIGURE A.28.5 A HYDRAULIC CALCULATIONS DESIGN PLACARD SHALL BE ATTACHED TO RISER.

10. NFPA 13 (2022) SEC. 28.1 SPRINKLER CONTRACTOR (C16) SHALL COMPLETE AND SIGN CONTRACTOR'S MATERIAL TEST CERTIFICATE FOR THE OVERHEAD SPRINKLER SYSTEM USING FORM IN FIGURE 25.1. THIS FORM SHALL BE GIVEN TO THE INSPECTOR OF RECORD (IOR) WHO WILL TURN-IN FOR DSA RECORDS.

11. NFPA 13 (2022) SEC. 28.2.3.4.1 THE MAIN DRAIN VALVE SHALL BE OPEN AND REMAIN OPEN UNTIL THE SYSTEM PRESSURE STABILIZES. THE STATIC AND RESIDUAL PRESSURES SHALL BE RECORDED IN THE CONTRACTOR'S TEST CERTIFICATE (WITNESSED BY INSPECTOR OF RECORD-IOR).

12. TITLE 19 ARTICLE 906 (a-d) A LABEL OF THE SELF-ADHESIVE TYPE SHALL BE PLACED ON THE FIRE DEPARTMENT CONNECTION OR ON THE RISER FOR THE FIRE SPRINKLER SYSTEM WITH THE DATE OF SERVICE AND/OR DATE OF INSTALLATION WAS PERFORMED AND LICENSE NUMBER OF PERSON PERFORMING SERVICE WORK.

13. ALL PENETRATIONS IN RATED WALL OR CEILING/FLOOR ASSEMBLIES WILL BE SEALED WITH AN APPROVED MATERIAL.

14. NFPA 13 (2022) SEC. 28.4 THE INSTALLING CONTRACTOR SHALL PROVIDE THE OWNER WITH A CALIFORNIA NFPA 25, 2013 CALIFORNIA EDITION.

15. ANY SUBSTITUTION OF "FLEXIBLE" TYPE PIPING IN LIEU OF "RIGID" PIPE OR ANY CHANGES TO SIZE, MANUFACTURER OR LENGTHS OF "FLEXIBLE" TYPE PIPING WILL REQUIRE RESUBMITTAL OF PIPING PLANS, PRODUCT DATA SHEETS AND HYDRAULIC CALCULATIONS TO DSA FOR REVIEW AND APPROVAL.

FIRE PROTECTION PROJECT SCOPE

DESIGN AND INSTALL NEW WET AUTOMATIC FIRE SPRINKLER SYSTEMS FOR NEW BUILDINGS

WATER SUPPLY TEST DATA

FLOW TEST LOCATION:	OUTSIDE MAIN ENTRANCE
TEST DATE:	3-28-2024
STATIC PRESSURE:	63 PSI
RESIDUAL PRESSURE:	20 PSI
FLOW:	1,698 GPM

APPLICABLE CODES

2022 CALIFORNIA ADMINISTRATION CODE , TITLE 24,CCR

2022 CALIFORNIA BUILDING CODE (PART 2, VOLUME 1 AND 2, TITLE 24) (2021 INTERNATIONAL BUILDING CODE)

2022 CALIFORNIA ELECTRICAL CODE (PART 3, TITLE 24, CCR) (2020 NATIONAL ELECTRICAL CODE)

2022 CALIFORNIA MECHANICAL CODE (PART 4, TITLE 24, CCR) (2021 UNIFORM MECHANICAL CODE)

2022 CALIFORNIA PLUMBING CODE (PART 5, TITLE 24, CCR) (2021 UNIFORM PLUMBING CODE)

2022 CALIFORNIA ELEVATOR SAFETY CONSTRUCTION CODE (PART 7, TITLE 8, CCR)

2022 CALIFORNIA FIRE CODE (PART 9, TITLE 24, CCR) (2012 INTERNATIONAL FIRE CODE)

2022 NFPA 13 - STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS

2022 CALIFORNIA GREEN BUILDING STANDARDS CODE

2022 CALIFORNIA REFERENCED STANDARDS CODE (PART 12, TITLE 24, CCR)

2019 NFPA 14 - PRIVATE FIRE MAINS

INSTALLATION OF FIRE SPRINKLER SYSTEM SHALL NOT BE STARTED UNTILL DRAWINGS, SPECIFICATIONS, CALCULATIONS, ETC. HAVE BEEN APPROVED BY DSA.

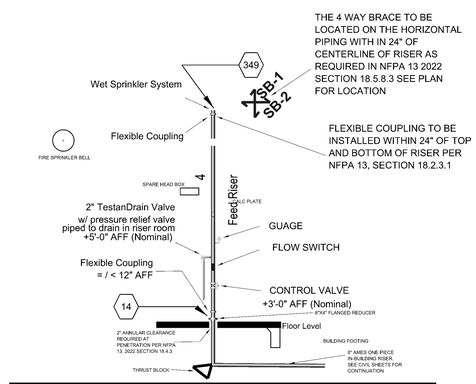
EDUCATIONAL OCCUPANCY AUTOMATIC FIRE SPRINKLER SYSTEMS:

LIGHT HAZARD: CLASSROOM, OFFICE, *AUDITORIUMS, LIBRARY READING AREAS WITHOUT HIGH STACKS

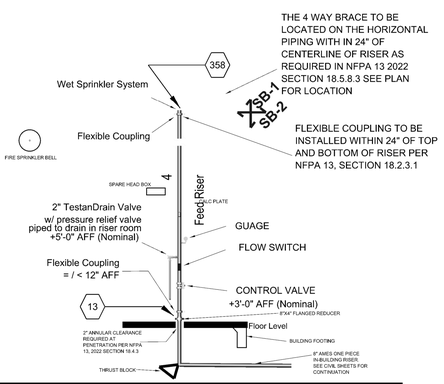
ORDINARY HAZARD GROUP I: KITCHENS, MULTI-PURPOSE ROOMS. LARGE STORAGE AREAS, STAGES (AS DEFINED IN 2022 CBC 410.2)

ORDINARY HAZARD GROUP II: SCIENCE LABS, VOCATIONAL SHOPS, STAGES 1000 SQFT IN AREA OR >50FT HIEGHT, LIBRARY READING AREAS WITH HIGH STACKS.

NFPA 13, 2022 A.4.3, A.4.3.3, A.4.3.4
*IF ALSO FUNCTIONS AS MULTI-PURPOSE ROOM, USE ORDINARY HAZARD GROUP I.



CLASSROOM Riser Detail
ELEMENTS ROTATED FOR CLARITY



TK / KINDERGARTEN Riser Detail
ELEMENTS ROTATED FOR CLARITY

VACINITY MAP

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

REVISIONS

NO.	DATE	DESCRIPTION
1		

CONTRACTOR:

REGISTERED PROFESSIONAL ENGINEER
JOSHUA J. MORO
No. M 40357
EXP 6/30/25
MECHANICAL
ELECTRICAL

NEW CLASSROOMS AT MENDOTA ELEM. SCHOOL

605 BASS AVE.
MENDOTA, CA. 95351

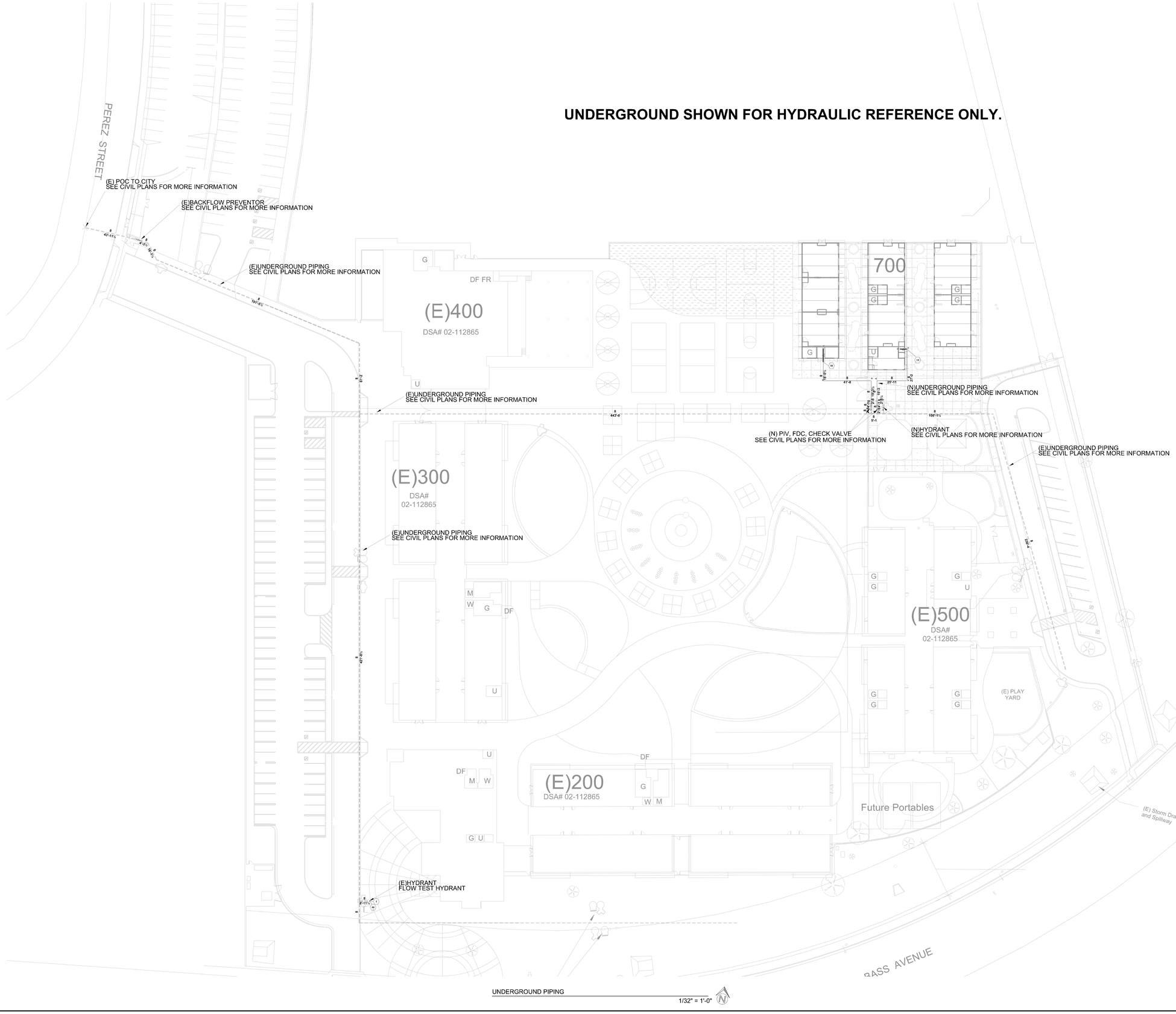
FOR REFERENCE ONLY

PFP JOB # :	202430
DATE :	12-19-2024
DRAWN BY :	ALBERT GILDING
CHECKED BY :	JOSHUA MORO NICET LEVEL IV #136133

GENERAL NOTES AND RISER DETAIL

FP-0.0

UNDERGROUND SHOWN FOR HYDRAULIC REFERENCE ONLY.



UNDERGROUND PIPING

1/32" = 1'-0"

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
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REVISIONS

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CONTRACTOR:

REGISTERED PROFESSIONAL ENGINEER
No. M 40357
EXP 6/30/25
MECHANICAL
TIMOTHY T. SUAST

FOR REFERENCE ONLY

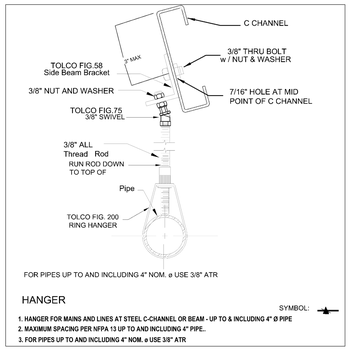
NEW CLASSROOMS AT MENDOTA ELEM. SCHOOL

605 BASS AVE.
MENDOTA, CA. 95351

PFP JOB # :	202430
DATE :	12-19-2024
DRAWN BY :	ALBERT GILDING
CHECKED BY :	JOSHUA MORO NICET LEVEL IV #136133

SITE UNDERGROUND

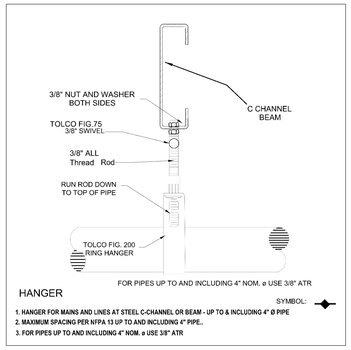
FP-0.1



HANGER

SYMBOL:

1. HANGER FOR MAINS AND LINES AT STEEL C-CHANNEL OR BEAM - UP TO & INCLUDING 4" Ø PIPE
2. MAXIMUM SPACING PER NFPA 13 UP TO AND INCLUDING 4" PIPE..
3. FOR PIPES UP TO AND INCLUDING 4" NOM. ø USE 3/8" ATR



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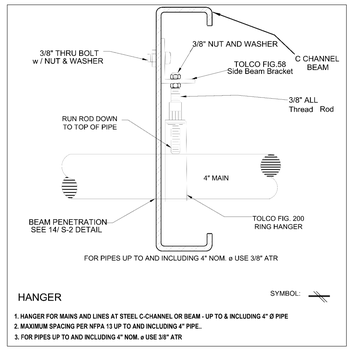

HANGER

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2. MAXIMUM SPACING PER NFPA 13 UP TO AND INCLUDING 4" PIPE..
3. FOR PIPES UP TO AND INCLUDING 4" NOM. ø USE 3/8" ATR

LATERAL BRANCH LINE RESTRAINT NOTES

1. LOCATE A RESTRAINT WITHIN 12" OF LAST BRANCHLINE HANGER.
2. WIRE USED FOR RESTRAINT SHALL BE LOCATED WITHIN 2 FT OF A HANGER.
   - THE HANGER CLOSET TO A WIRE RESTRAINT SHALL BE OF A TYPE THAT RESISTS VERTICAL MOVEMENT. [RUN ROD DOWN TO PIPE OR USE SURGE CLIP.]
3. SEE TABLE FOR MAXIMUM SPACING.

MAXIMUM SPACING BRANCH LINE RESTRAINTS (FT)
TABLE 18.6.4(a)

PIPE SIZE	SEISMIC COEFFICIENT, Cp		
	Cp < 0.50	0.5<Cp<0.71	Cp > 0.71
1 IN.	45	36	25
1 1/4 IN.	46	39	27
1 1/2 IN.	49	41	29
2 IN.	53	45	31

Ss = .894 Cp = 0.51

NFPA 13, 2022 EDITION, SECTION 18.6:

WHERE THE BRANCH LINES ARE SUPPORTED BY RODS LESS THAN 6 IN. LONG MEASURED BETWEEN THE TOP OF THE PIPE AND THE POINT OF ATTACHMENT TO THE BUILDING STRUCTURE, THE REQUIREMENTS OF 18.6.1 THROUGH 18.6.4 SHALL NOT APPLY AND ADDITIONAL RESTRAINT SHALL NOT BE REQUIRED FOR THE BRANCH LINES.

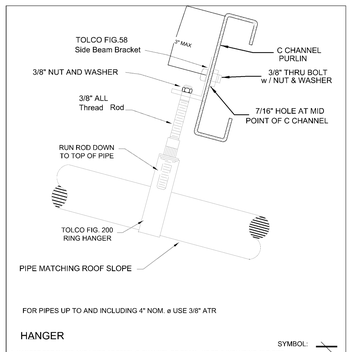
TABLE 17.2.1.1 Hanger Rod Sizes

Pipe Size		Diameter of Rod	
in.	mm	in.	mm
Up to and including 4	100	3/8	10
5	125		
6	150	1/2	13
8	200		
10	250	5/8	16
12	300	3/4	20

TABLE 17.4.2.1 (a) Maiximum Distance Between Hangers (ft-in.)

	Nominal Pipe Size (in.)											
	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Steel Pipe Except Threaded Lightwall	NA	12-0	12-0	15-0	15-0	15-0	15-0	15-0	15-0	15-0	15-0	15-0
Threaded Lightwall Steel Pipe	NA	12-0	12-0	12-0	12-0	12-0	12-0	NA	NA	NA	NA	NA
Copper tube	8-0	8-0	10-0	10-0	12-0	12-0	12-0	15-0	15-0	15-0	15-0	15-0
CPVC	5-6	6-0	6-6	7-0	8-0	9-0	9-0	NA	NA	NA	NA	NA
Ductile-Iron Pipe	NA	NA	NA	NA	NA	NA	15-0	NA	15-0	NA	15-0	15-0

NA: Not applicable.



HANGER

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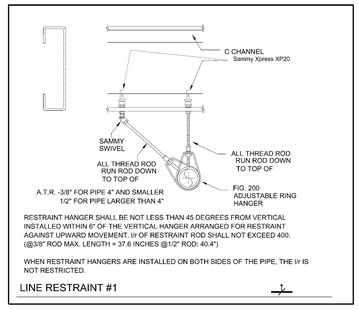
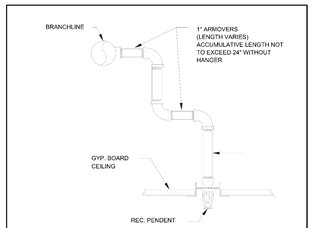


RESTRAINT HANGER SHALL BE NOT LESS THAN 45 DEGREES FROM VERTICAL INSTALLED WITHIN 6" OF THE VERTICAL HANGER ARRANGED FOR RESTRAINT AGAINST UPWARD MOVEMENT. I/r OF RESTRAINT ROD SHALL NOT EXCEED 400. (@3/8" ROD MAX. LENGTH = 37.6 INCHES @1/2" ROD: 40.4")

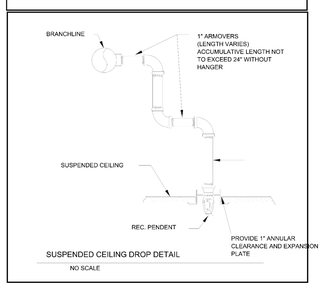
WHEN RESTRAINT HANGERS ARE INSTALLED ON BOTH SIDES OF THE PIPE, THE I/r IS NOT RESTRICTED.

LINE RESTRAINT #1



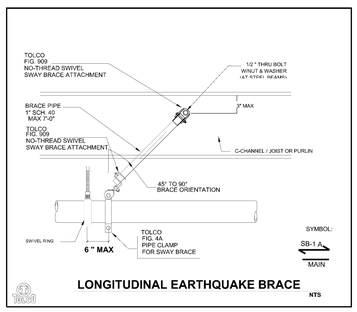
HARD LID DROP DETAIL

NO SCALE



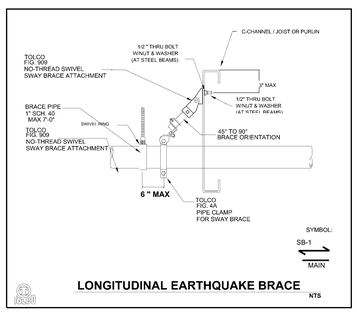
SUSPENDED CEILING DROP DETAIL

NO SCALE



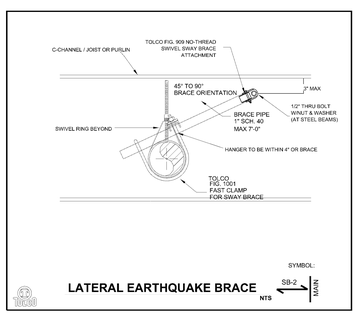
LONGITUDINAL EARTHQUAKE BRACE

NTS



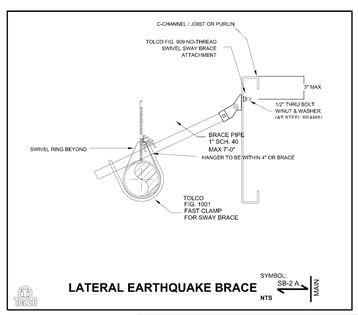
LONGITUDINAL EARTHQUAKE BRACE

NTS



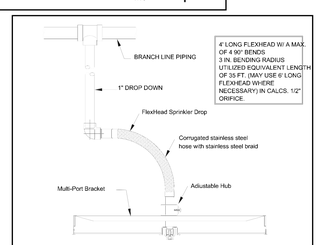
LATERAL EARTHQUAKE BRACE

NTS



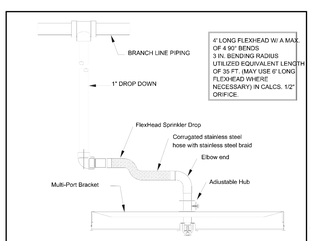
LATERAL EARTHQUAKE BRACE

NTS



STANDARD FLEX-DROP DETAIL

NO SCALE



FLEX-DROP DETAIL @ CEILING WITH MIN. CLEARANCE

NO SCALE

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

REVISIONS

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CONTRACTOR:

REGISTERED PROFESSIONAL ENGINEER
ALBERT J. GILDING
No. M 40357
EXP 6/30/25
MECHANICAL
FIRE ALARM

NEW CLASSROOMS AT MENDOTA ELEM. SCHOOL

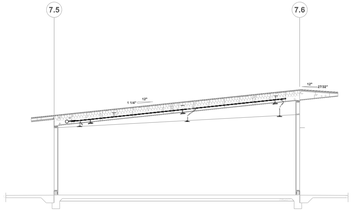
605 BASS AVE.
MENDOTA, CA. 95351

FOR REFERENCE ONLY

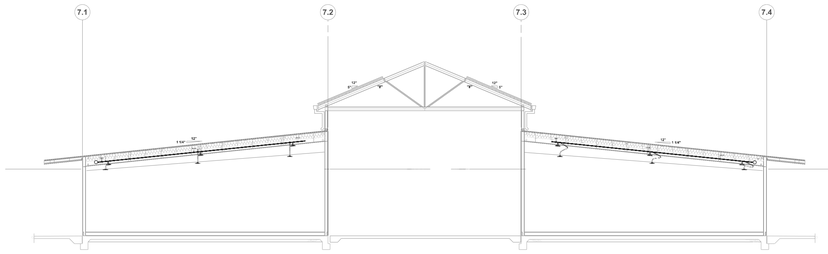
PFP JOB # :	202430
DATE :	12-19-2024
DRAWN BY :	ALBERT GILDING
CHECKED BY :	JOSHUA MORO NICET LEVEL IV #136133

HANGER, BRACING & PIPING DETAILS

FP-0.2

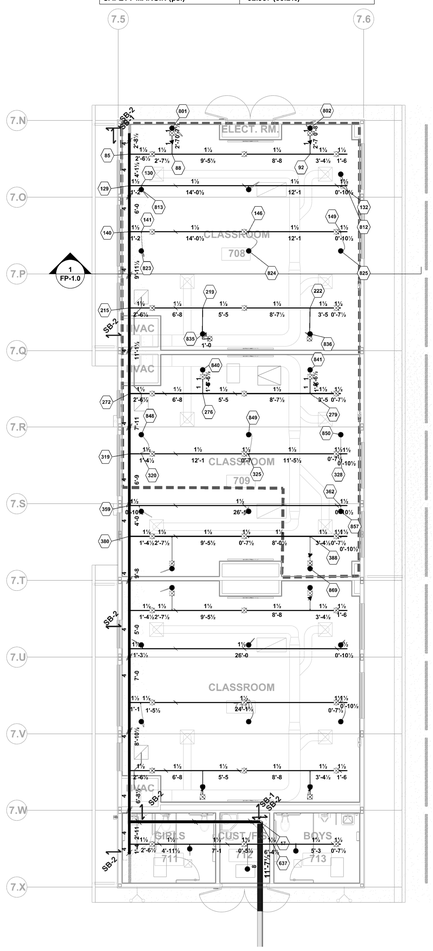


SECTION VIEW 1
TYP. CLASSROOM 1/8" = 1'-0"



SECTION VIEW 2
TK KINDERGARTEN 1/8" = 1'-0"

Hydraulic Information	
OCCUPANCY CLASSIFICATION	Light Hazard
DENSITY (gpm/ft²)	0.10 for 1500ft² (Actual 1587ft²)
TOTAL HOSE STREAMS	100.00
TOTAL HEADS FLOWING	16
K-FACTOR	5.6
TOTAL WATER REQUIRED	425.58
TOTAL PRESSURE REQUIRED	26.719
SAFETY MARGIN (psi)	+32.957 (55.2%)



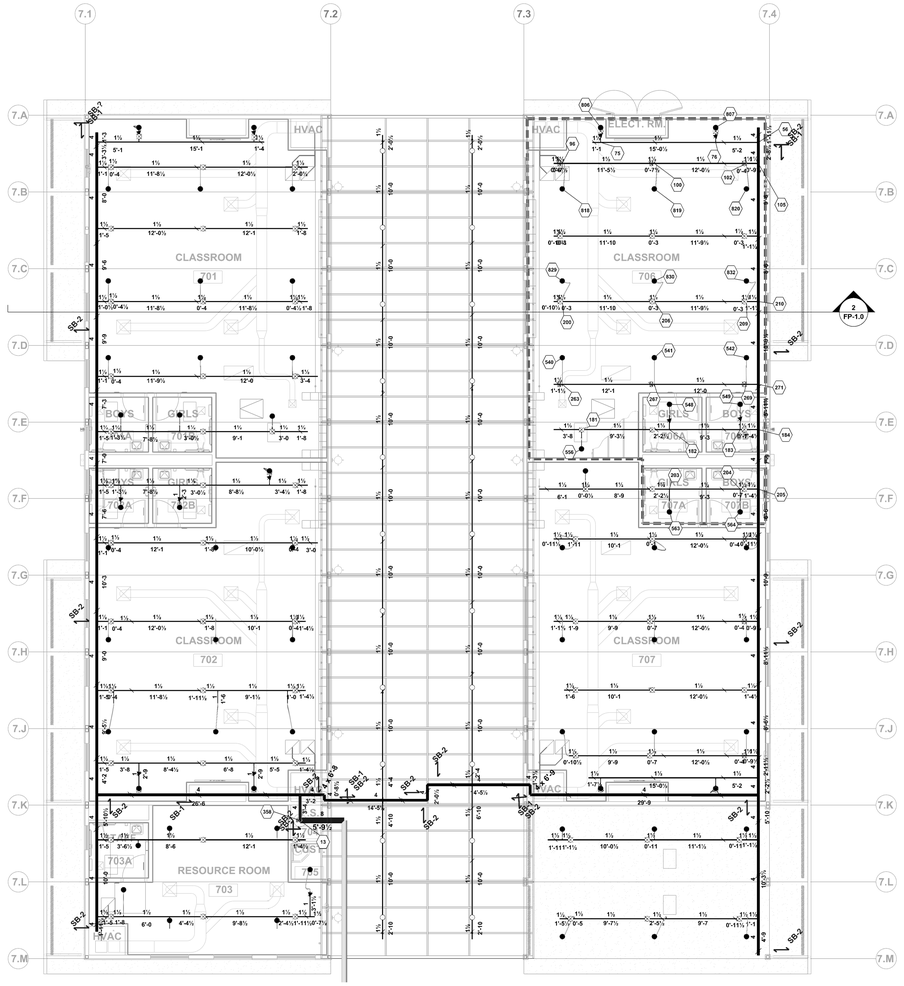
OVERHEAD PIPING PLAN
TYP. CLASSROOM 1/8" = 1'-0"

NOTE :
NON-COMBUSTIBLE, EXTERIOR CANOPY, ROOF, BALCONIES, DECK AND SIMILAR PROJECTIONS. SPRINKLER PROTECTION NOT REQUIRED UNDER PROJECTIONS IN ACCORDANCE WITH NFPA 13 SECTION 9.2.3.2

UNLESS OTHER WISE NOTED ALL BRANCHLINES TO BE HUNG WIT 6" RODS OR LESS AND SHALL NOT REQUIRE LINE RESTRAINTS PER NFPA 13 SECTION 18.6.5

Sprinkler Legend											
Symbol	Manufacturer	SIN	Model	K-Factor	Type	Size	Response	Finish	Temperature	Quantity
●	Viking	VK3021	XT1	5.6	Pendent	½	Quick	Chrome	155°F	101
○	Viking	VK3001	XT1	5.6	Upright	½	Quick	Brass	200°F	35
⊠	Viking	VK3021	XT1	5.6	Pendent	½	Quick	Brass	200°F	114
										Total = 250

Hydraulic Information	
OCCUPANCY CLASSIFICATION	Light Hazard
DENSITY (gpm/ft²)	0.10 for 1500ft² (Actual 1508ft²)
TOTAL HOSE STREAMS	100.00
TOTAL HEADS FLOWING	16
K-FACTOR	5.6
TOTAL WATER REQUIRED	381.27
TOTAL PRESSURE REQUIRED	24.881
SAFETY MARGIN (psi)	+35.406 (58.7%)



OVERHEAD PIPING PLAN
TK KINDERGARTEN 1/8" = 1'-0"

IDENTIFICATION STAMP
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REVISIONS

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CONTRACTOR:

REGISTERED PROFESSIONAL ENGINEER
JOSHUA J. SCHMIT
No. M 40357
EXP 6/30/25
MECHANICAL
FIRE PROTECTION

FOR REFERENCE ONLY

NEW CLASSROOMS AT MENDOTA ELEM. SCHOOL
605 BASS AVE.
MENDOTA, CA. 95351

PFP JOB # :	202430
DATE :	12-19-2024
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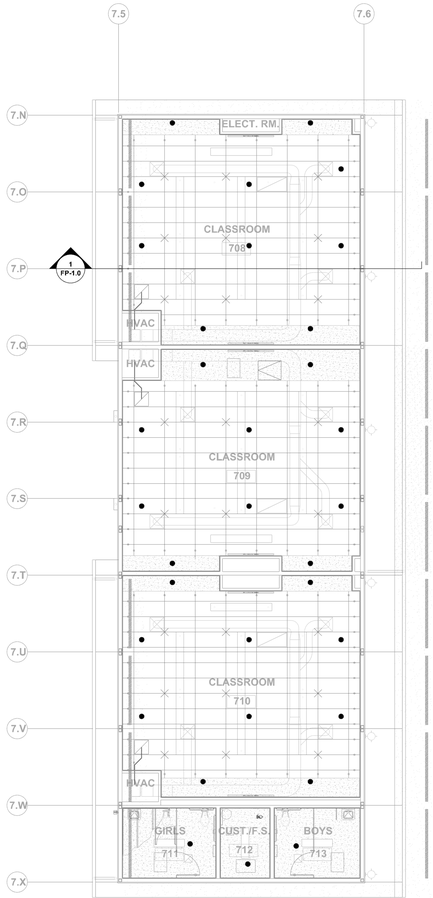
CHECKED BY :	JOSHUA MORO NICET LEVEL IV #136133

OVERHEAD PIPING PLAN & SECTIONS

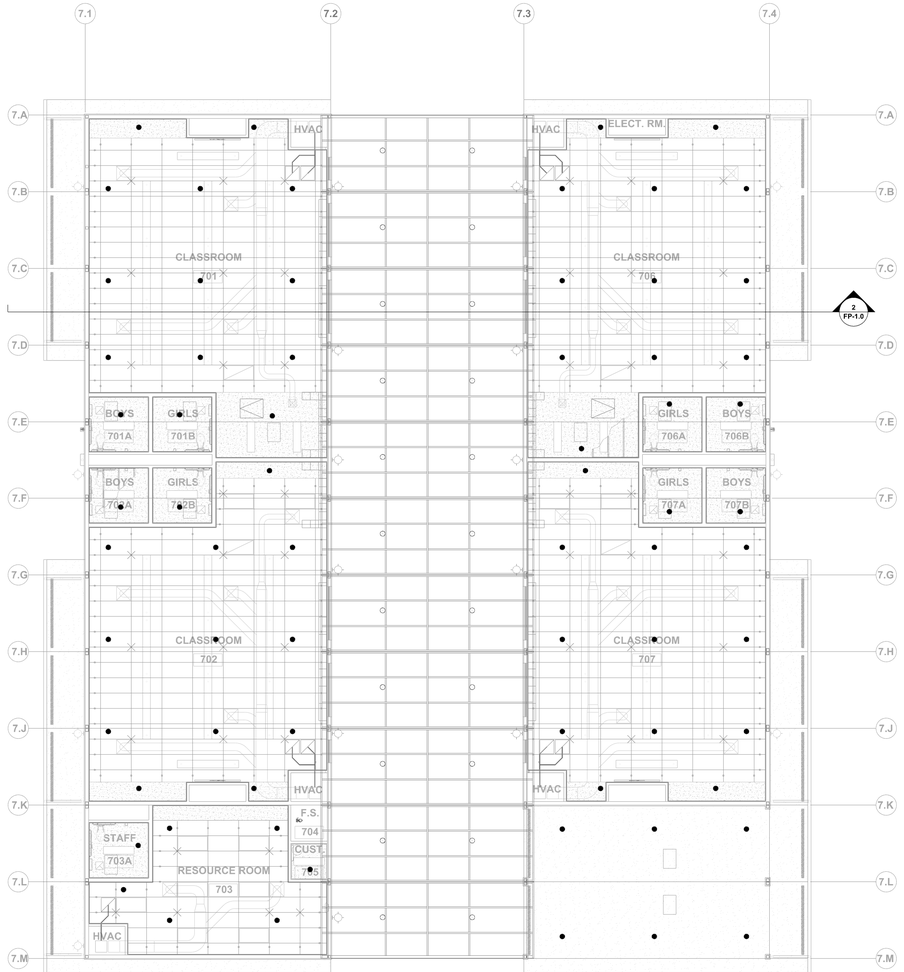
FP-1.0

NON-COMBUSTIBLE, EXTERIOR CANOPY, ROOF, BALCONIES, DECK AND SIMILAR PROJECTIONS. SPRINKLER PROTECTION NOT REQUIRED IN ACCORDANCE WITH NFPA 13 SECTION 9.2.3.2



REFLECTED CEILING PLAN
TYP. CLASSROOM 1/8" = 1'-0"

Sprinkler Legend										
Symbol	Manufacturer	SIN	Model	K-Factor	Type	Size	Response	Finish	Temperature	Quantity
●	Viking	VK3021	XT1	5.6	Pendent	½	Quick	Chrome	155°F	101
◇	Viking	VK3001	XT1	5.6	Upright	½	Quick	Brass	200°F	35
⊠	Viking	VK3021	XT1	5.6	Pendent	½	Quick	Brass	200°F	114
										Total = 250



REFLECTED CEILING PLAN
TK KINDERGARTEN 1/8" = 1'-0"

IDENTIFICATION STAMP
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DATE: 05/28/2025

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CONTRACTOR:

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY J. SCHAFF
No. M 40357
EXP 6/30/25
MECHANICAL
FIRE/ALARM/ELECTRICAL

FOR REFERENCE ONLY

NEW CLASSROOMS AT MENDOTA ELEM. SCHOOL

605 BASS AVE.
MENDOTA, CA. 95351

PFP JOB # :	202430
DATE :	12-19-2024
DRAWN BY :	ALBERT GILDING
CHECKED BY :	JOSHUA MORO NICET LEVEL IV #136133

REFLECTED CEILING PLAN

FP-2.0

DSA File No.:
10-89

DSA Application No.:
02-122955

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

KEYNOTES

1. EXISTING MAIN SWITCHBOARD "MSB". ADD NEW CIRCUIT BREAKER. SEE POWER SINGLE LINE DIAGRAM G1/X/E102.
2. EXISTING POWER CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW FEEDERS PER POWER SINGLE LINE DIAGRAM G1/X/E102.
3. EXISTING POWER VAULT, SIZE NOTED.
4. EXISTING INCREMENT 1 POWER CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW FEEDERS PER POWER SINGLE LINE DIAGRAM G1/X/E102.
5. EXISTING INCREMENT 1 POWER VAULT, SIZE NOTED.
6. PULL MANDRELS THRU EXISTING CONDUITS BACK TO MSB.
7. TRANSFORMER "MBTB" AND PRIMARY DISCONNECT. SEE G1/X/E102.
8. FREESTANDING DISTRIBUTION BOARD "7DSB". SEE G1/X/E102.
9. EXISTING INCREMENT 1 CONCRETE EQUIPMENT PAD. MAINTAIN EQUIPMENT WORKING CLEARANCES PER CEC 110.26.
10. CONNECT BUILDING PANEL. SEE G1/X/E102.
21. EXISTING ELECTRONIC SYSTEMS HEAD END ROOM: DATA, TELEPHONE, PUBLIC ADDRESS, INSTRUSION, FIRE ALARM
22. EXISTING ELECTRONIC SYSTEMS CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW CABLING PER K11/X/E102. DISCONNECT EXISTING SYSTEMS CABLES, REMOVE, ADD NEW CABLES, REPULL, AND RECONNECT AS REQUIRED.
23. EXISTING ELECTRONIC SYSTEMS VAULT, SIZE NOTED.
24. EXISTING INCREMENT 1 ELECTRONIC SYSTEMS CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW CABLES PER K11/X/E102.
25. EXISTING INCREMENT 1 DIRECTIONAL BORE SEGMENT.
26. EXISTING INCREMENT 1 ELECTRONIC SYSTEMS VAULT, SIZE NOTED.
27. EXISTING INCREMENT STUBBED UP CONDUITS AT PLYWOOD BACKBOARD.
41. EXISTING SITE POLE LIGHT SHOWN FOR REFERENCE.
42. TYPICAL BUILDING LIGHT SHOWN FOR REFERENCE. REFER TO BUILDING MANUFACTURER DRAWINGS.

REFERENCE ONLY

FOR R

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Consultant

REGISTERED PROFESSIONAL ENGINEER SCOTT DAVIDSON E17850 ELECTRICAL STATE OF CALIFORNIA

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

SITE DEVELOPMENT
SITE OVERALL ELECTRICAL PLAN
Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
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6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT ROBERT E. DARDEN No. C-30599 Exp. 6-30-26 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date

Revision

	Designed By: SD	Copyright 2025 Darden Architects
Scale: As indicated	Drawn By: EN	SD/E101
Project Number: 2277	Checked By: SD	
Date: 4/30/2025	Reviewed By: SD	Sheet: _____ of: _____

A1
1" = 30'-0"
Site Overall Electrical Plan

4/30/2025 11:12:05 AM
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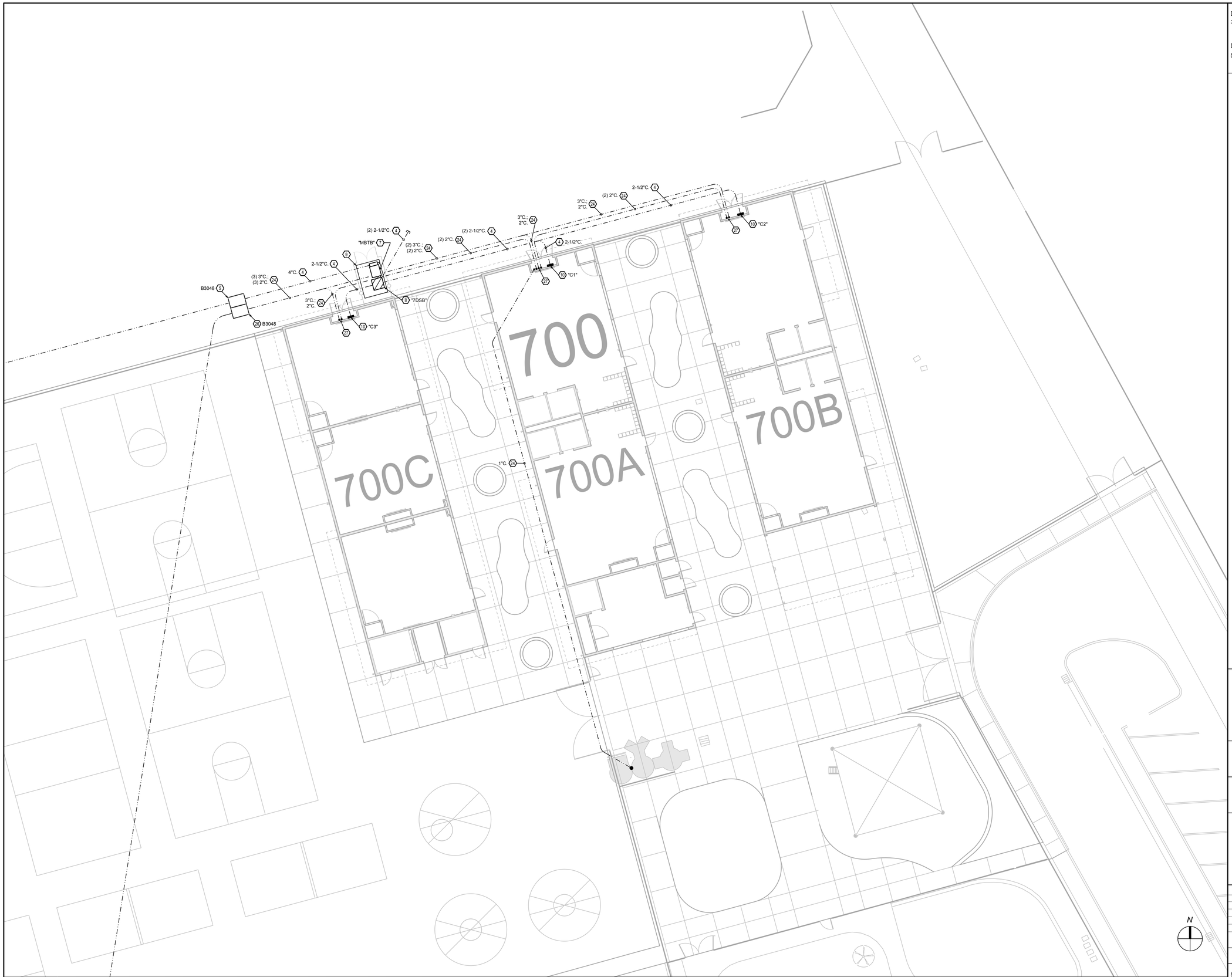

DSA File No.:
10-89

DSA Application No.:
02-122955

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DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

KEYNOTES

1. EXISTING MAIN SWITCHBOARD "MSB". ADD NEW CIRCUIT BREAKER. SEE POWER SINGLE LINE DIAGRAM G1/XE102.
2. EXISTING POWER CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW FEEDERS PER POWER SINGLE LINE DIAGRAM G1/XE102.
3. EXISTING POWER VAULT, SIZE NOTED.
4. EXISTING INCREMENT 1 POWER CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW FEEDERS PER POWER SINGLE LINE DIAGRAM G1/XE102.
5. EXISTING INCREMENT 1 POWER VAULT, SIZE NOTED.
6. PULL MANDRELS THRU EXISTING CONDUITS BACK TO MSB.
7. TRANSFORMER "MBTB" AND PRIMARY DISCONNECT. SEE G1/XE102.
8. FREESTANDING DISTRIBUTION BOARD "7DSB". SEE G1/XE102.
9. EXISTING INCREMENT 1 CONCRETE EQUIPMENT PAD. MAINTAIN EQUIPMENT WORKING CLEARANCES PER CEC 110.26.
10. CONNECT BUILDING PANEL. SEE G1/XE102.
21. EXISTING ELECTRONIC SYSTEMS HEAD END ROOM: DATA, TELEPHONE, PUBLIC ADDRESS, INSTRUSION, FIRE ALARM
22. EXISTING ELECTRONIC SYSTEMS CONDUITS, QUANTITY AND SIZES NOTED. PULL NEW CABLING PER K11/XE102. DISCONNECT EXISTING SYSTEMS CABLES, REMOVE, ADD NEW CABLES, REPULL, AND RECONNECT AS REQUIRED.
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Scale: As indicated	Drawn By: EN	SD/E102
Project Number: 2277	Checked By: SD	Sheet: ____ of: ____
Date: 4/30/2025	Reviewed By: SD	

A1
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Site Electrical Plan

4/30/2025 11:12:06 AM
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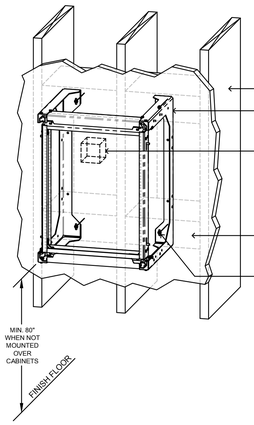
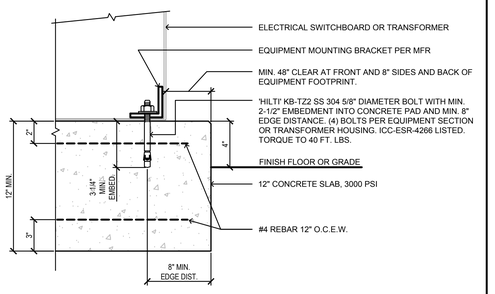


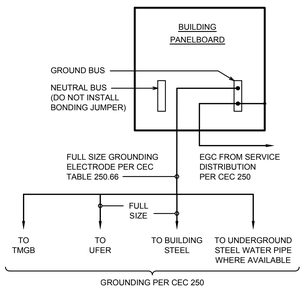
M1 — IDF Wall Rack Mounting Detail

No Scale



N5 — Switchgear Mounting Detail

No Scale

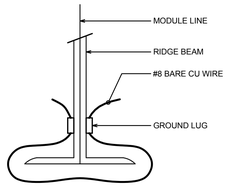


J5 — Modular Building Panel Grounding Detail

No Scale

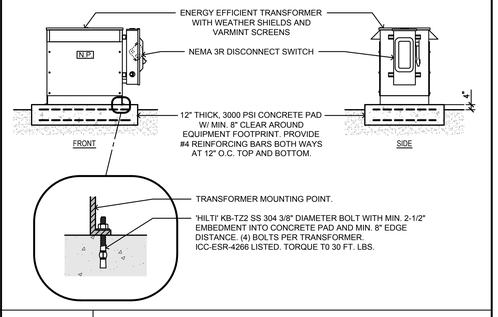
E5 — Transformer Grounding Detail

No Scale



A1 — Building Module Bonding Detail

No Scale



A5 — Transformer Pad Mounting Detail

No Scale

ELECTRICAL GENERAL NOTES

1. ALL WORK SHALL MEET THE LATEST ADOPTED ADDITIONS OF THE CALIFORNIA CODE OF REGULATIONS, TITLE 24 AND ALL OTHER APPLICABLE REGULATIONS, WHICH INCLUDE:

CALIFORNIA BUILDING CODE	2022
CALIFORNIA ELECTRICAL CODE	2022
NON RESIDENTIAL CEC ENERGY STANDARDS	2022

2. NOTHING IN THE PLANS OR SPECIFICATIONS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES.
3. IT IS THE INTENTION OF THESE PLANS AND SPECIFICATIONS TO COVER EVERYTHING REQUIRED TO PROVIDE FOR COMPLETE AND OPERATIVE SYSTEMS. THE CONTRACTOR IS TO FURNISH LABOR, MATERIAL, TRANSPORTATION, EQUIPMENT, MISCELLANEOUS SERVICES, ETC. REQUIRED TO ACCOMPLISH THIS RESULT, ANYTHING WHICH MAY BE REASONABLY CONSTRUED AS A NECESSARY PART OF THE INSTALLATION IS TO BE INCLUDED, WHETHER OR NOT SPECIFICALLY SHOWN OR MENTIONED.
4. THE CONTRACTOR SHALL EXAMINE THE SITE AND EXISTING CONDITIONS AND MAKE ALLOWANCES IN THE BID FOR ANY CONDITIONS NOT SHOWN ON THE ELECTRICAL DOCUMENTS.
5. THE PLANS AND SPECIFICATIONS ARE INTENDED TO BE USED AS CONSTRUCTION GUIDELINES AND ARE NOT THE TOTAL INSTRUMENT OF CONTRACT DOCUMENTS. IT IS NOT THE INTENTION OF ANY CONSTRUCTION PLANS TO DIVIDE WORK AMONG DIFFERENT TRADES. VERIFY THE SCOPE OF WORK WITH THE ARCHITECT AND THE GENERAL CONTRACTOR.
6. ELECTRICAL ROUTING IS DIAGRAMMATIC ONLY. ACTUAL ROUTING & PHYSICAL CONDITIONS MAY VARY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE ACTUAL ROUTING, CONNECTIONS, & PROVISION OF ALL APPURTENANCES NECESSARY FOR A COMPLETE & OPERATING SYSTEM.
7. ELECTRICAL EQUIPMENT SHALL HAVE AN APPROVED TESTING LABORATORY LABEL ATTACHED (UL, CSA ETC.) PER CEC 110.2.
8. PROVIDE LABELING AND DIRECTORIES FOR ALL SWITCHBOARDS AND PANELBOARDS PER CEC 408.4.
9. ELECTRICAL EQUIPMENT SHALL HAVE A SHORT CIRCUIT CURRENT RATING CAPABLE OF WITHSTANDING THE AVAILABLE SHORT CIRCUIT CURRENT PER CEC 110.9.
10. PROVIDE MINIMUM 30" WIDE x 78" HIGH x 36" DEEP [42" DEEP] WORK CLEARANCES IN FRONT OF PANELS, SERVICE OR EQUIPMENT RATED AT 120/208V 3Ø 4W [277/480V 3Ø 4W] PER CEC 110.26.
11. ELECTRICAL RECEPTACLE OUTLETS ON BRANCH CIRCUIT OF 30 AMPERES OR LESS AND COMMUNICATION SYSTEM RECEPTACLES SHALL BE MOUNTED BETWEEN 15" AFF AND 48" AFF AND SHALL COMPLY WITH CBC SECTION 11B-308. THE LOW REACH SHALL BE MEASURED TO THE BOTTOM OF THE OUTLET BOX AND THE HIGH REACH SHALL BE MEASURED TO THE TOP OF THE OUTLET BOX. IF THE REACH IS OBSTRUCTED (E.G. BY CASEWORK, COUNTERS, ETC.), RECEPTACLES SHALL BE LOCATED WITHIN THE REACH RANGES SPECIFIED IN CBC 11B-308.2.2 AND 11B-308.3.2.
12. CONTROLS AND SWITCHES INTENDED TO BE USED BY THE OCCUPANT OF A ROOM OR AREA TO CONTROL LIGHTING AND RECEPTACLE OUTLETS, APPLIANCES, OR COOLING, HEATING AND VENTILATING EQUIPMENT SHALL BE MOUNTED BETWEEN 15" AFF AND 48" AFF AND SHALL COMPLY WITH CBC SECTION 11B-308. THE LOW REACH SHALL BE MEASURED TO THE BOTTOM OF THE OUTLET BOX AND THE HIGH REACH SHALL BE MEASURED TO THE TOP OF THE OUTLET BOX. IF THE REACH IS OBSTRUCTED (E.G. BY CASEWORK, COUNTERS, ETC.), SWITCHES AND CONTROLS SHALL BE LOCATED WITHIN THE REACH RANGES SPECIFIED IN CBC 11B-308.2.2 AND 11B-308.3.2.
13. ALL WALL AND SURFACE MOUNTED FIXTURES PROTRUDING IN THE PATH OF TRAVEL (POT) OR COMMON PEDESTRIAN WAYS SHALL COMPLY WITH CBC 11B-307.2, OR SHALL BE MOUNTED LESS THAN 27" AFF OR GREATER THAN 80" AFF, OR SHALL BE PROVIDED WITH A BARRIER CONFORMING TO CBC 11B-307.4.
14. EMERGENCY EGRESS LIGHTING SHALL PROVIDE A MINIMUM LUMINANCE OF 1 FOOTCANDLE AT THE WALKING SURFACE FOR A MINIMUM OF 90 MINUTES.
15. FIRE ALARM EQUIPMENT SHALL BE SERVED BY DEDICATED FIRE ALARM BRANCH CIRCUITS PER NFPA 72 10.6.5.1.2. THE CIRCUIT NUMBER SHALL BE PERMANENTLY IDENTIFIED AT THE FIRE ALARM EQUIPMENT PER NFPA 10.6.5.2.1. THE CIRCUIT BREAKER SHALL BE EQUIPPED WITH RED HANDLE AND LOCK-ON DEVICE, AND PERMANENTLY IDENTIFIED AS "FIRE ALARM CIRCUIT" PER NFPA 72 10.6.5.2.2, 10.6.5.2.3, 10.6.5.2.4, AND 10.6.5.4.
16. WIRING FOR 120/208V AND 277/480V SYSTEMS SHALL BE MIN. #12 AWG THWN/THWN COPPER.
17. FEEDERS SIZE #4 AND LARGER SHALL BE MEGGER TESTED. TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER.
18. COLORS/FINISHES/MATERIALS FOR ALL ELECTRICAL DEVICES, PLATES, LIGHT FIXTURES, ETC. SHALL BE CHOSEN BY THE ARCHITECT.
19. PROVIDE PERMANENT LOCK-OPEN DEVICES ON CIRCUIT BREAKERS SERVING ELECTRIC WATER HEATERS TO MEET THE REQUIREMENTS OF CEC 422.31.
20. CONTRACTOR SHALL EXTEND ALL SIGNAL AND FIRE ALARM SYSTEMS AS REQUIRED. MODIFY HEAD-IN EQUIPMENT TO ACCOMMODATE NEW DEVICES AS REQUIRED. VERIFY THE CONDITION AND EXPANDABILITY OF ALL HEAD-IN EQUIPMENT PRIOR TO BID AND MODIFY ACCORDINGLY.
21. CALL USA UNDERGROUND ALERT AND VERIFY WITH DISTRICT THE DESIRED ROUTING AND LOCATIONS OF UNDERGROUND CONDUITS AND STRUCTURES PRIOR TO TRENCHING.
22. EXISTING EQUIPMENT TO BE REMOVED AND/OR REPLACED SHALL BE DELIVERED TO THE DISTRICT MAINTENANCE DEPARTMENT OR DISPOSED OF, AT THE DISCRETION OF THE DISTRICT.
23. ALL CONDUITS UNDER CONCRETE OR ASPHALT WILL HAVE 24" MINIMUM COVER OF ROCK FREE NATIVE SOIL, METALLIC WARNING TAPE AT 12", AND NO ENCASEMENT REQUIRED. ALL CONDUITS THAT HAVE CONDUCTORS WITH A POTENTIAL OF 250 VOLT TO GROUND OR GREATER, THAT ARE NOT UNDER ASPHALT AND/OR CONCRETE SHALL REQUIRE 1,500 PSI CONCRETE ENCASEMENT, METALLIC WARNING TAPE AT 12", AND A MINIMUM COVER FROM TOP OF ENCASEMENT OF 24". ALL CONDUITS THAT HAVE CONDUCTORS WITH A POTENTIAL OF LESS THAN 250 VOLTS TO GROUND, THAT ARE NOT UNDER ASPHALT AND/OR CONCRETE WILL HAVE 30" MINIMUM COVER OF NATIVE SOIL, METALLIC WARNING TAPE AT 12" AND NO ENCASEMENT REQUIRED.
24. INSTALL GALVANIZED RIGID STEEL RISERS & ELBOWS WHERE THEY OCCUR. WRAP GALVANIZED RIGID STEEL BELOW GRADE. PVC SHALL NOT BE INSTALLED ABOVE GRADE.
25. CONDUIT INSTALLED ABOVE GRADE SHALL BE MIN. 3/4" TRADE SIZE. CONDUIT BELOW GRADE SHALL BE MIN. 1" TRADE SIZE.
26. PROVIDE (4) 1" CONDUIT STUBS FROM NEW ELECTRICAL PANEL TO ACCESSIBLE ATTIC SPACE FOR FUTURE USE.
27. CIRCUIT BREAKERS SERVING FIRE ALARM EQUIPMENT SHALL HAVE A RED HANDLE AND LOCK-ON DEVICE.
28. HOLES ARE NOT ALLOWED THROUGH TOP PLATES OF BEARING WALLS AND SHEAR WALLS.
29. INCLUDE FIRE STOP SYSTEMS REQUIRED FOR ALL WORK AFFECTED BY FIRE RATED ASSEMBLIES.
30. INCLUDE ALL WORK REQUIRED TO INVESTIGATE, DEMOLISH, & RECONNECT EXISTING ITEMS.

ELECTRICAL SYMBOL SCHEDULE

SYMBOL	DESCRIPTION	NOTES
	POLE WITH POST TOP AREA LUMINAIRE	
	POLE WITH SINGLE AREA LUMINAIRE	
	POLE WITH DOUBLE AREA LUMINAIRES	
	LAY-IN LIGHT FIXTURE	
	FIXTURE ON EMERGENCY POWER	PROVIDE UNSWITCHED HOT CONDUCTOR
	SURFACE CEILING LIGHT	
	RECESSED DOWN LIGHT	
	WALL LIGHT	
$	SWITCH AT +48" AFF TO TOP OF BOX	20A 277V QUIET TOGGLE
	WALL MOUNTED DUAL TECH OCCUPANCY SENSOR SWITCH, 0-10V DIMMING, AT +48" AFF TO TOP OF BOX	ROUGH IN WITH 1G BOX PER SWITCH W/ RING, 1°C. TO ACCESSIBLE ATTIC SPACE
	DIGITAL DIMMER SWITCH, AT +48" AFF TO TOP OF BOX	nLIGHT SYSTEM, ROUGH IN WITH 1G BOX & RING, 1°C. TO ACCESSIBLE ATTIC
	SWITCHBOARD	REFER TO POWER SINGLE LINE DIAGRAM
	POWER PANEL	REFER TO PANEL SCHEDULE
	TERMINAL CABINET	REFER TO DETAIL N5/X/E101
	JUNCTION BOX	4-11/16" SQUARE BOX & COVER PLATE MIN.
	DISCONNECT SWITCH, FUSIBLE	DISCONNECT FUSING TO BE PER NAMEPLATE DATA.
	COMBINATION STARTER/DISCONNECT SWITCH	REFER TO MECH. PLANS & SPECS.
	MOTOR	REFER TO MECH. PLANS & SPECS.
	DUPLEX CONVENIENCE OUTLET AT +15" AFF TO BOTTOM OF BOX, U.O.N.	20A SPEC. GRADE, NEMA GROUNDED TAMPER RESISTANT, LEVITON #TDR20-W
	QUADPLEX CONVENIENCE OUTLET AT +15" AFF TO BOTTOM OF BOX, U.O.N.	20A SPEC. GRADE, NEMA GROUNDED TAMPER RESISTANT, LEVITON #TDR20-W
	GFI DUPLEX OUTLET AT +15" AFF TO BOTTOM OF BOX, U.O.N.	20A SPEC. GRADE, NEMA GROUNDED TAMPER RESISTANT, LEVITON #GFTR2-W
	WEATHERPROOF, GFI DUPLEX OUTLET AT +15" AFF TO BOTTOM OF BOX, U.O.N. W/ WEATHERPROOF IN-USE, METAL, LOCKABLE TYPE COVER	20A SPEC. GRADE, NEMA GROUNDED TAMPER RESISTANT, LEVITON #GFTR2-W
	DATA OUTLET (RJ-45 CAT6) WITH 2 JACKS AT +18" AFF, U.O.N. (2) DATA JACKS, U.O.N.	MOUNT JACKS IN NON-METALLIC, SURFACE RACEWAY SYSTEM
	(2) DATA JACKS (RJ-45 CAT6A) FOR WIRELESS ACCESS POINT MOUNTED IN ATTIC SPACE	REFER TO DETAIL E11/X/E102
	WALL MOUNT TELEPHONE OUTLET (RJ-45 CAT6) AT +48" AFF, U.O.N. (1) DATA JACK, U.O.N.	MOUNT JACK IN NON-METALLIC, SURFACE RACEWAY SYSTEM. PROVIDE "T" TELEPHONE CABLE TO BUILDING T.C.
	PUBLIC ADDRESS SPEAKER ATLAS 8" SPEAKER AND SURFACE HOUSING	PROVIDE "P" SPEAKER CABLE TO BUILDING T.C.
WP	WP OUTDOOR IP PUBLIC ADDRESS SPEAKER, WALL MOUNTED, +120" U.O.N. ATLAS OUTDOOR SPEAKER AND VANDAL HOUSING	PROVIDE "P" SPEAKER CABLE TO BUILDING T.C.
	WIRELESS CLOCK, WALL MOUNTED SAPLING #SAL-4BS-12R-0 W/ (2) D-CELL BATTERIES	
MDF	"MAIN DISTRIBUTION FRAME"	EXISTING
IDF	"INTERMEDIATE DISTRIBUTION FRAME"	SEE STANDARD SPECIFICATIONS
PA	P.A. SYSTEM HEAD END	EXISTING
TEL	TEL. SYSTEM HEAD END	EXISTING
EMS	ENERGY MANAGEMENT SYSTEM PUNCH BLOCK	SEE STANDARD SPECIFICATIONS
PB	PUNCH BLOCK	SEE STANDARD SPECIFICATIONS
TB	TERMINAL BLOCK	SEE STANDARD SPECIFICATIONS
FCP	FIRE ALARM CONTROL PANEL	SEE FIRE ALARM PLANS
	WIREMOLD 5400 SURFACE WIREWAY	RISERS WHERE INDICATED ON DRAWINGS
	EXISTING CONDUIT/WIRING	
	WIRING IN CONDUIT, BELOW GRADE	1" CONDUIT MIN.
	WIRING IN CONDUIT, IN WALL OR CEILING	3/4" CONDUIT MIN.; EMT CONCEALED AND ABV. 96" EXPOSED; GRS BELOWS 96" EXPOSED.
LV	LOW VOLTAGE WIRING IN ATTIC SPACE	TYPE PER EQUIPMENT MANUFACTURER
	CONDUIT RISER	3/4" CONDUIT MIN.
	FLEXIBLE CONDUIT	3/4" CONDUIT MIN.
	CONDUIT STUB AND CAP	3/4" CONDUIT MIN.
#10	HASH MARKS DENOTES QTY. OF CONDUCTORS WIRE SIZE INDICATED, IF OTHER THAN #12 AWG	3/4" CONDUIT MIN.
A-15	HOME RUN (TO PANEL "A", CIRCUIT "15")	3/4" CONDUIT MIN.
(E)	"EXISTING"	
(N)	"NEW"	
U.O.N.	"UNLESS OTHERWISE NOTED"	
WP	"WEATHERPROOF" / NEMA 3R	
GFI	"GROUND FAULT INTERRUPTER"	

DSA File No.: *10-89*

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REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

MEP COMPONENT ANCHORAGE NOTES

ALL MECHANICAL, PLUMBING, AND ELECTRICAL COMPONENTS SHALL BE ANCHORED AND INSTALLED PER THE DETAILS ON THE DSA-APPROVED CONSTRUCTION DOCUMENTS. THE FOLLOWING COMPONENTS SHALL BE ANCHORED OR BRACED TO MEET THE FORCE AND DISPLACEMENT REQUIREMENTS PRESCRIBED IN THE 2022 CBC SECTIONS 1[illegible] THROUGH 1617A.1.26 AND ASCE 7-16 CHAPTERS 13, 26, AND 30:

1. ALL PERMANENT EQUIPMENT AND COMPONENTS.
2. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT THAT IS PERMANENTLY ATTACHED (E.G., HARD WIRED) TO THE BUILDING UTILITY SERVICES SUCH AS ELECTRICITY, GAS OR WATER. "PERMANENTLY ATTACHED" SHALL INCLUDE ALL ELECTRICAL CONNECTIONS EXCEPT PLUGS FOR 15/125 VOLT RECEPTACLES HAVING A FLEXIBLE CORD CABLE.
3. TEMPORARY, MOVABLE OR MOBILE EQUIPMENT WHICH IS HEAVIER THAN 400 POUNDS OR HAS A CENTER OF MASS LOCATED 4 FEET OR MORE ABOVE THE ADJACENT FLOOR OR ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT IS REQUIRED TO BE RESTRAINED IN A MANNER APPROVED BY DSA.

THE FOLLOWING MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE POSITIVELY ATTACHED TO THE STRUCTURE BUT NEED NOT DEMONSTRATE DESIGN COMPLIANCE WITH THE REFERENCES NOTED ABOVE. THESE COMPONENTS SHALL HAVE FLEXIBLE CONNECTIONS PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING, AND CONDUIT. FLEXIBLE CONNECTIONS MUST ALLOW MOVEMENT IN BOTH TRANSVERSE AND LONGITUDINAL DIRECTIONS:

A. COMPONENTS WEIGHING LESS THAN 400 POUNDS AND HAVING A CENTER OF MASS LOCATED 4 FEET OR LESS ABOVE THE ADJACENT FLOOR OR A ROOF LEVEL THAT DIRECTLY SUPPORT THE COMPONENT.
B. COMPONENTS WEIGHING LESS THAN 20 POUNDS, OR IN THE CASE OF DISTRIBUTED SYSTEMS, LESS THAN 5 POUNDS PER FOOT, WHICH ARE SUSPENDED FROM A ROOF OR FLOOR OR HUNG FROM A WALL.

THE ANCHORAGE OF ALL MECHANICAL, ELECTRICAL AND PLUMBING COMPONENTS SHALL BE SUBJECT TO THE APPROVAL OF THE DESIGN PROFESSIONAL IN GENERAL RESPONSIBLE CHARGE OR STRUCTURAL ENGINEER DELEGATED RESPONSIBILITY AND ACCEPTANCE BY DSA. THE PROJECT INSPECTOR WILL VERIFY THAT ALL COMPONENTS AND EQUIPMENT HAVE BEEN ANCHORED IN ACCORDANCE WITH THE ABOVE REQUIREMENTS.

MEP DISTRIBUTION SYSTEM BRACING NOTES FOR ELECTRICAL CONDUIT

PIPING, DUCTWORK, AND ELECTRICAL DISTRIBUTION SYSTEMS SHALL BE BRACED TO COMPLY WITH THE FORCES AND DISPLACEMENTS PRESCRIBED IN ASCE 7 SECTION 13.3 AS DEFINED IN ASCE 7 SECTIONS 13.6.5, 13.6.7, AND 13.6.8; AND 2022 CBC, SECTIONS 1617A.1.24, 1617A.1.25 AND 1617A.1.26.

THE METHOD OF SHOWING BRACING AND ATTACHMENTS TO THE STRUCTURE FOR THE IDENTIFIED DISTRIBUTION SYSTEM ARE AS NOTED BELOW AND SHALL BE IN ACCORDANCE WITH DSA IR 16-13. EACH SHALL BE DESIGNED BY A STRUCTURAL ENGINEER AND COORDINATED WITH THE STRUCTURAL BUILDING DESIGN.

MECHANICAL PIPING (MP), MECHANICAL DUCTS (MD), PLUMBING PIPING (PP), ELECTRICAL DISTRIBUTION SYSTEMS (E):

MP ☐ MD ☐ PP ☐ E ■ IR 16-13 SECTION 2.1: PROJECT-SPECIFIC DESIGN.

MP ☐ MD ☐ PP ☐ E ☐ IR 16-13 SECTION 2.2: DESIGN BASED ON OSHPD OPM, PART OF THE PROJECT SUBMITTAL.

MP ☐ MD ☐ PP ☐ E ☐ IR 16-13 SECTION 2.2.6: DESIGN BASED ON OSHPD OPM, DEFERRED APPROVAL.

FOR REFERENCE ONLY

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TYPICAL INFORMATION
ELECTRICAL SYSTEMS - SYMBOLS, NOTES, AND DETAILS
Drawing

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Revision

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Scale: As indicated	Drawn By: EN	*X/E101*	
Project Number: 2277	Checked By: SD		
Date: 4/30/2025	Reviewed By: SD	Sheet: ____ of: ____	

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KEYNOTES

1. PROVIDE NEW CIRCUIT BREAKER AND MOUNTING HARDWARE.
2. TRANSFORMER 'MBTB', 225kVA, 480/240/120V 3Ø 4W, NEMA 3R. PAD MOUNTED. SEE DETAIL A5/X/E101.
3. GROUND TRANSFORMER PER DETAIL E5/X/E101.
4. PAD MOUNT DISTRIBUTION BOARD PER DETAIL N5/X/E101.
5. PANELBOARD PRE-INSTALLED BY BUILDING MANUFACTURER.
6. GROUND PANELBOARD PER DETAIL J5/X/E101. BOND INDIVIDUAL BUILDING MODULES TOGETHER PER DETAIL A1/X/E101.

FEEDERS

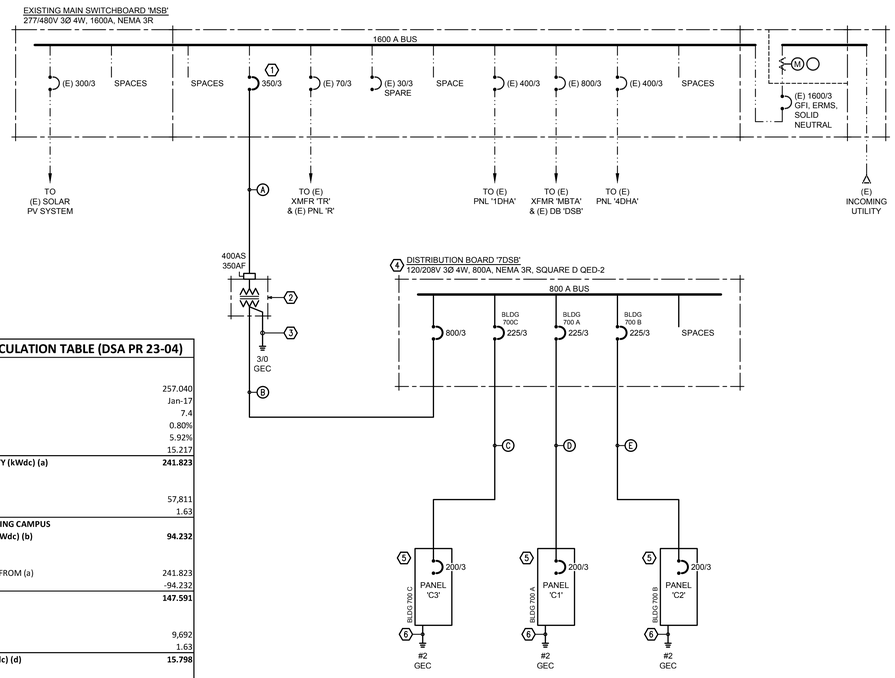
A. 4"C. (3) 600kCMIL, (1) #2 GND.

B. (2) SETS: 4"C. (4) 600kCMIL, (1) 3/0 SSBJ.

C. 2-1/2"C. (4) 4/0, (1) #4 GND.

D. 2-1/2"C. (4) 4/0, (1) #4 GND.

E. 2-1/2"C. (4) 4/0, (1) #4 GND.



CAMPUS PV SYSTEM CALCULATION TABLE (DSA PR 23-04)

CALCULATION (a)	
SYSTEM SIZE (kWdc):	257.040
INSTALLED:	Jan-17
AGE (YEARS):	7.4
ANNUAL DEGRADATION:	0.80%
TOTAL DEGRADATION:	5.92%
KW DEGRATION (kWdc):	15.217
EXISTING CAMPUS PV SYSTEM CAPACITY (kWdc) (a)	**241.823**
CALCULATION (b)	
EXISTING CAMPUS SQ. FT.	57,811
SOLAR kWdc PER SQ. FT	1.63
EQUIVALENT CALCULATED TOTAL EXISTING CAMPUS PHOTOVOLTAIC DIRECT CURENT SIZE (kWdc) (b)	**94.232**
CALCULATION (c)	
EXISTING CAMPUS PV CAPACITY (kWdc) FROM (a)	241.823
EQUIVALENT CAMPUS (kWdc) FROM (b)	-94.232
EXCESS CAMPUS POWER (kWdc) (c)	**147.591**
CALCULATION (d)	
NEW BUILDINGS SQ. FT.	9,692
SOLAR kWdc PER SQ. FT	1.63
NEW BUILDING REQUIRED PV SIZE (kWdc) (d)	**15.798**
CALCULATION (f)	
EXCESS CAMPUS POWER (kWdc) FROM (c)	147.591
NEW BUILDING REQUIRED PV SIZE (kWdc) FROM (d)	-15.798
FINAL SURPLUS CAMPUS POWER (kWdc) (f)	**131.793**

G1	Power Single Line Diagram
No Scale	

SYSTEMS CABLE SCHEDULE

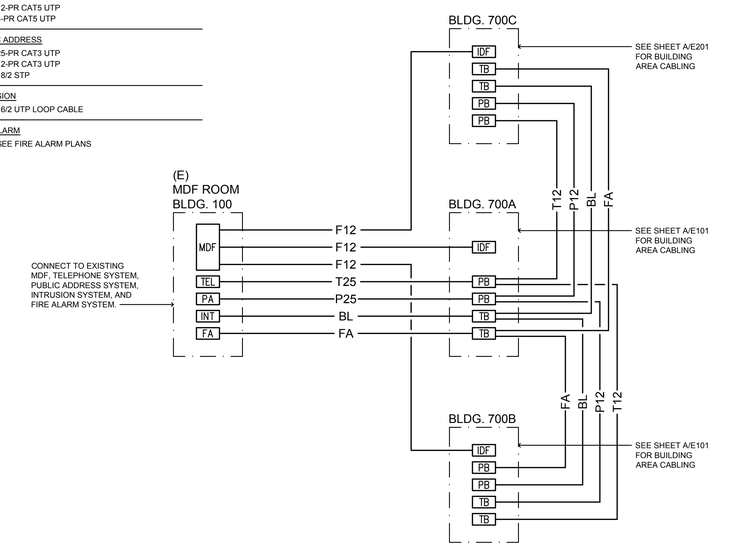
LOCAL AREA NETWORK
F12 12-STR SM FIBER OPTIC CABLE

TELEPHONE
T25 25-PR CAT5 UTP
T12 12-PR CAT5 UTP
T 4-PR CAT5 UTP

PUBLIC ADDRESS
P25 25-PR CAT3 UTP
P12 12-PR CAT3 UTP
P 18/2 STP

INTRUSION
BL 16/2 UTP LOOP CABLE

FIRE ALARM
FA SEE FIRE ALARM PLANS



K11	Site Electronic Systems Cabling Line Diagram
No Scale	

NOTES:

1. CONTRACTOR TO PROVIDE ALL TBAR WIRES AND ATTACHMENTS.
2. PROVIDE STRUCTURED CABLING AS SPECIFIED.
3. REPLACE ANY BROKEN TILES. ALERT OWNER TO ANY DAMAGE PRIOR TO INSTALLATION.

E11	Data Outlet at T-Bar Ceiling Detail
No Scale	

KEYNOTES

1. GROUNDING WIRE TO CONNECTED DEVICES PER CEC 654.15.
2. MDF: TMGB CPI PART NUMBER 40153-012; 4"W x 12"L x 1/4" THICK. IDF: TGB CPI PART NUMBER 13622-012; 2"W x 12"L x 1/4" THICK.
3. LOW VOLTAGE SYSTEMS BACKBOARD.
4. #2 BARE GROUNDING WIRE TO GEC.
5. GROUND CLAMP. #12CU BOND TO BUS.
6. 3/4" CONDUIT TO MAIN BUILDING GROUND BUS BAR/ROD/PANEL.

A11	Telecom Main Grounding Bus (TMGB) Installation Detail
No Scale	

REMOVE PAINT OR OTHER FINISH MATERIAL ON RACKS, TRAYS, ETC. TO BARE METAL WHERE CONNECTIONS ARE MADE FOR GROUNDING PURPOSES.

A14	Telecom Main Grounding Bus (TMGB) Grounding Detail
No Scale	

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

ELECTRONIC SYSTEMS GENERAL NOTES AND SCOPE

1. THE ELECTRICAL CONTRACTOR SHALL CONTACT EACH ELECTRONIC SYSTEM VENDOR AND THOROUGHLY INVESTIGATE THE EXPANDABILITY OF ALL EXISTING SYSTEMS. THE CONTRACTOR'S BID SHALL INCLUDE ALL REQUIRED COMPONENTS, CABLING, INSTALLATION, PROGRAMMING, LICENSING, TESTING, ETC. TO INTEGRATE THE WORK SHOWN IN THE ELECTRICAL DRAWINGS AND PROVIDE FOR FULLY FUNCTIONAL LOW VOLTAGE SYSTEMS.
2. EXISTING PULL BOX LOCATIONS ARE DIAGRAMMATIC. FIELD VERIFY EXACT LOCATIONS. ADD CONDUITS TO EXISTING PULL BOXES WHERE INDICATED. REPAIR ANY DAMAGE INCURRED.
3. DISCONNECT, REMOVE, REPULL, AND RETERMINATE EXISTING CABLING AS REQUIRED TO INSTALL NEW CABLING IN EXISTING CONDUITS.
4. THE CONTRACTOR SHALL PROVIDE A COMPLETE AND OPERATIONAL DATA AND VOICE COMMUNICATIONS LOCAL AREA NETWORK (LAN), INCLUDING INTERMEDIATE DATA FRAMES, UNINTERRUPTABLE POWER SUPPLIES, SINGLEMODE FIBER OPTIC CABLING TO THE EXISTING MDF, COPPER CAT6 AND CAT6A CABLING, LABELING, LADDER RACKING, CABLE MANAGEMENT, TERMINATION OF ALL CABLES, PATCH PANELS AND CABLES, COMMUNICATIONS GROUND BUS BAR AND GROUND CONNECTION, DATA, COMMUNICATION, CLOCK/SPEAKER, AND CAMERA OUTLETS, WIRELESS ACCESS POINT OUTLETS, AND TESTING AND REPORTS FOR ALL INSTALLED CABLES. NETWORK ELECTRONICS SUCH AS GATEWAYS AND SWITCHES SHALL BE FURNISHED BY THE OWNER AND INSTALLED BY THE CONTRACTOR. DELIVER TEST REPORTS TO OWNER.
5. THE CONTRACTOR SHALL PROVIDE A COMPLETE AND OPERATIONAL DIGITAL TELEPHONE SYSTEM, INCLUDING INTERFACE WITH EXISTING DIGITAL PHONE SYSTEM HEAD END, EXPANSION OF THE EXISTING SYSTEM TO ACCOMMODATE NEW EXTENSIONS, CABLE EXTENSION TO NEW BUILDING, PATCH PANELS LOCATED IN IDF AND PATCHED THROUGH TO DATA PORTS, AND TESTING FOR FUNCTIONALITY. DIGITAL TELEPHONE EXTENSIONS SHALL BE FURNISHED BY THE OWNER AND INSTALLED BY THE CONTRACTOR.
6. THE CONTRACTOR SHALL PROVIDE A COMPLETE AND OPERATIONAL PUBLIC ADDRESS SYSTEM, INCLUDING BACKBOXES, SPEAKERS, SPEAKER-CLOCKS, LICENSES, SERVER SOFTWARE/UPGRADES/MIGRATION, INTERFACE WITH EXISTING VALCOM CONTROLLER, CABLING, DATA JACKS, LABELING, PROGRAMMING, TESTING, AND REPORTS. THE SYSTEM SHALL BE INTERFACED WITH THE EXISTING TELEPHONE SYSTEMS TO ALLOW ANNOUNCEMENTS TO BE INTERFACED WITH THE EXISTING MPR AUDIO/VIDEO SYSTEM TO OVERRIDE MEDIA WHEN ANNOUNCEMENTS ARE MADE. THE CONTRACTOR SHALL ENSURE COMPATIBILITY OF NEW COMPONENTS WITH EXISTING.
7. THE CONTRACTOR SHALL PROVIDE COMPLETE AND OPERATIONAL CLASSROOM AUDIO/VIDEO SYSTEMS, INCLUDING AUDIO/VIDEO INPUTS WITH HDMI JACKS WHERE SHOWN AND THE RELATED OUTPUTS, CONCEALED BEHIND TV MONITORS, INSTALLATION OF ALL COMPONENTS, SETUP, PROGRAMMING, TESTING, AND DEMONSTRATION OF OPERABILITY. TV MONITOR AND MOUNTING BRACKETS SHALL BE FURNISHED BY THE OWNER AND INSTALLED BY THE CONTRACTOR.
8. THE CONTRACTOR SHALL PROVIDE A COMPLETE AND OPERATIONAL TOTAL COVERAGE, FIRE ALARM SYSTEM WITH EMERGENCY VOICE/ALARM COMMUNICATIONS, TO INCLUDE INTERFACE WITH THE MASTER FIRE CONTROL PANEL (FCP), ADDITION OF COMPONENTS TO THE MASTER FCP, NEW REMOTE FCP, NAC POWER SUPPLIES, SMOKE AND HEAT DETECTION DEVICES, ADDRESSABLE INPUT AND OUTPUT MODULES, CHIME-STROBES, SPEAKERS, NETWORK CONNECTION WITH DEDICATED 6-STRAND SINGLE MODE FIBER OPTIC CABLE, LOCAL COPPER CABLING, LABELING, PROGRAMMING, TESTING, AND REPORTS. DELIVER REPORTS TO OWNER FOR REVIEW.

FOR REFERENCE ONLY

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Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

TYPICAL INFORMATION
ELECTRICAL SYSTEMS - DETAILS AND DIAGRAMS
Drawing

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Architect

No.	Revision/Submission	Date

Revision

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FIRE ALARM GENERAL NOTES

1. FIRE ALARM SYSTEM: ADDRESSABLE, CLASS B, AUTOMATIC.
2. ALL WORK SHALL CONFORM TO THE 2022 EDITION OF NFPA 72, AND THE 2022 EDITION OF CBC, CEC, AND CFC.
3. INSTALLATION OF THE FIRE ALARM SYSTEM (FAS) SHALL NOT BE STARTED UNTIL DETAILED DESIGN DOCUMENTS AND SPECIFICATIONS, INCLUDING STATE FIRE MARSHAL LISTING NUMBERS FOR EACH COMPONENT OF THE SYSTEM HAS BEEN APPROVED BY DSA.
4. UPON COMPLETION OF THE INSTALLATION OF THE FIRE ALARM SYSTEM, A SATISFACTORY TEST OF THE ENTIRE SYSTEM SHALL BE MADE IN THE PRESENCE OF A DSA PROJECT INSPECTOR. (THE LOCAL FIRE AUTHORITY MAY WITNESS THE TEST).
5. A STAMPED SET OF APPROVED FIRE ALARM DESIGN DOCUMENTS SHALL BE ON THE JOB SITE AND USED FOR THE INSTALLATION.
6. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE CODE OR RECOGNIZED STANDARDS SHALL BE BROUGHT TO THE ATTENTION OF DSA AND THE ARCHITECT/ENGINEER OF THE PROJECT.
7. DSA, ARCHITECT/ENGINEER AND OWNER SHALL BE NOTIFIED A MINIMUM OF 48 HOURS PRIOR TO THE FINAL INSPECTION AND/OR TESTING.
8. ALL PENETRATIONS THROUGH RATED ASSEMBLIES REQUIRING OPENING PROTECTION SHALL BE PROVIDED WITH A PENETRATION FIRE STOP SYSTEM AS IDENTIFIED IN CBC CHAPTER 7, UL, OR OTHER LAB TESTING CRITERIA. APPROVED TYPE OF MATERIALS SHALL BE IDENTIFIED WITHIN THE SPECIFICATION WITHIN THE FIRE ALARM SECTION.
9. MICROPHONE ASSOCIATED WITH EMERGENCY VOICE ALARM COMMUNICATION SYSTEMS (EVAC) SHALL BE ACCESSIBLE FOR USE, INSTALLED IN COMPLIANCE WITH CBC SECTIONS 11B-305 AND 11B-308.
10. WALL MOUNTED VISUAL NOTIFICATION DEVICES SHALL HAVE THEIR ENTIRE LENS WITHIN AT 80" MINIMUM AND 96" MAXIMUM FROM FINISHED FLOOR.
11. WALL MOUNTED AUDIBLE NOTIFICATION DEVICES SHALL HAVE THEIR TOPS MOUNTED AT 90" MINIMUM AND 100" MAXIMUM FROM FINISHED FLOOR AND NO CLOSER THAN 6" TO A HORIZONTAL STRUCTURE.
12. AUDIBLE DEVICES SHALL PROVIDE A SOUND PRESSURE LEVEL OF 15 DECIBELS (dBA) ABOVE THE AVERAGE AMBIENT SOUND LEVEL OR 5 dBA ABOVE THE MAXIMUM SOUND LEVEL HAVING A DURATION OF AT LEAST 60 SECONDS, WHICHEVER IS GREATER, IN EVERY SPACE WITHIN A BUILDING THAT MAY BE OCCUPIED AND BE INTELLIGIBLE.
13. AUDIBLE DEVICES SHALL BE SYNCHRONIZED TEMPORAL CODE 3 PATTERN, PRIOR TO "EVAC" ANNOUNCEMENT. THE CARBON MONOXIDE SIGNAL SHALL SOUND A FOUR-PULSE TEMPORAL PATTERN PER NFPA 72, 18.4.3.2.
14. THE CONTRACTOR SHALL ADJUST/INSTALL ALL DEVICES TO MAXIMIZE PERFORMANCE AND TO MINIMIZE FALSE ALARMS.
15. VISUAL DEVICES SHALL NOT EXCEED 2 FLASHES PER SECOND AND SHALL NOT BE SLOWER THAN 1 FLASH PER SECOND. THE DEVICE SHALL HAVE A PULSING LIGHT SOURCE NOT LESS THAN 15 CANDELA. VISUAL DEVICES WITHIN 55' FROM EACH OTHER SHALL BE SYNCHRONIZED.
16. UNDERGROUND AND EXTERIOR CONDUITS SHALL HAVE WATERTIGHT FITTINGS AND WIRE APPROVED FOR WET LOCATIONS.
17. ALL FIRE ALARM WIRING SHALL BE FLP OR FPLP (FIRE POWER LIMITED OR FIRE POWER LIMITED PLENUM) AS REQUIRED FOR APPLICATION. WIRING IN CONDUIT ABOVE GROUND MAY BE THHN OR THWN.
18. PER CEC STANDARDS, ALL WIRING SHALL BE PULLED THROUGH EACH JUNCTION BOX AND CONNECTED DIRECTLY TO EACH FIRE DEVICE. DO NOT SPLICE WIRE. ANY CONNECTION SHALL BE BY LUG CONNECTION AT A DEVICE OR AT A FATC TERMINAL BLOCK ONLY. ALL BOXES TO BE SIZED PER CEC.
19. SMOKE DETECTORS SHALL NOT BE CLOSER THAN 12" FROM FIRE SPRINKLERS NOR 36" FROM SUPPLY AIR DIFFUSERS. IN AREA OF CONSTRUCTION OR POSSIBLE DAMAGE/CONTAMINATION, NEWLY INSTALLED FIRE ALARM DEVICES SHALL BE COVERED UNTIL THAT AREA IS READY TO BE TURNED OVER TO THE OWNER.
20. ALL FIRE ALARM CIRCUITS SHALL BE IN CONDUIT, SURFACE RACEWAY, OR OPEN RUN ABOVE CEILINGS, UNDER FLOORS, AND IN WALLS IN A NEAT AND PROTECTED MANOR AS INDICATED ON DESIGN DOCUMENTS. EXPOSED CIRCUITS ARE ONLY PERMITTED WHEN NOTED AS EXPOSED ON DESIGN DOCUMENTS. OWNER STANDARDS MAY BE MORE STRINGENT.
21. FIRE ALARM PANEL, REMOTES, AND COMPONENTS SHALL BE SECURED TO MOUNTING SURFACES PER MANUFACTURERS' SPECIFICATIONS. ANY SINGLE DEVICE SHALL NOT EXCEED THE WEIGHT OF 20 LBS. WITHOUT SPECIAL MOUNTING DETAILS.
22. A DEDICATED BRANCH CIRCUIT SHALL BE PROVIDED FOR FIRE ALARM EQUIPMENT. THIS CIRCUIT SHALL BE ENERGIZED FROM THE COMMON USE AREA PANEL AND SHALL HAVE NO OTHER OUTLETS. THE BREAKER SHALL HAVE A LOCKING DEVICE WITH RED MARKING PER NFPA 72, SECTION 10.6.5.4 AND 10.6.5.2.3 TO BLOCK THE HANDLE IN THE "ON" POSITION. THE CIRCUIT BREAKER SHALL BE LABELED "FIRE ALARM CIRCUIT CONTROL". CIRCUIT ID TO BE LABELED AT THE FIRE PANEL/EXTENDERS.
23. THE INSTALLING CONTRACTOR SHALL PROVIDE A RECORD OF COMPLETION IN COMPLIANCE WITH NFPA 72, SECTION 7.5.6.
24. CONTROL PANELS AND REMOTE ANNUNCIATORS SHALL BE INSTALLED WITH THEIR BOTTOMS MOUNTED AT 48".
25. THE INSTALLING CONTRACTOR SHALL PROVIDE SYSTEM PROGRAMMING FOR SUPERVISORY MONITORING PER CBC 901.6.2.
26. SUPERVISORY MONITORING SHALL BE TESTED AND VERIFIED AS SENDING CORRECT SIGNALS IN CONJUNCTIONS WITH FINAL TEST. FIRE ALARM SYSTEMS SHALL TRANSMIT THE ALARM, SUPERVISORY AND TROUBLE SIGNALS TO AN APPROVED SUPERVISING STATION IN ACCORDANCE WITH NFPA 72. THE SUPERVISING STATIONS SHALL BE LISTED AS EITHER UUFX (CENTRAL STATION) OR UUUS (REMOTE AND PROPRIETARY) BY UNDERWRITERS LABORATORY (UL) OR SHALL COMPLY WITH THE REQUIREMENTS OF STANDARD FM 3011. A COPY OF ALL DEVICES REPORTED TO THE CENTRAL STATION SHALL BE PROVIDED TO THE OWNER'S ELECTRONICS DEPARTMENT.
27. OWNER SHALL BE RESPONSIBLE FOR ESTABLISHING A FIRE SYSTEM MONITORING CONTRACT OR PROVISIONS.
28. ALL WIRING IS SHOWN DIAGRAMMATICALLY. SUBJECT TO DSA APPROVAL, CONTRACTOR MAY VARY SEQUENCE OF CIRCUITRY; HOWEVER, ALL CIRCUITS SHALL BE CONTINUOUS AND SUPERVISED.
29. ALL CONNECTIONS SHALL BE PROPERLY LABELED BY CONDUCTOR AND SHALL HAVE STA-KON LUG CONNECTORS. PANDUIT TAG (TIE WRAP) SEPARATELY.
30. FIRE ALARM TERMINAL CABINETS SHALL HAVE SUFFICIENT SPACE, TERMINAL BOARDS AND SCREW TERMINAL CONNECTORS TO ALLOW CONNECTION OF ALL CONDUCTORS SHOWN. PROVIDE BARRIER TO SEPARATE FIRE ALARM SYSTEM WHEN TERMINAL CABINET IS SHARED WITH NON-FIRE ALARM SYSTEMS. CONTRACTOR SHALL BE REQUIRED TO SUBMIT WITH HIS OTHER SHOP DRAWINGS DETAILED DRAWINGS OF HIS PROPOSED CONNECTIONS AT EACH FIRE ALARM TERMINAL CABINET PRIOR TO COMMENCING ANY WORK.
31. ALL NAC CIRCUIT CONDUCTORS SHALL BE #12 AWG, STRANDED (19 STRANDS OR LESS) COPPER, UNLESS OTHERWISE NOTED.
32. SET END-OF-LINE RESISTORS IN DISTRIBUTION TERMINAL CABINETS.
33. BATTERIES SHALL BE STAMPED WITH DATE OF MANUFACTURE.
34. INSTALLATION OF FAS EQUIPMENT SHALL BE BY AN AUTHORIZED ENGINEERED SYSTEM DISTRIBUTOR FOR THE EQUIPMENT SPECIFIED BY THE MANUFACTURER FOR SALES, SERVICE, INSTALLATION AND MAINTENANCE. PROVIDE CERTIFICATIONS WITH EQUIPMENT SUBMITTALS. SUBMITTALS BY FIRMS NOT FULFILLING THIS REQUIREMENT WILL BE AUTOMATICALLY REJECTED.
35. THE FAS INSTALLER SHALL BE NICET LEVEL 2 CERTIFIED.
36. THE FAS INSTALLER SHALL PROVIDE ALL FACTORY WARRANTIES TO THE OWNER AT THE CLOSE UP OF THE PROJECT.
37. THE FAS INSTALLER SHALL PROVIDE WRITTEN CERTIFICATION USING NFPA 72 INSPECTION AND TESTING FORMS AND SHALL CERTIFY THAT THE INSTALLATION, TESTING, AND OPERATION CONFORM IN ALL RESPECTS TO THE REQUIREMENTS AS SET FORTH IN TITLE 19 OF THE CALIFORNIA CODE OF REGULATIONS AND PART 3, ARTICLE 760 OF TITLE 24 OF THE C.C.R. AND C.B.C. SECTION 907. THE CONTRACTOR SHALL SUBMIT THE COMPLETED FAS CERTIFICATION AND DESCRIPTION FORM TO DIVISION OF STATE ARCHITECT.
38. INCLUDE ALL DEMOLITION OF EXISTING FIRE ALARM SYSTEM WHETHER SPECIFICALLY SHOWN OR NOT. REMOVE ALL CABLING & UNUSED EXPOSED RACEWAY & OUTLETS. BLANK OFF ALL UNUSED WALL & HARD CEILING OUTLETS. REMOVE ALL UNUSED OUTLETS IN TEE-BAR CEILING & REPLACE ACOUSTIC TILES. RETURN ALL DEVICES, APPLIANCES, & CONTROL PANELS TO OWNER IF REQUESTED BY OWNER DURING CONSTRUCTION.
39. WHEN FIRE ALARM WORK WILL DISABLE PORTIONS OF THE EXISTING FAS, PROVIDE ALL REQUIRED OVERTIME AND FIRE WATCH IN SCOPE OF WORK.
40. WHERE FIRE ALARM DEVICES ARE BEING INSTALLED IN OTHERWISE INACCESSIBLE AREAS, PROVIDE AN ALLOWANCE FOR THE INSTALLATION OF ACCESS PANELS AND ALL WORK ASSOCIATED WITH THE INSTALLATION. THE CONTRACTOR SHALL CUT ALL THE OPENINGS. THE SIZE OF THE ACCESS PANEL SHALL BE DETERMINED BY THE MAN ACCESS REQUIREMENTS. PROVIDE PAINT GRADE ACCESS DOORS AND PAINT TO MATCH THE COLOR & SHEEN OF THE EXISTING CEILING.
41. FIRE ALARM SYSTEM INSPECTION, TESTING, AND MAINTENANCE SHALL COMPLY WITH NFPA 72, CHAPTER 14.
42. PROVIDE FIRE ALARM RECORD DOCUMENTS CABINET NFPA 72, 7.7.2

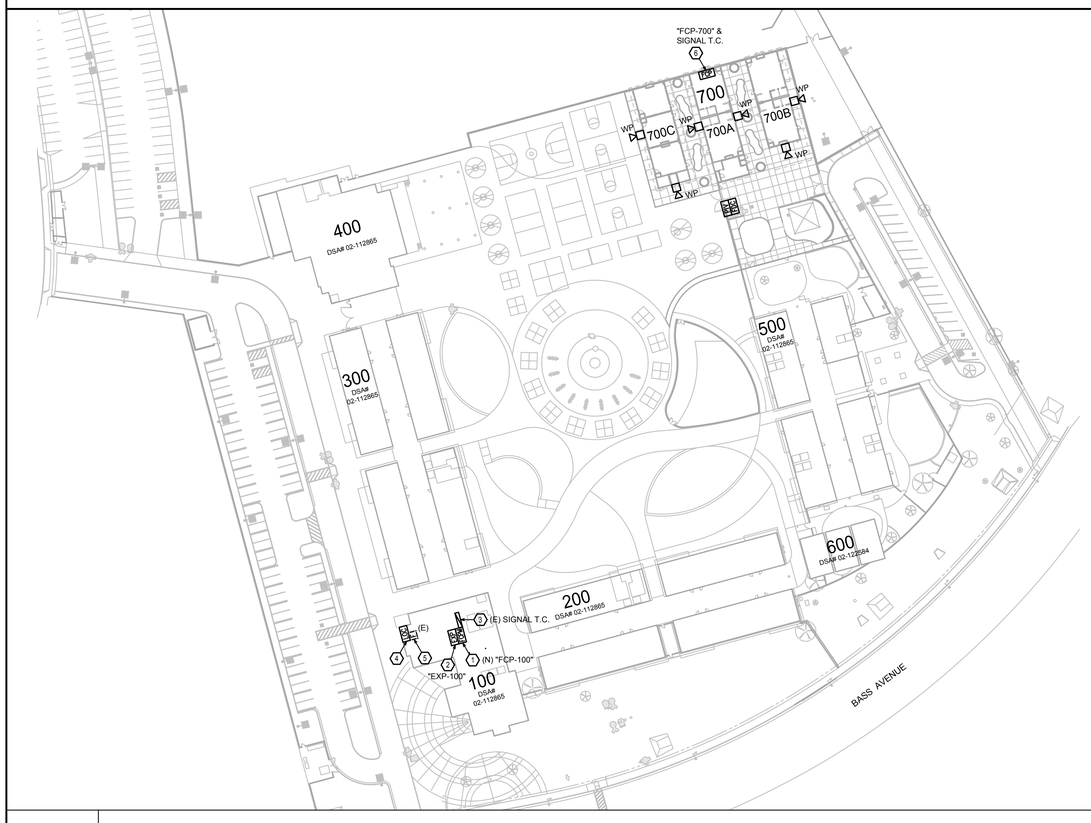
- EVERY NEW FIRE ALARM SYSTEM SHALL PROVIDE A DOCUMENTATION CABINET, INSTALLED AT THE SYSTEM CONTROL PANEL OR OTHER APPROVED LOCATION.
- THE DOCUMENTATION CABINET SHALL BE PROMINENTLY LABELED, "FIRE ALARM SYSTEM RECORD DOCUMENTS".
- ALL RECORD AND TESTING DOCUMENTATION SHALL BE STORED IN THE CABINET.
- CONTENTS SHALL BE ACCESSIBLE BY AUTHORIZED PERSONNEL ONLY.
- WHERE CABINET IS INSTALLED IN A LOCATION OTHER THAN THE SYSTEM CONTROL UNIT, ITS LOCATION SHALL BE IDENTIFIED AT THE SYSTEM CONTROL UNIT.

PROVIDE SYSTEM DOCUMENTS AS APPLICABLE:

- RECORD DRAWINGS/AS-BUILTS
- EQUIPMENT CUT SHEETS & CA SFM LISTINGS
- ALTERNATIVE MEANS AND METHODS
- PERFORMANCE BASED DESIGN DOCUMENTATION (NFPA 72, 7.3.7)
- SYSTEM RECORD OF COMPLETION & ANY SUPPLEMENTAL INSPECTION AND TESTING DOCUMENTATION (NFPA 72, 7.8.2)
- EMERGENCY RESPONSE PLAN (NFPA 72, 7.3.8)
- EVALUATION DOCUMENTATION (NFPA 72, 7.3.9)
- RISK ANALYSIS DOCUMENTATION (NFPA 72, 7.3.6)
- SOFTWARE & FIRMWARE CONTROL DOCUMENTATION (NFPA 72, 23.2.2)

FIRE ALARM CABLING INSTALLATION NOTES

1. FIRE ALARM CABLING SHALL BE INSTALLED IN A RACEWAY SYSTEM, EXCEPT AS NOTED BELOW.
2. IT SHALL BE ACCEPTABLE TO INSTALL FIRE ALARM CABLING FOR SLC, NAC, EV/AC, AND FA NETWORK OPEN AIR IN ATTIC SPACES ABOVE T-BAR CEILINGS. FIRE ALARM CABLING SHALL BE INSTALLED ON DEDICATED J-HOOKS, SEPARATE FROM OTHER SYSTEMS.
3. WHEREVER A HARD LID CEILING SYSTEM IS PRESENT, THE FIRE ALARM CABLING SHALL BE INSTALLED IN CONDUIT IN THE ATTIC SPACE ABOVE THE CEILING.



KEYNOTES ⬡

1. REPLACE EXISTING FIRE ALARM PANEL MASTER WITH NEW. CONNECT TO EXISTING 120V DEDICATED FA CIRCUIT. CONNECT FA PER FIRE ALARM SINGLE LINE DIAGRAM A1/X/E202.
2. INSTALL NAC EXPANDER PANEL ADJACENT TO FIRE ALARM CONTROL PANEL. CONNECT TO EXISTING 120V DEDICATED FA CIRCUIT. CONNECT FA PER FIRE ALARM SINGLE LINE DIAGRAM A1/X/E202.
3. EXISTING BUILDING SIGNAL TERMINAL CABINET TO REMAIN.
4. REPLACE EXISTING ANNUNCIATOR AT ADMIN OFFICE WITH NEW LOCAL OPERATING CONSOLE. CONNECT FA PER FIRE ALARM SINGLE LINE DIAGRAM A1/X/E202.
5. EXISTING MANUAL PULL STATION AT AT ADMIN OFFICE.
6. NEW NETWORK FIRE ALARM CONTROL PANEL. SEE FIRE ALARM PLANS.

A1 — Fire Alarm Reference Site Plan
1" = 60'-0"

FIRE ALARM GENERAL NOTES

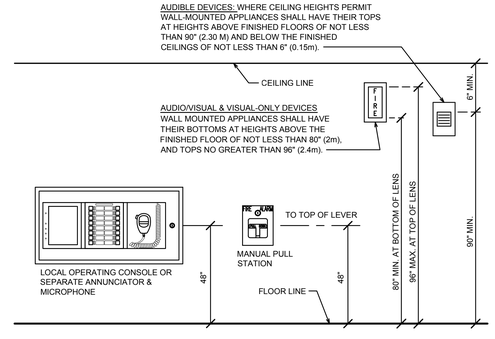
SYMBOL	DESCRIPTION	EQUIPMENT	CSFM LISTING
FACP	(N) FIRE ALARM CONTROL PANEL MASTER W/ EMERGENCY VOICE/ALARM COMMUNICATION	EDWARDS/UTC #EST4 W/ 4-CPU, 4-NET-SM, 3-MODCOM, (2)3-SDDC2, 4-MIC, 4-AUDTELS, 4-LCD, 4-PPS/M	7170-1657:0508, 7300-1657:0519
FCP	NETWORK FIRE ALARM CONTROL PANEL W/ EMERGENCY VOICE/ALARM COMMUNICATION	EDWARDS/UTC #EST4 W/ 4-CPU, 4-NET-SM, (2)3-SDDC2 (3)3-ZA20B, 4-LCD, 4-PPS/M	7170-1657:0508, 7300-1657:0519
LOCI	LOCAL OPERATING CONSOLE W/ ANNUNCIATOR & PAGING MICROPHONE	EDWARDS/UTC #4-6ANN W/ 4-6ANNMT, 4-ANNCPU, 4-NET-SM, 4-LCDANN, 4-24L12S, 4-MIC, 4-ANNAUDTEL	7170-1657:0508
EXP	NAC EXPANDER PANEL W/ INPUT MODULE SYNCHRONIZATION OUTPUT MODULE	EDWARDS/UTC #BPS10A W/ EDWARDS/UTC #SIGA-CT1 EDWARDS/UTC #SIGA-CC1S	7300-1657:0229 7300-1657:0121 7300-1657:0121
MPI	(E) MANUAL PULL STATION	EDWARDS/UTC #SIGA-278	7150-1657:0129
	SMOKE DETECTOR, PHOTOELECTRONIC DETECTOR BASE	EDWARDS/UTC #SIGA-OSD EDWARDS/UTC #SIGA-SB	7272-1657:0511 7300-1657:0120
	CEILING HEAT DETECTOR, 135°F DETECTOR BASE	EDWARDS/UTC #SIGA-HFD EDWARDS/UTC #SIGA-SB	7270-1657:0333 7300-1657:0120
M	MONITOR MODULE	EDWARDS/UTC #SIGA-MM1	7300-1657:0121
R	RELAY MODULE	EDWARDS/UTC #SIGA-CR	7300-1657:0121
S	SPEAKER/VISIBLE NAC DEVICE, CEILING MT'D (WATTS & cd INDICATED ON PLANS)	EATON/WHEELOCK #ELSPSTWC	7320-0785:0505
S	SPEAKER/VISIBLE NAC DEVICE, WALL MT'D (WATTS & cd INDICATED ON PLANS)	EATON/WHEELOCK #ELSPSTR	7320-0785:0505
SWP	EXTERIOR SPEAKER, W.P., WALL MT'D (WATTS INDICATED ON PLANS)	EATON/WHEELOCK #ET-1010-R	7320-0785:0105
PIV	SPRINKLER POST INDICATOR VALVE	SPECIFIED BY FIRE PROTECTION ENG.	
TS	SPRINKLER RISER TAMPER SWITCH	SPECIFIED BY FIRE PROTECTION ENG.	
FS	SPRINKLER RISER FLOW SWITCH	SPECIFIED BY FIRE PROTECTION ENG.	
	SPRINKLER RISER BELL	SPECIFIED BY FIRE PROTECTION ENG.	

FIRE ALARM CABLE SCHEDULE

SYMBOL	NAME	DESCRIPTION
A	SIGNALING LINE CIRCUIT (SLC) CABLE WEST PENN #D990	16/2 TWISTED PAIR, STRANDED, LOW CAPACITANCE FA POWER LIMITED, RISER CABLE (FPLR)
AW	SIGNALING LINE CIRCUIT (SLC) CABLE, OSP WEST PENN #AQC225	16/2 TWISTED PAIR, STRANDED, AQUASEAL FA POWER LIMITED CABLE (FPL)
B	NOTIFICATION APPLIANCE CKT (NAC) CABLE WEST PENN #998S	12/2 TWISTED PAIR, STRANDED FA POWER LIMITED, RISER CABLE (FPLR)
BW	NOTIFICATION APPLIANCE CKT (NAC) CABLE, OSP WEST PENN #AQ227	12/2 TWISTED PAIR, STRANDED, AQUASEAL FA POWER LIMITED CABLE (FPL)
C	EM. VOICE/ALARM COMM. (EV/AC) CABLE WEST PENN #HF995	18/2 SHIELDED TWISTED PAIR, STRANDED FA POWER LIMITED CABLE (FPL)
CW	EM. VOICE/ALARM COMM. (EV/AC) CABLE, OSP WEST PENN #AQC295	16/2 SHIELDED TWISTED PAIR, STRANDED, AQUASEAL FA POWER LIMITED CABLE (FPL)
D	INITIATING DEVICE CIRCUIT (IDC) CABLE WEST PENN #994S	14/2 TWISTED PAIR, STRANDED FA POWER LIMITED, RISER CABLE (FPLR)
DW	INITIATING DEVICE CKT (IDC) CABLE, OSP WEST PENN #AQC226	14/2 TWISTED PAIR, STRANDED, AQUASEAL FA POWER LIMITED CABLE (FPL)
F	NETWORK COMM CABLE	ARMORED, 4-STR SM ISP FIBER OPTIC CABLE
FW	SITE NETWORK COMM CABLE	ARMORED, 4-STR SM OSP FIBER OPTIC CABLE
G	POWER CABLE WEST PENN #998S	12/2 TWISTED PAIR, STRANDED FA POWER LIMITED, RISER CABLE (FPLR)

ACTION \ INITIATION CONDITION	FIRE SPRINKLER TAMPER SWITCH, POST INDICATOR VALVE	SMOKE, HEAT, FIRE SPRINKER FLOW SWITCH	POWER LOSS, SHORT CIRCUIT, GROUND FAULT
ANNUNCIATE TROUBLE			●
ANNUNCIATE ALARM		●	
ANNUNCIATE SUPERVISORY	●	●	
INITIATE VISUAL NOTIFICATION APPLICANCES		●	
INITIATE EV/AC SPEAKER APPLICANCES		●	
TRANSMIT TO CENTRAL STATION	●	●	●

E13 — Fire Alarm Sequence of Operations Matrix
No Scale



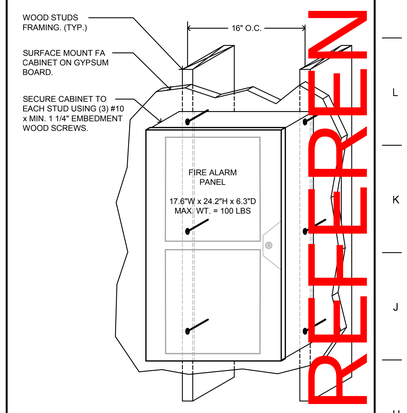
A13 — Fire Alarm Wall Mounted Devices Elevation
No Scale

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval



THIS DETAIL APPLIES TO EITHER NEW OR EXISTING WALL CONSTRUCTION. PANEL SHALL BE CENTERED OVER EXISTING STUD FRAMING. WHERE THIS IS NOT POSSIBLE, METALLIC HORIZONTAL BRACING SHALL BE ATTACHED ACROSS (3) WALL STUDS AND LINED UP WITH TOP, CENTER, AND BOTTOM OF PANEL.

G18 — Fire Alarm Panel Surface Mounting Detail
No Scale

FOR REFERENCE ONLY

Hardin-Davidson Engineering
356 Pollasky Ave., Suite 200, Clovis, CA 93612
559.323.4995 • www.hardin-davidson.com
REGISTERED PROFESSIONAL ENGINEER C. SCOTT DAVIDSON E17850 ELECTRICAL STATE OF CALIFORNIA
Consultant

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

TYPICAL INFORMATION
FIRE ALARM SYSTEM - SYMBOLS, NOTES, DETAILS, AND FA REFERENCE SITE PLAN
Drawing

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6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
LICENSED ARCHITECT BRYANT E. DARDEN No. C-20,307 6.30.25 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date

Revision

Designed By: SD
Drawn By: EN
Checked By: SD
Reviewed By: SD

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Scale: As indicated
Project Number: 2277
Date: 4/30/2025

X/E201

Sheet: _____ of: _____

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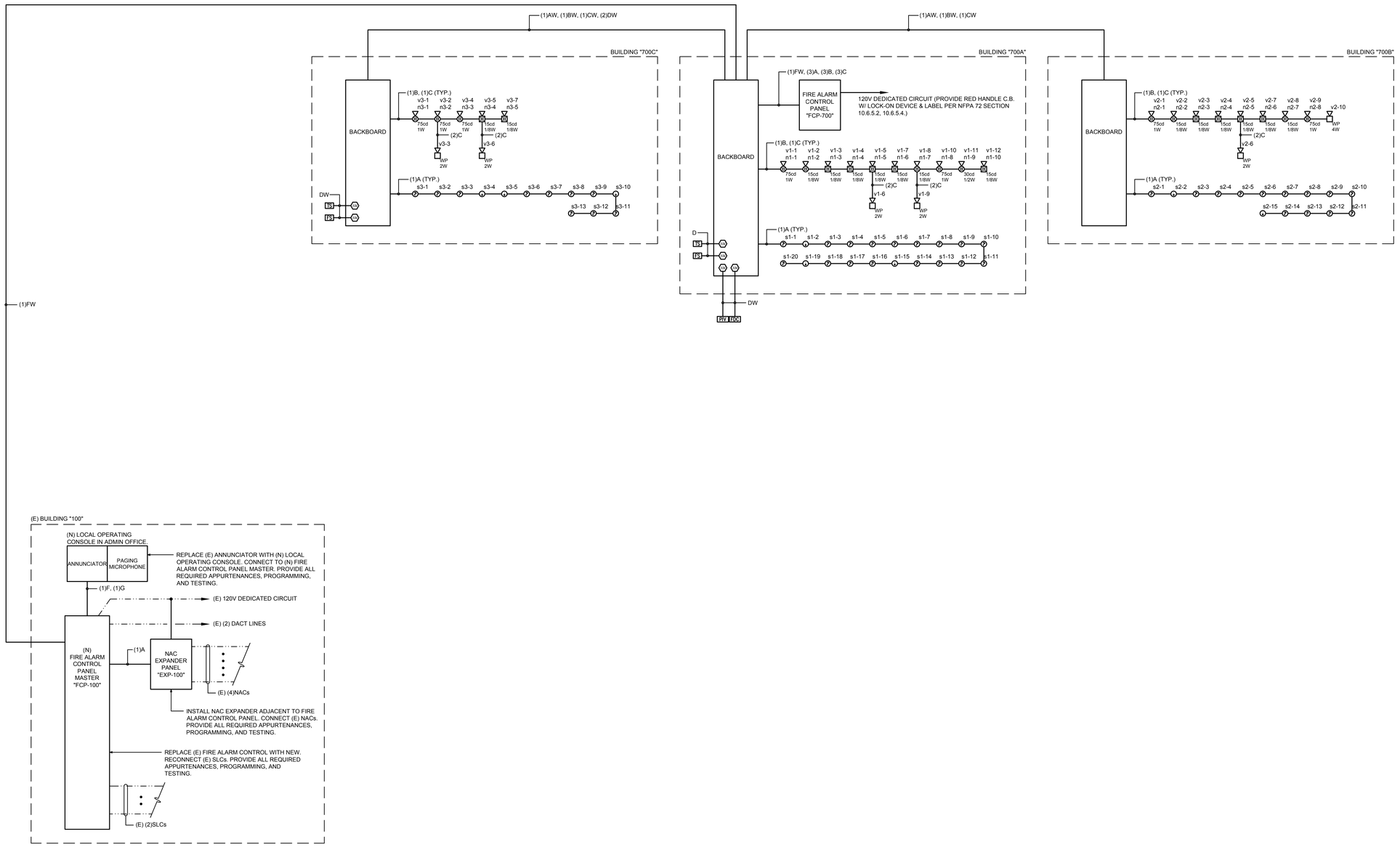

A1

Fire Alarm Single Line Diagram

No Scale

DSA File No.:
10-89

DSA Application No.:
02-122955

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APP: 02-122955 INC: 02
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SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

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REGISTERED PROFESSIONAL ENGINEER C. SCOTT DAVIDSON ELECTRICAL STATE OF CALIFORNIA
Consultant

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

TYPICAL INFORMATION
FIRE ALARM SYSTEM - SINGLE LINE DIAGRAM AND CALCULATIONS
Drawing

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LICENSED ARCHITECT DARDEN, ERIC T. DAVID No. C-34589 6-30-26 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date

Revision

	Designed By: SD	Copyright 2025 Darden Architects
Scale: As indicated	Drawn By: EN	X/E202
Project Number: 2277	Checked By: SD	
Date: 4/30/2025	Reviewed By: SD	Sheet: _____ of: _____

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BATTERY CALCULATION

F.A. Control Panel 'FCP-100'

POWER REQUIREMENTS

	CURRENT [A] SUPERVISORY	ALARM
4-CPU (Main Board)	0.2300	0.2300
4-NET-SM (Network Controller)	0.0050	0.0050
3-MODCOM (DACT Communicator)	0.0600	0.0950
3-SDDC2 (Driver Controller)	0.2640	0.3360
4-LCD (Panel Display Module)	0.0500	0.1100
4-PPS/M (Power Supply)	0.0450	0.0450
4-6ANN, 4-6ANNMT, 4-ANNCPU (Local Operation Console w/ Annunciator)	0.1450	0.1450
4-LCDAUDTELANN (Display Module)	0.0400	0.0930
4-24L12S (Control Display Module)	0.0040	0.0100
4-NET-SM (Network Controller)	0.0050	0.0050
4-MIC (Paging Microphone)	0.0080	0.0380
4-ANNAUDTEL (Audio Interface Module)	0.0980	0.0980
TOTALS	0.9540	1.2100

BATTERY CAPACITY

SUPERVISORY POWER (24 HOURS)	= 24 Hr * 0.954A =	22.896 AHr
ALARM POWER (15 MINUTES)	= 0.25 Hr * 1.21A =	0.303 AHr
TOTAL POWER REQUIREMENT =		23.199 AHr
MINIMUM BATTERY CAPACITY (includes 25% safety factor) =		29 AHr

BATTERY CALCULATION

NAC Expander 'EXP-100'

POWER REQUIREMENTS

	CURRENT [A] SUPERVISORY	ALARM
Panel Overhead	0.0700	0.2700
SIGA-CT1 (Input Module)	0.0003	0.0004
SIGA-CC1S (Syn Output Module)	0.0002	0.0001
(E) NAC Circuits	-	8.0000
TOTALS	0.0705	8.2705

BATTERY CAPACITY

SUPERVISORY POWER (24 HOURS)	= 24 Hr * 0.0705A =	1.691 AHr
ALARM POWER (15 MINUTES)	= 0.25 Hr * 8.2705A =	2.068 AHr
TOTAL POWER REQUIREMENT =		3.759 AHr
MINIMUM BATTERY CAPACITY (includes 25% safety factor) =		7 AHr

BATTERY CALCULATION

F.A. Control Panel 'FCP-700'

POWER REQUIREMENTS

	CURRENT [A] SUPERVISORY	ALARM
4-CPU (Main Board)	0.2300	0.2300
4-NET-SM (Network Controller)	0.0050	0.0050
(2)3-SDDC2 (Driver Controller)	0.5280	0.6720
(3)3-ZA20B (Zoned Audio Amplifier)	0.1860	3.3600
4-LCD (Panel Display Module)	0.0500	0.1100
4-PPS/M (Power Supply)	0.0450	0.0450
NAC Circuits	-	0.7800
TOTALS	1.0440	5.2020

BATTERY CAPACITY

SUPERVISORY POWER (24 HOURS)	= 24 Hr * 1.044A =	25.056 AHr
ALARM POWER (15 MINUTES)	= 0.25 Hr * 5.202A =	1.301 AHr
TOTAL POWER REQUIREMENT =		26.357 AHr
MINIMUM BATTERY CAPACITY (includes 25% safety factor) =		33 AHr

VOLTAGE DROP CALCULATION

NAC Circuit 'n1'

VD = Voltage Drop [V]
I = Current [A] (0.304A)
K = 12.9 (Copper Constant)
L = Distance to Load [ft.] (320')
CM = Circular Mils (#12 AWG = 6530)
V = Voltage [V] (24VDC)

$VD = \frac{K * I * 2L}{CM} = \frac{12.9 * 0.304 * 2 * 320}{6530} = 0.384$ V

$VD\% = \frac{VD}{24} = 1.6\%$

VOLTAGE DROP CALCULATION

NAC Circuit 'n2'

VD = Voltage Drop [V]
I = Current [A] (0.252A)
K = 12.9 (Copper Constant)
L = Distance to Load [ft.] (335')
CM = Circular Mils (#12 AWG = 6530)
V = Voltage [V] (24VDC)

$VD = \frac{K * I * 2L}{CM} = \frac{12.9 * 0.252 * 2 * 335}{6530} = 0.334$ V

$VD\% = \frac{VD}{24} = 1.4\%$

VOLTAGE DROP CALCULATION

NAC Circuit 'n3'

VD = Voltage Drop [V]
I = Current [A] (0.224A)
K = 12.9 (Copper Constant)
L = Distance to Load [ft.] (275')
CM = Circular Mils (#12 AWG = 6530)
V = Voltage [V] (24VDC)

$VD = \frac{K * I * 2L}{CM} = \frac{12.9 * 0.224 * 2 * 275}{6530} = 0.243$ V

$VD\% = \frac{VD}{24} = 1.0\%$

VOICE EVACUATION SPEAKER VOLTAGE DROP

Volt Drop Common Parameters

Volts 70.7 Volts
Wire Size 18 AWG
Wire Resistance 8.45 ohm/Kft

	INDOOR					OUTDOOR				CIRCUIT LENGTH		
Type										Total	Max	Actual
Wattage Tap	1/8 W	1/4 W	1/2W	1W	2W	1W	2W	4W	8W	Watts	Length	Length
v1	7		1	2			2			7.375	4752	370
v2	6			2			1	1		8.75	4006	392
v3	2			3				2		11.25	3115	353

DSA File No.:
10-89

DSA Application No.:
02-122955

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DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

FOR REFERENCE ONLY

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REGISTERED PROFESSIONAL ENGINEER C. SCOTT DAVIDSON E17850 ELECTRICAL STATE OF CALIFORNIA

Consultant

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640

Project

TYPICAL INFORMATION
FIRE ALARM SYSTEM - CALCULATIONS

Drawing

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LICENSED ARCHITECT BRYANT E. DARDEN Lic. No. C-26309 Exp. 6-30-25 STATE OF CALIFORNIA

Architect

No.	Revision/Submission	Date

Revision

	Designed By: SD	Copyright 2025 Darden Architects
Scale: As indicated	Drawn By: EN	X/E203
Project Number: 2277	Checked By: SD	
Date: 4/30/2025	Reviewed By: SD	Sheet: ____ of: ____

A1 Fire Alarm Calculations
No Scale

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STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700A	**Report Page:** (Page 1 of 5)
Project Address: 605 Bass Ave.	**Date Prepared:** 4/22/2025

This document is used to demonstrate compliance with prescriptive PV and battery requirements in 140.10/ 170.2 for nonresidential, multifamily and mixed-use buildings and prescriptive solar thermal requirements in 170.2(d)3C for multifamily and hotel/ motel occupancies. When PV/battery/solar thermal requirements don't apply or are traded using the performance approach, this document demonstrates compliance with mandatory solar readiness requirements in 110.10/ 160.8 for newly constructed buildings which are either multifamily ten stories or fewer, hotel/motel ten stories or fewer or all other nonresidential buildings three stories or fewer. It is also used to demonstrate compliance with solar readiness in 110.10/ 160.8 for additions to nonresidential, multifamily or hotel/motel building types which add more than 2,000 ft^2 of roof area. Alterations, or additions of less than 2,000 ft^2 of roof area, are not required to comply with solar readiness, solar PV and battery requirements and do not need to complete this document.

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Building Occupancies	All Other Occupancies
02	Climate Zone	13	05	Construction Type	New construction
03	Conditioned Floor Area (ft^2)	3553	06	Number of Stories	Bldg <= 3 stories

B. PROJECT SCOPE

The compliance path the project is using to comply per 110.10(b)1B/ 140.10/ 170.2(g and h) is indicated below.

Compliance with Solar Photovoltaic (PV) and Battery Requirements in 140.10/ 170.2(g and h)

01		
☒	Provided PV system and battery storage sized per 140.10/ 170.2 (g and h)	The project has included an installed PV system and battery storage system per requirements in 140.10/ 170.2(g and h) as documented in Table J.
☐	Exception to PV and Battery: Not enough Solar Access Roof Area	The total of all available Solar Access Roof Area(s) of the project site is less than three percent of the conditioned floor area as documented in Table J.
☐	Exception to PV and Battery: Required PV < 4kW	The required PV system size is less than 4 kW dc as documented in Table J..
☐	Exception to PV and Battery: No contiguous Solar Access Roof Area	The Solar Access Roof Area(s) of the project site contains less than 80 contiguous square feet as documented in Table J.
☐	Exception to PV and Battery: Can't meet snow load	The project has a roof design where the enforcement authority has verified it is not possible for the PV system, including panels, modules, components, supports, and attachments to the roof structure, to meet ASCE 7-16 Chapter 7, Snow Loads.
☐	Exception to PV and Battery: Multi-tenant without VNEM or Community Solar	The project is a multi-tenant building in an area where a load serving entity does not provide either a Virtual Net Metering (VNEM) or community solar program.
☐	The prescriptive PV/battery requirement has been traded off using the performance compliance approach as documented on the PRF Certificate of Compliance form.	

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700A	**Report Page:** (Page 2 of 5)
	Date Prepared: 4/22/2025

Compliance with Solar Thermal Water Heating Requirements in 170.2(d)3C (Multifamilly and hotel/ motel occupancies only)

01	
☐	The project includes a hotel/motel or multifamily occupancy with a gas or propane central water-heating system (serves 2+ dwelling units) and includes a permanently installed domestic solar water-heating system to comply with 170.2(d)3C and Reference Residential Appendix RA4, as documented in Table H. Compliance meets Exception 2 to solar ready requirements in 110.10(b).

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through I. Note: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance or see the applicable Table referenced below.

Allocated Solar Zone				Installed PV System				Installed SWH System				Smart Tstat and Alternative EE Measure		Compliance Results
01		02		03		04		05		06		07	08	
Required Minimum Area (ft^2)	<=	Designated Area (ft^2)	OR	Required Minimum DC Power Rating (Watts)	<=	Designed DC Power Rating (Watts)	OR	Required Minimum Solar Savings Fraction	<=	Designed/Rated Solar Savings Fraction	OR	JA5 Compliant Thermostat Specified?	Alternative Energy Efficiency Measure	COMPLIES
(See Table F)				(See Tables G or J)				(See Table H)				(See Table I)		
	<=		OR	5,791	<=	5,800	OR		<=		OR			
				Location in construction documents showing the location for inverters and metering equipment and a pathway for the routing of conduit/ plumbing to the electrical service/ water heating system per §110.10(c).										
Battery storage system design meets the minimum requirements in Joint Appendix JA12 and the minimum energy (kWh)/ power (kW) capacity per Table J.														COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700A	**Report Page:** (Page 3 of 5)
	Date Prepared: 4/22/2025

E. ADDITIONAL REMARKS

This table is includes remarks made by the permit applicant to the Authority Having Jurisdiction.

Campus PV system credit per DSA PR 23-04.

F. ALLOCATED SOLAR ZONE

This section does not apply to this project.

G. PERMANENTLY INSTALLED SOLAR PV FOR SOLAR READY EXCEPTION

This section does not apply to this project.

H. PERMANENTLY INSTALLED SOLAR HOT WATER SYSTEMS

This section does not apply to this project.

I. SMART THERMOSTATS AND ALTERNATIVE EFFICIENCY MEASURE FOR SOLAR READY EXCEPTION

This section does not apply to this project.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700A	**Report Page:** (Page 4 of 5)
	Date Prepared: 4/22/2025

J. PHOTOVOLTAIC (PV) AND BATTERY SYSTEMS

This table documents compliance with prescriptive photovoltaic and battery system requirements in 140.10/ 170.2(g and h). Unless the project meets one of the listed exceptions, or trades-off PV in an energy model using performance path, 140.10/ 170.2(g and h) requires installed photovoltaic and battery systems for newly constructed buildings. The installed PV systems must meet the minimum requirements in Joint Appendix 11.

Photovoltaic (PV) System

01	02	03	04	05	06	07	08
Occupancy	Conditioned Floor Area (ft^2)	Area of New Roof[1] (ft^2)	Roof Area < 70% Solar Access[2] (ft^2)	Plansheet or Document showing Solar Access Calculations	Occupied Roof Area[3] (ft^2)	Solar Access Roof Area (SARA) (ft^2)	Min Size of PV System Required (kWdc)
School or Classroom	3,553	4,094	0	A-8	0	4,094	5.79
					Total Min Size PV System Required for all Spaces (kWdc):		5.79
					Total Size PV System in Design (kWdc):		5.8

[1]*FOOTNOTES: Includes the area of the building's roof space capable of structurally supporting a PV system and the area of all roof space on covered parking areas, carports, and all other newly constructed structures on the site that are compatible with supporting a PV system per Title 24, Part 2 Section 1511.2.*
[2]*Solar access must be determined using CEC approved solar access calculation tools found at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/solar-assessment-tools.*
[3]*As specified by CBC Section 503.1.4.*

K. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selections have been changed by the permit applicant, an explanation should be included Table E. Additional Remarks and ExceptionalConditionMessageCCSABE += UserChangedSelectionInCI. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-SAB-01-E - Must be submitted for all buildings that must comply with solar readiness or PV/Battery requirements.

L. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

There are no forms required for this project.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700A	**Report Page:** (Page 5 of 5)
Project Address: 605 Bass Ave.	**Date Prepared:** 4/22/2025

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
C. Scott Davidson	C. Scott Davidson
Company: Hardin-Davidson Engineering	Signature Date: 2025-04-22
Address: 356 Pollasky Ave., Suite 200	CEA/ HERS Certification Identification (if applicable): E17850
City/State/Zip: Clovis CA 93612	Phone: 559-323-4995

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
C. Scott Davidson	C. Scott Davidson
Company: Hardin-Davidson Engineering	Date Signed: 2025-04-22
Address: 356 Pollasky Ave., Suite 200	License: E17850
City/State/Zip: Clovis CA 93612	Phone: (559) 323-4995

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700B	**Report Page:** (Page 1 of 5)
Project Address: 605 Bass Ave.	**Date Prepared:** 4/22/2025

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Building Occupancies	All Other Occupancies
02	Climate Zone	13	05	Construction Type	New construction
03	Conditioned Floor Area (ft^2)	6461	06	Number of Stories	Bldg <= 3 stories

B. PROJECT SCOPE

The compliance path the project is using to comply per 110.10(b)1B/ 140.10/ 170.2(g and h) is indicated below.

Compliance with Solar Photovoltaic (PV) and Battery Requirements in 140.10/ 170.2(g and h)

01		
☒	Provided PV system and battery storage sized per 140.10/ 170.2 (g and h)	The project has included an installed PV system and battery storage system per requirements in 140.10/ 170.2(g and h) as documented in Table J.
☐	Exception to PV and Battery: Not enough Solar Access Roof Area	The total of all available Solar Access Roof Area(s) of the project site is less than three percent of the conditioned floor area as documented in Table J.
☐	Exception to PV and Battery: Required PV < 4kW	The required PV system size is less than 4 kW dc as documented in Table J..
☐	Exception to PV and Battery: No contiguous Solar Access Roof Area	The Solar Access Roof Area(s) of the project site contains less than 80 contiguous square feet as documented in Table J.
☐	Exception to PV and Battery: Can't meet snow load	The project has a roof design where the enforcement authority has verified it is not possible for the PV system, including panels, modules, components, supports, and attachments to the roof structure, to meet ASCE 7-16 Chapter 7, Snow Loads.
☐	Exception to PV and Battery: Multi-tenant without VNEM or Community Solar	The project is a multi-tenant building in an area where a load serving entity does not provide either a Virtual Net Metering (VNEM) or community solar program.
☐	The prescriptive PV/battery requirement has been traded off using the performance compliance approach as documented on the PRF Certificate of Compliance form.	

Generated Date/Time: Documentation Software: EnergyPro
CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-7514-0425-1491 Report Generated: 2025-04-22 09:42:04

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700B	**Report Page:** (Page 2 of 5)
	Date Prepared: 4/22/2025

Compliance with Solar Thermal Water Heating Requirements in 170.2(d)3C (Multifamilly and hotel/ motel occupancies only)

01	
☐	The project includes a hotel/motel or multifamily occupancy with a gas or propane central water-heating system (serves 2+ dwelling units) and includes a permanently installed domestic solar water-heating system to comply with 170.2(d)3C and Reference Residential Appendix RA4, as documented in Table H. Compliance meets Exception 2 to solar ready requirements in 110.10(b).

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through I. Note: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance or see the applicable Table referenced below.

Allocated Solar Zone				Installed PV System				Installed SWH System				Smart Tstat and Alternative EE Measure		Compliance Results
01		02		03		04		05		06		07	08	
Required Minimum Area (ft^2)	<=	Designated Area (ft^2)	OR	Required Minimum DC Power Rating (Watts)	<=	Designed DC Power Rating (Watts)	OR	Required Minimum Solar Savings Fraction	<=	Designed/Rated Solar Savings Fraction	OR	JA5 Compliant Thermostat Specified?	Alternative Energy Efficiency Measure	COMPLIES
(See Table F)				(See Tables G or J)				(See Table H)				(See Table I)		
	<=		OR	4,740	<=	4,800	OR		<=		OR			
				Location in construction documents showing the location for inverters and metering equipment and a pathway for the routing of conduit/ plumbing to the electrical service/ water heating system per §110.10(c).										
Battery storage system design meets the minimum requirements in Joint Appendix JA12 and the minimum energy (kWh)/ power (kW) capacity per Table J.														COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

Generated Date/Time: Documentation Software: EnergyPro
CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-7514-0425-1491 Report Generated: 2025-04-22 09:42:04

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700B	**Report Page:** (Page 3 of 5)
	Date Prepared: 4/22/2025

E. ADDITIONAL REMARKS

This table is includes remarks made by the permit applicant to the Authority Having Jurisdiction.

Campus PV system credit per DSA PR 23-04.

F. ALLOCATED SOLAR ZONE

This section does not apply to this project.

G. PERMANENTLY INSTALLED SOLAR PV FOR SOLAR READY EXCEPTION

This section does not apply to this project.

H. PERMANENTLY INSTALLED SOLAR HOT WATER SYSTEMS

This section does not apply to this project.

I. SMART THERMOSTATS AND ALTERNATIVE EFFICIENCY MEASURE FOR SOLAR READY EXCEPTION

This section does not apply to this project.

Generated Date/Time: Documentation Software: EnergyPro
CA Building Energy Efficiency Standards - 2022 Nonresidential Compliance Report Version: 2022.0.000 Schema Version: rev 20220101 Compliance ID: EnergyPro-7514-0425-1491 Report Generated: 2025-04-22 09:42:04

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

FOR REFERENCE ONLY

Hardin-Davidson Engineering
356 Pollasky Ave., Suite 200, Clovis, CA 93612
559.323.4995 • www.hardin-davidson.com
E17850
Consultant

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

TITLE 24 COMPLIANCE
BUILDINGS 700A, 700B DOCUMENTATION
Drawing

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ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051
Architect

No.	Revision/Submission	Date

Revision

	Designed By: SD	Copyright 2025 Darden Architects	
Scale: As indicated	Drawn By: EN		
Project Number: 2277	Checked By: SD	X/E301	
Date: 4/30/2025	Reviewed By: SD	Sheet: _____ of: _____	

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Z:\Clients\Darden Architects\24059 - Mendota ES Modular Classroom Buildings\CAD Files\24059 - Electrical Inc 2 02 DSA Backcheck.dwg

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700B	**Report Page:** (Page 4 of 5)
	Date Prepared: 4/22/2025

J. PHOTOVOLTAIC (PV) AND BATTERY SYSTEMS

This table documents compliance with prescriptive photovoltaic and battery system requirements in 140.10/ 170.2(g and h). Unless the project meets one of the listed exceptions, or trades-off PV in an energy model using performance path, 140.10/ 170.2(g and h) requires installed photovoltaic and battery systems for newly constructed buildings. The installed PV systems must meet the minimum requirements in Joint Appendix 11.

Photovoltaic (PV) System

01	02	03	04	05	06	07	08
Occupancy	Conditioned Floor Area (ft²)	Area of New Roof[1] (ft²)	Roof Area < 70% Solar Access[2] (ft²)	Plansheet or Document showing Solar Access Calculations	Occupied Roof Area[3] (ft²)	Solar Access Roof Area (SARA) (ft²)	Min Size of PV System Required (kWdc)
School or Classroom	2,908	4,094	0	A/E102	0	4,094	4.74
						Total Min Size PV System Required for all Spaces (kWdc):	4.74
						Total Size PV System in Design (kWdc):	4.8

[1]FOOTNOTES: Includes the area of the building's roof space capable of structurally supporting a PV system and the area of all roof space on covered parking areas, carports, and all other newly constructed structures on the site that are compatible with supporting a PV system per Title 24, Part 2 Section 1511.2.
[2]Solar access must be determined using CEC approved solar access calculation tools found at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/solar-assessment-tools.
[3]As specified by CBC Section 503.1.4.

K. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections have been made based on information provided in this document. If any selections have been changed by the permit applicant, an explanation should be included Table E. Additional Remarks and ExceptionalConditionMessageCCSABE += UserChangedSelectionInCI. These documents must be provided to the building inspector during construction and can be found online

Form/Title
NRCI-SAB-01-E - Must be submitted for all buildings that must comply with solar readiness or PV/Battery requirements.

L. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

There are no forms required for this project.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Buildings 700B	**Report Page:** (Page 5 of 5)
Project Address: 605 Bass Ave.	**Date Prepared:** 4/22/2025

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
C. Scott Davidson	
Company: Hardin-Davidson Engineering	Signature Date: 2025-04-22
Address: 356 Pollasky Ave., Suite 200	CEA/ HERS Certification Identification (if applicable): E17850
City/State/Zip: Clovis CA 93612	Phone: 559-323-4995

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy.

Responsible Designer Name:	Responsible Designer Signature:
C. Scott Davidson	
Company: Hardin-Davidson Engineering	Date Signed: 2025-04-22
Address: 356 Pollasky Ave., Suite 200	License: E17850
City/State/Zip: Clovis CA 93612	Phone: (559) 323-4995

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
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APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025
Agency Approval

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
This document is used to demonstrate compliance with prescriptive PV and battery requirements in 140.10/ 170.2 for nonresidential, multifamily and mixed-use buildings and prescriptive solar thermal requirements in 170.2(d)3C for multifamily and hotel/ motel occupancies. When PV/battery/solar thermal requirements don't apply or are traded using the performance approach, this document demonstrates compliance with mandatory solar readiness requirements in 110.10/ 160.8 for newly constructed buildings which are either multifamily ten stories or fewer, hotel/motel ten stories or fewer or all other nonresidential buildings three stories or fewer. It is also used to demonstrate compliance with solar readiness in 110.10/ 160.8 for additions to nonresidential, multifamily or hotel/motel building types which add more than 2,000 ft² of roof area. Alterations, or additions of less than 2,000 ft² of roof area, are not required to comply with solar readiness, solar PV and battery requirements and do not need to complete this document.	
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Building 700C	**Report Page:** (Page 1 of 5)
Project Address: 605 Bass Ave.	**Date Prepared:** 4/22/2025

A. GENERAL INFORMATION

01	Project Location (city)	Mendota	04	Building Occupancies	All Other Occupancies
02	Climate Zone	13	05	Construction Type	New construction
03	Conditioned Floor Area (ft²)	3231	06	Number of Stories	Bldg <= 3 stories

B. PROJECT SCOPE

The compliance path the project is using to comply per 110.10(b)1B/ 140.10/ 170.2(g and h) is indicated below.

Compliance with Solar Photovoltaic (PV) and Battery Requirements in 140.10/ 170.2(g and h)

01	
☒	Provided PV system and battery storage sized per 140.10/ 170.2 (g and h) — The project has included an installed PV system and battery storage system per requirements in 140.10/ 170.2(g and h) as documented in Table J.
☐	Exception to PV and Battery: Not enough Solar Access Roof Area — The total of all available Solar Access Roof Area(s) of the project site is less than three percent of the conditioned floor area as documented in Table J.
☐	Exception to PV and Battery: Required PV < 4kW — The required PV system size is less than 4 kW dc as documented in Table J..
☐	Exception to PV and Battery: No contiguous Solar Access Roof Area — The Solar Access Roof Area(s) of the project site contains less than 80 contiguous square feet as documented in Table J.
☐	Exception to PV and Battery: Can't meet snow load — The project has a roof design where the enforcement authority has verified it is not possible for the PV system, including panels, modules, components, supports, and attachments to the roof structure, to meet ASCE 7-16 Chapter 7, Snow Loads.
☐	Exception to PV and Battery: Multi-tenant without VNEM or Community Solar — The project is a multi-tenant building in an area where a load serving entity does not provide either a Virtual Net Metering (VNEM) or community solar program.
☐	The prescriptive PV/battery requirement has been traded off using the performance compliance approach as documented on the PRF Certificate of Compliance form.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Building 700C	**Report Page:** (Page 2 of 5)
	Date Prepared: 4/22/2025

Compliance with Solar Thermal Water Heating Requirements in 170.2(d)3C (Multifamilly and hotel/ motel occupancies only)

01	
☐	The project includes a hotel/motel or multifamily occupancy with a gas or propane central water-heating system (serves 2+ dwelling units) and includes a permanently installed domestic solar water-heating system to comply with 170.2(d)3C and Reference Residential Appendix RA4, as documented in Table H. Compliance meets Exception 2 to solar ready requirements in 110.10(b).

C. COMPLIANCE RESULTS

Results in this table are automatically calculated from data input and calculations in Tables F through I. Note: If any cell on this table says "DOES NOT COMPLY" or "COMPLIES with Exceptional Conditions" refer to Table D. for guidance or see the applicable Table referenced below.

Allocated Solar Zone				Installed PV System				Installed SWH System				Smart Tstat and Alternative EE Measure		Compliance Results
01		02		03		04		05		06		07	08	
Required Minimum Area (ft²)	<=	Designated Area (ft²)	OR	Required Minimum DC Power Rating (Watts)	<=	Designed DC Power Rating (Watts)	OR	Required Minimum Solar Savings Fraction	<=	Designed/Rated Solar Savings Fraction	OR	JA5 Compliant Thermostat Specified?	Alternative Energy Efficiency Measure	
(See Table F)				(See Tables G or J)				(See Table H)				(See Table I)		
	<=		OR	5,267	<=	5,300	OR		<=		OR			
Location in construction documents showing the location for inverters and metering equipment and a pathway for the routing of conduit/ plumbing to the electrical service/ water heating system per §110.10(c).														
Battery storage system design meets the minimum requirements in Joint Appendix JA12 and the minimum energy (kWh)/ power (kW) capacity per Table J.														COMPLIES

D. EXCEPTIONAL CONDITIONS

This table is auto-filled with uneditable comments because of selections made or data entered in tables throughout the form.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Building 700C	**Report Page:** (Page 3 of 5)
	Date Prepared: 4/22/2025

E. ADDITIONAL REMARKS

This table is includes remarks made by the permit applicant to the Authority Having Jurisdiction.

Campus PV system credit per DSA PR 23-04.

F. ALLOCATED SOLAR ZONE

This section does not apply to this project.

G. PERMANENTLY INSTALLED SOLAR PV FOR SOLAR READY EXCEPTION

This section does not apply to this project.

H. PERMANENTLY INSTALLED SOLAR HOT WATER SYSTEMS

This section does not apply to this project.

I. SMART THERMOSTATS AND ALTERNATIVE EFFICIENCY MEASURE FOR SOLAR READY EXCEPTION

This section does not apply to this project.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Building 700C	**Report Page:** (Page 4 of 5)
	Date Prepared: 4/22/2025

J. PHOTOVOLTAIC (PV) AND BATTERY SYSTEMS

This table documents compliance with prescriptive photovoltaic and battery system requirements in 140.10/ 170.2(g and h). Unless the project meets one of the listed exceptions, or trades-off PV in an energy model using performance path, 140.10/ 170.2(g and h) requires installed photovoltaic and battery systems for newly constructed buildings. The installed PV systems must meet the minimum requirements in Joint Appendix 11.

Photovoltaic (PV) System

01	02	03	04	05	06	07	08
Occupancy	Conditioned Floor Area (ft²)	Area of New Roof[1] (ft²)	Roof Area < 70% Solar Access[2] (ft²)	Plansheet or Document showing Solar Access Calculations	Occupied Roof Area[3] (ft²)	Solar Access Roof Area (SARA) (ft²)	Min Size of PV System Required (kWdc)
School or Classroom	3,231	4,118	0	A/E202	0	4,118	5.27
						Total Min Size PV System Required for all Spaces (kWdc):	5.27
						Total Size PV System in Design (kWdc):	5.3

[1]FOOTNOTES: Includes the area of the building's roof space capable of structurally supporting a PV system and the area of all roof space on covered parking areas, carports, and all other newly constructed structures on the site that are compatible with supporting a PV system per Title 24, Part 2 Section 1511.2.
[2]Solar access must be determined using CEC approved solar access calculation tools found at https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/solar-assessment-tools.
[3]As specified by CBC Section 503.1.4.

K. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

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Form/Title
NRCI-SAB-01-E - Must be submitted for all buildings that must comply with solar readiness or PV/Battery requirements.

L. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

There are no forms required for this project.

STATE OF CALIFORNIA
Solar And Battery CALIFORNIA ENERGY COMMISSION

CERTIFICATE OF COMPLIANCE	NRCC-SAB-E
Project Name: Mendota Elementary School - Inc. 02: Modular Classroom Building 700C	**Report Page:** (Page 5 of 5)
Project Address: 605 Bass Ave.	**Date Prepared:** 4/22/2025

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name:	Documentation Author Signature:
C. Scott Davidson	
Company: Hardin-Davidson Engineering	Signature Date: 2025-04-22
Address: 356 Pollasky Ave., Suite 200	CEA/ HERS Certification Identification (if applicable): E17850
City/State/Zip: Clovis CA 93612	Phone: 559-323-4995

RESPONSIBLE PERSON'S DECLARATION STATEMENT

I certify the following under penalty of perjury, under the laws of the State of California:
1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer)
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
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Responsible Designer Name:	Responsible Designer Signature:
C. Scott Davidson	
Company: Hardin-Davidson Engineering	Date Signed: 2025-04-22
Address: 356 Pollasky Ave., Suite 200	License: E17850
City/State/Zip: Clovis CA 93612	Phone: (559) 323-4996

FOR REFERENCE ONLY

Hardin-Davidson Engineering
356 Pollasky Ave., Suite 200, Clovis, CA 93612
559.323.4995 • www.hardin-davidson.com
Consultant

REGISTERED PROFESSIONAL ENGINEER C. SCOTT DAVIDSON E17850 ELECTRICAL STATE OF CALIFORNIA

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640
Project

TITLE 24 COMPLIANCE
BUILDINGS 700B, 700C DOCUMENTATION
Drawing

darden architects
ARCHITECTURE PLANNING INTERIORS
www.dardenarchitects.com
6790 N. West Ave. • Fresno, CA 93711 • T. 559.448.8051

LICENSED ARCHITECT GEOFFREY E. DARDEN No. C-30,309 Exp. 6-30-26 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date

Revision

	Designed By: SD	Copyright 2025 Darden Architects
Scale: As indicated	Drawn By: EN	X/E302
Project Number: 2277	Checked By: SD	
Date: 4/30/2025	Reviewed By: SD	Sheet: _____ of: _____

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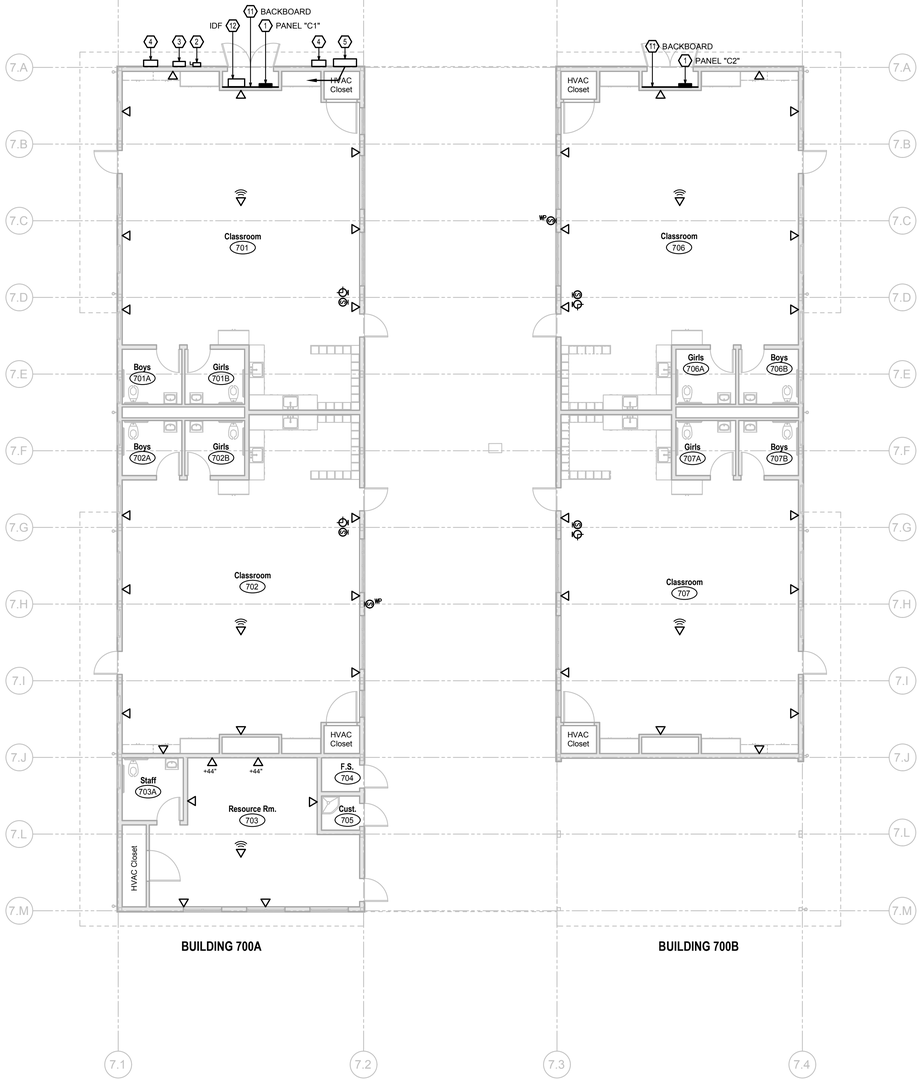
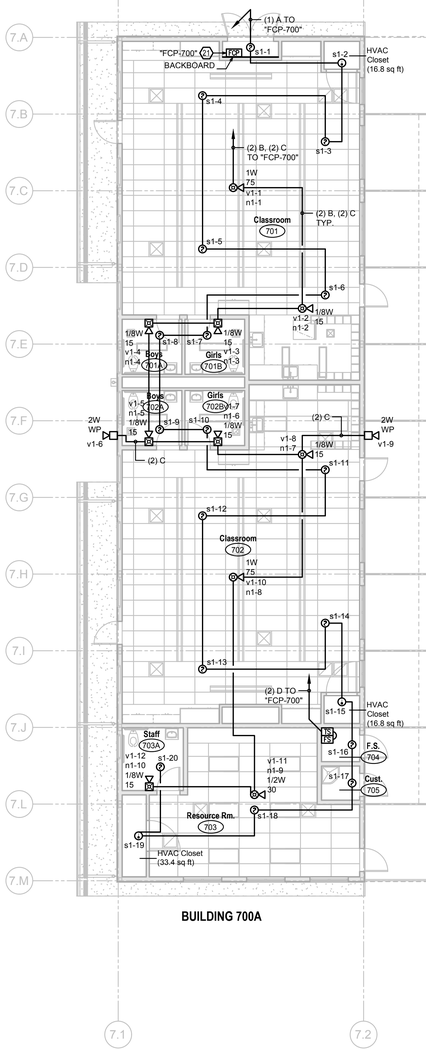
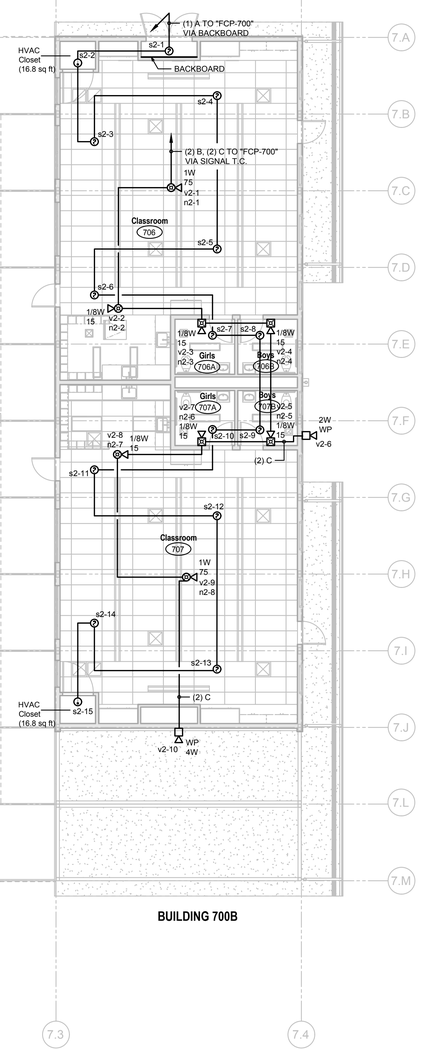


BUILDING 700A

BUILDING 700B



BUILDING 700A



BUILDING 700B

AN AUTOMATIC FIRE SPRINKLER SYSTEM IS PROVIDED AT OVERHANGS (NON-COMBUSTIBLE SPACE) AND AT ATTIC SPACES (CONCEALED COMBUSTIBLE SPACE), HEAT DETECTORS ARE OMITTED PER DSA GL-2 1.2.7.

A1 — Buildings 700A & 700B Low Voltage Plan
Scale: 1/8" = 1'-0"

A10 — Buildings 700A & 700B Fire Alarm Plan
Scale: 1/8" = 1'-0"

DSA File No.: *10-89*

DSA Application No.: *02-122955*

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 02-122955 INC: 02
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 05/28/2025

Agency Approval

KEYNOTES

1. BUILDING PANELBOARD PRE-INSTALLED BY BUILDING MANUFACTURER AND GROUND PER DETAIL E1/X/E101 AND J5/X/E101. BOND ALL BUILDING MODULES TOGETHER PER DETAIL A1/X/E101.
2. PV VERIFIEABLE AC DISCONNECT SWITCH. PROVIDE MAX LOCATION OF ALL PV SWITCHES AT MAIN BREAKER AT MSB. SEE A10/X/E103.
3. PV / BESS INVERTER. SEE A10/X/E103.
4. BESS BATTERY CABINET. MAINTAIN SEPARATION FROM FENESTRATIONS PER CFC 1207.8.4, CONDITION 5. SEE A10/X/E103.
5. NEMA 3R CABINET WITH TERMINAL BLOCKS. SEE KEYNOTE 9. DETAIL A10/X/E103.
11. 3/4" THICK x 8FT HIGH, FIRE RESISTANT PLYWOOD BACKBOARD. SECURE PLYWOOD TO (2) WOOD STUDS WITH #10 x 3" COUNTERSUNK WOOD SCREWS AT 8" CENTERS, WITH MIN. (4) SCREWS AT 6" CENTERS IN EACH WALL STUD, WITH 2-1/2" EMBEDMENT INTO WALL STUD. PROVIDE TMGB PER A11/X/E102, A14/X/E102.
12. IDF WALL RACK PER DETAIL M1/X/E101.
21. FIRE ALARM CONTROL PANEL. CONNECT FA PER FIRE ALARM SINGLE LINE DIAGRAM A1/X/E202.

REFERENCE ONLY

FOR R

Hardin-Davidson Engineering
356 Pollasky Ave., Suite 200, Clovis, CA 93612
559.323.4995 • www.hardin-davidson.com
Consultant

REGISTERED PROFESSIONAL ENGINEER C. SCOTT DAVIDSON E17850 ELECTRICAL STATE OF CALIFORNIA

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605 Bass Ave, Mendota CA 93640
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LICENSED ARCHITECT BRENT E. DARDEN No. C-20389 6-30-25 STATE OF CALIFORNIA
Architect

No.	Revision/Submission	Date

Revision

	Designed By: SD	Copyright 2025 Darden Architects
Scale: As indicated	Drawn By: EN	A/E101
Project Number: 2277	Checked By: SD	Sheet: ____ of: ____
Date: 4/30/2025	Reviewed By: SD	

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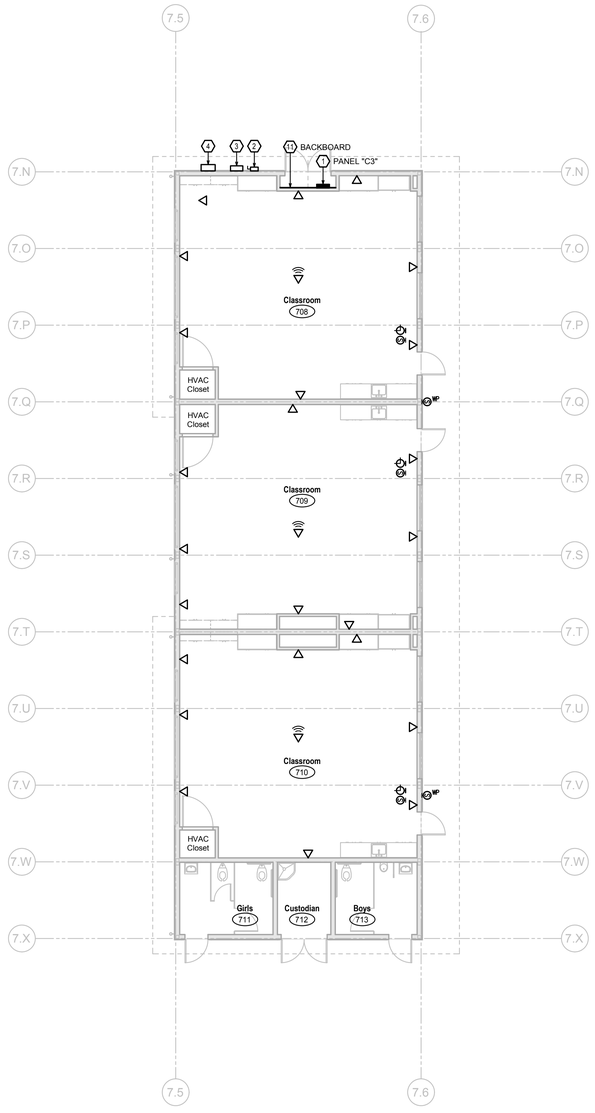

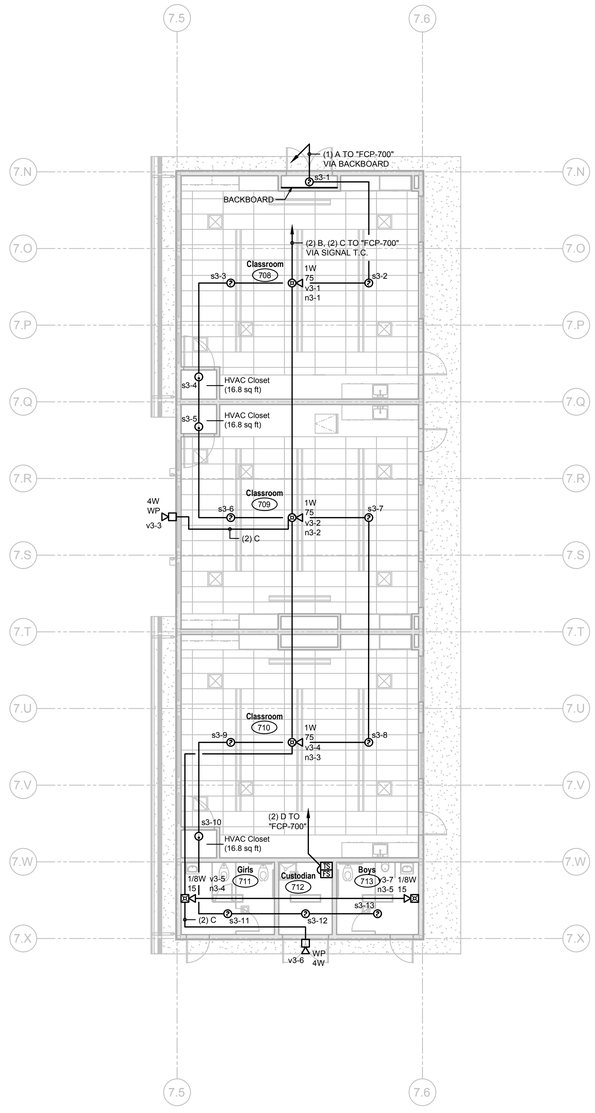

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KEYNOTES

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2. PV VERIFIEABLE AC DISCONNECT SWITCH. PROVIDE MAX LOCATION OF ALL PV SWITCHES AT MAIN BREAKER AT MSB. SEE A10/X/E103.
3. PV / BESS INVERTER. SEE A10/X/E103.
4. BESS BATTERY CABINET. MAINTAIN SEPARATION FROM FENESTRATIONS PER CFC 1207.8.4, CONDITION 5. SEE A10/X/E103.
5. NEMA 3R CABINET WITH TERMINAL BLOCKS. SEE KEYNOTE 9 DETAIL A10/X/E103.
11. 3/4" THICK x 8FT HIGH, FIRE RESISTANT PLYWOOD BACKBOARD. SECURE PLYWOOD TO (2) WOOD STUDS WITH #10 x 3" COUNTERSUNK WOOD SCREWS AT 8" CENTERS, WITH MIN. (4) SCREWS AT 6" CENTERS IN EACH WALL STUD, WITH 2-1/2" EMBEDMENT INTO WALL STUD. PROVIDE TMGB PER A11/X/E102, A14/X/E102.
12. IDF WALL RACK PER DETAIL M1/X/E101.
21. FIRE ALARM CONTROL PANEL. CONNECT FA PER FIRE ALARM SINGLE LINE DIAGRAM A1/X/E202.

FOR REFERENCE ONLY

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REGISTERED PROFESSIONAL ENGINEER C. SCOTT DAVIDSON E17850 ELECTRICAL STATE OF CALIFORNIA

Consultant

Mendota Elementary School - Inc. No. 02: Modular Classroom Buildings
Mendota Unified School District
605 Bass Ave, Mendota CA 93640

Project

BUILDING 700C
ELECTRICAL PLANS

Drawing

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Architect

No.	Revision/Submission	Date

Revision

Designed By: SD
Drawn By: EN
Checked By: SD
Reviewed By: SD

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Scale: As indicated
Project Number: 2277
Date: 4/30/2025

A/E201

Sheet: _____ of: _____

A1 Building 700C Low Voltage Plan
Scale: 1/8" = 1'-0"

A10 Building 700C Fire Alarm Plan
Scale: 1/8" = 1'-0"

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