ENGINEER'S DESIGN REPORT

Oxnard Airport

Runway 7-25,
Taxiway Connectors,
and Parallel Taxiway
Pavement Reconstruction

DOA 20-02; OXR-146
FAA AIP No. 3-06-0179-037-2020 (Design)
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Prepared for:

County of Ventura Department of Airports

COUNTY of VENTURA
Department of Airports

and the
Federal Aviation Administration

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1. EXECUTIVE SUMMARY

Mead & Hunt, Inc. (Mead & Hunt) has prepared this Engineer's Design Report (EDR) for the County of Ventura Department of Airports (County). The purpose of this report is to summarize the findings of the design efforts and to define the Project scope and recommendations for the improvements of the Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction (Project) at Oxnard Airport (Airport). The scope of work for the design included the use of geotechnical analysis and topographic survey data obtained during the preliminary design to recommend a pavement improvement method and to design airfield improvements compliant with FAA Advisory Circulars.

Based on the findings obtained from the geotechnical analysis, the subgrade within the pavement limits presents inconsistent in-place moisture conditions and bearing capacity, which can lead to an uneven deterioration of the pavement over time. The information from the topographic survey revealed that the runway and associated taxiway connectors have several non-standard conditions for the proposed RDC of D-III, including: runway shoulders width, blast pad dimensions, runway object free area dimensions, runway safety area dimensions, runway longitudinal and transverse grading requirements, and runway centerline to parallel taxiway centerline separation distance.

Reconstruction and rehabilitation options were analyzed for improving the pavement condition on Runway 7-25. The pavement design analysis was conducted in accordance with Advisory Circular 150/5320-6F to accommodate a fleet mix including six operations a day of an Embraer E175 for commercial service and 500 operations per year of a Gulfstream G650. The rehabilitation pavement design options included pavement sections consisting of the existing aggregate base, new crushed aggregate base, and an asphalt concrete surface course. The reconstruction alternatives included options for reconstruction with pavement sections consisting of new crushed aggregate base and an asphalt concrete surface course. The impact of subgrade stabilization on reconstruction alternatives was also analyzed as part of the reconstruction options. For the taxiways, only the reconstruction alternatives were analyzed.

Based on the outcome of the pavement design analysis, the recommended option is to reconstruct Runway 7-25 with 4 inches of asphalt concrete, 8.5 inches of crushed aggregate base, and 16 inches of lime-treated subgrade. The preferred design alternative for the taxiways consists of 4 inches of asphalt surface course, 9 inches of crushed aggregate base course, and 16 inches of lime-treated subgrade. These options will allow uniform subgrade conditions, as well as favorable constructability and reduced construction costs compared to the rehabilitation alternative. Furthermore, the reconstruction will reduce the impact on Airport operations as it will allow a shorter closure for construction.

The reconstruction is also the most cost-effective option to correct non-standard conditions on the runway and taxiways. In fact, the reconstruction can achieve standard longitudinal and transverse slopes without significant changes to the runway elevation. This Project does not include correction or remedy of the RSA, ROFA, TSA, and TOFA slopes; these will be addressed as part of a separate project.

Electrical improvements are required as a result of the rehabilitation measures. All the in-pavement MALSF concrete bars will need to be reconstructed to match new pavement elevations. The electrical improvements for the reconstruction option will also include elevation adjustments to existing runway edge light cans, replacement of the runway edge light fixtures, new taxiway edge light cans and fixtures, FAA-owned MALSF Bars, new 5kV cable, new counterpoise system, and replacement of airfield guidance signs and distance remaining signs.

The total estimated Project construction cost is $ 32,899,916.52.

2. GENERAL SCOPE OF THE PROJECT

2.1. INTRODUCTION

As stated above, Mead & Hunt has prepared this EDR for the County, which describes the design efforts undertaken for the Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project at the Airport.

Oxnard Airport is a public use airport owned and operated by the County of Ventura Department of Airports. Located in the County of Ventura, west of Oxnard, California, the Airport has a single runway, designated Runway 7-25, which has five taxiway connectors, and one full-length parallel taxiway, currently designated Taxiway F. The current Runway Design Code (RDC) for Runway 7-25 is B-II, although the current Airport runway and taxiway connector pavement dimensions meet or exceed D-III standards. This report analyzes the proposed future condition of RDC D-III and Taxiway Design Group (TDG) 3. These designations are consistent with past historical use. The aviation forecast for an RDC D-III and a TDG 3 have been approved by the FAA as part of an Airport Layout Plan (ALP) update.

The Project will be funded by a combination of County funds and a grant from the Federal Aviation Administration (FAA).

2.2. SCOPE OF WORK

The Runway 7-25, Taxiway Connectors (A, B, C, D, and E), and Parallel Taxiway (F) Pavement Reconstruction Project consists of reconstructing the runway and taxiways at the Airport for the County. This Project will be designed and bid as a single bid package but will consist of a Base Bid and up to two Bid Alternates. The proposed breakdown is as follows:

Base Bid: Runway 7-25 reconstruction

Bid Alternate 1: Taxiway Connectors A-E reconstruction

Bid Alternate 2: Parallel Taxiway F reconstruction

The Project scope of work for the Base Bid consists of the analysis for improvement type, which will include reconstructing or rehabilitating all asphalt concrete (AC) pavement, full width, on Runway 7-25 and will require pavement transitions on Taxiway Connectors A, B, C, D, and E to match the existing grades in the event that Bid Alternate 1 is not awarded. Adjustments to the existing MALSF system are also included.

Bid Alternates 1 and 2 consist of the removal of existing pavement surface and excavating to subgrade; construction of a new pavement section and crushed aggregate base course shoulder; transition grading to existing ground; application of pavement markings; installation of an underdrain system and adjustments to the storm drain; and installation of new edge lights, counterpoise system, and grounding at an airfield lighting vault. In the event Bid Alternate 2 is not awarded, a Bid Alternate 1 transition has been designed.

Included in this report is a discussion and evaluation of the following items:

1) FAA Advisory Circular 150/5300-13A Change 1 analysis of the existing runway, including runway surface gradient requirements based on RDC of D-III standards.

2) Analysis of existing and proposed pavement features.
3) Pavement design evaluation, including subgrade sampling and analysis, evaluation of pavement improvement alternatives, and life cycle cost analysis.
4) Airfield lighting, signage, and navigation aid (NAVAID) analysis.
5) Airfield markings.
6) Construction safety and phasing analysis, including evaluation of construction duration and operational impacts.
7) Runway surface analysis.
8) Cost estimates.

2.3. HISTORY OF THE EXISTING SYSTEM

Runway 7-25 is 5,953 feet long by 100 feet wide and was most recently reconstructed in 1992. The runway was reconstructed with a pavement section consisting of a 50-foot wide keel section with 4 inches of asphalt pavement on 9 to 16 inches of aggregate base, and an outer 25-foot wide runway section consisting of 3 inches of asphalt pavement on 8 to 17 inches of aggregate base. Taxiway connectors were also most recently reconstructed in 1992. The taxiway connector pavement sections consist of a minimum of 4 inches of asphalt pavement on 3.5 to 12 inches of aggregate base and the parallel taxiway has a minimum of 2 inches of asphalt pavement on 2.5 to 10 inches of aggregate base.

A timeline of the major pavement rehabilitation and maintenance projects are listed below:

1992	Reconstruction of Runway 7-25 and connector taxiways. This project consisted of removing all existing pavement, trimming existing aggregate base to meet design grades, placing new aggregate base material over existing, and placing a new layer of AC pavement. The AC thickness was 4 inches within 25 feet from the runway centerline, 3 inches along the 25-foot outboard runway edge, and 4 inches on all connector taxiways.
2000	2-inch AC overlay on Taxiway F. East of Taxiway C, the overlay was placed on top of a 1.5-inch leveling course within 20 feet from the Taxiway F centerline.
2003	Application of a rejuvenating seal on Runway 7-25 and a slurry seal on taxiway connectors A, B, C, D, and E.
2005	Taxiway F slurry seal.
2007	Extension of runup apron pavement at Taxiways A and E (shown as West Hangar Area and East Apron sections). The runup apron sections consisted of 8 inches of AB and 4 inches of AC pavement.
2011	Application of a rejuvenating seal on Runway 7-25. Taxiway A, B, C, D slurry seal.
2013	Replacement of runway and taxiway lighting system, and installation of airfield signs.

Table 1. shows the observed AC pavement distresses on the airfield based on the Airport Pavement Management System (APMS) report prepared in 2016. The extent and severity of cracking and weathering of the runway and taxiways pavement has created an increased potential for foreign object debris (FOD). As a result of the weathering, the runway grooves are deteriorating as well. The Pavements Condition Index (PCI) Ratings are included in the following Table.

Table 1. Pavement Distress

	Distress Type	Distress Severity	Pavement Condition Index (PCI) Rating
Runway 7-25 and Blast Pad	Weathering	Medium-to-High	Fair
	Longitudinal and Transverse Cracking	Low-to-Medium	
Taxiway A	Block Cracking	Low-to-Medium	Fair
	Weathering	Low	
Taxiway B	Block Cracking	Medium-to-High	Poor
	Weathering	Low	
Taxiway C	Block Cracking	Medium-to-High	Poor
	Weathering	Low	
Taxiway D	Block Cracking	Medium-to-High	Poor
	Weathering	Low	
Taxiway E	Block Cracking	Low-to-Medium	Fair
	Weathering	Low	
Taxiway F	Longitudinal and Transverse Cracking	Low-to-Medium	Fair
	Weathering	Low	

2.4. PAVEMENT CLASSIFICATION NUMBER

The Oxnard Airport APMS report, dated October 2016, evaluated existing pavement structures at the Airport to define their structural capacities for various aircraft. According to Advisory Circular 150/5335-5C, the Aircraft Classification Number (ACN) is defined as a number that expresses the relative effect of an aircraft at a given weight on a pavement structure for a specified standard subgrade strength. Higher ACNs indicate an aircraft with more severe effects on the pavement structure. The ACN-PCN system of reporting pavement strength states that a pavement with a given Pavement Classification Number (PCN) can support an aircraft that has an ACN equal to, or less than, the PCN. The PCN expresses the relative load-carrying capacity of the pavement. The recommended PCN for Runway 7-25 is 44/F/A/W/T, based on the structural capacity of the weakest pavement structure, which was adequate for the fleet mix operating at the Airport at the time of the analysis. There were no load-related distresses observed on the runway during the 2015 inspection. The recommended PCN for Taxiway F is 40/F/B/X/T; for Taxiways A, C, and D it is 27/F/B/X/T; and for Taxiways B and E it is 4/F/B/X/T. The analysis showed that Taxiway F has PCN values above the ACN values of all the aircraft currently using and forecasted to use the Airport. However, the connector taxiways do not have the structural capacity for the operating fleet mix.

2.5. FAA ADVISORY CIRCULAR 150/5300-13A ANALYSIS

FAA Advisory Circular 150/5300-13A, *Airport Design,* contains the standards and recommendations for the geometric layout and engineering design of runways, taxiways, aprons, and other facilities at civil airports. The updated Advisory Circular 150/5300-13A, *Change 1,* includes significant changes to several airport design standards, which are outlined in the following analysis.

The Airport's planning consultant, Coffman Associates, completed the ALP in November 2006. Within the ALP, non-standard conditions were outlined for the Airport, which pertained to the runway safety area, runway object free area, and the runway protection zone. An update to the ALP is currently underway and the aviation forecast has been approved by the FAA, which will assign the runway an RDC of D-III and the taxiways as TDG-3. Non-standard conditions outlined in the 2006 ALP were updated as a part of this report to reflect current conditions and include the following items:

- **Runway Object Free Area (ROFA)**
  - Advisory Circular: 150/5300-13A, Section 309
  - FAA Standard: The ROFA clearing standard requires clearing the ROFA of above-ground objects protruding above the nearest point of the RSA. Objects non-essential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA. The ROFA for an RDC of D-III is 400 feet from the runway centerline, 1,000 feet beyond the runway end, and 600 feet prior to the threshold.
  - Existing Condition Violations: Commercial/residential properties and associated obstructions are 300 feet to 400 feet north of the runway centerline; a commercial parking lot and associated obstructions are 370 feet south of the runway centerline; a perimeter service road is 255 feet north of the runway centerline and 330 feet south of the runway centerline; a fence line is 300 feet to 400 feet north of the runway centerline; and the segmented circle is 200 feet south of the runway centerline and it is not considered fixed-by-function.

- **Runway Safety Area (RSA)**
  - Advisory Circular: 150/5300-13A, Section 307
  - FAA Standard: The RSA must be free of objects, except for objects that need to be located in the RSA because of their function. The RSA for an RDC of D-III is 250 feet from the runway centerline, 1,000 feet beyond the departure end, and 600 feet prior to the threshold.
  - Existing Condition Violations: The segmented circle is 200 feet south of the runway centerline and it is not considered fixed-by-function.

- **Runway Safety Area (RSA) Grades**
  - Advisory Circular: 150/5300-13A, Section 313.d.
  - FAA Standard: For Approach Category D, Table 3-3 and Figure 3-23 of the Advisory Circular specify that the minimum and maximum grades in the RSA shall be 1.5% and 3.0% respectively, away from the runway.
  - Existing Condition Violations: RSA grades are less than 1.5%.

- **Runway Protection Zone (RPZ)**
  - Advisory Circular: 150/5300-13A, Section 310
  - FAA Standard: The RPZ's function is to enhance the protection of people and property on the ground. This is best achieved through Airport-owner control of RPZs. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ and includes clearing RPZ areas of incompatible objects and activities. The RPZ for an RDC of D-III has a 1,700-foot length, 500-foot inner width, 1,010-foot outer width, and starts 200 feet from the runway end.

  - Existing Condition Violations: Ventura Road, K Street, 2nd Street, and commercial/residential properties are within the Runway 25 RPZ; Victoria Avenue is within the Runway 7 RPZ.

- **Taxiway Surface Gradients**
  - Advisory Circular: 150/5300-13A, Section 418 b.(6)
  - FAA Standard: The crown of the taxiway should not be higher than the crown of the runway.
  - Existing Condition Violations: Taxiway B centerline is higher than the Runway centerline from Taxiway B Station 400+75 to 401+75. Taxiway F is higher than the Runway centerline from Runway Station 137+75 to 146+00.

This Project does not include correction or remedy of the above-mentioned conditions. Correction of these conditions are outside the scope of this Project and require additional coordination with the FAA.

As part of the design grant for this Project, Mead & Hunt analyzed the existing conditions of Runway 7-25 and taxiways from survey information provided by Encompass Consulting Group. The following non-standard conditions were determined by this analysis. A table showing the non-standard conditions is included as *Appendix B*.

Non-Standard Conditions to be improved by the Project

- **Deviation: Runway 25 Blast Pad Dimensions**
  - Advisory Circular: 150/5300-13A, Section 304
  - FAA Standard: Blast Pad Dimension Requirements for an RDC of D-III (under 150,000 lbs. maximum takeoff weight) is 140 feet wide x 200 feet long.
  - Existing Condition: Runway 25 Blast Pad is 120 feet x 163 feet. Runway 7 does not have a paved blast pad.

- **Deviation: Runway Longitudinal Grade Changes**
  - Advisory Circular: 150/5300-13A, Section 313 b.(1)
  - FAA Standard: The maximum allowable grade change for aircraft approach category D is ±1.50 percent; however, no grade changes are allowed in the first and last quarter, or first and last 2,500 feet, whichever is less, of the runway length.
  - Existing Condition: Grade changes occur in the first and last quarter of the runway varying from 0.10 percent to 0.40 percent.

- **Deviation: Runway Longitudinal Vertical Curve Length**
  - Advisory Circular: 150/5300-13A, Section 313 b.(3)
  - FAA Standard: All grade changes require vertical curves for aircraft approach category D. Vertical curves for longitudinal grade changes are parabolic. The length of the vertical curve is a minimum of 1,000 feet for each 1.0 percent of change.
  - Existing Condition: There are grade changes up to 0.40 percent without vertical curves on the runway.

- **Deviation: Runway Transverse Grades**
    - Advisory Circular: 150/5300-13A, Section 313 b.(5)
    - FAA Standard: Runway transverse grades for aircraft approach category D must be between 1.0 percent and 1.5 percent.
    - Existing Condition: Runway 7-25 transverse grades range from 0.10 percent to 2.08 percent.

- **Deviation: Runway 25 Blast Pad Longitudinal Grades**
    - Advisory Circular: 150/5300-13A, Section 313 d.(1)
    - FAA Standard: For the first 200 feet of the RSA beyond the runway ends, the longitudinal grade is between 0 and 3.0 percent, with any slope being downward from the ends.
    - Existing Condition: Runway 25 Blast Pad longitudinal grades range from 0.0 percent to 0.6 percent with slopes being upward from the end.

- **Deviation: Taxiway Width**
    - **Advisory Circular:** 150/5300-13A, Section 403
    - **FAA Standard:** Taxiway width for a TDG-3 is 50 feet.
    - **Existing Condition:** Taxiway widths range from 50 feet to 130 feet.

- **Deviation: Runway to Taxiway Separation**
    - **Advisory Circular:** 150/5300-13A, Section 405b.
    - **FAA Standard:** Required separation distance for an RDC D-III is 400 feet.
    - **Existing Condition:** 365 feet

- **Deviation: Taxiway Fillet Design**
    - **Advisory Circular:** 150/5300-13A, Section 406b.(1)
    - **FAA Standard:** Pavement fillets at taxiway intersections are designed for the entire selected TDG and must accommodate all aircraft of all lesser TDGs.
    - **Existing Condition:** None of the taxiways meet the standard fillet design, they do not have the required tapers or radii.

- **Deviation: Taxiway Acute Angle**
    - **Advisory Circular:** 150/5300-13A, Section 407b.
    - **FAA Standard:** Acute angles should not be larger than 45 degrees from the runway centerline.
    - **Existing Condition:** Taxiway C’s angle is 50 degrees.

- **Deviation: High Speed Exits**
    - **Advisory Circular:** 150/5300-13A, Section 409d.(2)
    - **FAA Standard:** The radius of the exit from the runway should always be 1500 feet.

  - **Existing Condition:** The existing radius of the exit from the runway is 1254 feet. High-speed Taxiway D does not meet design guidelines for a standard high-speed exit taxiway with a 30-degree angle of intersection.

- **Deviation: Longitudinal Grade Changes (Taxiways)**
  - **Advisory Circular:** 150/5300-13A, Section 418b.(3)
  - **FAA Standard:** When longitudinal grade changes are necessary, the vertical curves are parabolic. The minimum length of the vertical curve is 100 feet for each 1.0 percent of change.
  - **Existing Condition:** All taxiways have grade changes that do not meet the standards.

- **Deviation: Transverse Slopes (Taxiways)**
  - **Advisory Circular:** 150/5300-13A, Section 418b.(6)
  - **FAA Standard:** Cross-section slopes on paved areas for an approach category must be between 1.0 percent and 1.5 percent. The ideal configuration is a center crown with equal, constant transverse grades on either side. However, an off-center crown, different grades on either side, shed sections, and changes in transverse grades (other than from one side of the crown to the other) of no more than 0.5 percent are permissible. A 1.5-inch drop between paved and unpaved areas should be provided, and the first 10 feet off paved areas needs to be at 5.0 percent slope.
  - **Existing Condition:** Taxiways have flatter and steeper transverse slopes than the standards. The 5.0 percent slope for the first 10 feet off paved areas cannot be provided without grading the whole infields and affecting NAVAIDs.

- **Deviation: Existing Taxiway Naming Convention**
  - **Advisory Circular:** 150-5340-18G, Section 1.4
  - **FAA Standard:** For a runway with a parallel taxiway, use alphanumeric designators at the entrance and exit taxiways located at the ends and along the runway. Apply an increasing, sequentially numbered pattern from one runway end to the other runway end, such as A1, A2, …, A5.
  - **Existing Condition:** The name for the parallel taxiway is Taxiway F, the connectors are named east to west as A, B, C, D, and E.

3. PHOTOGRAPHS

Mead & Hunt performed a visual pavement survey in February 2015, which included an inspection of Runway 7-25 and associated taxiway connector pavements. During that field investigation, existing site conditions were observed and photographed. Additional photos were also taken during the site investigation held in the summer of 2020. These photographs are included as *Appendix C*.

4. DESIGN STANDARDS

The methodologies used to evaluate existing site conditions and to develop preliminary designs for this Project are in conformance with applicable FAA advisory circulars. The latest versions of the following advisory circulars have been reviewed during the evaluation of this Project:

150/5300-13A	*Airport Design (Change 1)*
150/5320-5D	*Airport Drainage Design*

150/5320-6F	*Airport Pavement Design and Evaluation*
150/5335-5C	*Standardized Method of Reporting Airport Pavement Strength - PCN*
150/5340-1M	*Standards for Airport Marking*
150/5340-18G	*Standards for Airport Sign Systems*
150/5340-26C	*Maintenance of Airport Visual Aid Facilities*
150/5340-30J	*Design and Installation Details for Airport Visual Aids*
150/5370-2G	*Operational Safety on Airports During Construction*
150/5370-10H	*Standard Specifications for Construction of Airports*
150/5380-6C	*Guidelines and Procedures for Maintenance of Airport Pavements*

The latest versions of the following standards and construction specifications have been reviewed during the evaluation of this Project:

FAA-STD-019f, Change 1	*Lightning and Surge Protection, Grounding, Bonding, and Shielding Requirements for Facilities and Electronic Equipment*
FAA-C-1217H	*Electrical Work, Premises Wiring Construction Specification*
FAA-C-1391E	*Installation, Termination, Splicing, and Transient/Surge Protection of Underground Electrical Distribution System Power Cables*

While Runway 7-25 is currently classified with an RDC of B-II, existing conditions were evaluated for the new critical aircraft that has a design code of D-III. The new critical aircraft is the Gulfstream G650, which has a wingspan of 99.58 feet and a maximum takeoff weight of 99,600 lbs. Minimum design standards in accordance with Advisory Circular 150/5300-13A for the existing and proposed RDC are as follows:

Table 2. Runway Design Standards

Runway Design Code	B-II	D-III
Runway Width	75 ft	100 ft*
Runway Shoulder	10 ft	20 ft*
Runway Safety Area (RSA) Width	150 ft	500 ft
Runway Object Free Area (ROFA) Width	500 ft	800 ft
Holding Position Separation	200 ft	250 ft
Parallel Taxiway/Taxilane Separation	240 ft	400 ft
Aircraft Parking Area Separation	250 ft	500 ft

** Per Advisory Circular 150/5300-13A, Table 3-5 Runway Design Standard Matrix, note 12: "For airplanes with maximum certified takeoff weight of 150,000 lbs. or less, the standard runway width is 100 feet, the shoulder width is 20 feet, and the runway Blast Pad width is 140 feet."*

The design standards in accordance with Advisory Circular (AC) 150/5300-13A for the proposed TDG-3 are as follows:

Table 3. Taxiway Design Standards

Taxiway Design Group	3
Taxiway Width	50 ft
Shoulder Width	20 ft
Taxiway Safety Area (TSA) Width	118 ft
Taxiway Object Free Area (TOFA) Width	186 ft
Taxiway Centerline to Fixed or Movable Object	93 ft
Transverse Grade (Min. – Max.)	1.0% - 1.5%
Longitudinal Grade (Min. – Max.)	0.0% - 1.5%

5. TOPOGRAPHIC SURVEYS

Topographic surveys were performed for the Project in October 2018, December 2019, and October 2020 by Encompass Consultant Group, as a subconsultant to Mead & Hunt. The surveys provided coordinates and elevations of the existing ground surface, as well as features within the Project limits, including drainage and electrical structures. Using this data, existing ground contours were generated and a digital terrain model (DTM) was developed to evaluate FAA AC 150/5300-13A design requirements criteria, surface gradient criteria, analyze site drainage, and develop proposed runway and taxiway profiles. Some of the storm drain invert elevations and pipe sizes could not be verified due to sedimentation.

6. GEOTECHNICAL INVESTIGATION

A geotechnical analysis was performed by Earth Systems Pacific as a subconsultant to Mead & Hunt. The final geotechnical engineering reports and Addendum No. 1 to the reports, which includes the sulfate testing, were submitted on July 10, 2020, and are attached as *Appendix D, Part 1 and Part 2* respectively. The geotechnical investigations included 70 (up to 10-foot depth) pavement borings, with 30 of the borings located on the runway, two on each of the taxiway connectors for a total of 10 borings, and 30 on Taxiway F. 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 AC over 10 inches of aggregate base was assumed. The existing pavement section on the taxiway connectors consists of a minimum of 4 inches of asphalt pavement on 3.5 to 12 inches of aggregate base. The parallel taxiway pavement sections consist of a minimum of 2 inches of asphalt pavement on 2.5 to 10 inches of aggregate base. Most of the asphalt thicknesses measured varied from 4 to 5.5 inches. Based on field samples, it was determined that the existing aggregate base does not comply with gradation specifications for FAA P-209 material. The material was classified as miscellaneous aggregate base. 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 California Bearing Ratio (CBR) tests.

Below the runway and taxiway connector pavement sections, 4- to 8-inch layers of loose to medium dense, poorly graded sand fill was 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 runway and taxiway connector borings, the underlying soil consisted of sandy lean clay, silty sand, and lean clay at depths ranging from 2 to 5 feet below the existing pavement surface. Below the parallel taxiway pavement sections, layers of well graded sand with varying percentages of silt and gravel, and varying in thickness from 6 to 14 inches, were found in 20 of the 30 borings drilled on the taxiway. Below the well graded sand and below the pavement sections in all other borings, the underlaying soil was sandy lean clay fill, which extended to depths ranging from 4 to 7 feet below the existing pavement surfaces.

The soil found on site is considered cohesive, with a compaction standard of 95 percent of maximum dry density. Alluvium was found below the fill in all borings, to the maximum depth explored (10 feet). The alluvium consisted of very soft to medium stiff sandy lean clay, silt, and lean clay. The soils were described during drilling as being slightly moist to very moist.

Subsurface water was not encountered in any of the borings at the maximum depth explored (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 46 of the 70 borings drilled for this Project. Existing soil moisture content was found to be up to 10.8 percent above optimum. As a result, the geotechnical reports recommend the construction of edge drains to help maintain consistent soil moisture. This observation was consistent with previous subsurface investigations.

The geotechnical analysis provided a recommended CBR value for the runway native subgrade soils to be used for the pavement design. The report recommends a CBR of 1, if no moisture conditioning or reworking of the subgrade is included as part of the Project. If moisture conditioning and compaction of the existing soils to 95 percent of maximum dry density is included, then the recommended CBR values of the subgrade (without chemical stabilization measures) will be 5 for the area between Taxiway Connectors B to D, and 8 for the remaining areas between Taxiway Connectors A and B and between D to E. The geotechnical report proposes design options for the pavement section, see Section 7.2 for details.

Addendum No. 1 (*Appendix D, Part 2*) of the report includes results and discussion on the soluble sulfate content tests. The design concern for lime-treated soil is that lime used in the stabilization process can react with the soluble sulfates and induce heave in the subgrade, which will cause heaving on the pavement. The tests yielded a wide range of results from a low of 169 ppm to 23,500 ppm of soluble sulfates. The soil sample with the greatest soluble sulfate content was treated with 5 percent lime, by dry weight, with different mellowing time periods. After treatment and mellowing, the sample with the highest level of soluble sulfates was sent to a subconsultant's laboratory, where tests revealed a considerable reduction from the initially tested value. The result of this test was a residual soluble sulfate level of 677 ppm. This is below 3,000 ppm soluble sulfate concentrations, which makes it a low risk level to use calcium-based (lime) stabilizers in sulfate rich soil. Addendum No. 1 to the geotechnical report proposed the following procedure for mitigating the heave in the subgrade for stabilization:

- Lime-treat the subgrade to 5 percent by dry weight.
- Lime treatment should be performed in two stages (3 percent initial and 2 percent secondary).
- A minimum mellowing period of 7 days should be used for the initial stage, prior to the secondary lime treatment operation. Soil moisture content should be maintained at 4 to 5 percent above optimum, as a minimum, during the initial mellowing period. Soil should be remixed a minimum of 3 times.
- After the initial treatment and mellowing period, the second treatment shall commence. The second treatment requires a 48-hour mellowing period. Soil moisture content should be maintained at 4 to 5 percent above optimum, as a minimum, during the initial mellowing period. The soil should be remixed at least 1 additional time following the final lime treatment operation prior to final compaction.
- Soluble sulfates should then be retested to verify it is within acceptable limits

If utilized, the lime treated soil layer should be 12 to 16 inches thick. To reduce off-haul and disposal of asphalt concrete and miscellaneous aggregate base, the reports suggest pulverizing these in place and mixing with the subgrade.

Swelling soils tests were also performed. FAA AC 150/5320-6F indicates that soils with a swell greater than 3 percent, when tested for CBR, require treatment to reduce the potential for damage to pavements. Only 4 borings tested with a swell in excess of 3 percent. The Airport does not exhibit pervasive evidence of damage due to swelling soils, as the swelling material was mainly identified at depths of 4 feet or greater. Treatment of existing soils with the prescribed lime percentage will neutralize the swell potential of existing soils. To estimate shrinkage of the subgrade, in-situ soil density data was analyzed. The average shrinkage percentage ranged from 7.3 at 95 percent relative compaction to 13 percent at 100 percent relative compaction. In some areas, if the material is recompacted to a value less than its existing compaction, it will swell, and, if it is recompacted to a higher value than that in place, then it will shrink.

7. PAVEMENT DESIGN EVALUATION

7.1. AIRCRAFT FLEET MIX

The aircraft fleet mix was developed from the FAA-approved 2018 Draft Forecast for Oxnard Airport and close coordination with the Airport on current and expected operations and aircraft types utilizing Runway 7-25. The 2017 Traffic Flow Management System Counts (TFMSC) from the FAA was included in the forecast and used to determine operations of the heavier aircraft utilizing the runway. The operations and aircraft types from the forecast were confirmed by the FAA 2018 TFMSC. The Airport anticipates the Gulfstream G650 as being the critical aircraft utilizing the runway by 2020, with 500 operations per year. The annual growth considered for the G650 was calculated according to the data provided from the 2018 forecast. The Embraer E175, with a design code of C-III, wingspan of 93.92 feet, and maximum takeoff weight of 85,517 pounds, was added to the aircraft fleet mix to account for the possibility of future commercial service at the Airport. Three flights per day, with a 3.0 percent annual growth, was forecast for this aircraft.

The itinerant operations given by the forecast were distributed proportionally to the traffic counts among the aircraft in the fleet mix, excluding the Embraer E175. The local operations were distributed proportionally to the present and future aircraft based at the Airport. The aircraft fleet mix used in the pavement design is included as *Appendix E*. The number of total operations over a 20-year period (number of total operations during design life) was used to determine the percent of annual growth in traffic for each aircraft.

7.2. PAVEMENT DESIGN OPTIONS

Pavement design options were developed and analyzed for the runway, including rehabilitation and reconstruction with a lime-treated subgrade and a subgrade that was not lime-treated. For the taxiways, the reconstruction options were the only choice considered since their geometry is changing. The analyses were performed with the FAA pavement design software, FAARFIELD, and in accordance with FAA procedures outlined in Advisory Circular 150/5320-6F. The pavement design options are discussed in the following sections. The detailed FAARFIELD pavement design reports are included in *Appendix F*.

The Asphalt Binder was determined utilizing the LTTPBind Online calculator. With 98% confidence on the low pavement temperature is 5 degrees Celsius, and the low binder can be set as -10. With 98% confidence in 7-day pavement high temperature at 56 degrees Celsius, the upper binder can be set at 58. Per FAA design criteria, the upper limit is bumped by two levels to accommodate for aircraft over 100,000 pounds. This bump does not create a need for polymer modification which keeps the oil cost relatively low, and 70-10 binder is a common binder is southern California.

7.2.1. Runway Rehabilitation Option

The rehabilitation option consists of constructing a new P-209 crushed aggregate base layer and a P-401 asphalt surface course. The existing asphalt concrete will be pulverized, blended, and compacted with the underlying existing aggregate base. The recommended subgrade, a CBR value of 1, was used for this option since moisture conditioning and compaction of the subgrade will not be part of the Project. The geotechnical investigation included CBR tests on the existing aggregate base material. Different types of existing aggregate base material were encountered along the runway, which are shown below with varying CBR values.

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

The pavement designs for the rehabilitation option were evaluated using the following parameters:

- Subgrade CBR value of 1
- 14-inch recycled aggregate base section consisting of existing aggregate base blended with pulverized asphalt concrete (modeled as user-defined layer for three different elastic modulus values)
- P-209 Crushed Aggregate Base Course
- P-401 Asphalt Surface Course
- 10-year design life (typical for rehabilitation).

Based on the three CBR values shown above for the existing aggregate base material, three pavement design alternatives were evaluated for the runway. The CBR values were converted into elastic moduli using the equation provided in Chapter 2.5.3 by FAA Advisory Circular 150/5320-6F as follows:

- E [psi]= 1,500 x CBR *(Equation 1)*

In accordance with paragraph 2.5.6.3 of the above-mentioned advisory circular, the maximum elastic modulus value that should be specified for a gravelly material is 50,000 psi.

The following table summarizes the pavement thicknesses obtained for the pavement rehabilitation option with different CBR values for the existing aggregate base material.

Table 4. Pavement Sections with Different CBR Values of Existing Aggregate Base

	CBR of Existing Aggregate Base		
	12	27	50
Asphalt Surface Course P-401	4 inches	4 inches	4 inches
Crushed Aggregate Base Course P-209	19 inches	14 inches	12.5 inches
Existing Recycled Aggregate Base	14 inches	14 inches	14 inches

7.2.2. Runway Reconstruction Options

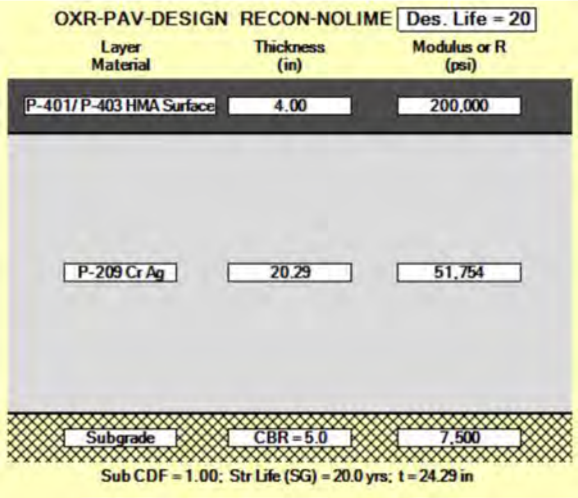
For the reconstruction option, the higher CBR values of 5 and 8 were used since the subgrade will be moisture conditioned and compacted to 95 percent of maximum dry density. However, based on the high moisture content results of the in-place subgrade, obtaining the required compaction and moisture limits may not be feasible or economical. For the purpose of this analysis, a lime-treated subgrade was considered to achieve moisture conditioning and stabilization. Two design alternatives were evaluated for the pavement reconstruction option including a lime-treated subgrade and a subgrade that was not lime-treated.

- **Runway Reconstruction without Lime-Treated Subgrade**:

  Reconstruction of the pavement structure without a lime-treated subgrade was evaluated with the following parameters:

  - Subgrade CBR values of 5 and 8 (two pavement designs for two CBR values)
  - P-209 Crushed Aggregate Base Course
  - P-401 Asphalt Surface Course
  - 20-year design life

  When the pavement design is evaluated with a CBR of 5, the pavement section consists of 4 inches of P-401 and 20.5 inches of P-209. When evaluated with a CBR of 8, the pavement section consists of 4 inches of P-401 over 16.5 inches of P-209. The following figures show the two pavement sections designed with different subgrade CBR values.

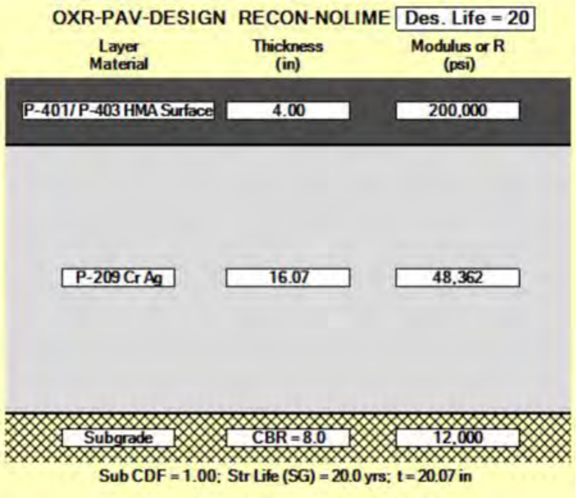


OXR-PAV-DESIGN RECON-NOLIME Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Surface	4.00	200,000
P-209 Cr Ag	20.29	51,754
Subgrade	CBR = 5.0	7,500

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 24.29 in

Runway Reconstruction Subgrade CBR = 5



OXR-PAV-DESIGN RECON-NOLIME Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Surface	4.00	200,000
P-209 Cr Ag	16.07	48,362
Subgrade	CBR = 8.0	12,000

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 20.07 in

Runway Reconstruction Subgrade CBR = 8

- **Runway Reconstruction with Lime-Treated Subgrade**:

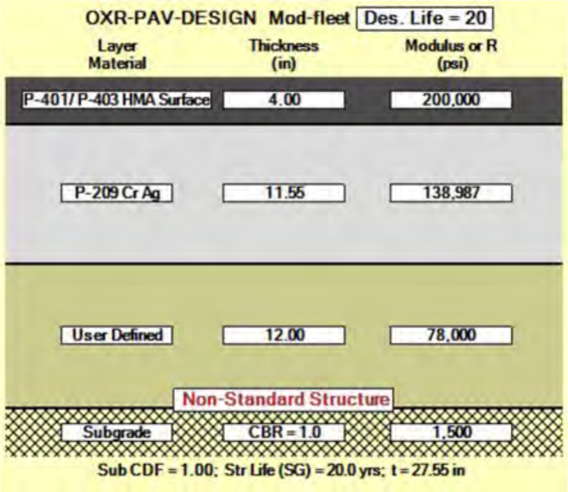
  The reconstruction option with a lime-treated subgrade was evaluated in accordance with paragraph 3.13.5.5 of FAA Advisory Circular 150/5320-6F. Based on the finding of the geotechnical analysis, a CBR value of 52 was determined for the lime-treated subgrade layer (E = 78,000 psi). The value of 52 corresponds to a lime-treated section consisting of 5 percent lime. A subgrade CBR value of 1 was assigned for the undisturbed subgrade soils. The geotechnical report recommends lime-treated subgrade thicknesses of 12 inches and 16 inches. Both thicknesses were evaluated for this alternative.

  Reconstruction of the pavement structure with a lime-treated subgrade was evaluated with the following parameters:

  - Subgrade CBR value of 1
  - Lime-Treated Subgrade (modeled as User Defined Layer with elastic modulus of 78,000 psi for both 12-inch and 16-inch thicknesses)
  - P-209 Crushed Aggregate Base Course

- P-401 Asphalt Surface Course
- 20-year design life

When the pavement design is evaluated with a 12-inch thick lime-treated subgrade, the pavement section consists of 4 inches of P-401 and 12 inches of P-209. When evaluated with a 16-inch thick lime-treated subgrade, the pavement section consists of 4 inches of P-401 and 8.5 inches of P-209. The following figures show the two pavement sections designed with different lime-treated subgrade depths.



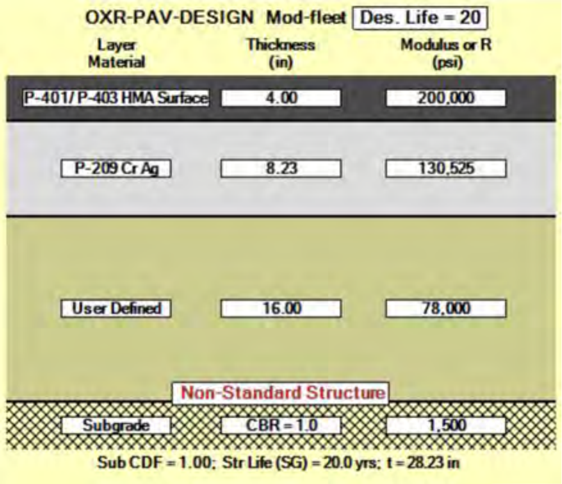
OXR-PAV-DESIGN Mod-fleet Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Surface	4.00	200,000
P-209 Cr Ag	11.55	138,987
User Defined	12.00	78,000
Subgrade	CBR = 1.0	1,500

Non-Standard Structure

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 27.55 in

12-inch Lime-Treated Section



OXR-PAV-DESIGN Mod-fleet Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Surface	4.00	200,000
P-209 Cr Ag	8.23	130,525
User Defined	16.00	78,000
Subgrade	CBR = 1.0	1,500

Non-Standard Structure

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 28.23 in

16-inch Lime-Treated Section

7.2.3. Runway Comparative Analysis

In summary, two runway pavement design options were analyzed along with multiple variables that affected the proposed pavement sections. The following table provides a summary of the pavement thicknesses and layers obtained from the FAARFIELD evaluations.

Table 5. Runway Rehabilitation Versus Reconstruction Pavement Section

	REHABILITATION			RECONSTRUCTION			
	RAB CBR 12	RAB CBR 27	RAB CBR 50	Untreated Subgrade CBR 5	CBR 8	Lime-Treated Subgrade	
Asphalt Surface Course, P-401	4 inches	4 inches	4 inches	4 inches	4 inches	4 inches	4 inches
Crushed Aggregate Base Course, P-209	19 inches	14 inches	12.5 inches	20.5 inches	16.5 inches	12.0 inches	8.5 inches
Recycled Aggregate Base (RAB)	14 inches	14 inches	14 inches	----	----	----	----
Lime-Treated Subgrade	----	----	----	----	----	12 inches	16 inches
Subgrade CBR	1*	1*	1*	5	8	1*	1*

Notes:
* In-situ subgrade CBR.

Based on the results of this analysis, the runway rehabilitation option will require at least 16.5 inches of new pavement section materials. Furthermore, the rehabilitation will not resolve the inconsistency in subgrade moisture content, which may present unknown constructability and stability issues.

For the runway 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 and in-situ moisture content varied considerably depending on the location. Without stabilization, the subgrade will have to be dried and recompacted to meet design requirements for moisture content and compaction. The time required to dry out the subgrade will be extensive and is not practical. In this case, the use of a stabilization process may ultimately be required, requiring additional construction time over conventional construction, except when accounting for soil-drying delay, and increased construction costs.

For the reasons stated above, the use of a lime-stabilization process for the subgrade is recommended (Runway Reconstruction with Lime-Treated Subgrade Option). The lime-treated subgrade will provide a uniform subgrade on which the pavement section can be constructed. The uniformity of the subgrade will promote a homogeneous deterioration of the pavement over time. The 16-inch thick lime-treated section is recommended since it will not only result in the least amount of new crushed aggregate base course and reduce the amount of required earthwork, but will also permit part of the existing aggregate base material to be mixed into the lime-treated subgrade section, which will increase the subgrade strength. The ability to perform a 16-inch treatment in a single pass has been confirmed with local contractors. Subgrade stabilization with excavation below subgrade may be required in certain areas prior to constructing pavement section, which will consist of in-place drying techniques and/or excavating below subgrade and replacing with multi-axial geogrid, asphalt millings, and existing aggregate base. This shall be performed only where directed by the RPR. As noted in the geotechnical report, lime-treated subgrade may be replaced with cement-treated subgrade in areas where the native subgrade materials contain more sand-type properties.

For subsequent sections of this report, only the runway rehabilitation option with a CBR value of 12 for the recycled aggregate base and the runway reconstruction option with a 16-inch lime-treated section is advanced for further analysis.

7.2.4. Taxiway Reconstruction Options

Two pavement reconstruction design options were developed and analyzed for the taxiways, which included lime-treated subgrade and untreated subgrade. The analysis was performed with the FAA pavement design software, FAARFIELD, and in accordance with FAA procedures outlined in AC 150/5320-6F.

An analysis was also performed for an overlay on the existing Taxiway C and the east end of Taxiway F, but this overlay was determined to be infeasible due to the low CBR values of the subgrade. The new asphalt thickness will need to be 15 inches, assuming 3 inches of existing asphalt is protected in place over 7 inches of aggregate base using a CBR value of 2.0.

- **Taxiway Reconstruction without Lime-Treated Subgrade**:

  The first design alternative consists of reconstruction over untreated subgrade and use of a subbase, then aggregate base and asphalt concrete. Per AC 150/5320-6F, a subbase is required as part of the flexible pavement structure on subgrades with a CBR value less than 20. Based on the findings of the geotechnical investigation, the existing condition of the subgrade and in-situ moisture content vary considerably, depending on the location. Without stabilization, the subgrade will have to be dried and recompacted to meet design requirements for moisture content and compaction. The time required to dry out the subgrade, as mentioned previously, will be extensive and is not practical in clayey soils.

  Reconstruction of the taxiway pavement structure without a lime-treated subgrade was evaluated with the following parameters:

  - Subgrade CBR value of 7.3
  - P-209 Crushed Aggregate Base Course
  - P-154 Subbase Course
  - P-401 Asphalt Surface Course
  - 20-year design life

- **Taxiway Reconstruction Lime-Treated Subgrade**:

  The second taxiway design alternative consists of using a lime-treated subgrade to provide a uniform subgrade on which the pavement section can be constructed. The uniformity of the subgrade will promote a homogeneous pavement response to loading and aging. A 16-inch thick lime-treated section is recommended. This will reduce the amount of required earthwork and permit part of the existing aggregate base material to be mixed into the lime-treated subgrade section, which will increase the subgrade strength. The ability to perform a 16-inch treatment in a single pass has been confirmed with local contractors. Due to the localized sulfate-rich soils and high soil moisture content, there will be an expected minimum of nine days during construction for mellowing time, plus additional testing of the mixed material to make sure that the expansive qualities and sulfate quantities have dropped to acceptable levels. Based on past evidence of subsurface water, the use of a stabilization process is the recommended alternative, with edge drains to help maintain long-term soil moisture.

  Reconstruction of the taxiway pavement structure with a lime-treated subgrade was evaluated with the following parameters:

  - Subgrade CBR value of 2
  - Lime-Treated Subgrade (modeled as User Defined Layer with elastic modulus of 78,000 psi)
  - P-209 Crushed Aggregate Base Course
  - P-401 Asphalt Surface Course
  - 20-year design life

7.2.5. Taxiway Comparative Analysis

Based on laboratory CBR test results, an approximate average CBR value of 8 for compacted native soils can be used in the design of reconstructed pavements, assuming the soils are compacted to a minimum of 95 percent. To be conservative and per FAA guidelines, a CBR for pavement design should be one standard deviation below the average. Thus, a CBR of 7.3 was used for the design alternative where the subgrade must be recompacted. The geotechnical report recommends a CBR of not more than 2 for in-situ material (not moisture conditioned or compacted to 95 percent). Based on historical performance showing no pavement rutting, significant edge cracking, or random surface unevenness, a CBR value of 2 was used as a conservative assumption for the existing untreated subgrade.

Table 6. Taxiways Design Alternatives Pavement Section

	Untreated Subgrade	Lime-Treated Subgrade
Asphalt Surface Course, P-401	4 inches	4 inches
Crushed Aggregate Base Course, P-209	7 inches	9 inches
Subbase, P-154	13 inches	N/A
Lime-Treated Subgrade	N/A	16 inches [1]
Re-Worked Subgrade	14 inches [2]	N/A
Subgrade CBR	7.3	2

Notes:

[1] Assumed CBR value of 30 to consider the slower traffic and more frequent hold of aircraft on the taxiway compared with the runway.

[2] Depth of compaction from top of subgrade. It is assumed that below this depth the existing subgrade has at least 85 percent maximum dry density.

7.3. LIFE CYCLE COST ANALYSIS

Life Cycle Cost Analysis (LCCA) is a procedure to economically compare competing design alternatives by considering all significant costs and benefits over the economic life of each alternative. LCCA equates all present and future costs (and benefits) over the life of a pavement by accounting for the effects of the time value of money. Because life cycle costing compares alternatives, it is necessary that each alternative is equivalently designed and provides similar performance results.

There are various ways to express the time value of money. However, present worth or present value economic analyses are considered by the FAA to be the best methods for evaluating airport pavement design or rehabilitation alternatives.

The fundamental factors that should be considered in LCCA are:

- Agency costs (initial, rehabilitation, operation, and maintenance costs)
- User costs (delay-of-use, and others)
- Discount rate
- Rehabilitation election and service life between rehabilitations
- Comparable sections
- Analysis period

Other factors, such as construction duration, rideability over time, safety, and environmental friendliness can also enter pavement type selection. However, it is difficult to relate these factors to cost or performance and put them into an economic analysis. For this LCCA, these factors have been omitted.

For this Project, a 20-year pavement maintenance cycle was evaluated for each runway pavement design option and for the taxiway lime-treated pavement design option. The cycle includes present values for the initial and maintenance costs. Note that the Project costs represent relative costs based on the existing areas to be rehabilitated, and do not include all the Project elements (such as shoulders, electrical, and others). The total present value costs for each option are listed below:

Table 7. Runway LCCA Total Present Values

Option	Total Present Value
Runway Rehabilitation (not selected)	$10,625,083.84
Runway Reconstruction (Base Bid)	$10,162,187.67
Taxiway Connectors (Bid Alternate 1)	$1,519,474.27
Parallel Taxiway (Bid Alternate 2)	$7,625,341.29

The complete LCCA, with a breakdown of initial costs and maintenance schedules, is included as *Appendix G.*

8. CONSIDERATIONS FOR AIRPORT OPERATIONAL SAFETY

8.1. CONSTRUCTION SAFETY AND PHASING ANALYSIS

An analysis between the reconstruction and rehabilitation alternatives of the runway was performed, which included an evaluation of the estimated construction duration. The analysis assumed a full runway closure. For the runway rehabilitation alternative, the estimated construction duration is approximately 3.5 to 4.5 months. For the reconstruction alternative, a construction duration of 3 to 4 months was estimated. Although the reconstruction alternative has more elements of work, the rehabilitation alternative requires almost double the quantity of aggregate base, which is the critical path element during construction. In addition, construction duration for the rehabilitation has more potential for delays, as the moisture condition and the stability of the existing aggregate base will be unknown until uncovered.

The analysis illustrates that the reconstruction alternative not only will provide the benefit listed in the previous paragraphs throughout the report but will also have the shortest duration for construction. The construction duration for each option is summarized below.

Table 8. Runway Construction Duration Options

Option	Estimated Duration
Runway Reconstruction	3 to 4 Months (Full Closure) 14 Working Nights (Nightly Closures)
Runway Rehabilitation	3.5 to 4.5 Months (Full Closure) 14 Working Nights (Nightly Closures)

A phasing analysis has been performed for the entire Project for the reconstruction alternative. The analysis provides the basis for the Construction Safety and Phasing Plan (CSPP). A sample construction schedule for the Project is included as *Appendix H*.

8.2. CONSTRUCTION SAFETY AND PHASING PLAN

Mead & Hunt analyzed the construction Project phasing and looked at options for minimizing disruption to Airport operations. As part of this Project, there are three community outreach workshops to inform the public about the Project and to receive input on construction phasing. The first workshop occurred on August 25, 2020; during the online workshop a survey was done where attendees were asked what was more important to them during construction, limited runway availability or shorter construction durations. There were 42 survey participants; 52% selected Limited Runway Availability and 48% selected the Shorter Construction Duration option. The second workshop occurred on November 17, 2020. Attendees were also given the opportunity to vote on their preference for the construction phasing alternatives. There were 25 survey participants, 64% selected the Full Runway Closure and 36% selected the Partial Runway Closure Alternative. As a result of the survey workshops and considering the safety, schedule, budget, and product quality, the County decided to move forward with the Full Runway Closure Alternative.

A CSPP was developed in accordance with Advisory Circular 150/5370-2G. The CSPP details the proposed phasing and sequence of work, work area limits and pavement closures, haul routes and staging areas, and impacts to procedures and FAA NAVAIDs. The CSPP was uploaded to OEAAA System for FAA review on February 19, 2021. The CSPP is included in the Project Specifications.

9. SURFACE GRADIENT AND DRAINAGE DESIGN

9.1. RUNWAY GENERAL SURFACE GRADIENT CONSIDERATIONS

The scope of this Project does not include grading the RSA to meet the surface gradient requirements of Advisory Circular 150/5300-13A. However, this Project will include improving both the longitudinal and transverse surface gradient of the runway pavement and matching existing grades with RSA-compliant slopes where possible. As part of the preliminary design, the runway surface was analyzed to determine how the existing conditions and electric facilities might impact the design of the new pavement surface. The existing runway surface is not in conformance with applicable gradient requirements, with deviations noted along the entire runway, which are discussed in the following paragraphs. Existing conditions that impact the design are the following:

- In MALSF bars
- Runway edge lights
- Runway 25 Localizer
- Transverse slopes on the runway cross section less than 1.0 percent in various locations
- Shallow slopes in the existing RSA
- Approach and departure surfaces

A design surface was developed for Runway 7-25. The surface aims at achieving 13A compliance, at least within the pavement limits. When matching into the existing RSA, Runway 7-25's centerline profile should be raised enough to allow for a maximum total transverse elevation drop of about 20 inches (1.675 feet) to allow matching existing (and shallow) grades without creating swales in the RSA. As mentioned above, the Project does not include grading the RSA to 13A-compliant grades off paved areas. A future project should be programmed to adjust the RSA slopes as necessary.

The analysis for the design of the new pavement surface was conducted considering the following assumptions:

- Runway Design Category D-III (Critical Aircraft – Gulfstream G650)
- Shoulder width of 20 feet
- RSA-compliant grading, including cross section slopes on paved areas between 1.0 and 1.5 percent slope (preferably not less than 1.25 percent for asphalt concrete pavements to allow for proper drainage), 1.5-inch drop between paved and unpaved areas, and first 10 feet off paved areas at 5.0 percent slope

9.1.1. First Quarter of Runway 7

The first quarter of Runway 7 starts at Taxiway E and ends before Taxiway D. The existing pavement transverse grades on both sides of the runway crown and the entire length of the runway section within the first quarter of Runway 7 are out of tolerance with the specified criteria per the Advisory Circular. Within this section, transverse grades are both too steep and too shallow. The grades are as steep as 2.08 percent and as shallow as 0.51 percent. Existing pavement longitudinal grades within the first quarter section of Runway 7 have grades below the 0.80 percent maximum but have non-standard grade changes. Within the first quarter section of the runway, grade changes are not allowed. There are existing grade changes up to 0.15 percent.

The proposed profile for the first quarter of Runway 7 consists of one tangent at a 0.09 percent slope, which complies with Advisory Circular 150/5300-13A (refer to *Appendix I, Exhibits I.4 and I.5*).

It was observed that the runway centerline profile in this section needs to be raised more than 6 inches to a maximum of 10 inches to meet RSA grading compliance for unpaved areas (first 10 feet off pavement at -5.0%). A deviation of more than 6 inches from the existing runway grades may require an adjustment to the localizer and approach and departure surfaces. Runway 7 threshold would need to be raised between 5 to 8 inches to be able to meet RSA grading on paved areas in the first quarter of Runway 7.

9.1.2. Middle Section of Runway 7-25

The middle section of Runway 7-25 starts before Taxiway D and ends after Taxiway B. Existing pavement transverse grades within the middle section of Runway 7-25 are outside the specified criteria. The areas outside the specified criteria are on both sides of the runway crown and span the entire length of the section. Within this section, transverse grades are typically too shallow. The transverse grades are as shallow as 0.10 percent. The longitudinal grades in this area are all below the maximum requirement of 1.50 percent. The middle section of Runway 7-25 has non-standard grade changes. All grade changes on a runway require vertical curves. The non-standard grade changes, without vertical curves, are up to 0.40 percent.

The proposed runway centerline profile in the middle section of Runway 7-25 (refer *Appendix I, Exhibits I.5 to I.8*) includes the only three grade changes of the profile. Longitudinal slopes as well as the distances of point of vertical intersection comply with Advisory Circular 150/5300-13A. Also, in this section, it was observed that the runway centerline profile needs to be raised more than 6 inches to meet full RSA grading compliance. In the middle section of Runway 7-25 joining the existing surface with RSA grading requirements can be done by raising the runway centerline profile by a maximum of 10 inches. Compliant slopes can be achieved in this runway section with a transverse slope of 1.3 percent.

9.1.3. First Quarter of Runway 25

The first quarter of Runway 25 starts at Taxiway A and ends before Taxiway B. Pavement transverse grades within the first quarter of Runway 25, on both sides of the crown, have slopes that are outside the specified criteria. The non-standard slopes run the entire length of this section, with slopes as steep as 1.91 percent and slopes as shallow as 0.20 percent. Pavement longitudinal grades within the first quarter of Runway 25 also have grade changes outside of the specified criteria. Longitudinal slopes are all below the 0.80 percent maximum. There are existing grade changes from 0.10 to 0.40 percent.

One of the goals of the design is to minimize disruption to the existing MALSF bars. To do this, three alternative centerline profiles were developed during preliminary design and an additional option was developed during final design for the first quarter of Runway 25 so that minimal to no adjustments will be required for the MALSF bars. The four options are as follows:

Option 1. This option consists of reconstructing/rehabilitating the runway pavement between MALSF bars by maintaining the existing grades and MALSF foundation bar elements. (See *Appendix I*, *Exhibit I.1*). With this option no adjustments to the concrete bars or to the approach surface will be required. However, this option results in grade changes in the first quarter of the runway centerline profile (AC 150/5300-13A Paragraph 313 b. (2)) and a positive longitudinal slope on Runway 25 blast pad (AC 150/5300-13A Figure 3-22).

Option 2. This option consists of reconstructing/rehabilitating the runway pavement with a -0.23% longitudinal slope in the first quarter of Runway 25 keeping the MALSF threshold bar (bar #1) at the existing elevation. (See *Appendix I*, *Exhibit I.2*). Option 2 also includes a 0.0% longitudinal slope on Runway 25 blast pad. This option will require the reconstruction of MALSF foundation bars #2 (-1.1 inches) and #3 (+0.4 inches) on Runway 25, and #4 (-4.2 inches) on Runway 25 blast pad. For Option 2, there is no longitudinal gradient change in the first quarter of the runway and no adjustment to the approach surface is anticipated.

Option 3. This option consists of reconstructing the runway pavement so that no adjustment is needed for MALSF bar #2. (See *Appendix I*, *Exhibit I.3*) The centerline profile proposed for Option 3 features the same longitudinal slopes as the one in Option 2, but the overall profile was raised by approximately 1 inch to avoid the reconstruction of MALSF bar #2. MALSF bars #1 and #3 will need to be reconstructed to raise them by +1.1 inches and +1.4 inches, respectively. Adjustment for MALSF bar #4 will be approximately -3 inches. Also, for Option 3 there is no longitudinal gradient change in the first runway quarter and no adjustment to the approach surface is anticipated.

The three MALSF options were discussed with the FAA during preliminary design; Option 3 was identified as the preferred alternative and a preliminary surface was developed considering this profile for the first quarter of Runway 25 (refer to *Appendix I*, *Exhibits I.8 and I.9*).

During final design and upon acquiring additional topographical information it was noticed that if Option 3, as explained above was used, the blast pad edge of pavement was going to be about one foot below existing ground when constructed according to standard. This would create a swale at the edge of the pavement. It was proposed to FAA and the Ventura County to raise the first quarter of Runway 25 to a maximum of 6 inches to resolve the grading issues (Option 4).

Option 4. This option will require the reconstruction of MALSF foundation bars #1 (+4.3 inches), #2 (+4 inches), and #3 (+6.4 inches) on Runway 25, and #4 (+2 inches) on Runway 25 blast pad. For Option 4, there is no longitudinal gradient change in the first quarter of the runway and no adjustment to the approach surface is anticipated.

The first quarter of Runway 25 (between stations 144+50 and 159+53) and Runway 25 Blast Pad, were analyzed considering this option of the MALSF alternatives as the centerline profile. Option 4 of the MALSF alternatives allows the pavement to be constructed at the minimum 1.0 percent transverse slope. Runway 25 Blast Pad is currently at a non-standard longitudinal grade. MALSF Option 4 profile shows the blast pad at a 0.0 percent slope, which is compliant with FAA Advisory Circular 150/5300-13A Change 1 requirements.

In summary, the preferred runway profile Option 4 will create 13A complaint slopes everywhere within Runway 7-25 pavement limits. With the proposed profile, RSA grades cannot be met everywhere outside of the runway pavement as the existing infield is too flat; however positive drainage will exist for the entirety of the runway. Per FAA's recommendation during final design, the MALSF threshold bar got moved 8 feet from the threshold to avoid it being crowded with the runway edge lights.

During preliminary coordination with the FAA and the Airport, there was discussion about the option of raising the runway surface between one and two feet to minimize the grading effort, and making adjustments to existing FAA-owned equipment located in the RSA, in the case of a future project to correct the existing RSA grades at the Airport. It was decided not to follow this option, as the timeline of the Project will not allow for the coordination of establishing a new approach. Therefore, without raising the runway more or grading the whole infields and affecting some of the NAVAIDs, it is not possible maintain 5% for the first ten feet of unpaved surface adjacent to the paved surface.

9.2. TAXIWAY GENERAL SURFACE GRADIENT CONSIDERATIONS

A pavement surface model was developed for the taxiway connectors and parallel taxiway. The surface aims at achieving 13A compliance, at least within the pavement limits. As mentioned above, the Project does not include grading the TSA and TOFA to 13A-compliant grades off paved areas. A future project will be scheduled to correct the TSA and TOFA slopes, if necessary.

The analysis for the design of the new pavement surface was conducted considering the following assumptions:

- Runway Design Category D-III (Critical Aircraft – Gulfstream G650)
- Taxiway Design Group 3
- Shoulder width of 20 feet
- Compliant grading within pavement limits, including cross section slopes on paved areas between 1.0 and 1.5 percent slope, a 1.5-inch drop between paved and unpaved areas, and grading of the first 10 feet off paved areas at 5.0 percent slope.

Taxiway longitudinal slopes will meet the maximum 1.5 percent slope requirements. Taxiway connector transverse slopes will be reconstructed to standard except where they are intersecting with the runway or another taxiway. Precedence is given to the runway in a runway-taxiway situation and to the parallel taxiway in a taxiway-taxiway situation. Taxiway F will be sloped towards the apron at 1.0-1.5 percent; this will be considered a shed section. This reduces the need to do a wide transition into the apron pavement and possible utility relocations. For the first ten feet of unpaved surface adjacent to the paved surface, a 3% cross slope is targeted. A 5% slope is not achievable as proposed surface is already below existing ground.

The existing non-standard condition will remain for the crown of the Taxiways B and F being higher than the Runway centerline in some areas. Some grades cannot be corrected due to matching elevations on the apron south of Taxiway F.

In the event Bid Alternate 1 is not awarded a Base Bid Transition is proposed to match the existing taxiway connectors pavement. If Alternate 2 is not awarded, Bid Alternate 1 Transition is proposed to match the new taxiway connector grades to Taxiway F existing pavement.

9.3. DRAINAGE CONSIDERATIONS

There are no significant drainage concerns within the Project limits. Although some of the existing infield grades are flatter than standard, all stormwater sheet flows away from the runway and taxiway centerlines and into the designated drainage areas and storm drain systems located throughout the airfield. A system of underground pipes is located between Runway 7-25 and Taxiway F in infield areas. Catch basins in the infield area collect stormwater into the pipes dispersing runoff to a detention area at the southwest corner of the Airport along the perimeter road and connect into the Victoria Ave storm drain system. An impervious area will be added to the existing Runway 25 blast pad, consisting of approximately 0.21 acres. The additional paved area is not expected to significantly increase runoff and is below the mitigation threshold indicated by the Ventura Technical Guidance Manual for Best Management Practices (BMPs). Thus, incorporation of post-construction BMPs in the Project is not expected. In total, the pavement area is reduced when considering the reduction in width of Connector Taxiways C and D (under Bid Alternate 1) and parallel Taxiway F for Bid Alternate 2.

Due to the shallow slopes in the in-fields, some areas of the proposed finished surface are below existing ground. Existing storm drain inlets will be protected in place and additional manholes will be constructed as part of underdrain system requirements. An analysis was completed to verify that the existing storm system is adequate based on the proposed grading plan.

The existing storm system within the project limits consists of 23 catchment areas. Each catchment area discharges its surface flow into an existing catch basin. Bid Alternate 1 will introduce a new catch basin within Catchment Area 7 and Bid Alternate 2 will introduce a new catch basin within Catchment Area 14. For simplicity in analysis, these new catch basins and their catchment areas were subdivided within the existing catchment area with an ‘A’ designation representing the existing catch basin and a ‘B’ designation representing the new catch basin.

Peak surface flow rates within catchment areas for pre-construction, Base Bid, Bid Alternate 1, and Bid Alternate 2 were computed using the Rational Method. Adequacy of the existing storm system was determined by comparing the pre-construction peak surface runoff rates to the Base Bid, Bid Alternate 1, and Bid Alternate 2 peak surface runoff rates using a 5-year storm event. For the Base Bid improvements there were two catchment areas where the peak flow increased by more 10%. For the Bid Alternate 1 improvements there were four catchment areas where the peak flow increased by more 10%. For Bid Alternate 2 the peak surface runoff rates decreased in most catchment areas. In the areas where the peak flow rate increased by more than 10%, the difference was minimal. For example, there was a 54% increase for Catchment 5 in Base Bid and Bid Alternate 1 improvements, but the flow rate only increased from 0.24 cfs to 0.37 cfs. The exhibits showing the catchment areas and a table showing the changes in peak surface runoff rates are included in *Appendix J*.

Changes in the peak surface runoff rate are attributed to geometric changes in catchment area boundaries due to a modified finished grade, changes in surface type, such an impermeable paved surface that is now a permeable seeded soil, and changes in elevations along the critical flow path from the most distant point in the catchment area. However, the proposed drainage conditions do not adversely impact the exiting drainage facilities and overall drainage characteristics of the site.

10. AIRFIELD LIGHTING AND SIGNAGE

10.1. EXISTING AIRFIELD LIGHTING, SIGNAGE, AND NAVAIDS

Runway 7-25 is equipped with medium intensity runway lights (MIRL), including edge, threshold, and end lights, along with FAA-owned four-box precision approach path indicators (PAPI) for each direction. Runway 7 is equipped with Runway End Identifier Lights (REIL) and Runway 25 is equipped with FAA-owned medium intensity approach lighting system with sequenced flashing lights (MALSF). The runway also has LED runway exit signs and LED runway distance remaining signs. Taxiways A, B, C, D, E, and F are equipped with medium intensity LED taxiway edge lights (MITL) and LED taxiway guidance signs.

An assessment of the electrical system revealed the following existing conditions:

Runway Lighting

- The runway edge lights meet spacing requirements of Advisory Circular 150/5340-30J. The FAA requirement for runway edge light spacing shall be consistent along the entire length of the runway and be no greater than 200 feet apart. The runway edge light spacing is 196.71 feet consistently along the runway.
- The runway L-867 light bases are individually grounded and were installed in 2013. The L-867 light bases were installed with drainage rock under each light base.
- The MIRLs utilize LED lamps and were installed in 2013. The fixtures were noted to be installed with consistent 14-inch stem heights, per construction details. The MIRLs are reaching the end of their useful

life. Replacement of the MIRLs under this Project would be the most cost-effective solution due to signs of deterioration and would avoid future runway closures.

Taxiway Lighting

- The MITLs utilize LED lamps and were installed in 2013. The fixtures were noted to be installed with consistent 14-inch stem heights, per construction details. The MITLs are reaching the end of their useful life. Replacement of the MITLs under this Project would be the most cost-effective solution and would avoid future runway closures.
- The taxiway light base cans will have to be removed and replaced due to the taxiway geometry changes.

Signage

- The spacing of the distance remaining signs on the runway does not meet Advisory Circular 150/5340-18G standards. Currently, five distance remaining signs, instead of four, are located on the north side of Runway 7-25. The existing distance remaining signs continue to be a maintenance issue and are also reaching the end of their useful life. Replacement of these airfield signs under this Project would be the most cost-effective solution due to indications of deterioration and would avoid future runway closures.
- The runway exit signs utilize LED technology and were replaced in 2013. Existing signs include a concrete pad with a base can to house the in-line isolation L-830 transformer. The existing runway exit signs continue to be a maintenance issue and are also reaching the end of their useful life. Replacement of the airfield signs under this Project would be the most cost-effective solution due to indications of deterioration and would avoid future runway closures.

Infrastructure

- The underground cable appears to be installed in schedule 40 PVC conduit. The runway and taxiways electrical conduit and cable were replaced in an electrical replacement project in 2013. Per the construction details, the 2-inch conduit is installed 2 feet under existing ground in paved and unpaved areas.
- Existing pullboxes and junction structures for the runway and taxiway are properly sized and were replaced as part of the electrical replacement project in 2013.
- The airfield is equipped with two airfield lighting circuits, one for the runway and one for all taxiways.
- The constant current regulators (CCRs) and other airfield NAVAIDs are controlled by a programmable logic controller (PLC) cabinet in the electrical switchgear room. The PLC cabinet was replaced in 2013 and is in good operating condition.
- The existing electrical switchgear room is located adjacent to the airport traffic control tower (ATCT). The building had all the electrical equipment renovated and upgraded in 2013. The vault houses two CCRs, one for the runway and one for the taxiways. The airfield vault is fed from an existing 8-parallel 250 MCM, THWN connecting to an existing 112.5kVA, 120/240V, 3P-3W delta transformer.
- The Runway 7-25 circuit is fed from a Siemens L-828 15 kW, 3-step CCR that was installed in 2013 and is in good operating condition. The runway circuit includes all MIRLs, runway distance remaining signs, and mandatory signs. Load calculations were done, and they confirm that the 15 kW CCR is sufficient for the Runway circuit load.

- The Taxiway circuit is fed from a Siemens L-828 15 kW, 3-step CCR that was installed in 2013 and is in good operating condition. The taxiway circuit includes all MITLs and guidance signs. Load calculations were done, and they confirm that the 15 kW CCR is sufficient for the Taxiway circuit load.
- Pilot controlled lighting includes the MALSF, REILs, runway and taxiway edge lights.
- The glide slope antenna is located east of Taxiway B.
- An Automated Surface Observing System (ASOS) is located west of Taxiway B.
- A primary lighted wind cone is located north of Taxiway F and west of Taxiway C. One of the supplemental lighted wind cones is located in the infield west of Taxiway A and the other one is located east of taxiway E. There is an anemometer east of the segmented circle.

10.2. AIRFIELD LIGHTING, SIGNAGE, AND NAVAID RECOMMENDATIONS

10.2.1. Runway Recommendations

Due to the improvements needed on Runway 7-25 pavement, the current airfield electrical system will need to be adjusted to the new runway surface grade per the preferred pavement design and surface option. Modifications to the electrical system will be necessary for both pavement improvement options. Adjustments for the spacing of the distance remaining signs will be necessary for both rehabilitation and reconstruction. It is also recommended that MIRLs, and runway exit and distance remaining signs be replaced as part of this Project for the reasons specified above.

With the reconstruction option, the runway surface grades will be raised up to 9 inches on the centerline. However, due to the steeper transverse slopes on the runway, the light cans will not need to be raised by more than six inches. New electrical cable and new counterpoise will be installed on the runway circuit due to the light can elevation adjustments and length of spare cable available to accommodate the adjustment. The MALSF light bars will need to be modified as described in Section 8.1.3. For the reconstruction option, four bars are required to be higher. They will need to be removed and replaced. The MALSF bars were previously considered to be adjusted without being removed. However, due to concerns with their concrete foundation integrity if sawcut and adjusted, it is recommended they be demolished and reconstructed. In the event that Bid Alternate 1 is not awarded, elevation adjustments to some of the runway signs are anticipated under Base Bid Transition due to proposed runway grades.

The electrical improvements on Runway 7-25 will be more extensive in a pavement rehabilitation. In this case, all the light cans will need to be raised by approximately 17 inches for the additional aggregate base required to keep the existing transverse slopes. Due to the elevation changes of the light cans, installation of new conduit and cable will be required, as well as new counterpoise. Adjustments to the MALSF bars will be more than a few inches and will require removal and reconstruction of all the bars. For the rehabilitation option, elevation adjustments of sign pads will be necessary as tie-in to existing grades occurs further from the pavement edge. However, this option is not considered due to the decision to only advance with the lime-treated subgrade reconstruction option.

The airfield electrical system improvements for the runway reconstruction and rehabilitation options discussed above are summarize below:

Electrical Modifications included with Runway Reconstruction Option

1) Runway edge light base can adjustments.
2) MIRLs fixtures replacement.

3) MALSF light bars removal and replacement.
4) New counterpoise system installation.
5) New runway MIRL cable in existing conduit installation.
6) Runway Exit signs replacement.
7) Runway Distance Remaining signs replacement.
8) Other NAVAIDS adjustments, such as REILs relocation.

Electrical Modifications included with Runway Rehabilitation Option (included for reference only)

1) Airfield electrical removals.
2) MIRLs fixtures replacement.
3) Existing base cans replacement.
4) Airfield signs elevation adjustments.
5) New runway MIRL conduit and cable installation.
6) New counterpoise system installation.
7) MALSF light bars removal and replacement.
8) Runway Exit signs replacement.
9) Runway Distance Remaining signs replacement.
10) Other NAVAIDS adjustments, such as REILs relocation.

10.2.2. Taxiway Recommendations

Due to the standardized geometry of the taxiway connectors and Taxiway F shift to the south, modifications to the electrical system will be necessary. New taxiway edge lights, electrical conduits, conductors, counterpoise, and signs will be installed on a taxiway circuit as part of Bid Alternates 1 and 2. In the event that Bid Alternate 1 is not awarded, a transition is proposed where taxiway edge lights will be adjusted to grade and signs will be installed. In the event that Bid Alternate 2 is not awarded, a transition is proposed where interim taxiway edge lights and signs will be installed. New conduits with new conductors will be installed and connected to the existing taxiway circuit. Note that these transitions are designed as temporary and do not meet standard fillet design.

If Bid Alternate 1 or 2 is awarded, all the taxiways will be renamed to be alphanumeric. Taxiway F will become Taxiway A and the taxiway connectors will be renamed A1 to A5 from east to west. Panel replacement on the new signs and taxiway renaming shall occur after all other construction is complete. The panel swap date shall comply with FAA publication cycle of airport diagrams per the NFDC aeronautical information portal.

11. NAVAIDS AND FAA-OWNED FACILITIES

11.1. MALSF

The existing MALSF is FAA-owned and located on the Runway 25 approach. The runway reconstruction and rehabilitation options would increase the runway profile elevation, which would require the threshold bar and centerline light elevations to be adjusted, as described in the previous section. A reimbursable agreement with the FAA is in place to support these modifications.

11.2. GLIDESLOPE

The existing glideslope equipment is FAA-owned and located in the infield between Runway 7-25 and Taxiway F, and Taxiway D and Taxiway E. It is believed the runway reconstruction option would not require a modification to the approach procedure. During construction, this will require a temporary deactivation by FAA Technical Operations and a flight check to reactivate as part of the reimbursable agreement. The reimbursable agreement with the FAA will confirm the approach procedure. Both options require a temporary deactivation by FAA Technical Operations and a flight check to reactivate as part of the reimbursable agreement.

11.3. LOCALIZER

The existing localizer equipment is FAA-owned and located at the end of Runway 25 (beginning of Runway 7). No modifications to this equipment are anticipated for this Project. During construction, this will require a temporary deactivation by FAA Technical Operations and a flight check to reactivate as part of the reimbursable agreement.

11.4. PAPI

The existing four-box PAPIs are FAA-owned and located on both runway approaches. Review of Threshold Crossing Height (TCH) revealed that Runway 7 PAPI will have to be adjusted by less than one inch to have a 40 feet TCH. Existing PAPI for Runway 25 is sitting more than 1.7 feet higher than existing runway centerline. With the proposed profile, the PAPI light housing assemblies (LHAs) will be 1.3 feet higher than the proposed runway centerline. As coordinated with FAA during final design, both PAPIs will be protected in place. Note that the grades adjacent to the PAPIs will not be changed. During construction the PAPIs will be protected with high visibility plastic fence, temporary deactivated by FAA Technical Operations, and flight checked to reactivate as part of the reimbursable agreement.

11.5. REILS

The existing LED REILs are Airport-owned and located on Runway 7. Both the runway reconstruction and the rehabilitation alternatives would increase the runway profile elevation, which require relocation and adjustment to the REILs.

11.6. WIND CONE AND SEGMENTED CIRCLE

The Airport is equipped with a primary lighted wind cone and segmented circle, with supplemental lighted wind cones at each end of the runway. All the wind cones are LED and the primary wind cone has an external lighting assembly. Only the cable feeding the wind cones will be removed and replaced, as all windcones are on the runway circuit. No other modifications to this equipment are anticipated for this Project.

12. PAVEMENT MARKINGS

FAA criteria listed in recently updated Advisory Circular 150/5340-1M provides guidance for the marking of airfield pavements. This Project will include new runway markings that meet current standards. The runway approach type is a non-precision instrument for Runway 7 and a precision instrument for Runway 25. The approach type dictates which runway markings are required. All markings will be designed to have the correct length, width, and spacing. Based on the distance between the displaced thresholds on the runway, the touchdown zone markings will be adjusted and marked accordingly. The taxiway centerline radii leading onto the runway will be designed to meet current requirements for Taxiway Design Group (TDG) 3. All new markings will include a black border, which is required for the runway and holding position markings and recommended for the taxiway centerline markings. All new markings should be conventional waterborne paint with Type I reflective media for red paint and Type III reflective media for the rest of the paint colors, as applicable.

In the event that Bid Alternates 1 and 2 are not awarded, a transition is proposed where interim non-standard taxiway pavement markings will be installed.

13. ENVIRONMENTAL CONSIDERATIONS

Due to the nature of the improvements, the FAA has determined that the proposed Project is Categorically Excluded, pursuant to FAA Order 1050.1F, Paragraph 5-6.4e, as it relates to the National Environmental Policy Act (NEPA) of 1969, as amended. The Project will not disturb any native ground areas. All construction will be performed within existing disturbed limits. Originally a Categorical Exclusion (CATEX) was submitted and approved for the Runway 7-25 and Connector Taxiways. Then a revalidation letter was sent and approved to include the Runway 25 blast pad construction and a CATEX was later submitted to include Taxiway F reconstruction. See *Appendix K* for the FAA Categorical Exclusion Approval letters.

14. UTILITY LINES IN WORK AREA

The known utilities are shown on the Project plans. Utilities known to cross the work area are as follows:

Table 9. Known Utilities

Utility	Provider
FAA Electrical and Communication	FAA
Airfield Electrical	County of Ventura
Electrical	Southern California Edison
Water	City of Oxnard
Storm Drain	City of Oxnard

Other utilities that may cross the work area, but no as-built have been located include:

Table 10. Possible Utilities

Utility	Provider
Telephone	Verizon
Sanitary Sewer	City of Oxnard
Gas	Southern California Gas Company (Sempra Energy)

The contractor must comply with Dig Alert/Underground Service Alert of Southern California requirements for underground service alert. There are utilities crossing the Airport, and the contractor will be required to pothole at locations for existing utility conflicts. In the unlikely event a utility is disrupted, the contractor is responsible for contacting that utility company and requesting the repair. All existing utilities should be protected in place unless otherwise noted. The Airport will assist with the location of County-owned utilities.

15. DELINEATION OF AIP ELIGIBLE AND INELIGIBLE WORK ITEMS

The Project design and construction are expected to be funded by FAA Airport Improvement Plan (AIP) Grant Nos. 3-06-0179-037-2020 (Design) and 3-06-0179-038-2021 (Construction). All Project elements are anticipated to be AIP eligible.

16. DBE PARTICIPATION

The FAA grant for this Project would exceed $250,000; therefore, a Disadvantaged Business Enterprise (DBE) program is required. The County of Ventura DBE Program, dated May 2017, is approved by the FAA. Language will be included in the bidding documents to encourage DBE participation. The established DBE goal is 6.03 percent. A draft DBE Program was submitted for the Fiscal Years (FY) 2019 to 2021 in February 2019, which proposes an average DBE goal of 5 percent on average during the three FYs.

17. PROJECT SCHEDULE

17.1. DESIGN AND BIDDING SCHEDULE

The Project design schedule is detailed in the following table:

Target Date	Design Milestone
October 3, 2018	Runway Preliminary Design Contract Award – Complete
October 28 – November 1, 2018	Topographic Survey field work (ECG) – Complete
October 28 – November 1, 2018	Geotechnical Investigation field work (Earth Systems) – Complete
November 13, 2018	Topographic Survey drawing received (ECG) – Complete
December 20, 2019	Topographic Survey drawing received (ECG) – Complete
October 2019	Preliminary Design Concept Report Submittal – Complete
June 12, 2020	CATEX Approved – Complete
June 16, 2020	Design Contract Award for Runway 7-25, Taxiway Connectors, and Parallel Taxiway Reconstruction Project – Complete
July 24, 2020	Geotechnical Investigation report (Earth Systems) – Complete
July 2020	Finalize Preliminary Design Concept Report – Complete
July 14, 2020	Preliminary (30%) Submittal (Bid Alternates 1 and 2 only) – Complete
July 31, 2020	County/FAA Review – Complete
August 25, 2020	Public Outreach Workshop #1 (online) – Complete
September 30, 2020	60% Submittal – Complete
October 13, 2020	County/FAA Review – Complete County comments received – 10/23/20 FAA ATO comments received – 11/2/20 FAA LA-ADO comments received – 11/10/20
November 17, 2020	Public Outreach Workshop #2 – Complete
January 7, 2021	95% Submittal – Complete

Target Date	Design Milestone
January 28, 2021	County/FAA Review – Complete County comments received – 2/2/21, 2/10/21 FAA ATO comments received – 2/2/21 FAA LA-ADO comments received – 2/3/21 FAA Part 139 Inspector comments received – 2/5/21
February 25, 2021	100% Submittal – Complete
March 11, 2021	County/FAA Review – Complete County comments received – 3/15/2021 FAA ATO comments received – 3/15/2021; 3/17/2021 FAA LA-ADO comments received – 3/17/2021
March 30, 2021	Final Bid Documents – Complete
March 30, 2021	Advertise for Bidding – Complete
April 29, 2021	Open Bids
May 12, 2021 After Bid Opening	Bid Tabulation and Recommendation for Award Public Outreach Workshop #3

The design and bidding schedule are subject to County approval of revised schedule, County and FAA review of the final design, as well as FAA funding availability.

17.2. CONSTRUCTION SCHEDULE

To assist the Contractor in sequencing the work, an example schedule for each award scenario (total of 3) has been included as *Appendix H*. This schedule is intended as a guide only and may not incorporate all means and methods required by the Contractor. The example schedule shall in no way override any of the requirements listed in the CSPP and contract documents. The Contractor is responsible for planning and sequencing the work in order to meet the limitations specified.

It is anticipated that the Notice to Proceed (NTP) for Mobilization Phase 1 will be on June 14, 2021, and the NTP for Mobilization Phase 2 and Construction is June 28, 2021. These dates are an estimated schedule. If delay of the FAA grant does not permit Construction Phase 1 completion by November 1, 2021, the Project may not start until 2022 to avoid a suspension of work with an unusable runway.

18. ENGINEER'S ESTIMATE OF PROBABLE COST

This Project will be bid with a Base Bid (two Bid Schedules), Bid Alternate 1 (two Bid Schedules), and Bid Alternate 2 (one Bid Schedule).

The construction cost estimates were developed for each of the Bid Schedules. The estimated construction costs are summarized below:

Table 11. Estimated Project Construction Costs per Bid Schedule

	Bid Schedule	Description	Bid Schedule Construction Cost Estimate
Base Bid (Runway)	A	Base Bid Work	$ 11,845,601.00
	B	Base Bid Transition Work	$ 838,035.00
Bid Alternate 1 (Taxiway Connectors)	C	Bid Alternate 1 Work	$ 3,049,275.00
	D	Bid Alternate 1 Transition Work	$ 1,117,340.00
Bid Alternate 2 (Parallel Taxiway)	E	Bid Alternate 2 Work	$ 11,496,170.00

Table 12. Estimated Project Construction Costs per Award Type

	Bid Schedules	Alternate Construction Cost Estimate
Base Bid + Base Bid Transition	A + B	$ 12,683,636.00
Base Bid + Bid Alternate 1 + Bid Alternate 1 Transition	A + C + D	$ 16,012,216.00
Base Bid + Bid Alternate 1 + Bid Alternate 2	A + C + E	$ 26,391,046.00

A detailed breakdown of the estimated Project costs for each Bid Schedule are included as *Appendix L*.

19. PROJECT BUDGET

The Project budget summary that identifies all anticipated Project costs without price escalation is shown as follows.

Table 13. Project Budget

Task	Budget
Runway 7-25, Taxiway Connectors, and Parallel Taxiway Reconstruction	$ 26,391,046.00
County Administration	$ 529,000.00
Preliminary Design	$ 157,640.00
Final Design	$ 1,507,309.14
Topographic Survey	$ 26,795.00
Geotechnical Investigation	$ 176,695.00
Resident Engineering	$ 1,453,000.00
Materials Testing	$ 397,000.00
Construction Administration	$ 1,319,700.00
Reimbursable Agreement	$ 150,000.00
Construction Contingency (3%)	$ 791,731.38
Total	**$ 32,899,916.52**

20. RECOMMENDATIONS

The recommended improvement option for Runway 7-25 is the runway reconstruction alternative consisting of 4 inches of asphalt surface course, 8.5 inches of crushed aggregate base course, and 16 inches of lime-treated subgrade. The preferred design alternative for the taxiways is the lime-treated subgrade design alternative, which consists of 4 inches of asphalt surface course, 9 inches of crushed aggregate base course, and 16 inches of lime-treated subgrade. These solutions present the best balance of minimizing the operational disruption to the Airport by keeping overall construction costs to a minimum, reducing export costs by raising the runway centerline, and accounting for wet subgrade conditions.

Furthermore, these options will correct non-standard transverse and longitudinal grades on the runway and taxiway pavements. The reconstruction option on the runway option also reduces the impact on the runway electrical system, as only minor elevation adjustments are needed for the base cans. This Project does not include correction or remedy of the RSA, TSA, and TOFA slopes, as this is outside of the approved environmental area and expected to be done as part of a future project.

Respectfully submitted by,

MEAD & HUNT, Inc.

Charles S. McCormick

Chuck McCormick

Project Manager

Jannet Loera

Jannet Loera, PE

Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
JANNET LOERA
C 84900
EXP. 03/31/22
CIVIL
STATE OF CALIFORNIA

3-30-21

Appendices:

Appendix A	Project Layout Plan
Appendix B	13A Survey Analysis Summary
Appendix C	Site Photographs
Appendix D	Geotechnical Engineering Report
	Part 1 – 2020 Geotechnical Report
	Part 2 – Addendum No. 1, Sulfate Testing of Subgrade Soils
Appendix E	Aircraft Fleet Mix
Appendix F	FAARFIELD Airport Pavement Design Reports
Appendix G	Life Cycle Cost Analysis
Appendix H	Construction Schedule
Appendix I	Preliminary Runway Surface Analysis
Appendix J	Drainage Catchment Areas
Appendix K	FAA CATEX Approval Letter
Appendix L	Engineer’s Estimate of Probable Cost

APPENDICES

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Appendix A – Project Layout Plan

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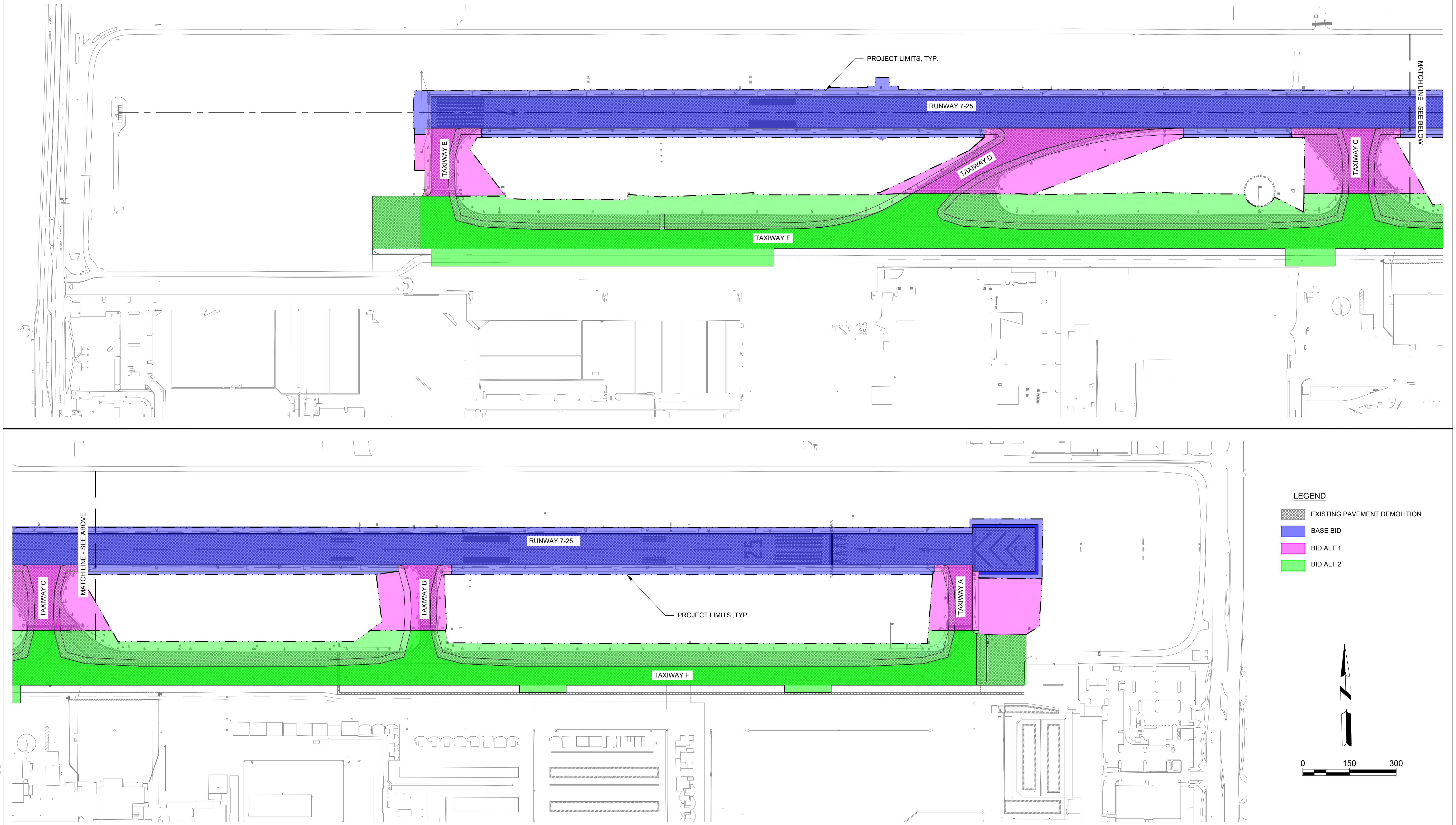

LEGEND

▨ EXISTING PAVEMENT DEMOLITION

🟦 BASE BID

🟪 BID ALT 1

🟩 BID ALT 2

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VENTURA COUNTY
DEPARTMENT OF AIRPORTS
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY
PAVEMENT RECONSTRUCTION

2/25/2021

PROJECT LAYOUT PLAN

Mead
&Hunt

APPENDIX A

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Appendix B - 13A Analysis Summary

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EXISTING NON-STANDARD CONDITIONS TABLE			
DEVIATION	**FAA STANDARD**	**EXISTING CONDITION**	**PROPOSED CORRECTION**
RUNWAY OBJECT FREE AREA (ROFA)	THE ROFA CLEARING STANDARD REQUIRES CLEARING THE ROFA OF ABOVE-GROUND OBJECTS PROTRUDING ABOVE THE NEAREST POINT OF THE RSA. OBJECTS NON-ESSENTIAL FOR AIR NAVIGATION OR AIRCRAFT GROUND MANEUVERING PURPOSES MUST NOT BE PLACED IN THE ROFA. THE ROFA FOR AN RDC OF D-III IS 400 FEET FROM THE RUNWAY CENTERLINE, 1,000 FEET BEYOND THE RUNWAY END, AND 600 FEET PRIOR TO THE THRESHOLD.	COMMERCIAL/RESIDENTIAL PROPERTIES AND ASSOCIATED OBSTRUCTIONS ARE 300 FEET TO 400 FEET NORTH OF THE RUNWAY CENTERLINE; A COMMERCIAL PARKING LOT AND ASSOCIATED OBSTRUCTIONS ARE 370 FEET SOUTH OF THE RUNWAY CENTERLINE; A PERIMETER SERVICE ROAD IS 255 FEET NORTH OF THE RUNWAY CENTERLINE AND 330 FEET SOUTH OF THE RUNWAY CENTERLINE; A FENCE LINE IS 300 FEET TO 400 FEET NORTH OF THE RUNWAY CENTERLINE; AND THE SEGMENTED CIRCLE IS 200 FEET SOUTH OF THE RUNWAY CENTERLINE AND IT IS NOT CONSIDERED FIXED-BY-FUNCTION.	CORRECTION OF THESE CONDITIONS ARE OUTSIDE THE SCOPE OF THIS PROJECT.
RUNWAY SAFETY AREA (RSA)	THE RSA MUST BE FREE OF OBJECTS, EXCEPT FOR OBJECTS THAT NEED TO BE LOCATED IN THE RSA BECAUSE OF THEIR FUNCTION. THE RSA FOR AN RDC OF D-III IS 250 FEET FROM THE RUNWAY CENTERLINE, 1,000 FEET BEYOND THE DEPARTURE END, AND 600 FEET PRIOR TO THE THRESHOLD.	THE SEGMENTED CIRCLE IS 200 FEET SOUTH OF THE RUNWAY CENTERLINE AND IT IS NOT CONSIDERED FIXED-BY-FUNCTION.	CORRECTION OF THESE CONDITIONS ARE OUTSIDE THE SCOPE OF THIS PROJECT.
RUNWAY SAFETY AREA (RSA) GRADES	FOR APPROACH CATEGORY D, TABLE 3-3 AND FIGURE 3-23 OF THE ADVISORY CIRCULAR SPECIFY THAT THE MINIMUM AND MAXIMUM GRADES IN THE RSA SHALL BE 1.5% AND 3.0% RESPECTIVELY, AWAY FROM THE RUNWAY.	RSA GRADES ARE LESS THAN 1.5%.	CORRECTION OF THESE CONDITIONS ARE OUTSIDE THE SCOPE OF THIS PROJECT.
RUNWAY PROTECTION ZONE (RPZ)	THE RPZ'S FUNCTION IS TO ENHANCE THE PROTECTION OF PEOPLE AND PROPERTY ON THE GROUND. THIS IS BEST ACHIEVED THROUGH AIRPORT-OWNER CONTROL OF RPZS. CONTROL IS PREFERABLY EXERCISED THROUGH THE ACQUISITION OF SUFFICIENT PROPERTY INTEREST IN THE RPZ AND INCLUDES CLEARING RPZ AREAS OF INCOMPATIBLE OBJECTS AND ACTIVITIES. THE RPZ FOR AN RDC OF D-III HAS A 1,700-FOOT LENGTH, 500-FOOT INNER WIDTH, 1,010-FOOT OUTER WIDTH, AND STARTS 200 FEET FROM THE RUNWAY END.	VENTURA ROAD, K STREET, 2ND STREET, AND COMMERCIAL/RESIDENTIAL PROPERTIES ARE WITHIN THE RUNWAY 25 RPZ; VICTORIA AVENUE IS WITHIN THE RUNWAY 7 RPZ.	CORRECTION OF THESE CONDITIONS ARE OUTSIDE THE SCOPE OF THIS PROJECT.
SHOULDER WIDTH	RUNWAY SHOULDER WIDTH FOR D-III UNDER 150,000 LBS MAXIMUM TAKEOFF WEIGHT IS 20-FT	RUNWAY 7-25 DOES NOT HAVE PAVED SHOULDERS	AGGREGATE BASE TO BE PLACED ON ALL SHOULDERS TO A 20 FOOT WIDTH
BLAST PAD DIMENSIONS	BLAST PAD DIMENSION REQUIREMENTS FOR D-III UNDER 150,000 LBS MAXIMUM TAKEOFF WEIGHT IS 140'X140'	RUNWAY 25 BLAST PAD IS 163'X120'	RUNWAY 25 BLAST PAD TO BE RECONSTRUCTED TO PROPER DIMENSIONS
RUNWAY OBJECT FREE AREA (ROFA) DIMENSIONS	ROFA IS 800-FT WIDE AND 1,000-FT BEYOND THE RUNWAY END. THE ROFA IS 600-FT PRIOR TO THE RUNWAY THRESHOLD	RUNWAY 7-25 HAS A ROFA WIDTH OF 575-FT AND EXTENDS 975-FT BEYOND RUNWAY 25 AND IS 715-FT LONG PRIOR TO RUNWAY 25	ROFA LIMITS TO BE REDEFINED TO MATCH CURRENT FAA STANDARDS
RUNWAY SAFETY AREA (RSA) DIMENSIONS	RSA IS 500-FT WIDE AND 1000-FT BEYOND THE RUNWAY END. THE RSA IS 600-FT PRIOR TO THE RUNWAY THRESHOLD	RUNWAY 7-25 RSA EXTENDS 975-FT BEYOND RUNWAY 25 AND IS 715-FT LONG PRIOR TO RUNWAY 25	RSA LIMITS TO BE REDEFINED TO MATCH CURRENT FAA STANDARDS
RUNWAY LONGITUDINAL GRADE CHANGES	THE MAXIMUM ALLOWABLE GRADE CHANGE IS ± 1.50%; HOWEVER, NO GRADE CHANGES ARE ALLOWED IN THE FIRST AND LAST QUARTER, OR FIRST AND LAST 2,500 FEET, WHICHEVER IS LESS, OF THE RUNWAY LENGTH	GRADE CHANGES OCCUR IN THE FIRST AND LAST QUARTER OF THE RUNWAY VARYING FROM 0.10% TO 0.40%	GRADES TO BE ALTERED TO REMOVE GRADE CHANGES IN THE FIRST AND LAST QUARTER OF THE RUNWAY

EXISTING NON-STANDARD CONDITIONS TABLE			
DEVIATION	**FAA STANDARD**	**EXISTING CONDITION**	**PROPOSED CORRECTION**
RUNWAY LONGITUDINAL VERTICAL CURVE LENGTH	VERTICAL CURVES FOR LONGITUDINAL GRADE CHANGES ARE PARABOLIC. THE LENGTH OF THE VERTICAL CURVE IS A MINIMUM OF 1,000 FEET FOR EACH 1.0% OF CHANGE	ALL GRADE CHANGES ON RUNWAY 7-25 REQUIRE VERTICAL CURVES. THERE ARE GRADE CHANGES UP TO 0.40% WITHOUT VERTICAL CURVES ON THE RUNWAY	GRADE CHANGES TO INCLUDE VERTICAL CURVES MEETING OR EXCEEDING CURRENT FAA STANDARDS
RUNWAY TRANSVERSE GRADES	RUNWAY TRANSVERSE GRADES MUST BE BETWEEN ± 1.0% AND ± 1.5%	RUNWAY 7-25 TRANSVERSE GRADES RANGE FROM 0.10% TO 2.08%	RUNWAY TRANSVERSE GRADES TO BE BROUGHT INTO COMPLIANCE
BLAST PAD LONGITUDINAL GRADES	FOR THE FIRST 200 FEET OF THE RSA BEYOND THE RUNWAY ENDS, THE LONGITUDINAL GRADE IS BETWEEN 0 AND 3.0 PERCENT, WITH ANY SLOPE BEING DOWNWARD FROM THE ENDS.	RUNWAY 25 BLAST PAD LONGITUDINAL GRADES RANGE FROM 0.0 PERCENT TO 0.6 PERCENT WITH SLOPES BEING UPWARD FROM THE END.	RUNWAY 25 BLAST PAD GRADES TO BE BROUGHT INTO COMPLIANCE
RUNWAY - TAXIWAY TRANSITIONS	PROVIDE A SMOOTH TRANSITION BETWEEN INTERSECTING PAVEMENT SURFACES AS WELL AS ADEQUATE DRAINAGE OF THE INTERSECTION. GIVE PRECEDENCE TO THE GRADES FOR THE RUNWAY IN A RUNWAY-TAXIWAY SITUATION	PAVEMENT TRANSITION BETWEEN THE RUNWAY AND TAXIWAY A IS NOT SMOOTH FROM 0.48% TO 1.61% PAVEMENT TRANSITION BETWEEN THE RUNWAY AND TAXIWAY B IS NOT SMOOTH FROM 0.58% TO 1.24% PAVEMENT TRANSITION BETWEEN THE RUNWAY AND TAXIWAY C IS NOT SMOOTH FROM 0.40% TO 1.10% PAVEMENT TRANSITION BETWEEN THE RUNWAY AND TAXIWAY D IS NOT SMOOTH FROM 0.49% TO 0.97% AT THE RUNWAY 7 END AND FROM 0.40% TO 0.88% AT THE RUNWAY 25 END PAVEMENT TRANSITION BETWEEN THE RUNWAY AND TAXIWAY E IS NOT SMOOTH FROM 0.67% TO 1.31%	RUNWAY-TAXIWAY TRANSITIONS WILL BE SMOOTHED BY ADJUSTMENT OF GRADING
TAXIWAY WIDTH	TAXIWAY WIDTH FOR A TDG-3 IS 50 FEET.	TAXIWAY WIDTHS RANGE FROM 50 FEET TO 130 FEET.	IF BID ALT 1 IS AWARDED, THE WIDTH OF THE TAXIWAYS WILL BE ADJUSTED TO COMPLY WITH THIS STANDARD
RUNWAY TO TAXIWAY SEPARATION	D-III REQUIREMENT IS 400 FEET	DISTANCE FROM THE PARALLEL TAXIWAY TO RUNWAY CENTERLINE IS 366-FT	IF BID ALT 2 IS AWARDED, SEPARATION OF TAXIWAY F TO THE RUNWAY WILL BE INCREASED TO 400 FEET
RUNWAY TO AIRCRAFT PARKING AREA	D-III REQUIREMENT IS 500 FEET	PARKING STRIPE SOUTH OF TAXIWAY CONNECTOR C INCURS THE 500 FT BOUNDARY	THE PARKING STRIPE WILL BE ADJUSTED IF BID ALT 2 IS AWARDED
RUNWAY - TAXIWAY INTERSECTIONS	ACUTE ANGLES SHOULD NOT BE LARGER THAN 45 DEGREES FROM THE RUNWAY CENTERLINE.	TAXIWAY C HAS AN ANGLE OF 50 DEGREES FROM RUNWAY 7-25.	IF BID ALT 1 IS AWARDED, THE GEOMETRY OF TAXIWAY C WILL BE ADJUSTED TO COMPLY WITH THIS STANDARD
INDIRECT ACCESS	TAXIWAYS THAT LEAD DIRECTLY FROM APRON TO RUNWAY REQUIRE A TURN.	DIRECT ACCESS FROM APRON TO RUNWAY 7-25	APRON ACCESS WILL NOT BE ADDRESSED WITHIN THE SCOPE OF THIS PROJECT
TAXIWAY CENTERLINE TO OBJECT SEPARATION	TAXIWAY CENTERLINE TO OBJECT SEPARATION, AS SHOWN IN FIGURE 4-8 AND TABLE 4-1, IS EQUAL TO 0.7 TIMES THE MAXIMUM WINGSPAN OF ADG, PLUS 10 FEET.	ILS GLIDESLOPE ANTENNA EQUIPMENT EAST OF TAXIWAY B IS 84 FEET FROM TAXIWAY B CENTERLINE. TO MEET ADG-III REQUIREMENTS, A SEPARATION OF 93 FEET FROM FIXED OR MOVABLE OBJECT IS REQUIRED.	IF BID ALT 1 IS AWARDED, TAXIWAY B CENTERLINE WILL BE SHIFTED WEST TO COMPLY WITH THIS STANDARD

EXISTING NON-STANDARD CONDITIONS TABLE

DEVIATION	FAA STANDARD	EXISTING CONDITION	PROPOSED CORRECTION
TAXIWAY FILLET DESIGN	PAVEMENT FILLETS AT TAXIWAY INTERSECTIONS ARE DESIGNED FOR ENTIRE SELECTED TDG AND MUST ACCOMMODATE ALL AIRCRAFT OF ALL LESSER TDGS.	NONE OF THE TAXIWAYS MEET CURRENT FAA FILLET DESIGN.	TAXIWAY FILLET GEOMETRIES WILL BE BROUGHT INTO MAXIMUM POSSIBLE COMPLIANCE, DEPENDING ON THE BID ALT AWARDED.
HIGH SPEED EXITS	THE RADIUS OF THE EXIT FROM THE RUNWAY SHOULD ALWAYS BE 1500 FEET.	ON HIGH SPEED TAXIWAY D THE EXISTING RADIUS OF THE EXIT FROM RUNWAY IS 1254 FEET.	THIS GEOMETRY WILL BE CORRECTED IF BID ALT 1 AND 2 ARE AWARDED
TAXIWAY SURFACE GRADIENT	THE CROWN OF THE TAXIWAY SHOULD NOT BE HIGHER THAN THE CROWN OF THE RUNWAY.	TAXIWAYS B AND F ARE HIGHER THAN THE RUNWAY IN SOME AREAS	SOME GRADES CANNOT BE CORRECTED DUE TO MATCHING ELEVATIONS ON THE APRON SOUTH OF TAXIWAY F
TAXIWAY TRANSVERSE SLOPES	CROSS-SECTION SLOPES ON PAVED AREAS FOR AN APPROACH CATEGORY MUST BE BETWEEN 1.0 PERCENT AND 1.5 PERCENT. THE IDEAL CONFIGURATION IS A CENTER CROWN WITH EQUAL, CONSTANT TRANSVERSE GRADES ON EITHER SIDE. HOWEVER, AN OFF-CENTER CROWN, DIFFERENT GRADES ON EITHER SIDE, SHED SECTIONS, AND CHANGES IN TRANSVERSE GRADES (OTHER THAN FROM ONE SIDE OF THE CROWN TO THE OTHER) OF NO MORE THAN 0.5 PERCENT ARE PERMISSIBLE. A 1.5-INCH DROP BETWEEN PAVED AND UNPAVED AREAS SHOULD BE PROVIDED, AND THE FIRST 10 FEET OFF PAVED AREAS NEEDS TO BE AT 5.0 PERCENT SLOPE.	TAXIWAYS HAVE FLATTER AND STEEPER TRANSVERSE SLOPES THAN THE STANDARDS.	GRADES WILL BE ADJUSTED TO BE IN COMPLIANCE IF BID ALT 1 AND 2 ARE AWARDED.
TAXIWAY LONGITUDINAL GRADES	MAXIMUM LONGITUDINAL GRADE FOR AIRCRAFT APPROACH CATEGORY C, D,AND E IS 1.5%. THE MINIMUM LENGTH OF THE VERTICAL CURVE IS 100 FEET FOR EACH 1.0% OF CHANGE WHEN USING LONGITUDINAL GRADES. A VERTICAL CURVE NOT NECESSARY WHEN GRADE CHANGE IS LESS THAN 0.40%, NOR WHERE TAXIWAY CROSSES RUNWAY OR TAXIWAY CROWN.	IN SOME AREAS TAXIWAYS HAVE LONGITUDINAL GRADES THAT ARE HIGHER THAN THE MAXIMUM ALLOWED. VERTICAL CURVES DO NOT MEET THE LENGTH REQUIREMENT.	GRADES WILL BE ADJUSTED TO BE IN COMPLIANCE IF BID ALT 1 AND 2 ARE AWARDED.

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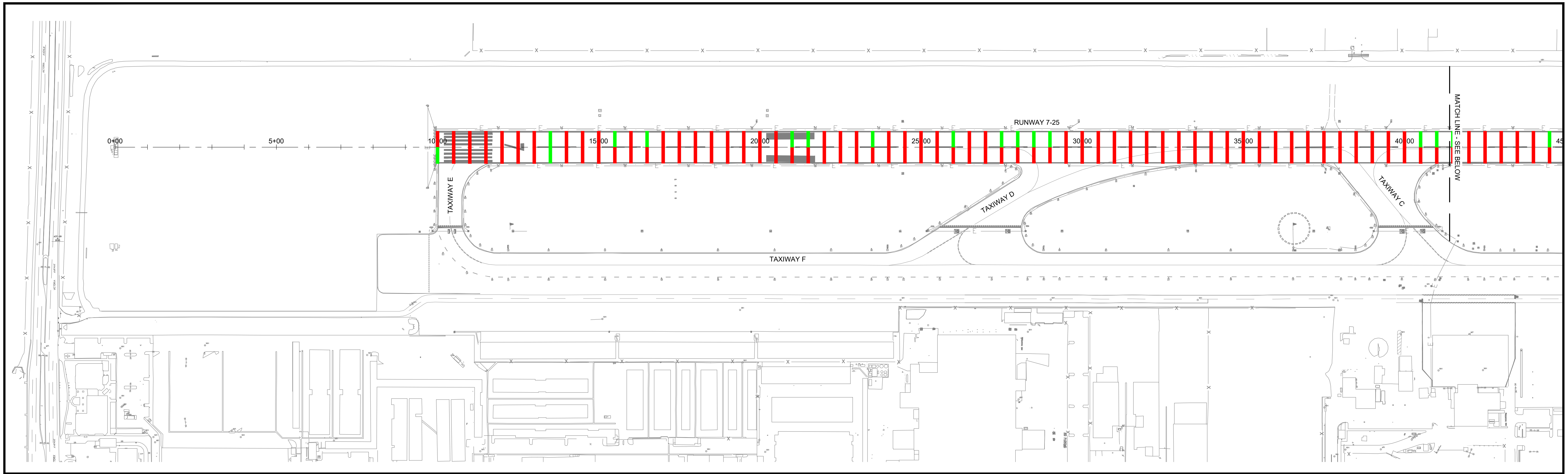
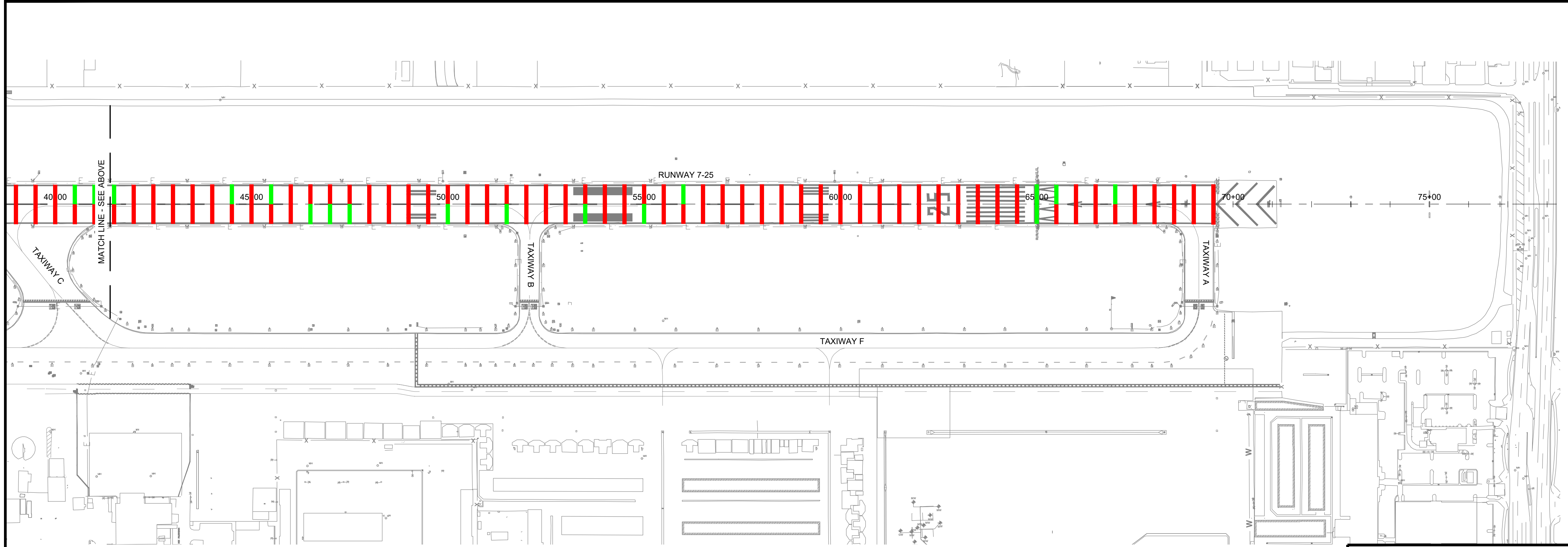


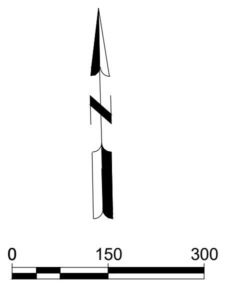


LEGEND

🟩 TRANSVERSE SLOPE IN COMPLIANCE WITH FAA REQUIREMENTS

🟥 TRANSVERSE SLOPE NOT IN COMPLIANCE WITH FAA REQUIREMENTS

NOTE:
1. TRANSVERSE SLOPES SHOWN AT 50' INTERVALS ALONG RUNWAY CENTERLINE



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PREPARED BY:
Mead & Hunt
DATE: OCT 2019
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Scottsdale, Arizona 85260
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meadhunt.com
FILE NAME: 3138400-181115.01

APPROVED: DIRECTOR OF AIRPORTS
RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS
RECOMMENDED: PROJECT MANAGER

COUNTY OF VENTURA
OXR CMA
DEPARTMENT OF AIRPORTS

SPEC. NO.
OXR XX-XX
PROJ. NO.
OXR XXX

APPENDIX B - 13A ANALYSIS SUMMARY

OXNARD AIRPORT

RUNWAY 7-25 IMPROVEMENTS

B

SHEET 1
OF 1

DRAWING NO.
APPENDIX

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Appendix C - Site Photographs

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Photo 1: Runway 7-25 Alligator Cracking

Photo 2: Runway 7-25 Asphalt Scarification

Photo 3: Runway 7-25 Longitudinal Cracking

Photo 4: Runway 7-25 Weathering

Photo 5: Blast Pad and MALSF System

Photo 6: MALSF System

Photo 7: Runway 7-25 Weathering

Photo 8: Runway 7-25 Longitudinal Cracking

Photo 9: Runway 7-25 Longitudinal Cracking

Photo 10: Runway 7-25 Wind Cone

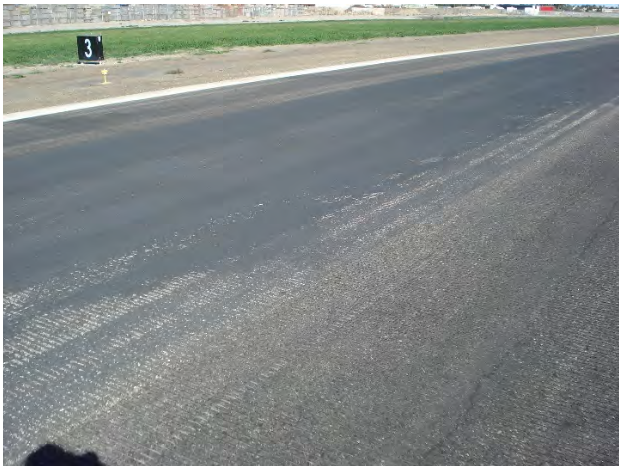

Photo 11: Runway 7-25 Weathering

Photo 12: Runway 7-25 Weathering

Photo 13: Glide Slope Antenna and Runway 25 PAPI

Photo 14: Taxiway A Block Cracking

Photo 15: Runway Edge In-Pavement Lights

Photo 16: Taxiway B Weathering

Photo 17: Taxiway B and Glide Slope Antenna

Photo 18: Taxiway C Alligator Cracking

Photo 19: *Taxiway D Block Cracking*

Photo 20: *Taxiway D Block Cracking*

Photo 21: *Taxiway F Longitudinal Cracking*

Photo 22: *Taxiway F Weathering*

Photo 23: *Taxiway E Weathering*

Photo 24: *East Run-up Apron*

Appendix D - Geotechnical Engineering Report

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Part 1 – Geotechnical Engineering Reports

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GEOTECHNICAL ENGINEERING REPORT
OXNARD AIRPORT
RUNWAY 7-25 AND TAXIWAY CONNECTOR IMPROVEMENTS
2889 WEST 5TH STREET
OXNARD, CALIFORNIA
MEAD & HUNT, INC. PROJECT NO. 3138400-181115.01

July 10, 2020

Prepared for

Mr. Jeff Leonard, PE
Associate Practice Leader
Aviation Services
Mead & Hunt, Inc.

Prepared by

Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401

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July 10, 2020

FILE NO.: 302524-001

Mr. Jeff Leonard, PE
Associate Practice Leader, Aviation Services
Mead & Hunt, Inc.
1360 19th Hole Drive, Suite 200
Windsor, CA 95492-7717

PROJECT: OXNARD AIRPORT
RUNWAY 7-25 AND TAXIWAY CONNECTOR IMPROVEMENTS/RECONSTRUCTION
2889 WEST 5TH STREET
OXNARD, CALIFORNIA
MEAD & HUNT, INC. PROJECT NO. 3138400-181115.01

SUBJECT: Geotechnical Engineering Report - Final

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 7-25 and Taxiway Connector Improvements 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. This final report version incorporates responses to comments received from the client on a draft version issued on February 6, 2019.

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

REGISTERED PROFESSIONAL ENGINEER
FREDERICK J. POTTHAST
No. GE 2369
Exp. 03/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

Fred J. Potthast, GE
Principal Engineer

Copy to: Mead & Hunt, Inc., Attn.: Edoardo Barber, and Jannet Loera

Doc. No.: 2007-039.SER/cr

TABLE OF CONTENTS

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). 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). Runway 7-25 and Taxiways A through E are in regular use currently.

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 engineering 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 other specific projects 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 extended 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 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 thicknesses 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 within a moisture conditioned 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 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 effective CBR value at that location 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 3 or greater, per FAA AC 150/5320-6F, Chapter 3.9.3). Also 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 Figures 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 to 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.

If the existing pavement sections are milled and stockpiled for later re-use as mAB, it is anticipated that some or all of the poorly graded sand layers found in Borings 1 through 8, 31 through 34 and 36 will be removed in the process. To maintain uniformity of the subgrade soils for lime treatment, any poorly graded and/or mAB layers remaining after the milling process should be removed from the lime treatment area and properly disposed off site or reused where acceptable on site. Alternately, if the quantity of poorly graded sand and/or mAB in the lime treatment zone is significant, the additive can be switched from lime to cement. The need to make this switch should be determined based on the conditions exposed at the time of construction.

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

Rehabilitation of Existing Pavements

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 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 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 RS380i or similar material depending on the degree of instability) 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. These 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 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

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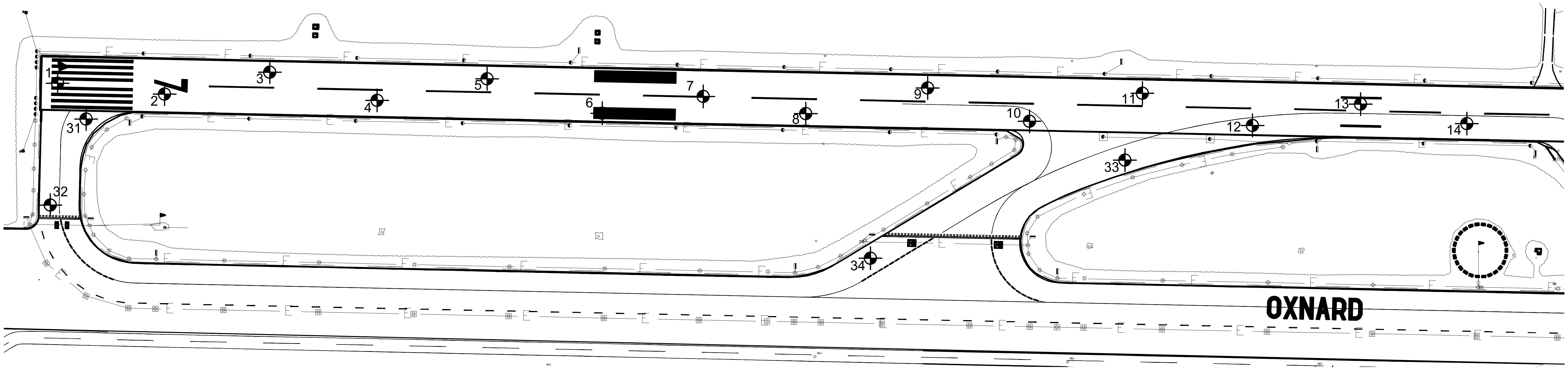

LEGEND

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 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

Project No.
302524-001

Sheet 1 of 2

OXNARDAIRPORT110518maps

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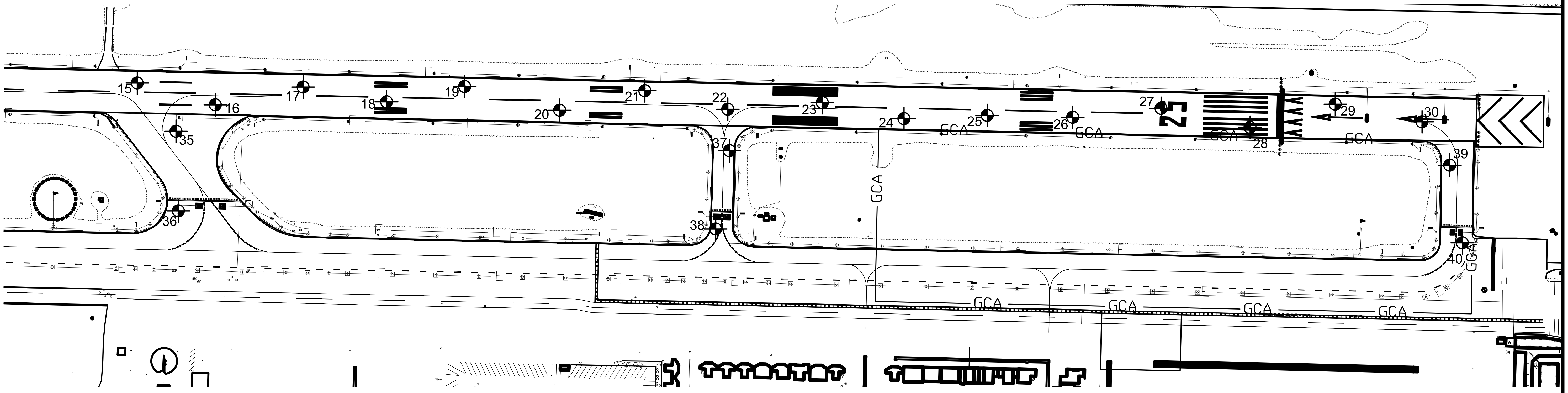

LEGEND

40 ⌖ Boring Location (Approx.)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

N

NOT TO SCALE

OXNARDAIRPORT110518maps

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 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

Project No.
302524-001

Sheet 2 of 2

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OXNARD AIRPORT 302524-001

RUNWAY 7-25 AND TAXIWAY CONNECTOR IMPROVEMENTS

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			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	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
UNWEATHERED	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"
HIGHLY 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 Legend 062719.dwg

Earth Systems Pacific

Boring No. 1

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: 11/1/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

SOIL DESCRIPTION

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION
0		■	4" AC over 9" Brown CLAYEY SAND with GRAVEL (misc. AB)
1	SP		+/- 4" POORLY GRADED SAND: brown, medium dense, moist (Fill)
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist
5	CL	▨	SANDY LEAN CLAY: brown, soft, moist (Alluvium)
7.5	ML	▥	SILT: brown, very soft, moist, trace caliche
10			End of Boring @ 10.0' No subsurface water encountered

SAMPLE DATA

INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0.5 - 1.0	○			
1.0 - 2.5	■	119.4	13.4	6 9 10
2.0 - 5.0	○			
5.0 - 6.5	●			3 2 2
8.5 - 10.0	●			0 0 2

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

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: 11/1/18

DEPTH (feet)	USCS CLASS	SYMBOL	OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS Oxnard, California SOIL DESCRIPTION	SAMPLE DATA				
				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	○			
2	CL	▨	SANDY LEAN CLAY: dark brown, very stiff, moist	1.5-3.0	■	121.1	13.8	6 13 16
4		▨		2.0 - 4.0	○			3
5	CL	▨	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	●			2 2
8		▨		8.5 - 10.0	●			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

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: 11/1/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: 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				0.5 - 1.5	○			
1.5	SP		+/- 6" POORLY GRADED SAND: brown, loose, moist (Fill)					
2	CL	▨						
2.5			SANDY LEAN CLAY: dark brown, very stiff, moist	1.5 - 3.0	■	116.9	14.2	6 12 16
4	CL	▨	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	2.0 - 4.0	○			
5				5.0 - 6.5	●			2 1 2
7	ML	▥	SILT: brown, very soft, moist					
8.5				8.5 - 10.0	●			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

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	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	■	116.2	16.1	5 8 9
4				2.0 - 5.0	○			
5	CL	▨	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	●			1 1 2
8				8.5 - 10.0	●			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.

Boring No. 5

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: 11/1/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

				SAMPLE DATA				
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	○			
2	SM	┆	SILTY SAND: dark brown, medium dense, moist	1.5 - 3.0	■	118.3	14.5	4 12 12
4	CL	▧	SANDY LEAN CLAY: brown, very soft, moist, trace caliche deposits (Alluvium)	2.0 - 4.0	○			
5		▧		5.0 - 6.5	●			1 1 1
8.5		▧	very moist, trace clay	8.5 - 10.0	●			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.

Boring No. 6

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: 11/1/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 12" Brown CLAYEY SAND with GRAVEL (misc. AB)	1.5 - 3.5	○			
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)					
	SM		SILTY SAND: dark brown, medium dense, moist	1.5 - 3.0	■	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	●			1 1 2
			gray/brown mottled, very soft, trace clay	8.5 - 10.0	●			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. 7

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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 12" Brown CLAYEY SAND with GRAVEL (misc. AB)					
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	0.5 - 1.5	○			
2	CL	▨	SANDY LEAN CLAY: dark brown, very stiff, moist	1.0 - 2.5	■	121.9	13.3	8 11 9
3		▨		2.0 - 3.5	○			
4	CL	▨	SANDY LEAN CLAY: brown, soft, moist, (Alluvium)	5.0 - 6.5	●			0 1 2
8		▨	very soft	8.5 - 10.0	●			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

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				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)					
	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)					13
	CL	▨	SANDY LEAN CLAY: dark brown, stiff, slightly moist	1.0 - 2.5	▬	118.1	4.7	15 9
	CL	▨	SANDY LEAN CLAY: brown, very soft, moist, trace caliche (Alluvium)	2.0 - 5.0	○			
		▨		5.0 - 6.5	●			0 1 1
		▨	brown/gray mottled, soft, very moist, trace clay	8.5 - 10.0	●			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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JOB NO.: 302524-001
DATE: 10/31/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 1		■	4" AC over 11" Brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	○			
2	CL	▨	SANDY LEAN CLAY: dark brown, medium stiff, very moist (Fill)	1.5 - 3.0 1.5 - 3.0	■ ○	102.6	19.7	7 5 6
3 4	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)	3.0 - 5.0	○			
5		▨	very soft	5.0 - 6.5	●			0 1 1
6 7 8 9		▨	gray/brown mottled	8.5 - 10.0	●			0 0 2
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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. 10

PAGE 1 OF 1
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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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	○			
1		■						5
2	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	■	115.0	13.6	10 11
		▨		1.5 - 2.5	○			
3	CL	▨	LEAN CLAY: brown, soft, moist (Alluvium)	2.5 - 4.0	○			
4		▨						1
5		▨	caliche deposits	5.0 - 6.5	●			2 2
6		▨						
7		▨						
8		▨						0
9		▨	gray/brown mottled, very soft, very moist	8.5 - 10.0	●			1 1
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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

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: 10/31/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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 12" Brown SILTY SAND with GRAVEL (misc. AB)					
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	▬	104.0	21.5	4 6 8
				2.0 - 4.0	○			
4	CL	▨	SANDY LEAN CLAY: brown/light brown mottled, very soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			0 0 1
8.5		▨	very moist, trace clay	8.5 - 10.0	●			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.

Boring No. 12

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 16" Brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	○			
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist, trace caliche (Fill)	1.5 - 3.0	■	95.5	24.8	3 7 9
2				2.0 - 4.0	○			
4	CL	▨	SANDY LEAN CLAY: brown/light brown mottled, soft, moist (Alluvium)					
5				5.0 - 6.5	●			0 2 2
8.5		▨	brown/gray mottled, very soft, very moist	8.5 - 10.0	●			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.

Boring No. 13

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0 1		■	5" AC over 14" brown SILTY SAND with GRAVEL (misc. AB)					
2 3	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0 2.0 - 4.0	▬ ○	101.2	22.0	5 7 12
4 5 6 7 8	CL	▨	SANDY LEAN CLAY: brown/light brown mottled, soft, moist (Alluvium)	5.0 - 6.5	●			1 1 2
9		▨	very soft	8.5 - 10.0	●			1 1 1
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26			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.

Boring No. 14

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: 10/31/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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 12" brown SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	○			
	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	■	102.5	22.0	3 6 10
				2.0 - 5.0	○			
5	CL	▨	SANDY LEAN CLAY: brown/light brown mottled, soft, moist, trace clay (Alluvium)	5.0 - 6.5	●			1 1 2
		▨	medium stiff	8.5 - 10.0	●			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

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

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 15" brown SILTY SAND with GRAVEL (misc. AB)					
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	■	100.1	23.4	4 7 11
2		▨		2.0 - 4.0	○			
3		▨	caliche deposits					
5	CL	▨	SANDY LEAN CLAY: brown/light brown mottled, very soft, moist (Alluvium)	5.0 - 6.5	●			1 1 1
9		▨	soft	8.5 - 10.0	●			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.

Boring No. 16

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 14" brown SILTY SAND with GRAVEL (misc. AB)					
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	■	109.3	19.0	4 7 9
2				2.0 - 4.0	○			
4.5	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist, trace caliche deposits (Alluvium)	5.0 - 6.5	●			1 3 4
8.5		▨	soft	8.5 - 10.0	●			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. 17

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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	○			
1		■		1.5 - 3.0	■	104.8	20.8	3 5 9
2	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	3.0 - 5.0	○			
3	CL	▨	SANDY LEAN CLAY: dark brown, medium stiff, moist (Alluvium)					
5		▨	brown, soft	5.0 - 6.5	●			1 1 2
8		▨	gray/brown mottled, medium stiff	8.5 - 10.0	●			0 2 4
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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.

Boring No. 18

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)					
1								2
2	CL	▨	SANDY LEAN CLAY: dark brown, medium stiff, very moist (Fill)	1.5 - 3.0	▬	103.2	20.1	4 7
3	CL	▨	SANDY LEAN CLAY: dark brown, medium stiff, moist (Alluvium)	2.5 - 5.0	○			
4		▨						1
5		▨	soft, caliche deposits	5.0 - 6.5	●			1 2
6		▨						
7		▨						
8		▨						2
9		▨	gray/brown mottled, medium stiff	8.5 - 10.0	●			3 3
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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. 19

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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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)	0.5 - 1.5	○			
	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0 1.5 - 3.5	■ ○	113.4	16.9	5 8 11
	CL	▨	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			1 1 3
		▨	light brown, very soft	8.5 - 10.0	●			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. 20

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 13" brown CLAYEY SAND with GRAVEL (misc. AB)					
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	■	111.7	17.6	3 8 11
3	CL	▨	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	3.0 - 6.0	○			
5		▨	caliche deposits	5.0 - 6.5	●			0 1 2
8.5		▨	gray/brown mottled	8.5 - 10.0	●			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. 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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				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	○			
	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	▬	119.5	13.9	4 9 15
				1.5 - 3.0	○			
3	CL	▨	SANDY LEAN CLAY: brown, very soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			0 1 1
		▨	gray/brown mottled, medium stiff	8.5 - 10.0	●			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.

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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 16" brown CLAYEY SAND with GRAVEL (misc. AB)					
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	2.0 - 3.5 2.0 - 4.0	▬ ○	114.0	17.6	4 7 10
3.5		▨	brown					
4	CL	▨	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			1 1 2
8.5		▨	gray/brown mottled, medium stiff	8.5 - 10.0	●			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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

				SAMPLE DATA				
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	○			
1		■		1.5 - 3.0	■	118.5	13.8	9 12 12
2	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.5	○			
3		▨		3.5 - 5.0	○			
4	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist (Alluvium)					
5		▨	soft	5.0 - 6.5	●			1 1 2
6		▨	light brown					
7		▨						
8		▨						
8.5		▨	gray/brown mottled, medium stiff, caliche deposits	8.5 - 10.0	●			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.

Boring No. 24

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: 10/29/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5" AC over 12" brown CLAYEY SAND with GRAVEL (misc. AB)					
2	SM	▒	SILTY SAND: yellow brown, medium dense, moist, trace gravel (Fill)	1.5 - 3.0	▬	107.2	5.6	7 10 10
3				1.5 - 3.5	○			
4	CL	▨	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)					
5				5.0 - 6.5	●			1 2 2
9				8.5 - 10.0	●			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. 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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA 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	○			
	CL	▨	SANDY LEAN CLAY: dark brown, medium stiff, very moist (Fill)	1.5 - 3.0	▬	106.3	19.0	4 6 7
3	CL	▨	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	3.0 - 5.0	○			
				5.0 - 6.5	●			0 2 2
	SM		SILTY SAND: brown, loose, moist					
8	ML		SILT: brown, very soft, very moist, trace clay	8.5 - 10.0	●			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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				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	○			
2	CL	▨	LEAN CLAY: gray brown, stiff, very moist (Fill)	2.0 - 3.5 2.0 - 4.0 4.0 - 6.0	■ ○ ○	110.1	17.1	4 6 9
4.5	CL	▨	SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	●			1 2 2
8		▨	very soft, caliche deposits	8.5 - 10.0	●			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. 27

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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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	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	○			
2	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	2.0 - 3.5	▬	97.4	20.8	5 7 7
				2.0 - 4.0	○			
5	CL	▨	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			1 1 2
8.5		▨	medium stiff	8.5 - 10.0	●			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

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

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DATE: 10/28/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			3" AC over 17" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	○			
				1.5 - 3.0	▬	122.5	4.9	8 11 11
2	SM		SILTY SAND: brown, medium dense, slightly moist, trace gravel (Fill)	2.0 - 4.0	○			
4	CL		SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)					
5			very soft	5.0 - 6.5	●			1 1 1
			very moist	8.5 - 10.0	●			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.

Boring No. 29

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

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DATE: 10/28/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC over 14" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	○			
2	CL	▨	SANDY LEAN CLAY: brown/gray mottled, stiff, moist (Fill)	1.5 - 3.0	▬	112.5	15.3	5 10 10
				2.0 - 5.0	○			
5	CL	▨	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			1 1 1
		▨	medium stiff	8.5 - 10.0	●			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

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DATE: 10/28/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 14" brown SILTY GRAVEL with SAND (misc. AB)	0.5 - 1.5	○			
2	CL	▧	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.0	▬	112.2	14.7	6 7 9
3				2.0 - 5.0	○			
5	CL	▧	SANDY LEAN CLAY: brown, soft, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			0 1 2
8	ML	▥	SILT: gray/brown mottled, medium stiff, moist, caliche deposits	8.5 - 10.0	●			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.

Boring No. 31

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 4" SILTY SAND with GRAVEL (misc. AB)	1.0 - 2.5	■	110.6	17.2	5 6 11
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)					
2	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist	2.0 - 5.0	○			
5	CL	▨	SANDY LEAN CLAY: brown, soft, moist, (Alluvium)	5.0 - 6.5	●			1 2 2
8		▨	medium stiff, caliche deposits	8.5 - 10.0	●			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

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 3.5" SILTY SAND with GRAVEL (misc. AB)	1.0 - 2.5	▬	110.8	16.3	4 7 10
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	2.0 - 5.0	○			
2	CL		SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)					
5	CL		SANDY LEAN CLAY: brown, soft, moist (Alluvium)	5.0 - 6.5	●			1 1 2
9			medium stiff	8.5 - 10.0	●			1 3 3
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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.

Boring No. 33

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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 5.5" SILTY SAND with GRAVEL (misc. AB)					8
1	SP	░	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	1.0 - 2.5 1.5 - 3.5	■ ○	115.3	15.5	10 15
2	SM	▥	SILTY SAND: brown/dark brown mottled, medium dense, very moist, trace to some gravel, trace AC fragments (Fill)					
3				3.5 - 5.0	○			
4	CL	▧	SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)					3
5				5.0 - 6.5	●			3 3
6			gray/brown mottled					
7								
8								0
9			soft	8.5 - 10.0	●			1 3
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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.

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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" AC over 5" SILTY SAND with GRAVEL (misc. AB)					9
1	SP		+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	1.0 - 2.5	■	118.4	13.7	11
	CL	▨	SANDY LEAN CLAY: dark brown, stiff, moist (Fill)	1.5 - 3.5	○			11
4	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			2 3 3
		▨	gray/brown mottled, very soft	8.5 - 10.0	●			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. 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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

USCS CLASS	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
	5" AC over 8" SILTY SAND with GRAVEL (misc. AB)	1.0 - 2.5	▬	117.0	14.6	5 7 10
SM	SILTY SAND: orange brown, medium dense, very moist, some gravel (Fill)					
CL	SANDY LEAN CLAY: dark brown, stiff, moist	3.0 - 5.0	○			
CL	SANDY LEAN CLAY: brown, medium stiff, moist (Alluvium)	5.0 - 6.5	●			2 3 3
	gray/brown mottled, caliche deposits					
	very soft, very moist	8.5 - 10.0	●			0 1 1
	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

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SOIL DESCRIPTION	SAMPLE DATA				
			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	○			
1	SP	+/- 4" POORLY GRADED SAND: brown, loose, moist (Fill)	1.0 - 2.5	▬	114.7	7.2	8 8 7
3	CL	SANDY LEAN CLAY: dark brown, stiff, slightly moist	2.5 - 5.0	○			
5	ML	SILT: gray/brown mottled, medium stiff, moist, caliche deposits (Alluvium)	5.0 - 6.5	●			1 2 4
9		soft	8.5 - 10.0	●			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

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: 10/29/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC over 12" SILTY SAND with GRAVEL (misc. AB)	0.5 - 1.5	○			
1				1.0 - 3.0	■	110.1	16.2	5 8 12
1.5	CL	▨	SANDY LEAN CLAY: dark brown, stiff, very moist (Fill)	1.5 - 3.0	○			
3	CL	▨	SANDY LEAN CLAY: brown, very soft, moist, caliche deposits (Alluvium)	3.0 - 5.0	○			
5				5.0 - 6.5	●			1 1 1
8.5			gray/brown mottled, soft	8.5 - 10.0	●			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. 38

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 RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
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 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	▬	110.9	14.7	6 12 13
2		▨		2.0 - 4.0	○			
4	CL	▨	SANDY LEAN CLAY: brown, very soft, moist, caliche deposits (Alluvium)					
5		▨		5.0 - 6.5	●			0 1 1
8.5		▨	soft	8.5 - 10.0	●			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.

Boring No. 39

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: 10/28/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				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	○			3
2	CH		SANDY FAT CLAY: dark brown, medium stiff, very moist (Alluvium)	1.0 - 2.5	■	108.4	19.1	4 5
3				2.0 - 5.0	○			
4								1
5	CL		SANDY LEAN CLAY: brown, soft, moist, caliche deposits	5.0 - 6.5	●			2 2
8								2
8.5			medium stiff	8.5 - 10.0	●			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.

Boring No. 40

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: 10/28/18

OXNARD AIRPORT RWY 7-25 AND TWY CONNECTOR IMPROVEMENTS
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA 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	○			
2		⁞		1.5 - 3.0	■	117.1	16.2	5 8
3		⁞		3.5 - 6.5	○			8
4	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist, caliche deposits (Alluvium)					1
5		▨	soft	5.0 - 6.5	●			2 2
6		▨						
7		▨						
8		▨		8.5 - 10.0	●			0 1
9		▨						3
10			End of Boring @ 10.0' No subsurface water encountered					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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 7-25 and Taxiway
Connector Improvements

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
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

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
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

Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

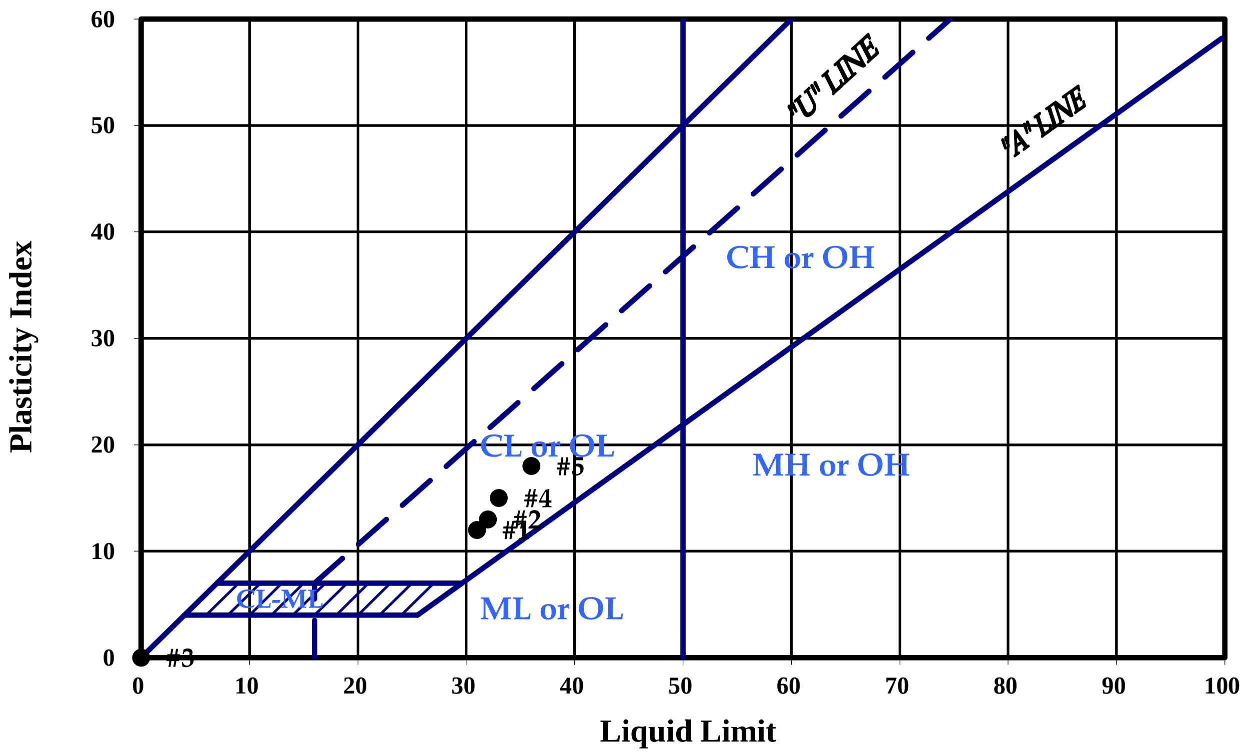
PLASTICITY INDEX

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 Chart



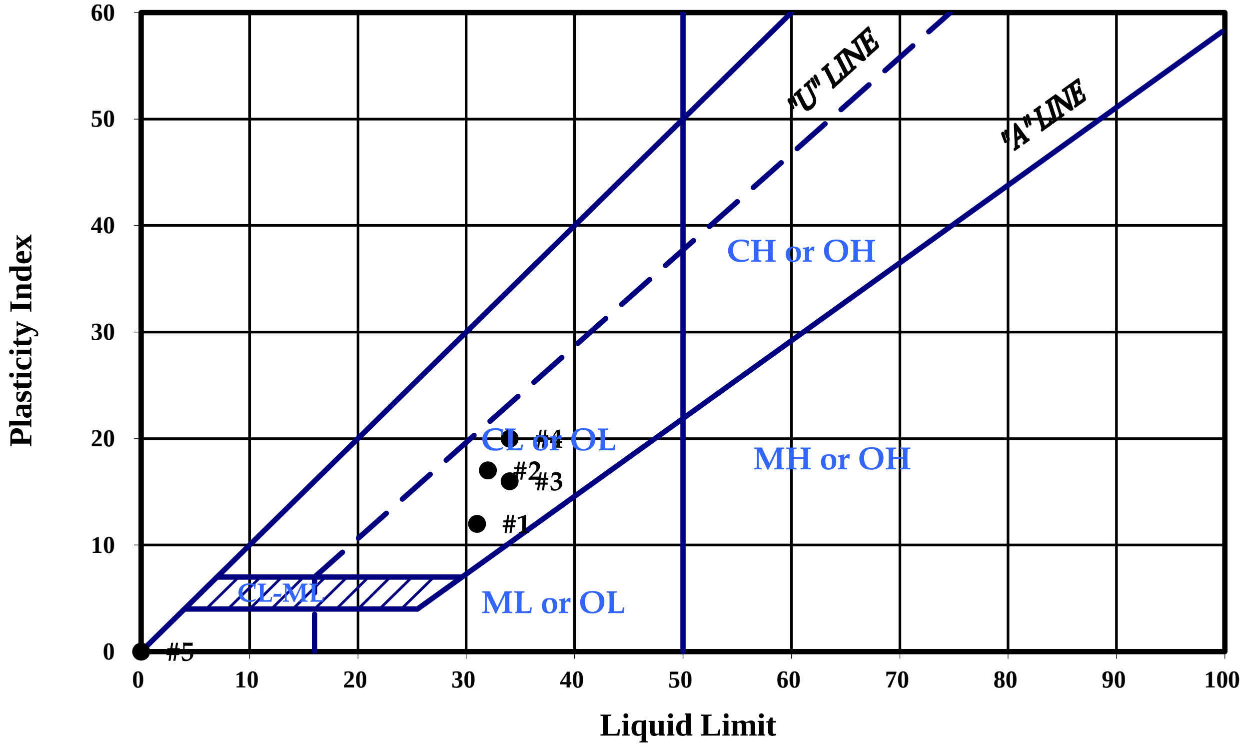
PLASTICITY INDEX

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 7-25 and Taxiway
Connector Improvements

302524-001

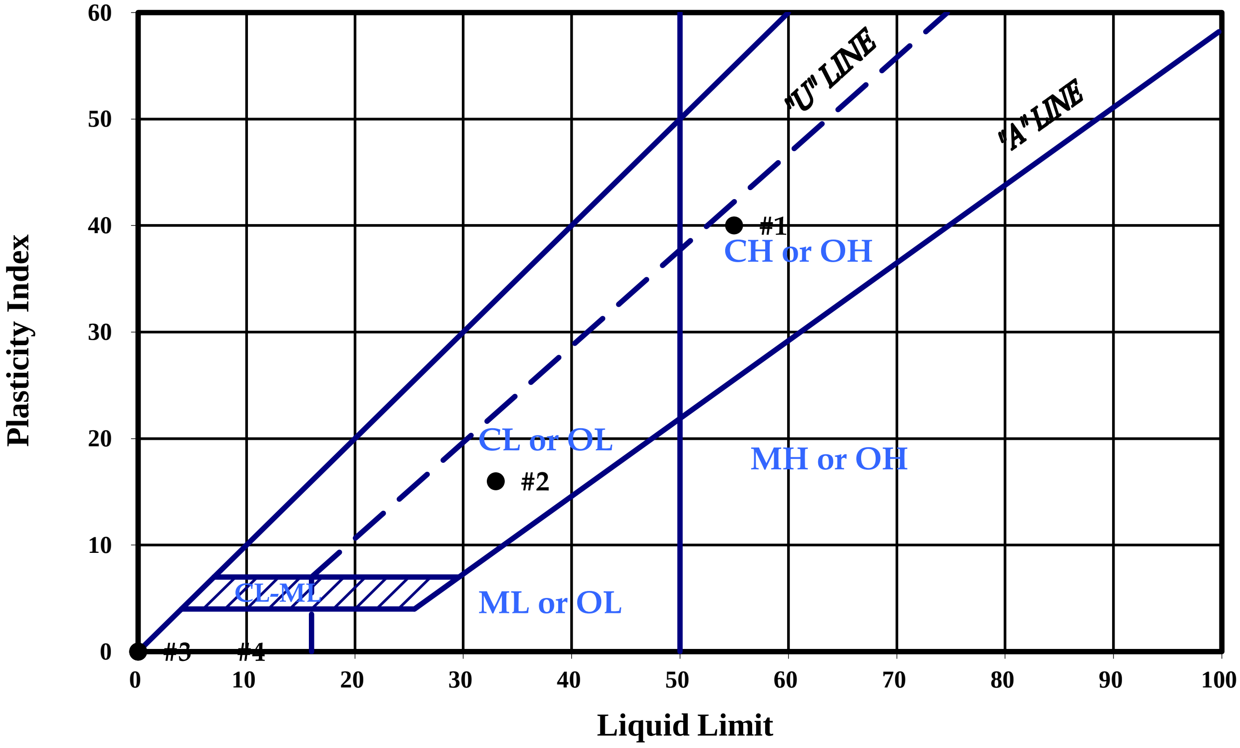
PLASTICITY INDEX

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

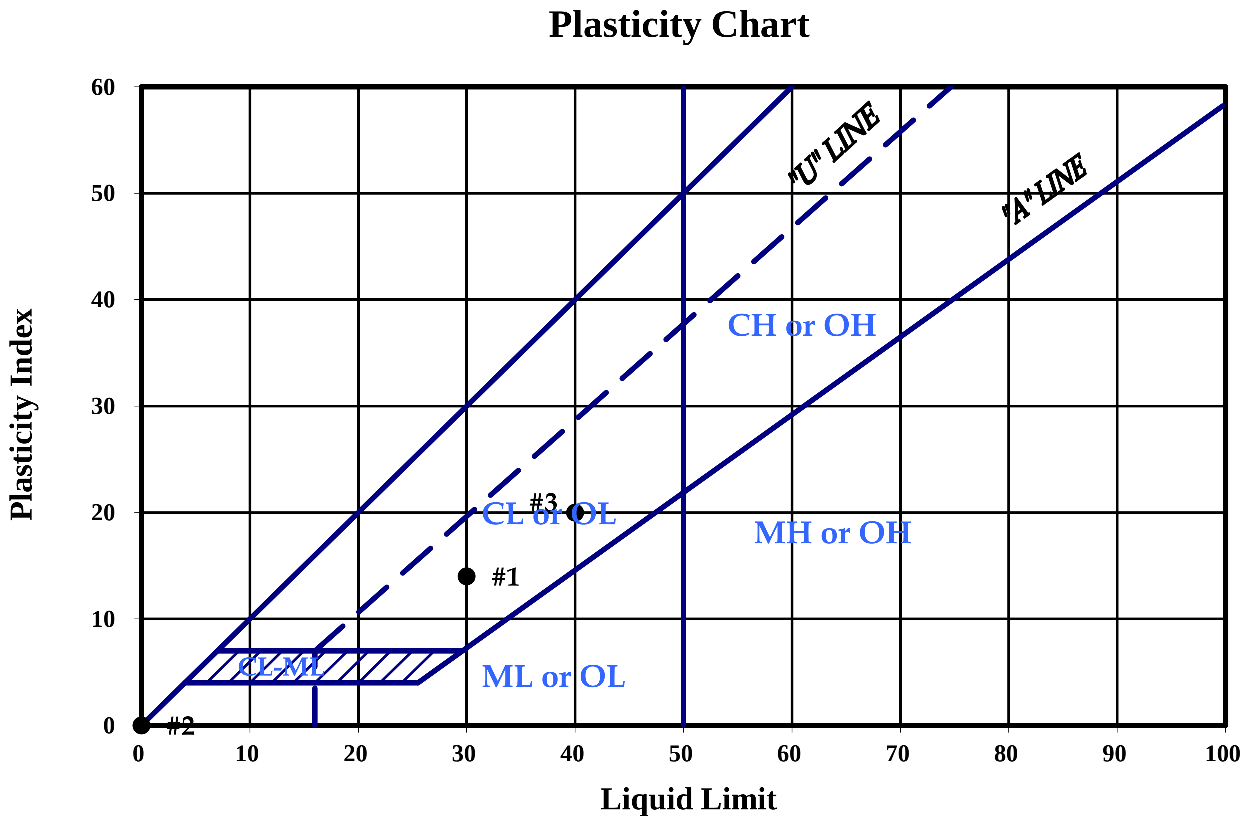


PLASTICITY INDEX

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		



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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)

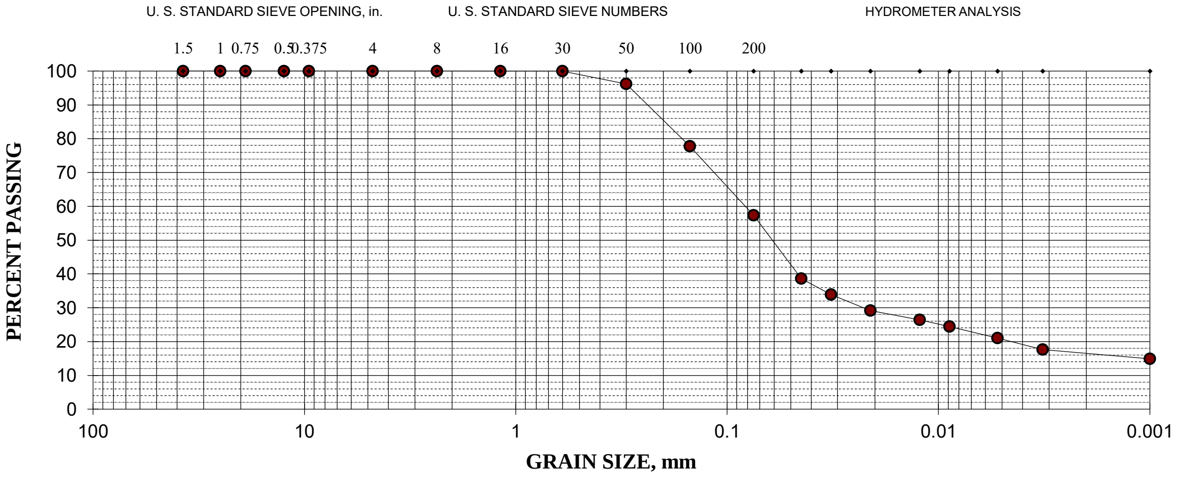
Specific Gravity = 2.70 (assumed)

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



PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

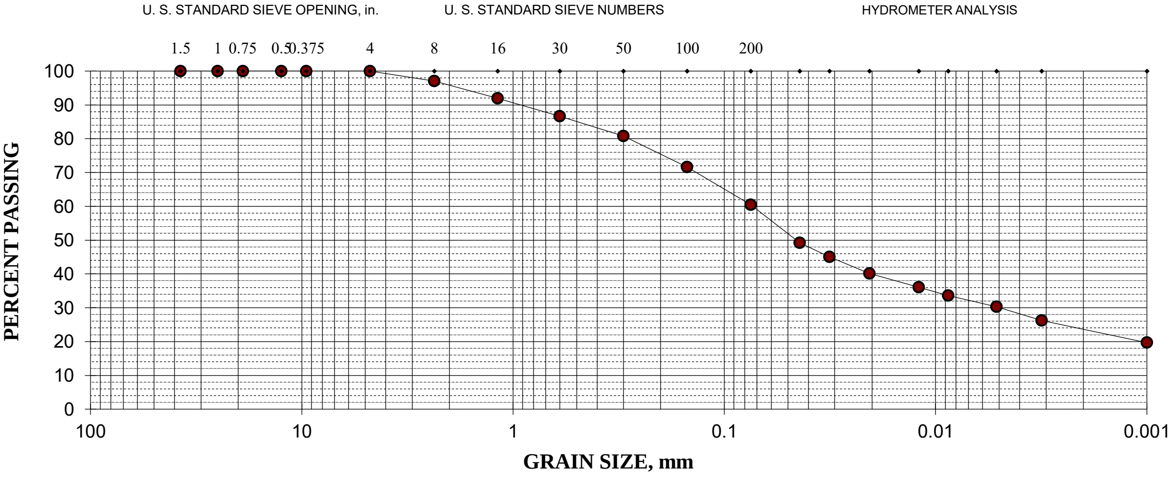
Sandy Lean Clay (CL)

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'

January 16, 2019

Silty Sand (SM)

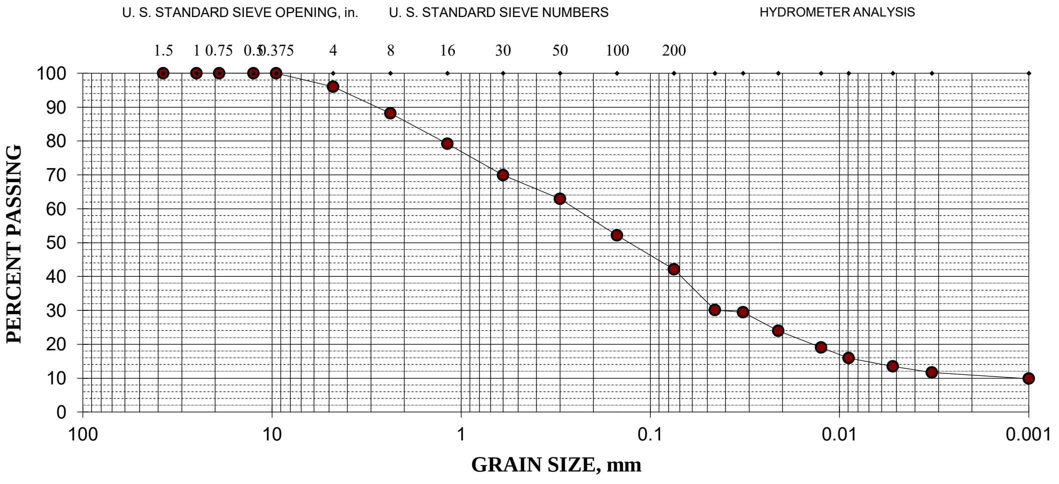
Specific Gravity = 2.65 (assumed)

PI = NP

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 7-25 and Taxiway Connector Improvements

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)

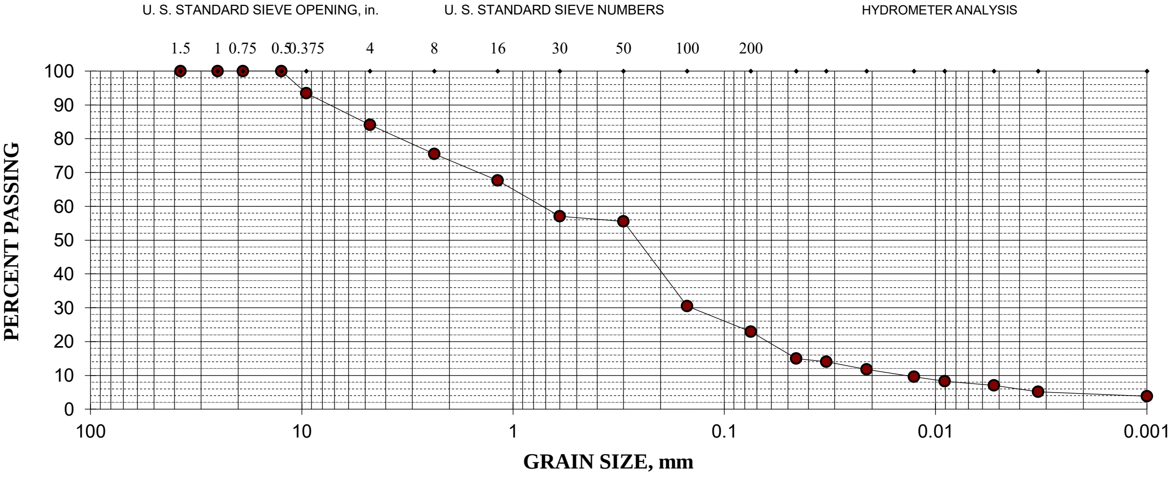
Specific Gravity = 2.65 (assumed)

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 7-25 and Taxiway
Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

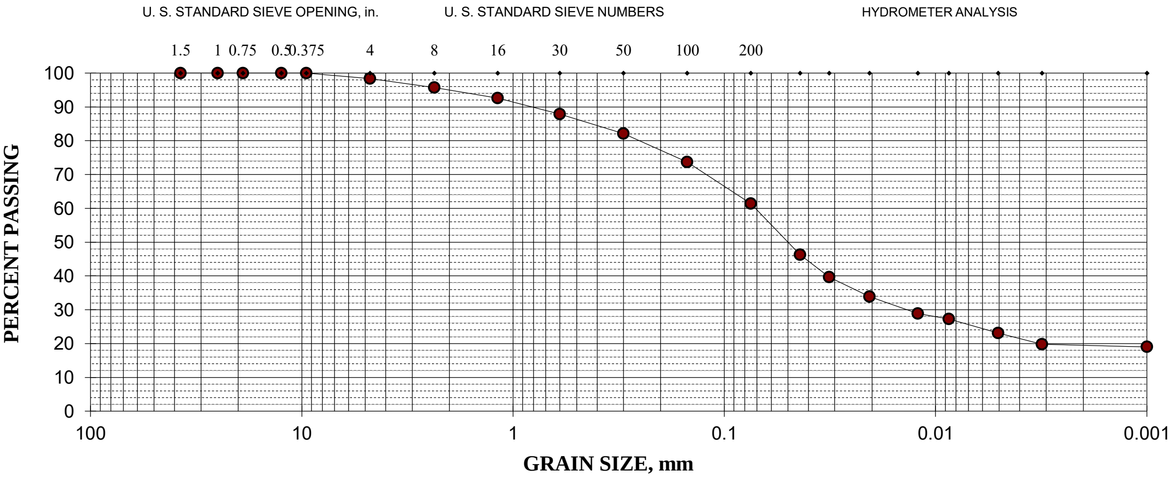
Sandy Lean Clay (CL)

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)

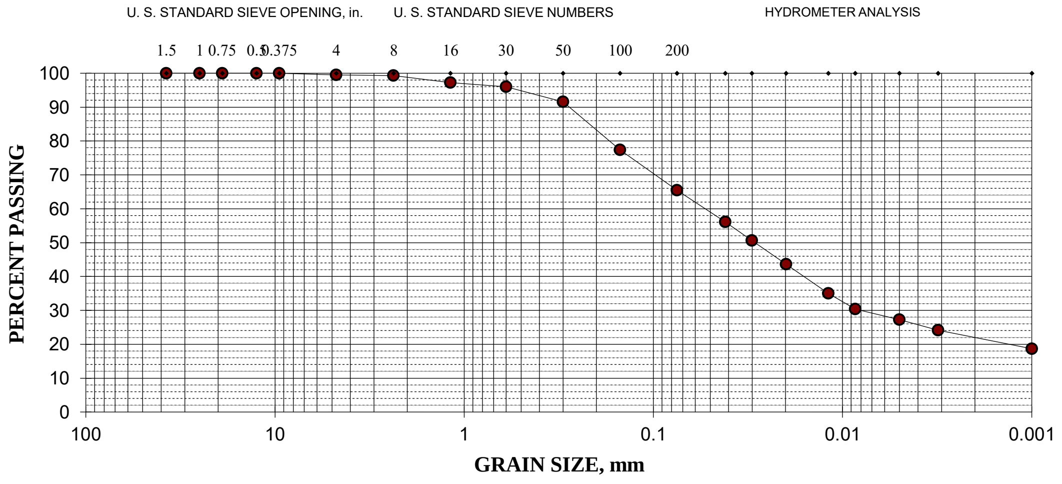
Specific Gravity = 2.70 (assumed)

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 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

Sandy Lean Clay (CL)

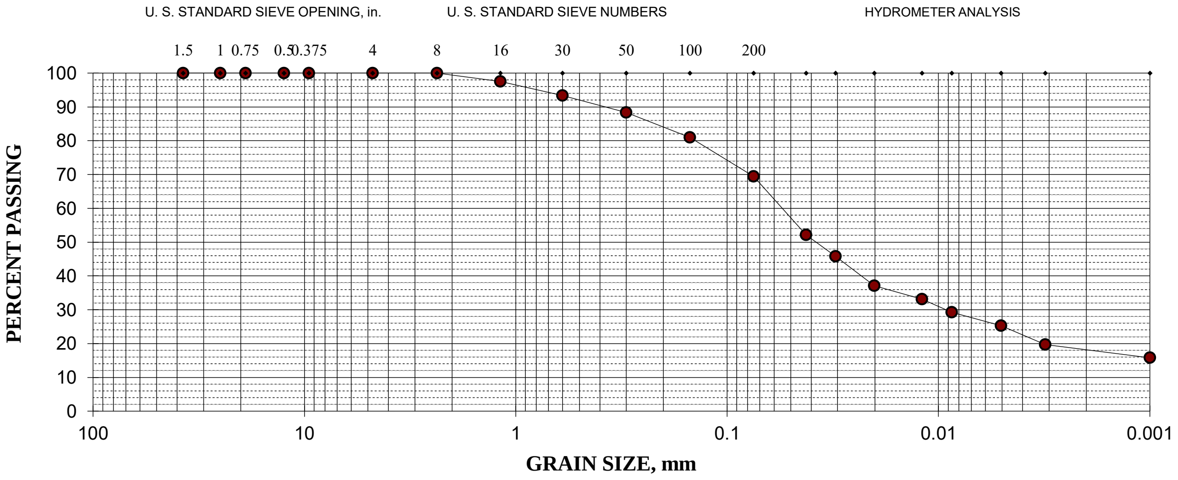
Specific Gravity = 2.70 (assumed)

LL = 36; PL = 18; PI = 18

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 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

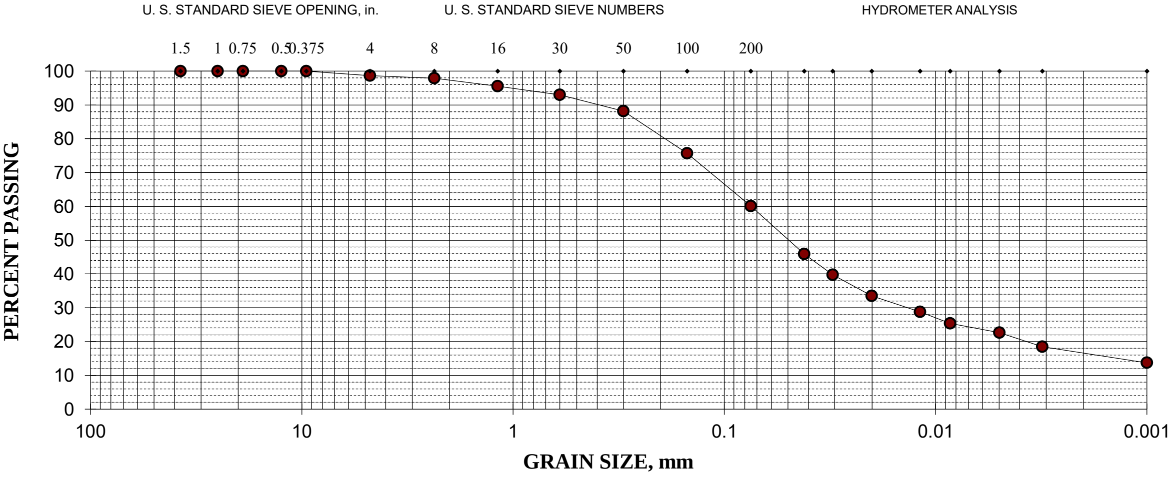
Sandy Lean Clay (CL)

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 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

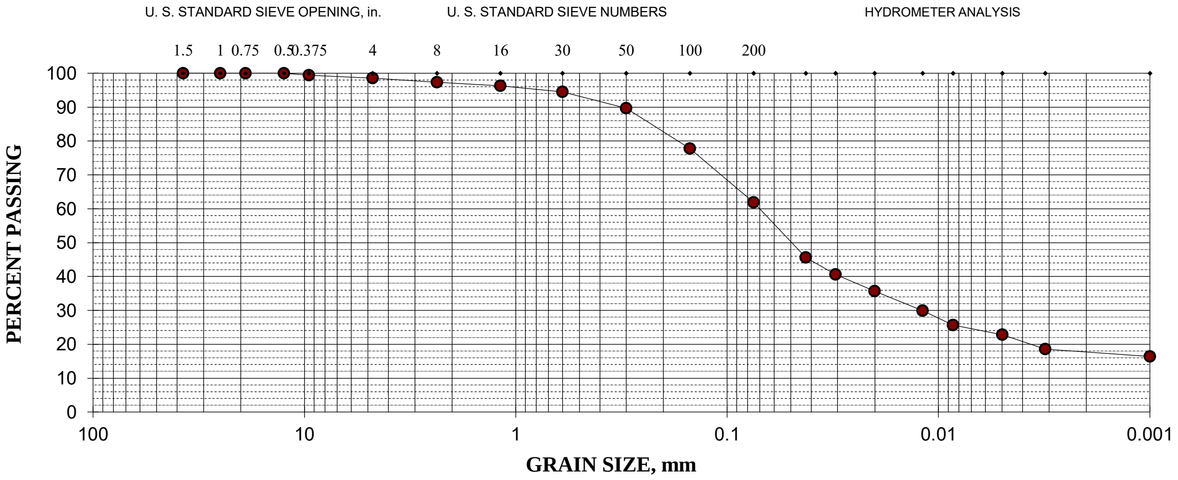
Sandy Lean Clay (CL)

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 7-25 and Taxiway Connector Improvements

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)

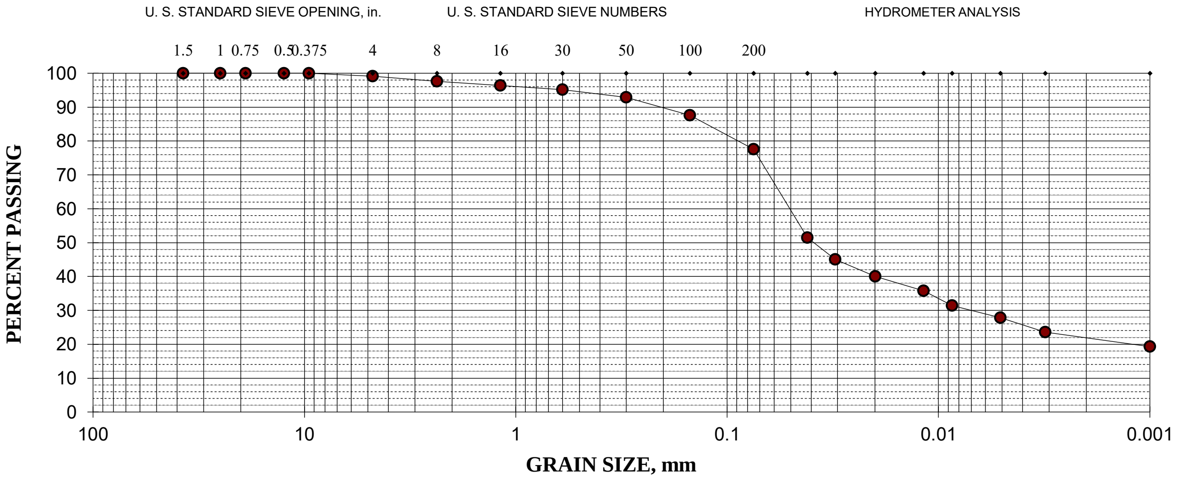
Specific Gravity = 2.70 (assumed)

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



PARTICLE SIZE ANALYSIS

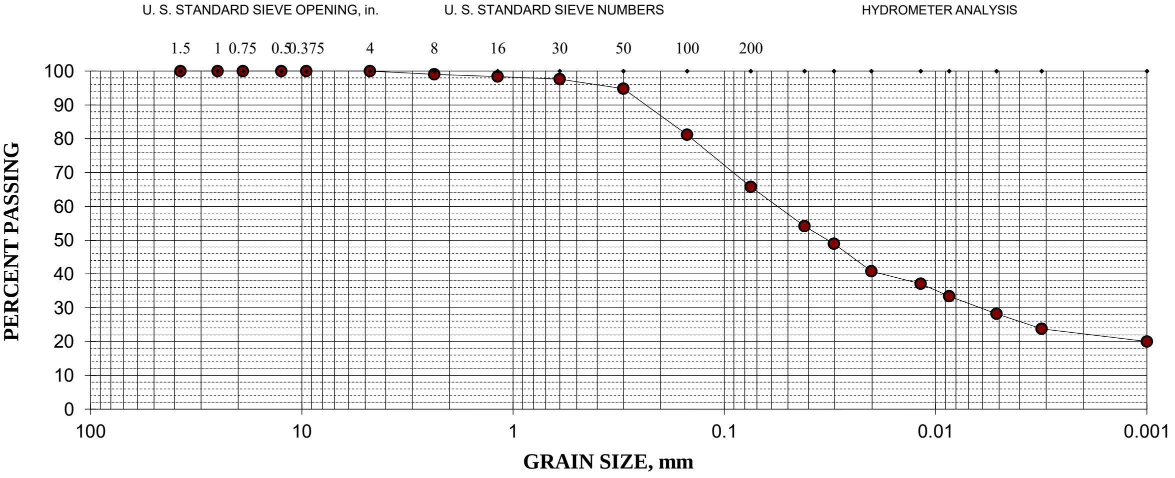
ASTM D 422-63/07

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 7-25 and Taxiway Connector Improvements | 302524-001

PARTICLE SIZE ANALYSIS

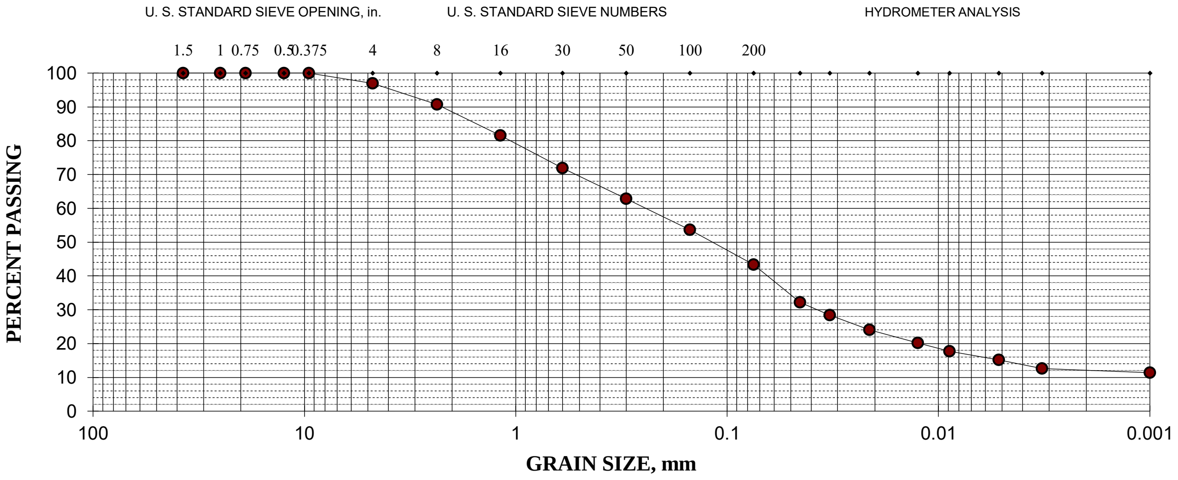
ASTM D 422-63/07

CBR #13; Boring #40 @ 1.5 - 3.5' | January 8, 2019

Silty Sand (SM) | Specific Gravity = 2.65 (assumed)

PI = NP | 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



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

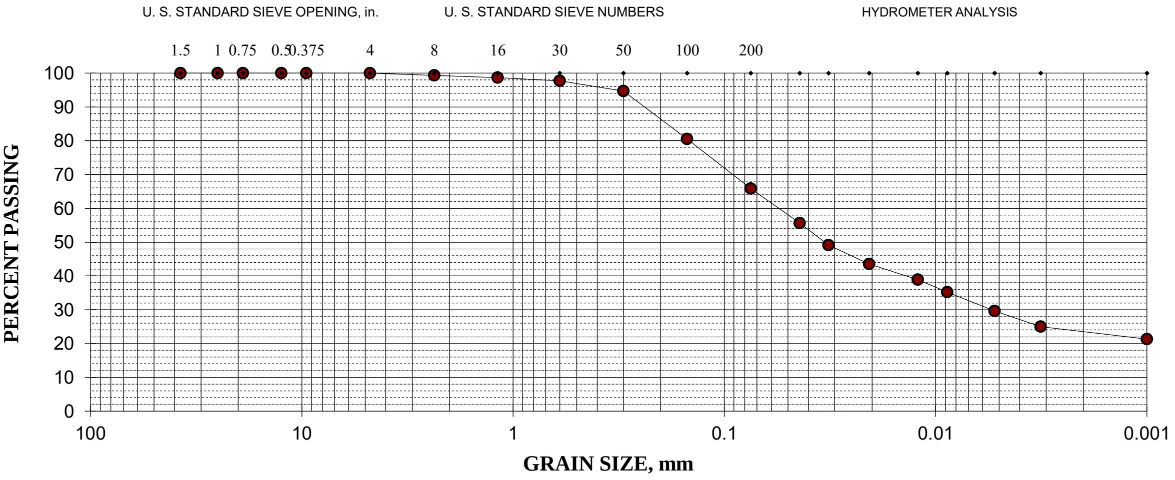
ASTM D 422-63/07

CBR #14; Boring #39 @ 2.0 - 5.0'
Sandy Fat Clay (CH)
LL = 55; PL = 15; PI = 40

January 8, 2019
Specific Gravity = 2.70 (assumed)
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



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

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)

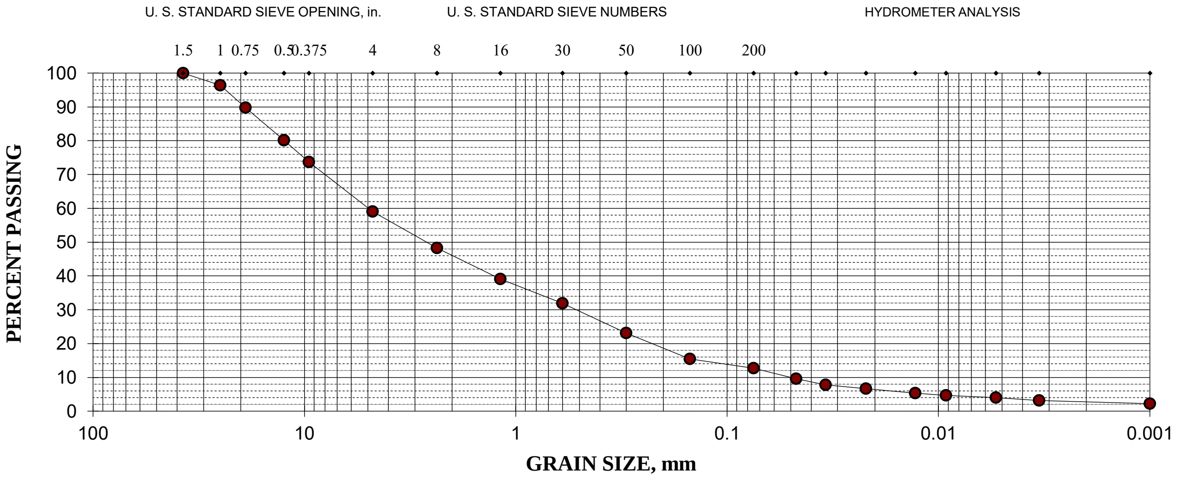
LL = 33; PL = 17; PI = 16

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 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

Silty Gravel with Sand (GM)

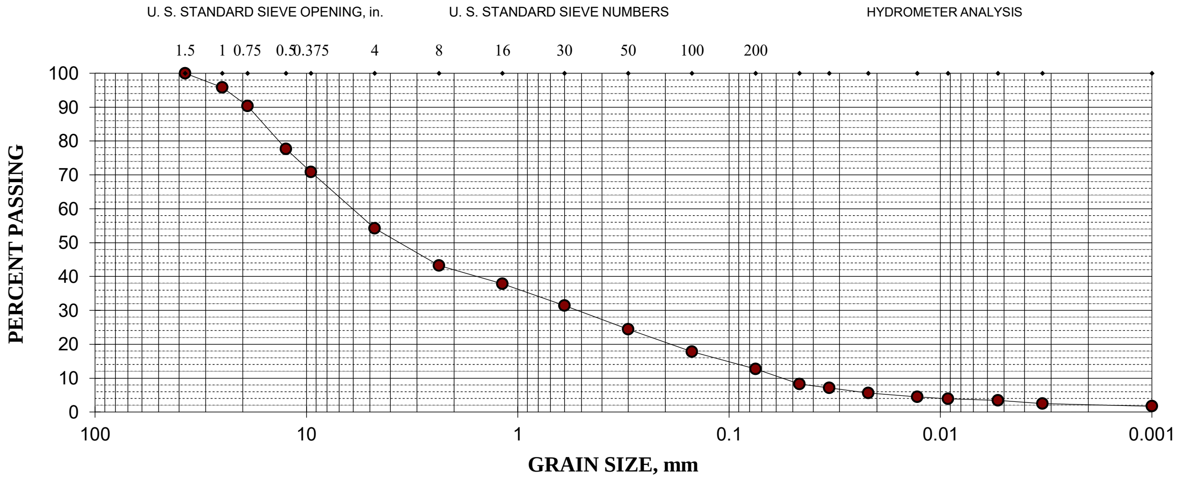
Specific Gravity = 2.65 (assumed)

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



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

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

January 8, 2019

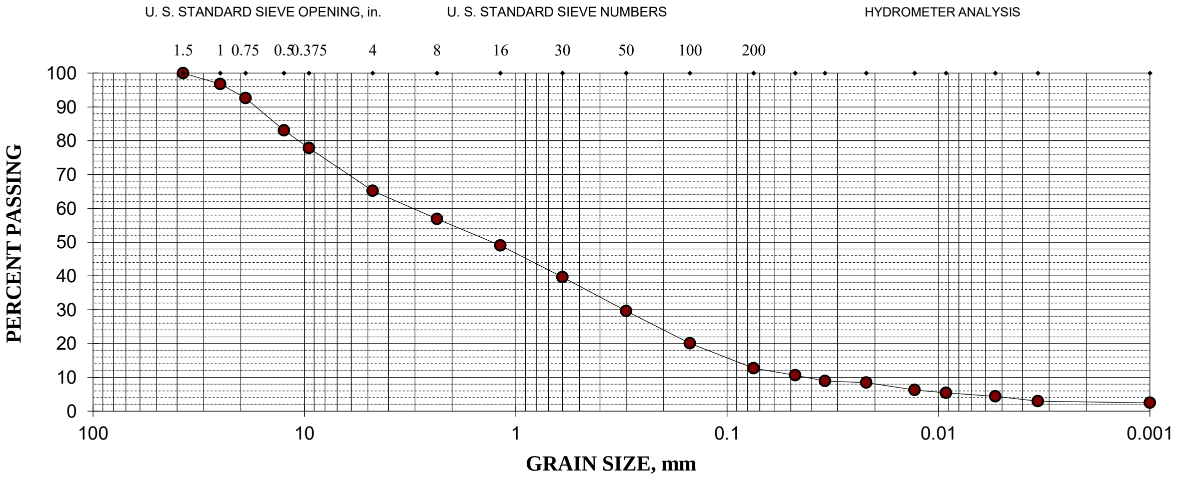
Silty Sand with Gravel (SM)

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 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #7 @ 2.0 - 3.5'

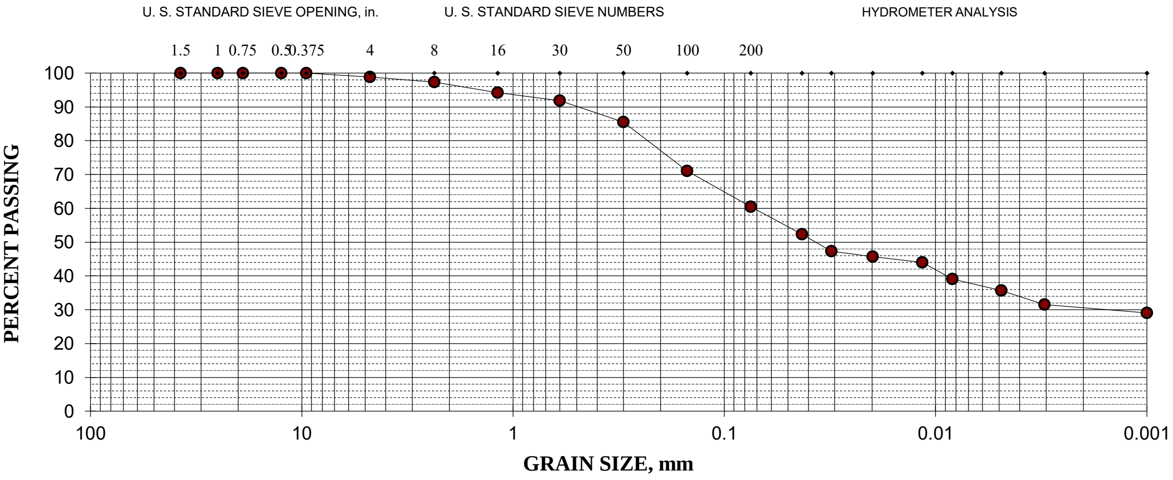
January 8, 2019

Sandy Lean Clay (CL)

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



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

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)

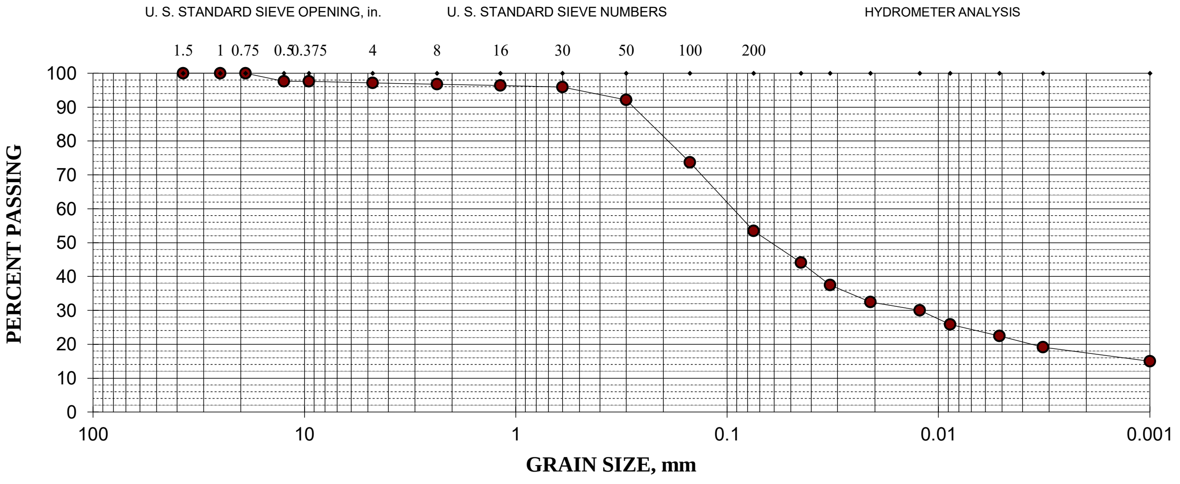
LL = 30; PL = 16; PI = 14

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 7-25 and Taxiway Connector Improvements

302524-001

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #10 @ 1.5 - 2.5'

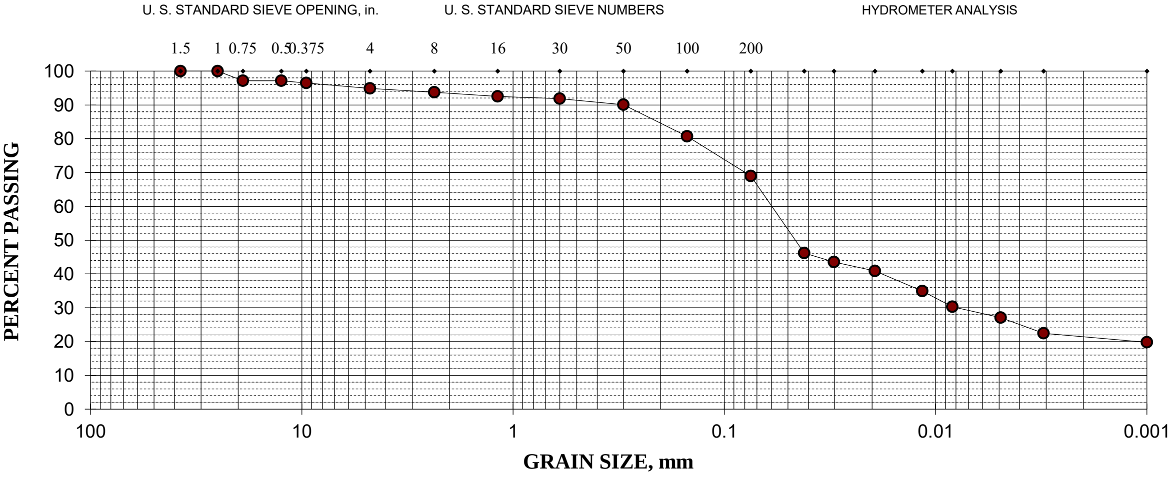
January 8, 2019

Sandy Lean Clay (CL)

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 7-25 and Taxiway Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

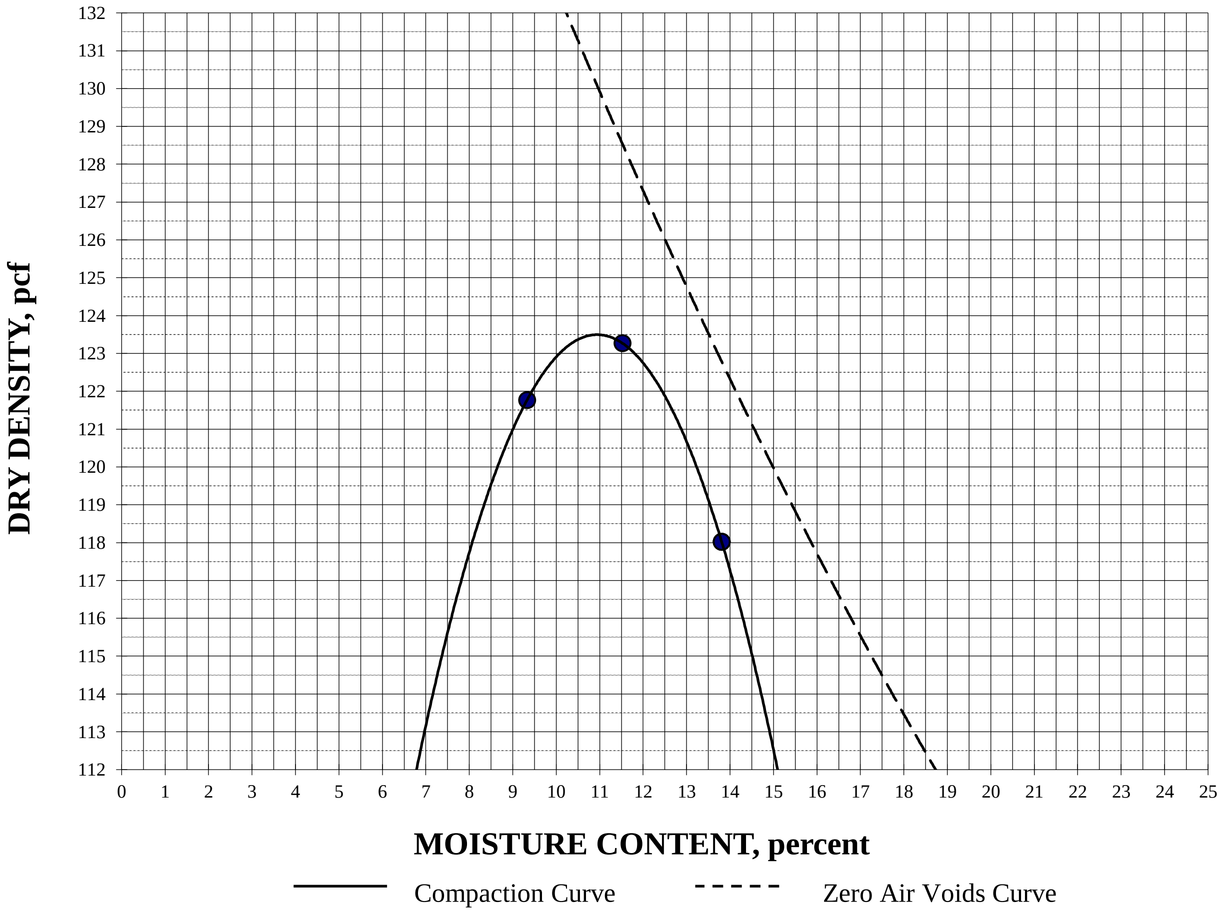
SPECIFIC GRAVITY: 2.70 (assumed)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 123.5 pcf

OPTIMUM MOISTURE: 10.9%



MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

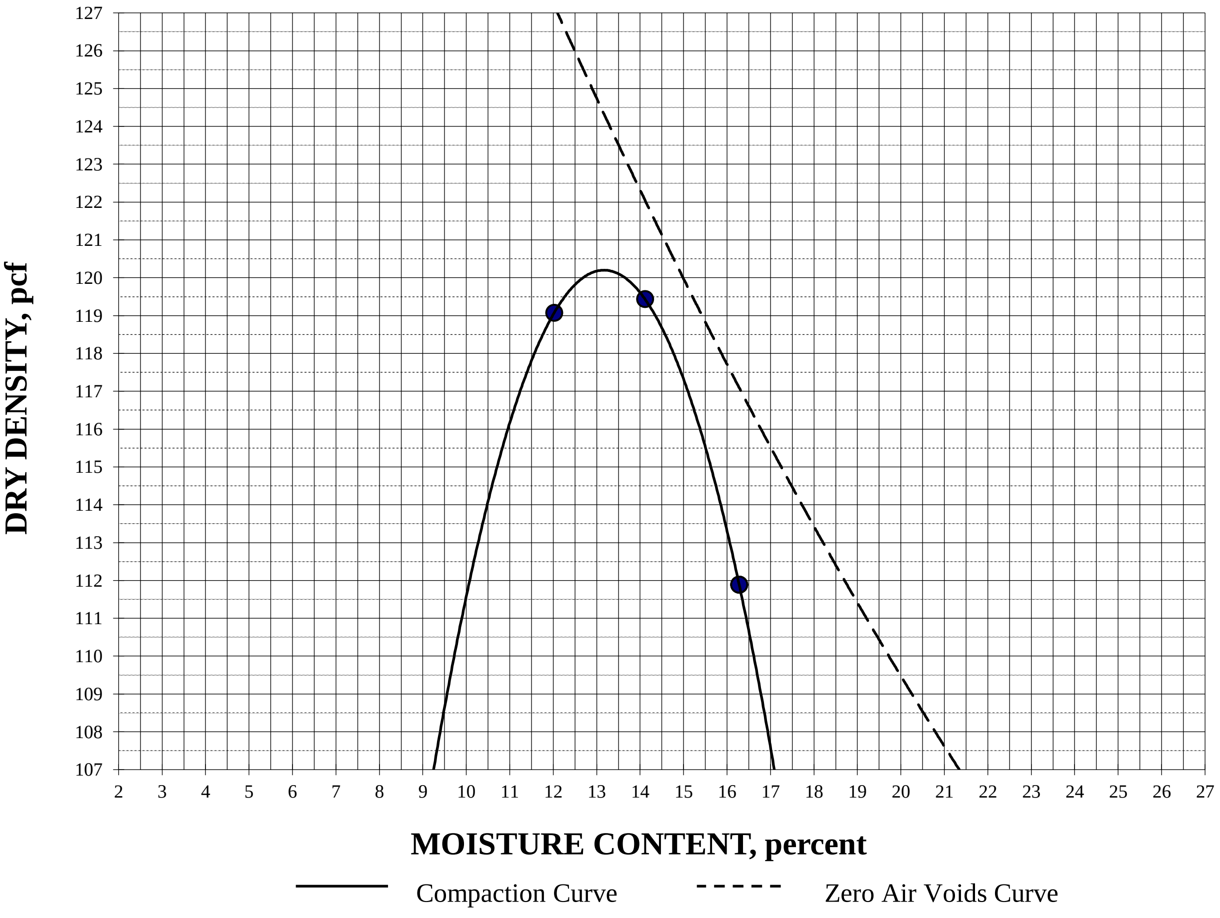
SPECIFIC GRAVITY: 2.70 (assumed)

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
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 16, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Silty Sand (SM)

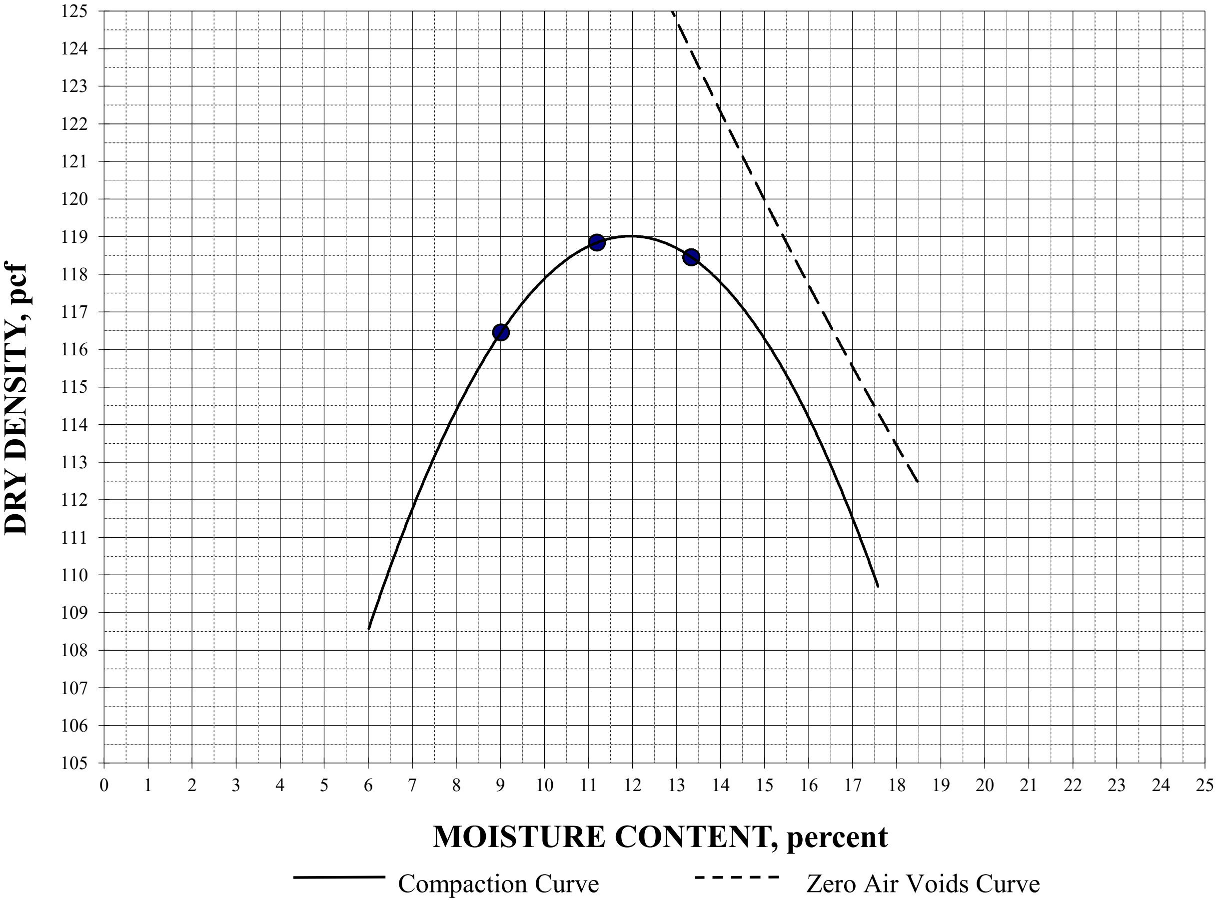
SPECIFIC GRAVITY: 2.70 (assumed)

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

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 16, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Silty Sand (SM)

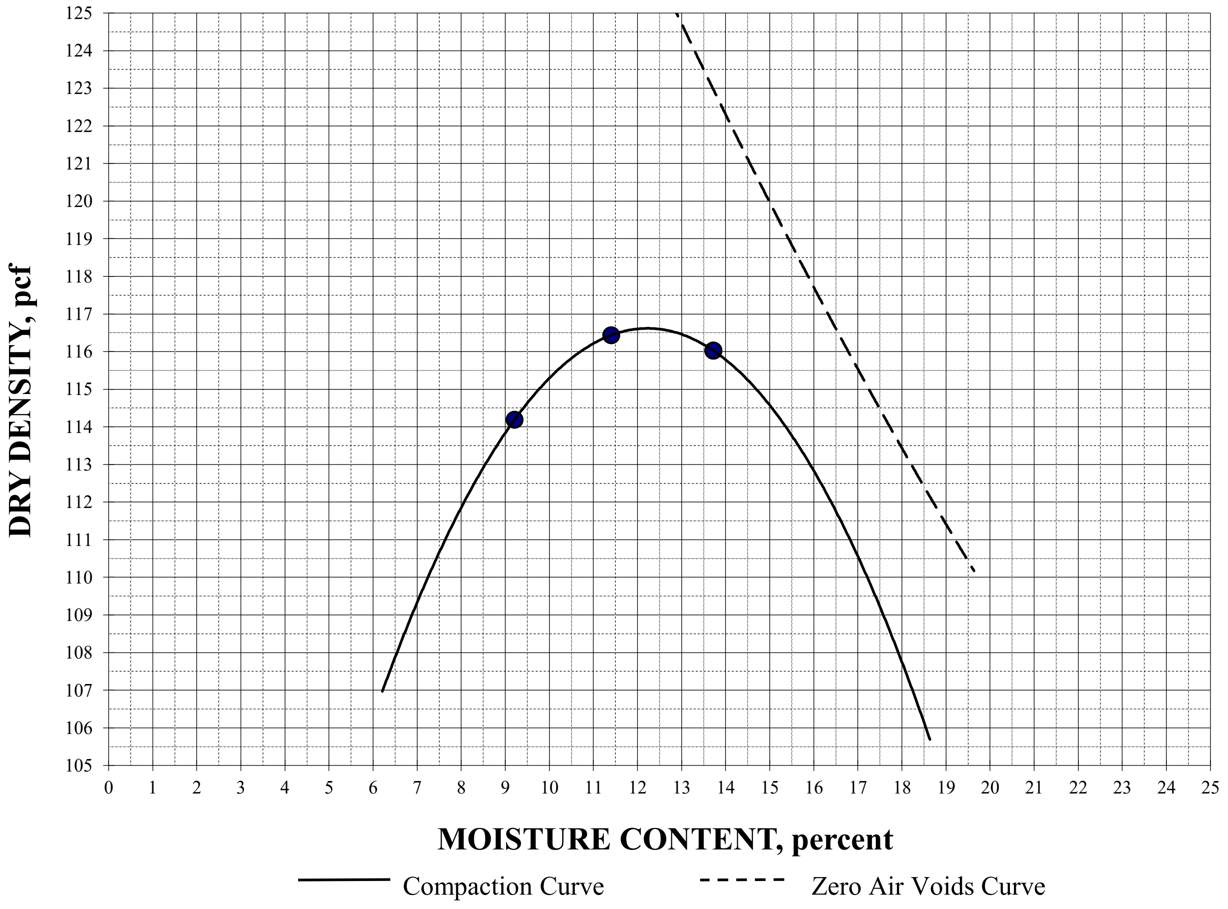
SPECIFIC GRAVITY: 2.70 (assumed)

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
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

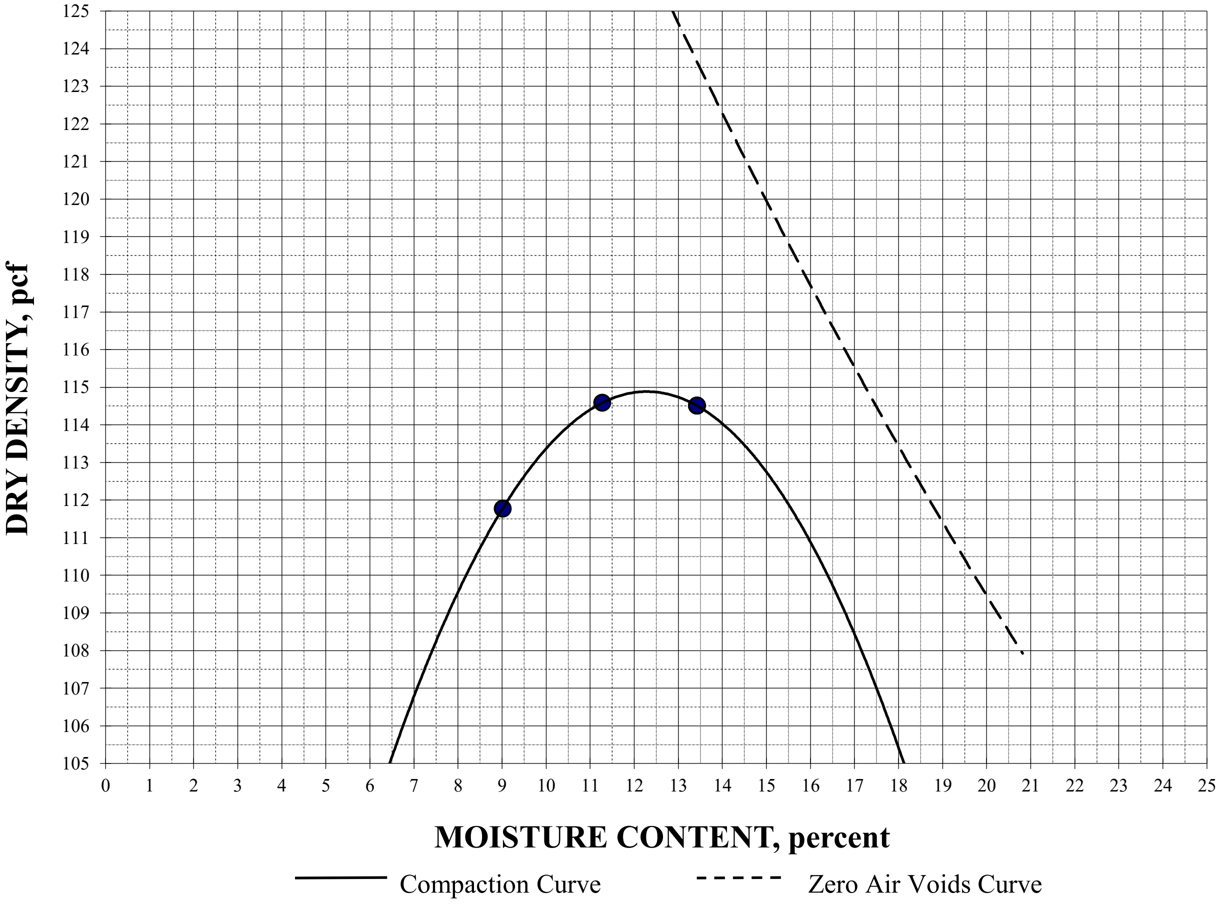
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

January 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 7-25 and Taxiway
Connector Improvements

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 #4; Boring #3 @ 0.5 - 1.0'

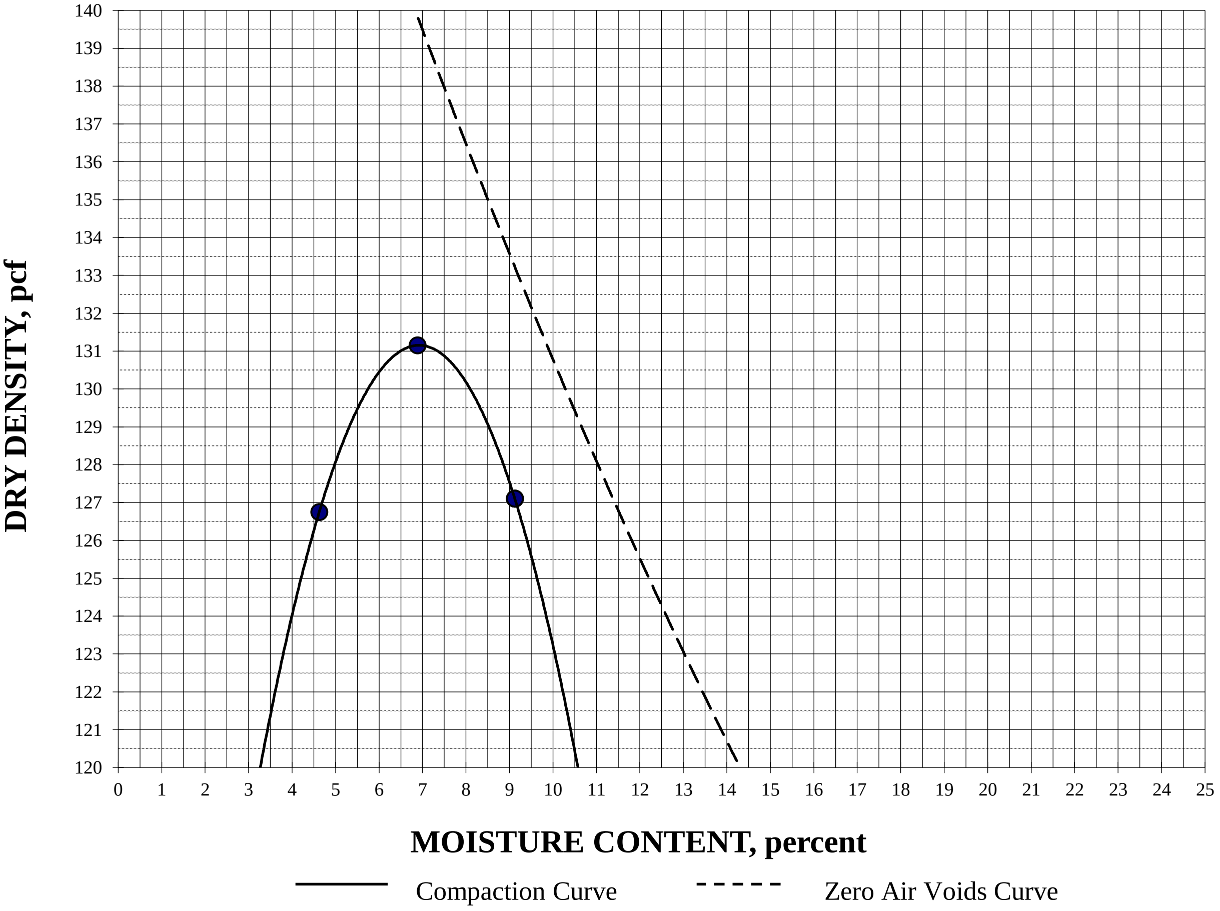
Brown Clayey Sand with Gravel (SC)

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 7-25 and Taxiway Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

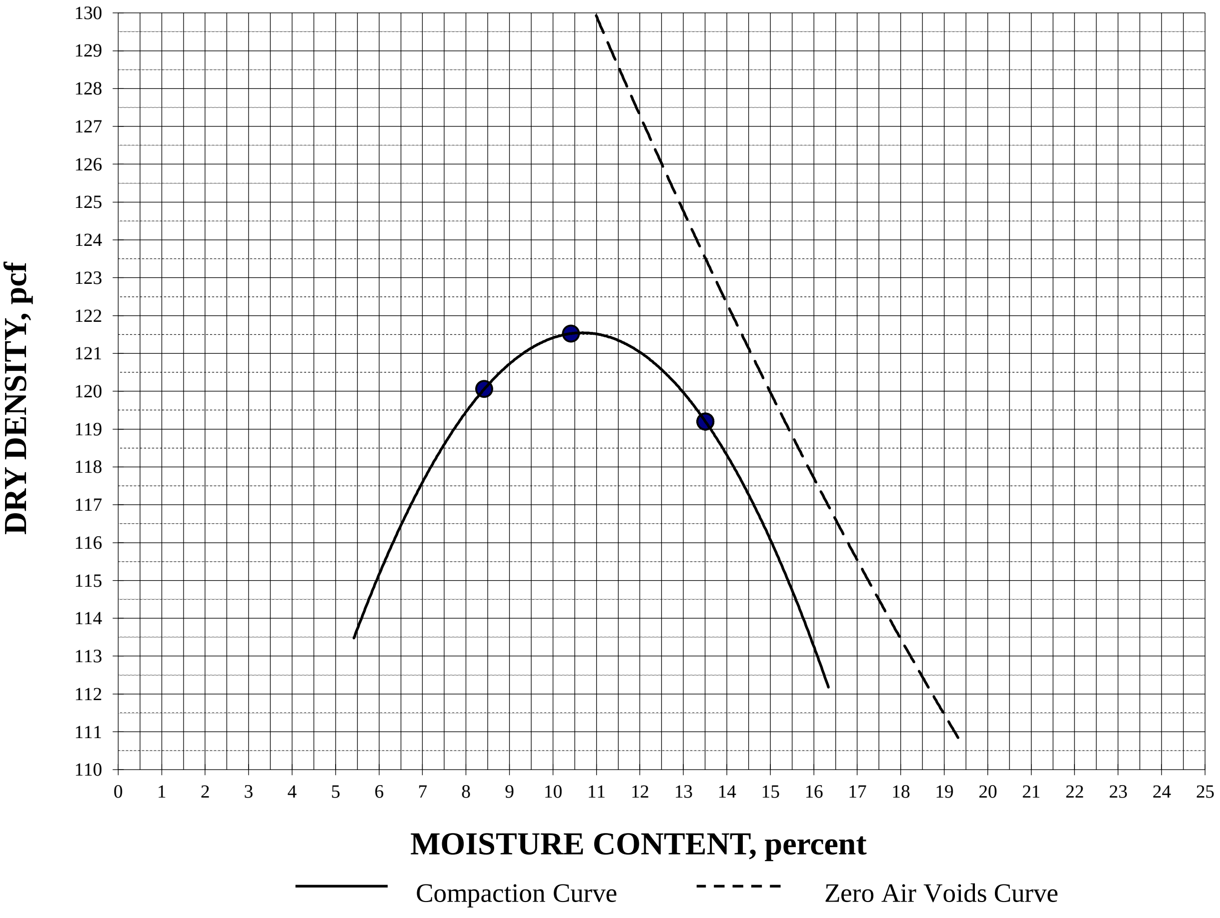
SPECIFIC GRAVITY: 2.70 (assumed)

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
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 16, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

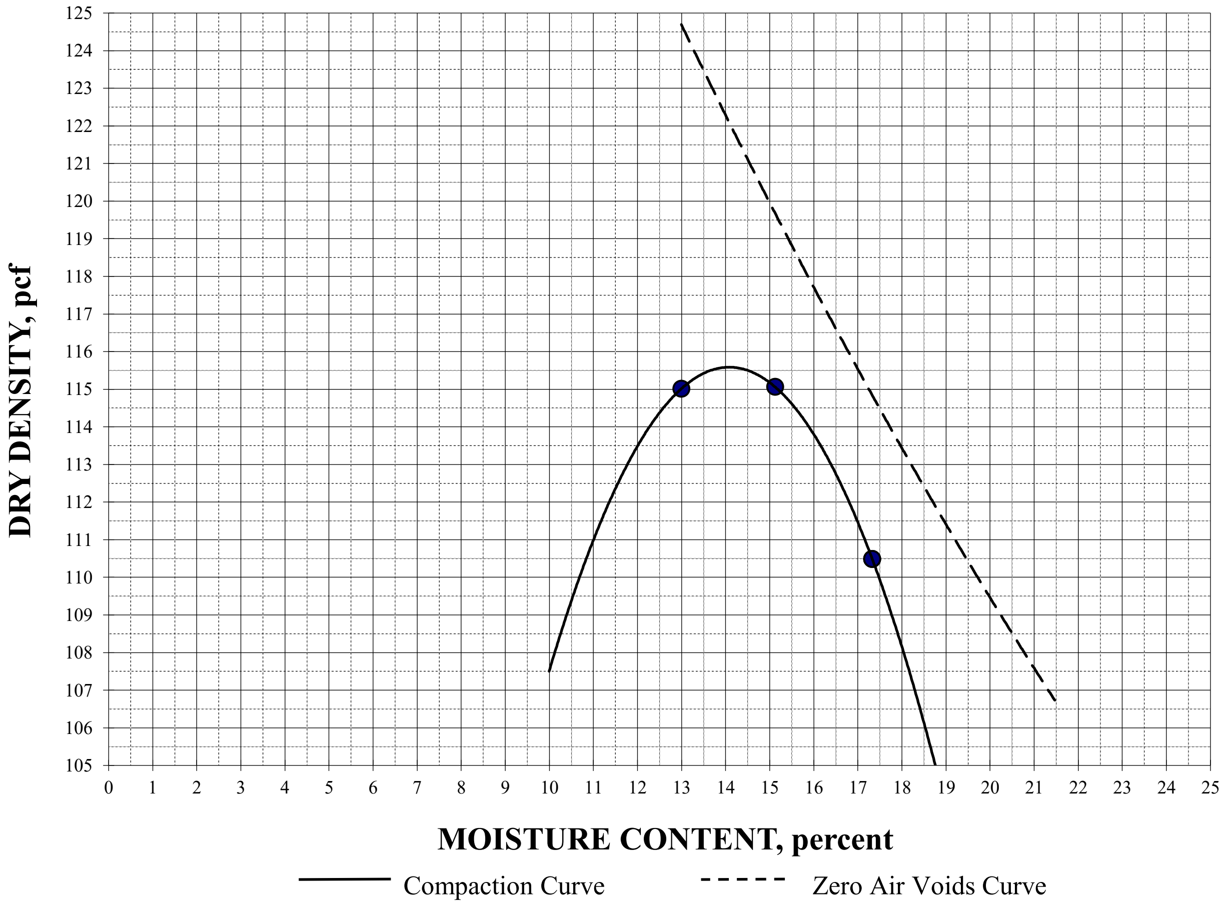
SPECIFIC GRAVITY: 2.70 (assumed)

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
Rehabilitation / Reconstruction

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 16, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

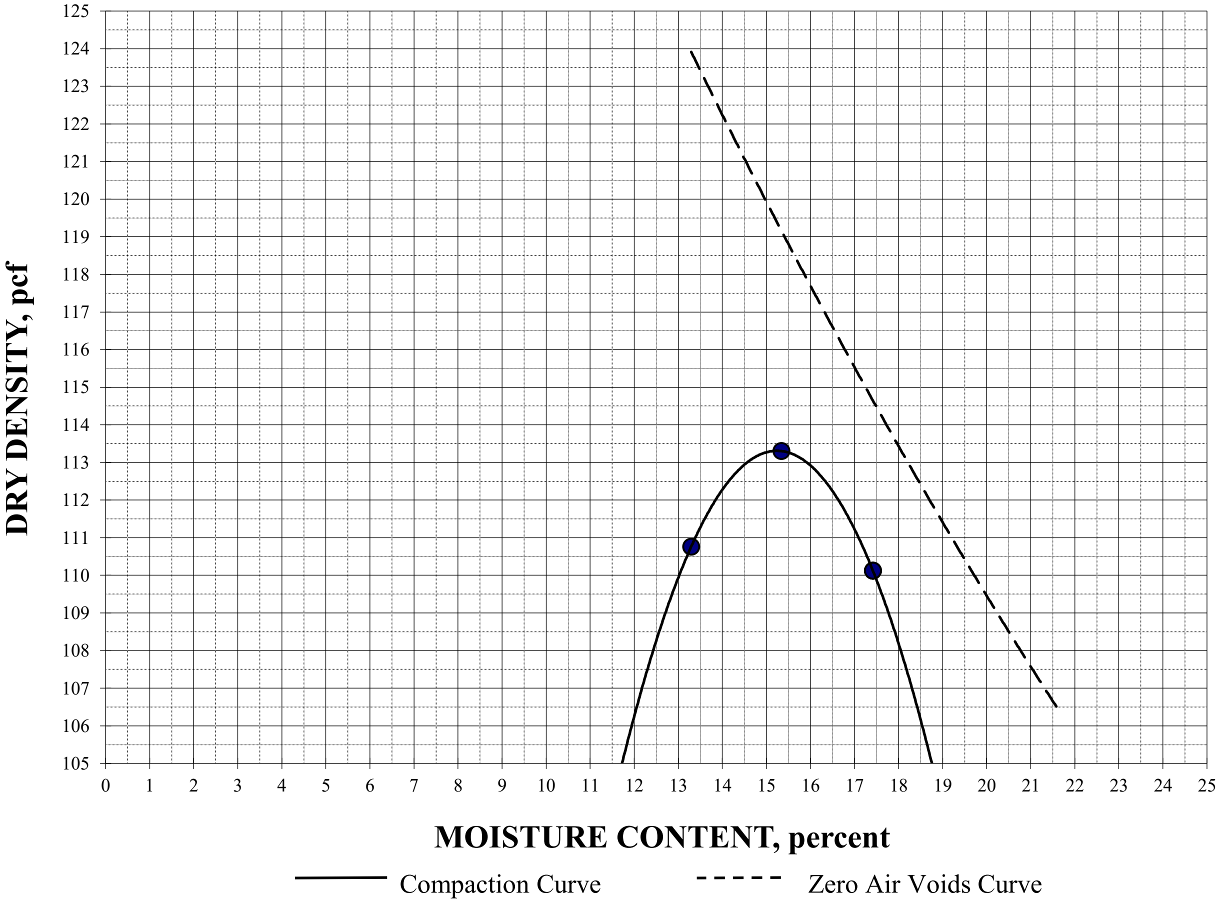
SPECIFIC GRAVITY: 2.70 (assumed)

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

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 16, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

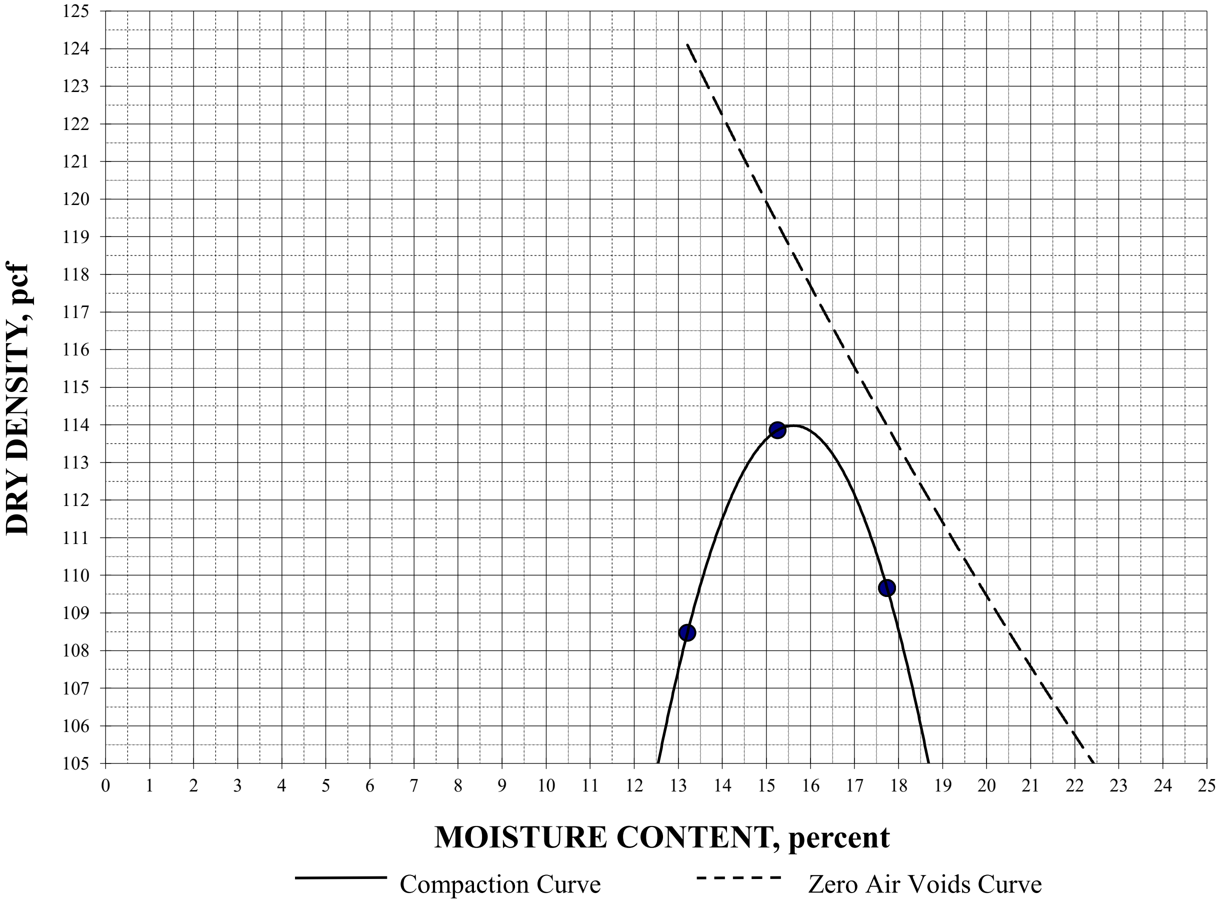
SPECIFIC GRAVITY: 2.70 (assumed)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 114.0 pcf

OPTIMUM MOISTURE: 15.6%



MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

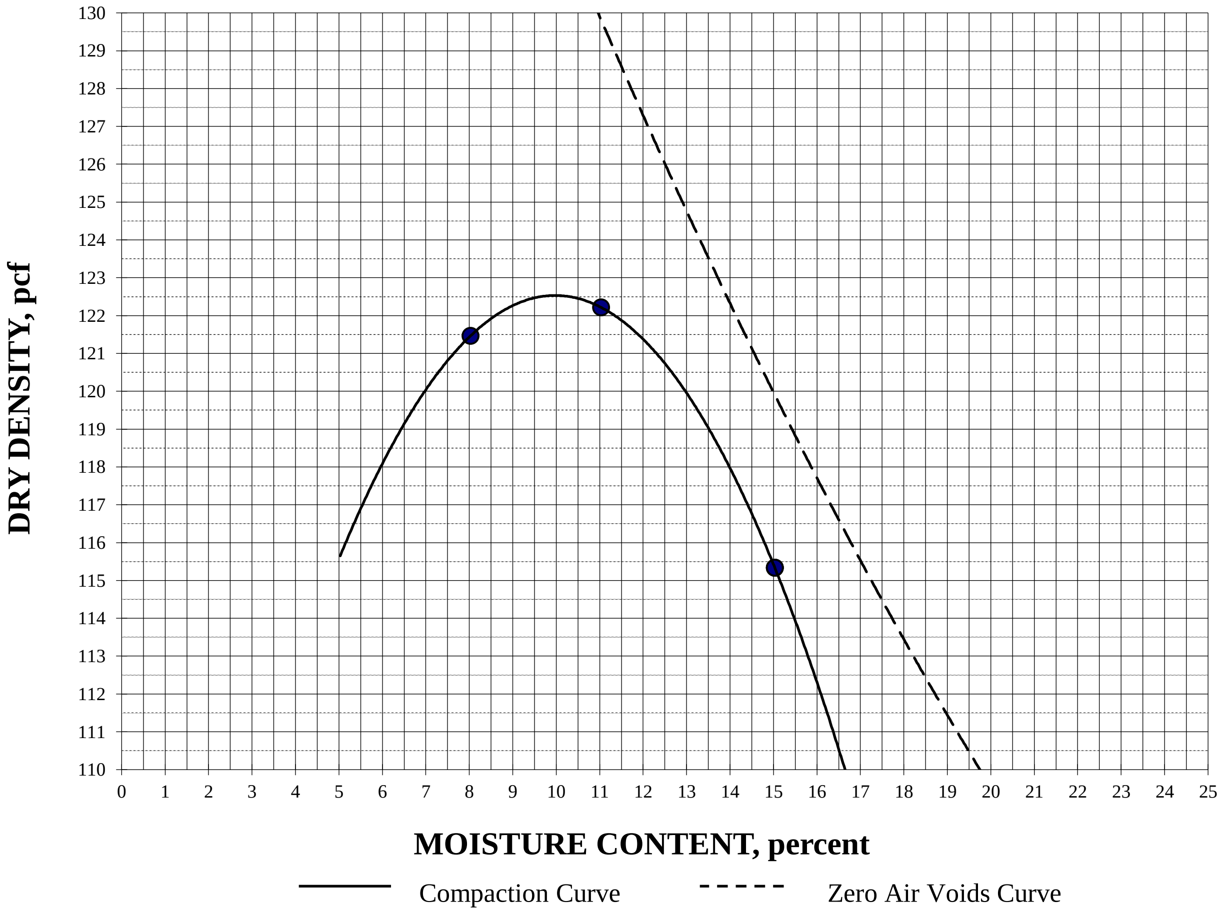
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

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%



MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Brown / Gray Mottled Sandy Lean Clay (CL)

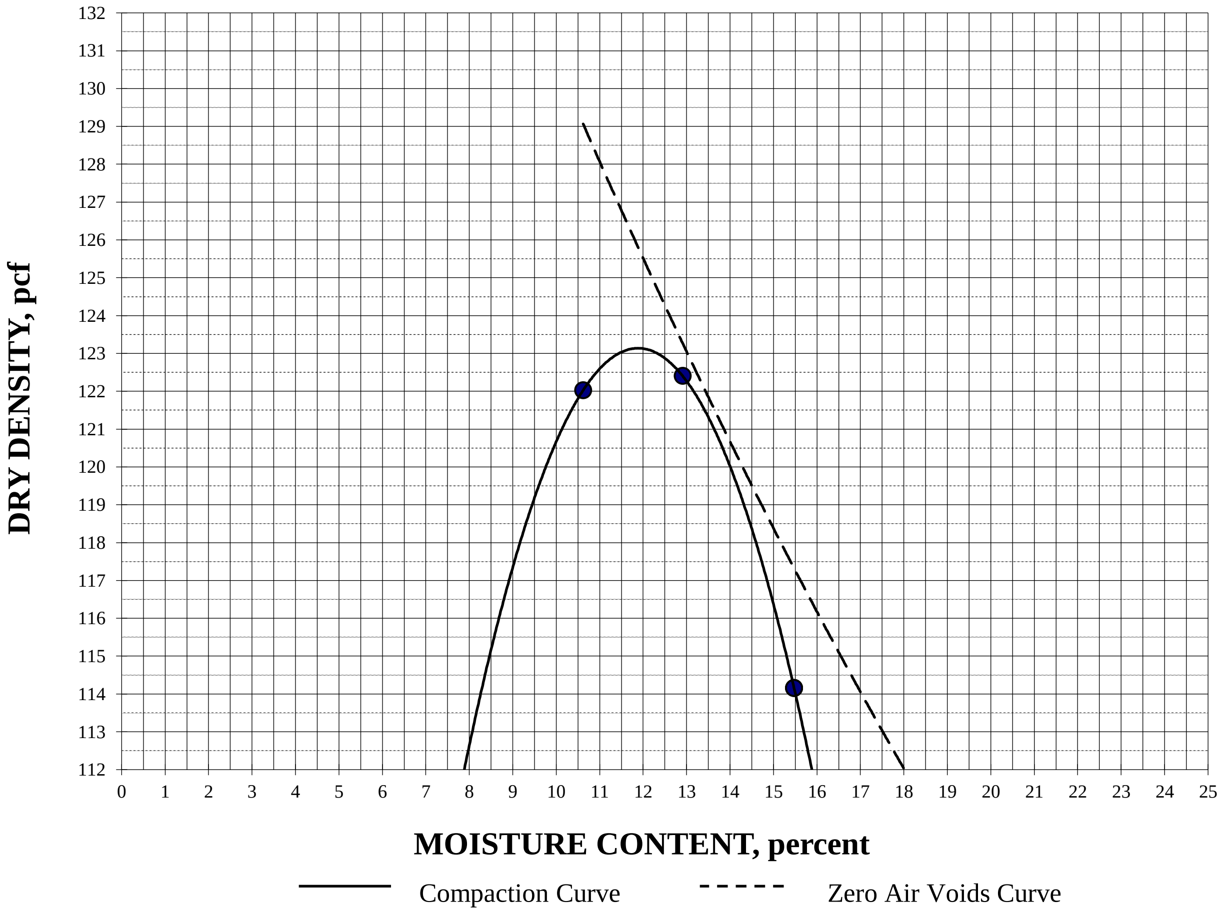
SPECIFIC GRAVITY: 2.65 (assumed)

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 7-25 and Taxiway Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Brown Sandy Lean Clay (CL)

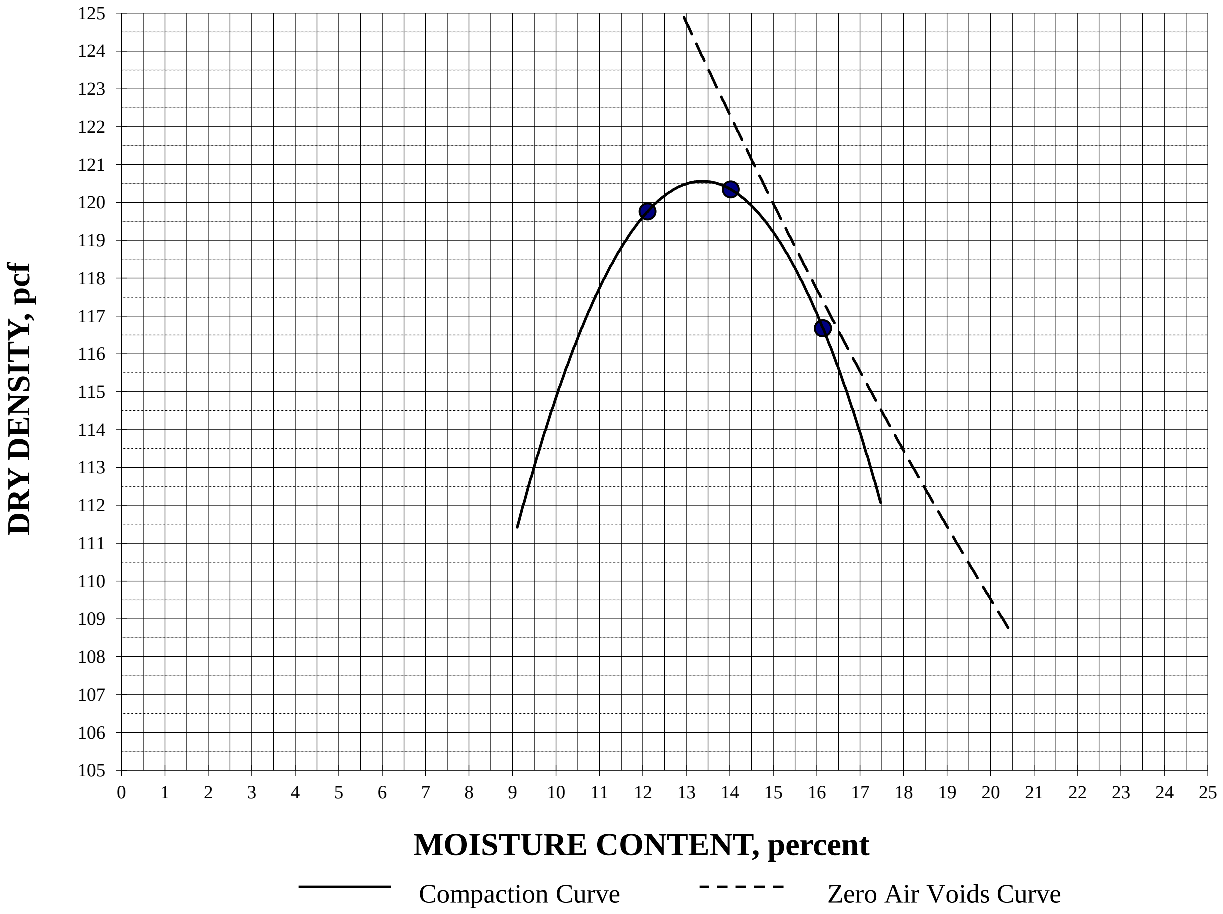
SPECIFIC GRAVITY: 2.70 (assumed)

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 7-25 and Taxiway
Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

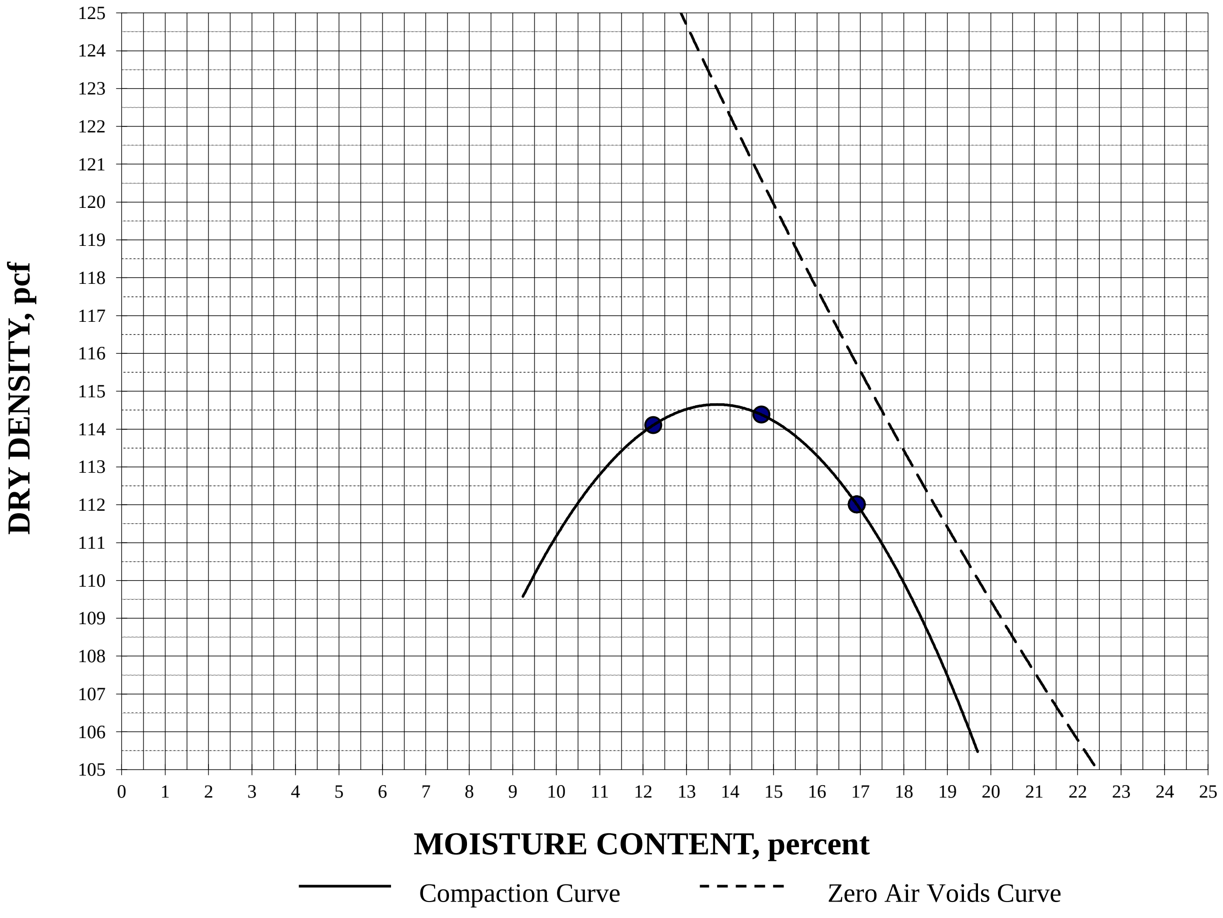
SPECIFIC GRAVITY: 2.70 (assumed)

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 7-25 and Taxiway Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

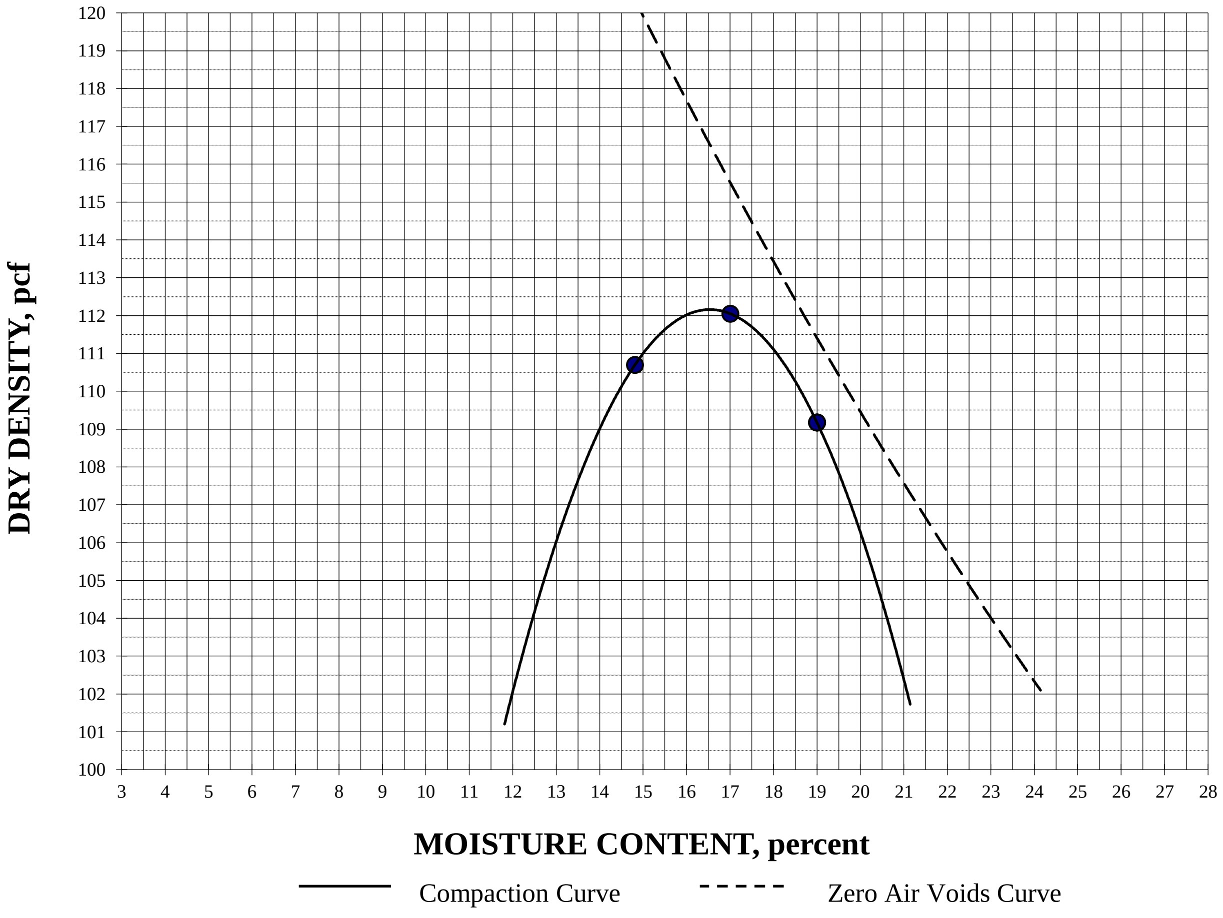
SPECIFIC GRAVITY: 2.70 (assumed)

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 7-25 and Taxiway Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Brown Silty Sand (SM)

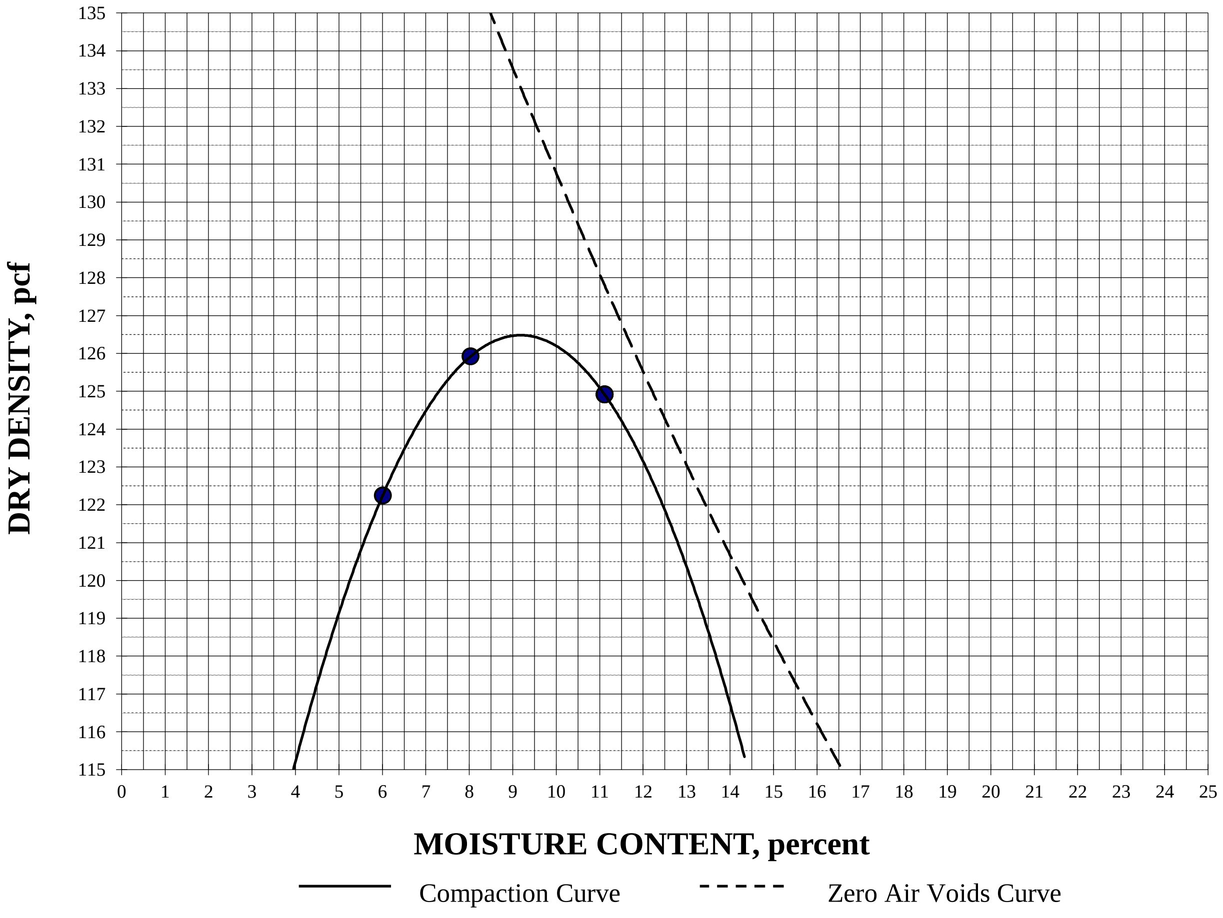
SPECIFIC GRAVITY: 2.65 (assumed)

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 7-25 and Taxiway Connector Improvements

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)

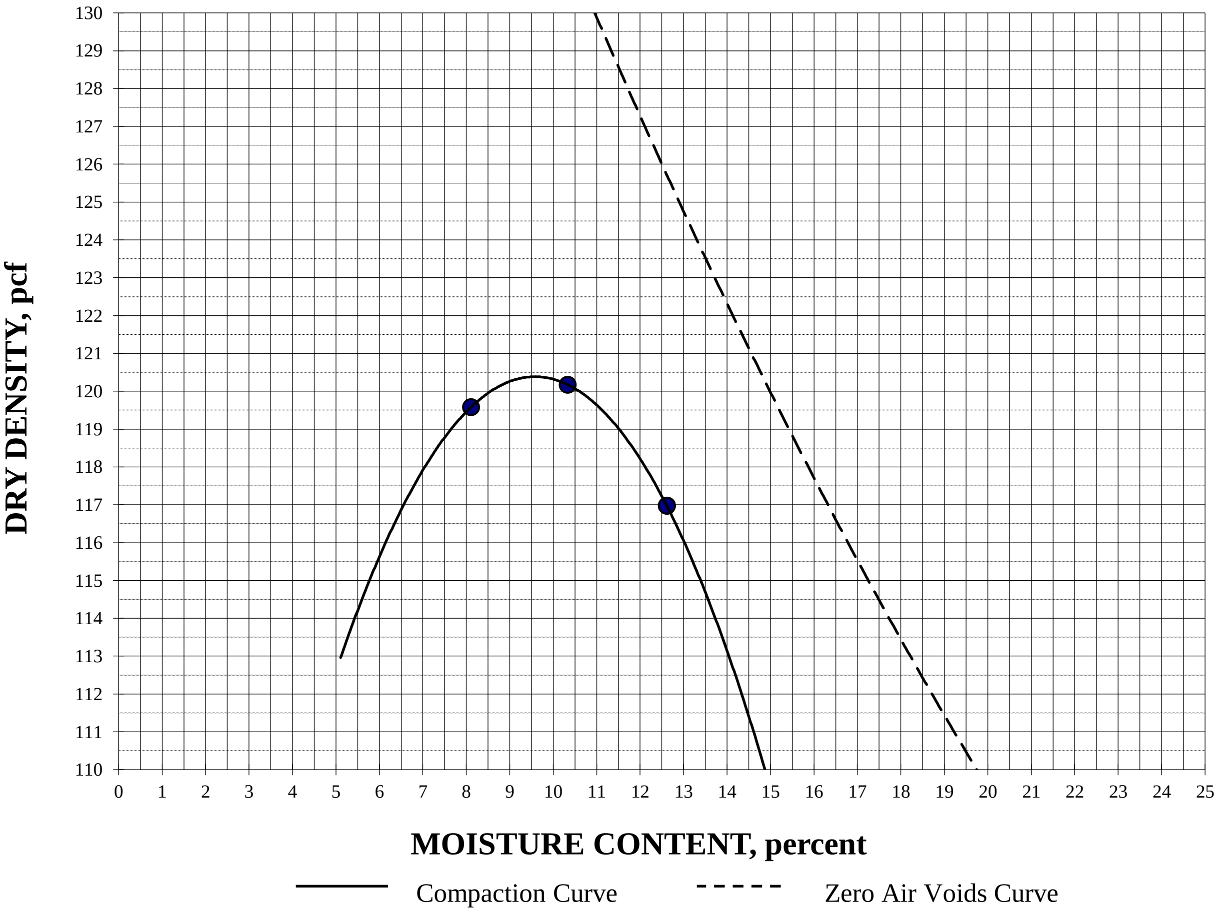
SPECIFIC GRAVITY: 2.70 (assumed)

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 7-25 and Taxiway Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: C

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Brown Clayey Sand with Gravel (SC)

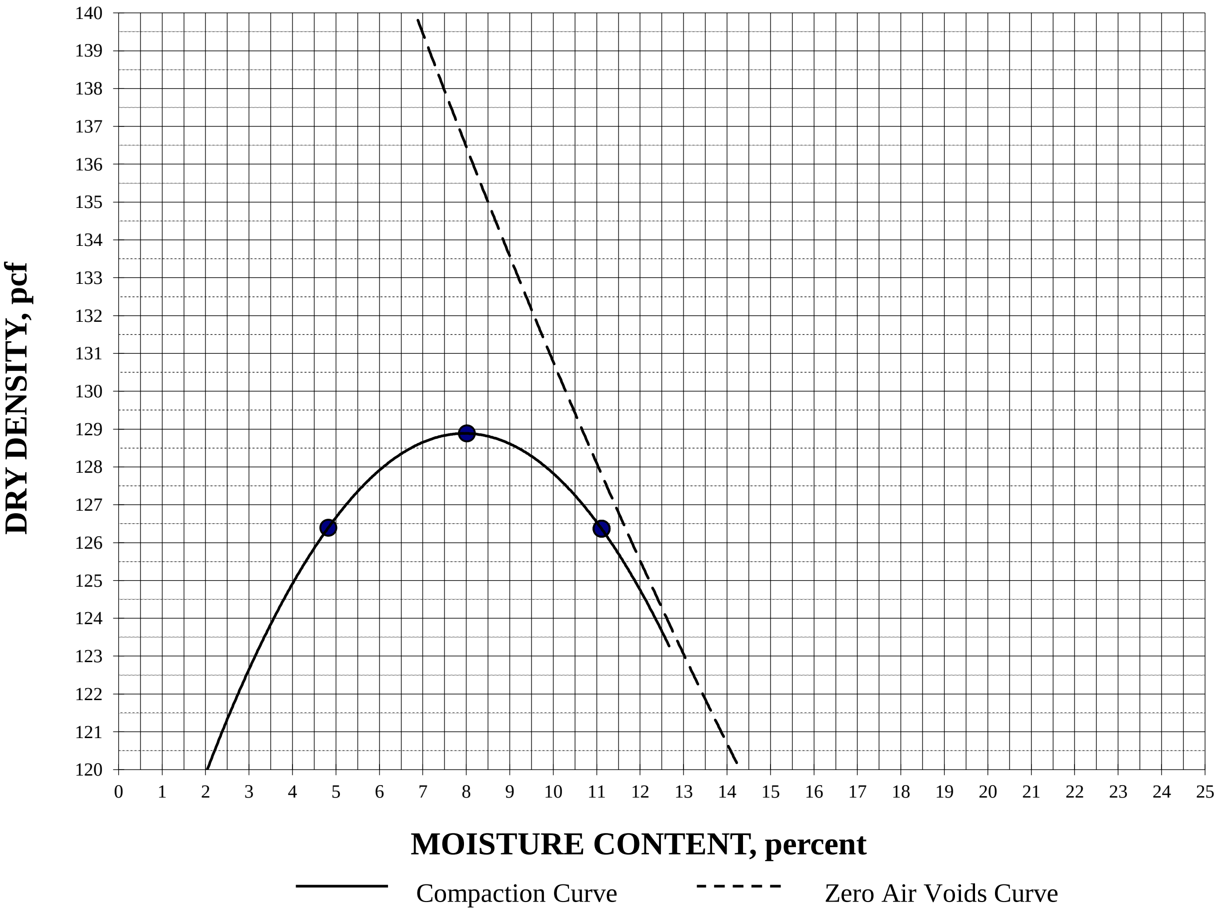
SPECIFIC GRAVITY: 2.65 (assumed)

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 7-25 and Taxiway Connector Improvements

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'

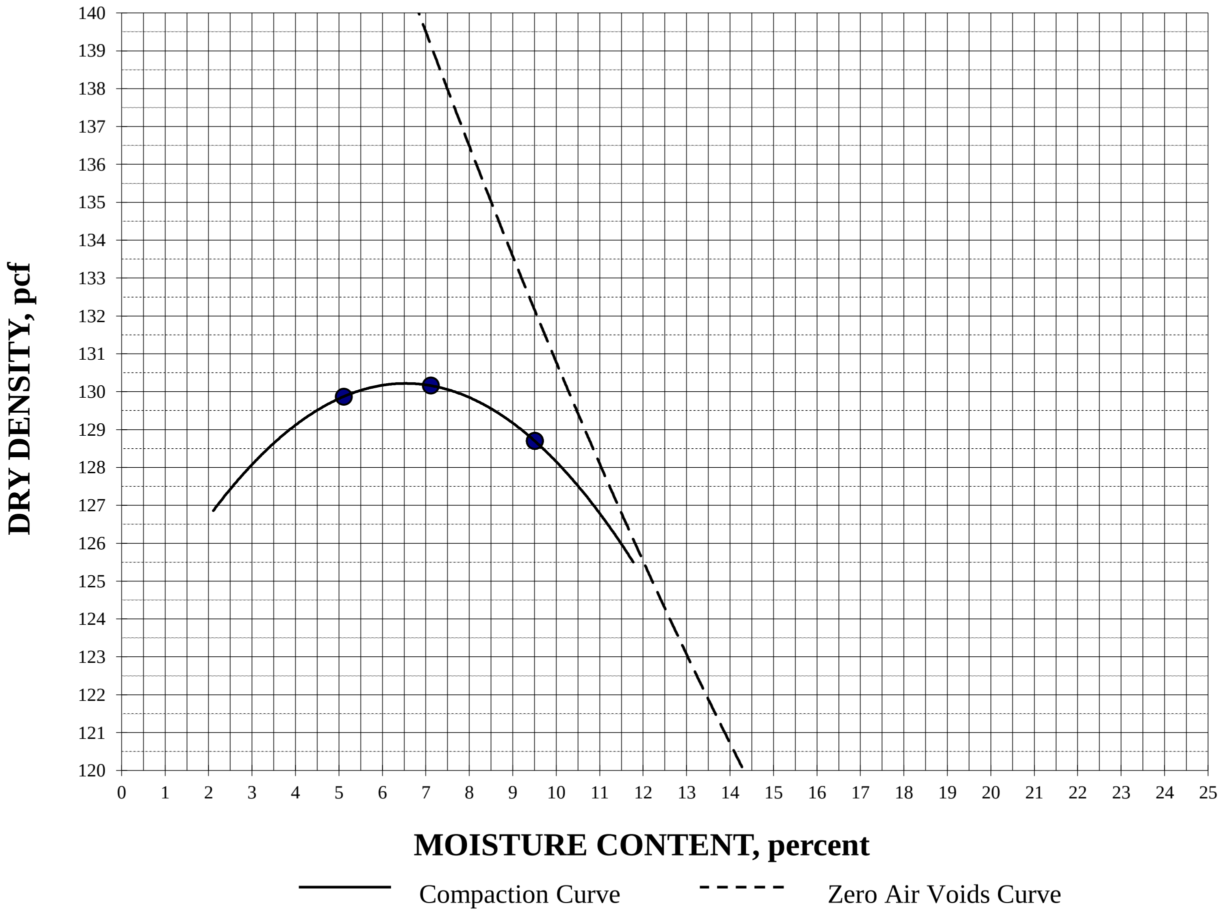
Brown Silty Gravel with Sand (GM)

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 7-25 and Taxiway
Connector Improvements

302524-001

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: C

January 8, 2019

PREPARATION METHOD: Moist

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

RAMMER TYPE: Mechanical

Brown Silty Sand with Gravel (SM)

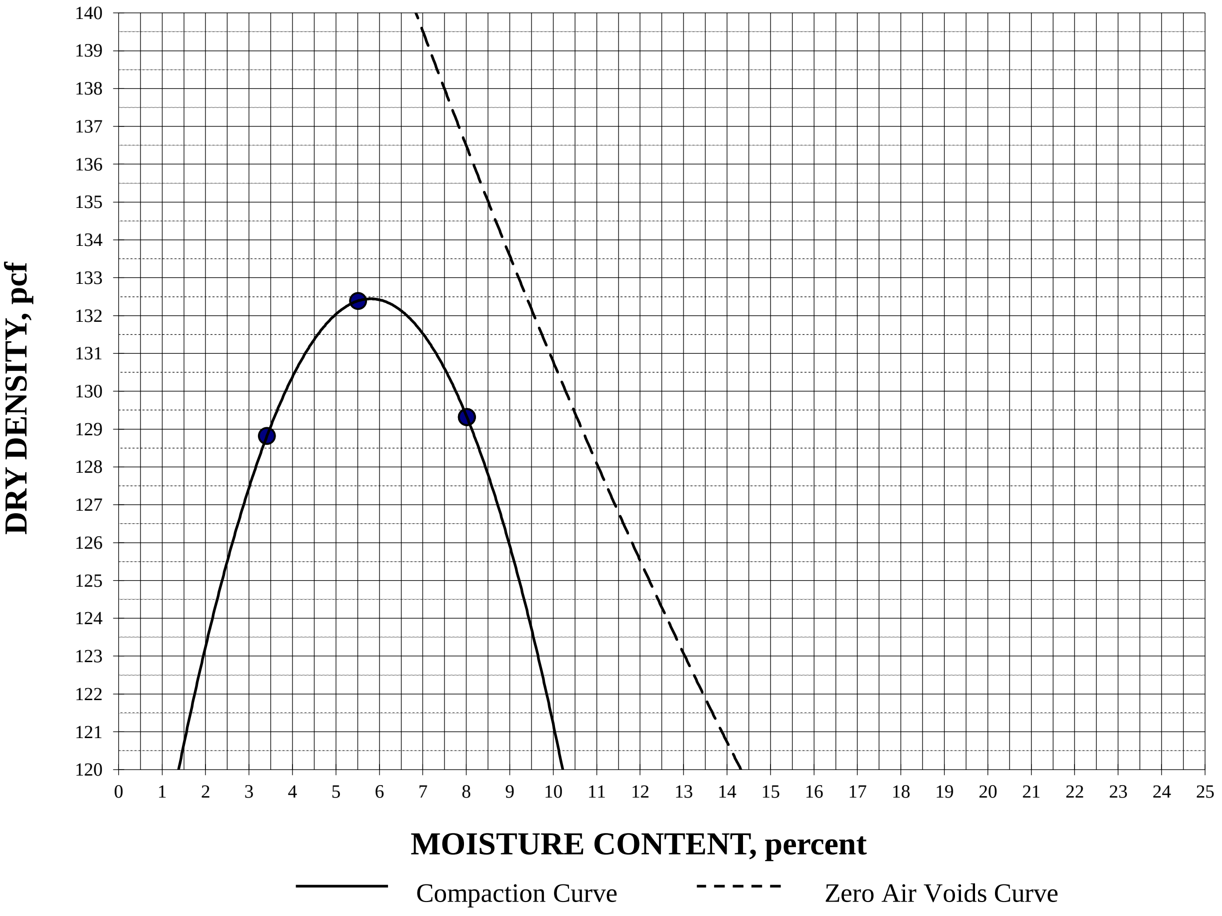
SPECIFIC GRAVITY: 2.65 (assumed)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 132.4 pcf

OPTIMUM MOISTURE: 5.8%



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

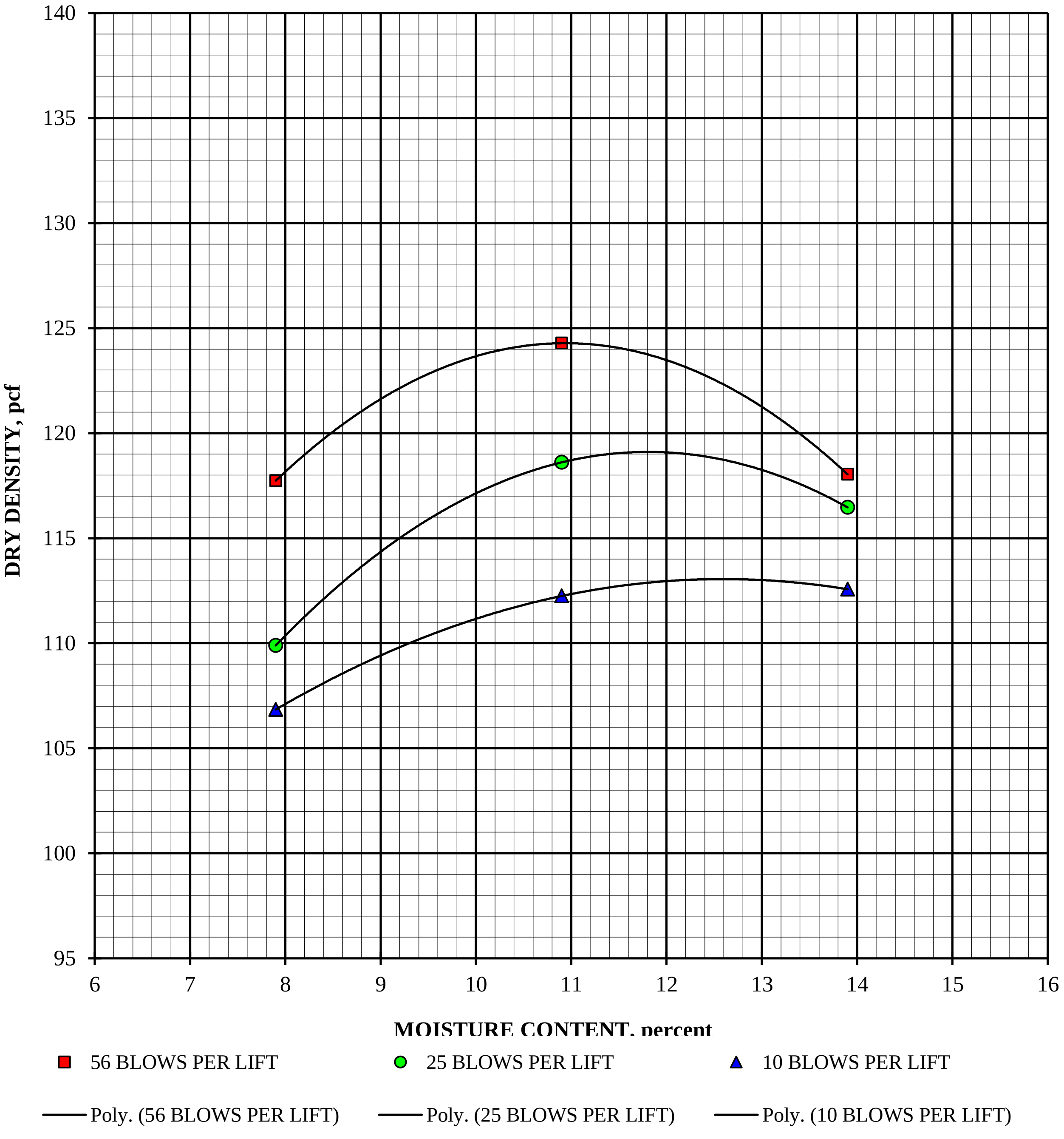
ASTM D 1883-16 (For a Range of Moisture Contents)

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 7-25 and Taxiway
Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

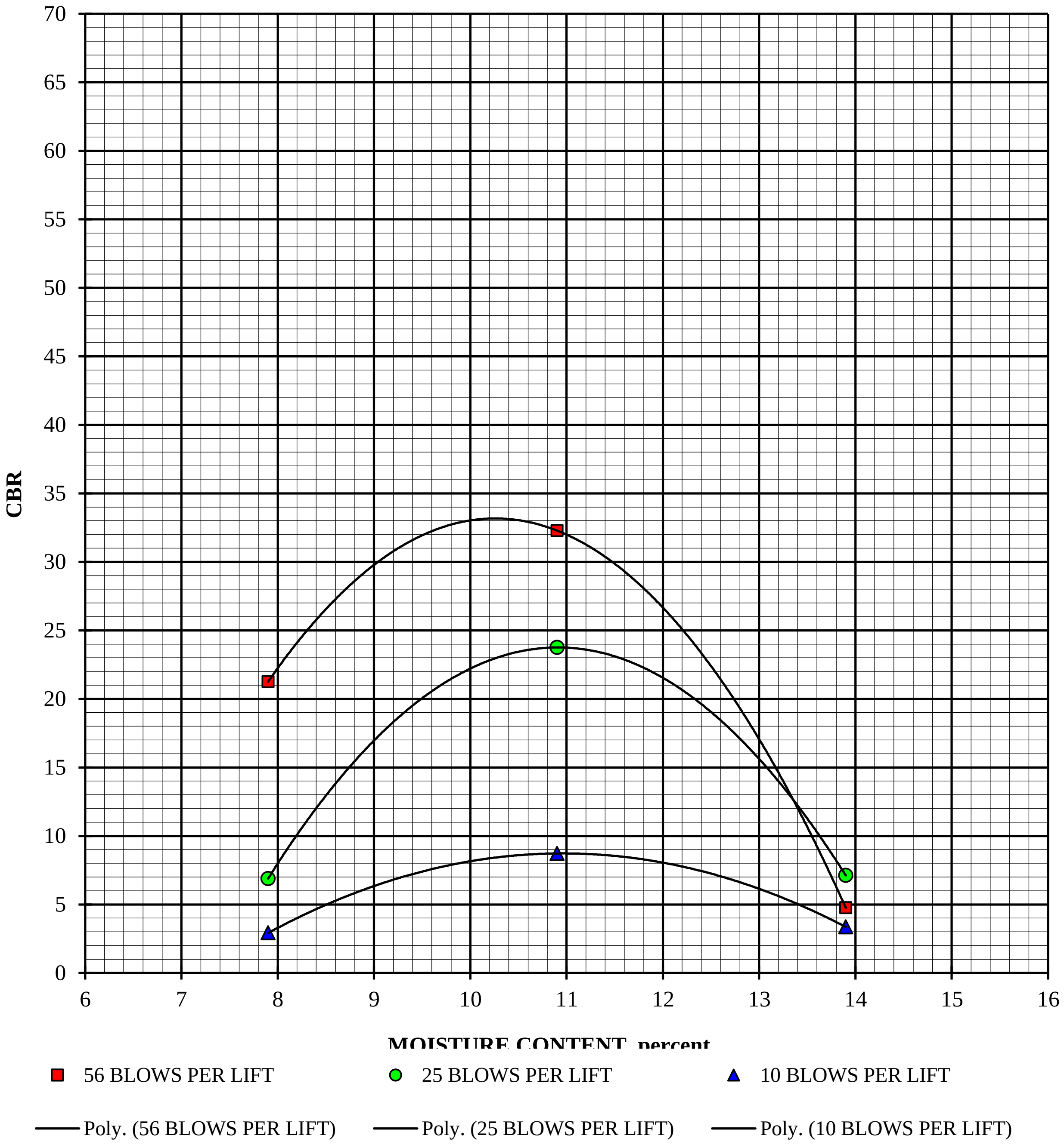
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

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

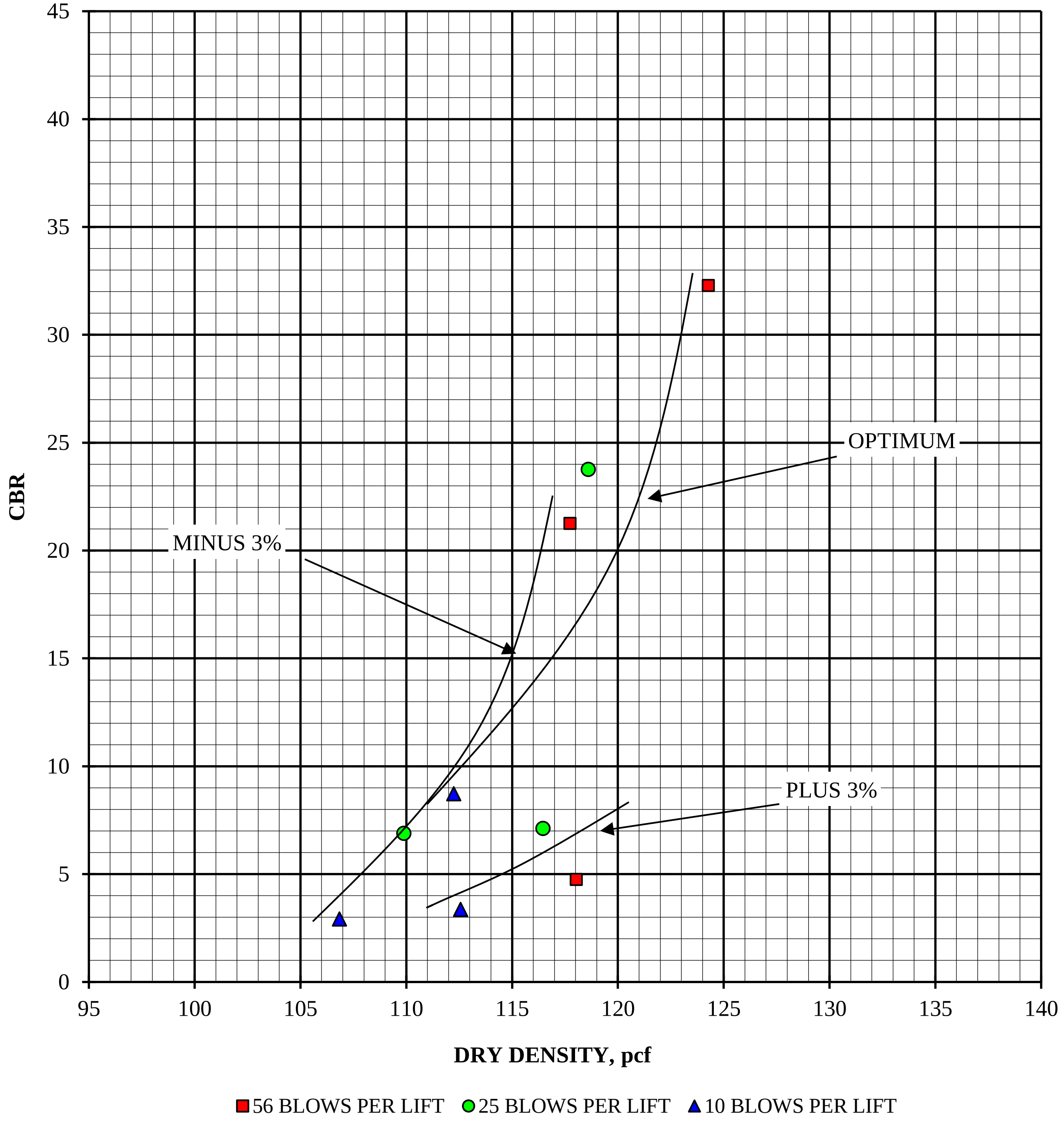
CBR #1; Boring #1 @ 2.0 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

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

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

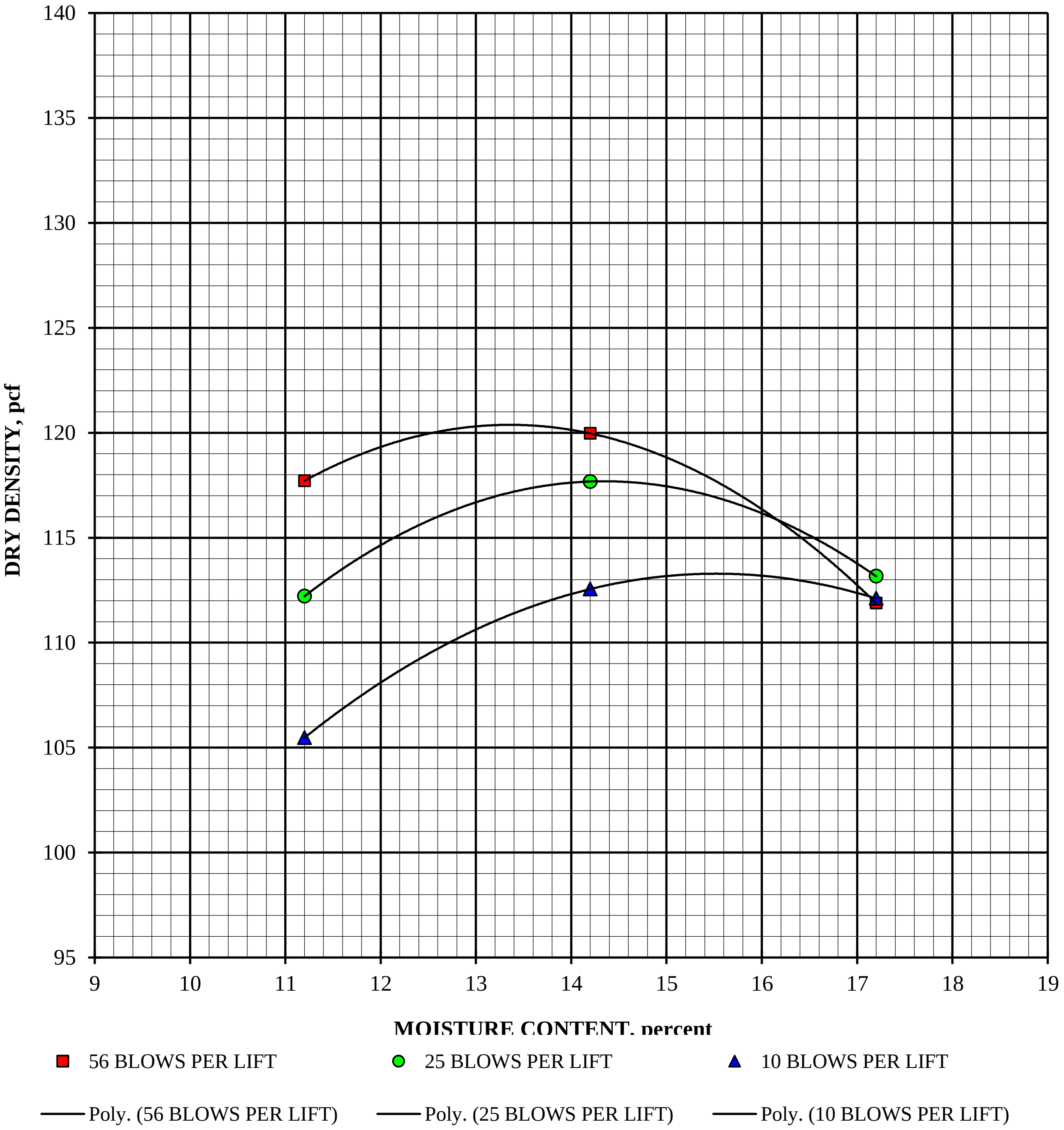
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

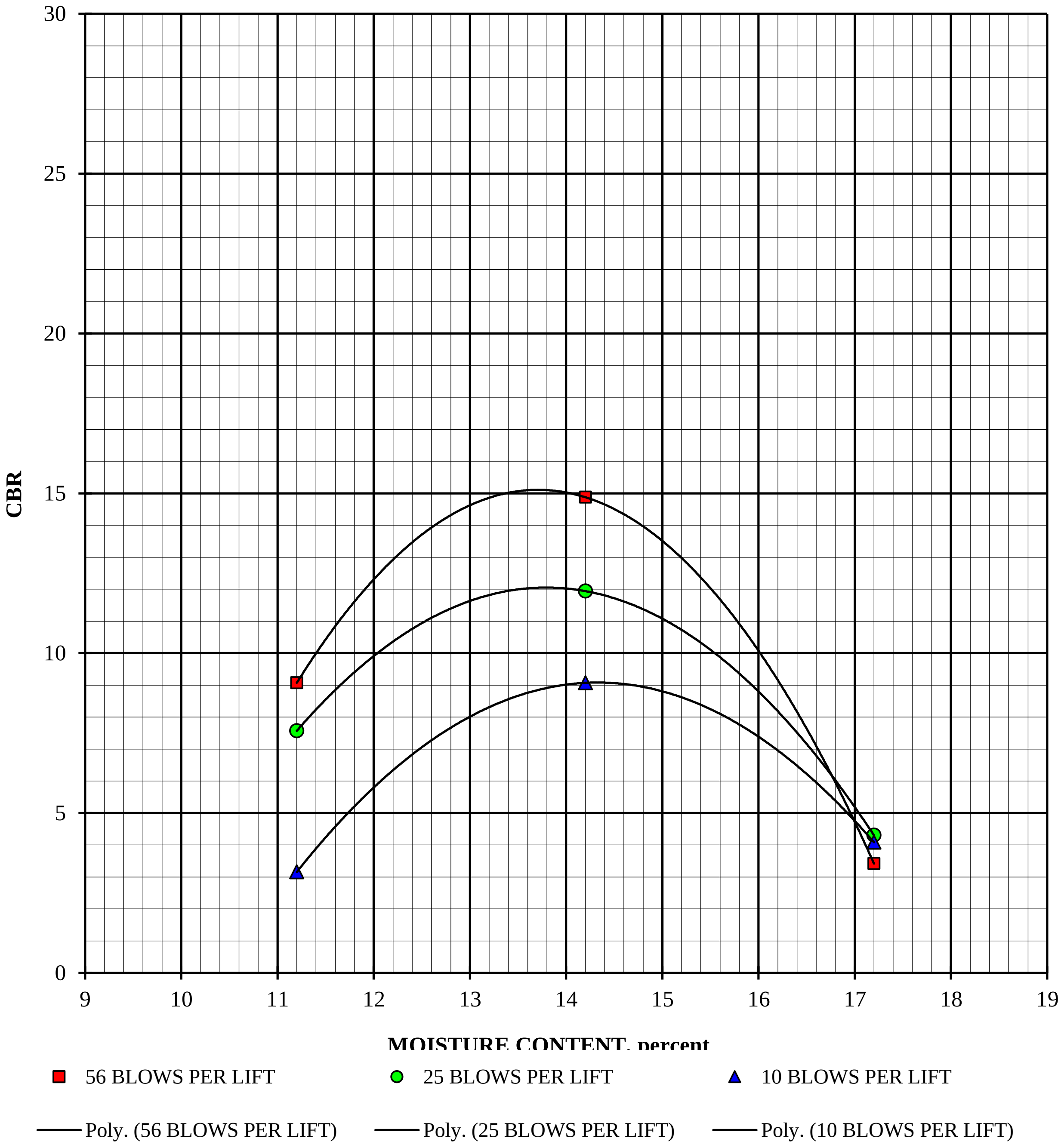
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

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

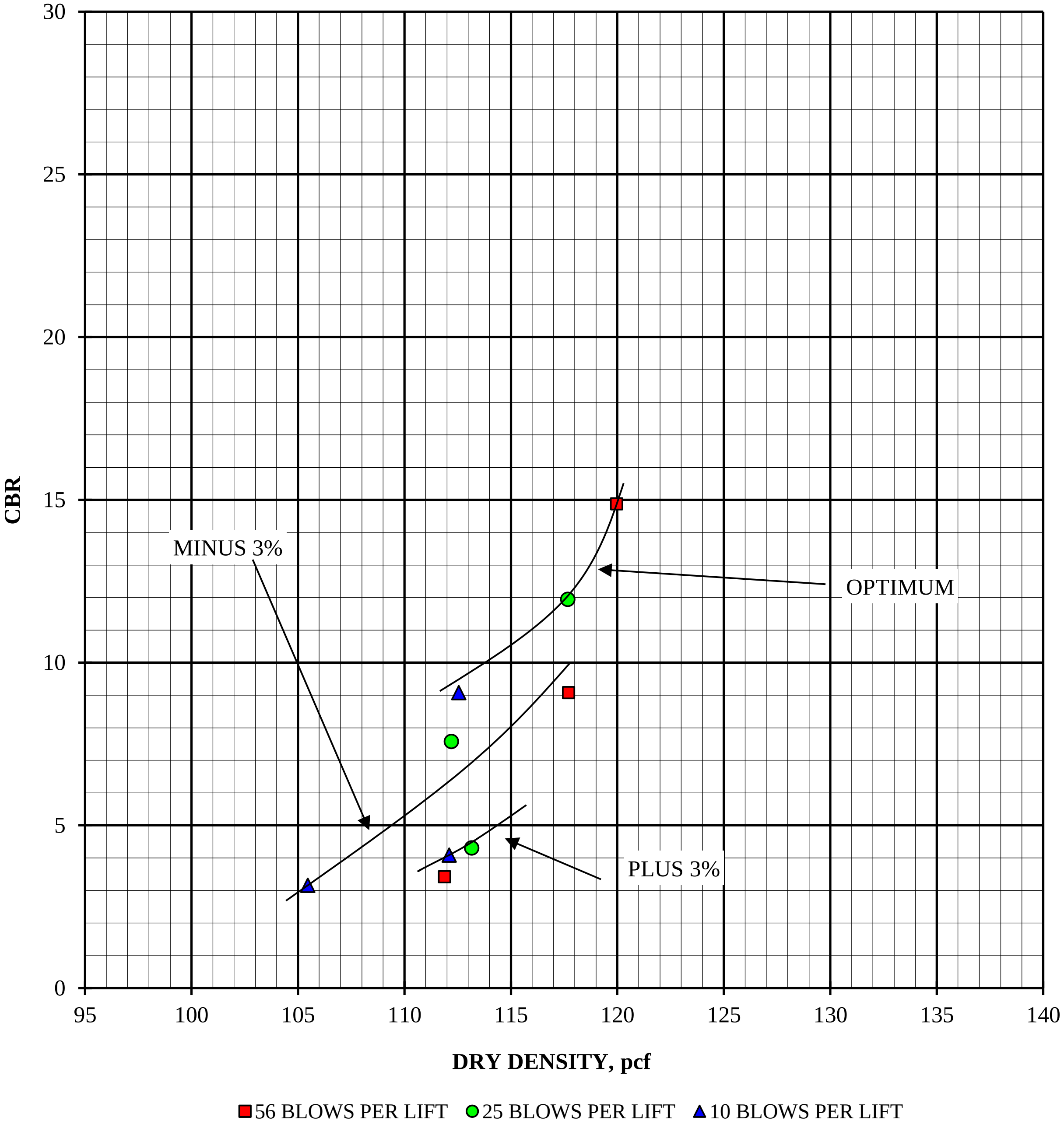
CBR #2; Boring #9 @ 3.0 - 5.0'

Dark Brown Sandy Lean Clay (CL)

January 8, 2019

DRY DENSITY vs. 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 #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

302524-001

CALIFORNIA BEARING RATIO

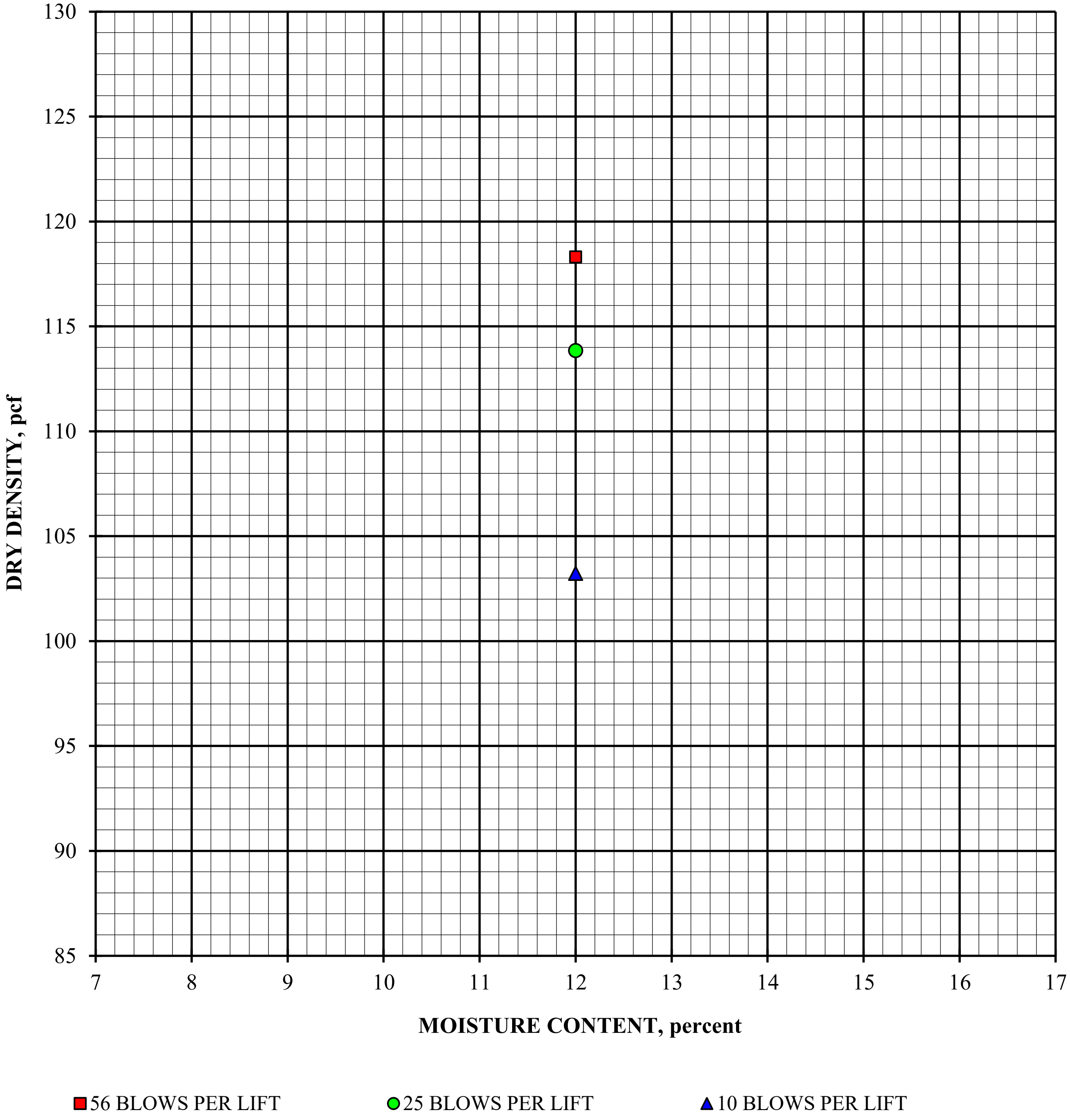
ASTM D 1883-07 (At Optimum Moisture Content)

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

302524-001

CALIFORNIA BEARING RATIO

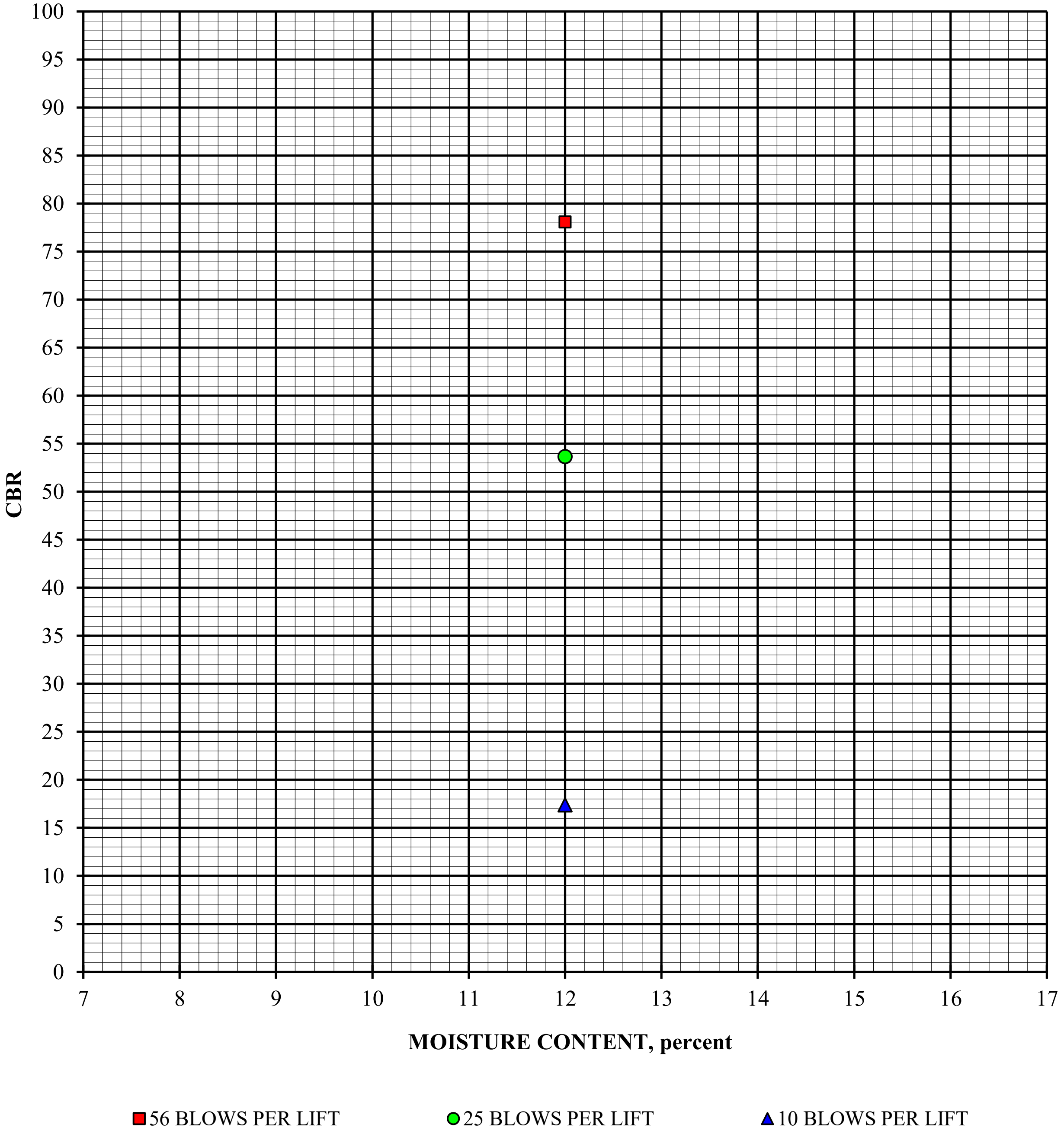
ASTM D 1883-07 (At Optimum Moisture Content)

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
Rehabilitation / Reconstruction

302524-001

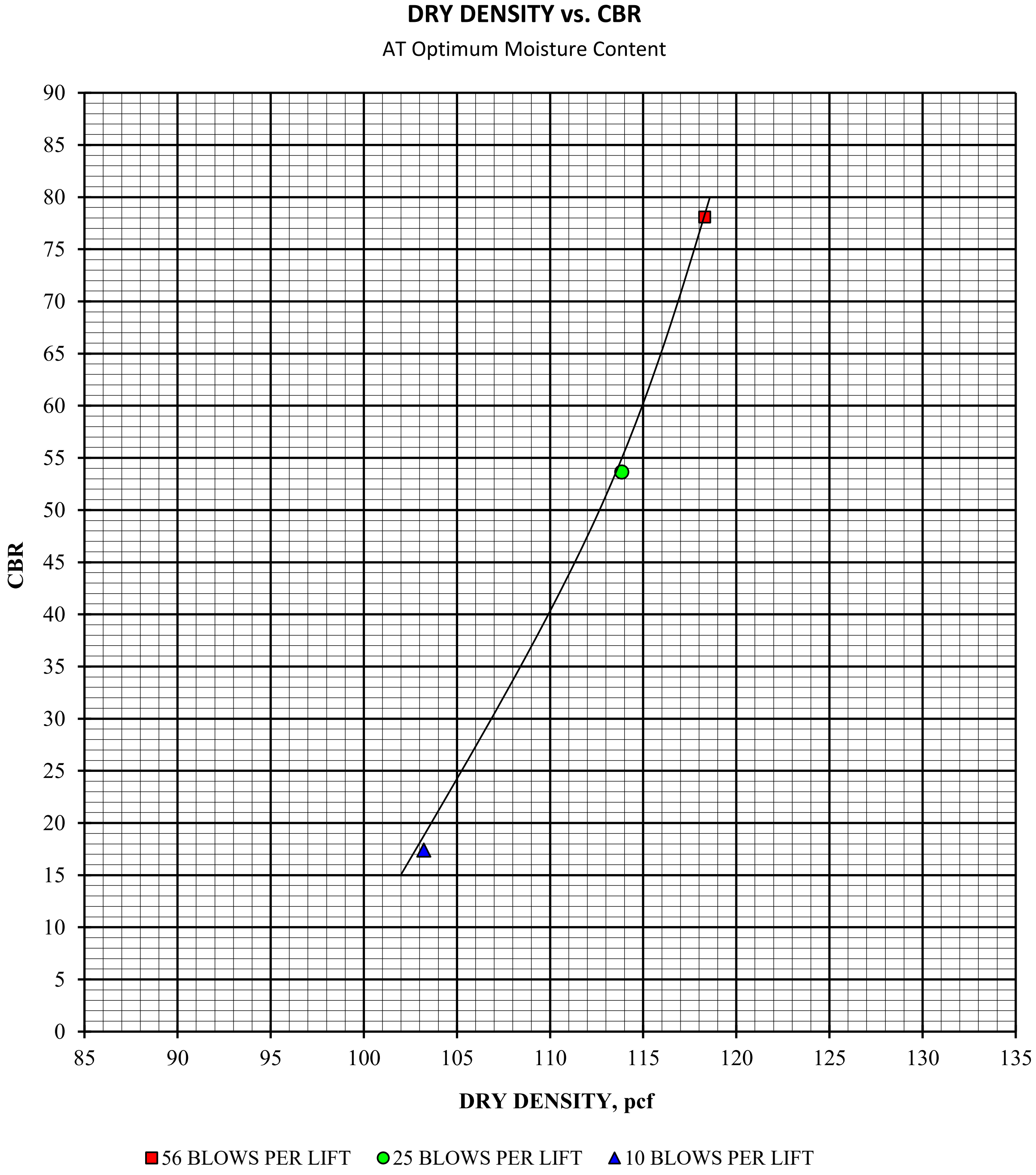
CALIFORNIA BEARING RATIO

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)



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

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
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

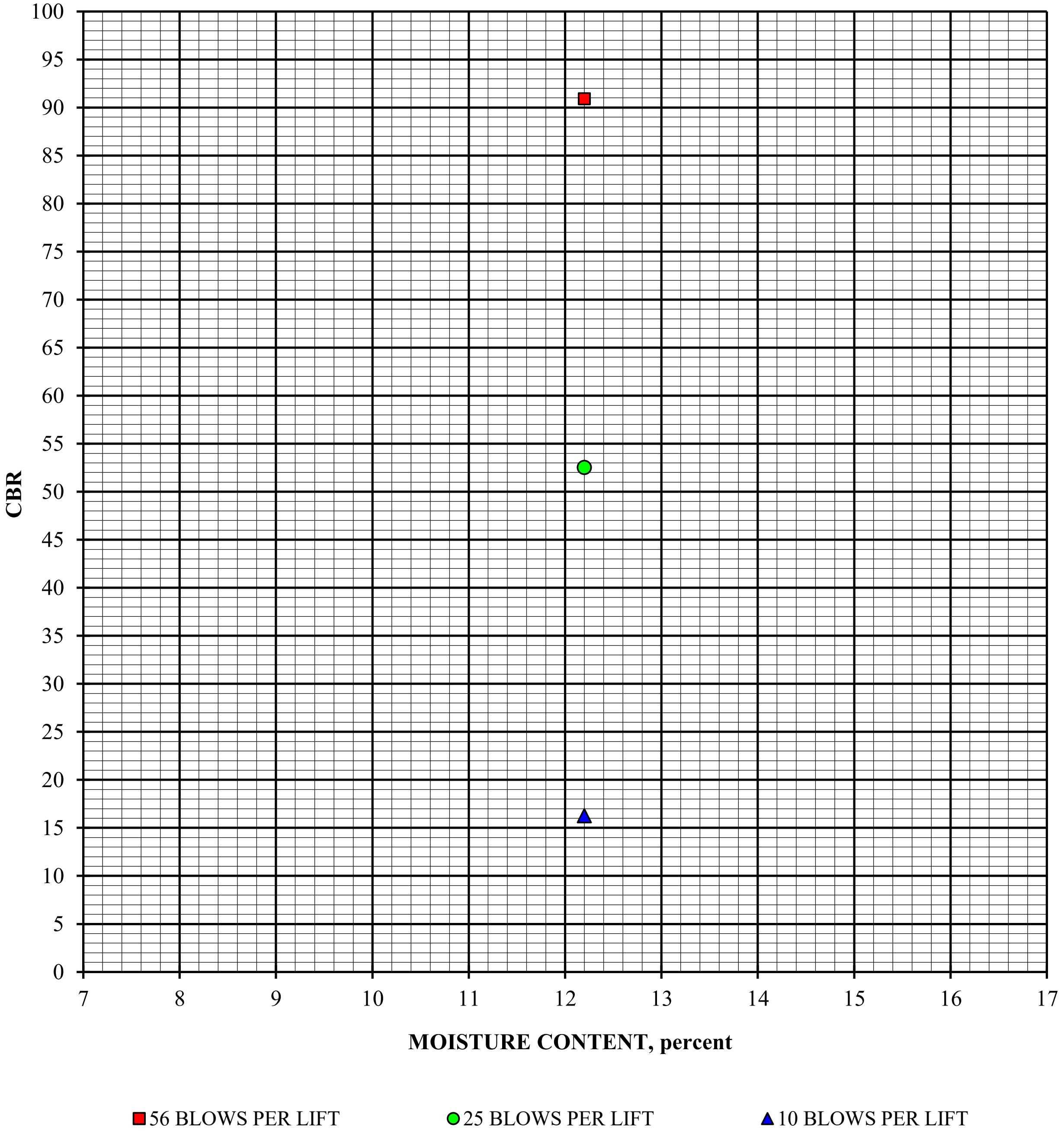
ASTM D 1883-07 (At Optimum Moisture Content)

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

January 16, 2019

Dark Brown Silty Sand (SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

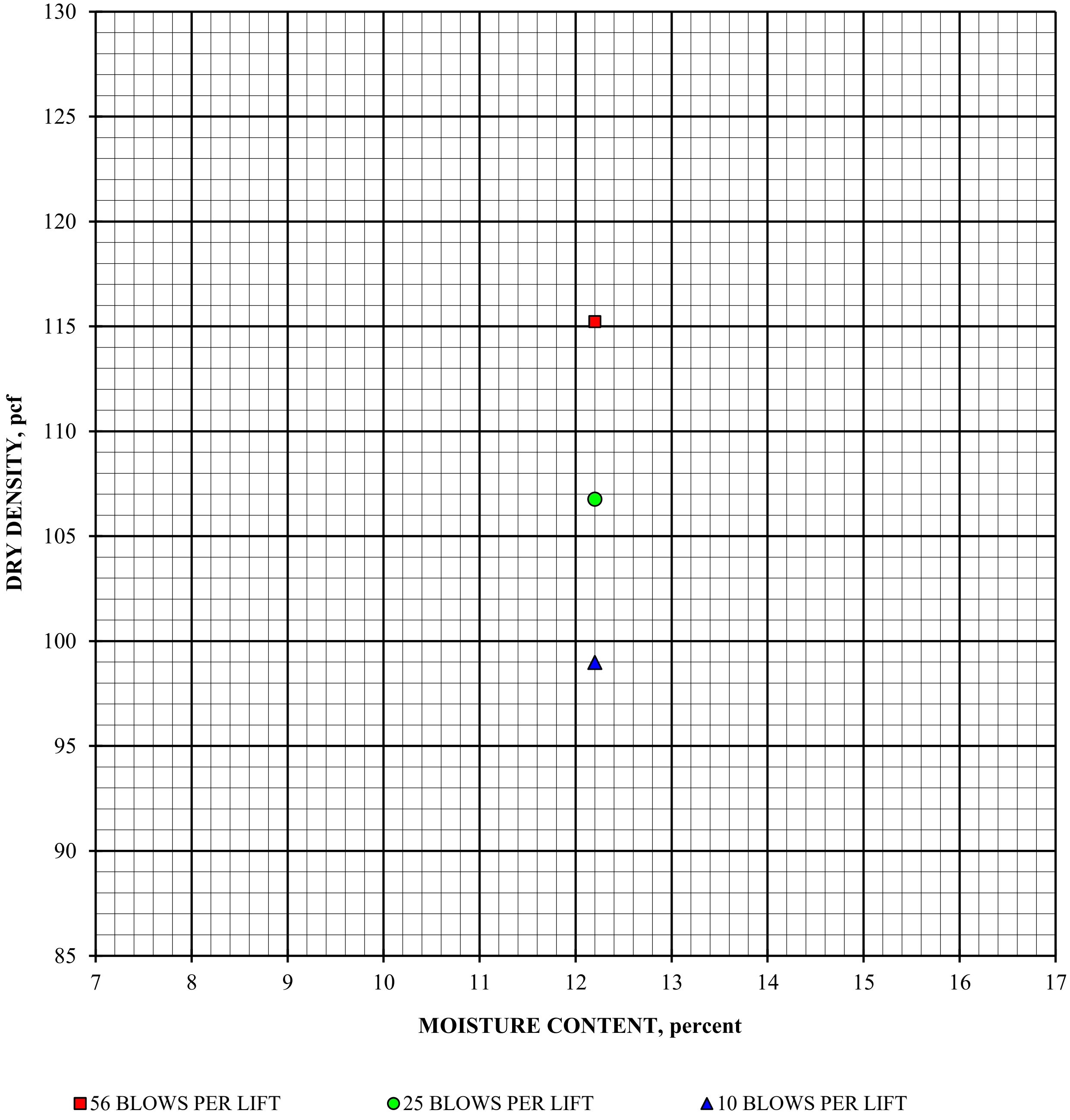
CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

CBR #3 with 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
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

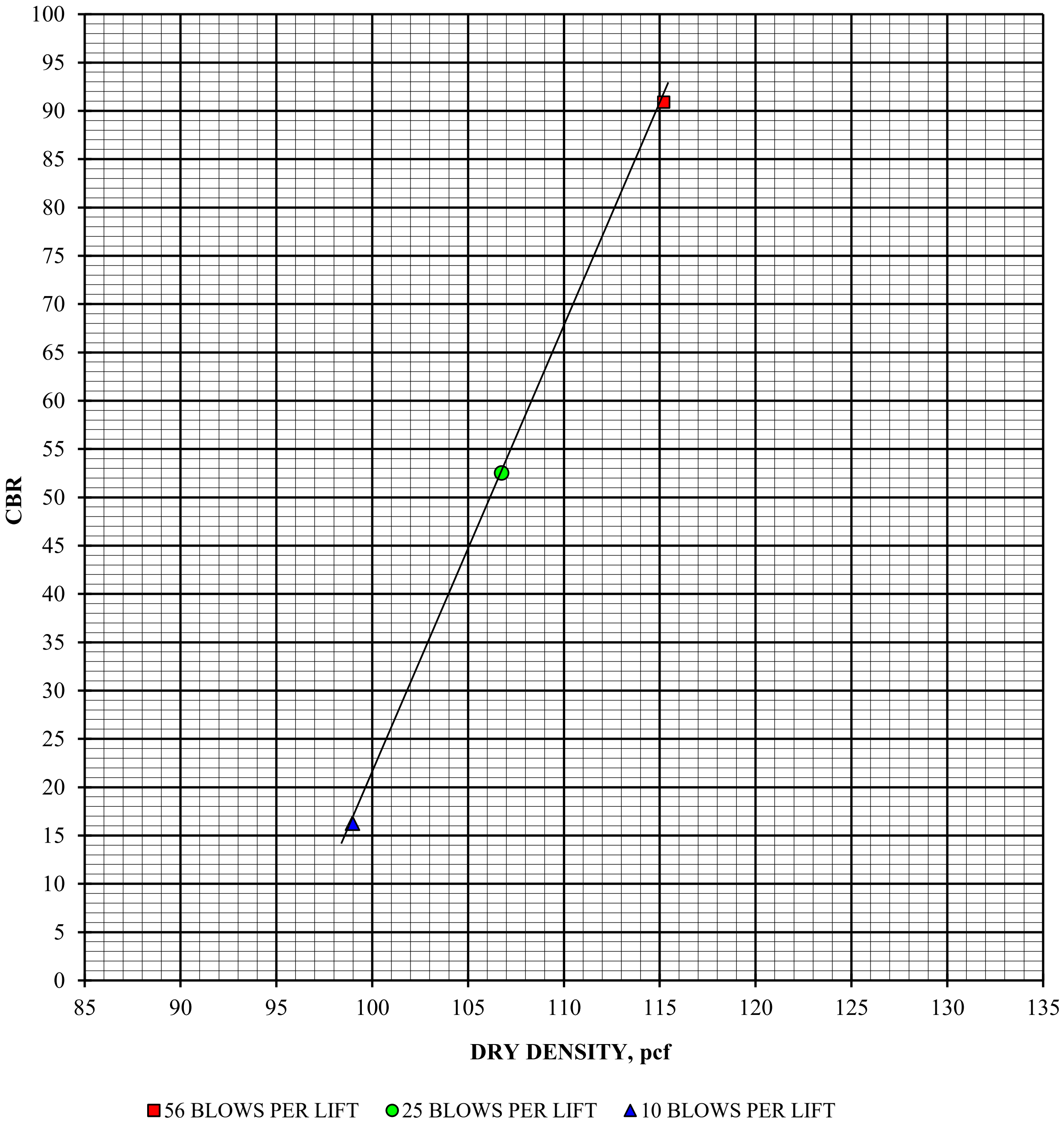
CBR #3 with 5% Lime added; Boring #5 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway
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'
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
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

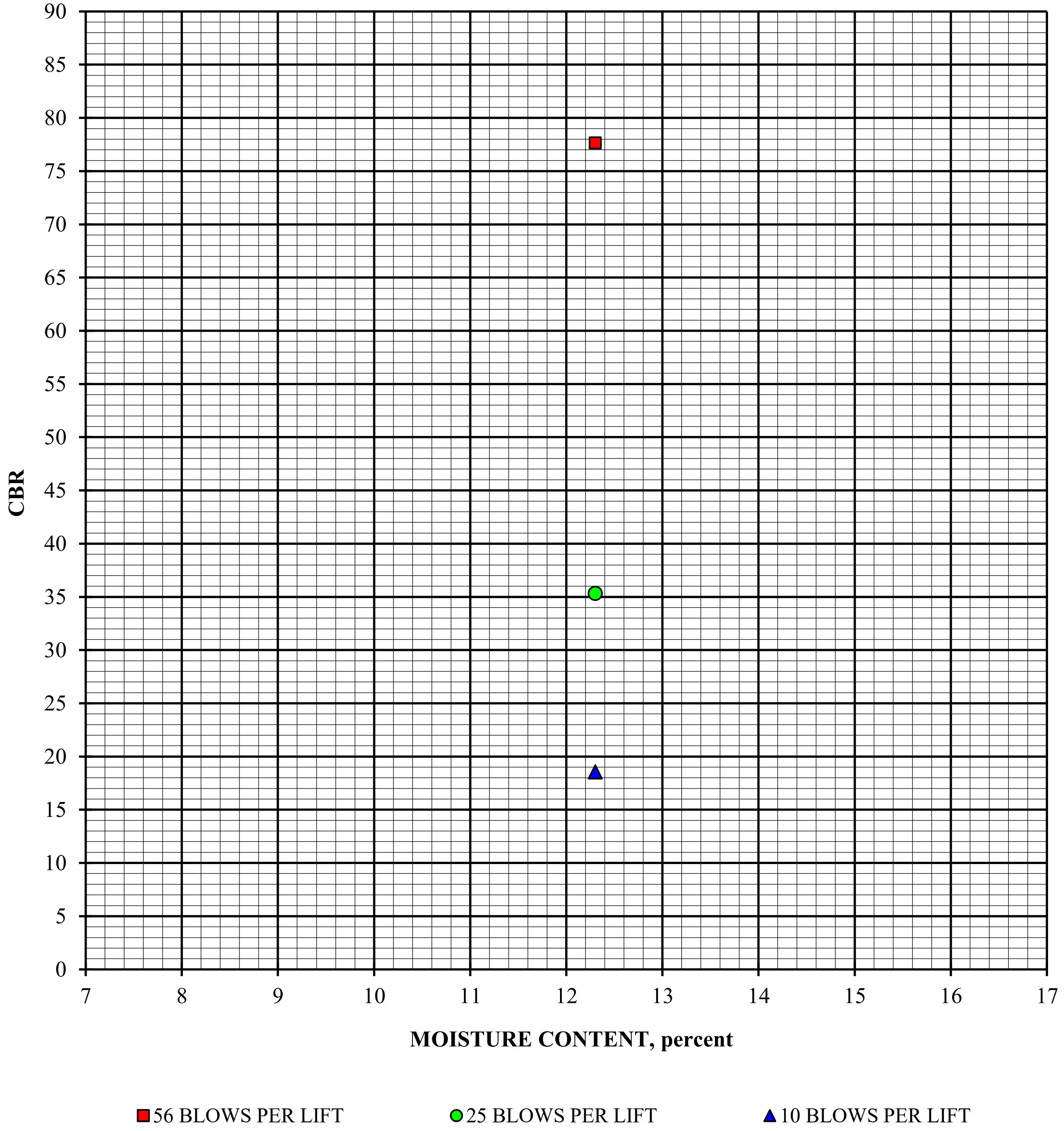
ASTM D 1883-07 (At Optimum Moisture Content)

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

January 16, 2019

Dark Brown Silty Sand (SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

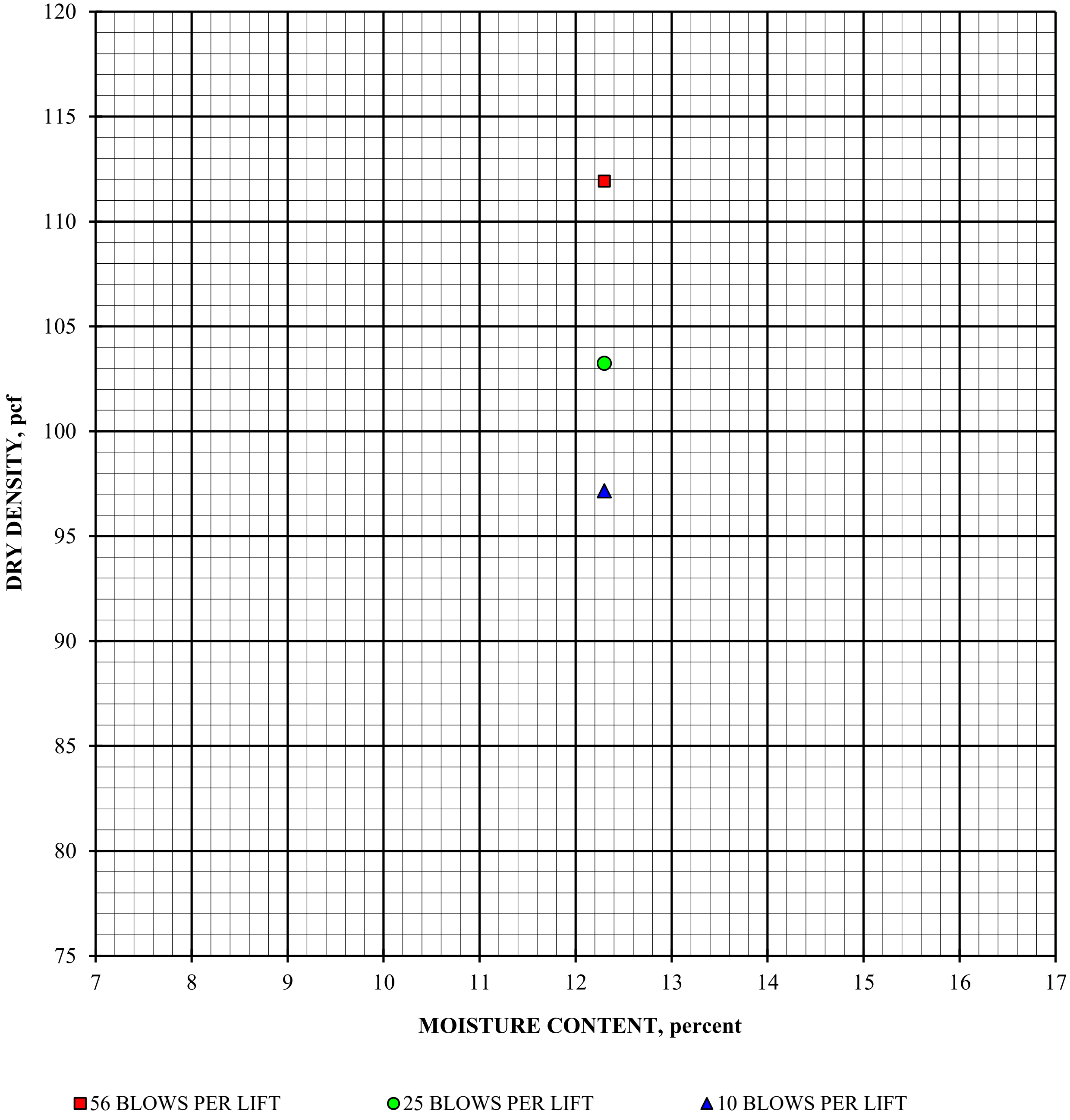
ASTM D 1883-07 (At Optimum Moisture Content)

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

January 16, 2019

Dark Brown Silty Sand (SM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

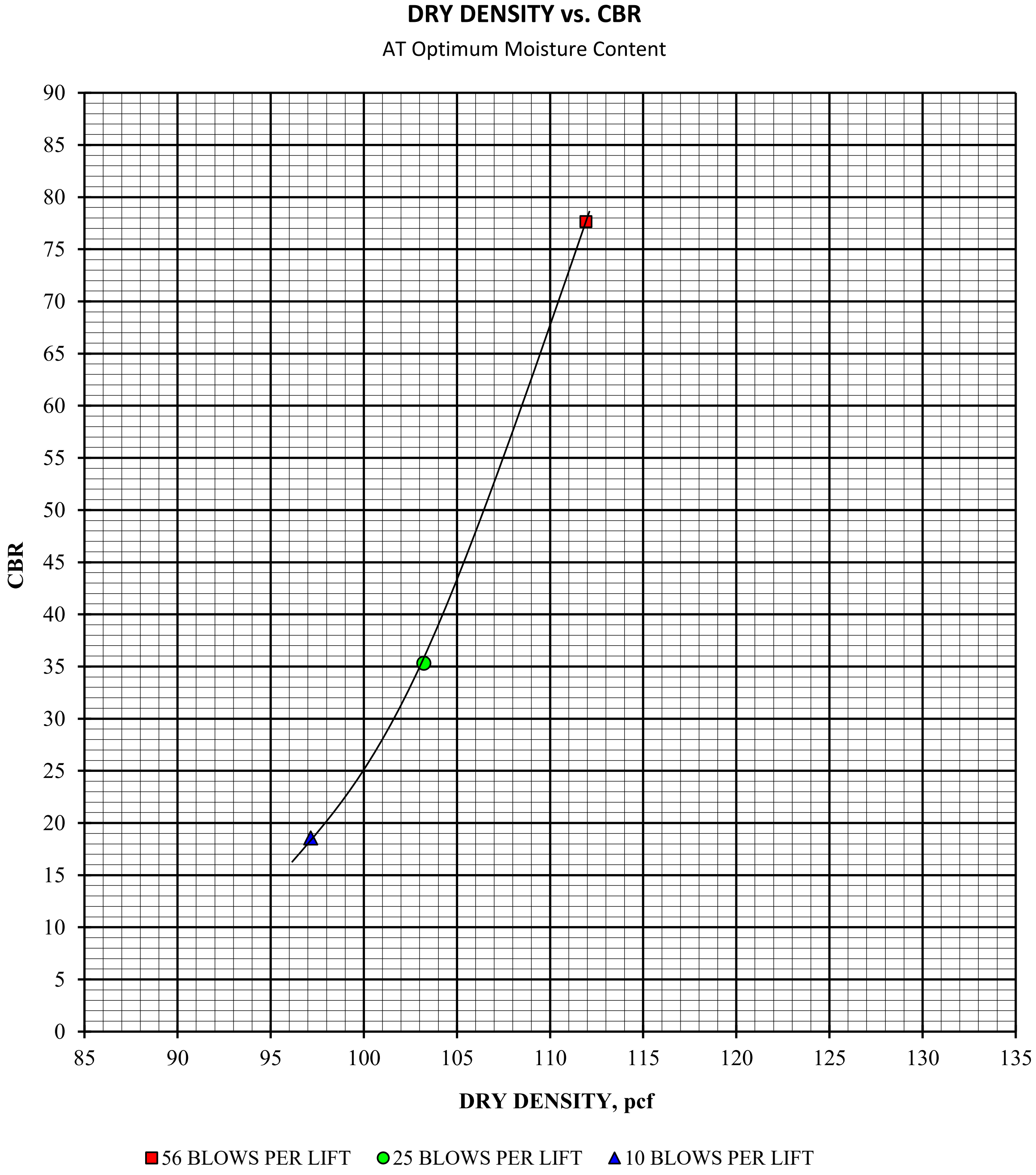
CALIFORNIA BEARING RATIO

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)



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

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

CALIFORNIA BEARING RATIO

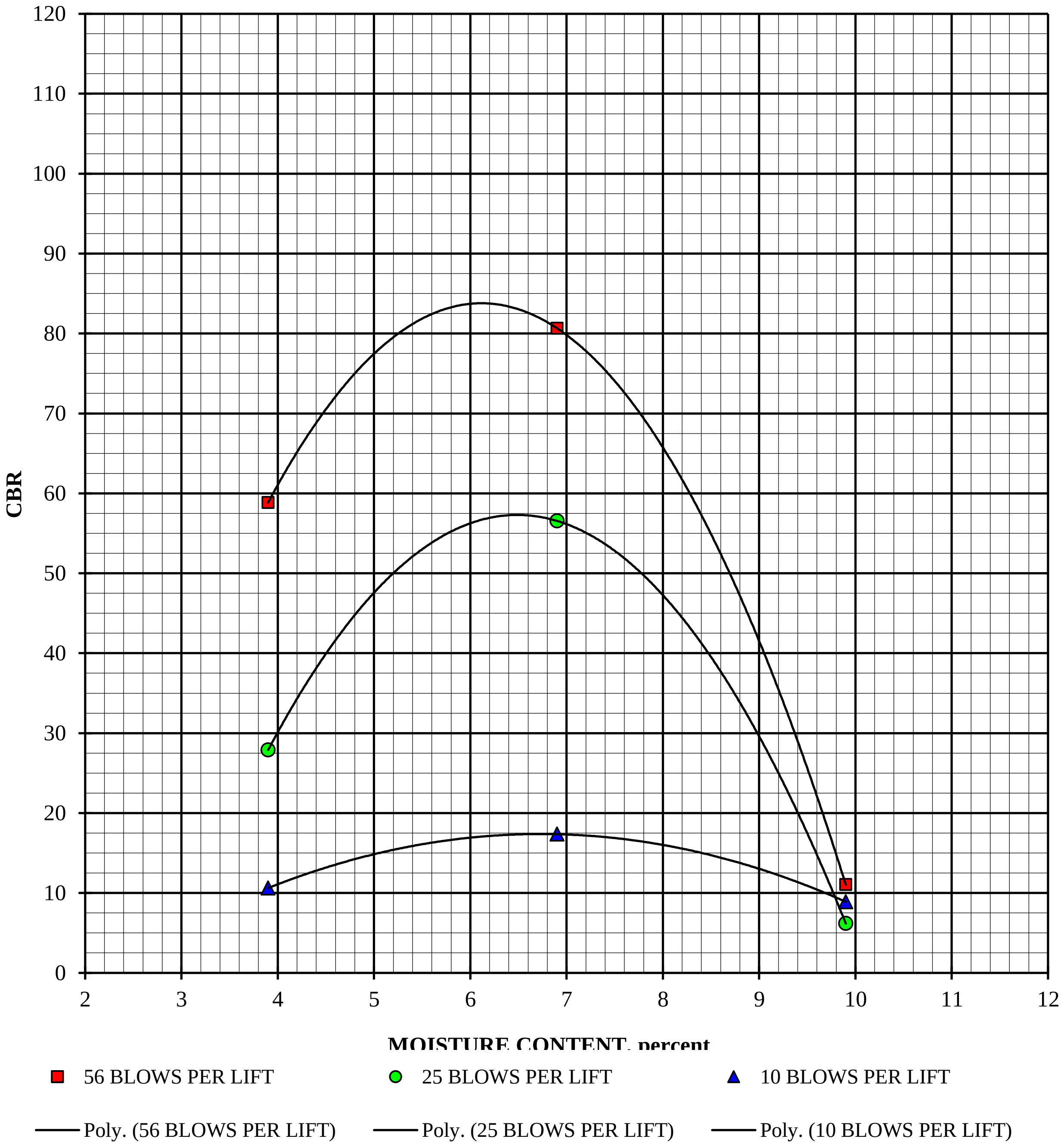
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Clayey Sand with Gravel (SC)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 302524-001

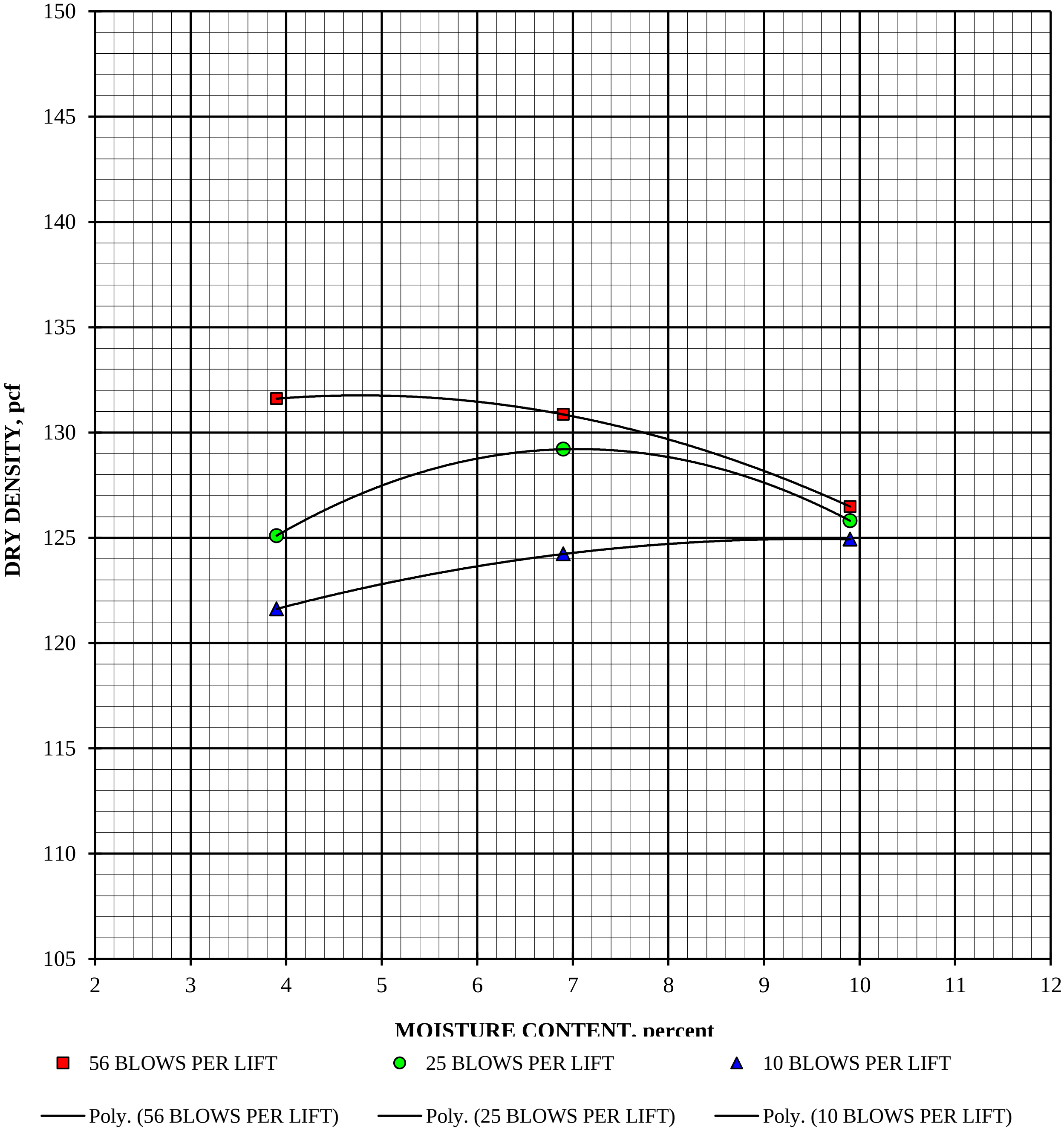
CALIFORNIA BEARING RATIO

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 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

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

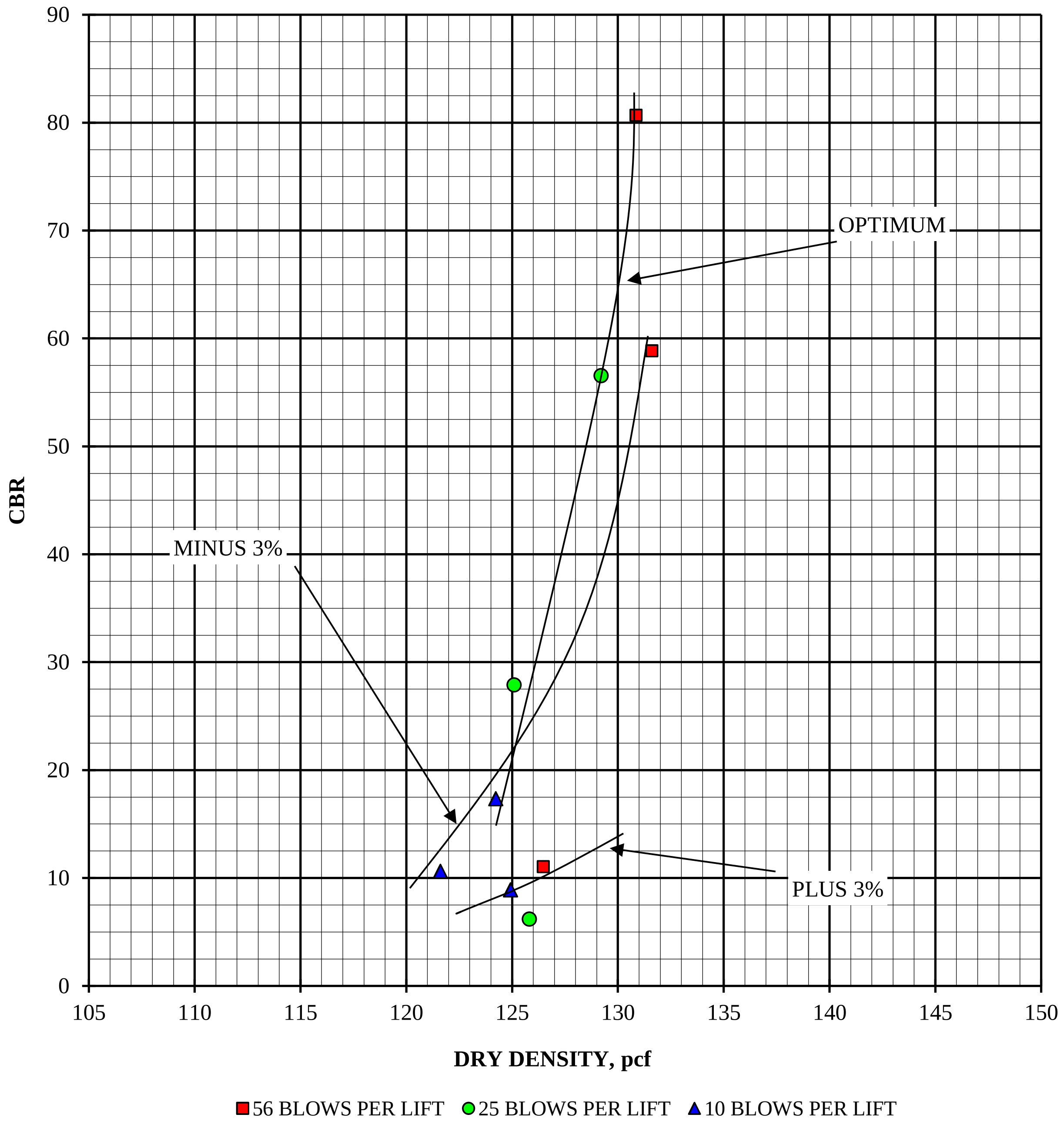
CBR #4; Boring #3 @ 0.5 - 1.0'

January 8, 2019

Brown Clayey Sand with Gravel (SC)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 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 7-25 and Taxiway
Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

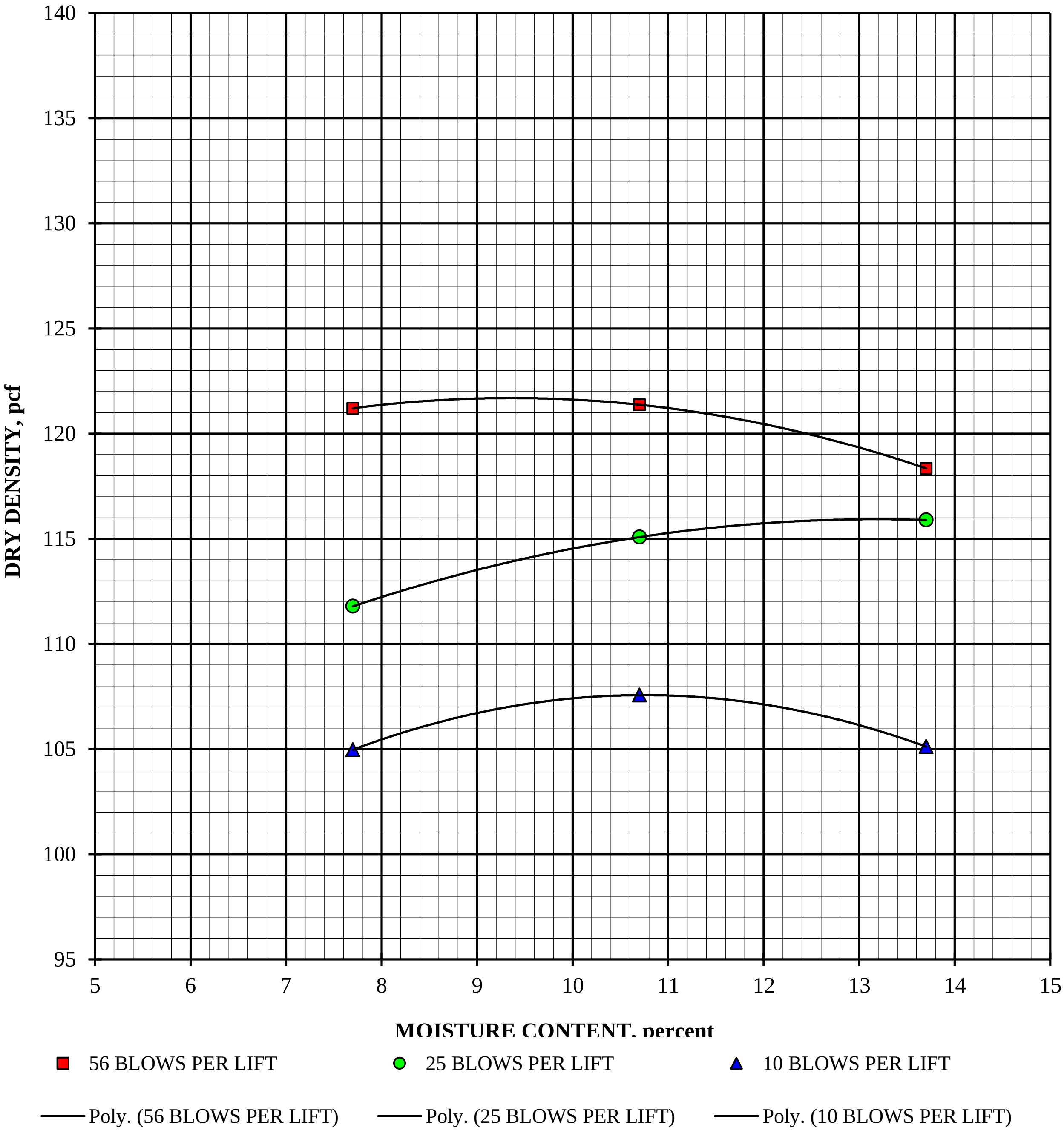
ASTM D 1883-16 (For a Range of Moisture Contents)

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 7-25 and Taxiway Connector Improvements

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CALIFORNIA BEARING RATIO

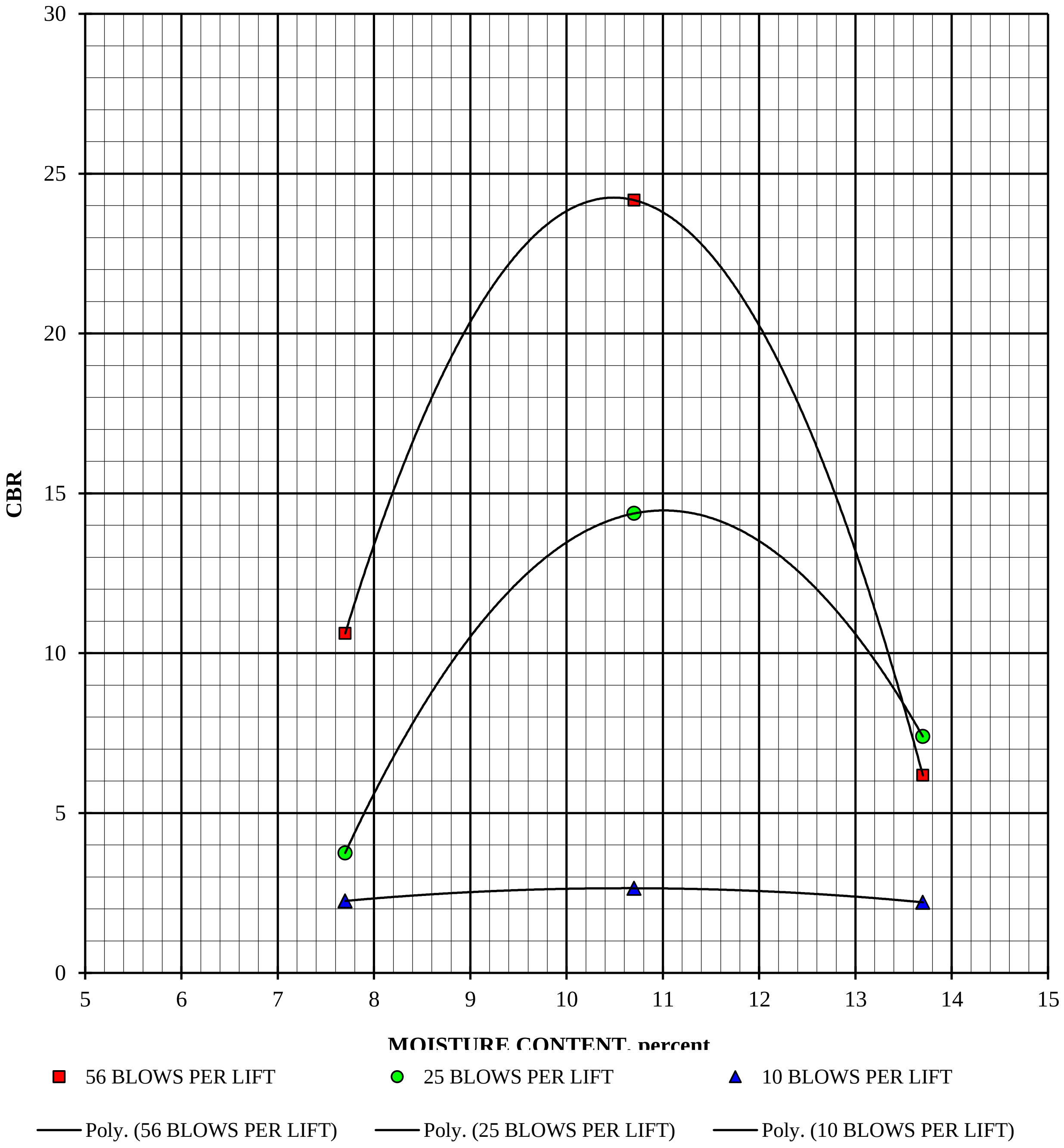
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

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

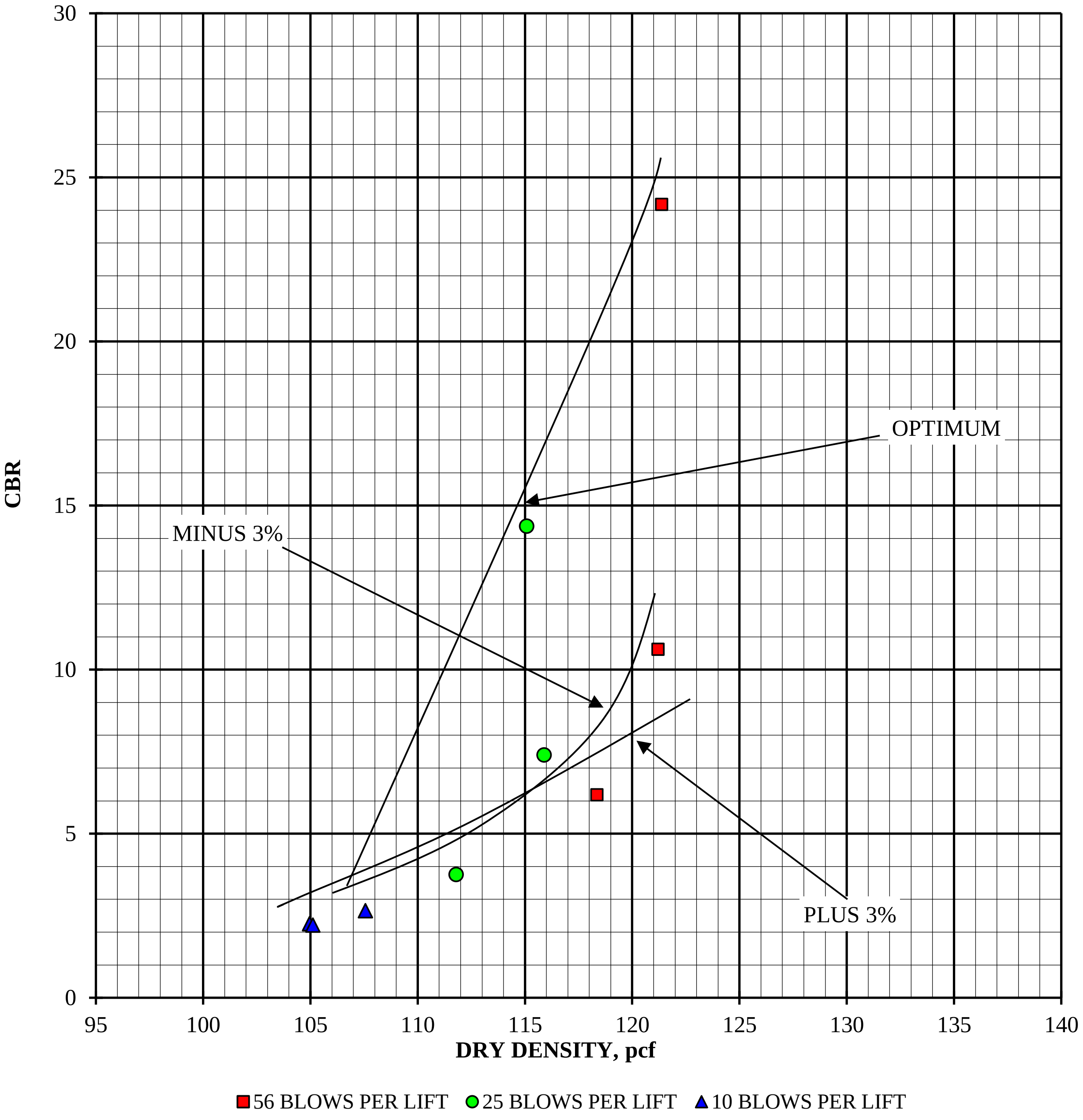
CBR #5; Boring #36 @ 2.5 - 5.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. 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

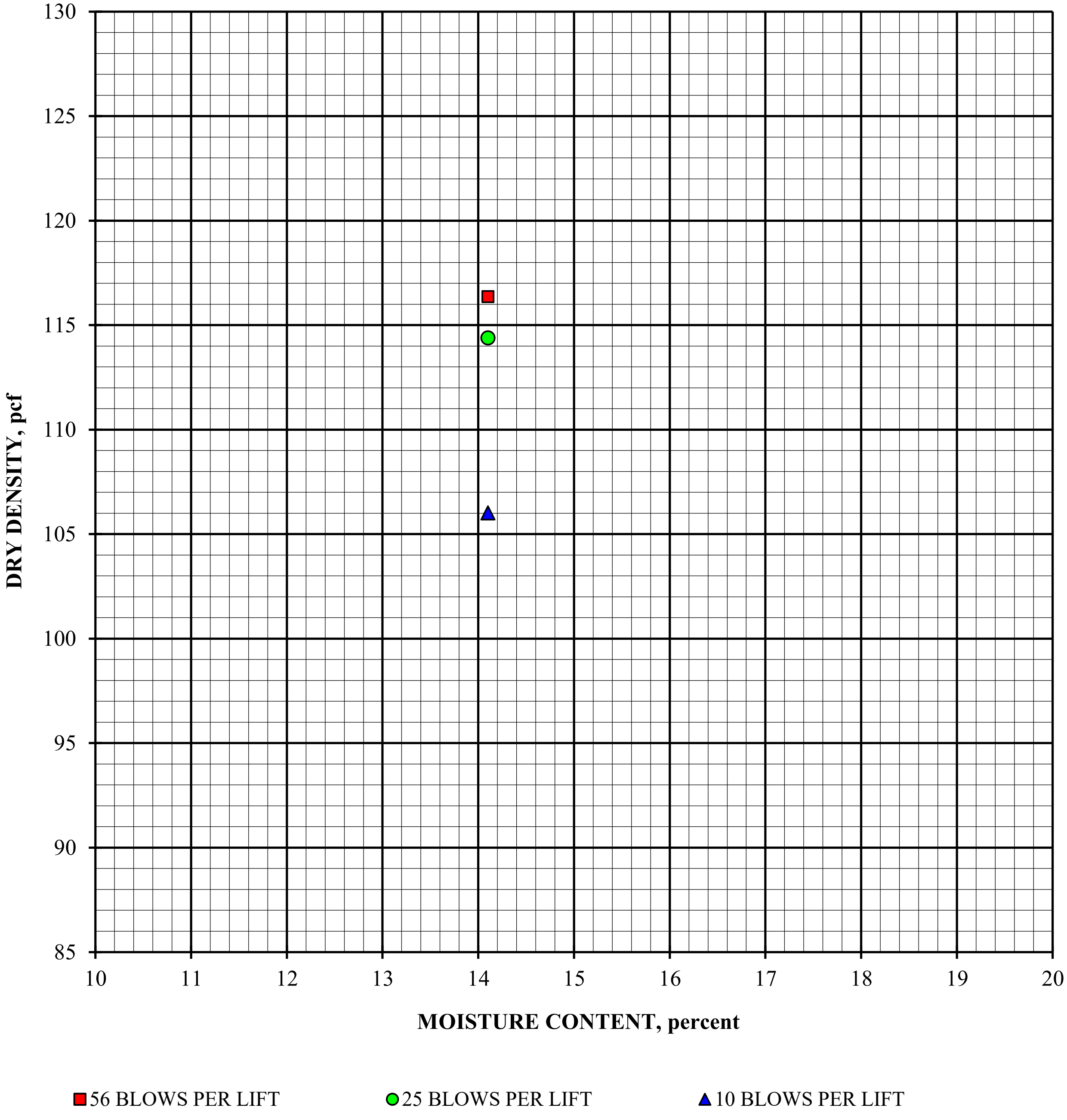
ASTM D 1883-07 (At Optimum Moisture Content)

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

January 16, 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

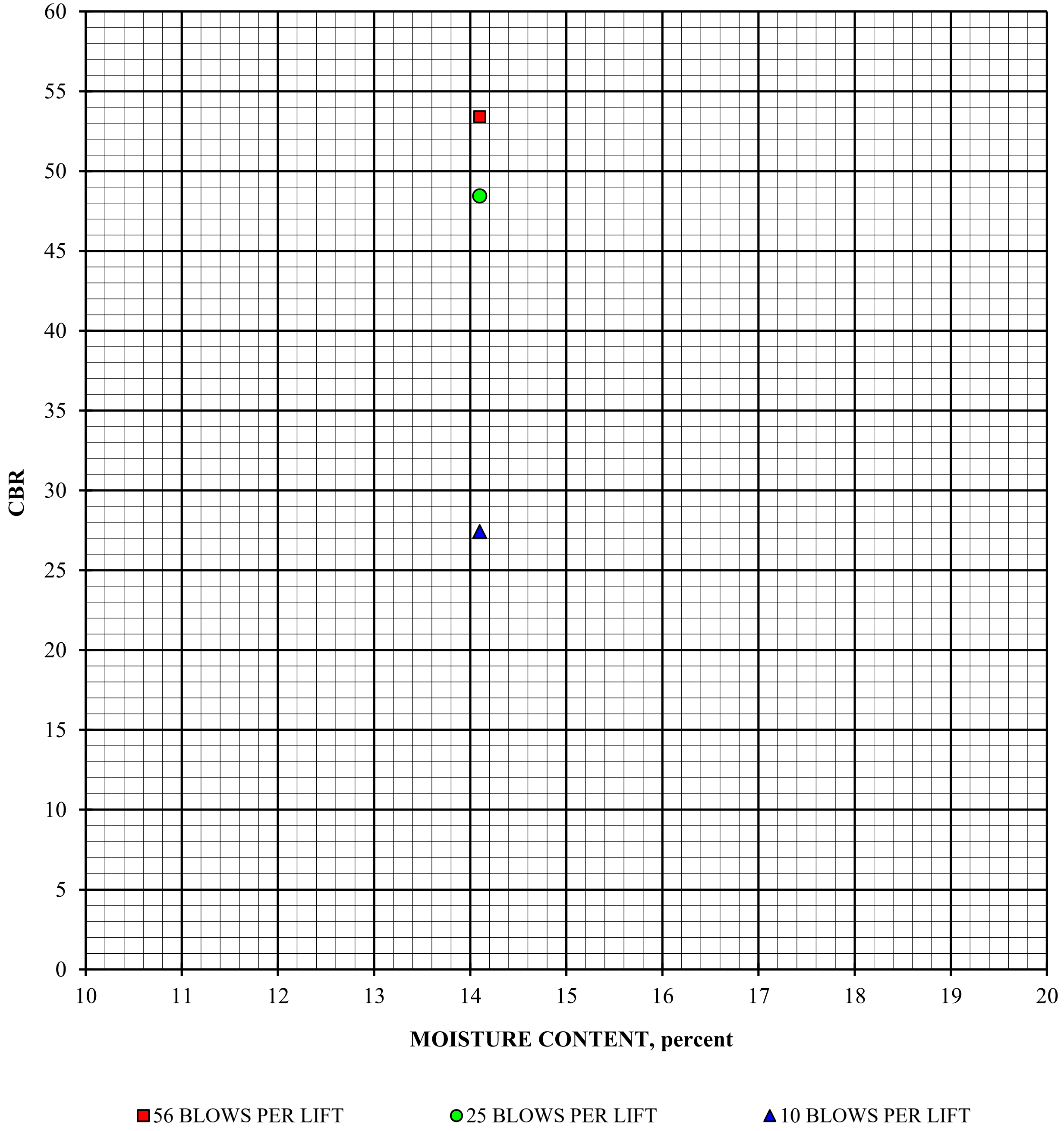
ASTM D 1883-07 (At Optimum Moisture Content)

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

302524-001

CALIFORNIA BEARING RATIO

ASTM D 1883-07 (At Optimum Moisture Content)

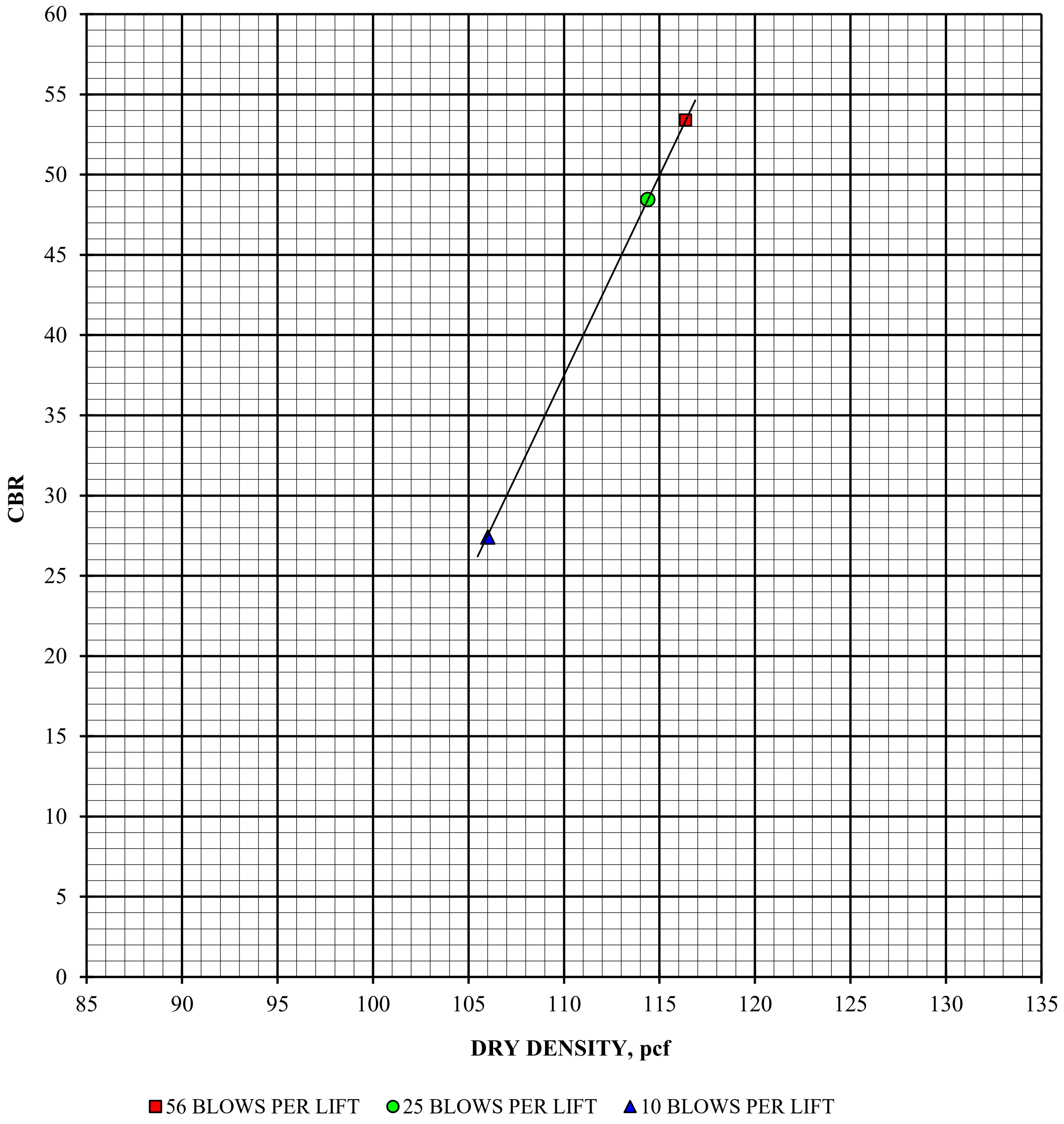
CBR #6 with 3% Lime added; Boring #27 @ 2.0 - 4.0'

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

302524-001

CALIFORNIA BEARING RATIO

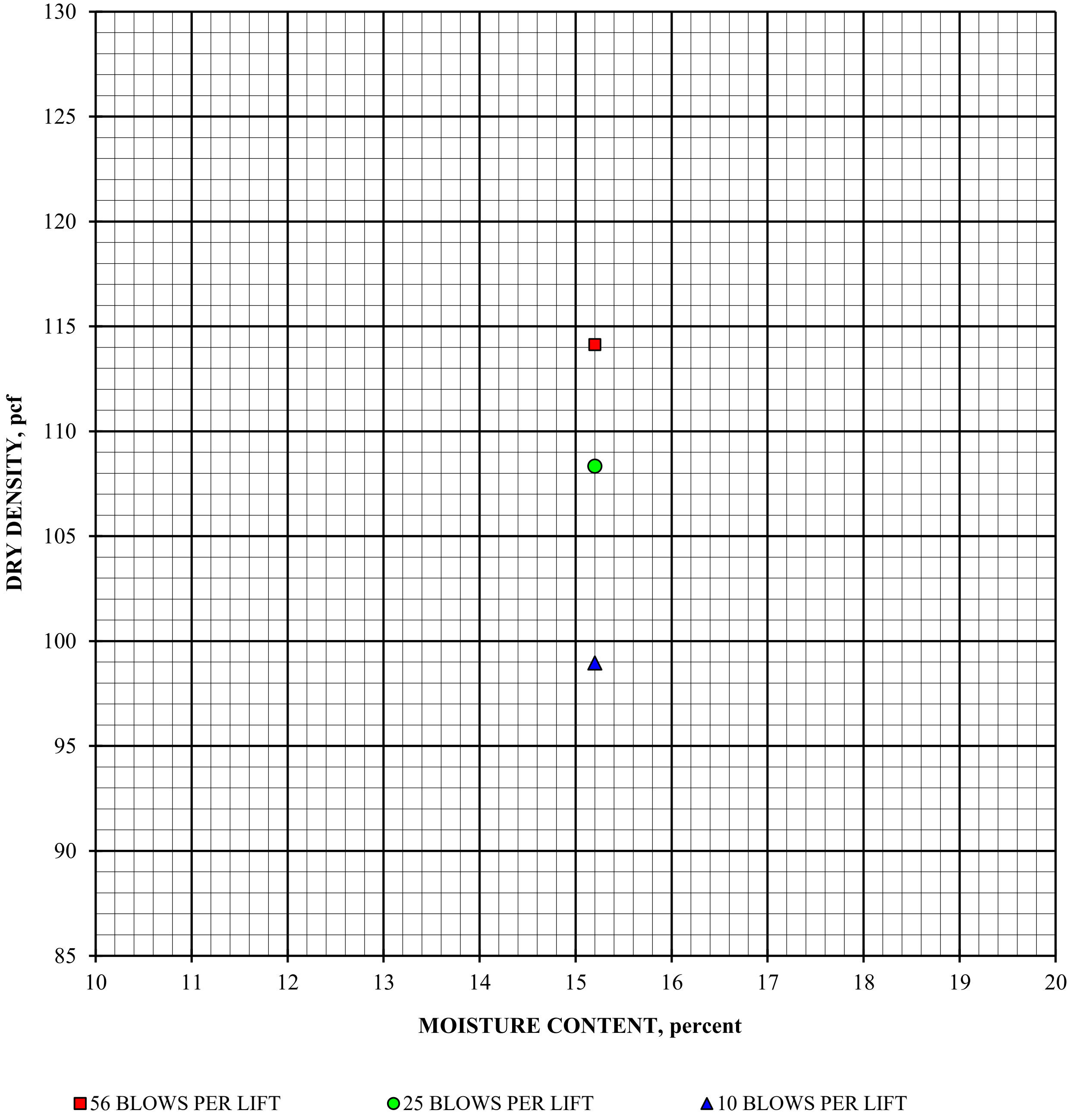
ASTM D 1883-07 (At Optimum Moisture Content)

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

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

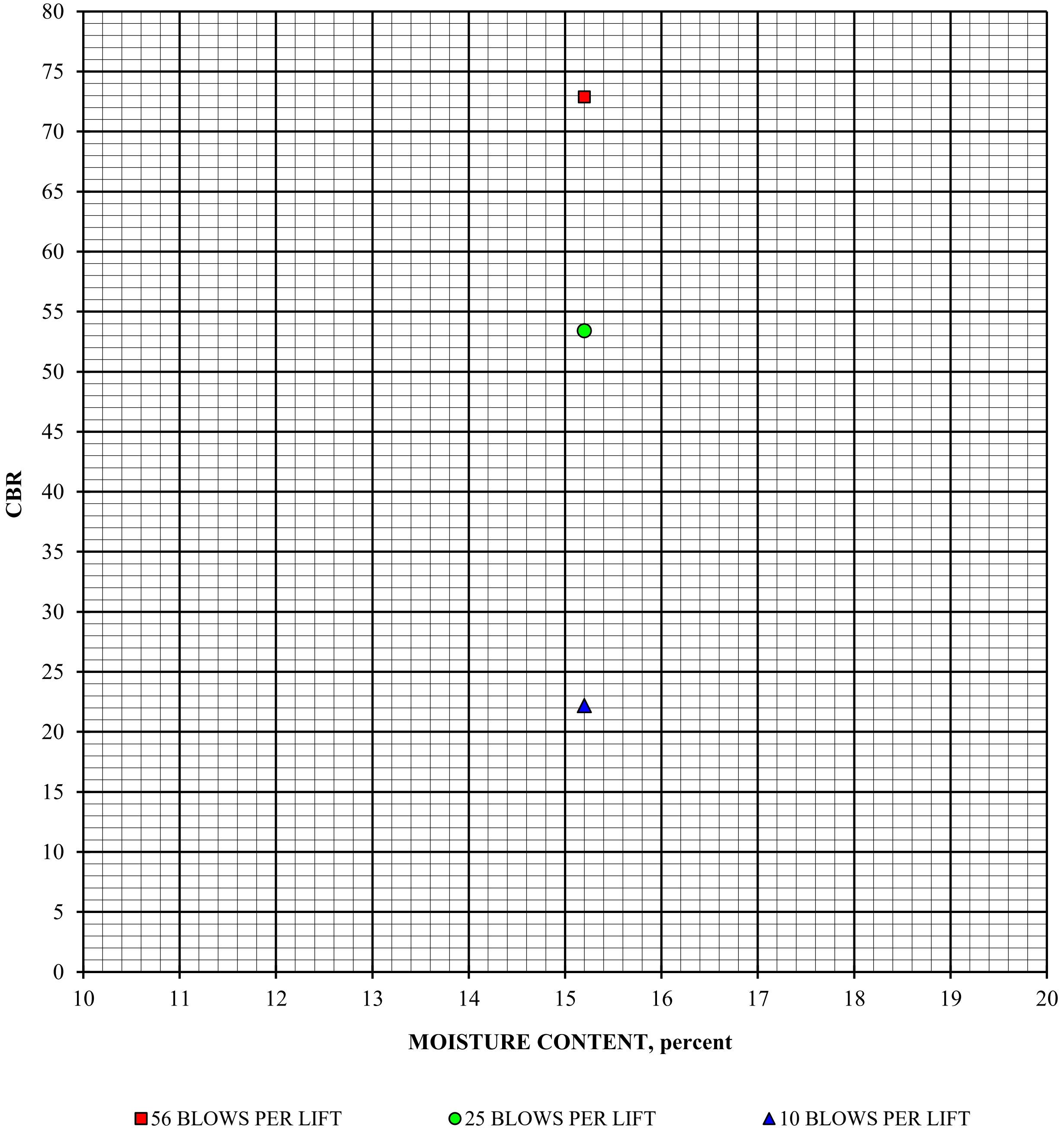
ASTM D 1883-07 (At Optimum Moisture Content)

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)

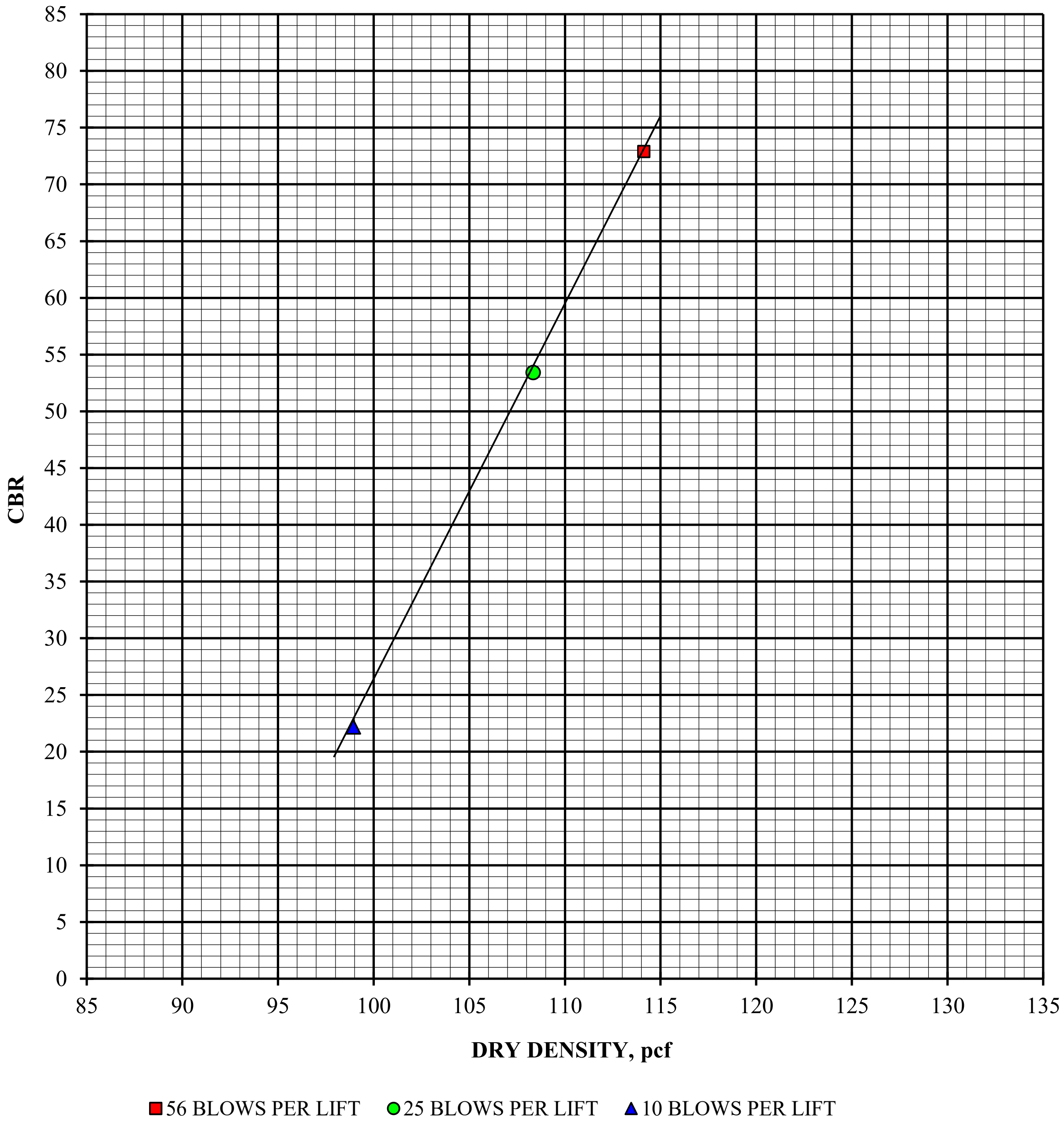
CBR #6 with 5% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

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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

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

CALIFORNIA BEARING RATIO

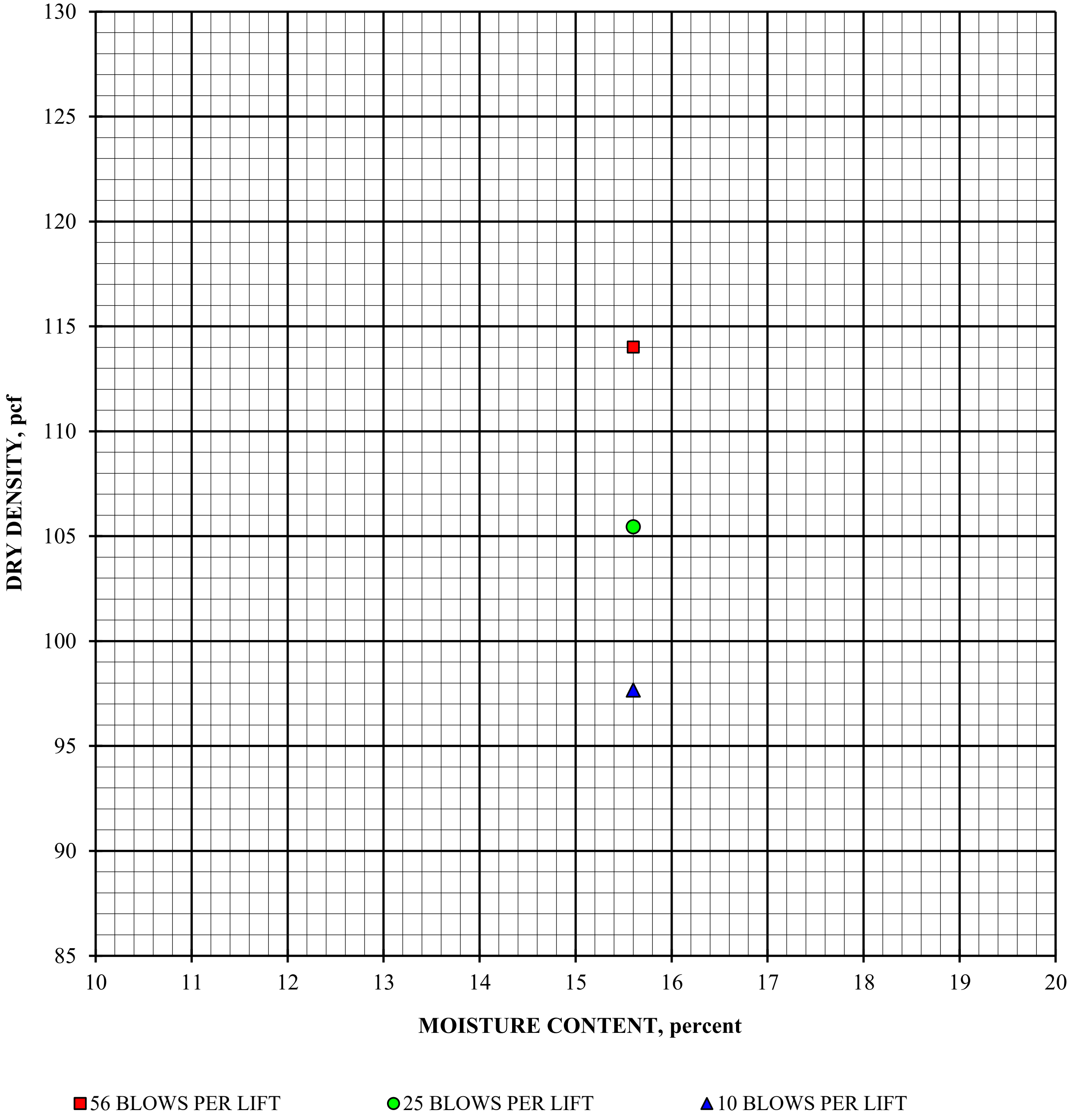
ASTM D 1883-07 (At Optimum Moisture Content)

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

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway and Taxiway
Rehabilitation / Reconstruction

302524-001

CALIFORNIA BEARING RATIO

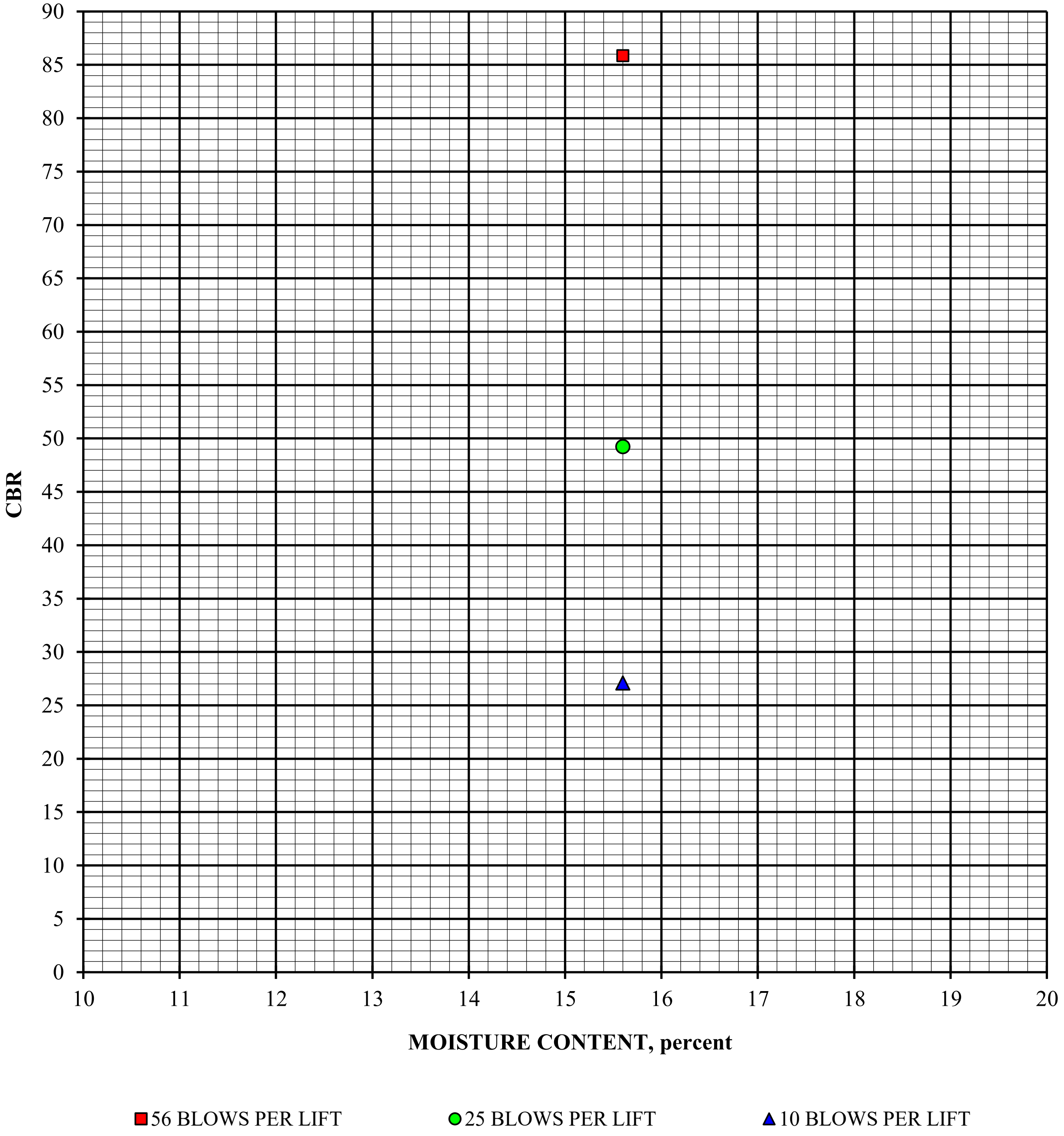
ASTM D 1883-07 (At Optimum Moisture Content)

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

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)

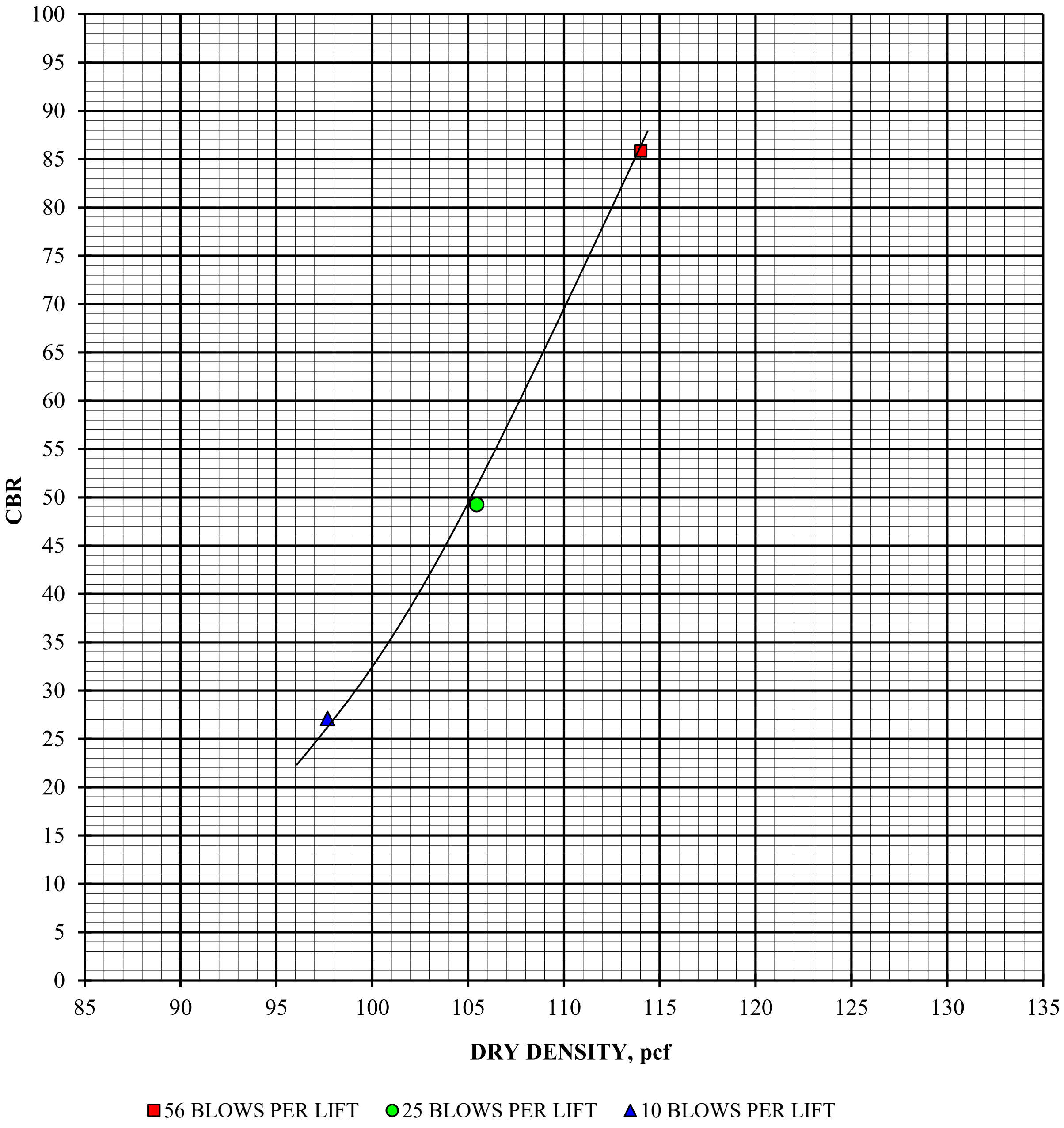
CBR #6 with 7% Lime added; Boring #27 @ 2.0 - 4.0'

January 16, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

AT Optimum Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

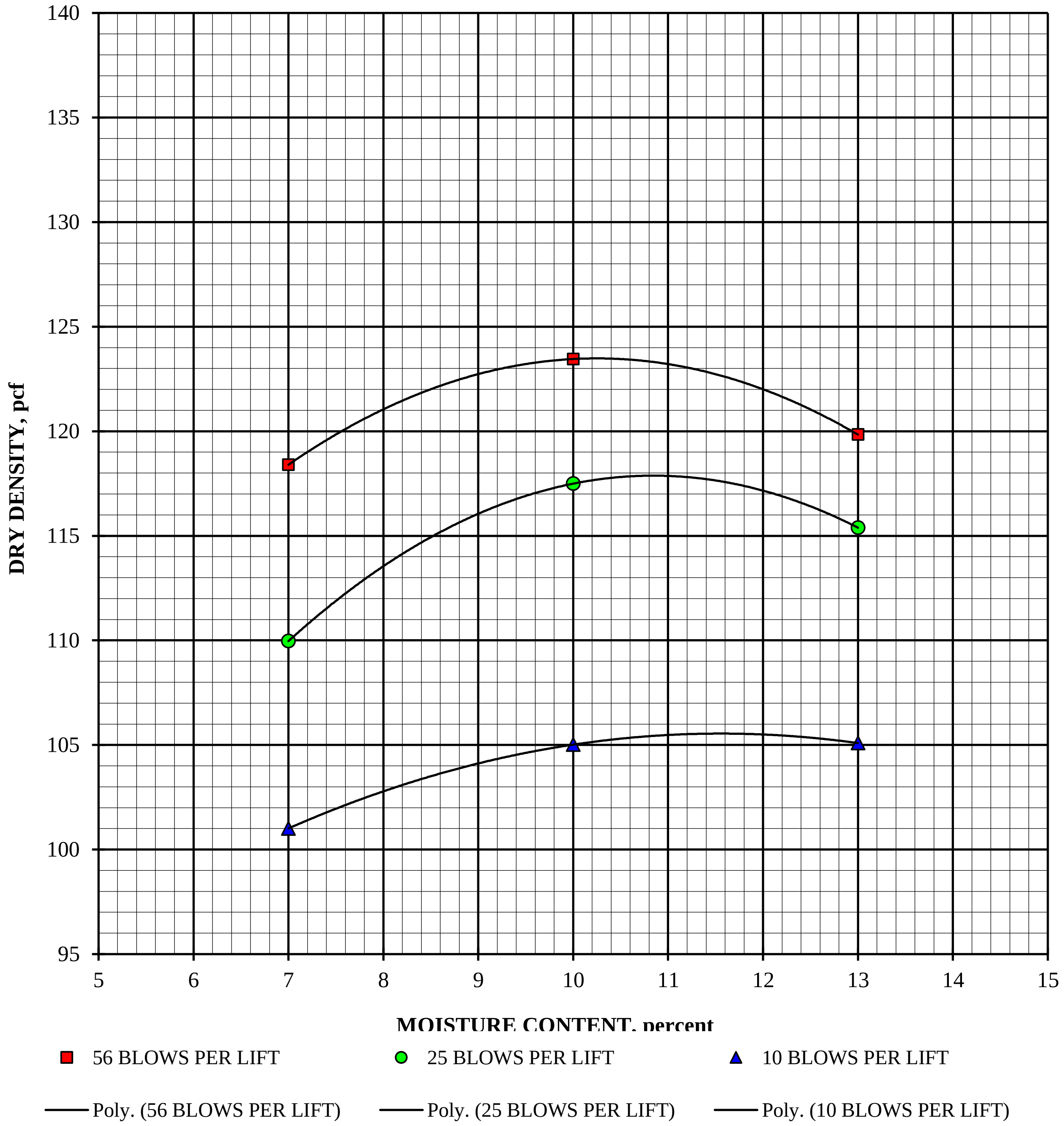
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

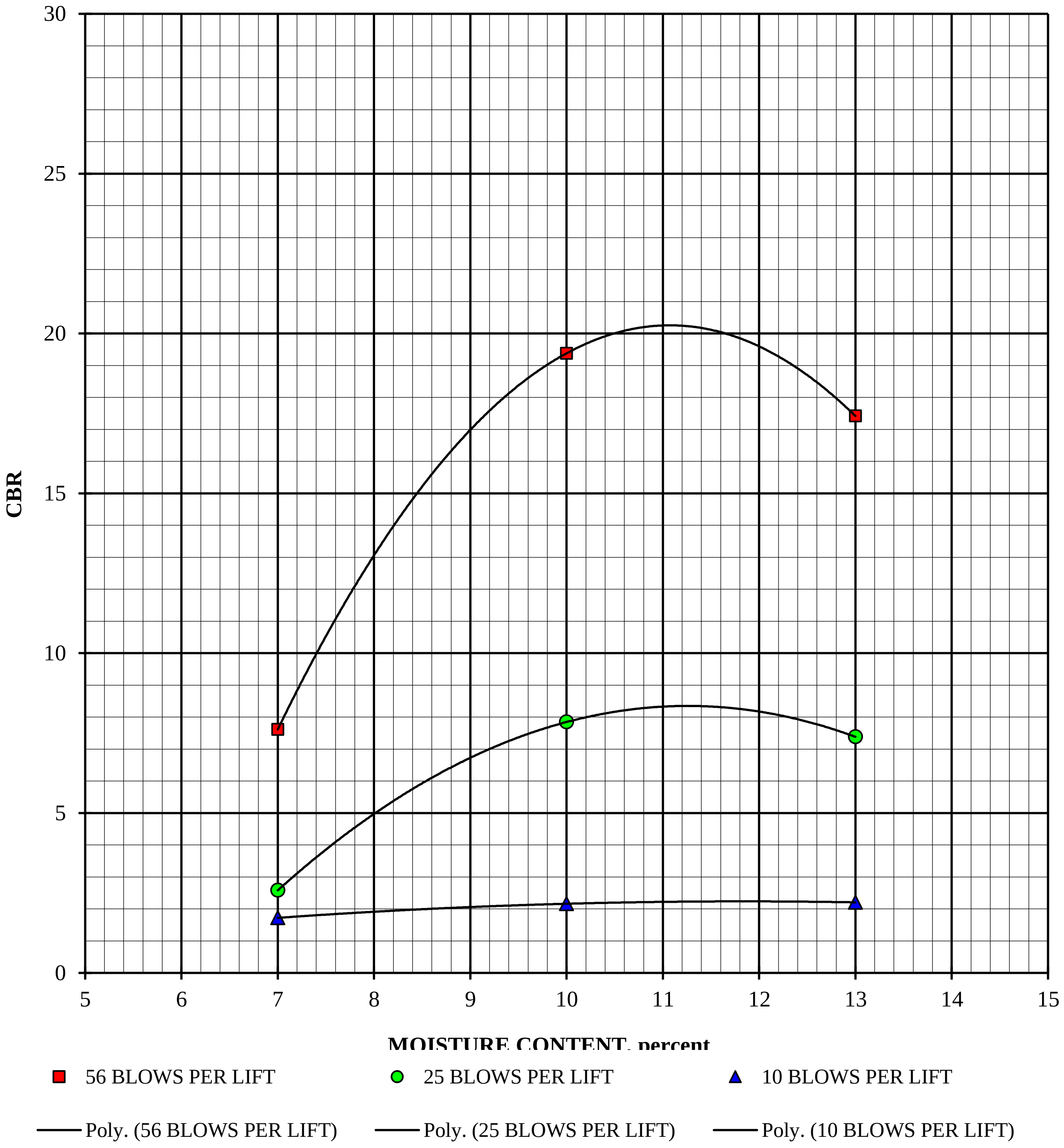
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

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

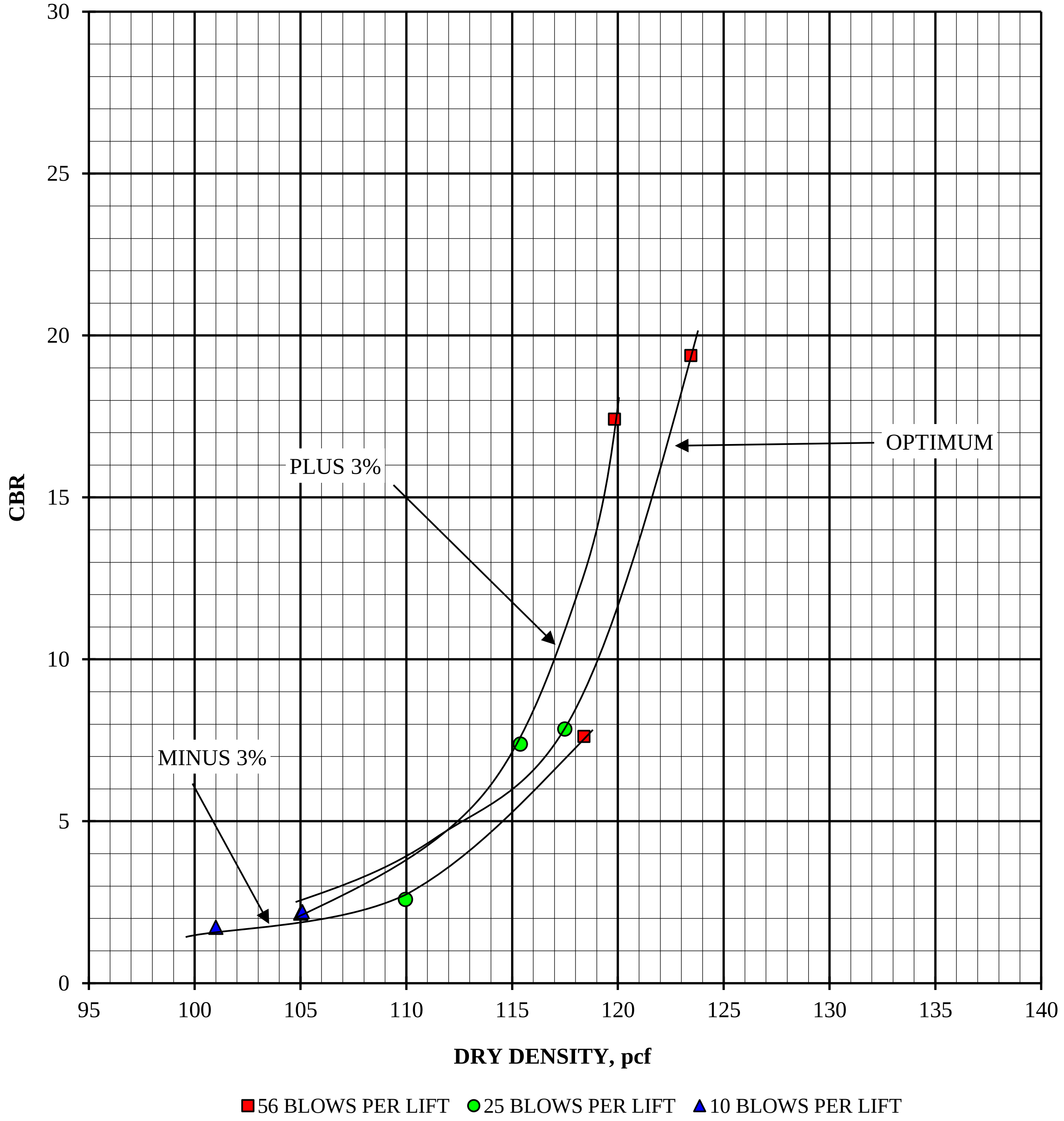
CBR #7; Boring #23 @ 3.5 - 5.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

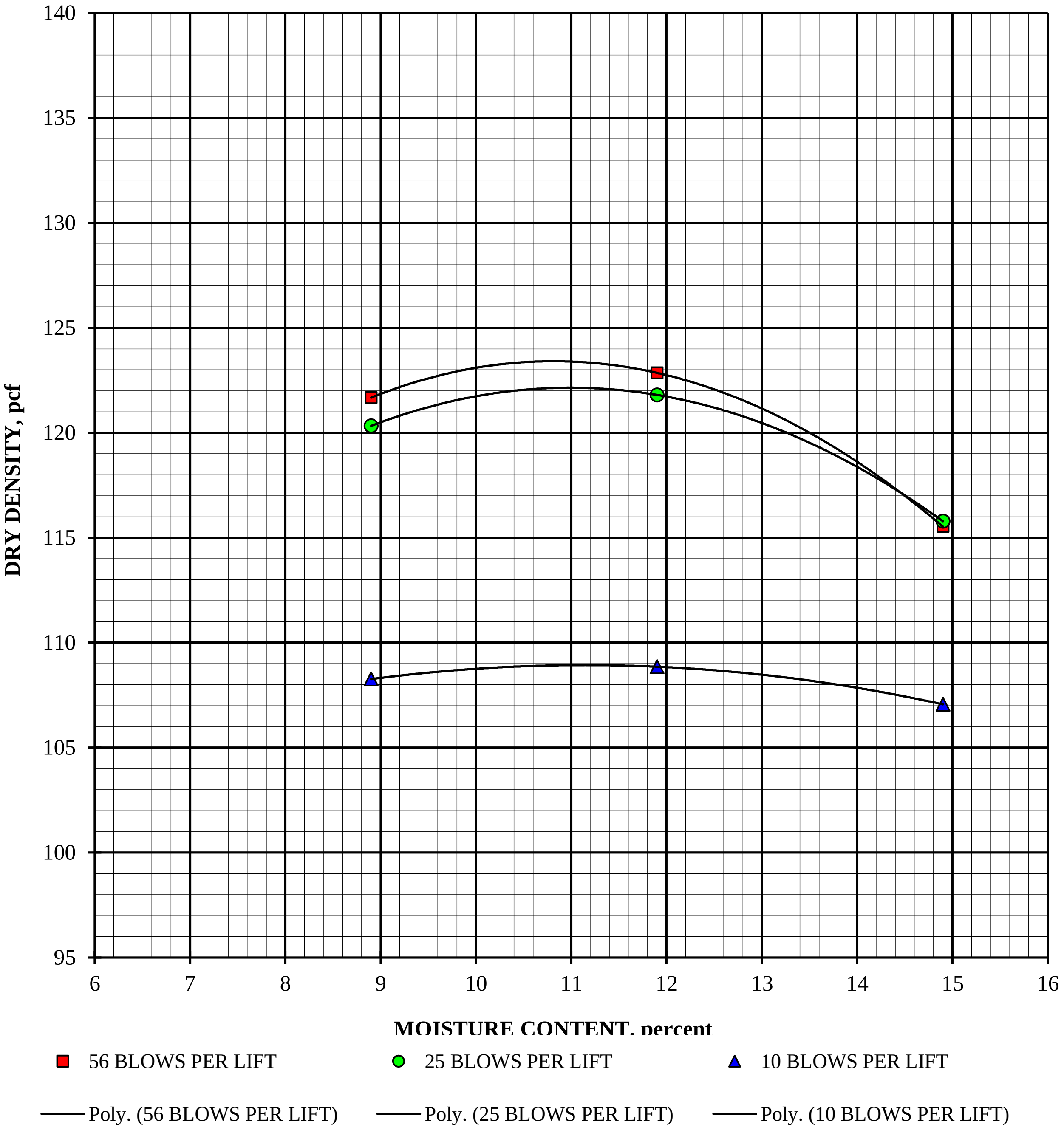
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown / Gray Mottled Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

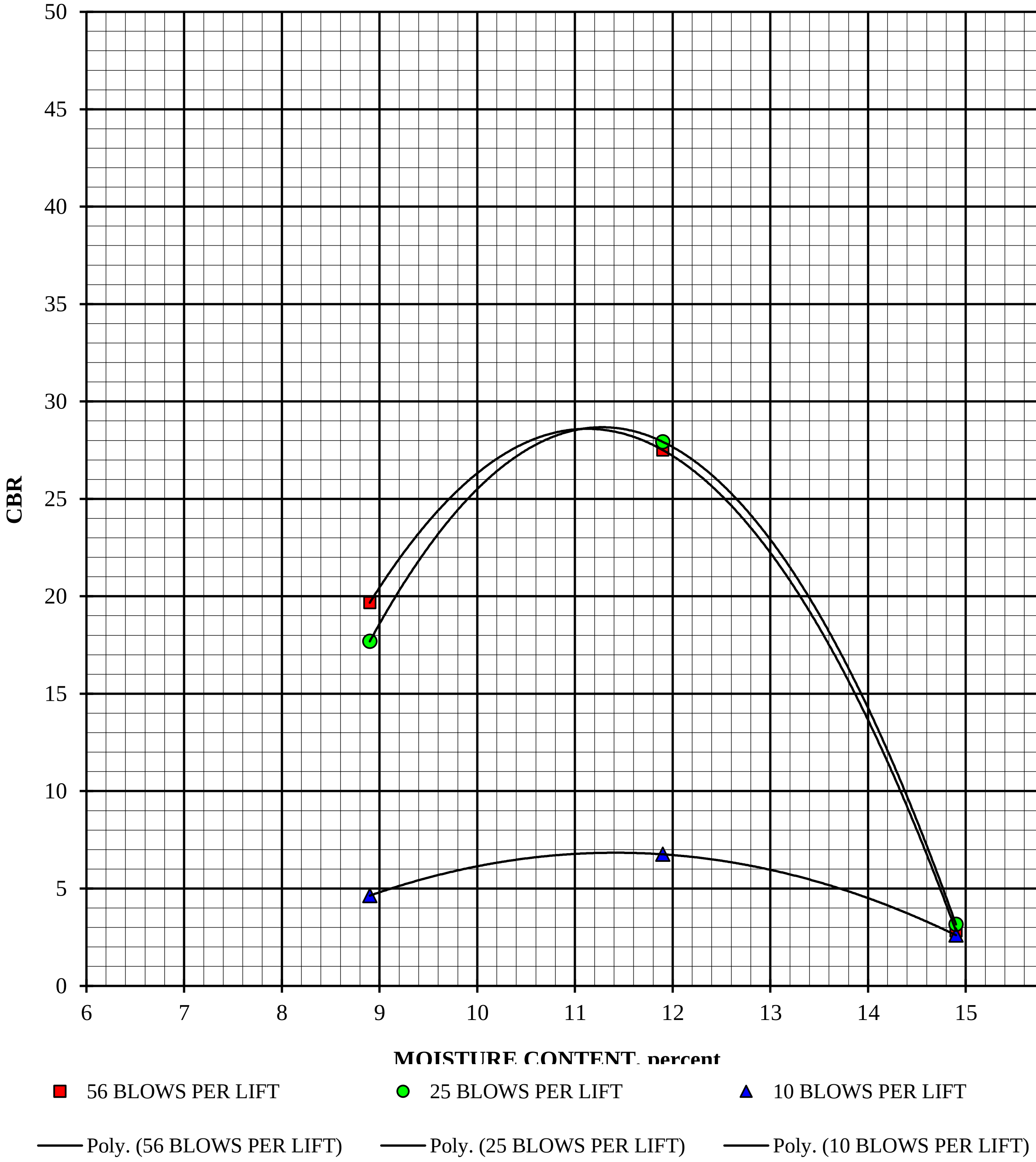
ASTM D 1883-16 (For a Range of Moisture Contents)

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)

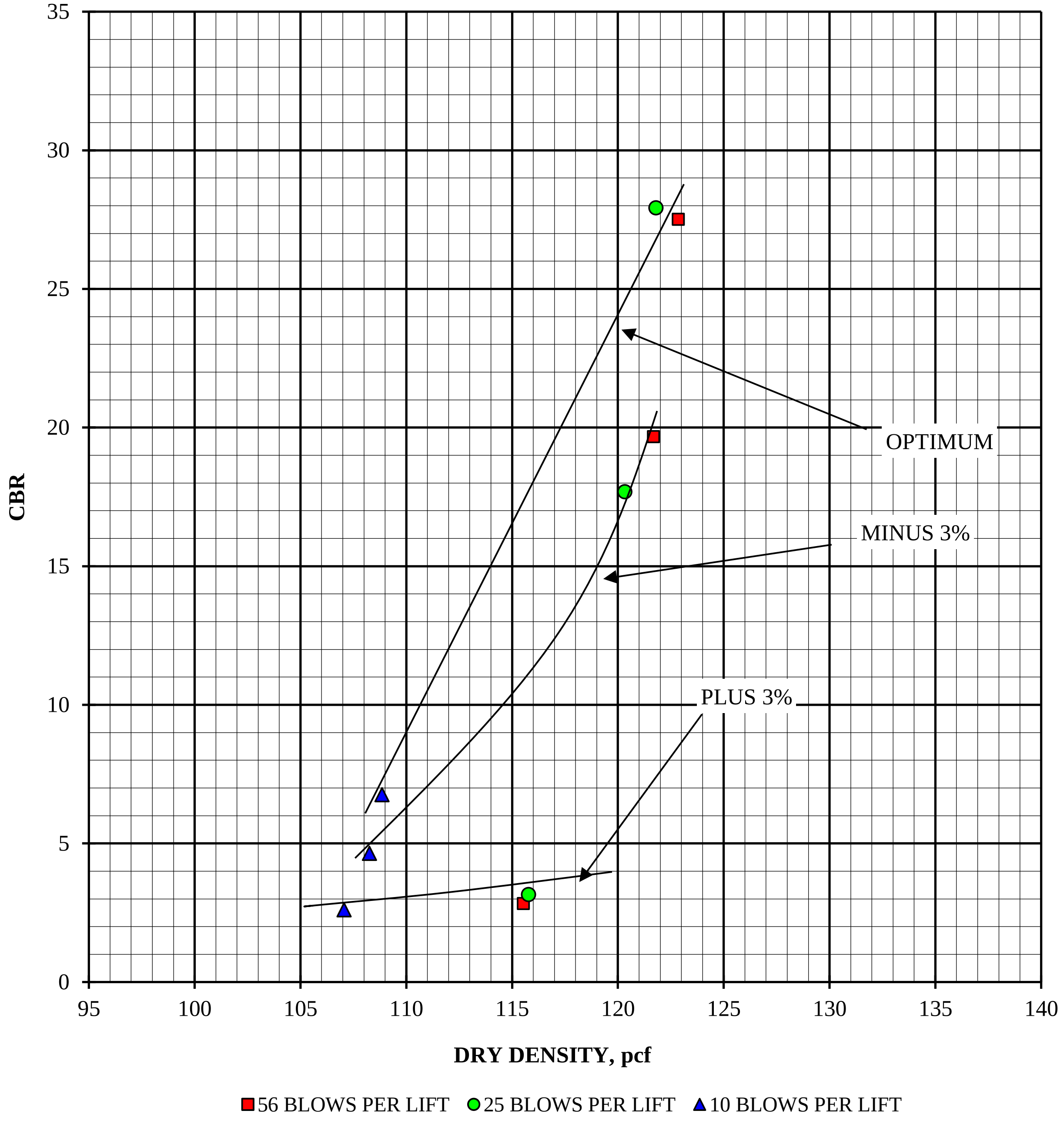
CBR #8; Boring #29 @ 2.0 - 5.0'

January 8, 2019

Brown / Gray Mottled Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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

Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

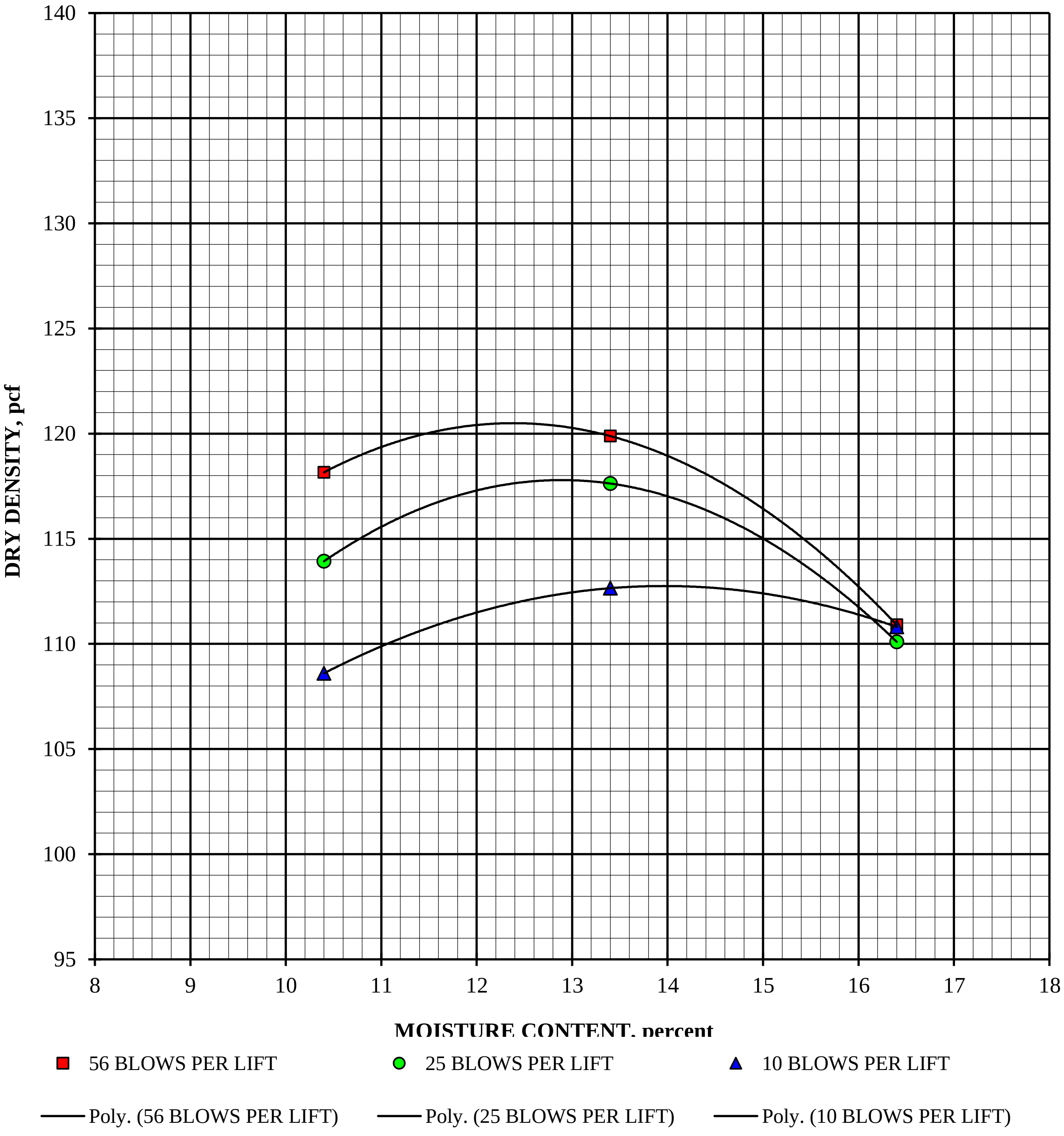
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

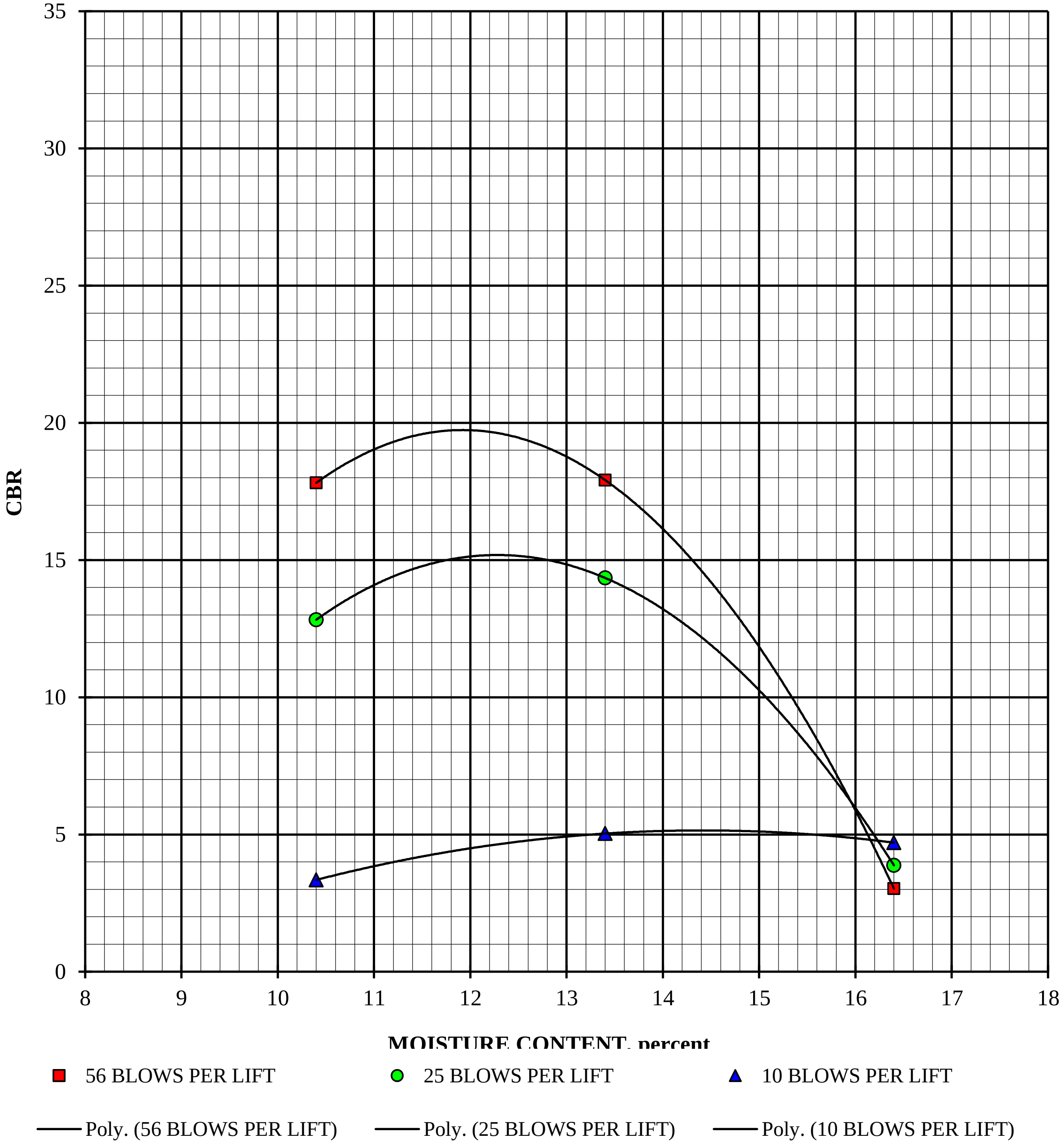
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

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

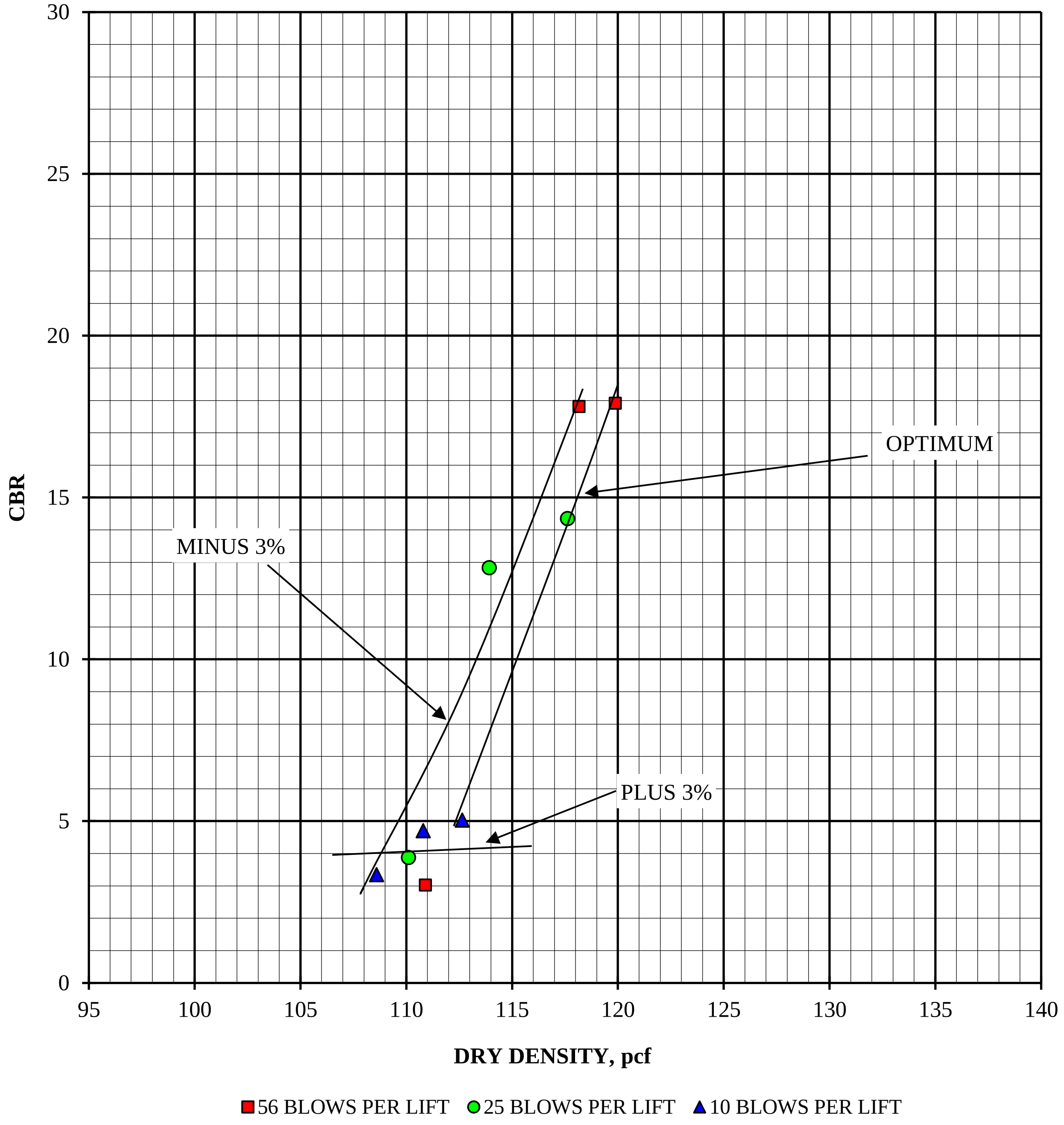
CBR #9; Boring #21 @ 1.5 - 3.0'

January 8, 2019

Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 302524-001

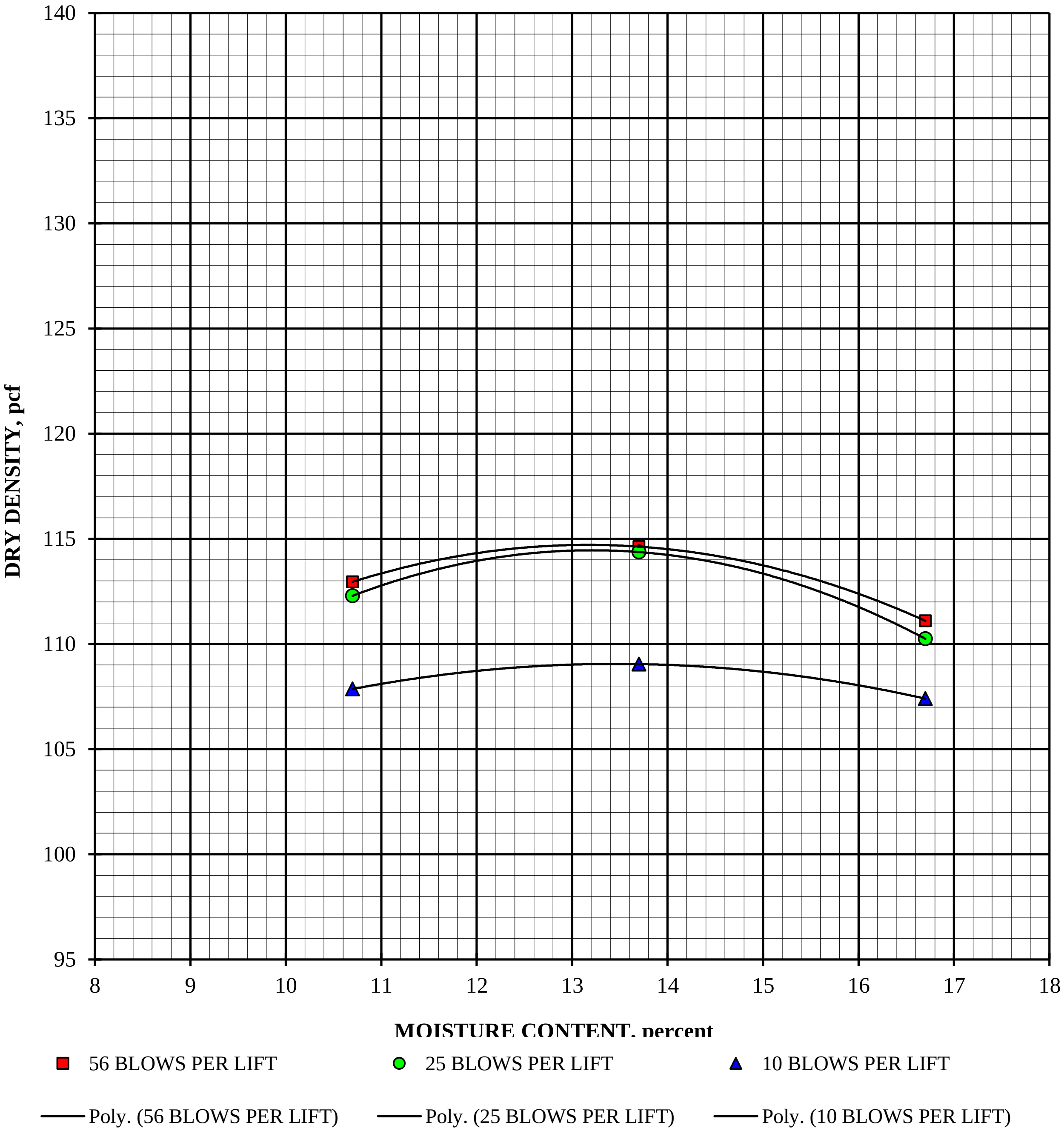
CALIFORNIA BEARING RATIO

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. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

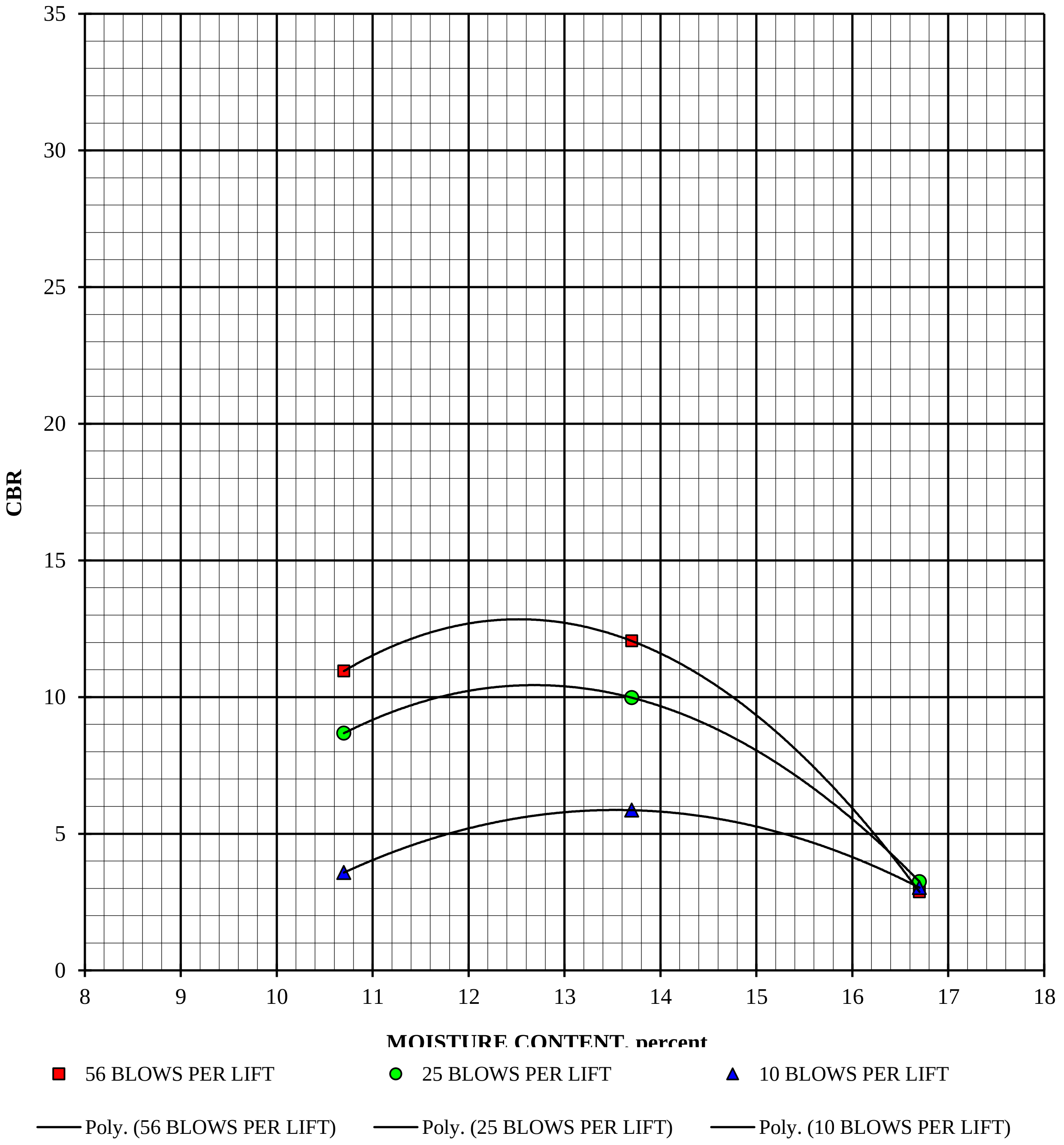
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

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

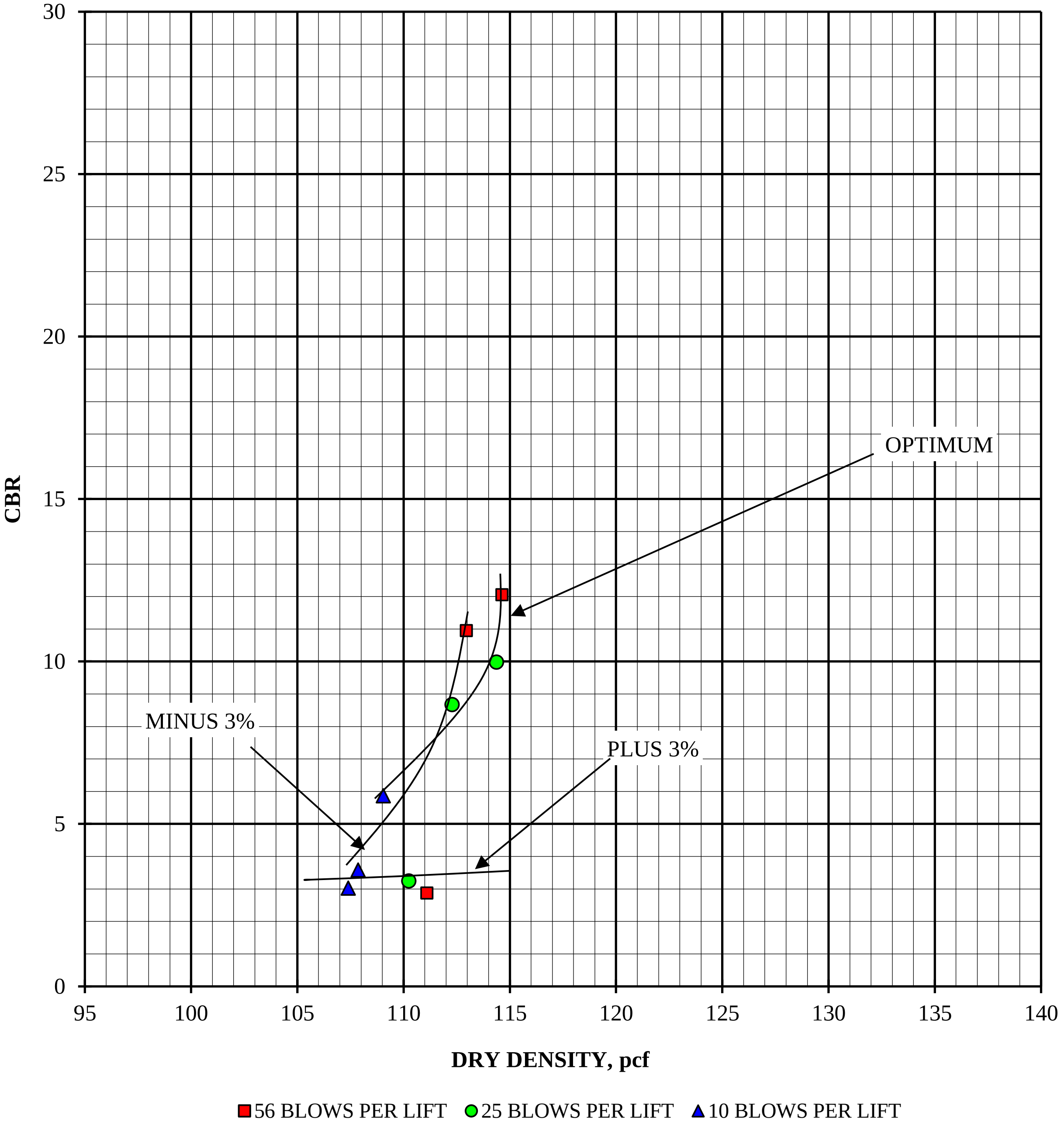
CBR #11; Boring #16 @ 2.0 - 4.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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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

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 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

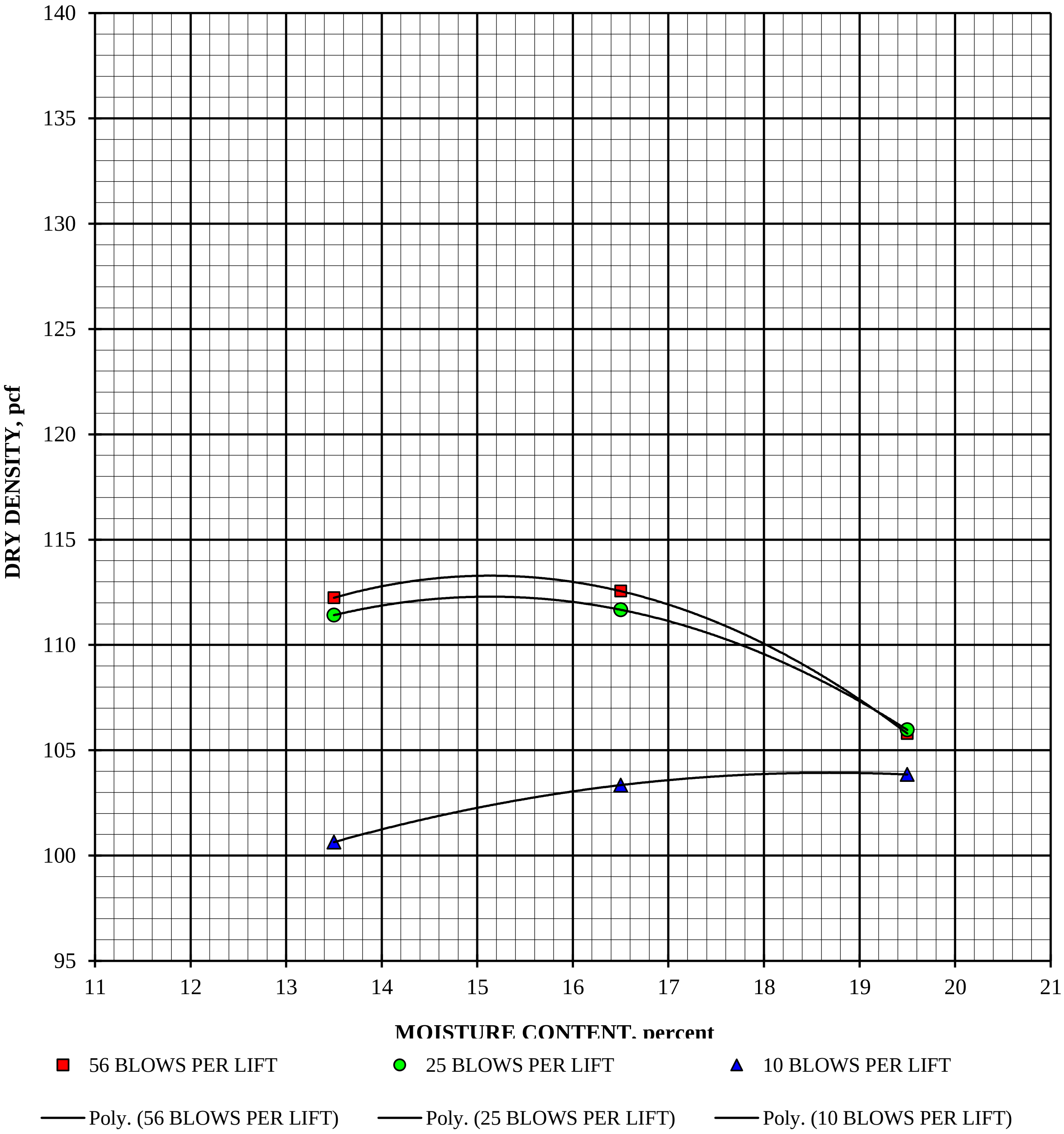
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway
Connector Improvements

302524-001

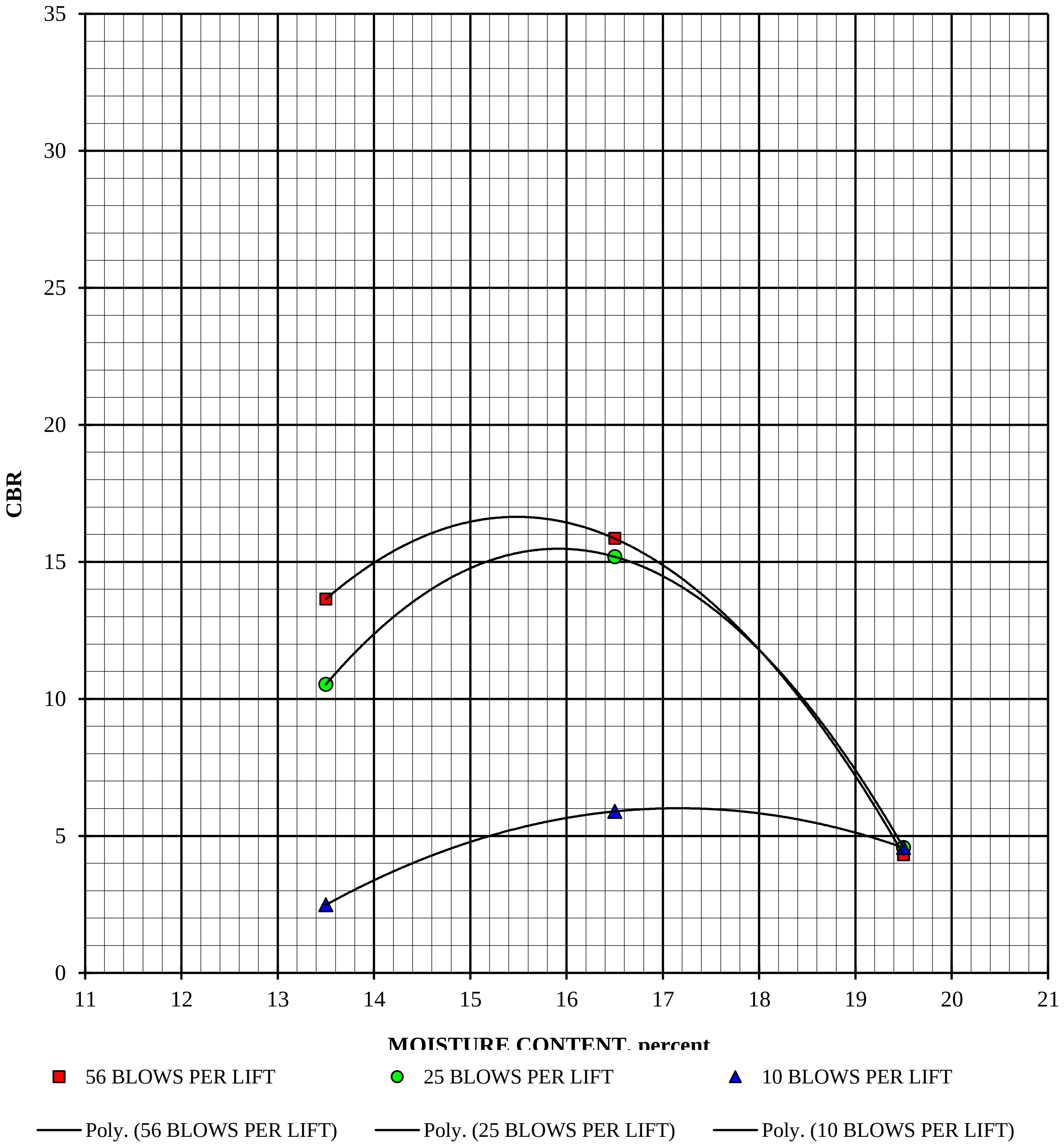
CALIFORNIA BEARING RATIO

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

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

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

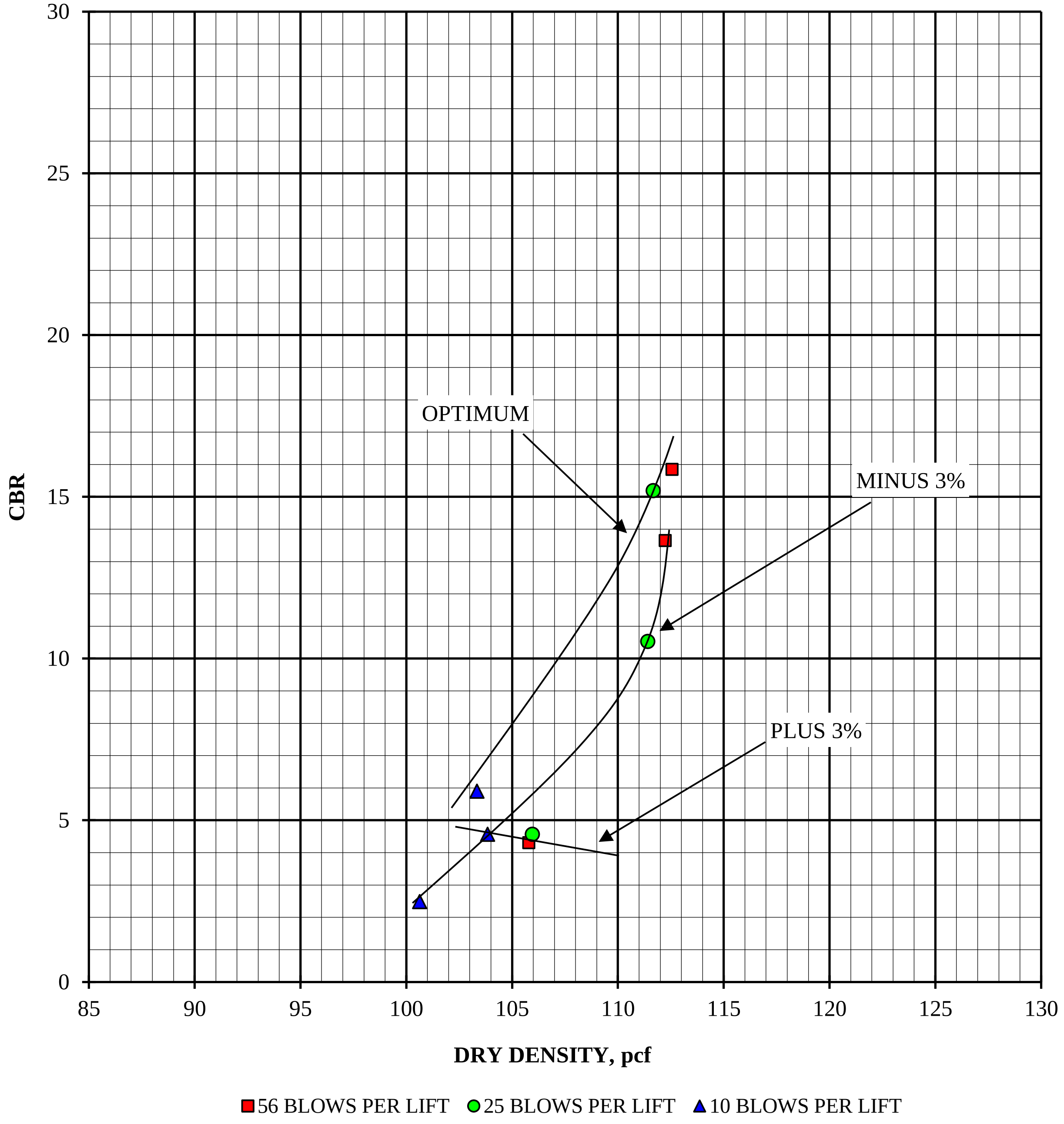
CBR #12; Boring #13 @ 2.0 - 4.0'

January 8, 2019

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 302524-001

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

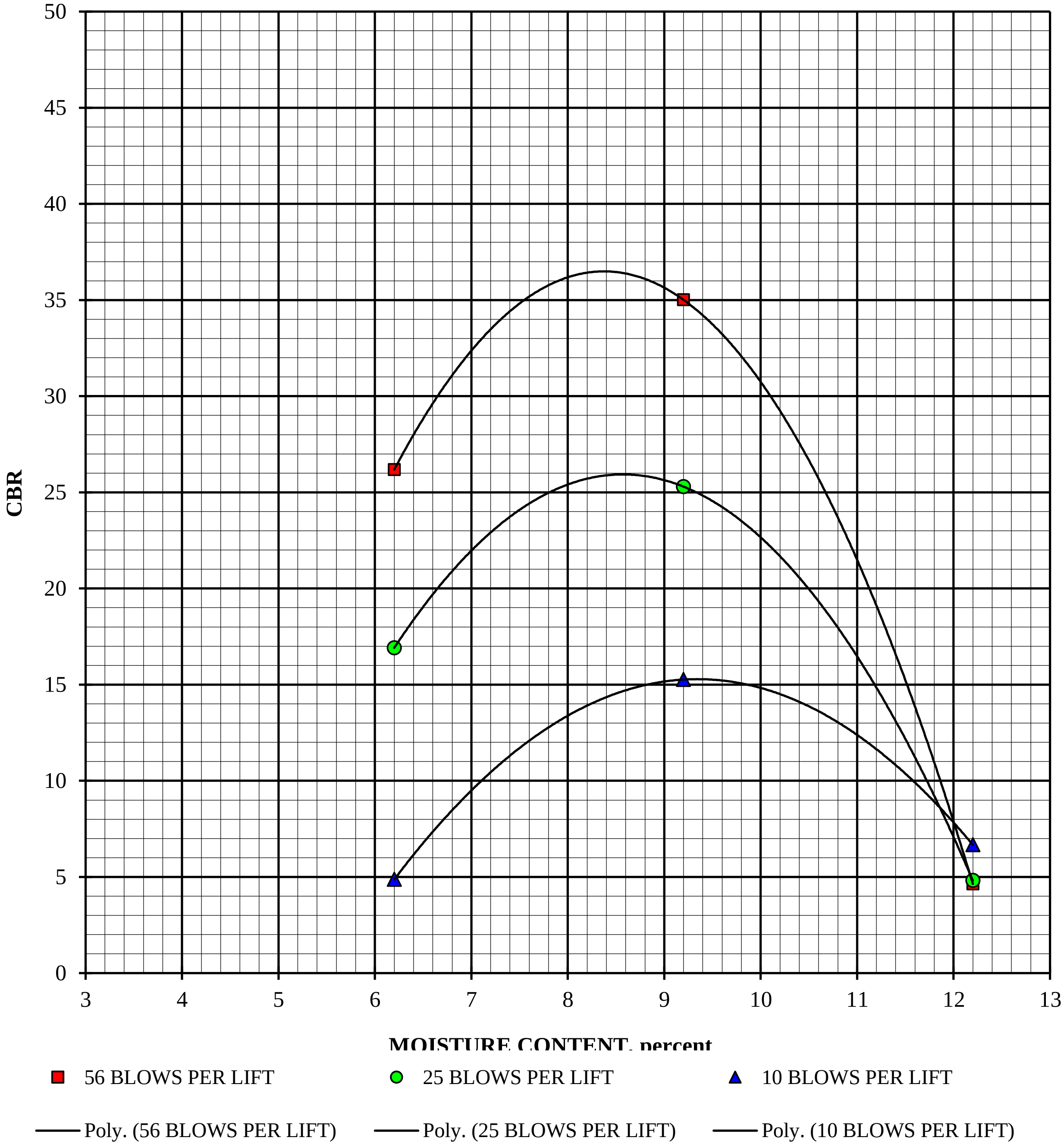
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Silty Sand (SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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CALIFORNIA BEARING RATIO

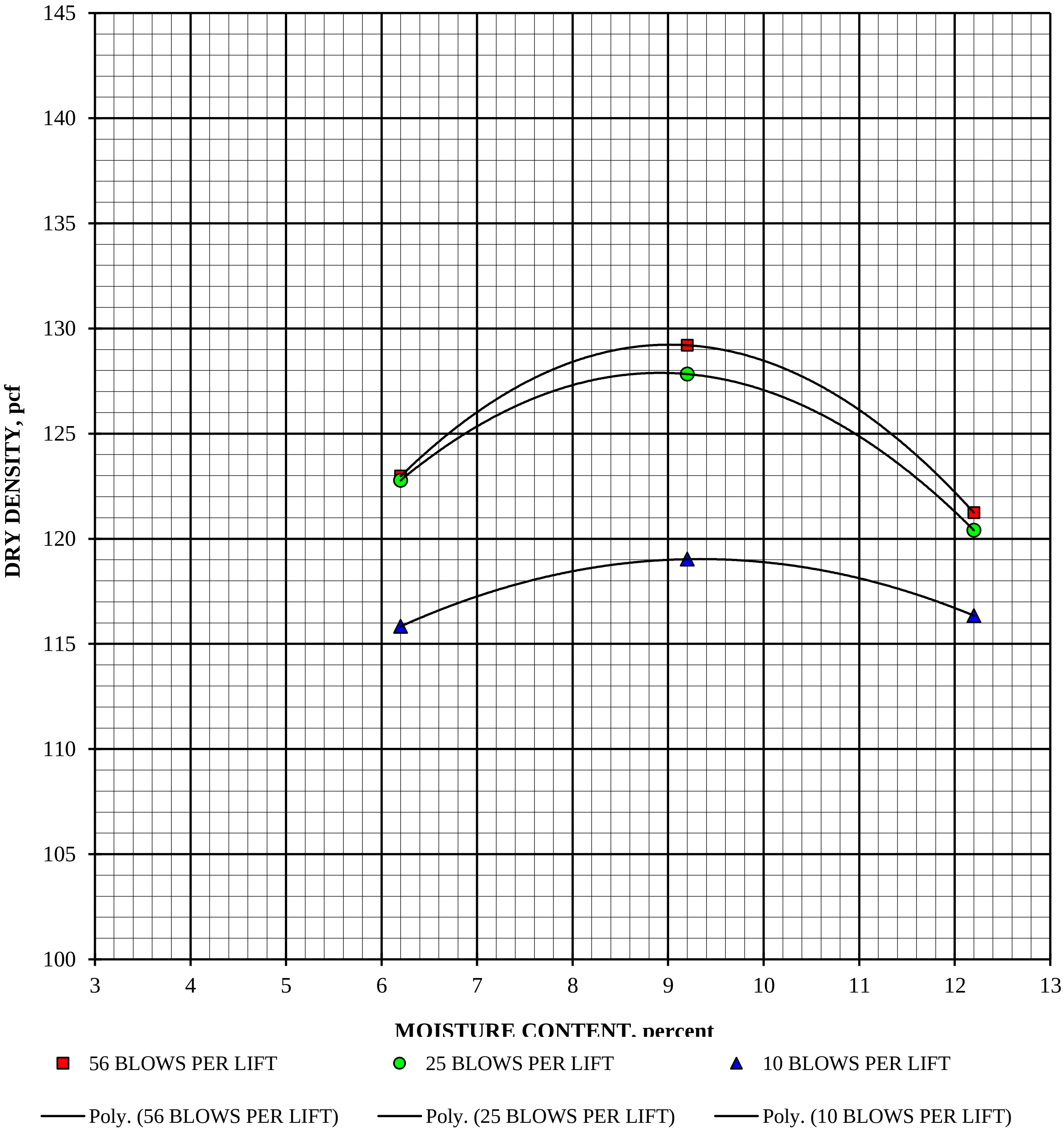
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Silty Sand (SM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 302524-001

CALIFORNIA BEARING RATIO

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

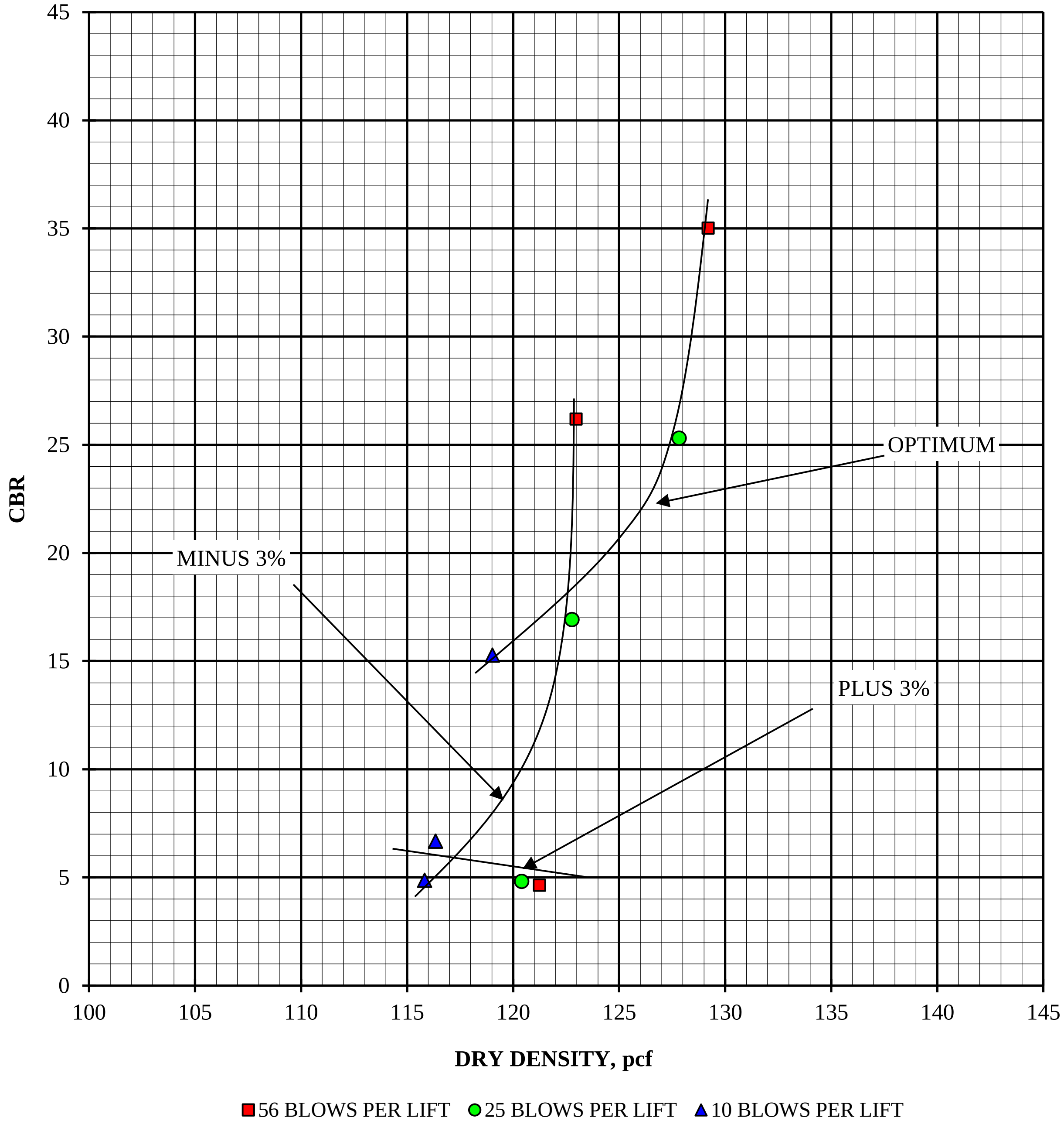
CBR #13; Boring #40 @ 1.5 - 3.5'

January 8, 2019

Brown Silty Sand (SM)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 302524-001

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 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

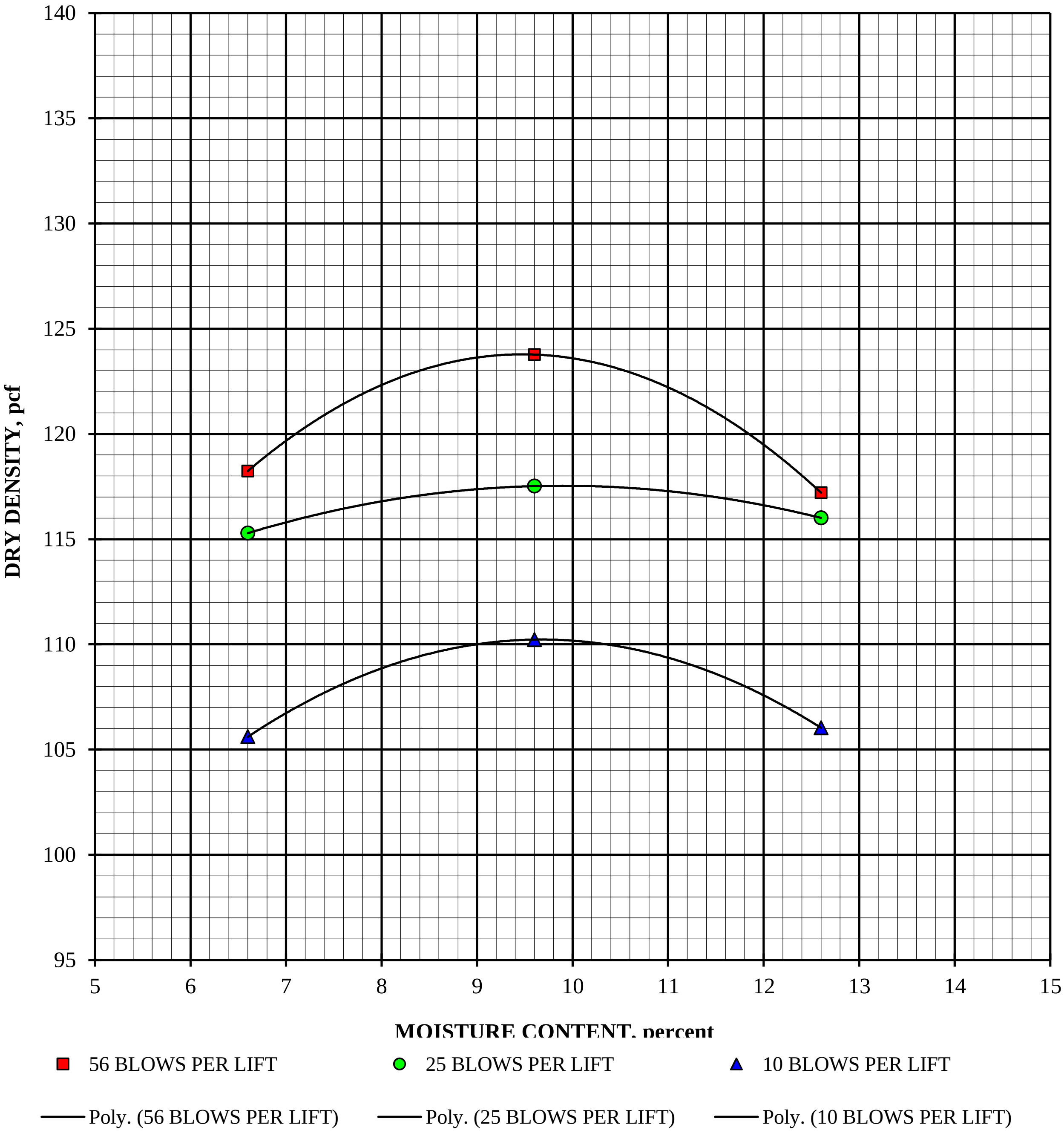
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Sandy Fat Clay (CH)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

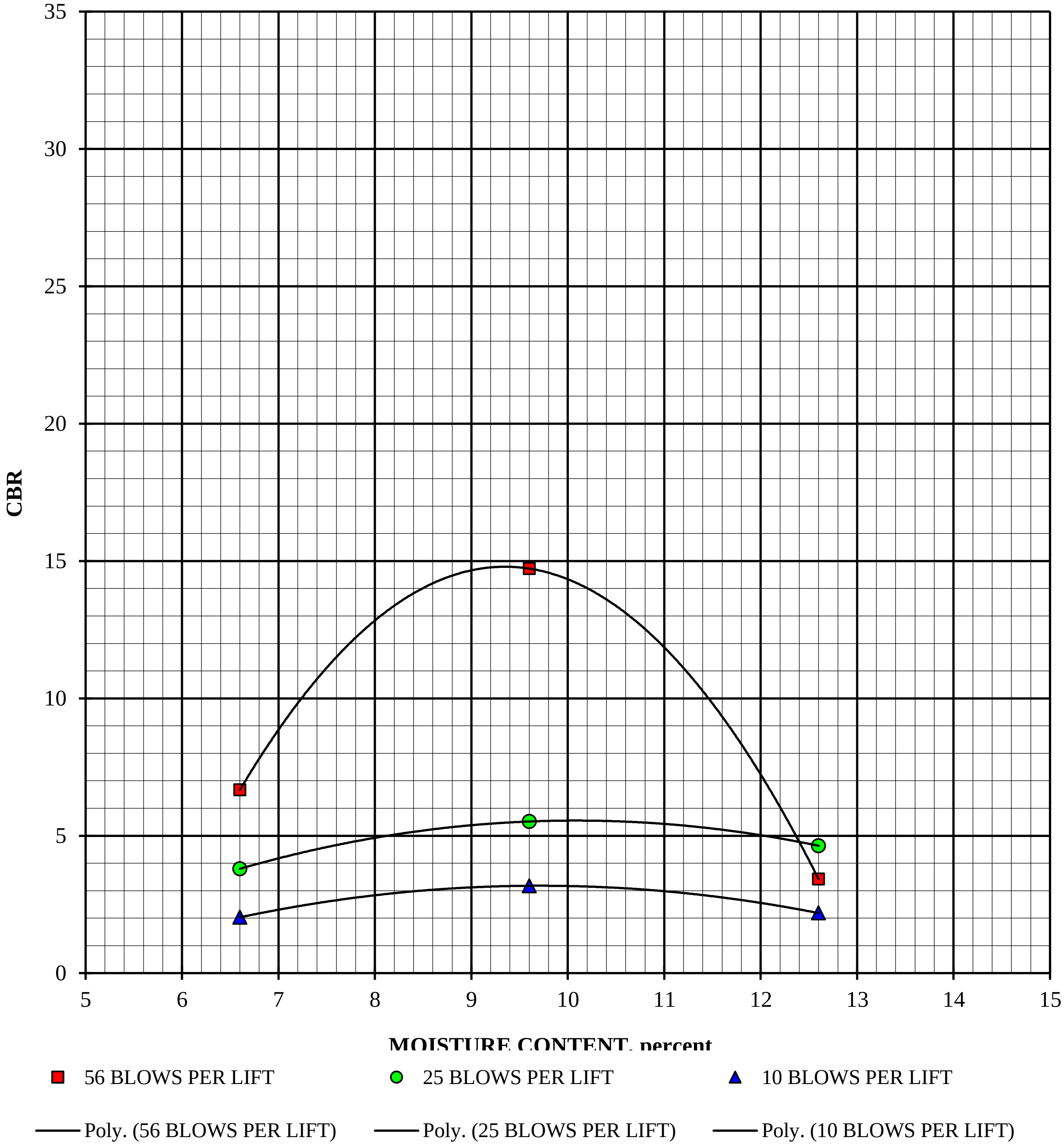
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Sandy Fat Clay (CH)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

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

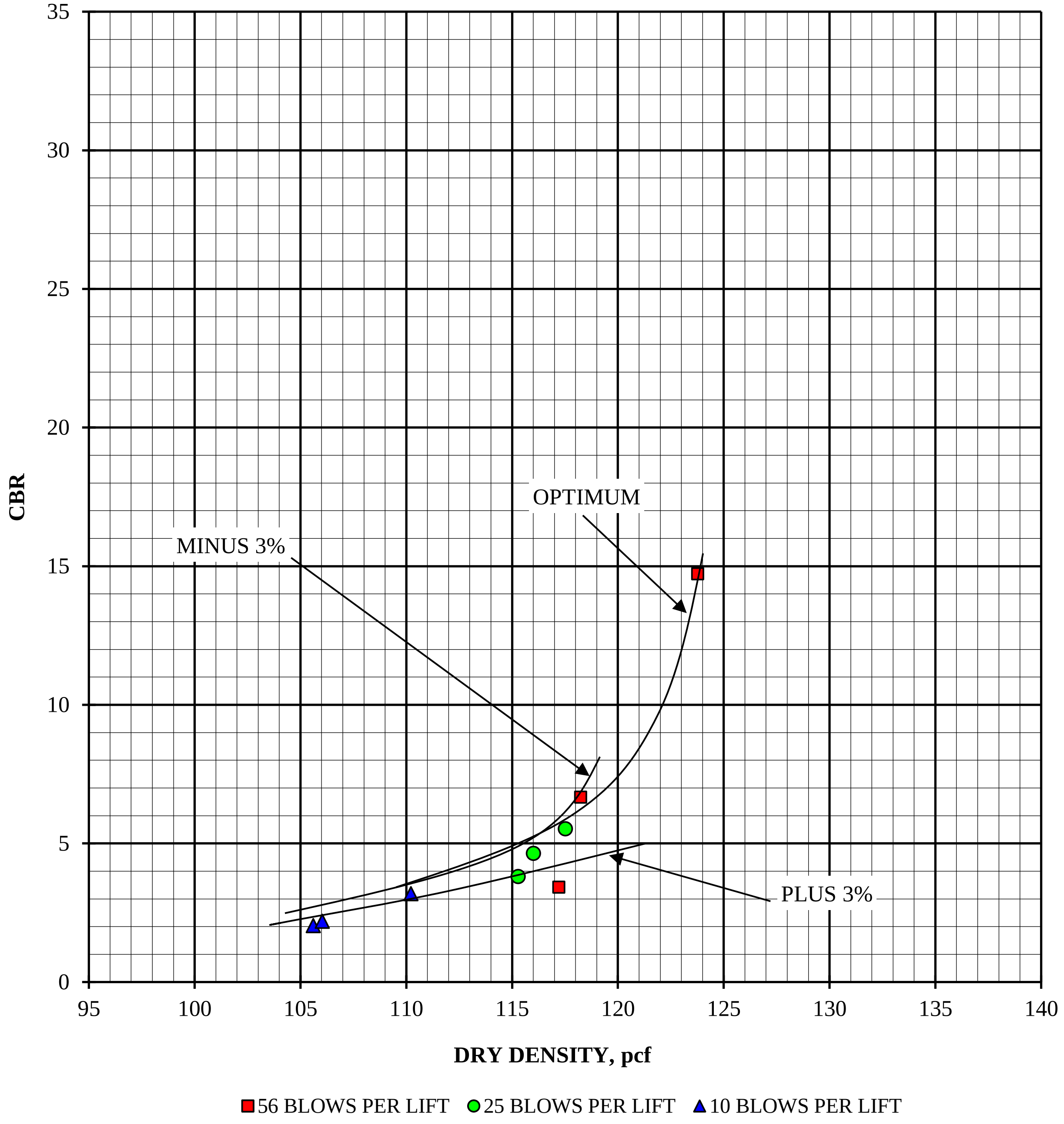
CBR #14; Boring #39 @ 2.0 - 5.0'

January 8, 2019

Brown Sandy Fat Clay (CH)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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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 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

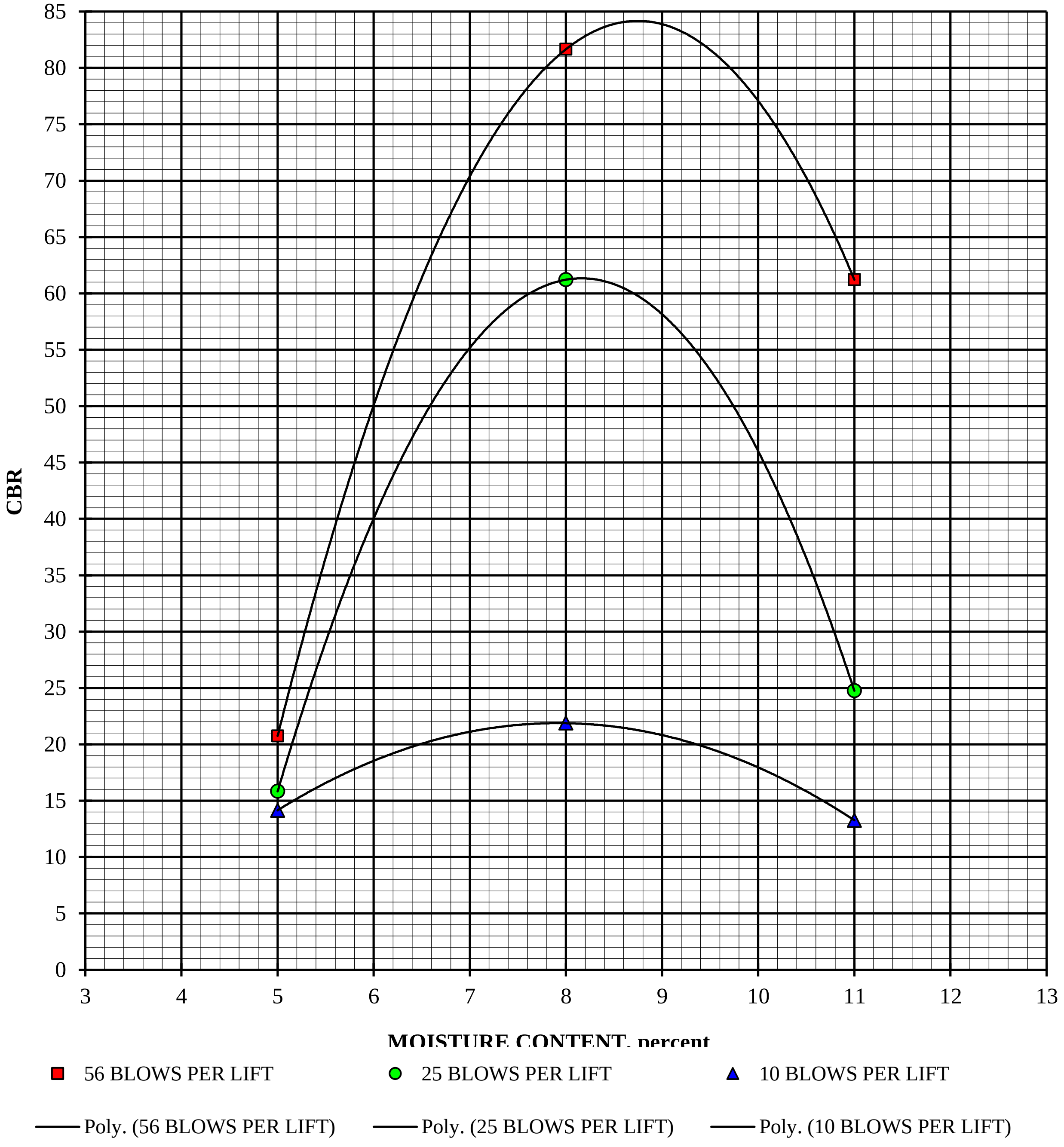
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Clayey Sand with Gravel (SC)

CBR vs. MOISTURE CONTENT



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CALIFORNIA BEARING RATIO

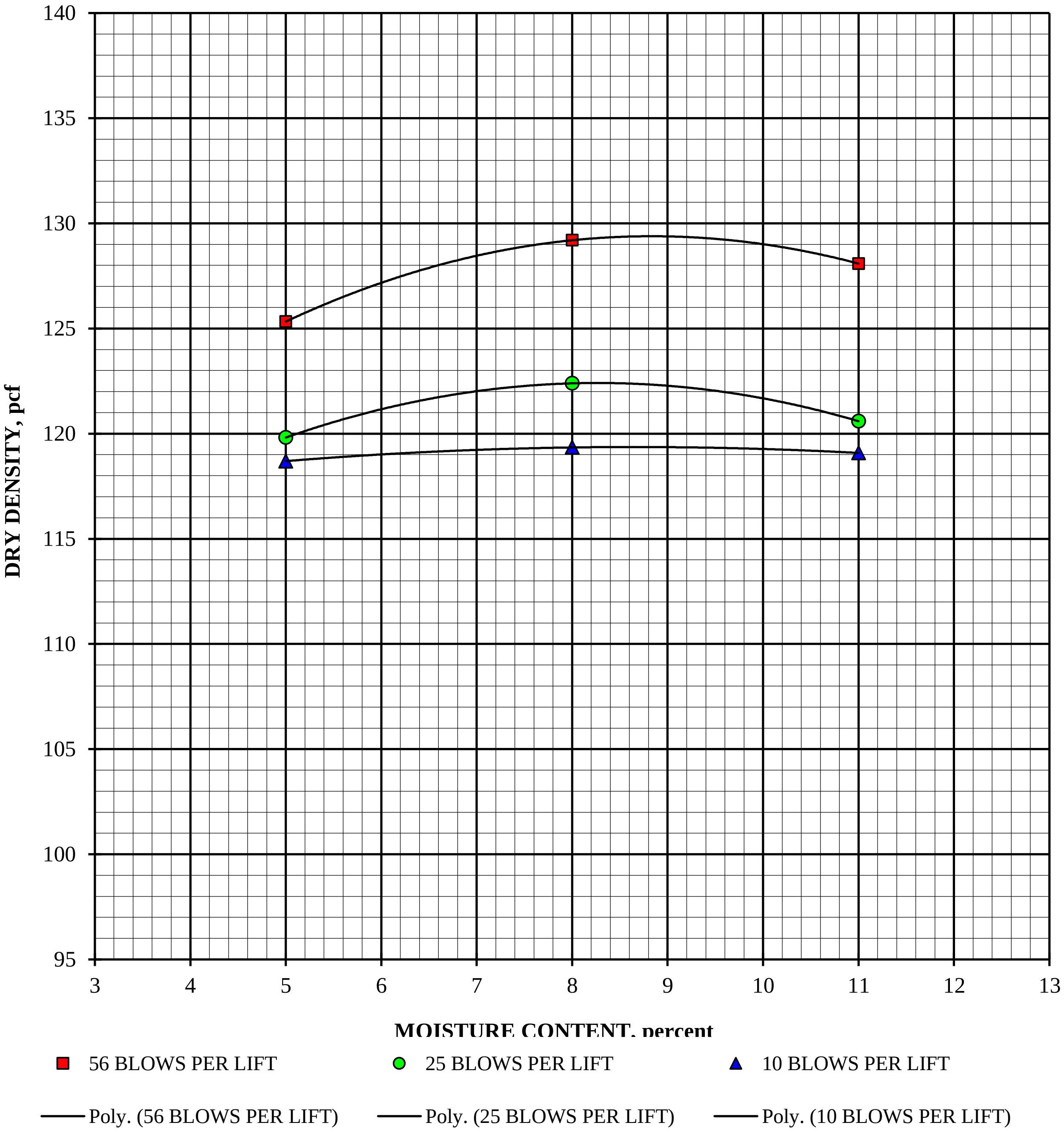
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Clayey Sand with Gravel (SC)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

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

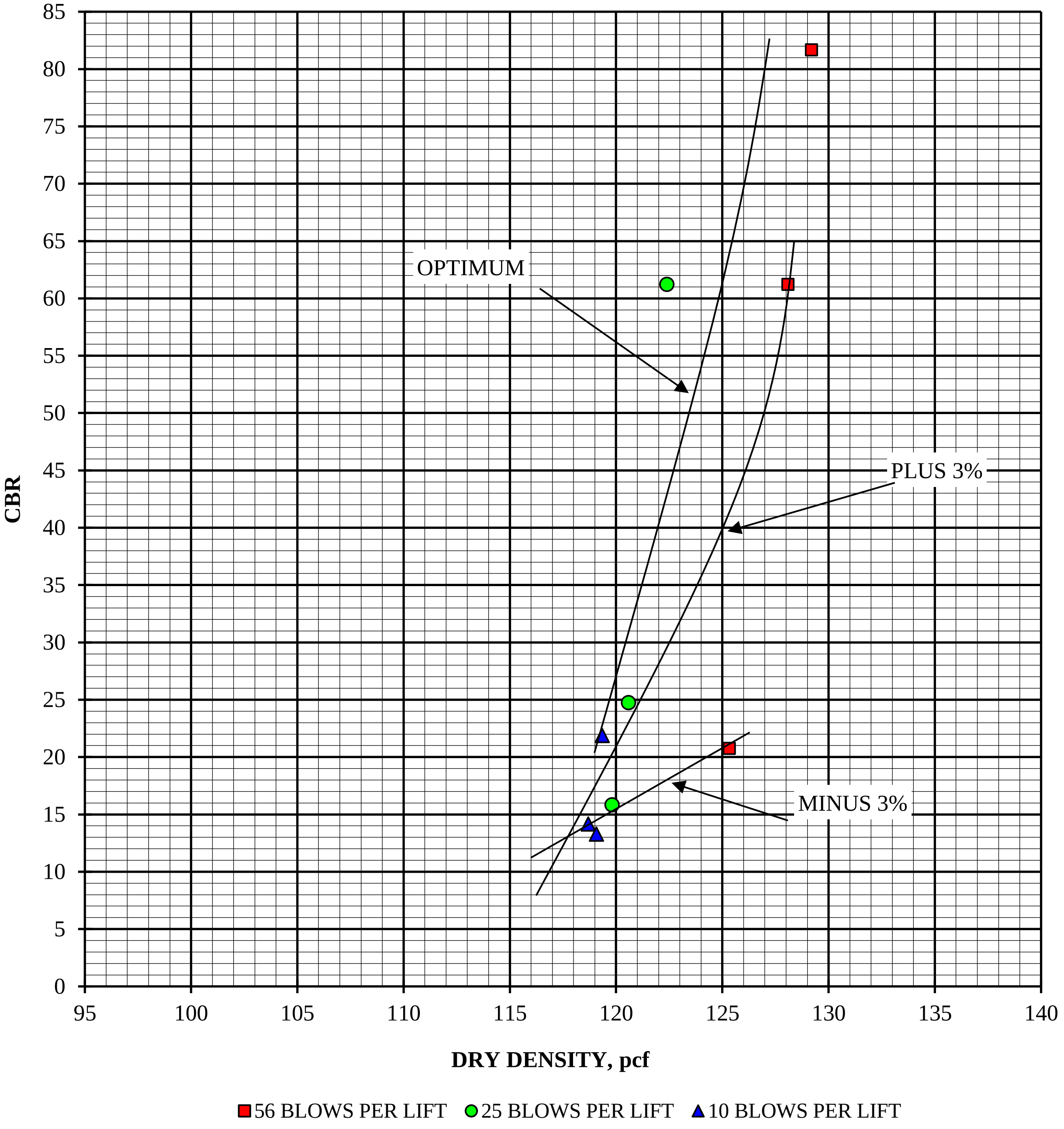
CBR #15; Boring #17 @ 0.5 - 1.5'

January 8, 2019

Brown Clayey Sand with Gravel (SC)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



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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 7-25 and Taxiway Connector Improvements

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CALIFORNIA BEARING RATIO

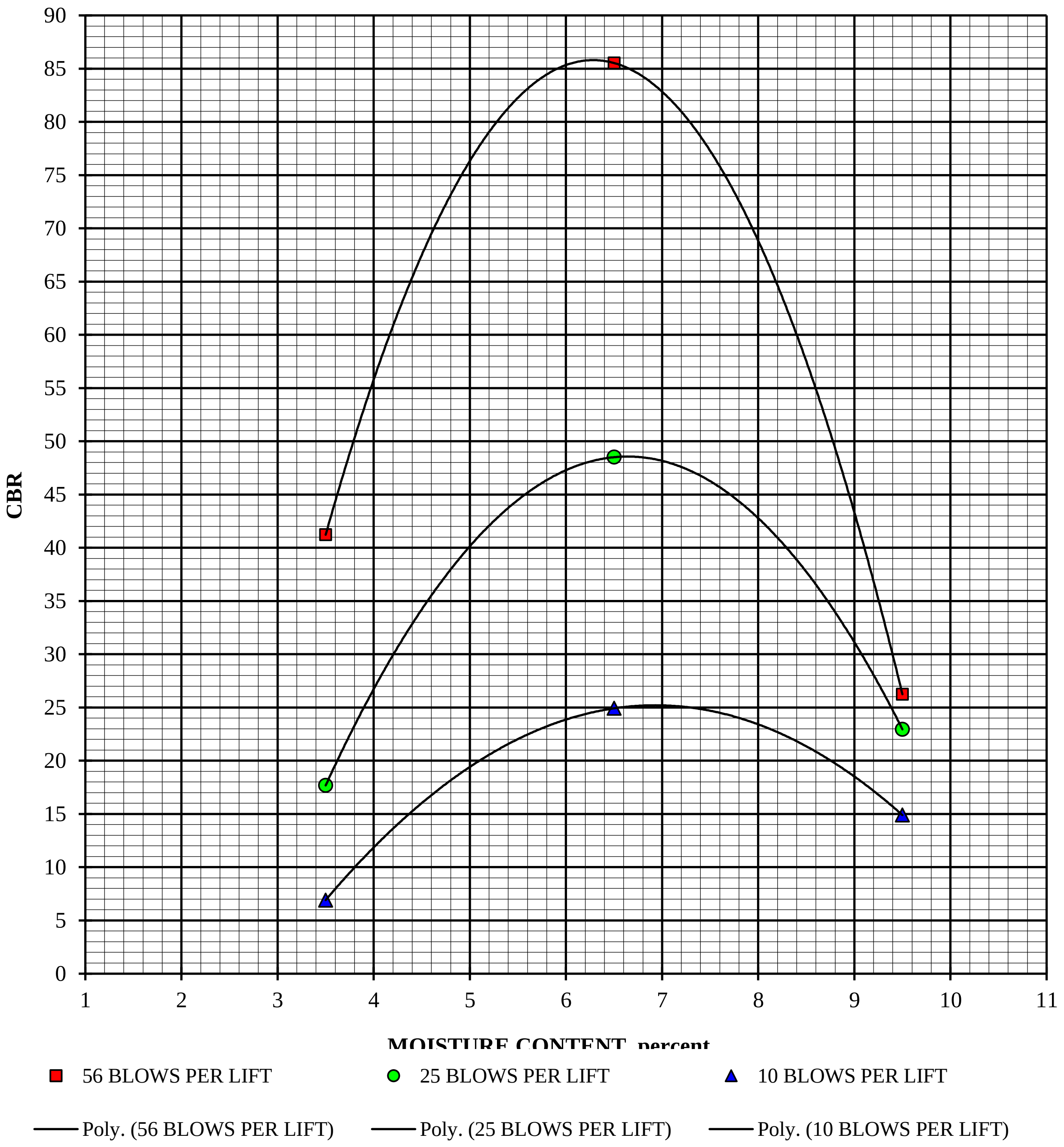
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Silty Gravel with Sand (GM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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CALIFORNIA BEARING RATIO

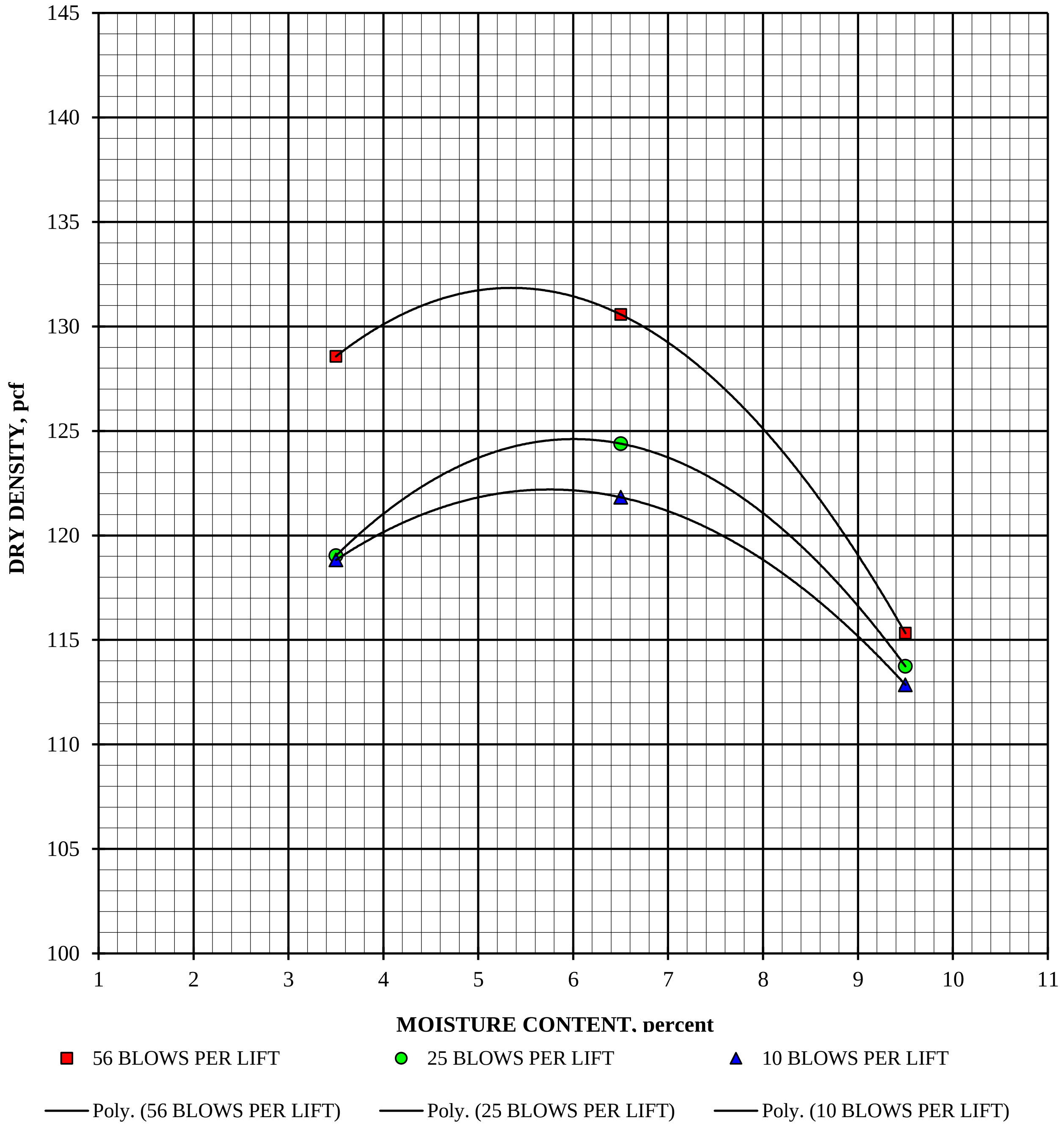
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Silty Gravel with Sand (GM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

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CALIFORNIA BEARING RATIO

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

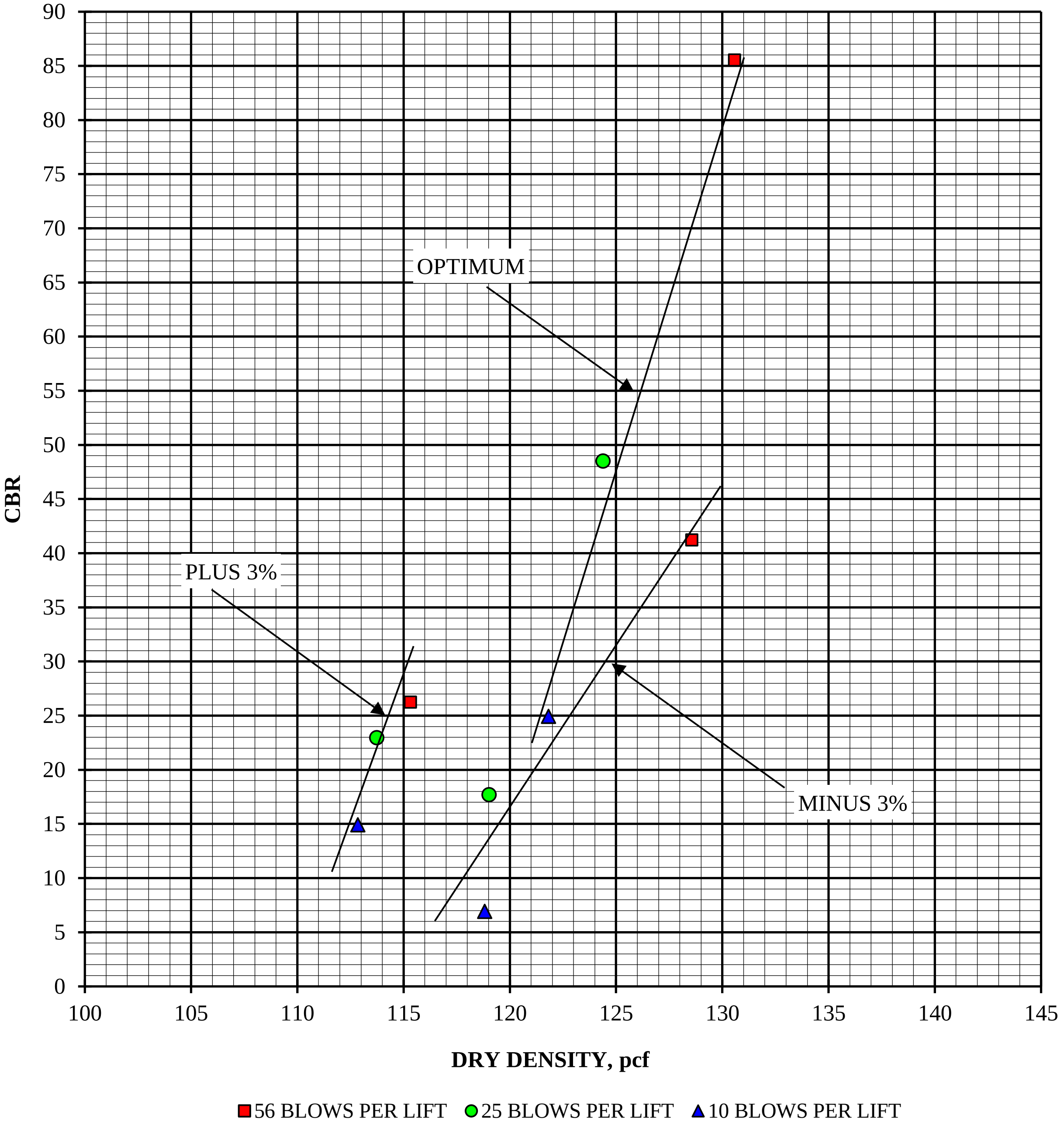
CBR #16; Boring #28 @ 0.5 - 1.5'

January 8, 2019

Brown Silty Gravel with Sand (GM)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements 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

CALIFORNIA BEARING RATIO

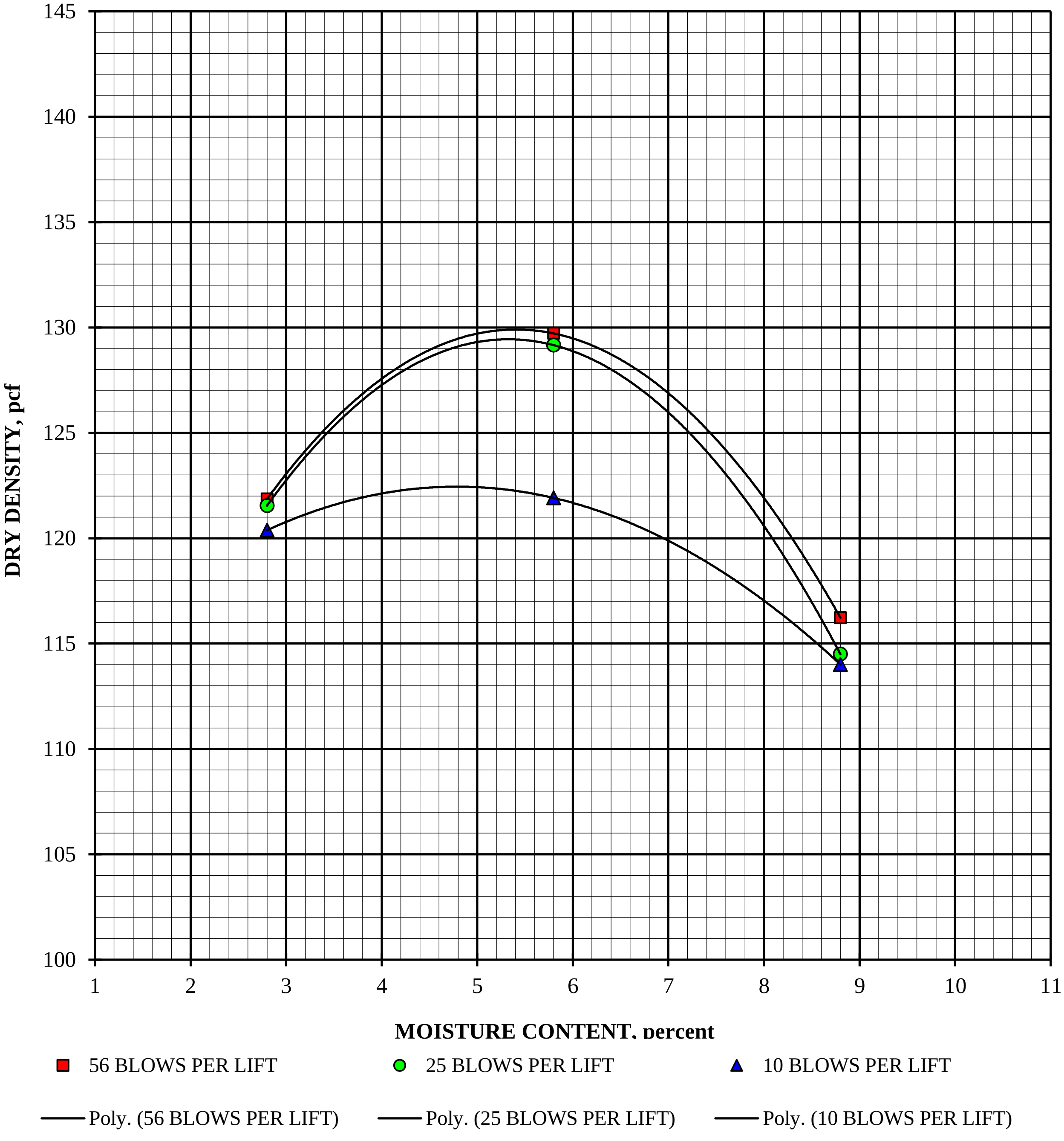
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Silty Sand with Gravel (SM)

DRY DENSITY vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

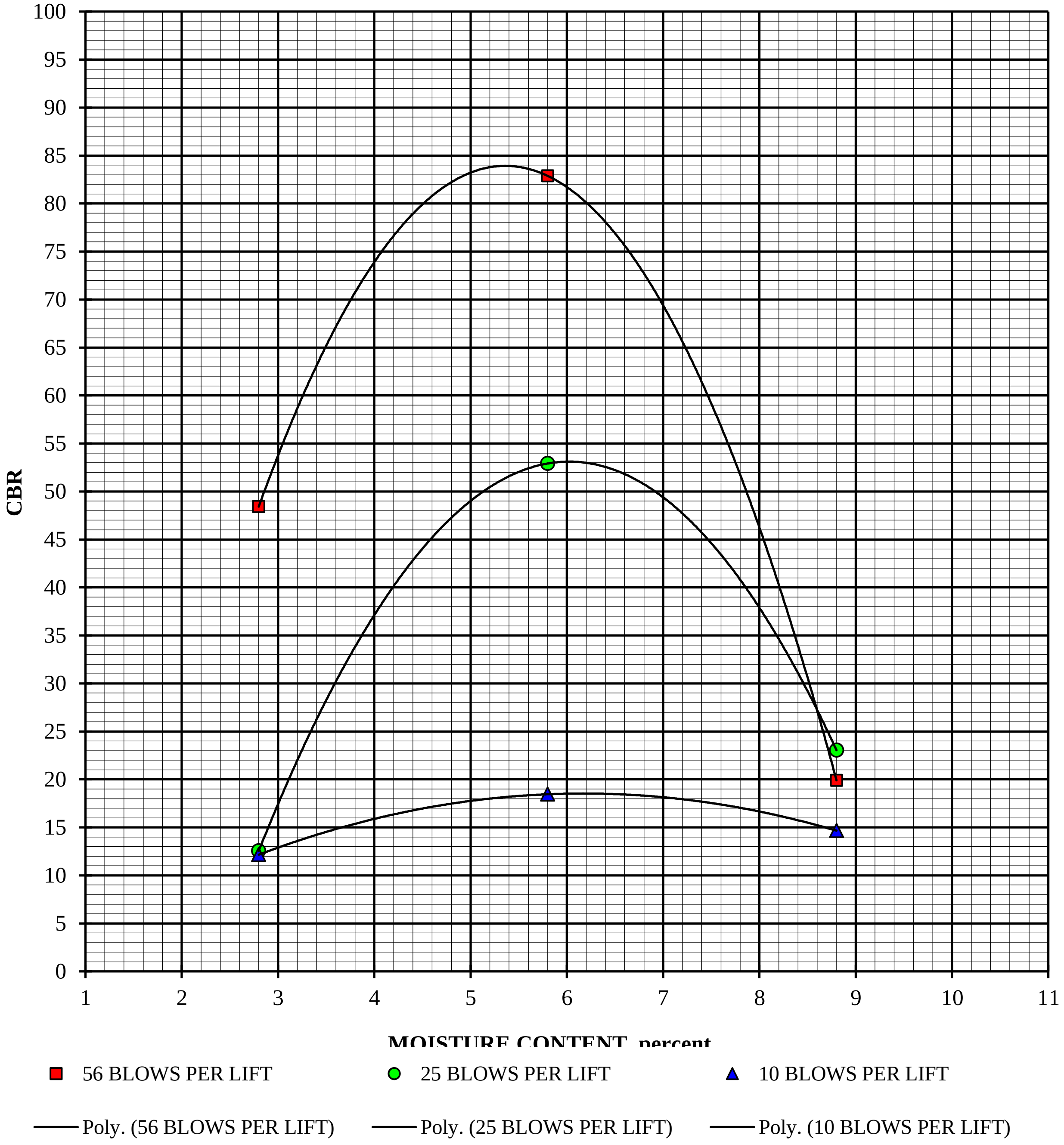
ASTM D 1883-16 (For a Range of Moisture Contents)

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

January 8, 2019

Brown Silty Sand with Gravel (SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements

302524-001

CALIFORNIA BEARING RATIO

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

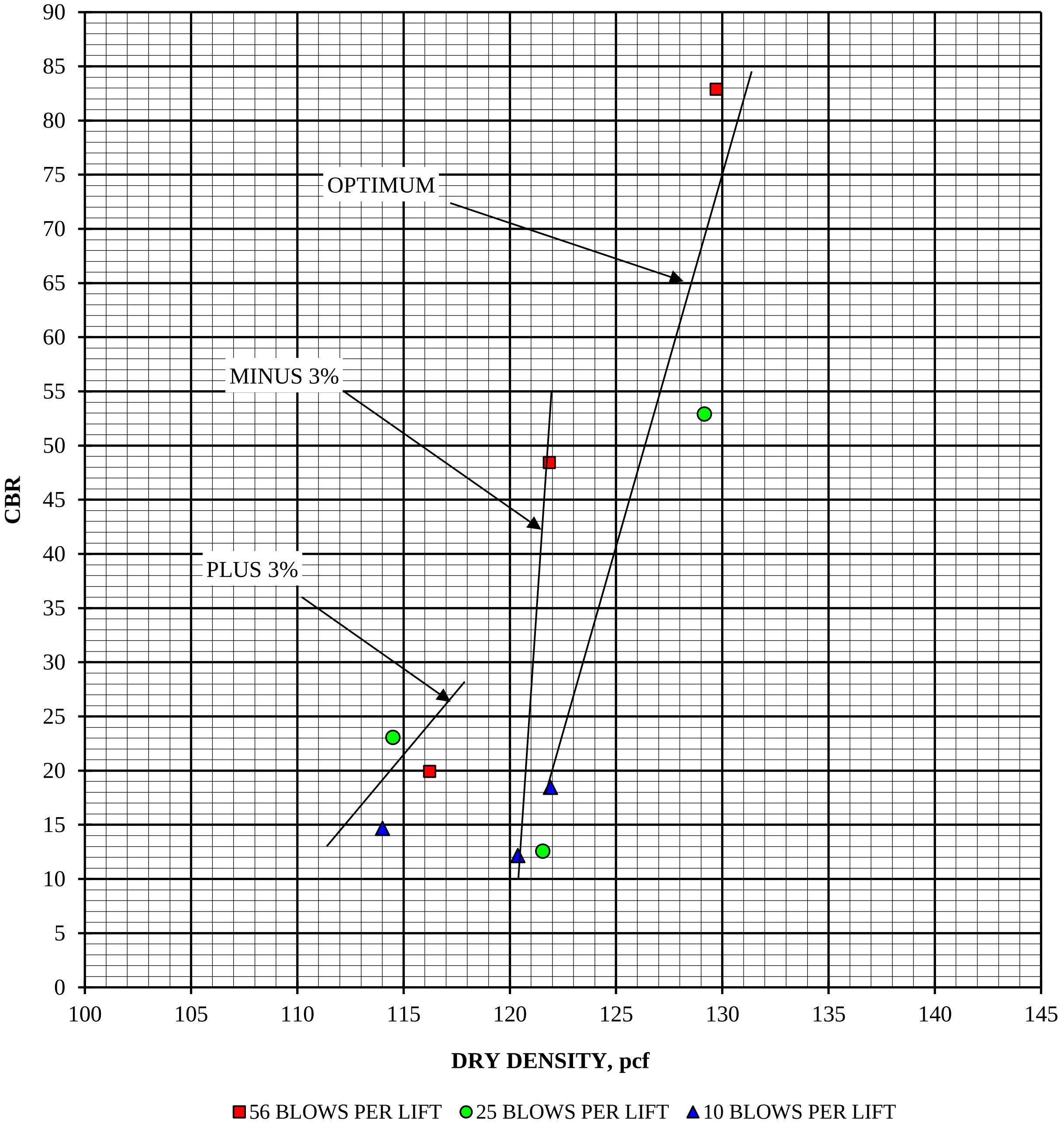
CBR #17; Boring #14 @ 0.5 - 1.5'

January 8, 2019

Brown Silty Sand with Gravel (SM)

DRY DENSITY vs. CBR

Arranged According to Moisture Content



APPENDIX C

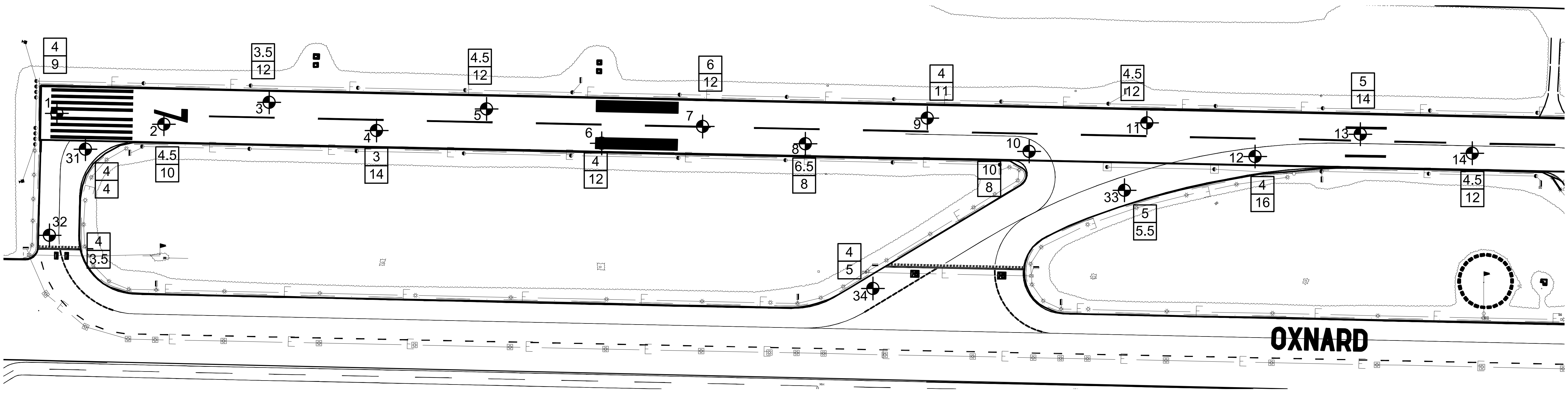
Figures 2a and 2b – Existing Pavement Section Thicknesses

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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FIGURE 2A - EXISTING PAVEMENT SECTION THICKNESSES

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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February 2020

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302524-001

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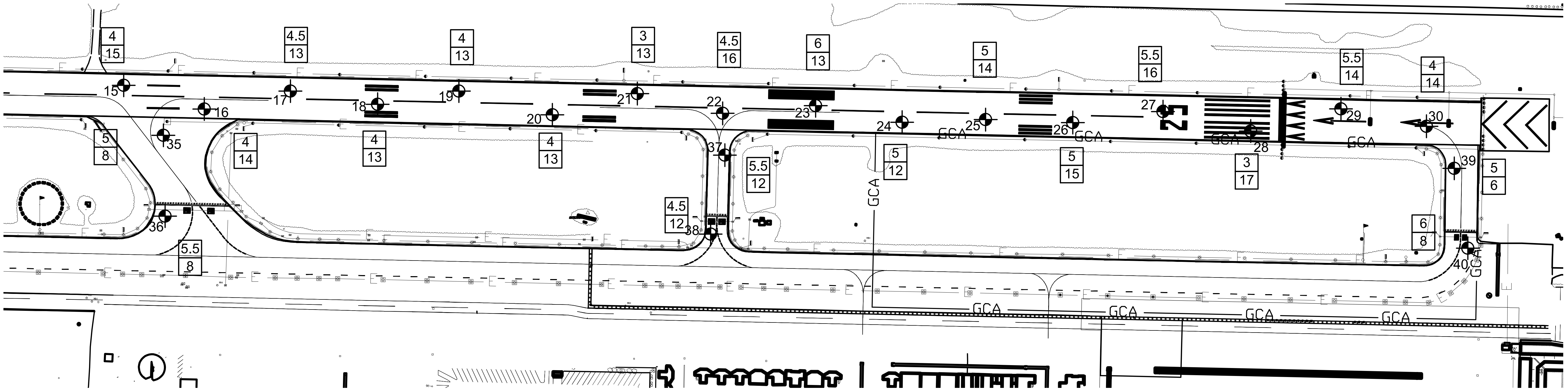

LEGEND

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 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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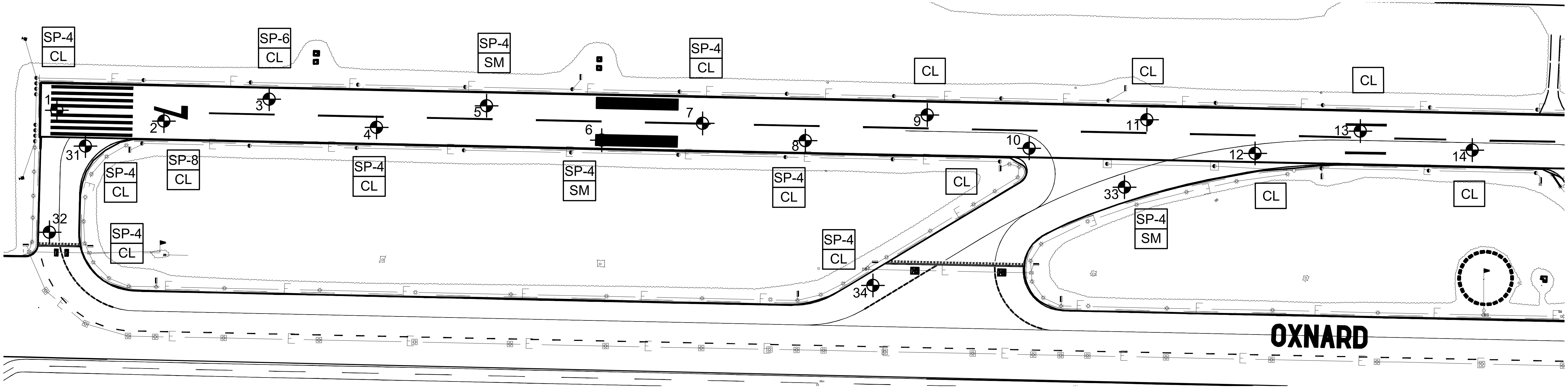

LEGEND

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 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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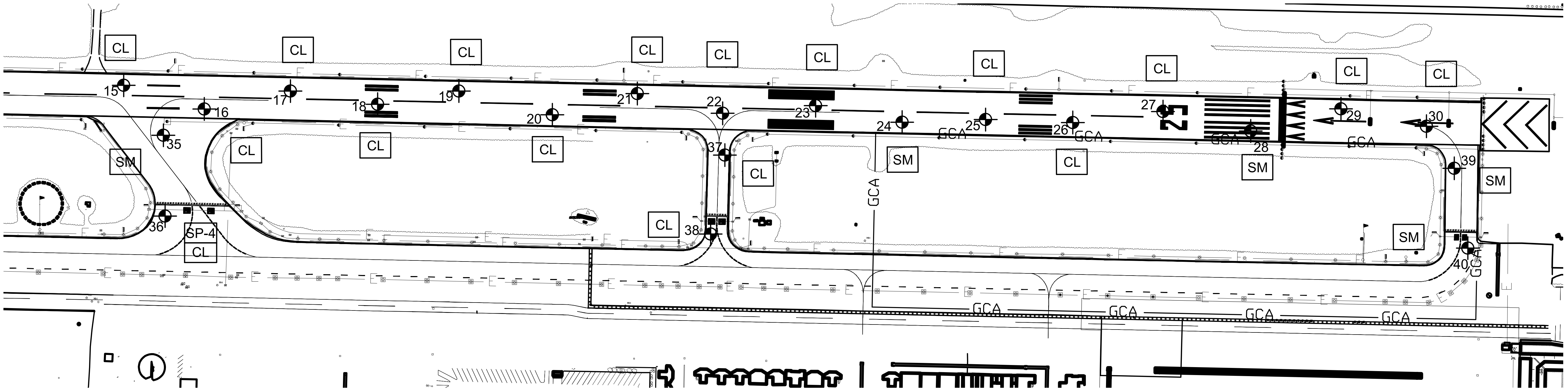

LEGEND

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 3B - USCS SOIL TYPES AT SUBGRADE
Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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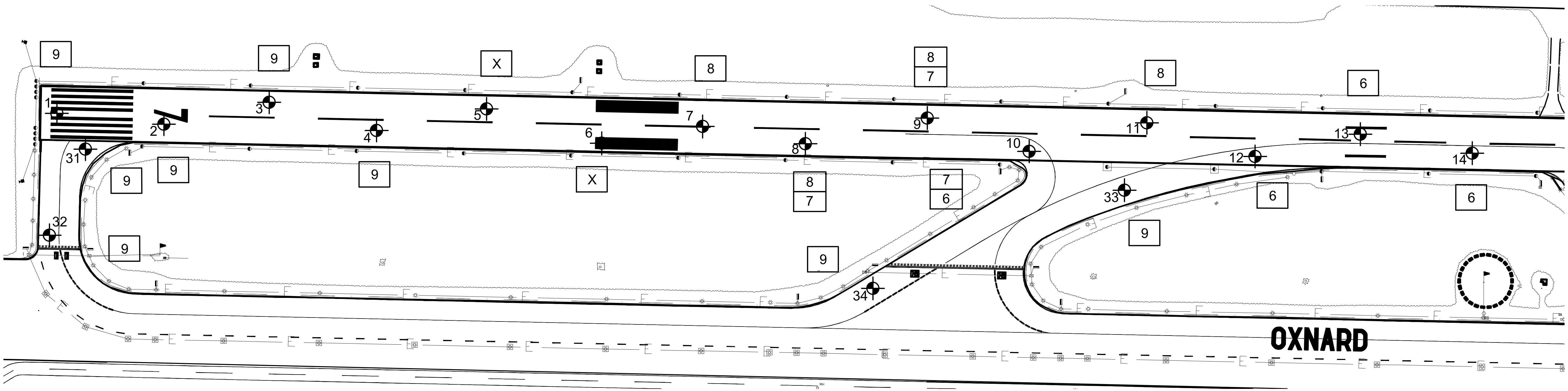

LEGEND

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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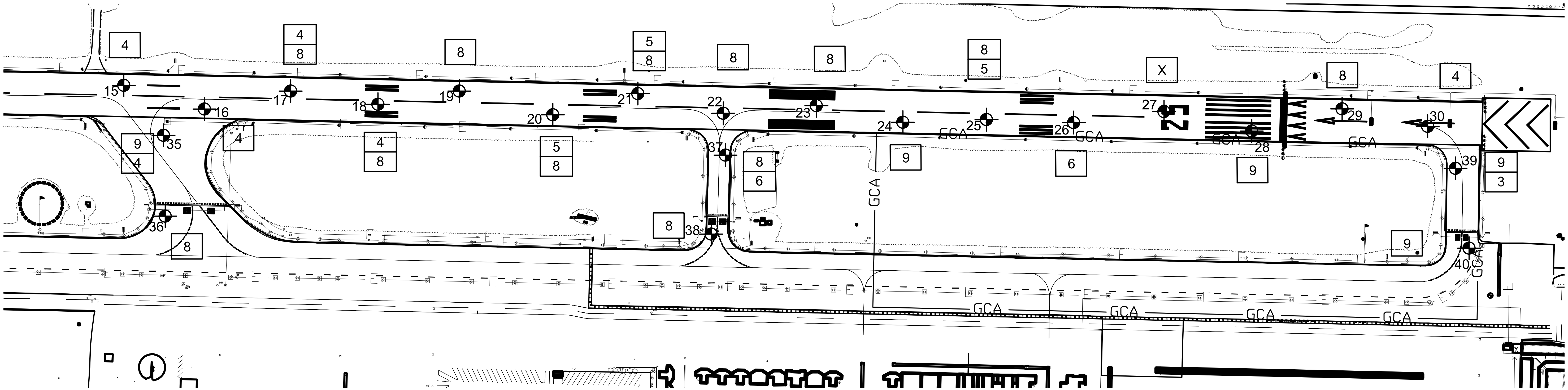

LEGEND

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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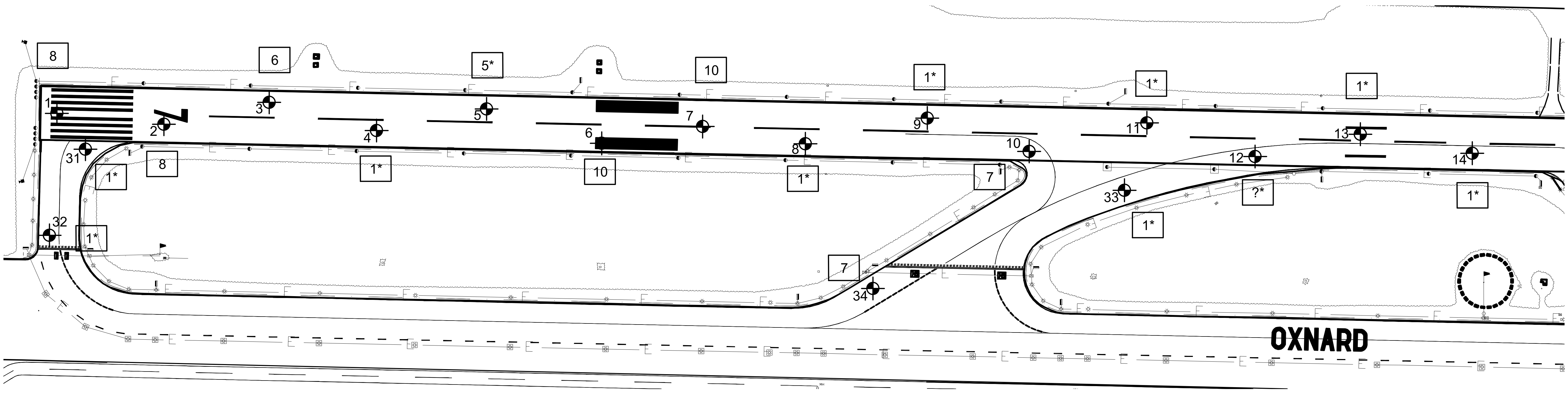

LEGEND

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.

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

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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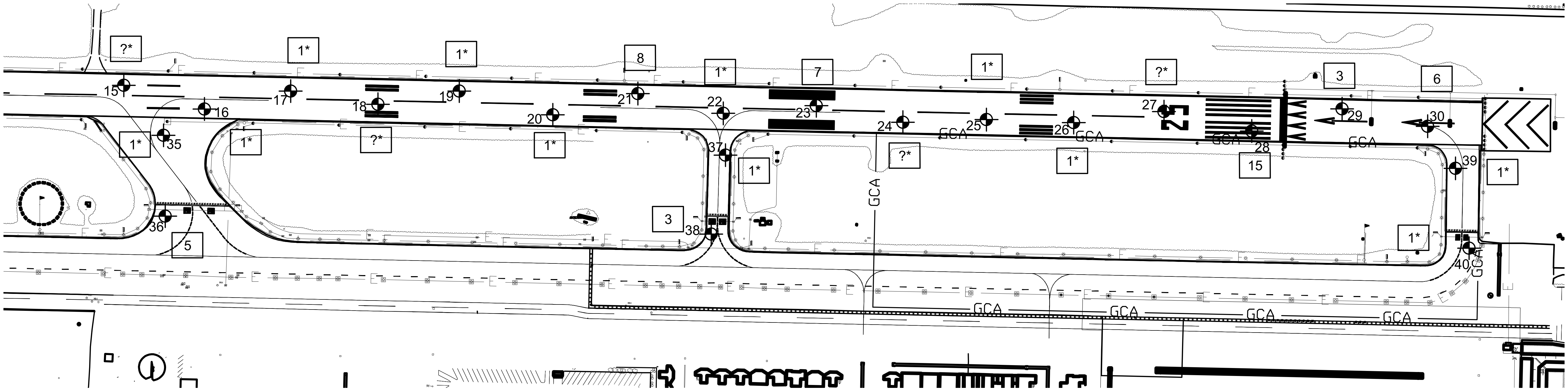

LEGEND

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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FIGURE 5B - APPROXIMATE CBR VALUES BASED ON EXISTING SOIL DENSITY AND MOISTURE CONTENT AT SUBGRADE

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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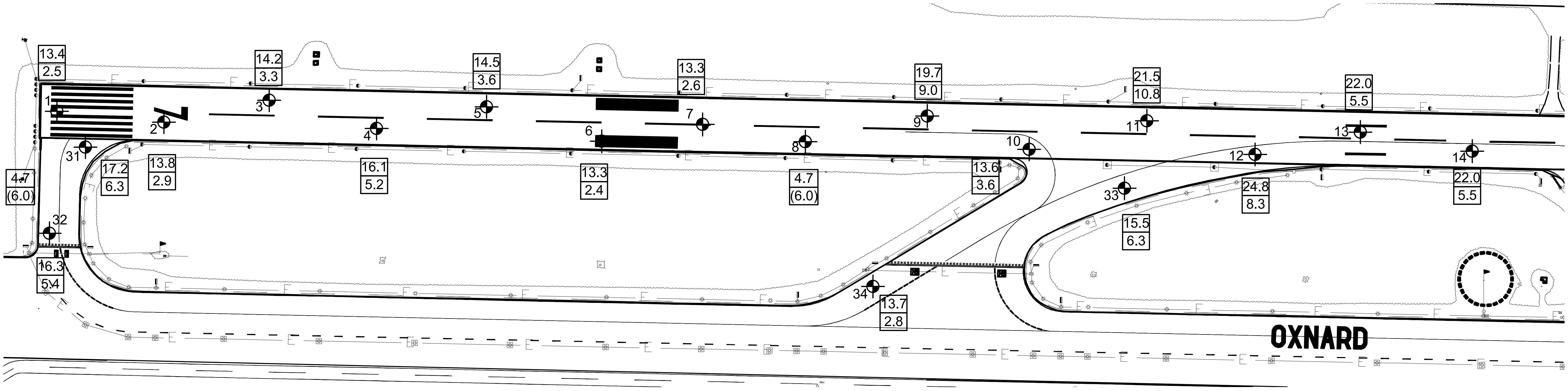

LEGEND

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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FIGURE 6A - SUBGRADE SOIL MOISTURE CONTENT

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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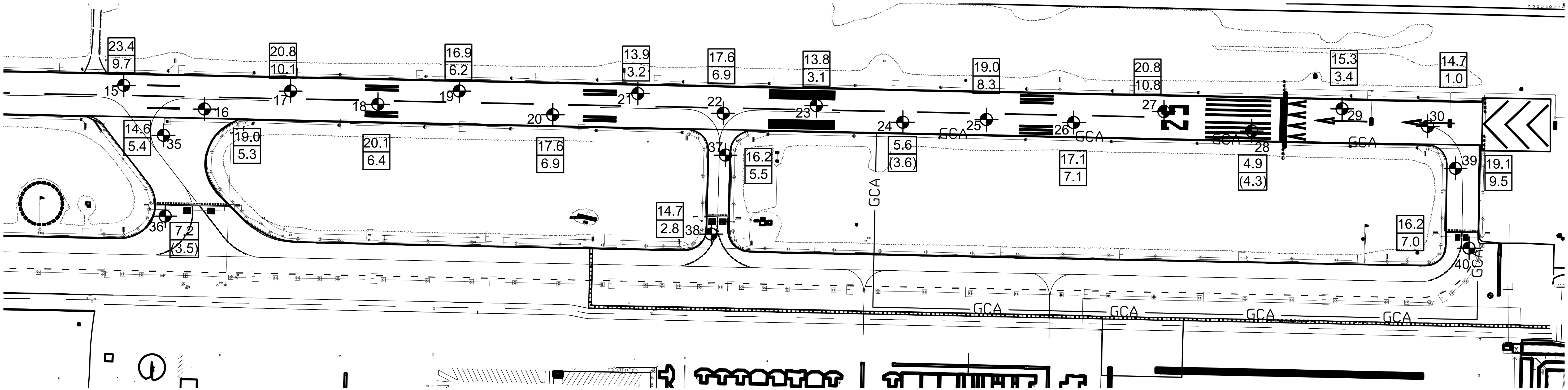

LEGEND

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

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FIGURE 6B - SUBGRADE SOIL MOISTURE CONTENT

Oxnard Airport - Runway 7-25 and Taxiway Connector Improvements
2889 West 5th Street
Oxnard, California

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February 2020

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APPENDIX D

Estimates of Earthwork Shrinkage

OXNARD AIRPORT **ESP File No. 302524-001** **Page 1 of 1**
RUNWAY 7-25 AND TAXIWAY CONNECTOR IMPROVEMENTS
0
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.**

GEOTECHNICAL ENGINEERING REPORT
OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 WEST 5TH STREET
OXNARD, CALIFORNIA
MEAD & HUNT, INC. PROJECT NO. 3138400-181115.03

July 10, 2020

Prepared for

Mr. Jeff Leonard, PE
Associate Practice Leader
Aviation Services
Mead & Hunt, Inc.

Prepared by

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July 10, 2020

FILE NO.: 302524-002

Mr. Jeff Leonard, PE
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PROJECT: OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 WEST 5TH STREET
OXNARD, CALIFORNIA
MEAD & HUNT, INC. PROJECT NO. 3138400-181115.03

SUBJECT: Geotechnical Engineering Report

CONTRACT
REFERENCE: Service Work Order No. 1, Oxnard Taxiway F, by Mead & Hunt, Inc., Referencing Proposal to Provide a Geotechnical Engineering Investigation and Recommendations, Oxnard Airport, Taxiway F Reconstruction, Oxnard, California, by Earth Systems Pacific, Doc. No. 1909-021.PRP, dated September 5, 2019

Dear Mr. Leonard:

As per the referenced Service Work Order, this geotechnical engineering report has been prepared for use in the design of the Taxiway F Improvements 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. This final report version incorporates responses to comments received from the client on a draft version issued on February 21, 2020.

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

FREDERICK J. POTTHAST
No. GE 2369
Exp. 03/31/22

Fred J. Potthast, GE
Principal Engineer

Copy to: Mead & Hunt, Inc., Attn.: Edoardo Barber, and Jannet Loera

Doc. No.: 2007-040.SER/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 Taxiway F at Oxnard Airport in Oxnard, California. Previous investigations of the pavement on the Airport were provided by this firm (ESP 2015 and 2020) and by Miller Geosciences, Inc. (Miller 2014). 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). Taxiway F is currently in regular use.

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 Taxiway F 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 engineering 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 taxiway will be necessary. The information may also be used to develop plans for future projects; however, no other specific projects 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 8 through October 11, 2019, a total of 30 borings were drilled on Taxiway F during night-shift closure periods. The borings were designated as Nos. 41 through 70, continuing the sequence started for the Runway 7-25 and Taxiway Connector Improvements Project Geotechnical Engineering Report by this firm (ESP 2020). The borings were extended 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 on a base map by the client, were identified and marked in the field during a site visit with airport staff on September 27, 2019. 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.

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 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. Six untreated 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 5 percent by dry weight of soil and 3 percent above optimum moisture content only. One other bulk sample was tested for maximum density and optimum moisture (ASTM D 1557-12, modified) only, and three other bulk samples were tested for particle size distribution (ASTM D 422-63/07; D 1140-17) and plasticity index (ASTM D 4318-17) only. Please refer to Appendix B for the laboratory test results.

5.0 GENERAL SUBSURFACE PROFILE

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

The AC thicknesses found in the borings varied from as little as 2 inches in Boring 51, to as much as 6 inches in Borings 41 and 58. The majority of the thicknesses measured in the other borings varied from 4 to 5.5 inches. The miscellaneous aggregate base (mAB) supporting the AC varied from 2.5 inches in Boring 55, to as much as 10 inches found in Boring 50.

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, layers of well graded sand with varying percentages of silt and gravel, and varying in thickness from 6 to 14 inches, were found in 20 of the 30 borings drilled for this project. Below the well graded sand, and below the pavement sections in all other borings, the underlying soil was sandy lean clay fill, which extended to depths ranging from 4 to 7 feet below the existing pavement surfaces. The consistency of the clays during drilling ranged from soft 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 stiff sandy lean clay and sandy silt, and loose silty clayey sand. A layer of loose poorly graded sand was found in Boring 70 from 4.5 to 6 feet.

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 14 of the 30 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 well graded sand layers, where found directly below the pavement sections, 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 were variable, with the thicknesses of the AC ranging from 2 inches to 6 inches. The miscellaneous aggregate base (mAB) supporting the AC varied from 2.5 inches to 10 inches. No pattern was evident with respect to the thicknesses of the AC or mAB across the project area.

The well graded sand (with variable percentages of silt and gravel) layers found in 20 of the 30 borings 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 did appear to be from either a production quarry or some other relatively uniform.

The mAB found below the AC in all borings was not uniform and varied from clayey sand with gravel to silty sand with gravel, similar to the material found during our investigation for the Runway 7-25 and Taxiway Connector Improvements Project (ESP 2020). The mAB did not appear to be consistent with typical FAA P-209 or Caltrans Class 2 aggregate base material. 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 within a moisture conditioned 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 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 or where a significant thickness of well graded sand fill was present, a *decrease* in the effective CBR value at that location could occur with moisture conditioning and recompaction to a lesser value than the existing conditions, or if the well graded sand fill was removed to expose the underlying sandy lean clay. 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. Except for the variable thickness layers of well graded sand fill found directly below the pavement in many of the borings, the soils encountered at the site are considered cohesive (plasticity index of 3 or greater, per FAA AC 150/5320-6F, Chapter 3.9.3). Also 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 previous discussions with the client, given the scattered and inconsistent nature of the well graded sand fill, 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. Based on previous discussions with the client and reviewing the current laboratory CBR test results and previously developed information (ESP 2020), it is our opinion that an "approximate average" CBR value of 8 can be used in the design of reconstructed pavements for this project. If it is desired to further optimize the pavement design, the design CBR can be increased to 13 for the eastern end of the project area (i.e., the area of Borings 66 through 70).

Reconstructed Pavement over Lime Treated Soil

To provide better subgrade CBR values and to 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 45 and Boring 62 were tested for CBR value with a lime treatment percentage of 5 percent by dry weight of soil, and at 3 percent above optimum moisture content. The lime treatment percentage was selected based on previous lab test results for the Runway 7-25 and Taxiway Connector Improvements Project (ESP 2020), and discussions with the client and a lime treatment contractor. The lime treatment percentage, as well as the moisture content at test, were also selected based on sulfate testing that was completed in parallel with the CBR tests. The results of the sulfate testing are provided under separate cover. Based on the laboratory test results, the CBR values for the site soils lime-treated at a minimum of 5 percent by dry weight, compacted to a minimum of 95 percent of maximum dry density, and with moisture contents as high as 3 percent over optimum, are expected to range from 40 to 50. 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.

If the existing pavement sections are milled and stockpiled for later reuse as mAB, it is anticipated that some or all of the well graded sand with silt and gravel layers found in 20 of the 30 borings drilled for this project will be removed in the process. To maintain uniformity for the lime treatment process, any well graded sand and/or mAB layers remaining after the milling process should be removed from the lime treatment zone and properly disposed off site or reused where acceptable on site. Alternately, if the quantity of well graded sand and/or mAB in the lime treatment zone is significant, the additive can be switched from lime to cement. The need to make this switch should be determined based on the conditions exposed at the time of construction.

CBR Value for Existing Miscellaneous Aggregate Base (mAB)

A sample of the miscellaneous aggregate base (mAB) from Boring 46 was also tested for CBR. As previously 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. Based on the test data, an approximate CBR value of 30 is recommended for the mAB material compacted to a minimum of 95 percent of maximum dry density within two percent of optimum moisture content.

Rehabilitation of Existing Pavements

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 4 of the 30 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 at all, no CBR value was provided, and the location was indicated with a question mark (?). Based on previous discussions with the client, and considering the variability of the in situ moisture, density and CBR 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 in the center and on the end of the taxiway (i.e., the vicinity of Borings 51 through 70). For the western portion of the taxiway (i.e., vicinity of Borings 41 through 50), the CBR value utilized for the evaluation could be increased to 5 or 6.

As noted in the “Subsurface Water and Soil Moisture Contents” Section below, edge 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." None of the soils tested for this project meet these criteria.

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. Only one sample exhibited a swell of greater than 3 percent when tested for CBR value:

- Boring 66 from 4.0 to 5.0 feet. Expansion values ranged from 5.3 to 6.8 percent after soaking for the samples compacted at 3 percent below optimum moisture content. Samples compacted at optimum moisture content exhibited expansion values of 1.5 to 3.9 percent after soaking. Samples compacted at 3 percent above optimum exhibited expansion values of 0.9 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." The material utilized for CBR testing from Boring 66 that exhibited swell in excess of 3 percent was found in the following borings: Boring 62 from 5.0 to 10.0 feet; Borings 63 through 69 from 4.0 to 10.0 feet; and in Boring 70 from 6.0 to 10 feet. 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. Due to the lack of existing apparent damage due to swelling soils, and as this material was identified at depths of 4.0 feet or greater, in our opinion it is probably not worth considering in a standard pavement rehabilitation process (i.e., reconstruction with a conventional pavement section over compacted native soil, or rehabilitation of the existing pavement in place).

If the engineer elects to lime treat the native soils for the reconstruction process, the lime treatment will neutralize whatever potential swelling soils may be present in the subgrade treatment zone and no additional action would be necessary.

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 14 of the 30 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 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 RS380i or similar material depending on the degree of instability) 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. These data show that in the majority of the boring locations, soil moisture contents were above optimum moisture content, with one location at 9 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 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.

<u>End of Text.</u>

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

ESP. (Earth Systems Pacific). July 10, 2020. Geotechnical Engineering Report, Runway 7-25 and Taxiway Connector Improvements, Oxnard Airport, Oxnard, California. Mead & Hunt, Inc., Project No. 3138400-181115.01

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

Boring Log Legend

Boring Logs

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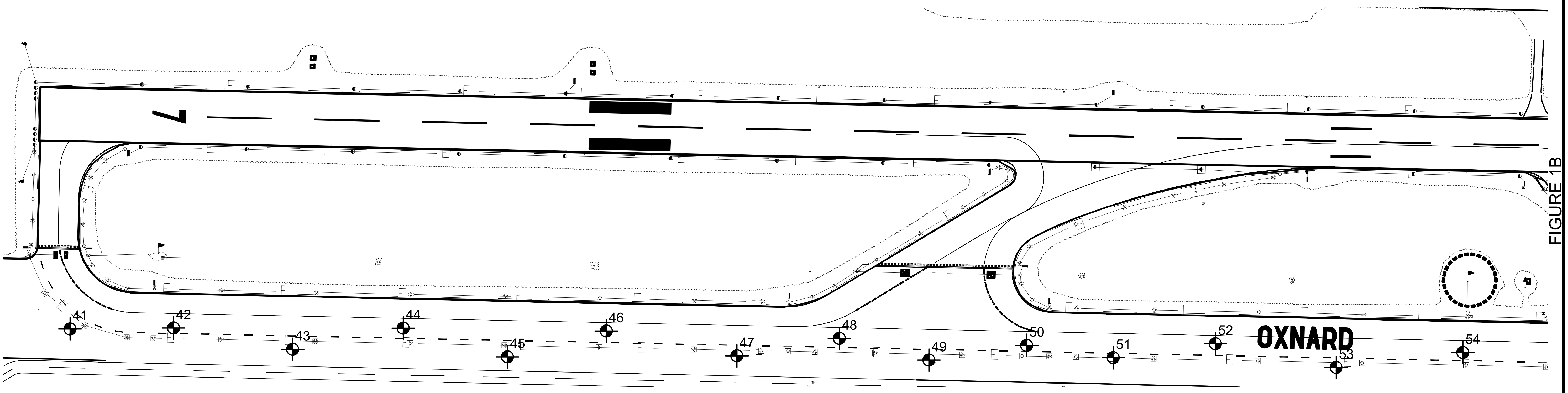


LEGEND

41-70 ⊕ Boring Location (Approx.)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

NOT TO SCALE

OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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

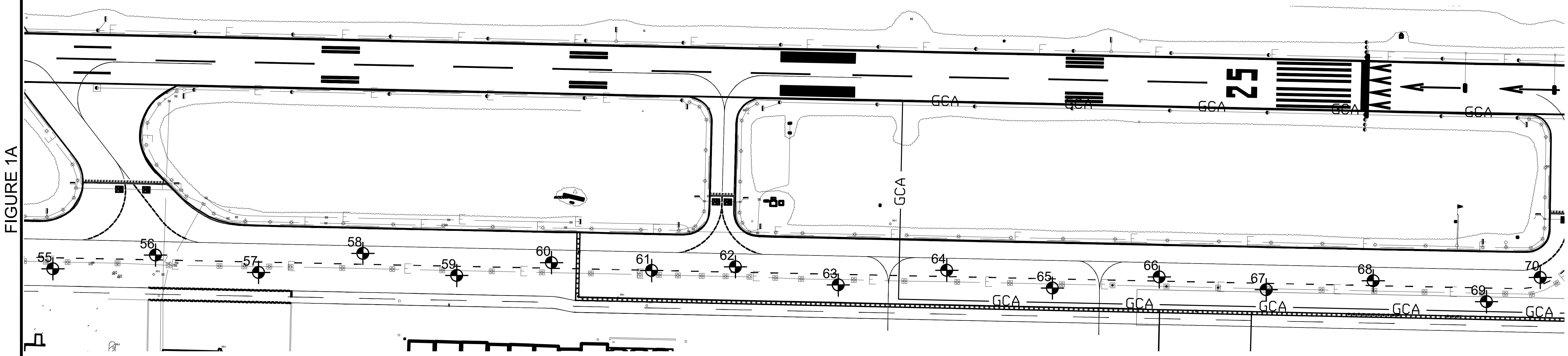
Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

Project No.
302524-002

Sheet 1 of 2

INTENTIONALLY BLANK



LEGEND

41-70 ⌖ Boring Location (Approx.)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

N

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 - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

Project No.
302524-002

Sheet 2 of 2

OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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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			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	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
UNWEATHERED	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"
HIGHLY 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 Legend 062719.dwg

Earth Systems Pacific

Boring No. 41

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/8/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	6.0" AC / 4.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist (Fill)					
2		▨		1.5 - 3.0	■	107.9	16.9	4 5 11
3		▨		1.5 - 5.0	○			
5		▨	soft	5.0 - 6.5	●			2 0 1
7	CL	▨	SANDY LEAN CLAY; brown, medium stiff, moist (Alluvium)					
9		▨		8.5 - 10.0	●			1 2 3
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 42

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/8/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
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 / 4.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	░	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)					
2	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist	1.5 - 3.0	■	112.3	15.5	7 9 12
5		▨	medium stiff	5.0 - 6.5	●			4 3 3
7	ML	▥	SANDY SILT; light brown, medium stiff, moist (Alluvium)					
8.5		▥		8.5 - 10.0	●			1 2 3
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 43

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/8/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC / 5.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist	1.0 - 2.5	▬	115.9	15.1	4 9 17
4		▨	soft					
5	CL	▨	SANDY LEAN CLAY; brown, medium stiff, moist (Alluvium)	5.0 - 6.5	●			1 2 2
8.5		▨		8.5 - 10.0	●			0 1 1
9		▨	very soft					
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 44

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/8/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	4.0" AC / 6.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▒	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)					
2	CL	▨	SANDY LEAN CLAY; dark brown, very stiff, moist	1.5 - 3.0	■	120.7	6.9	10 13 17
5	CL	▨	SANDY LEAN CLAY; brown, soft, moist (Alluvium)	5.0 - 6.5	●			1 2 2
8				8.5 - 10.0	●			0 1 3
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 45

PAGE 1 OF 1

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 302524-002
DATE: 10/8/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	4.0" AC / 5.5" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▧	SANDY LEAN CLAY; dark brown, stiff, moist (Fill)	1.0 - 2.5	▬	106.3	18.6	4 7 9
2								
3				1.0 - 5.0	○			
4			soft					
5	ML	▥	SANDY SILT; light brown, soft, moist (Alluvium)	5.0 - 6.5	●			1 1 3
6								
7								
8				8.5 - 10.0	●			0 2 2
9								
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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. 46

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/8/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	4.0" AC / 6.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW -SM	▒	WELL GRADED SAND with SILT and GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	▬	117.1	3.7	12 16 17
				1.0 - 2.0	○			
2	CL	▨	SANDY LEAN CLAY; dark brown, very stiff, moist					
4.5		▨	soft	5.0 - 6.5	●			2 2 2
6	CL	▨	SANDY LEAN CLAY; brown, soft, moist (Alluvium)					
		▨	some oxidation	8.5 - 10.0	●			1 2 1
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 47

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/8/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	4.0" AC / 7.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW -SM	▦	WELL GRADED SAND with SILT and GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	▬	116.4	13.1	8 14 22
2	CL	▨	SANDY LEAN CLAY; dark brown, very stiff, moist					
5	ML	▥	SANDY SILT; light brown, medium stiff, moist (Alluvium)	5.0 - 6.5	●			1 2 3
				8.5 - 10.0	●			0 1 3
9			yellow brown to olive brown, soft					
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 48

PAGE 1 OF 1

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 302524-002
DATE: 10/9/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
				SAMPLE DATA				
0		■	5.0" AC / 3.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW -SM	▒	WELL GRADED SAND with SILT and GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	▬	114.8	12.1	4 8 8
2	CL	▧	SANDY LEAN CLAY; dark brown, loose, moist					
4		▧	medium stiff					
5	CL	▧	SANDY LEAN CLAY; brown, medium stiff, moist, caliche (Alluvium)	5.0 - 6.5	●			2 4 5
8	ML	▥	SANDY SILT; light brown, soft	8.5 - 10.0	●			2 1 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 49

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/9/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC / 5.5" SILTY SAND with GRAVEL (Misc. AB)					
1 2 3 4	CL	▧	SANDY LEAN CLAY; dark brown, stiff, moist (Fill)	1.0 - 2.5	■	114.7	12.9	3 6 8
5 6 7	CL	▧	SANDY LEAN CLAY; brown, medium stiff, moist (Alluvium)	5.0 - 6.5	●			1 3 3
8 9	ML	▥	SILT; light brown, medium stiff, moist	8.5 - 10.0	●			1 2 3
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 50

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/9/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
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 / 10.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▧	SANDY LEAN CLAY; dark brown, very stiff, moist (Fill)	1.0 - 2.5	■	119.0	13.0	6 16 17
4		▧	soft					
5	ML	▥	SANDY SILT; light brown, very soft, moist, caliche (Alluvium)	5.0 - 6.5	●			1 0 1
8		▥	yellow brown, soft	8.5 - 10.0	●			1 1 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 51

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/9/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	2.0" AC / 5.5" SILTY SAND with GRAVEL (Misc. AB)					4
1	CL	▧	SANDY LEAN CLAY; dark brown, stiff, moist (Fill)	1.0 - 2.5	■	111.4	15.8	6 11
5	CL	▧	SANDY LEAN CLAY; brown, soft, moist, caliche (Alluvium)	5.0 - 6.5	●			1 2 2
8	ML	▥	SANDY SILT; yellow brown, medium stiff, moist	8.5 - 10.0	●			1 2 3
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 52

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

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JOB NO.: 302524-002
DATE: 10/9/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
		■	4.5" AC / 6.0" SILTY SAND with GRAVEL (Misc. AB)					
	SW		WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	■	114.6	11.6	9 14 22
	SC		SANDY LEAN CLAY; dark brown, very stiff, moist					
	CL		SANDY LEAN CLAY; brown, medium stiff, moist, caliche (Alluvium)	5.0 - 6.5	●			1 2 4
	ML		SANDY SILT; yellow brown, soft, moist	8.5 - 10.0	●			1 2 1
			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 53

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/9/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
				SAMPLE DATA				
0		■	3.5" AC / 5.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist (Fill)	1.0 - 2.5	■	110.1	15.3	3 9 14
4	CL	▨	SANDY LEAN CLAY; light brown, soft, moist, caliche (Alluvium)	5.0 - 6.5	●			1 1 3
				7.5 - 10.0	○			
				8.5 - 10.0	●			2 2 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 54

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/9/19

DEPTH (feet)	USCS CLASS	SYMBOL	**OXNARD AIRPORT TAXIWAY F IMPROVEMENTS 2889 West 5th Street Oxnard, California** SOIL DESCRIPTION	SAMPLE DATA INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC / 6.0" SILTY SAND with GRAVEL (Misc AB)					
1	SW	▒	POORLY GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	▬	124.3	5.2	8 11 15
2	CL	▧	SANDY LEAN CLAY; dark brown, stiff, moist					
3								
4	CL	▧	SANDY LEAN CLAY; brown, medium stiff, moist, (Alluvium)	4.0 - 5.0	○			
5				5.0 - 6.5	●			0 2 4
6								
7								
8	ML	▥	SANDY SILT; yellow brown, medium stiff, moist, caliche	8.5 - 10.0	●			3 3 3
9								
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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.

Boring No. 55

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

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JOB NO.: 302524-002
DATE: 10/9/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
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 / 2.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▒	POORLY GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	▬	108.9	14.4	5 6 8
2	CL	▧	SANDY LEAN CLAY; dark brown, medium stiff, moist	1.5 - 5.0	○			
5	ML	▥	SANDY SILT; light brown, stiff, moist, caliche (Alluvium)	5.0 - 6.5	●			1 3 6
8				8.5 - 10.0	●			1 3 3
9			medium stiff					
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 56

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/9/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
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 / 5.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	⁘	POORLY GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	▬	116.0	12.0	7 7 7
2	CL	▧	SANDY LEAN CLAY; dark brown, medium stiff, moist					
5	ML	▥	SANDY SILT; light brown, medium stiff, moist, (Alluvium)	5.0 - 6.5	●			2 2 5
9			light brown to gray brown, caliche	8.5 - 10.0	●			2 3 3
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 57

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/10/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
				SAMPLE DATA				
0		■	3.5" AC / 9.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▒	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	■	117.6	2.7	8 9 11
2	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist					
5	CL	▨	SANDY LEAN CLAY; brown, soft, moist, caliche (Alluvium)	5.0 - 6.5	●			1 1 2
9		▨	light brown, very soft	8.5 - 10.0	●			0 1 1
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 58

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/10/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	6.0" AC / 7.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▒	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	▬	115.5	12.1	5 7 11
2 3 4	CL	▧	SANDY LEAN CLAY; dark brown, stiff, moist					
5 6	CL	▧	SANDY LEAN CLAY; brown, very soft, moist (Alluvium)	5.0 - 6.5	●			0 1 1
7 8 9	ML	▥	SILT; light brown, soft, moist	8.5 - 10.0	●			0 1 2
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 59

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/10/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.0" AC / 6.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	░	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	▬	110.8	13.7	5 11 15
2	CL	▧	SANDY LEAN CLAY; dark brown, stiff, moist					
5	CL	▧	SANDY LEAN CLAY; brown, medium stiff, moist, caliche (Alluvium)	5.0 - 6.5	●			1 3 3
9	ML	▥	SANDY SILT; light brown, slightly moist, medium stiff	8.5 - 10.0	●			3 4 4
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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.

Boring No. 60

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/10/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE DATA: SAMPLE TYPE	SAMPLE DATA: DRY DENSITY (pcf)	SAMPLE DATA: MOISTURE (%)	SAMPLE DATA: BLOWS PER 6 IN.
0		■	4.5" AC / 6.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	░	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	■	119.8	7.1	14 16 17
2	CL	▧	SANDY LEAN CLAY; dark brown, very stiff, moist					
3								
4								
5	ML	▥	SANDY SILT; light brown, soft, moist (Alluvium)	5.0 - 6.5	●			1 1 3
6								
7								
8	CL	▧	SANDY LEAN CLAY; brown, very soft, moist, caliche	8.5 - 10.0	●			0 0 2
9								
10								
11			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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. 61

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

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JOB NO.: 302524-002
DATE: 10/10/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC / 9.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▒	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	■	112.4	14.5	4 7 9
2 3	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist					
4 5 6 7 8	CL	▨	SANDY LEAN CLAY; brown, soft, moist	5.0 - 6.5	●			0 1 2
9		▨	Caliche	8.5 - 10.0	●			1 1 3
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 62

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/10/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
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 / 9.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▨	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.5 - 3.0	■	90.7	12.2	7 7 8
2	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist					
3				2.0 - 5.0	○			
5	SC -SM	▨	SILTY, CLAYEY SAND; dark brown, loose, moist (Alluvium)	5.0 - 6.5	●			1 2 2
8			caliche	8.5 - 10.0	●			0 1 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 63

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

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JOB NO.: 302524-002
DATE: 10/10/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	3.5" AC / 7.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▨	SANDY LEAN CLAY; dark brown, very stiff, slightly moist (Fill)	1.0 - 2.5	■	77.9	12.4	29 17 14
4	SC -SM	▒	SILTY, CLAYEY SAND; dark brown, loose, moist (Alluvium)	5.0 - 6.5	●			1 3 4
				8.5 - 10.0	●			0 1 1
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 64

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/10/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			2.5" AC / 5.5" AC / 6.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW		WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	▬	104.3	3.4	7 4 6
2	CL		SANDY LEAN CLAY; dark brown, medium stiff, moist					
4	SC -SM		SILTY, CLAYEY SAND; brown, loose, moist, caliche (Alluvium)	5.0 - 6.5	●			0 2 3
9			soft	8.5 - 10.0	●			0 1 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 65

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

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JOB NO.: 302524-002
DATE: 10/11/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	3.0" AC / 6.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▧	SANDY LEAN CLAY; dark brown, medium stiff, moist (Fill)	1.0 - 2.5	■	102.3	19.0	3 4 5
4	SC -SM	░	SILTY CLAYEY SAND; dark brown, loose, moist (Alluvium)	5.0 - 6.5	●			0 1 1
				8.5 - 10.0	●			0 1 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 66

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

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JOB NO.: 302524-002
DATE: 10/11/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	4.0" AC / 7.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	░	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	■	115.4	14.8	12 12 16
2	CL	▧	SANDY LEAN CLAY; dark brown, very stiff, moist					
4	SC -SM	▒	SILTY, CLAYEY SAND; dark brown, loose, moist, caliche (Alluvium)	4.0 - 5.0	○			
5				5.0 - 6.5	●			1 1 2
8				8.5 - 10.0	●			0 2 2
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 67

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/11/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.0" AC / 7.0" SILTY SAND with GRAVEL (Misc. AB)					
1	CL	▨	SANDY LEAN CLAY; brown, loose, moist (Fill)	1.0 - 2.5	■	106.7	12.9	5 5 6
4	SC -SM	▒	SILTY, CLAYEY SAND; dark brown, loose, moist (Alluvium)	5.0 - 6.5	●			1 3 3
				8.5 - 10.0	●			2 3 7
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 68

PAGE 1 OF 1

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 302524-002
DATE: 10/11/19

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.5" AC / 5.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW		WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	■	112.7	2.8	12 8 7
2	CL		SANDY LEAN CLAY; dark brown, stiff, moist					
4	SC -SM		SILTY CLAYEY SAND; dark brown, loose, moist (Alluvium)	5.0 - 6.5	●			2 3 4
8.5			brown, caliche	8.5 - 10.0	●			2 3 5
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					

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. 69

PAGE 1 OF 1
JOB NO.: 302524-002
DATE: 10/11/19

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS
2889 West 5th Street
Oxnard, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	3.5" AC / 7.0" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	░	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	■	126.1	14.2	5 8 8
2	CL	▨	SANDY LEAN CLAY; dark brown, stiff, moist					
4	SC -SM	▒	SILTY CLAYEY SAND; dark brown, loose, moist (Alluvium)	5.0 - 6.5	●			1 2 2
				8.5 - 10.0	●			1 3 5
10			TD: 10.0' No subsurface groundwater encountered Backfilled with cuttings and tamped AC Patch					

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.

Boring No. 70

PAGE 1 OF 1

LOGGED BY: S. Hemmer
DRILL RIG: Mobile B-53 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem

JOB NO.: 302524-002
DATE: 10/11/19

DEPTH (feet)	USCS CLASS	SYMBOL	**OXNARD AIRPORT** **TAXIWAY F IMPROVEMENTS** **2889 West 5th Street** **Oxnard, California** SOIL DESCRIPTION	SAMPLE DATA				
				INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	5.0" AC / 6.5" SILTY SAND with GRAVEL (Misc. AB)					
1	SW	▒	WELL GRADED SAND with GRAVEL; light brown, loose, moist (Fill)	1.0 - 2.5	■	118.0	13.2	12 13 20
2 3 4	CL	▨	SANDY LEAN CLAY; dark brown, very stiff, moist	1.5 - 4.5	○			
5	SP	░	POORLY GRADED SAND; light brown, loose, moist (Alluvium)	5.0 - 6.5	●			2 2 1
6 7 8	SC -SM	▓	SILTY, CLAYEY SAND; dark brown, loose, moist, caliche					
9		▓	caliche	8.5 - 10.0	●			0 1 1
10			TD: 10.0' No subsurface water encountered Backfilled with cuttings and tamped AC Patch					
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26								

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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APPENDIX B

Laboratory Test Results

BULK DENSITY TEST RESULTS

ASTM D 2937-17 (modified for ring liners)

February 11, 2020

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
41	1.0 - 1.5	16.9	126.1	107.9
42	1.5 - 2.0	15.5	129.7	112.3
43	1.0 - 1.5	15.1	133.4	115.9
44	1.5 - 2.0	6.9	129.0	120.7
45	1.0 - 1.5	18.6	126.0	106.3
46	1.0 - 1.5	3.7	121.4	117.1
47	1.0 - 1.5	13.1	131.7	116.4
48	1.0 - 1.5	12.1	128.7	114.8
49	1.0 - 1.5	12.9	129.5	114.7
50	1.0 - 1.5	13.0	134.5	119.0
51	1.0 - 1.5	15.8	128.9	111.4
52	1.5 - 2.0	11.6	127.9	114.6
53	1.0 - 1.5	15.3	126.9	110.1
54	1.5 - 2.0	5.2	130.8	124.3
55	1.0 - 1.5	14.4	124.6	108.9
56	1.5 - 2.0	12.0	129.9	116.0
57	1.0 - 1.5	2.7	120.8	117.6
58	1.5 - 2.0	12.1	129.6	115.5
59	1.5 - 2.0	13.7	125.9	110.8
60	1.0 - 1.5	7.1	128.3	119.8
61	1.5 - 2.0	14.5	128.7	112.4
62	1.5 - 2.0	12.2	101.7	90.7
63	1.0 - 1.5	12.4	87.6	77.9
64	1.0 - 1.5	3.4	107.8	104.3
65	1.0 - 1.5	19.0	121.8	102.3
66	1.0 - 1.5	14.8	132.4	115.4
67	1.0 - 1.5	12.9	120.5	106.7
68	1.0 - 1.5	2.8	115.9	112.7
69	1.0 - 1.5	14.2	144.0	126.1
70	1.0 - 1.5	13.2	133.6	118.0

Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

PARTICLE SIZE ANALYSIS

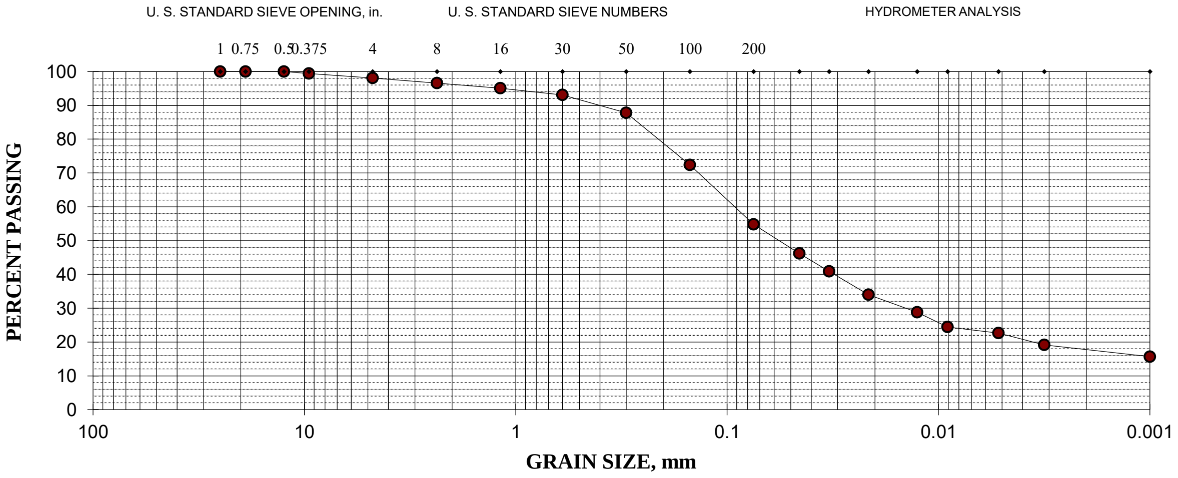
ASTM D 422-63/07

Boring #41 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)
LL = 28; PL = 17; PI = 11

February 11, 2020
Specific Gravity = 2.70 (assumed)
Gravel = 2%; Sand = 43%; Silt = 32%; Clay = 23%

Sieve size	% Retained	% Passing
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)	2	98
#8 (2.36-mm)	3	97
#16 (1.18-mm)	5	95
#30 (600-µm)	7	93
#50 (300-µm)	12	88
#100 (150-µm)	28	72
#200 (75-µm)	45	55

Hydrometer Analysis		
46-µm		46
33-µm		41
21-µm		34
13-µm		29
9-µm		24
5.2-µm		23
3.2-µm		19
Colloids		16



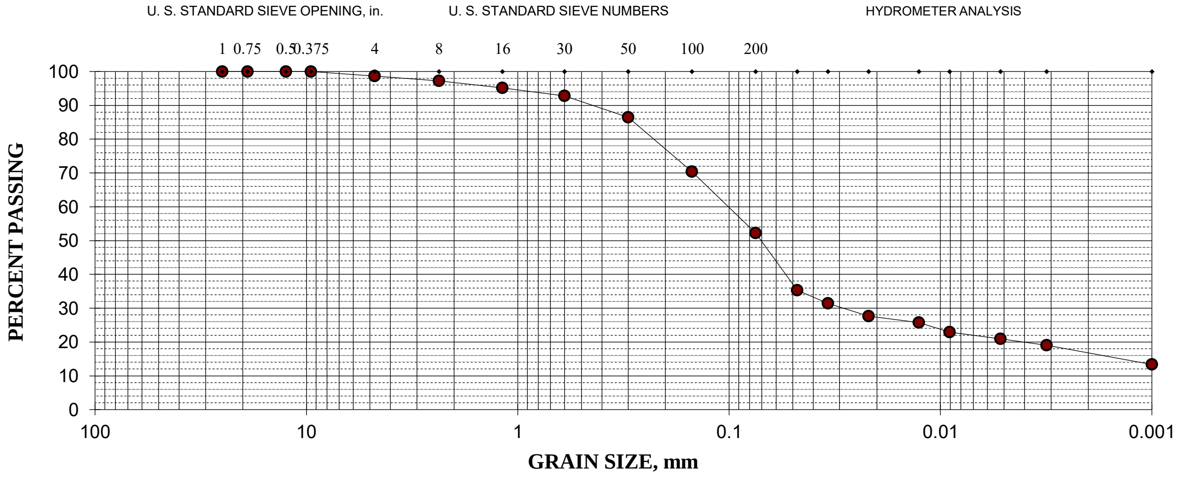
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #45 @ 1.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)
LL = 29; PL = 19; PI = 10

February 11, 2020
Specific Gravity = 2.70 (assumed)
Gravel = 1%; Sand = 47%; Silt = 31%; Clay = 21%

Sieve size	% Retained	% Passing
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)	5	95
#30 (600-µm)	7	93
#50 (300-µm)	14	86
#100 (150-µm)	30	70
#200 (75-µm)	48	52
Hydrometer Analysis		
48-µm		35
34-µm		31
22-µm		28
13-µm		26
9-µm		23
5.2-µm		21
3.1-µm		19
Colloids		13



Oxnard Airport Taxiway F Improvements 302524-002
Oxnard, California

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

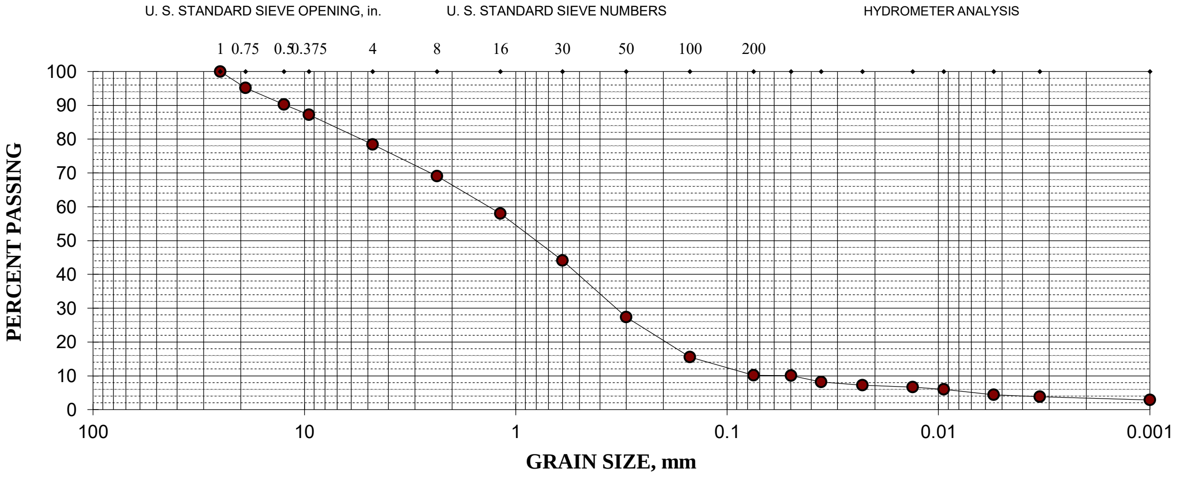
Boring #46 @ 1.0 - 2.0'
February 11, 2020

Light Brown Well-Graded Sand with Silt and Gravel (SW-SM)
Specific Gravity = 2.65 (assumed)

PI = NP (Non-plastic)
Gravel = 22%; Sand = 68%; Silt = 6%; Clay = 4%
Cu = 27.3; Cc = 1.7

Sieve size	% Retained	% Passing
1" (25.0-mm)	0	100
3/4" (19.0-mm)	5	95
1/2" (12.5-mm)	10	90
3/8" (9.5-mm)	13	87
#4 (4.75-mm)	22	78
#8 (2.36-mm)	31	69
#16 (1.18-mm)	42	58
#30 (600-µm)	56	44
#50 (300-µm)	73	27
#100 (150-µm)	84	16
#200 (75-µm)	90	10

Hydrometer Analysis	
50-µm	10
36-µm	8
23-µm	7
13-µm	7
9-µm	6
5.5-µm	4
3.3-µm	4
Colloids	3



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

PARTICLE SIZE ANALYSIS

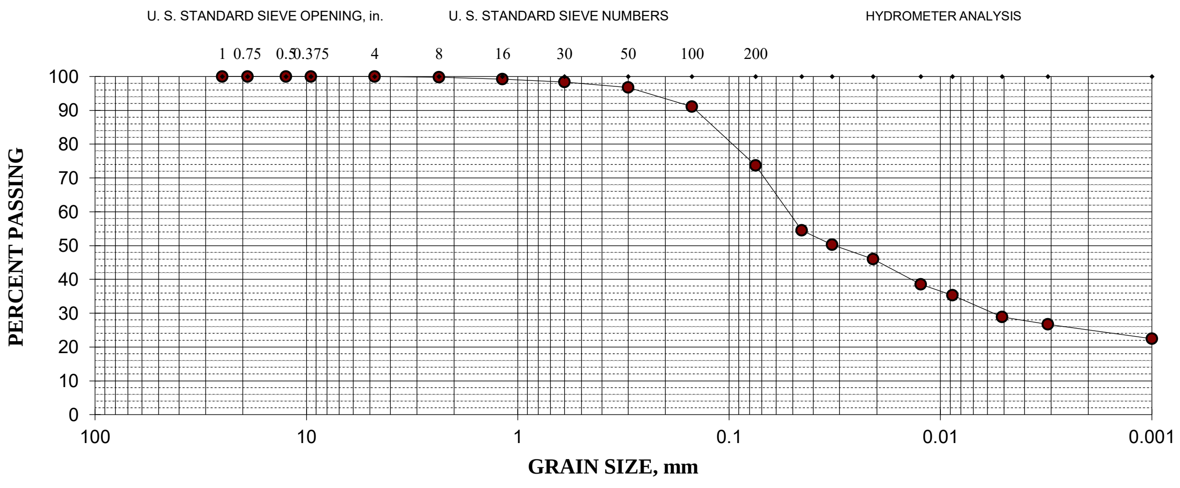
ASTM D 422-63/07

Boring #53 @ 7.5 - 10.0'
Light Brown Sandy Lean Clay (CL)
LL = 36; PL = 19; PI = 17

February 11, 2020
Specific Gravity = 2.70 (assumed)
Gravel = 0%; Sand = 26%; Silt = 45%; Clay = 29%

Sieve size	% Retained	% Passing
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)	1	99
#30 (600-µm)	2	98
#50 (300-µm)	3	97
#100 (150-µm)	9	91
#200 (75-µm)	26	74

Hydrometer Analysis	
45-µm	55
32-µm	50
21-µm	46
12-µm	38
9-µm	35
5.1-µm	29
3.1-µm	27
Colloids	22



Oxnard Airport Taxiway F Improvements
Oxnard, California

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PARTICLE SIZE ANALYSIS

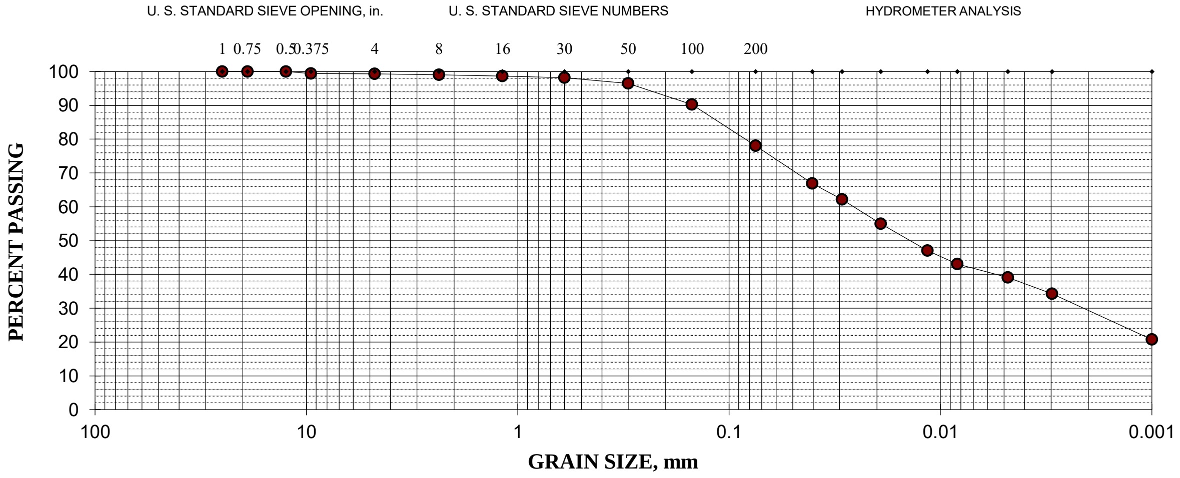
ASTM D 422-63/07

Boring #54 @ 4.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)
LL = 39; PL = 18; PI = 21

February 11, 2020
Specific Gravity = 2.70 (assumed)
Gravel = 1%; Sand = 21%; Silt = 39%; Clay = 39%

Sieve size	% Retained	% Passing
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)	1	99
#16 (1.18-mm)	1	99
#30 (600-µm)	2	98
#50 (300-µm)	3	97
#100 (150-µm)	10	90
#200 (75-µm)	22	78

Hydrometer Analysis	
40-µm	67
29-µm	62
19-µm	55
11-µm	47
8-µm	43
4.8-µm	39
3.0-µm	34
Colloids	21



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #55 @ 1.5 - 5.0'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

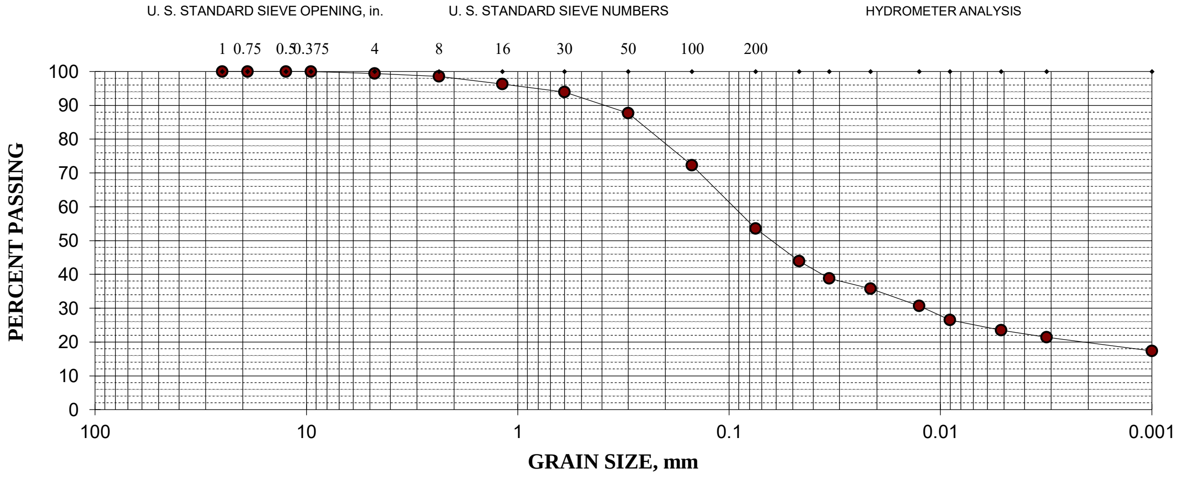
Specific Gravity = 2.70 (assumed)

LL = 30; PL = 19; PI = 11

Gravel = 1%; Sand = 45%; Silt = 31%; Clay = 23%

Sieve size	% Retained	% Passing
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)	4	96
#30 (600-µm)	6	94
#50 (300-µm)	12	88
#100 (150-µm)	28	72
#200 (75-µm)	46	54

Hydrometer Analysis		
47-µm		44
34-µm		39
21-µm		36
13-µm		31
9-µm		27
5.2-µm		23
3.1-µm		21
Colloids		17



Oxnard Airport Taxiway F Improvements
Oxnard, California

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PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #62 @ 2.0 - 5.0'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

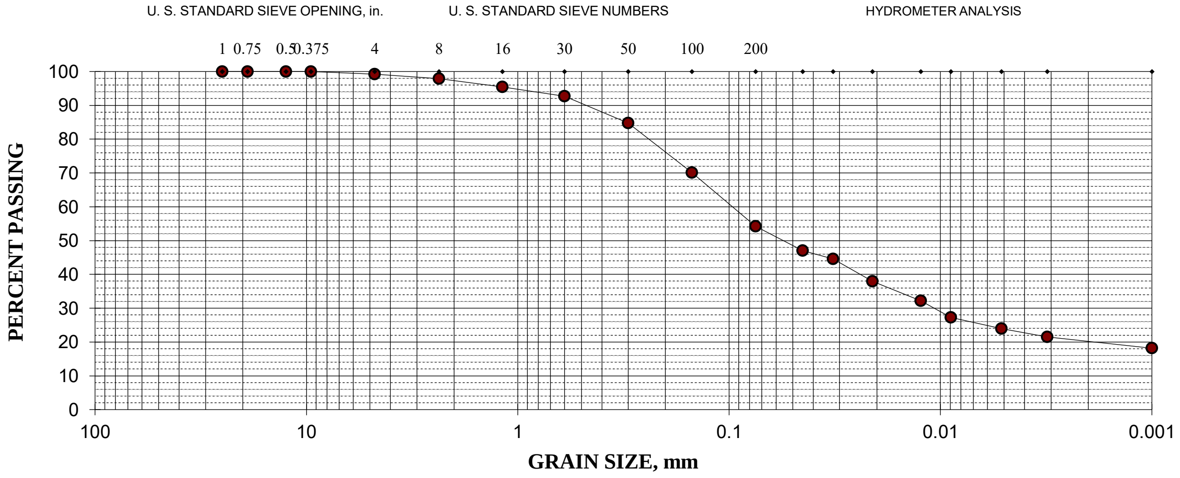
Specific Gravity = 2.70 (assumed)

LL = 27; PL = 18; PI = 9

Gravel = 1%; Sand = 45%; Silt = 30%; Clay = 24%

Sieve size	% Retained	% Passing
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)	5	95
#30 (600-µm)	7	93
#50 (300-µm)	15	85
#100 (150-µm)	30	70
#200 (75-µm)	46	54

Hydrometer Analysis	
45-µm	47
32-µm	45
21-µm	38
12-µm	32
9-µm	27
5.1-µm	24
3.1-µm	21
Colloids	18



Oxnard Airport Taxiway F Improvements
Oxnard, California

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PARTICLE SIZE ANALYSIS

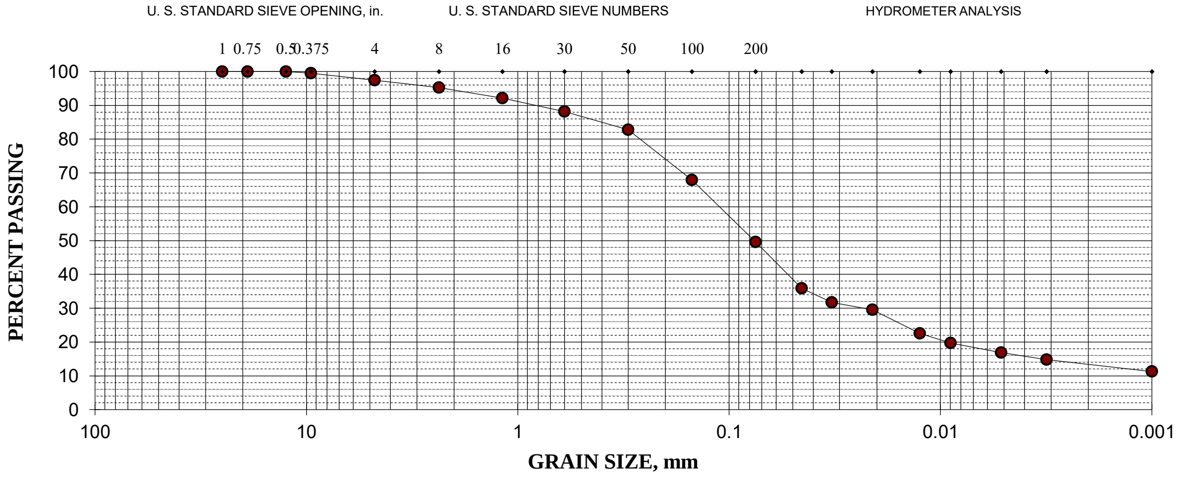
ASTM D 422-63/07

Boring #66 @ 4.0 - 5.0'
Dark Brown Silty, Clayey Sand (SC-SM)
LL = 27; PL = 21; PI = 6

February 11, 2020
Specific Gravity = 2.70 (assumed)
Gravel = 3%; Sand = 47%; Silt = 33%; Clay = 17%

Sieve size	% Retained	% Passing
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)	3	97
#8 (2.36-mm)	5	95
#16 (1.18-mm)	8	92
#30 (600-µm)	12	88
#50 (300-µm)	17	83
#100 (150-µm)	32	68
#200 (75-µm)	50	50

Hydrometer Analysis	
45-µm	36
33-µm	32
21-µm	30
13-µm	23
9-µm	20
5.2-µm	17
3.1-µm	15
Colloids	11



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

PARTICLE SIZE ANALYSIS

ASTM D 422-63/07

Boring #70 @ 1.5 - 4.5'

February 11, 2020

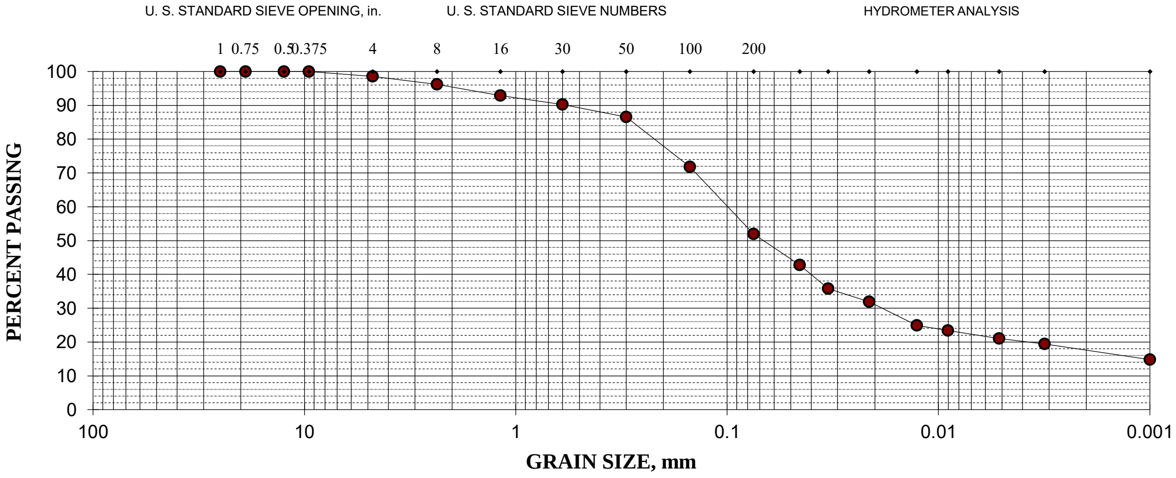
Dark Brown Sandy Lean Clay (CL)

Specific Gravity = 2.70 (assumed)

LL = 28; PL = 20; PI = 8

Gravel = 1%; Sand = 47%; Silt = 31%; Clay = 21%

Sieve size	% Retained	% Passing
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)	4	96
#16 (1.18-mm)	7	93
#30 (600-µm)	10	90
#50 (300-µm)	13	87
#100 (150-µm)	28	72
#200 (75-µm)	48	52
Hydrometer Analysis		
45-µm		43
33-µm		36
21-µm		32
13-µm		25
9-µm		23
5.2-µm		21
3.1-µm		19
Colloids		15



Oxnard Airport Taxiway F Improvements
Oxnard, California

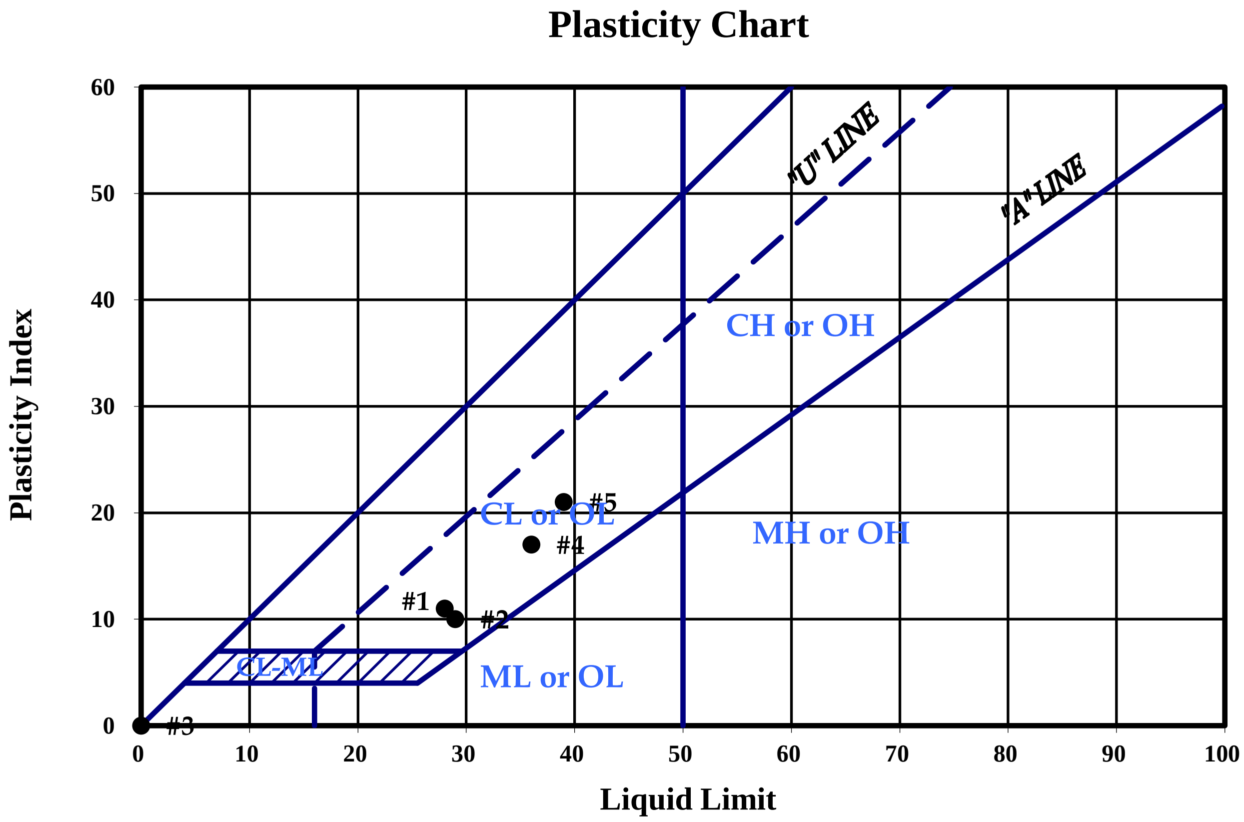
302524-002

PLASTICITY INDEX

ASTM D 4318-17

February 11, 2020

Test No.:	**1**	**2**	**3**	**4**	**5**
Boring No.:	41	45	46	53	54
Sample Depth:	1.5 - 5.0'	1.0 - 5.0'	1.0 - 2.0'	7.5 - 10.0'	4.0 - 5.0'
Liquid Limit:	28	29	NL	36	39
Plastic Limit:	17	19	NP	19	18
Plasticity Index:	11	10	NP	17	21



Oxnard Airport Taxiway F Improvements
Oxnard, California

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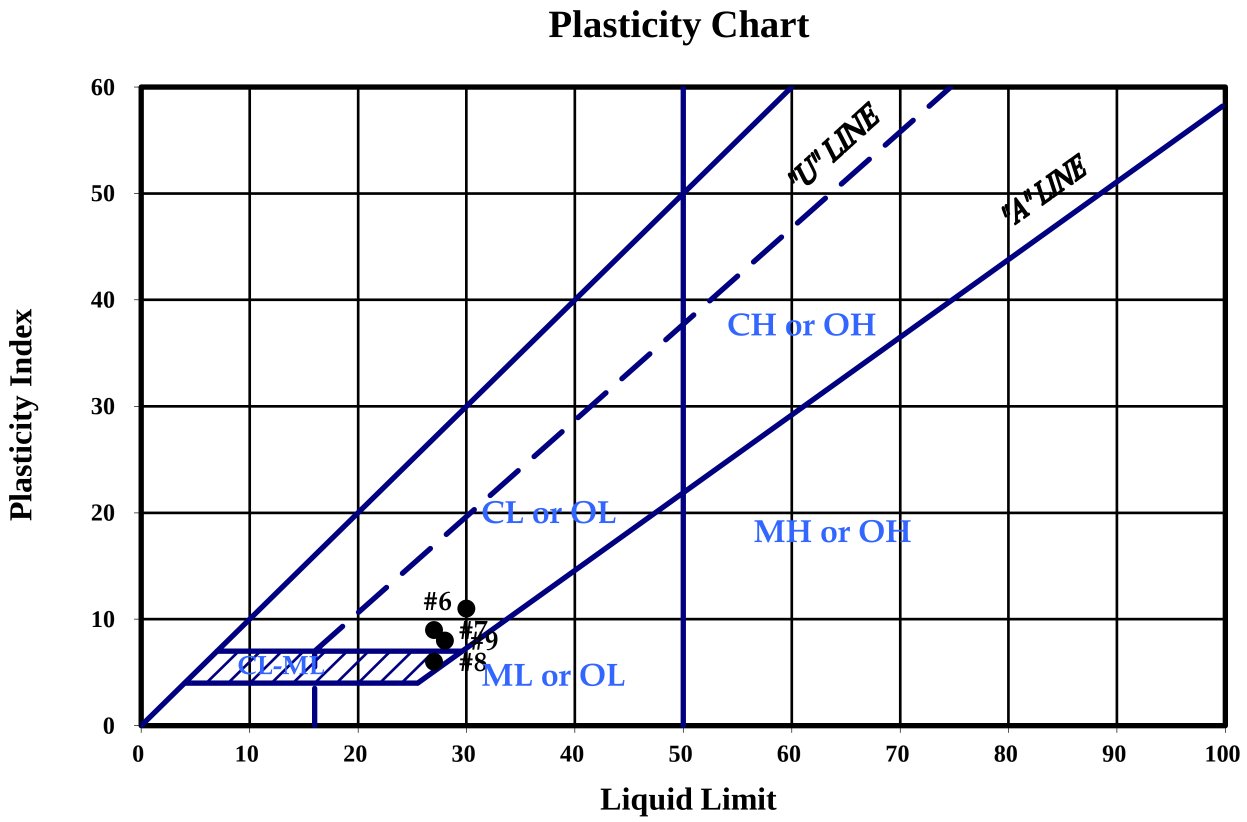
PLASTICITY INDEX

ASTM D 4318-17

February 11, 2020

Test No.:	6	7	8	9	10
Boring No.:	55	62	66	70	
Sample Depth:	1.5 - 5.0'	2.0 - 5.0'	4.0 - 5.0'	1.5 - 4.0'	
Liquid Limit:	30	27	27	28	
Plastic Limit:	19	18	21	20	
Plasticity Index:	11	9	6	8	



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST with 5% Lime, B.D.W.

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

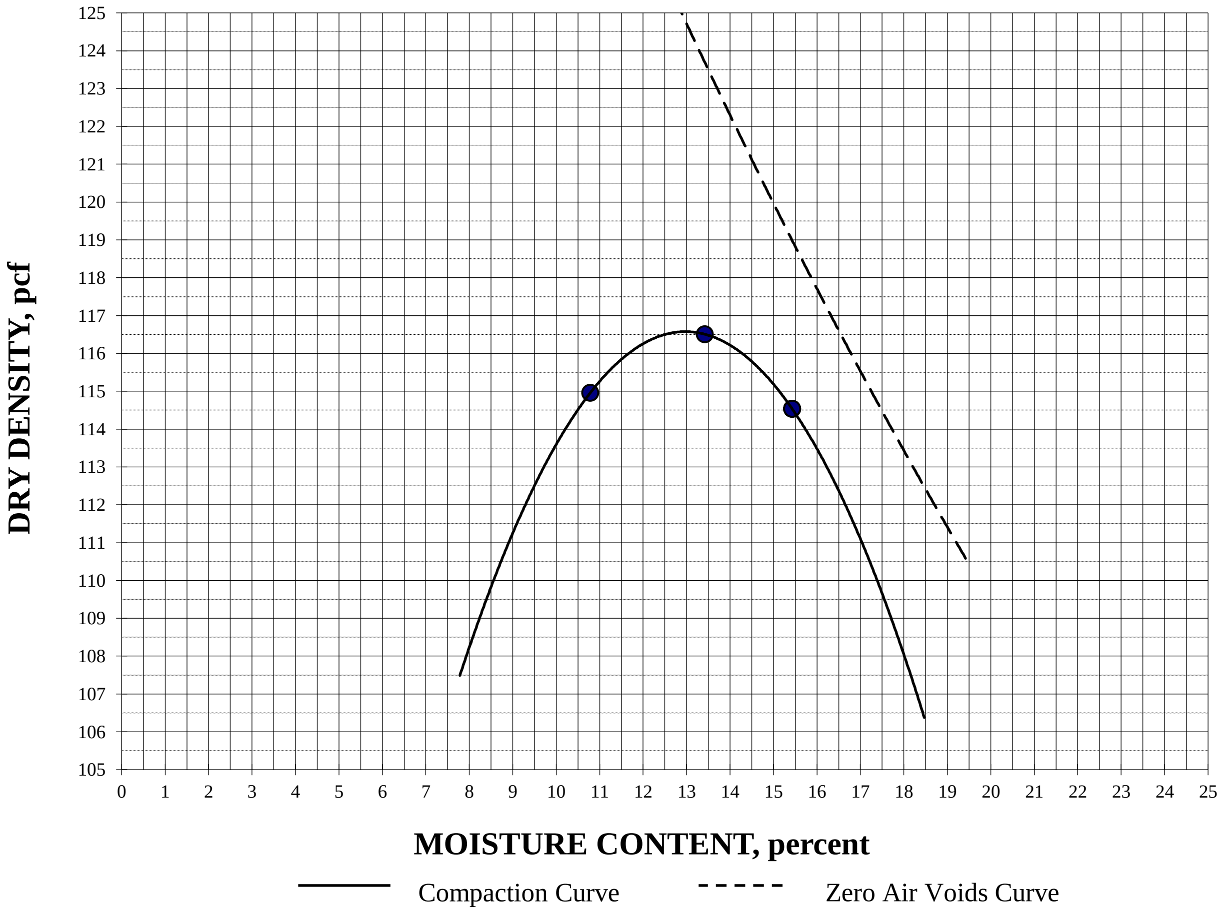
February 11, 2020
Boring #41 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)
With 5% Lime by Dry Weight

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	1
#4	2

MAXIMUM DRY DENSITY: 116.6 pcf

OPTIMUM MOISTURE: 13.0%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

February 11, 2020

Boring #45 @ 1.0 - 5.0'

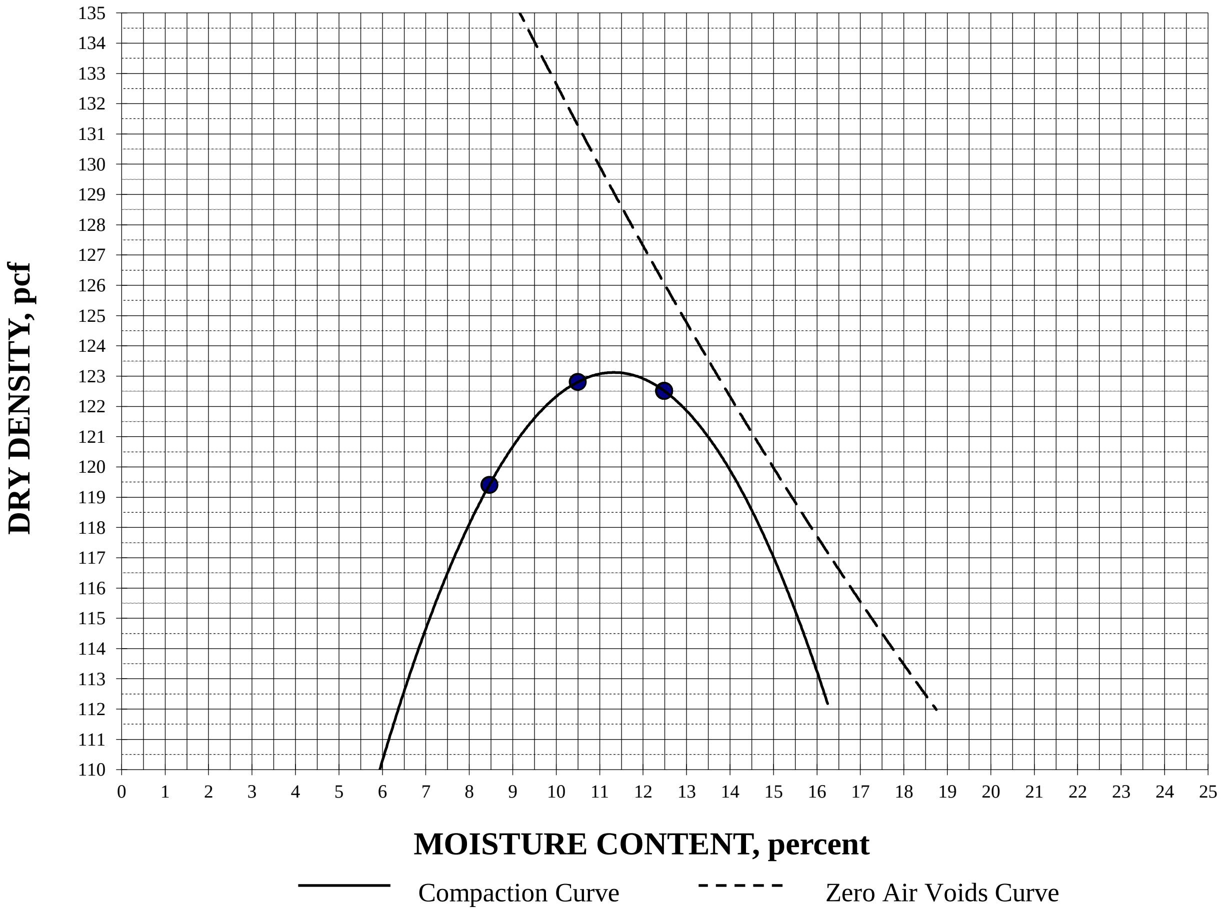
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 123.1 pcf

OPTIMUM MOISTURE: 11.3%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

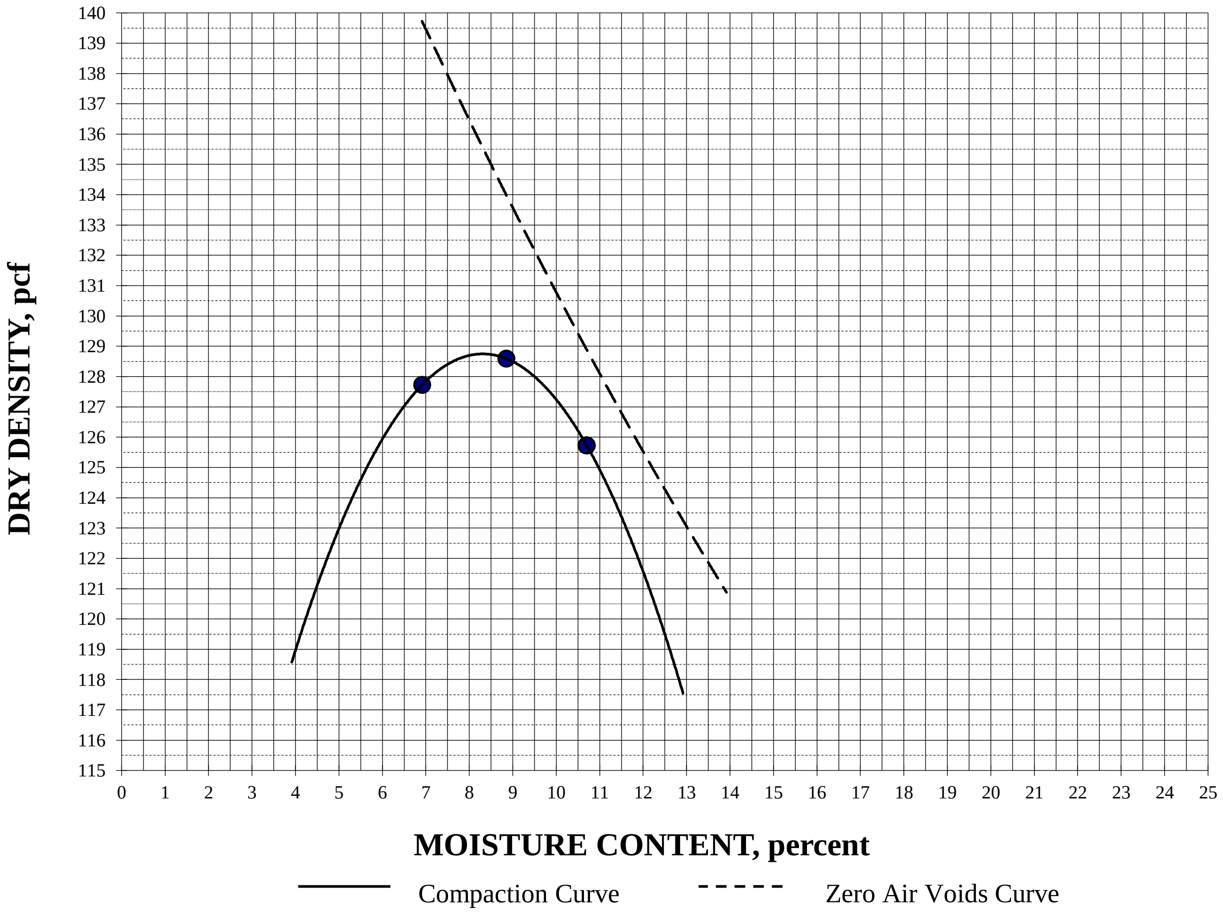
PROCEDURE USED: B
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.65 (assumed)

February 11, 2020
Boring #46 @ 1.0 - 2.0'
Light Brown Well-Graded Sand with Silt and Gravel (SW-SM)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	5
3/8"	13
#4	22

MAXIMUM DRY DENSITY: 128.7 pcf
OPTIMUM MOISTURE: 8.3%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

February 11, 2020

PREPARATION METHOD: Moist

Boring #53 @ 7.5 - 10.0'

RAMMER TYPE: Mechanical

Light Brown Sandy Lean Clay (CL)

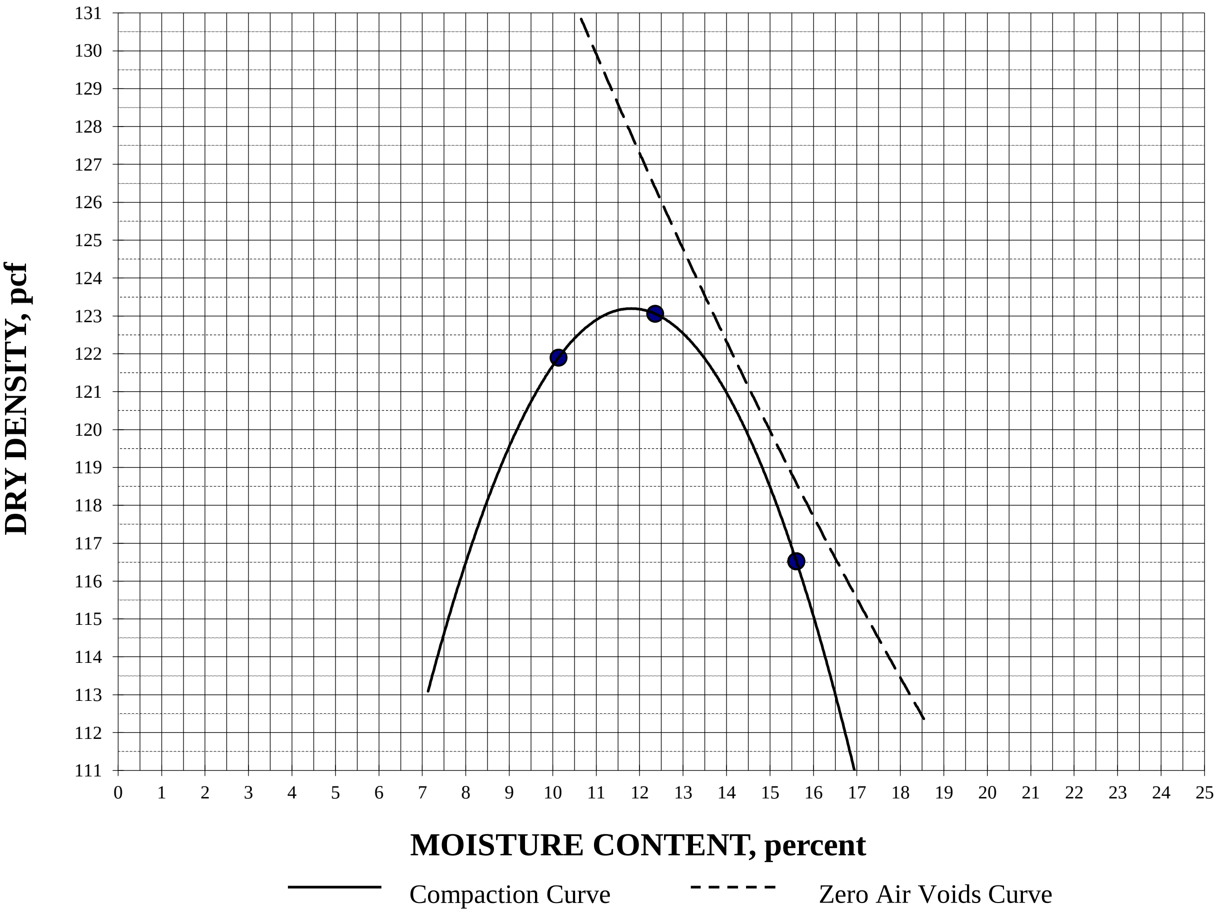
SPECIFIC GRAVITY: 2.70 (assumed)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 123.2 pcf

OPTIMUM MOISTURE: 11.8%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

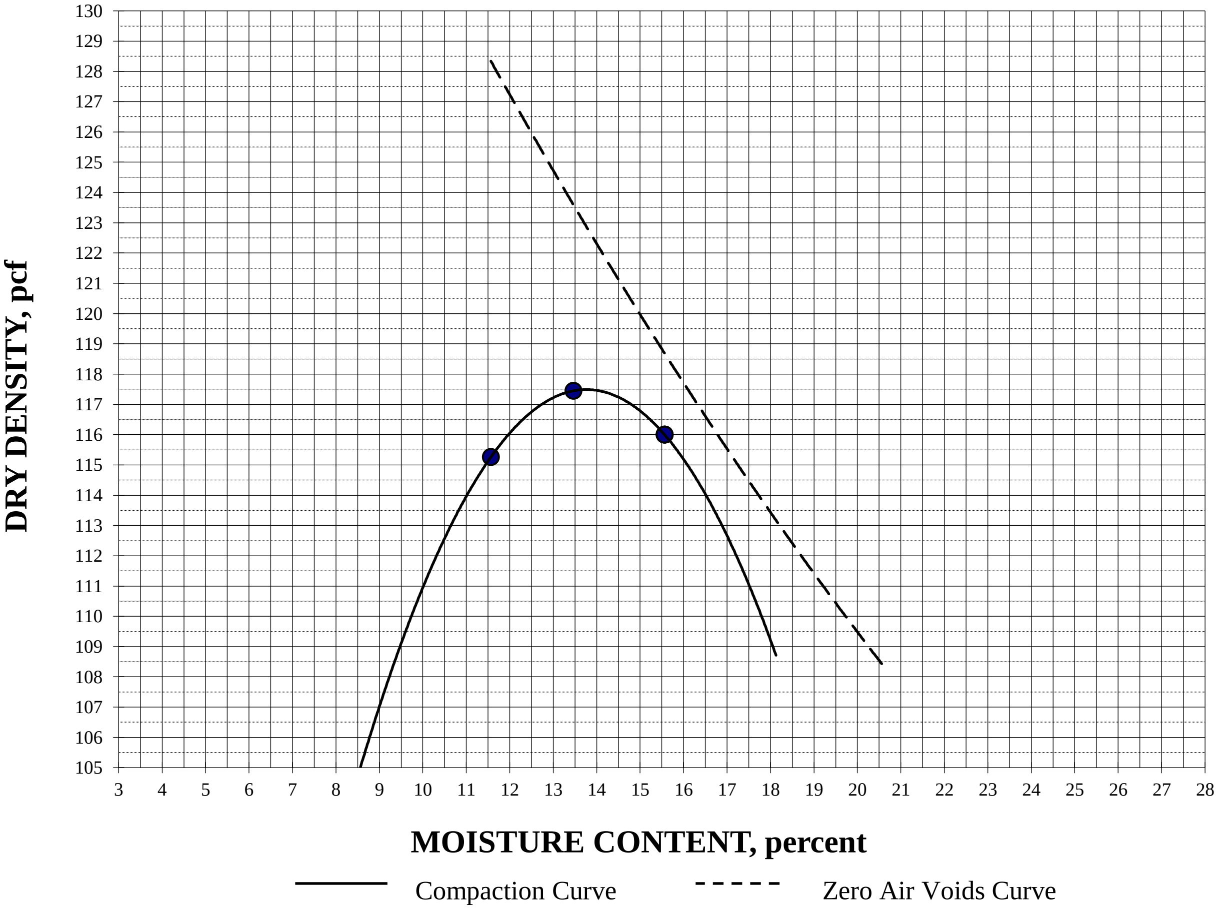
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

February 11, 2020
Boring #54 @ 4.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 117.5 pcf
OPTIMUM MOISTURE: 13.8%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.70 (assumed)

February 11, 2020

Boring #55 @ 1.5 - 5.0'

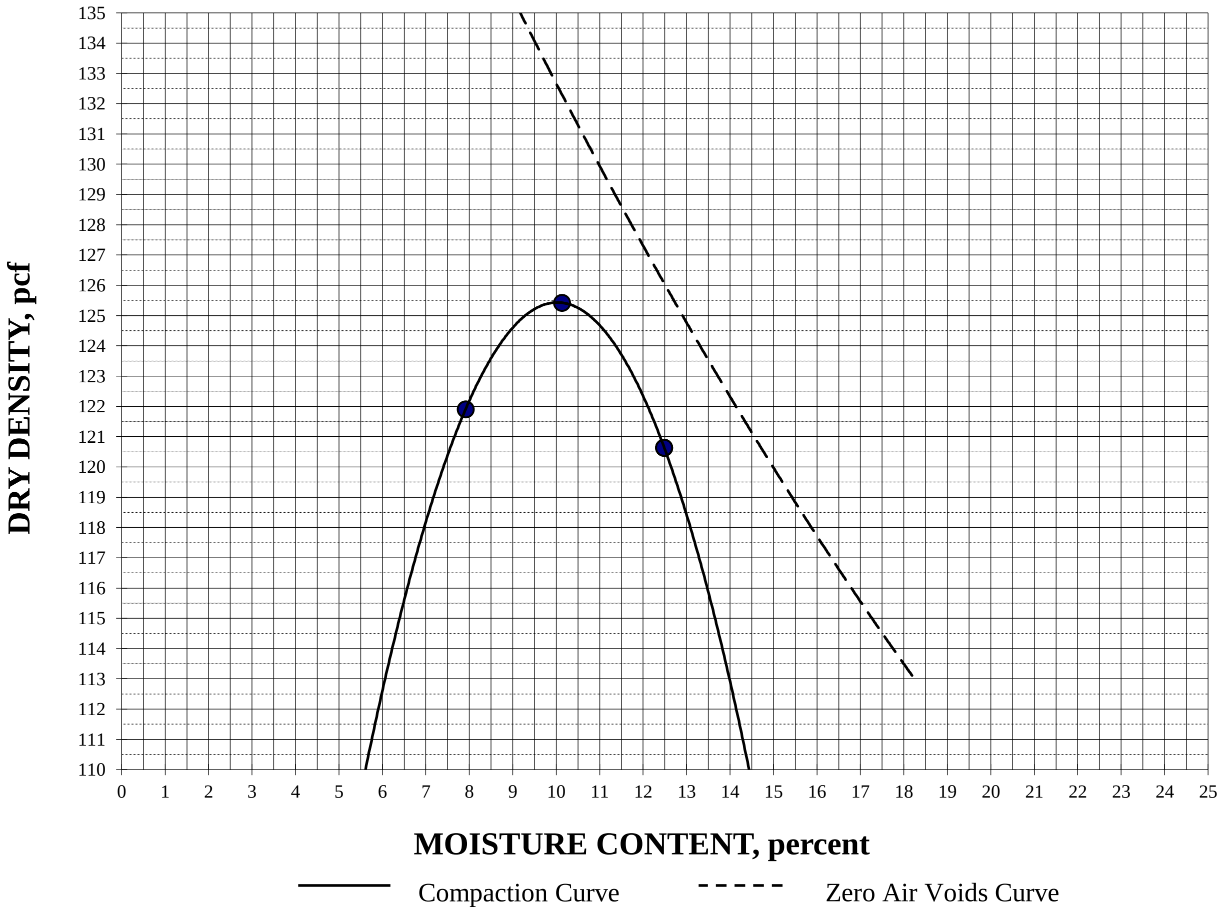
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 125.4 pcf

OPTIMUM MOISTURE: 10.0%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

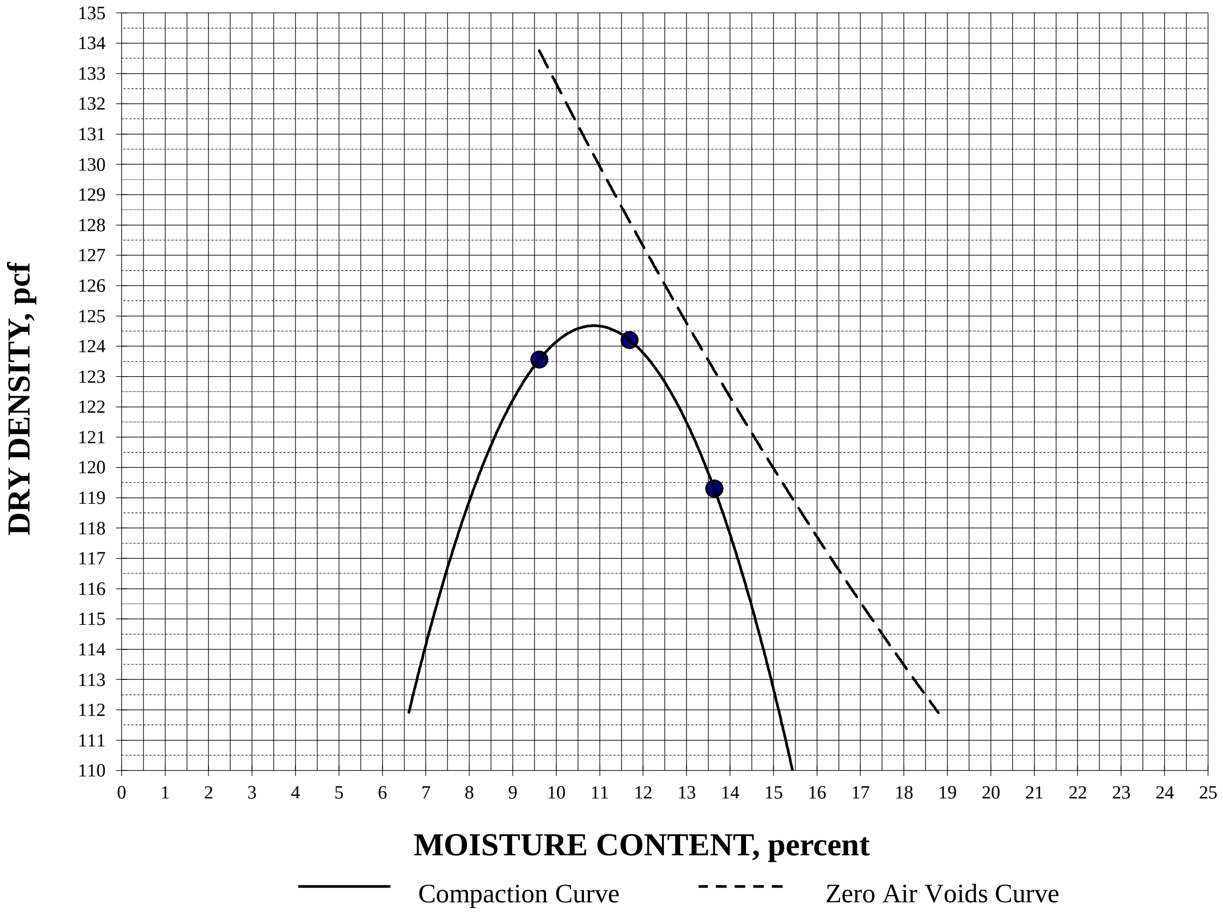
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

February 11, 2020
Boring #62 @ 2.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	1
#4	2

MAXIMUM DRY DENSITY: 124.7 pcf
OPTIMUM MOISTURE: 10.9%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

February 11, 2020

PREPARATION METHOD: Moist

Boring #66 @ 4.0 - 5.0'

RAMMER TYPE: Mechanical

Dark Brown Silty, Clayey Sand (SC-SM)

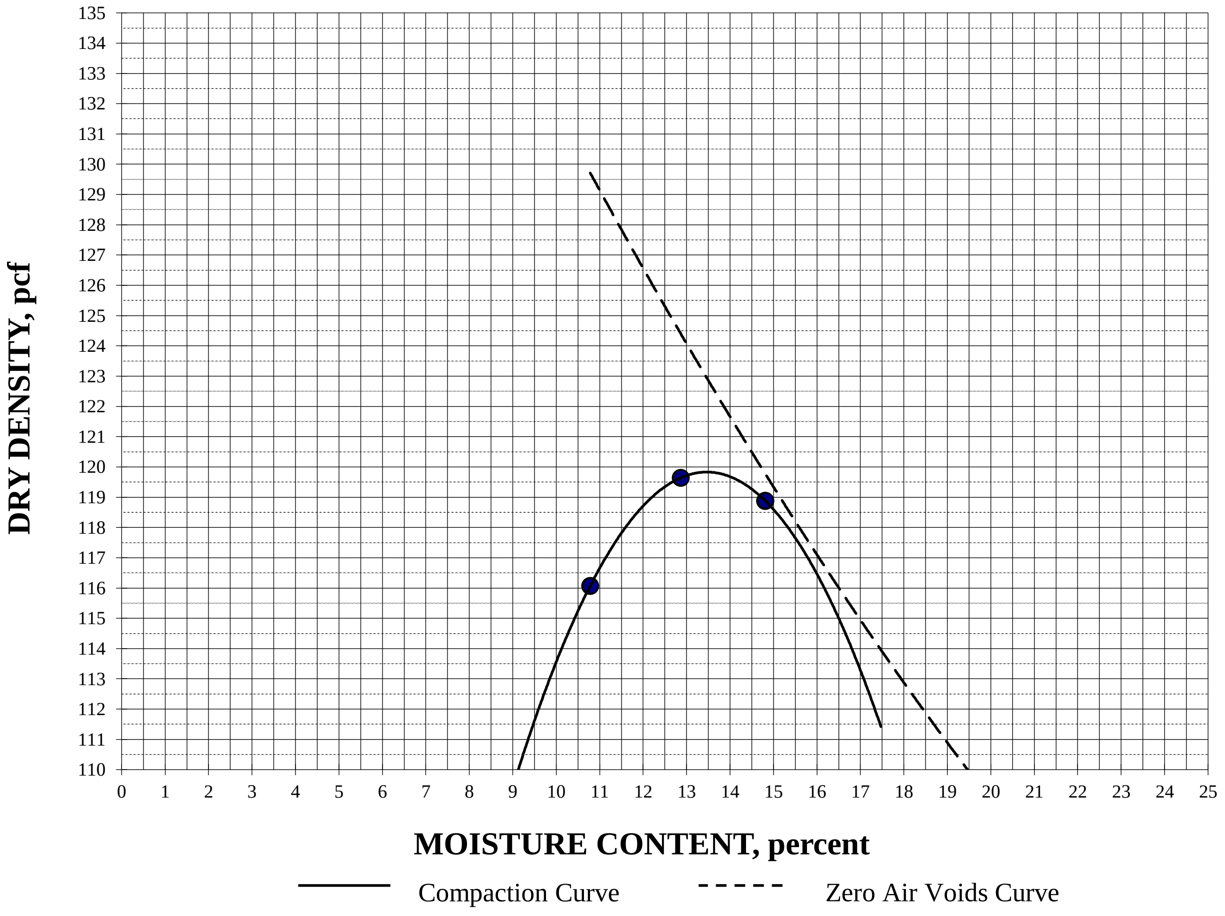
SPECIFIC GRAVITY: 2.68 (assumed)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 119.8 pcf

OPTIMUM MOISTURE: 13.5%



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

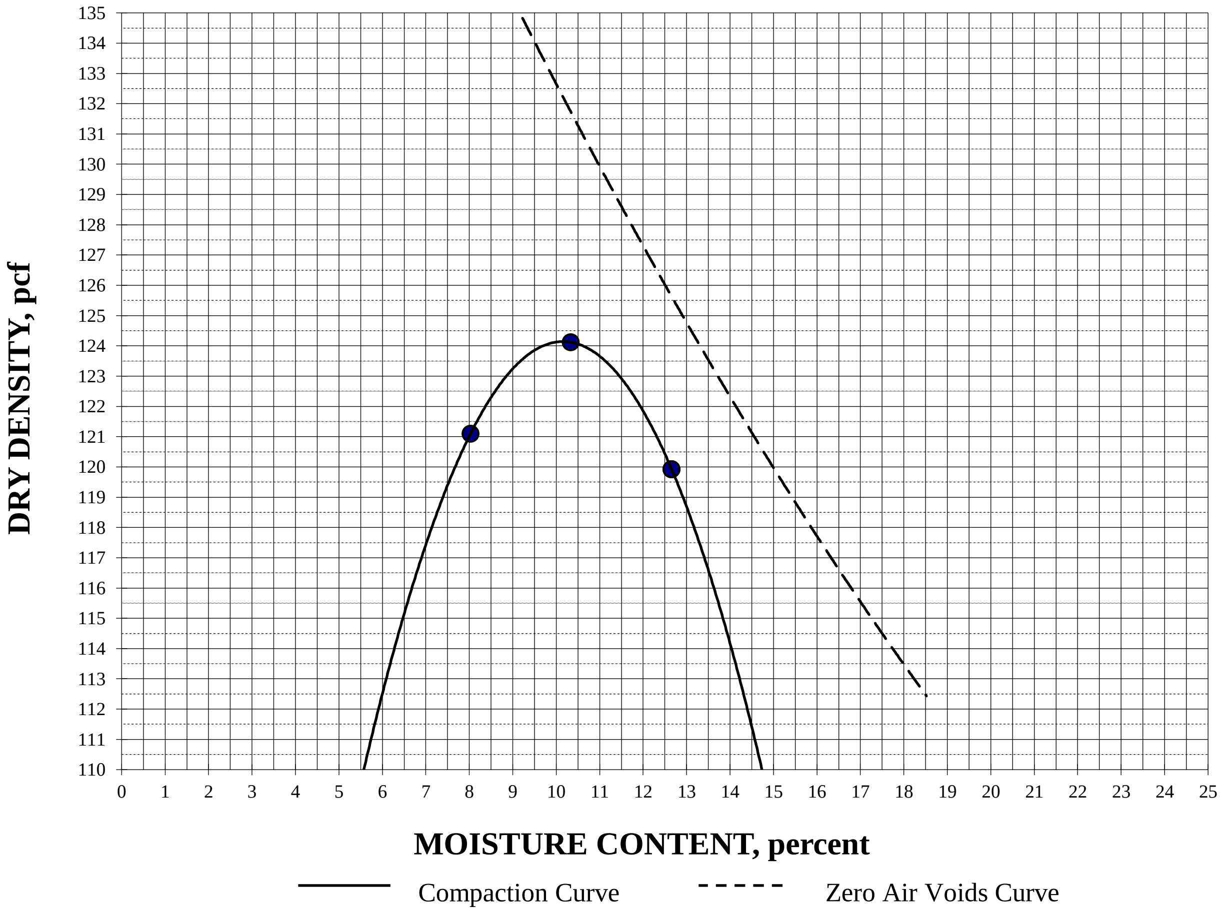
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

February 11, 2020
Boring #70 @ 1.5 - 4.5'
Dark Brown Sandy Lean Clay (CL)

SIEVE DATA:

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

MAXIMUM DRY DENSITY: 124.1 pcf
OPTIMUM MOISTURE: 10.2%



Oxnard Airport Taxiway F Improvements 302524-002
Oxnard, California

CALIFORNIA BEARING RATIO

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

Boring #41 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	101.9	106.5	111.6
Moisture content, %, before soak	8.5	11.5	14.5
Moisture content, %, after soak, avg.	21.5	18.4	15.6
Moisture content, %, after soak, top 1"	22.1	21.5	18.2
Expansion, %, 96 hour soak	0.0	0.0	0.0
Bearing Ratio, 0.100" penetration	2.7	5.1	7.0

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	110.0	110.5	116.1
Moisture content, %, before soak	8.5	11.5	14.5
Moisture content, %, after soak, avg.	19.1	15.9	16.3
Moisture content, %, after soak, top 1"	20.3	21.0	16.8
Expansion, %, 96 hour soak	0.0	0.2	0.0
Bearing Ratio, 0.100" penetration	5.1	6.6	10.1

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	119.9	121.4	118.3
Moisture content, %, before soak	8.5	11.5	14.5
Moisture content, %, after soak, avg.	15.7	15.0	16.4
Moisture content, %, after soak, top 1"	20.0	17.8	16.5
Expansion, %, 96 hour soak	0.2	0.5	0.0
Bearing Ratio, 0.100" penetration	10.3	20.3	10.4

Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

PROCEDURE USED: A

February 11, 2020

PREPARATION METHOD: Moist

Boring #41 @ 1.5 - 5.0'

RAMMER TYPE: Mechanical

Dark Brown Sandy Lean Clay (CL)

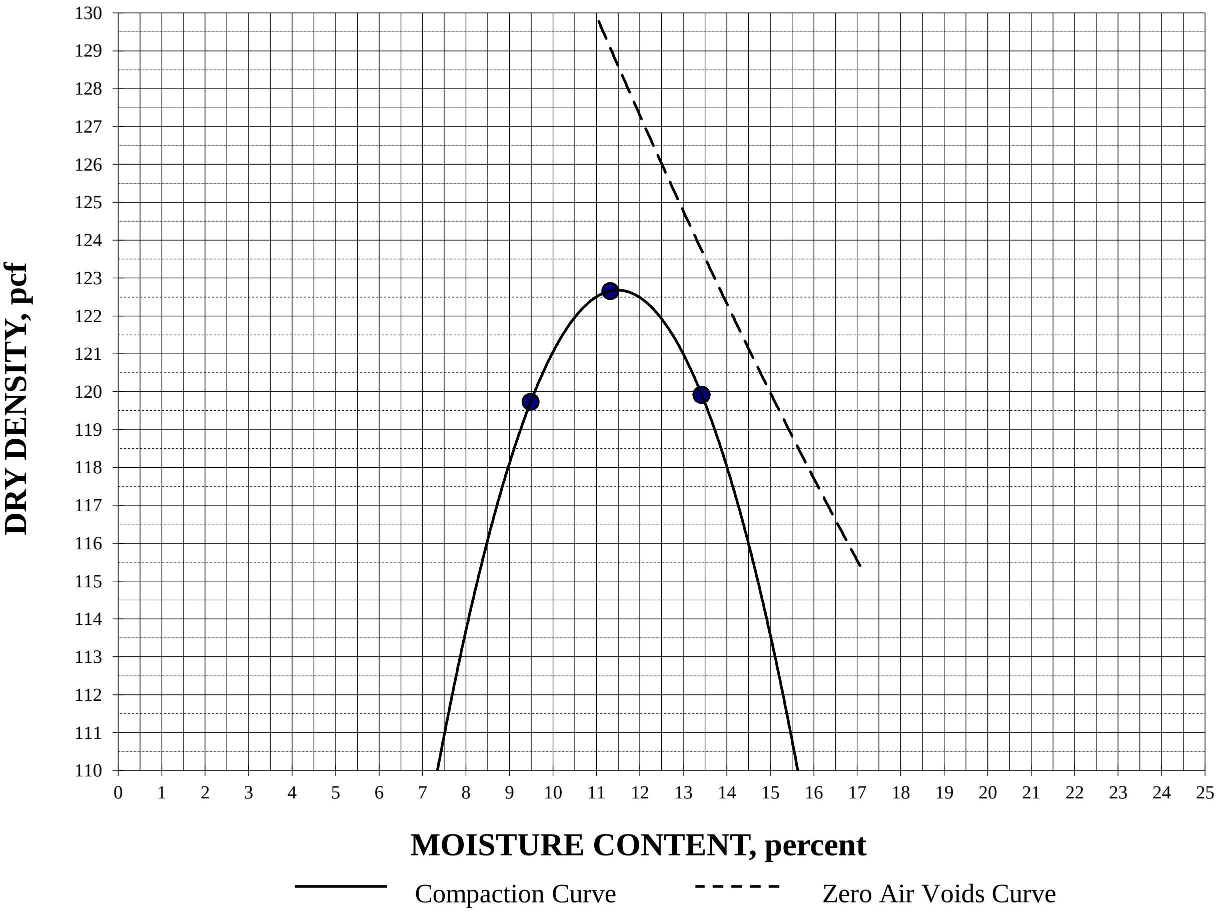
SPECIFIC GRAVITY: 2.70 (assumed)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	1
#4	2

MAXIMUM DRY DENSITY: 122.7 pcf

OPTIMUM MOISTURE: 11.5%



Oxnard Airport Taxiway F Improvements 302524-002
Oxnard, California

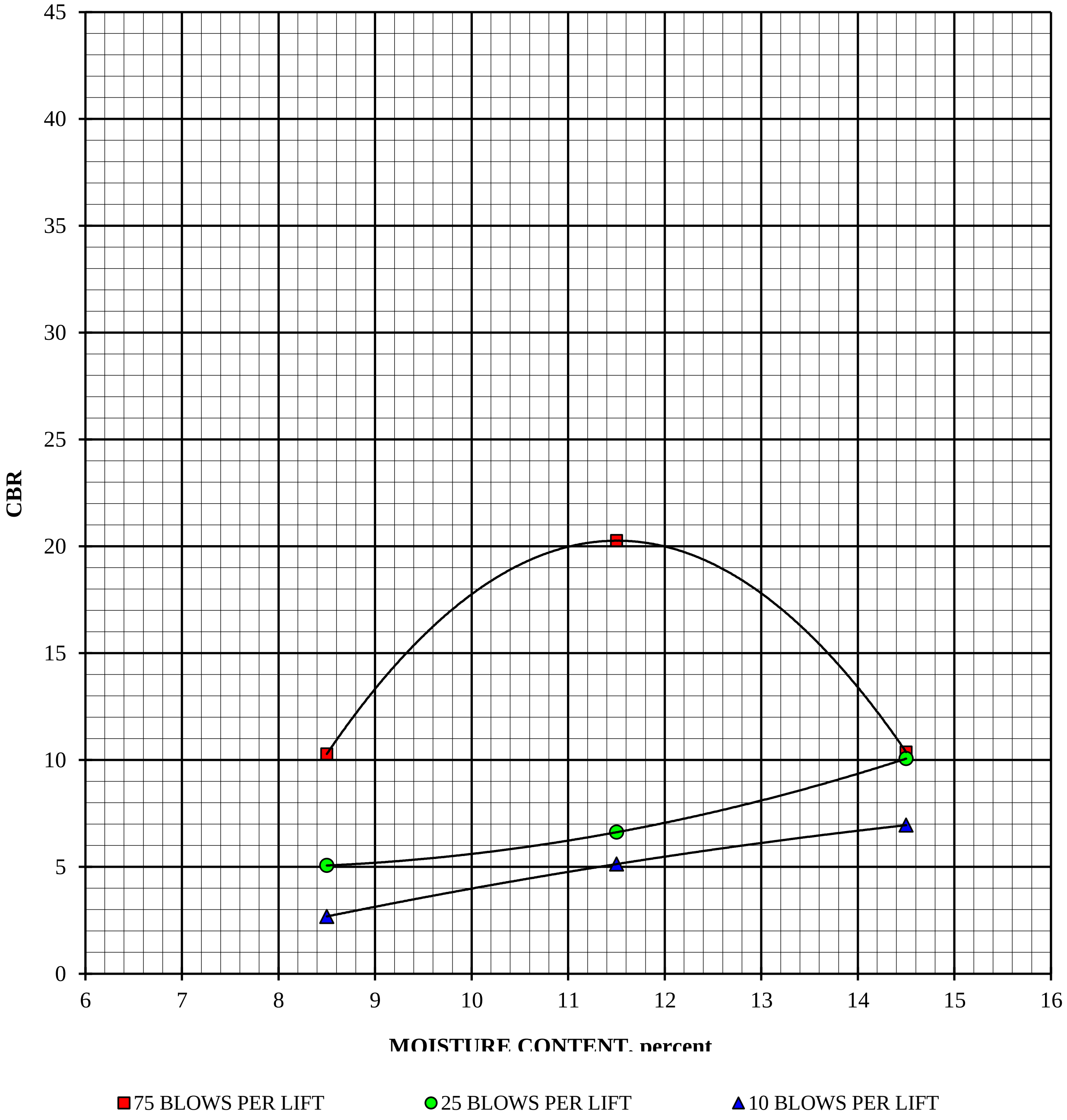
CALIFORNIA BEARING RATIO

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

Boring #41 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

CBR vs. MOISTURE CONTENT



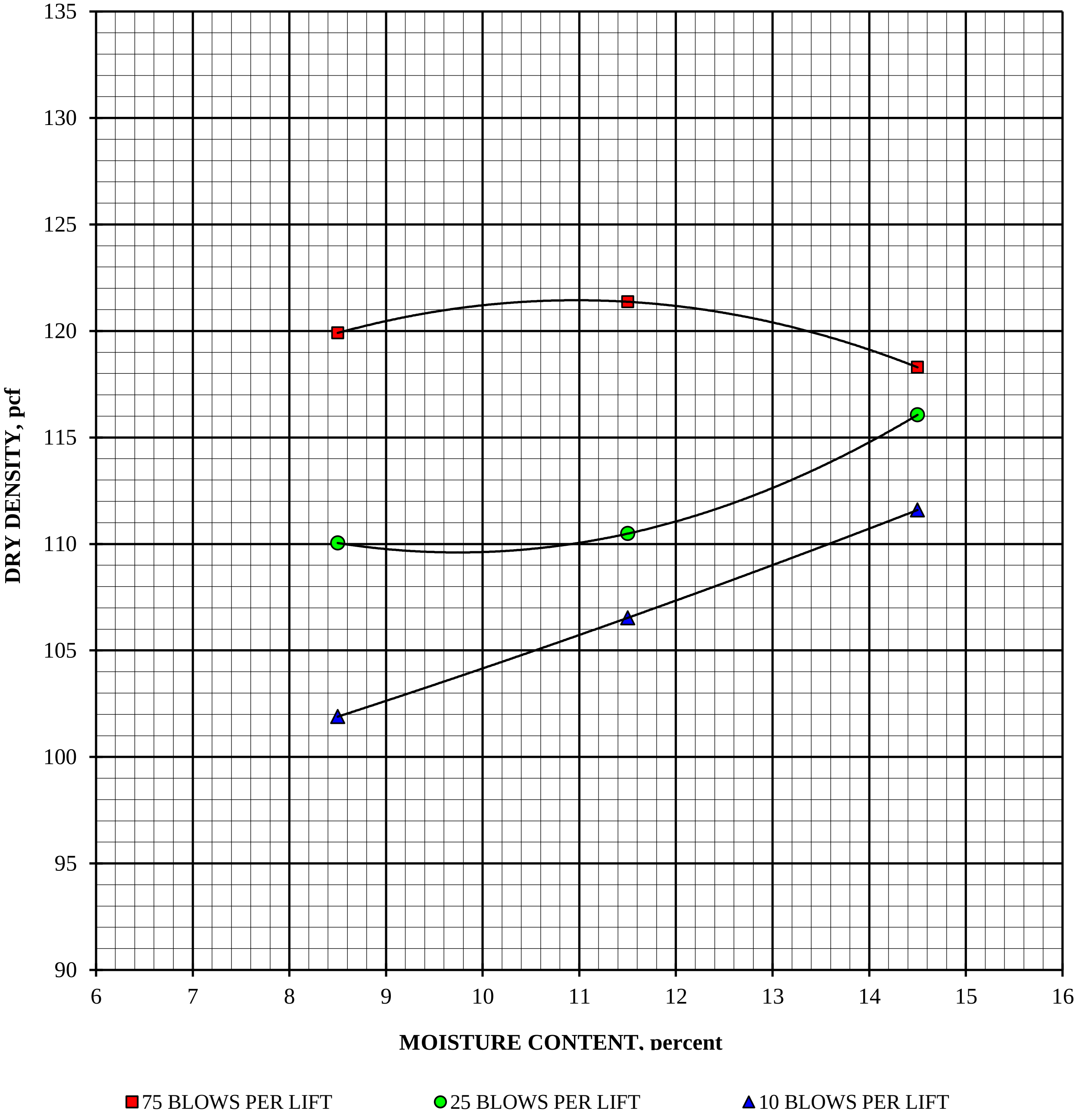
CALIFORNIA BEARING RATIO

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

Boring #41 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

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CALIFORNIA BEARING RATIO

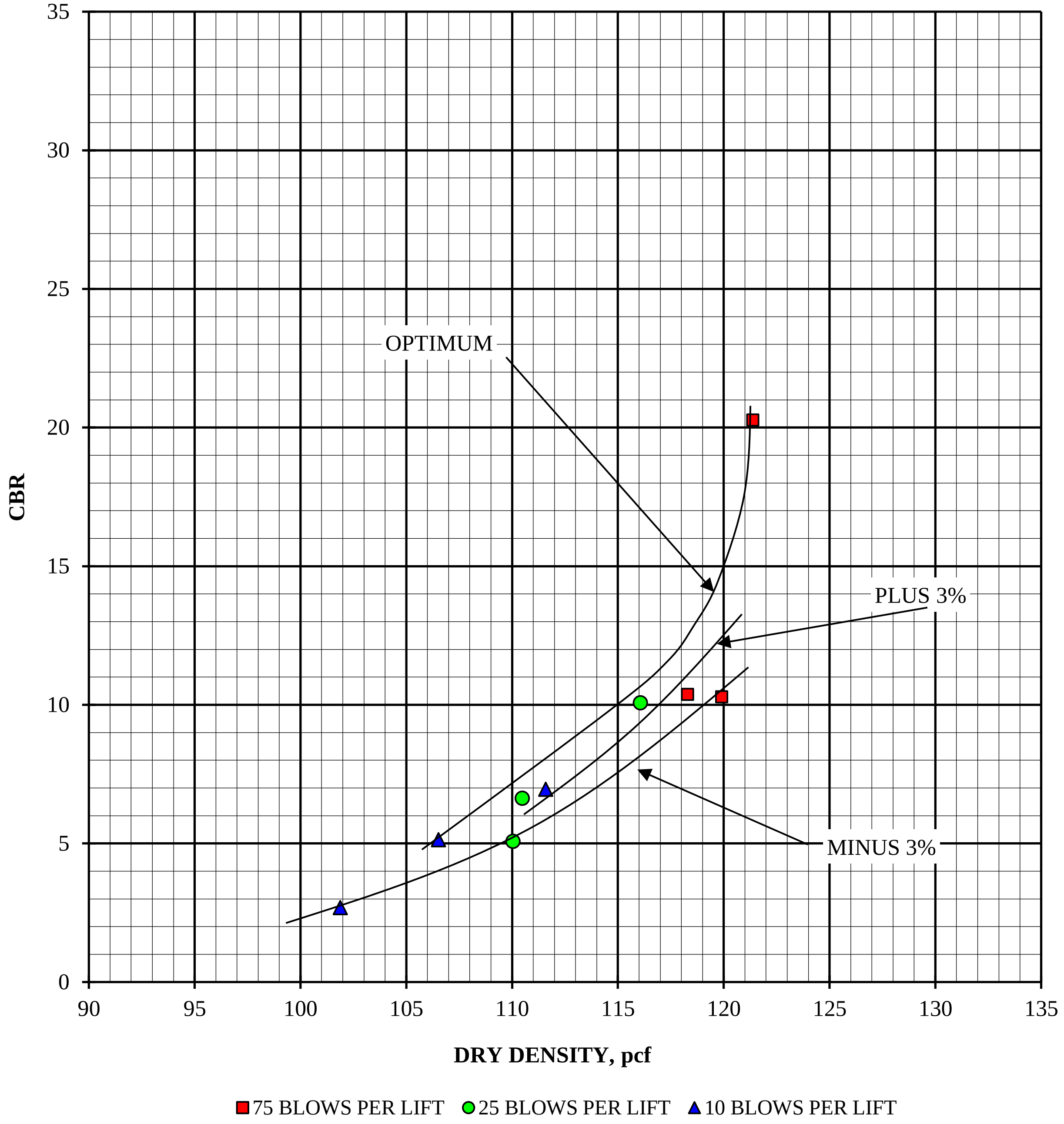
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #41 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport Taxiway F Improvements 302524-002
Oxnard, California

CALIFORNIA BEARING RATIO

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

Boring #45 @ 1.0 - 5.0'
February 11, 2020
Dark Brown Sandy Lean Clay (CL) With 5% Lime by Dry Weight

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak			104.5
Moisture content, %, before soak			14.3
Moisture content, %, after soak, avg.			17.2
Moisture content, %, after soak, top 1"			16.4
Expansion, %, 96 hour soak			0.1
Bearing Ratio, 0.100" penetration			22.6

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak			111.3
Moisture content, %, before soak			14.3
Moisture content, %, after soak, avg.			17.2
Moisture content, %, after soak, top 1"			18.3
Expansion, %, 96 hour soak			0.0
Bearing Ratio, 0.100" penetration			57.7

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak			116.4
Moisture content, %, before soak			14.3
Moisture content, %, after soak, avg.			15.2
Moisture content, %, after soak, top 1"			22.0
Expansion, %, 96 hour soak			0.3
Bearing Ratio, 0.100" penetration			72.5

Oxnard Airport Taxiway F Improvements
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CALIFORNIA BEARING RATIO

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

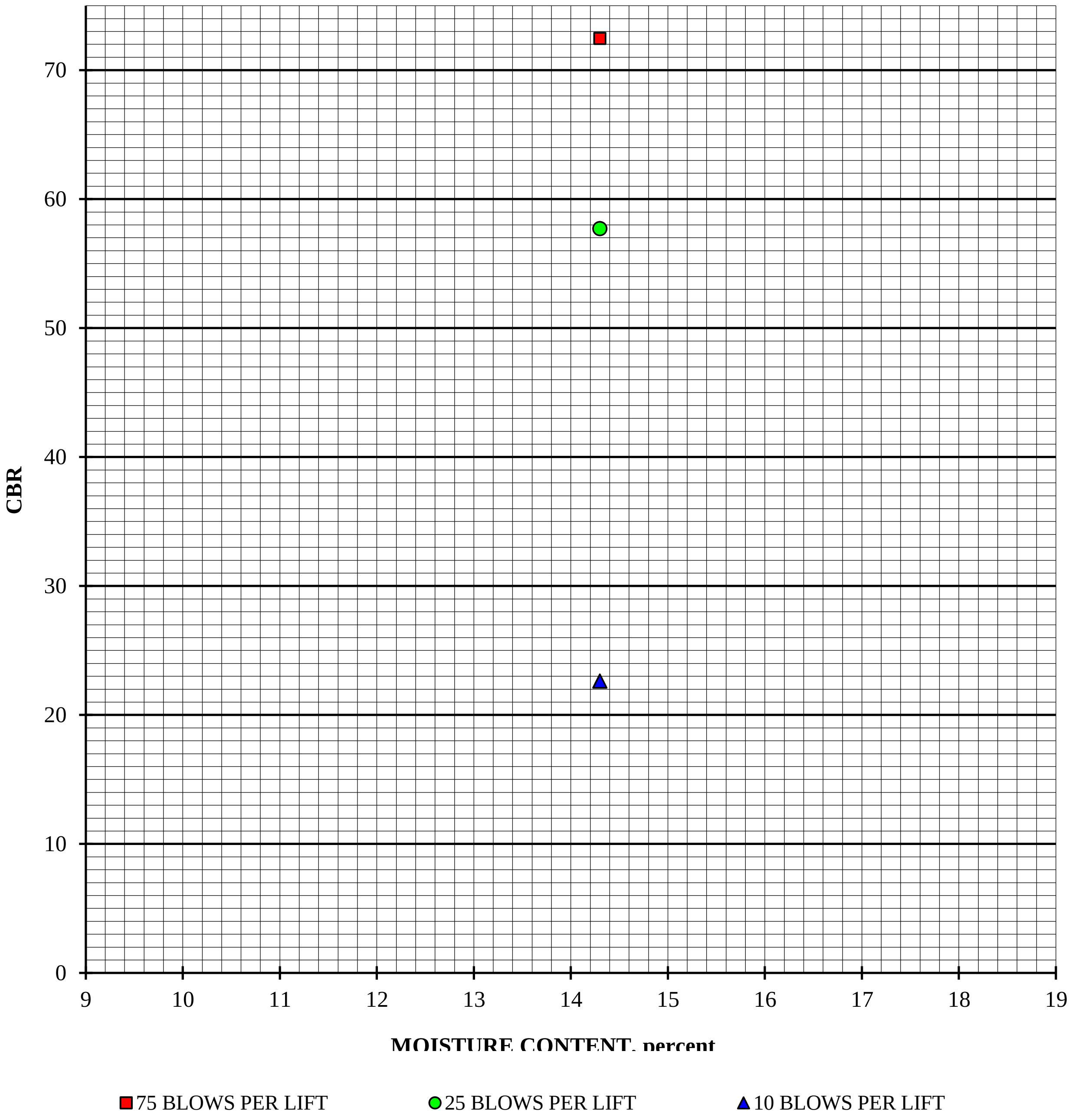
Boring #45 @ 1.0 - 5.0'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

With 5% Lime by Dry Weight

CBR vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

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CALIFORNIA BEARING RATIO

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

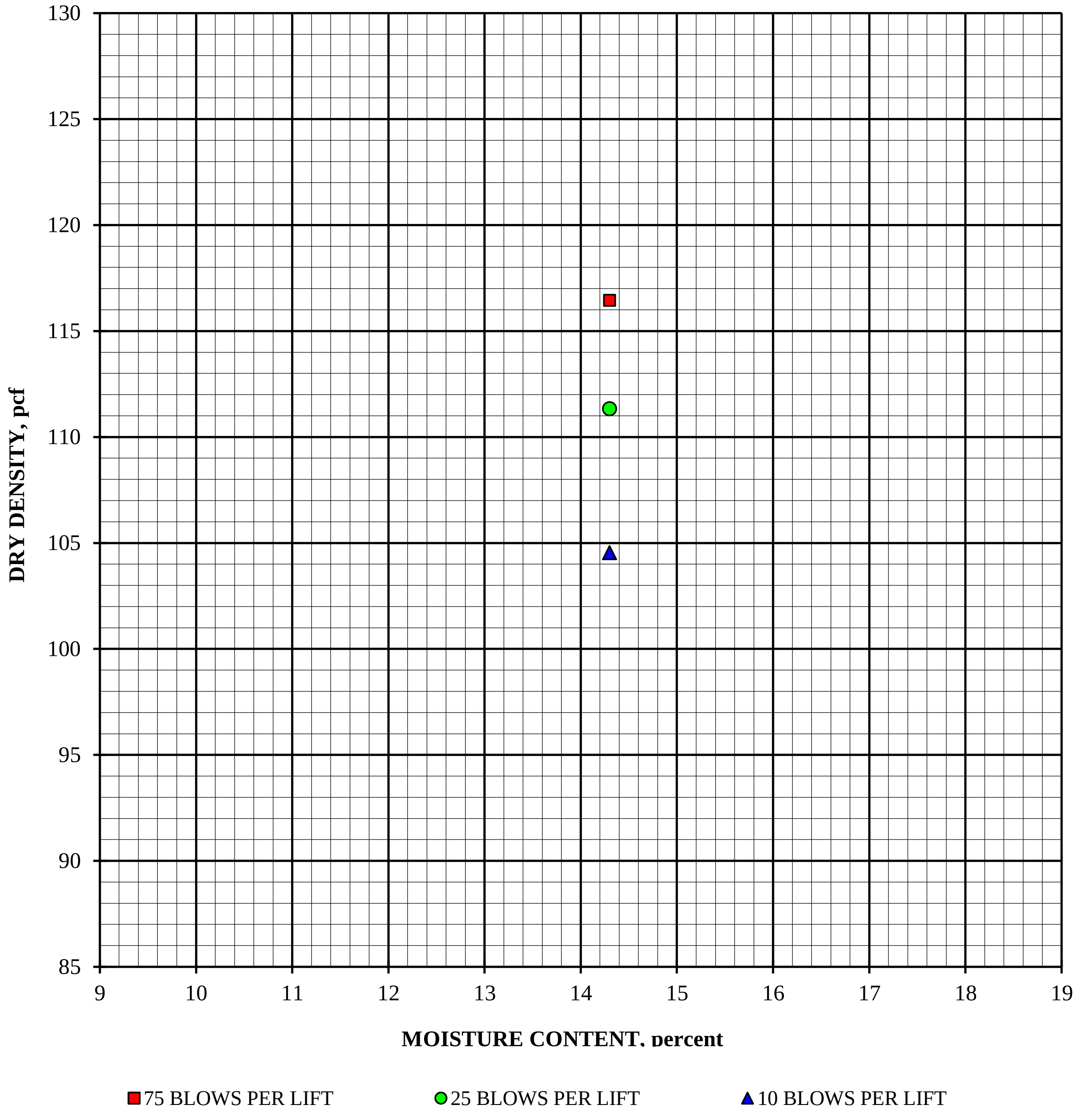
Boring #45 @ 1.0 - 5.0'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

With 5% Lime by Dry Weight

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

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CALIFORNIA BEARING RATIO

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

Boring #45 @ 1.0 - 5.0'

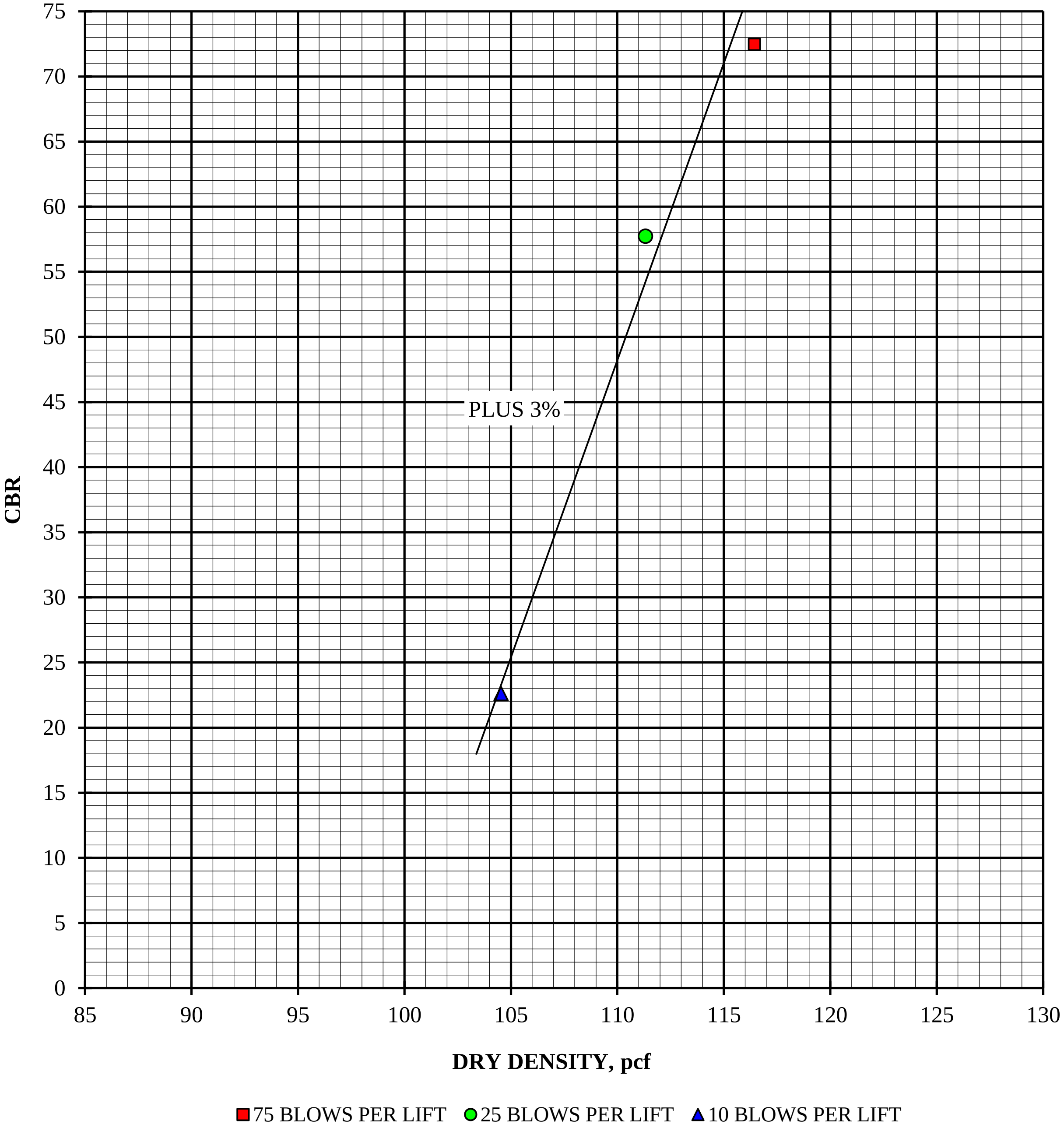
February 11, 2020

Dark Brown Sandy Lean Clay (CL)

With 5% Lime by Dry Weight

DRY DENSITY vs. CBR

Arranged According to Moisture Content



CALIFORNIA BEARING RATIO

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

Boring #46 @ 1.0 - 2.0'
Light Brown Well-Graded Sand with Silt and Gravel (SW-SM)

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	112.6	120.2	118.6
Moisture content, %, before soak	5.3	8.3	11.3
Moisture content, %, after soak, avg.	9.9	10.0	13.8
Moisture content, %, after soak, top 1"	13.2	11.6	13.1
Expansion, %, 96 hour soak	0.3	0.9	0.2
Bearing Ratio, 0.100" penetration	9.8	32.5	23.0

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	117.3	123.9	121.8
Moisture content, %, before soak	5.3	8.3	11.3
Moisture content, %, after soak, avg.	10.0	9.4	12.3
Moisture content, %, after soak, top 1"	12.1	10.0	11.0
Expansion, %, 96 hour soak	0.2	0.8	0.3
Bearing Ratio, 0.100" penetration	19.4	54.9	20.3

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	122.1	128.9	124.3
Moisture content, %, before soak	5.3	8.3	11.3
Moisture content, %, after soak, avg.	11.9	9.2	12.7
Moisture content, %, after soak, top 1"	10.5	8.8	10.9
Expansion, %, 96 hour soak	0.3	0.6	0.1
Bearing Ratio, 0.100" penetration	37.2	109.6	32.1

Oxnard Airport Taxiway F Improvements 302524-002
Oxnard, California

CALIFORNIA BEARING RATIO

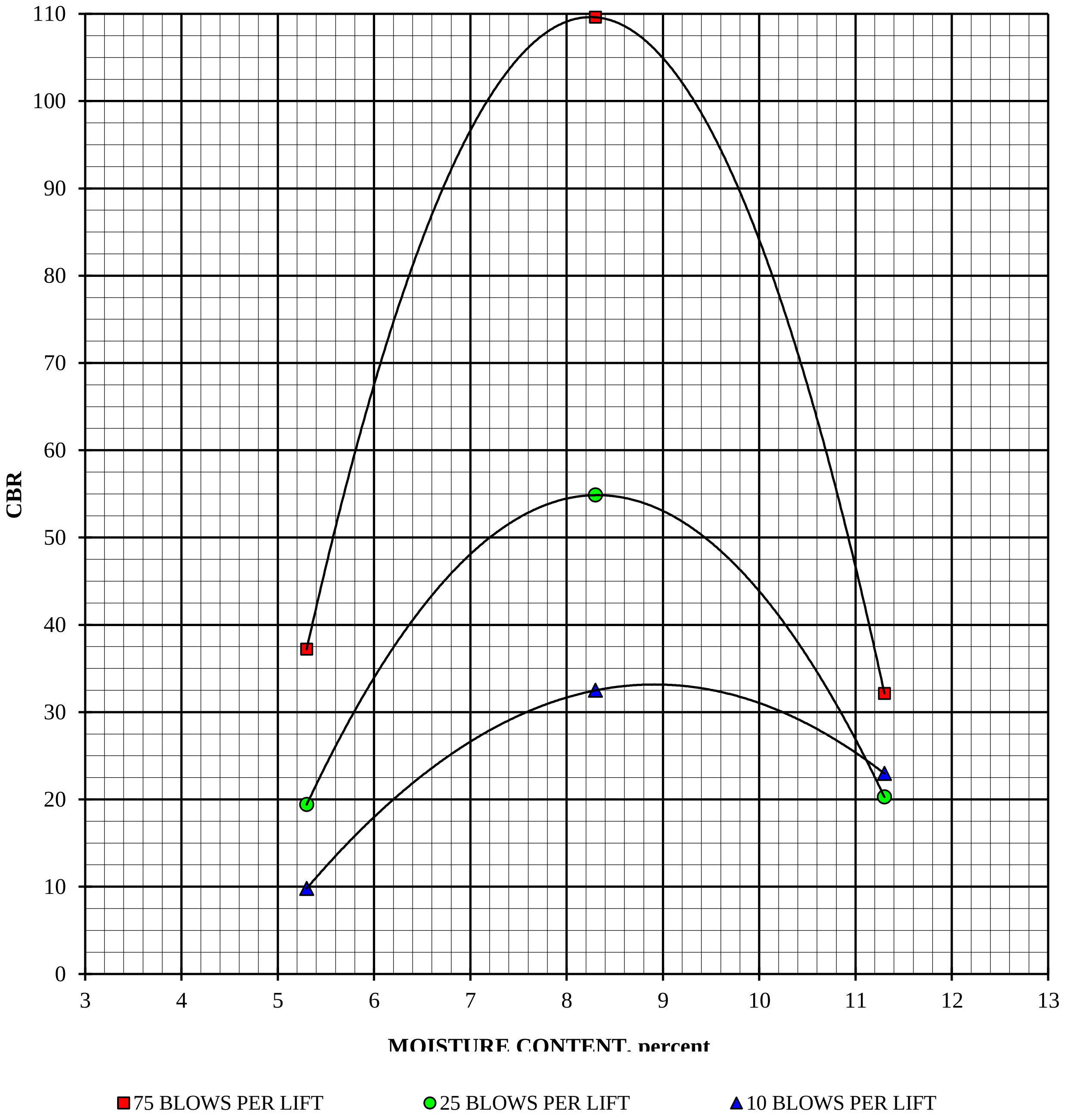
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #46 @ 1.0 - 2.0'

February 11, 2020

Light Brown Well-Graded Sand with Silt and Gravel (SW-SM)

CBR vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

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CALIFORNIA BEARING RATIO

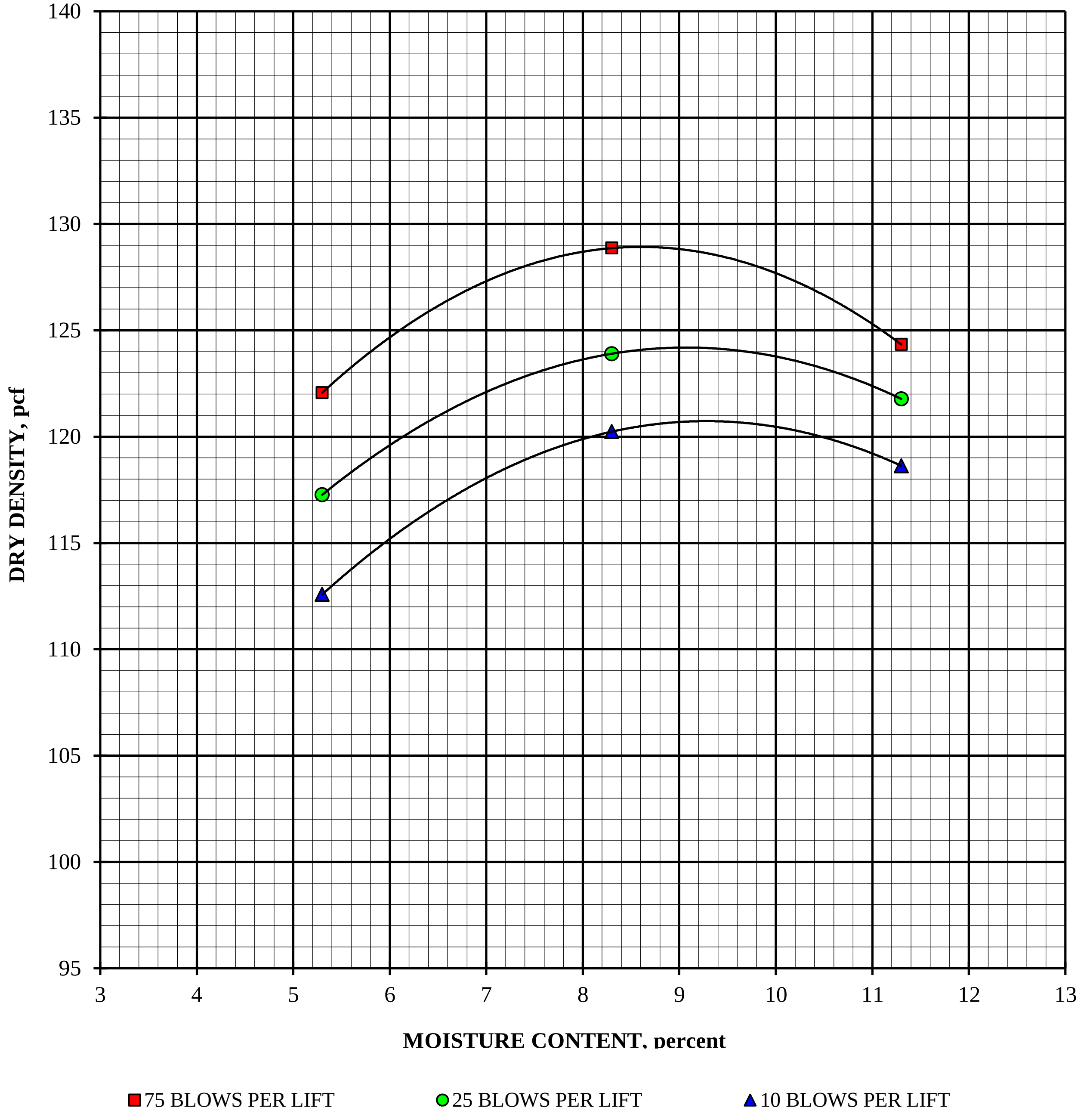
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #46 @ 1.0 - 2.0'

February 11, 2020

Light Brown Well-Graded Sand with Silt and Gravel (SW-SM)

DRY DENSITY vs. MOISTURE CONTENT



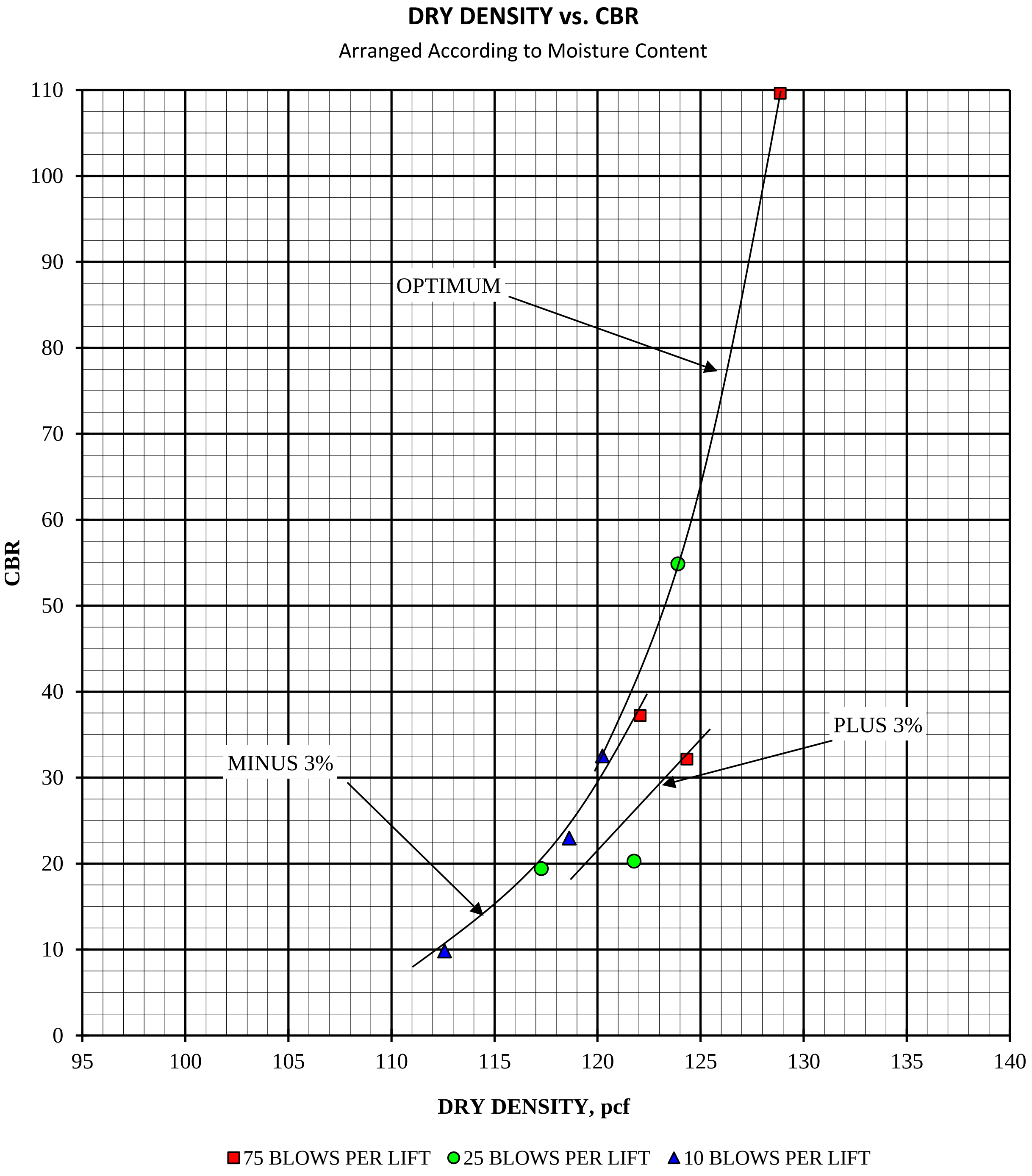
CALIFORNIA BEARING RATIO

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

Boring #46 @ 1.0 - 2.0'

February 11, 2020

Light Brown Well-Graded Sand with Silt and Gravel (SW-SM)



CALIFORNIA BEARING RATIO

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

Boring #54 @ 4.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	98.6	103.4	108.2
Moisture content, %, before soak	10.8	13.8	16.8
Moisture content, %, after soak, avg.	21.9	23.0	20.0
Moisture content, %, after soak, top 1"	23.6	25.4	24.3
Expansion, %, 96 hour soak	2.8	1.3	0.0
Bearing Ratio, 0.100" penetration	2.3	2.6	6.9

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	109.6	113.4	112.8
Moisture content, %, before soak	10.8	13.8	16.8
Moisture content, %, after soak, avg.	9.8	18.5	20.6
Moisture content, %, after soak, top 1"	23.5	23.2	20.9
Expansion, %, 96 hour soak	1.9	0.8	0.1
Bearing Ratio, 0.100" penetration	5.3	6.9	9.6

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	117.0	119.8	109.2
Moisture content, %, before soak	10.8	13.8	16.8
Moisture content, %, after soak, avg.	17.2	15.1	23.6
Moisture content, %, after soak, top 1"	26.7	21.0	20.3
Expansion, %, 96 hour soak	2.0	0.6	0.3
Bearing Ratio, 0.100" penetration	4.2	15.5	7.5

Oxnard Airport Taxiway F Improvements
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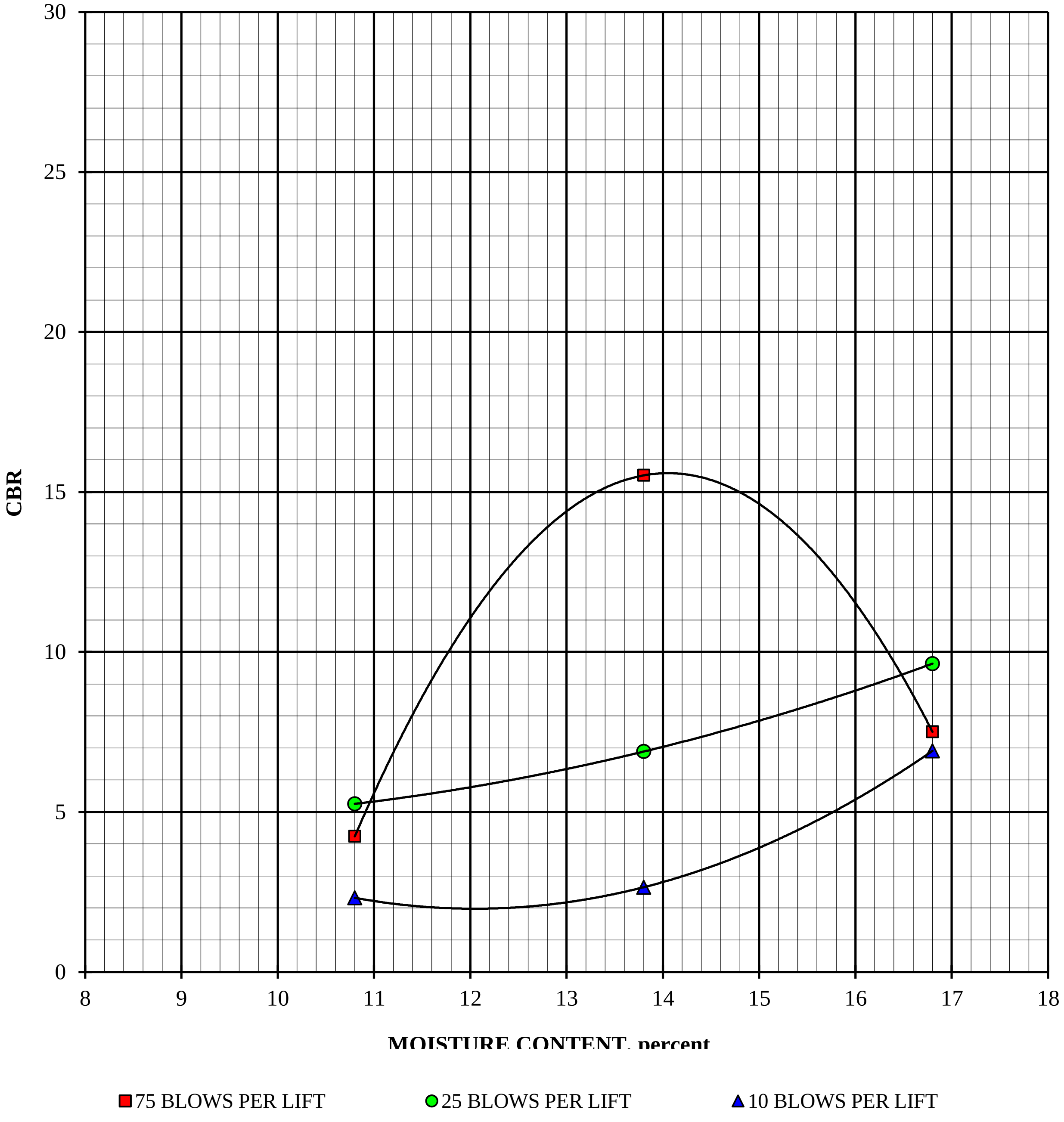
CALIFORNIA BEARING RATIO

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

Boring #54 @ 4.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

CBR vs. MOISTURE CONTENT



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Oxnard, California

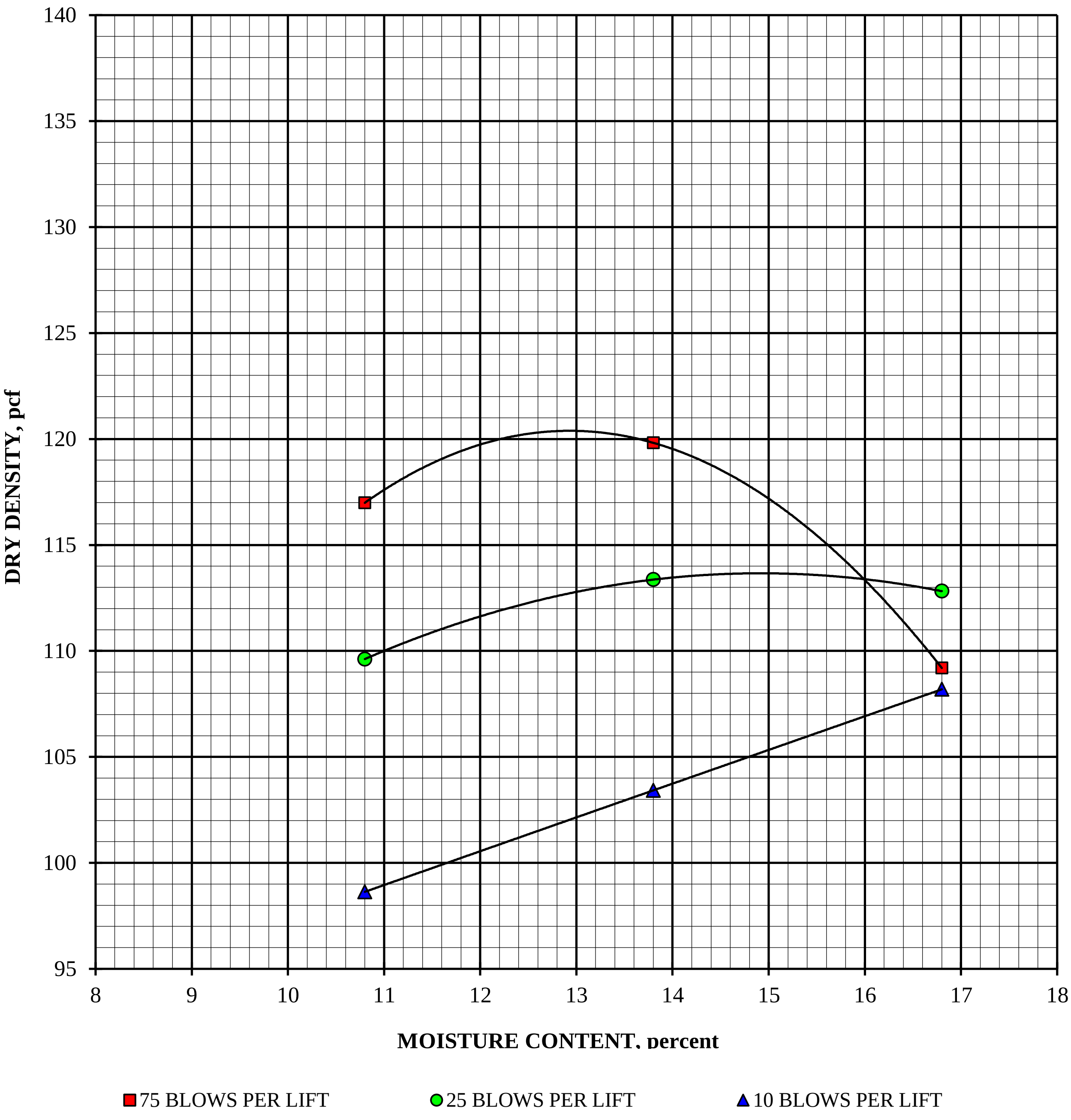
CALIFORNIA BEARING RATIO

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

Boring #54 @ 4.0 - 5.0' February 11, 2020

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
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CALIFORNIA BEARING RATIO

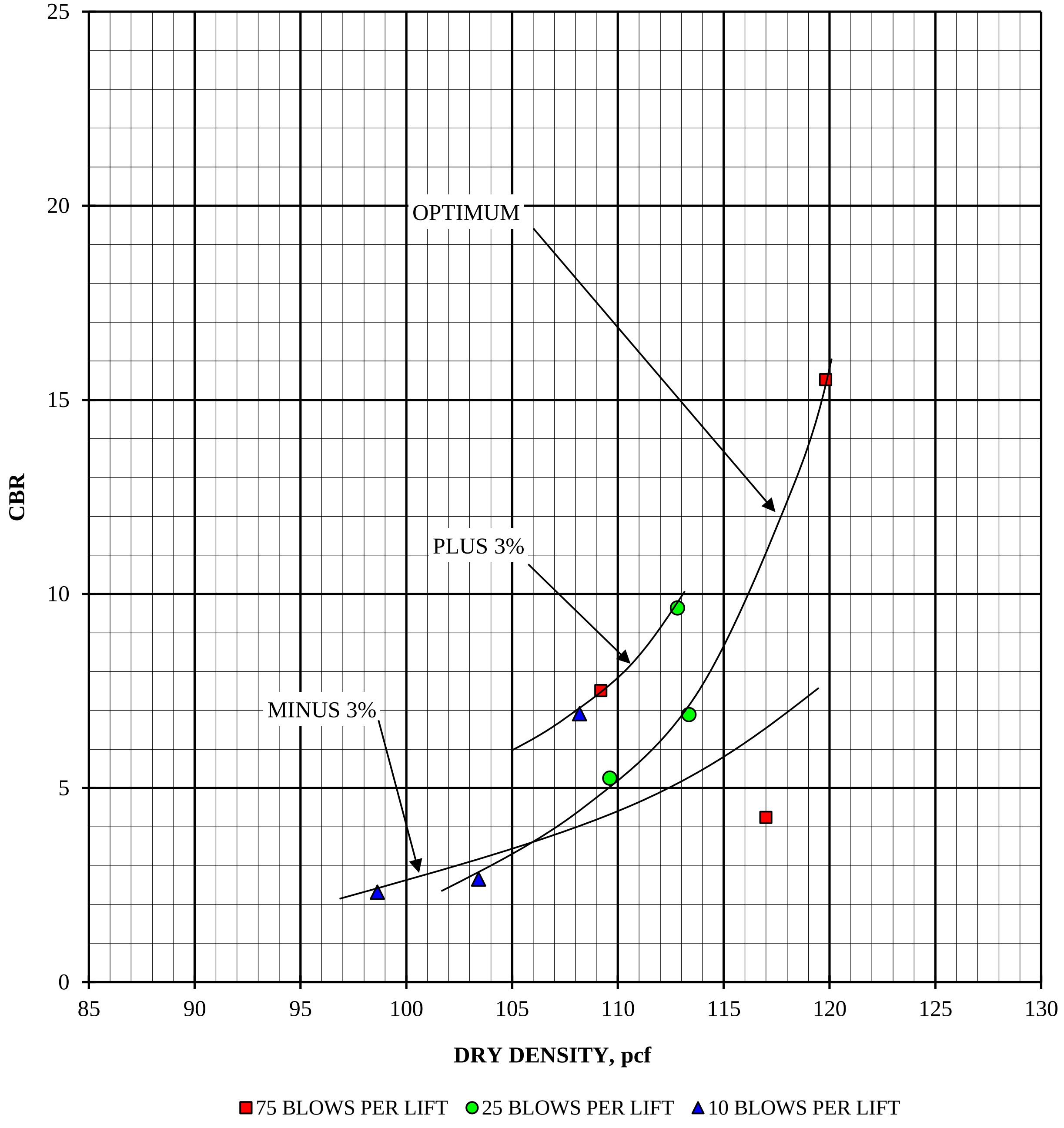
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #54 @ 4.0 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

DRY DENSITY vs. CBR

Arranged According to Moisture Content



Oxnard Airport Taxiway F Improvements 302524-002
Oxnard, California

CALIFORNIA BEARING RATIO

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

Boring #55 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	107.0	114.1	111.1
Moisture content, %, before soak	7.0	10.0	13.0
Moisture content, %, after soak, avg.	18.3	11.4	15.3
Moisture content, %, after soak, top 1"	20.1	15.0	15.1
Expansion, %, 96 hour soak	0.3	0.2	0.0
Bearing Ratio, 0.100" penetration	2.7	9.3	5.0

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	115.5	122.5	117.7
Moisture content, %, before soak	7.0	10.0	13.0
Moisture content, %, after soak, avg.	10.7	11.3	13.8
Moisture content, %, after soak, top 1"	19.2	17.2	14.5
Expansion, %, 96 hour soak	0.2	0.2	0.1
Bearing Ratio, 0.100" penetration	6.2	14.1	6.0

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	124.4	125.5	117.5
Moisture content, %, before soak	7.0	10.0	13.0
Moisture content, %, after soak, avg.	10.7	10.1	13.7
Moisture content, %, after soak, top 1"	16.2	15.6	13.3
Expansion, %, 96 hour soak	0.1	0.2	0.1
Bearing Ratio, 0.100" penetration	13.2	15.5	5.0

Oxnard Airport Taxiway F Improvements
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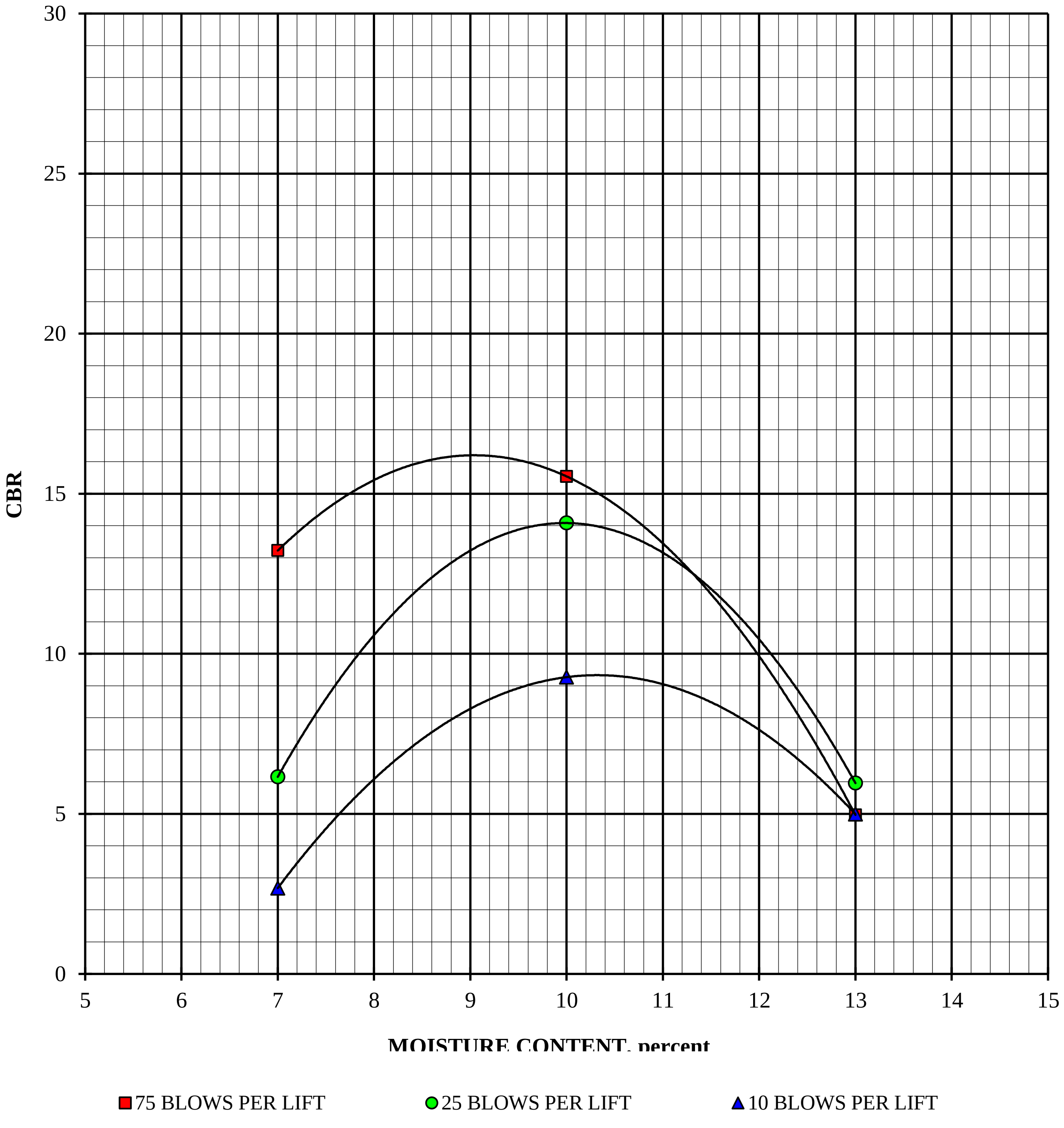
CALIFORNIA BEARING RATIO

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

Boring #55 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

CBR vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

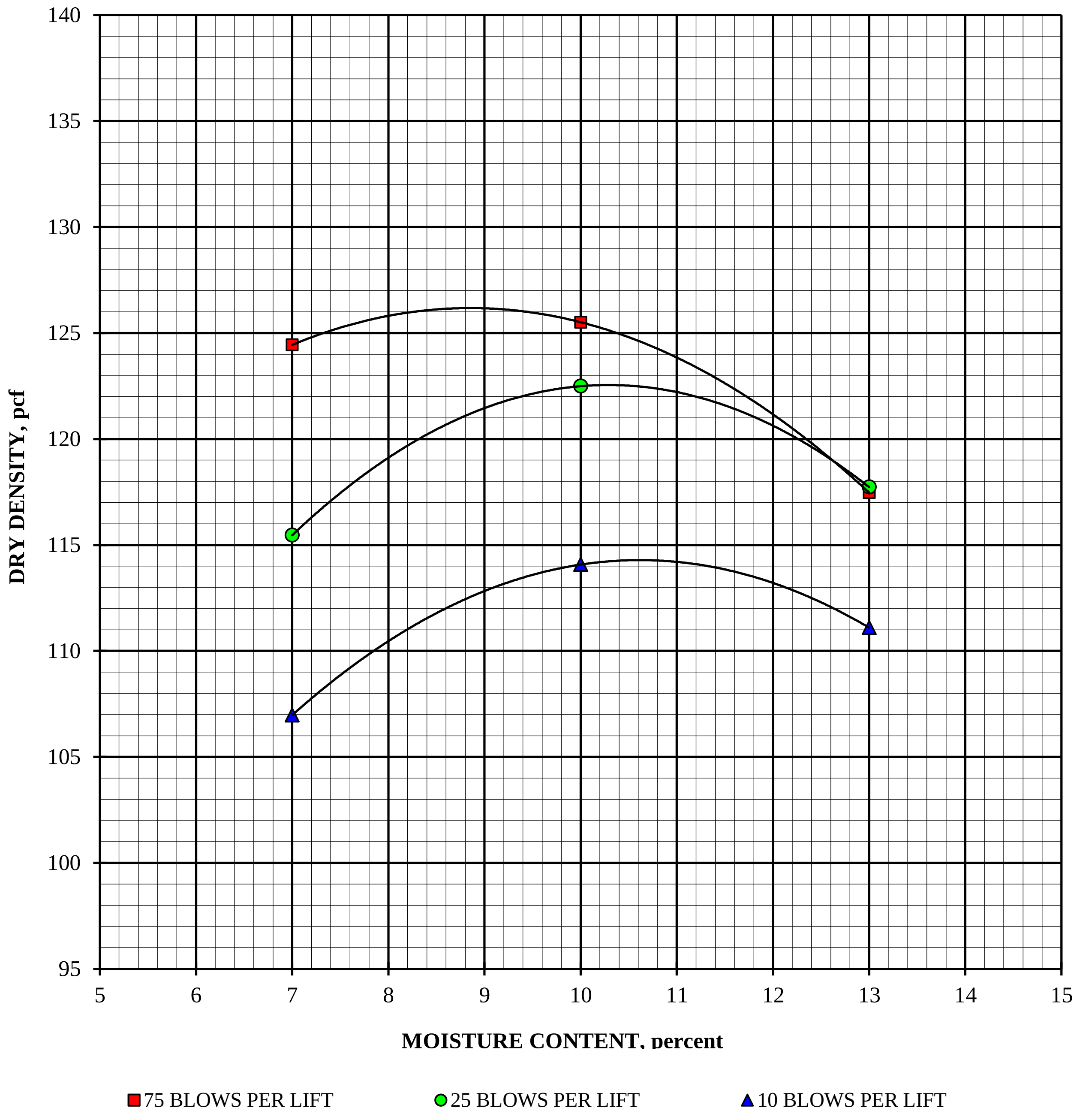
CALIFORNIA BEARING RATIO

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

Boring #55 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
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302524-002

CALIFORNIA BEARING RATIO

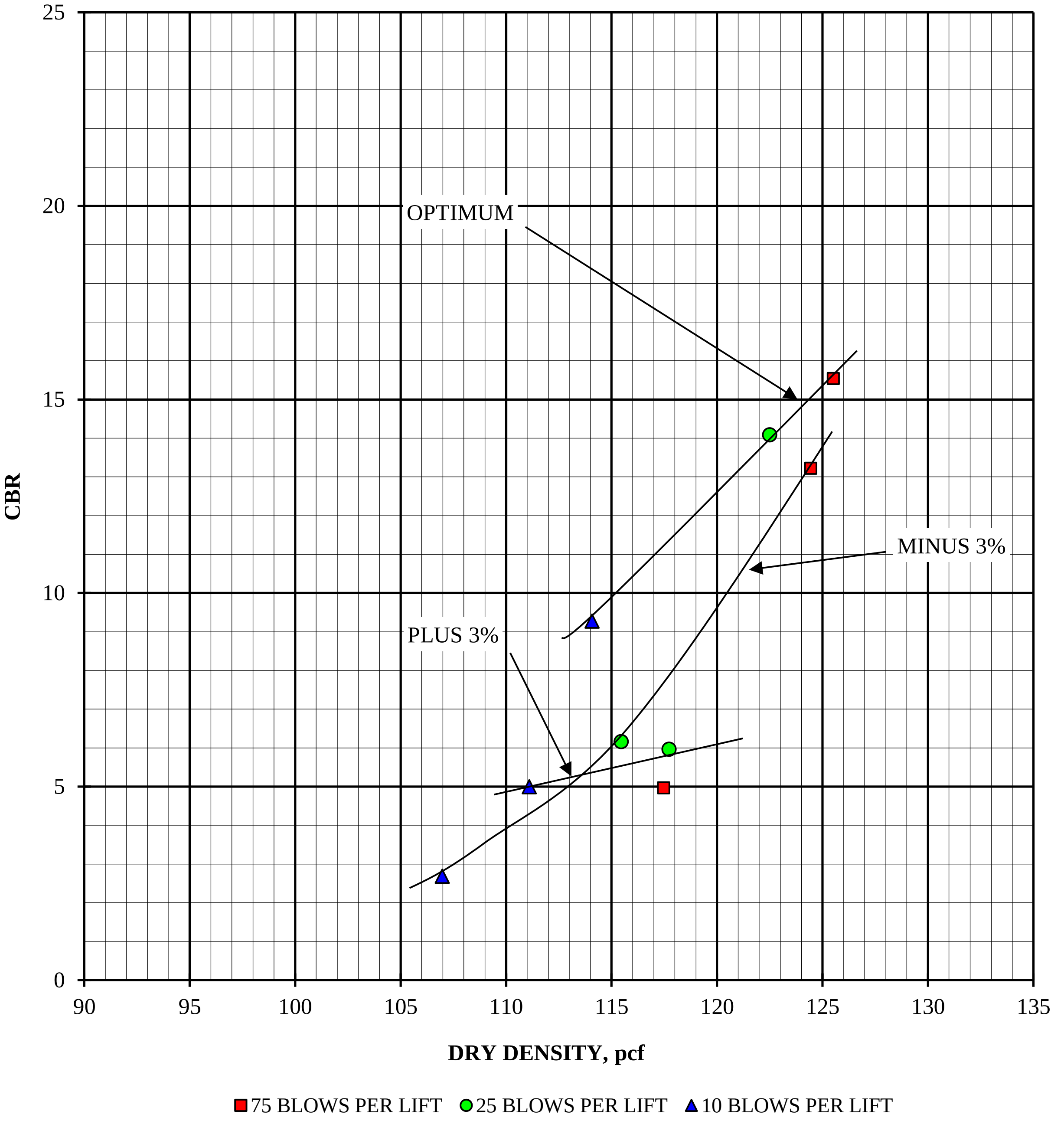
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #55 @ 1.5 - 5.0'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

DRY DENSITY vs. CBR

Arranged According to Moisture Content



CALIFORNIA BEARING RATIO

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

Boring #62 @ 2.0 - 5.0'
Dark Brown Sandy Lean Clay (CL) With 5% Lime by Dry Weight

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak			105.2
Moisture content, %, before soak			13.9
Moisture content, %, after soak, avg.			19.0
Moisture content, %, after soak, top 1"			16.9
Expansion, %, 96 hour soak			0.0
Bearing Ratio, 0.100" penetration			38.8

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak			111.5
Moisture content, %, before soak			13.9
Moisture content, %, after soak, avg.			15.7
Moisture content, %, after soak, top 1"			17.2
Expansion, %, 96 hour soak			0.0
Bearing Ratio, 0.100" penetration			48.4

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak			114.6
Moisture content, %, before soak			13.9
Moisture content, %, after soak, avg.			15.2
Moisture content, %, after soak, top 1"			22.0
Expansion, %, 96 hour soak			1.2
Bearing Ratio, 0.100" penetration			58.1

Oxnard Airport Taxiway F Improvements
Oxnard, California

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CALIFORNIA BEARING RATIO

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

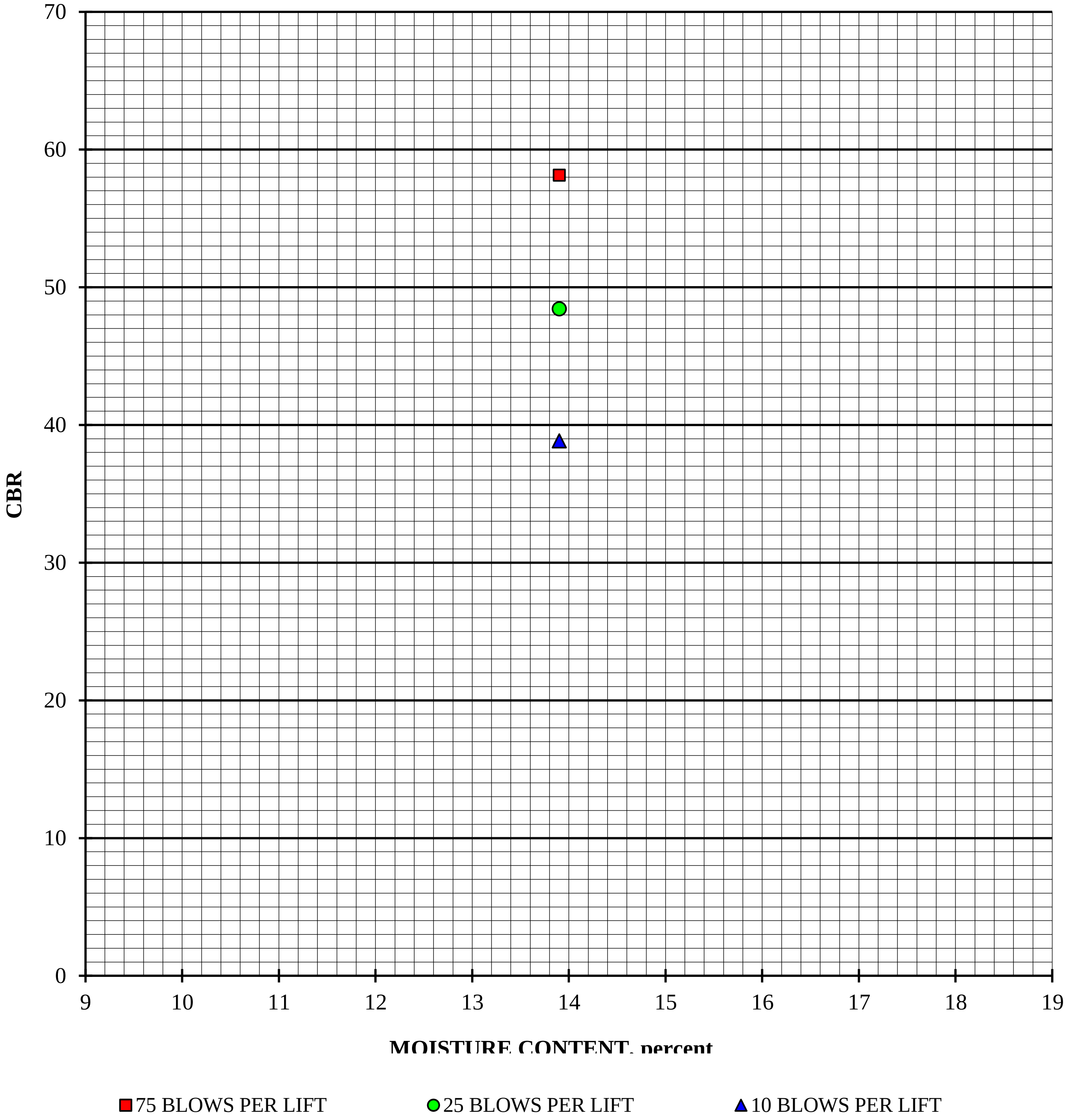
Boring #62 @ 2.0 - 5.0'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

With 5% Lime by Dry Weight

CBR vs. MOISTURE CONTENT



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CALIFORNIA BEARING RATIO

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

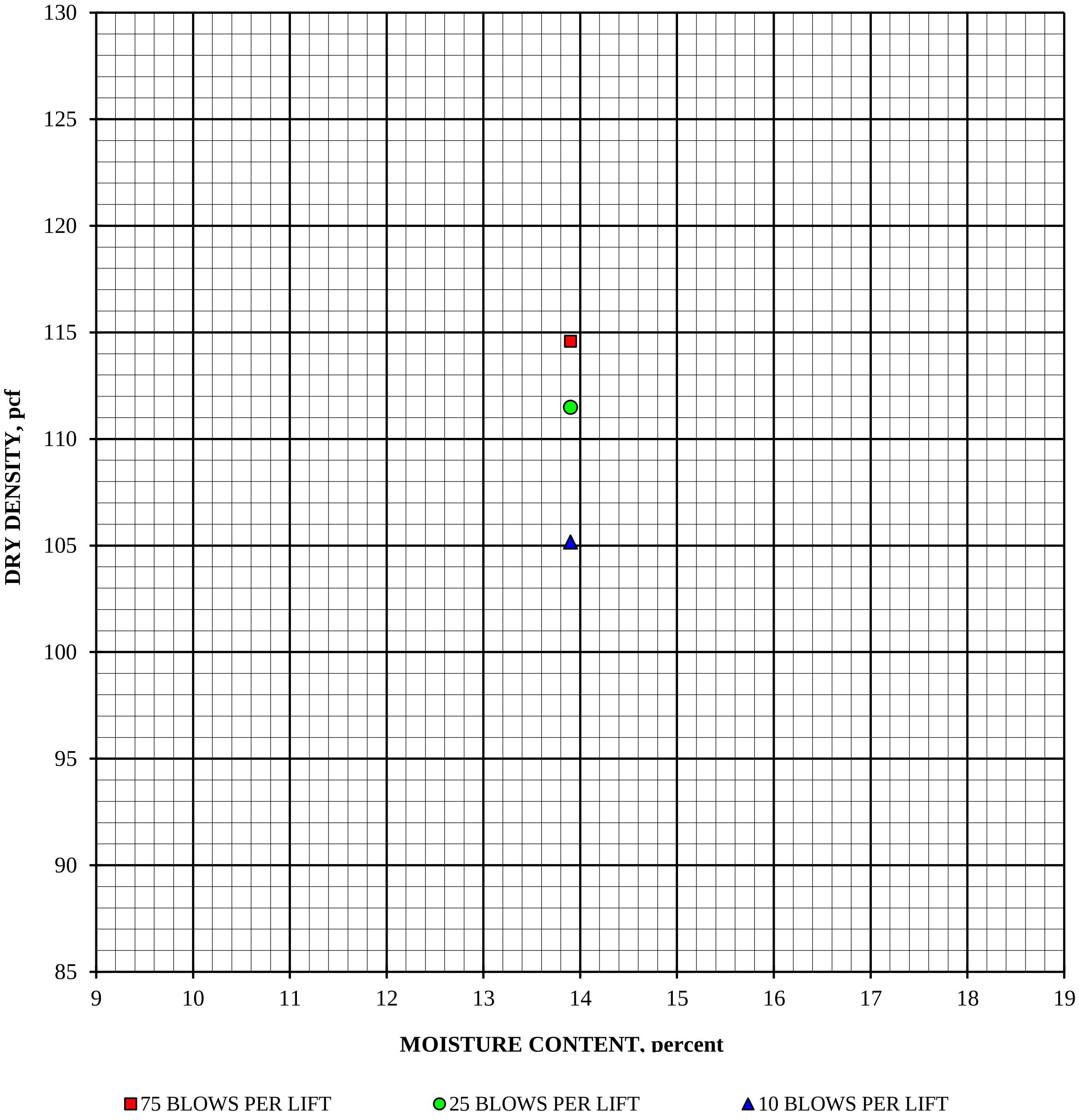
Boring #62 @ 2.0 - 5.0'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

With 5% Lime by Dry Weight

DRY DENSITY vs. MOISTURE CONTENT



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Oxnard, California

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CALIFORNIA BEARING RATIO

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

Boring #62 @ 2.0 - 5.0'

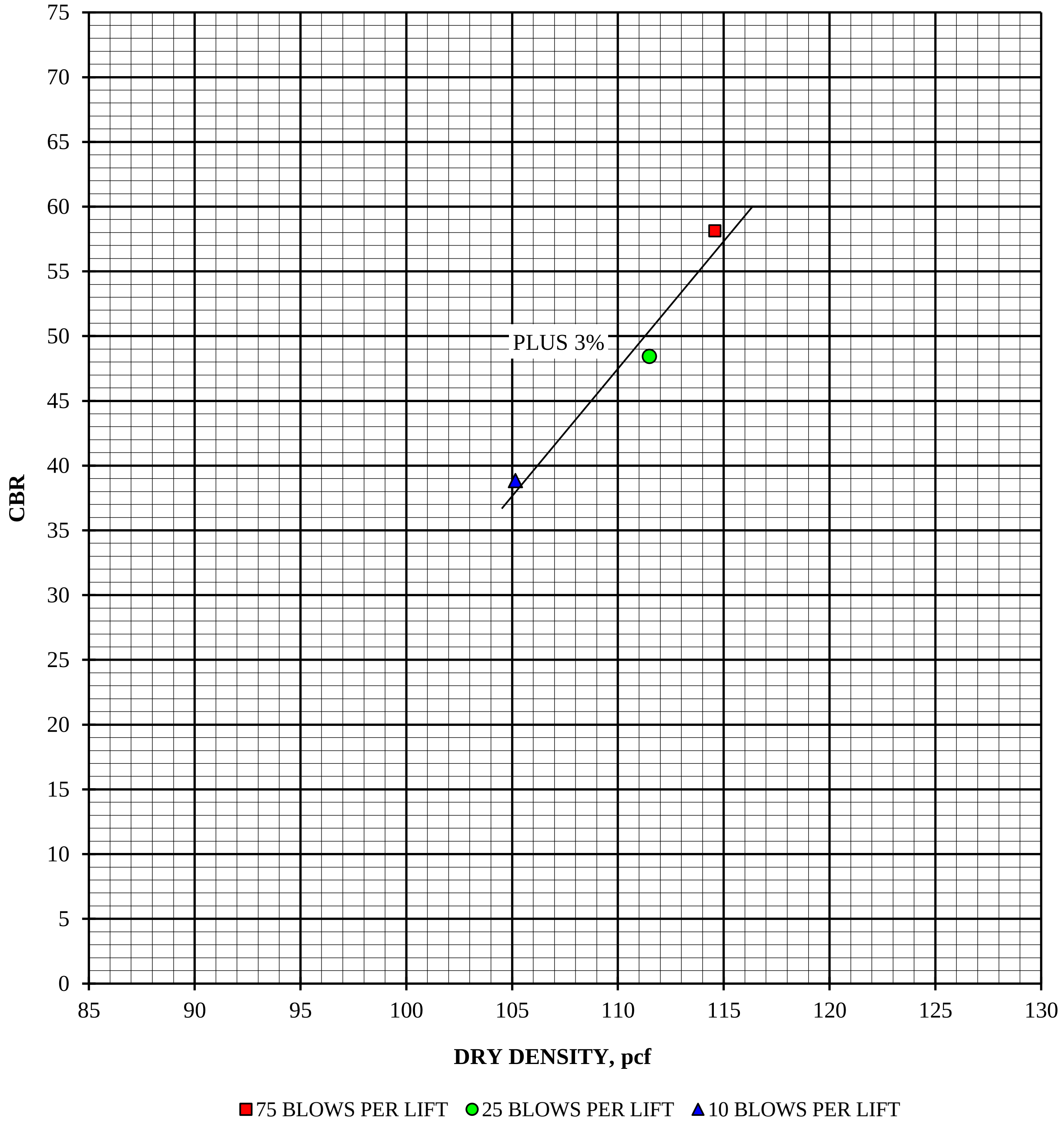
February 11, 2020

Dark Brown Sandy Lean Clay (CL)

With 5% Lime by Dry Weight

DRY DENSITY vs. CBR

Arranged According to Moisture Content



CALIFORNIA BEARING RATIO

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

Boring #66 @ 4.0 - 5.0'
Dark Brown Silty, Clayey Sand (SC-SM)

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	99.2	101.9	109.0
Moisture content, %, before soak	10.5	13.5	16.5
Moisture content, %, after soak, avg.	26.1	25.6	20.1
Moisture content, %, after soak, top 1"	26.5	25.4	21.1
Expansion, %, 96 hour soak	6.8	1.5	0.2
Bearing Ratio, 0.100" penetration	2.4	3.3	3.7

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	108.6	111.8	113.6
Moisture content, %, before soak	10.5	13.5	16.5
Moisture content, %, after soak, avg.	21.9	19.4	-188.3
Moisture content, %, after soak, top 1"	22.9	19.0	19.1
Expansion, %, 96 hour soak	8.0	3.9	0.9
Bearing Ratio, 0.100" penetration	5.4	17.5	12.1

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	115.0	120.1	115.1
Moisture content, %, before soak	10.5	13.5	16.5
Moisture content, %, after soak, avg.	18.2	16.7	18.8
Moisture content, %, after soak, top 1"	18.7	18.1	17.4
Expansion, %, 96 hour soak	5.3	3.2	0.2
Bearing Ratio, 0.100" penetration	16.5	22.8	8.5

Oxnard Airport Taxiway F Improvements
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CALIFORNIA BEARING RATIO

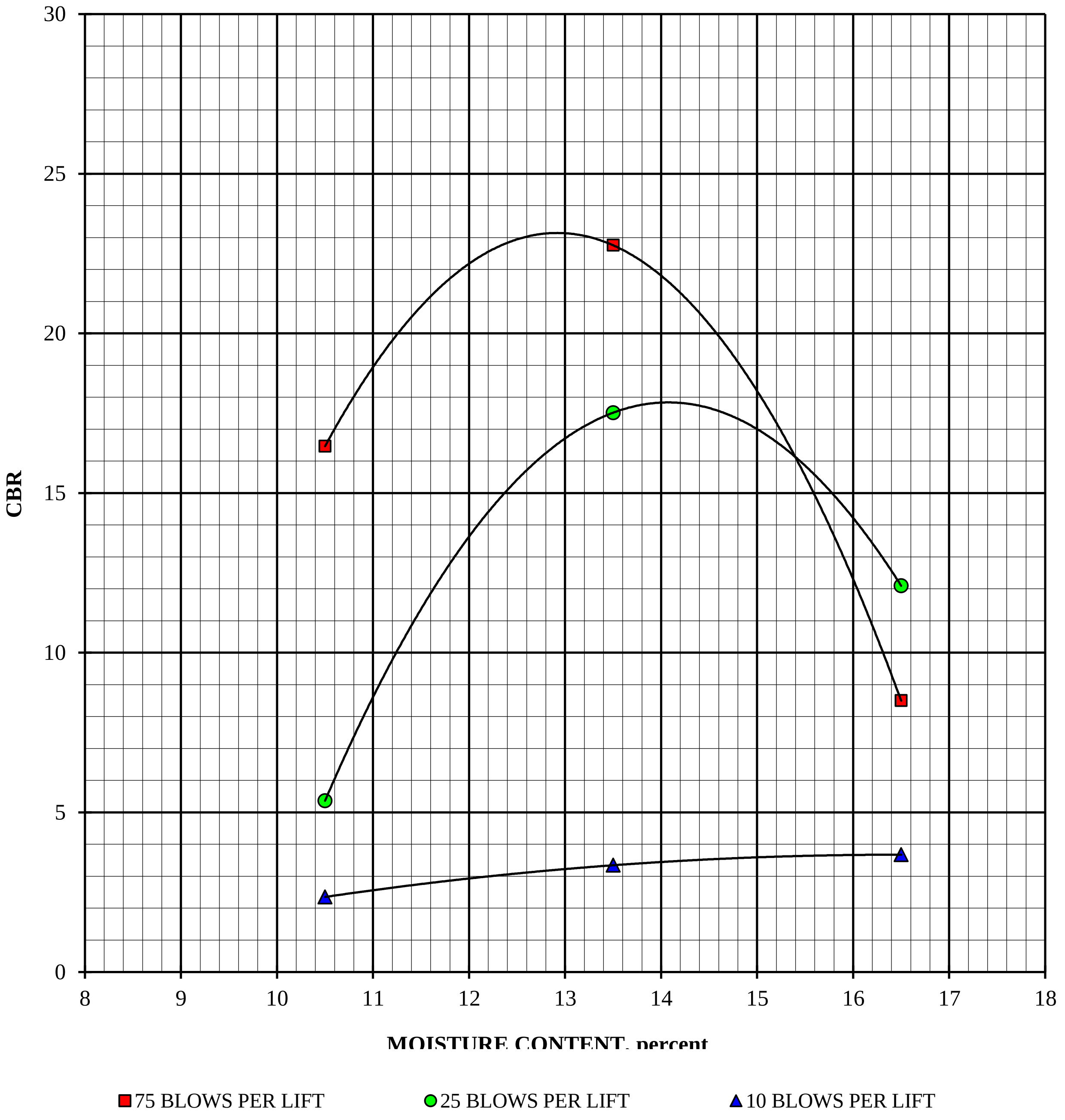
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #66 @ 4.0 - 5.0'

February 11, 2020

Dark Brown Silty, Clayey Sand (SC-SM)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

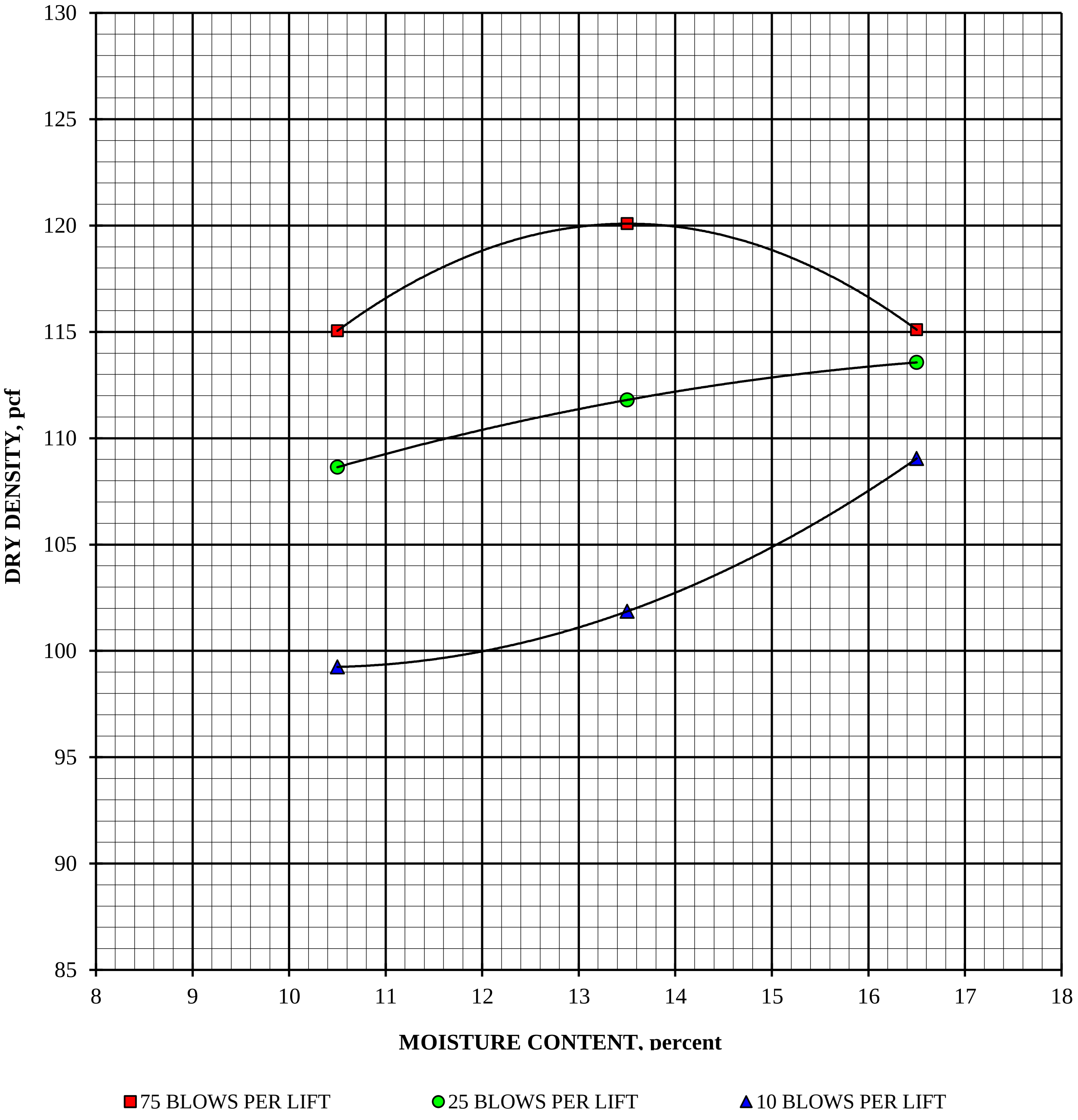
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #66 @ 4.0 - 5.0'

February 11, 2020

Dark Brown Silty, Clayey Sand (SC-SM)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

302524-002

CALIFORNIA BEARING RATIO

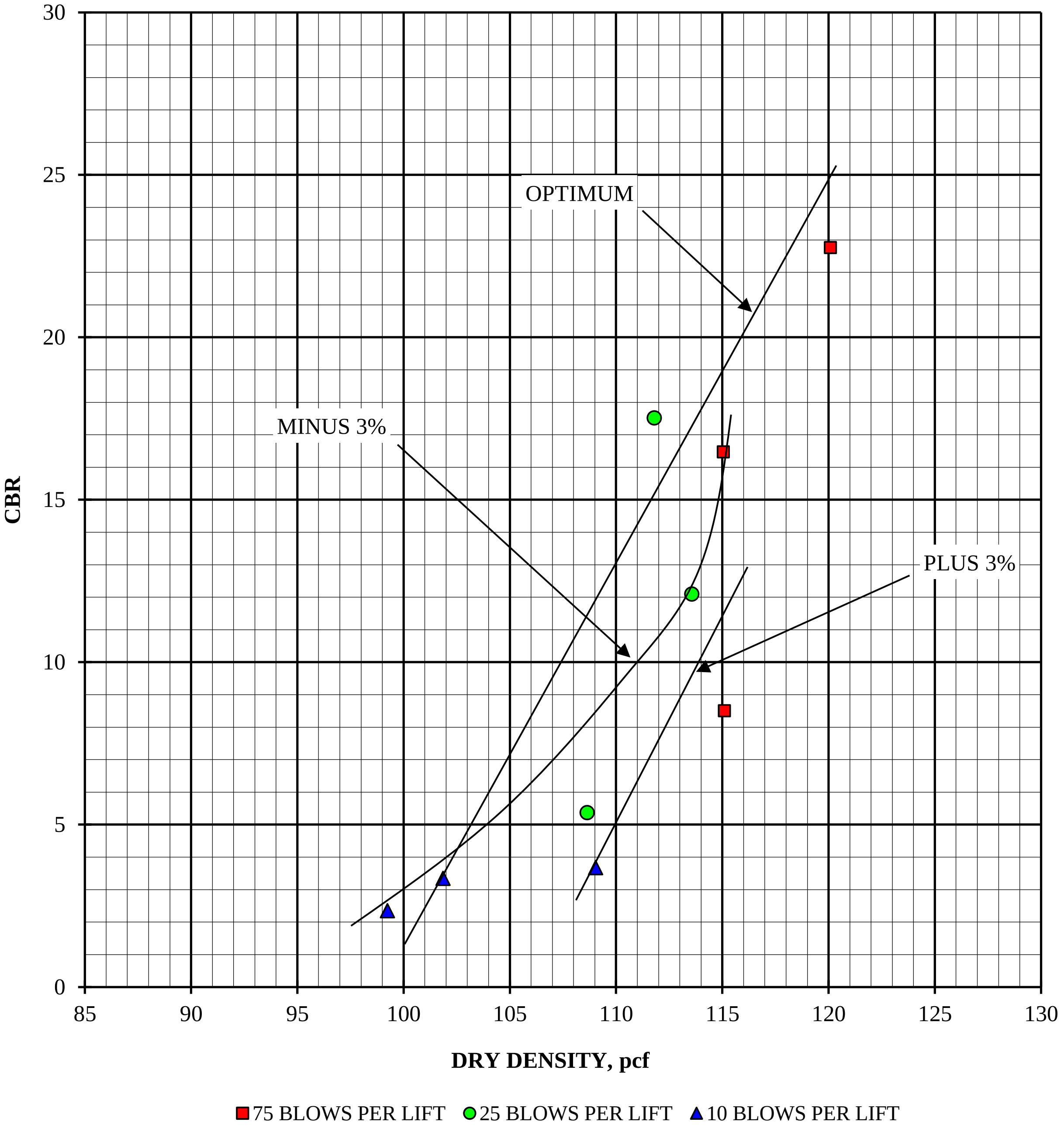
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #66 @ 4.0 - 5.0'
Dark Brown Silty, Clayey Sand (SC-SM)

February 11, 2020

DRY DENSITY vs. CBR

Arranged According to Moisture Content



CALIFORNIA BEARING RATIO

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

Boring #70 @ 1.5 - 4.5'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

10 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	107.1	111.0	115.4
Moisture content, %, before soak	7.2	10.2	13.2
Moisture content, %, after soak, avg.	18.9	11.7	14.7
Moisture content, %, after soak, top 1"	22.7	19.8	17.6
Expansion, %, 96 hour soak	1.4	2.4	0.1
Bearing Ratio, 0.100" penetration	4.2	10.1	4.2

25 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	116.8	119.8	117.7
Moisture content, %, before soak	7.2	10.2	13.2
Moisture content, %, after soak, avg.	10.7	11.6	13.9
Moisture content, %, after soak, top 1"	18.6	17.7	16.4
Expansion, %, 96 hour soak	1.1	1.6	0.1
Bearing Ratio, 0.100" penetration	16.2	33.4	9.6

75 BLOWS PER LIFT

	-3 Percent	Optimum Moisture	+ 3 percent
Dry density, pcf, before soak	121.8	125.2	117.3
Moisture content, %, before soak	7.2	10.2	13.2
Moisture content, %, after soak, avg.	13.2	12.7	15.1
Moisture content, %, after soak, top 1"	16.9	14.9	14.5
Expansion, %, 96 hour soak	1.6	0.4	0.2
Bearing Ratio, 0.100" penetration	19.4	44.9	6.2

CALIFORNIA BEARING RATIO

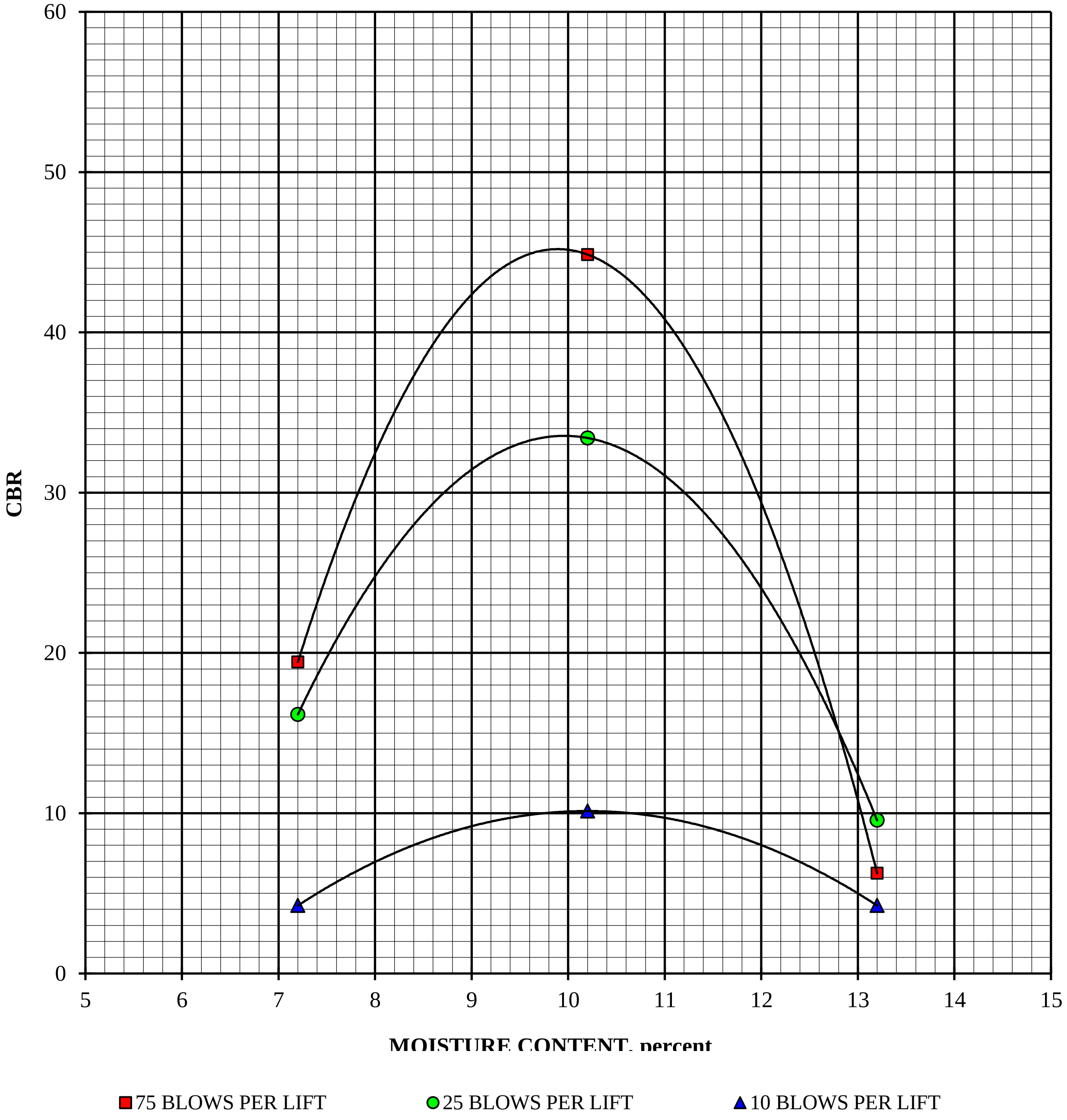
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #70 @ 1.5 - 4.5'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

CBR vs. MOISTURE CONTENT



CALIFORNIA BEARING RATIO

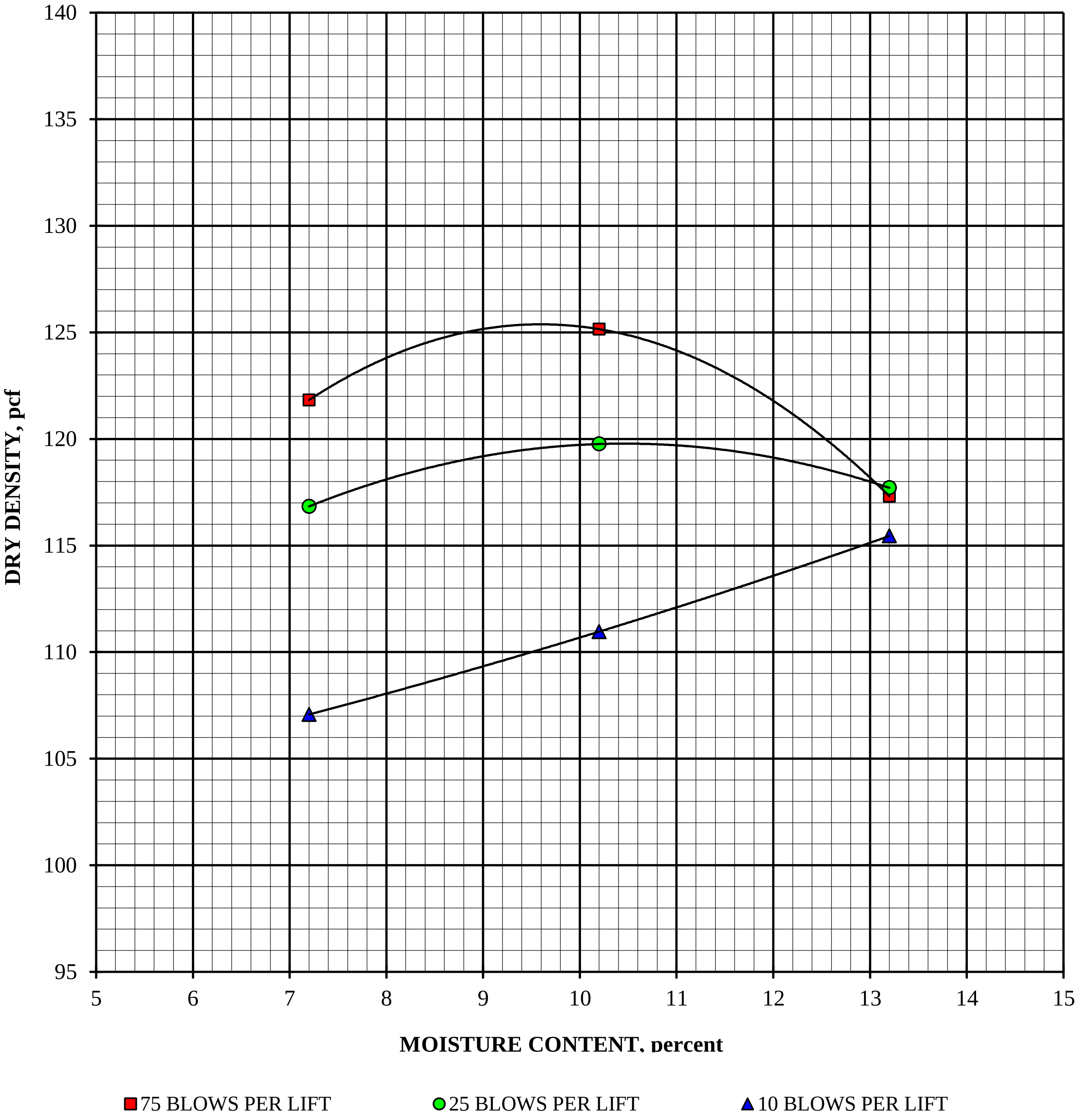
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #70 @ 1.5 - 4.5'

February 11, 2020

Dark Brown Sandy Lean Clay (CL)

DRY DENSITY vs. MOISTURE CONTENT



Oxnard Airport Taxiway F Improvements
Oxnard, California

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CALIFORNIA BEARING RATIO

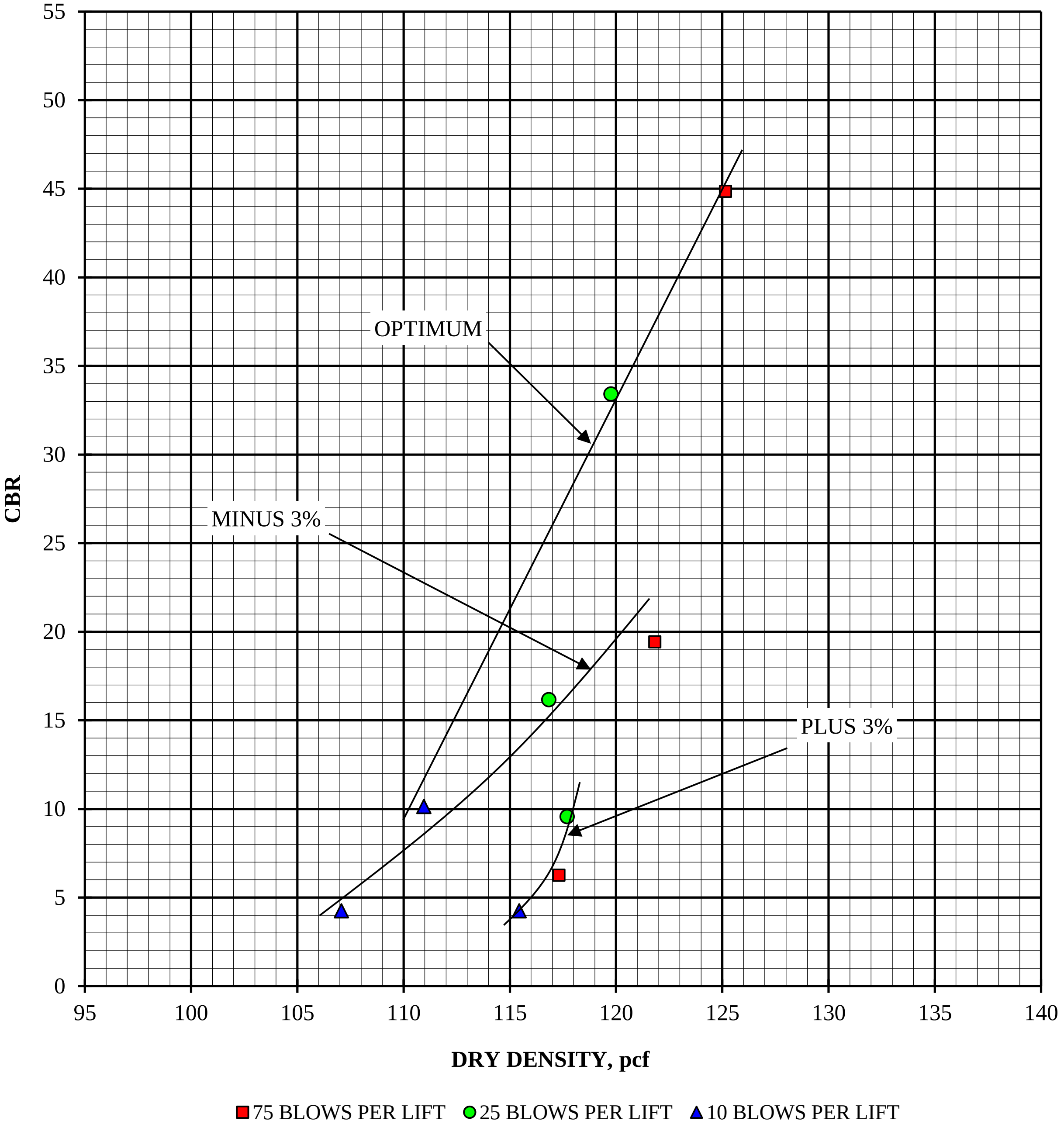
ASTM D 1883-16 (For a Range of Moisture Contents)

Boring #70 @ 1.5 - 4.5'
Dark Brown Sandy Lean Clay (CL)

February 11, 2020

DRY DENSITY vs. CBR

Arranged According to Moisture Content



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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

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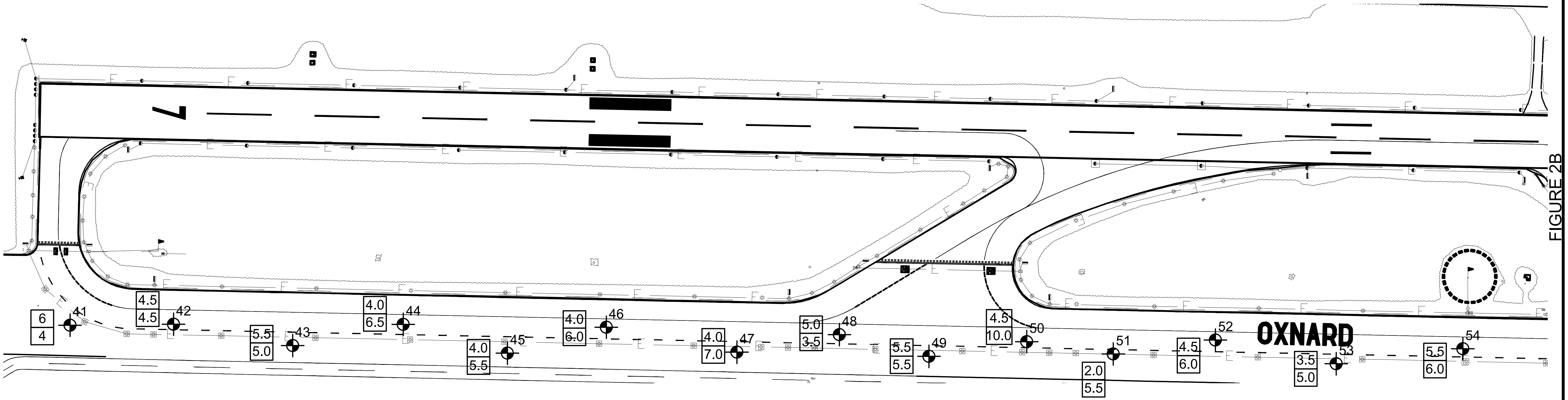

LEGEND

41-70 ⌖ Boring Location (Approx.)

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

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

N

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OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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FIGURE 2A - EXISTING PAVEMENT SECTION THICKNESSES

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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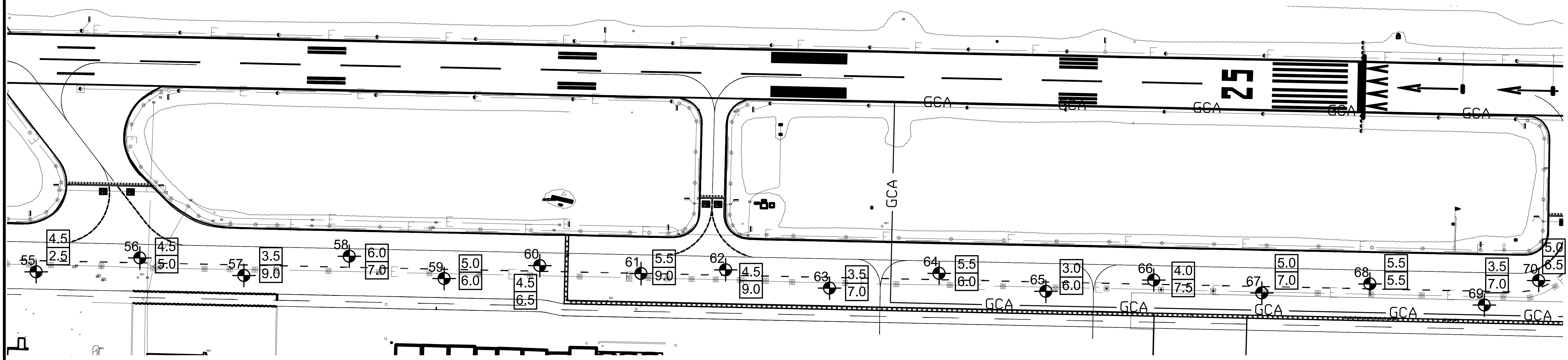
FIGURE 2A



LEGEND

41-70 ⌖ 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 - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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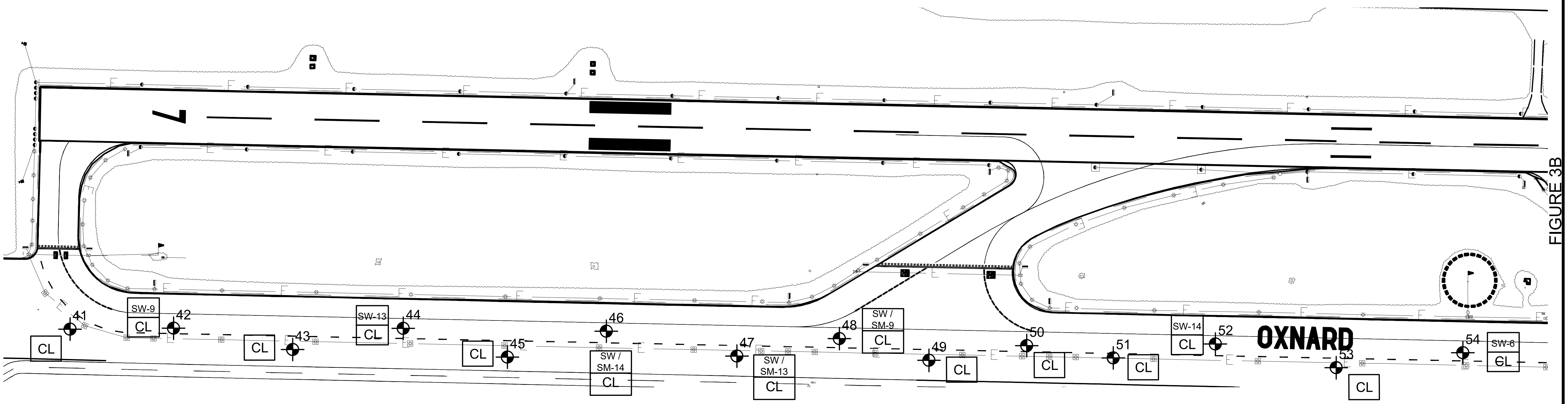

LEGEND

41-70	Boring Location (Approx.)
SW-X	WELL GRADED SAND (with or without silt and/or gravel) - "X" indicates thickness in inches where present below pavement section
CL	SANDY LEAN CLAY

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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FIGURE 3A - USCS SOIL TYPES AT SUBGRADE

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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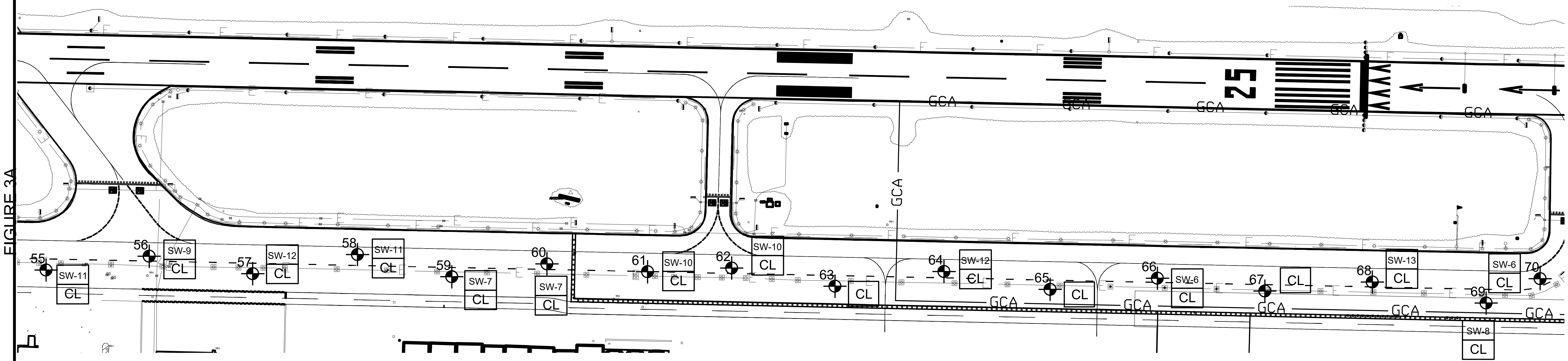

LEGEND

41-70 ⌖ Boring Location (Approx.)

SP-X WELL GRADED SAND (with or without silt and/or gravel) - "X" indicates thickness in inches where present below pavement section

CL SANDY LEAN CLAY

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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FIGURE 3B - USCS SOIL TYPES AT SUBGRADE

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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302524-002

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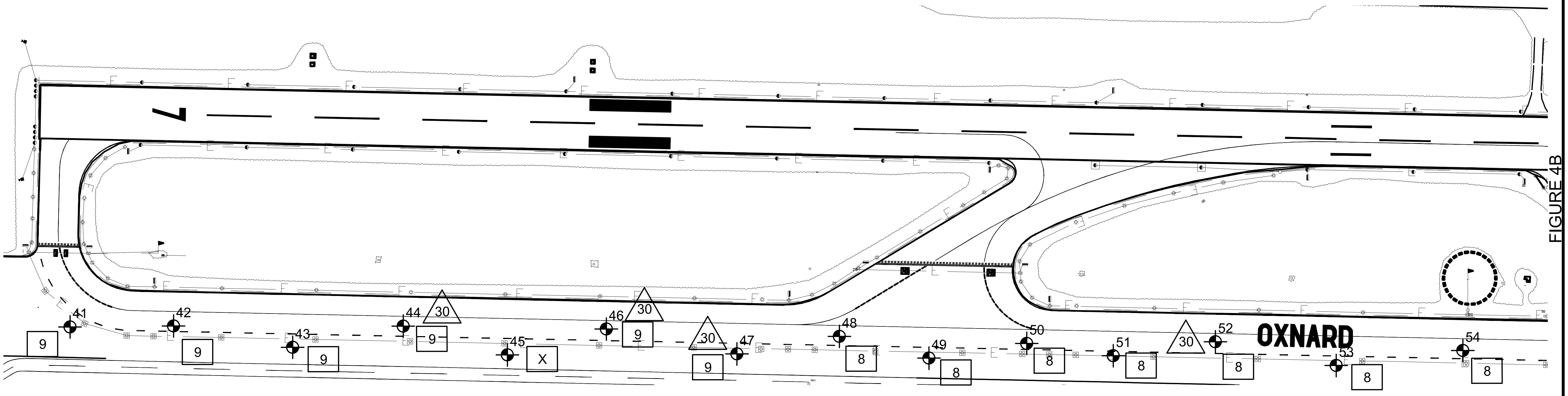

LEGEND

41-70 ⊕ Boring Location (Approx.)

X Subgrade soil from this boring lime treated at 5 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 moisture content in range of optimum +/- 2 percent. Well graded sand layers, where present, disregarded

△30 Recommended soil CBR value for well graded sand layer (Fill), directly below AC/mAB pavement section, where 10 inches or thicker, compacted to a minimum of 95 percent relative compaction, and moisture content in range of optimum +/- 2 percent.

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

Project No.
302524-002

Sheet 1 of 2

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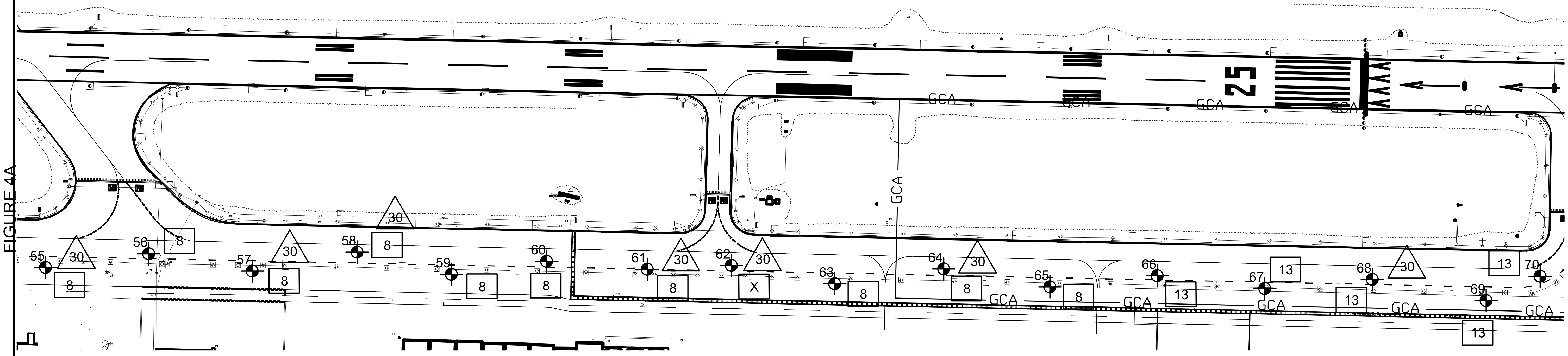

LEGEND

41-70 ⊕	Boring Location (Approx.)
X	Subgrade soil from this boring lime treated at 5 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 moisture content in range of optimum +/- 2 percent. Well graded sand layers, where present, disregarded
△ 30	Recommended soil CBR value for well graded sand layer (Fill), directly below AC/mAB pavement section, where 10 inches or thicker, compacted to a minimum of 95 percent relative compaction, and moisture content in range of optimum +/- 2 percent.

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

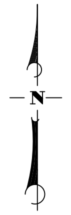

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FIGURE 4B - CBR VALUES - 95% MINIMUM RELATIVE COMPACTION AT SUBGRADE

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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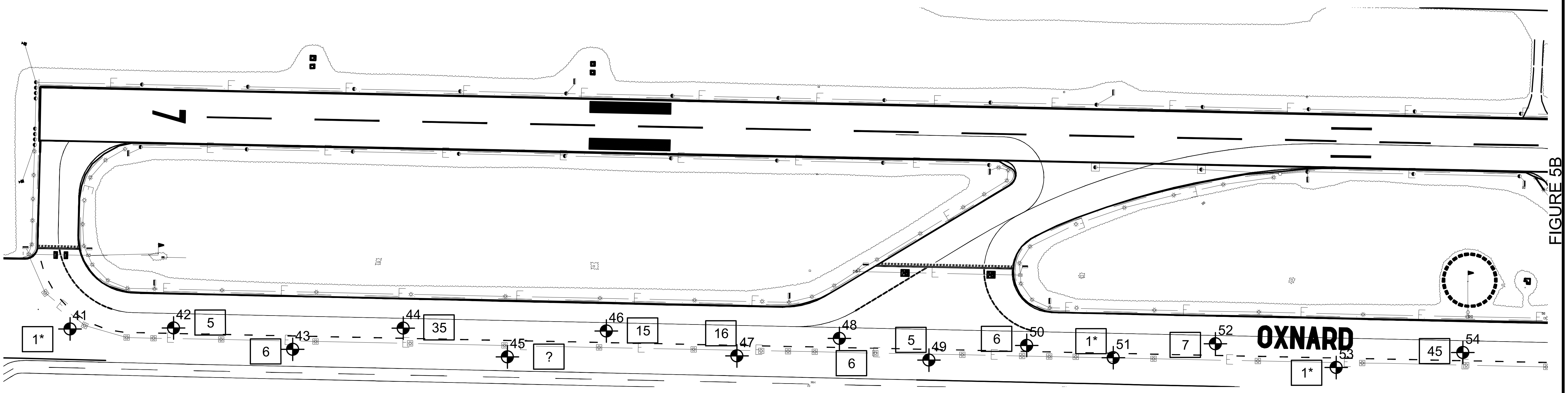
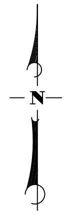


LEGEND

41-70 ⌖ Boring Location (Approx.)

8	Approximate CBR based on existing soil density and moisture content at subgrade. Thin well graded sand layers directly below misc. AB, where present, disregarded if less than 10 inches. If well graded sand layer is 10 inches or greater, value shown is for that layer.
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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OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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302524-002

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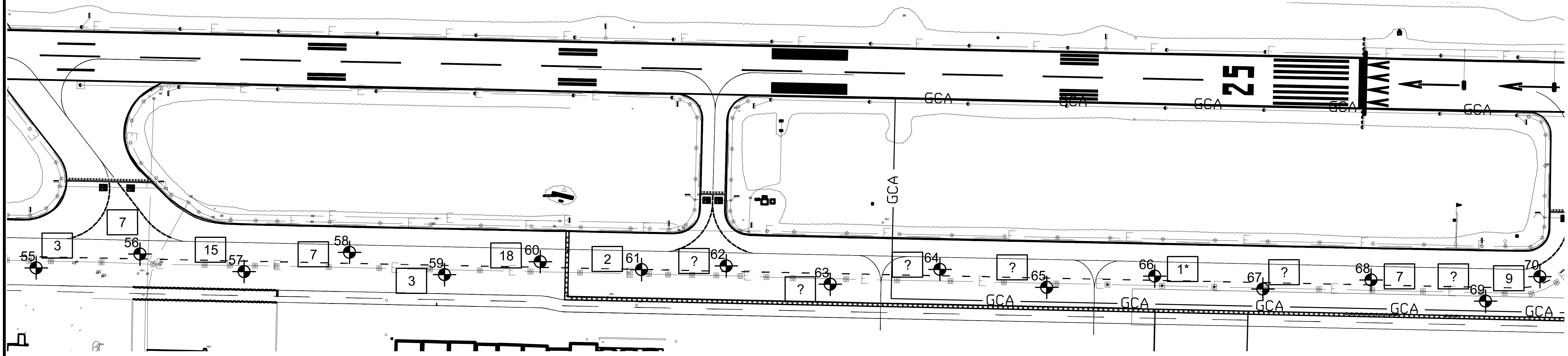
FIGURE 5A



LEGEND

41-70 Boring Location (Approx.)

8 Approximate CBR based on existing soil density and moisture content at subgrade. Thin well graded sand layers directly below misc. AB, where present, disregarded if less than 10 inches. If well graded sand layer is 10 inches or greater, value shown is for that layer.

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.

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BASE MAP PROVIDED BY: MEAD AND HUNT, INC

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OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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FIGURE 5B - APPROXIMATE CBR VALUES BASED ON EXISTING SOIL DENSITY AND MOISTURE CONTENT AT SUBGRADE

Oxnard Airport Runway and Taxiway
Rehabilitation/Reconstruction
Oxnard, California

Date
February 2020

Project No.
302524-002

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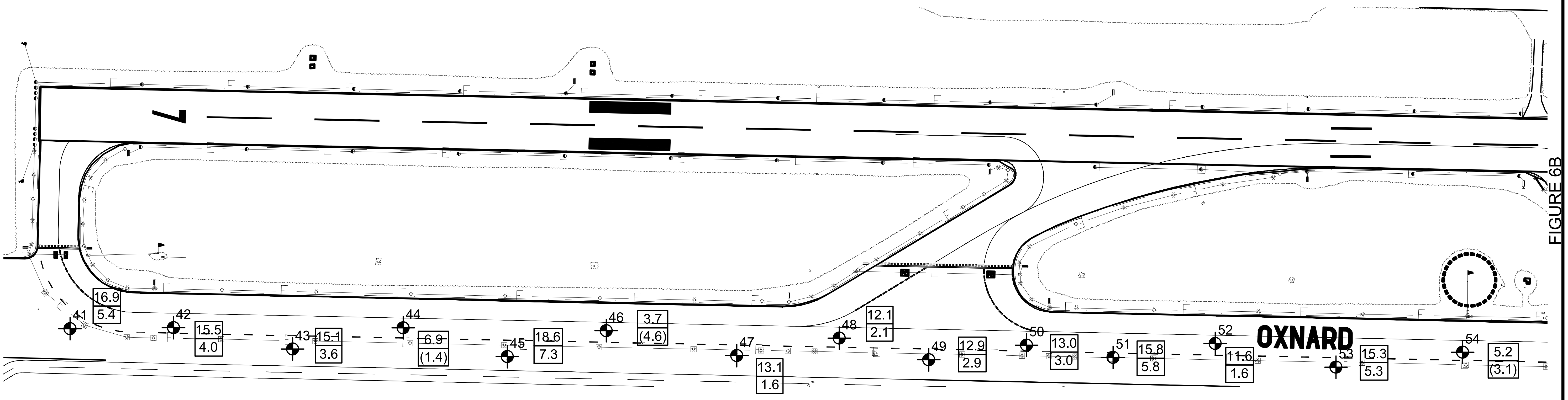

LEGEND

41-70 ⌖ 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

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OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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FIGURE 6A - SUBGRADE SOIL MOISTURE CONTENT

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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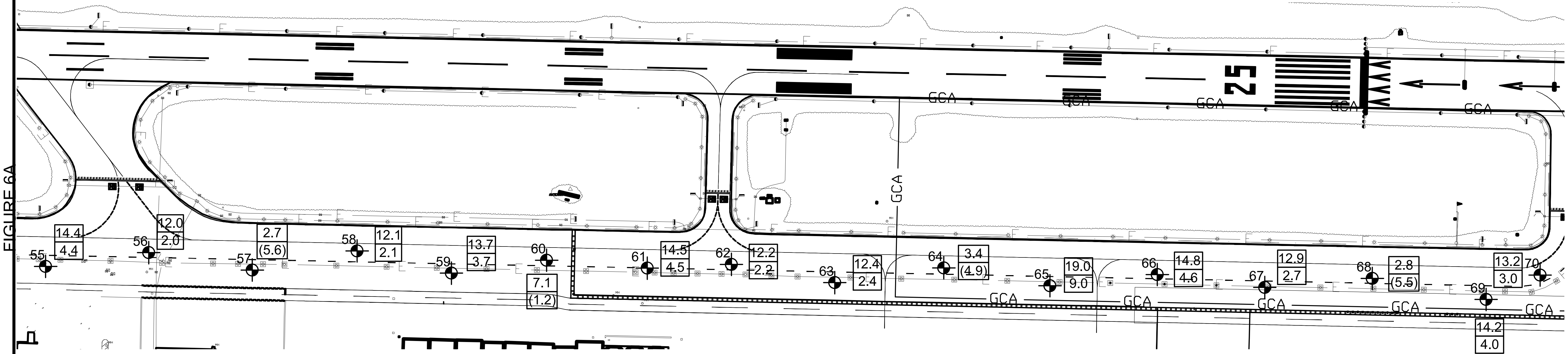

LEGEND

41-70 ⌖ 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

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FIGURE 6B - SUBGRADE SOIL MOISTURE CONTENT

Oxnard Airport - Taxiway F Improvements
2889 West 5th Street
Oxnard, California

Date
February 2020

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OXNARD AIRPORT TAXIWAY F IMPROVEMENTS021320maps

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APPENDIX D

Estimates of Earthwork Shrinkage

OXNARD AIRPORT
TAXIWAY F IMPROVEMENTS

ESP File No. 302524-002

Page 1 of 1

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).

Boring No.	Depth	Material Description	USCS Classificatior	Maximum Density, pcf	Optimum Moisture, %
41	1.5 - 5.0 ft	Dark Brown Sandy Lean Clay	CL	122.7	11.5
45	1.0 - 5.0 ft	Dark Brown Sandy Lean Clay	CL	123.1	11.3
46	1.0 - 2.0 ft	Lt Brn Well Gra Sand w/ Silt and Grav	SW-SM	128.7	8.3
54	4.0 - 5.0 ft	Dark Brown Sandy Lean Clay	CL	117.5	13.8
55	1.5 - 5.0 ft	Dark Brown Sandy Lean Clay	CL	125.4	10.0
62	2.0 - 5.0 ft.	Dark Brown Sandy Lean Clay	CL	124.7	10.9
66	4.0 - 5.0 ft	Dark Brown Silty, Clayey Sand	SC-SM	119.8	13.5
70	1.5 - 4.5	Dark Brown Sandy Lean Clay	CL	124.1	10.2

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.
41	1.0 - 1.5	16.9	107.9	122.7	87.9	8.0	9.2	10.3	11.4	12.6	13.7
42	1.5 - 2.0	15.5	112.3	122.7	91.5	3.8	4.9	6.0	7.1	8.2	9.3
43	1.0 - 1.5	15.1	115.9	122.7	94.5	0.6	1.6	2.7	3.7	4.8	5.9
44	1.5 - 2.0	6.9	120.7	128.7	93.8	1.3	2.4	3.4	4.5	5.6	6.6
45	1.0 - 1.5	18.6	106.3	123.1	86.4	10.0	11.2	12.3	13.5	14.6	15.8
46	1.0 - 1.5	3.7	117.1	128.7	91.0	4.4	5.5	6.6	7.7	8.8	9.9
47	1.0 - 1.5	13.1	116.4	122.7	94.9	0.1	1.2	2.3	3.3	4.4	5.4
48	1.0 - 1.5	12.1	114.8	125.4	91.5	3.8	4.9	6.0	7.0	8.1	9.2
49	1.0 - 1.5	12.9	114.7	125.4	91.5	3.9	5.0	6.0	7.1	8.2	9.3
50	1.0 - 1.5	13.0	119.0	125.4	94.9	0.1	1.2	2.2	3.3	4.3	5.4
51	1.0 - 1.5	15.8	111.4	125.4	88.8	6.9	8.1	9.2	10.3	11.4	12.6
52	1.5 - 2.0	11.6	114.6	125.4	91.4	4.0	5.0	6.1	7.2	8.3	9.4
53	1.0 - 1.5	15.3	110.1	125.4	87.8	8.2	9.3	10.5	11.6	12.8	13.9
54	1.5 - 2.0	5.2	124.3	128.7	96.6	-1.6	-0.6	0.4	1.5	2.5	3.5
55	1.0 - 1.5	14.4	108.9	125.4	86.8	9.4	10.5	11.7	12.8	14.0	15.2
56	1.5 - 2.0	12.0	116.0	125.4	92.5	2.7	3.8	4.9	5.9	7.0	8.1
57	1.0 - 1.5	2.7	117.6	128.7	91.4	4.0	5.1	6.2	7.3	8.3	9.4
58	1.5 -2.0	12.1	115.5	125.4	92.1	3.1	4.2	5.3	6.4	7.5	8.6
59	1.5 -2.0	13.7	110.8	125.4	88.4	7.5	8.6	9.8	10.9	12.0	13.2
60	1.0 - 1.5	7.1	119.8	128.7	93.1	2.1	3.1	4.2	5.3	6.4	7.4
61	1.5 - 2.0	14.5	112.4	125.4	89.6	6.0	7.1	8.2	9.3	10.5	11.6
62	1.5 - 2.0	12.2	90.7	124.7	72.7	30.6	32.0	33.4	34.7	36.1	37.5
63	1.0 - 1.5	12.4	77.9	125.4	62.1	52.9	54.5	56.1	57.8	59.4	61.0
64	1.0 - 1.5	3.4	104.3	128.7	81.0	17.2	18.5	19.7	20.9	22.2	23.4
65	1.0 - 1.5	19.0	102.3	125.4	81.6	16.5	17.7	18.9	20.1	21.4	22.6
66	1.0 - 1.5	14.8	115.4	124.1	93.0	2.2	3.2	4.3	5.4	6.5	7.5
67	1.0 - 1.5	12.9	106.7	124.1	86.0	10.5	11.7	12.8	14.0	15.1	16.3
68	1.0 - 1.5	2.8	112.7	128.7	87.6	8.5	9.6	10.8	11.9	13.1	14.2
69	1.0 - 1.5	14.2	126.1	124.1	101.6	-6.5	-5.5	-4.5	-3.6	-2.6	-1.6
70	1.0 - 1.5	13.2	118.0	124.1	95.1	-0.1	1.0	2.0	3.1	4.1	5.2
					Average Shrinkage, percent, all locations :	**7.3**	**8.5**	**9.6**	**10.7**	**11.9**	**13.0**
						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.**

Part 2 – Addendum to Geotechnical Engineering Reports

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Earth Systems

4378 Old Santa Fe Road | San Luis Obispo, CA 93401 | Ph: 805.544.3276 | www.earthsystems.com

July 10, 2020

FILE NO.: 302524-001
and 302524-002

Mr. Jeffrey Leonard, PE
Vice President
Mead & Hunt, Inc.
1360 19th Hole Drive, Suite 200
Windsor, CA 95492

PROJECT: OXNARD AIRPORT
2889 WEST 5TH STREET
OXNARD, CALIFORNIA

RUNWAY 7-25 AND TAXIWAY CONNECTOR IMPROVEMENTS
TAXIWAY F IMPROVEMENTS

SUBJECT: Addendum to Geotechnical Engineering Reports – Sulfate Testing of Subgrade Soils for Evaluation of Lime Treatment Option

TECHNICAL REFS: Attached

Dear Mr. Leonard:

As authorized, we have completed sulfate testing on samples of anticipated subgrade soils secured during the field investigations for our geotechnical engineering reports (ESP 2020a and 2020b) for these two projects. The purpose of testing was to satisfy the cautionary note in the introduction to Item P-155 Lime Treated Subgrade (FAA 2018) which states: "…The Engineer must check the soluble sulfate contents of the soils during design to determine if stabilization with lime can react and induce heave…"

As noted in *Recommended Practice for Stabilization of Sulfate-Rich Subgrade Soils* (NAP 2009), "…Even though stabilization improves engineering properties, problems can arise when calcium-based stabilizers (i.e., lime) are used in soils rich in sulfate-bearing minerals. Stabilization of sulfate-rich soils in the presence of excess moisture may lead to the formation of minerals such as ettringite and/or thaumasite and can cause distress in or even destruction of pavement structures due to heaving. However, the extent of such distress varies among soils and is dependent on factors including the strength of the soil matrix and the spatial distribution and arrangement of ettringite (and/or thaumasite) crystals in the matrix…Ettringite precipitation is a complex problem related not only to soil composition but also to construction methods, availability of water, ion migration, and void structures in pavements." This publication also provides a table indicating the level of risk associated with the use of calcium-based (lime) stabilizers in sulfate rich soils. A partial reproduction of the table (sulfate concentrations listed in parts per million (ppm) rather than percent by dry weight) is as follows:

Risk Involved	**Soluble Sulfate Concentrations - ppm**
Low Risk	Below 3,000 ppm
Moderate Risk	Between 3,000 and 5,000 ppm
Moderate to High Risk	Between 5,000 and 8,000 ppm
High to Unacceptable Risk	Greater than 8,000 ppm
Unacceptable Risk	Greater than 10,000 ppm

On October 16, 2019, four samples from the Taxiway F Improvements project area were sent to HDR, Inc., of Claremont, California for soluble sulfate testing. The Chain of Custody & Request for Laboratory Testing documentation for these samples, as well as the test results, are included in Appendix A.

After the results from this initial round of sulfate testing were received and reviewed, it was noted that one of the samples showed a significant level (23,500 ppm) of soluble sulfates. Per the table above, the material would therefore have an unacceptable level of risk associated with calcium-based lime treatment. The other three samples had soluble sulfate levels of 3,930 ppm, 1,100 ppm and 169 ppm. This nonuniformity and significant disparity among the results led to consideration for additional testing.

To further characterize the subgrade soils, a second set of six total samples were authorized to be sent to HDR, Inc., for soluble sulfate testing. Four samples were selected from material maintained in our laboratory from the Runway 7-25 and Taxiway Connector Improvements project area, and two additional samples were from the Taxiway F Improvements area. The intent of the additional samples was to provide data for the entire extent of both project areas, and to determine, if possible, if the sulfate-rich conditions were only present in an isolated area. The Chain of Custody & Request for Laboratory Testing documentation for this second round of samples, as well as the test results, are included in Appendix B. This second round of testing yielded a similar disparity in the results, with values ranging from a low of 740 ppm to a high of 20,200 ppm.

The results from both rounds of soluble sulfate testing are plotted on a map of the combined projects in Appendix C. The map also indicates the locations of the exploratory borings performed for the two reports by this firm (ESP 2020a and 2020b).

Based on information contained in *Recommended Practice for Stabilization of Sulfate-Rich Subgrade Soils* (NAP 2009), a limited program of swell testing was completed to determine, if possible, the effect of extended mellowing time and remixing on a samples of lime treated soil prior to compaction. For this test, the soil sample with the greatest soluble sulfate content (Boring 41 from 1.5 to 5.0 feet below existing grade) was treated with 5 percent lime by dry weight (BDW), in single and full stages, with the following modified mellowing time periods:

- 1 stage - 5 percent lime treatment BDW, 1 day mellowing period
- 2 stage – 2.5 percent lime treatment BDW, 2 days mellowing period; 2.5 percent additional lime treatment, 1 day additional mellowing period
- 2 stage – 2.5 percent lime treatment BDW, 4 days mellowing period; 2.5 percent additional lime treatment, 1 day additional mellowing period
- 2 stage – 2.5 percent lime treatment BDW, 6 days mellowing period; 2.5 percent additional lime treatment, 1 day additional mellowing period

During the mellowing period, the treated soil was maintained in sealed plastic bags with moisture contents of 3 to 4 percent above optimum moisture. After completion of the various mellowing periods, the samples were recompacted at 95 percent of maximum dry density as standard one-dimensional consolidation samples (ASTM D 2435/D 2435M-11). The samples were then loaded with a surcharge of 100 psf (to simulate an overlying AC/AB pavement section approximately 8 to 9 inches thick), and fully inundated. All samples collapsed under the surcharge loading prior to swelling. Initial collapse values ranged from 0.0010 to 0.0015-inch. As of January 27, 2020, all four samples appeared to have reached a steady state condition, with no swell or collapse (measured to the nearest 0.0001-inch) for at least 2 days prior to final readings.

The results of the swell tests are provided in the summary graph in Appendix C. The graph is not a complete depiction of all swell readings taken over time for all samples, but rather a plot of the maximum swell values observed as of January 27, 2020, vs. the time for mellowing and additional mixing prior to recompaction. The graph does indicate that, as noted in *Recommended Practice for Stabilization of Sulfate-Rich Subgrade Soils* (NAP 2009), the potential for swell is reduced with additional mellowing and mixing time.

As a final check on the effect of lime treatment, a sample of the 2-stage lime treated soil (5 percent total BDW) from Boring 41 at 1 to 5 feet that had mellowed for 13 days was sent to HDR, Inc., for soluble sulfate testing. The intent of this testing was to determine the residual sulfate level in the soil after lime treatment. The Chain of Custody & Request for Laboratory Testing documentation for this final round of testing, as well as the test results, are included in Appendix D. The result of this test was a residual soluble sulfate level of 677 ppm, a considerable reduction from the initially tested value (before lime treatment) of 23,500 ppm.

Based on this testing program, and on information obtained from *Recommended Practice for Stabilization of Sulfate-Rich Subgrade Soils* (NAP 2009), we recommend the following be incorporated in the plans for this project if it is elected to utilize lime treatment for improvement of subgrade soil strength and a subsequent reduction in the design pavement section. Information regarding subgrade soil strengths in the untreated and treated condition, and all other soil parameters, are contained in our project soil engineering reports (ESP 2020a and 2020b).

1. The minimum percentage of lime treatment should be 5 percent by dry weight of material (BDW).

2. The *Recommended Practice for Stabilization of Sulfate-Rich Subgrade Soils* (NAP 2009) indicates that in Texas, a single full application of lime should be utilized, rather than a split application. Discussions with a lime treatment contractor in this area indicates split applications appear to be more successful for higher lime treatment percentages. For this project, we recommend that the lime treatment should be performed in two stages, slightly weighted more to the initial treatment (i.e., 3 percent initial and 2 percent secondary).

3. A minimum mellowing period of 7 days should be used for the initial stage, prior to the secondary lime treatment operation. During this initial mellowing period the lime-treated soil moisture content should be maintained at 4 to 5 percent above optimum as a

minimum. The lime treated soil moisture content should be checked frequently, and additional moisture added as necessary to maintain the chemical reaction. During the initial mellowing period, the lime treated soil should be remixed a minimum of 3 times after the initial mixing period. Adequate water during the mellowing process is critical, and all efforts should be made to keep the soil moisture contents as high as possible without sacrificing construction workability and quality.

4. After the initial mellowing and mixing period is complete, the second stage lime treatment process can be completed. The secondary mellowing period should be a minimum of 48 hours; the lime treated soil should be maintained at 4 to 5 percent above optimum as a minimum, and the soil should be remixed at least 1 additional time following the final lime treatment/mixing operation, prior to final compaction.

5. To assure plenty of soil moisture during the treatment/mixing/mellowing operation, the contractor should consider lime application via slurry rather than in dry form.

6. Consideration should be given to testing the source of construction water available for the contractor during the lime treatment process, to verify that sulfates will not be added to the lime treated soil during the moisture conditioning process.

7. During final compaction operations, the lime treated soil should be maintained at as high a moisture content as possible (i.e., 3 to 5 percent above optimum moisture content, or more), while still achieving the required relative compaction, and maintaining firm and stable conditions during proofrolling.

8. To reduce the potential for the introduction of moisture into the compacted and completed overall pavement section, which can contribute to degradation of the lime treated soil layer, proper drainage of the pavement section, shoulders and adjacent infield areas is essential. Pavement edge drains should also be considered, to create a dewatered drainage flow line that is at least 3 feet below subgrade elevation.

9. Quality control testing (swell and/or residual sulfates) of the finished lime treated soil should be completed prior to compaction, to assure that the application, mixing and mellowing processes have been successful.

End of Addendum 1.

Please attach a copy of this addendum to each copy of the referenced report that you may have.

If there are any questions regarding this addendum, please feel free to contact the undersigned.

Sincerely,

Earth Systems Pacific

Fred J. Potthast, GE
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
FREDERICK J. POTTHAST
No. GE 2368
Exp. 03/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

Attachments: Appendix A – Chain of Custody/Request for Laboratory Testing, Samples Sent 10/16/19 to HDR, Inc. (1 page)
Laboratory Test Results for Samples Sent 10/16/19 to HDR, Inc. (2 pages)

Appendix B – Chain of Custody/Request for Laboratory Testing, Samples Sent 11/26/19 to HDR, Inc. (1 page)
Laboratory Test Results for Samples Sent 11/26/19 to HDR, Inc. (2 pages)

Appendix C – Soluble Sulfates Test Results Map (2 sheets)
Summary graph of Swell Test Data (1 page)

Appendix D – Chain of Custody/Request for Laboratory Testing, Samples Sent 1/16/20 to HDR, Inc. (1 page)
Laboratory Test Results for Samples Sent 1/16/20 to HDR, Inc. (2 pages)

Doc No.: 2002-053.ADD1/cr

TECHNICAL REFERENCE LIST

ESP (Earth Systems Pacific). January 21, 2020a. Geotechnical Engineering Report, Oxnard Airport, Runway and Taxiway Connector Rehabilitation/Reconstruction, Oxnard, California. Doc. No. 1901-103.SER.REV. File No. 302324-001

ESP (Earth Systems Pacific). July 10, 2020b. Geotechnical Engineering Report, Oxnard Airport, Taxiway F Improvements, Oxnard, California. Doc. No. 2007-040.SER. File No. 302324-002

FAA (U.S. Department of Transportation, Federal Aviation Administration). December 21, 2018. Standard Specifications for Construction of Airports. Advisory Circular 150/5370-10H.

NAP (The National Academies Press). 2009. Recommended Practice for Stabilization of Sulfate-Rich Subgrade Soils.

APPENDIX A

Chain of Custody/Lab Test Request for Samples Sent to HDR, Inc. on 10/16/19

Laboratory Test Results for Samples Sent to HDR, Inc. on 10/16/19

HDR

www.hdrinc.com

CHAIN OF CUSTODY & REQUEST FOR LABORATORY TESTING

DATE SENT: 10/1619

TESTING REQUESTED BY:
Name Fred J. Potthast, GE
Company Name Earth Systems Pacific
Address 4378 Old Santa Fe Road
City San Luis Obispo State CA Zip 93401

Phone: 805-544-3276 x-3
Fax: 805-544-1786
Email: fred@earthsystems.com

SEND RESULTS TO: Same as above
Name Fred J. Potthast, GE
Address Earth Systems Pacific
City San Luis Obispo State CA Zip 93401
Email: fred@earthsystems.com

SEND INVOICE TO: ☑Same as above
Name
Address
City State Zip
Email:

PROJECT INFORMATION:
P.O. NO: 302524-002 *JOB NAME:* Oxnard Airport - Taxiway F Improvements *JOB NO:* 302524-002
Site Address 2889 West 5th Street
Site City OxnardBoring Site State CA

TESTS DESIRED:
General Building Materials Corrosivity Testing (resistivity+pH, soluble salts analysis e.g. chlorides, sulfates, ammonium, nitrate)
CalTrans Corrosivity Testing (resistivity+pH per CTM 643, soluble salts analysis with chloride & sulfate per CTM 422 & 417)
Other (Please be specific) Soluable sulfates only

RESULTS DESIRED:
☐SOIL CORROSIVITY REPORT (with test results)*
☑TEST RESULTS ONLY (no report)
☐Expedite turn-around **(additional cost per sample)**. Expedited date required?

- **ARE THESE SAMPLES FROM A QUARANTINE AREA?** YES☐ NO☑

Boring ID	Depth	Type of Soil	Boring ID	Depth	Type of Soil
Boring 41	1.5 - 5	Dark Brown Clayey Sand (SC)			
Boring 55	1.5 - 5	Dark Brown Clayey Sand (SC)			
Boring 70	1.5 - 4.5	Brown Clayey Sand (SC)			
Boring 46	1 - 2	LTBr. Poorly grded Sand (SP)			

CHAIN OF CUSTODY

Signature	Print Name	Company	Date	Time
Collected/Relinquished By	Sean Hemmer	Earth Systems Pacific	10/11/19	PM
Received By:	Terry Reyes	Earth Systems Pacific	10/11/19	PM
Relinquished By:	Terry Reyes	Earth Systems Pacific	10/16/19	pm
Received By:				
Relinquished By:				
Received By Laboratory				

*IF SOIL CORROSIVITY REPORT IS REQUESTED PLEASE FILL OUT PAGE 2

TRANSMITTAL LETTER

DATE: November 19, 2019

ATTENTION: **Fred J. Potthast**

TO:

Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401

SUBJECT:

Laboratory Test Data
Oxnard Airport - Taxiway F Improvements
Your #302524-002, HDR Lab #19-0799LAB

COMMENTS: Enclosed are the results for the subject project.

James T. Keegan, MD
Corrosion and Lab Services Section Manager

Table 1 - Laboratory Tests on Soil Samples

Earth Systems Pacific
Oxnard Airport - Taxiway F Improvements
Your #302524-002, HDR Lab #19-0799LAB
19-Nov-19

Sample ID			Boring 41 @ 1.5-5'	Boring 55 @ 1.5-5'	Boring 70 @ 1.5-4.5'	Boring 46 @ 1-2'
Resistivity		**Units**				
as-received		ohm-cm	na	na	na	na
saturated		ohm-cm	na	na	na	na
pH			na	na	na	na
Electrical Conductivity		mS/cm	3.78	1.40	0.18	0.48
Chemical Analyses						
Cations						
calcium	Ca^{2+}	mg/kg	na	na	na	na
magnesium	Mg^{2+}	mg/kg	na	na	na	na
sodium	Na^{1+}	mg/kg	na	na	na	na
potassium	K^{1+}	mg/kg	na	na	na	na
Anions						
carbonate	CO_3^{2-}	mg/kg	na	na	na	na
bicarbonate	HCO_3^{1-}	mg/kg	na	na	na	na
fluoride	F^{1-}	mg/kg	na	na	na	na
chloride	Cl^{1-}	mg/kg	na	na	na	na
sulfate	SO_4^{2-}	mg/kg	23,500	3,930	169	1,100
phosphate	PO_4^{3-}	mg/kg	na	na	na	na
Other Tests						
ammonium	NH_4^{1+}	mg/kg	na	na	na	na
nitrate	NO_3^{1-}	mg/kg	na	na	na	na
sulfide	S^{2-}	qual	na	na	na	na
Redox		mV	na	na	na	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

APPENDIX B

Chain of Custody/Lab Test Request for Samples Sent to HDR, Inc. on 11/26/19

Laboratory Test Results for Samples Sent to HDR, Inc. on 11/26/19

HDR

www.hdrinc.com

CHAIN OF CUSTODY & REQUEST FOR LABORATORY TESTING

DATE SENT: 11/26/19

TESTING REQUESTED BY:
Name Fred J. Potthast, GE
Company Name Earth Systems Pacific
Address 4378 Old Santa Fe Road
City San Luis Obispo State CA Zip 93401
Phone: 805-544-3276 x-3
Fax: 805-544-1786
Email: fred@earthsystems.com

SEND RESULTS TO: Same as above
Name Fred J. Potthast, GE
Address Earth Systems Pacific
City San Luis Obispo State CA Zip 93401
Email: fred@earthsystems.com

SEND INVOICE TO: ☑ Same as above
Name
Address
City State Zip
Email:

PROJECT INFORMATION:
P.O. NO: 302524-002 *JOB NAME:* Oxnard Airport - Runway and Taxiway Improvements *JOB NO:* 302524-002
Site Address 2889 West 5th Street
Site City Oxnard Site State CA

TESTS DESIRED:
General Building Materials Corrosivity Testing (resistivity+pH, soluble salts analysis e.g. chlorides, sulfates, ammonium, nitrate)
CalTrans Corrosivity Testing (resistivity+pH per CTM 643, soluble salts analysis with chloride & sulfate per CTM 422 & 417)
Other (Please be specific) Soluable sulfates only

RESULTS DESIRED:
☐ SOIL CORROSIVITY REPORT (with test results)*
☑ TEST RESULTS ONLY (no report)
☐ Expedite turn-around **(additional cost per sample)**. Expedited date required?

- **ARE THESE SAMPLES FROM A QUARANTINE AREA?** YES ☐ NO ☑

Boring ID	Depth	Type of Soil	Boring ID	Depth	Type of Soil
1	2 - 5	Dark Brown Sandy Lean Clay (CL)			
5	2 - 4	Dark Brown Silty Sand (SM)			
13	2 - 4	Dark Brown Sandy Lean Clay (CL)			
27	2 - 4	Dark Brown Sandy Lean Clay (CL)			
45	1 - 5	Dark Brown Clayey Sand (SC)			
62	2 - 5	Dark Brown Clayey Sand (SC)			

CHAIN OF CUSTODY

Signature	Print Name	Company	Date	Time
Collected/Relinquished By	R. Wagner/S. Hemmer	Earth Systems Pacific	Nov. '18 / Oct '19	PM
Received By:	Terry Reyes	Earth Systems Pacific	Nov. '18 / Oct '19	PM
Relinquished By:	Terry Reyes	Earth Systems Pacific	11/26/19	PM
Received By:				
Relinquished By:				
Received By Laboratory:				

*IF SOIL CORROSIVITY REPORT IS REQUESTED PLEASE FILL OUT PAGE 2

HDR

TRANSMITTAL LETTER

DATE: December 10, 2019

ATTENTION: **Fred J. Potthast**

TO:
Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401

SUBJECT:
Laboratory Test Data
Oxnard Airport - Runway & Taxiway
Your #302524-002, HDR Lab #19-0860LAB

COMMENTS: Enclosed are the results for the subject project.

James T. Keegan, MD
Corrosion and Lab Services Section Manager

431 West Baseline Road · Claremont, CA 91711
Phone: 909.962.5485 · Fax: 909.626.3316

Table 1 - Laboratory Tests on Soil Samples

Earth Systems Pacific
Oxnard Airport - Runway & Taxiway Improvements
Your #302524-002, HDR Lab #19-0860LAB
10-Dec-19

Sample ID			B1 @ 2-5'	B5 @ 2-4'	B13 @ 2-4'	B27 @ 2-4'	B45 @ 1-5'
Resistivity		**Units**					
as-received		ohm-cm	na	na	na	na	na
saturated		ohm-cm	na	na	na	na	na
pH			na	na	na	na	na
Electrical Conductivity		mS/cm	0.56	0.32	3.09	4.71	0.73
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	na	na	na	na	na
magnesium	Mg^{2+}	mg/kg	na	na	na	na	na
sodium	Na^{1+}	mg/kg	na	na	na	na	na
potassium	K^{1+}	mg/kg	na	na	na	na	na
Anions							
carbonate	CO_3^{2-}	mg/kg	na	na	na	na	na
bicarbonate	HCO_3^{1-}	mg/kg	na	na	na	na	na
fluoride	F^{1-}	mg/kg	na	na	na	na	na
chloride	Cl^{1-}	mg/kg	na	na	na	na	na
sulfate	SO_4^{2-}	mg/kg	1,200	740	11,400	20,200	1,960
phosphate	PO_4^{3-}	mg/kg	na	na	na	na	na
Other Tests							
ammonium	NH_4^{1+}	mg/kg	na	na	na	na	na
nitrate	NO_3^{1-}	mg/kg	na	na	na	na	na
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mV	na	na	na	na	na

Sulfate per ASTM D4327.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

HDR

Table 1 - Laboratory Tests on Soil Samples

Earth Systems Pacific
Oxnard Airport - Runway & Taxiway Improvements
Your #302524-002, HDR Lab #19-0860LAB
10-Dec-19

Sample ID			B62 @ 2-5'
Resistivity		**Units**	
as-received		ohm-cm	na
saturated		ohm-cm	na
pH			na
Electrical Conductivity		mS/cm	0.59
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	na
magnesium	Mg^{2+}	mg/kg	na
sodium	Na^{1+}	mg/kg	na
potassium	K^{1+}	mg/kg	na
Anions			
carbonate	CO_3^{2-}	mg/kg	na
bicarbonate	HCO_3^{1-}	mg/kg	na
fluoride	F^{1-}	mg/kg	na
chloride	Cl^{1-}	mg/kg	na
sulfate	SO_4^{2-}	mg/kg	1,510
phosphate	PO_4^{3-}	mg/kg	na
Other Tests			
ammonium	NH_4^{1+}	mg/kg	na
nitrate	NO_3^{1-}	mg/kg	na
sulfide	S^{2-}	qual	na
Redox		mV	na

Sulfate per ASTM D4327.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

APPENDIX C

Soluble Sulfate Test Results Map

Summary Graph of Swell Test Data

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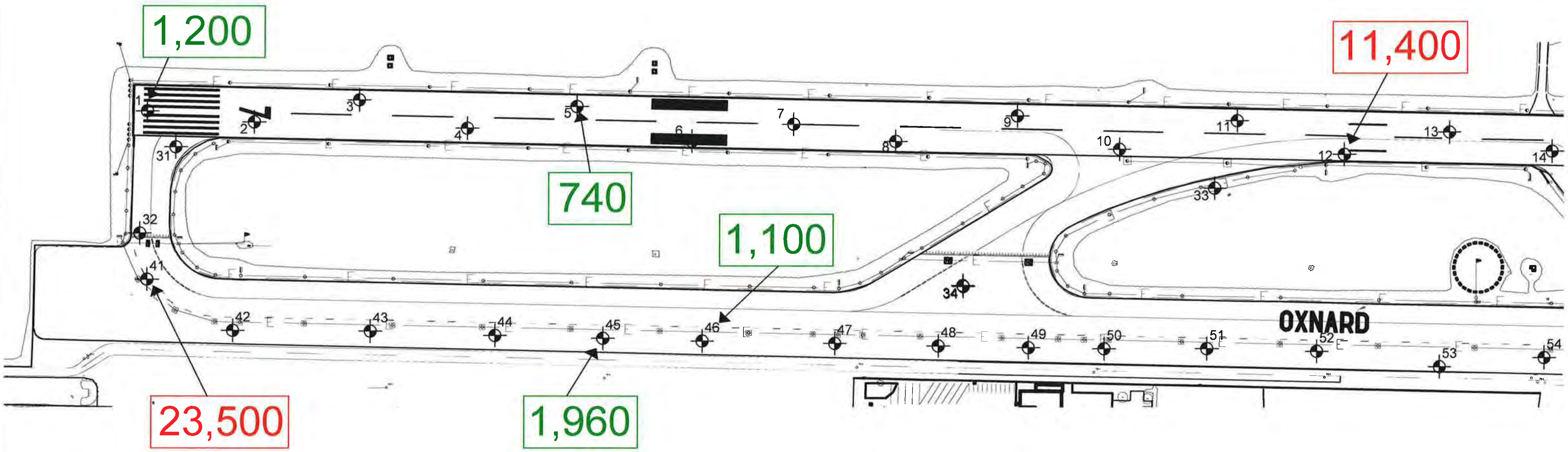

LEGEND

70 ⌖ Boring Location (Approx.)

23,500 Soluble Sulfate Content of Subgrade Soil (ppm)

Red (≥ 3000ppm) Green (< 3000ppm)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

N

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

SOLUBLE SULFATE TEST RESULTS MAP

Oxnard Airport Runway 7-25 and Taxiway Connector Improvements
Taxiway F Improvements
Oxnard, California

Date
February 2020

Project No.
302524-001, 002

Sheet 1 of 2

OXNARDAIRPORT110518maps

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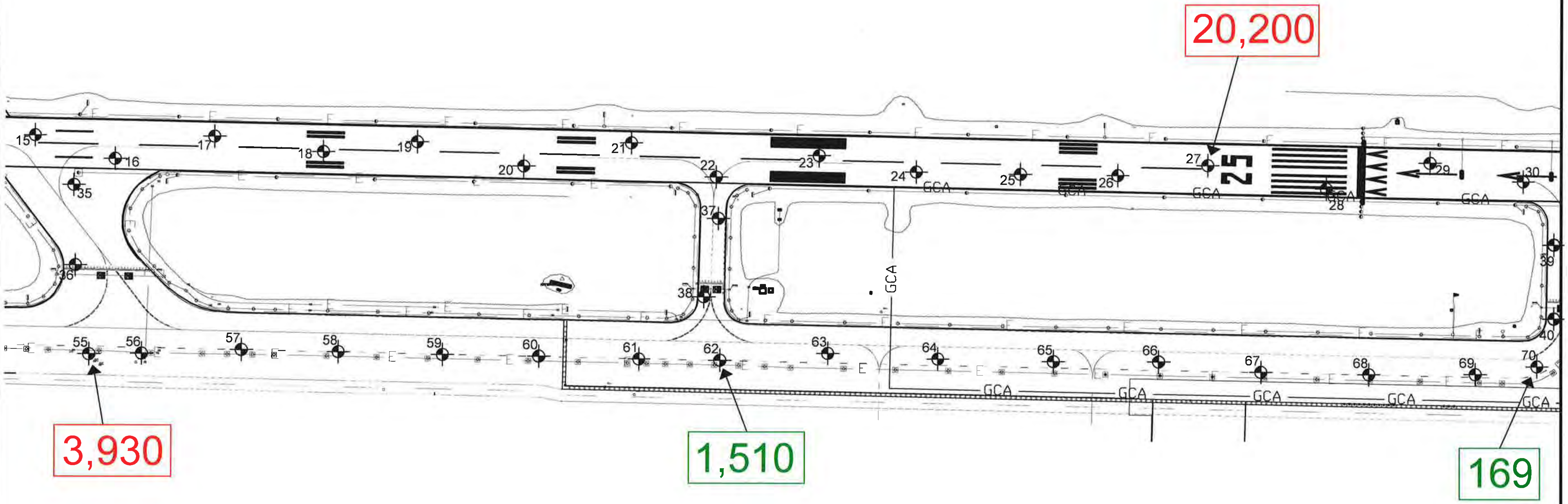

LEGEND

70 ⌖ Boring Location (Approx.)

23,500 Soluble Sulfate Content of Subgrade Soil (ppm)
Red (≥ 3000ppm) Green (< 3000ppm)

BASE MAP PROVIDED BY: MEAD AND HUNT, INC

N

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

SOLUBLE SULFATE TEST RESULTS MAP
Oxnard Airport Runway 7-25 and Taxiway Connector Improvements
Taxiway F Improvements
Oxnard, California

Date
February 2020

Project No.
302524-001, 002

Sheet 2 of 2

OXNARDAIRPORT110518maps

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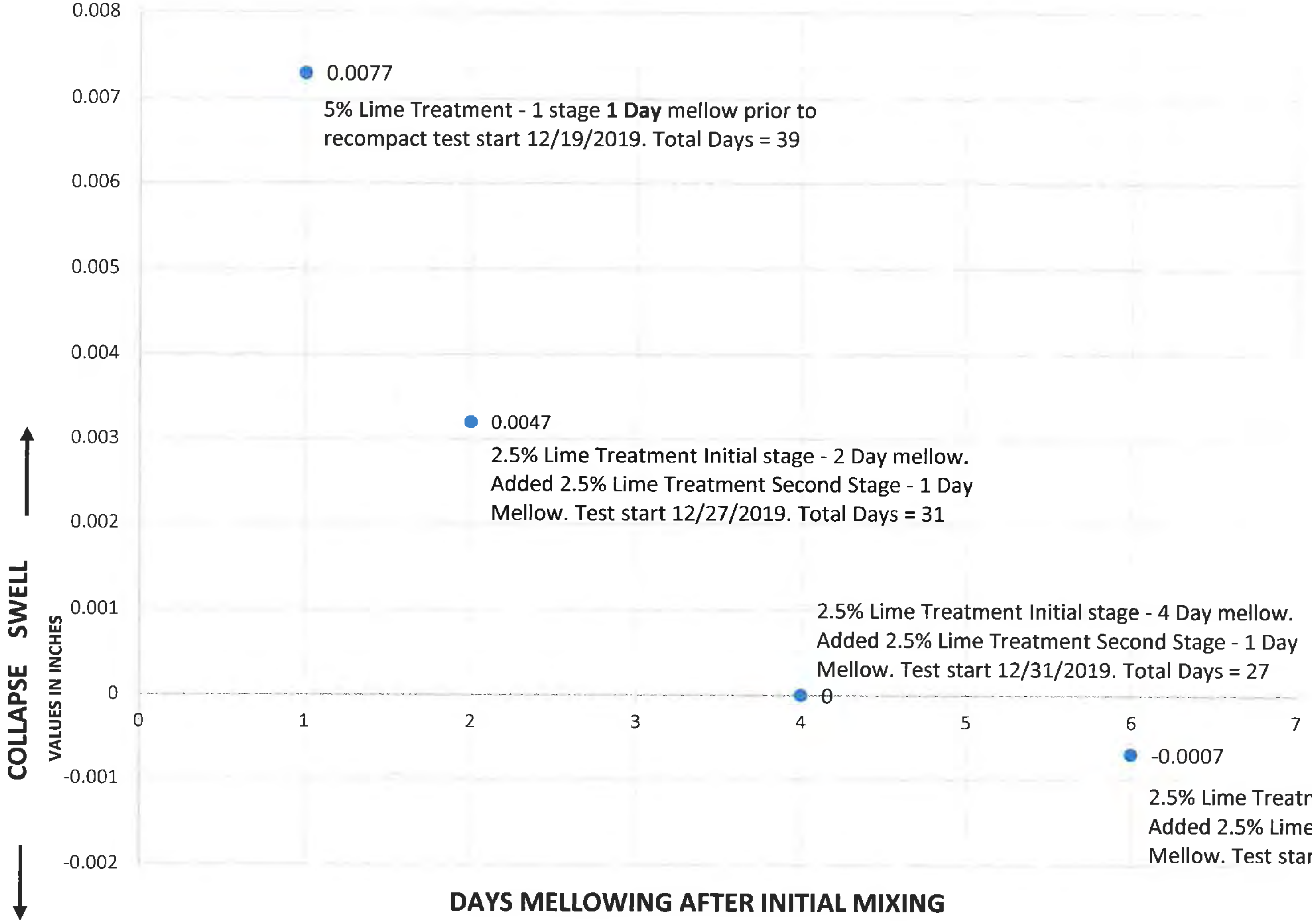
Oxnard Airport Taxiway F Improvements
Summary of Swell Test Data on Lime Treated Samples as of 1/27/2020
Sample ID: Boring 41 @ 1.5 - 5.0 ft.
Sulfate Content: 23,500 ppm



5% Lime Treatment - 1 stage **1 Day** mellow prior to recompact test start 12/19/2019. Total Days = 39

2.5% Lime Treatment Initial stage - 2 Day mellow. Added 2.5% Lime Treatment Second Stage - 1 Day Mellow. Test start 12/27/2019. Total Days = 31

2.5% Lime Treatment Initial stage - 4 Day mellow. Added 2.5% Lime Treatment Second Stage - 1 Day Mellow. Test start 12/31/2019. Total Days = 27

2.5% Lime Treatment Initial stage - 6 Day mellow. Added 2.5% Lime Treatment Second Stage - 1 Day Mellow. Test start 1/3/2020. Total Days = 24

Notes:

*All samples recompacted at 95% of Maximum Dry Density with 5% lime by dry weight of material at 3% above Optimum Moisture Content.

*100 psf surcharge, fully inundated to start swell test. Swell/collapse values measured after initial collapse under 100 psf surcharge and inundation to initial steady state (min. 2 days no change in readings).

Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 ◦ FAX (805) 544-1786
E-mail: esp@earthsystems.com

February 21, 2020

File No.: 302524-002 and 001

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APPENDIX D

Chain of Custody/Lab Test Request for Samples Sent to HDR, Inc. on 1/16/2020

Laboratory Test Results for Samples Sent to HDR, Inc. on 1/16/2020

CHAIN OF CUSTODY & REQUEST FOR LABORATORY TESTING

DATE SENT: 1/16/20

TESTING REQUESTED BY:
Name Fred J. Potthast, GE
Company Name Earth Systems Pacific
Address 4378 Old Santa Fe Road
City San Luis Obispo State CA Zip 93401
Phone: 805-544-3276 x-3
Fax: 805-544-1786
Email: fred@earthsystems com

SEND RESULTS TO: Same as above
Name Fred J. Potthast, GE
Address Earth Systems Pacific
City San Luis Obispo State CA Zip 93401
Email: fred@earthsystems.com

SEND INVOICE TO: ☑ Same as above
Name
Address
City State Zip
Email:

PROJECT INFORMATION:
P.O. NO: 302524-002 *JOB NAME:* Oxnard Airport - Runway and Taxiway Improvements *JOB NO:* 302524-002
Site Address 2889 West 5th Street
Site City Oxnard Site State CA

TESTS DESIRED:
General Building Materials Corrosivity Testing (resistivity+pH, soluble salts analysis e.g. chlorides, sulfates, ammonium, nitrate)
CalTrans Corrosivity Testing (resistivity+pH per CTM 643, soluble salts analysis with chloride & sulfate per CTM 422 & 417)
Other (Please be specific) Soluable sulfates only - per my phone call 1/16/20 at 0830 with James Keegan

RESULTS DESIRED:
☐ SOIL CORROSIVITY REPORT (with test results)*
☑ TEST RESULTS ONLY (no report)
☐ Expedite turn-around **(additional cost per sample)** Expedited date required?

- **ARE THESE SAMPLES FROM A QUARANTINE AREA?** YES ☐ NO ☑

Boring ID	Depth	Type of Soil	Boring ID	Depth	Type of Soil
41	1- 5	DkBrn Clayey Sand (SC)	This sample has been	lime treated	at 5% by dry
			weight in 2 stages - 2.5%	mellow for	6 days, then
			another 2.5 %. Total	mellowing	time as of 1/16/20
			is 13 days		

CHAIN OF CUSTODY

Signature	Print Name	Company	Date	Time
Collected/Relinquished By	R. Wagner/S. Hemmer	Earth Systems Pacific	Nov. '18 / Oct '19	PM
Received By:	Terry Reyes	Earth Systems Pacific	Nov. '18 / Oct '19	PM
Relinquished By:	Terry Reyes	Earth Systems Pacific	1/16/20	AM
Received By:				
Relinquished By:				
Received By Laboratory:				

*IF SOIL CORROSIVITY REPORT IS REQUESTED PLEASE FILL OUT PAGE 2

HDR

TRANSMITTAL LETTER

DATE: January 27, 2020

ATTENTION: **Fred J. Potthast**

TO:
Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401

SUBJECT:
Laboratory Test Data
Oxnard Airport - Runway and Taxiway
Your #302524-002, HDR Lab #20-0032LAB

COMMENTS: Enclosed are the results for the subject project.

James T. Keegan, MD
Corrosion and Lab Services Section Manager

431 West Baseline Road · Claremont, CA 91711
Phone: 909.962.5485 · Fax: 909.626.3316

Table 1 - Laboratory Tests on Soil Samples

Earth Systems Pacific
Oxnard Airport - Runway and Taxiway Improvements
Your #302524-002, HDR Lab #20-0032LAB
27-Jan-20

Sample ID			41 @ 1-5 DkBrn Clayey Sand (SC)
Resistivity		**Units**	
as-received		ohm-cm	na
saturated		ohm-cm	na
pH			12.5
Electrical Conductivity		mS/cm	8.30
Chemical Analyses			
Cations			
calcium	Ca^{2+}	mg/kg	4,620
magnesium	Mg^{2+}	mg/kg	23
sodium	Na^{1+}	mg/kg	91
potassium	K^{1+}	mg/kg	38
Anions			
hydroxide	OH^{1-}	mg/kg	3,350
carbonate	CO_3^{2-}	mg/kg	282
bicarbonate	HCO_3^{1-}	mg/kg	ND
fluoride	F^{1-}	mg/kg	95
chloride	Cl^{1-}	mg/kg	29
sulfate	SO_4^{2-}	mg/kg	677
phosphate	PO_4^{3-}	mg/kg	ND
Other Tests			
ammonium	NH_4^{1+}	mg/kg	28
nitrate	NO_3^{1-}	mg/kg	103
sulfide	S^{2-}	qual	na
Redox		mV	na

Resistivity per ASTM G187, Cations per ASTM D6919, Anions per ASTM D4327, and Alkalinity per APHA 2320-B.

Electrical conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.

mg/kg = milligrams per kilogram (parts per million) of dry soil.

Redox = oxidation-reduction potential in millivolts

ND = not detected

na = not analyzed

Appendix E - Aircraft Fleet Mix

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Oxnard Airport, Ventura County
Runway 7-25 Rehabilitation
Aircraft Fleet Mix

Appendix E

No,	Aircraft	MTOW (lbs)	2017	2018	2020	2023	2028	2038	2040
1	Gulfstream G650	99,600	165	167	500	517	550	611	624
2	Embraer 175	83,026	0		2,190	2,393	2,774	3,728	3,955
3	Falcon 900LX	49,000	1,025	1,037	1,062	1,098	1,168	1,298	1,324
4	Challenger 300/600/604	48,200	1,414	1,431	1,464	1,515	1,611	1,790	1,826
5	Gulfstream 200/280	39,600	495	501	513	530	564	627	639
6	Hawker 800	28,120	471	477	488	505	537	597	609
7	Citation V/VII	23,200	660	668	683	707	752	836	852
8	Citation XLS	22,000	825	835	854	884	940	1,044	1,065
9	Learjet 40	21,500	1,108	1,121	1,147	1,187	1,262	1,402	1,430
10	Phenom 300	18,000	577	584	598	619	658	731	746
11	Beech 1900	17,120	848	858	879	909	967	1,074	1,096
12	Citation CJ3/CJ4	17,110	507	513	525	543	872	1,545	1,680
13	King Air 200/350	15,100	5,576	5,685	5,903	6,231	6,885	8,149	8,401
14	Swearingen Merlin	13,300	5,717	5,828	6,050	6,382	7,046	8,328	8,584
15	Citation CJ1/CJ2	12,375	1,991	2,111	2,351	2,710	3,447	4,028	4,144
16	King Air 90/100	11,800	5,357	5,333	5,285	5,213	4,782	4,400	4,324
17	Phenom 100	10,600	943	954	976	1,010	1,074	1,194	1,217
18	Pilatus PC12	8,818	14,713	14,896	15,264	15,816	16,977	19,111	19,538
19	Socata TBM	6,580	25,909	26,101	26,487	27,065	27,770	29,637	30,011
			68,300	**69,100**	**73,219**	**75,834**	**80,636**	**90,131**	**92,066**

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Appendix F - FAARFIELD Airport Pavement Design Reports

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FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RUNWAY 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 09/24/19 at 09:37:59.

Compaction requirements for this section were computed on 09/24/19 at 09:38:02.

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	19.01	76,754	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 = 37.01 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

RUNWAY REHABILITATION OPTION,
CBR = 12

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.90	0.90	1.41
2	Falcon-900	0.00	0.00	1.51
3	Challenger-CL-604	0.00	0.00	1.44
4	Gulfstream-G-II	0.00	0.00	1.45
5	Hawker-800XP	0.00	0.00	1.55
6	Citation-VI/VII	0.00	0.00	1.65
7	Learjet-55	0.00	0.00	1.59
8	Citation-V	0.00	0.00	1.91
9	Citation-V	0.00	0.00	1.91
10	SuperKingAir-300	0.00	0.00	1.61
11	Citation-V	0.00	0.00	1.91
12	SuperKingAir-350	0.00	0.00	1.60
13	SuperKingAir-300	0.00	0.00	1.61
14	Citation-550B	0.00	0.00	1.90
15	KingAir-B-100	0.00	0.00	1.59
16	Citation-525	0.00	0.00	1.93
17	GrnCaravan-CE-208B	0.00	0.00	1.90
18	Baron-E-55	0.00	0.00	1.90
19	EMB-175 STD	0.10	0.11	1.29

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 - 44	0 - 7	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 - 24	--	Gulfstream-G-V
85	24 - 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.

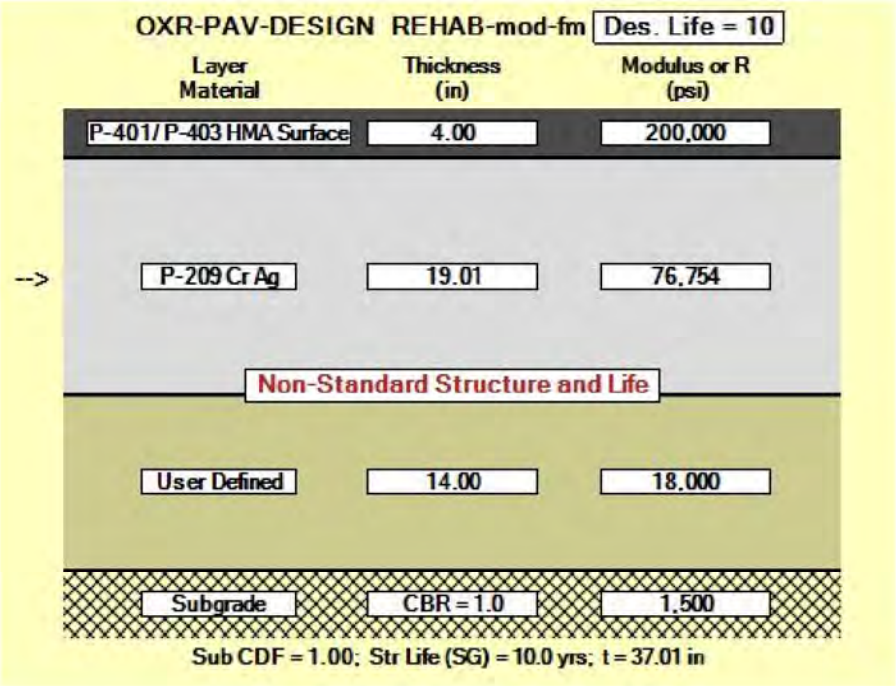
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

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.



OXR-PAV-DESIGN REHAB-mod-fm Des. Life = 10

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
-->	P-209 Cr Ag	19.01	76,754
	User Defined	14.00	18,000
	Subgrade	CBR = 1.0	1,500

Non-Standard Structure and Life

Sub CDF = 1.00; Str Life (SG) = 10.0 yrs; t = 37.01 in

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RUNWAY 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 09/24/19 at 09:38:29.

Compaction requirements for this section were computed on 09/24/19 at 09:38:33.

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	13.61	100,425	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 = 31.61 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

RUNWAY REHABILITATION OPTION,
CBR = 27

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.92	0.92	1.50
2	Falcon-900	0.00	0.00	1.62
3	Challenger-CL-604	0.00	0.00	1.54
4	Gulfstream-G-II	0.00	0.00	1.56
5	Hawker-800XP	0.00	0.00	1.67
6	Citation-VI/VII	0.00	0.00	1.81
7	Learjet-55	0.00	0.00	1.73
8	Citation-V	0.00	0.00	2.13
9	Citation-V	0.00	0.00	2.13
10	SuperKingAir-300	0.00	0.00	1.75
11	Citation-V	0.00	0.00	2.13
12	SuperKingAir-350	0.00	0.00	1.74
13	SuperKingAir-300	0.00	0.00	1.75
14	Citation-550B	0.00	0.00	2.13
15	KingAir-B-100	0.00	0.00	1.72
16	Citation-525	0.00	0.00	2.16
17	GrnCaravan-CE-208B	0.00	0.00	2.13
18	Baron-E-55	0.00	0.00	2.14
19	EMB-175 STD	0.08	0.08	1.36

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 - 40	0 - 9	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.

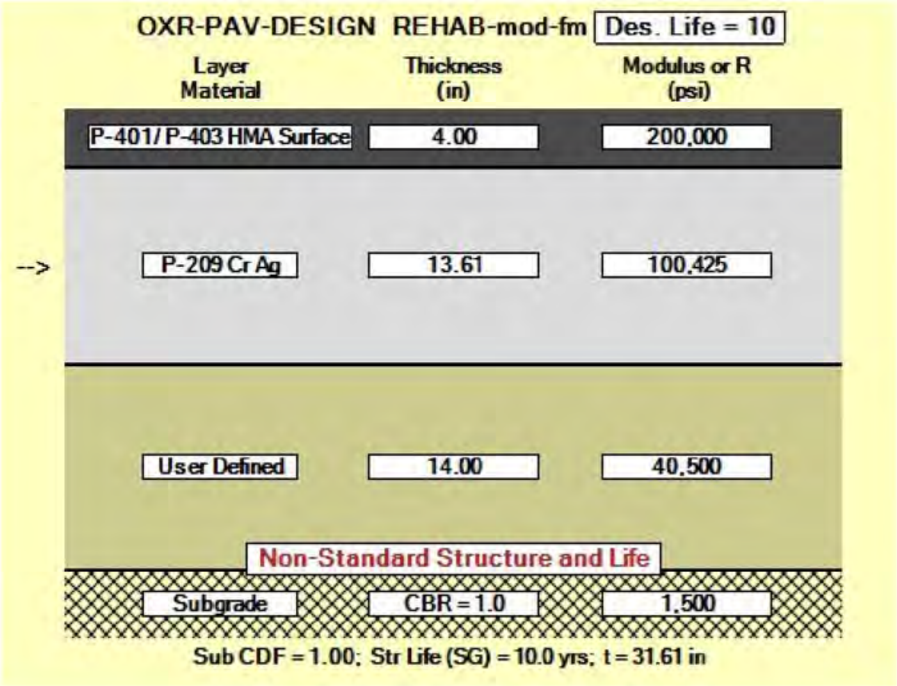
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

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.



OXR-PAV-DESIGN REHAB-mod-fm Des. Life = 10

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
-->	P-209 Cr Ag	13.61	100,425
	User Defined	14.00	40,500
	Subgrade	CBR = 1.0	1,500

Non-Standard Structure and Life

Sub CDF = 1.00; Str Life (SG) = 10.0 yrs; t = 31.61 in

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RUNWAY 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 09/24/19 at 09:36:51.

Compaction requirements for this section were computed on 09/24/19 at 09:37:22.

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	12.10	110,745	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 = 30.10 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

RUNWAY REHABILITATION OPTION, CBR = 50

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.92	0.92	1.52
2	Falcon-900	0.00	0.00	1.66
3	Challenger-CL-604	0.00	0.00	1.57
4	Gulfstream-G-II	0.00	0.00	1.59
5	Hawker-800XP	0.00	0.00	1.71
6	Citation-VI/VII	0.00	0.00	1.86
7	Learjet-55	0.00	0.00	1.78
8	Citation-V	0.00	0.00	2.21
9	Citation-V	0.00	0.00	2.21
10	SuperKingAir-300	0.00	0.00	1.79
11	Citation-V	0.00	0.00	2.21
12	SuperKingAir-350	0.00	0.00	1.79
13	SuperKingAir-300	0.00	0.00	1.79
14	Citation-550B	0.00	0.00	2.21
15	KingAir-B-100	0.00	0.00	1.76
16	Citation-525	0.00	0.00	2.24
17	GrnCaravan-CE-208B	0.00	0.00	2.21
18	Baron-E-55	0.00	0.00	2.22
19	EMB-175 STD	0.07	0.08	1.38

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 - 40	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 - 22	--	Gulfstream-G-V
85	22 - 25	--	Gulfstream-G-V
80	25 - 27	--	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.

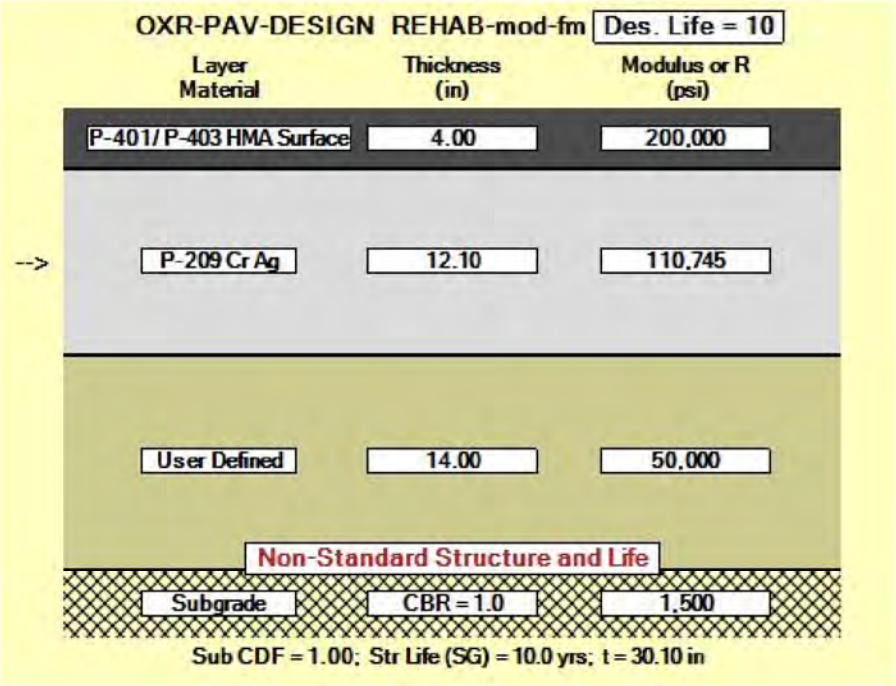
3.Maximum dry density is determined using ASTM Method D 698.

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

RUNWAY REHABILITATION OPTION,
CBR = 50

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.



OXR-PAV-DESIGN REHAB-mod-fm Des. Life = 10

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
-->	P-209 Cr Ag	12.10	110,745
	User Defined	14.00	50,000
	Subgrade	CBR = 1.0	1,500

Non-Standard Structure and Life

Sub CDF = 1.00; Str Life (SG) = 10.0 yrs; t = 30.10 in

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RUNWAY RECONSTRUCTION OPTION,
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 09/24/19 at 09:29:12.

Compaction requirements for this section were computed on 09/24/19 at 09:29:43.

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	20.29	51,754	0.35	0
3	Subgrade	0.00	7,500	0.35	0

Total thickness to the top of the subgrade = 24.29 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

RUNWAY RECONSTRUCTION OPTION,
CBR = 5

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	1.00	1.00	1.65
2	Falcon-900	0.00	0.00	1.82
3	Challenger-CL-604	0.00	0.00	1.71
4	Gulfstream-G-II	0.00	0.00	1.73
5	Hawker-800XP	0.00	0.00	1.90
6	Citation-VI/VII	0.00	0.00	2.09
7	Learjet-55	0.00	0.00	1.99
8	Citation-V	0.00	0.00	2.58
9	Citation-V	0.00	0.00	2.58
10	SuperKingAir-300	0.00	0.00	2.00
11	Citation-V	0.00	0.00	2.58
12	SuperKingAir-350	0.00	0.00	1.99
13	SuperKingAir-300	0.00	0.00	2.00
14	Citation-550B	0.00	0.00	2.58
15	KingAir-B-100	0.00	0.00	1.96
16	Citation-525	0.00	0.00	2.62
17	GrnCaravan-CE-208B	0.00	0.00	2.58
18	Baron-E-55	0.00	0.00	2.60
19	EMB-175 STD	0.00	0.00	1.47

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 - 37	0 - 13	Gulfstream-G-V
90	37 - 59	13 - 35	Gulfstream-G-V
85	59 - 87	35 - 63	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 - 30	0 - 5	Gulfstream-G-V
85	30 - 43	5 - 19	Gulfstream-G-V
80	43 - 58	19 - 34	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.

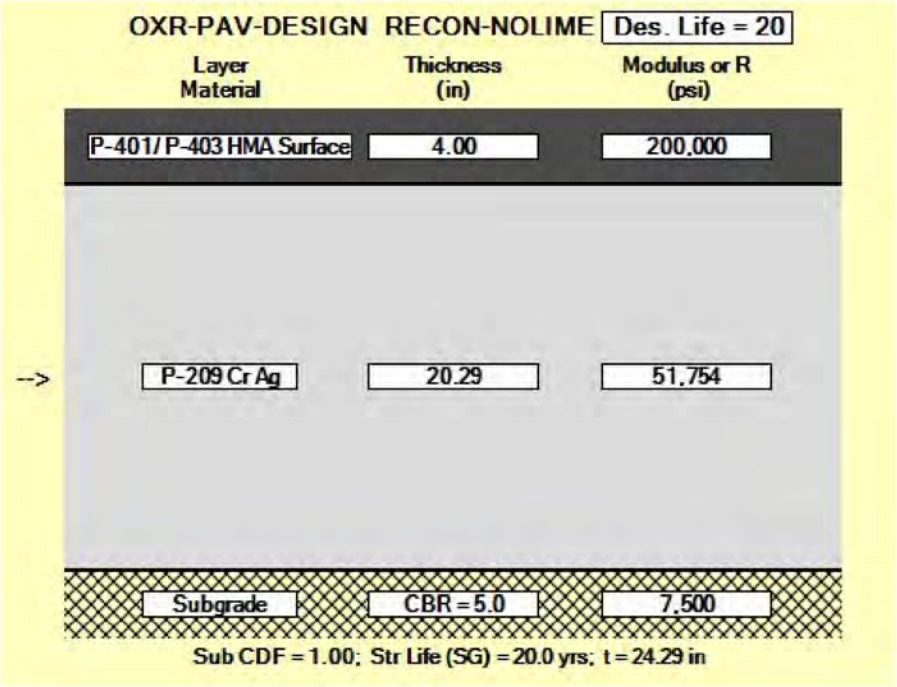
3.Maximum dry density is determined using ASTM Method D 698.

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.

RUNWAY RECONSTRUCTION OPTION,
CBR = 5

User is responsible for checking frost protection requirements.



OXR-PAV-DESIGN RECON-NOLIME Des. Life = 20

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
-->	P-209 Cr Ag	20.29	51,754
	Subgrade	CBR = 5.0	7,500

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 24.29 in

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RUNWAY RECONSTRUCTION OPTION, 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 09/24/19 at 09:30:03.

Compaction requirements for this section were computed on 09/24/19 at 09:30:06.

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	16.07	48,362	0.35	0
3	Subgrade	0.00	12,000	0.35	0

Total thickness to the top of the subgrade = 20.07 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

RUNWAY RECONSTRUCTION OPTION,
CBR = 8

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	1.00	1.00	1.76
2	Falcon-900	0.00	0.00	1.98
3	Challenger-CL-604	0.00	0.00	1.84
4	Gulfstream-G-II	0.00	0.00	1.87
5	Hawker-800XP	0.00	0.00	2.07
6	Citation-VI/VII	0.00	0.00	2.31
7	Learjet-55	0.00	0.00	2.19
8	Citation-V	0.00	0.00	2.95
9	Citation-V	0.00	0.00	2.95
10	SuperKingAir-300	0.00	0.00	2.20
11	Citation-V	0.00	0.00	2.95
12	SuperKingAir-350	0.00	0.00	2.19
13	SuperKingAir-300	0.00	0.00	2.20
14	Citation-550B	0.00	0.00	2.95
15	KingAir-B-100	0.00	0.00	2.15
16	Citation-525	0.00	0.00	3.01
17	GrnCaravan-CE-208B	0.00	0.00	2.95
18	Baron-E-55	0.00	0.00	2.99
19	EMB-175 STD	0.00	0.00	1.54

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 - 24	0 - 4	Gulfstream-G-V
95	24 - 44	4 - 24	Gulfstream-G-V
90	44 - 67	24 - 47	Gulfstream-G-V
85	67 - 95	47 - 75	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 - 22	0 - 2	Gulfstream-G-V
90	22 - 36	2 - 16	Gulfstream-G-V
85	36 - 51	16 - 30	Gulfstream-G-V
80	51 - 66	30 - 46	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.

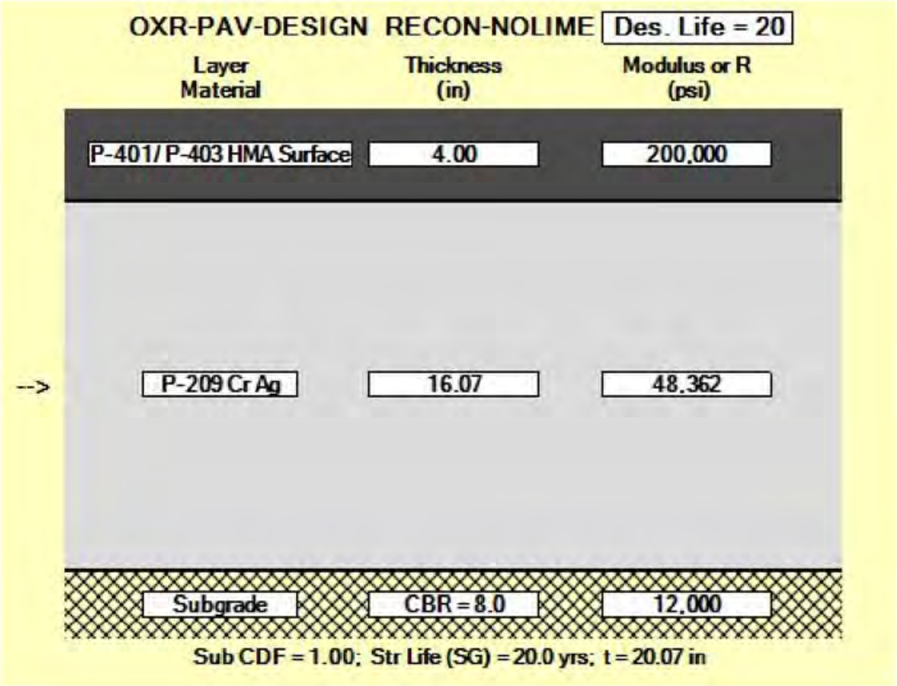
3.Maximum dry density is determined using ASTM Method D 698.

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.

RUNWAY RECONSTRUCTION OPTION,
CBR = 8

User is responsible for checking frost protection requirements.



OXR-PAV-DESIGN RECON-NOLIME Des. Life = 20

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
-->	P-209 Cr Ag	16.07	48,362
	Subgrade	CBR = 8.0	12,000

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 20.07 in

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

RUNWAY RECONSTRUCTION OPTION,
12-INCH LIME-TREATED SUBGRADE

Section Mod-fleet 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 09/24/19 at 09:33:02.

Compaction requirements for this section were computed on 09/24/19 at 09:33:05.

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	11.55	138,987	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 = 27.55 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

RUNWAY RECONSTRUCTION OPTION,
12-INCH LIME-TREATED SUBGRADE

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.98	0.98	1.57
2	Falcon-900	0.00	0.00	1.72
3	Challenger-CL-604	0.00	0.00	1.63
4	Gulfstream-G-II	0.00	0.00	1.65
5	Hawker-800XP	0.00	0.00	1.79
6	Citation-VI/VII	0.00	0.00	1.95
7	Learjet-55	0.00	0.00	1.87
8	Citation-V	0.00	0.00	2.35
9	Citation-V	0.00	0.00	2.35
10	SuperKingAir-300	0.00	0.00	1.88
11	Citation-V	0.00	0.00	2.35
12	SuperKingAir-350	0.00	0.00	1.87
13	SuperKingAir-300	0.00	0.00	1.88
14	Citation-550B	0.00	0.00	2.35
15	KingAir-B-100	0.00	0.00	1.85
16	Citation-525	0.00	0.00	2.39
17	GrnCaravan-CE-208B	0.00	0.00	2.35
18	Baron-E-55	0.00	0.00	2.37
19	EMB-175 STD	0.02	0.03	1.41

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	--	Gulfstream-G-V
85	27 - 36	0 - 9	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 - 21	--	Gulfstream-G-V
85	21 - 24	--	Gulfstream-G-V
80	24 - 27	--	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.

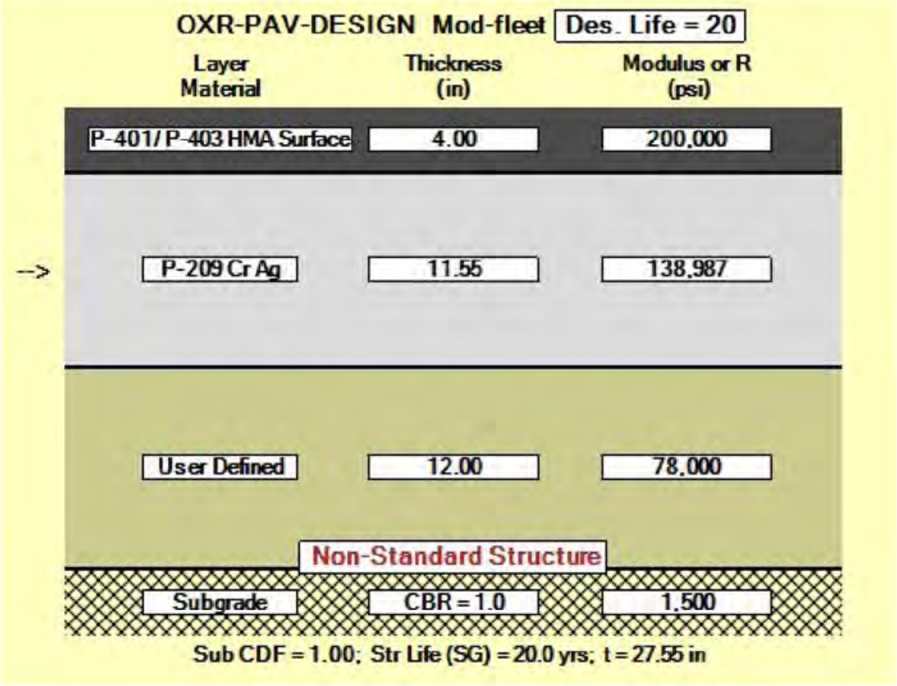
3.Maximum dry density is determined using ASTM Method D 698.

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.

RUNWAY RECONSTRUCTION OPTION,
12-INCH LIME-TREATED SUBGRADE

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



OXR-PAV-DESIGN Mod-fleet Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Surface	4.00	200,000
--> P-209 Cr Ag	11.55	138,987
User Defined	12.00	78,000
Subgrade	CBR = 1.0	1,500

Non-Standard Structure

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 27.55 in

RECOMMENDED OPTION

RUNWAY RECONSTRUCTION OPTION,
16-INCH LIME-TREATED SUBGRADE

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

Section Mod-fleet 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 09/24/19 at 09:31:17.

Compaction requirements for this section were computed on 09/24/19 at 09:31:20.

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	8.23	130,525	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 = 28.23 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

RECOMMENDED OPTION

RUNWAY RECONSTRUCTION OPTION
16-INCH LIME-TREATED SUBGRADE

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.98	0.98	1.56
2	Falcon-900	0.00	0.00	1.71
3	Challenger-CL-604	0.00	0.00	1.61
4	Gulfstream-G-II	0.00	0.00	1.63
5	Hawker-800XP	0.00	0.00	1.77
6	Citation-VI/VII	0.00	0.00	1.93
7	Learjet-55	0.00	0.00	1.84
8	Citation-V	0.00	0.00	2.31
9	Citation-V	0.00	0.00	2.31
10	SuperKingAir-300	0.00	0.00	1.85
11	Citation-V	0.00	0.00	2.31
12	SuperKingAir-350	0.00	0.00	1.85
13	SuperKingAir-300	0.00	0.00	1.85
14	Citation-550B	0.00	0.00	2.31
15	KingAir-B-100	0.00	0.00	1.82
16	Citation-525	0.00	0.00	2.35
17	GrnCaravan-CE-208B	0.00	0.00	2.31
18	Baron-E-55	0.00	0.00	2.33
19	EMB-175 STD	0.02	0.02	1.40

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 - 23	--	Gulfstream-G-V
90	23 - 27	--	Gulfstream-G-V
85	27 - 37	0 - 9	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 - 24	--	Gulfstream-G-V
80	24 - 27	--	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.

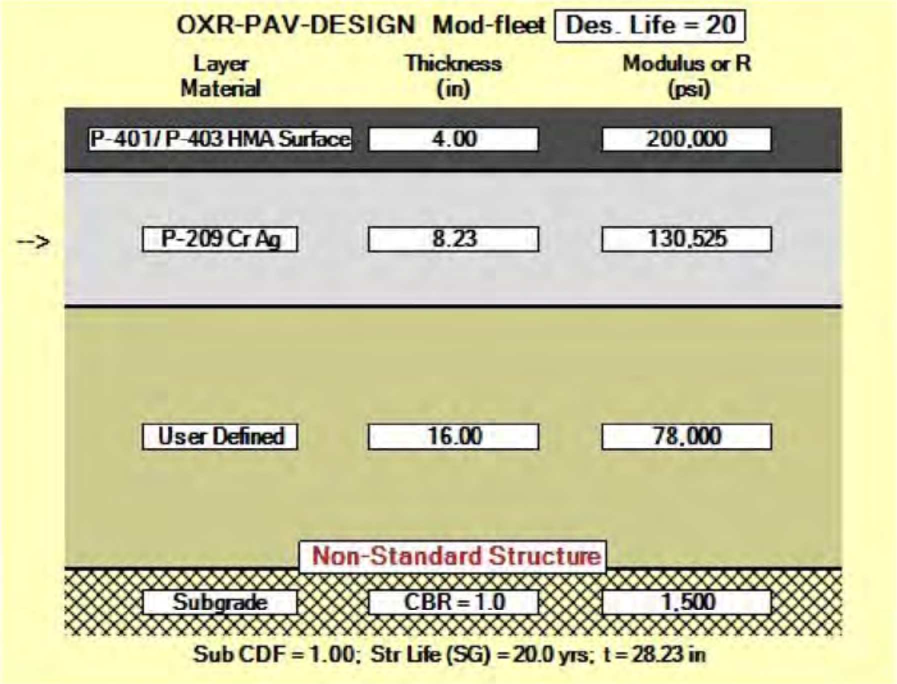
4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.

RECOMMENDED OPTION

RUNWAY RECONSTRUCTION OPTION,
16-INCH LIME-TREATED SUBGRADE

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



OXR-PAV-DESIGN Mod-fleet Des. Life = 20

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
-->	P-209 Cr Ag	8.23	130,525
	User Defined	16.00	78,000
	Subgrade	CBR = 1.0	1,500

Non-Standard Structure

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 28.23 in

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TAXIWAY C & F OVERLAY OPTION

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

Section TWYF_OVLY in Job TWY-F.

Working directory is X:\3138400\181115.02\TECH\Design\Pavement Design\FAARFIELD\

The structure is AC Overlay on Flexible. Asphalt CDF was not computed.

Design Life = 20 years.

A design for this section was completed on 06/24/20 at 10:22:37.

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 Overlay	14.98	200,000	0.35	0
2	P-401/ P-403 HMA Surface	3.00	200,000	0.35	0
3	P-209 Cr Ag	7.00	12,040	0.35	0
4	Subgrade	0.00	3,000	0.35	0

Total thickness to the top of the subgrade = 24.98 in

Airplane Information

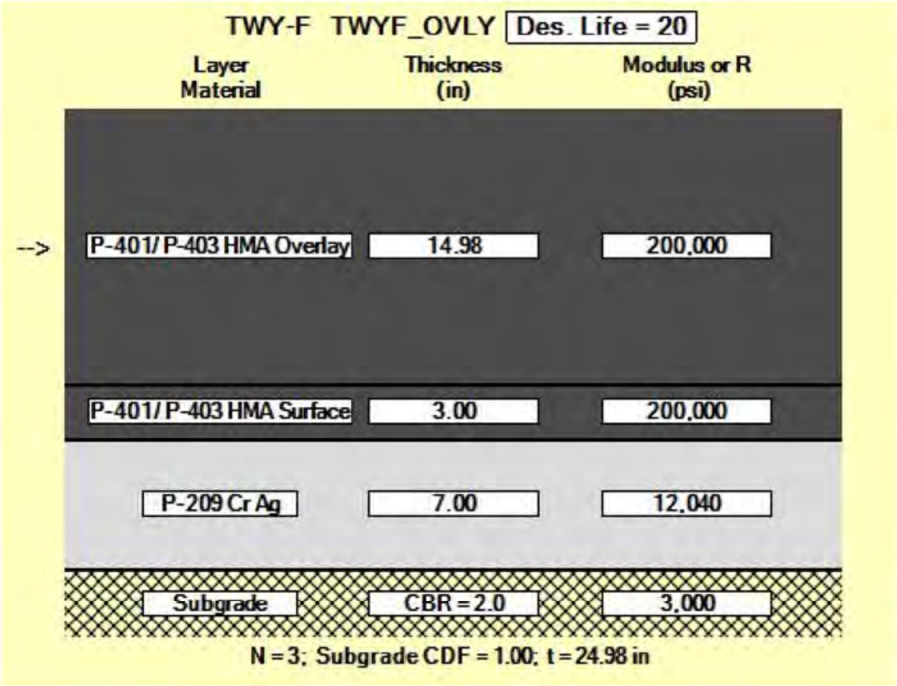
No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.99	0.99	1.63
2	Falcon-900	0.00	0.00	1.80
3	Challenger-CL-604	0.00	0.00	1.69
4	Gulfstream-G-II	0.00	0.00	1.71
5	Hawker-800XP	0.00	0.00	1.88
6	Citation-VI/VII	0.00	0.00	2.06
7	Learjet-55	0.00	0.00	1.96
8	Citation-V	0.00	0.00	2.53
9	Citation-V	0.00	0.00	2.53
10	SuperKingAir-300	0.00	0.00	1.97
11	Citation-V	0.00	0.00	2.53
12	SuperKingAir-350	0.00	0.00	1.96
13	SuperKingAir-300	0.00	0.00	1.97
14	Citation-550B	0.00	0.00	2.53
15	KingAir-B-100	0.00	0.00	1.94
16	Citation-525	0.00	0.00	2.57
17	GrnCaravan-CE-208B	0.00	0.00	2.53
18	Baron-E-55	0.00	0.00	2.55
19	EMB-175 STD	0.01	0.02	1.45

User is responsible for checking frost protection requirements.



TWY-F TWYF_OVLY Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Overlay	14.98	200,000
P-401/ P-403 HMA Surface	3.00	200,000
P-209 Cr Ag	7.00	12,040
Subgrade	CBR = 2.0	3,000

N = 3; Subgrade CDF = 1.00; t = 24.98 in

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

TAXIWAY RECONSTRUCTION OPTION,
UNTREATED SUBGRADE

Section Recn-NO-LIME in Job TWY-F.

Working directory is X:\3138400\181115.02\TECH\Design\Pavement Design\FAARFIELD\

The structure is New Flexible. Asphalt CDF = 0.2371.

Design Life = 20 years.

A design for this section was completed on 07/02/20 at 09:48:28.

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	7.08	49,266	0.35	0
3	P-154 UnCr Ag	12.76	17,853	0.35	0
4	Subgrade	0.00	10,950	0.35	0

Total thickness to the top of the subgrade = 23.84 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

Subgrade CDF

TAXIWAY RECONSTRUCTION OPTION,
UNTREATED SUBGRADE

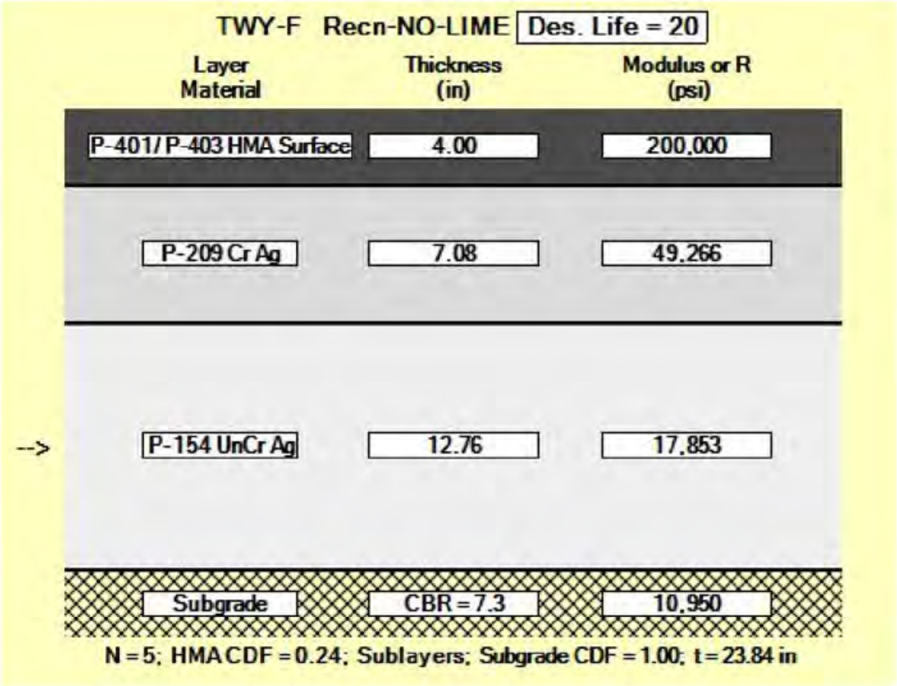
No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	1.00	1.00	1.66
2	Falcon-900	0.00	0.00	1.84
3	Challenger-CL-604	0.00	0.00	1.72
4	Gulfstream-G-II	0.00	0.00	1.75
5	Hawker-800XP	0.00	0.00	1.92
6	Citation-VI/VII	0.00	0.00	2.11
7	Learjet-55	0.00	0.00	2.01
8	Citation-V	0.00	0.00	2.61
9	Citation-V	0.00	0.00	2.61
10	SuperKingAir-300	0.00	0.00	2.02
11	Citation-V	0.00	0.00	2.61
12	SuperKingAir-350	0.00	0.00	2.01
13	SuperKingAir-300	0.00	0.00	2.02
14	Citation-550B	0.00	0.00	2.61
15	KingAir-B-100	0.00	0.00	1.98
16	Citation-525	0.00	0.00	2.66
17	GrnCaravan-CE-208B	0.00	0.00	2.61
18	Baron-E-55	0.00	0.00	2.64
19	EMB-175 STD	0.00	0.00	1.47

HMA CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.08	0.08	2.99
2	Falcon-900	0.04	0.04	3.38
3	Challenger-CL-604	0.03	0.03	3.36
4	Gulfstream-G-II	0.00	0.00	3.10
5	Hawker-800XP	0.00	0.00	3.85
6	Citation-VI/VII	0.01	0.01	4.28
7	Learjet-55	0.01	0.01	4.56
8	Citation-V	0.01	0.01	7.10
9	Citation-V	0.00	0.00	7.10
10	SuperKingAir-300	0.00	0.00	4.18
11	Citation-V	0.00	0.00	7.10
12	SuperKingAir-350	0.00	0.01	4.09
13	SuperKingAir-300	0.00	0.00	4.18
14	Citation-550B	0.00	0.00	7.24
15	KingAir-B-100	0.00	0.00	3.76
16	Citation-525	0.00	0.00	7.48
17	GrnCaravan-CE-208B	0.00	0.00	7.22
18	Baron-E-55	0.00	0.00	7.60
19	EMB-175 STD	0.04	0.05	2.87

User is responsible for checking frost protection requirements.

TAXIWAY RECONSTRUCTION OPTION,
UNTREATED SUBGRADE



TWY-F Recn-NO-LIME Des. Life = 20

Layer Material	Thickness (in)	Modulus or R (psi)
P-401/ P-403 HMA Surface	4.00	200,000
P-209 Cr Ag	7.08	49,266
--> P-154 UnCr Ag	12.76	17,853
Subgrade	CBR = 7.3	10,950

N = 5; HMA CDF = 0.24; Sublayers; Subgrade CDF = 1.00; t = 23.84 in

TAXIWAY RECONSTRUCTION OPTION,
16" LIME-TREATED SUBGRADE

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

Section Recon-LIME in Job TWY-F.

Working directory is X:\3138400\181115.02\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 02/18/21 at 18:39:23.

Compaction requirements for this section were computed on 02/18/21 at 18:40:24.

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	8.94	96,953	0.35	0
3	User Defined	16.00	45,000	0.35	0
4	Subgrade	0.00	3,000	0.35	0

Total thickness to the top of the subgrade = 28.94 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	99,600	250	1.25
2	Falcon-900	49,000	531	1.25
3	Challenger-CL-604	48,200	732	1.25
4	Gulfstream-G-II	39,600	256	1.25
5	Hawker-800XP	28,120	244	1.25
6	Citation-VI/VII	23,200	342	1.25
7	Learjet-55	21,500	574	1.25
8	Citation-V	20,500	427	1.25
9	Citation-V	18,000	299	1.25
10	SuperKingAir-300	17,120	439	1.25
11	Citation-V	17,110	262	9.55
12	SuperKingAir-350	15,100	2,952	2.10
13	SuperKingAir-300	13,300	3,025	2.10
14	Citation-550B	12,375	1,175	4.60
15	KingAir-B-100	11,800	2,643	-0.95
16	Citation-525	10,600	488	1.25
17	GrnCaravan-CE-208B	8,818	7,632	1.40
18	Baron-E-55	6,580	13,243	0.65
19	EMB-175 STD	83,026	1,095	3.00

Additional Airplane Information

TAXIWAY RECONSTRUCTION OPTION,
16" LIME-TREATED SUBGRADE

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	0.99	0.99	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	1.61
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	2.27
9	Citation-V	0.00	0.00	2.27
10	SuperKingAir-300	0.00	0.00	1.83
11	Citation-V	0.00	0.00	2.27
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	2.27
15	KingAir-B-100	0.00	0.00	1.80
16	Citation-525	0.00	0.00	2.30
17	GrnCaravan-CE-208B	0.00	0.00	2.27
18	Baron-E-55	0.00	0.00	2.28
19	EMB-175 STD	0.01	0.01	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 - 20	--	Gulfstream-G-V
95	20 - 26	--	Gulfstream-G-V
90	26 - 37	0 - 8	Gulfstream-G-V
85	37 - 63	8 - 34	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 - 24	--	Gulfstream-G-V
85	24 - 28	--	Gulfstream-G-V
80	28 - 36	0 - 7	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.

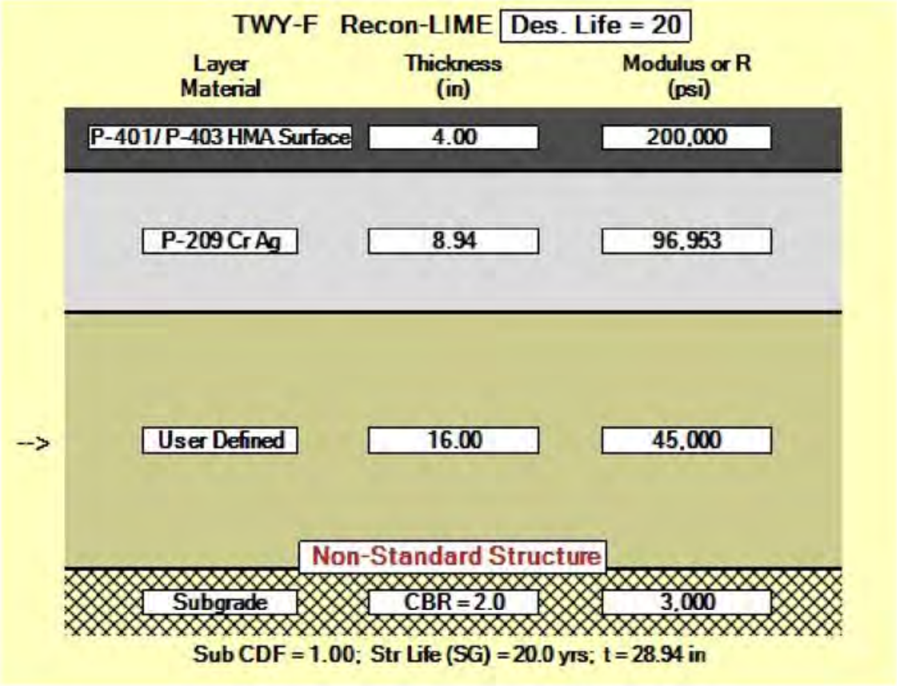
3.Maximum dry density is determined using ASTM Method D 698.

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.

TAXIWAY RECONSTRUCTION OPTION,
16" LIME-TREATED SUBGRADE

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.



TWY-F Recon-LIME Des. Life = 20

	Layer Material	Thickness (in)	Modulus or R (psi)
	P-401/ P-403 HMA Surface	4.00	200,000
	P-209 Cr Ag	8.94	96,953
-->	User Defined	16.00	45,000
	Subgrade	CBR = 2.0	3,000

Non-Standard Structure

Sub CDF = 1.00; Str Life (SG) = 20.0 yrs; t = 28.94 in

Appendix G - Life Cycle Cost Analysis

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Life Cycle Cost Analysis
Runway 7-25, Taxiway Connectors, and Parallel Taxiway Improvements

Present Cost

	Thickness (ft)	*Qtty*	*Units*	*Unit Price*	*Total*
Runway Rehabilitation (Not Selected)					
Asphalt Pavement Removal	Varies	68,400	SY	$ 9.00	$ 615,600.00
Subgrade Stabililization, Excavation Below Subgrade	-	4,500	CY	$ 70.00	$ 315,000.00
Crushed Aggregate Base Course, P-209	1.58	36,920	CY	$ 75.00	$ 2,769,000.00
Asphalt Surface Course, P-401	0.33	17,630	TON	$ 165.00	$ 2,908,950.00
				Total Cost	*$ 6,608,550.00*

	Thickness (ft)	*Qtty*	*Units*	*Unit Price*	*Total*
Runway Reconstruction (Base Bid)					
Asphalt Pavement Removal	Varies	68,500	SY	$ 9.00	$ 616,500.00
Subgrade Preparation	-	72,500	SY	$ 3.00	$ 217,500.00
Lime Treated Subgrade, 16-Inch Depth	1.33	72,500	SY	$ 16.50	$ 1,196,250.00
Crushed Aggregate Base Course, P-209	0.71	16,600	CY	$ 75.00	$ 1,245,000.00
Asphalt Surface Course, P-401	0.33	17,100	TON	$ 165.00	$ 2,821,500.00
				Total Cost	*$ 6,096,750.00*

	Thickness (ft)	*Qtty*	*Units*	*Unit Price*	*Total*
Taxiway Connectors Reconstruction (Alt 1)					
Asphalt Pavement Removal	Varies	16,100	SY	$ 9.00	$ 144,900.00
Subgrade Preparation	-	11,400	SY	$ 3.00	$ 34,200.00
Lime Treated Subgrade, 16-Inch Depth	1.33	11,400	SY	$ 16.50	$ 188,100.00
Crushed Aggregate Base Course, P-209	0.71	2,700	CY	$ 75.00	$ 202,500.00
Asphalt Surface Course, P-401	0.33	2,600	TON	$ 165.00	$ 429,000.00
				Total Cost	*$ 998,700.00*

	Thickness (ft)	*Qtty*	*Units*	*Unit Price*	*Total*
Taxiway Connectors Reconstruction (Alt 2)					
Asphalt Pavement Removal	Varies	90,700	SY	$ 9.00	$ 816,300.00
Subgrade Preparation	-	63,600	SY	$ 3.00	$ 190,800.00
Lime Treated Subgrade, 16-Inch Depth	1.33	63,600	SY	$ 16.50	$ 1,049,400.00
Crushed Aggregate Base Course, P-209	0.71	15,600	CY	$ 75.00	$ 1,170,000.00
Asphalt Surface Course, P-401	0.33	15,200	TON	$ 165.00	$ 2,508,000.00
				Total Cost	*$ 5,734,500.00*

Life Cycle Cost Analysis
Runway 7-25, Taxiway Connectors, and Paralle Taxiway Improvements

Maintenance Schedules

Runway Rehabilitation (Not Selected)

Year	*Item*	*Thickness (in)*	*Qtty*	*Units*	*Unit Price*	*Total*	*Comments*
5	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
10	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
15	P-101 Cold Milling 3"		91660.0	SY	$ 4.00	$ 366,640.00	
	P-401 Hot Mix Asphalt	0.25	11160.0	TON	$ 165.00	$ 1,841,400.00	3" Mill/Overlay
20	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
25	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
30	Salvage						End of Service Life

Runway Reconstruction (Base Bid)

Year	*Item*	*Thickness (in)*	*Qtty*	*Units*	*Unit Price*	*Total*	*Comments*
5	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
10	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
15	P-101 Cold Milling 3"		91660.0	SY	$ 4.00	$ 366,640.00	
	P-401 Hot Mix Asphalt	0.25	11160.0	TON	$ 165.00	$ 1,841,400.00	3" Mill/Overlay
20	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
25	Crack Seal		47600.0	FT	$ 4.00	$ 190,400.00	
	Surface Treatment		69950.0	SY	$ 5.00	$ 349,750.00	
30	Salvage						End of Service Life

Taxiway Connectors Reconstruction (Bid Alt 1)

Year	*Item*	*Thickness (in)*	*Qtty*	*Units*	*Unit Price*	*Total*	*Comments*
5	Crack Seal		1500.0	FT	$ 4.00	$ 6,000.00	
	Surface Treatment		10150.0	SY	$ 5.00	$ 50,750.00	
10	Crack Seal		1500.0	FT	$ 4.00	$ 6,000.00	
	Surface Treatment		10150.0	SY	$ 5.00	$ 50,750.00	
15	P-101 Cold Milling 3"		10150.0	SY	$ 4.00	$ 40,600.00	
	P-401 Hot Mix Asphalt	0.25	1770.0	TON	$ 165.00	$ 292,050.00	3" Mill/Overlay
20	Crack Seal		1500.0	FT	$ 4.00	$ 6,000.00	
	Surface Treatment		10150.0	SY	$ 5.00	$ 50,750.00	
25	Crack Seal		1500.0	FT	$ 4.00	$ 6,000.00	
	Surface Treatment		10150.0	SY	$ 5.00	$ 50,750.00	
30	Salvage						End of Service Life

Parallel Taxiway Reconstruction (Bid Alt 2)

Year	*Item*	*Thickness (in)*	*Qtty*	*Units*	*Unit Price*	*Total*	*Comments*
5	Crack Seal		25000.0	FT	$ 4.00	$ 100,000.00	
	Surface Treatment		55810.0	SY	$ 5.00	279050	
10	Crack Seal		25000.0	FT	$ 4.00	$ 100,000.00	
	Surface Treatment		55810.0	SY	$ 5.00	$ 279,050.00	
15	P-101 Cold Milling 3"		55810.0	SY	$ 4.00	$ 223,240.00	
	P-401 Hot Mix Asphalt	0.25	1770.0	TON	$ 165.00	$ 292,050.00	3" Mill/Overlay
20	Crack Seal		25000.0	FT	$ 4.00	$ 100,000.00	
	Surface Treatment		55810.0	SY	$ 5.00	$ 279,050.00	
25	Crack Seal		25000.0	FT	$ 4.00	$ 100,000.00	
	Surface Treatment		55810.0	SY	$ 5.00	$ 279,050.00	
30	Salvage						End of Service Life

Life Cycle Cost Analysis - Runway Rehabilitation (Not Selected)

Year	Present Worth Factor	Event Description	Present Cost	Escalated Cost	Present Value
	4%			3.50%	4%
0	1.0000	Initial Construction	$ 6,608,550.00	$ 6,608,550.00	$ 6,608,550.00
1	0.9615				
2	0.9246				
3	0.8890				
4	0.8548				
5	0.8219	Crack Seal + Surface Treatment	$ 540,150.00	$ 641,528.76	$ 527,289.88
6	0.7903				
7	0.7599				
8	0.7307				
9	0.7026				
10	0.6756	Crack Seal + Surface Treatment	$ 540,150.00	$ 761,934.92	$ 514,735.93
11	0.6496				
12	0.6246				
13	0.6006				
14	0.5775				
15	0.5553	3" Mill and Overlay	$ 2,208,040.00	$ 4,393,533.40	$ 2,005,151.29
16	0.5339				
17	0.5134				
18	0.4936				
19	0.4746				
20	0.4564	Crack Seal + Surface Treatment	$ 540,150.00	$ 1,074,784.45	$ 490,517.60
21	0.4388				
22	0.4220				
23	0.4057				
24	0.3901				
25	0.3751	Crack Seal + Surface Treatment	$ 540,150.00	$ 1,276,506.78	$ 478,839.14
26	0.3607				
27	0.3468				
28	0.3335				
29	0.3207				
30	0.3083	Salvage (End of Service Life)			

TOTAL = $ 10,625,083.84

Life Cycle Cost Analysis - Runway Reconstruction (Base Bid)

Year	Present Worth Factor 4%	Event Description	Present Cost	Escalated Cost 3.50%	Present Value 4%
0	1.0000	Initial Construction	$ 6,096,750.00	$ 6,096,750.00	$ 6,096,750.00
1	0.9615				
2	0.9246				
3	0.8890				
4	0.8548				
5	0.8219	Crack Seal + Surface Treatment	$ 540,150.00	$ 641,528.76	$ 527,289.88
6	0.7903				
7	0.7599				
8	0.7307				
9	0.7026				
10	0.6756	Crack Seal + Surface Treatment	$ 540,150.00	$ 761,934.92	$ 514,735.93
11	0.6496				
12	0.6246				
13	0.6006				
14	0.5775				
15	0.5553	3" Mill and Overlay	$ 2,208,040.00	$ 3,699,237.23	$ 2,054,055.12
16	0.5339				
17	0.5134				
18	0.4936				
19	0.4746				
20	0.4564	Crack Seal + Surface Treatment	$ 540,150.00	$ 1,074,784.45	$ 490,517.60
21	0.4388				
22	0.4220				
23	0.4057				
24	0.3901				
25	0.3751				
25	0.3751	Crack Seal + Surface Treatment	$ 540,150.00	$ 1,276,506.78	$ 478,839.14
27	0.3468				
28	0.3335				
29	0.3207				
30	0.3083	Salvage (End of Service Life)			

TOTAL = $ 10,162,187.67

Life Cycle Cost Analysis -Taxiway Connectors Reconstruction (Bid Alt 1)

Year	Present Worth Factor 4%	Event Description	Present Cost	Escalated Cost 3.50%	Present Value 4%
0	1.0000	Initial Construction	$ 998,700.00	$ 998,700.00	$ 998,700.00
1	0.9615				
2	0.9246				
3	0.8890				
4	0.8548				
5	0.8219	Crack Seal + Surface Treatment	$ 56,750.00	$ 67,401.20	$ 55,398.87
6	0.7903				
7	0.7599				
8	0.7307				
9	0.7026				
10	0.6756	Crack Seal + Surface Treatment	$ 56,750.00	$ 80,051.48	$ 54,079.91
11	0.6496				
12	0.6246				
13	0.6006				
14	0.5775				
15	0.5553	3" Mill and Overlay	$ 332,650.00	$ 557,304.79	$ 309,451.57
16	0.5339				
17	0.5134				
18	0.4936				
19	0.4746				
20	0.4564	Crack Seal + Surface Treatment	$ 56,750.00	$ 112,920.52	$ 51,535.45
21	0.4388				
22	0.4220				
23	0.4057				
24	0.3901				
25	0.3751				
25	0.3751	Crack Seal + Surface Treatment	$ 56,750.00	$ 134,114.15	$ 50,308.47
27	0.3468				
28	0.3335				
29	0.3207				
30	0.3083	Salvage (End of Service Life)			

TOTAL = $ 1,519,474.27

Life Cycle Cost Analysis - Parallel Taxiway Reconstruction (Bid Alt 2)

Year	Present Worth Factor 4%	Event Description	Present Cost	Escalated Cost 3.50%	Present Value 4%
0	1.0000	Initial Construction	$ 5,734,500.00	$ 5,734,500.00	$ 5,734,500.00
1	0.9615				
2	0.9246				
3	0.8890				
4	0.8548				
5	0.8219	Crack Seal + Surface Treatment	$ 379,050.00	$ 450,192.49	$ 370,025.41
6	0.7903				
7	0.7599				
8	0.7307				
9	0.7026				
10	0.6756	Crack Seal + Surface Treatment	$ 379,050.00	$ 534,687.46	$ 361,215.69
11	0.6496				
12	0.6246				
13	0.6006				
14	0.5775				
15	0.5553	3" Mill and Overlay	$ 515,290.00	$ 863,290.50	$ 479,354.57
16	0.5339				
17	0.5134				
18	0.4936				
19	0.4746				
20	0.4564	Crack Seal + Surface Treatment	$ 379,050.00	$ 754,229.47	$ 344,220.48
21	0.4388				
22	0.4220				
23	0.4057				
24	0.3901				
25	0.3751				
25	0.3751	Crack Seal + Surface Treatment	$ 379,050.00	$ 895,788.01	$ 336,025.13
27	0.3468				
28	0.3335				
29	0.3207				
30	0.3083	Salvage (End of Service Life)			

TOTAL = $ 7,625,341.29

Appendix H - Construction Schedule

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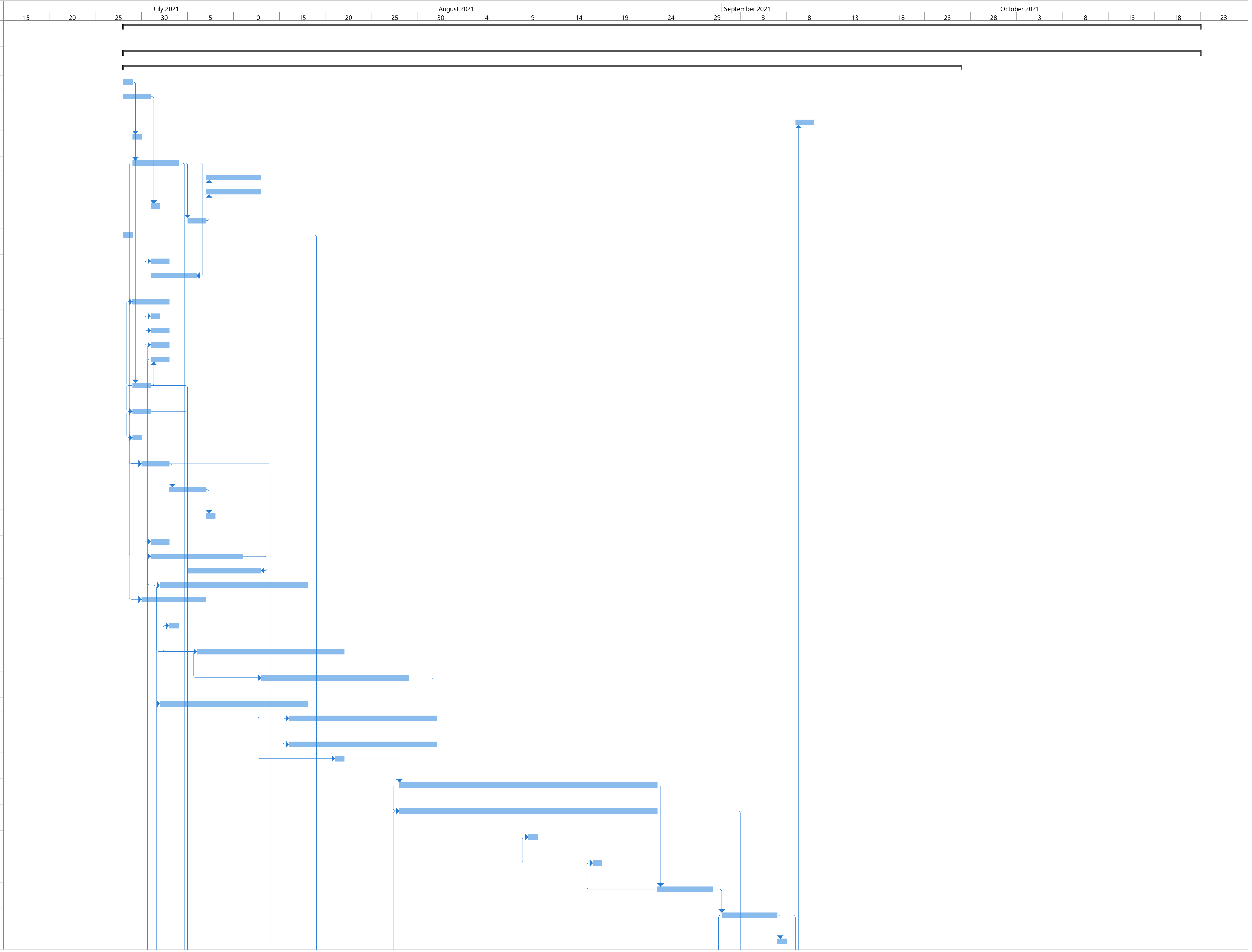
Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
1	**Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction (Base Bid)**	**117 days**	**Mon 6/28/21**	**Fri 10/22/21**
2	**Construction Element**	**117 days**	**Mon 6/28/21**	**Fri 10/22/21**
3	**Phase 1**	**91 days**	**Mon 6/28/21**	**Sun 9/26/21**
4	Airfield Safety and Traffic Control	1 day	Mon 6/28/21	Mon 6/28/21
5	Compliance with Pollution, Erosion, and Siltation Control	3 days	Mon 6/28/21	Wed 6/30/21
6	Airport Access and Haul Route Repair	2 days	Thu 9/9/21	Fri 9/10/21
7	Underground Utility Investigation and Potholing	1 day	Tue 6/29/21	Tue 6/29/21
8	Demolish Asphalt Pavement	5 days	Tue 6/29/21	Sat 7/3/21
9	Asphalt Crack Repair (under 1.5" width)	6 days	Wed 7/7/21	Mon 7/12/21
10	Asphalt Crack Repair (over 1.5" width)	6 days	Wed 7/7/21	Mon 7/12/21
11	Remove Pavement Markings	1 day	Thu 7/1/21	Thu 7/1/21
12	Cold Mill, Variable Depth (2 inches Maximum)	2 days	Mon 7/5/21	Tue 7/6/21
13	Remove and Salvage REILs. Demolish PCC Foundation	1 day	Mon 6/28/21	Mon 6/28/21
14	Demolish Conduit, Cable, and Counterpoise	2 days	Thu 7/1/21	Fri 7/2/21
15	Demolish Concrete Encased Conduit, Cable, and Counterpoise	5 days	Thu 7/1/21	Mon 7/5/21
16	Remove Cable and Counterpoise	4 days	Tue 6/29/21	Fri 7/2/21
17	Demolish Electrical Junction Can	1 day	Thu 7/1/21	Thu 7/1/21
18	Demolish Electrical Pullboxes	2 days	Thu 7/1/21	Fri 7/2/21
19	Demolish Airfield Sign and Pad	2 days	Thu 7/1/21	Fri 7/2/21
20	Remove and Salvage Elevated Taxiway Edge Light Fixture and Transformer. Protect Can.	2 days	Thu 7/1/21	Fri 7/2/21
21	Remove and Salvage Elevated Runway Edge Light Fixture and Transformer. Protect Can	2 days	Tue 6/29/21	Wed 6/30/21
22	Remove and Salvage Elevated Threshold Light Fixture and Transformer. Protect Can	2 days	Tue 6/29/21	Wed 6/30/21
23	Remove and Salvage In-pavement Runway Edge Light Fixture and Transformer. Protect Can.	1 day	Tue 6/29/21	Tue 6/29/21
24	Demolish MALSF Threshold Bar (13 Lights). Salvage Existing Fixtures	3 days	Wed 6/30/21	Fri 7/2/21
25	Demolish 3 MALSF Centerline Bars (5 Lights Each). Salvage Existing Fixtures	4 days	Sat 7/3/21	Tue 7/6/21
26	Demolish Reinforced Foundation from Abandoned MALSF Bar	1 day	Wed 7/7/21	Wed 7/7/21
27	Demolish Abandoned Waterline, if Encountered	2 days	Thu 7/1/21	Fri 7/2/21
28	Unclassified Excavation and Haul-Off	10 days	Thu 7/1/21	Sat 7/10/21
29	Embankment in Place	8 days	Mon 7/5/21	Mon 7/12/21
30	Subgrade Preparation	16 days	Fri 7/2/21	Sat 7/17/21
31	Place Asphalt Compacted Grindings, 24-inches thick	7 days	Wed 6/30/21	Tue 7/6/21
32	Lime Treated Subgrade, 16-inch Depth (Control Strip)	1 day	Sat 7/3/21	Sat 7/3/21
33	Lime Treated Subgrade, 16-inch Depth (1st Mix)	16 days	Tue 7/6/21	Wed 7/21/21
34	Lime Treated Subgrade, 16-inch Depth (2nd Mix and Compact)	16 days	Tue 7/13/21	Wed 7/28/21
35	In-Place Drying Techniques	16 days	Fri 7/2/21	Sat 7/17/21
36	Subgrade Stabilization, Excavation Below Subgrade	16 days	Fri 7/16/21	Sat 7/31/21
37	Multi-Axial Geogrid	16 days	Fri 7/16/21	Sat 7/31/21
38	Crushed Aggregate Base Course, P-209 (Control Strip)	1 day	Wed 7/21/21	Wed 7/21/21
39	Crushed Aggregate Base Course, P-209 (Pavement Section)	28 days	Wed 7/28/21	Tue 8/24/21
40	Crushed Aggregate Base Course, P-209 (Shoulders)	28 days	Wed 7/28/21	Tue 8/24/21
41	Asphalt Concrete Surface Course, P-401 (Control Strip #1)	1 day	Wed 8/11/21	Wed 8/11/21
42	Asphalt Concrete Surface Course, P-401 (Control Strip #2)	1 day	Wed 8/18/21	Wed 8/18/21
43	Asphalt Concrete Surface Course, P-401 (First Lift)	6 days	Wed 8/25/21	Mon 8/30/21
44	Asphalt Concrete Surface Course, P-401 (Second Lift)	6 days	Wed 9/1/21	Mon 9/6/21
45	Install 2 Runway Threshold Monuments	1 day	Tue 9/7/21	Tue 9/7/21



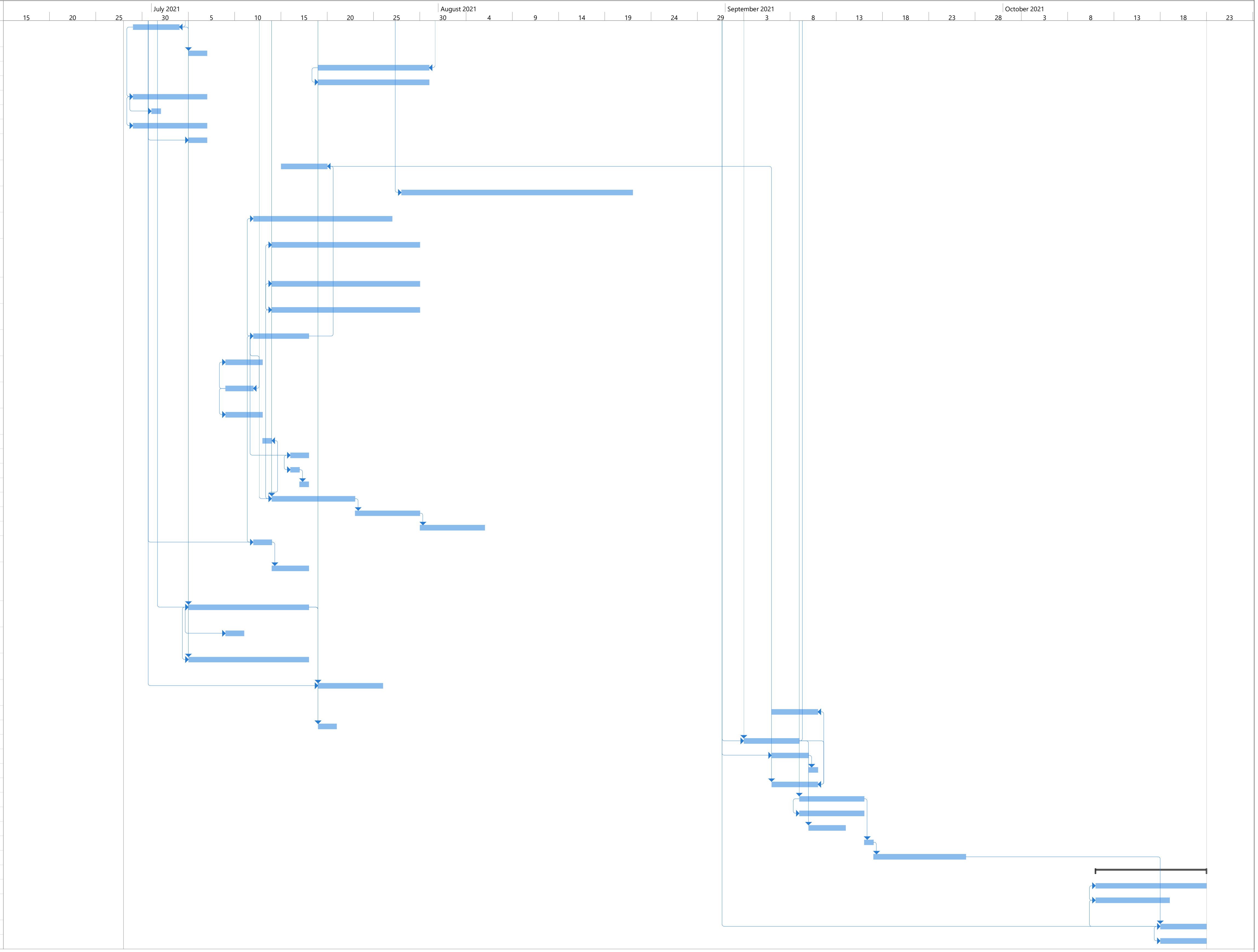
Project: Complete Project Sched
Date: Mon 3/29/21

Task ▬
Split ┈
Milestone ◆
Summary ┌─┐
Project Summary ┌─┐
Inactive Task
Inactive Milestone ◇
Inactive Summary
Manual Task ▬
Duration-only ▬
Manual Summary Rollup ▬
Manual Summary ┌─┐
Start-only [
Finish-only]
External Tasks ▬
External Milestone ◆
Deadline ⇩
Progress ─
Manual Progress ─

Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
46	12-inch RCP, Class IV, outside Pavement Areas	5 days	Tue 6/29/21	Sat 7/3/21
47	12-inch RCP, Class IV, within Pavement Areas	2 days	Mon 7/5/21	Tue 7/6/21
48	Underdrain Pipe, 6-inch, Perforated	12 days	Mon 7/19/21	Fri 7/30/21
49	Underdrain Pipe Cleanouts	12 days	Mon 7/19/21	Fri 7/30/21
50	48" Stormdrain Manholes	8 days	Tue 6/29/21	Tue 7/6/21
51	Adjust Catch Basin to Grade	1 day	Thu 7/1/21	Thu 7/1/21
52	Connect to Existing Manholes/Basins	8 days	Tue 6/29/21	Tue 7/6/21
53	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	2 days	Mon 7/5/21	Tue 7/6/21
54	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	5 days	Thu 7/15/21	Mon 7/19/21
55	No. 6 AWG Tinned Counterpoise Wire, Installed Adjacent to Duct Bank or Conduit	25 days	Wed 7/28/21	Sat 8/21/21
56	No. 6 AWG Tinned Counterpoise Wire, Installed in Duct Bank or Conduit	15 days	Mon 7/12/21	Mon 7/26/21
57	No. 1/0 AWG Tinned Counterpoise Wire for MALSF, Installed Adjacent to / In the Duct Bank or Conduit	16 days	Wed 7/14/21	Thu 7/29/21
58	No. 2-8 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	16 days	Wed 7/14/21	Thu 7/29/21
59	Concrete Encased Electrical Duct Bank, 1W - 2" GRMC Conduit	16 days	Wed 7/14/21	Thu 7/29/21
60	Non-encased Electrical Duct Bank, 1W - 2" Conduit	6 days	Mon 7/12/21	Sat 7/17/21
61	Non-encased Electrical Duct Bank, 1W - 3" and 1W - 2" Conduit	4 days	Fri 7/9/21	Mon 7/12/21
62	Non-encased Electrical Duct Bank, 1W - 3" and 2W - 2" Conduit	3 days	Fri 7/9/21	Mon 7/12/21
63	Non-encased Electrical Duct Bank, 1W - 3" and 3W - 2" Conduit	4 days	Fri 7/9/21	Mon 7/12/21
64	Construct FAA Pull Box	1 day	Tue 7/13/21	Wed 7/14/21
65	Construct 24" Junction Can: L-868 with Lid	2 days	Fri 7/16/21	Sat 7/17/21
66	Adjust Junction Can to Grade	1 day	Fri 7/16/21	Fri 7/16/21
67	Adjust Electrical Pullbox to Grade	1 day	Sat 7/17/21	Sat 7/17/21
68	Construct MALSF Threshold Bar	9 days	Wed 7/14/21	Thu 7/22/21
69	Construct 3 MALSF Centerline Bars	7 days	Fri 7/23/21	Thu 7/29/21
70	MALSF PCC Cure Time	7 edays	Thu 7/29/21	Thu 8/5/21
71	Construct New L-858B(L) Distance Remaining Sign and Concrete Pad	2 days	Mon 7/12/21	Tue 7/13/21
72	Construct New L-858(L) Taxiway Guidance Sign without Taxiway Identifier and Concrete Pad	4 days	Wed 7/14/21	Sat 7/17/21
73	Adjust Base Can for New L-861(L) Elevated Runway Edge Light	13 days	Mon 7/5/21	Sat 7/17/21
74	Adjust Base Can for New L-852D(L) In-Pavement Runway Edge Light	2 days	Fri 7/9/21	Sat 7/10/21
75	Adjust Base Can for New L-861E(L) Runway Threshold Light and Transformer	13 days	Mon 7/5/21	Sat 7/17/21
76	Adjust Base Can for Salvaged Elevated Taxiway Edge Light and Transformer	7 days	Mon 7/19/21	Sun 7/25/21
77	Install ID Tag	5 days	Mon 9/6/21	Fri 9/10/21
78	Install Salvaged REILs on New Concrete Pad	2 days	Mon 7/19/21	Tue 7/20/21
79	Shoulder Finishing and Miscellanous Grading	6 days	Fri 9/3/21	Wed 9/8/21
80	Install MALSF Light Fixtures	4 days	Mon 9/6/21	Thu 9/9/21
81	FAA MALSF Inspections	1 day	Fri 9/10/21	Fri 9/10/21
82	Install Runway and Taxiway Light Fixtures	5 days	Mon 9/6/21	Fri 9/10/21
83	Marking, 2 Coats with Beads (First Coat)	7 days	Thu 9/9/21	Wed 9/15/21
84	Marking, 2 Coats with No Beads (First Coat)	7 days	Thu 9/9/21	Wed 9/15/21
85	Hydroseeding	4 days	Fri 9/10/21	Mon 9/13/21
86	Flight Check	1 day	Thu 9/16/21	Thu 9/16/21
87	Float	10 days	Fri 9/17/21	Sun 9/26/21
88	**Phase 2 (Night Closures)**	**12 days**	**Mon 10/11/21**	**Fri 10/22/21**
89	Airfield Safety and Traffic Control	12 days	Mon 10/11/21	Fri 10/22/21
90	Grooving (30 Days after P-401 paving is completed)	8 days	Mon 10/11/21	Mon 10/18/21
91	Marking, 2 Coats with Beads (Second Coat)	5 days	Mon 10/18/21	Fri 10/22/21
92	Marking, Single Coat with No Beads (Second Coat)	5 days	Mon 10/18/21	Fri 10/22/21



Project: Complete Project Sched
Date: Mon 3/29/21

Task	▬	Milestone	◆	Project Summary	⊓	Inactive Milestone	◇	Manual Task	▬	Manual Summary Rollup	▬	Start-only	[	External Tasks	▬	Deadline	⬇
Split	┄	Summary	⊓	Inactive Task	▭	Inactive Summary	⊓	Duration-only	▬	Manual Summary	⊓	Finish-only	]	External Milestone	◆	Progress	─

Manual Progress ─

Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid + Bid Alt 1)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
1	**Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction (Base Bid + Bid Alt 1)**	**124 days**	**Mon 6/28/21**	**Fri 10/29/21**
2	**Construction Element**	**124 days**	**Mon 6/28/21**	**Fri 10/29/21**
3	**Phase 1**	**98 days**	**Mon 6/28/21**	**Sun 10/3/21**
4	Airfield Safety and Traffic Control	1 day	Mon 6/28/21	Mon 6/28/21
5	Compliance with Pollution, Erosion, and Siltation Control	3 days	Mon 6/28/21	Wed 6/30/21
6	Airport Access and Haul Route Repair	2 days	Tue 9/14/21	Wed 9/15/21
7	Underground Utility Investigation and Potholing	2 days	Tue 6/29/21	Wed 6/30/21
8	Demolish Asphalt Pavement	7 days	Tue 6/29/21	Mon 7/5/21
9	Asphalt Crack Repair (under 1.5" width)	2 days	Wed 7/7/21	Thu 7/8/21
10	Asphalt Crack Repair (over 1.5" width)	4 days	Wed 7/7/21	Sat 7/10/21
11	Remove Airfield Marking	2 days	Thu 7/1/21	Fri 7/2/21
12	Cold Mill, Variable Depth (2 inches Maximum)	1 day	Tue 7/6/21	Tue 7/6/21
13	Remove and Salvage REILs. Demolish PCC Foundation	1 day	Thu 7/1/21	Thu 7/1/21
14	Demolish Conduit, Cable, and Counterpoise	16 days	Fri 7/2/21	Sat 7/17/21
15	Demolish Concrete Encased Conduit, Cable, and Counterpoise	5 days	Fri 7/2/21	Tue 7/6/21
16	Remove Cable and Counterpoise	3 days	Tue 6/29/21	Thu 7/1/21
17	Remove and Salvage Unlit Information Sign	1 day	Sat 7/17/21	Sat 7/17/21
18	Remove and Salvage Unlit Information Sign. Demolish Concrete Pad	1 day	Sat 7/17/21	Sat 7/17/21
19	Demolish Electrical Junction Can	1 day	Fri 7/2/21	Fri 7/2/21
20	Demolish Electrical Pullboxes	16 days	Fri 7/2/21	Sat 7/17/21
21	Demolish Airfield Sign and Pad	16 days	Fri 7/2/21	Sat 7/17/21
22	Remove and Salvage Elevated Runway Edge Light Fixture and Transformer. Protect Can	2 days	Tue 6/29/21	Wed 6/30/21
23	Remove and Salvage Elevated Threshold Light Fixture and Transformer. Protect Can	2 days	Tue 6/29/21	Wed 6/30/21
24	Demolish Elevated Taxiway Edge Light and Can. Salvage Existing Fixture	16 days	Fri 7/2/21	Sat 7/17/21
25	Demolish Elevated Runway Edge Light and Can. Salvage Existing Fixture.	1 day	Thu 7/1/21	Thu 7/1/21
26	Demolish In-pavement Taxiway Edge Light and Can. Salvage Existing Fixture.	2 days	Fri 7/2/21	Sat 7/3/21
27	Demolish In-pavement Runway Edge Light and Can. Salvage Existing Fixture.	1 day	Mon 7/5/21	Mon 7/5/21
28	Demolish MALSF Threshold Bar (13 Lights). Salvage Existing Fixtures	3 days	Wed 6/30/21	Fri 7/2/21
29	Demolish 3 MALSF Centerline Bars (5 Lights Each). Salvage Existing Fixtures	4 days	Sat 7/3/21	Tue 7/6/21
30	Demolish Reinforced Foundation from Abandoned MALSF Bar	1 day	Wed 7/7/21	Wed 7/7/21
31	Demolish Abandoned Waterline, if Encountered	7 days	Fri 7/2/21	Thu 7/8/21
32	Unclassified Excavation and Haul-Off	14 days	Thu 7/1/21	Wed 7/14/21
33	Embankment in Place	10 days	Wed 7/7/21	Fri 7/16/21
34	Subgrade Preparation	19 days	Fri 7/2/21	Tue 7/20/21
35	Place Asphalt Compacted Grindings, 24-inches thick	7 days	Wed 6/30/21	Tue 7/6/21
36	Lime Treated Subgrade, 16-inch Depth (Control Strip)	1 day	Sat 7/3/21	Sat 7/3/21
37	Lime Treated Subgrade, 16-inch Depth (1st Mix)	21 days	Tue 7/6/21	Mon 7/26/21
38	Lime Treated Subgrade, 16-inch Depth (2nd Mix and Compact)	21 days	Tue 7/13/21	Mon 8/2/21
39	In-Place Drying Techniques	19 days	Fri 7/2/21	Tue 7/20/21

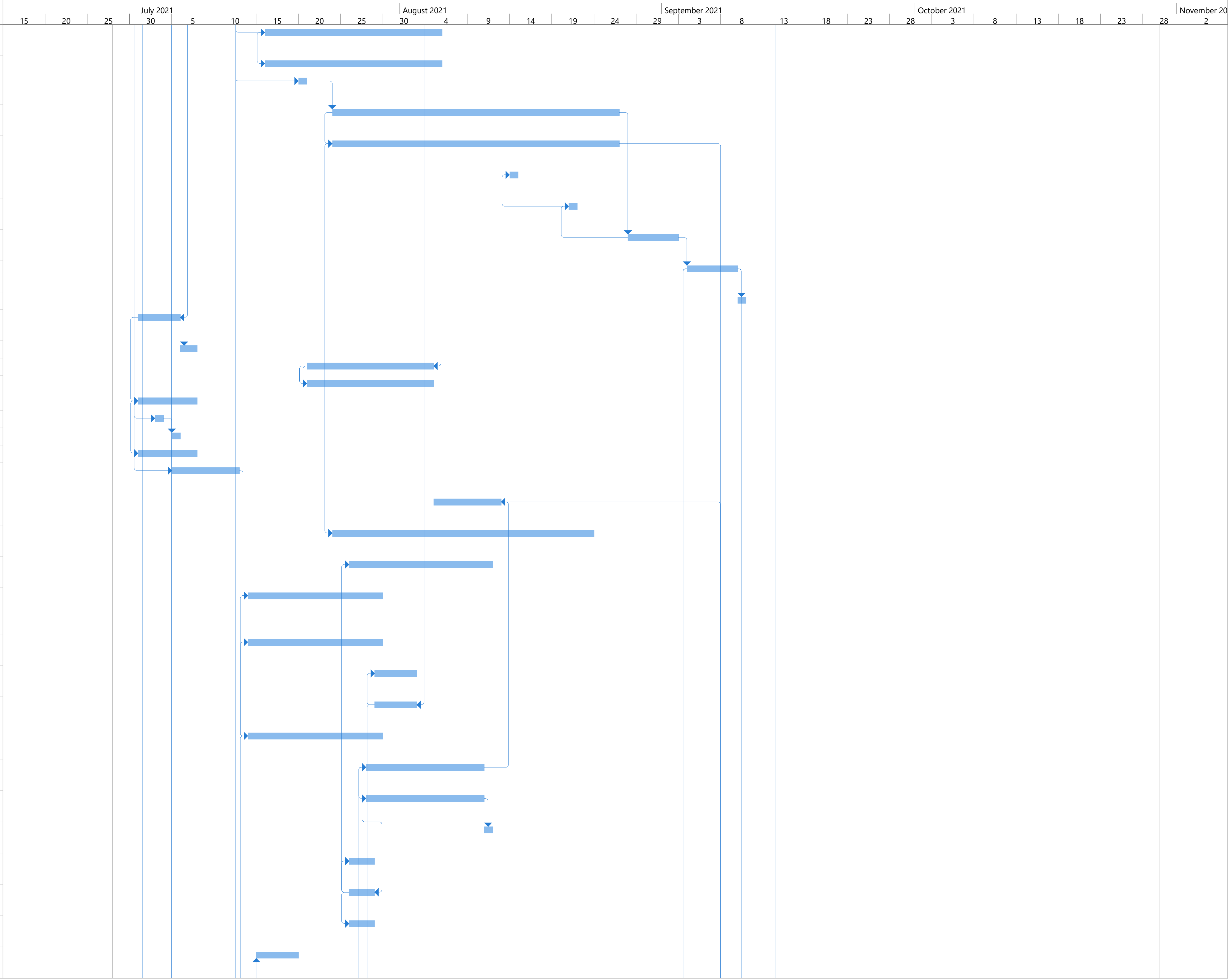
Project: Complete Project Sched
Date: Mon 3/29/21

Task		Summary		Inactive Milestone	◇	Duration-only		Start-only	[	External Milestone	◆	Manual Progress	
Split		Project Summary		Inactive Summary		Manual Summary Rollup		Finish-only	]	Deadline	⬇		
Milestone	◆	Inactive Task		Manual Task		Manual Summary		External Tasks		Progress			

Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid + Bid Alt 1)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
40	Subgrade Stabilization, Excavation Below Subgrade	21 days	Fri 7/16/21	Thu 8/5/21
41	Multi-Axial Geogrid	21 days	Fri 7/16/21	Thu 8/5/21
42	Crushed Aggregate Base Course, P-209 (Control Strip)	1 day	Tue 7/20/21	Tue 7/20/21
43	Crushed Aggregate Base Course, P-209 (Pavement Section)	34 days	Sat 7/24/21	Thu 8/26/21
44	Crushed Aggregate Base Course, P-209 (Shoulders)	34 days	Sat 7/24/21	Thu 8/26/21
45	Asphalt Concrete Surface Course, P-401 (Control Strip #1)	1 day	Sat 8/14/21	Sat 8/14/21
46	Asphalt Concrete Surface Course, P-401 (Control Strip #2)	1 day	Sat 8/21/21	Sat 8/21/21
47	Asphalt Concrete Surface Course, P-401 (First Lift)	6 days	Sat 8/28/21	Thu 9/2/21
48	Asphalt Concrete Surface Course, P-401 (Second Lift)	6 days	Sat 9/4/21	Thu 9/9/21
49	Install 2 Runway Threshold Monuments	1 day	Fri 9/10/21	Fri 9/10/21
50	12-inch RCP, Class IV, outside Pavement Areas	5 days	Thu 7/1/21	Mon 7/5/21
51	12-inch RCP, Class IV, within Pavement Areas	2 days	Tue 7/6/21	Wed 7/7/21
52	Underdrain Pipe, 6-inch, Perforated	15 days	Wed 7/21/21	Wed 8/4/21
53	Underdrain Pipe Cleanouts	15 days	Wed 7/21/21	Wed 8/4/21
54	48" Stormdrain Manholes	7 days	Thu 7/1/21	Wed 7/7/21
55	Catch Basin/Drop Inlet	1 day	Sat 7/3/21	Sat 7/3/21
56	Adjust Catch Basin to Grade	1 day	Mon 7/5/21	Mon 7/5/21
57	Connect to Existing Manholes/Basins	7 days	Thu 7/1/21	Wed 7/7/21
58	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	8 days	Mon 7/5/21	Mon 7/12/21
59	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	8 days	Thu 8/5/21	Thu 8/12/21
60	No. 6 AWG Tinned Counterpoise Wire, Installed Adjacent to Duct Bank or Conduit	31 days	Sat 7/24/21	Mon 8/23/21
61	No. 6 AWG Tinned Counterpoise Wire, Installed in Duct Bank or Conduit	17 days	Mon 7/26/21	Wed 8/11/21
62	No. 1/0 AWG Tinned Counterpoise Wire for MALSF, Installed Adjacent to / In the Duct Bank or Conduit	16 days	Wed 7/14/21	Thu 7/29/21
63	No. 2-8 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	16 days	Wed 7/14/21	Thu 7/29/21
64	Concrete Encased Electrical Duct Bank, 1W - 2" Conduit	5 days	Thu 7/29/21	Mon 8/2/21
65	Concrete Encased Electrical Duct Bank, 3W - 2" Conduit	5 days	Thu 7/29/21	Mon 8/2/21
66	Concrete Encased Electrical Duct Bank, 1W - 2" GRMC Conduit	16 days	Wed 7/14/21	Thu 7/29/21
67	Non-encased Electrical Duct Bank, 1W - 2" Conduit	14 days	Wed 7/28/21	Tue 8/10/21
68	Non-encased Electrical Duct Bank, 2W - 2" Conduit	14 days	Wed 7/28/21	Tue 8/10/21
69	Non-encased Electrical Duct Bank, 3W - 2" Conduit	1 day	Wed 8/11/21	Wed 8/11/21
70	Non-encased Electrical Duct Bank, 1W - 3" and 1W - 2" Conduit	3 days	Mon 7/26/21	Wed 7/28/21
71	Non-encased Electrical Duct Bank, 1W - 3" and 2W - 2" Conduit	3 days	Mon 7/26/21	Wed 7/28/21
72	Non-encased Electrical Duct Bank, 1W - 3" and 3W - 2" Conduit	3 days	Mon 7/26/21	Wed 7/28/21
73	Concrete Encase Existing FAA Line Under Proposed Pavement	5 days	Thu 7/15/21	Mon 7/19/21



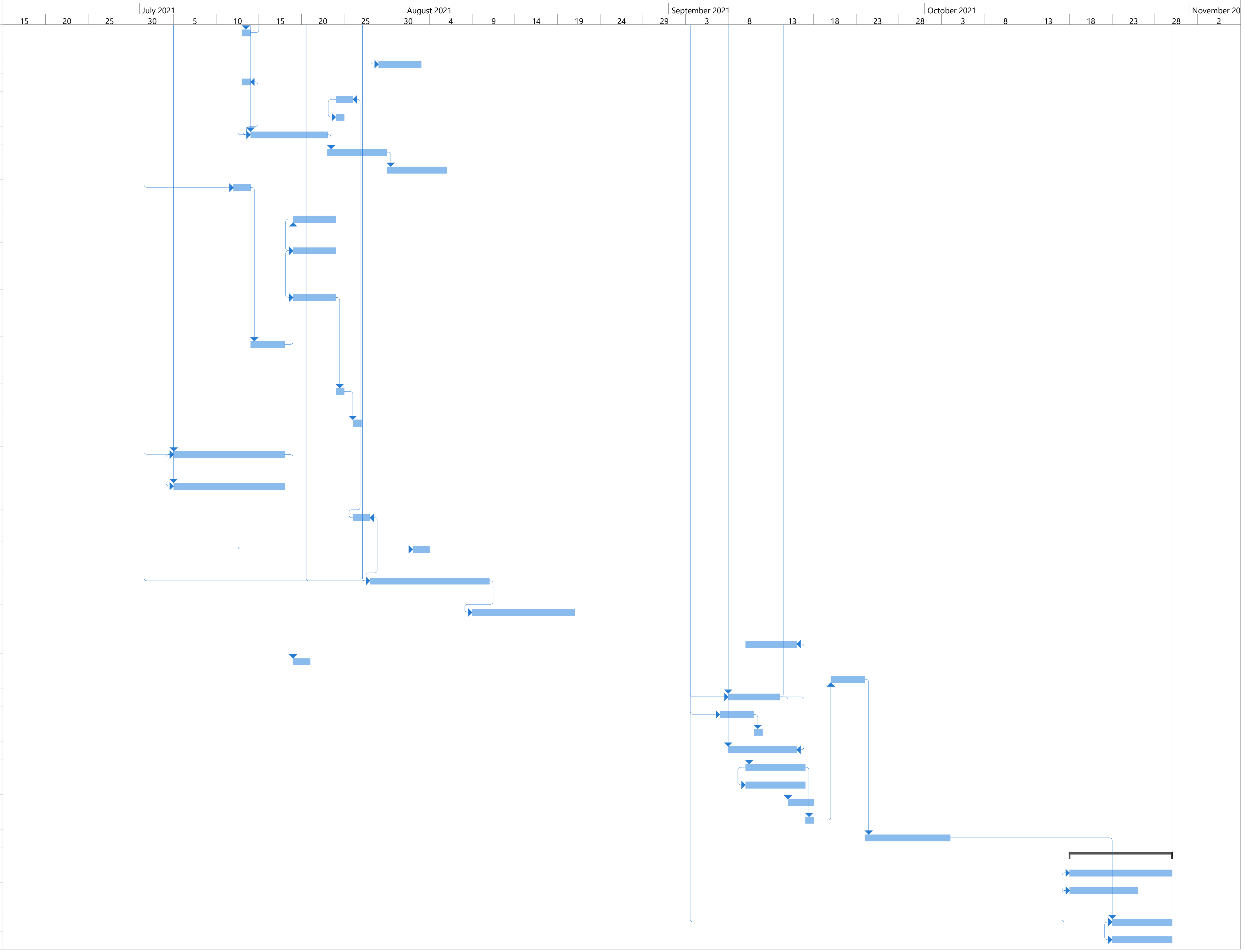
Project: Complete Project Sched
Date: Mon 3/29/21

Task	▬	Summary	┌─┐	Inactive Milestone	◇	Duration-only	▬	Start-only	[	External Milestone	◆	Manual Progress	―
Split	┈┈┈	Project Summary	┌─┐	Inactive Summary	┌─┐	Manual Summary Rollup	▬	Finish-only	]	Deadline	⬇		
Milestone	◆	Inactive Task	▭	Manual Task	▬	Manual Summary	┌─┐	External Tasks	▬	Progress	―		

Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid + Bid Alt 1)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
74	Concrete Encase Existing FAA Line Outside Pavement	1 day	Tue 7/13/21	Tue 7/13/21
75	Construct Electrical Pullbox: Aircraft Rated	5 days	Thu 7/29/21	Mon 8/2/21
76	Construct FAA Pull Box	1 day	Tue 7/13/21	Wed 7/14/21
77	Construct 24" Junction Can: L-868 with Lid	2 days	Sat 7/24/21	Mon 7/26/21
78	Adjust Junction Can to Grade	1 day	Sat 7/24/21	Sat 7/24/21
79	Construct MALSF Threshold Bar	9 days	Wed 7/14/21	Thu 7/22/21
80	Construct 3 MALSF Centerline Bars	7 days	Fri 7/23/21	Thu 7/29/21
81	MALSF PCC Cure Time	7 edays	Thu 7/29/21	Thu 8/5/21
82	Construct New L-858B(L) Distance Remaining Sign and Concrete Pad	2 days	Mon 7/12/21	Tue 7/13/21
83	Construct New L-858(L) Runway Hold Position Sign and Concrete Pad	5 days	Mon 7/19/21	Fri 7/23/21
84	Construct New L-858(L) Taxiway Guidance Sign, Double Arrow, with Taxiway Identifier and Concrete Pad	5 days	Mon 7/19/21	Fri 7/23/21
85	Construct New L-858(L) Taxiway Guidance Sign, Single Arrow, with Taxiway Identifier and Concrete Pad	5 days	Mon 7/19/21	Fri 7/23/21
86	Construct New L-858(L) Taxiway Guidance Sign without Taxiway Identifier and Concrete Pad	4 days	Wed 7/14/21	Sat 7/17/21
87	Install Salvaged Unlit Informational Sign on Existing Concrete Pad	1 day	Sat 7/24/21	Sat 7/24/21
88	Install Salvaged Unlit Informational Sign on New Concrete Pad	1 day	Mon 7/26/21	Mon 7/26/21
89	Adjust Base Can for New L-861(L) Elevated Runway Edge Light	13 days	Mon 7/5/21	Sat 7/17/21
90	Adjust Base Can for New L-861E(L) Runway Threshold Light and Transformer	13 days	Mon 7/5/21	Sat 7/17/21
91	Construct New L-861(L) Elevated Runway Edge Light and Base Can	2 days	Mon 7/26/21	Wed 7/28/21
92	Construct New L-852D(L) In-Pavement Runway Edge Light and Base Can	2 days	Mon 8/2/21	Tue 8/3/21
93	Construct New L-861T(L) Medium Intensity Elevated Taxiway Edge Light and Base Can	14 days	Wed 7/28/21	Tue 8/10/21
94	Construct New L-852T(L) Medium Intensity In-Pavement Taxiway Edge Light and Base Can	12 days	Mon 8/9/21	Fri 8/20/21
95	Install ID Tag	6 days	Fri 9/10/21	Wed 9/15/21
96	Install Salvaged REILs on New Concrete Pad	2 days	Mon 7/19/21	Tue 7/20/21
97	Change Sign Legend	4 days	Mon 9/20/21	Thu 9/23/21
98	Shoulder Finishing and Miscellanous Grading	6 days	Wed 9/8/21	Mon 9/13/21
99	Install MALSF Light Fixtures	4 days	Tue 9/7/21	Fri 9/10/21
100	FAA MALSF Inspections	1 day	Sat 9/11/21	Sat 9/11/21
101	Install Runway and Taxiway Light Fixtures	8 days	Wed 9/8/21	Wed 9/15/21
102	Marking, 2 Coats with Beads (First Coat)	7 days	Fri 9/10/21	Thu 9/16/21
103	Marking, 2 Coats with No Beads (First Coat)	7 days	Fri 9/10/21	Thu 9/16/21
104	Hydroseeding	3 days	Wed 9/15/21	Fri 9/17/21
105	Flight Check	1 day	Fri 9/17/21	Fri 9/17/21
106	Float	10 days	Fri 9/24/21	Sun 10/3/21
107	**Phase 2 (Night Closures)**	**12 days**	**Mon 10/18/21**	**Fri 10/29/21**
108	Airfield Safety and Traffic Control	12 days	Mon 10/18/21	Fri 10/29/21
109	Grooving (30 Days after P-401 paving is completed)	8 days	Mon 10/18/21	Mon 10/25/21
110	Marking, 2 Coats with Beads (Second Coat)	7 days	Sat 10/23/21	Fri 10/29/21
111	Marking, Single Coat with No Beads (Second Coat)	7 days	Sat 10/23/21	Fri 10/29/21



Project: Complete Project Sched
Date: Mon 3/29/21

Task	▬	Summary	┌─┐	Inactive Milestone	◇	Duration-only	▬	Start-only	[	External Milestone	◆	Manual Progress	─
Split	┈┈┈	Project Summary	┌─┐	Inactive Summary	┌─┐	Manual Summary Rollup	▬	Finish-only	]	Deadline	⬇		
Milestone	◆	Inactive Task	▭	Manual Task	▬	Manual Summary	┌─┐	External Tasks	▬	Progress	─		

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Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid + Bid Alt 1 + Bid Alt 2)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
1	**Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction (Base Bid + Bid Alts 1 & 2)**	**131 days**	**Mon 6/28/21**	**Fri 11/5/21**
2	**Construction Element**	**131 days**	**Mon 6/28/21**	**Fri 11/5/21**
3	**Phase 1**	**105 days**	**Mon 6/28/21**	**Sun 10/10/21**
4	**Work Area 1**	**98 days**	**Mon 6/28/21**	**Sun 10/3/21**
5	Airfield Safety and Traffic Control	1 day	Mon 6/28/21	Mon 6/28/21
6	Compliance with Pollution, Erosion, and Siltation Control	3 days	Mon 6/28/21	Wed 6/30/21
7	Underground Utility Investigation and Potholing	2 days	Tue 6/29/21	Wed 6/30/21
8	Demolish Asphalt Pavement	8 days	Tue 6/29/21	Tue 7/6/21
9	Remove and Salvage REILs. Demolish PCC Foundation	1 day	Thu 7/1/21	Thu 7/1/21
10	Demolish Conduit, Cable, and Counterpoise	14 days	Fri 7/2/21	Thu 7/15/21
11	Demolish Concrete Encased Conduit, Cable, and Counterpoise	3 days	Mon 7/5/21	Wed 7/7/21
12	Remove Cable and Counterpoise	3 days	Tue 6/29/21	Thu 7/1/21
13	Remove and Salvage Unlit Information Sign	1 day	Thu 7/15/21	Thu 7/15/21
14	Remove and Salvage Unlit Information Sign. Demolish Concrete Pad	1 day	Thu 7/15/21	Thu 7/15/21
15	Demolish Electrical Junction Can	1 day	Fri 7/2/21	Fri 7/2/21
16	Demolish Electrical Pullboxes	14 days	Fri 7/2/21	Thu 7/15/21
17	Demolish Airfield Sign and Pad	14 days	Fri 7/2/21	Thu 7/15/21
18	Remove and Salvage Elevated Runway Edge Light Fixture and Transformer. Protect Can	2 days	Tue 6/29/21	Wed 6/30/21
19	Remove and Salvage Elevated Threshold Light Fixture and Transformer. Protect Can	2 days	Tue 6/29/21	Wed 6/30/21
20	Demolish Elevated Taxiway Edge Light and Can. Salvage Existing Fixture	14 days	Fri 7/2/21	Thu 7/15/21
21	Demolish Elevated Runway Edge Light and Can. Salvage Existing Fixture.	1 day	Thu 7/1/21	Thu 7/1/21
22	Demolish In-pavement Runway Edge Light and Can. Salvage Existing Fixture.	1 day	Mon 7/5/21	Mon 7/5/21
23	Demolish MALSF Threshold Bar (13 Lights). Salvage Existing Fixtures	3 days	Wed 6/30/21	Fri 7/2/21
24	Demolish 3 MALSF Centerline Bars (5 Lights Each). Salvage Existing Fixtures	4 days	Sat 7/3/21	Tue 7/6/21
25	Demolish Reinforced Foundation from Abandoned MALSF Bar	1 day	Wed 7/7/21	Wed 7/7/21
26	Demolish Abandoned Waterline, if Encountered	7 days	Fri 7/2/21	Thu 7/8/21
27	Demolish Concrete Valley Gutter	1 day	Wed 7/7/21	Wed 7/7/21
28	Unclassified Excavation and Haul-Off	17 days	Thu 7/1/21	Sat 7/17/21
29	Embankment in Place	10 days	Sat 7/10/21	Mon 7/19/21
30	Subgrade Preparation	19 days	Fri 7/2/21	Tue 7/20/21
31	Place Asphalt Compacted Grindings, 24-inches thick	7 days	Wed 6/30/21	Tue 7/6/21
32	Lime Treated Subgrade, 16-inch Depth (Control Strip)	1 day	Sat 7/3/21	Sat 7/3/21
33	Lime Treated Subgrade, 16-inch Depth (1st Mix)	23 days	Tue 7/6/21	Wed 7/28/21
34	Lime Treated Subgrade, 16-inch Depth (2nd Mix and Compact)	23 days	Tue 7/13/21	Wed 8/4/21
35	In-Place Drying Techniques	19 days	Fri 7/2/21	Tue 7/20/21
36	Subgrade Stabilization, Excavation Below Subgrade	23 days	Fri 7/16/21	Sat 8/7/21
37	Multi-Axial Geogrid	23 days	Fri 7/16/21	Sat 8/7/21
38	Crushed Aggregate Base Course, P-209 (Control Strip)	1 day	Tue 7/20/21	Tue 7/20/21
39	Crushed Aggregate Base Course, P-209 (Pavement Section)	34 days	Sat 7/24/21	Thu 8/26/21
40	Crushed Aggregate Base Course, P-209 (Shoulders)	34 days	Sat 7/24/21	Thu 8/26/21
41	Asphalt Concrete Surface Course, P-401 (Control Strip #1)	1 day	Fri 8/13/21	Fri 8/13/21
42	Asphalt Concrete Surface Course, P-401 (Control Strip #2)	1 day	Fri 8/20/21	Fri 8/20/21

Project: Complete Project Sched
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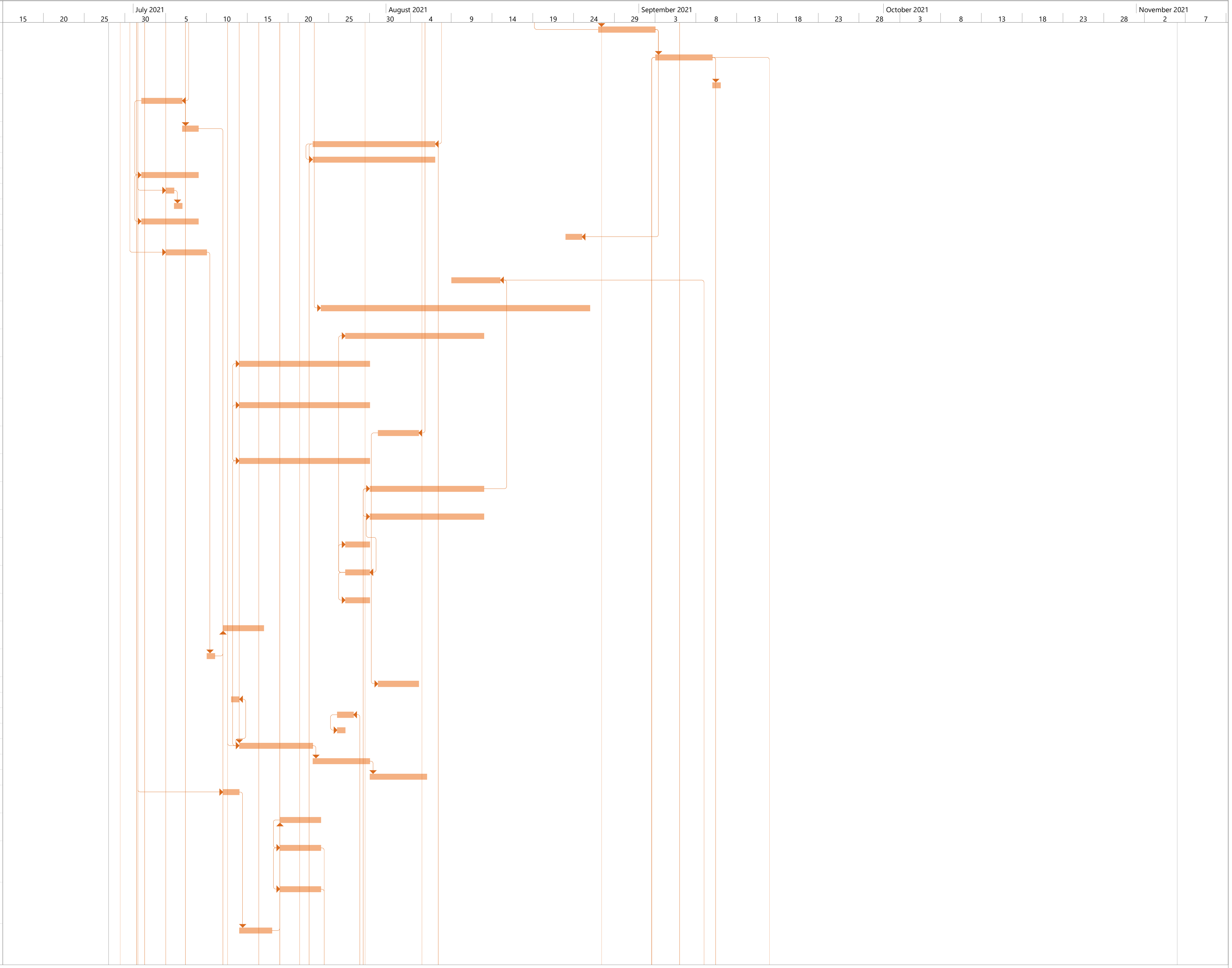
Task
Split
Milestone ◆
Summary
Project Summary
Inactive Task
Inactive Milestone ◇
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only [
Finish-only]
External Tasks
External Milestone ◆
Deadline ↓
Progress
Manual Progress

Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid + Bid Alt 1 + Bid Alt 2)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
43	Asphalt Concrete Surface Course, P-401 (First Lift)	7 days	Fri 8/27/21	Thu 9/2/21
44	Asphalt Concrete Surface Course, P-401 (Second Lift)	7 days	Fri 9/3/21	Thu 9/9/21
45	Install 2 Runway Threshold Monuments	1 day	Fri 9/10/21	Fri 9/10/21
46	12-inch RCP, Class IV, outside Pavement Areas	5 days	Fri 7/2/21	Tue 7/6/21
47	12-inch RCP, Class IV, within Pavement Areas	2 days	Wed 7/7/21	Thu 7/8/21
48	Underdrain Pipe, 6-inch, Perforated	15 days	Fri 7/23/21	Fri 8/6/21
49	Underdrain Pipe Cleanouts	15 days	Fri 7/23/21	Fri 8/6/21
50	48" Stormdrain Manholes	7 days	Fri 7/2/21	Thu 7/8/21
51	Catch Basin/Drop Inlet	1 day	Mon 7/5/21	Mon 7/5/21
52	Adjust Catch Basin to Grade	1 day	Tue 7/6/21	Tue 7/6/21
53	Connect to Existing Manholes/Basins	7 days	Fri 7/2/21	Thu 7/8/21
54	Construct Concrete Valley Gutter	2 days	Mon 8/23/21	Tue 8/24/21
55	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	5 days	Mon 7/5/21	Fri 7/9/21
56	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	6 days	Mon 8/9/21	Sat 8/14/21
57	No. 6 AWG Tinned Counterpoise Wire, Installed Adjacent to Duct Bank or Conduit	33 days	Sat 7/24/21	Wed 8/25/21
58	No. 6 AWG Tinned Counterpoise Wire, Installed in Duct Bank or Conduit	17 days	Tue 7/27/21	Thu 8/12/21
59	No. 1/0 AWG Tinned Counterpoise Wire for MALSF, Installed Adjacent to / In the Duct Bank or Conduit	16 days	Wed 7/14/21	Thu 7/29/21
60	No. 2-8 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	16 days	Wed 7/14/21	Thu 7/29/21
61	Concrete Encased Electrical Duct Bank, 3W - 2" Conduit	5 days	Sat 7/31/21	Wed 8/4/21
62	Concrete Encased Electrical Duct Bank, 1W - 2" GRMC Conduit	16 days	Wed 7/14/21	Thu 7/29/21
63	Non-encased Electrical Duct Bank, 1W - 2" Conduit	14 days	Fri 7/30/21	Thu 8/12/21
64	Non-encased Electrical Duct Bank, 2W - 2" Conduit	14 days	Fri 7/30/21	Thu 8/12/21
65	Non-encased Electrical Duct Bank, 1W - 3" and 1W - 2" Conduit	3 days	Tue 7/27/21	Thu 7/29/21
66	Non-encased Electrical Duct Bank, 1W - 3" and 2W - 2" Conduit	3 days	Tue 7/27/21	Fri 7/30/21
67	Non-encased Electrical Duct Bank, 1W - 3" and 3W - 2" Conduit	3 days	Tue 7/27/21	Thu 7/29/21
68	Concrete Encase Existing FAA Line Under Proposed Pavement	5 days	Mon 7/12/21	Fri 7/16/21
69	Concrete Encase Existing FAA Line Outside Pavement	1 day	Sat 7/10/21	Sat 7/10/21
70	Construct Electrical Pullbox: Aircraft Rated	5 days	Sat 7/31/21	Wed 8/4/21
71	Construct FAA Pull Box	1 day	Tue 7/13/21	Wed 7/14/21
72	Construct 24" Junction Can: L-868 with Lid	2 days	Mon 7/26/21	Wed 7/28/21
73	Adjust Junction Can to Grade	1 day	Mon 7/26/21	Mon 7/26/21
74	Construct MALSF Threshold Bar	9 days	Wed 7/14/21	Thu 7/22/21
75	Construct 3 MALSF Centerline Bars	7 days	Fri 7/23/21	Thu 7/29/21
76	MALSF PCC Cure Time	7 edays	Thu 7/29/21	Thu 8/5/21
77	Construct New L-858B(L) Distance Remaining Sign and Concrete Pad	2 days	Mon 7/12/21	Tue 7/13/21
78	Construct New L-858(L) Runway Hold Position Sign and Concrete Pad	5 days	Mon 7/19/21	Fri 7/23/21
79	Construct New L-858(L) Taxiway Guidance Sign, Double Arrow, with Taxiway Identifier and Concrete Pad	5 days	Mon 7/19/21	Fri 7/23/21
80	Construct New L-858(L) Taxiway Guidance Sign, Single Arrow, with Taxiway Identifier and Concrete Pad	5 days	Mon 7/19/21	Fri 7/23/21
81	Construct New L-858(L) Taxiway Guidance Sign without Taxiway Identifier and Concrete Pad	4 days	Wed 7/14/21	Sat 7/17/21



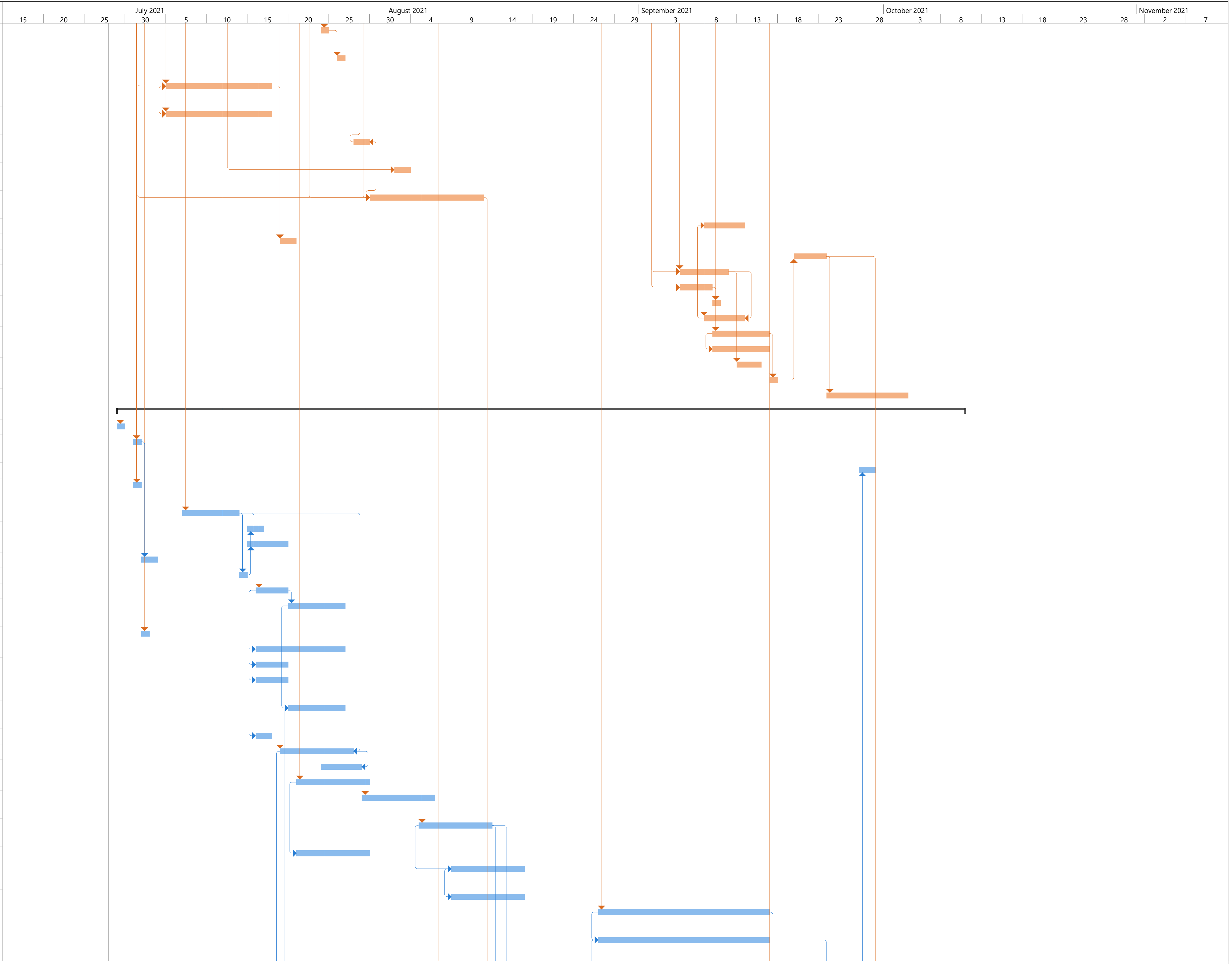
Project: Complete Project Sched
Date: Mon 3/29/21

Task	▬	Milestone	◆	Project Summary	┌─┐	Inactive Milestone	◇	Manual Task	▬	Manual Summary Rollup	▬	Start-only	[	External Tasks	▬	Deadline	⬇	Manual Progress	─
Split	┈	Summary	┌─┐	Inactive Task	▭	Inactive Summary	┌─┐	Duration-only	▬	Manual Summary	┌─┐	Finish-only	]	External Milestone	◆	Progress	─		

Runway 7-25, Taxiway Connectors, and Parallel Taxiway Pavement Reconstruction Project (Base Bid + Bid Alt 1 + Bid Alt 2)

Mon 3/29/21

ID	Task Name	Duration	Start	Finish
82	Install Salvaged Unlit Informational Sign on Existing Concrete Pad	1 day	Sat 7/24/21	Sat 7/24/21
83	Install Salvaged Unlit Informational Sign on New Concrete Pad	1 day	Mon 7/26/21	Mon 7/26/21
84	Adjust Base Can for New L-861(L) Elevated Runway Edge Light	13 days	Mon 7/5/21	Sat 7/17/21
85	Adjust Base Can for New L-861E(L) Runway Threshold Light and Transformer	13 days	Mon 7/5/21	Sat 7/17/21
86	Construct New L-861(L) Elevated Runway Edge Light and Base Can	2 days	Wed 7/28/21	Fri 7/30/21
87	Construct New L-852D(L) In-Pavement Runway Edge Light and Base Can	2 days	Mon 8/2/21	Tue 8/3/21
88	Construct New L-861T(L) Medium Intensity Elevated Taxiway Edge Light and Base Can	14 days	Fri 7/30/21	Thu 8/12/21
89	Install ID Tag	5 days	Thu 9/9/21	Mon 9/13/21
90	Install Salvaged REILs on New Concrete Pad	2 days	Mon 7/19/21	Tue 7/20/21
91	Change Sign Legend	4 days	Mon 9/20/21	Thu 9/23/21
92	Shoulder Finishing and Miscellanous Grading	6 days	Mon 9/6/21	Sat 9/11/21
93	Install MALSF Light Fixtures	4 days	Mon 9/6/21	Thu 9/9/21
94	FAA MALSF Inspections	1 day	Fri 9/10/21	Fri 9/10/21
95	Install Runway and Taxiway Light Fixtures	5 days	Thu 9/9/21	Mon 9/13/21
96	Marking, 2 Coats with Beads (First Coat)	7 days	Fri 9/10/21	Thu 9/16/21
97	Marking, 2 Coats with No Beads (First Coat)	7 days	Fri 9/10/21	Thu 9/16/21
98	Hydroseeding	3 days	Mon 9/13/21	Wed 9/15/21
99	Flight Check	1 day	Fri 9/17/21	Fri 9/17/21
100	Float	10 days	Fri 9/24/21	Sun 10/3/21
101	**Work Area 2**	**104 days**	**Tue 6/29/21**	**Sun 10/10/21**
102	Airfield Safety and Traffic Control	1 day	Tue 6/29/21	Tue 6/29/21
103	Compliance with Pollution, Erosion, and Siltation Control	1 day	Thu 7/1/21	Thu 7/1/21
104	Airport Access and Haul Route Repair	2 days	Tue 9/28/21	Wed 9/29/21
105	Underground Utility Investigation and Potholing	1 day	Thu 7/1/21	Thu 7/1/21
106	Demolish Asphalt Pavement	7 days	Wed 7/7/21	Tue 7/13/21
107	Asphalt Crack Repair (under 1.5" width)	2 days	Thu 7/15/21	Fri 7/16/21
108	Asphalt Crack Repair (over 1.5" width)	5 days	Thu 7/15/21	Mon 7/19/21
109	Remove Airfield Marking	2 days	Fri 7/2/21	Sat 7/3/21
110	Cold Mill, Variable Depth (2 inches Maximum)	1 day	Wed 7/14/21	Wed 7/14/21
111	Demolish Conduit, Cable, and Counterpoise	4 days	Fri 7/16/21	Mon 7/19/21
112	Demolish Concrete Encased Conduit, Cable, and Counterpoise	7 days	Tue 7/20/21	Mon 7/26/21
113	Remove Cable and Counterpoise	1 day	Fri 7/2/21	Fri 7/2/21
114	Demolish Electrical Pullbox	11 days	Fri 7/16/21	Mon 7/26/21
115	Demolish Airfield Sign and Pad	4 days	Fri 7/16/21	Mon 7/19/21
116	Demolish Elevated Taxiway Edge Light and Can. Salvage Existing Fixture.	4 days	Fri 7/16/21	Mon 7/19/21
117	Demolish In-pavement Taxiway Edge Light and Can. Salvage Existing Fixture.	7 days	Tue 7/20/21	Mon 7/26/21
118	Demolish Abandoned Waterline, if Encountered	2 days	Fri 7/16/21	Sat 7/17/21
119	Unclassified Excavation and Haul-off	9 days	Mon 7/19/21	Tue 7/27/21
120	Embankment in Place	5 days	Sat 7/24/21	Wed 7/28/21
121	Subgrade Preparation	9 days	Wed 7/21/21	Thu 7/29/21
122	Lime Treated Subgrade, 16-inch Depth (1st Mix)	9 days	Thu 7/29/21	Fri 8/6/21
123	Lime Treated Subgrade, 16-inch Depth (2nd Mix and Compact)	9 days	Thu 8/5/21	Fri 8/13/21
124	In-Place Drying Techniques	9 days	Wed 7/21/21	Thu 7/29/21
125	Subgrade Stabilization, Excavation Below Subgrade	9 days	Mon 8/9/21	Tue 8/17/21
126	Multi-axial Geogrid	9 days	Mon 8/9/21	Tue 8/17/21
127	Crushed Aggregate Base Course, P-209 (Pavement Section)	21 days	Fri 8/27/21	Thu 9/16/21
128	Crushed Aggregate Base Course, P-209 (Shoulders)	21 days	Fri 8/27/21	Thu 9/16/21

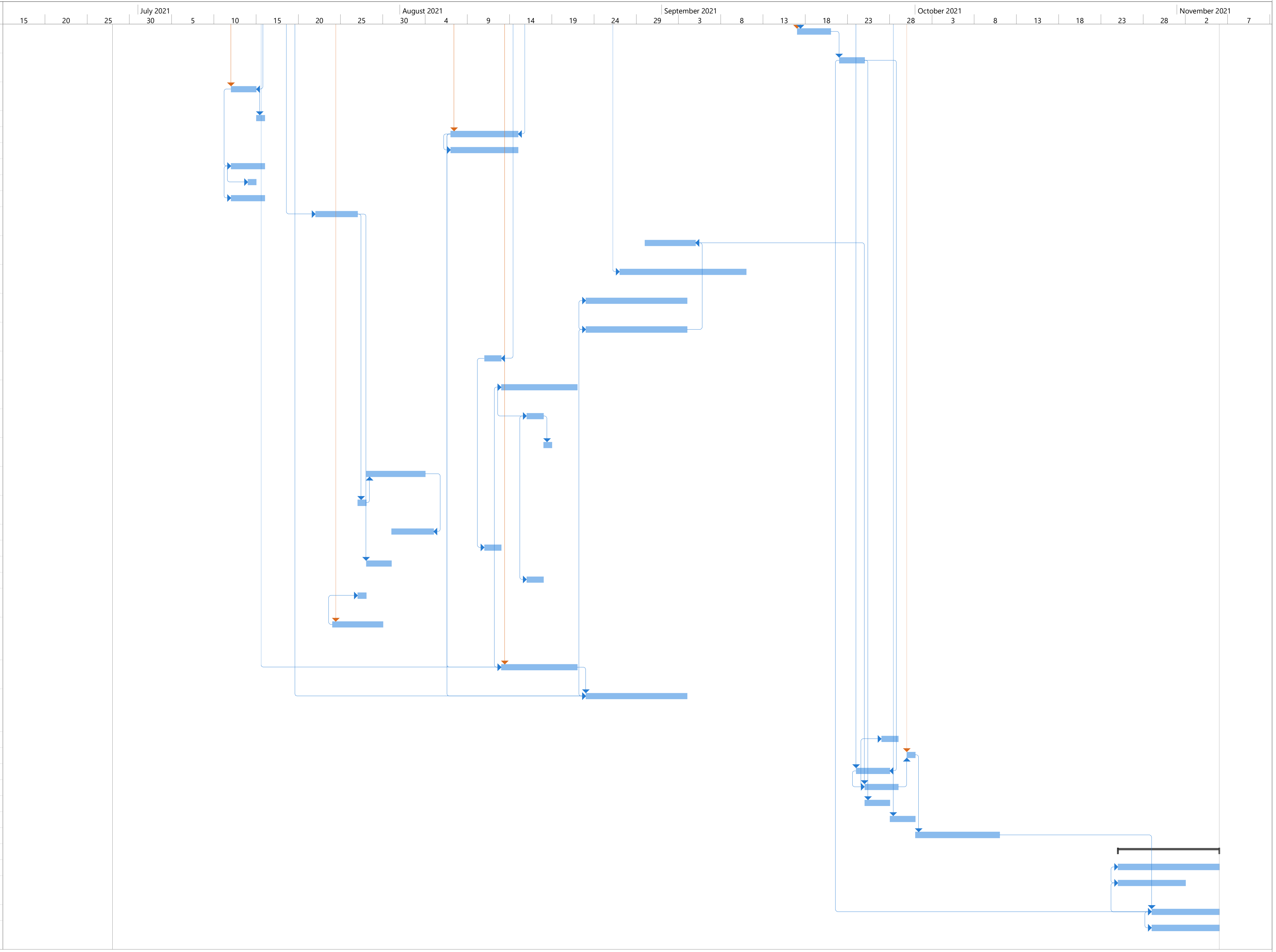


Project: Complete Project Sched
Date: Mon 3/29/21

Task	▬	Milestone	◆	Project Summary	▬	Inactive Milestone	◇	Manual Task	▬	Manual Summary Rollup	▬	Start-only	[
Split	┅	Summary	▬	Inactive Task	▭	Inactive Summary	▬	Duration-only	▬	Manual Summary	▬	Finish-only	]

External Tasks	▬	Deadline	⬇	Manual Progress	▬
External Milestone	◆	Progress	▬		

ID	Task Name	Duration	Start	Finish
129	Asphalt Concrete Surface Course, P-401 (First Lift)	4 days	Fri 9/17/21	Mon 9/20/21
130	Asphalt Concrete Surface Course, P-401 (Second Lift)	3 days	Wed 9/22/21	Fri 9/24/21
131	12-inch RCP, Class IV, outside Pavement Areas	3 days	Mon 7/12/21	Wed 7/14/21
132	12-inch RCP, Class IV, within Pavement Areas	1 day	Thu 7/15/21	Thu 7/15/21
133	Underdrain Pipe, 6-Inch, Perforated	8 days	Sat 8/7/21	Sat 8/14/21
134	Underdrain Pipe Cleanouts	8 days	Sat 8/7/21	Sat 8/14/21
135	48" Stormdrain Manholes	4 days	Mon 7/12/21	Thu 7/15/21
136	Catch Basin/Drop Inlet	1 day	Wed 7/14/21	Wed 7/14/21
137	Connect to Existing Manholes/Basins	4 days	Mon 7/12/21	Thu 7/15/21
138	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	5 days	Thu 7/22/21	Mon 7/26/21
139	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	6 days	Mon 8/30/21	Sat 9/4/21
140	No. 6 AWG Tinned Counterpoise Wire, Installed Adjacent to Duct Bank or Conduit	15 days	Fri 8/27/21	Fri 9/10/21
141	No. 6 AWG Tinned Counterpoise Wire, Installed in Duct Bank or Conduit	12 days	Mon 8/23/21	Fri 9/3/21
142	Concrete Encased Electrical Duct Bank, 1W - 2" Conduit	12 days	Mon 8/23/21	Fri 9/3/21
143	Concrete Encased Electrical Duct Bank, 5W - 2" Conduit	2 days	Wed 8/11/21	Thu 8/12/21
144	Non-encased Electrical Duct Bank, 1W - 2" Conduit	9 days	Fri 8/13/21	Sat 8/21/21
145	Non-encased Electrical Duct Bank, 2W - 2" Conduit	2 days	Mon 8/16/21	Tue 8/17/21
146	Non-encased Electrical Duct Bank, 3W - 2" Conduit	1 day	Wed 8/18/21	Wed 8/18/21
147	Concrete Encase Existing FAA Line Under Proposed Pavement	7 days	Wed 7/28/21	Tue 8/3/21
148	Concrete Encase Existing FAA Line Outside Pavement	1 day	Tue 7/27/21	Tue 7/27/21
149	Lower and Concrete Encase FAA Line	5 days	Sat 7/31/21	Wed 8/4/21
150	Construct Electrical Pullbox: Aircraft Rated	2 days	Wed 8/11/21	Thu 8/12/21
151	Construct FAA Pull Box	3 days	Wed 7/28/21	Fri 7/30/21
152	Construct 24" Junction Can: L-868 with Lid	2 days	Mon 8/16/21	Tue 8/17/21
153	Construct New L-858(L) ILS Hold Position Sign and Concrete Pad	1 day	Tue 7/27/21	Tue 7/27/21
154	Construct New L-858(L) Taxiway Guidance Sign, Double Arrow, with Taxiway Identifier and Concrete Pad	6 days	Sat 7/24/21	Thu 7/29/21
155	Construct New L-861T(L) Medium Intensity Elevated Taxiway Edge Light and Base Can	9 days	Fri 8/13/21	Sat 8/21/21
156	Construct New L-852T(L) Medium Intensity In-Pavement Taxiway Edge Light and Base Can	12 days	Mon 8/23/21	Fri 9/3/21
157	Install ID Tag	2 days	Mon 9/27/21	Tue 9/28/21
158	Change Sign Legend	1 day	Thu 9/30/21	Thu 9/30/21
159	Shoulder Finishing and Miscellanous Grading	4 days	Fri 9/24/21	Mon 9/27/21
160	Install Taxiway Light Fixtures	4 days	Sat 9/25/21	Tue 9/28/21
161	Marking, 2 Coats with Beads (First Coat)	3 days	Sat 9/25/21	Mon 9/27/21
162	Hydroseeding	3 days	Tue 9/28/21	Thu 9/30/21
163	Float	10 days	Fri 10/1/21	Sun 10/10/21
164	**Phase 2 (Night Closures)**	**12 days**	**Mon 10/25/21**	**Fri 11/5/21**
165	Airfield Safety and Traffic Control	12 days	Mon 10/25/21	Fri 11/5/21
166	Grooving (30 Days after P-401 paving is completed)	8 days	Mon 10/25/21	Mon 11/1/21
167	Marking, 2 Coats with Beads (Second Coat)	8 days	Fri 10/29/21	Fri 11/5/21
168	Marking, Single Coat with No Beads (Second Coat)	8 days	Fri 10/29/21	Fri 11/5/21



Project: Complete Project Sched
Date: Mon 3/29/21

Task	Milestone ◆	Project Summary	Inactive Milestone ◇	Manual Task	Manual Summary Rollup	Start-only [	External Tasks	Deadline ⬇	Manual Progress
Split	Summary	Inactive Task	Inactive Summary	Duration-only	Manual Summary	Finish-only]	External Milestone ◆	Progress	

Appendix I - Preliminary Runway Surface Analysis

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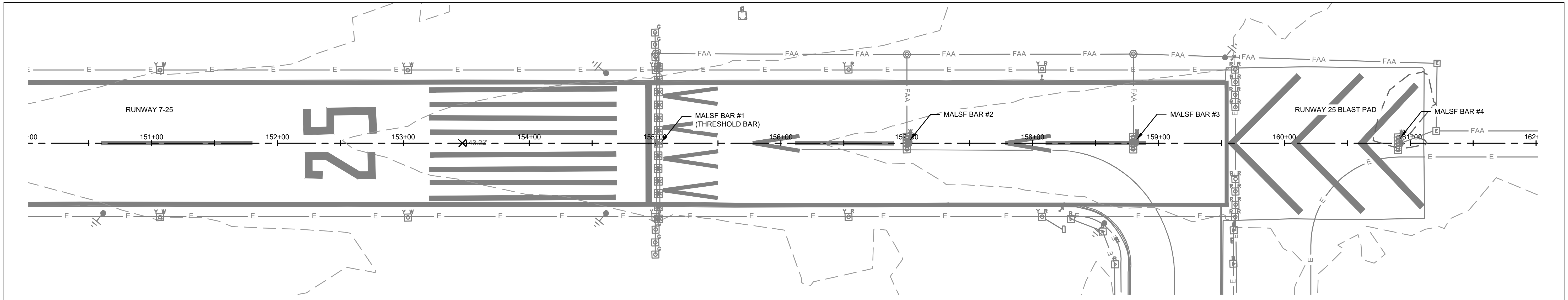
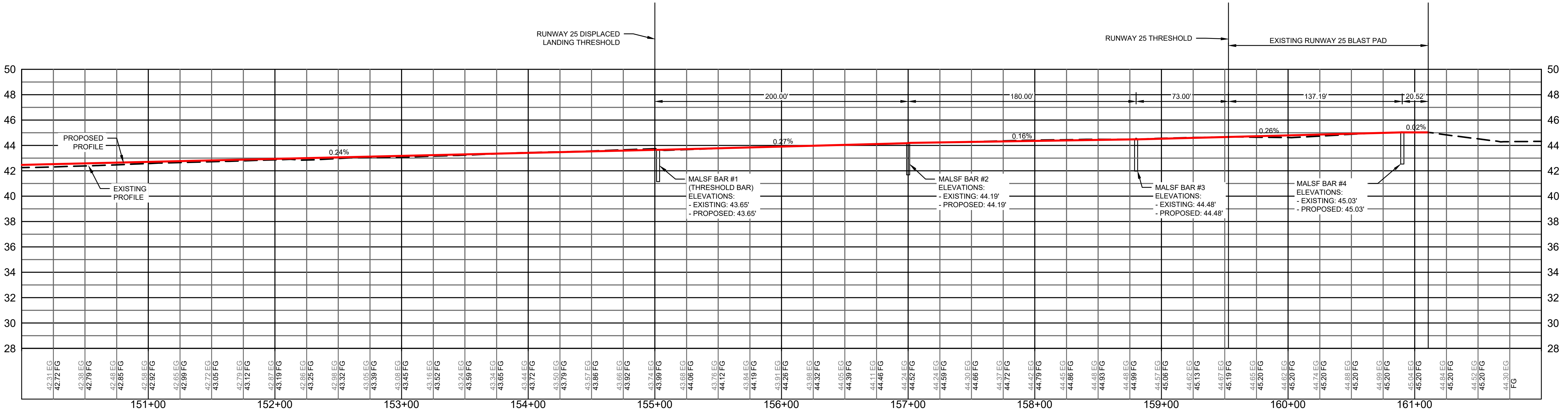




PROPOSED RUNWAY 7-25 CENTERLINE PROFILE - OPTION 1

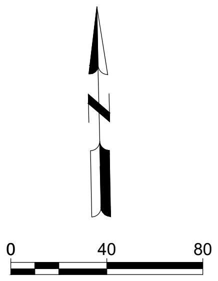
MALSF ALTERNATIVES

OPTIONS	BAR #1	BAR #2	BAR #3	BAR #4
OPTION 1	0.0"	0.0"	0.0"	0.0"
OPTION 2	0.0"	-1.1"	+0.4"	-4.2"
OPTION 3	+1.1"	0.0"	+1.4"	-3.1"
OPTION 4	+4.1"	+4.0"	+6.3"	+2.0"

NOTE: OPTION 1 CONSISTS OF RECONSTRUCTING RUNWAY PAVEMENT BETWEEN MALSF BARS MAINTAINING THE EXISTING GRADE AND MALSF FOUNDATION BAR ELEVATIONS.

ITEMS TO NOTE:

1. PRESENCE OF LONGITUDINAL GRADE BREAKS IN THE FIRST QUARTER OF RUNWAY 25 (AC 150/5300-13A PARAGRAPH 313 b. (2)).
2. POSITIVE LONGITUDINAL SLOPES ON RUNWAY 25 BLAST PAD (AC 150/5300-13A FIGURE 3-22).
3. ADJUSTMENT TO APPROACH SURFACE NOT ANTICIPATED.



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OXNARD RUNWAY 7-25 RECONSTRUCTION
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MALSF ALTERNATIVES - OPTION 1

Mead & Hunt

EXHIBIT I.1

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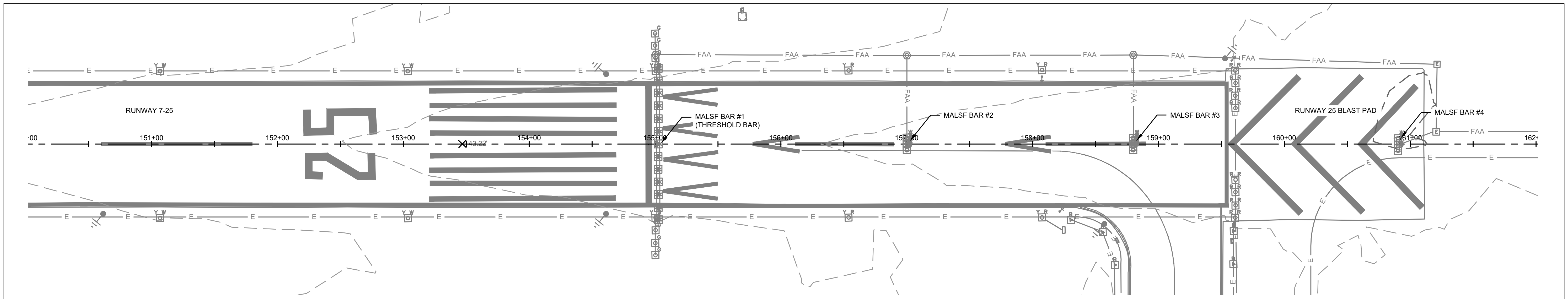
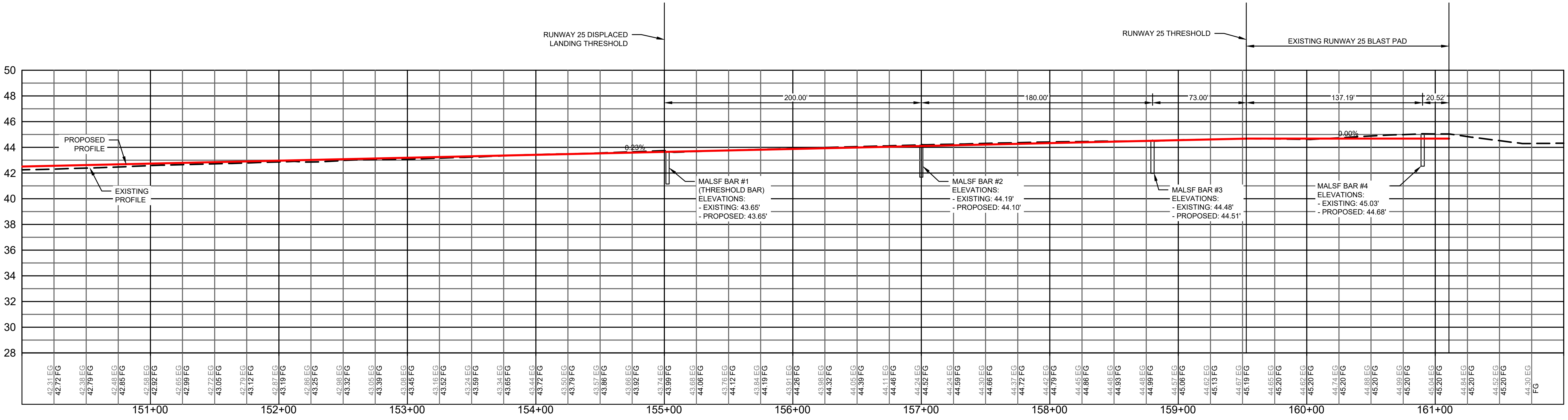




PROPOSED RUNWAY 7-25 CENTERLINE PROFILE - OPTION 2

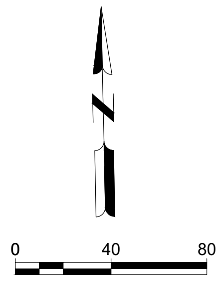
MALSF ALTERNATIVES

OPTIONS	BAR #1	BAR #2	BAR #3	BAR #4
OPTION 1	0.0"	0.0"	0.0"	0.0"
OPTION 2	0.0"	-1.1"	+0.4"	-4.2"
OPTION 3	+1.1"	0.0"	+1.4"	-3.1"
OPTION 4	+4.1"	+4.0"	+6.3"	+2.0"

NOTE: OPTION 2 CONSISTS OF RECONSTRUCTING RUNWAY PAVEMENT WITH A -0.23% SLOPE IN THE FIRST QUARTER OF RUNWAY 25 WITHOUT ADJUSTING THE ELEVATION OF THE DISPLACED THRESHOLD. ALSO, OPTION 2 CONSIDERS A 0.00% SLOPE ON RUNWAY 25 BLAST PAD.

ITEMS TO NOTE:

1. LONGITUDINAL GRADE BREAK COMPLIANT IN THE FIRST QUARTER OF RUNWAY 25 (AC 150/5300-13A PARAGRAPH 313 b. (2)).
2. LONGITUDINAL SLOPE COMPLIANT ON RUNWAY 25 BLAST PAD (AC 150/5300-13A FIGURE 3-22).
3. ADJUSTMENT TO APPROACH SURFACE NOT ANTICIPATED.



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MALSF ALTERNATIVES - OPTION 2

Mead
&Hunt

EXHIBIT I.2

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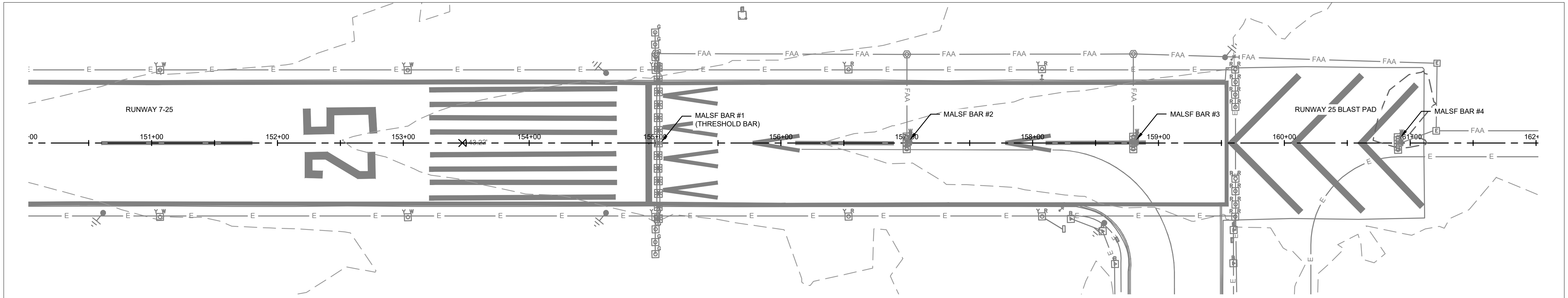

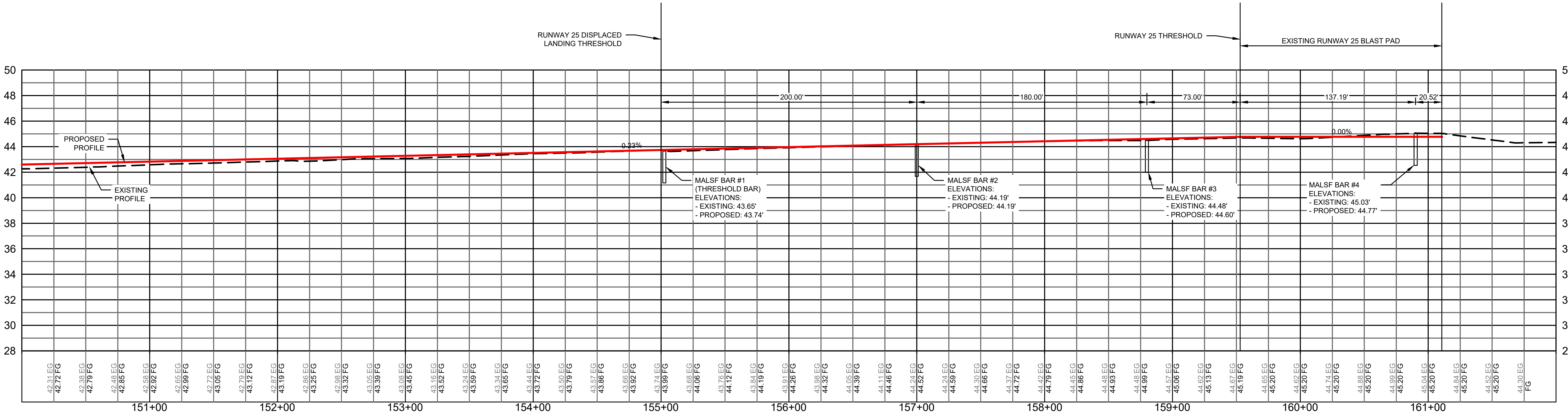

PROPOSED RUNWAY 7-25 CENTERLINE PROFILE - OPTION 3

MALSF ALTERNATIVES

OPTIONS	BAR #1	BAR #2	BAR #3	BAR #4
OPTION 1	0.0"	0.0"	0.0"	0.0"
OPTION 2	0.0"	-1.1"	+0.4"	-4.2"
OPTION 3	+1.1"	0.0"	+1.4"	-3.1"
OPTION 4	+4.1"	+4.0"	+6.3"	+2.0"

NOTE: OPTION 3 CONSISTS OF RECONSTRUCTING RUNWAY PAVEMENT SO THAT NO ADJUSTMENT IS NEEDED FOR MALSF BAR #2. THE PROPOSED PROFILE FOR OPTION 3 ALSO HAS -0.23% SLOPE FOR THE FIRST QUARTER OF RUNWAY 25 AND 0.00% SLOPE ON RUNWAY 25 BLAST PAD. OPTION 3 REDUCES THE ADJUSTMENT FOR MALSF BAR #4.

ITEMS TO NOTE:

1. LONGITUDINAL GRADE BREAK COMPLIANT IN THE FIRST QUARTER OF RUNWAY 25 (AC 150/5300-13A PARAGRAPH 313 b. (2)).
2. LONGITUDINAL SLOPE COMPLIANT ON RUNWAY 25 BLAST PAD (AC 150/5300-13A FIGURE 3-22).
3. ADJUSTMENT TO APPROACH SURFACE NOT ANTICIPATED.

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MALSF ALTERNATIVES - OPTION 3

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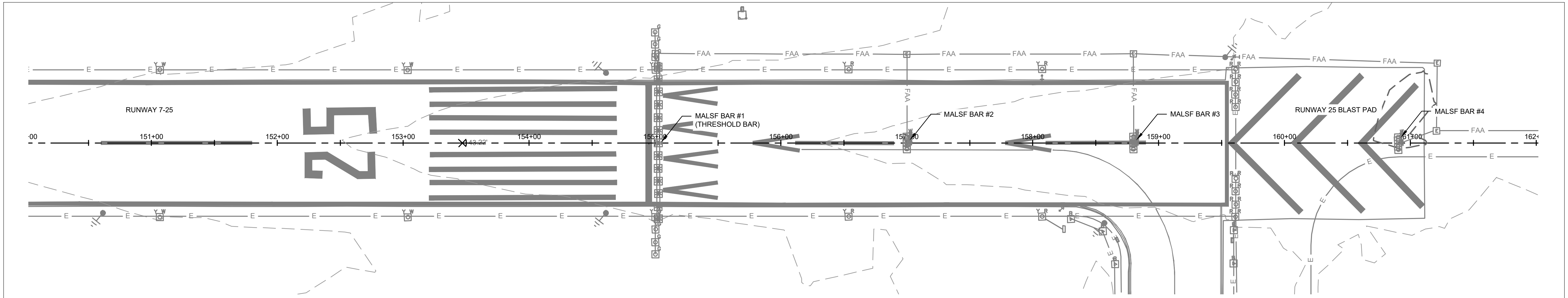
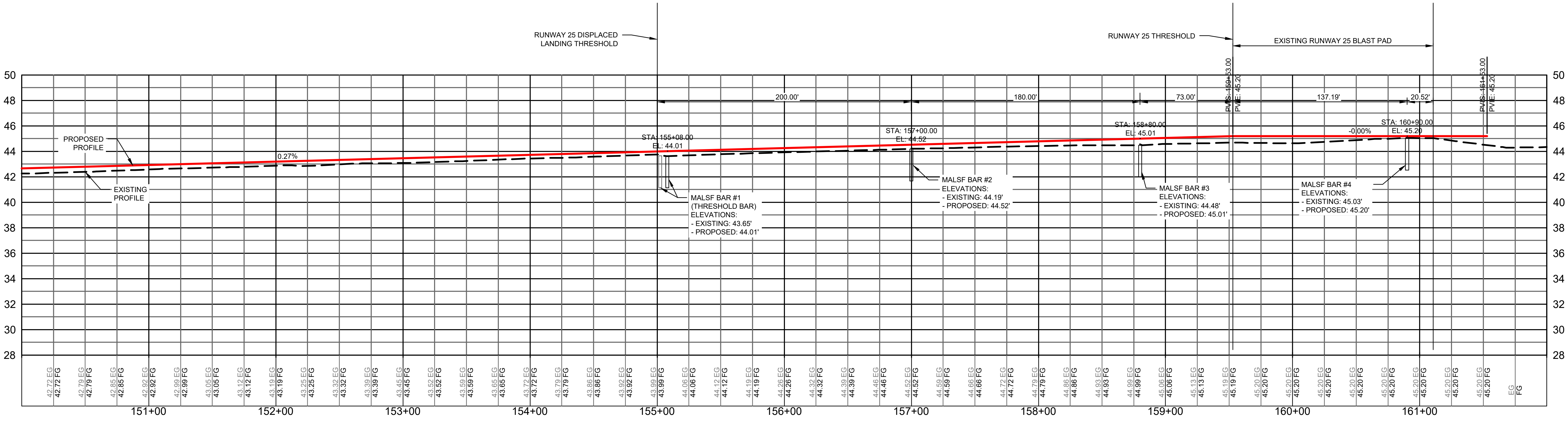




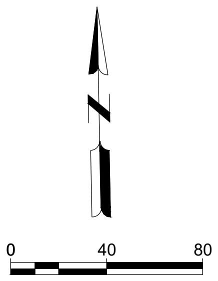
PROPOSED RUNWAY 7-25 CENTERLINE PROFILE - OPTION 4

MALSF ALTERNATIVES				
OPTIONS	**BAR #1**	**BAR #2**	**BAR #3**	**BAR #4**
OPTION 1	0.0"	0.0"	0.0"	0.0"
OPTION 2	0.0"	-1.1"	+0.4"	-4.2"
OPTION 3	+1.1"	0.0"	+1.4"	-3.1"
OPTION 4	+4.1"	+4.0"	+6.3"	+2.0"

NOTE: OPTION 4 CONSISTS OF RAISING THE RUNWAY 4-6" TO ALLOW FOR MORE COMPLIANT SHOULDER GRADING AND CORRECTIONS TO THE BLAST PAD, WHICH CURRENTLY IS OUT OF COMPLIANCE WITH RSA AND BLAST PAD GRADING RULES. ALL MALSF BARS WILL BE RECONSTRUCTED TO THEIR NEW ELEVATIONS IN THIS OPTION.

ITEMS TO NOTE:

1. LONGITUDINAL GRADE BREAK COMPLIANT IN THE FIRST QUARTER OF RUNWAY 25 (AC 150/5300-13A PARAGRAPH 313 b. (2)).
2. LONGITUDINAL SLOPE COMPLIANT ON RUNWAY 25 BLAST PAD (AC 150/5300-13A FIGURE 3-22).
3. ADJUSTMENT TO APPROACH SURFACE NOT ANTICIPATED.



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MALSF ALTERNATIVES - OPTION 4

Mead & Hunt

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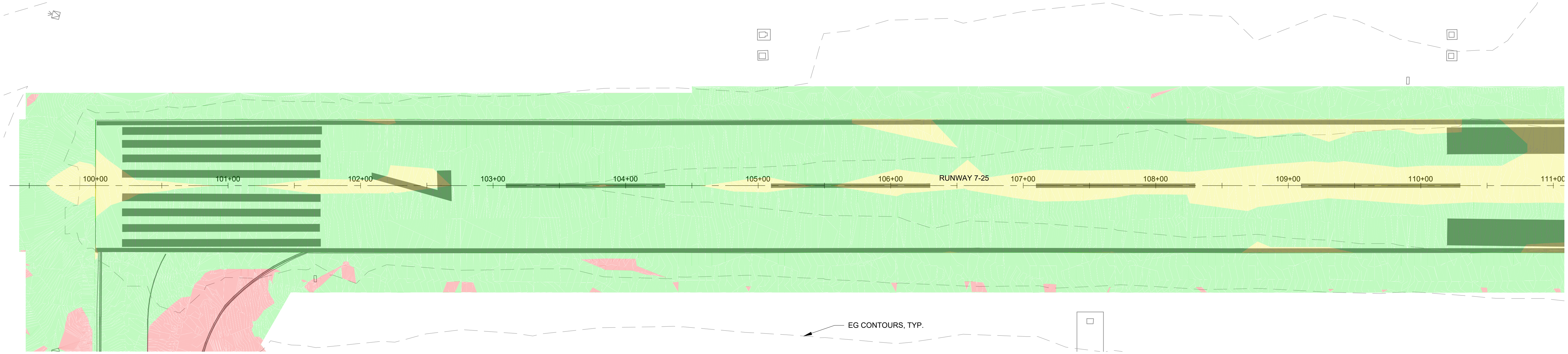
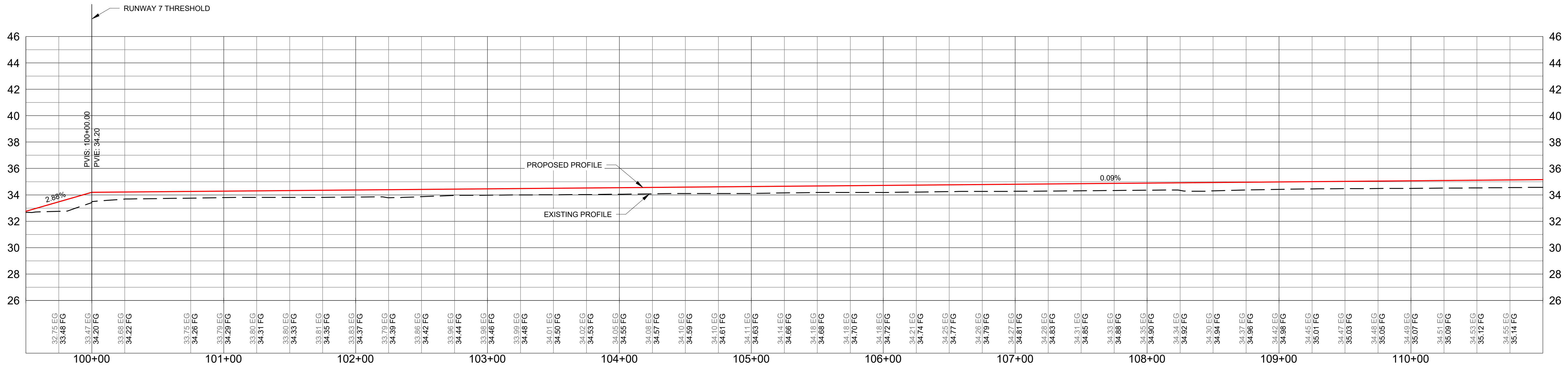
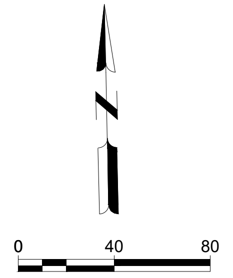




PROPOSED RUNWAY 7-25 CENTERLINE PROFILE



LEGEND:

🟥 FG-EG LESS THAN 0 FT
🟩 FG-EG BETWEEN 0 AND +0.5 FT
🟨 FG-EG GREATER THAN +0.5 FT

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APPENDIX I

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RUNWAY 7-25 PROFILE - STA. 100+00 TO 110+00

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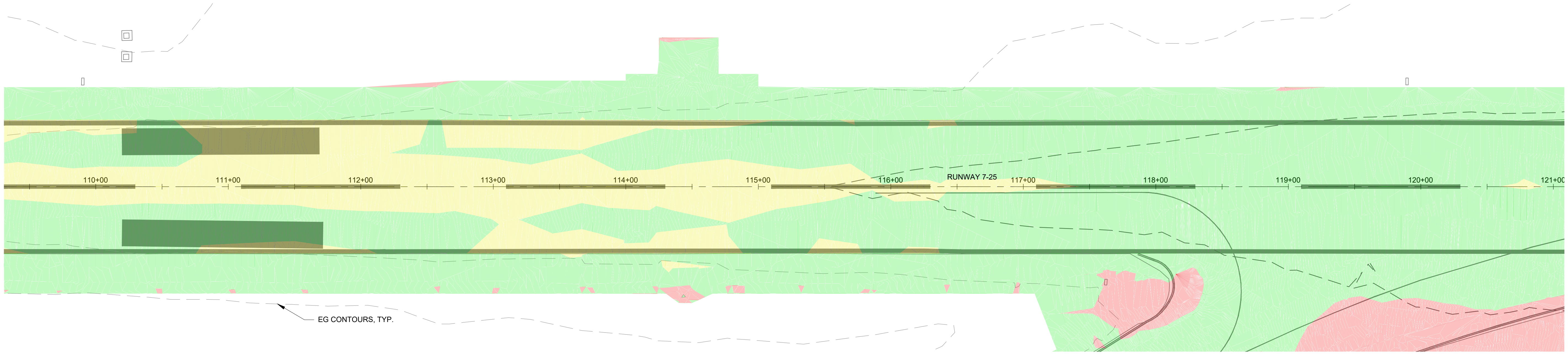

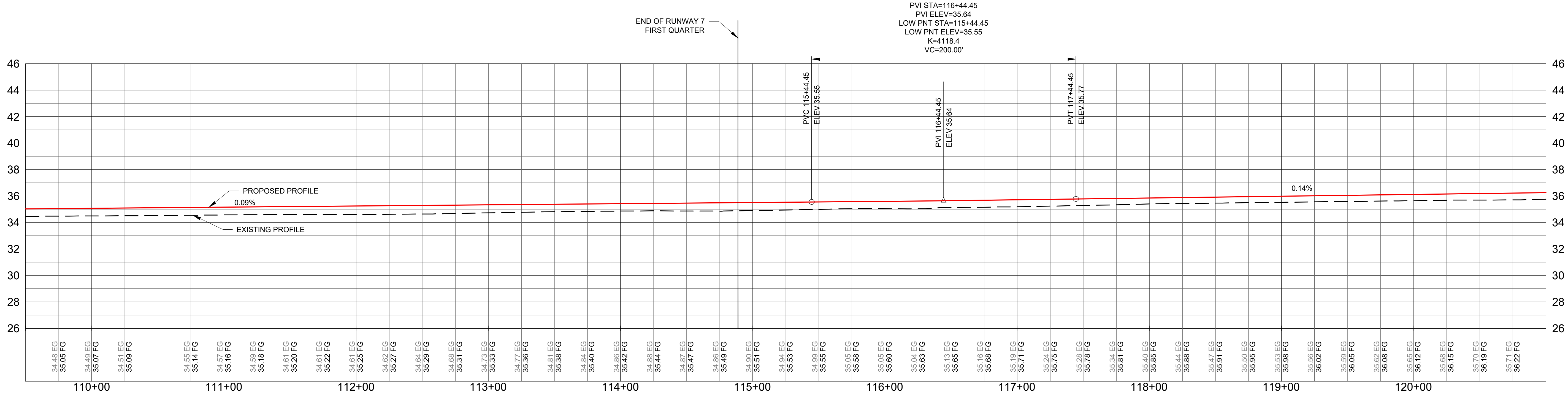

PROPOSED RUNWAY 7-25 CENTERLINE PROFILE

LEGEND:

🟥	FG-EG LESS THAN 0 FT
🟩	FG-EG BETWEEN 0 AND +0.5 FT
🟨	FG-EG GREATER THAN +0.5 FT

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RUNWAY 7-25 PROFILE - STA. 110+00 TO 120+00

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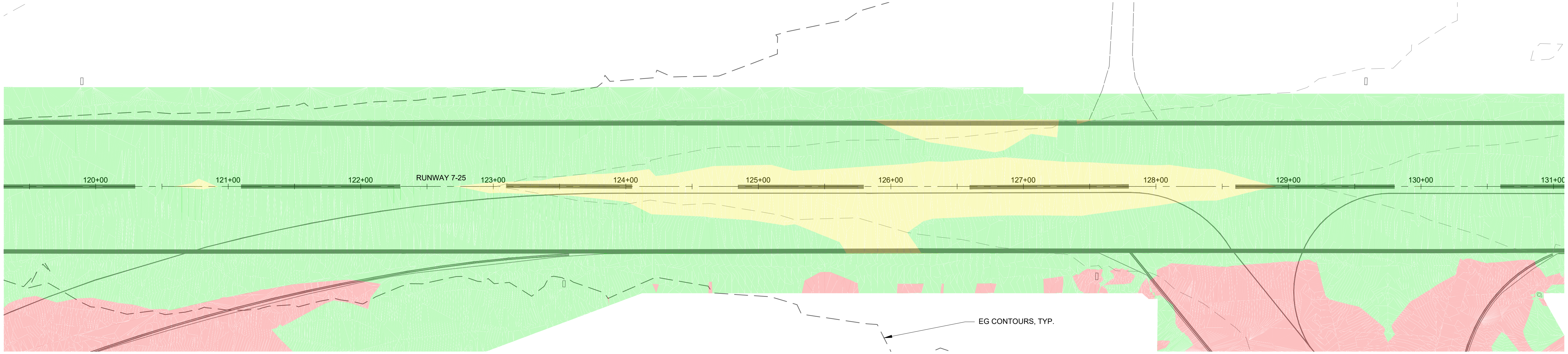

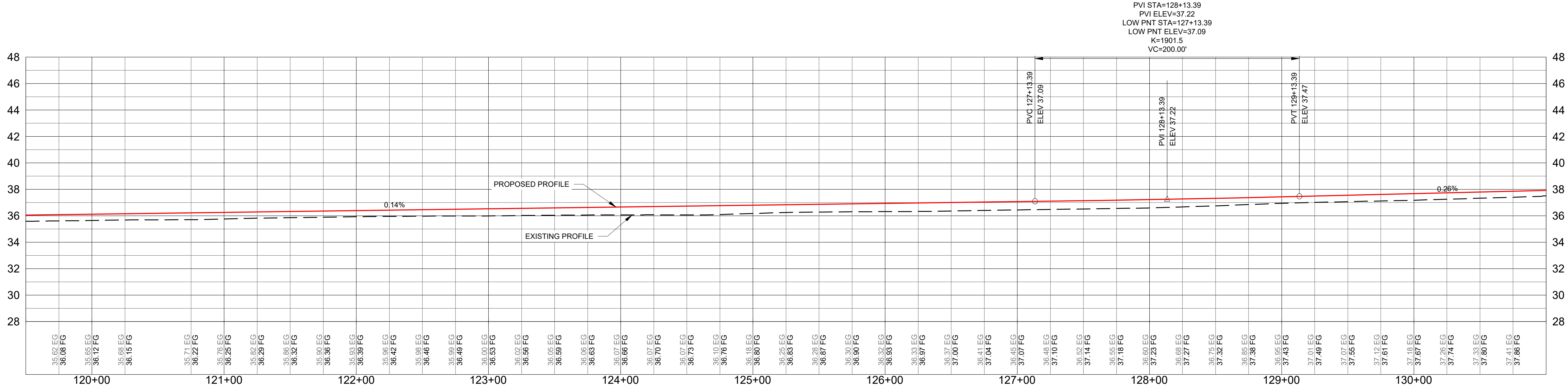

PROPOSED RUNWAY 7-25 CENTERLINE PROFILE

LEGEND:

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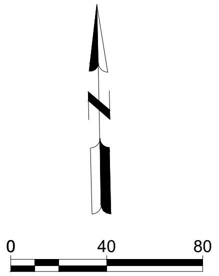
🟩 FG-EG BETWEEN 0 AND +0.5 FT

🟨 FG-EG GREATER THAN +0.5 FT



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RUNWAY 7-25 PROFILE - STA. 120+00 TO 130+00

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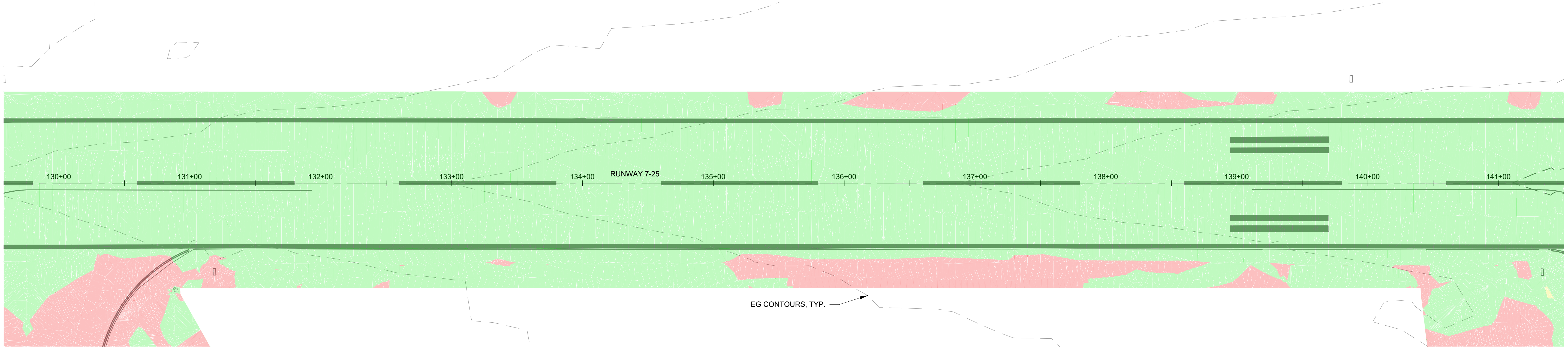

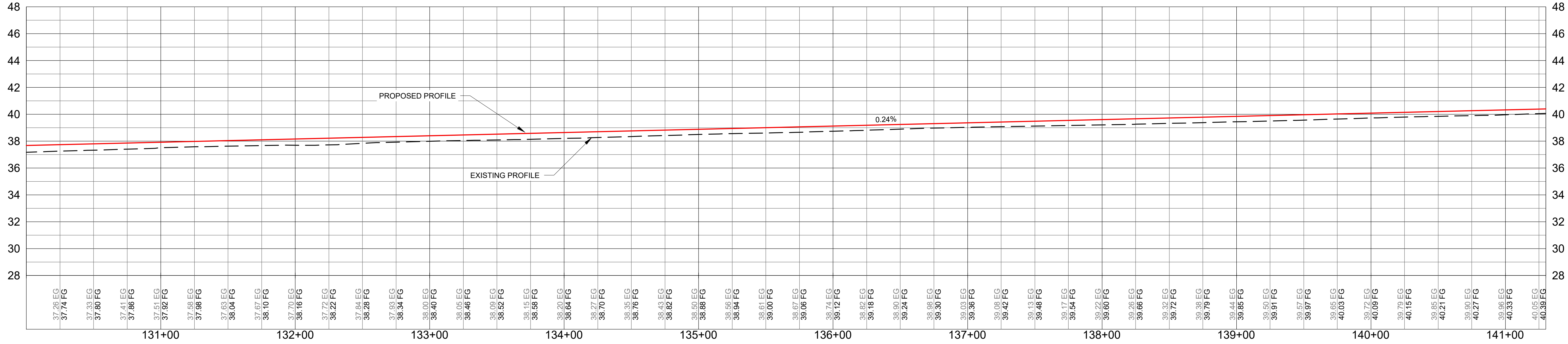

PROPOSED RUNWAY 7-25 CENTERLINE PROFILE

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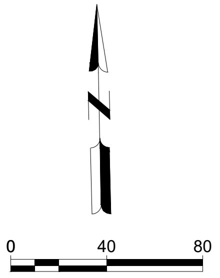
🟩 FG-EG BETWEEN 0 AND +0.5 FT

🟨 FG-EG GREATER THAN +0.5 FT



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RUNWAY 7-25 PROFILE - STA. 130+00 TO 140+00

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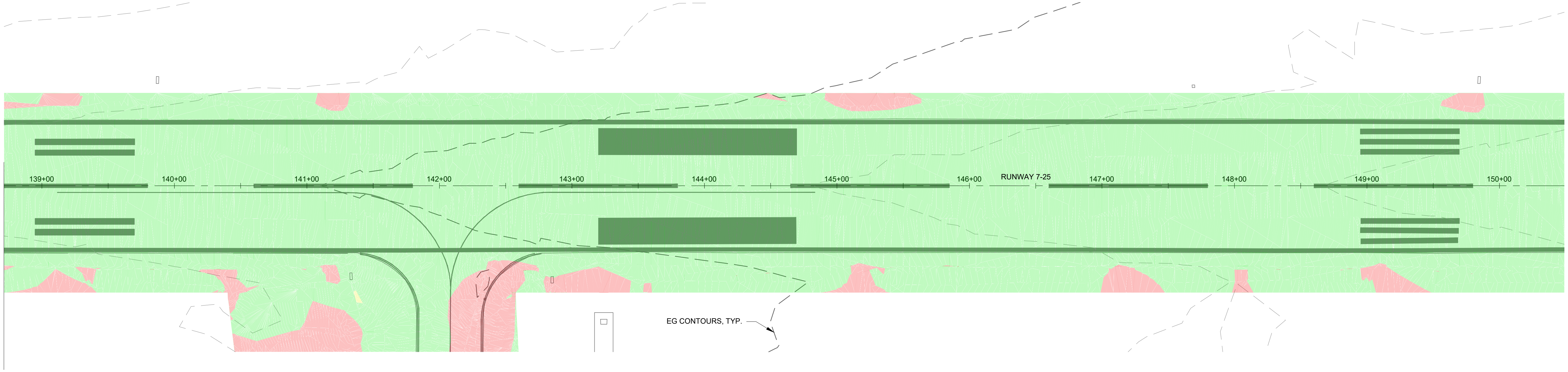

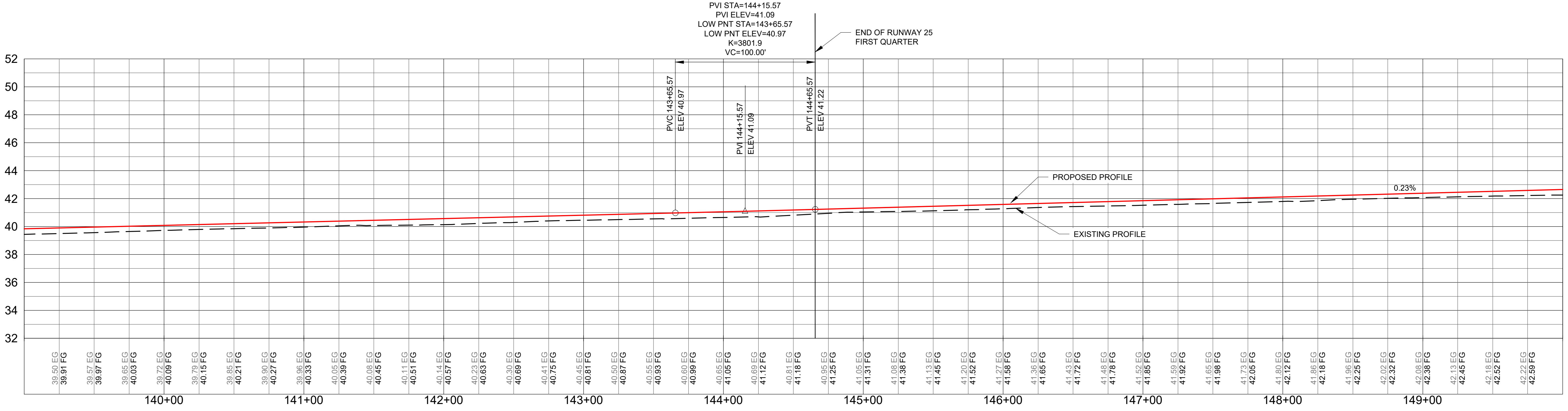

PROPOSED RUNWAY 7-25 CENTERLINE PROFILE

LEGEND:

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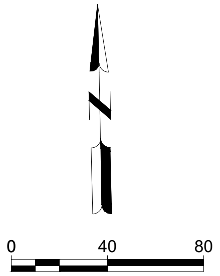
🟨 FG-EG GREATER THAN +0.5 FT



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RUNWAY 7-25 PROFILE - STA. 140+00 TO 150+00

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EXHIBIT I.9

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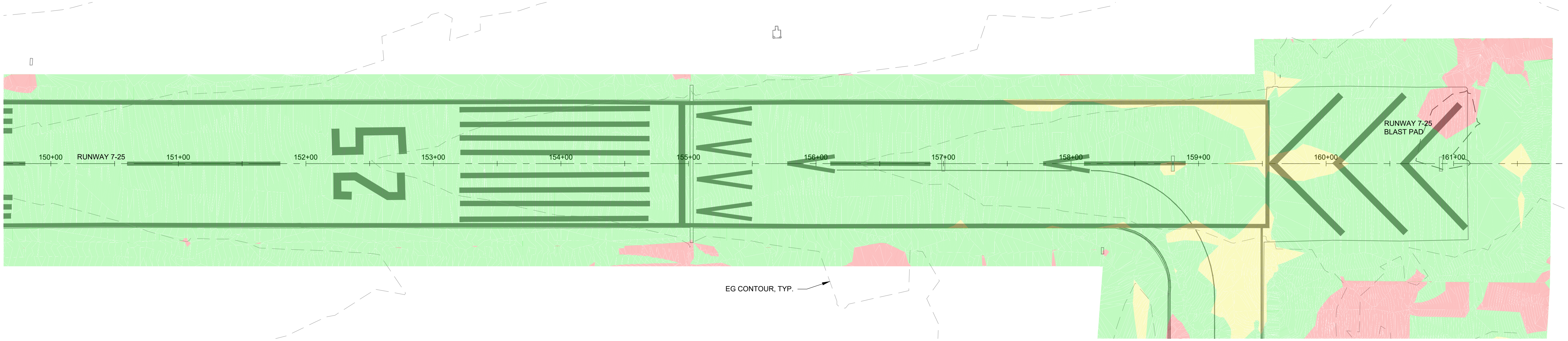

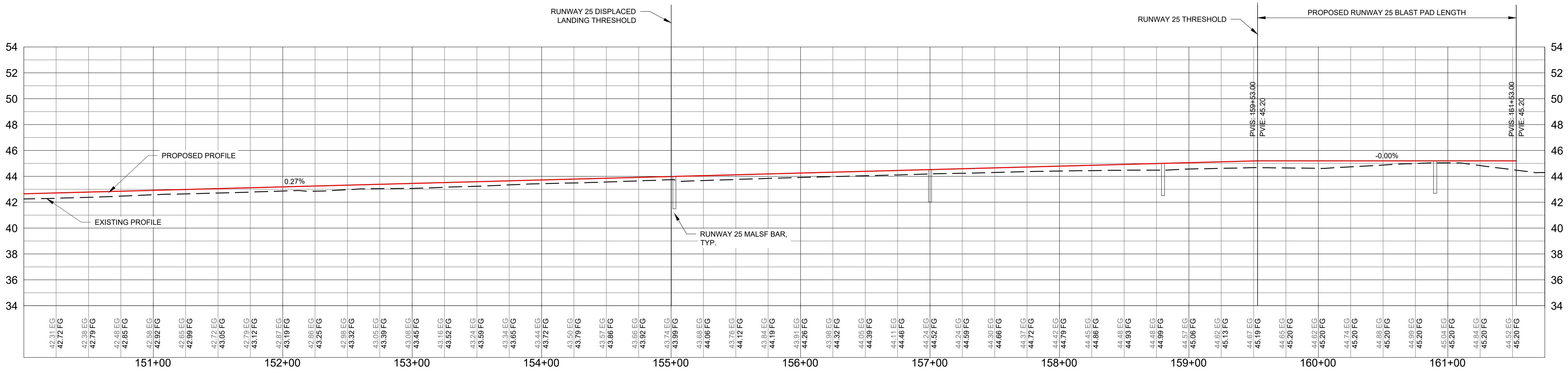

PROPOSED RUNWAY 7-25 CENTERLINE PROFILE

LEGEND:

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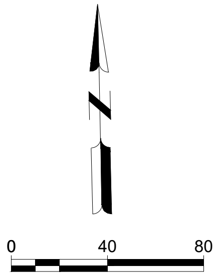
🟩	FG-EG BETWEEN 0 AND +0.5 FT
🟨	FG-EG GREATER THAN +0.5 FT



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RUNWAY 7-25 PROFILE - STA. 150+00 TO 161+75

Mead & Hunt

EXHIBIT I.10

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Appendix J – Drainage Catchment Areas

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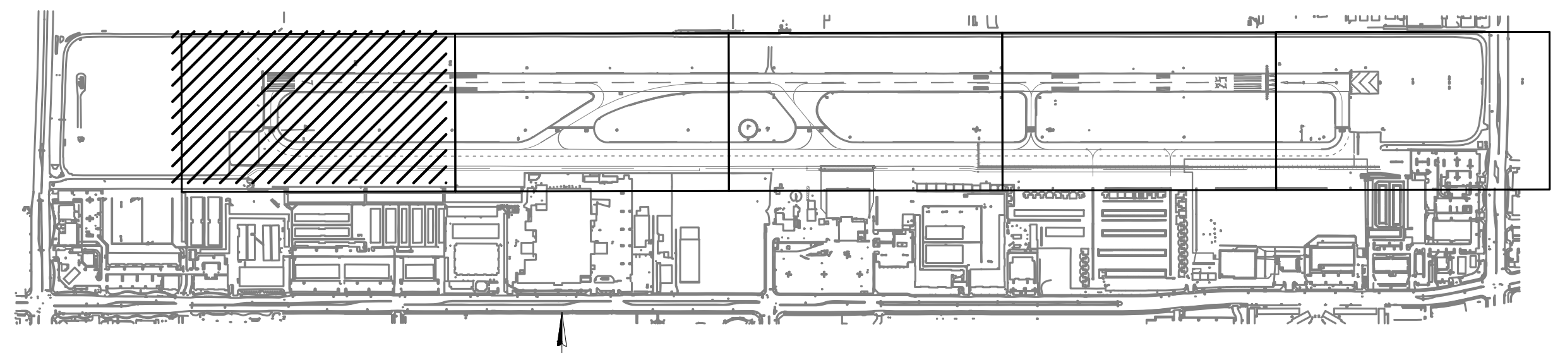
Catchment Area	Q, Peak Surface Flow Rate (CFS)						
	Pre-Construction	Base Bid		Alternative 1		Alternative 2	
	Q_P	Q_B	% Diff	Q_1	% Diff	Q_2	% Diff
1	***4.63***	5.13	**11%**	5.08	10%	4.71	2%
2	***3.04***	3.17	4%	3.14	3%	3.05	0%
3	***5.06***	5.29	4%	5.11	1%	4.33	-14%
4	***0.89***	0.90	0%	0.90	0%	0.90	0%
5	***0.24***	0.37	**54%**	0.37	**54%**	0.25	5%
6	***5.02***	4.88	-3%	3.56	-29%	2.82	-44%
7A	***5.56***	5.59	1%	5.09	**15%**	4.89	7%
7B				1.31		1.03	
8	***1.16***	1.16	0%	1.16	0%	0.64	-45%
9	***1.47***	1.58	7%	1.58	7%	1.58	7%
10	***0.13***	0.13	0%	0.09	-28%	0.10	-25%
11	***2.92***	2.75	-6%	1.92	-34%	1.82	-38%
12	***0.06***	0.06	0%	0.06	0%	0.05	-24%
13	***0.57***	0.29	-48%	0.12	-78%	0.12	-78%
14A	***6.45***	6.99	8%	7.06	9%	1.56	-14%
14B						3.97	
15	***0.05***	0.01	-79%	0.01	-79%	0.01	-79%
16	***1.10***	0.26	-76%	0.19	-82%	0.19	-82%
17	***1.95***	1.99	3%	2.02	4%	1.51	-23%
18	***3.92***	3.69	-6%	3.90	0%	3.89	-1%
19	***1.17***	0.89	-24%	0.89	-24%	0.71	-39%
20	***3.13***	3.37	7%	3.49	**12%**	3.16	1%
21	***0.11***	0.01	-92%	0.06	-47%	0.06	-47%
22	***1.67***	1.87	**12%**	0.86	-48%	1.82	9%
23	***4.67***	5.14	10%	5.26	**13%**	5.10	9%

Legend	**Percent Difference between Pre-Construction and Post-Construction Flow Rate**
Black Text	Within 10% of Pre-Construction Flow Rate
Red Text	Surface Flow Rate Increased by More than 10%
Blue Text	Surface Flow Rate Decreased

INTENTIONALLY BLANK

▩	ASPHALT
🟨	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
—>—	SHEET FLOW DRAINAGE PATH
—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
☐	CATCHMENT AREA BOUNDARY


KEYMAP
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△	REVISION	DESCRIPTION	APP.	DATE

PREPARED BY: DATE:
Mead & Hunt
3110 E. Guasti Road, Suite 330
Ontario, California 91761
(909) 467-8560
FILE NAME:

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APPROVED: DIRECTOR OF AIRPORTS
RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS
RECOMMENDED: PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
DOA 20-02
PROJ. NO.
OXR-146

PRE-CONSTRUCTION

OXNARD AIRPORT

RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 1
OF 20
DRAWING NO.

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▨	ASPHALT
🟨	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
—>—	SHEET FLOW DRAINAGE PATH
—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
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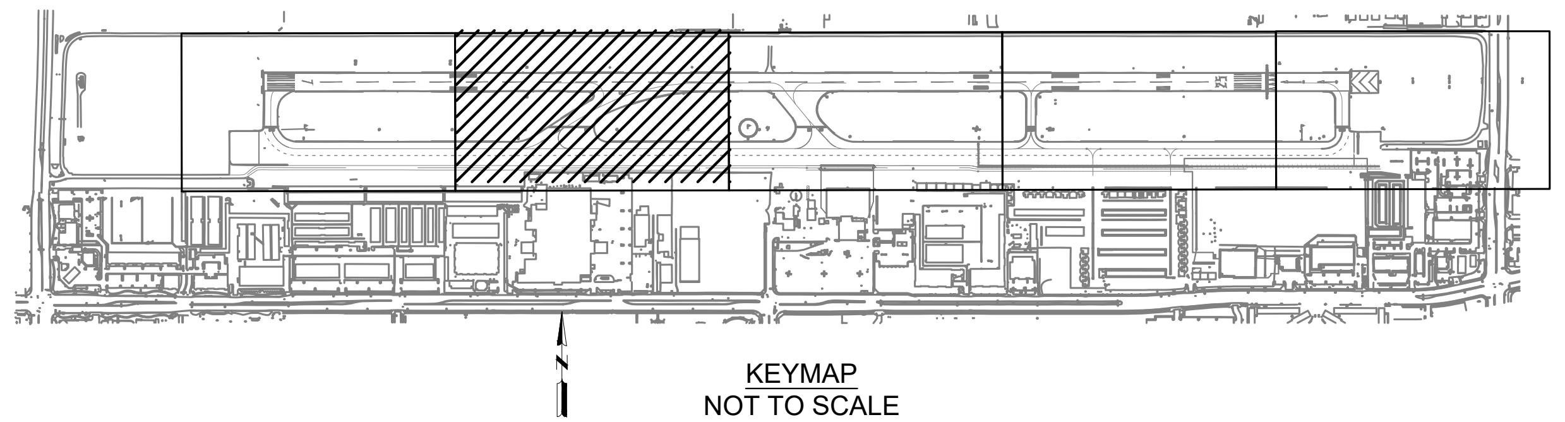
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PRE-CONSTRUCTION

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL
TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 2 OF 20
DRAWING NO.

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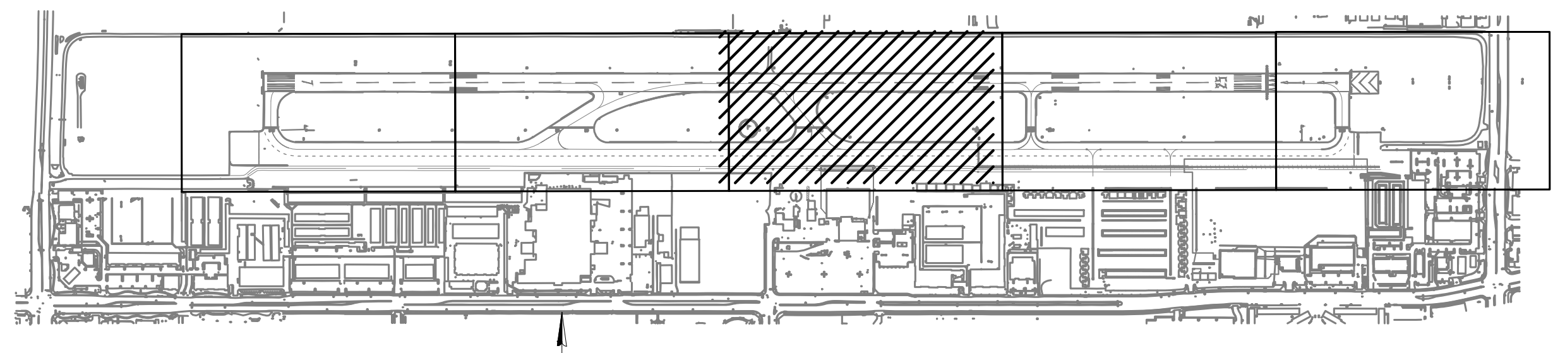
⬛	ASPHALT	→	SHEET FLOW DRAINAGE PATH
🟧	CONCRETE	→	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
🟩	UNIMPROVED AREAS	▭	CATCHMENT AREA BOUNDARY
🟦	ROOFS		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OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL
TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 3
OF 20
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▩	ASPHALT
🟧	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
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—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
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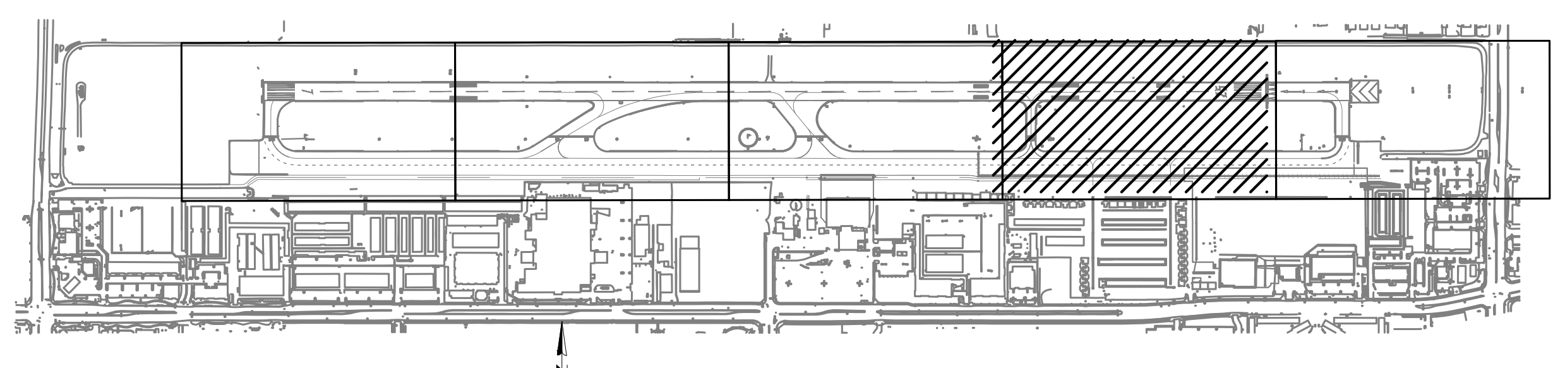

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PROJ. NO. OXR-146

PRE-CONSTRUCTION

OXNARD AIRPORT

RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 4 OF 20
DRAWING NO.

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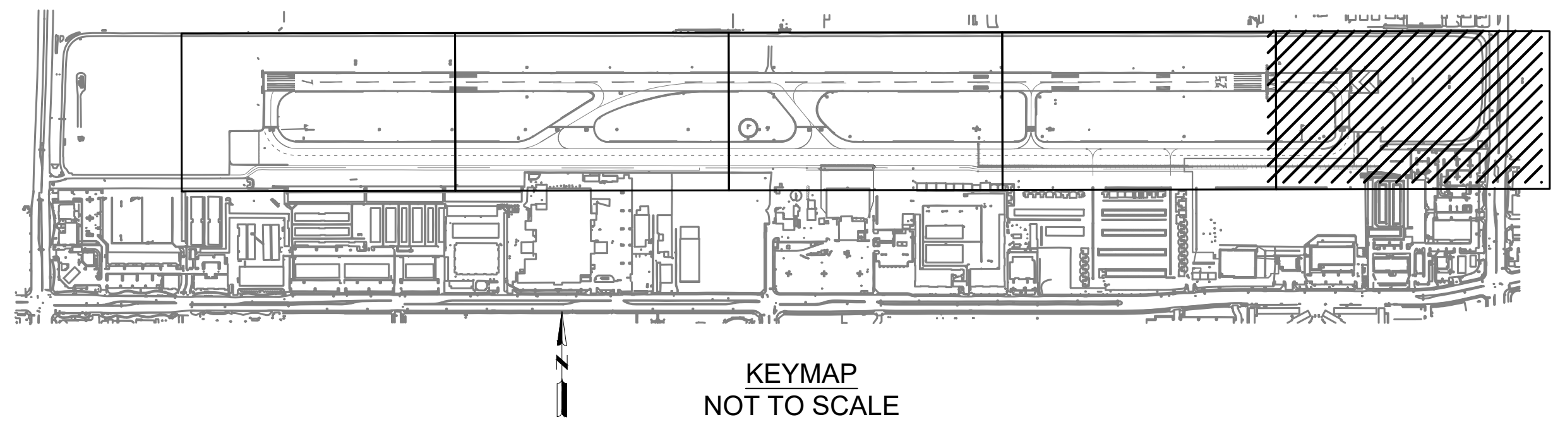
▩	ASPHALT
🟧	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
—>—	SHEET FLOW DRAINAGE PATH
—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
☐	CATCHMENT AREA BOUNDARY



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OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 5 OF 20

DRAWING NO.

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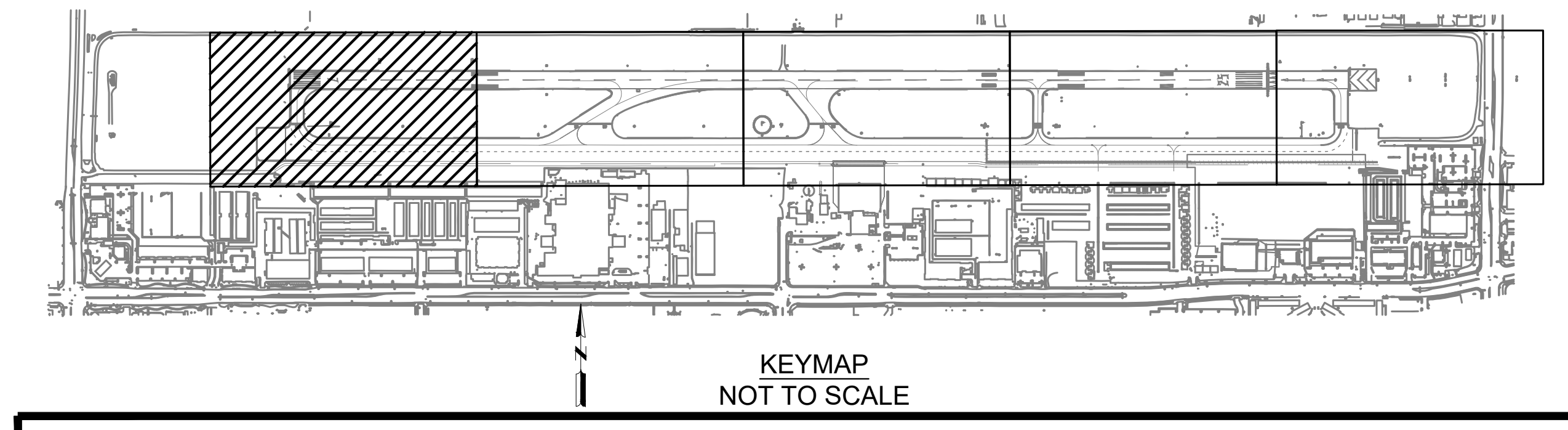
▇	ASPHALT
🟨	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
→→	SHEET FLOW DRAINAGE PATH
→→	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
☐	CATCHMENT AREA BOUNDARY



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BASE BID

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OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 6
OF 20
DRAWING NO.

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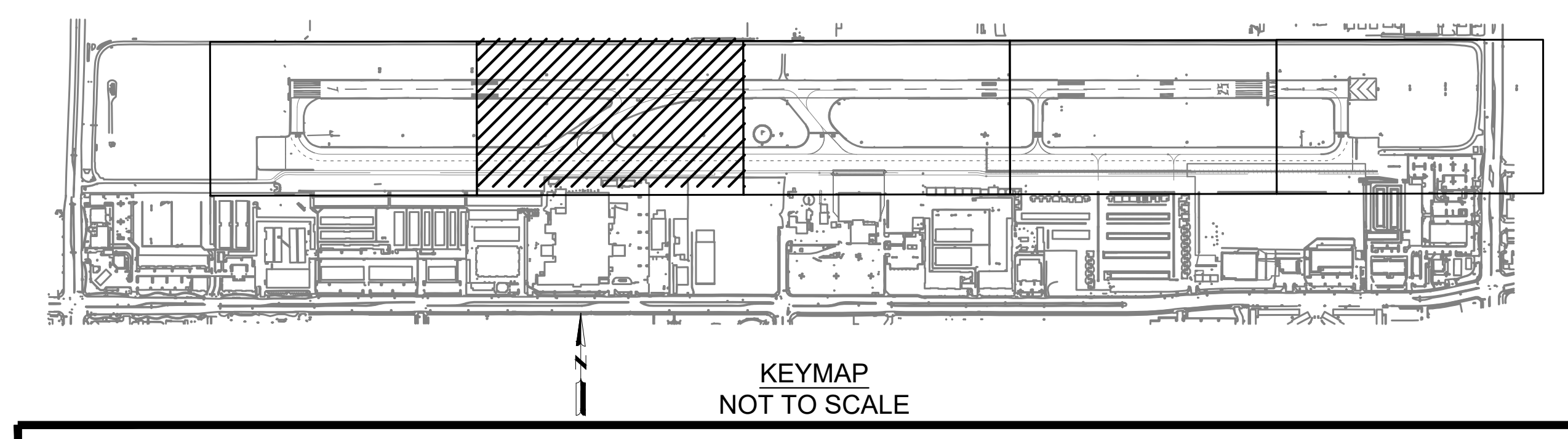

⬛	ASPHALT	—>—	SHEET FLOW DRAINAGE PATH
🟧	CONCRETE	—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
🟩	UNIMPROVED AREAS	▭	CATCHMENT AREA BOUNDARY
🟦	ROOFS		

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BASE BID

OXNARD AIRPORT

RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 7 OF 20
DRAWING NO.

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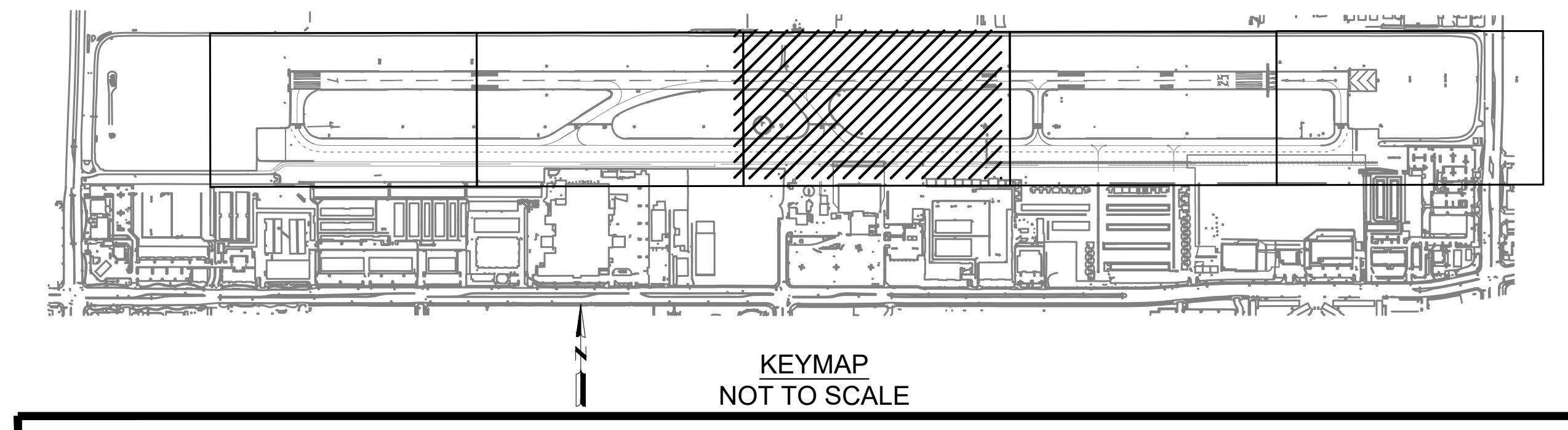
▇	ASPHALT
🟧	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
—>—	SHEET FLOW DRAINAGE PATH
—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
☐	CATCHMENT AREA BOUNDARY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OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL
TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 8
OF 20
DRAWING NO.

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🟨	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
—>—	SHEET FLOW DRAINAGE PATH
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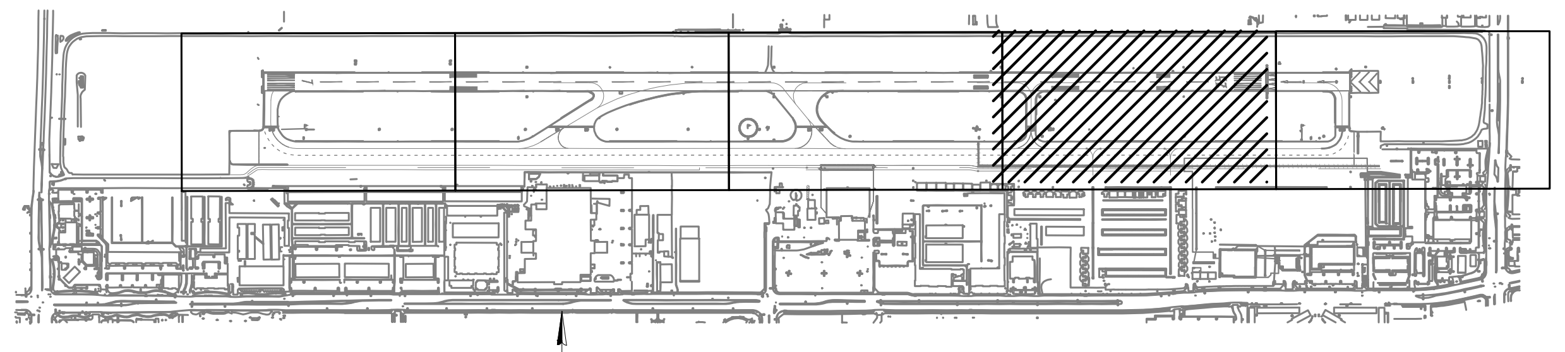

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OXNARD AIRPORT

RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 9 OF 20

DRAWING NO.

SPEC. NO. DOA 20-02

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⬛	ASPHALT
🟨	CONCRETE
🟩	UNIMPROVED AREAS
🟦	ROOFS
—>—	SHEET FLOW DRAINAGE PATH
—>—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
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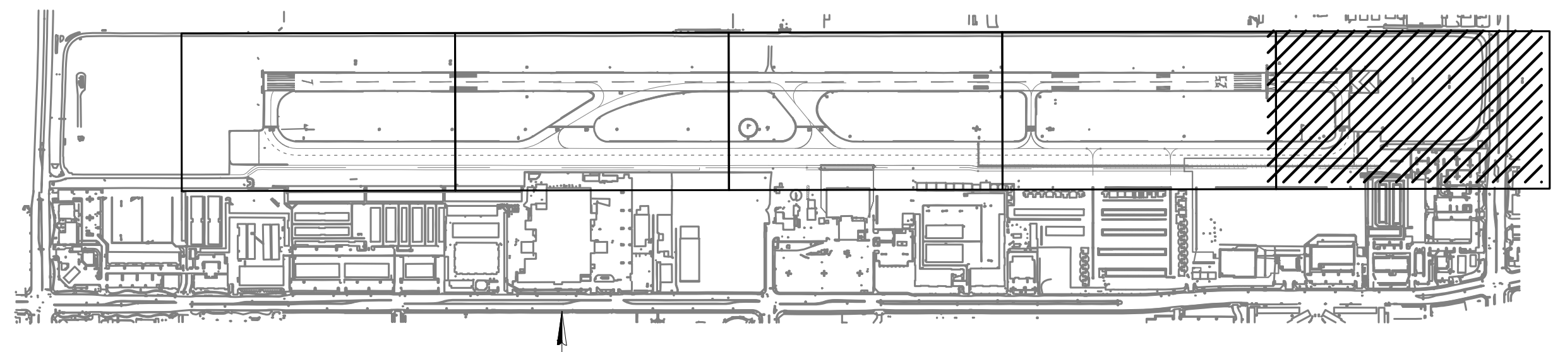

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RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 10 OF 20
DRAWING NO.

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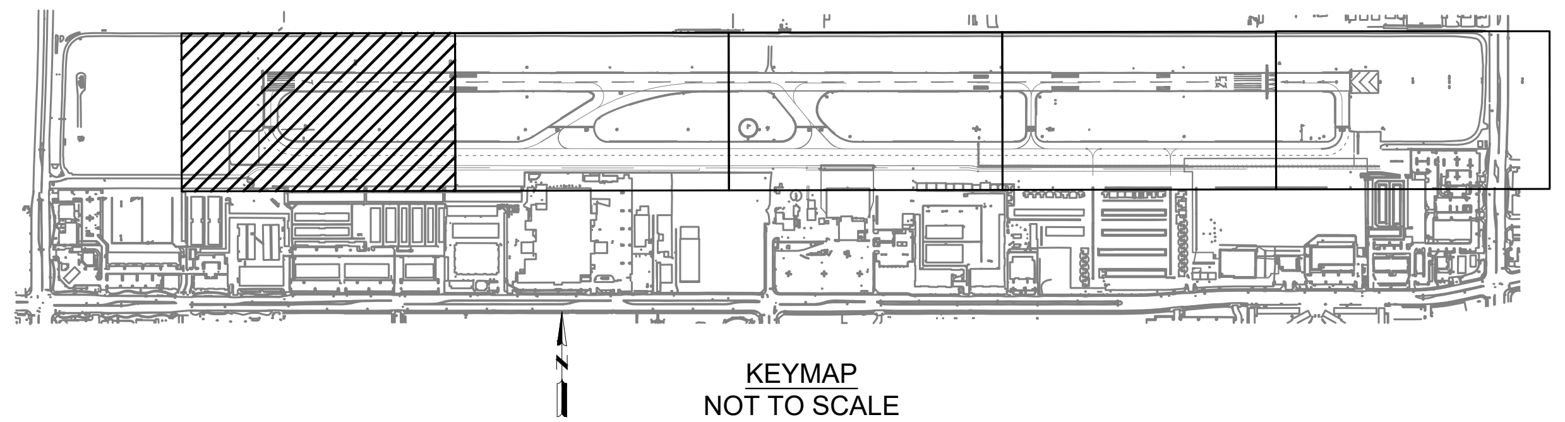
▩	ASPHALT	→—	SHEET FLOW DRAINAGE PATH
🟧	CONCRETE	→—	SHALLOW CONCENTRATED FLOW DRAINAGE PATH
🟩	UNIMPROVED AREAS	☐	CATCHMENT AREA BOUNDARY
🟦	ROOFS		



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BID ALTERNATE I

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OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 11
OF 20
DRAWING NO.

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🟫 ASPHALT

🟨 CONCRETE

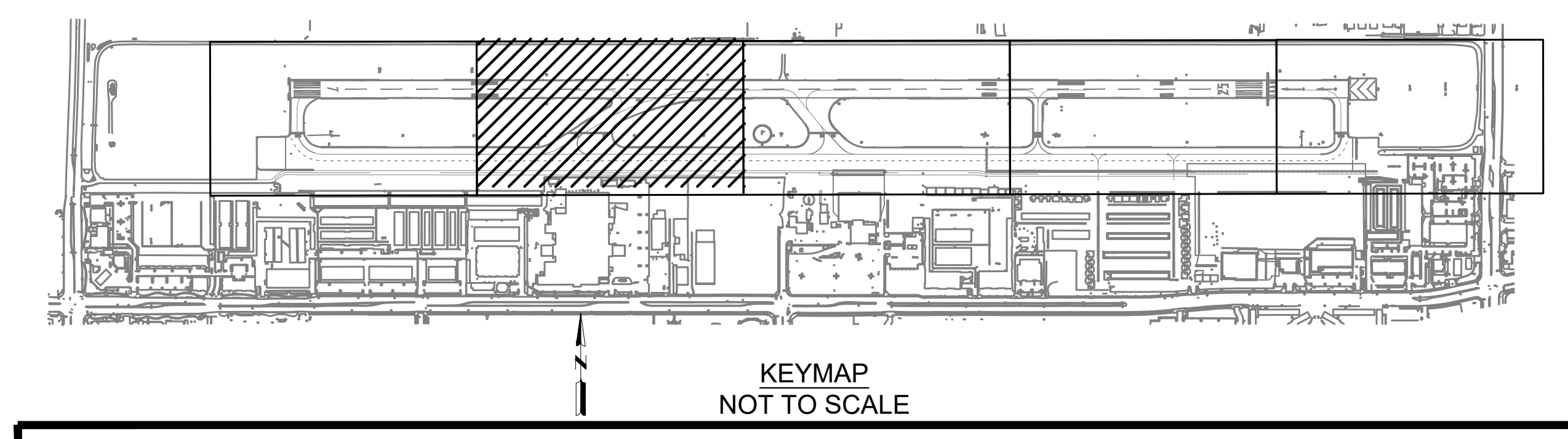
🟩 UNIMPROVED AREAS

🟦 ROOFS

→ SHEET FLOW DRAINAGE PATH

→ SHALLOW CONCENTRATED FLOW DRAINAGE PATH

▭ CATCHMENT AREA BOUNDARY



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BID ALTERNATE 1

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RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 12 OF 20

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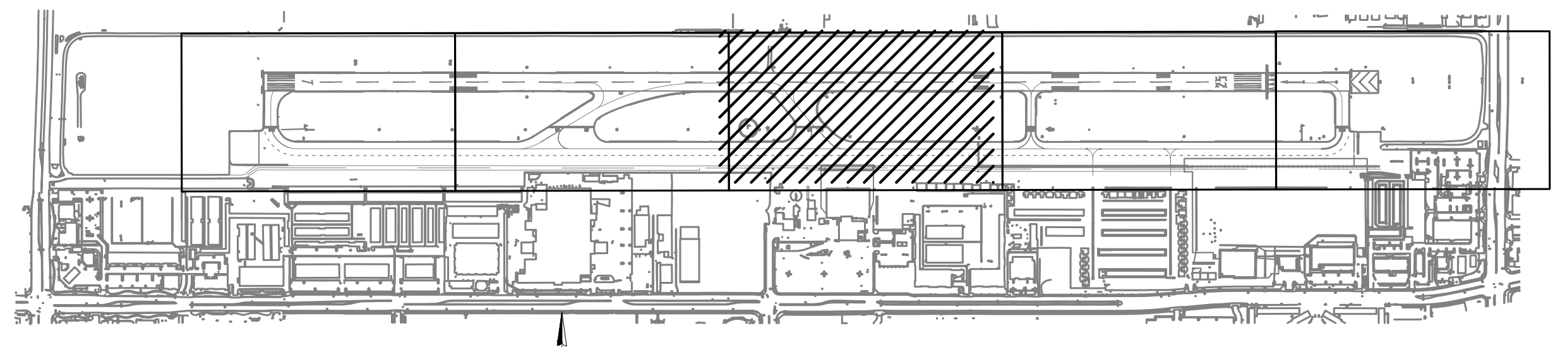

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NOT FOR CONSTRUCTION

BID ALTERNATE 1

REVISION	DESCRIPTION	APP.	DATE

PREPARED BY:
DATE:
Mead & Hunt
3110 E. Guasti Road, Suite 330
Ontario, California 91761
(909) 467-8560
FILE NAME:

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APPROVED: ____________
DIRECTOR OF AIRPORTS
RECOMMENDED: ____________
DEPUTY DIRECTOR OF AIRPORTS
RECOMMENDED: ____________
PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
DOA 20-02
PROJ. NO.
OXR-146

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 13 OF 20
DRAWING NO.

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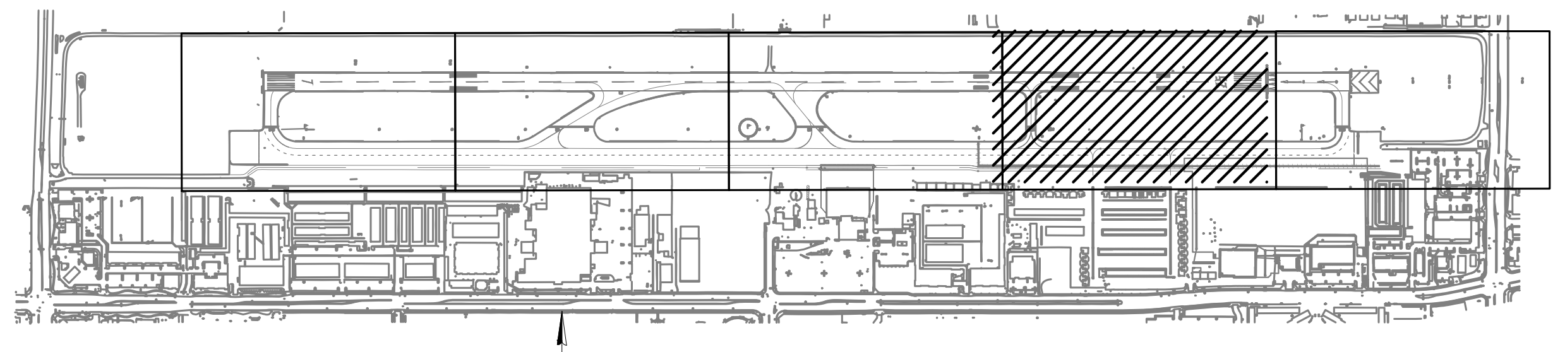

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RECOMMENDED:
DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED:
PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
DOA 20-02
PROJ. NO.
OXR-146

BID ALTERNATE 1

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 14
OF 20

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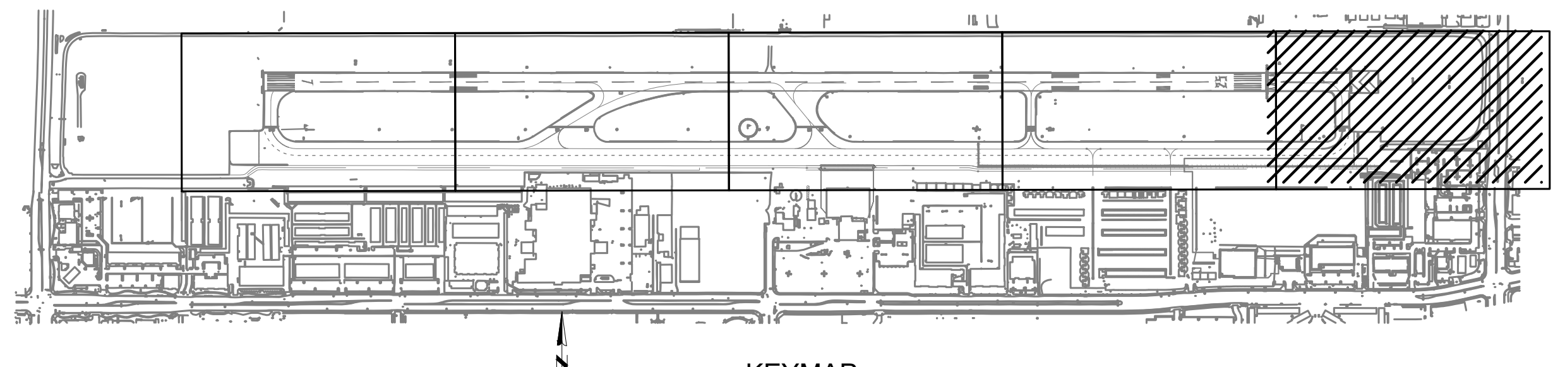

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OXR-146

BID ALTERNATE 1

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 15 OF 20
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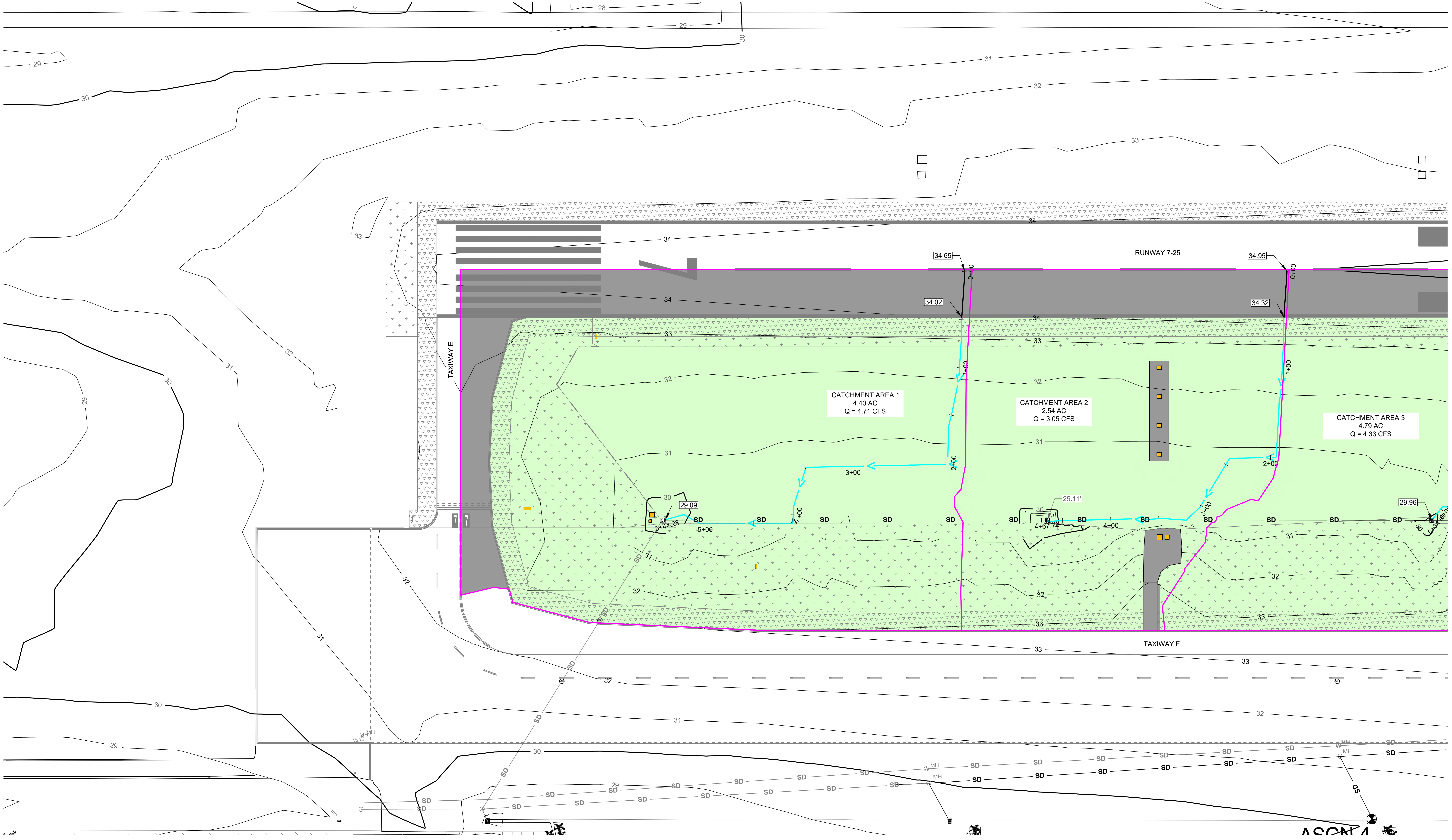

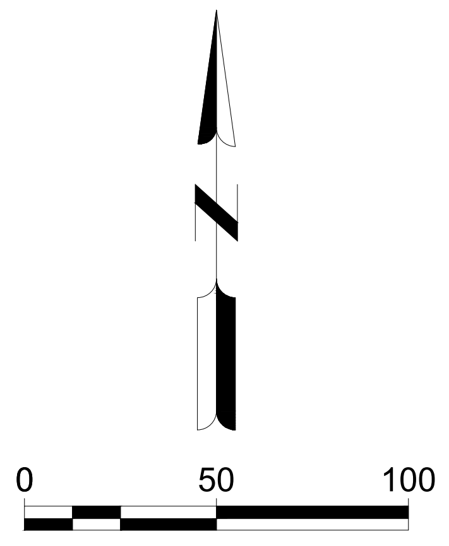

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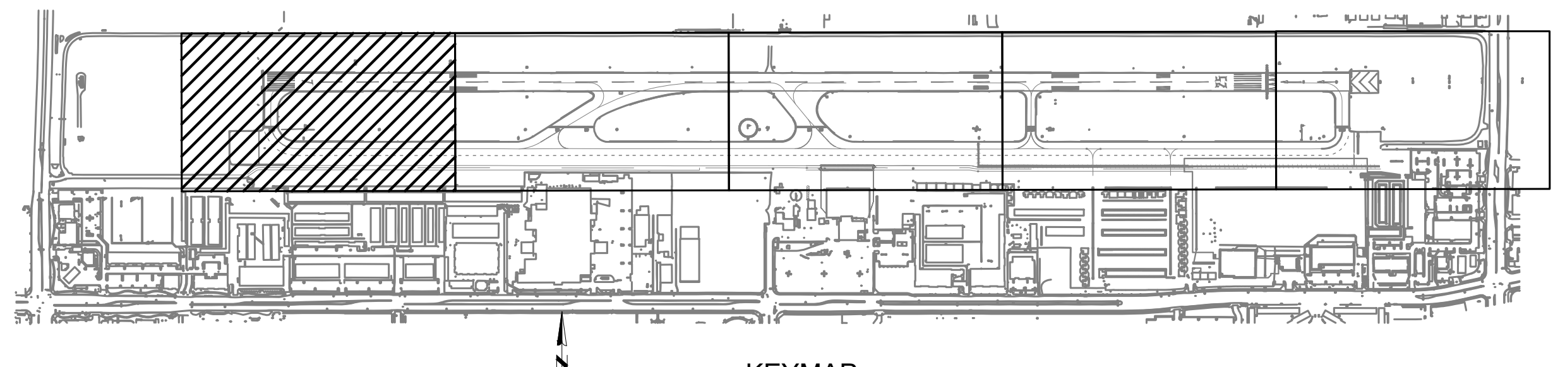

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BID ALTERNATE 2

REVISION	DESCRIPTION	APP.	DATE

PREPARED BY:
DATE:

Mead & Hunt
3110 E. Guasti Road, Suite 330
Ontario, California 91761
(909) 467-8560

FILE NAME:

APPROVED:
DIRECTOR OF AIRPORTS
RECOMMENDED:
DEPUTY DIRECTOR OF AIRPORTS
RECOMMENDED:
PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
DOA 20-02
PROJ. NO.
OXR-146

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 16
OF 20
DRAWING NO.

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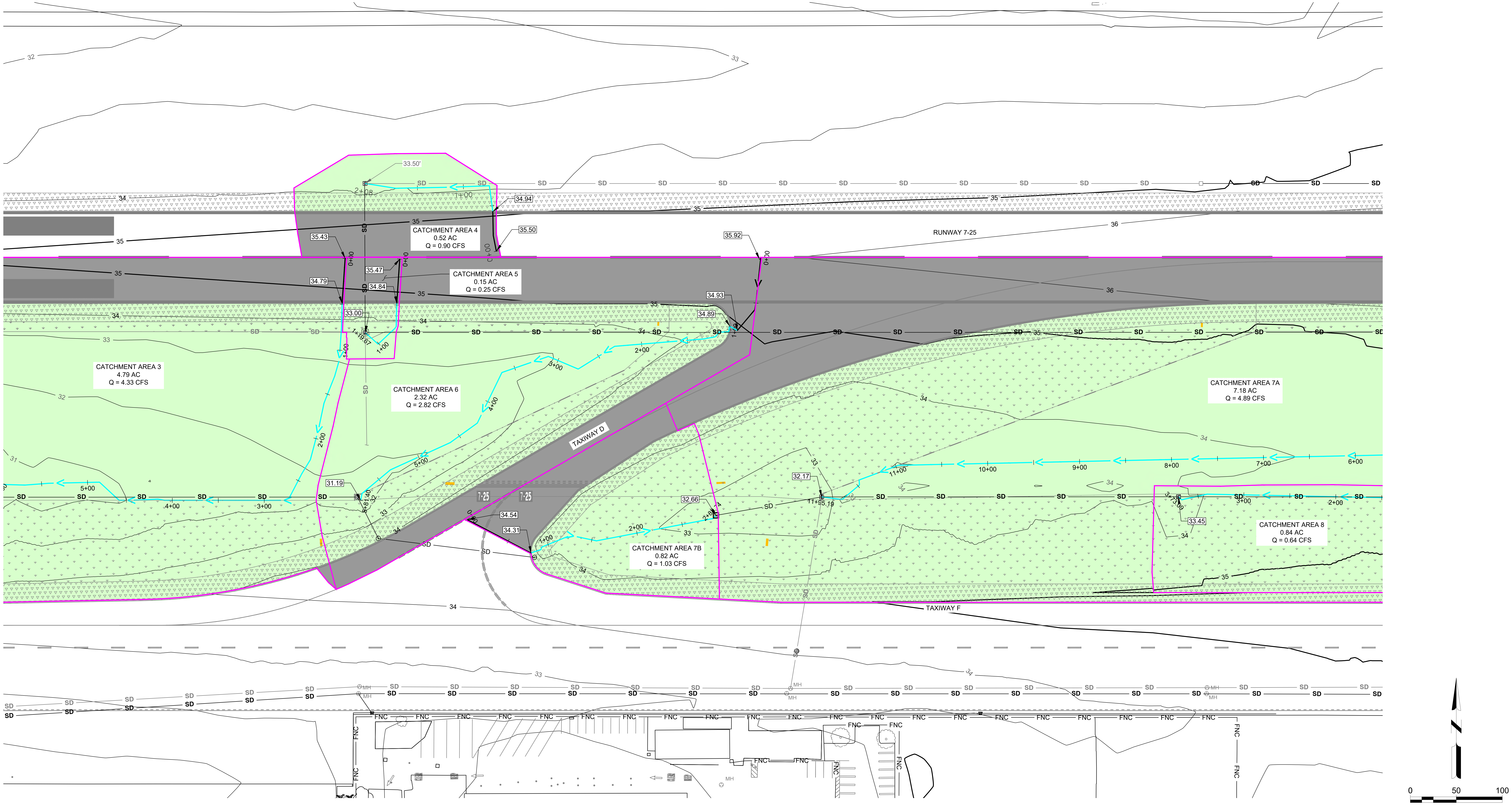

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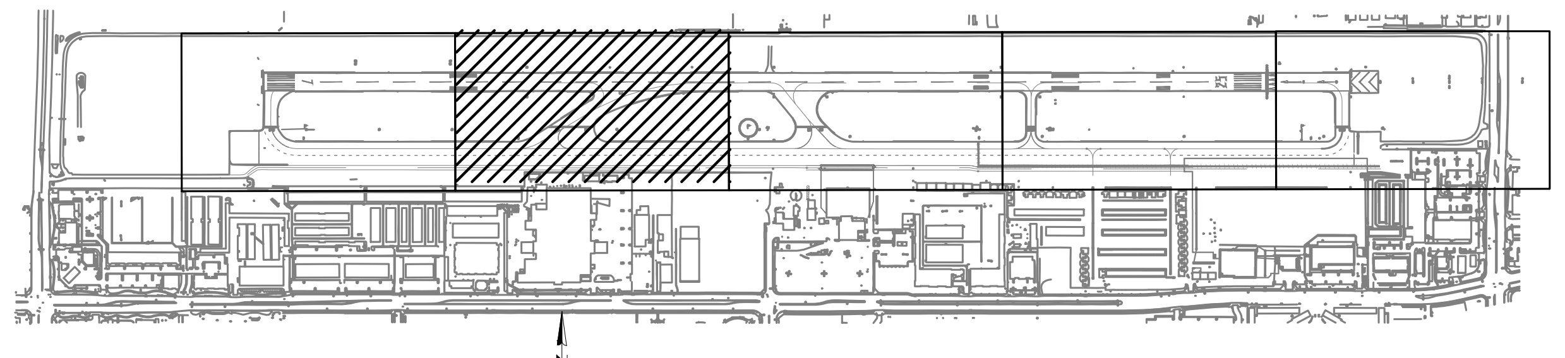

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△ REVISION DESCRIPTION APP. DATE

PREPARED BY: DATE:

Mead & Hunt
3110 E. Guasti Road, Suite 330
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(909) 467-8560

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RECOMMENDED: PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
DOA 20-02
PROJ. NO.
OXR-146

BID ALTERNATE 2

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL
TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 17
OF 20
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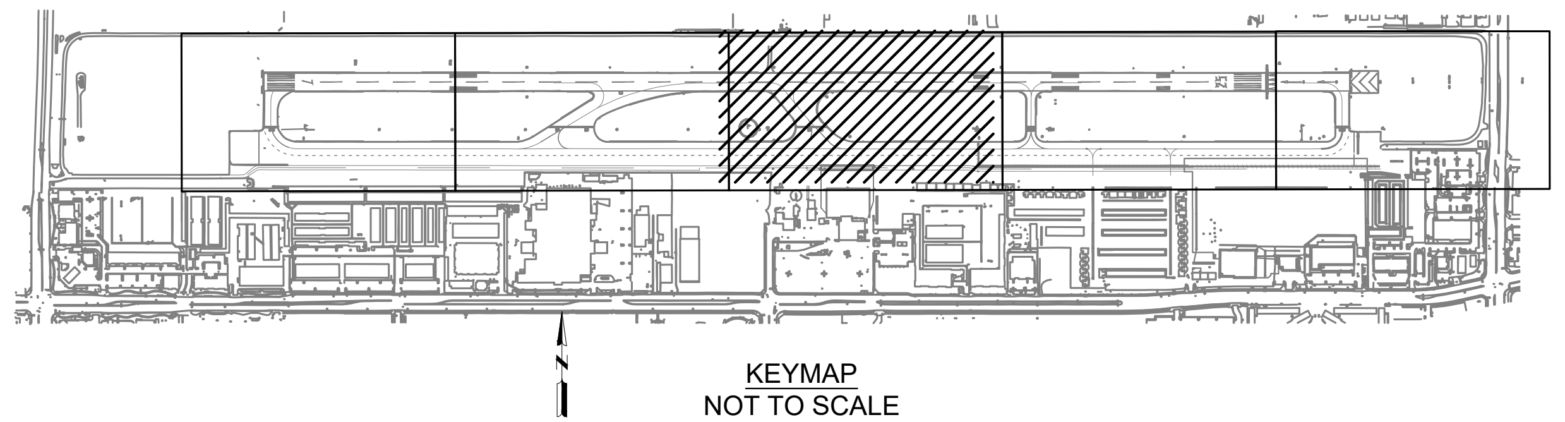

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COUNTY of VENTURA
Department of Airports

SPEC. NO.
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PROJ. NO.
OXR-146

OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 18
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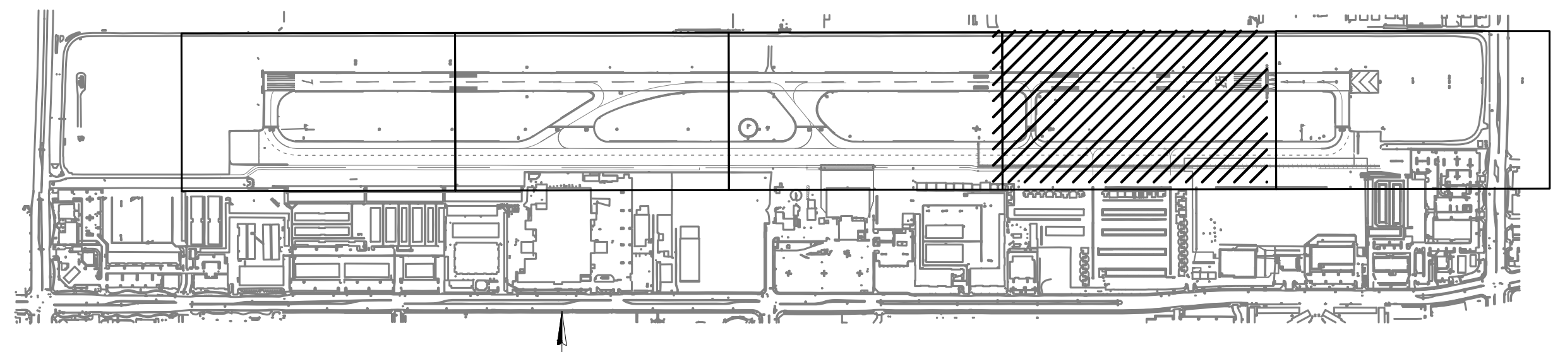

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FILE NAME:

APPROVED:
DIRECTOR OF AIRPORTS
RECOMMENDED:
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PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
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OXNARD AIRPORT
RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 19
OF 20
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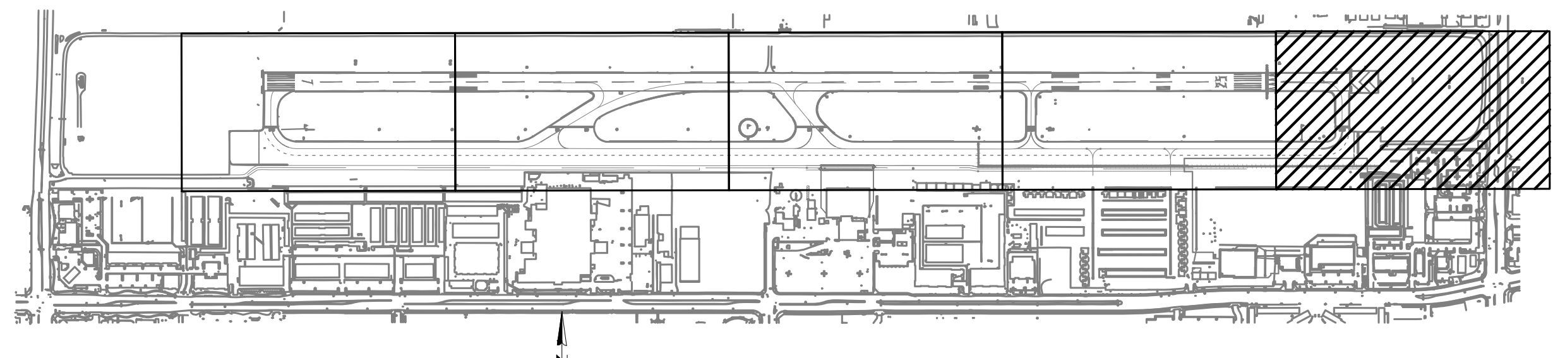

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BID ALTERNATE 2

REVISION	DESCRIPTION	APP.	DATE

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3110 E. Guasti Road, Suite 330
Ontario, California 91761
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RECOMMENDED: DEPUTY DIRECTOR OF AIRPORTS

RECOMMENDED: PROJECT MANAGER

COUNTY of VENTURA
Department of Airports

SPEC. NO.
DOA 20-02

PROJ. NO.
OXR-146

OXNARD AIRPORT

RUNWAY 7-25, TAXIWAY CONNECTORS, AND PARALLEL TAXIWAY PAVEMENT RECONSTRUCTION

SHEET 20 OF 20

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Appendix K - FAA CATEX Approval Letter

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U.S Department
of Transportation

**Federal Aviation
Administration**

Western-Pacific Region
Airports Division
Los Angeles Airports District Office

777 S. Aviation Blvd., Suite 150
El Segundo, CA 90245

February 23, 2019

Mr. Jorge Rubio
Deputy Director of Airports
Department of Airports
555 Airport Way, Suite B
Camarillo, CA 93010

Dear Mr. Rubio:

Oxnard Airport
Pavement Reconstruction of Runway 7-25 and Connector Taxiways A, B, C, D, and E
Categorical Exclusion Approval

The FAA has determined that the proposed project is Categorically Excluded pursuant to FAA Order 1050.1F as it relates to the National Environmental Policy Act of 1969, as amended (NEPA). Therefore, no further federal environmental disclosure documentation for this project is necessary for NEPA purposes.

In the event that you do not begin the above identified projects within 3 years, of this Categorical Exclusion Approval, additional environmental review may be necessary (See Section 202(c)(3)(a) of FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*).

This letter notifies you that the proposed project has complied with NEPA only. This is not a notice of final project approval or funding availability.

Please feel free to call me if you have any questions regarding this matter, I can be reached at 424-405-7269.

Sincerely,

Gail Campos

Gail Campos
Environmental Protection Specialist

U.S Department
of Transportation

**Federal Aviation
Administration**

Western-Pacific Region
Office of Airports
Los Angeles Airports District Office

777 S. Aviation Blvd., Suite 150
El Segundo, CA 90245

June 12, 2020

Erin Powers
Projects Administrator
County of Ventura, Dept. of Airports
555 Airport Way, Suite B
Camarillo, CA 93010

Dear Ms. Powers:

Oxnard Airport (OXR)
Pavement Reconstruction of Runway 7-25, Blast Pad, and Connector Taxiways A, B, C, D, and E
Categorical Exclusion Approval

The Federal Aviation Administration (FAA) has determined that the proposed project is Categorically Excluded pursuant to FAA Order 1050.1F, as it relates to the National Environmental Policy Act of 1969, as amended (NEPA). Therefore, no further federal environmental disclosure documentation for this project is necessary for NEPA purposes.

In the event that you do not begin the above identified projects within 3 years, of this Categorical Exclusion Approval, additional environmental review may be necessary (See Section 202(c)(3)(a) of FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*).

This letter notifies you that the proposed project has complied with NEPA only. This is not a notice of final project approval or funding availability.

Feel free to contact me if you have any questions regarding this matter. I can be reached via phone at (424) 405-7269 or email at gail.campos@faa.gov.

Sincerely,

GAIL
MARIE
CAMPOS

Digitally signed by
GAIL MARIE
CAMPOS
Date: 2020.06.12
15:18:13 -07'00'

Gail Campos
Environmental Protection Specialist

U.S Department
of Transportation

**Federal Aviation
Administration**

Western-Pacific Region
Office of Airports
Los Angeles Airports District Office

777 S. Aviation Blvd., Suite 150
El Segundo, CA 90245

January 27, 2021

Erin Powers
Projects Administrator
County of Ventura, Dept. of Airports
555 Airport Way, Suite B
Camarillo, CA 93010

Dear Ms. Powers:

Oxnard Airport (OXR)
Taxiway F Reconstruction
Categorical Exclusion Approval

The Federal Aviation Administration (FAA) has determined that the proposed project is Categorically Excluded pursuant to FAA Order 1050.1F, as it relates to the National Environmental Policy Act of 1969, as amended (NEPA). Therefore, no further federal environmental disclosure documentation for this project is necessary for NEPA purposes.

In the event that you do not begin the above identified projects within 3 years, of this Categorical Exclusion Approval, additional environmental review may be necessary (See Section 202(c)(3)(a) of FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*).

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Sincerely,

GAIL MARIE CAMPOS

Digitally signed by GAIL MARIE CAMPOS
Date: 2021.01.27 17:25:32 -08'00'

Gail Campos
Environmental Protection Specialist

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Appendix L - Engineer's Estimate of Probable Cost

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Oxnard Airport, Ventura County
Engineer's Estimate of Probable Cost
100% Design Phase

Total Project Cost				
	BASE BID	**BID ALT 1**	**BID ALT 2**	**TOTAL**
CONSTRUCTION COST	$ 12,683,636.00	$ 3,328,580.00	$ 10,378,830.00	$ 26,391,046.00
COUNTY ADMINISTRATION (2%)	$ 254,000.00	$ 67,000.00	$ 208,000.00	$ 529,000.00
PRELIMINARY DESIGN	$ 157,640.00			$ 157,640.00
FINAL DESIGN	$ 700,348.74	$ 423,215.55	$ 383,744.85	$ 1,507,309.14
TOPOGRAPHIC SURVEY	$ 26,795.00			$ 26,795.00
GEOTECHNICAL INVESTIGATION	$ 79,925.00		$ 96,770.00	$ 176,695.00
RESIDENT ENGINEERING (5.5%)	$ 698,000.00	$ 184,000.00	$ 571,000.00	$ 1,453,000.00
MATERIALS TESTING (1.5%)	$ 191,000.00	$ 50,000.00	$ 156,000.00	$ 397,000.00
CONSTRUCTION ADMINISTRATION (5%)	$ 634,200.00	$ 166,500.00	$ 519,000.00	$ 1,319,700.00
REIMBURSABLE AGREEMENT	$ 150,000.00	$ -	$ -	$ 150,000.00
CONSTRUCTION CONTINGENCY (3%)	$ 380,509.08	$ 99,857.40	$ 311,364.90	$ 791,731.38
TOTAL	$ 15,956,053.82	$ 4,319,152.95	$ 12,624,709.75	$ 32,899,916.52
Total Adjusted for Price Escalation (2022)	**$16,275,174.90**	**$4,405,536.01**	**$12,877,203.95**	**$33,557,914.85**
Total Adjusted for Price Escalation (2023)	**$16,600,678.39**	**$4,493,646.73**	**$13,134,748.02**	**$34,229,073.15**
Total Adjusted for Price Escalation (2024)	**$16,932,691.96**	**$4,583,519.66**	**$13,397,442.98**	**$34,913,654.61**
Total Adjusted for Price Escalation (2025)	**$17,271,345.80**	**$4,675,190.06**	**$13,665,391.84**	**$35,611,927.70**

Note: Price Escalation assumes 2% per year

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Oxnard Airport, Ventura County
Engineer's Estimate of Probable Cost

Base Bid - Runway Pavement Reconstruction

This project will consist of a full reconstruction of the structural section, including strengthening of the subgrade. Base Bid consists of the runway. Based on the fleet mix, the pavement section is anticipated to be composed of 4 inches of P-401 asphalt surface course, 8.5 inches of P-209 crushed aggregate base course, and 16 inches of lime-treated subgrade. Grading will extend into the infields to accomplish positive drainage, however full infield RSA compliance is not included in this estimate. The estimated cost for Base Bid is as follows:

SCHEDULE A: BASE BID WORK						
Item	**Spec No.**	**Description**	**Unit**	**Qty**	**Cost**	**Total**
1	C-100-14.1	Contractor Quality Control Program (CQCP)	LS	1	$103,000.00	$103,000.00
2	C-105.1	Mobilization	LS	1	$1,028,000.00	$1,028,000.00
3	C-105.2	Resident Project Engineer's Field Office	LS	1	$26,000.00	$26,000.00
4	SP-102-3.1	Compliance with Pollution, Erosion, and Siltation Control	LS	1	$103,000.00	$103,000.00
5	SP-100-3.1	Airfield Safety and Traffic Control	LS	1	$206,000.00	$206,000.00
6	SP-100-3.2	Construction Staking and Survey Layout	LS	1	$103,000.00	$103,000.00
7	SP-100-3.3	Airport Access and Haul Route Repair	SY	2,000	$35.00	$70,000.00
8	SP-100-3.8	Underground Utility Investigation and Potholing	HOUR	16	$550.00	$8,800.00
9	P-101-5.1	Demolish Asphalt Pavement	SY	68,500	$9.00	$616,500.00
10	SP-126-4.1	Remove and Salvage REILs. Demolish PCC Foundation	SET	1	$2,500.00	$2,500.00
11	SP-126-4.2a	Demolish Conduit, Cable, and Counterpoise	LF	1,000	$8.00	$8,000.00
12	SP-126-4.2b	Demolish Concrete Encased Conduit, Cable, and Counterpoise	LF	460	$30.00	$13,800.00
13	SP-126-4.3	Remove Cable and Counterpoise	LF	10,800	$1.00	$10,800.00
14	SP-126-4.6	Demolish Electrical Junction Can	EA	2	$800.00	$1,600.00
15	SP-126-4.7b	Demolish FAA Pullbox	EA	2	$1,200.00	$2,400.00
16	SP-126-4.8	Demolish Airfield Sign and Pad	EA	5	$1,200.00	$6,000.00
17	SP-126-4.9b	Remove and Salvage Elevated Runway Edge Light Fixture and Transformer. Protect Can.	EA	53	$200.00	$10,600.00
18	SP-126-4.9c	Remove and Salvage Elevated Threshold Light Fixture and Transformer. Protect Can.	EA	24	$400.00	$9,600.00
19	SP-126-4.13	Demolish MALSF Threshold Bar (13 Lights). Salvage Existing Fixtures.	EA	1	$13,000.00	$13,000.00
20	SP-126-4.14	Demolish MALSF Centerline Bar (5 Lights). Salvage Existing Fixtures.	EA	3	$5,000.00	$15,000.00
21	SP-126-4.15	Demolish Reinforced Concrete Foundation from Abandoned MALSF Bars	LS	1	$20,000.00	$20,000.00
22	SP-126-4.17	Demolish Abandoned Waterline, if Encountered	LF	410	$25.00	$10,250.00
23	P-152-4.1	Unclassified Excavation and Haul-off	CY	18,500	$40.00	$740,000.00
24	P-152-4.2	Embankment in Place	CY	13,500	$12.00	$162,000.00
25	P-152-4.3	Subgrade Preparation	SY	94,100	$3.00	$282,300.00
26	SP-100-3.7	Place Asphalt Compacted Grindings, 24-inches thick	SY	8,300	$10.00	$83,000.00
27	P-155-8.1	Lime Treated Subgrade, 16-Inch Depth	SY	72,500	$16.50	$1,196,250.00
28	SP-100-3.4	In-place Drying Techniques	SY	7,300	$1.50	$10,950.00
29	SP-100-3.5	Subgrade Stabilization, Excavation Below Subgrade	CY	1,500	$70.00	$105,000.00
30	SP-100-3.6	Multi-axial Geogrid	SY	2,200	$6.00	$13,200.00
31	P-209-5.1	Crushed Aggregate Base Course, P-209	CY	25,900	$75.00	$1,942,500.00
32	P-401-8.1	Asphalt Concrete Surface Course, P-401	TON	17,100	$165.00	$2,821,500.00
33	P-621-5.1	Grooving	SY	52,700	$7.00	$368,900.00
34	SP-100-3.9	Install Runway Threshold Survey Monument	EA	2	$5,000.00	$10,000.00
35	SP-100-3.10	Install Checkpoint Markers	LS	1	$10,000.00	$10,000.00
36	D-701-5.1	12-inch RCP, Class IV, outside Pavement Areas	LF	750	$250.00	$187,500.00
37	D-701-5.2	12-inch RCP, Class IV, within Pavement Areas	LF	190	$300.00	$57,000.00
38	D-705-5.1	Underdrain Pipe, 6-Inch, Perforated	LF	11,300	$45.00	$508,500.00
39	D-705-5.2	Underdrain Pipe Cleanout	EA	27	$500.00	$13,500.00
40	D-751-5.1	48" Stormdrain Manhole	EA	17	$7,000.00	$119,000.00
41	D-751-5.3	Adjust Catch Basin to Grade	EA	2	$5,000.00	$10,000.00
42	D-751-5.4	Connect to Existing Manhole/Basin	EA	10	$2,500.00	$25,000.00
43	P-153-6.1	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	CY	50	$30.00	$1,500.00
44	L-108-5.1	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	LF	12,000	$2.50	$30,000.00
45	L-108-5.2a	No. 6 AWG Bare Counterpoise Wire, Installed Adjacent to / In the Duct Bank or Conduit	LF	10,600	$2.00	$21,200.00
46	L-108-5.2b	No. 1/0 AWG Bare Counterpoise Wire for MALSF, Installed Adjacent to / In the Duct Bank or Conduit	LF	1,200	$5.25	$6,300.00
47	L-108-5.3a	No. 4/0 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	LF	2,900	$5.25	$15,225.00
48	L-108-5.3b	No. 4 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	LF	2,900	$3.00	$8,700.00
49	L-108-5.3c	No. 6 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	LF	3,200	$2.50	$8,000.00
50	L-108-5.3d	No. 2 AWG 600V, L-824, Type THWN-2 Cable for MALSF, Installed in Duct Bank or Conduit	LF	400	$3.50	$1,400.00
51	L-110-5.4	Concrete-Encased Electrical Duct Bank, 1W - 2" RGS Conduit	LF	210	$50.00	$10,500.00
52	L-110-5.5	Non-encased Electrical Duct Bank, 1W - 2" Conduit	LF	170	$25.00	$4,250.00
53	L-110-5.8b	Non-encased Electrical Duct Bank, 1W - 3" and 2W - 2" Conduit	LF	380	$45.00	$17,100.00
54	L-110-5.8c	Non-encased Electrical Duct Bank, 1W - 3" and 3W - 2" Conduit	LF	140	$45.00	$6,300.00
55	L-115-5.1b	Construct FAA Pull Box	EA	2	$12,000.00	$24,000.00
56	L-115-5.1c	Construct Junction Can: L-868 with Lid	EA	4	$3,000.00	$12,000.00
57	L-115-5.1d	Adjust Junction Can to Grade	EA	1	$1,500.00	$1,500.00
58	L-115-5.3a	Construct MALSF Threshold Bar	EA	1	$100,000.00	$100,000.00
59	L-115-5.3b	Construct MALSF Centerline Bar	EA	3	$35,000.00	$105,000.00
60	L-125-5.1a	Construct New L-858B(L) Distance Remaining Sign and Concrete Pad	EA	4	$4,000.00	$16,000.00
61	L-125-5.4a	Install New L-861(L) Elevated Runway Edge Light and Adjust Existing Base Can	EA	44	$750.00	$33,000.00
62	L-125-5.4b	Install New L-861(L) Elevated Runway Edge Light on Existing Base Can	EA	9	$300.00	$2,700.00
63	L-125-5.6a	Install New L-861E(L) Runway Threshold Light and Transformer and Adjust Existing Base Can	EA	18	$750.00	$13,500.00
64	L-125-5.6b	Install New L-861E(L) Runway Threshold Light and Transformer on Existing Base Can	EA	6	$300.00	$1,800.00
65	L-125-5.12	Install ID Tag	EA	77	$75.00	$5,775.00
66	L-125-5.13	Install Salvaged REILs on New Concrete Pad	SET	1	$15,000.00	$15,000.00
67	L-125-5.15a	Miscellaneous Lighting Equipment for Runway	LS	1	$40,000.00	$40,000.00
68	P-620-5.2a	Marking, 2 Coats with Beads (All Colors)	SF	78,300	$3.00	$234,900.00
69	P-620-5.2b	Marking, 2 Coats with No Beads (All Colors)	SF	2,000	$2.50	$5,000.00
70	P-620-5.2c	Marking, Single Coat with No Beads (All Colors)	SF	24,000	$1.50	$36,000.00
71	T-901-5.1	Seeding	AC	3	$5,000.00	$15,000.00
72	CVSS-DOA 9-4	Execution of Release on Contract	LS	1	$1.00	$1.00
					TOTAL	**$11,845,601.00**

SCHEDULE B: BASE BID TRANSITION WORK

Item	Spec No.	Description	Unit	Qty	Cost	Total
1	C-100-14.1	Contractor Quality Control Program (CQCP)	LS	1	$7,000.00	$7,000.00
2	C-105.1	Mobilization	LS	1	$69,000.00	$69,000.00
3	C-105.2	Resident Project Engineer's Field Office	LS	1	$2,000.00	$2,000.00
4	SP-102-3.1	Compliance with Pollution, Erosion, and Siltation Control	LS	1	$7,000.00	$7,000.00
5	SP-100-3.1	Airfield Safety and Traffic Control	LS	1	$14,000.00	$14,000.00
6	SP-100-3.2	Construction Staking and Survey Layout	LS	1	$7,000.00	$7,000.00
7	P-101-5.2	Asphalt Crack Repair (under 1.5" width)	LF	6,100	$5.00	$30,500.00
8	P-101-5.3	Asphalt Crack Repair (over 1.5" width)	SF	400	$50.00	$20,000.00
9	P-101-5.4	Remove Pavement Markings	SF	500	$2.00	$1,000.00
10	P-101-5.6	Cold Mill, Variable Depth (2 inches Maximum)	SY	8,200	$5.00	$41,000.00
11	SP-126-4.3	Remove Cable and Counterpoise	LF	7,100	$1.00	$7,100.00
12	SP-126-4.8	Demolish Airfield Sign and Pad	EA	8	$1,200.00	$9,600.00
13	SP-126-4.9a	Remove and Salvage Elevated Taxiway Edge Light Fixture and Transformer. Protect Can.	EA	31	$200.00	$6,200.00
14	SP-126-4.9b	Remove and Salvage Elevated Runway Edge Light Fixture and Transformer. Protect Can.	EA	2	$200.00	$400.00
15	SP-126-4.10	Remove and Salvage In-pavement Runway Edge Light Fixture and Transformer. Protect Can.	EA	3	$220.00	$660.00
16	P-152-4.1	Unclassified Excavation and Haul-off	CY	1,000	$40.00	$40,000.00
17	P-152-4.2	Embankment in Place	CY	300	$12.00	$3,600.00
18	P-152-4.3	Subgrade Preparation	SY	3,100	$3.00	$9,300.00
19	P-209-5.1	Crushed Aggregate Base Course, P-209	CY	1,200	$75.00	$90,000.00
20	P-401-8.1	Asphalt Concrete Surface Course, P-401	TON	2,000	$165.00	$330,000.00
21	D-751-5.3	Adjust Catch Basin to Grade	EA	1	$5,000.00	$5,000.00
22	L-108-5.1	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	LF	11,700	$2.50	$29,250.00
23	L-108-5.2a	No. 6 AWG Bare Counterpoise Wire, Installed Adjacent to / In the Duct Bank or Conduit	LF	3,500	$2.00	$7,000.00
24	L-110-5.5	Non-encased Electrical Duct Bank, 1W - 2" Conduit	LF	120	$25.00	$3,000.00
25	L-115-5.2a	Adjust Electrical Pullbox to Grade	EA	2	$2,000.00	$4,000.00
26	L-125-5.1d	Construct New L-858(L) Airfield Guidance Sign (A3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
27	L-125-5.1g	Construct New L-858(L) Airfield Guidance Sign (B3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
28	L-125-5.1h	Construct New L-858(L) Airfield Guidance Sign (B4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
29	L-125-5.1k	Construct New L-858(L) Airfield Guidance Sign (C3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
30	L-125-5.1l	Construct New L-858(L) Airfield Guidance Sign (C4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
31	L-125-5.1o	Construct New L-858(L) Airfield Guidance Sign (D3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
32	L-125-5.1p	Construct New L-858(L) Airfield Guidance Sign (D4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
33	L-125-5.4a	Install New L-861(L) Elevated Runway Edge Light and Adjust Existing Base Can	EA	2	$750.00	$1,500.00
34	L-125-5.5	Install New L-852D(L) In-Pavement Runway Edge Light and Adjust Existing Base Can	EA	3	$900.00	$2,700.00
35	L-125-5.11	Install Salvaged Elevated Taxiway Edge Light and Transformer on Existing Base Can	EA	32	$500.00	$16,000.00
36	L-125-5.12	Install ID Tag	EA	37	$75.00	$2,775.00
37	P-620-5.2a	Marking, 2 Coats with Beads (All Colors)	SF	3,200	$3.00	$9,600.00
38	P-620-5.2c	Marking, Single Coat with No Beads (All Colors)	SF	7,900	$1.50	$11,850.00
39	P-620-5.2d	Marking, Single Coat with Beads (All Colors)	SF	1,500	$2.00	$3,000.00
40	T-901-5.1	Seeding	AC	1	$5,000.00	$5,000.00
					TOTAL	**$838,035.00**

Oxnard Airport, Ventura County
Engineer's Estimate of Probable Cost

Bid Alt 1 - Taxiway Connectors Pavement Reconstruction

This project will consist of a full reconstruction of the structural section, including strengthening of the subgrade. Bid Alt 1 consists of the connector taxiways A, B, C, D, and E. Based on the fleet mix, the pavement section is anticipated to be composed of 4 inches of P-401 asphalt surface course, 9 inches of P-209 crushed aggregate base course, and 16 inches of lime-treated subgrade. Grading will extend into the infields to accomplish positive drainage, however full infield RSA compliance is not included in this estimate. The estimated cost for Bid Alt 1 is as follows:

SCHEDULE C: BID ALT 1 WORK						
Item	**Spec No.**	**Description**	**Unit**	**Qty**	**Cost**	**Total**
1	C-100-14.1	Contractor Quality Control Program (CQCP)	LS	1	$27,000.00	$27,000.00
2	C-105.1	Mobilization	LS	1	$265,000.00	$265,000.00
3	C-105.2	Resident Project Engineer's Field Office	LS	1	$7,000.00	$7,000.00
4	SP-102-3.1	Compliance with Pollution, Erosion, and Siltation Control	LS	1	$27,000.00	$27,000.00
5	SP-100-3.1	Airfield Safety and Traffic Control	LS	1	$53,000.00	$53,000.00
6	SP-100-3.2	Construction Staking and Survey Layout	LS	1	$27,000.00	$27,000.00
7	SP-100-3.8	Underground Utility Investigation and Potholing	HOUR	12	$550.00	$6,600.00
8	P-101-5.1	Demolish Asphalt Pavement	SY	16,200	$9.00	$145,800.00
9	SP-126-4.2a	Demolish Conduit, Cable, and Counterpoise	LF	7,900	$8.00	$63,200.00
10	SP-126-4.2b	Demolish Concrete Encased Conduit, Cable, and Counterpoise	LF	400	$30.00	$12,000.00
11	SP-126-4.3	Remove Cable and Counterpoise	LF	200	$1.00	$200.00
12	SP-126-4.7a	Demolish Electrical Pullbox	EA	13	$1,200.00	$15,600.00
13	SP-126-4.7b	Demolish FAA Pullbox	EA	1	$1,200.00	$1,200.00
14	SP-126-4.8	Demolish Airfield Sign and Pad	EA	18	$1,200.00	$21,600.00
15	SP-126-4.11a	Demolish Elevated Taxiway Edge Light and Can. Salvage Existing Fixture.	EA	55	$400.00	$22,000.00
16	SP-126-4.11b	Demolish Elevated Runway Edge Light and Can. Salvage Existing Fixture.	EA	2	$400.00	$800.00
17	SP-126-4.12b	Demolish In-pavement Runway Edge Light and Can. Salvage Existing Fixture.	EA	3	$750.00	$2,250.00
18	SP-126-4.17	Demolish Abandoned Waterline, if Encountered	LF	220	$25.00	$5,500.00
19	P-152-4.1	Unclassified Excavation and Haul-off	CY	5,500	$40.00	$220,000.00
20	P-152-4.2	Embankment in Place	CY	2,500	$12.00	$30,000.00
21	P-152-4.3	Subgrade Preparation	SY	17,600	$3.00	$52,800.00
22	P-155-8.1	Lime Treated Subgrade, 16-Inch Depth	SY	11,400	$16.50	$188,100.00
23	SP-100-3.4	In-place Drying Techniques	SY	1,200	$1.50	$1,800.00
24	SP-100-3.5	Subgrade Stabilization, Excavation Below Subgrade	CY	300	$70.00	$21,000.00
25	SP-100-3.6	Multi-axial Geogrid	SY	400	$6.00	$2,400.00
26	P-209-5.1	Crushed Aggregate Base Course, P-209	CY	5,400	$75.00	$405,000.00
27	P-401-8.1	Asphalt Concrete Surface Course, P-401	TON	2,600	$165.00	$429,000.00
28	P-621-5.1	Grooving	SY	2,500	$7.00	$17,500.00
29	D-701-5.1	12-inch RCP, Class IV, outside Pavement Areas	LF	120	$250.00	$30,000.00
30	D-705-5.1	Underdrain Pipe, 6-Inch, Perforated	LF	3,100	$45.00	$139,500.00
31	D-705-5.2	Underdrain Pipe Cleanout	EA	32	$500.00	$16,000.00
32	D-751-5.1	48" Stormdrain Manhole	EA	3	$7,000.00	$21,000.00
33	D-751-5.2	Catch Basin/Drop Inlet	EA	1	$10,000.00	$10,000.00
34	D-751-5.4	Connect to Existing Manhole/Basin	EA	2	$2,500.00	$5,000.00
35	P-153-6.1	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	CY	120	$30.00	$3,600.00
36	L-108-5.1	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	LF	12,800	$2.50	$32,000.00
37	L-108-5.2a	No. 6 AWG Bare Counterpoise Wire, Installed Adjacent to / In the Duct Bank or Conduit	LF	4,700	$2.00	$9,400.00
38	L-110-5.1	Concrete Encased Electrical Duct Bank, 1W - 2" Conduit	LF	550	$50.00	$27,500.00
39	L-110-5.2	Concrete Encased Electrical Duct Bank, 3W - 2" Conduit	LF	490	$65.00	$31,850.00
40	L-110-5.5	Non-encased Electrical Duct Bank, 1W - 2" Conduit	LF	1,200	$25.00	$30,000.00
41	L-110-5.6	Non-encased Electrical Duct Bank, 2W - 2" Conduit	LF	2,700	$38.00	$102,600.00
42	L-110-5.9	Concrete Encase Existing FAA Line Under Proposed Pavement	LF	250	$40.00	$10,000.00
43	L-110-5.10	Concrete Encase Existing FAA Line Outside Pavement	LF	40	$40.00	$1,600.00
44	L-115-5.1a	Construct Electrical Pullbox: Aircraft Rated	EA	10	$10,000.00	$100,000.00
45	L-115-5.1b	Construct FAA Pull Box	EA	1	$12,000.00	$12,000.00
46	L-115-5.1c	Construct Junction Can: L-868 with Lid	EA	3	$3,000.00	$9,000.00
47	L-125-5.1b	Construct New L-858(L) Airfield Guidance Sign (A1) and Concrete Pad	EA	1	$6,000.00	$6,000.00
48	L-125-5.1c	Construct New L-858(L) Airfield Guidance Sign (A2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
49	L-125-5.1d	Construct New L-858(L) Airfield Guidance Sign (A3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
50	L-125-5.1e	Construct New L-858(L) Airfield Guidance Sign (B1) and Concrete Pad	EA	1	$6,000.00	$6,000.00
51	L-125-5.1f	Construct New L-858(L) Airfield Guidance Sign (B2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
52	L-125-5.1g	Construct New L-858(L) Airfield Guidance Sign (B3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
53	L-125-5.1h	Construct New L-858(L) Airfield Guidance Sign (B4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
54	L-125-5.1i	Construct New L-858(L) Airfield Guidance Sign (C1) and Concrete Pad	EA	1	$6,000.00	$6,000.00
55	L-125-5.1j	Construct New L-858(L) Airfield Guidance Sign (C2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
56	L-125-5.1k	Construct New L-858(L) Airfield Guidance Sign (C3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
57	L-125-5.1l	Construct New L-858(L) Airfield Guidance Sign (C4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
58	L-125-5.1m	Construct New L-858(L) Airfield Guidance Sign (D1) and Concrete Pad	EA	1	$6,000.00	$6,000.00
59	L-125-5.1n	Construct New L-858(L) Airfield Guidance Sign (D2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
60	L-125-5.1o	Construct New L-858(L) Airfield Guidance Sign (D3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
61	L-125-5.1p	Construct New L-858(L) Airfield Guidance Sign (D4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
62	L-125-5.1q	Construct New L-858(L) Airfield Guidance Sign (E1) and Concrete Pad	EA	1	$6,000.00	$6,000.00
63	L-125-5.1r	Construct New L-858(L) Airfield Guidance Sign (E2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
64	L-125-5.1s	Construct New L-858(L) Airfield Guidance Sign (E3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
65	L-125-5.7	Construct New L-861(L) Elevated Runway Edge Light and Base Can	EA	2	$2,500.00	$5,000.00
66	L-125-5.8	Construct New L-852D(L) In-Pavement Runway Edge Light and Base Can	EA	3	$2,500.00	$7,500.00
67	L-125-5.9	Construct New L-861T(L) Medium Intensity Elevated Taxiway Edge Light and Base Car	EA	58	$2,300.00	$133,400.00
68	L-125-5.12	Install ID Tag	EA	63	$75.00	$4,725.00
69	L-125-5.14	Change Sign Legend	EA	18	$800.00	$14,400.00
70	L-125-5.15b	Miscellaneous Lighting Equipment for Taxiways	LS	1	$60,000.00	$60,000.00
71	P-620-5.2a	Marking, 2 Coats with Beads (All Colors)	SF	5,400	$3.00	$16,200.00
72	P-620-5.2c	Marking, Single Coat with No Beads (All Colors)	SF	9,100	$1.50	$13,650.00
73	T-901-5.1	Seeding	AC	5	$5,000.00	$25,000.00
					TOTAL	**$3,049,275.00**

SCHEDULE D: BID ALT 1 TRANSITION WORK

Item	Spec No.	Description	Unit	Qty	Cost	Total
1	C-100-14.1	Contractor Quality Control Program (CQCP)	LS	1	$10,000.00	$10,000.00
2	C-105.1	Mobilization	LS	1	$97,000.00	$97,000.00
3	C-105.2	Resident Project Engineer's Field Office	LS	1	$3,000.00	$3,000.00
4	SP-102-3.1	Compliance with Pollution, Erosion, and Siltation Control	LS	1	$10,000.00	$10,000.00
5	SP-100-3.1	Airfield Safety and Traffic Control	LS	1	$20,000.00	$20,000.00
6	SP-100-3.2	Construction Staking and Survey Layout	LS	1	$10,000.00	$10,000.00
7	P-101-5.1	Demolish Asphalt Pavement	SY	4,300	$9.00	$38,700.00
8	P-101-5.2	Asphalt Crack Repair (under 1.5" width)	LF	1,200	$5.00	$6,000.00
9	P-101-5.3	Asphalt Crack Repair (over 1.5" width)	SF	100	$50.00	$5,000.00
10	P-101-5.4	Remove Pavement Markings	SF	2,400	$2.00	$4,800.00
11	P-101-5.6	Cold Mill, Variable Depth (2 inches Maximum)	SY	1,600	$5.00	$8,000.00
12	SP-126-4.2a	Demolish Conduit, Cable, and Counterpoise	LF	1,200	$8.00	$9,600.00
13	SP-126-4.2b	Demolish Concrete Encased Conduit, Cable, and Counterpoise	LF	500	$30.00	$15,000.00
14	SP-126-4.3	Remove Cable and Counterpoise	LF	1,100	$1.00	$1,100.00
15	SP-126-4.4	Remove and Salvage Unlit Information Sign	EA	1	$300.00	$300.00
16	SP-126-4.5	Remove and Salvage Unlit Information Sign. Demolish Concrete Pad	EA	1	$1,000.00	$1,000.00
17	SP-126-4.7a	Demolish Electrical Pullbox	EA	1	$1,200.00	$1,200.00
18	SP-126-4.8	Demolish Airfield Sign and Pad	EA	3	$1,200.00	$3,600.00
19	SP-126-4.11a	Demolish Elevated Taxiway Edge Light and Can. Salvage Existing Fixture.	EA	16	$400.00	$6,400.00
20	SP-126-4.12a	Demolish In-pavement Taxiway Edge Light and Can. Salvage Existing Fixture.	EA	6	$750.00	$4,500.00
21	SP-126-4.17	Demolish Abandoned Waterline, if Encountered	LF	40	$25.00	$1,000.00
22	P-152-4.1	Unclassified Excavation and Haul-off	CY	1,800	$40.00	$72,000.00
23	P-152-4.2	Embankment in Place	CY	500	$12.00	$6,000.00
24	P-152-4.3	Subgrade Preparation	SY	6,500	$3.00	$19,500.00
25	P-155-8.1	Lime Treated Subgrade, 16-Inch Depth	SY	4,400	$16.50	$72,600.00
26	SP-100-3.4	In-place Drying Techniques	SY	500	$1.50	$750.00
27	SP-100-3.5	Subgrade Stabilization, Excavation Below Subgrade	CY	100	$70.00	$7,000.00
28	SP-100-3.6	Multi-axial Geogrid	SY	200	$6.00	$1,200.00
29	P-209-5.1	Crushed Aggregate Base Course, P-209	CY	2,000	$75.00	$150,000.00
30	P-401-8.1	Asphalt Concrete Surface Course, P-401	TON	1,300	$165.00	$214,500.00
31	P-621-5.1	Grooving	SY	200	$7.00	$1,400.00
32	D-701-5.1	12-inch RCP, Class IV, outside Pavement Areas	LF	60	$250.00	$15,000.00
33	D-705-5.1	Underdrain Pipe, 6-Inch, Perforated	LF	1,000	$45.00	$45,000.00
34	D-705-5.2	Underdrain Pipe Cleanout	EA	12	$500.00	$6,000.00
35	D-751-5.4	Connect to Existing Manhole/Basin	EA	1	$2,500.00	$2,500.00
36	P-153-6.1	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	CY	100	$30.00	$3,000.00
37	L-108-5.1	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	LF	5,100	$2.50	$12,750.00
38	L-108-5.2a	No. 6 AWG Bare Counterpoise Wire, Installed Adjacent to / In the Duct Bank or Conduit	LF	2,300	$2.00	$4,600.00
39	L-110-5.1	Concrete Encased Electrical Duct Bank, 1W - 2" Conduit	LF	560	$50.00	$28,000.00
40	L-110-5.5	Non-encased Electrical Duct Bank, 1W - 2" Conduit	LF	1,140	$25.00	$28,500.00
41	L-110-5.6	Non-encased Electrical Duct Bank, 2W - 2" Conduit	LF	30	$38.00	$1,140.00
42	L-110-5.7	Non-encased Electrical Duct Bank, 3W - 2" Conduit	LF	200	$45.00	$9,000.00
43	L-110-5.9	Concrete Encase Existing FAA Line Under Proposed Pavement	LF	110	$40.00	$4,400.00
44	L-115-5.1a	Construct Electrical Pullbox: Aircraft Rated	EA	1	$10,000.00	$10,000.00
45	L-115-5.1c	Construct Junction Can: L-868 with Lid	EA	2	$3,000.00	$6,000.00
46	L-125-5.1u	Construct New L-858(L) Airfield Guidance Sign (F2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
47	L-125-5.1x	Construct New L-858(L) Airfield Guidance Sign (F5) and Concrete Pad	EA	1	$6,000.00	$6,000.00
48	L-125-5.1z	Construct New L-858(L) Airfield Guidance Sign (F7) and Concrete Pad	EA	1	$6,000.00	$6,000.00
49	L-125-5.2	Install Salvaged Unlit Informational Sign on Existing Concrete Pad	EA	1	$1,000.00	$1,000.00
50	L-125-5.3	Install Salvaged Unlit Informational Sign on New Concrete Pad	EA	1	$3,000.00	$3,000.00
51	L-125-5.9	Construct New L-861T(L) Medium Intensity Elevated Taxiway Edge Light and Base Can	EA	21	$2,300.00	$48,300.00
52	L-125-5.10	Construct New L-852T(L) Medium Intensity In-Pavement Taxiway Edge Light and Base Can	EA	13	$2,500.00	$32,500.00
53	L-125-5.12	Install ID Tag	EA	34	$75.00	$2,550.00
54	L-125-5.14	Change Sign Legend	EA	8	$800.00	$6,400.00
55	P-620-5.2a	Marking, 2 Coats with Beads (All Colors)	SF	5,100	$3.00	$15,300.00
56	P-620-5.2c	Marking, Single Coat with No Beads (All Colors)	SF	5,500	$1.50	$8,250.00
57	T-901-5.1	Seeding	AC	1	$5,000.00	$5,000.00
					TOTAL	**$1,117,340.00**

Oxnard Airport, Ventura County
Engineer's Estimate of Probable Cost

Bid Alt 2 - Parallel Taxiway F Pavement Reconstruction

This project will consist of a full reconstruction of the structural section, including strengthening of the subgrade. Bid Alt 2 consists of the parallel taxiway F. Based on the fleet mix, the pavement section is anticipated to be composed of 4 inches of P-401 asphalt surface course, 9 inches of P-209 crushed aggregate base course, and 16 inches of lime-treated subgrade. Grading will extend into the infields to accomplish positive drainage, however full infield RSA compliance is not included in this estimate. The estimated cost for Bid Alt 2 is as follows:

SCHEDULE E: BID ALT 2 WORK

Item	Spec No.	Description	Unit	Qty	Cost	Total
1	C-100-14.1	Contractor Quality Control Program (CQCP)	LS	1	$100,000.00	$100,000.00
2	C-105.1	Mobilization	LS	1	$998,000.00	$998,000.00
3	C-105.2	Resident Project Engineer's Field Office	LS	1	$25,000.00	$25,000.00
4	SP-102-3.1	Compliance with Pollution, Erosion, and Siltation Control	LS	1	$100,000.00	$100,000.00
5	SP-100-3.1	Airfield Safety and Traffic Control	LS	1	$200,000.00	$200,000.00
6	SP-100-3.2	Construction Staking and Survey Layout	LS	1	$100,000.00	$100,000.00
7	SP-100-3.8	Underground Utility Investigation and Potholing	HOUR	24	$550.00	$13,200.00
8	P-101-5.1	Demolish Asphalt Pavement	SY	90,700	$9.00	$816,300.00
9	P-101-5.2	Asphalt Crack Repair (under 1.5" width)	LF	2,100	$5.00	$10,500.00
10	P-101-5.3	Asphalt Crack Repair (over 1.5" width)	SF	200	$50.00	$10,000.00
11	P-101-5.4	Remove Pavement Markings	SF	14,800	$2.00	$29,600.00
12	P-101-5.6	Cold Mill, Variable Depth (2 inches Maximum)	SY	2,800	$5.00	$14,000.00
13	SP-126-4.2a	Demolish Conduit, Cable, and Counterpoise	LF	6,400	$8.00	$51,200.00
14	SP-126-4.2b	Demolish Concrete Encased Conduit, Cable, and Counterpoise	LF	6,500	$30.00	$195,000.00
15	SP-126-4.3	Remove Cable and Counterpoise	LF	400	$1.00	$400.00
16	SP-126-4.4	Remove and Salvage Unlit Information Sign	EA	1	$300.00	$300.00
17	SP-126-4.5	Remove and Salvage Unlit Information Sign. Demolish Concrete Pad	EA	1	$1,000.00	$1,000.00
18	SP-126-4.7a	Demolish Electrical Pullbox	EA	12	$1,200.00	$14,400.00
19	SP-126-4.7b	Demolish FAA Pullbox	EA	5	$1,200.00	$6,000.00
20	SP-126-4.8	Demolish Airfield Sign and Pad	EA	9	$1,200.00	$10,800.00
21	SP-126-4.11a	Demolish Elevated Taxiway Edge Light and Can. Salvage Existing Fixture.	EA	65	$400.00	$26,000.00
22	SP-126-4.12a	Demolish In-pavement Taxiway Edge Light and Can. Salvage Existing Fixture.	EA	64	$750.00	$48,000.00
23	SP-126-4.17	Demolish Abandoned Waterline, if Encountered	LF	400	$25.00	$10,000.00
24	SP-126-4.16	Demolish Concrete Valley Gutter	LF	170	$5.00	$850.00
25	P-152-4.1	Unclassified Excavation and Haul-off	CY	25,300	$40.00	$1,012,000.00
26	P-152-4.2	Embankment in Place	CY	8,900	$12.00	$106,800.00
27	P-152-4.3	Subgrade Preparation	SY	76,400	$3.00	$229,200.00
28	P-155-8.1	Lime Treated Subgrade, 16-Inch Depth	SY	63,600	$16.50	$1,049,400.00
29	SP-100-3.4	In-place Drying Techniques	SY	6,400	$1.50	$9,600.00
30	SP-100-3.5	Subgrade Stabilization, Excavation Below Subgrade	CY	1,300	$70.00	$91,000.00
31	SP-100-3.6	Multi-axial Geogrid	SY	2,000	$6.00	$12,000.00
32	P-209-5.1	Crushed Aggregate Base Course, P-209	CY	21,100	$75.00	$1,582,500.00
33	P-401-8.1	Asphalt Concrete Surface Course, P-401	TON	15,600	$165.00	$2,574,000.00
34	P-621-5.1	Grooving	SY	200	$7.00	$1,400.00
35	D-701-5.1	12-inch RCP, Class IV, outside Pavement Areas	LF	200	$250.00	$50,000.00
36	D-701-5.2	12-inch RCP, Class IV, within Pavement Areas	LF	340	$300.00	$102,000.00
37	D-705-5.1	Underdrain Pipe, 6-Inch, Perforated	LF	9,000	$45.00	$405,000.00
38	D-705-5.2	Underdrain Pipe Cleanout	EA	37	$500.00	$18,500.00
39	D-751-5.1	48" Stormdrain Manhole	EA	14	$7,000.00	$98,000.00
40	D-751-5.2	Catch Basin/Drop Inlet	EA	2	$10,000.00	$20,000.00
41	D-751-5.3	Adjust Catch Basin to Grade	EA	1	$5,000.00	$5,000.00
42	D-751-5.4	Connect to Existing Manhole/Basin	EA	4	$2,500.00	$10,000.00
43	D-754-5.1	Construct Concrete Valley Gutter and Apron	LF	120	$50.00	$6,000.00
44	P-153-6.1	Controlled Low-Strength Material (CLSM) for Existing Utility Protection	CY	300	$30.00	$9,000.00
45	L-108-5.1	No. 8 AWG 5 kV, L-824, Type C Cable, Installed in Duct Bank or Conduit	LF	20,800	$2.50	$52,000.00
46	L-108-5.2a	No. 6 AWG Bare Counterpoise Wire, Installed Adjacent to / In the Duct Bank or Conduit	LF	13,400	$2.00	$26,800.00
47	L-110-5.1	Concrete Encased Electrical Duct Bank, 1W - 2" Conduit	LF	6,600	$50.00	$330,000.00
48	L-110-5.3	Concrete Encased Electrical Duct Bank, 5W - 2" Conduit	LF	100	$80.00	$8,000.00
49	L-110-5.5	Non-encased Electrical Duct Bank, 1W - 2" Conduit	LF	6,600	$25.00	$165,000.00
50	L-110-5.6	Non-encased Electrical Duct Bank, 2W - 2" Conduit	LF	490	$38.00	$18,620.00
51	L-110-5.7	Non-encased Electrical Duct Bank, 3W - 2" Conduit	LF	160	$45.00	$7,200.00
52	L-110-5.9	Concrete Encase Existing FAA Line Under Proposed Pavement	LF	400	$40.00	$16,000.00
53	L-110-5.10	Concrete Encase Existing FAA Line Outside Pavement	LF	30	$40.00	$1,200.00
54	L-110-5.11	Lower and Concrete Encase FAA Line	LF	70	$60.00	$4,200.00
55	L-115-5.1a	Construct Electrical Pullbox: Aircraft Rated	EA	1	$10,000.00	$10,000.00
56	L-115-5.1b	Construct FAA Pull Box	EA	5	$12,000.00	$60,000.00
57	L-115-5.1c	Construct Junction Can: L-868 with Lid	EA	2	$3,000.00	$6,000.00
58	L-125-5.1t	Construct New L-858(L) Airfield Guidance Sign (F1) and Concrete Pad	EA	1	$6,000.00	$6,000.00
59	L-125-5.1u	Construct New L-858(L) Airfield Guidance Sign (F2) and Concrete Pad	EA	1	$6,000.00	$6,000.00
60	L-125-5.1v	Construct New L-858(L) Airfield Guidance Sign (F3) and Concrete Pad	EA	1	$6,000.00	$6,000.00
61	L-125-5.1w	Construct New L-858(L) Airfield Guidance Sign (F4) and Concrete Pad	EA	1	$6,000.00	$6,000.00
62	L-125-5.1x	Construct New L-858(L) Airfield Guidance Sign (F5) and Concrete Pad	EA	1	$6,000.00	$6,000.00
63	L-125-5.1y	Construct New L-858(L) Airfield Guidance Sign (F6) and Concrete Pad	EA	1	$6,000.00	$6,000.00
64	L-125-5.1z	Construct New L-858(L) Airfield Guidance Sign (F7) and Concrete Pad	EA	1	$6,000.00	$6,000.00
65	L-125-5.1aa	Construct New L-858(L) Airfield Guidance Sign (F8) and Concrete Pad	EA	1	$6,000.00	$6,000.00
66	L-125-5.1bb	Construct New L-858(L) Airfield Guidance Sign (F9) and Concrete Pad	EA	1	$6,000.00	$6,000.00
67	L-125-5.2	Install Salvaged Unlit Informational Sign on Existing Concrete Pad	EA	1	$1,000.00	$1,000.00
68	L-125-5.3	Install Salvaged Unlit Informational Sign on New Concrete Pad	EA	1	$3,000.00	$3,000.00
69	L-125-5.9	Construct New L-861T(L) Medium Intensity Elevated Taxiway Edge Light and Base Can	EA	70	$2,300.00	$161,000.00
70	L-125-5.10	Construct New L-852T(L) Medium Intensity In-Pavement Taxiway Edge Light and Base Can	EA	66	$2,500.00	$165,000.00
71	L-125-5.12	Install ID Tag	EA	136	$75.00	$10,200.00
72	L-125-5.14	Change Sign Legend	EA	8	$800.00	$6,400.00
73	P-620-5.2a	Marking, 2 Coats with Beads (All Colors)	SF	22,100	$3.00	$66,300.00
74	P-620-5.2c	Marking, Single Coat with No Beads (All Colors)	SF	57,400	$1.50	$86,100.00
75	P-620-5.2d	Marking, Single Coat with Beads (All Colors)	SF	10,600	$2.00	$21,200.00
76	T-901-5.1	Seeding	AC	9	$5,000.00	$45,000.00
					TOTAL	**$11,496,170.00**