GEOTECHNICAL INVESTIGATION REPORT

PROPOSED WAREHOUSE, APN: 0463-372-21
Southeast Corner of Gustine Street & Dachshund Avenue
Apple Valley, CA 92307

Prepared for Terra Nova Planning & Research
Submitted by Merrell Johnson Geotechnical, Inc.
July 26, 2024
Project No. 24082P1

MERRELL JOHNSON

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July 26, 2024

Attn: Nicole Sauviat Criste
Terra Nova Planning & Research
42635 Melanie Place, Ste 101
Palm Desert, CA 92211

Re: Geotechnical Investigation Report | Proposed Warehouse, APN: 0463-372-21 | SE Corner of Gustine Street & Dachshund Avenue, Apple Valley, CA 92307 | MJG Project No. 24082P1

Ms. Criste:

This letter transmits Merrell Johnson Geotechnical's (MJG) Geotechnical Investigation Report for the Proposed Warehouse building. The investigation was planned and performed based on the proposed project development illustrated on the Conceptual Grading Plan prepared by Merrell Johnson.

We trust that the enclosed information will be useful for the design and construction phases of this project. If you have any questions, please do not hesitate to contact our firm.

Sincerely,

Merrell Johnson Companies

Brad S. Merrell, P.E., President
Merrell Johnson Geotechnical, Inc.
R.C.E. 49423

CONTENTS

APPENDICES

INTRODUCTION

Project Description

This report presents the results of the geotechnical investigation Merrell Johnson Geotechnical (MJG) performed for the new warehouse planned for the 40-acre parcel located on the southeast corner of Gustine Street and Dachshund Avenue, Apple Valley, CA. The location of the proposed development is shown on the Site Vicinity Map, Google Earth Site Image, and Conceptual Grading Plan, included with this report as Appendix A, Figures 1-3.

The proposed warehouse will occupy a plan area of 627,200 square feet (SF). Proposed site improvements will include truck loading docks, truck trailer parking, automobile parking, driveways, underground stormwater chambers, a retention basin, utilities, and other ancillary site improvements.

Proposed off-site improvements will include installing utilities, widening Dachshund Avenue from Gustine Street to Fresno Road, and paving Fresno Road from Dachshund Avenue to Ramona Road.

Scope of Services

The scope of work for this project consisted of field exploration, laboratory testing, engineering analyses, and preparation of this report. The results of the field exploration and laboratory test programs were analyzed to develop conclusions and recommendations regarding:

- Subsurface conditions underlying areas to be developed
- Site preparation and grading
- Excavation conditions
- Foundation support for the new structure along with soils engineering criteria for foundation design
- Support for slab-on-grade floors
- Concrete and flexible pavement structural sections for parking and driveway/fire lanes
- Flexible pavement structural sections for off-site street improvements

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface conditions were explored by drilling eleven (11), 8-inch-diameter, test borings. Five (5) test borings were drilled within the building limits of the proposed warehouse, one (1) to a depth of 50 feet and four (4) to a depth of 25 feet. The 50-foot-deep test boring was also used to evaluate the soil liquefaction potential.

Outside the limits of the proposed warehouse: one (1) 10-foot-deep test boring was drilled within the proposed underground stormwater chambers/parking lot; four (4) 5-foot-deep test borings, two (2) within the parking areas and two (2) for the offsite road improvements; one (1) three-foot-deep test boring within the proposed location of the retention basin.

The locations of the test borings are shown on Conceptual Grading Plan, Figure 3 in Appendix A. The borings were logged by an MJG representative, who also collected samples of the materials encountered for examination and laboratory testing. Bulk samples were collected from drill cuttings. Relatively undisturbed samples were obtained by driving a 2.5-inch inside diameter

modified California sampler with a 140-pound hammer falling 30 inches. Blow counts required to drive the sampler each 6 inches of an 18-inch (or less) drive are noted on the boring logs as “N” value.

Standard Penetration Tests (SPTs) were performed at selected depths by driving a 1.4-inch inside diameter sampler 18 inches with a 140-pound hammer falling 30 inches. The blow counts required to drive the sampler each 6 inches of the drive are noted on the boring logs as “N” value. Disturbed samples were collected from the SPT sampler at the time of driving.

The logs of the test borings are in Appendix B. Soils are described according to the Unified Soil Classification System explained in Appendix B.

Laboratory Testing

The laboratory program included the following tests:

- ASTM D422 - Grain Size Analysis
- ASTM D1557 - Maximum Density
- ASTM D2937 - In-Place Moisture Content and Dry Density
- ASTM D4829 - Expansion Index of Soil
- ASTM D2419 - Sand Equivalent
- ASTM D2844 / CT 301 - Resistance R-value
- ASTM D2435 / CT-219 - Consolidation of Soils
- ASTM D3080 - Direct Shear
- ASTM G51 / CT643, CT417, CT422 - Corrosion Potential

The results of the laboratory tests are summarized in Appendix C.

SITE AND SUBSURFACE CONDITIONS

Site Conditions

The 40-acre site is located on the southeast corner of Gustine Street and Dachshund Avenue. The property is undeveloped and covered with creosote bushes and sparce desert vegetation. A shallow drainage travels diagonally through the western portion of the site. From this drainage, the ground surface ascends towards the northwest at an approximate inclination of 1.0 percent.

The site is bound on the north, east, south, and west by Gustine Street, Ramona Road, Fresno Road, and Dachshund Avenue, respectively. Only Dachshund Avenue is paved with asphalt concrete. The remaining three (3) streets are unpaved dirt roads.

Subsurface Conditions

The site is blanketed by medium dense to very dense silty sand (SM) with traces of caliche to a depth of about 40 feet. The silty sand is underlain by a dense poorly graded sand with silt and (SP-SM) to the depths explored (50’).

Expansion Potential

Results of an expansion index test (ASTM D4829) performed on a near-surface soil sample from Boring No. 1, within the limits of the proposed warehouse, exhibited an expansion index of 0, which corresponds to a very low expansion potential.

Geologic Setting

The subject site is located within a natural geomorphic province in southern California known as the Mojave Desert. This province consists of a broad interior region of isolated mountain ranges separated by expanses of desert plains and is characterized by the numerous interior enclosed drainages and playas. The Mojave Desert is in large, bounded structurally on the southwest by the San Andreas Fault and on the northwest by the Garlock Faults, and is ill-defined along the east where the structural patterns resemble the Basin and Range Province to the north and east. This province exhibits interior drainage, including the Mojave River, which has its source in the San Bernardino Mountains and would extend into Death Valley if there was enough water.

The geologic units of this region generally consist of three main divisions being: 1) Crystalline rocks of pre-Tertiary age; 2) sediments and volcanic rocks of Tertiary age; and 3) sediments and basalt flows of Quaternary age. Regionally, the site is located along a large alluvial plain, locally underlain by Quaternary-age alluvium and older that has been derived predominantly as outwash from the adjacent highlands to the north and east along Sidewinder Valley. These sediments are believed to be less than 500± feet locally (Subsurface Surveys, 1990).

Locally as mapped by Hernandez and Tan (2007), the subject site is shown to be underlain by late Pleistocene-age older alluvium. These deposits are generally described as being comprised of a fine- to medium-grained sand and fine to medium gravel of inactive fans.

CBC Ground Motion Analysis

Included for this study was an assessment of the seismic ground motion parameters of the subject site with respect to the most recently adopted 2022 California Building Code (CBC) and ASCE/SEI Standard 7-16 (ASCE, 2016) as partially summarized and tabulated below. Geographically, the proposed construction area is centrally located at Latitude 34.57709 and Longitude -117.19590.

TABLE 1: SUMMARY OF SEISMIC DESIGN PARAMETERS	
Factor or Coefficient	***Value***
S_s	1.036
S_1	0.397
F_a	1.085
F_v	N/A
S_{MS}	1.125
S_{M1}	N/A
S_{DS}	0.75
S_{D1}	N/A
T_L	12
PGA	0.445
PGA_M	0.514
F_{PGA}	1.155
I_e	1
C_V	1.307

Site Classification (CBC 1613.3.2) – Based on the presence of mapped Quaternary age alluvial deposits underlying the site and the absence of site-specific shear-wave data, the design Site Class is *estimated* to be **"D."** This Class is defined as having the upper 100 feet (30 meters) of the subsurface being underlain by "Stiff Soil" with average shear-wave velocities of 600 to 1,200 feet/second (180 to 360 meters/second). In accordance with the CBC, the proposed warehouse is considered a Risk Category II structure.

Groundwater

The study area lies within the Upper Mojave River Groundwater Basin of Southern California. The Mojave River Basin is part of the Mojave Desert region and is bordered by the San Bernardino and San Gabriel Mountains to the south and extends to Afton Canyon to the northeast, with Lucerne Valley and Antelope Valleys bordering the east and west, respectively. The Mojave River, which is located to the west, is the principal source of water recharge to the basin, which originates from the junctions of Deep Creek and West Fork Mojave River at the northern foot of the San Bernardino Mountains. Other sources of recharge include other lesser river tributaries from the San Bernardino and San Gabriel Mountains, the adjacent highlands to the north and east, as well as deep percolation from rainwater and other artificial means.

The water-bearing deposits are principally unconsolidated and partially consolidated continental sedimentary deposits that form two aquifers (Stamos and Predmore, 1995), the upper one being shallow alluvium (200± feet thick, within 1± mile of the Mojave River), with the regional aquifer underlying most of the basin at depth. The regional aquifer is comprised of unconsolidated older alluvium and fan deposits of Pleistocene to Tertiary age, and partly consolidated to consolidated sediments of Tertiary age. These deposits are as much as 1,000 feet thick in some places and their permeability generally decreases with depth.

Based on groundwater data provided by the California Department of Water Resources (2024), the closest measured well is approximately 700 feet to the south (State Well No. 06N03W28R001S), which had a historic high groundwater level of 125.7 feet in 1948.

Faulting

There are at least thirty-five major "potentially active/active" (late Quaternary) faults that are within a 100-kilometer (62 mile) radius of the site as shown on Figure 1 below (site shown as small dot in middle).

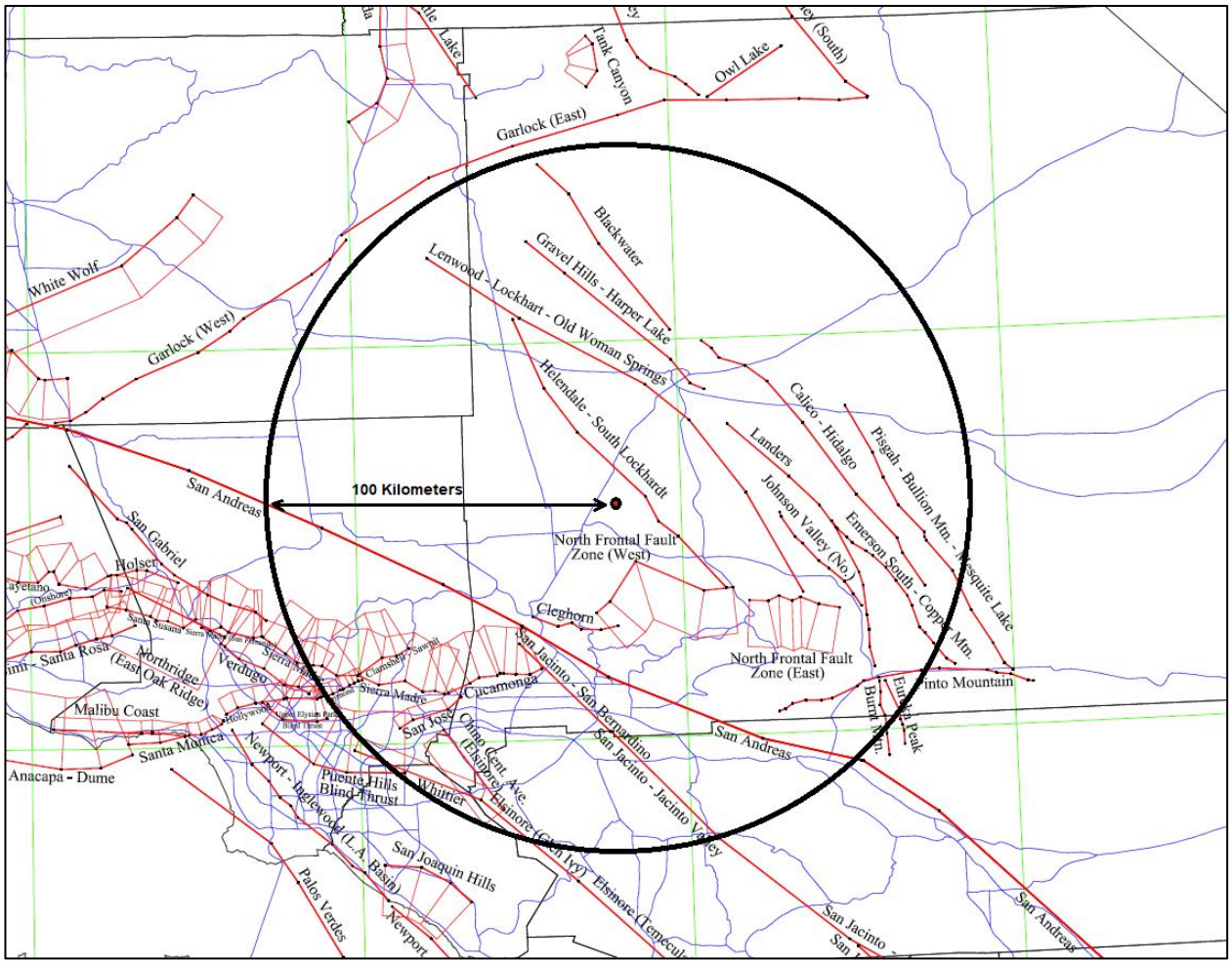


FIGURE 1: Regional Fault Map showing 100 km radius (from CGS 2002 California Fault Model)

Of these, there are no active faults known to traverse the site based on published literature. In addition, the subject site is not located within a State of California “Alquist-Priolo Earthquake Fault Zone” for surface fault rupture hazards (CGS, 2018).

The nearest mapped “active” fault zoned by the State of California is for the Helendale-South Lockhart Fault, located approximately 3± miles to the northeast. The Helendale-South Lockhart Fault is a right-lateral, strike-slip fault, being approximately 97 kilometers in length, with an associated slip-rate of 0.6 ±0.4 mm/year (C.D.M.G., 1996 and Cao, et al., 2003).

CONCLUSIONS AND RECOMMENDATIONS

The existing surface soils are medium dense to a depth of about 3 feet. Below 3 feet, the native soils are generally dense and are considered adequate for support of the new facilities.

The site is not within an Alquist Priolo Earthquake Fault Zone. The soils are medium dense to dense, and groundwater is deep below this site. The liquefaction potential consequently is very low. The potential for dynamically induced settlement of the granular soils is also very low. In addition, the soils have a very low potential for expansion due to changes in moisture content.

The potential for encountering groundwater within the anticipated relatively shallow excavations is minimal. There is a potential for minor amounts of water to enter open excavations because of direct rainfall and runoff.

Earthwork

At the time of MJG's investigation, the site was covered with creosote bushes and sparce desert vegetation. Any debris, vegetation, and other deleterious materials should be stripped and removed from the site prior to grading work. Organic materials should be disposed of off-site in accordance with the owner's instructions. Roots should be removed to a depth of 6 inches below foundation and pavement subgrade elevations.

Areas to receive fill should be scarified to a depth of 12 inches, brought to within 2 percentage points of optimum moisture content, and compacted to a minimum of 95% relative compaction based on the ASTM D1557 laboratory test method. All references to optimum moisture content and relative compaction in this report are based on this test method.

Compacted Fill Placement

Fill should be placed in 8-inch-thick loose lifts, moisture conditioned to within 2 percentage points above or below optimum moisture content and compacted to a minimum of 95% relative compaction.

Imported Soils

Imported soils, if needed, should consist of predominantly granular material with an expansion index less than 20 when tested in accordance with ASTM D4829, and should have a minimum R-value of 40. Imported material should be inspected and approved by an MJG representative prior to being brought to the site.

Shallow Foundation and Building Slab-On-Grade Support

The existing soils below and within 5 feet of the proposed warehouse building should be over-excavated to a depth of at least 3 feet below the existing ground surface or 12 inches below the proposed footing base grade, whichever depth is greater. The bottom of the over-excavation should be scarified to a depth of at least 6 inches, moistened to within 2 percent of the optimum moisture content, and compacted to a relative compaction of at least 95 percent (ASTM D1557).

Fill should be placed in 8-inch-thick loose lifts, moisture conditioned to within 2 percentage points above or below optimum moisture content and compacted to a minimum of 95% relative compaction.

The planned structures can be supported on shallow spread footings with bottom levels in the compacted fill at a minimum depth of 18 inches below the lowest adjacent finished grade.

A minimum width of 18 inches is recommended for continuous footings. Isolated footings should be at least 24 inches wide. Footings can be designed for an allowable bearing pressure of 3,000 pounds per square foot (psf) for dead plus long-term live loads. This value can be increased by ⅓ when considering the total of all loads, including wind or seismic forces.

Total post-construction settlement is estimated to be approximately ¾ inch. Post-construction differential settlements are anticipated to be ½ inch or less between isolated footings, and between the middle and end of a continuous footing.

Continuous (strip) foundations should be reinforced with a minimum of #5 deformed reinforcing bars at the top and bottom of the footings.

Spread footing reinforcement should be designed by the structural engineer for punching shear and bending. As a minimum, the spread footings should be reinforced with a #5 deformed reinforcing bars, spaced 18 inches on center each way and placed 3 inches above the bottom of the spread footing.

All grade beam reinforcement should be designed and specified by the building's designer/structural engineer.

Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Footing excavations should be observed by an MJG representative to check bearing materials and cleaning.

Lateral Loading

Resistance to lateral loads will be provided by passive earth pressure against the faces of footings and other structural elements below grade, and by friction along the bases of footings and slabs. Passive earth pressure can be taken as 350 pounds per square foot (psf) per foot of depth. Base friction can be taken as 0.35 times the actual dead load. Base friction and passive earth pressure can be combined without reduction. Retaining structures free to rotate at the top should be designed for an active equivalent fluid pressure of 35 psf per foot of height, plus any additional building or equipment surcharge. MJG should be notified if retaining walls greater than 10 feet in height, restrained walls, or tieback walls are planned so that geotechnical recommendations specific to wall conditions can be developed.

Building Floor Slabs

During grading operations, the building pad soils should be compacted to a relative compaction of at least 95 percent (ASTM D1557). Prior to placing the slab-on-grade concrete, the final pad surfaces should be proof-rolled to provide a smooth, dense surface upon which to place the concrete.

A 15-mil vapor retarder membrane, conforming to ASTM E1745 and installed per ASTM E1643, should be placed beneath concrete slabs-on-grade covered with moisture sensitive or impervious floor coverings, or where the slab will support equipment or materials sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to

ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Reinforcing for slabs-on-grade should be designed by the project structural engineer based on anticipated storage and forklift loads. A modulus of subgrade reaction of 150 pounds per cubic inch (pci) can be used. Reinforcing should extend down into the footings. Concrete construction (i.e. jointing, etc.) should be in conformance with the American Concrete Institute Manual of Concrete Practice Design and Construction Standards.

The project's designer should be responsible for the slabs-on-grade recommendations based on the anticipated floor loading requirements. Minimum reinforcing for 6-inch-thick slabs-on-grade should consist of at least #4 deformed reinforcing bars at 18 inches on center each way placed at mid-height in the slab.

Where the project's structural engineer's reinforcement recommendations exceed MJG's above minimum slab reinforcement recommendations, the structural engineer's recommendations should be followed.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The structural engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Surface Drainage

It is important that water be kept a minimum of 5 feet from structures and slabs. No ponding adjacent to buildings and structures should be allowed. Final surfaces should have a positive 2 percent minimum slope away from structures.

Retaining walls should be designed to resist hydrostatic pressures or be provided with a back-drain, weep holes or other drainage facilities. If a basement or underground structure is constructed, a subsurface drainage system is recommended.

Concrete and Flexible Asphalt Concrete Pavement Subgrade Preparation

The existing soils below the proposed concrete and asphalt concrete pavement areas should be over-excavated to a depth of at least 12 inches below the existing ground surface or finish grade, whichever depth is greater. The soils exposed on the bottoms of the over-excavations should be scarified to a depth of at least 12 inches, moistened to within 2 percent of the optimum moisture content and compacted to a relative compaction of at least 95 percent (ASTM D1557). The over-excavated soils and any additional fill required to prepare the finish subgrade should be placed in maximum 8-inch-thick lifts, each lift moistened to within 2 percent of the optimum moisture content and compacted to a relative compaction of at least 95 percent.

Flexible Pavement Structural Sections

New flexible pavement structural sections were determined following California Department of Transportation (Caltrans) procedures.

ON-SITE FLEXIBLE PAVEMENT

On-site flexible pavement for automobiles and light trucks are planned for the east and west sides of the project site. MJG's review of the Conceptual Site Plan indicates that most of the heavy truck driveways, trailer parking areas, and loading docks will be located on the north and south sides of the warehouse and paved with rigid portland cement concrete pavement. The automobile and truck trailer parking areas will be connected by on-site access driveways.

Four (4) test borings were drilled around the perimeter of the proposed warehouse. Sieve analyses (ASTM D422, D1140 & D2487) were performed from soil samples collected in each of these borings. The soil sample containing the largest percentage of fines (soil fraction passing the #200 sieve) and the lowest sand equivalent value was selected and tested for R-value (ASTM D2844).

The most critical soil sample was collected in Boring No. 5. The sieve analysis, sand equivalent, and R-value test data are summarized in Table 2 below.

TABLE 2: ON-SITE SIEVE, SAND EQUIVALENT, AND R-VALUE TEST RESULTS

Boring No.	***% Fines*** *ASTM D422/D1140*	***Sand Equivalent*** *ASTM D2419*	***R-Value*** *ASTM D2844*
B-3	33.7	23	-
B-5	36.2	17	28
B-6	31.6	-	-
B-8	32.8	-	37

Based on the above soil test data, the most critical R-value of 33 was used to calculate the recommended on-site flexible pavement sections for the project. In addition, the Traffic Indexes for the flexible pavement areas was selected as follows:

- Automobiles and light truck traffic: TI = 5
- Heavy truck traffic: TI = 8

Recommended on-site flexible pavement structural sections are listed in Table 3 below.

TABLE 3: ON-SITE FLEXIBLE PAVEMENT STRUCTURAL SECTIONS

Pavement Area	***Traffic Index***	***Asphalt Concrete (inches)***	***Base Course (inches)***
Autos & Light Truck Traffic	5	4.0	4.0
Heavy Truck Traffic	8	6.0	6.0

OFF-SITE FLEXIBLE PAVEMENT FOR CARDOVA AND DACHSHUND AVENUE

Off-site flexible pavement is proposed for Fresno Road and Dachshund Avenue adjacent to the subject warehouse site. Two (2) test borings (B-7 and B-9) were drilled for these streets. Samples from the two test borings were collected and tested for R-value (ASTM D2844). The R-value test data are summarized in Table 4 below.

TABLE 4: OFF-SITE ROADWAY R-VALUE TEST RESULTS

Boring No.	***Roadway***	***R-value ASTM D2844***
B-7	Fresno Road	41
B-9	Dachshund Avenue	34

Based on the above soil test data, R-values of 41 and 34 were used to calculate the recommended off-site flexible pavement sections for Fresno Road and Dachshund Avenue, respectfully. The Traffic Index used to calculate the roadway pavement sections was:

- Automobiles and Heavy truck traffic: TI = 9

Recommended off-site flexible pavement structural sections for Fresno Road and Dachshund Avenue are presented in Table 5 below.

TABLE 5: OFF-SITE FLEXIBLE PAVEMENT STRUCTURAL SECTIONS

Roadway	***Traffic Index***	***Asphalt Concrete (inches)***	***Base Course (inches)***
Fresno Road	9	6.0	8.0
Dachshund Avenue	9	6.0	10.0

Alternative pavement sections can also be considered. Merrell Johnson should review the design pavement sections if traffic loads will be different from those currently anticipated.

PORTLAND CEMENT CONCRETE PAVEMENTS AND FLATWORK

The subgrade surface beneath rigid (portland cement concrete) pavements should be proof-rolled with a smooth-wheel roller to form a dense, uniform surface. Any pumping or yielding areas should be excavated and replaced with compacted fill.

Rigid pavements to support automobile and light truck traffic should be a minimum of 6 inches thick and reinforced with a minimum of #4 deformed reinforcing bars spaced 12 inches on center each way. Joints should be provided at intervals of no more than 12 feet. Smooth dowels should be provided across pavement joints.

Rigid pavement to support heavy truck traffic should be a minimum of 8 inches thick and reinforced with #4 deformed reinforcing bars spaced 12 inches of center each way. Joints should be provided at intervals of no more than 12 feet. Smooth dowels should be provided across pavement joints.

Pedestrian walkways and other lightly loaded concrete flatwork areas should be proof rolled as described above. The flatwork in these areas should have a minimum thickness of 4 inches and be provided with doweled joints at no more than 12-foot intervals. Minimum reinforcement

should consist of 6 x 6 W1.4/1.4 welded wire fabric supported mid height in the slab by concrete blocks or dobies. Positioning the wire fabric by lifting after concrete placement should not be allowed.

UTILITY EXCAVATIONS

Excavations for this project will require sloping sidewalls or shoring. Excavations should be made in accordance with California Administrative Code, Title 8, Industrial Relations, Chapter 4, Division of Industrial Safety, Subchapter 4, Construction Safety Orders, Article 6. Temporary excavations should be shored or sloped in accordance with Cal OSHA requirements. On-site soils can be considered Type C for purposes of excavation design.

In general, temporary excavations in on-site soils should be sloped no steeper than 1.5 horizontal to 1 vertical for excavations up to 20 feet in depth. Compound excavations with vertical sides in lower portions should be properly shielded to a minimum height of 18 inches above the top of the vertical side, with the upper portion having a maximum slope of 1.5 horizontal to 1 vertical. A Registered Professional Engineer should design slopes or benching for excavations greater than 20 feet in depth.

Temporary excavation slopes should be inspected twice daily by the contractor's competent person before personnel are allowed to enter the excavation. If sloughing, raveling or other evidence for slope instability is noted, corrective measures should be implemented.

Temporary shoring will be required for those excavations where temporary cut slopes as described above are not feasible. Cantilever shoring, and shoring with 1 level of bracing, can be designed to resist an equivalent fluid pressure of 30 psf per foot of depth. For shoring with multiple levels of bracing, a uniform lateral pressure equal to 25H in psf, where H is the height of shoring in feet, should be used. The recommended soil pressure applies to level soil conditions behind the shoring. Where a combination of sloped embankment and shoring is used, the soil pressure will be greater and should be evaluated for actual conditions.

In addition to the above recommended lateral earth pressures, a minimum uniform lateral pressure of 125 psf should be incorporated in the design of the upper 10 feet of shoring when normal traffic is permitted within 10 feet of the shoring. The design of temporary shoring should also include the surcharge loads from delivery and construction equipment, as appropriate.

CORROSIVITY

Laboratory test results indicate that site soils have a low potential for corrosion with respect to reinforced concrete and ferrous metals. Nevertheless, Type II modified or Type V cement is recommended for use in concrete in contact with the ground. Foundations should be designed with continuous reinforcing steel top and bottom. Reinforcing steel should maintain minimum clearances specified by applicable codes and good construction practice.

LIMITATIONS

The recommendations in this report are based on results of the field exploration and laboratory test programs, combined with interpolation and extrapolation of subsurface conditions between and beyond boring locations. The nature and extent of variations in these conditions may not become evident until construction. If variations are encountered during construction, MJG should be notified so these variations can be reviewed and the recommendations in this report

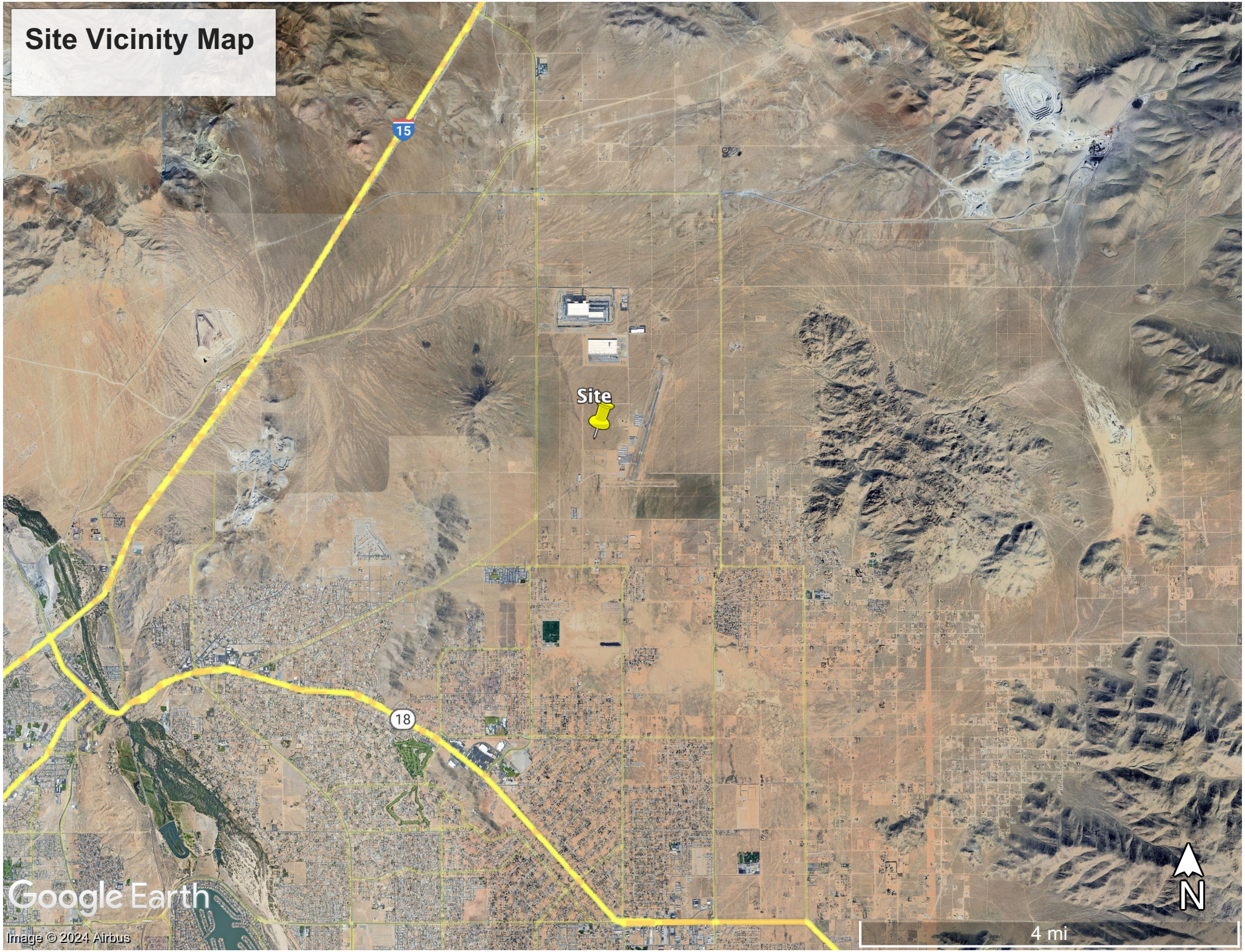
modified if necessary. If changes in the nature, design or location of the structures are planned, these changes should be reviewed by MJG so that modifications to the recommendations in this report can be made if needed.

Our professional services have been performed using the degree of care and skill ordinarily exercised under similar circumstances by reputable engineering consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice or data included in this report. This report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

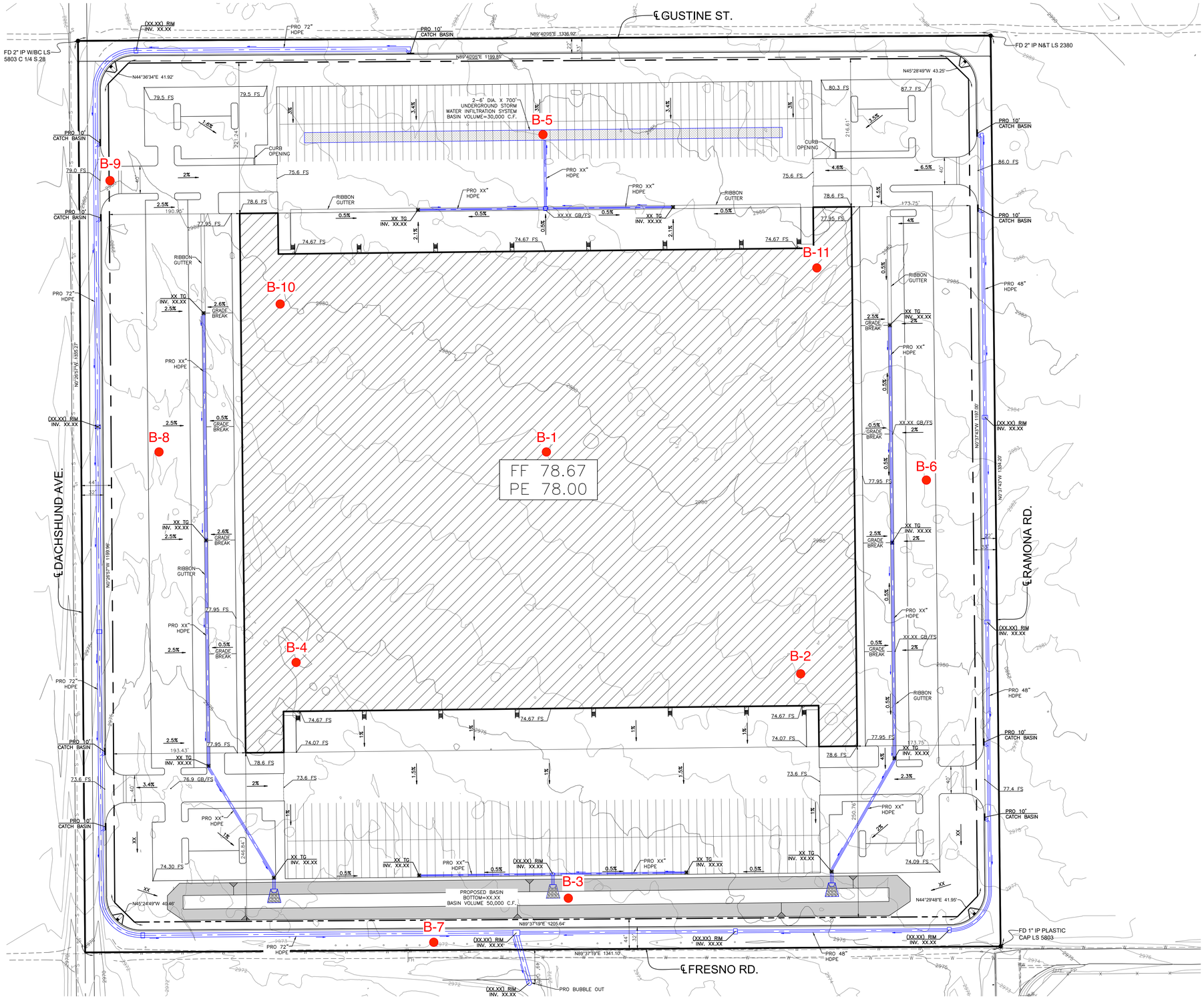
APPENDIX A

Figure 1 – Site Vicinity Map
Figure 2 – Satellite Image of the Project Site
Figure 3 – Conceptual Grading Plan / Boring Plot Plan

Site Vicinity Map




Site Image
Gustine St
APN: 0463-372-21
Dakota Rd
Fresno Rd
Founders Rd
Google Earth
Image © 2024 Airbus
N
1000 ft



811 Know what's below. Call before you dig.

SURVEY MONUMENTATION:

ALL SURVEY MONUMENTS AND MARKERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT IN PLACE UNTIL SURVEYOR HAS TIED OUT LOCATIONS FOR REPLACEMENT PURSUANT TO BUSINESS AND PROFESSIONS CODE SECTION 8700 TO 8805 (LAND SURVEYOR'S ACT).

UNDERGROUND UTILITIES:

THE LOCATIONS AND EXISTENCE OF UNDERGROUND UTILITIES ARE NOT GUARANTEED. THESE DRAWINGS WERE PREPARED BASED ON SURFACE DATA AND AVAILABLE RECORD INFORMATION AND IT IS POSSIBLE THAT ADDITIONAL UNDERGROUND UTILITIES COULD BE PRESENT THAT ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE LOCATION AND DEPTH OF EXISTING UNDERGROUND UTILITIES AND SHALL PERFORM POTHOLING AS NECESSARY AT ALL CROSSINGS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING ALL PRECAUTIONS NECESSARY TO PROTECT ALL EXISTING UTILITIES AND STRUCTURES FROM DAMAGE DURING THE COURSE OF THE WORK, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY UTILITIES OR STRUCTURES DAMAGED DURING THE COURSE OF THE WORK.

BENCHMARK

DESCRIPTION: CSM BENCHMARK 1-23

LOCATION:
1.0 MILES SOUTH ALONG CENTRAL ROAD FROM THE INTERSECTION OF CENTRAL ROAD AND QUARRY ROAD, 166 FEET EAST OF CENTERLINE CENTRAL ROAD, 33 FEET NORTH OF CENTERLINE JOHNSON ROAD, 16 FEET NORTH OF POWER POLE NO. 63127 CEPCO, 0.60 FEET ABOVE GROUND, 6.00 FEET SOUTH OF A WITNESS POST (11/01/70 ORIGINAL DESCRIPTION)

ELEVATION: 3156.94 DATUM:

BASIS OF BEARINGS

CALIFORNIA STATE PLANE COORDINATE SYSTEM ZONE V NAD83

DATE	DELTA	REVISION DESCRIPTION	APPROVAL DATE	APPROVAL BY

MERRELL JOHNSON

MERRELL JOHNSON ENGINEERING, INC.
22221 U.S. HIGHWAY 18, APPLE VALLEY, CA 92307
760 240 8000 | MERRELLJOHNSON.COM

CONCEPTUAL GRADING PLAN

DASCHSHUND & GUSTINE WHEARHOUSE

DRAWN BY: EKJ
DATE: 07/15/24

JOB NO. 4171.001

SHEET 1 OF 1

APPENDIX B

Exploratory Logs

Soil Classification Key

Unified Soil Classification System (USCS) and Particle Size Limits

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Unified Soil Classification System (USCS)

Coarse Grained Soils More Than 50% Is Larger Than No. 200 Sieve	Gravel and Gravelly Soils More Than 50% Retained on No. 4 Sieve	Clean Gravels Little Or No Fines	GW		Well-graded gravels, gravel-sand mixtures, little or no fines
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines
		Gravels w/ Fines Appreciable Amount	GM		Silty gravels, gravel-sand-silt mixtures
			GC		Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils More Than 50% Passing No. 4 Sieve	Clean Sand Little Or No Fines	SW		Well-graded sands, gravelly sands, little or no fines
			SP		Poorly-graded sands, gravelly sands, little or no fines
		Sands w/ Fines Appreciable Amount	SM		Silty-sands, sand-silt mixtures
			SC		Clayey sands, sand-clay mixtures
Fine Grained Soils More Than 50% Is Smaller Than No. 200 Sieve	Silts and Clays Liquid Limit Less Than 50		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic silts and organic silty clays of low placticity
	Silts and Clays Liquid Limit Greater Than 50		MH		Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
	Highly Organic Soils		PT		Peat, humus, swamp soils with high organic contents

Particle Size Limits

Divison	Silt or Clay	Sand			Gravel		Cobbles	Boulders
		Fine	Medium	Coarse	Fine	Coarse		
U.S. Sieve		No. 200	No. 40	No. 10	No. 4	3/4"	3"	12"
Grain (mm)		0.075	0.420	2.00	4.76	19.1	76.2	305

Soils possessing characteristics of two classifications are designated by group symbol combination. Soils may be classified initially using the visual manual procedure prior to laboratory test.

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 2
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B1	**Start Date/Time:**	6/27/24 0835	**End Date/Time:**	6/27/24 1015

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2979
Operator:	V. Zermeno	**Dimensions:**	8" x 50'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Dense, Silty Sand	
	5, 8, 26						Bulk Sample at 0' to 5' - JDA06272401	MD, DS, CR, EI
			2.4	109.1			Tube at 1' - JDA06272402	TD
	40, 50 (5")		4.8	107.0			Tube at 3' - JDA06272403 (One Tube Recovered)	TD
							Very Dense	
5	35 50 (4")		8.6	112.6			Tube at 5' - JDA06272404	TD
							Caliche Present	
10	20, 50 (6")		3.9	113.5			Tube at 10' - JDA06272405	TD, DS
15	28, 38, 42						SPT at 15'	
20	25, 50 (4")						SPT at 20'	
25	25, 50 (3")						SPT at 25'	

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk, =Driven

(2) **DS** =Direct Shear, **EI** =Expansion Index, **SA** =Sieve Analysis, **CR** =Corrosion, **MD** =Max Density, **RV** =R-Value, **AL** =Atterberg Limits, **SE** =Sand Equivalent, **CN** =Consolidation, **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	2 of 2
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B1 (Cont.)	**Start Date/Time:**	6/27/24 0835	**End Date/Time:**	6/27/24 1015

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2979
Operator:	V. Zermeno	**Dimensions:**	8" x 50'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
30	21, 35, 36				SM		SPT at 30'	
35								
40	13, 17, 20				SPSM		SPT at 40' Light Brown, Moist, Dense, Poorly Graded Sand with Silt	
45								
50	17, 39 50 (4")						SPT at 50' Very Dense *Drilling Terminated at Approximately 50'* Groundwater Not Encountered	

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Location No:	B2	**Start Date/Time:**	06/27/24 1035	**End Date/Time:**	6/27/24 1135

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2978
Operator:	V. Zermeno	**Dimensions:**	8" x 25'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Medium Dense, Silty Sand	
	4, 5,						Bulk Sample at 0' to 5' - JDA06272406	SA, MD
	10		2.2	106.2			Tube at 1' - JDA06272407	TD
	50 (6")		2.6	108.3			Tube at 3' - JDA06272408 (One Tube Recovered)	TD
							Very Dense	
5	50 (6")		7.6	113.1			Tube at 5' - JDA06272409 (One Tube recovered)	TD
10	24, 24,		2.6	114.3	SPSM		Tube at 10' - JDA06272410	TD, CN
	50 (6")						Orangish Brown, Dry, Poorly Graded Sand with Sit	
15	50 (6")		3.1	111.1	SM		Tube at 15' - JDA06272411	TD
							Light Brown, Dry, Very Dense, Silty Sand	
20	26,						SPT at 20'	
	50 (5")							
25	33,						SPT at 25'	
	50(6")						*Drilling Terminated at Approximately 25'*	
							Groundwater Not Encountered	

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk, =Driven

(2) **DS** =Direct Shear, **EI** =Expansion Index, **SA** =Sieve Analysis, **CR** =Corrosion, **MD** =Max Density, **RV** =R-Value, **AL** =Atterberg Limits, **SE** =Sand Equivalent, **CN** =Consolidation, **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B3	**Start Date/Time:**	6/27/24 1155	**End Date/Time:**	6/27/24 1200

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2974
Operator:	V. Zermeno	**Dimensions:**	8" x 3'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample 0' to 3' - JDA06272412 *Drilling Terminated at Approximately 3'* Groundwater Not Encountered	SA, SE
5								
10								
15								
20								
25								

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B4	**Start Date/Time:**	6/27/24 1215	**End Date/Time:**	6/27/24 1300

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2975
Operator:	V. Zermeno	**Dimensions:**	8" x25'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Medium Dense, Silty Sand	
	3, 5, 7						Bulk Sample at 0' to 5' - JDA06272413	MD
			2.4	109.4			Tube at 1' - JDA06272414	TD
	7, 17, 13		2.0	108.0			Tube at 3' - JDA06272415 Dense	TD
5	12, 22, 50 (5")		2.6	116.8			Tube at 5' - JDA06272416 Caliche Present, Very Dense	TD, DS
10	50 (5")		5.0	114.9			Tube at 10' - JDA06272417 (One Tube Recovered)	TD
15	50 (6")		3.2	116.3			Tube at 15' - JDA06272418 (One Tube Recovered)	TD
20	9, 14, 44						SPT at 20'	
25	16, 12, 12						SPT at 25' *Drilling Terminated at Approximately 25'* Groundwater Not Encountered	

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B5	**Start Date/Time:**	6/27/24 1430	**End Date/Time:**	6/27/24 1445

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2984
Operator:	V. Zermeno	**Dimensions:**	8" x 10'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand	
5							Bulk Sample at 5' to 10' - JDA06272419	SA, SE, RV
10							*Drilling Terminated at Approximately 10'* Groundwater Not Encountered	
15								
20								
25								

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B6	**Start Date/Time:**	6/27/24 1455	**End Date/Time:**	6/27/2024 1500

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2982
Operator:	V. Zermeno	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample at 0' to 5' - JDA06272420	SA
5							*Drilling Terminated at Approximately 5'* Groundwater Not Encountered	
10								
15								
20								
25								

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B7	**Start Date/Time:**	6/27/24 1510	**End Date/Time:**	6/27/24 1515

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2972
Operator:	V. Zermeno	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample 0' to 5' - JDA06272421	RV
5							*Drilling Terminated at Approximately 5'* Groundwater Not Encountered	
10								
15								
20								
25								

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B8	**Start Date/Time:**	6/27/24 1525	**End Date/Time:**	6/27/24 1530

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2977
Operator:	V. Zermeno	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample at 0' to 5' - JDA06272422	SA
5							Groundwater Not Encountered	
10								
15								
20								
25								

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/27/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B9	**Start Date/Time:**	6/27/24 1540	**End Date/Time:**	6/27/24 1545

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2980
Operator:	V. Zermeno	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample at 0' to 5' - JDA06272423	RV
5							*Drilling Terminated at Approximately 5'* Groundwater Not Encountered	
10								
15								
20								
25								

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/28/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B10	**Start Date/Time:**	6/28/24 0900	**End Date/Time:**	6/28/24 1000

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2980
Operator:	V. Zermeno	**Dimensions:**	8" x 25'	**Groundwater:**	Not Encountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0							Light Brownn, Dry, Medium Dense, Silty Sand	
	4, 7, 21	Bulk					Bulk Sample at 0' to 5' - JDA06282401	CR
		Tube	3.5	104.0			Tube Sample at 1' - JDA06282402	TD
	7, 20, 24	Tube	3.1	117.2			Tube Sample at 3' - JDA06282403	TD
							Dense	
5	32, 50 (4")	Tube	2.5	117.4			Tube Sample at 5' - JDA06282404 (One Tube Recovered)	TD
							Very Dense	
10	50 (5")	Tube	1.7	115.0			Tube Sample at 10' - JDA06282405 (One Tube Recovered)	TD
15	14, 20, 28	Tube					Tube Sample at 15' - JDA06282406	CN
20	26, 50 (6")						SPT at 20'	
25	11, 21, 39						SPT at 25'	
							Drilling Terminated at Approximately 25'	
							Groundwater Not Encountered	

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk, =Driven

(2) **DS** =Direct Shear, **EI** =Expansion Index, **SA** =Sieve Analysis, **CR** =Corrosion, **MD** =Max Density, **RV** =R-Value, **AL** =Atterberg Limits, **SE** =Sand Equivalent, **CN** =Consolidation, **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Report Date:	06/28/24
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street & Dachshund Avenue
Project Location:	Apple Valley, CA
Client:	Terra Nova Planing & Research, Inc.

Location No:	B11	**Start Date/Time:**	6/28/2024 1015	**End Date/Time:**	6/28/24 1115

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2984
Operator:	V. Zermeno	**Dimensions:**	8" x 25'	**Groundwater:**	Not Enncountered
Equipment Type:	GT-16 HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0							Light Brown, Dry, Medium Dense, Silty Sand	
	8, 7, 8	■	1.8	110.3			Tube Sample at 1' - JDA06282407	TD
	32, 44, 50 (5")	■	3.8	110.5			Tube Sample at 3' - JDA06282408	TD
5	30, 50 (5")	■	7.3	114.9			Tube Sample at 5' - JDA06282409	TD
10	20, 40, 50 (4")	■	2.8	113.5			Tube Sample at 10' - JDA06282410	TD, CN
15	50 (3")	■	5.1	116.6			Tube at 15' - JDA06282411 (One Tube Recovered)	TD
20	36, 50 (3")						SPT at 20'	
25	50 (6")						SPT at 25' *Drilling Terminated at Approximately 25'* Groundwater Not Encountered	

Comments: "N" Values based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) ▒ =Bulk ■ =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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APPENDIX C

Laboratory Testing

Particle-Size Analysis of Soil

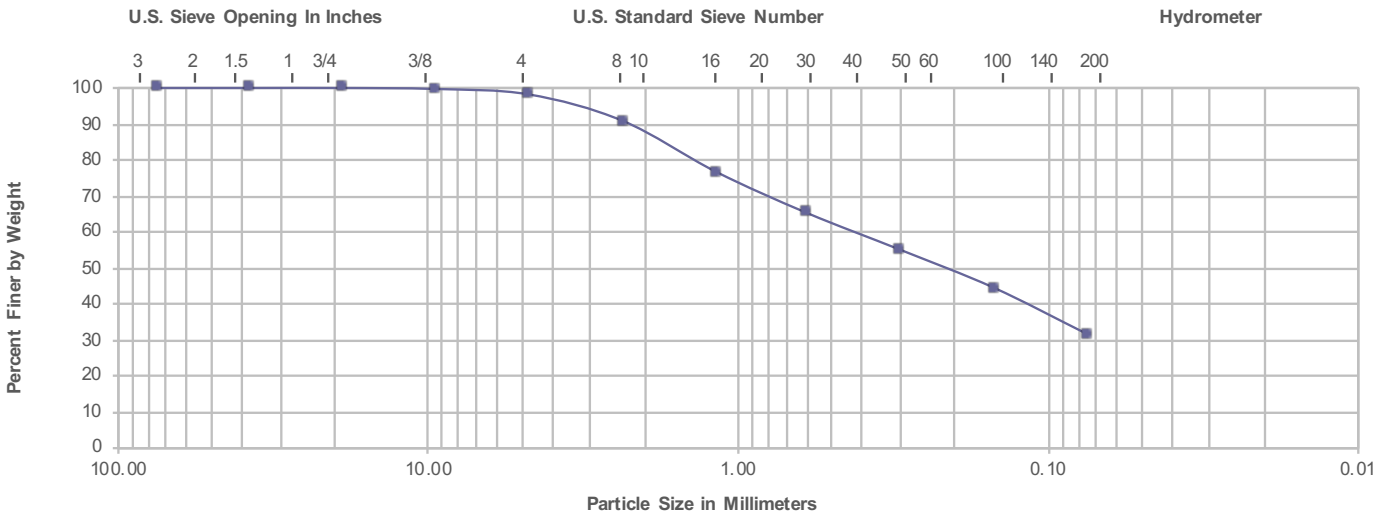
D422, D1140, D2487

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272406 **Gravel** (%): 1.8% **Sand** (%): 66.5% **Fines** (%): 31.7%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Two at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	1.8%	7.216	0.445	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used:	D422, D1140
Size of Initial Dry Mass (g):	466.6
Determination of Dry Mass:	D2216
Particles; Shape, Hardness:	ND
Dispersion Device/Period:	Manual/2 hr
Type & Amount of Agent:	Defloc. & 1.0
Laboratory Comments:	

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

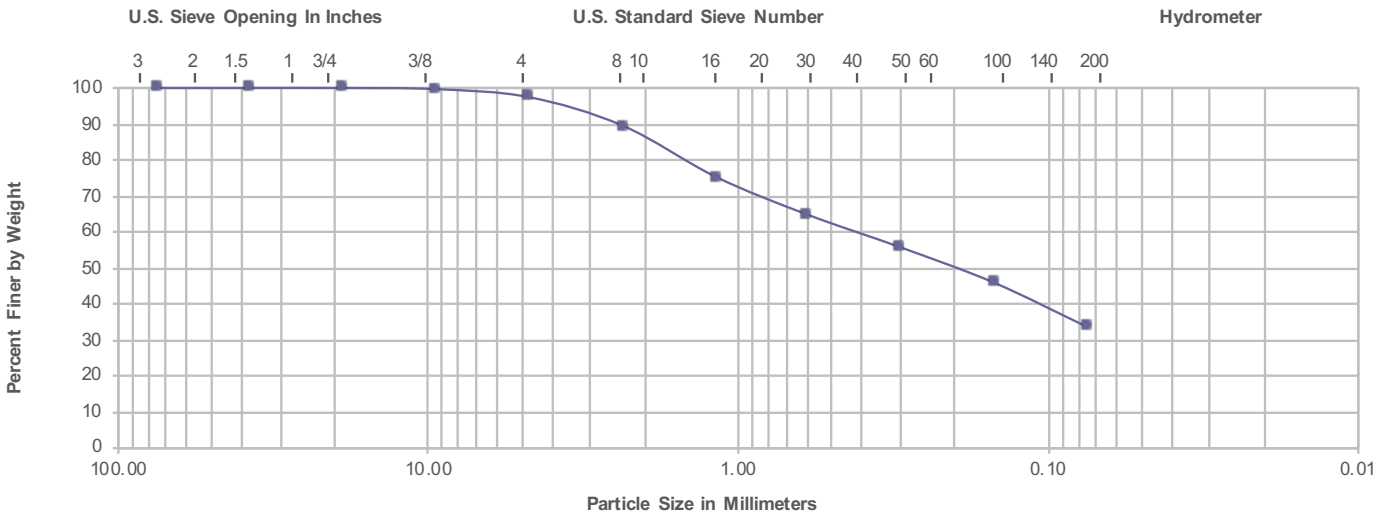
D422, D1140, D2487

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272412 **Gravel** (%): 2.5% **Sand** (%): 63.8% **Fines** (%): 33.7%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Three at 0' to 3'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	2.3%	8.037	0.439	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 498.8
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

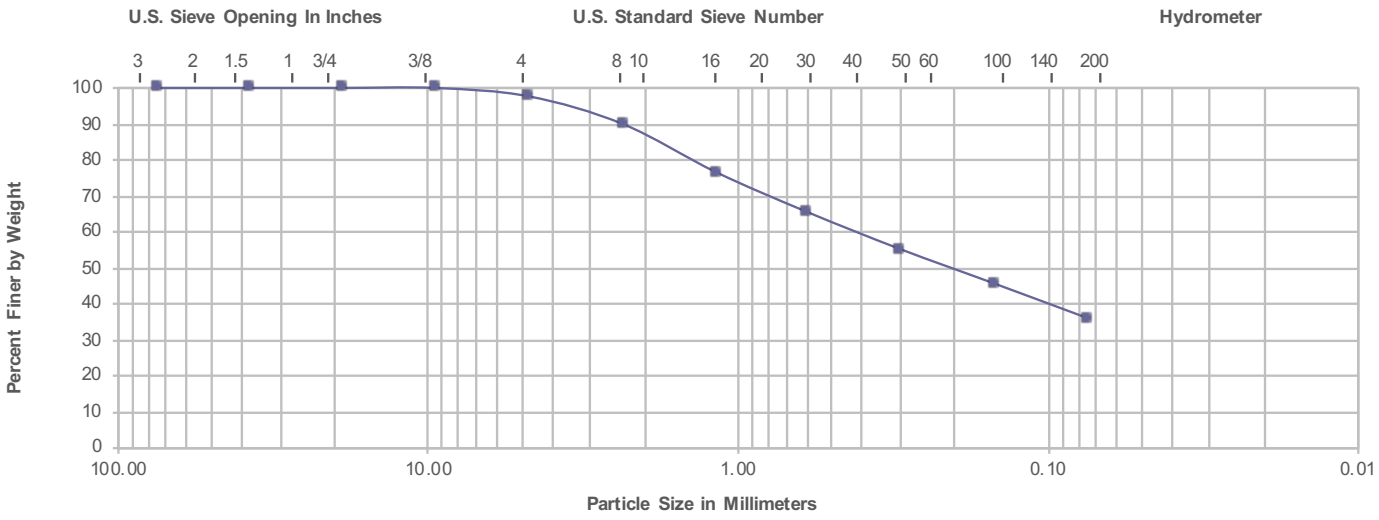
D422, D1140, D2487

Report Date:
Sheet: 1 of 1
Appendix: C
Permit No:
Client Project No:
Other:
DSA File No:
DSA Application No:
DSA LEA No:

Project Number: 24082P1
Project Title: Warehouse, Gustine Street and Dachshund Aveune
Project Location: Apple Valley, CA
Client: Terra Nova Planning & Research, Inc.

Sample ID: JDA06272419 **Gravel (%):** 2.3% **Sand (%):** 61.5% **Fines (%):** 36.2%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Five at 5' to 10'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	5.6%	7.449	0.438	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 522.4
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

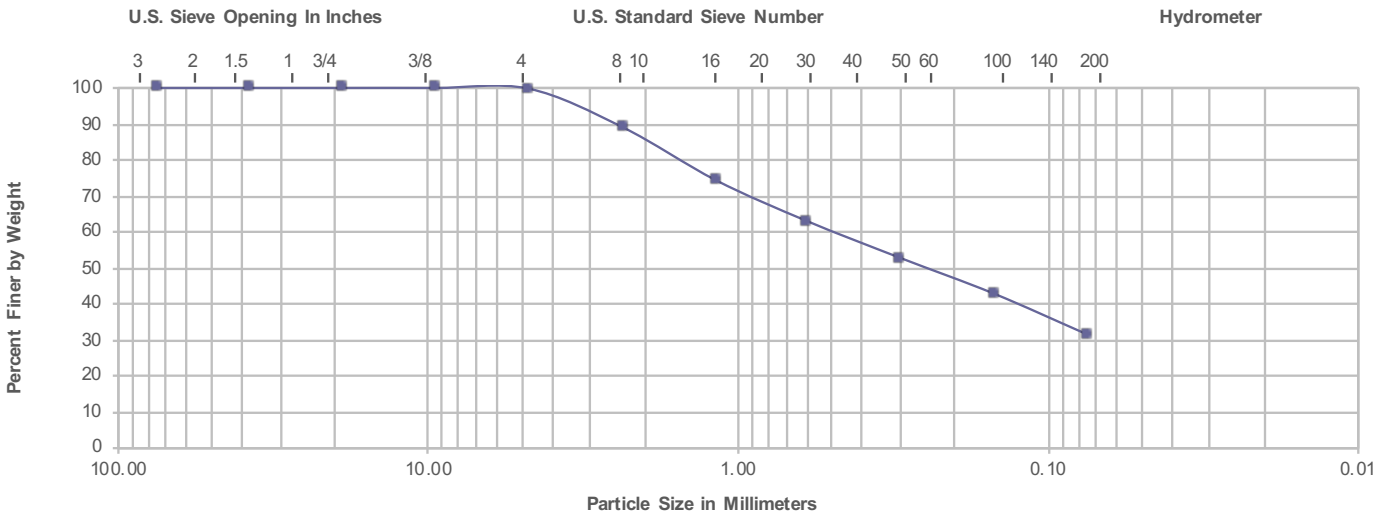
D422, D1140, D2487

Report Date:
Sheet: 1 of 1
Appendix: C
Permit No:
Client Project No:
Other:
DSA File No:
DSA Application No:
DSA LEA No:

Project Number: 24082P1
Project Title: Warehouse, Gustine Street and Dachshund Aveune
Project Location: Apple Valley, CA
Client: Terra Nova Planning & Research, Inc.

Sample ID: JDA06272420 **Gravel** (%): 0.2% **Sand** (%): 68.2% **Fines** (%): 31.6%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Six at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	2.3%	4.791	0.511	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 591.4
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

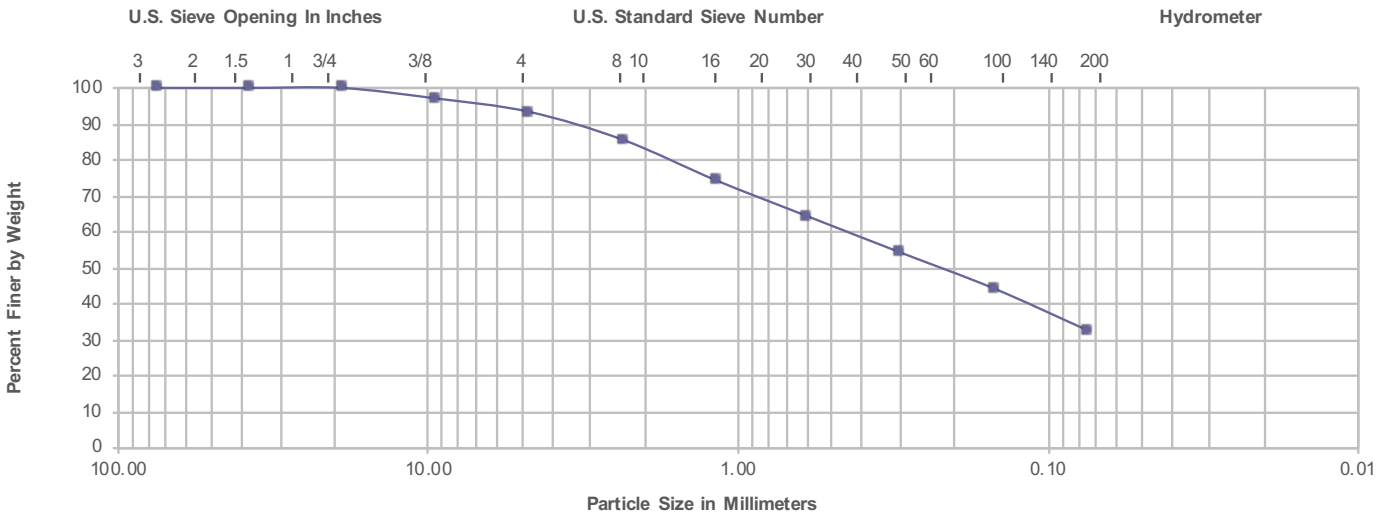
D422, D1140, D2487

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272422 **Gravel** (%): 6.6% **Sand** (%): 60.6% **Fines** (%): 32.8%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Eight at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	3.9%	15.708	0.469	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used:	D422, D1140
Size of Initial Dry Mass (g):	499.0
Determination of Dry Mass:	D2216
Particles; Shape, Hardness:	ND
Dispersion Device/Period:	Manual/2 hr
Type & Amount of Agent:	Defloc. & 1.0
Laboratory Comments:	

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Laboratory Compaction Characteristics

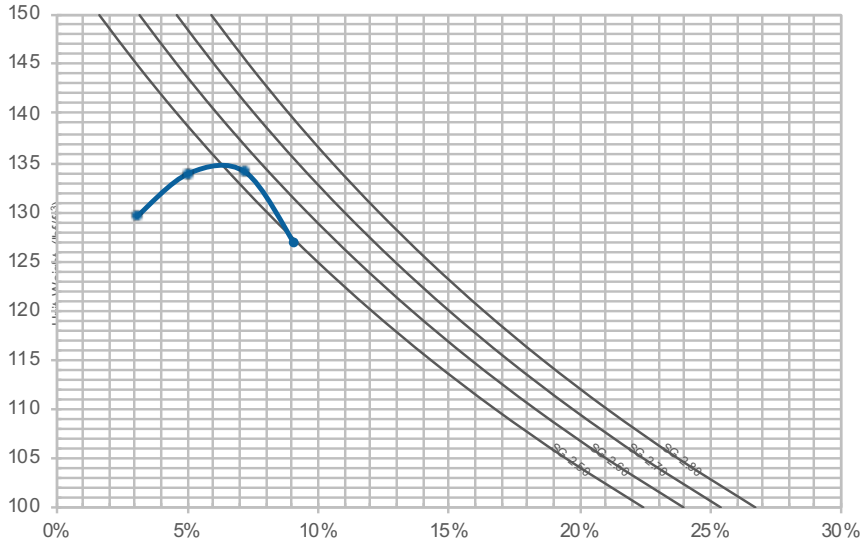
ASTM D1557, D2488

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	*of*
Attachment:	
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA06272401 **Maximum Dry Unit Weight** (lbf/ft³): 134.9 **Optimum Moisture Content** (%): 6.4

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring One at 0' to 5'
Laboratory Remarks:



Tested By:	EJM
Received Moisture:	1.1%
Preparation:	Wet
Specific Gravity:	
SG Method:	
Start Weight (lb):	37.8
Retained on 3/4" (lb):	0.0
Retained on 3/8" (lb):	0.2
Retained on No. 4 (lb):	1.0
Retained on 3/4" (%):	
Retained on 3/8" (%):	0.5%
Retained on No. 4 (%):	2.6%
Oversize Correction:	
Mold Volume Factor:	29.94
Tare Weight (lb):	4.35
Rammer Used:	Mechanical
Method Used:	☑ A ☐ B ☐ C

Weight of Soil and Tare (lb):	8.81	9.05	9.15	8.97
Wet Weight (g):	302.6	307.5	314.2	308.7
Dry Weight (g):	293.6	292.7	293.1	283.0
Moisture Content (%):	3.1%	5.1%	7.2%	9.1%
Dry Unit Weight (flb/ft³):	129.6	133.9	134.1	126.8

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner / Laboratory Manager
Name / Title

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Laboratory Compaction Characteristics

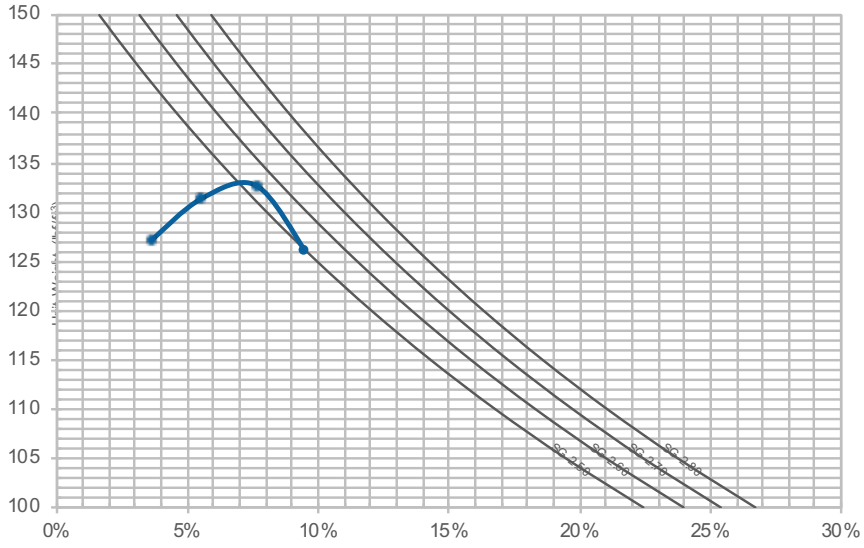
ASTM D1557, D2488

Report Date:
Sheet: *of*
Attachment:
Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Project Number: 24082P1
Project Title: Warehouse, Gustine Street and Dachshund Aveune
Project Location: Apple Valley, CA
Client: Terra Nova Planning & Research, Inc.

Sample ID: JDA06272406 **Maximum Dry Unit Weight** (lbf/ft³): 133.1 **Optimum Moisture Content** (%): 7.2

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring Two at 0' to 5'
Laboratory Remarks:



Tested By:	EJM
Received Moisture:	1.6%
Preparation:	Wet
Specific Gravity:	
SG Method:	
Start Weight (lb):	39.5
Retained on 3/4" (lb):	0.0
Retained on 3/8" (lb):	0.1
Retained on No. 4 (lb):	0.8
Retained on 3/4" (%):	
Retained on 3/8" (%):	0.3%
Retained on No. 4 (%):	2.0%
Oversize Correction:	
Mold Volume Factor:	29.94
Tare Weight (lb):	4.35
Rammer Used:	Mechanical
Method Used:	☑ A ☐ B ☐ C

Weight of Soil and Tare (lb):	8.75	8.98	9.12	8.96
Wet Weight (g):	306.5	305.5	305.2	307.9
Dry Weight (g):	295.8	289.5	283.6	281.2
Moisture Content (%):	3.6%	5.5%	7.6%	9.5%
Dry Unit Weight (flb/ft³):	127.1	131.4	132.7	126.1

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner / Laboratory Manager
Name / Title

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Laboratory Compaction Characteristics

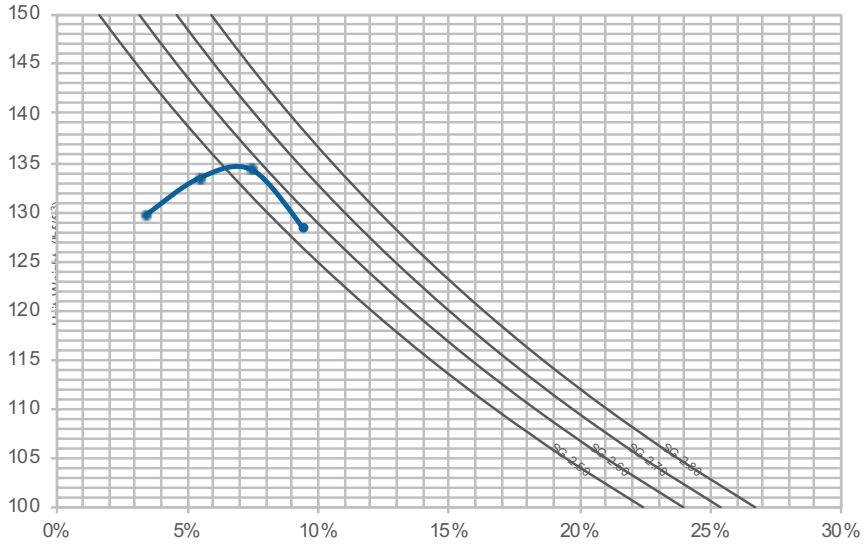
ASTM D1557, D2488

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	*of*
Attachment:	
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA06272413 **Maximum Dry Unit Weight** (lbf/ft³): 134.7 **Optimum Moisture Content** (%): 7.1

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring Four at 0' to 5'
Laboratory Remarks:



Tested By:	EJM
Received Moisture:	1.4%
Preparation:	Wet
Specific Gravity:	
SG Method:	
Start Weight (lb):	37.5
Retained on 3/4" (lb):	0.0
Retained on 3/8" (lb):	0.3
Retained on No. 4 (lb):	1.6
Retained on 3/4" (%):	
Retained on 3/8" (%):	0.8%
Retained on No. 4 (%):	4.3%
Oversize Correction:	
Mold Volume Factor:	29.94
Tare Weight (lb):	4.35
Rammer Used:	Mechanical
Method Used:	☑ A ☐ B ☐ C

Weight of Soil and Tare (lb):	8.83	9.05	9.17	9.04
Wet Weight (g):	303.2	313.7	304.1	309.6
Dry Weight (g):	293.2	297.5	283.0	282.9
Moisture Content (%):	3.4%	5.4%	7.5%	9.4%
Dry Unit Weight (flb/ft³):	129.7	133.5	134.3	128.3

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner / Laboratory Manager
Name / Title

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Expansion Index

ASTM D4829

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA.
Client:	Terra Nova Planning & Research, Inc.

Report Date:
Sheet: 1 *of* 1
Attachment:
Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA06272401 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Classification, ASTM D2487:	(SM) Silty sand
Sample Origin:	Boring One at 0' to 5'
Laboratory Remarks:	
Tested By:	JJB
Method/Procedure:	ASTM D4829

Expansion Index

Value: 0

Expansion Index	Potention Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
> 130	Very High

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner / Laboratory Manager
Name / Title

Sand Equivalent of Soils and Fine Aggregate

ASTM D2419

Report Date:
Sheet: *of*
Attachment:
Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Project Number: 24082P1
Project Title: Warehouse, Gustine Street and Dachshund Aveune
Project Location: Apple Valley, CA
Client: Terra Nova Planning & Research, Inc.

Sample ID: JDA06272412 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription: (SM) Silty sand
Sample Origin: Boring Three at 0' to 3'
Laboratory Remarks:

Tested By: JJB
Mechanical/Manual Shaker: Mechanical

Sand Equivalent Value	Minimum Value Allowable
23	

Ammount/Value Allowable Based On:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner/ Laboratory Manager
Name / Title

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Sand Equivalent of Soils and Fine Aggregate

ASTM D2419

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:
Sheet: *of*
Attachment:
Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA06272419 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription:	(SM) Silty sand
Sample Origin:	Boring Five at 5' to 10'
Laboratory Remarks:	
Tested By:	JJB
Mechanical/Manual Shaker:	Mechanical

Sand Equivalent Value	**Minimum Value Allowable**
17	

Ammount/Value Allowable Based On:

The Material	☐ Was	☐ Was Not	Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested	☐ Met	☐ Did Not Meet	The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner/ Laboratory Manager
Name / Title

R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

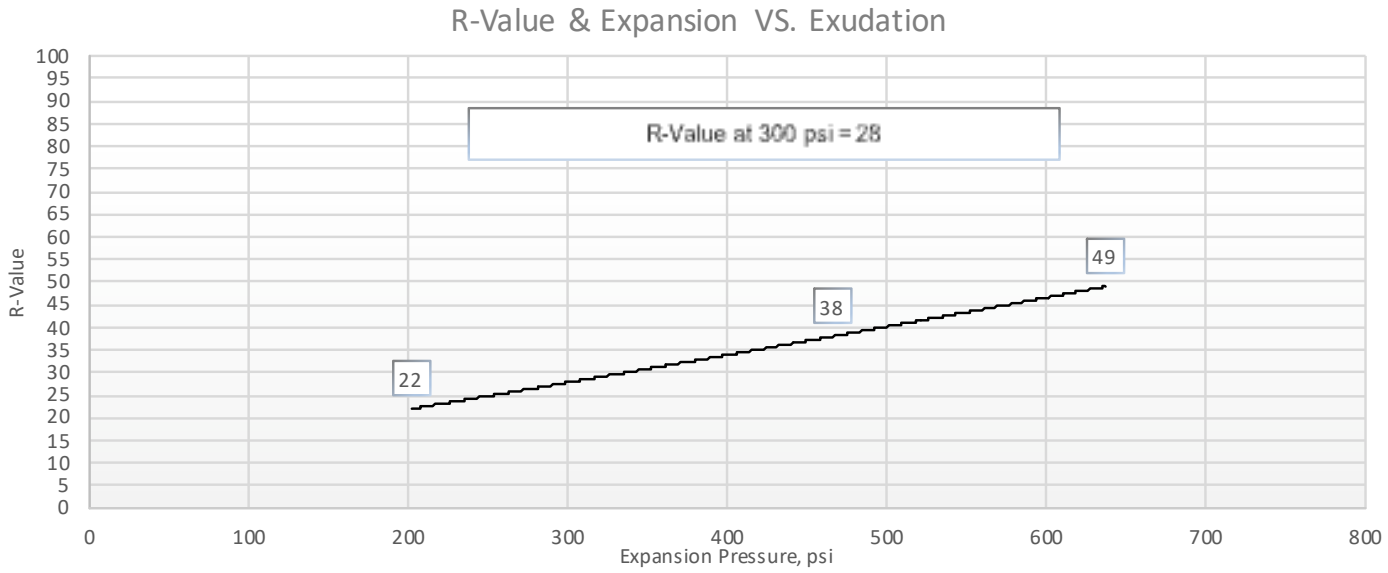
Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 *of* 1
Appendix:	C
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA06272419 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2847:	(SM) Silty sand
Sample Origin:	Boring Five at 5' to 10'
Tested By:	JJB
Value Allowable Based On:	

Briguette Number:	1	2	3
Moisture Content (%):	7.3	8.5	9.2
Dry Density (pcf):	135.6	136.0	130.1
Exudation Pressure (psi):	637	466	202
Expansion Pressure (psf):	0.0000	0.0015	0.0110
R-Value:	49	38	22



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R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

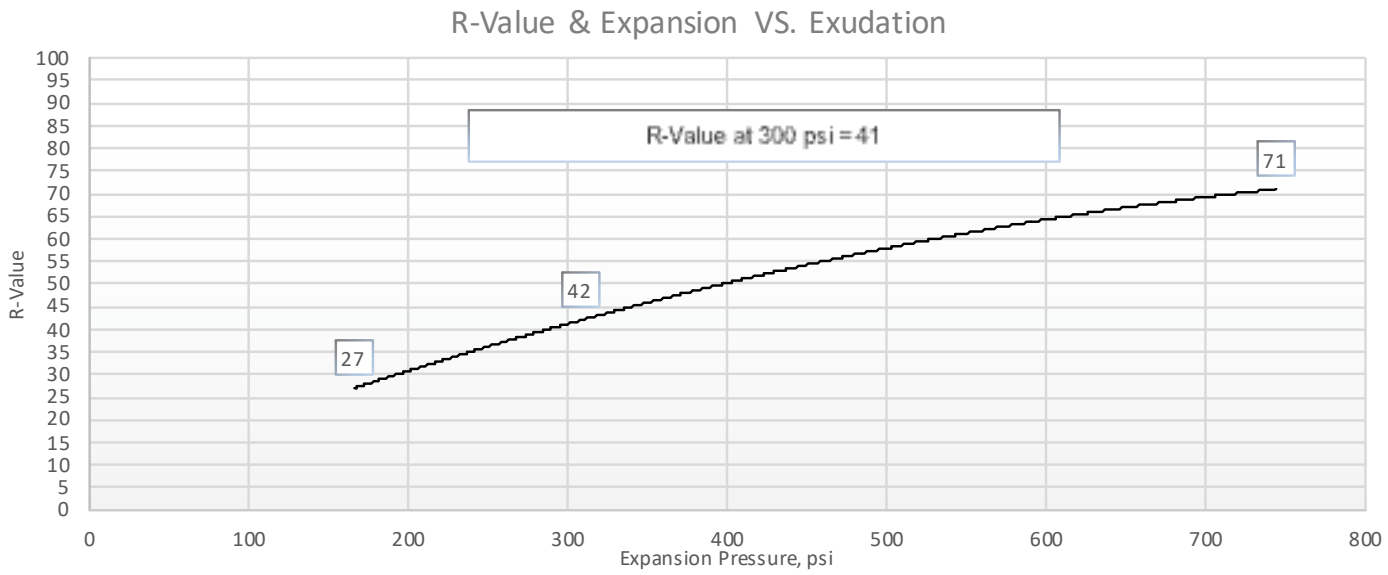
Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 *of* 1
Appendix:	C
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA06272421 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2847:	(SM) Silty sand
Sample Origin:	Boring Seven at 0' to 5'
Tested By:	EJM
Value Allowable Based On:	

Briguette Number:	1	2	3
Moisture Content (%):	7.8	8.4	9.4
Dry Density (pcf):	133.7	134.1	137.4
Exudation Pressure (psi):	744	308	166
Expansion Pressure (psf):	0.0100	0.0000	0.0000
R-Value:	71	42	27



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R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

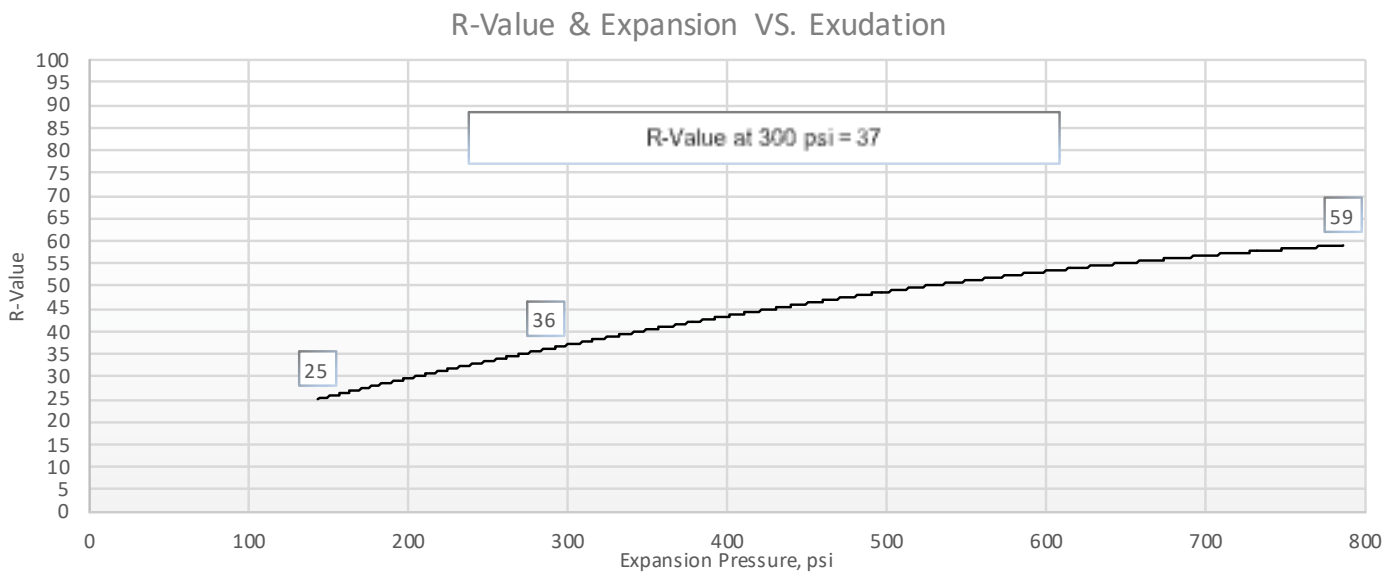
Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 *of* 1
Appendix:	C
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA06272422 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2847:	(SM) Silty sand
Sample Origin:	Boring Eight at 0' to 5'
Tested By:	EJM
Value Allowable Based On:	

Briguette Number:	1	2	3
Moisture Content (%):	9.2	10.3	11.5
Dry Density (pcf):	131.9	130.2	129.3
Exudation Pressure (psi):	786	286	143
Expansion Pressure (psf):	0.0027	0.0000	0.0000
R-Value:	59	36	25



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R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

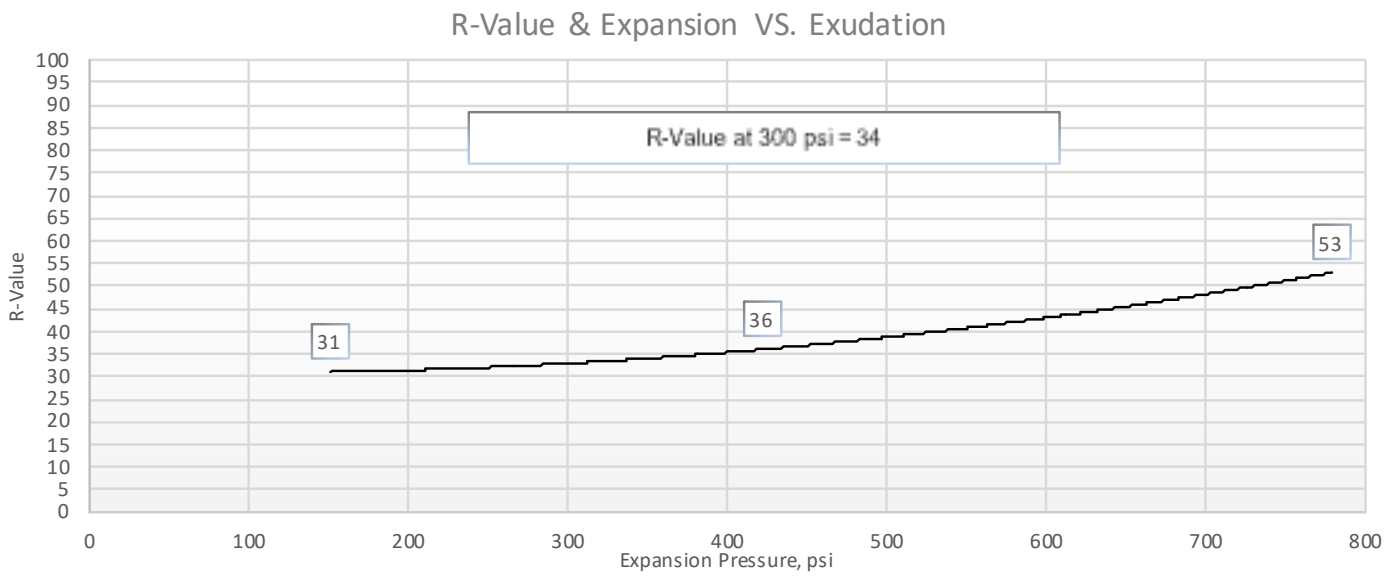
Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 *of* 1
Appendix:	C
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA06272423 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2847:	(SM) Silty sand
Sample Origin:	Boring Nine at 0' ot 5'
Tested By:	JJB
Value Allowable Based On:	

Briguette Number:	1	2	3
Moisture Content (%):	8.3	8.8	7.3
Dry Density (pcf):	134.4	135.7	128.6
Exudation Pressure (psi):	779	422	151
Expansion Pressure (psf):	0.0000	0.0019	0.0000
R-Value:	53	36	31



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Direct Shear Test of Soils

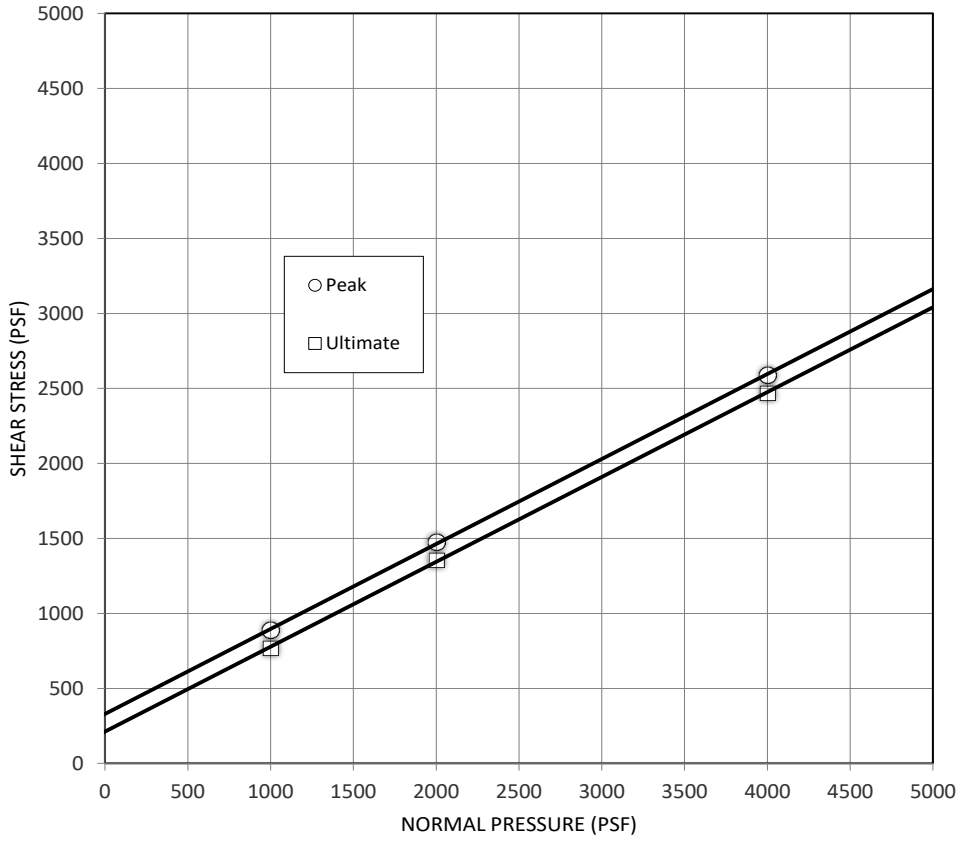
ASTM D3080

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272401 **Angle of Internal Friction** (°)**:** 30 **Peak Cohesion** (psf)**:** 330 **Ultimate Cohesion** (psf)**:** 212

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring One at 0' to 5'
Laboratory Remarks: Sample remolded to 95 % maximum relative density 134.9 (lbf/ft3) and optimum moisture 6.4



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The Material Tested	☐ Met	☐ Did Not Meet	The requirements of the DSA approved documents.

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Direct Shear Test of Soils

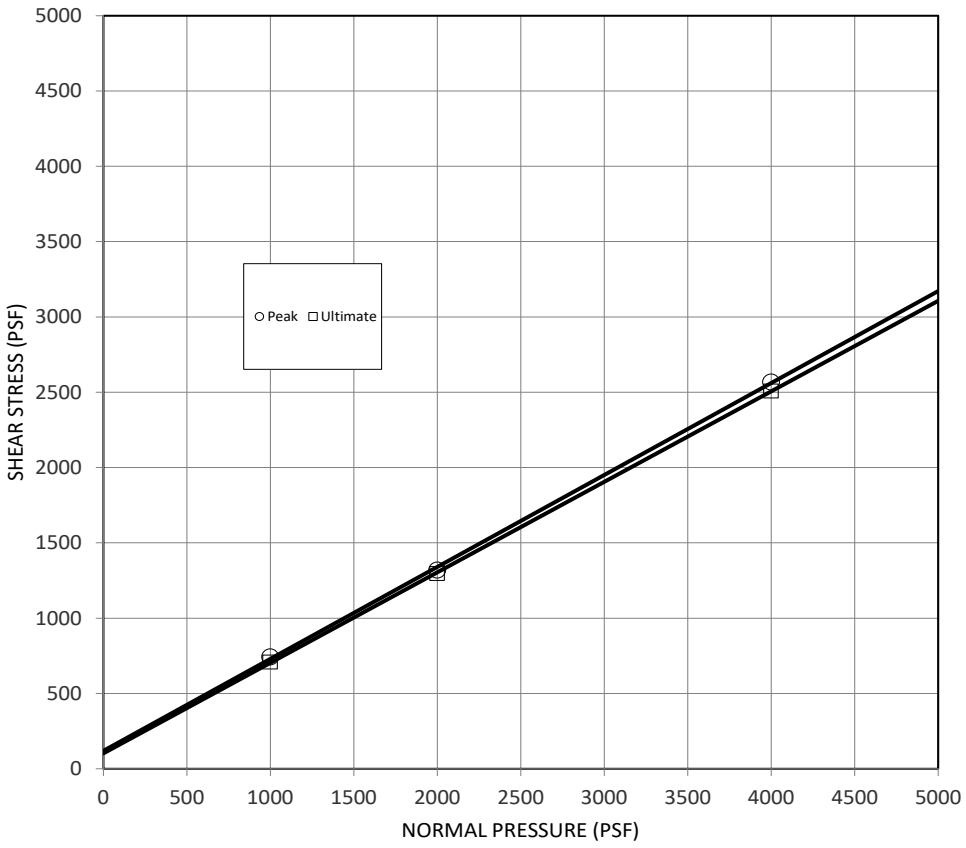
ASTM D3080

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272405 **Angle of Internal Friction** (°)**:** 31 **Peak Cohesion** (psf)**:** 120 **Ultimate Cohesion** (psf)**:** 102

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring One at 10'
Laboratory Remarks: Sample obtained via drive tube per ASTM D3550



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Direct Shear Test of Soils

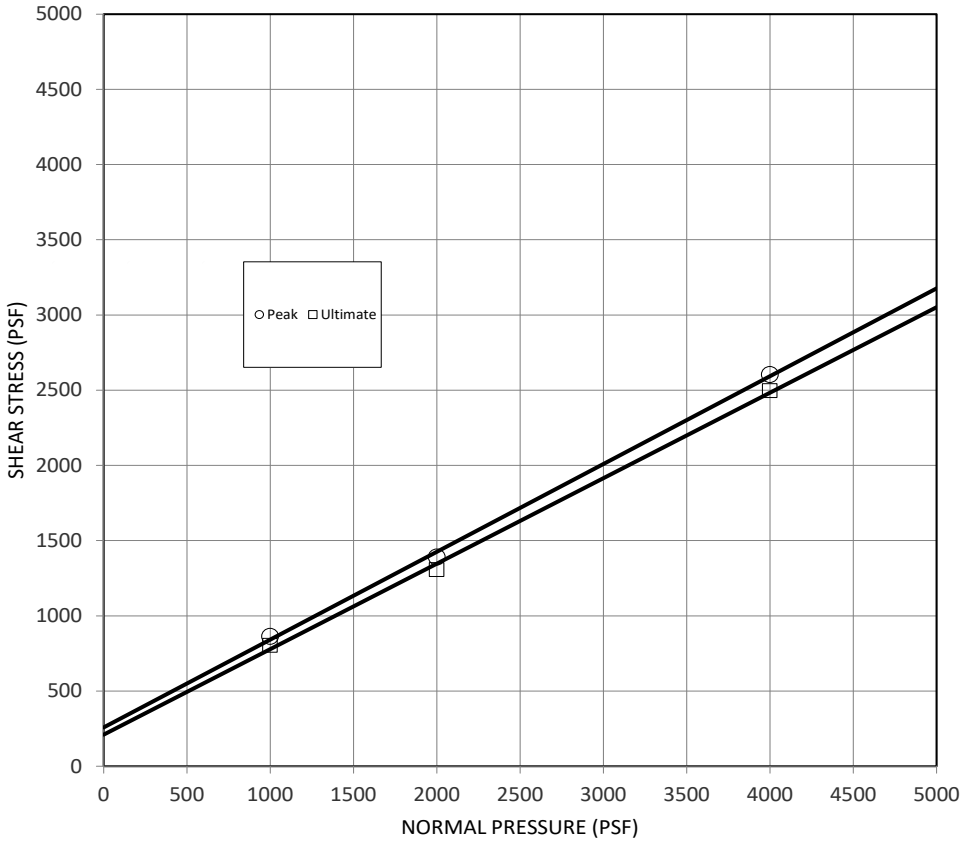
ASTM D3080

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272416 **Angle of Internal Friction** (°)**:** 30 **Peak Cohesion** (psf)**:** 258 **Ultimate Cohesion** (psf)**:** 210

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring Four at 5'
Laboratory Remarks: Sample obtained via drive tube per ASTM D3550



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Consolidation Properties of Soils

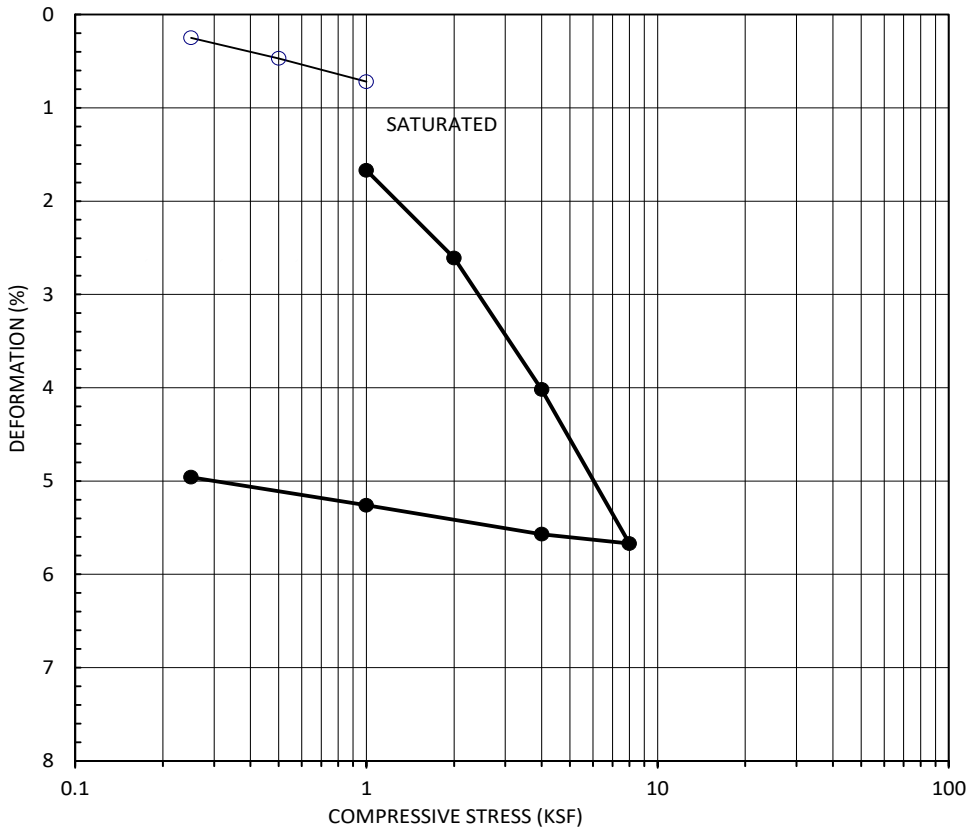
ASTM D2435

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06272410 **Initial Moisture Content** (%)**:** 5.9 **Initial Dry Density** (pcf)**:** 114.6 **Initial Void Ratio:** 0.470

Classification, ASTM D2488:	(SM) Silty sand
Sample Origin:	Boring Two at 10'
Laboratory Remarks:	Sample obtained via drive tube per ASTM D3550



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Consolidation Properties of Soils

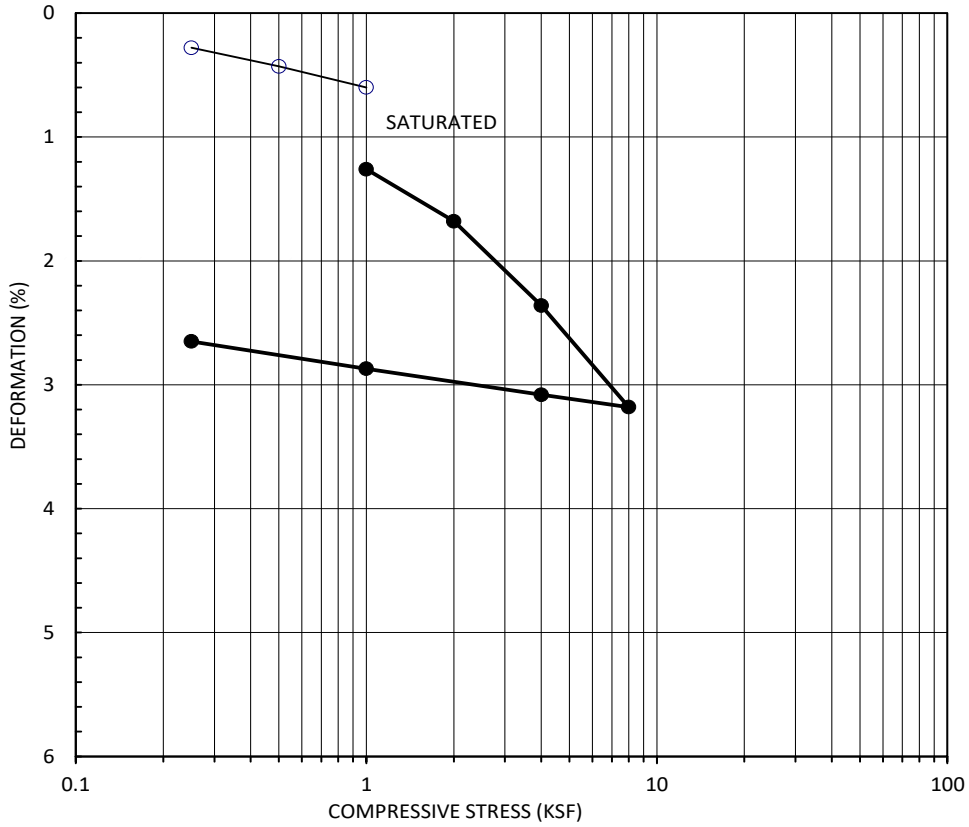
ASTM D2435

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06282406 **Initial Moisture Content** (%)**:** 1.1 **Initial Dry Density** (pcf)**:** 124.2 **Initial Void Ratio:** 0.356

Classification, ASTM D2488:	(SM) Silty sand
Sample Origin:	Boring Ten at 15'
Laboratory Remarks:	Sample obtained via drive tube per ASTM D3550



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Consolidation Properties of Soils

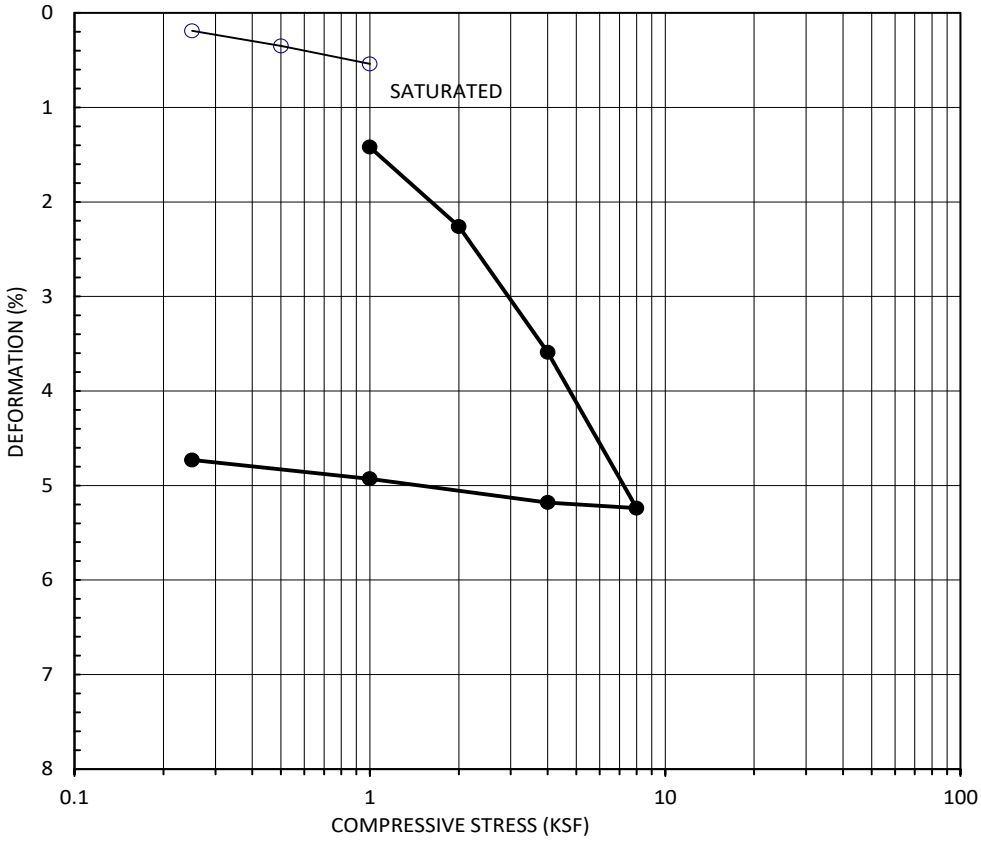
ASTM D2435

Project Number:	24082P1
Project Title:	Warehouse, Gustine Street and Dachshund Aveune
Project Location:	Apple Valley, CA
Client:	Terra Nova Planning & Research, Inc.

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA06282410 **Initial Moisture Content** (%)**:** 2.7 **Initial Dry Density** (pcf)**:** 114.4 **Initial Void Ratio:** 0.473

Classification, ASTM D2488:	(SM) Silty sand
Sample Origin:	Boring Eleven at 10'
Laboratory Remarks:	Sample obtained via drive tube per ASTM D3550



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Corrosion Potential

CT 643, 422, 417, 643

Report Date:
Sheet: 1 of 1
Appendix: C
Permit No:
Client Project No:
Other:
DSA File No:
DSA Application No:
DSA LEA No:

Project Number: 24082P1
Project Title: Warehouse, Gustine Street and Dachshund Aveune
Project Location: Apple Valley, CA
Client: Terra Nova Planning & Research, Inc.

Sample ID: JDA06272401

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring One at 0' to 5'
Laboratory Remarks:

Analysis	Result	Units	Test Method
Minimum Resistivity	5,600	ohm-cm	CT 643
Chloride Content	135	ppm	CT 422
Sulfate Content	0.001	%	CT 417
pH	7.97	pH units	CT 643

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Corrosion Potential

CT 643, 422, 417, 643

Project Number: 24082P1
Project Title: Warehouse, Gustine Street and Dachshund Aveune
Project Location: Apple Valley, CA
Client: Terra Nova Planning & Research, Inc.

Report Date:
Sheet: 1 of 1
Appendix: C
Permit No:
Client Project No:
Other:
DSA File No:
DSA Application No:
DSA LEA No:

Sample ID: JDA06282401

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Ten at 0' to 5'
Laboratory Remarks:

Analysis	Result	Units	Test Method
Minimum Resistivity	6,700	ohm-cm	CT 643
Chloride Content	165	ppm	CT 422
Sulfate Content	0.001	%	CT 417
pH	7.82	pH units	CT 643

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