OXR Runway 7-25 Pavement Design Options

BACKGROUND

Runway 7-25 at the Oxnard Airport is in need of improvements based on the Airport Pavement Management System Report dated October 2016. The 2015 PCI rating was fair (PCI range of 55-70); the most recent project to date was a crack seal and surface treatment project completed in 2011. The last runway reconstruction project was completed in 1992 (27 years ago). Due to the surface distresses and pavement age, the runway surface has exceeded its useful life and needs a major rehabilitation or reconstruction. Rehabilitation and reconstruction options were considered for Runway 7-25. Mead & Hunt, Inc. (the Consultant) performed a thorough analysis of the existing conditions of the pavement section and evaluated various design scenarios for rehabilitation and reconstruction options. This report summarizes the outcomes of the analysis and provides the Consultant's recommendation moving forward for the runway improvements.

GEOTECHNICAL ANALYSIS

A geotechnical analysis was performed by Earth Systems Pacific; a report in draft form was submitted on February 6, 2019, as is included in this analysis (*Attachment 1*). The geotechnical study included 40 (up to 10-foot depth) pavement borings; 30 borings were on the runway and 2 were on each of the taxiway connectors. Based on the geotechnical investigation, the existing asphalt concrete thickness on the runway varied from 3 inches to 6.5 inches and the existing aggregate base section varied from 8 inches to 17 inches. For design and analysis purposes, an average existing pavement section of 4 inches of asphalt concrete over 10 inches of aggregate base was assumed. It was determined that the existing aggregate base does not comply with gradation specifications for FAA P-209 material. For this reason, the quality of the existing layer of aggregate base will not be considered or modeled as P-209 during the design but rather with the values determined by the laboratory reports for material quality.

The geotechnical report described the soils encountered during the investigation as slightly moist to very moist. Although water was not encountered in any of the borings, caliche deposits were found, which indicates the past presence of water. Existing soil moisture content was found to be up to 10.8% above the optimum moisture content. This observation was consistent with previous subsurface investigations as well.

The geotechnical study provided a recommendation for the CBR to be used for the pavement design. For rehabilitation of Runway 7-25, the report recommends a CBR of 1 or 2 as no moisture conditioning or reworking of the subgrade would be included as part of the project. In case of a reconstruction, the recommended CBR values of the subgrade (without chemical stabilization measures) will be 5 for the runway pavement section between Taxiway Connectors D and B and 8 for the pavement section between Taxiway Connectors D and E and between A and B. These CBR values for a reconstruction assume that the subgrade is prepared in accordance with the FAA P-152 specification.

FLEET MIX

The fleet mix for the pavement design analysis was developed from the FAA-approved 2018 Draft Forecast for Oxnard Airport as is included in this analysis (*Attachment 2*) with the addition of the Embraer 175 to account for the possibility of future commercial service at the Airport (3 flights per day with 2% annual growth). The fleet mix includes representative aircraft from each aircraft category currently operating the Airport. The 2017 Traffic Flow Management System Counts (TFMSC) from the FAA were included in the Draft Forecast and used to determine operations of the heavier aircraft utilizing the runway. The itinerant operations given by the forecast were distributed proportionally to the traffic counts among the aircraft in the fleet mix. The local operations were distributed proportionally to the based aircraft among the present and future aircraft based at the Airport. The table below illustrates the fleet mix utilized for the analysis. The number of total operations over a 20-year period (number of total operations during design life) was used to determine the percent annual growth in traffic for each aircraft.

No.	Aircraft	MTOW (lbs)	Total Operations				Total Ops in 20 Years
			2017	2023	2028	2038	
1	Gulfstream G650	99,600	165	177	188	209	3,750
2	Embraer 175	83,026	2,190	2,393	2,774	3,728	56,885
3	Falcon 900LX	49,000	1,025	1,098	1,168	1,298	23,306
4	Challenger 300/600/604	48,200	1,414	1,515	1,611	1,790	32,146
5	Gulfstream 200/280	39,600	495	530	564	627	11,251
6	Hawker 800	28,120	471	505	537	597	10,715
7	Citation V/VII	23,200	660	707	752	836	15,002
8	Citation XLS	22,000	825	884	940	1,044	18,752
9	Learjet 40	21,500	1,108	1,187	1,262	1,402	25,181
10	Phenom 300	18,000	577	619	658	731	13,126
11	Beech 1900	17,120	848	909	967	1,074	19,288
12	Citation CJ3/CJ4	17,110	507	543	872	1,545	18,247
13	King Air 200/350	15,100	5,576	6,231	6,885	8,149	137,470
14	Swearingen Merlin	13,300	5,717	6,382	7,046	8,328	140,685
15	Citation CJ1/CJ2	12,375	1,991	2,710	3,447	4,028	64,523
16	King Air 90/100	11,800	5,357	5,213	4,782	4,400	97,325
17	Phenom 100	10,600	943	1,010	1,074	1,194	21,431
18	Pilatus PC12	8,818	14,713	15,816	16,977	19,111	338,746
19	Socata TBM	6,580	25,909	27,065	27,770	29,637	556,556
	TOTAL OPERATIONS		**70,490**	**75,493**	**80,274**	**89,728**	

RUNWAY 7-25 IMPROVEMENT – PAVEMENT REHABILITATION OPTION

The pavement rehabilitation was the first design scenario analyzed. The rehabilitation method would consist of placing a P-209 crushed aggregate base layer and a P-401 asphalt concrete surface course over the existing pavement section. The existing asphalt concrete will be pulverized, blended, and compacted with the underlying existing aggregate base. The recommended CBR of 1 was used for the analysis as moisture conditioning and compaction of the subgrade are not included as part of the rehabilitation option. The geotechnical investigation included CBR tests on the existing aggregate base material. As different types of existing aggregate base material were encountered on the runway pavement section, the report provided different CBR values, which were used in the analysis. The material types and associated CBR values for the existing aggregate base are as follows:

- Brown Clayey Sand with Gravel CBR = 12 and 27;
- Brown Silty Gravel with Sand CBR = 50;
- Brown Silty Sand with Gravel CBR = 50.

FAARFIELD Pavement Design Modeling

Based on the findings of the geotechnical analysis, the pavement design for the rehabilitation was evaluated using the following parameters:

- Subgrade CBR value of 1 per the geotechnical report;
- Pavement design life of 10 years (as this was modeled as a rehabilitation);
- Fourteen inches of recycled base (existing aggregate base blended with pulverized asphalt concrete) section modeled using a User Defined layer;
- A layer of additional P-209 Crushed Aggregate Base; and
- A layer of P-401 Asphalt Concrete surface course.
- 10-year design life (typical for rehabilitation).

As three values of CBR for the existing aggregate base were provided, three design models were run as different pavement sections could be constructed within the runway limits. The CBR values were converted into elastic moduli using the formula provided in Chapter 2.5.3 by FAA Advisory Circular 150/5320-6F as follows:

$$E\ [psi] = 1{,}500 \times CBR \qquad \textit{(Equation 1)}$$

In compliance with paragraph 2.5.6.3 of the abovementioned Advisory Circular, the maximum modulus used for the analysis of the aggregate base was 50,000 psi.

The table below details the pavement thicknesses obtained for the pavement rehabilitation option with the different CBR values for the existing aggregate base. FAARFIELD design sheets for rehabilitation are included in the analysis (*Attachment 3*).

Pavement Thicknesses at CBR values of existing aggregate base

	CBR of Existing Aggregate Base		
	12	27	50
Asphalt Concrete P-401	4”	4”	4”
Crushed Aggregate Base P-209	18”	12.5”	11”
Existing Recycled Base	14”	14”	14”

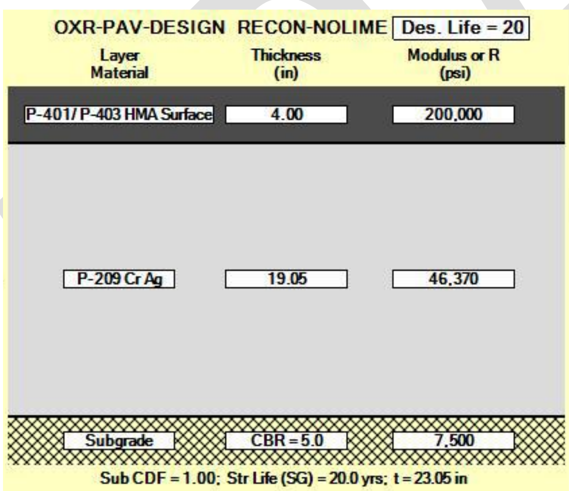
RUNWAY 7-25 IMPROVEMENT – PAVEMENT RECONSTRUCTION OPTION

The subsequent analysis included the reconstruction option of the runway pavement. For the reconstruction option, the higher CBR values of 5 and 8 can be used as the subgrade can be moisture conditioned and recompacted in accordance with the P-152 Specification. However, based on the high moisture content results of the in-place subgrade, obtaining the required compaction and moisture limits may not be feasible or economical. A lime/cement treatment may be necessary to allow compaction of the subgrade as well as for constructability purposes. A lime or cement treatment will be determined based on the depth of recycled base and native material stabilized. For the purpose of this report, a lime treatment will also be considered. The two cases of the pavement design (with and without lime-treated subgrade) were analyzed to assess differences between the reconstruction methods.

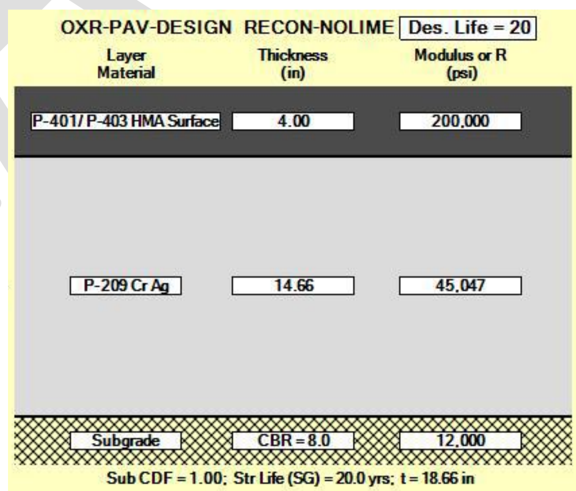
FAARFIELD Pavement Design Modeling

- Alternative 1:
  The reconstruction without a lime-treated subgrade was modeled using the following parameters:
  - Subgrade CBR values of 5 and 8 as recommended by the Geotechnical report; two pavement designs were prepared for the two CBR values;
  - P-209 Crushed Aggregate Base;
  - P-401 Asphalt Concrete Surface Course; and
  - Standard 20-year design life.

  When the pavement design is run using a CBR of 5, the pavement section consists of 4 inches of P-401 over 19 inches of P-209. For a CBR of 8, the proposed pavement section included 4 inches of P-401 over 15 inches of P-209. The figures below show the two pavement sections designed with different CBR values.



Pavement Design CBR = 5



Pavement Design CBR = 8

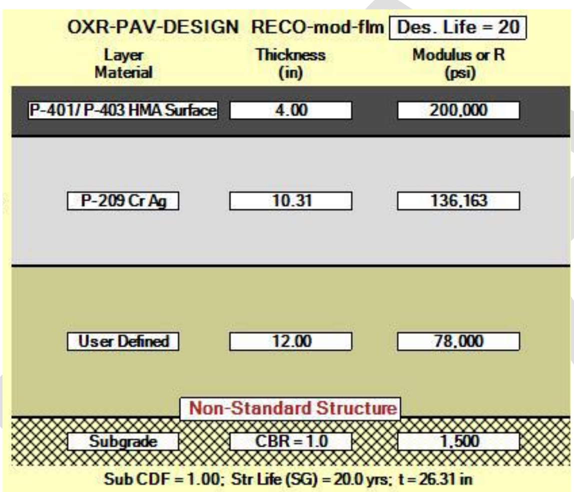
- Alternative 2:
  The reconstruction with a lime-treated subgrade was modeled in accordance with paragraph 3.13.5 of FAA Advisory Circular 150/5320-6F. The lime-treated subgrade was modeled using a "User Defined" layer having thickness equal to the depth of stabilization and elastic modulus calculated through *Equation 1* from the CBR values obtained from the geotechnical analysis. Based on the finding of the geotechnical analysis, a CBR value of 52 was chosen for the lime-treated subgrade (E = 78,000 psi). The value of 52 corresponds to a lime treated section consisting of 5% lime. A

subgrade CBR value of 1 was used in this case, corresponding to the natural subgrade condition in-place. The geotechnical report recommends thicknesses between 12 inches and 16 inches for the lime treatment of the subgrade; both limits were analyzed as part of this study.

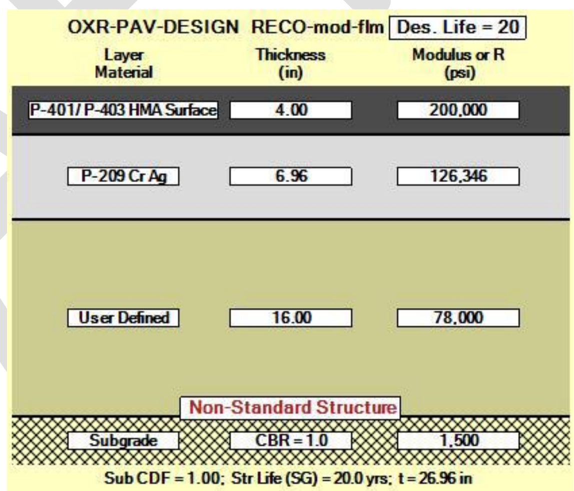
In summary, the following parameters were used for the pavement design with lime-treated subgrade:

- Subgrade CBR value of 1;
- User Defined layer of varying thickness (12 inches or 16 inches) having an elastic modulus of 78,000 psi;
- P-209 Crushed Aggregate Base;
- P-401 Asphalt Concrete Surface Course; and
- Standard 20-year design life.

If a thickness of 12 inches is used for the lime-treated subgrade, the pavement section consists of 4 inches of asphalt concrete over 10.5 inches of crushed aggregate base. A design evaluation using a thickness of 16 inches results in a pavement section consisting of 4 inches of asphalt concrete over 7 inches of crushed aggregate base. The figures below show the two pavement sections designed with different lime-treated subgrade depth. FAARFIELD design sheets for reconstruction are attached to this analysis (*Attachment 4*).



Lime-treated Section 12 inches



Lime-treated Section 16 inches

CONCLUSIONS

Two pavement improvements options were analyzed in this report along with variables that can affect the ultimate pavement section. The table below is a summary of the pavement thicknesses and layers obtained from the study.

	REHABILITATION			**RECONSTRUCTION**			
	RAB CBR 12	*RAB CBR 27*	*RAB CBR 50*	*W/o Lime Treatment*		*W/ Lime Treatment*	
Asphalt Concrete, P-401	4”	4”	4”	4”	4”	4”	4”
Crushed Aggregate Base, P-209	18”	12.5”	11”	19”	15”	10.5”	7”
Recycled Aggregate Base (RAB)	14”	14”	14”	----	----	----	----
Lime Treated Subgrade	----	----	----	----	----	12”	16”
Subgrade CBR	1	1	1	5	8	1	1

Based on the results of the analysis, for the runway rehabilitation option it will be necessary to add to the existing runway section at least 15 inches of new pavement section materials. Grade changes will require additional electrical improvements and infrastructure replacement. Furthermore, the rehabilitation will not resolve the inconsistency in subgrade moisture content and may present unknown constructability and stability issues leading to additional costs to remedy during construction. Additionally, the rehabilitation option may not correct non-compliant 13A runway characteristics within the runway limits in an economical manner. For these reasons, a rehabilitation of Runway 7-25 is not recommended.

For the reconstruction option, pavement sections with and without a lime-treated subgrade were analyzed. Based on the findings of the geotechnical investigation, the existing condition of the subgrade varies considerably depending on the location on the pavement and shows high variability in the in-situ moisture content values. Without a stabilization, the subgrade will have to be dried and recompacted below subgrade elevation to meet design requirements for moisture content and compaction requirements. Given the high moisture content in some areas and the overall high variability of moisture content, the drying period of the subgrade will be extensive and may not be practical, in which case the use of a stabilization process may ultimately be required and cause additional delays and increased construction costs.

For the reasons stated above, the use of a lime stabilization process for the subgrade is recommended (Rehabilitation Option, Alternative 2). The lime-treated subgrade will provide a uniform subgrade on which the pavement section can then be constructed. The uniformity of the subgrade will promote a homogeneous deterioration of the pavement in time. The 16-inch lime-treated section is recommended as it will not only allow the minimum crushed aggregate base thickness and reduce the amount of earthwork but will also allow part of the existing aggregate base to be incorporated, which will increase the subgrade strength.

To further support the reconstruction option including the 16-inch stabilized subgrade, the Consultant prepared a detailed cost estimate for the recommended alternative as well as the rehabilitation option as summarized in the table below. The itemized cost estimate for the recommended option is included as *Attachment 5.*

DESIGN OPTION	TOTAL PROJECT COST (Based on 2019 Cost Data)
Reconstruction Option – Alternative 2 (16 inches lime-treated section) - Recommended	$11,880,275.00
Rehabilitation Option	$15,746,875.00

In conclusion, the Consultant recommends that the pavement improvement on Runway 7-25 be a reconstruction with the following proposed pavement section:

- 4 inches of Asphalt Concrete, P-401;
- 7 inches of Crushed Aggregate Base, P-209; and
- 16 inches of Lime-treated Subgrade, P-155.

Please note, the runway safety area limits between the edge of pavement out to the 250-foot limit are flatter than the FAA recommended slopes. Due to a programmed taxiway reconstruction project and possible relocation/reorientation of the taxiway connectors, this project and costs presented in this analysis include FAA-compliant slopes and gradients within 10 feet of the runway edge of pavement limits (or 60 feet from the runway centerline).

Attachments:

1. *Earth Systems Pacific Draft Geotechnical Report, February 6, 2019*
2. *Oxnard Airport Draft Forecast, 2018*
3. *FAARFIELD Pavement Design - Rehabilitation Option*
4. *FAARFIELD Pavement Design – Reconstruction Option*
5. *Probable Estimate of Project Cost for recommended option (Reconstruction Option, Alternative 2)*

Attachment 1 : Earth Systems Pacific Draft Geotechnical Report, 2019

GEOTECHNICAL ENGINEERING REPORT
OXNARD AIRPORT
RUNWAY AND TAXIWAY CONNECTOR
REHABILITATION/RECONSTRUCTION
OXNARD, CALIFORNIA
MEAD & HUNT, INC. PROJECT NO. 3138400-181115.01

February 6, 2019

Prepared for

Mr. Jeff Leonard, PE
Associate Practice Leader
Aviation Services
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February 6, 2019

FILE NO.: 302524-001

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PROJECT: OXNARD AIRPORT
RUNWAY AND TAXIWAY CONNECTOR REHABILITATION/RECONSTRUCTION
OXNARD, CALIFORNIA
MEAD & HUNT, INC. PROJECT NO. 3138400-181115.01

SUBJECT: Geotechnical Engineering Report

CONTRACT REFERENCE: Service Work Order No. 1 by Mead & Hunt, Inc., Referencing Proposal to Provide a Geotechnical Engineering Investigation and Recommendations, Oxnard Airport, Runway and Taxiway Connector Rehabilitation / Reconstruction, Oxnard, California, by Earth Systems Pacific, Doc. No. 1804-100.PRP, dated April 26, 2018

Dear Mr. Leonard:

As per the referenced Service Work Order, this geotechnical engineering report has been prepared for use in the design of the Runway and Taxiway Connector Rehabilitation/Reconstruction Project at Oxnard Airport in Oxnard, California. Boring logs and a boring location map, results of laboratory testing, and conclusions regarding CBR testing, earthwork shrinkage, and subsurface water and soil moisture contents are provided. Two paper copies and a digital copy of this report are furnished for your use.

We appreciate the opportunity to have provided geotechnical services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Earth Systems Pacific

DRAFT

Fred J. Potthast, GE
Principal Engineer

Doc. No.: 1901-103.SER.REV/cr

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APPENDICES

1.0 INTRODUCTION

This geotechnical engineering report has been completed for the client's use in the development of a preliminary pavement design for Runway 7-25 and Taxiway Connectors A through E at Oxnard Airport in Oxnard, California. Previous investigations of the pavement on the Airport were provided by this firm (ESP 2015) and by Miller Geosciences, Inc. (Miller 2014). The runway and taxiways are in regular use. Based on those reports, the existing pavement sections are known to consist of varying thicknesses of asphalt concrete (AC) over varying thicknesses of aggregate base (AB).

In general, this report contains logs of the subsurface conditions encountered in our exploratory borings, the results of laboratory tests, and conclusions regarding CBR testing, earthwork shrinkage, and subsurface water and soil moisture contents. We understand that this report, and the previous investigations, will be used by the client and the owner to determine if rehabilitation or reconstruction of the runway and taxiway connectors will be necessary.

2.0 SCOPE OF SERVICES

The scope of work for this geotechnical engineering report included a general site reconnaissance, subsurface exploration, laboratory testing of soil samples, engineering evaluation of the data collected, and the preparation of this report. The investigation and subsequent recommendations were based on information and base maps provided by the client.

The report and recommendations are intended to be in general accordance with AC 150/5320-6F (FAA 2016), the client's requested work scope, and common geotechnical engineering practice in this area under similar conditions at this time. The tests were performed in general conformance with the standards noted, as modified by common geotechnical practice in this area under similar conditions at this time.

It is our intent that this report be used exclusively by the client to determine if rehabilitation or reconstruction of the runway and taxiway connectors will be necessary. The information may also be used to develop plans for future projects, however no specific are planned at this time. Application beyond these intents is strictly at the user's risk. As there may be geotechnical issues yet to be resolved, the geotechnical engineer should be retained to provide consultation as the project progresses, to assist in verifying that pertinent geotechnical issues have been addressed and to aid in conformance with the intent of this report. In the event this report is used to develop project plans, it may also be advantageous to retain the geotechnical engineer to review the grading and drainage plans as they near completion to further aid in conformance of the plans with the intent of this report.

This report does not address issues in the domain of the contractor such as, but not limited to, site safety, excavatability, shoring, temporary slope angles, construction methods, etc. Analysis of site geology and of the soil for corrosive potential, radioisotopes, asbestos (either naturally occurring or in man-made products), lead or mold potential, hydrocarbons, or other chemical properties are beyond the scope of this investigation. Ancillary features beyond the pavement areas covered by this report are also not within our scope and are not addressed.

In the event that there are any changes in the nature of the work scope, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing.

3.0 FIELD INVESTIGATION

On October 28 through November 1, 2018, a total of 40 borings were drilled on the runways and taxiways within the project area, during night-shift closure periods. The borings were drilled to a maximum depth of 10.0 feet below the existing pavement surfaces with a Mobile Drill rig, Model B-53, equipped with 6-inch outside diameter hollow stem auger and an automatic hammer for sampling. The approximate locations of the borings are shown on the Exploration Location Maps – Figures 1a and 1b, in Appendix A.

The boring locations, which were provided to us by the client, were identified and marked in the field during a site visit with airport staff on October 10, 2018. During the field meeting, the general areas of all requested boring locations were determined by airport staff to be clear of underground utility lines, with only slight adjustments in a few locations made to increase setback distances. A table with the actual boring locations identified by latitude and longitude, as determined using a Verizon Android Smartphone, is also included in Appendix A.

As the borings were drilled, soil samples were obtained using a 3-inch outside diameter ring-lined barrel sampler (ASTM D 3550-17 with shoe similar to D 2937-17) at approximate subgrade elevation. Standard penetration tests (SPT) using a 2-inch outside diameter split-spoon sampler were also performed in the borings (ASTM D 1586-11) from 5 to 6.5 feet and from 8.5 to 10.0 feet in each boring. Bulk samples were secured from the auger cuttings.

The pavement sections consisting at each boring location were noted by direct measurement of the material layers in the boring. The soils underlying the pavement sections were initially classified and logged in general accordance with the Unified Soils Classification System (ASTM D 2488-17). Final classifications of the soils in accordance with the Unified Soils Classification System (ASTM D 2487-17) were made following completion of laboratory testing. Copies of the boring logs and a boring log legend can also be found in Appendix A. In reviewing the boring logs and legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the soil characteristics as observed during drilling. These include, but are not limited to, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in soils descriptions that vary somewhat from the legend. Following completion of drilling, the borings were backfilled with cement-treated auger spoils and gravel, and then patched at the surface with cold-mix AC (Instant Road Repair by International Roadway Research).

4.0 LABORATORY INVESTIGATION

In situ moisture content and unit dry weight (ASTM D 2937-17, as modified for ring liners) were determined for the ring samples. Fourteen bulk samples were tested for the following: maximum density and optimum moisture (ASTM D 1557-12, modified), particle size distribution (ASTM D 422-63/07; D 1140-17), plasticity index (ASTM D 4318-17), and CBR (ASTM D 1883-16, for a range of moisture contents, with ASTM D 1557-12 as the reference standard for maximum density). Two additional bulk samples were tested for the same series of parameters, except that CBR testing was completed with the soils lime treated at 3, 5 and 7 percent by dry weight of soil at optimum moisture content only. One additional sample was tested for plasticity index (ASTM D 4318-17), and three additional samples were tested for particle size distribution (ASTM D 422-63/07; D 1140-17). Please refer to Appendix B for the laboratory test results.

5.0 GENERAL SUBSURFACE PROFILE

Variations in the thickness of the existing pavement sections were observed throughout the borings drilled in the project area.

The AC thicknesses found in the borings on the runway varied from 3 inches in Borings 4, 21 and 28, to 6.5 inches in Boring 8. The majority of the thicknesses measured in the other borings on the runway varied from 4 to 5.5 inches. The miscellaneous aggregate base (mAB) supporting the

AC on the runway varied from 8 inches in Borings 8 and 10, to as much as 17 inches found in Boring 28. The mAB on the runway consisted of clayey sand with gravel, silty sand with gravel, and silty gravel with sand.

On the connector taxiways, the borings encountered more uniform AC thicknesses of 4 to 5.5 inches, with one section (Boring 40) at 6 inches. The mAB thicknesses ranged from 3.5 inches in Boring 32, to 12 inches in Borings 37 and 38. The mAB on the connector taxiways consisted of silty sand with gravel, and silty gravel with sand.

The pavement sections found in each of the borings are noted on Figures 2a and 2b - Existing Pavement Section Thicknesses, in Appendix C.

Below the pavement sections, thin (4 to 8 inches) layers of loose to medium dense poorly graded sand fill were found, generally on the west side of the project area, in Borings 1 through 8, 31 through 34, and 36. Below the poorly graded sand, and below the pavement sections in all other borings, the underlying soil was fill consisting of sandy lean clay, silty sand and lean clay to depths ranging from 2 to 5 feet below the existing pavement surfaces. Variable amounts of gravel were noted in the fill. The silty sand fill in Boring 33 contained traces of AC fragments; in Boring 40 the silty sand fill was mixed with sandy lean clay. In general, the silty sands were medium dense, and the clays were medium stiff to very stiff.

Alluvium was found below the fill in all of the borings, to the maximum depth explored of 10 feet below the existing pavement surfaces. The alluvium consisted of very soft to medium stiff sandy lean clay, silt, and lean clay; a layer of loose silty sand was also found in the alluvium in Boring 25.

The soils were described during drilling as being slightly moist to very moist. Subsurface water was not encountered in any of the borings, to the maximum depth explored of 10 feet below the existing pavement surface. However, caliche deposits, a residual mineral in the soil indicating the past presence of subsurface water, were found at various depths in 32 of the 40 borings drilled for this project.

Please refer to the logs in Appendix A for a more complete description of the subsurface conditions found in the borings.

Figures 3a and 3b – USCS Soil Types at Subgrade, in Appendix C, is a summary of the soil types found at or within 1.5 feet of subgrade (i.e., below the pavement sections) in the borings. The poorly graded sand layers found directly below the pavement sections in Borings 1 through 8, 31 through 34, and 36, are also indicated on Figures 3a and 3b.

6.0 CONCLUSIONS

Existing Pavement Sections and Miscellaneous Aggregate Base

The existing pavement sections found in the borings on the runway were variable, with the thicknesses of the AC ranging from 3 inches to 6.5 inches. The miscellaneous aggregate base (mAB) supporting the AC on the runway varied from 8 inches to 17 inches; the thicker sections of mAB appeared to be more on the eastern end of the runway. On the connector taxiways, the borings encountered AC thicknesses of 4 to 6 inches, with the underlying mAB ranging from 3.5 inches to 12 inches.

The 4 to 8-inch layers of poorly graded sand found below Borings 1 through 8, 31 through 34, and 36, appeared to be leveling courses, and it is unclear if they were considered to be part of the overall pavement section when constructed. The material itself appeared to be beach sand.

The mAB found below the AC in all borings was not uniform and varied from clayey sand with gravel to silty sand with gravel. Comparison of the results (Appendix B) of grain size distribution tests completed on the mAB with gradation specifications for FAA P-209 material and Caltrans Class 2 aggregate base indicate that none of the four samples tested appeared to meet the gradation requirements. Therefore, for the purposes of this report, the material was classified as “miscellaneous aggregate base (mAB).”

CBR Test Results

The laboratory test results indicate variability of the CBR values of the soils based on their USCS type and on their moisture contents. The CBR test results have been summarized on Figures 4a, 4b, 5a and 5b in Appendix C, and the following paragraphs are a discussion regarding use of the data on the maps. Determinations of the actual CBR values and elastic modulus (E) values to be used in either the design for reconstruction of pavement, or the evaluation for rehabilitation of existing pavement, are to be made by the project engineer.

Per AC 150/5320-6F (FAA 2016), Chapter 2.5.3, for flexible pavements, the elastic modulus E can be estimated from CBR test results using the following correlation: E (psi) = 1500 x CBR.

Reconstructed Pavement over Existing Soils

In general, the laboratory CBR test results indicate variations in the strengths of the soils tested based on their density and their moisture content. Variations in the CBR values were noted when moisture contents were above or below optimum moisture content for most of the samples. The summary of CBR values provided in the following paragraph is based on the assumption that the subgrade soils will be recompacted to a moisture conditioned to the range extending from 2 percent below optimum moisture content to 2 percent above optimum moisture content.

If the subgrade soils are not maintained within this range, a reduction in the CBR value will occur. Assuming the CBR values provided in this report for pavement section reconstruction will be utilized for design, the project plans should fully indicate the relatively narrow moisture content range as a specification requirement, to allow the contractor to plan earthwork operations accordingly. Provisions should also be taken (e.g., proper surface drainage and flowlines away from edges of pavement, regular maintenance of the pavement surface to fill any cracks that develop, etc.) to ensure that the moisture contents of the subgrade soils remain within the design range for the design life of the pavement sections. As noted in the "Subsurface Water and Soil Moisture Contents" Section below, edge drains and centerline drains should be considered to help maintain soil moisture contents following construction.

For fully reconstructed conditions, where the existing pavement sections will be removed and the underlying soils can be moisture conditioned and recompacted, the CBR values of the subgrade soils can be increased in some areas from their *in situ* conditions. However, where the existing conditions are already very well compacted, a *decrease* in the CBR values could occur with moisture conditioning and recompaction to a lesser value than the existing conditions. The most important soil condition achieved with complete reconstruction will be uniformity of subgrade moisture and density. Per FAA AC 150/5320-6F, the degree of relative compaction required at subgrade for any pavement areas where complete reconstruction will be undertaken (and therefore the CBR value that can be used in the reconstruction design) is based on the cohesive/non-cohesive classification of the subgrade soils. With the exception of the silty sands found at or near subgrade in Borings 5, 6, 24, 28, 33, 35, 39 and 40, the soils encountered at the site are considered cohesive (plasticity index of 6 or greater). Per FAA AC 150/5320-6F, cohesive soils are required to be compacted at subgrade to a minimum of 95 percent of maximum dry density. Based on discussions with the client during development of the laboratory data, given the scattered and inconsistent nature of the silty sands, it was decided to consider all of the subgrade soils on the site as being cohesive, with a compaction standard of 95 percent of maximum dry density.

Figures 4a and 4b in Appendix C are summaries of the CBR values expected at the boring locations, based on the results of our laboratory testing and assuming the soils are compacted to a minimum of 95 percent of maximum dry density within 2 percent of optimum moisture content. After discussing the design parameters and construction considerations with the client, and reviewing the laboratory CBR test results, it is our opinion that the following "approximate average" CBR values should be used in the design of reconstructed pavements for the project:

- Runway 7-25, from Borings 11/12 to Borings 21-22 (see Maps 4A and 4B in Appendix C) – CBR = 5

- All other portions of Runway 7-25 and all Taxiway connectors – CBR = 8

Reconstructed Pavement over Lime Treated Soil

To provide better subgrade CBR values and reduce the design section where pavement will be fully reconstructed, lime treatment can be utilized. The existing pavement sections (asphalt concrete - AC and miscellaneous aggregate base - mAB) can also be pulverized/milled in place and mixed with the subgrade, to reduce or even eliminate off-haul and disposal from demolition, and to provide a stronger subgrade material than the native soils. Milled pavement section material should be thoroughly mixed with the native soils using disks or other suitable equipment, prior to shaping to provide the design crowned subgrade section. Final mixing of the materials after shaping will be completed during the lime treatment process by pugmills. Lime treatment of the native soils mixed with milled AC/mAB material will likely provide a superior subgrade material for support of new pavement, when compared to untreated native soils, or to lime treated native soils without milled AC/mAB.

Samples of the subgrade soils only (without milled AC/mAB) from Boring 5 and Boring 27 were tested for CBR value at optimum moisture content only, with lime treatment percentages of 3, 5 and 7 percent by dry weight of soil. Based on the laboratory test results, the approximate CBR values provided in Tables 1 and 2 were determined for the samples compacted to a minimum of 95 percent of maximum dry density. If utilized, the lime treated soil layer should be 12 to 16 inches thick. A thicker section may be appropriate for areas of the site where in situ soil moisture contents are well above optimum and construction equipment traffic may cause instability. The actual thickness of lime treated soil to be utilized should be determined by the engineer.

Table 1 - CBR #3 – Boring 5 at 2.0 to 4.0 Feet – Dark Brown Silty Sand – Lime Treated

Lime Treatment	Max. Density, pcf	95% Max. Dens., pcf	Approximate CBR
3 %	119.0	113.0	52
5 %	116.6	110.8	72
7 %	114.9	109.2	62

Table 2 - CBR #6 – Boring 27 at 2.0 to 4.0 Feet – Dark Brown Sandy Lean Clay – Lime Treated

Lime Treatment	Max. Density, pcf	95% Max. Dens., pcf	Approximate CBR
3 %	115.6	109.8	37
5 %	113.3	107.6	52
7 %	114.0	108.3	62

CBR Values for Existing Miscellaneous Aggregate Base (mAB)

Samples of the miscellaneous aggregate base (mAB) from four of the borings were tested for CBR in the laboratory. As discussed with the client, considering its variability, it was decided that the mAB material was not consistent enough to be able to assume with any certainty that it would be capable of being compacted to 100 percent of maximum dry density with a reasonable amount of effort. The approximate CBR values in Table 3 were determined for the four samples of mAB material compacted to a minimum of 95 percent of maximum dry density within two percent of optimum moisture content. Per AC 150/5320-6F (FAA 2016), Chapter 2.5.6.3, a *maximum* elastic modulus (E) value of 50,000 psi (CBR = 33) is recommended for the mAB material.

Table 3 – CBR Vales of Existing Misc. Aggregate Base (mAB) below Existing AC

CBR No.	Soil Type (USCS)	Found in Borings	CBR
4	Brown Clayey Sand with Gravel (SC)	1 through 8	12
15	Brown Clayey Sand with Gravel (SC)	17 through 24	27
16	Brown Silty Gravel with Sand (GM)	25 through 30	50
17	Brown Silty Sand with Gravel (SM)	9 through 16, and 31 through 40	50

<u>Rehabilitation of Existing Pavements</u>

Figures 5a and 5b in Appendix C show the estimated CBR values of the subgrade soils at each boring location, based on their existing density and moisture contents, and on the results of the laboratory CBR tests. Note that in 26 of the 40 borings, the existing soil moisture contents and/or densities were beyond the range of the data from the laboratory CBR tests; those locations are marked on the map with an asterisk. Where the CBR information appeared to follow a trend line beyond the data range, a rough estimate of the CBR value was provided. Where the soil moisture contents and/or density values were well out of the data range or did not appear to follow a trend line, no CBR value was provided. After reviewing the design parameters and construction considerations with the client, reviewing the laboratory CBR test results, and considering the variability of the in situ moisture and site density test results, it is our opinion that a CBR value of only 1 or 2 should be used for the subgrade in its existing condition when evaluating the potential for rehabilitation of the existing pavement.

As noted in the "Subsurface Water and Soil Moisture Contents" Section below, edge drains and centerline drains should be considered to help maintain soil moisture contents following construction.

Swelling Soils

AC 150/5320-6F (FAA 2016) Chapter 3.10.1 describes the effects that swelling soils have on airport pavements, and recommends various treatments (removal and replacement, stabilization, modified compaction efforts and adequate drainage) to reduce the potential for damage to pavements due to swelling soils.

Chapter 3.10.2 (FAA 2016) indicates swelling soils "usually have liquid limits above 40 and plasticity indexes above 25." Only one soil type, the brown sandy fat clay (CH) found in Boring 39 from 2.0 to 5.0 feet, meets these criteria; the test results for this material were a liquid limit of 55 and a plasticity index of 40.

Chapter 3.10.3 (FAA 2016) indicates soils with a swell of greater than 3 percent when tested for CBR require treatment to reduce the potential for damage to pavements. The following samples exhibited a swell of greater than 3 percent when tested for CBR value:

- CBR #7 – Boring 23 from 3.5 to 5.0 feet. Expansion values ranged from 3.0 to 5.8 percent after soaking for the samples compacted at 3 percent below optimum moisture content only. Samples compacted at optimum and at 3 percent above optimum exhibited expansion values of 0.5 percent or less after soaking.

- CBR #14 – Boring 39 from 2.0 to 5.0 feet. Expansion values ranged from 3.3 to 5.3 percent after soaking for the samples compacted at 3 percent below optimum moisture content only. One sample compacted at optimum moisture content experienced 3.1 percent expansion after soaking; the other two samples compacted at optimum moisture content exhibited expansion values of 2.0 percent or less. All three samples compacted at 3 percent above optimum exhibited expansion values of 2.2 percent or less after soaking.

Chapter 3.10.1 (FAA 2016) states "Local experience and judgment should be applied in dealing with swelling soils to achieve the best results." It is our understanding that the pavement at Oxnard Airport does not exhibit pervasive evidence of damage due to swelling soils, i.e., significant edge cracking or random surface unevenness. In our opinion, the material found in Boring 23 (CBR #7) from 3.5 to 5.0 feet does not exhibit enough of the characteristics to be considered a swelling soil that should be accounted for in the design process. However, the fat clay soil found in Boring 39 from 2.0 to 5.0 feet *is* considered a swelling soil, and it should be considered in the design process. This material was only found in one boring, therefore its presence on the site is likely limited.

If the engineer elects to lime treat all of the native soils for a reconstruction process, per Table 3-1 "Recommended Treatment of Swelling Soils" (FAA 2016), the lime treatment will neutralize the swelling soils, and no additional action would be necessary. If reconstruction is planned *without* lime treatment, the most reasonable course of action, again per Table 3-1 "Recommended Treatment of Swelling Soils" (FAA 2016), would probably be to remove the fat clay soils to a depth of at least 36 inches below the pavement section and replace with non-swelling soil. If the existing pavements are rehabilitated without reconstruction, the only option available to reduce the potential for damage would be to provide adequate surface and subsurface drainage, as described in the "Subsurface Water and Soil Moisture Contents" Section below, where the fat clay soils are present in the subgrade.

Earthwork Shrinkage

Soil volume loss, or "shrinkage", during earthwork can be attributed to three categories; soil loss due to stripping or demolition of existing improvements, subsidence of the underlying soils due to compaction, and shrinkage of fill soil as it is placed and compacted. These factors are partly due to the soil characteristics, but largely due to depths of cuts and fills, stripping techniques, type and weight of earthwork equipment, traffic pattern of earthwork equipment, and soil moisture at the time of grading.

In paved areas that are to be reconstructed, removal of distinct AC and AB layers can result in less loss than from removal of vegetation in unpaved areas, if any. The amount of soil loss that will occur is largely dependent upon how careful the contractor is in stripping and demolition/removal operations.

Subsidence of the site due to compaction of the soils below a fill area also occurs. Subsidence due to compaction is likely to be in the range of 0.1 to 0.2 feet. The main zone of subsidence is typically the upper two to three feet. Deeper subsidence is not expected as earthwork operations for pavement reconstruction are expected to be limited to the upper 1 to 2 feet in the project area.

To estimate shrinkage of the subgrade, *in situ* soil density data from ring samples taken in the borings at approximate subgrade elevation were analyzed. Appendix D contains a summary of the existing relative compaction at each depth where a ring sample was secured, as well as calculated shrinkage assuming final relative compaction values ranging from 95 to 100 percent.

As loss, subsidence, and shrinkage are only partly due to the soil characteristics, and are largely influenced by the earthwork equipment, earthwork methods, and soil moisture, these factors cannot be precisely estimated.

Subsurface Water and Soil Moisture Contents

Subsurface water was not encountered in any of the borings to the maximum depth drilled of 10 feet below the existing pavement surface. However, caliche deposits, a residual mineral in the soil indicating the past presence of subsurface water, were found at various depths in 32 of the 40 borings drilled for this project. Caliche is an indicator that significant soil moisture contents have been present in the past. If soil moisture contents are well above optimum in pavement areas to be reconstructed, the soils could become unstable under equipment traffic. Unstable conditions hinder compaction efforts and are not acceptable to support fill or pavement section placement. All grading areas should be firm and unyielding following compaction operations and prior to placement of fill, aggregate base or pavement.

Depending on the time of year that construction operations take place, the most effective methods to deal with unstable conditions due to high soil moisture could be scarification and aeration, or the use of geotextile stabilization fabrics. Scarification and aeration may only be possible if the weather conditions are clear and if the project schedule permits.

If the project schedule will not allow drying of the soil naturally, stabilization fabric could be typically utilized. Additional excavation below subgrade may also be needed before the stabilization fabric is placed; the depth of overexcavation should be determined by the geotechnical engineer based on conditions exposed at the time of construction. After all excavations are complete, and prior to placement of the geotextiles, the exposed surfaces are typically back-dragged to a smooth condition to the degree practicable with light earthwork equipment. Geotextile stabilization fabric (Mirafi RS580i or similar material) is typically placed in the excavated area and extended up the sidewalls of the excavation to within 2 inches of the bottom of the AC layer. Stabilization fabrics are rolled out along the long dimension of the reconstruction area (not perpendicular to it), and are stretched, overlapped and held in place according to the manufacturer's recommendations. Recycled subbase and/or imported aggregate base, per the overall pavement section design, is placed over the fabric in thin, moisture-conditioned lifts and compacted. Recycled subbase and/or aggregate base is placed by end-dumping on the fabric and spreading ahead of equipment; equipment traffic is typically not allowed to travel directly over the fabric. Initial lifts of subbase/base are spread and compacted by rubber-tired equipment; subsequent lifts are compacted using sheepsfoot and/or steel-drum equipment. Compaction equipment is usually operated in static mode only until base grade is reached, to reduce the potential for any free water in the underlying soils to be drawn through the fabric and into the subbase or aggregate base.

If it appears that stable conditions will not be created at base grade after the use of geotextiles, a layer of geogrid (Tensar TriAx TX-7 or similar material) can be placed according to the manufacturer's recommendations as additional reinforcement at the approximate mid-depth of the subbase/aggregate base layer. Often sufficient material may not be in place over the geotextile stabilization fabric at mid-depth of the design subbase/aggregate base layer to fully mobilize its strength characteristics and to determine if geogrid will be needed, therefore it may be necessary to construct a full-scale test strip of the pavement section, with and without geogrid reinforcement. This test strip will give an indication as to whether or not geogrids will be required in any reconstruction areas.

Figures 6a and 6b – Subgrade Soil Moisture Content in Appendix C show the soil moisture contents at the time of our field exploration, and percentage above (or below) optimum moisture content. The data show that in the majority of the boring locations, soil moisture contents were above optimum moisture content, with some in excess of 10 percent above optimum. As noted in the "CBR Test Results" Section of this report, the CBR values decrease significantly with increasing soil moisture contents. To reduce the potential for accumulated moisture in the subgrade and the subsequent loss of soil strength (CBR value), positive surface drainage away from all paved areas must be provided. Edge drains adjacent to the pavement areas and centerline drains within pavement areas are also recommended. The drains could consist of conventional geotextile-wrapped and gravel-filled trenches with perforated collection pipes, or prefabricated panel-type drainage systems that are placed in narrow trenches. The 3- to 4-inch diameter perforated collection pipes in conventional trenches have the advantage of being able to be fitted with cleanouts for system maintenance; however, this could be outweighed by the relatively low cost of a thin panel drain system, as gravel drains require excavation of wider trenches, trench spoil disposal, and gravel placement. The actual type of system to be utilized, if any, should be determined by the engineer. The drains should be placed, wherever practicable, to dewater the upper 2 to 3 feet of soil below the pavement sections.

Soil Erodibility

The site soils are considered to be erodible. It is essential that all surface drainage be controlled and directed to appropriate discharge points, and that surface soils, particularly those disturbed during construction, are stabilized by vegetation or other means during and following construction.

7.0 OBSERVATION AND TESTING

1. It must be recognized that the recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered. Therefore, the geotechnical engineer should be retained to provide consultation during the design phase, to review plans as they near completion, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

2. At a minimum, the following should be provided by the geotechnical engineer during construction:

    - Professional observation during grading
    - Oversight of special inspection during grading

3. Special inspection of grading should be provided as per the requirements of the FAA or Section 1705.6 and Table 1705.6 of the CBC; the soils special inspector should be under

the direction of the geotechnical engineer. Subject to approval by the building official or other jurisdiction, special inspection requirements should be addressed by the geotechnical engineer during the preconstruction meeting (see below) prior to the start of grading operations.

At a minimum, the following items should be inspected and/or tested by the special inspector:

- Stripping and clearing of vegetation and existing pavement where planned for removal
- Excavations to subgrade in any pavement reconstruction areas, and corrective operations (scarification/aeration or placement of geotextile stabilization fabric) in any unstable areas
- Excavations to subgrade in any pavement reconstruction areas and scarification, moisture conditioning, and recompaction in stable areas
- Fill, milled/pulverized AC (if any) and imported aggregate base quality, placement, moisture conditioning, and compaction
- Utility trench backfill

4. A program of quality control should be developed prior to beginning grading. The contractor or project manager should determine any additional inspection items required by the architect/engineer or the governing jurisdiction.

5. Locations and frequency of compaction tests should be as per the recommendation of the geotechnical engineer at the time of construction. The recommended test location and frequency may be subject to modification by the geotechnical engineer, based upon soil and moisture conditions encountered, size and type of equipment used by the contractor, the general trend of the results of compaction tests, or other factors.

6. A preconstruction conference among the owner, the geotechnical engineer, the governing agency, the special inspector, the project inspector, the architect/engineer, and contractors is recommended to discuss planned construction procedures and quality control requirements.

7. The geotechnical engineer should be notified at least 48 hours prior to beginning construction operations. If Earth Systems Pacific is not retained to provide construction observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising therefrom.

8.0 CLOSURE

Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project and under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the "Scope of Services" section. Application beyond the stated intent is strictly at the user's risk.

This report is valid for conditions as they exist at this time for the type of project described herein. The conclusions and recommendations contained in this report could be rendered invalid, either in whole or in part, due to changes in building codes, FAA regulations, standards of geotechnical or construction practice, changes in physical conditions, or the broadening of knowledge.

If changes with respect to development type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, this firm shall be notified for modifications to this report. Any items not specifically addressed in this report should comply with the FAA, the CBC and/or the requirements of the governing jurisdiction.

The preliminary recommendations of this report are based upon the geotechnical conditions encountered at the site and may be augmented by additional requirements of the engineer, or by additional recommendations provided by this firm based on conditions exposed at the time of construction.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems Pacific, the client, and the client's authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text.

TECHNICAL REFERENCES

ESP. (Earth Systems Pacific). December 31, 2015. Geotechnical Engineering Report, Taxiway and Apron PCN Calculations, Oxnard Airport, Oxnard, California. Mead & Hunt, Inc., Project No. 3138400-150628.01

FAA. (U.S. Department of Transportation Federal Aviation Administration). November 10, 2016. Advisory Circular (AC) 150/5320-6F. Airport Pavement Design and Evaluation.

Miller. (Miller Geosciences, Inc.). August 28, 2014. Preliminary Geotechnical Explorations, Proposed Improvements, Oxnard Airport Runway, 2889 West 5th Street, Oxnard, California.

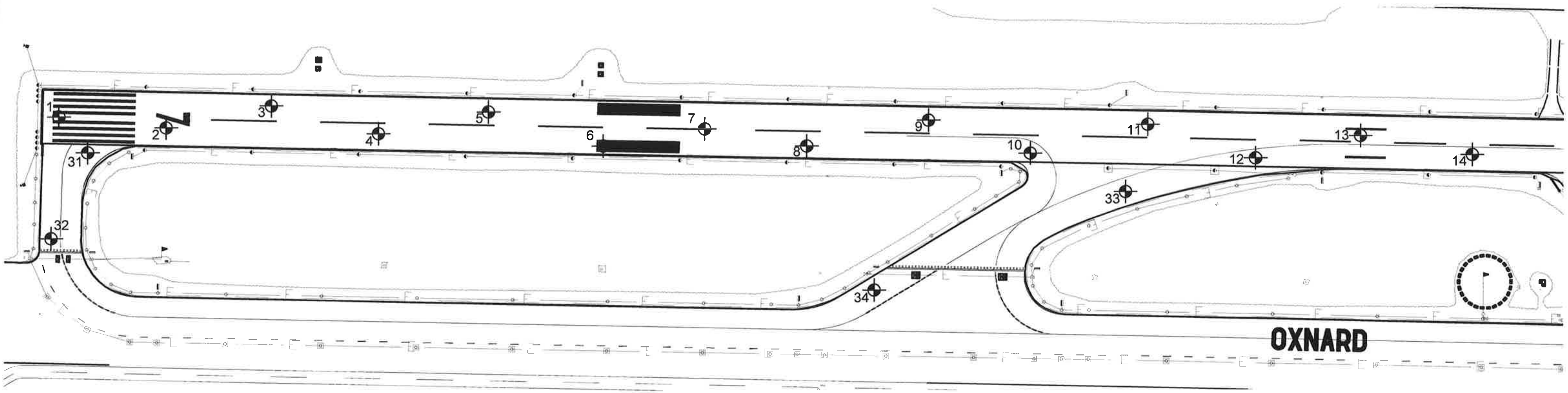
APPENDIX A

Figures 1a and 1b – Exploration Location Maps

Table 1 - Boring Locations by Latitude and Longitude

Boring Log Legend

Boring Logs



LEGEND

40 Boring Location (Approx.)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

NOT TO SCALE

Earth Systems Pacific
4378 Old Santa Fe Road, San Luis Obispo, CA 93401
www.earthsystems.com
(805) 544-3276 • Fax (805) 544-1786

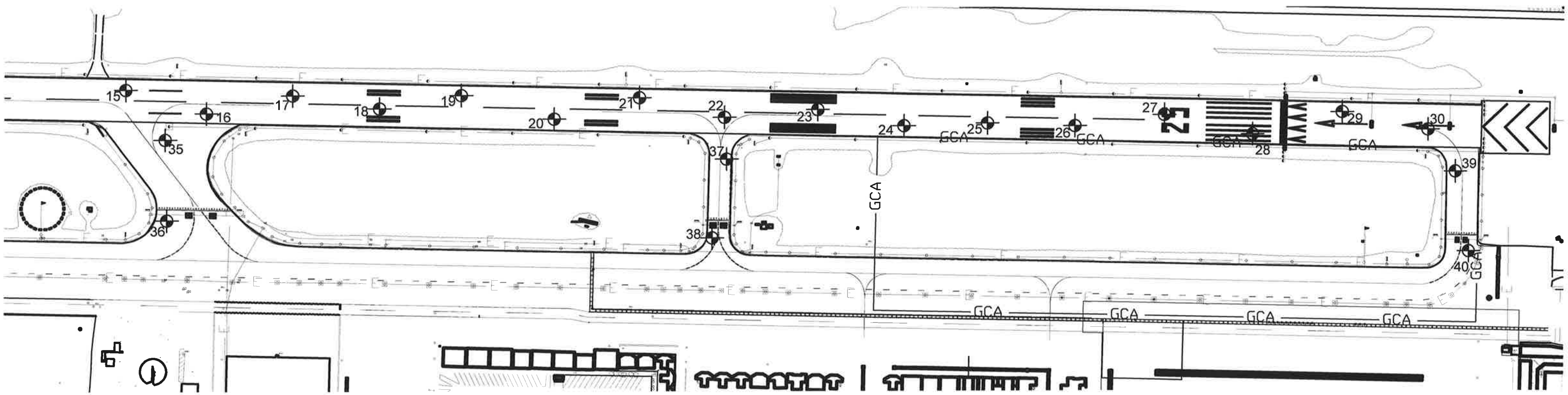
FIGURE 1A - EXPLORATION LOCATION MAP
Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 1 of 2

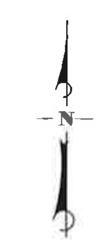
OXNARDAIRPORT110518maps



LEGEND

40 Boring Location (Approx.)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC



NOT TO SCALE

Earth Systems Pacific
4378 Old Santa Fe Road, San Luis Obispo, CA 93401
www.earthsystems.com
(805) 544-3276 • Fax (805) 544-1786

FIGURE 1B - EXPLORATION LOCATION MAP
Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 2 of 2

OXNARDAIRPORT110518maps

BORING LOCATIONS BY LATITUDE AND LONGITUDE

Boring No.	Latitude	Longitude
1	34.20089	-119.21698
2	34.20090	-119.21639
3	34.20094	-119.21567
4	34.20078	-119.21501
5	34.20091	-119.21436
6	34.20079	-119.21373
7	34.20087	-119.21302
8	34.20077	-119.21245
9	34.20088	-119.21170
10	34.20071	-119.21107
11	34.20092	-119.21040
12	34.20075	-119.20971
13	34.20086	-119.20908
14	34.20677	-119.20847
15	34.20087	-119.20775
16	34.20081	-119.20710
17	34.20082	-119.20640
18	34.20079	-119.20576
19	34.20091	-119.20508
20	34.20077	-119.20449
21	34.20087	-119.20377
22	34.20075	-119.20392
23	34.20084	-119.20245
24	34.20074	-119.20182
25	34.20076	-119.20116
26	34.20076	-119.20049
27	34.20081	-119.19983
28	34.20072	-119.19908
29	34.20082	-119.19847
30	34.20075	-119.19784
31	34.20070	-119.21687
32	34.20026	-119.21700
33	34.20058	-119.21054
34	34.20005	-119.21200
35	34.20053	-119.20737
36	34.19999	-119.20740
37	34.20053	-119.20316
38	34.20002	-119.20325
39	34.20045	-119.19760
40	34.19996	-119.19747

Earth Systems Pacific

BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	
STANDARD PENETRATION TEST (SPT)	
SHELBY TUBE	
BULK	
SUBSURFACE WATER DURING DRILLING	
SUBSURFACE WATER AFTER DRILLING	

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS	MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
		SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS	HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS

BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER	
0-10	0-16	LOOSE
11-30	17-50	MEDIUM DENSE
31-50	51-83	DENSE
OVER 50	OVER 83	VERY DENSE

FINE GRAINED SOILS

BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER	
0-2	0-3	VERY SOFT
3-4	4-7	SOFT
5-8	8-13	MEDIUM STIFF
9-15	14-25	STIFF
16-30	26-50	VERY STIFF
OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING			
	# 200	# 40	# 10	# 4	3/4"	3"	12"
SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
FRESH	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
INTENSELY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend121714.dwg

Earth Systems Pacific

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

Boring No. 1
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JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		4" AC over 9" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP	+/- 4" POORLY GRADED SAND: brown, medium dense, moist (Fill)	0.5 - 1.0	Grab Sample			
2	SM	SANDY LEAN CLAY: dark brown, stiff, moist	1.0 - 2.5	Ring Sample	119.4	13.4	6, 9, 10
4			2.0 - 5.0	Grab Sample			
5	SM	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	SPT			3, 2, 2
7.5	ML	SILT: brown, very soft, moist,trace caliche	8.5 - 10.0	SPT			0, 0, 2
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

PAGE 1 OF 1
JOB NO.: 302524-001
DATE: 11/1/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4.5" AC over 10" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP		+/- 8" POORLY GRADED SAND: brown, loose, moist (Fill)	0.5 - 1.0	Grab Sample			
2	CL		SANDY LEAN CLAY: dark brown, very stiff, moist	1.5-3.0	Ring Sample	121.1	13.8	6 13 16
4				2.0 - 4.0	Grab Sample			
5	CL		SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	SPT			3 2 2
8.5				8.5 - 10.0	SPT			0 1 2
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3

PAGE 1 OF 1

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		3.5" AC over 12" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP	+/- 6" POORLY GRADED SAND: brown, loose, moist (Fill)	0.5 - 1.5	Grab Sample			
2	CL	SANDY LEAN CLAY: dark brown, very stiff, moist	1.5 - 3.0	Ring Sample	116.9	14.2	6, 12, 16
4	CL	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	2.0 - 4.0	Grab Sample			
5			5.0 - 6.5	SPT			2, 1, 2
7	ML	SILT: brown, very soft, moist					
8.5			8.5 - 10.0	SPT			1, 1, 1
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		3" AC over 14" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)					
2	CL	SANDY LEAN CLAY: dark brown, stiff, very moist	1.5 - 3.0	Ring Sample	116.2	16.1	5 8 9
4			2.0 - 5.0	Grab Sample			
5	CL	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	SPT			1 1 2
8			8.5 - 10.0	SPT			0 1 2
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 5
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JOB NO.: 302524-001
DATE: 11/1/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4.5" AC over 12" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	0.5 - 1.5	Grab Sample			
2	SM		SILTY SAND: dark brown, medium dense, moist	1.5 - 3.0	Ring Sample	118.3	14.5	4, 12, 12
4				2.0 - 4.0	Grab Sample			
4	CL		SANDY LEAN CLAY: brown, very soft, moist, trace caliche deposits (Alluvium)	5.0 - 6.5	SPT			1, 1, 1
8.5			very moist, trace clay	8.5 - 10.0	SPT			0, 1, 1
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 6

PAGE 1 OF 1

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 12" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	1.5 - 3.5	Grab Sample			
2	SM		SILTY SAND: dark brown, medium dense, moist	1.5 - 3.0	Ring Sample	121.5	13.3	7, 9, 10
4	CL		SANDY LEAN CLAY: brown to light brown, soft, moist, trace caliche deposits (Alluvium)	5.0 - 6.5	SPT			1, 1, 2
8.5			gray/brown mottled, very soft, trace clay	8.5 - 10.0	SPT			0, 1, 1
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

Boring No. 7

JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

SOIL DESCRIPTION

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		6" AC over 12" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	0.5 - 1.5	Grab Sample			
1.5	CL	SANDY LEAN CLAY: dark brown, very stiff, moist	1.0 - 2.5	Ring Sample	121.9	13.3	8, 11, 9
			2.0 - 3.5	Grab Sample			
4	CL	SANDY LEAN CLAY: brown, soft, moist, (Alluvium)	5.0 - 6.5	SPT			0, 1, 2
8.5		very soft	8.5 - 10.0	SPT			0, 0, 1
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 8

PAGE 1 OF 1

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		6.5" AC over 12" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1.5	SP	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)					
2	CL	SANDY LEAN CLAY: dark brown, stiff, slightly moist	1.0 - 2.5	Ring Sample	118.1	4.7	13 15 9
3.5	CL	SANDY LEAN CLAY: brown, very soft, moist, trace caliche (Alluvium)	2.0 - 5.0	Grab Sample			
			5.0 - 6.5	SPT			0 1 1
8.5		brown/gray mottled, soft, very moist, trace clay	8.5 - 10.0	SPT			0 2 1
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample · Grab Sample · Shelby Tube Sample · SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 9

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 11" Brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5	CL		SANDY LEAN CLAY: dark brown, medium stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	102.6	19.7	7 5 6
				1.5 - 3.0	Grab Sample			
3	CL		SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)	3.0 - 5.0	Grab Sample			
5			very soft	5.0 - 6.5	SPT			0 1 1
6			gray/brown mottled					
8.5				8.5 - 10.0	SPT			0 0 2
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Boring No. 10
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JOB NO.: 302524-001
DATE: 10/31/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			10" AC over 8" Brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5	CL		SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	Ring Sample	115.0	13.6	5 10 11
				1.5 - 2.5	Grab Sample			
2.5	CL		LEAN CLAY: brown, soft, moist (Alluvium)	2.5 - 4.0	Grab Sample			
5			caliche deposits	5.0 - 6.5	SPT			1 2 2
8.5			gray/brown mottled, very soft, very moist	8.5 - 10.0	SPT			0 1 1
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 11

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LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4.5" AC over 12" Brown SILTY SAND with GRAVEL (misc. AB)					
1.5	CL		SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	Ring Sample	104.0	21.5	4 6 8
				2.0 - 4.0	Grab Sample			
4	CL		SANDY LEAN CLAY: brown/light brown mottled, very soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			0 0 1
8.5			very moist, trace clay	8.5 - 10.0	SPT			0 1 0
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 12

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JOB NO.: 302524-001
DATE: 10/31/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./ RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 - 1.3			4" AC over 16" Brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5 - 4.0	CL		SANDY LEAN CLAY: dark brown, stiff, moist, trace caliche (Fill)	1.5 - 3.0	Ring Sample	95.5	24.8	3 7 9
				2.0 - 4.0	Grab Sample			
4.0 - 10.0	CL		SANDY LEAN CLAY: brown/light brown mottled, soft, moist (Alluvium)	5.0 - 6.5	SPT			0 2 2
			brown/gray mottled, very soft, very moist	8.5 - 10.0	SPT			1 1 1
10.0			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 13

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 - 1.5		5" AC over 14" brown SILTY SAND with GRAVEL (misc. AB)					
1.5 - 4	CL	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	101.2	22.0	5 7 12
			2.0 - 4.0	Grab Sample			
4 - 10	CL	SANDY LEAN CLAY: brown/light brown mottled, soft, moist (Alluvium)	5.0 - 6.5	SPT			1 1 2
		very soft	8.5 - 10.0	SPT			1 1 1
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 14

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		4.5" AC over 12" brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5	CL	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	102.5	22.0	3, 6, 10
			2.0 - 5.0	Grab Sample			
5	CL	SANDY LEAN CLAY: brown/light brown mottled, soft, moist, trace clay (Alluvium)	5.0 - 6.5	SPT			1, 1, 2
9		medium stiff	8.5 - 10.0	SPT			1, 2, 3
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 15

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECINSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 15" brown SILTY SAND with GRAVEL (misc. AB)					
1.5				1.5 - 3.0	Ring Sample	100.1	23.4	4 7 11
1.6	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)					
2.0				2.0 - 4.0	Grab Sample			
			caliche deposits					
5	CL		SANDY LEAN CLAY: brown/light brown mottled, very soft, moist (Alluvium)	5.0 - 6.5	SPT			1 1 1
8.5			soft	8.5 - 10.0	SPT			1 1 2
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 16

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 – 1.5		4" AC over 14" brown SILTY SAND with GRAVEL (misc. AB)					
1.5 – 4.5	CL	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	109.3	19.0	4, 7, 9
			2.0 - 4.0	Grab Sample			
4.5 – 10.0	CL	SANDY LEAN CLAY: brown, medium stiff, moist, trace caliche deposits (Alluvium)	5.0 - 6.5	SPT			1, 3, 4
		soft	8.5 - 10.0	SPT			1, 1, 2
10.0		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

Boring No. 17

JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4.5" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	104.8	20.8	3, 5, 9
				3.0 - 5.0	Grab Sample			
3	CL		SANDY LEAN CLAY: dark brown, medium stiff, moist (Alluvium)					
5			brown, soft	5.0 - 6.5	SPT			1, 1, 2
8.5			gray/brown mottled, medium stiff	8.5 - 10.0	SPT			0, 2, 4
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 18
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JOB NO.: 302524-001
DATE: 10/30/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)					
1.5	CL		SANDY LEAN CLAY: dark brown, medium stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	103.2	20.1	2, 4, 7
				2.5 - 5.0	Grab Sample			
2.5	CL		SANDY LEAN CLAY: dark brown, medium stiff, moist (Alluvium)					
5			soft, caliche deposits	5.0 - 6.5	SPT			1, 1, 2
8.5			gray/brown mottled, medium stiff	8.5 - 10.0	SPT			2, 3, 3
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

Boring No. 19

JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

SOIL DESCRIPTION

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 - 1.5		4" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5 - 3.5	CL	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	113.4	16.9	5 8 11
			1.5 - 3.5	Grab Sample			
3.5 - 8.5	CL	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			1 1 3
8.5 - 10.0		light brown, very soft	8.5 - 10.0	SPT			0 1 1
10.0		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 20
PAGE 1 OF 1
JOB NO.: 302524-001
DATE: 10/30/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 – 1.4			4" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)					
1.4 – 3.0	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	Ring Sample	111.7	17.6	3, 8, 11
3.0 – 5.0	CL		SANDY LEAN CLAY: brown, soft, moist (Alluvium)	3.0 - 6.0	Grab Sample			
5.0 – 8.5			caliche deposits	5.0 - 6.5	SPT			0, 1, 2
8.5 – 10.0			gray/brown mottled	8.5 - 10.0	SPT			1, 2, 3
10.0			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 21

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		3" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.3	CL	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	Ring Sample	119.5	13.9	4, 9, 15
			1.5 - 3.0	Grab Sample			
3	CL	SANDY LEAN CLAY: brown, very soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			0, 1, 1
8.5		gray/brown mottled, medium stiff	8.5 - 10.0	SPT			1, 2, 3
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 22

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/29/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4.5" AC over 16" brown CLAYEY SAND with GRAVEL (misc. AB)					
1.5	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	2.0 - 3.5	Ring Sample	114.0	17.6	4 / 7 / 10
				2.0 - 4.0	Grab Sample			
3.5			brown					
4	CL		SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			1 / 1 / 2
8.5			gray/brown mottled, medium stiff	8.5 - 10.0	SPT			1 / 2 / 3
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 23

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/29/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./REOCNSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			6" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5	CL		SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	Ring Sample	118.5	13.8	9, 12, 12
				1.5 - 3.5	Grab Sample			
3.5	CL		SANDY LEAN CLAY: brown, medium stiff, moist (Alluvium)	3.5 - 5.0	Grab Sample			
5			soft	5.0 - 6.5	SPT			1, 1, 2
6			light brown					
8.5			gray/brown mottled, medium stiff, caliche deposits	8.5 - 10.0	SPT			1, 2, 4
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 24
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JOB NO.: 302524-001
DATE: 10/29/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		5" AC over 12" brown CLAYEY SAND with GRAVEL (misc. AB)					
1.5	SM	SILTY SAND: yellow brown, medium dense, moist, trace gravel (Fill)	1.5 - 3.0	Ring Sample	107.2	5.6	7 10 10
			1.5 - 3.5	Grab Sample			
3.5	CL	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			1 2 2
			8.5 - 10.0	SPT			0 1 2
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Boring No. 25

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/28/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			5" AC over 14" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	Grab Sample			
				1.5 - 3.0	Ring Sample	106.3	19.0	4 6 7
1.6	CL		SANDY LEAN CLAY: dark brown, medium stiff, very moist (Fill)					
3	CL		SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	3.0 - 5.0	Grab Sample			
				5.0 - 6.5	SPT			0 2 2
5.5	SM		SILTY SAND: brown, loose, moist					
8	ML		SILT: brown, very soft, very moist, trace clay	8.5 - 10.0	SPT			0 0 1
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 26

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/28/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			5" AC over 15" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	Grab Sample			
2	CL		LEAN CLAY: gray brown, stiff, very moist (Fill)	2.0 - 3.5	Ring Sample	110.1	17.1	4 6 9
				2.0 - 4.0	Grab Sample			
				4.0 - 6.0	Grab Sample			
5	CL		SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	SPT			1 2 2
8			very soft, caliche deposits	8.5 - 10.0	SPT			0 1 1
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Boring No. 27

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/28/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		5.5" AC over 16" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	Grab Sample			
2	CL	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	2.0 - 3.5	Ring Sample	97.4	20.8	5 7 7
			2.0 - 4.0	Grab Sample			
5	CL	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			1 1 2
8.5		medium stiff	8.5 - 10.0	SPT			0 2 3
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 28

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LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/28/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 - 2			3" AC over 17" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	Grab Sample			
2 - 4	SM		SILTY SAND: brown, medium dense, slightly moist, trace gravel (Fill)	1.5 - 3.0	Ring Sample	122.5	4.9	8 / 11 / 11
				2.0 - 4.0	Grab Sample			
4 - 5	CL		SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)					
5 - 8.5			very soft	5.0 - 6.5	SPT			1 / 1 / 1
8.5 - 10			very moist	8.5 - 10.0	SPT			0 / 0 / 1
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Boring No. 29
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JOB NO.: 302524-001
DATE: 10/28/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 - 2			5.5" AC over 14" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	Grab Sample			
2 - 5	CL		SANDY LEAN CLAY: brown/gray mottled, stiff, moist (Fill)	1.5 - 3.0	Ring Sample	112.5	15.3	5 10 10
				2.0 - 5.0	Grab Sample			
5 - 10	CL		SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			1 1 1
			medium stiff	8.5 - 10.0	SPT			0 2 3
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Boring No. 30

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/28/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		4" AC over 14" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	Grab			
1.5	CL	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	Ring	112.2	14.7	6 7 9
			2.0 - 5.0	Grab			
5	CL	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			0 1 2
8	ML	SILT: gray/brown mottled, medium stiff, moist, caliche deposits	8.5 - 10.0	SPT			2 3 5
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 31

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LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 4" SILTY SAND with GRAVEL (misc. AB)	1.0 - 2.5	Ring Sample	110.6	17.2	5 6 11
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	2.0 - 5.0	Grab Sample			
2	CL		SANDY LEAN CLAY: dark brown, stiff, very moist					
5	CL		SANDY LEAN CLAY: brown, soft, moist, (Alluvium)	5.0 - 6.5	SPT			1 2 2
8.5			medium stiff, caliche deposits	8.5 - 10.0	SPT			1 2 5
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 32

PAGE 1 OF 1

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 11/1/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 3.5" SILTY SAND with GRAVEL (misc. AB)	1.0 - 2.5	Ring Sample	110.8	16.3	4 7 10
	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	2.0 - 5.0	Grab Sample			
	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)					
5	CL		SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	SPT			1 1 2
			medium stiff	8.5 - 10.0	SPT			1 3 3
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 33

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

JOB NO.: 302524-001
DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

SOIL DESCRIPTION

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION
0		5" AC over 5.5" SILTY SAND with GRAVEL (misc. AB)
	SP	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)
	SM	SILTY SAND: brown/dark brown mottled, medium dense, very moist, trace to some gravel, trace AC fragments (Fill)
	CL	SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)
		gray/brown mottled
		soft
10		End of Boring @ 10.0' No subsurface water encountered

SAMPLE DATA

INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
1.0 - 2.5	Ring Sample	115.3	15.5	8, 10, 15
1.5 - 3.5	Grab Sample			
3.5 - 5.0	Grab Sample			
5.0 - 6.5	SPT			3, 3, 3
8.5 - 10.0	SPT			0, 1, 3

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 34

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/31/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4" AC over 5" SILTY SAND with GRAVEL (misc. AB)					9
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	1.0 - 2.5	Ring Sample	118.4	13.7	11
	CL		SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.5	Grab Sample			11
4	CL		SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)					2
5				5.0 - 6.5	SPT			3
								3
8								0
8.5			gray/brown mottled, very soft	8.5 - 10.0	SPT			1
								1
10			End of Boring @ 10.0' No subsurface water encountered					

Depth scale: 0 to 26 feet.

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 35

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		5" AC over 8" SILTY SAND with GRAVEL (misc. AB)					
1	SM	SILTY SAND: orange brown, medium dense, very moist, some gravel (Fill)	1.0 - 2.5	Ring Sample	117.0	14.6	5 7 10
3	CL	SANDY LEAN CLAY: dark brown, stiff, moist	3.0 - 5.0	Grab Sample			
4	CL	SANDY LEAN CLAY: brown, medium stiff, moist (Alluvium)	5.0 - 6.5	SPT			2 3 3
5.5		gray/brown mottled, caliche deposits					
8.5		very soft, very moist	8.5 - 10.0	SPT			0 1 1
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 36

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

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JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		5.5" AC over 8" SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1	SP	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	1.0 - 2.5	Ring Sample	114.7	7.2	8 8 7
2	CL	SANDY LEAN CLAY: dark brown, stiff, slightly moist	2.5 - 5.0	Grab Sample			
5	ML	SILT: gray/brown mottled, medium stiff, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			1 2 4
8.5		soft	8.5 - 10.0	SPT			0 1 2
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 37
PAGE 1 OF 1
JOB NO.: 302524-001
DATE: 10/29/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 – 1.5			5.5" AC over 12" SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	Grab Sample			
1.5 – 3.0	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.0 - 3.0	Ring Sample	110.1	16.2	5 8 12
				1.5 - 3.0	Grab Sample			
3.0 – 10.0	CL		SANDY LEAN CLAY: brown, very soft, moist, caliche deposits (Alluvium)	3.0 - 5.0	Grab Sample			
				5.0 - 6.5	SPT			1 1 1
8.5			gray/brown mottled, soft	8.5 - 10.0	SPT			1 1 2
10.0			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 38

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

PAGE 1 OF 1
JOB NO.: 302524-001
DATE: 10/30/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			4.5" AC over 12" SILTY SAND with GRAVEL (misc. AB)					
1.5	CL		SANDY LEAN CLAY: brown/dark brown/yellow brown mottled, stiff, moist (Fill)	1.5 - 3.0	Ring Sample	110.9	14.7	6 12 13
				2.0 - 4.0	Grab Sample			
4	CL		SANDY LEAN CLAY: brown, very soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	SPT			0 1 1
8.5			soft	8.5 - 10.0	SPT			0 1 2
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 39
PAGE 1 OF 1
JOB NO.: 302524-001
DATE: 10/28/18

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			5" AC over 6" SILTY SAND with GRAVEL (misc. AB)					
1	SM		SILTY SAND: brown, loose, moist (Fill)	1.0 - 2.0	Grab Sample			
2	CH		SANDY FAT CLAY: dark brown, medium stiff, very moist (Alluvium)	1.0 - 2.5	Ring Sample	108.4	19.1	3 4 5
3				2.0 - 5.0	Grab Sample			
5	CL		SANDY LEAN CLAY: brown, soft, moist, caliche deposits	5.0 - 6.5	SPT			1 2 2
8.5			medium stiff	8.5 - 10.0	SPT			2 3 5
10			End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

LOGGED BY: R. Wagner
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

Boring No. 40

JOB NO.: 302524-001
DATE: 10/28/18

OXNARD AIRPORT RUNWAY AND TAXIWAY CONNECTOR REHAB./RECONSTRUCT.
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		6" AC over 8" SILTY SAND with GRAVEL (misc. AB)					
1	SM	SILTY SAND: brown, loose, very moist, mixed with sandy lean clay (Fill)	1.5 - 3.5	Grab Sample			
			1.5 - 3.0	Ring Sample	117.1	16.2	5, 8, 8
3.5	CL	SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)	3.5 - 6.5	Grab Sample			
5		soft	5.0 - 6.5	SPT			1, 2, 2
			8.5 - 10.0	SPT			0, 1, 3
10		End of Boring @ 10.0' No subsurface water encountered					

LEGEND: Ring Sample; Grab Sample; Shelby Tube Sample; SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Laboratory Test Results

Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

January 8, 2019

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
1	2.0 - 2.5	13.4	135.4	119.4
2	2.5 - 3.0	13.8	137.8	121.1
3	2.5 - 3.0	14.2	133.6	116.9
4	2.5 - 3.0	16.1	134.9	116.2
5	2.5 - 3.0	14.5	135.4	118.3
6	2.5 - 3.0	13.3	137.7	121.5
7	2.0 - 2.5	13.3	138.2	121.9
8	2.0 - 2.5	4.7	123.7	118.1
9	2.5 - 3.0	19.7	122.8	102.6
10	2.5 - 3.0	13.6	130.6	115.0
11	2.5 - 3.0	21.5	126.3	104.0
12	2.5 - 3.0	24.8	119.2	95.5
13	2.5 - 3.0	22.0	123.5	101.2
14	2.5 - 3.0	22.0	125.1	102.5
15	2.5 - 3.0	23.4	123.5	100.1
16	2.5 - 3.0	19.0	130.0	109.3
17	2.5 - 3.0	20.8	126.7	104.8
18	2.5 - 3.0	20.1	124.0	103.2
19	2.5 - 3.0	16.9	132.5	113.4
20	2.5 - 3.0	17.6	131.3	111.7
21	2.5 - 3.0	13.9	136.1	119.5
22	3.0 - 3.5	17.6	134.1	114.0
23	2.5 - 3.0	13.8	134.8	118.5
24	2.5 - 3.0	5.6	113.1	107.2
25	2.5 - 3.0	19.0	126.5	106.3
26	3.0 - 3.5	17.1	128.9	110.1
27	3.0 - 3.5	20.8	117.6	97.4
28	2.5 - 3.0	4.9	128.6	122.5
29	2.5 - 3.0	15.3	129.7	112.5
30	2.5 - 3.0	14.7	128.7	112.2

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

January 8, 2019

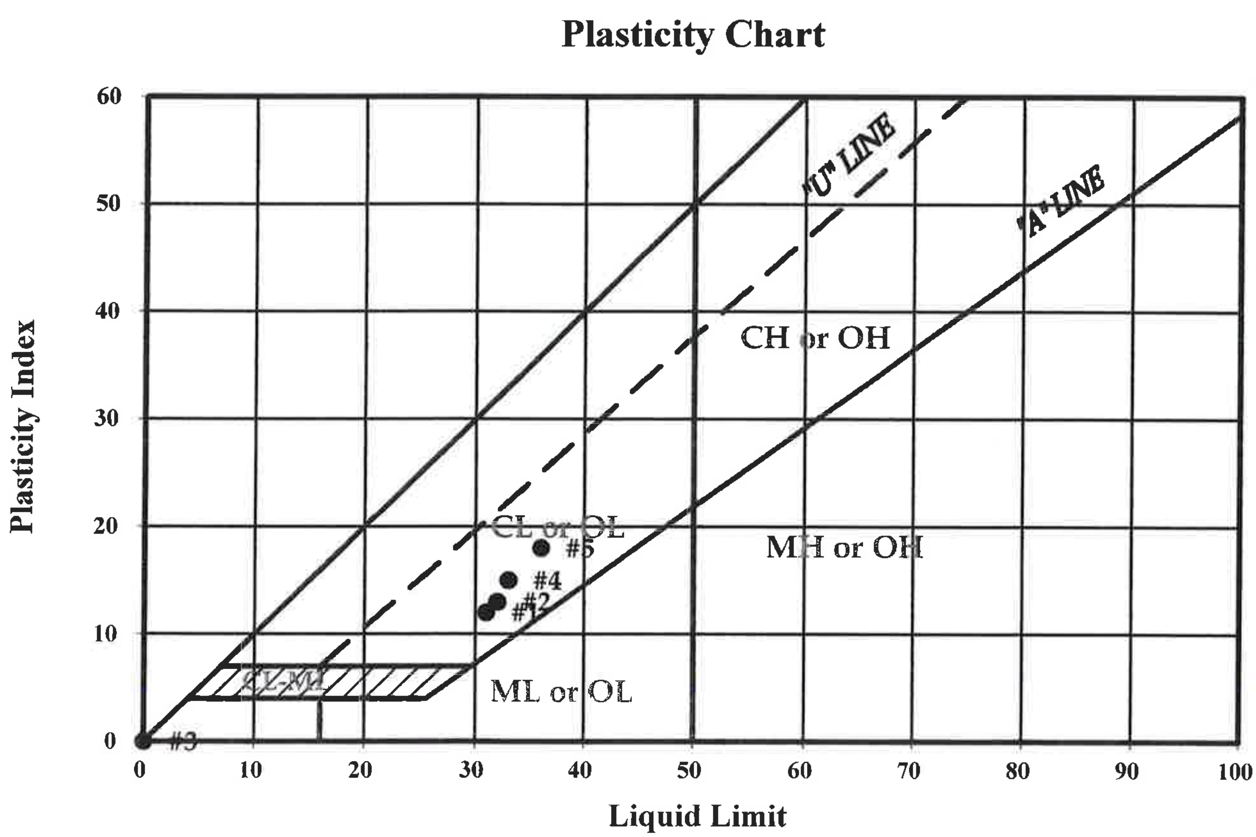
BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
31	2.5 - 3.0	17.2	129.6	110.6
32	2.0 - 2.5	16.3	128.8	110.8
33	2.0 - 2.5	15.5	133.1	115.3
34	2.0 - 2.5	13.7	134.6	118.4
35	2.0 - 2.5	14.6	134.1	117.0
36	2.0 - 2.5	7.2	123.0	114.7
37	2.5 - 3.0	16.2	127.9	110.1
38	2.5 - 3.0	14.7	127.2	110.9
39	2.0 - 2.5	19.1	129.1	108.4
40	2.5 - 3.0	16.2	136.0	117.1

PLASTICITY INDEX

ASTM D 4318-17

January 8, 2019

Designation.:	CBR 1	CBR 2	CBR 4	CBR 5	CBR 7
Test No.:	1	2	3	4	5
Boring No.:	1	9	3	36	23
Sample Depth:	2.0 - 3.0'	3.0 - 5.0'	0.5 - 1.0'	2.0 - 5.0'	3.5 - 5.0'
Liquid Limit:	31	32	NL	33	36
Plastic Limit:	19	19	NP	18	18
Plasticity Index:	12	13	NP	15	18



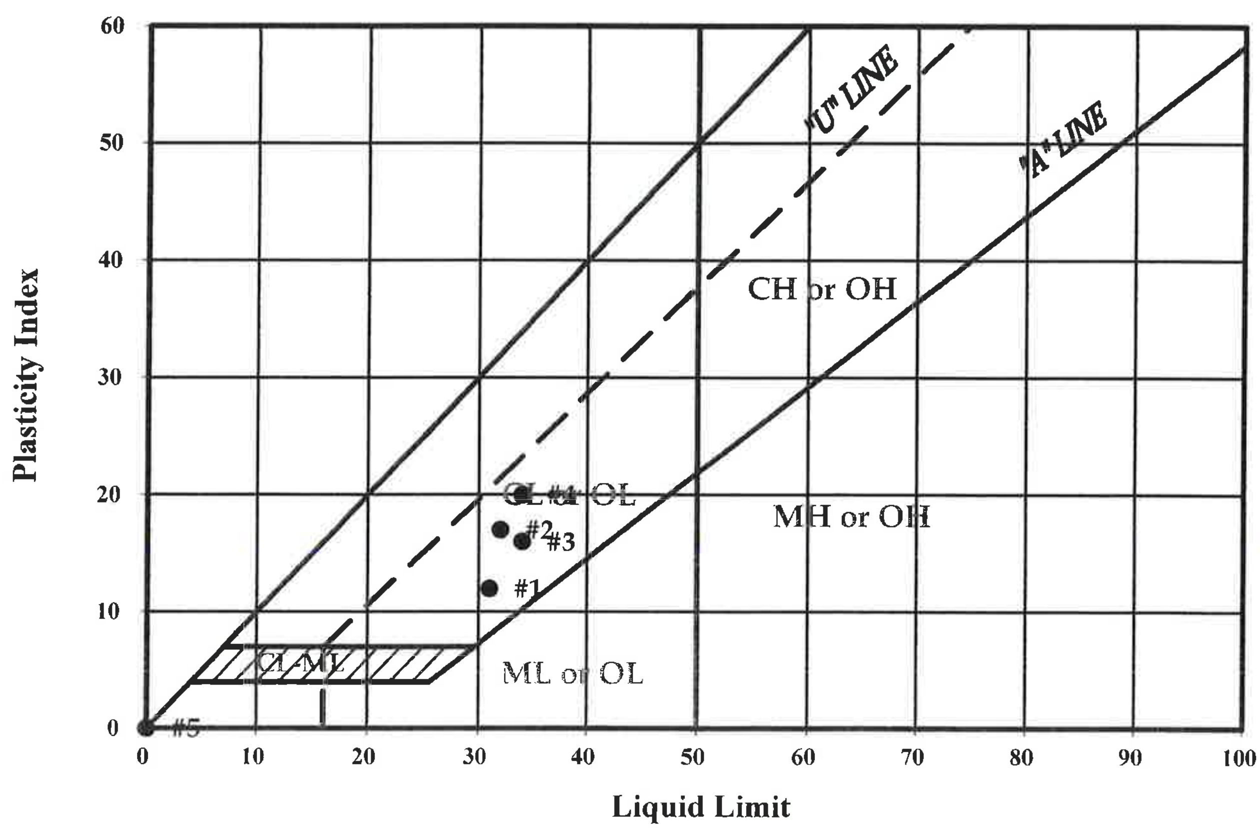
PLASTICITY INDEX

ASTM D 4318-17

January 8, 2019

Designation.:	CBR 8	CBR 9	CBR 11	CBR 12	CBR 13
Test No.:	1	2	3	4	5
Boring No.:	29	21	16	13	40
Sample Depth:	2.0 - 5.0'	1.5 - 3.0'	2.0 - 4.0'	2.0 - 5.0'	1.5 - 3.5'
Liquid Limit:	31	32	34	34	NL
Plastic Limit:	19	15	18	14	NP
Plasticity Index:	12	17	16	20	NP

Plasticity Chart



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

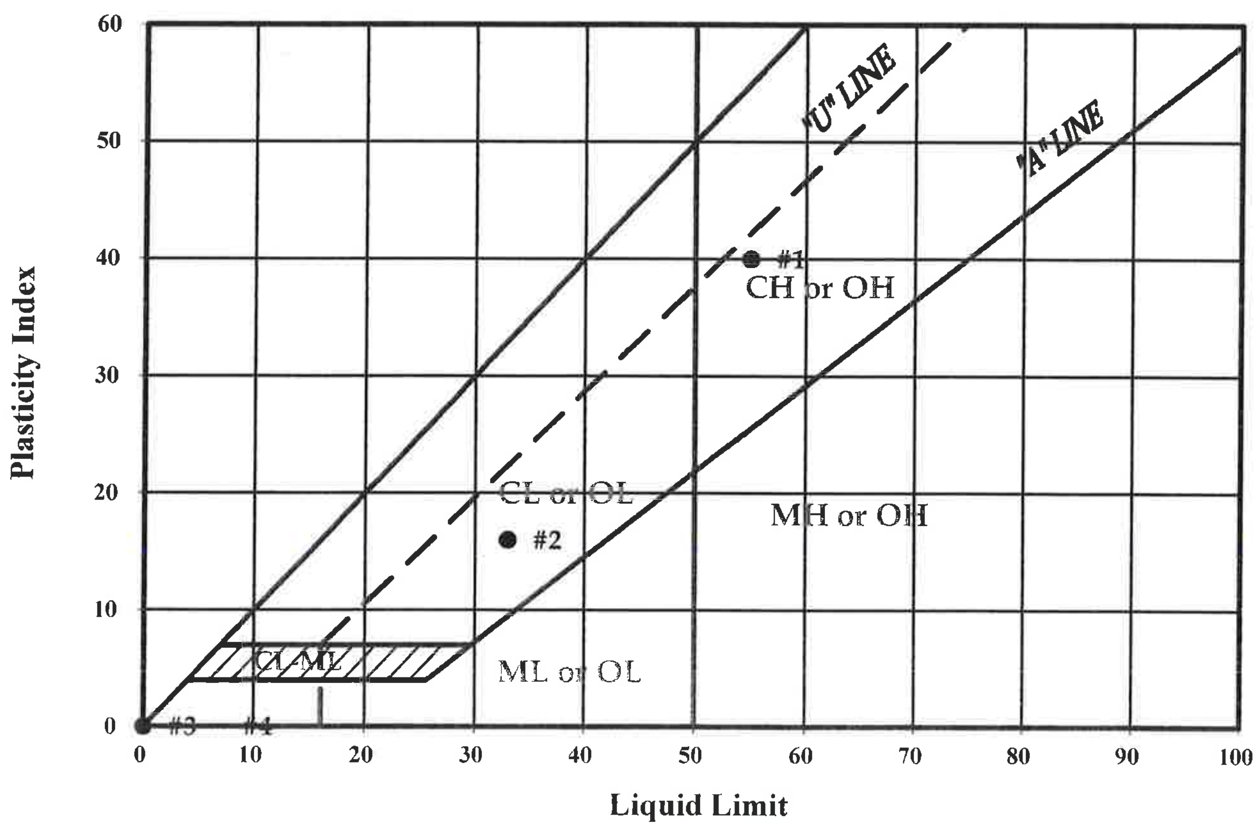
PLASTICITY INDEX

ASTM D 4318-17

January 8, 2019

Designation.:	CBR 14	CBR 15	CBR 16	CBR 17	
Test No.:	1	2	3	4	
Boring No.:	39	17	28	14	
Sample Depth:	2.0 - 5.0'	0.5 - 1.5'	0.5 - 1.5'	0.5 - 1.5'	
Liquid Limit:	55	33	NL	NL	
Plastic Limit:	15	17	NP	NP	
Plasticity Index:	40	16	NP	NP	

Plasticity Chart



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

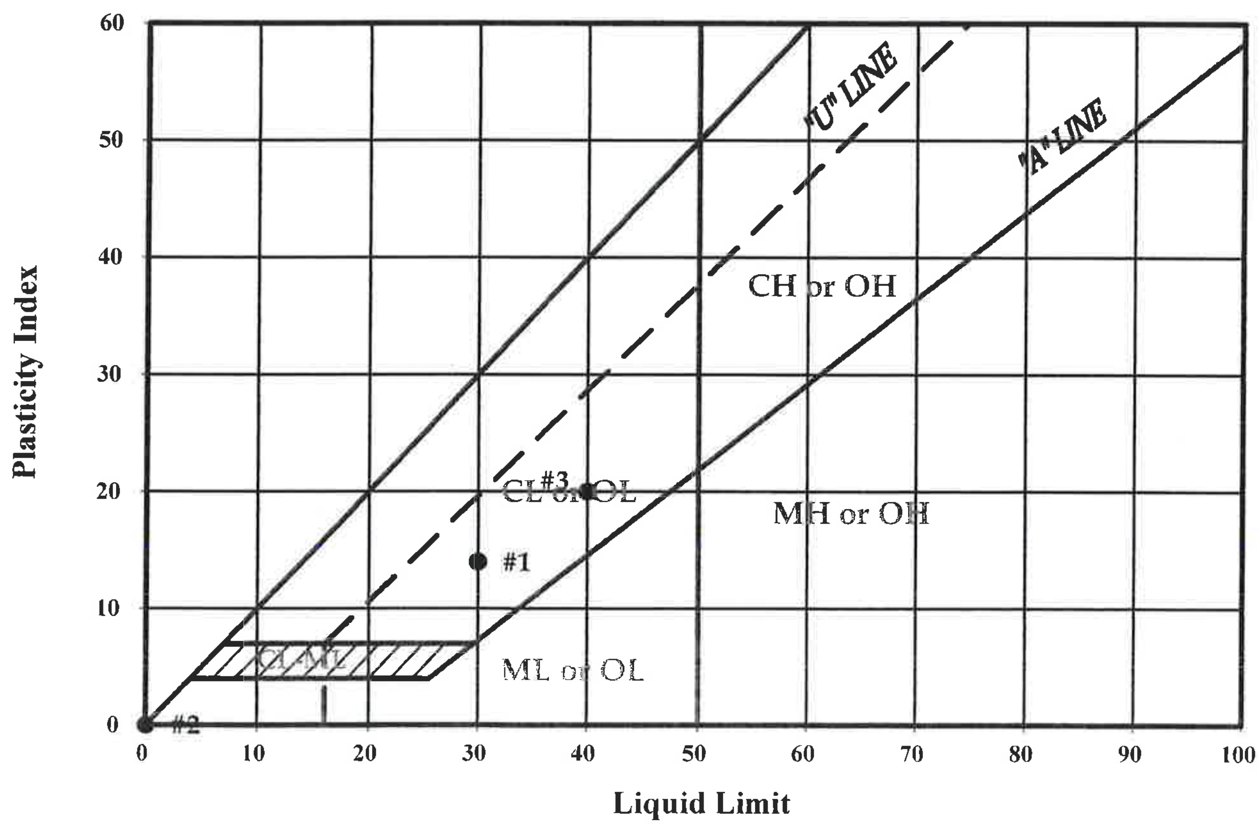
PLASTICITY INDEX

ASTM D 4318-17

January 8, 2019

Designation.:		CBR 3	CBR 6		
Test No.:	1	2	3		
Boring No.:	9	5	27		
Sample Depth:	0.5 - 1.5'	2.0 - 4.0'	0.5 - 1.5'		
Liquid Limit:	30	NL	40		
Plastic Limit:	16	NP	20		
Plasticity Index:	14	NP	20		

Plasticity Chart



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #1; Boring #1 @ 2.0 - 5.0'

January 8, 2019

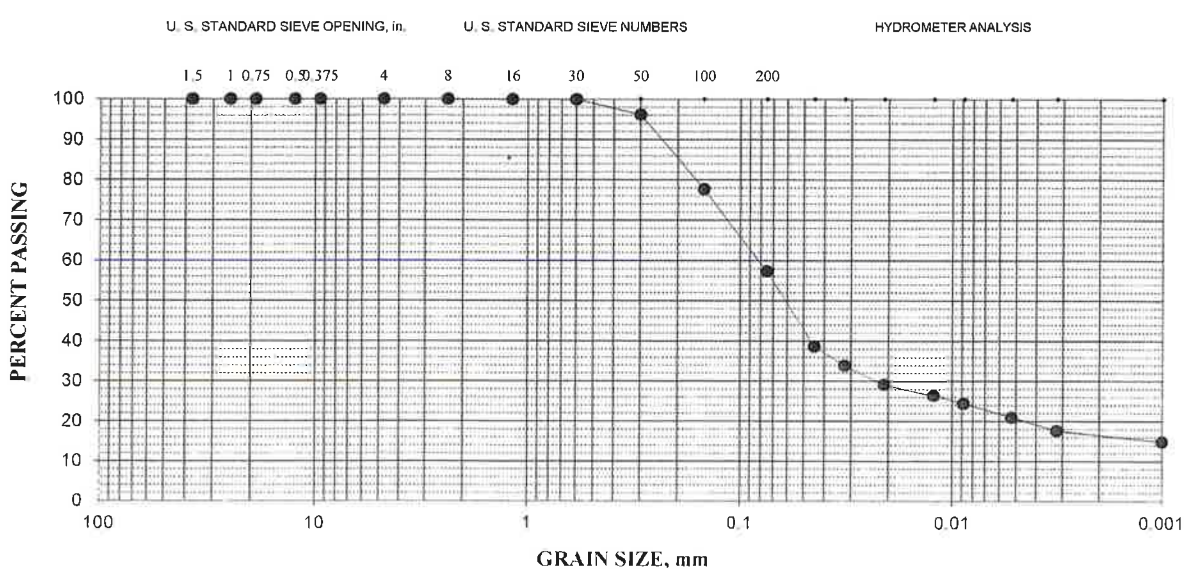
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 31; PL = 19; PI = 12

Gravel = 0%; Sand = 43%; Silt = 36%; Clay = 21%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	0	100
#16 (1.18-mm)	0	100
#30 (600-µm)	0	100
#50 (300-µm)	4	96
#100 (150-µm)	22	78
#200 (75-µm)	43	57
Hydrometer Analysis		
45-µm		39
32-µm		34
21-µm		29
12-µm		26
9-µm		24
5.2-µm		21
3.2-µm		18
Colloids		15



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #2; Boring #9 @ 3.0 - 5.0'

January 8, 2019

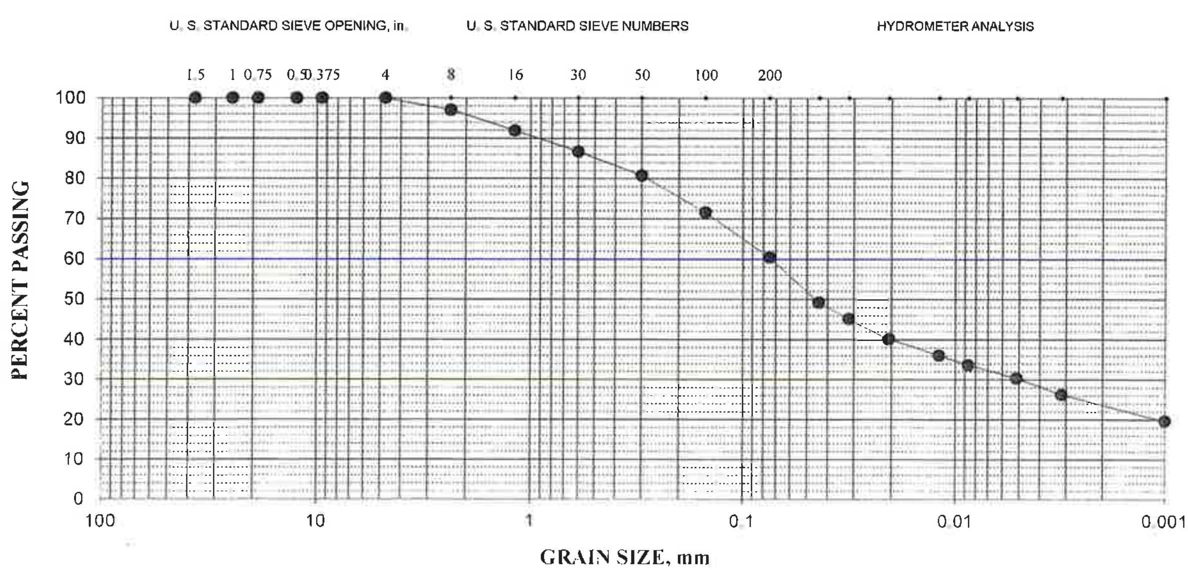
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 32; PL = 19; PI = 13

Gravel = 0%; Sand = 40%; Silt = 30%; Clay = 30%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	3	97
#16 (1.18-mm)	8	92
#30 (600-µm)	13	87
#50 (300-µm)	19	81
#100 (150-µm)	28	72
#200 (75-µm)	40	60
Hydrometer Analysis		
44-µm		49
32-µm		45
21-µm		40
12-µm		36
9-µm		34
5.1-µm		30
3.1-µm		26
Colloids		20



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #3; Boring #5 @ 2.0 - 4.0'

Silty Sand (SM)

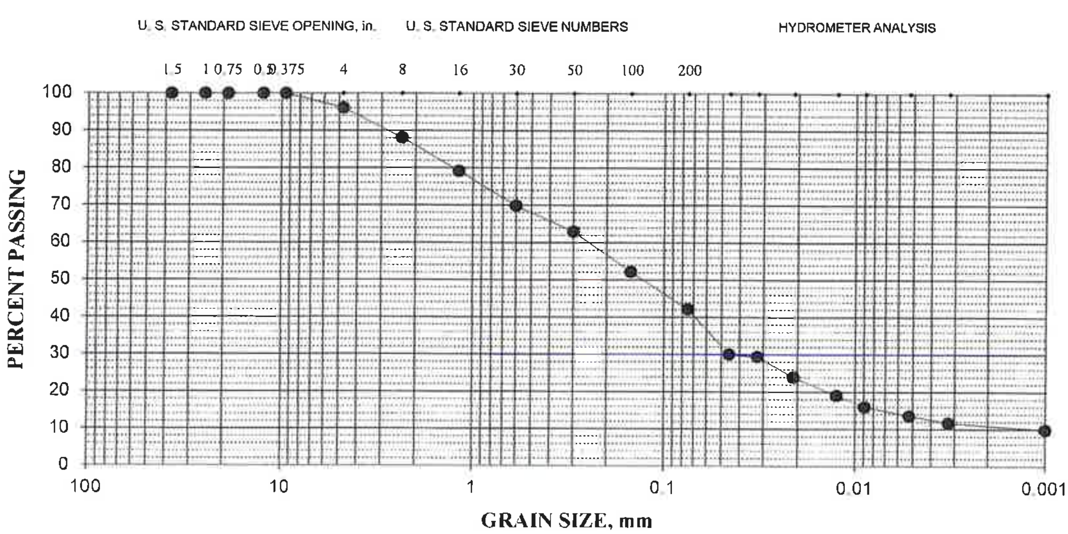
PI = NP

January 16, 2019

Specific Gravity = 2.65 (assumed)

Gravel = 4%; Sand = 54%; Silt = 28%; Clay = 14%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	4	96
#8 (2.36-mm)	12	88
#16 (1.18-mm)	21	79
#30 (600-µm)	30	70
#50 (300-µm)	37	63
#100 (150-µm)	48	52
#200 (75-µm)	58	42
Hydrometer Analysis		
46-µm		30
32-µm		29
21-µm		24
13-µm		19
9-µm		16
5.2-µm		14
3.2-µm		12
Colloids		10



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #4; Boring #3 @ 0.5 - 1.0'

January 8, 2019

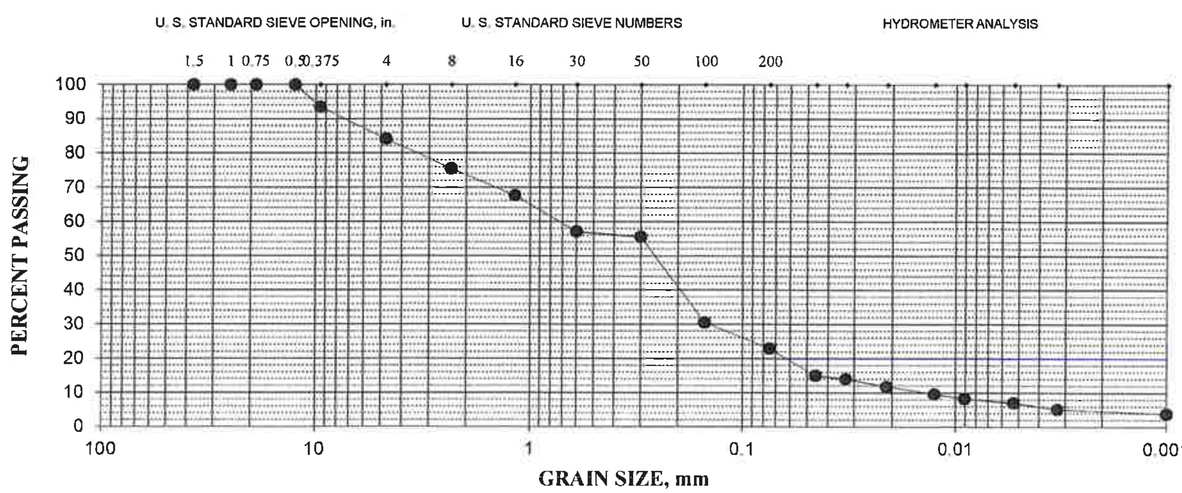
Clayey Sand with Gravel (SC)

Specific Gravity = 2.65 (assumed)

PI = NP

Gravel = 16%; Sand = 61%; Silt = 16%; Clay = 7%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	7	93
#4 (4.75-mm)	16	84
#8 (2.36-mm)	24	76
#16 (1.18-mm)	32	68
#30 (600-µm)	43	57
#50 (300-µm)	44	56
#100 (150-µm)	70	30
#200 (75-µm)	77	23
Hydrometer Analysis		
46-µm		15
33-µm		14
21-µm		12
13-µm		10
9-µm		8
5.3-µm		7
3.3-µm		5
Colloids		4



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #5; Boring #36 @ 2.5 - 5.0'

January 8, 2019

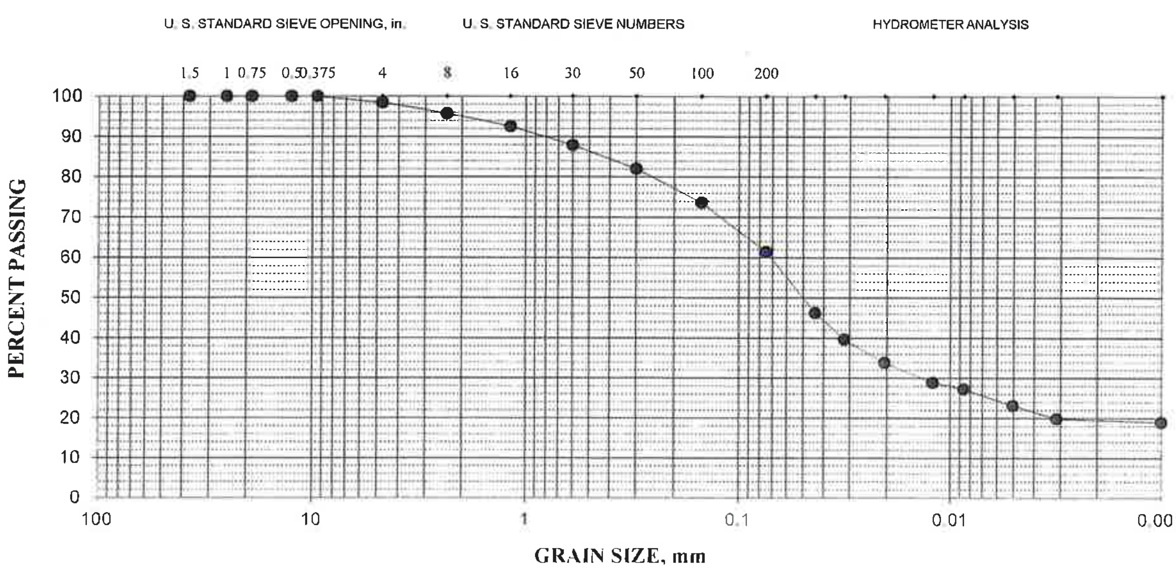
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 33; PL = 18; PI = 15

Gravel = 2%; Sand = 37%; Silt = 38%; Clay = 23%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	2	98
#8 (2.36-mm)	4	96
#16 (1.18-mm)	7	93
#30 (600-µm)	12	88
#50 (300-µm)	18	82
#100 (150-µm)	26	74
#200 (75-µm)	39	61
Hydrometer Analysis		
44-µm		46
32-µm		40
21-µm		34
12-µm		29
9-µm		27
5.0-µm		23
3.1-µm		20
Colloids		19



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'

January 8, 2019

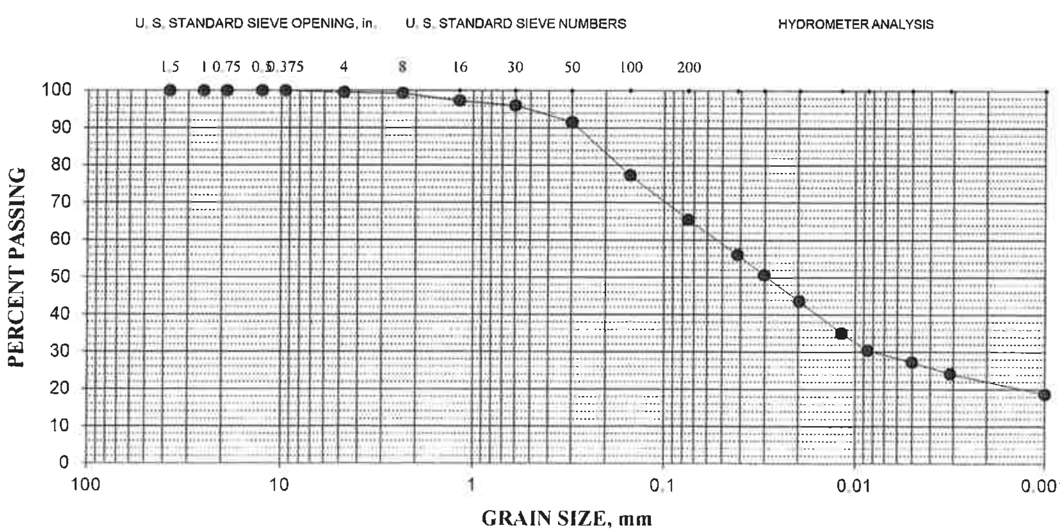
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 40; PL = 20; PI = 20

Gravel = 1%; Sand = 34%; Silt = 38%; Clay = 27%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	1	99
#8 (2.36-mm)	1	99
#16 (1.18-mm)	3	97
#30 (600-µm)	4	96
#50 (300-µm)	8	92
#100 (150-µm)	23	77
#200 (75-µm)	35	65
Hydrometer Analysis		
42-µm		56
30-µm		51
20-µm		44
12-µm		35
9-µm		30
5.0-µm		27
3.1-µm		24
Colloids		19



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

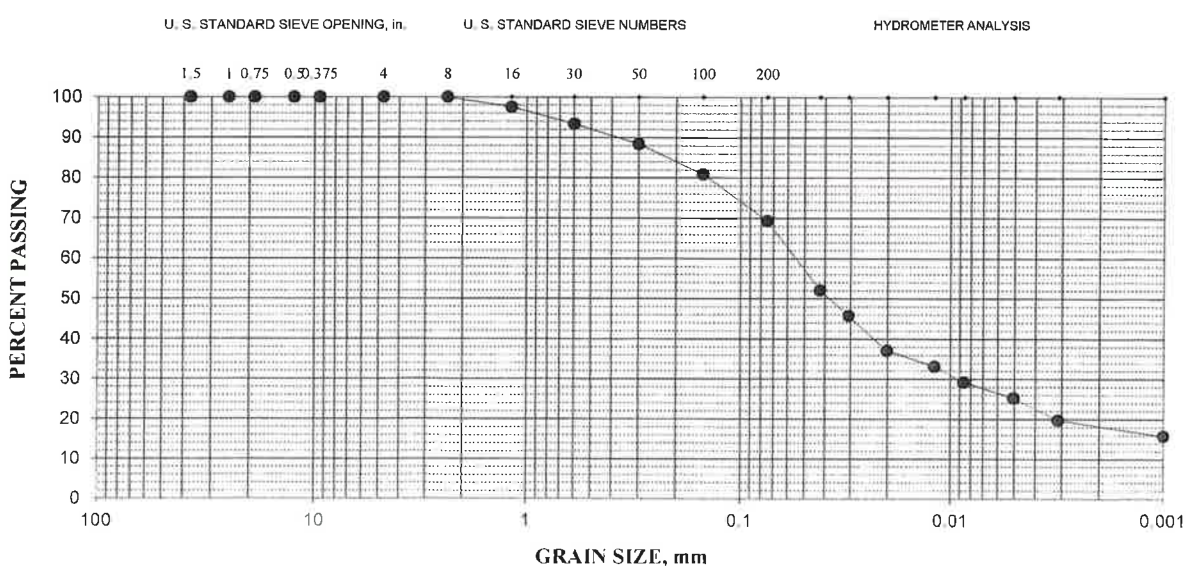
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #7; Boring #23 @ 3.5 - 5.0'
Sandy Lean Clay (CL)
LL = 36; PL = 18; PI = 18

January 8, 2019
Specific Gravity = 2.70 (assumed)
Gravel = 0%; Sand = 31%; Silt = 44%; Clay = 25%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	0	100
#16 (1.18-mm)	2	98
#30 (600-µm)	7	93
#50 (300-µm)	12	88
#100 (150-µm)	19	81
#200 (75-µm)	31	69
Hydrometer Analysis		
42-µm		52
31-µm		46
20-µm		37
12-µm		33
9-µm		29
5.0-µm		25
3.1-µm		20
Colloids		16



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #8; Boring #29 @ 2.0 - 5.0'

January 8, 2019

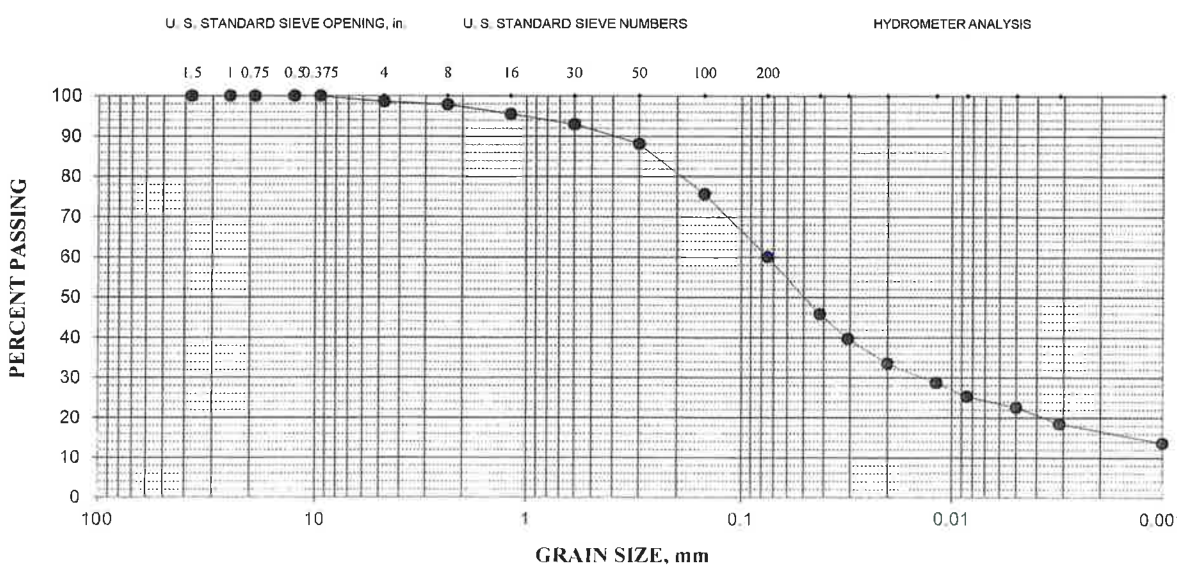
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 31; PL = 19; PI = 12

Gravel = 1%; Sand = 39%; Silt = 37%; Clay = 23%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	1	99
#8 (2.36-mm)	2	98
#16 (1.18-mm)	4	96
#30 (600-µm)	7	93
#50 (300-µm)	12	88
#100 (150-µm)	24	76
#200 (75-µm)	40	60
Hydrometer Analysis		
42-µm		46
31-µm		40
20-µm		34
12-µm		29
9-µm		25
5.0-µm		23
3.1-µm		18
Colloids		14



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #9; Boring #21 @ 1.5 - 3.0'

January 8, 2019

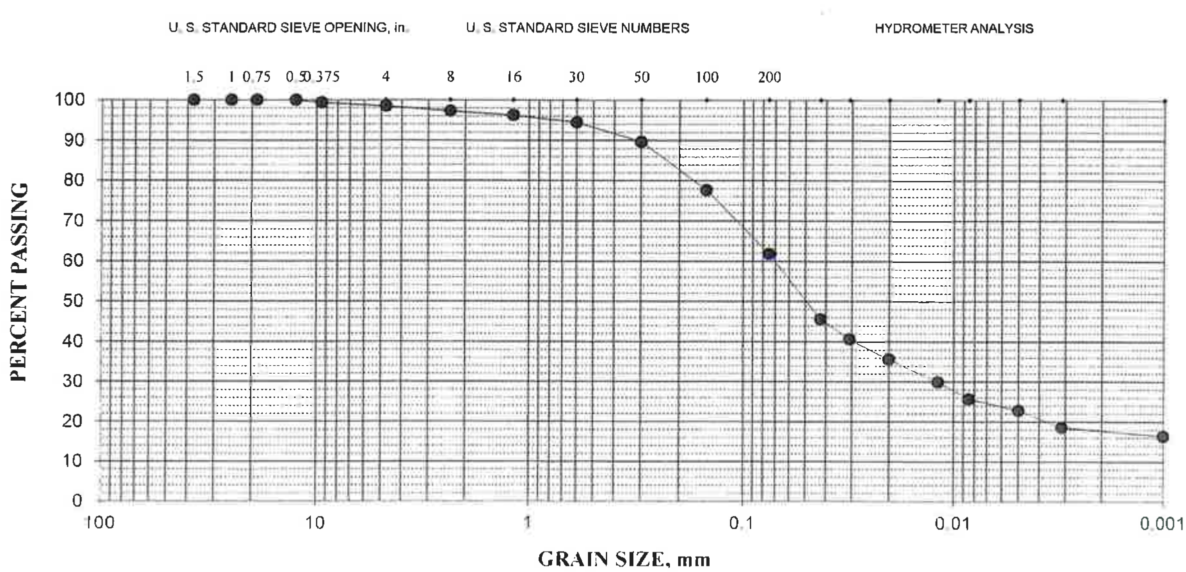
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 32; PL = 15; PI = 17

Gravel = 1%; Sand = 37%; Silt = 39%; Clay = 23%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	1	99
#4 (4.75-mm)	1	99
#8 (2.36-mm)	3	97
#16 (1.18-mm)	4	96
#30 (600-µm)	6	94
#50 (300-µm)	10	90
#100 (150-µm)	22	78
#200 (75-µm)	38	62
Hydrometer Analysis		
42-µm		46
31-µm		41
20-µm		36
12-µm		30
9-µm		26
5.0-µm		23
3.1-µm		19
Colloids		16



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #11; Boring #16 @ 2.0 - 4.0'

January 8, 2019

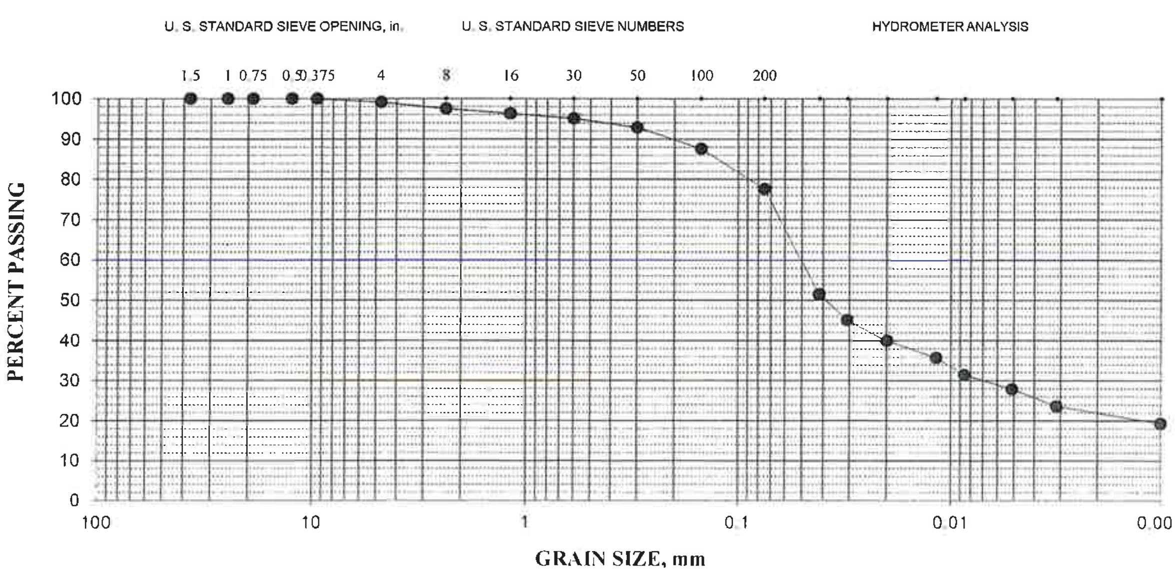
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 34; PL = 18; PI = 16

Gravel = 1%; Sand = 21%; Silt = 50%; Clay = 28%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	1	99
#8 (2.36-mm)	2	98
#16 (1.18-mm)	4	96
#30 (600-µm)	5	95
#50 (300-µm)	7	93
#100 (150-µm)	12	88
#200 (75-µm)	22	78
Hydrometer Analysis		
42-µm		51
31-µm		45
20-µm		40
12-µm		36
9-µm		31
5.1-µm		28
3.1-µm		24
Colloids		19



Oxnard Airport - Runway and Taxiway
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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #12; Boring #13 @ 2.0 - 4.0'

January 8, 2019

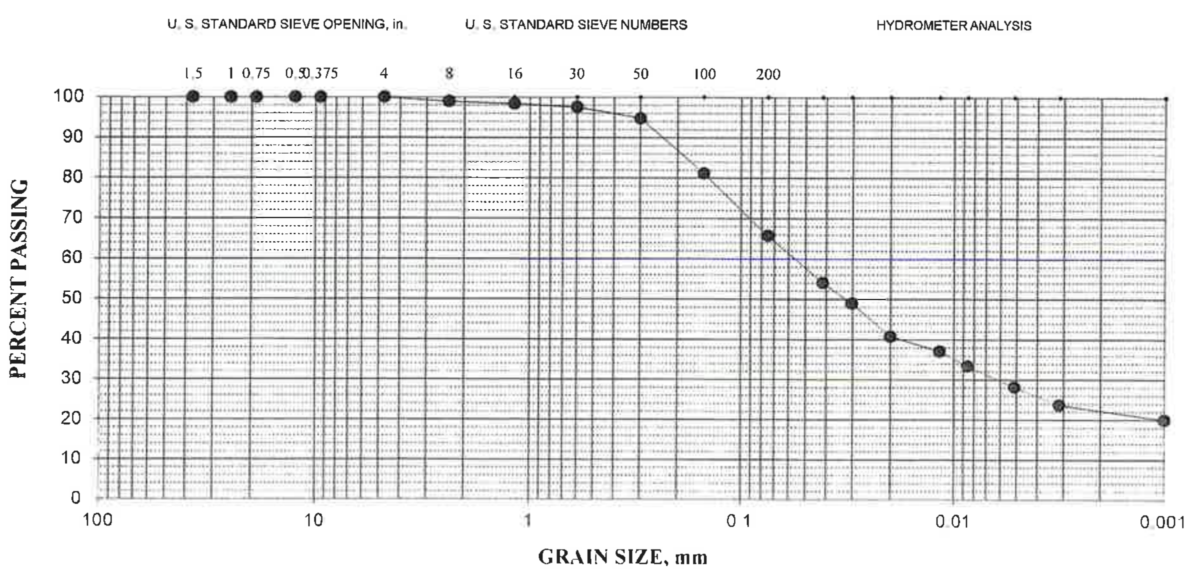
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 34; PL = 14; PI = 20

Gravel = 0%; Sand = 34%; Silt = 38%; Clay = 28%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	1	99
#16 (1.18-mm)	2	98
#30 (600-µm)	2	98
#50 (300-µm)	5	95
#100 (150-µm)	19	81
#200 (75-µm)	34	66
Hydrometer Analysis		
42-µm		54
30-µm		49
20-µm		41
12-µm		37
9-µm		33
5.1-µm		28
3.1-µm		24
Colloids		20



Oxnard Airport - Runway and Taxiway
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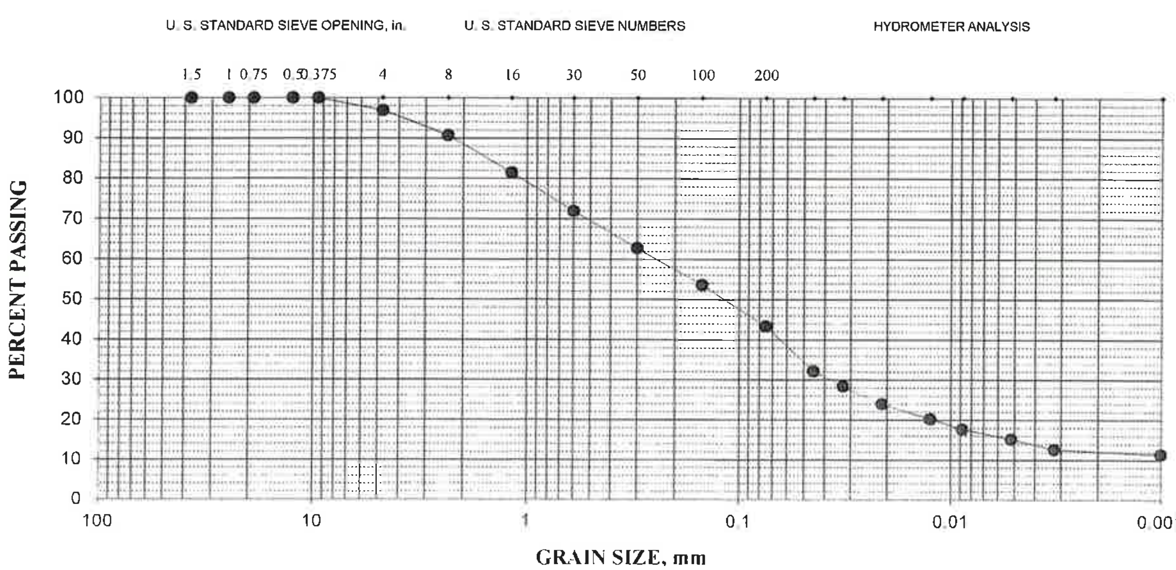
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #13; Boring #40 @ 1.5 - 3.5'
Silty Sand (SM)
PI = NP

January 8, 2019
Specific Gravity = 2.65 (assumed)
Gravel = 3%; Sand = 54%; Silt = 28%; Clay = 15%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	3	97
#8 (2.36-mm)	9	91
#16 (1.18-mm)	19	81
#30 (600-µm)	28	72
#50 (300-µm)	37	63
#100 (150-µm)	46	54
#200 (75-µm)	57	43
Hydrometer Analysis		
45-µm		32
33-µm		28
21-µm		24
13-µm		20
9-µm		18
5.2-µm		15
3.2-µm		13
Colloids		11



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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #14; Boring #39 @ 2.0 - 5.0'

January 8, 2019

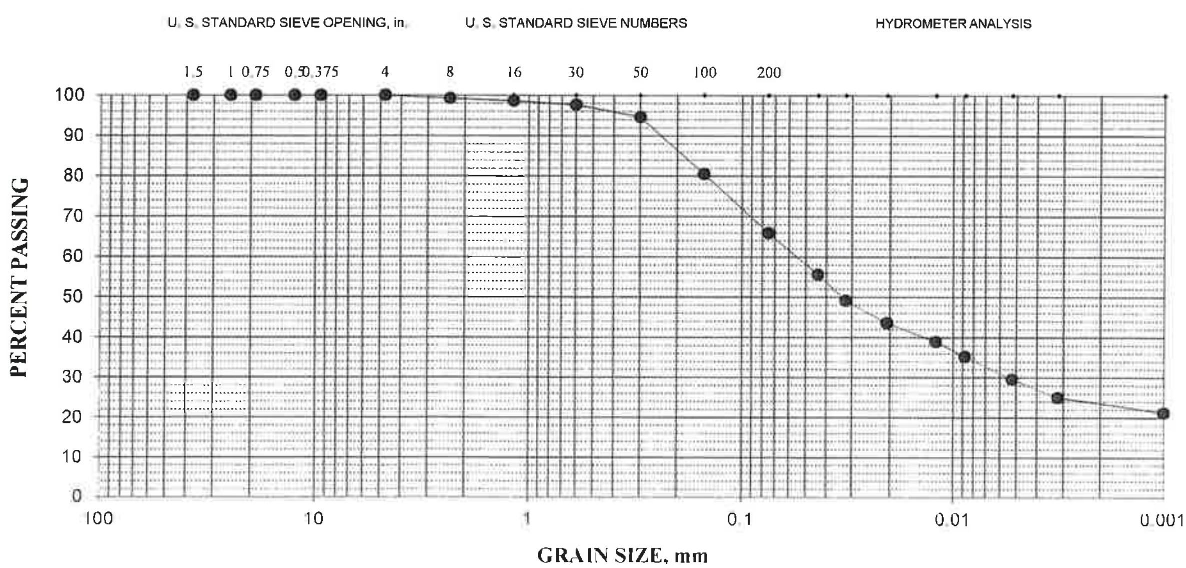
Sandy Fat Clay (CH)

Specific Gravity = 2.70 (assumed)

LL = 55; PL = 15; PI = 40

Gravel = 0%; Sand = 34%; Silt = 36%; Clay = 30%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	0	100
#8 (2.36-mm)	1	99
#16 (1.18-mm)	1	99
#30 (600-µm)	2	98
#50 (300-µm)	5	95
#100 (150-µm)	20	80
#200 (75-µm)	34	66
Hydrometer Analysis		
44-µm		56
32-µm		49
21-µm		44
12-µm		39
9-µm		35
5.2-µm		30
3.2-µm		25
Colloids		21



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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #15; Boring #17 @ 0.5 - 1.5'

January 8, 2019

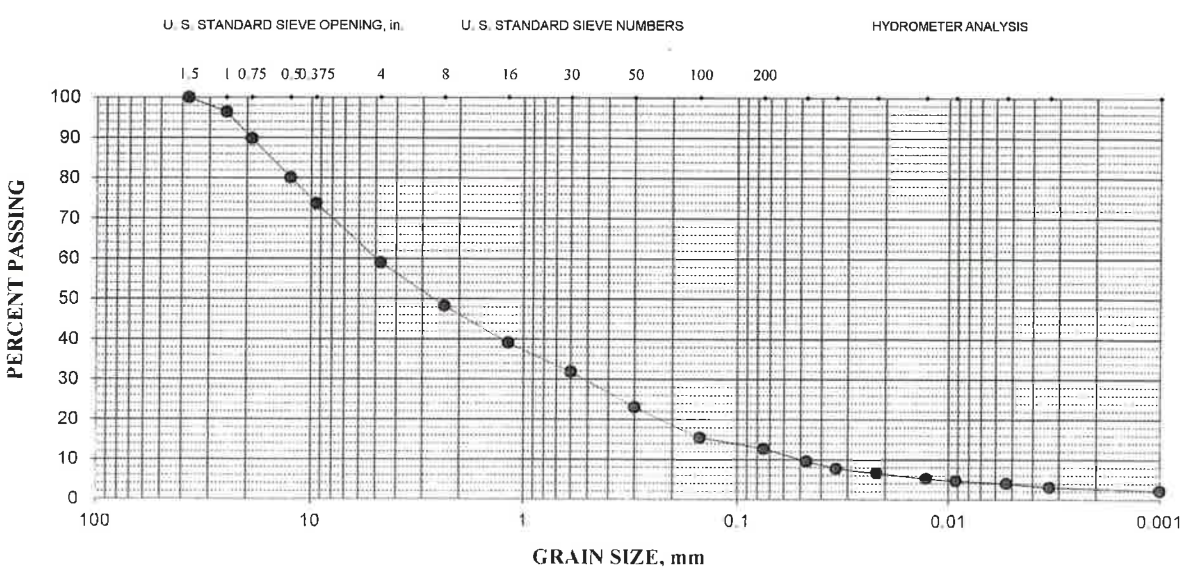
Clayey Sand with Gravel (SC)

Specific Gravity = 2.65 (assumed)

LL = 33; PL = 17; PI = 16

Gravel = 41%; Sand = 46%; Silt = 9%; Clay = 4%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	4	96
3/4" (19.0-mm)	10	90
1/2" (12.5-mm)	20	80
3/8" (9.5-mm)	26	74
#4 (4.75-mm)	41	59
#8 (2.36-mm)	52	48
#16 (1.18-mm)	61	39
#30 (600-µm)	68	32
#50 (300-µm)	77	23
#100 (150-µm)	85	15
#200 (75-µm)	87	13
Hydrometer Analysis		
47-µm		10
34-µm		8
22-µm		7
13-µm		5
9-µm		5
5.3-µm		4
3.3-µm		3
Colloids		2



Oxnard Airport - Runway and Taxiway
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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #16; Boring #28 @ 0.5 - 1.5'

January 8, 2019

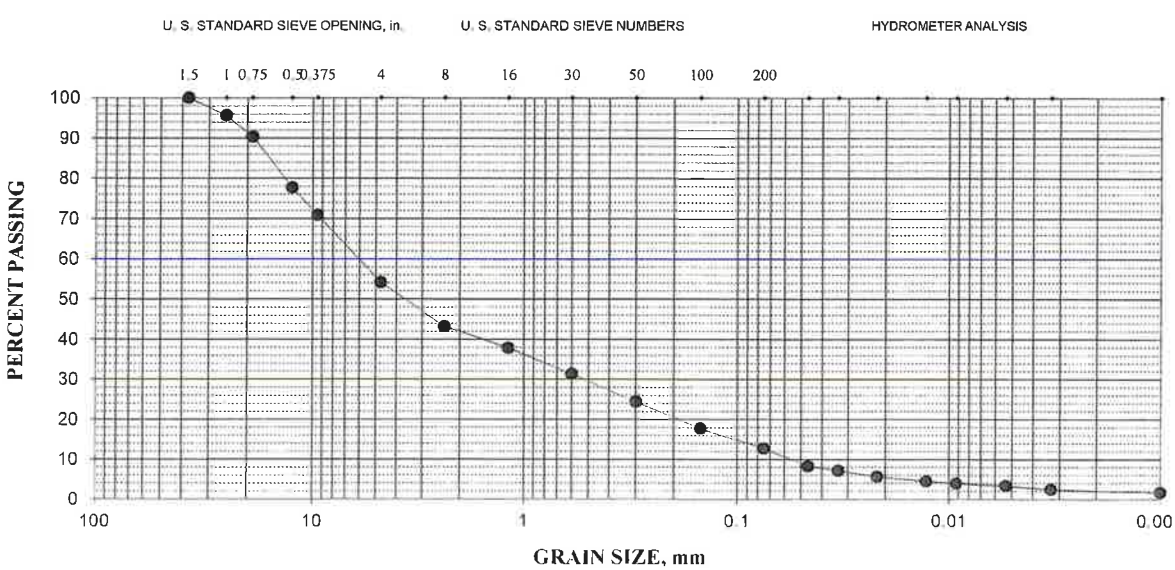
Silty Gravel with Sand (GM)

Specific Gravity = 2.65 (assumed)

PI = NP

Gravel = 46%; Sand = 41%; Silt = 10%; Clay = 3%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	4	96
3/4" (19.0-mm)	10	90
1/2" (12.5-mm)	22	78
3/8" (9.5-mm)	29	71
#4 (4.75-mm)	46	54
#8 (2.36-mm)	57	43
#16 (1.18-mm)	62	38
#30 (600-µm)	69	31
#50 (300-µm)	76	24
#100 (150-µm)	82	18
#200 (75-µm)	87	13
Hydrometer Analysis		
47-µm		8
34-µm		7
22-µm		6
13-µm		5
9-µm		4
5.3-µm		3
3.3-µm		2
Colloids		2



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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

CBR #17; Boring #14 @ 0.5 - 1.5'

January 8, 2019

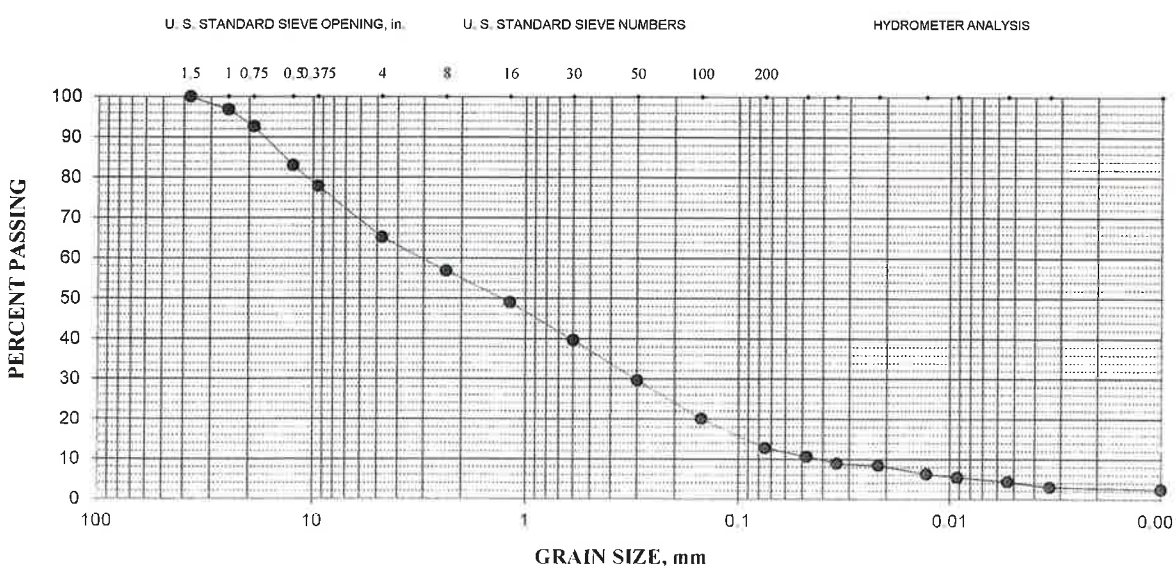
Silty Sand with Gravel (SM)

Specific Gravity = 2.65 (assumed)

PI = NP

Gravel = 35%; Sand = 52%; Silt = 9%; Clay = 4%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	3	97
3/4" (19.0-mm)	7	93
1/2" (12.5-mm)	17	83
3/8" (9.5-mm)	22	78
#4 (4.75-mm)	35	65
#8 (2.36-mm)	43	57
#16 (1.18-mm)	51	49
#30 (600-µm)	60	40
#50 (300-µm)	70	30
#100 (150-µm)	80	20
#200 (75-µm)	87	13
Hydrometer Analysis		
48-µm		11
34-µm		9
22-µm		8
13-µm		6
9-µm		5
5.4-µm		4
3.4-µm		3
Colloids		2



Oxnard Airport - Runway and Taxiway
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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #7 @ 2.0 - 3.5'

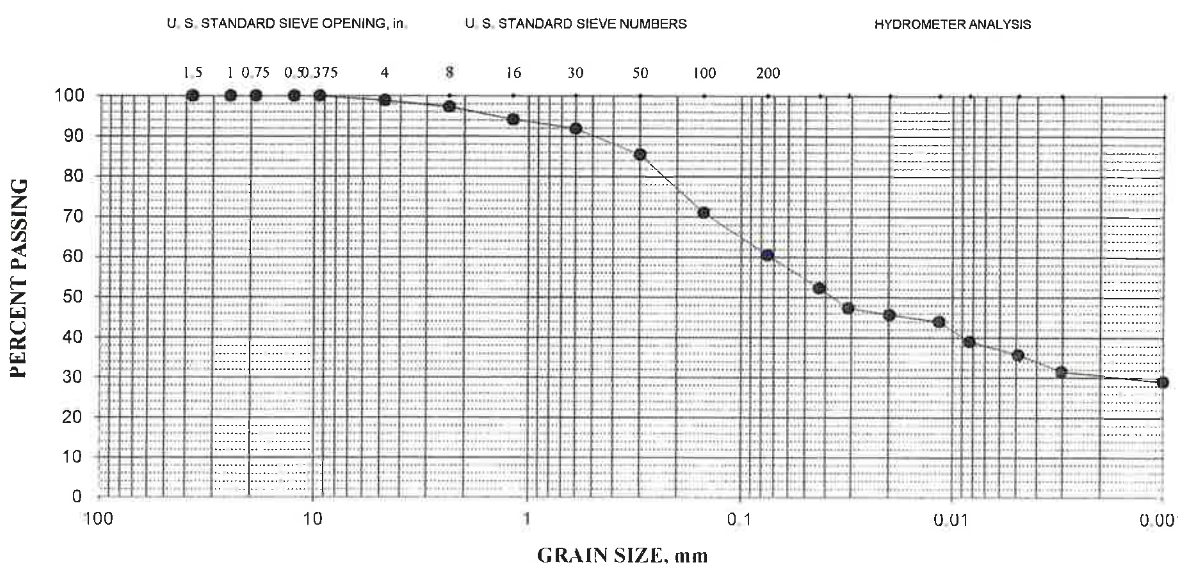
Sandy Lean Clay (CL)

January 8, 2019

Specific Gravity = 2.70 (assumed)

Gravel = 1%; Sand = 39%; Silt = 24%; Clay = 36%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	0	100
3/8" (9.5-mm)	0	100
#4 (4.75-mm)	1	99
#8 (2.36-mm)	3	97
#16 (1.18-mm)	6	94
#30 (600-µm)	8	92
#50 (300-µm)	14	86
#100 (150-µm)	29	71
#200 (75-µm)	40	60
Hydrometer Analysis		
43-µm		52
31-µm		47
20-µm		46
12-µm		44
8-µm		39
4.9-µm		36
3.0-µm		32
Colloids		29



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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #9 @ 1.5 - 3.0'

January 8, 2019

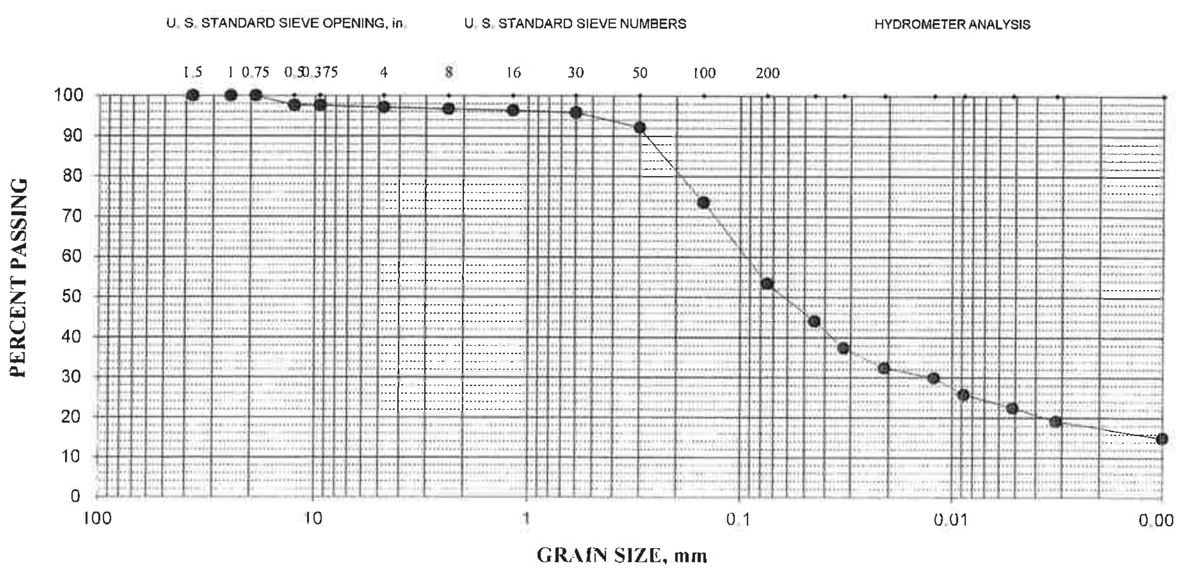
Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 30; PL = 16; PI = 14

Gravel = 3%; Sand = 44%; Silt = 31%; Clay = 22%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	0	100
1/2" (12.5-mm)	2	98
3/8" (9.5-mm)	2	98
#4 (4.75-mm)	3	97
#8 (2.36-mm)	3	97
#16 (1.18-mm)	4	96
#30 (600-µm)	4	96
#50 (300-µm)	8	92
#100 (150-µm)	26	74
#200 (75-µm)	47	53
Hydrometer Analysis		
45-µm		44
33-µm		37
21-µm		32
12-µm		30
9-µm		26
5.1-µm		22
3.2-µm		19
Colloids		15



Oxnard Airport - Runway and Taxiway
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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #10 @ 1.5 - 2.5'

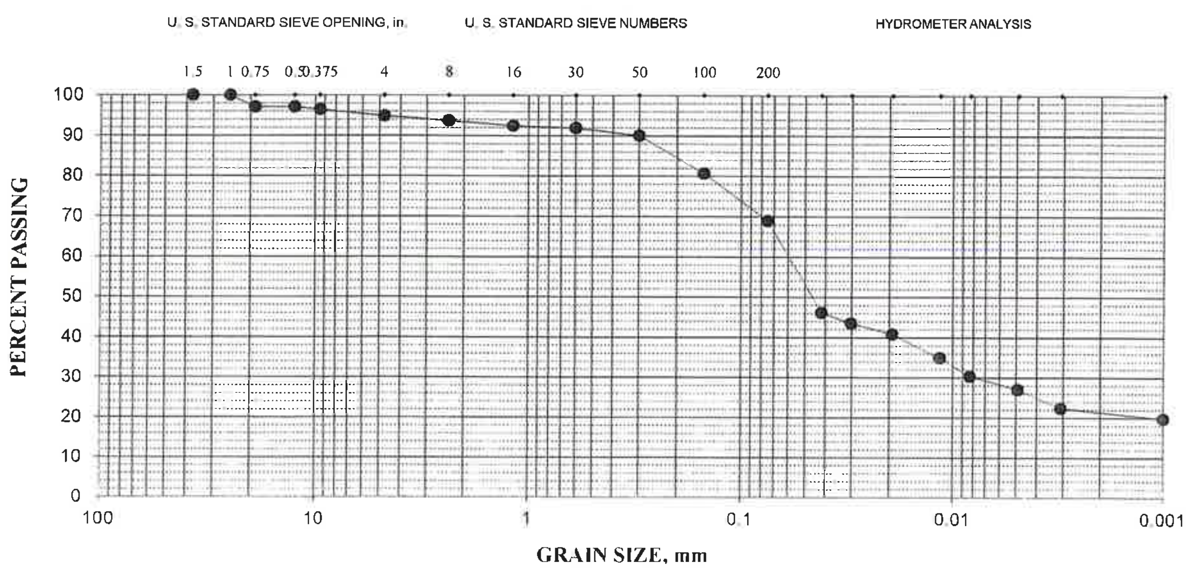
Sandy Lean Clay (CL)

January 8, 2019

Specific Gravity = 2.70 (assumed)

Gravel = 5%; Sand = 26%; Silt = 42%; Clay = 27%

Sieve size	% Retained	% Passing
1-1/2" (37.5-mm)	0	100
1" (25.0-mm)	0	100
3/4" (19.0-mm)	3	97
1/2" (12.5-mm)	3	97
3/8" (9.5-mm)	4	96
#4 (4.75-mm)	5	95
#8 (2.36-mm)	6	94
#16 (1.18-mm)	8	92
#30 (600-µm)	8	92
#50 (300-µm)	10	90
#100 (150-µm)	19	81
#200 (75-µm)	31	69
Hydrometer Analysis		
42-µm		46
30-µm		44
19-µm		41
12-µm		35
8-µm		30
4.9-µm		27
3.1-µm		22
Colloids		20



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019

CBR #1; Boring #1 @ 2.0 - 5.0'

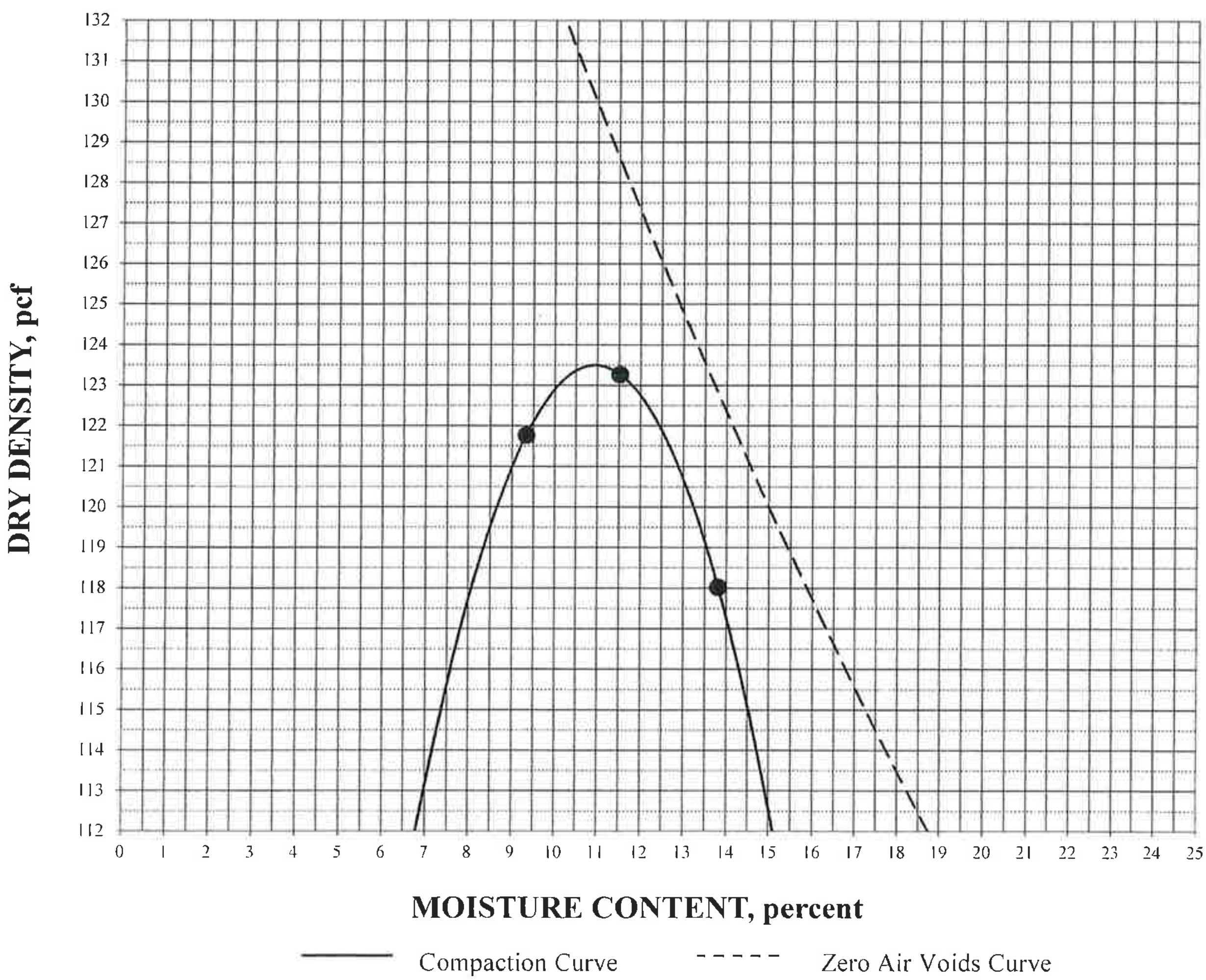
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 123.5 pcf

OPTIMUM MOISTURE: 10.9%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019

CBR #2; Boring #9 @ 3.0 - 5.0'

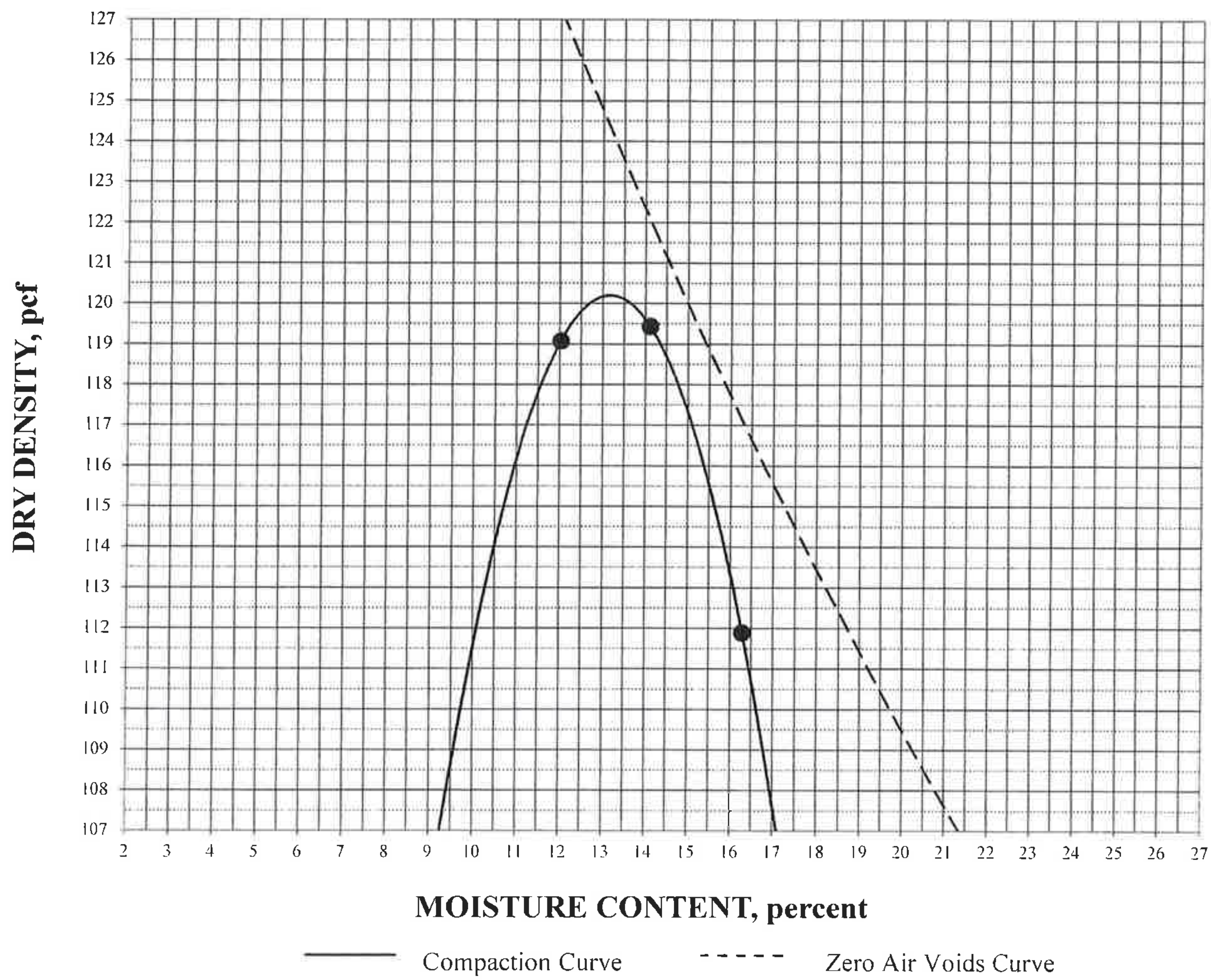
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 120.2 pcf

OPTIMUM MOISTURE: 13.2%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 16, 2019

CBR #3 with 3% Lime added; Boring #5 @ 2.0 - 4.0'

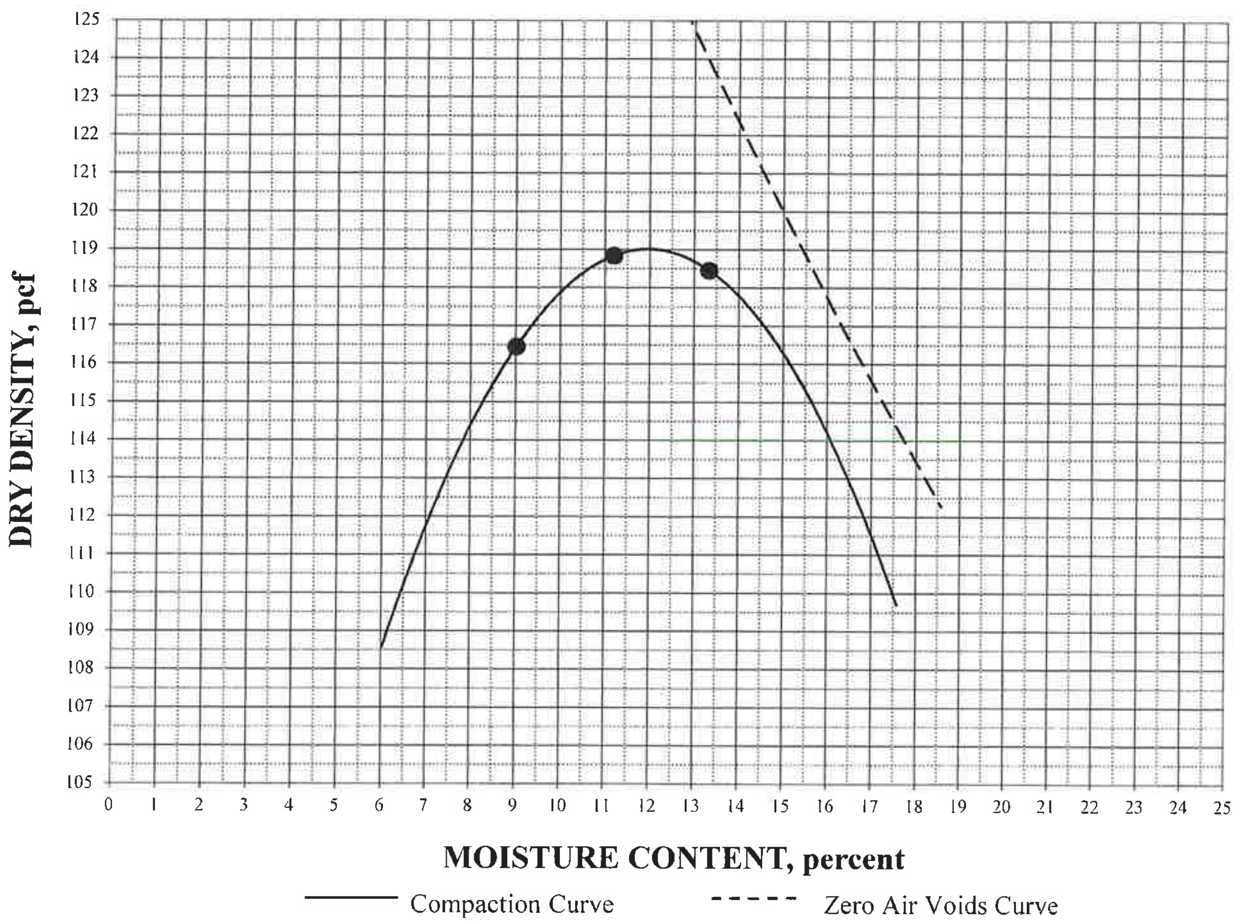
Dark Brown Silty Sand (SM)

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 119.0 pcf

OPTIMUM MOISTURE: 12.0%



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 16, 2019

CBR #3 with 5% Lime added; Boring #5 @ 2.0 - 4.0'

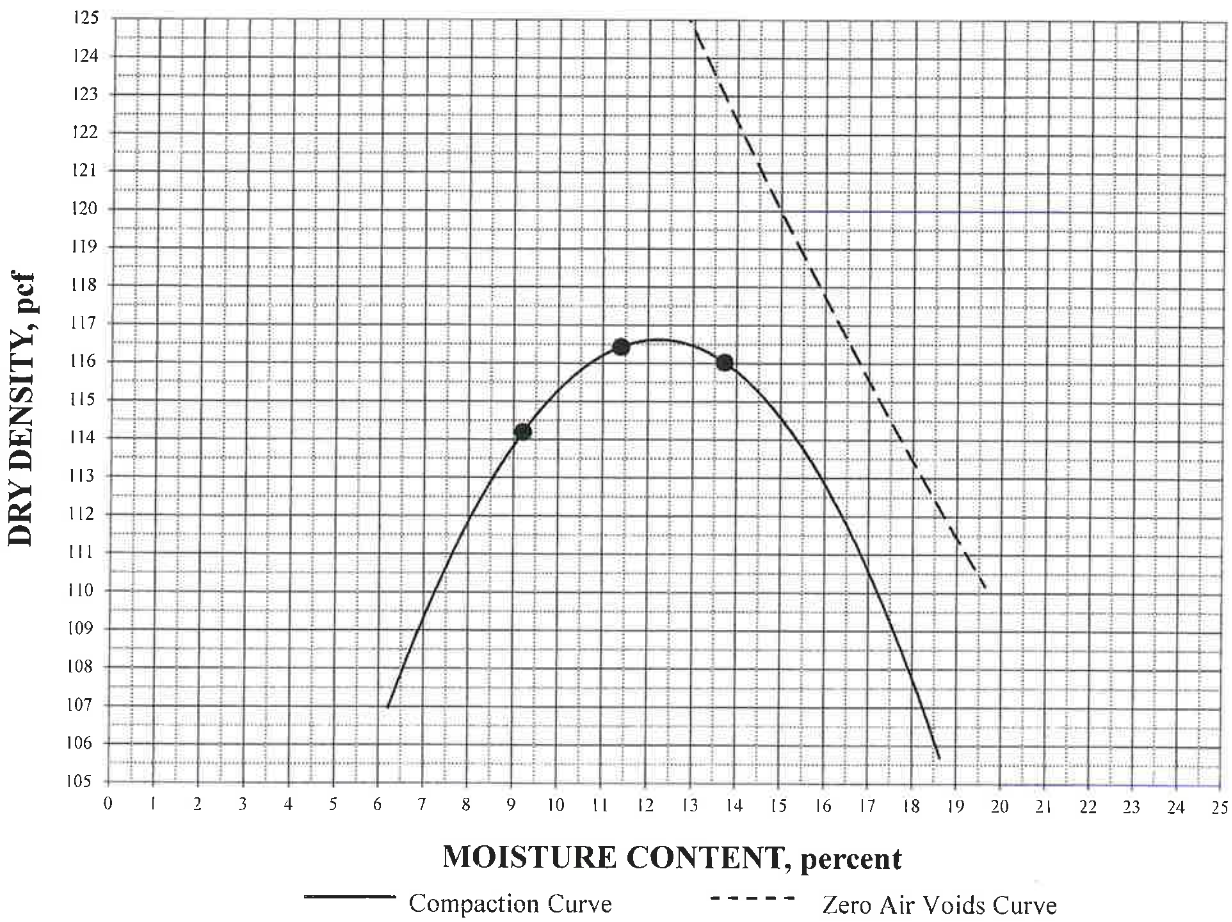
Dark Brown Silty Sand (SM)

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 116.6 pcf

OPTIMUM MOISTURE: 12.2%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

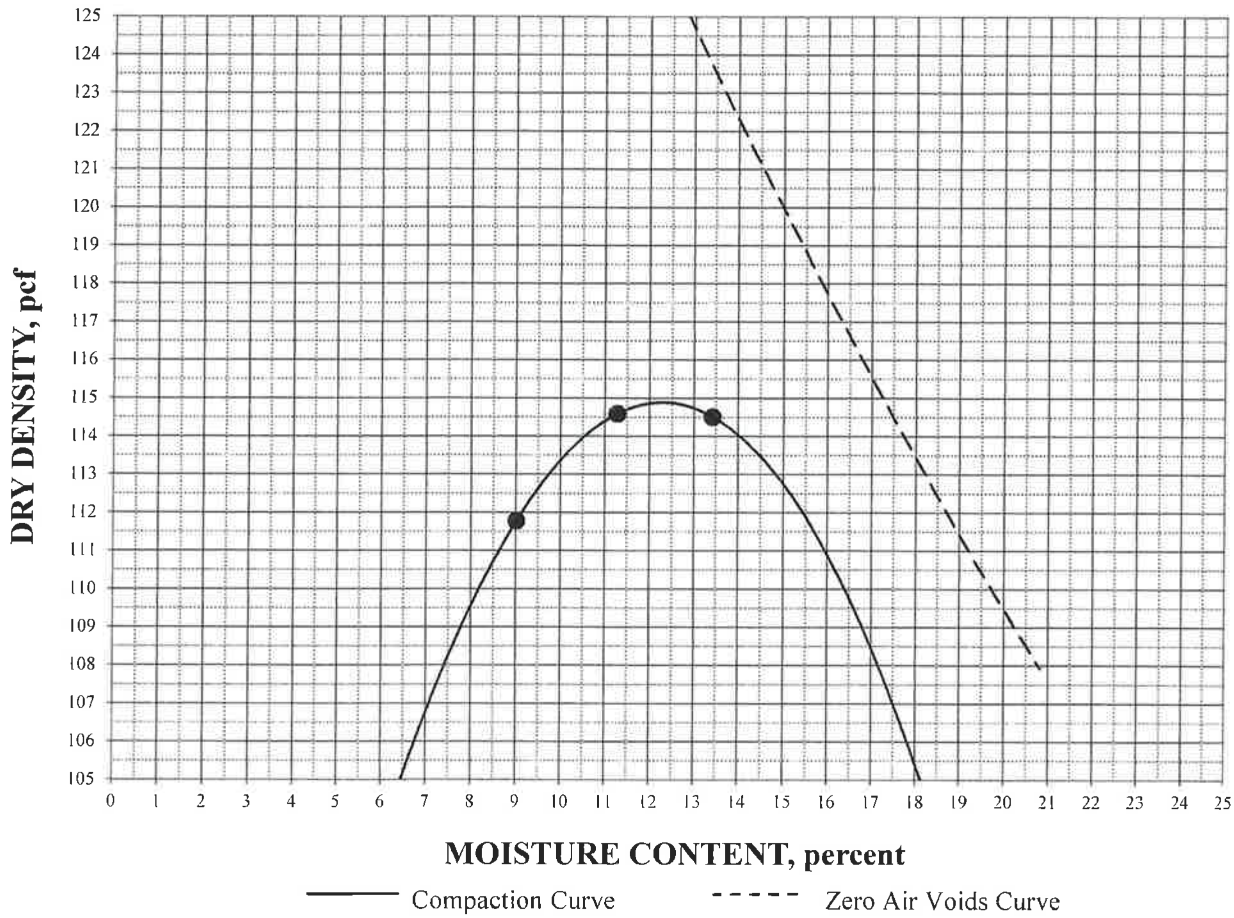
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

January 16, 2019
CBR #3 with 7% Lime added; Boring #5 @ 2.0 - 4.0'
Dark Brown Silty Sand (SM)

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 114.9 pcf
OPTIMUM MOISTURE: 12.3%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: C

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

January 8, 2019

CBR #4; Boring #3 @ 0.5 - 1.0'

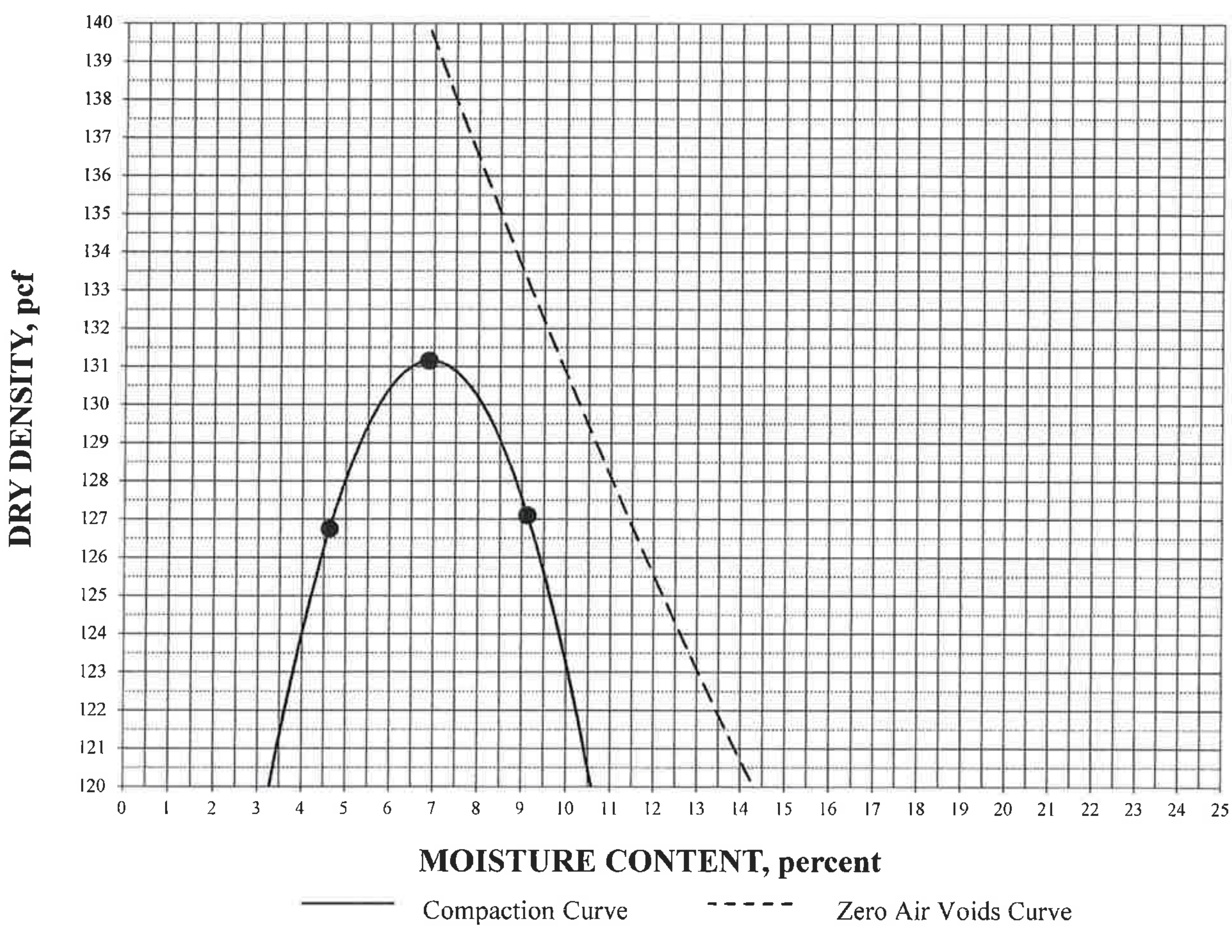
Brown Clayey Sand with Gravel (SC)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	7
#4	16

MAXIMUM DRY DENSITY: 131.2 pcf

OPTIMUM MOISTURE: 6.9%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019

CBR #5; Boring #36 @ 2.5 - 5.0'

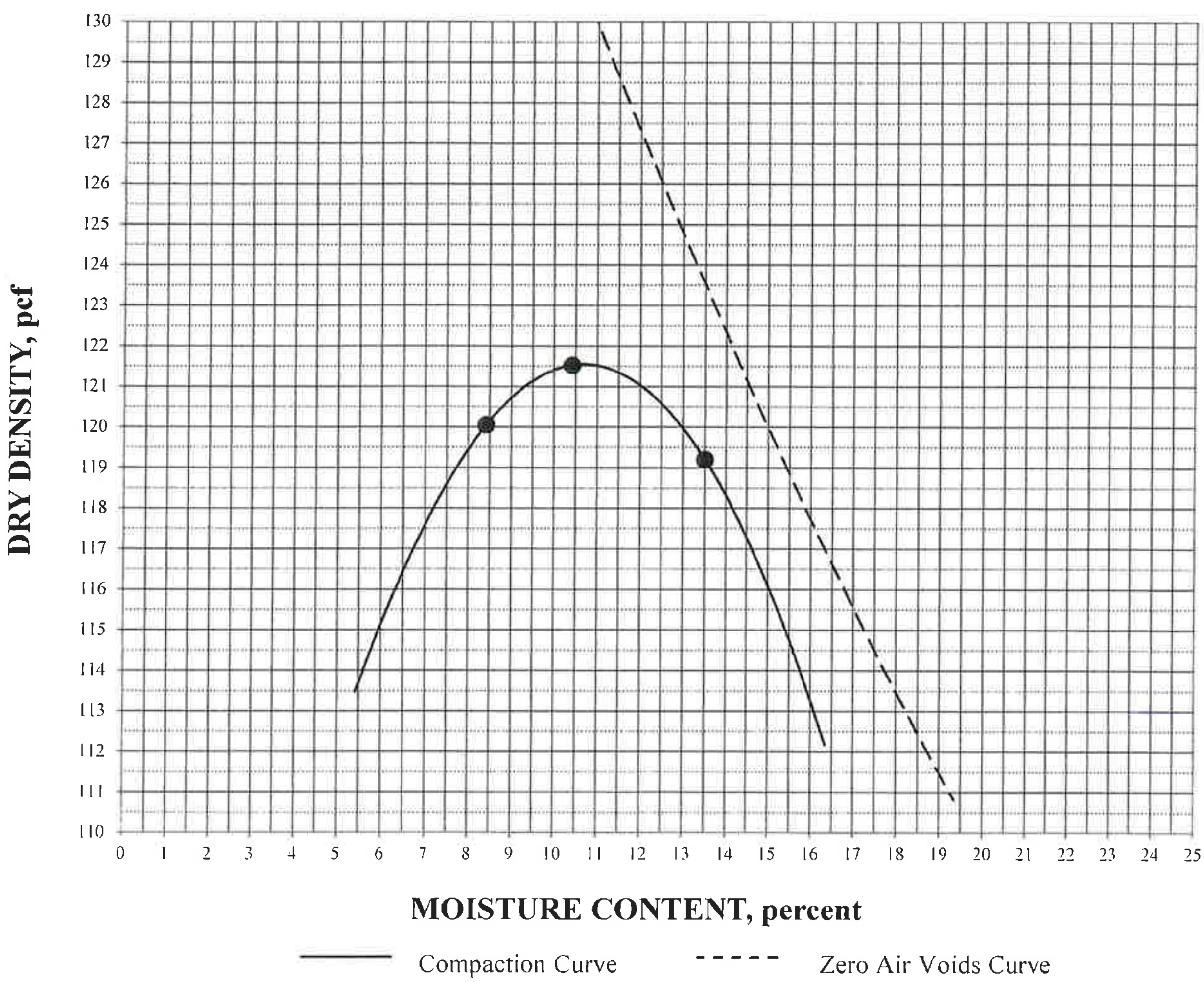
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	2

MAXIMUM DRY DENSITY: 121.5 pcf

OPTIMUM MOISTURE: 10.7%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 16, 2019

CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'

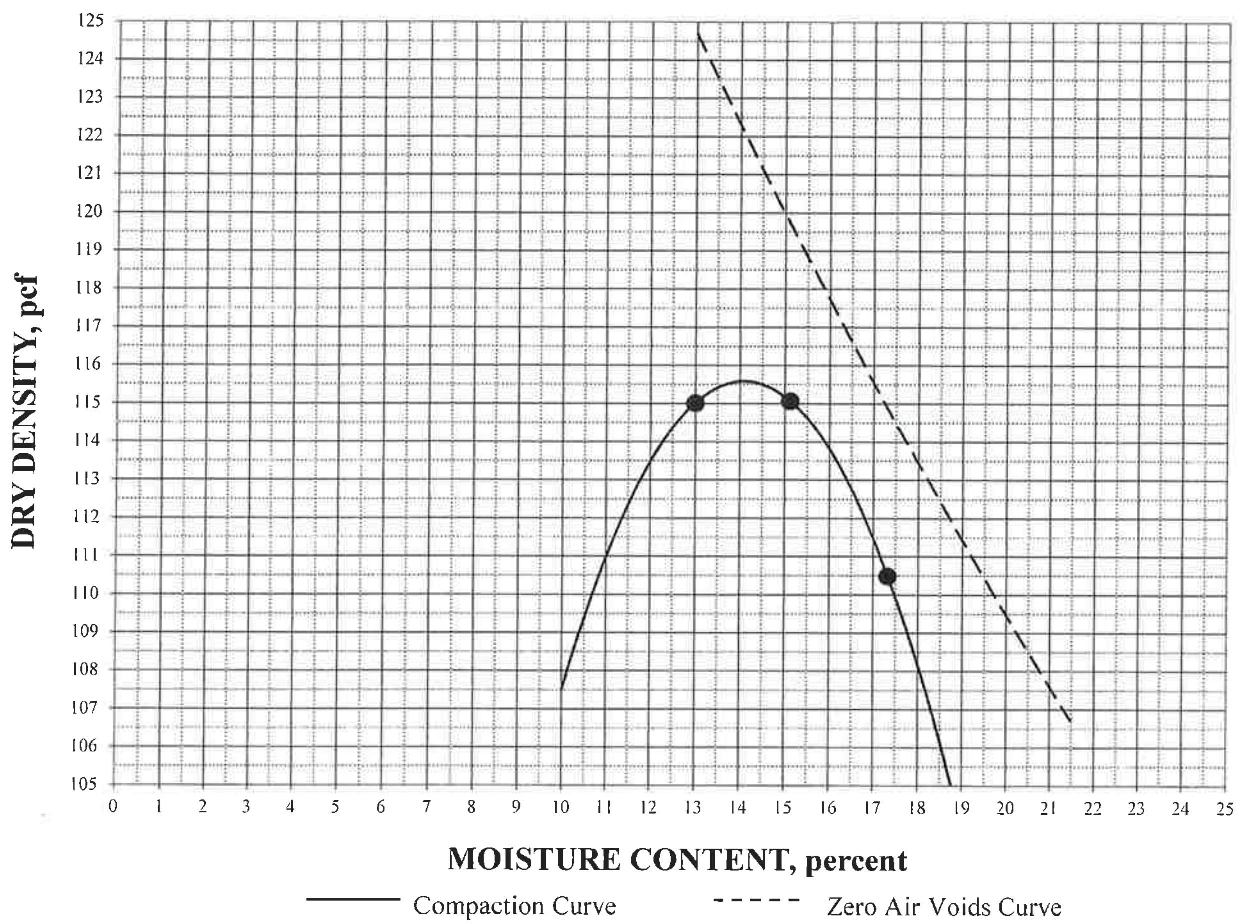
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	1

MAXIMUM DRY DENSITY: 115.6 pcf

OPTIMUM MOISTURE: 14.1%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 16, 2019

CBR #6 with 5% Lime added; Boring #27 @ 2.0 - 4.0'

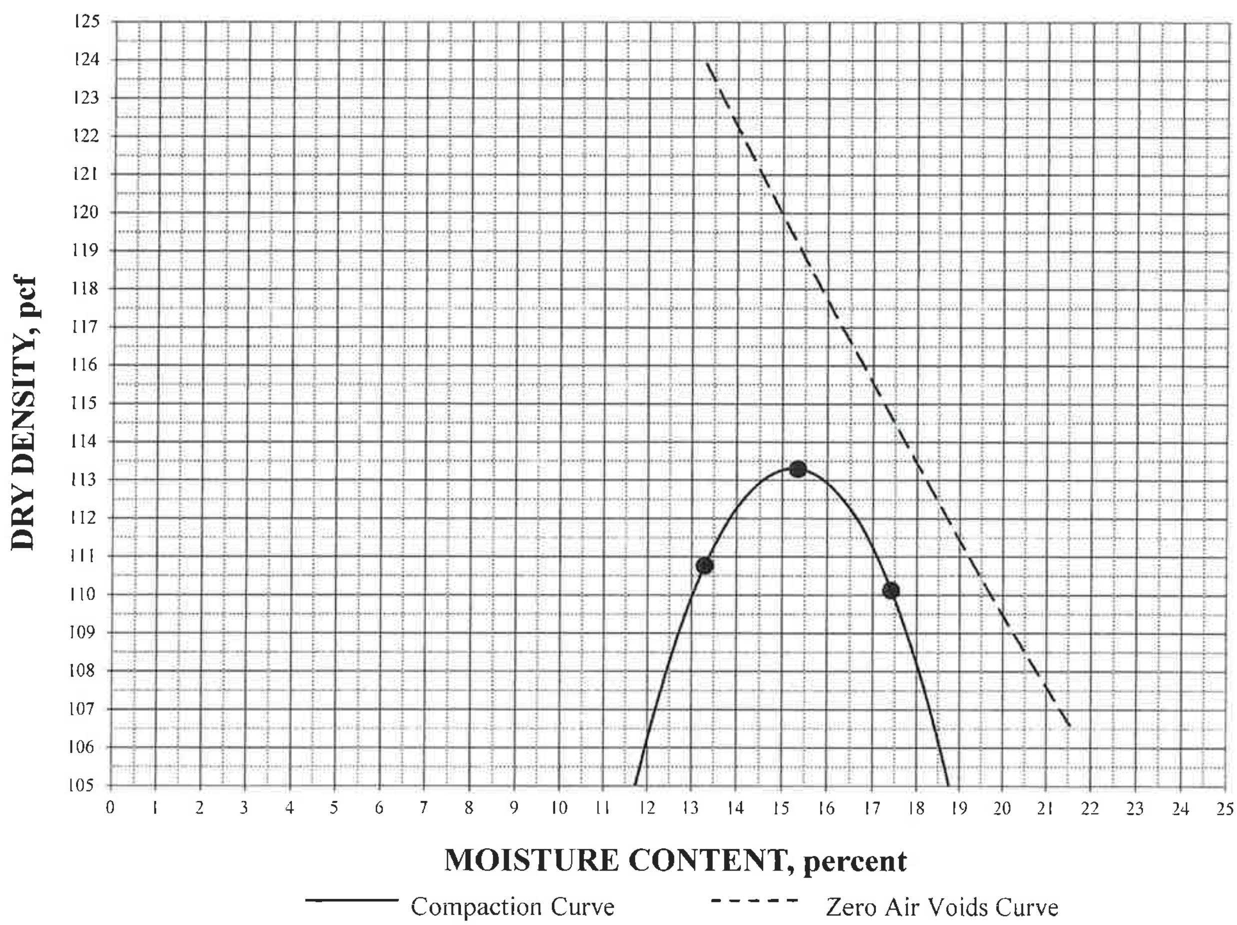
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	1

MAXIMUM DRY DENSITY: 113.3 pcf

OPTIMUM MOISTURE: 15.2%



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 16, 2019

CBR #6 with 7% Lime added; Boring #27 @ 2.0 - 4.0'

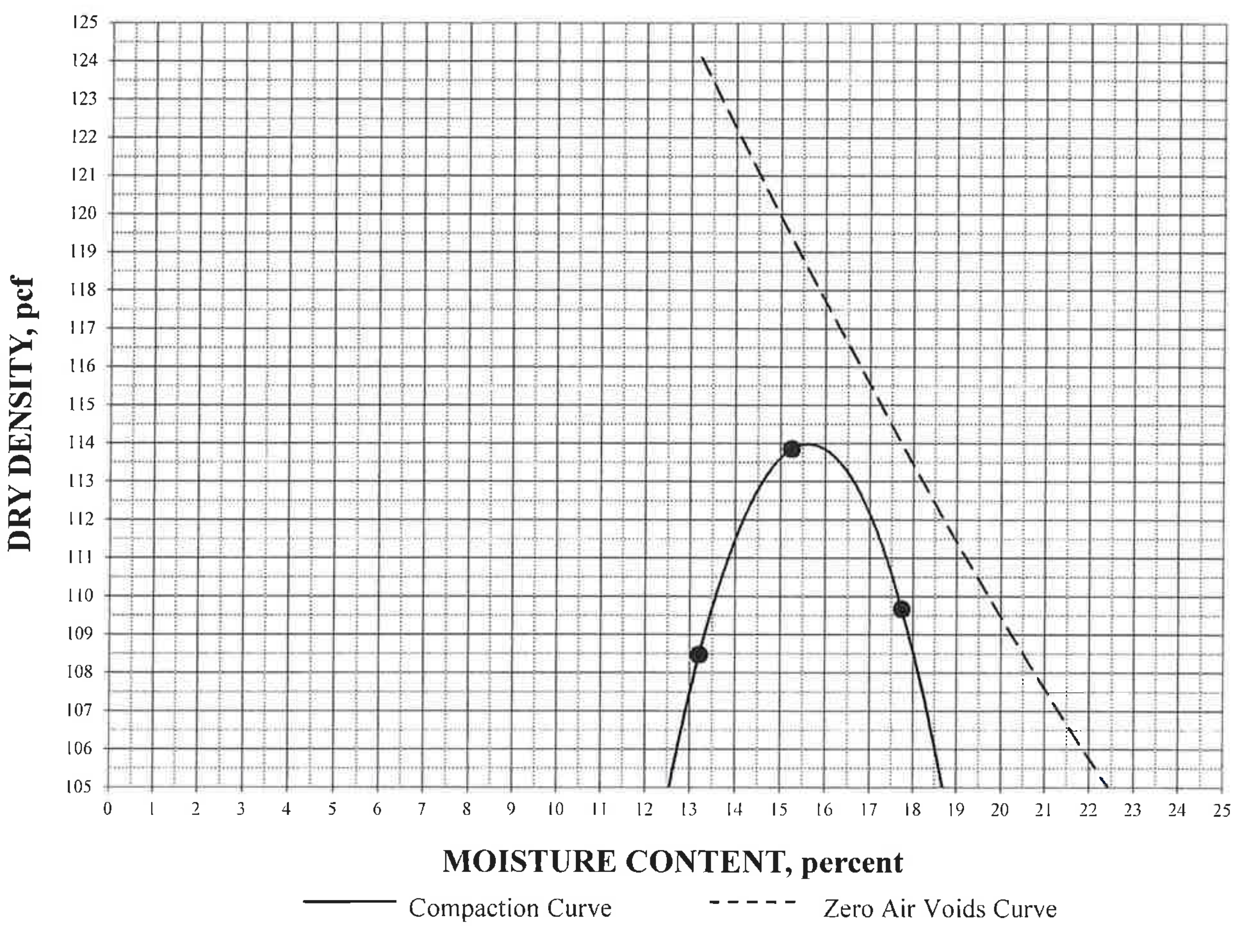
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	1

MAXIMUM DRY DENSITY: 114.0 pcf

OPTIMUM MOISTURE: 15.6%



Oxnard Airport - Runway and Taxiway
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MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019

CBR #7; Boring #23 @ 3.5 - 5.0'

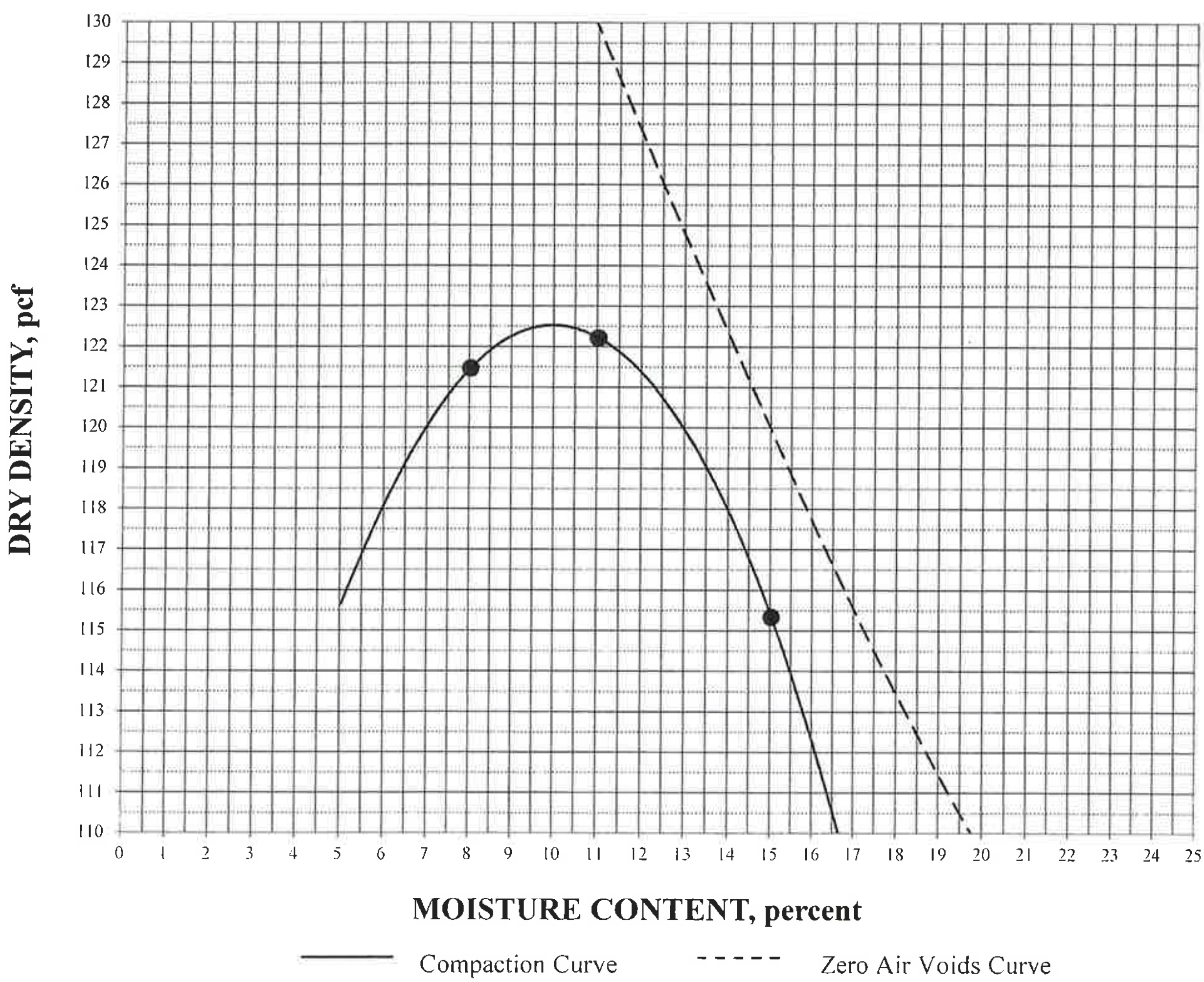
Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 122.5 pcf

OPTIMUM MOISTURE: 10.0%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

January 8, 2019

CBR #8; Boring #29 @ 2.0 - 5.0'

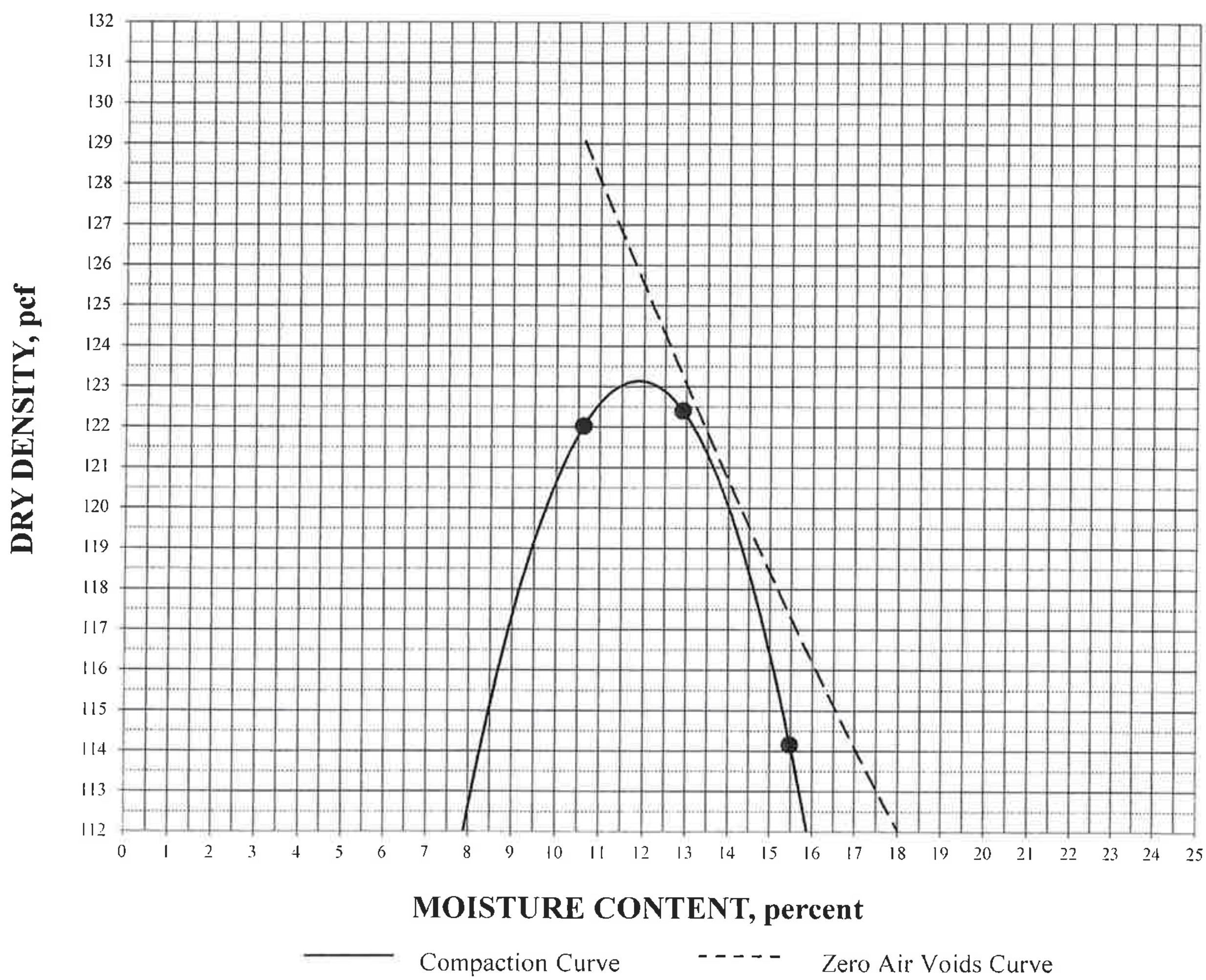
Brown / Gray Mottled Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	1

MAXIMUM DRY DENSITY: 123.1 pcf

OPTIMUM MOISTURE: 11.9%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019

CBR #9; Boring #21 @ 1.5 - 3.0'

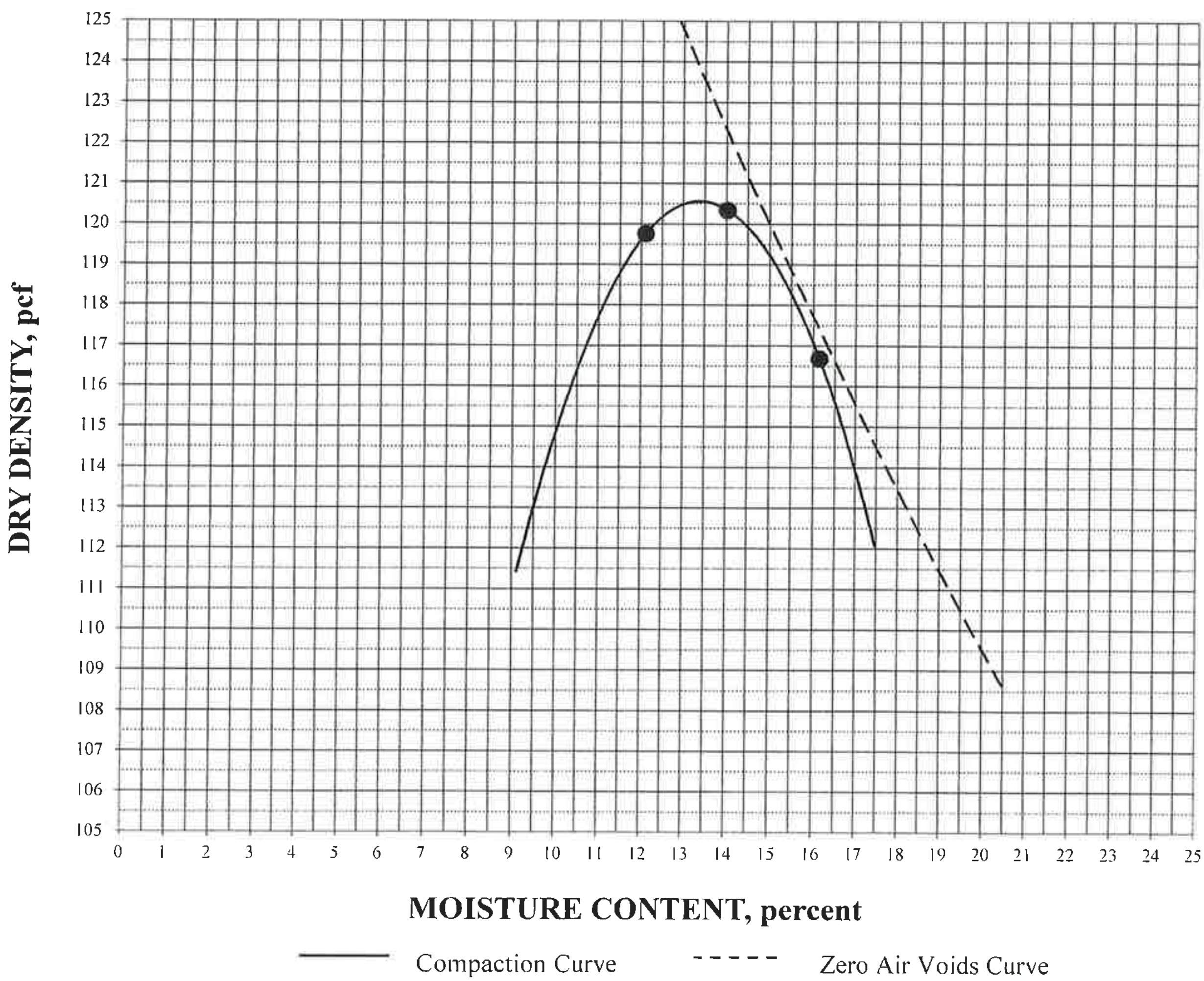
Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	1
#4	1

MAXIMUM DRY DENSITY: 120.6 pcf

OPTIMUM MOISTURE: 13.4%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

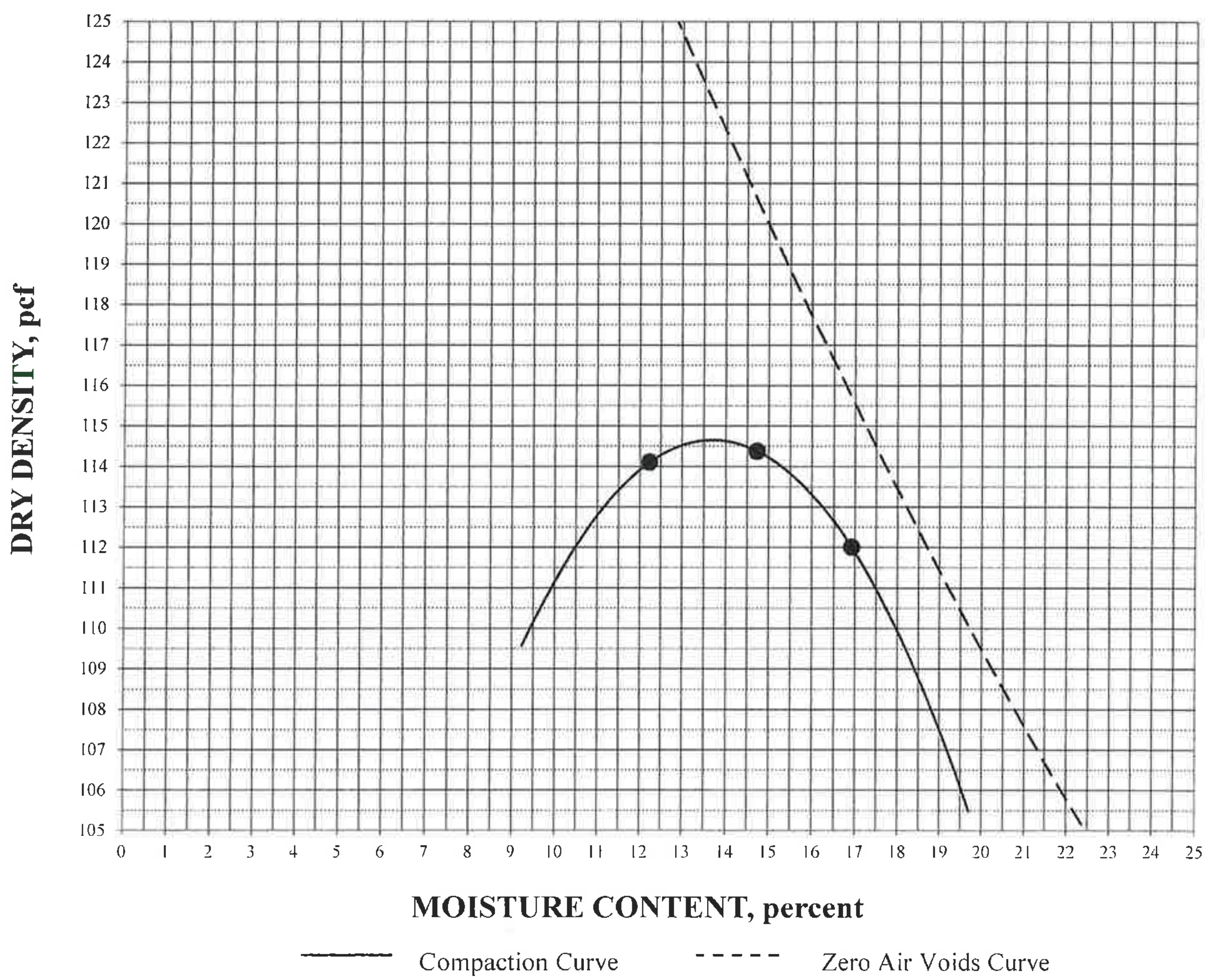
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019
CBR #11; Boring #16 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	1

MAXIMUM DRY DENSITY: 114.7 pcf
OPTIMUM MOISTURE: 13.7%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

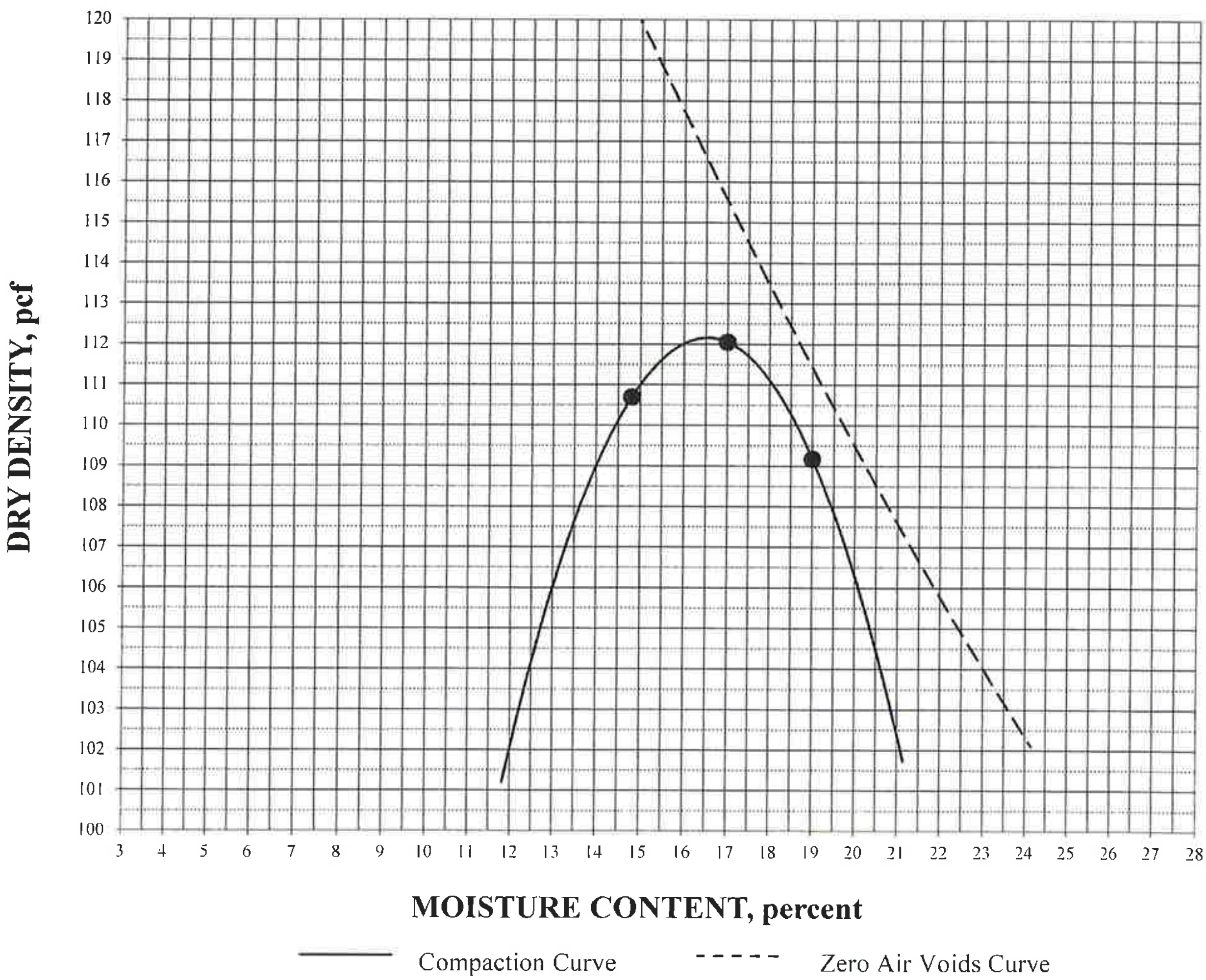
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

January 8, 2019
CBR #12; Boring #13 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 112.2 pcf
OPTIMUM MOISTURE: 16.5%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

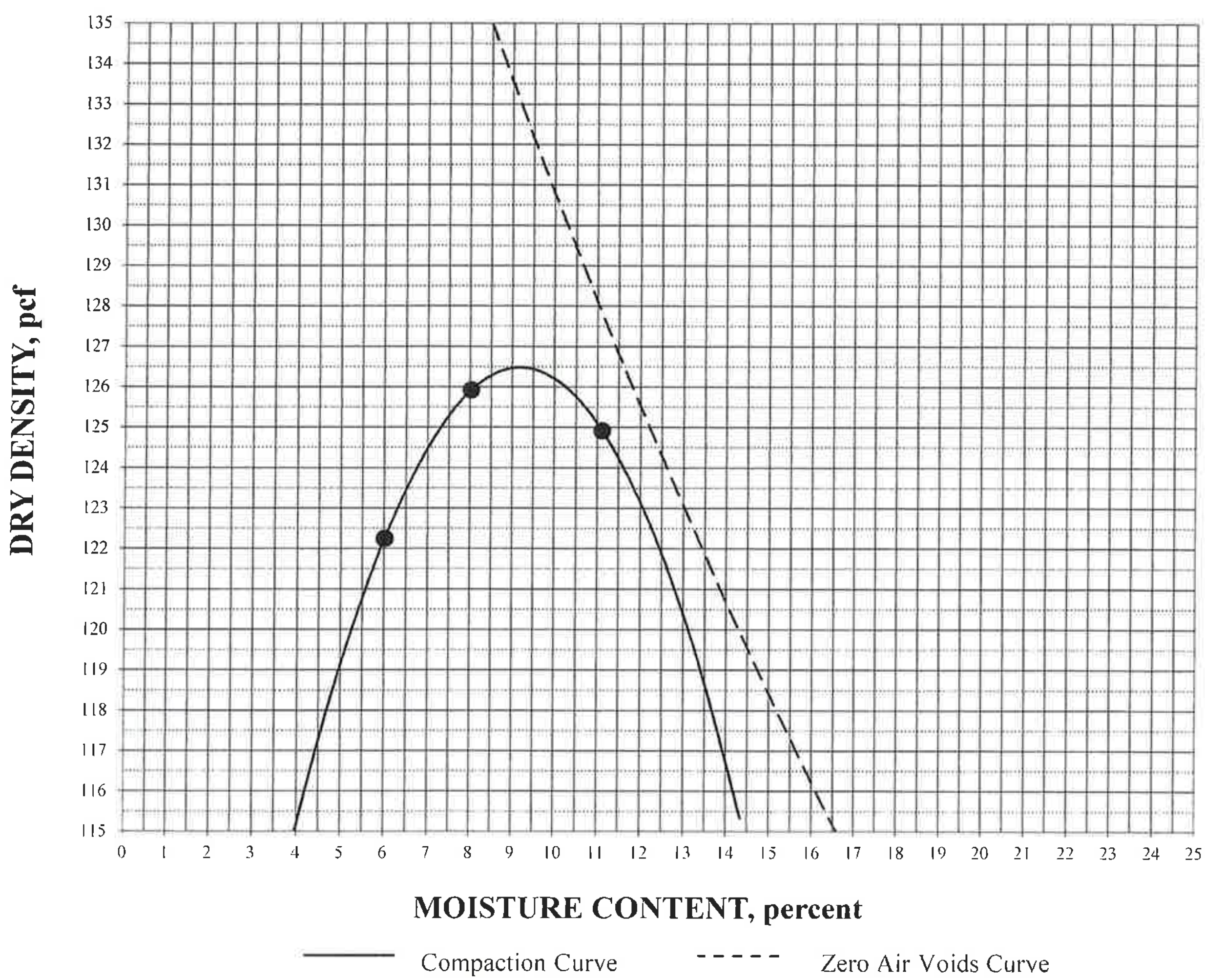
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.65 (assumed)

January 8, 2019
CBR #13; Boring #40 @ 1.5 - 3.5'
Brown Silty Sand (SM)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	3

MAXIMUM DRY DENSITY: 126.5 pcf
OPTIMUM MOISTURE: 9.2%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

CBR #14; Boring #39 @ 2.0 - 5.0'

RAMMER TYPE: Mechanical

Brown Sandy Fat Clay (CH)

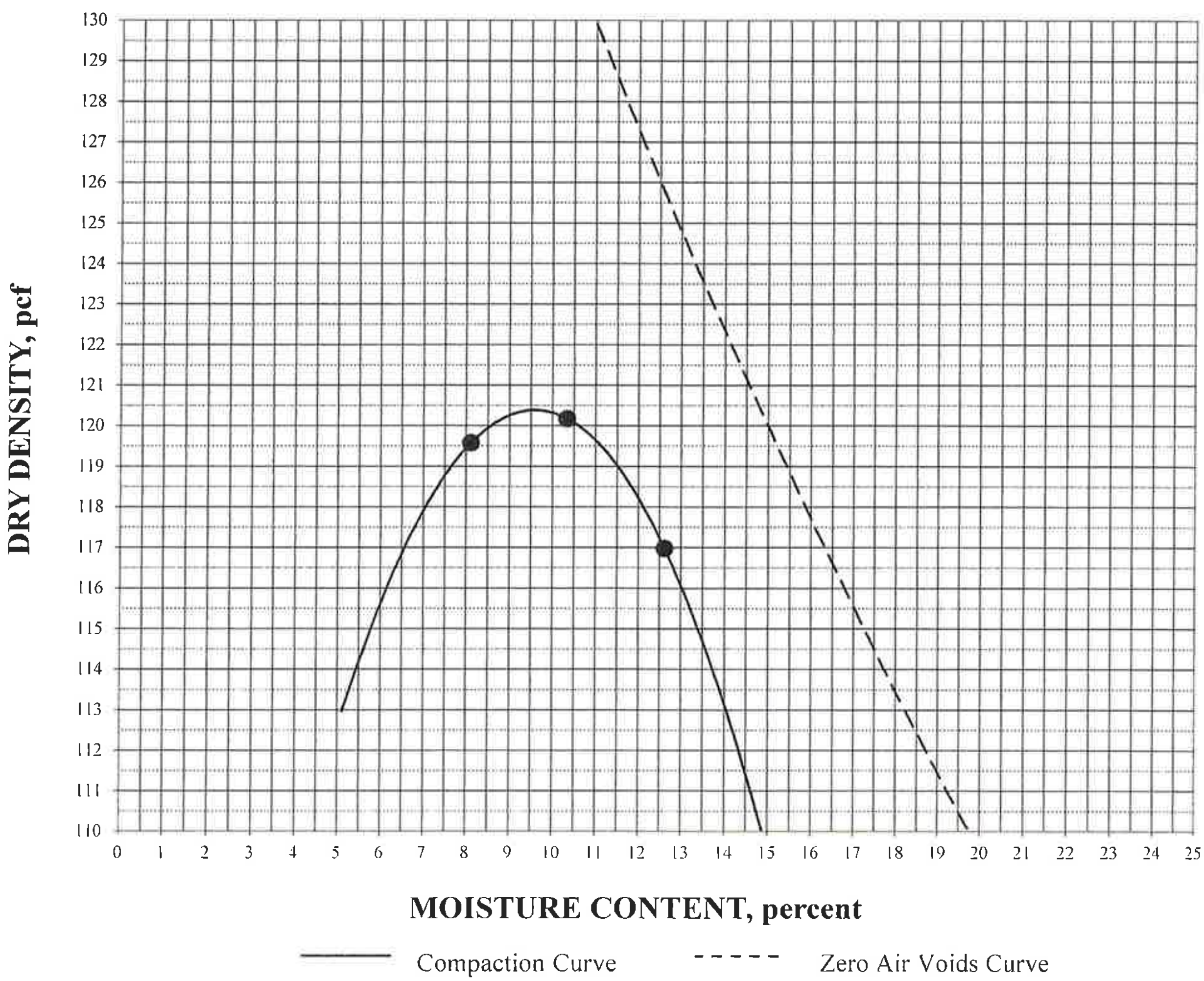
SPECIFIC GRAVITY: 2.70 (assumed)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 120.4 pcf

OPTIMUM MOISTURE: 9.6%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: C

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

January 8, 2019

CBR #15; Boring #17 @ 0.5 - 1.5'

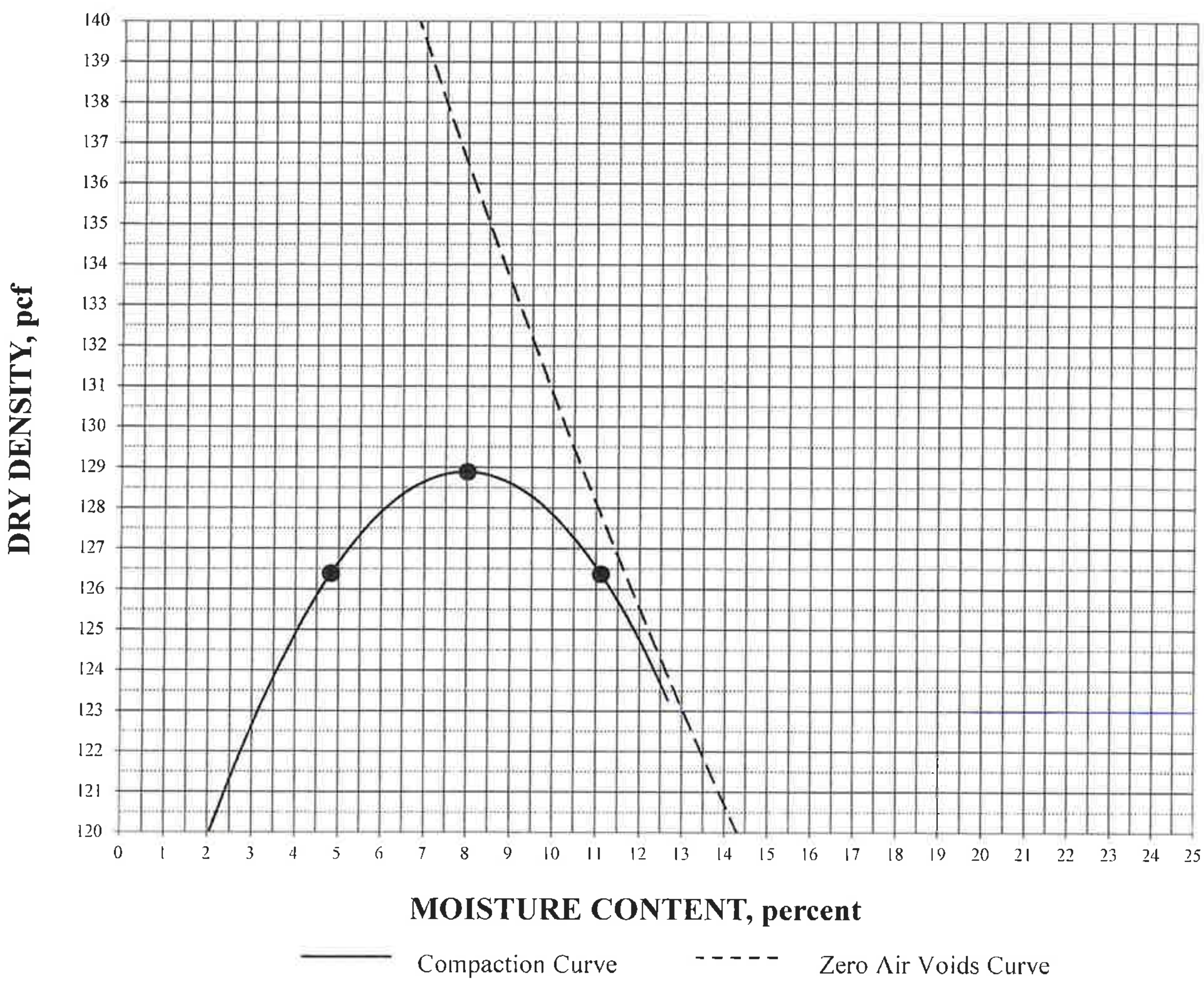
Brown Clayey Sand with Gravel (SC)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	10
3/8"	26
#4	41

MAXIMUM DRY DENSITY: 128.9 pcf

OPTIMUM MOISTURE: 8.0%



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: C

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

January 8, 2019

CBR #16; Boring #28 @ 0.5 - 1.5'

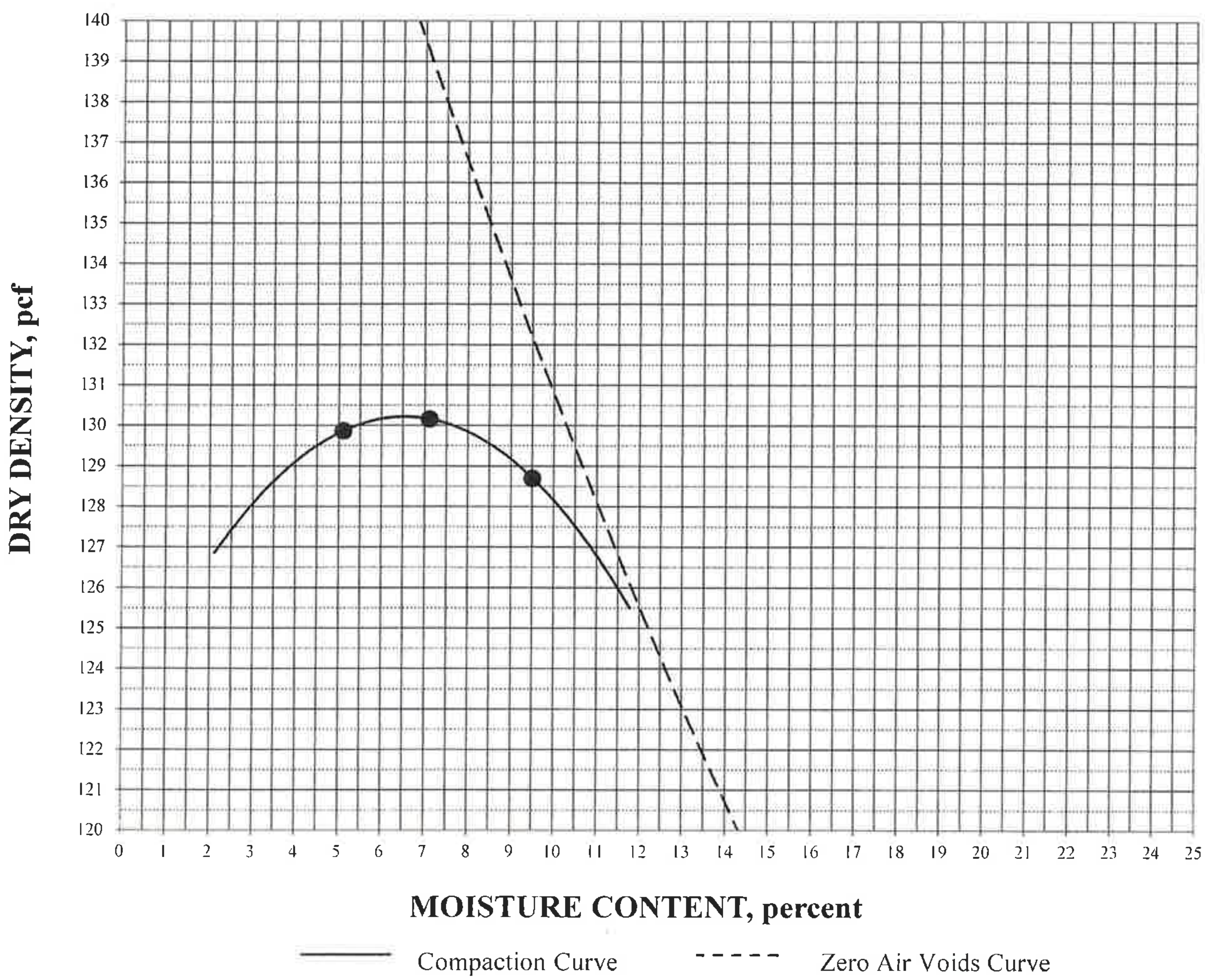
Brown Silty Gravel with Sand (GM)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	10
3/8"	29
#4	46

MAXIMUM DRY DENSITY: 130.2 pcf

OPTIMUM MOISTURE: 6.5%



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: C

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

January 8, 2019

CBR #17; Boring #14 @ 0.5 - 1.5'

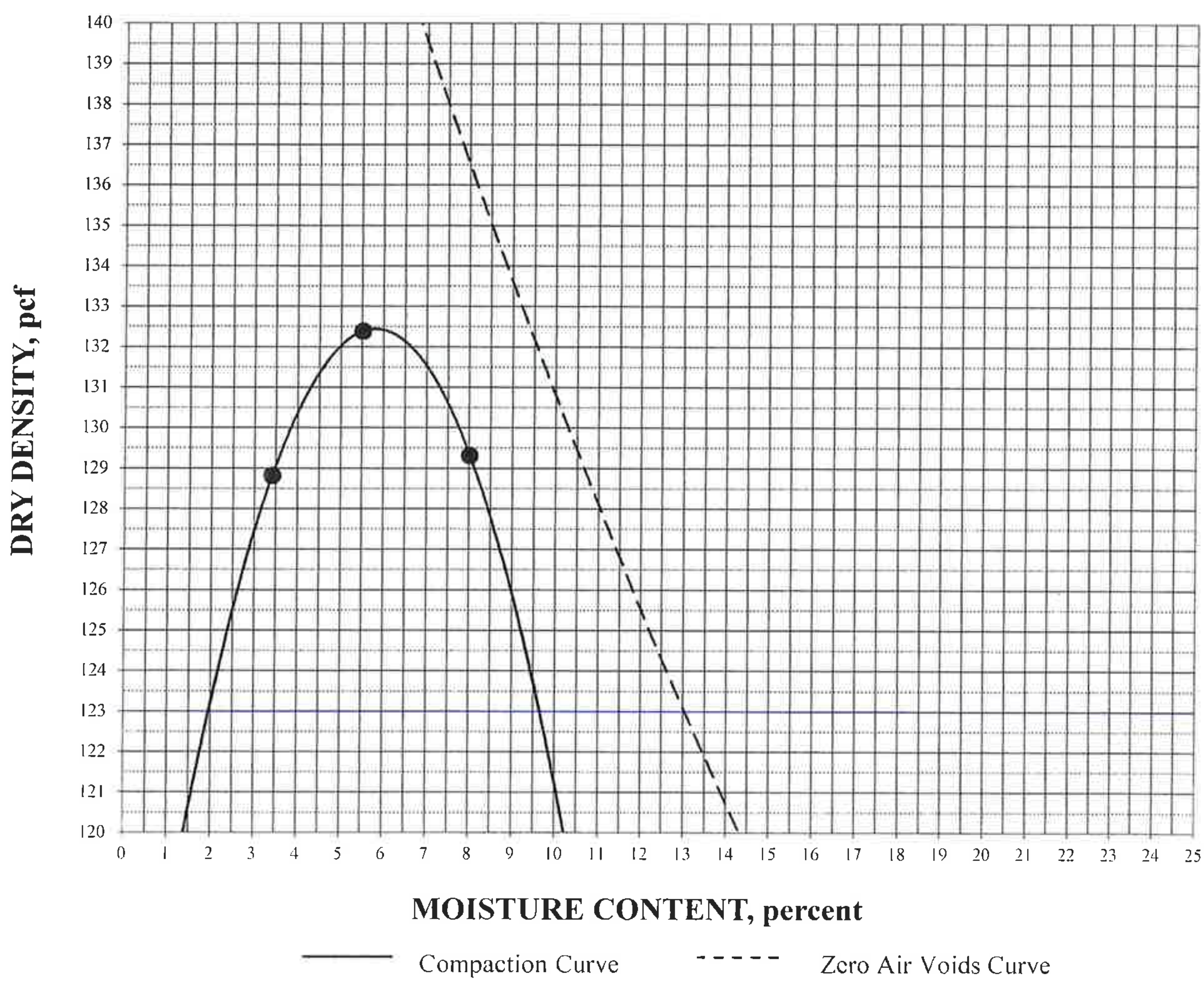
Brown Silty Sand with Gravel (SM)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	7
3/8"	22
#4	35

MAXIMUM DRY DENSITY: 132.4 pcf

OPTIMUM MOISTURE: 5.8%



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #1; Boring #1 @ 2.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	106.8	112.2	112.6
Moisture content, %, before soak	7.9	10.9	13.9
Moisture content, %, after soak, avg.	15.3	16.8	18.8
Moisture content, %, after soak, top 1"	20.3	17.7	16.8
Expansion, %, 96 hour soak	1.9	0.1	0.2
Bearing Ratio, 0.100" penetration	2.9	8.7	3.4

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	109.9	118.6	116.5
Moisture content, %, before soak	7.9	10.9	13.9
Moisture content, %, after soak, avg.	13.7	14.4	16.5
Moisture content, %, after soak, top 1"	18.6	16.5	14.2
Expansion, %, 96 hour soak	1.6	0.2	0.1
Bearing Ratio, 0.100" penetration	6.9	23.8	7.1

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	117.7	124.3	118.0
Moisture content, %, before soak	7.9	10.9	13.9
Moisture content, %, after soak, avg.	14.3	12.4	14.1
Moisture content, %, after soak, top 1"	15.7	13.0	14.0
Expansion, %, 96 hour soak	1.0	0.0	0.0
Bearing Ratio, 0.100" penetration	21.3	32.3	4.7

CALIFORNIA BEARING RATIO

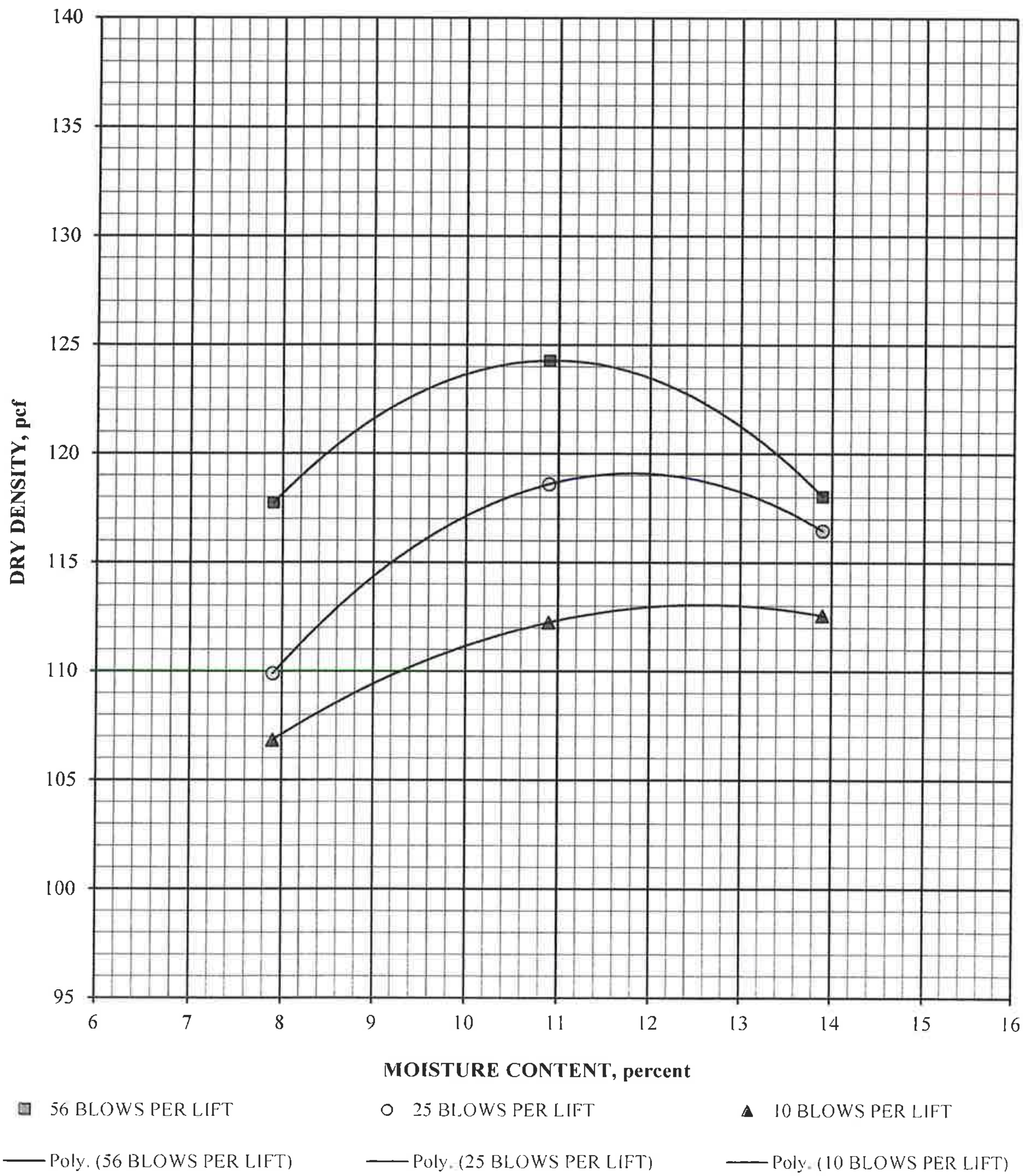
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #1; Boring #1 @ 2.0 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

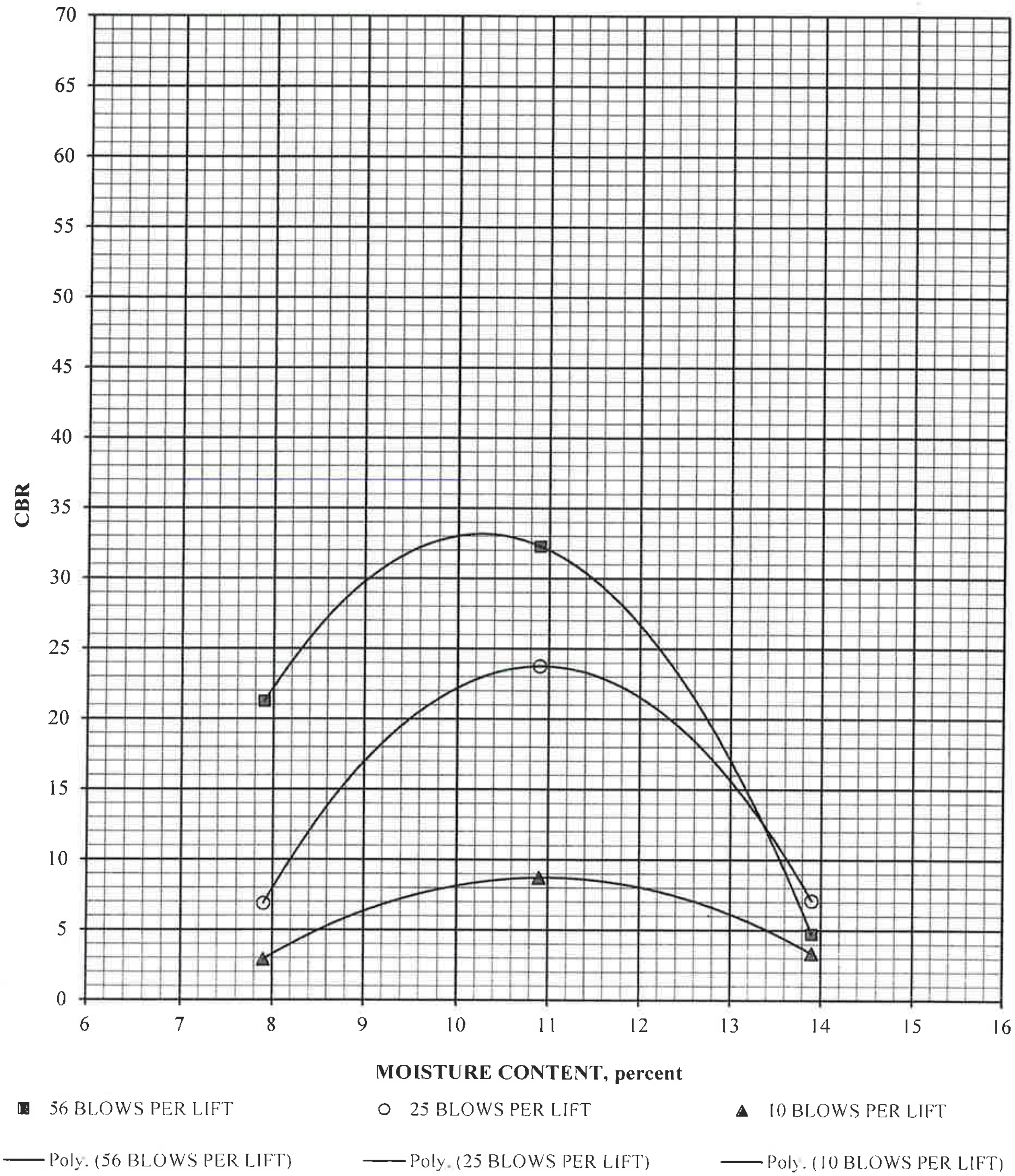
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #1; Boring #1 @ 2.0 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

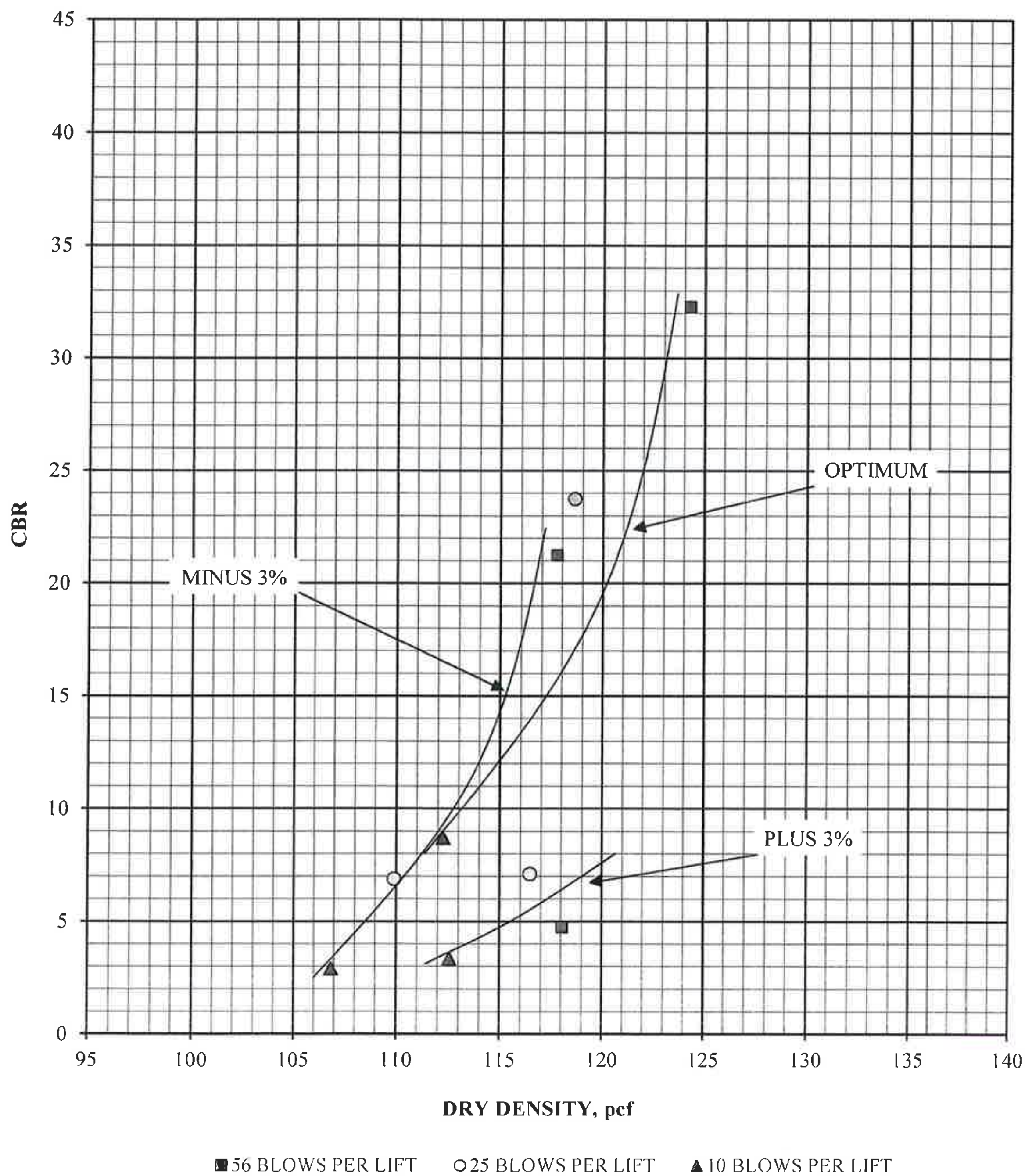
CBR #1; Boring #1 @ 2.0 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #9 @ 3.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	105.5	112.6	112.1
Moisture content, %, before soak	11.2	14.2	17.2
Moisture content, %, after soak, avg.	21.9	17.8	19.8
Moisture content, %, after soak, top 1"	21.7	20.4	17.8
Expansion, %, 96 hour soak	1.6	0.7	0.0
Bearing Ratio, 0.100" penetration	3.2	9.1	4.1

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	112.2	117.7	113.2
Moisture content, %, before soak	11.2	14.2	17.2
Moisture content, %, after soak, avg.	19.9	16.0	18.2
Moisture content, %, after soak, top 1"	20.3	16.8	17.3
Expansion, %, 96 hour soak	0.9	0.0	0.0
Bearing Ratio, 0.100" penetration	7.6	11.9	4.3

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	117.7	120.0	111.9
Moisture content, %, before soak	11.2	14.2	17.2
Moisture content, %, after soak, avg.	19.0	15.5	18.1
Moisture content, %, after soak, top 1"	17.4	14.7	16.4
Expansion, %, 96 hour soak	1.1	0.4	0.0
Bearing Ratio, 0.100" penetration	9.1	14.9	3.4

CALIFORNIA BEARING RATIO

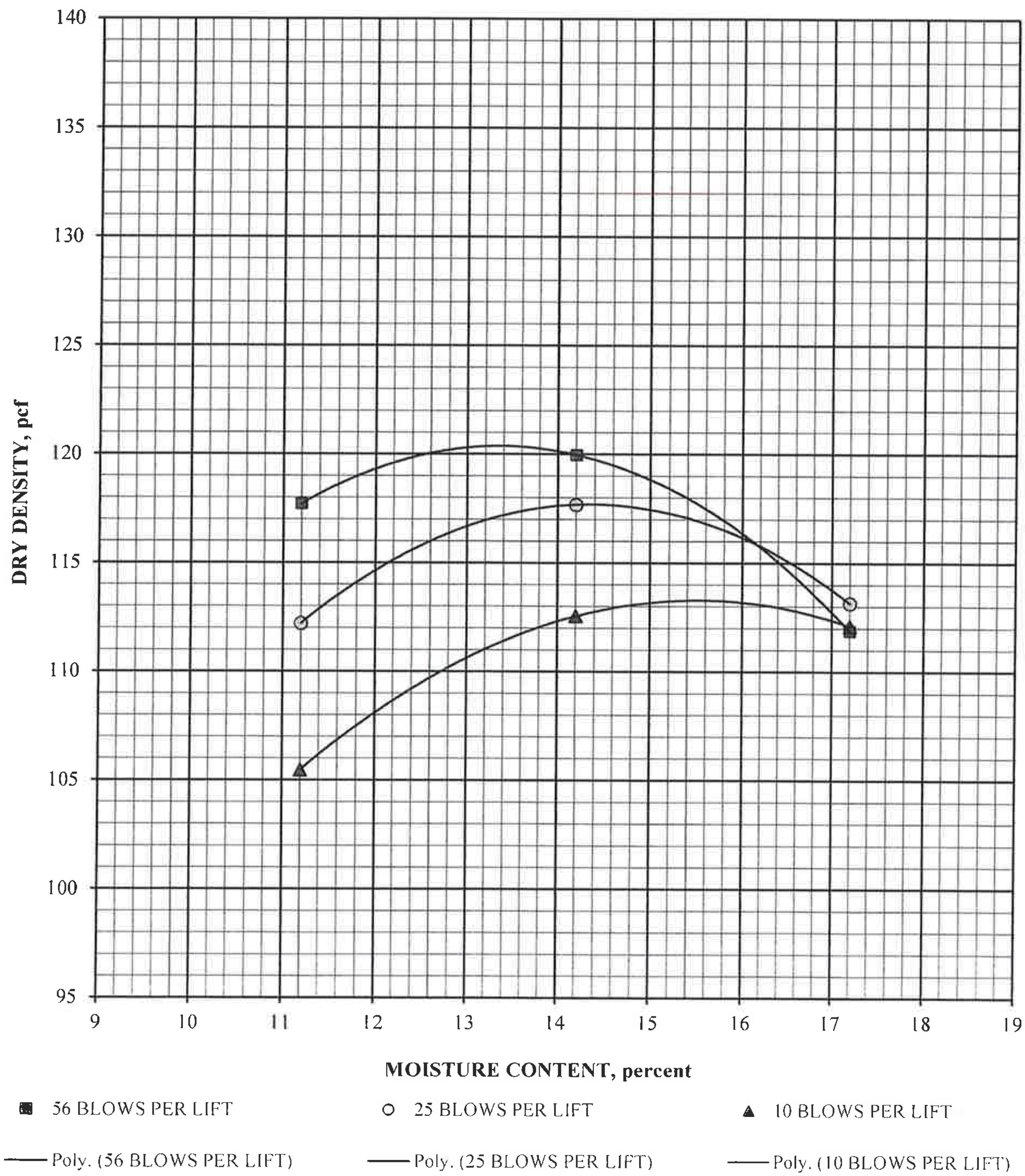
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #2; Boring #9 @ 3.0 - 5.0'

Dark Brown Sandy Lean Clay (CL)

January 8, 2019

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

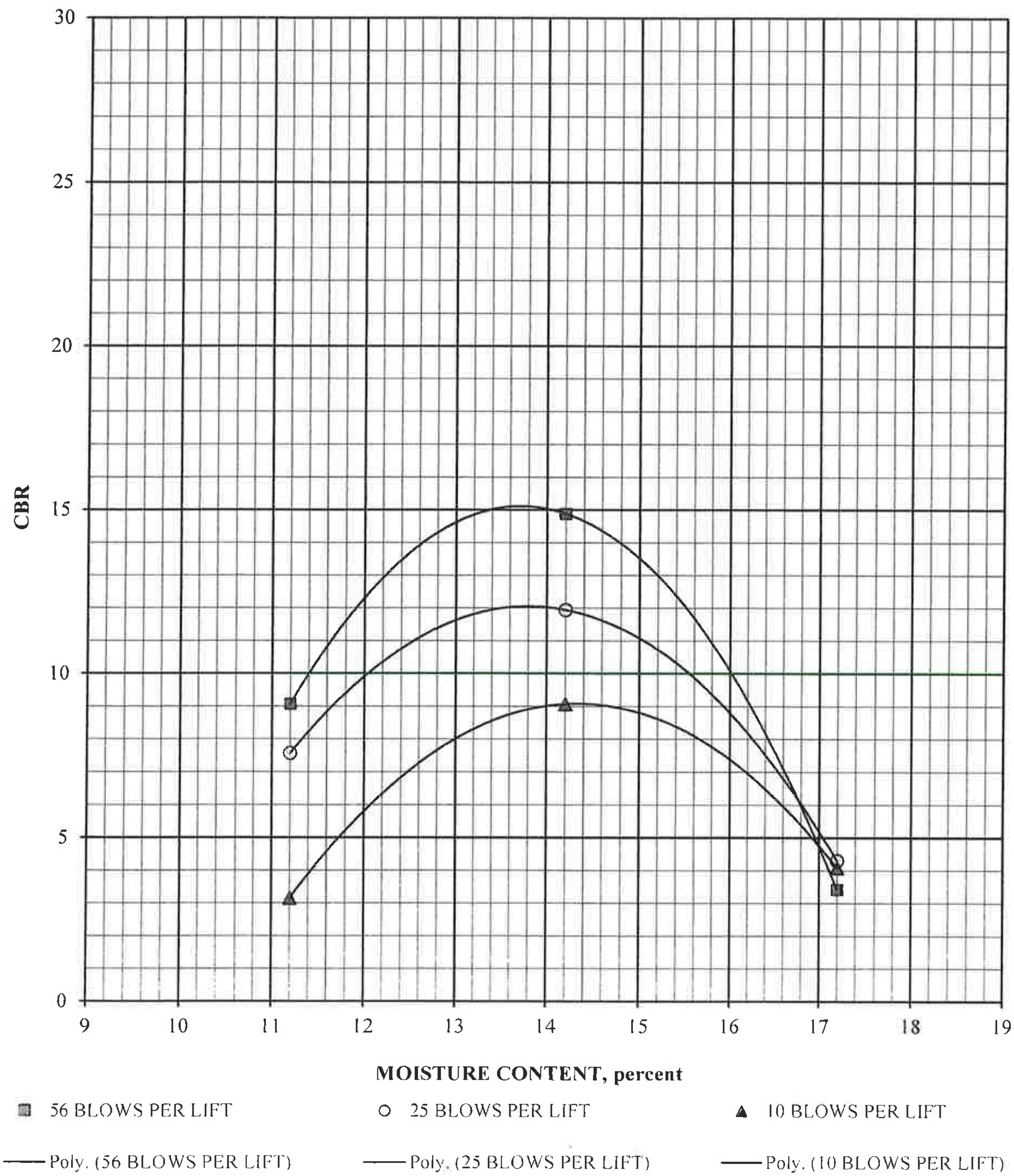
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #2; Boring #9 @ 3.0 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

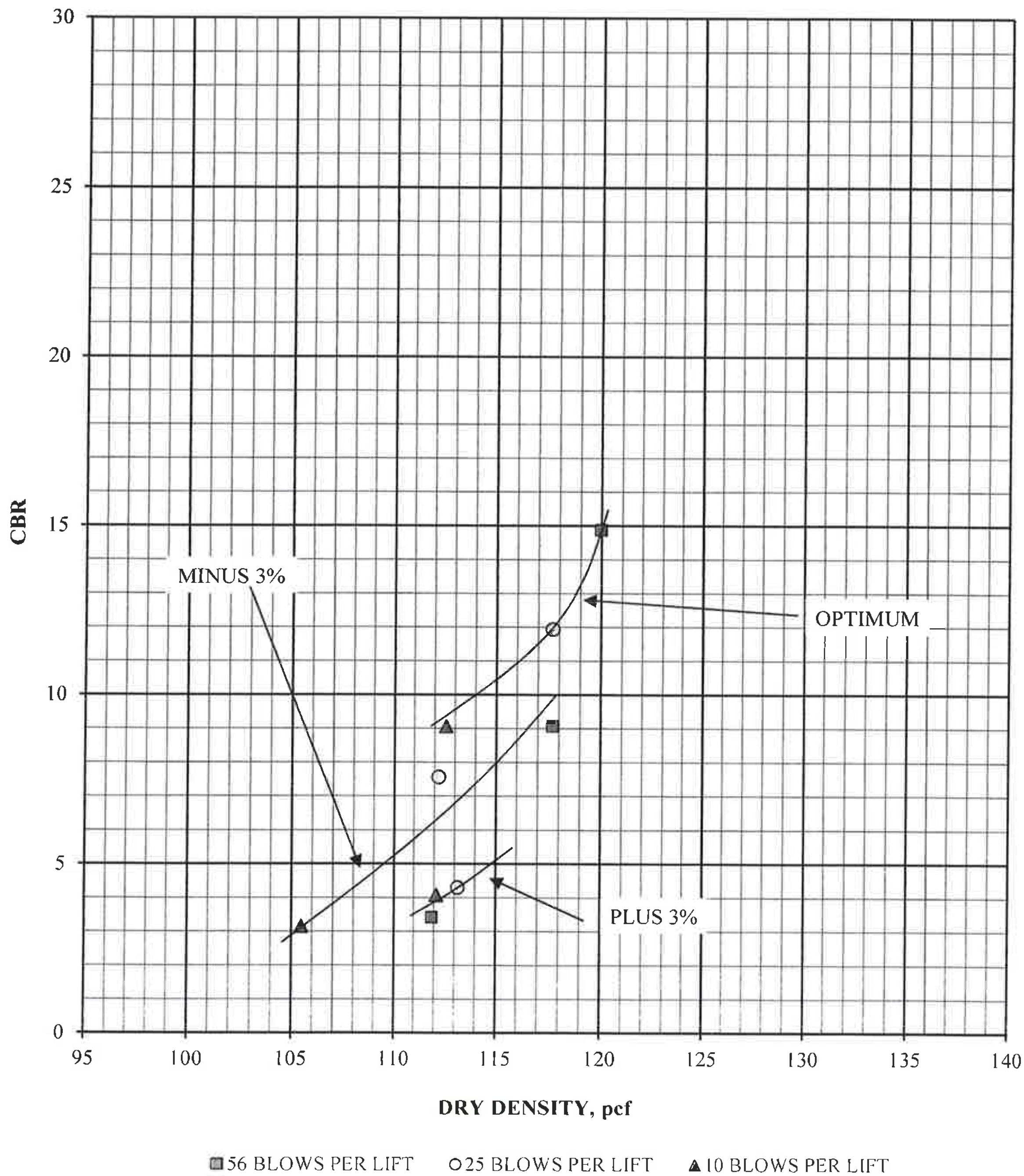
CBR #2; Boring #9 @ 3.0 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 3% Lime added; Boring #5 @ 2.0 - 4.0'
Dark Brown Silty Sand (SM)

January 16, 2019

10 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	103.2
Moisture content, %, before soak	12.0
Moisture content, %, after soak, avg.	20.3
Moisture content, %, after soak, top 1"	23.4
Expansion, %, 96 hour soak	0.0
Bearing Ratio, 0.100" penetration	17.4

25 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	113.8
Moisture content, %, before soak	12.0
Moisture content, %, after soak, avg.	14.3
Moisture content, %, after soak, top 1"	19.5
Expansion, %, 96 hour soak	0.0
Bearing Ratio, 0.100" penetration	53.6

56 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	118.3
Moisture content, %, before soak	12.0
Moisture content, %, after soak, avg.	13.2
Moisture content, %, after soak, top 1"	19.0
Expansion, %, 96 hour soak	0.2
Bearing Ratio, 0.100" penetration	78.1

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

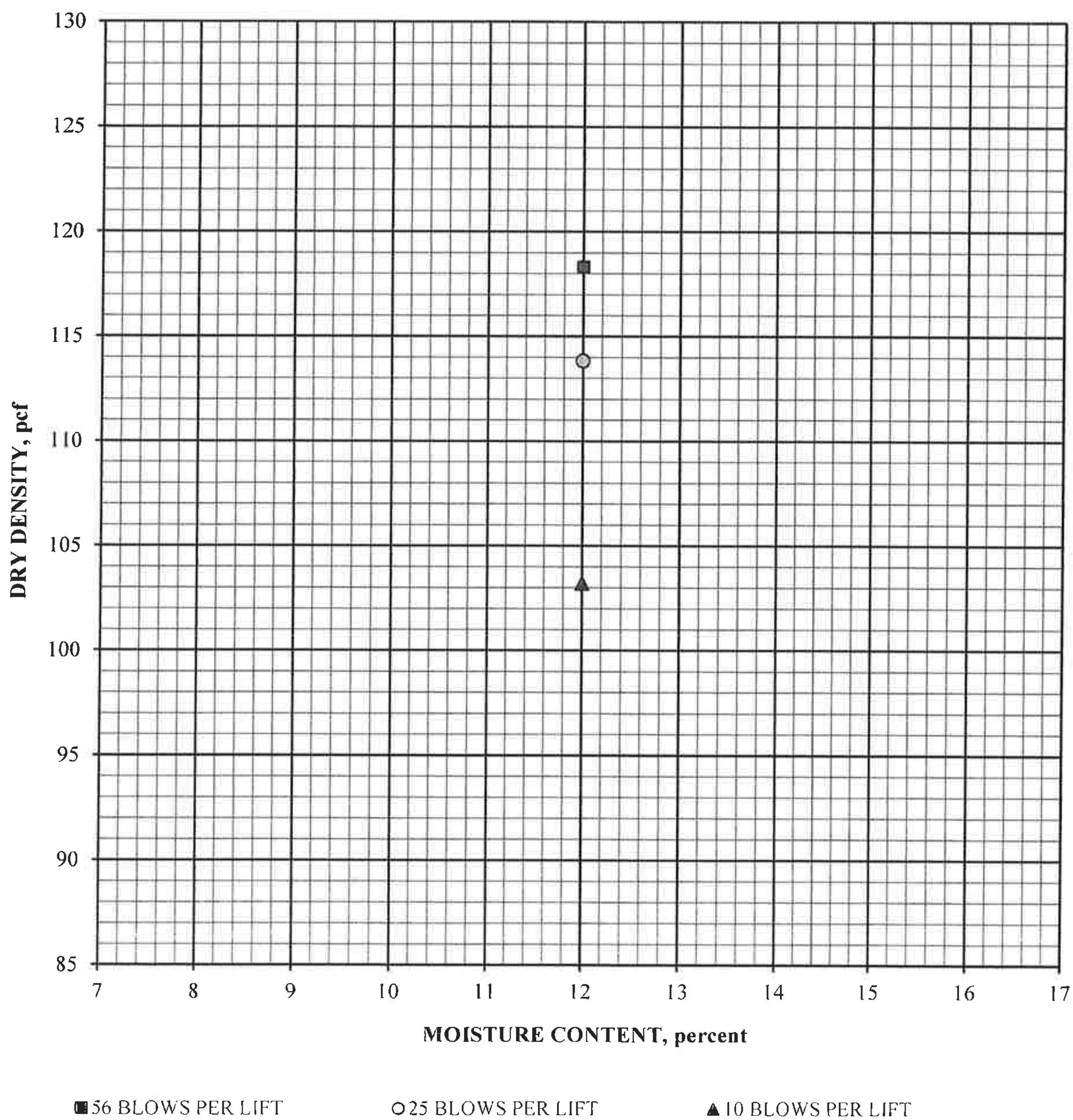
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 3% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

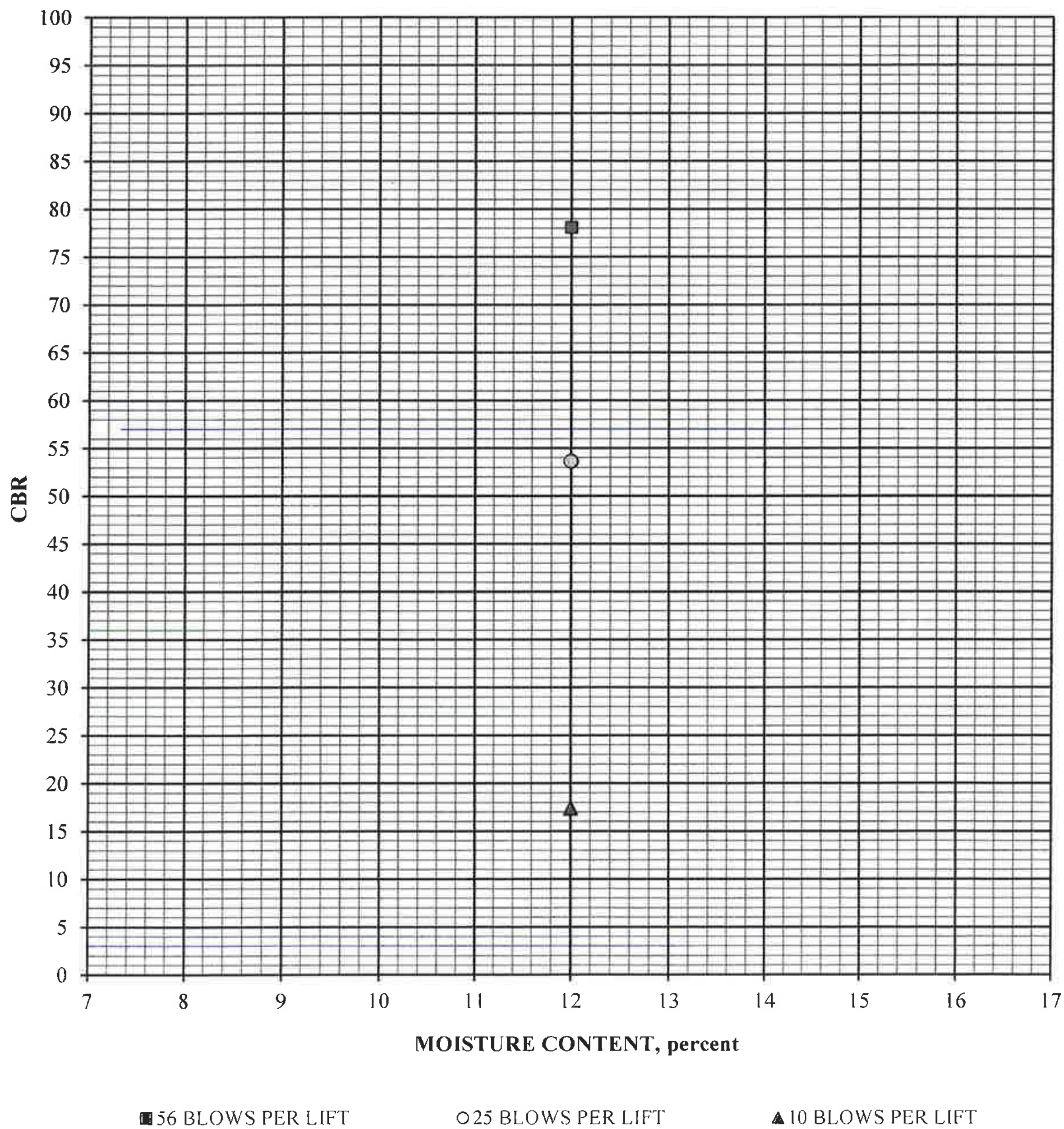
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 3% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

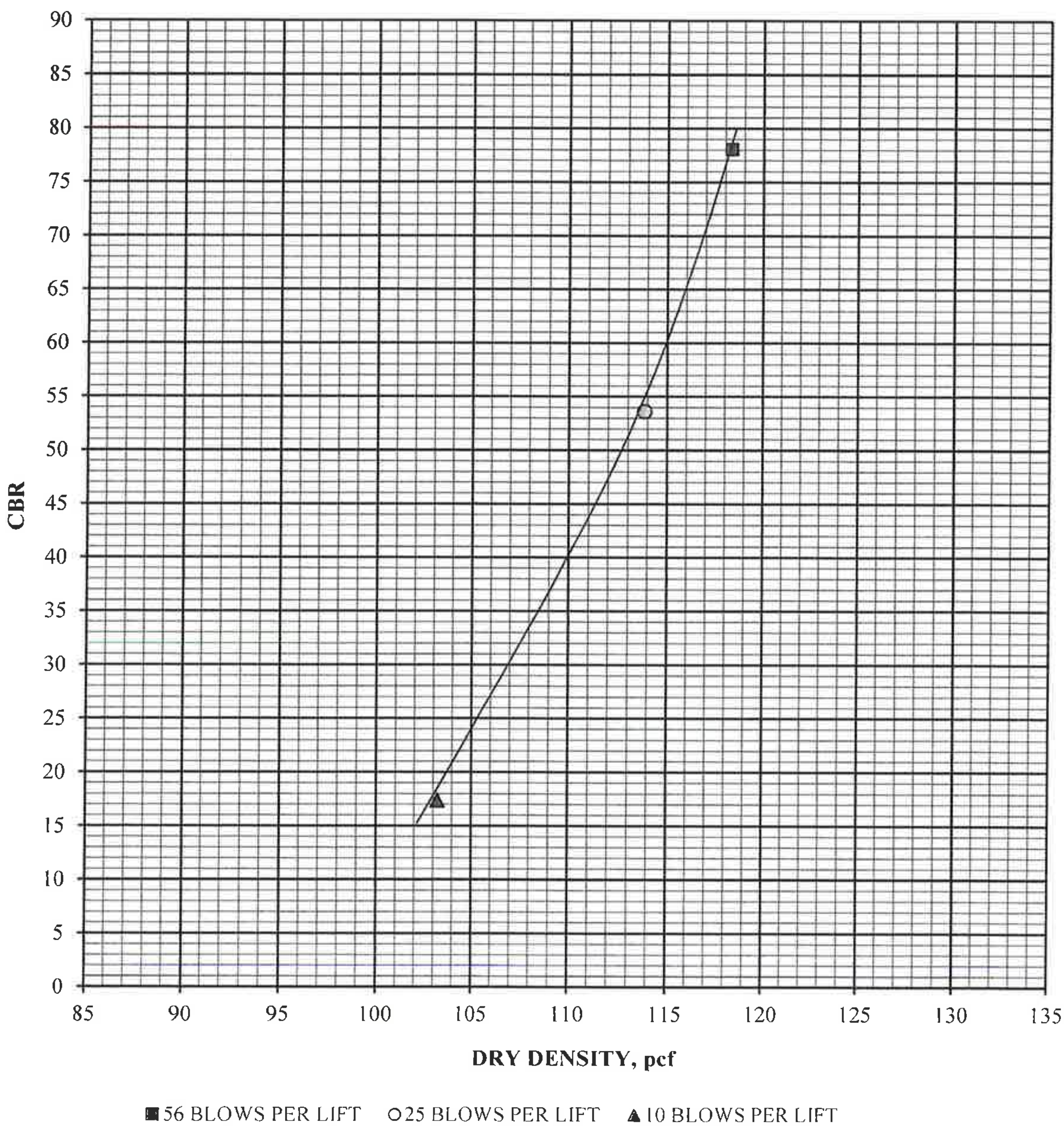
CBR #3 with 3% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 5% Lime added; Boring #5 @ 2.0 - 4.0'
Dark Brown Silty Sand (SM)

January 16, 2019

10 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	99.0
Moisture content, %, before soak	12.2
Moisture content, %, after soak, avg.	24.1
Moisture content, %, after soak, top 1"	23.1
Expansion, %, 96 hour soak	0.0
Bearing Ratio, 0.100" penetration	16.3

25 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	106.8
Moisture content, %, before soak	12.2
Moisture content, %, after soak, avg.	14.3
Moisture content, %, after soak, top 1"	19.9
Expansion, %, 96 hour soak	0.0
Bearing Ratio, 0.100" penetration	52.5

56 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	115.2
Moisture content, %, before soak	12.2
Moisture content, %, after soak, avg.	13.5
Moisture content, %, after soak, top 1"	18.3
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	90.9

Oxnard Airport - Runway and Taxiway
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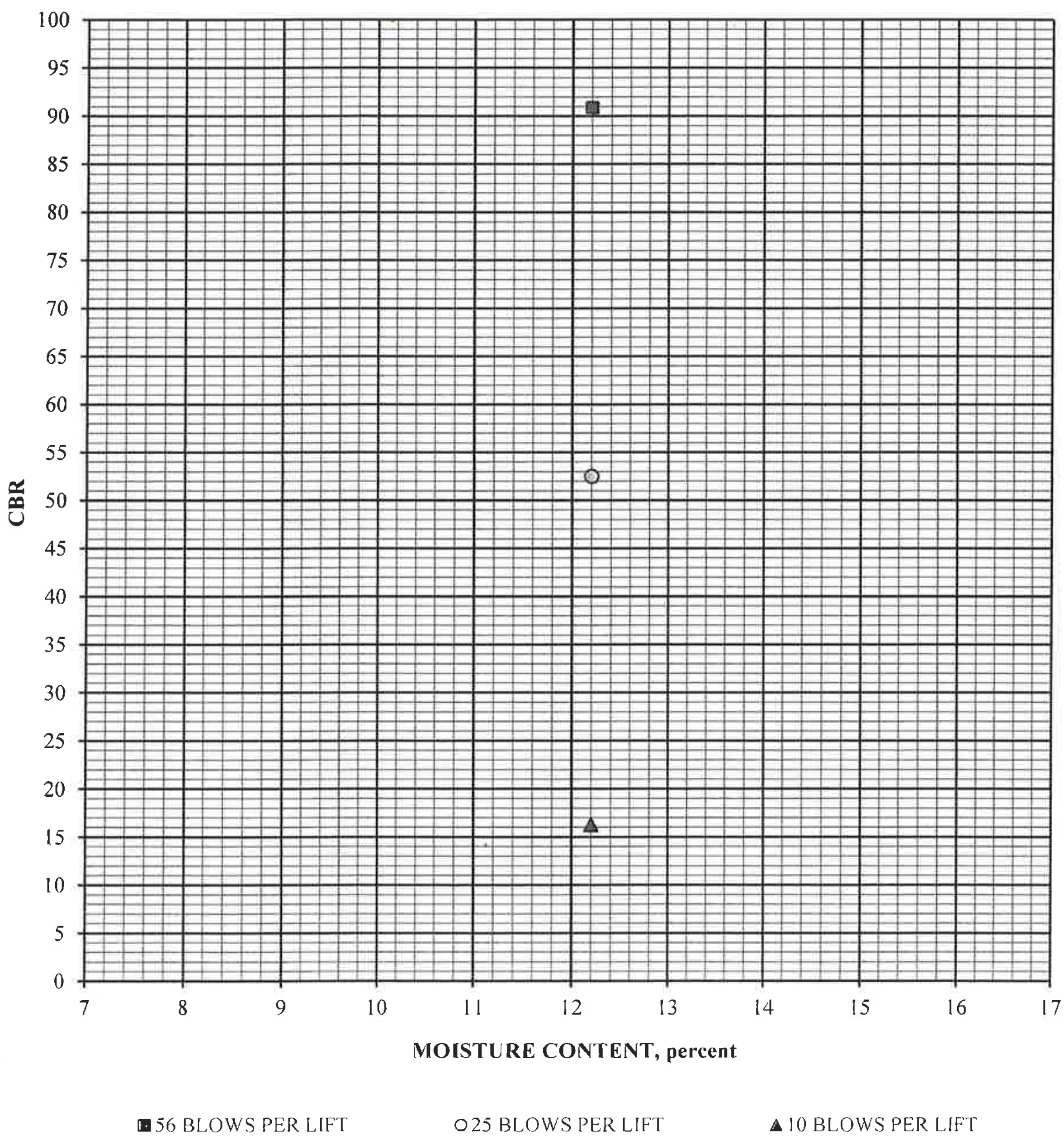
CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 5% Lime added; Boring #5 @ 2.0 - 4.0'
Dark Brown Silty Sand (SM)

January 16, 2019

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
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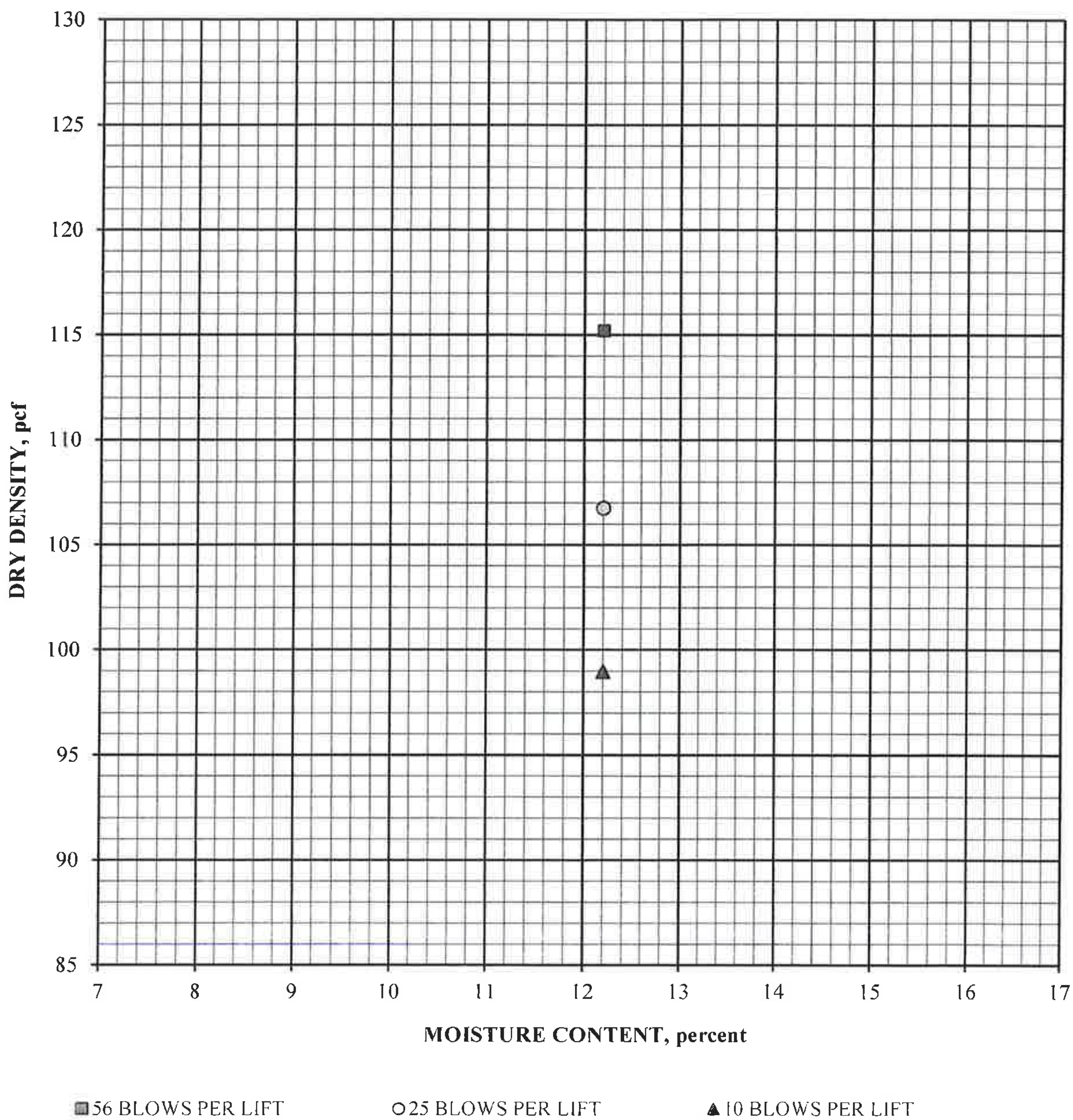
CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 5% Lime added; Boring #5 @ 2.0 - 4.0'
Dark Brown Silty Sand (SM)

January 16, 2019

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

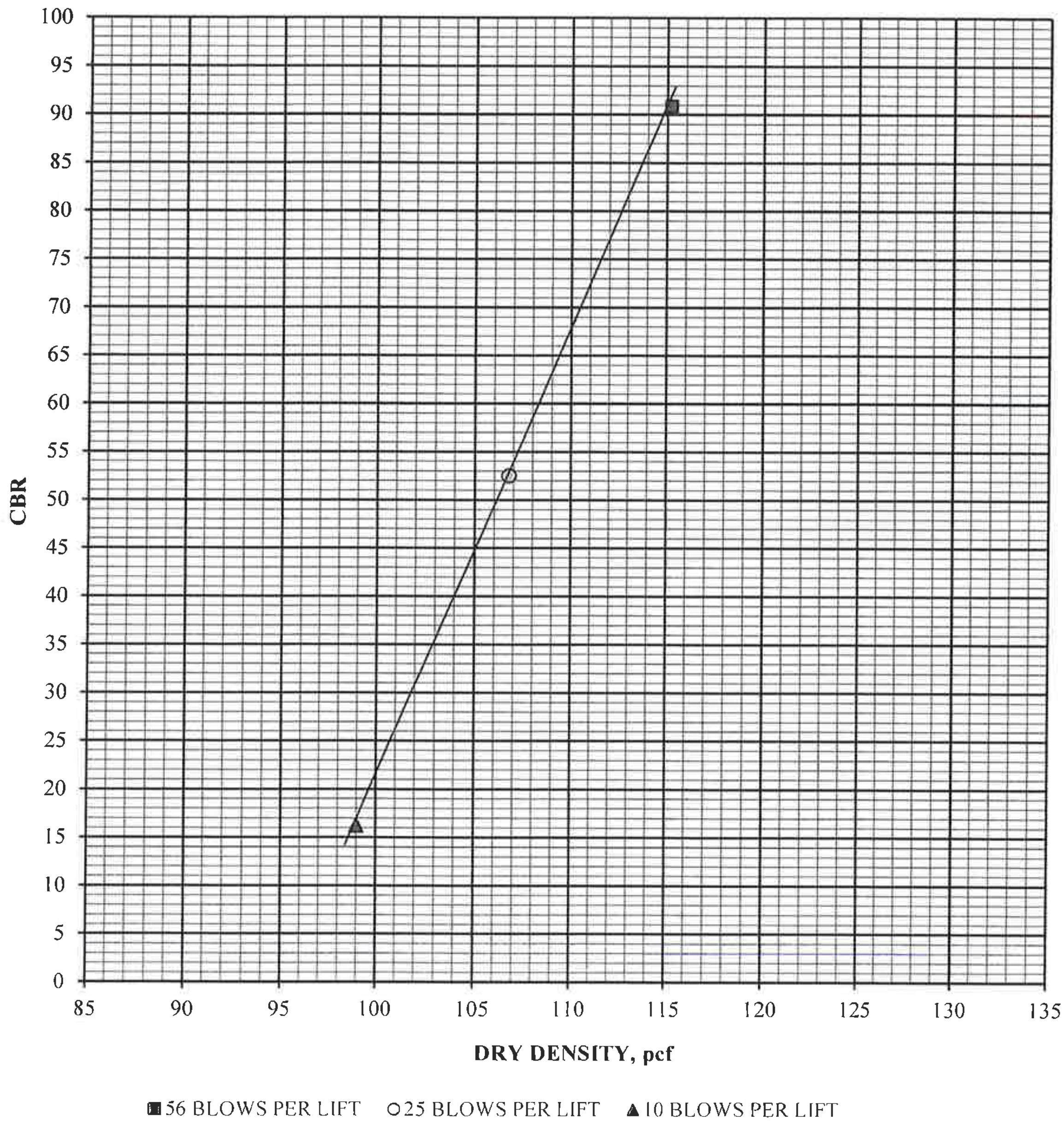
CBR #3 with 5% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 7% Lime added; Boring #5 @ 2.0 - 4.0'
Dark Brown Silty Sand (SM)

January 16, 2019

10 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	97.2
Moisture content, %, before soak	12.3
Moisture content, %, after soak, avg.	25.3
Moisture content, %, after soak, top 1"	24.6
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	18.5

25 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	103.2
Moisture content, %, before soak	12.3
Moisture content, %, after soak, avg.	16.3
Moisture content, %, after soak, top 1"	22.4
Expansion, %, 96 hour soak	0.2
Bearing Ratio, 0.100" penetration	35.3

56 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	111.9
Moisture content, %, before soak	12.3
Moisture content, %, after soak, avg.	13.6
Moisture content, %, after soak, top 1"	19.6
Expansion, %, 96 hour soak	0.5
Bearing Ratio, 0.100" penetration	77.6

Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

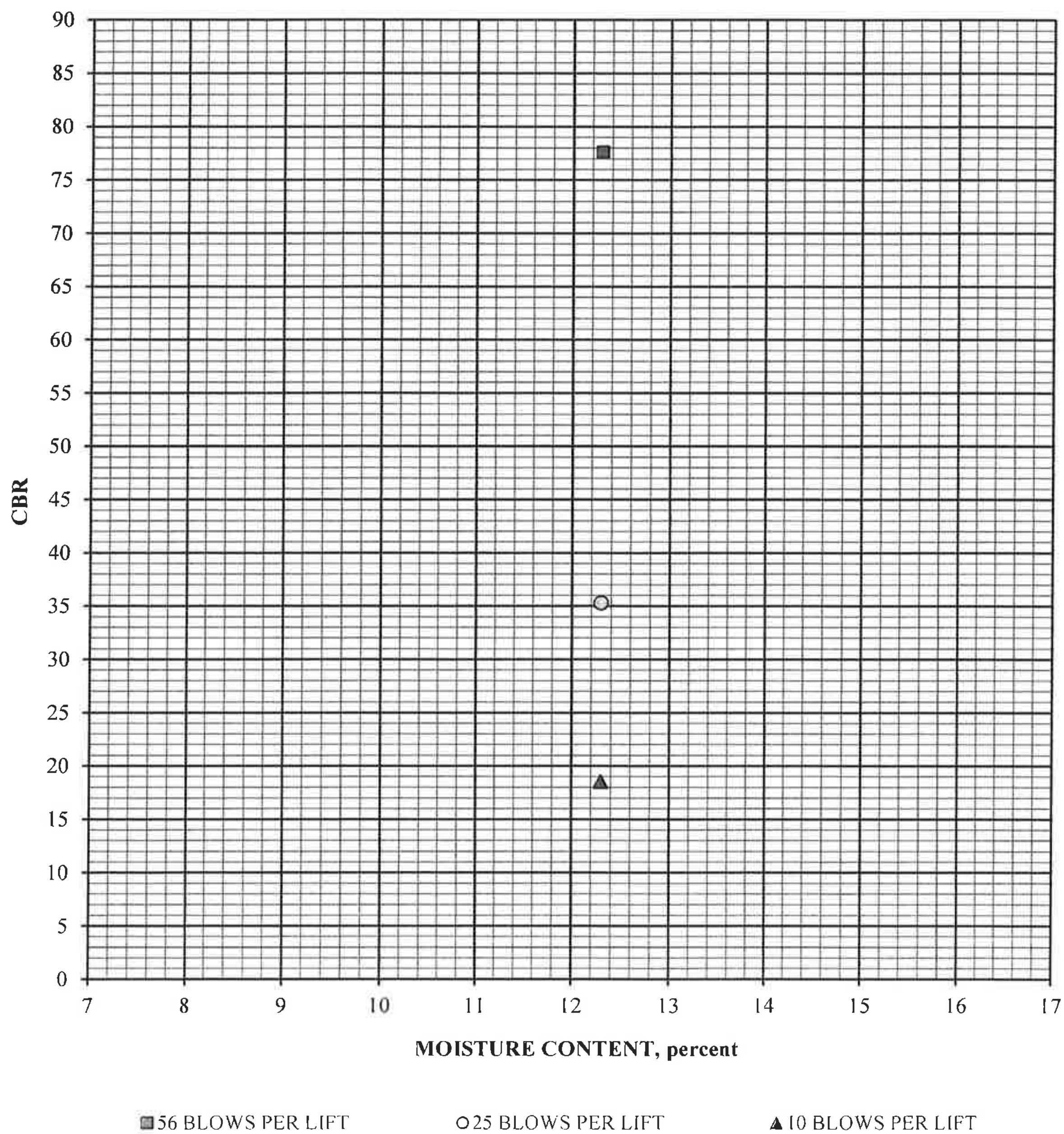
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 7% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

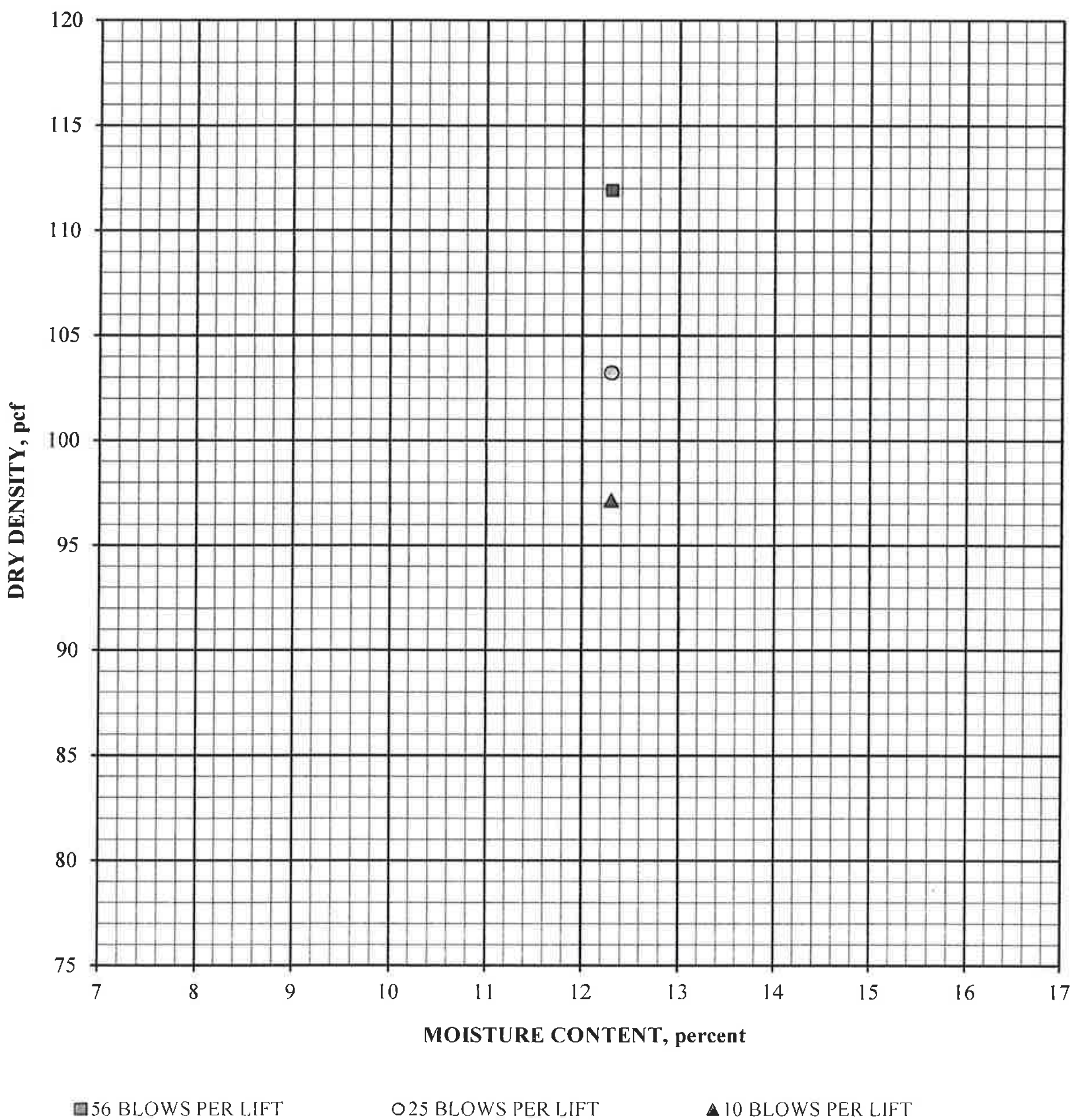
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 7% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

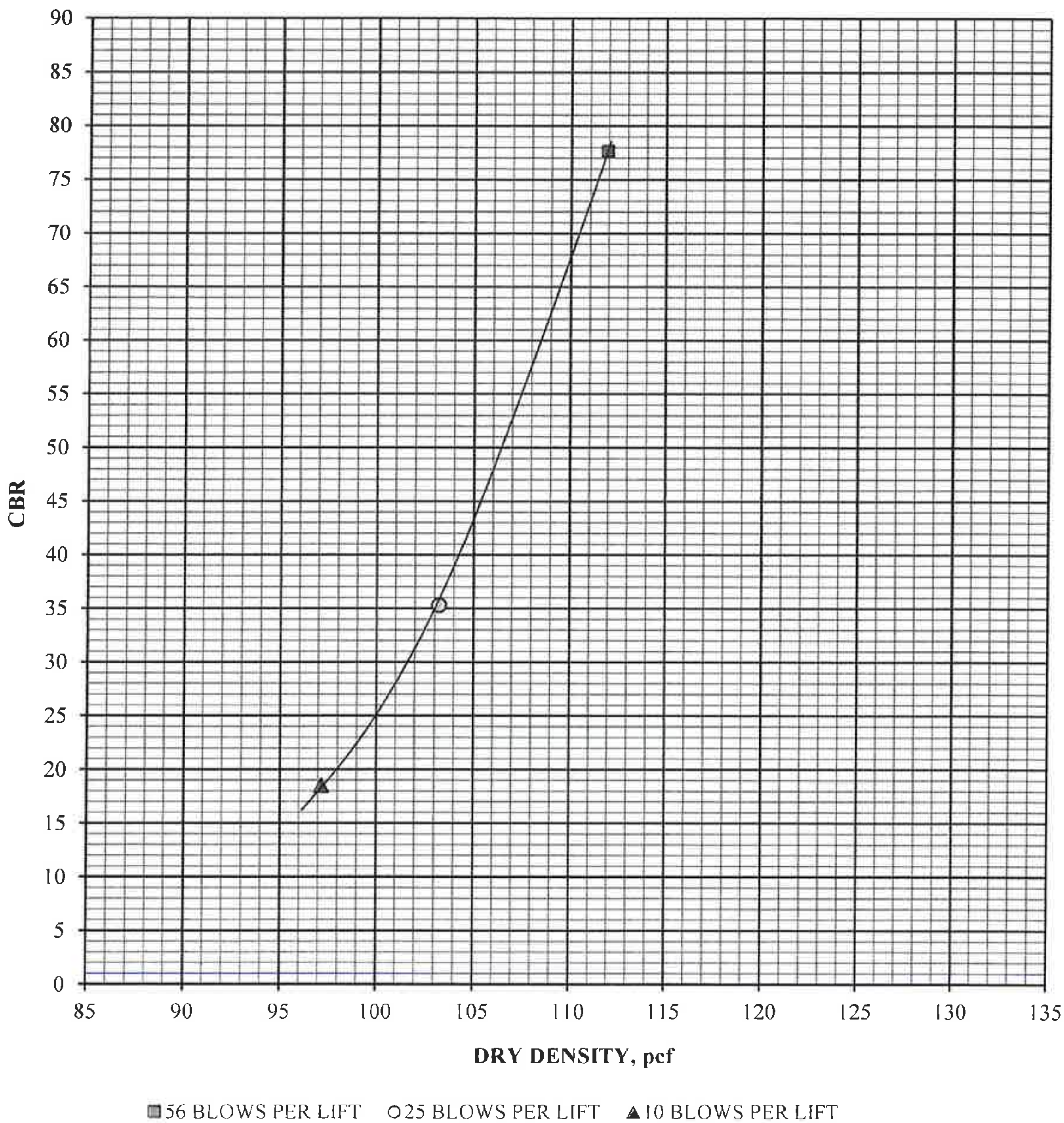
CBR #3 with 7% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #4; Boring #3 @ 0.5 - 1.0'
Brown Clayey Sand with Gravel (SC)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	121.6	124.2	124.9
Moisture content, %, before soak	3.9	6.9	9.9
Moisture content, %, after soak, avg.	10.6	13.7	12.2
Moisture content, %, after soak, top 1"	11.8	9.4	10.0
Expansion, %, 96 hour soak	0.9	0.1	0.1
Bearing Ratio, 0.100" penetration	10.6	17.4	8.9

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	125.1	129.2	125.8
Moisture content, %, before soak	3.9	6.9	9.9
Moisture content, %, after soak, avg.	8.1	8.7	10.4
Moisture content, %, after soak, top 1"	9.1	7.5	9.9
Expansion, %, 96 hour soak	0.7	0.2	0.2
Bearing Ratio, 0.100" penetration	27.9	56.6	6.2

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	131.6	130.9	126.5
Moisture content, %, before soak	3.9	6.9	9.9
Moisture content, %, after soak, avg.	7.1	8.4	11.6
Moisture content, %, after soak, top 1"	8.1	7.3	10.1
Expansion, %, 96 hour soak	0.5	0.4	0.1
Bearing Ratio, 0.100" penetration	58.9	80.7	11.0

Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

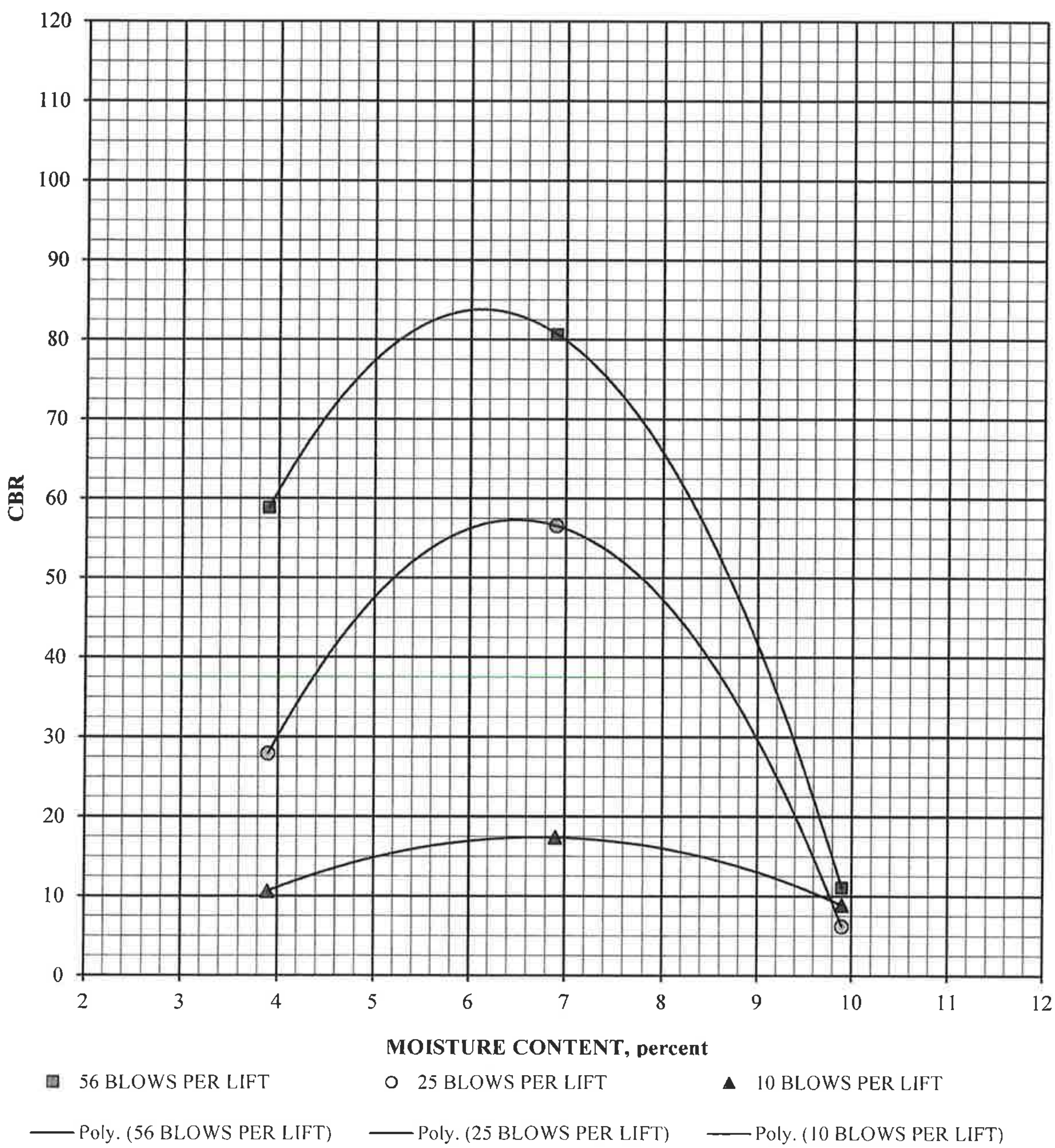
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #4; Boring #3 @ 0.5 - 1.0'

January 8, 2019

Brown Clayey Sand with Gravel (SC)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

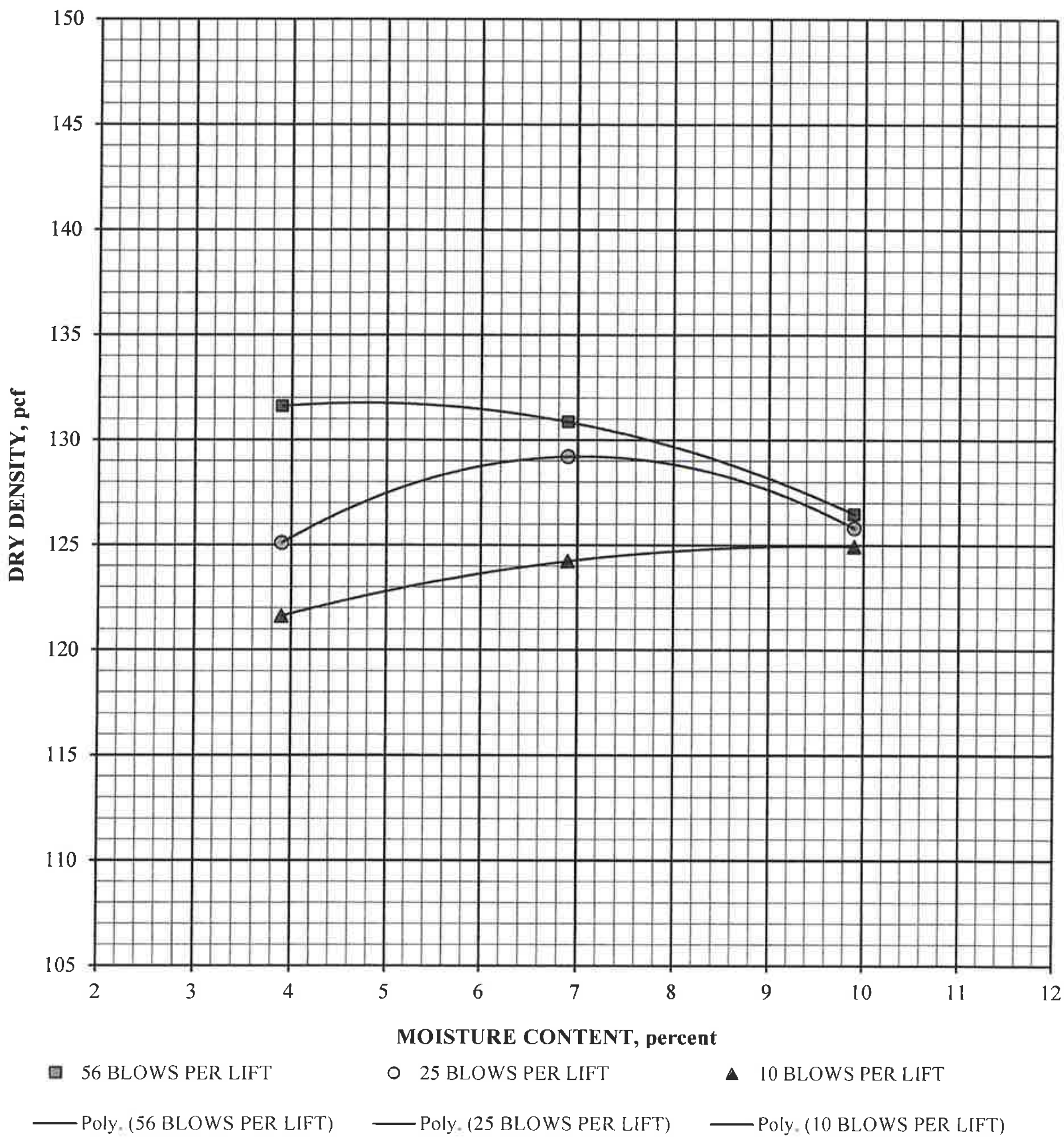
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #4; Boring #3 @ 0.5 - 1.0'

January 8, 2019

Brown Clayey Sand with Gravel (SC)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

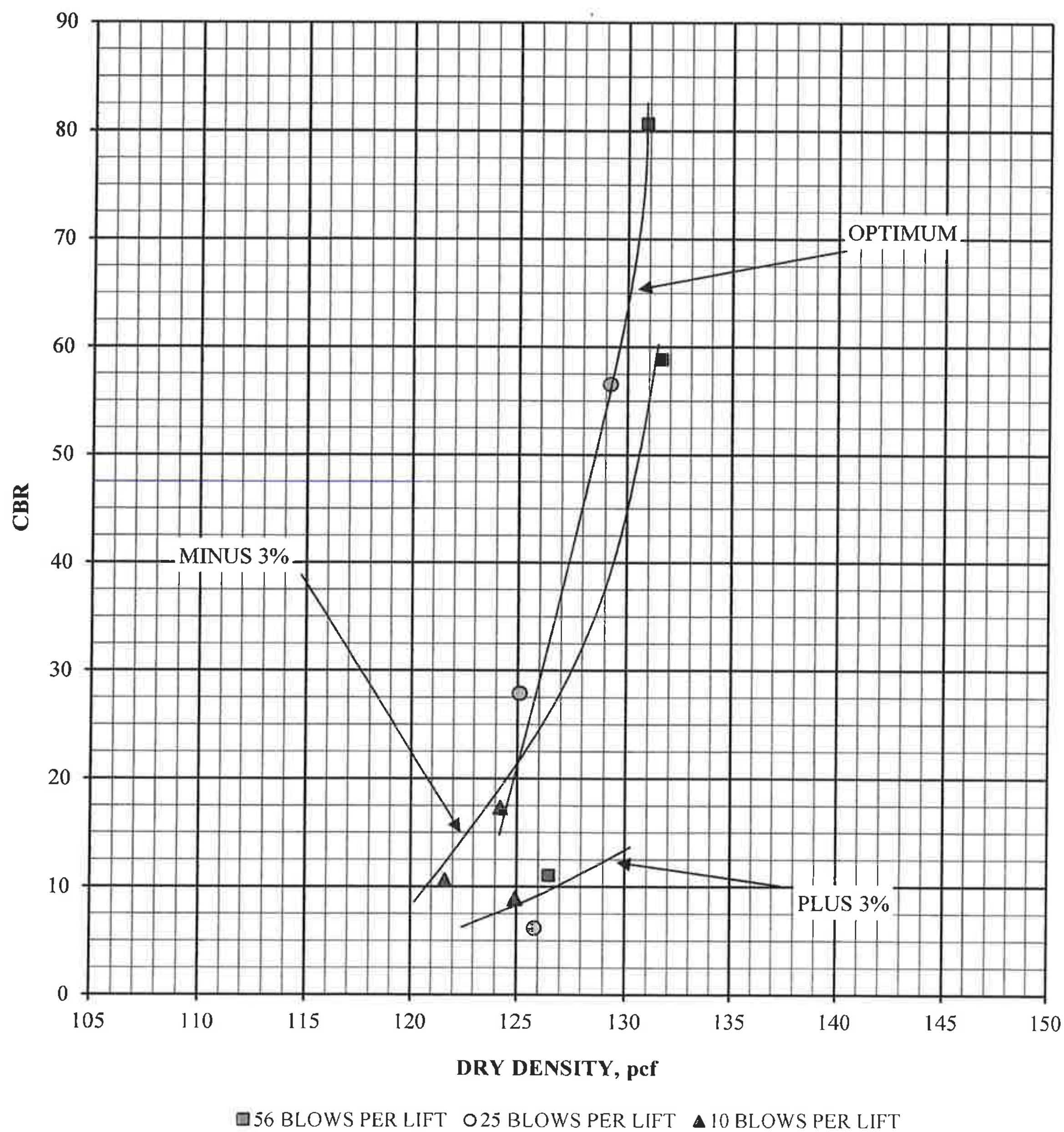
CBR #4; Boring #3 @ 0.5 - 1.0'

January 8, 2019

Brown Clayey Sand with Gravel (SC)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #5; Boring #36 @ 2.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	105.0	107.6	105.1
Moisture content, %, before soak	7.7	10.7	13.7
Moisture content, %, after soak, avg.	21.4	14.8	26.8
Moisture content, %, after soak, top 1"	19.4	21.5	18.9
Expansion, %, 96 hour soak	1.9	0.3	0.1
Bearing Ratio, 0.100" penetration	2.3	2.6	2.2

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	111.8	115.1	115.9
Moisture content, %, before soak	7.7	10.7	13.7
Moisture content, %, after soak, avg.	18.1	16.4	16.7
Moisture content, %, after soak, top 1"	17.8	21.8	17.6
Expansion, %, 96 hour soak	2.0	0.6	0.1
Bearing Ratio, 0.100" penetration	3.8	14.4	7.4

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	121.2	121.4	118.4
Moisture content, %, before soak	7.7	10.7	13.7
Moisture content, %, after soak, avg.	13.5	11.6	14.1
Moisture content, %, after soak, top 1"	15.3	13.7	14.4
Expansion, %, 96 hour soak	2.7	0.2	0.1
Bearing Ratio, 0.100" penetration	10.6	24.2	6.2

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

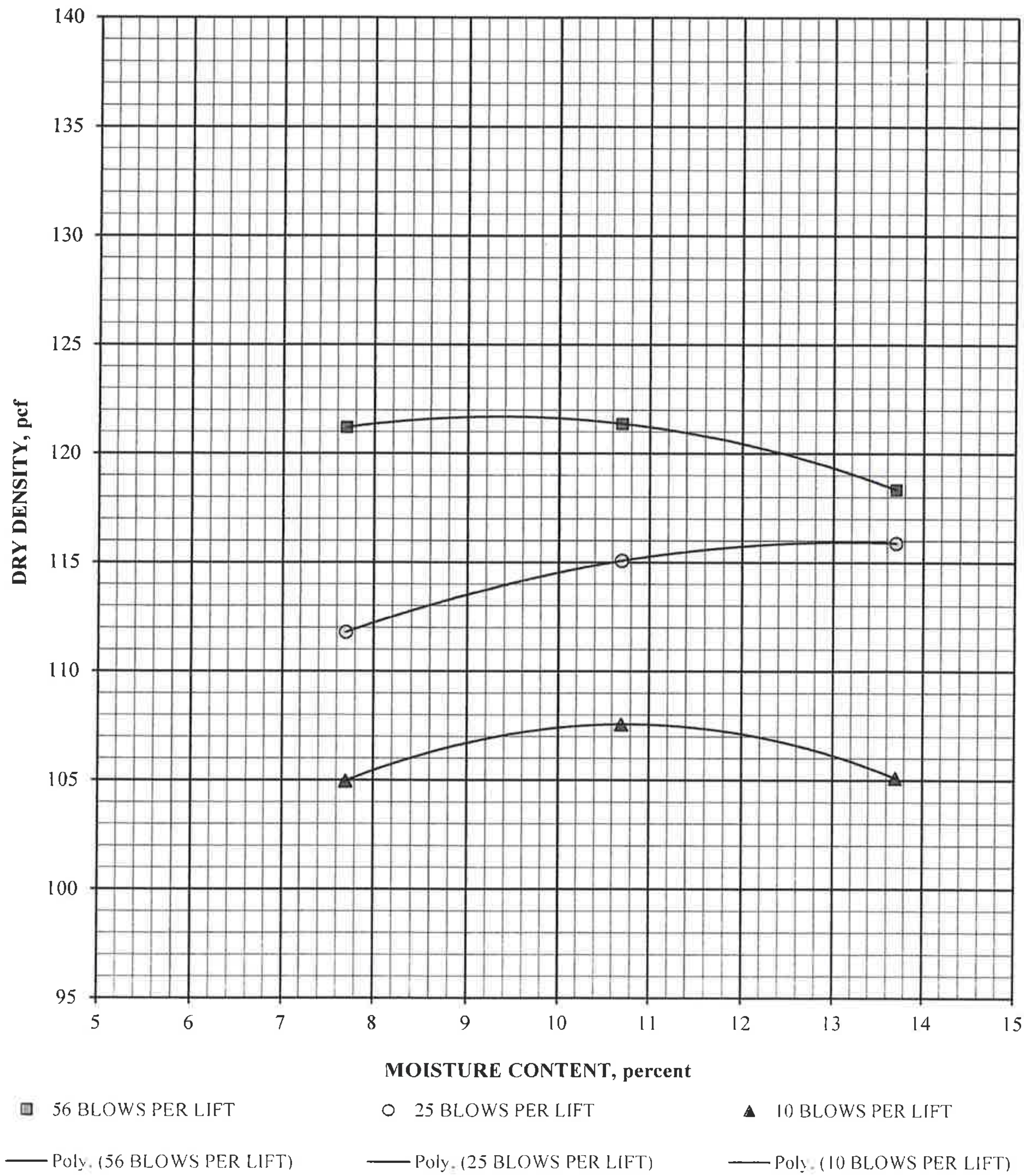
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #5; Boring #36 @ 2.5 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

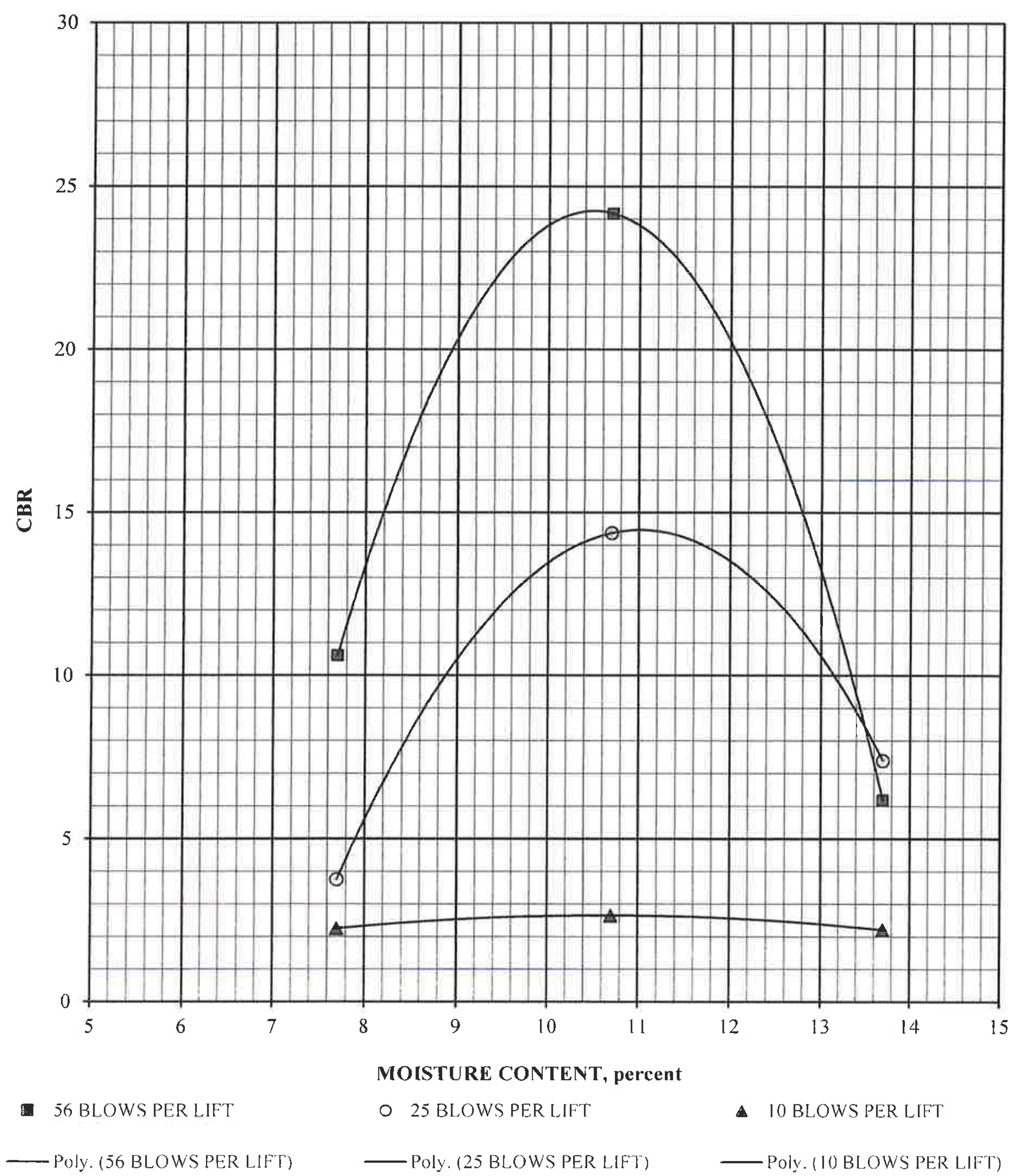
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #5; Boring #36 @ 2.5 - 5.0'

Dark Brown Sandy Lean Clay (CL)

January 8, 2019

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

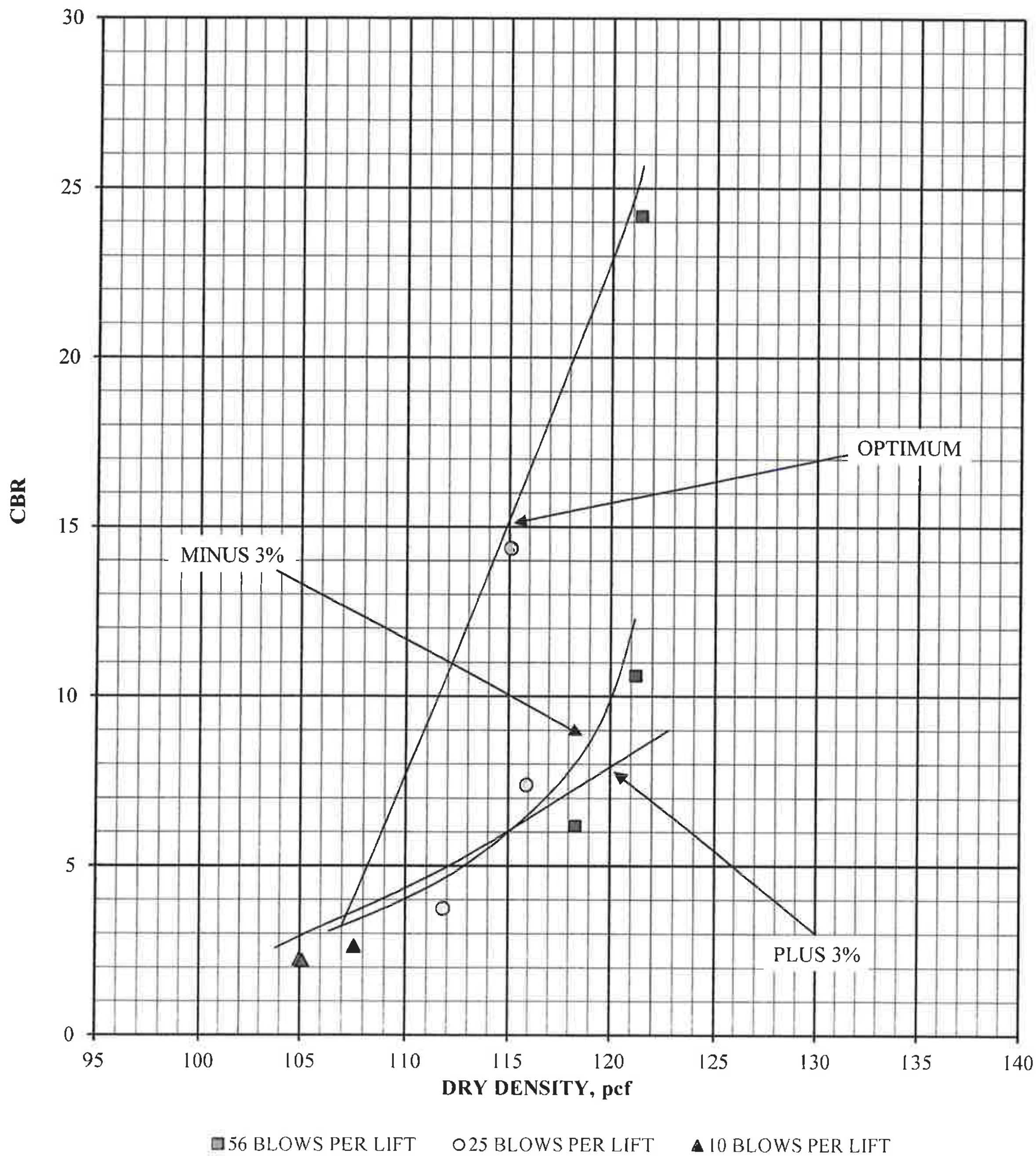
CBR #5; Boring #36 @ 2.5 - 5.0'

Dark Brown Sandy Lean Clay (CL)

January 8, 2019

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 16, 2019

10 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	106.0
Moisture content, %, before soak	14.1
Moisture content, %, after soak, avg.	19.0
Moisture content, %, after soak, top 1"	25.6
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	27.4

25 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	114.4
Moisture content, %, before soak	14.1
Moisture content, %, after soak, avg.	14.7
Moisture content, %, after soak, top 1"	19.2
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	48.4

56 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	116.4
Moisture content, %, before soak	14.1
Moisture content, %, after soak, avg.	15.0
Moisture content, %, after soak, top 1"	18.3
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	53.4

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

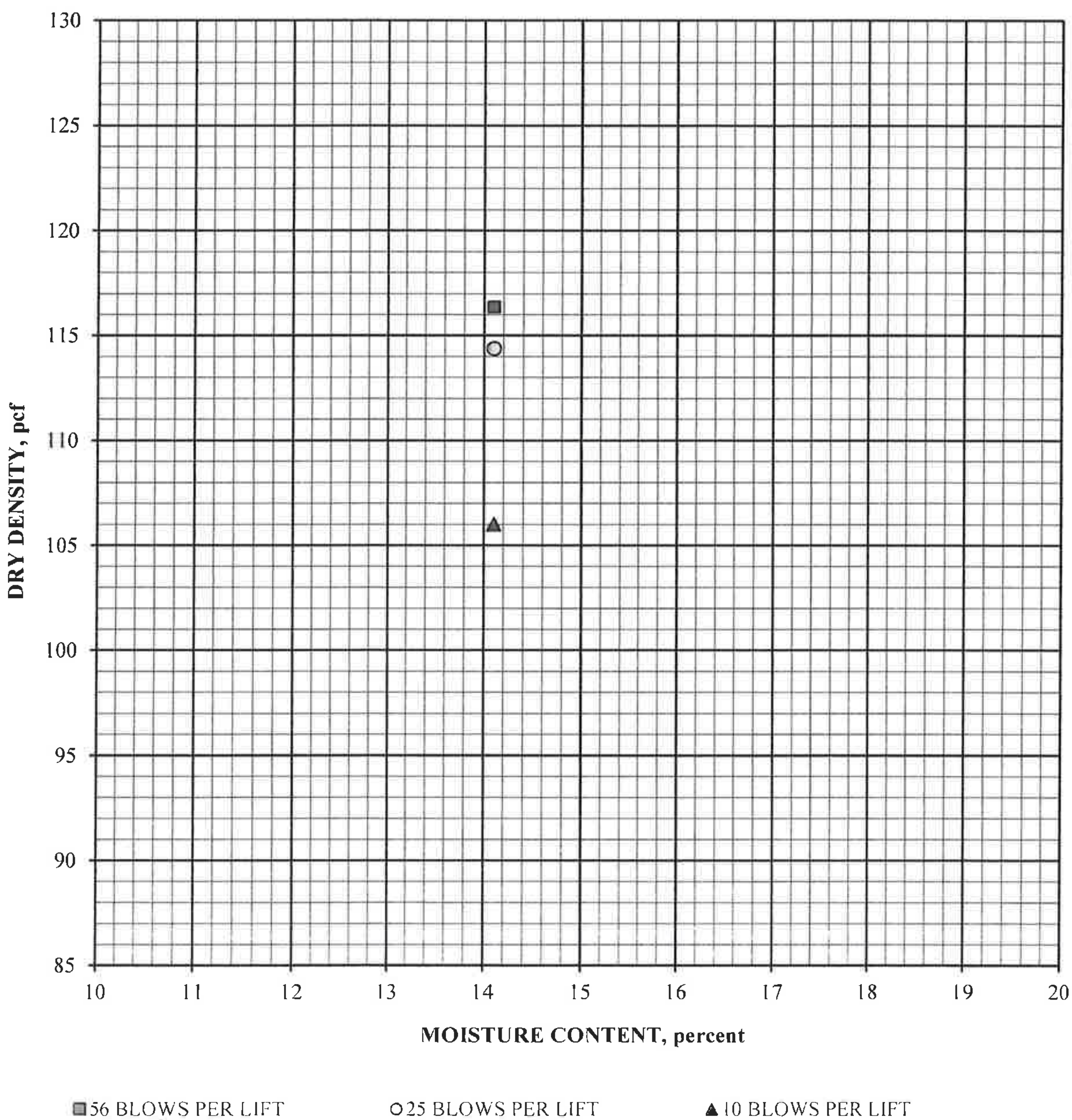
CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 16, 2019

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

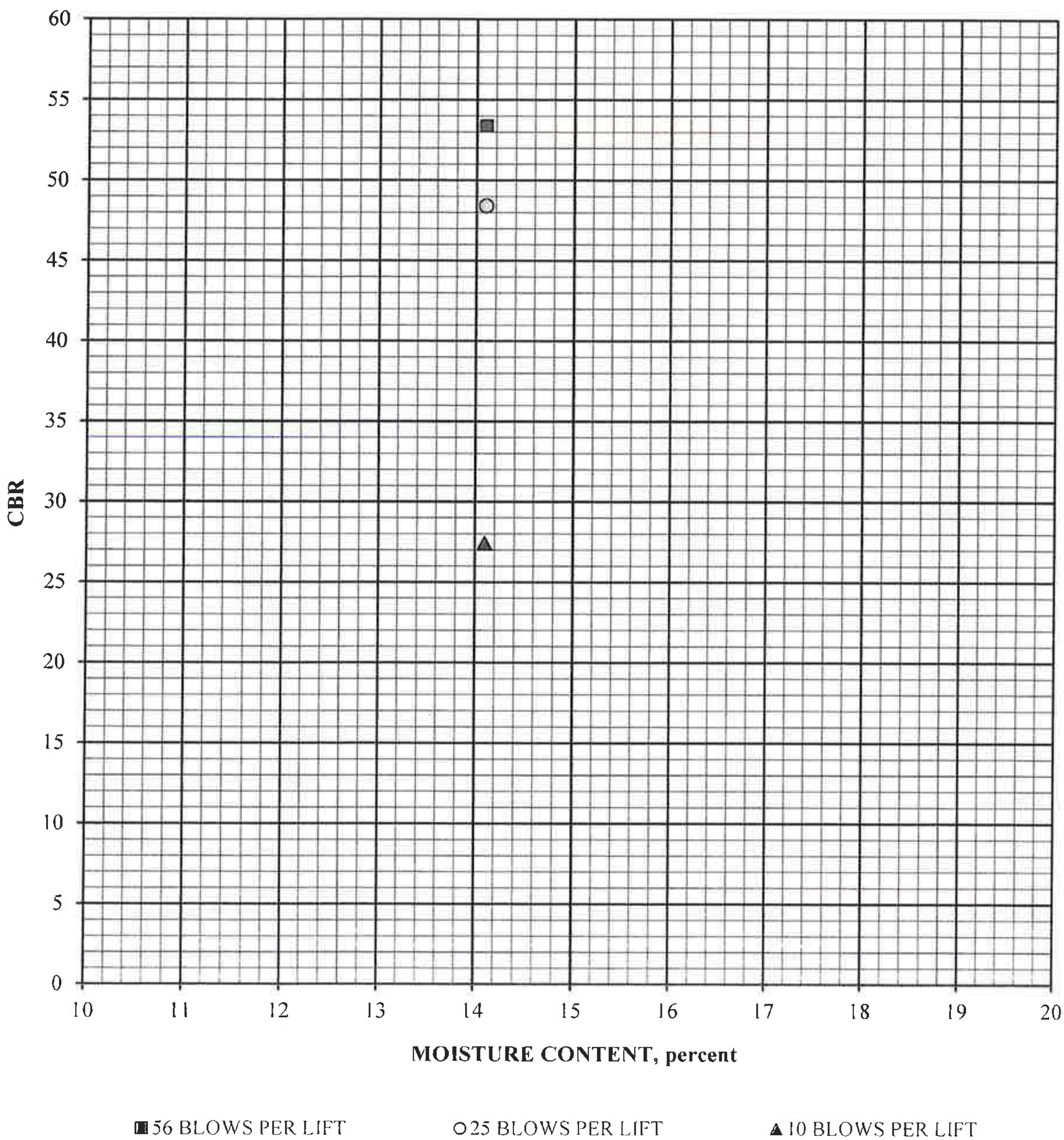
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

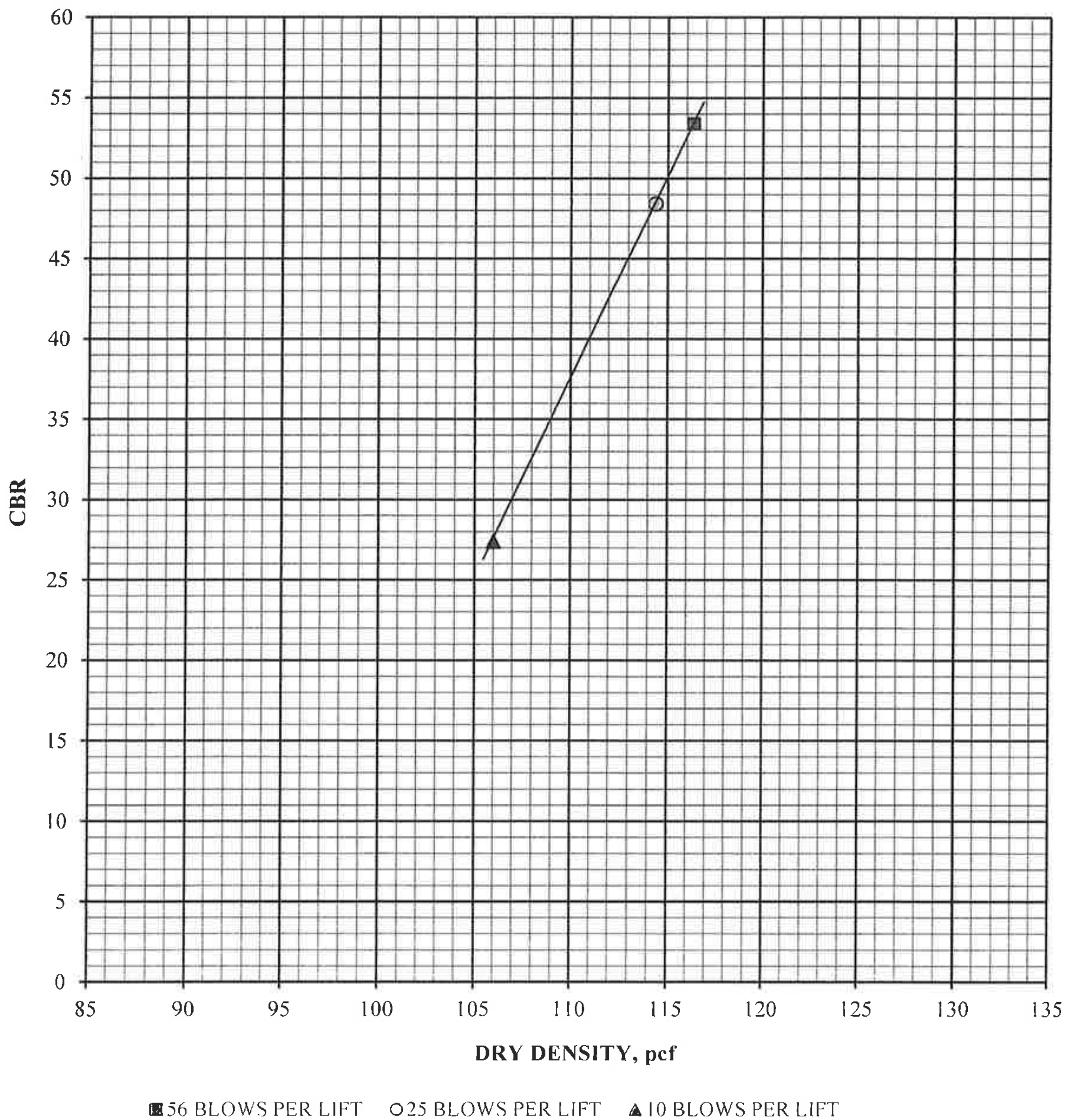
CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 5% Lime added; Boring #27 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 16, 2019

10 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	98.9
Moisture content, %, before soak	15.2
Moisture content, %, after soak, avg.	22.6
Moisture content, %, after soak, top 1"	24.8
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	22.2

25 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	108.3
Moisture content, %, before soak	15.2
Moisture content, %, after soak, avg.	19.2
Moisture content, %, after soak, top 1"	21.4
Expansion, %, 96 hour soak	0.0
Bearing Ratio, 0.100" penetration	53.4

56 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	114.1
Moisture content, %, before soak	15.2
Moisture content, %, after soak, avg.	17.7
Moisture content, %, after soak, top 1"	19.5
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	72.9

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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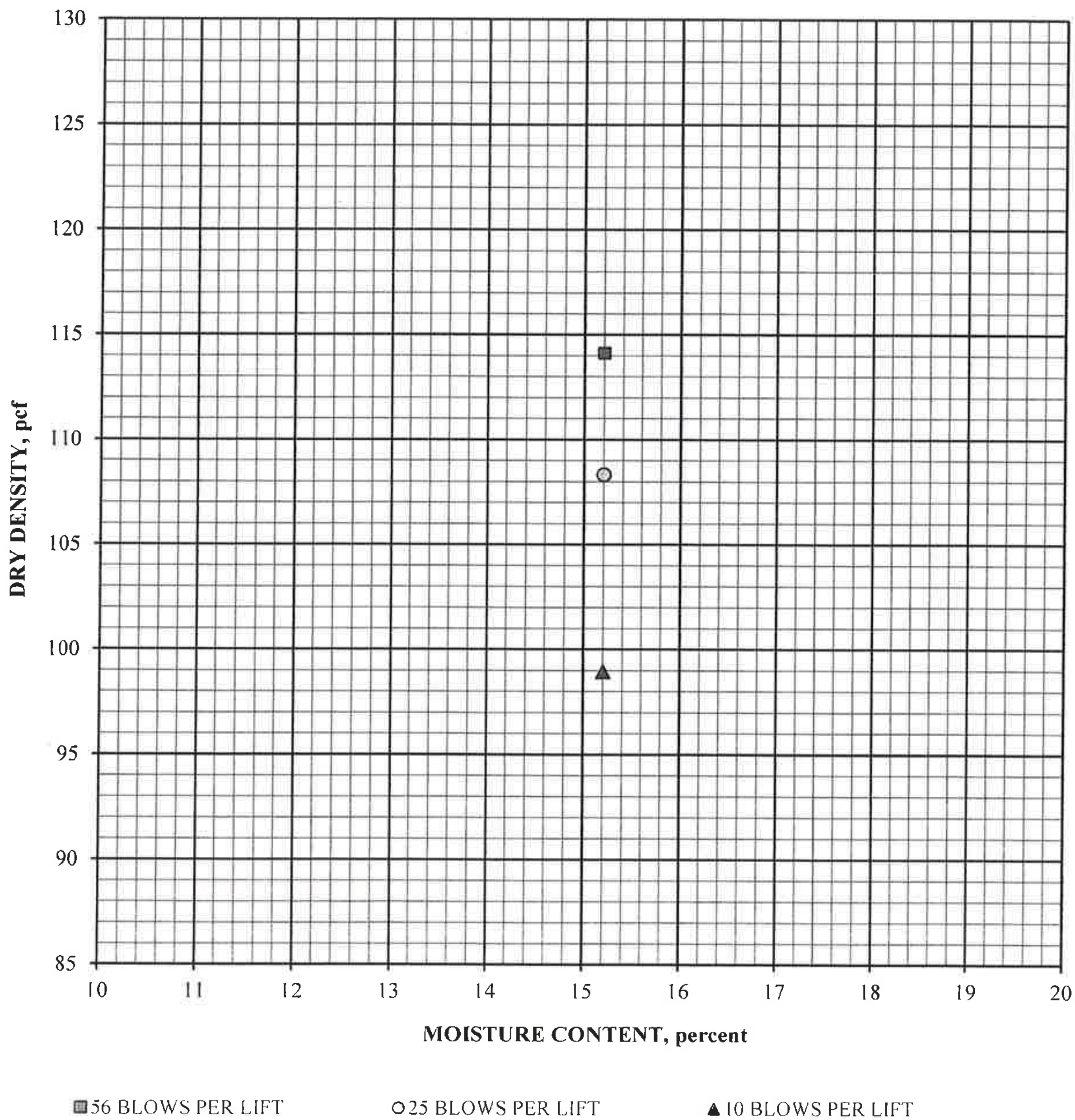
CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 5% Lime added; Boring #27 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 16, 2019

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

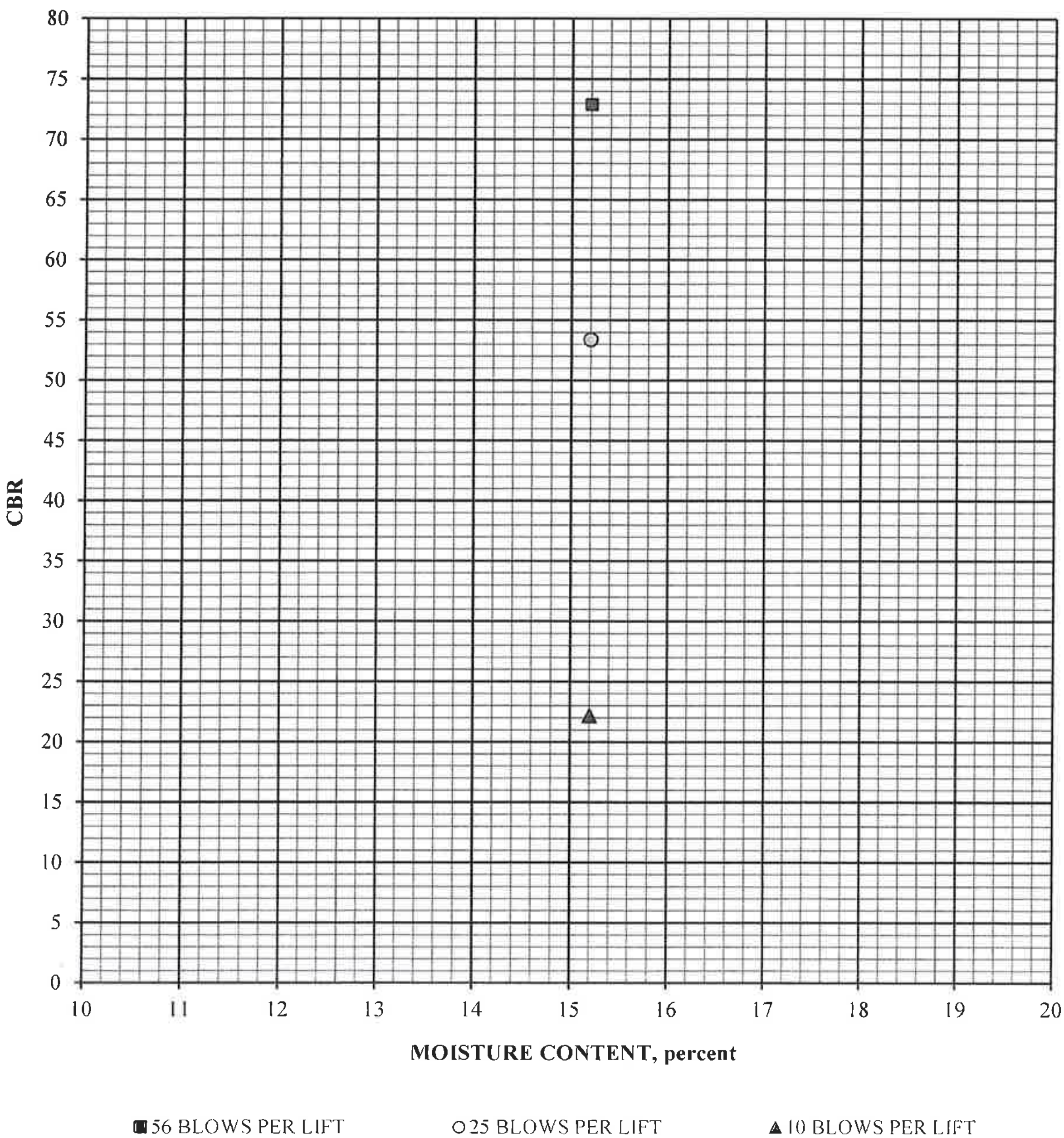
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 5% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

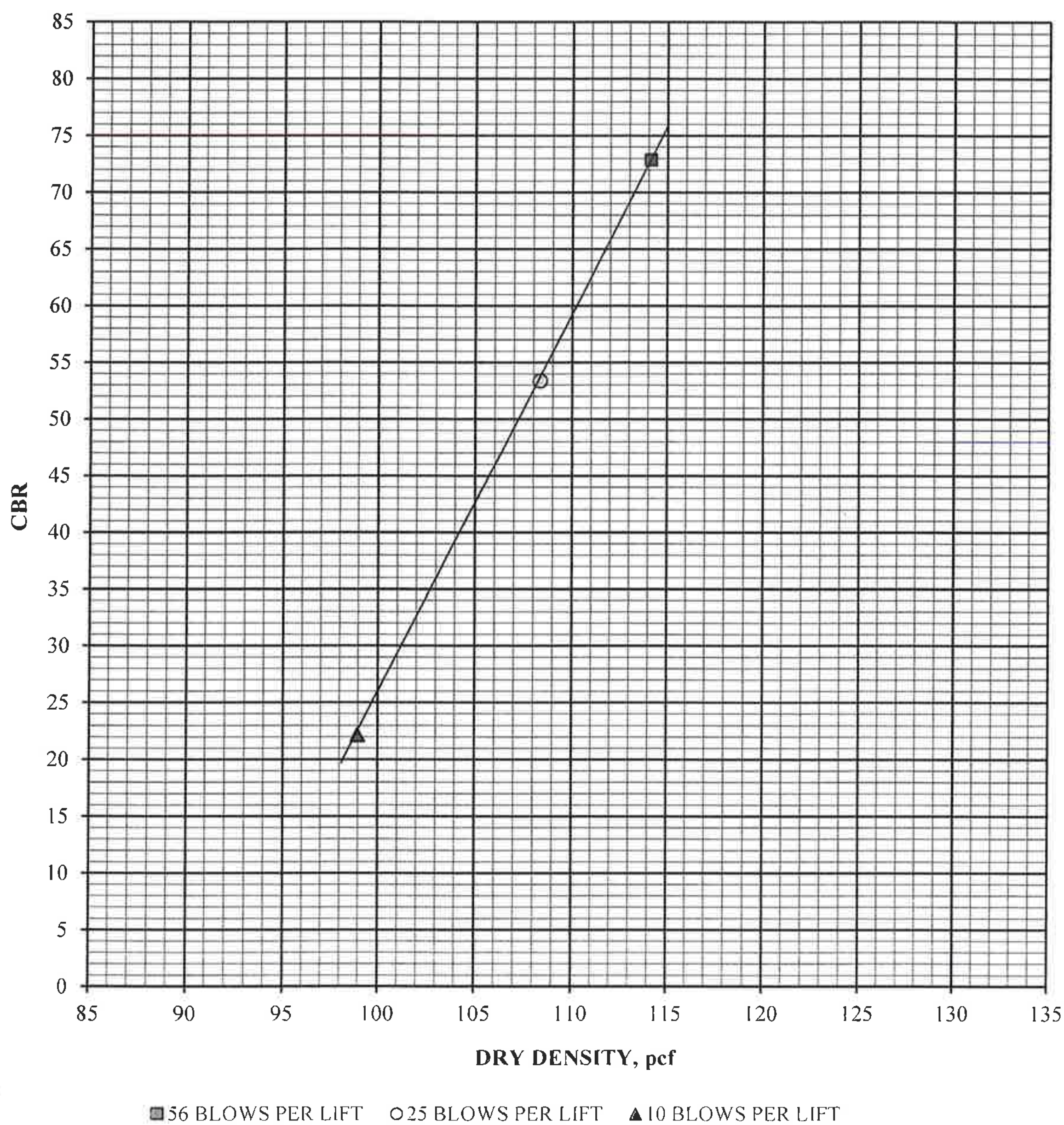
CBR #6 with 5% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 7% Lime added; Boring #27 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 16, 2019

10 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	97.7
Moisture content, %, before soak	15.6
Moisture content, %, after soak, avg.	24.4
Moisture content, %, after soak, top 1"	26.4
Expansion, %, 96 hour soak	0.2
Bearing Ratio, 0.100" penetration	27.1

25 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	105.4
Moisture content, %, before soak	15.6
Moisture content, %, after soak, avg.	20.9
Moisture content, %, after soak, top 1"	24.4
Expansion, %, 96 hour soak	0.2
Bearing Ratio, 0.100" penetration	49.2

56 BLOWS PER LIFT

	Optimum Moisture
Dry density, pcf, before soak	114.0
Moisture content, %, before soak	15.6
Moisture content, %, after soak, avg.	18.0
Moisture content, %, after soak, top 1"	22.8
Expansion, %, 96 hour soak	0.1
Bearing Ratio, 0.100" penetration	85.8

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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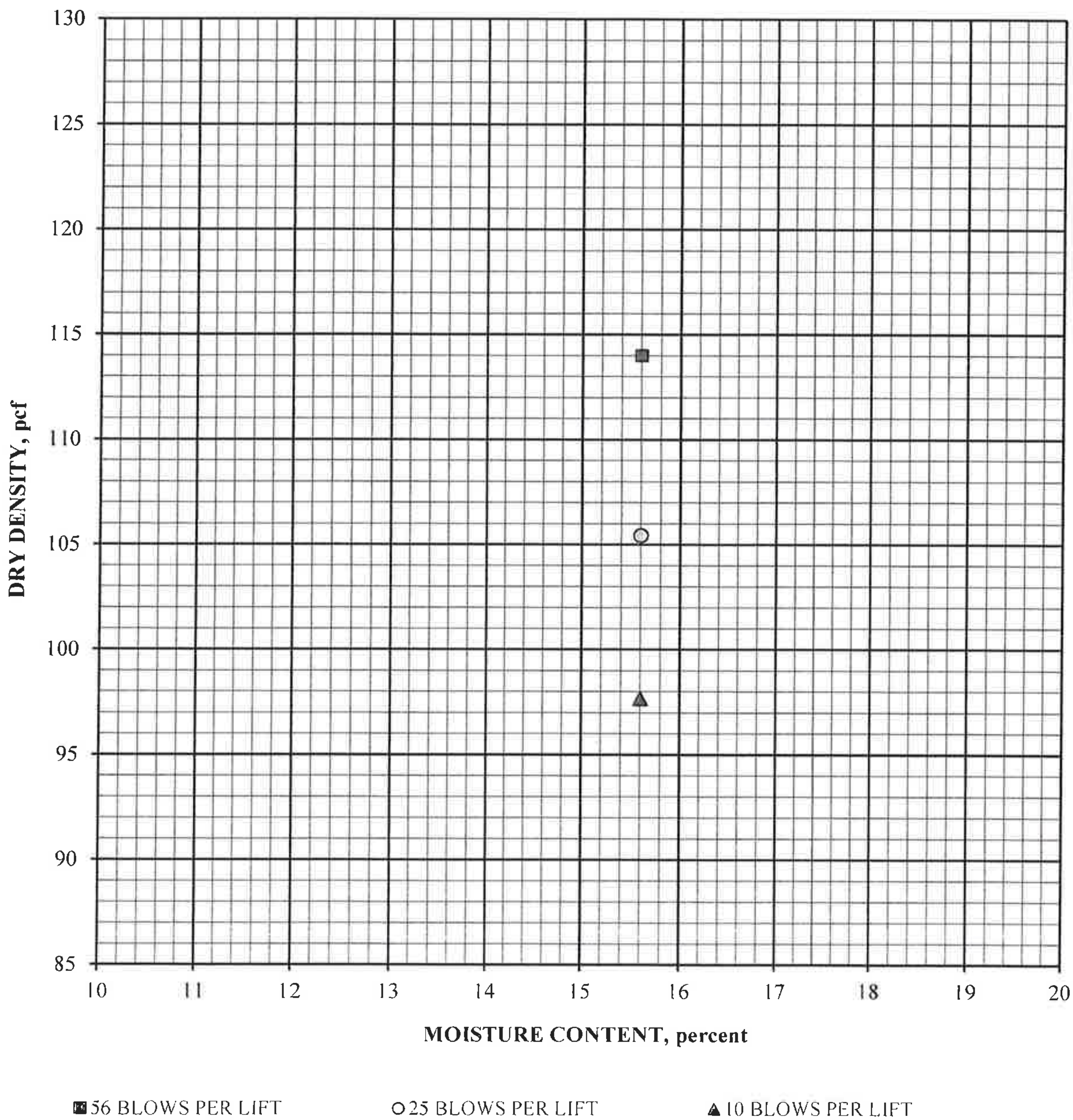
CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 7% Lime added; Boring #27 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 16, 2019

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

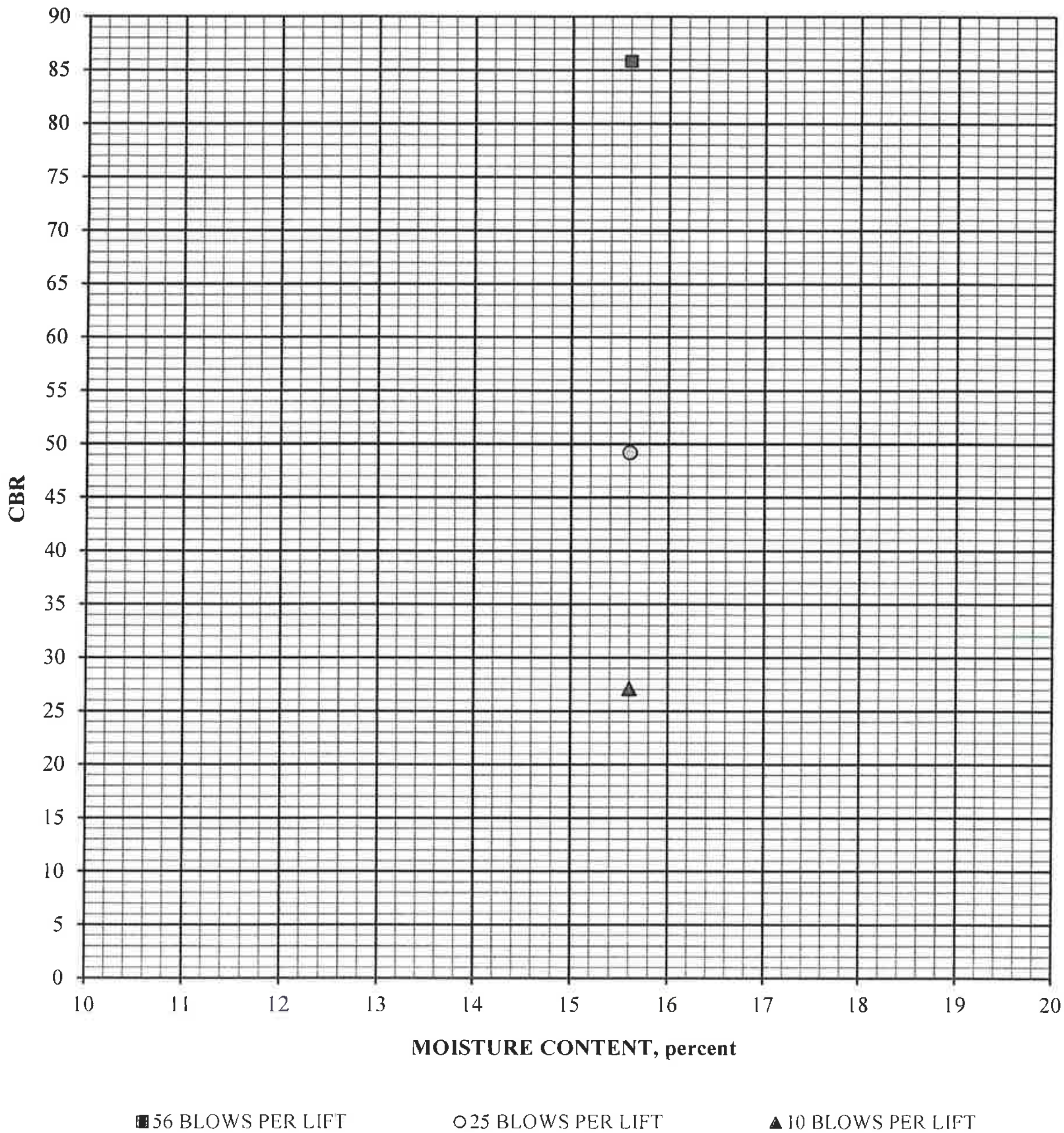
ASTM D 1883-07 (At Optimum Moisture Content)

CBR #6 with 7% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

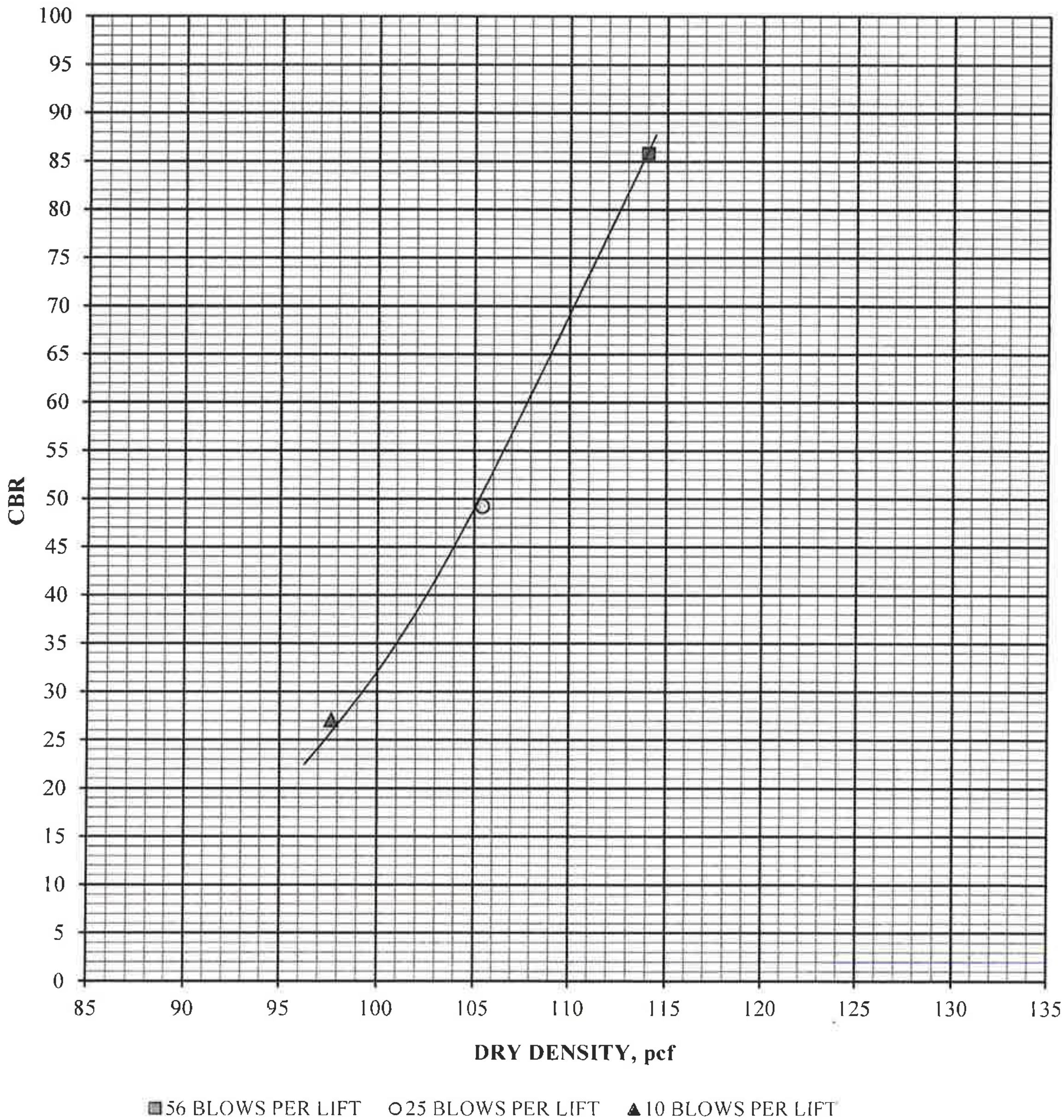
CBR #6 with 7% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #7; Boring #23 @ 3.5 - 5.0'
Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	101.0	105.0	105.1
Moisture content, %, before soak	7.0	10.0	13.0
Moisture content, %, after soak, avg.	22.9	19.3	21.3
Moisture content, %, after soak, top 1"	26.2	23.5	25.3
Expansion, %, 96 hour soak	5.8	0.5	0.0
Bearing Ratio, 0.100" penetration	1.7	2.2	2.2

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	110.0	117.5	115.4
Moisture content, %, before soak	7.0	10.0	13.0
Moisture content, %, after soak, avg.	16.7	15.1	17.2
Moisture content, %, after soak, top 1"	23.7	20.3	20.5
Expansion, %, 96 hour soak	3.0	0.2	0.0
Bearing Ratio, 0.100" penetration	2.6	7.8	7.4

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	118.4	123.5	119.8
Moisture content, %, before soak	7.0	10.0	13.0
Moisture content, %, after soak, avg.	15.2	12.2	14.6
Moisture content, %, after soak, top 1"	18.6	14.8	15.7
Expansion, %, 96 hour soak	3.0	0.1	0.0
Bearing Ratio, 0.100" penetration	7.6	19.4	17.4

CALIFORNIA BEARING RATIO

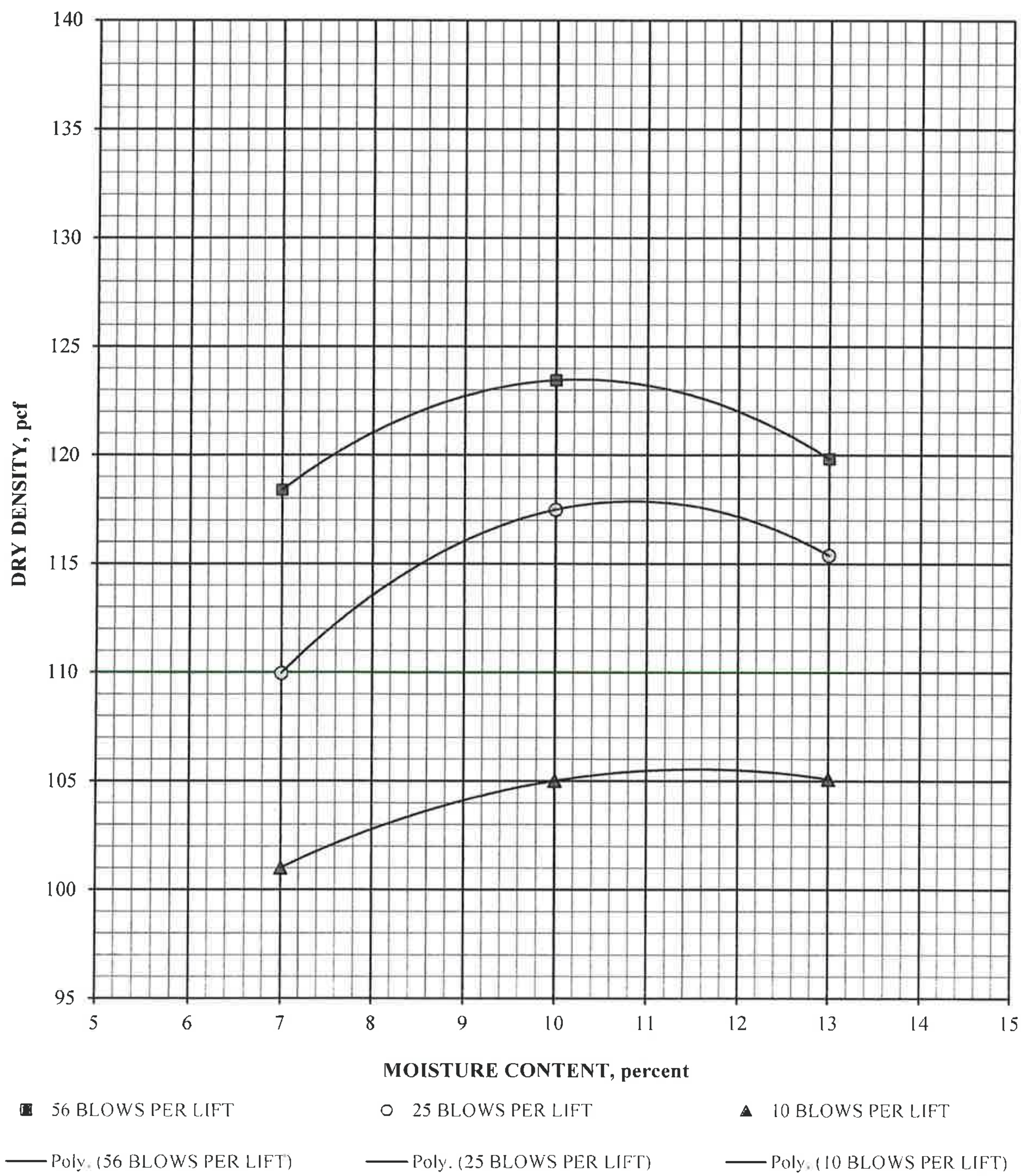
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #7; Boring #23 @ 3.5 - 5.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

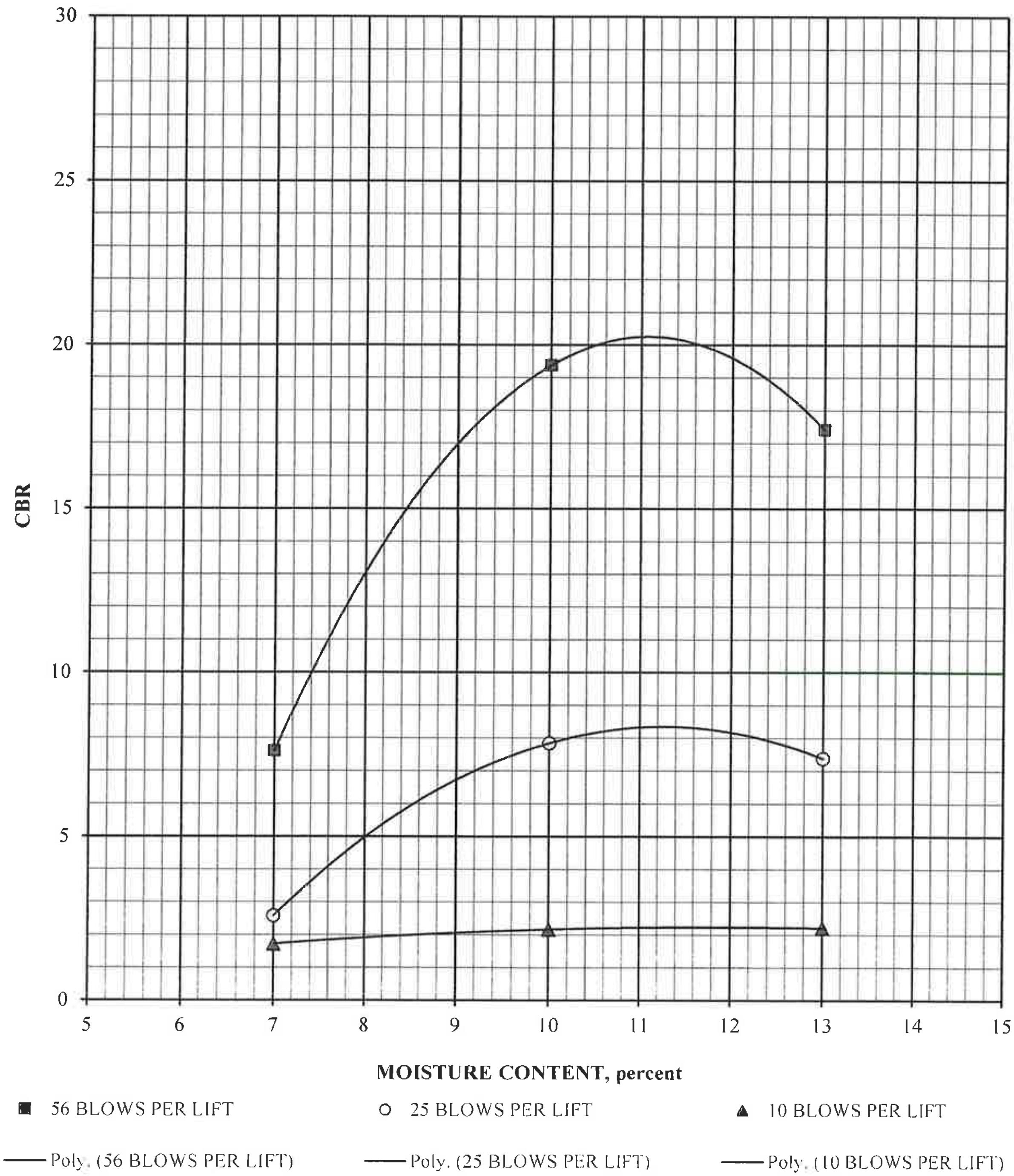
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #7; Boring #23 @ 3.5 - 5.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

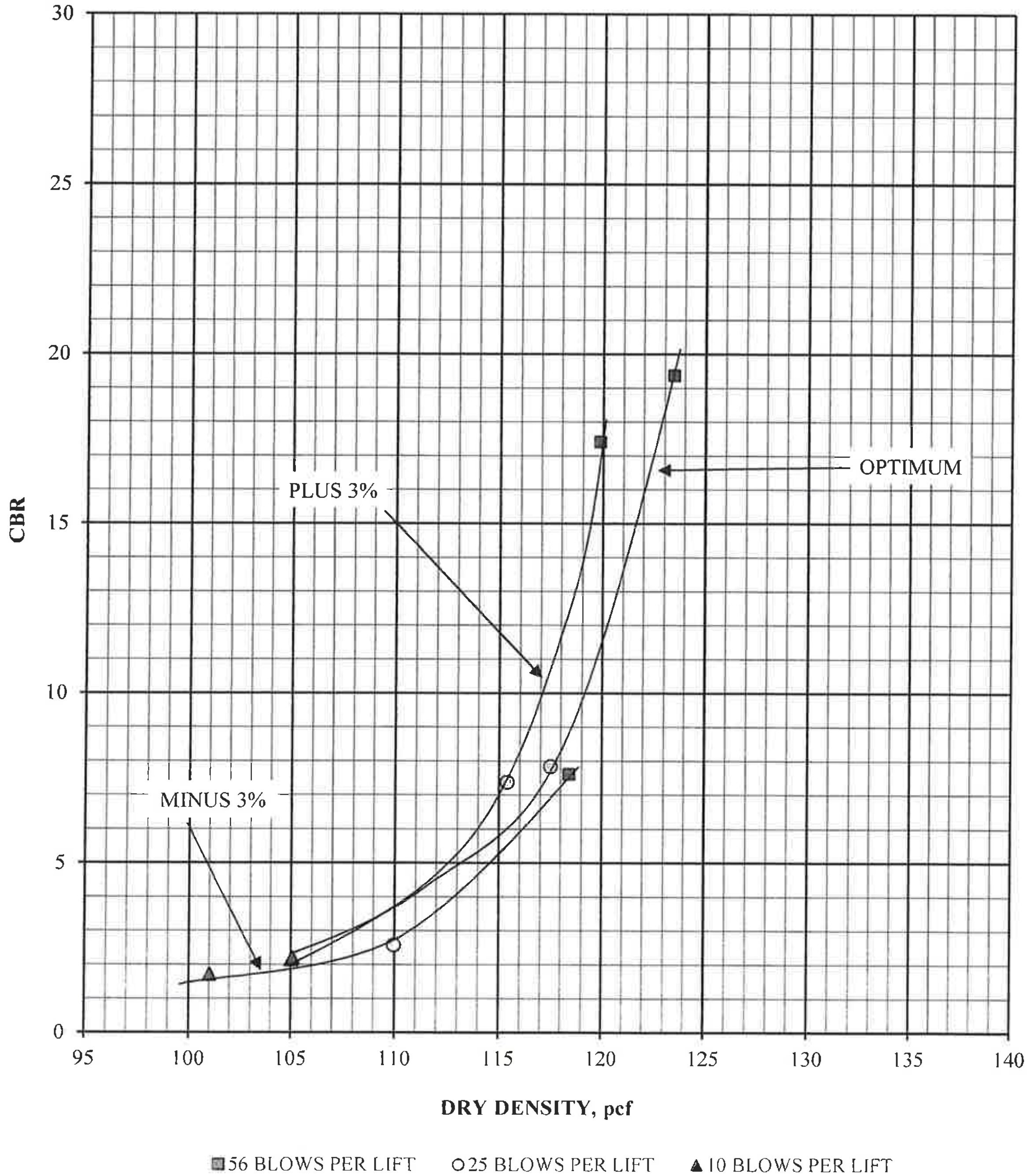
CBR #7; Boring #23 @ 3.5 - 5.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #8; Boring #29 @ 2.0 - 5.0'
Brown / Gray Mottled Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	108.3	108.9	107.1
Moisture content, %, before soak	8.9	11.9	14.9
Moisture content, %, after soak, avg.	15.9	12.9	23.5
Moisture content, %, after soak, top 1"	20.4	18.3	17.7
Expansion, %, 96 hour soak	0.7	0.4	0.1
Bearing Ratio, 0.100" penetration	4.6	6.8	2.6

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	120.3	121.8	115.8
Moisture content, %, before soak	8.9	11.9	14.9
Moisture content, %, after soak, avg.	12.6	14.0	15.4
Moisture content, %, after soak, top 1"	16.8	15.6	16.5
Expansion, %, 96 hour soak	0.6	0.3	0.7
Bearing Ratio, 0.100" penetration	17.7	27.9	3.2

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	121.7	122.9	115.5
Moisture content, %, before soak	8.9	11.9	14.9
Moisture content, %, after soak, avg.	16.3	12.4	15.2
Moisture content, %, after soak, top 1"	13.8	15.1	16.8
Expansion, %, 96 hour soak	0.6	0.4	0.0
Bearing Ratio, 0.100" penetration	19.7	27.5	2.8

CALIFORNIA BEARING RATIO

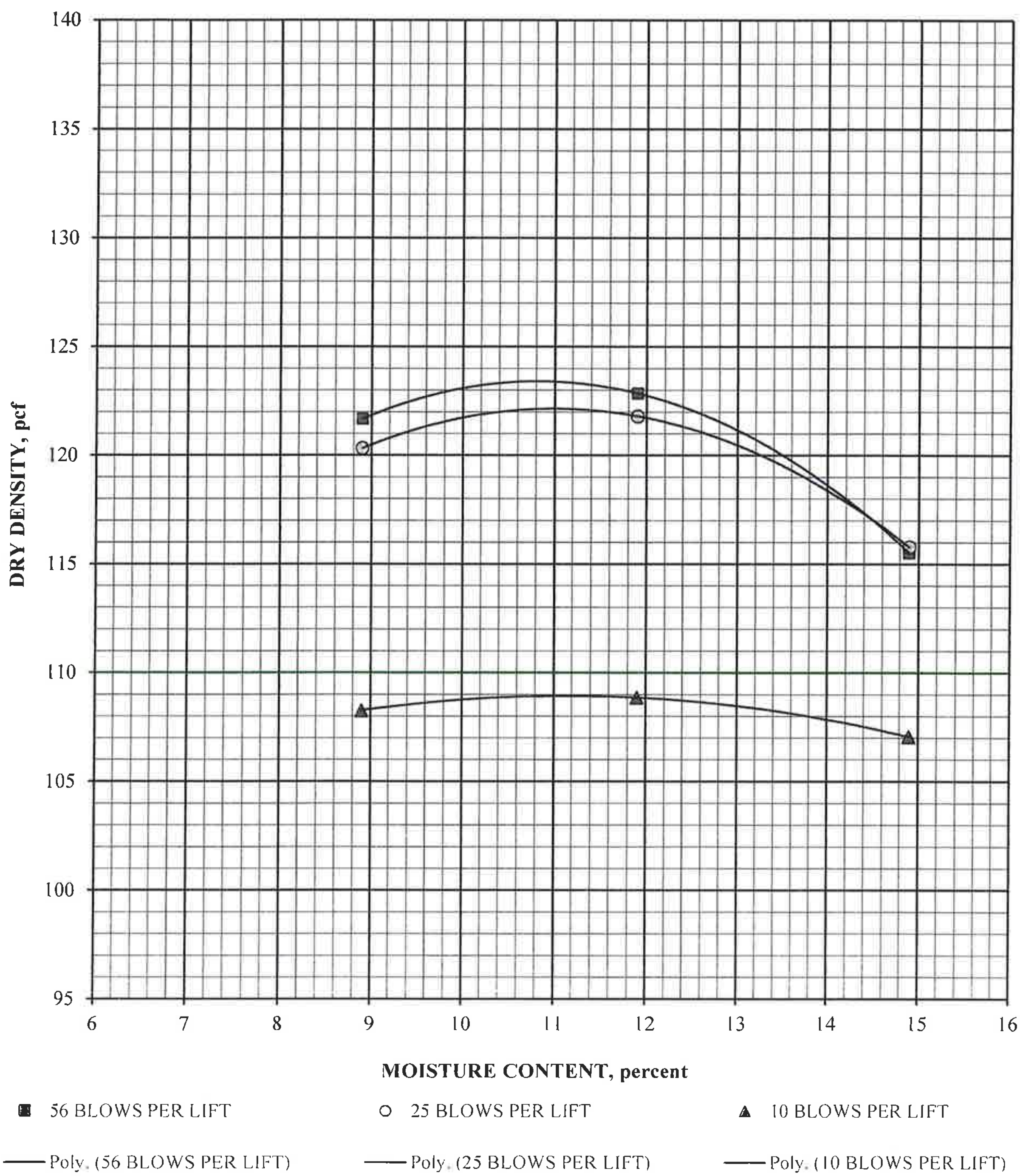
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #8; Boring #29 @ 2.0 - 5.0'

January 8, 2019

Brown / Gray Mottled Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

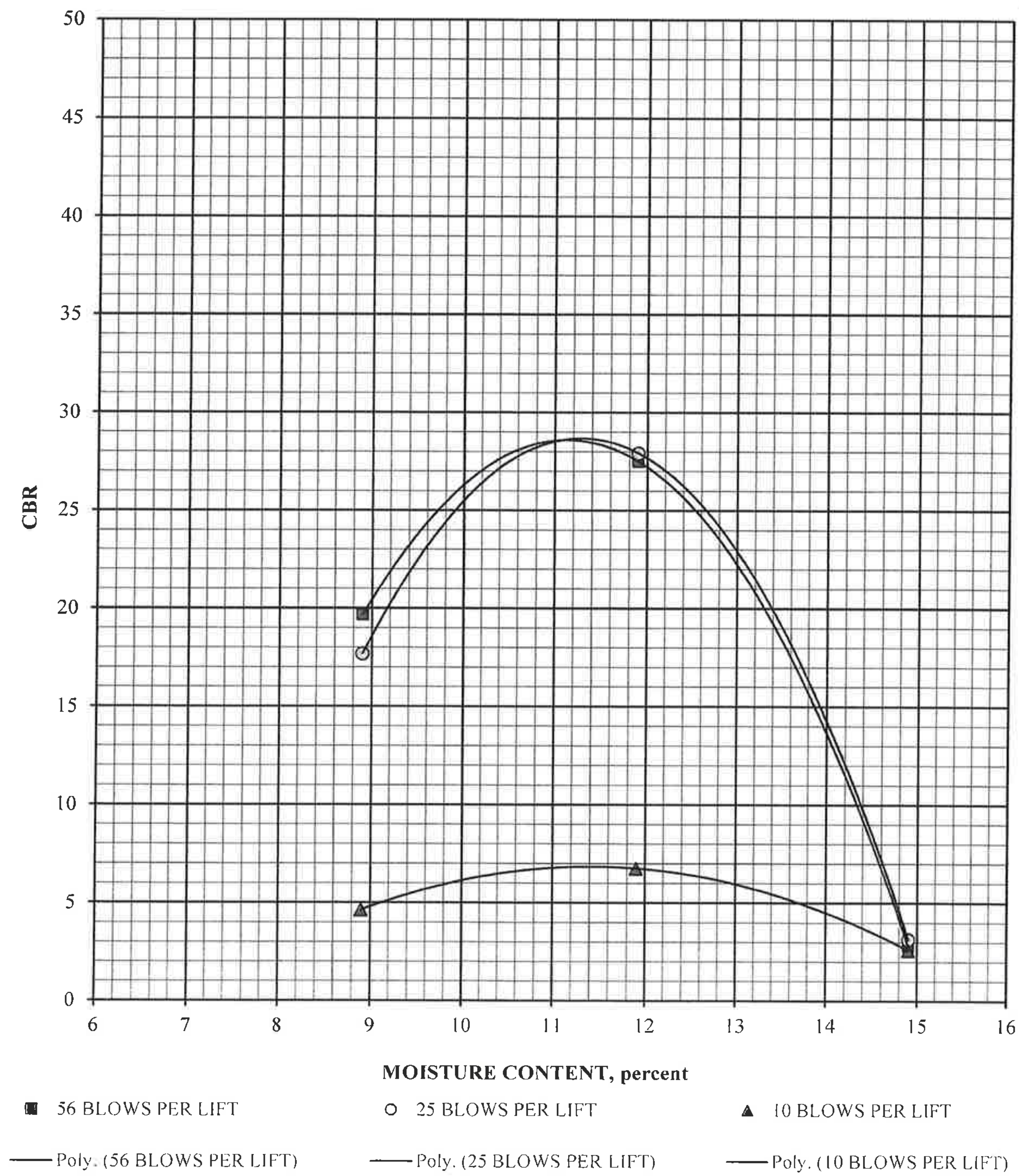
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #8; Boring #29 @ 2.0 - 5.0'

January 8, 2019

Brown / Gray Mottled Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

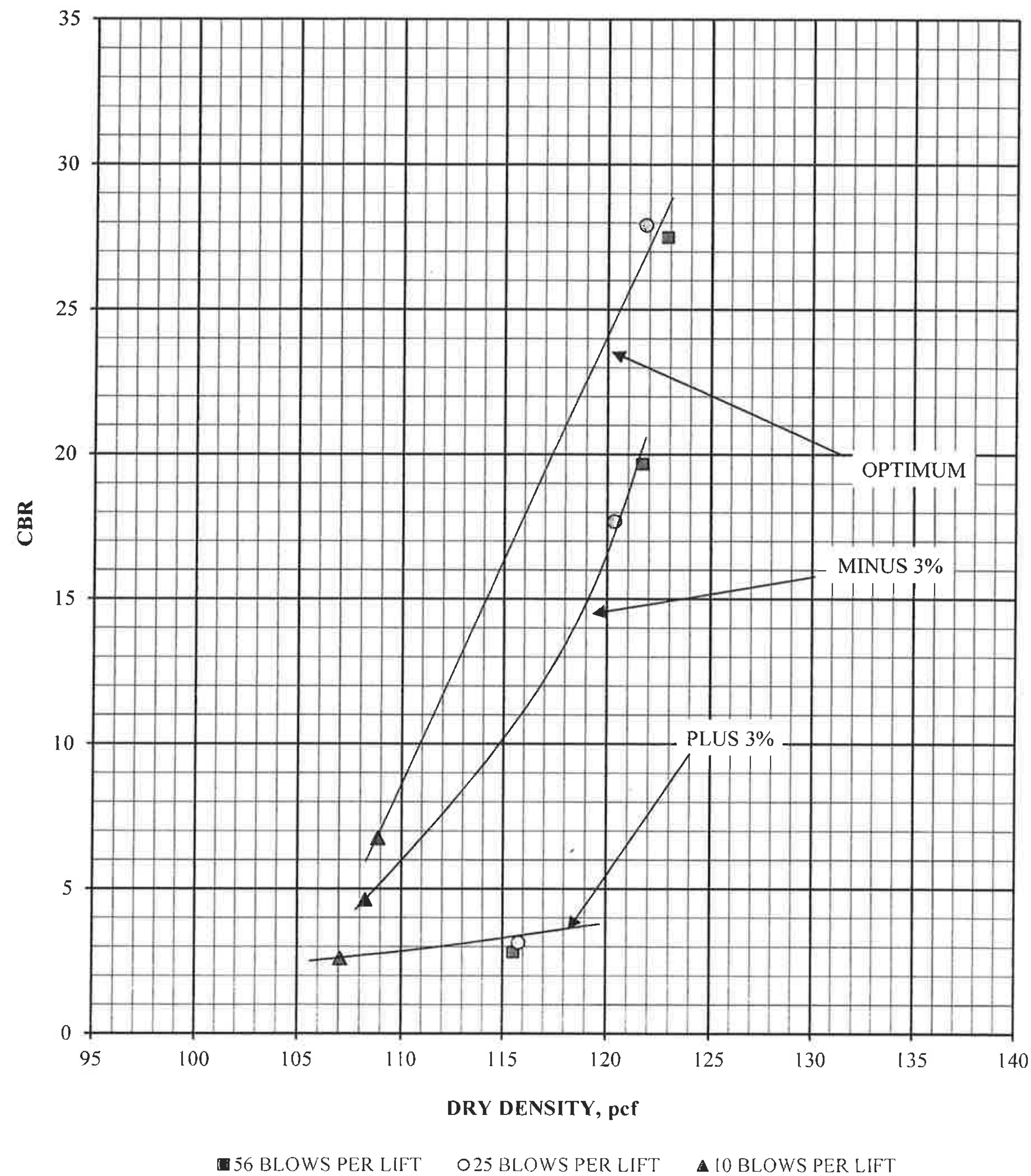
CBR #8; Boring #29 @ 2.0 - 5.0'

January 8, 2019

Brown / Gray Mottled Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #9; Boring #21 @ 1.5 - 3.0'
Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	108.6	112.7	110.8
Moisture content, %, before soak	10.4	13.4	16.4
Moisture content, %, after soak, avg.	15.2	15.6	17.2
Moisture content, %, after soak, top 1"	19.1	22.8	19.8
Expansion, %, 96 hour soak	0.4	0.1	0.1
Bearing Ratio, 0.100" penetration	3.3	5.0	4.7

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	113.9	117.6	110.1
Moisture content, %, before soak	10.4	13.4	16.4
Moisture content, %, after soak, avg.	20.2	16.1	17.7
Moisture content, %, after soak, top 1"	17.3	18.8	19.1
Expansion, %, 96 hour soak	0.2	0.1	0.2
Bearing Ratio, 0.100" penetration	12.8	14.3	3.9

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	118.2	119.9	110.9
Moisture content, %, before soak	10.4	13.4	16.4
Moisture content, %, after soak, avg.	17.4	14.5	14.6
Moisture content, %, after soak, top 1"	16.2	15.8	18.9
Expansion, %, 96 hour soak	0.3	0.1	0.0
Bearing Ratio, 0.100" penetration	17.8	17.9	3.0

CALIFORNIA BEARING RATIO

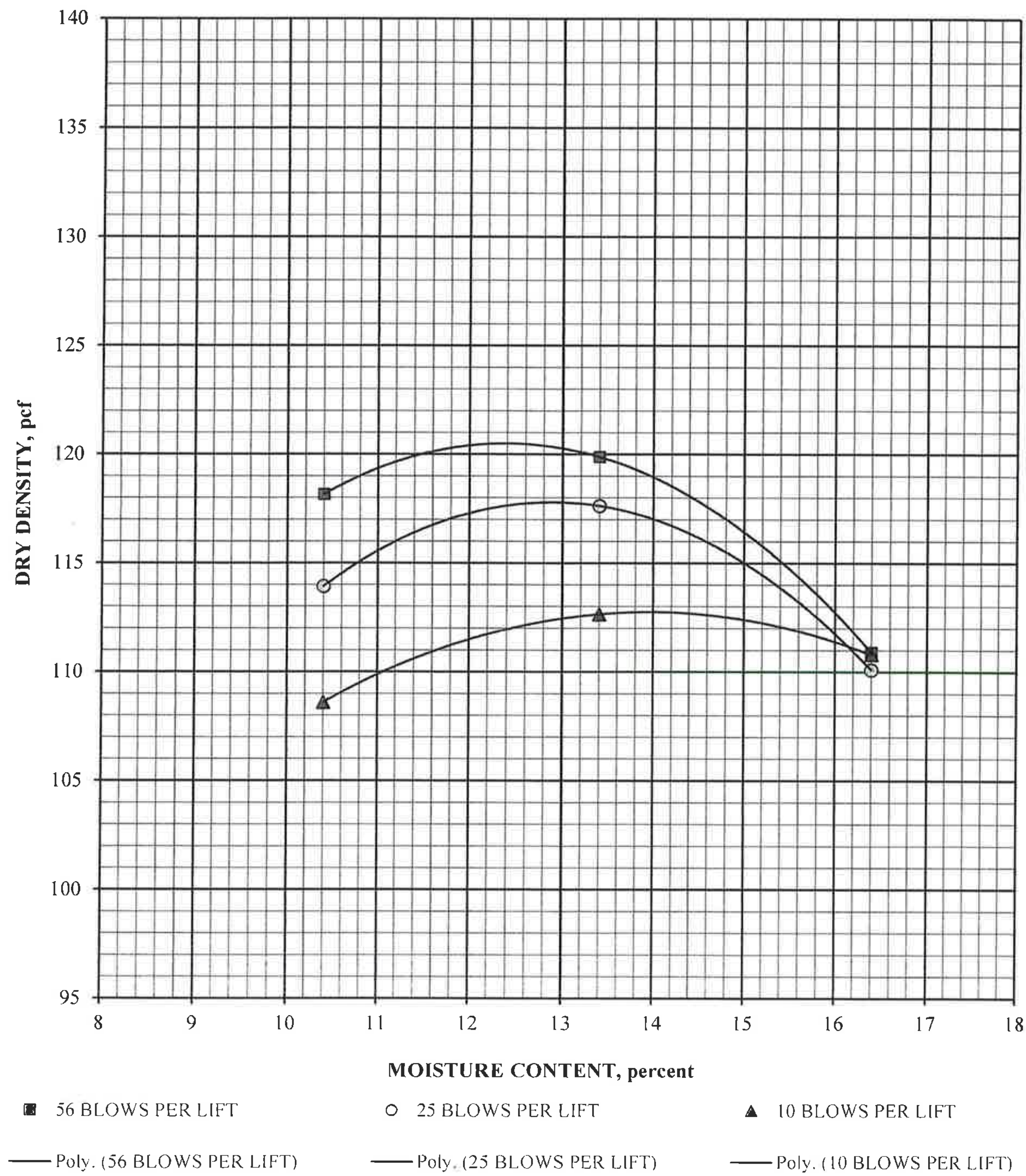
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #9; Boring #21 @ 1.5 - 3.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

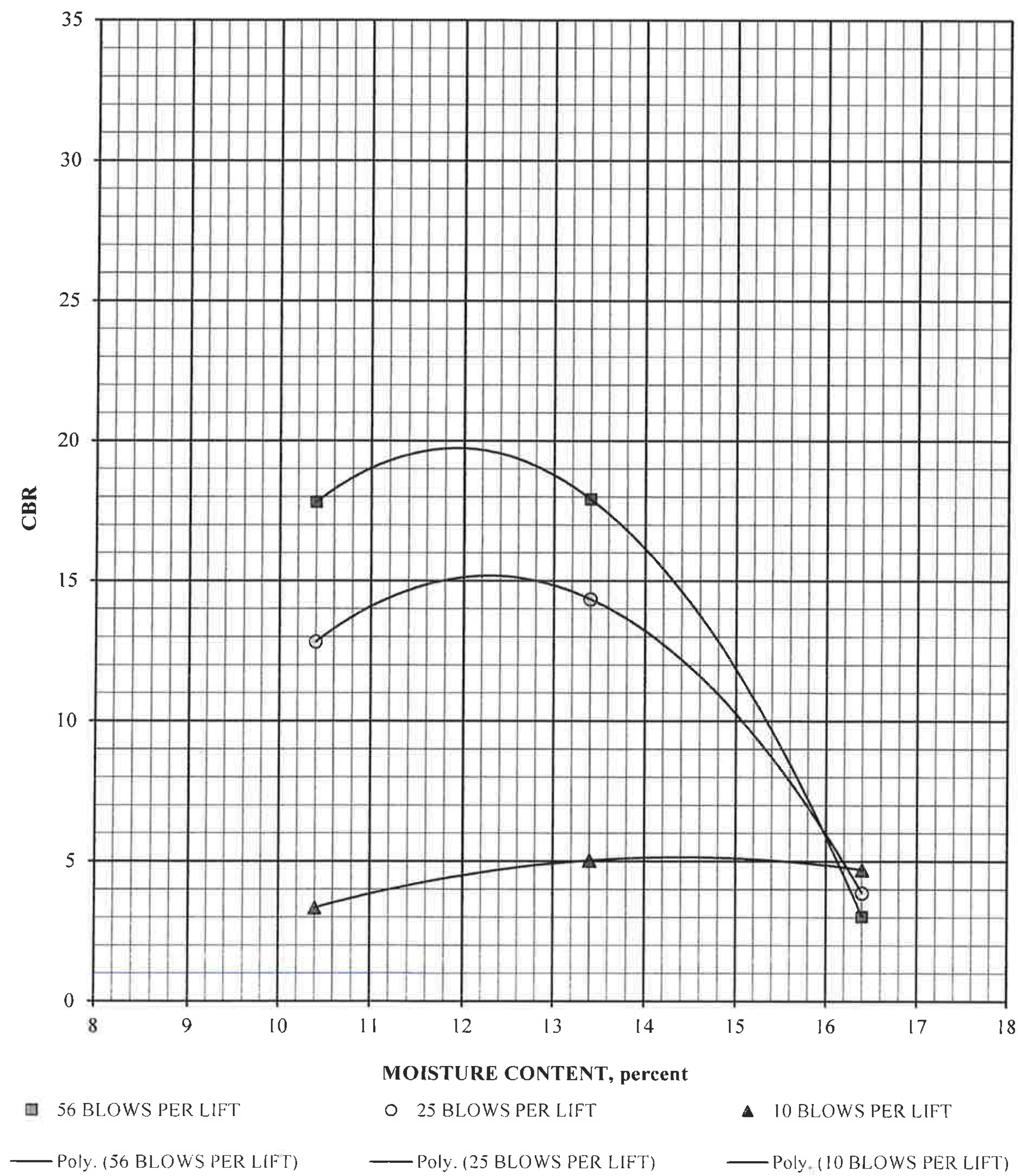
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #9; Boring #21 @ 1.5 - 3.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

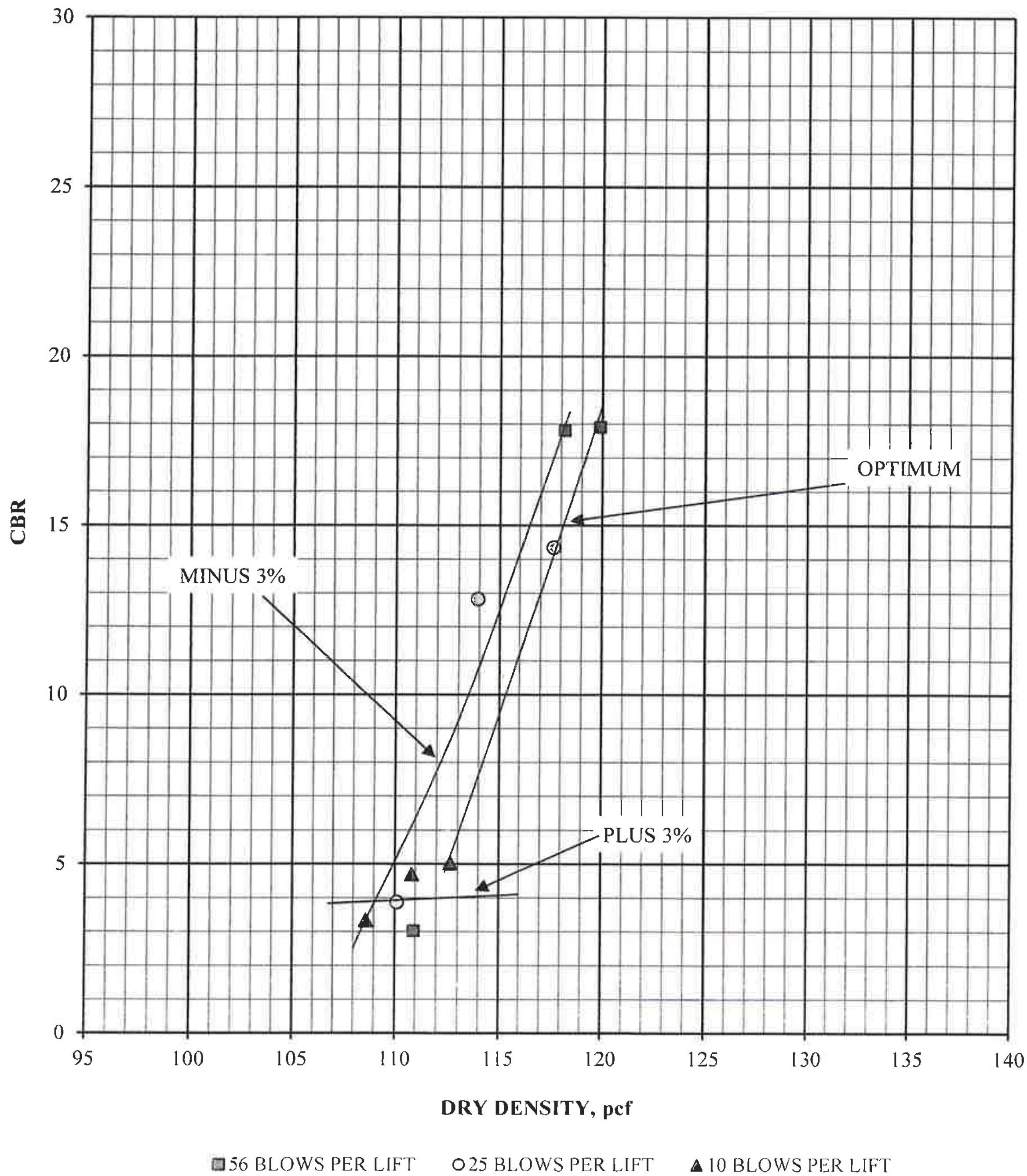
CBR #9; Boring #21 @ 1.5 - 3.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #11; Boring #16 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	107.9	109.0	107.4
Moisture content, %, before soak	10.7	13.7	16.7
Moisture content, %, after soak, avg.	18.6	17.4	20.1
Moisture content, %, after soak, top 1"	22.6	22.3	21.7
Expansion, %, 96 hour soak	0.4	0.2	0.0
Bearing Ratio, 0.100" penetration	3.6	5.9	3.0

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	112.3	114.4	110.2
Moisture content, %, before soak	10.7	13.7	16.7
Moisture content, %, after soak, avg.	20.3	16.2	19.2
Moisture content, %, after soak, top 1"	18.8	18.1	20.7
Expansion, %, 96 hour soak	0.3	0.2	0.0
Bearing Ratio, 0.100" penetration	8.7	10.0	3.2

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	113.0	114.6	111.1
Moisture content, %, before soak	10.7	13.7	16.7
Moisture content, %, after soak, avg.	22.1	16.5	18.3
Moisture content, %, after soak, top 1"	20.6	17.5	20.9
Expansion, %, 96 hour soak	0.4	0.2	0.0
Bearing Ratio, 0.100" penetration	10.9	12.1	2.9

CALIFORNIA BEARING RATIO

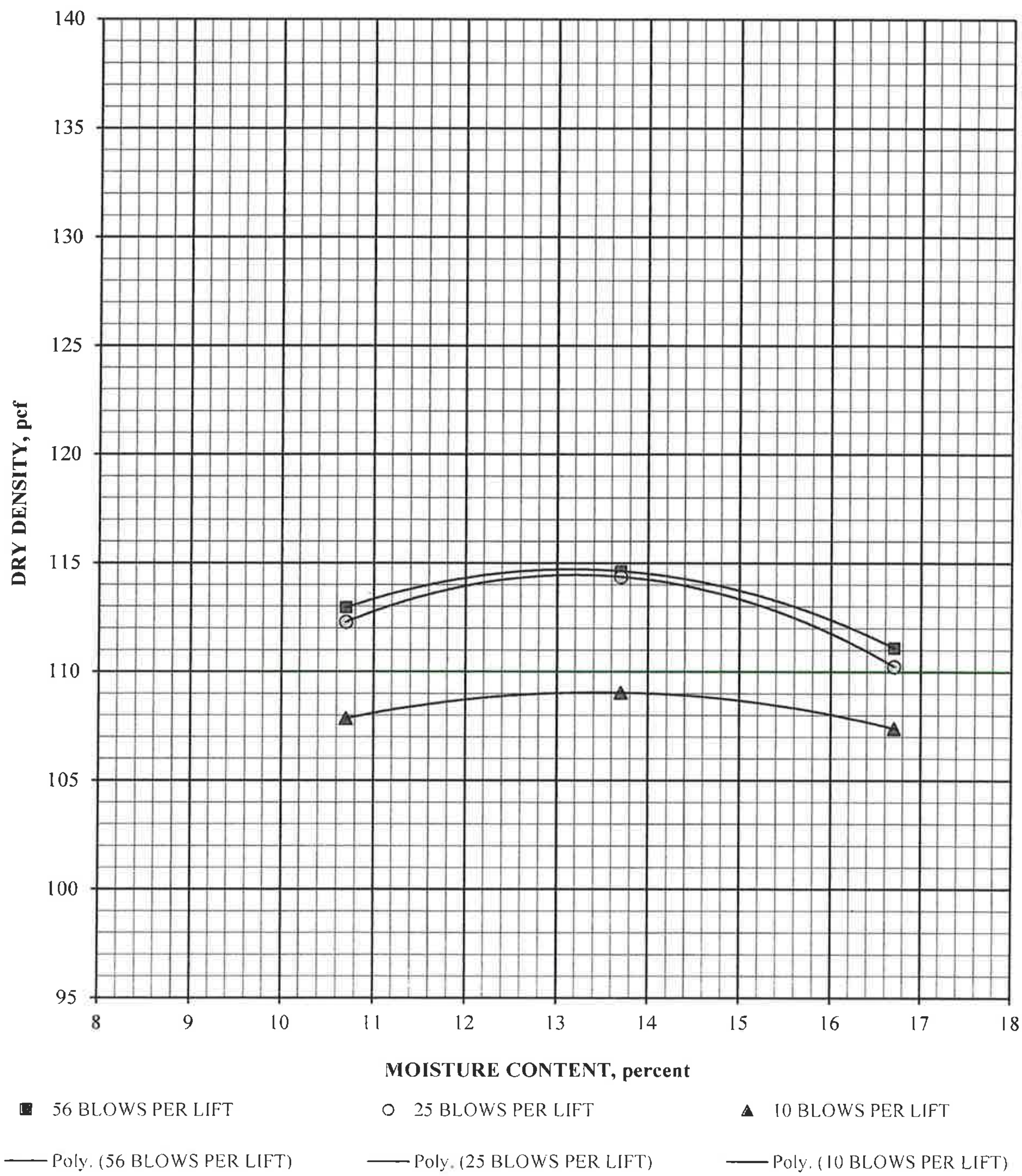
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #11; Boring #16 @ 2.0 - 4.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

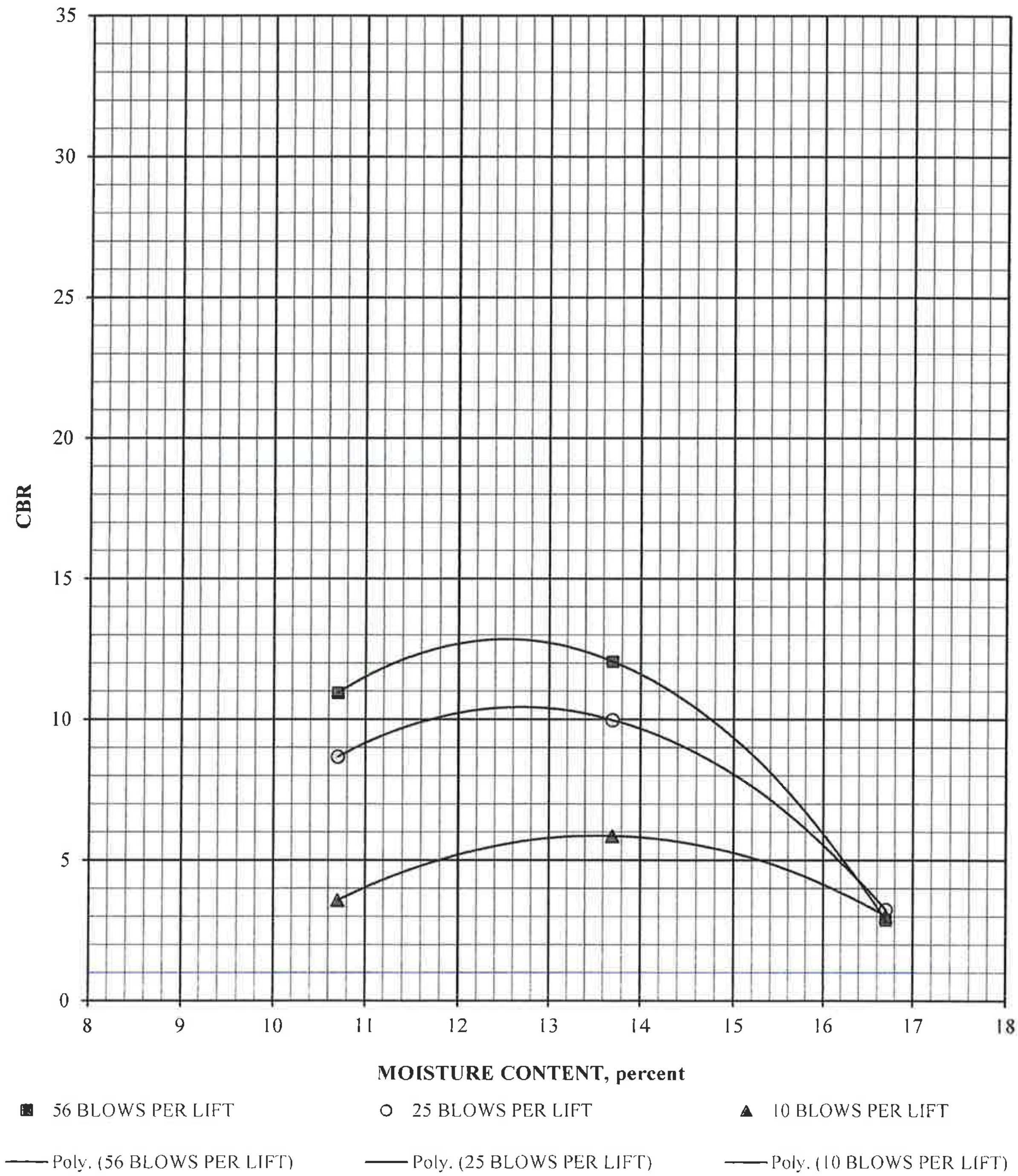
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #11; Boring #16 @ 2.0 - 4.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

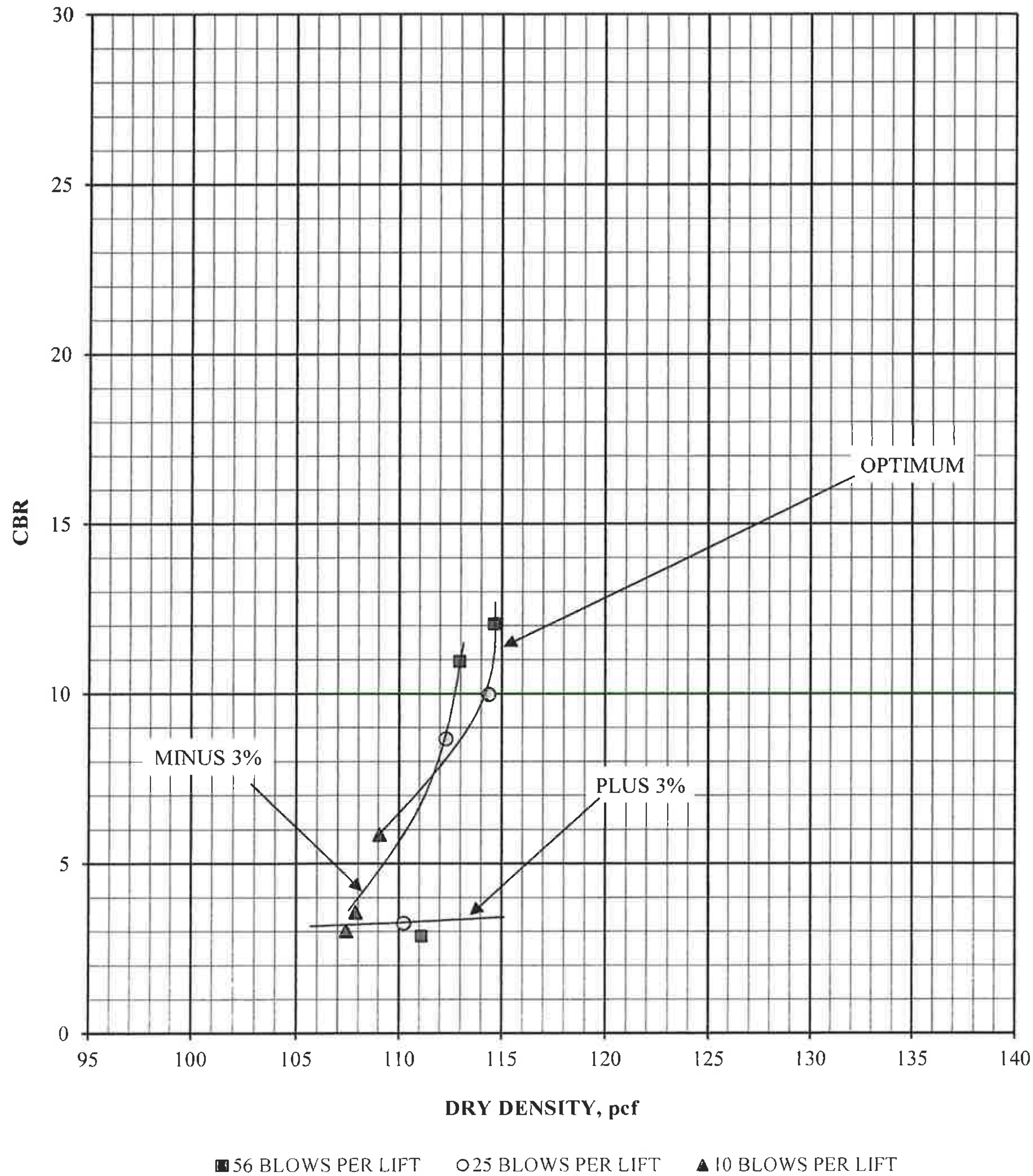
CBR #11; Boring #16 @ 2.0 - 4.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #12; Boring #13 @ 2.0 - 4.0'
Dark Brown Sandy Lean Clay (CL)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	100.6	103.3	103.8
Moisture content, %, before soak	13.5	16.5	19.5
Moisture content, %, after soak, avg.	24.8	22.0	20.5
Moisture content, %, after soak, top 1"	30.7	25.3	23.8
Expansion, %, 96 hour soak	0.5	0.1	0.0
Bearing Ratio, 0.100" penetration	2.5	5.9	4.6

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	111.4	111.7	106.0
Moisture content, %, before soak	13.5	16.5	19.5
Moisture content, %, after soak, avg.	15.8	18.3	19.7
Moisture content, %, after soak, top 1"	23.8	20.9	22.8
Expansion, %, 96 hour soak	0.2	0.1	0.0
Bearing Ratio, 0.100" penetration	10.5	15.2	4.6

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	112.2	112.6	105.8
Moisture content, %, before soak	13.5	16.5	19.5
Moisture content, %, after soak, avg.	21.0	19.2	19.8
Moisture content, %, after soak, top 1"	17.7	18.8	22.8
Expansion, %, 96 hour soak	0.5	0.0	0.0
Bearing Ratio, 0.100" penetration	13.6	15.8	4.3

Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

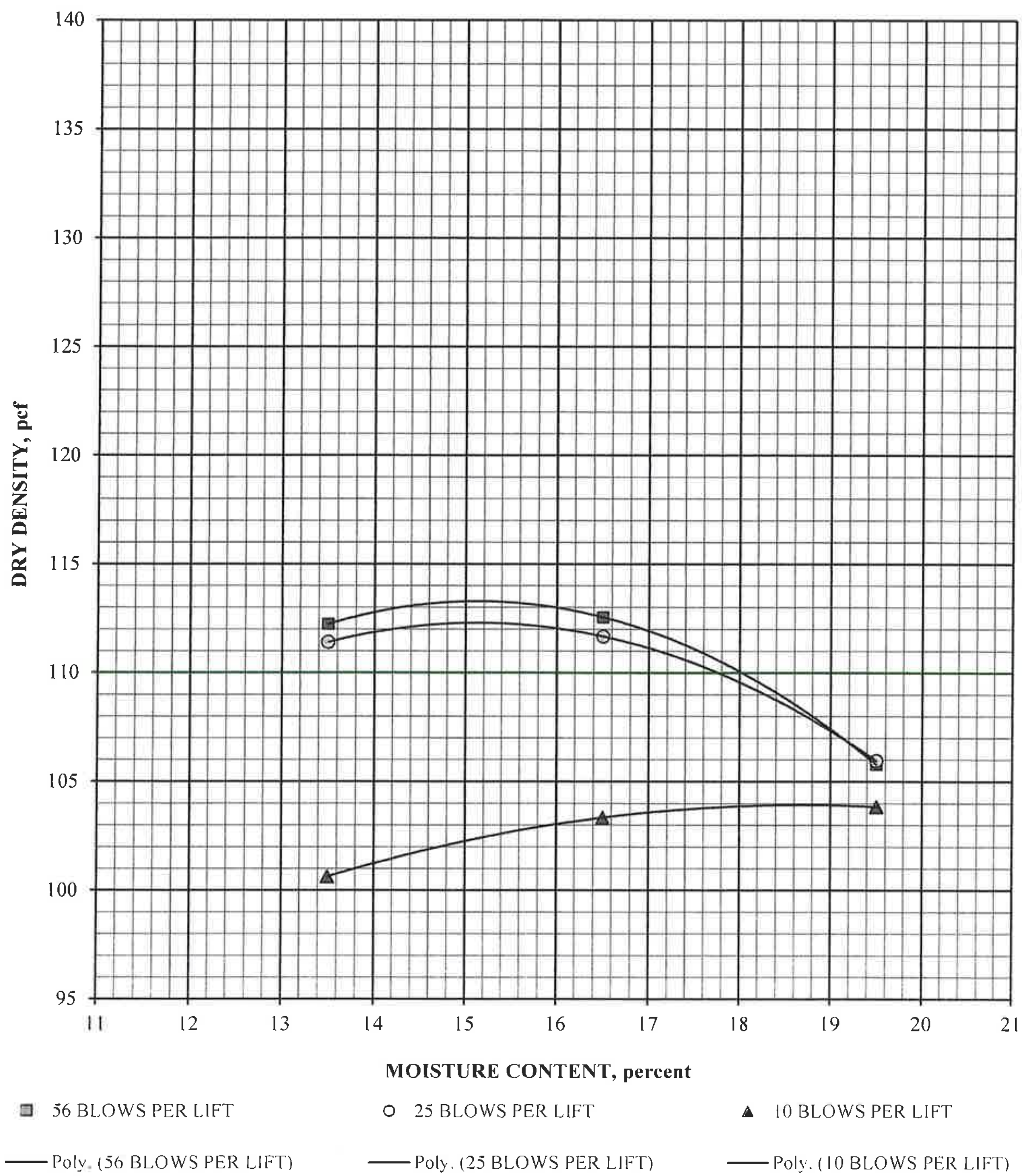
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #12; Boring #13 @ 2.0 - 4.0'

Dark Brown Sandy Lean Clay (CL)

January 8, 2019

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

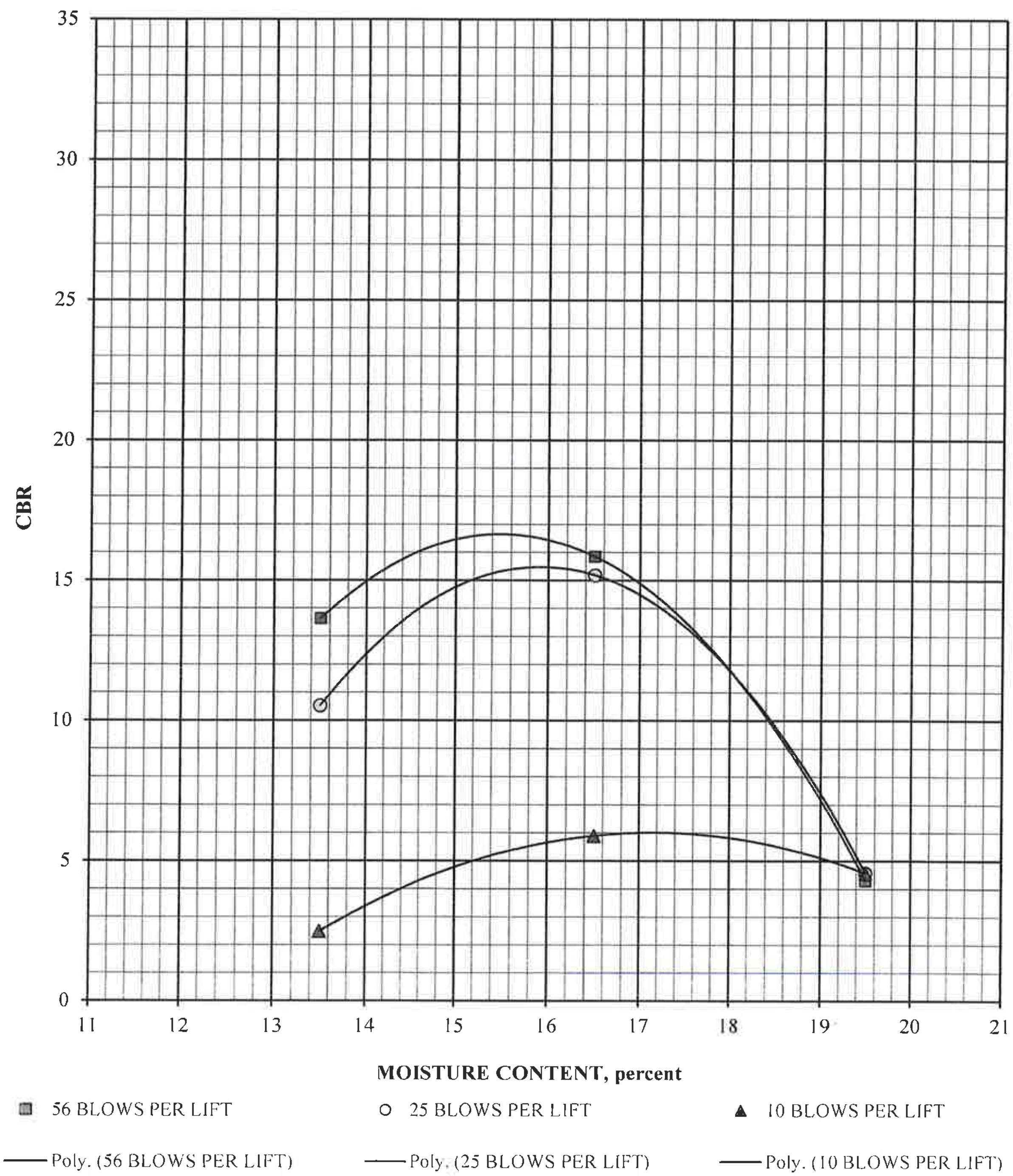
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #12; Boring #13 @ 2.0 - 4.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

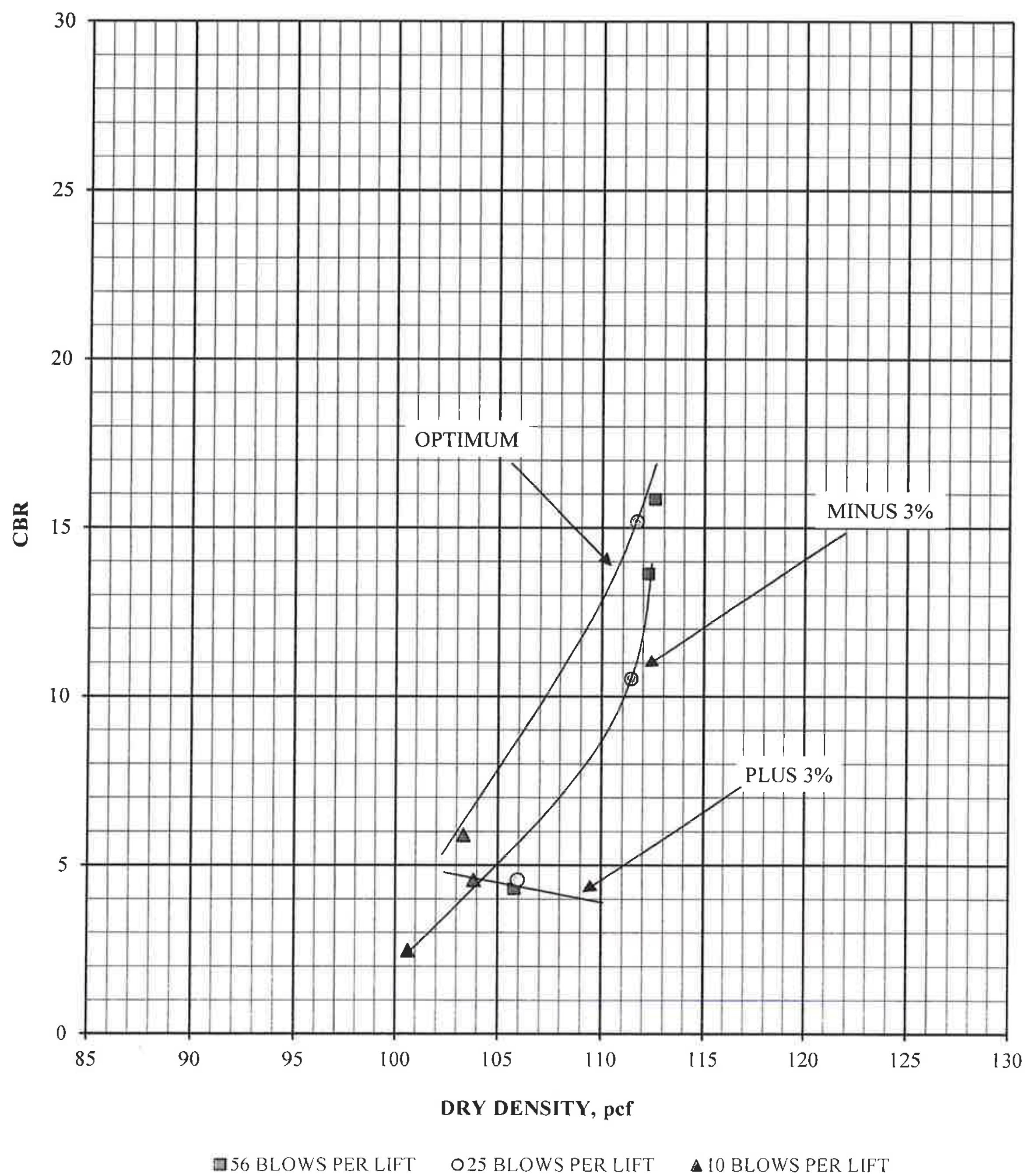
CBR #12; Boring #13 @ 2.0 - 4.0'

Dark Brown Sandy Lean Clay (CL)

January 8, 2019

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #13; Boring #40 @ 1.5 - 3.5'
Brown Silty Sand (SM)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	115.8	119.0	116.3
Moisture content, %, before soak	6.2	9.2	12.2
Moisture content, %, after soak, avg.	14.9	11.8	18.8
Moisture content, %, after soak, top 1"	19.3	15.9	14.0
Expansion, %, 96 hour soak	0.2	0.1	0.0
Bearing Ratio, 0.100" penetration	4.9	15.3	6.7

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	122.8	127.8	120.4
Moisture content, %, before soak	6.2	9.2	12.2
Moisture content, %, after soak, avg.	11.1	10.4	12.5
Moisture content, %, after soak, top 1"	15.1	11.4	13.0
Expansion, %, 96 hour soak	0.4	0.1	0.0
Bearing Ratio, 0.100" penetration	16.9	25.3	4.8

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	123.0	129.2	121.2
Moisture content, %, before soak	6.2	9.2	12.2
Moisture content, %, after soak, avg.	15.6	11.7	14.1
Moisture content, %, after soak, top 1"	13.3	10.4	12.4
Expansion, %, 96 hour soak	0.5	0.2	0.0
Bearing Ratio, 0.100" penetration	26.2	35.0	4.6

CALIFORNIA BEARING RATIO

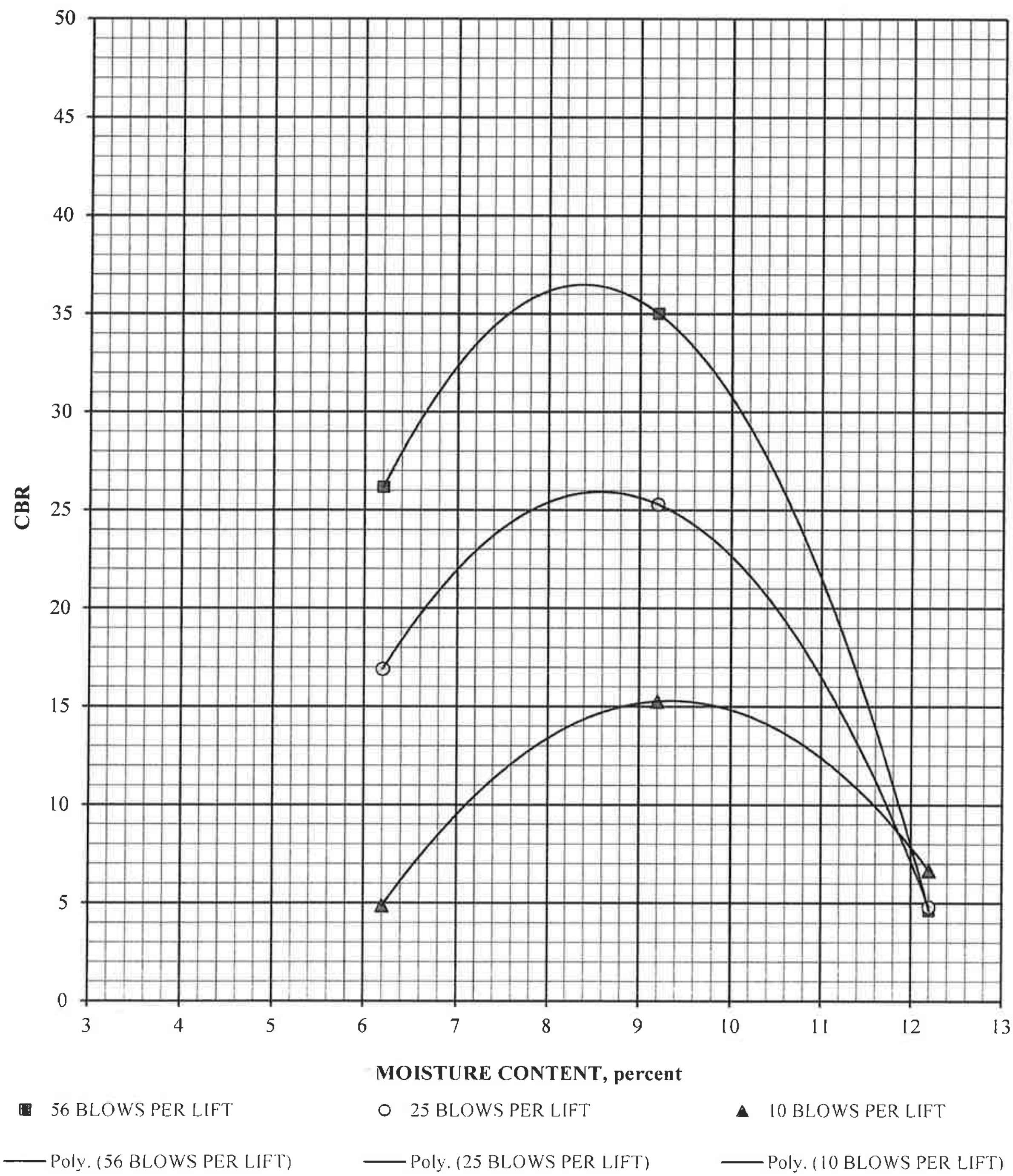
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #13; Boring #40 @ 1.5 - 3.5'

January 8, 2019

Brown Silty Sand (SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

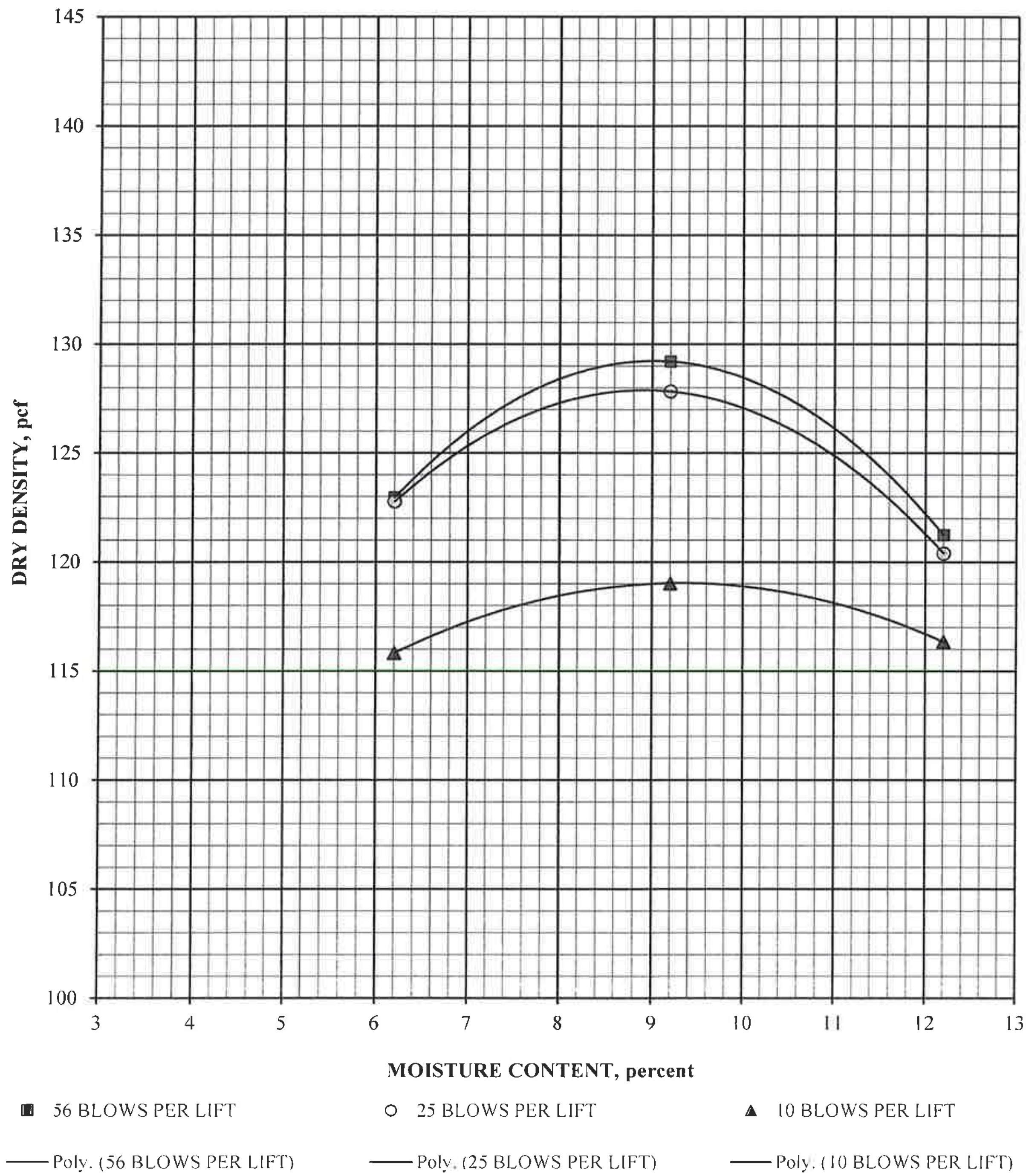
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #13; Boring #40 @ 1.5 - 3.5'

January 8, 2019

Brown Silty Sand (SM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

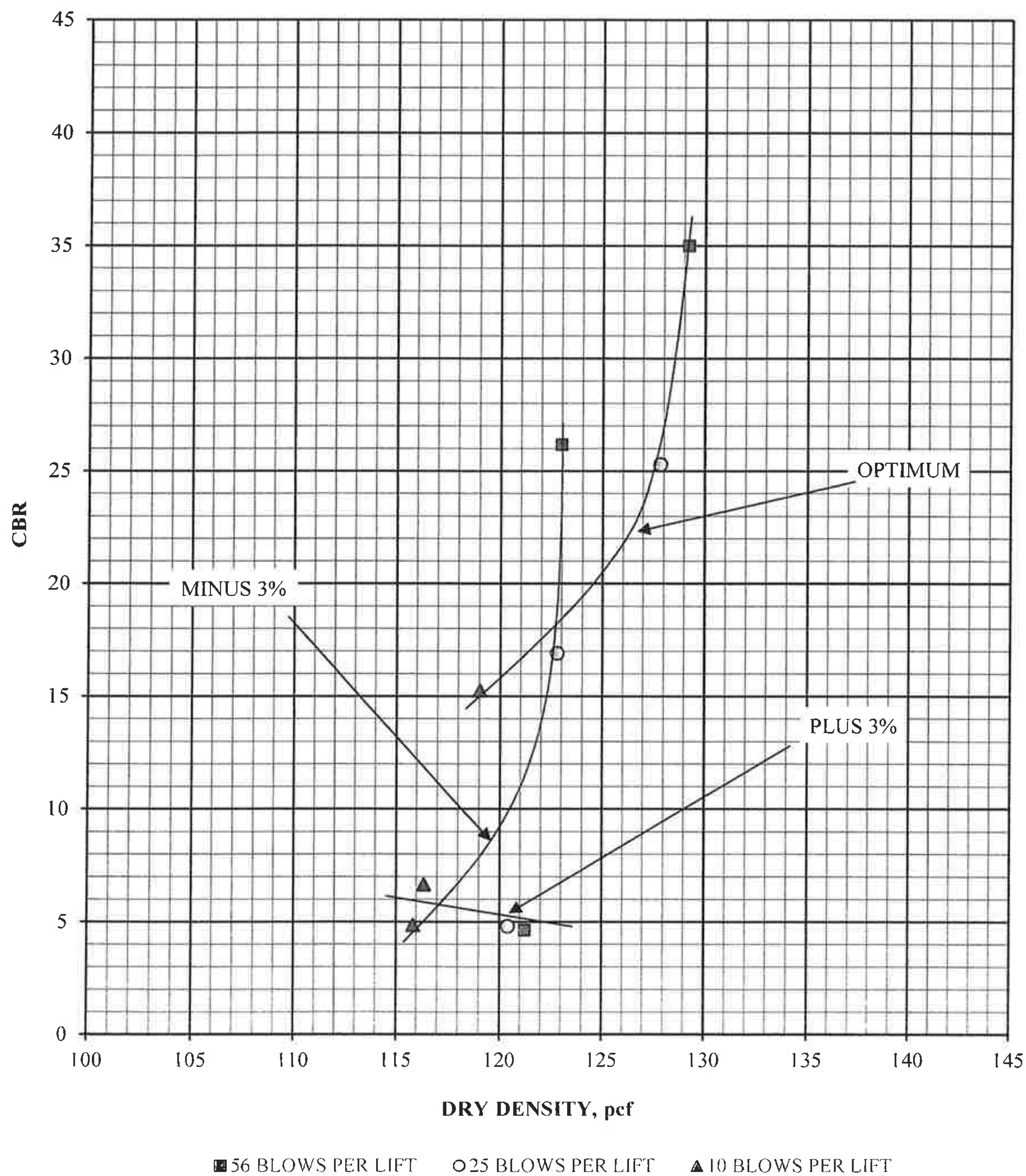
CBR #13; Boring #40 @ 1.5 - 3.5'

January 8, 2019

Brown Silty Sand (SM)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #14; Boring #39 @ 2.0 - 5.0'
Brown Sandy Fat Clay (CH)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	105.6	110.2	106.0
Moisture content, %, before soak	6.6	9.6	12.6
Moisture content, %, after soak, avg.	20.5	17.4	24.2
Moisture content, %, after soak, top 1"	22.2	21.4	17.8
Expansion, %, 96 hour soak	5.3	3.1	2.2
Bearing Ratio, 0.100" penetration	2.0	3.2	2.2

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	115.3	117.5	116.0
Moisture content, %, before soak	6.6	9.6	12.6
Moisture content, %, after soak, avg.	16.8	15.3	13.9
Moisture content, %, after soak, top 1"	21.9	17.9	17.2
Expansion, %, 96 hour soak	3.3	2.0	0.0
Bearing Ratio, 0.100" penetration	3.8	5.5	4.6

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	118.2	123.8	117.2
Moisture content, %, before soak	6.6	9.6	12.6
Moisture content, %, after soak, avg.	20.0	13.1	13.2
Moisture content, %, after soak, top 1"	19.5	18.0	17.7
Expansion, %, 96 hour soak	4.1	1.6	0.0
Bearing Ratio, 0.100" penetration	6.7	14.7	3.4

Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

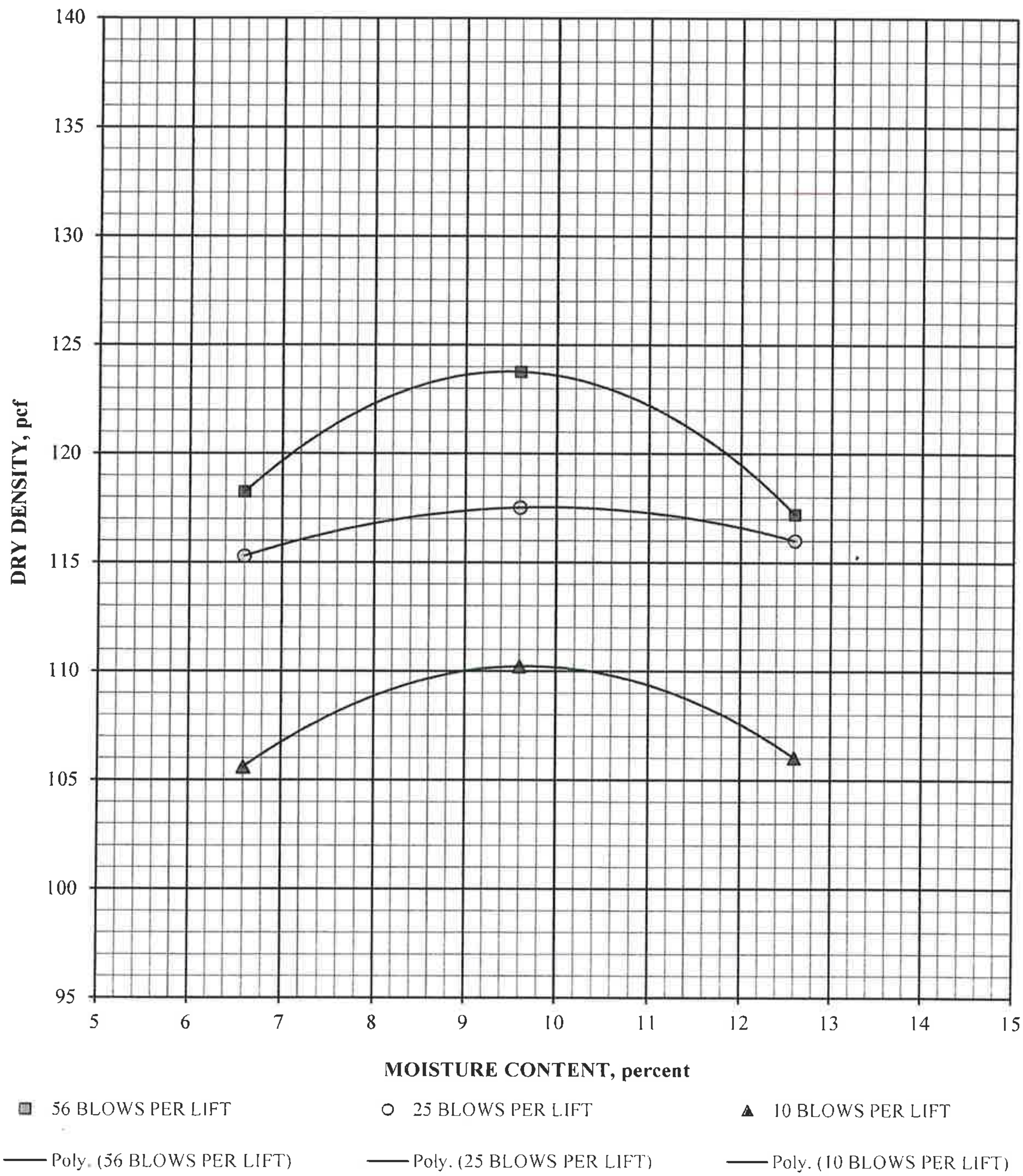
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #14; Boring #39 @ 2.0 - 5.0'

January 8, 2019

Brown Sandy Fat Clay (CH)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

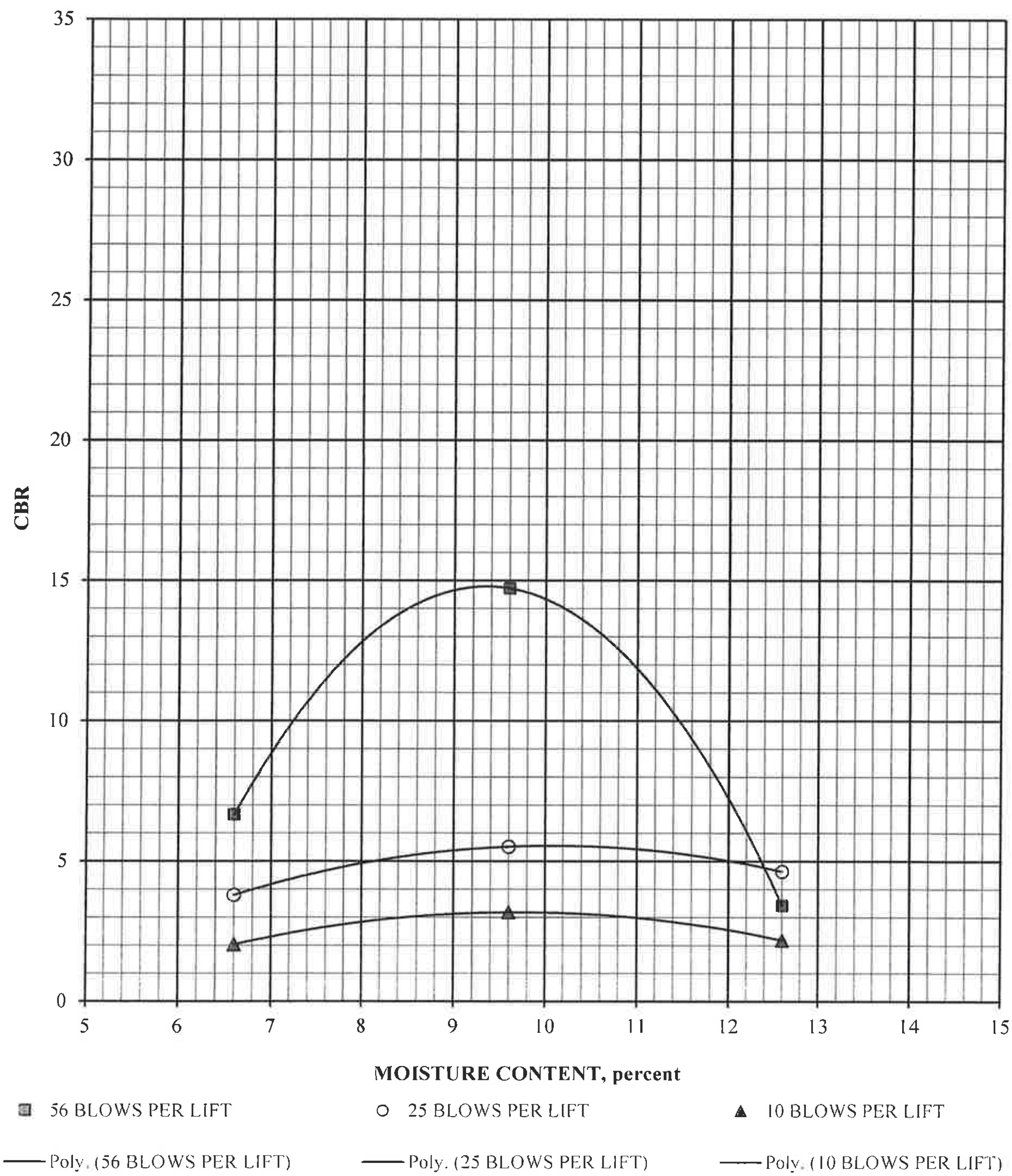
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #14; Boring #39 @ 2.0 - 5.0'

Brown Sandy Fat Clay (CH)

January 8, 2019

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

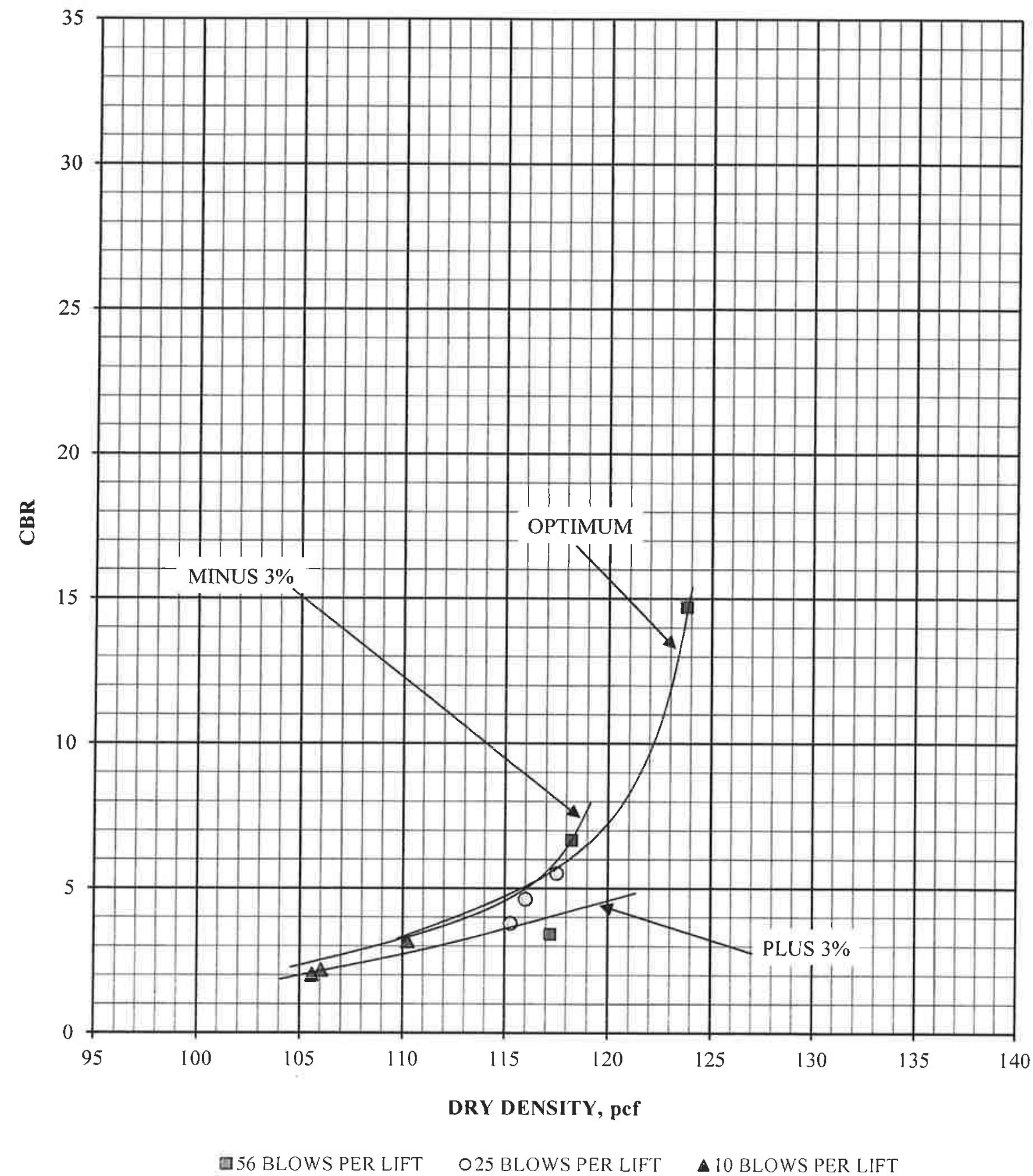
CBR #14; Boring #39 @ 2.0 - 5.0'

January 8, 2019

Brown Sandy Fat Clay (CH)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #15; Boring #17 @ 0.5 - 1.5'
Brown Clayey Sand with Gravel (SC)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	118.7	119.3	119.1
Moisture content, %, before soak	5.0	8.0	11.0
Moisture content, %, after soak, avg.	13.0	12.4	17.2
Moisture content, %, after soak, top 1"	16.7	13.8	13.6
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	14.2	21.9	13.3

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	119.8	122.4	120.6
Moisture content, %, before soak	5.0	8.0	11.0
Moisture content, %, after soak, avg.	14.8	13.7	17.8
Moisture content, %, after soak, top 1"	14.2	13.1	12.8
Expansion, %, 96 hour soak	0.2	0.1	0.2
Bearing Ratio, 0.100" penetration	15.8	61.2	24.7

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	125.3	129.2	128.1
Moisture content, %, before soak	5.0	8.0	11.0
Moisture content, %, after soak, avg.	5.6	9.3	19.9
Moisture content, %, after soak, top 1"	16.3	14.4	13.6
Expansion, %, 96 hour soak	0.2	0.1	0.0
Bearing Ratio, 0.100" penetration	20.8	81.7	61.2

Oxnard Airport - Runway and Taxiway
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CALIFORNIA BEARING RATIO

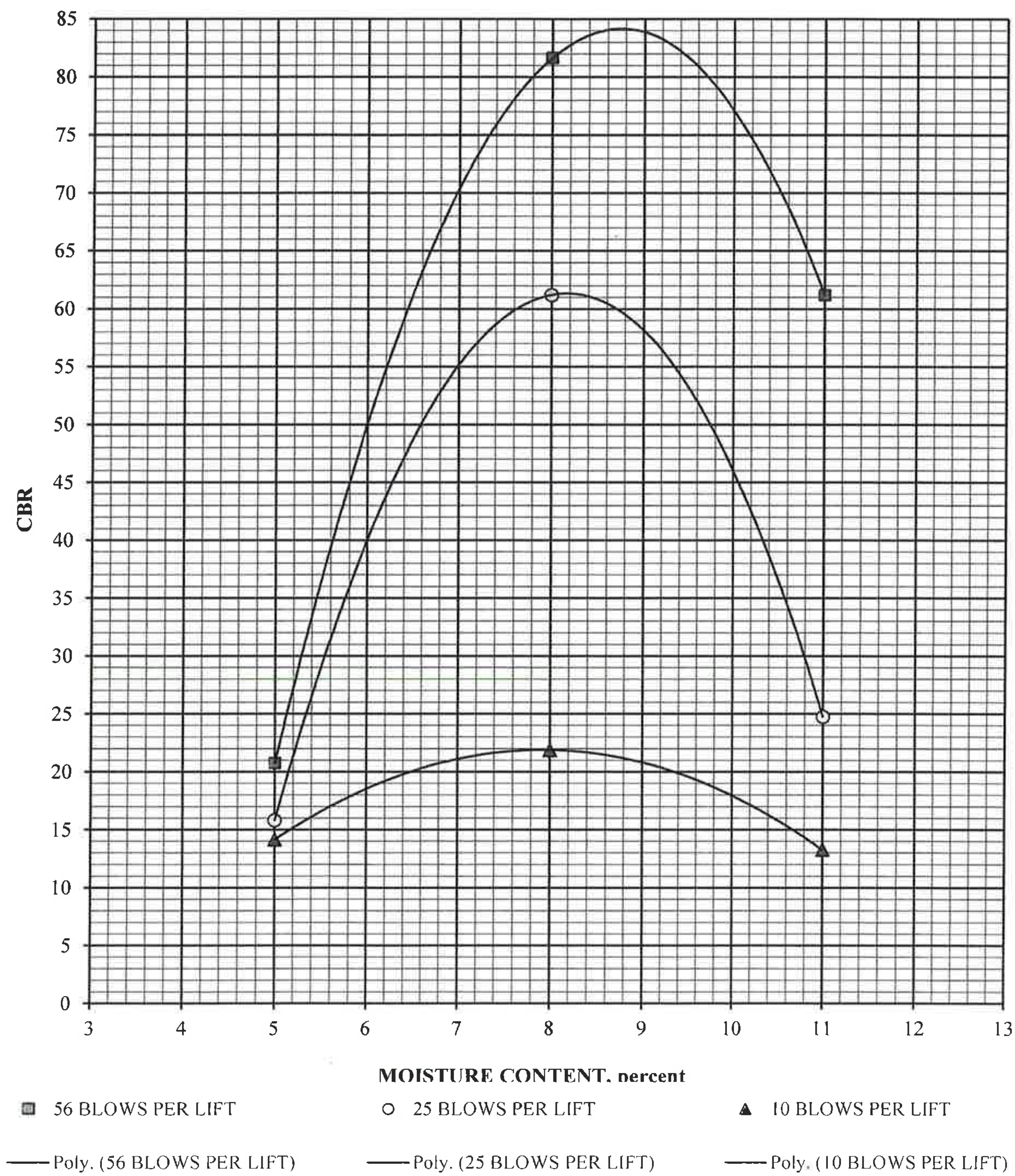
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #15; Boring #17 @ 0.5 - 1.5'

January 8, 2019

Brown Clayey Sand with Gravel (SC)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

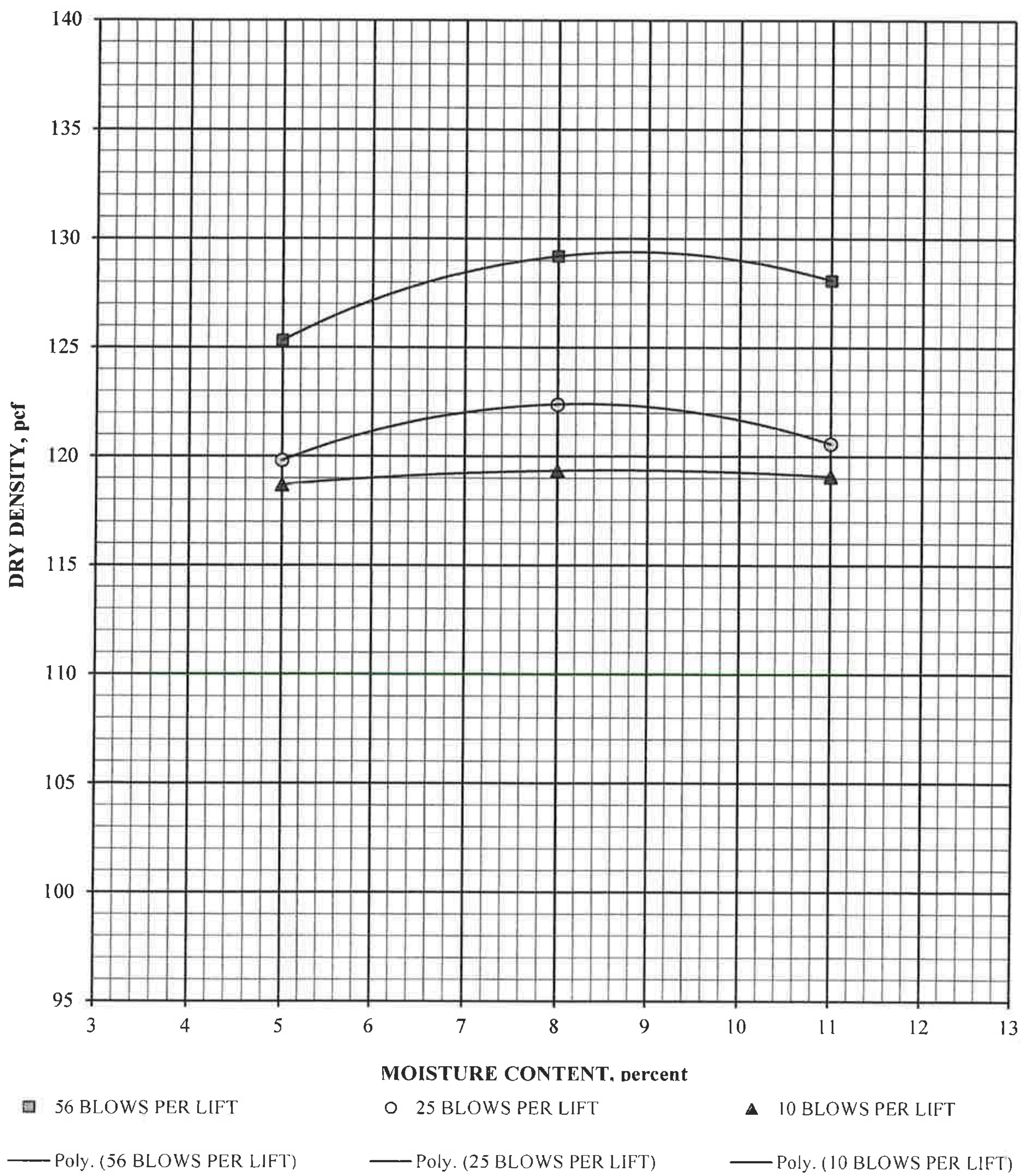
CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #15; Boring #17 @ 0.5 - 1.5'
Brown Clayey Sand with Gravel (SC)

January 8, 2019

DRY DENSITY vs. MOISTURE CONTENT



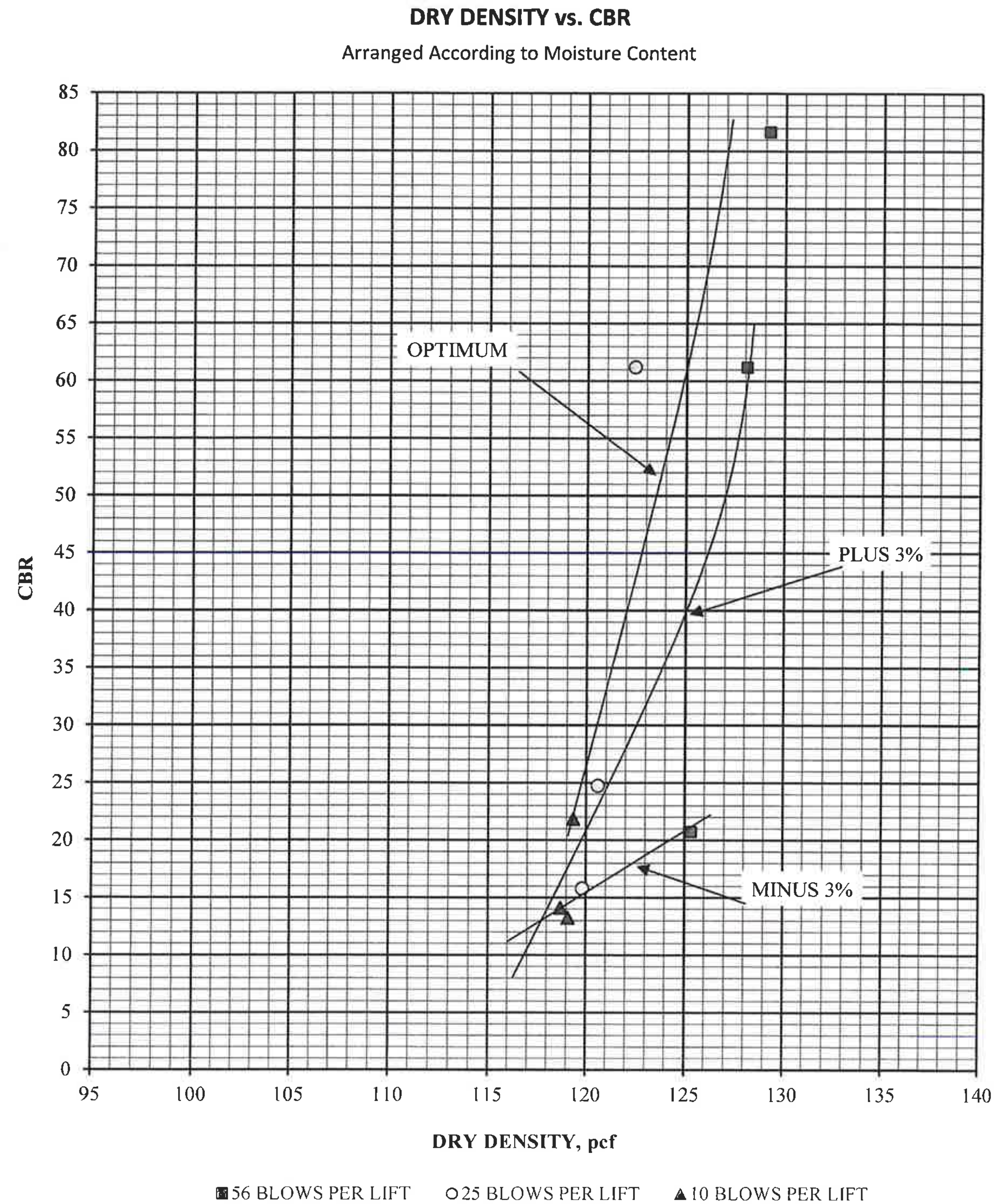
CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #15; Boring #17 @ 0.5 - 1.5'

Brown Clayey Sand with Gravel (SC)

January 8, 2019



Oxnard Airport - Runway and Taxiway Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #16; Boring #28 @ 0.5 - 1.5'
Brown Silty Gravel with Sand (GM)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	118.8	121.8	112.9
Moisture content, %, before soak	3.5	6.5	9.5
Moisture content, %, after soak, avg.	8.2	8.9	20.8
Moisture content, %, after soak, top 1"	9.6	9.3	9.0
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	6.9	24.9	14.9

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	119.0	124.4	113.7
Moisture content, %, before soak	3.5	6.5	9.5
Moisture content, %, after soak, avg.	8.7	8.1	11.4
Moisture content, %, after soak, top 1"	9.8	8.0	8.7
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	17.7	48.5	23.0

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	128.6	130.6	115.3
Moisture content, %, before soak	3.5	6.5	9.5
Moisture content, %, after soak, avg.	6.4	7.7	9.8
Moisture content, %, after soak, top 1"	9.0	7.1	9.2
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	41.2	85.5	26.2

Oxnard Airport - Runway and Taxiway
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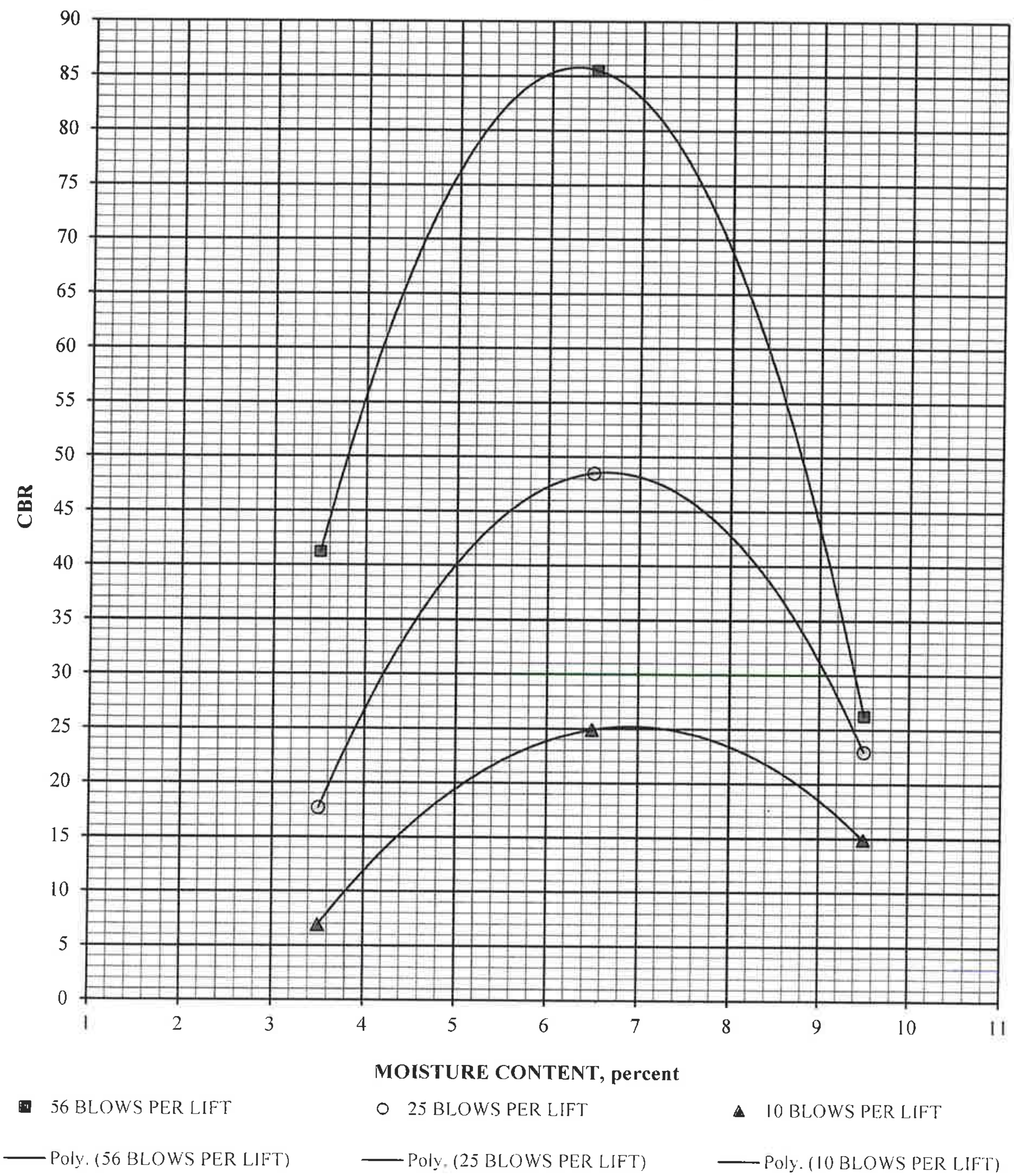
CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #16; Boring #28 @ 0.5 - 1.5'
Brown Silty Gravel with Sand (GM)

January 8, 2019

CBR vs. MOISTURE CONTENT



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Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

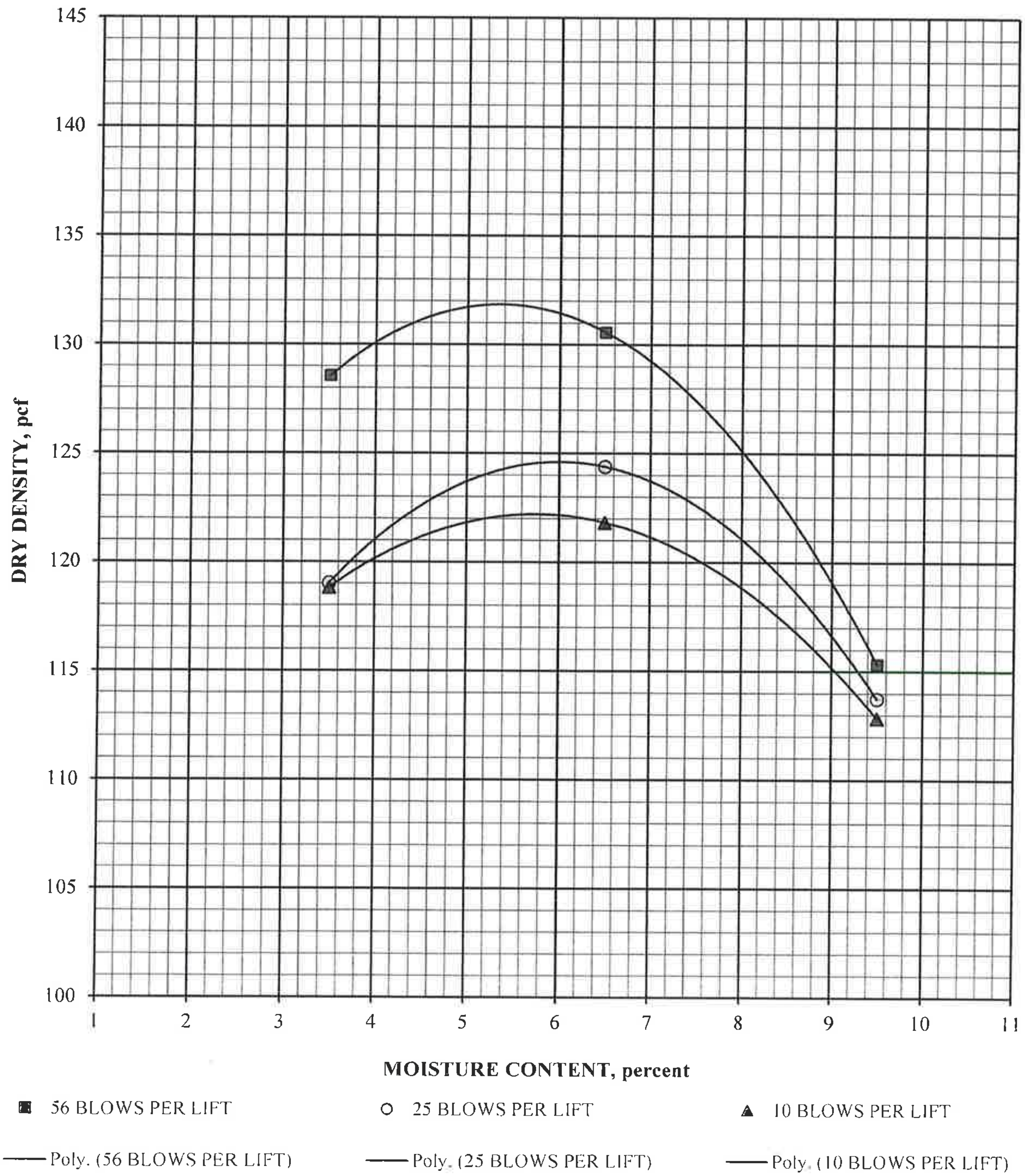
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #16; Boring #28 @ 0.5 - 1.5'

Brown Silty Gravel with Sand (GM)

January 8, 2019

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

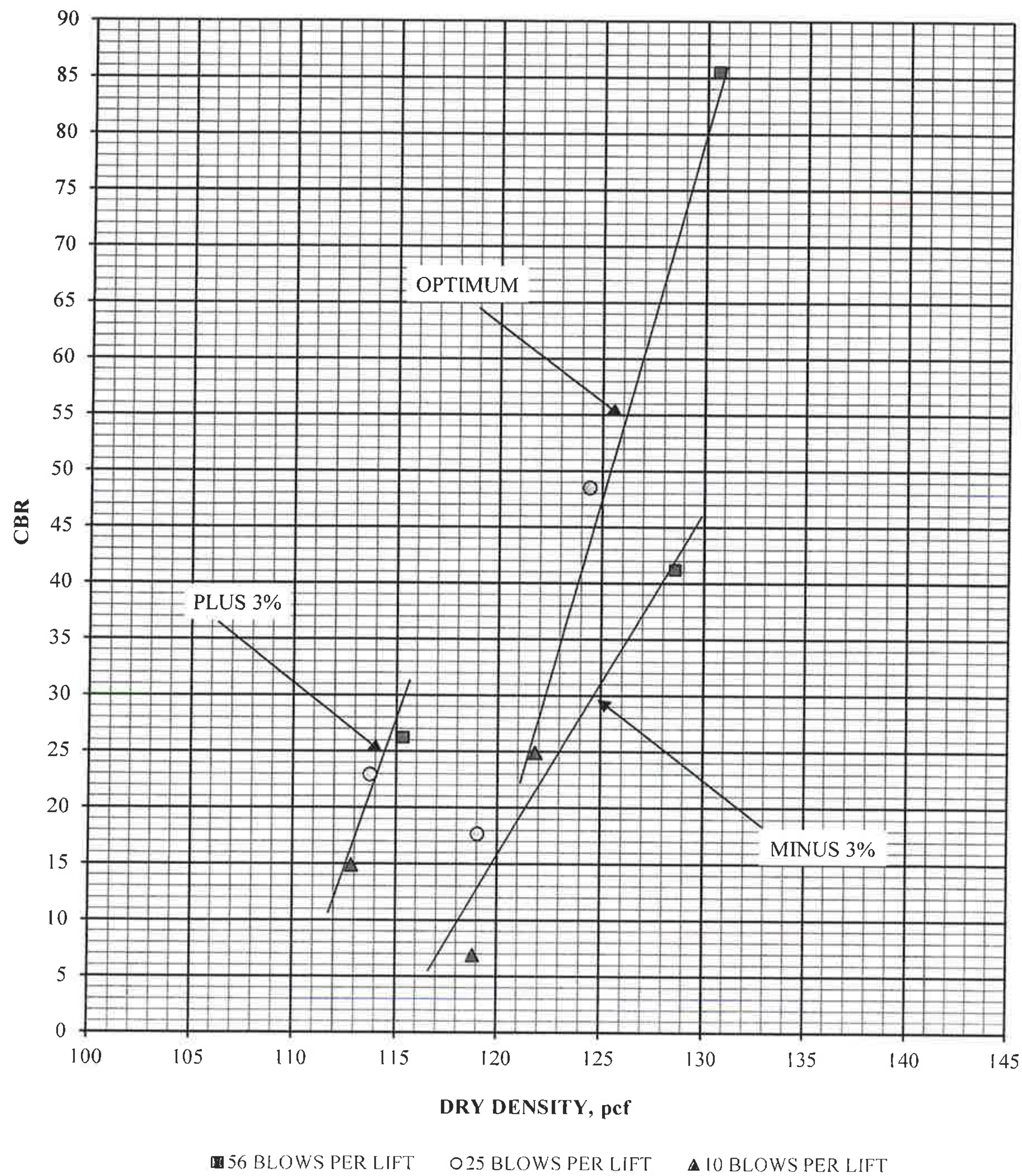
CBR #16; Boring #28 @ 0.5 - 1.5'

Brown Silty Gravel with Sand (GM)

January 8, 2019

DRY DENSITY vs. CBR

Arranged According to Moisture Content



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302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #17; Boring #14 @ 0.5 - 1.5'
Brown Silty Sand with Gravel (SM)

January 8, 2019

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	120.4	121.9	114.0
Moisture content, %, before soak	2.8	5.8	8.8
Moisture content, %, after soak, avg.	12.8	9.3	9.5
Moisture content, %, after soak, top 1"	9.7	8.6	8.3
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	12.2	18.5	14.7

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	121.5	129.2	114.5
Moisture content, %, before soak	2.8	5.8	8.8
Moisture content, %, after soak, avg.	12.2	8.1	10.8
Moisture content, %, after soak, top 1"	9.7	8.9	8.2
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	12.6	52.9	23.0

56 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	121.9	129.7	116.2
Moisture content, %, before soak	2.8	5.8	8.8
Moisture content, %, after soak, avg.	9.7	8.6	9.4
Moisture content, %, after soak, top 1"	8.7	7.8	7.7
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	48.4	82.9	19.9

Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

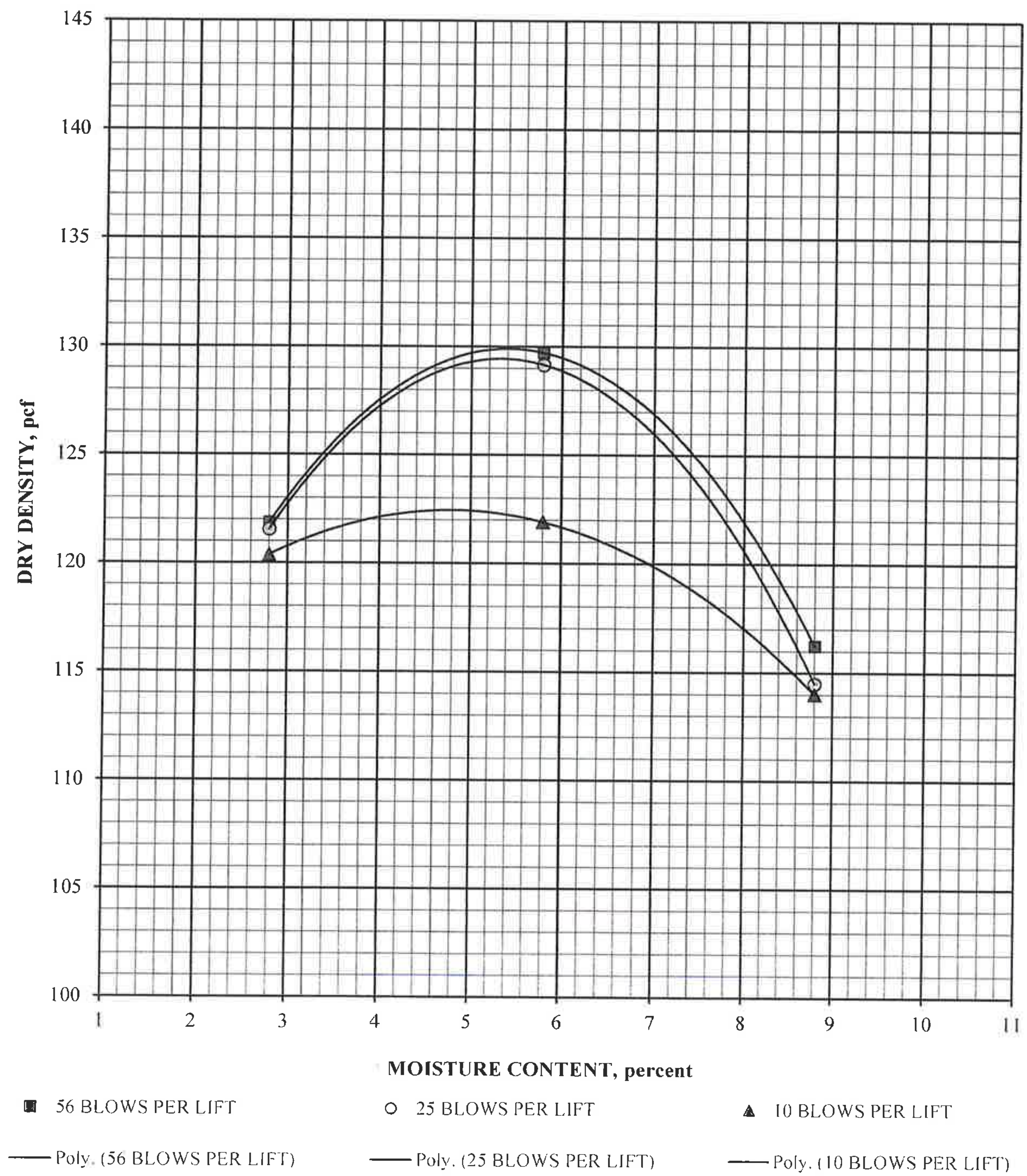
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #17; Boring #14 @ 0.5 - 1.5'

January 8, 2019

Brown Silty Sand with Gravel (SM)

DRY DENSITY vs. MOISTURE CONTENT



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Rehabilitation / Reconstruction

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CALIFORNIA BEARING RATIO

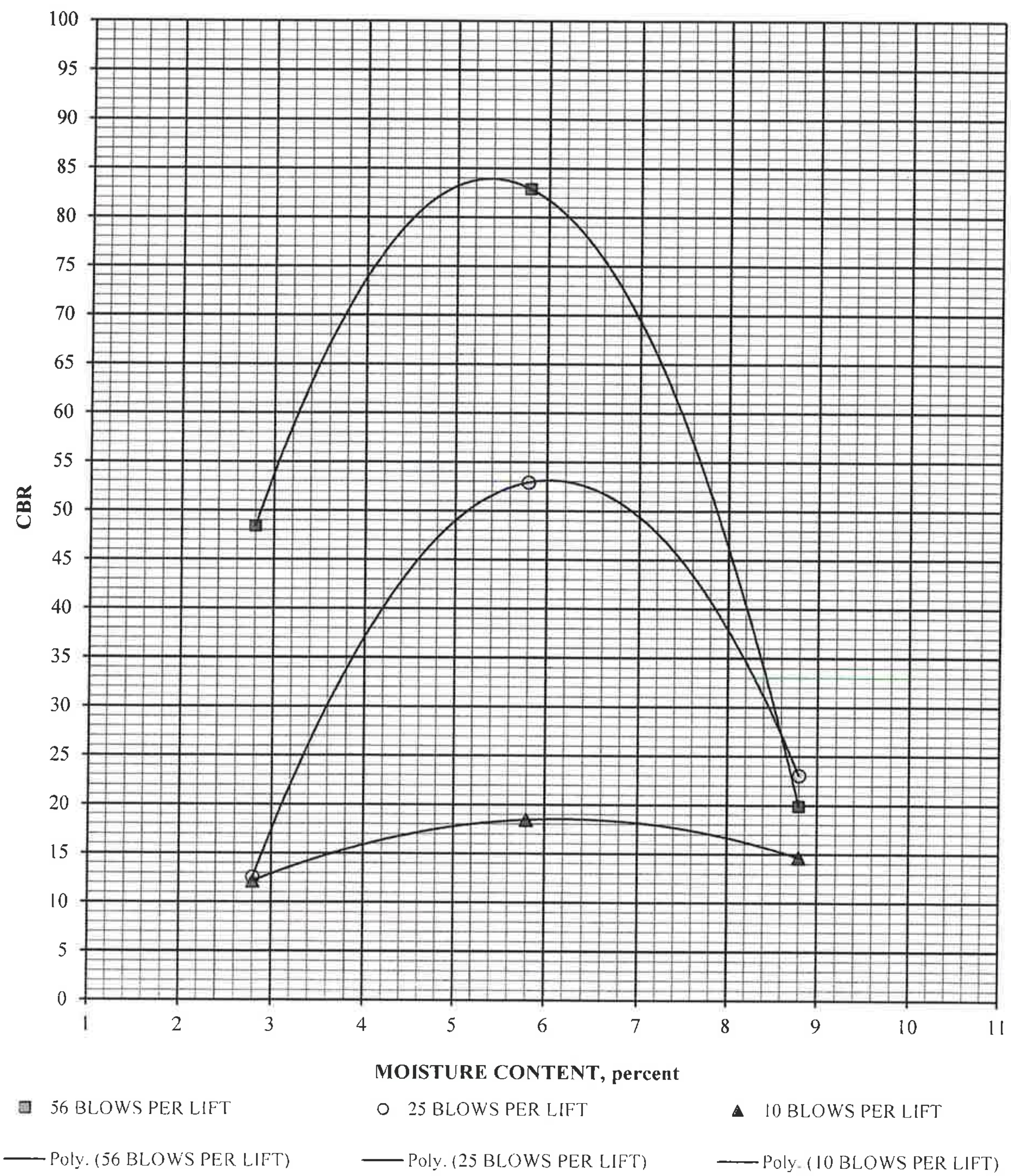
ASTM D 1883-16 (For a Range of Moisture Contents)

CBR #17; Boring #14 @ 0.5 - 1.5'

January 8, 2019

Brown Silty Sand with Gravel (SM)

CBR vs. MOISTURE CONTENT



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Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

CALIFORNIA BEARING RATIO

ASTM D 1883-16 (For a Range of Moisture Contents)

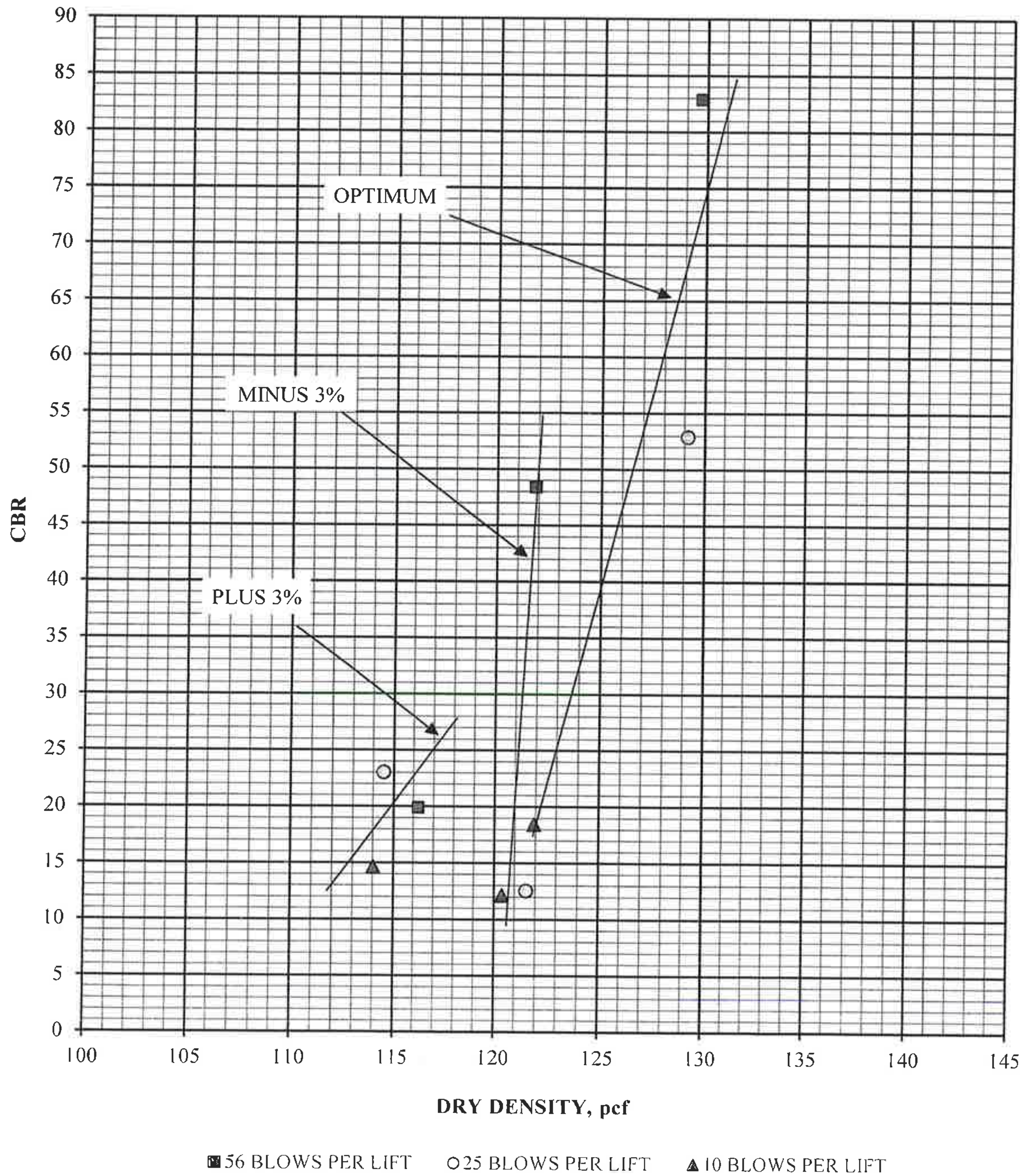
CBR #17; Boring #14 @ 0.5 - 1.5'

January 8, 2019

Brown Silty Sand with Gravel (SM)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



APPENDIX C

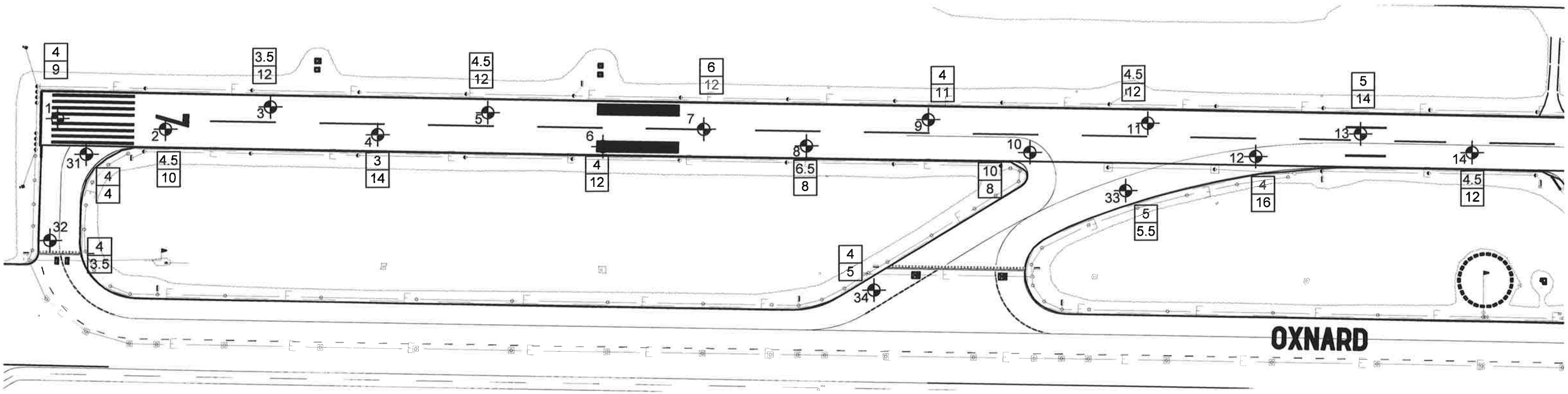
Figures 2a and 2b – Existing Pavement Section Thicknesses

Figures 3a and 3b – USCS Soil Types at Subgrade

Figures 4a and 4b – CBR Values – 95% Minimum Relative Compaction at Subgrade

Figures 5a and 5b – Approximate CBR Values Based on Existing Soil Density and Moisture Content at Subgrade

Figures 6a and 6b – Subgrade Soil Moisture Content



LEGEND

40 Boring Location (Approx.)

4 Asphalt Concrete (AC) - Inches

9 Miscellaneous Aggregate Base (mAB) - Inches

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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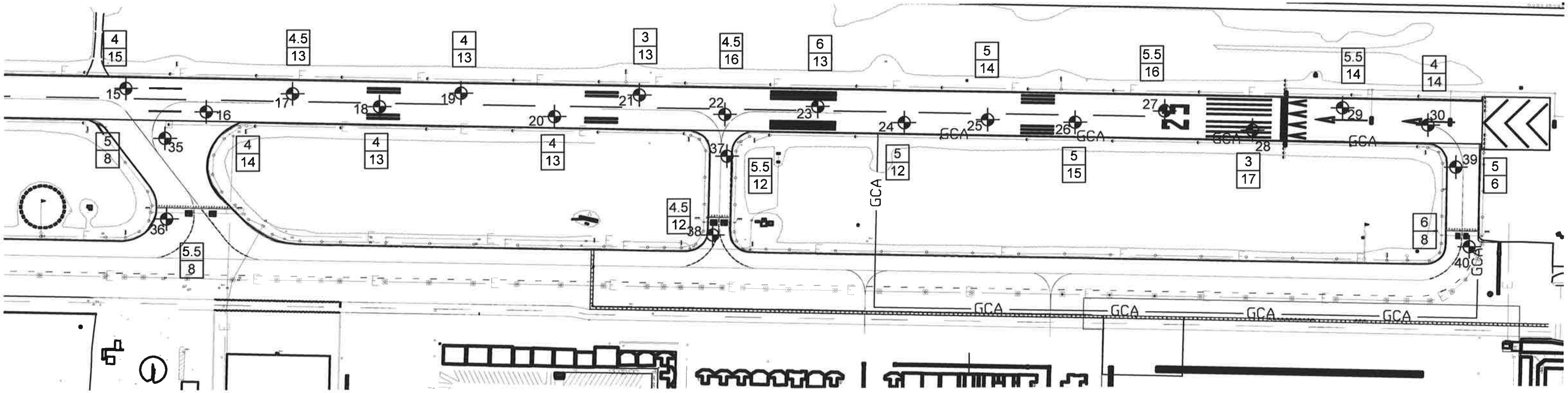
MAP 2A - EXISTING PAVEMENT SECTION THICKNESSES

Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 1 of 2



LEGEND

40 Boring Location (Approx.)

4	Asphalt Concrete (AC) - Inches
9	Miscellaneous Aggregate Base (mAB) - Inches

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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FIGURE 2B - EXISTING PAVEMENT SECTION THICKNESSES

Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

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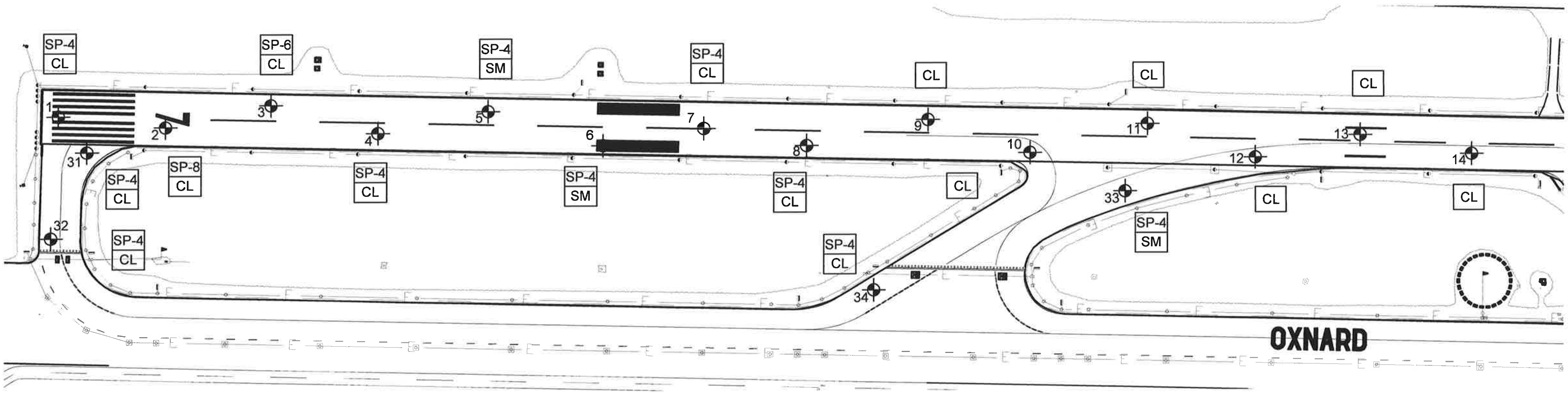

LEGEND

40 — Boring Location (Approx.)

SP-X — Poorly Graded Sand - "x" indicates thickness in inches where present below pavement section

CL — SANDY LEAN CLAY

SM — SILTY SAND

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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FIGURE 3A - USCS SOIL TYPES AT SUBGRADE
Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

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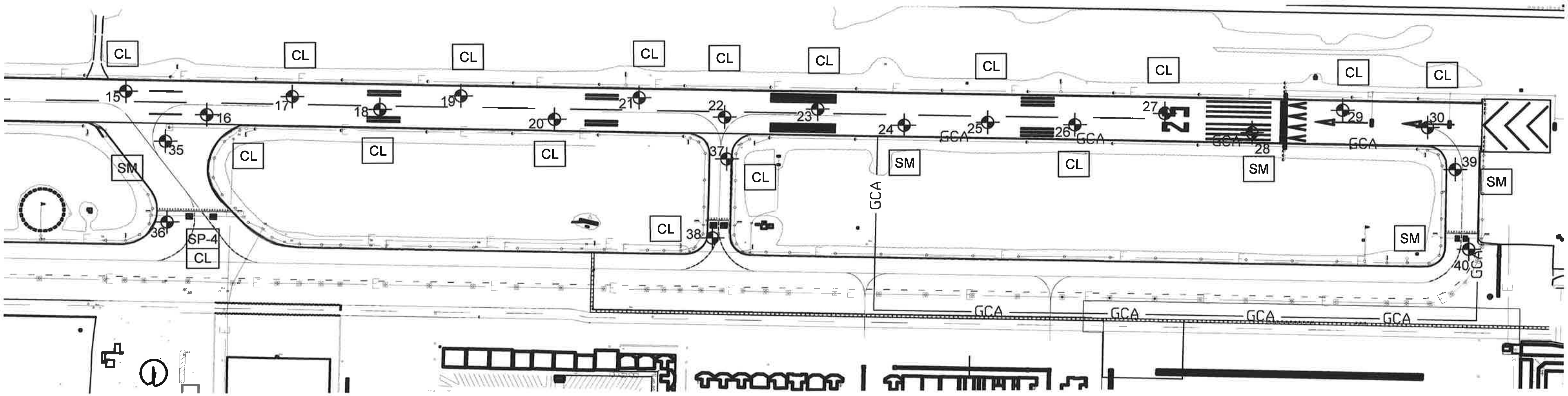
Sheet 1 of 2



LEGEND

40 Boring Location (Approx.)

SP-X Poorly Graded SAND - "x" indicates thickness in inches where present below pavement section

CL SANDY LEAN CLAY

SM SILTY SAND

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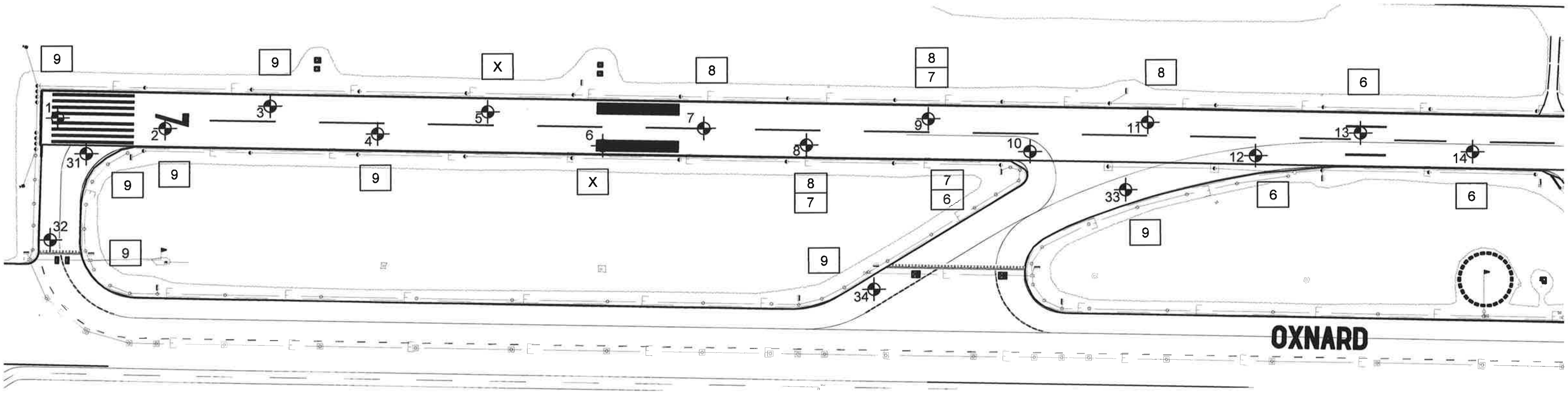
FIGURE 3B - USCS SOIL TYPES AT SUBGRADE

Oxnard Airport Runway and Taxiway Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 2 of 2



LEGEND

40 Boring Location (Approx.)

X — Subgrade soil from this boring lime treated at 3,5 and 7 percent by dry weight - See report text

9 — Recommended soil CBR value for reconstructed areas with subgrade compacted to a minimum of 95 percent relative compaction and soil moisture content in range of optimum +/- 2 percent. Thin (+/- 4 to 8 inch) poorly graded sand layers, where present, disregarded

8/7 — Upper Soil Layer 18 inches thick or less, CBR value possibly affected by underlying soil layer (Assumes underlying layer also compacted to 95 percent relative compaction at soil moisture content of optimum +/- 2 percent)

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BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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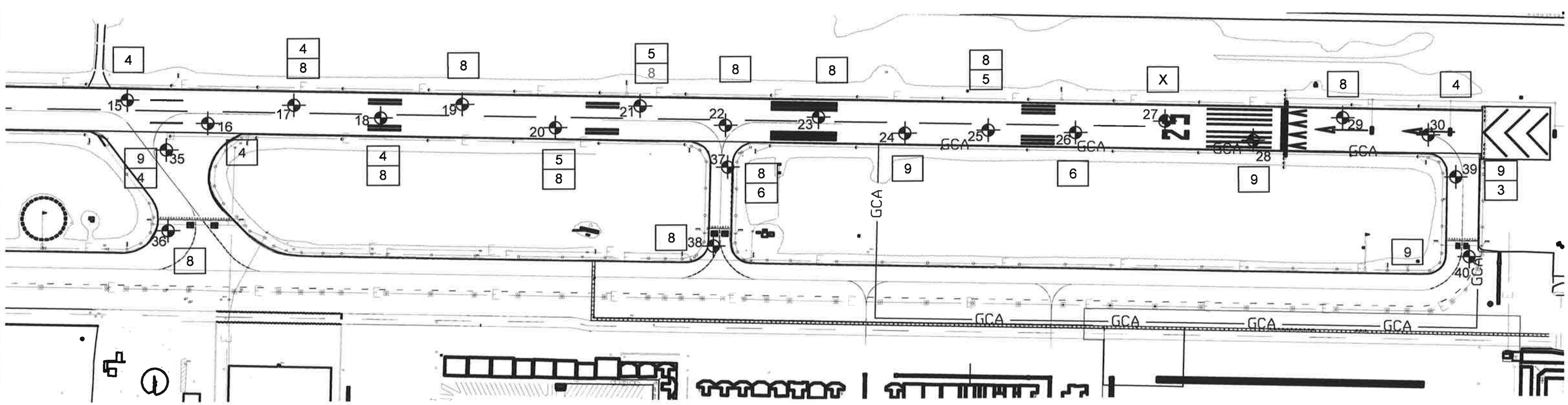
FIGURE 4A - CBR VALUES - 95% MINIMUM RELATIVE COMPACTION AT SUBGRADE

Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 1 of 2



LEGEND

40 Boring Location (Approx.)

X — Subgrade soil from this boring lime treated at 3,5 and 7 percent by dry weight - See report text

9 — Recommended soil CBR value for reconstructed areas with subgrade compacted to a minimum of 95 percent relative compaction and soil moisture content in range of optimum +/- 2 percent. Thin (+/- 4 to 8 inch) poorly graded sand layers, where present, disregarded

8/7 — Upper Soil Layer 18 inches thick or less, CBR value possibly affected by underlying soil layer (Assumes underlying layer also compacted to 95 percent relative compaction at soil moisture content of optimum +/- 2 percent)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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MAP 4B - CBR VALUES - 95% MINIMUM RELATIVE COMPACTION AT SUBGRADE

Oxnard Airport Runway and Taxiway Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
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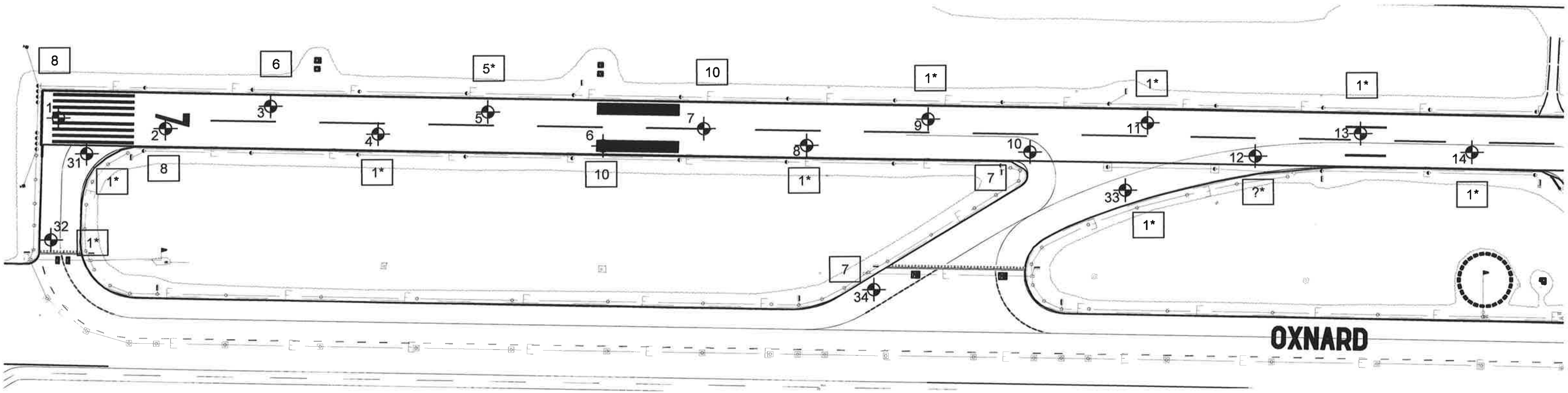
Sheet 2 of 2



LEGEND

40 — Boring Location (Approx.)

8 — Approximate CBR based on existing soil density and moisture content at subgrade. Thin (+/- 4 to 8 inch) poorly graded sand layers, where present, disregarded

1* — Asterisk indicates soil density and/or moisture content beyond laboratory data range - CBR value estimated only. Question mark (?) indicates no estimate possible from laboratory data.

N

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MAP 5A - APPROXIMATE CBR VALUES BASED ON EXISTING SOIL DENSITY AND MOISTURE CONTENT AT SUBGRADE

Oxnard Airport Runway and Taxiway Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

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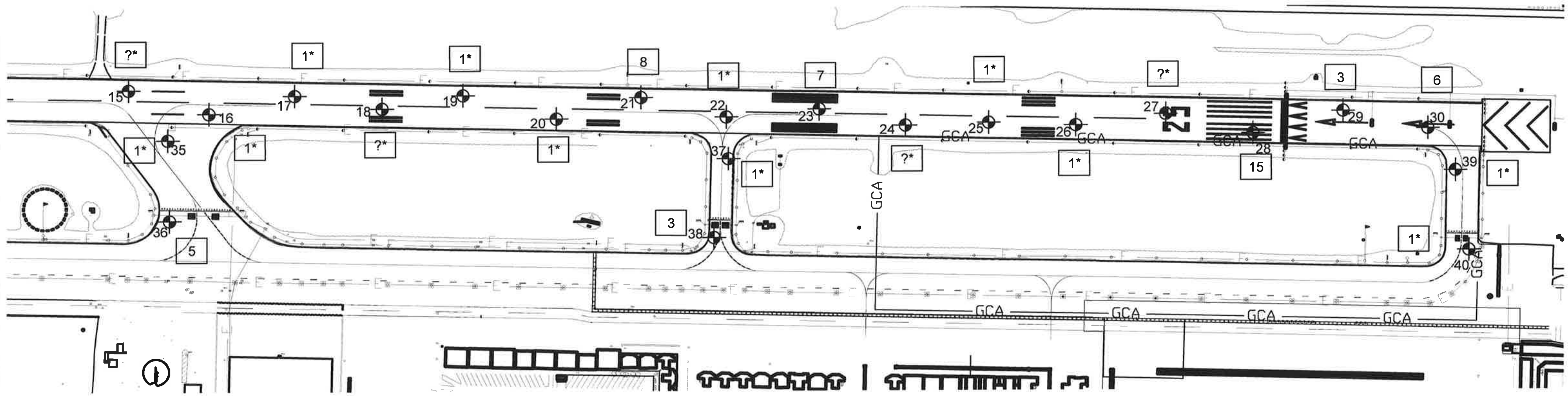
302524-001

Sheet 1 of 2



LEGEND

40 Boring Location (Approx.)

8 — Approximate CBR based on existing soil density and moisture content at subgrade. Thin (+/- 4 to 8 inch) poorly graded sand layers, where present, disregarded

1* — Asterisk indicates soil density and/or moisture content beyond laboratory data range - CBR value estimated only. Question mark (?) indicates no estimate possible from laboratory data.

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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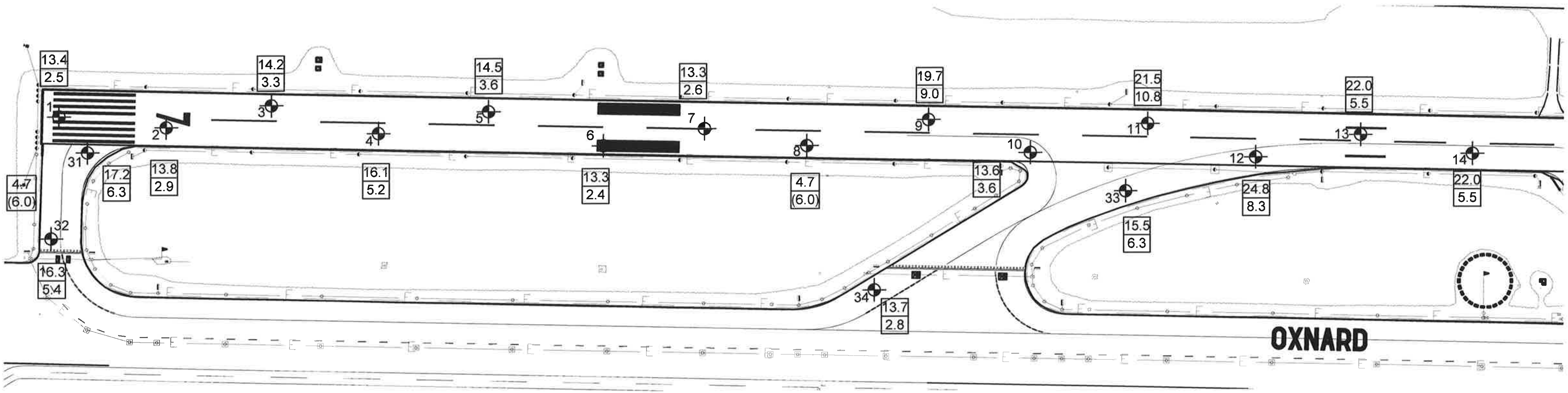
MAP 5B - APPROXIMATE CBR VALUES BASED ON EXISTING SOIL DENSITY AND MOISTURE CONTENT AT SUBGRADE
Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 2 of 2



LEGEND

40 Boring Location (Approx.)

4.7	Subgrade soil moisture content at time of drilling, percent
(6.0)	Percent above (below) optimum moisture content

N

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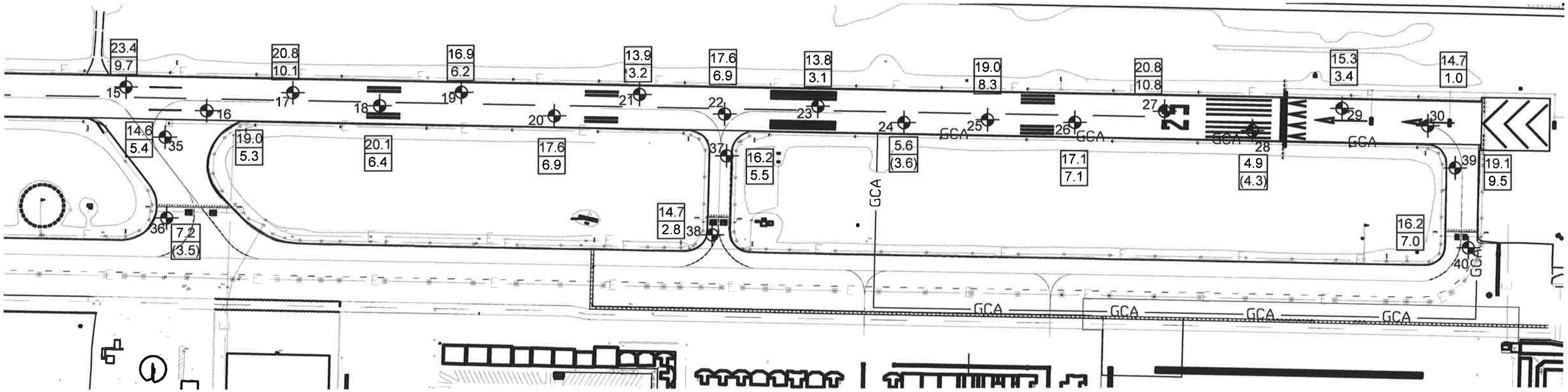
MAP 6A - SUBGRADE SOIL MOISTURE CONTENT

Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 1 of 2



LEGEND

40 Boring Location (Approx.)

4.7 Subgrade soil moisture content at time of drilling , percent

(6.0) Percent above (below) optimum moisture content

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

N

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MAP 6B - SUBGRADE SOIL MOISTURE CONTENT

Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
January 2019

Project No.
302524-001

Sheet 2 of 2

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APPENDIX D

Estimates of Earthwork Shrinkage

Estimates of Soil Shrinkage Using In-Place Density Values from Borings and Assumed Final Relative Compaction Values. All Calculations Based on Uniform Density, Moisture Content and Compaction Effort Negative Values Indicate Expansion (Bulking).

CBR No.	Boring No.	Depth	Material Description	USCS Classification	Maximum Density, pcf	Optimum Moisture, %
1	1	2.0 - 2.5 ft.	Dark Brown Sandy Lean Clay	CL	123.5	10.9
5	36	2.0 - 5.0 ft.	Dark Brown Sandy Lean Clay	CL	121.5	10.7
7	23	3.5 - 5.0 ft	Brown Lean Clay	CL	121.6	10.9
8	29	2.0 - 5.0 ft.	Brown/Gray Mottled Sandy Lean Clay	CL	123.1	11.9
11	16	2.0 - 4.0 ft	Dark Brown Sandy Lean Clay	CL	114.7	13.7
12	13	2.0 - 4.0 ft.	Dark Brown Sandy Lean Clay	CL	112.2	16.5
13	40	1.5 - 3.5 ft.	Brown Silty Sand	SM	126.5	9.2
14	39	2.0 - 5.0 ft.	Brown Sandy Fat Clay	CH	120.4	9.6

Boring	Depth, Ft. Below Ext. Grade	Moisture in Place, %	Dry Density in Place, pcf	Maximum Dens., pcf	Existing Rel.Comp. %	Shrinkage, % at 95.0 % Rel. Comp.	Shrinkage, % at 96.0 % Rel. Comp.	Shrinkage, % at 97.0 % Rel. Comp.	Shrinkage, % at 98.0 % Rel. Comp.	Shrinkage, % at 99.0 % Rel. Comp.	Shrinkage, % at 100.0 % Rel. Comp.
1	2-2.5	13.4	119.4	123.5	96.7	-1.7	-0.7	0.3	1.4	2.4	3.4
2	2.5-3	13.8	121.1	123.5	98.1	-3.1	-2.1	-1.1	-0.1	1.0	2.0
3	2.5-3	14.2	116.9	123.5	94.7	0.4	1.4	2.5	3.5	4.6	5.6
4	2.5-3	16.1	116.2	123.5	94.1	1.0	2.0	3.1	4.2	5.2	6.3
5	2.5-3	14.5	118.3	123.5	95.8	-0.8	0.2	1.3	2.3	3.4	4.4
6	2.5-3	13.3	121.5	123.5	98.4	-3.4	-2.4	-1.4	-0.4	0.6	1.6
7	2-2.5	13.3	121.9	121.5	100.3	-5.3	-4.3	-3.3	-2.3	-1.3	-0.3
8	2-2.5	4.7	118.1	121.5	97.2	-2.3	-1.2	-0.2	0.8	1.9	2.9
9	2.5-3	19.7	102.6	121.5	84.4	12.5	13.7	14.9	16.1	17.2	18.4
10	2.5-3	13.6	115.0	122.5	93.9	1.2	2.3	3.3	4.4	5.5	6.5
11	2.5-3	21.5	104.0	121.5	85.6	11.0	12.2	13.3	14.5	15.7	16.8
12	2.5-3	24.8	95.5	112.2	85.1	11.6	12.8	14.0	15.1	16.3	17.5
13	2.5-3	22.0	101.2	112.2	90.2	5.3	6.4	7.5	8.7	9.8	10.9
14	2.5-3	22.0	102.5	112.2	91.4	4.0	5.1	6.2	7.3	8.4	9.5
15	2.5-3	23.4	100.1	114.7	87.3	8.9	10.0	11.1	12.3	13.4	14.6
16	2.5-3	19.0	109.3	114.7	95.3	-0.3	0.7	1.8	2.8	3.9	4.9
17	2.5-3	20.8	104.8	121.5	86.3	10.1	11.3	12.5	13.6	14.8	15.9
18	2.5-3	20.1	103.2	114.7	90.0	5.6	6.7	7.8	8.9	10.0	11.1
19	2.5-3	16.9	113.4	121.5	93.3	1.8	2.9	3.9	5.0	6.1	7.1
20	2.5-3	17.6	111.7	121.5	91.9	3.3	4.4	5.5	6.6	7.7	8.8
21	2-2.5	13.9	119.5	121.5	98.4	-3.4	-2.4	-1.4	-0.4	0.7	1.7
22	3-3.5	17.6	114.0	121.5	93.8	1.3	2.3	3.4	4.4	5.5	6.6
23	2.5-3	13.8	118.5	121.5	97.5	-2.6	-1.6	-0.5	0.5	1.5	2.5
24	2.5-3	5.6	107.2	126.5	84.7	12.1	13.3	14.5	15.6	16.8	18.0
25	2.5-3	19.0	106.3	121.5	87.5	8.6	9.7	10.9	12.0	13.2	14.3
26	3-3.5	17.1	110.1	122.5	89.9	5.7	6.8	7.9	9.0	10.1	11.3
27	3-3.5	20.8	97.4	122.5	79.5	19.5	20.7	22.0	23.3	24.5	25.8
28	2.5-3	4.9	122.5	126.5	96.8	-1.9	-0.9	0.2	1.2	2.2	3.3
29	2.5-3	15.3	112.5	123.1	91.4	4.0	5.0	6.1	7.2	8.3	9.4
30	2.5-3	14.7	112.2	114.7	97.8	-2.9	-1.9	-0.8	0.2	1.2	2.2
31	2.5-3	17.2	110.6	123.5	89.6	6.1	7.2	8.3	9.4	10.5	11.7
32	2-2.5	16.3	110.8	123.5	89.7	5.9	7.0	8.1	9.2	10.3	11.5
33	2-2.5	15.5	115.3	126.5	91.1	4.2	5.3	6.4	7.5	8.6	9.7
34	2-2.5	13.7	118.4	123.5	95.9	-0.9	0.1	1.2	2.2	3.3	4.3
35	2-2.5	14.6	117.0	126.5	92.5	2.7	3.8	4.9	6.0	7.0	8.1
36	2-2.5	7.2	114.7	121.5	94.4	0.6	1.7	2.8	3.8	4.9	5.9
37	2.5-3	16.2	110.1	121.5	90.6	4.8	5.9	7.0	8.1	9.3	10.4
38	2.5-3	14.7	110.9	123.1	90.1	5.5	6.6	7.7	8.8	9.9	11.0
39	2-2.5	19.1	108.4	120.4	90.0	5.5	6.6	7.7	8.8	10.0	11.1
40	2.5-3	16.2	117.1	126.5	92.6	2.6	3.7	4.8	5.9	6.9	8.0
			Average Shrinkage, percent, all locations :			**3.4**	**4.5**	**5.6**	**6.7**	**7.8**	**8.9**
						At 95.0 % Rel. Comp.	At 96.0 % Rel. Comp.	At 97.0 % Rel. Comp.	At 98.0 % Rel. Comp.	At 99.0 % Rel. Comp.	At 100.0 % Rel. Comp.

Attachment 2 : Oxnard Airport Draft Forecast, 2018

FORECASTS OF AVIATION DEMAND

Facility planning requires a definition of demand that may be expected to occur during the useful life of the facility's crucial components. For OXR, this involves projecting aviation demand for a 20-year timeframe. In this report, forecasts of registered aircraft, based aircraft, based aircraft fleet mix, annual airport operations, and forecasts of airport peaking characteristics are projected.

The forecasts generated may be used for a multitude of purposes; including facility needs assessments as well as environmental evaluations. The forecasts will be submitted to the FAA for review and approval to ensure accuracy and reasonable projection of aviation activity. The intent of the projections is to enable Ventura County and OXR to make facility improvements to meet demand in the most efficient and cost-effective manner possible.

As previously mentioned, OXR has historically experienced commercial passenger service; however, the airport has not experienced this demand segment since 2010. Due to a lack of consistent commercial passenger service history and the expectation that commercial passenger service will not return to the airport at least during the short-term planning period of this study, the forecasts of aviation demand to follow will focus on the current aviation demand segment occurring at the airport, which is related to GA activity. With that said, the airport should continue to monitor the potential for commercial service to return to OXR in the future and plan accordingly to accommodate this demand segment.

It should be noted that aviation activity can be affected by numerous outside influences on local, regional, and national levels. As a result, forecasts of aviation demand should be used only for advisory purposes. It is recommended that planning strategies remain flexible enough to accommodate any unforeseen facility needs.

FORECASTING APPROACH

Typically, the most accurate and reliable forecasting approach is derived from multiple analytical forecasting techniques. Analytical forecasting methodologies typically consist of regression analysis, trend analysis and extrapolation, market share or ratio analysis, and smoothing. Through the use of multiple forecasting techniques based upon each aviation demand indicator, an envelope of aviation demand projections can be generated. Generally, the preferred planning forecast will consist of a combination of forecasts as the averaged result of multiple forecasts are typically more accurate, although it is possible to use just one forecast result.

Regression analysis can be described as a forecasting technique that correlates certain aviation demand variables (such as passenger enplanements or operations) with economic measures. When using regression analysis, the technique should be limited to relatively simple models containing independent variables for which reliable forecasts are available (such as population or income forecasts).

Trend analysis and *extrapolation* is a forecasting technique that records historical activity (such as airport operations) and projects this pattern into the future. Oftentimes, this technique can be beneficial when local conditions of the study area are differentiated from the region or other airports.

Market share or *ratio analysis* can be described as a forecasting technique that assumes the existence of a top-down relationship between national, regional, and local forecasts. The local forecasts are presented as a market share of regional forecasts, and regional forecasts are presented as a market share of national forecasts. Typically, historical market shares are calculated and used as a base to project future market shares.

Smoothing is a statistical forecasting technique that can be applied to historical data, giving greater weight to the most recent trends and conditions. Generally, this technique is most effective when generating short-term forecasts.

NATIONAL GENERAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, GA, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was FAA *Aerospace Forecasts – Fiscal Years 2018-2038*, published in March 2018. The FAA primarily used the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

The FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. It is important to note that from 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

The long-term outlook for general aviation is stable to optimistic, as growth at the high-end offsets continuing retirements at the traditional low end of the segment. The active general aviation fleet is forecast to remain relatively stable between 2018 and 2038. While steady growth in both gross domestic product (GDP) and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest segment of the fleet – fixed-wing piston aircraft - continues to shrink over the FAA's forecast.

In 2017, the previous slow decline in aircraft deliveries of the general aviation industry reversed course with increases in the piston segment. Single engine piston deliveries by U.S. manufacturers were up 8.8 percent, while the smaller category of multi-engine piston deliveries went up by 24.2 percent. Business jet deliveries were about the same as the previous year, marginally down by 0.2 percent. Turboprop deliveries were also slightly down by 0.5 percent.

In 2017, the FAA estimated there were 143,265 piston-powered fixed-wing aircraft in the national fleet. The total number of fixed-wing piston-powered aircraft in the fleet is forecast to decline by 0.9 percent from 2017-2038, resulting in 119,645 by 2038. This includes -1.0 percent annually for single engine pistons and -0.4 percent for multi-engine pistons.

Total turbine aircraft are forecast to grow at an annual growth rate of 2.0 percent through 2038. The FAA estimates there were 30,905 turbine-powered aircraft in the national fleet in 2017, and there will be 46,160 by 2038. This includes annual growth rates of 1.7 percent for turboprops, 2.2 percent for business jets, and 1.9 percent for turbine helicopters.

While comprising a much smaller portion of the general aviation fleet, experimental aircraft, typically identified as home-built aircraft, are projected to grow annually by 0.8 percent through 2038. The FAA estimates there were 27,865 experimental aircraft in 2017, and these are projected to grow to 33,105 by 2038. Sport aircraft are forecast to grow 3.6 percent annually through the long-term, growing from 2,585 in 2017 to 5,440 by 2038. **Exhibit H** presents the historical and forecast U.S. active general aviation aircraft.

The FAA also forecasts total operations based upon activity at control towers across the United States. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. General aviation operations, both local and itinerant, declined significantly as a result of the 2008-2009 recession and subsequent slow recovery. Through 2038, total general aviation operations are forecast to grow 0.3 percent annually. Air taxi/commuter operations are forecast to decline by 2.1 percent through 2028, and then increase slightly through the remainder of the forecast period. Overall, air taxi/commuter operations are forecast to decline by 0.6 percent annually from 2017 through 2038.

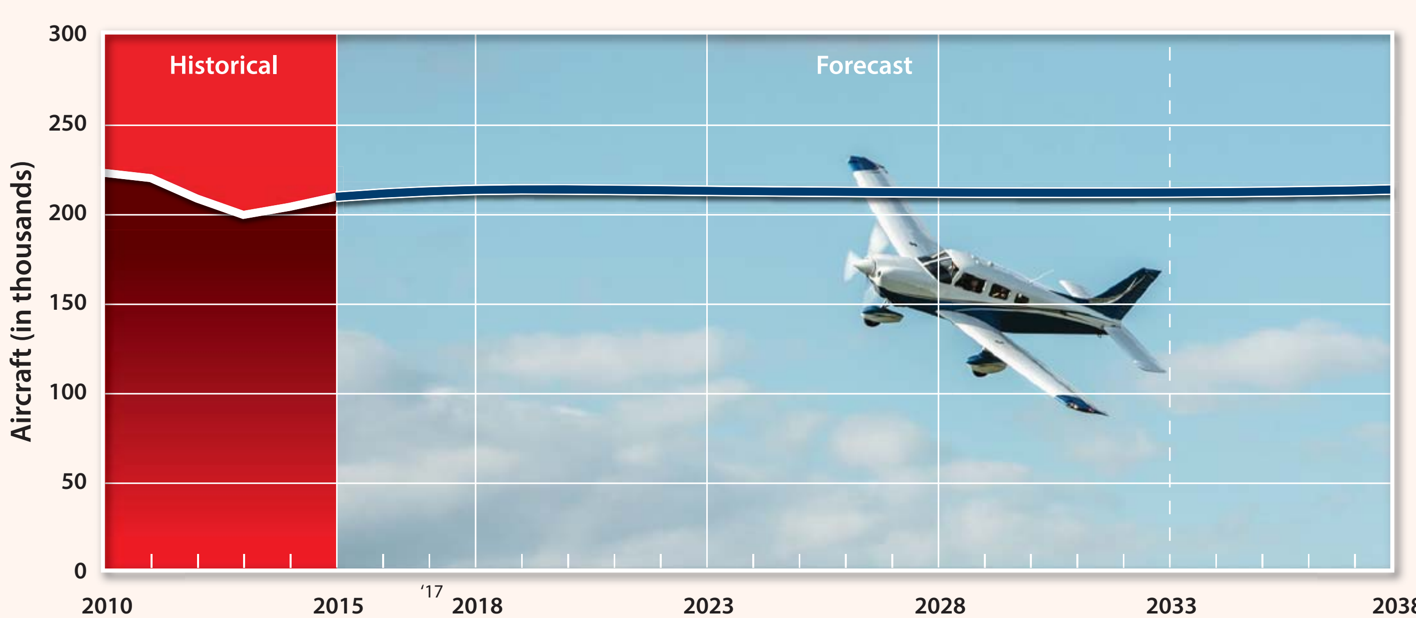
General Aviation Aircraft Shipments and Revenue

The 2008-2009 economic recession has had a negative impact on general aviation aircraft production, and the industry has been slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturers Association (GAMA), there is optimism that aircraft manufacturing will stabilize and return to growth, which has been evidenced since 2011. **Table K** presents historical data related to general aviation aircraft shipments.

Worldwide shipments of general aviation airplanes increased in 2017 with a total of 2,324 units delivered around the globe, compared to 2,268 units in 2016. However, worldwide general aviation billings were lower than the previous year. In 2017, $20.2 billion in new general aviation aircraft were shipped, but year-end results were mixed across the market segments. North America is the largest market for general aviation aircraft. The Asian-Pacific region is the second largest market for piston-powered aircraft,

U.S. ACTIVE GENERAL AVIATION AIRCRAFT

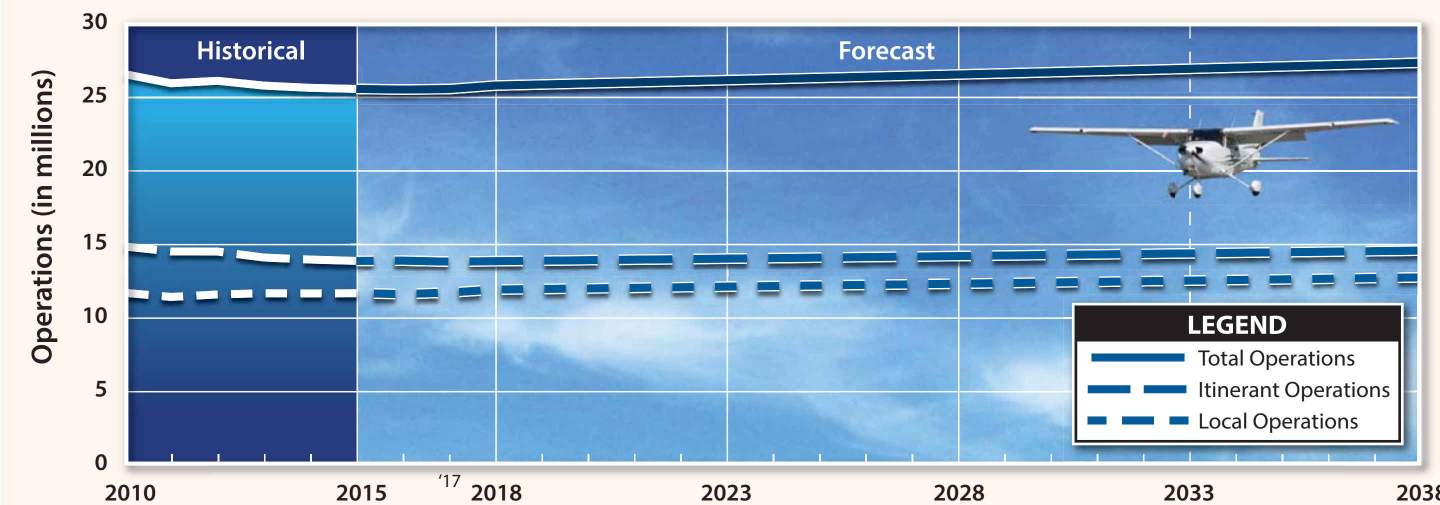
	2017 Estimate	2023	2028	2038	AAGR 2018-2038
Fixed Wing					
Piston					
Single Engine	130,330	125,330	118,740	107,800	-1.0%
Multi-Engine	12,935	12,720	12,465	11,845	-0.4%
Turbine					
Turboprop	9,430	9,025	9,870	12,855	1.7%
Turbojet	14,075	16,220	18,120	22,195	2.2%
Rotorcraft					
Piston	3,405	3,750	4,035	4,675	1.5%
Turbine	7,400	8,375	9,200	11,110	1.9%
Experimental					
	27,865	29,595	30,980	33,105	0.8%
Sport Aircraft					
	2,585	3,330	3,995	5,440	3.6%
Other					
	5,025	5,045	5,060	5,065	0.0%
Total Pistons	**146,670**	**141,800**	**135,240**	**124,320**	**-0.8%**
Total Turbines	**30,905**	**33,620**	**37,190**	**46,160**	**2.0%**
Total Fleet	**213,050**	**213,390**	**212,465**	**214,090**	**0.0%**



Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

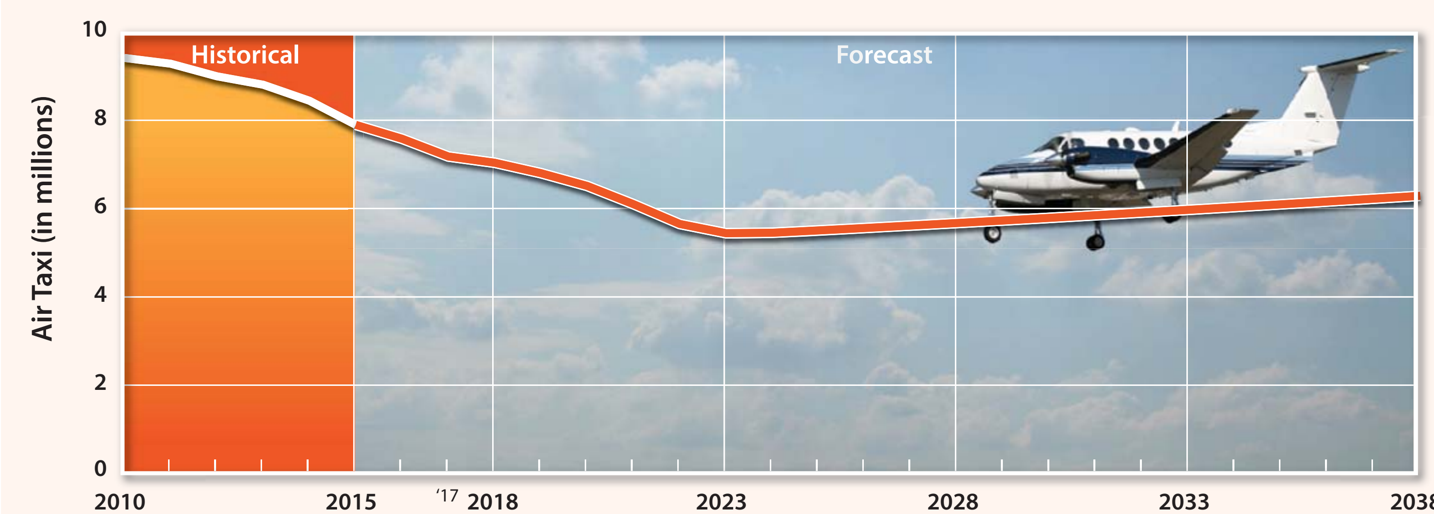
U.S. GENERAL AVIATION OPERATIONS

	2017 Estimate	2023	2028	2038	AAGR 2018-2038
Itinerant					
	13,838,029	14,039,925	14,217,031	14,587,442	0.3%
Local					
	11,731,596	12,135,595	12,338,286	12,763,556	0.3%
Total GA Operations	**25,569,625**	**26,175,520**	**26,555,317**	**27,350,998**	**0.3%**



U.S. GENERAL AVIATION AIR TAXI

	2017E	2023	2028	2038	AAGR 2018-2038
Air Taxi/Commuter Operations					
Itinerant	7,179,301	5,442,448	5,671,740	6,287,749	-0.6%



Source: *FAA Aerospace Foreast - Fiscal Years 2018-2038*

Latin America is the second largest market for turboprops, and Europe is the second largest market for business jets.

Business Jets: General aviation manufacturers business jet deliveries grew from 667 units in 2016 to 676 units in 2017. The North American market accounted for 63.8 percent of business jet deliveries, which is a 1.8 percent increase in market share compared to 2016.

Turboprops: Turboprop shipments were down from 582 in 2016 to 563 in 2017. North America's market share of turboprop aircraft dropped by 3.6 percent in the last year, while the European, Asian-Pacific, and Latin American markets increased their market share.

Pistons: In 2017, piston airplane shipments grew to 1,085 units over last year's shipment of 1,019 units for a 6.5 percent increase. However, North America's market share of piston aircraft deliveries dropped from 69.6 percent in 2016 to 65.6 percent in 2017. The Asian-Pacific market saw the largest increase in market share at 3.2 percent growth.

TABLE K
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

Year	Total	SEP	MEP	TP	J	Net Billings ($millions)
1994	1,132	544	77	233	278	3,749
1995	1,251	605	61	285	300	4,294
1996	1,437	731	70	320	316	4,936
1997	1,840	1043	80	279	438	7,170
1998	2,457	1508	98	336	515	8,604
1999	2,808	1689	112	340	667	11,560
2000	3,147	1,877	103	415	752	13,496
2001	2,998	1,645	147	422	784	13,868
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,962	1,999	52	319	592	12,093
2005	3,590	2,326	139	375	750	15,156
2006	4,054	2,513	242	412	887	18,815
2007	4,277	2,417	258	465	1,137	21,837
2008	3,974	1,943	176	538	1,317	24,846
2009	2,283	893	70	446	874	19,474
2010	2,024	781	108	368	767	19,715
2011	2,120	761	137	526	696	19,042
2012	2,164	817	91	584	672	18,895
2013	2,353	908	122	645	678	23,450
2014	2,454	986	143	603	722	24,499
2015	2,331	946	110	557	718	24,129
2016	2,268	890	129	582	667	20,092
2017	2,324	936	149	563	676	20,197

SEP - Single Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet
Source: General Aviation Manufacturers Association 2017 Annual Report.

AIRPORT SERVICE AREA

In determining aviation demand for an airport, it is necessary to identify the role of that airport. OXR is classified as a Regional GA airport in the NPIAS. According to the NPIAS and as previously described in the Airport Role section of this document, Regional airports are those that support regional economies, are located in metropolitan areas serving relatively large populations, and have high levels of activity with some jets and multi-engine propeller aircraft.

The primary role of the airport is to serve the needs of GA in the service area. GA is a term used to describe a diverse range of aviation activities, which includes all segments of the aviation industry except commercial air carriers and the military. GA is the largest component of the national aviation system and includes activities such as pilot training, recreational flying, and the use of sophisticated turboprop and jet aircraft for business and corporate use.

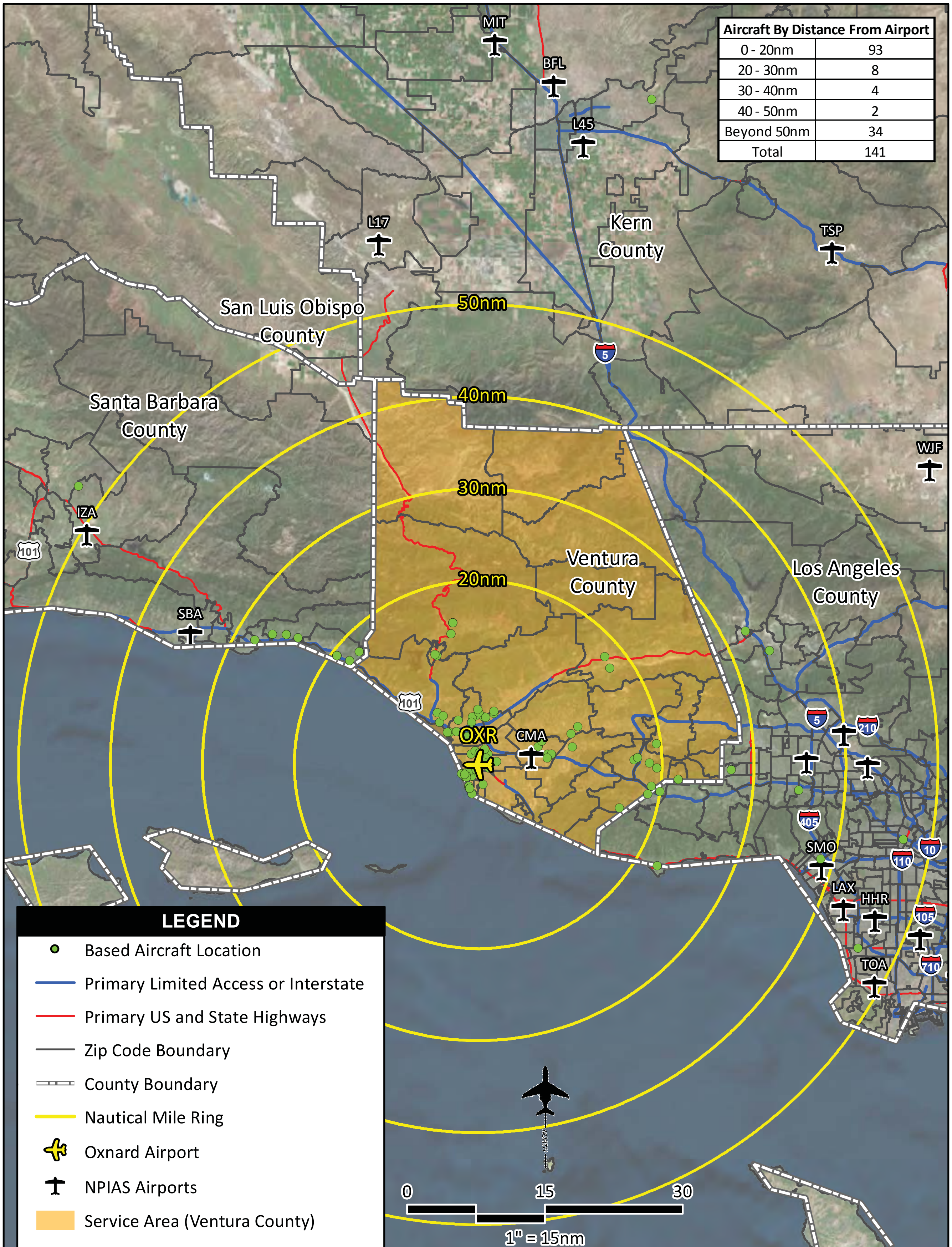
The initial step in determining the GA demand for an airport is to define its generalized service area. The airport service area is a generalized geographical area where there is a potential market for airport services, particularly based aircraft. Access to GA airports and transportation networks enter the equation to determine the size of a service area, as well as the quality of aviation facilities, distance, and other subjective criteria.

As in any business enterprise, the more attractive the facility is in terms of service and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of its service area. If facilities and services are adequate and/or competitive, some level of aviation activity might be attracted to an airport from more distant locales.

Typically, the service area for a local GA airport can range from a minimum of 30 miles, extending up to approximately 50 miles. The proximity and level of GA services are largely the defining factors when describing the GA service area. A description of nearby airports was previously completed in the Vicinity Airports section, as presented on **Exhibit D**. There are two public-use airports and one military airfield, which is owned and operated by the U.S. Navy, located within 30 nm of OXR. There are an additional 10 airports within 50 nm of OXR as previously mentioned in the Vicinity Airports section.

Of the two public-use airports within 30 nm of OXR, Camarillo Airport (CMA) is classified as National Reliever Airport within the NPIAS. In addition, Santa Paula Airport (SZP), located in close proximity to OXR, is a non-NPIAS airport that also serves GA demand mainly associated with small piston-powered aircraft. It should be noted that CMA and SPZ, combined, have captured a significant amount (approximately 78 percent) of Ventura County's based aircraft market share.

Given the surrounding competition for based aircraft and services offered, the most effective method of defining the airport's service area is by examining the based aircraft listing by their registered address. **Exhibit J** presents the number of OXR based aircraft located within the region by their registered address. It should be noted that 34 based aircraft are registered to addresses outside the regional area, many of which are registered out-of-state.



Aircraft By Distance From Airport	
0 - 20nm	93
20 - 30nm	8
30 - 40nm	4
40 - 50nm	2
Beyond 50nm	34
Total	141

Exhibit J
AIRPORT SERVICE AREA

Sources: ESRI Basemap Imagery (2016), FAA Registered Aircraft Database

As depicted on the exhibit, the most concentrated number of aircraft owners are located in the southern portion, particularly the southwest portion, of Ventura County, near the cities of Oxnard, Camarillo, and Ventura. When considering all 141 OXR based aircraft, approximately 62 percent are registered in Ventura County, with approximately eight percent being registered in Santa Barbara County and seven percent registered in Los Angeles County. The remaining 23 percent of based aircraft are registered to addresses outside of the regional area.

Although there is strong competition from airports within the region offering services similar to or greater than those available at OXR, most notably at CMA, the service area appears to be centered largely in the southern portion of Ventura County and extends northwest and southeast along the coastline. Given the services currently offered at OXR and the possibility for expansion to meet future demand, it is likely for the airport to remain competitive within the region. For the purposes of this study, the primary service area for OXR can be defined as the entirety of Ventura County, and more broadly defined as the 50 nautical mile radius extending farther north, east, and northwest as the secondary service area as depicted on **Exhibit J**.

REGISTERED AIRCRAFT FORECAST

Table L depicts the historical registered aircraft for Ventura County for years 1993 to 2017. The registered aircraft in the area shows a decreasing trend from years 1993 through 1999, then increasing through 2009. However, after 2009, the county has experienced a downward trend in aircraft registration. As previously noted, the FAA's effort to re-register aircraft during this timeframe likely contributed to the decrease in registered aircraft ownership in the region, as it did in much of the United States. The service area is currently at a 24-year registered aircraft low, with 971 registered aircraft. Although there are no recently prepared forecasts for the airport service area regarding registered aircraft, one was prepared for this study using market share projection and ratio projection methods.

When projecting the registered aircraft, it is helpful to calculate the service area's market share of the total active GA aircraft in the U.S. In conducting this market share analysis, comparison of Ventura County aircraft ownership trends against the nation's ownership trends can be carried out. **Table M** details the market share analysis, which shows the Ventura County market share of the U.S. active GA aircraft fleet has held a consistent declining trend, ranging from a high of 0.56 percent in 2009 to a low of 0.46 percent in 2017. Holding the 2017 market share of 0.46 percent constant, the market share can be applied to the forecast of U.S. active GA aircraft to generate the forecast registered aircraft in the airport service area, which is Ventura County. According to this projection, 985 aircraft could be registered in the service area by 2038, yielding a CAGR of 0.07 percent. In addition, an increasing market share percentage was also applied. Despite the declining market share trend, there could be potential for increased market share capturing historical values should the service area experience economic growth. Utilizing this forecasting technique, registered aircraft within the service area could reach 1,199 by 2038 and grow at a CAGR of 1.01 percent.

TABLE L
Historical Registered Aircraft
Ventura County

Year	Helicopter	MEP	Other*	SEP	Turbojet	Turboprop	Total
1993	45	92	21	878	25	13	1,074
1994	45	81	23	878	24	11	1,062
1995	43	80	26	866	24	10	1,049
1996	47	74	24	866	12	8	1,031
1997	47	71	26	863	14	8	1,029
1998	51	73	26	854	13	16	1,033
1999	53	76	26	836	14	13	1,018
2000	60	77	30	895	15	12	1,089
2001	63	68	31	895	15	48	1,120
2002	63	68	30	892	15	46	1,114
2003	67	61	36	870	21	74	1,129
2004	64	56	35	883	24	79	1,141
2005	63	60	37	930	28	80	1,198
2006	66	81	35	980	24	13	1,199
2007	64	89	43	1,005	24	19	1,244
2008	65	87	44	984	32	36	1,248
2009	70	85	44	991	28	37	1,255
2010	75	76	46	975	24	38	1,234
2011	71	72	45	957	21	31	1,197
2012	58	66	39	900	21	30	1,114
2013	50	63	50	819	22	30	1,034
2014	49	55	34	837	23	22	1,020
2015	48	52	39	815	23	18	995
2016	51	50	42	812	24	24	1,003
2017	49	52	41	788	23	18	971

MEP: Multi-Engine Piston
SEP: Single Engine Piston
* The "Other" aircraft category refers to aircraft such as gliders, electric aircraft, balloons, and dirigibles.
Source: FAA Registered Aircraft

Population trends have also been used to analyze and project aircraft registrations within the service area. This projection method analyzes the service area population as a ratio of the historical registered aircraft per 1,000 residents. In 2018, the California Department of Finance, Demographic Research Unit calculated the population of the service area to be approximately 856,111. Population within the service area is forecasted to increase to 953,170 by 2038. The ratio of registered aircraft to 1,000 population has been trending down from a high of 1.55 in 2007 to a low of 1.13 in 2017. A constant ratio projection maintaining the 2017 ratio of 1.13 yields 1,077 aircraft in the service area by 2038, growing at a CAGR of 0.49 percent.

Similar to the market share analysis, an increasing ratio projection was also utilized, which applies an increasing ratio of registered aircraft to the forecast population of the service area. By increasing the ratio to 1.20 over the planning horizon, a total of 1,144 aircraft could be registered by 2038, growing at a CAGR of 0.78 percent.

TABLE M
Registered Aircraft Forecast
Ventura County

Year	Ventura County Registered Aircraft	U.S. Active GA Aircraft	% of U.S. Active GA Aircraft	Ventura County Population	Aircraft per 1,000 Residents
2005	1,198	224,257	0.53%	795,962	1.51
2006	1,199	221,942	0.54%	799,049	1.50
2007	1,244	231,606	0.54%	803,572	1.55
2008	1,248	228,664	0.55%	808,970	1.54
2009	1,255	223,876	0.56%	815,284	1.54
2010	1,234	223,370	0.55%	824,441	1.50
2011	1,197	220,453	0.54%	831,606	1.44
2012	1,114	209,034	0.53%	836,782	1.33
2013	1,034	199,927	0.52%	842,964	1.23
2014	1,020	204,408	0.50%	848,038	1.20
2015	995	210,031	0.47%	852,199	1.17
2016	1,003	211,794	0.47%	853,673	1.17
2017	971	213,050	0.46%	856,111	1.13
Constant Market Share Projection of U.S. Active GA Aircraft (CAGR 0.07%)					
2023	982	213,390	0.46%	884,148	1.11
2038	977	212,465	0.46%	909,352	1.07
2038	985	214,090	0.46%	953,170	1.03
Increasing Market Share Projection of U.S. Active GA Aircraft (CAGR 1.01%)					
2023	1,024	213,390	0.48%	884,148	1.16
2038	1,105	212,465	0.52%	909,352	1.21
2038	1,199	214,090	0.56%	953,170	1.26
Constant Ratio Projection Per 1,000 Residents (CAGR 0.49%)					
2023	999	213,390	0.47%	884,148	1.13
2038	1,028	212,465	0.48%	909,352	1.13
2038	1,077	214,090	0.50%	953,170	1.13
Increasing Ratio Projection Per 1,000 Residents (CAGR 0.78%)—Selected					
2023	1,017	213,390	0.48%	884,148	1.15
2038	1,064	212,465	0.50%	909,352	1.17
2038	1,144	214,090	0.53%	953,170	1.20
Historical Average Ratio Projection Per 1,000 Residents (CAGR 1.42%)					
2023	1,211	213,390	0.57%	884,148	1.37
2038	1,246	212,465	0.59%	909,352	1.37
2038	1,306	214,090	0.61%	953,170	1.37

Source: Historical Registered Aircraft – FAA Aircraft Registry; Historical and Forecast U.S. Active GA Aircraft – FAA Aerospace Forecast, Fiscal Years 2018-2038; Historical and Forecast Population – California Department of Finance, Demographic Research Unit, January 2018.

A historical average ratio projection of 1.37 aircraft per 1,000 people was applied to the projected population to reflect a return to historic ratio levels. This projection yields a total of 1,306 registered aircraft and a CAGR of 1.42 percent.

The increasing ratio projection per capita was selected as the planning forecast as it is indicative of the forecast economic and population growth potential within the region. As such, a slight increase in market share is carried forward throughout the planning horizon to reflect a return to market share and registered aircraft levels last realized in the 2011-2012 timeframe.

BASED AIRCRAFT FORECAST

According to airport records, there are currently 141 aircraft based at the airport. Historical based aircraft data prior to 2017 was not readily available; therefore, the FAA's TAF historical based aircraft count for OXR was used to analyze historical based aircraft trends. Building upon the projections previously developed, market share analysis and trend line projection forecasting approaches were used to generate forecasts for the future based aircraft totals at OXR. As presented in **Table N**, the OXR market share of registered aircraft within the service area has experienced a downward trend from 2006 to 2012, reaching a low of 10.95 percent. From 2012 to 2016, the OXR market share has increased to 16.35 percent, then decreased slightly to 14.52 percent in 2017. Holding the current market share constant at 14.52 percent, future based aircraft projections were calculated by applying the service area registered aircraft projection to the market share of registered aircraft. This approach results in a projection of 166 based aircraft by the year 2038. The second projection assumes the airport's market share will increase throughout the planning period, reflecting the 2012 to 2016 five-year trend. An increasing market share projection results in 189 based aircraft by 2038 and a CAGR of 1.40 percent.

Additional projections were prepared by examining the ratio of based aircraft to population. Historic data shows that the ratio of based aircraft per 1,000 residents has followed a trend similar to the OXR based aircraft market share, reaching a low of 0.146 in 2012, then increasing to 0.194 in 2015. Since 2015, the ratio has decreased to 0.165 in 2017. Holding the current value of 0.165 based aircraft per 1,000 residents constant results in a projection of 157 based aircraft by 2038. An increasing ratio of based aircraft per 1,000 residents was also applied to the forecast service area population. Given that the service area population is projected to increase at a CAGR of 0.51 percent over the planning horizon, it is reasonable to assume that based aircraft within the service area could also experience some growth. Increasing the ratio of registered aircraft per 1,000 residents within the service area to 0.185 over the planning horizon results in a projection of 175 based aircraft by 2038 and a CAGR of 1.07 percent.

For comparative purposes, the FAA based aircraft forecast for OXR included within the TAF (which has a 2017 based aircraft count of 165) was also analyzed. The FAA's TAF increases OXR's based aircraft to 189 by year 2038 at a CAGR of 0.65 percent, generating a based aircraft market share of 16.52 percent and a ratio of based aircraft per 1,000 people of 0.198 throughout the planning horizon. As previously detailed, it is important to note that the FAA TAF is reporting 165 based aircraft for the base year (2017) of this study, which is significantly higher than the 141 based aircraft that are reported by airport staff.

The forecasts summarized in **Table N** represent a reasonable planning envelope. The selected forecast considers the airport experiencing an increase in market share by 0.89 percent to a total of 15.41 percent and an increase in the ratio of the service area population by 0.20 percent to a total of 0.185 percent. The selected forecast is similar to the OXR based aircraft market share and ratio of based aircraft per 1,000 service area residents last experienced in 2014. By 2038, 176 aircraft are projected to be based at

OXR. This forecast results in a 1.07 percent CAGR through the long-term planning period, returning to a market share and ratio of the service area population experienced in the recent past.

TABLE N
Based Aircraft Forecast
Oxnard Airport

Year	OXR Based Aircraft	Ventura County Registrations	OXR Market Share	Service Area Population	Aircraft per 1,000 Residents
2005	137	1,198	11.44%	795,962	0.172
2006	184	1,199	15.35%	799,049	0.230
2007	184	1,244	14.79%	803,572	0.229
2008	178	1,248	14.26%	808,970	0.220
2009	157	1,255	12.51%	815,284	0.193
2010	157	1,234	12.72%	824,441	0.190
2011	157	1,197	13.12%	831,606	0.189
2012	122	1,114	10.95%	836,782	0.146
2013	147	1,034	14.22%	842,964	0.174
2014	157	1,020	15.39%	848,038	0.185
2015	165	995	16.58%	852,199	0.194
2016	164	1,003	16.35%	853,673	0.192
2017	141	971	14.52%	856,111	0.165
Constant Market Share Projection of Registered Aircraft (CAGR 0.78%)					
2023	148	1,017	14.52%	884,148	0.167
2028	154	1,064	14.52%	909,352	0.170
2038	166	1,144	14.52%	953,170	0.174
Increasing Market Share Projection of Registered Aircraft (CAGR 1.40%)					
2023	153	1,017	15.00%	884,148	0.173
2028	165	1,064	15.50%	909,352	0.181
2038	189	1,144	16.50%	953,170	0.198
Constant Ratio Projection Per 1,000 Residents (CAGR 0.52%)					
2023	146	1,017	14.34%	884,148	0.165
2028	150	1,064	14.10%	909,352	0.165
2038	157	1,144	13.75%	953,170	0.165
Increasing Ratio Projection per 1,000 Residents (CAGR 1.07%)—Selected					
2023	150	1,017	14.78%	884,148	0.170
2028	159	1,064	14.96%	909,352	0.175
2038	176	1,144	15.41%	953,170	0.185
FAA Terminal Area Forecast (CAGR 0.65%)					
2023	174	1,017	17.11%	884,148	0.197
2028	179	1,064	16.82%	909,352	0.197
2038	189	1,144	16.52%	953,170	0.198

Note: 2017 OXR based aircraft number from current airport records. Historical based aircraft totals are derived from the FAA's *Terminal Area Forecast*.
Source: Historical Registered Aircraft – FAA Aircraft Registry; Historical and Forecast U.S. Active GA Aircraft – FAA Aerospace Forecast, Fiscal Years 2018-2038; Historical and Forecast Population – California Department of Finance, Demographic Research Unit, January 2018.

Future aircraft basing at the airport will depend on several factors, including the state of the economy, fuel costs, available facilities, competing airports, and adjacent development potential. Forecasts assume a reasonably stable and growing economy, as well as reasonable development of airport facilities necessary to accommodate aviation demand. Competing airports will play a role in deciding demand; however, OXR should fare well in this competition as it is served by a runway capable of handling the majority of general aviation aircraft and the airport's services and facilities currently offered. Furthermore, there is currently a hangar waiting list of approximately 30 aircraft, with the majority of those being aircraft currently not based at the airport.

BASED AIRCRAFT FLEET MIX

The current fleet mix based at OXR consists of 113 single engine piston aircraft, 15 multi-engine piston aircraft, four turboprops, and nine helicopters. Given that the total number of aircraft based at the airport is projected to increase, it is important to have an idea of the type of aircraft expected to utilize the airfield. A forecast of the fleet mix will ensure that adequate facilities are planned to accommodate these aircraft in the future.

The projection for the fleet mix of based aircraft was generated by comparing the existing fleet mix of based aircraft at OXR with the U.S. GA fleet trends. The forecast for the active U.S. GA fleet shows declining trends in the single and multi-engine categories; however, the larger and more sophisticated aircraft, such as turboprop and turbojet, are forecast to increase. In addition, both piston and turbine rotorcraft are projected to increase through 2038. Taking the national trends and airport communication into consideration, a projected based aircraft fleet mix has been prepared and is detailed in **Table P**.

TABLE P
Based Aircraft Fleet Mix
Oxnard Airport

Aircraft Type	2017	%	2023	%	2028	%	2038	%
Single Engine Piston	113	80.14%	117	78.00%	119	75.00%	126	71.75%
Multi-Engine Piston	15	10.64%	14	9.50%	12	7.50%	10	5.50%
Turboprop	4	2.84%	6	4.00%	8	5.00%	12	6.75%
Jet	0	0.00%	2	1.00%	5	3.00%	8	4.75%
Helicopters	9	6.38%	11	7.50%	15	9.50%	20	11.25%
Total	**141**	**100.00%**	**150**	**100.00%**	**159**	**100.00%**	**176**	**100.00%**

Source: Airport records; Coffman Associates' analysis

ANNUAL OPERATIONS

Aircraft operations are segregated into four general categories: air carrier, air taxi, military, and general aviation. Air carrier operations are performed by commercial airline aircraft with greater than 60 seats. Air taxi operations are generally associated with commuter aircraft, but also include for-hire general aviation aircraft. Military operations are those conducted by airplanes and helicopters with a military identification. General aviation includes all other aviation activity from small ultralights to large business jets.

Records of airport operational activities are essential for determining required facilities (types and sizes), as well as eligibility for federal funding. **Table Q** provides a summary of operational statistics over the past 20 years. According to the FAA's Operations Network (OPSNET), which reports ATCT counts for OXR, the airport had its peak air taxi operations levels in 1998 with almost 17,000 operations. Total operations were at their peak in 2005, at nearly 102,000 operations; however, total operations have since fluctuated, averaging approximately 65,900 over the last 10-year period. Total operations in 2017 were slightly higher than that average, at 66,932. It should be noted that all operations reported in the OPSNET system are confined to the operational hours of the ATCT serving OXR, which operates from 7:00 a.m. to 9:00 p.m. After hours operations occurring at OXR will be addressed later within this section.

TABLE Q
Aircraft Operational History
Oxnard Airport

Year	Itinerant Operations					Local Operations			Total Ops
	Air Carrier	Air Taxi	GA	Military	Subtotal	GA	Military	Subtotal	
1998	397	16,965	46,222	1,033	64,617	35,911	140	36,051	100,668
1999	0	16,929	44,274	1,539	62,742	27,372	94	27,466	90,208
2000	0	15,422	43,158	1,461	60,041	28,138	64	28,202	88,243
2001	0	14,046	44,506	958	59,510	26,885	37	26,922	86,432
2002	0	13,406	44,822	1,523	59,751	28,981	18	28,999	88,750
2003	0	11,529	41,369	822	53,720	29,730	0	29,730	83,450
2004	0	20,086	39,495	1,344	60,925	35,145	14	35,159	96,084
2005	0	10,456	49,979	1,240	61,675	40,183	4	40,187	101,862
2006	0	7,355	44,916	1,073	53,344	33,044	4	33,048	86,392
2007	0	6,586	25,025	359	31,970	36,931	16	36,947	68,917
2008	39	5,986	14,263	65	20,353	44,210	63	44,273	83,988
2009	0	5,222	26,201	115	31,538	29,839	25	29,864	61,402
2010	5	4,292	24,511	88	28,896	26,331	90	26,421	55,317
2011	14	3,620	24,957	198	28,789	27,629	367	27,996	56,785
2012	0	4,079	24,233	169	28,481	25,940	190	26,130	54,611
2013	8	5,498	23,846	218	29,570	29,457	468	29,925	59,495
2014	0	6,047	27,233	218	33,498	37,388	342	37,730	71,228
2015	1	5,397	28,371	178	33,947	40,506	292	40,798	74,745
2016	0	4,953	28,263	184	33,400	40,361	390	40,751	74,151
2017	0	4,629	25,366	187	30,182	36,594	156	36,750	66,932

Source: FAA Operations Network (OPSNET).

Military activity has constituted a very small percentage of annual aircraft operations during the past several years. This activity can include fixed-wing aircraft, as well as helicopter activity associated with military operations. The largest percentage of aircraft activity experienced at the airport falls within the general aviation category and can range from small aircraft conducting recreational flights, up to large corporate jets transporting passengers for business purposes.

Operations are further sub-categorized as either itinerant or local. Itinerant operations are those made by aircraft which arrive from or depart to destinations outside the local operating area. Typically, itinerant operations increase with business and commercial use since business aircraft are not usually used for large scale training activities. Local operations are associated primarily with touch-and-go or pilot training activity. Over the course of the past 10 years, itinerant operations have averaged approximately 48 percent of total operations, with local operations averaging approximately 52 percent.

An examination of monthly total operations at OXR from January 2008 through December 2017 shows no strong seasonal fluctuations over the course of the year; however, it does show that late fall and winter months typically have the lowest activity of the year, and spring months, March, April, and May, are typically the busiest in terms of operations. Over the 10-year time period, the airport has averaged 5,489 operations per month. So far this year, January through June 2018, the airport has experienced an average of 6,104 operations per month.

Itinerant General Aviation Operations Forecast

Five forecasts of itinerant general aviation operations have been developed and are presented in **Table R**. The forecasts presented consider the FAA TAF and examine and/or manipulate variables, such as the OXR market share of itinerant operations and operations per based aircraft. For planning purposes, forecasts have been rounded to the nearest hundred. The first projection considers the airport maintaining its market share of total U.S. itinerant general aviation operations at a constant level. In 2017, OXR accounted for 0.18 percent of U.S. itinerant operations. By carrying this percentage forward to the plan years of this study, a forecast emerges with a CAGR of 0.17 percent and 26,300 itinerant GA operations by year 2038. The second forecast considers an increasing OXR market share of national GA itinerant operations to 0.25 percent and produces a CAGR of 1.75 percent and 36,500 operations by 2038.

Additional forecasts were prepared by examining the airport's operations per based aircraft. By maintaining the current ratio of operations per based aircraft constant at 180 through the planning period, a forecast of 31,700 itinerant GA operations by 2038 results. Alternatively, the increasing operations per based aircraft grows the ratio to 190 and forecasts a CAGR of 1.32 percent and 33,400 itinerant GA operations by the year 2038.

Itinerant operations from the FAA TAF were also examined, which is slightly lower than the ATCT count at 25,308 itinerant operations for 2017. The TAF employs a decreasing forecast, projecting 24,201 itinerant GA operations by 2038 at a CAGR of -0.21 percent.

Ultimately, the constant operations per based aircraft projection has been carried forward as the selected forecast. Given the forecast potential for GA itinerant operations to increase moderately on a national level, it is possible for OXR to grow its market share within this operational segment. The selected forecast maintains a reasonable level of operations per based aircraft, while modestly increasing the airport's market share. Itinerant operations per based aircraft are projected to remain constant at 180 through the planning horizon, which ultimately increases OXR's itinerant GA operations market share to 0.22 percent by the long-term planning horizon. Each of these metrics are slightly above activity levels experienced in the recent past; however, each of these values are considered reasonable as historical trends (particularly itinerant GA operations market share) have shown steady growth.

TABLE R
Itinerant GA Operations Forecast
Oxnard Airport

Year	OXR Itinerant GA Operations	U.S. ATCT Itinerant GA Operations	Market Share of Itinerant Operations	OXR Based Aircraft	Itinerant Operations per Based Aircraft
2008	14,263	17,493,000	0.08%	178	80
2009	26,201	15,571,000	0.17%	157	167
2010	24,511	14,864,000	0.16%	157	156
2011	24,957	14,528,000	0.17%	157	159
2012	24,233	14,522,000	0.17%	122	199
2013	23,846	14,117,000	0.17%	147	162
2014	27,233	13,979,000	0.19%	157	173
2015	28,371	13,887,000	0.20%	165	172
2016	28,263	13,904,000	0.20%	164	172
2017	25,366	13,838,000	0.18%	141	180
Constant Market Share Projection (CAGR 0.17%)					
2023	25,300	14,040,000	0.18%	150	169
2028	25,600	14,217,000	0.18%	159	161
2038	26,300	14,587,000	0.18%	176	149
Increasing Market Share Projection (CAGR 1.75%)					
2023	28,100	14,040,000	0.20%	150	187
2028	31,300	14,217,000	0.22%	159	197
2038	36,500	14,587,000	0.25%	176	207
Constant Operations per Based Aircraft (CAGR 1.07%)—Selected					
2023	27,000	14,040,000	0.19%	150	180
2028	28,600	14,217,000	0.20%	159	180
2038	31,700	14,587,000	0.22%	176	180
Increasing Operations per Based Aircraft (CAGR 1.32%)					
2023	27,300	14,040,000	0.19%	150	182
2028	29,400	14,217,000	0.21%	159	185
2038	33,400	14,587,000	0.23%	176	190
FAA Terminal Area Forecast (CAGR -0.21%)					
2023	24,231	14,040,000	0.17%	150	162
2028	24,221	14,217,000	0.17%	159	152
2038	24,201	14,587,000	0.17%	176	138

Sources: Airport based aircraft information; FAA Aerospace Forecast 2018-2038, Fiscal Years 2018-2038; FAA Operations Network (OPSNET); Coffman Associates' analysis.

Local General Aviation Operations Forecast

A similar methodology was utilized to generate a planning forecast for local GA operations. Five forecasts were developed, with the first considering the airport maintaining a constant percentage of U.S. local GA operations. The second forecast applies an increasing market share percentage of U.S. local operations throughout the planning horizon. These forecasts generated CAGRs of 0.38 and 1.35 percent, respectively. Local GA operations forecasts are shown in **Table S**.

TABLE S
Local GA Operations Forecast
Oxnard Airport

Year	OXR Local GA Operations	U.S. ATCT Local GA Operations	Market Share of Local Operations	OXR Based Aircraft	Local Operations per Based Aircraft
2008	44,210	14,081,000	0.31%	178	248
2009	29,839	12,448,000	0.24%	157	190
2010	26,331	11,716,000	0.22%	157	168
2011	27,629	11,437,000	0.24%	157	176
2012	25,940	11,608,000	0.22%	122	213
2013	29,457	11,688,000	0.25%	147	200
2014	37,388	11,675,000	0.32%	157	238
2015	40,506	11,691,000	0.35%	165	245
2016	40,361	11,632,000	0.35%	164	246
2017	36,594	11,732,000	0.31%	141	260
Constant Market Share Projection (CAGR 0.38%)					
2023	37,600	12,136,000	0.31%	150	251
2028	38,200	12,338,000	0.31%	159	240
2038	39,600	12,764,000	0.31%	176	225
Increasing Market Share Projection (CAGR 1.35%)					
2023	38,800	12,136,000	0.32%	150	259
2028	41,900	12,338,000	0.34%	159	264
2038	48,500	12,764,000	0.38%	176	276
Constant Operations per Based Aircraft (CAGR 1.07%)—Selected					
2023	39,000	12,136,000	0.32%	150	260
2028	41,300	12,338,000	0.33%	159	260
2038	45,800	12,764,000	0.36%	176	260
Increasing Operations per Based Aircraft (CAGR 1.43%)					
2023	39,800	12,136,000	0.33%	150	265
2028	42,900	12,338,000	0.35%	159	270
2038	49,300	12,764,000	0.39%	176	280
FAA Terminal Area Forecast (CAGR 0.89%)					
2023	38,977	12,136,000	0.32%	150	260
2028	40,561	12,338,000	0.33%	159	255
2038	43,921	12,764,000	0.34%	176	250

Sources: Airport based aircraft information; FAA Aerospace Forecast 2018-2038, Fiscal Years 2018-2038; FAA Operations Network (OPSNET); Coffman Associates' analysis.

Forecasts manipulating variables, such as operations per based aircraft, were also prepared. Maintaining the constant operations per based aircraft at 260 projects a total of 45,800 local GA operations by year 2038 and a CAGR of 1.07 percent, while increasing the operations per based aircraft to 280 over the planning horizon projects 49,300 operations and a CAGR of 1.43 percent.

As a point of comparison, the FAA's TAF has been included which projects a CAGR of 0.89 percent and 43,921 local operations by 2038. It should be noted that the 2017 TAF GA local operations count is slightly lower than the ATCT count at 36,471.

The constant operations per based aircraft has been selected as the planning forecast. The potential for increases in based aircraft indicates possible growth for OXR's local operational levels and increased market share of national local GA operations. The selected forecast maintains the current level of local operations per based aircraft at 260. Although historical local operations per based aircraft have been increasing since 2013, this metric has been maintained throughout the planning horizon as increasing based aircraft will drive OXR's total local operations as well as market share. The selected long-term planning forecast projects a market share of 0.36 percent and local operations totaling 45,800 - activity levels that have been experienced as recent as 2016.

Other Air Taxi Operations Forecast

Air taxi operations are those with authority to provide "on-demand" transportation of persons or property via aircraft with fewer than 60 passenger seats. Air taxi includes a broad range of operations, including some smaller commercial service aircraft, some charter aircraft, air cargo aircraft, many fractional ownership aircraft, and air ambulance services.

The history of air taxi operations is included on **Table T**. As can be seen, air taxi operations at OXR have experienced a decreasing trend since 2014.

The FAA national air taxi forecast projects a 2.10 percent decrease in air taxi operations through 2028, followed by modest increases thereafter. The primary reason for this decrease is the transition by commuter airlines to larger aircraft with more than 60 passenger seats, which are then counted as air carrier operations. While air taxi operations that are represented by commuter airlines using aircraft with fewer than 60 seats are decreasing, the business jet segment of the air taxi category is expected to continue to grow nationally. The facilities and FBO services available at OXR are especially accommodating to operators of business jets. Therefore, it is reasonable to expect the business jet component of air taxi activity to increase moderately over time at OXR.

In addition, a total of eight business jets and 12 turboprops are forecast to base at the airport by 2038. **Table T** presents three forecasts for other air taxi operations at the airport. The first simply considers the airport capturing a constant market share of national air taxi operations, which results in a decreasing number of other air taxi operations. This forecast is not thought to reflect the local condition at OXR, considering the historical air taxi operations and the forecast potential for increased based turbine aircraft at the airport. The second forecast considers an increasing market share of air taxi operations, which produces a CAGR of 0.37 percent and 5,000 other air taxi operations by 2038.

The remaining forecast examines the FAA TAF, which has been selected as the most reasonable forecast. As was discussed, growth has been projected for this market segment due to the forecast potential for increased based turbine aircraft at OXR. As such, other air taxi operations are forecast to reach 6,400 by

2038 and grow at a CAGR of 1.36 percent. For planning purposes, the selected forecast has been rounded to the nearest hundred.

TABLE T
Other Air Taxi Operations Forecast
Oxnard Airport

Year	OXR Air Taxi Operations	U.S. Air Taxi Operations	OXR Market Share
2008	5,986	11,032,000	0.054%
2009	5,222	9,521,000	0.055%
2010	4,292	9,410,000	0.046%
2011	3,620	9,279,000	0.039%
2012	4,079	8,994,000	0.045%
2013	5,498	8,803,000	0.062%
2014	6,047	8,440,000	0.072%
2015	5,397	7,895,000	0.068%
2016	4,953	7,580,000	0.065%
2017	4,629	7,179,000	0.064%
Constant Market Share of U.S. Air Taxi Operations (CAGR -0.69%)			
2022	3,500	5,442,000	0.064%
2023	3,600	5,672,000	0.064%
2038	4,000	6,288,000	0.064%
Increasing Market Share of U.S. Air Taxi Operations (CAGR 0.37%)			
2022	3,800	5,442,000	0.070%
2023	4,300	5,672,000	0.075%
2038	5,000	6,288,000	0.080%
FAA Terminal Area Forecast (CAGR 1.36%)—Selected			
2022	5,233	5,442,000	0.096%
2023	5,600	5,672,000	0.099%
2038	6,413	6,288,000	0.102%

KEY: CAGR-Compound annual growth rate;
Source: FAA Aerospace Forecast 2018-2038, Fiscal Years 2018-2038; FAA Operations Network (OPSNET); Coffman Associates' analysis.

Military Operations Forecast

Military aircraft utilize civilian airports across the country. The FAA TAF operational data identifies 518 annual military operations at OXR, with 214 being itinerant operations and the remaining 304 classified as local operations. Forecasting of military activity is inherently difficult because of the national security nature of their operations and the fact that missions can change on a daily basis. Thus, it is typical for the FAA to utilize a flat-line number for military operations, which has been applied at OXR. For the purposes of this study, 500 annual military operations will be considered throughout the planning horizon.

TOTAL OPERATIONS ADJUSTMENT AND FORECAST

The Oxnard Airport ATCT is not a 24-hour tower. Thus, its air traffic counts are not all-inclusive of aircraft operations at the airport. Some aspects of this study require that all airport activity be considered. For these evaluations, it is necessary to estimate and adjust for operations that occur when the tower is closed. The OXR tower operates daily from 7:00 a.m. to 9:00 p.m.

For planning purposes, operations that occur when the tower has closed are estimated from FAA OPSNET data. Over a five-year time period, from 2013-2017, approximately two percent of all operations occurring at OXR were after operational hours of the ATCT. As such, base year and forecast operations were increased by two percent to account for operations occurring at OXR after ATCT hours.

Table U presents a summary of the ATCT operations, as well as the adjusted operations, for all aircraft activity segments at OXR over the long-term planning horizon. The operational projections equate to a 1.10 percent CAGR.

TABLE U
Forecast Adjustment for ATCT After-Hours Operations
Oxnard Airport

	Base Year 2017	2023	2028	2038
ATCT OPERATIONS				
Itinerant	**30,182**	**32,400**	**34,400**	**38,300**
Air Taxi	4,629	5,200	5,600	6,400
General Aviation	25,366	27,000	28,600	31,700
Military	187	200	200	200
Local	**36,750**	**39,300**	**41,600**	**46,100**
General Aviation	36,594	39,000	41,300	45,800
Military	156	300	300	300
Total ATCT Operations	***66,932***	***71,700***	***76,000***	***84,400***
ADJUSTED OPERATIONS**				
Itinerant	**30,800**	**33,000**	**35,100**	**39,000**
Air Taxi	4,700	5,300	5,700	6,500
General Aviation	25,900	27,500	29,200	32,300
Military	200	200	200	200
Local	**37,500**	**40,100**	**42,400**	**47,000**
General Aviation	37,300	39,800	42,100	46,700
Military	200	300	300	300
Total Adjusted Operations	***68,300***	***73,100***	***77,500***	***86,000***

*ATCT records for period from January through December 2017
**Adjusted operations rounded to the nearest 100

Operations Forecast Summary

Table V presents the aggregate total of estimated current operational totals, as well as the operational forecasts for the planning horizon.

TABLE V
Operations Forecast Summary
Oxnard Airport

Year	Based Aircraft	Itinerant Air Taxi	Itinerant GA Operations	Local GA Operations	Itinerant Military Operations	Local Military Operations	Total Operations
2017	141	4,700	25,900	37,300	200	200	68,300
Forecast Planning Horizon							
2023	150	5,300	27,500	39,800	200	300	73,100
2028	159	5,700	29,200	42,100	200	300	77,500
2038	176	6,500	32,300	46,700	200	300	86,000
CAGR	1.06%	1.56%	1.06%	1.08%	0.00%	1.95%	1.10%

ANNUAL INSTRUMENT APPROACHES

Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. An instrument approach is defined by the FAA as "an approach to an airport with intent to land by an aircraft in accordance with an IFR flight plan, when visibility is less than three miles and/or when the ceiling is at or below the minimum approach altitude." To qualify as an instrument approach, aircraft must land at an airport after following one of the published instrument approach procedures. Forecasts of AIAs provide guidance in determining an airport's requirements for navigational aid facilities. Practice or training approaches do not count as AIAs, nor do instrument approaches that occur in visual conditions.

A review of historic AIAs utilizing the FAA's OPSNET system revealed that over the past five years, AIAs have constituted approximately 25 percent of the itinerant operations total at OXR. It is highly unusual for pilots to perform local operations when IFR conditions are in effect. AIAs may be expected to increase as itinerant operations and operations by more sophisticated aircraft (e.g., turboprops and business jets) increase through the planning period. For this reason, AIA projections consider a constant estimate of 25 percent of annual itinerant operations. The projections are presented in **Table W**.

TABLE W
Annual Instrument Approaches (AIAs)
Oxnard Airport

Year	AIAs	Itinerant Operations	Ratio
2017	7,700	30,800	25.00%
2023	8,250	33,000	25.00%
2028	8,775	35,100	25.00%
2038	9,750	39,000	25.00%

Source: Coffman Associates' analysis

PEAK PERIOD FORECASTS

Many airport facility needs are related to the level of activity during peak periods for both operations and enplanements. The periods used in developing facility requirements for this study are as follows:

- **Peak Month –** The calendar month when peak activity occurs.
- **Design Day –** The average day in the peak month.
- **Busy Day –** The busy day of a typical week in the peak month.
- **Design Hour –** The peak hour within the design day.

It is important to realize that only the peak month is an absolute peak within the year. Each of the other periods will be exceeded at various times during the year. However, each provides reasonable planning standards that can be applied without overbuilding or being too restrictive.

A review of tower reports obtained from OPSNET over the past 10 years shows that the peak month for operations has averaged 10.08 percent of total annual operations. This factor is carried to the plan years. The design day is simply the peak month divided by the number of days in that month. Over the last 10 years, the peak month has averaged 30.70 days; therefore, the peak month estimate is divided by 30.70 to arrive at the design day. The busy day is calculated as 43.30 percent higher than the design day, which is derived based on the average of the peak day for each week of the peak month. The design hour is an average of the peak hour of the peak day of each week in the peak month.

Hourly operations were also obtained from OPSNET. In order to calculate the design hour, the peak hour within the peak day of each week in the peak month was identified. This process was conducted for each year from 2008 through 2017. Peak hours from each year were then calculated as a percentage of the corresponding peak day and averaged in an effort to exclude extreme outliers. The percentage was then applied to the OXR ATCT operational data, which has been adjusted to account for operations occurring after the ATCT has closed, to generate the design hour. **Table X** presents the peaking characteristics for the planning horizon.

TABLE X
Peak Operations Forecast
Oxnard Airport

	2017	2023	2028	2038
Annual Operations	68,300	73,100	77,500	86,000
Peak Month	6,885	7,368	7,812	8,669
Busy Day	329	344	365	405
Design Day	229	240	254	282
Design Hour	57	60	64	71

Source: Coffman Associates analysis of OXR ATCT data.

FORECAST COMPARISON TO THE *TERMINAL AREA FORECAST*

The FAA will review the forecasts presented in this Narrative Report for consistency with the TAF. Typically, the local FAA Airport District Office (ADO) or Regional Airports Division (RO) are responsible for forecasting. When reviewing a sponsor's forecast, FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Forecasts of operations and based aircraft are considered consistent with the TAF if they differ by less than 10 percent in the five-year period and 15 percent in the 10-year forecast period. If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used for FAA decision-making. **Table Y** presents the direct comparison of the master planning forecasts with the TAF published in January 2018.

TABLE Y
Forecast Comparison to the *Terminal Area Forecast*
Oxnard Airport

	BASE YEAR	FORECAST			
	2017	2023	2028	2038	CAGR 2017-2038
Itinerant Operations					
ALP Narrative Forecast	30,800	33,000	35,100	39,000	1.13%
2018 FAA TAF	30,349	29,678	30,035	30,828	0.07%
% Difference	1.49%	11.19%	16.86%	26.51%	
Local Operations					
ALP Narrative Forecast	37,500	40,100	42,400	47,000	1.08%
2018 FAA TAF	36,775	39,281	40,865	44,225	0.88%
% Difference	1.97%	2.08%	3.76%	6.27%	
Total Operations					
ALP Narrative Forecast	68,300	73,100	77,500	86,000	1.10%
2018 FAA TAF	67,124	68,959	70,900	75,053	0.53%
% Difference	1.75%	6.01%	9.31%	14.59%	
Based Aircraft					
ALP Narrative Forecast	141	150	159	176	1.06%
2018 FAA TAF	165	174	179	189	0.65%
% Difference	-14.55%	-13.79%	-11.17%	-6.88%	

KEY: CAGR - Compound annual growth rate
Source: Coffman Associates analysis

The reason the FAA allows this differential is because the TAF forecasts are not meant to replace forecasts developed locally (i.e., in this study). While the TAF can provide a point of reference or comparison, their purpose is much broader in defining FAA national workload measures.

In examining the projections formulated for this study and FAA TAF projections of itinerant operations, the selected planning forecast differs from the TAF by 11.19 percent in the five-year forecast and 16.86 percent in the 10-year forecast. Thus, the forecast of itinerant operations is slightly outside of what would be considered to be consistent with the FAA TAF in the five-year forecast; however, the base year itinerant operations (as reported by OPSNET and adjusted for afterhours operations) are estimated at a

1.49 percent difference from the TAF. As shown in the table, local and total operations would generally be considered consistent with the TAF as the 5 and 10-year tolerances are not exceeded. For based aircraft, the TAF identifies a total of 165 based aircraft in 2018; however, this planning effort identified 141 based aircraft at OXR through the use of the FAA National Based Aircraft Inventory Program as well as a based aircraft list provided by airport management. As a result, the selected base year count has a –14.55 percent difference from the TAF. Ultimately, the selected based aircraft forecast decreases to –13.79 percent difference from the TAF in the five-year forecast period and further decreases to –11.17 percent difference in the 10-year forecast.

FORECAST SUMMARY

This section has provided demand-based forecasts of aviation activity at OXR over the next 20 years. An attempt has been made to define the projections in terms of short- (1-5 years), intermediate- (6-10 years), and long-term (11-20 years) planning horizons. **Exhibit K** presents a 20-year forecast summary. Elements such as local socioeconomic indicators, anticipated regional development, historical aviation data, and national aviation trends were all considered when determining future conditions.

AIRPORT/AIRCRAFT/RUNWAY CLASSIFICATION

The FAA has established multiple aircraft classification systems that group aircraft based upon performance (approach speed in landing configuration) and on design characteristics (wingspan and landing gear configuration). These classification systems are used to design certain airport elements, such as separation standards, safety areas, runways, taxiways, and aprons, based upon the aircraft expected to use the airport facilities most frequently.

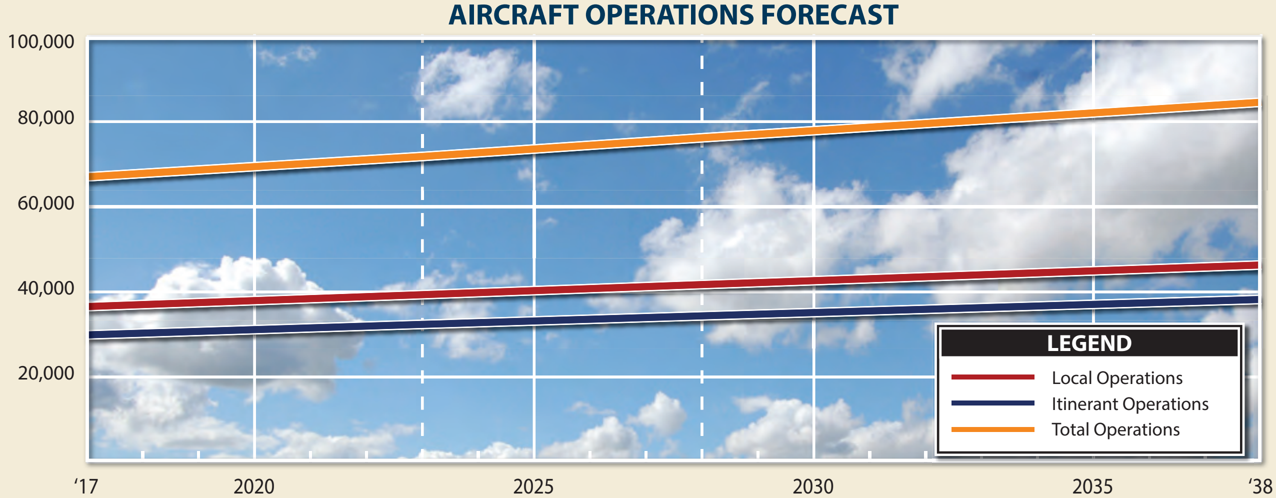
AIRCRAFT CLASSIFICATION

The use of appropriate FAA design standards is generally based upon the characteristics of aircraft commonly using, or expected to use, the airport facilities. The aircraft used to design the airport is designated as the critical aircraft. The design criteria used in the aircraft classification process are presented in **Exhibit L**. An airport's critical aircraft can be a single aircraft or a collection of multiple aircraft commonly using the airport that fit into a single aircraft category. The design aircraft or collection of aircraft is classified by three different categories: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). The FAA Advisory Circular (AC) 150/5300-13A, *Airport Design,* describes the following classification systems and parameters.

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or if V_{REF} is not specified, 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry. The AAC generally refers to the approach speed

	2017	2023	2028	2038
BASED AIRCRAFT				
Single Engine	113	117	119	126
Multi-Engine Piston	15	14	12	10
Turboprop	4	6	8	12
Jet	0	2	5	8
Rotor	9	11	15	20
TOTAL BASED AIRCRAFT	***141***	***150***	***159***	***176***
ANNUAL OPERATIONS*				
ITINERANT				
Air Taxi	4,700	5,300	5,700	6,500
General Aviation	25,900	27,500	29,200	32,300
Military	200	200	200	200
Total Itinerant	***30,800***	***33,000***	***35,100***	***39,000***
LOCAL				
General Aviation	37,300	39,800	42,100	46,700
Military	200	300	300	300
Total Local	***37,500***	***40,100***	***42,400***	***47,000***
TOTAL OPERATIONS	***68,300***	***73,100***	***77,500***	***86,000***
ANNUAL INSTRUMENT APPROACHES	***7,700***	***8,250***	***8,775***	***9,750***

AIRCRAFT OPERATIONS FORECAST



BASED AIRCRAFT FORECAST

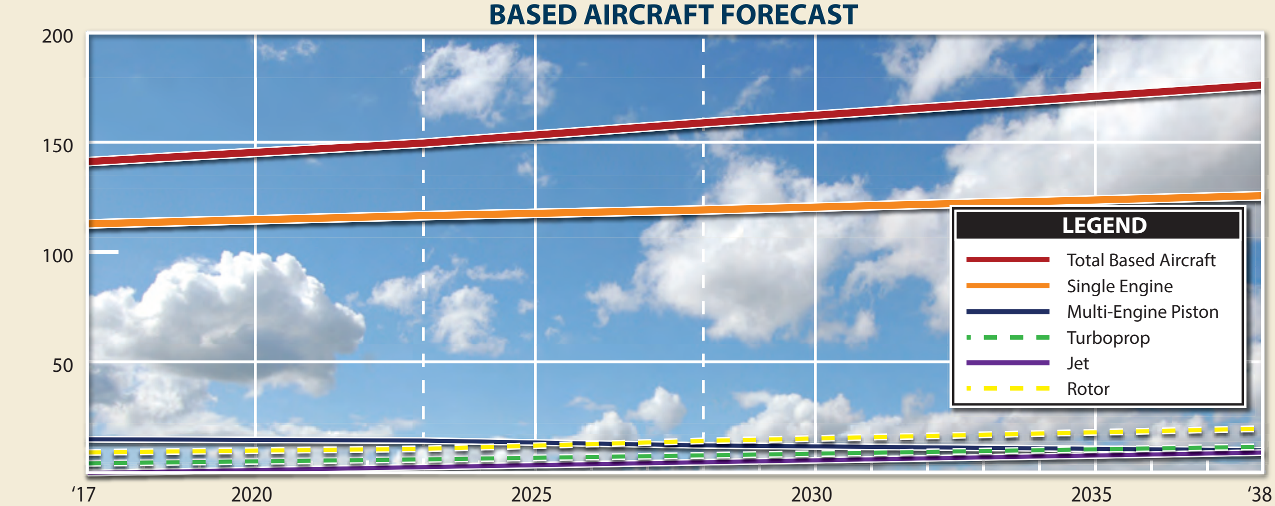


Exhibit K
FORECAST SUMMARY

*Annual operations have been adjusted to account for operations occurring after operational hours of the ATCT.

AIRCRAFT APPROACH CATEGORY (AAC)

Category	Approach Speed
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

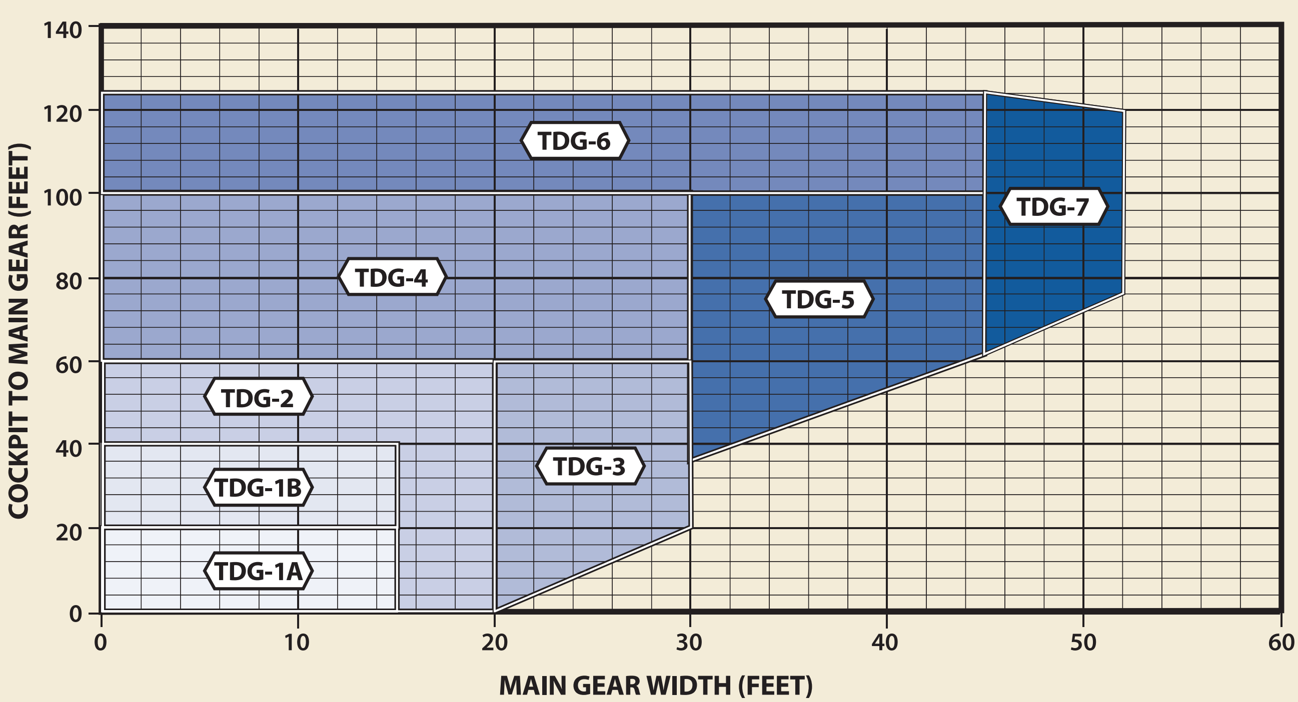
AIRPLANE DESIGN GROUP (ADG)

Group #	Tail Height (ft)	Wingspan (ft)
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS

RVR (ft)	Flight Visibility Category (statute miles)
VIS	3-mile or greater visibility minimums
5,000	Lower than 3 miles but not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile (APV ≥ ¾ but < 1-mile)
2,400	Lower than ¾-mile but not lower than ½-mile (CAT-I PA)
1,600	Lower than ½-mile but not lower than ¼-mile (CAT-II PA)
1,200	Lower than ¼-mile (CAT-III PA)

TAXIWAY DESIGN GROUP (TDG)



KEY

APV: Approach Procedure with Vertical Guidance
PA: Precision Approach
RVR: Runway Visual Range
TDG: Taxiway Design Group

Source: FAA AC 150/5300-13A, Change 1, Airport Design

Exhibit L
AIRCRAFT CLASSIFICATION PARAMETERS

of an aircraft in landing configuration. The higher the approach speed is, the more restrictive the design standards become. The AAC, depicted by letters A-E, represents the approach category and relates to the approach speed of the aircraft (operational characteristics). The AAC typically applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to the aircraft wingspan or tail height (physical characteristics). If the aircraft wingspan or tail height fall under two different classifications, the higher category is used. The ADG is used to establish design standards for taxiway safety area (TSA), taxiway obstacle free area (TOFA), taxilane object free area, apron wingtip clearance, and various other separation standards.

Taxiway Design Group (TDG): A classification of airplanes based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distance. The TDG relates to the dimensions of the under-carriage of the design aircraft. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiway/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for a taxiway to be planned and built to different taxiway design standards based on expected use.

Exhibit M presents the aircraft classification of common aircraft in operation today.

AIRPORT AND RUNWAY CLASSIFICATION

The airport and runway classifications, along with the aircraft classifications defined above, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

Airport Reference Code (ARC): An airport designation that signifies the airport's highest runway design code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design purposes only and does not limit the aircraft's capability of operating safely on the airport. The current ALP, which was last updated and approved in March 2006 and will be updated as part of this study, indicates that the airport is currently designed to ARC D-II standards.

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component.

The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500/550
- Piper Archer
- Piper Seneca

C-I, D-I

- Beech 400
- **Lear** 31, **35**, 45, 60
- Israeli Westwind

B-I

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I (525)

C-II, D-II

- **Cessna Citation X (750)**
- Gulfstream 100, 200,300
- Challenger 300/600
- ERJ-135, 140, 145
- CRJ-200/700
- Embraer Regional Jet
- Lockheed JetStar
- Hawker 800

B-II *less than 12,500 lbs.*

- **Super King Air 200**
- Cessna 441
- Cessna 208 Caravan
- DHC Twin Otter
- Pilatus PC-12

C-III, D-III *less than 100,000 lbs.*

- ERJ-170
- CRJ 705, 900
- Falcon 7X
- **Gulfstream 500**, 550, 650
- Global Express, Global 5000
- Q-400

B-I, B-II *more than 12,500 lbs.*

- Super King Air 350
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation II**, III, IV, V
- Saab 340
- Embraer 120

C-IV, D-IV

- B-757
- B-767
- **C-130 Hercules**
- DC-8-70
- MD-11

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

D-V

- **B-747-400**
- B-777
- B-787
- A-330, A-340

Exhibit M
AIRCRAFT REFERENCE CODES

component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only.

Numerous airfield design standards are based upon the RDC. The RDC of any given runway is used to determine specific airfield design standards, which include imaginary surfaces established by the FAA to protect aircraft operational areas in order to keep them free of obstructions that could possibly affect the safe operation of aircraft. Airfield design standards at OXR are further described later in the report.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under particular meteorological conditions where no special operating procedures are necessary, as opposed to the RDC, which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway to taxiway centerline separation.

Currently, the runway to taxiway centerline separation for Runway 7-25 is 365 feet. Given that Runway 7-25 is served by instrument approach procedures with minimums not lower than one mile, Runway 7-25 meets standards for APRC B/III/5000.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to take-off operations. The DPRC represents those aircraft that can take off from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC but is composed of two components: AAC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

The runway to taxiway centerline separation for Runway 7-25 is currently 365 feet, which meets FAA design standards for DPRC B/III and D/II.

CRITICAL DESIGN AIRCRAFT

The selection of airport design criteria is based upon the aircraft currently using, or expected to use, the airport. The critical aircraft is used to establish the design parameters of the airport. These criteria are typically based upon the most demanding aircraft using the airfield facilities on a relatively frequent basis. The critical design aircraft can be a single aircraft or a composite of multiple aircraft that represent a collection of aircraft characteristics. Upon the selection of multiple aircraft, the most demanding aircraft characteristics are used to establish the design criteria of the airport based upon the AAC, ADG, and TDG. If the airport contains multiple runways, a critical design aircraft will be established for each runway.

The primary consideration for a critical design aircraft is to ensure safe operation of the aircraft using the airport. If an aircraft larger than the critical design aircraft is to operate at the airport, it may result in reduced safety margins, or an unsafe operation. However, airports typically do not establish design criteria based solely upon the largest aircraft using the airfield facilities if it operates on an infrequent basis.

The critical design aircraft can be defined as an aircraft, or grouping of aircraft with similar characteristics, conducting at least 500 itinerant annual operations at an airport or the most regularly scheduled aircraft in commercial service. When planning for future airport facilities, it is extremely important to consider the demands of aircraft operating at the airport in the future. As a result of the separation standards based upon the critical aircraft, caution must be exercised to ensure that short-term development does not preclude the long-term needs of the airport. Thus, it is important to strike a balance between the facility needs of aircraft currently operating at the airport and the facility needs of aircraft projected to operate at the airport. Although precautions must be taken to ensure long-term airport development, airports with critical aircraft that do not use the airport facilities on a regular basis are unable to operate economically due to added development and maintenance expenses.

AIRPORT DESIGN AIRCRAFT

It is imperative to have an accurate understanding of what type of aircraft operate at the airport both now and in the future. The type of aircraft utilizing airport facilities can have a significant impact on numerous design criteria. Thus, an aircraft activity study by type and aircraft category can be beneficial in determining future airport standards that must be met in order to accommodate certain aircraft.

The FAA maintains the Traffic Flow Management System Count (TFMSC) database which documents aircraft operations at most NPIAS airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected by the National Airspace System, usually via radar. The database includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans and limited radar coverage, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. Most VFR and some non-enroute IFR traffic is excluded. Therefore, it is likely that there are more operations at an airport than are captured by this methodology. Despite its shortcomings, the program is a valuable source of information when it comes to identifying the primary airport users and type of aircraft operating at the airport on a regular basis. TFMSC data for all turbine-powered aircraft (jets and turboprops) operating at OXR, presented in **Exhibit N**, is available and was utilized in this analysis.

Numerous aircraft classified within the B-II category were reported by TFMSC as operating at OXR. Of the B-II aircraft identified, some have a maximum takeoff weight (MTOW) of less than 12,500 pounds,

ARC	Aircraft Model	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
A-I	Cirrus Vision Jet	0	0	0	0	0	0	0	0	0	1
	Eclipse 400/500	20	8	31	37	27	24	39	26	33	40
	Epic Dynasty	17	13	0	14	27	20	23	16	73	41
	Kodiak Quest	0	6	9	0	0	0	0	9	1	0
	Lancair 4	4	3	9	0	0	0	0	0	0	0
	Lancair Evolution/Legacy	0	0	0	0	0	0	0	1	4	0
	Mitsubishi MU-2	24	11	21	13	9	9	13	22	24	31
	Pilatus PC-7	0	0	3	0	2	3	2	0	2	0
	Piper Malibu/Meridian	46	54	84	94	80	64	18	13	15	24
	Socata TBM 7/850/900	101	44	28	27	26	53	41	24	95	133
	TOTAL	*212*	*139*	*185*	*185*	*171*	*173*	*136*	*111*	*247*	*270*
A-II	Cessna Caravan	3	9	4	9	2	27	3	5	8	5
	De Havilland Twin Otter	21	15	0	7	1	0	0	0	0	2
	Pilatus PC-12	56	49	43	8	38	39	201	214	309	446
	TOTAL	*80*	*73*	*47*	*24*	*41*	*66*	*204*	*219*	*317*	*453*
B-I	Cessna 425 Corsair	52	4	8	0	6	3	13	0	1	1
	Aero Commander 690	4	13	20	12	7	9	5	1	1	4
	Beech 99 Airliner	1	1	0	0	0	0	0	0	0	0
	Beechjet 400	101	62	48	34	40	48	50	40	26	14
	Cessna 526 Jet Trainer	13	0	0	0	0	0	0	0	0	0
	Citation CJ1/CJ2	64	45	80	97	89	130	174	122	60	137
	Citation I/SP	11	13	7	5	4	0	8	8	6	1
	Citation M2	1	0	0	0	0	0	0	0	0	4
	Citation Mustang	14	24	18	21	22	37	29	13	9	4
	Falcon 10	14	0	2	4	0	2	0	2	0	2
	Hawker 1000	1	0	0	2	0	0	2	0	0	3
	Honda Jet	0	0	0	0	0	0	0	0	0	4
	King Air 90/100	96	124	111	54	39	43	64	58	78	93
	Phenom 100	0	14	5	16	20	22	42	30	34	42
	Piaggio Avanti	29	35	49	42	28	6	0	7	2	6
	Piper Cheyenne	11	8	3	9	6	4	3	5	5	4
	Premier 1	12	5	6	10	2	4	9	4	4	28
	Rockwell Sabre 40/60	0	1	0	0	0	13	1	0	2	0
	Swearingen Merlin	21	260	483	484	410	458	524	410	366	437
	TOTAL	*445*	*609*	*840*	*790*	*673*	*779*	*924*	*700*	*594*	*784*

ARC	Aircraft Model	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
B-II	BAe Jetstream	2	0	0	0	0	0	0	0	0	0
	Beech 1900	405	172	35	70	43	108	77	68	139	72
	Cessna Conquest	22	8	9	4	3	6	13	3	1	0
	Citation CJ3/CJ4	61	30	21	28	27	41	91	39	31	33
	Citation II/SP/Latitude	147	105	40	59	38	37	23	21	20	10
	Citation V/VII/Sovereign	134	147	126	185	135	124	152	103	67	56
	Citation X	50	24	14	17	24	34	25	33	21	16
	Citation XLS	148	68	40	65	52	65	57	40	42	46
	Dornier 328	0	0	0	0	0	0	2	2	2	0
	Embraer 500/450 Legacy	0	0	0	0	0	0	0	0	0	8
	Embraer EMB-110/120	2,570	2,314	896	2	27	3	0	3	7	0
	Falcon 20/50	21	26	34	16	26	18	21	28	13	7
	Falcon 2000	34	11	24	23	10	16	12	14	17	19
	Falcon 900	12	15	21	21	75	75	70	49	85	61
	King Air 200/300/350	603	639	604	500	613	555	504	540	520	417
	King Air F90	11	21	7	13	8	3	5	2	4	8
	Phenom 300	0	0	0	6	8	16	35	20	27	49
	Saab 340	0	0	0	0	56	0	0	0	0	0
	Shorts 330/360	1	0	0	0	0	0	0	0	0	0
	TOTAL	*4,221*	*3,580*	*1,871*	*1,009*	*1,145*	*1,101*	*1,087*	*965*	*996*	*802*
B-III	Bombardier Global 5000	0	0	0	0	0	0	2	2	0	8
	Bombardier Global Express	0	1	2	7	2	2	1	2	4	4
	C-2 Greyhound	0	4	4	2	0	0	0	0	6	0
	Falcon 7X/8X	0	0	0	5	2	0	4	2	0	2
	Grumman E-2 Hawkeye	0	4	1	1	2	0	0	1	0	0
	Gulfstream I Turboprop	1	0	0	0	0	0	0	0	0	0
	TOTAL	*1*	*9*	*7*	*15*	*6*	*2*	*7*	*7*	*10*	*14*
C-I	BAe HS 125 Series	2	0	2	2	0	0	0	0	0	0
	Learjet 20 Series	8	3	0	5	4	0	0	0	0	0
	Learjet 31	2	2	7	8	0	12	10	8	6	8
	Learjet 40 Series	13	10	8	8	18	16	32	84	93	59
	Learjet 50 Series	5	6	6	11	4	10	8	8	10	4
	Learjet 60 Series	41	20	16	37	24	37	37	23	30	21
	Westwind II	17	6	4	5	4	6	0	2	4	2
	TOTAL	*88*	*47*	*43*	*76*	*54*	*81*	*87*	*125*	*143*	*94*

Exhibit N
TURBINE-POWERED AIRCRAFT OPERATIONS BY REFERENCE CODE

ARC	Aircraft Model	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
C-II	Bombardier CRJ 100/200/700	0	2	0	2	0	0	0	0	0	0
	Challenger 300/600/604	46	52	55	36	30	70	65	86	103	112
	Embraer ERJ-135/140/145	2	2	2	2	2	2	0	4	2	8
	Gulfstream 100/150	14	0	6	4	9	5	7	4	1	8
	Gulfstream 200/280	30	15	26	17	29	17	8	40	34	26
	Gulfstream G100	21	14	4	4	43	37	4	0	4	4
	Gulfstream G-III	24	16	22	1	9	1	5	2	0	4
	Hawker 4000	0	0	0	0	0	0	0	0	8	4
	Hawker 800	54	26	49	24	35	49	56	43	20	28
	Learjet 70 Series	0	0	0	0	0	0	0	0	8	8
	TOTAL	*191*	*127*	*164*	*90*	*157*	*181*	*145*	*179*	*180*	*202*
C-III	Embraer EMB 170/175/190	0	0	0	0	0	0	0	0	0	1
	P-3 Orion	0	0	1	0	0	0	0	0	0	0
	TOTAL	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*
C-IV	Boeing 707	1	0	0	0	1	0	0	0	0	0
	Boeing C-17	0	0	0	0	1	0	0	0	0	0
	C-130 Hercules	0	1	2	1	4	1	6	0	0	0
	TOTAL	*1*	*1*	*2*	*1*	*6*	*1*	*6*	*0*	*0*	*0*
D-I	F/A-18 Hornet	1	1	0	1	0	0	0	0	0	0
	F-15 Eagle	1	1	0	0	0	0	0	0	0	0
	Learjet 35/36	37	26	30	8	30	23	17	25	20	16
	T-38 Talon	2	0	1	0	2	0	0	0	1	0
	TOTAL	*41*	*28*	*31*	*9*	*32*	*23*	*17*	*25*	*21*	*16*
D-II	Gulfstream 450	39	24	28	52	68	61	55	47	50	50
	TOTAL	*39*	*24*	*28*	*52*	*68*	*61*	*55*	*47*	*50*	*50*
D-III	Gulfstream 500/600	29	16	34	31	27	18	20	29	10	16
	TOTAL	*29*	*16*	*34*	*31*	*27*	*18*	*20*	*29*	*10*	*16*
E-I	Dornier Alpha Jet	0	0	2	0	0	0	0	0	0	0
	F-16 Falcon/Viper	0	0	0	0	0	1	0	0	0	0
	TOTAL	*0*	*0*	*2*	*0*	*0*	*1*	*0*	*0*	*0*	*0*

ARC CODE SUMMARY

ARC Code	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
A-I	212	139	185	185	171	173	136	111	247	270
A-II	80	73	47	24	41	66	204	219	317	453
B-I	445	609	840	790	673	779	924	700	594	784
B-II	4,221	3,580	1,871	1,009	1,145	1,101	1,087	965	996	802
B-III	1	9	7	15	6	2	7	7	10	14
C-I	88	47	43	76	54	81	87	125	143	94
C-II	191	127	164	90	157	181	145	179	180	202
C-III	0	0	1	0	0	0	0	0	0	1
C-IV	1	1	2	1	6	1	6	0	0	0
D-I	41	28	31	9	32	23	17	25	21	16
D-II	39	24	28	52	68	61	55	47	50	50
D-III	29	16	34	31	27	18	20	29	10	16
E-I	0	0	2	0	0	1	0	0	0	0
Total	*5,348*	*4,653*	*3,255*	*2,282*	*2,380*	*2,487*	*2,688*	*2,407*	*2,568*	*2,702*

APPROACH CATEGORY

AC	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
A	292	212	232	209	212	239	340	330	564	723
B	4,667	4,198	2,718	1,814	1,824	1,882	2,018	1,672	1,600	1,600
C	280	175	210	167	217	263	238	304	323	297
D	109	68	93	92	127	102	92	101	81	82
E	0	0	2	0	0	1	0	0	0	0
Total	*5,348*	*4,653*	*3,255*	*2,282*	*2,380*	*2,487*	*2,688*	*2,407*	*2,568*	*2,702*

AIRPLANE DESIGN GROUP

ADG	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
I	786	823	1,101	1,060	930	1,057	1,164	961	1,005	1,164
II	4,531	3,804	2,110	1,175	1,411	1,409	1,491	1,410	1,543	1,507
III	30	25	42	46	33	20	27	36	20	31
IV	1	1	2	1	6	1	6	0	0	0
Total	*5,348*	*4,653*	*3,255*	*2,282*	*2,380*	*2,487*	*2,688*	*2,407*	*2,568*	*2,702*

Exhibit N (continued)
TURBINE-POWERED AIRCRAFT OPERATIONS BY REFERENCE CODE

identifying with the small aircraft category, while others have MTOWs greater than 12,500 pounds which are classified as large aircraft. The operational characteristics of a sampling of the B-II category turbine aircraft operating at OXR are presented in **Table Z**.

Currently, ARC B-II aircraft make up the most demanding category of aircraft operating at OXR at least 500 times annually. According to TFMSC, ARC B-II aircraft conducted 802 operations at OXR in 2017 and have averaged 1,678 annual operations over the past 10 years. As reported by TFMSC, OXR experienced 202 operations by aircraft classified in the next most demanding ARC C-II, and a total of 297 operations by aircraft categorized in AAC C.

The 2006 ALP designates the existing ARC as D-II and identifies the critical aircraft as the Gulfstream IV, while the ultimate ARC is based upon D-II and B-III design standards with the Gulfstream IV and Dash 8 listed as the critical aircraft. Based upon the TFMSC analysis, as well as based aircraft records, Category D-II and/or B-III is no longer the most demanding ARC/RDC designation for OXR per FAA standards. It should be noted that the previous ARCs of D-II and B-III were highly dependent on the presence of commercial service at OXR. Given that OXR is not currently a commercial service facility and is not expected to accommodate commercial service activities in at least the short-term planning period, the existing ARC should be based on the most demanding operational aircraft utilizing the airport on a regular basis.

TABLE Z
Category B-II Aircraft Characteristics
Oxnard Airport

	MTOW (lbs)	Approach Speed (kts)	Wingspan (ft)	Tail Height (ft)
Beechcraft 1900	17,120	113	58.00	15.50
Beechcraft King Air 100	11,800	111	45.92	15.42
Beechcraft King Air 200	12,500	102	54.50	14.80
Beechcraft King Air 350	15,000	99	57.90	14.30
Beechcraft King Air 90	10,100	101	50.00	14.25
Cessna CJ4	17.110	107	50.83	15.42
Citation Excel/XLS	22,000	114	53.50	16.80
Citation II/Bravo	14,800	112	52.17	15.00
Citation Sovereign	30,775	112	72.33	20.33
Falcon 2000	41,000	107	70.17	23.17
Falcon/Mystère 50	40,780	113	61.92	22.92
Falcon 900LX	49,000	110	70.17	24.75

In addition, there are currently two category B-II aircraft based at OXR, including a Beechcraft King Air 90 and King Air 200. According to the TFMSC, the King Air 200/300/350 has averaged 550 operations annually since 2008 and conducted a total of 417 operations in 2017. Each variant of the King Air, the 200, 300, and 350, is classified within TDG 2 due to the dimensions of the undercarriage of the aircraft. Thus, the airport design aircraft is best described as B-II-2. Although aircraft more demanding than B-II were identified utilizing the airport, these aircraft do not currently conduct at least 500 annual operations to justify a larger critical design aircraft. It should be mentioned, however, that in communications with airport management, jet aircraft including the Gulfstream V and VI (category C-III and D-III, respectively) as well as the Falcon 900 (category B-II) operate frequently at the airport, with the Falcon 900 being a very frequent operator.

EXISTING RUNWAY DESIGN

As previously discussed, each runway has a designated RDC. The RDC relates to specific design criteria set forth by the FAA that should be met. The RDC is determined by the particular aircraft or category of aircraft expected to use each runway.

Runway 7-25 Runway Design Code

Given that Runway 7-25 is the sole runway serving OXR, it should be designed to accommodate the critical design aircraft. This runway is currently 5,953 feet in length and 100 feet wide. The runway is equipped with instrument approach procedures with visibility minimums not lower than one mile. As a result of these characteristics, Runway 7-25 is currently categorized as B-II-5000.

FUTURE RUNWAY DESIGN

The aviation demand forecasts indicate the potential for continued growth in turbine activity at the airport. This includes eight based jets and 12 turboprops by the long-term planning horizon. The type and size of business jets and turboprops using the airport regularly can impact the design standards to be applied to the airport system. Therefore, it is important to have an understanding of what type of aircraft may use the airport in the future. Factors such as population and employment growth in the airport service area, the proximity to and level of service offered at other regional airports, and development at the airport can influence future activity.

Most operations throughout the planning period of this study are expected to be by aircraft within AACs A and B and within ADGs I and II. However, the trend toward manufacturing of a larger percentage of medium and large business jets in AACs C and D may lead to greater utilization of these aircraft (particularly those in AAC C) at OXR by the long-term planning horizon. This is a trend being realized by the FBOs currently serving OXR and airport staff as the frequency of operations by larger business jets and have been noted, as discussed in the previous section.

Future Runway 7-25 Runway Design Code

OXR currently experiences a large amount of operational activity from business jets and turboprop aircraft with a total of 20 turbine aircraft projected to base at OXR in the future. As previously mentioned, the airport experienced 202 operations by aircraft categorized as ARC C-II and 297 operations by aircraft within AAC C in 2017. With projected growth in based jets and the current AAC C (and larger) aircraft operating at the airport on a frequent basis, the AAC could transition to Category C. However, the evidence supporting a shift to AAC C contradicts the currently approved ALP, which ultimately defines Runway 7-25 as ARC D-II and B-III. It should be noted, though, that the previous ALP was based upon OXR remaining a commercial service airport. The previous master plan calls for ultimate ½-mile instrument approaches to Runway 7-25. The Facility Requirements section of this study will make comparisons between the existing 1-mile approach minimums and the potential ½-mile approach minimums, as well as the potential impacts to the airport based upon the implementation of ½-mile instrument approaches, which are mainly tied to the RPZs. This planning effort will analyze ARC C-II as the future critical design category and the future RDC to be C-II-2400 for Runway 7-25. The existing and ultimate RDC, APRC, and DPRC are presented in **Table AA**.

TABLE AA
Existing/Ultimate Design Characteristics
Oxnard Airport

	RDC	APRC	DPRC
Existing	B-II-5000	B/III/5000	B/III and D/II
Ultimate	C-II-2400	B/III/2400	B/III and D/II

Attachment 3 : FAARFIELD Pavement Design - Rehabilitation Option

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

REHABILITATION OPTION, CBR = 12

Section REHAB-mod-fm in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The section does not have a design life of 20 years.This constitutes a deviation from standards andrequires FAA approval.

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 10 years.

A design for this section was completed on 05/02/19 at 08:07:58.

Compaction requirements for this section were computed on 05/02/19 at 08:08:04.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	17.90	70,996	0.35	0
3	User Defined	14.00	18,000	0.35	0
4	Subgrade	0.00	1,500	0.35	0

Total thickness to the top of the subgrade = 35.90 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.60	0.60	1.42
2	Falcon-900	0.00	0.00	1.53
3	Challenger-CL-604	0.00	0.00	1.46
4	Gulfstream-G-II	0.00	0.00	1.47
5	Hawker-800XP	0.00	0.00	1.57
6	Citation-VI/VII	0.00	0.00	1.68
7	Learjet-55	0.00	0.00	1.62
8	Citation-V	0.00	0.00	1.95
9	Citation-V	0.00	0.00	1.95
10	SuperKingAir-300	0.00	0.00	1.63
11	Citation-V	0.00	0.00	1.95
12	SuperKingAir-350	0.00	0.00	1.63
13	SuperKingAir-300	0.00	0.00	1.63
14	Citation-550B	0.00	0.00	1.94
15	KingAir-B-100	0.00	0.00	1.61
16	Citation-525	0.00	0.00	1.97
17	GrnCaravan-CE-208B	0.00	0.00	1.94
18	Baron-E-55	0.00	0.00	1.95
19	EMB-175 STD	0.40	0.42	1.31

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 19	--	Gulfstream-G-V
95	19 - 26	--	Gulfstream-G-V
90	26 - 33	--	Gulfstream-G-V
85	33 - 46	0 - 10	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 18	--	Gulfstream-G-V
90	18 - 23	--	Gulfstream-G-V
85	23 - 28	--	Gulfstream-G-V
80	28 - 33	--	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

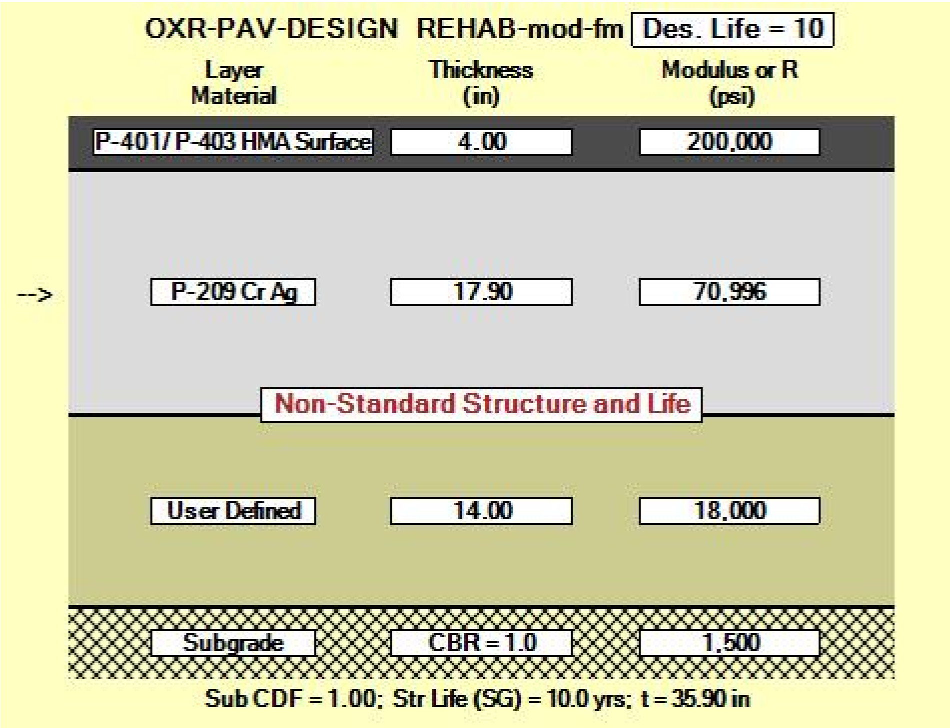
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so

that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.
5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

REHABILITATION OPTION, CBR = 27

Section REHAB-mod-fm in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The section does not have a design life of 20 years.This constitutes a deviation from standards andrequires FAA approval.

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 10 years.

A design for this section was completed on 06/14/19 at 17:02:48.

Compaction requirements for this section were computed on 06/14/19 at 17:02:54.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	12.36	98,212	0.35	0
3	User Defined	14.00	40,500	0.35	0
4	Subgrade	0.00	1,500	0.35	0

Total thickness to the top of the subgrade = 30.36 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.64	0.64	1.52
2	Falcon-900	0.00	0.00	1.65
3	Challenger-CL-604	0.00	0.00	1.56
4	Gulfstream-G-II	0.00	0.00	1.58
5	Hawker-800XP	0.00	0.00	1.71
6	Citation-VI/VII	0.00	0.00	1.85
7	Learjet-55	0.00	0.00	1.77
8	Citation-V	0.00	0.00	2.20
9	Citation-V	0.00	0.00	2.20
10	SuperKingAir-300	0.00	0.00	1.78
11	Citation-V	0.00	0.00	2.20
12	SuperKingAir-350	0.00	0.00	1.78
13	SuperKingAir-300	0.00	0.00	1.78
14	Citation-550B	0.00	0.00	2.19
15	KingAir-B-100	0.00	0.00	1.76
16	Citation-525	0.00	0.00	2.23
17	GrnCaravan-CE-208B	0.00	0.00	2.19
18	Baron-E-55	0.00	0.00	2.20
19	EMB-175 STD	0.36	0.38	1.37

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 19	--	Gulfstream-G-V
95	19 - 24	--	Gulfstream-G-V
90	24 - 28	--	Gulfstream-G-V
85	28 - 43	0 - 12	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 18	--	Gulfstream-G-V
90	18 - 22	--	Gulfstream-G-V
85	22 - 25	--	Gulfstream-G-V
80	25 - 28	--	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

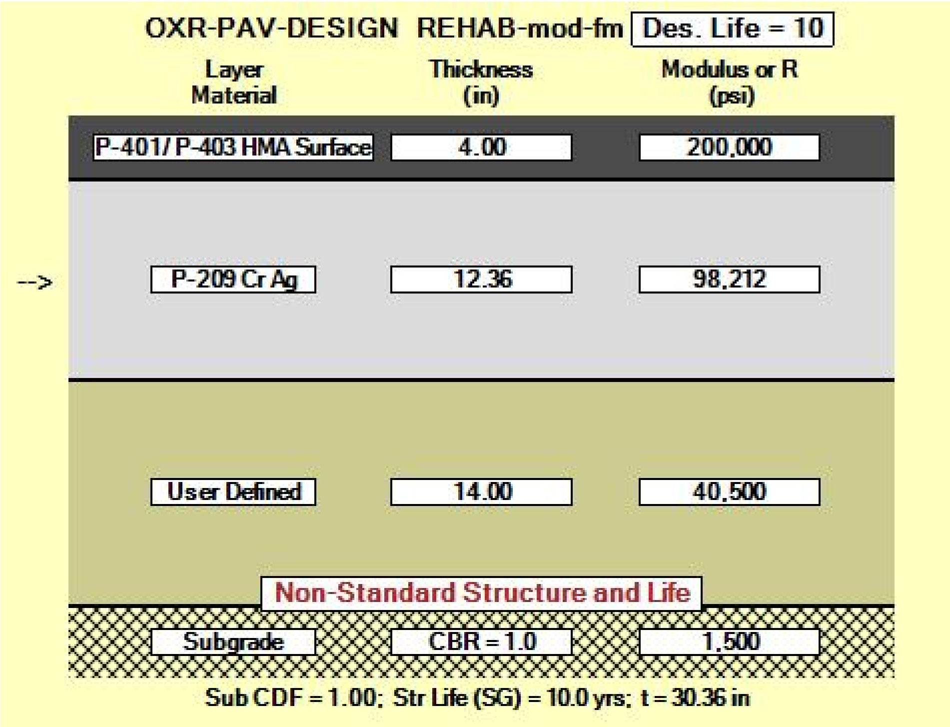
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so

that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.
5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

REHABILITATION OPTION, CBR = 50

Section REHAB-mod-fm in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The section does not have a design life of 20 years.This constitutes a deviation from standards andrequires FAA approval.

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 10 years.

A design for this section was completed on 06/14/19 at 17:05:29.

Compaction requirements for this section were computed on 06/14/19 at 17:05:39.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	10.85	108,082	0.35	0
3	User Defined	14.00	50,000	0.35	0
4	Subgrade	0.00	1,500	0.35	0

Total thickness to the top of the subgrade = 28.85 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.65	0.65	1.55
2	Falcon-900	0.00	0.00	1.69
3	Challenger-CL-604	0.00	0.00	1.60
4	Gulfstream-G-II	0.00	0.00	1.62
5	Hawker-800XP	0.00	0.00	1.75
6	Citation-VI/VII	0.00	0.00	1.90
7	Learjet-55	0.00	0.00	1.82
8	Citation-V	0.00	0.00	2.28
9	Citation-V	0.00	0.00	2.28
10	SuperKingAir-300	0.00	0.00	1.83
11	Citation-V	0.00	0.00	2.28
12	SuperKingAir-350	0.00	0.00	1.82
13	SuperKingAir-300	0.00	0.00	1.83
14	Citation-550B	0.00	0.00	2.28
15	KingAir-B-100	0.00	0.00	1.80
16	Citation-525	0.00	0.00	2.31
17	GrnCaravan-CE-208B	0.00	0.00	2.28
18	Baron-E-55	0.00	0.00	2.29
19	EMB-175 STD	0.35	0.37	1.39

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 18	--	Gulfstream-G-V
95	18 - 24	--	Gulfstream-G-V
90	24 - 28	--	Gulfstream-G-V
85	28 - 42	0 - 13	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 18	--	Gulfstream-G-V
90	18 - 22	--	Gulfstream-G-V
85	22 - 25	--	Gulfstream-G-V
80	25 - 28	--	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

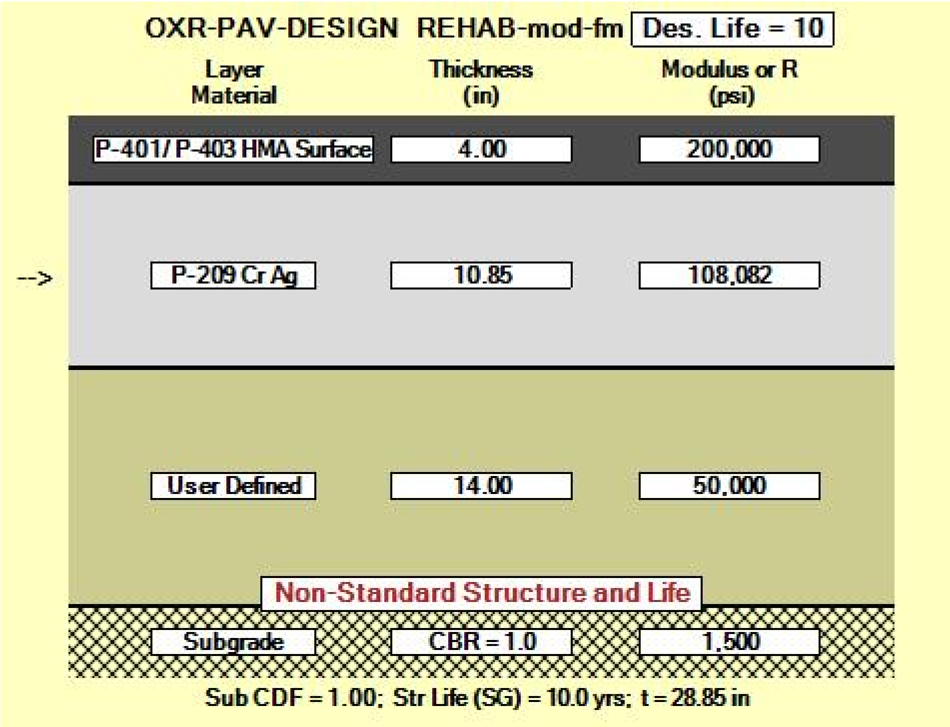
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so

that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.
5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



Attachment 4 : FAARFIELD Pavement Design - Reconstruction Option

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RECONSTRUCTION OPTION,
ALTERNATIVE 1 - CBR = 5

Section RECON-NOLIME in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 20 years.

A design for this section was completed on 06/14/19 at 16:32:44.

Compaction requirements for this section were computed on 06/14/19 at 16:32:47.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	19.05	46,370	0.35	0
3	Subgrade	0.00	7,500	0.35	0

Total thickness to the top of the subgrade = 23.05 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.96	0.96	1.68
2	Falcon-900	0.00	0.00	1.86
3	Challenger-CL-604	0.00	0.00	1.75
4	Gulfstream-G-II	0.00	0.00	1.77
5	Hawker-800XP	0.00	0.00	1.95
6	Citation-VI/VII	0.00	0.00	2.15
7	Learjet-55	0.00	0.00	2.05
8	Citation-V	0.00	0.00	2.67
9	Citation-V	0.00	0.00	2.67
10	SuperKingAir-300	0.00	0.00	2.05
11	Citation-V	0.00	0.00	2.67
12	SuperKingAir-350	0.00	0.00	2.05
13	SuperKingAir-300	0.00	0.00	2.05
14	Citation-550B	0.00	0.00	2.68
15	KingAir-B-100	0.00	0.00	2.01
16	Citation-525	0.00	0.00	2.72
17	GrnCaravan-CE-208B	0.00	0.00	2.68
18	Baron-E-55	0.00	0.00	2.71
19	EMB-175 STD	0.04	0.04	1.49

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 20	--	Gulfstream-G-V
95	20 - 38	0 - 15	Gulfstream-G-V
90	38 - 61	15 - 37	Gulfstream-G-V
85	61 - 88	37 - 65	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 19	--	Gulfstream-G-V
90	19 - 31	0 - 8	Gulfstream-G-V
85	31 - 45	8 - 22	Gulfstream-G-V
80	45 - 60	22 - 36	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

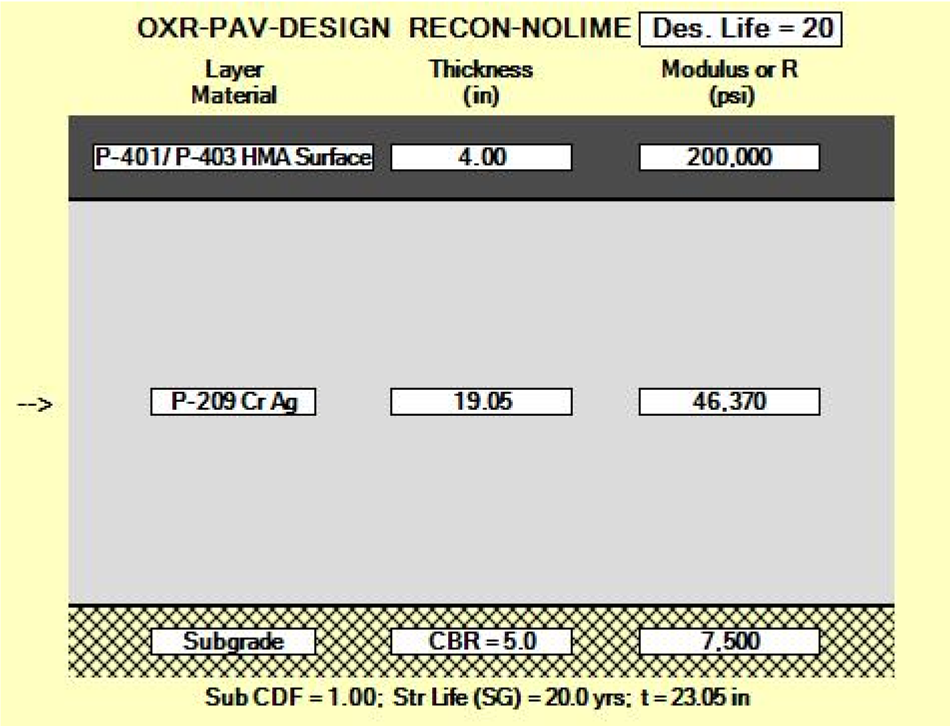
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RECONSTRUCTION OPTION, ALTERNATIVE 1 - CBR = 8

Section RECON-NOLIME in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 20 years.

A design for this section was completed on 06/14/19 at 16:32:07.

Compaction requirements for this section were computed on 06/14/19 at 16:32:10.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	14.66	45,047	0.35	0
3	Subgrade	0.00	12,000	0.35	0

Total thickness to the top of the subgrade = 18.66 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.97	0.97	1.81
2	Falcon-900	0.00	0.00	2.04
3	Challenger-CL-604	0.00	0.00	1.89
4	Gulfstream-G-II	0.00	0.00	1.92
5	Hawker-800XP	0.00	0.00	2.14
6	Citation-VI/VII	0.00	0.00	2.40
7	Learjet-55	0.00	0.00	2.27
8	Citation-V	0.00	0.00	3.10
9	Citation-V	0.00	0.00	3.10
10	SuperKingAir-300	0.00	0.00	2.27
11	Citation-V	0.00	0.00	3.10
12	SuperKingAir-350	0.00	0.00	2.26
13	SuperKingAir-300	0.00	0.00	2.27
14	Citation-550B	0.00	0.00	3.11
15	KingAir-B-100	0.00	0.00	2.22
16	Citation-525	0.00	0.00	3.17
17	GrnCaravan-CE-208B	0.00	0.00	3.11
18	Baron-E-55	0.00	0.00	3.16
19	EMB-175 STD	0.03	0.03	1.57

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 25	0 - 6	Gulfstream-G-V
95	25 - 45	6 - 27	Gulfstream-G-V
90	45 - 68	27 - 49	Gulfstream-G-V
85	68 - 96	49 - 77	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 23	0 - 4	Gulfstream-G-V
90	23 - 37	4 - 19	Gulfstream-G-V
85	37 - 52	19 - 33	Gulfstream-G-V
80	52 - 67	33 - 48	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

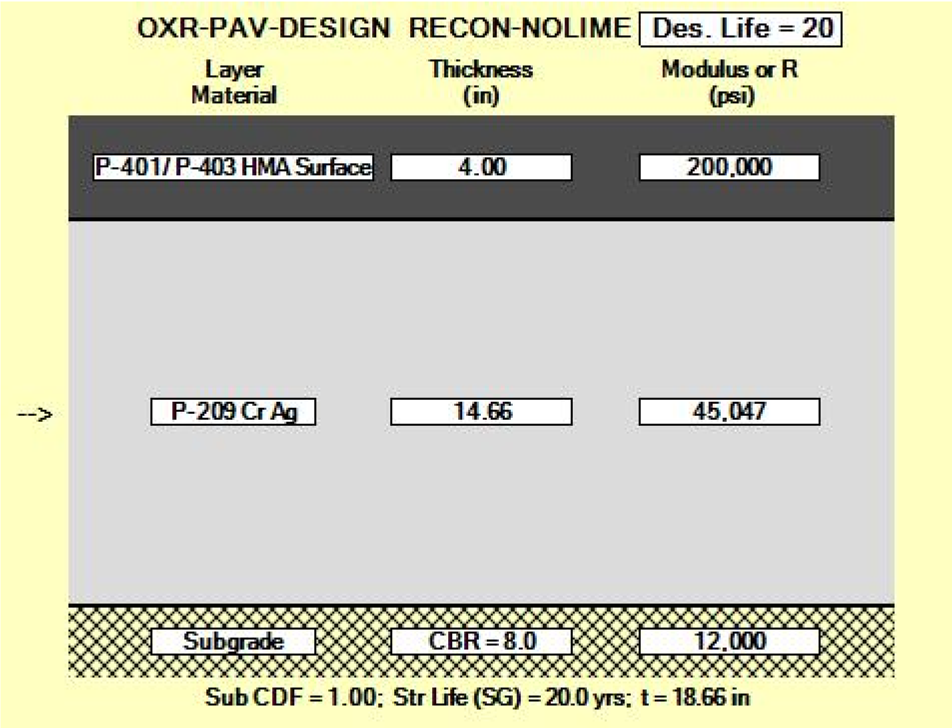
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



FAARFIELD

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RECONSTRUCTION OPTION, ALTERNATIVE 2 - 12-INCH LIME-TREATED SUBGRADE

Section RECO-mod-flm in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 20 years.

A design for this section was completed on 06/14/19 at 16:44:51.

Compaction requirements for this section were computed on 06/14/19 at 16:44:55.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	10.31	136,163	0.35	0
3	User Defined	12.00	78,000	0.35	0
4	Subgrade	0.00	1,500	0.35	0

Total thickness to the top of the subgrade = 26.31 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.80	0.80	1.60
2	Falcon-900	0.00	0.00	1.76
3	Challenger-CL-604	0.00	0.00	1.66
4	Gulfstream-G-II	0.00	0.00	1.68
5	Hawker-800XP	0.00	0.00	1.83
6	Citation-VI/VII	0.00	0.00	2.00
7	Learjet-55	0.00	0.00	1.91
8	Citation-V	0.00	0.00	2.43
9	Citation-V	0.00	0.00	2.43
10	SuperKingAir-300	0.00	0.00	1.92
11	Citation-V	0.00	0.00	2.43
12	SuperKingAir-350	0.00	0.00	1.91
13	SuperKingAir-300	0.00	0.00	1.92
14	Citation-550B	0.00	0.00	2.43
15	KingAir-B-100	0.00	0.00	1.89
16	Citation-525	0.00	0.00	2.47
17	GrnCaravan-CE-208B	0.00	0.00	2.43
18	Baron-E-55	0.00	0.00	2.45
19	EMB-175 STD	0.20	0.22	1.43

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 17	--	Gulfstream-G-V
95	17 - 23	--	Gulfstream-G-V
90	23 - 27	0 - 1	Gulfstream-G-V
85	27 - 39	1 - 12	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 16	--	Gulfstream-G-V
90	16 - 21	--	Gulfstream-G-V
85	21 - 24	--	Gulfstream-G-V
80	24 - 27	0 - 0	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

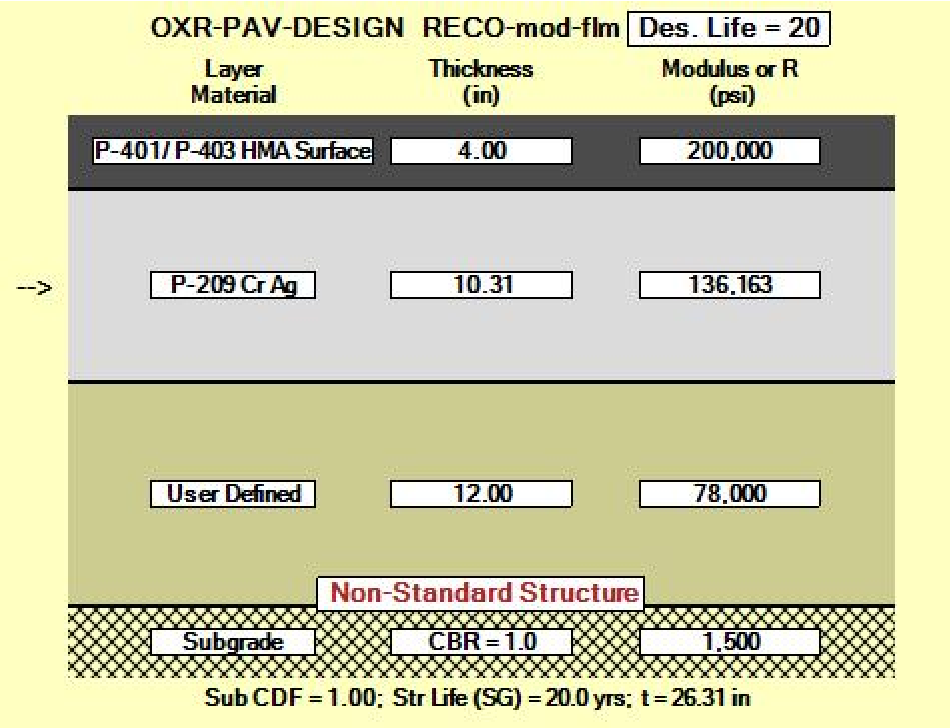
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RECOMMENDED OPTION

RECONSTRUCTION OPTION, ALTERNATIVE 2 - 16-INCH LIME-TREATED SUBGRADE

Section RECO-mod-flm in Job OXR-PAV-DESIGN.

Working directory is X:\3138400\181115.01\TECH\Design\Pavement Design\FAARFIELD\

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 20 years.

A design for this section was completed on 05/01/19 at 23:37:24.

Compaction requirements for this section were computed on 05/01/19 at 23:37:27.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	P-209 Cr Ag	6.96	126,346	0.35	0
3	User Defined	16.00	78,000	0.35	0
4	Subgrade	0.00	1,500	0.35	0

Total thickness to the top of the subgrade = 26.96 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	83	1.30
2	Falcon-900	49,000	513	1.40
3	Challenger-CL-604	48,200	707	1.40
4	Gulfstream-G-II	39,600	248	1.40
5	Hawker-800XP	28,120	236	1.40
6	Citation-VI/VII	23,200	330	1.40
7	Learjet-55	21,500	554	1.40
8	Citation-V	20,200	413	1.40
9	Citation-V	18,000	289	1.40
10	SuperKingAir-300	17,120	425	1.40
11	Citation-V	16,500	254	8.00
12	SuperKingAir-350	15,100	2,787	2.35
13	SuperKingAir-300	13,300	2,858	2.35
14	Citation-550B	12,375	996	6.20
15	KingAir-B-100	11,800	2,679	-0.86
16	Citation-525	10,600	472	1.40
17	GrnCaravan-CE-208B	8,818	7,357	1.52
18	Baron-E-55	6,580	12,955	0.75
19	EMB-175 STD	83,026	1,095	2.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.80	0.80	1.59
2	Falcon-900	0.00	0.00	1.74
3	Challenger-CL-604	0.00	0.00	1.64
4	Gulfstream-G-II	0.00	0.00	1.66
5	Hawker-800XP	0.00	0.00	1.81
6	Citation-VI/VII	0.00	0.00	1.98
7	Learjet-55	0.00	0.00	1.89
8	Citation-V	0.00	0.00	2.39
9	Citation-V	0.00	0.00	2.39
10	SuperKingAir-300	0.00	0.00	1.90
11	Citation-V	0.00	0.00	2.39
12	SuperKingAir-350	0.00	0.00	1.89
13	SuperKingAir-300	0.00	0.00	1.90
14	Citation-550B	0.00	0.00	2.39
15	KingAir-B-100	0.00	0.00	1.87
16	Citation-525	0.00	0.00	2.43
17	GrnCaravan-CE-208B	0.00	0.00	2.39
18	Baron-E-55	0.00	0.00	2.41
19	EMB-175 STD	0.20	0.21	1.42

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 18	--	Gulfstream-G-V
95	18 - 23	--	Gulfstream-G-V
90	23 - 27	0 - 0	Gulfstream-G-V
85	27 - 39	0 - 12	Gulfstream-G-V

Cohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
95	0 - 17	--	Gulfstream-G-V
90	17 - 22	--	Gulfstream-G-V
85	22 - 24	--	Gulfstream-G-V
80	24 - 27	0 - 0	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

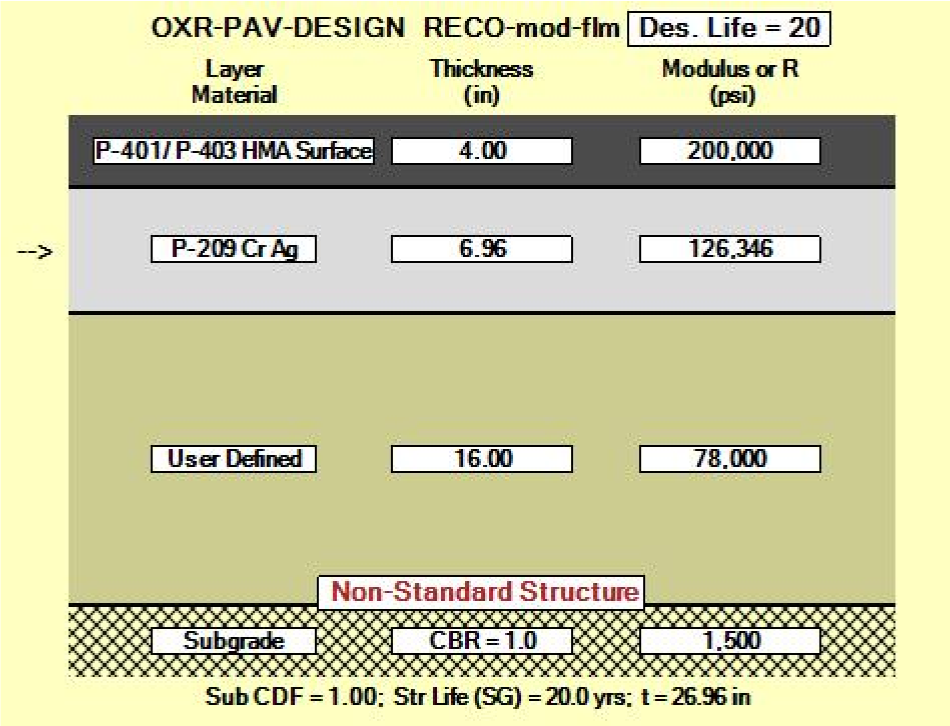
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



Attachment 5 : Probable Estimate of Project Cost for Recommended Option (Reconstruction Option, Alternative 2)

Oxnard Airport, Ventura County 5/2/2019
Probable Estimate of Project Cost

Reconstruction of Runway 7-25

This project will consist of a full reconstruction of the structural section, including strengthening of the subgrade. Based on the current fleet mix, the pavement section is anticipated to be composed of 4 inches of P-401 AC surface course, 6 inches of P-209 crushed AB, and 16 inches of lime-treated subgrade. Grading will terminate approximately 10 feet from the edge of pavement so full RSA compliance is not included in this estimate. Assumes MALSF bar will only have slight PCC adjustments for new crown (no adjustments to approach surface). The estimated cost for this project is as follows:

Item	Description	Unit	Qty	Cost	Total
1	Airfield Safety and Traffic Control	LS	1	$150,000.00	$150,000.00
2	Prepare Storm Water Pollution Prevention Plan (SWPPP)	LS	1	$8,500.00	$8,500.00
3	Implement SWPPP / Install Temporary Erosion Control	LS	1	$35,000.00	$35,000.00
4	Construction Staking and Survey Layout	LS	1	$25,000.00	$25,000.00
5	Airport Access and Haul Route Repair	T&M	1	$20,000.00	$20,000.00
6	Engineer's Field Office	LS	1	$12,000.00	$12,000.00
7	Contractor Quality Control Program	LS	1	$75,000.00	$75,000.00
8	Mobilization	LS	1	$765,000.00	$765,000.00
9	Asphalt Pavement Removal	SY	68,500	$5.50	$376,750.00
10	PCC Foundation Removal	LS	1	$35,000.00	$35,000.00
11	Unclassified Excavation, On-site Disposal	CY	16,900	$12.00	$202,800.00
12	Subgrade Preparation	SY	81,000	$3.00	$243,000.00
13	Subgrade Stabilization, Excavation Below Subgrade	CY	2,300	$90.00	$207,000.00
14	Lime Treated Subgrade, 16-Inch Depth	SY	69,900	$16.50	$1,153,350.00
15	Crushed Aggregate Base Course, P-209	CY	18,700	$75.00	$1,402,500.00
16	Asphalt Concrete Surface Course, P-401	TON	18,500	$125.00	$2,312,500.00
17	Emulsified Asphalt Tack Coat	TON	30	$925.00	$27,750.00
18	Runway Grooving	SY	53,300	$7.50	$399,750.00
19	Underdrain Pipe, 6-Inch	LF	13,500	$45.00	$607,500.00
20	Underdrain Pipe Cleanout	EA	30	$350.00	$10,500.00
21	Pavement Markings, White, Initial Application	SF	79,100	$1.25	$98,875.00
22	Pavement Marking with Glass Beads, White, Final Application	SF	79,100	$1.50	$118,650.00
23	Pavement Markings, Yellow, Initial Application	SF	5,200	$1.50	$7,800.00
24	Pavement Marking with Glass Beads, Yellow, Final Application	SF	5,200	$1.75	$9,100.00
25	Pavement Marking, Black	SF	17,000	$1.75	$29,750.00
26	MALSF Light Bar Adjustments	LS	1	$45,000.00	$45,000.00
27	Runway Lighting Base Can Adjustments	EA	63	$500.00	$31,500.00
				TOTAL	**$8,409,575.00**

Total Project Cost

COUNTY ADMINISTRATION	**$169,000.00**
PRELIMINARY DESIGN	**$160,000.00**
FINAL DESIGN	**$625,000.00**
TOPOGRAPHIC SURVEY	**$35,000.00**
GEOTECHNICAL INVESTIGATION	**$85,000.00**
CONSTRUCTION	**$8,409,575.00**
RESIDENT ENGINEERING	**$505,000.00**
MATERIALS TESTING	**$200,000.00**
CONSTRUCTION ADMINISTRATION	**$588,700.00**
REIMBURSABLE AGREEMENT	**$25,000.00**
CONTINGENCY (10%)	**$1,078,000.00**
TOTAL	**$11,880,275.00**
Total Adjusted for Price Escalation (2020)	**$12,117,880.50**
Total Adjusted for Price Escalation (2021)	**$12,360,238.11**
Total Adjusted for Price Escalation (2022)	**$12,607,442.87**
Total Adjusted for Price Escalation (2023)	**$12,859,591.73**

Note: Price Escalation assumes 2% per year