

**PRELIMINARY GEOTECHNICAL AND
INFILTRATION FEASIBILITY INVESTIGATION
PROPOSED WAREHOUSE DEVELOPMENT
APNs 0463-213-26, -27, AND -28
TOWN OF APPLE VALLEY, CALIFORNIA**

**PROJECT NO. 23885.1
MARCH 3, 2023**

Prepared For:

55555 Amargosa, LLC
5901 S. Eastern Avenue
Commerce, California 90040

Attention: Mr. Simon Bouzaglou

March 3, 2023

55555 Amargosa, LLC
5901 S. Eastern Avenue
Commerce, California 90040

Project No. 23885.1

Attention: Mr. Simon Bouzaglou

Subject: Preliminary Geotechnical and Infiltration Feasibility Investigation, Proposed Warehouse Development, APNs 0463-213-26, -27, and -28, Town of Apple Valley, California.

LOR Geotechnical Group, Inc., is pleased to present this report of our geotechnical investigation for the subject project. In summary, it is our opinion that the proposed development is feasible from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction. However, the contents of this summary should not be solely relied upon.

To provide adequate support for the proposed structure, and structural improvements, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. Any undocumented fill material and any loose, compressible alluvial materials should be removed from structural areas and areas to receive engineered compacted fills. The data developed during this investigation indicates that removals ranging from approximately 2 to 5 feet will be required from currently planned development areas. The given removal depths are preliminary and the actual depths of the removals should be determined during the grading operation by observation and/or in-place density testing.

Very low expansion potential and poor R-value quality content generally characterize the upper onsite materials tested. Near completion and/or at the completion of site grading, additional foundation and subgrade soils should be tested, as necessary, to verify their expansion potential, soluble sulfate content, and R-value quality.

Good infiltration rates were obtained for the soils tested.

LOR Geotechnical Group, Inc.

TABLE OF CONTENTS

	<u>Page No.</u>
INTRODUCTION.	1
PROJECT CONSIDERATIONS.	1
AERIAL PHOTO ANALYSIS.	2
EXISTING SITE CONDITIONS.	2
SUBSURFACE FIELD INVESTIGATION.	2
LABORATORY TESTING PROGRAM.	3
GEOLOGIC CONDITIONS.	3
Regional Geologic Setting.	3
Site Geologic Conditions.	4
Groundwater Hydrology.	5
Mass Movement.	5
Faulting.	5
Historical Seismicity.	7
Secondary Seismic Hazards.	7
Liquefaction.	8
Seiches/Tsunamis.	8
Flooding (Water Storage Facility Failure).	8
Seismically-Induced Landsliding.	8
Rockfalls.	8
Seismically-Induced Settlement.	8
SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2019).	8
Site Classification.	8
CBC Earthquake Deign Summary.	8
CONCLUSIONS.	10
Foundation Support.	10
Soil Expansiveness.	10
Corrosion Screening.	11
Infiltration.	11
Geologic Mitigations.	11
Seismicity.	12

TABLE OF CONTENTS

	<u>Page No.</u>
RECOMMENDATIONS.	12
Geologic Recommendations.	12
General Site Grading.	12
Initial Site Preparation.	13
Preparation of Fill Areas.	13
Engineered Compacted Fill.	14
Preparation of Foundation Areas.	14
Short-Term Excavations.	14
Slope Construction.	15
Slope Protection.	15
Soil Expansiveness.	15
Foundation Design.	16
Settlement.	16
Building Area Slab-On-Grade.	17
Exterior Flatwork.	17
Wall Pressures.	18
Preliminary Pavement Design.	18
Infiltration.	20
Corrosion Protection.	21
Construction Monitoring.	21
LIMITATIONS.	22
TIME LIMITATIONS.	23
CLOSURE.	23
REFERENCES.	24

TABLE OF CONTENTS

Page No.

APPENDICES

Appendix A

Index Map.....	A-1
Site Plan.....	A-2
Regional Geologic Map.	A-3
Historical Seismicity Maps.	A-4 and A-5

Appendix B

Field Investigation Program.	B
Boring Log Legend.....	B-i
Soil Classification Chart.	B-ii
Boring Logs.	B-1 through B-10

Appendix C

Borehole Percolation Testing Program.....	C
Infiltration Rate Test Results.	C-1 through C-3

Appendix D

Laboratory Testing Program.....	D
Laboratory Test Results.....	D-1 and D-2
Project X Corrosion Engineering Test Results	

INTRODUCTION

During February and March of 2023, a Preliminary Geotechnical and Infiltration Feasibility Investigation was performed by LOR Geotechnical Group, Inc., for the proposed warehouse project, Assessor's Parcel Numbers (APNs) 0463-213-26, -27, and -28, in the Town of Apple Valley, California. The purpose of this investigation was to provide a technical evaluation of the geologic setting of the site and to provide geotechnical design recommendations for the proposed development. The scope of our services included:

- Review of available geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Interpretation of aerial photographs of the site and surrounding regions dated 1952 through 2022;
- Geologic field reconnaissance mapping to verify the areal distribution of earth units and significance of surficial features as compiled from documents, literature, and reports reviewed;
- A subsurface field investigation to determine the physical soil conditions pertinent to the proposed development;
- Percolation testing via the borehole test method to determine Infiltration characteristics;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of geotechnical recommendations for site grading and foundation design; and
- Preparation of this report summarizing our findings, and providing conclusions and recommendations for site development.

The approximate location of the site is shown on the attached Index Map, Enclosure A-1, within Appendix A.

PROJECT CONSIDERATIONS

To orient our investigation at the site, a Site Plan prepared by Steeno Design Studio, dated November 2022, was furnished for our use. The current site conditions, proposed building configuration, and associated driveway, parking, and landscape areas were indicated on this plan. The Site Plan was utilized as a base map for our field investigation and is presented as Enclosure A-2, within Appendix A.

As noted on the site plan, development of the site will include a 379,657 square foot warehouse as well as new driveway, parking, and landscape areas. The building is anticipated to be of concrete tilt-up or similar type construction and light to moderate foundation loads are anticipated with this type of structure.

Grading plans have not yet been developed. However, based on the current topography of the site and adjacent areas, minor cuts and fills are anticipated to create level surfaces for the proposed improvements.

AERIAL PHOTO ANALYSIS

The aerial photographs reviewed consisted of vertical aerial photograph images of varying scales. We reviewed imagery available from Google Earth Pro (2023) computer software and from online Historic Aerials (2023).

To summarize briefly, the site remained vacant, natural land from prior to 1952 through today. No evidence for the presence of faults traversing the site area or mass movement features was noted during our review of the photographs covering the site and nearby vicinity.

EXISTING SITE CONDITIONS

The approximately 20-acre site is located at the northwest corner of the intersection of Johnson Road and Navajo Road in the Town of Apple Valley, California. The property consists of vacant, desert land with sparse desert vegetation. Topographically, the site slopes gently to the southwest. Abundant trash and debris is present locally, primarily along the southern site boundary. Navajo Road, a dirt road, bounds the site on the east with vacant, desert land similar to the site beyond. The adjacent properties to the west and north are vacant desert land, similar to the site. Mesa Linda Avenue, a dirt road, bounds the site on the east with vacant, desert land beyond. Johnson Road, a paved roadway, bounds the site on the south with a large distribution (warehouse) facility beyond.

SUBSURFACE FIELD INVESTIGATION

Our subsurface field exploration program was conducted on December 20, 2022 and February 7, 2023. The work consisted of advancing a total of 10 exploratory borings using a truck-mounted drill rig equipped with 8-inch diameter hollow stem augers. In addition, three borehole percolation tests were conducted in general accordance with the Shallow

Percolation Test procedure as outlined in the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013). The approximate locations of our exploratory borings and percolation tests are presented on Enclosure A-2, within Appendix A.

The subsurface conditions encountered in the exploratory borings were logged by a geologist from this firm. The borings were drilled to depths ranging from approximately 20 to 30 feet below the existing ground surface. Relatively undisturbed and bulk samples were obtained at a maximum depth interval of 5 feet, and returned to our geotechnical laboratory in sealed containers for further testing and evaluation.

Percolation test borings were drilled to the requested depth of approximately 6 feet below the existing ground surface at the requested locations on February 7, 2023.

A detailed description of the subsurface field exploration program and the boring logs is presented in Appendix B.

A detailed description of our borehole percolation testing program and the test results are presented in Appendix C.

LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to geotechnical laboratory testing to evaluate their physical and engineering properties. Laboratory testing included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, and corrosion. Physical testing was conducted in our geotechnical laboratory and chemical testing was conducted by our subconsultant, Project X Corrosion Engineering. A detailed description of the geotechnical laboratory testing program and the test results are presented in Appendix D.

GEOLOGIC CONDITIONS

Regional Geologic Setting

The site is situated along the southern edge of the Mojave Desert on a series of coalescing alluvial fans and terraces collectively referred to as the Cajon Fan. These fans and terraces have formed from sediment eroded from the San Gabriel and San Bernardino Mountains in Pleistocene and Recent times. The subject site is generally located on a large, wide fan

region within the Cajon Fan series, referred to as the Baldy Mesa Fan. The Baldy Mesa Fan slopes to the northeast and is composed predominantly of silty sand and poorly graded to well graded sand, with lesser amounts of clayey sand and sandy clay. These fans lie on a very thick sequence of terrestrial sedimentary rocks, which in turn overlie crystalline bedrock (Dibblee, 1960).

This area north of the San Gabriel Mountains lies along the southeastern portion of a larger geomorphic province in southern California known as the Mojave Desert. The Mojave Desert geomorphic province is essentially a very large, wedge shaped, alluviated plain of comparatively low relief, containing irregularly trending bedrock hills and low mountains.

The Mojave Desert province is bounded on the southwest by the San Andreas fault zone and on the north by the Garlock fault zone. The eastern boundary of the Mojave Desert geomorphic province is not distinct, but gradually converges with the Basin and Range geomorphic province east of Death Valley and into Arizona and Nevada. The province is broken by many internal, major but discontinuous faults, predominately trending to the northwest showing rough parallelism with the trend of the San Andreas. Most of these faults have been active within the last 1.6 million years and many are still considered to be active or potentially active.

The closest known active fault to the subject site noted in the documents reviewed during our study is the Helendale fault located approximately 4.8 kilometers (3.0 miles) northwest of the site. A complete listing of the distances to known active faults in relation to the site is given in the Faulting section of this report.

The site and the regional geologic setting are shown on Enclosure A-3 within Appendix A.

Site Geologic Conditions

Alluvium: Alluvial materials were encountered within all of our exploratory borings to the maximum depths explored. These units were noted to mainly consist of silty sand with minor well graded sand with silt. These materials were typically tan to red brown in color and were noted to contain some secondary calcite. The alluvial materials were in a relatively loose state at the surface becoming medium dense to very dense state at a depth of approximately 2 feet and generally becoming increasingly dense with increasing depth based on our equivalent Standard Penetration Test (SPT) data and in-place density testing.

Bedrock: Igneous bedrock was encountered within all of our exploratory borings underlying the alluvial materials above to the maximum depths explored. These units were encountered at depths of approximately 10 to 20 feet and were noted to mainly consist of dry, gray, coarse to medium grained granitic rock. The bedrock was in a relatively hard state based on our equivalent Standard Penetration Test (SPT) data and in-place density testing.

A detailed description of the subsurface soil and bedrock conditions as encountered within our exploratory borings is presented on the Boring Logs within Appendix B.

Groundwater Hydrology

Groundwater was not encountered within any of exploratory borings as advanced to a maximum depth of approximately 30 feet below the existing ground surface.

In order to estimate the approximate depth to groundwater in the site area, a search was conducted for local groundwater (well) level measurements within the State of California Department of Water Resources online database (CDWR, 2023).

The closest well found is State Well Number 06N03W15Q001S, located approximately 1.2 (0.75 miles) east of the site. In this well, groundwater records were available from 2015 back to 1933. The depth of water in this well fluctuated from approximately 76 feet in 2015 to approximately 114 feet in 1933. A ground surface elevation of approximately 3,132 feet above mean sea level was listed.

Based on this information, groundwater at the site appears to be greater than 50 feet below the lowest ground surface elevation at the site.

Mass Movement

The site lies on a relatively flat surface. The occurrence of mass movement failures such as landslides, rockfalls, or debris flows within such areas is generally not considered common, and no evidence of mass movement was observed on the site.

Faulting

No active or potentially active faults are known to exist at the subject site. In addition, the subject site does not lie within a current State of California Earthquake Fault Zone (Hart and Bryant, 2003) nor does the site lie within a County of San Bernardino fault zone.

No evidence of faulting projecting into or crossing the site was noted during our aerial photograph review or our review of published geologic maps.

As previously mentioned, the closest known active fault is the Helendale fault, located approximately 4.8 kilometers (3.0 miles) to the northeast. In addition, other relatively close active faults include the North Frontal fault located approximately 18.6 kilometers (11.5 miles) to the south, the Cleghorn fault located approximately 34.3 kilometers (21.3 miles) to the south, and the San Andreas fault located about 44.2 kilometers (27.5 miles) to the southwest.

The Helendale fault is a right-lateral strike slip fault. This fault has been active very recently. It is believed that the Helendale fault is capable of producing an earthquake magnitude on the order of 6.5 to 7.3.

The North Frontal fault zone of the San Bernardino Mountains is a zone consisting of numerous fault segments, many of which have their own names. The primary sense of slip is south dipping thrust. This fault seems to be offset (right-laterally) by the Helendale fault. It is believed that the North Frontal fault zone is capable of producing an earthquake magnitude on the order of 6.0 to 7.1.

The Cleghorn fault of the San Bernardino Mountains is a left-lateral strike-slip fault. The exact nature of the activity of this fault is questionable. The local landscape does not seem to express the reported slip rate (0.3 mm/yr) and some have dismissed Holocene displacement and rupture surfaces as caused by landsliding, not faulting. However, it is believed that the Cleghorn fault is capable of producing an earthquake magnitude on the order of 6.5.

The San Andreas fault is considered to be the major tectonic feature of California, separating the Pacific Plate and the North American Plate. While estimates vary, the San Andreas fault is generally thought to have an average slip rate on the order of 24mm/yr and capable of generating large magnitude events on the order of 7.5.

Current standards of practice included a discussion of all potential earthquake sources within a 100 kilometer (62 mile) radius. However, while there are other large earthquake faults within a 100 kilometer (62-mile) radius of the site, none of these are considered as relevant to the site as the faults described above, due to their greater distance and/or smaller anticipated magnitudes.

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search website of the U.S.G.S. (2022). This website conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto a map. At the time of our search, the database contained data from January 1, 1932 through February 28, 2023.

In our first search, the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of moderate to large events. As depicted on Enclosure A-4, within Appendix A, the site lies within a relatively active region associated with the San Andreas fault and various Mojave Desert faults to the east.

In the second search, the micro seismicity of the area lying within a 15 kilometer (9.2 mile) radius of the site was examined by selecting an epicenter map listing events on the order of 1.0 and greater since 1978. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the time period for the events on the detail map is to enhance the accuracy of the map. Events recorded prior to the mid to late 1970's are generally considered to be less accurate due to advancements in technology. As depicted on this map, Enclosure A-5, a few events are present in the area to the northeast associated with the Helendale fault.

In summary, the historical seismicity of the site entails numerous small to medium magnitude earthquake events occurring in the region around the subject site. Any future developments at the subject site should anticipate that moderate to large seismic events could occur very near the site.

Secondary Seismic Hazards

Other secondary seismic hazards generally associated with severe ground shaking during an earthquake include liquefaction, seismic-induced settlement, seiches and tsunamis, earthquake induced flooding, landsliding, and rockfalls.

Liquefaction: The potential for liquefaction generally occurs during strong ground shaking within granular loose sediments where the groundwater is usually less than 50 feet below the ground surface. As groundwater is anticipated to lie greater than 50 feet beneath the site and the site is underlain by hard, igneous bedrock at relatively shallow depths, the possibility of liquefaction at the site is considered nil.

Seiches/Tsunamis: The potential for the site to be affected by a seiche or tsunami (earthquake generated wave) is considered nil due to absence of any large bodies of water near the site.

Flooding (Water Storage Facility Failure): There are no large water storage facilities located on or near the site which could possibly rupture during in earthquake and affect the site by flooding.

Seismically-Induced Landsliding: Due to the low relief of the site and surrounding region, the potential for landslides to occur at the site is considered nil.

Rockfalls: No large, exposed, loose or unrooted boulders are present above the site that could affect the integrity of the site.

Seismically-Induced Settlement: Settlement generally occurs within areas of loose, granular soils with relatively low density. Since the site is underlain by relatively dense to alluvial materials, the potential for settlement is considered very low. In addition, the recommended earthwork operations to be conducted during the development of the site should mitigate any near surface loose soil conditions.

SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2022)

Design requirements for structures can be found within Chapter 16 of the 2022 California Building Code (CBC) based on building type, use, and/or occupancy. The classification of use and occupancy of all proposed structures at the site, shall be the responsibility of the building official.

Site Classification

Chapter 20 of the ASCE 7-16 defines six possible site classes for earth materials that underlie any given site. Bedrock is assigned one of three of these six site classes and these are: A, B, or C. Soil is assigned as C, D, E, or F. Per ASCE 7-16, Site Class A and Site Class B shall be measured on-site or estimated by a geotechnical engineer,

engineering geologist or seismologist for competent rock with moderate fracturing and weathering. Site Class A and Site Class B shall not be used if more than 10 feet of soil is between the rock surface and bottom of the spread footing or mat foundation. Site Class C can be used for very dense soil and soft rock with \tilde{N} values greater than 50 blows per foot. Site Class D can be used for stiff soil with \tilde{N} values ranging from 15 to 50 blows per foot. Site Class E is for soft clay soils with \tilde{N} values less than 15 blows per foot. Our investigation, mapping by others, and our experience in the site region indicates that the materials beneath the site are considered Site Class C, very dense soil and soft rock.

CBC Earthquake Design Summary

Earthquake design criteria have been formulated in accordance with the 2019 CBC and ASCE 7-16 for the site based on the results of our investigation to determine the Site Class and an assumed Risk Category II. However, these values should be reviewed and the final design should be performed by a qualified structural engineer familiar with the region. In addition, the building official should confirm the Risk Category utilized in our design (Risk Category II). Our design values are provided below:

CBC 2019 SEISMIC DESIGN SUMMARY*	
Site Location (USGS WGS84) 34.6019, -117.1914, Risk Category II	
Site Class Definition Chapter 20 ASCE 7	C
S_s Mapped Spectral Response Acceleration at 0.2s Period	1.021
S_1 Mapped Spectral Response Acceleration at 1s Period	0.392
S_{MS} Adjusted Spectral Response Acceleration at 0.2s Period	1.225
S_{M1} Adjusted Spectral Response Acceleration at 1s Period	0.588
S_{DS} Design Spectral Response Acceleration at 0.2s Period	0.816
S_{D1} Design Spectral Response Acceleration at 1s Period	0.392
F_a Short Period Site Coefficient at 0.2s Period	1.2
F_v Long Period Site Coefficient at 1s Period	1.5
PGA_M	0.527
Seismic Design Category	D
*Values obtained from OSHPD Seismic Design Maps tool	

CONCLUSIONS

This investigation provides a broad overview of the geotechnical and geologic factors which are expected to influence future site planning and development. On the basis of our field investigation and testing program, it is the opinion of LOR Geotechnical Group, Inc., that the proposed development of the site for the proposed use is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into design and implemented during grading and construction.

It should be noted that the subsurface conditions encountered in our exploratory borings are indicative of the locations explored and the subsurface conditions may vary. If conditions are encountered during the construction of the project that differ significantly from those presented in this report, this firm should be notified immediately so we may assess the impact to the recommendations provided.

Foundation Support

To provide adequate support for the proposed structure, we recommend that a compacted fill mat be constructed beneath footings and slabs. The compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. The construction of this compacted fill mat will allow for the removal of the existing loose alluvial materials.

Conventional foundation systems utilizing either individual spread footings and/or continuous wall footings will provide adequate support for the anticipated downward and lateral loads when utilized in conjunction with the recommended fill mat.

Soil Expansiveness

Our observations and testing of the on-site soils indicate they are comprised of relatively granular materials considered to have a very low expansion potential. For very low expansive soils, specialized construction procedures to resist expansive soil activity are not considered necessary.

Careful evaluation of onsite soils and any import fill for their expansion potential should be conducted during the grading operation.

Corrosion Screening

Select representative samples from our borings were taken to Project X Corrosion Engineering for full corrosion series testing. Results from soil corrosivity testing completed by Project X Corrosion Engineering are presented within Appendix D.

The corrosivity test results indicate that soluble sulfate concentrations in the samples were less than 0.10 percent by weight. These concentrations indicate an exposure class S0 for sulfate (ACI 318). No special mitigation methods are considered necessary.

The corrosivity test results indicate that chloride concentrations were below 500 ppm. This concentration indicates an exposure class C1 for chloride (ACI 318). Special mitigation measures are not considered necessary.

Soil pH for the samples was 7.9 to 8.1, neutral to slightly basic. Therefore, the need for specialized design is not anticipated.

Concentrations of ammonium and nitrate indicate the soil may be aggressive towards copper.

Resistivity results for the samples indicate a moderate corrosion potential to ferrous metals.

LOR Geotechnical does not practice corrosion engineering. If further information concerning the corrosion characteristics, or interpretation of the results submitted herein, is required, then a competent corrosion engineer could be consulted.

Infiltration

The results of our field investigation and test data indicate marginal infiltration characteristics for the soils tested, with the results ranging from 1.6 to 3.1 inches per hour.

Geologic Mitigations

No special mitigation methods are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

Seismicity

Seismic ground rupture is generally considered most likely to occur along pre-existing active faults. Since no known faults are known to exist at, or project into the site, the probability of ground surface rupture occurring at the site is considered nil.

Due to the site's close proximity to the faults described above, it is reasonable to expect a relatively strong ground motion seismic event to occur during the lifetime of the proposed development on the site. Large earthquakes could occur on other faults in the general area, but because of their lesser anticipated magnitude and/or greater distance, they are considered less significant than the faults described above from a ground motion standpoint.

The effects of ground shaking anticipated at the subject site should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the California Building Code. However, it should be noted that the current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of the structure (Larson and Slosson, 1992).

No secondary seismic hazards are anticipated to impact the proposed development.

RECOMMENDATIONS

Geologic Recommendations

No special geologic recommendations are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

General Site Grading

It is imperative that no clearing and/or grading operations be performed without the presence of a qualified geotechnical engineer. An onsite, pre-job meeting with the developer, the contractor, the jurisdictional agency, and the geotechnical engineer should occur prior to all grading related operations. Operations undertaken at the site without the geotechnical engineer present may result in exclusions of affected areas from the final compaction report for the project.

Grading of the subject site should be performed in accordance with the following recommendations as well as applicable portions of the California Building Code, and/or applicable local ordinances.

All areas to be graded should be stripped of significant vegetation and other deleterious materials.

Any undocumented fill encountered during grading should be completely removed, cleaned of significant deleterious materials, and may be reused as compacted fill. It is our recommendation that any existing fills under any proposed flatwork and paved areas be removed and replaced with engineered compacted fill. If this is not done, premature structural distress (settlement) of the flatwork and pavement may occur.

Cavities created by removal of subsurface obstructions, which are anticipated in areas of the site which were previously developed, should be thoroughly cleaned of loose soil, organic matter and other deleterious materials, shaped to provide access for construction equipment, and backfilled as recommended in the following Engineered Compacted Fill section of this report.

Initial Site Preparation

The existing fill material and any loose, compressible alluvial soils should be removed from all proposed structural and/or fill areas. The data developed during this investigation indicates that removals on the order of 2 to 5 feet deep will be required from proposed development areas in order to encounter competent alluvium upon which engineered compacted fill can be placed. The given removal depths are preliminary. Deeper fills may be present locally. Removals should expose alluvial materials with an in-situ relative compaction of at least 85 percent (ASTM D 1557). The actual depths of the removals should be determined during the grading operation by observation and/or in-place density testing.

Preparation of Fill Areas

Prior to placing fill, the surfaces of all areas to receive fill should be scarified to a minimum depth of 12 inches. The scarified soil should be brought to near optimum moisture content and compacted to a relative compaction of at least 90 percent (ASTM D 1557).

Engineered Compacted Fill

The onsite soils should provide adequate quality fill material, provided they are free from oversized and/or organic matter and other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills.

If required, import fill should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6 inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use. Fill should be spread in maximum 8-inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Preparation of Foundation Areas

All footings should rest upon at least 24 inches of properly compacted fill material placed over competent alluvium. In areas where the required fill thickness is not accomplished by the recommended removals or by site rough grading, the footing areas should be further subexcavated to a depth of at least 24 inches below the proposed footing base grade, with the subexcavation extending at least 5 feet beyond the footing lines. The bottom of all excavations should be scarified to a depth of 12 inches, brought to near optimum moisture content, and recompacted to at least 90 percent relative compaction (ASTM D 1557) prior to the placement of compacted fill.

Concrete floor slabs should bear on a minimum of 24 inches of compacted soil. This should be accomplished by the recommendations provided above. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Short-Term Excavations

Following the California Occupational and Safety Health Act (CAL-OSHA) requirements, excavations 5 feet deep and greater should be sloped or shored. All excavations and shoring should conform to CAL-OSHA requirements. Short-term excavations of 5 feet deep and greater shall conform to Title 8 of the California Code of Regulations, Construction Safety Orders, Section 1504 and 1539 through 1547. Based on our exploratory borings, it appears that Type C soils are the predominant type of soil on the project and all short-term excavations should be based on this type of soil.

Deviation from the standard short-term slopes are permitted using option 4, Design by a Registered Professional Engineer (Section 1541.1).

Short-term excavation construction and maintenance are the responsibility of the contractor and should be a consideration of his methods of operation and the actual soil conditions encountered.

Slope Construction

Preliminary data indicates that cut and fill slopes should be constructed no steeper than two horizontal to one vertical. Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction, then roll the final slopes to provide dense, erosion-resistant surfaces.

Slope Protection

Since the site soil materials are susceptible to erosion by running water, measures should be provided to prevent surface water from flowing over slope faces. Slopes at the project should be planted with a deep rooted ground cover as soon as possible after completion. The use of succulent ground covers such as iceplant or sedum is not recommended. If watering is necessary to sustain plant growth on slopes, then the watering operation should be monitored to assure proper operation of the irrigation system and to prevent over watering.

Soil Expansiveness

The upper materials encountered during this investigation were tested and found to have a low expansion potential. Therefore, specialized construction procedures to specifically resist expansive soil activity are anticipated at this time and are provided within the following sections of this report.

Additional evaluation of on-site and any imported soils for their expansion potential should be conducted following completion of the grading operation.

Foundation Design

If the site is prepared as recommended, the proposed building may be safely supported on conventional shallow foundations, either individual spread footings and/or continuous wall footings, bearing entirely on a minimum of 24 inches of engineered compacted fill placed over competent alluvial materials. All foundations should have a minimum width of 12 inches. Footings placed upon very low and low expansive soils should be established a minimum of 12 inches below lowest adjacent grade.

For the minimum width and depth, spread foundations may be designed using an allowable bearing pressure of 2,000 psf. This bearing pressure may be increased by 200 psf for each additional foot of width, and by 500 psf for each additional foot of depth, up to a maximum of 4,000 psf. For example, a footing 2 feet wide and embedded 2 feet will have an allowable bearing pressure of 2,700 psf.

The above values are net pressures; therefore, the weight of the foundations and the backfill over the foundations may be neglected when computing dead loads. The values apply to the maximum edge pressure for foundations subjected to eccentric loads or overturning. The recommended pressures apply for the total of dead plus frequently applied live loads, and incorporate a factor of safety of at least 3.0. The allowable bearing pressures may be increased by one-third for temporary wind or seismic loading.

The resultant of the combined vertical and lateral seismic loads should act within the middle one-third of the footing width. The maximum calculated edge pressure under the toe of foundations subjected to eccentric loads or overturning should not exceed the increased allowable pressure.

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footings bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of 500 pounds per square foot per foot of depth. Base friction may be computed at 0.30 times the normal load. Base friction and passive earth pressure may be combined without reduction. These values are for dead load plus live load and may be increased by one-third for wind or seismic loading.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the

order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly, primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Building Area Slab-on-Grade

To provide adequate support, concrete floor slabs-on-grade should bear on a minimum of 24 inches of engineered fill compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces.

Slabs to receive moisture-sensitive coverings should be provided with a moisture vapor retarder/barrier. We recommend that a vapor retarder/barrier be designed and constructed according to the American Concrete Institute 302.1R, Concrete Floor and Slab Construction, which addresses moisture vapor retarder/barrier construction. At a minimum, the vapor retarder/barrier should comply with ASTM E1745 and have a nominal thickness of at least 10 mils. The vapor retarder/barrier should be properly sealed, per the manufacturer's recommendations, and protected from punctures and other damage. Per the Portland Cement Association, for slabs with vapor-sensitive coverings, a layer of dry, granular material (sand) should be placed under the vapor retarder/barrier.

For slabs in humidity-controlled areas, a layer of dry, granular material (sand) should be placed above the vapor retarder/barrier.

The slabs should be protected from rapid and excessive moisture loss which could result in slab curling. Careful attention should be given to slab curing procedures, as the site area is subject to large temperature extremes, humidity, and strong winds.

Exterior Flatwork

To provide adequate support, exterior flatwork improvements should rest on a minimum of 12 inches of soil compacted to at least 90 percent (ASTM D 1557).

Flatwork surface should be sloped a minimum of 1 percent away from buildings and slopes, to approved drainage structures.

Wall Pressures

The design of footings for retaining walls should be performed in accordance with the recommendations described earlier under Preparation of Foundation Areas and Foundation Design. For design of retaining wall footings, the resultant of the applied loads should act in the middle one-third of the footing, and the maximum edge pressure should not exceed the basic allowable value without increase.

For design of retaining walls unrestrained against movement at the top, we recommend an active pressure of 30 pounds per square foot (psf) per foot of depth be used. This assumes level backfill consisting of compacted, non-expansive, on-site soils placed against the structures and within the back cut slope extending upward from the base of the stem at 35 degrees from the vertical or flatter.

Retaining structures subject to uniform surcharge loads within a horizontal distance behind the structures equal to the structural height should be designed to resist additional lateral loads equal to 0.40 times the surcharge load. Any isolated or line loads from adjacent foundations or vehicular loading will impose additional wall loads and should be considered individually.

To avoid over stressing or excessive tilting during placement of backfill behind walls, heavy compaction equipment should not be allowed within the zone delineated by a 45 degree line extending from the base of the wall to the fill surface. The backfill directly behind the walls should be compacted using light equipment such as hand operated vibrating plates and rollers. No material larger than three inches in diameter should be placed in direct contact with the wall.

Wall pressures should be verified prior to construction, when the actual backfill materials and conditions have been determined. Recommended pressures are applicable only to level, non-expansive, properly drained backfill with no additional surcharge loadings. If inclined backfills are proposed, this firm should be contacted to develop appropriate active earth pressure parameters.

Preliminary Pavement Design

Testing and design for preliminary onsite pavement was conducted in accordance with the California Highway Design Manual and the Guild for the Design and Construction of Concrete Parking Lot (ACI33OR).

Based upon our preliminary sampling and testing, and upon an assumed Traffic Index generally used for similar projects, it appears that the structural sections tabulated below should provide satisfactory pavements for the subject on-site pavement improvements:

AREA	T.I.	DESIGN R-VALUE	PRELIMINARY SECTION
On site vehicular parking with occasional truck traffic (ADTT=10)	6.0	15	0.25' AC / 0.95' AB or 5" JPCP / 4" AB
Light to moderate truck traffic (ADTT=25)	7.0	15	0.30' AC / 1.15' AB or 6" JPCP / 4" AB
Moderate to Heavy Truck Traffic (ADTT=100)	--	15	6.5" JPCP / 4" AB
AC - Asphalt Concrete AB - Class 2 Aggregate Base JPCP - Jointed Plain Concrete Pavement with MR ≥ 550 psi			

The above structural sections are predicated upon 90 percent relative compaction (ASTM D 1557) of all utility trench backfills and 95 percent relative compaction (ASTM D 1557) of the upper 12 inches of pavement subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

The recommended concrete pavement sections should have a minimum modulus of rupture (MR) of 550 pounds per square inch (psi). Transverse joints should be sawcut in the pavement at approximately 12 to 15-foot intervals within 4 to 6 hours of concrete placement, or preferably sooner. Sawcut depth should be equal to approximately one quarter of slab thickness. Construction joints should be constructed such that adjacent sections butt directly against each other and are keyed into each other. Parallel pavement sections should also be keyed into each other.

It should be noted that all of the above pavement design was based upon the results of preliminary sampling and testing, and should be verified by additional sampling and testing during construction when the actual subgrade soils are exposed.

Infiltration

Based upon our field investigation and infiltration test data, a clear water absorption rate of approximately 1.6 to 3.1 inches per hour was obtained. It is our opinion that a design clear water rate of 2.1 inches per hour is appropriate for the planned infiltration in the area and depth tested.

A factor of safety should be applied as indicated by the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013). The design infiltration rate should be adjusted using Worksheet H, using the following factor values in determination of the suitability assessment, S_A :

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) $p = w \times v$
A	Suitability Assessment	Soil assessment method	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	2	0.5
		Depth to groundwater/impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \sum p$			

To ensure continued infiltration capability of the infiltration area, a program to maintain the facility should be considered. This program should include periodic removal of accumulated materials, which can slow the infiltration considerably and decrease the water quality. Materials to be removed from the catch basin areas typically consist of litter, dead plant matter, and soil fines (silts and clays). Proper maintenance of the system is critical. A maintenance program should be prepared and properly executed. At a minimum, the program should be as outlined in the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013).

The program should also incorporate the recommendations contained within this report and any other jurisdictional agency requirements.

- Systems should be set back at least 10 feet from foundations or as required by the design engineer.

- Any geotextile filter fabric utilized should consist of such that it prevents soil piping but has greater permeability than the existing soil.
- During site development, care should be taken to not disturb the area(s) proposed for infiltration as changes in the soil structure could occur resulting in a change of the soil infiltration characteristics.

Corrosion Protection

Based on the test results, this soil is classified as moderately corrosive to ferrous metals and potentially aggressive towards copper. The laboratory data above should be reviewed and corrosion design should be completed by a qualified corrosion engineer.

In lieu of corrosion design for metal piping, ABS/PVC may be used. Soil corrosion is not considered a factor with ABS/PVC materials. ABS/PVC is considered suitable for use due to the corrosion potential of the on-site soils with respect to metals.

LOR Geotechnical does not practice corrosion engineering. If further information concerning the corrosion characteristics, or interpretation of the results submitted herein, is required, then a competent corrosion engineer could be consulted.

Construction Monitoring

Post investigative services are an important and necessary continuation of this investigation. Project plans and specifications should be reviewed by the project geotechnical consultant prior to construction to confirm that the intent of the recommendations presented in this report have been incorporated into the design.

Additional R-value, expansion, and soluble sulfate content testing may be needed after/during site rough grading.

During construction, sufficient and timely geotechnical observation and testing should be provided to correlate the findings of this investigation with the actual subsurface conditions exposed during construction. Items requiring observation and testing include, but are not necessarily limited to, the following:

1. Site preparation-stripping and removals.
2. Excavations, including approval of the bottom of excavations prior to the processing and preparation of the bottom areas for fill placement.

3. Scarifying and compacting prior to fill placement.
4. Foundation excavations.
5. Subgrade preparation for pavements and slabs-on-grade.
6. Placement of engineered compacted fill and backfill, including approval of fill materials and the performance of sufficient density tests to evaluate the degree of compaction being achieved.

LIMITATIONS

This report contains geotechnical conclusions and recommendations developed solely for use by 55555 Amargosa, LLC, and their design consultants for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance.

The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. If conditions are encountered during the construction of the project, which differ significantly from those presented in this report, this firm should be notified immediately so we may assess the impact to the recommendations provided. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

If parties other than LOR Geotechnical Group, Inc., provide construction monitoring services, they must be notified that they will be required to assume responsibility for the geotechnical phase of the project being completed by concurring with the recommendations provided in this report or by providing alternative recommendations.

The report was prepared using generally accepted geotechnical engineering practices under the direction of a state licensed geotechnical engineer. No warranty, expressed or implied, is made as to conclusions and professional advice included in this report. Any persons using this report for bidding or construction purposes should perform such independent investigations as deemed necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

TIME LIMITATIONS

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the Standards-of-Practice and/or Governmental Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a significant amount of time without a review by LOR Geotechnical Group, Inc., verifying the suitability of the conclusions and recommendations.

CLOSURE

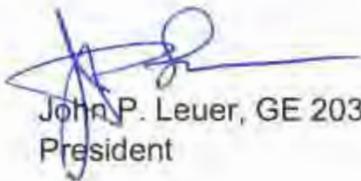
It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins. Should conditions be encountered during construction that appear to be different than indicated by this report, please contact this office immediately in order that we might evaluate their effect.

Should you have any questions regarding this report, please do not hesitate to contact our office at your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.



Andrew A. Tardie, PG 10144
Vice President



John P. Leuer, GE 2030
President



AAT:JPL:ss

Distribution: Addressee (2) and via email simon@55555-amargosa.com
Steno Design via email angie@steenodesign.com,
tom@steenodesign.com

REFERENCES

American Society of Civil Engineers, 2016, Minimum Design Load for Buildings and Other Structures, ASCE 7-16.

California Building Standards Commission and International Conference of Building Officials, 2022, California Building Code, 2022 Edition.

California Department of Water Resources, 2023, Online Water Data Library (WDL), <https://wdl.water.ca.gov/waterdatalibrary/Map.aspx>.

CDM Smith, 2013, Technical Guidance Document for Water Quality Management Plans, dated June 2013.

Dibblee, T.W., 1960, Preliminary Geologic Map of the Victorville Quadrangle, California, Mineral Investigations Field Studies Map MF-229.

Google Earth, 2023, Imagery from various years, www.google.com/earth.

Hart, E.W. and W.A. Bryant, 2010, Fault-Rupture Hazard Zones in California, California Dept. of Conservation Division of Mines and Geology Special Publication 42.

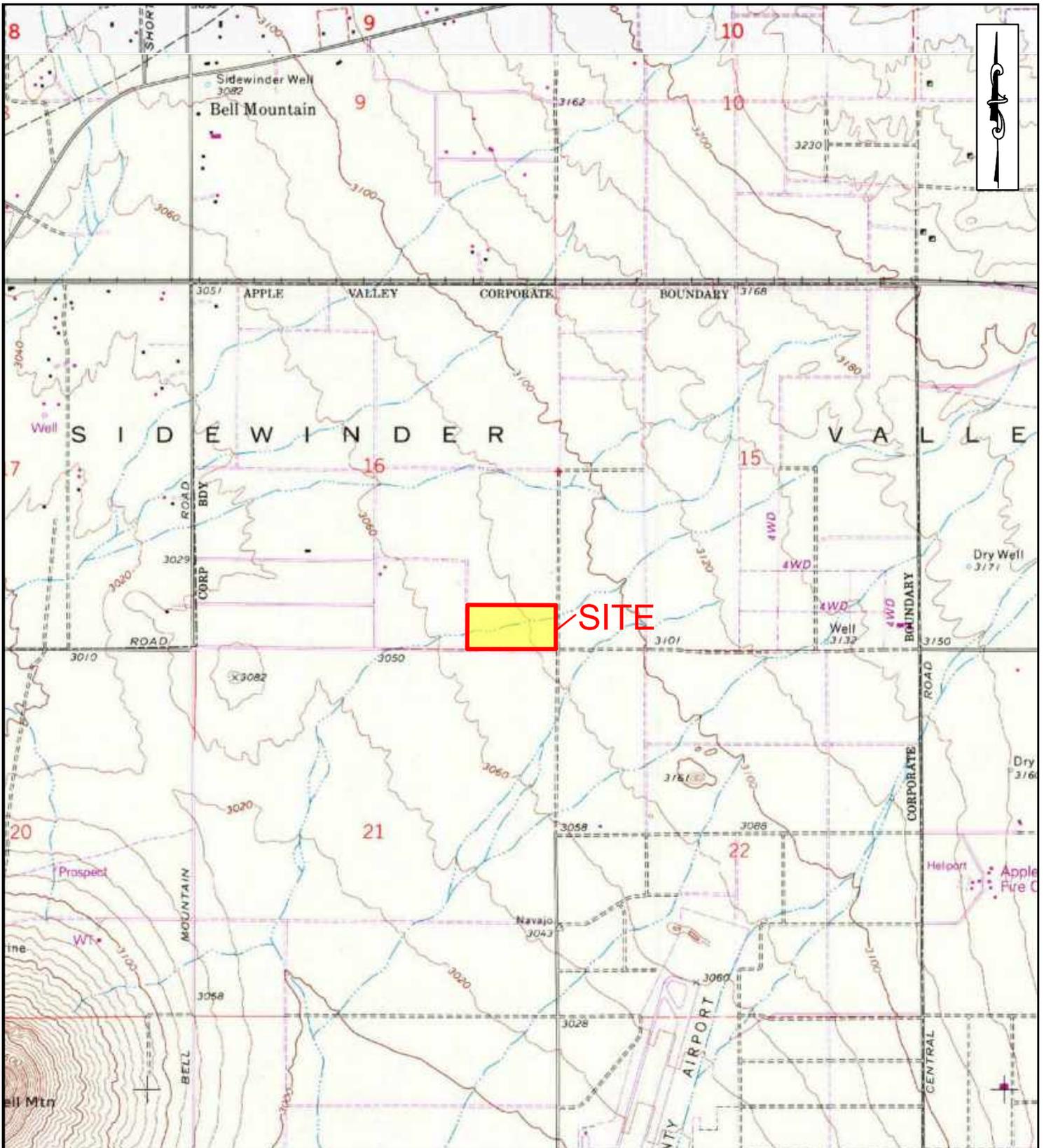
Historic Aerials (Nationwide Environmental Title Research, LLC), 2022, Imagery from Various Years, <https://www.historicaerials.com/>, accessed December 2022.

Larson, R., and Slosson, J., 1992, The Role of Seismic Hazard Evaluation in Engineering Reports, in Engineering Geology Practice in Southern California, AEG Special Publication Number 4, pp 191-194.

USGS, 2023, <https://earthquake.usgs.gov/earthquakes/map/>.

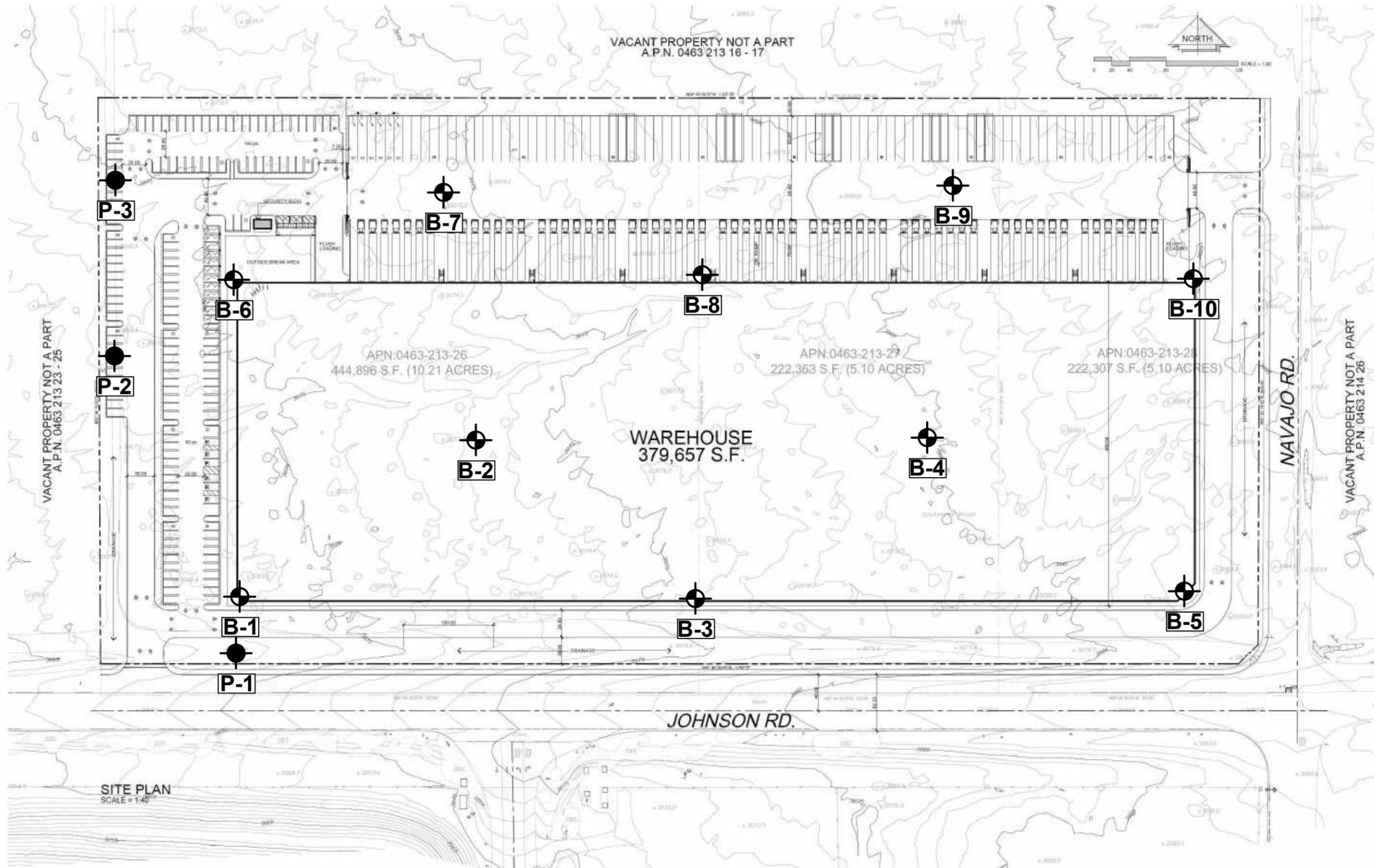
APPENDIX A

Index Map, Site Plan, Regional Geologic Map, and Historical Seismicity Maps



INDEX MAP

PROJECT:	Proposed Warehouse Development, Town of Apple Valley, California	PROJECT NO.:	23885.1
CLIENT:	5555 Amargosa LLC	ENCLOSURE:	A-1
LOR GEOTECHNICAL GROUP, INC.		DATE:	March 2023
		SCALE:	1" ≈ 2,000'



STEENO
DESIGN STUDIO
ARCHITECTURAL DESIGN & PLANNING
PHOTOGRAPHY & VIDEO SERVICES
WWW.STEENO.COM

NO-MEMBER 2022

EXPIRES

REGISTERED PROFESSIONAL ARCHITECT
STATE OF CALIFORNIA
NO. 10000
EXPIRES 12/31/2024

REGISTERED PROFESSIONAL CIVIL ENGINEER
STATE OF CALIFORNIA
NO. 44448
EXPIRES 12/31/2024

PROJECT: INDUSTRIAL DEVELOPMENT
AMARGOSA LLC

PROJECT LOCATION:
55555 AMARGOSA RD.
APPLE VALLEY, CA 92308

FOR FILE:
C22-A14

SHEET NAME:
SITE PLAN

FIG. NO.
A-0

SITE PLAN

KEYED NOTES		
① CONCRETE WHEEL STOP PER CITY STANDARDS	① CONCRETE WHEEL STOP PER CITY STANDARDS	① CONCRETE WHEEL STOP PER CITY STANDARDS

PARKING SUMMARY			
REQUIRED PARKING PER G.F.A.:			
WAREHOUSE (PART 65.000)	7.500	40,000	301
(REMAINING)	1.400	338,617	475
TOTAL REQUIRED PARKING SPACES			= 776 SPACES
PROVIDE PARKING:			
STANDARD SPACE PARKING SPACES			= 148 SPACES
CAR EV PARKING SPACES			= 13 SPACES
ADA 5002 PARKING SPACES			= 6 SPACES
TOTAL PROVIDED VEHICLE PARKING SPACES			= 167 SPACES
TRUCK PARKING:			
TRUCK EV PARKING SPACES			= 8 SPACES
TRAILER PARKING SPACES			= 88 SPACES
TOTAL PROVIDED TRUCKLOADING DOORS			= 88 SPACES

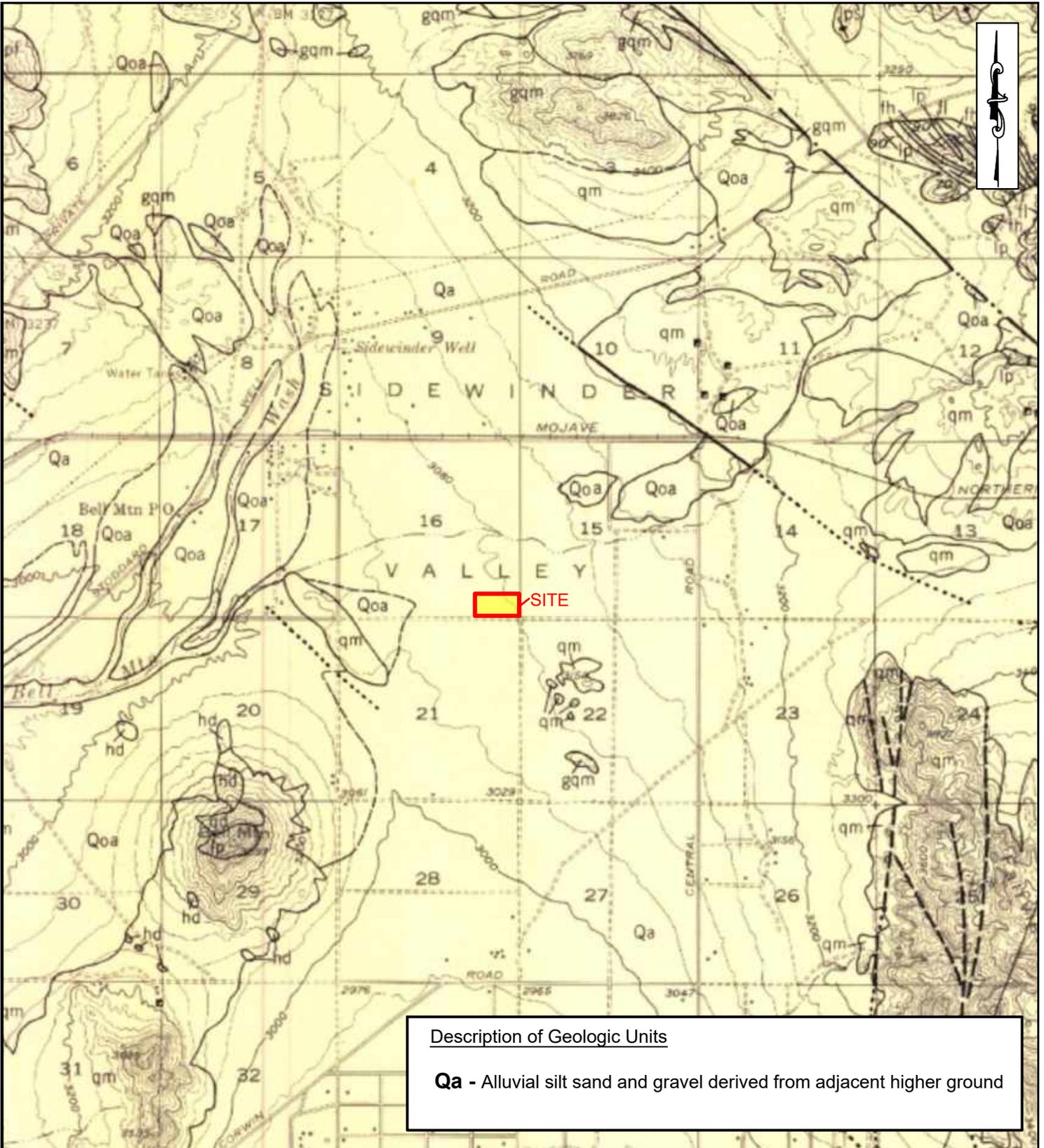
SITE DATA		
SITE AREA		
AREA		SQ. FOOTAGE
NET LAND AREA (18.71 ACRES)		813,807 S.F.
PROPOSED LAND AREA & COVERAGE		
AREA	SQ. FOOTAGE	% COVERAGE
BUILDING AREA (TOTAL)	379,657	47%
ACREAGE	402,300	49%
CONCRETE HAMMOCKS	10,000	2%
LANDSCAPED AREA	113,000	14%
TOTAL NET LAND AREA COVERAGE	813,807 S.F.	100%
SCOPE OF WORK		
TO CONSTRUCT A 379,657 SQ.FT. INDUSTRIAL WAREHOUSE BUILDING.		

Legend
(Locations Approximate)

Map Symbols

- ⊕ B-10 - Exploratory Boring
- P-3 - Percolation Test

PROJECT:	Proposed Warehouse Development, Town of Apple Valley, California	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa LLC	ENCLOSURE:	A-2
DATE:	March 2023	SCALE:	1" = 115'



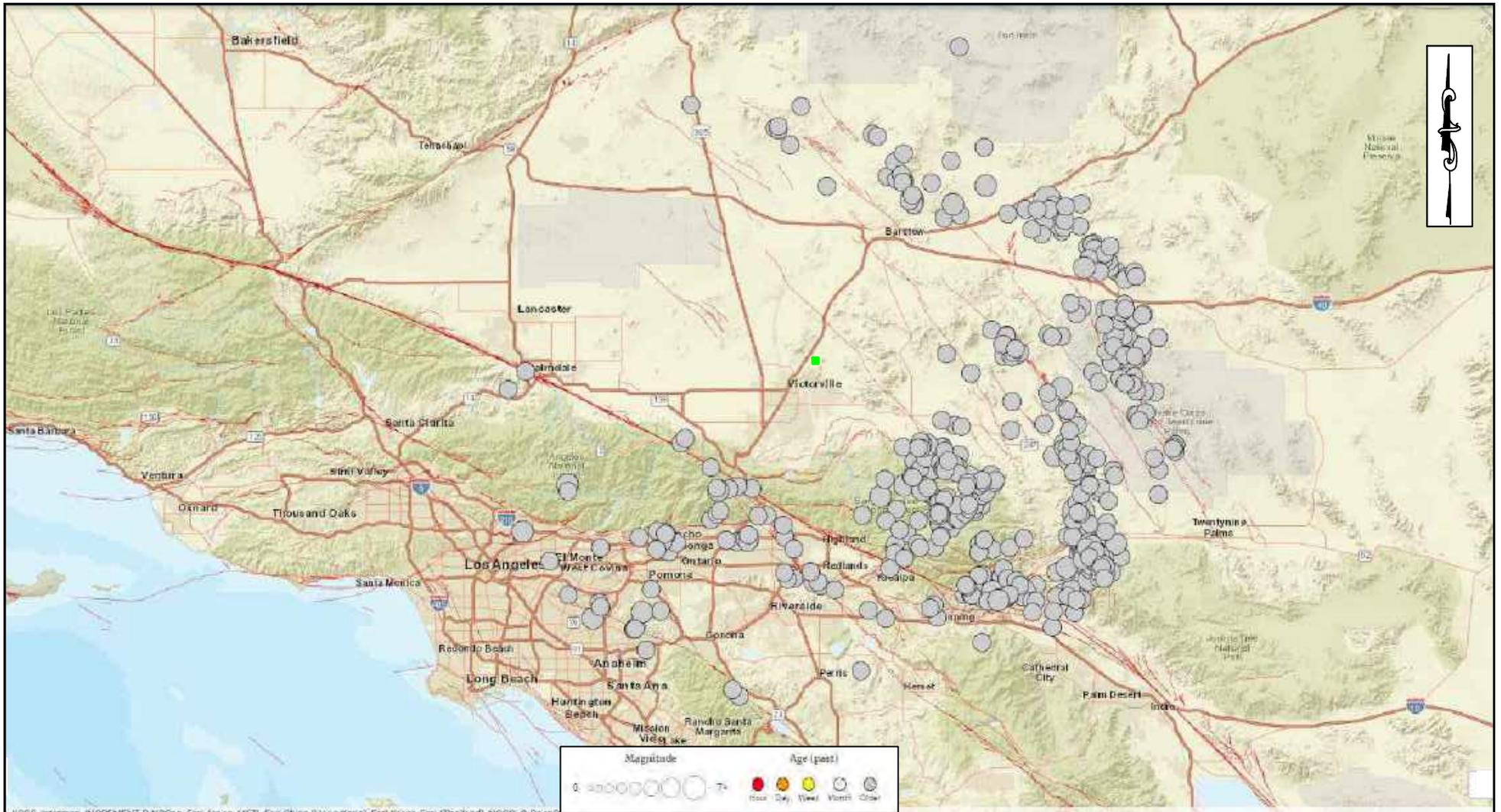
Description of Geologic Units

Qa - Alluvial silt sand and gravel derived from adjacent higher ground

REGIONAL GEOLOGIC MAP

(Dibblee, 1960)

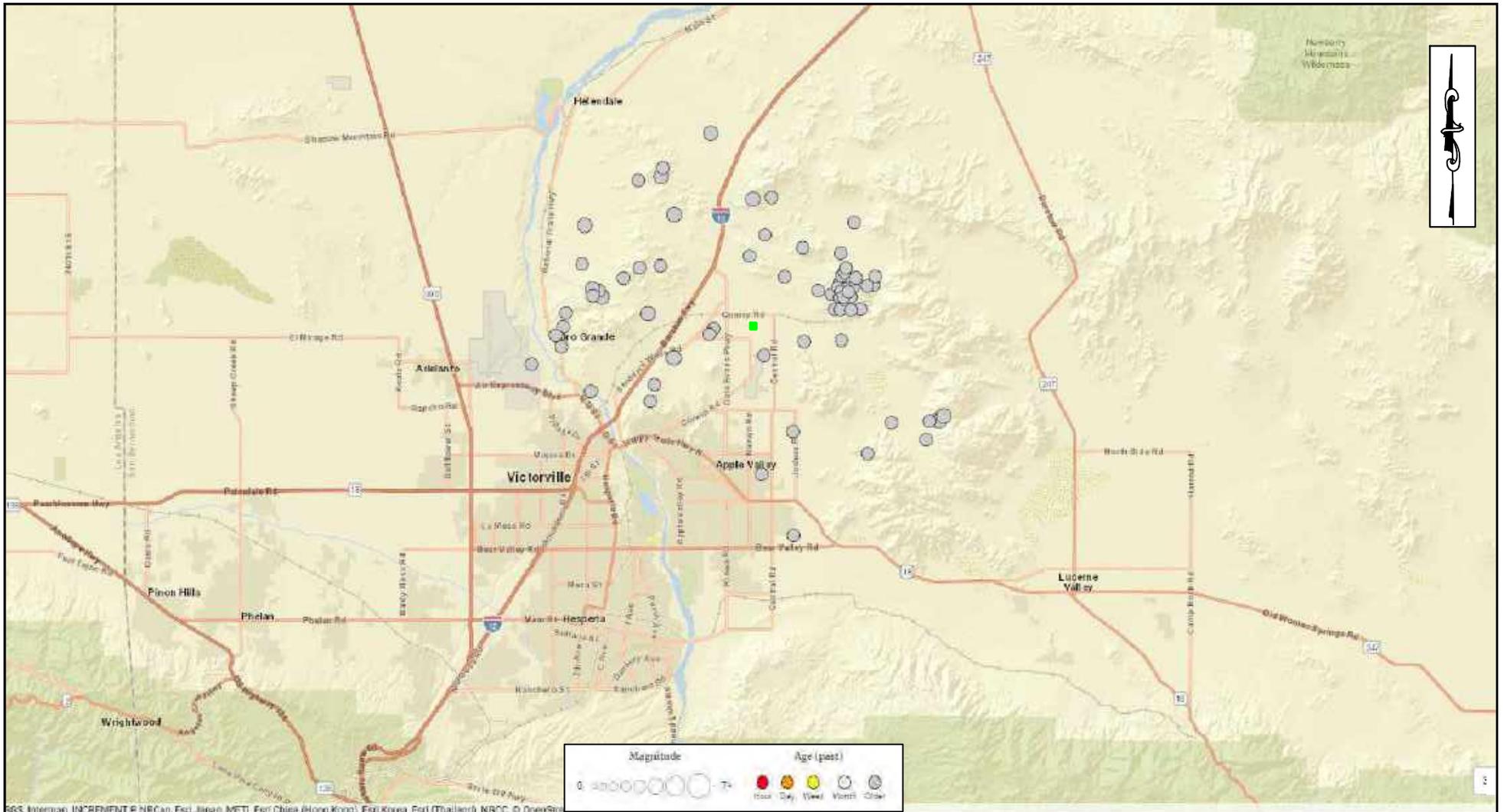
PROJECT:	Proposed Warehouse Development, Town of Apple Valley, California	PROJECT NO.:	23885.1
CLIENT:	5555 Amargosa LLC	ENCLOSURE:	A-3
LOR GEOTECHNICAL GROUP, INC.		DATE:	March 2023
		SCALE:	1" ≈ 4,000'



U.S. Geologic Survey (2023) real-time earthquake epicenter map. Plotted are 463 epicenters of instrument-recorded events from 01/01/32 to present (02/28/23) of local magnitude 4+ within a radius of ~62 miles (100 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

HISTORICAL SEISMICITY MAP - 100km Radius

PROJECT:	Proposed Warehouse Development, Town of Apple Valley, California	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa LLC	ENCLOSURE:	A-4
LOR GEOTECHNICAL GROUP, INC.		DATE:	March 2023
		SCALE:	1" ≈ 40km



U.S. Geologic Survey (2023) real-time earthquake epicenter map. Plotted are 75 epicenters of instrument-recorded events from 01/01/78 to present (02/28/23) of local magnitude 1+ within a radius of ~9.2 miles (15 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

HISTORICAL SEISMICITY MAP - 15km Radius

PROJECT:	Proposed Warehouse Development, Town of Apple Valley, California	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa LLC	ENCLOSURE:	A-5
LOR GEOTECHNICAL GROUP, INC.		DATE:	March 2023
		SCALE:	1" ≈ 15km

APPENDIX B

Field Investigation Program and Boring Logs

APPENDIX B

FIELD INVESTIGATION

Subsurface Exploration

Our subsurface exploration of the site consisted of drilling 10 exploratory borings to depths of approximately 20 and 30 feet below the existing ground surface using a Mobile B-61 drill rig on December 20, 2022 and February 7, 2023. The approximate locations of the borings are shown on Enclosure A-2 within Appendix A.

The drilling exploration was conducted using a Mobile B-61 drill rig equipped with 8-inch diameter hollow stem augers. The soils were continuously logged by a geologist from this firm who inspected the site, created detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50 inch inside diameter and 3.25 inch outside diameter or a Standard Penetration Sampler (SPT) from the ground surface to the total depth explored. The samplers were driven by a 140 pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches were recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), borehole diameter (8"), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for field procedures (N₆₀) which are included in the boring logs, Enclosures B-1 through B-10.

The undisturbed soil samples were retained in brass sample rings of 2.42 inches in diameter and 1.00 inch in height, and placed in sealed plastic containers. Disturbed soil samples were obtained at selected levels within the borings and placed in sealed containers for transport to our geotechnical laboratory.

All samples obtained were taken to our geotechnical laboratory for storage and testing. Detailed logs of the borings are presented on the enclosed Boring Logs, Enclosures B-1 through B-10. A Boring Log Legend is presented on Enclosure B-i. A Soil Classification Chart is presented as Enclosure B-ii.

CONSISTENCY OF SOIL

SAMPLE KEY

SANDS

SPT BLOWS

CONSISTENCY

0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Over 50	Very Dense

COHESIVE SOILS

SPT BLOWS

CONSISTENCY

0-2	Very Soft
2-4	Soft
4-8	Medium
8-15	Stiff
15-30	Very Stiff
30-60	Hard
Over 60	Very Hard

Symbol

Description



INDICATES CALIFORNIA
SPLIT SPOON SOIL
SAMPLE

INDICATES BULK SAMPLE

INDICATES SAND CONE
OR NUCLEAR DENSITY
TEST

INDICATES STANDARD
PENETRATION TEST (SPT)
SOIL SAMPLE

TYPES OF LABORATORY TESTS

- 1 Atterberg Limits
- 2 Consolidation
- 3 Direct Shear (undisturbed or remolded)
- 4 Expansion Index
- 5 Hydrometer
- 6 Organic Content
- 7 Proctor (4", 6", or Cal216)
- 8 R-value
- 9 Sand Equivalent
- 10 Sieve Analysis
- 11 Soluble Sulfate Content
- 12 Swell
- 13 Wash 200 Sieve

BORING LOG LEGEND

PROJECT:	Proposed Industrial Development, Apple Valley, California	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ENCLOSURE:	B-i
LOR GEOTECHNICAL GROUP, INC.		DATE:	February 2023

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSED NO. 4 SIEVE	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SILTS AND CLAYS LIQUID LIMIT LESS THAN 50	SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND-SILT MIXTURES
			SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50	SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50	SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		CH	INORGANIC CLAYS OF HIGH PLASTICITY	
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
HIGHLY ORGANIC SOILS				PT	PEAT HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

PARTICLE SIZE LIMITS

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	
12"	3"	3/4"	No. 4 <small>(U.S. STANDARD SIEVE SIZE)</small>	No. 10	No. 40	200	

SOIL CLASSIFICATION CHART

PROJECT:	Proposed Industrial Development, Apple Valley, California	PROJECT NO.:	23882.1
CLIENT:	55555 Amargosa, LLC	ENCLOSURE:	B-ii
LOR GEOTECHNICAL GROUP, INC.		DATE:	February 2023

LOG OF BORING B-1

TEST DATA								DESCRIPTION
DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	
0		3, 7, 9, 10						
	31		3.4	108.6	■	SW SM	SM	@ 0 feet, <u>ALLUVIUM</u> : WELL GRADED SAND with SILT, approximately 5% gravel to 1/2", 20% coarse grained sand, 35% medium grained sand, 30% fine grained sand, 10% silty fines, tan, dry, loose.
5	71		4.5	118.1	■		SM	@ 5 feet, SILTY SAND, approximately 5% gravel to 1/2", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 20% silty fines with trace clay, some thin calcite stringers, red brown, dry. @ 5 feet, no secondary calcite.
10	69 for 10"		6.0		■			@ 10 feet, contains some calcite stringers, rings disturbed.
15	46 for 5"		7.3		■			@ 15 feet, rings disturbed.
20	51 for 5"		1.1		■			@ 20 feet, <u>IGNEOUS BEDROCK</u> : GRANITIC, coarse to medium grained, gray, dry, rings disturbed.
25	73 for 2"		1.2					
30	77 for 3"				≡			
								END OF BORING @ 30.33'
								No fill No groundwater Bedrock @ 20'

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,069
		DATE DRILLED:	December 20, 2022
		EQUIPMENT:	Mobile B-61
	HOLE DIA.:	8"	ENCLOSURE:

LOG OF BORING B-2

TEST DATA

DEPTH IN FEET	TEST DATA						
	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.
0							
61 for 11"			4.5		█		SM
5	74		2.9	105.8	█		
10	69		7.5	113.5	█		
15	46 for 4"				■		
20	73 for 5"		1.3				
25	73 for 3"						

DESCRIPTION

@ 0 feet, ALLUVIUM: SILTY SAND, approximately 5% gravel to 1/2", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 20% silty fines, tan, dry, loose.
 @ 1 foot, becomes red brown with trace clay.
 @ 2 feet, damp, rings disturbed.

@ 5 feet, SILTY SAND, approximately 25% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 15% silty fines, red brown, dry, some calcite stringers.

@ 10 feet, slight increase in silty fines, trace clay, damp.

@ 15 feet, IGNEOUS BEDROCK: GRANITIC, coarse to medium grained, gray, dry, no recovery.

@ 25 feet, no recovery.
 END OF BORING @ 25.33'

No fill
 No groundwater
 Bedrock @ 15'

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,074
LOR GEOTECHNICAL GROUP, INC.		DATE DRILLED:	December 20, 2022
		EQUIPMENT:	Mobile B-61
	HOLE DIA.:	8"	ENCLOSURE:

LOG OF BORING B-3

TEST DATA

DEPTH IN FEET	TEST DATA						
	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.
0							
10	10		4.3	104.4	█		SM
5	62		1.3		█		SW SM
10	36		2.1	110.8	█		SM
15	89		4.3				
20	73 for 6"		1.2				
25	73 for 4"		1.1				

DESCRIPTION

@ 0 feet, FILL: SILTY SAND, approximately 5% gravel to 3/4", 20% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 20% silty fines, tan, dry, loose.

@ 3 feet, WELL GRADED SAND with SILT, approximately 30% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 10% silty fines, red brown, dry.

@ 5 feet, SILTY SAND, approximately 25% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 20% silty fines, red brown, dry, some secondary calcite, rings disturbed.

@ 15 feet, becomes yellowish-brown, slightly finer grained.

@ 20 feet, IGNEOUS BEDROCK: GRANITIC, coarse to medium grained, gray, dry.

END OF BORING @ 25.25'

No fill
No groundwater
Bedrock @ 20'

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,076
LOR GEOTECHNICAL GROUP, INC.	DATE DRILLED:	December 20, 2022	
	EQUIPMENT:	Mobile B-61	
	HOLE DIA.:	8"	ENCLOSURE: B-3

LOG OF BORING B-4

TEST DATA

DEPTH IN FEET	TEST DATA						
	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY
0		9, 10					
20			5.2		103.5		
5	64		4.7				
10	46 for 6"		3.5		112.7		
15	65 for 6"		6.6				
20	73 for 4"		1.9				
25	73 for 6"		2.4				

DESCRIPTION

@ 0 feet, ALLUVIUM: SILTY SAND, approximately 5% gravel to 1/2", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 20% silty fines, tan, dry, loose.

@ 1 foot, SILTY SAND, approximately 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 25% silty fines with trace clay, red brown, damp, some thin calcite stringers.

@ 5 feet, becomes slightly coarser grained, rings disturbed.

@ 15 feet, increase in secondary calcite.

@ 20 feet, IGNEOUS BEDROCK: GRANITIC, coarse to medium grained, dark gray, dry.

END OF BORING @ 25.5'

No fill
No groundwater
Bedrock @ 20'

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,081
LOR GEOTECHNICAL GROUP, INC.		DATE DRILLED:	December 20, 2022
		EQUIPMENT:	Mobile B-61
	HOLE DIA.:	8"	ENCLOSURE:

LOG OF BORING B-5

TEST DATA

DEPTH IN FEET	TEST DATA						LITHOLOGY	U.S.C.S.	DESCRIPTION
	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE				
0		8, 9, 10						SM	@ 0 feet, <u>ALLUVIUM</u> : SILTY SAND, approximately 5% gravel to 3/4", 15% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 30% silty fines, tan, dry, loose. @ 1 foot, becomes red brown, trace clay, some thin calcite stringers.
66			2.8	115.1					
5	40 for 6"								@ 5 feet, no recovery.
10	67								@ 10 feet, <u>IGNEOUS BEDROCK</u> : GRANITIC, coarse to medium grained, red brown, dry, no recovery.
15	115		3.8						@ 15 feet, slightly coarser grained.
20	14		3.1						
END OF OF BORING @ 21.5'									
No fill									
No groundwater									
Bedrock @ 10'									

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,082
LOR GEOTECHNICAL GROUP, INC.		DATE DRILLED:	December 20, 2022
		EQUIPMENT:	Mobile B-61
	HOLE DIA.:	8"	ENCLOSURE:

LOG OF BORING B-6

TEST DATA

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.
0		9, 10					
63 for 7"		6.3		117.4			
5			1.2				
70 for 11"				117.8			
10			3.3				
75 for 11"				116.0			
15							
46 for 6"							
20			1.4				
73 for 5"							
25			0.5				
73 for 3"							

DESCRIPTION

@ 0 feet, ALLUVIUM: SILTY SAND with GRAVEL, approximately 15% gravel to 1", 5% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 20% silty fines, tan, dry, loose.

@ 2 feet, WELL GRADED SAND with SILT, approximately 30% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 5% silty fines, red brown, damp.

@ 5 feet, approximately 5% gravel to 1/2", dry.

@ 10 feet, SILTY SAND, approximately 25% coarse grained sand, 25% medium grained sand, 35% fine grained sand, 15% silty fines with trace clay, red brown, dry.

@ 15 feet, IGNEOUS BEDROCK: GRANITIC, coarse to medium grained, gray, dry, no recovery.

END OF BORING @ 25.25'

No fill
No groundwater
Bedrock @ 15'

PROJECT: Proposed Industrial Development

PROJECT NO.: 23885.1

CLIENT: 55555 Amargosa, LLC

ELEVATION: 3,071

LOR GEOTECHNICAL GROUP, INC.

DATE DRILLED: February 7, 2023

EQUIPMENT: Mobile B-61

HOLE DIA.: 8" ENCLOSURE: B-6

LOG OF BORING B-7

TEST DATA

DEPTH IN FEET	TEST DATA						LITHOLOGY	U.S.C.S.	DESCRIPTION
	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE				
0									
22	22		1.0	111.3	█		SW SM	<p>@ 0 feet, <u>ALLUVIUM</u>: WELL GRADED SAND with SILT, approximately 5% gravel to 1/2", 25% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 10% silty fines, tan, dry, loose.</p> <p>@ 2 feet, becomes red brown.</p>	
5	40 for 6"		3.0	█	<p>@ 5 feet, rings disturbed.</p>				
10	46 for 6"		3.9	█	<p>@ 10 feet, rings disturbed.</p>				
15	116 for 10"		1.0		<p>@ 15 feet, <u>IGNEOUS BEDROCK</u>: GRANITIC, coarse to medium grained, gray, dry.</p>				
20	73 for 6"		0.7		<p>END OF BORING @ 20.5'</p> <p>No fill No groundwater Bedrock @ 15'</p>				

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,075
		DATE DRILLED:	February 7, 2023
		EQUIPMENT:	Mobile B-61
	HOLE DIA.:	8"	ENCLOSURE:

LOG OF BORING B-8

TEST DATA

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.
0		9, 10					
55			2.5	122.7	█		
5	60		2.4	120.1	█		
10	46 for 6"		3.6		█		
15	104		3.8				
20	73 fo r6"		0.4				

DESCRIPTION

SM @ 0 feet, ALLUVIUM: SILTY SAND, approximately 10% gravel to 1/2", 15% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 15% silty fines, tan, dry, loose.
 @ 1 foot, becomes red brown.

@ 5 feet, SILTY SAND, approximately 5% gravel to 1/2", 25% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 15% silty fines, red brown, dry.

@ 10 feet, slightly coarser grained, some secondary calcite, rings disturbed.

@ 15 feet, IGNEOUS BEDROCK: GRANITIC, coarse to medium grained, red brown, dry.

@ 20 feet, becomes gray.
 END OF BORING @ 20.5'

No fill
 No groundwater
 Bedrock @ 15'

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,077
LOR GEOTECHNICAL GROUP, INC.		DATE DRILLED:	February 7, 2023
		EQUIPMENT:	Mobile B-61
	HOLE DIA.:	8"	ENCLOSURE:

LOG OF BORING B-9

TEST DATA

DEPTH IN FEET	TEST DATA						DESCRIPTION
	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	
0							SM @ 0 feet, <u>ALLUVIUM</u> : SILTY SAND, approximately 5% gravel to 1/2", 25% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 15% silty fines, tan, dry, loose.
68 for 8"		3.0	103.7	█			@ 2 feet, becomes red brown, trace clay.
5	42		1.9	122.6	█		@ 5 feet, contains some secondary calcite.
10	79 for 11"		1.9	109.0	█		@ 10 feet, <u>IGNEOUS BEDROCK</u> : GRANITIC, coarse to medium grained, red brown, dry.
15	103 for 11"		2.3				@ 15 feet, becomes grayish brown.
20	73 for 5"		0.5				END OF BORING @ 20.42' No fill No groundwater Bedrock @ 10'

PROJECT:	Proposed Industrial Development	PROJECT NO.:	23885.1
CLIENT:	55555 Amargosa, LLC	ELEVATION:	3,081
LOR GEOTECHNICAL GROUP, INC.	DATE DRILLED:	February 7, 2023	
	EQUIPMENT:	Mobile B-61	
	HOLE DIA.:	8"	ENCLOSURE: B-9

LOG OF BORING B-10

TEST DATA

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.
0		9, 10					
	34		2.6	111.5			
5			1.6	113.8			
	27						
10	46 for 6"						
15	65 for 4"		2.7				
20	73 for 6"		0.3				

DESCRIPTION

@ 0 feet, ALLUVIUM: SILTY SAND, approximately 5% gravel to 1/2", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 20% silty fines, tan, dry, loose.

@ 2 feet, becomes red brown, abundant thin calcite stringers.

@ 5 feet, slight increase in secondary calcite, slighter coarser grained.

@ 10 feet, no recovery.

@ 15 feet, IGNEOUS BEDROCK: GRANITIC, coarse to medium grained, red brown, dry.

@ 20 feet, becomes gray.
END OF BORING @ 20.42'

No fill
No groundwater
Bedrock @ 15'

PROJECT: Proposed Industrial Development

PROJECT NO.: 23885.1

CLIENT: 55555 Amargosa, LLC

ELEVATION: 3,085

LOR GEOTECHNICAL GROUP, INC.

DATE DRILLED: February 7, 2023

EQUIPMENT: Mobile B-61

HOLE DIA.: 8" ENCLOSURE: B-10

APPENDIX C

Borehole Percolation Testing Program and Infiltration Rate Test Results

APPENDIX C
BOREHOLE PERCOLATION TESTING PROGRAM
AND INFILTRATION RATE TEST RESULTS

Two borehole percolation tests were conducted in general accordance with the Shallow Percolation Test procedure as outlined in the Technical Guidance Document for Water Quality Management Plans (CDM Smith, 2013). The general locations of our tests are illustrated on Enclosure A-2 and were conducted at the requested locations and depths. Subsequent to drilling, a 3-inch diameter, perforated PVC pipe wrapped in filter fabric was placed within each test hole and 3/4-inch gravel was placed between the outside of the pipe and the hole wall. Test holes were pre-soaked the same day as drilling. Testing took place the next day, February 8, 2023, within 26 hours but not before 15 hours, of the pre-soak. The holes were filled using water from a 200 gallon water tank. Test periods consisted of allowing the water to drop in 10-minute intervals. After each reading, the hole was refilled. Testing was terminated after a total of 10 readings were recorded. The percolation test data was converted to an infiltration rate using the Porchet Method as outlined by the Technical Guidance Document (CDM Smith, 2013).

Infiltration test results are summarized in the following table:

Test No.	Depth* (ft)	Infiltration Rate** (in/hr)
P-1	6.0	1.72
P-2	6.0	3.11
P-3	6.0	1.63

* depth measured below existing ground surface
** Porchet Method determined clear water rate

The results of this testing are presented as Enclosures C-1 through C-3.

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project: Proposed Industrial Development
 Project No.: 23885.1
 Soil Classification: (SM) Silty sand
 Depth of Test Hole: 6.0 ft.
 Tested By: A.L.

Test Date: February 8, 2023
 Test Hole No.: P-1
 Effective Hole Dia.*: 4.8 in.
 Date Excavated: February 7, 2023

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME hr.	INITIAL WATER LEVEL in.	FINAL WATER LEVEL in.	INITIAL HOLE DEPTH in.	FINAL HOLE DEPTH in.	CHANGE IN WATER LEVEL in.	AVERAGE WETTED DEPTH in.	PERCOLATION RATE (min/in)
			min	hr.								
1	8:46 AM	9:11 AM	25	0.42	0.42	24.00	61.00	72.00	72.00	37.00	29.50	0.7
2	9:11 AM	9:36 AM	25	0.42	0.83	24.00	58.00	72.00	72.00	34.00	31.00	0.7
3	9:36 AM	9:46 AM	10	0.17	1.00	24.00	40.00	72.00	72.00	16.00	40.00	0.6
4	9:46 AM	9:56 AM	10	0.17	1.17	24.00	38.00	72.00	72.00	14.00	41.00	0.7
5	9:56 AM	10:06 AM	10	0.17	1.33	24.00	37.00	72.00	72.00	13.00	41.50	0.8
6	10:06 AM	10:16 AM	10	0.17	1.50	24.00	36.00	72.00	72.00	12.00	42.00	0.8
7	10:16 AM	10:26 AM	10	0.17	1.67	24.00	35.00	72.00	72.00	11.00	42.50	0.9
8	10:26 AM	10:36 AM	10	0.17	1.83	24.00	35.00	72.00	72.00	11.00	42.50	0.9
9	10:36 AM	10:46 AM	10	0.17	2.00	24.00	34.50	72.00	72.00	10.50	42.75	1.0
10	10:46 AM	10:56 AM	10	0.17	2.17	24.00	34.50	72.00	72.00	10.50	42.75	1.0

PERCOLATION RATE CONVERSION (Porchet Method):

H_o 48.00
 H_f 37.50
 ΔH 10.50
 H_{avg} 42.75
 l_t **1.72** in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project:	Proposed Industrial Development	Test Date:	February 8, 2023
Project No.:	23885.1	Test Hole No.:	P-2
Soil Classification:	(SW-SM) Well graded sand w/ silt	Effective Hole Dia.*:	4.8 in.
Depth of Test Hole:	6.0 ft.	Date Excavated:	February 7, 2023
Tested By:	A.L.		

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME hr.	INITIAL WATER LEVEL in.	FINAL WATER LEVEL in.	INITIAL HOLE DEPTH in.	FINAL HOLE DEPTH in.	CHANGE IN WATER LEVEL in.	AVERAGE WETTED DEPTH in.	PERCOLATION RATE (min/in)
			min	hr.								
1	8:49 AM	9:14 AM	25	0.42	0.42	24.00	72.00	72.00	72.00	48.00	24.00	0.5
2	9:14 AM	9:39 AM	25	0.42	0.83	24.00	66.00	72.00	72.00	42.00	27.00	0.6
3	10:59 AM	11:09 AM	10	0.17	1.00	24.00	48.00	72.00	72.00	24.00	36.00	0.4
4	11:09 AM	11:19 AM	10	0.17	1.17	24.00	44.00	72.00	72.00	20.00	38.00	0.5
5	11:19 AM	11:29 AM	10	0.17	1.33	24.00	43.00	72.00	72.00	19.00	38.50	0.5
6	11:29 AM	11:39 AM	10	0.17	1.50	24.00	42.00	72.00	72.00	18.00	39.00	0.6
7	11:39 AM	11:49 AM	10	0.17	1.67	24.00	42.00	72.00	72.00	18.00	39.00	0.6
8	11:49 AM	11:59 AM	10	0.17	1.83	24.00	41.50	72.00	72.00	17.50	39.25	0.6
9	11:59 AM	12:09 PM	10	0.17	2.00	24.00	41.50	72.00	72.00	17.50	39.25	0.6
10	12:09 PM	12:19 PM	10	0.17	2.17	24.00	41.50	72.00	72.00	17.50	39.25	0.6

PERCOLATION RATE CONVERSION (Porchet Method):

H_o	48.00	
H_f	30.50	
ΔH	17.50	
H_{avg}	39.25	
l_t	3.11	in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

BOREHOLE METHOD PERCOLATION TEST RESULTS

Project: Proposed Industrial Development
 Project No.: 23885.1
 Soil Classification: (SM) Silty sand
 Depth of Test Hole: 6.0 ft.
 Tested By: A.L.

Test Date: February 8, 2023
 Test Hole No.: P-3
 Effective Hole Dia.*: 4.8 in.
 Date Excavated: February 7, 2023

READING	TIME START	TIME STOP	TIME INTERVAL		TOTAL TIME	INITIAL WATER LEVEL	FINAL WATER LEVEL	INITIAL HOLE DEPTH	FINAL HOLE DEPTH	CHANGE IN WATER LEVEL	AVERAGE WETTED DEPTH	PERCOLATION RATE
			min	hr.	hr.	in.	in.	in.	in.	in.	in.	(min/in)
1	8:53 AM	9:18 AM	25	0.42	0.42	24.00	65.00	72.00	72.00	41.00	27.50	0.6
2	9:18 AM	9:43 AM	25	0.42	0.83	24.00	60.00	72.00	72.00	36.00	30.00	0.7
3	12:22 PM	12:32 PM	10	0.17	1.00	24.00	39.00	72.00	72.00	15.00	40.50	0.7
4	12:32 PM	12:42 PM	10	0.17	1.17	24.00	36.00	72.00	72.00	12.00	42.00	0.8
5	12:42 PM	12:52 PM	10	0.17	1.33	24.00	35.00	72.00	72.00	11.00	42.50	0.9
6	12:52 PM	1:02 PM	10	0.17	1.50	24.00	35.00	72.00	72.00	11.00	42.50	0.9
7	1:02 PM	1:12 PM	10	0.17	1.67	24.00	34.50	72.00	72.00	10.50	42.75	1.0
8	1:12 PM	1:22 PM	10	0.17	1.83	24.00	34.50	72.00	72.00	10.50	42.75	1.0
9	1:22 PM	1:32 PM	10	0.17	2.00	24.00	34.00	72.00	72.00	10.00	43.00	1.0
10	1:32 PM	1:42 PM	10	0.17	2.17	24.00	34.00	72.00	72.00	10.00	43.00	1.0

PERCOLATION RATE CONVERSION (Porchet Method):

H_o 48.00
 H_f 38.00
 ΔH 10.00
 H_{avg} 43.00
 I_t **1.63** in/hr (clear water rate)

* diameter adjusted to an effective diameter due to the loss in volume of water because of gravel packing

APPENDIX D

Laboratory Testing Program and Test Results

APPENDIX D LABORATORY TESTING

General

Selected soil samples obtained from the borings were tested in our geotechnical laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. The laboratory testing program performed in conjunction with our investigation included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, and corrosion. Descriptions of the laboratory tests are presented in the following paragraphs:

Moisture Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, in accordance with ASTM D 2921 and ASTM D 2216, respectively, and the results are shown on the boring logs, Enclosures B-1 through B-10 for convenient correlation with the soil profile.

Laboratory Compaction

A selected soil sample was tested in the laboratory to determine compaction characteristics using the ASTM D 1557 compaction test method. The results are presented in the following table:

LABORATORY COMPACTION				
Boring Number	Sample Depth (feet)	Soil Description (U.S.C.S.)	Maximum Dry Density (pcf)	Optimum Moisture Content (percent)
B-1	0-3	(SW-SM) Well Graded Sand with Silt	130.	6.5

Direct Shear Test

Shear tests are performed in general accordance with ASTM D 3080 with a direct shear machine at a constant rate-of-strain (0.04 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at

varying normal loads in order to evaluate the shear strength parameters, angle of internal friction and cohesion. Samples are tested in remolded condition (90 percent relative compaction per ASTM D 1557) and soaked, to represent the worse case conditions expected in the field.

The results of the shear test on a selected soil sample is presented in the following table:

DIRECT SHEAR TEST				
Boring Number	Sample Depth (feet)	Soil Description (U.S.C.S.)	Apparent Cohesion (psf)	Angle of Internal Friction (degrees)
B-1	0-3	(SW-SM) Well Graded Sand with Silt	100	39

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with the ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the grain size distribution analyses are presented graphically on Enclosure D-1.

Sand Equivalent

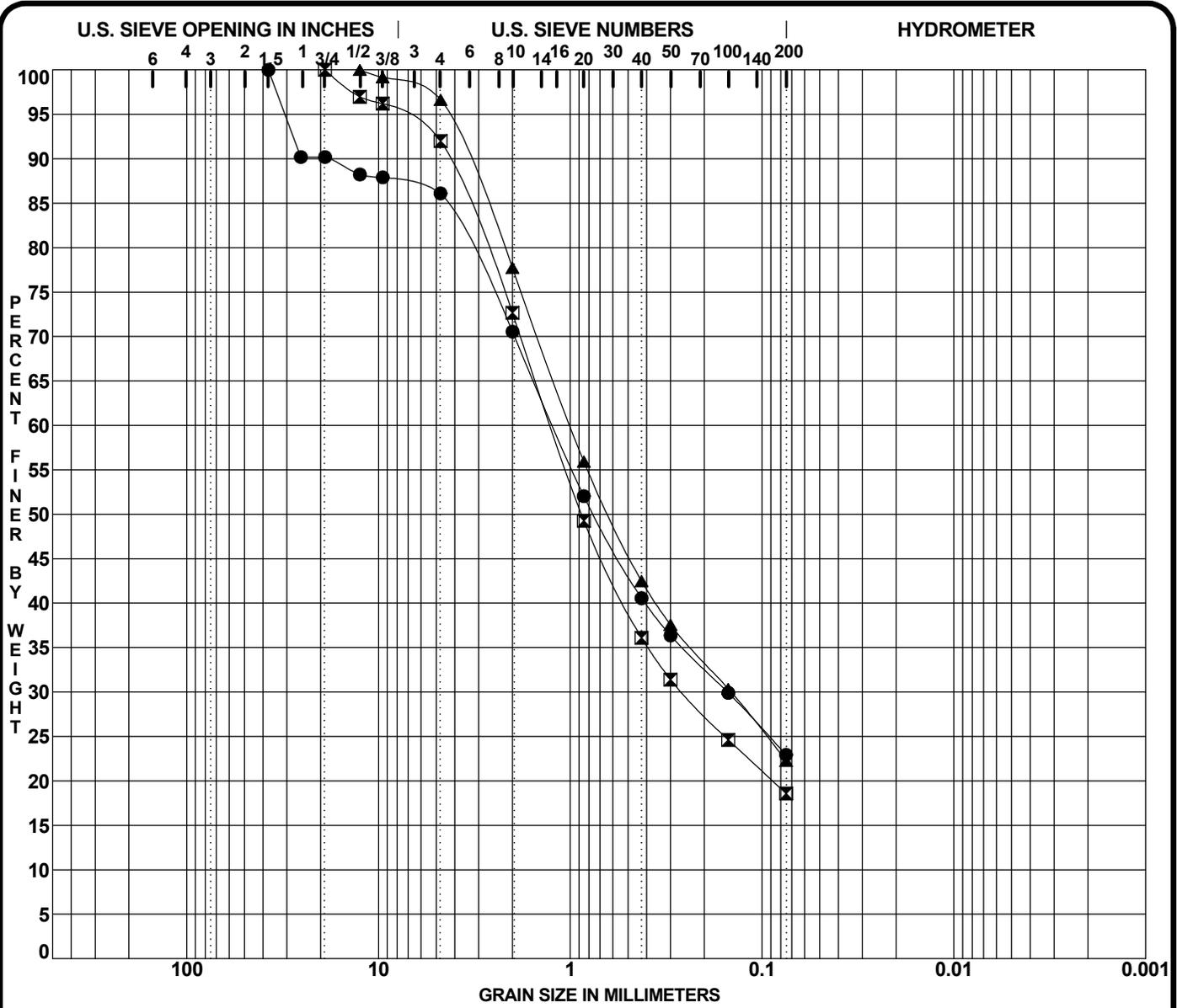
The sand equivalent of selected soils were evaluated using the California Sand Equivalent Test Method, Caltrans Number 217. The results of the sand equivalent tests are presented with the grain size distribution analyses on Enclosure D-1.

R-Value Test

Based on the indicator testing above, a soil sample was selected and tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the R-value test is presented on Enclosure D-1.

Corrosion

Corrosion testing was conducted by our subconsultant, Project X Corrosion Engineering. Test results are enclosed.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Soil Classification	SE	RV	PL	PI	Cc	Cu
● B-06 @ 0-3'	(SM) Silty Sand w/ Gravel	21	--				
☒ B-08 @ 0-3'	(SM) Silty Sand	25	--				
▲ B-10 @ 0-3'	(SM) Silty Sand	28	--				

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-06 @ 0-3'	37.50	1.23	0.151		13.9	63.2	22.9	
☒ B-08 @ 0-3'	19.00	1.26	0.260		8.0	73.4	18.6	
▲ B-10 @ 0-3'	12.50	1.00	0.145		3.4	74.4	22.3	

PROJECT: Proposed Industrial Development PROJECT NO.: 23885.1
 CLIENT: 55555 Amargosa, LLC DATE: February 2023

GRADATION CURVES



Results Only Soil Testing for Apple Valley

February 10, 2023

Prepared for:

**Andrew Tardie
LOR Geotechnical
6121 Quail Valley Ct
Riverside, CA
atardie@lorgeo.com**

**Project X Job#: S230209C
Client Job or PO#: 23885.1**

Respectfully Submitted,

Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com





Soil Analysis Lab Results

Client: LOR Geotechnical
 Job Name: Apple Valley
 Client Job Number: 23885.1
 Project X Job Number: S230209C
 February 10, 2023

Bore# / Description	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
		Sulfates SO ₄ ²⁻		Chlorides Cl ⁻		Resistivity As Rec'd Minimum		pH	Redox	Sulfide S ²⁻	Nitrate NO ₃ ⁻	Ammonium NH ₄ ⁺	Lithium Li ⁺	Sodium Na ⁺	Potassium K ⁺	Magnesium Mg ²⁺	Calcium Ca ²⁺	Fluoride F ₂ ⁻	Phosphate PO ₄ ³⁻
Depth	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
RV-3 - B-5 - (SM) Silty Sand	0-3	72.1	0.0072	73.1	0.0073	46,900	6,700	8.1	150	1.1	21.6	0.8	0.0	92.3	15.8	36.5	190.9	1.9	2.2
RV-4 - B-6 - (SM) Silty Sand	0-3	20.5	0.0021	18.2	0.0018	28,810	5,695	7.9	148	0.8	5.6	4.3	ND	35.6	11.1	26.9	153.8	2.1	7.5
RV-5 - B-8 - (SW/SM) Well Graded Sand w/ Silt	0-3	75.8	0.0076	79.8	0.0080	34,170	6,633	8.1	159	0.8	1.2	1.3	0.0	82.2	11.8	30.2	187.4	2.8	3.5

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

Ship Samples To: 29990 Technology Dr, Suite 13, Murrieta, CA 92563

Project X Job Number: <u>S230209C LOR 23885.1 Apple Valley 3 Fall</u>																																																																																																																																																														
IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.																																																																																																																																																														
Company Name: <u>LOR Geotechnical Group, Inc.</u>				Contact Name: <u>Andrew Tardie</u>			Phone No: <u>951-653-1760</u>																																																																																																																																																							
Mailing Address: <u>6121 Quail Valley</u>				Contact Email: <u>atardie@lorgeo.com</u>																																																																																																																																																										
Accounting Contact: <u>John Leuer</u>				Invoice Email: <u>atardie@lorgeo.com</u>																																																																																																																																																										
Client Project No: <u>23885.1</u>				Project Name: <u>Apple Valley</u>																																																																																																																																																										
P.O. #: <u>--</u>		3-5 Day Standard	3 Day Guarantee 50% mark-up	24 Hour RUSH 100% mark-up	METHOD ANALYSIS REQUESTED (Please circle)																																																																																																																																																									
(Business Days) Turn Around Time: ●		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																																					
For Corrosion Control Recommendations (350g soil sample): NEED (1) Groundwater depth and (2) Soil Sample Locations Map				Default Method	ASTM A1047	ASTM A1048	ASTM A1049	ASTM A1050	ASTM A1051	ASTM A1052	ASTM A1053	ASTM A1054	ASTM A1055	ASTM A1056	ASTM A1057	ASTM A1058	ASTM A1059	ASTM A1060	ASTM A1061	ASTM A1062	ASTM A1063	ASTM A1064	ASTM A1065	ASTM A1066	ASTM A1067	ASTM A1068	ASTM A1069	ASTM A1070	ASTM A1071	ASTM A1072	ASTM A1073	ASTM A1074	ASTM A1075	ASTM A1076	ASTM A1077	ASTM A1078	ASTM A1079	ASTM A1080	ASTM A1081	ASTM A1082	ASTM A1083	ASTM A1084	ASTM A1085	ASTM A1086	ASTM A1087	ASTM A1088	ASTM A1089	ASTM A1090	ASTM A1091	ASTM A1092	ASTM A1093	ASTM A1094	ASTM A1095	ASTM A1096	ASTM A1097	ASTM A1098	ASTM A1099	ASTM A1100	ASTM A1101	ASTM A1102	ASTM A1103	ASTM A1104	ASTM A1105	ASTM A1106	ASTM A1107	ASTM A1108	ASTM A1109	ASTM A1110	ASTM A1111	ASTM A1112	ASTM A1113	ASTM A1114	ASTM A1115	ASTM A1116	ASTM A1117	ASTM A1118	ASTM A1119	ASTM A1120	ASTM A1121	ASTM A1122	ASTM A1123	ASTM A1124	ASTM A1125	ASTM A1126	ASTM A1127	ASTM A1128	ASTM A1129	ASTM A1130	ASTM A1131	ASTM A1132	ASTM A1133	ASTM A1134	ASTM A1135	ASTM A1136	ASTM A1137	ASTM A1138	ASTM A1139	ASTM A1140	ASTM A1141	ASTM A1142	ASTM A1143	ASTM A1144	ASTM A1145	ASTM A1146	ASTM A1147	ASTM A1148	ASTM A1149	ASTM A1150	ASTM A1151	ASTM A1152	ASTM A1153	ASTM A1154	ASTM A1155	ASTM A1156	ASTM A1157	ASTM A1158	ASTM A1159	ASTM A1160	ASTM A1161	ASTM A1162	ASTM A1163	ASTM A1164	ASTM A1165	ASTM A1166	ASTM A1167	ASTM A1168	ASTM A1169	ASTM A1170	ASTM A1171	ASTM A1172	ASTM A1173	ASTM A1174	ASTM A1175	ASTM A1176	ASTM A1177	ASTM A1178	ASTM A1179	ASTM A1180	ASTM A1181	ASTM A1182	ASTM A1183	ASTM A1184	ASTM A1185	ASTM A1186	ASTM A1187	ASTM A1188	ASTM A1189	ASTM A1190	ASTM A1191	ASTM A1192	ASTM A1193	ASTM A1194	ASTM A1195	ASTM A1196	ASTM A1197	ASTM A1198	ASTM A1199	ASTM A1200
FOR THERMAL RESISTIVITY PROVIDE (1,500g soil sample): (1) Optimal Moisture % (2) Dry Density(PCF) (3) Desired Compaction Date & Received By:				Default Method	ASTM D1585	ASTM D1586	ASTM D1587	ASTM D1588	ASTM D1589	ASTM D1590	ASTM D1591	ASTM D1592	ASTM D1593	ASTM D1594	ASTM D1595	ASTM D1596	ASTM D1597	ASTM D1598	ASTM D1599	ASTM D1600	ASTM D1601	ASTM D1602	ASTM D1603	ASTM D1604	ASTM D1605	ASTM D1606	ASTM D1607	ASTM D1608	ASTM D1609	ASTM D1610	ASTM D1611	ASTM D1612	ASTM D1613	ASTM D1614	ASTM D1615	ASTM D1616	ASTM D1617	ASTM D1618	ASTM D1619	ASTM D1620	ASTM D1621	ASTM D1622	ASTM D1623	ASTM D1624	ASTM D1625	ASTM D1626	ASTM D1627	ASTM D1628	ASTM D1629	ASTM D1630	ASTM D1631	ASTM D1632	ASTM D1633	ASTM D1634	ASTM D1635	ASTM D1636	ASTM D1637	ASTM D1638	ASTM D1639	ASTM D1640	ASTM D1641	ASTM D1642	ASTM D1643	ASTM D1644	ASTM D1645	ASTM D1646	ASTM D1647	ASTM D1648	ASTM D1649	ASTM D1650	ASTM D1651	ASTM D1652	ASTM D1653	ASTM D1654	ASTM D1655	ASTM D1656	ASTM D1657	ASTM D1658	ASTM D1659	ASTM D1660	ASTM D1661	ASTM D1662	ASTM D1663	ASTM D1664	ASTM D1665	ASTM D1666	ASTM D1667	ASTM D1668	ASTM D1669	ASTM D1670	ASTM D1671	ASTM D1672	ASTM D1673	ASTM D1674	ASTM D1675	ASTM D1676	ASTM D1677	ASTM D1678	ASTM D1679	ASTM D1680	ASTM D1681	ASTM D1682	ASTM D1683	ASTM D1684	ASTM D1685	ASTM D1686	ASTM D1687	ASTM D1688	ASTM D1689	ASTM D1690	ASTM D1691	ASTM D1692	ASTM D1693	ASTM D1694	ASTM D1695	ASTM D1696	ASTM D1697	ASTM D1698	ASTM D1699	ASTM D1700																																						
				Default Method	ASTM D1701	ASTM D1702	ASTM D1703	ASTM D1704	ASTM D1705	ASTM D1706	ASTM D1707	ASTM D1708	ASTM D1709	ASTM D1710	ASTM D1711	ASTM D1712	ASTM D1713	ASTM D1714	ASTM D1715	ASTM D1716	ASTM D1717	ASTM D1718	ASTM D1719	ASTM D1720	ASTM D1721	ASTM D1722	ASTM D1723	ASTM D1724	ASTM D1725	ASTM D1726	ASTM D1727	ASTM D1728	ASTM D1729	ASTM D1730	ASTM D1731	ASTM D1732	ASTM D1733	ASTM D1734	ASTM D1735	ASTM D1736	ASTM D1737	ASTM D1738	ASTM D1739	ASTM D1740	ASTM D1741	ASTM D1742	ASTM D1743	ASTM D1744	ASTM D1745	ASTM D1746	ASTM D1747	ASTM D1748	ASTM D1749	ASTM D1750	ASTM D1751	ASTM D1752	ASTM D1753	ASTM D1754	ASTM D1755	ASTM D1756	ASTM D1757	ASTM D1758	ASTM D1759	ASTM D1760	ASTM D1761	ASTM D1762	ASTM D1763	ASTM D1764	ASTM D1765	ASTM D1766	ASTM D1767	ASTM D1768	ASTM D1769	ASTM D1770	ASTM D1771	ASTM D1772	ASTM D1773	ASTM D1774	ASTM D1775	ASTM D1776	ASTM D1777	ASTM D1778	ASTM D1779	ASTM D1780	ASTM D1781	ASTM D1782	ASTM D1783	ASTM D1784	ASTM D1785	ASTM D1786	ASTM D1787	ASTM D1788	ASTM D1789	ASTM D1790	ASTM D1791	ASTM D1792	ASTM D1793	ASTM D1794	ASTM D1795	ASTM D1796	ASTM D1797	ASTM D1798	ASTM D1799	ASTM D1800																																																						
				Default Method	ASTM D1801	ASTM D1802	ASTM D1803	ASTM D1804	ASTM D1805	ASTM D1806	ASTM D1807	ASTM D1808	ASTM D1809	ASTM D1810	ASTM D1811	ASTM D1812	ASTM D1813	ASTM D1814	ASTM D1815	ASTM D1816	ASTM D1817	ASTM D1818	ASTM D1819	ASTM D1820	ASTM D1821	ASTM D1822	ASTM D1823	ASTM D1824	ASTM D1825	ASTM D1826	ASTM D1827	ASTM D1828	ASTM D1829	ASTM D1830	ASTM D1831	ASTM D1832	ASTM D1833	ASTM D1834	ASTM D1835	ASTM D1836	ASTM D1837	ASTM D1838	ASTM D1839	ASTM D1840	ASTM D1841	ASTM D1842	ASTM D1843	ASTM D1844	ASTM D1845	ASTM D1846	ASTM D1847	ASTM D1848	ASTM D1849	ASTM D1850	ASTM D1851	ASTM D1852	ASTM D1853	ASTM D1854	ASTM D1855	ASTM D1856	ASTM D1857	ASTM D1858	ASTM D1859	ASTM D1860	ASTM D1861	ASTM D1862	ASTM D1863	ASTM D1864	ASTM D1865	ASTM D1866	ASTM D1867	ASTM D1868	ASTM D1869	ASTM D1870	ASTM D1871	ASTM D1872	ASTM D1873	ASTM D1874	ASTM D1875	ASTM D1876	ASTM D1877	ASTM D1878	ASTM D1879	ASTM D1880	ASTM D1881	ASTM D1882	ASTM D1883	ASTM D1884	ASTM D1885	ASTM D1886	ASTM D1887	ASTM D1888	ASTM D1889	ASTM D1890	ASTM D1891	ASTM D1892	ASTM D1893	ASTM D1894	ASTM D1895	ASTM D1896	ASTM D1897	ASTM D1898	ASTM D1899	ASTM D1900																																																						
				Default Method	ASTM D1901	ASTM D1902	ASTM D1903	ASTM D1904	ASTM D1905	ASTM D1906	ASTM D1907	ASTM D1908	ASTM D1909	ASTM D1910	ASTM D1911	ASTM D1912	ASTM D1913	ASTM D1914	ASTM D1915	ASTM D1916	ASTM D1917	ASTM D1918	ASTM D1919	ASTM D1920	ASTM D1921	ASTM D1922	ASTM D1923	ASTM D1924	ASTM D1925	ASTM D1926	ASTM D1927	ASTM D1928	ASTM D1929	ASTM D1930	ASTM D1931	ASTM D1932	ASTM D1933	ASTM D1934	ASTM D1935	ASTM D1936	ASTM D1937	ASTM D1938	ASTM D1939	ASTM D1940	ASTM D1941	ASTM D1942	ASTM D1943	ASTM D1944	ASTM D1945	ASTM D1946	ASTM D1947	ASTM D1948	ASTM D1949	ASTM D1950	ASTM D1951	ASTM D1952	ASTM D1953	ASTM D1954	ASTM D1955	ASTM D1956	ASTM D1957	ASTM D1958	ASTM D1959	ASTM D1960	ASTM D1961	ASTM D1962	ASTM D1963	ASTM D1964	ASTM D1965	ASTM D1966	ASTM D1967	ASTM D1968	ASTM D1969	ASTM D1970	ASTM D1971	ASTM D1972	ASTM D1973	ASTM D1974	ASTM D1975	ASTM D1976	ASTM D1977	ASTM D1978	ASTM D1979	ASTM D1980	ASTM D1981	ASTM D1982	ASTM D1983	ASTM D1984	ASTM D1985	ASTM D1986	ASTM D1987	ASTM D1988	ASTM D1989	ASTM D1990	ASTM D1991	ASTM D1992	ASTM D1993	ASTM D1994	ASTM D1995	ASTM D1996	ASTM D1997	ASTM D1998	ASTM D1999	ASTM D2000																																																						
				Default Method	ASTM D2001	ASTM D2002	ASTM D2003	ASTM D2004	ASTM D2005	ASTM D2006	ASTM D2007	ASTM D2008	ASTM D2009	ASTM D2010	ASTM D2011	ASTM D2012	ASTM D2013	ASTM D2014	ASTM D2015	ASTM D2016	ASTM D2017	ASTM D2018	ASTM D2019	ASTM D2020	ASTM D2021	ASTM D2022	ASTM D2023	ASTM D2024	ASTM D2025	ASTM D2026	ASTM D2027	ASTM D2028	ASTM D2029	ASTM D2030	ASTM D2031	ASTM D2032	ASTM D2033	ASTM D2034	ASTM D2035	ASTM D2036	ASTM D2037	ASTM D2038	ASTM D2039	ASTM D2040	ASTM D2041	ASTM D2042	ASTM D2043	ASTM D2044	ASTM D2045	ASTM D2046	ASTM D2047	ASTM D2048	ASTM D2049	ASTM D2050	ASTM D2051	ASTM D2052	ASTM D2053	ASTM D2054	ASTM D2055	ASTM D2056	ASTM D2057	ASTM D2058	ASTM D2059	ASTM D2060	ASTM D2061	ASTM D2062	ASTM D2063	ASTM D2064	ASTM D2065	ASTM D2066	ASTM D2067	ASTM D2068	ASTM D2069	ASTM D2070	ASTM D2071	ASTM D2072	ASTM D2073	ASTM D2074	ASTM D2075	ASTM D2076	ASTM D2077	ASTM D2078	ASTM D2079	ASTM D2080	ASTM D2081	ASTM D2082	ASTM D2083	ASTM D2084	ASTM D2085	ASTM D2086	ASTM D2087	ASTM D2088	ASTM D2089	ASTM D2090	ASTM D2091	ASTM D2092	ASTM D2093	ASTM D2094	ASTM D2095	ASTM D2096	ASTM D2097	ASTM D2098	ASTM D2099	ASTM D2100																																																						
				Default Method	ASTM D2101	ASTM D2102	ASTM D2103	ASTM D2104	ASTM D2105	ASTM D2106	ASTM D2107	ASTM D2108	ASTM D2109	ASTM D2110	ASTM D2111	ASTM D2112	ASTM D2113	ASTM D2114	ASTM D2115	ASTM D2116	ASTM D2117	ASTM D2118	ASTM D2119	ASTM D2120	ASTM D2121	ASTM D2122	ASTM D2123	ASTM D2124	ASTM D2125	ASTM D2126	ASTM D2127	ASTM D2128	ASTM D																																																																																																																													