BLD 23-05279 REV

GEOTECHNICAL INVESTIGATION REPORT

2600 OUTLOOK DRIVE

APN: 018-253-15

RENO, NEVADA

Prepared For

Mr. Brandon Freeman
Robison Engineering Company, Inc.
846 Victorian Avenue, Suite 20
Sparks, Nevada 89431

Prepared By

REVISED

SEP 26 2023

CITY OF RENO
Community Development Dept.

WESTEX
Consulting Engineers

We Strive for Excellence

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File No.: 2108.047-A
September 15, 2023

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220 S. Rock Boulevard, Suite 12
Reno, Nevada 89502
Office: (775) 384-2898

September 15, 2023

Mr. Brandon Freeman
Robison Engineering Company, Inc.
846 Victorian Avenue, Suite 20
Sparks, Nevada 89431

Subject: **Geotechnical Investigation Report**
2600 Outlook Drive
APN: 018-253-15
Reno, Nevada
File No.: 2108.047-A

Reference: *Grading Plan – 2600 Outlook Drive, Robison Engineering Company, Inc., File No: 1-2429-01.001, 6 June 2023.*

Dear Mr. Freeman,

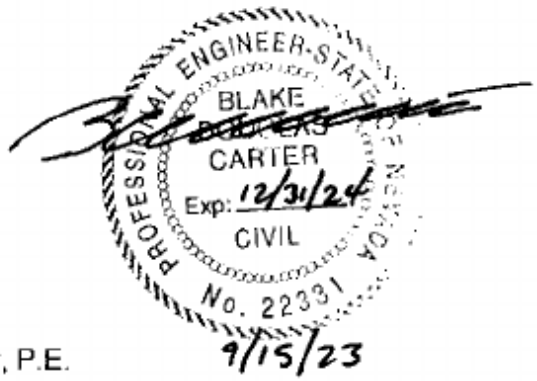
WESTEX Consulting Engineers, LLC (Westex) is pleased to present this report containing the results of our geotechnical investigation performed at the referenced property.

As presented in the attached report, based on the results of our investigation, knowledge of the project area, and understanding of the project, we conclude that from a geotechnical standpoint the site is suitable for the intended use. The primary geotechnical concerns include:

- Processing any over-size cobbles for re-use as structural fill.
- Proper moisture conditioning and compaction of foundation and subgrade soils.

We appreciate your selecting WESTEX Consulting Engineers to perform this investigation and trust that the results will fulfill project design requirements. If you, any design consultants, or plan reviewers have any questions, please contact me directly at (775) 384-2898 or blake@westexconsulting.com.

Respectfully submitted,
WESTEX Consulting Engineers, LLC



Blake D. Carter, P.E.
President
P.E. 22331, Exp. 12/31/2024
ICC 8077939, Exp. 03/06/2026

Mikela Dzwir
Geotechnical Coordinator

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WESTEX Consulting Engineers, LLC
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I INTRODUCTION

This report presents the results of our geotechnical investigation performed for the proposed shelter, storage units and transitional housing to be located at 3649 Gordon Street, Carson City, Nevada. The site location is shown on the attached *Site Vicinity Map,* Plate 1. This investigation was conducted in general accordance with our July 21, 2023 proposal and work order, authorized on July 21, 2023.

The conclusions and recommendations contained in this report are founded on selected points of exploration, an engineering analysis of the data acquired during our investigation, and our experience with similar site characteristics. If during grading and construction, site conditions or project plans are found to vary from those described in this report, we should be contacted immediately to verify that the recommendations contained herein remain applicable to the final project design. Accordingly, this report may be revised at any time. To provide project continuity and observe that the provided geotechnical recommendations are followed, we recommend retaining Westex for construction testing and inspection services.

A. Purpose and Scope of Services

The purpose of this geotechnical engineering investigation is to characterize the site subsurface soil and groundwater conditions and provide appropriate and economic design-level engineering conclusions and recommendations pertaining to these conditions. Our scope of services included:

1. Field reconnaissance of the site,
2. Review of published geologic information,
3. Exploration of the subsurface conditions by excavating, logging, and sampling within two (2) test pits,
4. Geophysical measurements of shear wave velocity to a depth of 100-feet to determine seismic Site Classification,
5. Laboratory testing on select samples acquired from the exploratory test pits,
6. Engineering evaluation and preparation of this geotechnical engineering report addressing current project design and construction recommendations.

Included in this report are conclusions and recommendations regarding:

1. Local soil and groundwater conditions,
2. Potential geologic hazards,
3. Earthquake site response,
4. Site grading and structural design,
5. Fill placement and compaction specifications,
6. Soil properties for drainage,
7. Trench excavation, utility line bedding, and trench backfilling,
8. Foundation and slab-on-grade support,
9. Lateral resistance and loads,
10. Exterior concrete flatwork,
11. Pavement section recommendations,
12. Additional geotechnical engineering services.

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This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wetlands determinations and/or the potential presence of buried utilities. Recommendations included in this report are specific to development within the limits of the property and are not intended for off-site development. Proposed development outside the limits of our investigation or any conceptual changes to site development, such as the use of alternative foundations or grade changes, could require additional subsurface exploration, laboratory tests and engineering analyses.

B. Site Location and Description

Our site description is based on our site visits conducted in July 2023 and Washoe County Assessor mapping information.

The project site is located on the south side of I-80 and west side of I-580 in Reno, Nevada, and occupies Assessor parcel number (APN) 018-253-15. According to the Public Land Survey System (PLSS), the project site is located in a portion of the SE ¼ , Section 22, Township 19 North, Range 19 East, Mt. Diablo Meridian.

The approximately 0.6-acre property is currently developed with a single-family residence, paved driveway utilities and landscaping. Access to the site is along Outlook Drive. The property is bordered by Belford Road to the North, private property to the south and east and Outlook Drive to the west.

Based on published topographic information, the maximum site elevation is approximately 4,650 feet above mean sea level (MSL, NAVD88 vertical datum), to the west of the site boundary. The minimum elevation is approximately 4,630 MSL, for a maximum relief of about 20 feet. The property slopes down slightly toward the southeast, at approximately 10 percent, draining towards the ditch at southeast side of the property.

C. Proposed Development

Project information is based on conversations with the client and the referenced site plan. The current plan consists of constructing retaining walls within the backyard of the existing residence.

Site grading is anticipated to produce a near-balanced site and could include minor cuts and fills on the order of five vertical feet.

Buildings are not proposed for construction at this time, however, we assume that any future building foundations will bottom at least 24 inches below the lowest adjacent exterior ground surface and that structural design will be in accordance with the 2018 edition of the International Building Code and Northern Nevada Code Amendments. Off-site civil improvements shall be constructed in accordance with the latest edition of the Standard Specifications for Public Works Construction "Orange Book" as required by the City of Reno.

II FIELD EXPLORATION AND LABORATORY TESTING

A. Field Exploration

Exploratory Test Pits

Subsurface soil conditions were explored in August 2023 by excavating two (2) exploratory test pits to a maximum depth of 4 feet below the existing ground surface (BEG) and sampling from the on-site stockpile. The test pits were excavated with a CAT 304 excavator.

The test pits were located in the field based on the referenced site plan, knowledge of the project, existing underground and above-ground utility locations, and accessibility, and are depicted on Plate 2, *Geotechnical Exploration Map*. Our field engineer recorded the location of each test pit using a hand-held Global Positioning System (GPS) receiver. All locations are approximate and considered accurate to within ±15 feet. No greater accuracy is inferred.

Bulk soil samples were collected from the exploratory test pits from specific soil layers. The soils were visually classified and logged by our engineer in the field in accordance with the Unified Soil Classification System (USCS) and ASTM D2488. Logs of the exploratory test pits are presented in Plate 6 through Plate 7.

Test pits encountered medium dense soils and were backfilled with native soils to the extent possible with the excavator bucket, but not to compaction levels specified for improvements. During grading the test pits shall be located, excavated and re-compacted to limit disturbance to newly constructed improvements.

Geophysical Survey

Seismic refraction microtremor (ReMi®) measurements were performed in accordance with ASTM D5777, Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation, and result in a one-dimensional shear wave velocity profile. A multi-channel seismograph using 12 geophones was spaced at 27-feet to develop a line creating a total geophone spread of 300-feet.

Shear wave velocity, which was also measured, is typically reserved for soil stiffness but design codes present those velocities in excess of 1,200 (fps) indicate very dense soil and soft rock; rock is indicated at a velocity of 2,500 fps. Shear wave velocities presented on Plate 12 do not typically begin to significantly exceed 1,200 feet per second (fps) until depths on the order of 40 feet.

Results from geophysical measurements are included in Plate 12.

B. Laboratory Testing

Bulk representative samples from the exploratory test pits were selected for laboratory testing. Index tests were performed which were in turn correlated with typical engineering design parameters for similar soils. The following tests were performed:

- Particle size analysis (ASTM D422)
- Atterberg Limits (ASTM D4318)

III. SUBSURFACE SOILS AND GROUNDWATER CONDITIONS

A. Soils

According to mapping by the U.S. Department of Agriculture, Soil Classification Service (*Web Soil Survey of Washoe County, Nevada, South Part*), the site is underlain by the following soil units to a depth of 60 inches:

- Verdico sandy loam, 4 to 8 percent slopes (615): composed of sandy loam (SM), clay (CH), gravelly clay (CH) and bedrock; fines content between 25 to 90 percent; plasticity index (PI) ranging from non-plastic (NP) to 45.
- Stodick very stony loam, 15 to 30 percent slopes (730): composed of stony loam (CL-ML,CL), very gravelly clay loam, very gravelly loam (SC,GC) and bedrock; fines content between 20 to 70 percent; PI ranging from 5 to 20.

We anticipate that soils within the expected depths of grading will be excavatable with conventional grading equipment; however deeper utility excavations could experience difficult trenching due to dense soils.

B. Groundwater

At the time of our exploration, groundwater was not encountered in either test pit to the maximum explored depth of 4 feet BEG. Based on a query of water wells in the area, an average depth to reported static water levels is approximately 185 feet and depending on topography could be as deep as 345 feet.

Depths to groundwater may vary significantly over time due to seasonal precipitation and snow fall/melt that may significantly affect surface and near-surface water seepage. Provisions should be made during construction to manage surface and subsurface water flows.

IV. GEOLOGY

To delineate possible faulting and to evaluate any other geological hazards on the site, our investigation included a review of available geological literature.

A. Geology

Regional Geology

The property is situated in west Reno, along Last Chance Ditch. The primary geologic deposit beneath the site is composed of glacial deposits.

Based on the *Geologic Map of the Carson City 30 X 60 Minute Quadrangle, Nevada*, Nevada Bureau of Mines and Geology (NBMG, 1999), prepared by Stewart, the materials underlain the site are primarily composed of the following Quaternary Deposits:

Outwash deposits of Donner Lake glaciation (Qod) – "Deeply weathered, poorly sorted gravel composed of andesite and rare granitic rock clasts in sandy and muddy matrix. Deposits near Reno consist of unconsolidated gravel that contains well rounded clasts and interbedded coarse

sand. Forms extensive pediment and thin fan deposits 5 to 10 km south of Reno, smaller areas of strath-terrace gravel within and near Reno, small outcrops near Truckee River in northwestern most part of quadrangle, and small outcrops of gravel 8 km southeast of Reno."

B. Faulting, Seismicity, and Slope Stability

Faulting

The United States Geological Survey (USGS) publishes a Quaternary fault and fold database for use with Google Earth. This database allows the user to view possible faults at or near a location. The database shows a spread of the unnamed fault zone in the Truckee River canyon trending in a roughly east to west direction and not trending through the project site. This fault zone is of Middle and Late Quaternary age and its traces are considered inactive due to the age since last movement. Based on provisions of the 2018 IBC and Northern Nevada Amendments, it is our opinion that this fault zone requires no further investigation for consideration of building development on this property. Structures should generally maintain a minimum 100-foot setback from any Holocene-active or younger mapped faults, which are mapped 0.6 miles northeast of the site and trending through the site.

Seismicity

Active faults capable of generating large magnitude earthquakes have been identified within the region. Strong ground shaking associated with earthquakes should be expected to occur during the life of the project.

Literature prepared by A. Ryall and B. M. Douglas (NBMG, *Regional Seismicity*, 1976) indicates that earthquake recurrence curves predict a return period of 70 to 80 years for an earthquake of Magnitude 7.0 or greater within this region. They also calculate that, on average, an earthquake of Magnitude 5.3 to 5.4 would be expected to occur regionally approximately once in 30 years, would have a maximum bedrock acceleration of 0.12 to 0.19g, and would involve about 6 seconds of strong shaking. The expected return period of rock accelerations greater than 0.5g at an average site in western Nevada associated with an earthquake of magnitude greater than 7.0 is on the order of 2,000 years.

Slope Stability

Based on the existing and planned topography on-site, slope stability is not a concern that would effect grading or development of the site. Any planned slopes shall be constructed to a 3H:1V inclination per City of Reno standard details.

C. Flooding

Based on studies completed by the Federal Emergency Management Agency (FEMA), Community Panel Number 32031C3230G, effective March 16, 2009, the project site is within Flood Hazard Zone X (unshaded). *These are areas determined to be outside of the 0.2 percent annual chance floodplain (500-year flood).*

V CONCLUSIONS

Based on the results of our investigation, experience in the project area, and understanding of the proposed project, it is our opinion that the subject site is suitable for development provided

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the recommendations presented in this report and any subsequent reports are followed during the design and construction phases of the project. The primary identified geotechnical concerns are:

- Processing any over-size cobbles for re-use as structural fill.
- Proper moisture conditioning and compaction of foundation and subgrade soils.

Following are our conclusions.

1. Site soils consist predominately of a soil matrix composed of clayey sands, various blends of sands with varying degrees of gravel.
2. On-site soils are medium dense to dense, and any thin surface fills appear well compacted.
3. Based on the one-dimensional seismic (Shear-Wave) velocity profile measured at the site, a Vs100 of 1,077 feet per second was calculated. A seismic Site Class D "Stiff Soil" is appropriate for structural design per ASCE 7-16.
4. The project site is within Flood Hazard Zone X (unshaded), which is classified as areas determined to be outside of the 0.2 percent annual chance floodplain (500-year flood).
5. There are no apparent geologic hazards that would place unusual constraints on the project; however, strong ground shaking associated with earthquakes should be expected to occur during the life of the project.

The following recommendations are based on present information; structural design was not available at the time of writing. When available, structural plans should be reviewed by Westex to evaluate whether or not the recommendations in this report remain valid, and to provide any supplemental recommendations as necessary.

A. Site Preparation and Grading

Areas to be developed should be cleared of any existing and pre-existing improvements, debris, and vegetation. Soils should be scarified a minimum of 12-inches, moisture conditioned to within two percent of optimum moisture content and compacted to a minimum of 90% relative compaction per ASTM D1557.

We recommend supporting all structural elements and flatwork as follows:

- Continuous Spread Footings: the existing native soil should be re-compacted a minimum 12 inches below the proposed bottom-of-footing elevation.
- **Over-excavation depths do *not* include aggregate base sections.**

Over-excavation and re-compaction may be excavated in a neat line (vertical) manner during foundation excavation.

The foundation elevation should be observed by a representative of Westex to document that the conditions are as anticipated and that no objectionable materials are present prior to concrete placement.

Scarification and moisture conditioning may be waived by the Geotechnical Engineer (or their representative) if it is determined that the exposed materials exist at a suitable moisture content for attaining compaction or contain oversize material which will inhibit compaction procedures and result in a lesser density state. Surfaces should be "proof-rolled" under the observation of the Geotechnical Engineer (or their representative) to ensure that adequate compaction has been attained. The Earthwork Contractor is responsible for obtaining approval for each prepared surface prior to proceeding with placement of structural components or fills.

B. Fill Placement and Compaction

To provide quality control where fill material is proposed to attain grades, structural zones are defined as the area three feet below and laterally away from foundations, 12 inches below pavements, 12 inches below slabs-on-grade, exterior flatwork and driveway sections. Mass zones are defined as all areas outside the structural zones. Only approved, select material may be utilized within structural zones; however, materials which do not meet the requirements for structural fill may, in general, be used within mass zones with the prior approval of the Geotechnical Engineer (or representative in the field).

Mass grading and structural fill shall be tested for conformance with specifications and minimum compaction at a minimum rate of one compaction test per 1,000 cubic yards of fill placed.

Suitability of On-site Soils

The native granular soils are considered suitable for use as properly compacted structural fill, provided any deleterious material, debris, vegetation, and/or oversized material are removed from the appropriate layers. In general, any large boulders would be suitable for use in deeper fills, walls or landscaping.

Fill Material Specifications

Import soils used as structural fill should be free of organic matter and in general conform to the following requirements:

TABLE 1
IMPORT STRUCTURAL FILL SOIL REQUIREMENTS

Sieve Size	% Passing (by dry weight)
6-inch	100
3/4-inch	70 – 100
No. 4	50 – 100
No. 200	15 – 40

Liquid Limit = 40 maximum
Plasticity Index = 15 maximum
R-Value = 30 minimum
Non-deleterious to concrete (low sulfate)

The Earthwork Contractor shall ensure that all proposed fill materials are approved by the Geotechnical Engineer prior to use. Representative imported material samples shall be made available for testing one week prior to hauling to allow for material quality tests.

The recommendations for structural fill are intended as a guideline and define a readily attainable, acceptable material. Adjustments to the specified limits to address the use of other potentially acceptable materials, such as those containing oversize rock or which deviate from the classification requirements, can be made provided: 1) the Earthwork Contractor can demonstrate their ability to place and compact the material in substantial conformance with industry standards to achieve an equivalent finished product as that specified; 2) the Geotechnical Engineer gives their written approval; 3) the Geotechnical Engineer (or their representative) directly observes and approves the placement method; and 4) all parties understand that the Standard ASTM Compaction Test procedures may be invalid for certain material containing oversize aggregate. Compaction approval would only be achieved based on other criteria, such as a performance specification with on-site observation of compaction activity.

Fill Placement

All properly compacted structural fill shall be uniformly moisture conditioned to near optimum and compacted to at least 90 percent relative compaction based on the maximum dry density determined by ASTM D1557. Lift thickness shall be restricted to 8 inches (maximum loose lift) and individually tested unless the Earthwork Contractor can demonstrate their ability to uniformly achieve the required compaction for the entire placed layer.

C. Site Surface Drainage

Adequate drainage for surfaces adjacent to foundations and slopes should be provided to restrict water from infiltrating into the supporting soils. To allow water to drain away from the structure and prevent ponding against perimeter foundations, the ground surface should be permanently sloped at least one-half percent for concrete, one percent for asphalt pavement, and two percent for soil. Landscape adjacent to structural areas should be limited and consist of native vegetation utilizing drip-type irrigation.

D. Foundation Support

Spread Footings

Conventional spread foundations can gain adequate support on the approved, compacted, structural fill material composed of granular native soils. As previously mentioned, to control the potential for settlement, the supporting materials within spread footings should consist of a uniform 12-inch layer of moisture-conditioned, compacted soils. Monolithic slab-on-grade is another option with thickened edges and thickened foundation at load bearing walls and or columns.

In preparation for foundation construction, the earthwork contractor shall ensure that the Geotechnical Engineer has certified the foundation elevation and that field density tests have been performed to document the relative compaction of the upper 12 inches of exposed materials, and shall be responsible for maintaining the recommended moisture content during construction. Preparation of these materials shall be documented prior to placement of structural components.

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For adequate confinement and frost protection, footings should be bottomed at least 24 inches below lowest adjacent exterior grade. **Footings supported in accordance with our recommendations can be designed for a net allowable bearing capacity of 2,500 pounds per square foot (psf).** This pressure can be increased by one-third when considering total design loads, including wind or seismic forces.

Estimated total settlement for footings designed for these bearing capacities should be less than ¾ inch and differential settlement is anticipated to approach half this value. A factor of safety of 3.0 has been utilized in comparison to ultimate soil capacities for the given settlement. Bearing capacity calculations are included in Plate 13.

Seismic Design Parameters

We obtained the site seismic design parameters using the *ATC Hazards by Location* application. The web-based application can be found at:

https://hazards.atcouncil.org

The mapping database is used for determining seismic design values according to ASCE 7-16 and the 2018 International Building Code. Design parameters are presented in Table 2:

TABLE 2
2018 IBC SEISMIC DESIGN PARAMETERS (ASCE 7-16)

Description	Value
Latitude	39.4980288 deg
Longitude	-119.8291143 deg
Site Class	D – "Stiff Soil"
Risk Category	II
Short-Period (0.2 sec) Spectral Response, S_S	1.766 g
Long-Period (1.0 sec) Spectral Response, S_1	0.632 g
Short-Period (0.2 sec) Site Coefficient, F_A	1
Long-Period (1.0 sec) Site Coefficient, F_V	*null
Short (0.2 sec) MCE Spectral Response, S_{MS}	1.766 g
Long (1.0 sec) MCE Spectral Response, S_{M1}	*null
Short (0.2 sec) Design Spectral Response, S_{DS}	1.177 g
Long (1.0 sec) Design Spectral Response, S_{D1}	*null
PGA_M Site Modified Peak Ground Acceleration	0.847 g
Seismic Design Category, IBC	D

*null values shall be determined by the Structural Engineer in accordance with Section 11.4.8.

Site Classification

Based on our field exploration, knowledge of the site geology, and resulting Shear Wave Velocity ranging from 1,077 feet per second weighted-average to 100 feet, a Site Classification of D "Stiff Soil" is appropriate used for design.

E. Soil Parameters, Lateral Resistance and Loads

Soil Parameters

Representative native soils can be characterized with the following parameters:

- Soil Unit Weight, 120 pcf
- Internal Friction Angle, 30 degrees

Lateral Resistance

Resistance to lateral loads can be obtained from passive earth pressures and soil friction against the bottom of concrete foundation elements. For design, based on native soil types, we recommend the use of a coefficient of friction of 0.40 with a passive pressure of 400 pounds per cubic foot (equivalent fluid method) per foot of depth.

Lateral Loads

The granular native soils are considered suitable for use as retaining wall, foundation wall, or deep excavation backfill, provided all deleterious material and material larger than six-inch diameter are removed. All backfill materials should meet the requirements of Table 1 *Import Structural Fill Requirements* and be limited to granular soils for native backfill soils. Accordingly, for level backfill using select granular materials, the recommended design active and passive pressures for level backfill, seismic design, restrained retaining walls are summarized in Table 3.

TABLE 3
ACTIVE AND PASSIVE DESIGN PRESSURES

Pressure	Design Pressure Value (pcf)
Active Pressure (Ka)	40
Active Earth Pressure (Kae)	90
Passive Pressure (Kp)	400
Passive Earth Pressure (Kpe)	245
At-Rest Pressure (Ko)	60

F. Permanent Cut-and-Fill Slopes

Permanent slopes are not anticipated for final site design.

Temporary (during construction) and permanent (after construction) erosion control will be required for all disturbed areas. The contractor shall prevent dust from being generated during construction in compliance with all applicable city, county, state and federal regulations. The project specifications should include an indemnification by the contractor of the owner and engineer for any dust generation during the construction period. The owner will be responsible for mitigation of dust after his acceptance of the project.

G. Corrosion

The native soils in the area are mapped and have been tested ranging from a high corrosion potential to steel and a low corrosion potential to concrete. The native soils may be considered detrimental to normally formulated concrete per ACI guidelines.

H. Utilities, Trench Excavation, and Backfilling

The Earthwork Contractor must comply with the "Safety and Health Regulations for Construction" as directed by the Occupational Safety and Health Act (OSHA Standards, Volume III, Part 1926, Subpart P) while excavating and backfilling. The Earthwork Contractor is also responsible for providing a competent person, as defined by OSHA standards, to ensure excavation safety.

Pipe bedding and trench backfill materials should be moisture conditioned to slightly over optimum and compacted to 90 percent relative compaction, or local requirements, based on the maximum dry density determined by ASTM D1557. The upper 24 inches of trench backfill within asphalt or concrete paved areas should be compacted to a minimum 95 percent relative compaction as determined by ASTM D1557. The thickness of all lifts will be restricted to a maximum of 8 inches (loose) and individually tested unless the Earthwork Contractor can demonstrate their ability to uniformly achieve the required compaction for the entire layer of material placed.

For corrosion protection, where steel and/or metal pipes are proposed, the Contractor shall follow the pipe manufacturer's recommendation regarding corrosion protection.

I. Additional Engineering & Inspection Services

This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wetlands determinations and/or the potential presence of buried utilities. We can assist in evaluating these considerations should further information be requested. Moreover, this office should be retained to provide grading observation and testing as well as associated special inspection during all phases of construction.

All plans and specifications for projects should be reviewed for conformance with this geotechnical report and approved by the Geotechnical Engineer.

The recommendations presented in this report are based on the assumption that sufficient field inspection and construction review will be provided during all phases of construction. A pre-construction conference should be scheduled to include, but not be limited to, the Owner, Architect, Civil Engineer, General Contractor, Earthwork and Materials Sub-Contractors, Building Official and Geotechnical Engineer. The recommendations presented in this report should be reviewed by all parties to discuss applicable specifications and testing requirements. At this time, any applicable material quality and mix design reports should be submitted for approval by the Geotechnical Engineer.

WESTEX Consulting Engineers, LLC has prepared this report based on certain assumptions concerning subsurface conditions at the Property. WESTEX Consulting Engineers, LLC should also provide on-site observations and testing during site preparations, grading, excavation, fill placement, foundation installation, and paving. These observations will allow us to document that the soil conditions are as anticipated, and that the contractor's work is in conformance with the intent of our recommendations and the approved plans and specifications. Our conclusions and recommendations may be invalidated, partially or in whole, by changes outside our control and by subsequent acts occurring on the site after field reconnaissance. This report may be subject to review and revision at any time. Opinions about the condition of the Property do not constitute a warranty of any kind, either express or implied.

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VII. DISTRIBUTION

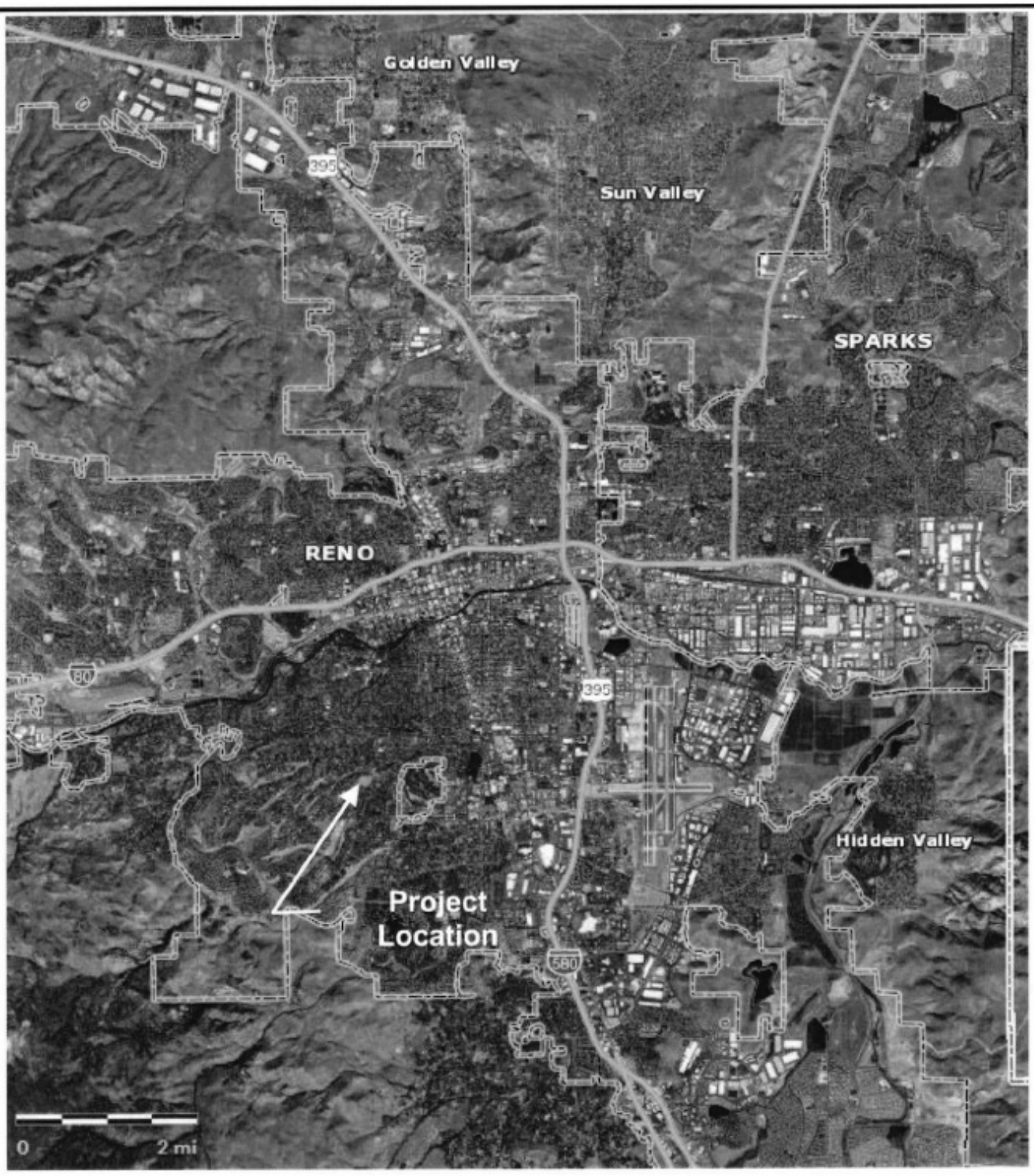
One electronic-stamped copy via email to addressee:

Mr. Brandon Freeman
Robison Engineering Company, Inc.
846 Victorian Avenue, Suite 20
Sparks, Nevada 89431

LIST OF PLATES

APPENDIX A
GEOTECHNICAL FIGURES

WESTEX
Consulting Engineers



Ref: Washoe County Assessors Map, Imagery Hybrid, accessed September 2023.

Property Information	
Parcel ID	018-253-15
Acreage	0.6
Land Use	200: Single Family Residence

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SITE VICINITY MAP

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File No.: 2108.047-A
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PLATE 1

Ref: Washoe County Assessors Map, Imagery Hybrid, accessed September 2023.

TP-1
Approximate Test Pit Location

SP-1
Approximate Stockpile Location

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GEOTECHNICAL EXPLORATION MAP

Geotechnical Investigation
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APN: 018-253-15
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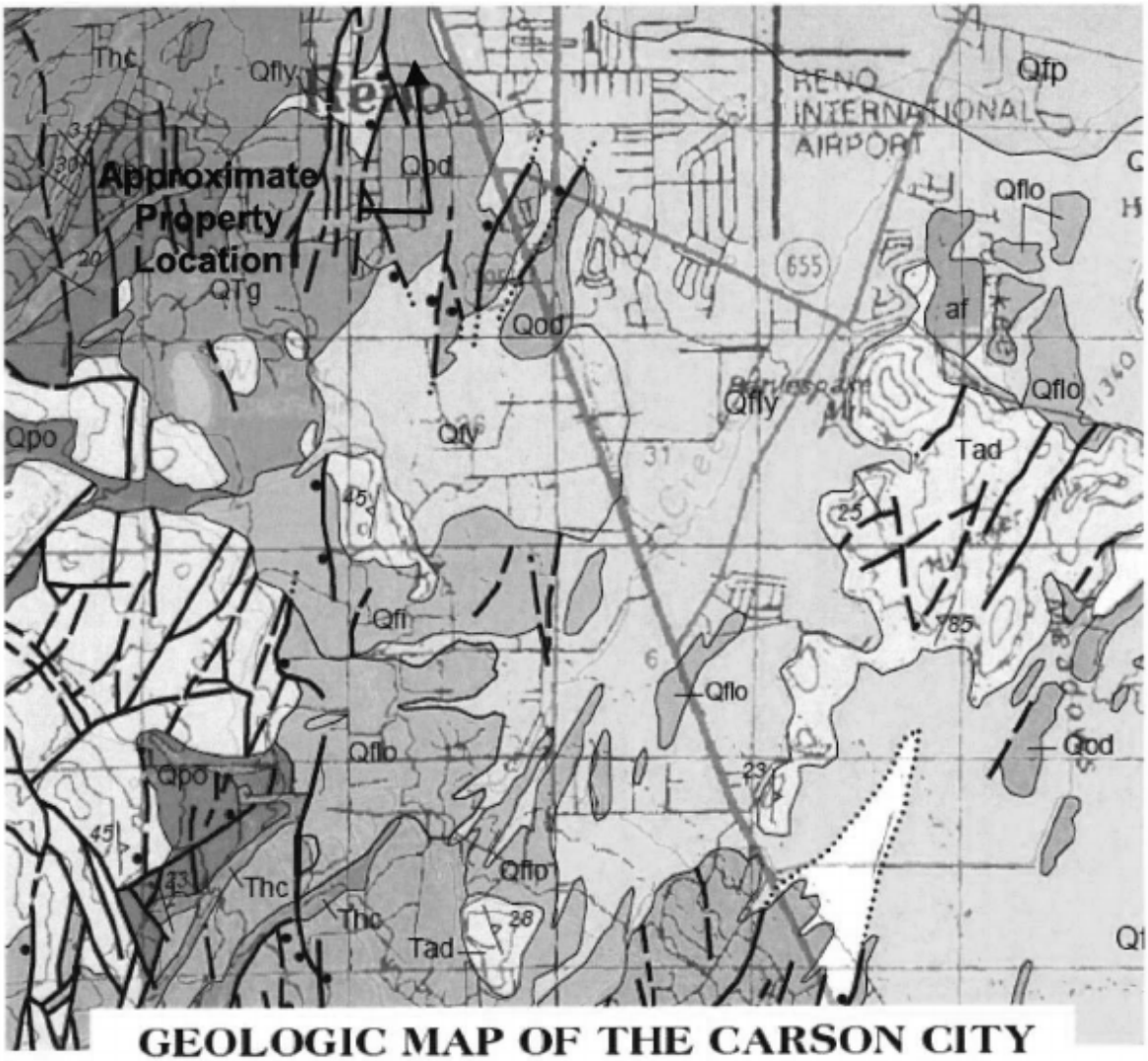
Date:	9/15/2023	**2**



GEOLOGIC MAP OF THE CARSON CITY 30 X 60 MINUTE QUADRANGLE, NEVADA

JOHN H. STEWART

1999

Qod — Outwash deposits of Donner Lake glaciation

Nevada Bureau of Mines and Geology
University of Nevada, Mail Stop 178
Reno, Nevada 89557-0088
(775) 784-6691, ext. 2
info@nbmg.unr.edu; www.nbmg.unr.edu

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GEOLOGIC MAP

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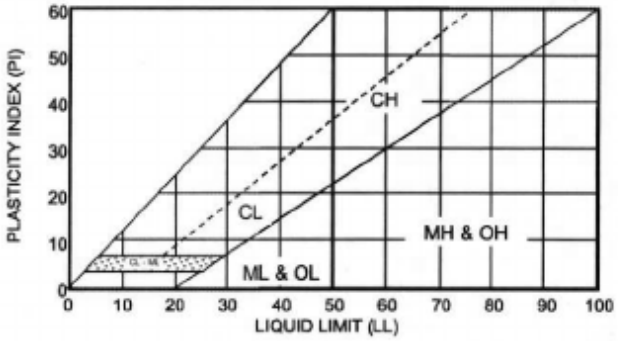
PLATE 3

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



CONSISTENCY		RELATIVE DENSITY	
SILTS & CLAYS	SPT BLOW* COUNTS (N)	SANDS & GRAVELS	SPT BLOW* COUNTS (N)
VERY SOFT	0 - 2	VERY LOOSE	0 - 4
SOFT	3 - 4	LOOSE	5 - 10
MEDIUM STIFF	5 - 8	MEDIUM DENSE	11 - 30
STIFF	9 - 15	DENSE	31 - 50
VERY STIFF	16 - 30	VERY DENSE	50 +
HARD	30 +		

* The Standard Penetration Resistance (N) In blows per foot is obtained by the ASTM D1585 procedure using 2" O.D., 1 3/8" I.D. samplers.

DESCRIPTION OF ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES	
TRACE	Particles are present but est. < 5%
FEW	5% - 10%
LITTLE	15% - 20%
SOME	30% - 45%
MOSTLY	50% - 100%

NOTE: Percentages are presented within soil description for soil horizon with laboratory tested soil samples.

DEFINITIONS OF SOIL FRACTIONS	
SOIL COMPONENT	PARTICLE SIZE RANGE
COBBLES	ABOVE 3 INCHES
GRAVEL	3 IN. TO NO. 4 SIEVE
COARSE GRAVEL	3 IN. TO 3/4 IN.
FINE GRAVEL	3/4 IN. TO NO. 4 SIEVE
SAND	NO. 4 TO NO. 200
COARSE SAND	NO. 4 TO NO. 10
MEDIUM SAND	NO. 10 TO NO. 40
FINE SAND	NO. 40 TO NO. 200
FINES (SILT OR CLAY)	MINUS NO. 200 SIEVE

S.6 Rev 2-6-10

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KEY TO SOIL DESCRIPTIONS

Geotechnical Investigation
2600 Outlook Drive
APN: 018-253-15
Reno, Nevada

File No.: 2108.047-A
Date: 9/15/2023
PLATE 4

CONSOLIDATION OF SEDIMENTARY ROCKS Usually determined from unweathered samples. Largley dependent on cementation.

U = unconsolidated **M** = moderately consolidated
P = poorly consolidated **W** = well consolidated

BEDDING OF SEDIMENTARY ROCKS

Splitting Property	Thickness	Stratification
Massive	Greater than 4.0 ft.	Very thick-bedded
Blocky	2.0 to 4.0 ft.	Thick-bedded
Slabby	0.2 to 2.0 ft.	Thin-bedded
Flaggy	0.05 to 0.2 ft.	Very thin bedded
Shaly or platy	0.01 to 0.05 ft.	Laminated
Papery	Less than 0.01 ft.	Thinly laminated

FRACTURING

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0
Occasionally fractured	1.0 to 4.0
Moderately fractured	0.5 to 1.0
Closely fractured	0.1 to 0.5
Intensely fractured	0.005 to 0.1
Crushed	Less than 0.005

HARDNESS

1. Soft - Reserved for plastic material alone
2. Moderately soft - can be gouged deeply or carved easily with a knife blade
3. Moderately hard - can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away
4. Hard - can be scratched with difficulty; scratch produces little powder and is often faintly visible
5. Very Hard - cannont be scratched with a knife blade; leaves a metallic streak

STRENGTH

1. Plastic - very low strength
2. Friable - crumbles easily by rubbing with fingers
3. Weak - An unfractured specimen of such material will crumble under light hammer blows
4. Moderately Strong - Specimen will withstand a few heavy hammer blows before breaking
5. Strong - Specimen will withstand a few heavy hammer blows, and will yeild with difficulty only dust and small flying fragments
6. Very Strong - Specimen will resist heavy ringing hammer blows and will yeild with difficulty only dust and small flying fragments

WEATHERING

The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, freezing, and thawing

D. Deep - Moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration, many fractures, all extensively coated or filled with oxides, carbonates and/or clay silt

M. Moderate - Slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected; Moderate to occasionally intense discoloration; Moderately coated features

S. Slightly - No megascopic decomposition of minerals; little or no effect on normal cementation; Slight and intermittent, or localized discoloration; Few stains on fracture surfaces

F. Fresh - Unaffected by weathering agents; No disintegration or discoloration; Fractures usually less numerous than joints

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CRITERIA FOR ROCK DESCRIPTIONS

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Reno, Nevada

Project No.: 2108.047-A
Date: 09/15/23

PLATE 5

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We Strive for Excellence

Test Pit No.: TP-1
Project: 2600 Outlook Drive
File No.: 2108.047-A
Location: Reno, Nevada

Date: Tuesday, August 1, 2023
Excv. Method: Excavator
Excv. Type: CAT 304
Logged By: DC

GPS: 39.497896, -119.828986
Datum: EL ~ 4,656

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: Grab	SAMPLE TYPE: Drive Tube	Sample ID	Color	PENETROMETER (TSF)	CLAYEY SOILS: SOFT	CLAYEY SOILS: MED. STIFF	CLAYEY SOILS: STIFF	CLAYEY SOILS: VERY STIFF	CLAYEY SOILS: HARD	SAND OR GRAVEL: VERY LOOSE	SAND OR GRAVEL: LOOSE	SAND OR GRAVEL: MED. DENSE	SAND OR GRAVEL: DENSE	SAND OR GRAVEL: VERY DENSE	MOISTURE: DRY	MOISTURE: DAMP	MOISTURE: MOIST	MOISTURE: WET	MOISTURE: SATURATED	USCS SYMBOL	DESCRIPTION
													X					X					
													X					X					
													X					X					
--1--													X					X					
														X				X					
														X				X					
														X				X					
--2--				1090	Brown									X				X				SC	Clayey sand with gravel (SC) with a plasticity index of 18 and fines content of approximately 25 percent.
														X				X					
														X				X					
														X				X					
--3--														X				X					
														X				X					
														X				X					
														X				X					
--4--																							
--5--																							
--6--																							
--7--																							
--8--																							
--9--																							
--10--																							

Total Depth: 4.0 feet

Groundwater: NFWE

Plate 6

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Test Pit No.: TP-2
Project: 2600 Outlook Drive
File No.: 2108.047-A
Location: Reno, Nevada

Date: Tuesday, August 1, 2023
Excv. Method: Excavator
Excv. Type: CAT 304
Logged By: DC

GPS: 39.497815, -119.828871
Datum: EL ~ 4,653

DEPTH (FEET)	SAMPLE TYPE: BULK	SAMPLE TYPE: Grab	SAMPLE TYPE: Drive Tube	Sample ID	Color	PENETROMETER (TSF)	CLAYEY SOILS: SOFT	CLAYEY SOILS: MED. STIFF	CLAYEY SOILS: STIFF	CLAYEY SOILS: VERY STIFF	CLAYEY SOILS: HARD	SAND OR GRAVEL: VERY LOOSE	SAND OR GRAVEL: LOOSE	SAND OR GRAVEL: MED. DENSE	SAND OR GRAVEL: DENSE	SAND OR GRAVEL: VERY DENSE	MOISTURE: DRY	MOISTURE: DAMP	MOISTURE: MOIST	MOISTURE: WET	MOISTURE: SATURATED	USCS SYMBOL	DESCRIPTION
				1090	Brown								X					X				SC	Clayey sand with gravel (SC) with a plasticity index of 18 and fines content of approximately 25 percent.
--1--													X					X					
													X					X					
													X					X					
--2--														X				X					
														X				X					
														X				X					
--3--														X				X					
														X				X					
														X				X					
--4--														X				X					
--5--																							
--6--																							
--7--																							
--8--																							
--9--																							
--10--																							

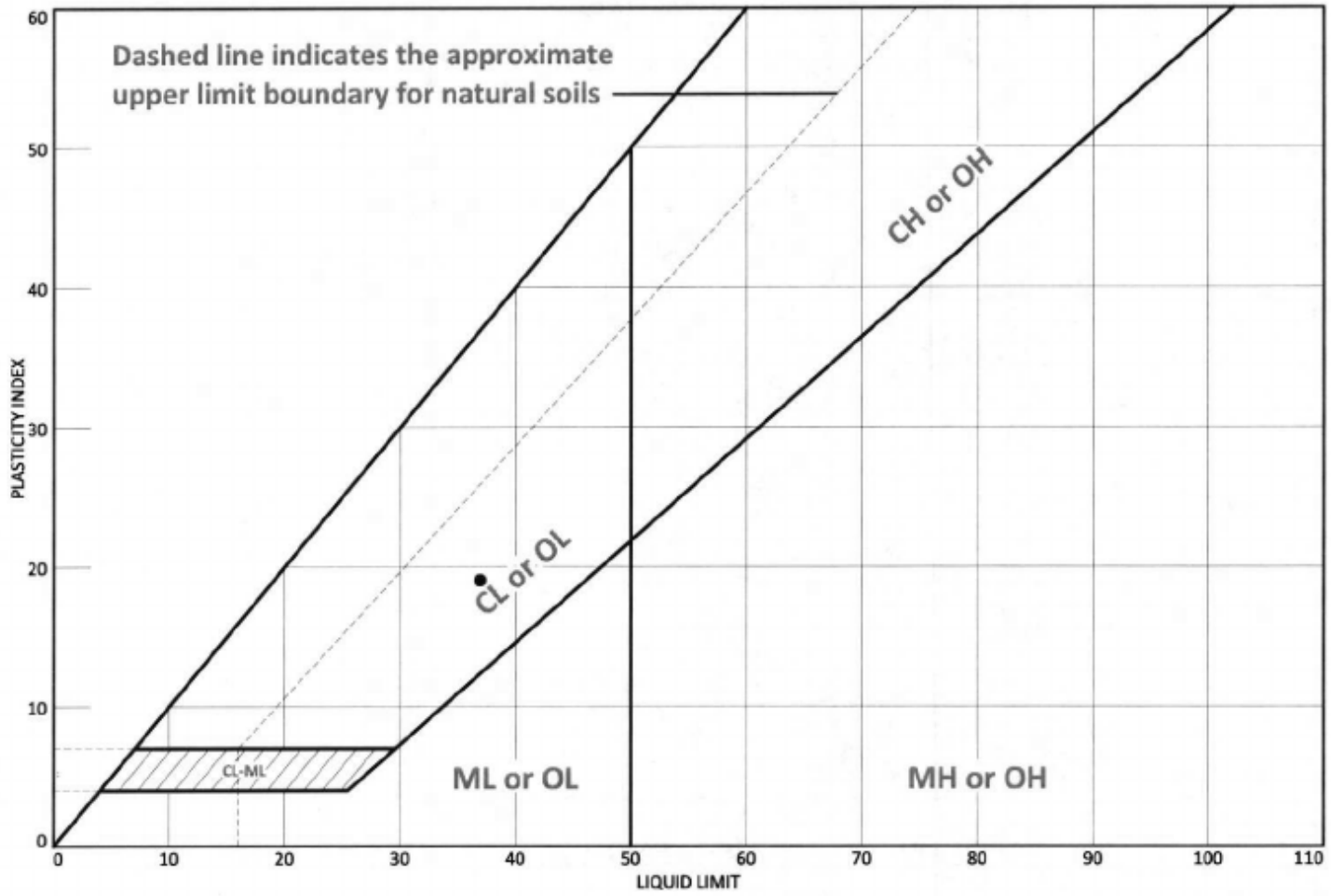
Total Depth: 4.0 feet

Groundwater: NFWE

Format: GROUP NAME: cementation; grain size; modifiers

Plate 7

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown clayey sand	37	18	19	65.6	22.5	SC

Project No. 2108.047-A **Client:** Robison Engineering

Project: 2600 Outlook Drive

●**Source of Sample:** Stockpile **Depth:** Composite **Sample Number:** 1089

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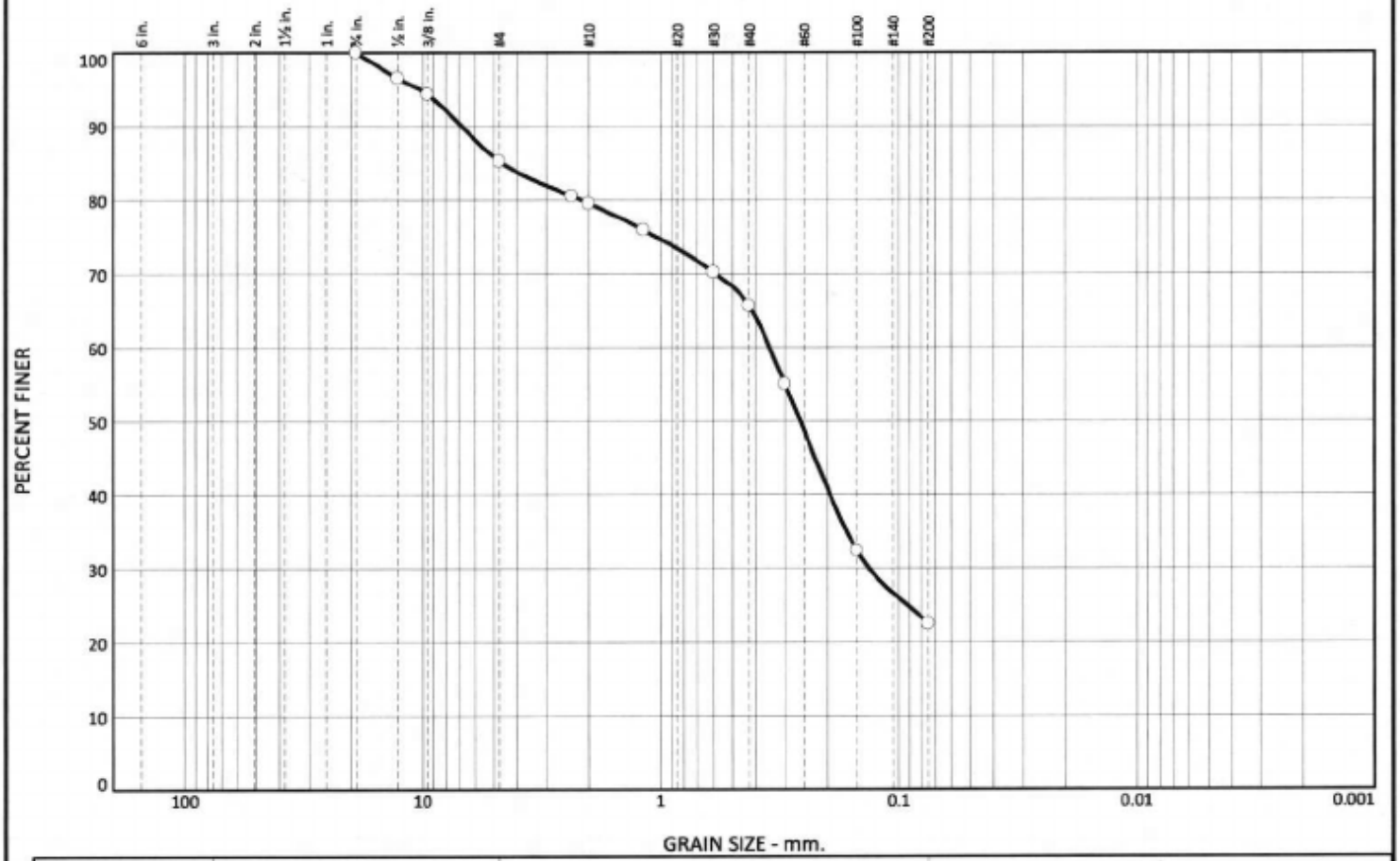
Figure 8

Tested By: AM **Checked By:** CM

Particle Size Distribution Report

ASTM C117 & C136



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	14.7	5.8	13.9	43.1	22.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	37	18	4.6227	0.3491	0.2585	0.1338				

Material Description	Test Date	USCS	NM
○ Brown clayey sand	8-2-23	SC	

Project No. 2108.047-A **Client:** Robison Engineering

Project: 2600 Outlook Drive

○**Source of Sample:** Stockpile **Depth:** Composite **Sample Number:** 1089

Remarks:

○Natural moisture: 7.8%

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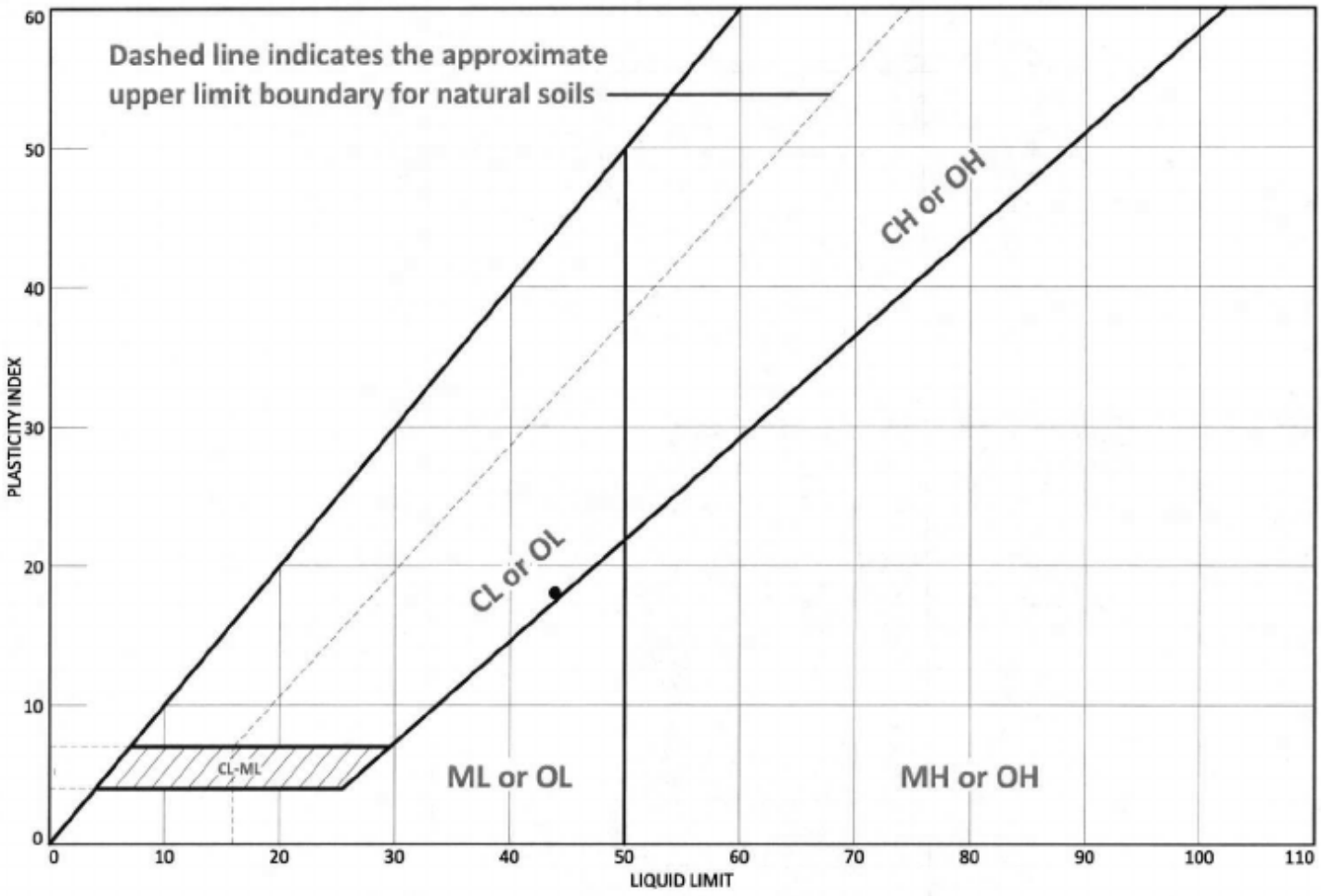
Figure 9

Tested By: Andrew Mayse **Checked By:** CM

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown clayey sand with gravel	44	26	18	57.5	26.0	SC

Project No. 2108.047-A **Client:** Robison Engineering

Project: 2600 Outlook Drive

●**Source of Sample:** Native **Depth:** Composite **Sample Number:** 1090

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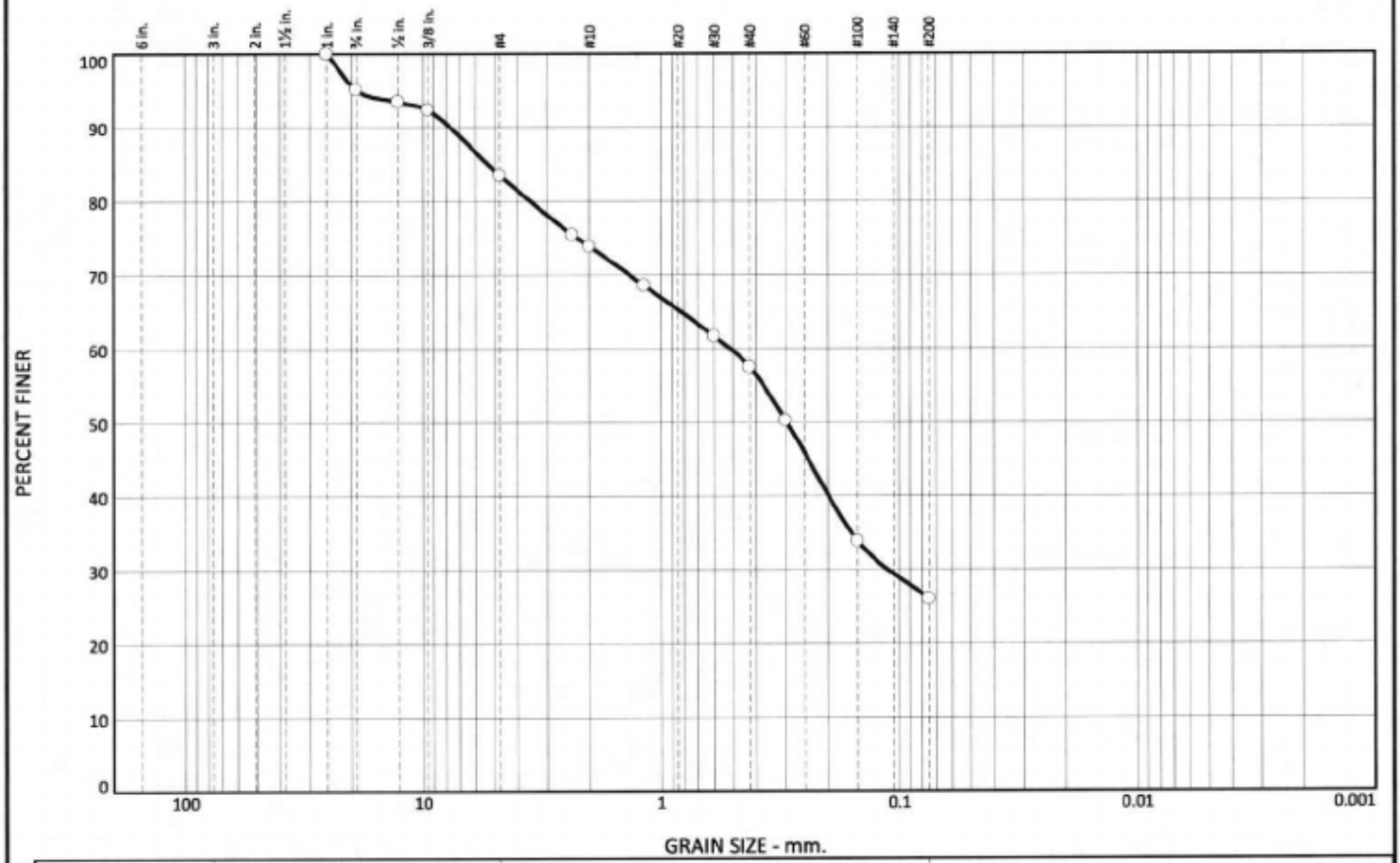
Figure 10

Tested By: AM **Checked By:** CM

Particle Size Distribution Report

ASTM C117 & C136



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	4.9	11.6	9.6	16.4	31.5	26.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	44	26	5.3334	0.5136	0.2965	0.1124				

Material Description	Test Date	USCS	NM
○ Brown clayey sand with gravel	8-2-23	SC	

Project No. 2108.047-A **Client:** Robison Engineering

Project: 2600 Outlook Drive

○**Source of Sample:** Native **Depth:** Composite **Sample Number:** 1090

Remarks:

○Natural moisture: 18.2%

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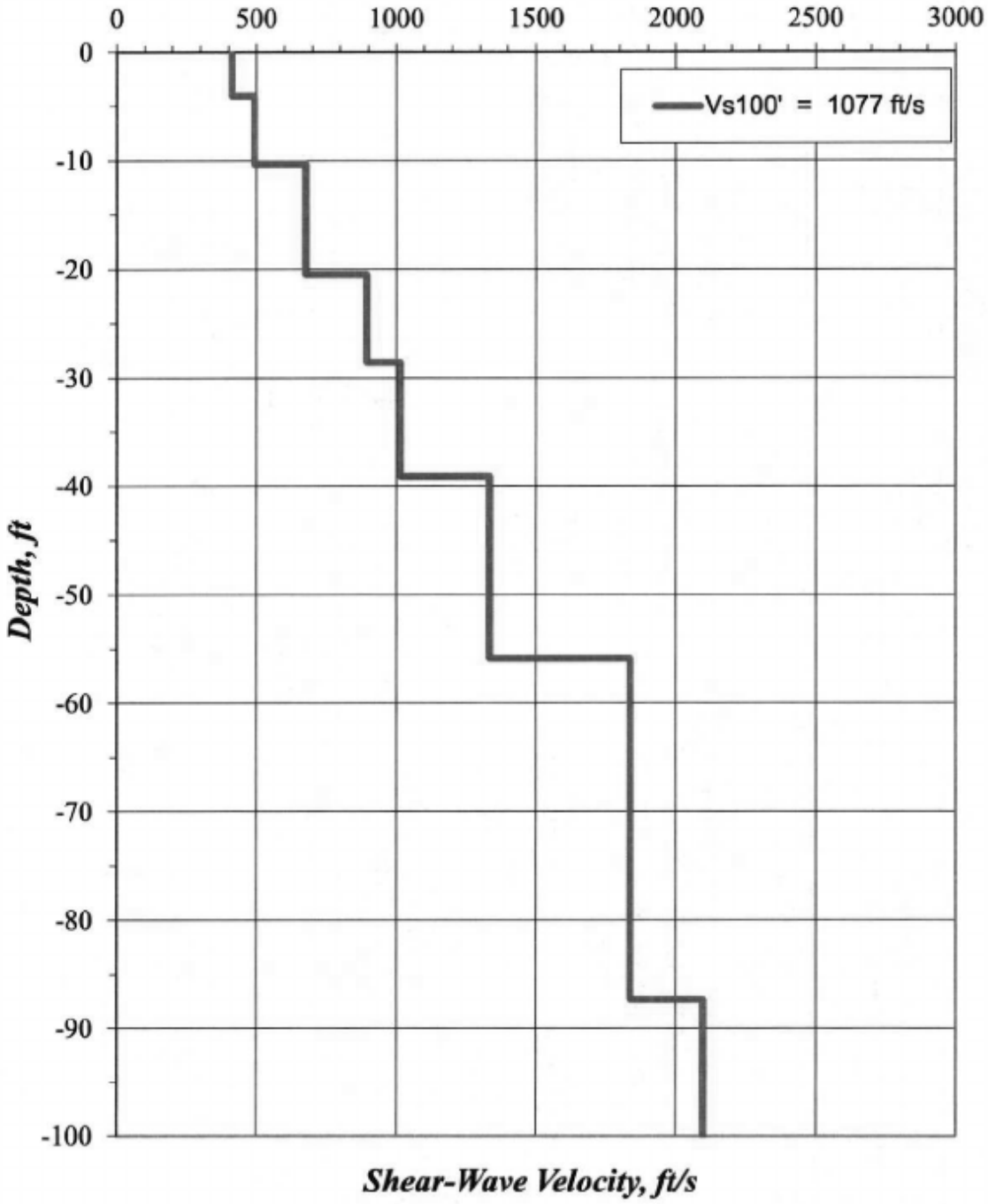
Figure 11

Tested By: Andrew Mayse **Checked By:** CM

2600 Outlook Drive: Vs Model



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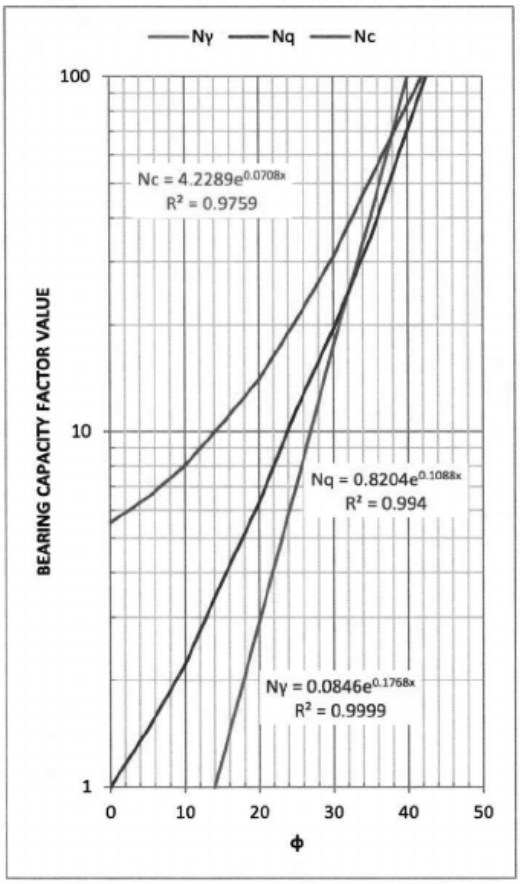
LINE 1
ONE-DIMENSIONAL SHEARWAVE VELOCITY

Geotechnical Investigation
2600 Outlook Drive
APN: 018-253-15
Reno, Nevada

File No.:	2108.047-A	PLATE
Date:	9/15/2023	12



L	=	2	Footing Length, Feet	c	=	0	psf	N_c = 35.4
B or R	=	2	Footing Width, Feet	ϕ	=	30	°	N_q = 21.5
D	=	2	Footing Depth, Feet	γ	=	120	pcf	$N_γ$ = 17.0
d_o	=	100	Depth to Water, d_o > B	P_o	=	240	psf	

Footing Type	x
Continuous, General	x
Square or Rectangular	x
Circular	x

ϕ - c Soil

Continuous Footing, General Case
q_{ult} = 7192 psf
q_{all} = 2400 psf
Square or Rectangular Footing
q_{ult} = 6783 psf
q_{all} = 2260 psf
Circular Footing, R
q_{ult} = 7600 psf
q_{all} = 2530 psf

ϕ, c = 0

Continuous Footing, General Case
q_{ult} = 7192 psf
q_{all} = 2400 psf
Square or Rectangular Footing
q_{ult} = 6783 psf
q_{all} = 2260 psf
Circular Footing, R
q_{ult} = 7600 psf
q_{all} = 2530 psf

c, ϕ = 0

Continuous Footing, General Case
q_{ult} = 240 psf
q_{all} = 80 psf
Square or Rectangular Footing
q_{ult} = 240 psf
q_{all} = 80 psf
Circular Footing, R
q_{ult} = 240 psf
q_{all} = 80 psf

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ALLOWABLE BEARING CAPACITY
(DM-7.1, NAVFAC)

Geotechnical Investigation
2600 Outlook Drive
APN: 018-253-15
Reno, Nevada

File No.: 2108.047-A
Date: 09/15/23

PLATE 13

APPENDIX B

USDA WEB SOIL SURVEY REPORTS

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Map Scale: 1:479 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 20 40 80 120

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washoe County, Nevada, South Part
Survey Area Data: Version 19, Sep 8, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 10, 2022—Jun 14, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
615	Verdico sandy loam, 4 to 8 percent slopes	0.0	1.7%
730	Stodick very stony loam, 15 to 30 percent slopes	0.6	98.3%
Totals for Area of Interest		**0.6**	**100.0%**

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk "*" denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–Washoe County, Nevada, South Part

Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity Index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
615—Verdico sandy loam, 4 to 8 percent slopes														
Verdico	85	D	0-2	Sandy loam	SM	A-4, A-2	0-0-0	0-3-5	90-95-100	85-90-95	50-58-65	25-33-40	20-27-33	NP
			2-22	Clay	CH	A-7	0-0-0	0-3-5	85-90-95	85-90-95	75-85-95	65-78-90	50-58-65	30-38-45
			22-29	Gravelly clay	CH	A-7	0-0-0	0-3-5	75-85-95	65-70-75	60-68-75	50-60-70	50-58-65	30-38-45
			29-60	Bedrock	—	—	—	—	—	—	—	—	—	—
730—Stodick very stony loam, 15 to 30 percent slopes														
Stodick	85	D	0-4	Stony loam	CL-ML, CL	A-4	5-8-10	0-3-5	85-90-95	80-85-90	70-78-85	50-60-70	15-20-25	5-8-10
			4-14	Very gravelly clay loam, very gravelly loam	SC, GC	A-2, A-6	0-0-0	0-3-5	50-63-75	35-45-55	30-43-55	20-33-45	30-35-40	10-15-20
			14-60	Bedrock	—	—	—	—	—	—	—	—	—	—

APPENDIX C
ATC HAZARDS BY LOCATION
SEISMIC DESIGN PARAMETERS

WESTEX
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Data Source Information

Soil Survey Area: Washoe County, Nevada, South Part
Survey Area Data: Version 19, Sep 8, 2022

⚠ This is a beta release of the [illegible]

ℹ The ATC Hazards by Location [illegible]

ATC Hazards by Location

Search Information

Address:	2600 Outlook Dr, Reno, NV 89509, USA
Coordinates:	39.4980288, -119.8291143
Elevation:	4651 ft
Timestamp:	2023-09-14T19:05:53.851Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	II
Site Class:	D

Basic Parameters

Name	Value	Description
S_S	1.766	MCE_R ground motion (period=0.2s)
S_1	0.632	MCE_R ground motion (period=1.0s)
S_{MS}	1.766	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.177	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.89	Coefficient of risk (0.2s)
CR_1	0.884	Coefficient of risk (1.0s)
PGA	0.77	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.847	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.766	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.983	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.562	Factored deterministic acceleration value (0.2s)
S1RT	0.632	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.715	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.026	Factored deterministic acceleration value (1.0s)
PGAd	1.044	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

APPENDIX D
EXPLORATION PHOTOS

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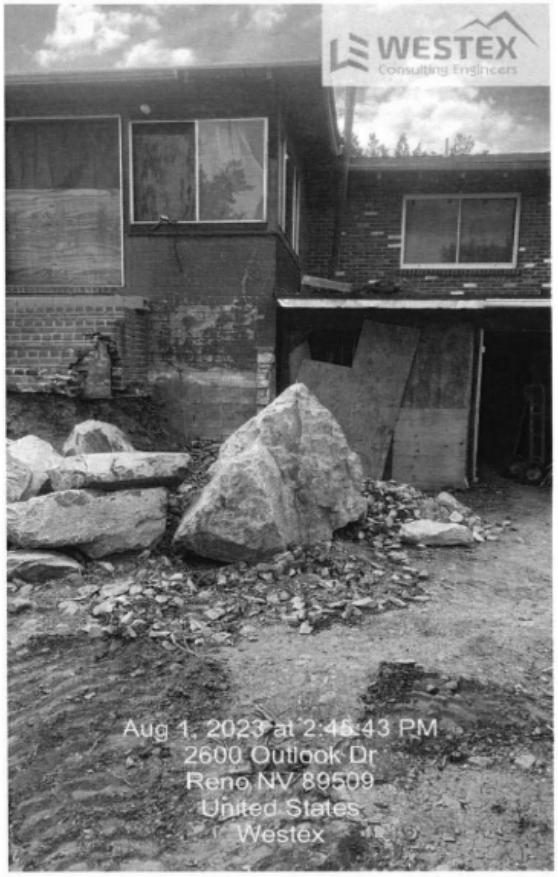

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EXPLORATION PHOTOS

Geotechnical Investigation
2600 Outlook Drive
APN: 018-253-15
Reno, Nevada

File No.: 2108.047-A
Date: 09/15/23

PLATE D-1