

APPENDIX E

Geotechnical Investigation

GEOTECHNICAL INVESTIGATION

TransMontaigne Martinez Rail Track Expansion Waterfront Road Martinez, California

PREPARED FOR:

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Project No. E9272-04-02

December 22, 2023

JMA Civil

383 4th Street, Suite 201

Oakland, California 94607

Attention: Mr. Zhaoyang Wang, PE

Subject: TRANSMONTAIGNE MARTINEZ RAIL TRACK EXPANSION
WATERFORD ROAD
MARTINEZ, CALIFORNIA
GEOTECHNICAL INVESTIGATION

Dear Mr. Wang:

In accordance with your authorization, we have performed a geotechnical investigation to support the design and construction of the subject rail track expansion project in Martinez, California. Our investigation was performed to observe the subsurface and geologic conditions that may impact site development for the project as presently planned. The accompanying report presents the results of our investigation and conclusions and recommendations pertaining to the geotechnical aspects of the proposed project. The findings of this study indicate the site is suitable for development as planned provided the recommendations of this report are implemented during design and construction. This report has been updated from its original version to incorporate information from our supplemental field investigation, laboratory testing and engineering analysis performed for added project components.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

DRAFT

Shane Rodacker, GE

Senior Engineer

(1/e-mail) Addressee

Disclaimer: This DRAFT is intended for the use of the project team to help with the on-going design of the project and provided as a courtesy for review only. This DRAFT should not be relied upon for final design nor produced and submitted to regulatory agencies until a FINAL document is completed with the signatures and stamps of the design professionals.

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation to support the design and construction of a rail track expansion project at the TransMontaigne facility in Martinez, California (See Vicinity Map, Figure 1). The purpose of this investigation was to evaluate the subsurface and geologic conditions in the area of the planned rail expansion and related improvements and provide conclusions and geotechnical recommendations for project design and construction, based on the conditions encountered during our study. This report has been updated from its previous (2022) version to reflect supplemental field exploration performed for various retaining walls that were added to the proposed project.

The scope of this investigation included field exploration, laboratory testing, engineering analysis and the preparation of this report. Our field exploration included three soil borings drilled to depths ranging from approximately 5 to 20 feet on September 9, 2021, four Cone Penetrometer Tests (CPTs) advanced to depths of approximately 17 to 60 feet on September 21, 2021, and two hand auger borings excavated to depths of approximately 2 feet on November 4, 2021. We recently drilled five additional soil borings to depths of approximately 8 ½ to 39 feet on November 6 and 7, 2023. The locations of our explorations are depicted on the Site Plan, Figure 2. A detailed discussion of our field investigation, boring logs and CPT profiles are presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to evaluate pertinent geotechnical parameters. Appendix B presents the laboratory test results in tabular format and graphical format.

The opinions expressed herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE CONDITIONS AND PROJECT DESCRIPTION

Based on information provided by JMA Civil, we understand that approximately 2,500 linear feet of private rail track expansion are planned. The new track will diverge from the existing UPRR line approximately 1,500 feet of the Waterfront Road overcrossing. Just west of the overcrossing, the new rail line will turn and trend to the northwest along the western margin of the TransMontaigne facility. Approximately 500 feet northwest of the overcrossing, the rail line will split into 3 separate loading area lines that extend another 500 feet to the northwest. The rail line extension adjacent to the TransMontaigne facility will require two new retaining walls. Approximately 700 linear feet of retaining wall is proposed along the northeast side of the extension with retained heights up to approximately 14 feet; most of this “inside” wall is planned as a soil nail wall but portions may be conventional cantilever retaining wall. In addition, approximately 460 feet of cantilever retaining wall (“outside” wall) is planned along the southwestern side of the loading area rail lines at the margin of a relatively low-lying marsh area.

Approximately 95 feet of soil nail wall up to 11 feet in maximum height is proposed immediately east of the Waterfront Road overcrossing, on the north side of the rail line extension. A new crash wall is proposed on the north side of the extension beneath the overcrossing to protect the existing bent support columns should a derailment occur. Details of the crash wall were not available at the time of this report.

East of the Waterfront Road overcrossing, new embankment fills up to approximately 2 ½ to 3 feet will be required beneath the prism for the new rail track. Thicker fills, on the order of 4 ½ to 5 feet in thickness, are

proposed at the northern margin of the track alignment where short 2:1 (horizontal:vertical) fill slopes are planned. The new rail line west of Waterfront Road will be generally constructed in a cut condition. However, new fills are planned on the southwestern side of the extension from approximately Station 23+00 to the northwestern terminus. The proposed project improvements are included on the Site Plan, Figure 2.

3. GEOLOGIC SETTING

Martinez is located within the Coast Ranges Geomorphic Province of California, which is characterized by a series of northwest-trending mountains and valleys along the north and central coast of California. Topography is controlled by the predominant geological structural trends within the Coast Range that generally consist of northwest-trending synclines, anticlines, and faulted blocks. The dominant structure is a result of both active northwest-trending strike-slip faulting, associated with the San Andreas Fault system, and east-west compression within the province.

Available geologic mapping by the United States Geological Survey (Dibblee, 2006) indicates the Waterfront Road overcrossing is within an area of Cretaceous age Panoche Formation that trends northwest to southeast in the general vicinity of the TransMontaigne facility. Holocene age Bay Mud is present on either side of the formational unit. The Bay Mud is mantled by artificial fills placed during previous episodes of site development in some areas e.g., Waterfront Road east of the overcrossing. Bay Mud is a notoriously weak and compressible young alluvial deposit typically comprising silts and clays with high organic content. We note that site geologic conditions can change dramatically over short horizontal distances e.g. the northwestern end of the extension is underlain by both Bay Mud and Panoche Formation. A Geologic Map covering the site vicinity is presented as Figure 3.

4. SOIL AND GROUNDWATER CONDITIONS

4.1 Artificial Fill

Artificial fills were encountered in our Borings B1 through B6 to depths of approximately 1 to 6 feet below existing grade. Our Borings B7 and B8, located north of the Waterfront Road overcrossing encountered approximately 6 to 7 feet of fill material placed during prior development for the roadway and bridge. Fill materials in Borings B1 through B6 consisted of loose sand and gravel, medium dense silty gravel and sand with various amounts of brick fragments, medium dense clayey sand with variable amounts of gravel, and stiff sandy clay with gravel. The fill materials in Borings B7 and B8 were not sampled, but were observed to generally consist of sandy clay with gravel. Concrete fragments were observed within the fill materials in Boring B7. The in-situ measurements from our CPTs suggest approximately 5 to 10 feet of artificial fill overlies the native Bay Mud at our CPT2 through CPT4 locations.

4.2 Bay Mud

We encountered Bay Mud deposits beneath a mantle of artificial fill in Boring B4. The Bay Mud deposits were observed as very soft to medium stiff lean to fat clay with organics and extended to a depth of approximately 17 ½ feet below existing grade. Bay Mud deposits were encountered beneath the existing artificial fills in our CPT2 through CPT4 locations. The CPT data indicates the Bay Mud deposits extend to minimum depths of approximately 50 feet below the existing grade at those locations. Our CPTs interpreted the deposits as very soft to soft clay, typical of Bay Mud. Based on our experience with other project at Bay Mud sites, the upper several feet of Bay Mud is likely stiffer than the underlying materials within the unit. This stiffer material is referenced herein as Bay Mud “crust.”

4.3 Alluvium

Our Borings B5 and B6 encountered alluvial soils consisting of stiff clays with sand. The alluvium extended to depths of approximately 6 and 8 feet in Borings B5 and B6, respectively.

4.4 Residual Soil

Residual soils were encountered in our Borings B1 through B3 and HA1 and HA2 atop underlying formational materials. The residual soils were encountered below existing fills (where present) and extended to depths of approximately 1 ¼ to 5 ½ feet below existing grade. The residual soils were observed to be stiff to very stiff, lean to fat clay with variable amounts of sand and silt.

4.5 Panoche Formation

Panoche Formation was encountered beneath residual soils in our Borings B1 through B3 and HA2, beneath the Bay Mud or alluvial soils in Borings B4 through B6, and was observed at grade in the cuts below the Waterfront Road overcrossing. In addition, our Borings B7 and B8 encountered Panoche Formation beneath 6 to 7 feet of fill materials associated with bridge or roadway construction. Panoche Formation is a Cretaceous age marine formation with sandstone and claystone/shale subunits that are both mapped within the limits of the site. Panoche Formation materials should provide good foundation support characteristics and are not considered susceptible to significant settlements under anticipated project loading.

Subsurface conditions described in the previous paragraphs are generalized. Therefore, we advise the reader to consult the exploratory boring logs and CPT data included in Appendix A. Logs include soil/rock type(s), color, moisture, consistency, and USCS classification of the materials encountered at specific locations.

4.6 Groundwater

Groundwater was not encountered in our borings. Pore pressure dissipation testing in our CPTs inferred groundwater at depths of approximately 2 to 4 feet in CPT2 through CPT4. Actual groundwater levels will fluctuate seasonally and with variations in rainfall, reservoir water level, temperature, and other factors and may be higher or lower than observed during our study. Shallow groundwater conditions should be anticipated, especially within areas of Bay Mud.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 General

- 5.1.1 No overriding geotechnical constraints were encountered during our investigation that would preclude the project as presently proposed. A primary geotechnical consideration is the high variability in geologic conditions throughout the limits of the project. Formational materials are present at-grade in the vicinity of the Waterfront Road overcrossing but transition to highly compressible Bay Mud over a short distance, east of the overcrossing. Additionally, Bay Mud was encountered in our soil boring at the northwestern terminus of the rail spur line extension. The planned new rail line and associated embankment fills will be constructed over both units and significant differential settlement should be expected due to the compressibility of the Bay Mud.
- 5.1.2 Based on the subsurface conditions at the site and the planned embankment thickness, post-construction settlements on the order of 6 to 8 inches may occur in areas underlain by Bay Mud. Additionally, east of the overcrossing, the transition from Panoche Formation to Bay Mud is abrupt and differential settlement should be expected across that transition since the Panoche Formation materials have very low compressibility. Similarly, it appears geologic conditions at the northwestern end of the spur line extension also transition abruptly from Panoche Formation at/near existing grade to Bay Mud extending to a depth of approximately 17 ½ feet below existing grade, and differential settlements should be anticipated. Our settlement estimates are based on a unit weight of approximately 105 pounds per cubic foot (pcf) for the ballast rock that will comprise most of the embankment for the new rail line. Proposed ballast and fill materials should be reviewed by Geocon. Updates to the conclusions and recommendations herein may be necessary.
- 5.1.3 Numerous case studies of the time-dependent consolidation properties of Bay Mud indicate up to approximately 50 percent of the estimated settlement should occur in the first 10 years. In the new track area underlain by Bay Mud, the placement of new embankment fills may induce comparatively minor settlements at the adjacent existing track.
- 5.1.4 The recommendations presented herein for the “outside” cantilever retaining wall along the southwestern margin of the loading area are based on the soil conditions encountered in Boring B4. Additional soil borings should be considered to explore the transition in geologic conditions along the proposed wall alignment and refine the recommendations herein.
- 5.1.5 As noted above, details of the crash wall proposed beneath the Waterfront Road overcrossing were not available at the time of this report. The corresponding recommendations herein are based on conceptual information previously provided by the design team and should be considered preliminary. Updated recommendations should be provided once crash wall design details are available.
- 5.1.6 Based on the soil and geologic conditions encountered during our study, soil nails for the “inside” retaining wall will be constructed in Panoche Formation materials, and any cantilever portions will retain Panoche Formation materials with footings bearing on the same.
- 5.1.7 Any changes in the design, location or elevation of the proposed improvements, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

5.1.8 The proposed project improves a site with past episodes of site development. As such, unknown underground improvements and/or areas of undocumented fill materials may be present. Supplemental recommendations may be provided during construction.

5.1.9 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

5.2 Soil and Excavation Characteristics

5.2.1 The onsite soils and formational materials can be excavated with moderate to heavy effort using conventional excavation equipment. We do not anticipate excavations in the Bay Mud, alluvium, and residual soils at the site will generate oversize material (greater than 3 inches in nominal dimension). However, the artificial fills within the project limits are undocumented and may contain oversize materials or constituents not reported herein. We recommend contractors review the subsurface conditions prior to bidding and selecting excavation equipment.

5.2.2 In our experience, Panoche Formation materials may be excavated with moderate to heavy effort using conventional excavation or drilling equipment. Oversize materials may be generated during initial excavation and additional effort may be necessary to reduce the oversize.

5.2.3 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.

5.3 Materials for Fill

5.3.1 With the exception of ballast rock, import materials should possess “low” expansion potential (Expansion Index less than 50), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock larger than 3 inches in greatest dimension.

5.3.2 Environmental characteristics and corrosion potential of import soil materials may also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

5.4 Grading

5.4.1 All earthwork should be observed and all fills tested for recommended compaction and moisture content by representatives of Geocon.

5.4.2 Prior to placing fill materials for new embankments, the existing ground surface should be stripped of vegetation and organic-laden topsoil. The ground surface exposed after stripping should be scarified to a depth of approximately 6 to 12 inches, moisture conditioned (if necessary) to at least 3 percent over optimum moisture content and recompacted to at least 85 percent relative compaction.

5.4.3 Import fill materials should be placed in 8- to 12-inch loose lifts and compacted to at least 90 relative compaction at above optimum moisture content. If excavated Bay Mud materials are to be re-used as fill, we should be contacted for review. Specific recommendations will be provided.

5.4.4 The Bay Mud crust is subject to high deflections under heavy wheel loads. Therefore, construction equipment should be limited to light to medium size, supported on mud-tracks or ballon-size tires.

Haul routes for heavy equipment should be kept level and smooth to prevent equipment from bouncing and imposing very high dynamic loads on the Bay Mud. Heavy equipment should not be allowed to travel at high speeds as this can cause serious subgrade damage and rutting. All operators of heavy equipment should be informed of these guidelines and be aware of the general soil conditions.

- 5.4.5 Under repeated wheel loads and/or excessive moisture, the Bay Mud crust can become rutted and difficult to repair. Soft or “pumping” areas can develop from heavy earthwork equipment. Careful attention should be given to the construction operations to limit traffic over areas that have become wet or show signs of surface cracking due to pumping subgrade soils. No water should be allowed to pond in traveled areas.
- 5.4.6 Subgrade damage most often occurs where repeated heavy wheel loads are imposed on the soil. Increased subgrade moisture content resulting from ponded water can also lead to subgrade damage under even lightweight earthwork equipment.
- 5.4.7 Bay Mud crust soils have high in-situ moisture content (generally 10% or more above optimum) and may require drying effort in order to achieve suitable compaction. We highly recommend that grading and earthwork operations be performed during the seasonal dry months. Outside of this time period, cool and wet weather conditions will likely inhibit the ability to effectively reduce soil moisture content and achieve suitable compaction.

5.5 Temporary Excavations

- 5.5.1 Alluvium, residual soils and Panoche Formation materials at the site can be considered Type B soil in accordance with OSHA guidelines. Where free water, sandy or cohesionless soils, or undocumented fills are encountered the materials should be downgraded to Type C. Open-cut excavations into Bay Mud are not anticipated. The contractor should have a “competent person” as defined by OSHA evaluate all excavations. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping and possibly shoring.
- 5.5.2 It is the contractor’s responsibility to provide sufficient and safe excavation support as well as protect nearby utilities, structures, and other improvements which may be damaged by earth movements.

5.6 Drilled Shaft Foundations – Crash Wall

- 5.6.1 The proposed crash wall below the Waterfront Road overcrossing may utilize drilled shafts for foundation support. The drilled shafts should extend at least 5 feet into formational materials and axial and lateral capacity contribution from the upper 3 feet of embedment should be ignored.
- 5.6.2 Drilled, cast-in-place, straight shaft concrete piles should have a minimum diameter of 24 inches and a minimum center-to-center spacing of three pile diameters. To estimate allowable skin friction capacity to resist axial compression loads, a unit skin friction of 450 psf may be used. An allowable bearing pressure of 4,000 psf may be assumed for end bearing contribution.
- 5.6.3 Allowable passive pressure used to resist lateral movement may be assumed to be equal to a fluid weighing 450 pcf. The passive pressure may be applied over two pier diameters.

- 5.6.4 All loose soils must be removed from the bottom of drilled shaft excavations. All drilled shaft foundation excavations should be continuously observed by our representatives to confirm soil/rock and geologic conditions are consistent with our assumptions.
- 5.6.5 Although not expected, casing could be required if caving is experienced. If casing is used, extreme care should be employed so that the pile is not damaged as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet. Continuous observation of the drilling and pouring of the piles by the geotechnical engineer (a representative of Geocon Consultants, Inc.), is required. Final pile depths should be confirmed by a Geocon representative in the field.
- 5.6.6 Interaction between the crash wall foundations and foundations for the overcrossing should be evaluated by the structural engineer.

5.7 Soil Nail Walls

- 5.7.1 Soil nail walls consist of installing rows of closely spaced steel bars (nails) into a slope or excavation in a top-down construction sequence. After the top of the slope is excavated to the wall face, the top row of soil nails is installed in boreholes drilled at a designated inclination. After installing the nails, the boreholes are grouted to the wall face. Soil nails are typically installed at an inclination of approximately 10 to 15 degrees; however, the wall designer may vary the inclination.
- 5.7.2 Following installation of each row of nails, drains, waterproofing, and wall reinforcing steel are placed, shotcrete is applied to create a final wall. Shotcrete facing should keep pace with excavation and wall construction. Generally, the excavation should not be advanced deeper than 3 feet below the bottom of facing at any time. These unsupported gaps of up to 3 feet should only be allowed to stand for short periods of time (two days or less) to reduce the potential for soil sloughing and caving. Test sections may be completed during construction to observe if deeper cuts will stand.
- 5.7.3 Seepage and/or zones of dense or hard materials may be encountered and may result in some raveling of the unsupported excavation and/or difficult drilling. The planned soil nails will be installed via drilling into hard or dense formational materials. The soil nail contractor should carefully review anticipated drilling conditions. A wall back-drainage system should be used with the soil nail walls. Soil nail walls should be designed in accordance with Caltrans standards. The soil properties listed in the table below may be used for design.

TABLE 5.7
SOIL PARAMETERS FOR SOIL NAIL WALLS

Soil Property	Value
Friction Angle, ϕ	35 degrees
Cohesion, c	0 psf
Total Unit Weight	125 pcf
Poisson's Ratio	0.35
Estimated Ultimate Bond Stress	15 to 20 psi

Notes: psf = pounds per square foot
pcf = pounds per cubic foot
psi = pounds per square inch

- 5.7.4 Soil nail capacity is strongly influenced by soil and geologic conditions, method of nail hole advancement, hole diameter, bonded length, grout type, and grouting pressure. Therefore, soil nail capacity/ultimate bond stress must be determined by the contractor and verified by load testing. Testing of the soil nails should be performed in general accordance with Caltrans guidelines. A representative of Geocon should observe soil wall construction and load testing on a continuous basis.
- 5.7.4 In our experience, soil nail walls can be subject to deflection as the wall system essentially needs to move to engage soil-anchor bond resistance and develop passive resistance to lateral loading. The structural engineer should consult with the project designer and owner regarding permissible deflection and wall performance.

5.8 Cantilever Retaining Walls – Inside Wall

- 5.8.1 Lateral earth pressures may be used in the design of retaining walls. Lateral earth pressures against these facilities may be assumed to be equal to the pressure exerted by an equivalent fluid. The unit weight of the equivalent fluid depends on the design conditions. The table below summarizes the weights of the equivalent fluid based on the different design conditions. Based on our field exploration program, we anticipate that the walls will retain Panoche Formation materials and wall footings will bear on the same.

**TABLE 5.8
RECOMMENDED LATERAL EARTH PRESSURES**

Condition	Equivalent Fluid Density
Active	45 pcf
At-Rest	65 pcf

- 5.8.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than $0.01H$ (where H is the height of the wall). Walls restrained from movement should be designed using the at-rest case. The above soil pressures assume level backfill under drained conditions within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall and no surcharges within that same area. Where backfill surfaces are inclined up to 2:1, an additional 15 pcf should be added to the equivalent fluid density values tabulated above.
- 5.8.3 Where deemed necessary by the project structural engineer or required by building code, retaining walls should be designed considering seismic lateral earth pressure. For level backfill conditions, the seismic lateral earth pressure increment exerted on a cantilever retaining wall should be a triangular distribution with a pressure of $8H$ (where H is the height of the wall, in feet, resulting in psf) exerted at the base of the wall and zero at the top of the wall. Where slopes up to 2:1 (horizontal:vertical) are present above the wall, the dynamic loading component should be taken as $30H^2$ with the resultant force acting 0.35 to $0.4H$ (where H is the height of the wall) above the base of the wall. Seismic loading should be considered in conjunction with active earth pressures for both restrained and unrestrained (cantilever) walls.
- 5.8.4 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be

composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.

- 5.8.5 The planned cantilever retaining walls may utilize conventional shallow foundations (footings) founded in competent formational material. Over-excavations or other provisions may be required if soft or unstable soils are encountered during footing excavations.
- 5.8.6 Footings should be embedded at least 24 inches below lowest adjacent grade and may be designed for an allowable soil bearing pressure of 4,000 pounds per square foot (psf) where bearing on competent formational materials. The allowable bearing pressure is for dead + live loads may be increased by up to one-third for transient loads due to wind or seismic forces.
- 5.8.7 The allowable passive pressure used to resist lateral movement of the footings may be assumed to be equal to a fluid weighing 400 pounds per cubic foot (pcf) where lateral resistance is derived from competent formational materials. The allowable coefficient of friction to resist sliding is 0.30 for concrete against soil. Combined passive resistance and friction may be utilized for design provided that the frictional resistance is reduced by 50%. The upper 1 foot of soil should be ignored when calculating passive resistance.
- 5.8.8 We recommend that all retaining wall designs be reviewed by Geocon to confirm the incorporation of the recommendations provided herein. In particular, potential surcharges from adjacent structures and other improvements should be reviewed by Geocon.

5.9 Cantilever Retaining Walls – Outside Wall

- 5.9.1 Lateral earth pressures may be used in the design of retaining walls. Lateral earth pressures against these facilities may be assumed to be equal to the pressure exerted by an equivalent fluid. The unit weight of the equivalent fluid depends on the design conditions. The table below summarizes the weights of the equivalent fluid based on the different design conditions. Based on our field exploration program, we anticipate that the wall will retain artificial fill materials and will develop lateral support through drilled shafts extending into formational materials at depth. Based on the depth to formational materials, we anticipate that dead man piers or possibly tie-back anchors will be needed to achieve adequate resistance to lateral loading. Updated recommendations can be provided once design details emerge.

**TABLE 5.9
RECOMMENDED LATERAL EARTH PRESSURES**

Geologic Unit	Condition	Equivalent Fluid Density
Artificial Fill	Active	60 pcf
	At-Rest	80 pcf
Panoche Formation	Active	45 pcf
	At-Rest	65 pcf

- 5.9.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than $0.01H$ (where H is the height of the wall). Walls restrained from movement should be designed using the at-rest case. The above soil pressures assume level backfill under drained conditions within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall and no surcharges within that same area. Where backfill surfaces are inclined up to 2:1, an additional 15 pcf should be added to the equivalent fluid density values tabulated above.
- 5.9.3 Where deemed necessary by the project structural engineer or required by building code, retaining walls should be designed considering seismic lateral earth pressure. For level backfill conditions, the seismic lateral earth pressure increment exerted on a cantilever retaining wall should be a triangular distribution with a pressure of $8H$ (where H is the height of the wall, in feet, resulting in psf) exerted at the base of the wall and zero at the top of the wall.
- 5.9.4 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.
- 5.9.5 The planned cantilever retaining wall will require drilled shaft foundations that extend into Panoche Formation materials. Drilled, cast-in-place, straight shaft concrete piles should have a minimum diameter of 24 inches and a minimum center-to-center spacing of three pile diameters. Allowable passive pressure used to resist lateral movement may be assumed to be equal to a fluid weighing 450 pcf for the portion of the shaft embedded in formational materials. The passive pressure may be applied over two pier diameters. An allowable bearing pressure of 4,000 psf may be assumed for end bearing.
- 5.9.6 All loose soils must be removed from the bottom of drilled shaft excavations. All drilled shaft foundation excavations should be continuously observed by our representatives to confirm soil/rock and geologic conditions are consistent with our assumptions.
- 5.9.7 Based on anticipated soils conditions, casing may be required. If casing is used, extreme care should be employed so that the pile is not damaged as the casing is withdrawn. At no time should the distance between the surface of the concrete and the bottom of the casing be less than 5 feet. Continuous observation of the drilling and pouring of the piles by the geotechnical engineer (a representative of Geocon Consultants, Inc.), is required. Final pile depths should be confirmed by a Geocon representative in the field.
- 5.9.8 We recommend that all retaining wall designs be reviewed by Geocon to confirm the incorporation of the recommendations provided herein. In particular, potential surcharges from adjacent structures and other improvements should be reviewed by Geocon.

5.10 Surface Drainage

- 5.10.1 Proper surface drainage is critical to the future performance of the improvements. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. The saturation of soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times. Surface runoff should not be allowed to the pond.

6. FURTHER GEOTECHNICAL SERVICES

6.1 Plan and Specification Review

We should review project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

6.2 Testing and Observation Services

The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase and provide compaction testing and observation services and foundation observations throughout the project. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Consultants, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous materials was not part of the geotechnical scope of services provided by Geocon Consultants, Inc.

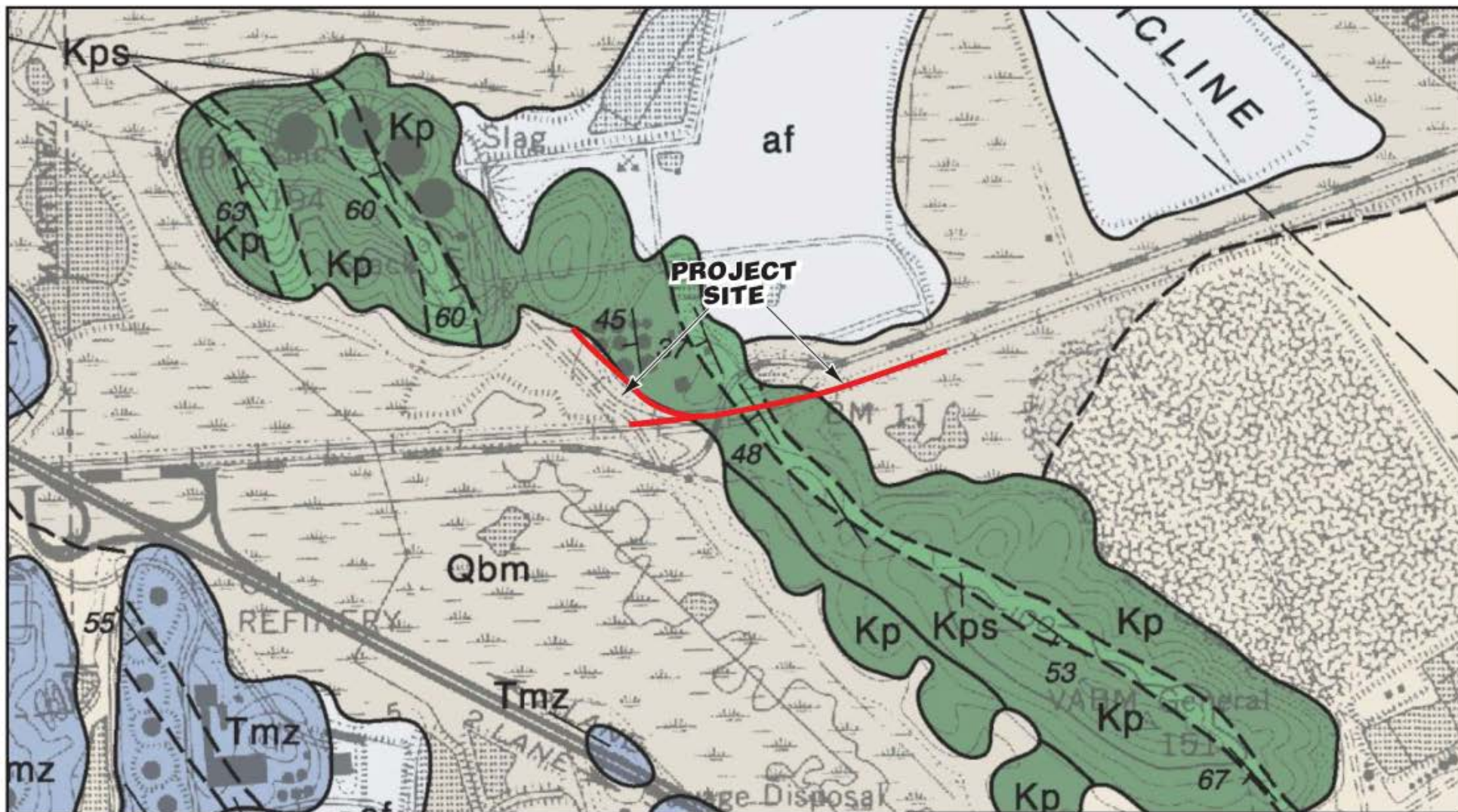
This report is issued with the understanding that it is the responsibility of the owner, or of its representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.

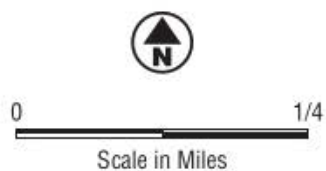


Figure 2



Ref: Geologic Map of the Vine Hill & Honker Bay Quadrangles, Contra Costa & Solano Counties, California, 2006

- | | |
|------------|---|
| af | Artificial fill |
| Qbm | Bay mud |
| Tmz | Martinez Formation |
| Kp | Panoche Formation – Clay shale or claystone |
| Kps | Panoche Formation – Sandstone |



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TransMontaigne Martinez Rail Track Expansion

Waterfront Road
Martinez, California

GEOLOGIC MAP

E9272-04-01

November 2023

Figure 3

APPENDIX



APPENDIX A FIELD EXPLORATION

Fieldwork for our investigation included a site visit, subsurface exploration, and soil sampling. The locations of our exploratory borings and Cone Penetrometer Tests (CPTs) are shown on the Site Plan, Figure 2. Soil boring and CPT profiles for our exploration are presented as figures following the text in this appendix. The borings and CPTs were located by pacing from existing reference points. Therefore, the exploration locations shown on Figure 2 are approximate.

Our field exploration included eight exploratory soil borings to depths ranging from 5 to 33 feet and 2 hand auger borings to a depth of approximately 2 feet below existing grade. Six of our eight soil borings were performed on September 9, 2021 and September 6, 2023 using a limited access track-mounted MPP LLD drill rig equipped with 6 ½ -inch O.D. hollow stem augers. Two borings were drilled on September 7, 2023 using a truck-mounted CME75 drill rig with 7-inch hollow stem augers. Sampling in the borings was accomplished using a 140-pound auto hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler, and a 2-inch OD, Standard Penetration Test (SPT) sampler. The number of blows required to drive the sampler the last 12 inches (or fraction thereof) of the 18-inch sampling interval were recorded on the boring logs. The blow counts shown on the boring logs should not be interpreted as standard SPT “N” values; corrections have not been applied.

Our exploration also included four CPT soundings to depths ranging from approximately 17 to 60 feet existing grade utilizing a truck-mounted CPT rig with a down-pressure capacity of approximately 20 tons. The CPTs were performed on September 21, 2021 by Middle Earth Geo Testing using an integrated electronic cone system. The cone has a tip area of 15 square centimeters, a friction sleeve area of 225 square centimeters, and a ratio of friction sleeve area to tip end area equal to 0.8. The cone bearing (Q_c) and sleeve friction (F_s) were measured and recorded during tests at approximately 2-inch depth intervals. The CPT data consisting of cone bearing, sleeve friction, friction ratio and equivalent standard penetration blow counts (N) versus penetration depth below the existing ground surface for each location has been recorded and is presented in this appendix.

Subsurface conditions encountered in the exploratory boring were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The log depicts soil and geologic conditions encountered and depths at which samples were obtained. The log also includes our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field logs were revised based on subsequent laboratory testing.

Upon completion, our soil borings and CPT boreholes were backfilled with cement grout in accordance with Contra Costa and/or City of Martinez permit requirements. Our hand auger borings were backfilled with compacted soil cuttings.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS			TYPICAL NAMES	
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
	GRAVELS WITH OVER 12% FINES		GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SM	SILTY SANDS WITH OR WITHOUT GRAVEL
		SANDS WITH OVER 12% FINES	SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	DESCRIPTOR
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3/4-INCH TO 1 FOOT	MODERATELY BEDDED
1/2-INCH TO 3/4-INCH	THINLY BEDDED
1/4-INCH TO 1/2-INCH	VERY THINLY BEDDED
LESS THAN 1/4-INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST 1/2-INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN 1/2-INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKENSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMBLES WITH BARE HAND	WEAK
MATERIAL CRUMBLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
1/2-INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH ONE BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH COUPLE BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH MANY BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK- NOTICEABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOT NOTICEABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINTED

BORING/TRENCH LOG LEGEND

— No Recovery	PENETRATION RESISTANCE						
— Shelby Tube Sample	SAND AND GRAVEL			SILT AND CLAY			
— Bulk Sample	RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
— SPT Sample	VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
— Modified California Sample	LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
— Groundwater Level (At Completion)	MEDIUM DENSE	11 - 30	17 - 48	MEDIUM STIFF	5 - 8	7 - 13	0.50 - 1.0
— Groundwater Level (Seepage)	DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
	VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
				HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	S<25	DRY
SLIGHT INDICATION OF MOISTURE	25≤S<50	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	50≤S<75	MOIST
MINOR VISIBLE FREE WATER	75≤S<100	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO #3)	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (#3-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER

KEY TO LOGS



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DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B1		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>9/9/2021</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0					Approximately 2 inches of topsoil				
1					Approximately 10 inches of AB				
2	B1-1.5 B1-2			CL	RESIDUAL SOIL				16.6
3					Stiff, dark brown, moist Sandy CLAY with few rock fragments				
4					-very weathered shale				
5					PANOCHÉ FORMATION				
					SHALE; brown, weathered				
					END OF BORING AT APPROXIMATELY 5 FEET				
					NO FREE WATER ENCOUNTERED				
					BACKFILLED WITH NEAT CEMENT				
					MOVED 50' TO THE EAST				

Figure A2, Log of Boring B1, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL

... DISTURBED OR BAG SAMPLE

... STANDARD PENETRATION TEST

... CHURN SAMPLE

... DRIVE SAMPLE (UNDISTURBED)

... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B1-A		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>9/9/2021</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0					Approximately 2 inches of topsoil				
1					Approximately 10 inches of AB				
2	B1-A-1.5-2.5				Stiff, brown, very weathered shale				
3					Black SAND -oil odor				
					END OF BORING AT APPROXIMATELY 3½ NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT				

Figure A3, Log of Boring B1-A, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B2		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>9/9/2021</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0					Approximately 6 inches of AB				
1				GM	FILL				
2	B2-2				Medium dense, dry, brown Silty (f-c) GRAVEL and (f-c) SAND with brick fragments				32
3									
4	B2-4			CH	RESIDUAL SOIL				25
5	B2-4.5				Very stiff, moist, dark brown fat CLAY with few sands				14.8
6					PANOCHE FORMATION				
7	B2-6-7				SANDSTONE; brown, weathered, fractured				50/6"
8									
9	B2-8.5-9.5				SHALE; dark brown				50/5"
10									
11									
12									
13									
14	B2-13.5-14.5				-brown				50/3"
					END OF BORING AT APPROXIMATELY 14½ FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT				9.9

Figure A4, Log of Boring B2, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B3		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>9/9/2021</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0				SP	FILL				
1					Loose, dry, brown SAND (topsoil)				
2				SC	Medium dense, moist, dark brown Clayey SAND with some angular gravels				16
3	B3-2.5 B3-3			CL	RESIDUAL SOIL				
4					Very stiff, damp, brown Sandy CLAY with few rock fragments				
5					PANOCHE FORMATION				
6	B3-6.5 B3-7				SHALE with SANDSTONE; olive shale with brown sandstone fragments; weathered				35
7									
8									
9	B3-9 B3-9.5				-shale				28
10									
11									
12									
13									
14	B3-14-15				-greenish-gray, very weathered, mostly shale/claystone with interbedded trace sandstone				23
15									
16									
17									
18									
19	B3-19-20				SANDSTONE; gray				70
20					END OF BORING AT APPROXIMATELY 20 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT				

Figure A5, Log of Boring B3, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B4		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>11/6/2023</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0	B4-0-2.5			CL	ARTIFICIAL FILL				
1					Very stiff, moist, brown and olive, CLAY with sand and few gravels				
2					-with shale fragments				
3	B4-2.5 B4-3								31
4					-less gravel and sand with shale fragments				
5					-with sandstone fragments				
6	B4-5.5 B4-6			CL	-pp>4½				11
7	B4-6.5-7				-difficult to drill from 4 to 6 feet				
8					-with olive shale				
9	B4-8.5-9.5				BAY MUD				2
10	B4-10-11.5				Medium stiff to soft, wet, dark olive with purple water inside hollow stem				
11	B4-10.5-11				auger, CLAY				1
12				CH	-with fuel odor				
13					-very soft, purple, with organics odor and less fuel odor				
14	B4-14				-with sand				
15	B4-14.5				-black, marsh and organics odor				
16					Soft, olive, fat CLAY with trace organics				5
17					-pp=1-1½				
18					-harder per driller feel				
19	B4-19				PANOCHÉ FORMATION				72
20	B4-19.5				Brown SHALE				
21									
22									
23	B4-23-24								54
24					END OF BORING AT APPROXIMATELY 24 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT				

Figure A6, Log of Boring B4, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▨ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▩ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B5		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>11/6/2023</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0					ARTIFICIAL FILL				
1					GRAVEL				
2					-cemented fines				
3	B5-2.5 B5-3			CL	ALLUVIUM				22
4					Stiff, moist, brown, CLAY with sand				
5					-pp>4½				
6	B5-5.5 B5-6				-dark brown				21
7					PANOCHÉ FORMATION				
8					Brown SANDSTONE				
					-difficult to drill after 6½ feet				
	B5-8.5				END OF BORING AT APPROXIMATELY 8½ FEET				50/2"
					NO FREE WATER ENCOUNTERED				
					BACKFILLED WITH NEAT CEMENT				

Figure A7, Log of Boring B5, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B6		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>11/6/2023</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>Cuesta Geo</u>			
					EQUIPMENT <u>MPP Limited Access w/ 8" HSA</u>	HAMMER TYPE <u>Autohammer</u>			
					MATERIAL DESCRIPTION				
0				GP	FILL				
1				CL	GRAVEL with sand				
2					Stiff, moist, dark brown, Sandy CLAY with few gravels				
3	B6-2.5 B6-3								22
4				CL	-sandstone chunks				
5					ALLUVIUM				
6	B6-5.5-6.5				Stiff, moist, dark brown, CLAY with sand				13
7					-pp>4½				
8					-less sand, trace organics				
9	B6-9 B6-9.5				PANOCHE FORMATION				
10					Olive SHALE				84/10"
					-difficult to drill				
					END OF BORING AT APPROXIMATELY 10½ FEET				
					NO FREE WATER ENCOUNTERED				
					BACKFILLED WITH NEAT CEMENT				

Figure A8, Log of Boring B6, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

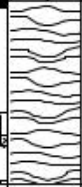
DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B7			PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED				
					ENG./GEO.	AA	DRILLER	V&W Drilling		
					EQUIPMENT	CME 75 w/ 7" HSA	HAMMER TYPE	Autohammer		
MATERIAL DESCRIPTION										
0	B7-6			CL	ARTIFICIAL FILL					
1					Sandy CLAY with gravel					
2					-augered to 6 feet, no sampling					
3										
4										
5	B7-9-9.25				-concrete fragments			90/8"		
6					PANOCHÉ FORMATION					
7					Brown SHALE					
8										
9										
10					-refusal			50/3"		
END OF BORING AT APPROXIMATELY 10 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH COMPACTED CUTTINGS										

Figure A9, Log of Boring B7, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B8			PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	11/7/2023			
					ENG./GEO. AA	DRILLER	V&W Drilling			
					EQUIPMENT CME 75 w/ 7" HSA	HAMMER TYPE	Autohammer			
MATERIAL DESCRIPTION										
0					-augered down to 8½ feet, no sampling -harder at approximately 6 to 7 feet					
1										
2										
3										
4										
5										
6										
7					PANOCHE FORMATION Brown SANDSTONE					
8										
9	B8-9-10									23
10										
11										
12										
13										
14					Brown SHALE					
15	B8-14-15									30
16										
17										
18										
19	B8-19-19.5									
20										
21					Very weathered, dark brown, SANDSTONE					
22										
23										
24	B8-23.5-24.5									50/6"
25										
26										
27										
28					-difficult to drill to approximately 33 feet					
29	B8-28.5-29.2									50/2"

Figure A10, Log of Boring B8, Page 1 of 2

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▤ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B8			PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.)	DATE COMPLETED	11/7/2023			
					ENG./GEO.	AA	DRILLER	V&W Drilling		
					EQUIPMENT	CME 75 w/ 7" HSA	HAMMER TYPE	Autohammer		
MATERIAL DESCRIPTION										
30										
31										
32										
33										
34	B8-33.5-34							50/6"		
35										
36										
37										
38										
39	B8-38.5-39							50/6"		
END OF BORING AT APPROXIMATELY 39 FEET NO FREE WATER ENCOUNTERED BACKFILLED WITH NEAT CEMENT										

Figure A10, Log of Boring B8, Page 2 of 2

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL

☒ ... DISTURBED OR BAG SAMPLE

☐ ... STANDARD PENETRATION TEST

☒ ... CHUNK SAMPLE

☒ ... DRIVE SAMPLE (UNDISTURBED)

☒ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING HA1		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>11/4/2021</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>EGI</u>			
					EQUIPMENT <u>Hand Auger</u>	HAMMER TYPE _____			
					MATERIAL DESCRIPTION				
0				CL	ALLUVIUM				
1					Moist, brown, CLAY with sand				
2					PANOCHÉ FORMATION				
					SANDSTONE; light gray				
					END OF HAND AUGER AT APPROXIMATELY 2 FEET DUE TO PRACTICAL REFUSAL				
					NO FREE WATER ENCOUNTERED				
					BACKFILLED WITH COMPACTED CUTTINGS				

Figure A11, Log of Boring HA1, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL

☒ ... DISTURBED OR BAG SAMPLE

☐ ... STANDARD PENETRATION TEST

☒ ... CHUNK SAMPLE

☐ ... DRIVE SAMPLE (UNDISTURBED)

☒ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING HA2		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) _____	DATE COMPLETED <u>11/4/2021</u>			
					ENG./GEO. <u>AA</u>	DRILLER <u>EGI</u>			
					EQUIPMENT <u>Hand Auger</u>	HAMMER TYPE _____			
					MATERIAL DESCRIPTION				
0				CL	ALLUVIUM				
1					Moist, brown, CLAY with sand				
					PANOCHÉ FORMATION				
					SANDSTONE; light brown to light gray				
					END OF HAND AUGER AT APPROXIMATELY 1½ FEET DUE TO PRACTICAL REFUSAL				
					NO FREE WATER ENCOUNTERED				
					BACKFILLED WITH COMPACTED CUTTINGS				

Figure A12, Log of Boring HA2, Page 1 of 1

GEOCON BORING LOG W/FIG# STARTING W/ A2 E9272-04-01 BORING LOGS.GPJ 12/19/23



SAMPLE SYMBOLS

□ ... SAMPLING UNSUCCESSFUL

▣ ... DISTURBED OR BAG SAMPLE

■ ... STANDARD PENETRATION TEST

▣ ... CHUNK SAMPLE

■ ... DRIVE SAMPLE (UNDISTURBED)

▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

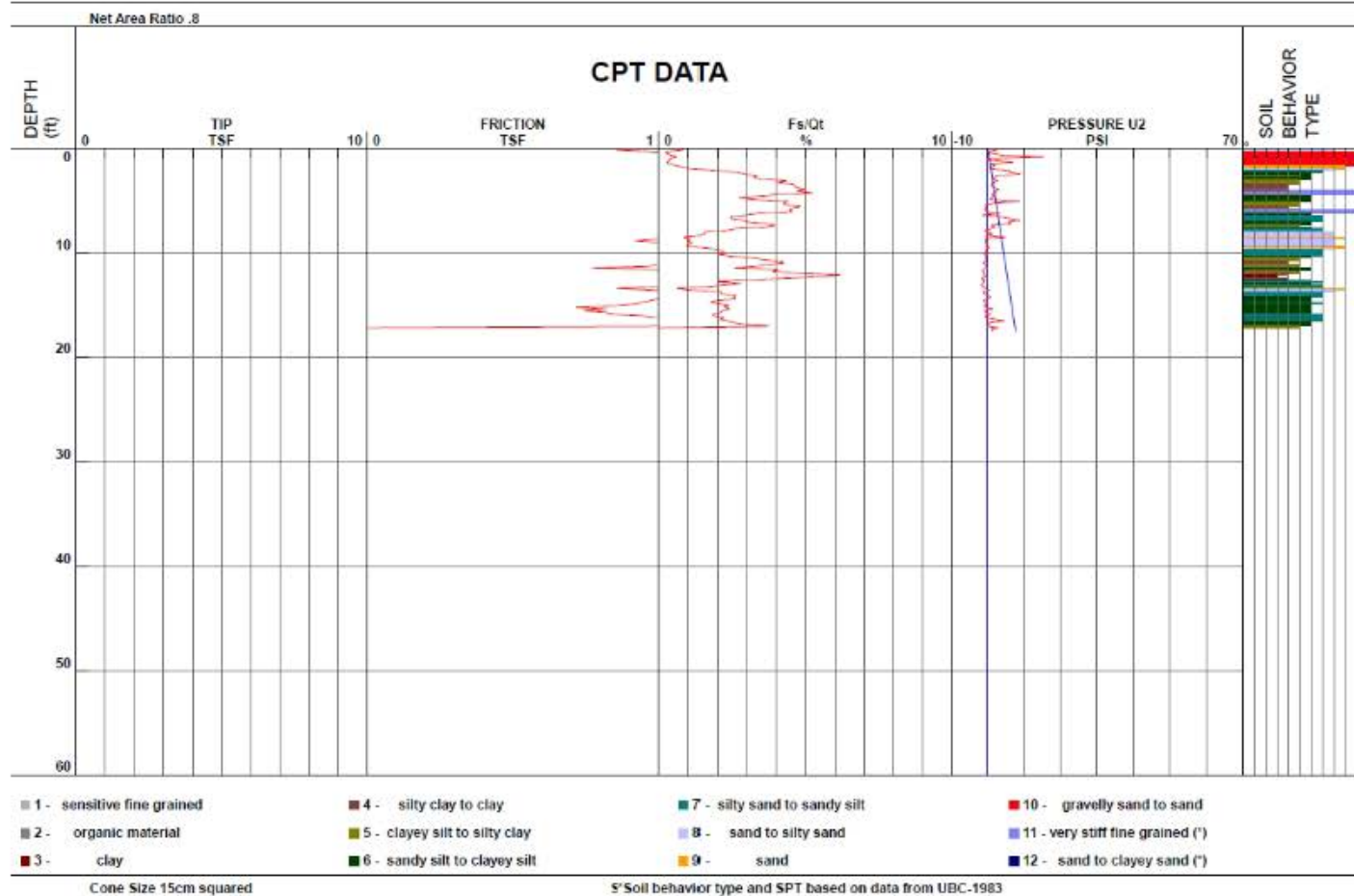


Geocon Inc.

Project TransMontaigne Martinez Rail
Job Number E9272-4-1
Hole Number CPT 01A
EST GW Depth During Test

Operator JM-JY
Cone Number DDG1596
Date and Time 9/21/2021 2:34:36 PM
NO GW

Filename SDF(972).cpt
GPS
Maximum Depth 17.55 ft





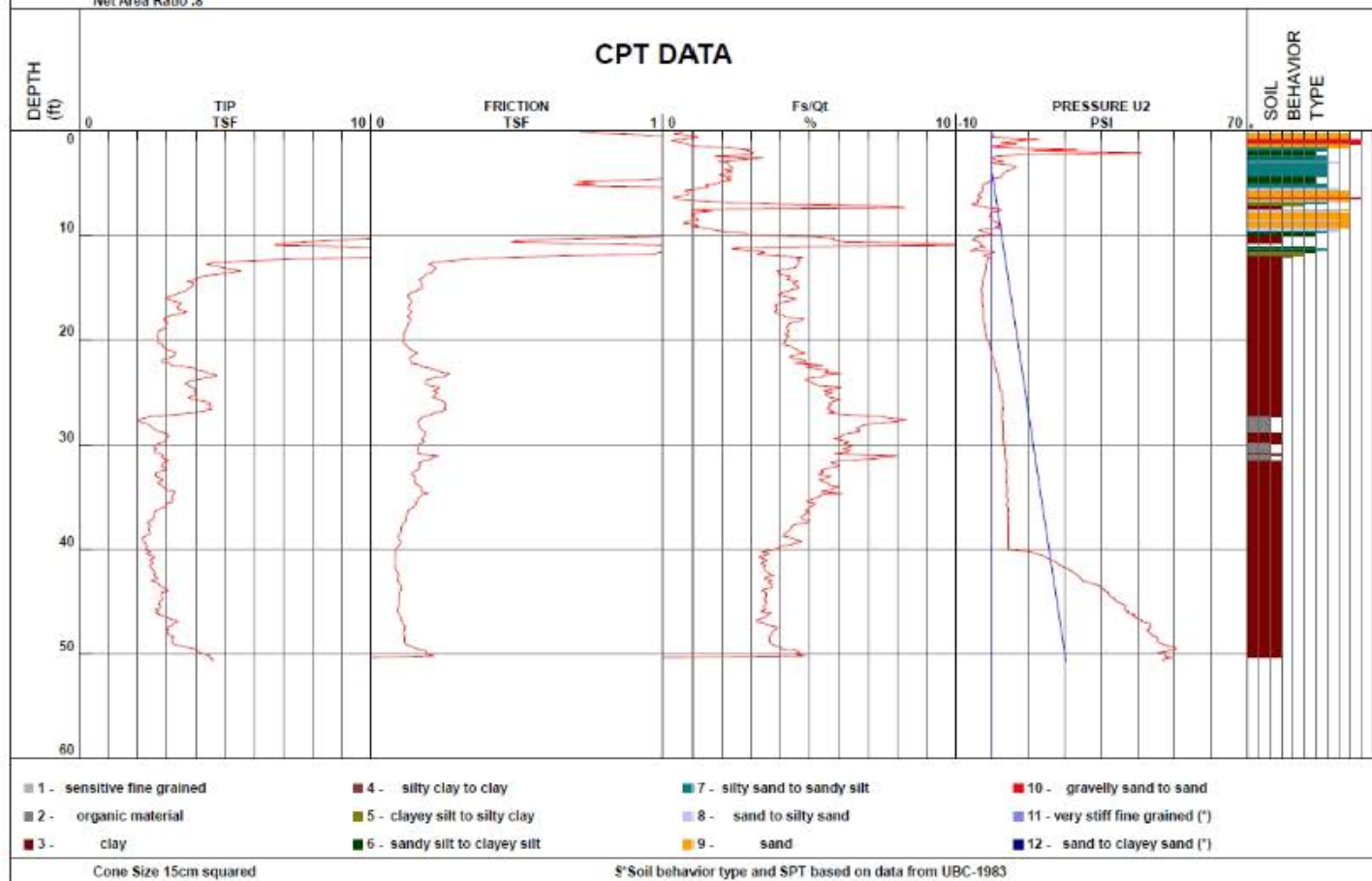
Geocon Inc.

Project TransMontaigne Martinez Rail
Job Number E9272-4-1
Hole Number CPT-02
EST GW Depth During Test

Operator JM-IV
Cone Number DDG1596
Date and Time 9/21/2021 3:31:40 PM
4.00 ft

Filename SDF(973).cpt
GPS
Maximum Depth 50.69 ft

Net Area Ratio .8



GEOCON
CONSULTANTS, INC.

5671 BRISA STREET - LIVERMORE, CA 94550
PHONE 925.371.5900 - FAX 925.371.5915

CONE PENETROMETER TEST DATA - CPT2

Project: TransMontaigne Martinez
Project No. E9272-04-01
Date: January 2022

FIGURE A14

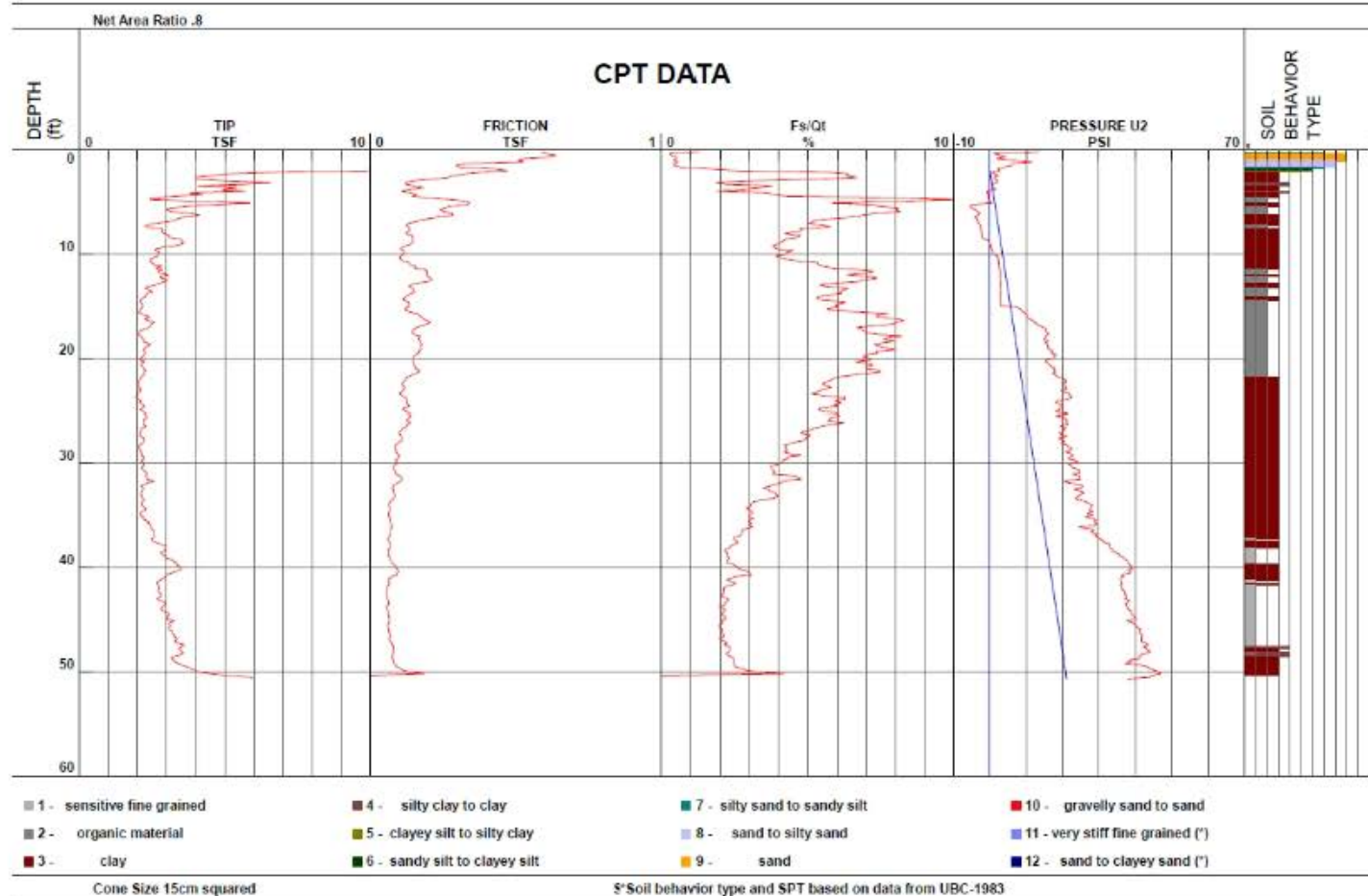


Project TransMontaigne Martinez Rail
Job Number E9272-4-1
Hole Number CPT-03
EST GW Depth During Test

Geocon Inc.

Operator JM-1Y
Cone Number DDG1506
Date and Time 9/21/2021 4:23:51 PM
2.00 ft

Filename SDF(074).cpt
GPS
Maximum Depth 50.69 ft



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5671 BRISA STREET - LIVERMORE, CA 94550
PHONE 925.371.5900 - FAX 925.371.5915

CONE PENETROMETER TEST DATA - CPT3

Project: TransMontaigne Martinez
Project No. E9272-04-01
Date: January 2022

FIGURE A15

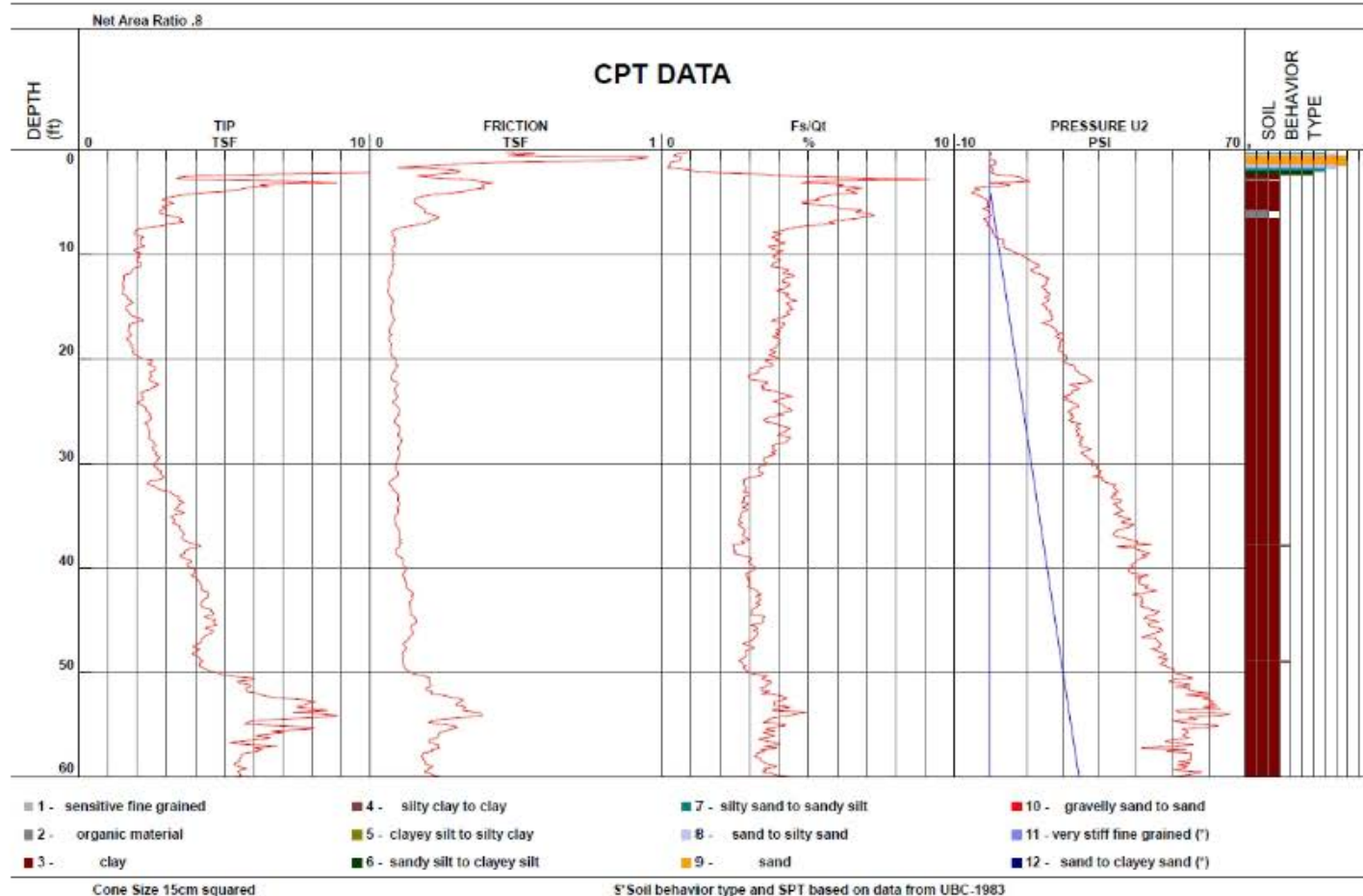


Geocon Inc.

Project TransMontaigne Martinez Rail
Job Number E9272-4-1
Hole Number CPT-04
EST GW Depth During Test

Operator JM-IY
Cone Number DDG1596
Date and Time 9/21/2021 12:48:18 PM
4.00 ft

Filename SDF(971).cpt
GPS
Maximum Depth 60.69 ft



GEOCON
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PHONE 925.371.5900 - FAX 925.371.5915

CONE PENETROMETER TEST DATA - CPT4

Project: TransMontaigne Martinez
Project No. E9272-04-01
Date: January 2022

FIGURE A16

APPENDIX



**APPENDIX B
LABORATORY TESTING**

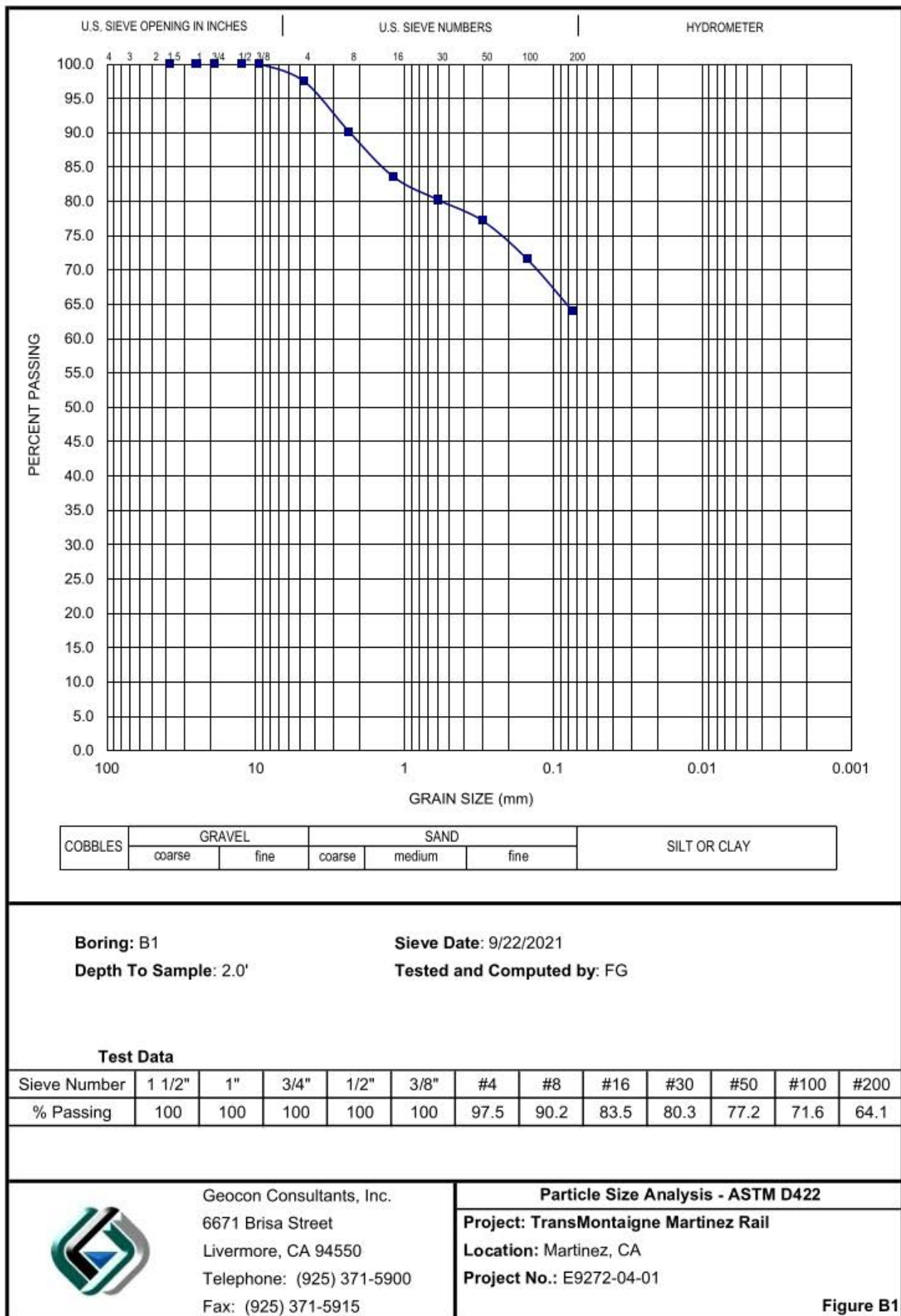
Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected samples were tested for in-situ dry density and moisture content, grain size distribution, and plasticity testing. The results of our testing are summarized in tabular format below and the following figures. In-situ dry density and/or moisture content test results are included on the boring logs in Appendix A.

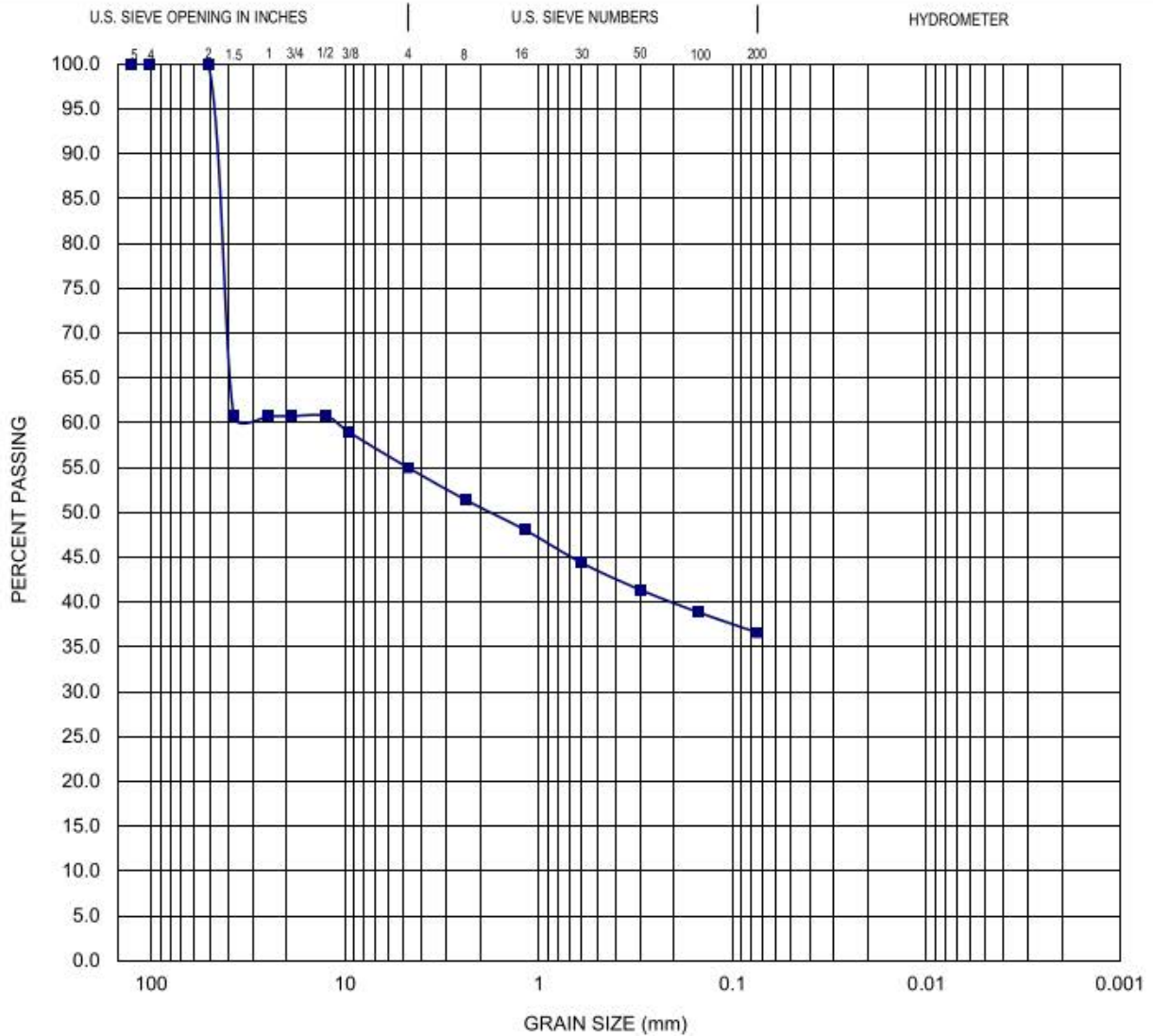
**TABLE B-I
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318**

Sample No.	Liquid Limit	Plastic Limit	Plasticity Index
B2-4	56	17	39
B3-2.5	42	16	27

**TABLE B-II
SUMMARY OF LABORATORY GRAIN SIZE ANALYSIS – NO. 200 WASH
ASTM D1140**

Boring No.	Sample Depth (feet)	Fraction Passing No. 200 Sieve (%)
B2	4	90





Boring: B2

Sieve Date: 9/22/21

Depth To Sample: 2'

Tested and Computed by: FG

Test Data

Sieve Number	5"	4"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
% Passing	100	100	100	60.7	60.7	60.7	60.7	58.9	55.0	51.3	48.0	44.4	41.4	38.8	36.6



Geocon Consultants, Inc.
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Livermore, CA 94550
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Particle Size Analysis - ASTM D422

Project: TransMontaigne Martinez Rail
Location: Martinez, CA
Project No.: E9272-04-01

Figure B2

