Appendix E

Geotechnical Investigation

GEOTECHNICAL PROFESSIONALS INC.

GEOTECHNICAL INVESTIGATION
PROPOSED BAKERSFIELD SHOPPING CENTER
SWC OF COFFEE ROAD AND ROSEDALE HIGHWAY
APN 368-010-05
BAKERSFIELD, CALIFORNIA

Prepared for:
Coffee Road Ventures, LLC
c/o DJM Capital Partners Inc.
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Prepared by:
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Project No. 3282.I

December 13, 2024

GEOTECHNICAL PROFESSIONALS INC.

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Coffee Road Ventures, LLC
c/o DJM Capital Partners Inc.
7777 Edinger Avenue, Suite 133
Huntington Beach, California 92647

Attention: Mr. Brett Thornton
Senior Vice President Construction & Development

Subject: Report of Geotechnical Investigation
Proposed Bakersfield Shopping Center
SWC of Coffee Road and Rosedale Highway
Bakersfield, California
GPI Project No. 3282.I

Dear Mr. Thornton:

Transmitted herewith is our report of geotechnical investigation for the subject project. The report presents the results of our design-level evaluation of the subsurface conditions at the site and recommendations for design and construction.

We appreciate the opportunity of offering our services on this project and look forward to seeing the project through its successful completion. Please contact us if you have questions regarding our report or need further assistance.

Very truly yours,
Geotechnical Professionals Inc.





Patrick McGervey, G.E.
Senior Engineer





Donald A. Cords, G.E.
Principal

Distribution: Addressee (PDF)

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of the geotechnical investigation performed by Geotechnical Professionals Inc. (GPI) for the proposed retail development at the subject project site in Bakersfield, California. The geographical site location is shown on the Site Location Map, Figure 1.

1.2 PROJECT DESCRIPTION

Based on the preliminary Site Plan by MCG Architecture, we understand that the site will be developed into a 46.2-acre retail center with several single-story buildings. The buildings include a “Major A” retail building covering a footprint of approximately 88,129 square feet (sf), connected “Majors B through L” buildings covering a combined footprint of about 216,973 sf, and 12 “Pad” buildings with footprints ranging from 1,764 to 11,546 sf. The total building area is planned to be approximately 416,115 sf. The layouts of the buildings are provided on Figure 2, Site Plan (Proposed).

The ”Major” buildings will include a market, health club, and retail buildings. Major D building is currently planned to be a Whole Foods grocery store. The “Pads” will include restaurants, retail, outpatient medical office, gas station, and carwash buildings. Other improvements include a community park, multi-use path, screen walls, drives, parking, and landscaping. Currently, we are not aware of the locations of stormwater infiltration systems onsite.

Proposed finish floor elevations were not finalized at the time this report was prepared. We have assumed proposed grades for the buildings will be similar to existing grades plus or minus 3 feet. We anticipate the loading dock areas will be cut up to 3 to 4 feet below existing grades, and the remainder of the parking and landscape areas will be similar to existing grades with cuts and fills on the order of 2 to 3 feet.

Structural plans are not available at this time, however based on our experience on similar projects, we anticipate typical interior column loads of up to 150 kips, wall loads up to 9 kips per lineal foot (klf), and floor slab loads up to 150 pounds per square foot for the “Major” buildings. For the remaining “Pad” buildings, we anticipate up to 50 kips or less for column loads and 3 to 5 klf for continuous wall loads.

Our recommendations are based upon the above structural and grading information. We should be notified if the actual loads and/or grades change during the project design to either confirm or modify our recommendations. When the project structural and grading plans become available, we should be provided with copies for review and comment.

1.3 PURPOSE OF INVESTIGATION

The primary purpose of this investigation and report is to provide an evaluation of the existing geotechnical conditions at the site as they relate to the design and construction of the proposed development. More specifically, this investigation was aimed at providing geotechnical recommendations for earthwork, and design of foundations.

2.0 SCOPE OF WORK

Our scope of services included review of existing documents, field exploration, laboratory testing, engineering analysis and preparation of this report.

Our field investigation for “Major D” was performed in general accordance with the geotechnical requirements outlined in the Whole Foods Lease agreement “Exhibit E” Section 2.2.

The field exploration program for the retail center consisted of 17 Cone Penetration Tests (CPTs) and 24 exploratory borings. Within the proposed pad of “Major D”, we performed nine explorations (3 borings and 6 CPTs). The locations of the explorations are shown on the Proposed and Existing Site Plans, Figures 2 and 3, respectively.

The CPT’s were advanced to depths ranging from 30 to 100 feet below existing site grades. Detailed logs of the CPT’s and a summary of the equipment used are presented in Appendix A. The borings were drilled using hollow-stem auger equipment to depths between 6 and 31½ feet below existing site grades. Details of the drilling and Logs of Borings are presented in Appendix B.

Shear wave velocity measurements were performed in CPT C-2 at approximately 10-foot intervals to a depth of 100 feet, where the CPT. A summary of the shear wave velocity measurements is provided in Appendix A.

Laboratory soil tests were performed on selected representative samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing program included moisture content, dry density, grain size, shear strength (direct shear), consolidation, expansion potential, collapse, compaction, R-value, and soil corrosivity. Laboratory testing procedures and results are summarized in Appendix C.

Soil corrosivity testing was performed by Project X Corrosion Engineering (Project X) under subcontract to GPI. R-value testing was performed by Geologic Associates under subcontract to GPI. Their test results are presented in Appendix C.

Engineering evaluations were performed to provide earthwork criteria, foundation and slab design parameters, preliminary pavement sections and assessments of seismic hazards. The results of our evaluations are presented in the remainder of the report.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The site is “L” shaped with the northern property line bordering Rosedale Highway, and the eastern property line bordering Coffee Road. The eastern portion of the site is bound by a gravel-paved staging/storage area to the south and a PG&E substation/Kern Power Plant to the west. The western portion of the site is bound by El Toro Viejo Road and a fast-food restaurant at the corner of El Toro Viejo Road and Rosedale Highway to the west, and the PG&E substation/Kern Power Plant to the south.

The site is predominately undeveloped with the eastern portion being used as staging/storage area, large power poles and electrical lines cross the middle of the site spanning from the PG&E substation to Rosedale Highway, and two tank structures within the northeastern portion of the site that are surrounded by a chain link fence. The ground surface is predominately soil with some small weeds spread across the site and gravel access/staging areas within the eastern portion of the site. Within the western third of the site are 5- to 8-feet-high raised access roads that appear to have been created to access oil pump jacks.

Based on our review of aerial photographs dating back to the oldest available photographs (1952), the site was used as part of the Kern Power Plant which included large steel storage tanks, oil pump jacks, storage buildings, drives and miscellaneous structures. The majority of the structures appear to have been demolished and removed between the years 2012 and 2014. Around the same time as the demolition, the adjacent substation appears to have been developed and some grading was performed onsite.

The site is relatively flat with ground surface elevations ranging from about Elevation +381 feet on the western portion of the site to +390 feet in the eastern portion of the site.

3.2 SUBSURFACE SOILS

Our field investigation disclosed a subsurface profile consisting of limited undocumented fills on the order of 0 to 3 feet below existing grades in the majority of our explorations overlying natural soils. Within borings B-3 and B-16, we encountered localized undocumented fills on the order of 5 to 7 feet below existing grades. Similar depths of undocumented fills may be encountered under former buildings and storage tanks. Although our explorations were not performed on top of the raised roads within the eastern portion of the site, we anticipate they consist of stockpiled onsite undocumented fill soils. Detailed descriptions of the conditions encountered in our explorations are provided in Appendices A and B. A brief summary of the subsurface conditions is provided below.

The undocumented fill soils consisted of predominately slightly moist silty sands with limited clayey sands. Documentation regarding the placement and compaction of the fill was not provided.

The natural soils consist of medium dense to dense silty sands with some thin layers of sandy silts and clayey sands to depths of about 20 to 25 feet where the soils became more dense and sandier. Our laboratory testing indicates the upper medium dense natural soils exhibit high strength and low compressibility and have a low susceptibility to hydro collapse.

The soils within the upper 5 feet were predominately dry to slightly moist with an average moisture content of 5.8 percent (about 1 to 3 percent dry of optimum).

3.3 GROUNDWATER AND CAVING

Groundwater was not encountered in our explorations to a depth of 100 feet below existing grades. Groundwater levels in the site vicinity was evaluated based on groundwater well data provided by the California Department of Water Resources (CDWR) Water Data Library (wdl.water.ca.gov) at four wells each within about ¼-mile from the site in each direction (north, east, south and west). The groundwater well data readily available from these wells indicates the existing and historical high groundwater level is greater than 50 feet below existing grades.

Due to the method of drilling with a hollow-stem auger, the potential for caving was very difficult to determine. We anticipate the upper dry, sandy soils have the potential to exhibit moderate caving in open cuts and excavations.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

Based on the results of our investigation, it is our opinion that from a geotechnical viewpoint it is feasible to develop the site as proposed, provided the following geotechnical issues are incorporated into the design and construction of the proposed structures.

The most significant geotechnical issues that will affect the design and construction of the proposed development are as follows:

- Undocumented fills were encountered to depths of predominately 3 feet below existing grade at the site with localized deeper fills on the order of 5 to 7 feet. The fill soils are not considered to be suitable for direct support of foundations or floor slabs without remedial earthwork. For the proposed improvements, we recommend removal and recompaction of the fill and a portion of the upper low-density natural soils to provide uniform support for the planned foundations and floor slab.

- Current moisture contents of the upper soils are generally below the optimum moisture content; therefore, significant moisture conditioning (wetting) will be required.

- The site is located within a seismically active zone in California, and due to the relatively loose sandy soils near the ground surface, has the potential for seismically induced settlement. We estimate the magnitude of induced seismic ground surface settlement is on the order of ½ inch with differential settlement across 60 feet on the order of ¼ inch.

- The upper on-site sandy soils are considered to be susceptible to moderate caving in open cuts and excavations. Care should be taken to maintain support of the soils and structures left in-place adjacent to planned excavations.

- Resistivity testing of representative samples of the on-site soils indicates that they are moderately corrosive to buried ferrous metals. If corrosion protection recommendations are required, a corrosion engineer such as Project X should be consulted to provide recommendations to protect these elements from corrosion.

Our recommendations related to the geotechnical aspects of the development of the site are presented in the subsequent sections of this report.

4.2 SEISMIC CONSIDERATIONS

4.2.1 General

The site is in a seismically active area of Southern California and is likely to be subjected to strong ground shaking due to earthquakes on nearby faults.

We assume the seismic design of the proposed development will be in accordance with the 2022 California Building Code (CBC) criteria. Analysis of the data obtained during the seismic cone penetration test performed in CPT C-2 indicated that the "weighted average" shear-wave velocity within the upper 100 feet of the subject site (Vs_{30}) is 1076 feet per second. Details of the shear wave velocity testing are presented in Table A-1 in Appendix A. Based on the results of our seismic cone penetration test, a Site Class D may be used for the seismic design of the proposed development.

4.2.2 Strong Ground Motion Potential

Based on published information, the closest fault to the site is the San Andreas fault, which are located about 34 miles from the site.

During the life of the project, the site will likely be subject to strong ground motions due to earthquakes on nearby faults. Based on the SEOC/OSHPD website (seismicmaps.org), we computed that the site could be subjected to a peak ground acceleration (PGA_M) of 0.48g. Based on the USGS Unified Hazard Tool (USGS, 2014) the site is subject to a mean magnitude 6.4 earthquake. This acceleration has been computed using the mapped Maximum Considered Geometric Mean peak ground acceleration from the ASCE 7-16 (for 2022 CBC) and a site coefficient (F_{PGA}) based on Site Class. The predominant earthquake magnitude was determined using a 2-percent probability of exceedance in a 50-year period, or an average return period of 2,475 years. The structural design will need to incorporate measures to mitigate the effects of strong ground motion.

The corresponding mapped seismic design parameters from the CBC are as follows:

2022 CBC:

$S_S = 0.92g$	$S_{MS} = F_a * S_S = 1.04g$	$S_{DS} = 2/3 * S_{MS} = 0.69g$
$S_1 = 0.34g$	$S_{M1} = F_V * S_1 = 0.67g$	$S_{D1} = 2/3 * S_{M1} = 0.44g$

In accordance with the 2022 CBC, site-specific response spectra are required for structures located in a Site Class D (with S_1 greater than or equal to 0.2) unless, per the exceptions detailed in Section 11.4 8 of ASCE 7-16 (Supplement 3), the value of the parameter S_{M1}, determined by Eq. (11.4-2) is increased by 50 percent for all applications of S_{M1}. The resulting value of the parameter S_{D1} determined by Eq. (11.4-4) shall be used for all applications of S_{D1}.

The above seismic code values should be confirmed by the Project Structural Engineer using the Site Class value above and the pertinent internet website and tables from the building code.

4.2.3 Potential for Ground Rupture

There are no known active faults crossing or projecting through the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. Therefore, ground rupture at this site due to faulting is considered unlikely.

4.2.4 Liquefaction

The site is not located within a zone identified as having a potential for liquefaction by the State, as the quadrangle has not yet been assessed. Based on the depth of groundwater in the area, soil liquefaction is not likely to occur at the site.

4.2.5 Seismic Settlement

Seismic settlement (not related to liquefaction) occurs when strong earthquake shaking results in densification of loose to medium dense sandy soils above groundwater. The upper, natural, loose sandy soils encountered during our investigation exhibited the potential for seismic settlement.

If design level earthquake shaking occurs at the site, the estimated magnitude of seismic ground subsidence is expected to be on the order of ½ inch or less in the sandy soils onsite. Provided remedial pad grading recommendations are implemented, we anticipate less than ¼ inch of seismic settlement.

4.3 EARTHWORK

The earthwork for the planned improvements is anticipated to consist of clearing and excavation of undocumented fill and upper natural soils, subgrade preparation, and the placement and compaction of fill.

4.3.1 Clearing

Prior to grading, the areas to be developed should be stripped of vegetation and cleared of debris. Buried obstructions, such as footings, utilities, and tree roots should be removed. Deleterious material generated during the clearing operation should be removed from the site. Inert demolition debris, such as concrete and asphalt may be crushed for reuse in engineered fills, in accordance with the criteria presented in the “Materials for Fill” section of this report.

The existing power poles at the site will likely be supported on concrete piles. If the poles are removed in the parking or flatwork areas, we recommend the piles be removed to a depth of at least 2 feet below the bottom of the proposed pavement section or flatwork. While not anticipated based on current plans, if the poles are removed in the footprint of buildings, we recommend the piles be removed to a depth of 4 feet below the bottom of the proposed foundations for the buildings. We recommend the entire pile not be vibrated and removed from the ground but chipped cleanly at the above recommended depths. We recommend the location and depth of the piles be surveyed during demolition. The resulting excavation should be backfilled as recommended in the “Subgrade Preparation” and “Placement and Compaction of Fill” sections of this report.

Although not anticipated, if cesspools or septic systems are encountered during grading, they should be removed in their entirety. The resulting excavation should be backfilled as recommended in the "Subgrade Preparation" and "Placement and Compaction of Fill" sections of this report. As an alternative, cesspools can be backfilled with lean sand-cement slurry (two-sacks cement per yard). At the conclusion of the clearing operations, a representative of GPI should observe and accept the site prior to further grading.

4.3.2 Excavations

Excavations at this Property will include removals of undocumented fill and disturbed and low-density natural soils, footing excavations, and trenching for proposed utility lines.

Building Pads, Pavements and Minor Structures

To provide uniform support for the planned buildings, prior to placement of fills or construction of the buildings, the existing fill and a portion of the upper natural soils within the proposed building pads should be removed and replaced as properly compacted fill. For planning purposes, removals for the building pads should extend to a depth of at least 4 feet below existing grades and at least 1 foot below the base of foundations, whichever is deeper. Deeper removals associated with demolition of the former structures may be required where deeper undocumented fills are encountered. Removals should extend below these depths where undocumented fills or otherwise unsuitable materials are encountered.

Removals below minor structures, such as free-standing walls and trash enclosures, should extend to a depth of 3 feet below existing grade or 1-foot below the base of the foundations, whichever is deeper. For onsite and offsite pavements and flatwork, removals should extend at least 1 foot below existing grades or the proposed subgrade, whichever is deeper.
The actual depths of removals should be determined in the field during grading by GPI. The soils exposed at the base of the overexcavation should be processed in place as described in the “Subgrade Preparation” section of this Report.

Excavations should be readily achieved using conventional methods. The contractor should determine the best method for removal based on the subsurface conditions outlined herein.

Lateral Limits

The Project Surveyor should accurately stake the corners of the areas to be overexcavated in the field. Where space is available, the base of the excavations should extend laterally at least 5 feet beyond the building lines or edge of foundations, or a minimum distance equal to the depth of overexcavation/compaction below finish grade (i.e., a 1:1 projection below the top outside edge of footings), whichever is greater. Building lines include the footprint of the building and other foundation supported improvements, such as canopies and attached site walls.

Where the recommended removals for minor site walls cannot extend laterally as recommended above due to property constraints, the wall foundations should be designed using a reduced allowable bearing pressure as discussed in the “Foundation” section of this Report.

Existing Utilities

Existing utility trench backfill, if encountered, should be removed and replaced as properly compacted fill. The limits of removal should be confirmed in the field. We recommend known utilities be shown on the grading plan.

Caving Potential and Cuts

The granular soils onsite are expected to have a moderate caving potential when exposed in open cuts. We recommend the following maximum slope inclinations for temporary, unsurcharged excavations:

Excavation Height (ft)	Slope (h:v)
<4	Vertical
<12	¾:1
<25	1:1

If cuts greater than 25 feet are planned, we should be contacted to provide further recommendations. The allowable slope inclinations are measured from the toe to the top of the cut. Even at these inclinations, due to the granular nature of the onsite soils some raveling and local sloughing should be anticipated. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. Surcharge loads should not be permitted within a horizontal distance equal to the height of cut from the top of the excavation or 5 feet from the top of the slopes, whichever is greater, unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of adjacent existing site facilities (including existing underground utilities) should be properly shored to maintain support of adjacent elements. Excavations and shoring systems should meet the minimum requirements given in the State of California Occupational Safety and Health Standards.

If trench box shoring is used for the installation of new utilities, sloughing will likely occur surrounding the trench boxes. Care should be taken when considering the shoring methods used to minimize the impact of adjacent improvements.

Slot Cuts

Deeper removals along property lines may require shoring or slot cuts. Recommendations for shoring are provided in the “Retaining Structures” section of the Report. Removals that will undermine existing adjacent pavements or hardscape or property may utilize “ABC” slot cuts to depths not greater than 8 feet. Unsurcharged slot cuts up to 8 feet in height should not be wider than 6 feet and should be backfilled to finished grade prior to excavation of the adjacent four slots (two on each side of the excavated slot). We can provide slot widths for other slot heights if required. A test slot should be performed, while observed by a GPI representative, prior to production slots to confirm the stability of the planned cuts.

4.3.3 Subgrade Preparation

After the recommended cuts and removals are performed and prior to placing fills or construction of the proposed improvements, the subgrade soils should be scarified to a depth of 8 inches, moisture conditioned to moisture contents of 0 to 2 percent over the optimum moisture content and compacted to at least 90 percent of the maximum dry density, determined in accordance with ASTM D1557. Moistening of the dry, upper sandy soils anticipated at the site can usually be accomplished by deep ripping and liberal watering prior to compaction. Pre-watering the site prior to grading may also be used to moisten the soils; however, application of water during grading will still be required.

4.3.4 Material for Fill

The surficial on-site soils are suitable for use as generally compacted fill. Although not encountered, fill placed within the upper 3 feet of the building pad should not have particles larger than 3-inches in diameter. Additionally, clay soils, which were encountered in limited quantities in the upper onsite soils, should not be used as wall backfill, directly below floor slabs, or directly beneath pedestrian flatwork.

Imported fill material should be predominantly granular (containing between 10 and 40 percent fines - portion passing No. 200 sieve), non-expansive (E.I. of 20 or less), and not contain particles larger than 3 inches in diameter. Imported fill materials in pavement areas should have a minimum R-value of 40. GPI should be provided with a sample (at least 50 pounds) and notified of the location of soils proposed for import at least 72 hours in advance of importing. Each proposed import source should be sampled, tested and accepted for use prior to delivery of the soils to the site. Soils imported prior to acceptance by GPI may be rejected if not suitable.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain at least 1½ sacks of cement per cubic yard and have a maximum slump of 5 inches. If used within the footprint of the building pads, the slurry should contain 2½ sacks of cement per cubic yard.

If open-graded rock is used as backfill, the material should be placed in lifts and mechanically densified. Open-graded rock should be separated from soils by a suitable filter fabric (Mirafi 140N or equivalent).

4.3.5 Placement and Compaction of Fills

Fill soils should be placed in horizontal lifts, moisture-conditioned, and mechanically compacted to at least 90 percent of the maximum dry density in accordance with ASTM D1557. Soils within one foot of the subgrade for floor slabs and pavement areas, and the aggregate base material should be compacted to a relative compaction of at least 95 percent. The optimum lift thickness will depend on the compaction equipment used and can best be determined in the field. The following uncompacted lift thickness can be used as preliminary guidelines.

Plate Compactors	4-6 inches
Track Equipment, Small Vibratory or Static Rollers (5-ton±)	6-8 inches
Heavy Loaders/Scrapers	8-12 inches

The maximum lift thickness should not be greater than 12 inches and each lift should be thoroughly compacted and accepted prior to subsequent lifts.

Fills consisting of the imported or on-site sandy soils should be placed at a moisture content of 0 to 2 percent over the optimum moisture content to achieve the required compaction. The moisture content of the upper sandy soils encountered in the explorations was generally well below the optimum moisture content. As such, significant moisture conditioning (wetting) will be required prior to replacing the soils as properly compacted fill.

Once moisture is conditioned and properly compacted, the exposed soils should not be allowed to dry out prior to covering. A representative of GPI should confirm the moisture content of the subgrade soils immediately prior to placement of concrete or additional fill.

During backfill of excavations, the fill should be properly benched into the construction slopes as it is placed in lifts.

4.3.6 Shrinkage and Subsidence

Shrinkage is the loss of soil volume caused by compaction of fills to a higher density than before grading. Subsidence is the settlement of in-place subgrade soils caused by loads generated by large earthmoving equipment. For earthwork volume estimating purposes, an average shrinkage value of 13 percent (+/- 3 percent) may be used. Subsidence of 0.1 feet may be assumed for the surficial soils. These values are estimates only and exclude losses due to removal of vegetation and debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during grading.

4.3.7 Trench/Wall Backfill

Utility trench and wall backfill should be mechanically compacted in lifts. Although only encountered in limited quantities, clayey soils should not be used in retaining wall backfill. Lift thickness should not exceed those values given in the "Compacted Fill" section of this report. Moisture conditioning (wetting) of the on-site soils may be required prior to re-use as backfill. Jetting or flooding of backfill materials should not be permitted. GPI should observe and test trench and wall backfills as they are placed.

4.3.8 Observation and Testing

A representative of GPI should observe excavations, subgrade preparation, and fill placement activities. Sufficient in-place field density tests should be performed during fill placement and in-place compaction to evaluate the overall compaction of the soils. Soils that do not meet minimum compaction requirements should be reworked and tested prior to placement of any additional fill.

4.4 FOUNDATIONS

4.4.1 Foundation Type

The proposed structures can be supported on conventional spread footings founded in properly compacted fill.

Minor structures such as light poles, shade structures, and playground equipment may be supported on drilled pier foundations supported on natural, undisturbed soils or on conventional isolated and/or continuous shallow footings, in accordance with the recommendations provided in this report. Shallow foundations should be supported on properly compacted fill.

4.4.2 Allowable Bearing Pressures

Based on the shear strength and elastic settlement characteristics of the natural and recompacted on-site soils, a static allowable net bearing pressure of up to 4,000 pounds per square foot (psf) may be used for both continuous footings and isolated column footings for

the buildings. These bearing pressures are for dead-plus-live-loads, and may be increased one-half for short-term, transient, wind and seismic loading. The actual bearing pressure used may be less than the value presented above and can be based on economics and structural loads to determine the minimum width for footings as discussed below. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values.

For minor structures, such as site walls and property line screen walls, where reduced excavation depths have been recommended and lateral limits of the overexcavation may be limited, we recommend a maximum allowable bearing capacity of 2,500 pounds per square foot be used.

4.4.3 Minimum Footing Width and Embedment

The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressure.

STATIC BEARING PRESSURE (psf)	MINIMUM FOOTING WIDTH (inches)	MINIMUM FOOTING* EMBEDMENT (inches)
4,000	24	24
3,500	24	18
2,500	18	18

* Refers to minimum depth below lowest adjacent grade at the time of foundation construction. If interior footings are not fully loaded before the slab is in-place, the depth of interior footings may be taken from the top of the floor slab.

A minimum footing width and depth of 18 inches should be used even if the actual bearing pressure is less than 2,500 psf.

4.4.4 Estimated Settlements

Total static settlement of isolated pad or continuous wall footings (up to 150 kips for columns and 9 kips per lineal foot for walls) is expected to be on the order of ¾-inch or less. Differential static settlement between similarly loaded column footings or along a 60-foot span of a continuous footing is expected to be on the order of 3/8-inch or less. The differential settlement across other spans can be extrapolated from the information provided. Most of the settlement will occur immediately upon load application.

The potential for seismic settlement was addressed in a previous section of this report and should be referred to in evaluating the total potential settlement of foundations.

The above estimates assume that the recommended earthwork will be performed and that the footings will be sized in accordance with our recommendations.

4.4.5 Lateral Load Resistance

For resistance to lateral loads, a combination of frictional resistance and passive soil bearing pressure may be used. For frictional resistance, a coefficient of friction of 0.35 may be used for design. In addition, an allowable lateral bearing pressure equal to an equivalent fluid weight of 300 pounds per cubic foot may be used, provided the footings are poured tight against compacted fill soils. These values may be used in combination without reduction.

4.4.6 Pier Foundation Design Parameters

Based upon the results of our subsurface explorations and laboratory testing, the drilled pier design parameters shown in the following tables may be used for axial and lateral pile design:

Recommended Design Parameters - Axial

Depth Below Existing Grade (feet)	Allowable Pile Skin Friction (psf)	Allowable Pile Tip Resistance (psf)
0-3	50	---
3-10	500	---
>10	1,000	---

We utilized a factor of safety of 3 to determine the allowable skin friction values. The settlement of the drilled piers designed using the above allowable skin friction values only is anticipated to be on the order of ½-inch.

The uplift capacity of the piers may be taken as one-half of the downward capacities derived from skin friction only.

For design of the pier footings for the shade structures by the simplified pole formula presented in Section 1807A.3.2.1 of the 2022 CBC, a unit passive pressure of 600 pounds per square foot per foot (up to a maximum value of 6,000 psf) may be used for the shaft in lieu of presumptive lateral bearing values presented in Table *1806A.2*. This value incorporates the allowable increase stated in the Section *1806A.3.4* of the code for single poles that can tolerate a ½-inch of deflection under short-term loads.

The above pier design parameters for shallow depths assume the ground surface surrounding the piers will be paved. If the surface surrounding the pier is not paved, we recommend the upper 18 inches of soil be ignored in developing lateral resistance and skin friction. Otherwise, lateral and skin friction resistance may be utilized beginning at the finished grade.

Since the drilled piers will be designed to derive resistance from soil friction only, rigorous cleaning of the loose materials from the bottom of the excavation prior to placement of steel and concrete is not considered essential. However, effort should be made to clean the bottom with the drill rig-mounted equipment.

Pier excavations should be filled with concrete on the same day that they are drilled. The concrete should be placed with special equipment so that it is not allowed to fall freely more than 5 feet or strike the walls of the excavations. Drilling should not be performed within 5 feet of recently excavated or recently poured piers until the concrete has been allowed to set for at least 6 hours.

The piers should be poured in a manner that will not result in concrete flowing into adjacent drilled pier excavations and prevent segregation of aggregate. Drilled pier construction should be performed in accordance with the latest edition of ACI 336.1, “Standard Specifications for the Construction of Drilled Piles.”

Pier excavations should be observed by a representative of GPI to confirm and document the depth, diameter, and embedment in suitable materials.

4.4.7 Foundation Inspection

Prior to placement of steel and concrete, a representative of GPI should observe and approve all foundation excavations including pier excavations.

4.5 BUILDING FLOOR SLABS

Slab-on-grade floors should be supported on granular, non-expansive (EI $\leq$ 20), compacted soils as discussed in the "Placement and Compaction of Fills" section. Based on our explorations, granular, non-expansive soils are readily available on-site. We do not anticipate swell pressures to negatively impact the building floor slab based on the non-expansive characteristics of the on-site soils. There is not a geotechnical requirement for slab thickness or reinforcing based on the non-expansive characteristics of the on-site soils.

For elastic design of slabs-on-grade supporting sustained concentrated loads, a modulus of subgrade reaction (k) of 300 pounds per cubic inch (pounds per square inch per inch of deflection) and 150 pounds per cubic inch may be used for on-site soils for short- and long-term loads.

A vapor/moisture retarder should be placed under slabs that are to be covered with moisture-sensitive floor coverings (parquet, vinyl tile, etc.) or will be storing moisture sensitive supplies. Currently, common practice is to use a 15-mil polyolefin product such as Stego Wrap for this purpose. The need for a sand layer with the vapor retarder is not a geotechnical issue and is a decision for the Project Architect. It should be noted that the material used as a vapor retarder is only one of several factors affecting the prevention of moisture accumulation under floor coverings. Other factors include maintaining a low water to cement ratio for the concrete used for the floor slab, effective sealing of joints and edges (particularly pipe penetrations), and excess moisture in the concrete. The manufacturer of the floor coverings should be consulted for establishing acceptable criteria for the condition of floor surface prior to placing moisture-sensitive floor coverings.

4.6 CORROSION

Laboratory testing by Project X (Appendix C) on selected samples indicates soluble sulfate contents of between 16 and 130 mg/kg. For the 2022 CBC, foundation concrete should conform to the requirements outlined in ACI 318, Section 4.3 for category S1 levels of soluble sulfate exposure. Chloride levels in the samples tested were found to be between 3.8 mg/kg and 19 mg/kg. Due to the potential exposure to moisture, we recommend at least a Category C1 be used in design.

Resistivity testing of representative samples of the onsite soils indicates that they are moderately corrosive to buried ferrous metals. GPI does not practice corrosion protection engineering. If corrosion protection recommendations are required, a corrosion engineer, such as Project X, should be consulted to provide recommendations to protect these elements from corrosion.

4.7 RETAINING STRUCTURES

The following recommendations are provided for retaining walls that do not extend more than 10 feet in height. We recommend that conventionally constructed walls be backfilled with sandy (granular) soils, which are anticipated to be readily available on-site.

Active earth pressures can be used for designing walls that can yield at least ½-inch laterally in 10 feet of wall height under the imposed loads. For drained level backfill comprised of non-expansive granular soils (no more than 40 percent passing No. 200 U.S. standard sieve), the magnitude of active pressures are equivalent to the pressures imposed by a fluid weighing 40 pounds per cubic foot (pcf). This pressure may also be used for the design of temporary excavation support. For retaining walls retaining sloping backfill with inclinations of up to 2:1 (h:v), we recommend an active pressure of 55 pcf be used in design.

At-rest pressures should be used for restrained walls that remain rigid enough to be essentially non-yielding. For select, non-expansive, level, drained backfill, a lateral pressure of an equivalent fluid weighing 60 pounds per cubic foot can be used. If the walls are designed with sloping backfill (up to 2:1), a lateral pressure of an equivalent fluid weighing 90 pounds per cubic foot may be used.

To account for seismic loads, an additional lateral earth pressure equal to 18 pcf (equivalent fluid pressure) should be added to the above active pressures. This pressure should be combined with the active earth pressures presented above. If the retaining walls are designed using the at-rest pressures provided above, only the difference between the active plus seismic pressures and needs to be included as the seismic pressure.

Walls subject to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge pressure for unrestrained and restrained walls, respectively. The wall backfill should be well-drained to relieve possible hydrostatic pressure or designed to withstand these pressures.

The wall backfill for conventional walls should be well-drained to relieve possible hydrostatic pressure or designed to withstand these pressures. A drain consisting of perforated pipe and gravel wrapped in filter fabric should be used. One cubic foot of rock should be used for each lineal foot of pipe. The fabric (non-woven filter fabric, Mirafi 140N or equivalent) should be lapped at the top.

The Structural Engineer should specify the use of select, granular wall backfill on the plans for retaining walls that are to be conventionally backfilled. Wall footings should be designed as discussed in the "Foundations" section.

4.8 DRAINAGE

Positive surface gradients should be provided adjacent to structures to direct surface water run-off and roof drainage away from foundations and slabs toward suitable discharge facilities. The introduction of water into the existing fill soils can result in subsidence. Long-term ponding of surface water should not be allowed on pavements or adjacent to buildings.

4.9 STORM WATER INFILTRATION

Current local regulations generally require that storm water be infiltrated in the site soils of new developments when possible. The soil types present at the site control the ability of water to infiltrate into the subgrade.

The upper soils encountered in our explorations consist of generally sandy soils that will likely facilitate stormwater infiltration. When stormwater infiltration systems are designed,

we should be provided the locations and types of systems so that infiltration testing can be performed, if required.

4.10 EXTERIOR CONCRETE AND MASONRY FLATWORK

Exterior concrete and masonry flatwork should be supported on non-expansive, compacted fill, which appears to be readily available onsite. This includes the slabs for trash enclosures, generators, etc. This includes exterior sidewalks, stamped concrete, trash enclosures, non-traffic pavement, pavers, etc. Prior to placement of concrete, the subgrade should be prepared as recommended in the "Subgrade Preparation" section of this report.

4.11 PAVED AREAS

Laboratory testing of near surface soils indicated a R-values of 72 and 60. To account for soil variability, we have used an R-value of 50 for preliminary design. Based on the subgrade soils anticipated, we recommend the following pavement sections for the various levels of traffic (traffic indices) anticipated:

PAVEMENT AREA	TRAFFIC INDEX	SECTION THICKNESS (inches)	
		ASPHALT/PORTLAND CONCRETE	AGGREGATE BASE COURSE
Asphalt Concrete			
Parking and Drives	5	3.0	4
Truck Delivery Areas	6	4.0	4
Heavy Truck Areas	7	4.0	5
Portland Cement Concrete			
Parking and Drives	5	5.5	--
Truck Delivery Areas	6	6.0	--
Heavy Truck Areas	7	6.5	--

If vehicular pavers are to be used for the project, the paver and leveling sand should be supported on at least the thickness of aggregate base shown above for the appropriate asphalt concrete traffic index.

The pavement subgrade underlying the aggregate base should be properly prepared and compacted in accordance with the recommendations outlined under "Subgrade Preparation".

The portland cement concrete used for paving should have a compressive strength of at least 3,500 psi at the time the pavement is subjected to vehicular traffic.

The pavement base course should be compacted to at least 95 percent of the maximum dry density (ASTM D1557). Aggregate base should conform to the requirements of Section 26 of the California Department of Transportation Standard Specifications for Class II aggregate base (three-quarter-inch maximum) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for untreated base materials (except Processed Miscellaneous Base).

The above recommendations assume that the base course will be properly drained. The design of paved areas should incorporate measures to prevent moisture build-up within the base course and subgrade, which can otherwise lead to premature pavement failure. For example, curbing adjacent to landscaped areas should be deep enough to act as a barrier to infiltration of irrigation water into the adjacent base course.

4.12 GEOTECHNICAL OBSERVATION AND TESTING

We recommend that a representative of GPI observe earthwork during construction to confirm that the recommendations provided in our report are applicable during construction. The earthwork activities include grading, compaction of fills and subgrade preparation, as well as ground improvement and foundation construction. If conditions are different than expected, we should be afforded the opportunity to provide alternate recommendations based on the actual conditions encountered.

5.0 LIMITATIONS

The report, exploration logs, and other materials resulting from GPI's efforts were prepared exclusively for use by Coffee Road Ventures LLC and their consultants in designing the proposed development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided during grading, excavation, and foundation construction by GPI. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations. If construction phase services are performed by others they must accept full responsibility for all geotechnical aspects of the project including this report.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

Respectfully submitted,
Geotechnical Professionals Inc.









Patrick I.F. McGervey, G.E
Senior Engineer

Donald A. Cords, G.E.
Principal

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APPENDIX B

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APPENDIX C

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C-9	Consolidation Test
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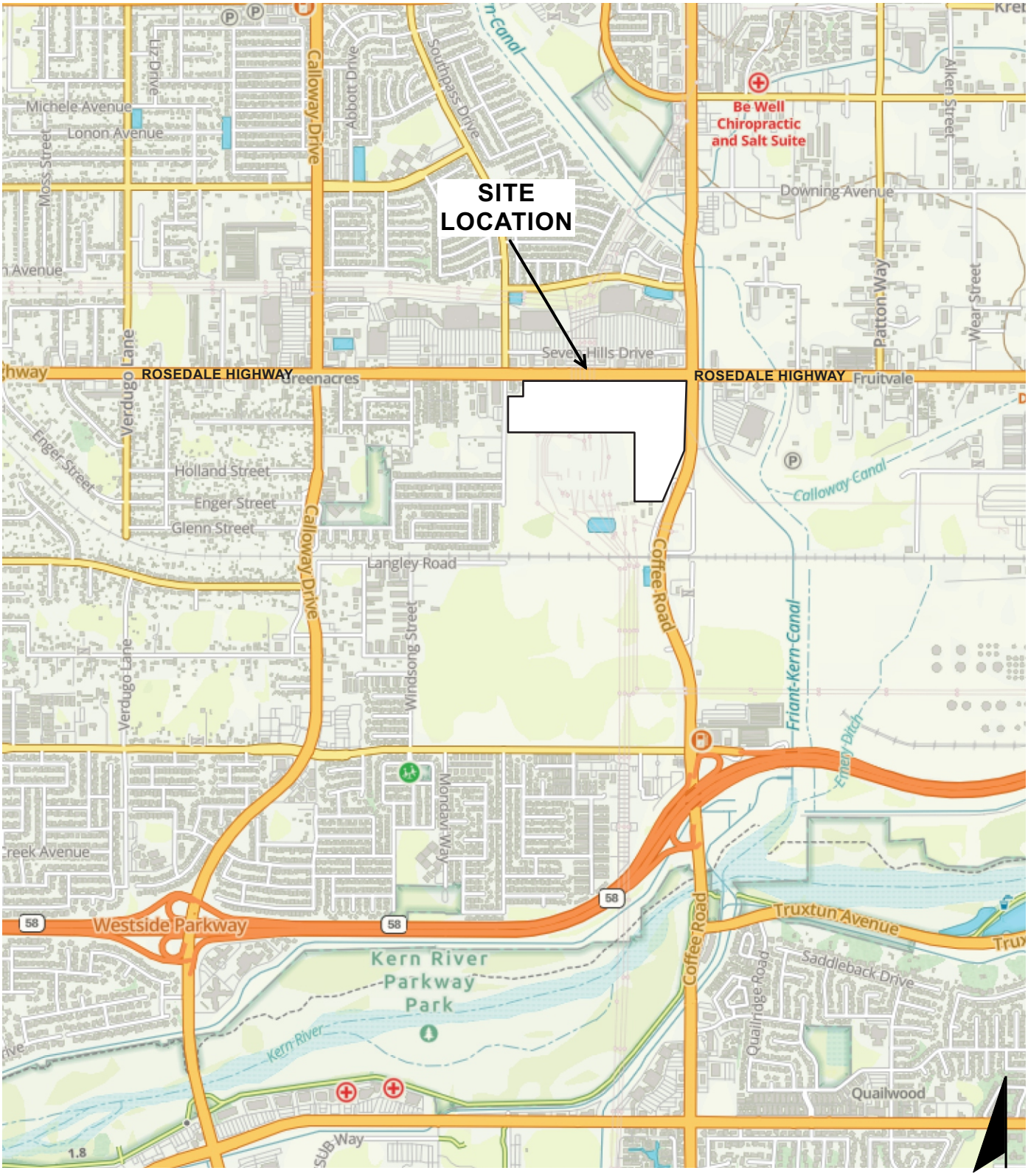

BASE MAP REPRODUCED FROM © GAIA GPS (2024)

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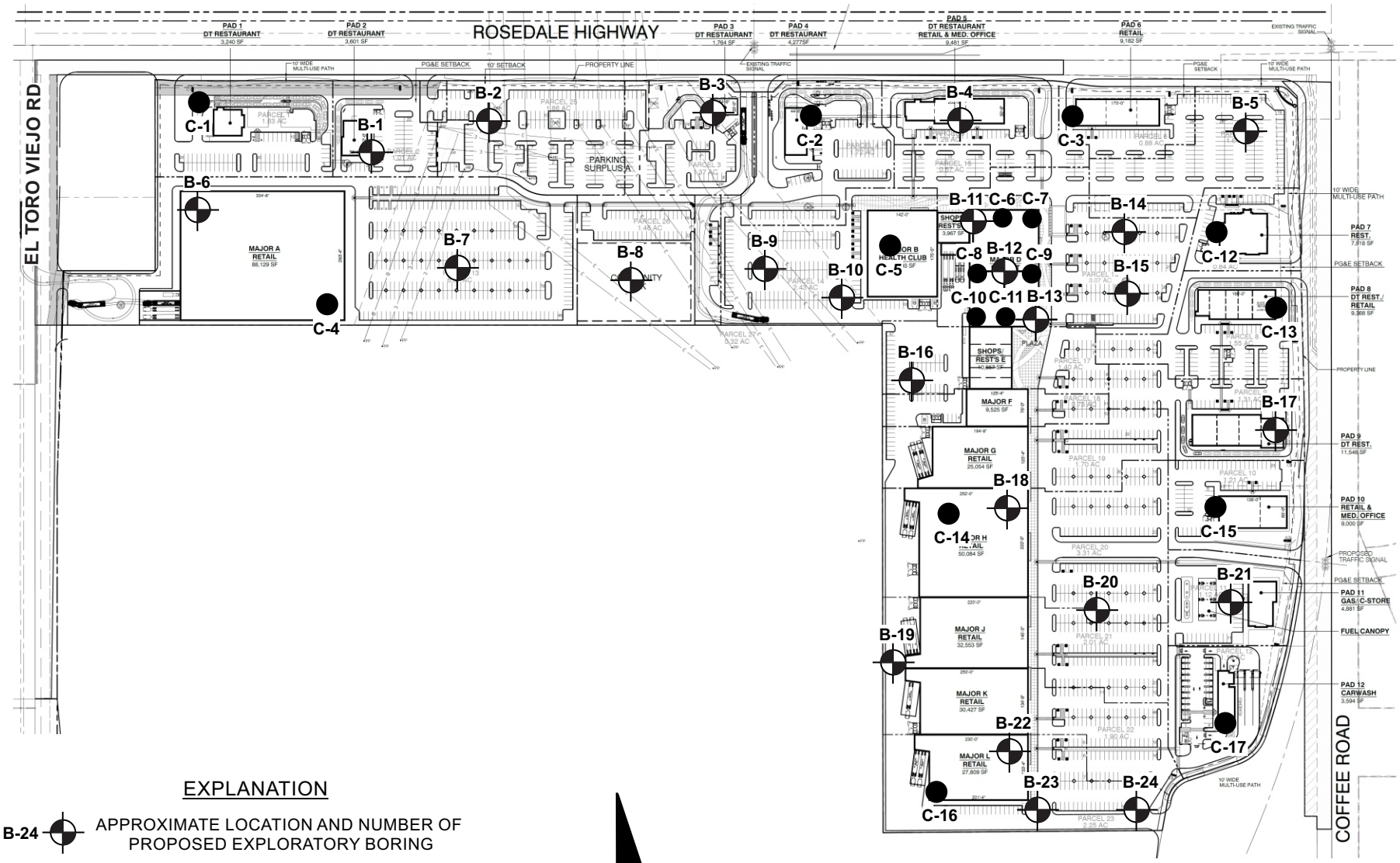
SITE LOCATION MAP

FIGURE 1



EXPLANATION

B-24 — APPROXIMATE LOCATION AND NUMBER OF PROPOSED EXPLORATORY BORING

C-17 — APPROXIMATE LOCATION AND NUMBER OF PROPOSED CONE PENETRATION TEST

BASE PLAN REPRODUCED FROM SITE PLAN PROVIDED BY MCG ARCHITECTURE DATED 6/26/2024

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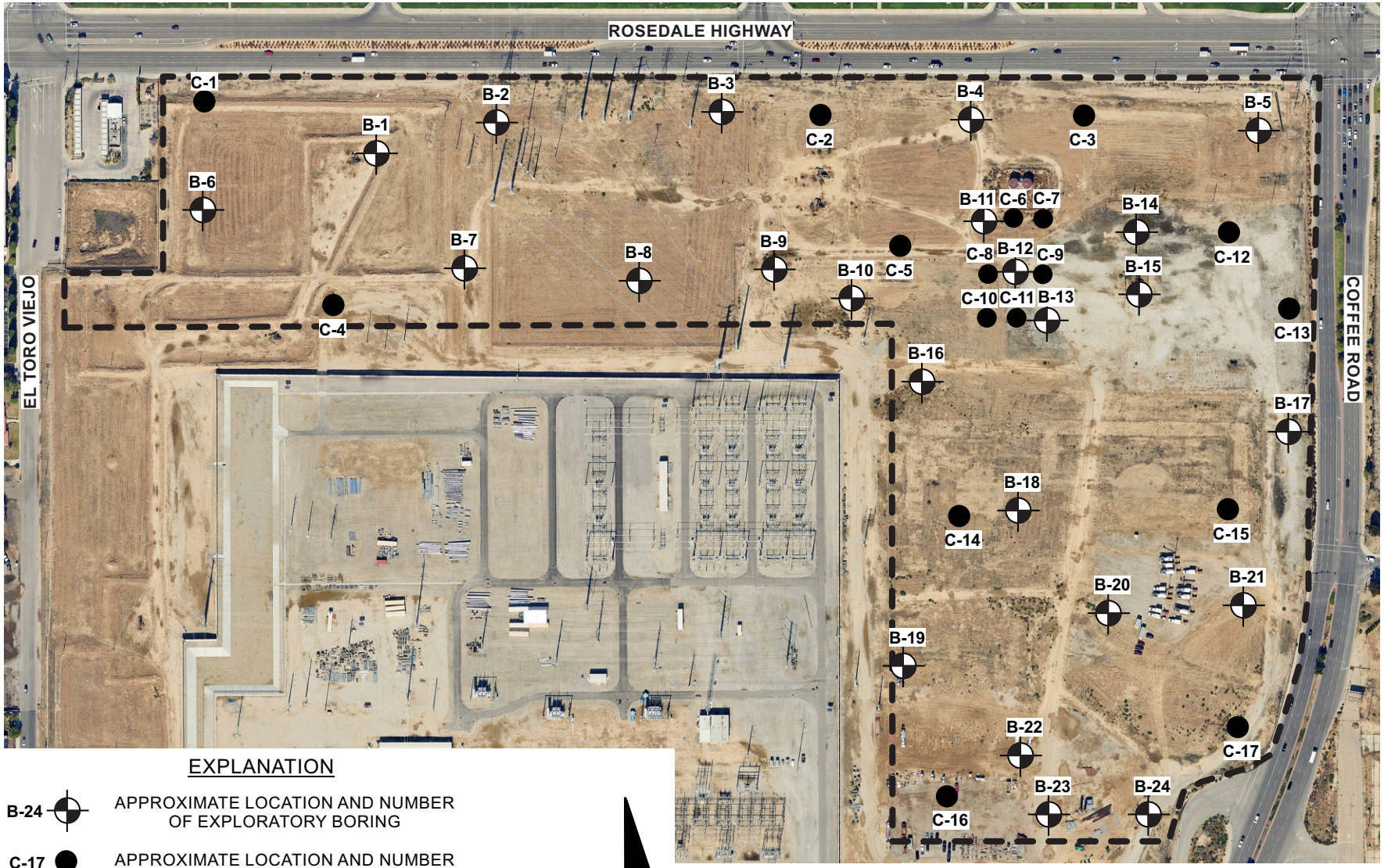
SCALE: 1" = 300'

SITE PLAN

(PROPOSED)

FIGURE 2



EXPLANATION

B-24 — APPROXIMATE LOCATION AND NUMBER OF EXPLORATORY BORING

C-17 — APPROXIMATE LOCATION AND NUMBER OF CONE PENETRATION TEST

LIMITS OF THIS PROJECT

BASE PLAN REPRODUCED FROM SITE PLAN PROVIDED BY MCG ARCHITECTURE DATED 6/26/2024

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GPI PROJECT NO.: 3282.I | SCALE: 1" = 300'

SITE PLAN
(EXISTING)

FIGURE 3

APPENDIX A

CONE PENETRATION TESTS

The subsurface conditions were investigated by performing 17 Cone Penetration Tests (CPTs) at the site. The CPT's were advanced to depths ranging from 30 to 100 feet below existing grades. The locations of the CPTs are shown on the Site Plans, Figures 2 and 3.

The Cone Penetration Test consists of pushing a cone-tipped probed into the soil deposit while simultaneously recording the cone tip resistance and side friction resistance of the soil to penetration. The CPTs described in this report were conducted in general accordance with ASTM specifications (ASTM D5778) using an electric cone penetrometer.

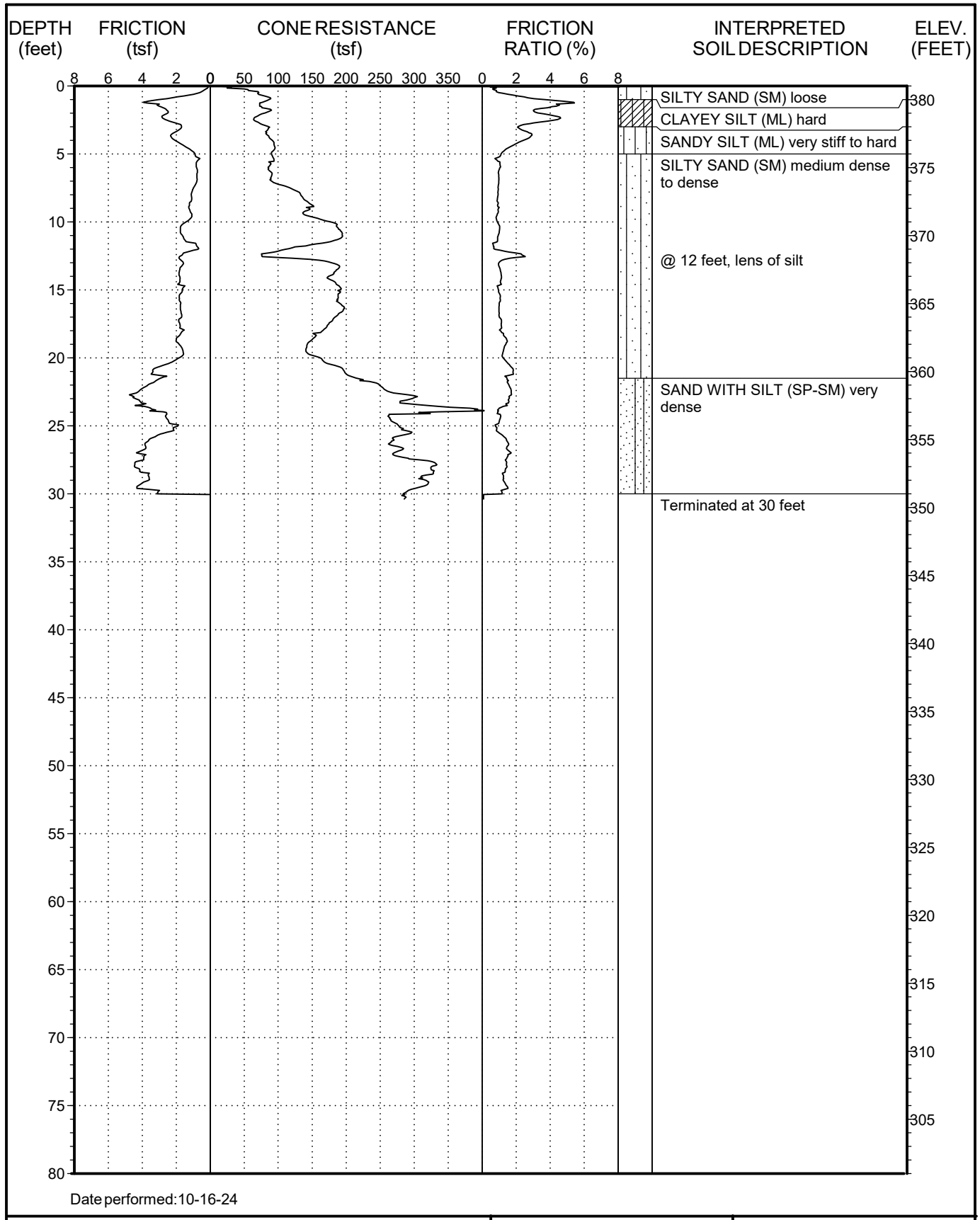
The CPT equipment consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to push the cone and rods into the soil while a continuous record of cone and friction resistance versus depth is obtained in both analog and digital form at the ground surface. A specially designed truck is used to transport and house the test equipment and to provide a 30-ton reaction to the thrust of the hydraulic rams.

Standard data obtained during a CPT consists of continuous stratigraphic information with close vertical resolution. Stratigraphic interpretation is based on relationships between cone tip resistance and friction resistance. The calculated friction ratio (CPT friction sleeve resistance divided by cone tip resistance) is used as an indicator of soil type. Granular soils typically have low friction ratios and high cone resistance, while cohesive or organic soils have high friction ratios and low cone resistance. These stratigraphic material categories form the basis for all subsequent calculations which utilize the CPT data.

A seismic cone penetration test provided shear wave velocity measurements of the soils profile within CPT C-2. A standard cone penetrometer is equipped with two sets of geophones located approximately 3 feet apart on the cone penetrometer. At 10-foot intervals, a shear wave source is activated at the ground surface suing an air-actuated hammer. A seismograph measures the travel time of the shear wave detected at each set of the geophones. The time difference provides the velocity of the shear wave in the layer between the two geophone sets. Table A-1 provides the shear wave velocity from the surface and the interval of the soil between the geophones.

Plots of the reduced CPT data acquired for this investigation are presented in Figures A-1 to A-17 of this appendix. The field testing and processing was performed by Kehoe Testing and Engineering under subcontract to Geotechnical Professionals Inc. (GPI). The interpreted soils descriptions were prepared by GPI.

The CPT locations were laid out in the field by measuring from existing features at the site. Upon completion, the CPT holes were backfilled above the caving with bentonite and the ground surface were patched with cold patch asphalt. The ground surface elevation at the CPT locations was estimated with Google Earth and should be considered very approximate.



Date performed: 10-16-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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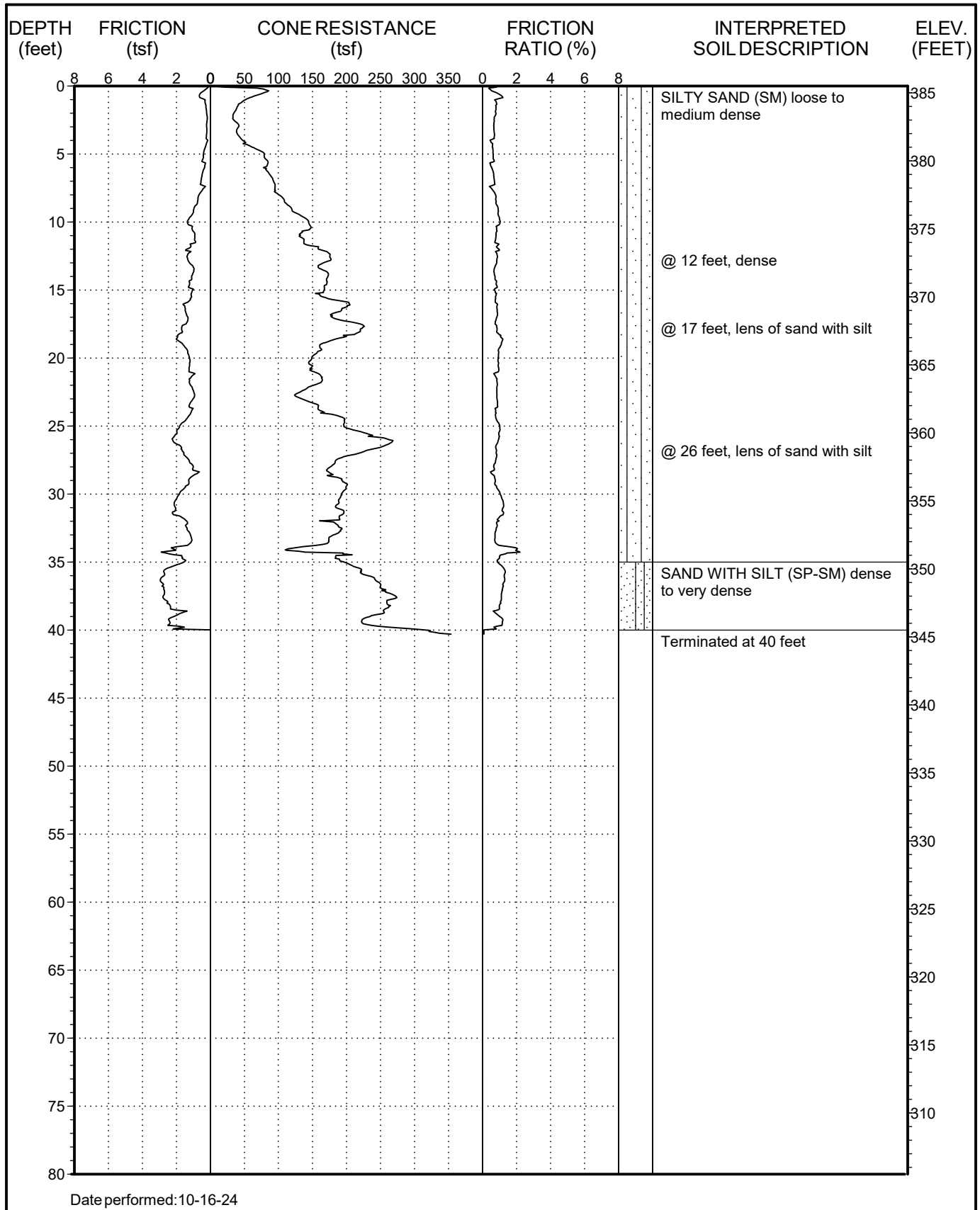
LOG OF CPT NO. C-1

FIGURE A-1



Date performed: 10-16-24

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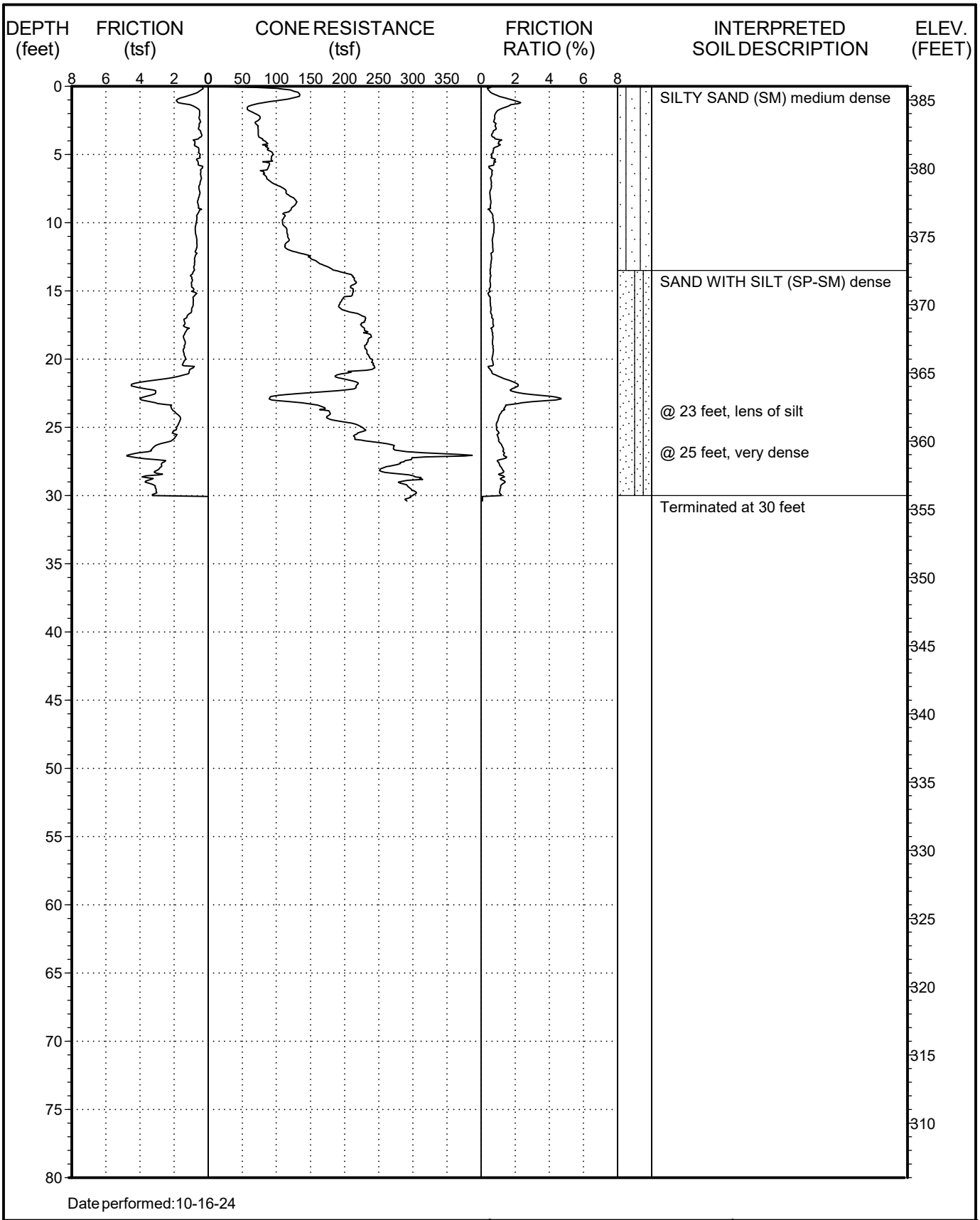
LOG OF CPT NO. C-2

FIGURE A-2



Date performed: 10-16-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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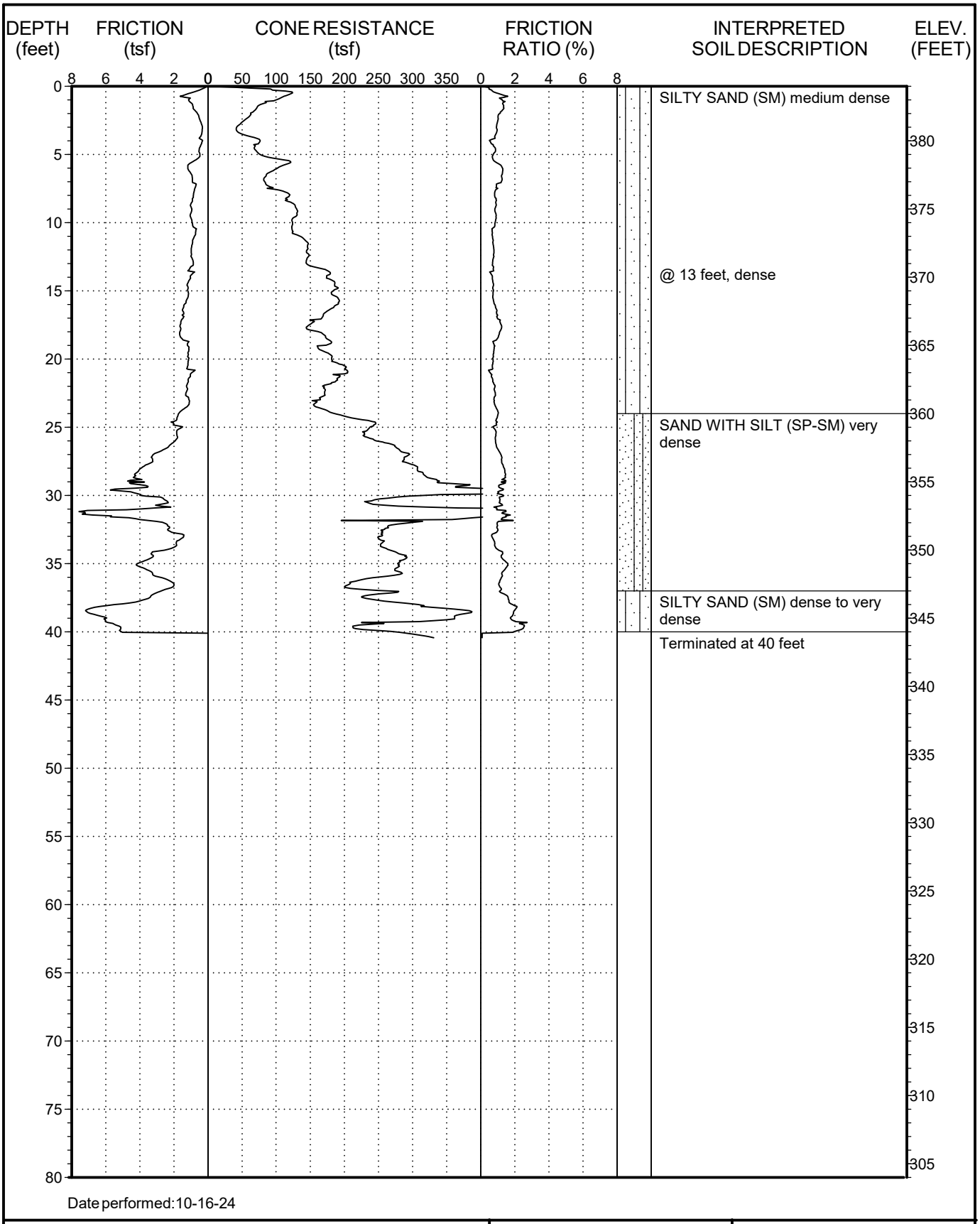
LOG OF CPT NO. C-3

FIGURE A-3



Date performed: 10-16-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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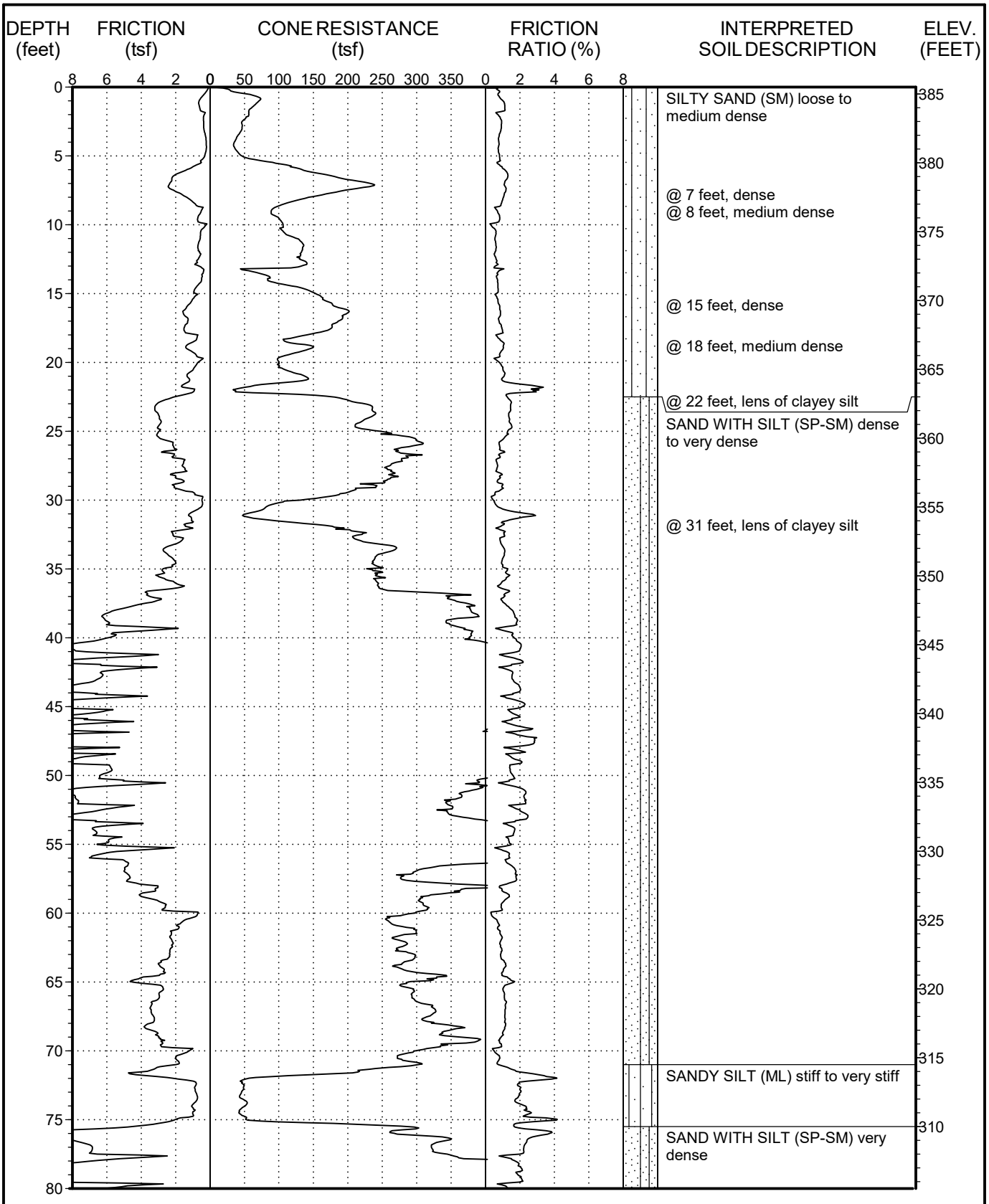
LOG OF CPT NO. C-4

FIGURE A-4



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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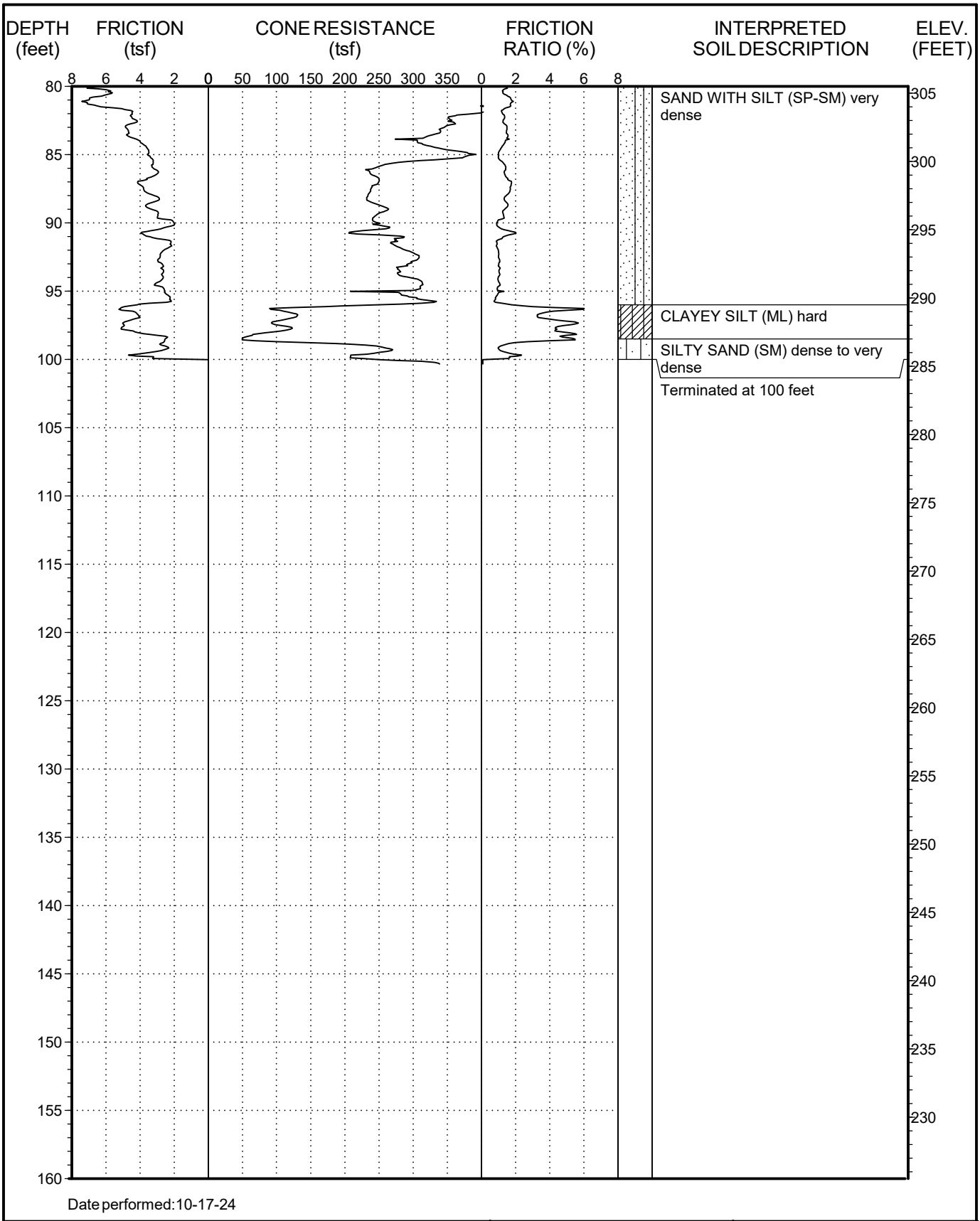
LOG OF CPT NO. C-5

FIGURE A-5



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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PROJECT NO.: 3282.I

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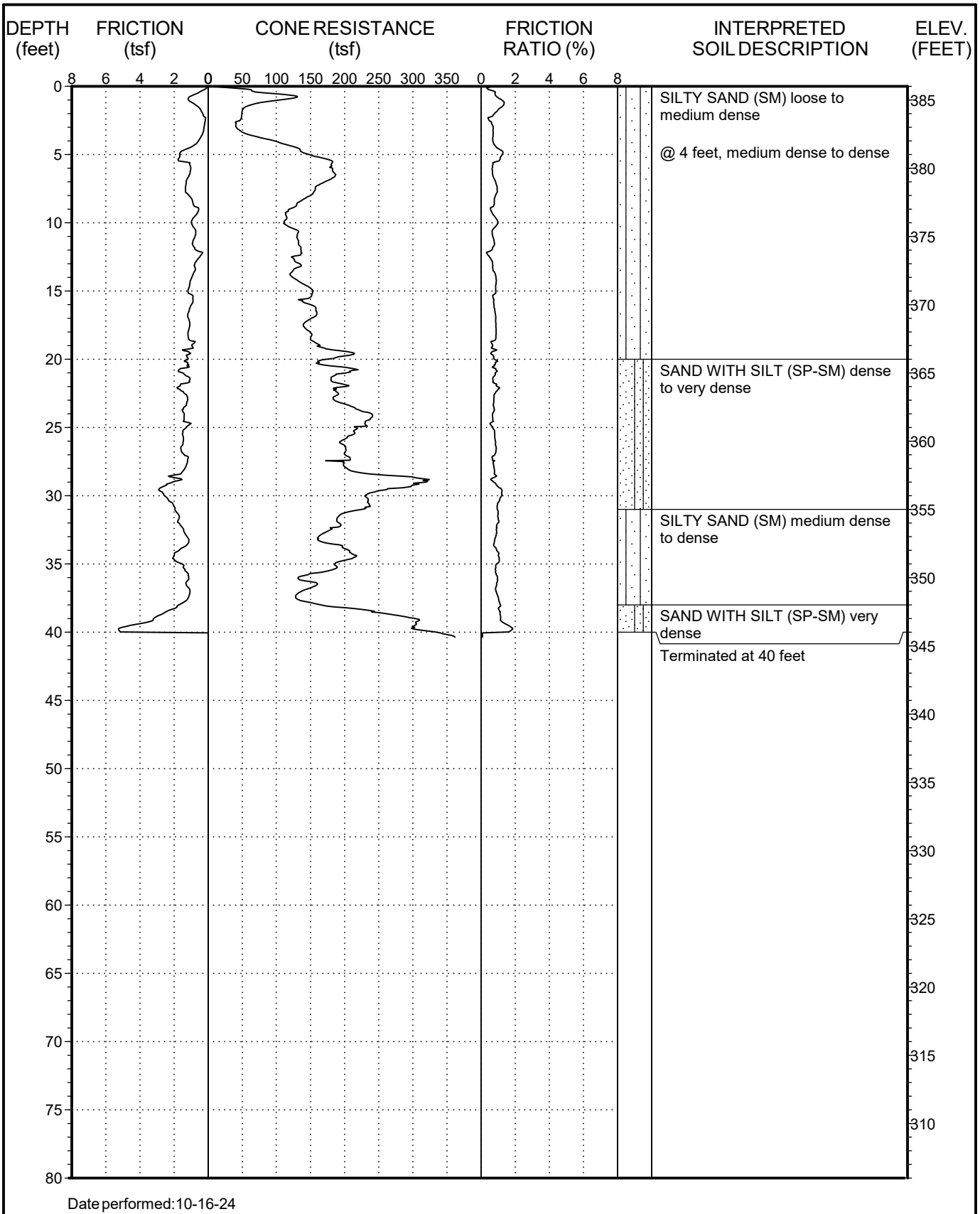
LOG OF CPT NO. C-5

FIGURE A-5



Date performed: 10-16-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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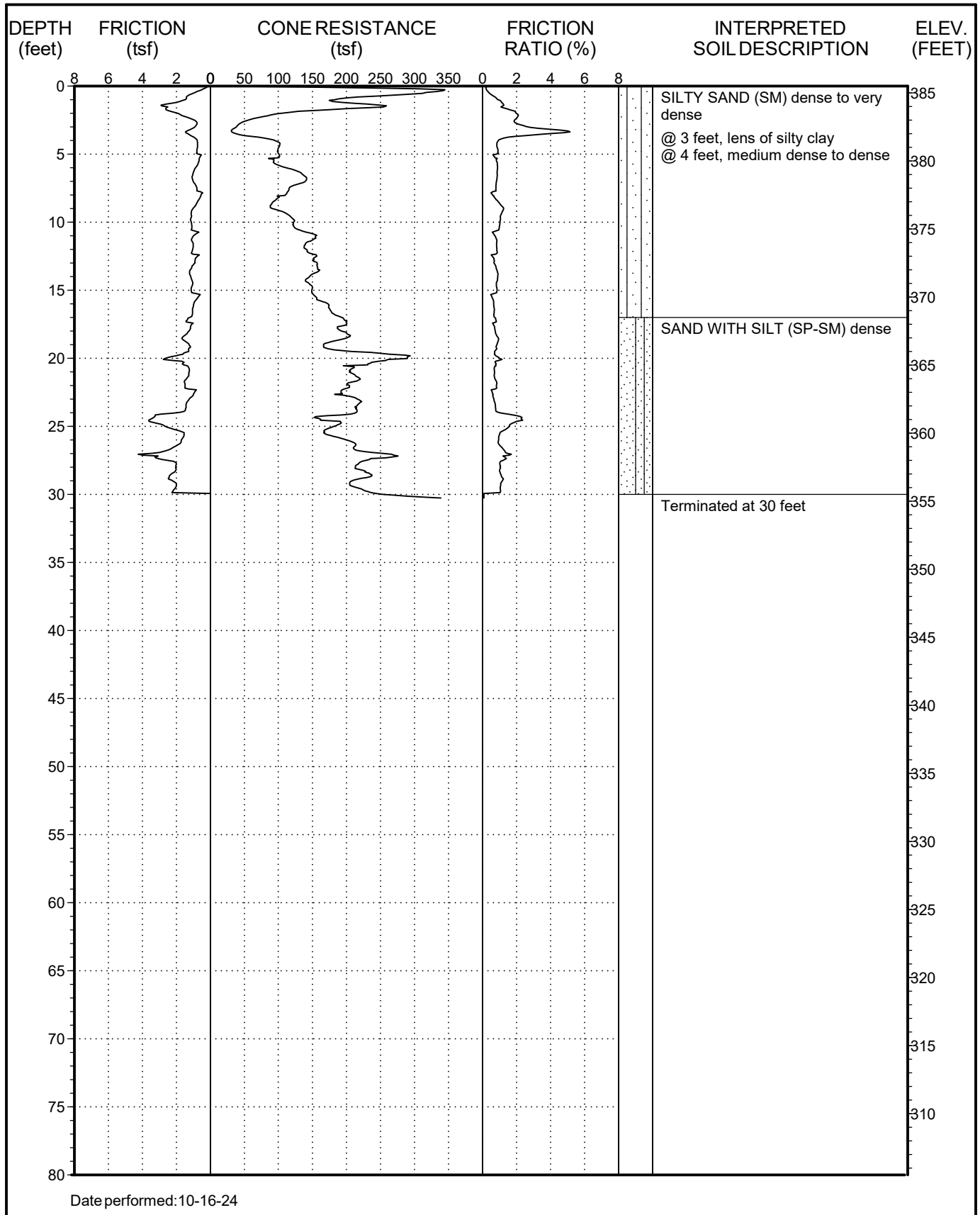
LOG OF CPT NO. C-6

FIGURE A-6



Date performed: 10-16-24

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PROJECT NO.: 3282.I

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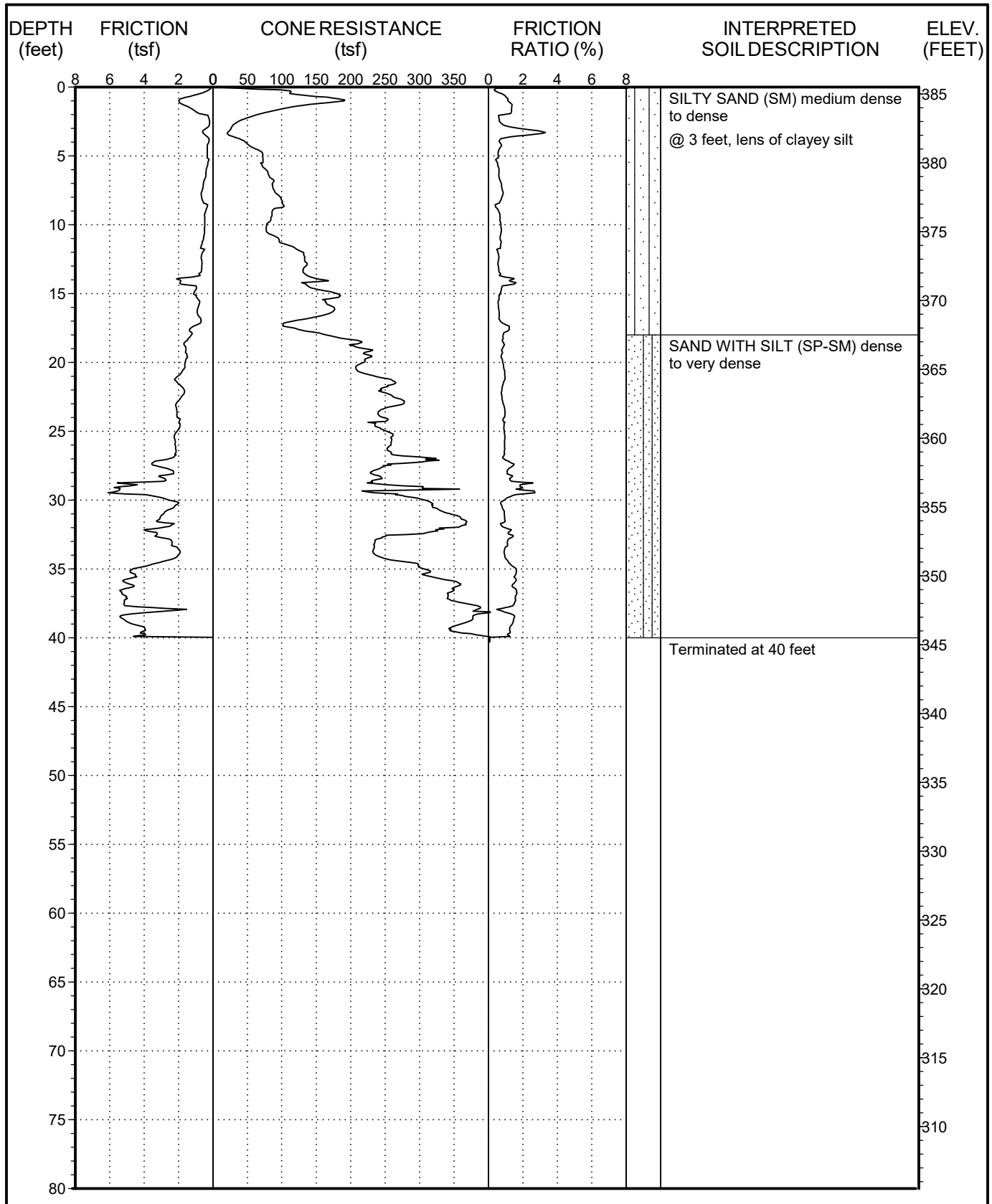
LOG OF CPT NO. C-7

FIGURE A-7



Date performed: 10-17-24

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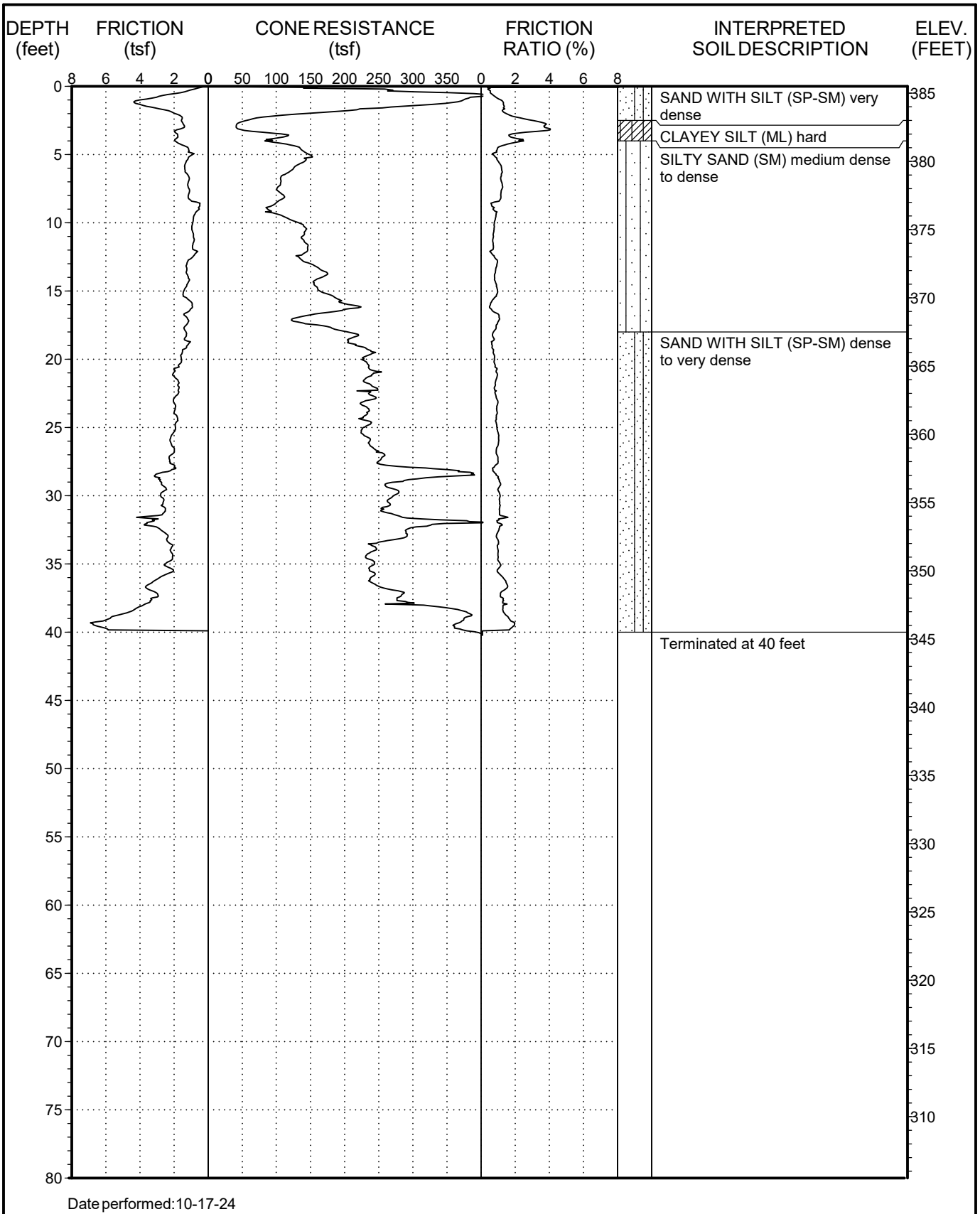
LOG OF CPT NO. C-8

FIGURE A-8



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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PROJECT NO.: 3282.I

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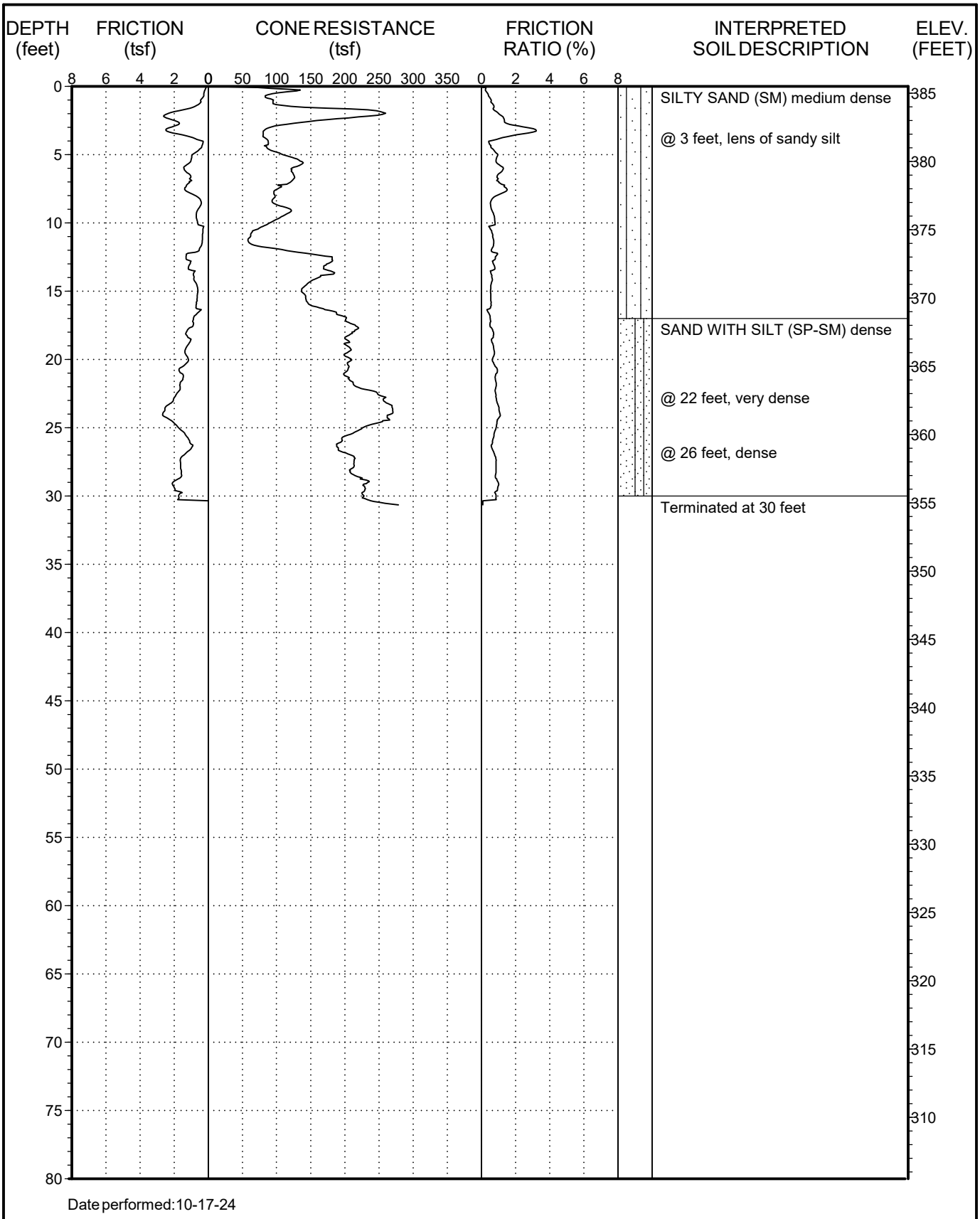
LOG OF CPT NO. C-9

FIGURE A-9



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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PROJECT NO.: 3282.I

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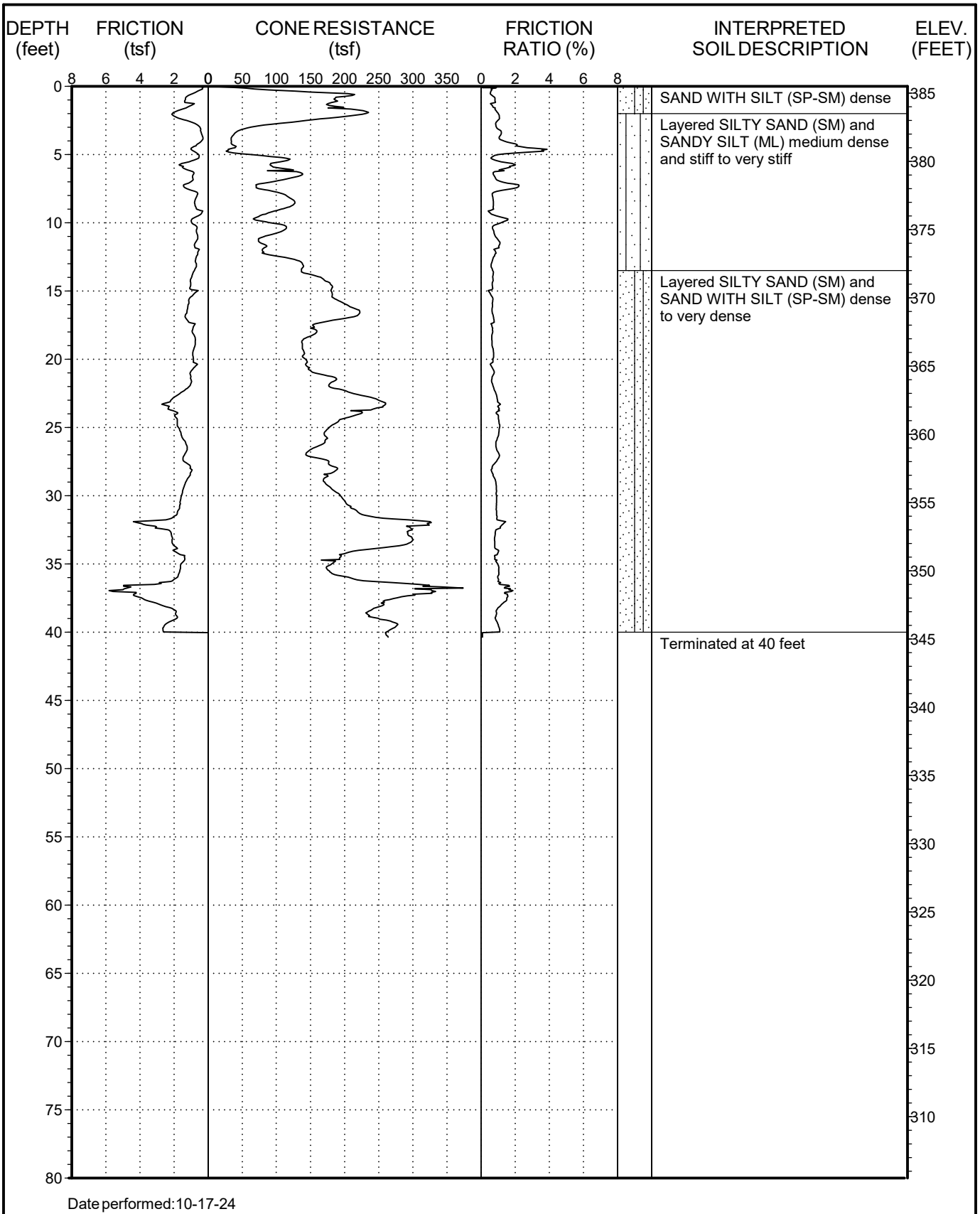
LOG OF CPT NO. C-10

FIGURE A-10



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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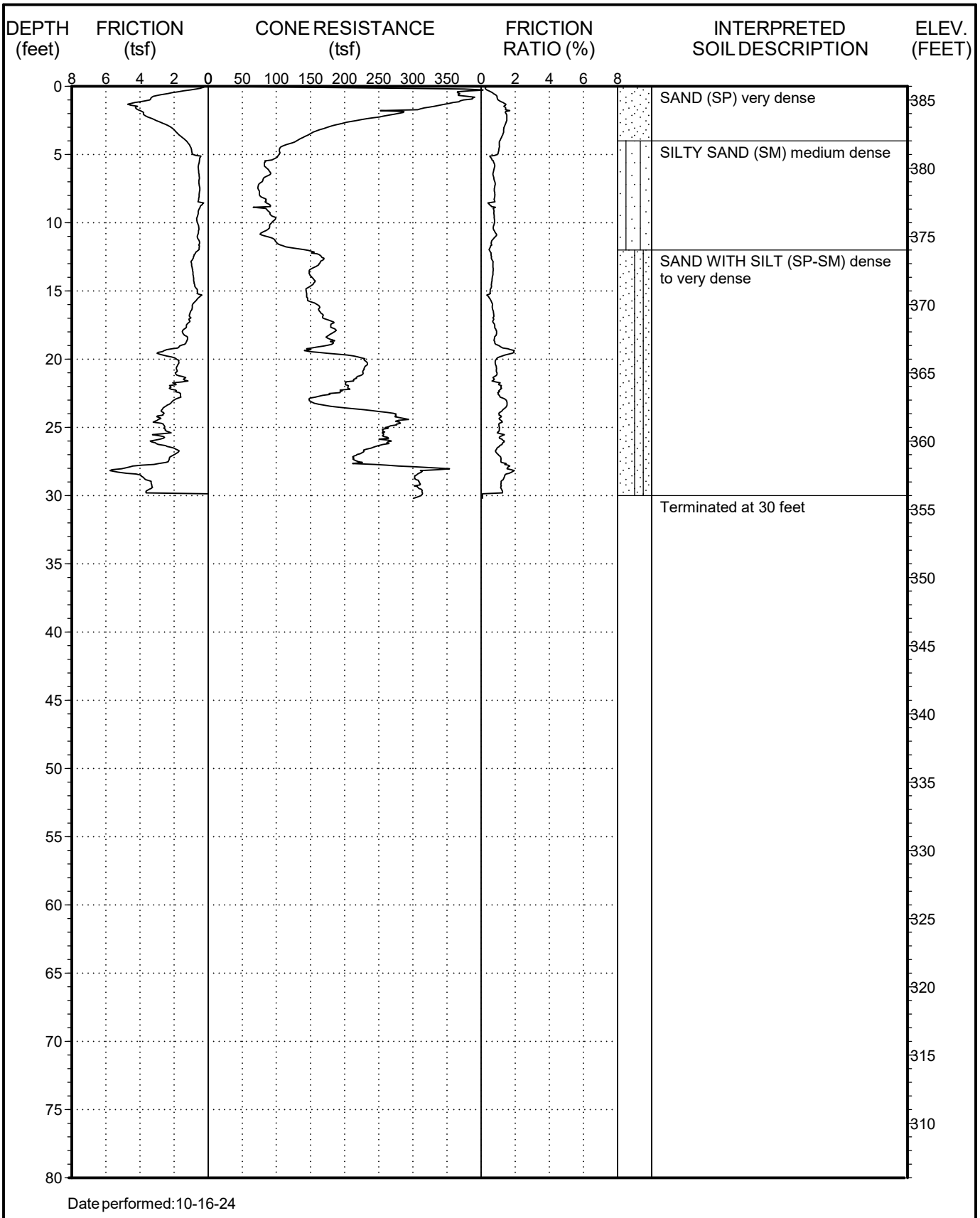
LOG OF CPT NO. C-11

FIGURE A-11



Date performed: 10-16-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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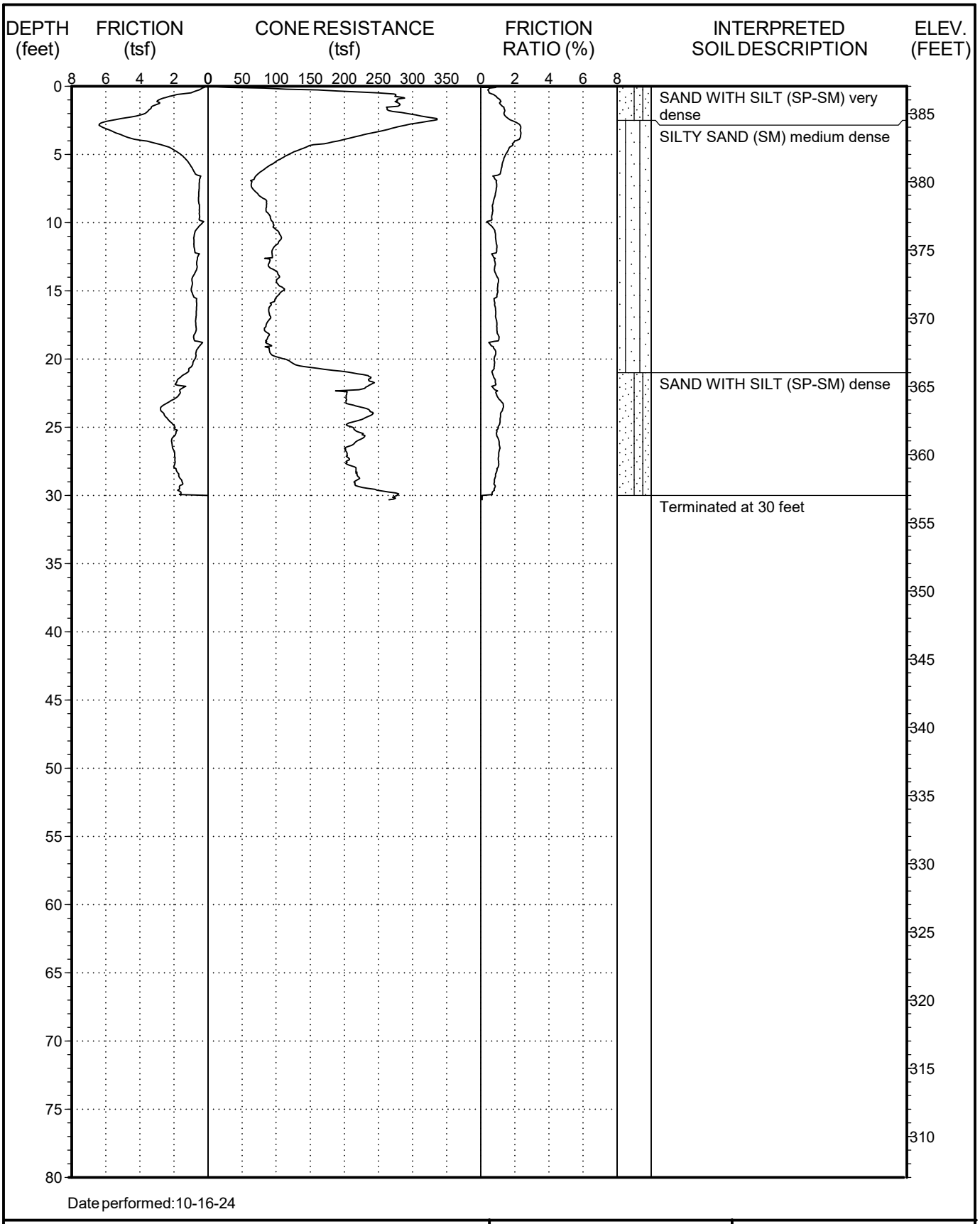
LOG OF CPT NO. C-12

FIGURE A-12



Date performed: 10-16-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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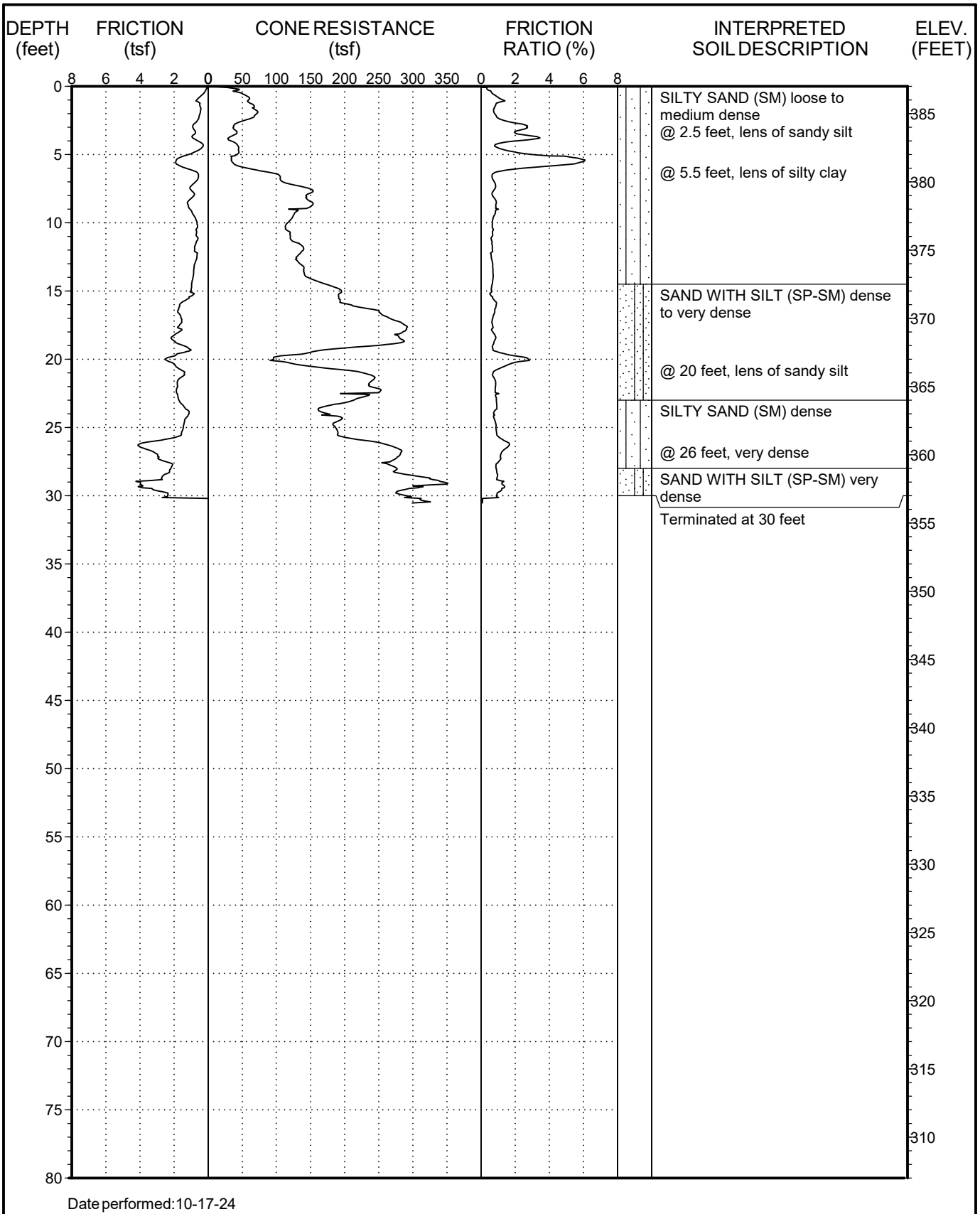
LOG OF CPT NO. C-13

FIGURE A-13



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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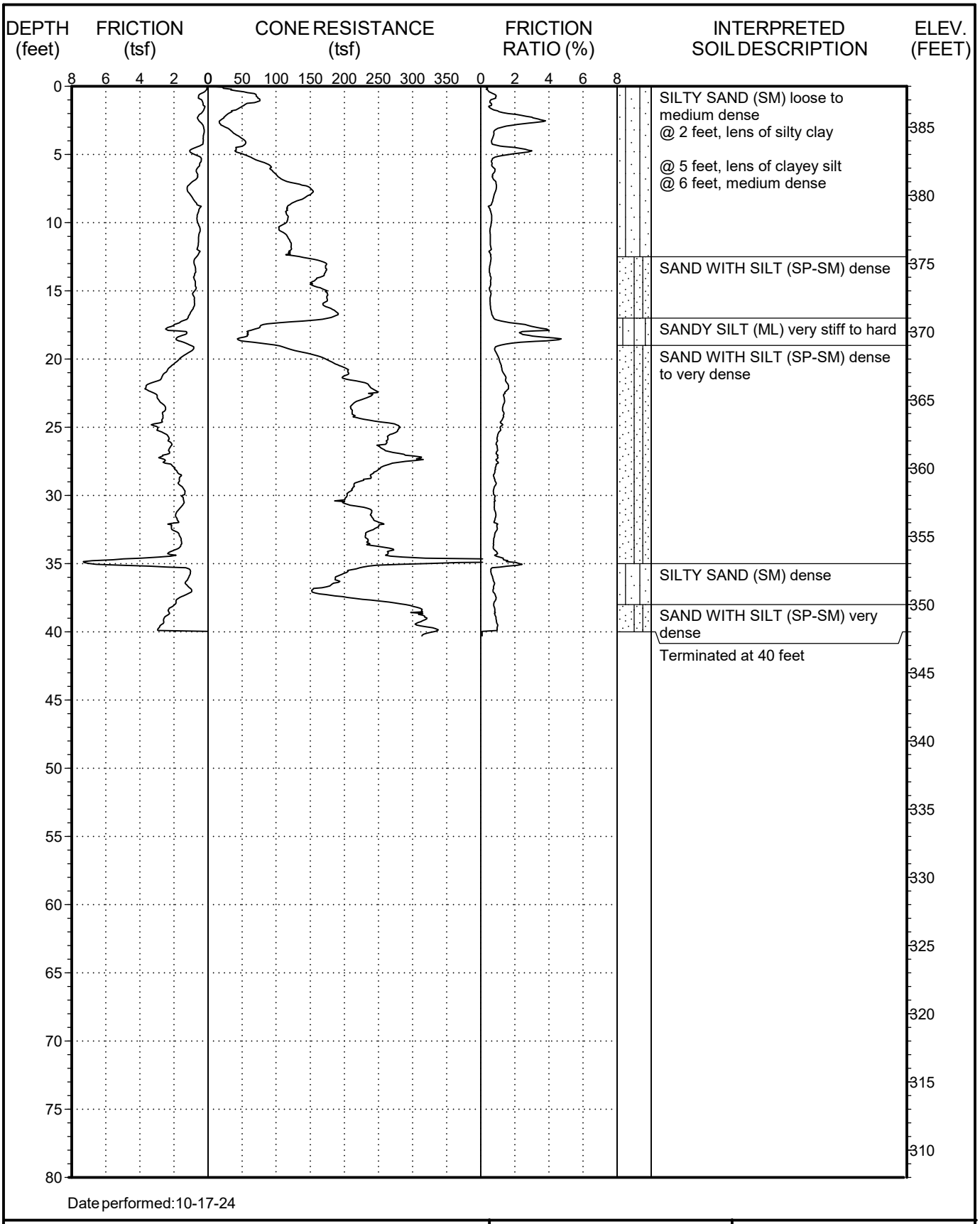
LOG OF CPT NO. C-14

FIGURE A-14



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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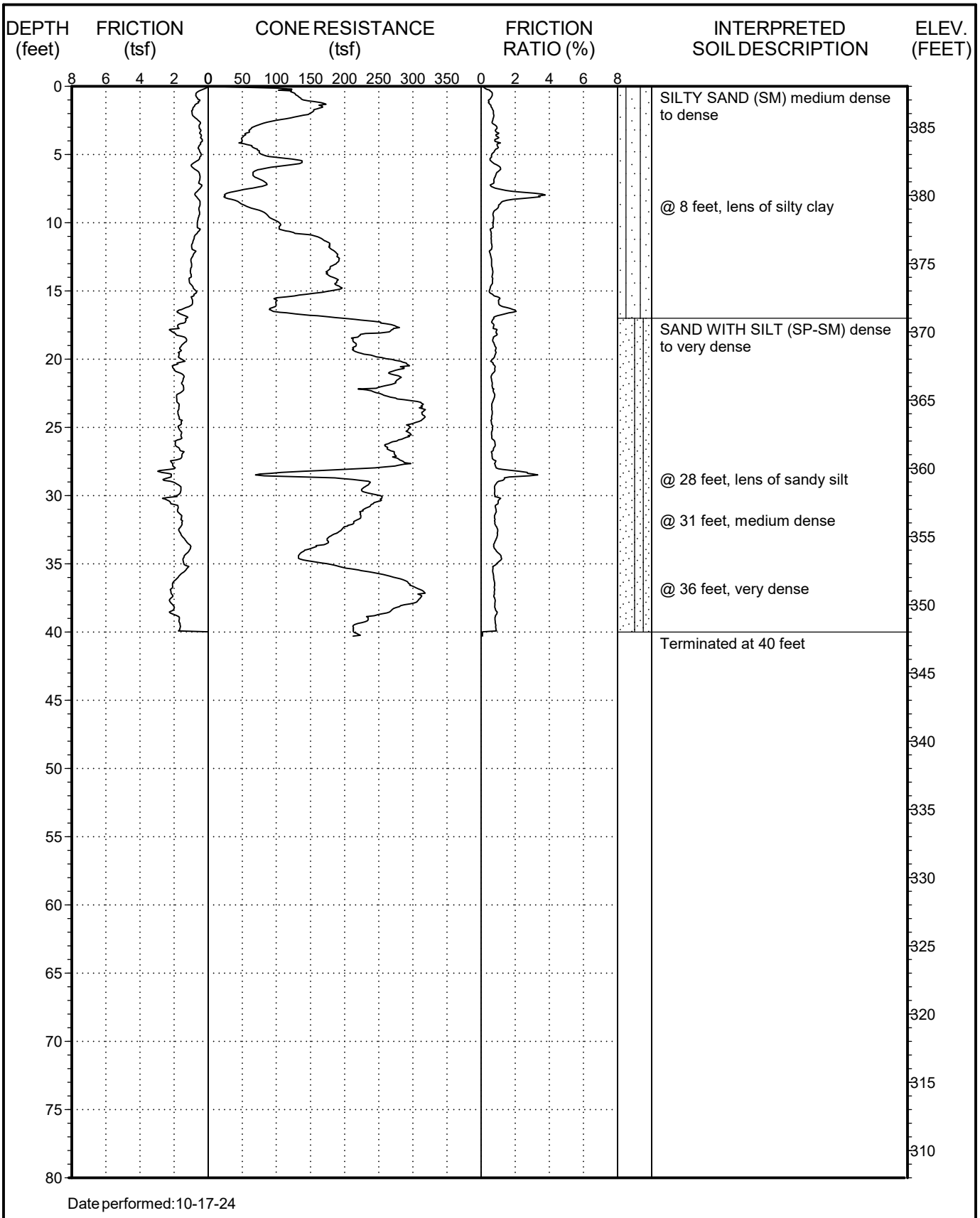
LOG OF CPT NO. C-15

FIGURE A-15



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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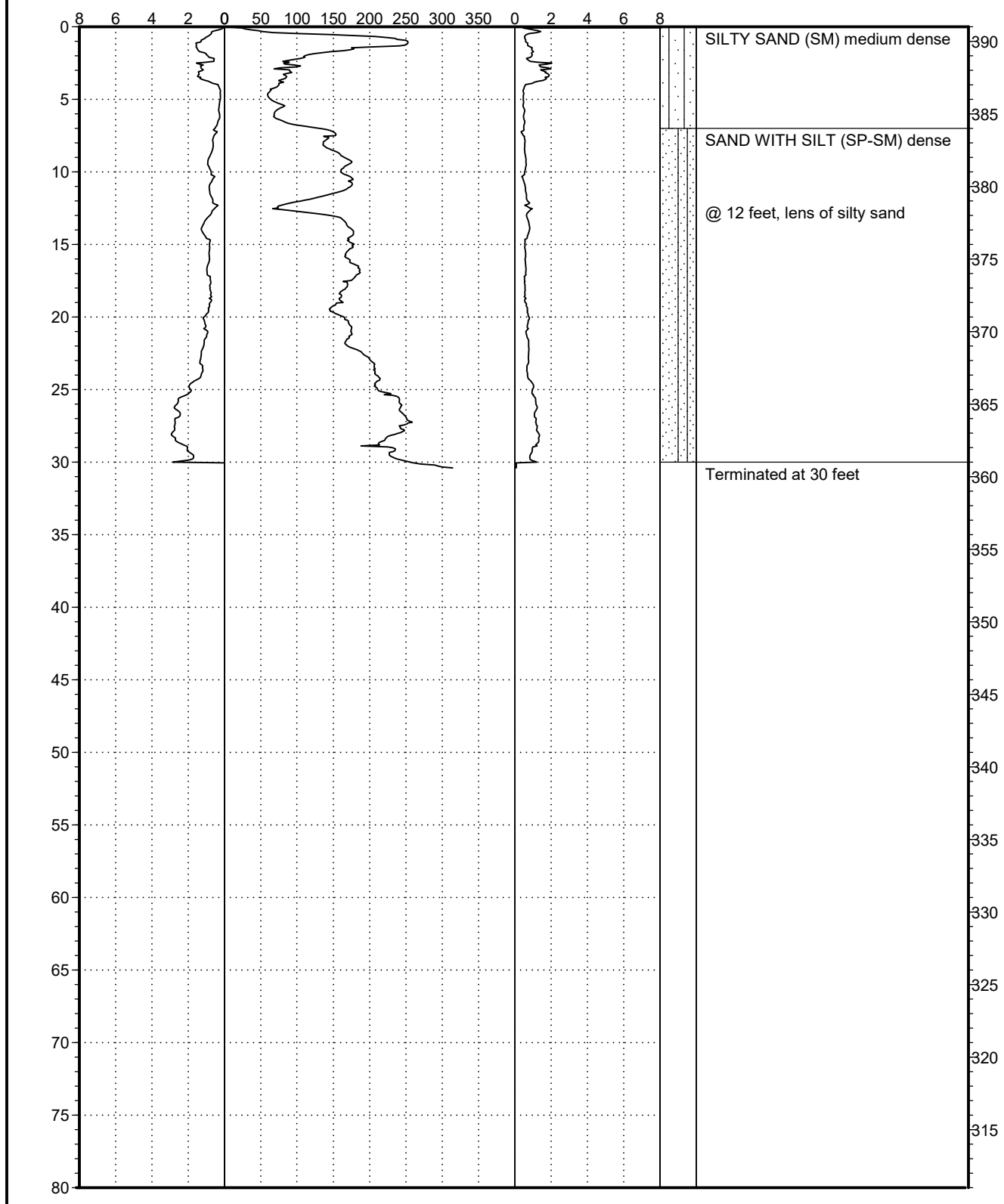
LOG OF CPT NO. C-16

FIGURE A-16



Date performed: 10-17-24

This summary applies only at the location of this cone penetration test and at the time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The interpreted soil description is derived from the friction ratio and cone resistance and is a simplification of actual conditions encountered.

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LOG OF CPT NO. C-17

FIGURE A-17

Table A-1

CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
CPT-2	10.04	9.04	9.26	12.52	740	
	20.01	19.01	19.11	24.84	770	800
	30.02	29.02	29.09	34.88	834	993
	40.03	39.03	39.08	42.26	925	1354
	50.03	49.03	49.07	49.46	992	1387
	60.01	59.01	59.04	57.40	1029	1256
	70.01	69.01	69.04	64.58	1069	1392
	80.05	79.05	79.08	74.18	1066	1045
	90.03	89.03	89.05	83.72	1064	1046
	100.03	99.03	99.05	92.08	1076	1196

Shear Wave Source Offset - 2 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

APPENDIX B

EXPLORATORY BORINGS

The subsurface conditions at the site were investigated by drilling and sampling 24 exploratory borings. The borings were advanced to depths ranging from approximately 6 to 31.5 feet below the existing ground surface. The locations of the explorations are shown on the Site Plan, Figure 2.

The exploratory borings were drilled using truck-mounted hollow-stem auger drill equipment. Relatively undisturbed samples were obtained using a brass-ring lined sampler (ASTM D 3550). The brass-rings have an inside diameter of 2.42 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the “free-fall” hammer described above. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches was recorded as the penetration resistance. These values are the raw uncorrected blowcounts.

The field explorations for the investigation were performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the borings were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures B-1 to B-24 in this appendix.

The boring locations were laid out in the field by measuring from existing site features. Upon completion the explorations were backfilled with soil cuttings up to the existing ground surface. Ground surface elevations at the exploration locations were estimated from Google Earth.

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Fill: **SILTY SAND (SM)** orange brown, slightly moist	380
5.2	112	32	D		Natural: **SILTY SAND (SM)** orange brown, slightly moist, medium dense	
1.6	93	25	D	5	**SAND (SP)** light brown, dry, medium dense	375
12.1	107	23	D		**SANDY SILT (ML)** light brown, moist, very stiff	
1.3	94	28	D	10	**SAND (SP)** light brown, dry, medium dense	370
					Total Depth 11 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-18-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

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LOG OF BORING NO. B-1

FIGURE B-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Fill: **SILTY SAND (SM)** brown, slightly moist	
5.4	107	22	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	380
4.1	107	23	D	5	**SAND WITH SILT (SP-SM)** light brown, slightly moist, medium dense	
2.0	101	32	D		**SAND (SP)** light brown, dry, medium dense	375
1.7	100	26	D	10		
					Total Depth 11 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

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LOG OF BORING NO. B-2

FIGURE B-2

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
						Fill: **SILTY SAND (SM)** light brown, dry	385
	3.1	102	41	D		@ 2 feet, medium dense	
	8.0	98	50	D	5	@ 5 feet, dense, with wire debris	380
	1.3	94	34	D		Natural: **SAND (SP)** light brown, dry, medium dense	
	1.3		26	S	10		375
						Total Depth 11.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

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LOG OF BORING NO. B-3

FIGURE B-3

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Fill: **CLAYEY SAND (SC)** brown with white streaks, moist, medium dense	385
9.0	106	19	D			
6.7	98	15	D		Natural: **SILTY SAND (SM)** brown, slightly moist, loose to medium dense	
				5		380
		26	D		@ 6 feet, no recovery	
1.4		21	S	10	**SAND (SP)** light brown, dry, medium dense	375
1.2		27	S			
1.5		32	S	15	@ 15 feet, dense	370
3.0		40	S	20		365
2.5		60	S	25	@ 25 feet, very dense	360
1.5	86	60	D	30	@ 30 feet, dense	355
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

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LOG OF BORING NO. B-4

FIGURE B-4

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Natural: **SILTY SAND (SM)** brown, slightly moist, loose	385
4.3	101	14	D			
2.8	86	18	D	5	**SAND (SP)** light brown, dry, medium dense	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-18-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-5

FIGURE B-5

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
			B	0	Fill: **SILTY SAND (SM)** brown, slightly moist	380
6.3	105	22	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense, trace clay	
6.2	108	40	D		@ 3 feet, orange brown	
				5		375
2.7	108	30	D		**SAND WITH SILT (SP-SM)** light brown, dry, medium dense	
		25	D	10	@ 9 feet, no recovery	370
1.0		36	S		**SAND (SP)** light brown, dry, dense	
1.2		40	S	15		365
1.1		48	S	20		360
2.0		66	S	25	@ 25 feet, very dense	355
2.2		62	S	30	@ 30 feet, trace gravel	350
					Total Depth 31.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-6

FIGURE B-6

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **CLAYEY SAND (SC)** brown with white streaks, moist	
11.9	107	19	D		Natural: **CLAYEY SAND (SC)** brown with white streaks, moist, medium dense	380
9.9	95	12	D	5	**SILTY SAND (SM)** mottled brown, moist, loose	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-7

FIGURE B-7

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Fill: **SILTY SAND (SM)** light brown, dry, trace gravel	
3.8	100	21	D		Natural: **SILTY SAND (SM)** light brown, dry, medium dense, trace gravel	
4.5	101	33	D		@ 3 feet, dry to slightly moist	380
4.0	102	50	D	5	@ 6 feet, mottled brown	
		18	D		@ 9 feet, no recovery	375
1.2		31	S	10	**SAND (SP)** light brown, dry, dense	
1.2		36	S			370
				15		
1.2		46	S			365
22.6				20	**CLAYEY SILT (ML)** mottled brown, wet, hard	
2.0		55	S	25	**SAND (SP)** light brown, dry, very dense	360
1.7	83	70	D	30	@ 30 feet, dense	355
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

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LOG OF BORING NO. B-8

FIGURE B-8

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SILTY SAND (SM)** brown, slightly moist, with gravel	
6.7	103	15	D		Natural: **SILTY SAND (SM)** brown, slightly moist, loose to medium dense, with gravel	380
11.8	104	18	D	5	@ 5 feet, moist, trace clay	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

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LOG OF BORING NO. B-9

FIGURE B-9

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Fill: **SILTY SAND (SM)** brown, slightly moist	
7.4	111	29	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	380
7.2	110	27	D	5		
3.9	97	13	D		**SAND (SP)** light brown, slightly moist, loose	375
3.7	97	25	D	10	@ 10 feet, medium dense	
					Total Depth 11 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

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LOG OF BORING NO. B-10

FIGURE B-10

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Fill: **SILTY SAND (SM)** brown, slightly moist	385
5.2	103	32	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	
7.8	105	32	D		**CLAYEY SAND (SC)** orange brown, slightly moist, medium dense	
1.3	102	55	D	5	**SILTY SAND (SM)** orange brown, dry, dense	380
0.6	86	28	D		**SAND (SP)** light brown, dry, medium dense	
0.7	110	28	D	10		375
		30	D		@ 12 feet, no recovery	
1.1		38	S	15	@ 15 feet, dense	370
6.4		36	S	20	@ 20 feet, slightly moist, trace clay	365
1.3		47	S	25	@ 25 feet, dry	360
1.1		55	S	30	@ 30 feet, very dense	355
					Total Depth 31.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-11

FIGURE B-11

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
				0	Fill: **SILTY SAND (SM)** brown, slightly moist	385
5.5	110	53	D		Natural: **SILTY SAND (SC)** orange brown, slightly moist, dense	
8.3	104	25	D	5	@ 4 feet, moist, medium dense	380
4.0	99	27	D		**SAND WITH SILT (SP-SM)** brown, slightly moist, medium dense	
7.1	97	28	D		**CLAYEY SAND (SC)** mottled orange and grey, slightly moist, medium dense	
		23	D	10	@ 10 feet, no recovery	375
1.8	99	55	D	15	**SAND (SP)** light brown, dry, dense	370
		88	D	20	@ 20 feet, very dense, no recovery	365
1.5		60	S	25		360
1.8		65	S	30		355
					Total Depth 31.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-12

FIGURE B-12

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Fill: **SILTY SAND (SM)** brown, slightly moist	385
6.2	116	52	D		Natural: **SILTY SAND (SM)** brown, slightly moist, dense	
9.5	110	43	D		@ 3 feet, moist, medium dense	
11.9	114	33	D	5	**CLAYEY SAND (SC)** brown, moist, medium dense	380
10.4	103	26	D		**SILTY SAND (SM)** light brown, moist, medium dense	
					CLAYEY SAND (SC) brown, moist, medium dense	
3.3	92	22	D	10	**SAND (SP)** light brown, dry, medium dense	375
12.6	95	30	D		**SILTY SAND (SM)** light brown, moist, medium dense	
2.6	94	50	D	15	**SAND (SP)** light brown, dry, dense	370
		62	D	20	@ 20 feet, no recovery	365
1.6	78	77	D	25	@ 25 feet, very dense	360
3.9	93	98	D	30	@ 30 feet, slightly moist	355
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-13

FIGURE B-13

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SILTY SAND (SM)** brown, slightly moist	385
6.6	110	41	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	
12.8	103	46	D		@ 3 feet, mottled brown, moist, dense	
				5		380
23.3	93	15	D		**SANDY SILT (ML)** mottled brown, wet, stiff	
2.2	92	27	D		**SAND (SP)** light brown, dry, medium dense, with gravel	
				10	Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-18-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-14

FIGURE B-14

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SILTY SAND (SM)** brown, slightly moist	
6.5	114	38	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	385
9.0	107	24	D	5	@ 5 feet, moist	
4.5	95	19	D		**SAND (SP)** light brown, slightly moist, medium dense	380
3.9	90	24	D	10		
					Total Depth 11 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-18-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-15

FIGURE B-15

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
9.0	107	24	D		Fill: **SILTY SAND (SM)** brown, moist, medium dense, trace gravel	385
4.5	107	33	D	5	Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense, trace gravel	380
2.4	102	35	D		**SAND (SP)** light brown, dry, medium dense	
1.7		16	S	10		375
					Total Depth 10.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-16

FIGURE B-16

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Fill: **SILTY SAND (SM)** light brown, slightly moist	
6.5	105	56	D		Natural: **SILTY SAND (SM)** light brown, slightly moist, dense	385
4.9	103	30	D		@ 3 feet, brown, medium dense	
				5		
6.7	100	34	D		**SAND WITH SILT (SP-SM)** brown, moist, medium dense	380
1.9	98	20	D		**SAND (SP)** light brown, dry, medium dense	
				10		
2.0	95	35	D			375
1.7	91	50	D	15	@ 15 feet, dense	
						370
1.3	98	75	D	20	@ 20 feet, dense to very dense	
						365
3.2	85	50/5"	D	25	@ 25 feet, very dense	
						360
2.5	100	50/5"	D	30		
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-18-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-17

FIGURE B-17

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Fill: **SILTY SAND (SM)** light brown, dry, dense	385
4.0	110	55	D		Natural: **SILTY SAND (SM)** light brown, dry, dense	
1.2	86	35	D	5	**SAND (SP)** light brown, dry, medium dense	
1.6	83	20	D			380
1.6	92	33	D	10		
						375
1.7	94	59	D	15	@ 15 feet, dense	
						370
2.2	95	70	D	20	**SANDY SILT (ML)** mottled brown, dry, hard	
						365
24.0	93	95	D	25	@ 25 feet, wet	
						360
2.7	97	50/5"	D	30	**SAND WITH SILT (SP-SM)** light brown, dry, very dense	
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-18

FIGURE B-18

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				B	0		
	6.4	106	47	D		Fill: **SILTY SAND (SM)** brown, slightly moist, dense, with gravel	385
	4.9	101	17	D		Natural: **SILTY SAND (SM)** orange brown, slightly moist, medium dense	
					5		
	12.0	103	26	D		@ 6 feet, moist	380
	2.5	99	23	D		**SAND (SP)** light brown, dry, medium dense	
					10	Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-19

FIGURE B-19

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SILTY SAND (SM)** light brown, slightly moist, with gravel	385
5.8	109	72	D		Natural: **SILTY SAND (SM)** light brown, slightly moist, dense, with gravel	
18.0	105	34	D	5	**SANDY CLAY (CL)** orange brown with white streaks, very moist to wet, very stiff	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-20

FIGURE B-20

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
4.3	106	45	D		Fill: **SILTY SAND (SM)** light brown, dry, medium dense to dense	390
7.6	92	20	D		Natural: **SILTY SAND (SM)** light brown, dry, medium dense to dense @ 3 feet, medium dense	
				5		
7.7	107	27	D			385
					CLAYEY SAND (SC) light brown, moist, medium dense	
13.9	95	21	D			
				10	**SILTY SAND (SM)** mottled brown, very moist, medium dense	
					Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-16-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-21

FIGURE B-21

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	Fill: **SILTY SAND (SM)** brown, slightly moist	
4.3	105	36	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	385
3.9	104	24	D	5		
24.3	93	26	D		**SANDY SILT (ML)** brown with white streaks, wet, very stiff	
					SILTY SAND (SM) brown, wet, medium dense	380
5.2	102	50	D	10	**SAND WITH SILT (SP-SM)** brown, slightly moist, dense	
						375
10.2	107	43	D	15	@ 15 feet, moist to very moist, medium dense	
						370
1.5	103	90	D	20	**SAND (SP)** light brown, dry, very dense	
						365
2.1	91	92	D	25		
						360
2.9	95	100	D	30		
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-22

FIGURE B-22

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0		
2.2	103	50/5"	D		Fill: **SILTY SAND (SM)** light brown, dry, very dense, trace gravel and debris	
4.4	107	38	D		Natural: **SILTY SAND (SM)** brown, slightly moist, medium dense	385
				5		
9.0	95	27	D		@ 6 feet, moist	
7.0	98	31	D		@ 9 feet, mottled brown, slightly moist	380
				10		
1.3	89	49	D		**SAND (SP)** light brown, dry, dense	
						375
1.6	95	31	D	15	@ 15 feet, medium dense	
						370
2.3	95	50/5"	D	20	@ 20 feet, very dense	
						365
11.4	106	70	D	25	**SILTY SAND (SM)** orange brown, moist, dense	
						360
2.3	93	50/4"	D	30	**SAND (SP)** light brown, dry, very dense	
					Total Depth 31 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-23

FIGURE B-23

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Fill: **SILTY SAND (SM)** light brown, slightly moist, medium dense	390
6.1	100	16	D		Natural: **SILTY SAND (SM)** light brown, slightly moist, medium dense	
18.5	98	24	D	5	@ 5 feet, wet	385
6.2	100	33	D		@ 7 feet, slightly moist	
12.5	104	28	D		@ 9 feet, brown, moist	
				10	Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 10-17-24

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3282.I

DJM BAKERSFIELD

LOG OF BORING NO. B-24

FIGURE B-24

APPENDIX C

LABORATORY TESTS

INTRODUCTION

Representative undisturbed soil samples and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring samples. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content and dry density values are presented on the boring logs in Appendix A.

GRAIN SIZE DISTRIBUTION

Selected soil samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. The percentages passing the No. 200 sieve are tabulated below.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	PERCENT PASSING No. 200 SIEVE
B-1	2	Silty Sand (SM)	23
B-2	0-5	Silty Sand (SM)	24
B-4	0-5	Silty Sand (SM)	34
B-5	2	Silty Sand (SM)	17
B-5	5	Sand (SP)	1
B-5	0-5	Silty Sand (SM)	20
B-6	0-5	Silty Sand (SM)	31
B-13	0-5	Silty Sand (SM)	30
B-19	0-5	Silty Sand (SM)	26
B-24	0-5	Silty Sand (SM)	29

DIRECT SHEAR

Direct shear tests were performed on undisturbed and remolded bulk samples in accordance with ASTM D3080. The bulk samples were remolded to approximately 90 percent of maximum density (ASTM D1557). The samples were placed in the shear machine, and a normal load comparable

to the in-situ overburden stress was applied. The samples were inundated, allowed to consolidate, and then were sheared to failure. The tests were repeated on additional test specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the test. The results of the direct shear tests are presented in Figures C-1 to C-7.

CONSOLIDATION

One-dimensional consolidation testing was performed on one relatively undisturbed soil sample in accordance with ASTM D2435. After trimming the ends, the sample was placed in the consolidometer and loaded to 0.4 ksf. Thereafter, the sample was incrementally loaded to a maximum load of 12.8 ksf. Sample deformation was measured to 0.0001 inch. The sample was inundated with water at 1.6 ksf. Rebound behavior was investigated by unloading the sample back to 0.4 ksf. The results of the consolidation test, in the form of percent consolidation versus log pressure, are presented in Figure C-8.

HYDRO-CONSOLIDATION

Oedometer tests were performed on relatively undisturbed samples in accordance with ASTM D5333. After trimming the ends, the sample was placed in the consolidometer and loaded to 0.4 ksf. Thereafter, the samples were incrementally loaded to 1.6 ksf at the in-situ moisture content and then saturated. Sample deformation was measured to 0.0001 inch. The amount of collapse is shown below as percent compression of the sample.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	Surcharge (PSF)	TOTAL COMPRESSION (%)		
				BEFORE SATURATION	AFTER SATURATION	TOTAL COLLAPSE
B-1	7	Sand (SP)	1600	1.0	1.4	0.4
B-18	20	Sandy Silt (ML)	1600	1.5	2.2	0.7

EXPANSION INDEX

Expansion index tests were performed on select bulk samples. The test was performed in accordance with ASTM D4829, to assess the expansion potential of on-site soils. The results of the test are summarized below:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	EXPANSION INDEX
B-13	0-5	Silty Sand (SM)	1
B-24	0-5	Silty Sand (SM)	3

COMPACTION TEST

Maximum dry density/optimum moisture tests were performed in accordance with ASTM D1557 on representative bulk samples of the site soils. The test results are as follows:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)
B-4	0-5	Silty Sand (SM)	131	8.5
B-13	0-5	Silty Sand (SM)	133	7.0
		Silty Sand (SM) with Gravel	135	6.5
B-19	0-5	Silty Sand (SM)	126	9.0
		Silty Sand (SM) with Gravel	128	8.0

CORROSIVITY

Soil corrosivity testing was performed by Project X on representative stockpile fill and natural soil samples provided by GPI. The test results are summarized in Table C-1 at the end of this Appendix.

R-VALUE

Suitability of the near-surface soils for pavement was evaluated by conducting an R-value test. The test was performed in accordance with ASTM D2844 by GeoLogic Associates (GLA) under subcontract to GPI. The result of the test is as follows:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	R-VALUE BY EXUDATION
B-2	0-5	Silty Sand (SM)	72
B-17	0-5	Silty Sand (SM)	60

Soil Analysis Lab Results

Client: Geotechnical Professionals Inc.
Job Name: DJM Bakersfield
Client Job Number: 3282.I
Project X Job Number: S241023F
October 25, 2024

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**
	(ft)	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**	**(Ω-cm)**	**(Ω-cm)**	
B 4	0-5	16.0	0.0016	3.8	0.0004	12,730	5,963	7.8

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops. This is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

If one sample pops up much more corrosive than all others, we would recommend collecting more samples surrounding the problem sample location to determine if the peak is isolated to it. This allows us to conclude it was a contaminated sample and able to declare it an outlier.

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Soil Analysis Lab Results

Client: Geotechnical Professionals Inc.
Job Name: DJM Bakersfield
Client Job Number: 3282.I
Project X Job Number: S241023E
October 25, 2024

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**
	(ft)	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**	**(Ω-cm)**	**(Ω-cm)**	
B 13	0-5	130.0	0.0130	19.4	0.0019	6,231	3,015	8.4

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops. This is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

If one sample pops up much more corrosive than all others, we would recommend collecting more samples surrounding the problem sample location to determine if the peak is isolated to it. This allows us to conclude it was a contaminated sample and able to declare it an outlier.

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