Appendix D:

Geotechnical Report

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Draft Geotechnical Report

Mariposa-Engineering Design Services for Zero Emission Transit Yard Project

Mariposa, California

Crawford File No. 24-1289.1

April 11, 2025

Prepared by:

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April 11, 2025
Crawford File No. 24-1289.1

Ed Noriega, PE
Mark Thomas
7571 N Remington Ave, Suite 102
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Subject: **DRAFT GEOTECHNICAL REPORT**
Mariposa-Engineering Design Services for Zero Emission Transit Yard Project
Mariposa, California

Dear Mr. Noriega,

Crawford & Associates, Inc (Crawford) presents this Geotechnical Report for the Mariposa-Engineering Design Services for Zero Emission Transit Yard Project in Mariposa, California. Crawford prepared this report in accordance with our Subconsultant Agreement dated October 4, 2024 (amended January 10th, 2025). Crawford expects to update/revise the recommendations in this draft report after details (e.g., locations, foundation type/loading, etc.) of the various project elements are further developed.

This report presents the results of our subsurface exploration, laboratory testing, engineering analysis, conclusions, and preliminary recommendations for use in design and construction of the proposed project improvements.

Thank you for the opportunity to be part of your design team. Please contact us if you have questions or require additional information.

Crawford & Associates, Inc.,

Reviewed By,

Lois Kearney, GIT
Project Geologist

Eric Nichols, PE, CEG
Senior Engineering Geologist/Principal

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Project Manager

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1 INTRODUCTION

1.1 PURPOSE

Crawford & Associates, Inc (Crawford) presents this Geotechnical Design Report for the Mariposa-Engineering Design Services for Zero Emission Transit Yard Project (project) in Mariposa, California. Crawford prepared this report in accordance with our Subconsultant Agreement dated October 4, 2024 (amended January 10th, 2025).

This report presents the results of our subsurface exploration, laboratory testing, engineering analysis, conclusions, and preliminary recommendations for use in design and construction of the proposed project improvements.

This report is intended to assist in planning, design, and during construction for Mark Thomas, the design team, and Mariposa County. This report contains our findings and preliminary geotechnical recommendations exclusively developed for this project. This report is a draft submittal intended for review and commentary by Mark Thomas and Mariposa County and will be updated as the plans are developed further.

1.2 GEOTECHNICAL SERVICES

To prepare this report, Crawford:

- Discussed the project goals and objectives with Erik Chin from Mark Thomas;
- Reviewed published topographic, geologic, and seismic mapping of the site;
- Reviewed the preliminary site map provided by Mark Thomas;
- Completed ten exploratory test pits and three seismic refraction lines at the proposed improvement area on February 19 and 20, 2025;
- Performed laboratory testing on selected soil and rock samples recovered from the test pits;
- reviewed the topographic survey provided electronically by Mark Thomas on March 4, 2025;
- performed geotechnical engineering analysis in support of the recommendations contained herein; and
- discussed the findings and recommendations with the design team.

Limitations of this study are discussed in the final section of this report.

1.3 PROJECT DESCRIPTION

The project improvements are located near the intersection of Frank Wilson Road and Lemee Lane in Mariposa, California. The project site location is at approximate latitude 37.5004° and longitude -119.9848° (per Google Earth). See the attached Figure 1 for the Vicinity Map.

We understand Mariposa County plans to build a zero-emission transit yard that may extend parking connectivity to the existing Mariposa County Health and Human Services building. Project elements for the new transit yard are understood to include a driveway, parking lot, solar canopy, lighting, and solar charging stalls for Mariposa County vehicles. The transit yard is currently

planned within the flat area of the parcel. The site may also include a future administration building. The proposed locations of the various project elements are still under development.

2 GEOTECHNICAL INVESTIGATION

Crawford completed a total of ten test pits on February 19, 2025 and three seismic lines on February 20, 2025.

2.1 TEST PITS

The test pits completed for this project were excavated on February 19, 2025 using a Komatsu PC 138 US LC equipped with a 24-inch bucket. Table 1 provides a test pit exploration summary.

Table 1: Test Pit Exploration Summary

Test Pit Number	Completion Date	Approximate Northing/Easting	Drill Rig Type / Equipment Type	Approx. Ground Surface Elevation (ft)	Test Pit Depth (ft)
TP-25-001	2/19/2025	236152.53E/ 4154536.94N	Komatsu PC 138 US LC Excavator	2139	8.5
TP-25-002		236144.13E/ 4154576.09N		2128	10.8
TP-25-003		236169.72E/ 4154576.61N		2133	12.0
TP-25-004		236188.43E/ 4154574.68N		2138	8.3
TP-25-005		236148.42E/ 4154605.51N		2115	13.5
TP-25-006		236157.72E/ 4154588.77N		2120	6.0
TP-25-007		236184.11E/ 4154586.60N		2130	12.0
TP-25-008		236141.91E/ 4154595.38N		2114	6.8
TP-25-009		236100.85E/ 4154587.46N		2107	6.0
TP-25-010		236121.82E/ 4154565.02N		2114	14.3

Crawford's Project Geologist, Lois Kearney, logged the exploratory test pits consistent with the Unified Soil Classification System (USCS) and the Caltrans 2022 Logging Manual. Groundwater observations were recorded during excavation operations when/if encountered. Bulk soil and rock samples were retained in sealed bags for laboratory testing and reference. Each test pit was backfilled with native material (not compacted) and wheel-rolled with the backhoe upon completion of field operations.

The test pit locations were measured in the field with respect to existing site features. The test pit elevations are approximated using a preliminary site topographic plan that shows provided by Mark Thomas on March 4, 2025. The locations of the exploratory test pits are shown on Figure 2 in Appendix I.

2.2 GEOPHYSICAL SURVEY

A geophysical seismic survey that consisted of three refraction seismic profiles (SL1, SL2, and SL3) was completed by Crawford on February 20, 2025. Seismic lines SL1 and SL2 were located on the northwestern portion of the site in the flatter and gently sloping areas. SL1 transected approximately northeast to southwest and SL2 approximately east to west. The locations of the seismic refraction surveys are shown on Figure 2 Exploration Map in Appendix I. Refer to Figures 5, 6 and 7 for seismic line profiles.

The data was recorded with a 24 channel ES-3000 seismometer with 24 geophones spaced at 10 ft intervals for SL1, SL2 and SL3. The energy source for this survey was by means of hand-actuated sledge hammer striking a 1/4-inch thick steel plate. The recorded data was analyzed using the SeisImager/SW software package published by Geometrics to estimate the depth to rock surface across the geophone spread and provide a generalized two-dimensional profile that shows the interpreted depth to rock units.

3 GEOECHNICAL CONDITIONS

3.1 SITE GEOLOGY

The project is located near the western extent of the Sierra Nevada Geomorphic Province[1] of California. The Sierra Nevada has a general northwest topographic trend and is on the order of 690 km long and 64-129 km wide. The mountain ranges of the Sierra Nevada were created roughly 120 to 130 million years ago when sediments as thick as 9,200 m along with volcanic rocks were buckled and warped resulting in a series of low mountain ranges. The roots of these mountain ranges were then intruded by granitic rock.

The Sierra Nevada ranges were subsequently tilted upward as a result of faulting along the east edge of the ranges. In the higher elevations of the Sierra Nevada, much of the sedimentary material has been eroded to extensively expose the granitic rock. Older rocks that remain have been metamorphosed and are exposed in the foothills of the Sierra Nevada.

Published geologic mapping[2] shows the project site is underlain by Jurassic and/or Triassic Metavolanic rocks, consisting of massive green meta-morphosed metatuff breccia, local andesitic, and basaltic lava, and interbedded black slate and phyllite (JRv) bounded by Jurassic to late Paleozoic aged Ultramafic rocks (um). The USDA-NRCS Soil Survey[3] indicates that the upper 16 to 24-inches consists of native soils generally comprised of loam (clayey silt, and silt) and gravelly silt and clay loam underlain by rock.

The California Geological Survey (CGS) considers a fault to be active if it has shown evidence of ground displacement during the Holocene Period, defined as the last 11,000 years. Based on

[1] California Geologic Survey (2002), *California Geomorphic Province*, Note 36.
[2] Strand 1967, Geologic Map of California Olaf P. Jenkins Edition Mariposa Sheet, California: California Division of Mines and Geology, scale 1:250,000.
[3] USDA Web Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

mapping by the CGS[4], the nearest active fault is the Silver Lake fault, located about 50 miles northeast of the project site. Inactive pre-quaternary faults (older than 1.6 million years or fault without recognized Quaternary displacement) are located throughout Mariposa.

A Geologic Map and Fault Map are included as Figure 3 and Figure 4, respectively on Appendix I.

3.2 SURFACE CONDITIONS

The project site is north of the existing Mariposa County Health and Human Services building. Based on our review of historic aerial photographs[5] and Google Earth Imagery, the northern extents of the project site appear to have been graded between 1998 and 2005 when Frank Wilson Road was constructed. This construction appears to have cut into a large hill and graded the northwest area of the site to be generally flat (where the proposed solar charging is located). The hill generally slopes at about a 1.3H:1V towards the flat area. The site was also graded between 2010 to 2011 when the Mariposa County Health and Human Services building was constructed. This grading created a construction access road ascends to the east and then south around the hill. The grading also cut into the southern side of the hill at about a 1.7H:1V slope for a parking lot at the Mariposa County Health and Human Services building. The grade difference between the Mariposa County Health and Human Services parking lot and the project site is about 15 ft.

A natural drainage, located upslope of the project site, discharges and directs surface runoff towards the northwest corner of the project site. We observed an approximately 190 ft long, 51.5-inch diameter corrugated plastic culvert directing flow to the west with an outlet near Frank Wilson Road and Lemee Lane. The culvert is located within the previously flat graded areas and was likely installed when the site was graded between 1998 and 2005. The culvert had about ½-inch of water present during our site visits.

Two sets of overhead electric lines were observed at the site. One overhead line is aligned from the southeast to the northwet; another overhead line is aligned northeast to southwest near the southern edge of the site. An underground sewer line was also observed parallel to the overhead lines near the southern edge of the site (aligned southwest to northeast) An underground water line was observed at the northern area of the site, aligned parallel to the barbwire fence from southwest to northeast. The presence of other underground utilities is unknown.

The site was undeveloped and supported a cover of grass, oak trees and some small brush at the time of the field work.

3.3 SUBSURFACE CONDITIONS

Based on the exploratory data, subsurface materials underlying the project site are considered consistent with the published mapping consisting predominantly of clayey sand and sandy lean clay with varying amounts of gravel underlain by metavolcanic rock.

3.3.1 TEST PITS

We divided materials encountered in the test pits into two general soil/rock units considered significant to the proposed project. Refer to the boring logs and legend sheets in Appendix II for

[4] https://maps.conservation.ca.gov/cgs/fam/
[5] https://www.historicaerials.com/viewer

more specific soil/rock descriptions, test pit details, elevations, and an explanation of terms and engineering geology descriptors used to log the soil and bedrock.

Unit 1 (Surficial Deposits and Fill) is generally comprised of sand, silt, clay and gravel in test pits TP-25-001 though TP-25-010. Unit 1 was encountered in the upper 0.5 to 1.5 ft in TP-25-001 through TP-25-007 and TP-25-010. Materials of this unit were encountered from ground surface to 6 to 7 ft depth in TP-25-008 and TP-25-009 and are interpreted as native fill associated with grading along Frank Wilson Road.

Unit 2 (Decomposed to Moderately Weathered Rock) was encountered below Unit 1a in test pits TP-25-001 through TP-25-007 and TP-25-010 and generally consists of decomposed to moderately weathered Greenstone. The maximum depth explored was 14.3 ft. Rock was generally easy to excavate to a depth of 5 ft bgs. At 5 to 9 ft bgs, the equipment had greater difficulty excavating the rock, with refusal generally 1 to 3 ft beyond the harder rock. Bucket refusal was encountered between a depth of 6 to 12 ft bgs in test pits TP-25-001 through TP-25-004, TP-25-006, and TP-25-007. Test pits TP-25-005 and TP-25-010 were terminated at a depth of 13.5 ft and 14.2 ft bgs prior to bucket refusal.

3.3.2 GEOPHYSICAL SURVEY

A geophysical survey consisting of three seismic refraction lines was completed to estimate depth to rock and evaluate rippability characteristics. The locations of the seismic lines are shown on Figure 2 and the seismic refraction profiles are shown on Figures 5 to 7 in Appendix I. The interpreted seismic survey data is provided in Table 2 below.

Table 2: Summary of Seismic Refraction Survey

Seismic Line	Unit 2 (Rock)	
	Depth to Intensely to Moderately Weathered Rock (ft)	Approximate Primary Velocity, Vp (ft/s)
SL1	8 to 12	4,000 to 6,000
SL2	9 to 12	5,000 to 6,000
SL3	7 to 15	3,500 to 5,000

[1]Material description is interpreted based on site observations and layer velocities

The locations of the seismic refraction lines and profiles are shown on Figures 2, 5, 6 and 7 in Appendix I.

4 GROUNDWATER

During our subsurface exploration on February 19, 2025, free groundwater was encountered and measured in four of the test pits. Table 3 depicts the groundwater data where encountered.

Table 3: Groundwater Data

Test Pit Number	Groundwater Depth (ft)	Approx. Groundwater Elevation (ft)	Notes
TP-25-005	10.5	2,104.5	Water encountered about 3 ft above test pit refusal; located near culvert inlet
TP-25-008	4.2	2,109.8	Significant water seepage; located near culvert
TP-25-009	5.5	2,101.5	Significant water seepage; located near culvert
TP-25-010	14.0	2,100.0	Water encountered above test pit refusal; located at base of hill

Groundwater was encountered in the test pits located near and downslope of the culvert inlet. We observed significant seepage in test pits TP-25-008 and TP-25-009, which are both located within the flat graded area near the culvert. Field exploration data indicate that groundwater may be perched above the weathered rock and flowing through rock fractures at this site and particularly within surficial deposits and fill in the vicinity of the culvert, and will be influenced by the amount of precipitation, seasonal changes, and surface/subsurface drainage characteristics.

5 LABORATORY TESTING

The following laboratory tests were completed on representative soil samples obtained from the exploratory borings:

- Atterberg Limits (ASTM D4318)
- Corrosivity Testing (CTM 643, CTM 417 and CTM 442)
- Grain Size Analysis (ASTM C136)
- Moisture Content (ASTM D2216);
- Point Load (ASTM D5731)
- R-Value (CTM 301)

The laboratory test results are provided in Appendix III.

6 CORROSION EVALUATION

For structural elements, Caltrans[6] 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. With the exception of MSE wall design, Caltrans does not require soil and water to be tested for chlorides and sulfates if the minimum resistivity is greater than 1,100 ohm-cm.

The results of corrosivity tests on soil samples obtained from the borings completed for this project are summarized in Table 4.

[6] Caltrans, Corrosion Guidelines Version 3.2, May 2021.

Table 4: Soil Corrosivity Test Results

Boring / Sample No.	Depth (ft)	Elevation (ft)	pH	Minimum Resistivity (ohm-cm)	Chloride (ppm)	Sulfate (ppm)	Corrosive
TP-25-008/ Bulk 1	0 to 5	2,109 to 2,114	5.64	4,820	11.3	8.5	No

Based on the corrosivity test results summarized in Table 4 and current Caltrans guidelines, the site is not corrosive to structural concrete/steel foundation elements. The test results are only an indicator of soil corrosivity. Section 12 of Caltrans' Corrosion Guidelines provides information regarding corrosion mitigation measures for structural elements and lists additional Caltrans guideline documents regarding corrosion mitigation if deemed appropriate by the designer. The designer should also consult with a corrosion engineer if the test result values are considered significant.

7 SEISMIC HAZARDS

7.1 SEISMIC DESIGN

Seismic design parameters were developed in accordance with the 2022 California Building Code Section 1613 and ASCE 7-16. The values were based on site coordinates (37.5004°; -119.9848°), a Site Class C, and mapped Risk Targeted Maximum Considered Earthquake (MCE) ground motions parameters obtained through the ASCE Hazard Tool website[7]. Table 5 summarizes the seismic design parameters for the project.

Table 5: Seismic Design Parameters

Site Class	**C**
Risk Category	**≤III**
S_s – Acceleration Parameter	0.446g
S_1 – Acceleration Parameter	0.192g
F_a – Site Coefficient	1.3
F_v – Site Coefficient	1.5
S_{MS} – Adjusted MCE Spectral Response Acceleration Parameter	0.580
S_{M1} – Adjusted MCE Spectral Response Acceleration Parameter	0.288
S_{DS} – Design Spectral Acceleration Parameter	0.386
S_{D1} – Design Spectral Acceleration Parameter	0.192
T_L – Long-Period Transition Period	12 seconds
PGA_m – Site Modified Peak Ground Acceleration	0.232g

[7] https://www.ascehazardtool.org

7.2 FAULTS RUPTURE

The alignment does not cross an Alquist-Priolo (AP) Earthquake Fault Zone[8] and no known active faults are mapped within or through the project area.

Based on the foregoing, surface fault rupture along/within the project alignment is not expected unless a previously unmapped fault that crosses beneath the alignment were to rupture. In our opinion the potential for surface fault rupture is insignificant and is therefore not a design consideration for this project.

7.3 LIQUEFACTION POTENTIAL

Soil liquefaction can occur when saturated, relatively loose sand and specific soft, fine-grained saturated soils (typically within the upper 50 ft) are subject to ground shaking strong enough to create soil particle separation that results from increased pore pressure. This separation and subsequent pore pressure dissipation can lead to decreased soil shear strength and settlement. Liquefaction is known to occur in soils ranging from low plasticity silts to gravels. However, soils most susceptible to liquefaction are clean sands to silty sands and non-plastic silts. Granular soils with SPT blow count $(N_1)_{60} \geq 30$, rock and most clay soil are not liquefiable.

Due to the shallow depth to rock, the potential for liquefaction does not exist at this site and is not a geotechnical consideration for project design.

7.4 LIQUEFACTION-INDUCED LATERAL SPREADING

Lateral spreading, characterized by incremental flow-failure within liquefiable soil on sloping ground or a free face, is capable of producing horizontal ground displacement during a seismic event. Based on our liquefaction evaluation/analysis, no potentially liquefiable soil layers are identified at this site. Therefore, the potential for lateral spreading to occur at this site does not exist and is not a geotechnical design consideration.

8 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

The proposed site improvements are feasible from a geotechnical engineering standpoint provided the recommendations presented herein are incorporated into design and construction of the project. Support is generally available within shallow, decomposed to moderately weathered rock. The potential for damaging effects due to seismic shaking, such as soil liquefaction, seismic settlement, and slope instability, is generally low. No other over-riding geologic hazards (e.g., faulting, soft soils, subsidence, etc.) were identified by published geologic mapping performed for this study and are not design considerations.

Key geotechnical considerations for the project include the following:

- Varying depth to rock,
- Undocumented fill placed during the 1998 to 2005 site grading, and
- Groundwater depth and seepage along the north end of the site.

The recommendations below are preliminary and should be updated based on final solar canopy, charging station, and administration building locations.

[8] http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps

8.1 SOLAR CANOPY FOUNDATIONS

We understand the foundation type is still unknown for the solar canopy foundations and the structure is planned within the northwest area of the site (flat area).

8.1.1 DEEP FOUNDATIONS

Undocumented fill is present within the flat area of the site at the proposed canopy structure. We recommend the solar canopy foundations extend into intact native soil/rock. Support for the canopy is available using drilled pier foundations. We recommend minimum 24-inch diameter drilled piers. Consistent with current guidelines for drilled pile design, end bearing contributions to axial capacity were neglected due to the presence of groundwater.

For axial capacity, we recommended using 450 psf for allowable skin friction for 2 to 7 ft below finish grade, and 1,100 psf for allowable skin friction for depths greater than 7 ft below finish grade. For tension (uplift), we recommended using 225 psf for allowable skin friction for 2 to 7 ft below finish grade, and 550 psf for allowable skin friction for depths greater than 7 ft below finish grade.

For lateral analysis, we provide the following LPile parameters for preliminary design.

Table 6: LPile Input Parameters

Depth (ft)	Material Type	LPile Soil Type (p-y) curve model)	Total Unit Weight (lb/ft^3)	Friction Angle	Cohesion (lb/ft^2)	Strain Factor, E50 (dim.)	p-y Modulus k (lb/in^3)
0 to 7	Fill (Clayey Sand)	Still Clay w/out Free Water	125	--	2,500	0.006	--
7 to 14	Decomposed Greenstone	Sand (Reese)	130	40	--	--	125

8.1.2 SHALLOW FOUNDATIONS

Alternatively, isolated spread footing foundations may be used; however, we recommend these foundations extend below the fill (into the intact rock). A maximum allowable bearing capacity value of 3,500 psf may be used for a minimum 2 ft by 2 ft footing established on rock. This value may be increased by one-third for all loads, including wind and seismic. We estimate the total settlement should be less the 0.5-inches and differential settlement should be less than half for the total settlement across the spread footing. The depth of the bottom of footing can be reduced if intact rock is encountered but should be a minimum of 3 ft below finished grade.

To resist lateral movement, we recommend using a maximum coefficient of friction of 0.84 and a nominal passive earth pressure of 375 psf/ft. Reduce the static passive pressure to 357 psf/ft during a seismic event. The designer should apply the appropriate factor of safety to the nominal passive pressures. The sliding resistance and passive soil pressure can be combined; however, since horizontal movement is required to mobilize passive resistance, decrease the passive pressure by one-half if both friction and passive pressures are used.

To resist uplift, we recommend using the weight of the foundation and weight of the soil directly above the foundation. Uplift will also need to consider buoyancy forces.

8.2 CHARGING STATION FOOTINGS

We understand the charging station is likely planned to be founded on isolated spread footings. Due to the presence of undocumented local fill, we recommended the charging station footings are founded on a 2 ft overexcavation and recompaction following Section 8.6.

For use of a square footing, an allowable bearing capacity of 2,500 psf may be used for design provided the footings are designed to be a minimum of 12 inches wide and established a minimum of 24-inches below lowest adjacent grade on firm recompacted soil. These values may be increased by one-third if wind and/or seismic loads are included.

To resist lateral movement, we recommend using a maximum coefficient of friction of 0.5 and passive earth pressure of 375 psf/ft. Reduce the static passive pressure to 357 psf/ft during a seismic event. The designer should apply the appropriate factor of safety to the nominal passive pressures.

The sliding resistance and passive soil pressure can be combined; however, since horizontal movement is required to mobilize passive resistance, decrease the passive pressure by one-half if both friction and passive pressures are used.

To resist uplift, we recommend using the weight of the foundation and weight of the soil directly above the foundation. Uplift will also need to consider buoyancy forces.

We estimated the total settlement will be less than 1-inch and is expected to be within tolerable limits; however, the settlement will be evaluated based on further development of the plans.

8.3 ADMINISTRATION BUILDING

The proposed location of the administration building is currently under development. The administration building should be located outside of the culvert/drainage pathway. If the administration building is planned for the northern extends of the project side, the drainage should be rerouted and the previous fill removed and recompacted to provide uniform support. Additional analysis for the bearing capacity and settlement will be completed as the building location is further developed.

8.4 FLATWORK

We recommend a minimum of 4-inches of concrete flatwork on 4-inches of aggregate base compacted to 95% relative compaction. Scarify and compact the subgrade following Section 8.6.3. Construct control and construction joints in accordance with Portland Cement Association guidelines to help control shrinkage cracking.

8.5 PAVEMENT

One R-value test (CTM 301) was completed on a bulk sample of anticipated subgrade soils. The tests results indicate an R-value of 10 by Stabilometer.

New flexible pavement structural section alternatives calculated in accordance with Caltrans flexible pavement design methods for various Traffic Index (TI) values at a design R-value = 10 are shown in Table 6.

Table 7: New Pavement Structural Sections (R-value = 10)

Traffic Index (TI)	6.0	7.0	8.0	9.0
Hot Mix Asphalt (HMA), feet	0.25	0.30	0.40	0.45
Class 2 Aggregate Base (AB), feet	1.05	1.25	1.40	1.60

If “hard” bedrock is encountered less than 30-inches below finished grade (likely on the hill and outside of the flatter drainage area) the pavement section could be established on a 4 to 6-inch subbase section to provide a compatible flexible pavement section within the remainder of roadway. In sections of “hard” bedrock, the rock surface (which may be highly irregular at subgrade level) should be scored at least 2-inches below subgrade prior to placing aggregate base. Areas of “soft” bedrock which are not irregular should be trimmed to a firm, intact surface and visually affirmed to be consistent with 95% relative compaction.

The asphalt pavement thicknesses shown above are minimum depths and incorporate a 0.2-ft Gravel Equivalent factor of safety in accordance with Caltrans flexible pavement design methods. Other flexible pavement structural sections -- typically involving variations in AB thicknesses -- which satisfy basement soil requirements are available and can be provided, if desired.

Design by the Caltrans method presumes materials and construction in accordance with Caltrans “Standard Specifications”, including 95% relative compaction on all materials within 30-inches of finished grade. Inability to achieve the required compaction on the scarified materials may be used as a field criterion to identify areas requiring additional removal and/or re-compaction.

The subgrade soils should be field reviewed with respect to uniformity and suitability by the soils engineer. Any loose, disturbed or otherwise unsuitable materials should be removed to full depth and replaced with imported fill meeting the requirements of Section 8.6.4 or Class 2 Aggregate Base compacted to at least 90% relative compaction.

The above pavement design assumes that free water will be absent from the structural section. Suitable surface drainage is of particular importance to limit subgrade saturation and excess free water.

8.6 GRADING

8.6.1 EARTHWORK

Site grading and earthwork should be performed in accordance with Section 17 and Section 19 of Caltrans Standard Specifications, respectively.

8.6.2 CLEARING

Prior to grading, demolish and clear the site to remove structures, fences, vegetation, tree roots, debris, abandoned utilities, soft or unstable areas, and other deleterious materials. If/where undocumented fill is encountered during construction, overexcavation and recompaction is recommended.

8.6.3 SUBGRADE PREPARATION

Process and compact the exposed subgrade in new structure, concrete flatwork and/or fill areas as follows:

- Scarify the exposed soil to a depth of approximately 6 inches.
- Moisture condition subgrade soil 0% to 3% over optimum moisture content.
- Compact the scarified soil to a minimum of 90% relative compaction based on ASTM D1557.

Scarification is not required to extend into Unit 2 (rock).

8.6.4 FILL MATERIAL

Onsite soils can be considered suitable for use as general fill for the project provided it is free from concentrations of organics, debris, and oversize material (3-inch maximum dimension). Testing during construction should be completed prior to backfill placement to confirm native soils meet fill requirements.

Import soil for new general fill should meet the following criteria:

- Contain no visual concentration of organics, debris or deleterious materials;
- Have a maximum particle size of 3-inches with at least 50% passing the No. 4 Sieve and at least 15% passing the No. 200 sieve;
- Meet or exceed the design R-value = 10; and
- Have low expansion potential (i.e., Expansion Index (EI) ≤ 50 and Sand Equivalent (SE) ≥ 20).

8.6.5 FILL PLACEMENT AND COMPACTION

The contractor should place new fill in accordance with Caltrans Standard Specifications, including at least 95% relative compaction per ASTM D1557 within 2 ft of the pavement and foundations. Soil should be placed in thin lifts (6 to 8-inches) prior to compaction.

Where new fill is placed against an existing slope, the contractor should prepare the slope by cutting into it at least 4 ft horizontally and below any loose/soft or otherwise unsuitable materials as the new fill is placed in layers.

If loose, disturbed, or otherwise unsuitable materials are present at plan subgrade, they should be removed to full depth and replaced with Structure Backfill, Class 2 Aggregate Base, or other granular soil as approved by the engineer.

8.6.6 OVER-OPTIMUM SOIL MOISTURE

Excessively over-optimum (wet) soil conditions can make proper compaction difficult or impossible to achieve. Wet soil is commonly encountered during the winter and spring months. Excessively over-optimum soil conditions may be encountered during construction if on-site cohesive soils are encountered.

If encountered, wet soil can be mitigated by:

- Discing the soil during periods of dry weather
- Over excavating and replacing wet soil with drier material
- Chemical-treatment or stabilization using aggregate and/or stabilization fabric

If wet, unstable soil is encountered, Crawford should observe the conditions and provide more specific mitigation recommendations.

8.6.7 EXCAVATABILITY

The metamorphic rock encountered in the test pits was excavated to a maximum depth of 14.3 ft in test pit TP-25-010. Test pits TP-25-001 through TP-25-007 typically encountered refusal or very difficult excavating between 6.0 and 13.5 ft with a Komatsu PC 138 excavator. TP-25-008 and TP-25-009 were unable to be excavated beyond 6.8 and 6.0 ft respectively due to water seepage and caving soil.

Material with seismic velocities of 4,000 to 5,000 ft/s is typically excavatable with conventional equipment, and seismic velocities greater than 5,000 ft/s were encountered in SL1 and SL2 at a depth of approximately 7 to 10 ft bgs and about 8 to 15 feet bgs in SL3.

The Caterpillar Handbook[9] estimates metamorphic rock—the bedrock type we encountered—is rippable with a CAT D8R with a single ripping shank up to a primary wave velocity of about 6,500 ft/s. Our seismic results for SL3 (across the hill), indicate the upper 9 to 20 ft have a primary wave velocity of about 6,500 ft/s or less (estimated elevation of 2125 to 2115 ft). Our seismic results for SL1 and SL2 (northern end of site), indicate the upper 8 to 14 ft of the site is rippable with a CAT D8R with a single ripping shank. Based on our seismic velocity results, the D9R ripper would excavate about 1 to 3 ft deeper than the D8R equipment.

Ultimately, the contractor should evaluate the logs, seismic refraction data, and surface materials and determine the appropriate equipment for the project.

9 CONSTRUCTION CONSIDERATIONS

Earthwork activities may disturb soils below excavation depths and variation in subgrade support characteristics may be encountered. We recommend the surfaces exposed during earthwork be reviewed by a Crawford representative to affirm exposure of competent native soils and/or intact bedrock at planned footing grade. The reviews are to be made after the excavation has been completed to the bottom of planned footing elevation and prior to placing steel reinforcement and concrete in the excavations.

Construct spread footing foundations on intact/undisturbed bearing material and/or recompacted native soils at the bottom of the excavation within clean and dry excavations. Place structural footing concrete neat (without forming), against trimmed walls and intact materials at the bottom of the footing excavation. Clean foundation excavations of debris and loose materials prior to placing concrete.

If the spread footing excavations expose unsuitable material, including wet soil at the bottom of footing elevations or the soils are disturbed, then these soils should be re-compacted or removed and replaced with structure backfill compacted according to Caltrans Standard Specifications Section 17 and 19. Alternatively, the bottom of footing elevations can be lowered to undisturbed competent material.

If forming is necessary, backfill excavations outside footing limits with lean concrete or suitable

[9] Caterpillar Handbook of Ripping, 12th Edition

granular backfill (i.e. "Structure Backfill" per Caltrans "Standard Specifications") compacted to at least 95% relative compaction (per ASTM D1557). Slope the ground surface away from the structures to direct surface runoff away from the foundations.

For the project described herein, we also recommend that the geotechnical report, boring logs and legend, and any subsequent addenda be included with project documents during the bidding process for reference purposes.

9.1 EXCAVATIONS AND SHORING

Temporary excavations are recommended to be sloped and/or shored in accordance with the current Cal OSHA requirements. We expect most native soils above the rock along the proposed structures to be classified as Type C. The protection of workers and adjacent structures, shoring design, and the stability of all temporary slopes should be contractually established as solely the responsibility of the contractor.

9.2 DEWATERING

Groundwater was encountered as shallow as 4.2 feet bgs (elevation 2,109.8) and as deep as 14 feet bgs (elevation 2,100.0) in the explorations at test pits TP-25-005, TP-25-008, TP-25-009 and TP-25-010 (north of hill). If nuisance water within foundation excavations is present, the contractor should be prepared to dewater excavations with sump pumps. The contractor is responsible for dewatering design and construction methods.

9.3 DRILLED PIERS

Groundwater was encountered at a depth of about 4 to 14 ft during our test pit excavations north of the hill, with seeping groundwater near the existing culvert. While groundwater might not be encountered during summer construction, the contractor should be prepared to temporary case the drilled piers to reduce caving soils and drill with slurry.

10 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services. For this project, Crawford should be retained to:

- Review and provide written comments on the (civil) plans and specifications prior to construction.
- Monitor construction to check and document our report assumptions. At a minimum, Crawford should monitor trench bedding/backfill operations for the pipeline, fill placement, and underground excavations.
- Update this report if design changes occur, 2 years lapse between this report and construction, or site conditions change.

If Crawford is not retained to perform the above applicable services, we are not responsible for any other parties' interpretation of our report, and subsequent addendums, letters, and discussions.

11 LIMITATIONS

Crawford performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. This report is intended to assist Mark Thomas for the Mariposa-Engineering Design Services for Zero Emission Transit Yard Project in Mariposa, CA. Do not use this report for different locations and/or projects without the written consent of Crawford. Where referenced, we used ASTM and Caltrans as a general (not strict) *guideline* only.

Crawford based this report on the current site conditions. We assume the soil and groundwater conditions are representative of the subsurface conditions on the site. Actual conditions between explorations will vary along the project alignment segments.

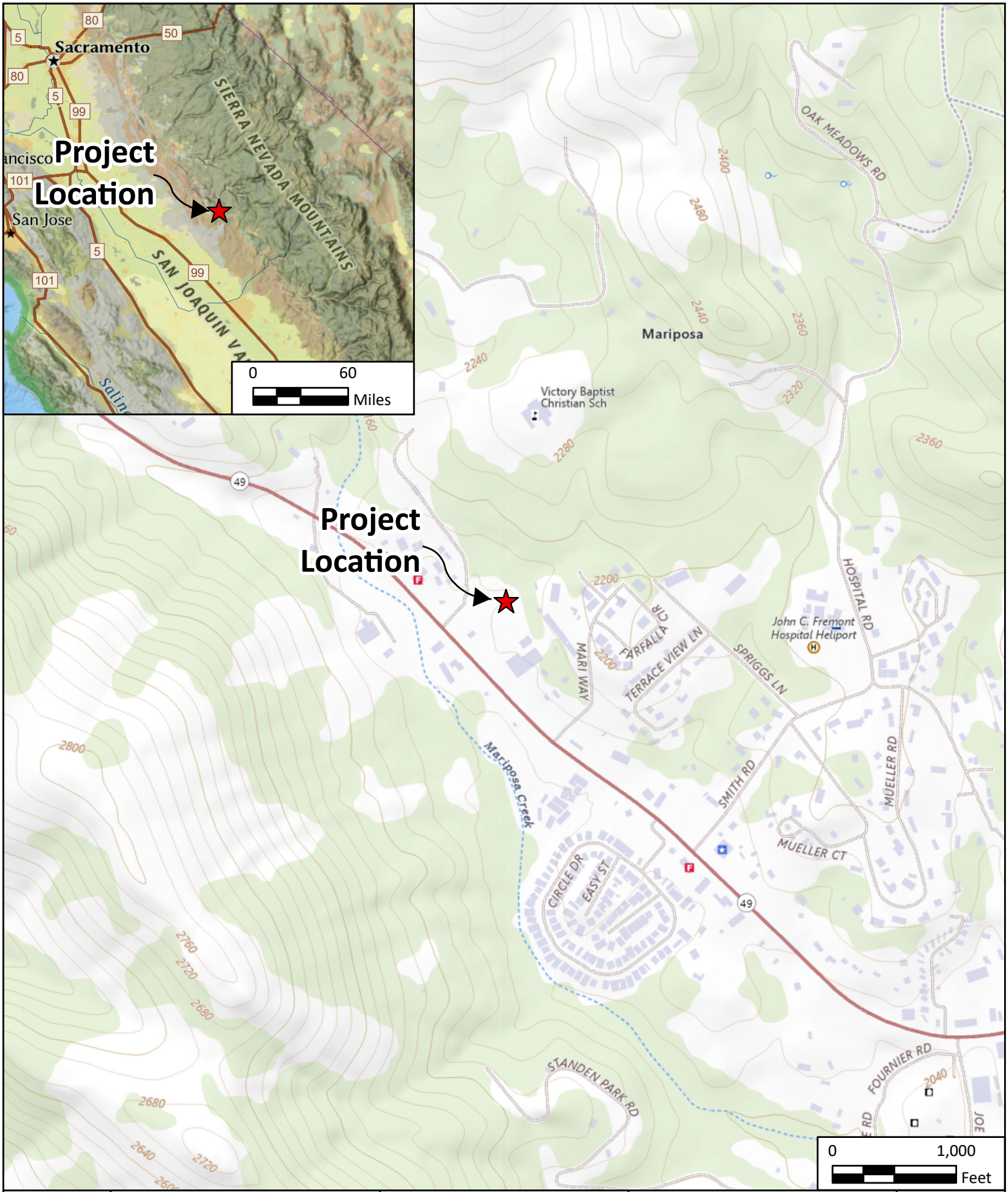
Our scope did not include evaluation of on-site hazardous materials.

Logs of our explorations are found in Appendix II. The lines designating the interface between soil types are approximate. The transition between soil types may be abrupt or gradual. Our recommendations are based on the final logs, which represent our interpretation of the field logs and general knowledge of the site and geological conditions.

Modern design and construction are complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

Appendix I

Figure 1: Vicinity Map
Figure 2: Exploration Map
Figure 3: Geologic Map
Figure 4: Fault Map
Figure 5: Seismic Refraction Profile SL1
Figure 6: Seismic Refraction Profile SL2
Figure 7: Seismic Refraction Profile SL3



NORTH

References

1. Base Map: USGS Topographic Map Layer, ArcGIS Pro, ESRI

2. Insert Base Map: National Geographic Style, ArcGIS Pro, ESRI

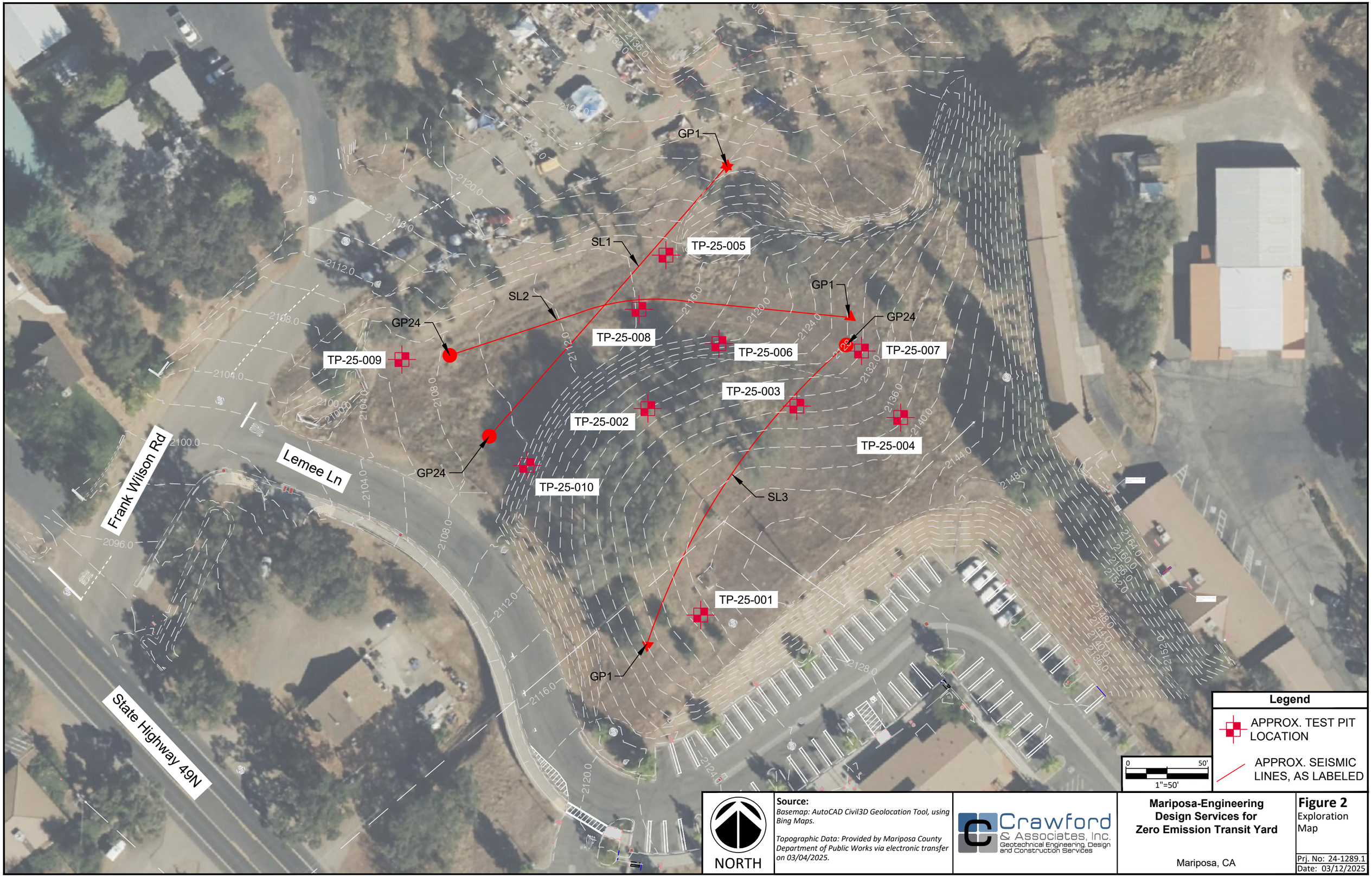
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Mariposa-Engineering Design Services for Zero Emission Transit Yard

Mariposa, CA

Figure 1
Vicinity Map

Prj. No: 24-1289.1
Date: 02/28/2025



Source:
Basemap: AutoCAD Civil3D Geolocation Tool, using Bing Maps.

Topographic Data: Provided by Mariposa County Department of Public Works via electronic transfer on 03/04/2025.

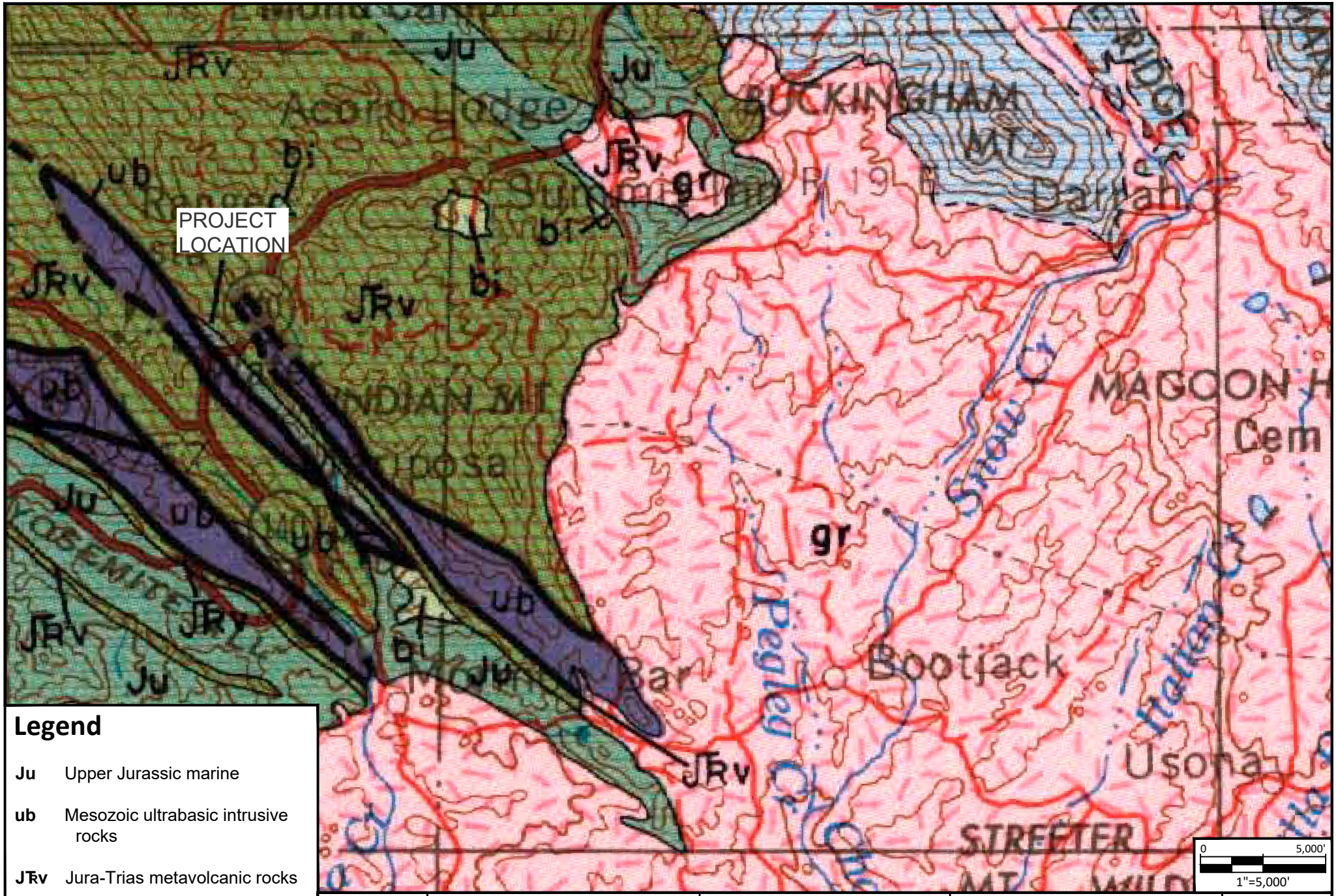
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Mariposa, CA

Figure 2
Exploration Map

Prj. No: 24-1289.1
Date: 03/12/2025



Legend

Ju Upper Jurassic marine

ub Mesozoic ultrabasic intrusive rocks

JTrv Jura-Trias metavolcanic rocks

Note: The above formations are mapped within the immediate vicinity of the project site (approximately 0.5 miles). Refer to the source material for formation descriptions beyond the immediate site area.

NORTH

Source:
Jenkins, O.P.; 1967, Division of Mines and Geology; Geologic Map of California, Mariposa Sheet; 1:250,000.

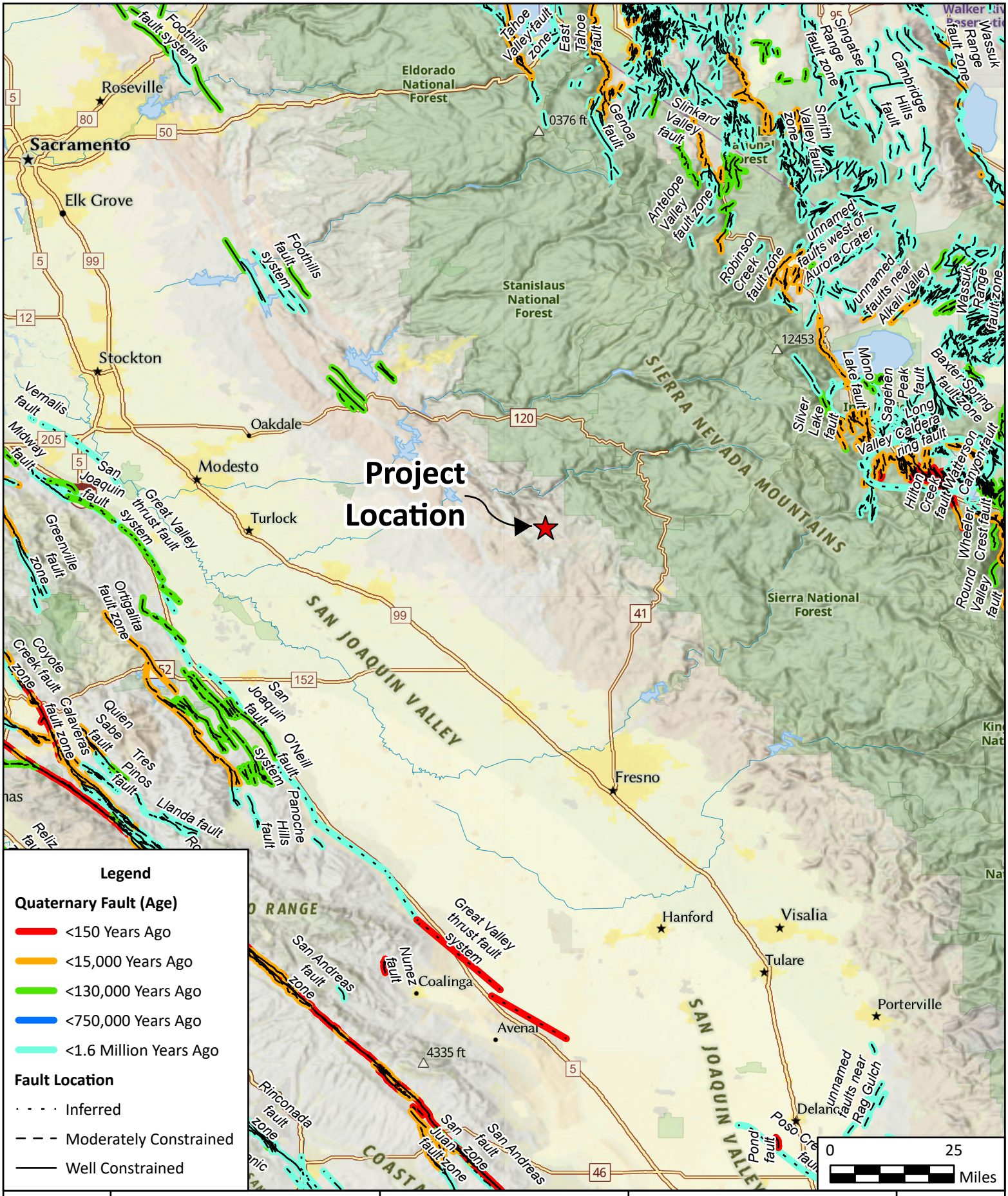
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Mariposa, CA

Figure 3
Geologic Map

Prj. No: 24-1289.1
Date: 02/28/2025



NORTH

References

1. *Fault Data: USGS GIS Data*
2. *Base Map: National Geographic Style, ArcGIS Pro, ESRI*

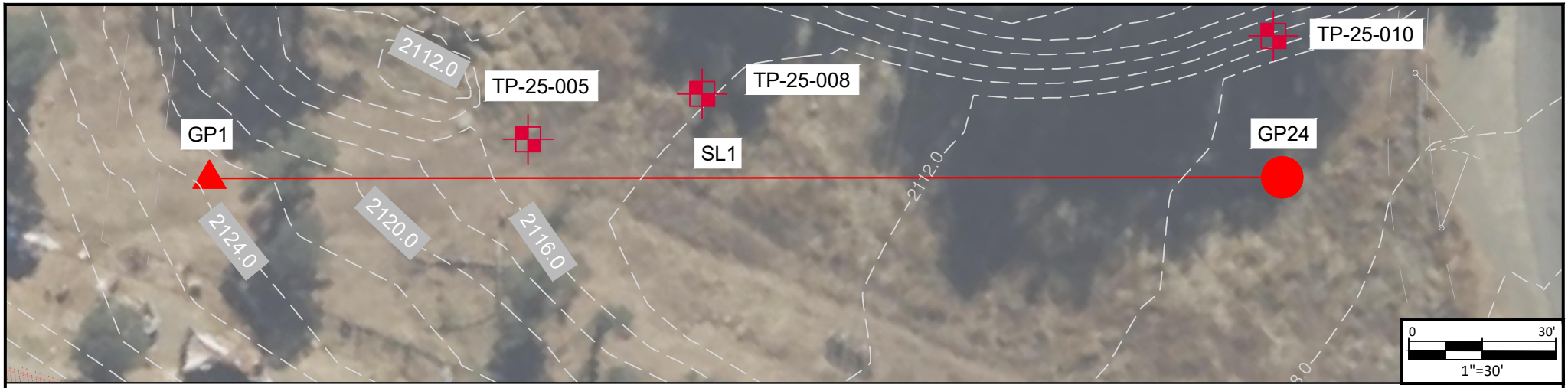
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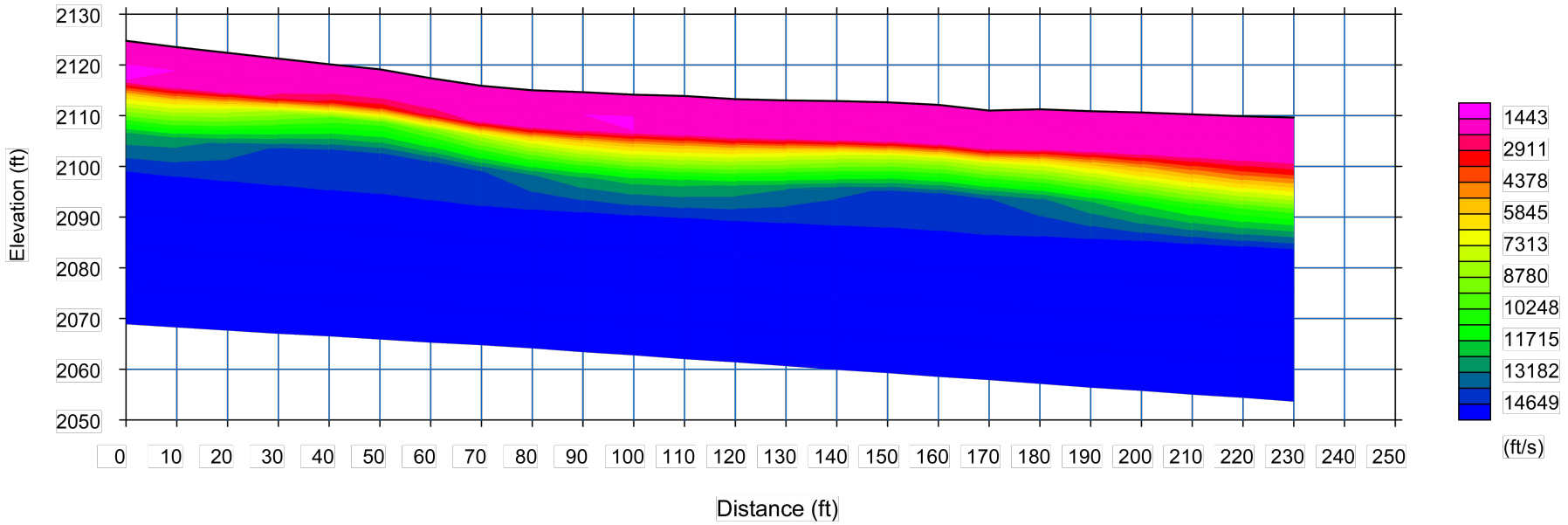
Mariposa-Engineering Design Services for Zero Emission Transit Yard

Mariposa, CA

Figure 4
Fault Map

Prj. No: 24-1289.1
Date: 02/28/2025





Legend

APPROX. TEST PIT LOCATION

APPROX. SEISMIC LINES

NORTH

Source:
Seismic refraction results produced from Geometrics, SeisImager2D.

Topographic Data: Provided by Mariposa County Department of Public Works via electronic transfer on 03/04/2025.

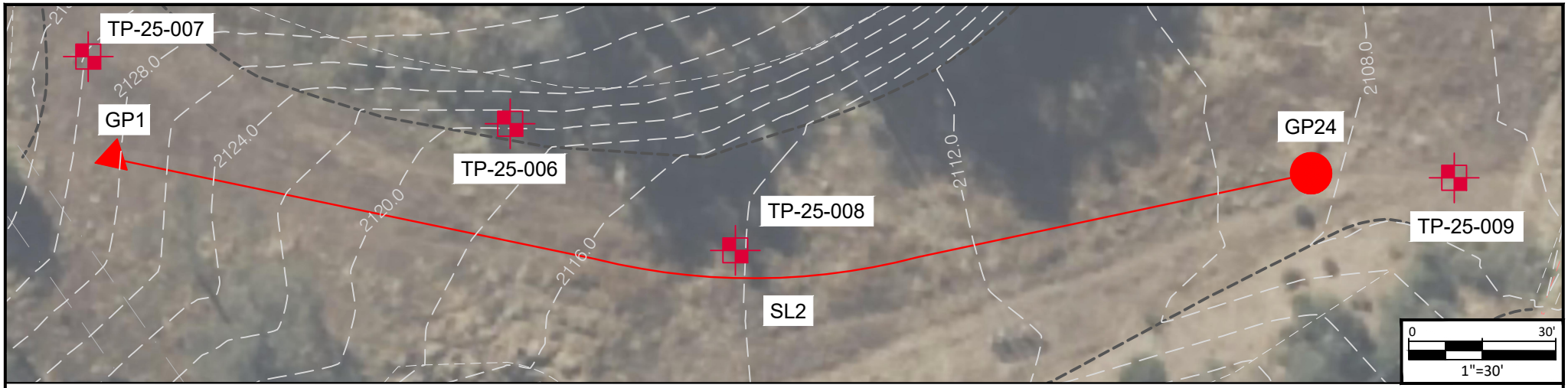
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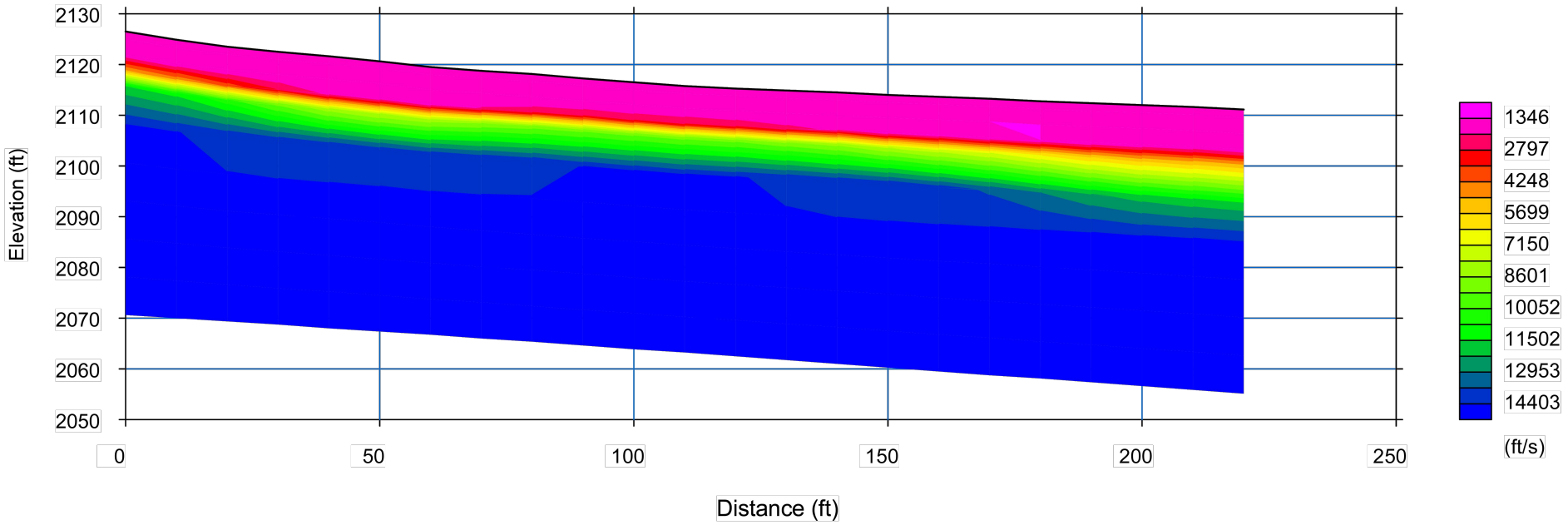
Mariposa-Engineering Design Services for Zero Emission Transit Yard

Mariposa, CA

Figure 5
Seismic Refraction Profile (SL1)

Prj. No: 24-1289.1
Date: 03/12/2025





Legend

APPROX. TEST PIT LOCATION

APPROX. SEISMIC LINES

NORTH

Source:
Seismic refraction results produced from Geometrics, SeisImager2D.

Topographic Data: Provided by Mariposa County Department of Public Works via electronic transfer on 03/04/2025.

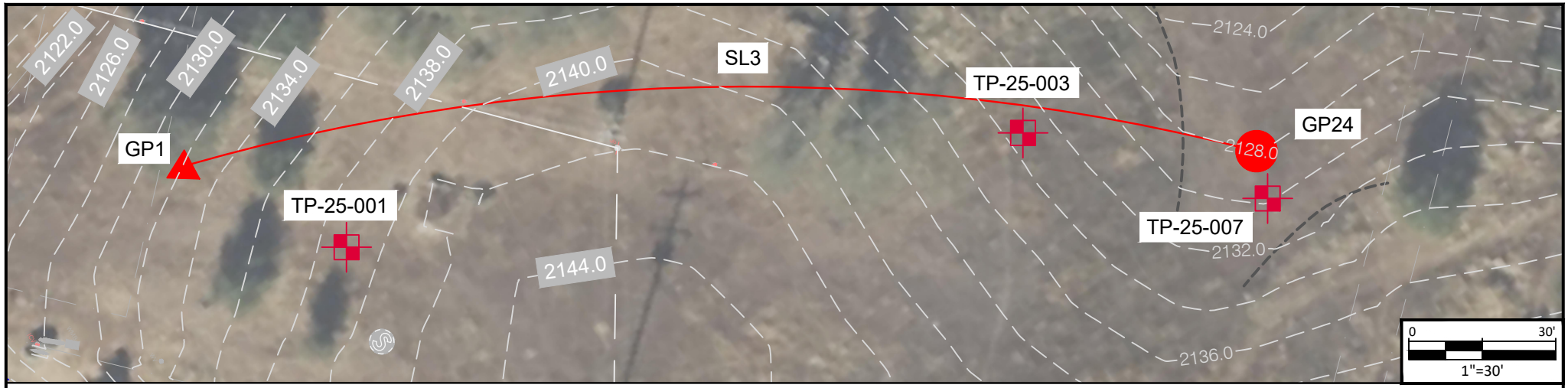
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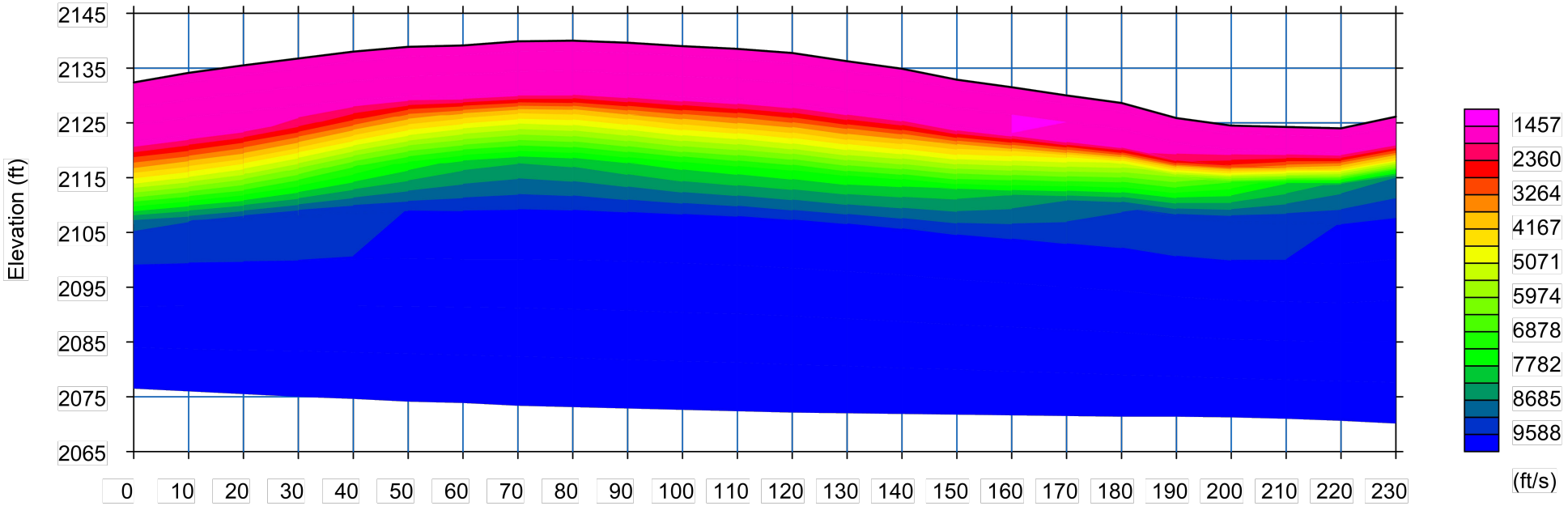
Mariposa-Engineering Design Services for Zero Emission Transit Yard

Mariposa, CA

Figure 6
Seismic Refraction Profile (SL2)

Prj. No: 24-1289.1
Date: 03/12/2025





Legend

APPROX. TEST PIT LOCATION

APPROX. SEISMIC LINES

NORTH

Source:
Seismic refraction results produced from Geometrics, SeisImager2D.

Topographic Data: Provided by Mariposa County Department of Public Works via electronic transfer on 03/04/2025.

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Mariposa-Engineering Design Services for Zero Emission Transit Yard

Mariposa, CA

Figure 7
Seismic Refraction Profile (SL3)

Prj. No: 24-1289.1
Date: 03/12/2025

Appendix II

Boring Log Legend

2025 Crawford Test Pit Logs

UNIFIED SOIL CLASSIFICATION (ASTM D 2487-06)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GRAPHIC SYMBOL	GROUP SYMBOL	SOIL GROUP NAMES
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS <5% FINES	Cu ≥ 4 AND 1 ≤ Cc ≤ 3		GW	WELL-GRADED GRAVEL
			Cu < 4 AND/OR 1 > Cc > 3		GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH		GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH		GC	CLAYEY GRAVEL
	SANDS <50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN SANDS <5% FINES	Cu ≥ 6 AND 1 ≤ Cc ≤ 3		SW	WELL-GRADED SAND
			Cu < 6 AND/OR 1 > Cc > 3		SP	POORLY-GRADED SAND
		SANDS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH		SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH		SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	INORGANIC	PI>7 AND PLOTS ON OR ABOVE "A" LINE		CL	LEAN CLAY
			PI>4 AND PLOTS BELOW "A" LINE		ML	SILT
		ORGANIC	LL (oven dried)<0.75/LL (not dried)		OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT >50	INORGANIC	PI PLOTS ON OR ABOVE "A" LINE		CH	FAT CLAY
			PI PLOTS BELOW "A" LINE		MH	ELASTIC SILT
		ORGANIC	LL (oven dried)<0.75/LL (not dried)		OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK COLOR, ORGANIC ODOR			PT	PEAT

NOTE: $Cu = D_{60}/D_{10}$

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

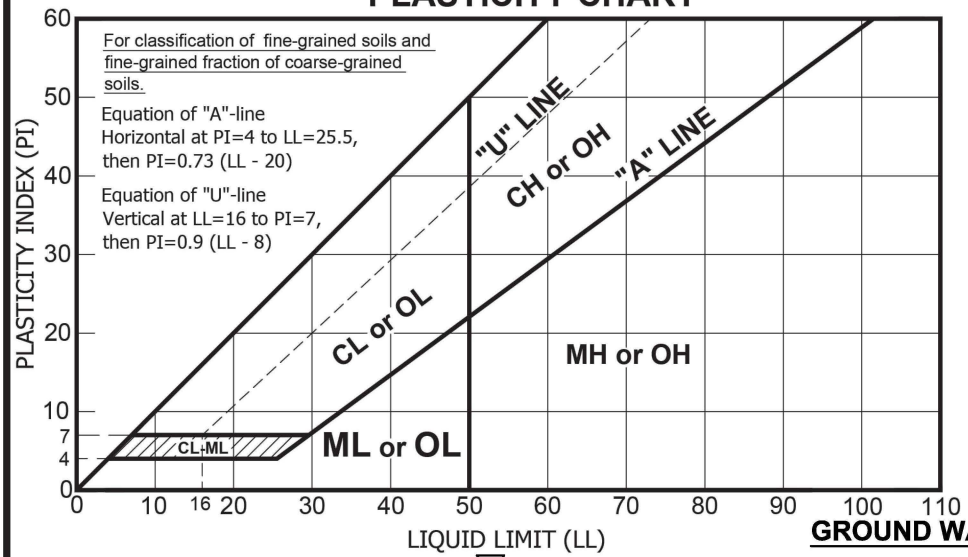
BLOW COUNT

The number of blows of a 140-lb. hammer falling 30-inches required to drive the sampler the last 12-inches of an 18-inch drive. The notation 50/0.4 indicates 4-inches of penetration achieved in 50 blows.

SAMPLE TYPES

- Auger or backhoe cuttings
- Modified California 2.5"
- Shelby tube
- Standard Penetration (SPT)
- Rock core
- Bulk Sample

PLASTICITY CHART



ADDITIONAL TESTS

C	- Consolidation
CP	- Compaction Curve
CR	- Corrosivity Testing
CU	- Consolidated Undrained Triaxial
DS	- Direct Shear
EI	- Expansion Index
P	- Permeability
PA	- Partical Size Analysis
PI	- Plasticity Index
PP	- Pocket Penetrometer
R	- R-Value
SE	- Sand Equivalent
SG	- Specific Gravity
SL	- Shrinkage Limit
SW	- Swell Potential
TV	- Pocket Torvane Shear Test
UC	- Unconfined Compression
UU	- Unconsolidated Undrained Triaxial

GROUND WATER LEVELS

- First Water Level Reading (during drilling)
- Static Water Level Reading (short-term)
- Static Water Level Reading (long-term)

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BORING LOG / TEST PIT LEGEND AND SOIL DESCRIPTIONS

LOG OF TEST PIT TP-25-001

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 8.5 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2139.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2138	1	Bulk	1			2.25			GRAVELLY lean CLAY with SAND (CL); (very stiff); reddish brown; moist; mostly medium plastic fines; fine to coarse SAND; fine to coarse GRAVEL.	100				21.4				
2137	2	Bulk	2						METAMORPHIC ROCK (GREENSTONE); greenish gray; decomposed to intensely weathered; moderately soft to moderately hard. Brown oxidation on fracture planes.	100								
2136	3																	
2135	4																	
2134	5																	
2133	6																	Operator reports higher excavating effort required at 5.5'.
2132	7																	
2131	8																	
2130	9	Bulk	3						Intensely weathered. Bottom of test pit at 8.5 ft bgs	100								Excavator refusal at 8.5'.
2129	10																	
2128	11																	
2127	12																	
2126	13																	
2125	14																	
2124	15																	
2123	16																	
2122	17																	
2121	18																	
2120	19																	
2119	20																	
2118	21																	
2117	22																	
2116	23																	
2115	24																	

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Crawford & Associates, Inc.
4701 Freeport Blvd
Sacramento, CA 95822
(916) 455-4225

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-001
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-002

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 10.8 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2128.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2127	1	Bulk	1			2.25			GRAVELLY lean CLAY with SAND (CL); (very stiff); reddish brown; moist; mostly medium plastic fines; little fine to coarse SAND; little fine to coarse GRAVEL. Little organics present.	100				21.6				
2126	2	Bulk	2						METAMORPHIC ROCK (GREENSTONE); reddish brown and greenish gray; decomposed; soft.	100								Correlated Uniaxial Compressive Strength: 330 psi
2125	3								decomposed to intensely weathered.									
2124	4																	
2123	5																	
2122	6																	
2121	7																	
2120	8																	
2119	9	Bulk	3						Intensely weathered; hard to moderately hard.	100								Operator reports higher excavating effort required at 9'.
2118	10																	
2117	11								Bottom of test pit at 10.8 ft bgs									Excavator refusal at 10.8'.
2116	12																	
2115	13																	
2114	14																	
2113	15																	
2112	16																	
2111	17																	
2110	18																	
2109	19																	
2108	20																	
2107	21																	
2106	22																	
2105	23																	
2104	24																	

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Geotechnical Engineering, Design and Construction Services

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4701 Freeport Blvd
Sacramento, CA 95822
(916) 455-4225

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-002
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-003

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 12.0 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2133.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2132	1	Bulk	1			4.00			GRAVELLY lean CLAY with SAND (CL); (very stiff); reddish brown; moist; mostly medium plastic fines; little fine to coarse SAND; little fine to coarse GRAVEL; Some organics.	100								
2131	2	Bulk	2						METAMORPHIC ROCK (GREENSTONE); grayish green; decomposed to intensely weathered; moderately soft. Reddish brown oxidation on fracture planes. Intensely weathered.	100								
2130	3																	
2129	4																	
2128	5	Bulk	3						Moderately hard.	100								Operator reports higher excavating effort required at 5'.
2127	6																	
2126	7																	
2125	8																	
2124	9																	Operator reports higher excavating effort required at 9'.
2123	10								Moderately weathered; hard.									
2122	11																	
2121	12								Bottom of test pit at 12.0 ft bgs									Excavator refusal at test pit 12.0'.
2120	13																	
2119	14																	
2118	15																	
2117	16																	
2116	17																	
2115	18																	
2114	19																	
2113	20																	
2112	21																	
2111	22																	
2110	23																	
2109	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-003
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-004

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 8.2 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2138.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierrra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE:
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2137	1	Bulk	1			4.00			SANDY lean CLAY (CL); (hard); reddish brown; moist; mostly (50%) medium plastic fines; little (46%) fine to coarse SAND; little (4%) fine to coarse GRAVEL.	100		9	34			50		
2136	2	Bulk	2						METAMORPHIC ROCK (GREENSTONE); yellowish brown, reddish brown, and black; decomposed; soft.	100								
2135	3																	
2134	4																	
2133	5																	
2132	6	Bulk	3						Intensely weathered; moderately soft; grayish green.	100								Correlated Uniaxial Compressive Strength: 4800 psi
2131	7																	
2130	8								Bottom of test pit at 8.2 ft bgs									Operator reports higher excavating effort required at 5.8'. Excavator refusal at 8.25'.
2129	9																	
2128	10																	
2127	11																	
2126	12																	
2125	13																	
2124	14																	
2123	15																	
2122	16																	
2121	17																	
2120	18																	
2119	19																	
2118	20																	
2117	21																	
2116	22																	
2115	23																	
2114	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-004
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-005

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 13.5 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2115.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: 10.5 ft
READING TAKEN: 02/19/25
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2114	1		Bulk 1			2.00			GRAVELLY lean CLAY with SAND (CL); (very stiff); reddish brown; moist; mostly medium plastic fines; little fine to coarse GRAVEL; little fine to coarse SAND; few COBBLES.	100								
2113	2		Bulk 2						METAMORPHIC ROCK (GREENSTONE); Grayish green; intensely weathered; moderately hard. Reddish brown oxidation on fracture planes.	100								Correlated Uniaxial Compressive Strength: 3700 psi
2112	3																	
2111	4																	
2110	5																	
2109	6																	
2108	7		Bulk 3						Moderately weathered; hard.	100								Correlated Uniaxial Compressive Strength: 9200 psi Operator reports higher excavating effort required at 6.5'.
2107	8																	
2106	9																	
2105	10																	
2104	11																	
2103	12																	
2102	13																	
2101	14								Bottom of test pit at 13.5 ft bgs									Test pit terminated at 13.5 due to higher excavating effort, not refusal.
2100	15																	
2099	16																	
2098	17																	
2097	18																	
2096	19																	
2095	20																	
2094	21																	
2093	22																	
2092	23																	
2091	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-005
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-006

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 6.0 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2120.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2119	1	Bulk	1						SANDY lean CLAY with GRAVEL (CL); reddish yellowish brown; moist; mostly medium plastic fines; little fine to coarse SAND; little fine to coarse GRAVEL.	100								
		Bulk	2							100								
2118	2								METAMORPHIC ROCK (GREENSTONE); grayish green; moderately weathered; hard. Reddish brown oxidation on fracture planes.									
2117	3																	
2116	4																	
2115	5																	Operator reports higher excavation effort required at 5'.
2114	6								Bottom of test pit at 6.0 ft bgs									Excavator refusal at 6.0'.
2113	7																	
2112	8																	
2111	9																	
2110	10																	
2109	11																	
2108	12																	
2107	13																	
2106	14																	
2105	15																	
2104	16																	
2103	17																	
2102	18																	
2101	19																	
2100	20																	
2099	21																	
2098	22																	
2097	23																	
2096	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-006
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-007

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 12.0 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2130.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2129	1	Bulk	1			4.25			SANDY lean CLAY with GRAVEL (CL); (hard); reddish brown; moist; mostly medium plastic fines; some fine to coarse SAND; little fine to coarse GRAVEL.	100				13.9				
2128	2	Bulk	2						METAMORPHIC ROCK (GREENSTONE); grayish green; intensely weathered; moderately soft. Reddish brown oxidation on fracture planes.	100								
2127	3																	
2126	4																	
2125	5																	
2124	6																	
2123	7																	
2122	8																	
2121	9	Bulk	3						Intensely to moderately to slightly weathered; moderately hard.	100								Operator reports higher excavation effort required at 9'.
2120	10																	
2119	11																	
2118	12								Bottom of test pit at 12.0 ft bgs									Excavator refusal at 12.0'.
2117	13																	
2116	14																	
2115	15																	
2114	16																	
2113	17																	
2112	18																	
2111	19																	
2110	20																	
2109	21																	
2108	22																	
2107	23																	
2106	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-007
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-008

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 6.8 (ft)

BEGIN DATE: 02/19/TEST PIT
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2114.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: 4.2 ft
READING TAKEN: 02/19/25
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2113	1		Bulk 1			4.25			SILTY CLAYEY SAND with GRAVEL (SC-SM); (hard); moist; mostly medium plastic fines; some fine to coarse SAND; little fine to coarse GRAVEL; few cobbles.	100		7	31			24		
2112	2																	
2111	3																	
2110	4																	
2109	5								Wet at 4.75'.									
2108	6																	
2107	7								Bottom of test pit at 6.8 ft bgs									Excavation terminated due to water infiltration and caving.
2106	8																	
2105	9																	
2104	10																	
2103	11																	
2102	12																	
2101	13																	
2100	14																	
2099	15																	
2098	16																	
2097	17																	
2096	18																	
2095	19																	
2094	20																	
2093	21																	
2092	22																	
2091	23																	
2090	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-008
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-009

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 6.0 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2107.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: Not Encountered
READING TAKEN: N/A
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD	CASING DEPTH	REMARKS
2106	1		Bulk 1			4.00			CLAYEY SAND with GRAVEL (SC); (very stiff); reddish yellowish brown; moist; mostly fine to coarse SAND; little (33%) medium plastic fines; some (18%) fine to coarse GRAVEL; few cobbles.	100						33			R-value=10
2105	2																		
2104	3																		
2103	4																		
2102	5								Wet at 4.75'.										
2101	6								Bottom of test pit at 6.0 ft bgs										Excavation terminated due to water infiltration and caving.
2100	7																		
2099	8																		
2098	9																		
2097	10																		
2096	11																		
2095	12																		
2094	13																		
2093	14																		
2092	15																		
2091	16																		
2090	17																		
2089	18																		
2088	19																		
2087	20																		
2086	21																		
2085	22																		
2084	23																		
2083	24																		

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-009
ENTRY BY: JDH
CHECKED BY:

LOG OF TEST PIT TP-25-010

PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
LOCATION: Mariposa, CA
COUNTY: Mariposa
CLIENT: Mark Thomas
LOGGED BY: LEK
DEPTH OF BORING: 14.2 (ft)

BEGIN DATE: 02/19/2025
COMPLETION DATE: 02/19/2025
SURFACE ELEVATION: 2114.0 (ft)
SURFACE CONDITION: Soil
WATER DEPTH: 14.0 ft
READING TAKEN: 02/19/25
HAMMER EFFICIENCY: N/A

DRILLING CONTRACTOR: Allison Sierra, Inc.
DRILLING METHOD: Excavator
DRILL RIG: Komatsu PC 138 US LC
HAMMER TYPE: N/A
SAMPLER TYPE & SIZE: Bulk
BOREHOLE DIAMETER: 24.0 (in)
BACKFILL METHOD: Native Cuttings

FIELD										LABORATORY							
ELEVATION (ft)	DEPTH (ft)	SAMPLE	SAMPLE NO	BLOWS PER 6 IN.	BLOWS PER FOOT	POCKET PEN. (TSF)	TORVANE (TSF)	GRAPHIC LOG	DESCRIPTION	RECOVERY(%)	RQD (%)	PLASTICITY INDEX	LIQUID LIMIT	MOISTURE (%)	D. DENSITY (PCF)	% PASSING 200 SIEVE	DRILL METHOD / CASING DEPTH	REMARKS
2114	0	Bulk	1			4.00			GRAVELLY lean CLAY with SAND (CL); (very stiff); Reddish yellowish brown; moist; mostly medium plastic fines; some fine to coarse GRAVEL; little fine to coarse SAND.	100								
2113	1	Bulk	2							100								Correlated Uniaxial Compressive Strength: 100 psi
2112	2								METAMORPHIC ROCK (GREENSTONE); light grayish green; decomposed; very soft. Yellowish reddish brown oxidation on fracture planes.								
2111	3																	
2110	4																	Operator reports lower excavation effort required from 4.0' to 12.75'.
2109	5																	
2108	6																	
2107	7																	
2106	8																	
2105	9																	Operator reports higher excavation effort required at 8.5'.
2104	10								Wet; decomposed; very soft at 10'.									
2103	11																	
2102	12																	
2101	13																	Operator reports higher excavation effort required at 12.75'.
2100	14								Bottom of test pit at 14.2 ft bgs									Excavation terminated due to high effort, water infiltration, and caving.
2099	15																	
2098	16																	
2097	17																	
2096	18																	
2095	19																	
2094	20																	
2093	21																	
2092	22																	
2091	23																	
2090	24																	

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PROJECT NO: 24-1289.1
PROJECT: Zero Emission Transit Yard
BORING: TP-25-010
ENTRY BY: JDH
CHECKED BY:

Appendix III

Laboratory Test Results

Crawford & Associates, Inc.
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Project Name: Mariposa Engineer Design Services for Zero Emissions Transit Yard
Crawford File No: 24-1289.1
Date: 2/27/25
Technician: A. Madden

MOISTURE TESTS - D2216

	1	2	3	4	5
Sample No.	TP-25-001-Bulk 1	TP-25-002-Bulk 1	TP-25-007-Bulk 1		
USCS Symbol	CL	CL	CL		
Depth (ft.)	0.0-1.5	0.0-1.3	0.0-2.0		
Tare No.	119	H9	154		
Tare (g)	14.0	13.3	14.1		
Wet Soil + Tare (g)	96.4	94.9	97.2		
Dry Soil + Tare (g)	81.9	80.4	87.1		
Dry Soil (g)	67.9	67.2	73.0		
Water (g)	14.5	14.5	10.1		
Moisture (%)	**21.4**	**21.6**	**13.9**		

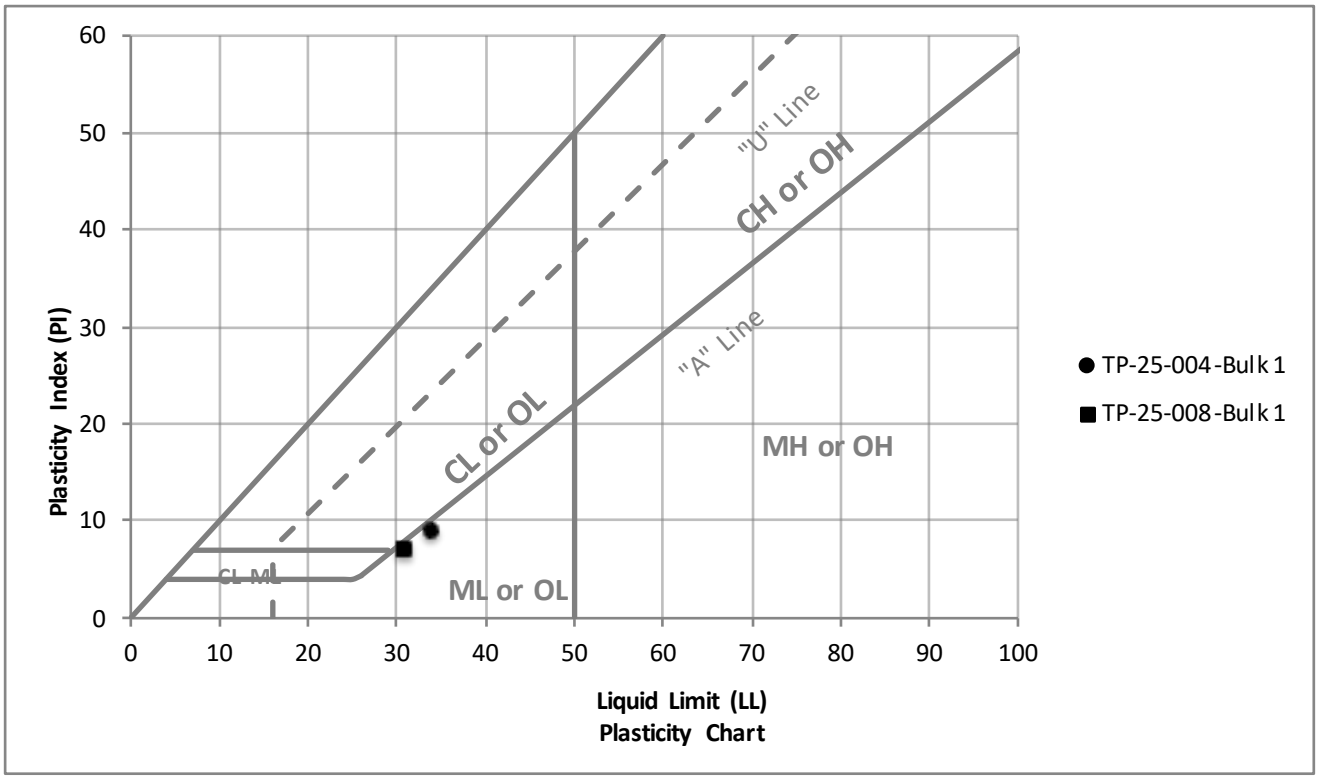
Notes:

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Mariposa Engineering Design Services for Zero Emissions Transit Yard
Crawford File No: 24-1289.1
Date: 2/28/25
Technician: A. Madden

Plasticity Index - ASTM D4318

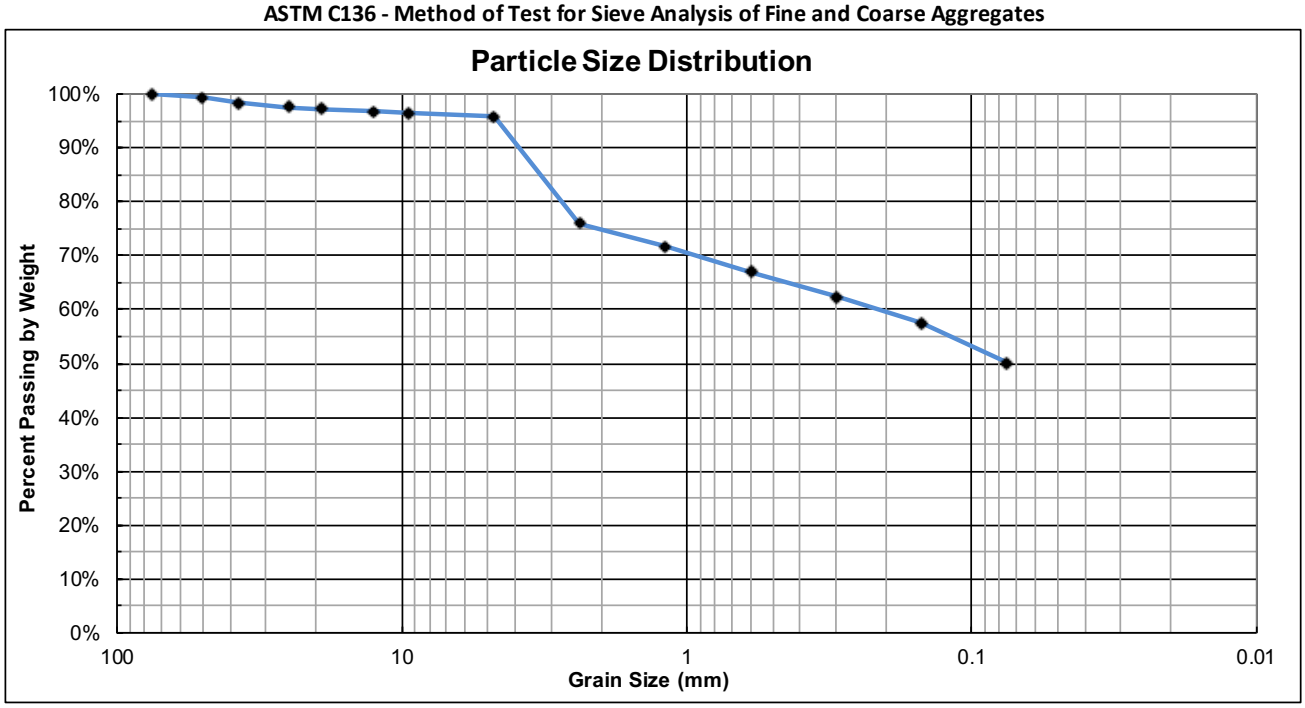
Sample ID	Depth (ft)	Liquid Limit	Plastic Limit	PI
TP-25-004-Bulk 1	1.0-1.3	34	25	9
TP-25-008-Bulk 1	0.0-5.0	31	24	7



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Project Name: Mariposa Engineering Design Services for Zero Emission Transit Yard
CAInc File No: 24-1289.1
Date: 2/28/25
Technician: A. Madden
Sample ID: TP-25-004-Bulk 1
Depth (ft): 1.0-1.3
Classification: SANDY LEAN CLAY, Reddish Brown

ASTM C136 - Method of Test for Sieve Analysis of Fine and Coarse Aggregates

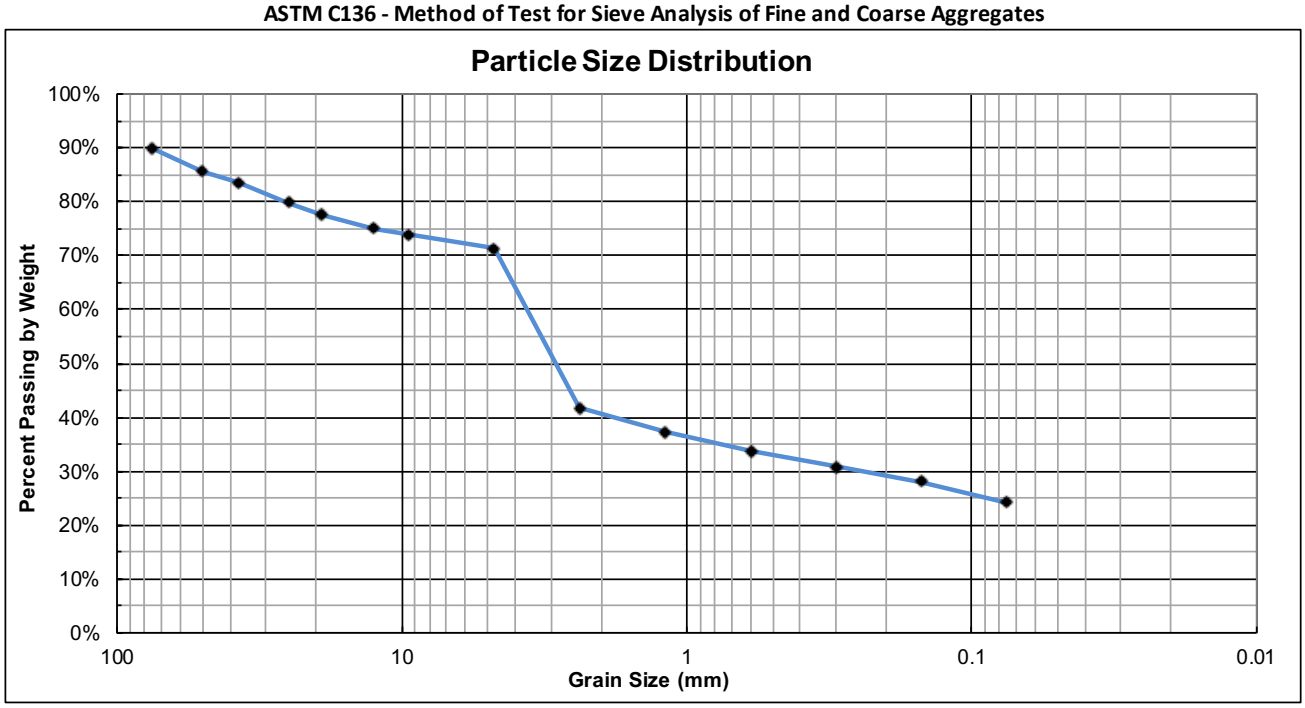


Sieve #	Opening	Grading of Aggregate Size Fractions				Cummulative % Passing	Specification Limits
		A 1 in x No. 4 %		B No. 4 X 0 %			
		Cummulative mass (g)	% Passing	Cummulative mass (g)	% Passing		
	mm	21%		79%			
3"	75	0	100%	0	100%	100%	
2"	50	258.4	97%	0	100%	99%	
1-1/2"	37.5	611.1	92%	0	100%	98%	
1"	25.0	922.9	88%	0	100%	97%	
3/4"	19.0	1042.4	86%	0	100%	97%	
1/2"	12.5	1207.3	84%	0	100%	97%	
3/8"	9.50	1320.3	83%	0	100%	96%	
#4	4.75	1574	79%	0	100%	96%	
#10	2.38	0	0%	20.3	96%	76%	
#20	1.190	0	0%	48.2	90%	72%	
#40	0.595	0	0%	78	84%	67%	
#60	0.297	0	0%	107.6	79%	62%	
#100	0.150	0	0%	138	73%	57%	
#200	0.075	0	0%	184.3	63%	50%	

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Mariposa Engineering Design Services for Zero Emission Transit Yard
CAInc File No: 24-1289.1
Date: 2/28/25
Technician: A. Madden
Sample ID: TP-25-008-Bulk 1
Depth (ft): 0.0-5.0
Classification: SILTY CLAYEY SAND with GRAVEL, Reddish Brown

ASTM C136 - Method of Test for Sieve Analysis of Fine and Coarse Aggregates

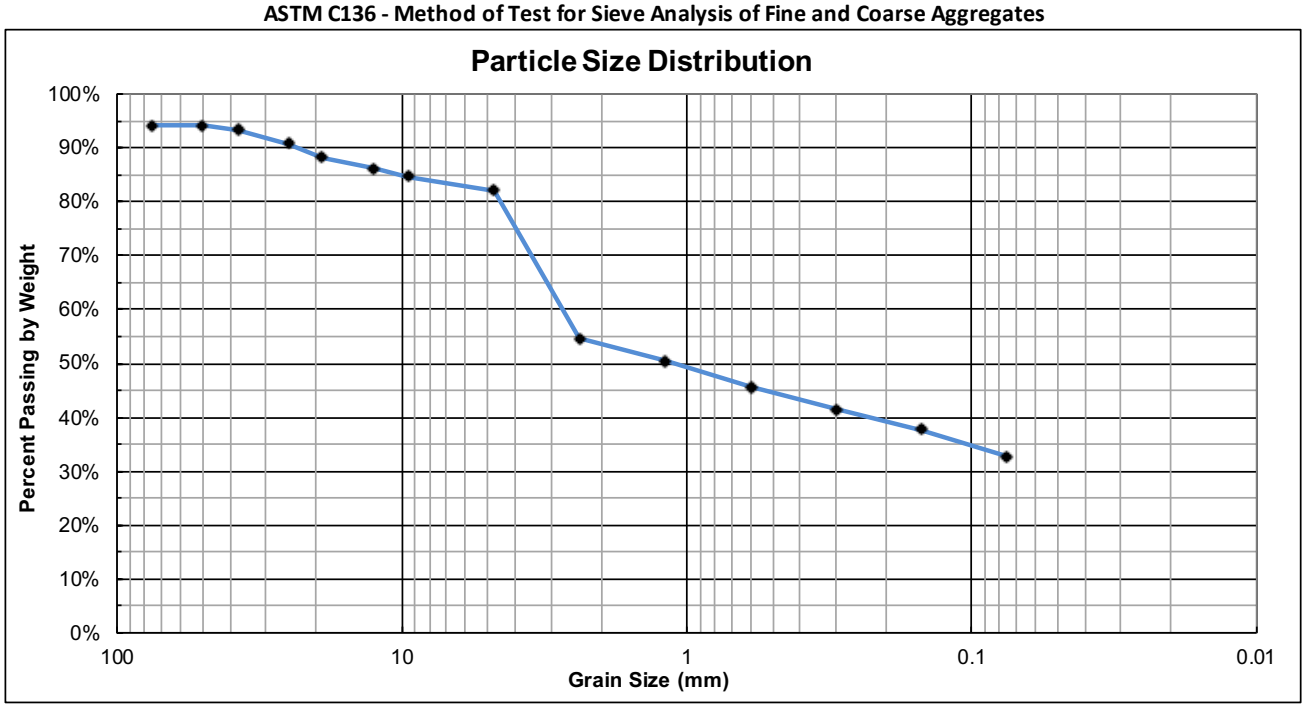


Sieve #	Opening	Grading of Aggregate Size Fractions				Cummulative % Passing	Specification Limits
		A 1 in x No. 4 %		B No. 4 X 0 %			
		Cummulative mass (g)	% Passing	Cummulative mass (g)	% Passing		
	mm	54%		46%			
3"	75	439.3	81%	0	100%	90%	
2"	50	439.3	73%	0	100%	86%	
1-1/2"	37.5	439.3	69%	0	100%	83%	
1"	25.0	926.9	62%	0	100%	80%	
3/4"	19.0	1399.5	58%	0	100%	78%	
1/2"	12.5	1890.5	54%	0	100%	75%	
3/8"	9.50	2150.7	51%	0	100%	74%	
#4	4.75	2674.3	46%	0	100%	71%	
#10	2.38	0	0%	41.4	90%	42%	
#20	1.190	0	0%	85.2	80%	37%	
#40	0.595	0	0%	122.1	73%	34%	
#60	0.297	0	0%	154.1	66%	31%	
#100	0.150	0	0%	183.6	60%	28%	
#200	0.075	0	0%	227.2	52%	24%	

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Mariposa Engineering Design Services for Zero Emission Transit Yard
CAInc File No: 24-1289.1
Date: 2/28/25
Technician: A. Madden
Sample ID: TP-25-009-Bulk 1
Depth (ft): 0.0-5.0
Classification: CLAYEY SAND with GRAVEL, Reddish Brown

ASTM C136 - Method of Test for Sieve Analysis of Fine and Coarse Aggregates



Sieve #	Opening	Grading of Aggregate Size Fractions				Cummulative % Passing	Specification Limits
		A 1 in x No. 4 %		B No. 4 X 0 %			
		Cummulative mass (g)	% Passing	Cummulative mass (g)	% Passing		
	mm	42%		58%			
3"	75	791.2	86%	0	100%	94%	
2"	50	791.2	86%	0	100%	94%	
1-1/2"	37.5	909.6	84%	0	100%	93%	
1"	25.0	1245.2	78%	0	100%	91%	
3/4"	19.0	1608.7	72%	0	100%	88%	
1/2"	12.5	1881.1	67%	0	100%	86%	
3/8"	9.50	2080	64%	0	100%	85%	
#4	4.75	2441.3	58%	0	100%	82%	
#10	2.38	0	0%	26.3	95%	55%	
#20	1.190	0	0%	63.5	87%	50%	
#40	0.595	0	0%	104.4	79%	46%	
#60	0.297	0	0%	140.9	72%	41%	
#100	0.150	0	0%	174	65%	38%	
#200	0.075	0	0%	216.4	57%	33%	

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services

Project Name: Mariposa Engineering Design Services for Zero Emissions Transit Yard
Crawford File No: 24-1289.1
Date: 3/5/25
Technician: A. Madden

Test Pit Number	Sample Number	Trial Number	Equivalent Core Diameter (inches)	Failure Load (P) (lbf)	Point Load Index (I_S) (psi)	Correlated Uniaxial Compressive Strength (psi)	Remarks/Notes
TP-25-002	Bulk 2	**1**	2.1	64.51	14	330	
TP-25-004	Bulk 3	**1**	2.6	425.56	64	4800	
TP-25-005	Bulk 2	**1**	3.5	1555.22	127	3700	
TP-25-005	Bulk 3	**1**	3.5	1039.51	87	9200	
TP-25-010	Bulk 2	**1**	3.5	46.78	4	100	

Uniaxial compressive strength values based on point load test data and correlations derived from Bieniawski (1975); "Rock Mechanics for Underground Mining", Brady & Brown, 1985 (page 98-99).

Equation to Determine Uniaxial Compressive Strength:

Uniaxial Compressive Strength = $s_c = (14+ 0.175D)I_s$

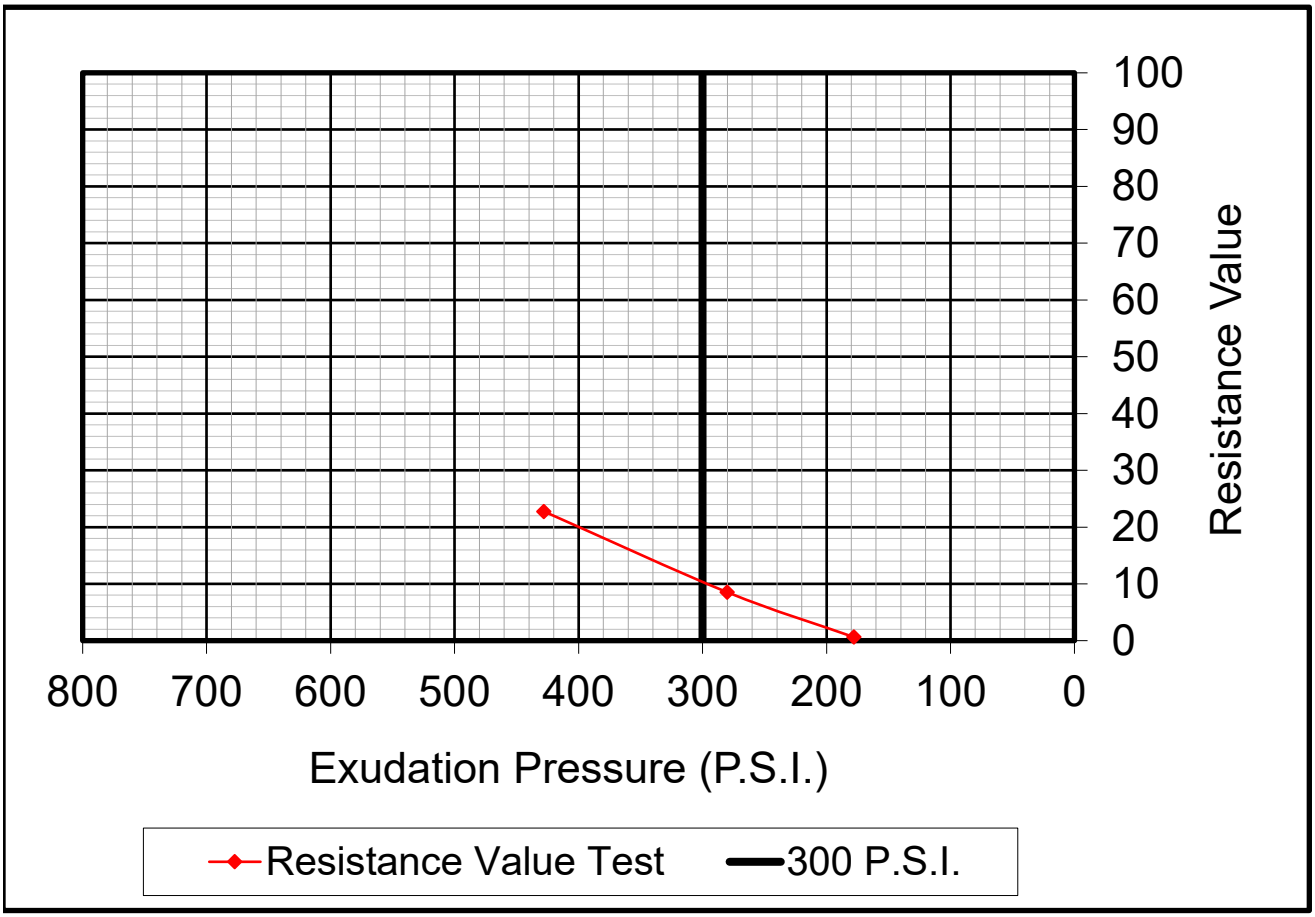
Point Load Index = $I_s = P/D^2$

Pavement Engineering Inc.
Redding • Sacramento • San Luis Obispo
Concord • Santa Clarita

RESISTANCE (R) VALUE TEST

California Test 301

Laboratory No.: L250338
Project No.: 250017 (Crawford & Associates Project: 24-1289.1)
Sample Date: February 28, 2025
Report Date: March 7, 2025
Client: Crawford & Associates, Inc.
Project Name: Mariposa Eng. Des. Svcs. for Emission Transit Yard
Sample Description: Brown Silty Clay
Sample Location: TP-25-009, Bulk 1



Specimen No.	1	2	3
Moisture Content (%)	19.6	18.5	21.2
Dry Density (PCF)	114.3	115.9	112.0
Resistance Value (R)	9	23	1
Exudation Pressure (PSI)	280	428	178
Expansion Pressure	48	91	9
As Received Moisture Content (%)	19.6		

RESISTANCE VALUE AT 300 P.S.I. 10

AASHTO R18

Reviewed By: _____

Brandon Rodebaugh
Materials Engineer

Sunland Analytical

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

Date Reported 03/05/2025
Date Submitted 02/28/2025

To: Carmelo Pagan
Crawford & Associates, Inc.
4701 Freeport Blvd
Sacramento, CA 95822

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

The reported analysis was requested for the following location:
Location : TP-25-008 Site ID : BULK 1 @ 0-5.
Thank you for your business.

* For future reference to this analysis please use SUN # 94170-194593.

EVALUATION FOR SOIL CORROSION

Soil pH	5.64	
Minimum Resistivity	4.82 ohm-cm (x1000)	
Chloride	11.3 ppm	00.00113 %
Sulfate	8.5 ppm	00.00085 %

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