

Geotechnical Engineering Investigation
Proposed Single-Family Residence
333 26th Street
Hermosa Beach, California

David Toomey
333 26th Street
Hermosa Beach, California 90254

Project Number 25635-25
October 30, 2025

NorCal Engineering

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October 30, 2025

Project Number 25635-25

David Toomey
333 26th Street
Hermosa Beach, California 90254

RE: **Geotechnical Engineering Investigation** - Proposed Single Family Residence -
 Located at 333 26th Street, in the City of Hermosa Beach, California

Dear Mr. Toomey:

Pursuant to your request, this firm has performed a Geotechnical Engineering Investigation for the above referenced project in accordance with your approval of proposal dated September 23, 2025. The purpose of this investigation is to evaluate the geotechnical conditions of the subject site and to provide recommendations for the proposed residential development. The scope of work included the following: 1) site reconnaissance; 2) subsurface geotechnical exploration and sampling; 3) laboratory testing; 4) soils infiltration study; 5) engineering analysis of field and laboratory data; 6) preparation of a geotechnical engineering report.

1.0 Project Description

It is proposed to construct a three-story single-family residence over a full level basement as shown on 30' x 82' subject property. The residence will be supported by a conventional slab-on-grade foundation system with perimeter-spread footings and isolated interior footings. Other improvements will include driveway, hardscape and landscaping. It is anticipated that grading will consist of minor cuts and fills on the order of about 10 feet to achieve finished grade elevations. Final building plans shall be reviewed by this firm prior to submittal for city approval to determine the need for any additional study and revised recommendations pertinent to the proposed development, if necessary.

2.0 Site Description

The subject property is located within the 300 block and north side of 26th Street, bordered by 27th Court to the south, in the City of Hermosa Beach. The generally rectangular shaped lot is elongated in a northwest to southeast direction with topography of the relatively level parcel descending gradually from north to south on the order of a few feet. The site is currently occupied by two residences with associated site improvements.

3.0 Site Exploration

The field investigation consisted of the placement of six (6) subsurface exploratory borings by hand operated auger to depths of 3 and 20 feet below current ground elevations. The explorations were visually classified and logged by a field engineer with locations of the subsurface explorations shown on the attached Site Plan. The exploratory borings revealed the existing earth materials to consist of fill and natural soil. Detailed descriptions of the subsurface conditions are listed on the boring logs in Appendix A. It should be noted that the transition from one soil type to another as shown on the borings logs is approximate and may in fact be a gradual transition. The soils encountered are described as follows:

Fill: A fill soil classifying as a brown fine to medium grained, slightly silty SAND was encountered to a depth of 0.5 to 2.5 feet below ground surface. These soils were noted to be loose to loose to medium dense and slightly damp.

Natural: An undisturbed Eolian and Sand Dune deposits classifying as a light brown, fine to medium grained, slightly silty SAND was encountered beneath the fill soils. These soils were observed to be medium dense and damp.

The overall engineering characteristics of the earth material were relatively uniform with each excavation. Groundwater was not encountered to the depth of our borings and slight caving occurred in the deeper cohesionless soils.

4.0 **Laboratory Tests**

Relatively undisturbed samples of the subsurface soils were obtained to perform laboratory testing and analysis for direct shear, consolidation tests, and to determine in-place moisture/densities. These relatively undisturbed ring samples were obtained by driving a thin-walled steel sampler lined with one-inch long brass rings with an inside diameter of 2.42 inches into the undisturbed soils. The sampler was driven a total of six inches into undisturbed soils. Bulk bag samples were obtained in the upper soils for expansion index tests and maximum density tests. All test results are included in Appendix B, unless otherwise noted.

- 4.1 **Field Moisture Content** (ASTM: D 2216) and the dry density of the ring samples were determined in the laboratory. This data is listed on the logs of explorations.
- 4.2 **Maximum Density tests** (ASTM: D 1557) were performed on typical samples of the upper soils. Results of these tests are shown on Table I.
- 4.3 **Expansion Index tests** (ASTM: D 4829) were performed on remolded samples of the upper soils to determine the expansive characteristics. Results of these tests are provided on Table II.
- 4.4 **Direct Shear tests** (ASTM: D 3080) were performed on undisturbed and/or remolded samples of the subsurface soils. The test is performed under saturated conditions at loads of 1,000 lbs./sq.ft., 2,000 lbs./sq.ft., and 3,000 lbs./sq.ft. with results shown on Plate A.
- 4.5 **Consolidation tests** (ASTM: D 2435) were performed on undisturbed samples to determine the differential and total settlement which may be anticipated based upon the proposed loads. Water was added to the samples at a surcharge of one KSF and the settlement curves are plotted on Plates B and C.

5.0 Seismicity Evaluation

The proposed development lies outside of any Alquist-Priolo Special Studies Zone and the potential for damage due to direct fault rupture is considered unlikely. The Palos Verdes Fault is located within 2 kilometers from the site and is capable of producing a Magnitude 7.3 earthquake. Ground shaking originating from earthquakes along other active faults in the region is expected to induce lower horizontal accelerations due to smaller anticipated earthquakes and/or greater distances to other faults.

The mapped seismic design acceleration parameters for the project site in accordance with the 2022 California Building Code (CBC) are provided below and based on the ASCE/SEI 7-16 American Society of Civil Engineers (ASCE) website, <https://asce7hazardtool.online/> and attached in Appendix C.

2022 CBC Mapped Seismic Design Acceleration Parameters

Latitude	33.873
Longitude	-118.403
Site Class	D
Risk Category	II
Mapped Spectral Response Acceleration	$S_S = 1.915$ $S_1 = 0.684$
Adjusted Maximum Acceleration	$S_{MS} = 1.915$
Design Spectral Response Acceleration Parameters	$S_{DS} = 1.276$
Peak Ground Acceleration	$PGA_M = 0.921$

Use of these values is dependent on requirements of Section 11-4.8, ASCE 7-16, Supplement 3 that requires the value of the seismic response coefficient C_s be determined by Equation 12.8.2 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either 12.8-3 for $T_L \geq T \geq 1.5T_s$ or Equation 12.8-4 for $T > T_L$. Computations and verification of these conditions is referred to the structural engineer.

6.0 Liquefaction Evaluation

The site is expected to experience ground shaking and earthquake activity that is typical of the Southern California area. It is during severe shaking that loose, granular soils below the groundwater table can liquefy. Based upon information in the California Division of Mines and Geology "Seismic Hazard Zone Map – Redondo Beach Quadrangle" dated March 25, 1999, the subject site is not situated within an area of historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions to indicate a potential for permanent ground displacement. Thus, the design of the proposed development in conformance with the latest Building Code provisions for earthquake design is expected to provide mitigation of ground shaking hazards that are typical to Southern California.

7.0 Infiltration Characteristics

Infiltration tests within the site were performed to provide preliminary infiltration rates for the purpose of planning and design of an on-site water disposal system. Hand excavation equipment was used to excavate the exploratory test boring to a depth of 3 feet below existing ground surface into the undisturbed natural soils. Based upon the results of our testing, the soils encountered exhibit the following infiltration rate with calculations provided in Appendix D.

Boring/Test No.	Depth	Soil Classification	Field Infiltration Rate	Design Rate
B-1/TH-1	3'	Silty SAND	144 in/ hr	72 in/hr

The site elevation is about 83 feet above mean sea level (msl) and it is our professional opinion that the historical high groundwater depth would be greater than 50 feet below existing ground surface base on the Los Angeles County Flood Control District - Coastal Plain Well Location Map Shallow Aquifer Fall 1993.

It is recommended that foundations shall be setback a minimum distance of 10 feet from the drainage disposal system and the bottom of footing shall be a minimum of 10 feet from the expected zone of saturation. The boundary of the zone of saturation may be assumed to project downward from the top of the permeable portion of the disposal system at an inclination of 1 to 1 or flatter, as determined by the geotechnical engineer. All systems must meet the latest city and/or county specifications and the California Regional Water Quality Control Board (CRWQCB) requirements.

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8.0 Conclusions and Recommendations

Based upon our evaluations, the proposed development is acceptable from a geotechnical engineering standpoint. By following the recommendations and guidelines set forth in our report, the structures will be safe from excessive settlements under the anticipated design loadings and conditions. The proposed development shall meet all requirements of the City Building Ordinance and will not impose any adverse effect on existing adjacent structures.

The following recommendations are based upon soil conditions encountered in our field investigation; these near-surface soil conditions could vary across the site. Variations in the soil conditions may not become evident until the commencement of grading operations for the proposed development and revised recommendations from the soils engineer may be necessary based upon the conditions encountered.

It is recommended that site inspections are performed by a representative of this firm during all grading and construction of the development to verify the findings and recommendations documented in this report. The following sections present a discussion of geotechnical related requirements for specific design recommendations of different aspects of the project.

8.1 Site Grading Recommendations

Any vegetation and/or demolition debris shall be removed and hauled from proposed grading areas prior to the start of grading operations. Existing vegetation shall not be mixed or disced into the soils. Any removed soils may be reutilized as compacted fill once any deleterious material or oversized materials (in excess of eight inches) is removed. Grading operations shall be performed in accordance with the attached *Specifications for Placement of Compacted Fill*.

All fill and disturbed soils shall be removed to competent native material (about 0.5 to 2.5 feet below existing ground surface), the exposed surface scarified to a depth of 12 inches, brought to within 2% of optimum moisture content and compacted to a minimum of 90% of the laboratory standard (ASTM: D 1557) prior to placement of any additional compacted fill soils, foundations, slabs-on-grade and pavement. Grading shall extend a minimum of five horizontal feet outside the edges of foundations or equidistant to the depth of fill placed, whichever is greater.

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It is possible that isolated areas of undiscovered fill not described in this report are present on site; if found, these areas should be treated as discussed earlier. A diligent search shall also be conducted during grading operations in an effort to uncover any underground structures, irrigation or utility lines. If encountered, these structures and lines shall be either removed or properly abandoned prior to the proposed construction.

Any imported fill material should be preferably soil similar to the upper soils encountered at the subject site. All soils shall be approved by this firm prior to importing at the site and will be subjected to additional laboratory testing to assure concurrence with the recommendations stated in this report.

If placement of slabs-on-grade and pavement is not completed immediately upon completion of grading operations, additional testing and grading of the areas may be necessary prior to continuation of construction operations. Likewise, if adverse weather conditions occur which may damage the subgrade soils, additional assessment by the soils engineer as to the suitability of the supporting soils may be needed.

Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase. Adequate drainage away from the structures, pavement and slopes should be provided at all times.

8.2 **Temporary Excavations**

Temporary uncharged excavations in the existing site materials may be made at vertical inclinations up to 3 feet in height unless cohesionless soils are encountered. In areas where soils with little or no binder are encountered, where adverse geological conditions are exposed, or where excavations are adjacent to existing structures, shoring or flatter excavations may be required. The temporary cut slope gradients given above do not preclude local raveling and sloughing. Additional recommendations regarding specific excavations may be provided once typical detail sections are made available.

For deeper excavations, temporary shoring design may utilize an active earth pressure of 25 pcf without any surcharge due to adjacent traffic, equipment or structures. The passive fluid pressures of 250 pcf may be doubled to 500 pcf for temporary design. This value may be doubled for isolated piles spaced at least 2.5 times the diameter apart, center-to-center. The point of fixity should be selected at a depth of one foot below the base of the temporary cuts.

Any drilled caissons will require to be cased due to the potential of caving. Shoring members should not be vibrated or driven due to the potential for damage to nearby improvements. Vertical soldier piles should be placed with a minimum diameter of 18 inches. Concrete should be placed in the drilled shafts to encase the steel beams.

Vertical steel soldier piles are typically spaced 6 to 8 feet apart with horizontal wood beams placed between the piles. Backfill placed behind the wood lagging should consist of a two-sack cement slurry mix. The soldier piles should extend at least 8 feet deep below the base of the cut. Axial loads may be resisted using a skin friction value of 500 psf along the perimeter of the pile and an allowable bearing capacity of 3,000 psf at a depth of 8 feet below the excavated pad level. The final shoring structural calculations and drawings should be reviewed by this firm prior to installation.

All excavations shall be made in accordance with the requirements of the geotechnical engineer, CAL-OSHA and other public agencies having jurisdiction. Care should be taken to provide or maintain adequate lateral support for all adjacent improvements and structures at all times during the grading operations and construction phase.

8.3 **Foundation Design**

All foundations for the proposed residence shall be designed utilizing an allowable soil bearing capacity of 2,000 psf for an embedded depth of 24 inches into approved engineered fill or competent native soils for. A one-third increase may be used when considering short-term loading and seismic forces. Any foundations for smaller structures (site walls, etc.) located along property line may utilize an allowable bearing capacity of 2,000 psf and embedded a minimum depth of 18 inches and into competent native soils. A representative of this firm shall inspect all foundation excavations prior to pouring concrete.

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8.4 **Settlement Analysis**

Resultant pressure curves for the consolidation tests are shown on Plates B and C. Computations utilizing these curves and the recommended allowable soil bearing capacities reveal that the foundations will experience settlements on the order of ¾ inch and differential settlements of less than ¼ inch.

8.5 **Lateral Resistance**

The following values may be utilized in resisting lateral loads imposed on the structure. Requirements of the California Building Code should be adhered to when the coefficient of friction and passive pressures are combined.

Coefficient of Friction - 0.40

Equivalent Passive Fluid Pressure = 250 lbs./cu.ft.

Maximum Passive Pressure = 2,500 lbs./cu.ft.

The passive pressure recommendations are valid only for approved compacted fill soils or competent native materials.

8.6 **Retaining Wall Design Parameters**

Active earth pressures against retaining walls will be equal to the pressures developed by the following fluid densities. These values are for **granular backfill material** placed behind the walls at various ground slopes above the walls.

Surface Slope of Retained Materials (Horizontal to Vertical)	Equivalent Fluid Density (lb./cu.ft.)
Level	30
5 to 1	35
4 to 1	38
3 to 1	40
2 to 1	45

Any applicable short-term construction surcharges and seismic forces should be added to the above lateral pressure values. An equivalent fluid pressure of 45 pcf may be utilized for the restrained wall condition with a level grade behind the wall.

The seismic-induced lateral soil pressure for walls greater than 6 feet may be computed using a triangular pressure distribution with the maximum value at the top of the wall. The maximum lateral pressure of $(20 \text{ pcf}) H$ where H is the height of the retained soils above the wall footing should be used in final design of retaining walls. Sliding resistance values and passive fluid pressure values may be increased by $1/3$ during short-term wind and seismic loading conditions.

All walls shall be waterproofed as needed and protected from hydrostatic pressure by a reliable permanent subdrain system. The subsurface drainage system shall consist of a 4-inch diameter perforated PVC pipe encased with gravel and wrapped with filter fabric. The granular backfill to be utilized immediately adjacent to retaining walls shall consist of an approved granular soil with a sand equivalency greater than 30. This backfill zone of free draining material shall consist of a wedge beginning a minimum of one horizontal foot from the base of the wall extending upward at an inclination of no less than $3/4$ to 1 (horizontal to vertical).

8.7 **Slab Design**

All concrete slabs including driveway and hardscape shall be a minimum of four inches in thickness and placed on approved subgrade soils. The subgrade soils shall be moisture conditioned over optimum moisture levels in the upper one foot. A vapor retarder should be utilized in areas which would be sensitive to the infiltration of moisture. This retarder shall meet requirements of ASTM E 96, *Water Vapor Transmission of Materials* and ASTM E 1745, *Standard Specification for Water Vapor Retarders used in Contact with Soil or Granular Fill Under Concrete Slabs*. The vapor retarder shall be installed in accordance with procedures stated in ASTM E 1643, *Standard practice for Installation of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slabs*.

The moisture retarder may be placed directly upon compacted subgrade soils conditioned to near optimum moisture levels, although one to two inches of sand beneath the membrane is desirable. The subgrade upon which the retarder is placed shall be smooth and free of rocks, gravel or other protrusions which may damage the retarder. Use of sand above the retarder is under the purview of the structural engineer; if sand is used over the retarder, it should be placed in a dry condition.

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8.8 **Utility Trench and Excavation Backfill**

Trenches from installation of utility lines and other excavations may be backfilled with on-site soils or approved imported soils compacted to a minimum of 90% relative compaction. All utility lines shall be properly bedded with clean sand having a sand equivalency rating of 30 or more. This bedding material shall be thoroughly water jetted around the pipe structure prior to placement of compacted backfill soils.

8.9 **Expansive Soil**

If expansive soils are encountered, special attention should be given to the project design and maintenance. The attached *Expansive Soil Guidelines* should be reviewed by the engineers, architects, owner, maintenance personnel and other interested parties and considered during the design of the project and future property maintenance.

9.0 **Closure**

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the general contractor, grading contractor, city inspector and geotechnical engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

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This geotechnical investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING



Keith D. Tucker
Project Engineer
R.G.E. 841



Scott D. Spensiero
Project Manager

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References

1. American Society of Civil Engineers (ASCE) website, <https://asce7hazardtool.online/>
2. California Building Code, 2022.
3. California Division of Mines and Geology, 1998, Seismic Hazard Zone for the Redondo Beach 7.5-Minute Quadrangle, Los Angeles County, California - Seismic Hazard Zone Report 031.
4. California Division of Mines and Geology, 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California: Special Publication 117A.
5. County of Los Angeles Department of Public Works - Boring Percolation Test Procedure, Administrative Manual – Geotechnical and Materials Engineering Division, GS200.1, December 31, 2014.
6. Earthquake Zones of Required Investigation, Seismic Hazard Zones, Redondo Beach Quadrangle, published by the California Geological Survey.
7. Geologic Map of the Palos Verdes Peninsula and Vicinity, Redondo Beach, Torrance, and San Pedro Quadrangles, Los Angeles County, California, prepared by Thomas W. Dibblee, Jr., 1999, published by the Dibblee Geological Foundation as Map DF-70.
8. Los Angeles County Flood Control District - Coastal Plain Well Location Map Shallow Aquifer Fall 1993.

SPECIFICATIONS FOR PLACEMENT OF COMPACTED FILL

Excavation

Any existing low-density soils and/or saturated soils shall be removed to competent natural soil under the inspection of the Geotechnical Engineering Firm. After the exposed surface has been cleansed of debris and/or vegetation, it shall be scarified until it is uniform in consistency, brought to the proper moisture content and compacted to a minimum of 90% relative compaction (in accordance with ASTM: D 1557).

In any area where a transition between fill and native soil or between bedrock and soil are encountered, additional excavation beneath foundations and slabs will be necessary in order to provide uniform support and avoid differential settlement of the structure.

Material for Fill

The on-site soils or approved import soils may be utilized for the compacted fill provided they are free of any deleterious materials and shall not contain any rocks, brick, asphaltic concrete, concrete or other hard materials greater than eight inches in maximum dimensions. Any import soil must be approved by the Geotechnical Engineering firm a minimum of 72 hours prior to importation of site.

Placement of Compacted Fill Soils

The approved fill soils shall be placed in layers not excess of six inches in thickness. Each lift shall be uniform in thickness and thoroughly blended. The fill soils shall be brought to within 2% of the optimum moisture content, unless otherwise specified by the Geotechnical Engineering firm. Each lift shall be compacted to a minimum of 90% relative compaction (in accordance with ASTM: D 1557) and approved prior to the placement of the next layer of soil. Compaction tests shall be obtained at the discretion of the Geotechnical Engineering firm but to a minimum of one test for every 500 cubic yards placed and/or for every 2 feet of compacted fill placed.

The minimum relative compaction shall be obtained in accordance with accepted methods in the construction industry. The final grade of the structural areas shall be in a dense and smooth condition prior to placement of slabs-on-grade or pavement areas. No fill soils shall be placed, spread or compacted during unfavorable weather conditions. When the grading is interrupted by heavy rains, compaction operations shall not be resumed until approved by the Geotechnical Engineering firm.

Grading Observations

The controlling governmental agencies should be notified prior to commencement of any grading operations. This firm recommends that the grading operations be conducted under the observation of a Geotechnical Engineering firm as deemed necessary. A 24-hour notice must be provided to this firm prior to the time of our initial inspection.

Observation shall include the clearing and grubbing operations to assure that all unsuitable materials have been properly removed; approve the exposed subgrade in areas to receive fill and in areas where excavation has resulted in the desired finished grade and designate areas of overexcavation; and perform field compaction tests to determine relative compaction achieved during fill placement. In addition, all foundation excavations shall be observed by the Geotechnical Engineering firm to confirm that appropriate bearing materials are present at the design grades and recommend any modifications to construct footings.

EXPANSIVE SOIL GUIDELINES

The following expansive soil guidelines are provided for your project. The intent of these guidelines is to inform you, the client, of the importance of proper design and maintenance of projects supported on expansive soils. ***You, as the owner or other interested party, should be warned that you have a duty to provide the information contained in the soil report including these guidelines to your design engineers, architects, landscapers and other design parties in order to enable them to provide a design that takes into consideration expansive soils.***

In addition, you should provide the soil report with these guidelines to any property manager, lessee, property purchaser or other interested party that will have or assume the responsibility of maintaining the development in the future.

Expansive soils are fine-grained silts and clays which are subject to swelling and contracting. The amount of this swelling and contracting is subject to the amount of fine-grained clay materials present in the soils and the amount of moisture either introduced or extracted from the soils. Expansive soils are divided into five categories ranging from “very low” to “very high”. Expansion indices are assigned to each classification and are included in the laboratory testing section of this report. *If the expansion index of the soils on your site, as stated in this report, is 21 or higher, you have expansive soils.* The classifications of expansive soils are as follows:

Classification of Expansive Soil*

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

*From Table 18A-I-B of California Building Code (1988)

When expansive soils are compacted during site grading operations, care is taken to place the materials at or slightly above optimum moisture levels and perform proper compaction operations. Any subsequent excessive wetting and/or drying of expansive soils will cause the soil materials to expand and/or contract. These actions are likely to cause distress of foundations, structures, slabs-on-grade, sidewalks and pavement over the life of the structure. ***It is therefore imperative that even after construction of improvements, the moisture contents are maintained at relatively constant levels, allowing neither excessive wetting or drying of soils.***

Evidence of excessive wetting of expansive soils may be seen in concrete slabs, both interior and exterior. Slabs may lift at construction joints producing a trip hazard or may crack from the pressure of soil expansion. Wet clays in foundation areas may result in lifting of the structure causing difficulty in the opening and closing of doors and windows, as well as cracking in exterior and interior wall surfaces. In extreme wetting of soils to depth, settlement of the structure may eventually result. Excessive wetting of soils in landscape areas adjacent to concrete or asphaltic pavement areas may also result in expansion of soils beneath pavement and resultant distress to the pavement surface.

Excessive drying of expansive soils is initially evidenced by cracking in the surface of the soils due to contraction. Settlement of structures and on-grade slabs may also eventually result along with problems in the operation of doors and windows.

Projects located in areas of expansive clay soils will be subject to more movement and "hairline" cracking of walls and slabs than similar projects situated on non-expansive sandy soils. There are, however, measures that developers and property owners may take to reduce the amount of movement over the life the development. The following guidelines are provided to assist you in both design and maintenance of projects on expansive soils:

- Drainage away from structures and pavement is essential to prevent excessive wetting of expansive soils. Grades should be designed to the latest building code and maintained to allow flow of irrigation and rainwater to approved drainage devices or to the street. Any “ponding” of water adjacent to buildings, slabs and pavement after rains is evidence of poor drainage; the installation of drainage devices or regrading of the area may be required to assure proper drainage. Installation of rain gutters is also recommended to control the introduction of moisture next to buildings. Gutters should discharge into a drainage device or onto pavement which drains to roadways.
- Irrigation should be strictly controlled around building foundations, slabs and pavement and may need to be adjusted depending upon season. This control is essential to maintain a relatively uniform moisture content in the expansive soils and to prevent swelling and contracting. Over-watering adjacent to improvements may result in damage to those improvements. NorCal Engineering makes no specific recommendations regarding landscape irrigation schedules.
- Planting schemes for landscaping around structures and pavement should be analyzed carefully. Plants (including sod) requiring high amounts of water may result in excessive wetting of soils. Trees and large shrubs may actually extract moisture from the expansive soils, thus causing contraction of the fine-grained soils.
- Thickened edges on exterior slabs will assist in keeping excessive moisture from entering directly beneath the concrete. A six-inch thick or greater deepened edge on slabs may be considered. Underlying interior and exterior slabs with 6 to 12 inches or more of non-expansive soils and providing presaturation of the underlying clayey soils as recommended in the soil report will improve the overall performance of on-grade slabs.

- Increase the amount of steel reinforcing in concrete slabs, foundations and other structures to resist the forces of expansive soils. The precise amount of reinforcing should be determined by the appropriate design engineers and/or architects.
- Recommendations of the soil report should always be followed in the development of the project. Any recommendations regarding presaturation of the upper subgrade soils in slab areas should be performed in the field and verified by the Soil Engineer.

List of Appendices (in order of appearance)

Appendix A – Log of Excavations

Log of Borings B-1 to B-6

Appendix B – Laboratory Tests

Table I – Maximum Dry Density

Table II – Expansion

Plate A – Direct Shear

Plates B and C - Consolidation

Appendix C –Seismic Design Report

ASCE/SEI 7-16 Seismic Design Report

Seismic Hazards Zones Map

Geology Map

Appendix D – Soil Infiltration Data

Field Data Sheets and Calculations

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Appendix A

Log of Excavations

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MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS		
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES		
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		
		SANDS WITH FINE (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES		
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES		
		FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
						CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL				ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
	MH				INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

KEY:

- Indicates 2.5-inch Inside Diameter, Ring Sample.
- ☒ Indicates 2-inch OD Split Spoon Sample (SPT).
- ☐ Indicates Shelby Tube Sample.
- ▨ Indicates No Recovery.
- ▣ Indicates SPT with 140# Hammer 30 in. Drop.
- ☑ Indicates Bulk Sample.
- ▤ Indicates Small Bag Sample.
- ▥ Indicates Non-Standard
- ☒ Indicates Core Run.

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1 - 5%
Few	5 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table.

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N -VALUE

COHESIONLESS SOILS		COHESIVE SOILS		
Density	N (blows/ft)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	Very Soft	0 to 2	< 250
Loose	4 to 10	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	Very Stiff	15 to 30	2000 - 4000
		Hard	over 30	> 4000

David Toomey
25635-25

Log of Boring B-1

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25

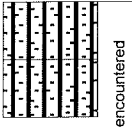
Groundwater Depth: None Encountered

Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0	 GWT not encountered	FILL SOILS Silty, fine to medium grained SAND Brown, loose, slightly damp Slightly silty					
5		NATURAL SOILS Silty, fine to medium grained SAND Light brown, medium dense, damp Slightly silty to slight silt content Boring completed at depth of 3'					
10							
15							
20							
25							
30							
35							

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Log of Boring B-2

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25

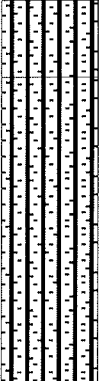



Groundwater Depth: None Encountered

Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0	 GWT not encountered	FILL SOILS Silty, fine to medium grained SAND Brown, loose, slightly damp Slightly silty			2.798	72.5	
5		NATURAL SOILS Silty, fine to medium grained SAND Light brown, medium dense, damp Slightly silty to slight silt content		3.7	96.7		
10				3.5	102.1		
		Boring completed at depth of 10'					

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog\125635-25.log Date: 10/30/2025

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Log of Boring B-3

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25

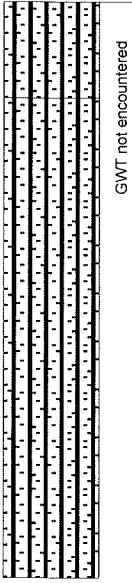
Groundwater Depth: None Encountered

Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory			
			Type	Blow Counts	Moisture	Dry Density	Fines Content %	
0	 <p>GWT not encountered</p>	<p>FILL SOILS</p> <p>Silty, fine to medium grained SAND</p> <p>Brown, loose, slightly damp</p> <p>Slightly silty</p>						
5		<p>NATURAL SOILS</p> <p>Silty, fine to medium grained SAND</p> <p>Light brown, medium dense, damp</p> <p>Slightly silty to slight silt content</p>	■		3.8	100.9		
10				■		2.7	97.3	
15				■		3.5	97.0	
		Boring completed at depth of 15'						

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Log of Boring B-4

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25


Groundwater Depth: None Encountered

Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0	 GWT not encountered	FILL SOILS Silty, fine to medium grained SAND Brown, loose, slightly damp Slightly silty	■		2.2	97.5	
5		NATURAL SOILS Silty, fine to medium grained SAND Light brown, medium dense, damp Slightly silty to slight silt content	■		2.6	101.0	
10			■		5.3	96.3	
15			■		2.7	98.9	
20			■		2.8	95.8	
Boring completed at depth of 21'							

SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog4\25635-25.log Date: 11/4/2025

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Log of Boring B-5

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25

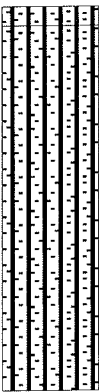
Groundwater Depth: None Encountered

Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0	 GWT not encountered	FILL SOILS Silty, fine to medium grained SAND Brown, loose, damp Slightly silty					
5		NATURAL SOILS Silty, fine to medium grained SAND Light brown, medium dense, damp Slightly silty to slight silt content	■		3.0	100.2	
10		Boring completed at depth of 10'	■		2.8	101.7	
15							
20							
25							
30							
35							

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SuperLog CivilTech Software, USA www.civiltech.com File: C:\Superlog\425635-25.log Date: 11/4/2025

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25635-25

Log of Boring B-6

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25

Groundwater Depth: None Encountered

Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0		FILL SOILS Silty, fine to medium grained SAND Brown, loose, slightly damp					
5		NATURAL SOILS Silty, fine to medium grained SAND Light brown, medium dense, damp Slightly silty to slight silt content	■		3.8	100.1	
10			■		2.5	96.8	
15		Boring completed at depth of 15'					

SuperLog CivilTech Software, USA www.civiltech.com
 File: C:\Superlog4\25635-25.log Date: 10/30/2025

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25635-25

Log of Boring B-7

Boring Location: 333 26th St., Hermosa Beach

Date of Drilling: 10/20/25

Groundwater Depth: None Encountered

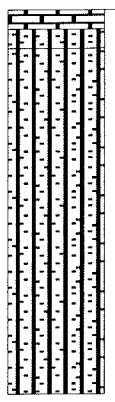
Drilling Method: Hand Auger

Hammer Weight:

Drop:

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples		Laboratory		
			Type	Blow Counts	Moisture	Dry Density	Fines Content %
0		Concrete Slab					
0		FILL SOILS					
0		Silty, fine to medium grained SAND					
0		Brown, loose, slightly damp					
0		Slightly silty					
5		NATURAL SOILS					
5		Silty, fine to medium grained SAND	■		3.3	96.7	
5		Light brown, medium dense, damp					
5		Slightly silty to slight silt content					
10		Boring completed at depth of 10'	■		2.4	98.2	



Concrete Slab
 FILL SOILS
 Silty, fine to medium grained SAND
 Brown, loose, slightly damp
 Slightly silty
 NATURAL SOILS
 Silty, fine to medium grained SAND
 Light brown, medium dense, damp
 Slightly silty to slight silt content

Boring completed at depth of 10'

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Appendix B

Laboratory Tests

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TABLE I
MAXIMUM DENSITY TESTS

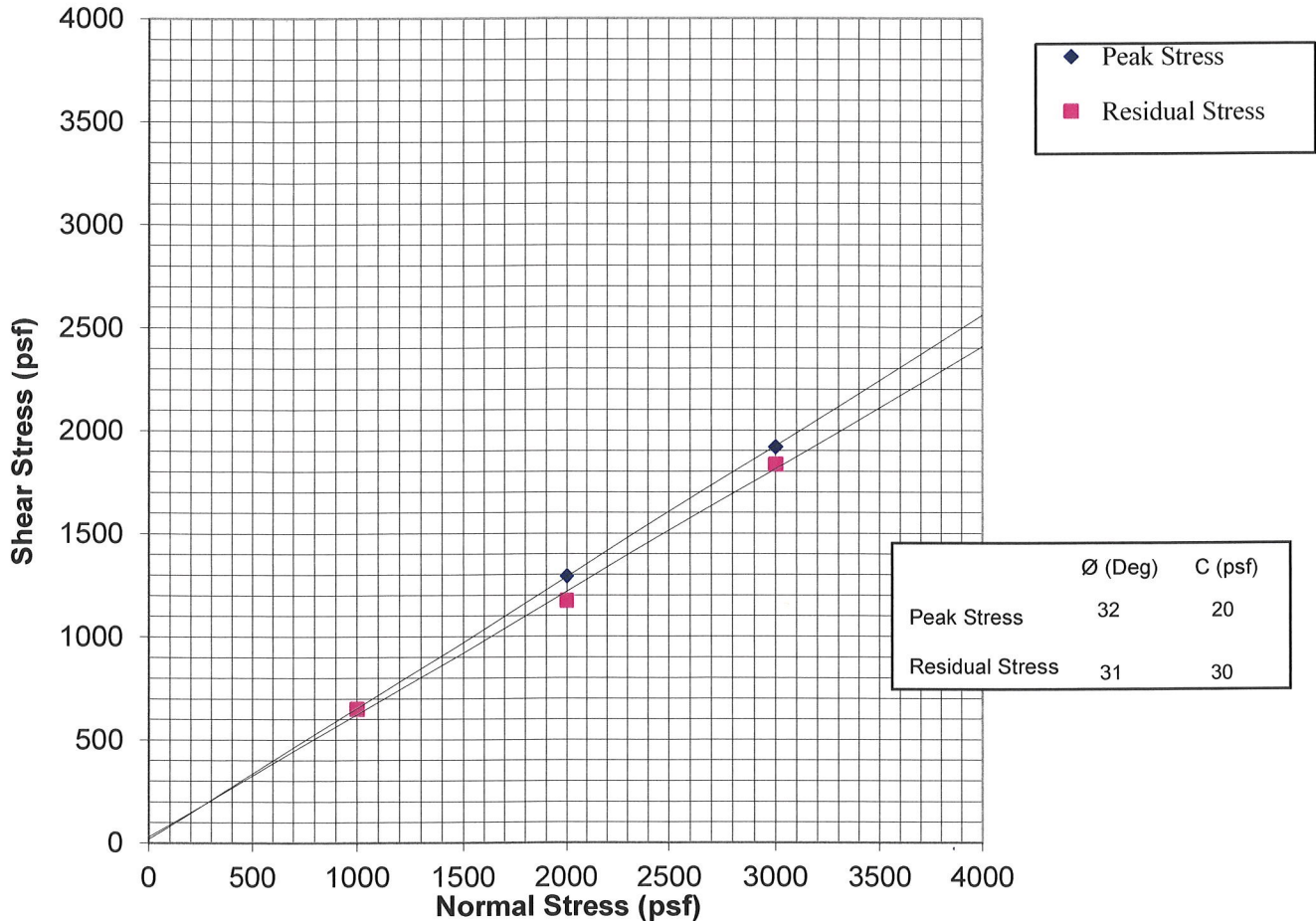
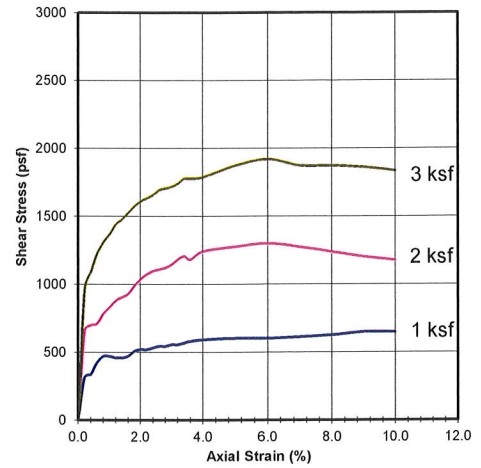
Sample	Classification	Optimum Moisture (%)	Maximum Dry Density (lbs/cu.ft)
B-2 @ 2'	Silty SAND	9.0	112.0

TABLE II
EXPANSION TESTS

Sample	Classification	Expansion Index
B-2 @ 2'	Silty SAND	0

Sample No. B4@2'
 Sample Type: Undisturbed-Saturated
 Soil Description: F-M Grained Sand w/ Some Silt

		1	2	3
Normal Stress	(psf)	1000	2000	3000
Peak Stress	(psf)	648	1296	1920
Displacement	(in.)	0.225	0.150	0.150
Residual Stress	(psf)	648	1176	1836
Displacement	(in.)	0.250	0.250	0.250
Initial Dry Density	(pcf)	97.5	97.5	97.5
Initial Water Content	(%)	2.2	2.2	2.2
Strain Rate	(in./min.)	0.020	0.020	0.020



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PROJECT NUMBER: 25635-25

DATE: 10/30/2025

DIRECT SHEAR TEST
 ASTM D3080

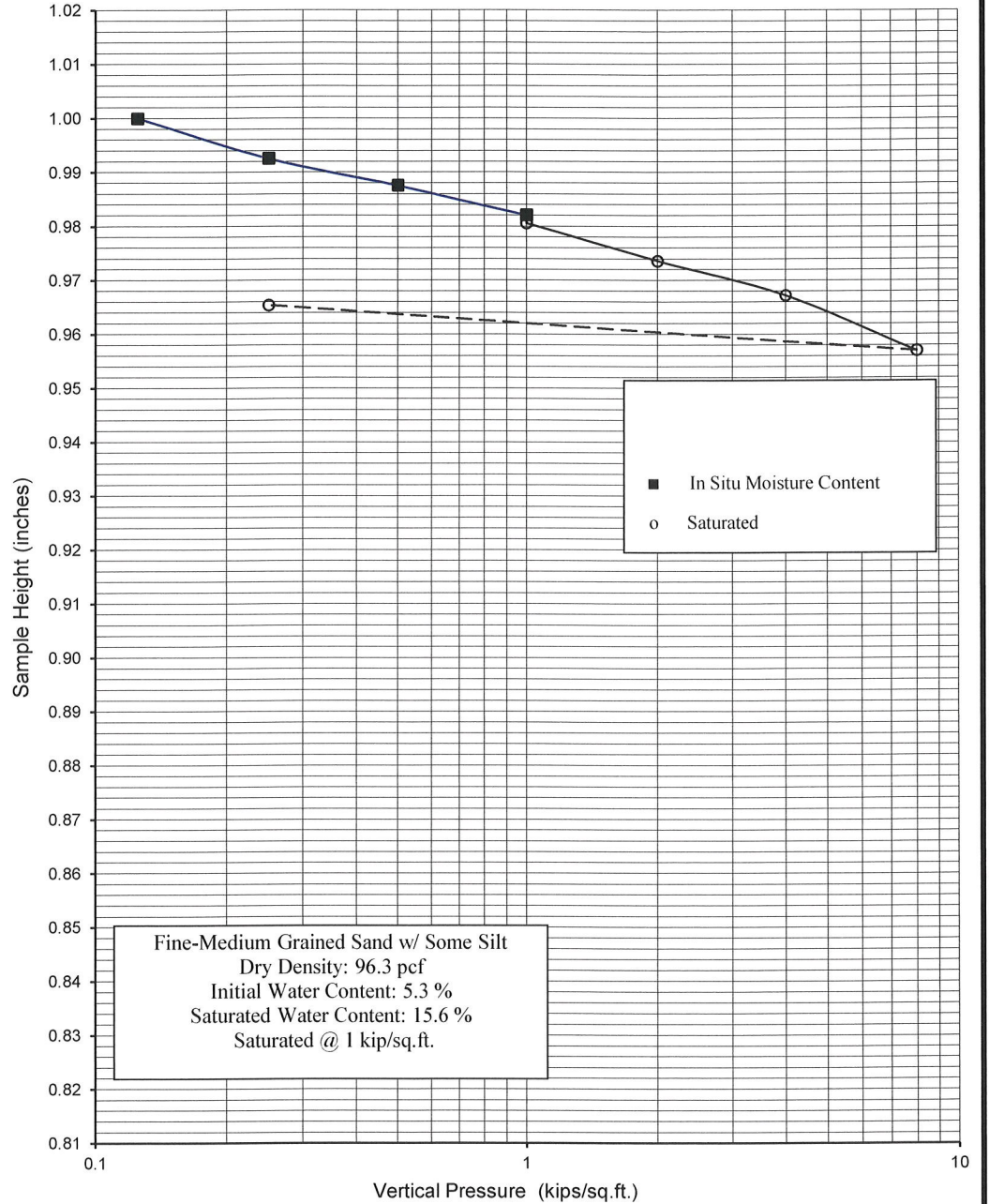
Plate A

Vertical Pressure (kips/sq.ft.)	Sample Height (inches)	Consolidation (percent)	Saturated	Sample No.	B4	Depth	10'	Date	10/30/2025
------------------------------------	---------------------------	----------------------------	-----------	------------	----	-------	-----	------	------------

0.125	1.0000	0.0
0.25	0.9926	0.7
0.5	0.9876	1.2
1	0.9821	1.8
1	0.9806	1.9
2	0.9736	2.6
4	0.9672	3.3
8	0.9570	4.3
0.25	0.9654	3.5

Date Tested: 10/28/2025
Sample: B4
Depth: 10'

S



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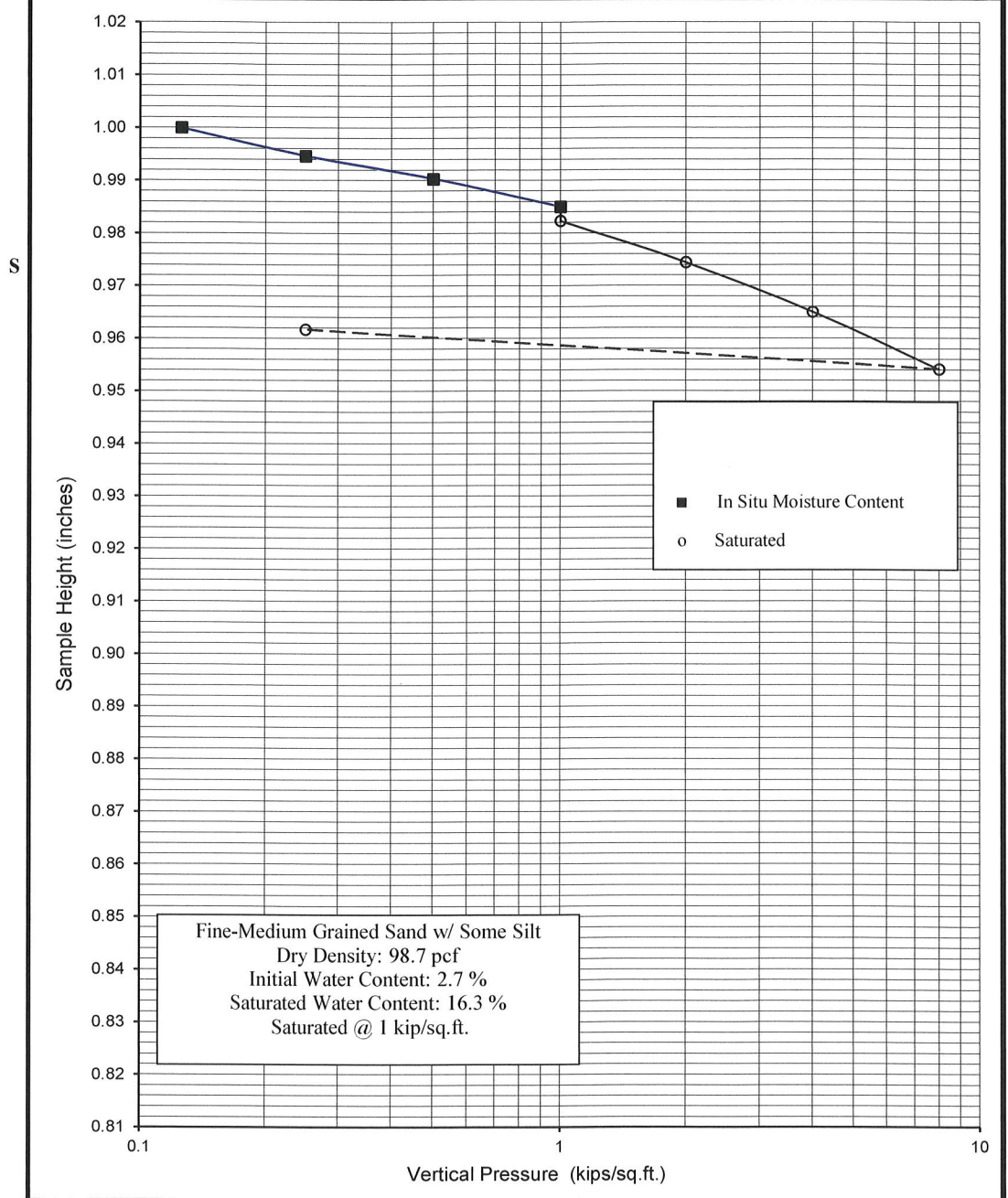
PROJECT NUMBER: 25635-25 DATE: 10/30/2025

CONSOLIDATION TEST
ASTM D2435
Plate B

Vertical Pressure (kips/sq.ft.)	Sample Height (inches)	Consolidation (percent)	Saturated	Sample No. B4	Depth 15'	Date 10/30/2025
------------------------------------	---------------------------	----------------------------	-----------	---------------	-----------	-----------------

0.125	1.0000	0.0
0.25	0.9946	0.5
0.5	0.9903	1.0
1	0.9850	1.5
1	0.9823	1.8
2	0.9744	2.6
4	0.9650	3.5
8	0.9541	4.6
0.25	0.9617	3.8

Date Tested: 10/28/2025
Sample: B4
Depth: 15'



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David Toomey	
PROJECT NUMBER: 25635-25	DATE: 10/30/2025

CONSOLIDATION TEST ASTM D2435 Plate C

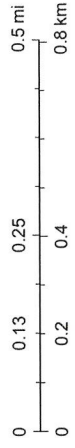
ArcGIS Web Map



9/23/2025, 9:10:22 AM

- CGS Liquefaction Zones
- CGS Landslide Zones

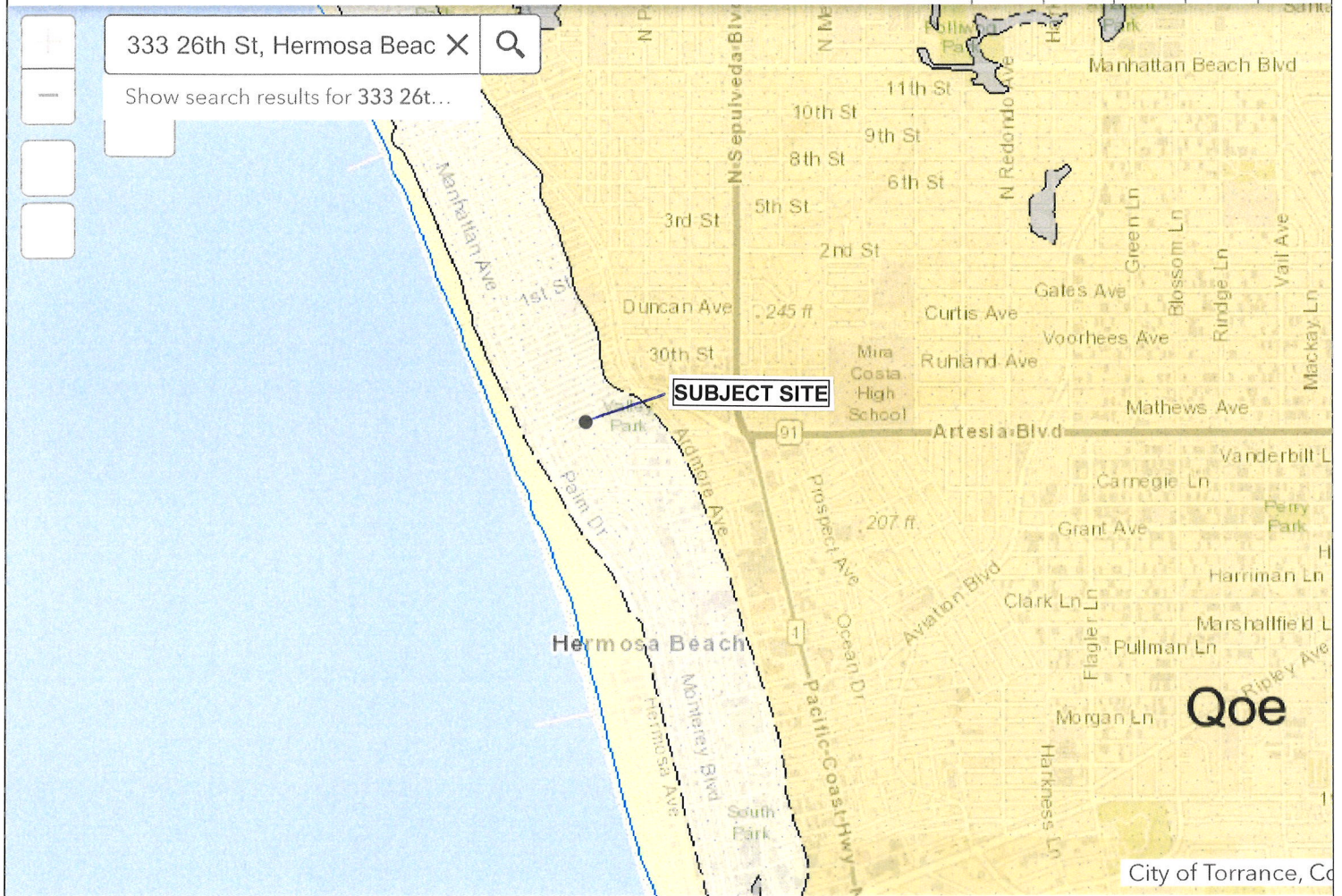
1:12,432



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Compilation of Quaternary Surficial Deposits



- af** Artificial Fill
- Qsu** Undifferentiated Surficial Deposits
- Qls** Landslide Deposits
- Qb** Beach Deposits
- Qw** Alluvial Wash Deposits
- Qf** Alluvial Fan Deposits
- Qa** Alluvial Valley Deposits
- Qt** Terrace Deposits
- Ql** Lacustrine, Playa, and Estuarine (Paralic) Deposits
- Qe** Eolian and Dune Deposits



0.6mi

-118.377 33.872 Degrees

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Appendix C

Seismic Design Report

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Seismic

Site Soil Class: D - Stiff Soil

Results:

S_s :	1.915	S_{D1} :	N/A
S_1 :	0.684	T_L :	8
F_a :	1	PGA :	0.837
F_v :	N/A	PGA _M :	0.921
S_{MS} :	1.915	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.276	C_v :	1.483

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Oct 27 2025

Date Source: [USGS Seismic Design Maps](#)

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Appendix D

Soil Infiltration Data

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PERCOLATION TEST DATA

Client: David Toomey	Tested By: Javi
Project No.: 25635-25	Date Tested: 10/20/2025
Test Hole: 1	Caving:
Depth of Test Hole: 3' (36")	Notes:
Diameter of Test Hole: 6"	
Date Excavated: 10/20/2025	

PRE-SOAK

TIME	PRE-SOAK NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
8:35	1	1	1	24.0	36.0	12.0
8:36						
8:36	2	1	1	24.0	36.0	12.0
8:37						

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
8:37	1	1	1	24.0	36.0	12.0
8:38						
8:38	2	1	2	24.0	36.0	12.0
8:39						
8:39	3	1	3	24.0	36.0	12.0
8:40						
8:40	4	1	4	24.0	36.0	12.0
8:41						
8:41	5	1	5	24.0	36.0	12.0
8:42						
8:42	6	1	6	24.0	36.0	12.0
8:43						
8:43	7	1	7	24.0	36.0	12.0
8:44						
8:44	8	1	8	24.0	36.0	12.0
8:45						
8:45	9	1	9	24.0	36.0	12.0
8:46						
8:46	10	1	10	24.0	36.0	12.0
8:47						
8:47	11	1	11	24.0	36.0	12.0
8:48						
8:48	12	1	12	24.0	36.0	12.0
8:49						

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PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
8:49	13	1	13	24.0	36.0	12.0
8:50						
8:50	14	1	14	24.0	36.0	12.0
8:51						
8:51	15	1	15	24.0	36.0	12.0
8:52						
8:52	16	1	16	24.0	36.0	12.0
8:53						
8:53	17	1	17	24.0	36.0	12.0
8:54						
8:54	18	1	18	24.0	36.0	12.0
8:55						
8:55	19	1	19	24.0	36.0	12.0
8:56						
8:56	20	1	20	24.0	36.0	12.0
8:57						
8:57	21	1	21	24.0	36.0	12.0
8:58						
8:58	22	1	22	24.0	36.0	12.0
8:59						
8:59	23	1	23	24.0	36.0	12.0
9:00						
9:00	24	1	24	24.0	36.0	12.0
9:01						
9:01	25	1	25	24.0	36.0	12.0
9:02						
9:02	26	1	26	24.0	36.0	12.0
9:03						
9:03	27	1	27	24.0	36.0	12.0
9:04						
9:04	28	1	28	24.0	36.0	12.0
9:05						
9:05	29	1	29	24.0	36.0	12.0
9:06						
9:06	30	1	30	24.0	36.0	12.0
9:07						
9:07	31	1	31	24.0	36.0	12.0
9:08						
9:08	32	1	32	24.0	36.0	12.0
9:09						
9:09	33	1	33	24.0	36.0	12.0
9:10						



SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
9:10	34	1	34	24.0	36.0	12.0
9:11						
9:11	35	1	35	24.0	36.0	12.0
9:12						
9:12	36	1	36	24.0	36.0	12.0
9:13						
9:13	37	1	37	24.0	36.0	12.0
9:14						
9:14	38	1	38	24.0	36.0	12.0
9:15						
9:15	39	1	39	24.0	36.0	12.0
9:16						
9:16	40	1	40	24.0	36.0	12.0
9:17						
9:17	41	1	41	24.0	36.0	12.0
9:18						
9:18	42	1	42	24.0	36.0	12.0
9:19						
9:19	43	1	43	24.0	36.0	12.0
9:20						
9:20	44	1	44	24.0	36.0	12.0
9:21						
9:21	45	1	45	24.0	36.0	12.0
9:22						
9:22	46	1	46	24.0	36.0	12.0
9:23						
9:23	47	1	47	24.0	36.0	12.0
9:24						
9:24	48	1	48	24.0	36.0	12.0
9:25						
9:25	49	1	49	24.0	36.0	12.0
9:26						
9:26	50	1	50	24.0	36.0	12.0
9:26						
9:27	51	1	51	24.0	36.0	12.0
9:27						
9:28	52	1	52	24.0	36.0	12.0
9:28						
9:29	53	1	53	24.0	36.0	12.0
9:29						
9:30	54	1	54	24.0	36.0	12.0
9:30						

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SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
9:31	55	1	55	24.0	36.0	12.0
9:31						
9:32	56	1	56	24.0	36.0	12.0
9:32						
9:32	57	1	57	24.0	36.0	12.0
9:33						
9:33	58	1	58	24.0	36.0	12.0
9:34						
9:34	59	1	59	24.0	36.0	12.0
9:35						
9:35	60	1	60	24.0	36.0	12.0
9:36						
9:36	61	1	61	24.0	36.0	12.0
9:37						
9:37	62	1	62	24.0	36.0	12.0
9:38						
9:38	63	1	63	24.0	36.0	12.0
9:39						
9:39	64	1	64	24.0	36.0	12.0
9:39						
9:40	65	1	65	24.0	36.0	12.0
9:40						
9:41	66	1	66	24.0	36.0	12.0
9:41						
9:42	67	1	67	24.0	36.0	12.0
9:42						
9:43	68	1	68	24.0	36.0	12.0
9:44						
9:44	69	1	69	24.0	36.0	12.0
9:45						
9:45	70	1	70	24.0	36.0	12.0
9:46						
9:46	71	1	71	24.0	36.0	12.0
9:47						
9:47	72	1	72	24.0	36.0	12.0
9:48						
9:48	73	1	73	24.0	36.0	12.0
9:49						
9:49	74	1	74	24.0	36.0	12.0
9:50						
9:50	75	1	75	24.0	36.0	12.0
9:51						

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SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
9:51	76	1	76	24.0	36.0	12.0
9:52						
9:52	77	1	77	24.0	36.0	12.0
9:53						
9:53	78	1	78	24.0	36.0	12.0
9:54						
9:54	79	1	79	24.0	36.0	12.0
9:55						
9:55	80	1	80	24.0	36.0	12.0
9:56						
9:56	81	1	81	24.0	36.0	12.0
9:57						
9:57	82	1	82	24.0	36.0	12.0
9:58						
9:58	83	1	83	24.0	36.0	12.0
9:59						
9:59	84	1	84	24.0	36.0	12.0
10:00						
10:00	85	1	85	24.0	36.0	12.0
10:01						
10:01	86	1	86	24.0	36.0	12.0
10:02						
10:02	87	1	87	24.0	36.0	12.0
10:03						
10:03	88	1	88	24.0	36.0	12.0
10:04						
10:04	89	1	89	24.0	36.0	12.0
10:05						
10:05	90	1	90	24.0	36.0	12.0
10:06						
10:06	91	1	91	24.0	36.0	12.0
10:07						
10:07	92	1	92	24.0	36.0	12.0
10:08						
10:08	93	1	93	24.0	36.0	12.0
10:09						
10:09	94	1	94	24.0	36.0	12.0
10:10						
10:10	95	1	95	24.0	36.0	12.0
10:11						
10:11	96	1	96	24.0	36.0	12.0
10:12						



SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
10:12	97	1	97	24.0	36.0	12.0
10:13						
10:13	98	1	98	24.0	36.0	12.0
10:14						
10:14	99	1	99	24.0	36.0	12.0
10:15						
10:15	100	1	100	24.0	36.0	12.0
10:16						
10:16	101	1	101	24.0	36.0	12.0
10:17						
10:17	102	1	102	24.0	36.0	12.0
10:18						
10:18	103	1	103	24.0	36.0	12.0
10:19						
10:19	104	1	104	24.0	36.0	12.0
10:20						
10:20	105	1	105	24.0	36.0	12.0
10:21						
10:21	106	1	106	24.0	36.0	12.0
10:22						
10:22	107	1	107	24.0	36.0	12.0
10:23						
10:23	108	1	108	24.0	36.0	12.0
10:24						
10:24	109	1	109	24.0	36.0	12.0
10:25						
10:25	110	1	110	24.0	36.0	12.0
10:26						
10:26	111	1	111	24.0	36.0	12.0
10:27						
10:27	112	1	112	24.0	36.0	12.0
10:28						
10:28	113	1	113	24.0	36.0	12.0
10:29						
10:29	114	1	114	24.0	36.0	12.0
10:30						
10:30	115	1	115	24.0	36.0	12.0
10:31						
10:31	116	1	116	24.0	36.0	12.0
10:32						
10:32	117	1	117	24.0	36.0	12.0
10:33						

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
10:33	118	1	118	24.0	36.0	12.0
10:34						
10:34	119	1	119	24.0	36.0	12.0
10:35						
10:35	120	1	120	24.0	36.0	12.0
10:36						
10:36	121	1	121	24.0	36.0	12.0
10:37						
10:37	122	1	122	24.0	36.0	12.0
10:38						
10:38	123	1	123	24.0	36.0	12.0
10:39						
10:39	124	1	124	24.0	36.0	12.0
10:40						
10:40	125	1	125	24.0	36.0	12.0
10:41						
10:41	126	1	126	24.0	36.0	12.0
10:42						
10:42	127	1	127	24.0	36.0	12.0
10:43						
10:43	128	1	128	24.0	36.0	12.0
10:44						
10:44	129	1	129	24.0	36.0	12.0
10:45						
10:45	130	1	130	24.0	36.0	12.0
10:46						
10:49	131	1	131	24.0	36.0	12.0
10:47						
10:47	132	1	132	24.0	36.0	12.0
10:48						
10:48	133	1	133	24.0	36.0	12.0
10:49						
10:49	134	1	134	24.0	36.0	12.0
10:50						
10:50	135	1	135	24.0	36.0	12.0
10:51						
10:51	136	1	136	24.0	36.0	12.0
10:52						
10:52	137	1	137	24.0	36.0	12.0
10:53						
10:53	138	1	138	24.0	36.0	12.0
10:54						

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
10:54	139	1	139	24.0	36.0	12.0
10:55						
10:55	140	1	140	24.0	36.0	12.0
10:56						
10:56	141	1	141	24.0	36.0	12.0
10:57						
10:57	142	1	142	24.0	36.0	12.0
10:58						
10:58	143	1	143	24.0	36.0	12.0
10:59						
10:59	144	1	144	24.0	36.0	12.0
11:00						
11:00	145	1	145	24.0	36.0	12.0
11:01						
11:01	146	1	146	24.0	36.0	12.0
11:02						
11:02	147	1	147	24.0	36.0	12.0
11:03						
11:03	148	1	148	24.0	36.0	12.0
11:04						
11:04	149	1	149	24.0	36.0	12.0
11:05						
11:05	150	1	150	24.0	36.0	12.0
11:06						
11:06	151	1	151	24.0	36.0	12.0
11:07						
11:07	152	1	152	24.0	36.0	12.0
11:08						
11:08	153	1	153	24.0	36.0	12.0
11:09						
11:09	154	1	154	24.0	36.0	12.0
11:10						
11:10	155	1	155	24.0	36.0	12.0
11:11						
11:11	156	1	156	24.0	36.0	12.0
11:12						
11:12	157	1	157	24.0	36.0	12.0
11:13						
11:13	158	1	158	24.0	36.0	12.0
11:14						
11:14	159	1	159	24.0	36.0	12.0
11:15						



SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
11:16	160	1	160	24.0	36.0	12.0
11:16						
11:16	161	1	161	24.0	36.0	12.0
11:17						
11:17	162	1	162	24.0	36.0	12.0
11:18						
11:18	163	1	163	24.0	36.0	12.0
11:19						
11:19	164	1	164	24.0	36.0	12.0
11:20						
11:20	165	1	165	24.0	36.0	12.0
11:21						
11:21	166	1	166	24.0	36.0	12.0
11:22						
11:22	167	1	167	24.0	36.0	12.0
11:23						
11:23	168	1	168	24.0	36.0	12.0
11:24						
11:24	169	1	169	24.0	36.0	12.0
11:25						
11:25	170	1	170	24.0	36.0	12.0
11:26						
11:26	171	1	171	24.0	36.0	12.0
11:27						
11:27	172	1	172	24.0	36.0	12.0
11:28						
11:28	173	1	173	24.0	36.0	12.0
11:29						
11:29	174	1	174	24.0	36.0	12.0
11:30						
11:30	175	1	175	24.0	36.0	12.0
11:31						
11:31	176	1	176	24.0	36.0	12.0
11:32						
11:32	177	1	177	24.0	36.0	12.0
11:33						
11:33	178	1	178	24.0	36.0	12.0
11:34						
11:34	179	1	179	24.0	36.0	12.0
11:35						
11:35	180	1	180	24.0	36.0	12.0
11:36						



SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
11:36	181	1	181	24.0	36.0	12.0
11:37						
11:37	182	1	182	24.0	36.0	12.0
11:38						
11:38	183	1	183	24.0	36.0	12.0
11:39						
11:39	184	1	184	24.0	36.0	12.0
11:40						
11:40	185	1	185	24.0	36.0	12.0
11:41						
11:41	186	1	186	24.0	36.0	12.0
11:42						
11:42	187	1	187	24.0	36.0	12.0
11:43						
11:43	188	1	188	24.0	36.0	12.0
11:44						
11:44	189	1	189	24.0	36.0	12.0
11:45						
11:45	190	1	190	24.0	36.0	12.0
11:46						
11:46	191	1	191	24.0	36.0	12.0
11:47						
11:47	192	1	192	24.0	36.0	12.0
11:48						
11:48	193	1	193	24.0	36.0	12.0
11:49						
11:49	194	1	194	24.0	36.0	12.0
11:50						
11:50	195	1	195	24.0	36.0	12.0
11:51						
11:51	196	1	196	24.0	36.0	12.0
11:52						
11:52	197	1	197	24.0	36.0	12.0
11:53						
11:53	198	1	198	24.0	36.0	12.0
11:54						
11:54	199	1	199	24.0	36.0	12.0
11:55						
11:55	200	1	200	24.0	36.0	12.0
11:56						
11:56	201	1	201	24.0	36.0	12.0
11:57						



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PERCOLATION TEST

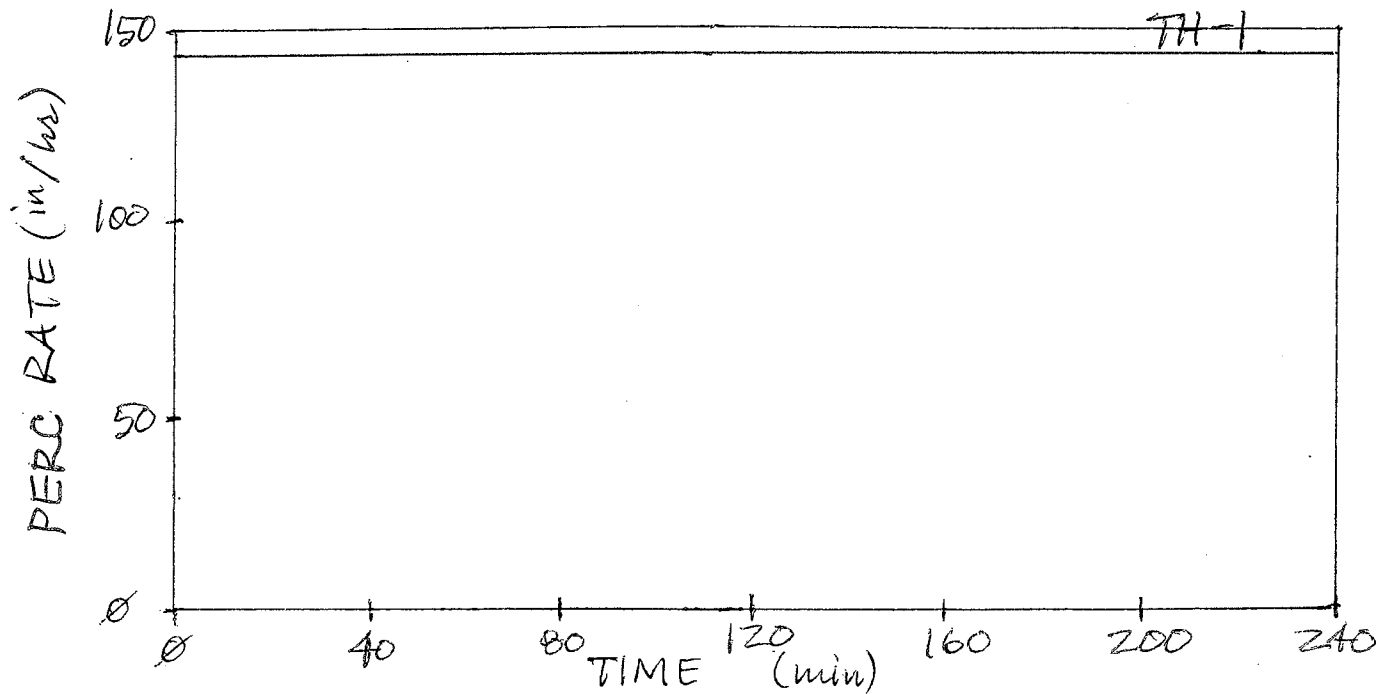
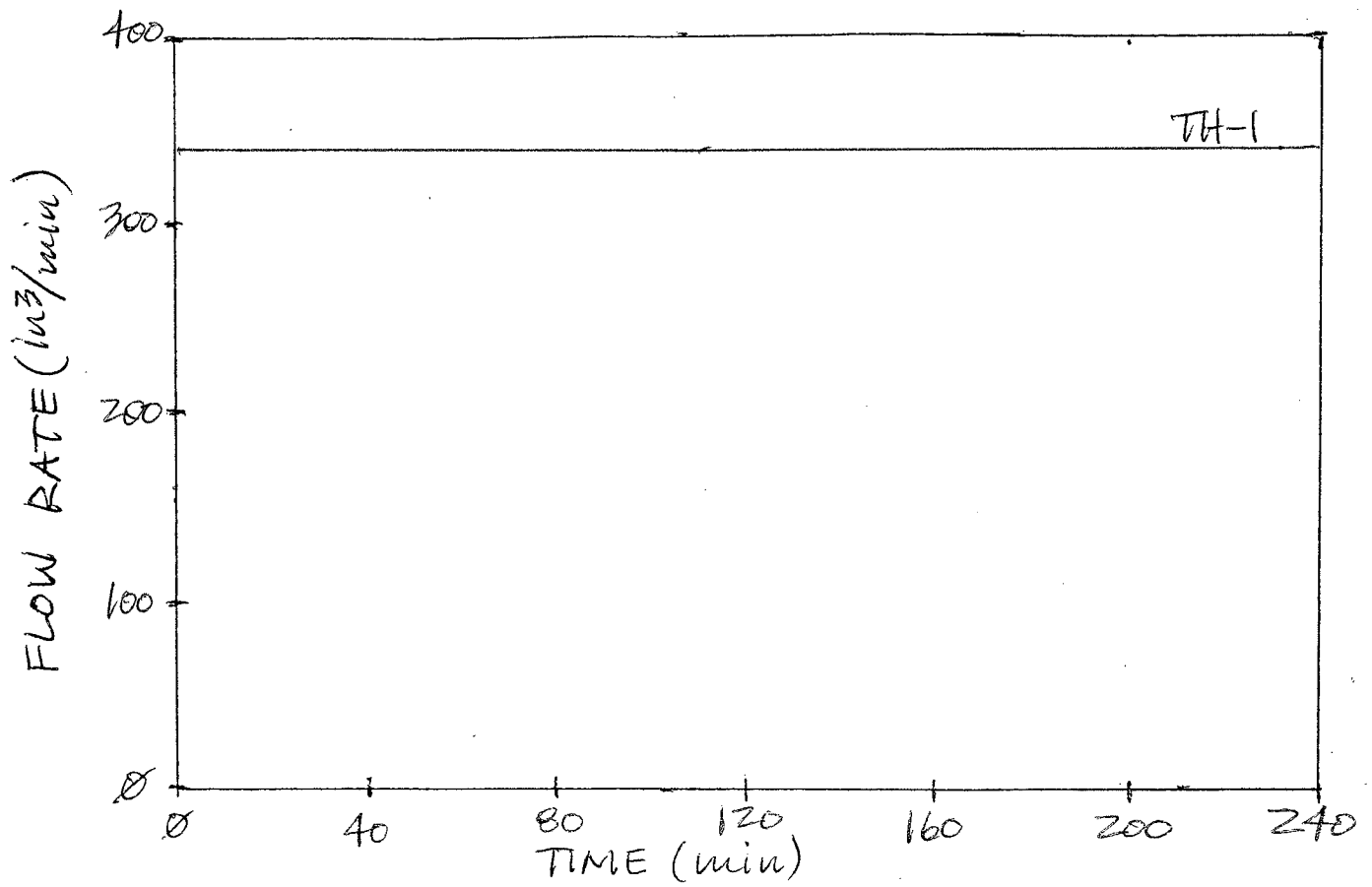
TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
11:57	202	1	202	24.0	36.0	12.0
11:58						
11:58	203	1	203	24.0	36.0	12.0
11:59						
11:59	204	1	201	24.0	36.0	12.0
12:00						
12:00	205	1	205	24.0	36.0	12.0
12:01						
12:01	206	1	206	24.0	36.0	12.0
12:02						
12:02	207	1	207	24.0	36.0	12.0
12:03						
12:03	208	1	208	24.0	36.0	12.0
12:04						
12:04	209	1	209	24.0	36.0	12.0
12:05						
12:05	210	1	210	24.0	36.0	12.0
12:06						
12:06	211	1	211	24.0	36.0	12.0
12:07						
12:07	212	1	212	24.0	36.0	12.0
12:08						
12:08	213	1	213	24.0	36.0	12.0
12:09						
12:09	214	1	214	24.0	36.0	12.0
12:10						
12:10	215	1	215	24.0	36.0	12.0
12:11						
12:11	216	1	216	24.0	36.0	12.0
12:12						
12:12	217	1	217	24.0	36.0	12.0
12:13						
12:13	218	1	218	24.0	36.0	12.0
12:14						
12:14	219	1	219	24.0	36.0	12.0
12:15						
12:15	220	1	220	24.0	36.0	12.0
12:16						
12:16	221	1	221	24.0	36.0	12.0
12:17						
12:17	222	1	222	24.0	36.0	12.0
12:18						



SOILS AND GEOTECHNICAL CONSULTANTS

PERCOLATION TEST

TIME	TEST NO.	TIME INTERVAL	TOTAL ELAPSED TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	CHANGE IN WATER LEVEL
12:18	223	1	223	24.0	36.0	12.0
12:19						
12:19	224	1	224	24.0	36.0	12.0
12:20						
12:20	225	1	225	24.0	36.0	12.0
12:21						
12:21	226	1	226	24.0	36.0	12.0
12:22						
12:22	227	1	227	24.0	36.0	12.0
12:23						
12:23	228	1	228	24.0	36.0	12.0
12:24						
12:24	229	1	229	24.0	36.0	12.0
12:25						
12:25	230	1	230	24.0	36.0	12.0
12:26						
12:26	231	1	231	24.0	36.0	12.0
12:27						
12:27	232	1	232	24.0	36.0	12.0
12:28						
12:28	233	1	233	24.0	36.0	12.0
12:29						
12:29	234	1	234	24.0	36.0	12.0
12:30						
12:30	235	1	235	24.0	36.0	12.0
12:31						
12:31	236	1	236	24.0	36.0	12.0
12:32						
12:32	237	1	237	24.0	36.0	12.0
12:33						
12:33	238	1	238	24.0	36.0	12.0
12:34						
12:34	239	1	239	24.0	36.0	12.0
12:36						
12:36	240	1	240	24.0	36.0	12.0
12:37						



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PROJECT:

DATE: