PRELIMINARY

GEOTECHNICAL EXPLORATION

PROPOSED IMPROVEMENTS

OXNARD AIRPORT RUNWAY

2889 WEST 5TH STREET

OXNARD, CALIFORNIA

M14-703 8-28-14

For

Mead & Hunt, Inc.
133 Aviation Blvd., Ste 100
Santa Rosa, California 95403
Attn: Jeff Leonard

*23890 Copper Hill Dr. #111, Valencia , California 91354 * (661) 299-2206 * millergeosciences@gmail.com*

TABLE OF CONTENTS

Page #

APPENDIX A

Field Data

APPENDIX B

Laboratory Data

APPENDIX C

CBR Test Results

PRELIMINARY

GEOTECHNICAL EXPLORATION

PROPOSED IMPROVEMENTS

OXNARD AIRPORT RUNWAY

2889 WEST 5TH STREET

OXNARD, CALIFORNIA

M14-703 8-28-14

INTRODUCTION

This report presents the results of our geotechnical exploration conducted for the Oxnard Airport Runway located at 2889 West 5th Street, Oxnard, California. Provided herein is a description and an evaluation of the soil materials and the near subsurface conditions under the runway. This information provides the basis for our geotechnical engineering recommendations presented herein for the proposed runway improvements.

Objective

The primary objective of this exploration has been to: a) appraise the thickness of the runway, b) assess the thickness of the underlying base material, c) evaluate the subsurface soil conditions to a depth of 10 feet, and d) to provide our best opinions and advice on the geotechnical issues that pertain to the runway improvements.

Location

The Oxnard Airport is located in the City of Oxnard in Southern California (Fig.1). The terminal is located off of West 5th Street, just west of downtown Oxnard (lat., 34.1985, long., -119.2065). The runway is situated north of the terminal and traverses in a general east-west direction. The airport runway extends some 6100 feet between South Victoria Avenue on the west and South Ventura Road on the east. Access from the Ventura Freeway (U.S. 101) is south on Victoria Avenue to 5th Street.

SCOPE

The scope of our exploration involved the completion of the following:

1. Review of available published literature, including those referenced below,
2. Review of recent reports prepared for soil erosion along the flanks of the runway,
3. Review of preliminary airport plans and aerial photographs,
4. Excavation and detailed logging of 20 borings.
5. Sampling of representative earth materials.
6. Laboratory testing to evaluate representative geotechnical properties of the soil encountered beneath the runway.
7. Geotechnical analysis of field and laboratory data.
8. Preparation of a geotechnical map, boring logs, 1 cross section, and various graphs presenting laboratory data.
9. Presentation of our procedures, findings and recommendations.

PROPOSED DEVELOPMENT

It is our understanding that improvements to the existing runway are proposed.

We recognize that no specific plans have yet been developed for the project and that development plans await the findings and conclusions of this report.

Recommendations are considered preliminary in nature and are intended to aid the design professionals. Review of the final design is recommended once plans become available. Should changes outside the design area as described herein be made, the conclusions and recommendations contained in this report may not be valid unless the changes are reviewed and approved in writing by a representative of this firm.

SITE CONDITIONS

The property is geographically located on the Oxnard Plain of Southern California. Locally, the site and surrounding areas consists of the coastal lowlands that vary little in elevation. Located about 2 miles from the coast, the total relief varies from about 28 feet msl on the west end of the runway to about 42 feet msl on the east end of the runway.

With the exception of residential and commercial development associated with the City of Oxnard, land use within the surrounding area is primarily agrarian. Farmland is directly adjacent to the runway on the north. West of Victoria Avenue, farmlands continue out to the coastal dunes, just inland of the shoreline. Land directly east of S. Ventura Road is also agricultural. Further east, this land use quickly gives way to a high school and a residential neighborhood. An elementary school, a park, and an undeveloped strip of land is situated south of 5th Street.

The southern portions of the airport consist of parking lots, a terminal, and buildings and hangers that line the north side of 5th Street. These structures extend some 600 feet north from 5th Street out to a 160± feet wide asphalt pavements and taxiways that provides access to the 100± foot wide runway.

Vegetation in the runway safety areas consists of small weeds and grasses. Vegetation in these areas is trimmed and well maintained. Directly adjacent to the runway is a 25± foot wide denuded strip that is covered with base material and gravel. These denuded areas were being prepared and sprayed with a bonding agent that

reduces blast and wind erosion while we were conducting our field exploration.

Drainage around the runway is primarily by sheetflow. The runway is slightly crowned and runoff sheds to the sides of the runway into the runway safety areas. No obvious drainage devices were observed during our exploration nor did the site conditions warrant any improvements. Runoff likely percolates directly into the ground.

FIELD EXPLORATION

The site was explored during the night time hours when the runway was closed on July 14 through July 16, 2014. Exploration consisted of drilling 20 boring ranging in depth from 10 to 21½ feet using an 8-inch diameter hollow-stem, flight auger. The surface of the runway was cut with a 12-inch diameter hole saw in each of the 20 locations. The thickness of the asphalt was recorded to the nearest ¼ inch. Borings were then extended through the underlying base material and the thickness of the base was measured to the nearest ½ inch. Borings were then advanced to the prescribed depth.

Soil samples were obtained for laboratory testing. The earth materials were logged in detail and are presented in the Log of Borings. The approximate locations of each of the borings are depicted on Plates 1 through 5.

Standard penetration testing was conducted, generally at 5-foot intervals during the drilling process. Standard Penetration Test (SPT) data provide a standardized measure of the penetration resistance of a soil deposit and can be used to approximate the density. The test is run during the drilling process by counting the number of blows it takes for a 140-pound hammer to drive a sampler of specific dimensions one foot into the soil. Blow counts are taken at 6, 12 and 18 inch intervals and the last 12 inches is recorded for the blow count. Representative samples were obtained from the core of the sampler so that the soil could be classified using the Uniform Soil Classification System (USCS).

RUNWAY SURFACE

The thickness of the runway surface was measured in each of the borings. Once the asphalt cores were removed, they were measured. Thickness varied from a minimum of $1^{7}/_{8}$ to a maximum of 4¾ inches. Core thickness was recorded as follows:

Table I
(Asphalt and Base Thickness)

Boring Number	Station	Runway Surface Thickness (in.)	Base Material Thickness (in.)
1	10+25	3	16
2	13+25	2½	16
3	16+25	4¾	19
4	19+25	3¼	18
5	22+25	3	19
6	25+25	3½	20½
7	28+25	2	20½
8	31+25	2¾	18
9	34+25	4½	16
10	37+25	$1^{7}/_{8}$	16
11	40+25	3	14
12	43+25	4½	14½
13	46+25	3	15
14	49+25	3	14
15	52+25	3½	15½
16	55+25	2¾	15
17	58+25	3	17
18	62+40	3 over 1½ *	15½
19	64+40	2¾	20
20	67+25	3½	18½

* Not clear if there was two layers of asphalt or if the asphalt was delaminating.

Asphalt thickness tended to be greater in the center of the runway, varying from

3½ to 4¾ inches. The thickness of the cores in borings drilled about 20 feet from the on southern edge of the runway vary from $1^{7}/_{8}$ to 3¼ inches. The asphalt cores in borings drilled 20 feet from the northern edge of the runway vary from 2½ to 3½ inches. No obvious correlation of the base thickness to boring location was apparent.

EARTH MATERIALS

Regional Geology

The earth materials encountered on the Oxnard Plain consists primarily of Holocene (recent) age sediments. These materials generally consist of sandy material deposited in alluvial fans, and stream channel deposits associated with the Santa Clara River some 2 miles north of the airport (see Plate 27). These river-deposits have been derived from sandstone and siltstone bedrock exposed along the flanks of the Santa Clara River basin in northern Ventura and western Los Angeles Counties. The alluvial deposits have been mapped out based on the depositional environment and relative ages (Loyd, 2002).

Turner (1975) indicates that the Holocene deposits range from 200 to 250 feet throughout most of the Oxnard Plain. Studies throughout the region suggest that the upper 40 feet of these sediments are comprised primarily of sand, silty sand, gravel, silt, and clay. This is consistent with our on-site findings.

On-Site Condition

The earth materials encountered directly beneath the runway surface is a layer of base material. The natural deposits underlying the base on and surrounding the airport have been mapped by others as alluvial fan (Qf) deposits of modern age. Typical to the region, the underlying native soil generally consists of alternating layers of sand, silty sand, silty clayey sand and sandy clay.

The earth materials encountered in our borings were fairly consistent. The base material was encountered beneath the airport surface asphalt. Beneath the base was a silty sand layer underlain by a clayey-silt to silty-clay layer. These materials have been separated for purposes of this report into units designated as Type I through Type VII. The lateral distribution of these units is depicted on Cross Section A-A' (Plate 6).

Type I - Base Material

Base material encountered directly beneath the runway surface consisted of a dry to damp, firm, poorly graded gravelly sand to sandy gravel that has been well rolled and well compacted. The coarser fraction apparently consists of a washed aggregate. As indicated above the base material varies in thickness from 14 to 20½ inches thick.

Type II - Silty Sand

A dark brown to black, fine to medium grained, damp to moist, firm to dense, silty sand layer was encountered at depths of about 1½ to 2 feet. Although visibly this material looks like a silty-sand, lab test results indicate that the lower portions contain a slight amount of clay. This material extended down to a depth of about 4 to 5 feet. In some areas the upper portions of this layer are stiff and appear to be either well-consolidated or possibly well-compacted. The unit is significant in that it extends laterally beneath the entire runway and provides direct support for the runway base material (sub-base).

Type III - Clayey Sandy Silt

This unit is distinctly different from the overlying silty sand in that there is a notable color and moisture change. This unit is medium to dark brown, fine grained, firm to soft, moist, and slightly clayey. Type lll is encountered in Boring 1 through 4 under the western end of the runway as a lense-shaped unit that thickens toward the west to about 3 feet in Boring 1.

Type IV - Silty Sand

Under the eastern end of the runway and underlying the Type ll unit (black silty sand), a medium to dark brown, fine grained, moist, firm, moderately dense silty sand is encountered. The unit contains caliche or calcite deposits suggesting exposure to groundwater or capillary action due to a high groundwater table.

Type V - Clayey Silt to Silty Clay

Considered one of the major subsurface unit in this study, this fine grained unit is commonly encountered under Type ll material. Compositionally, it consists of a slightly clayey, dark brown, firm, fine grained, moist to slightly wet, slightly cohesive,

clayey silt. Small crystals of gypsum are occasionally encountered and streaks of caliche deposits are common. To the east of Boring 16, the Type V unit gives way to slightly coarser materials (Type lV).

Type VI - Silty Sand to Sandy Silt

A medium brown, fine-grained, moist, firm to soft, slightly cohesive, silty sand was briefly encountered in Borings B-8 and B-10. The unit is nearly saturated and some limonite staining was noted. SPT blow counts suggests that densities in these materials are low to moderate.

Type VII - Clayey Sand

This unit is encountered at depths greater than 7 feet, east of Boring B-15, under the east end of the runway. Type Vll generally varies from a medium brown, firm, fine grained, damp to moist silty sand to a medium brown, moist, clayey fine sand.

Minor Units

A gravelly sand was encountered in Boring 19 just below Type ll materials. This 2 to 3 feet thick unit is distinctly different from the surrounding materials. Due to the limited horizontal distribution this material has not been defined as a significant unit. The material may represent localized fill.

Boring 20 was extended to a depth of 21½' in an attempt to encounter free-bearing water. Type Vll silty sand extends to a depth of about 12 feet where it transitions into a medium brown, very fined grained, moist to very moist firm to soft, clayey sand down to a depth of 15 feet. At a depth interval of 15 to 21 feet, a medium brown, fine-grained, damp to very moist silty sand is encountered. SPT blow counts suggest that the unit is moderately dense.

At a depth of 21 feet, a change in the SPT sample was observed. The deepest unit penetrated is a greenish gray, moist to wet, firm, fine-grained, silty sand. Blow counts were low for a depth of 20 feet indicating a slight to moderate density.

GROUNDWATER

The ground water near the surface of the Oxnard Plain is associated with an unconfined aquifer that ranges from the surface to about 75 feet. This unconfined zone

is semi-perched on an 80-feet thick clay-rich zone, separating it from deeper confined aquifers. Groundwater levels within an unconfined aquifer will fluctuate with time.

No free groundwater or seepage was observed in the borings excavated to depth of 21½ feet. Although soils were very moist to wet and saturated, free water was not observed standing in the borings. This may be due to the current drought condition or it may be attributed to the low permeability of the soil and the short amount of time the holes were open.

Evidence was observed in the samples that suggests high groundwater levels have occurred at the site. Iron staining, caliche and gypsum crystals were common in samples as shallow as 3 feet below the surface. Although some of the mineral deposition in the upper couple of feet may be the result of phreatic phenomena, a review of hypothetical high groundwater maps produced by the State of California for the Oxnard Quadrangle suggest that the groundwater levels can potentially be between 5 and 10 feet beneath the surface of the site.

EVALUATION OF GEOLOGIC HAZARDS

An evaluation of geologic hazards at the site includes seismic hazards. Seismic hazards addressed are ground shaking, fault displacement, ground lurching, tsunami potential and liquefaction potential, including seismically induced settlement and lateral spreading.

Tsunami Potential

The elevation of the runway varies from 28+ feet above mean sea level (msl) on the west to about 42+ feet msl on the east. Generally, sites less than 35 feet above msl can be susceptible to tsunamis as a result of seismicity offshore. A review of the Tsunami Inundation Map for the Oxnard Quadrangle prepared by the State of California, indicates that most of Ventura Harbor, Oxnard Beach and Port Hueneme has a potential to be inundated in such an event, the airport property is outside of the inundation zone. The potential for inundation at the site is considered to be moderate to low based on the anticipated offshore seismicity potential. Actual inundation, however, is dependent on the size and source of the earthquake.

Seismic Hazard Evaluation

The site is located in Southern California, an area of known seismic activity. Ground shaking resulting from earthquakes common to Southern California can be expected within the lifespan of the runway.

No known surface traces of active faults traverse the site. The site is not located within an Alquist Priolo Earthquake Fault Zones. The nearest seismic source is believed to be a concealed section of the Oak Ridge Fault, located some 2½ miles north of the site. It is postulated that the Oak Ridge Fault is capable of producing probable earthquake magnitudes ranging from 6.5 to 7.5. This fault has been classified by the State as a B-Type fault with a slip rate that ranges from 3.5 to 6 mm/yr.

A review of the ground shaking maps produced by the State of California for the Oxnard 7.5 minute Quadrangle suggests that a 10% exceedance in 50 years peak ground acceleration is on the order of 0.62g. This adopts a M_w of 6.9 with an epicentral distance of 7 km (4.3 miles).

Liquefaction Potential

This scope of this study does not include the site specific testing for evaluating the liquefaction potential at the site. Liquefaction is an earthquake related phenomena, that generally occurs where the underlying sandy soil has a low to moderate density in areas where high groundwater conditions exist. A review of available seismic hazard maps of the Oxnard Quadrangle indicate that nearly the entire Quadrangle is located within an area susceptible to liquefaction. This includes the airport. The soil conditions that occur at the site is one of silty sand and soft clayey silt in an area of potentially high groundwater. These local conditions are considered to have a moderate to high potential for liquefaction. Subsequently, the risk for seismically induced settlement, lateral spreading and ground effects phenomena such as sandboils, ground fissures, etc., is considered to be moderate to high.

LABORATORY TESTING

Laboratory tests were conducted on representative samples to determine certain physical properties of the earth materials. Field moisture content, in-place density,

maximum laboratory compaction, grain-size distribution, Atterburg limit characteristics and California Bearing Ratio (CBR) values were determined from these tests.

In-Place Density and Moisture Content

The in-place density and field moisture content of representative samples were determined using ASTM methods D-2937-04 and D-2216-05 or D-4643-00, whichever is applicable. The following table presents the results of our testing.

Table II
Results of In-situ Density and Moisture Tests

Sample #	Depth (ft)	Material Type	In-Place Density (pcf)	Moisture Content (%)
B1-1	2	I	119.9	13.5
B1-2	5	III	--	16.6
B1-3	10	V	--	23.0
B2-1	5	II	--	13.0
B2-2	10	V	--	21.1
B3-1	5	II	--	9.5
B3-2	8	V	99.0	18.2
B3-3	10	V	--	20.7
B4-2	10	V	94.2	25.4
B6-1	5	V	--	19.1
B6-1	10	V	--	31.7
B7-1	2	II	114.2	13.1
B7-2	7	V	91.1	19.7
B7-3	10	V	--	35.7
B10-1	4	V	91.6	26.5
B12-2	10	V	96.0	21.4
B14-2	10	V	--	29.7
B15-1	5	V	97.6	21.5
B16-1	10	VII	--	29.2

Sample #	Depth (ft)	Material Type	In-Place Density (pcf)	Moisture Content (%)
B1-1	2	I	119.9	13.5
B1-2	5	III	--	16.6
B1-3	10	V	--	23.0
B2-1	5	II	--	13.0
B2-2	10	V	--	21.1
B3-1	5	II	--	9.5
B3-2	8	V	99.0	18.2
B3-3	10	V	--	20.7
B4-2	10	V	94.2	25.4
B6-1	5	V	--	19.1
B6-1	10	V	--	31.7
B17-1	3	IV	104.0	17.9
B19-1	7	IV	91.8	20.7

Maximum Laboratory Compaction

The maximum laboratory compaction and optimum moisture content of selected samples were determined in accordance with ASTM Method D1557. For the finer grained materials, the compaction test was made on the sample portion passing a #4 sieve. The soil is placed in a 4-inch diameter mold having a 1/30 cubic foot volume and compacted with 25 blows of a 10-pound hammer falling 18 inches on each of five layers (Method A). For coarser grained materials, exclusively the base materials (Type I), the compaction test was made on the sample portion passing a ¾-inch sieve. The soil is placed in a 6-inch diameter mold having a 1/13.33 cubic foot volume and compacted with 56 blows of a 10-pound hammer falling 18 inches on each of five layers (Method C). The maximum compaction of the selected materials is as follows:

Table III
Laboratory Maximum Compaction

Sample Number	Material Type	Maximum Compaction (pcf)	Optimum Moisture (%)
B1 & 2 @ 0 - 2'	Type I (Base)	134	7.5
B9 @ 2 - 4'	Type II (SM)	122	11
B12 @ 2 - 4'	Type II (SM)	123	11
B13 @ 7 - 9'	Type V (SM/SC)	123	11
B-16 @ 0 - 2'	Type I (Base)	134	7

Grain-Size Analysis

The distribution of grain size was performed to aid in the classification of soils. Classifications systems, such as the Unified Soil Classification System, have been developed to provide a method of communication of soil types, typical soil characteristics, and probable engineering behavior of the soil among engineers. The grain size distribution of obtained soil samples was evaluated using ASTM method 422. The results of the grain-size distribution testing are shown in the Appendix. The results indicate that the following soil types are classified as follows:

Table IV
Results of Sieve/Hydrometer Testing

Sample Number	Depth (ft)	Soil Type	USCS	Field Classification and Notes
B1-1	2	II	SM/SC	Black Silty Sand
B1-2	5	III	SM/SC	Dark Brown Clayey Silt to Silty Clay
B4-2	10	V	SM/SC	Brown Clayey Silt to Silty Clay
B6-1	5	V	SM	Brown Clayey Silt to Silty Clay
B6	0-2	I	GP	Gravelly Sand to Sandy Gravel - Base
B16	0-2	I	GP	Gravelly Sand to Sandy Gravel - Base
B17-1	3	IV	SM/SC	Dark Brown Silty Sand

Atterberg Limits

Atterberg limits testing was performed to aid in classification and evaluation of the volumetric changes (shrink and swell) potential of the soils. The liquid limits, the plastic limits, the plasticity index and the shrinkage potential of a typical soil was determined in accordance with ASTM Methods D-4318 and D-4943. The results are as follows:

Table V
Results of Atterberg Limits Testing

Sample Number	Depth (ft)	Soil Type	Liquid Limits	Plastic Limits	Plasticity Index	Shrinkage Limits	USCS
B2-1	5	II	26.2	20.6	5.6	13.28	CL-ML
B3-3	10	V	25.8	24	1.8	--	ML
B6-1	5	V	--	--	--	9.1	CL
B7-1	2	II	--	--	--	13.32	SM/SC
B7-2	7	V	39.6	24.2	15.4	--	CL
B10-1	4	V	48.5	27.8	20.7	--	CL
B19-1	7	IV	29.9	25.4	4.5	--	ML

California Bearing Ratios (CBR) Testing

California Bearing Ratio (CBR) testing was conducted for Miller Geosciences, Inc., by Pacific Materials Laboratory, Inc., in Camarillo, California. CBR testing is a penetration test for evaluation of the mechanical strength of road or airstrip sub-grades and base courses. The test is performed by measuring the pressure required to penetrate a soil sample with a plunger of standard area. The measured pressure is then divided by the pressure required to achieve an equal penetration on a standard crushed rock material. The CBR testing was conducted in accordance with ASTM Standards D1883-05. The results are attached in Appendix C and are summarized below:

Table VI
Results of CBR Testing

SAMPLE NO./ LOCATION	**B-4 @ 2' - 4'**		**B-7 & 8 @ 0 - 2'**		**B-11 @ 2' - 4'**		**B-18 @ 5' - 8'**	
Description	Black Clayey Silty Sand (Type II)		Brown Gravelly Clayey Silty Sand (Type I)		Black Sandy Silty Clay (Type II)		Brown Sandy Clayey Silt (Type V)	
Wet Unit Weight (pcf)	142.7		142.9		138.9		140.7	
Moisture Content (%)	10.5		5.8		13.0		12.3	
Dry Unit Weight (pcf)	129.1		135.1		122.9		125.5	
Elasticity (%)	1.05		0.99		0.88		1.3	
Swell (%)	1.62		0.12		2.54		3.40	
PENETRATION (*in.*)	**Pressure (psi)**	**CBR***	**Pressure (psi)**	**CBR***	**Pressure (psi)**	**CBR***	**Pressure (psi)**	**CBR***
0.1	135	14	1030	103	433	43	67	7
0.2	328	22	2000	133	633	42	193	13
0.3	427	23	2645	139	733	39	286	15
0.4	490	21	2850	124	793	35	380	17
0.5	557	21	3475	126	840	32	460	18
Assigned CBR =		**14**		**103**		**32**		**7**

** CBR adjusted per the Stress-penetration curve.*

FINDINGS

The findings herein are based on the excavation and detailed logging of 20 borings to a maximum of 20½ feet deep, our sampling of representative soil, and the results of conducting several laboratory tests on the various soil encountered beneath the existing runway. Based on our field observations, soil types were divided into seven types and discussed above. The natural soil types (Type II - Type VII), reflect conditions typical of the Oxnard Coastal Plain, primarily fine-grained, sand, silt and clay.

Observations and measurements of the airport runway indicate that the asphalt tarmac varies from $1^{7}/_{8}$ to 4¾ inches thick. No visible evidence of distress in the forms of sags, excessive cracking, potholes, pitting, raveling or weathering to the surface was observed. The condition of the runway surface does not visibly exhibit evidence of subsurface soil degradation or loss of support in the sub-base materials.

Gravelly, Type I materials have obviously been imported to stabilize and provide a firm base for the runway surface. Base materials consist of a poorly-graded, sandy gravel that varies from 14 to 20½ -inches thick. Classified herein as Type I material, it appears to be a washed aggregate due to the sub-rounding to rounding characteristics

of the coarse fraction rather than an angular to sub-angular nature of a typical crushed aggregate. Grain-size analysis on two samples using the Uniform Soil Classification System (USCS) places the material in a GP category. Laboratory testing indicates that the Type I material has a CBR of 103 and is therefore considered a good base for the asphalt.

The sub-base materials immediately below the gravel base (Type II) are well-consolidated (as indicated by the high in-place density and relatively higher SPT blow counts), in the upper 1 to 2 feet and suggests that they may have been compacted prior to the placement of the base. Lab testing indicates that the Type II soils range from a USCS category SM (silty sand) to a CL-ML (clayey to silty sand). Testing on two samples, yielded CBR values of 14 and 32.

Soil below a depth of about 5 feet transition into clay, silts and sands or a combination thereof, with low densities as indicated by the in-place density testing and by the reduced SPT blow counts. CBR testing indicate that these fine grained materials are a poor load-carrying material. Additionally, moisture testing indicates that these clayey materials reflect a significant increase in water content. Precipitated minerals such as calcite, gypsum and limonite suggests that the soils have been or are near saturation.

No free groundwater was encountered in any of our borings. Groundwater levels may be depressed due to the current drought. Many of the samples and drill cuttings were near or at saturation. Squeezing of the samples did release some free water and water was occasionally observed on the samplers when brought to the surface. Due to the fine-grained nature of the soils encountered and the limited amount of time that the borings could remain open, groundwater did not accumulate in the test holes. Evidence observed in the samples that suggests high groundwater levels have occurred at the site and may have been as shallow as 3 feet below the surface. A review of hypothetical high groundwater maps produced by the State of California for the Oxnard Quadrangle suggest that the groundwater levels can potentially be between 5 and 10 feet beneath the surface of the site.

Frost conditions or freezing of the subsurface soils is not a consideration at this

site. No bedrock conditions were encountered.

RECOMMENDATIONS

We understand that the client will evaluate the existing runway conditions for the intended improvements. These possible improvements are not yet specified and await the findings presented herein. Recommendations provided are applicable should the runway be lengthened, widened or reconstructed.

Geotechnical Considerations

The primary geotechnical considerations considered significant to the project development will be the thickness of the current runway, the thickness of the base material, the resistance to penetration by the sub-base and base materials, and the groundwater conditions.

The design of any improvements to the runway should be based on the minimum values for the current asphalt thickness and the asphalt base. Design should assume an existing asphalt thickness of 2 inches and an existing base thickness of 14 inches.

Should asphalt removal and re-grading of the runway be necessary, the base material can be re-used if properly gathered, separated from other on-site materials and properly conditioned before placing it as new base material.

It is recommended that a CBR value of 14 be used in any new designs for the runway. Should sub-grade reconditioning be necessary to improve the sub-grade reaction, the grading recommendations provided below should be used. The use of geo-synthetic materials, lime treatment or cement treatment can also be used in concert with grading techniques to provide improved sub-grade conditions should they be needed. The methods of stabilization can be explored once it has been determined that sub-grade stabilization is required. The evaluation of geo-grid reinforcement, lime or concrete treatment designs and the thickness of the stabilized zones are considered beyond the scope of this study and can be evaluated upon request.

Groundwater levels for design purposes, should be assumed to be at 3 feet. In discussions with the design engineers, it has been suggested that sub-grade drainage may be employed to aid in the stabilization of the sub-base materials. If improved

drainage methods are considered helpful, it is recommended that french-drain type systems (drain pipes embedded in a gravel trench or gravel mat), should be used at or below the depth of 3 feet.

Groundwater levels can fluctuate throughout the year, and from year to year depending on the seasonal rainfall. High groundwater conditions in Southern California generally take place during the months of April, May and June. Should sub-grade improvements using grading techniques be required, it is recommended that grading take place during the dry months of the year, and either before or after the high groundwater season occurs. Grading in inclement weather will result in long delays due to the high clay content in the sub-surface soil.

GRADING RECOMMENDATIONS

General

Variations in asphalt and base material thickness can be determined with the information provided herein without sub-grade improvements. However, it may be more cost effective to improve the sub-base materials and reduce the base and asphalt thicknesses. Once preliminary designs have been prepared, it is recommended that we be contacted to discuss the alternatives and benefits of sub-grade preparation.

Should the proposed improvement require the improvement of the sub-base materials, it is recommended that conventional grading techniques be employed. Grading will likely include removal and stockpiling of the existing base material (Type I) and removal and recompaction of the upper black silty sand (Type II material). The depths of removal and recompaction will depend on the runway load requirements and feedback from the design engineers.

All grading shall be conducted in a responsible, workmanlike manner. All fill material should be placed in accordance with our grading guidelines (attached) and should be constructed in accordance with the FAA requirements unless otherwise specified herein.

All removal areas and excavations shall be observed by a representative of the geotechnical engineer before placing any fill. It is the responsibility of the client to notify

Miller Geosciences, Inc., when grading operations or construction begins so that the required observations can be made.

All surface vegetation and debris shall be removed from the site during the initial phases of grading. This debris shall be removed from the site and disposed of properly.

A careful search shall be made for subsurface debris, abandoned wells and any undesirable void or buried structure during grading operations. Should such subsurface cavities or debris be encountered, they shall be removed down to firm material and properly backfilled and compacted as directed by the geotechnical engineer.

The final grading plan should be reviewed by this firm to insure changed are in conformance with the recommendations presented in this report.

Suitability of Materials

The existing base material (Type l) may be reused. Sources for additional base materials are nearby and base material is readily available.

The black silty sand material (Type ll) encountered at the site is suitable for reuse in compacted fills provided it is properly prepared. Fine-grained native soil may need to be blended with off-site granular materials under the observation and approval of the Geotechnical Engineer to improve sub-grade conditions. In lieu of importing granular soils, geo-textiles may be used with the Type ll soils to improve sub-grade reaction.

Imported Materials

All imported soils, if any, to be used to support the runway, shall be observed and approved by a representative of the Geotechnical Engineer prior to transport to the site. Imported fill material shall be free of organic or construction debris and rocks greater than 4 inches in diameter, measured at its widest point. Imported soils shall be similar to or coarser grained than the existing on-site soils. The rock to soil ratios of imported material shall not exceed 50 percent.

Over-Excavation

If the runway and adjoining aprons are proposed to be located partially on the cut portions and partially on the compacted fill, it is recommended that the removal and

recompaction extend a minimum of 5 feet beyond the runway or apron limit. In areas where removals expose materials of various expansion potential or different in-place densities, such as sand and clay, the over-excavation shall extend through the clayey soil a minimum of 2 feet and refilled with granular soils compacted to a minimum of 95 percent of the laboratory maximum compaction to provide a firm uniform base.

Over-excavations shall extend to a depth of at least 2 feet below the bottom the proposed final sub-grade. If the maximum depth of the fill exceeds 8 feet, the over-excavations shall extend to a depth of at least ½ the total fill thickness, measured under the proposed runway and aprons (i.e. where fill is a maximum of 10 feet thick, removals in the cut portions of the pad shall be 5 feet). All over-excavation and recompaction shall extend a minimum lateral distance beyond the runway or apron, 5 feet or shall extend to a distance equal to the depth of removal, whichever is greater.

Special attention shall be given to the areas near the cut/fill transition line so that proper removals and compaction of loose soils is achieved.

Shrinkage/Bulking

The earth materials used during grading are expected to change in volume. These conditions will vary with the type of material used in the grading process. Volume changes assigned to earth materials are as follows:

Table VII
Estimated Change in Volume

Natural Soil and Existing Fill:	8 - 20 % shrinkage
Base Material	0 - 4% shrinkage

Drainage Protection

Final grading shall provide positive drainage away from the runway, aprons and taxi-ways. ADDITIONALLY, proper drainage shall also be provided away from these areas during construction. Maintaining a proper drainage system will minimize the shrink/swell potential of the subsoils.

All runway, taxi-way and apron drainage should be collected and transferred to designated areas employing sheetflow using acceptable gradients. Drainage should not be allowed to pond on the pad or against any runway, apron or taxi-way.

Approval

A set of grading and design plans should be submitted to this office for review and approval prior to initiation of construction.

It is recommended that all excavations be observed by this firm prior to placing any compacted fill. All fill that is placed should be tested for compaction if used for engineering purposes.

It is advised that the client contact **Miller Geosciences, Inc.,** at least **1 week** in advance of commencing grading to allow for contractual agreements for geotechnical services during the construction phases of your project.

Please advise this office at least 24 hours prior to any required verification.

Representatives of Miller Geosciences, Inc., will observe work in progress, perform tests on soil, and observe excavations and trenches. It should be understood that the contractor or others shall supervise and direct the work and they shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and shall be solely and completely responsible for conditions of the job site, including safety of all persons and property during the performance of the work.

We are providing this information solely as a service to our client. Under no circumstances should the information provided herein be interpreted to mean that Miller Geosciences, Inc. is assuming the responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

Periodic observation by Miller Geosciences, Inc., is not intended to include verification of dimensions or review of the adequacy of the contractor's safety measures in, on, or near the construction site.

Remarks

The conclusions and recommendations contained herein are based on the findings and observations made at the boring locations. While no great variations in subsurface conditions are anticipated, if conditions are encountered during construction that appear to differ from those disclosed, Miller Geosciences, Inc., should be notified, so the need for modifications can be considered.

Testing of the entire soil mass that is at the site is not practical. As such, our testing is a statistical representation of the onsite soil conditions. Engineering judgement is used in selecting the location of the test, selecting the type of test and assessing the type of soil in accordance with accepted practices in the area at the time of the study. Engineering judgement is also used during construction, including compaction testing and bottom observation during our site visits in accordance with accepted practices in the area at the time of the construction. No other representations with respect to the data contained in this report are made.

This report has been compiled for the exclusive use of Mead and Hunt and their authorized representatives. It shall not be transferred to, or used by, a third party, to another project or applied to any other project on this site, other than as described herein, without consent and/or thorough review by this facility.

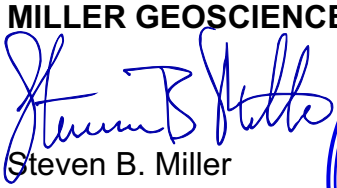
Should the project be delayed beyond the period of one year after the date of this report, the site should be observed and the report reviewed to consider possible changed conditions.

The owner and the contractor should make themselves aware of and become familiar with the applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

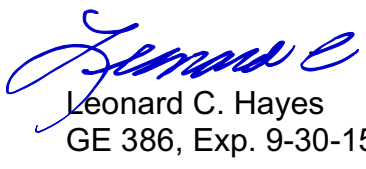
This report is issued with the understanding that it is the responsibility of the owner, or his representative, to assure that the information and recommendations contained herein are called to the attention of the designers and builders for the project.

The limits of our liability for data contained in this report are presented on the following page.

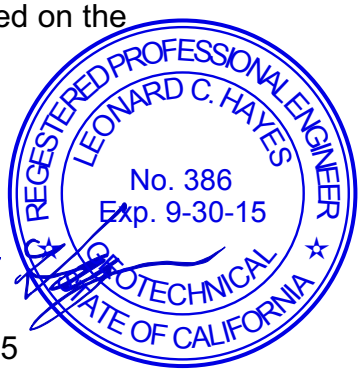
MILLER GEOSCIENCES, INC.



Steven B. Miller
CEG 1303, Exp. 7-31-15



Leonard C. Hayes
GE 386, Exp. 9-30-15



LIMITATIONS

This report is based on the development plans provided to our office. In the event that any significant changes in the design or location of the structure(s); as outlined on this report, are planned, the conclusions and recommendations contained in this report may not be considered valid unless the changes are reviewed and the conclusions of this report are modified or approved by the geotechnical engineer and engineering geologist in writing.

The subsurface conditions, excavations, characteristics and geologic structure described herein and shown on the enclosed cross section(s) have been projected from individual borings or test pits placed on the subject property. The subsurface conditions and excavation characteristics, and geologic structure should in no way be construed to reflect any variations which may occur between these borings or test pits.

It should be noted that fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, over-watering, and other factors not evident at the time measurements were made and reported herein. Miller Geosciences, assumes no responsibility for variations in groundwater levels that may occur across the site or in time.

If conditions encountered during construction appear to differ from those disclosed, this office shall be notified to consider the need for modifications. No responsibility for construction compliance with design concepts, specifications or recommendations is assumed unless on-site construction review is performed during the course of construction that pertains to the specific recommendations contained herein.

This report has been prepare in accordance with sound, generally accepted engineering practices common to the region. No warranties, either expressed or implied, are made regarding the professional advice provided under the terms of the agreement and included in this report.

This report is intended to aid your design professionals in their design of your project. Utilization of the advice presented herein is intended to reduce the risk associated with the construction projects. The professional opinions and geotechnical advise contained in this report are not intended to imply total performance of the project or guarantee that unusual conditions will not be discovered during or after construction.

GRADING GUIDELINES

Site Clearing

Any existing brush, loose fill and porous soils shall be excavated to competent native materials. Before placement of any fill soils, the exposed surface shall be scarified, cleansed of debris and recompacted to **95** percent of the laboratory standard under the direction of the Soils Engineer according to the following "Placing, Spreading, and Compacting Fill Materials."

Preparation

After the foundation for the fill has been cleared, and scarified, it shall be brought to a proper moisture content and compaction to not less than **95** percent of the maximum dry density according to D1557.

Materials

On-site materials may be used in the fill if cleansed of debris. Imported fill materials shall be approved by the Soils Engineer and may be obtained from any other approved source. The materials used should be free of excessive organic matter and other deleterious substances and shall not contain rocks or lumps greater than 6 inches in maximum dimension.

Placing, Spreading and Compacting Fill Materials

Fill materials shall be placed in layers which when compacted shall not exceed 6 inches in thickness. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to ensure uniformity of material and moisture of each layer.

Where the moisture content of fill material is below optimum value determined by the Soils Engineer, water shall be uniformly added to obtain the approximate optimum moisture content.

Where the moisture content of the fill materials is higher than the optimum value determined by the Soils Engineer, the fill materials shall be aerated by blading, disking or mixing with dry materials until the optimum moisture content is obtained.

After each layer has been placed, mixed and spread evenly, it shall be thoroughly compacted to not less than 95 percent of the maximum dry density according to ASTM D1557.

Compaction shall be by sheepsfoot roller, tract rolling or other types of acceptable compaction equipment of such design so that the contractors can compact the fill material to the specified density. Rolling shall be done while the fill material is at the specified moisture content, to ensure that the desired density has been obtained. The final surface of the areas to review slabs-on-grade should be rolled to a dense smooth surface.

Field density tests shall be made by the Soils Engineer at intervals not to exceed 2 feet of fill height. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density reading shall be taken in the compaction material below the disturbed surface. When these readings suggests the density of any fill or portion of it is below the required 95 percent density, the particular layer of portion shall be reworked until the required density has been obtained.

The grading specifications should be a part of the project specifications. The Soils Engineer shall review the grading plan before grading.

REFERENCES

California Emergency Management Agency, California Geological Survey, University of Southern California, 2009, Tsunami Inundation Map for Emergency Planning, Oxnard Quadrangle: scale 1:24,000.

California Geological Survey Staff, 2001, Official Seismic Hazard Zone Map, Oxnard Quadrangle: California Geological Survey, Official Map of Seismic Hazard Zones, scale 1:24,000.

Dibblee, T.W., and Ehrenspeck, H.E., ed., 1992, Geologic Map of the Saticoy Quadrangle, Ventura County, California, Dibblee Geological Foundation, DF-42, 1:24,000.

Jennings, C.W., and Strand, R.G., 1969, Geologic Map of California: Los Angeles Sheet, California Division of Mines and Geology, Scale, 1:250,000.

Johnson, S.Y., Dartnell, Peter, Cochrane, G.R., Golden, N.E., Phillips, E.L., Ritchie, A.C., Kvitek, R.G., Greene, H.G., Krigsman, L.M., Endris, C.A., Clahan, K.B., Sliter, R.W., Wong, F.L., Yoklavich, M.M., and Normark, W.R., 2012, California State Waters Map Series -- Hueneme Canyon and Vicinity, California, U.S. Geological Survey Scientific Investigations Map SIM-3225, 1:24,000

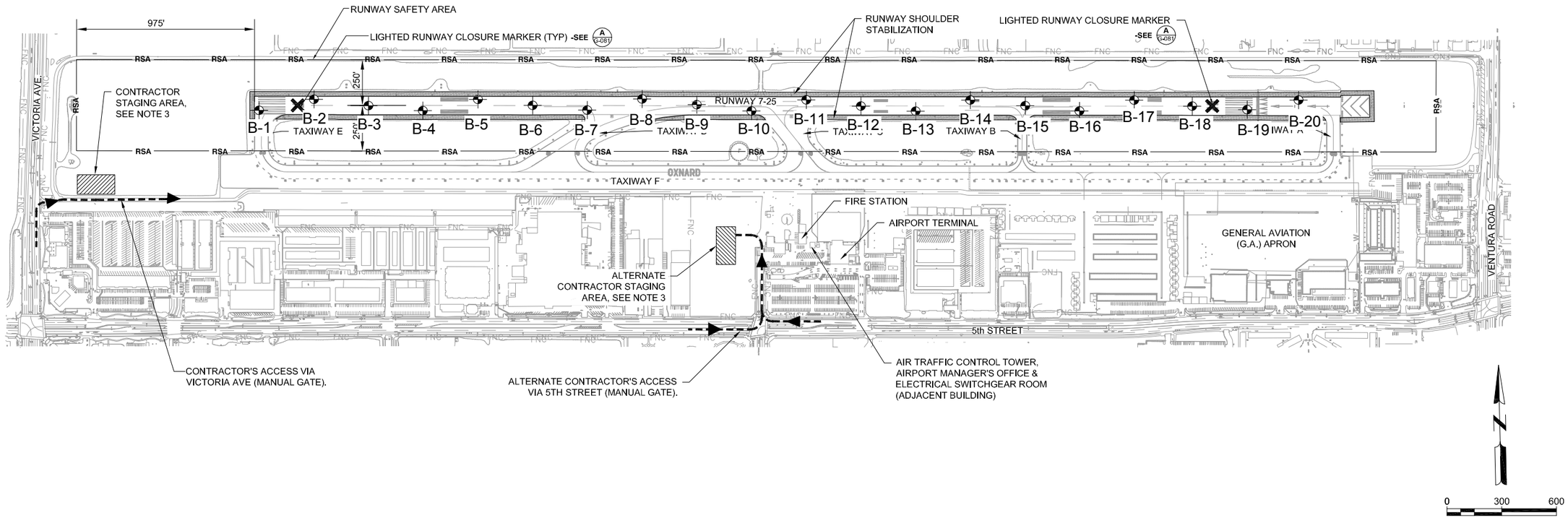
Loyd, Ralph C., 2002, Liquefaction Evaluation Report, Liquefaction Zones in the Oxnard 7.5-Minute Quadrangle, Ventura County, California, Section 1 *in* Seismic Hazard Zone Report for the Oxnard 7.5-minute Quadrangle, Ventura County, California Seismic Hazard Zone Report 052, Department of Conservation, California Geological Survey

Petersen, Mark D., Cramer, Chris H., Faneros, Geoffrey A., Real, Charles R., and Reichle, Michael S., 2002, Ground Shaking Evaluation Report, Potential Ground Shaking in the, Oxnard 7.5-Minute Quadrangle, Ventura County, California, Section 3 *in* Seismic Hazard Zone Report for the Oxnard 7.5-minute Quadrangle, Ventura County, California Seismic Hazard Zone Report 052, Department of Conservation, California Geological Survey

Turner, J.M. 1975, Aquifer delineation in the Oxnard-Calleguas Area, Ventura County: Ventura County Department of Public Works Flood Control District Water, Resources Management Study, 45 p.

Weber, F.H., Jr., Cleveland, J.E., Kahle, J.E., Kiessling, E.W., Miller, R.V., Mills, M.F., and Morton, D.M., 1973, Geology and Mineral Resources Study of Southern Ventura County, California: California Division of Mines and Geology, Preliminary Report 14, 102 p., map scale 1:48,000.

APPENDIX A



GENERAL NOTES:

1. SEE THE SPECIAL PROVISIONS AND THE CONSTRUCTION SAFETY AND PHASING PLAN FOR WORK REQUIREMENTS WITHIN THE AIR OPERATIONS AREA (AOA).

2. CONTRACTOR'S ACCESS TO THE AIRPORT SHALL BE VIA THE ROUTES SHOWN UNLESS OTHERWISE APPROVED BY THE AGENCY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING DAMAGE TO PAVEMENTS OR OTHER EXISTING FACILITIES CAUSED BY CONSTRUCTION ACTIVITIES. CONSTRUCTION TRAFFIC IS LIMITED TO APPROVED HAUL AND ACCESS ROUTES. HAUL ROUTES ON PAVEMENTS SHALL BE CLEANED EACH DAY AND DUST CONTROL SHALL BE MAINTAINED BY THE CONTRACTOR. USING THE METHODS OUTLINED IN SPECIFICATIONS, SPECIAL PROVISIONS SECTION 1002. "EARTHWORK AND SITE PREPARATION".

3. THE STAGING AREA SHALL BE RETURNED TO PRECONSTRUCTION CONDITION AT THE END OF THE PROJECT. THE EXACT LOCATION OF THE STAGING AREA SHALL BE CONFIRMED BY THE AGENCY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR BARRICADING AND FENCING THE LIMITS OF THE STAGING AREA AND MAKING VISIBLE TO AIRPORT USERS.

Geotechnical Explanation

B-1 - Boring Location

GEOTECHNICAL MAP		
SITE: 2889 W. 5th. Street Oxnard, California		
SCALE: 1" = 600'	BY: sbm	REV.
M14-703	DATE: August, 2014	PLATE 1
MILLER GEOSCIENCES, INC.		

X:\3138400\140440.01\TECH\CAD\drawings\G-021 PROJECT LAYOUT PLAN.dwg
030614 7:06am

	REVISION	DESCRIPTION	APP.	DATE
D				
C				
B				
A				
△				

PREPARED BY: JTL DATE: 3/2014

Mead & Hunt

133 Aviation Blvd., Suite 100
Santa Rosa, California 95403
(707) 526-5010 FAX (707) 526-9721

FILE NAME: 3138400-140440.01

APPROVED: DIRECTOR OF AIRPORTS

RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED: PROJECT MANAGER

county of ventura

DEPARTMENT OF AIRPORTS

555 Airport Way ◦ Camarillo, CA 93010

SPEC. NO. DOA 14-05

PROJ. NO. OXR-125

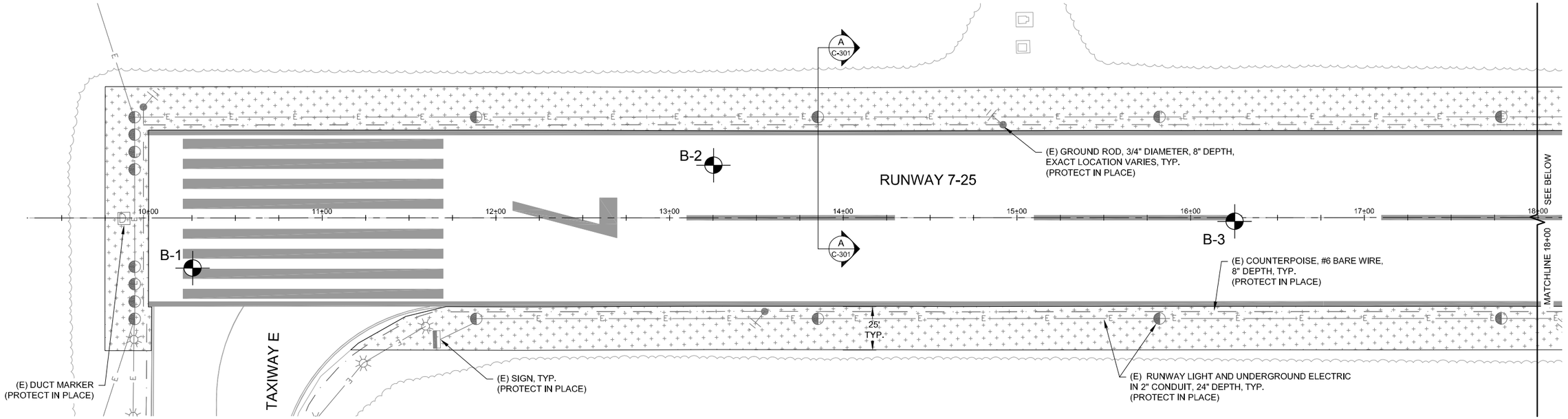
PROJECT LAYOUT PLAN

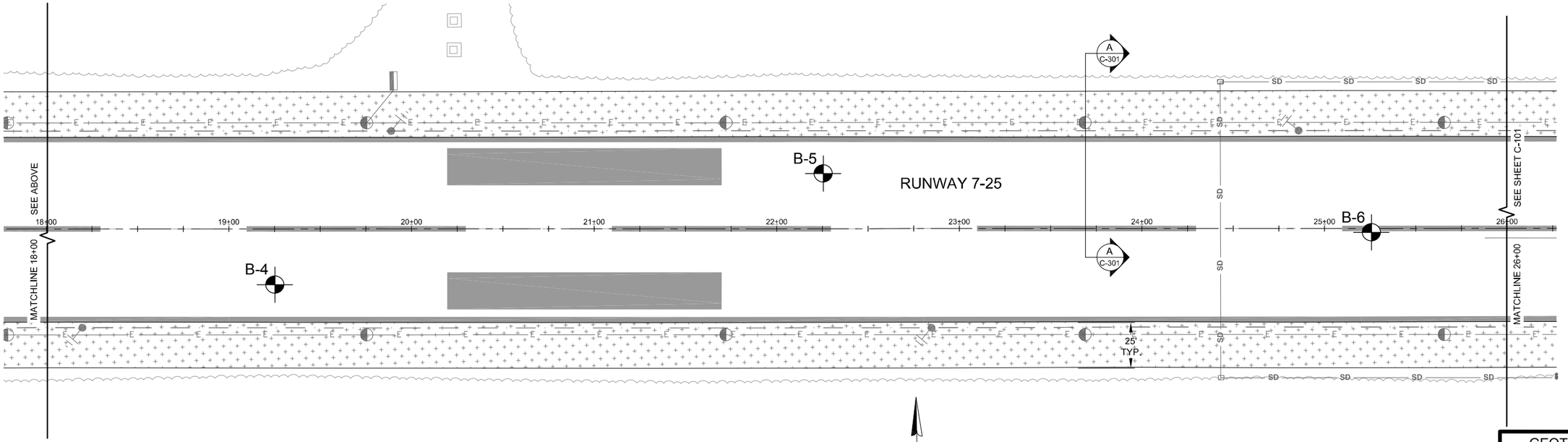
OXNARD AIRPORT

G-021

SHEET 3 OF 9

DRAWING NO. XXX-DOA





0 30' 60'

N

Geotechnical Explanation

B-1 - Boring Location

X:\3138400\140440.01\TECH\CAD\drawings\C-101 RWY SHOULDER STABILIZATION PLAN.dwg
030614 7:06am

D			
C			
B			
A			
△	REVISION DESCRIPTION	APP.	DATE

PREPARED BY: JTL DATE: 3/2014

Mead & Hunt

133 Aviation Blvd., Suite 100
Santa Rosa, California 95403
(707) 526-5010 FAX (707) 526-9721

FILE NAME: 3138400-140440.01

APPROVED: DIRECTOR OF AIRPORTS

RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED: PROJECT MANAGER

county of ventura

DEPARTMENT OF AIRPORTS

555 Airport Way ◦ Camarillo, CA 93010

SPEC. NO. DOA 14-05

PROJ. NO. 0XR-125

OXNARD AIRPORT

SHEET 5 OF 9

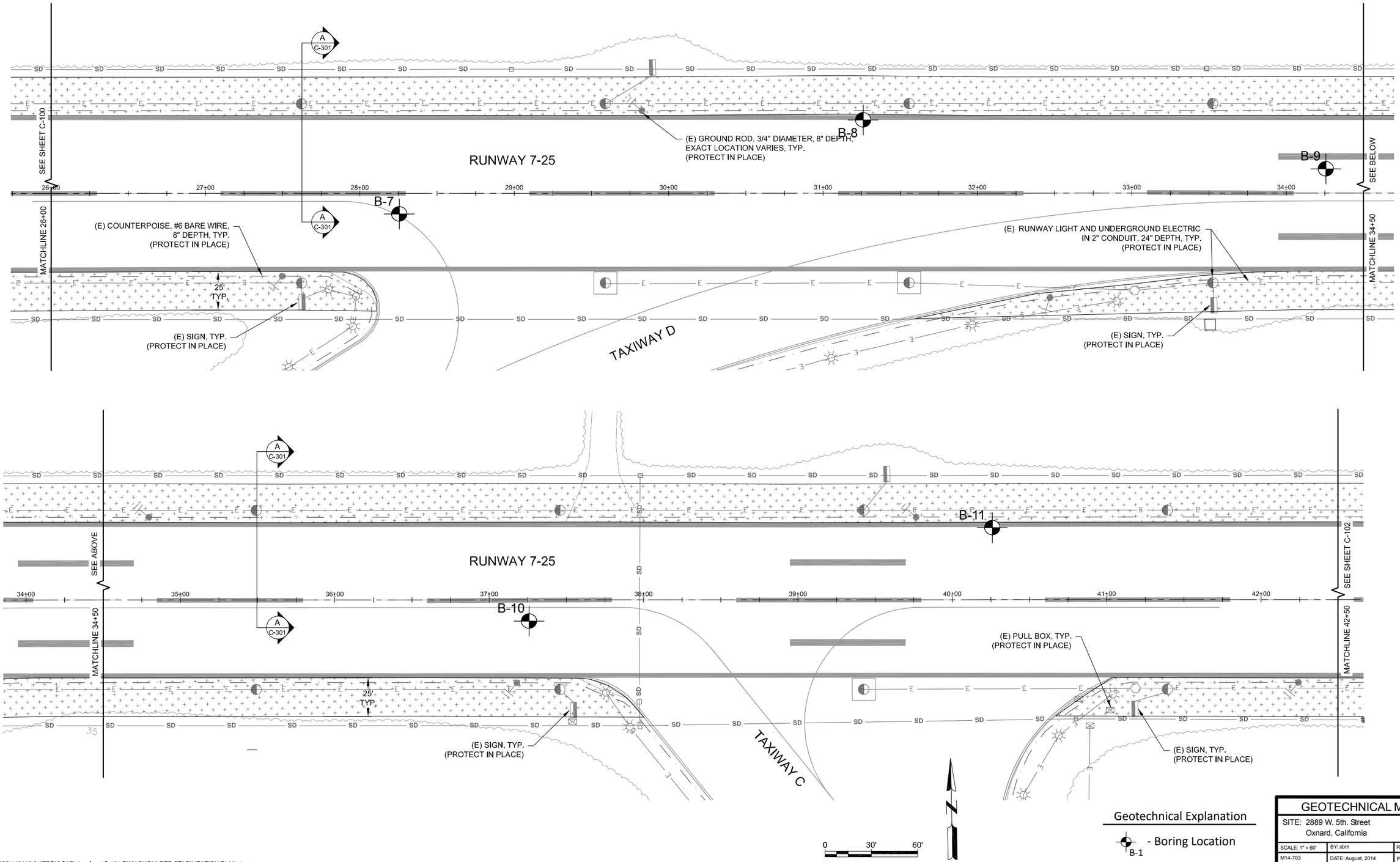
DRAWING NO. XXX-DOA

GEOTECHNICAL MAP

SITE: 2889 W. 5th. Street
Oxnard, California

SCALE: 1" = 60'	BY: sbm	REV:
M14-703	DATE: August, 2014	PLATE 2

MILLER GEOSCIENCES, INC.



Geotechnical Explanation

B-1 - Boring Location

X:\3138400\140440.01\TECH\CAD\drawings\C-101 RWY SHOULDER STABILIZATION PLAN.dwg
030614 7:07am

D			
C			
B			
A			
△	REVISION DESCRIPTION	APP.	DATE

PREPARED BY: JTL

DATE: 3/2014

Mead & Hunt

133 Aviation Blvd., Suite 100
Santa Rosa, California 95403
(707) 526-5010 FAX (707) 526-9721

FILE NAME: 3138400-140440.01

APPROVED: DIRECTOR OF AIRPORTS

RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED: PROJECT MANAGER

county of ventura

DEPARTMENT OF AIRPORTS

555 Airport Way ◦ Camarillo, CA 93010

SPEC. NO. DOA 14-05

PROJ. NO. OXR-125

OXNARD AIRPORT

SHEET 6 OF 9

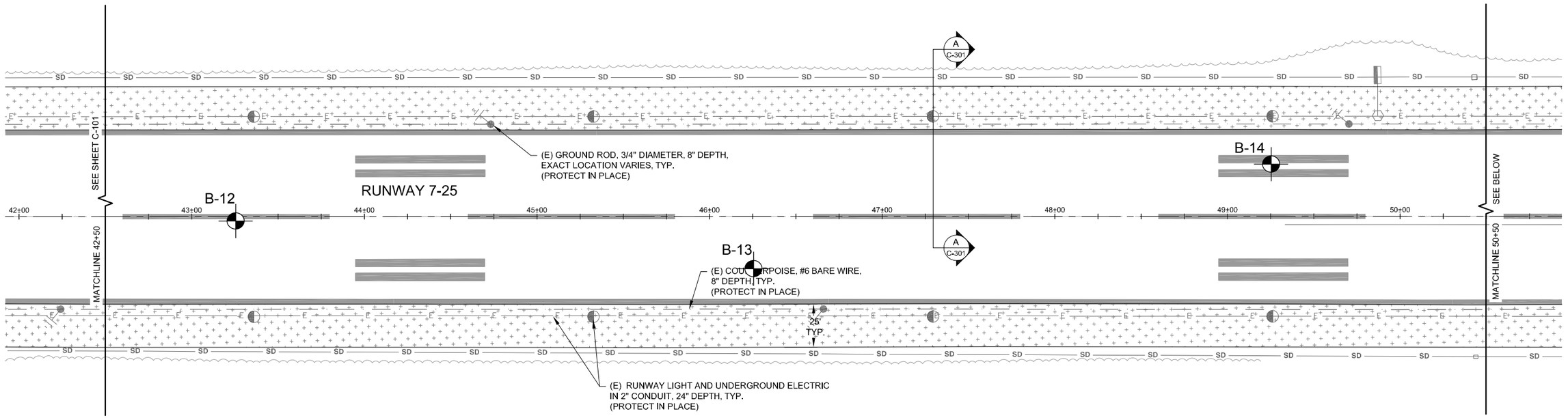
DRAWING NO. XXX-DOA

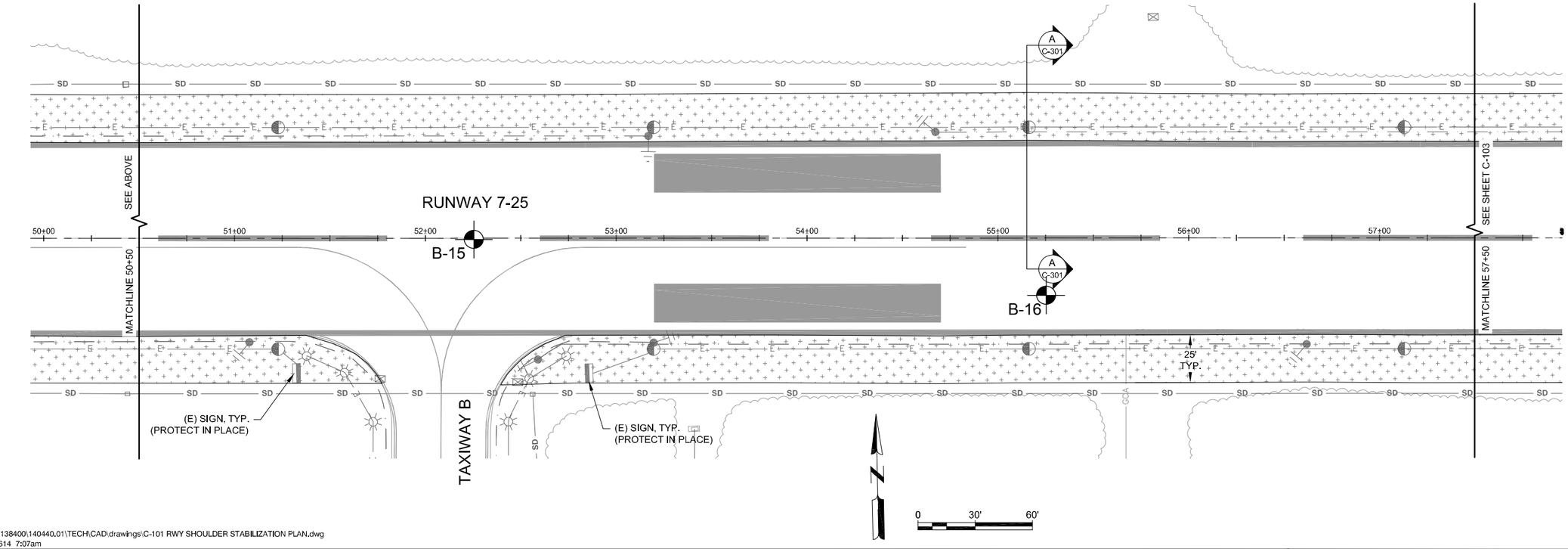
GEOTECHNICAL MAP

SITE: 2889 W. 5th. Street
Oxnard, California

SCALE: 1" = 60'	BY: sbm	REV:
M14-703	DATE: August, 2014	PLATE 3

MILLER GEOSCIENCES, INC.





Geotechnical Explanation

B-1 - Boring Location

GEOTECHNICAL MAP

SITE: 2889 W. 5th. Street
Oxnard, California

SCALE: 1" = 60'	BY: sbm	REV:
M14-703	DATE: August, 2014	PLATE 4

MILLER GEOSCIENCES, INC.

X:\3138400\140440.01\TECH\CAD\drawings\C-101 RWY SHOULDER STABILIZATION PLAN.dwg
030614 7:07am

D			
C			
B			
A			
△	REVISION DESCRIPTION	APP.	DATE

PREPARED BY: JTL

DATE: 3/2014

Mead & Hunt

133 Aviation Blvd., Suite 100
Santa Rosa, California 95403
(707) 526-5010 FAX (707) 526-9721

FILE NAME: 3138400-140440.01

APPROVED: DIRECTOR OF AIRPORTS

RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED: PROJECT MANAGER

county of ventura

DEPARTMENT OF AIRPORTS

555 Airport Way ◦ Camarillo, CA 93010

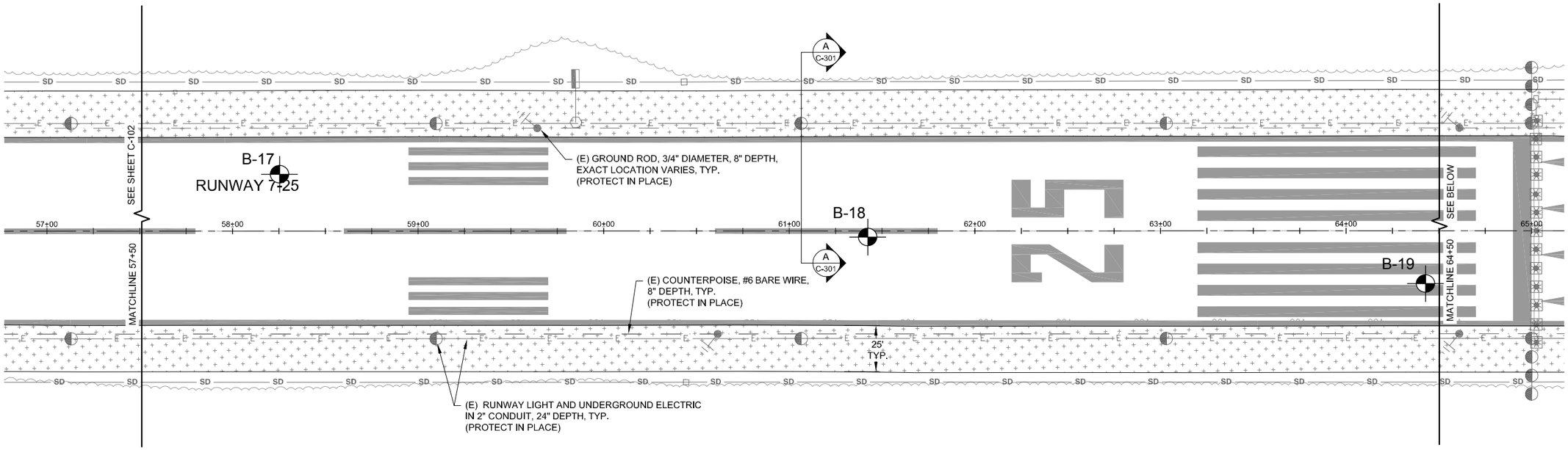
SPEC. NO. DOA 14-05

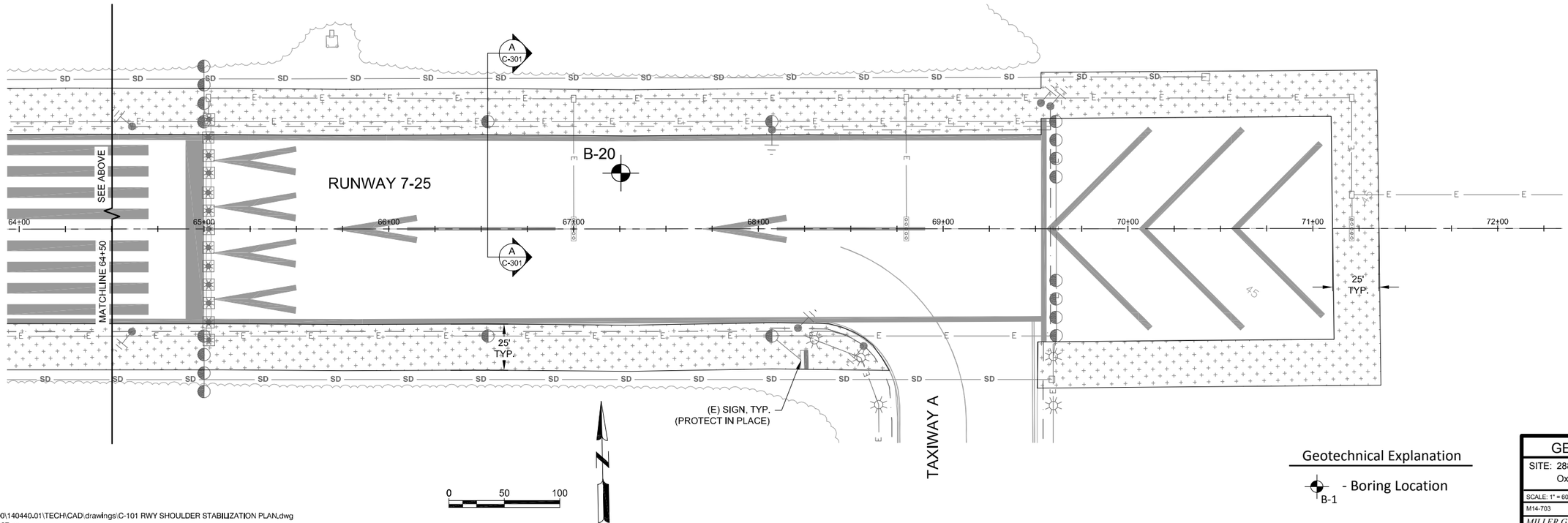
PROJ. NO. 0XR-125

OXNARD AIRPORT

SHEET 7 OF 9

DRAWING NO. XXX-DOA





0 50 100

N

Geotechnical Explanation

B-1 - Boring Location

X:\3138400\140440.01\TECH\CAD\drawings\C-101 RWY SHOULDER STABILIZATION PLAN.dwg
030614 7:07am

D				
C				
B				
A				
△	REVISION	DESCRIPTION	APP.	DATE

PREPARED BY: JTL DATE: 3/2014

Mead & Hunt

133 Aviation Blvd., Suite 100
Santa Rosa, California 95403
(707) 526-5010 FAX (707) 526-9721

FILE NAME: 3138400-140440.01

APPROVED: DIRECTOR OF AIRPORTS

RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED: PROJECT MANAGER

county of ventura
DEPARTMENT OF AIRPORTS
555 Airport Way ◦ Camarillo, CA 93010

SPEC. NO. DOA 14-05

PROJ. NO. OXR-125

OXNARD AIRPORT

GEOTECHNICAL MAP

SITE: 2889 W. 5th. Street
Oxnard, California

SCALE: 1" = 60'	BY: sbm	REV:
M14-703	DATE: August, 2014	PLATE 5

MILLER GEOSCIENCES, INC.

SHEET 8 OF 9

DRAWING NO. XXX-DOA

A

Horizontal Scale: 1" = 400'

A'

10+00 15+00 20+00 25+00 30+00 35+00 40+00 45+00 50+00 55+00 60+00 65+00 70+00

50 45 40 35 30 25 20 15

B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11 B-12 B-13 B-14 B-15 B-16 B-17 B-18 B-19 B-20

Asphaltic Concrete Surface

Medium to Dark Brown Gravelly Sand

Base Material (Type I)

Dark Brown to Black Silty Sand (Type II)

Dark Brown Clayey Sandy Silt (Type III)

Medium Brown Clayey Silt to Silty Clay (Type V)

Medium to Dark Brown Silty Sand (Type IV)

Medium Brown Clayey Sand (Type VII)

Medium Brown Silty Sand to Sandy Silt (Type VI)

Approximate High Groundwater Table

Medium Brown Silty Sand

Greenish Gray Silty Sand

Vertical Scale: 1" = 5'

Cross Section A-A'

SITE: Oxnard Airport
2889 W. 5th. Street , Oxnard, California

SCALE: see above	BY: sbm	REV:
M14-703	DATE: 7-28-14	PLATE 6

MILLER GEOSCIENCES, INC.

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 1
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 10+25, 20 ft. From Southern Edge, Elev. ±28' msl		Logged By: sbm

Sample #	Blow Count (6/12/18")	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3"			3" A/C
Bulk Sample of Base						3 - 19"	GP	I	16" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
B1 - 1 @ 2'	30 for 12"	119.9	13.5	2		19" - 5'	SM/SC	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4					
SPT B1 - 2 @ 5'	7/8/10		16.6	6		5 - 8'	SM/SC	III	Silty Sand, dark brown, fine grained, slightly clayey, damp to moist, firm, moderately dense.
				8		8-11½'	SM/SC	V	Sandy Clayey Silt, medium to dark brown, fine grained, moist, cohesive.
SPT B1 - 3 @ 10'	1/4/5		23.0	10					
				12					Total Depth: 11½' No groundwater. Back-filled with sand/cement mixture(1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-14-14	M14-703	Plate: 7

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*

23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 2
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 13+25, 20 Feet From Northern Edge, Elev. ±29' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 2½"			2½" A/C
Bulk Sample of Base						2½-18½"	GP	I	16" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		18½" - 7'			Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
SPT B2 - 1 @ 5'	6/7/10		13.0	4			SM/SC	II	
				6					
				8		7 - 8½'	SM/SC	III	Silty Sand, medium to dark brown, fine grained, moist, slightly clayey, cohesive.
						8½ -11½'			Sandy Clayey Silt, medium brown, firm, fine grained, moist, cohesive.
SPT B2 - 2 @ 10'	4/5/5		21.1	10			SM/SC	V	
				12					Total Depth: 11½', trace of free water in sample at 11½'. No standing water. Back-filled with sand/cement mixture(1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-14-14	M14-703	Plate: 8

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 3
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 16+25, Center of Runway, Elev. ±29' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 4¾"			4¾" A/C
Bulk Sample of Base						4¾ - 24"	GP	I	19+" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		2 - 7'			Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4			SM/SC	II	
SPT B3 - 1 @ 5'	7/8/10		9.5						
				6			SM/SC	III	Silty Sand, medium to dark brown, fine grained, moist, slightly clayey, cohesive.
						7 - 11½'			Sandy Clayey Silt, medium brown, firm, fine-grained, moist, cohesive.
				8					
B3 - 2 @ 8'	28 for 12"	99.0	18.2				SM/SC	V	
				10					
SPT B3 - 3 @ 10'	1/2/4		20.7						Soft at 10 feet, soil saturated.
				12					Total Depth: 11½', trace of free water in sample at 10'. No standing water. Back-filled with sand/ cement mixture(1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-14-14	M14-703	Plate: 9

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 4
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 19+25, 20 ft. from S. Edge of Runway, Elev. ±30' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3¼"			3¼" A/C
						3¼ - 21"	GP	I	18±" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		21" - 5'			Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
Bulk Sample							SM/SC	II	
				4					
SPT B4 - 1 @ 5'	4/8/7					5 - 7'			Silty Sand to Sandy Silt, medium brown, fine grained, damp to moist, firm, dense.
				6			SM/SC	III	
						7 - 11'			Sandy Clayey Silt, medium brown, firm, fine grained, moist to wet, cohesive.
				8			SM/SC	V	
B4 - 2 @ 10'	10 for 12"	94.2	25.4	10					
				12					Total Depth: 11', No water. Back-filled with sand/cement mixture(1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-14-14	M14-703	Plate: 10

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 5
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 22+25, 20 ft. from N. Edge of Runway, Elev. ± 31' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3"			3" A/C
Bulk Sample						3 - 22"	GP	I	19" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		21" - 5'	SM/SC	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4					
SPT B5 - 1 @ 5'	2/2/4					5 - 11½'			Sandy Clayey Silt, medium brown, firm, fine grained, moist to slightly wet, cohesive.
				6					
Bulk Sample									
				8			SM/SC	V	
SPT B5 - 2 @ 10'	P/2/2			10					Moist to wet and very soft at 10'
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
	P= push			20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-14-14	M14-703	Plate: 11

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*

23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level:	Boring #: 6
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 25+25, At Center of Runway, Elev. ±31' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3½"			3½" A/C
Bulk Sample						3½ - 24"	GP	I	20½" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		2 - 5'	SM	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4					
SPT B6 - 1 @ 5'	2/4/3		19.1			5 - 11½'			Sandy Clayey Silt, medium brown, firm, fine grained, moist, cohesive.
				6					
									Moist to slightly wet at 7'
				8			SM/SC	V	Wet at 8', no free-water
SPT B6 - 2 @ 10'	P/2/2		31.7	10					Moist to wet and very soft at 10'
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
	P= push			20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-14-14	M14-703	Plate: 12

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level:	Boring #: 7
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 28+25, 20 ft. from S. Edge of Runway, Elev. ±32' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					2" A/C
Bulk Sample						2 - 20½"	GP	I	20½" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
B7 - 1 @ 2'	31 for 12"	114.2	13.1	2		20" - 5'	SM/SC	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4					
				6		5 - 7'	SM/SC	V	Sandy Silt, slightly clayey, dark brown, firm, fine grained, moist, slightly cohesive.
B7 - 2 @ 7'	12 for 12"	91.1	19.7	8		7 - 10½'	SM/SC	V	Sandy Silt, slightly clayey, dark brown, firm, fine grained, moist to slightly wet, slightly cohesive, contains small crystals of gypsum and possibly caliche deposits.
SPT B7 - 3 @ 10'	1/2/3		35.7	10					Soft at 10'
						10½'-11½'	SM/SC	V	Silt, medium brown, fine-grained, moist to slightly wet, some limonite staining.
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 13

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 8
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 31+25, 20 ft. from N. Edge of Runway, Elev. ± 34' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					2¾" A/C
Bulk Sample						2¾-20¾"	GP	I	18" Base Material - Gravelly sand, gray to medium brown, tight to stiff, damp, dense.
				2		20¾"-5'	SM	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4					
SPT B8 - 1 @ 5'	3/4/4					5 - 10'	SM/SC	V	Sandy Silt, medium brown, firm, fine-grained, damp to moist, slightly cohesive.
				6					
				8					
SPT B8 - 2 @ 10'	2/4/4			10		10'-11½'	SM	VI	Silty Fine Sand, medium brown, fine-grained, moist, firm to soft, slightly cohesive, some limonite staining.
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 14

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 9
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 34+25, At Center Line of Runway, Elev., ± 35' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 4¼"			4¼" A/C
						4¼-22¼"	GP	I	18" Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
Bulk Sample				2		22¼" -5'	SM	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
				4					
				6		5 - 10'	SM/SC	V	Clayey Silt, medium brown, firm, fine-grained, damp to moist, slightly cohesive.
				8					
				10					Total Depth: 10', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				12					
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 15

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 10
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 37+25, 20' From S. Edge of Runway, Elev., ± 35' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					$1^7/_8$" A/C
						$1^7/_8$ - 18"	GP	I	16± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		18" - 4'	SM	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense, slightly clayey.
B10-1 @ 4'	14 for 12"	91.6	26.5	4		4 - 8'	SM/SC	V	Silt, medium brown, slightly sandy, firm, damp, some caliche.
SPT B10-2 @ 10'	1/2/2			8		8 - 11 ½'	SM/SC	VI	Sandy Silt, medium brown, slightly clayey, moist, slightly plastic, firm to soft, fine grained.
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 16

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 11
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 40+25, 20 ft. From N. Edge of Runway, Elev. ± 36' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					3" A/C
						3 - 17"	GP	I	14± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
Bulk Sample				2		17" - 5'	SM/SC	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense, slightly clayey.
				4					
						5 - 6'	SM	II	Silty Sand, medium brown, firm, damp, some caliche.
				6		6 - 8'	ML	V	Silt, medium brown, slightly sandy, firm, damp, some caliche.
				8		8 - 10'	SM/SC	V	Clayey Silt, medium brown, moist to very moist, slightly plastic, firm to soft, fine grained.
				10					
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 17

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 12
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 43+25, At Center Line of Runway, Elev., ± 37' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 4½"			4½" A/C
						4½ - 19"	GP	I	14½± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
Bulk Sample				2		19"-5½'	SM	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
SPT B12 - 1 @ 5'	2/4/5			4					
				6		5½ - 11'	SM/SC	V	Sandy Silt, medium brown, slightly clayey, moist to very moist, slightly plastic, firm, fine grained.
B12 - 2 @ 10'	15 for 12"	96.0	21.4	8					Very moist to wet at 10'
				10					Total Depth: 11', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				12					
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 18

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 13
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 46+25, 20' From S. Edge of Runway, Elev., ± 37' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					3" A/C
						3 - 18"	GP	I	15± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		18" - 5½'	SM	II	Silty Sand, dark brown to black, fine to medium grained, damp to moist, firm to tight, dense.
SPT B13 - 1 @ 5'	3/5/6			4					
				6		5½ - 11'			Sandy Silt, medium brown, slightly clayey, moist to very moist, slightly plastic, firm, fine grained, minor caliche.
Bulk Sample				8			SM/SC	V	
SPT B13 - 2 @ 10'	3/6/6			10					Gypsum crystals in sample at 11½'
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-15-14	M14-703	Plate: 19

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 14
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 49+25, 20' From N. Edge of Runway, Elev., ± 38' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3"			3" A/C
						3 - 17"	GP	I	14± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
SPT B14 - 1 @ 2'	5/6/8			2		18" - 3'	SM	II	Silty Sand, dark brown to black, slightly clayey, fine to medium grained, damp to moist, firm, dense.
				4		3 - 6'	SM/ML	II	Sandy Silt, medium to dark brown, moist, slightly plastic, firm, very fine grained, minor caliche.
SPT B14 - 2 @ 10'	4/6/6		29.7	6		6 - 11½'	SC	V	Silty Clay, medium to dark brown, slightly sandy, moist to very moist, slightly plastic, firm, fine grained, slightly mottled, minor caliche.
				8					
				10					
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 20

MILLER GEOSCIENCES, INC.
23890 Copperhill Drive #111, Valencia, California 91354
Engineering Geologic / Geotechnical Services
*(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 15
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 52+25, At Center Line of Runway, Elev., ± 39' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3½"			3½" A/C
						3½ -19"	GP	I	15½± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		19"- 5½'	SM	II	Silty Sand, dark brown to black, fine grained, damp to moist, firm, dense.
B15 - 1 @ 5'	16 for 12"	97.6	21.5	4					
				6		5½ - 8'	SM/SC	V	Clayey Silt, medium brown, slightly sandy, moist, firm, fine grained, minor caliche.
				8		8-11½'			Clayey Silt, medium to grayish brown, mottled, slightly sandy, moist, slightly plastic, firm to soft, fine grained, minor caliche.
SPT B15 - 2 @ 10'	3/4/4			10			SM/SC	V	
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 21

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 16
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 55+25, 20' From S. Edge of Runway, Elev., ± 40' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					2¾" A/C
Bulk Sample						2¾ - 18"	GP	I	15± " Base Material - Gravelly sand, gray to medium brown, tight to stiff, damp, dense.
				2		18" - 6'			Silty Sand, dark brown to black, fine grained, damp to moist, firm, dense.
Bulk Sample				4			SM	II	
				6		6 - 8'	SM/SC	V	Clayey Silt, medium brown, slightly sandy, moist, firm, fine grained, slightly plastic.
				8		8 - 11½'			Silty Clayey Sand, medium brown, moist to wet, firm to soft, fine grained, minor caliche, slightly mottled.
SPT B16 - 1 @ 10'	4/6/4		29.2	10			SM/SC	VII	
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
				20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 22

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 17
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 58+25, 20' From N. Edge of Runway, Elev., ± 40" msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3"			3" A/C
Bulk Sample						3 - 20"	GP	I	17± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		20" - 8'			Silty Sand, medium brown, fine grained, moist, moderately dense, firm, some caliche.
B17 - 1 @ 3'	15 for 12"	104	17.9						
				4			SM	IV	
SPT B17 - 2 @ 5'	2/4/5			6					
				8		8 - 11½'			Clayey Sand, medium brown, moist, firm to soft, very fine grained.
SPT B17 - 3 @ 10'	P/3/3			10			SM/SC	VII	
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
	P = push			20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 23

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 18
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 61+40, At center line of Runway, Elev., ±41' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 4½"			3" A/C over 1½" Old AC
						4½ - 19"	GP	I	15½± " Base Material - Gravelly Sand, gray to medium brown, tight to stiff, damp, dense.
				2		19" - 3'	SM	II	Silty Sand, dark brown to black, fine grained, moist, moderately dense, firm, some caliche.
						3 - 7'	SM	IV	Silty Sand, medium brown, fine grained, moist, moderately dense, firm, some caliche.
SPT B18 - 1 @ 5'	4/5/5			6					
Bulk Sample						7 - 8'	SM/SC	VII	Silty Sand, medium brown, slightly clayey, fine grained, moist, moderately dense, firm, some caliche.
				8		8 - 11½'	SM/SC	VII	Silty Sand, medium brown, fine grained, moist, firm, slightly clayey.
SPT B18 - 2 @ 10'	3/5/5			10					
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
	P = push			20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 24

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 19
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 64+40, 20' From S. Edge of Runway, Elev., ± 42' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0					2¾" A/C
						2¾ - 23"	GP	I	20± " Base Material - Gravelly Sand, medium brown, firm to tight, dry to damp, dense, well graded, gravel is ¾ to 1" diameter.
				2		23" - 5'	GP/SP	–	Gravelly Sand, medium to dark brown, damp, dense, firm, contains some silt.
				4					
				6		5 - 7'	SM	IV	Silty Sand, medium to dark brown, damp, firm.
B19 - 1 @ 7'	18 for 12"	91.8	20.7			7 - 8'	SM	VII	Silty Sand, medium brown, firm, fine grained, damp to moist.
				8		8 - 10'	SM/SC	VII	Clayey Fine Sand, medium brown, moist.
SPT B19 - 2 @ 10'	3/4/5			10		10-11½'	SC/ML	VII	Clayey Silt, medium brown, very fine grained, moist to very moist, firm to soft, slightly plastic.
				12					Total Depth: 11½', No Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
				14					
				16					
				18					
	P = push			20					

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 25

MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Boring Log

Drilling Method: 8" Hollow Stem Flight Auger	Water Level: Not Encountered	Boring #: 20
Sampling Method: 2.4" Drive Tube & SPT	Drilling Conditions: Cool, Dark	Sheet: 1 of 1
Surface Conditions: Runway Surface at Sta. 67+25, 20' From N. Edge of Runway, Elev., ± 42' msl		Logged By: sbm

Sample #	Blow Count	γ_w (pcf)	ω (%)	Depth	Soil Graph	Soil Interval	USCS	Soil Type	Description and Comments
				0		0 - 3½"			3½" A/C
						3½ - 22"	GW	I	18½± " Base Material - Gravelly Sand, medium brown, firm to tight, dry to damp, dense, well graded, gravel is ¾ to 1" diameter.
				2		22" - 3½'	SM	II	Silty Sand, dark brown, damp, firm.
				4		3½ - 7'	SM	IV	Silty Sand, medium brown, damp, fine to medium grained, some iron staining, some caliche.
SPT B20 - 1 @ 5'	2/3/4			6					
				8		7 - 12'	SM/SC	VII	Silty Sand, medium brown, slightly clayey, fine grained, moist, slightly plastic, some caliche.
SPT B20 - 2 @ 10'	2/4/5			10					
				12		12 - 15'	SM/SC	VII	Clayey Sand, medium brown, fine grained, moist to very moist, firm, slightly plastic.
SPT B20 - 3 @ 15'	7/11/13			14		15 - 21'	SM		Silty Sand, grayish to medium brown, very moist, fine to medium grained, firm, moderately dense.
				16					Silty Sand, greenish gray, moist to wet, fine grained, firm, moderately dense.
				18			SM		Total Depth: 21½', No Free Groundwater. Back-filled with sand/cement mixture (1/1). Soil hauled to on-site disposal area.
SPT B20 - 4 @ 20'	2/3/4			20		21-21½'			

Site: Oxnard Airport, 2889 W. 5th St, Oxnard, CA	Date: 7-16-14	M14-703	Plate: 26

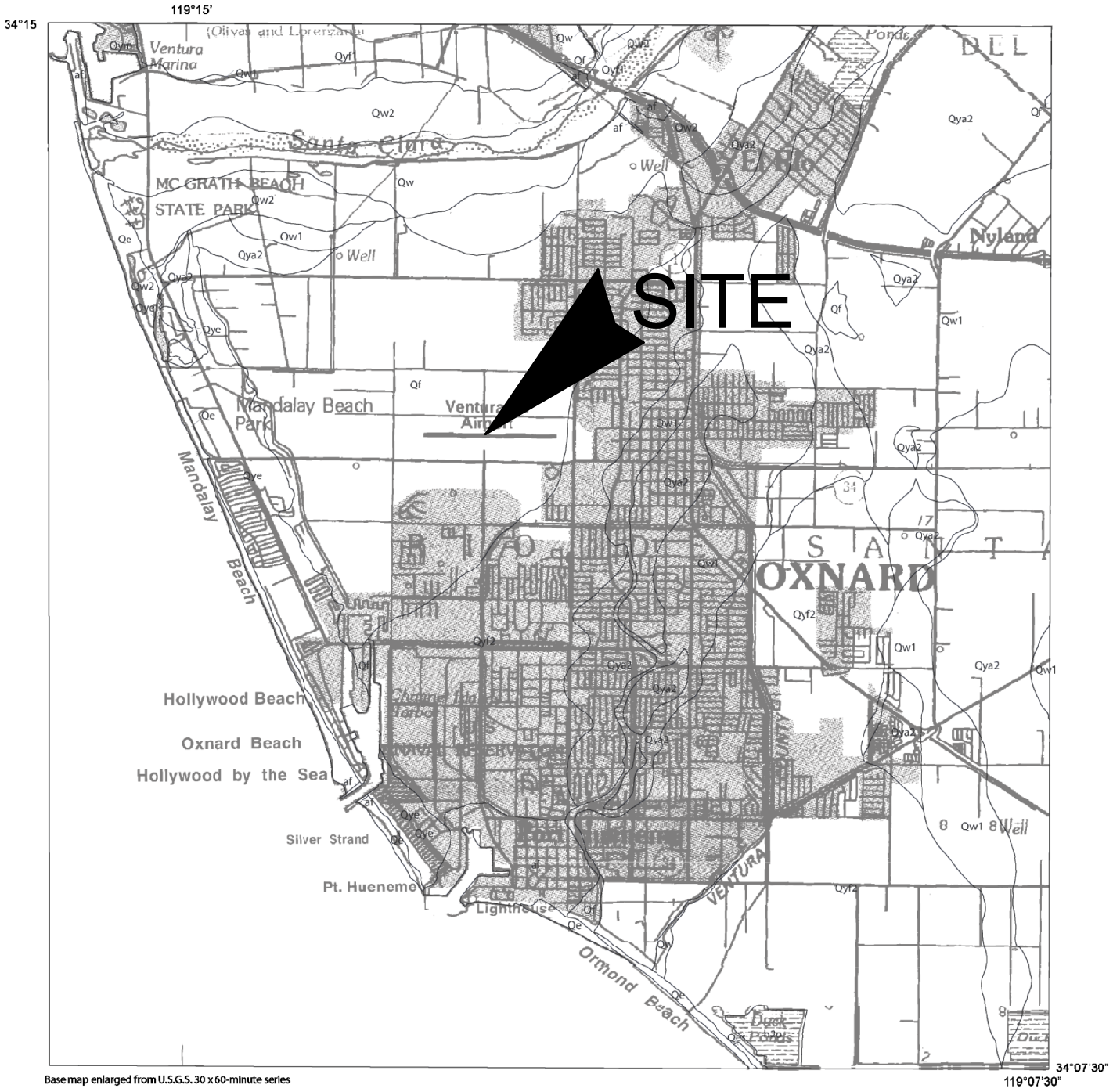
MILLER GEOSCIENCES, INC. *Engineering Geologic / Geotechnical Services*
23890 Copperhill Drive #111, Valencia, California 91354 *(661) 299-2206 * millergeosciences@gmail.com*

Regional Geologic Map

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA–GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY–MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION–DARRYL YOUNG, DIRECTOR

Oxnard Quadrangle Plate 1.1
SEISMIC HAZARD ZONE REPORT 052



Base map enlarged from U.S.G.S. 30 x 60-minute series

OXNARD QUADRANGLE

SCALE

2 MILES
2000 0 2000 4000 6000 FEET
1 0 1 2 KILOMETERS

N

Lithologic contact
See Geologic Conditions section in report for descriptions of the units.

Ref: California Geological Survey, Department of Conservation, 2002, Seismic Hazard Zone Report for the Oxnard 7.5-Minute Quadrangles, Ventura County, California, Seismic Hazard Zone Report 052.

Note: Qf Active Alluvial Fan Deposits (Sands, Silty Sands)

Plate 1.1 Quaternary geologic map of the Oxnard 7.5-minute Quadrangle, California, from William Lettis & Associates, 2000.

SITE: 2889 W. 5 Th Street, Oxnard, California	DATE: Aug., 2014	M14-703	PLATE 27

MILLER GEOSCIENCES, INC.
23890 Copper Hill Dr., #111, Valencia, Ca., 91354
GEOLOGIC AND GEOTECHNICAL SERVICES
*(661) 299-2206 * millergeosciences@gmail.com*

Regional Historic High Groundwater Map

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA–GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY–MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION–DARRYL YOUNG, DIRECTOR

Oxnard Quadrangle Plate 1.2
SEISMIC HAZARD ZONE REPORT 052

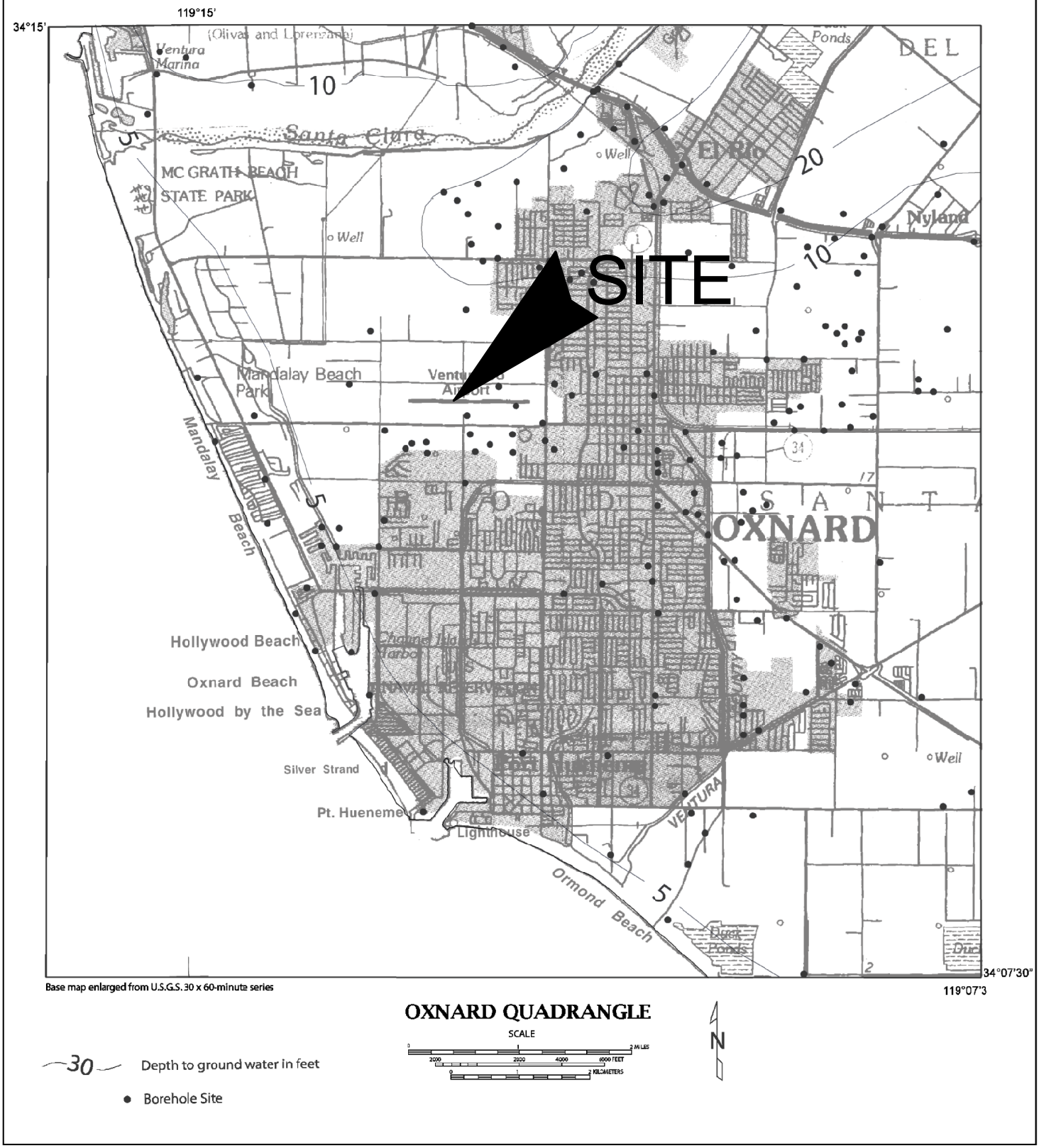


Plate 1.2 Depth to historically highest groundwater and borehole locations, Oxnard 7.5-minute quadrangle, California

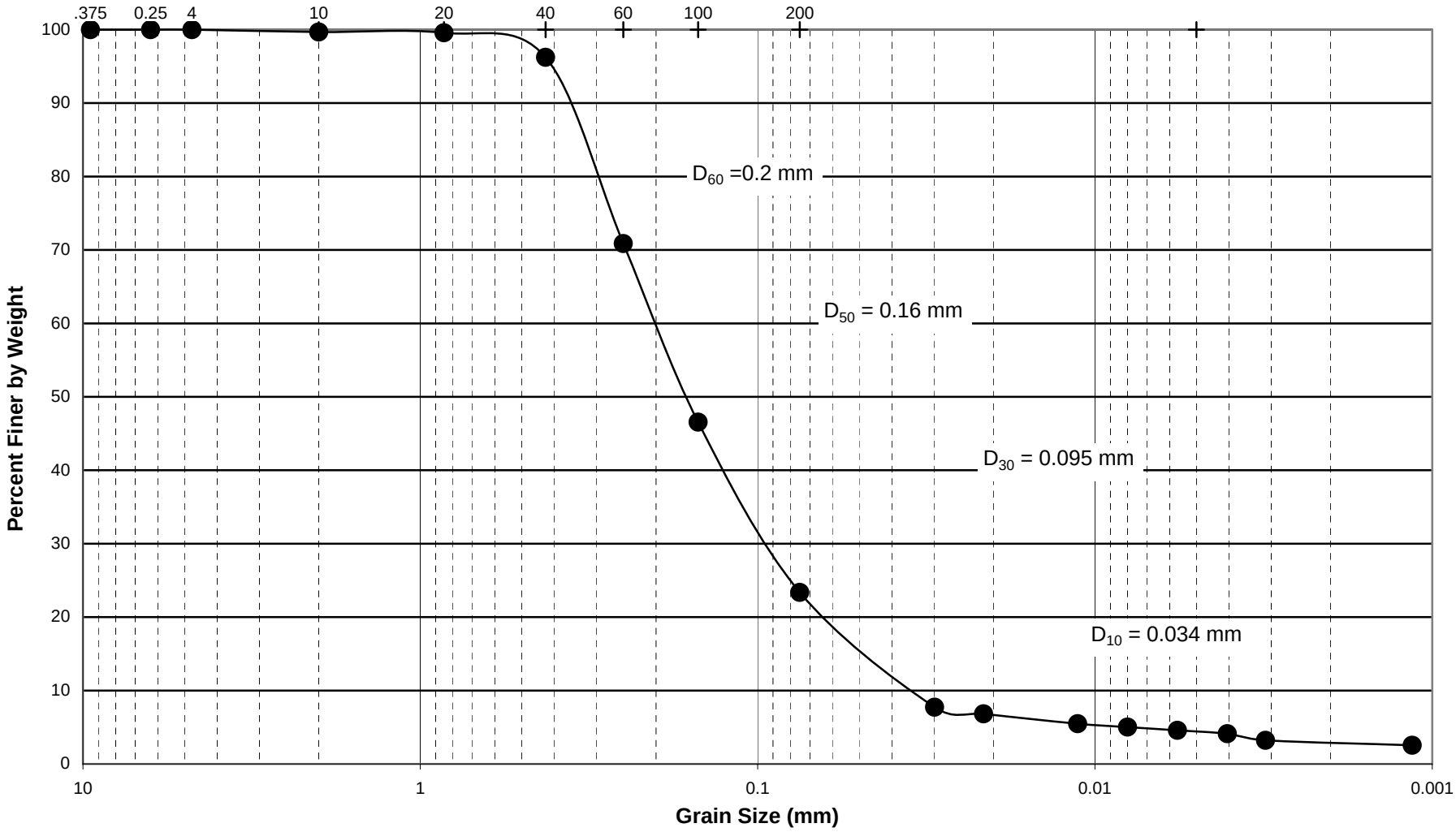
Ref: California Geological Survey, Department of Conservation, 2002, Seismic Hazard Zone Report for the Oxnard 7.5-Minute Quadrangles, Ventura County, California, Seismic Hazard Zone Report 052.

SITE: 2889 W. 5 Th Street, Oxnard, California	DATE: Aug., 2014	M14-703	PLATE 28

MILLER GEOSCIENCES, INC.
23890 Copper Hill Dr., #111, Valencia, Ca., 91354
GEOLOGIC AND GEOTECHNICAL SERVICES
*(661) 299-2206 * millergeosciences@gmail.com*

APPENDIX B

Gravel	Sand			Silt	Clay
Fine	Coarse	Medium	Fine		
inches	US Standard Sieve Numbers			Hydrometer	



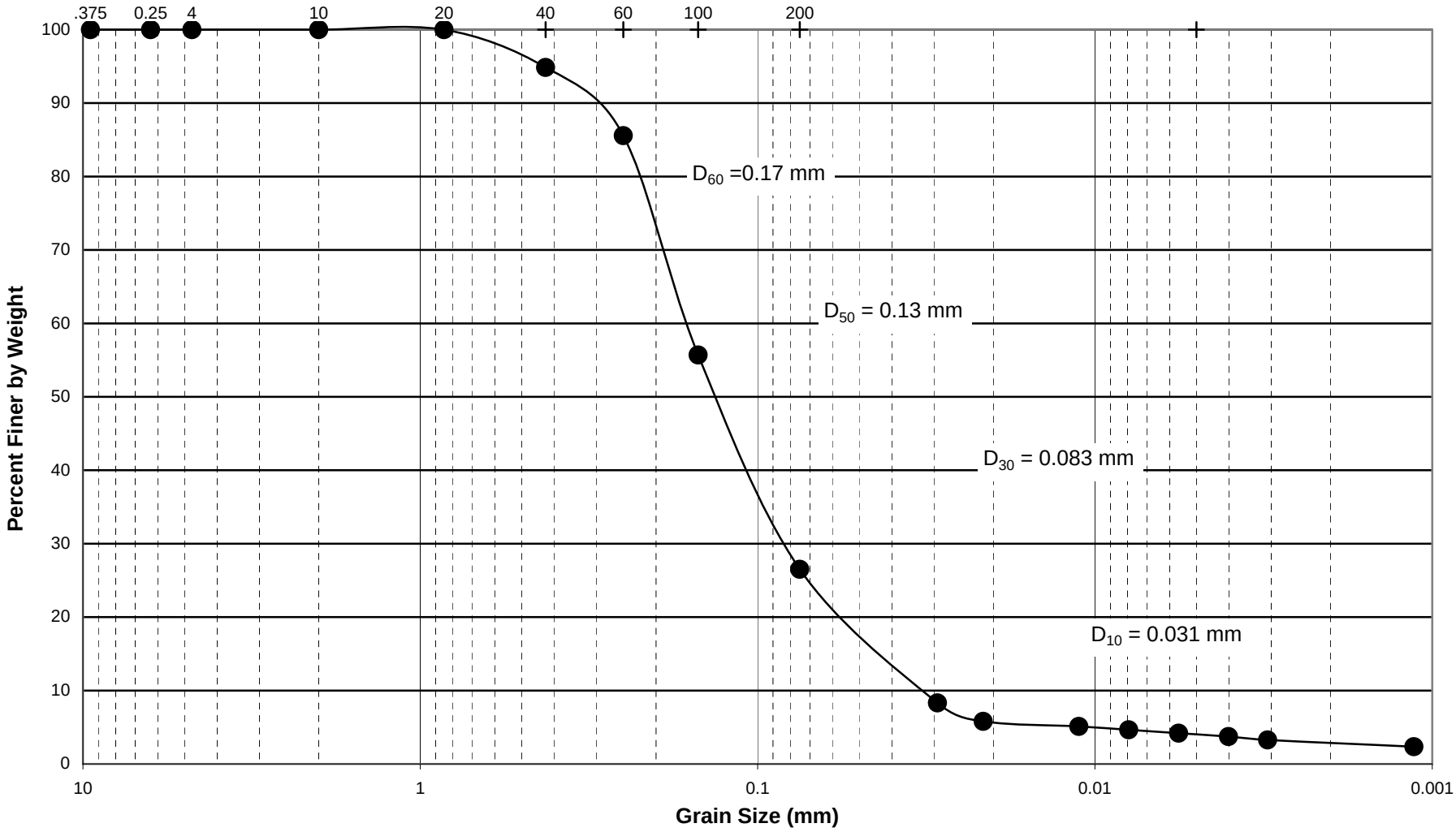
Sample # : **B1-1 @ 2'**

Classification: Type II (SM/SC)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M 14-703**	**Aug-14**	**29**

MILLER GEOSCIENCES, INC. ***ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT***

Gravel	Sand			Silt	Clay
Fine	Coarse	Medium	Fine		
inches	US Standard Sieve Numbers			Hydrometer	



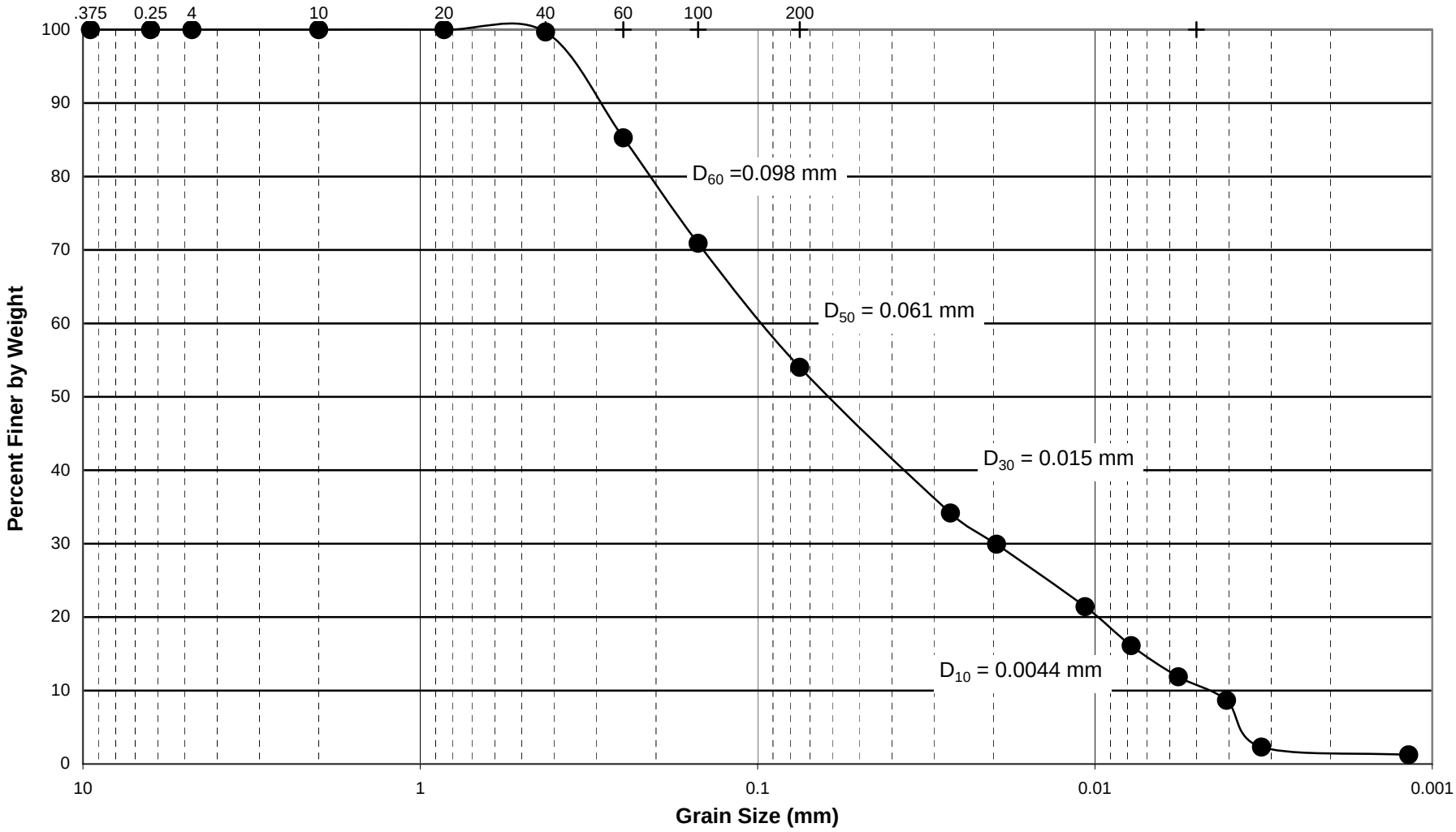
Sample # : **B1-2 @5**

Classification: Type lll (SM/SC)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M 14-703**	**Aug-14**	**30**

MILLER GEOSCIENCES, INC. *ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT*

Gravel	Sand			Silt	Clay
Fine	Coarse	Medium	Fine		
inches	US Standard Sieve Numbers			Hydrometer	



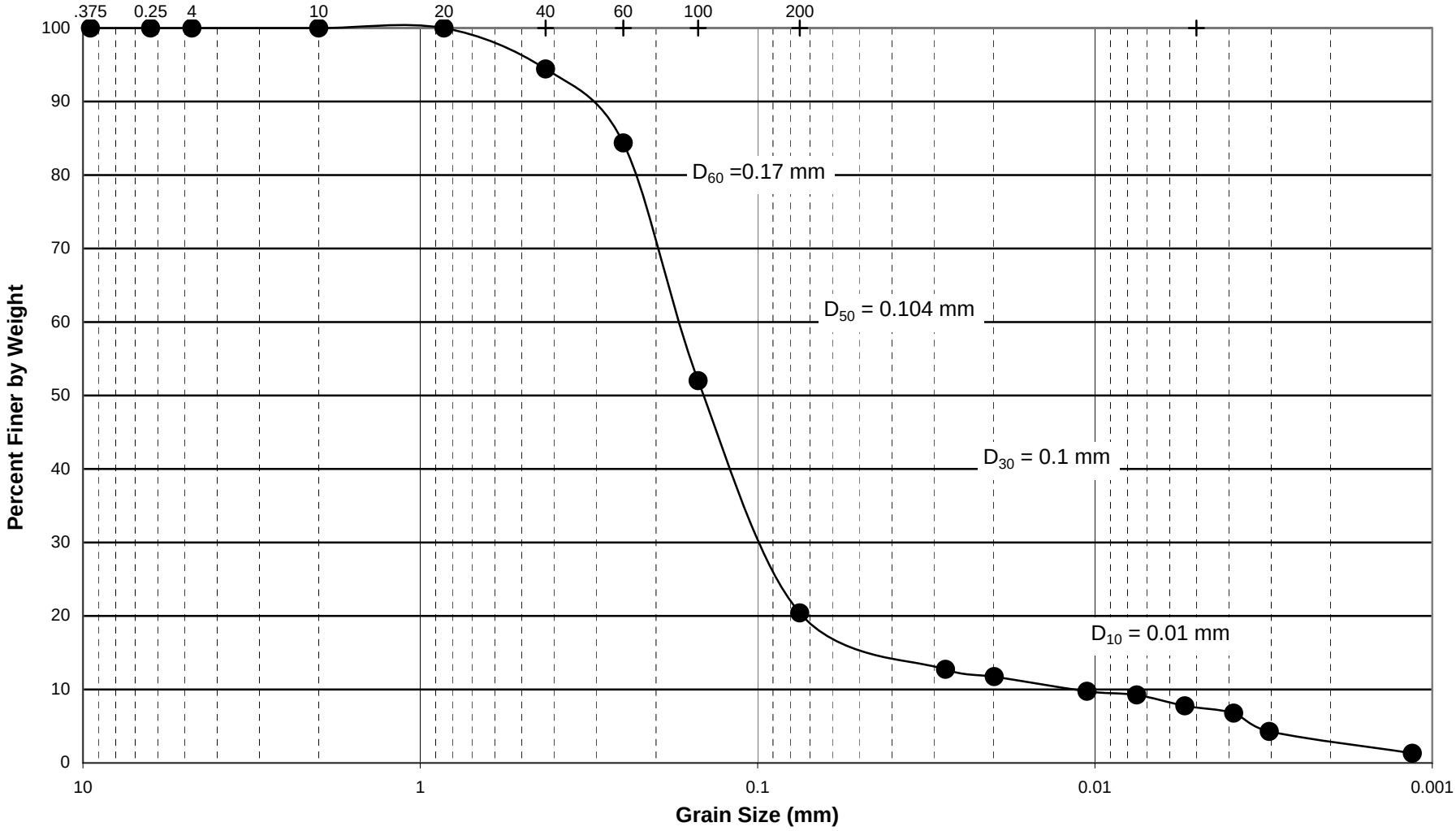
Sample # : **B4-2 @10'**

Classification: Type V (SM/SC)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M 14-703**	**Aug-14**	**31**

MILLER GEOSCIENCES, INC. *ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT*

Gravel	Sand			Silt	Clay
Fine	Coarse	Medium	Fine		
inches	US Standard Sieve Numbers			Hydrometer	



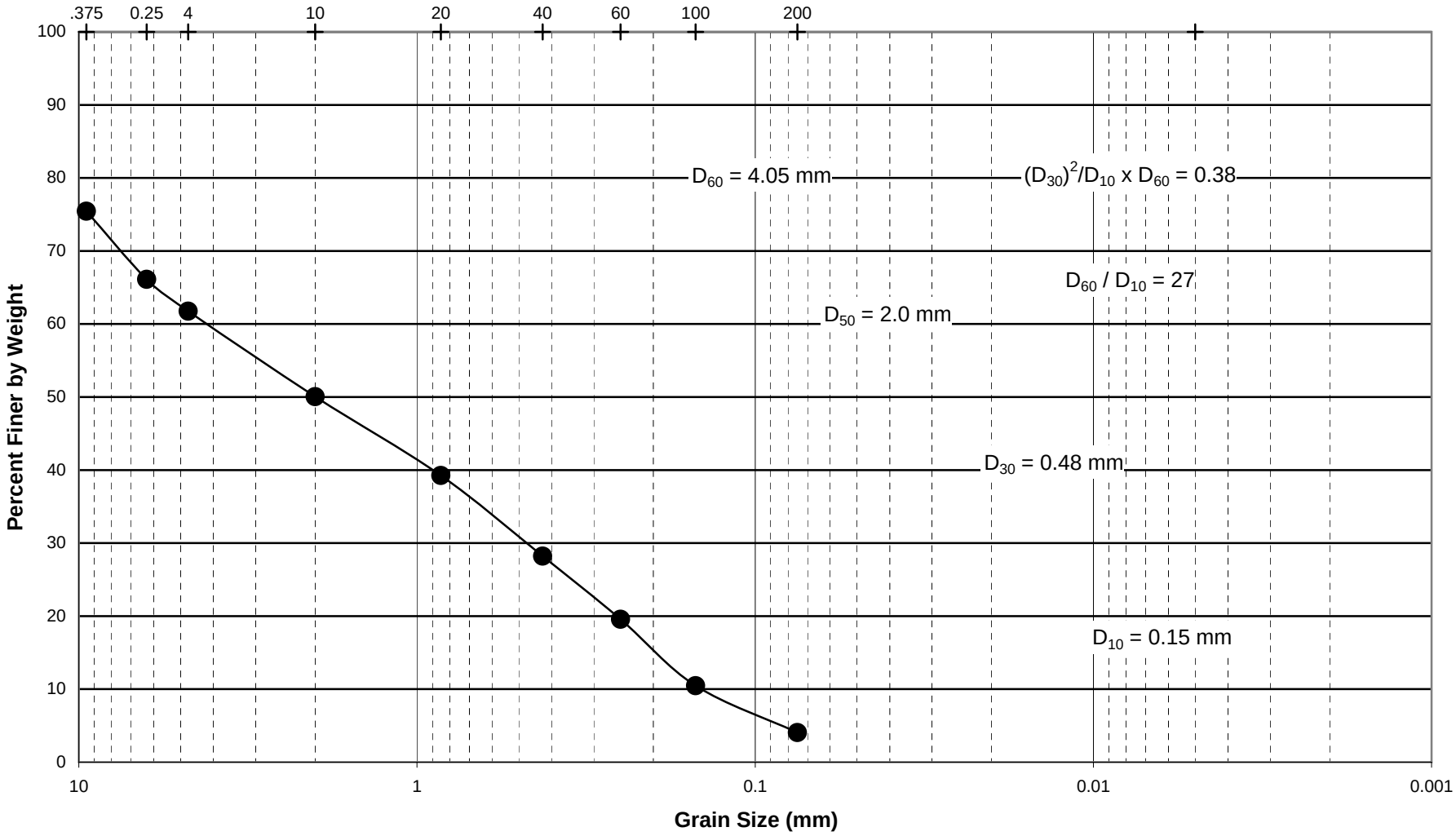
Sample # : **B6-1 @ 5'**

Classification: Type V (SM/SC)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M 14-703**	**Aug-14**	**32**

MILLER GEOSCIENCES, INC. *ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT*

Gravel	Sand			Silt	Clay
Fine	Coarse	Medium	Fine		
inches	US Standard Sieve Numbers			Hydrometer	



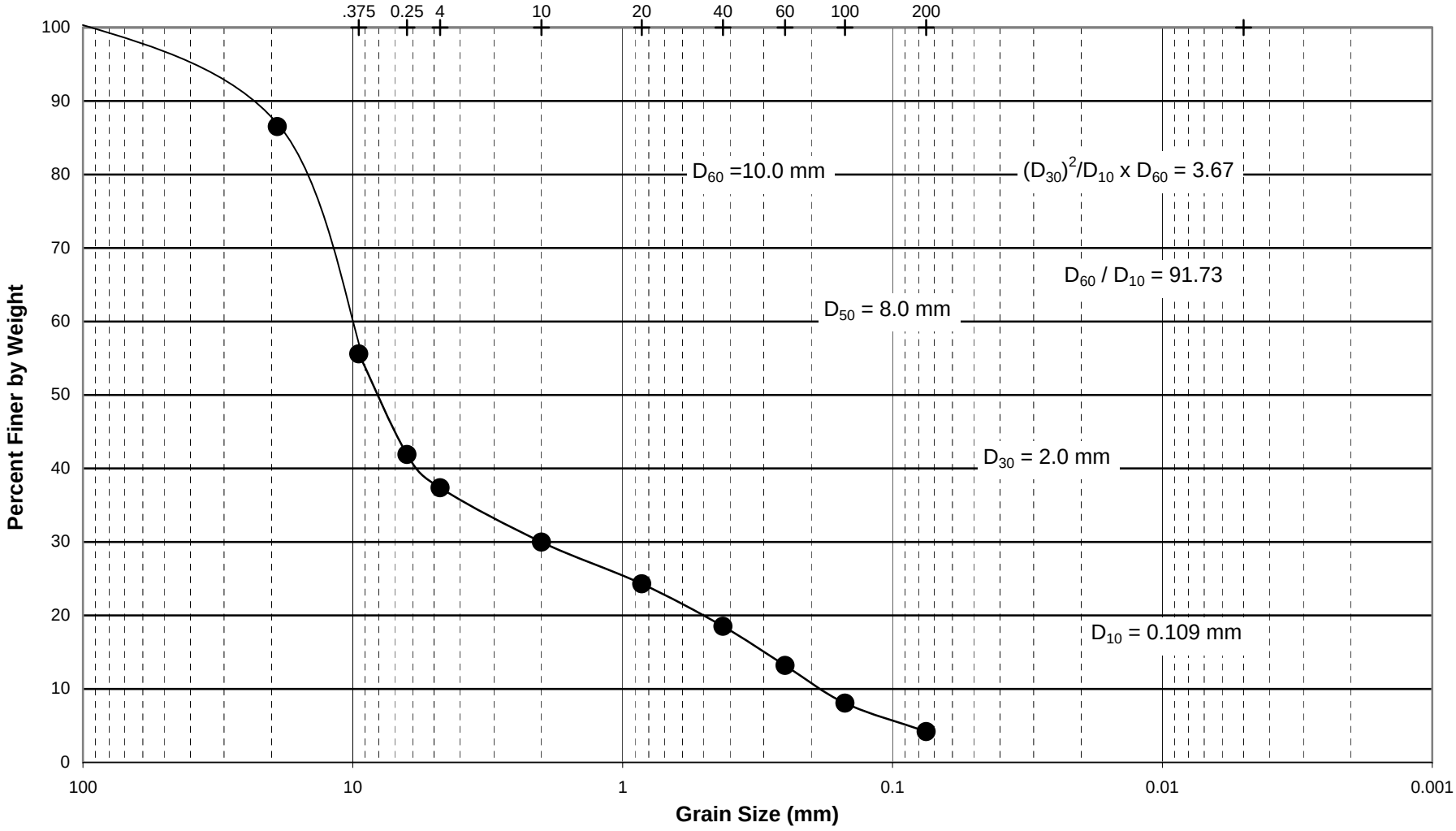
Sample # : **B6 @ 0-2**

Classification: Type I (GP)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M14--703**	**Aug-14**	**33**

MILLER GEOSCIENCES, INC. *ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT*

Gravel	Sand			Silt	Clay
	Coarse	Medium	Fine		
	US Standard Sieve Numbers			Hydrometer	



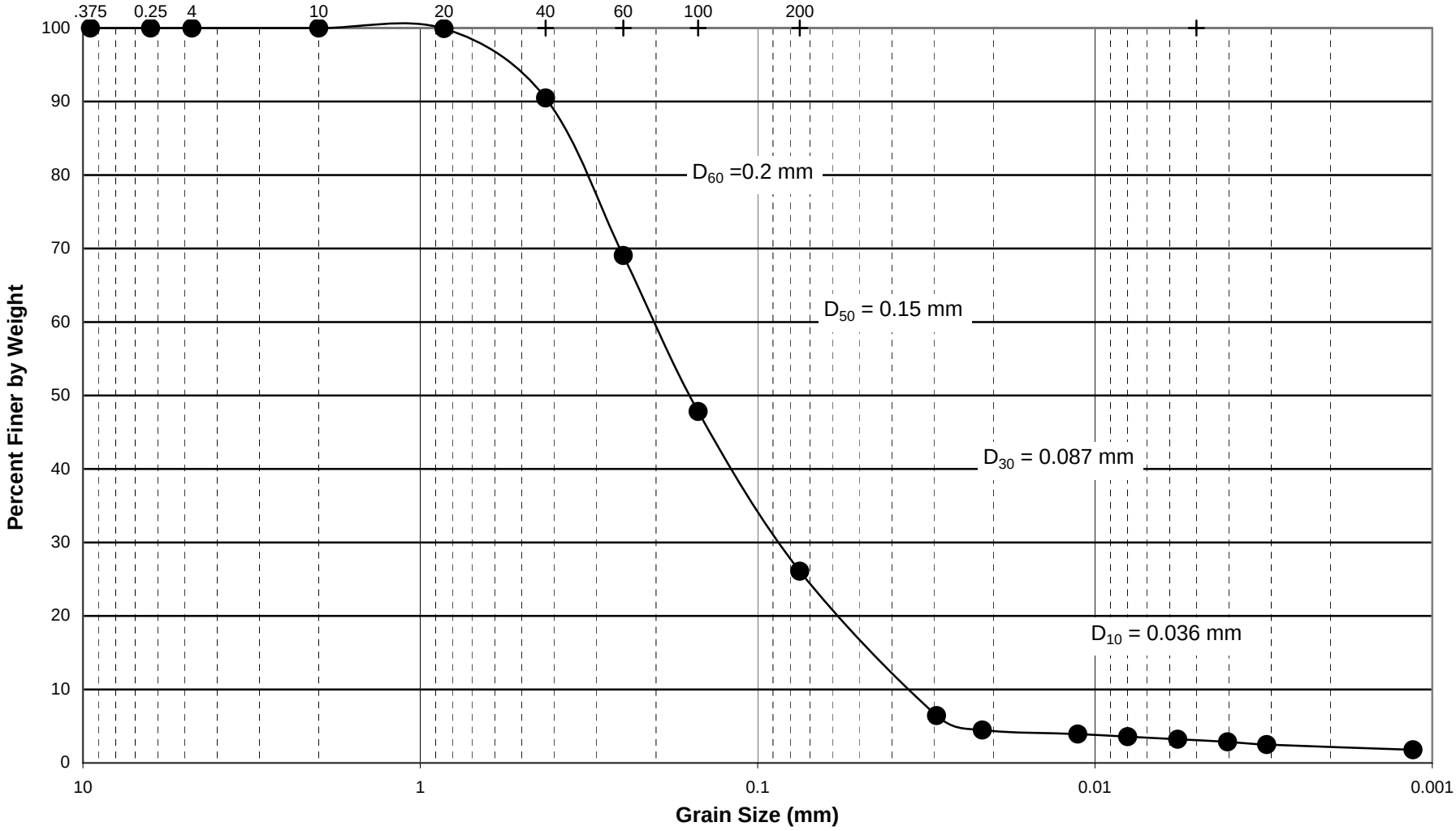
Sample # : **B16 @ 0-2'**

Classification: Type I (GP)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M 14-703**	**Aug-14**	**34**

MILLER GEOSCIENCES, INC. *ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT*

Gravel	Sand			Silt	Clay
Fine	Coarse	Medium	Fine		
inches	US Standard Sieve Numbers			Hydrometer	

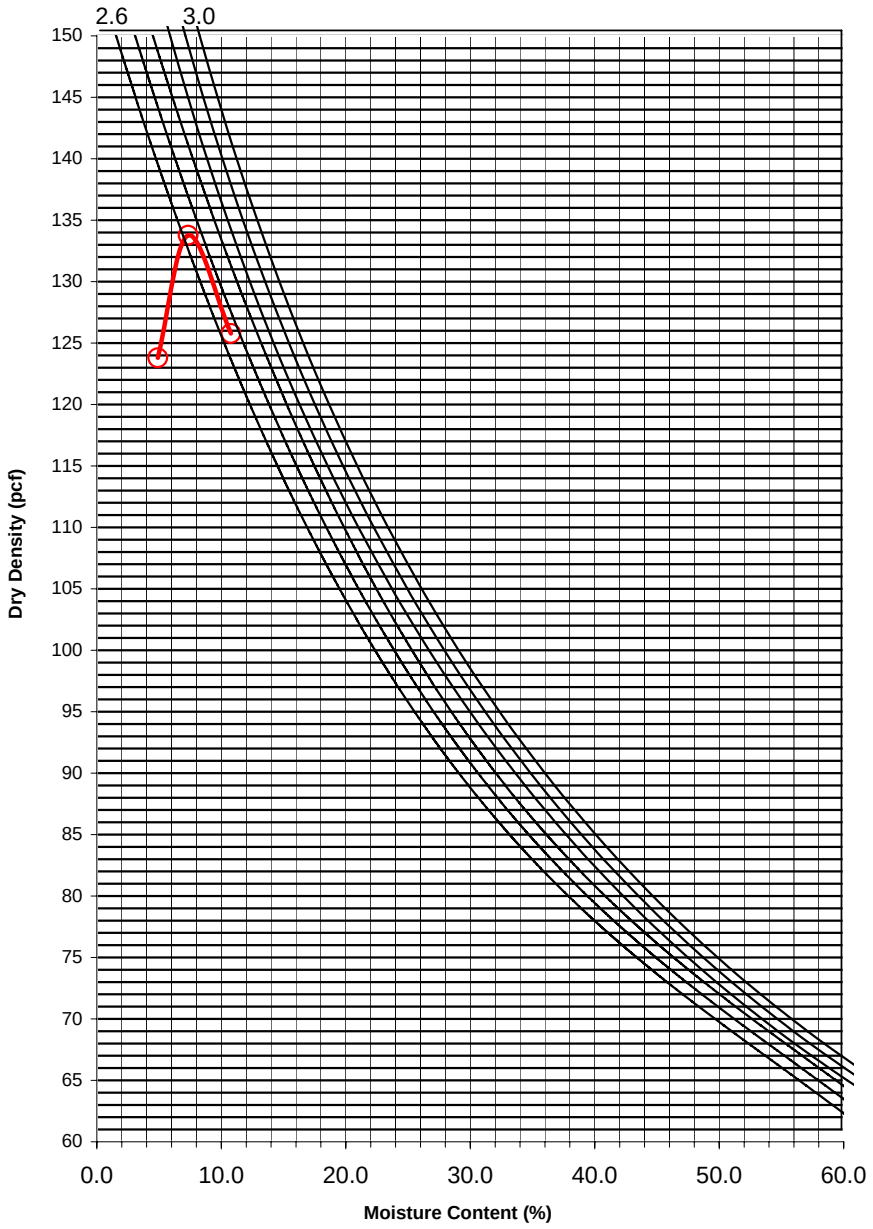


Sample # : **B17-1 @3'**

Classification: Type IV (SM/SC)

Site:	Job:	Date:	Plate:
2889 W. 5th Street, Oxnard, California	**M 14-703**	**Aug-14**	**35**

MILLER GEOSCIENCES, INC. ***ENVIRONMENTAL AND GEOTECHNICAL CONSULTANT***



Dry Density					
	1	2	3		
Initial Weight (lbs)	23.85	24.88	24.56		
Weight of Mold (lbs)	14.11	14.11	14.11		
Weight of Soil	9.74	10.77	10.45		
Wet Density (pcf)	129.86	143.60	139.33		
Moisture Content (%)	4.90	7.34	10.78		
Dry Density (pcf)	123.80	133.78	125.78		

Moisture Content					
	1	2	3		
Wet Soil + Tare	147.36	115.62	122.91		
Dry Soil + Tare	140.56	107.83	111.12		
Weight of Tare	1.68	1.68	1.71		
Dry Soil	138.88	106.15	109.41		
Weight of Water	6.80	7.79	11.79		
Soil Moisture	0.0490	0.0734	0.1078		

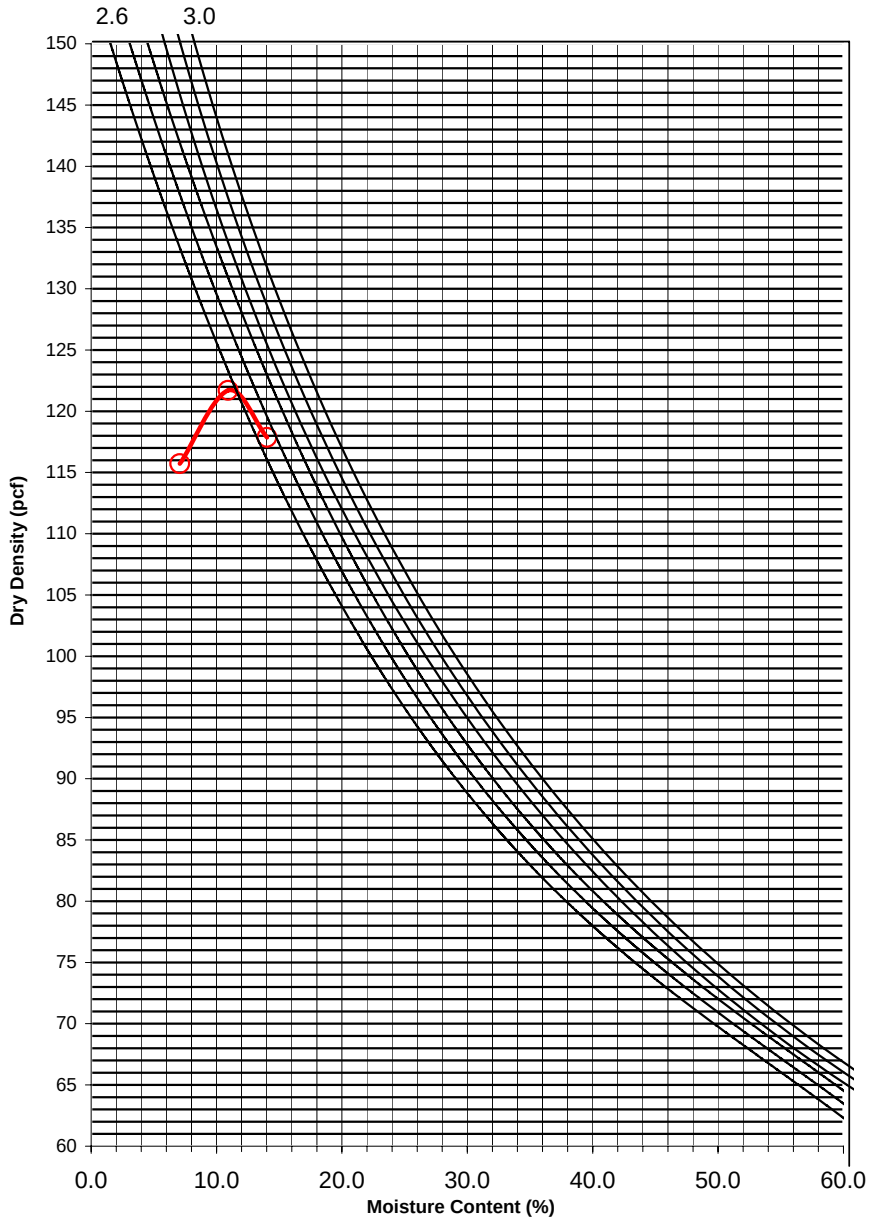
Maximum Dry Density	134	pcf
Optimum Moisture	7.5%	

Sample Number	B1 & 2
Depth	0 - 2'
Type of Soil	Base (Type 1)

Laboratory Maximum Compaction

SITE:	2889 W. 5th Street, Oxnard, California - Oxnard Airport				
M14-703	Date:	Aug., 14	By:	sbm	Plate 36

MILLER GEOSCIENCES, INC. _____



Dry Density	1	2	3	4	5
Initial Weight (lbs)	9.53	9.9	9.88		
Weight of Mold (lbs)	5.4	5.4	5.4		
Weight of Soil	4.13	4.5	4.48		
Wet Density (pcf)	123.90	135.00	134.40		
Moisture Content (%)	7.07	10.92	14.02		
Dry Density (pcf)	115.72	121.71	117.87		

Moisture Content	1	2	3	4	5
Wet Soil + Tare	98.63	105.78	102.77		
Dry Soil + Tare	92.23	95.53	90.34		
Weight of Tare	1.69	1.68	1.71		
Dry Soil	90.54	93.85	88.63		
Weight of Water	6.40	10.25	12.43		
Soil Moisture	0.0707	0.1092	0.1402		

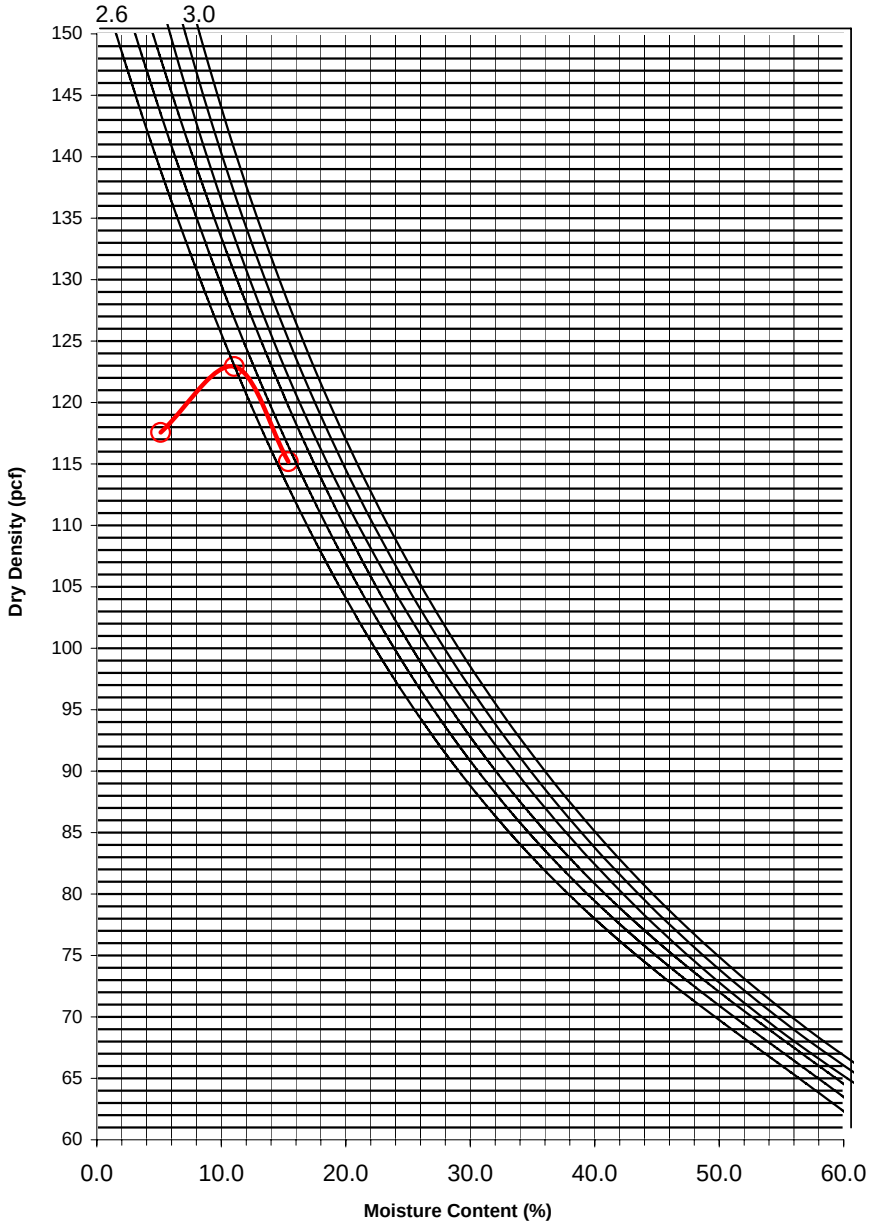
Maximum Dry Density	122	pcf
Optimum Moisture	11%	

Sample Number	B-9
Depth	2-4'
Type of Soil	SM/SC

Laboratory Maximum Compaction

SITE:	2889 W. 5th street, Oxnard, California - Oxnard Airport				
M14-703	Date:	Aug., 14	By:	sbm	Plate 37

MILLER GEOSCIENCES, INC. _____



Dry Density					
	1	2	3		
Initial Weight (lbs)	9.52	9.95	9.83		
Weight of Mold (lbs)	5.4	5.4	5.4		
Weight of Soil	4.12	4.55	4.43		
Wet Density (pcf)	123.60	136.50	132.90		
Moisture Content (%)	5.13	11.04	15.38		
Dry Density (pcf)	117.57	122.93	115.18		

Moisture Content					
	1	2	3		
Wet Soil + Tare	102.36	114.15	106.37		
Dry Soil + Tare	97.45	102.97	92.41		
Weight of Tare	1.70	1.68	1.67		
Dry Soil	95.75	101.29	90.74		
Weight of Water	4.91	11.18	13.96		
Soil Moisture	0.0513	0.1104	0.1538		

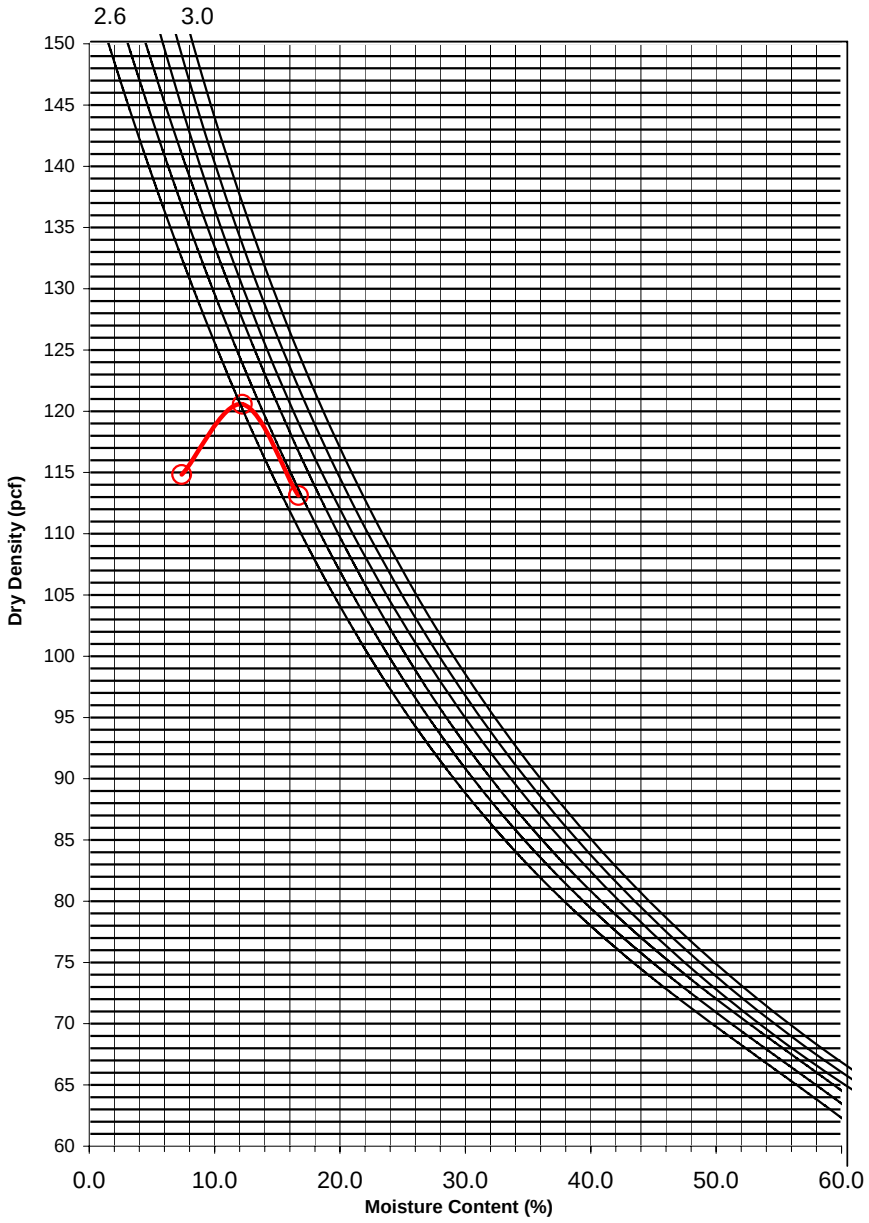
Maximum Dry Density	123	pcf
Optimum Moisture	11%	

Sample Number	B-12
Depth	2-4'
Type of Soil	Type ll (SM)

Laboratory Maximum Compaction

SITE:	2889 W. 5th Street, Oxnard, California - Oxnard Airport				
M14-703	Date:	Aug., 14	By:	sbm	Plate 38

MILLER GEOSCIENCES, INC. _____



Dry Density					
	1	2	3	4	5
Initial Weight (lbs)	9.51	9.91	9.8		
Weight of Mold (lbs)	5.4	5.4	5.4		
Weight of Soil	4.11	4.51	4.4		
Wet Density (pcf)	123.30	135.30	132.00		
Moisture Content (%)	7.37	12.22	16.69		
Dry Density (pcf)	114.83	120.57	113.12		

Moisture Content					
	1	2	3	4	5
Wet Soil + Tare	94.01	91.15	82.79		
Dry Soil + Tare	87.67	81.41	71.19		
Weight of Tare	1.67	1.69	1.69		
Dry Soil	86.00	79.72	69.50		
Weight of Water	6.34	9.74	11.60		
Soil Moisture	0.0737	0.1222	0.1669		

Maximum Dry Density	121	pcf
Optimum Moisture	12%	%

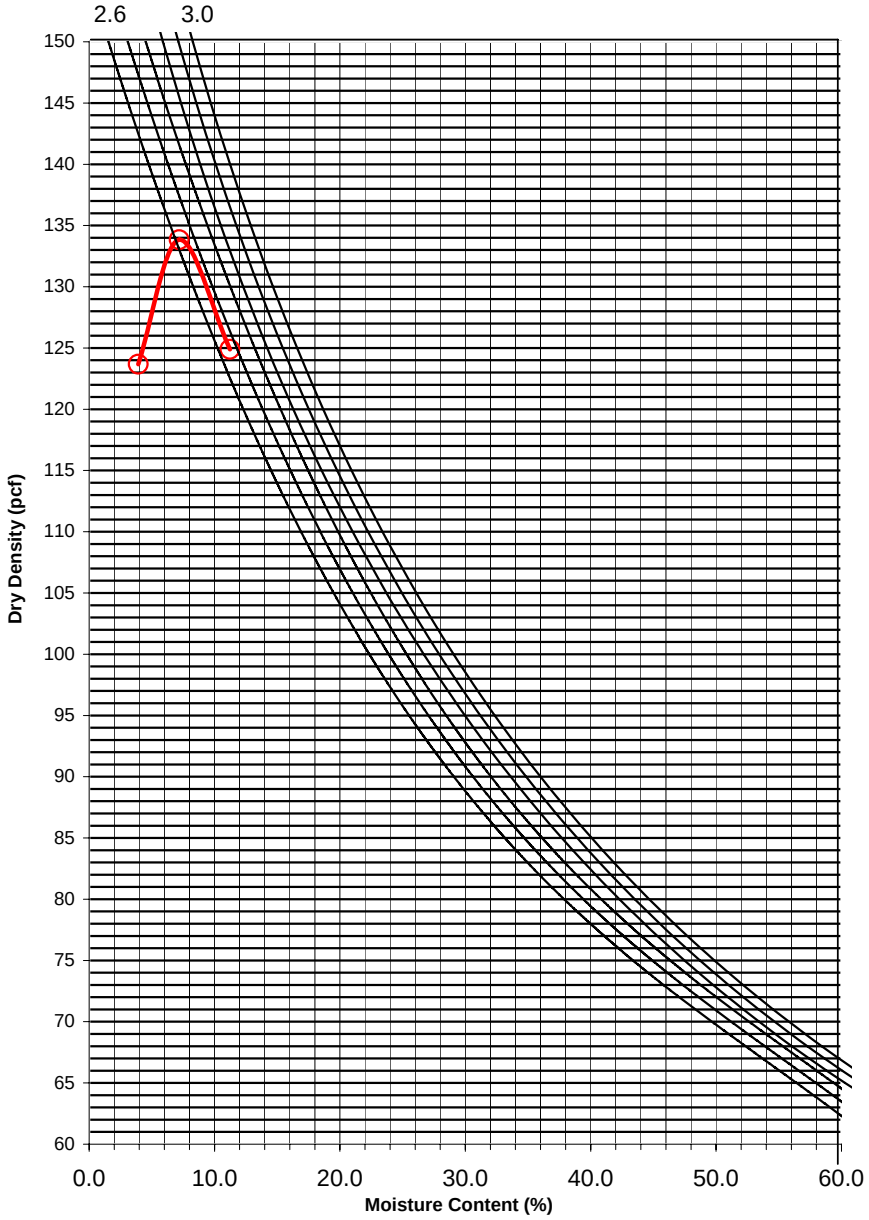
Sample Number	B-13
Depth	7 - 9'
Type of Soil	SM/SC

Laboratory Maximum Compaction

SITE:	2889 W. 5th Street, Oxnard, California - Oxnard Airport				
M14-703	Date:	Aug., 14	By:	sbm	Plate 39

MILLER GEOSCIENCES, INC. _____

Maximum Compaction



Dry Density					
	1	2	3	4	5
Initial Weight (lbs)	23.75	24.87	24.53		
Weight of Mold (lbs)	14.11	14.11	14.11		
Weight of Soil	9.64	10.76	10.42		
Wet Density (pcf)	128.53	143.46	138.93		
Moisture Content (%)	3.92	7.18	11.24		
Dry Density (pcf)	123.69	133.85	124.90		

Moisture Content					
	1	2	3	4	5
Wet Soil + Tare	125.87	112.08	105.24		
Dry Soil + Tare	121.19	104.68	94.78		
Weight of Tare	1.72	1.67	1.68		
Dry Soil	119.47	103.01	93.10		
Weight of Water	4.68	7.40	10.46		
Soil Moisture	0.0392	0.0718	0.1124		

Maximum Dry Density	134	pcf
Optimum Moisture	7%	

Sample Number	B16
Depth	0-2
Type of Soil	Base (Type I)

Laboratory Maximum Compaction

SITE:	2889 W. 5th Street, Oxnard, California - Oxnard Airport				
M14-703	Date:	Aug., 14	By:	sbm	Plate 40

MILLER GEOSCIENCES, INC. _____

APPENDIX C

Pacific Materials Laboratory, Inc.
Serving Ventura County since 1963

August 11, 2014
Lab No. 34947-3
File No. 14-8149-3

Miller Geosciences
Attn.: Mr. Steve Miller
23890 Copper Hill Drive, #111
Valencia, CA 91354

SUBJECT: CBR Test Report
Samples Delivered to our Laboratory

Gentlemen:

Pursuant to your request CBR testing was performed on four (4) soil samples delivered to our laboratory on August 1, 2014. CBR testing was performed in accordance with ASTM 1883-05 procedures. The test results follow:

PROJECT: Oxnard Airport

CBR RESULTS

SAMPLE NO./LOCATION	**B-4 @ 2' - 4'**		**B-7 & 8 @ 0 - 2'**		**B-11 @ 2' - 4'**		**B-18 @ 5' - 8'**	
Description	Black Clayey Silty Sand		Brown Gravelly Clayey Silty Sand		Black Sandy Silty Clay		Brown Sandy Clayey Silt	
Wet Unit Weight (pcf)	142.7		142.9		138.9		140.7	
Moisture Content (%)	10.5		5.8		13.0		12.3	
Dry Unit Weight (pcf)	129.1		135.1		122.9		125.5	
Elasticity (%)	1.05		0.99		0.88		1.31	
Swell (%)	1.62		0.12		2.54		3.40	
PENETRATION (*in.*)	**Pressure (psi)**	**CBR***	**Pressure (psi)**	**CBR***	**Pressure (psi)**	**CBR***	**Pressure (psi)**	**CBR***
0.1	135	14	1030	103	433	43	67	7
0.2	328	22	2000	133	633	42	193	13
0.3	427	23	2645	139	733	39	286	15
0.4	490	21	2850	124	793	35	380	17
0.5	557	21	3475	126	840	32	460	18
Assigned CBR =		**14**		**103**		**32**		**7**

** CBR adjusted per the Stress-penetration curve.*

Thank you for allowing Pacific Materials Laboratory, Inc. to be of service. If we may be of further service regarding this or other geotechnical issues, please do not hesitate to call (805) 482-9801, fax (805) 445-6551 or write.

Respectfully submitted,
PACIFIC MATERIALS LABORATORY, INC.

Douglas C. Papay, RCE 29,565
President

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS C. PAPAY
CE 29565
Exp: 3-31-15
CIVIL
STATE OF CALIFORNIA

DCP:dk
cc: Addressee (3)