# GEOTECHNICAL EXPLORATION REPORT
# PROPOSED INDUSTRIAL BUILDING
# 12118 BLOOMFIELD AVENUE
# SANTA FE SPRINGS, CALIFORNIA

Prepared for:

**REXFORD INDUSTRIAL REALTY, INC.**

11620 Wilshire Boulevard, 10th Floor
Los Angeles, California 90025

Project No. 13062.001

April 5, 2021

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

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Rexford Industrial Realty, Inc.
11620 Wilshire Boulevard, 10th Floor
Los Angeles, California 90025

Attention: Mr. Tomas Narbutas

**Subject: Geotechnical Exploration Report**
**Proposed Industrial Building**
**12118 Bloomfield Avenue**
**Santa Fe Springs, California**

In accordance with our February 24, 2021 proposal, authorized on February 26, 2021; Leighton Consulting, Inc. (Leighton) has prepared this geotechnical exploration report for the subject project. We understand the proposed development will include demolition of the existing site improvements to allow for construction of a new one-story, Type III-B industrial building with a total building area of 107,472 square feet. The proposed concrete tilt-up building will be constructed at grade with associated truck parking and loading and surface parking. Ancillary improvements likely consist of utility infrastructure, pavement, flatwork, and landscaping.

The purpose of our geotechnical exploration was to evaluate the subsurface conditions at the site, identify potential geologic and seismic hazards that may impact the project, and provide geotechnical recommendations for design and construction of the proposed improvements as currently planned.

The project is considered feasible from a geotechnical standpoint. The results of our exploration, conclusions and recommendations are presented in this report.

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We appreciate the opportunity to be of service to you on this project. If you have any questions or if we can be of further service, please contact us at ***(866) LEIGHTON***; or specifically at the phone extensions or e-mail addresses listed below.

Respectfully submitted,

LEIGHTON CONSULTING, INC.

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## TABLE OF CONTENTS

**Section** **Page**





Leighton

Tables



ATTACHMENTS



Appendices

# 1.0 INTRODUCTION

## 1.1 Site Description and Proposed Development

The project site is located at 12118 Bloomfield Avenue in the city of Santa Fe Springs, Los Angeles County, California. The site location (latitude 33.921399°, longitude -118.062595°) and immediate vicinity are shown on Figure 1, *Site Location Map.*

The project site is roughly rectangular in shape and covers approximately 5.16 acres. The site is bordered by Bloomfield Avenue to the west, existing commercial properties to the north and south, and by an existing railway easement to the east. Access to the site is via Bloomfield Avenue to the west. The site is currently occupied by an existing commercial facility that contains various commercial buildings and asphalt paved parking and access associated with the existing and active Crown Fence Supply Company.

The project site is relatively flat with sheet flow generally directed to the west across the site over paved surfaces to curbs and gutters. Review of the United States Geological Survey (USGS) 7.5-Minute Whittier Quadrangle (USGS, 1981) indicates the site is at approximately Elevation (El.) +125 feet mean sea level (msl).

Based on review of historical aerial photographs (NETR, 2021), the eastern portion of the site was mostly vacant and the western portion of the site was used for parking and portions of the western buildings appear to have been partially constructed. By 1963, the building in the western and northern portions of the site were constructed, and by 1972 the buildings in the central and eastern portion of the site were constructed.

Based on review of the *Conceptual Site Plan – Option #3* (Sheet A-1.0) for the project site, dated 12/23/2020, we understand that the proposed development will include demolition of the existing site improvements to allow for construction of a new one-story, Type III-B industrial building with a total building area of 107,472 square feet. The proposed concrete tilt-up building will be constructed at grade with associated truck parking and loading and surface parking. Ancillary improvements likely consist of utility infrastructure, pavement, flatwork, and landscaping.

## 1.2 Purpose and Scope

The purpose of our geotechnical exploration was to evaluate the subsurface conditions at the site relative to the proposed development concept and provide geotechnical recommendations to aid in the design and construction for the project as currently planned. The scope of this geotechnical exploration included the following tasks:

- *Background Review* – We reviewed readily available in-house geotechnical reports, literature, aerial photographs, and maps relevant to the site. We evaluated geological hazards and potential geotechnical issues that may significantly impact the site. The documents reviewed are listed in Section 5.0.

- *Pre-Field Exploration Activities* – A site visit was performed by a member of our technical staff to mark the proposed exploration locations. Underground Service Alert (USA) was notified to locate and mark existing underground utilities prior to our subsurface exploration.

- *Field Exploration* – Our subsurface exploration was performed on March 3, 2021; and included drilling, logging, and sampling of five (5) hollow-stem auger borings (designated LB-1 through LB-5) to depths between approximately 30 and 50 feet below the existing ground surface (bgs). Two (2) additional borings (designated LP-1 and LP-2) were drilled to an approximate depth of 10 feet bgs for subsequent percolation testing. The approximate locations of the explorations are shown on Figure 2, *Exploration Location Map.* The boring logs are presented in Appendix A, *Exploration Logs.*

  During drilling of the borings, bulk and drive samples were obtained for geotechnical laboratory testing. Driven ring samples were collected from the borings using a Modified California ring-lined sampler conducted in accordance with ASTM Test Method D 3550. Standard Penetration Tests (SPTs) were also performed within the borings in accordance with ASTM Test Method D 1586. Samples were collected at 2½- and 5-foot intervals throughout the depth of exploration. In both test methods, the sampler is driven below the bottom of the borehole by a 140-pound weight (hammer) free-falling 30 inches. The drilling rig was equipped with an automatic hammer to provide greater consistency in the drop height and striking frequency. The number of blows to drive the sampler the final 12-inches of the 18-inch drive interval is termed the "blowcount" or SPT N-value. The N-values provide a measure of relative density in granular (non-cohesive) soils and comparative consistency in cohesive soils. The number of blows per 6 inches of penetration was recorded on the boring logs, see Appendix A.

The borings were logged in the field by a geologist from our firm. Each soil sample collected was reviewed and described in accordance with the Unified Soil Classification System (USCS). The samples were sealed and packaged for transportation to our laboratory for testing. After completion of drilling, the borings were backfilled to the ground surface with soil cuttings and patched with cold-mix asphalt concrete at the surface to match existing conditions.

- *Percolation Testing* – Borings LP-1 and LP-2 were converted to temporary percolation test wells upon completion of drilling and sampling. The test wells consisted of 2-inch slotted (0.020") PVC well casing surrounded by #3 Monterey Sand placed in the annulus of the well within the test zone. In-situ percolation testing was performed in general accordance with the County of Los Angeles Department of Public Works (LADPW) *Guidelines for Geotechnical Investigation* and Reporting, *Low Impact Development Stormwater Infiltration* (LADPW, 2017). The results of the percolation testing are presented in Appendix B, *Percolation Test Data*. Refer to the discussion of infiltration rate presented in Section 2.4.1, *Infiltration*. Upon completion of the percolation testing, the well casing was removed from each boring and the borings were backfilled with soil cuttings and patched at the surface with cold-mix asphalt concrete to match existing site conditions.

- *Laboratory Testing* – Laboratory tests were performed on selected soil samples obtained from the borings during our field investigation. The laboratory testing program was designed to evaluate the physical and engineering characteristics of the onsite soils. Tests performed during this investigation include:

  - In-situ Moisture Content and Dry Density (ASTM D 2216 and ASTM D 2937);
  - Atterberg Limits (ASTM D 4318);
  - Direct Shear (ASTM D 3080);
  - Consolidation (ASTM D 2435);
  - Maximum Dry Density (ASTM D 1557);
  - Expansion Index (ASTM D 4829);
  - R-value (California Test Method 301); and

- Corrosivity Suite – pH, Sulfate, Chloride, and Resistivity (California Test Methods 417, 422, and 532/643).

Results of the in-situ moisture content and dry density testing are presented on the boring logs in Appendix A. Other laboratory test results are presented in Appendix B, *Laboratory Test Results.*

- *Engineering Analysis* – The data obtained from our background review and field exploration were evaluated and analyzed to develop recommendations for the proposed development.

- *Report Preparation* – This report presents our findings, conclusions, and recommendations for the proposed development.

# 2.0 GEOTECHNICAL FINDINGS

## 2.1 Regional Geologic Setting

The site is located in the Los Angeles Basin in the northwestern portion of the Peninsular Ranges Geomorphic Province of Southern California. The Peninsular Ranges province extends approximately 900 miles southward from the Santa Monica Mountains to the tip of Baja California (Yerkes, et al., 1965) and is characterized by elongated, northwest-trending mountain ridges and sediment-floored valleys. The province includes numerous northwest trending fault zones, most of which either gradually truncate, merge with, or are terminated by faults that form the southern margin of the Transverse Ranges province. These northwest trending fault zones include the San Jacinto, Whittier-Elsinore, Palos Verdes, and Newport-Inglewood fault zones.

Approximately 65 million years ago (at the end of the Cretaceous Period) a deep, structural trough existed off the current coast of southern California (Yerkes, 1972). Over time, sedimentation filled the trough with hundreds to thousands of feet of sediment. About 7 million years ago, as sedimentation continued, an eastward shift of the boundary between the Pacific and North American plates to its present position would begin shaping the Los Angeles basin from this deep trough. Today the Los Angeles basin refers to the area defined by the Santa Monica, Whittier and Palos Verdes faults, and San Joaquin Hills. Basin depth is limited to the sediments deposited over the basement rock in the last 7 million years (Wright, 1991). The deepest part of the Los Angeles basin contains Tertiary to Quaternary-aged (65 million years and younger) marine and non-marine sedimentary rocks that are about 24,000 feet thick (Yerkes, et al, 1965; Wright, 1991). During the Pleistocene epoch (the last two million years) the region was flooded as sea level rose in response to the worldwide melting of the Pleistocene glaciers.

## 2.2 Surficial Geology

The subject site is located approximately 2.5-miles southeast of the unlined portion of the San Gabriel River channel at its closest point. Regional geologic mapping of the project site and vicinity indicates that near-surface native soils beneath the site consist of Quaternary-aged (Pleistocene) slightly to moderately consolidated old alluvial fan deposits comprised of varying proportions of silt, sand and gravel (Bedrossian and Roffers, 2010; Dibblee Jr., 2001). The surficial geologic units mapped in the vicinity of the project site are shown on Figure 3, *Regional Geology Map.*

## 2.3 Subsurface Conditions

Based on our subsurface explorations, the site is underlain by a layer of undocumented artificial fill materials (Afu) overlying Quaternary-aged (Pleistocene) old alluvial fan deposits (Qoa). The artificial fill encountered in our borings at the explored locations is generally about 2 to 5 feet in thickness across the site, likely associated with the existing and previous site improvements. The fill soils consist primarily of locally derived sandy silt and silty sand. Localized thicker accumulations of the fill materials should be anticipated between explored locations during future earthwork construction, particularly below the existing buildings.

Below the artificial fill materials, old alluvial fan deposits (Qoa) were encountered in the borings to the maximum depth explored (50 feet bgs). The alluvial fan deposits encountered generally consist of brown to reddish brown and olive brown, slightly moist to moist, loose to very dense, clayey sand, silty sand, sand and sand, and soft to very stiff, sandy clay, silty clay, silt, sandy silt.

Detailed descriptions of the subsurface materials encountered in the borings are presented on the logs included in Appendix A. Some of the engineering properties of these soils are described in the following sections. The locations of the borings are shown on Figure 2, *Exploration Location Map*.

### 2.3.1 Expansive Soil Characteristics

Expansive soils contain significant amounts of clay particles that swell considerably when wetted and which shrink when dried. Foundations constructed on these soils are subject to uplifting forces caused by the swelling. Without proper mitigation measures, heaving and cracking of both building foundations and slabs-on-grade could result.

Two (2) near-surface bulk soil samples obtained during our subsurface exploration were tested for expansion potential. The test results indicate Expansion Index (EI) values of 5 and 16 (“very low” potential for expansion). The Expansion Index laboratory test results are included in Appendix B of this report.

Variance in expansion potential of onsite soil is anticipated; therefore, additional testing is recommended upon completion of site grading and excavation to confirm the expansion potential presented in this report. For purposes of this report, and based upon visual characterization of alluvial materials at approximate foundation depth, low expansion potential of site materials may be considered to support design and verified upon completion of earthwork grading.

### 2.3.2 Soil Corrosivity

Two (2) near-surface bulk soil samples obtained during our subsurface exploration were tested for corrosivity to assess corrosion potential to buried concrete. The chemical analysis test results for the onsite soil from our geotechnical exploration are included in Appendix B of this report.

The test results indicate soluble sulfate concentrations of 33 and 49 parts per million (ppm), chloride contents of 60 and 90 ppm, pH values of 7.66 and 7.93, and minimum resistivity values of 1,900 and 4,640 ohm-cm.

The results of the resistivity tests indicate the underlying soil is moderately to severely corrosive to buried ferrous metals per ASTM STP 1013. Based on the measured water-soluble sulfate contents from the soil samples, concrete in contact with the soil is expected to have negligible exposure to sulfate attack per ACI 318 (ACI, 2014). The sample tested for water-soluble chloride content indicate a low potential for corrosion of steel in concrete due to the chloride content of the soil.

### 2.3.3 Soil Compressibility

Five (5) samples of the onsite soils recovered from the borings were subjected to consolidation testing to evaluate the compressibility of these materials under assumed loads representative of anticipated structural bearing stresses. The results of testing indicate these soils exhibit low compressibility potential. The results of testing are presented in Appendix B.

#### 2.3.4 Shear Strength

Evaluation of the shear strength characteristics of the soils included laboratory direct shear testing. The results of testing are included in Appendix B as well as summary graphs that provide values of angle of internal friction (ø) and cohesion (c) for use in geotechnical analysis.

#### 2.3.5 Excavation Characteristics

Based on our subsurface explorations performed at the site and our experience from grading jobs in the vicinity of the site, we anticipate the onsite artificial fill and native earth materials can generally be excavated using conventional excavation equipment in good operating condition.

### 2.4 Groundwater Conditions

Groundwater was not encountered at the site during our subsurface exploration performed at the site to the maximum depth of approximately 50 feet bgs. Based on review information available from CGS, the historically shallowest groundwater depth at the site is between approximately 15 and 20 feet bgs. However, based on review of groundwater level data available through the California Department of Water Resources for a well located approximately ¾-mile southeast of the project site (State Well ID 03S11W17F002S) for a monitoring period between 2011 and 2020, the shallowest groundwater level recorded was 81.7 feet bgs. Furthermore, the location of this well is along the reported historically shallowest groundwater depth contour line for 8 feet bgs.

Based on these findings, groundwater is not expected to pose a constraint during or after construction. Fluctuations of the groundwater level, localized zones of perched water, and an increase in soil moisture, should be anticipated during and following the rainy seasons or periods of locally intense rainfall or storm water runoff, or from stormwater infiltration.

#### 2.4.1 Infiltration

Percolation testing was performed in temporary wells installed within borings LP-1 and LP-2 to evaluate the infiltration characteristics of subsurface soils. The percolation tests were conducted in general accordance with the County of Los Angeles Department of Public Works (LADPW) *Guidelines for Geotechnical Investigation* and Reporting, *Low Impact Development*

*Stormwater Infiltration* (LADPW, 2017). Results of the percolation testing are presented in Appendix B. The test locations and zones tested are shown on Figure 2.

A boring percolation test is useful for field measurements of the infiltration rate of soils, and is suited for testing when the design depth of the infiltration device is deeper than current existing grades, especially in areas where it is difficult to dig test pits, or where the depths of these test pits would be considerably deep. At the subject site, testing consisted of advancing the borings to general depths anticipated for the invert of typical infiltration devices.

The falling-head test method was employed for test well LP-1 in which the volume of discharge was calculated by adding the total volume of water that dropped within the PVC pipe and within the annulus, and incorporating a porosity reduction factor to account for the porosity of the annulus material. The flow area was based on the average water height within the slotted pipe section of the test well. The infiltration rate was calculated by dividing the rate of discharge by the infiltration surface area, or flow area.

Since the test well at LP-2 was allowing a favorable amount of water to percolate, the percolation test at this location was performed using a constant-head method which records the approximate volume of water delivered to the test zone while maintaining a relatively constant height of water in the well over the testing period. A water source was used to deliver water to the well at a relatively constant rate while recording the water height in the well. The measured infiltration rate for the constant-head percolation test was calculated by dividing the total volume of water infiltrated by the total duration of the test and dividing by the percolation surface area.

Detailed results of the field testing data and measured infiltration rate for the test well are presented in Appendix B. The test results are summarized in the table below:

**Table 1 – Measured (Unfactored) Infiltration Rate**

| Test Well Designation | Approximate Depth of Test Zone (feet bgs) | Measured Infiltration Rate (inches per hour) |
|---|---|---|
| LP-1 | 5 to 10 | 0.06 |
| LP-2 | 5 to 10 | 40 |

Based the results of our field percolation testing that was performed at the site, the infiltration characteristics of the subsurface soils are highly variable at the locations and depths tested. The measured (unfactored) infiltration rate for the two (2) tests performed were 0.06 inch per hour (LP-1) and 40 inches per hour (LP-2), respectively. Based on the predominately fine-grained soils encountered within the percolation test zone for LP-2, there is a potential that the high infiltrate measured at this location does not represent the actual native soil conditions. There is a possibility that the borehole for LP-2 may have been adjacent to a utility trench or similar anomaly that led to the significantly higher infiltration rate.

According to the County of Los Angeles Department of Public Works (LADPW) *Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration* (LADPW, 2017), the infiltration rate measured at LP-1 does not meet the minimum feasibility requirements. Should stormwater infiltration be considered for the project, we recommend additional testing be performed at the specific location and depth of the planned infiltration device to confirm that infiltration will be feasible due to the high variability in test results.

## 2.5 Surface Fault Rupture

Our review of available literature indicates that no known active faults have been mapped across the site, and the site is **not** located within a currently established *Alquist-Priolo Earthquake Fault Zone* (Bryant and Hart, 2007). Therefore, a surface fault rupture hazard evaluation is not mandated for this site and the potential for surface fault rupture at the site is expected to be low.

The location of the closest active faults to the site was evaluated using the United States Geological Survey (USGS) Earthquake Hazards Program National Seismic

Hazard Maps (USGS, 2008). The closest active fault to the site with the potential for surface fault rupture is the Whittier-Elsinore fault, located approximately 4.9 miles from the site. The San Andreas fault, which is the largest active fault in California, is approximately 37 miles northeast of the site on the north side of the San Gabriel Mountains. Major regional faults with surface expression in proximity to the site are shown on Figure 4, *Regional Fault and Historic Seismicity Map*.

## 2.6 Strong Ground Shaking

The principal seismic hazard to the site is ground shaking resulting from an earthquake occurring along any of several major active and potentially active faults in southern California (Figure 4). The intensity of ground shaking at a given location depends primarily upon the earthquake magnitude, the distance from the source, and the site response characteristics.

Accordingly, design of the project should be performed in accordance with all applicable current codes and standards utilizing the appropriate seismic design parameters to reduce seismic risk as defined by California Geological Survey (CGS) Chapter 2 of Special Publication 117A (CGS, 2008). The 2019 edition of the California Building Code (CBC) is the current edition of the code. Through compliance with these regulatory requirements and the utilization of appropriate seismic design parameters selected by the design professionals, potential effects relating to seismic shaking can be reduced.

The following code-based seismic parameters should be considered for design under the 2019 CBC:

**Table 2 – 2019 CBC Based Ground Motion Parameters (Mapped Values)**

| Categorization/Coefficient | Code-Based |
|---|---|
| Site Latitude | 33.921399° |
| Site Longitude | -118.062595° |
| Site Class | D (default) |
| Mapped Spectral Response Acceleration at Short Period (0.2 sec), $S_S$ | 1.672 g |
| Mapped Spectral Response Acceleration at Long Period (1 sec), $S_1$ | 0.598 g |
| Short Period (0.2 sec) Site Coefficient, $F_a$ | 1.2 |
| Long Period (1 sec) Site Coefficient, $F_v$ | null[1] |
| Adjusted Spectral Response Acceleration at Short Period (0.2 sec), $S_{MS}$ | 2.007 g |
| Adjusted Spectral Response Acceleration at Long Period (1 sec), $S_{M1}$ | null[1] |
| Design Spectral Response Acceleration at Short Period (0.2 sec), $S_{DS}$ | 1.338 g |
| Design Spectral Response Acceleration at Long Period (1 sec), $S_{D1}$ | null[1] |
| Site-adjusted geometric mean Peak Ground Acceleration, $PGA_M$ | 0.862 g |

[1]Per Exception 2 in Section 11.4.8 of ASCE 7-16, seismic response coefficient $C_S$ to be determined by Eq. 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 Eq. 12.8-3 for $T_L \geq T > 1.5T_s$ or Eq. 12.8-4 for $T > T_L$

## 2.7 Liquefaction Potential

The term liquefaction is generally referenced to loss of strength and stiffness in soils due to build-up of pore water pressure when subject to cyclic or monotonic loading. Both sandy and clayey soils are susceptible to loss of strength and stiffness. Because of the difference in strength characteristic and methods for evaluating strength loss potential for granular and clayey soils, the term liquefaction is used for granular soils while cyclic softening is used for fine-grained soils (i.e. clays and plastic silts).

In general, adverse effects of liquefaction or cyclic softening include excessive ground settlement, loss of bearing support for structural foundations, and seismically-induced lateral ground deformations such as lateral spreading. Depending upon the relative thickness of the liquefied strata with respect to overlying non-liquefiable soils, other potentially adverse effects such as ground oscillation and ground fissuring may occur.

As shown on the *Seismic Hazard Zones* map for the Whittier Quadrangle (CGS, 1999), the project site is **not** located within a liquefaction hazard zone as identified by the State of California (Figure 5, *Seismic Hazard Map*). In addition, the site is underlain by Pleistocene aged alluvial sediments that are generally not considered to be susceptible to liquefaction, and current depth to groundwater is greater than 50 feet bgs. Based on these findings, the potential for liquefaction at the site is considered to be low.

## 2.8 Seismically-Induced Settlement

Seismically-induced settlement consists of dynamic settlement of unsaturated soil (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within low density sandy soil due to reduction in volume during and shortly after an earthquake event.

Based on our evaluation of the site soils, the total seismically-induced settlement is estimated to be less than ½ inch. The differential settlement can be taken as half the total settlement over a horizontal distance of 30 feet.

## 2.9 Lateral Spreading

Liquefaction may also cause lateral spreading. For lateral spreading to occur, the liquefiable zone must be continuous, unconstrained laterally, and free to move along gently sloping ground toward an unconfined area. Since the site is relatively flat and constrained laterally, earthquake-induced lateral spreading is not considered a hazard at the site.

## 2.10 Earthquake-Induced Landsliding

As shown on Figure 5, the site is **not** mapped within a seismically-induced landslide hazard zone identified by the State of California (CGS, 1999). In addition, due to project site being relatively flat, it is our opinion that the potential for seismically-induced landslide hazard at the site is negligible.

## 2.11 Flooding

According to a Federal Emergency Management Agency (FEMA) flood insurance rate map (FEMA, 2008a and 2008b), the project site is located within a flood hazard area identified as "Zone X", which is defined as an area of minimal flood hazard. As shown on Figure 6, *Flood Hazard Zone Map*, the site is **not** located within a 100- or 500-year flood hazard zone. Regionally, storm runoff flow is generally directed to the southwest.

Earthquake-induced flooding can be caused by failure of dams or other water-retaining structures as a result of earthquakes. The project site is **not** located within a flood impact zone from dam failure as indicated on Figure 7, *Dam Inundation Map*. Therefore, the risk of seismically-induced flooding due to dam failure is considered low.

## 2.12 Seiches and Tsunamis

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Tsunamis are waves generated in large bodies of water by fault displacement or major ground movement. Based on the absence of an enclosed water body near the site and the inland location of the site, seiche and tsunami risks at the site are considered negligible.

## 2.13 Methane

Based on review of State of California Geologic Energy Management Division (CalGEM) records, the project site is not located within a documented oil field (CalGEM, 2021). As shown on Figure 8, *Oil Well Location Map,* the nearest oil field is the Santa Fe Springs oil field located approximately 2,200 feet to the north of the project site. The nearest documented oil well is located approximately 460 feet north of the site (API# 0403705867; Shamrock Syndicate Lease, Well No. 1) and is reported as idle (CalGEM, 2021). Based on these findings, methane hazard at the site is considered low.

# 3.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

Based on this study, we conclude that the proposed development for the subject site is feasible from a geotechnical standpoint, provided that the recommendations presented in this report are properly incorporated in design and construction.

The proposed structural improvements may be supported on shallow spread-type foundations established in engineered fill. The floor slab may be supported directly on grade. There may be existing underground utilities that will also be impacted. Information on these utilities should be provided to Leighton for evaluation. All existing undocumented fill is recommended to be removed from below the proposed building footprint and other structural improvements prior to placement of engineered fill.

The recommendations below are based upon the exhibited geotechnical engineering properties of the soils and their anticipated response both during and after construction. The recommendations are also based upon proper field observation and testing during construction. The project geotechnical engineer should be notified of suspected variances in field conditions to determine the effect upon the recommendations subsequently presented. These recommendations are considered minimal and may be superseded by more restrictive requirements of the civil and structural engineers, the City of Santa Fe Springs, the County of Los Angeles and other governing agencies.

Leighton should review the grading plans, foundation plans and project specifications as they become available to verify that the recommendations presented in this report have been incorporated into the plans for this project.

## 3.1 Site Grading

All site grading should be performed in accordance with the applicable local codes and in accordance with the project specifications that are prepared by the appropriate design professional. Earthwork for the project is expected to include overexcavation and recompaction of existing fill soils below new improvement footprints. Leighton should review the final grading plan and landscape plan when it becomes available to verify the recommendations in this report.

### 3.1.1 Site Preparation

Prior to construction, the site should be cleared of any vegetation, trash, former foundation remnants and/or debris within the area of proposed grading. These materials should be removed from the site. Any underground obstructions onsite should be removed. Efforts should be made to locate any existing utility lines to be removed or rerouted where interfering with the proposed construction. Any resulting cavities should be properly backfilled and compacted. After the site is cleared, the soils should be carefully observed for the removal of all unsuitable deposits.

### 3.1.2 Removals and Overexcavations

To provide uniform foundation support and reduce the potential for excessive static settlement, all existing undocumented fill and any unsuitable soil, as deemed by the geotechnical engineer, should be removed to expose suitable native soils and replaced as engineered fill below the proposed building and other structural improvements. Based on our field explorations, we estimate removals of existing undocumented fill will be approximately 2 to 5 feet below existing grade across most of the site, with localized areas anticipated to require deeper removals.

Removals should be performed such that all undocumented fill is removed and replaced as engineered fill. In addition, overexcavations should be performed such that a minimum of 3 feet of engineered fill is established below the proposed foundation elements. The lateral extent of overexcavation beyond foundations should be equal to the depth of overexcavation below the proposed foundations. The depth of overexcavation in non-structural areas planned for new pavement construction is recommended to be 2 feet below the current grade or planned subgrade elevation to develop a suitable bearing subgrade for pavement support. Deeper overexcavations in localized areas may be recommended during grading by a representative of the geotechnical engineer depending on observed subsurface conditions.

### 3.1.3 Excavation Bottom Preparation

All excavation bottoms or removal bottoms should be observed by a representative of the geotechnical engineer prior to placement of fill or other improvements to determine that geotechnically suitable soil is exposed. Excavation bottoms observed to be suitable for fill placement or other improvements should be scarified to a depth of at least 8 inches, moisture-conditioned as necessary to achieve a moisture content of at least 2 percentage points above the optimum moisture content, and then compacted to a minimum of 90 percent of the laboratory derived maximum density as determined by ASTM Test Method D 1557 (Modified Proctor).

### 3.1.4 Fill Materials

On-site soil that is free of construction debris, organics, cobbles, boulders, rubble, or rock larger than 4-inches in largest dimension is suitable to be used as fill for support of structures. Any imported fill soil should be approved by the geotechnical engineer prior to import or use onsite.

### 3.1.5 Fill Placement and Compaction

Fill soils should be placed in loose lifts not exceeding 8 inches, moisture-conditioned to at least 2 percent above optimum moisture content, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction.

When grading is interrupted by heavy rains, fill operations should not be resumed until the moisture content and the dry density of the placed fill are satisfactory.

### 3.1.6 Shrinkage

The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Field and laboratory data used in our calculations included laboratory-measured maximum dry density for the general soil type encountered at the subject site, the measured in-place densities of near surface soils encountered and our experience.

Based upon the results of the in-place density and the moisture-density relationship exhibited by representative bulk samples of the near surface soils, recompaction of the soils is anticipated to result in volume shrinkage in the range of 10 to 15 percent. The estimated shrinkage does not include material losses due to removal of organic material or other unsuitable bearing materials (debris, rubble, oversize material greater than 6-inches) and the actual shrinkage that occurs during grading may vary throughout the site.

### 3.1.7 Reuse of Concrete and Asphalt Rubble

If encountered during site clearing and/or during preparation activities, construction rubble (i.e., Portland cement concrete and asphalt concrete) may be incorporated in the proposed development. For use as structural fill, the processed material should be crushed to develop a relatively well-graded mixture with a maximum particle size of 3-inch nominal diameter. Concrete rubble should be free of rebar; processed asphalt pavement rubble may be used if mixed with the existing base course (where present) and soils in proportion of 1 part processed asphalt to 3 parts soil. For use as pavement base course, rubble should be crushed to satisfy gradation requirements of Section 200-2.4 of the SSPWC. Such materials must be free of and segregated from any hazardous materials and/or organic material of any kind

## 3.2 Foundation Design

Conventional spread footings established in engineered fill may be used to support proposed structural elements. Footings should be embedded a minimum 12 inches below the lowest adjacent grade. An allowable soil bearing pressure of 3,000 pounds per square foot (psf) may be used for footings with a minimum width of 12 inches for continuous footings and 18 inches for isolated footings.

The ultimate bearing capacity can be taken as 9,000 psf, which does not incorporate a factor of safety. A resistance factor of 0.45 should be used for initial bearing capacity evaluation with factored loads.

The allowable bearing capacity for shallow footings is based on a total static settlement of ½ inch. Differential settlement can be taken as half the total settlement over a horizontal distance of 30 feet.

For static loading, 50 pounds per cubic inch (pci) may be assumed as the modulus of subgrade reaction (*k*). For seismic loading, a *k* value of 150 pci may be assumed.

Since settlement is a function of footing size and contact bearing pressure, differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists. Once developed by the structural engineer, we should review total dead and sustained live loads for each column including plan location and span distance, to evaluate if differential settlements between dissimilarly loaded columns will be tolerable. Excessive differential settlement can be mitigated with the use of reduced bearing pressures, deeper footing embedment, possibly changing overexcavation schemes and using imported base material under spread footings, or possibly other methods.

Resistance to lateral loads will be provided by a combination of friction between the soil and structure interface and passive pressure acting against the vertical portion of the footings structures. For calculating lateral resistance, a passive pressure of 300 psf per foot of depth to a maximum of 3,000 psf and a frictional coefficient of 0.30 may be used. Note that the passive and frictional coefficients do not include a factor of safety. The frictional resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

### 3.3 **Slabs-on-Grade**

Concrete slabs may be designed using a modulus of subgrade reaction of 100 pci provided the subgrade is prepared as described in Section 3.1. From a geotechnical standpoint, we recommend slab-on-grade be a minimum 5 inches thick with No. 3 rebar placed at the center of the slab at 24 inches on center in each direction. The structural engineer should design the actual thickness and reinforcement based on anticipated loading conditions. Where moisture-sensitive floor coverings or equipment is planned, the slabs should be protected by a minimum 10-mil-thick vapor barrier between the slab and subgrade. A coefficient of friction of 0.35 can be used between the floor slab and the vapor barrier.

Minor cracking of concrete after curing due to drying and shrinkage is normal and should be expected; however, concrete is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low-slump concrete or low water/cement ratios can reduce the potential for shrinkage cracking. Additionally, our experience indicates that the use of reinforcement in slabs and foundations can generally reduce the potential but not eliminate for concrete cracking.

To reduce the potential for excessive cracking, concrete slabs-on-grade should be provided with construction or weakened plane joints at frequent intervals. Joints should be laid out to form approximately square panels.

## 3.4 Cement Type and Corrosion Protection

Based on the results of laboratory testing, concrete structures in contact with the onsite soil are expected to have negligible exposure to water-soluble sulfates in the soil. Common Type II cement may be used for concrete construction onsite and the concrete should be designed in accordance with 2019 CBC requirements. However, concrete exposed to recycled water should be designed using Type V cement.

Based on our laboratory testing, the onsite soil is considered moderately corrosive to ferrous metals. Ferrous pipe should be avoided by using high-density polyethylene (HDPE) or other non-ferrous pipe when possible. Ferrous pipe, if used, should be protected by polyethylene bags, tap or coatings, di-electric fittings or other means to separate the pipe from onsite soils.

## 3.5 Retaining Walls

Recommended lateral earth pressures are provided as equivalent fluid unit weights, in psf/ft. or pcf. These values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Onsite soils are likely suitable to be used as retaining wall backfill due to its very low expansion potential; however, field and laboratory verification are recommended before use. Should site soil be considered for reuse behind retaining walls, it should be tested to ensure Expansion potential is less than 20 (EI<20). Recommended lateral earth pressures for retaining walls backfilled with sandy soils with drained conditions as shown on Figure 9, *Retaining Wall Backfill and Subdrain Detail* are as follows:

**Table 3 – Retaining Wall Design Earth Pressures**

| Retaining Wall Condition (Level Backfill) | Equivalent Fluid Pressure (pounds-per-cubic-foot)* |
|---|---|
| Active (cantilever) | 35 |
| At-Rest (braced) | 60 |
| Passive Resistance (compacted fill) | 300 |
| Seismic Increment (add to active pressure) | 20 |

Walls that are free to rotate or deflect may be designed using active earth pressure. For basement walls or walls that are fixed against rotation, the at-rest pressure should be used. For seismic condition, the pressure should be distributed as an inverted triangular distribution and the dynamic thrust should be applied at a height of 0.6H above the base of the wall.

### 3.5.1 Sliding and Overturning

Total depth of retained earth for design of walls and for uplift resistance, should be measured as the vertical height of the stem below the ground surface at the wall face for stem design, or measured at the heel of the footing for overturning and sliding. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing, if drained, or 60 pcf if submerged, for properly compacted backfill.

### 3.5.2 Drainage

Adequate drainage may be provided by a subdrain system positioned behind the walls. Typically, this system consists of a 4-inch minimum diameter perforated pipe placed near the base of the wall (perforations placed downward). The pipe should be bedded and backfilled with pervious backfill material described in Section 300-3.5.2 of the Standard Specifications for Public Works Construction (Green Book), 2018 Edition. This pervious backfill should extend at least 2 feet out from the wall and to within 2 feet of the outside finished grade. This pervious backfill and pipe should be wrapped in filter fabric, such as Mirafi 140N or equivalent, placed as described in Section 300-8.1 of the Standard Specifications for Public Works Construction (Green Book), 2018 Edition. The subdrain outlet should be connected to a free-draining outlet or sump.

Miradrain, Geotech Drainage Panels, or Enkadrain drainage geocomposites, or similar, may be used for wall drainage as an alternative to the Class 2 Permeable Material or drain rock backfill, particularly where horizontal space is limited adjacent to shoring (where walls are cast against shoring). These drainage panels should be connected to the perforated drainpipe at the base of the wall.

## 3.6 Paving

To provide support for paving, the subgrade soils should be prepared as recommended in the Section 3.1. Compaction of the subgrade, including trench backfills, to at least 90 percent of the maximum dry density as determined by ASTM Test Method D 1557, and achieving a firm, hard, and unyielding surface will be important for paving support. The preparation of the paving area subgrade should be performed immediately prior to placement of the base course.

Adequate drainage (both surface and subsurface) should be provided such that the subgrade soils and aggregate base materials are not allowed to become wet. Landscape areas must be separated from pavements with concrete curbs and/or edge drains. Excessive over-irrigation will have an adverse impact on adjacent pavements. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from paving, will result in premature pavement failure.

### 3.6.1 Asphalt Concrete

The required paving and base thicknesses will depend on the expected wheel loads and volume of traffic (Traffic Index or TI). Assuming that the paving subgrade will consist of engineered fill with an R-value greater than 25, compacted to at least 90 percent as recommended, the minimum recommended paving thicknesses are presented in the following table. Results of R-value testing on two (2) near surface samples of existing onsite soils indicate values of 25 and 50.

**Table 4 – Asphalt Concrete Pavement Sections**

| Traffic Index | Asphalt Concrete (inches) | Base Course (inches) |
|---|---|---|
| 5 | 3 | 8 |
| 6 | 4 | 8 |
| 7 | 4 | 12 |
| 8 | 5 | 12 |
| 9 | 6 | 14 |

The asphalt paving sections were determined using the Caltrans design method. We can determine the recommended paving and base course thicknesses for other Traffic Indices if required. Careful inspection is recommended to verify that the recommended thicknesses or greater are achieved, and that proper construction procedures are followed.

### 3.6.2 Portland Cement Concrete Paving

Concrete slabs-on-grade should be underlain by at least 2 feet of relatively non-expansive materials. We have assumed that the subgrade below paving will have an R-value of at least 25. Portland cement concrete (PCC) paving sections were determined in accordance with procedures developed by the Portland Cement Association. Concrete paving sections for a range of Traffic Indices are presented in the following table. We have assumed that the Portland cement concrete will have a compressive strength of at least 3,000 pounds per square inch.

**Table 5 – PCC Pavement Sections**

| Traffic Index | PCC (inches) |
|---|---|
| 5 | 6½ |
| 6 | 7 |
| 7 | 7½ |
| 8 | 8 |
| 9 | 8½ |

The paving should be provided with expansion joints at regular intervals no more than 15 feet in each direction. Load transfer devices, such as dowels or keys, are recommended at joints in the paving to reduce possible offsets.

The paving sections in the above table have been developed based on the strength of unreinforced concrete. Steel reinforcing and a 4-inch-thick aggregate base course layer under paving may be added to reduce cracking and to prolong the life of the paving.

### 3.6.3 Base Course

The base course for both asphalt concrete and Portland cement concrete paving should meet the specifications for Class 2 Aggregate Base as defined in Section 26 of the latest edition of the State of California, Department of Transportation, Standard Specifications. Alternatively, the base course could meet the specifications for untreated base as defined in Section 200-2 of the latest edition of the Standard Specifications for Public Works Construction. The base course should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM Test Method D 1557.

## 3.7 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations, and foundation excavations should be performed in accordance with project plans, specifications, and all OSHA requirements. Excavations 4 feet or deeper should be laid back or shored in accordance with OSHA requirements before personnel are allowed to enter.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the cut, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structure.

Temporary excavations should be treated in accordance with the State of California version of OSHA excavation regulations, Construction Safety Orders for Excavation General Requirements, Article 6, Section 1541, effective October 1, 1995. The sides of excavations should be shored or sloped in accordance with OSHA regulations. OSHA allows the sides of unbraced excavations, up to a maximum height of 20 feet, to be cut to a ¾H:1V (horizontal:vertical) slope for Type A soils, 1H:1V for Type B soils, and 1½H:1V for Type C soils. Near-surface onsite soils are to be considered Type B soils.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor shall be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

## 3.8 Trench Backfill

Utility trenches should be backfilled with compacted fill in accordance with Sections 306-1 and 306-6 of the Standard Specifications for Public Works Construction, ("Greenbook"), 2018 Edition. Utility trenches can be backfilled with onsite sandy material free of rubble, debris, organic and oversized material up to (≤) 3-inches in largest dimension. Prior to backfilling trenches, pipes should be bedded in and covered with either:

(1) **Sand:** A uniform, sand material that has a Sand Equivalent (SE) greater-than-or-equal-to (≥) 30, passing the No. 4 U.S. Standard Sieve (or as specified by the pipe manufacturer), water densified in place, or

(2) **CLSM:** Controlled Low Strength Material (CLSM) conforming to Section 201-6 of the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2018 Edition. CLSM should not be jetted.

Pipe bedding should extend at least 4 inches below the pipeline invert and at least 12 inches over the top of the pipeline. Native and clean fill soils can be used as backfill over the pipe bedding zone, and should be placed in thin lifts, moisture conditioned above optimum, and mechanically compacted to at least 90 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

## 3.9 Drainage and Landscaping

Building walls below grade should be waterproofed or at least damp proofed, depending upon the degree of moisture protection desired. Surface drainage should be designed to direct water away from foundations and toward approved drainage devices. Irrigation of landscaping should be controlled to maintain, as much as possible, consistent moisture content sufficient to provide healthy plant growth without overwatering.

## 3.10 Additional Geotechnical Services

Leighton should review the grading plans, foundation plans, and specifications when they are available to verify that the recommendations presented in this report have been properly interpreted and incorporated. In addition, should stormwater infiltration be considered for the project, we recommend additional testing be performed at the specific location and depth of the planned infiltration device to confirm that infiltration will be feasible due to the high variability in test results.

Geotechnical observation and testing should be provided during the following activities:

- Grading and excavation of the site;
- Subgrade Preparation;
- Compaction of all fill materials;
- Utility trench backfilling and compaction;
- Footing excavation and slab-on-grade preparation;
- Pavement subgrade and base preparation;
- Placement of asphalt concrete and/or concrete; and
- When any unusual conditions are encountered.

## 4.0 LIMITATIONS

This geotechnical exploration does not address the potential for encountering hazardous soil at this site. In addition, this report was necessarily based in part upon data obtained from a limited number of observances, site visits, soil samples, tests, analyses, histories of occurrences, spaced subsurface explorations and limited information on historical events and observations. Such information is, by necessity, incomplete. Please also refer GBA's *Important Information About Your Geotechnical Report* (included at the rear of the text), presenting additional information and limitations regarding geotechnical engineering studies and reports. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report are only valid if Leighton Consulting, Inc. has the opportunity to observe subsurface conditions during grading and construction, to confirm that our data are representative for the site. Leighton Consulting, Inc. should also review the construction plans and project specifications, when available, to comment on the geotechnical aspects.

This report was prepared using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing at this time in Los Angeles County. We do not make any warranty, either expressed or implied.

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# Important Information about This
# Geotechnical-Engineering Report

**Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.**

**While you cannot eliminate all such risks, you can manage them. The following information is provided to help.**

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

## Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

*Do not rely on this report* if your geotechnical engineer prepared it:
- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

## You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:
- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

## Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

## This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

## This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

## Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

## Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

## Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

## Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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FIGURES

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|---|---|
| Project: 13062.001 | Eng/Geol: CCK/JMP |
| Scale:1 " = 2,000 ' | Date: April 2021 |

Base Map: ESRI ArcGIS Online 2021
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

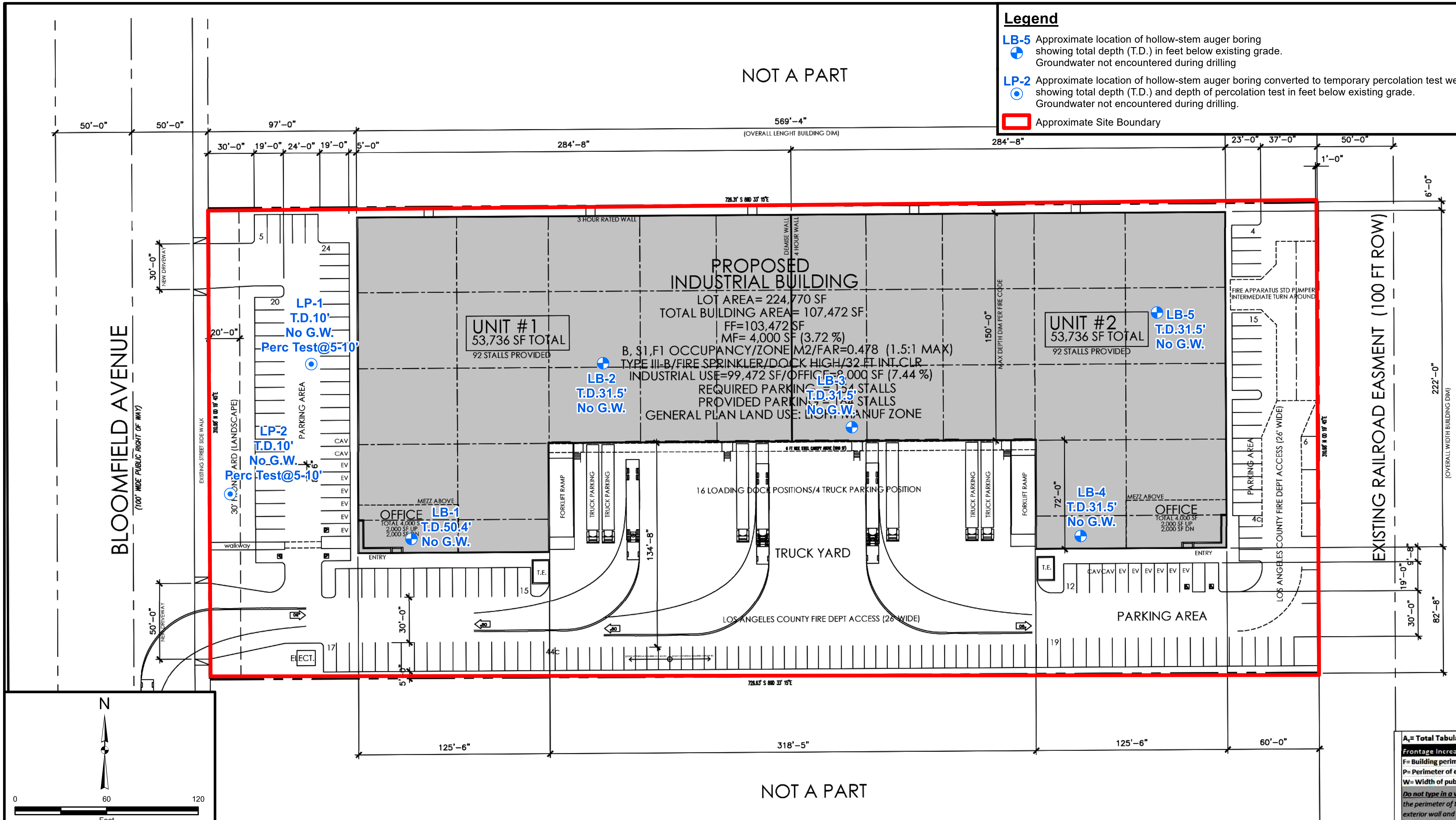
# SITE LOCATION MAP

12118 Bloomfield Avenue
Santa Fe Springs, California

Figure 1

Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F01_SLM_2021-04-02.mxd on 3/5/2021 4:17:02 PM




| | |
|---|---|
| Project: 13062.001 | Eng/Geol: CCK/JMP |
| Scale: 1 " = 60 ' | Date: April 2021 |

Base Map: Conceptual Site Plan, Sheet A1-0 from Rexford Construction, Dated 12/28/2020

Author: Leighton Geomatics (btran)

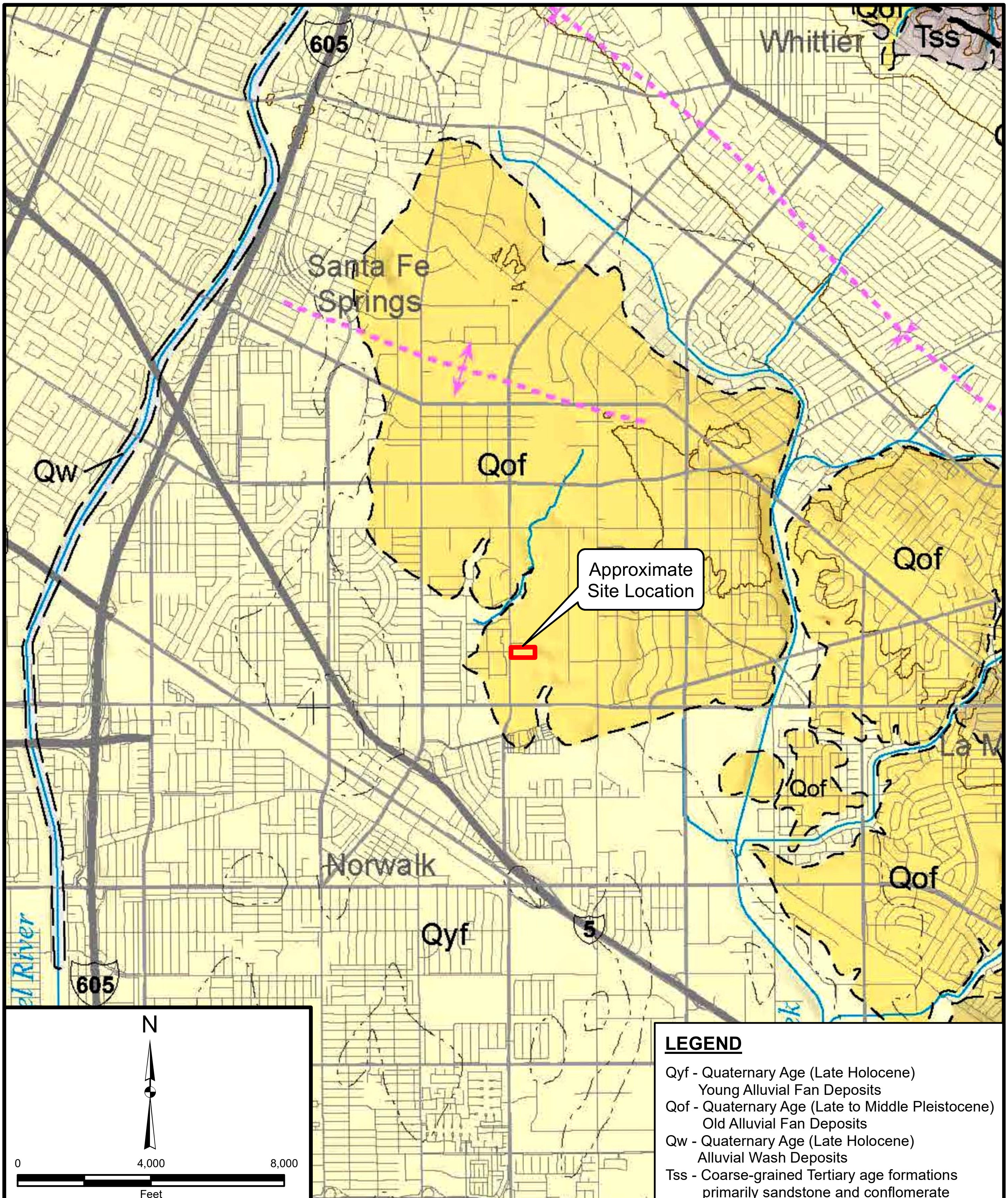
# EXPLORATION LOCATION MAP

12118 Bloomfield Avenue
Santa Fe Springs, California

Figure 2

Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F02_ELM_PDF-BASE_2021-04-02.mxd on 4/2/2021 3:13:22 PM




## LEGEND

Qyf - Quaternary Age (Late Holocene) Young Alluvial Fan Deposits

Qof - Quaternary Age (Late to Middle Pleistocene) Old Alluvial Fan Deposits

Qw - Quaternary Age (Late Holocene) Alluvial Wash Deposits

Tss - Coarse-grained Tertiary age formations primarily sandstone and conflomerate

| | | |
|---|---|---|
| Project: 13062.001 | Eng/Geol: CCK/JMP | Figure 3 |
| Scale:1 " = 4,000 ' | Date: April 2021 | |

Base Map: Geologic Compilation of Quaternary Surficial Deposits in Southern California, Orange County, July 2010

Thematic Information: Leighton, USGS

Author: Leighton Geomatics (btran)

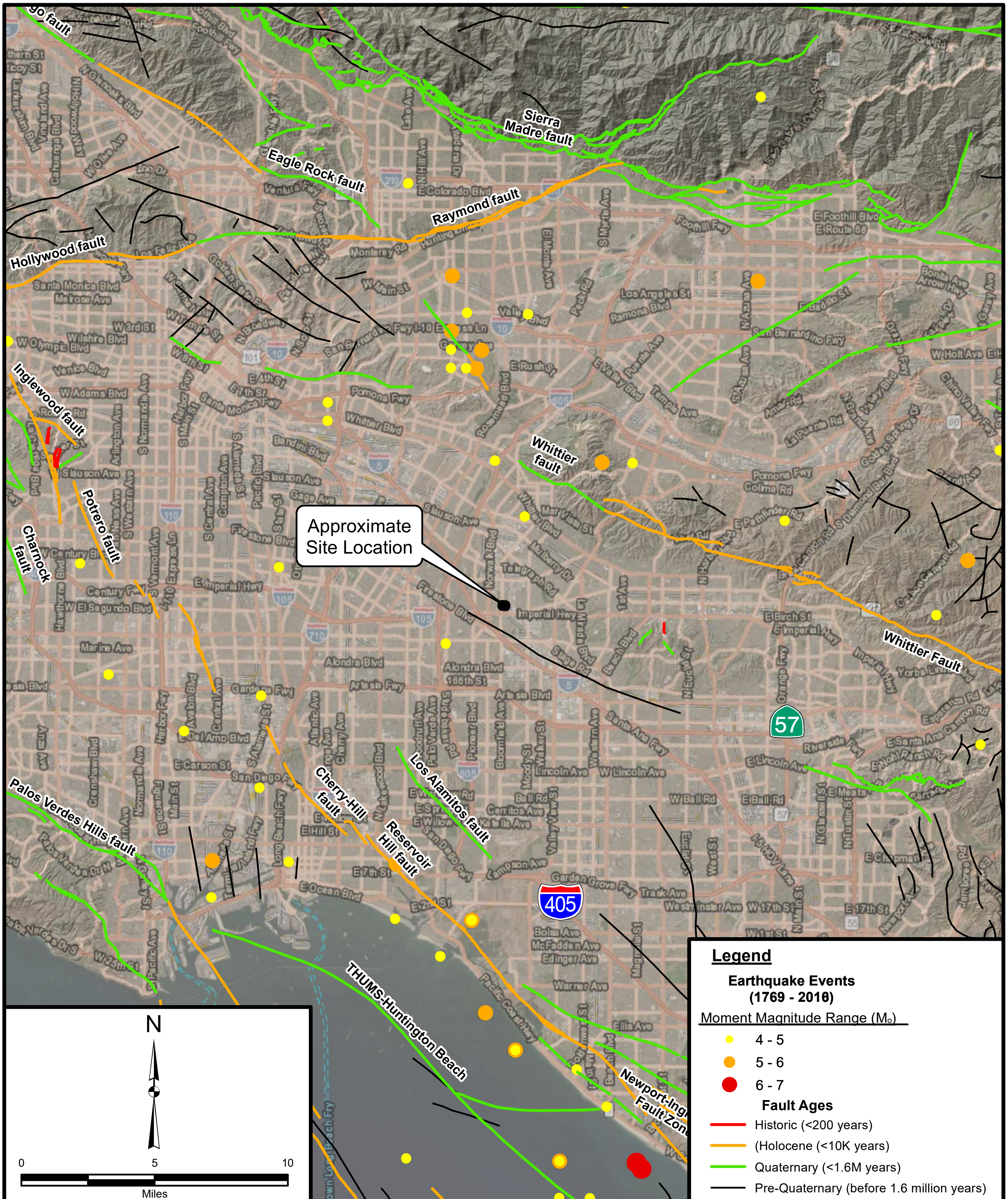
# REGIONAL GEOLOGY MAP

12118 Bloomfield Avenue

Santa Fe Springs, California

Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F03_RGM_2021-04-02.mxd on 3/5/2021 1:48:07 PM




| | |
|---|---|
| Project: 13062.001 | Eng/Geol: CCK/JMP |
| Scale:1 " = 5 miles | Date: April 2021 |

Base Map: ESRI ArcGIS Online 2021
Thematic Information: Leighton, Bryant, W. A. (compiler), 2005, Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0: CGS, USGS, SCEC.
Author: Leighton Geomatics (btran)

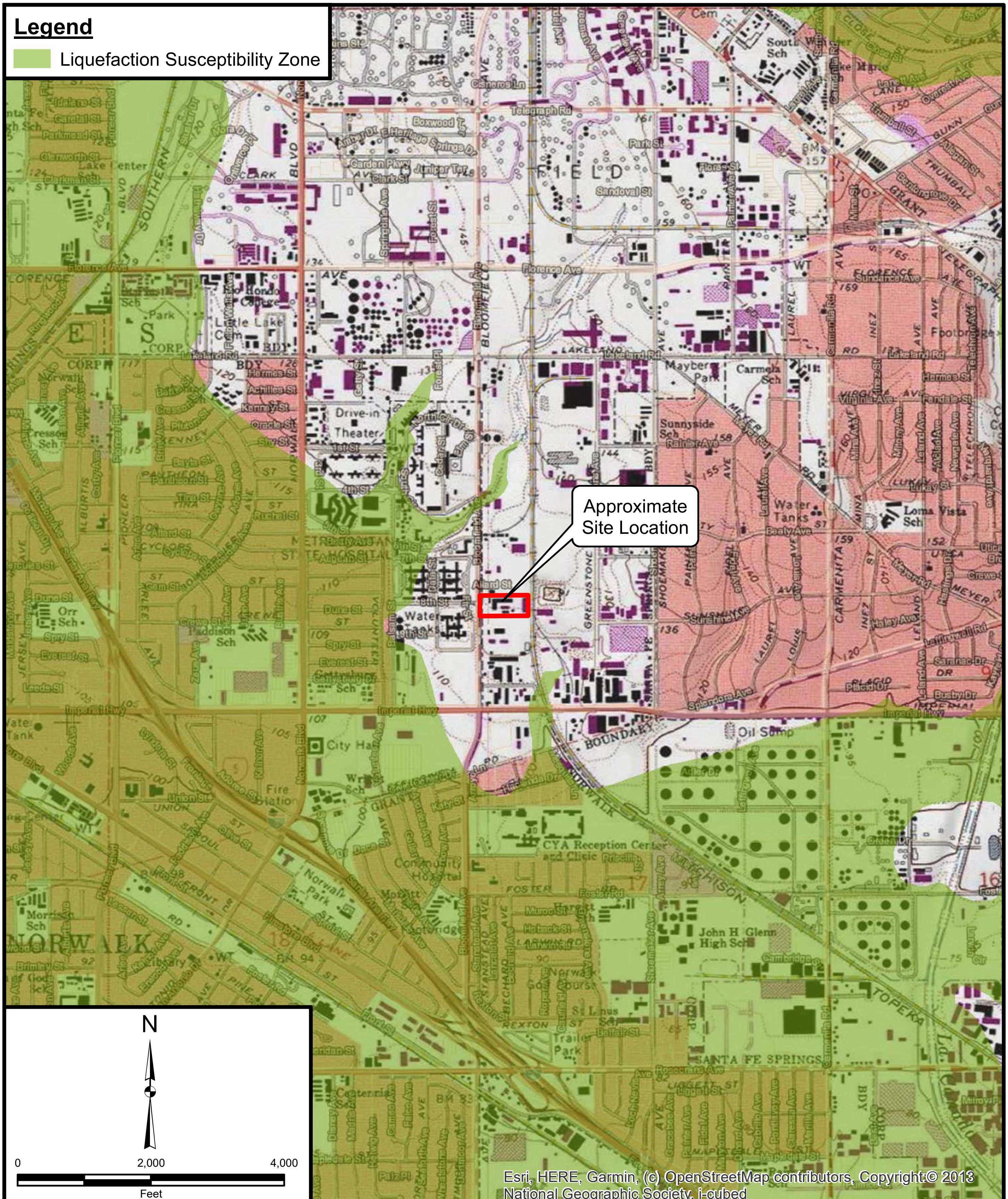
# REGIONAL FAULT AND HISTORICAL SEISMICITY MAP

12118 Bloomfield Avenue
Santa Fe Springs, California

Figure 4

Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F04_RF&HSM_2021-04-02.mxd on 3/5/2021 4:18:19 PM




| Project: 13062.001 | Eng/Geol: CCK/JMP |
|---|---|
| Scale:1 " = 2,000 ' | Date: April 2021 |

Base Map: ESRI ArcGIS Online 2021
Thematic Information: Leighton, CGS
Author: Leighton Geomatics (btran)

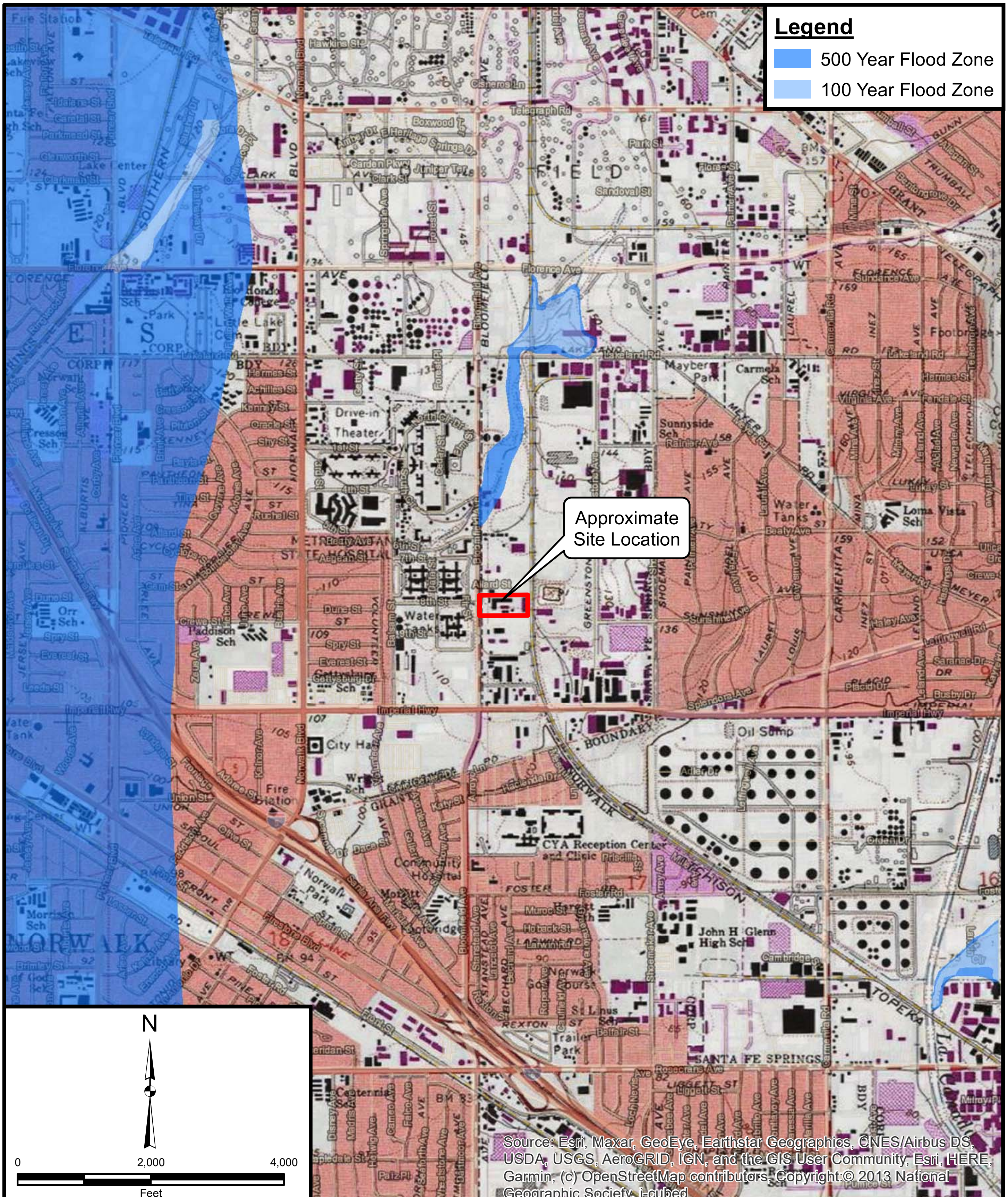
Figure 5

# SEISMIC HAZARD MAP

12118 Bloomfield Avenue
Santa Fe Springs, California

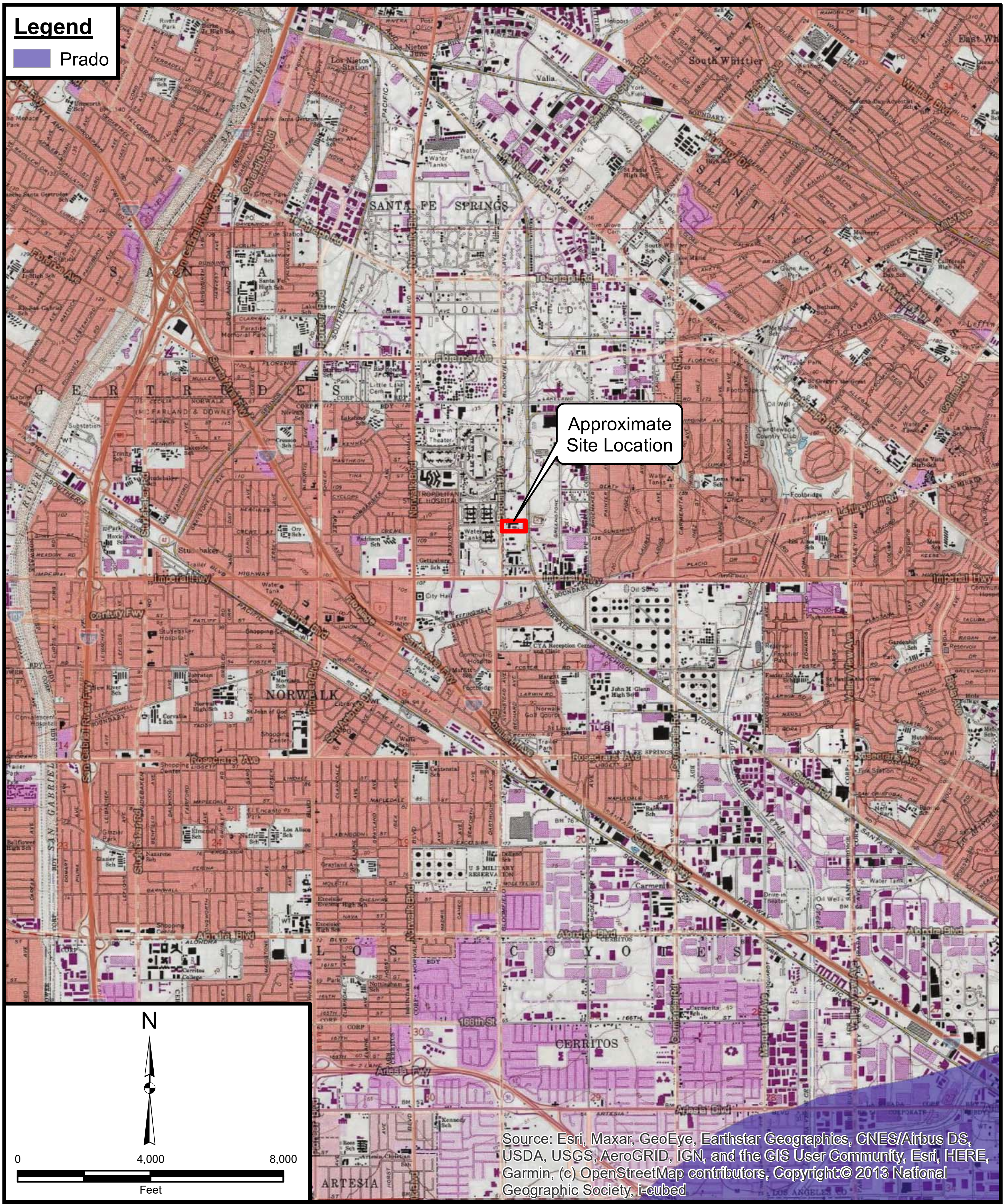
Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F05_SHM_2021-04-02.mxd on 3/5/2021 4:18:45 PM




| | | | |
|---|---|---|---|
| Project: 13062.001 | Eng/Geol: CCK/JMP | FLOOD HAZARD ZONE MAP<br>12118 Bloomfield Avenue<br>Santa Fe Springs, California | Figure 6 |
| Scale:1 " = 2,000 ' | Date: April 2021 | | Leighton |
| Base Map: ESRI ArcGIS Online 2021<br>Thematic Information: Leighton, CA DWR, FEMA<br>Author: Leighton Geomatics (btran) | | | |

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F06_FHM_2021-04-02.mxd on 3/5/2021 1:20:01 PM




| | |
|---|---|
| Project: 13062.001 | Eng/Geol: CCK/JMP |
| Scale:1 " = 4,000 ' | Date: April 2021 |

Base Map: ESRI ArcGIS Online 2021
Thematic Information: Leighton, CA DWR, FEMA
Author: Leighton Geomatics (btran)

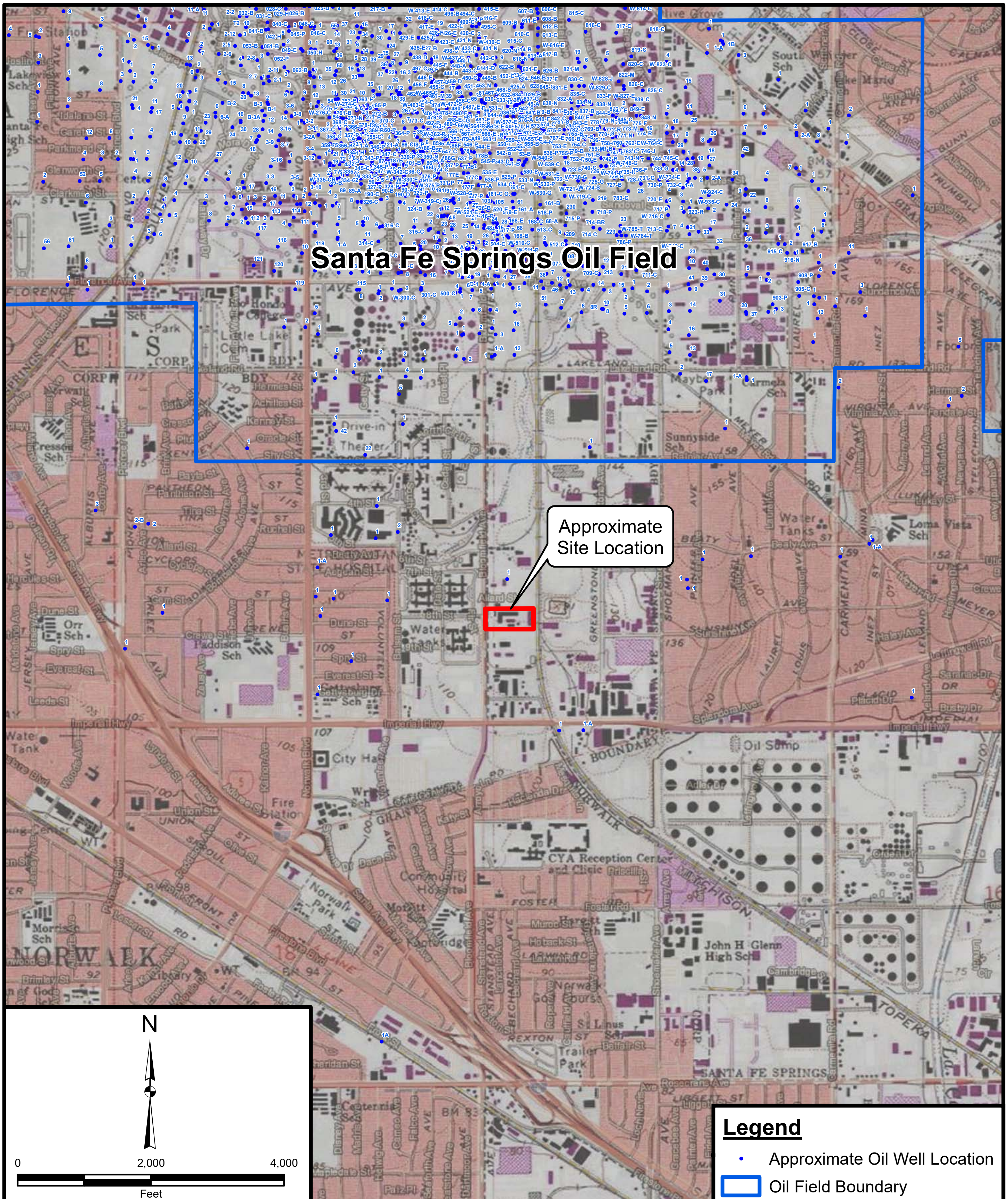
# DAM INUNDATION MAP

12118 Bloomfield Avenue
Santa Fe Springs, California

Figure 7

Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F07_DIM_2021-04-02.mxd on 3/5/2021 1:23:45 PM




| Project: 13062.001 | Eng/Geol: CCK/JMP |
| --- | --- |
| Scale: 1 " = 2,000 ' | Date: April 2021 |

Base Map: ESRI ArcGIS Online 2021
Thematic Information: Leighton, CA DWR, FEMA
Author: Leighton Geomatics (btran)

# OIL WELL LOCATION MAP

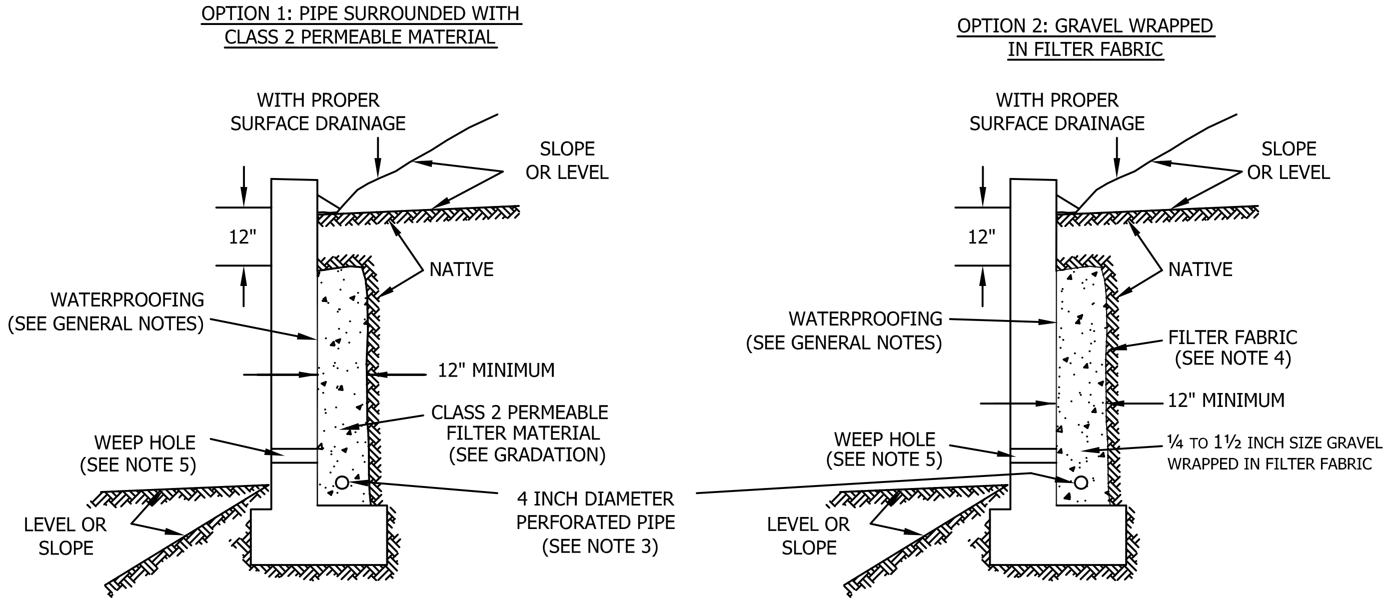
12118 Bloomfield Avenue
Santa Fe Springs, California

Figure 8

Leighton

Map Saved as V:\Drafting\13062\001\Maps\13062-001_F08_OWLM_2021-04-02.mxd on 4/2/2021 3:02:29 PM

## SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50




Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

| Sieve Size | Percent Passing |
|---|---|
| 1" | 100 |
| 3/4" | 90-100 |
| 3/8" | 40-100 |
| No. 4 | 25-40 |
| No. 8 | 18-33 |
| No. 30 | 5-15 |
| No. 50 | 0-7 |
| No. 200 | 0-3 |

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent.  Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals.  If exposure is permitted, weepholes should be located 12 inches above finished grade.  If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6)  Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7)  Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

# RETAINING WALL BACKFILL AND SUBDRAIN DETAIL FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

Leighton
FIGURE 9

P:Drafting\templates\details\retain-wall-backfill-and subdrain.dwg (7/00)

APPENDIX A

EXPLORATION LOGS

# GEOTECHNICAL BORING LOG LB-1

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

**SOIL DESCRIPTION**

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 125 | 0 | | | | | | | | @0': 5-inches Asphalt Concrete over Subgrade. | |
| | | | | B-1 | | | | ML | **Artificial Fill, undocumented (Afu):** @0.42': Sandy SILT, dark brown, moist, fine sand. | CN, CR DS, EI Mx, RV |
| | | | | | | | | SM-ML | **Quaternary Old Alluvial Fan Deposits (Qof)** @2': Sandy SILT to Silty SAND, strong brown, moist, fine to coarse sand. | |
| 120 | 5 | | | R-1 | 5 9 12 | | | CL | @5': Sandy CLAY, strong brown, slightly moist, stiff, fine to medium sand, some coarse sand. | AL, CN, DS |
| | | | | | | | | SC | @6.33': Grades to Clayey SAND, medium dense, fine sand. | |
| 115 | 10 | | | S-1 | 3 6 9 | | 14 | CL | @10': CLAY, dark reddish brown, moist, stiff, trace very fine to fine sand, some MnO spots, weak blocky structure. | AL |
| 110 | 15 | | | R-2 | 18 22 25 | | | ML | @15': SILT, mottled olive grey and reddish brown, slightly moist, hard, very fine to fine sand, pinhole pores, CaCO3 veins and pockets. | CN, DS |
| 105 | 20 | | | S-2 | 9 13 16 | | 5 | SP | @20': SAND, olive brown, moist, medium dense, fine sand, pinhole pores, cemented, becoming pervasively FeO-stained by 20.5' to become dark orange brown, less well cemented, trace medium to coarse sand. | |
| 100 | 25 | | | R-3 | 16 31 45 | 106 | 3 | | @25': SAND, greyish brown, moist, very dense, with FeO-staining, predominantly fine sand, trace medium to coarse sand, grading coarser to some medium sand. | |
| 95 | 30 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

# GEOTECHNICAL BORING LOG LB-1

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | **SOIL DESCRIPTION** *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.* | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 30 | | | S-3 | 8<br>14<br>10 | | 7 | | @30': SAND, grey-brown, moist, medium dense, predominantly fine sand, few medium to coarse sand, grading slightly coarser. | |
| | | | | | | | | SP-GP<br>ML | @31.25': SAND with gravel, grey-brown, moist, fine to medium sand, some coarse sand, fine gravel.<br>@31.33': SILT, olive grey, slightly moist, very stiff, laminated, with FeO-stained and CaCO3-impacted laminations. | |
| 90 | 35 | | | R-4 | 4<br>10<br>24 | 112 | 18 | SC | @35': Clayey SAND, olive grey to olive brown, moist, medium dense, predominantly fine sand, some medium to coarse sand, trace to few fine gravel. | |
| 85 | 40 | | | S-4 | 4<br>7<br>14 | | 17 | ML | @40': Sandy SILT with clay, olive grey, moist, very stiff, very fine sand, some CaCO3 pockets, grading to SILT with sand, olive grey, with abundant FeO-stained orange veins and blebs, moist, very stiff, very fine sand, no CaCO3. | |
| 80 | 45 | | | R-5 | 12<br>22<br>33 | 116 | 15 | SM-ML | @45': Interbedded Sandy SILT and Silty SAND, olive and olive brown, respectively, moist, hard/very dense, very fine to fine sand, CaCO3 nodules, trace coarse sand and fine gravel, FeO stains. | |
| 75 | 50 | | | S-5 | 50/5" | | 18 | GC | @50': Pieces of broken rock surrounded by dark reddish brown CLAY. | |
| | | | | | | | | | **Total Depth: 50.4' bgs**<br>**No groundwater encountered during drilling**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| 70 | 55 | | | | | | | | | |
| 65 | 60 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

# GEOTECHNICAL BORING LOG LB-2

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

**SOIL DESCRIPTION**

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

Graphic Log: N S

| Elevation Feet | Depth Feet | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | Soil Description | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|
| 125 | 0 | | B-1 | | | | ML | @0': 4-inches Asphalt Concrete over Subgrade.<br>**Artificial Fill, undocumented (Afu):**<br>@0.33': Sandy SILT, dark brown, moist, fine sand. | |
| | | | | | | | SC-CL | **Quaternary Old Alluvial Fan Deposits (Qof)**<br>@2': Sandy CLAY to Clayey SAND, orange brown, moist, fine to coarse sand. | |
| 120 | 5 | | S-1 | 3<br>6<br>11 | | 12 | CL | @5': Sandy CLAY to CLAY with sand, dark brown, moist, very stiff, predominantly fine sand, some medium to coarse sand with waxy clay films, massive. | |
| 115 | 10 | | R-1 | 8<br>28<br>28 | 106 | 26 | SP-SC<br>SC<br>ML | @10': SAND with gravel and clay, orange brown, dense, moist, fine to medium sand, some coarse sand, fine gravel.<br>@11': Grades to Clayey SAND, dark reddish brown, moist, fine to coarse sand, few fine gravel.<br>@11.25': Sandy SILT, mottled olive brown and olive grey, moist, hard, laminated, fine sand. | |
| 110 | 15 | | S-2 | 5<br>11<br>12 | | 13 | | @15': Sandy SILT, olive brown, moist, very stiff, fine sand, massive. | |
| 105 | 20 | | R-2 | 9<br>21<br>50/5" | 100 | 27 | ML<br>SM | @20': SILT, mottled olive and reddish brown, hard, with MnO spotting.<br>@21.25': Silty SAND, grey brown, moist, very dense, fine sand. | |
| 100 | 25 | | S-3 | 6<br>17<br>23 | | 3 | | | |
| 95 | 30 | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

# GEOTECHNICAL BORING LOG LB-2

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.* | |
| 95 | 30 | | | R-3 | 14<br>15<br>50/6" | 118 | 8 | ML | @30': SILT, mottled olive and reddish brown, hard, with MnO spotting and CaCO3 nodules. | |
| | | | | | | | | SP-SM | @31.33': SAND to Silty SAND, grey-brown, moist, very dense, fine sand. | |
| | | | | | | | | | **Total Depth: 31.5' bgs**<br>**No groundwater encountered during drilling**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| 90 | 35 | | | | | | | | | |
| 85 | 40 | | | | | | | | | |
| 80 | 45 | | | | | | | | | |
| 75 | 50 | | | | | | | | | |
| 70 | 55 | | | | | | | | | |
| 65 | 60 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

# GEOTECHNICAL BORING LOG LB-3

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

**SOIL DESCRIPTION**

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | Soil Description | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 125 | 0 | | | | | | | | @0': 4-inches Asphalt Concrete over 2-inches Aggregate Base. | |
| | | | | B-1 | | | | SM | **Artificial Fill, undocumented (Afu):** @0.5': Silty SAND with clay, reddish brown, moist, fine sand. | |
| | | | | | | | | CL | **Quaternary Old Alluvial Fan Deposits (Qof)** @2': Sandy CLAY, reddish brown, moist, predominantly fine sand, some medium sand. | |
| 120 | 5 | | | R-1 | 7<br>10<br>14 | 116 | 14 | SC-CL | @5': Very stiff, with trace to few coarse sand, grading between Sandy CLAY and Clayey SAND. | |
| 115 | 10 | | | S-1 | 3<br>10<br>17 | | 16 | ML | @10': Sandy SILT, olive brown, slightly moist to moist, very stiff, very fine sand, grades less sandy, gains FeO stains and some CaCO3 veins. | |
| 110 | 15 | | | R-2 | 13<br>21<br>22 | 97 | 16 | SM-ML | @15': Interbedded Sandy SILT and Silty SAND, olive brown, moist, very stiff/medium dense, very fine sand, some FeO staining and FeO-filled or lined pinhole pores. | |
| 105 | 20 | | | S-2 | 5<br>13<br>15 | | 3 | SP | @20': SAND, grayish brown, moist, medium dense, predominantly fine sand, some medium sand, trace to few coarse sand, trace fine gravel, patchy yellow (FeO) staining. | |
| 100 | 25 | | | R-3 | | 108 | 3 | | @25': Dense. | |
| | | | | | 16<br>31<br>22 | | | ML | @26.5': SILT with clay, olive brown, slightly moist to moist, pervasive FeO and MnO spots. | |
| 95 | 30 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

# GEOTECHNICAL BORING LOG LB-3

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 30 | | | S-3 | 5<br>13<br>15 | | 13 | CL-ML | @30': Silty CLAY to Clayey SILT, olive brown, moist, very stiff, with 3-inches broken limestone, then SILT, olive, moist, very stiff, FeO staining. | |
| | | | | | | | | | **Total Depth: 31.5' bgs**<br>**No groundwater encountered during drilling**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| 90 | 35 | | | | | | | | | |
| 85 | 40 | | | | | | | | | |
| 80 | 45 | | | | | | | | | |
| 75 | 50 | | | | | | | | | |
| 70 | 55 | | | | | | | | | |
| 65 | 60 | | | | | | | | | |

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

# GEOTECHNICAL BORING LOG LB-4

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.* | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 125 | 0 | | | | | | | | @0': 4-inches Asphalt Concrete over 6-inches Aggregate Base. | |
| | | | | B-1 | | | | SM | **Quaternary Old Alluvial Fan Deposits (Qof)**<br>@0.83': Silty SAND, dark reddish brown, moist, fine sand, few to some clay. | |
| 120 | 5 | | | S-1 | 5<br>9<br>11 | | 13 | CL | @5': Sandy CLAY with silt, dark reddish brown, moist, very stiff, fine sand, fine sand, few pinhole pores, trace medium sand. | |
| 115 | 10 | | | R-1 | 3<br>3<br>6 | 102 | 8 | SP-SM | @10': SAND with silt to Silty SAND, olive brown, slightly moist, loose, fine sand, few CaCO3 nodules. | |
| 110 | 15 | | | S-2 | 9<br>13<br>17 | | 6 | SP | @15': SAND, olive brown, moist, medium dense, fine sand, with FeO-stained zones and few CaCO3 veins. | |
| 105 | 20 | | | R-2 | 11<br>23<br>28 | 105 | 7 | SP | @20': SAND to SAND with silt, grey with regions of pervasive red-orange FeO staining, moist, dense, fine sand, trace CaCO3 intergranular pockets. | |
| 100 | 25 | | | S-3 | 7<br>14<br>19 | | 9 | ML<br>SP-GP<br>SP | @25': Sandy SILT, olive brown, moist, hard, laminated, fine sand.<br>@25.2': Gravelly SAND, dark yellowish brown, moist, dense, fine to coarse sand, fine gravel.<br>@25.33': SAND, dark yellowish brown, moist, dense, fine to medium sand, some coarse sand, few fine gravel, FeO-stained thin beds. | |
| 95 | 30 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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# GEOTECHNICAL BORING LOG LB-4

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 125' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 30 | | | R-3 | 16<br>29<br>26 | 107 | 5 | | @30': SAND, grayish brown, moist, dense, fine sand, trace to few medium sand, cemented. | |
| | | | | | | | | SC | @31.4': Clayey SAND, dark grey brown, slightly moist to moist, dense, predominantly fine sand, indistinct bedding, with few Sandy CLAY laminations and trace charcoal or decomposed organic matter. | |
| | | | | | | | | | **Total Depth: 31.5' bgs**<br>**No groundwater encountered during drilling**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| 90 | 35 | | | | | | | | | |
| 85 | 40 | | | | | | | | | |
| 80 | 45 | | | | | | | | | |
| 75 | 50 | | | | | | | | | |
| 70 | 55 | | | | | | | | | |
| 65 | 60 | | | | | | | | | |

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

# GEOTECHNICAL BORING LOG LB-5

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 124' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

**SOIL DESCRIPTION**

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

| Elevation Feet | Depth Feet | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | Soil Description | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | | B-1 | | | | SM | @0': 3-inches Asphalt Concrete over Subgrade.<br>**Artificial Fill, undocumented (Afu):**<br>@0.25': Silty SAND, dark brown, moist, fine to medium sand, some coarse sand. | CN, CR DS, EI Mx, RV |
| | | | | | | | SC | **Quaternary Old Alluvial Fan Deposits (Qof)**<br>@2': Clayey SAND, orange brown, slightly moist, fine sand. | |
| 120 | 5 | | R-1 | 4<br>5<br>8 | 113 | 10 | | @5': Loose, with pinhole pores, CaCO3 veins, variable clay content, few beds of Clayey SAND. | CN, DS |
| 115 | 10 | | S-1 | 8<br>15<br>20 | | 14 | ML<br>SM | @10': Sandy SILT, light grey brown, slightly moist, hard, very fine to fine sand, pervasive CaCO3 veins, fine gravel-sized limestone clasts, some pinhole pores, few MnO-lined.<br>@11': Grades to Silty SAND, grey-brown, slightly moist, dense fine sand. | |
| 110 | 15 | | R-2 | 20<br>43<br>50/5" | 108 | 17 | ML | @15': Sandy SILT, olive grey, slightly moist, hard, with regions of pervasive MnO-spotting, FeO-staining, CaCO3 veins and blebs, few pinhole pores. | |
| 105 | 20 | | S-2 | 6<br>16<br>22 | | 8 | SP-SC<br>SP | @20': SAND with clay, olive grey, slightly moist, dense, fine sand, abundant CaCO3, especially in laminations of brown CLAY.<br>@20.43': SAND, grey brown, moist, dense, predominantly fine sand, few medium sand, trace coarse sand. | |
| 100 | 25 | | R-3 | 7<br>16<br>28 | 115 | 17 | ML | @25': Clayey Sandy SILT, mottled reddish brown and olive grey, moist to very moist, fine sand, pervasive FeO stains, MnO spotting and regions of CaCO3 veins and nodules, few to some FeO-lined pores. | |
| 95 | 30 | | | | | | | | |

Graphic Log: N S

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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# GEOTECHNICAL BORING LOG LB-5

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 124' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

**SOIL DESCRIPTION**

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| | 30 | | | S-3 | 5<br>10<br>12 | | 13 | ML | @30': Sandy SILT, grayish brown, moist, very stiff, very fine sand, regions of abundant CaCO3 nodules, grades less sandy to SILT with sand. | |
| 90 | | | | | | | | | **Total Depth: 31.5' bgs**<br>**No groundwater encountered during drilling**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| | 35 | | | | | | | | | |
| 85 | | | | | | | | | | |
| | 40 | | | | | | | | | |
| 80 | | | | | | | | | | |
| | 45 | | | | | | | | | |
| 75 | | | | | | | | | | |
| | 50 | | | | | | | | | |
| 70 | | | | | | | | | | |
| | 55 | | | | | | | | | |
| 65 | | | | | | | | | | |
| | 60 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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# GEOTECHNICAL BORING LOG LP-1

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 124' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

**SOIL DESCRIPTION**

*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 124 | 0 | | | | | | | | @0': 5-inches Asphalt Concrete over Subgrade. | |
| | | | | B-1 | | | | SM-ML | **Artificial Fill, undocumented (Afu):** @0.42': Sandy SILT to Silty SAND, strong brown, slightly moist, predominantly fine sand, some medium sand, trace to few coarse sand, few clay. | |
| 120 | 5 | | | | | | | | | |
| | | | | S-1 | 6<br>9<br>12 | | 11 | CL | **Quaternary Old Alluvial Fan Deposits (Qof)** @5.25': Sandy CLAY, strong brown, slightly moist, very stiff, predominantly fine to medium sand, some coarse sand with waxy clay film, fine root hairs. | |
| 115 | | | | S-2 | 5<br>10<br>8 | | 15 | ML | @8.5': Sandy SILT, mottled olive reddish brown, slightly moist, very stiff, very fine sand, FeO and MnO spots and veins, few clayey pockets. | |
| | 10 | | | | | | | | **Total Depth: 10' bgs**<br>**No groundwater encountered during drilling**<br>**Boring converted to temporary percolation well**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| 110 | 15 | | | | | | | | | |
| 105 | 20 | | | | | | | | | |
| 100 | 25 | | | | | | | | | |
| 95 | 30 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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# GEOTECHNICAL BORING LOG LP-2

| | | | |
|---|---|---|---|
| **Project No.** | 13062.001 | **Date Drilled** | 3-3-21 |
| **Project** | Rexford Bloomfield | **Logged By** | KMD |
| **Drilling Co.** | Martini Drilling Co. | **Hole Diameter** | 8" |
| **Drilling Method** | Hollow Stem Auger - 140lb - Autohammer - 30" Drop | **Ground Elevation** | 123' |
| **Location** | 12118 Bloomfield Avenue, Santa Fe Springs | **Sampled By** | KMD |

| Elevation Feet | Depth Feet | Graphic Log (N S) | Attitudes | Sample No. | Blows Per 6 Inches | Dry Density pcf | Moisture Content, % | Soil Class. (U.S.C.S.) | SOIL DESCRIPTION<br>*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.* | Type of Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | | | | @0': 4-inches Asphalt Concrete over Subgrade. | |
| | | | | B-1 | | | | SM-ML | **Artificial Fill, undocumented (Afu):**<br>@0.33': Sandy SILT to Silty SAND, strong brown, slightly moist, predominantly fine sand, few clay. | |
| 120 | 5 | | | | | | | | | |
| | | | | S-1 | 5<br>9<br>10 | | 10 | CL | **Quaternary Old Alluvial Fan Deposits (Qof)**<br>@5': Sandy Silty CLAY, strong brown, slightly moist, very stiff, fine to medium sand, massive. | |
| 115 | | | | S-2 | 1<br>2<br>1 | | 16 | ML | @8.5': Sandy SILT, olive, slightly moist, soft, very fine sand, minor MnO spotting. | |
| | 10 | | | | | | | | **Total Depth: 10' bgs**<br>**No groundwater encountered during drilling**<br>**Boring converted to temporary percolation well**<br>**Boring backfilled with soil cuttings, surface patched with cold-mix asphalt concrete.** | |
| 110 | 15 | | | | | | | | | |
| 105 | 20 | | | | | | | | | |
| 100 | 25 | | | | | | | | | |
| 95 | 30 | | | | | | | | | |

**SAMPLE TYPES:**
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

**TYPE OF TESTS:**
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

# APPENDIX B

# PERCOLATION TEST DATA

## Boring Percolation Test Data Sheet

| | | | |
|---|---|---|---|
| **Project Number:** | 13062.001 | **Test Hole Number:** | LP-1 |
| **Project Name:** | Rexford Bloomfield Ave. | **Date Excavated:** | 3/3/2021 |
| **Earth Description:** | Alluvium | **Date Tested:** | 3/4/2021 |
| **Liquid Description:** | Tap water | **Depth of boring (ft):** | 10 |
| **Tested By:** | KMD | **Radius of boring (in):** | 4 |
| **Time Interval Standard** | | **Radius of casing (in):** | 1 |
| **Start Time for Pre-Soak:** | 7:36 | **Length of slotted of casing (ft):** | 5 |
| **Start Time for Standard:** | 8:38 | **Depth to Initial Water Depth (ft):** | 5 |
| **Standard Time Interval Between Readings, mins:** | 30 | **Porosity of Annulus Material, *n* :** | 0.35 |
| | | **Bentonite Plug at Bottom:** | No |

Percolation Data

| Reading | Time | Time Interval, Δt (min.) | Initial/Final Depth to Water (ft.) | Initial/Final Water Height, $H_0/H_f$ (in.) | Total Water Drop, Δd (in.) | Infiltration Rate (in./hr.) |
|---|---|---|---|---|---|---|
| P1 | 7:36 | 30 | 5.00 | 60.0 | 3.5 | 0.09 |
| | 8:06 | | 5.29 | 56.5 | | |
| P2 | 8:06 | 30 | 4.94 | 60.7 | 2.8 | 0.07 |
| | 8:36 | | 5.17 | 58.0 | | |
| 1 | 8:36 | 30 | 4.99 | 60.1 | 2.3 | 0.06 |
| | 9:06 | | 5.18 | 57.8 | | |
| 2 | 9:06 | 30 | 5.00 | 60.0 | 2.6 | 0.07 |
| | 9:36 | | 5.22 | 57.4 | | |
| 3 | 9:36 | 30 | 5.00 | 60.0 | 2.5 | 0.06 |
| | 10:06 | | 5.21 | 57.5 | | |
| 4 | 10:06 | 30 | 5.00 | 60.0 | 2.5 | 0.06 |
| | 10:36 | | 5.21 | 57.5 | | |
| 5 | 10:36 | 30 | 5.02 | 59.8 | 2.4 | 0.06 |
| | 11:06 | | 5.22 | 57.4 | | |
| 6 | 11:06 | 30 | 5.00 | 60.0 | 2.5 | 0.06 |
| | 11:36 | | 5.21 | 57.5 | | |
| 7 | 11:06 | 30 | 5.00 | 60.0 | 2.4 | 0.06 |
| | 11:36 | | 5.20 | 57.6 | | |
| 8 | 11:36 | 30 | 5.00 | 60.0 | 2.4 | 0.06 |
| | 12:06 | | 5.20 | 57.6 | | |
| 9 | 12:06 | 30 | 5.00 | 60.0 | 2.4 | 0.06 |
| | 12:36 | | 5.20 | 57.6 | | |

Infiltration Rate (I) = Discharge Volume/Surface Area of Test Section/Time Interval

**Measured Infiltration Rate, I (Average of Last 3 ReadingsLast Readings) =** $\boxed{\textbf{0.06}}$ **in./hr.**

## Boring Percolation Test Data Sheet

| | | | |
|---|---|---|---|
| **Project Number:** | 13062.001 | **Test Hole Number:** | LP-2 |
| **Project Name:** | Rexford Bloomfield Ave. | **Date Excavated:** | 3/3/2021 |
| **Earth Description:** | Alluvium | **Date Tested:** | 3/4/2021 |
| **Liquid Description:** | Tap water | **Depth of boring (ft):** | 10 |
| **Tested By:** | KMD | **Radius of boring, r (in):** | 4 |
| | | **Diameter of casing (in):** | 2 |
| | | **Length of slotted of casing (ft):** | 5 |
| | | **Depth to Initial Water Depth (ft):** | 6 |
| | | **Porosity of Annulus Material, *n* :** | 0.35 |
| | | **Bentonite Plug at Bottom:** | No |

Field Percolation Data

| Reading | Time | Time Interval, Δt (minutes) | Depth to Water (feet bgs) | Water Height, H (inches) | Cumulative Water Volume Delivered (gallons) |
|---|---|---|---|---|---|
| 1 | 9:36 | - | - | - | 0.0 |
| 2 | 9:46 | 10 | 6.00 | 48.0 | 36.2 |
| 3 | 9:56 | 10 | 5.76 | 50.9 | 72.3 |
| 4 | 10:06 | 10 | 5.39 | 55.3 | 108.5 |
| 5 | 10:16 | 10 | 5.03 | 59.6 | 144.6 |
| 6 | 10:26 | 10 | 6.80 | 38.4 | 180.8 |
| 7 | 10:36 | 10 | 6.65 | 40.2 | 216.9 |
| 8 | 10:46 | 10 | 6.56 | 41.3 | 253.1 |
| 9 | 10:56 | 10 | 6.42 | 43.0 | 289.2 |
| 10 | 11:06 | 10 | 6.32 | 44.2 | 325.4 |
| 11 | 11:16 | 10 | 6.25 | 45.0 | 361.5 |
| 12 | 11:16 | 10 | 6.19 | 45.7 | 397.7 |
| 13 | 11:16 | 10 | 6.07 | 47.2 | 433.8 |
| 14 | 11:26 | 10 | 6.01 | 47.9 | 470.0 |
| 15 | 11:36 | 10 | 5.91 | 49.1 | 506.1 |

**High Flowrate Percolation Test Calculation**

| | |
|---|---|
| Total Volume of Water Delivered (gallons) | 506.1 |
| Total Volume of Water Delivered (cubic inches) | 116909.1 |
| Average Water Height (inches) | 46.8 |
| Average Percolation Surface Area (cubic Inches) | 1227.3 |
| Duration of Test (minutes) | 140 |
| Duration of Test (hours) | 2.33 |

$$\text{Measured Infiltration Rate} = (\text{Total Volume})/(\text{Test Duration})/(\text{Surface Area})$$

**Measured Infiltration Rate (inches per hour) = 40.8**

# APPENDIX C

# LABORATORY TEST RESULTS

# MODIFIED PROCTOR COMPACTION TEST

**ASTM D 1557**

Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | J. Gonzalez | Date: | 03/10/21 |
| Project No.: | 13062.001 | Checked By: | A. Santos | Date: | 03/11/21 |
| Boring No.: | LB-1 | Depth (ft.): | 0-5 | | |
| Sample No.: | B-1 | | | | |
| Soil Identification: | Dark yellowish brown silty sand (SM) | | | | |

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

**Mold Volume (ft³)** 0.03330 — *Ram Weight = 10 lb.; Drop = 18 in.*

| TEST NO. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wt. Compacted Soil + Mold (g) | 3867 | 3970 | 3916 | | | |
| Weight of Mold (g) | 1868 | 1868 | 1868 | | | |
| Net Weight of Soil (g) | 1999 | 2102 | 2048 | | | |
| Wet Weight of Soil + Cont. (g) | 314.9 | 316.1 | 325.3 | | | |
| Dry Weight of Soil + Cont. (g) | 301.4 | 296.3 | 299.6 | | | |
| Weight of Container (g) | 38.8 | 38.4 | 39.3 | | | |
| Moisture Content (%) | 5.14 | 7.68 | 9.87 | | | |
| Wet Density (pcf) | 132.3 | 139.2 | 135.6 | | | |
| Dry Density (pcf) | 125.9 | 129.2 | 123.4 | | | |

**Maximum Dry Density (pcf)** 129.4 **Optimum Moisture Content (%)** 7.2

**PROCEDURE USED**

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

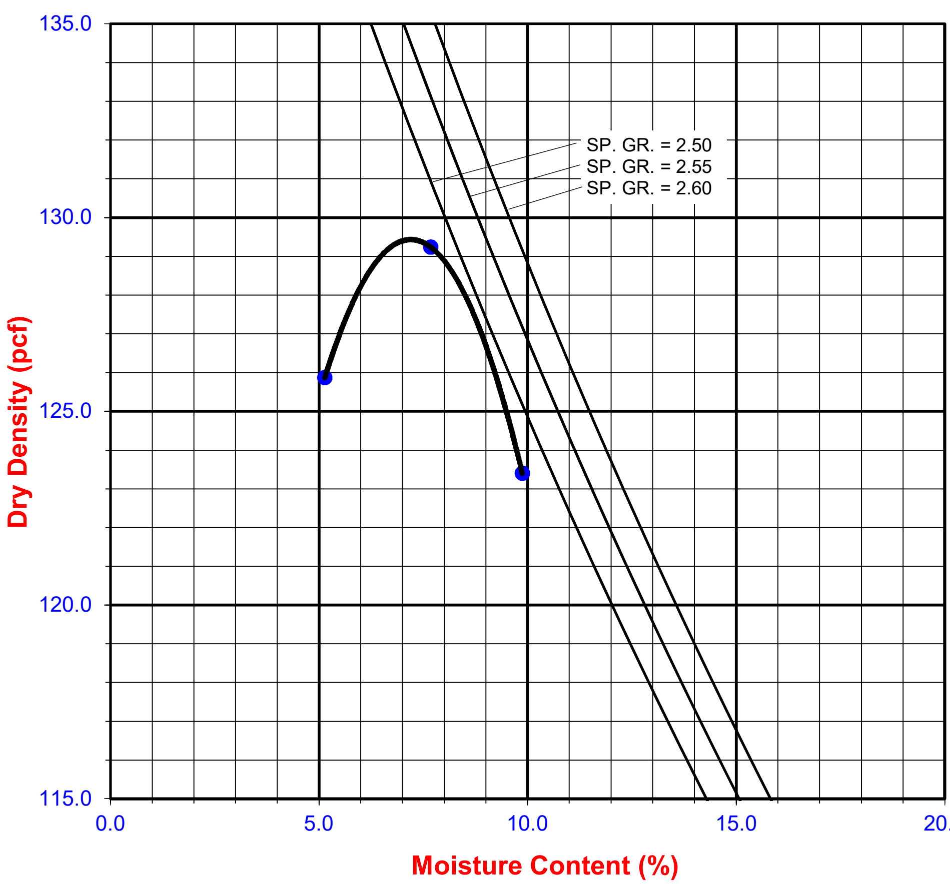
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

**Particle-Size Distribution:**

GR:SA:FI

**Atterberg Limits:**

LL,PL,PI



# MODIFIED PROCTOR COMPACTION TEST

**ASTM D 1557**

Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave | Tested By: | J. Gonzalez | Date: | 03/09/21 |
| Project No.: | 13062.001 | Checked By: | A. Santos | Date: | 03/11/21 |
| Boring No.: | LB-5 | Depth (ft.): | 0-5 | | |
| Sample No.: | B-1 | | | | |
| Soil Identification: | Dark yellowish brown clayey sand (SC) | | | | |

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

**Mold Volume (ft³)** 0.03330 — *Ram Weight = 10 lb.; Drop = 18 in.*

| TEST NO. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Wt. Compacted Soil + Mold (g) | 3810 | 3987 | 3890 | | | |
| Weight of Mold (g) | 1868 | 1868 | 1868 | | | |
| Net Weight of Soil (g) | 1942 | 2119 | 2022 | | | |
| Wet Weight of Soil + Cont. (g) | 322.0 | 247.1 | 302.6 | | | |
| Dry Weight of Soil + Cont. (g) | 304.6 | 228.9 | 274.2 | | | |
| Weight of Container (g) | 39.3 | 38.0 | 39.2 | | | |
| Moisture Content (%) | 6.56 | 9.53 | 12.09 | | | |
| Wet Density (pcf) | 128.6 | 140.3 | 133.9 | | | |
| Dry Density (pcf) | 120.7 | 128.1 | 119.4 | | | |

**Maximum Dry Density (pcf)** 128.2 **Optimum Moisture Content (%)** 9.2

**PROCEDURE USED**

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

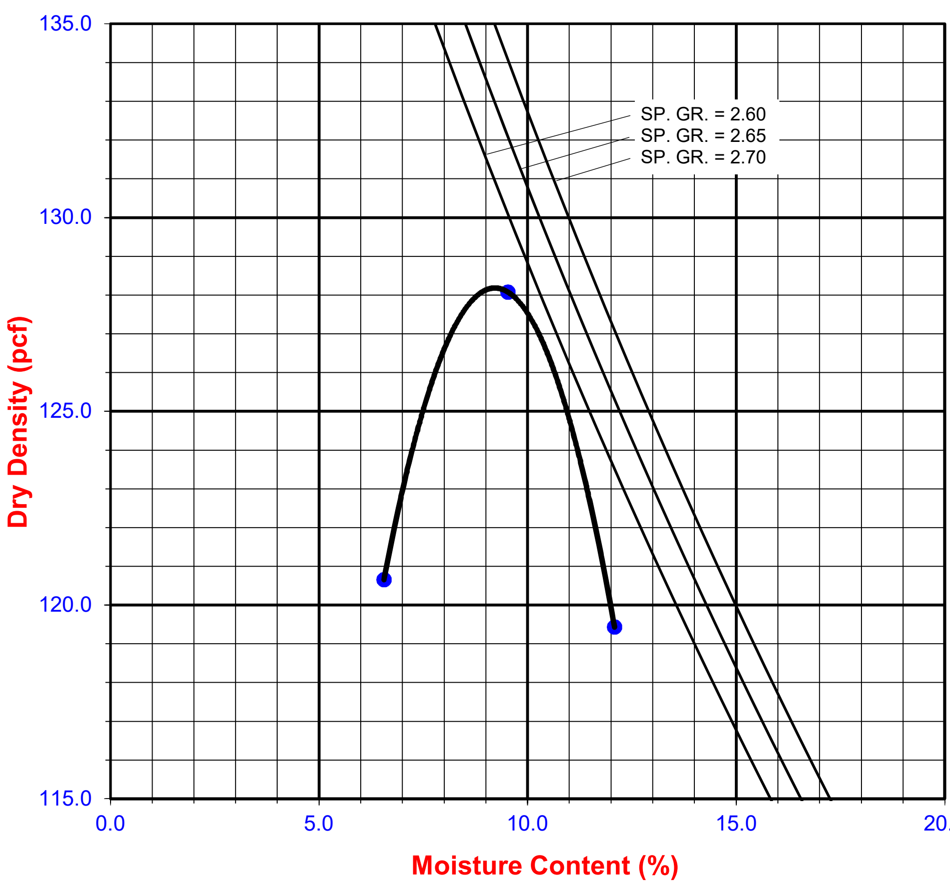
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

**Particle-Size Distribution:**

GR:SA:FI

**Atterberg Limits:**

LL,PL,PI



Leighton

# ATTERBERG LIMITS

## ASTM D 4318

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | Y. Nguyen | Date: | 03/22/21 |
| Project No. : | 13062.001 | Input By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Checked By: | J. Ward | | |
| Sample No.: | R-1 | Depth (ft.) | 5.0 | | |
| Soil Identification: | Brown silty, clayey sand (SC-SM) | | | | |

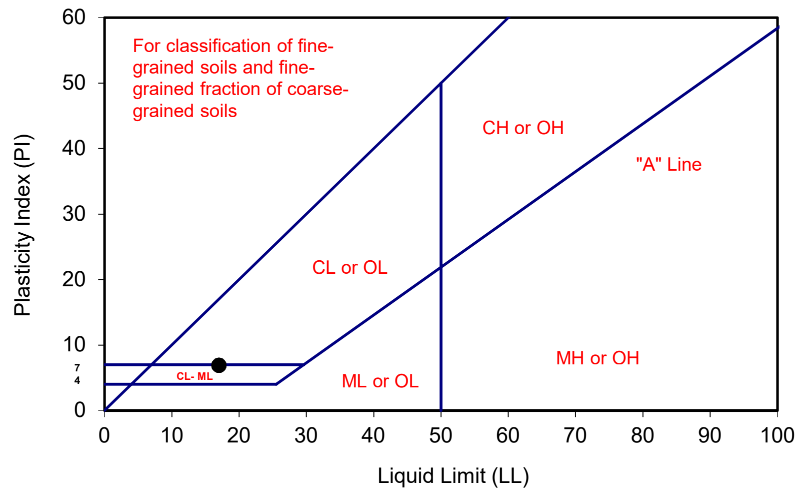
| TEST | PLASTIC LIMIT | | LIQUID LIMIT | | | |
|---|---|---|---|---|---|---|
| NO. | 1 | 2 | 1 | 2 | 3 | 4 |
| Number of Blows [N] | | | 32 | 24 | 16 | |
| Wet Wt. of Soil + Cont. (g) | 9.62 | 9.58 | 20.43 | 22.57 | 20.99 | |
| Dry Wt. of Soil + Cont. (g) | 8.83 | 8.80 | 17.74 | 19.45 | 17.93 | |
| Wt. of Container (g) | 1.06 | 1.02 | 1.06 | 1.05 | 1.02 | |
| Moisture Content (%) [Wn] | 10.17 | 10.03 | 16.13 | 16.96 | 18.10 | |

| | |
|---|---|
| **Liquid Limit** | **17** |
| **Plastic Limit** | **10** |
| **Plasticity Index** | **7** |
| **Classification** | **CL-ML** |

PI at "A" - Line = 0.73(LL-20) | -2.19

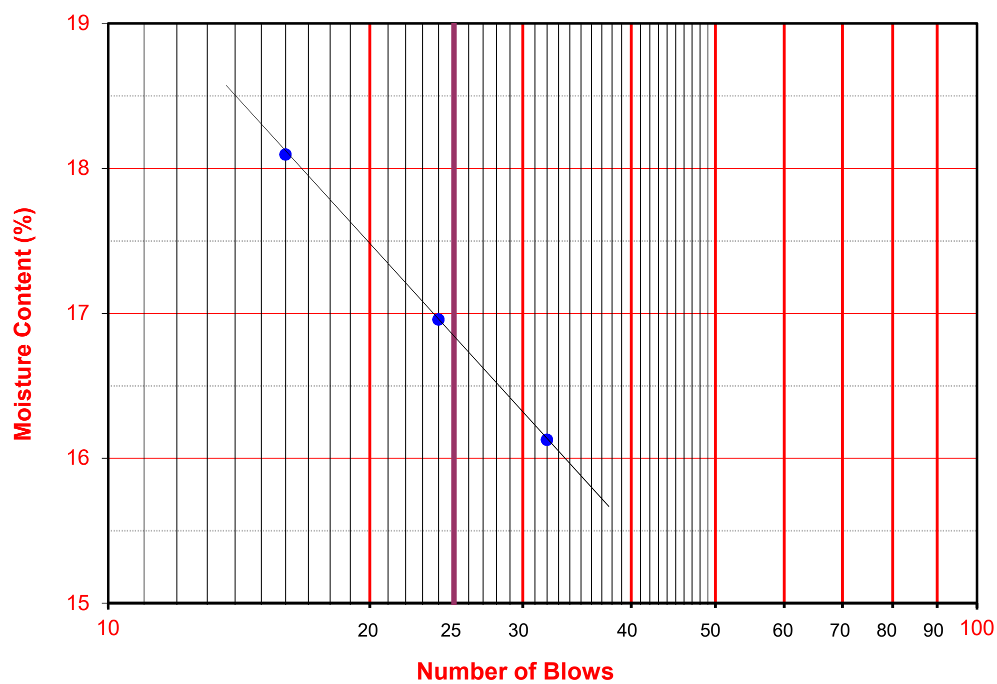
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$




## PROCEDURES USED

| | |
|---|---|
| [ ] | Wet Preparation<br>Multipoint - Wet |
| [X] | Dry Preparation<br>Multipoint - Dry |
| [X] | Procedure A<br>Multipoint Test |
| [ ] | Procedure B<br>One-point Test |



# ATTERBERG LIMITS

## ASTM D 4318

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | S. Felter | Date: | 03/17/21 |
| Project No. : | 13062.001 | Input By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Checked By: | J. Ward | | |
| Sample No.: | S-1 | Depth (ft.) | 10.0 | | |
| Soil Identification: | Brown lean clay (CL) | | | | |

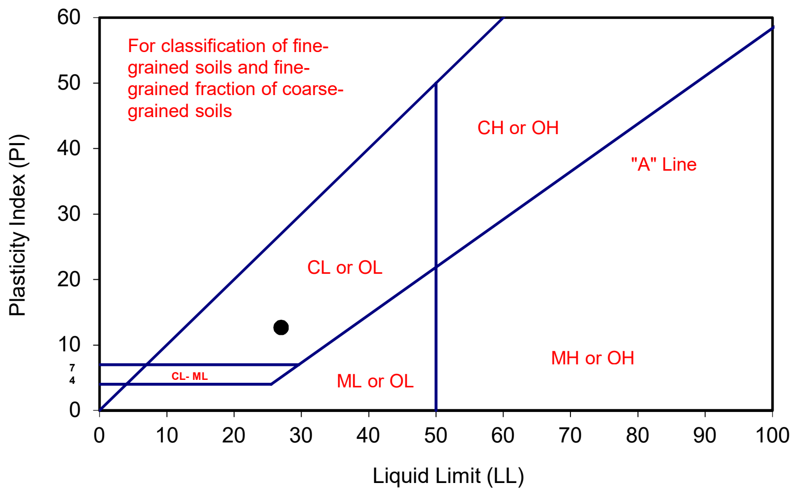
| TEST | PLASTIC LIMIT | | LIQUID LIMIT | | | |
|---|---|---|---|---|---|---|
| NO. | 1 | 2 | 1 | 2 | 3 | 4 |
| Number of Blows [N] | | | 34 | 27 | 17 | |
| Wet Wt. of Soil + Cont. (g) | 10.08 | 10.30 | 21.10 | 20.73 | 21.21 | |
| Dry Wt. of Soil + Cont. (g) | 8.96 | 9.14 | 16.97 | 16.52 | 16.74 | |
| Wt. of Container (g) | 1.09 | 1.10 | 1.10 | 1.04 | 1.06 | |
| Moisture Content (%) [Wn] | 14.23 | 14.43 | 26.02 | 27.20 | 28.51 | |

| | |
|---|---|
| **Liquid Limit** | **27** |
| **Plastic Limit** | **14** |
| **Plasticity Index** | **13** |
| **Classification** | **CL** |

PI at "A" - Line = 0.73(LL-20) | 5.11

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



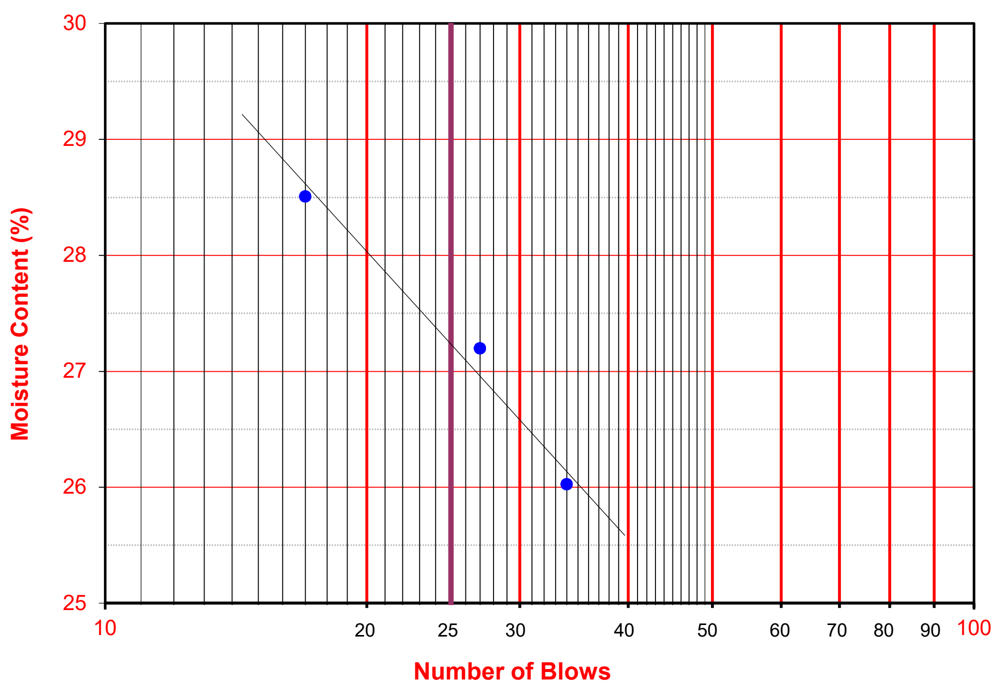

**PROCEDURES USED**

☐ Wet Preparation
Multipoint - Wet

☒ Dry Preparation
Multipoint - Dry

☒ Procedure A
Multipoint Test

☐ Procedure B
One-point Test



# EXPANSION INDEX of SOILS

**ASTM D 4829**

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Berdy | Date: | 03/23/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/02/21 |
| Boring No.: | LB-1 | Depth (ft.): | 0-5 | | |
| Sample No.: | B-1 | | | | |
| Soil Identification: | Dark yellowish brown silty sand (SM) | | | | |

| | |
|---|---|
| Dry Wt. of Soil + Cont. (g) | 1000.00 |
| Wt. of Container No. (g) | 0.00 |
| Dry Wt. of Soil (g) | 1000.00 |
| Weight Soil Retained on #4 Sieve | 0.00 |
| Percent Passing # 4 | 100.00 |

| **MOLDED SPECIMEN** | Before Test | After Test |
|---|---|---|
| Specimen Diameter (in.) | 4.01 | 4.01 |
| Specimen Height (in.) | 1.0000 | 1.0045 |
| Wt. Comp. Soil + Mold (g) | 641.80 | 462.70 |
| Wt. of Mold (g) | 202.00 | 0.00 |
| Specific Gravity (Assumed) | 2.70 | 2.70 |
| Container No. | O | O |
| Wet Wt. of Soil + Cont. (g) | 880.80 | 664.70 |
| Dry Wt. of Soil + Cont. (g) | 827.10 | 614.96 |
| Wt. of Container (g) | 0.00 | 202.00 |
| Moisture Content (%) | 6.49 | 12.04 |
| Wet Density (pcf) | 132.7 | 138.9 |
| Dry Density (pcf) | 124.6 | 124.0 |
| Void Ratio | 0.353 | 0.359 |
| Total Porosity | 0.261 | 0.264 |
| Pore Volume (cc) | 54.0 | 55.0 |
| Degree of Saturation (%) [ $S_{meas}$ ] | **49.6** | 90.5 |

**SPECIMEN INUNDATION** in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

| Date | Time | Pressure (psi) | Elapsed Time (min.) | Dial Readings (in.) |
|---|---|---|---|---|
| 03/23/21 | 13:57 | 1.0 | 0 | 0.6600 |
| 03/23/21 | 14:07 | 1.0 | 10 | 0.6590 |
| Add Distilled Water to the Specimen | | | | |
| 03/23/21 | 14:30 | 1.0 | 23 | 0.6630 |
| 03/24/21 | 6:06 | 1.0 | 959 | 0.6645 |
| 03/24/21 | 7:38 | 1.0 | 1051 | 0.6645 |
| | | | | |

| | |
|---|---|
| Expansion Index ($EI_{meas}$) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000 | **5** |

Leighton

# EXPANSION INDEX of SOILS

**ASTM D 4829**

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Berdy | Date: | 03/23/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/02/21 |
| Boring No.: | LB-5 | Depth (ft.): | 0-5 | | |
| Sample No.: | B-1 | | | | |
| Soil Identification: | Dark yellowish brown clayey sand (SC) | | | | |

| | |
|---|---|
| Dry Wt. of Soil + Cont. (g) | 1000.00 |
| Wt. of Container No. (g) | 0.00 |
| Dry Wt. of Soil (g) | 1000.00 |
| Weight Soil Retained on #4 Sieve | 0.00 |
| Percent Passing # 4 | 100.00 |

| **MOLDED SPECIMEN** | Before Test | After Test |
|---|---|---|
| Specimen Diameter (in.) | 4.01 | 4.01 |
| Specimen Height (in.) | 1.0000 | 1.0145 |
| Wt. Comp. Soil + Mold (g) | 625.80 | 461.40 |
| Wt. of Mold (g) | 191.60 | 0.00 |
| Specific Gravity (Assumed) | 2.70 | 2.70 |
| Container No. | O | O |
| Wet Wt. of Soil + Cont. (g) | 872.80 | 653.00 |
| Dry Wt. of Soil + Cont. (g) | 817.30 | 598.15 |
| Wt. of Container (g) | 0.00 | 191.60 |
| Moisture Content (%) | 6.79 | 13.49 |
| Wet Density (pcf) | 131.0 | 137.2 |
| Dry Density (pcf) | 122.6 | 120.9 |
| Void Ratio | 0.375 | 0.395 |
| Total Porosity | 0.272 | 0.283 |
| Pore Volume (cc) | 56.4 | 59.4 |
| Degree of Saturation (%) [ $S_{meas}$] | **48.9** | 92.3 |

**SPECIMEN INUNDATION** in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

| Date | Time | Pressure (psi) | Elapsed Time (min.) | Dial Readings (in.) |
|---|---|---|---|---|
| 03/23/21 | 14:30 | 1.0 | 0 | 0.6060 |
| 03/23/21 | 14:40 | 1.0 | 10 | 0.6045 |
| Add Distilled Water to the Specimen | | | | |
| 03/23/21 | 15:00 | 1.0 | 20 | 0.6145 |
| 03/24/21 | 6:05 | 1.0 | 925 | 0.6205 |
| 03/24/21 | 7:40 | 1.0 | 1020 | 0.6205 |
| | | | | |

| | |
|---|---|
| Expansion Index ($EI_{meas}$) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000 | **16** |

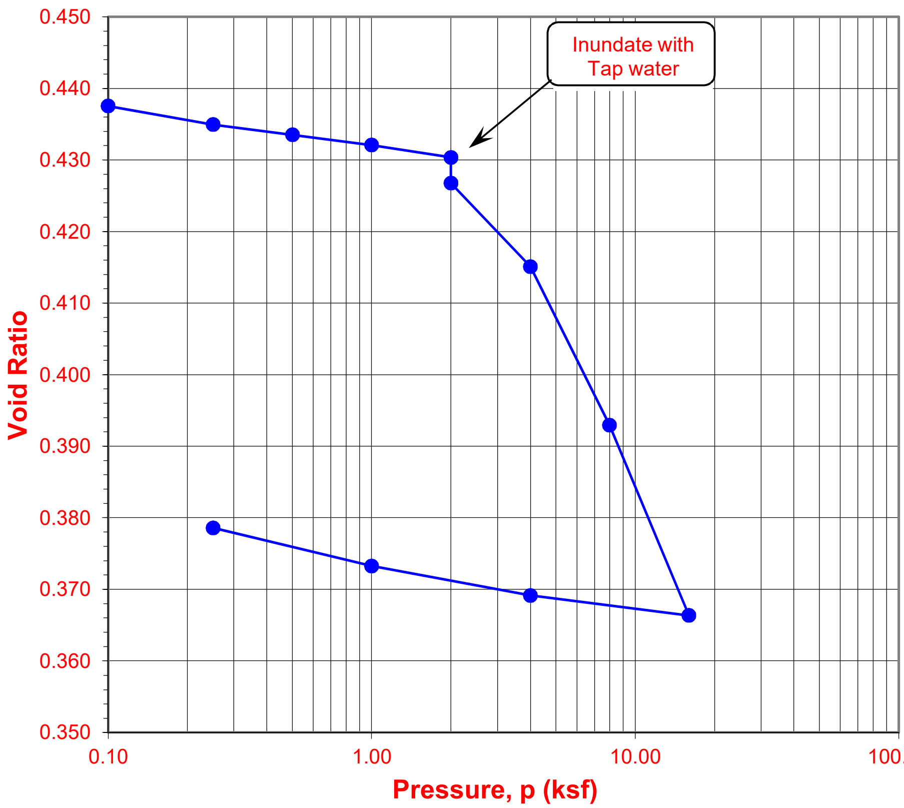
# ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

**ASTM D 2435**

Leighton

| | | | |
|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: G. Bathala | Date: 03/11/21 |
| Project No.: | 13062.001 | Checked By: J. Ward | Date: 04/01/21 |
| Boring No.: | LB-1 | Depth (ft.): 0-5 | |
| Sample No.: | B-1 | Sample Type: | 90% Remold |
| Soil Identification: | Dark yellowish brown silty sand (SM) | | |

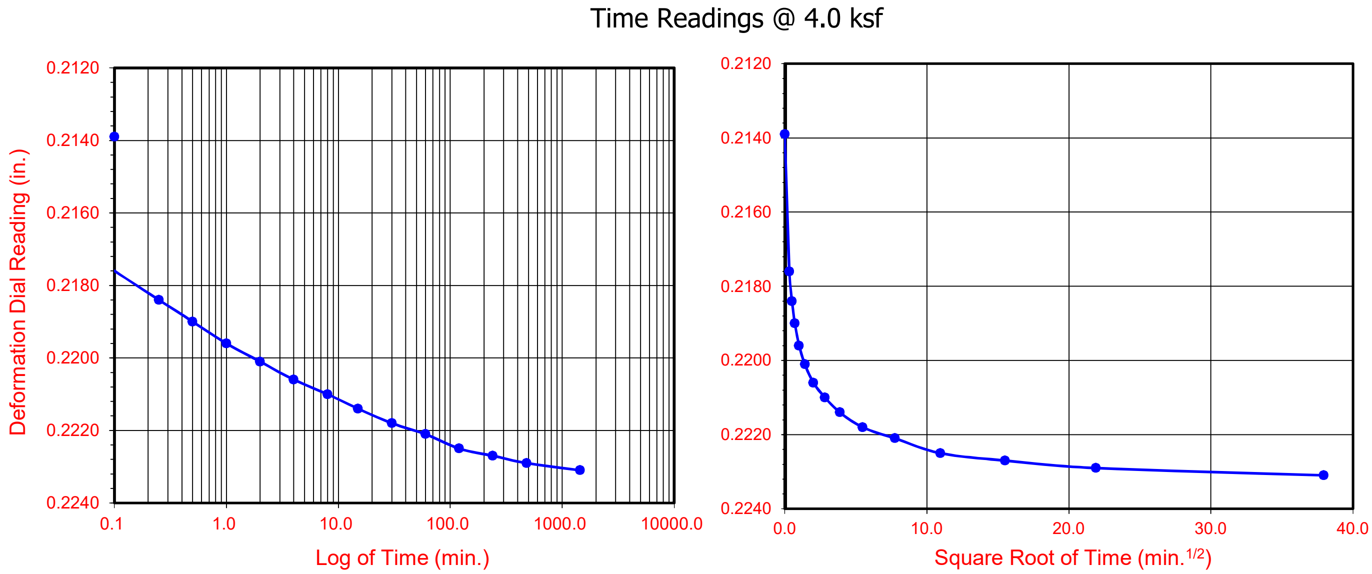
| | |
|---|---|
| Sample Diameter (in.): | 2.415 |
| Sample Thickness (in.): | 1.000 |
| Weight of Sample + ring (g): | 196.46 |
| Weight of Ring (g): | 45.48 |
| Height after consol. (in.): | 0.9588 |
| **Before Test** | |
| Wt. of Wet Sample+Cont. (g): | 211.08 |
| Wt. of Dry Sample+Cont. (g): | 200.87 |
| Weight of Container (g): | 57.18 |
| Initial Moisture Content (%) | 7.1 |
| Initial Dry Density (pcf) | 117.2 |
| Initial Saturation (%): | 44 |
| Initial Vertical Reading (in.) | 0.2032 |
| **After Test** | |
| Wt. of Wet Sample+Cont. (g): | 271.08 |
| Wt. of Dry Sample+Cont. (g): | 254.23 |
| Weight of Container (g): | 67.87 |
| Final Moisture Content (%) | 11.96 |
| Final Dry Density (pcf): | 122.2 |
| Final Saturation (%): | 85 |
| Final Vertical Reading (in.) | 0.2477 |
| Specific Gravity (assumed): | 2.70 |
| Water Density (pcf): | 62.43 |

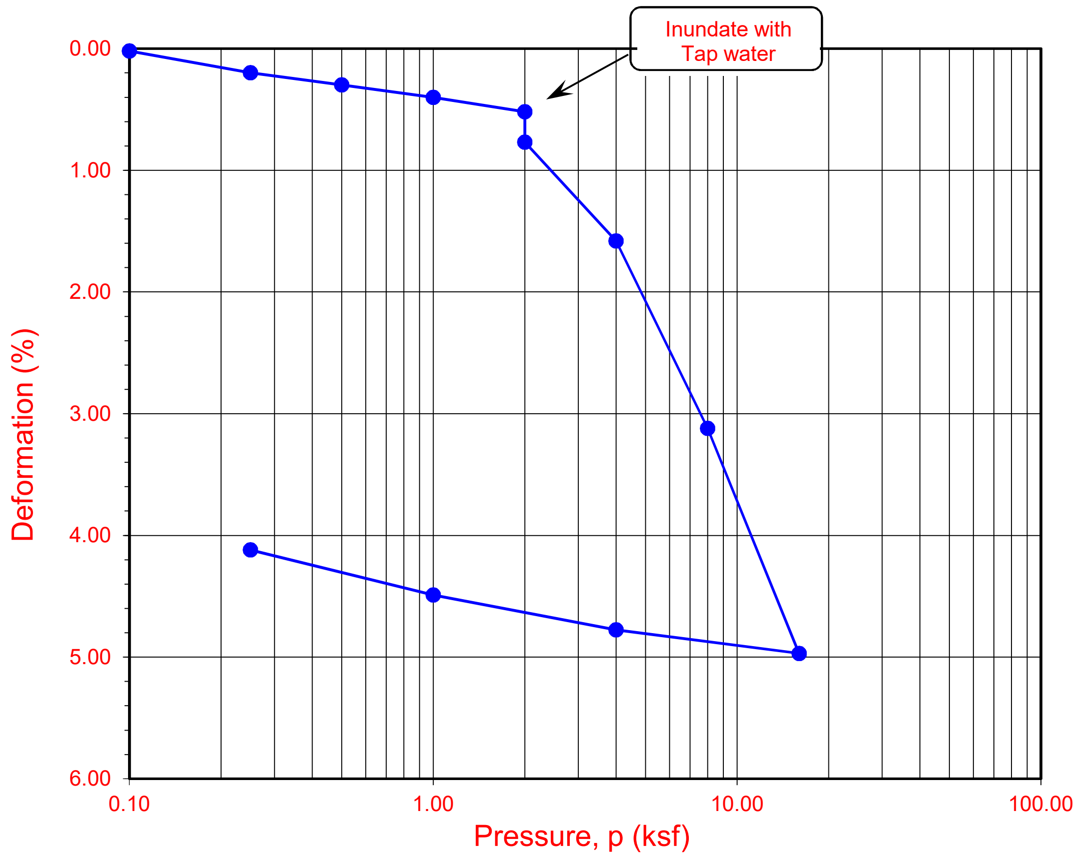



| Pressure (p) (ksf) | Final Reading (in.) | Apparent Thickness (in.) | Load Compliance (%) | Deformation % of Sample Thickness | Void Ratio | Corrected Deforma-tion (%) |
|---|---|---|---|---|---|---|
| 0.10 | 0.2034 | 0.9998 | 0.00 | 0.02 | 0.438 | 0.02 |
| 0.25 | 0.2056 | 0.9976 | 0.04 | 0.24 | 0.435 | 0.20 |
| 0.50 | 0.2071 | 0.9961 | 0.09 | 0.39 | 0.434 | 0.30 |
| 1.00 | 0.2091 | 0.9941 | 0.19 | 0.59 | 0.432 | 0.40 |
| 2.00 | 0.2114 | 0.9918 | 0.30 | 0.82 | 0.430 | 0.52 |
| 2.00 | 0.2139 | 0.9893 | 0.30 | 1.07 | 0.427 | 0.77 |
| 4.00 | 0.2231 | 0.9801 | 0.41 | 1.99 | 0.415 | 1.58 |
| 8.00 | 0.2399 | 0.9633 | 0.55 | 3.67 | 0.393 | 3.12 |
| 16.00 | 0.2601 | 0.9431 | 0.72 | 5.69 | 0.366 | 4.97 |
| 4.00 | 0.2566 | 0.9467 | 0.56 | 5.34 | 0.369 | 4.78 |
| 1.00 | 0.2525 | 0.9507 | 0.44 | 4.93 | 0.373 | 4.49 |
| 0.25 | 0.2477 | 0.9555 | 0.33 | 4.45 | 0.379 | 4.12 |

Time Readings @ 4.0 ksf

| Date | Time | Elapsed Time (min) | Square Root of Time | Dial Rdgs. (in.) |
|---|---|---|---|---|
| 3/15/21 | 8:45:00 | 0.0 | 0.0 | 0.2139 |
| 3/15/21 | 8:45:06 | 0.1 | 0.3 | 0.2176 |
| 3/15/21 | 8:45:15 | 0.2 | 0.5 | 0.2184 |
| 3/15/21 | 8:45:30 | 0.5 | 0.7 | 0.2190 |
| 3/15/21 | 8:46:00 | 1.0 | 1.0 | 0.2196 |
| 3/15/21 | 8:47:00 | 2.0 | 1.4 | 0.2201 |
| 3/15/21 | 8:49:00 | 4.0 | 2.0 | 0.2206 |
| 3/15/21 | 8:53:00 | 8.0 | 2.8 | 0.2210 |
| 3/15/21 | 9:00:00 | 15.0 | 3.9 | 0.2214 |
| 3/15/21 | 9:15:00 | 30.0 | 5.5 | 0.2218 |
| 3/15/21 | 9:45:00 | 60.0 | 7.7 | 0.2221 |
| 3/15/21 | 10:45:00 | 120.0 | 11.0 | 0.2225 |
| 3/15/21 | 12:45:00 | 240.0 | 15.5 | 0.2227 |
| 3/15/21 | 16:45:00 | 480.0 | 21.9 | 0.2229 |
| 3/16/21 | 8:45:00 | 1440.0 | 37.9 | 0.2231 |




| Boring No. | Sample No. | Depth (ft.) | Moisture Content (%) | | Dry Density (pcf) | | Void Ratio | | Degree of Saturation (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| **LB-1** | **B-1** | **0-5** | **7.1** | **12.0** | **117.2** | **122.2** | **0.438** | **0.379** | **44** | **85** |

Soil Identification: Dark yellowish brown silty sand (SM)

Leighton

**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS**
**ASTM D 2435**

Project No.: 13062.001

Rexford Bloomfield Ave.

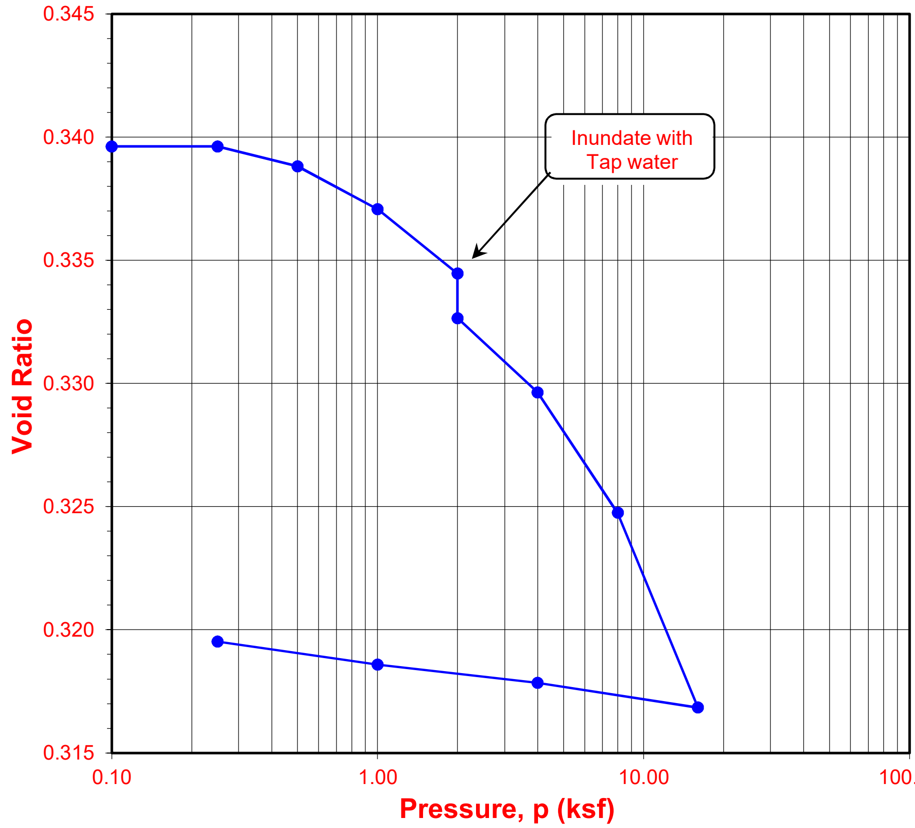
04-21

# ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
## ASTM D 2435

Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Bathala | Date: | 03/10/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Depth (ft.): | 5.0 | | |
| Sample No.: | R-1 | Sample Type: | Ring | | |
| Soil Identification: | Brown silty, clayey sand (SC-SM) | | | | |

| | |
|---|---|
| Sample Diameter (in.) | 2.415 |
| Sample Thickness (in.) | 1.000 |
| Wt. of Sample + Ring (g) | 211.59 |
| Weight of Ring (g) | 44.89 |
| Height after consol. (in.) | 0.9849 |
| **Before Test** | |
| Wt.Wet Sample+Cont. (g) | 238.20 |
| Wt.of Dry Sample+Cont. (g) | 222.26 |
| Weight of Container (g) | 65.86 |
| Initial Moisture Content (%) | 10.2 |
| Initial Dry Density (pcf) | 125.8 |
| Initial Saturation (%) | 81 |
| Initial Vertical Reading (in.) | 0.2886 |
| **After Test** | |
| Wt.of Wet Sample+Cont. (g) | 268.81 |
| Wt. of Dry Sample+Cont. (g) | 253.29 |
| Weight of Container (g) | 57.18 |
| Final Moisture Content (%) | 10.26 |
| Final Dry Density (pcf) | 127.7 |
| Final Saturation (%) | 87 |
| Final Vertical Reading (in.) | 0.2708 |
| Specific Gravity (assumed) | 2.70 |
| Water Density (pcf) | 62.43 |

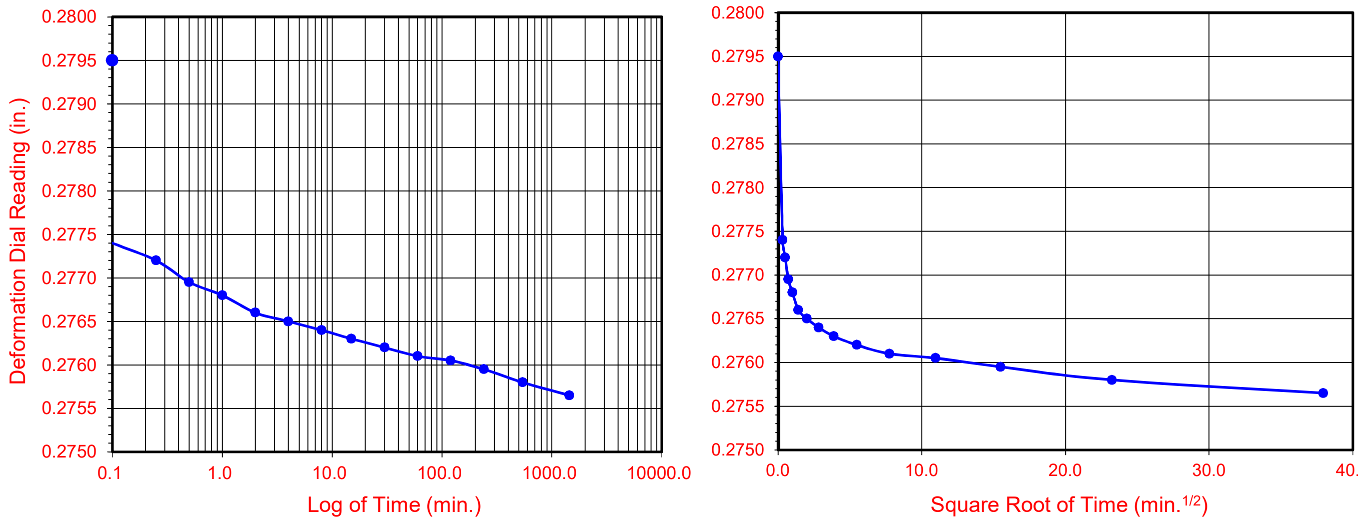


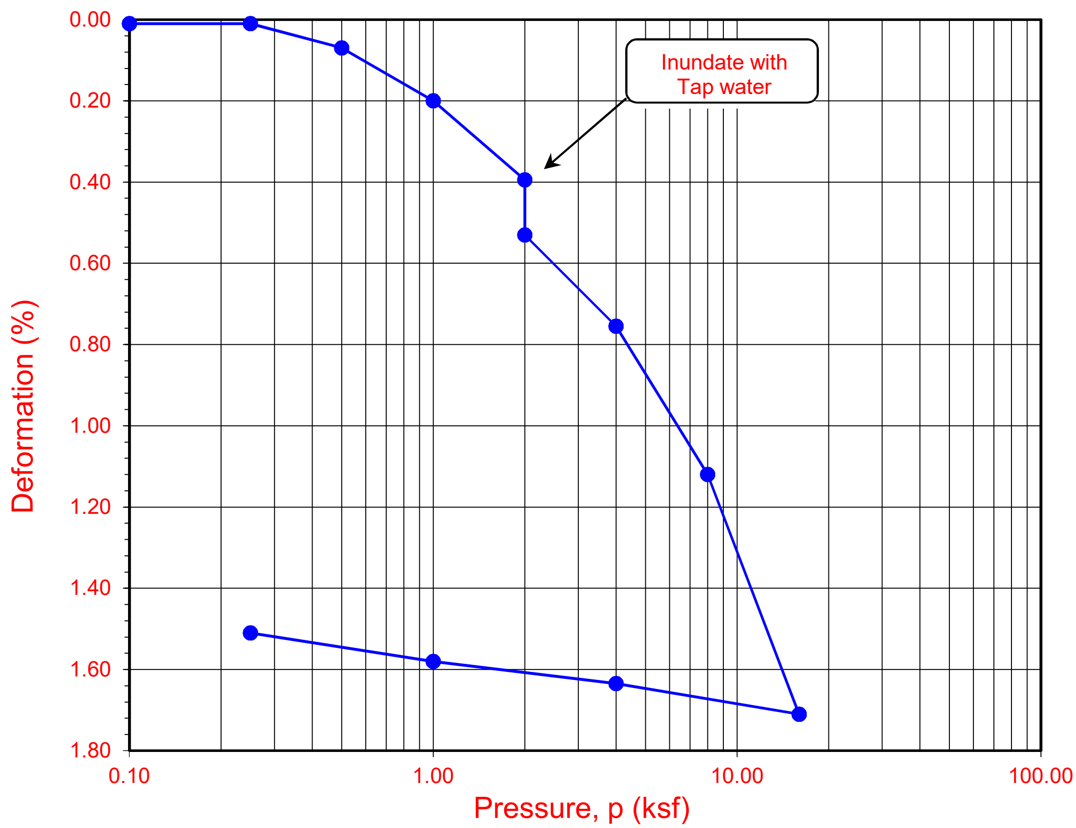

| Pressure (p) (ksf) | Final Reading (in.) | Apparent Thickness (in.) | Load Compliance (%) | Deformation % of Sample Thickness | Void Ratio | Corrected Deforma-tion (%) |
|---|---|---|---|---|---|---|
| 0.10 | 0.2885 | 0.9999 | 0.00 | 0.01 | 0.340 | 0.01 |
| 0.25 | 0.2880 | 0.9994 | 0.05 | 0.06 | 0.340 | 0.01 |
| 0.50 | 0.2866 | 0.9980 | 0.13 | 0.20 | 0.339 | 0.07 |
| 1.00 | 0.2843 | 0.9957 | 0.23 | 0.43 | 0.337 | 0.20 |
| 2.00 | 0.2809 | 0.9923 | 0.38 | 0.78 | 0.334 | 0.40 |
| 2.00 | 0.2795 | 0.9909 | 0.38 | 0.91 | 0.333 | 0.53 |
| 4.00 | 0.2757 | 0.9871 | 0.54 | 1.30 | 0.330 | 0.76 |
| 8.00 | 0.2702 | 0.9816 | 0.72 | 1.84 | 0.325 | 1.12 |
| 16.00 | 0.2621 | 0.9735 | 0.94 | 2.65 | 0.317 | 1.71 |
| 4.00 | 0.2651 | 0.9765 | 0.72 | 2.36 | 0.318 | 1.64 |
| 1.00 | 0.2680 | 0.9794 | 0.48 | 2.06 | 0.319 | 1.58 |
| 0.25 | 0.2708 | 0.9822 | 0.27 | 1.78 | 0.320 | 1.51 |

**Time Readings @ 4 ksf**

| Date | Time | Elapsed Time (min) | Square Root of Time | Dial Rdgs. (in.) |
|---|---|---|---|---|
| 3/13/21 | 6:35:00 | 0.0 | 0.0 | 0.2795 |
| 3/13/21 | 6:35:06 | 0.1 | 0.3 | 0.2774 |
| 3/13/21 | 6:35:15 | 0.2 | 0.5 | 0.2772 |
| 3/13/21 | 6:35:30 | 0.5 | 0.7 | 0.2770 |
| 3/13/21 | 6:36:00 | 1.0 | 1.0 | 0.2768 |
| 3/13/21 | 6:37:00 | 2.0 | 1.4 | 0.2766 |
| 3/13/21 | 6:39:00 | 4.0 | 2.0 | 0.2765 |
| 3/13/21 | 6:43:00 | 8.0 | 2.8 | 0.2764 |
| 3/13/21 | 6:50:00 | 15.0 | 3.9 | 0.2763 |
| 3/13/21 | 7:05:00 | 30.0 | 5.5 | 0.2762 |
| 3/13/21 | 7:35:00 | 60.0 | 7.7 | 0.2761 |
| 3/13/21 | 8:35:00 | 120.0 | 11.0 | 0.2761 |
| 3/13/21 | 10:35:00 | 240.0 | 15.5 | 0.2760 |
| 3/13/21 | 15:35:00 | 540.0 | 23.2 | 0.2758 |
| 3/14/21 | 6:35:00 | 1440.0 | 37.9 | 0.2757 |

Time Readings @ 4 ksf




| Boring No. | Sample No. | Depth (ft.) | Moisture Content (%) | | Dry Density (pcf) | | Void Ratio | | Degree of Saturation (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| **LB-1** | **R-1** | **5.0** | **10.2** | **10.3** | **125.8** | **127.7** | **0.340** | **0.320** | **81** | **87** |

Soil Identification: Brown silty, clayey sand (SC-SM)

Leighton

**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS**
**ASTM D 2435**

Project No.: 13062.001

Rexford Bloomfield Ave.

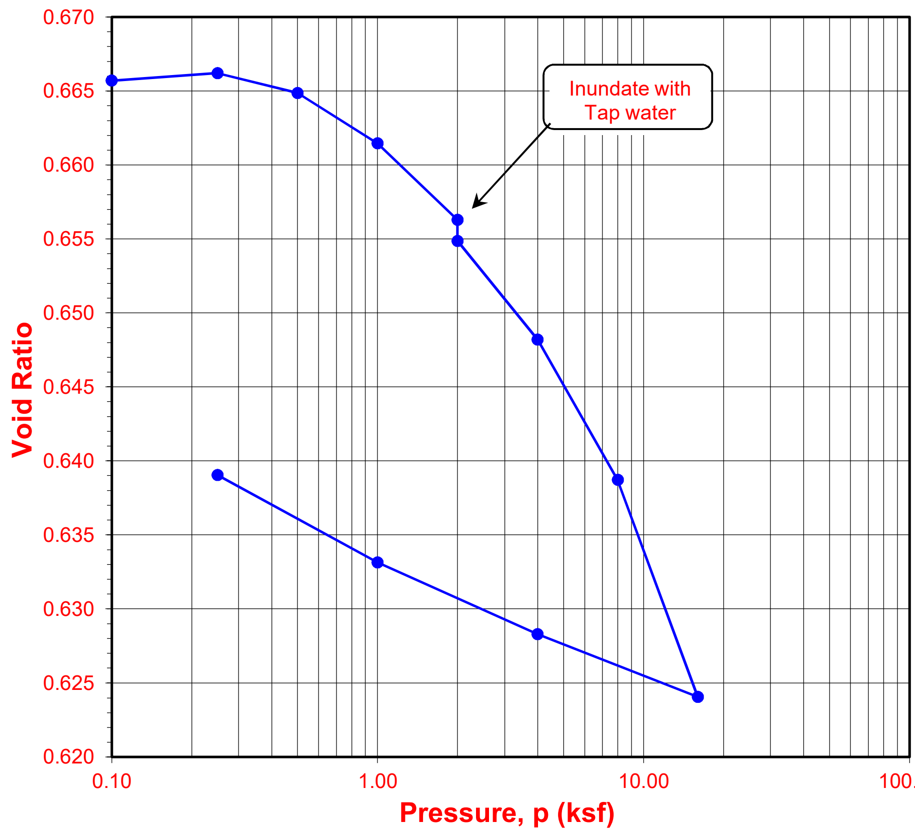
04-21

# ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
## ASTM D 2435

Leighton

| | | | | |
|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: G. Bathala | Date: | 03/10/21 |
| Project No.: | 13062.001 | Checked By: J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Depth (ft.): 15.0 | | |
| Sample No.: | R-2 | Sample Type: | Ring | |
| Soil Identification: | Light olive brown silt (ML) | | | |

| | |
|---|---|
| Sample Diameter (in.) | 2.415 |
| Sample Thickness (in.) | 1.000 |
| Wt. of Sample + Ring (g) | 173.19 |
| Weight of Ring (g) | 42.06 |
| Height after consol. (in.) | 0.9839 |
| **Before Test** | |
| Wt.Wet Sample+Cont. (g) | 174.67 |
| Wt.of Dry Sample+Cont. (g) | 166.81 |
| Weight of Container (g) | 65.76 |
| Initial Moisture Content (%) | 7.8 |
| Initial Dry Density (pcf) | 101.2 |
| Initial Saturation (%) | 32 |
| Initial Vertical Reading (in.) | 0.2863 |
| **After Test** | |
| Wt.of Wet Sample+Cont. (g) | 258.26 |
| Wt. of Dry Sample+Cont. (g) | 231.44 |
| Weight of Container (g) | 69.50 |
| Final Moisture Content (%) | 22.37 |
| Final Dry Density (pcf) | 101.3 |
| Final Saturation (%) | 91 |
| Final Vertical Reading (in.) | 0.2670 |
| Specific Gravity (assumed) | 2.70 |
| Water Density (pcf) | 62.43 |

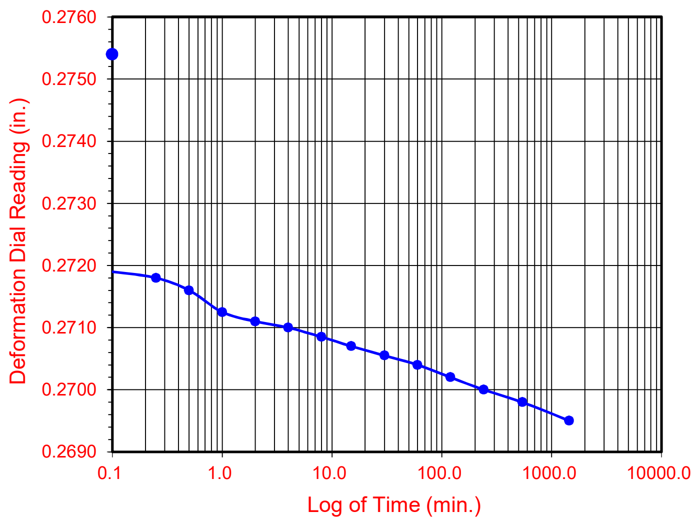


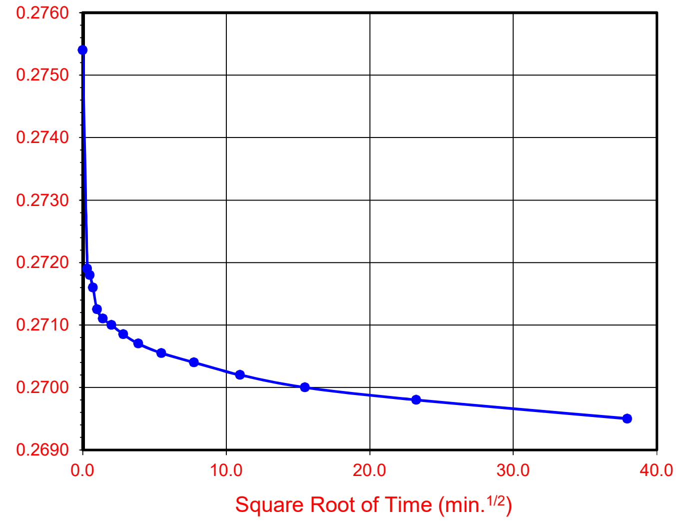

| Pressure (p) (ksf) | Final Reading (in.) | Apparent Thickness (in.) | Load Compliance (%) | Deformation % of Sample Thickness | Void Ratio | Corrected Deformation (%) |
|---|---|---|---|---|---|---|
| 0.10 | 0.2862 | 0.9999 | 0.00 | 0.01 | 0.666 | 0.01 |
| 0.25 | 0.2856 | 0.9993 | 0.09 | 0.07 | 0.666 | -0.02 |
| 0.50 | 0.2839 | 0.9976 | 0.18 | 0.24 | 0.665 | 0.06 |
| 1.00 | 0.2808 | 0.9945 | 0.29 | 0.55 | 0.661 | 0.26 |
| 2.00 | 0.2763 | 0.9900 | 0.43 | 1.01 | 0.656 | 0.58 |
| 2.00 | 0.2754 | 0.9891 | 0.43 | 1.09 | 0.655 | 0.66 |
| 4.00 | 0.2695 | 0.9832 | 0.62 | 1.68 | 0.648 | 1.06 |
| 8.00 | 0.2616 | 0.9753 | 0.84 | 2.47 | 0.639 | 1.63 |
| 16.00 | 0.2505 | 0.9642 | 1.07 | 3.58 | 0.624 | 2.51 |
| 4.00 | 0.2555 | 0.9692 | 0.83 | 3.09 | 0.628 | 2.26 |
| 1.00 | 0.2613 | 0.9750 | 0.54 | 2.51 | 0.633 | 1.97 |
| 0.25 | 0.2670 | 0.9807 | 0.32 | 1.93 | 0.639 | 1.61 |

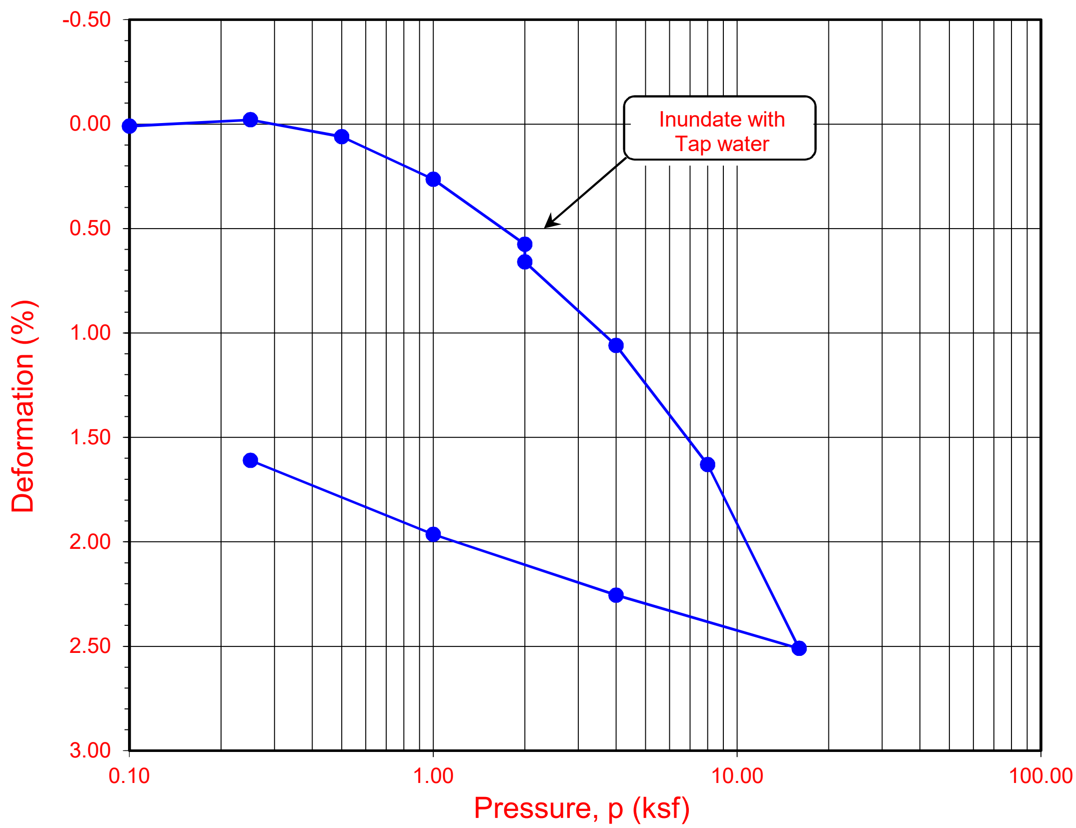
**Time Readings @ 4 ksf**

| Date | Time | Elapsed Time (min) | Square Root of Time | Dial Rdgs. (in.) |
|---|---|---|---|---|
| 3/13/21 | 6:40:00 | 0.0 | 0.0 | 0.2754 |
| 3/13/21 | 6:40:06 | 0.1 | 0.3 | 0.2719 |
| 3/13/21 | 6:40:15 | 0.2 | 0.5 | 0.2718 |
| 3/13/21 | 6:40:30 | 0.5 | 0.7 | 0.2716 |
| 3/13/21 | 6:41:00 | 1.0 | 1.0 | 0.2713 |
| 3/13/21 | 6:42:00 | 2.0 | 1.4 | 0.2711 |
| 3/13/21 | 6:44:00 | 4.0 | 2.0 | 0.2710 |
| 3/13/21 | 6:48:00 | 8.0 | 2.8 | 0.2709 |
| 3/13/21 | 6:55:00 | 15.0 | 3.9 | 0.2707 |
| 3/13/21 | 7:10:00 | 30.0 | 5.5 | 0.2706 |
| 3/13/21 | 7:40:00 | 60.0 | 7.7 | 0.2704 |
| 3/13/21 | 8:40:00 | 120.0 | 11.0 | 0.2702 |
| 3/13/21 | 10:40:00 | 240.0 | 15.5 | 0.2700 |
| 3/13/21 | 15:40:00 | 540.0 | 23.2 | 0.2698 |
| 3/14/21 | 6:40:00 | 1440.0 | 37.9 | 0.2695 |

Time Readings @ 4 ksf




| Boring No. | Sample No. | Depth (ft.) | Moisture Content (%) | | Dry Density (pcf) | | Void Ratio | | Degree of Saturation (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| **LB-1** | **R-2** | **15.0** | **7.8** | **22.4** | **101.2** | **101.3** | **0.666** | **0.639** | **32** | **91** |

Soil Identification: Light olive brown silt (ML)

Leighton

**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS**
**ASTM D 2435**

Project No.: 13062.001

Rexford Bloomfield Ave.

04-21

# ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

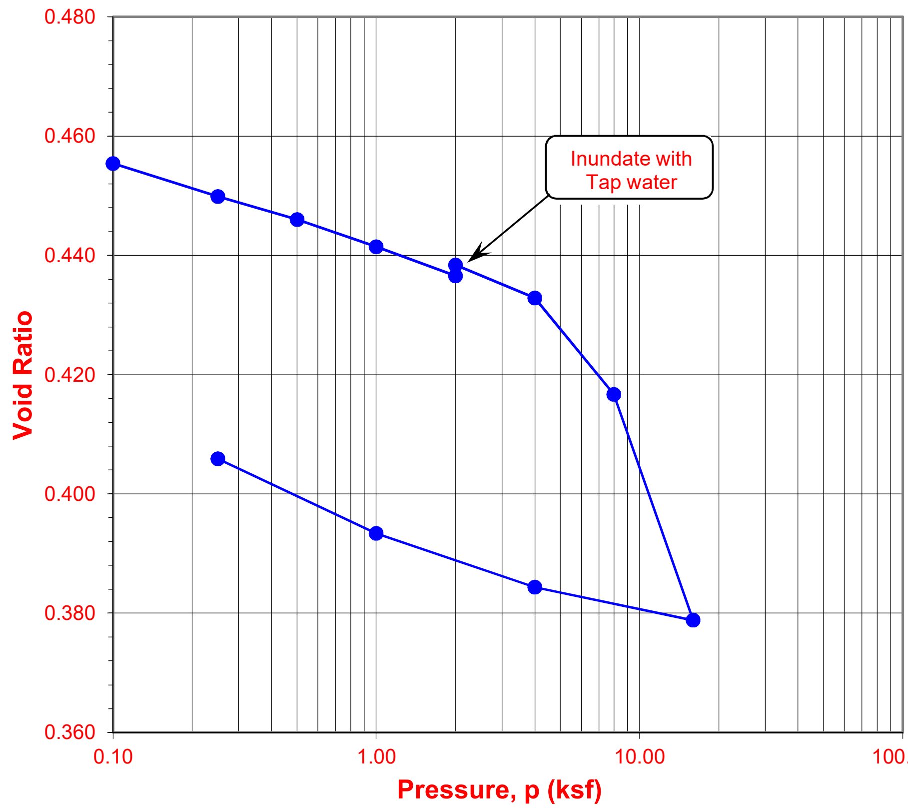
## ASTM D 2435

Leighton

Project Name: Rexford Bloomfield Ave.
Project No.: 13062.001
Boring No.: LB-5
Sample No.: B-1
Soil Identification: Dark yellowish brown clayey sand (SC)

Tested By: G. Bathala Date: 03/11/21
Checked By: J. Ward Date: 04/01/21
Depth (ft.): 0-5
Sample Type: 90% Remold

| | |
|---|---|
| Sample Diameter (in.): | 2.415 |
| Sample Thickness (in.): | 1.000 |
| Weight of Sample + ring (g): | 197.39 |
| Weight of Ring (g): | 45.51 |
| Height after consol. (in.): | 0.9657 |
| **Before Test** | |
| Wt. of Wet Sample+Cont. (g): | 207.30 |
| Wt. of Dry Sample+Cont. (g): | 195.05 |
| Weight of Container (g): | 60.36 |
| Initial Moisture Content (%) | 9.1 |
| Initial Dry Density (pcf) | 115.8 |
| Initial Saturation (%): | 54 |
| Initial Vertical Reading (in.) | 0.1267 |
| **After Test** | |
| Wt. of Wet Sample+Cont. (g): | 268.77 |
| Wt. of Dry Sample+Cont. (g): | 249.24 |
| Weight of Container (g): | 64.67 |
| Final Moisture Content (%) | 14.04 |
| Final Dry Density (pcf): | 119.8 |
| Final Saturation (%): | 93 |
| Final Vertical Reading (in.) | 0.1621 |
| Specific Gravity (assumed): | 2.70 |
| Water Density (pcf): | 62.43 |

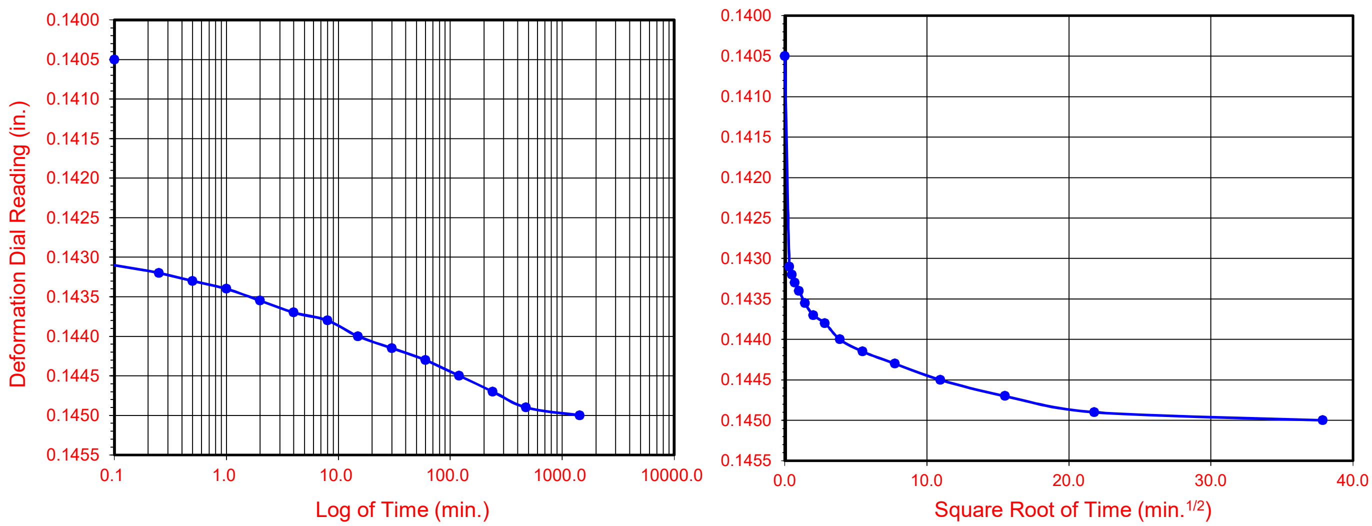


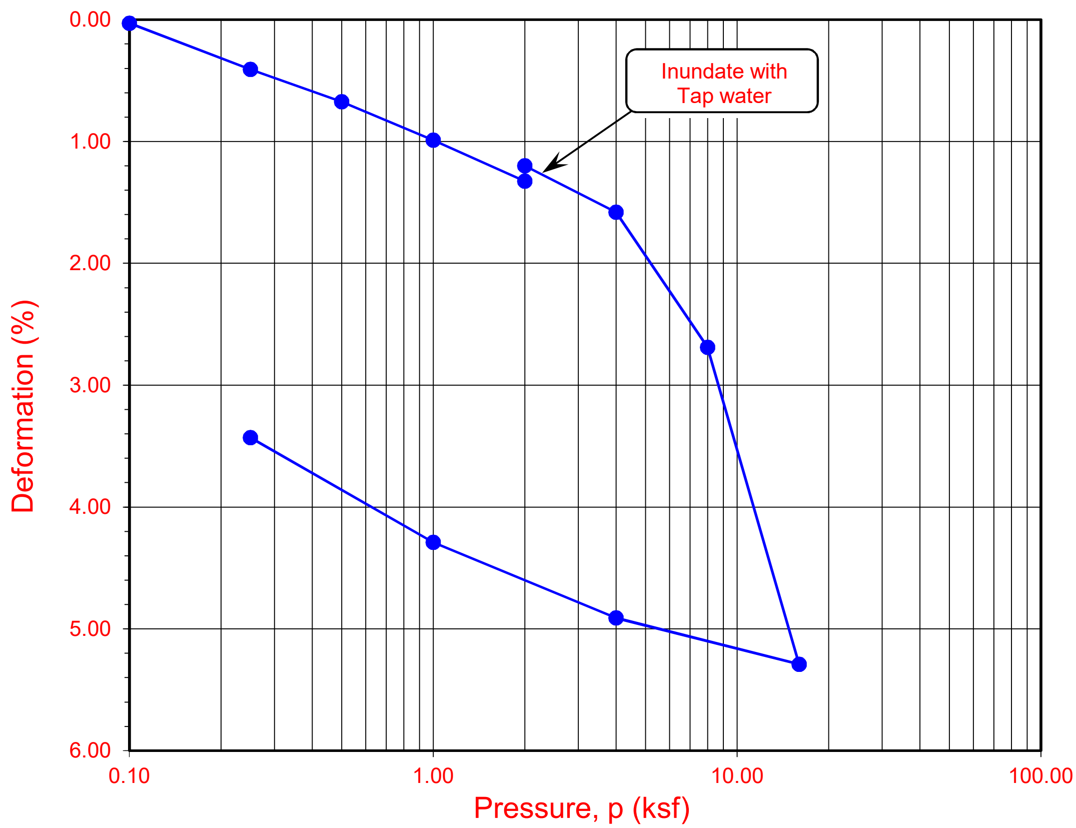

| Pressure (p) (ksf) | Final Reading (in.) | Apparent Thickness (in.) | Load Compliance (%) | Deformation % of Sample Thickness | Void Ratio | Corrected Deformation (%) |
|---|---|---|---|---|---|---|
| 0.10 | 0.1270 | 0.9997 | 0.00 | 0.03 | 0.455 | 0.03 |
| 0.25 | 0.1311 | 0.9956 | 0.03 | 0.44 | 0.450 | 0.41 |
| 0.50 | 0.1342 | 0.9926 | 0.07 | 0.74 | 0.446 | 0.67 |
| 1.00 | 0.1378 | 0.9889 | 0.12 | 1.11 | 0.441 | 0.99 |
| 2.00 | 0.1418 | 0.9850 | 0.18 | 1.51 | 0.437 | 1.33 |
| 2.00 | 0.1405 | 0.9862 | 0.18 | 1.38 | 0.438 | 1.20 |
| 4.00 | 0.1450 | 0.9817 | 0.25 | 1.83 | 0.433 | 1.58 |
| 8.00 | 0.1570 | 0.9697 | 0.34 | 3.03 | 0.417 | 2.69 |
| 16.00 | 0.1843 | 0.9424 | 0.47 | 5.76 | 0.379 | 5.29 |
| 4.00 | 0.1791 | 0.9476 | 0.33 | 5.24 | 0.384 | 4.91 |
| 1.00 | 0.1718 | 0.9549 | 0.22 | 4.51 | 0.393 | 4.29 |
| 0.25 | 0.1621 | 0.9646 | 0.11 | 3.54 | 0.406 | 3.43 |

Time Readings @ 4.0 ksf

| Date | Time | Elapsed Time (min) | Square Root of Time | Dial Rdgs. (in.) |
|---|---|---|---|---|
| 3/15/21 | 8:50:00 | 0.0 | 0.0 | 0.1405 |
| 3/15/21 | 8:50:06 | 0.1 | 0.3 | 0.1431 |
| 3/15/21 | 8:50:15 | 0.2 | 0.5 | 0.1432 |
| 3/15/21 | 8:50:30 | 0.5 | 0.7 | 0.1433 |
| 3/15/21 | 8:51:00 | 1.0 | 1.0 | 0.1434 |
| 3/15/21 | 8:52:00 | 2.0 | 1.4 | 0.1436 |
| 3/15/21 | 8:54:00 | 4.0 | 2.0 | 0.1437 |
| 3/15/21 | 8:58:00 | 8.0 | 2.8 | 0.1438 |
| 3/15/21 | 9:05:00 | 15.0 | 3.9 | 0.1440 |
| 3/15/21 | 9:20:00 | 30.0 | 5.5 | 0.1442 |
| 3/15/21 | 9:50:00 | 60.0 | 7.7 | 0.1443 |
| 3/15/21 | 10:50:00 | 120.0 | 11.0 | 0.1445 |
| 3/15/21 | 12:50:00 | 240.0 | 15.5 | 0.1447 |
| 3/15/21 | 16:45:00 | 475.0 | 21.8 | 0.1449 |
| 3/16/21 | 8:45:00 | 1435.0 | 37.9 | 0.1450 |

Time Readings @ 4.0 ksf




| Boring No. | Sample No. | Depth (ft.) | Moisture Content (%) | | Dry Density (pcf) | | Void Ratio | | Degree of Saturation (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| **LB-5** | **B-1** | **0-5** | **9.1** | **14.0** | **115.8** | **119.8** | **0.456** | **0.406** | **54** | **93** |

Soil Identification: Dark yellowish brown clayey sand (SC)

Leighton

**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS**
**ASTM D 2435**

Project No.: 13062.001

Rexford Bloomfield Ave.

04-21

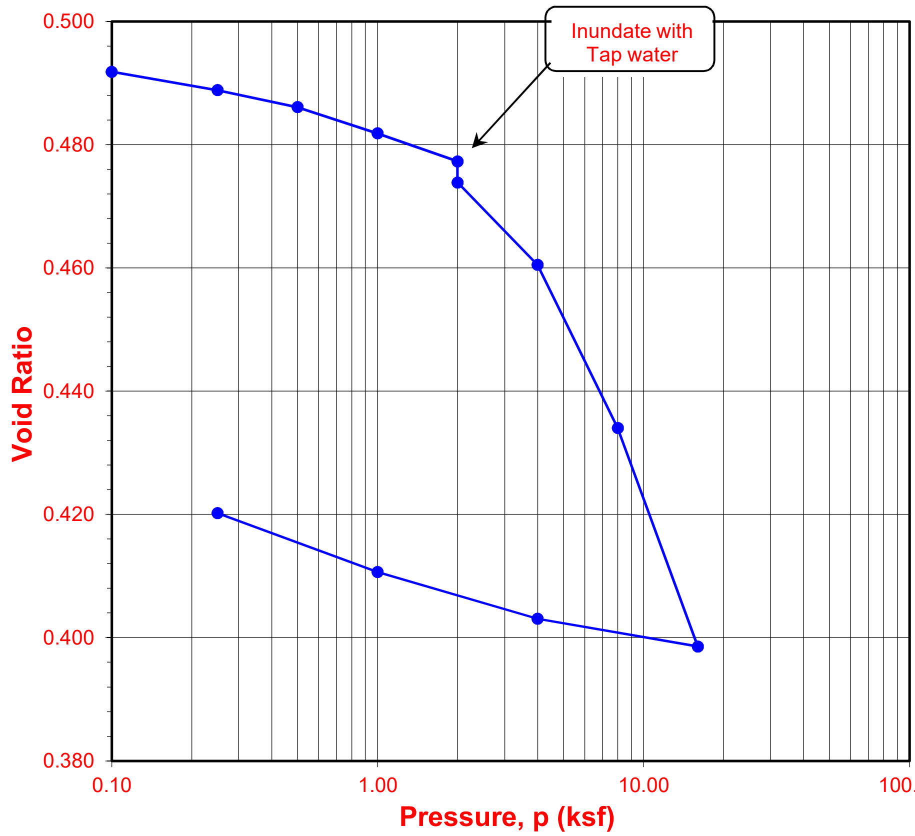
# ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

## ASTM D 2435

Leighton

| | | | |
|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: G. Bathala | Date: 03/10/21 |
| Project No.: | 13062.001 | Checked By: J. Ward | Date: 04/01/21 |
| Boring No.: | LB-5 | Depth (ft.): 5.0 | |
| Sample No.: | R-1 | Sample Type: | Ring |
| Soil Identification: | Yellowish brown clayey sand (SC) | | |

| | |
|---|---|
| Sample Diameter (in.) | 2.415 |
| Sample Thickness (in.) | 1.000 |
| Wt. of Sample + Ring (g) | 191.67 |
| Weight of Ring (g) | 40.75 |
| Height after consol. (in.) | 0.9519 |
| **Before Test** | |
| Wt.Wet Sample+Cont. (g) | 201.23 |
| Wt.of Dry Sample+Cont. (g) | 188.06 |
| Weight of Container (g) | 69.37 |
| Initial Moisture Content (%) | 11.1 |
| Initial Dry Density (pcf) | 113.0 |
| Initial Saturation (%) | 61 |
| Initial Vertical Reading (in.) | 0.3063 |
| **After Test** | |
| Wt.of Wet Sample+Cont. (g) | 255.96 |
| Wt. of Dry Sample+Cont. (g) | 235.65 |
| Weight of Container (g) | 59.81 |
| Final Moisture Content (%) | 15.03 |
| Final Dry Density (pcf) | 118.0 |
| Final Saturation (%) | 95 |
| Final Vertical Reading (in.) | 0.2565 |
| Specific Gravity (assumed) | 2.70 |
| Water Density (pcf) | 62.43 |

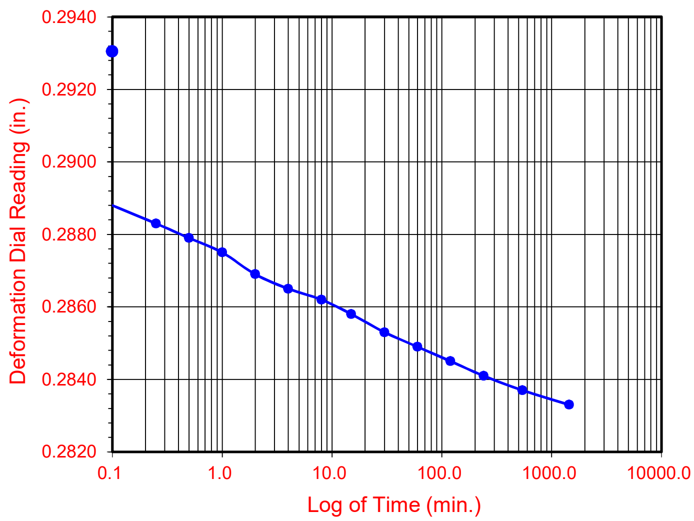


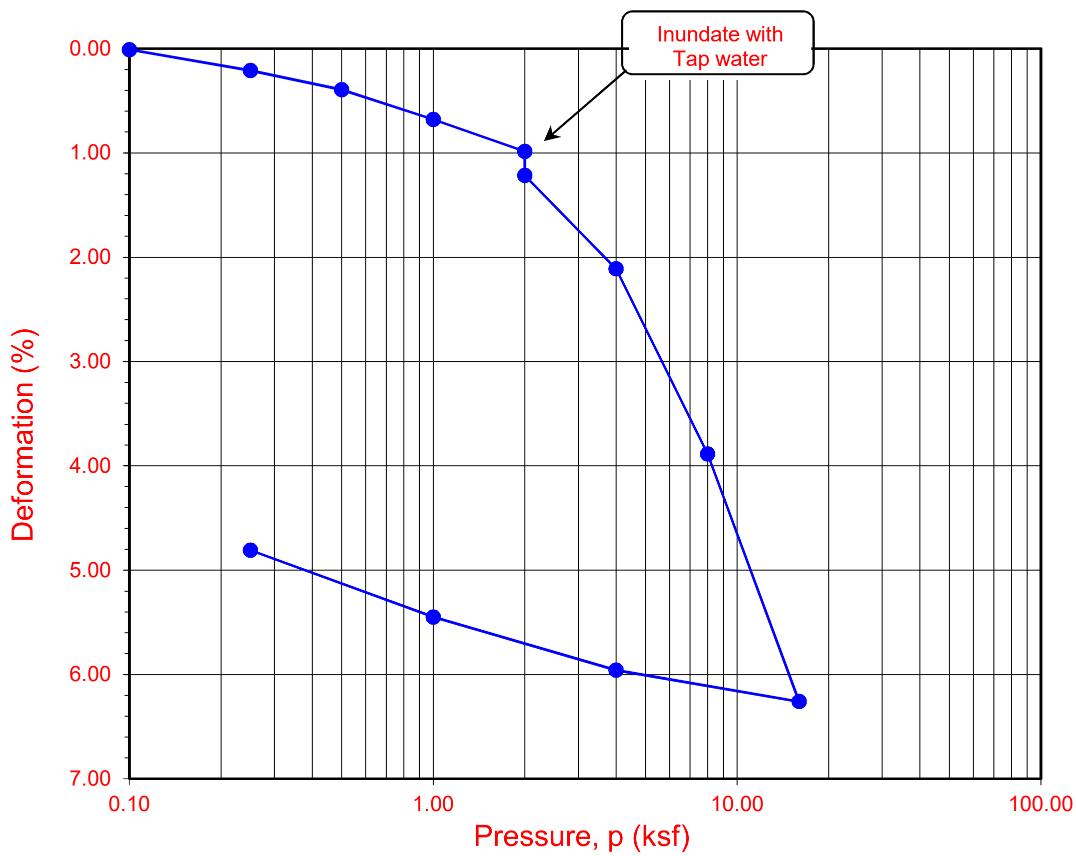

| Pressure (p) (ksf) | Final Reading (in.) | Apparent Thickness (in.) | Load Compliance (%) | Deformation % of Sample Thickness | Void Ratio | Corrected Deformation (%) |
|---|---|---|---|---|---|---|
| 0.10 | 0.3062 | 0.9999 | 0.00 | 0.01 | 0.492 | 0.01 |
| 0.25 | 0.3041 | 0.9978 | 0.01 | 0.22 | 0.489 | 0.21 |
| 0.50 | 0.3021 | 0.9958 | 0.03 | 0.43 | 0.486 | 0.40 |
| 1.00 | 0.2989 | 0.9926 | 0.06 | 0.74 | 0.482 | 0.68 |
| 2.00 | 0.2954 | 0.9891 | 0.11 | 1.10 | 0.477 | 0.99 |
| 2.00 | 0.2931 | 0.9868 | 0.11 | 1.33 | 0.474 | 1.22 |
| 4.00 | 0.2833 | 0.9770 | 0.19 | 2.30 | 0.461 | 2.11 |
| 8.00 | 0.2642 | 0.9579 | 0.33 | 4.22 | 0.434 | 3.89 |
| 16.00 | 0.2385 | 0.9322 | 0.52 | 6.78 | 0.399 | 6.26 |
| 4.00 | 0.2431 | 0.9368 | 0.36 | 6.32 | 0.403 | 5.96 |
| 1.00 | 0.2495 | 0.9432 | 0.23 | 5.68 | 0.411 | 5.45 |
| 0.25 | 0.2565 | 0.9502 | 0.17 | 4.98 | 0.420 | 4.81 |

Time Readings @ 4 ksf

| Date | Time | Elapsed Time (min) | Square Root of Time | Dial Rdgs. (in.) |
|---|---|---|---|---|
| 3/13/21 | 6:45:00 | 0.0 | 0.0 | 0.2931 |
| 3/13/21 | 6:45:06 | 0.1 | 0.3 | 0.2888 |
| 3/13/21 | 6:45:15 | 0.2 | 0.5 | 0.2883 |
| 3/13/21 | 6:45:30 | 0.5 | 0.7 | 0.2879 |
| 3/13/21 | 6:46:00 | 1.0 | 1.0 | 0.2875 |
| 3/13/21 | 6:47:00 | 2.0 | 1.4 | 0.2869 |
| 3/13/21 | 6:49:00 | 4.0 | 2.0 | 0.2865 |
| 3/13/21 | 6:53:00 | 8.0 | 2.8 | 0.2862 |
| 3/13/21 | 7:00:00 | 15.0 | 3.9 | 0.2858 |
| 3/13/21 | 7:15:00 | 30.0 | 5.5 | 0.2853 |
| 3/13/21 | 7:45:00 | 60.0 | 7.7 | 0.2849 |
| 3/13/21 | 8:45:00 | 120.0 | 11.0 | 0.2845 |
| 3/13/21 | 10:45:00 | 240.0 | 15.5 | 0.2841 |
| 3/13/21 | 15:45:00 | 540.0 | 23.2 | 0.2837 |
| 3/14/21 | 6:45:00 | 1440.0 | 37.9 | 0.2833 |

Time Readings @ 4 ksf




| Boring No. | Sample No. | Depth (ft.) | Moisture Content (%) | | Dry Density (pcf) | | Void Ratio | | Degree of Saturation (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Initial | Final | Initial | Final | Initial | Final | Initial | Final |
| **LB-5** | **R-1** | **5.0** | **11.1** | **15.0** | **113.0** | **118.0** | **0.492** | **0.420** | **61** | **95** |

Soil Identification: Yellowish brown clayey sand (SC)

Leighton

**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS**
**ASTM D 2435**

Project No.: 13062.001

Rexford Bloomfield Ave.

04-21

# DIRECT SHEAR TEST

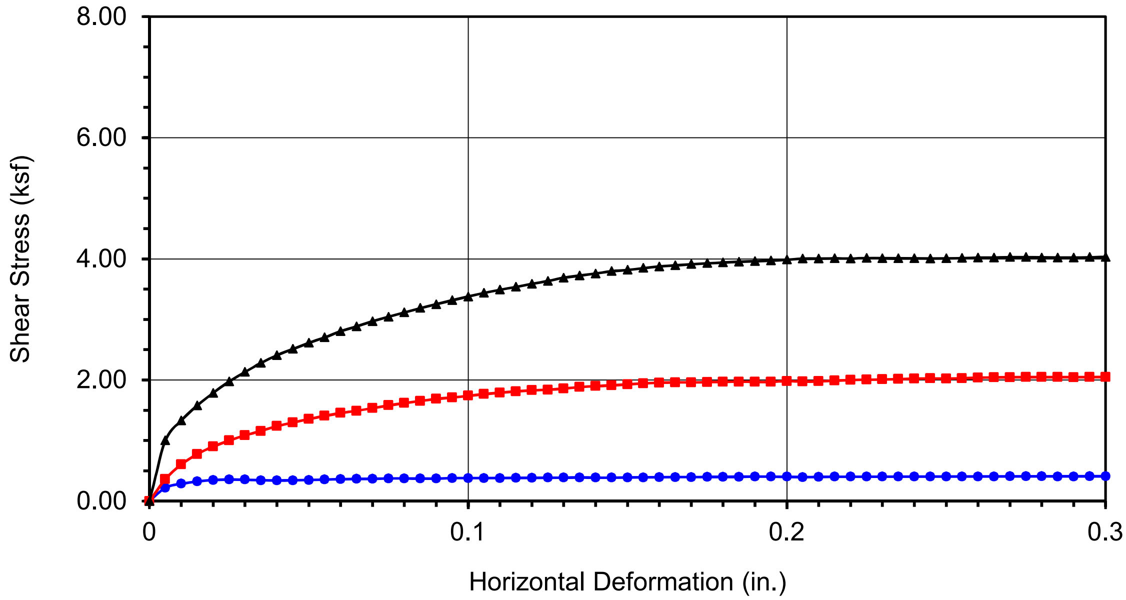
**Consolidated Drained - ASTM D 3080**

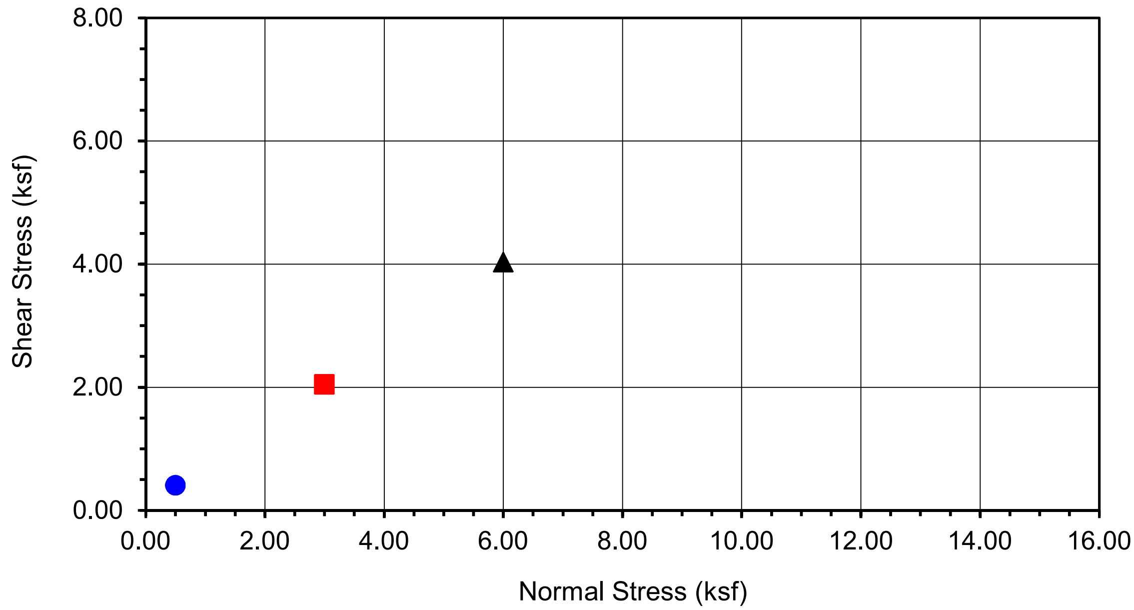
Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Bathala | Date: | 03/16/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Sample Type: | 90% Remold | | |
| Sample No.: | B-1 | Depth (ft.): | 0-5 | | |

Soil Identification: Dark yellowish brown silty sand (SM)

| | | | |
|---|---|---|---|
| Sample Diameter(in): | 2.415 | 2.415 | 2.415 |
| Sample Thickness(in.): | 1.000 | 1.000 | 1.000 |
| Weight of Sample + ring(gm): | 195.68 | 194.90 | 195.93 |
| Weight of Ring(gm): | 45.39 | 44.46 | 45.49 |
| **Before Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 211.08 | 211.08 | 211.08 |
| Weight of Dry Sample+Cont.(gm): | 200.87 | 200.87 | 200.87 |
| Weight of Container(gm): | 57.18 | 57.18 | 57.18 |
| Vertical Rdg.(in): Initial | 0.0000 | 0.2972 | 0.2516 |
| Vertical Rdg.(in): Final | -0.0059 | 0.3199 | 0.2891 |
| **After Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 228.40 | 215.62 | 208.24 |
| Weight of Dry Sample+Cont.(gm): | 210.78 | 199.83 | 192.86 |
| Weight of Container(gm): | 72.42 | 60.91 | 53.69 |
| Specific Gravity (Assumed): | 2.70 | 2.70 | 2.70 |
| Water Density(pcf): | 62.43 | 62.43 | 62.43 |




| | |
|---|---|
| **Boring No.** | **LB-1** |
| **Sample No.** | **B-1** |
| **Depth (ft)** | **0-5** |

Sample Type:

90% Remold

Soil Identification:

Dark yellowish brown silty sand (SM)

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 0.500 | 3.000 | 6.000 |
| Peak Shear Stress (kip/ft²) | ● 0.409 | ■ 2.047 | ▲ 4.030 |
| Shear Stress @ End of Test (ksf) | ○ 0.409 | □ 2.047 | △ 4.030 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 7.11 | 7.11 | 7.11 |
| Dry Density (pcf) | 116.7 | 116.8 | 116.8 |
| Saturation (%) | 43.2 | 43.3 | 43.3 |
| Soil Height Before Shearing (in.) | 0.9941 | 0.9773 | 0.9625 |
| Final Moisture Content (%) | 12.7 | 11.4 | 11.1 |

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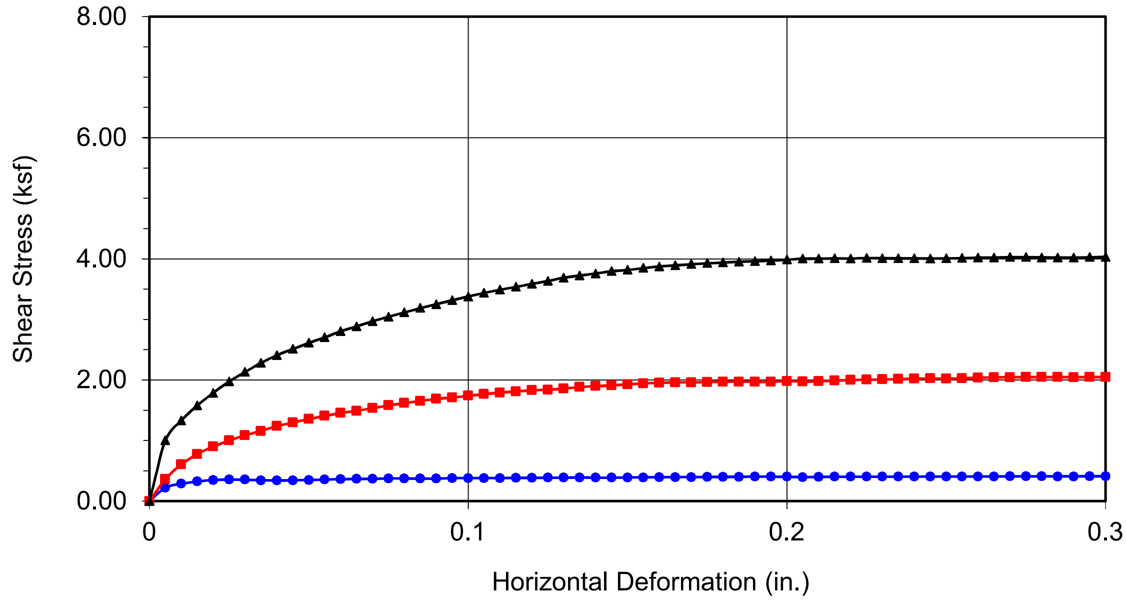
**DIRECT SHEAR TEST RESULTS**

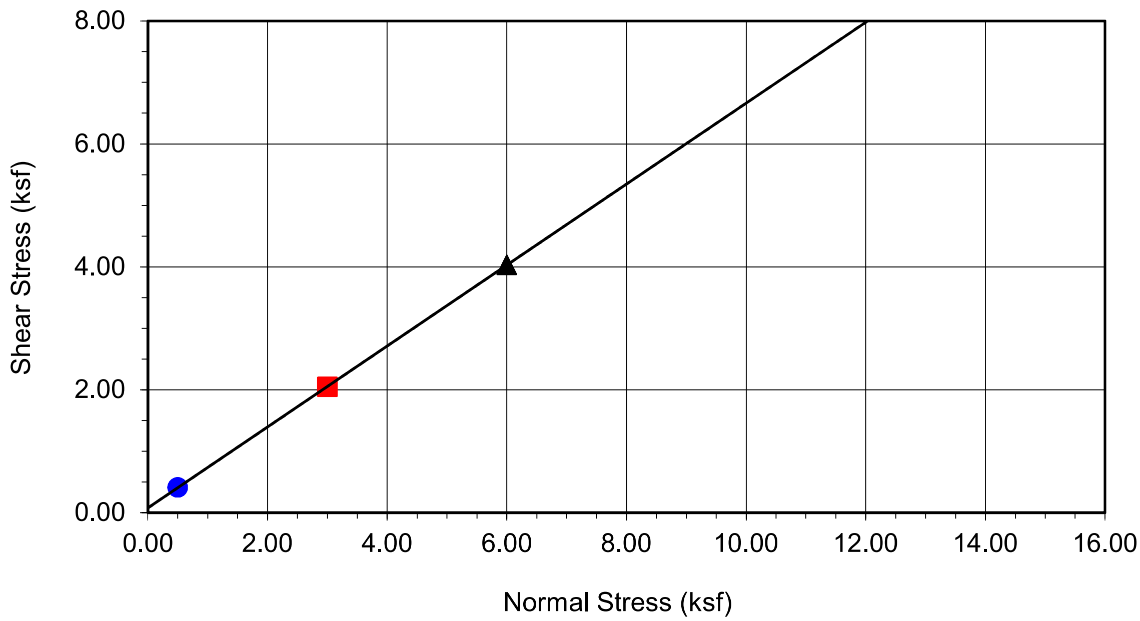
**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21




| | |
|---|---|
| **Boring No.** | **LB-1** |
| **Sample No.** | **B-1** |
| **Depth (ft)** | **0-5** |
| Sample Type: | 90% Remold |

Soil Identification:
Dark yellowish brown silty sand (SM)

**Strength Parameters**

| | C (psf) | ϕ (°) |
|---|---|---|
| Peak | 77 | 33 |
| Ultimate | 77 | 33 |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 0.500 | 3.000 | 6.000 |
| Peak Shear Stress (kip/ft²) | ● 0.409 | ■ 2.047 | ▲ 4.030 |
| Shear Stress @ End of Test (ksf) | ○ 0.409 | □ 2.047 | △ 4.030 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 7.11 | 7.11 | 7.11 |
| Dry Density (pcf) | 116.7 | 116.8 | 116.8 |
| Saturation (%) | 43.2 | 43.3 | 43.3 |
| Soil Height Before Shearing (in.) | 0.9941 | 0.9773 | 0.9625 |
| Final Moisture Content (%) | 12.7 | 11.4 | 11.1 |

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**DIRECT SHEAR TEST RESULTS**

**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21

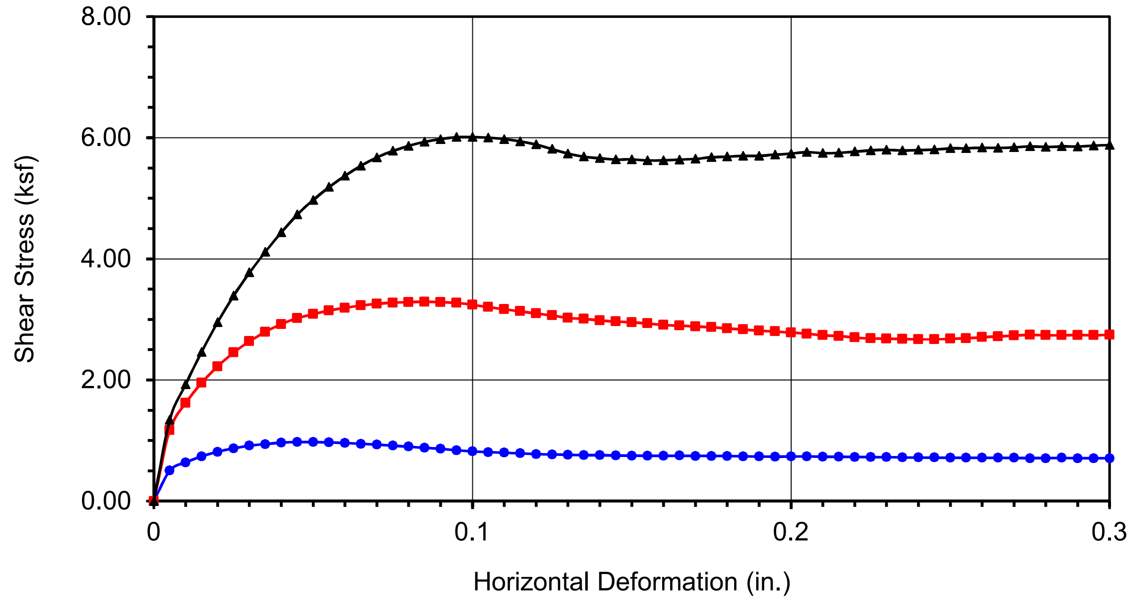
# DIRECT SHEAR TEST

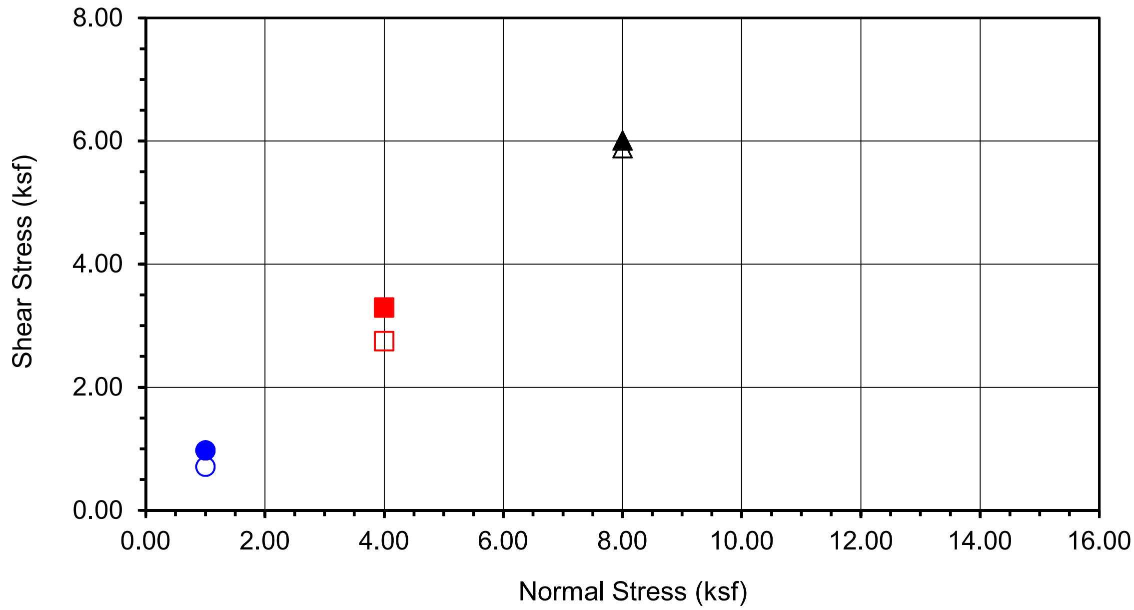
**Consolidated Drained - ASTM D 3080**

Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Bathala | Date: | 03/16/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Sample Type: | Ring | | |
| Sample No.: | R-1 | Depth (ft.): | 5.0 | | |
| Soil Identification: | Brown silty, clayey sand (SC-SM) | | | | |

| | | | |
|---|---|---|---|
| Sample Diameter(in): | 2.415 | 2.415 | 2.415 |
| Sample Thickness(in.): | 1.000 | 1.000 | 1.000 |
| Weight of Sample + ring(gm): | 209.51 | 213.10 | 213.34 |
| Weight of Ring(gm): | 44.78 | 45.55 | 44.73 |
| **Before Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 238.20 | 238.20 | 238.20 |
| Weight of Dry Sample+Cont.(gm): | 222.26 | 222.26 | 222.26 |
| Weight of Container(gm): | 65.86 | 65.86 | 65.86 |
| Vertical Rdg.(in): Initial | 0.2609 | 0.2590 | 0.0000 |
| Vertical Rdg.(in): Final | 0.2670 | 0.2741 | -0.0262 |
| **After Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 232.39 | 243.55 | 234.55 |
| Weight of Dry Sample+Cont.(gm): | 214.95 | 227.73 | 219.52 |
| Weight of Container(gm): | 67.88 | 77.78 | 68.27 |
| Specific Gravity (Assumed): | 2.70 | 2.70 | 2.70 |
| Water Density(pcf): | 62.43 | 62.43 | 62.43 |




| | |
|---|---|
| **Boring No.** | **LB-1** |
| **Sample No.** | **R-1** |
| **Depth (ft)** | **5** |
| Sample Type: Ring | |
| Soil Identification: Brown silty, clayey sand (SC-SM) | |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 1.000 | 4.000 | 8.000 |
| Peak Shear Stress (kip/ft²) | ● 0.975 | ■ 3.292 | ▲ 6.008 |
| Shear Stress @ End of Test (ksf) | ○ 0.707 | □ 2.745 | △ 5.879 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 10.19 | 10.19 | 10.19 |
| Dry Density (pcf) | 124.3 | 126.5 | 127.3 |
| Saturation (%) | 77.3 | 82.6 | 84.8 |
| Soil Height Before Shearing (in.) | 0.9939 | 0.9849 | 0.9738 |
| Final Moisture Content (%) | 11.9 | 10.6 | 9.9 |

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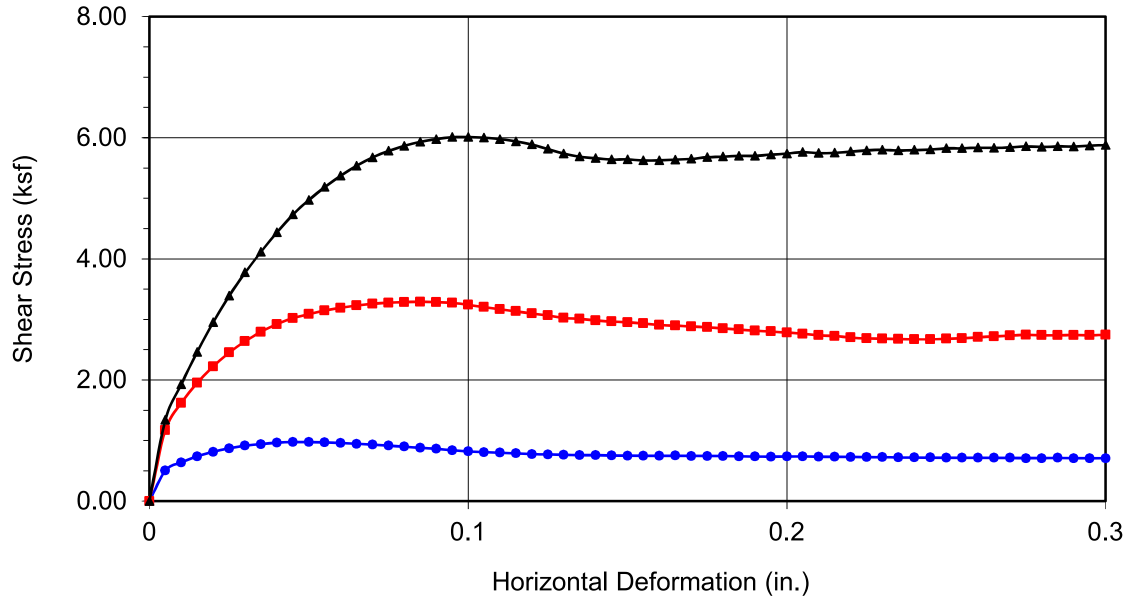
**DIRECT SHEAR TEST RESULTS**

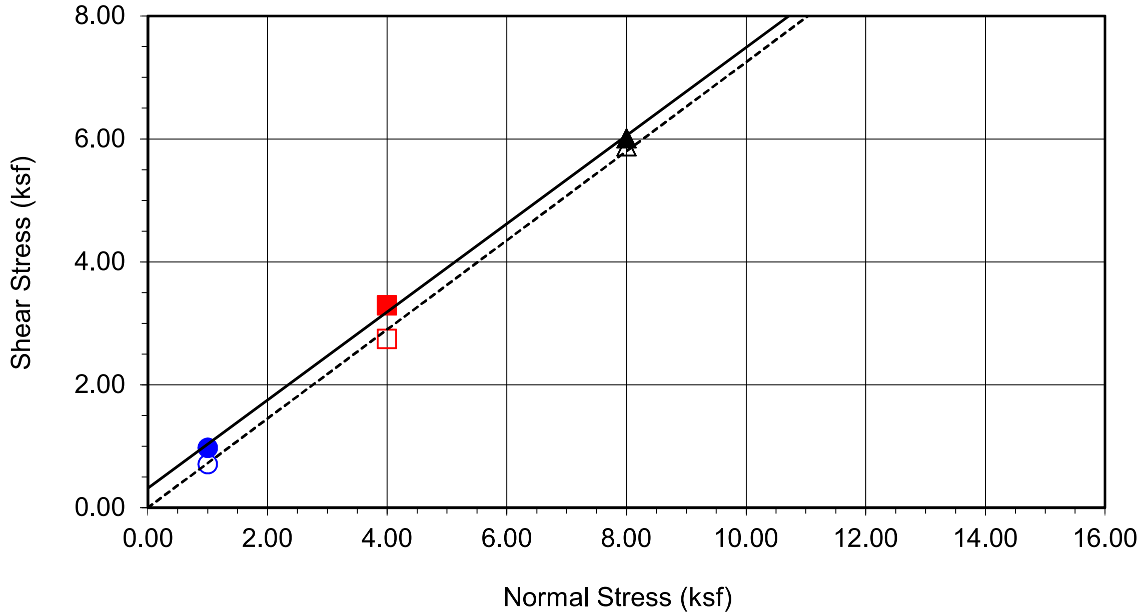
**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21




| | |
|---|---|
| **Boring No.** | **LB-1** |
| **Sample No.** | **R-1** |
| **Depth (ft)** | **5** |
| Sample Type: | Ring |
| Soil Identification: Brown silty, clayey sand (SC-SM) | |

**Strength Parameters**

| | C (psf) | ϕ (°) |
|---|---|---|
| Peak | 319 | 36 |
| Ultimate | 0 | 36 |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 1.000 | 4.000 | 8.000 |
| Peak Shear Stress (kip/ft²) | ● 0.975 | ■ 3.292 | ▲ 6.008 |
| Shear Stress @ End of Test (ksf) | ○ 0.707 | □ 2.745 | △ 5.879 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 10.19 | 10.19 | 10.19 |
| Dry Density (pcf) | 124.3 | 126.5 | 127.3 |
| Saturation (%) | 77.3 | 82.6 | 84.8 |
| Soil Height Before Shearing (in.) | 0.9939 | 0.9849 | 0.9738 |
| Final Moisture Content (%) | 11.9 | 10.6 | 9.9 |

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**DIRECT SHEAR TEST RESULTS**

**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21

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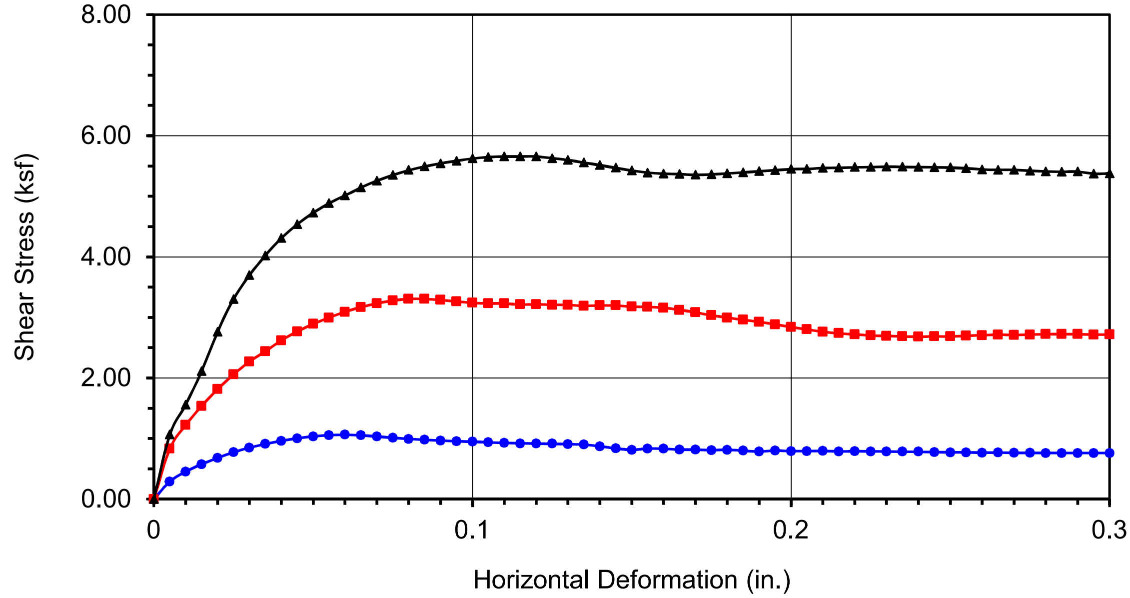
# DIRECT SHEAR TEST

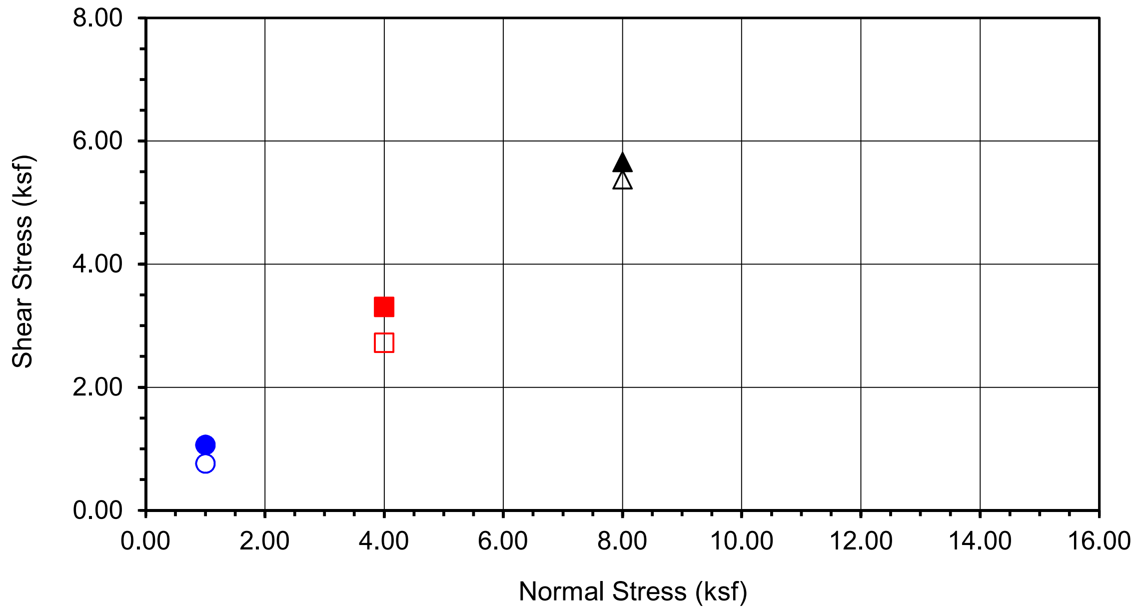
**Consolidated Drained - ASTM D 3080**

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Bathala | Date: | 03/17/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-1 | Sample Type: | Ring | | |
| Sample No.: | R-2 | Depth (ft.): | 15.0 | | |

Soil Identification: Light olive brown silt (ML)

| | | | |
|---|---|---|---|
| Sample Diameter(in): | 2.415 | 2.415 | 2.415 |
| Sample Thickness(in.): | 1.000 | 1.000 | 1.000 |
| Weight of Sample + ring(gm): | 172.09 | 176.03 | 174.80 |
| Weight of Ring(gm): | 42.45 | 45.61 | 43.15 |
| **Before Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 174.67 | 174.67 | 174.67 |
| Weight of Dry Sample+Cont.(gm): | 166.81 | 166.81 | 166.81 |
| Weight of Container(gm): | 65.76 | 65.76 | 65.76 |
| Vertical Rdg.(in): Initial | 0.2356 | 0.2233 | 0.0000 |
| Vertical Rdg.(in): Final | 0.2432 | 0.2404 | -0.0378 |
| **After Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 205.01 | 171.69 | 222.75 |
| Weight of Dry Sample+Cont.(gm): | 177.57 | 149.71 | 196.10 |
| Weight of Container(gm): | 60.90 | 57.18 | 77.78 |
| Specific Gravity (Assumed): | 2.70 | 2.70 | 2.70 |
| Water Density(pcf): | 62.43 | 62.43 | 62.43 |




| | |
|---|---|
| **Boring No.** | **LB-1** |
| **Sample No.** | **R-2** |
| **Depth (ft)** | **15** |
| <u>Sample Type:</u><br>Ring | |
| <u>Soil Identification:</u><br>Light olive brown silt (ML) | |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 1.000 | 4.000 | 8.000 |
| Peak Shear Stress (kip/ft²) | ● 1.063 | ■ 3.304 | ▲ 5.656 |
| Shear Stress @ End of Test (ksf) | ○ 0.761 | □ 2.719 | △ 5.379 |
| Deformation Rate (in./min.) | 0.0025 | 0.0025 | 0.0025 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 7.78 | 7.78 | 7.78 |
| Dry Density (pcf) | 100.0 | 100.6 | 101.6 |
| Saturation (%) | 30.7 | 31.1 | 31.9 |
| Soil Height Before Shearing (in.) | 0.9924 | 0.9829 | 0.9622 |
| Final Moisture Content (%) | 23.5 | 23.8 | 22.5 |

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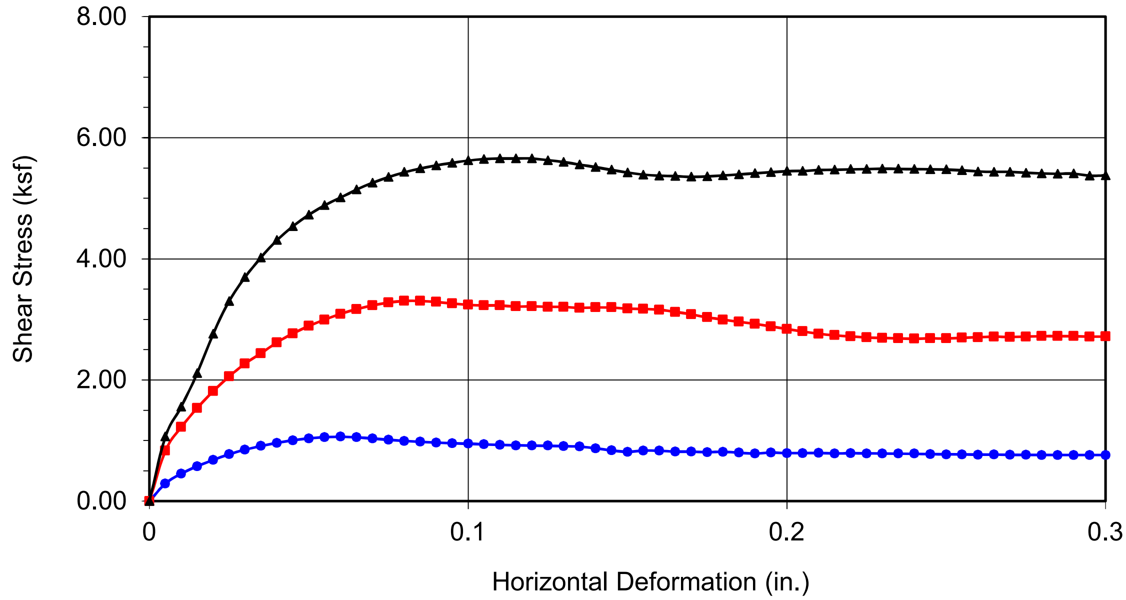
**DIRECT SHEAR TEST RESULTS**

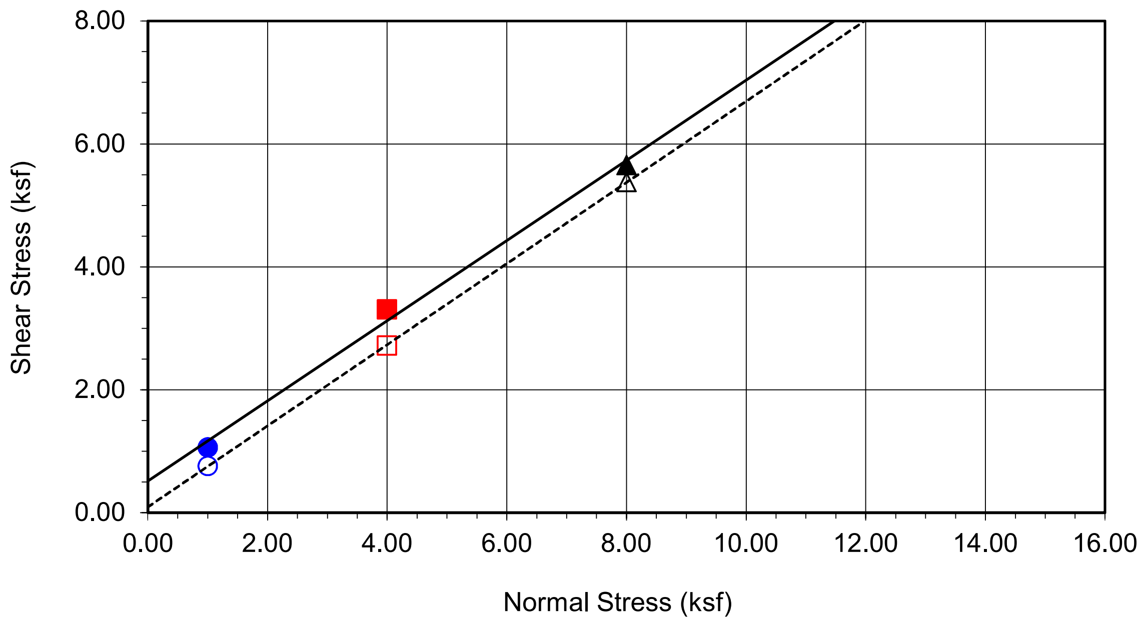
**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21




| | |
|---|---|
| **Boring No.** | **LB-1** |
| **Sample No.** | **R-2** |
| **Depth (ft)** | **15** |
| Sample Type: | Ring |

Soil Identification:
Light olive brown silt (ML)

**Strength Parameters**

| | C (psf) | ϕ (°) |
|---|---|---|
| Peak | 514 | 33 |
| Ultimate | 93 | 33 |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 1.000 | 4.000 | 8.000 |
| Peak Shear Stress (kip/ft²) | ● 1.063 | ■ 3.304 | ▲ 5.656 |
| Shear Stress @ End of Test (ksf) | ○ 0.761 | □ 2.719 | △ 5.379 |
| Deformation Rate (in./min.) | 0.0025 | 0.0025 | 0.0025 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 7.78 | 7.78 | 7.78 |
| Dry Density (pcf) | 100.0 | 100.6 | 101.6 |
| Saturation (%) | 30.7 | 31.1 | 31.9 |
| Soil Height Before Shearing (in.) | 0.9924 | 0.9829 | 0.9622 |
| Final Moisture Content (%) | 23.5 | 23.8 | 22.5 |

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**DIRECT SHEAR TEST RESULTS**
**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21

*DS LB-1, R-2 @ 15*

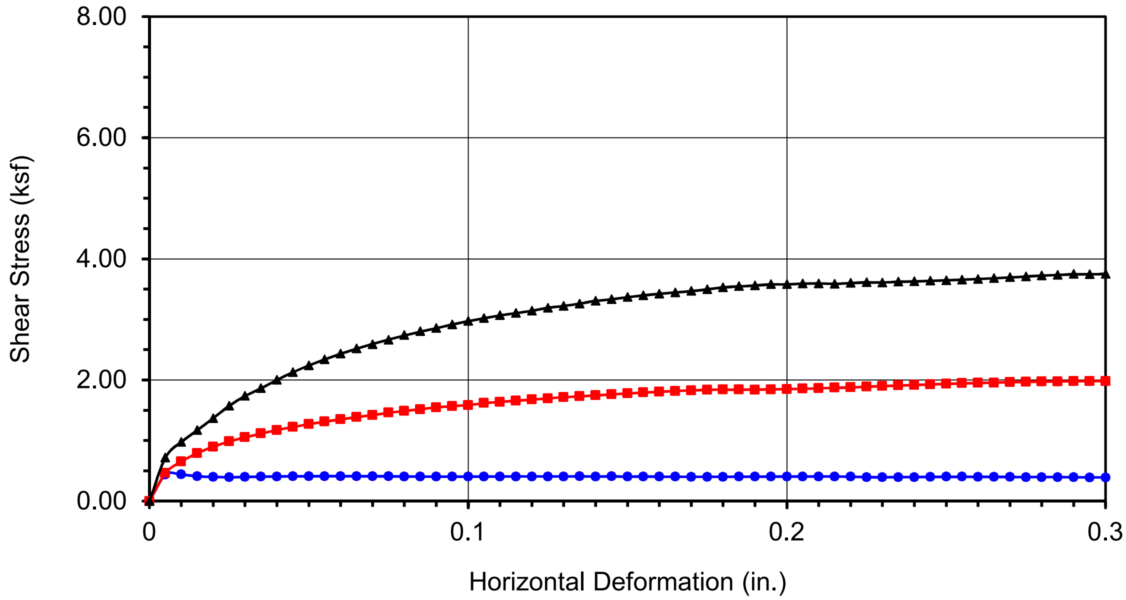
# DIRECT SHEAR TEST

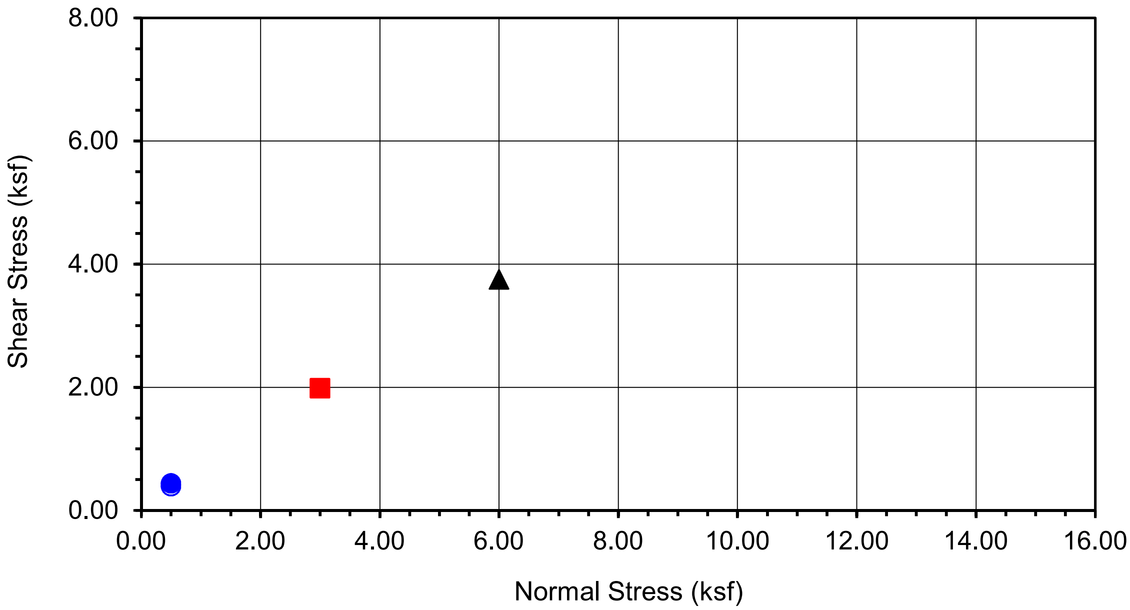
**Consolidated Drained - ASTM D 3080**

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Bathala | Date: | 03/15/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/02/21 |
| Boring No.: | LB-5 | Sample Type: | 90% Remold | | |
| Sample No.: | B-1 | Depth (ft.): | 0-5 | | |

Soil Identification: Dark yellowish brown clayey sand (SC)

| | | | |
|---|---|---|---|
| Sample Diameter(in): | 2.415 | 2.415 | 2.415 |
| Sample Thickness(in.): | 1.000 | 1.000 | 1.000 |
| Weight of Sample + ring(gm): | 197.18 | 197.48 | 196.43 |
| Weight of Ring(gm): | 45.37 | 45.46 | 45.70 |
| **Before Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 207.30 | 207.30 | 207.30 |
| Weight of Dry Sample+Cont.(gm): | 195.05 | 195.05 | 195.05 |
| Weight of Container(gm): | 60.36 | 60.36 | 60.36 |
| Vertical Rdg.(in): Initial | 0.2584 | 0.2783 | 0.0000 |
| Vertical Rdg.(in): Final | 0.2577 | 0.2979 | -0.0289 |
| **After Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 219.94 | 225.37 | 209.92 |
| Weight of Dry Sample+Cont.(gm): | 198.64 | 206.00 | 191.87 |
| Weight of Container(gm): | 60.94 | 67.87 | 55.16 |
| Specific Gravity (Assumed): | 2.70 | 2.70 | 2.70 |
| Water Density(pcf): | 62.43 | 62.43 | 62.43 |




| | |
|---|---|
| **Boring No.** | **LB-5** |
| **Sample No.** | **B-1** |
| **Depth (ft)** | **0-5** |

Sample Type:

90% Remold

Soil Identification:

Dark yellowish brown clayey sand (SC)

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 0.500 | 3.000 | 6.000 |
| Peak Shear Stress (kip/ft²) | ● 0.440 | ■ 1.981 | ▲ 3.751 |
| Shear Stress @ End of Test (ksf) | ○ 0.390 | □ 1.981 | △ 3.751 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 9.09 | 9.09 | 9.09 |
| Dry Density (pcf) | 115.7 | 115.9 | 114.9 |
| Saturation (%) | 53.8 | 54.0 | 52.6 |
| Soil Height Before Shearing (in.) | 1.0007 | 0.9804 | 0.9711 |
| Final Moisture Content (%) | 15.5 | 14.0 | 13.2 |

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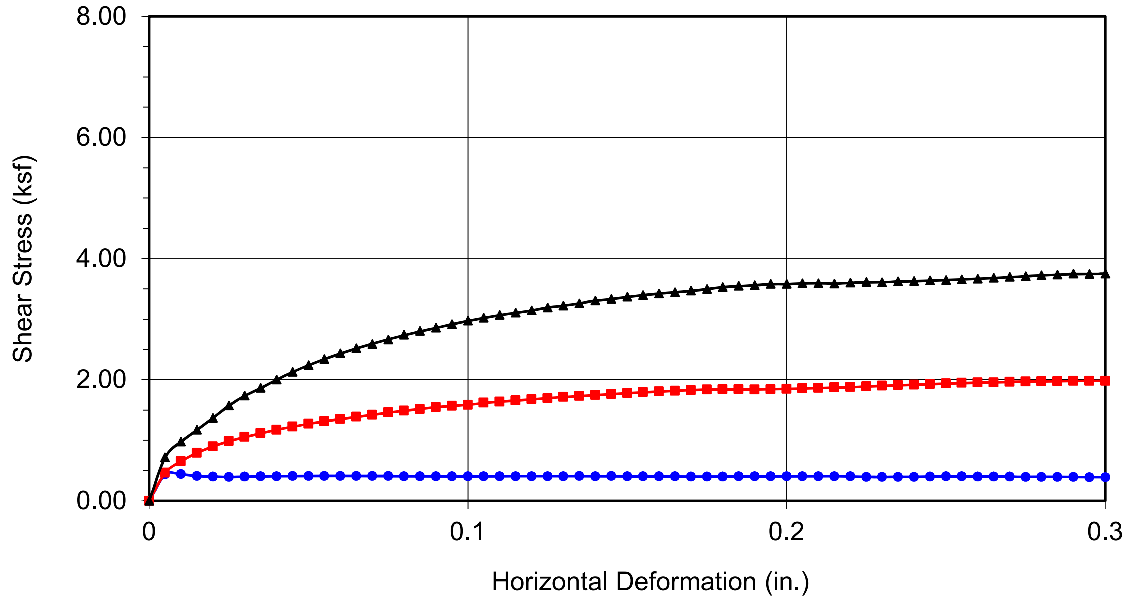
**DIRECT SHEAR TEST RESULTS**

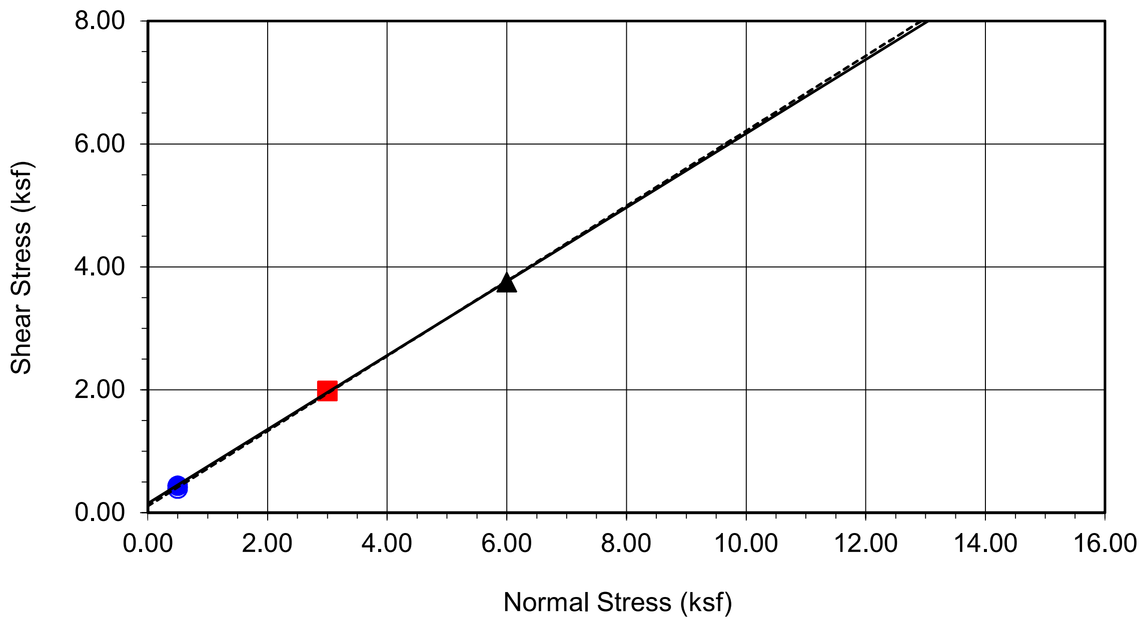
**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21




| | |
|---|---|
| **Boring No.** | **LB-5** |
| **Sample No.** | **B-1** |
| **Depth (ft)** | **0-5** |
| Sample Type: | 90% Remold |
| Soil Identification: Dark yellowish brown clayey sand (SC) | |

**Strength Parameters**

| | C (psf) | $\phi$ (°) |
|---|---|---|
| Peak | 152 | 31 |
| Ultimate | 108 | 31 |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 0.500 | 3.000 | 6.000 |
| Peak Shear Stress (kip/ft²) | ● 0.440 | ■ 1.981 | ▲ 3.751 |
| Shear Stress @ End of Test (ksf) | ○ 0.390 | □ 1.981 | △ 3.751 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 9.09 | 9.09 | 9.09 |
| Dry Density (pcf) | 115.7 | 115.9 | 114.9 |
| Saturation (%) | 53.8 | 54.0 | 52.6 |
| Soil Height Before Shearing (in.) | 1.0007 | 0.9804 | 0.9711 |
| Final Moisture Content (%) | 15.5 | 14.0 | 13.2 |

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**DIRECT SHEAR TEST RESULTS**

**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21

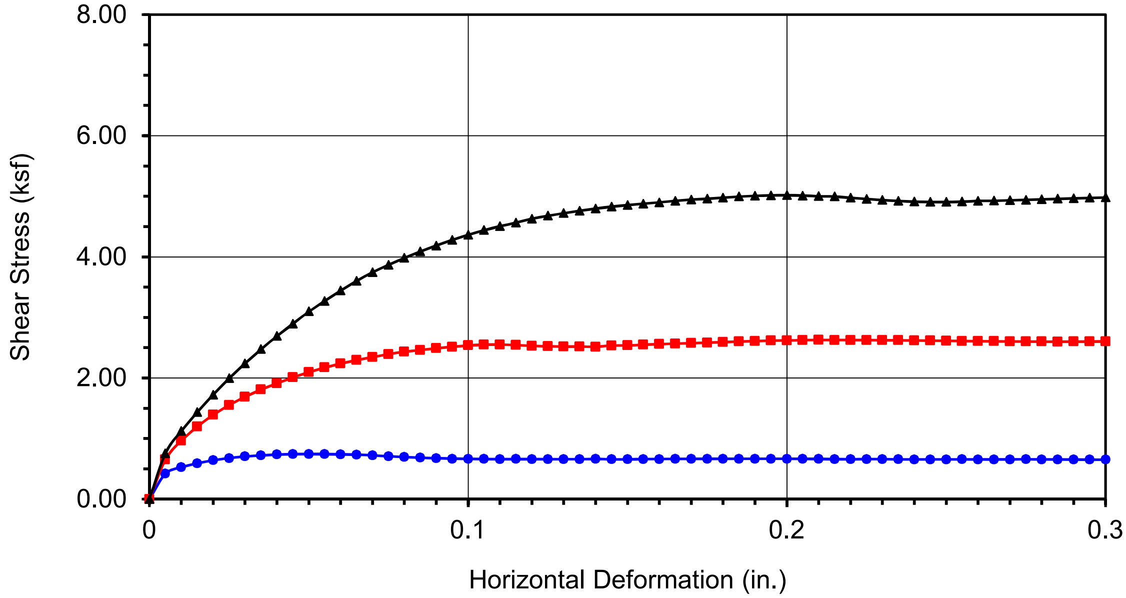
# DIRECT SHEAR TEST

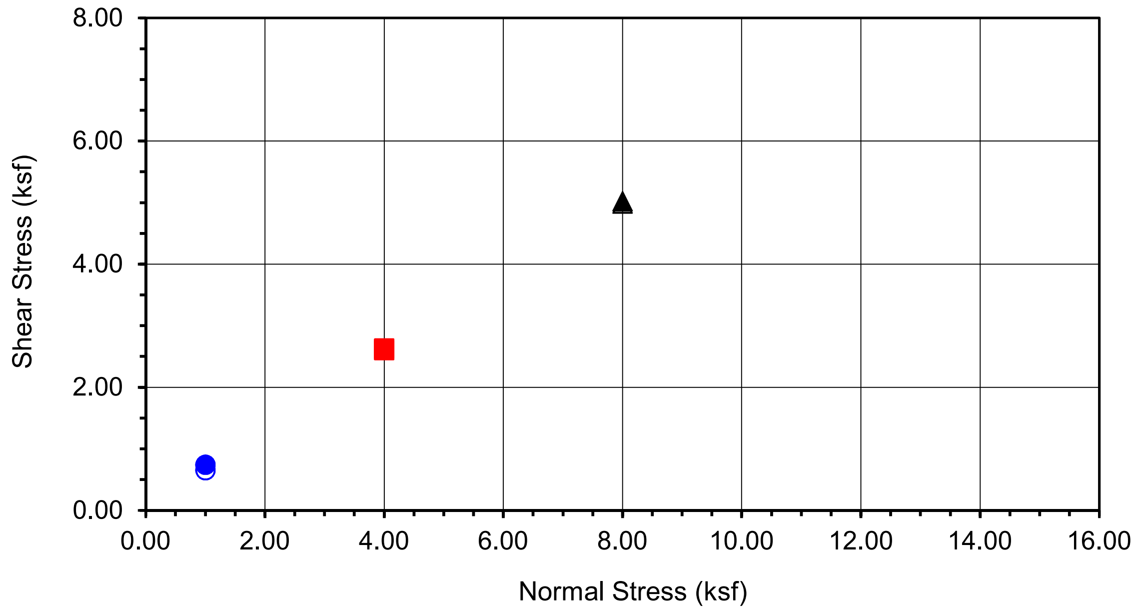
**Consolidated Drained - ASTM D 3080**

Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By: | G. Bathala | Date: | 03/17/21 |
| Project No.: | 13062.001 | Checked By: | J. Ward | Date: | 04/01/21 |
| Boring No.: | LB-5 | Sample Type: | Ring | | |
| Sample No.: | R-1 | Depth (ft.): | 5.0 | | |
| Soil Identification: | Yellowish brown clayey sand (SC) | | | | |

| | | | |
|---|---|---|---|
| Sample Diameter(in): | 2.415 | 2.415 | 2.415 |
| Sample Thickness(in.): | 1.000 | 1.000 | 1.000 |
| Weight of Sample + ring(gm): | 194.52 | 193.15 | 201.08 |
| Weight of Ring(gm): | 45.78 | 42.21 | 45.74 |
| **Before Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 201.23 | 201.23 | 201.23 |
| Weight of Dry Sample+Cont.(gm): | 188.06 | 188.06 | 188.06 |
| Weight of Container(gm): | 69.37 | 69.37 | 69.37 |
| Vertical Rdg.(in): Initial | 0.2735 | 0.2649 | 0.0000 |
| Vertical Rdg.(in): Final | 0.2805 | 0.2868 | -0.0449 |
| **After Shearing** | | | |
| Weight of Wet Sample+Cont.(gm): | 222.35 | 215.31 | 219.72 |
| Weight of Dry Sample+Cont.(gm): | 199.46 | 195.23 | 201.09 |
| Weight of Container(gm): | 67.90 | 61.37 | 64.67 |
| Specific Gravity (Assumed): | 2.70 | 2.70 | 2.70 |
| Water Density(pcf): | 62.43 | 62.43 | 62.43 |




| | |
|---|---|
| **Boring No.** | **LB-5** |
| **Sample No.** | **R-1** |
| **Depth (ft)** | **5** |

Sample Type:

Ring

Soil Identification:
Yellowish brown clayey sand (SC)

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 1.000 | 4.000 | 8.000 |
| Peak Shear Stress (kip/ft²) | ● 0.742 | ■ 2.628 | ▲ 5.017 |
| Shear Stress @ End of Test (ksf) | ○ 0.651 | □ 2.603 | △ 4.980 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 11.10 | 11.10 | 11.10 |
| Dry Density (pcf) | 111.3 | 113.0 | 116.3 |
| Saturation (%) | 58.3 | 60.9 | 66.6 |
| Soil Height Before Shearing (in.) | 0.9930 | 0.9781 | 0.9551 |
| Final Moisture Content (%) | 17.4 | 15.0 | 13.7 |

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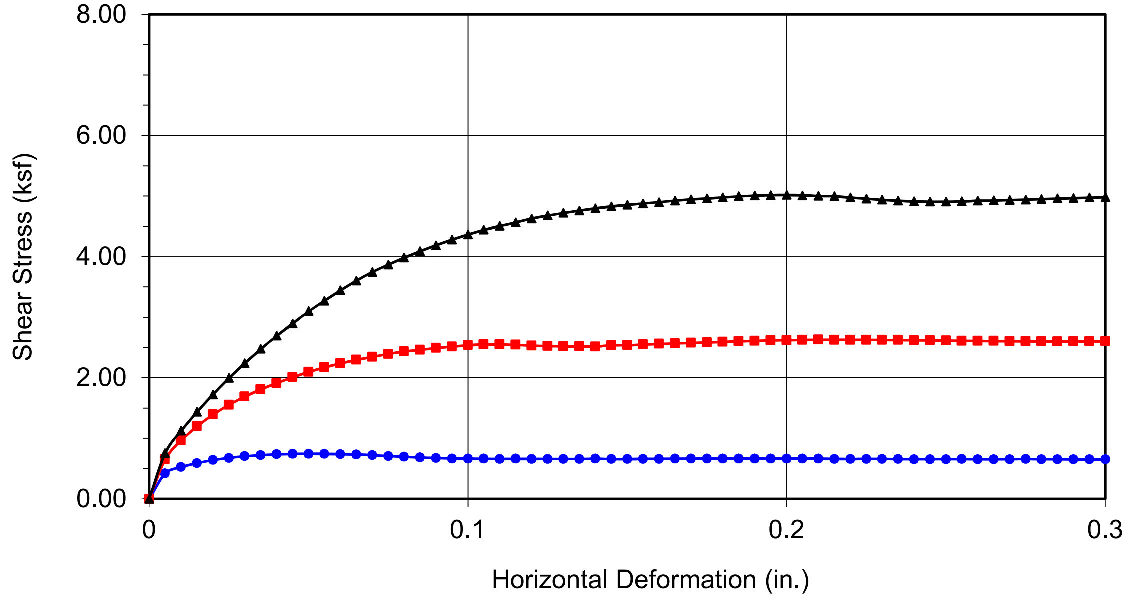
**DIRECT SHEAR TEST RESULTS**

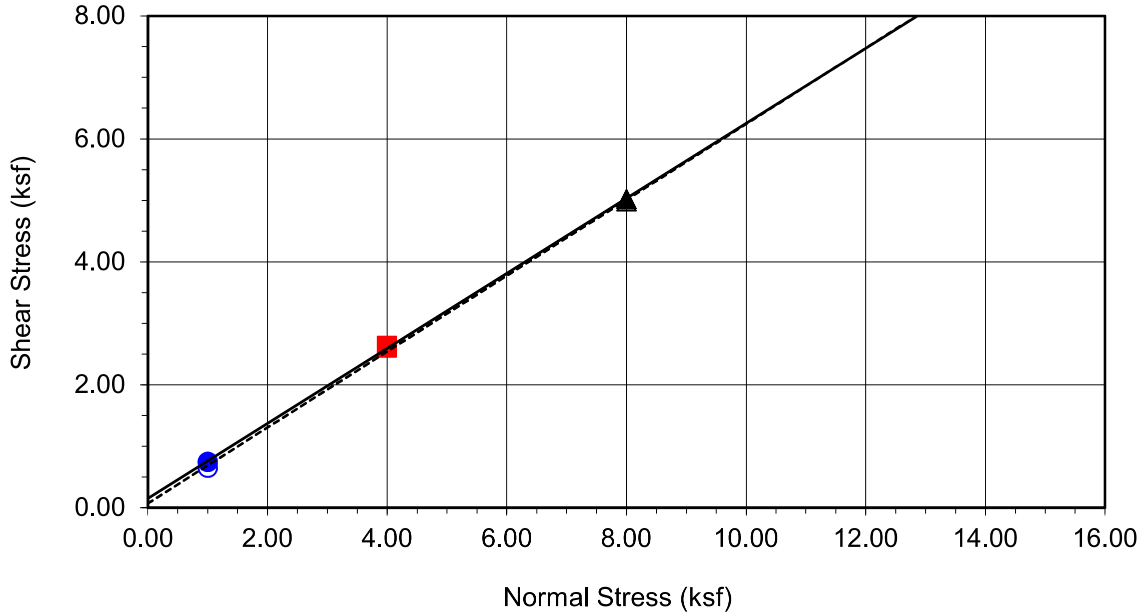
**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21




| | |
|---|---|
| **Boring No.** | **LB-5** |
| **Sample No.** | **R-1** |
| **Depth (ft)** | **5** |
| Sample Type: | Ring |
| Soil Identification: Yellowish brown clayey sand (SC) | |

**Strength Parameters**

| | C (psf) | ϕ (°) |
|---|---|---|
| Peak | 152 | 31 |
| Ultimate | 70 | 32 |

| | | | |
|---|---|---|---|
| Normal Stress (kip/ft²) | 1.000 | 4.000 | 8.000 |
| Peak Shear Stress (kip/ft²) | ● 0.742 | ■ 2.628 | ▲ 5.017 |
| Shear Stress @ End of Test (ksf) | ○ 0.651 | □ 2.603 | △ 4.980 |
| Deformation Rate (in./min.) | 0.0017 | 0.0017 | 0.0017 |
| Initial Sample Height (in.) | 1.000 | 1.000 | 1.000 |
| Diameter (in.) | 2.415 | 2.415 | 2.415 |
| Initial Moisture Content (%) | 11.10 | 11.10 | 11.10 |
| Dry Density (pcf) | 111.3 | 113.0 | 116.3 |
| Saturation (%) | 58.3 | 60.9 | 66.6 |
| Soil Height Before Shearing (in.) | 0.9930 | 0.9781 | 0.9551 |
| Final Moisture Content (%) | 17.4 | 15.0 | 13.7 |

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**DIRECT SHEAR TEST RESULTS**

**Consolidated Drained - ASTM D 3080**

Project No.: 13062.001

Rexford Bloomfield Ave.

03-21

Leighton

# R-VALUE TEST RESULTS

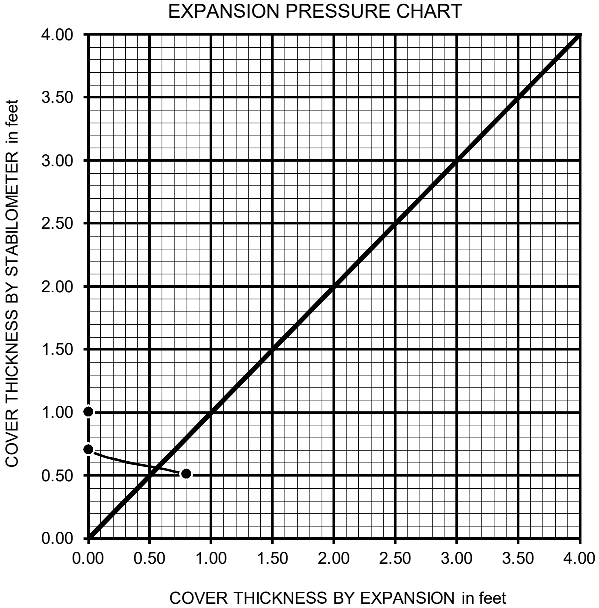
DOT CA Test 301

| | | | |
|---|---|---|---|
| PROJECT NAME: | Rexford Bloomfield Ave. | PROJECT NUMBER: | 13062.001 |
| BORING NUMBER: | LB-1 | DEPTH (FT.): | 0-5 |
| SAMPLE NUMBER: | B-1 | TECHNICIAN: | A. Santos |
| SAMPLE DESCRIPTION: | Dark yellowish brown SM | DATE COMPLETED: | 3/25/2021 |

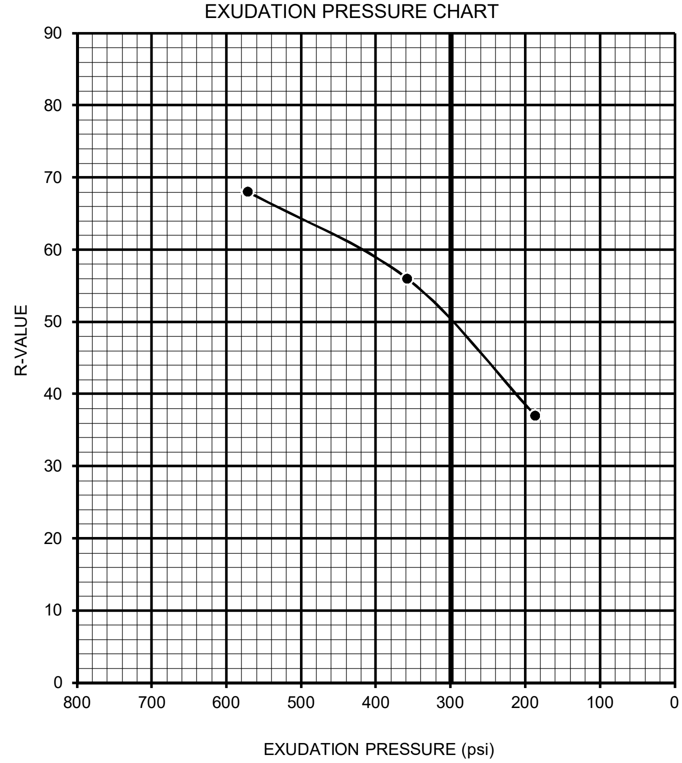
| **TEST SPECIMEN** | **a** | **b** | **c** |
|---|---|---|---|
| MOISTURE AT COMPACTION % | 9.4 | 10.2 | 10.7 |
| HEIGHT OF SAMPLE, Inches | 2.30 | 2.53 | 2.40 |
| DRY DENSITY, pcf | 129.1 | 123.6 | 128.2 |
| COMPACTOR PRESSURE, psi | 200 | 150 | 100 |
| EXUDATION PRESSURE, psi | 571 | 358 | 187 |
| EXPANSION, Inches x 10exp-4 | 24 | 0 | 0 |
| STABILITY Ph 2,000 lbs (160 psi) | 28 | 45 | 68 |
| TURNS DISPLACEMENT | 4.50 | 5.10 | 5.25 |
| R-VALUE UNCORRECTED | 72 | 56 | 39 |
| R-VALUE CORRECTED | 68 | 56 | 37 |

| **DESIGN CALCULATION DATA** | **a** | **b** | **c** |
|---|---|---|---|
| GRAVEL EQUIVALENT FACTOR | 1.0 | 1.0 | 1.0 |
| TRAFFIC INDEX | 5.0 | 5.0 | 5.0 |
| STABILOMETER THICKNESS, ft. | 0.51 | 0.70 | 1.01 |
| EXPANSION PRESSURE THICKNESS, ft. | 0.80 | 0.00 | 0.00 |

EXPANSION PRESSURE CHART




EXUDATION PRESSURE CHART




| | |
|---|---|
| R-VALUE BY EXPANSION: | 65 |
| R-VALUE BY EXUDATION: | 50 |
| EQUILIBRIUM R-VALUE: | 50 |

Leighton

# R-VALUE TEST RESULTS

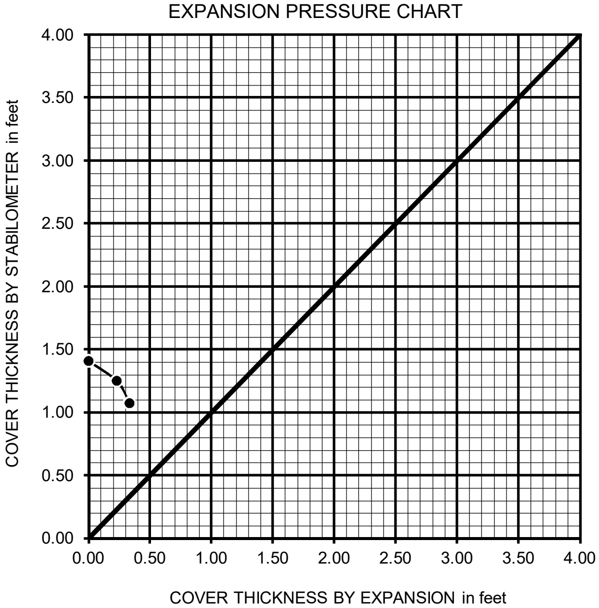
DOT CA Test 301

| | | | |
|---|---|---|---|
| PROJECT NAME: | Rexford Bloomfield Ave. | PROJECT NUMBER: | 13062.001 |
| BORING NUMBER: | LB-5 | DEPTH (FT.): | 0-5 |
| SAMPLE NUMBER: | B-1 | TECHNICIAN: | O. Figueroa |
| SAMPLE DESCRIPTION: | Dark yellowish brown SC | DATE COMPLETED: | 3/19/2021 |

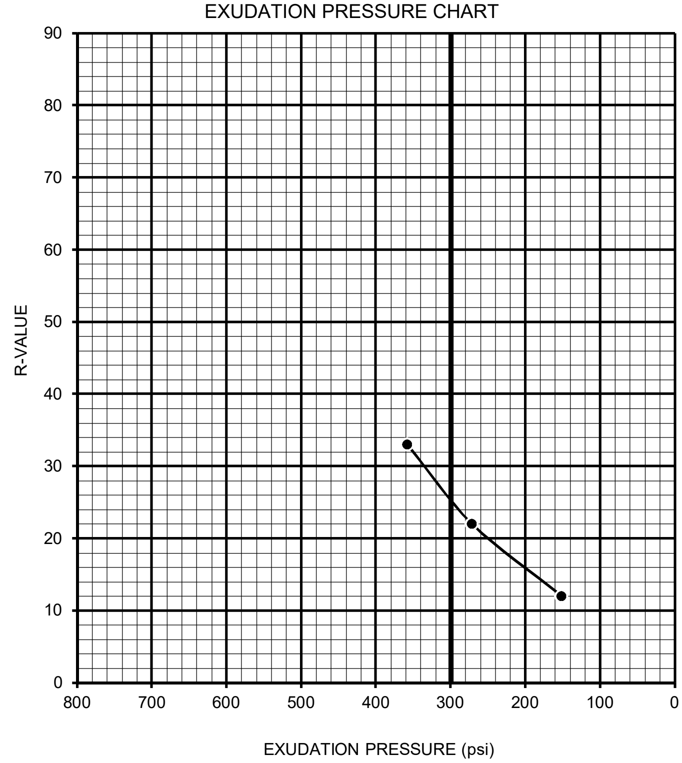
| **TEST SPECIMEN** | a | b | c |
|---|---|---|---|
| MOISTURE AT COMPACTION % | 11.8 | 12.3 | 13.2 |
| HEIGHT OF SAMPLE, Inches | 2.46 | 2.50 | 2.56 |
| DRY DENSITY, pcf | 126.6 | 124.9 | 122.7 |
| COMPACTOR PRESSURE, psi | 125 | 80 | 60 |
| EXUDATION PRESSURE, psi | 358 | 271 | 151 |
| EXPANSION, Inches x 10exp-4 | 10 | 7 | 0 |
| STABILITY Ph 2,000 lbs (160 psi) | 82 | 102 | 124 |
| TURNS DISPLACEMENT | 4.90 | 5.00 | 5.10 |
| R-VALUE UNCORRECTED | 33 | 22 | 12 |
| R-VALUE CORRECTED | 33 | 22 | 12 |

| **DESIGN CALCULATION DATA** | a | b | c |
|---|---|---|---|
| GRAVEL EQUIVALENT FACTOR | 1.0 | 1.0 | 1.0 |
| TRAFFIC INDEX | 5.0 | 5.0 | 5.0 |
| STABILOMETER THICKNESS, ft. | 1.07 | 1.25 | 1.41 |
| EXPANSION PRESSURE THICKNESS, ft. | 0.33 | 0.23 | 0.00 |

EXPANSION PRESSURE CHART




EXUDATION PRESSURE CHART




| | |
|---|---|
| R-VALUE BY EXPANSION: | 66 |
| R-VALUE BY EXUDATION: | 25 |
| EQUILIBRIUM R-VALUE: | 25 |

# TESTS for SULFATE CONTENT
# CHLORIDE CONTENT and pH of SOILS

Leighton

Project Name: Rexford Bloomfield Ave. Tested By : ACS/GEB/GB Date: 03/21/21

Project No. : 13062.001 Checked By: J. Ward Date: 04/02/21

| | | | | |
|---|---|---|---|---|
| Boring No. | LB-1 | LB-5 | | |
| Sample No. | B-1 | B-1 | | |
| Sample Depth (ft) | 0-5 | 0-5 | | |
| Soil Identification: | Dark yellowish brown SM | Dark yellowish brown SC | | |
| Wet Weight of Soil + Container (g) | 0.00 | 0.00 | | |
| Dry Weight of Soil + Container (g) | 0.00 | 0.00 | | |
| Weight of Container (g) | 1.00 | 1.00 | | |
| Moisture Content (%) | 0.00 | 0.00 | | |
| Weight of Soaked Soil (g) | 100.40 | 100.10 | | |

**SULFATE CONTENT, DOT California Test 417, Part II**

| | | | | |
|---|---|---|---|---|
| Beaker No. | 16 | 92 | | |
| Crucible No. | 16 | 17 | | |
| Furnace Temperature (°C) | 860 | 860 | | |
| Time In / Time Out | 8:45/9:30 | 8:45/9:30 | | |
| Duration of Combustion (min) | 45 | 45 | | |
| Wt. of Crucible + Residue (g) | 18.4709 | 22.2161 | | |
| Wt. of Crucible (g) | 18.4697 | 22.2153 | | |
| Wt. of Residue (g) (A) | 0.0012 | 0.0008 | | |
| PPM of Sulfate (A) x 41150 | 49.38 | 32.92 | | |
| **PPM of Sulfate, Dry Weight Basis** | **49** | **33** | | |

**CHLORIDE CONTENT, DOT California Test 422**

| | | | | |
|---|---|---|---|---|
| ml of Extract For Titration (B) | 30 | 30 | | |
| ml of AgNO3 Soln. Used in Titration (C) | 1.1 | 0.8 | | |
| PPM of Chloride (C -0.2) * 100 * 30 / B | 90 | 60 | | |
| **PPM of Chloride, Dry Wt. Basis** | **90** | **60** | | |

**pH TEST, DOT California Test 643**

| | | | | |
|---|---|---|---|---|
| **pH Value** | **7.93** | **7.66** | | |
| **Temperature °C** | 22.4 | 22.6 | | |

# SOIL RESISTIVITY TEST
## DOT CA TEST 643

| | | | |
|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By : | Y. Nguyen Date: 03/24/21 |
| Project No. : | 13062.001 | Checked By: | J. Ward Date: 04/02/21 |
| Boring No.: | LB-1 | Depth (ft.) : | 0-5 |
| Sample No. : | B-1 | | |

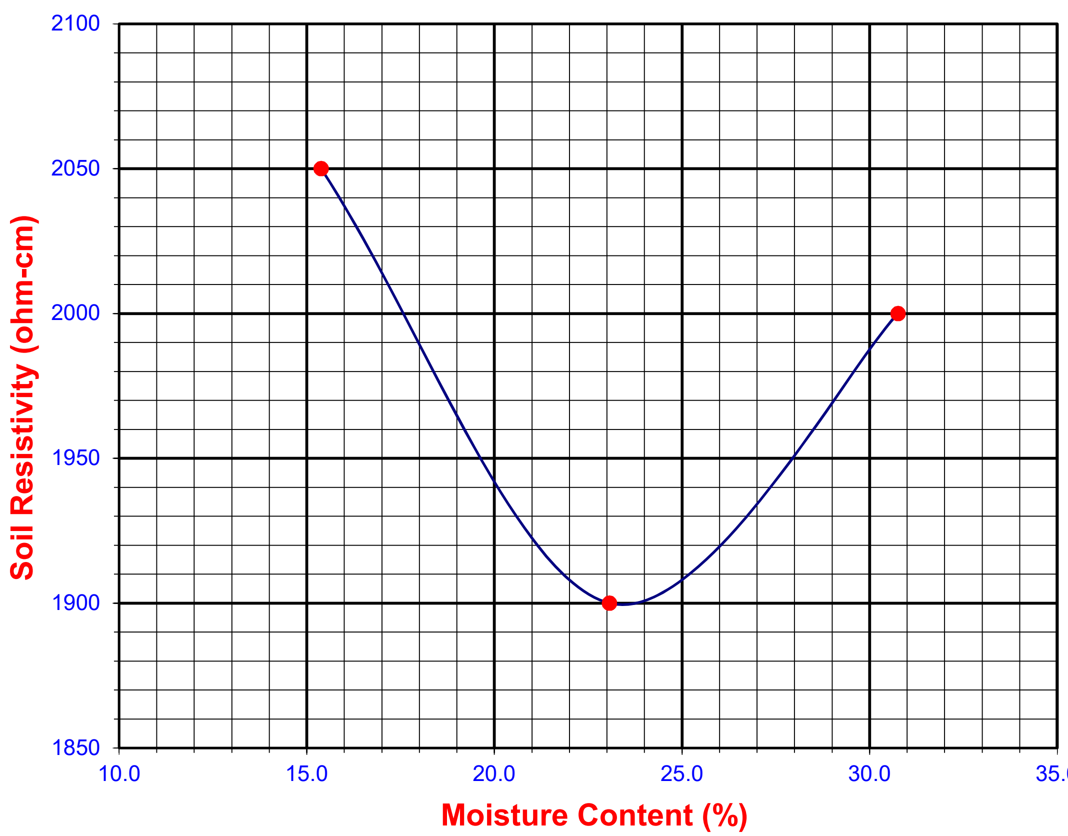
Soil Identification:* Dark yellowish brown SM

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

| Specimen No. | Water Added (ml) (Wa) | Adjusted Moisture Content (MC) | Resistance Reading (ohm) | Soil Resistivity (ohm-cm) |
|---|---|---|---|---|
| 1 | 20 | 15.38 | 2050 | 2050 |
| 2 | 30 | 23.07 | 1900 | 1900 |
| 3 | 40 | 30.76 | 2000 | 2000 |
| 4 | | | | |
| 5 | | | | |

| | |
|---|---|
| Moisture Content (%) (MCi) | 0.00 |
| Wet Wt. of Soil + Cont. (g) | 0.00 |
| Dry Wt. of Soil + Cont. (g) | 0.00 |
| Wt. of Container (g) | 1.00 |
| Container No. | |
| Initial Soil Wt. (g) (Wt) | 130.03 |
| Box Constant | 1.000 |
| MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100 | |

| Min. Resistivity (ohm-cm) | Moisture Content (%) | Sulfate Content (ppm) | Chloride Content (ppm) | Soil pH | |
|---|---|---|---|---|---|
| | | | | pH | Temp. (°C) |
| DOT CA Test 643 | | DOT CA Test 417 Part II | DOT CA Test 422 | DOT CA Test 643 | |
| **1900** | **23.4** | **49** | **90** | **7.93** | **22.4** |



# SOIL RESISTIVITY TEST

## DOT CA TEST 643

Leighton

| | | | | | |
|---|---|---|---|---|---|
| Project Name: | Rexford Bloomfield Ave. | Tested By : | Y. Nguyen | Date: | 03/24/21 |
| Project No. : | 13062.001 | Checked By: | J. Ward | Date: | 04/02/21 |
| Boring No.: | LB-5 | Depth (ft.) : | 0-5 | | |
| Sample No. : | B-1 | | | | |

Soil Identification:* Dark yellowish brown SC

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

| Specimen No. | Water Added (ml) (Wa) | Adjusted Moisture Content (MC) | Resistance Reading (ohm) | Soil Resistivity (ohm-cm) |
|---|---|---|---|---|
| 1 | 20 | 15.35 | 5000 | 5000 |
| 2 | 30 | 23.03 | 4650 | 4650 |
| 3 | 40 | 30.70 | 4750 | 4750 |
| 4 | | | | |
| 5 | | | | |

| | |
|---|---|
| Moisture Content (%) (MCi) | 0.00 |
| Wet Wt. of Soil + Cont. (g) | 0.00 |
| Dry Wt. of Soil + Cont. (g) | 0.00 |
| Wt. of Container (g) | 1.00 |
| Container No. | |
| Initial Soil Wt. (g) (Wt) | 130.28 |
| Box Constant | 1.000 |
| MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100 | |

| Min. Resistivity (ohm-cm) | Moisture Content (%) | Sulfate Content (ppm) | Chloride Content (ppm) | Soil pH | |
|---|---|---|---|---|---|
| | | | | pH | Temp. (°C) |
| DOT CA Test 643 | | DOT CA Test 417 Part II | DOT CA Test 422 | DOT CA Test 643 | |
| **4640** | **24.2** | **33** | **60** | **7.66** | **22.6** |