Geotechnical Engineering Report

Ocean Mist Farms Expansion Project

Coachella, Riverside County, California

August 5, 2014

Terracon Project No. 60145042

Prepared for:

HANSEN-RICE CONSTRUCTION

Nampa, Idaho

Prepared by:

Terracon Consultants, Inc.

Irvine, California

August 5, 2014

Hansen-Rice Construction
1717 E Chisholm Dr.
Nampa, Idaho 83687

Attn: Mr. James L. Escobar
Pre-Construction Department - Architect
E: jescobar@hansen-rice.com

Re: Geotechnical Engineering Report
Ocean Mist Farms Expansion Project
52300 Enterprise Way
Coachella, Riverside County, California
Terracon Project No. 60145042

Dear Mr. Escobar:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. These services were performed in general accordance with our proposal number P60140198 dated July 1, 2014.

This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical engineering recommendations concerning earthwork and the design and construction of foundations, floor slab, and pavements for the proposed development.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Tamara Hashimoto, E.I.T.
Staff Engineer

Fouad (Fred) Abuhamdan, P.E.
Senior Project Manager

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Copies to: Addressee (1 via email)

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EXECUTIVE SUMMARY

A geotechnical exploration has been performed for the proposed project located at 52300 Enterprise Way in Coachella, Riverside County, California. Terracon's geotechnical scope of work included the advancement of twenty-one (21) test borings and two (2) Cone Penetrometer Test (CPT) soundings to approximate depths ranging between 5 to 100 feet below existing site grades. Three (3) borings were utilized for in-situ percolation testing.

Based on the information obtained from our subsurface exploration, the site is considered suitable for development of the proposed project provided the geotechnical engineering recommendations contained in this report are implemented in the design and construction of the project. The following geotechnical considerations were identified:

- Surface materials encountered in multiple borings consisted of 3 to 4 inches of asphalt concrete overlying 6 to 8 inches of aggregate base. Surface materials encountered in three internal borings consisted of reinforced concrete slabs. The on-site soils encountered generally consisted of sand with variable amounts of silt, with interbedded layers of sandy silt. Groundwater was encountered in multiple borings at an approximate depth of 18 to 23 feet below the ground surface (bgs) at the completion of the field exploration.
- Our analysis has concluded that the seismically-induced settlement of dry and saturated sands is estimated to be approximately 3½ to 4 inches; differential settlement is estimated to range between 1¾ and 2½ inches.
- Due to the anticipated seismic settlement onsite, we recommend utilizing in-situ ground densification methods within the upper 22 feet of onsite soils. Ground improvements such as rammed aggregate piers should enhance settlement control to meet the County of Riverside criteria of 2 inches for total static and seismic settlement. Upon ground densification, the proposed structures may be supported on a spread footing foundation system.
- Foundations and floor slabs for secondary buildings and minor structures should be supported on engineered fill extending to a minimum depth of 36 inches below the bottom of the proposed foundations. In order to reduce the seismically induced differential settlement, engineered fill should be reinforced with multi-axial geogrid. The on-site soils are considered suitable for use as engineered fill on the project.
- Automobile parking areas– 3" AC over 4" AB or 5" PCC over compacted native subgrade; on-site driveways – 3" AC over 6" AB or 5" PCC over 4" AB. Truck parking, loading, and delivery areas – 3" AC over 8" AB or 6½" PCC over 4" AB.
- Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during construction.

This geotechnical executive summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled General Comments should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
OCEAN MIST FARMS EXPANSION PROJECT
52300 ENTERPRISE WAY
COACHELLA, RIVERSIDE COUNTY, CALIFORNIA

Terracon Project No. 60145042
August 5, 2014

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the Ocean Mist Farms Expansion Project located at 52300 Enterprise Way in Coachella, Riverside County, California. The Site Location Plan (Exhibit A-1) is included in Appendix A of this report. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- earthwork
- seismic considerations
- floor slab design and construction
- groundwater conditions
- foundation design and construction
- pavement design and construction
- liquefaction analysis

Our geotechnical engineering scope of work for this project included the advancement of twenty-one (21) borings and two (2) Cone Penetrometer Test (CPT) soundings to depths ranging between 5 to 100 feet below existing site grades. Three (3) borings were utilized for in-situ percolation testing.

Logs of the borings along with an Boring Location Diagram (Exhibit A-2) are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

2.0 PROJECT INFORMATION

2.1 Project Description

ITEM	DESCRIPTION
Site layout	Refer to the Site Location Plan (Exhibit A-1)

ITEM	DESCRIPTION
Structures	The project will include multiple new structures: ■ A new addition to the existing warehouse with an approximate footprint area of 23,000 square feet (SF). ■ A new steel canopy with a footprint area ranging between 20,000 SF and 25,000 SF. ■ Multiple relatively small single-story buildings and minor structures.
Construction	Warehouse Addition: Steel columns and masonry walls supported on a reinforced concrete foundation system with concrete slab-on-grade floors. Steel Canopy: Steel columns with metal sidings and roof. Secondary buildings and minor structures: wood frame structures supported on a reinforced concrete foundation system with concrete slab-on-grade floors.
Finished floor elevation	We assume all proposed structures will be within one foot of existing grade.
Maximum loads	Assumed maximum loads are as follows: Warehouse Addition: Column Load: 150 to 200 kips Wall Loads: 1.5 to 3 kips Steel Canopy: Column Load: 100 to 150 kips Secondary buildings and minor structures Column Load: 40 to 600 kips Wall Loads: 1to 2 kips
Grading	Grading will involve ground improvements including over-excavations, backfill, and utilizing Rammed Aggregate Piers.
Traffic loading	Assumed Design Traffic Index (TI's): Automobile Parking Areas……………………..……………..4.5 Automobile Driving Lanes.…………………..……….……..6.0 Loading, Delivery, and Truck Parking Areas……..………..7.0

2.2 Site Location and Description

Item	Description
Location	This project is located at 52300 Enterprise Way in Coachella, Riverside County, California.
Existing site features	The site consists of and existing Ocean Mist Farms facility building with surrounding steel/wood canopy and associated pavements for parking and driveways.

Item	Description
Surrounding developments	The site has the following features: North: Avenue 52 followed by residential buildings. East: Industrial facility South: Currently undeveloped land West: Enterprise Way followed by commercial buildings and agricultural/undeveloped land
Current ground cover	Asphalt and concrete pavements within the limits of the existing Ocean Mist Farms facility and soils with sparse desert vegetation elsewhere.
Existing topography	Relatively level project site.

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

The site is situated within the northern portion of the Colorado Desert Geomorphic Province of Southern California. The Colorado Desert, which is dominated by the Salton Sea, is characterized as a low lying (about 245 feet below sea level in parts) desert basin. Primary geologic constituents include alluvial fan, Colorado River deltaic, and lacustrine deposits. Ancient beach lines and silt deposits of the extinct Lake Cahuilla are evident throughout this geomorphic province. The region is classified as a tectonic transition zone, from the extensional tectonics of the East Pacific Rise to the transform tectonics of the San Andreas Fault system. The province is bounded by the Sand Andreas and the San Jacinto fault systems.[1, 2]

3.2 Typical Subsurface Profile

Specific conditions encountered at the boring locations are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for the borings can be found on the boring logs included in Appendix A. Subsurface conditions throughout the project site can be generalized sand with variable amounts of silt and clay with interbedded layers of sandy silt. Two (2) borings, B-1 and B-2, encountered a layer of sandy lean clay. Fill materials comprised of silty sand soils were encountered within the upper 30 inches in three soil borings onsite.

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B. Atterberg limits tests conducted on multiple soil samples indicate the on-site materials exhibit no plasticity to medium plasticity. Laboratory test results indicate that the

[1] Harden, D. R., "*California Geology, Second Edition*," Pearson Prentice Hall, 2004.

[2] Norris, R. M. and Webb, R. W., *"Geology of California, Second Edition,"* John Wiley & Sons, Inc., 1990.

subsoils exhibit a negligible to slight collapse potential when saturated. A direct shear test was performed on silty sand materials encountered at 2½ feet and were found to have an ultimate friction angle of 31° with a corresponding cohesion of 102 psf.

3.3 Groundwater

Groundwater was observed in multiple borings test borings at an approximated depth ranging between 18 to 23 feet bgs at the completion of field exploration. This observation represents groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations.

Based on a monitoring well located approximately 1 mile south of the project site, historical groundwater is anticipated to occur at approximate depths of 22 feet to 38 feet below the ground surface. The referenced monitoring well was measured between December 2011 and March 2014[3].

3.4 Seismic Considerations

3.4.1 Seismic Site Classification and Parameters

DESCRIPTION	VALUE
2013 California Building Code Site Classification (CBC)	D
Site Latitude	N 33.6706°
Site Longitude	W 116.1528°
S_s Spectral Acceleration for a Short Period	2.178g
S_1 Spectral Acceleration for a 1-Second Period	1.065g

Notes: Per CBC Table 1613.5.2, any profile containing soils vulnerable to potential failure or collapse under seismic loading such as liquefiable soils should have a site class "F". However, for structures with fundamental period equal to or less than 0.5 seconds, Section 20.3.1 of ASCE 7-05 allows the site coefficients (F_a and F_v) to be determined assuming that liquefaction does not occur. The structure's fundamental period should be verified by the structural engineer.

The 2013 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the required 100 foot soil profile determination. Borings extended to a maximum depth of 50 feet, and this seismic site class definition considers that dense soil continues below the maximum depth of the subsurface exploration.

3.4.2 Faulting and Estimated Ground Motions

The site is located in Southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance of causative faults, the intensity, and the magnitude of the seismic event. The table below indicates the distance of the fault zones and the associated maximum credible earthquake that can be

[3] Based on data obtained from the California Department of Water Resources Well No. 336407N1161430W001.

produced by nearby seismic events, as calculated using the USGS Earthquake hazard Program 2002 interactive deaggregation. The San Andreas Fault – Southern 2 segments Amod2, which is located approximately 3.5 kilometer from the site, is considered to have the most significant effect at the site from a design standpoint. The site has a magnitude of 7.74 based on the USGS deaggregations.

Characteristics and Estimated Earthquakes for Regional Faults		
Fault Name	**Approximate Distance to Site (kilometers)**	**Maximum Credible Earthquake (MCE) Magnitude**
SAF – Southern 2 segments Amod2	3.5	7.7
SAF – Southern 2 segments Amod1	3.5	7.7
SAF – All southern segments Amod1	3.4	8.1
SAF – Coachella Amod1	3.5	7.2

Based on the USGS Design Maps Summary Report using the American Society of Civil Engineers (ASCE 7-10) standard, the peak ground acceleration at the project site is expected to be approximately 0.849 g.

The site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps[4] and the County of Riverside GIS website.

3.4.3 Liquefaction Potential

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. The County of Riverside has designated certain areas within the County as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

The project site is located within a high potential liquefaction hazard zone as designated by the County of Riverside GIS website. Materials encountered at the project site generally consisted mainly of granular sandy soils with interbedded layers of sandy silts. Groundwater was encountered in the test borings B-1 at approximate depths of 18 to 23 feet at the time of field exploration. Historical high groundwater in the project vicinity is approximately 22 feet below the ground surface.

Liquefaction analysis for the site was performed in general accordance with the DMG Special Publication 117. The liquefaction study utilized the software “LiquefyPro” by CivilTech Software.

4. California Department of Conservation Division of Mines and Geology (CDMG), *“Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region”*, CDMG Compact Disc 2000-003, 2000.

This analysis was based on the soils data from the CPT soundings. Peak Ground Acceleration (PGA) of 0.849g was calculated based on ASCE 7-10 standards. Calculations utilized historical groundwater depths. The Modified Robertson method was used for CPT calculations. Settlement analysis used the Tokimatsu, M-correction method. Fines were corrected for liquefaction using the modified Stark/Olsen et al method.

Three liquefaction potential analyses were calculated from a depth of 0 to 50 feet below the ground surface. The sites were represented by CPT-1 and CPT-2. Liquefaction potential analysis is attached in Appendix D of this report.

Based on the calculation results, total seismically-induced settlement of dry sands and saturated sands are expected to be approximately 3½ to 4 inches. Seismically-induced differential settlement is anticipated to range between 1¾ and 2½ inches.

3.5 Geologic Hazards

- Slope stability - The site is relatively flat and there are no slopes near the site; therefore, it is not necessary to perform a slope stability analysis.
- Rock fall hazards - The site is relatively flat and there are no slopes near the site; therefore, hazards from rock fall are negligible.
- Landslide hazards - The site is relatively flat and there are no slopes near the site; therefore, landslide hazards are negligible.
- Surface fault rupture - The site is not located within an Alquist-Priolo Special Study Zone nor is located within a fault zone based on the County of Riverside GIS website.
- Fissures - As the site is not within an Alquist-Priolo Special Study Zone nor is located within a fault zone based on the County of Riverside GIS website, the expectation of fissures occurring at the site is considered low.
- Liquefaction potential - The site is located within a high liquefaction zone as identified by the County of Riverside GIS website. Liquefaction potential is addressed in Section 3.4.3 of this report.
- Collapsible and/or expansive soils – the laboratory test results indicate that the materials at shallow depth exhibit a negligible to slight collapse potential when saturated. On site soils are expected to have low expansion potential.
- Subsidence - The site is located within an active subsidence zone as identified on the County of Riverside GIS website. However, based on the current conditions of the existing building, we did not observe signs of distress that may have resulted from subsidence. Based on the available information about the subsurface conditions, existing topography, and conditions of the existing building, we anticipate the impact of subsidence resulting from groundwater removal may be considered low.

- Wind and water erosion - The site is a flat, well developed area and the ground surface is mostly covered with asphalt, concrete, or graded pads; therefore, the possibility of wind and water erosion is considered negligible.
- Debris flow - The site is relatively flat, there are no slopes near the site vicinity; therefore, the possibility of debris flow is considered negligible.
- Ground shaking potential - The site is not located with an Alquist-Priolo Special Studies Zone, nor is it located within a fault zone based on the County of Riverside GIS website. However, with the active faults in the region, the site could be subjected to strong ground shaking that may result from earthquakes on local to distant sources during the life span of the project. Faulting and ground motion are addressed in Section 3.4.2 above.
- Seismic Settlement - Calculation of dynamic dry settlement was performed in accordance with the DMG Special Publication 117. The study utilized liquefaction analysis calculations to evaluate the dynamic settlement assuming a depth to groundwater of 18 feet. Seismic induced settlement for dry and saturated sands is addressed in Section 3.4.3 of this report.

3.6 Corrosion Potential

Results of soluble sulfate testing indicates that ASTM Type V Portland cement should be used for all concrete on and below grade. Foundation concrete should be designed for high sulfate exposure in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4. Laboratory test results indicate the on-site soils have a pH of 6.7 to 7.3, a minimum resistivity of 136 to 2,959 ohm-centimeters, and a chloride content of 37 to 1,875 ppm, as shown on the attached Results of Corrosivity Analysis sheet. These values should be used to evaluate corrosive potential of the on-site soils to underground ferrous metals.

Refer to the Results of Corrosivity Analysis in Appendix B for the complete results of the corrosivity testing conducted in conjunction with this geotechnical exploration.

3.7 Percolation Test Results

Three (3) in-situ Percolation tests (falling head borehole permeability) were performed to approximate depths of 5 and 10 feet bgs. A 2-inch thick layer of gravel was placed in the bottom of each boring after the borings were drilled to investigate the soil profile. A 3-inch diameter perforated pipe was installed on top of the gravel layer in each boring. Gravel was used to backfill between the perforated pipes and the boring sidewall. The borings were then filled with water for a pre-soak period. Testing began after the pre-soak water completed percolated through the boreholes. At the beginning of each test, the pipes were refilled with water and readings were taken at 10-minute time intervals. Percolation rates are provided in the following table:

TEST RESULTS			
Test Location (depth)	**Percolation Rate, in/hr**	**Correlated Infiltration Rate*, in/hr**	**Water Head, in**
P-1 (5 ft)	72	2.2	48
P-2 (10 ft)	87	1.2	105
P-3 (5 ft)	129	4.1	45

*If the proposed infiltration systems will mainly rely on vertical downward seepage, the correlated infiltration rates should be used. The correlated infiltration rates were calculated using the Porchet Method.

The field test results are not intended to be design rates. They represent the result of our tests, at the depths and locations indicated, as described above. The design rate should be determined by the designer by applying an appropriate factor of safety. With time, the bottoms of infiltration systems tend to plug with organics, sediments, and other debris. Long term maintenance will likely be required to remove these deleterious materials to help reduce decreases in actual percolation rates.

The percolation test was performed with clear water, whereas the storm water will likely not be clear, but may contain organics, fines, and grease/oil. The presence of these deleterious materials will tend to decrease the rate that water percolates from the infiltration systems. Design of the storm water infiltration systems should account for the presence of these materials and should incorporate structures/devices to remove these deleterious materials.

Infiltration testing should be performed after construction of the infiltration system to verify the design infiltration rates. It should be noted that siltation and vegetation growth along with other factors may affect the infiltration rates of the infiltration areas. The actual infiltration rate may vary from the values reported here. Infiltration systems should be located at least 10 feet from any existing or proposed foundation system.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings provided the geotechnical engineering recommendations contained in this report are implemented in the design and construction of the project.

Our analysis has concluded that the seismically-induced settlement of dry and saturated sands is estimated to be approximately 3½ to 4 inches; differential settlement is estimated to range between 1¾ and 2½ inches.

Due to the anticipated seismic settlement onsite, we recommend utilizing in-situ ground densification methods within the upper 22 feet of onsite soils. Ground improvements such as rammed aggregate piers should enhance settlement control to meet the County of Riverside criteria of 2 inches for total static and seismic settlement. Upon ground densification and verifying the improved characteristics on the subsurface soils onsite, the proposed building may be supported on a spread footing foundation system.

Foundations and floor slabs for secondary buildings and minor structures should be supported on engineered fill extending to a minimum depth of 36 inches below the bottom of the proposed foundations. In order to reduce the seismically induced differential settlement, engineered fill should be reinforced with multi-axial geogrid.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in Appendices A and B), engineering analyses, and our current understanding of the proposed project.

4.2 Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for the design and construction of earth supported elements including, foundations, slabs, and pavements, are contingent upon following the recommendations outlined in this section. All grading and ground improvements for the proposed structures should incorporate the limits of the proposed structure plus a minimum lateral distance of five feet beyond the edges, if permitted by the property lines and adjacent structures.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

4.2.1 Site Preparation

Strip and remove existing pavements, demolition debris, and other deleterious materials from proposed building and pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Fill materials comprised of silty sand soils were encountered within the upper 30 inches in three soil borings onsite. It is our assumption that these materials were placed during the grading of the main warehouse. We recommend that all fill soils be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Demolition of the existing building should include complete removal of all foundation systems and remaining underground utilities within the proposed construction area. This should include removal of any loose backfill found adjacent to existing foundations. All materials derived from the demolition of existing structures and pavements should be removed from the site and not be allowed for use as on-site fill.

Evidence of underground utilities was observed onsite. Underground facilities such as septic tanks, cesspools, and basements were not observed during the site reconnaissance, such features could be encountered during construction. Utilities and underground facilities (if encountered) should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

4.2.2 Subgrade Preparation

Structure	Foundations	Floor Slabs
Warehouse Addition	Native soils improved with rammed aggregate piers	Minimum of 18 inches of engineered fill comprised of on-site soils or imported low volume change materials
Steel Canopy	Native soils improved with rammed aggregate piers	Minimum of 18 inches of engineered fill comprised of on-site soils or imported low volume change materials
Secondary Buildings and Minor Structures	Engineered fill reinforced with multi-axial geogrid extending a minimum depth of 36 inches below the bottom of the proposed foundations	

Subsequent to demolition and surface clearing and grubbing, subgrade soils beneath exterior slabs and pavements should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches. The moisture content and compaction of subgrade soils should be maintained until slab or pavement construction.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned, and compacted per the compaction requirements in Section 4.2.4.

4.2.3 Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than three inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer. The on-site soils are considered suitable for use as engineered fill on the project.

Onsite soils or approved imported materials may be used as fill material for the following:

- interior floor slab areas
- foundation areas
- general site grading
- foundation backfill
- exterior slab areas
- pavement areas

Imported soils for use as fill material within proposed building and structure areas should conform to low volume change materials as indicated in the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
3”	100
No. 4 Sieve	50-100
No. 200 Sieve	20-50

- Liquid Limit .... 30 (max)
- Plasticity Index .... 15 (max)
- Maximum expansive index* .... 20 (max)

*ASTM D 4829

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed eight inches loose thickness.

4.2.4 Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials are as follows:

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
On-site soils or approved imported fill soils:			
Beneath foundations:	90%	0%	+4%
Beneath slabs:	90%	0%	+4%
Beneath asphalt pavements:	95%	0%	+4%
Beneath concrete pavements:	95%	0%	+4%
Utility trenches (pavement and structural areas):	95%	0%	+4%
Utility trenches (Landscape areas):	90%	0%	+4%
Exterior Slabs:	90%	0%	+4%
Miscellaneous backfill:	90%	0%	+4%
Aggregate base (beneath pavements):	95%	0%	+4%

4.2.5 Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the development. Infiltration of water into utility trenches or foundation excavations should be prevented during construction. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration. We recommend a minimum horizontal setback distance of 10 feet from the perimeter of any building and the high-water elevation of the nearest storm-water retention basin.

Roof drainage should discharge into splash blocks or extensions when the ground surface beneath such features is not protected by exterior slabs or paving. Sprinkler systems and landscaped irrigation should not be installed within 5 feet of foundation walls.

4.2.6 Exterior Slab Design and Construction

Exterior slabs-on-grade, exterior architectural features, and utilities founded on, or in backfill may experience some movement due to the volume change of the backfill. To reduce the potential for damage caused by movement, we recommend:

- minimizing moisture increases in the backfill;
- controlling moisture-density during placement of backfill;
- using designs which allow vertical movement between the exterior features and adjoining structural elements;
- placing effective control joints on relatively close centers.

4.2.7 Utility Trenches

It is anticipated that the on-site soils will provide suitable support for underground utilities and piping that may be installed. Any soft and/or unsuitable material encountered at the bottom of excavations should be removed and be replaced with an adequate bedding material. A non-expansive granular material with a sand equivalent greater than 30 should be used for bedding and shading of utilities, unless specified otherwise by the utility manufacturer.

On-site materials are considered suitable for backfill of utility and pipe trenches. Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

4.2.8 Construction Considerations

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable. However, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

At the time of our study, moisture contents of the surface and near-surface native soils ranged from about 4 to 10 percent. Based on these moisture contents, some moisture conditioning of soils when used as fill will likely be needed for the project.

Upon completion of filling and grading, care should be taken to maintain the subgrade moisture content prior to construction of floor slabs and pavements. Construction traffic over the completed subgrade should be avoided to the extent practical. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. If the subgrade should become desiccated, saturated, or disturbed, the affected material should be removed or these materials should be scarified, moisture conditioned, and recompacted prior to floor slab and pavement construction.

The geotechnical engineer should be retained during the construction phase of the project to observe earthwork and to perform necessary tests and observations during subgrade preparation, proof-rolling, placement and compaction of controlled compacted fills, backfilling of excavations to the completed subgrade.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. Excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

4.3 Foundations

4.3.1 Warehouse Addition & Steel Canopy

DESCRIPTION	RECOMENDATION
Foundation Type	Conventional Shallow Spread Footings bearing on rammed aggregate piers
Bearing Material	Native soils improved with rammed aggregate piers

DESCRIPTION	RECOMENDATION
Allowable Bearing Pressure	Allowable bearing pressures will be provided by a specialty contractor upon the design of the rammed aggregate piers to mitigate the seismic induced settlement.
Minimum Dimensions	Walls: 18 inches; Columns: 24 inches
Minimum Embedment Depth Below Finished Grade	18 inches

4.3.2 Secondary Buildings and Minor Structures

DESCRIPTION	RECOMENDATION
Foundation Type	Concrete support slabs with thickened edges.
Bearing Material	Engineered fill extending to a minimum depth of 36 inches below foundations.
Allowable Bearing Pressure	2,500 psf for isolated and continuous footings (thickened edges)
Minimum Dimensions	Walls: 18 inches; Columns: 24 inches
Minimum Embedment Depth Below Finished Grade	18 inches
Estimated Static Settlement	1 inch
Estimated Differential Static Settlement	½ inch in 40 feet.

Due to the anticipated dynamic settlement in a seismic event, we recommend the engineered fill be reinforced with multi-axial geogrid. Engineered fill placed beneath the entire footprint of such structures should extend horizontally a minimum distance of 5 feet beyond the outside edge of perimeter footings. The geogrid should be placed at one-foot centers with the first geogrid placed on the bottom of the excavation on prepared native soils. This placement schedule will place the top geogrid one foot below the bottom of the footing. The use of multi-axial geogrid will reduce potential differential settlement beneath the proposed building, but will not reduce potential total dynamic settlement.

The engineered fill placed with the geogrid beneath the proposed building should be moisture conditioned, and compacted per the compaction requirements in Section 4.2.4. The multii-axial geogrid should be Tensar TX-5 or equivalent.

4.3.3 Shallow Foundations Designed for Uplift Conditions

Reinforced concrete footings or dead-man foundations, cast against undisturbed subsoils, are recommended for resistance to uplift. Footings may be designed using the cone method.

The equation for determining the ultimate uplift capacity as a function of footing dimension, foundation depth, and soil weight is:

$$T_u = 0.63 \times \gamma \times D^2 \times (B + L) + W$$

Where:

Variable	Description	Unit
T_u	Ultimate uplift capacity	lbs
γ	Unit weight of soil[1]	pcf
D	Depth to base of footing/dead-man foundation below final grade	ft
B	Width of footing/dead-man foundation	ft
L	Length of footing/dead-man foundation	ft
W	Weight of footing/dead-man + weight of soil directly over the top of the footing/block	lbs

Notes: [1]A unit weight (γ) of 120 pcf is recommended for soil (either undisturbed or compacted backfill) at this site.

The design uplift resistance should be calculated by dividing the ultimate resistance obtained from the equation above by an appropriate factor of safety. A factor of safety of at least 2 is recommended for live uplift loads in the analysis.

4.3.4 Rammed Aggregate Pier (RAP) Recommendations

In order to mitigate the seismic induced settlement anticipated for the proposed warehouse addition and steel canopy, Rammed Aggregate Pier® elements should be installed for support of the proposed structures. RAP elements enhance settlement control by providing composite stiffened bearing materials to reduce the matrix soil compressibility.

The construction process typically consists of utilizing pre-augered or displacement methods. The augered or displaced cavities are backfilled with aggregate that is compacted in place using static crowd pressure augmented with a high frequency, low amplitude, vibratory hammer. The Impact hammer densifies aggregate vertically while the tamper foot forces aggregate laterally into cavity sidewalls resulting in stiff RAP elements and a stiffened matrix/soil. Constructed diameters may range from 20 to 30 inches depending on the method of installation.

In combination with the RAP foundation systems are considered for the project, the proposed buildings can be supported on shallow foundations. RAP design is typically performed by a specialty design build ground improvement contractor who should be consulted to provide further analysis and recommendations. Shallow foundation design recommendations will rely on the design and configuration of the RAP system.

4.3.5 Design Considerations

Footings should be proportioned to reduce differential foundation movement. Proportioning on the basis of equal total settlement is recommended; however, proportioning to relative constant dead-load pressure will reduce differential settlement between adjacent footings. Additional foundation movements could occur if water, from any source, saturates the foundation soils; therefore, proper drainage should be provided during construction and in the final design.

Finished grade is defined as the lowest adjacent grade within five feet of the foundation for perimeter (or exterior) footings or the depth below the floor slab for interior footings or basement construction. The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls 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.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations may be required.

4.4 Floor Slab

DESCRIPTION	VALUE
Interior floor system	Concrete Slab-on-grade for the proposed addition and steel canopy.
Floor slab support	A minimum 18 inches of engineered fill
Modulus of subgrade reaction	200 pounds per square inch per inch (psi/in) (The modulus was obtained based on 18 inches of engineered fill, and estimates obtained from NAVFAC 7.1 design charts). This value is for a small loaded area (1 sq. ft. or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas.

In areas of exposed concrete, control joints should be saw cut into the slab after concrete placement in accordance with ACI Design Manual, Section 302.1R-37 8.3.12 (tooled control joints are not recommended). Additionally, dowels should be placed at the location of proposed construction joints. To control the width of cracking (should it occur) continuous slab reinforcement may be considered in exposed concrete slabs.

Positive separations and/or isolation joints should be provided between slabs and all foundations, columns or utility lines to allow independent movement. Interior trench backfill placed beneath slabs should be compacted in accordance with recommendations outlined in the Earthwork section of this report. Other design and construction considerations, as outlined in the ACI Design Manual, Section 302.1R are recommended.

The use of a vapor retarder or barrier should be considered beneath concrete slabs on grade that will be covered with moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture to prevent moisture migration. When conditions warrant the use of a vapor retarder, the slab designer and slab contractor should refer to ACI 302 and ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder/barrier.

4.5 Lateral Earth Pressures

The lateral earth pressure recommendations herein are applicable to the design of rigid retaining walls subject to slight rotation, such as cantilever, or gravity type concrete walls. These recommendations are not applicable to the design of geogrid-reinforced-backfill walls. Recommendations covering these types of wall systems are beyond the scope of services for this assignment; however, we would be pleased to develop recommendations for the design of such wall systems upon request.

For onsite native soils or imported low volume change fill materials above any free water surface, recommended equivalent fluid pressures for foundation elements are:

ITEM	VALUE
Active Case	37 psf/ft
Passive Case	380 psf/ft
At-Rest Case	56 psf/ft
Surcharge Pressure	0.31*(Surcharge)
Coefficient of friction	0.40

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

Surcharge pressure for uniform pressure acting at the back of the wall should be applied to the wall as a uniform pressure over the entire wall height and is added to the static earth pressures. Other surcharge loads should be considered where they are located within a horizontal distance behind the wall equal to 1.5 times the height of the wall. Surcharge stresses due to point loads, line loads, and those of limited extent, such as compaction equipment, should be evaluated using elastic theory.

Fill against foundation and retaining walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors.

Adequate drainage should be provided behind the below-grade walls to collect water from irrigation, landscaping, surface runoff, or other sources, to achieve a free-draining backfill condition. The wall back drain should consist of Class 2 permeable materials that are placed behind the entire wall height to within 18 inches of ground surface at the top of the wall. As a minimum, the width of Class 2 permeable materials behind the wall should be two feet. Water collected by the back drain should be directed to an appropriate outlet, such as weep holes or perforated pipes, for disposal.

4.6 Pavements

4.6.1 Design Recommendations

Based on an estimated R-Value of the near surface soils, and soil classification and properties of materials encountered in the upper 2 feet in our borings, multiple asphalt concrete and portland cement concrete pavement sections were evaluated for various traffic loadings on the project.

Assuming the pavement subgrades will be prepared as recommended within this report, the following pavement sections should be considered minimums for this project for the traffic indices assumed in the following table. As more specific traffic information becomes available, we should be contacted to reevaluate the pavement thickness recommendations.

	Recommended Pavement Section Thickness (inches)*		
	Light (Automobile) Parking	**On-site Driveways**	**Loading, Delivery, and Truck Parking Areas**
	Assumed TI = 4.5	**Assumed TI = 6.0**	**Assumed TI = 7.0**
Section I Portland Cement Concrete	5.0” Concrete	5.0” Concrete over 4” Class II Aggregate Base	6.5” Concrete over 4” Class II Aggregate Base
Section II Asphaltic Concrete	3” Asphaltic Concrete over 4” Class II Aggregate Base	3” Asphaltic Concrete over 6” Class II Aggregate Base	3” Asphaltic Concrete over 8” Class II Aggregate Base

* All materials should meet the CALTRANS Standard Specifications for Highway Construction.
Traffic indices should be verified by the traffic/civil engineer

Subgrade soils beneath all pavements should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches. All materials should meet the CALTRANS Standard Specifications for Highway Construction. Aggregate base materials should meet the gradation and quality requirement of Class 2 Aggregate Base in Caltrans Standard Specifications, latest edition, Sections 25 through 29.

All concrete for rigid pavements should have a minimum flexural strength of 600 psi, and be placed with a maximum slump of four inches. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. All joints should be sealed to prevent entry of foreign material and dowelled where necessary for load transfer.

It is our experience that asphalt pavement sections could suffer severe distress and shoving in tight turning radius areas. We recommend that portland cement concrete pavement be used for such areas.

Asphalt concrete sections should be thickened to a minimum of 8 inches at transitions with concrete, especially at the trash enclosure pad, loading zones, escape lane intersections, and any other transitions with concrete.

Preventative maintenance should be planned and provided for through an on-going pavement management program in order to enhance future pavement performance. Preventative maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment.

Preventative maintenance consists of both localized maintenance (e.g. crack sealing and patching) and global maintenance (e.g. surface sealing). Preventative maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements.

4.6.2 Pavement Construction Considerations

Materials and construction of pavements for the project should be in accordance with the requirements and specifications of the State of California Department of Transportation, or other approved local governing specifications.

Base course or pavement materials should not be placed when the surface is wet. Surface drainage should be provided away from the edge of paved areas to minimize lateral moisture transmission into the subgrade.

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between explorations, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION

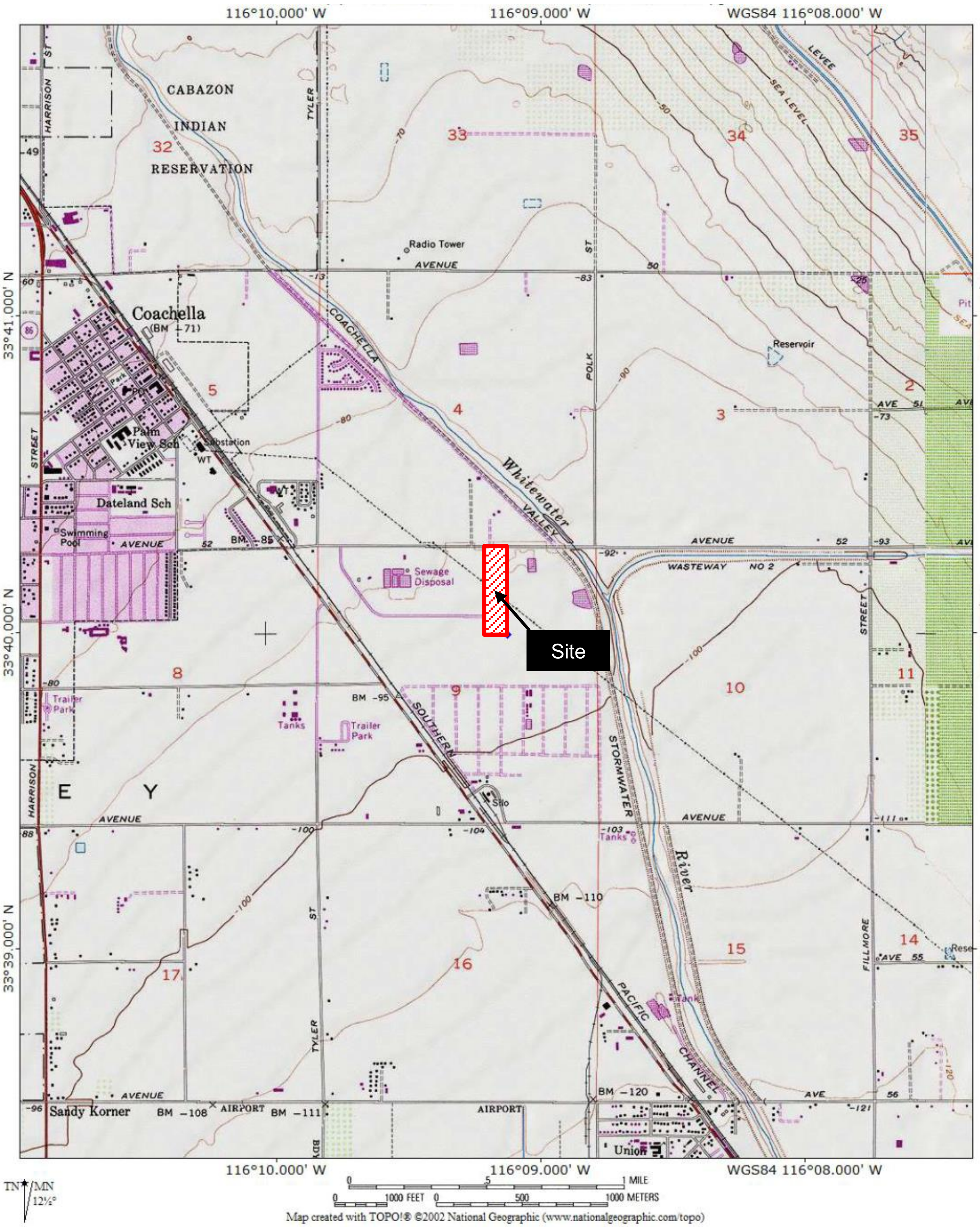
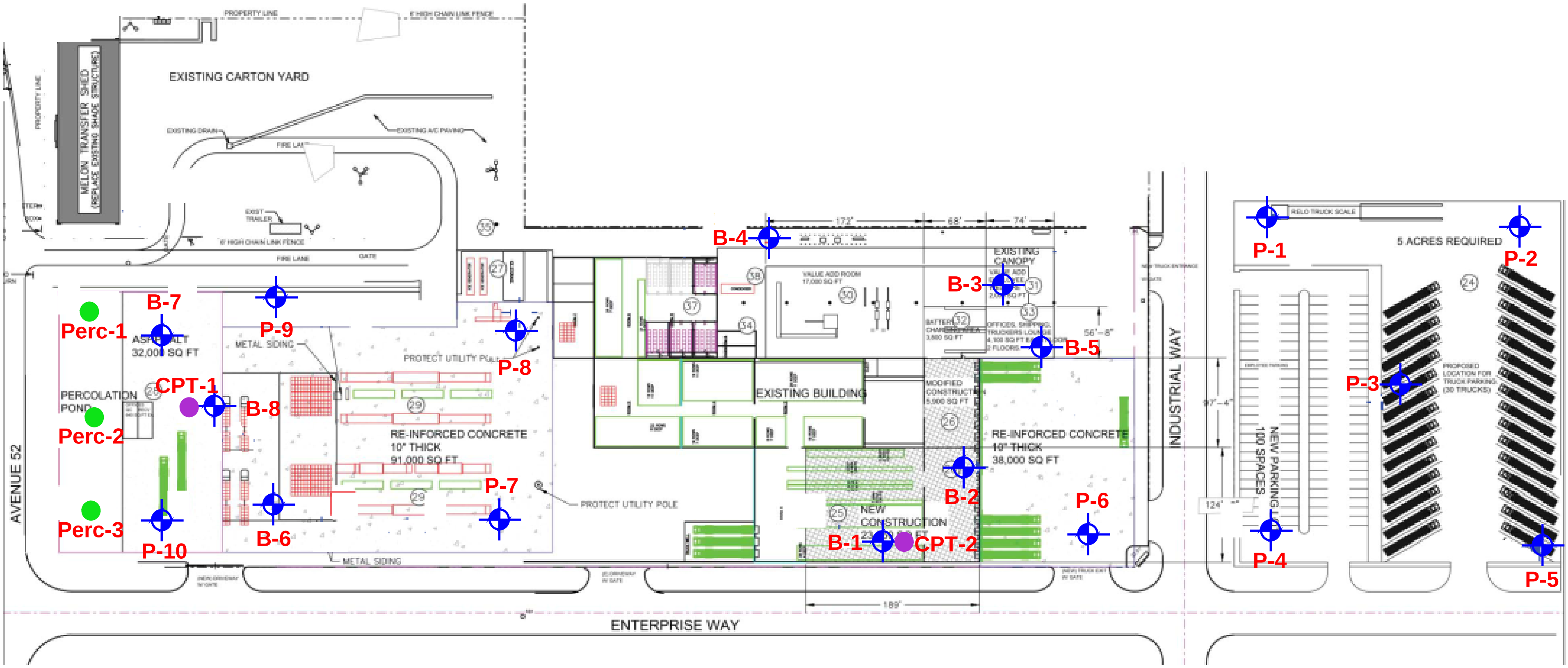


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

REFERENCE: USGS INDIO, CALIFORNIA, 7.5-MINUTE QUADRANGLE (dated 1981)

Project Manager: FH	Project No. 60145042	Terracon Consulting Engineers & Scientists	SITE LOCATION PLAN	Exhibit
Drawn by: TH	Scale: AS SHOWN	2817 McGaw Avenue, Irvine, California 92614	**Ocean Mist Farms Expansion Project**	A-1
Checked by: FH	File Name: EXHIBIT A-1	PH. (949) 261-0051 FAX. (949) 261-6110	52300 Enterprise Way	
Approved by: FH	Date: 08/04/14		Coachella, Riverside County, California	



LEGEND

B-1	APPROXIMATE BORING LOCATION
Perc-1	APPROXIMATE PERCOLATION TEST LOCATION
CPT-1	APPROXIMATE PERCOLATION TEST LOCATION

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: FH	Project No. 60145042
Drawn by: TH	Scale: 1 in. ~ 170 ft.
Checked by: FH	File Name: EXHIBIT A-2
Approved by: FH	Date: 08/04/14

Terracon
Consulting Engineers & Scientists
2817 McGaw Avenue Irvine, CA 92614
PH. (949) 261-0051 FAX. (949) 261-6110

BORING LOCATION DIAGRAM

Ocean Mist Farms Expansion Project
52300 Enterprise Way
Coachella, Riverside County, California

Exhibit
A-2

Field Exploration Description

The field exploration program included the advancement of twenty-one (21) test borings and two (2) Cone Penetrometer Test (CPT) soundings to approximate depths ranging between 5 to 100 feet below existing site grades. The field program was performed at the site on July 14, 15 and 21, 2014. Three (3) borings were utilized for in-situ percolation testing.

The drilled test borings were advanced with a truck-mounted Mobil B-61 drill rig utilizing 6-inch diameter hollow-stem auger. CPT soundings were advanced with a 30-ton truck providing the reaction weight for pushing the cone assembly into the ground at a constant rate of 20-mm per second (approximately four feet per minute). The cone tip resistance and sleeve friction resistance were recorded every 2-cm (approximately ¾-inch) and stored in digital form.

The borings were located in the field by using the proposed site plan, an aerial photograph of the site, and measuring from existing site features and property lines. The accuracy of boring locations should only be assumed to the level implied by the method used. The location of the borings and CPT soundings are shown on the attached Boring Location Diagram, Exhibit A-2.

Continuous lithologic logs of the borings were recorded by the field engineer during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were also obtained. Groundwater conditions were evaluated in the borings at the time of site exploration.

Penetration resistance measurements were obtained by driving the split-spoon and ring-barrel samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered.

An automatic hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The samples were tagged for identification, sealed to reduce moisture loss, and taken to our laboratory for further examination, testing, and classification. Information provided on the boring logs attached to this report includes soil descriptions, consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The borings were backfilled with auger cuttings prior to the drill crew leaving the site.

BORING LOG NO. B-1

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction, Nampa, ID

SITE: 52300 Enterprise Way, Coachella, Riverside County, California

LOCATION See Exhibit A-2

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	**ASPHALT CONCRETE**, 3" thick											
0.6	**AGGREGATE BASE COURSE**, 4" thick											
	SILTY SAND (SM), olive-brown, loose, micaceous				2-2-3 N=5							
		5			1-2-3 N=5							
7.5	**SANDY LEAN CLAY (CL)**, olive-brown, soft				1-1-2 N=3						31-22-9	67
10.0	**SILTY SAND (SM)**, olive-brown, loose	10			2-4-5 N=9							
		15			2-2-3 N=5							
			▽									
20.0	**POORLY GRADED SAND WITH SILT (SP-SM)**, brown, medium dense	20			7-12-14 N=26							
25.0	**POORLY GRADED SAND (SP)**, brown, medium dense	25			4-9-20 N=29							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with asphalt upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-4

BORING LOG NO. B-1

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction Nampa, ID

SITE: 52300 Enterprise Way Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	COMPRESSIVE STRENGTH (psf)	STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	POORLY GRADED SAND (SP), brown, medium dense *(continued)*											
		30		X	11-18-23 N=41							
		35		X	4-12-12 N=24							
		40		X	3-4-5 N=9							
	43.5											
	SANDY SILT (ML)											
		45		X	4-6-11 N=17							
	50.0											
	POORLY GRADED SAND WITH SILT (SP-SM)	50		X	6-10-13 N=23							
	51.5											
	Boring Terminated at 51.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with asphalt upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-4

BORING LOG NO. B-2

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	TEST TYPE	COMPRESSIVE STRENGTH (psf)	STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	**ASPHALT CONCRETE**, 3" thick											
0.7	**AGGREGATE BASE COURSE**, 5" thick											
2.5	**SILTY SAND (SM)**, brown											
5.0	**POORLY GRADED SAND (SP)**, brown, medium dense				5-9-13				5	102		
	SILTY SAND (SM), olive-brown, loose	5			2-4-5				22	95		
10.0					4-5-6				8	94		
15.0	**SANDY LEAN CLAY (CL)**, olive-brown, medium stiff	10			2-5-4				32	88		
	SILTY SAND (SM), olive-brown, loose	15			3-2-3 N=5							
21.5	medium dense	20	▽		5-8-13 N=21							

Boring Terminated at 21.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with asphalt upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
▽ *While drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-5

BORING LOG NO. B-3

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.8	**REINFORCED CONCRETE**, 10" thick											
2.0	**FILL - SILTY SAND (SM)**, brown										NP	12
4.5	**POORLY GRADED SAND (SP)**, brown, loose				6-8-8				5	97		
8.5	**SANDY SILT (ML)**, olive-brown, stiff	5			4-5-6				29	96		
					4-4-5				3	107		
10.0	**POORLY GRADED SAND (SP)**, tan, loose	10										
15.0	**SILTY SAND (SM)**, olive-brown, loose				2-3-4				33	90		
20.0	**SANDY SILT (ML)**, olive-brown, medium stiff	15			3-2-4 N=6							
			▽									
21.5	**SILTY SAND (SM)**, olive-brown, loose	20			6-10-19 N=29							

Boring Terminated at 21.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with concrete upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color, and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS
▽ *While drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-6

BORING LOG NO. B-4

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

DEPTH	Material Description	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	TEST TYPE	COMPRESSIVE STRENGTH (psf)	STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.7	**REINFORCED CONCRETE**, 8" thick											
2.0	**FILL - SILTY SAND**, brown											
	SILTY SAND (SM), brown, loose	5			4-7-8				11	101		
7.5												
	POORLY GRADED SAND (SP), light brown, loose				6-7-7				26	95		
11.0		10			2-7-10				14	102		
15.0	**SANDY SILT (ML)**, olive-brown, stiff											
	SILTY SAND, olive-brown, loose	15			4-4-4 N=8							
			▽									
21.5	medium dense	20			12-22-29				19	109		

Boring Terminated at 21.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with concrete upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data, (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color, and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

▽ *While drilling*

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-7

BORING LOG NO. B-5

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.8	**REINFORCED CONCRETE**, 10" thick											
2.5	**FILL - SILTY SAND (SM)**, brown											
5.0	**POORLY GRADED SAND (SP)**, brown, medium dense				5-10-19				6	102		
	SILTY SAND (SM), olive-brown, medium dense	5			9-11-12				18	108		
10.0	loose				4-5-7				32	88		
15.0	**SANDY SILT (ML)**, olive-brown, stiff	10			3-5-6				31	91		
	SILTY SAND (SM), olive-brown, medium dense	15			4-7-7 N=14							
21.5		20			4-19-26				22	103		
	Boring Terminated at 21.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with concrete upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color, and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-8

BORING LOG NO. B-6

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

Depth (Ft.)	Description	Water Level Observations	Sample Type	Field Test Results	Test Type	Compressive Strength (psf)	Strain (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
0	**SILTY SAND (SM)**, tan, medium dense										
				8-9-11				4	97		
5				4-9-16				10	95		
7.5	**POORLY GRADED GRAVEL (SP)**, light brown, medium dense			10-16-24				5	113		
10.0	**SANDY SILT (ML)**, olive-brown, stiff			3-5-6				30	92		
15				3-4-8				26	98		
20	medium stiff			2-2-3 N=5							
21.5	***Boring Terminated at 21.5 Feet***										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-9

BORING LOG NO. B-7

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction Nampa, ID

SITE: 52300 Enterprise Way Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		SILTY SAND (SM), brown											
	2.5	**POORLY GRADED SAND (SP)**, tan, loose				7-7-9				10	97		
		medium dense	5			7-13-17				5	102		
						5-7-11				20	92		
	8.5	**SILTY SAND (SM)**, olive-brown, medium dense											
	10.0	**SANDY SILT (SM)**, tan, stiff	10			4-5-9							
	15.0	**SILT (ML)**, trace sand, olive-brown, medium stiff	15			2-2-3 N=5						46-30-16	97
	20.0	**SILTY SAND (SM)**, olive-brown, medium dense	20	▽		9-8-5 N=13							
	21.5	***Boring Terminated at 21.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *At completion of drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-10

BORING LOG NO. B-8

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	2.5	**SILTY SAND (SM)**, brown											
	5.0	**POORLY GRADED SAND (SP)**, brown, loose				3-3-4 N=7							
	7.5	**SILTY SAND (SM)**, brown, loose	5			3-4-3 N=7							
	10.0	**POORLY GRADED SAND (SP)**, brown, loose				3-4-3 N=7							
	15.0	**SILTY SAND (SM)**, brown, loose	10			1-2-3 N=5							
	23.5	**POORLY GRADED SAND (SP)**, brown, loose	15			2-2-7 N=9							
			20			2-2-3 N=5							
				▽ (while drilling)									
		SANDY SILT (ML), brown, medium stiff	25			2-3-4 N=7							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
▽ *While drilling*
▽ *At completion of drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-11

BORING LOG NO. B-8

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG / DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SANDY SILT (ML), brown, medium stiff *(continued)*		▽									
29.0	**SILTY SAND (SM)**, brown, medium dense											
		30		X	8-8-12 N=20							28
	dense	35		X	10-16-26 N=42							
		40		X	8-17-22 N=39							
	very dense	45		X	8-20-28 N=48							
	medium dense	50		X	8-10-18 N=28							
51.5	***Boring Terminated at 51.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
▽ *While drilling*
▽ *At completion of drilling*

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-11

BORING LOG NO. P-1

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction Nampa, ID

SITE: 52300 Enterprise Way Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND, brown, loose											
					4-4-5 N=9							
		5										
	6.5				3-2-5 N=7							
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-12

BORING LOG NO. P-2

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

GRAPHIC LOG	LOCATION See Exhibit A-2 DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND, tan, medium dense											
					5-6-8 N=14							
		5			4-5-5 N=10							
	6.5											
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-13

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL OCEAN MIST LOGS.GPJ TEMPLATE UPDATE 3-31-14.GPJ 8/4/14

BORING LOG NO. P-3

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION: See Exhibit A-2

GRAPHIC LOG	DEPTH	DESCRIPTION	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		CLAYEY SAND (SC), tan								31-20-11	
	2.5	**SILTY SAND (SM)**, tan, medium dense					4-6-8 N=14				
				5			3-6-5 N=11				
	6.5	***Boring Terminated at 6.5 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-14

BORING LOG NO. P-4

PROJECT: Ocean Mist Farms Expansion Project

**CLIENT: Hansen Rice Construction
Nampa, ID**

**SITE: 52300 Enterprise Way
Coachella, Riverside County, California**

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND, brown, medium dense											
	olive-brown				4-6-7 N=13							
	loose	5			3-3-4 N=7							
	6.5											
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-15

BORING LOG NO. P-5

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), tan, medium dense				3-5-6 N=11							
	loose	5			4-4-5 N=9							
	6.5											
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-16

BORING LOG NO. P-6

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

DEPTH	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	**ASPHALT CONCRETE**, 3" thick											
0.7	**AGGREGATE BASE COURSE**, 5" thick											
	SILTY SAND (SM), brown to olive-brown, loose											
					4-4-4 N=8							
		5										
6.5					2-2-3 N=5							
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with asphalt upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-17

BORING LOG NO. P-7

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

DEPTH	Description	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3	**ASPHALT CONCRETE**, 3" thick											
0.8	**AGGREGATE BASE COURSE**, 6" thick											
	SILTY SAND (SM), tan to brown, loose to medium dense											
					3-2-4 N=6							
		5			5-6-6 N=12							17
6.5	***Boring Terminated at 6.5 Feet***											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with asphalt upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-18

BORING LOG NO. P-8

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

GRAPHIC LOG	LOCATION See Exhibit A-2 DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	0.3 **ASPHALT CONCRETE**, 4" thick											
	1.0 **AGGREGATE BASE COURSE**, 8" thick											
	FILL - SILTY SAND (SM), tan, loose 3.0				3-5-6 N=11							
	SILTY SAND (SM), medium dense 5.0	5										
	POORLY GRADED SAND (SP), tan, loose 6.5				3-4-5 N=9							
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings and capped with asphalt upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

The estimated depth of the fill materials should not be considered exact due to the similarity of lithology, color, and densities of the graded materials and native soils.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-19

BORING LOG NO. P-9

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), tan to broiwn, loose											
					4-3-2 N=5							
	medium dense	5										
	6.5				3-5-8 N=13							
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-20

BORING LOG NO. P-10

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), tan, loose										NP	17
					3-3-3 N=6							
		5			3-3-4 N=7							
	6.5											
	Boring Terminated at 6.5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/15/2014	Boring Completed: 7/15/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-21

BORING LOG NO. Perc-1

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction Nampa, ID

SITE: 52300 Enterprise Way Coachella, Riverside County, California

GRAPHIC LOG	LOCATION See Exhibit A-2 DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown 5.0	5										
	Boring Terminated at 5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-22

BORING LOG NO. Perc-2

PROJECT: Ocean Mist Farms Expansion Project

CLIENT: Hansen Rice Construction
Nampa, ID

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

GRAPHIC LOG	LOCATION See Exhibit A-2 DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown											
		5										
	trace clay below 7 feet											
	10.0	10										
	Boring Terminated at 10 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-23

BORING LOG NO. Perc-3

PROJECT: Ocean Mist Farms Expansion Project

**CLIENT: Hansen Rice Construction
Nampa, ID**

**SITE: 52300 Enterprise Way
Coachella, Riverside County, California**

LOCATION See Exhibit A-2

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (psf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS: LL-PL-PI	PERCENT FINES
	SILTY SAND (SM), brown											
	5.0	5										
	Boring Terminated at 5 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic SPT Hammer

Advancement Method:
8" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
2817 McGaw Avenue
Irvine, California

Boring Started: 7/14/2014	Boring Completed: 7/14/2014
Drill Rig: CME-75	Driller: CalPac Drilling
Project No.: 60145042	Exhibit: A-24

Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

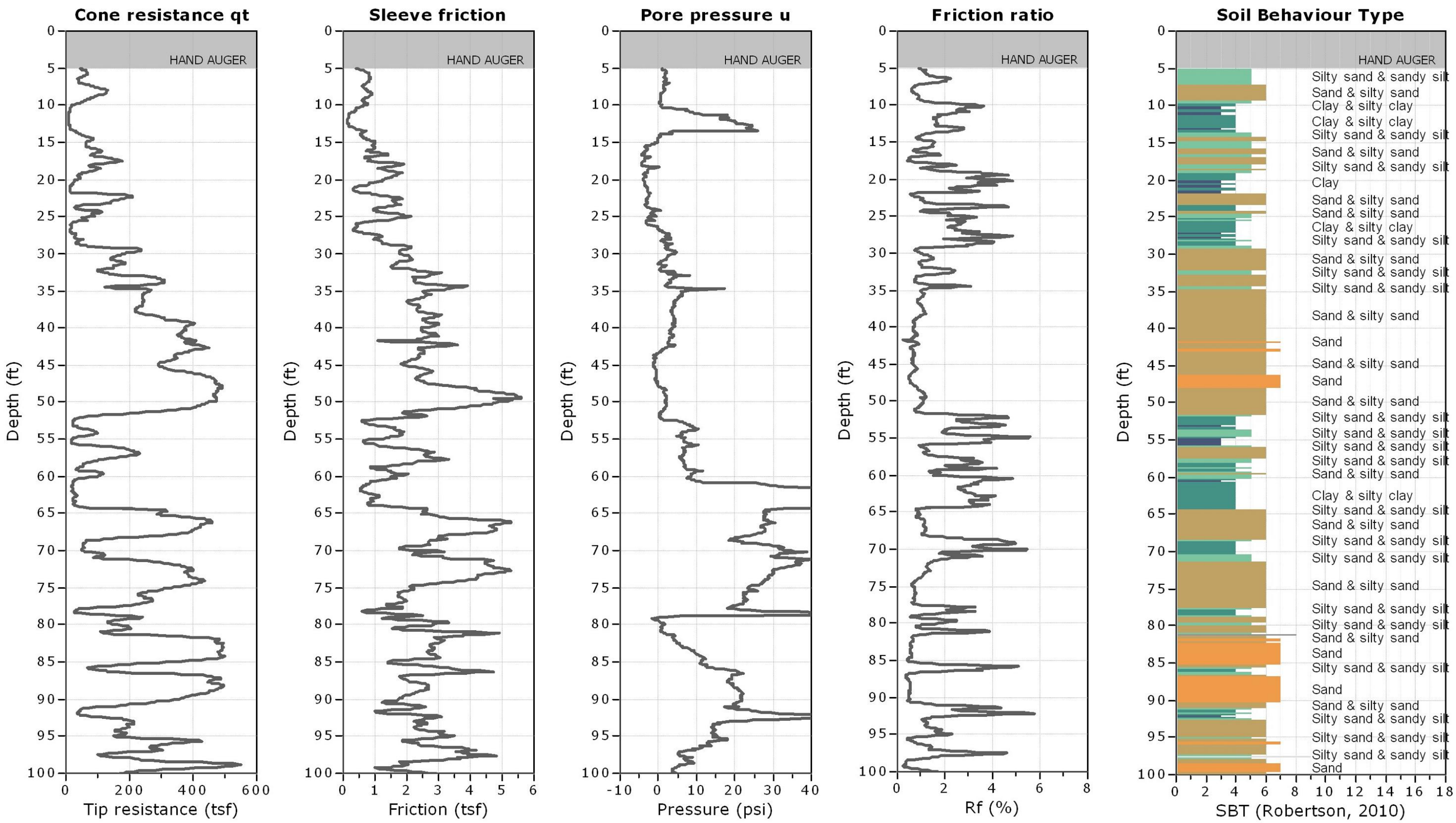
CPT: CPT-1

Total depth: 100.50 ft, Date: 7/21/2014

Cone Type: Vertek

Project: Terracon Consultants, Inc/60145040

Location: Industrial Way & Enerprise Way Coachella, CA



Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

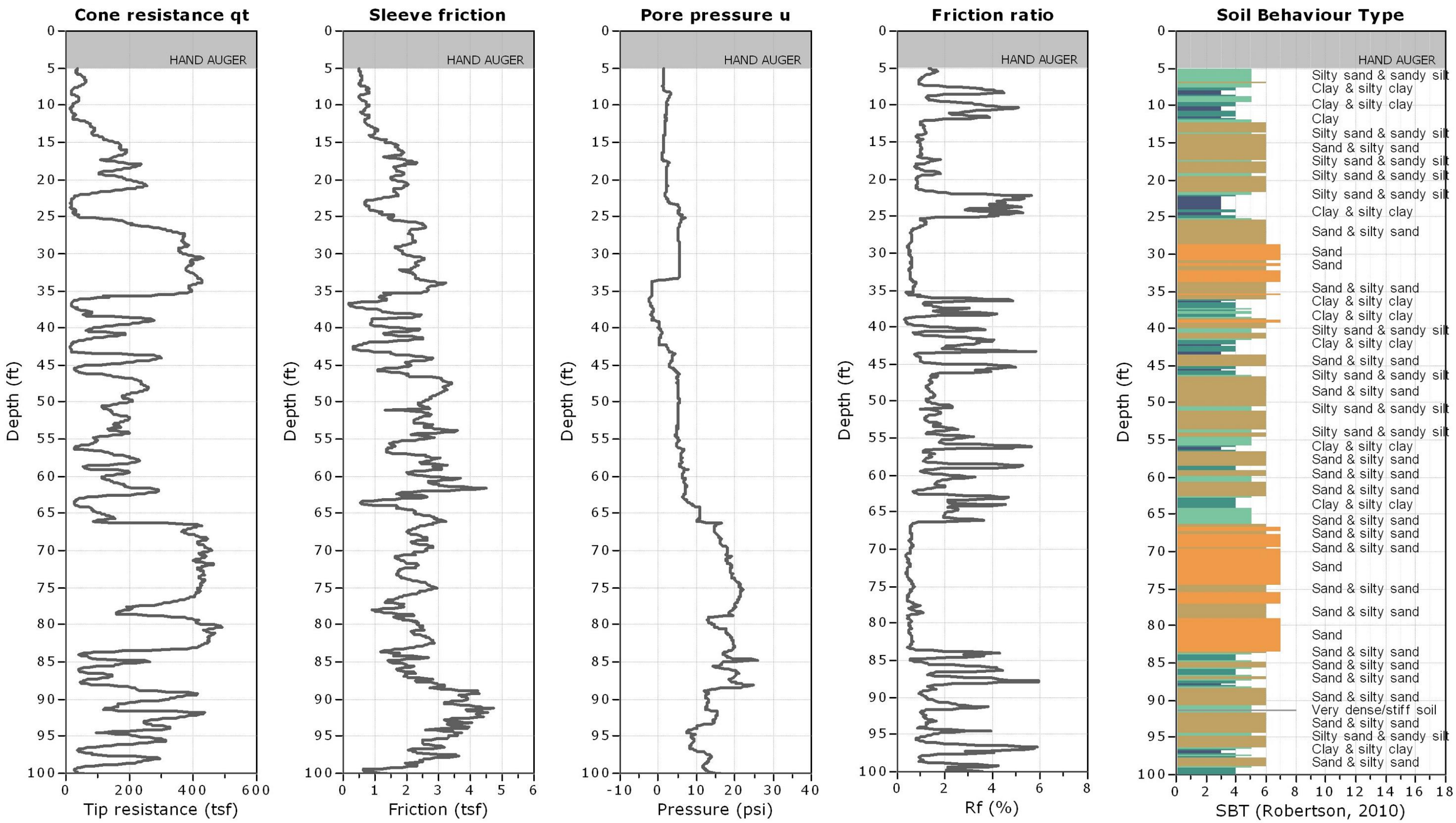
CPT: CPT-2

Total depth: 100.66 ft, Date: 7/21/2014

Cone Type: Vertek

Project: **Terracon Consultants, Inc/60145040**

Location: **Industrial Way & Enerprise Way Coachella, CA**



APPENDIX B

LABORATORY TESTING

Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

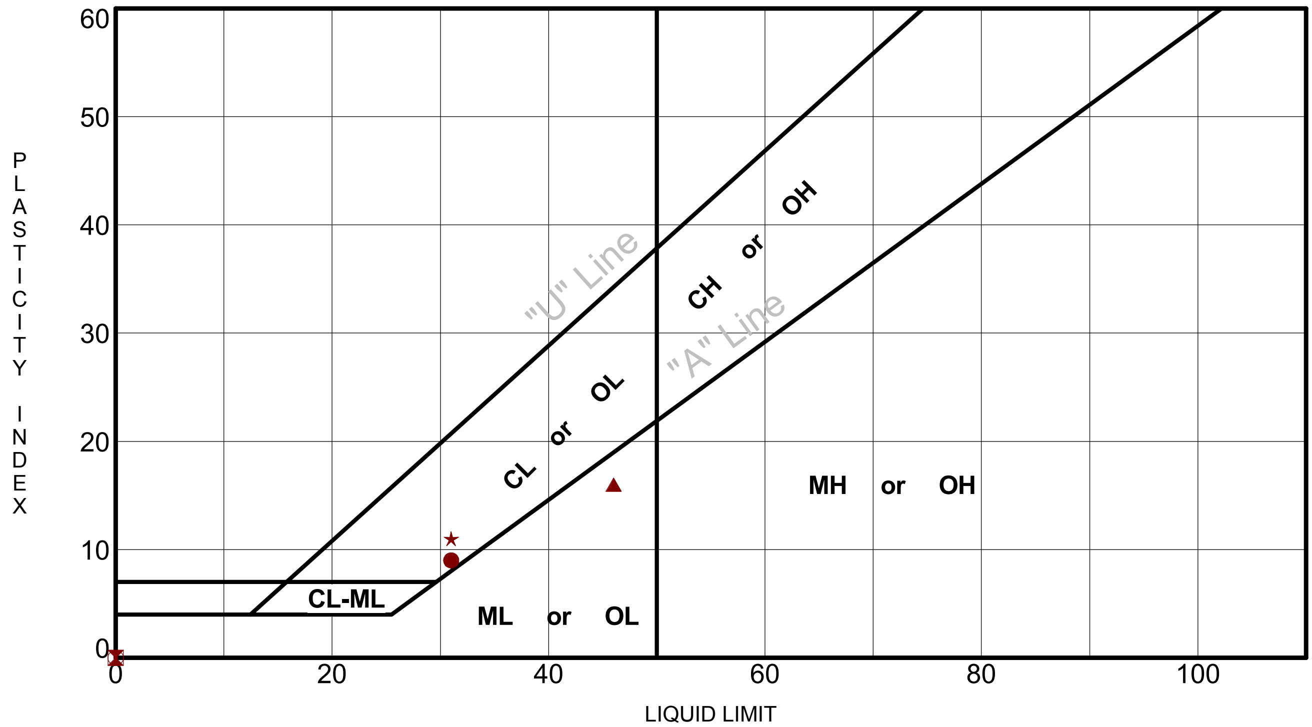
Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- In-situ Dry Density
- In-situ Water Content
- Soluble Chlorides
- Soluble Sulfates
- pH
- Minimum Resistivity
- Grain Size Distribution
- Consolidation/Swell Potential
- Direct Shear
- Atterberg Limits

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
●	B-1	7.5	31	22	9	67	CL	SANDY LEAN CLAY
⧗	B-3	0.0	NP	NP	NP	12	SM	SILTY SAND
▲	B-7	15.0	46	30	16	97	ML	SILT
★	P-3	0.0	31	20	11		SC	CLAYEY SAND
⊙	P-10	0.0	NP	NP	NP	17	SM	SILTY SAND

PROJECT: Ocean Mist Farms Expansion Project

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

Terracon
2817 McGaw Avenue
Irvine, California

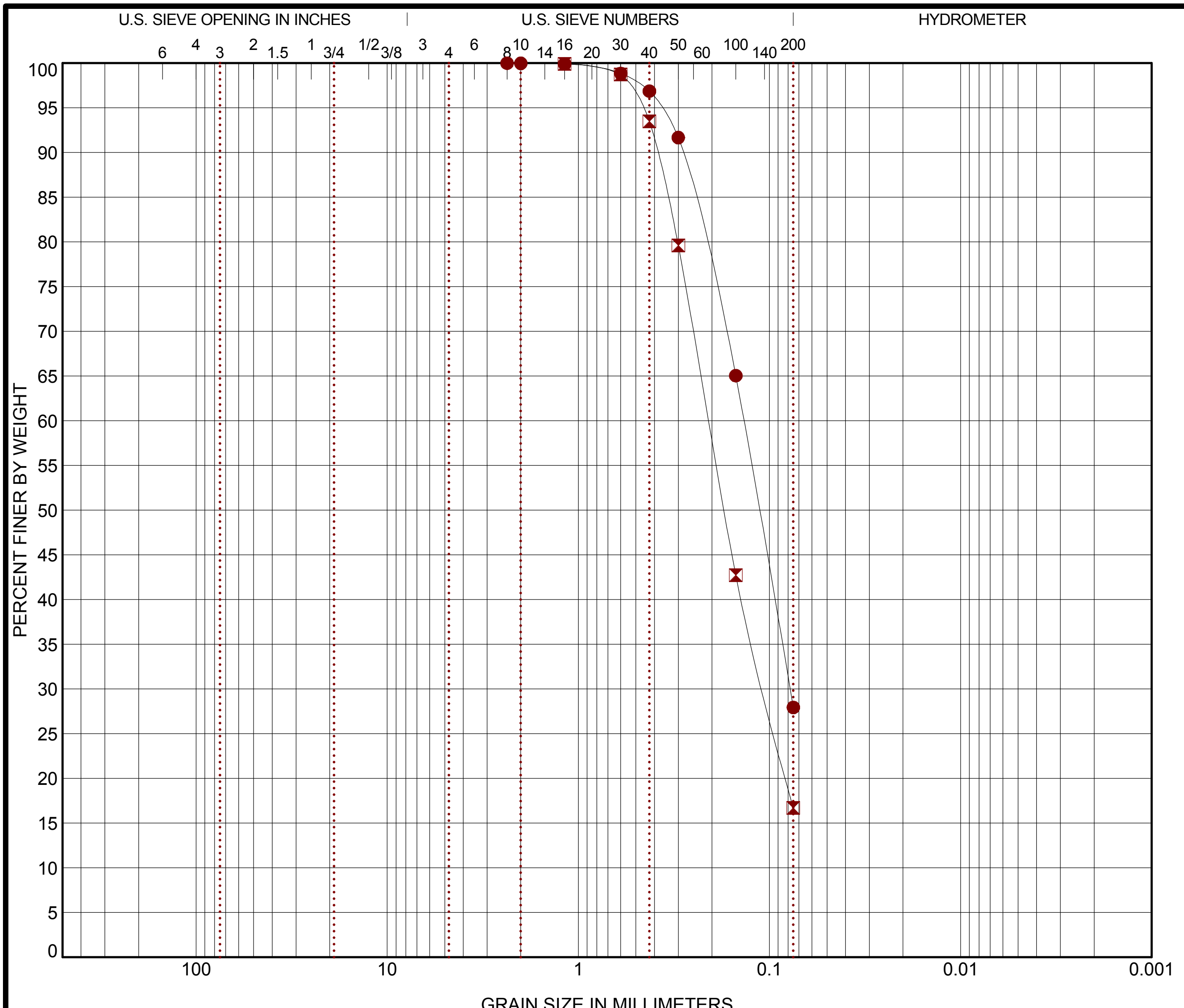
PROJECT NUMBER: 60145042

CLIENT: Hansen Rice Construction
Nampa, ID

EXHIBIT: B-2

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
● B-8	30.0	SILTY SAND					
⊠ P-7	5.0	SILTY SAND					

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● B-8	30.0	2.36	0.137	0.078		0.0	72.1	27.9	
⊠ P-7	5.0	1.18	0.208	0.107		0.0	83.2	16.7	

PROJECT: Ocean Mist Farms Expansion Project

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

Terracon
2817 McGaw Avenue
Irvine, California

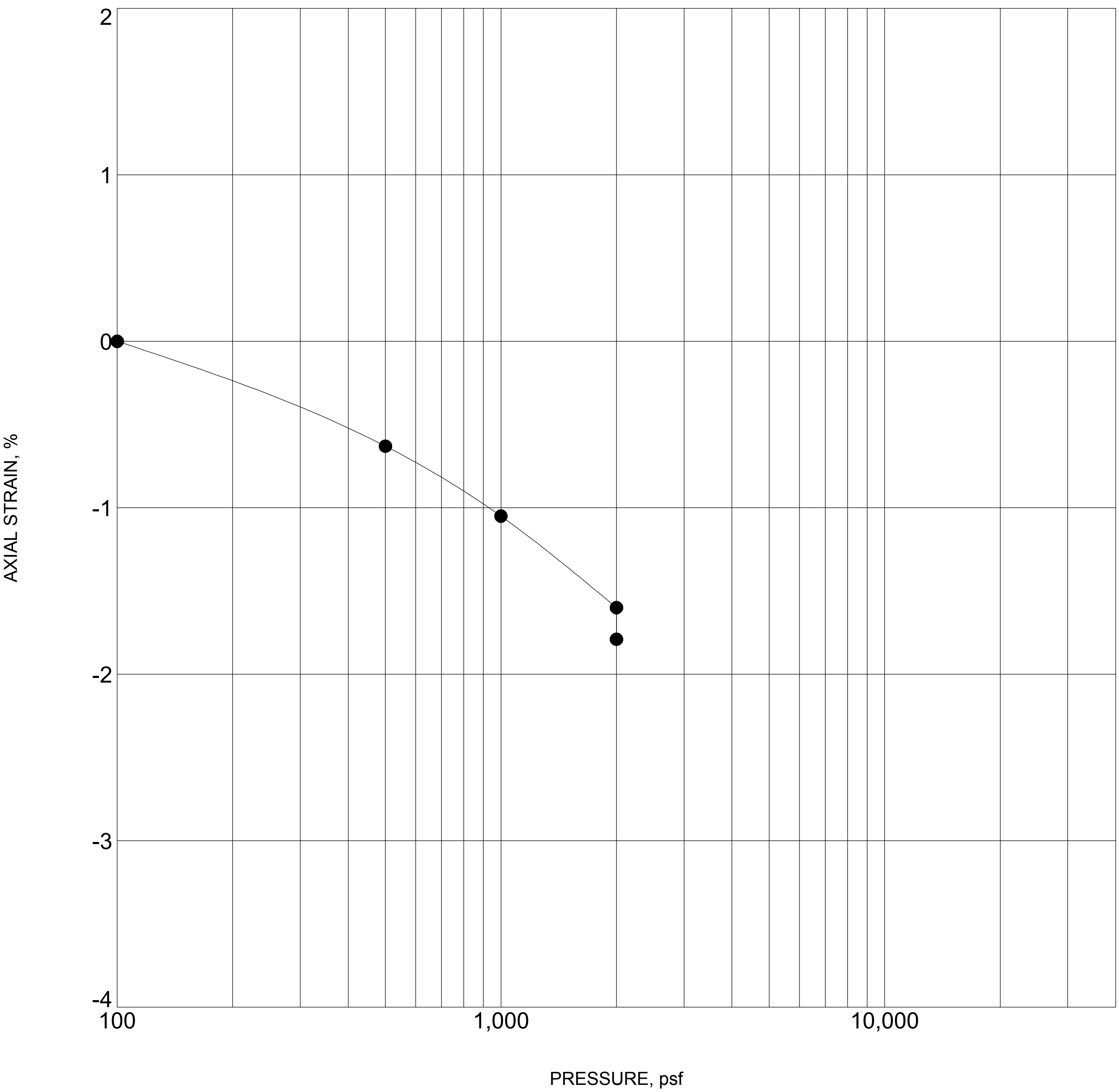
PROJECT NUMBER: 60145042

CLIENT: Hansen Rice Construction
Nampa, ID

EXHIBIT: B-3

SWELL CONSOLIDATION TEST

ASTM D4546



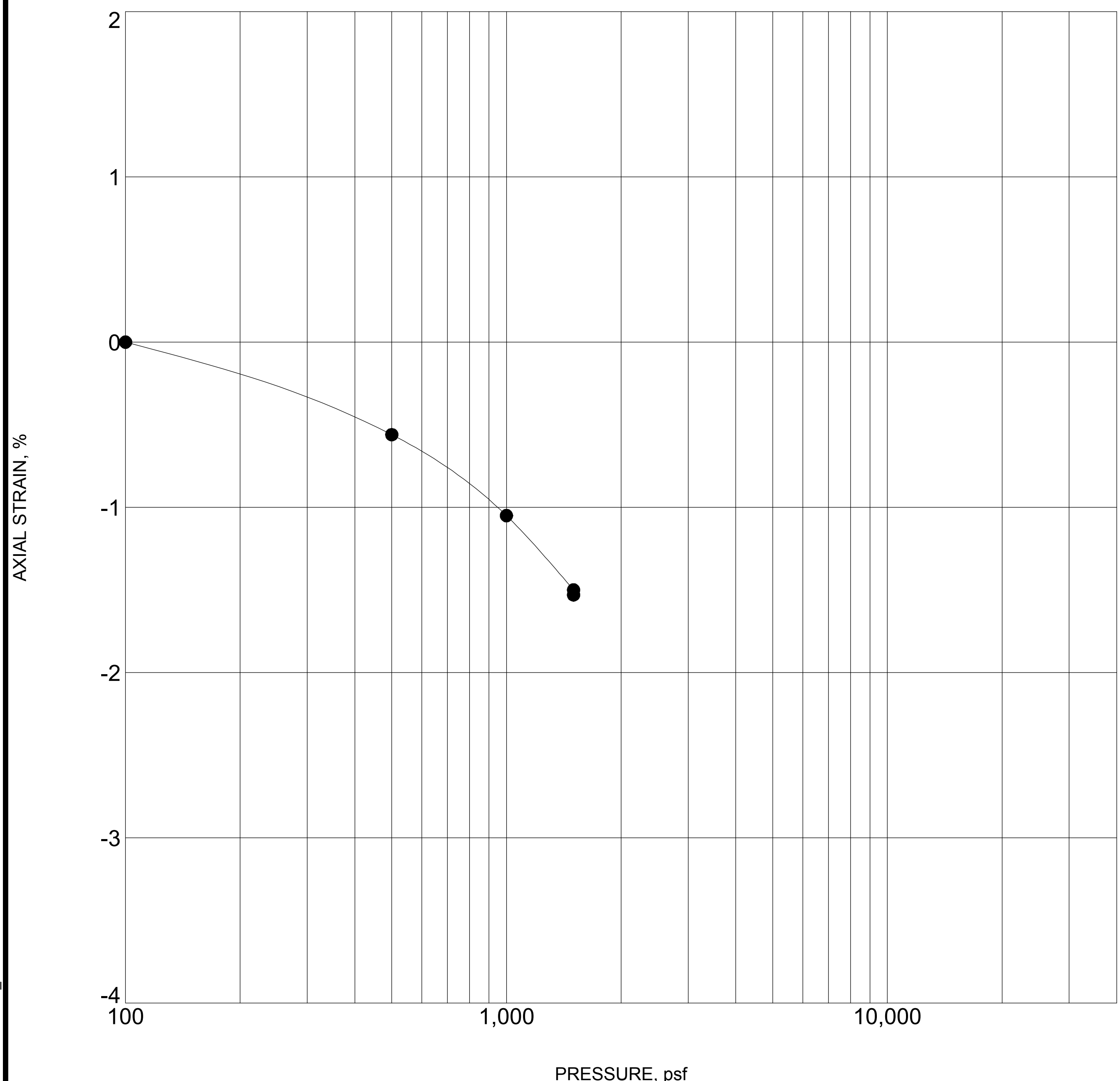
Specimen Identification		Classification	γ_d, pcf	WC, %
●	B-2 2.5 ft	POORLY GRADED SAND	102	5

NOTES: Water added at 2,000 psf.

PROJECT: Ocean Mist Farms Expansion Project	Terracon 2817 McGaw Avenue Irvine, California	PROJECT NUMBER: 60145042
SITE: 52300 Enterprise Way Coachella, Riverside County, California		CLIENT: Hansen Rice Construction Nampa, ID
		EXHIBIT: B-4

SWELL CONSOLIDATION TEST

ASTM D4546

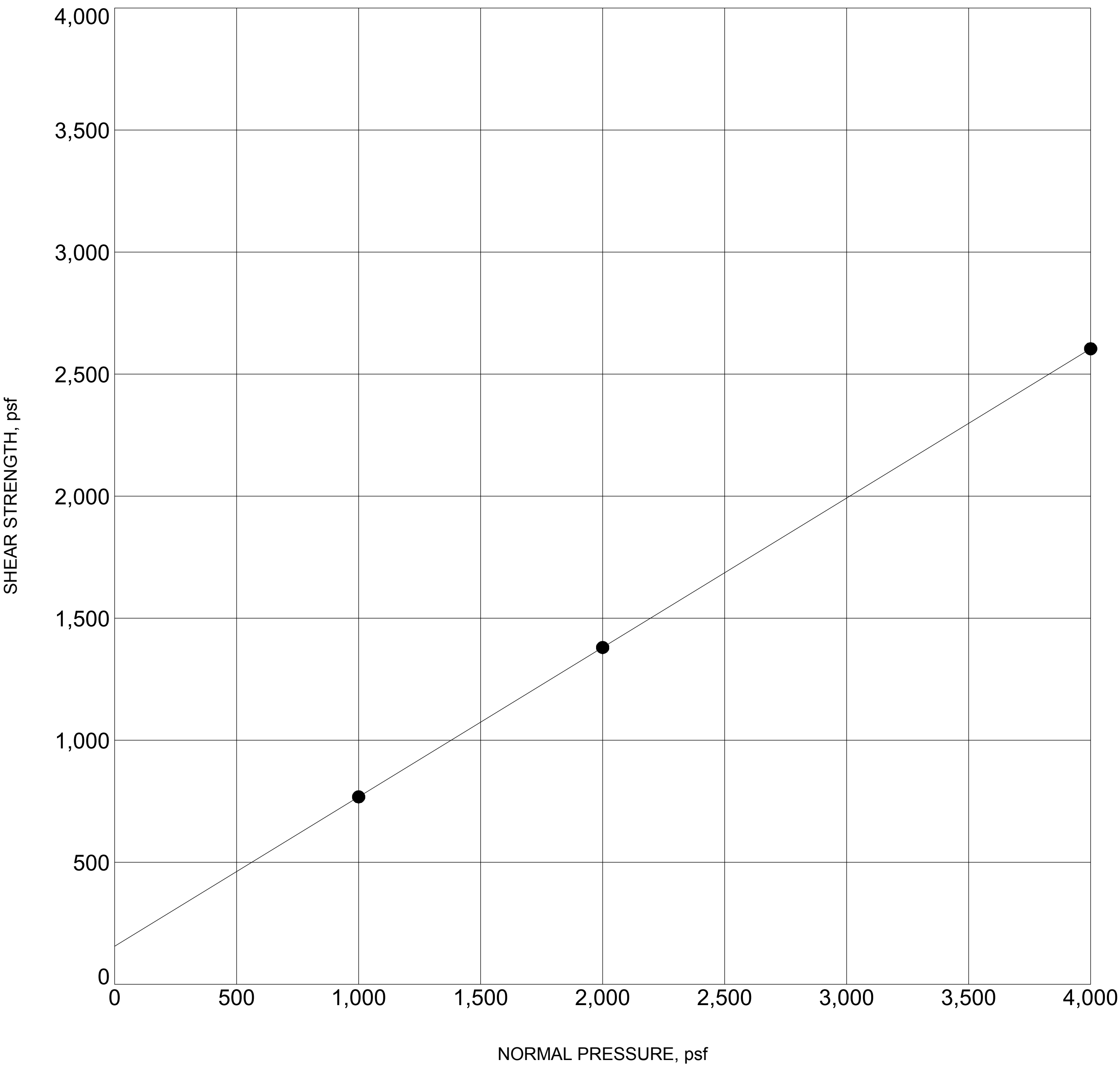


Specimen Identification		Classification	γ_d, pcf	WC, %
●	B-2 5.0 ft	SILTY SAND	95	22

NOTES: Water added at 1,500 psf.

PROJECT: Ocean Mist Farms Expansion Project	Terracon 2817 McGaw Avenue Irvine, California	PROJECT NUMBER: 60145042
SITE: 52300 Enterprise Way Coachella, Riverside County, California		CLIENT: Hansen Rice Construction Nampa, ID
		EXHIBIT: B-5

DIRECT SHEAR TEST ASTM D3080



	Specimen Identification		Classification	γ_d, pcf	WC,%	c, psf	ϕ°
●	**B-5**	**2.5ft**	**SILTY SAND**	**102**	**6**	**156**	**31**

PROJECT: Ocean Mist Farms Expansion Project

SITE: 52300 Enterprise Way
Coachella, Riverside County, California

Terracon
2817 McGaw Avenue
Irvine, California

PROJECT NUMBER: 60145042

CLIENT: Hansen Rice Construction
Nampa, ID

EXHIBIT: B-6

CHEMICAL LABORATORY TEST REPORT

Project Number: 60145042
Service Date: 07/28/14
Report Date: 07/29/14
Task:

Terracon

750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client

Project

Ocean Mist Farms Expansion

Sample Submitted By: Terracon (60) **Date Received:** 7/25/2014 Lab No.: 14-0396

Results of Corrosivity Analysis

Sample Number		
Sample Location	B-1	B-8
Sample Depth (ft.)	0.0	0.0
pH Analysis, AWWA 4500 H	7.31	6.71
Water Soluble Sulfate (SO4), AWWA 4500 E (mg/kg)	88	1403
Sulfides, AWWA 4500-S D, (mg/kg)	Nil	Nil
Red-Ox, AWWA 2580, (mV)	+624	+636
Total Salts, AWWA 2510, (mg/kg)	750	12992
Chlorides, AWWA 4500 Cl B, (mg/kg)	37	1875
Resistivity, ASTM G-57, (ohm-cm)	2959	136

Analyzed By: Kurt D. Ergun

Kurt D. Ergun
Chemist

APPENDIX C

SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

Auger	Shelby Tube	Split Spoon
Rock Core	Macro Core	Modified California Ring Sampler
Grab Sample	No Recovery	Modified Dames & Moore Ring Sampler

WATER LEVEL

- **Water Initially Encountered**
- **Water Level After a Specified Period of Time**
- **Water Level After a Specified Period of Time**

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	**Hand Penetrometer**
(T)	**Torvane**
(b/f)	**Standard Penetration Test (blows per foot)**
N	**N value**
(PID)	**Photo-Ionization Detector**
(OVA)	**Organic Vapor Analyzer**
(WOH)	Weight of Hammer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			**CONSISTENCY OF FINE-GRAINED SOILS** (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	$\geq$ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

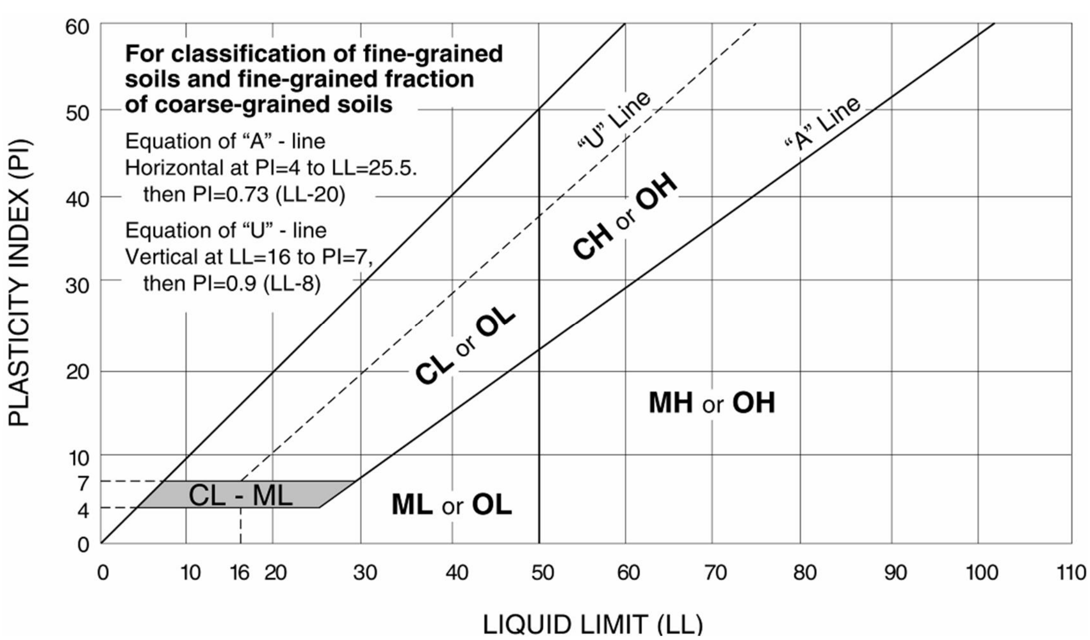
PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G,H,I]
			Fines classify as CL or CH	SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	$PI > 7$ and plots on or above "A" line [J]	CL	Lean clay [K,L,M]
			$PI < 4$ or plots below "A" line [J]	ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [K,L,M,N]
					Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K,L,M]
			PI plots below "A" line	MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [K,L,M,P]
					Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay
[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains $\geq$ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains $\geq$ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains $\geq$ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains $\geq$ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] $PI \geq 4$ and plots on or above "A" line.
[O] $PI < 4$ or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



Design Maps Detailed Report

ASCE 7-10 Standard (33.67061°N, 116.15284°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1[1] S_S = 2.178 g

From Figure 22-2[2] S_1 = 1.065 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 2.178 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 1.065 g, F_v = 1.500

Equation (11.4–1):	$S_{MS} = F_aS_S = 1.000 \times 2.178 = 2.178$ g
Equation (11.4–2):	$S_{M1} = F_vS_1 = 1.500 \times 1.065 = 1.597$ g

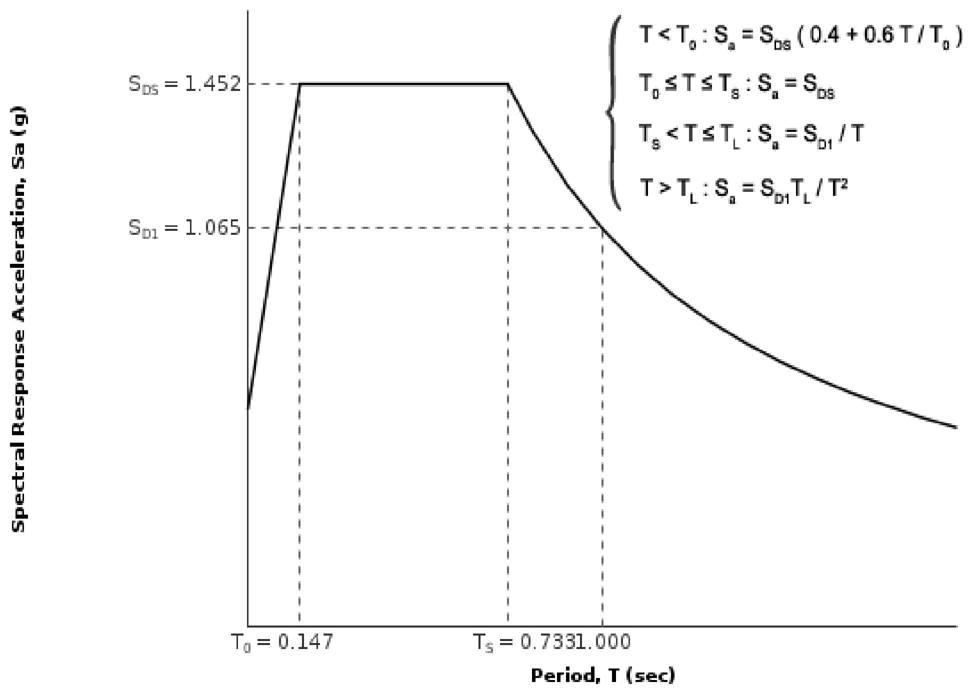
Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4–3):	$S_{DS} = ⅔\ S_{MS} = ⅔ \times 2.178 = 1.452$ g
Equation (11.4–4):	$S_{D1} = ⅔\ S_{M1} = ⅔ \times 1.597 = 1.065$ g

Section 11.4.5 — Design Response Spectrum

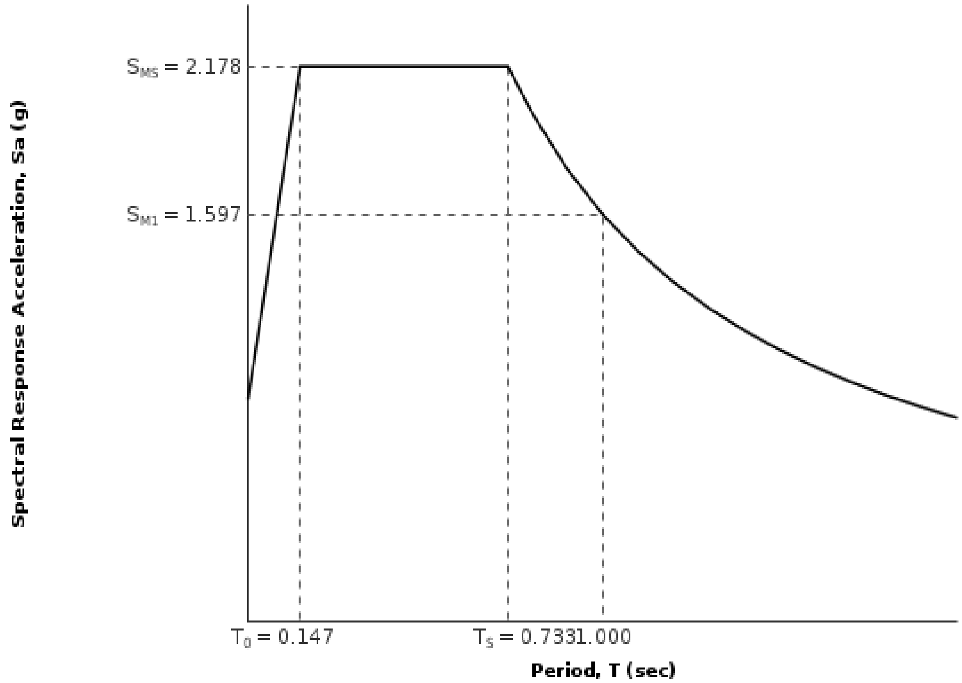
From Figure 22-12[3]	T_L = 8 seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7[4] PGA = 0.849

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.849 = 0.849$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.849 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17[5] C_{RS} = 0.977

From Figure 22-18[6] C_{R1} = 0.946

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.452 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 1.065 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = E

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

APPENDIX D

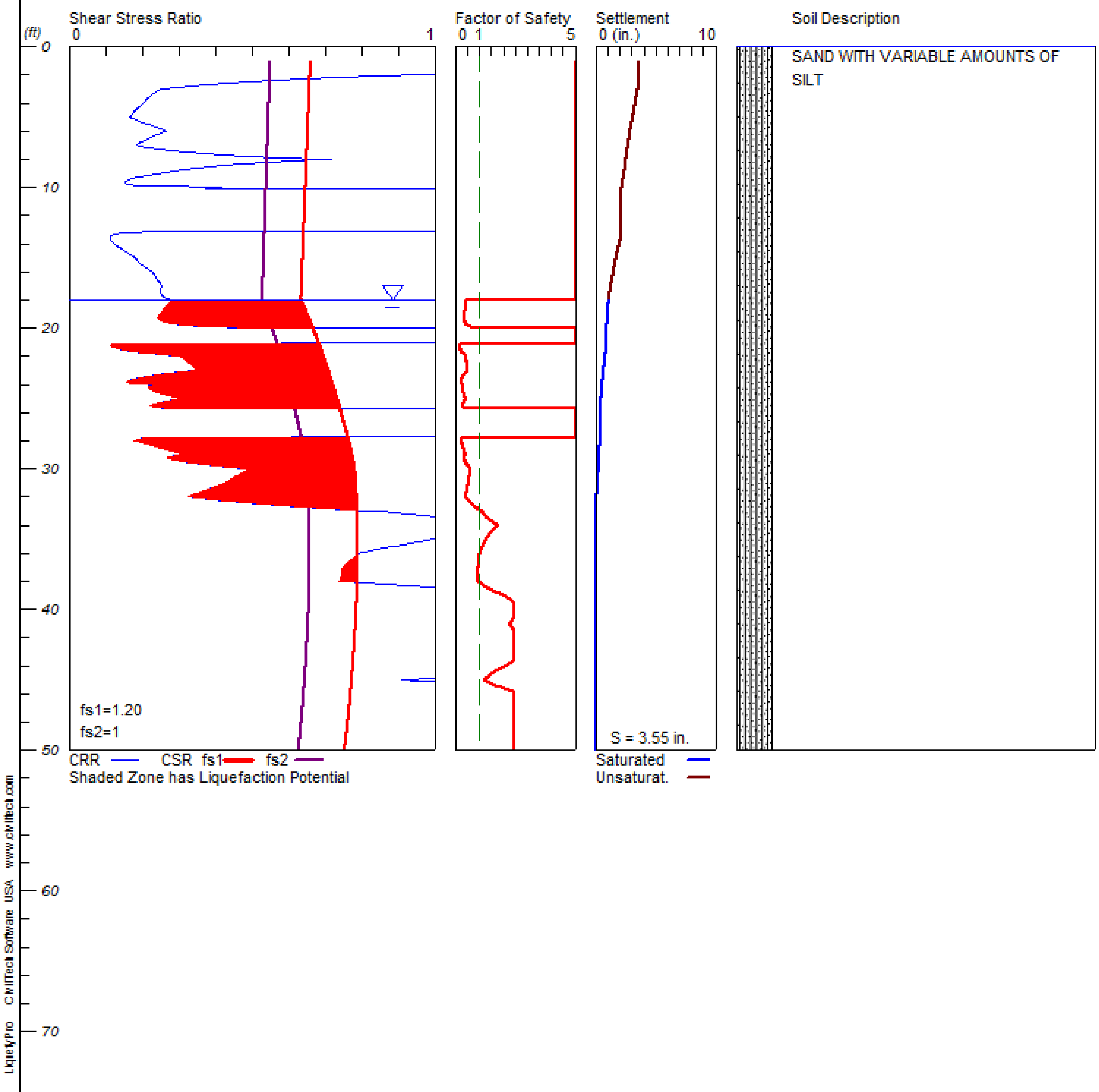
LIQUEFACTION ANALYSIS

LIQUEFACTION ANALYSIS

Ocean Mist Farms

Hole No.=CPT-1   Water Depth=18 ft

Magnitude=7.74
Acceleration=0.849g



LIQUEFACTION ANALYSIS SUMMARY

Input Data:

Hole No.=CPT-1
Depth of Hole=50.00 ft
Water Table during Earthquake= 18.00 ft
Water Table during In-Situ Testing= 18.00 ft
Max. Acceleration=0.85 g
Earthquake Magnitude=7.74
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. CPT Calculation Method: Modify Robertson*
2. Settlement Analysis Method: Tokimatsu, M-correction
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
9. User request factor of safety (apply to CSR) , User= 1.2
   Plot two CSR (fs1=User, fs2=1)
10. Use Curve Smoothing: Yes*

* Recommended Options

In-Situ Test Data:

Depth ft	qc atm	fs atm	Rf pcf	gamma %	Fines mm	D50
1.00	98.60	0.71	0.72	118.90	0.00	0.50
2.00	69.30	0.80	1.15	118.90	0.00	0.50
3.00	49.50	0.33	0.67	111.60	0.00	0.50
4.00	44.50	0.46	1.03	113.80	0.00	0.50
5.00	44.30	0.40	0.90	112.80	0.00	0.50
6.00	59.40	0.82	1.38	118.70	0.00	0.50
7.00	42.00	0.74	1.76	117.10	0.00	0.50
8.00	129.90	0.77	0.59	120.20	0.00	0.50
9.00	79.00	0.70	0.89	118.30	0.00	0.50
10.00	20.60	0.67	3.25	114.70	0.00	0.50
11.00	9.30	0.23	2.47	104.90	0.00	0.50
12.00	8.40	0.14	1.67	101.10	0.00	0.50
13.00	12.70	0.35	2.76	108.80	0.00	0.50
14.00	51.20	0.53	1.04	115.20	0.00	0.50
15.00	65.30	1.02	1.56	120.60	0.00	0.50
16.00	102.90	0.81	0.79	120.00	0.00	0.50
17.00	119.80	0.68	0.57	119.10	0.00	0.50
18.00	81.30	1.84	2.26	125.40	0.00	0.50
19.00	69.10	1.65	2.39	124.20	0.00	0.50
20.00	38.10	1.27	3.33	120.80	0.00	0.50
21.00	14.10	0.43	3.05	110.50	0.00	0.50
22.00	140.80	0.93	0.66	121.80	0.00	0.50
23.00	136.10	1.63	1.20	125.80	0.00	0.50
24.00	35.90	0.89	2.48	118.10	0.00	0.50
25.00	83.30	2.15	2.58	126.60	0.00	0.50
26.00	16.30	0.40	2.45	110.30	0.00	0.50
27.00	13.70	0.35	2.55	108.90	0.00	0.50
28.00	40.50	0.89	2.20	118.40	0.00	0.50
29.00	68.40	2.05	3.00	125.80	0.00	0.50
30.00	183.10	1.76	0.96	127.10	0.00	0.50
31.00	165.60	1.91	1.15	127.40	0.00	0.50

In-Situ Test Data:

Depth ft	qc atm	fs atm	Rf pcf	gamma %	Fines mm	D50
32.00	141.30	1.75	1.24	126.40	0.00	0.50
33.00	232.60	2.72	1.17	130.80	0.00	0.50
34.00	297.50	2.44	0.82	130.60	0.00	0.50
35.00	265.20	2.55	0.96	130.70	0.00	0.50
36.00	241.90	2.39	0.99	130.00	0.00	0.50
37.00	237.80	2.38	1.00	129.90	0.00	0.50
38.00	231.90	2.66	1.15	130.70	0.00	0.50
39.00	331.70	2.55	0.77	131.20	0.00	0.50
40.00	370.50	2.45	0.66	131.20	0.00	0.50
41.00	348.30	2.98	0.86	132.50	0.00	0.50
42.00	373.20	2.58	0.69	131.60	0.00	0.50
43.00	397.80	2.45	0.62	131.40	0.00	0.50
44.00	349.50	2.24	0.64	130.40	0.00	0.50
45.00	287.70	1.85	0.64	128.50	0.00	0.50
46.00	387.00	2.77	0.72	132.20	0.00	0.50
47.00	470.00	2.39	0.51	131.60	0.00	0.50
48.00	492.70	3.87	0.79	135.20	0.00	0.50
49.00	464.80	5.35	1.15	137.20	0.00	0.50
50.00	450.40	4.92	1.09	136.80	0.00	0.50

Modify Robertson method generates Fines from qc/fs. Inputted Fines are not relevant.

Output Results:

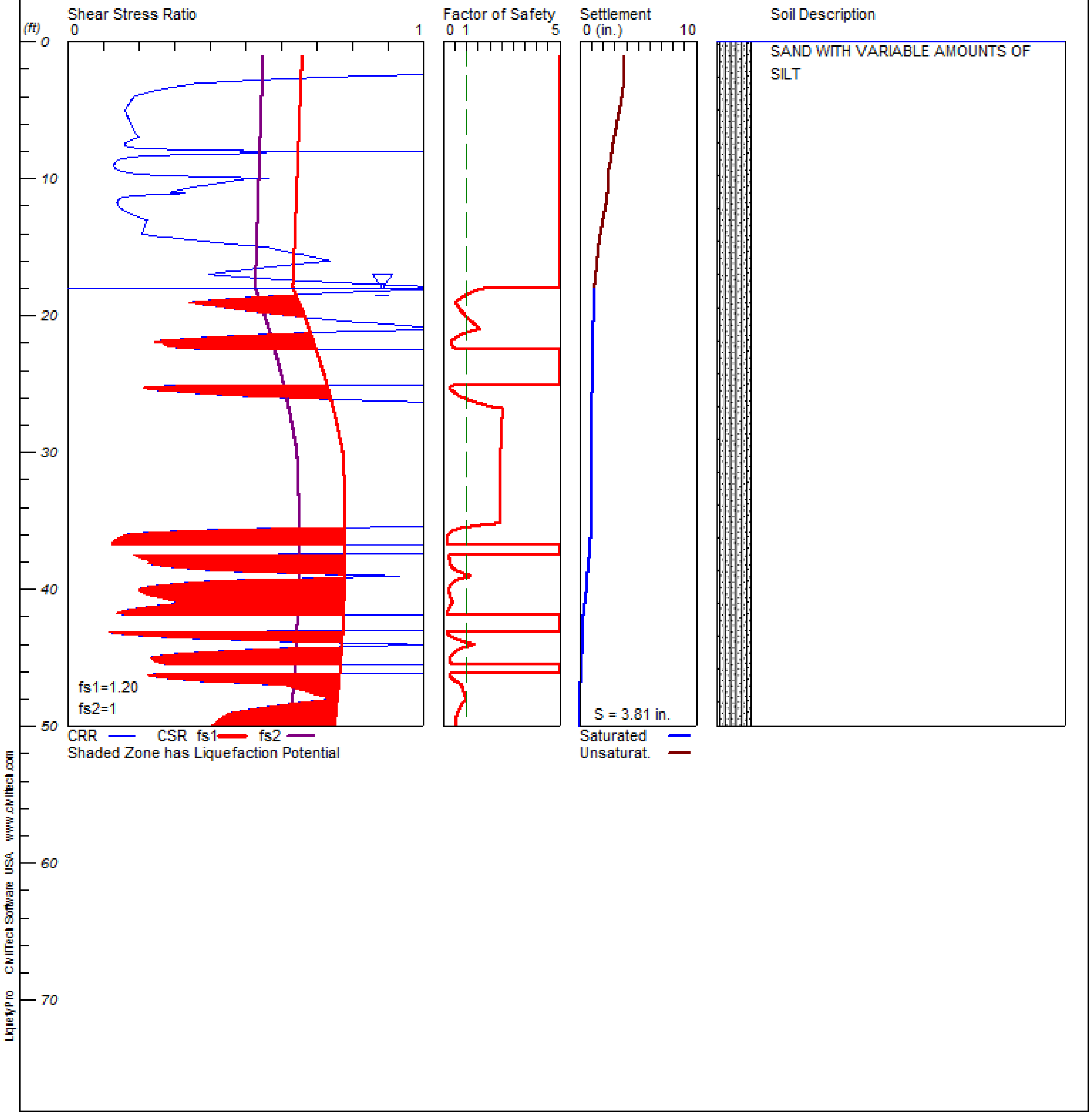
Settlement of Saturated Sands=1.06 in.
Settlement of Unsaturated Sands=2.49 in.
Total Settlement of Saturated and Unsaturated Sands=3.55 in.
Differential Settlement=1.774 to 2.342 in.

LIQUEFACTION ANALYSIS

Ocean Mist Farms

Hole No.=CPT-2 Water Depth=18 ft

Magnitude=7.74
Acceleration=0.849g



LIQUEFACTION ANALYSIS SUMMARY

Input Data:

Surface Elev.=
Hole No.=CPT-2
Depth of Hole=50.00 ft
Water Table during Earthquake= 18.00 ft
Water Table during In-Situ Testing= 18.00 ft
Max. Acceleration=0.85 g
Earthquake Magnitude=7.74
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. CPT Calculation Method: Modify Robertson*
2. Settlement Analysis Method: Tokimatsu/Seed
3. Fines Correction for Liquefaction: Stark/Olson et al.*
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
9. User request factor of safety (apply to CSR) , User= 1.2
   Plot two CSR (fs1=User, fs2=1)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	qc atm	fs atm	Rf pcf	gamma %	Fines mm	D50
1.00	105.60	1.08	1.02	122.10	0.00	0.50
2.00	95.10	1.00	1.05	121.30	0.00	0.50
3.00	50.60	0.80	1.58	118.20	0.00	0.50
4.00	36.20	0.55	1.52	114.60	0.00	0.50
5.00	38.30	0.49	1.28	113.90	0.00	0.50
6.00	47.10	0.56	1.19	115.40	0.00	0.50
7.00	60.90	0.55	0.90	115.90	0.00	0.50
8.00	18.00	0.74	4.11	115.10	0.00	0.50
9.00	41.20	0.49	1.19	114.10	0.00	0.50
10.00	22.60	0.79	3.50	116.10	0.00	0.50
11.00	19.10	0.51	2.67	112.50	0.00	0.50
12.00	44.70	0.69	1.54	116.80	0.00	0.50
13.00	84.00	0.94	1.12	120.60	0.00	0.50
14.00	89.20	0.79	0.89	119.50	0.00	0.50
15.00	158.40	1.38	0.87	124.90	0.00	0.50
16.00	181.90	1.76	0.97	127.00	0.00	0.50
17.00	147.40	1.10	0.75	123.10	0.00	0.50
18.00	235.40	1.90	0.81	128.20	0.00	0.50
19.00	119.30	1.80	1.51	126.20	0.00	0.50
20.00	192.20	1.53	0.80	126.20	0.00	0.50
21.00	239.00	1.90	0.79	128.30	0.00	0.50
22.00	61.20	1.70	2.78	124.10	0.00	0.50
23.00	16.30	0.69	4.23	114.30	0.00	0.50
24.00	23.50	0.83	3.53	116.60	0.00	0.50
25.00	35.60	1.60	4.49	122.40	0.00	0.50
26.00	207.20	1.39	0.67	125.60	0.00	0.50
27.00	337.00	2.11	0.63	129.90	0.00	0.50
28.00	369.40	2.18	0.59	130.30	0.00	0.50
29.00	377.60	1.63	0.43	128.30	0.00	0.50

Depth ft	qc atm	fs atm	Rf pcf	gamma %	Fines mm	D50
30.00	370.40	1.87	0.50	129.20	0.00	0.50
31.00	391.50	2.38	0.61	131.10	0.00	0.50
32.00	376.90	2.15	0.57	130.30	0.00	0.50
33.00	410.50	2.27	0.55	130.90	0.00	0.50
34.00	414.30	3.21	0.77	133.50	0.00	0.50
35.00	394.90	2.67	0.68	132.00	0.00	0.50
36.00	72.40	1.26	1.74	122.40	0.00	0.50
37.00	18.40	0.22	1.20	106.20	0.00	0.50
38.00	78.70	1.98	2.52	125.90	0.00	0.50
39.00	276.20	0.89	0.32	123.10	0.00	0.50
40.00	87.40	1.72	1.97	125.10	0.00	0.50
41.00	169.10	1.63	0.96	126.30	0.00	0.50
42.00	24.20	0.81	3.35	116.50	0.00	0.50
43.00	18.80	0.47	2.50	111.90	0.00	0.50
44.00	299.50	2.70	0.90	131.40	0.00	0.50
45.00	85.90	2.08	2.42	126.40	0.00	0.50
46.00	42.30	1.67	3.95	123.10	0.00	0.50
47.00	225.00	3.11	1.38	131.70	0.00	0.50
48.00	258.30	3.11	1.20	132.10	0.00	0.50
49.00	192.10	2.94	1.53	130.90	0.00	0.50
50.00	192.60	2.46	1.28	129.60	0.00	0.50

Modify Robertson method generates Fines from qc/fs. Inputted Fines are not relevant.

Output Results:

Settlement of Saturated Sands=1.25 in.
Settlement of Unsaturated Sands=2.55 in.
Total Settlement of Saturated and Unsaturated Sands=3.81 in.
Differential Settlement=1.903 to 2.512 in.

August 27, 2014
Revised on September 12, 2014

Terracon

HANSEN·RICE CONSTRUCTION

1717 E Chisholm Dr.
Nampa, Idaho 83687

Attn: Mr. James L. Escobar
Pre-Construction Department - Architect
E: jescobar@hansen-rice.com

Re: Alternative Settlement Mitigation Measures
Ocean Mist Farms Expansion Project
52300 Enterprise Way
Coachella, Riverside County, California
Terracon Project No. 60145042

Dear Mr. Escobar:

As per the Design-Build Team's request, we are providing the following letter which provides supplemental information to our geotechnical engineering report (Project No. 601145042, dated August 5, 2014).

Based on the liquefaction analysis included in our report, total seismically-induced settlement of dry sands and saturated sands are expected to be approximately 3½ to 4 inches. Seismically-induced differential settlement is anticipated to range between 1¾ and 2½ inches.

Due to the anticipated seismic settlement onsite, our referenced report recommended utilizing in-situ ground densification methods within the upper 22 feet of onsite soils. Ground improvements such as rammed aggregate piers were suggested to meet the County of Riverside criteria of 2 inches for total static and seismic settlement.

As an alternative to the rammed aggregate piers, proposed shallow foundations may bear on a minimum of 36 inches of geogrid reinforced engineered fill. The use of engineered fill and multi-axial (such as Tensar TX5 or equivalent) geogrid will reduce the potential differential settlement beneath the proposed building, but will not reduce potential total dynamic settlement.

Typically, the tolerated differential settlement among foundations is on the order of ½ to ¾ of inch in a span of 40 feet. Such tolerance is based on the column beam connections and should be verified by the building structural engineer. The reinforced engineered fill will reduce the differential settlement by producing a relatively uniform settlement beneath the footprint of the proposed structures.

The engineered fill should be placed beneath the entire footprint of the building and should extend horizontally a minimum distance of 5 feet beyond the outside edge of perimeter footings. The geogrid should be placed at one-foot depth intervals with the first geogrid placed on the bottom of the excavation on prepared native soils. This placement schedule will place the top geogrid one foot below the bottom of the footing.

Foundation design should include interconnecting isolated and continuous footings with seismic ties (per CBC 1809.13) to improve support and lessen the differential settlement. A bearing pressure of 2500 psf should be used in footing design and the coefficient of friction should be considered as 0.45.

Minimum footing embedment, dimensions, and construction consideration are included in the referenced geotechnical engineering report.

In summary, deep soil improvements such as rammed aggregate piers or the use of deep foundations will reduce total and differential settlement more than the engineered fill alternate. Utilizing reinforced engineered fill and structural seismic ties will only reduce the differential settlement values and provide a uniform behavior for the foundation system. This uniformity will reduce the probability of structural collapse, however, for the engineered fill option, some permanent deformations and repair to the structure should be anticipated following a seismic event.

The recommendations contained in this addendum are based upon the results of field and laboratory testing provided in our referenced report, engineering analysis, and our current understanding of the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this letter, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Joshua Morgan, E.I.T.
Senior Staff Engineer

Fouad (Fred) Abuhamdan, P.E.
Senior Project Manager

September 15, 2014

HANSEN-RICE CONSTRUCTION
1717 E Chisholm Dr.
Nampa, Idaho 83687

Attn: Mr. James L. Escobar
Pre-Construction Department - Architect
E: jescobar@hansen-rice.com

Re: Pavement Design Recommendations – Addendum #2
Ocean Mist Farms Expansion Project
52300 Enterprise Way
Coachella, Riverside County, California
Terracon Project No. 60145042

Dear Mr. Escobar:

As per the Design-Build Team's request, we are providing the following letter which provides supplemental information to our geotechnical engineering report (Project No. 60145042, dated August 5, 2014). It is our understanding that additional pavement recommendations are need for heavy truck loading areas and other areas designated for loading and unloading using heavy forklifts.

As per our discussion with the Design-Build Team, truck areas are expected to support a daily traffic consisting of 150 trucks per day for 215 days per year for a total of 20 years. Forklift areas will support a daily traffic of 150 loaded forklifts and 150 unloaded forklifts for 215 days per year for a total of 20 years. Based on traffic calculations, pavement for truck areas will have a traffic loading of 900,000 ESAL's, which correlates to a Traffic Index (TI) of 9.0. Pavement for forklift areas will have a traffic loading of 18,100,000 ESAL's, which correlates to a TI of 13.0. Such traffic assumptions should be discussed and verified with a traffic engineer and/or the owner.

Assuming the pavement subgrades will be prepared as recommended within our referenced report, the following pavement sections should be considered minimums for this project for the TI values assumed in the following table:

	Recommended Pavement Section Thickness (inches)*	
	Truck Area	**Forklift Area**
	Assumed TI = 9.0	**Assumed TI = 13.0**
Section I Portland Cement Concrete	8" of Plain-Jointed Concrete or 7" of Jointed Reinforced Concrete with Dowels over 6" Class II Aggregate Base	12" of Jointed Reinforced Concrete or 11" of Continuously Reinforced Concrete over 6" Class II Aggregate Base
Section II Asphaltic Concrete	5" Asphaltic Concrete over 8" Class II Aggregate Base	6" Asphaltic Concrete over 13" Class II Aggregate Base

* All materials should meet the CALTRANS Standard Specifications for Highway Construction.
Traffic indices should be verified by the traffic/civil engineer

Subgrade soils beneath all pavements should be scarified, moisture conditioned, and compacted to a minimum depth of 10 inches. All concrete for rigid pavements should have a minimum flexural strength of 600 psi, and be placed with a maximum slump of four inches.

It is our experience that asphalt pavement sections could suffer severe distress and shoving in tight turning radius areas. We recommend that portland cement concrete pavement be used for such areas.

Asphalt concrete sections should be thickened to a minimum of 8 inches at transitions with concrete, especially at the trash enclosure pad, loading zones, escape lane intersections, and any other transitions with concrete.

Pavement design and construction considerations are included in our referenced report. The recommendations contained in this addendum are based upon the results of field and laboratory testing provided in our referenced report, engineering analysis, and our current understanding of the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this letter, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

for

REGISTERED PROFESSIONAL ENGINEER
FOUAD ABUHAMDAN
C 77455
CIVIL
STATE OF CALIFORNIA

Tamara Hashimoto, E.I.T.
Staff Engineer

Fouad (Fred) Abuhamdan, P.E.
Senior Project Manager