



February 16, 2024

Project No. 24031.1

Mr. Daniel Patneaude
DRP Enterprises, LLC
PO Box 4428
Palm Springs, CA 92263

Subject: Percolation Investigation Report
Proposed Industrial Building
APN: 648-110-013, Thousand Palms, County of Riverside,
California

Dear Mr. Patneaude:

In accordance with your request and authorization, we are presenting the results of our percolation investigation for the proposed single-family residence Onsite Wastewater Treatment System (OWTS) located at APN: 648-110-013, Thousand Palms, County of Riverside, California. The purpose of this investigation has been to evaluate the subsurface conditions at the site and to provide geotechnical recommendations and percolation test data for design and construction of proposed OWTS.

Based on our findings, the proposed project is geotechnically feasible, provided that the recommendations in this report are incorporated into the design and are implemented during construction of the project. This report was prepared in accordance with the requirements of the 2022 California Plumbing Code and the County of Riverside.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report or if we can be of further service, please do not hesitate to contact the undersigned at (657) 888-4608 or info@ntsgeo.com.

Respectfully submitted,
NTS GEOTECHNICAL, INC.

A handwritten signature in blue ink, appearing to read "Nadim Sunna", is written over a light blue horizontal line.

Nadim Sunna, M.Sc., Q.S.P, P.E., G.E. 3172
Principal Engineer



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	Plate 2 – Plot Plan
	Appendix A – Field Exploration
	Appendix B – Geotechnical Laboratory Test Result
	Appendix C – Percolation Test Result

INTRODUCTION

This report presents the results of our percolation testing performed for the proposed installation of an OWTS as part of the construction of new industrial building located at APN: 648-110-013, Thousand Palms, County of Riverside, California. See (Plate 1, Location Map). The purpose of this study has been to evaluate the subsurface conditions at the site and to provide geotechnical recommendations related to the design and construction of the proposed septic system.

SITE AND PROJECT DESCRIPTION

The project site is located at APN: 648-110-013, Thousand Palms, County of Riverside, California. The lot is bound by vacant lots to the north, east, south, and west. There is a dirt road on the western end of the property leading to Rio del Sol. The site is currently vacant with native plants. Where the proposed building is planned, the site elevation has a difference of about 7 feet from the northeast corner to the southwest corner of the building pad. The building pad is planned to receive a cut of about 3 feet on the northeast and a fill of about 5 feet on the southwest. Where the leachlines are planned the difference in elevation is about 2 feet from northeast to southwest over a distance is about 80 feet, which is approximately 2.5% slope. Additionally, a future levee is planned to be constructed at the northeastern corner of the lot, the levee will be over 800 feet away from the proposed leachline location.

It is our understanding that the proposed project will consist construction of one-story industrial building.

SCOPE OF WORK

As part of the preparation of this report, we have performed the following tasks:

Background Review

We reviewed readily available background data including in-house geologic maps, topographic maps, and aerial photographs relevant to the subject site in preparation of this report. The list of documents reviewed is presented in the "References" section of this report.

Field Exploration

The subsurface conditions were evaluated on January 17, 2024, by advancing two (2) 8-inch diameter, hollow-stem-auger borings. The borings were advanced to depths ranging from 10 and 15 feet below the existing grade and four percolation holes drilled to a depth of 4 feet below the existing grade. The approximate locations of the borings and percolation holes are shown on Plate 2,

Geotechnical Map. Detailed exploration information of soils borings is presented in Appendix A, Field Exploration.

Geotechnical Laboratory Testing

Laboratory testing was performed on selected samples obtained from the boring in order to aid in the soil classification and to evaluate the engineering properties of the foundation soils. The following tests were performed in general accordance with ASTM standards:

- In-situ moisture and density
- Grain Size Analysis
- Direct shear
- Consolidation

Laboratory test results are presented within Appendix B of this report.

GEOLOGIC FINDINGS

Subsurface Materials

Earth materials encountered during our subsurface investigation consist of alluvium (Qa) extending to the total depth of the exploration. In general, the alluvium consists of tan to brown, dry to damp, loose to dense, sand.

Groundwater

Groundwater was not observed during our exploration to a maximum depth of 15 feet below the existing grade. Groundwater conditions may vary across the site due to stratigraphic and hydrologic conditions and may change over time as a consequence of seasonal and meteorological fluctuations, or activities by humans at this site and nearby sites. However, based on the above findings, groundwater is unlikely to impact the proposed septic system and it is well below the minimum requirement of 10 feet below the proposed seepage pit in accordance with the City of Rancho Cucamonga requirement.

GEOTECHNICAL ENGINEERING FINDINGS

Expansive Soil

Based on our evaluation, laboratory testing and experience with similar material types, the soils encountered near the ground surface at the site exhibit a very low to low expansion potential.

Percolation Testing

Four percolation tests were performed for the proposed leachline location. The percolation test holes were excavated using an 8-inch diameter hollow-stem-auger boring. The test holes were excavated and prepared in general accordance with the County of Riverside, Local Agency Management Program for Onsite Wastewater Treatment Systems.

Measurement of the Percolation Rate: Readings were attempted in 10-minute intervals based on the sandy soil criteria. Our percolation test results are presented within Appendix C of this report.

Excavation Characteristics

The majority of the soil materials underlying the site can be excavated with excavators and other conventional grading equipment.

GEOTECHNICAL ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of our field exploration and engineering analyses, it is our opinion that the proposed septic system is feasible from a geotechnical standpoint, provided that the recommendations in this report are incorporated into the design plans and are implemented during construction.

Site Percolation Suitability

Based on our review of available geologic information, our recent subsurface investigation, review of available data for the site vicinity, and our evaluation, we note the following:

- Groundwater was not encountered during our subsurface investigation to a maximum depth of 15 feet below the existing grade. The minimum separation between groundwater and bottom of OWTS is greater than 10 feet.
- Due to the lack of steep slopes on the site, the potential for slope instability and saturation is considered low.
- The soil conditions as encountered within the exploratory borings and test holes were generally uniform. The subsurface native soils generally consist of sandy soil. The soil conditions should be considered favorable.

- Results were generally as anticipated, based on the classification of the soils encountered.

Leach Lines Design Recommendations

Based on our percolation testing and our groundwater findings, we recommend the following:

- The recommended percolation rates for the proposed leachlines is determined to be 6.7 minutes per inch (mpi).
- Based on our understand use of the building (industrial building) and the number of fixtures provided by the project designer (55), the septic system should be designed for a minimum tank size of 2,250 gallons.
- Based on the percolation rate of 6.7 minutes per inches, the minimum absorption area is 20 square feet per 100 gallons of septic tank, we a recommend a minimum of 2 trenches that 3 feet deep, and minimum length of 32 feet per trench.
- The planned leach lines and septic tank should maintain the setbacks as provided in Table 5.5 of the County of Riverside, Local Agency Management Program for Onsite Wastewater Treatment Systems.
- The leach lines should be located in natural, undisturbed soil at the recommended depth. No grading shall be performed in the proposed sewage disposal area.
- The sewer disposal system should be properly maintained in order to increase the useful life, applicability and effectiveness of the disposal system.
- Underground pipes and soil porosity can be damaged by driving vehicles over the area repeatedly. Additionally, vegetation over the disposal system area should not be irrigated.

Temporary Excavations

Temporary excavations for the demolishing, earthwork, footing and utility trench are expected. We anticipate that unsurcharged excavations with vertical side slopes less than 4 feet high will generally be stable.

Where the space is available, temporary, unsurcharged excavation sides over 4 feet in height should be sloped no steeper than an inclination of 1H:1V (horizontal:vertical). Where sloped excavations are created, the tops of the

slopes should be barricaded so that vehicles and storage loads do not encroach within 10 feet of the top of the excavated slopes. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes. NTS should be advised of such heavy vehicle loadings so that specific setback requirements can be established. If the temporary construction slopes are to be maintained during the rainy season, berms are recommended to be graded along the tops of the slopes in order to prevent runoff water from entering the excavation and eroding the slope faces. Where space for sloped excavations is not available, temporary shoring may be utilized.

If the temporary construction slopes are to be maintained during the rainy season, berms are recommended to be graded along the tops of the slopes in order to prevent runoff water from entering the excavation and eroding the slope faces. Where space for sloped excavations is not available, temporary shoring may be utilized. Personnel from NTS should observe the excavation so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgments. Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and site construction will be identical to those observed, sampled, and interpreted during our study, or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of geotechnical conditions and their probable influence on the grading and use of the property.

Our conclusions and recommendations are based on the assumption that our firm will act as the geotechnical engineer of record during construction and grading of the project to observe the actual conditions exposed, to verify our design concepts and the grading contractor's general compliance with the project geotechnical specifications, and to provide our revised conclusions and recommendations should subsurface conditions differ significantly from those used as the basis for our conclusions and recommendations presented in this report. Since our conclusions and recommendations are based on a limited amount of current and previous geotechnical exploration and analysis, all parties

should recognize the need for possible revisions to our conclusions and recommendations during grading of the project.

It should be further noted that the recommendations presented herein are intended solely to minimize the effects of post-construction soil movements. Consequently, minor cracking and/or distortion of all on-site improvements should be anticipated.

This report has not been prepared for the use by other parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.



LOCATION MAP

NTS
GEOTECHNICAL

Date: February 5, 2024

Project No.: 24031

Plate
1

APPENDIX A

Field Exploration

Appendix A

Field Exploration

The subsurface exploration program for the proposed project consisted of advancing two (2) 8-inch-diameter, hollow-stem-auger drill rig borings at the subject site. The borings were advanced to depths ranging from 10 to 15 feet below the existing grade. The logs are presented within Appendix A.

The Boring Logs are presented as Figures A-2 to A-3. The Boring Logs describe the earth materials encountered, samples obtained, and show the field and laboratory tests performed. The log also shows the boring number, drilling date, and the name of the logger and drilling subcontractor. The borings were logged by an engineer using the Unified Soil Classification System. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual. Drive and bulk samples of representative earth materials were obtained from the borings.

Disturbed samples were obtained using a Standard Penetration Sampler (SPT). This sampler consists of a 2-inch O.D., 1.4-inch I.D. split barrel shaft that is advanced into the soil at the bottom of the drilled hole a total of 18 inches. The number of blows required to drive the sampler 18 inches is presented on the boring logs. Soil samples obtained by the SPT were retained in plastic bags. A California modified sampler was used to obtain drive samples of the soil encountered. This sampler consists of a 3-inch outside diameter (O.D.), 2.4-inch inside diameter (I.D.) split barrel shaft that was driven a total of 12-inches into the soil at the bottom of the boring by a safety hammer weighing 140 pounds at a drop height of approximately 30 inches. The soil was retained in brass rings for laboratory testing. Additional soil from each drive remaining in the cutting shoe was usually discarded after visually classifying the soil. The number of blows required to drive the sampler 18 inches is presented on the boring logs.

Upon completion of the borings, the boreholes were backfilled with soil from the cuttings.

Project: **APN 648-110-013**
 Project Location: **APN 648-110-013,
 Thousand Palms**
 Project Number: **24031**



Key to Log of Boring Sheet 1 of 1

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9

COLUMN DESCRIPTIONS

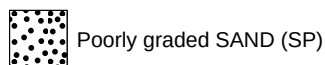
- | | |
|--|---|
| <p>1 Depth (feet): Depth in feet below the ground surface.</p> <p>2 Sample Type: Type of soil sample collected at the depth interval shown.</p> <p>3 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.</p> <p>4 Material Type: Type of material encountered.</p> <p>5 Graphic Log: Graphic depiction of the subsurface material encountered.</p> | <p>6 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.</p> <p>7 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.</p> <p>8 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.</p> <p>9 REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.</p> |
|--|---|

FIELD AND LABORATORY TEST ABBREVIATIONS

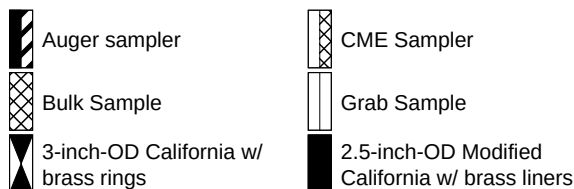
CHEM: Chemical tests to assess corrosivity
 COMP: Compaction test
 CONS: One-dimensional consolidation test
 LL: Liquid Limit, percent

PI: Plasticity Index, percent
 SA: Sieve analysis (percent passing No. 200 Sieve)
 UC: Unconfined compressive strength test, Qu, in ksf
 WA: Wash sieve (percent passing No. 200 Sieve)

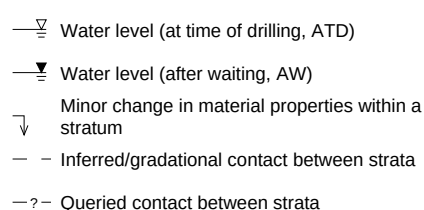
MATERIAL GRAPHIC SYMBOLS



TYPICAL SAMPLER GRAPHIC SYMBOLS



OTHER GRAPHIC SYMBOLS



GENERAL NOTES

- Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
- Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Figure A-1

Project: APN 648-110-013		Log of Boring B-1 Sheet 1 of 1
Project Location: APN 648-110-013, Thousand Palms		
Project Number: 24031		

Date(s) Drilled 1/17/2023	Logged By IJV	Checked By NS
Drilling Method Hollow Stem Auger	Drill Bit Size/Type 8"	Total Depth of Borehole 15 feet
Drill Rig Type CME 75	Drilling Contractor OWD	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California, SPT	Hammer Data 140-lb Autohammer
Borehole Backfill Native	Location APN 648-110-013, Thousand Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP		ALLUVIUM (Qa): SAND, tan to brown, fine to coarse-grained sand, some pebbles, loose, dry	2	107	
5		4	SP		SAND to SILTY SAND, tan to brown, few pebbles, loose			
10		50/6"	SP		dense, dry	2	85	
15		16	SP		some pebbles, few cobbles, medium dense			
					Total Depth = 15 feet Groundwater not encountered Backfilled with native			
20								
25								
30								

Figure A-2

Project: APN 648-110-013		Log of Boring B-2 Sheet 1 of 1
Project Location: APN 648-110-013, Thousand Palms		
Project Number: 24031		

Date(s) Drilled 1/17/2023	Logged By IJV	Checked By NS
Drilling Method Hollow Stem Auger	Drill Bit Size/Type 8"	Total Depth of Borehole 10 feet
Drill Rig Type CME 75	Drilling Contractor OWD	Approximate Surface Elevation N/A
Groundwater Level and Date Measured Not Encountered	Sampling Method(s) Modified California, SPT	Hammer Data 140-lb Autohammer
Borehole Backfill Native	Location APN 648-110-013, Thousand Palms	

Depth (feet)	Sample Type	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
0			SP		ALLUVIUM (Qa): SAND, tan to brown, fine to coarse-grained sand, few cobbles, medium dense			
10		10						
5		15	SP		SAND to SILTY SAND, tan to brown, medium dense, damp	5	98	
10		15	SP		medium dense Total Depth = 10 feet Groundwater not encountered Backfilled with native			
15								
20								
25								
30								

Figure A-3

APPENDIX B

Laboratory Testing Data

Appendix B

Geotechnical Laboratory Testing

Laboratory Moisture Content and Density Tests

The moisture content and dry densities of selected driven samples obtained from the exploratory boring was evaluated in general accordance with the latest version of ASTM D 2937. The test results are presented on the log of the exploratory boring in Appendix A.

No. 200 Wash Sieve

The number of fines passing the No. 200 sieve was evaluated by the wash sieve. The test procedure was in general accordance with ASTM D 1140. The results are attached to this Appendix B.

Boring No.	Depth (ft)	Fines Passing No. 200, %
B-1	5	7.0
B-2	2	5.0

Direct Shear Tests

Direct shear tests were performed on selected remolded and relatively undisturbed soil samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of the materials. The samples were inundated during shearing to represent adverse field conditions. Direct shear test results are attached to Appendix B.

Consolidation Test

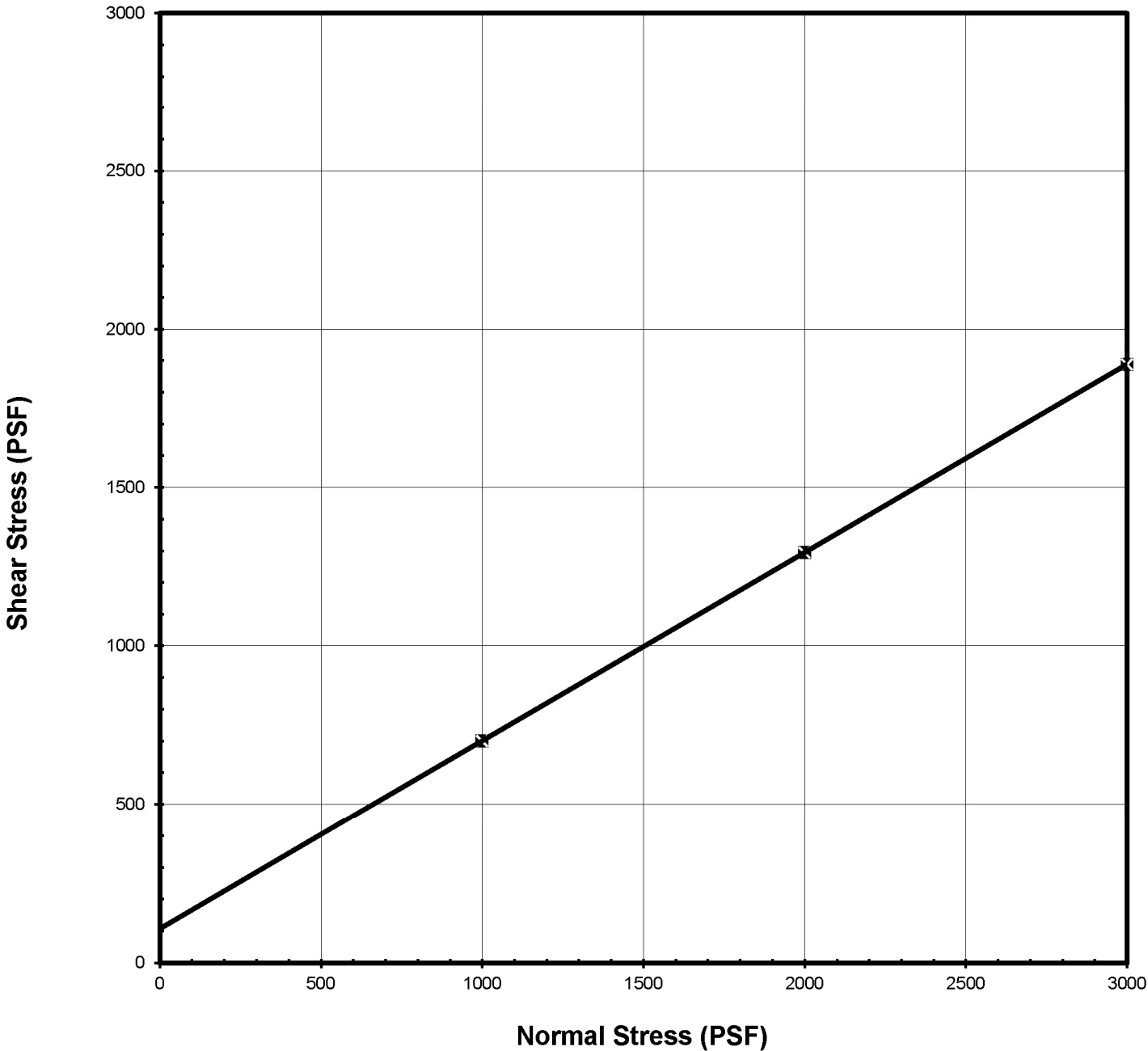
Consolidation tests was performed on a selected driven soil sample in general accordance with the latest version of ASTM D2435. The sample was inundated during testing to represent adverse field conditions. The percent consolidation for each load cycle was recorded as a ratio of the amount of vertical compression to the original height of the sample. Consolidation testing results are attached to this Appendix B.

Direct Shear Test Diagram (D-3080)

PLATE: S-1
P.N. 24031

Sample Description	Sample Identification	Test Type	Sample Test State	Number of Passes
Qa	B-1 @ 2.0'	Ultimate	Saturated	1

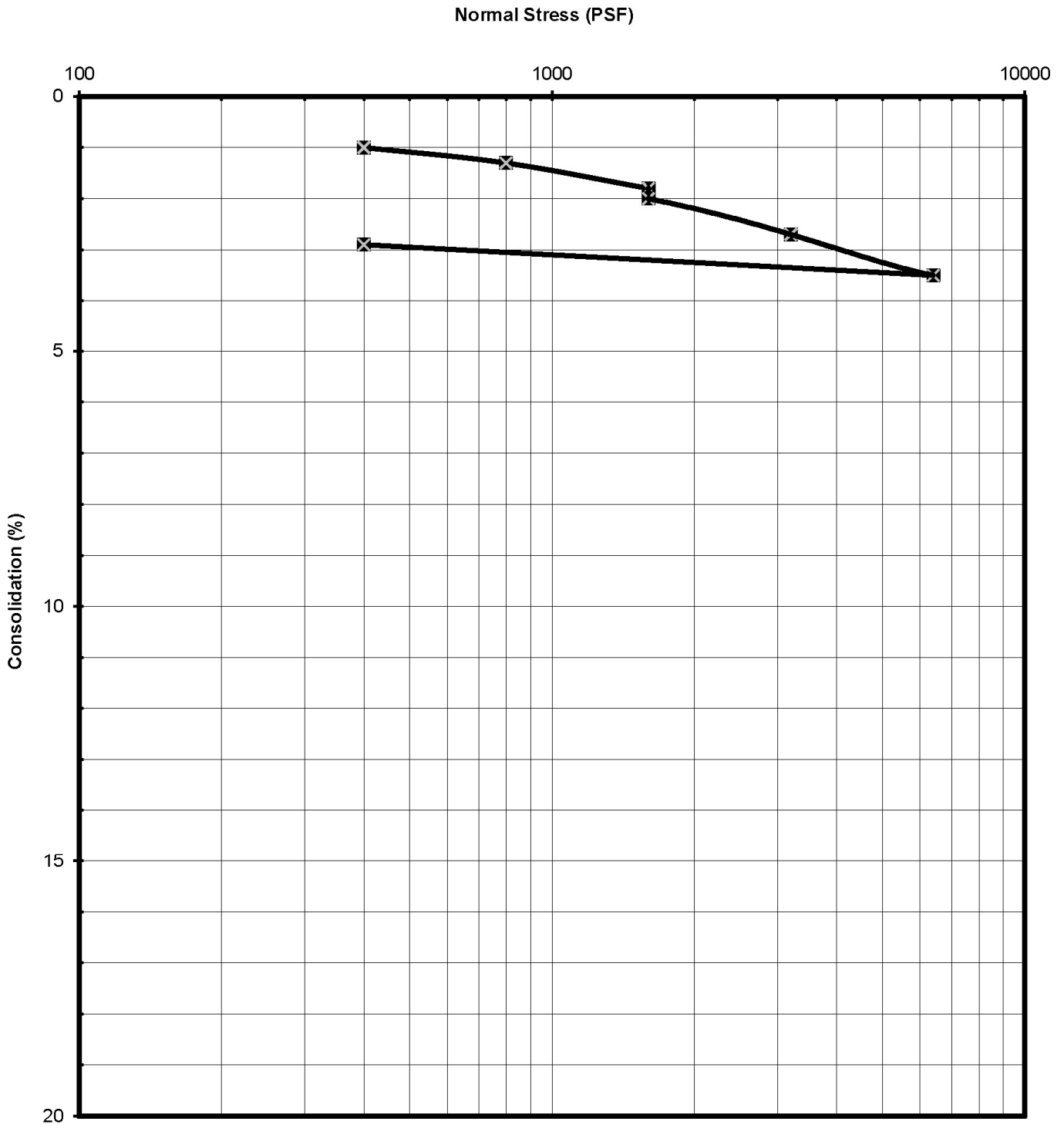
Soil Dry Density (PCF)	107	Shear Strength Values:	
Soil Moisture Content (%)	20.5	Phi (Degrees)	30.7
Soil Saturation (%)	99.6	Cohesion (PSF)	107.7



Consolidation Pressure Curve (D-2435)

Sample Identification	Sample Description
B-2 @ 5.0'	Qa

PLATE: C-1
P.N. 24031



APPENDIX C

Percolation Testing Data



Project Name:	Rio Del Sol Rangel, County of Riverside	Depth to Bottom of Hole (ft):	4
Project #:	24031	Hole Diameter (in.):	8
Test Date:	1/17/2024	Tested By:	IJV
Test Hole #:	P-1	No Caving Observed	

Depth (feet)	Soil Classification
0'-4'	Grey to tan Sand (SP)

Initial Time	Final Time	Change in Time	Initial Depth (in.)	Final Depth (in.)	Change in Depth (in.)	Percolation Rate (min./inch)
8:20	8:45	25	42.00	48.00	6.00	4.17
8:45	9:10	25	42.00	48.00	6.00	4.17
9:12	9:22	10	42.00	46.50	4.50	2.22
9:22	9:32	10	42.00	46.00	4.00	2.50
9:32	9:42	10	42.00	45.50	3.50	2.86
9:42	9:52	10	42.00	45.00	3.00	3.33
9:52	10:02	10	42.00	44.50	2.50	4.00
10:02	10:12	10	42.00	44.00	2.00	5.00
PERCOLATION RATE (MIN./INCH):						5.00



Project Name:	Rio Del Sol Rangel, County of Riverside	Depth to Bottom of Hole (ft):	4
Project #:	24031	Hole Diameter (in.):	8
Test Date:	1/17/2024	Tested By:	IJV
Test Hole #:	P-2	No Caving Observed	

Depth (feet)	Soil Classification
0'-4'	Grey to tan Sand (SP)

Initial Time	Final Time	Change in Time	Initial Depth (in.)	Final Depth (in.)	Change in Depth (in.)	Percolation Rate (min./inch)
8:10	8:35	25	42.00	48.00	6.00	4.17
8:40	9:05	25	42.00	48.00	6.00	4.17
9:07	9:17	10	42.00	48.00	6.00	1.67
9:17	9:27	10	42.00	47.50	5.50	1.82
9:27	9:37	10	42.00	47.00	5.00	2.00
9:37	9:47	10	42.00	46.50	4.50	2.22
9:47	9:57	10	42.00	45.50	3.50	2.86
9:57	10:07	10	42.00	44.50	2.50	4.00
PERCOLATION RATE (MIN./INCH):						4.00



Project Name:	Rio Del Sol Rangel, County of Riverside	Depth to Bottom of Hole (ft):	5
Project #:	24031	Hole Diameter (in.):	8
Test Date:	1/17/2024	Tested By:	IJV
Test Hole #:	P-3	No Caving Observed	

Depth (feet)	Soil Classification
0'-4'	Grey to tan (SP)

Initial Time	Final Time	Change in Time	Initial Depth (in.)	Final Depth (in.)	Change in Depth (in.)	Percolation Rate (min./inch)
8:30	8:55	25	42.00	48.00	6.00	4.17
8:55	9:20	25	42.00	48.00	6.00	4.17
9:25	9:35	10	42.0	46.00	4.00	2.50
9:35	9:45	10	42.0	46.00	4.00	2.50
9:45	9:55	10	42.0	45.50	3.50	2.86
9:55	10:05	10	42.0	45.00	3.00	3.33
10:05	10:15	10	42.0	44.00	2.00	5.00
10:15	10:25	10	42.0	43.50	1.50	6.67
PERCOLATION RATE (MIN./INCH):						6.67



Project Name:	Rio Del Sol Rangel, County of Riverside	Depth to Bottom of Hole (ft):	4
Project #:	24031	Hole Diameter (in.)	8
Test Date:	1/17/2024	Tested By:	IJV
Test Hole #:	P-4	No Caving Observed	

Depth (feet)	Soil Classification
0'-4'	Brown to tan Sand (SP)

Initial Time	Final Time	Change in Time	Initial Depth (in.)	Final Depth (in.)	Change in Depth (in.)	Percolation Rate (min./inch)
8:40	9:05	25	42.0	48.00	6.00	4.17
9:05	9:30	25	42.0	48.00	6.00	4.17
9:40	9:50	10	42.0	46.50	4.50	2.22
9:50	10:00	10	42.0	46.00	4.00	2.50
10:00	10:10	10	42.0	46.00	4.00	2.50
10:10	10:20	10	42.0	45.50	3.50	2.86
10:20	10:30	10	42.0	45.00	3.00	3.33
10:30	10:40	10	42.0	44.00	2.00	5.00
PERCOLATION RATE (MIN./INCH):						5.00