FOUNDATION REPORT

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION FACILITY
COUNTY OF YUBA, CALIFORNIA

For

AECOM
300 Lakeside Drive, Suite 400
Oakland, CA 94612

PARIKH CONSULTANTS, INC.
3100 Fite Circle, Suite 202
Sacramento, CA 95827

April 22, 2025

Job No. 2024-142-GEO

TABLE OF CONTENTS **Page**

TABLES

PLATES

APPENDICES

FOUNDATION REPORT

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION FACILITY
COUNTY OF YUBA, CALIFORNIA

1.0 INTRODUCTION

This Foundation Report (FR) presents the results of our geotechnical engineering investigation for Yuba-Sutter Transit Resilient Next Generation Facility Project in Solano County, California. The approximate location of the Project site is shown on Plate 1. The work was performed in general accordance with the scope of work outlined in our proposal to AECOM.

The geotechnical recommendations presented in this report are intended for design input and are not intended to be used as specifications. These recommendations should not be used directly for bidding purposes or for construction cost estimates by prospective contractors.

1.1 Project Description

In 1996, the Yuba-Sutter Transit Authority (also referred to as the Owner) purchased and renovated its existing 3.2-acre site and former 7-Up bottling plant for use as a transit operations, maintenance, and administration facility. It was expanded and remodeled again in 2011 to its current and ultimate capacity. The facility has served the growing transit system well over the years, but the recent adoption of the Innovative Clean Transit regulations by the California Air Resources Board (CARB) requiring that 25% of buses purchased after 2025 and 100% of buses purchased after 2028 be zero-emission buses (ZEBs) has created a need for additional space for ZEB fueling infrastructure. Additionally, a potential Highway 70 widening project will also impact the existing Yuba-Sutter Transit facility by reducing the northern bus parking area. To address these fleet capacity and operational impacts, a new site was selected for a new Yuba-Sutter Transit Authority Next Generation Transit Facility (Next Gen Facility). The proposed project is to include the following facilities and functions:

- Administration and Operations Building
- Vehicle Maintenance Building
- Revenue Fuel and Wash facilities
- Agency revenue vehicle parking
- Agency non-revenue vehicle parking
- Mobility hub with vanpool parking

- Revenue battery electric bus (BEB), cutaway shuttle, and van charging infrastructure (Refer to drawings for quantity and locations of partial revenue charging infrastructure installed with this project's construction and accommodations for future charging infrastructure expansion.)
- Non-revenue electric vehicle (EV) private and public charging infrastructure (Refer to drawings for quantity and locations of partial non-revenue charging infrastructure installed with this project's construction and accommodations for future charging infrastructure expansion.)
- Employee / visitor parking.
- Provisions for future trailerized hydrogen mobile fueler
- Provisions for future fixed liquid hydrogen storage and compression yard to supply hydrogen dispensers at Revenue Vehicle Fueling / Service Facility and Public Hydrogen Fueling Facility

The site is 19.72 acres, which will accommodate future system growth, and has more than enough space for the estimated 2040 build-out as well as co-development potential. The site is located on an arterial road, North Beale Road, with direct access to Yuba-Sutter Transit Routes 1, 3, and 6. The site is located near a bus stop—North Beale and Lowe Avenue—and has active transportation infrastructure, which allows for good public access. The site is within a disadvantaged community (as defined by CalEnviroScreen).

1.2 Scope of Work

The scope of work performed for this investigation included a review of the readily available soils and geologic literature pertaining to the Project site, site reconnaissance, geotechnical field exploration, laboratory testing, engineering analyses, and preparation of this Foundation Report.

Due to limitations inherent in geotechnical investigations, it is neither uncommon to encounter unforeseen variations in the soil conditions during construction, nor is it practical to determine all such variations during an acceptable program of drilling and sampling for a project of this scope.

Such variations, when encountered, generally require additional engineering services to attain a properly constructed project. Parikh, therefore, recommends that a contingency

fund be provided to accommodate any additional charges resulting from technical services that may be required during the Project construction.

2.0 FIELD EXPLORATION

PARIKH conducted a field exploration to support the foundation recommendations for the proposed building. Prior to drilling operations, a drilling permit was obtained from the Yuba County Environmental Health Division.

Four (4) soil borings were drilled to the maximum depth of approximately 46.5 feet below the existing ground surface with a track mounted Dietrich D-70 rig and 6-inch flight auger. In addition, three (3) borings were drilled to maximum 8 feet below the existing surface for percolation tests. The drilling contractor was Terra-Ex Subsurface Exploration Inc from Dixon, CA.

The soil samples were obtained from the borings during drilling at various depths by driving a 2.5-inch Inside Diameter (I. D.) Modified California Sampler or a 1.375-inch I.D. Standard Penetration Sampler (ASTM Test Method No. 1586). The sampler was driven into the subsurface soils under the impact of a 140 pounds hammer having a free fall of 30 inches. The blow counts required to drive the sampler for the last 12 inches are presented on the LOTB, Appendix III. When correlating standard penetration data in similar soils, the blow counts for the Modified California sampler can be converted to equivalent Standard Penetration Test sampler by multiplying a non-standard sampler conversion factor of 0.65 and 0.41 for cohesive soil and cohesionless soil, respectively, per Caltrans Geotechnical Manual, “Soil Correlations” module (March 2021).

At the completion of drilling, the soil borings were backfilled with cement grout per drilling permit requirement. The table below summarizes the soil boring information.

Table 1. Summary of Field Explorations

Exploration ID.	Approximate Location		Total Exploration Depth (ft)	Ground Surface Elevation (ft)	Completion Date	Hammer Efficiency
	Northing	Easting				
A-25-001	2172478.35	6684421.83	40.0	65.0'	02/19/2025	87.9%
A-25-002	2172734.89	6684406.58	46.5	65.0'	02/19/2025	
A-25-003	2172975.64	6684044.68	38.5	64.7'	02/18/2025	
A-25-004	2173232.29	6683723.38	40.0	64.9'	02/18/2025	
A-25-005	2172944.3	6683779.09	7.9	66.0'	02/18/2025	
A-25-006	2172845.72	6683896.09	8.0	65.0'	02/18/2025	
A-25-007	2172755.66	6683983.78	7.8	65.0'	02/18/2025	

It should be noted that the descriptions of the soils encountered, and relevant soil boring information presented on the logs of test borings depict subsurface conditions only at the locations indicated on Plate 2 and on the date noted on the logs.

Because of the variability from place to place within the soil in general, subsurface conditions at other locations may differ from conditions occurring at the soil boring locations explored. The abrupt stratum changes shown on the logs of test borings may be gradational, and relatively minor changes in soil types within a stratum may not be noted on the logs due to field limitations. Also, the passage of time may result in a change in the soil conditions at these locations due to environmental or anthropogenic changes.

3.0 LABORATORY TESTING

Laboratory tests were performed on selected soil samples to evaluate the physical and engineering properties of the subsoils. The tests performed for this study include the following: Moisture Contents (ASTM D2216), Unit Weight (ASTM D7263), Plasticity Index (AASHTO T 90), Particle Size Analysis (ASTM D422) and Corrosivity Testing (CTM 643, 422, and 417). The laboratory test results are shown in Appendix IV.

4.0 GEOTECHNICAL CONDITIONS

4.1 Site Geology

The Project site is located in the Great Central Valley Geomorphic Province. Plate 3 shows the locations of the geological units in the Project area. The distribution and description of geological units in the project area were derived from the "Geologic map of the Chico quadrangle, California". California Division of Mines and Geology, Regional Geologic Map RGM-7A, scale 1:250,000.

The majority of the project is mapped to be underlain by Quaternary alluvium (Qa) with minor Holocene basin deposits (Qb).

Quaternary alluvium consists of unconsolidated sand, silt, clay, and gravel deposited by rivers, streams, and floodplains. Holocene basin deposits are primarily composed of fine-grained sediments, including clay, silt, and fine sand.

Depth to bedrock was not revealed during this investigation. However, a well (WCR2004-004610) located adjacent to the west side of the Project at 6124 Avondale Avenue, did not intersect bedrock to a drilled depth of 300 feet.

4.2 Surface Conditions

The Project area is relatively flat and slopes gently towards the south. No major creeks or drains intersect the site and site drainage is locally derived. The site was used for orchards up to the 1970's, after which the site was used for industrial uses that contained buildings over the sites central portion and a railroad spur in the north-west part of the site. The site is currently vacant and cleared.

Geologic and elevation data relative to the site does not indicate the presence of geologic hazards such as landslides, slope failure, rockfalls, or debris flows.

4.3 Subsurface Conditions

Based on the soil boring data, the subsurface consists of loose to very dense silty sand, poorly graded sand, poorly graded gravel with silt and sand, and soft to stiff lean clay, silty clay, silt and elastic silt up to maximum depth of 46.5 feet (elevation of 18.5 feet).

4.4 Groundwater

We summarized the measured groundwater levels from the soil borings in the table below.

Table 2. Summary of Groundwater Data

Exploration ID	Approximate Ground Surface (ft)	Approximate Groundwater Table or Piezometric Elevation		Date Measured
		Elevation (ft)	Depth (ft)	
A-25-001	65.0±	41.0	24.0±	02/19/2025
A-25-002	65.0±	39.0	26.0±	02/19/2025
A-25-003	64.7±	38.7	26.0±	02/18/2025
A-25-004	64.9±	36.9	28.0±	02/18/2025
A-25-005	66.0±	N/A	N/A	N/A
A-25-006	65.0±	N/A	N/A	N/A
A-25-007	65.0±	N/A	N/A	N/A

We reviewed the Department of Water Resources (DWR) historical seasonal groundwater elevation contours. (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels). Based on the DWR groundwater contours, approximate groundwater elevation varies between 39 to 46 feet at the project location. To account for seasonal and other potential groundwater fluctuations, design groundwater elevation of 46.0 feet is recommended for design.

It is anticipated that the groundwater level will vary due to seasonal groundwater and tidal fluctuations, surface and subsurface flow, ground surface run-off, and other factors that were not present at the time of our investigation.

5.0 GEOLOGIC HAZARDS

5.1 Scour Potential

The site does not cross a waterway. Hence, scour is not considered a design issue.

5.2 Corrosion Potential

The chemical test results performed on selected soil samples to evaluate the corrosion potential of the subsurface soils are shown in the table below.

Table 3. Corrosion Test Results

Sample ID.	Approximate Sample Depth (ft)	Minimum Resistivity (ohm-cm)	pH	Chloride (ppm)	Sulfate (ppm)	Corrosive/Non-Corrosive (1)
A-25-001	6.0	2250	7.11	9.1	26.5	Non-Corrosive
A-25-002	10.6	8040	6.47	3.2	11.2	Non-Corrosive
A-25-004	3.0	34840	6.82	3.5	3.1	Non-Corrosive

Note:

1. Caltrans currently defines a corrosive environment as an area where the soil has either a chloride concentration of 500 ppm or greater, a sulfate concentration of 1,500 ppm or greater, or has a pH of 5.5 or less.

5.3 Slope Instability

The potential for slope failure or landslide is not considered a design issue because the site is relatively level. The project only involves relatively minor site grading to meet the finish grade.

5.4 Expansive / Collapsible Soils

Shallow soils/fills encountered during the field exploration were predominantly sandy silt (ML) and silty sand (SM). Hence, the near surface material is expected to have a low expansion potential. The collapse potential is low and not a design issue.

6.0 SEISMIC CONSIDERATIONS

6.1 Seismic Sources and Design Criteria

The project is located in a seismically active area of northern California. The closest active fault to the Project site is a section of the historically aged (<150 years) Foothills fault system is located about 21.8 miles at a bearing of 17° from the Project. The location of the fault is moderately to well constrained and has a normal displacement. The active section of the fault is approximately 4.1 miles long and has an average strike of 357°. The major fault zones of the Foothills Fault System have been sources of earthquakes and are expected to be a source of future earthquakes. Plate 4 shows the location of active faults within the project region.

According to the boring data, the subsoil can be categorized as Site Class D based on Chapter 16 of the 2019 California Building Code (CBC). The relevant seismic coefficients per 2019 CBC seismic criteria are presented below in Table 4. The detailed output is attached in Appendix II.

Table 4 – Maximum Considered Earthquake Response Spectral Parameters

S_S	**S_1**	S_{MS}	S_{M1}	S_{DS}	S_{D1}
0.516	0.247	0.715	Note (1)	0.477	Note (1)

Note:
(1) In accordance with Section 11.4.8 of ASCE 7-16, structures on Site Class D sites with S1 greater than or equal 0.2 requires site-specific ground motion hazard analysis unless the structural engineer applies the exceptions listed in ASCE 7-16 section 11.4.8 when using the parameters in the table above for the foundation design. Alternatively, site-specific ground motion hazard analysis can be performed if deemed necessary; however, such a site-specific analysis is not included in our scope of work and will have to be authorized separately.

6.2 Seismic Hazards

Potential seismic hazards may arise from three sources: surface fault rupture; ground shaking; and liquefaction. Since no active faults pass through the project site, the potential for fault rupture is low. Based on available geological and seismic data, the possibility that the project site will experience strong ground shaking should be considered moderate.

6.3 Liquefaction Potential

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclic shear stress associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are susceptible to liquefaction. Clays are generally not susceptible to liquefaction.

Based on our analysis of existing subsurface data, potential liquefiable sand layers are indentified only in three borings. Results of the liquefaction potential analyses are summarized in the table below and presented in in Appendix IV.

Table 5 – Liquefaction Analysis Results

Exploration ID.	**Approximate Liquefiable Soil Elev. (ft)**	**Approximate Liquefiable Soil Depth (ft)**	**Approximate Thickness (ft)**	**Average $(N_1)_{60cs}$ (1)**	**Approximate Post-Liquefaction Settlement (in)**
R-25-001	41 to 39	24 to 26	2	7.3	± 0.7
R-25-002	36 to 31	29 to 34	5	11.5	± 1.3
R-25-004	40.9 to 36.9	24 to 28	4	8.7	± 1.2
	36.9 to 29.4	28 to 35.5	7.5	15.4	± 1.3

Notes:
(1) Granular/cohesionless soils with SPT blow count $(N_1)_{60cs}$ >30 are considered not susceptible to liquefaction per Caltrans Geotechnical Manual, "Liquefaction Evaluation" Module, dated January 2020.
(2) Only potentially liquefiable layers are included in this table.

The estimated post-liquefaction settlement ranges between approximately 1.0 and 2.5 inches. For the purposes of this project, this level of settlement is considered tolerable based on the anticipated performance requirements of the proposed structures.

6.4 Seismic-Induced Settlement

Soil densification (i.e., volumetric compression) due to earthquake-induced ground shaking is a condition that may occur in dry cohesionless soils such as dry or loose sands or gravels. The relative density, maximum shear strain induced by the design earthquake, and number of shear strain cycles are factors that govern the settlement of the soils and can be represented by N-blow count values, peak ground acceleration, and earthquake magnitude.

Based on our analysis, the maximum seismic-induced settlement is expected to be about 0.3 inches. Therefore, surface manifestation (ground surface settlement) at the site due to soil densification is not expected to be a design issue. The calculations are attached in Appendix IV.

6.5 Surface Fault Rupture

An Earthquake Zones of Required Investigation map and Seismic Hazard Zone Report have not been prepared for the site enclosing Yuba City 7.5-minute Quadrangle. Hence, the Project does not lay within an Alquist-Priolo Earthquake Fault Zone or Seismic Hazard Zone.

The USGS Quaternary Fault and Fold Database shows the Project is not located within 1,000 feet of an unzoned fault that is Holocene/Latest Pleistocene (15,000 years) or younger in age.

In assessing seismic risks, we consider that surface fault rupture does not contribute to the seismic hazards at the site during the useful life of the Project. The preceding statements do not make inferences on the potential for secondary surface cracking.

6.6 Tsunami

The Project site is outside of a tsunami-designated hazard area. It is not the design concern for this project.

7.0 GEOTECHNICAL RECOMMENDATIONS

7.1 General

This report was prepared specifically for the proposed Yuba-Sutter Transit Resilient Next Generation Transit Facility as described in the Project Description section (Section 1.1). The plans dated April 1, 2025, provided by AECOM, are shown in Appendix V.

Normal construction procedures were assumed throughout our analyses and represent one of the basis of recommendations presented herein. Our design criteria have been based upon the materials encountered on the site. Therefore, we should be notified in the event that these conditions are changed, so as to modify or amend our recommendations.

7.2 Soil Properties

SPT N-Equivalent blow counts of the materials encountered at shallow depth (0-10 feet from the existing surface) ranged from 5 to 30 (with only two outliers greater than 10). Loose to medium dense sand and medium stiff to stiff clay were encountered at shallow depth. Based on correlations (per Caltrans 2021) to the blow counts using applicable sampler, hammer energy, and overburden corrections, a friction angle of 30 degrees for the sands is recommended for design. A representative unit weight of 110 pcf may be used for design.

7.3 Foundations

Based on the information provided by the designer, it is our understanding that the proposed improvements will be supported on native soils and new fills are not expected for the project. As discussed in the above section, loose silty sand and medium stiff silt and clay were encountered at shallow depth. Therefore, it is recommended to over-excavate 2 feet of soil below the bottom of the footing and replacing with Aggregate Base (AB) with at least 95% relative compaction. The over-excavation should extend a minimum of one foot laterally beyond the perimeter of the footing.

The buildings may be supported on a conventional spread footing foundation established on properly compacted engineered fill. An allowable bearing capacity of 2500 psf, a friction coefficient of 0.35, and a passive earth pressure of 300 pcf EFP may be considered

for dead-plus-live loads. Please note that the bearing capacity and the passive earth pressure may be increased by one-third for transient wind or seismic loads.

Since, new fills are not expected for the project, settlement will not be a design issue. If significant amount of new fills are considered, settlement should be calculated and settlement waiting period would be required prior to the construction of the structural pavement, buildings, and any other critical structures.

7.3.1 Shallow Foundations

Per discussions with AECOM, the foundations for the new buildings will consist of spread and strip footings.

In our opinion, shallow foundations are feasible provided that site grading and compaction work are properly executed. As discussed in Section 7.3, it is recommended to remove 2 feet of native soil below bottom of footing elevation and replacing with Aggregate Base (AB) with re-compaction of minimum 95% relative compaction per ASTM D1557. The footings should be a minimum of 24 inches wide and embedded at a depth of minimum 18 inches below the lowest adjacent finish grade. The recommended allowable bearing capacity is 2500 psf. The anticipated footing settlement is less than 1 inch.

For design of mat/slab-on-grade, the recommended modulus of subgrade reaction is 100 pci.

For lateral design, a coefficient of 0.35 may be used between the subgrade soil and footing base. The recommended passive soil resistance against footing sides is 300 pcf, up to maximum 1500 psf. The footing bottom friction and the passive resistance may be combined for seismic lateral design. The upper 1 foot of soil should be neglected for lateral design. The value of vertical foundation pressure and lateral bearing pressure given above may be permitted to be increased by one-third for temporary seismic loading conditions.

7.3.2 Slabs-On-Grade

Slabs-on-grade construction may be anticipated for the project. The structural slabs should be designed in accordance with their anticipated use and loadings.

To minimize moisture migration through the slab for enclosed area, a moisture barrier and capillary break should be provided below the slab. The capillary break generally consists of 4 inches of free draining, clean ¾-inch crushed rock, overlaid with a moisture barrier, which is generally an impervious membrane. Polyethylene sheeting is commonly used.

The membrane should be covered with a 2-inch-thick layer of sand or, alternatively, the concrete slab can be constructed directly over the vapor barrier if the water cement ratio (W/C) ratio of the concrete slab mix design is 0.42 maximum. If sand is used, it should be slightly moist just prior to pouring the slab to aid in curing the concrete.

Minor cracking and maintenance problems may be anticipated for slab-on-grade construction. However, separation from the structure with concentrated loads and keeping the subgrade moist during construction can greatly reduce the amount of eventual cracking.

Prior to concrete placement, any dry cracked subgrade should be sealed with appropriate watering or should be excavated and recompacted. These conditions and construction procedures should be observed by the regulatory agency or Geotechnical Engineer.

7.4 Lateral Earth Pressures

If required, the following equivalent fluid pressure (EFP) recommendations may be used for minor retaining walls and miscellaneous hardscapes:

- 36 pcf — Active (yielding, unrestrained walls)
- 55 pcf — At-rest, drained soil (non-yielding, restrained walls)
- 300 pcf — Passive (up to a maximum of 1,500 pcf)
- 4 pcf — Seismic Increment of Lateral Earth Pressure (computed using one third of PGA_M)

Lateral pressure from any surcharge loading behind the wall may be estimated by using coefficients of earth pressures of 0.3 for yielding and 0.5 for non-yielding walls.

The above lateral earth pressures assume levelled backfill. The above lateral earth pressures, assume the backfill is well-drained (i.e., no hydrostatic pore pressure buildup behind the wall).

A drainage system, such as 4-inch diameter perforated PVC pipe enclosed in gravel and wrapped in geofabric, should be installed for all retaining walls to prevent hydrostatic pressure buildup behind the walls. Retaining wall backfill should consist of non-expansive granular soils that generally conform to Section 300 of the "Greenbook", latest edition, and be compacted to at least 90% relative compaction per ASTM D1557. Jetting or flooding should not be used for compaction.

7.4.1 Standard Poles

The depth to resist lateral loads can be determined using Section 1807.3 of the 2021 IBC. An allowable lateral soil-bearing pressure of 300 pcf is recommended for standard pole design. The depth of pile embedment should be limited to 12 feet.

7.5 Pavement

Pavement design for flexible pavement sections using hot mix asphalt (HMA) is based on Caltrans conventional empirical method. New pavements are expected on the native soil. Based on the information provided by the designer, new fills are not expected for the project. The lab R-values of the existing subgrade material are 68 and 69. R-values of 40 was assumed for native soils, considering subsurface variations. It is recommended to excavate 6-inches below bottom of pavement section and recompact to 95% relative compaction per ASTM D1557 for both rigid and flexible pavement sections.

The designer (AECOM) provided the Traffic Index (TI) value of 12.9 for the design. The table below summarizes our flexible pavement structural section recommendations.

Table 6 - Flexible Pavement Recommendations

T.I.	R-value (Native Soil)	(HMA/AB)
12.9	40	0.7' HMA
		1.20' AB

Note:
HMA= Hot Mix Asphalt.
RHMA= Rubberized Hot Mix Asphalt.
AB= Aggregate Base (Class 2) with R-value equal to 78; RHMA= Rubberized Hot Mix Asphalt.

It is our understanding that due to bus operations and turning movements, rigid PCC pavement is desirable. Yuba is within the Inland Valley climate region according to Caltrans HDM. Based on our field investigation, the subgrade soil

will be Type II soil according to Caltrans HDM. The recommended rigid pavement sections, based on Table 623.1G of HDM, are presented in the table below. HDM Table 623.1G is attached in Appendix IV.

Table 7 – PCC Pavement Sections

Parking Lot	TI	Structural Pavement Section (ft)					
		Option 1			Option 2		
		JPCP	HMA-A	AS	JPCP	LCB	AS
Transit Vehicles	12.9	1.00	0.25	0.70	1.00	0.35	0.70

Note:
JPCP: Jointed Plain Concrete Pavement.
HMA-A: Hot Mix Asphalt (Type A)
AB: Aggregate Base (Class 2) with R-value equal to 78.
AS: Aggregate Base (Class 2) with R-value equal to 50.
LCB: Lean Concrete Base

7.6 Percolation Testing

Percolation test hole preparation, pre-soak and testing were performed in general accordance with Soil Percolation Testing Requirements (Chapter 8) of the Alameda County Department of Environmental Health's Onsite Wastewater Treatment Systems Manual, dated June 2018.

Three percolation test borings A-25-005 (P5), A-25-006 (P6) and A-25-007 (P7) were drilled to depths of between 7.8 and 8.0 feet along the proposed alignment of the planned infiltration basin. The locations of the percolation test borings are shown on Plate 1, Site Plan.

Percolation test Boring A-25-005 encountered about 7 feet of silty sand over silty clay. Borings A-25-006 and A-25-007 encountered 5 to 7 feet of sandy silt over silty clay. Below the silty clay lean clay was encountered in Boring A-25-007. Groundwater was not encountered in the borings.

The boreholes were fitted with 4" diameter Schedule 40 screened PVC well casing (0.020-inch slots) to depths of 7.8 to 8.0 feet. The pipes were supported on about 2 inches of clean ½ to ¾-inch gravel. The pipe annulus was backfilled to grade with clean ½ to ¾-inch gravel.

On February 18, 2025, the percolation test holes were pre-soaked for 4 hours during which the test pipes filled with clear water to at least 12 inches above the bottom of the test holes. Measurements were obtained every half hour, and the test holes were refilled as needed.

On February 19, 2025, percolation testing was performed by filling the test pipes with clear water to approximately 6 inches above the bottom of the holes. The drop in water level was measured at half-hour intervals for 4 hours, and the test pipes were refilled to maintain at least 6 inches of water above the bottom of the holes as needed. The percolation test zones were between about 7 and 8 feet below the existing ground surface.

Following the testing, the screened PVC well casings were removed, and the boreholes were backfilled loosely with the annular gravel and soil cuttings per guidance from Yuba County Environmental Health.

Relatively stabilized drops in water level were obtained in the test holes at the end of the 4- hour test period. The stabilized percolation rate is based on the average of the last three (3) readings of the 4-hour test period. The adjusted percolation rate is calculated by multiplying the stabilized percolation rate by 1.6. The design percolation rate is the average of the adjusted percolation rates for the 3 test holes. Results of the field percolation testing, calculated values for the stabilized, adjusted, and design percolation rates are presented in the following table.

Table 8. Summary of Percolation Test Data

Test Hole No.	Ground Surface Elev. (feet)	Start Time	End Time	Reading Interval (Min)	Initial Height of Water Column (Inch)	Final Height of Water Column (Inch)	Drop in Water Level (Inch)	Stabilized Percolation Rate – Ave. of Last 3 Readings (Min/Inch)	Adjusted Percolation Rate (Stabilized Percolation Rate x 1.6; (Min/Inch)	Design Percolation Rate (Avg. of Adjusted Percolation Rate/ # of Test Holes
P5	66±	0810	0840	30	7.75	6.125	1.625	17.52	28.03 (2.14 Inch/Hr.)	21.3 Min/Inch (~2.8 Inch/Hr.)
		0840	0910	30	6.125	3.75	2.375			
		0910	0940	30	14.00	11.75	2.25			
		0940	1010	30	11.75	7.50	4.25			
		1010	1040	30	7.50	5.50	2.00			
		1040	1110	30	7.50	7.50	0.00			
		1110	1150	40	7.50	4.00	3.50			
		1150	1220	30	6.50	5.25	1.25			
		1220	1250	30	9.25	7.50	1.75			
P6	65±	0805	0835	30	6.50	6.25	0.25	12.41	19.86 (3.02 Inch/Hr.)	
		0835	0905	30	6.25	6.00	0.25			
		0905	0935	30	6.00	5.50	0.50			
		0935	1005	30	7.75	7.75	0.00			
		1005	1035	30	7.75	7.375	0.375			
		1035	1105	30	7.375	6.75	0.625			
		1105	1135	30	6.75	6.50	0.25			
		1135	1205	30	6.50	5.75	0.75			
P7	65±	0800	0830	30	8.25	6.00	2.25	1.66	16.00 (3.75 Inch/Hr.)	
		0830	0900	30	6.00	4.00	2.00			
		0900	0930	30	6.00	4.375	1.625			
		0930	1000	30	11.00	8.50	2.50			
		1000	1030	30	8.50	6.00	2.50			
		1030	1100	30	6.00	4.00	2.00			
		1100	1130	30	8.5	6.75	1.75			
		1130	1200	30	6.75	4.875	1.875			

7.7 Drainage

Since soils are generally sensitive to water and tend to lose strength once they become wet, it is essential that drainage be properly controlled.

The site should be graded to provide positive drainage away from all structures and so that water is not allowed to collect or discharge near the foundation lines. Landscaping within 5 feet of the perimeter of the foundations should be avoided to reduce the potential of ponding and saturation along the foundations.

Surface runoff water should be collected and drained to suitable discharge points. Usually, this drainage is connected to the storm drainage system. The site grading should not be altered, or ditches and drains should not be blocked as a result of future landscaping or any other future construction activities.

Final grading plans should be reviewed by our office prior to grading to see that the intent of our recommendations is included in the plans.

7.8 Earthwork / Grading

7.8.1 General

Parikh recommends that the final plans be reviewed by this office prior to construction so that the intent of our recommendations is included in the Project plans and specifications, and to further see that no misunderstandings or misinterpretations have occurred.

To a degree, the performance of any structure is dependent upon construction procedures and quality. Hence, observation of foundation excavations, and observation and testing of the grading operation should be carried out by our office or the regulatory agency. If the subsurface conditions differ from those forming the basis of our recommendations, this office should be informed in order to assess the need for design changes. Therefore, the recommendations presented in this report are contingent upon good quality control and these geotechnical observations during construction.

The following are general recommendations for earthwork and grading at the site:

- Earthwork and grading should be performed in accordance with the 2022 California Building Code (CBC), with the latest editions of the County of Yuba and Caltrans standard specifications, as applicable, and with the recommendations presented in this report.
- All grading should be performed under the observation of the geotechnical engineer or regulatory agency and in accordance with the Project plans and specifications.

- Site preparation should include removal of unsuitable and deleterious materials, undocumented fill, loose native material, existing structures, or other improvements from areas that will be under structural or fill loads.
- If abandoned utility lines are encountered during grading operations, they may be cut off at the property lines, filled with pressure-pump sand-cement slurry (minimum 2-bag mix), and sealed at the property lines. If buried utility lines are removed, resulting depressions should be backfilled and properly compacted to at least 90% relative compaction per ASTM D1557.

7.8.2 Clearing, Grubbing and Proof-Rolling

We recommend that a minimum of 6 inches of the existing ground be cleared and grubbed to remove the surficial organic, deleterious material and rootlet.

Proof-Rolling with a roller compactor or a loaded water truck is recommended after the clearing and grubbing. If soft/pumping spots are encountered during proof-rolling, the area should be mitigated by over-excavating and replacing with compacted engineered fill. If necessary, the soft/pumping spots may be over-excavated up to about 24 inches and be replaced with compacted granular import material such as Aggregate Base (AB) over a layer of geotextile biaxial geogrid.

7.8.3 Fill Materials

In general, fill material should be relatively non-expansive and free of rubble and rock fragments over 3 inches in largest dimension, rubbish, significant vegetation, and other deleterious matters.

Import material should be checked for toxic or hazardous materials before importing. In addition, it is recommended that any fill brought onto the Project be non-corrosive, have a plasticity index (PI) less than 15 and a minimum Sand Equivalent (SE) of 10. The material should be reviewed and approved by the regulatory agency or geotechnical engineer. The Project native soils, if meet the above criteria, can be used as fill and for construction.

7.8.4 Fill Placement and Compaction

Areas receiving fill should be clean of vegetation, shrubs, trees, and roots greater than 1.5 inches in diameter. The area should be scarified to a depth of at least 8 inches and

moisture conditioned to near optimum moisture content and recompacted to at least 90% relative compaction per ASTM D1557. The project compaction requirements are as follows:

- 90% for subgrade preparation, general fill and backfilling after removing buried utilities and depressions caused due to construction activities, etc. The engineered fill should be constructed in lifts with maximum compacted level lift thickness up to 6 inches.

- 95% for all engineered fill for structure backfill for foundations and behind retaining walls, upper 6 inches of pavement subgrade and aggregate base of pavement sections.

Two compaction tests (ASTM D1557) on the retrieved bulk samples were performed as shown in Appendix B. It appears that the native moisture content of the upper soil (about 10%) is close to the Optimum Moisture Content per ASTM D1557. It is our opinion that the existing soil just needs normal moisture conditioning and blending for compaction work. This assumes that the construction is done in dry weather.

For permanent fill slope, a maximum slope gradient of 2H:1V (horizontal to vertical) is recommended. It should be noted that local irregularities such as loose layers and pockets and seepage might require flatter slopes.

7.8.5 Excavations and Shoring

Deep excavations are not expected for the site improvements. In general, conventional soil equipment may be used for any excavations.

For temporary cut slopes, a type C soil per Cal/OSHA should be assumed for excavations made into native soil and fill less than 20 feet in height. Shoring design and installation, if needed, are the responsibility of the Project contractor.

Temporary control of groundwater or dewatering is not expected for the Project.

7.9 Utility Trenches

Trenches for utilities should be excavated and backfilled to conform to Section 306 (Underground Conduit Construction) of the Greenbook, latest edition. The trenches

should be located in areas outside of a 1:1 (horizontal:vertical) gradient extending from the bottom edge of any footings.

8.0 INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices and are based on our site reconnaissance and the assumption that the subsurface conditions do not deviate from observed conditions.

All work done is in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by taking soil samples and excavating test borings; different soil conditions may require that additional expenditures be made during construction to attain a properly constructed project. Some contingency fund is thus recommended to accommodate these possible extra costs.

This report has been prepared for the proposed Project as described earlier, to assist AECOM in the design of this Project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed, and our recommendations modified or approved by us in writing.

This report is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the Project and that necessary steps are also taken to see that the recommendations are carried out in the field.

The findings in this report are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge.

Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Respectfully submitted,
PARIKH CONSULTANTS, INC.

Kandeep Saravanapavan, P.E., G.E. 3040
Senior Project Engineer

Y. David Wang, Ph.D., P.E.52911
Project Manager

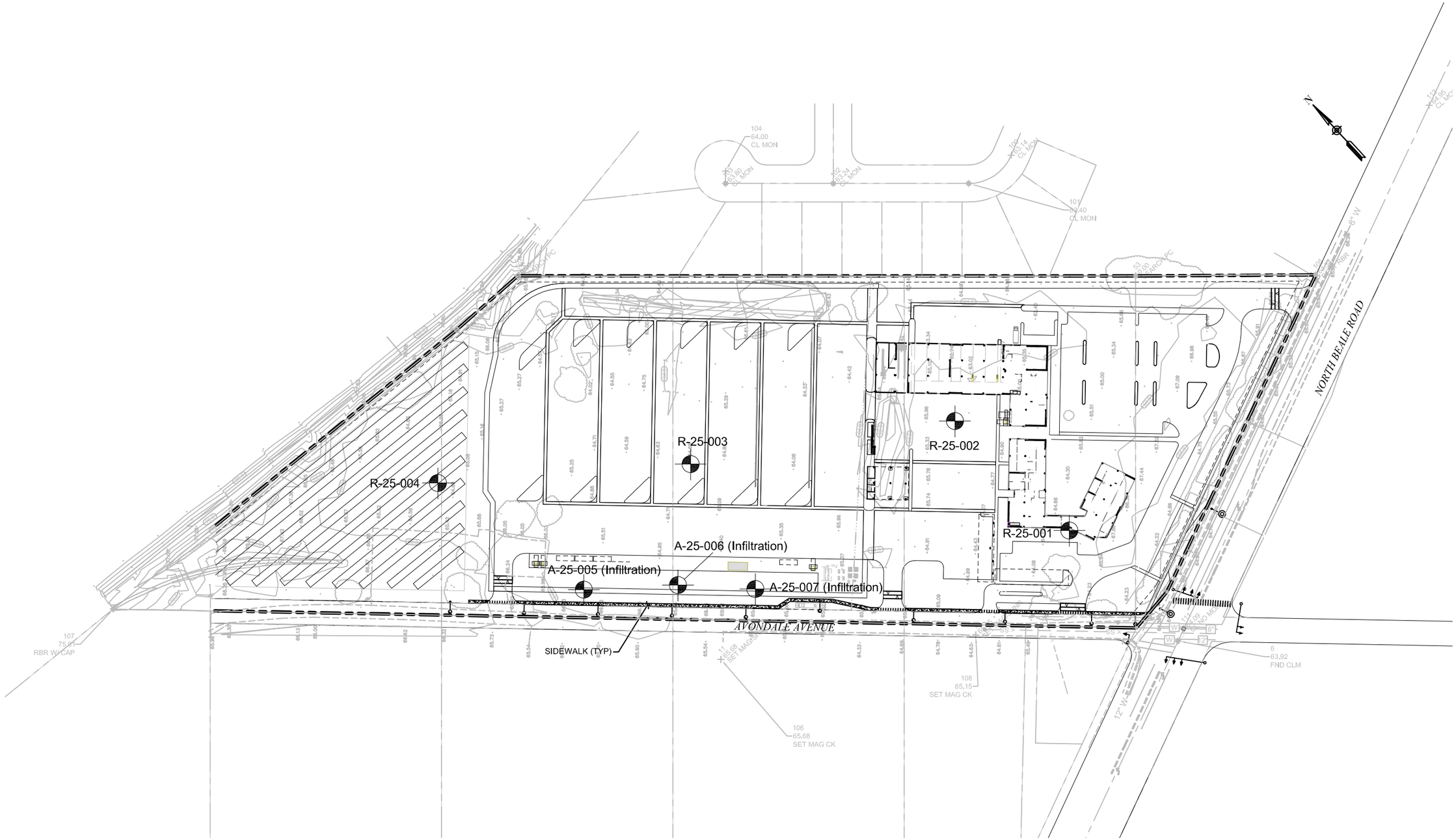
Craig Langbein, P.G., 9447
Project Geologist

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

JOB NO.: 2024-142-GEO

PLATE NO.: 1



SITE PLAN

LEGEND

Approximate Boring Location

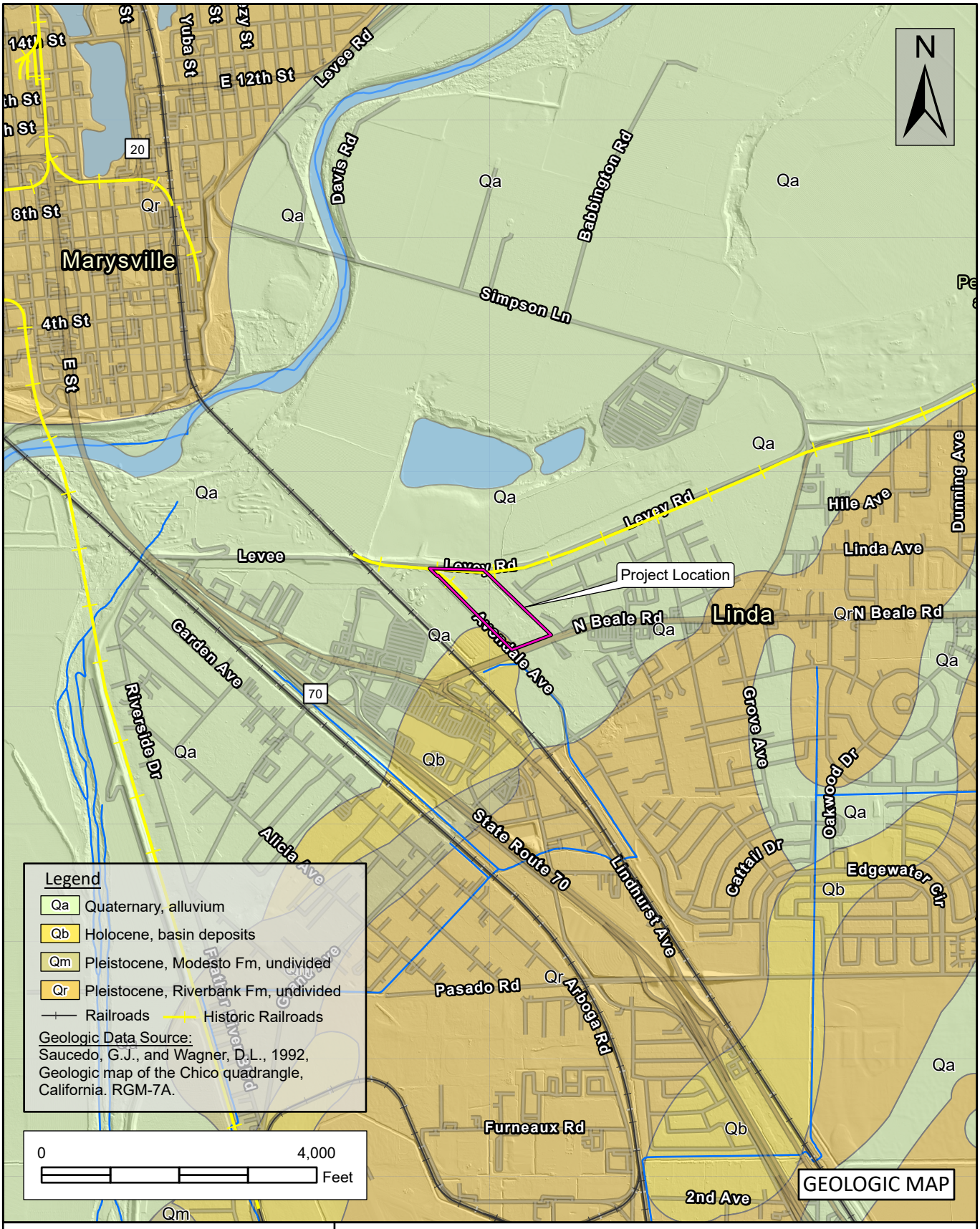
SCALE 1 inch = 160 feet

Note: All units are in feet unless otherwise specified
Reference Map was provided by AECOM

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY
COUNTY OF YUBA, CALIFORNIA

JOB NO.: 2024-142-GEO | PLATE NO: 2

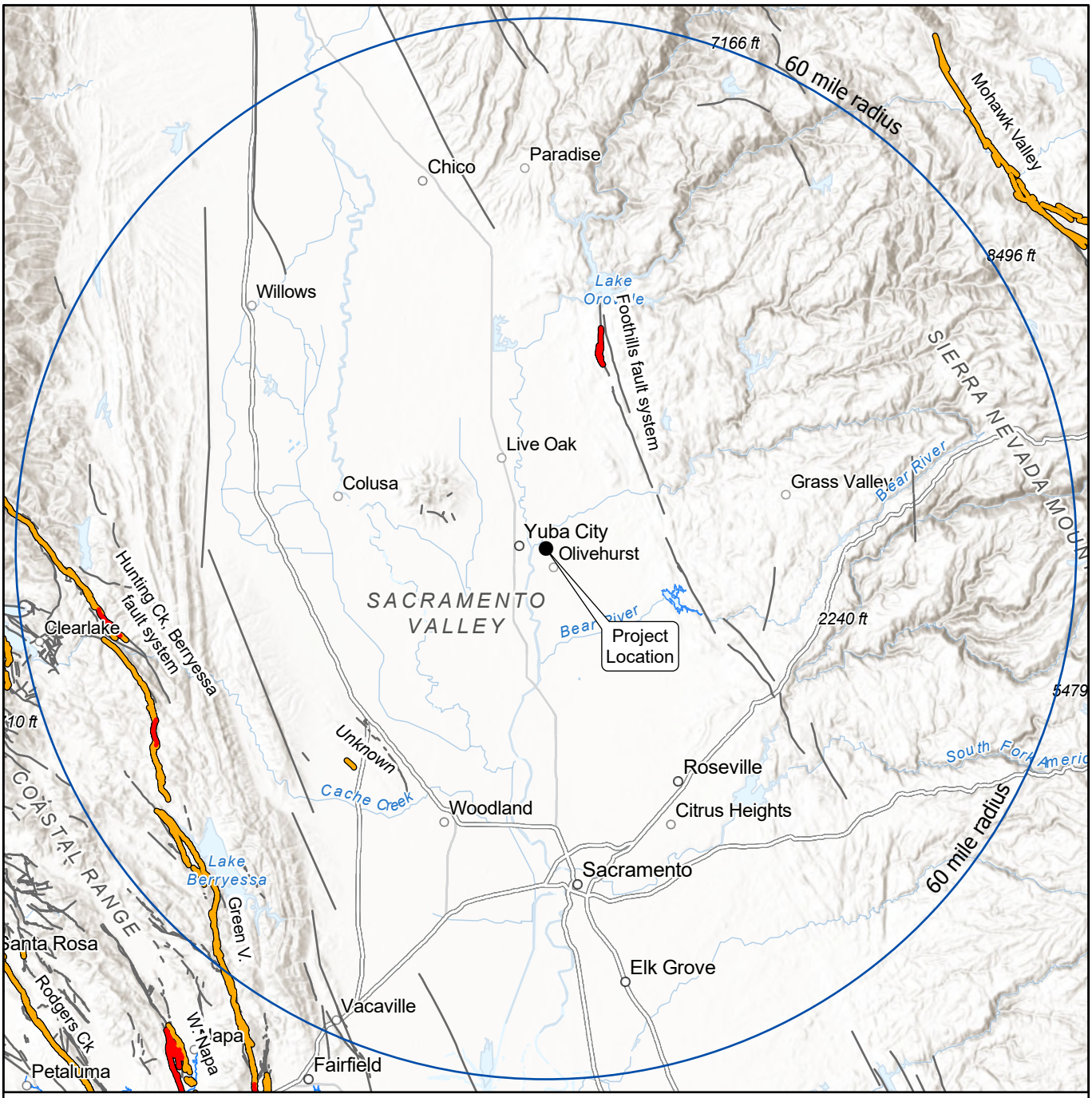


PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

JOB NO.: 2024-142-GEO

PLATE NO.: 3



Legend

Fault trace

Fault name

Cascade

Historic <150 yrs

Latest Quaternary <15,000 yrs

Quaternary <1.6 million yrs

N

0 Scale: 1:1,100,000 30 Miles

Fault data source:

USGS & CGS. Quaternary Fault and Fold Database for the United States. Accessed 01/23/2023.

Base: ESRI and Partners

FAULT MAP

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

JOB NO.: 2024-142-GEO

PLATE NO.: 4

APPENDIX I

GROUND MOTION DATA

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
USGS web services are now operational so this tool should work as expected.

Yuba-Sutter Transit Resilient Next Generation Transit Facility

Latitude, Longitude: 39.127853, -121.568067

Date	3/27/2025, 9:30:43 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.516	MCE_R ground motion. (for 0.2 second period)
S_1	0.247	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.715	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.477	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.388	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.222	MCE_G peak ground acceleration
F_{PGA}	1.378	Site amplification factor at PGA
PGA_M	0.306	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	0.516	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.551	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.247	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.268	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.222	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration

Type	Value	Description
C_{RS}	0.936	Mapped value of the risk coefficient at short periods
C_{R1}	0.924	Mapped value of the risk coefficient at a period of 1 s
C_V	1.044	Vertical coefficient

APPENDIX II

LOG OF TEST BORINGS

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
S. Polishchuk	**2-19-25**	**2-19-25**	**39° 12' 75.59" / -122° 56' 77.81"**	**R-25-001**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**65.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash & Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, MC			**Auto 140 lbs / 30 inches**	**87.9%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with cement grout			**24.0 ft**	**-**	**40.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); medium dense; light brown; moist; fine sand, uncemented.												
63.00	2														
	3				1	5 7 7	14	25			100				CR
61.00	4														
	5		Lean CLAY (CL); stiff; brown; moist; low plasticity fines.		2	2 2 3	5	44			100				PP=1.25 tsf
59.00	6														
	7														
57.00	8		Elastic SILT (MH); soft; light brown; moist; trace fine sand.												
	9														
55.00	10				3A	4	11	35	77		100				PP<0.5 tsf
	11		Stiff; trace fine sand, (LL=55; PI=25).		3B	4 7		37	85						PP=1.65 tsf PI
53.00	12														
	13														
51.00	14		SILT (ML); soft; olive brown; moist; nonplastic fines; fine sand.												
	15				4	2 2 3	5	38			100				
49.00	16														
	17														
47.00	18		SILTY SAND (SM); medium dense; olive brown; moist.												
	19														
	20														

(continued)

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-001 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-A

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	20		SILTY SAND (SM); medium dense; olive brown; moist. *layer description continued from previous page* SILTY SAND (SM) *(continued)*. (>#4=0%; <#200-28.7%).		5	4 6 8	14	17			100				PA
	21														
43.00	22														
	23														
41.00	24		Poorly graded SAND (SP); loose; gray; wet.												
	25				6A	4	5	22			100				PA
			(>#4=1.5%; <#200=2.8%).		6B	2 3		35							
39.00	26		Lean CLAY (CL); soft; gray; wet.												
	27														
37.00	28														
	29		SILTY SAND (SM); very dense; olive gray; moist; fine to medium sand, fine subangular gravel, pocket of Lean Clay.												
35.00	30				7A	4	69/9				20				
					7B	19 50/3		17 14	95 126						
	31														
33.00	32														
	33														
31.00	34		Poorly graded GRAVEL with SILT and SAND (GP-GM); very dense; dark greenish gray; wet; fine sand, angular to subangular fine gravel.												
	35				8	35 40 50/6	90	9			100				PA
29.00	36		(>#4=54.5%; <#200=7.7%).												
	37														
27.00	38														
	39				9	40 30 41	71	6			100				
25.00	40		Bottom of borehole at 40.0 ft bgs/Elev. 25.0 ft Boring terminated at a depth of 40.0 ft. This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
	41														
23.00	42														
	43														
	44														

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-001 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-B

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
S. Polishchuk	**2-18-25**	**2-19-25**	**39° 12' 75.04" / -121° 56' 73.01"**	**R-25-002**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**65.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash & Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, MC			**Auto 140 lbs / 30 inches**	**87.9%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with cement grout			**26.0 ft**	**-**	**46.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); dense; light brown; moist; fine sand.												
	1														
63.00	2														
	3				1A	9	30				100				
					1B	15		16							CR
						15		16							
61.00	4		Elastic SILT (MH); stiff; light brown; moist; medium plasticity fines.												
	5				2	3	7			PP = 2	100				PP=2.0 tsf
						3									
59.00	6					4		44							PI
	7														
57.00	8		SANDY SILT (ML); stiff; olive; moist; low plasticity fines.												
	9														
55.00	10				3A	4	12				100				PP=1.0 tsf
					3B	4		24	89						PP=1.5 tsf
	11					8		11	76						
			SILTY SAND (SM); loose; light brown; moist; nonplastic fines; fine sand, uncemented.												
53.00	12														
	13														
51.00	14														
	15		Loose.		4	2	5				100				
						2									
49.00	16					3		24							
	17														
47.00	18														
	19														
	20														

(continued)

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-002 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-A

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	20		SILTY SAND (SM); loose; light brown; moist; nonplastic fines; fine sand, uncemented. *layer description continued from previous page*		5	7 8 6	14				100				
	21		Medium dense.					3							
43.00	22		SILTY SAND (SM) *(continued)*.												
	23														
41.00	24		Poorly graded SAND with SILT (SP-SM); medium dense; yellowish brown; wet.												
	25				6	4 4 6	10				100				
39.00	26		(>#4=0.4%; <#200=9.4%).					28						PA	
	27														
37.00	28														
	29		Poorly graded SAND (SP); medium dense; brown; wet; fine to medium sand, uncemented.												
35.00	30				7	3 1 7	8				20				
	31							30							
33.00	32														
	33														
31.00	34		Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; brown; moist; fine to coarse sand, fine subangular and angular gravel.												
	35				8	9 8 9	17				100				
29.00	36		(>#4=32.8%; <#200=7.2%).					15						PA	
	37														
27.00	38														
	39														
25.00	40		Poorly graded GRAVEL with CLAY and SAND (GP-GC); medium dense; olive gray; wet.		9	11 8 6	14				0				
	41														
23.00	42														
	43														
	44														

(continued)

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-002 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-B

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
			Poorly graded GRAVEL with CLAY and SAND (GP-GC) *(continued)*. (>#4=60.0%; <#200=8.0%).					9							PA
	45		Lean CLAY (CL); very stiff; gray; moist; low plasticity fines.		10A	9	34				100				
19.00	46					18		53							
					10B	16		30							
	47		Bottom of borehole at 46.5 ft bgs/Elev. 18.5 ft												
			Boring terminated at a depth of 46.5 ft.												
17.00	48		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
	49														
15.00	50														
	51														
13.00	52														
	53														
11.00	54														
	55														
9.00	56														
	57														
7.00	58														
	59														
5.00	60														
	61														
3.00	62														
	63														
1.00	64														
	65														
-1.00	66														
	67														
-3.00	68														

LOG OF TEST BORING

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-002 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-C

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
S. Polishchuk	**2-18-25**	**2-18-25**	**39° 12' 80.45" / 121° 56' 86.54"**	**R-25-003**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**64.7 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash & Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, MC			**Auto 140 lbs / 30 inches**	**87.9%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with cement grout			**26.0 ft**	**-**	**38.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); medium stiff; olive brown; moist; fine sand, uncemented.												
62.70	2														
	3				1	3 3 4	7	24			100				PA
60.70	4		(>#4=0%; <#200=51.5%).												
	5		SILTY CLAY (CL-ML); medium stiff; olive brown; moist; low plasticity fines; pocket of silty sand.		2	2 3 3	6	37			100				
58.70	6														
	7														
56.70	8														
	9														
54.70	10				3A	3	7	41	48		100				PP=1.0 tsf
	11		SILT (ML); medium stiff; gray; moist; nonplastic fines; trace fine sand, (LL=46; PI=15).		3B	3 4		46	49						PI
52.70	12														
	13														
50.70	14														
	15				4	3 3 3	6	33			100				
48.70	16														
	17														
46.70	18		Poorly graded SAND (SP); medium dense; light gray; moist; fine sand, uncemented.												
	19														
	20														

(continued)

LOG OF TEST BORING

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-003 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-A

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	20		Poorly graded SAND (SP); medium dense; light gray; moist; fine sand, uncemented. *layer description continued from previous page*		5	6 6 6	12	4			100				
	21		Poorly graded SAND (SP) *(continued)*.												
42.70	22														
	23														
40.70	24		Poorly graded SAND with GRAVEL (SP); medium dense; gray; wet; fine to coarse sand, uncemented.												
	25				6	8 7 7	14	17			100				PA
38.70	26		(>#4=21.1%; <#200=3.6%).												
	27														
36.70	28		Poorly graded GRAVEL with SAND (GP); medium dense; dark gray; wet; angular fine gravel. some coarse sand.												
	29														
34.70	30				7	9 17 19	36	7			100				PA
	31		(>#4=75.8%; <#200=4.6%).												
32.70	32														
	33														
30.70	34														
	35		Dense.		8	10 10 14	24	22			100				
28.70	36														
	37														
26.70	38		Very dense.		9	50/6	REF	10			100				
	39		Bottom of borehole at 38.5 ft bgs/Elev. 26.2 ft Boring terminated at a depth of 38.5 ft.												
24.70	40		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
	41														
22.70	42														
	43														
	44														

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-003 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-B

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
S. Polishchuk	**2-18-25**	**2-18-25**	**39° 12' 87.61" / -121° 56' 96.79"**	**R-25-004**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**64.9 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wash & Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, MC			**Auto 140 lbs / 30 inches**	**87.9%**
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Backfilled with cement grout			**28.0 ft**	**-**	**40.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); stiff; light brown; moist; nonplastic fines; fine sand.												
	1														
62.90	2														
	3				1	5 5 3	8	35			100				
60.90	4														
	5		SILTY SAND (SM); loose; light olive; moist; fine sand, homogeneous.		2	5 7 8	15	7	94		100				CR
58.90	6														
	7														
56.90	8		SANDY SILT (ML); medium stiff; light brown; moist; fine SAND.												
	9														
54.90	10				3	2 2 3	5	27			100				PA
	11		(>#4=0.0%; <#200=60.3%).												
52.90	12														
	13		SILTY SAND (SM); medium dense; light gray; moist; fine sand, homogeneous.												
50.90	14														
	15				4	4 4 3	7	3			100				
48.90	16														
	17														
46.90	18		Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; light brown; moist; fine sand, trace fine angular gravel.												
	19														
	20														

(continued)

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-004 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-A

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	20		Poorly graded SAND with SILT and GRAVEL (SP-SM); medium dense; light brown; moist; fine sand, trace fine angular gravel. *layer description continued from previous page*		5	3 4 7	11	4			100				PA
	21		Poorly graded SAND with SILT and GRAVEL (SP-SM) *(continued)*.												
42.90	22		(>#4=17.2%; <#200=7.4%).												
	23														
40.90	24		Poorly graded SAND (SP); loose; brown; moist; fine to medium sand.												
	25				6	3 2 4	6	24			100				PA
38.90	26		(>#4=0.0%; <#200=3.9%).												
	27														
36.90	28														
	29														
34.90	30		Medium dense.		7	3 4 7	11	23			100				PA
	31		(>#4=0.6%; <#200=4.7%).												
32.90	32														
	33														
30.90	34														
	35				8	12 24 19	43	20			100				
28.90	36		Poorly graded GRAVEL with SILT and SAND (GP-GM); very dense; dark gray; wet; fine angular gravel.												
	37														
26.90	38		Poorly graded GRAVEL (GP); very dense; dark gray; wet; fine angular gravel.												
	39				9	43 50/6	50/6	7			100				
24.90	40		Bottom of borehole at 40.0 ft bgs/Elev. 24.9 ft Boring terminated at a depth of 40.0 ft. This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
	41														
22.90	42														
	43														
	44														

LOG OF TEST BORING

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

Date: | Boring ID: R-25-004 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-B

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/2/25

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Mckee	**2-18-25**	**2-18-25**	**39° 12' 80.16" / -121° 56' 95.13"**	**A-25-005**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**66.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE) **-**	TOTAL DEPTH OF BORING **7.9 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); loose to medium dense; light brown; moist; fine sand, native soil.												
64.00	2														
62.00	4														
60.00	6		SILTY CLAY (CL-ML); soft to medium stiff; grayish brown; moist; low plasticity fines; fine sand.												
58.00	8		Bottom of borehole at 7.9 ft bgs/Elev. 58.1 ft Boring terminated at a depth of 7.9 ft. This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
56.00	10														
54.00	12														
52.00	14														
50.00	16														
48.00	18														
	20														

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

AECOM NEXT GEN SOLAR PROJECT

LINDA, CALIFORNIA

Date: | Boring ID: A-25-005 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/22/25

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Mckee	**2-18-25**	**2-18-25**	**39° 12' 77.76" / -121° 56' 91.66"**	**A-25-006**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**65.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE) **-**	TOTAL DEPTH OF BORING **8.0 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SILT (ML); soft; light olive brown; moist; low plasticity fines; native soil.												
63.00	2														
	3		Moist.												
61.00	4														
	5		SILTY CLAY (CL-ML); soft; light olive brown; moist; low plasticity fines.												
59.00	6														
	7														
57.00	8		Bottom of borehole at 8.0 ft bgs/Elev. 57.0 ft Boring terminated at a depth of 8.0 ft. This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
	9														
55.00	10														
	11														
53.00	12														
	13														
51.00	14														
	15														
49.00	16														
	17														
47.00	18														
	19														
	20														

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

AECOM NEXT GEN SOLAR PROJECT

LINDA, CALIFORNIA

Date: | Boring ID: A-25-006 | Job No.: 2024-142-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: II-

PCI-CT 5 BR 2024-142-GEO.GPJ TEMPLATE 7-22-11.GDT 4/22/25

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Mckee	**2-18-25**	**2-18-25**	**39° 12' 75.2" / -121° 56' 88.66"**	**A-25-007**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Terra-Ex				**65.0 ft**
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Solid-Stem Auger			**D-70**	**6 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING	AFTER DRILLING (DATE) **-**	TOTAL DEPTH OF BORING **7.8 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); soft; brown; moist; low plasticity fines; fine sand, native soil.												
63.00	2														
61.00	4														
	5		SILTY CLAY (CL-ML); soft; grayish brown; moist; low plasticity fines.												
59.00	6														
	7		Lean CLAY (CL); soft; grayish brown; wet; low plasticity fines.												
57.00	8		Bottom of borehole at 7.8 ft bgs/Elev. 57.2 ft Boring terminated at a depth of 7.8 ft. This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2022) except as noted on the Soil or Rock Legend or below.												
55.00	10														
53.00	12														
51.00	14														
49.00	16														
47.00	18														
	20														

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

AECOM NEXT GEN SOLAR PROJECT

LINDA, CALIFORNIA

Date: | Boring ID: A-25-007 | Job No.: 2024-142-GEO

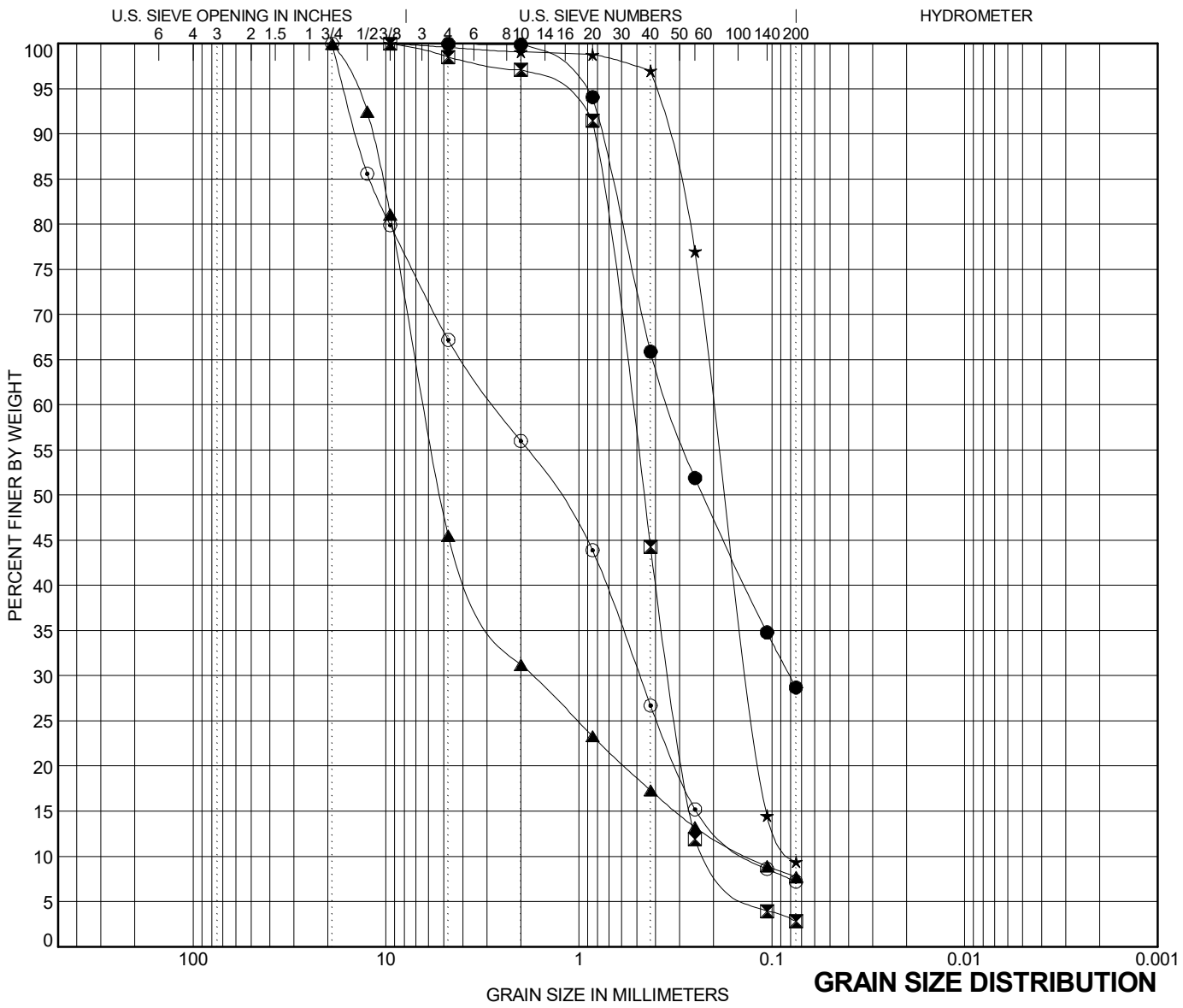
Plate: II-

APPENDIX III

LABORATORY TEST RESULTS

Borehole	Sample Number	Depth (ft)	Classi-fication	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Shear Strength (tsf)
R-25-001	1	3.5	SM	25.2	-						
R-25-001	2	6.0	CL	43.6	-						
R-25-001	3A	10.5	MH	34.8	77.0	55	30	25			
R-25-001	3B	11.0	MH	37.1	85.2						
R-25-001	4	16.0	ML	37.8	-						
R-25-001	5	21.0	SM	17.1	-				0.0	28.7	
R-25-001	6A	25.0	SP	22.4	-				1.5	2.8	
R-25-001	6B	26.0	CL	35.4	-						
R-25-001	7A	30.5	SM	17.4	95.5						
R-25-001	7B	31.0	SM	14.4	126.5						
R-25-001	8	36.0	GP-GM	8.6	-				54.5	7.7	
R-25-001	9	39.5	GP-GM	6.1	-						
R-25-002	1A	3.0	SM	16.4	-						
R-25-002	1B	3.5	SM	16.2	-						
R-25-002	2	6.0	MH	44.0	-	51	32	19			
R-25-002	3A	10.5	ML	24.3	89.0						
R-25-002	3B	11.0	SM	10.7	76.2						
R-25-002	4	16.0	SM	24.0	-						
R-25-002	5	21.0	SM	3.3	-						
R-25-002	6	26.0	SP-SM	28.2	-				0.4	9.4	
R-25-002	7	31.0	SP	30.1	-						
R-25-002	8	36.0	SP-SM	15.2	-				32.8	7.2	
R-25-002	9	44.2	GP-GC	9.3	-				60.0	8.0	
R-25-002	10A	45.5	CL	53.0	-						
R-25-002	10B	46.0	CL	29.8	-						
R-25-003	1	3.5	ML	23.8	-					51.5	
R-25-003	2	6.0	CL-ML	37.1	-						
R-25-003	3A	10.5	CL-ML	41.1	47.6						
R-25-003	3B	11.0	ML	45.5	49.5	46	31	15			
R-25-003	4	16.0	ML	33.3	-						
R-25-003	5	21.0	SP	4.3	-						
R-25-003	6	26.0	SP	16.9	-				21.1	3.6	
R-25-003	7	31.0	GP	7.4	-				75.8	4.6	
R-25-003	8	36.0	GP	22.3	-						
R-25-003	9	38.0	GP	9.7	-						
R-25-004	1	3.5	ML	35.3	-						
R-25-004	2	6.0	SM	7.4	93.6						
R-25-004	3	11.0	ML	26.5	-					60.3	
R-25-004	4	16.0	SM	3.2	-						
R-25-004	5	21.0	SP-SM	4.4	-				17.2	7.4	
R-25-004	6	26.0	SP	23.8	-				0.0	3.9	
R-25-004	7	31.0	SP	23.3	-				0.6	4.7	
R-25-004	8	35.5	GP-GM	20.4	-						

Borehole	Sample Number	Depth (ft)	Classi-fication	Water Content (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Shear Strength (tsf)
R-25-004	9	39.5	GP	7.0	-						



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
● R-25-001	5	21.0	SILTY SAND					
⊠ R-25-001	6A	25.0	Poorly graded SAND				1.04	2.62
▲ R-25-001	8	36.0	Poorly graded GRAVEL with SILT and SAND				3.71	47.72
★ R-25-002	6	26.0	Poorly graded SAND with SILT				1.11	2.53
⊙ R-25-002	8	36.0	Poorly graded SAND with SILT and GRAVEL				0.68	21.42

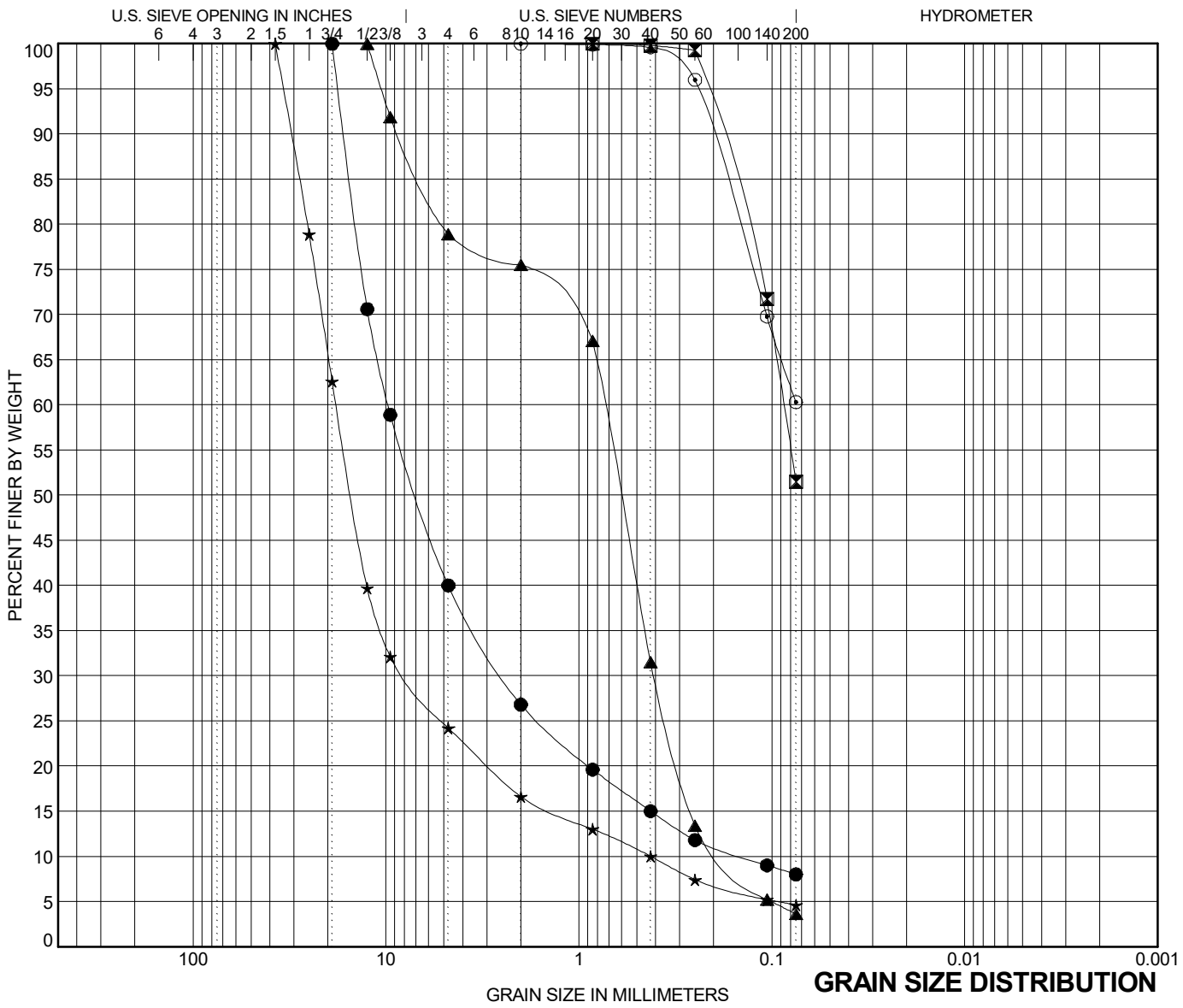
BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● R-25-001	5	21.0	4.75	0.34	0.081		0.0	71.3	28.7	
⊠ R-25-001	6A	25.0	9.5	0.535	0.336	0.204	1.5	95.7	2.8	
▲ R-25-001	8	36.0	19	6.299	1.756	0.132	54.5	37.8	7.7	
★ R-25-002	6	26.0	9.5	0.198	0.131	0.078	0.4	90.2	9.4	
⊙ R-25-002	8	36.0	19	2.724	0.485	0.127	32.8	60.0	7.2	

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

JOB NO: 2024-142-GEO

PLATE NO: III-2A



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	R-25-002	9	44.2	Poorly graded GRAVEL with CLAY and SAND				4.33	67.69
⊠	R-25-003	1	3.5	SANDY SILT					
▲	R-25-003	6	26.0	Poorly graded SAND with GRAVEL				1.28	4.23
★	R-25-003	7	31.0	Poorly graded GRAVEL with SAND				8.11	42.63
⊙	R-25-004	3	11.0	SANDY SILT					

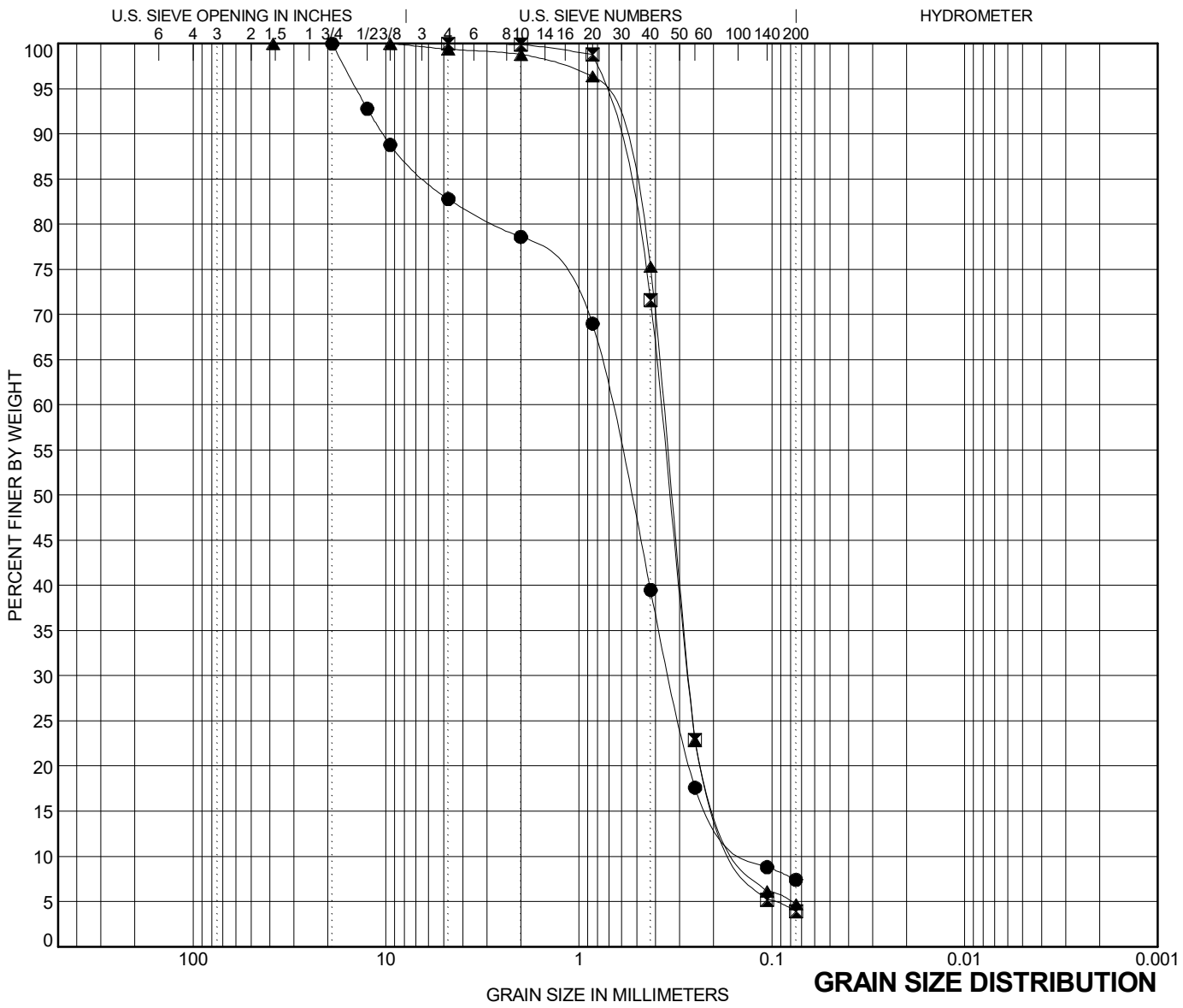
	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-25-002	9	44.2	19	9.748	2.467	0.144	60.0	32.0	8.0	
⊠	R-25-003	1	3.5	0.85	0.087			0.0	48.5	51.5	
▲	R-25-003	6	26.0	12.5	0.74	0.407	0.175	21.1	75.3	3.6	
★	R-25-003	7	31.0	37.5	18.118	7.901	0.425	75.8	19.6	4.6	
⊙	R-25-004	3	11.0	2				0.0	39.7	60.3	

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

JOB NO: 2024-142-GEO

PLATE NO: III-2B



GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BORING	SAMPLE #	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	R-25-004	5	21.0	Poorly graded SAND with SILT and GRAVEL				1.39	5.77
⧓	R-25-004	6	26.0	Poorly graded SAND				1.46	2.80
▲	R-25-004	7	31.0	Poorly graded SAND				1.53	2.81

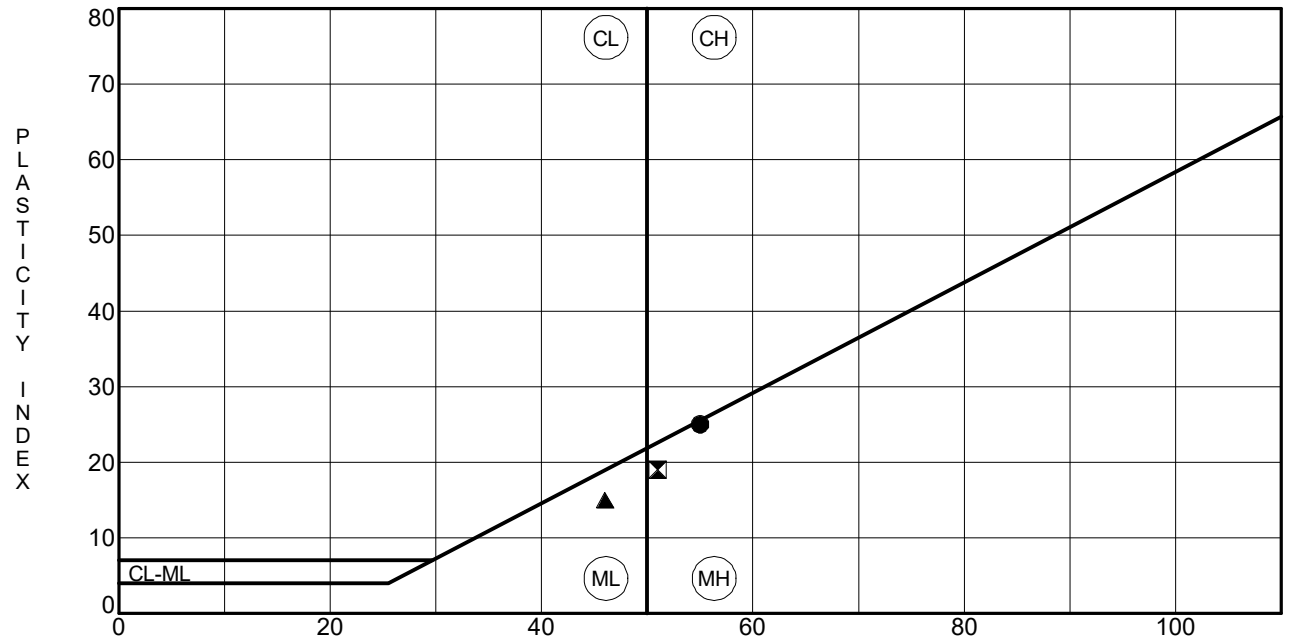
	BORING	SAMPLE #	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	R-25-004	5	21.0	19	0.688	0.338	0.119	17.2	75.4	7.4	
⧓	R-25-004	6	26.0	4.75	0.375	0.27	0.134	0.0	96.1	3.9	
▲	R-25-004	7	31.0	38.5	0.364	0.269	0.13	0.6	94.7	4.7	

PARIKH
Practicing in the Geosciences

YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

JOB NO: 2024-142-GEO

PLATE NO: III-2C



PLASTICITY

	BOREHOLE	SAMPLE #	DEPTH	LL	PL	PI	Fines	Classification
●	**R-25-001**	**3A**	**10.5**	**55**	**30**	**25**		**Elastic SILT**
⧓	**R-25-002**	**2**	**6.0**	**51**	**32**	**19**		**Elastic SILT**
▲	**R-25-003**	**3B**	**11.0**	**46**	**31**	**15**		**SILT**

PARIKH
Practicing in the Geosciences

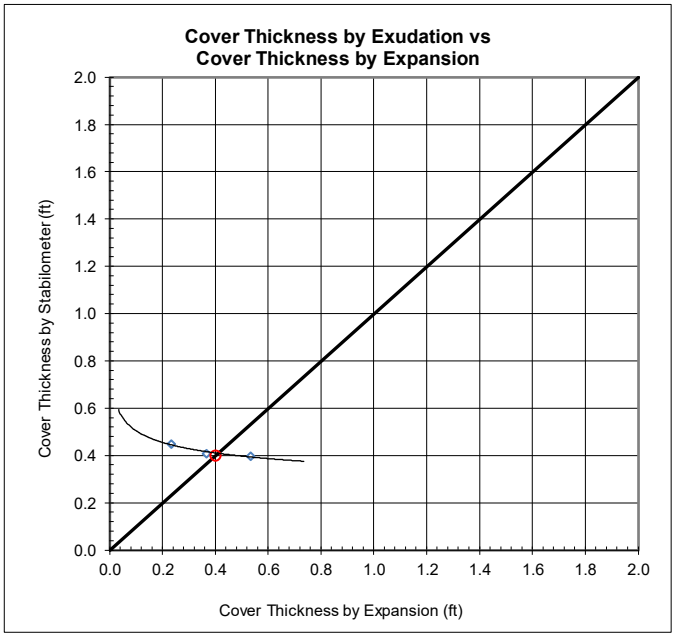
YUBA-SUTTER TRANSIT RESILIENT NEXT GENERATION TRANSIT FACILITY PLAN
COUNTY OF YUBA, CALIFORNIA

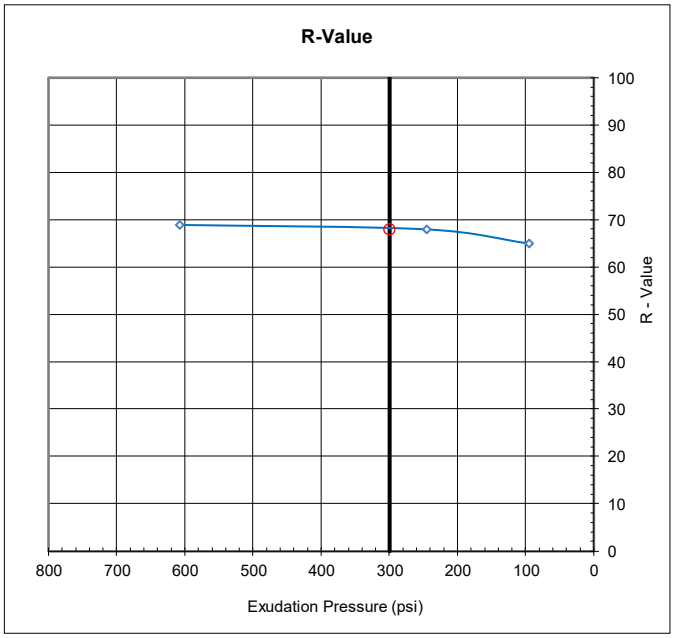
JOB NO: 2024-142-GEO | **PLATE NO: III-3**

R-VALUE REPORT

ASTM D2844 or CTM 301

Project Name:	Yuba-Sutter Transit Facility			Date:	3/6/2025
Client:	AECOM			Project No.:	2024-142-GEO
Sample No.:	R-25-001	Depth:	0'-5'	Lab No.:	
Location:			Onsite / Native	Sample Date:	
Material:	Silty SAND (SM); Yellowish Brown			Sampled By:	Stanislav





Specimen No.		A	B	C
Moisture Content at Test (%)		14.8	14.3	13.4
Dry Density at Test (pcf)		104.8	105.3	107.3
Compactor Pressure (psi)		250.0	250.0	250.0
Exudation Pressure (psi)		95.0	245.9	608.0
Stabilometer	Stabilometer at 2,000 lb (160 psi), Ph	50.6	47.5	46.9
	Displacement Turns, d	2.9	2.8	2.7
	R-Value	65	68	69
	Specimen Height (in)	2.54	2.58	2.52
	Corrected R-Value	65	68	69
	Cover Thickness by Stabilometer (ft)	0.45	0.41	0.40
Expansion	Expansion Dial Reading (0.0001 in)	7	11	16
	Expansion Pressure (psf)	30.3	47.6	69.3
	Cover Thickness by Expansion (ft)	0.23	0.37	0.53
R-Value @ 300 psi Exudation Pressure =		68.0	**Controlling R-Value = 68**	
R-Value by Expansion Pressure =		68.8		

Notes:

Assumed TI = 5.0

Assumed Gf = 1.25

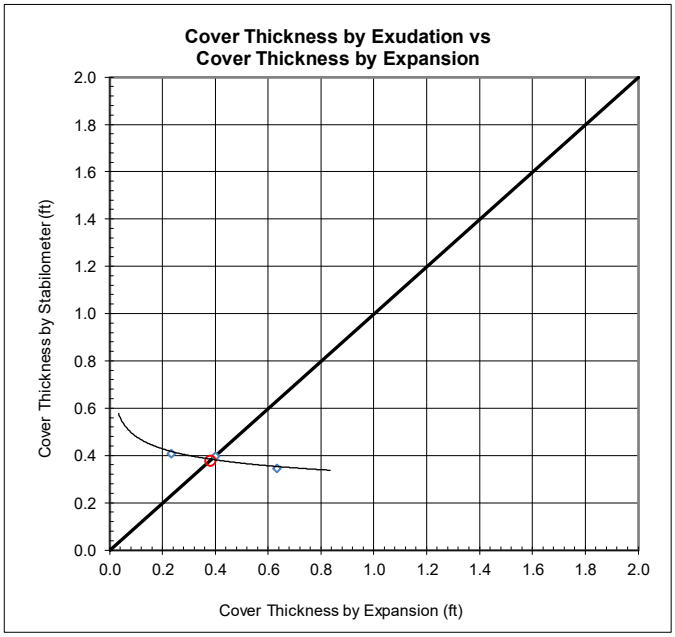
Report By: Do Nguyen

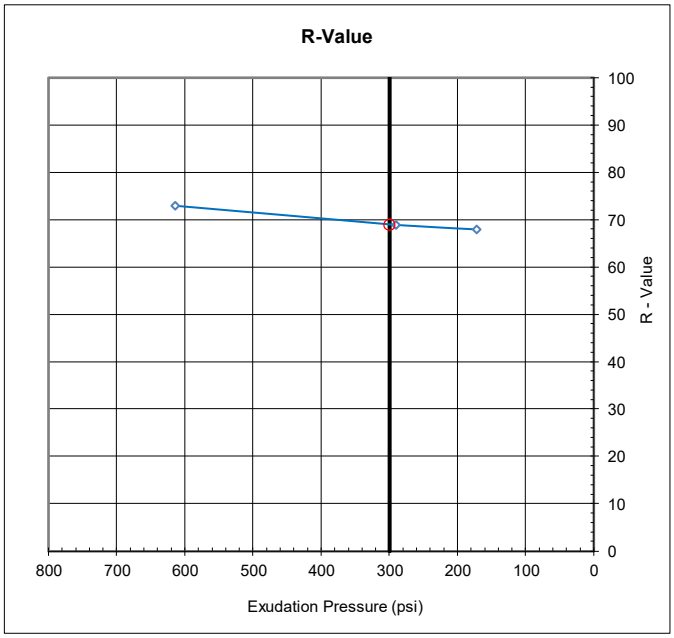
Plate No.: III-4A

R-VALUE REPORT

ASTM D2844 or CTM 301

Project Name:	Yuba-Sutter Transit Facility			Date:	3/6/2025
Client:	AECOM			Project No.:	2024-142-GEO
Sample No.:	R-25-004	Depth:	0'-5'	Lab No.:	
Location:			Onsite / Native	Sample Date:	
Material:	Sandy SILT (ML); Light Brown			Sampled By:	Stanislav





Specimen No.		A	B	C
Moisture Content at Test (%)		14.1	13.6	13.1
Dry Density at Test (pcf)		109.7	110.7	112.0
Compactor Pressure (psi)		175.0	200.0	215.0
Exudation Pressure (psi)		172.5	290.5	614.9
Stabilometer	Stabilometer at 2,000 lb (160 psi), Ph	46.7	44.1	38.2
	Displacement Turns, d	2.9	3.0	2.9
	R-Value	68	69	73
	Specimen Height (in)	2.59	2.61	2.52
	Corrected R-Value	68	69	73
	Cover Thickness by Stabilometer (ft)	0.41	0.40	0.35
Expansion	Expansion Dial Reading (0.0001 in)	7	12	19
	Expansion Pressure (psf)	30.3	52.0	82.3
	Cover Thickness by Expansion (ft)	0.23	0.40	0.63
R-Value @ 300 psi Exudation Pressure =	69.0	**Controlling R-Value = 69**		
R-Value by Expansion Pressure =	70.3			

Notes:

Assumed TI = 5.0

Assumed Gf = 1.25

Report By: Do Nguyen

Plate No.: III-4B

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/14/2025
Date Submitted 03/10/2025

To: Do Nguyen
Parikh Consultants, Inc.
1497 N.Milpitas Blvd
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Ty Bui
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2024-142-GEO Site ID : A-25-001 #2@6FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 94232-194704.

EVALUATION FOR SOIL CORROSION

Soil pH	7.11	
Minimum Resistivity	2.25 ohm-cm (x1000)	
Chloride	9.1 ppm	00.00091 %
Sulfate	26.5 ppm	00.00265 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/14/2025
Date Submitted 03/10/2025

To: Do Nguyen
Parikh Consultants, Inc.
1497 N.Milpitas Blvd
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Ty Bui
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2024-142-GEO Site ID : A-25-002 #1@3FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 94232-194705.

EVALUATION FOR SOIL CORROSION

Soil pH	6.47	
Minimum Resistivity	8.04 ohm-cm (x1000)	
Chloride	3.2 ppm	00.00032 %
Sulfate	11.2 ppm	00.00112 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/14/2025
Date Submitted 03/10/2025

To: Do Nguyen
Parikh Consultants, Inc.
1497 N.Milpitas Blvd
Milpitas, CA 95035

From: Gene Oliphant, Ph.D. \ Ty Bui
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2024-142-GEO Site ID : A-25-004 #2@6FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 94232-194706.

EVALUATION FOR SOIL CORROSION

Soil pH	6.82	
Minimum Resistivity	34.84 ohm-cm (x1000)	
Chloride	3.5 ppm	00.00035 %
Sulfate	3.1 ppm	00.00031 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422m

APPENDIX IV

CALCULATIONS

Strength Parameters and Shear Wave Velocity Calculations

SOIL PARAMETERS & Vs30

Calc By:
Date:

PROJECT NAME:	Yuba-Sutter Transit Resilient Next Gen	**MAJOR CUT(-)/FILL(+) (ft)**		0	**Soil Groups**
PROJECT NO.:	2024-142-GEO	**DESIGN GW DEPTH (ft)**		19	1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)
STRUCTURE:	Transit Center				2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)
BORING NO.:	R-25-001				3. Liquefiable Soils (Residual Shear Strength, Sr)
BORING ELEV. (ft):	65				4. Young Sedimentary Rocks (Cohesionless)
BOREHOLE DIA (in)=	6	**HAMMER ENERGY =**	87.9%		5. Young Sedimentary Rocks (Cohesive)
GW DEPTH (ft)=	24	**DRILLING RODS (Y/N)=**	Y		

Age Scaling Factor (ASF, Dimensionless)
H: Holocene
Q: Quaternary
P: Pleistocene

N_d	12.8	V_{sd} (m/s)	168
N_{30}	16.2	V_{s30} (m/s)	213

Sample No	Layer Thickness (ft) from	to	Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$ (C_B, C_B & C_S Corr.)	F.C.	$(N_1)_{60,CS}$	Correlated Strength Parameters ϕ (°)	Su (psf)	Sr (psf)	Lab Su (psf)	Vs (m/s)
1	0	4.5	2.5	SM	1	Q	14	SPT	125	313	313	14.0	1.47	20.5	1.70	34.9	0.75	1.20	1.05	19.4	32.9		32.9	35.8				111
2	4.5	8	5	CL	2	Q	5	SPT	125	625	625	5.0	1.47	7.3	1.70	12.5	0.75	1.20	1.05	6.9	11.8				916			107
3	8	11	10.5	CL-ML	2	Q	11	MC	125	1,313	1,313	7.2	1.47	10.5	1.27	13.3	0.85	1.00	1.05	9.3	11.9				1,309			143
4	11	18	15	ML	2	Q	5	SPT	125	1,875	1,875	5.0	1.47	7.3	1.06	7.8	0.85	1.20	1.05	7.8	8.3				916			156
5	18	24	20	SM	1	Q	14	SPT	125	2,500	2,500	14.0	1.47	20.5	0.92	18.9	0.95	1.20	1.05	24.6	22.6		22.6	32.6				188
6	24	26	25	SP	1	Q	5	SPT	125	3,125	3,063	5.0	1.47	7.3	0.83	6.1	0.95	1.20	1.05	8.8	7.3	3%	7.3	30.8				156
7	26	29	26	CL	2	Q	5	MC	125	3,250	3,125	3.3	1.47	4.8	0.82	3.9	1.00	1.00	1.05	5.0	4.1				595			170
8	29	34	35	SM	1	Q	69	SPT	125	4,375	3,689	69.0	1.47	100.0	0.76	75.7	1.00	1.20	1.05	100.0	75.7		75.7	40.1				284
9	34	36.5	40	GP-GM	1	Q	90	SPT	125	5,000	4,002	90.0	1.47	100.0	0.73	72.7	1.00	1.20	1.05	100.0	72.7		72.7	39.9				327
10	36.5	40	39	GP-GM	1	Q	71	SPT	125	4,875	3,939	71.0	1.47	100.0	0.73	73.3	1.00	1.20	1.05	100.0	73.3		73.3	40.0				326

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For fine-grained materials, the correlated undrained shear strengths are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
4. The friction angles were estimated based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
5. Residual Strength (Sr) is based on Kramer and Wang (2015) as suggested in the Caltrans Geotechnical Manual, "Liquefaction-Induced Lateral Spreading" module (January 2020).
6. The estimated Vs were correlated based on Caltrans Geotechnical Manual, "Design Acceleration Response Spectrum" module (January 2021).

SOIL PARAMETERS & Vs30

Calc By:
Date:

PROJECT NAME:	Yuba-Sutter Transit Resilient Next Gen	**MAJOR CUT(-)/FILL(+) (ft)**		0	
PROJECT NO.:	2024-142-GEO	**DESIGN GW DEPTH (ft)**		19	
STRUCTURE:	Transit Center				
BORING NO.:	R-25-002				
BORING ELEV. (ft):	65				
BOREHOLE DIA (in)=	6	**HAMMER ENERGY =**		87.9%	
GW DEPTH (ft)=	26	**DRILLING RODS (Y/N)=**		Y	

Soil Groups
1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)
2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)
3. Liquefiable Soils (Residual Shear Strength, Sr)
4. Young Sedimentary Rocks (Cohesionless)
5. Young Sedimentary Rocks (Cohesive)

Age Scaling Factor (ASF, Dimensionless)
H: Holocene
Q: Quaternary
P: Pleistocene

N_d	16.2	V_{sd} (m/s)	169
N_{30}	20.1	V_{s30} (m/s)	209

Sample No	Layer Thickness (ft) from	to	Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$ (C_B, C_B & C_S Corr.)	F.C.	$(N_1)_{60,CS}$	Correlated Strength Parameters ϕ (°)	Su (psf)	Sr (psf)	Lab Su (psf)	Vs (m/s)
1	0	4.5	2.5	SM	1	Q	30	SPT	125	313	313	30.0	1.47	44.0	1.70	74.7	0.75	1.20	1.05	41.5	70.6		70.6	40.0				132
2	4.5	8	5	MH	2	Q	7	SPT	125	625	625	7.0	1.47	10.3	1.70	17.4	0.75	1.20	1.05	9.7	16.5				1,282			113
3	8	13	10.5	ML	2	Q	12	MC	125	1,313	1,313	7.8	1.47	11.4	1.27	14.5	0.85	1.00	1.05	10.2	13.0				1,428			145
4	13	18	15	SM	1	Q	5	SPT	125	1,875	1,875	5.0	1.47	7.3	1.06	7.8	0.85	1.20	1.05	7.8	8.3	12%	10.2	29.0				136
5	18	24	20	SM	1	Q	14	SPT	125	2,500	2,500	14.0	1.47	20.5	0.92	18.9	0.95	1.20	1.05	24.6	22.6	12%	24.9	32.6				188
6	24	29	25	SP-SM	1	Q	10	SPT	125	3,125	3,125	10.0	1.47	14.7	0.82	12.1	0.95	1.20	1.05	17.5	14.4	9%	15.4	30.6				183
7	29	34	30	SP	1	Q	8	SPT	125	3,750	3,500	8.0	1.47	11.7	0.78	9.1	1.00	1.20	1.05	14.8	11.5		11.5	32.1				181
8	34	40	35	SP	1	Q	17	SPT	125	4,375	3,813	17.0	1.47	24.9	0.74	18.6	1.00	1.20	1.05	31.4	23.4	7%	23.7	35.0				220
9	40	44.5	40	GP	1	Q	14	SPT	125	5,000	4,126	14.0	1.47	20.5	0.72	14.7	1.00	1.20	1.05	25.8	18.5		18.5	35.5				255
10	44.5	46.5	45	CL	2	Q	34	SPT	125	5,625	4,439	34.0	1.47	49.8	0.69	34.4	1.00	1.20	1.05	62.8	43.3				6,226			292

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For fine-grained materials, the correlated undrained shear strengths are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
4. The friction angles were estimated based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
5. Residual Strength (Sr) is based on Kramer and Wang (2015) as suggested in the Caltrans Geotechnical Manual, "Liquefaction-Induced Lateral Spreading" module (January 2020).
6. The estimated Vs were correlated based on Caltrans Geotechnical Manual, "Design Acceleration Response Spectrum" module (January 2021).

SOIL PARAMETERS & Vs30

Calc By:
Date:

PROJECT NAME:	Yuba-Sutter Transit Resilient Next Gen	**MAJOR CUT(-)/FILL(+) (ft)**	0	**Soil Groups**	**Age Scaling Factor (ASF, Dimensionless)**
PROJECT NO.:	2024-142-GEO	**DESIGN GW DEPTH (ft)**	18.7	1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)	H: Holocene
STRUCTURE:	Transit Center			2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)	Q: Quaternary
BORING NO.:	R-25-003			3. Liquefiable Soils (Residual Shear Strength, Sr)	P: Pleistocene
BORING ELEV. (ft):	64.7			4. Young Sedimentary Rocks (Cohesionless)	
BOREHOLE DIA (in)=	6	**HAMMER ENERGY =**	87.9%	5. Young Sedimentary Rocks (Cohesive)	
GW DEPTH (ft)=	26	**DRILLING RODS (Y/N)=**	Y		

N_d	12.7	V_{sd} (m/s)	161
N_{30}	16.2	V_{s30} (m/s)	205

Sample No	Layer Thickness (ft)		Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$ (C_B, C_B & C_S Corr.)	F.C.	$(N_1)_{60,CS}$	Correlated Strength Parameters			Lab Su (psf)	Vs (m/s)
	from	to																						ϕ (°)	Su (psf)	Sr (psf)	
1	0	4.5	2.5	SM	1	Q	7	SPT	125	313	313	7.0	1.47	10.3	1.70	17.4	0.75	1.20	1.05	9.7	16.5		16.5	32.2				94
2	4.5	8	5	CL-ML	2	Q	5	SPT	125	625	625	5.0	1.47	7.3	1.70	12.5	0.75	1.20	1.05	6.9	11.8				916			107
3	8	14	10.5	CL-ML	2	Q	7	MC	125	1,313	1,313	4.6	1.47	6.7	1.27	8.5	0.85	1.00	1.05	5.9	7.6				833			132
4	14	18	15	ML	2	Q	6	SPT	125	1,875	1,875	6.0	1.47	8.8	1.06	9.3	0.85	1.20	1.05	9.4	10.0				1,099			161
5	18	23	20	SP	1	Q	12	SPT	125	2,500	2,500	12.0	1.47	17.6	0.92	16.2	0.95	1.20	1.05	21.0	19.4		19.4	34.4				182
6	23	28	25	SP	1	Q	14	SPT	125	3,125	3,125	14.0	1.47	20.5	0.82	16.9	0.95	1.20	1.05	24.6	20.2		20.2	34.6				198
7	28	33	30.5	GP	1	Q	36	SPT	125	3,813	3,532	36.0	1.47	52.7	0.77	40.8	1.00	1.20	1.05	66.5	51.4		51.4	40.7				296
8	33	37	35	GP	1	Q	24	SPT	125	4,375	3,813	24.0	1.47	35.2	0.74	26.2	1.00	1.20	1.05	44.3	33.0		33.0	38.2				278
9	37	38.5	38	GP	1	Q	100	SPT	125	4,750	4,001	100.0	1.47	100.0	0.73	72.7	1.00	1.20	1.05	100.0	72.7		72.7	43.9				327

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For fine-grained materials, the correlated undrained shear strengths are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
4. The friction angles were estimated based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
5. Residual Strength (Sr) is based on Kramer and Wang (2015) as suggested in the Caltrans Geotechnical Manual, "Liquefaction-Induced Lateral Spreading" module (January 2020).
6. The estimated Vs were correlated based on Caltrans Geotechnical Manual, "Design Acceleration Response Spectrum" module (January 2021).

SOIL PARAMETERS & Vs30

Calc By:
Date:

PROJECT NAME:	Yuba-Sutter Transit Resilient Next Gen	**MAJOR CUT(-)/FILL(+) (ft)**	0	**Soil Groups**	**Age Scaling Factor (ASF, Dimensionless)**
PROJECT NO.:	2024-142-GEO	**DESIGN GW DEPTH (ft)**	18.9	1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)	H: Holocene
STRUCTURE:	Transit Center			2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)	Q: Quaternary
BORING NO.:	R-25-004			3. Liquefiable Soils (Residual Shear Strength, Sr)	P: Pleistocene
BORING ELEV. (ft):	64.9			4. Young Sedimentary Rocks (Cohesionless)	
BOREHOLE DIA (in)=	6	**HAMMER ENERGY =**	87.9%	5. Young Sedimentary Rocks (Cohesive)	
GW DEPTH (ft)=	28	**DRILLING RODS (Y/N)=**	Y		

N_d	13.4	V_{sd} (m/s)	156
N_{30}	16.9	V_{s30} (m/s)	197

Sample No	Layer Thickness (ft)		Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$ (C_B, C_B & C_S Corr.)	F.C.	$(N_1)_{60,CS}$	Correlated Strength Parameters ϕ (°)	Su (psf)	Sr (psf)	Lab Su (psf)	Vs (m/s)
	from	to																										
1	0	5	2.5	ML	2	Q	8	SPT	125	313	313	8.0	1.47	11.7	1.70	19.9	0.75	1.20	1.05	11.1	18.8				1,465			93
2	5	8	5.5	SM	1	Q	15	MC	125	688	688	6.2	1.47	9.0	1.70	15.3	0.80	1.00	1.05	7.6	12.9		12.9	31.6				107
3	8	13	10	ML	2	Q	5	SPT	125	1,250	1,250	5.0	1.47	7.3	1.30	9.5	0.85	1.20	1.05	7.8	10.2	60%			916			137
4	13	18	15	SM	2	Q	7	SPT	125	1,875	1,875	7.0	1.47	10.3	1.06	10.9	0.85	1.20	1.05	11.0	11.7				1,282			165
5	18	24	20	SP-SM	1	Q	11	SPT	125	2,500	2,500	11.0	1.47	16.1	0.92	14.8	0.95	1.20	1.05	19.3	17.7	7%	18.1	31.5				178
6	24	28	25	SP	1	Q	6	SPT	125	3,125	3,125	6.0	1.47	8.8	0.82	7.2	0.95	1.20	1.05	10.5	8.7	4%	8.7	31.3				163
7	28	35.5	30.5	SP	1	Q	11	SPT	125	3,813	3,657	11.0	1.47	16.1	0.76	12.3	1.00	1.20	1.05	20.3	15.4	5%	15.4	33.2				197
8	35.5	38	35	GP-GM	1	Q	43	SPT	125	4,375	3,938	43.0	1.47	63.0	0.73	46.2	1.00	1.20	1.05	79.4	58.2		58.2	37.5				312
9	38	41	40	GP	1	Q	100	SPT	125	5,000	4,251	100.0	1.47	100.0	0.71	70.6	1.00	1.20	1.05	100.0	70.6		70.6	43.8				331

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For fine-grained materials, the correlated undrained shear strengths are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
4. The friction angles were estimated based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021).
5. Residual Strength (Sr) is based on Kramer and Wang (2015) as suggested in the Caltrans Geotechnical Manual, "Liquefaction-Induced Lateral Spreading" module (January 2020).
6. The estimated Vs were correlated based on Caltrans Geotechnical Manual, "Design Acceleration Response Spectrum" module (January 2021).

Liquefaction Analysis

LIQUEFACTION ANALYSIS

Calc By:
Date:

PROJECT NAME:	Yuba-Sutter Transit Resilient Next Gener	**MAJOR CUT(-)/FILL(+) (ft)**	0	a_{max} (g)=	0.26
PROJECT NO.:	2024-142-GEO	**DESIGN GW DEPTH (ft)**	19	**FAULT M_w =**	6.79
STRUCTURE:	Transit Center				
BORING NO.:	R-25-001			*MSF* =	1.29
BORING ELEV. (ft):	65				
BOREHOLE DIA (in)=	6	**HAMMER ENERGY =**	87.9%		
GW DEPTH (ft)=	24	**DRILLING RODS (Y/N)=**	Y		

Soil Groups
1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)
2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)
3. Liquefiable Soils (Residual Shear Strength, Sr)
4. Young Sedimentary Rocks (Cohesionless)
5. Young Sedimentary Rocks (Cohesive)

Age Scaling Factor (ASF, Dimensionless)
H: Holocene
Q: Quaternary
P: Pleistocene

MAXIMUM LIQ. DEPTH CONSIDERED (ft) 70

Sample No	Layer Thickness (ft) from	to	Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	Cyc. Resistance Ratio (CRR) /Cyc. Stress Ratio (CSR) $CRR_{7.5}$	σ_v	σ_v'	r_d	CSR	*F.S.=($CRR_{7.5}$/CSR)*MSF*Ks*Kα* Kσ	Dr	f	Kα	FS	*Post-Liq. Settl.* Vol. Strain (%)	ΔD (in)
1	0	4.5	2.5	SM	1	Q	14	SPT	125	313	313	14.0	1.47	20.5	1.70	34.9	0.75	1.20	1.05	19.4	32.9		32.9		312.5	312.5	1.0	0.2	1.0	0.9	0.6	1.0			
2	4.5	8	5	CL	2	Q	5	SPT	125	625	625	5.0	1.47	7.3	1.70	12.5	0.75	1.20	1.05	6.9	11.8				625.0	625.0	1.0		1.0	0.6	0.7	1.0			
3	8	11	10.5	CL-ML	2	Q	11	MC	125	1,313	1,313	7.2	1.47	10.5	1.27	13.3	0.85	1.00	1.05	9.3	11.9				1312.5	1312.5	1.0		1.0	0.7	0.7	1.0			
4	11	18	15	ML	2	Q	5	SPT	125	1,875	1,875	5.0	1.47	7.3	1.06	7.8	0.85	1.20	1.05	7.8	8.3				1875.0	1875.0	1.0		1.0	0.5	0.7	1.0			
5	18	24	20	SM	1	Q	14	SPT	125	2,500	2,500	14.0	1.47	20.5	0.92	18.9	0.95	1.20	1.05	24.6	22.6		22.6	0.25	2500.0	2437.6	1.0	0.2	0.9	0.8	0.6	1.0	1.83		
6	24	26	25	SP	1	Q	5	SPT	125	3,125	3,063	5.0	1.47	7.3	0.83	6.1	0.95	1.20	1.05	8.8	7.3	3%	7.3	0.09	3125.0	2750.6	0.9	0.2	0.9	0.5	0.7	1.0	(0.58)	2.87%	0.7
7	26	29	26	CL	2	Q	5	MC	125	3,250	3,125	3.3	1.47	4.8	0.82	3.9	1.00	1.00	1.05	5.0	4.1				3250.0	2813.2	0.9		0.9	0.4	0.8	1.0			
8	29	34	35	SM	1	Q	69	SPT	125	4,375	3,689	69.0	1.47	100.0	0.76	75.7	1.00	1.20	1.05	100.0	75.7		75.7		4375.0	3376.6	0.9	0.2	0.8	1.3	0.6	1.0	NON-LIQ.		
9	34	36.5	40	GP-GM	1	Q	90	SPT	125	5,000	4,002	90.0	1.47	100.0	0.73	72.7	1.00	1.20	1.05	100.0	72.7		72.7		5000.0	3689.6	0.9	0.2	0.8	1.3	0.6	1.0	NON-LIQ.		
10	36.5	40	39	GP-GM	1	Q	71	SPT	125	4,875	3,939	71.0	1.47	100.0	0.73	73.3	1.00	1.20	1.05	100.0	73.3		73.3		4875.0	3627.0	0.9	0.2	0.8	1.3	0.6	1.0	NON-LIQ.		

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For correction of overburden, CN = (1/sv')0.5 with a maximum value of 1.7.
4. The influence of Fines Contents are expressed by the following correction: (N1)60cs = a + b (N1)60
   where a and b = coefficients determined from the following relationships
   for FC < 5% a = 0, b = 1.0
   for 5% < FC < 35% a = exp(1.76-(190/FC2)), b = (0.99+(FC1.5/1000))
   for FC > 35% a = 5.0, b = 1.2
5. For (N1)60,cs greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.
6. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

LIQUEFACTION ANALYSIS

Calc By:
Date:

PROJECT NAME:	Yuba-Sutter Transit Resilient Next Gener	**MAJOR CUT(-)/FILL(+) (ft)**	0	a_{max} (g)=	0.26
PROJECT NO.:	2024-142-GEO	**DESIGN GW DEPTH (ft)**	19	**FAULT M_w =**	6.79
STRUCTURE:	Transit Center				
BORING NO.:	R-25-002			**MAXIMUM LIQ. DEPTH CONSIDERED (ft)**	70
BORING ELEV. (ft):	65			*MSF =*	1.29
BOREHOLE DIA (in)=	6	**HAMMER ENERGY =**	87.9%		
GW DEPTH (ft)=	26	**DRILLING RODS (Y/N)=**	Y		

Soil Groups
1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)
2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)
3. Liquefiable Soils (Residual Shear Strength, Sr)
4. Young Sedimentary Rocks (Cohesionless)
5. Young Sedimentary Rocks (Cohesive)

Age Scaling Factor (ASF, Dimensionless)
H: Holocene
Q: Quaternary
P: Pleistocene

Sample No	Layer Thickness (ft) from	to	Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	Cyc. Resistance Ratio (CRR) /Cyc. Stress Ratio (CSR) $CRR_{7.5}$	σ_v	σ_v'	r_d	CSR	*F.S.=($CRR_{7.5}$/CSR)*MSF*Ks*Kα* Kσ	Dr	f	Kα	FS	*Post-Liq. Settl.* Vol. Strain (%)	ΔD (in)
1	0	4.5	2.5	SM	1	Q	30	SPT	125	313	313	30.0	1.47	44.0	1.70	74.7	0.75	1.20	1.05	41.5	70.6		70.6		312.5	312.5	1.0	0.2	1.0	1.2	0.6	1.0			
2	4.5	8	5	MH	2	Q	7	SPT	125	625	625	7.0	1.47	10.3	1.70	17.4	0.75	1.20	1.05	9.7	16.5				625.0	625.0	1.0		1.0	0.7	0.7	1.0			
3	8	13	10.5	ML	2	Q	12	MC	125	1,313	1,313	7.8	1.47	11.4	1.27	14.5	0.85	1.00	1.05	10.2	13.0				1312.5	1312.5	1.0		1.0	0.7	0.7	1.0			
4	13	18	15	SM	1	Q	5	SPT	125	1,875	1,875	5.0	1.47	7.3	1.06	7.8	0.85	1.20	1.05	7.8	8.3	12%	10.2		1875.0	1875.0	1.0	0.2	1.0	0.5	0.7	1.0			
5	18	24	20	SM	1	Q	14	SPT	125	2,500	2,500	14.0	1.47	20.5	0.92	18.9	0.95	1.20	1.05	24.6	22.6	12%	24.9	0.29	2500.0	2437.6	1.0	0.2	0.9	0.8	0.6	1.0	2.11		
6	24	29	25	SP-SM	1	Q	10	SPT	125	3,125	3,125	10.0	1.47	14.7	0.82	12.1	0.95	1.20	1.05	17.5	14.4	9%	15.4	0.16	3125.0	2750.6	0.9	0.2	0.9	0.7	0.7	1.0	1.03		
7	29	34	30	SP	1	Q	8	SPT	125	3,750	3,500	8.0	1.47	11.7	0.78	9.1	1.00	1.20	1.05	14.8	11.5		11.5	0.13	3750.0	3063.6	0.9	0.2	0.9	0.6	0.7	1.0	(0.74)	2.14%	1.3
8	34	40	35	SP	1	Q	17	SPT	125	4,375	3,813	17.0	1.47	24.9	0.74	18.6	1.00	1.20	1.05	31.4	23.4	7%	23.7	0.27	4375.0	3376.6	0.9	0.2	0.8	0.8	0.6	1.0	1.41		
9	40	44.5	40	GP	1	Q	14	SPT	125	5,000	4,126	14.0	1.47	20.5	0.72	14.7	1.00	1.20	1.05	25.8	18.5		18.5	0.20	5000.0	3689.6	0.9	0.2	0.8	0.7	0.6	1.0	1.03		
10	44.5	46.5	45	CL	2	Q	34	SPT	125	5,625	4,439	34.0	1.47	49.8	0.69	34.4	1.00	1.20	1.05	62.8	43.3				5625.0	4002.6	0.8		0.7	1.0	0.6	1.0			

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For correction of overburden, CN = (1/sv')0.5 with a maximum value of 1.7.
4. The influence of Fines Contents are expressed by the following correction: (N1)60cs = a + b (N1)60
   where a and b = coefficients determined from the following relationships
   for FC < 5% a = 0, b = 1.0
   for 5% < FC < 35% a = exp(1.76-(190/FC2)), b = (0.99+(FC1.5/1000))
   for FC > 35% a = 5.0, b = 1.2
5. For (N1)60,cs greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.
6. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

LIQUEFACTION ANALYSIS

Calc By:
Date:

PROJECT NAME: Yuba-Sutter Transit Resilient Next Gener
PROJECT NO.: 2024-142-GEO
STRUCTURE: Transit Center
BORING NO.: R-25-003
BORING ELEV. (ft): 64.7
BOREHOLE DIA (in)= 6
GW DEPTH (ft)= 26

MAJOR CUT(-)/FILL(+) (ft) 0
DESIGN GW DEPTH (ft) 18.7
HAMMER ENERGY = 87.9%
DRILLING RODS (Y/N)= Y

Soil Groups
1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)
2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)
3. Liquefiable Soils (Residual Shear Strength, Sr)
4. Young Sedimentary Rocks (Cohesionless)
5. Young Sedimentary Rocks (Cohesive)

Age Scaling Factor (ASF, Dimensionless)
H: Holocene
Q: Quaternary
P: Pleistocene

MAXIMUM LIQ. DEPTH CONSIDERED (ft) 70

a_{max} (g)= 0.26
FAULT M_w = 6.79
MSF = 1.29

Sample No	Layer Thickness (ft) from	to	Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_B, C_B & C_S Corr.)	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	Cyc. Resistance Ratio (CRR) /Cyc. Stress Ratio (CSR) $CRR_{7.5}$	σ_v	σ_v'	r_d	CSR	F.S.=($CRR_{7.5}$/CSR)*MSF*Ks*Kα Kσ	Dr	f	Kα	FS	Post-Liq. Settl. Vol. Strain (%)	ΔD (in)
1	0	4.5	2.5	SM	1	Q	7	SPT	125	313	313	7.0	1.47	10.3	1.70	17.4	0.75	1.20	1.05	9.7	16.5		16.5		312.5	312.5	1.0	0.2	1.0	0.7	0.6	1.0			
2	4.5	8	5	CL-ML	2	Q	5	SPT	125	625	625	5.0	1.47	7.3	1.70	12.5	0.75	1.20	1.05	6.9	11.8				625.0	625.0	1.0		1.0	0.6	0.7	1.0			
3	8	14	10.5	CL-ML	2	Q	7	MC	125	1,313	1,313	4.6	1.47	6.7	1.27	8.5	0.85	1.00	1.05	5.9	7.6				1312.5	1312.5	1.0		1.0	0.6	0.7	1.0			
4	14	18	15	ML	2	Q	6	SPT	125	1,875	1,875	6.0	1.47	8.8	1.06	9.3	0.85	1.20	1.05	9.4	10.0				1875.0	1875.0	1.0		1.0	0.6	0.7	1.0			
5	18	23	20	SP	1	Q	12	SPT	125	2,500	2,500	12.0	1.47	17.6	0.92	16.2	0.95	1.20	1.05	21.0	19.4		19.4	0.21	2500.0	2418.9	1.0	0.2	0.9	0.7	0.6	1.0	1.51		
6	23	28	25	SP	1	Q	14	SPT	125	3,125	3,125	14.0	1.47	20.5	0.82	16.9	0.95	1.20	1.05	24.6	20.2		20.2	0.22	3125.0	2731.9	0.9	0.2	0.9	0.8	0.6	1.0	1.33		
7	28	33	30.5	GP	1	Q	36	SPT	125	3,813	3,532	36.0	1.47	52.7	0.77	40.8	1.00	1.20	1.05	66.5	51.4		51.4		3812.5	3076.2	0.9	0.2	0.8	1.0	0.6	1.0	NON-LIQ.		
8	33	37	35	GP	1	Q	24	SPT	125	4,375	3,813	24.0	1.47	35.2	0.74	26.2	1.00	1.20	1.05	44.3	33.0		33.0		4375.0	3357.9	0.9	0.2	0.8	0.9	0.6	1.0	NON-LIQ.		
9	37	38.5	38	GP	1	Q	100	SPT	125	4,750	4,001	100.0	1.47	100.0	0.73	72.7	1.00	1.20	1.05	100.0	72.7		72.7		4750.0	3545.7	0.9	0.2	0.8	1.3	0.6	1.0	NON-LIQ.		

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For correction of overburden, CN = (1/sv')0.5 with a maximum value of 1.7.
4. The influence of Fines Contents are expressed by the following correction: (N1)60cs = a + b (N1)60
   where a and b = coefficients determined from the following relationships
   for FC < 5% a = 0, b = 1.0
   for 5% < FC < 35% a = exp(1.76-(190/FC2)), b = (0.99+(FC1.5/1000))
   for FC > 35% a = 5.0, b = 1.2
5. For (N1)60,cs greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.
6. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

LIQUEFACTION ANALYSIS

Calc By:
Date:

PROJECT NAME: Yuba-Sutter Transit Resilient Next Gener
PROJECT NO.: 2024-142-GEO
STRUCTURE: Transit Center
BORING NO.: R-25-004
BORING ELEV. (ft): 64.9
BOREHOLE DIA (in)= 6
GW DEPTH (ft)= 28

MAJOR CUT(-)/FILL(+) (ft) 0
DESIGN GW DEPTH (ft) 18.9
HAMMER ENERGY = 87.9%
DRILLING RODS (Y/N)= Y

Soil Groups
1. Cohesionless Materials (SC, SM, SP, SW, GP, & GW, ML)
2. Cohesive Materials (CL, CH, ML, MH, OL, & OH, SC, GC)
3. Liquefiable Soils (Residual Shear Strength, Sr)
4. Young Sedimentary Rocks (Cohesionless)
5. Young Sedimentary Rocks (Cohesive)

Age Scaling Factor (ASF, Dimensionless)
H: Holocene
Q: Quaternary
P: Pleistocene

MAXIMUM LIQ. DEPTH CONSIDERED (ft) 70

a_{max} (g)= 0.26
FAULT M_w = 6.79
MSF = 1.29

Sample No	Layer Thickness (ft) from	to	Sample Depth (ft)	USCS Type	Soil Type	ASF (H/Q/P)	Field Blow Count	Sampler Type	Unit Weight (pcf)	σ_v (psf)	σ_v' (psf)	SPT-N eq.	C_E	N_{60} C_E Corr.	C_N	$(N_1)_{60}$	C_R	C_S	C_B	N_{60} (C_R, C_B & C_S Corr.)	$(N_1)_{60}$	F.C.	$(N_1)_{60,CS}$	Cyc. Resistance Ratio (CRR) /Cyc. Stress Ratio (CSR) $CRR_{7.5}$	σ_v	σ_v'	r_d	CSR	F.S.=($CRR_{7.5}$/CSR)*MSF*Ks*Kα Kσ	Dr	f	Kα	FS	Post-Liq. Settl. Vol. Strain (%)	ΔD (in)
1	0	5	2.5	ML	2	Q	8	SPT	125	313	313	8.0	1.47	11.7	1.70	19.9	0.75	1.20	1.05	11.1	18.8				312.5	312.5	1.0		1.0	0.7	0.6	1.0			
2	5	8	5.5	SM	1	Q	15	MC	125	688	688	6.2	1.47	9.0	1.70	15.3	0.80	1.00	1.05	7.6	12.9		12.9		687.5	687.5	1.0	0.2	1.0	0.6	0.7	1.0			
3	8	13	10	ML	2	Q	5	SPT	125	1,250	1,250	5.0	1.47	7.3	1.30	9.5	0.85	1.20	1.05	7.8	10.2	60%			1250.0	1250.0	1.0		1.0	0.6	0.7	1.0			
4	13	18	15	SM	2	Q	7	SPT	125	1,875	1,875	7.0	1.47	10.3	1.06	10.9	0.85	1.20	1.05	11.0	11.7				1875.0	1875.0	1.0		1.0	0.6	0.7	1.0			
5	18	24	20	SP-SM	1	Q	11	SPT	125	2,500	2,500	11.0	1.47	16.1	0.92	14.8	0.95	1.20	1.05	19.3	17.7	7%	18.1	0.19	2500.0	2431.4	1.0	0.2	0.9	0.7	0.6	1.0	1.41		
6	24	28	25	SP	1	Q	6	SPT	125	3,125	3,125	6.0	1.47	8.8	0.82	7.2	0.95	1.20	1.05	10.5	8.7	4%	8.7	0.10	3125.0	2744.4	0.9	0.2	0.9	0.5	0.7	1.0	(0.65)	2.50%	1.2
7	28	35.5	30.5	SP	1	Q	11	SPT	125	3,813	3,657	11.0	1.47	16.1	0.76	12.3	1.00	1.20	1.05	20.3	15.4	5%	15.4	0.16	3812.5	3088.7	0.9	0.2	0.8	0.7	0.7	1.0	(0.92)	1.43%	1.3
8	35.5	38	35	GP-GM	1	Q	43	SPT	125	4,375	3,938	43.0	1.47	63.0	0.73	46.2	1.00	1.20	1.05	79.4	58.2		58.2		4375.0	3370.4	0.9	0.2	0.8	1.1	0.6	1.0	NON-LIQ.		
9	38	41	40	GP	1	Q	100	SPT	125	5,000	4,251	100.0	1.47	100.0	0.71	70.6	1.00	1.20	1.05	100.0	70.6		70.6		5000.0	3683.4	0.9	0.2	0.8	1.3	0.6	1.0	NON-LIQ.		

Version 3.53 Notes:
1. The correction factors CE (Energy Ratio), CB (Borehole Diameter), CR (Rod Length) and CS (Sampling Method-liner), CN (Overburden) are per Youd 2001
2. The conversion factors from Modified California Sampler (MC)-N or California Sampler (C)-N to SPT-N are based on Caltrans Geotechnical Manual, "Soil Correlations" module (March 2021):
   MC Cohesive: 0.65 MC Cohesionless: 0.41 C Cohesive: 0.85 C Cohesionless: 0.63
3. For correction of overburden, CN = (1/sv')0.5 with a maximum value of 1.7.
4. The influence of Fines Contents are expressed by the following correction: (N1)60cs = a + b (N1)60
   where a and b = coefficients determined from the following relationships
   for FC < 5% a = 0, b = 1.0
   for 5% < FC < 35% a = exp(1.76-(190/FC2)), b = (0.99+(FC1.5/1000))
   for FC > 35% a = 5.0, b = 1.2
5. For (N1)60,cs greater than 30, clean granular soils are too dense to liquefy and are classed as non-liquefiable.
6. Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER Workshops on Evaluation of Liquefaction Resistance of Soils, Youd, et al., ASCE Journal of Geotechnical and Geoenvironmental Engineering, October 2001, Vol. 127 No. 10

Bearing Capacity Analysis

Meyerhof Bearing Capacity Calculation

Project No:	2024-142-GEO	**Date:**	4/1/2025
Project Name:	Yuba-Sutter Transit Facility	**By:**	KS
Structure	Buildings		

Input Parameters

Unit weight, γ (pcf)	110
Cohesion, c (psf)	
Friction Angle, ϕ (deg)	30
Width, B (feet)	2
Length, L (feet)	1.5
Depth, D (feet)	1.5
Load Inclination, θ (deg)	0
Water Depth, Dw (feet)	20
Factor of Safety, FS	3

Calculated Parameters

Kp	3.00
sc	1.80
sq	1.40
sγ	1.40
dc	1.26
dq	1.13
dγ	1.13
ic	1.00
iq	1.00
iγ	1.00
Nq	18.40
Nc	30.14
Nγ	15.67
Overburden above footing, $\sigma_{zD'}$ (psf)	165.00
Eff. UW below footing, γ' (pcf)	110.00

Bearing Capacity

(Under Vertical Load)

q_{ult} (ksf)	7.53
$q_{allowable}$ (ksf)	2.51

Seismic-Induced Settlement

SEISMIC-INDUCED SETTLEMENT (SOIL DENSIFICATION)

- Method by Tokimatsu and Seed (1987)

Project Name: **Yuba-Sutter Transit Resilient Next Generation Transit Facility**
Project No.: **2024-142-GEO**
Boring No.: **R-25-001**

INPUT PARAMETERS

Peak Ground Accel., PGA (g)=	0.26			
Earthquake Magnitude, M =	6.79			
Water Table Depth =	24.00	(ft)	7.32	(m)
Average γ above water table =	120.0	(pcf)	18.9	(kN/m^3)
Average γ below water table =	62.6	(pcf)	9.8	(kN/m^3)
Borehole diameter (mm) =	8.0	(in)	203.2	(mm)
Hammer Energy (%) =	87.9			

EQUATIONS

$G_{max} = 20{,}000[(N_1)_{60}]^{0.333}(\sigma'_m)^{0.50}$ where $\sigma'_m \sim 0.67 \times \sigma'_{vc}$

$\gamma_{eff} \times (G_{eff}/G_{max}) = 0.65_{rd}(\sigma_{vc}/G_{max})\,(a_{max}/g)$ where rd = 1 - 0.012z (z = depth in meters)

Volumetric Strain Ratio = 1

Settlement = volumetric strain x layer thickness

Approximate Total Settlement of Dry Sand = 0.1 in

Sample Number	Layer From	Layer To	Sample Depth (ft)	Sample Depth (m)	RAW Field Blow Count	Sampler Type	Liner Correction (YES/NO)	Measured N (Equi. SPT-N)	Soil Type (USCS)	Flag "Unsaturated" "Clay" "Unreliable"	Fines Content (%)	C_E	C_B	C_R	C_S	N_{60}	σ_{vc} (kPa)	σ_{vc}' (kPa)	C_N	$(N_1)_{60}$	σ'_m (tsf)	G_{max} (ksf)	$\gamma_{eff} \times (G_{eff}/G_{max})$	γ_{eff} (approx)	$\%\gamma_{cyc} = 100\,\gamma_{eff}$	ε_v (approx)	$2\varepsilon_v$	Volumetric Strain, $2\varepsilon_v$ x VSR	Sett (in)
1	0	4.5	2.5	0.8	14	SPT	YES	14.0	SM	Unsaturated		1.47	1.15	0.75	1.30	23.0	14.4	14.4	1.70	39.1	0.1	961	5.2E-05	0.000065	0.0065	0.0023	0.0046	0.0046	0.0
2	4.5	8	5.0	1.5	5	SPT	YES	5.0	CL	Clay		1.47	1.15	0.8	1.30	8.8	28.7	28.7	1.39	n.a.	0.2	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
3	8	11	10.5	3.2	11	MC	NO	7.2	CL-ML	Clay		1.47	1.15	0.85	1.00	10.2	60.3	60.3	1.15	n.a.	0.4	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
4	11	18	15.0	4.6	5	SPT	YES	5.0	ML	Clay		1.47	1.15	0.95	1.30	10.4	86.2	86.2	1.04	n.a.	0.6	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
5	18	24	20.0	6.1	14	SPT	YES	14.0	SM	Unsaturated		1.47	1.15	0.95	1.27	28.5	114.9	114.9	0.95	27.1	0.8	2406	1.6E-04	0.00022	0.022	0.016	0.032	0.032	0.0
6	24	26	25.0	7.6	5	SPT	YES	5.0	SP	Unsaturated	2.8	1.47	1.15	0.95	1.10	8.8	140.9	137.9	0.84	7.4	1.0	1708	2.6E-04	0.0005	0.05	0.16	0.32	0.32	0.1
7	26	29	26.0	7.9	5	MC	NO	3.3	CL	Clay		1.47	1.15	0.95	1.00	5.2	143.9	137.9	0.92	n.a.	1.0	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
8	29	34	35.0	10.7	69	SPT	YES	69.0	SM	Unsaturated		1.47	1.15	1	1.30	151.1	170.9	138.0	0.92	139.2	1.0	4547	1.2E-04	0.00015	0.015	0.001	0.002	0.002	0.0
9	34	36.5	40.0	12.2	90	SPT	YES	90.0	GP-GM	Unsaturated		1.47	1.15	1	1.30	197.1	185.9	138.0	0.92	181.6	1.0	4968	1.1E-04	0.00015	0.015	0.001	0.002	0.002	0.0
10	36.5	40	39.0	11.9	71	SPT	YES	71.0	GP-GM	Unsaturated		1.47	1.15	1	1.30	155.5	182.9	138.0	0.92	143.2	1.0	4591	1.2E-04	0.000155	0.0155	0.001	0.002	0.002	0.0

SEISMIC-INDUCED SETTLEMENT (SOIL DENSIFICATION)

- Method by Tokimatsu and Seed (1987)

Project Name: **Yuba-Sutter Transit Resilient Next Generation Transit Facility**
Project No.: **2024-142-GEO**
Boring No.: **R-25-002**

INPUT PARAMETERS

Peak Ground Accel., PGA (g)=	0.26			
Earthquake Magnitude, M =	6.79			
Water Table Depth =	26.00	(ft)	7.92	(m)
Average γ above water table =	120.0	(pcf)	18.9	(kN/m^3)
Average γ below water table =	62.6	(pcf)	9.8	(kN/m^3)
Borehole diameter (mm) =	8.0	(in)	203.2	(mm)
Hammer Energy (%) =	87.9			

EQUATIONS

$G_{max} = 20{,}000[(N_1)_{60}]^{0.333}(\sigma'_m)^{0.50}$ where $\sigma'_m \sim 0.67 \times \sigma'_{vc}$

$\gamma_{eff} \times (G_{eff}/G_{max}) = 0.65_{rd}(\sigma_{vc}/G_{max})\,(a_{max}/g)$ where rd = 1 - 0.012z (z = depth in meters)

Volumetric Strain Ratio = 1

Settlement = volumetric strain x layer thickness

Approximate Total Settlement of Dry Sand = 0.3 in

Sample Number	Layer From	Layer To	Sample Depth (ft)	Sample Depth (m)	RAW Field Blow Count	Sampler Type	Liner Correction (YES/NO)	Measured N (Equi. SPT-N)	Soil Type (USCS)	Flag "Unsaturated" "Clay" "Unreliable"	Fines Content (%)	C_E	C_B	C_R	C_S	N_{60}	σ_{vc} (kPa)	σ_{vc}' (kPa)	C_N	$(N_1)_{60}$	σ'_m (tsf)	G_{max} (ksf)	$\gamma_{eff} \times (G_{eff}/G_{max})$	γ_{eff} (approx)	$\%\gamma_{cyc} = 100\,\gamma_{eff}$	ε_v (approx)	$2\varepsilon_v$	Volumetric Strain, $2\varepsilon_v$ x VSR	Sett (in)
1	0	4.5	2.5	0.8	30	SPT	YES	30.0	SM	Unsaturated		1.47	1.15	0.75	1.30	49.3	14.4	14.4	1.67	82.3	0.1	1232	4.1E-05	0.000047	0.0047	0.001	0.002	0.002	0.0
2	4.5	8	5.0	1.5	7	SPT	YES	7.0	MH	Clay		1.47	1.15	0.8	1.30	12.3	28.7	28.7	1.39	n.a.	0.2	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
3	8	13	10.5	3.2	12	MC	NO	7.8	ML	Clay		1.47	1.15	0.85	1.00	11.2	60.3	60.3	1.15	n.a.	0.4	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
4	13	18	15.0	4.6	5	SPT	YES	5.0	SM	Unsaturated		1.47	1.15	0.95	1.10	8.8	86.2	86.2	1.09	9.6	0.6	1475	1.9E-04	0.00034	0.034	0.085	0.17	0.17	0.1
5	18	24	20.0	6.1	14	SPT	YES	14.0	SM	Unsaturated		1.47	1.15	0.95	1.27	28.5	114.9	114.9	0.95	27.1	0.8	2406	1.6E-04	0.00022	0.022	0.015	0.03	0.03	0.0
6	24	29	25.0	7.6	10	SPT	YES	10.0	SM	Unsaturated		1.47	1.15	0.95	1.16	18.5	143.7	143.7	0.84	15.6	1.0	2239	2.1E-04	0.00032	0.032	0.045	0.09	0.09	0.1
7	29	34	30.0	9.1	8	SPT	YES	8.0	SP	Unsaturated		1.47	1.15	1	1.12	15.1	161.4	149.4	0.82	12.4	1.0	2114	2.4E-04	0.00041	0.041	0.08	0.16	0.16	0.1
8	34	40	35.0	10.7	17	SPT	YES	17.0	SP	Unsaturated	7	1.47	1.15	1	1.30	37.2	176.4	149.5	0.87	32.5	1.0	2916	1.9E-04	0.00026	0.026	0.012	0.024	0.024	0.0
9	40	44.5	40.0	12.2	14	SPT	YES	14.0	GP	Unsaturated		1.47	1.15	1	1.25	29.5	191.4	149.5	0.86	25.3	1.0	2682	2.1E-04	0.00035	0.035	0.025	0.05	0.05	0.0
10	44.5	46.5	45.0	13.7	34	SPT	YES	34.0	CL	Clay		1.47	1.15	1	1.30	74.5	206.4	149.5	0.90	n.a.	1.0	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.

SEISMIC-INDUCED SETTLEMENT (SOIL DENSIFICATION)

- Method by Tokimatsu and Seed (1987)

Project Name: **Yuba-Sutter Transit Resilient Next Generation Transit Facility**
Project No.: **2024-142-GEO**
Boring No.: **R-25-003**

INPUT PARAMETERS

Peak Ground Accel., PGA (g)=	0.26			
Earthquake Magnitude, M =	6.79			
Water Table Depth =	26.00	(ft)	7.92	(m)
Average γ above water table =	120.0	(pcf)	18.9	(kN/m^3)
Average γ below water table =	62.6	(pcf)	9.8	(kN/m^3)
Borehole diameter (mm) =	8.0	(in)	203.2	(mm)
Hammer Energy (%) =	87.9			

EQUATIONS

$G_{max} = 20{,}000[(N_1)_{60}]^{0.333}(\sigma'_m)^{0.50}$ where $\sigma'_m \sim 0.67 \times \sigma'_{vc}$

$\gamma_{eff} \times (G_{eff}/G_{max}) = 0.65_{rd}(\sigma_{vc}/G_{max})\,(a_{max}/g)$ where rd = 1 - 0.012z (z = depth in meters)

Volumetric Strain Ratio = 1

Settlement = volumetric strain x layer thickness

Approximate Total Settlement of Dry Sand = 0.1 in

Sample Number	Layer From	Layer To	Sample Depth (ft)	Sample Depth (m)	RAW Field Blow Count	Sampler Type	Liner Correction (YES/NO)	Measured N (Equi. SPT-N)	Soil Type (USCS)	Flag "Unsaturated" "Clay" "Unreliable"	Fines Content (%)	C_E	C_B	C_R	C_S	N_{60}	σ_{vc} (kPa)	σ_{vc}' (kPa)	C_N	$(N_1)_{60}$	σ'_m (tsf)	G_{max} (ksf)	$\gamma_{eff} \times (G_{eff}/G_{max})$	γ_{eff} (approx)	$\%\gamma_{cyc} = 100\,\gamma_{eff}$	ε_v (approx)	$2\varepsilon_v$	Volumetric Strain, $2\varepsilon_v$ x VSR	Sett (in)
1	0	4.5	2.5	0.8	7	SPT	YES	7.0	SM	Unsaturated		1.47	1.15	0.75	1.18	10.4	14.4	14.4	1.70	17.7	0.1	738	6.8E-05	0.0001	0.01	0.012	0.024	0.024	0.0
2	4.5	8	5.0	1.5	5	SPT	YES	5.0	CL-ML	Clay		1.47	1.15	0.8	1.30	8.8	28.7	28.7	1.39	n.a.	0.2	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
3	8	14	10.5	3.2	7	MC	NO	4.6	CL-ML	Clay		1.47	1.15	0.85	1.00	6.5	60.3	60.3	1.15	n.a.	0.4	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
4	14	18	15.0	4.6	6	SPT	YES	6.0	ML	Clay		1.47	1.15	0.95	1.30	12.5	86.2	86.2	1.04	n.a.	0.6	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
5	18	23	20.0	6.1	12	SPT	YES	12.0	SP	Unsaturated		1.47	1.15	0.95	1.22	23.5	114.9	114.9	0.95	22.2	0.8	2253	1.7E-04	0.00025	0.025	0.021	0.042	0.042	0.0
6	23	28	25.0	7.6	14	SPT	YES	14.0	SP	Unsaturated		1.47	1.15	0.95	1.24	27.8	143.7	143.7	0.87	24.1	1.0	2587	1.8E-04	0.00026	0.026	0.02	0.04	0.04	0.0
7	28	33	30.5	9.3	36	SPT	YES	36.0	GP	Unsaturated		1.47	1.15	1	1.30	78.8	162.9	149.4	0.90	71.1	1.0	3783	1.3E-04	0.00019	0.019	0.001	0.002	0.002	0.0
8	33	37	35.0	10.7	24	SPT	YES	24.0	GP	Unsaturated		1.47	1.15	1	1.30	52.6	176.4	149.5	0.90	47.4	1.0	3306	1.6E-04	0.00023	0.023	0.004	0.008	0.008	0.0
9	37	38.5	38.0	11.6	100	SPT	YES	100.0	GP	Unsaturated		1.47	1.15	1	1.30	219.0	185.4	149.5	0.90	197.5	1.0	5317	1.1E-04	0.00014	0.014	0.001	0.002	0.002	0.0

SEISMIC-INDUCED SETTLEMENT (SOIL DENSIFICATION)

- Method by Tokimatsu and Seed (1987)

Project Name: **Yuba-Sutter Transit Resilient Next Generation Transit Facility**
Project No.: **2024-142-GEO**
Boring No.: **R-25-003**

INPUT PARAMETERS

Peak Ground Accel., PGA (g)=	0.26			
Earthquake Magnitude, M =	6.79			
Water Table Depth =	26.00	(ft)	7.92	(m)
Average γ above water table =	120.0	(pcf)	18.9	(kN/m^3)
Average γ below water table =	62.6	(pcf)	9.8	(kN/m^3)
Borehole diameter (mm) =	8.0	(in)	203.2	(mm)
Hammer Energy (%) =	87.9			

EQUATIONS

$G_{max} = 20{,}000[(N_1)_{60}]^{0.333}(\sigma'_m)^{0.50}$ where $\sigma'_m \sim 0.67 \times \sigma'_{vc}$

$\gamma_{eff} \times (G_{eff}/G_{max}) = 0.65_{rd}(\sigma_{vc}/G_{max})\,(a_{max}/g)$ where rd = 1 - 0.012z (z = depth in meters)

Volumetric Strain Ratio = 1

Settlement = volumetric strain x layer thickness

Approximate Total Settlement of Dry Sand = 0.3 in

Sample Number	Layer From	Layer To	Sample Depth (ft)	Sample Depth (m)	RAW Field Blow Count	Sampler Type	Liner Correction (YES/NO)	Measured N (Equi. SPT-N)	Soil Type (USCS)	Flag "Unsaturated" "Clay" "Unreliable"	Fines Content (%)	C_E	C_B	C_R	C_S	N_{60}	σ_{vc} (kPa)	σ_{vc}' (kPa)	C_N	$(N_1)_{60}$	σ'_m (tsf)	G_{max} (ksf)	$\gamma_{eff} \times (G_{eff}/G_{max})$	γ_{eff} (approx)	$\%\gamma_{cyc} = 100\,\gamma_{eff}$	ε_v (approx)	$2\varepsilon_v$	Volumetric Strain, $2\varepsilon_v$ x VSR	Sett (in)
1	0	5	2.5	0.8	8	SPT	YES	8.0	ML	Clay		1.47	1.15	0.75	1.30	13.1	14.4	14.4	1.67	n.a.	0.1	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
2	5	8	5.5	1.7	15	MC	NO	9.8	SM	Unsaturated		1.47	1.15	0.8	1.00	13.1	31.6	31.6	1.64	21.6	0.2	1170	9.3E-05	0.000135	0.0135	0.012	0.024	0.024	0.0
3	8	13	10.0	3.0	5	SPT	YES	5.0	ML	Clay	60.3	1.47	1.15	0.85	1.30	9.3	57.5	57.5	1.16	n.a.	0.4	n.a.	n.a.		n.a.		n.a.	n.a.	n.a.
4	13	18	15.0	4.6	7	SPT	YES	7.0	SM	Unsaturated		1.47	1.15	0.95	1.14	12.7	86.2	86.2	1.08	13.8	0.6	1664	1.7E-04	0.00027	0.027	0.047	0.094	0.094	0.1
5	18	24	20.0	6.1	11	SPT	YES	11.0	SM	Unsaturated	7.4	1.47	1.15	0.95	1.20	21.1	114.9	114.9	0.94	20.0	0.8	2173	1.7E-04	0.00026	0.026	0.025	0.05	0.05	0.0
6	24	28	25.0	7.6	6	SPT	YES	6.0	SP-SM	Unsaturated	3.9	1.47	1.15	0.95	1.10	10.6	143.7	143.7	0.82	8.7	1.0	1841	2.5E-04	0.00044	0.044	0.12	0.24	0.24	0.1
7	28	35.5	30.5	9.3	11	SPT	YES	11.0	SM	Unsaturated	4.7	1.47	1.15	1	1.18	21.9	162.9	149.4	0.84	18.4	1.0	2410	2.1E-04	0.00034	0.034	0.04	0.08	0.08	0.1
8	35.5	38	35.0	10.7	43	SPT	YES	43.0	GP-GM	Unsaturated		1.47	1.15	1	1.30	94.2	176.4	149.5	0.90	84.9	1.0	4014	1.4E-04	0.00019	0.019	0.001	0.002	0.002	0.0
9	38	41	40.0	12.2	100	SPT	YES	100.0	GP	Unsaturated		1.47	1.15	1	1.30	219.0	191.4	149.5	0.90	197.5	1.0	5318	1.1E-04	0.00014	0.014	0.001	0.002	0.002	0.0

Pavement Analysis

PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

Project Informations:

Project Name: ***Yuba-Sutter Transit***
Project Location: *Yuba County, California*
Project Number: *2024-142-GEO*

Design Case: AC over AB

Design TI= ***12.9***
R_{BS}= ***40***
R_{AB}= 78

$GE_{AC+AB} = 0.0032*TI*(100-R_{BS}) =$		2.48	
$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$		0.91	
=>	GE'_{AC} =	1.11	(add 0.2 ft safety factor)
	AC Thickness =	0.65	ft
=>	AC Thickness =	**0.70**	ft (round up to the nearest 0.05 ft)
	$G_{f, AC}$ =	1.73	
	GE_{AC} =	1.21	
$GE_{AB} = GE_{AC+AB} - GE_{AC} =$		1.27	
	AB thickness=	1.15	ft
=>	AB Thickness=	**1.20**	ft (round up to the nearest 0.05 ft)
	GE_{AB}=	1.32	$G_{f, AB}$=1.1

Design Section:

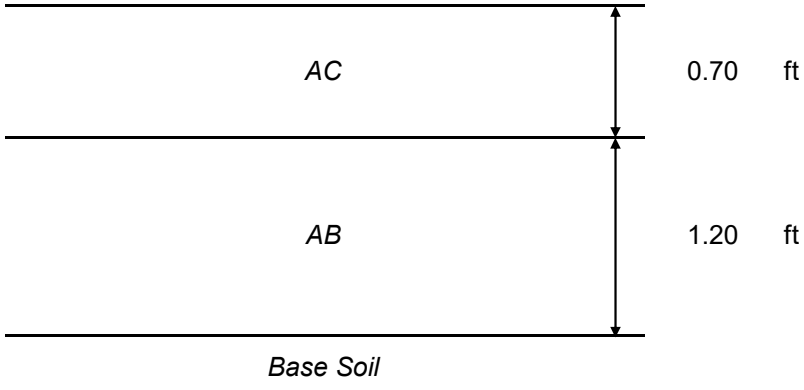


Table 623.1G

Rigid Pavement Catalog (Inland Valley, Type II Subgrade Soil)[(1), (2), (3), (4), (5)]

	Rigid Pavement Structural Depth					
TI	With Lateral Support (ft)			Without Lateral Support (ft)		
≤ 9			0.75 JPCP 1.00 AB			0.80 JPCP 1.00 AB
9.5 to 10			0.80 JPCP 1.00 AB			0.90 JPCP 1.00 AB
10.5 to 11	0.75 JPCP 0.35 LCB 0.60 AS	0.75 JPCP 0.25 HMA-A 0.60 AS	0.85 JPCP 1.30 AB	0.85 JPCP 0.35 LCB 0.60 AS	0.90 JPCP 0.25 HMA-A 0.60 AS	0.95 JPCP 1.30 AB
11.5 to 12	0.85 JPCP 0.35 LCB 0.60 AS	0.85 JPCP 0.25 HMA-A 0.60 AS	0.80 CRCP 0.25 HMA-A 0.60 AS	0.95 JPCP 0.35 LCB 0.60 AS	0.95 JPCP 0.25 HMA-A 0.60 AS	0.85 CRCP 0.25 HMA-A 0.60 AS
12.5 to 13	0.85 JPCP 0.35 LCB 0.70 AS	0.90 JPCP 0.25 HMA-A 0.70 AS	0.80 CRCP 0.25 HMA-A 0.70 AS	1.00 JPCP 0.35 LCB 0.70 AS	1.00 JPCP 0.25 HMA-A 0.70 AS	0.90 CRCP 0.25 HMA-A 0.70 AS
13.5 to 14	0.95 JPCP 0.35 LCB 0.70 AS	0.95 JPCP 0.25 HMA-A 0.70 AS	0.85 CRCP 0.25 HMA-A 0.70 AS	1.05 JPCP 0.35 LCB 0.70 AS	1.05 JPCP 0.25 HMA-A 0.70 AS	0.95 CRCP 0.25 HMA-A 0.70 AS
14.5 to 15	1.00 JPCP 0.35 LCB 0.70 AS	1.00 JPCP 0.25 HMA-A 0.70 AS	0.90 CRCP 0.25 HMA-A 0.70 AS	1.15 JPCP 0.35 LCB 0.70 AS	1.15 JPCP 0.25 HMA-A 0.70 AS	1.00 CRCP 0.25 HMA-A 0.70 AS
15.5 to 16	1.05 JPCP 0.35 LCB 0.70 AS	1.05 JPCP 0.25 HMA-A 0.70 AS	0.95 CRCP 0.25 HMA-A 0.70 AS	1.20 JPCP 0.35 LCB 0.70 AS	1.20 JPCP 0.25 HMA-A 0.70 AS	1.05 CRCP 0.25 HMA-A 0.70 AS
16.5 to 17	1.10 JPCP 0.35 LCB 0.70 AS	1.10 JPCP 0.25 HMA-A 0.70 AS	0.95 CRCP 0.25 HMA-A 0.70 AS	1.25 JPCP 0.35 LCB 0.70 AS	1.25 JPCP 0.25 HMA-A 0.70 AS	1.10 CRCP 0.25 HMA-A 0.70 AS
> 17	1.15 JPCP 0.35 LCB 0.70 AS	1.15 JPCP 0.25 HMA-A 0.70 AS	1.00 CRCP 0.25 HMA-A 0.70 AS	1.30 JPCP 0.35 LCB 0.70 AS	1.30 JPCP 0.25 HMA-A 0.70 AS	1.10 CRCP 0.25 HMA-A 0.70 AS

NOTES:

(1) Thicknesses shown for JPCP are for doweled pavement only. The thickness shown in these tables are not valid for nondoweled JPCP.

(2) Includes 0.03 ft sacrificial wearing course for future grinding of JPCP/CRCP.

(3) Portland cement concrete may be substituted for LCB when justified for constructability or traffic handling. If Portland cement concrete is used in lieu of LCB, it must be placed in a separate lift than JPCP and must not be bonded to the JPCP.

(4) If ATPB is needed for TIs > 10.0 to perpetuate an existing treated permeable layer, place the ATPB between the surface layer (JPCP or CRCP) and the base layer. No deduction is made to the thickness of the base and subbase layers on account of the ATPB.

(5) Place an interlayer between JPCP and LCB in all cases

LEGEND:

JPCP = Jointed Plain Concrete Pavement
CRCP = Continuously Reinforced Concrete Pavement
LCB = Lean Concrete Base
HMA-A = Hot Mix Asphalt (Type A)
ATPB = Asphalt Treated Permeable Base
AB = Class 2 Aggregate Base
AS = Class 2 Aggregate Subbase
TI = Traffic Index