

ENGINEER'S DESIGN REPORT

Petaluma Municipal Airport

Based Aircraft Apron Rehabilitation Project

FAA AIP No.: 3-06-0186-022 and -029

Prepared for the City of Petaluma



Prepared by

**Mead
& Hunt**

www.meadhunt.com

January 28, 2022

Final Submittal

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1. GENERAL SCOPE OF THE PROJECT

1.1 INTRODUCTION

Petaluma Municipal Airport (Airport) is owned and operated by the City of Petaluma (City) and is situated at the foot of the Sonoma Mountain range lying to the east of downtown Petaluma, California. The Airport has one runway (Runway 11-29) and serves general aviation (GA). Based on the Airport Layout Plan (ALP) that was approved by the Federal Aviation Administration (FAA) in 2020, the Airport's reference code is A-II for small aircraft.

Mead & Hunt, Inc. has prepared this Engineer's Design Report (99% Design Submittal) for the City. This report describes the design considerations and engineering analysis that occurred during the design phase undertaken for the Based Aircraft Apron Rehabilitation (Project) at the Airport. The design was previously completed to 99% in 2012 and was funded by FAA Airport Improvement Program (AIP) Grant No. 3-06-0186-022. Due to FAA funding priorities at the time the Project was not finalized and bid. The FAA subsequently programmed construction of the Project for FAA Fiscal Year 2022. Mead & Hunt has repackaged the 99% design submittal to be consistent with recent updates to FAA standards. The construction will be funded by an upcoming FAA AIP Grant No. 3-06-0186-029-2022.

1.2 SCOPE OF WORK

The Project design includes the following which will be completed under a single bid package:

Work Area A: Reconstruction

- Asphalt Concrete Pavement Removal
- Subgrade Excavation and Preparation
- Lime and Cement Treatment of Subgrade and Compaction
- Placement and Compaction of New Aggregate Base Material
- Paving of New Asphalt Surface Course
- Application of New Pavement Markings
- Tie-Down Installation
- Drainage Improvements, including New Valley Gutter, New Curb and Gutter, and Underdrain Replacement

Work Area B: Surface Treatment

- Surface Preparation
- Crack Repair and Isolated Pavement Repair (If needed)
- Double Application of Slurry Seal
- Application of New Pavement Markings
- Replacement of Tie-Down Chains

1.3 UNIQUE AND UNUSUAL SITUATIONS

The Project does not have any significant unique or unusual situations.



1.4 HISTORY OF THE EXISTING SYSTEM

A timeline of the major pavement construction projects is listed below:

- 1987** Original construction of the north section of the Based Aircraft Apron (AIP No. 3-06-0186-06). The pavement section was constructed with 2 inches of asphalt concrete (AC) pavement over 6 inches of aggregate base (AB) and 14 inches of select import material (SIM).
- 1989** Original construction of the south section of the Based Aircraft Apron (AIP No. 3-06-0186-08). The pavement section was constructed with 2 inches of AC pavement over 8 inches of AB and 12 inches of SIM.

2. FIELD INVESTIGATIONS

2.1 GENERAL FIELD INVESTIGATIONS AND PAVEMENT CONDITION

Field investigations were conducted by Mead & Hunt in 2011 for the original design. Mead & Hunt also conducted a visual condition survey on January 31, 2017, as part of the Airport Pavement Management System (APMS). The following distresses were observed during the visual condition survey:

| Severity | Distress (North Section) |
|----------|---|
| Low | Longitudinal and Transverse Cracking; Weathering |
| Medium | Longitudinal and Transverse Cracking; Raveling (Coal Tar); Weathering |
| High | Longitudinal and Transverse Cracking |

| Severity | Distress (South Section) |
|----------|---|
| Low | Longitudinal and Transverse Cracking; Patching and Utility Cut Patching; Weathering |
| Medium | Alligator Cracking; Block Cracking; Longitudinal and Transverse Cracking; Raveling (Coal Tar); Weathering |
| High | Depression; Longitudinal and Transverse Cracking; Raveling (Coal Tar) |

As a result of these distresses, the Pavement Condition Index (PCI) was determined to be 38 for the north section, and 26 for the south section. Mead & Hunt performed an additional field investigation on October 19, 2021, to document additional site features and verify the conditions identified in the 2017 APMS. Although some conditions have worsened since then, the distresses have not changed significantly. Photos taken during the field investigations are shown on following page.



Photo 1: Depression and Ponding in South Section



Photo 2: Block Cracking in North Section



Photo 3: Raveling of Pavement



Photo 4: Existing Water and Drainage Features



Photo 5: Alligator Cracking in South Section



Photo 6: Existing Tie-Down Anchor

2.2 TOPOGRAPHIC SURVEY

A topographic survey was performed by Brelje & Race of the aircraft parking apron and taxilane to include adjacent building corners, any visible grade breaks, valley gutters, flow lines, fueling pad, and tie-down locations. Contours were prepared on a one-foot interval. This data was used to create a Digital Terrain



Model (DTM) and existing ground contours. This information will be used in developing final design grades in conformance with FAA design criteria and to generate grading plans and earthwork quantities.

2.3 GEOTECHNICAL INVESTIGATION

A geotechnical investigation was performed by Bauer Associates Geotechnical Consultants for this Project in October 2011. Their investigation consisted of exploring site conditions by performing 19 exploratory borings and obtaining undisturbed subgrade soil samples for laboratory analysis. The Geotechnical Report is included as *Appendix D* of this report.

The existing pavement section is typically 2 to 3 inches of asphalt on 2.5 to 6.5 inches of aggregate base course over an imported fill material that was gray, green to brown, clayey, sand material averaging 1-foot in depth. Below that a dark, brown, sandy, clay subgrade was generally moist when encountered and tests indicated a high expansion potential. A discussion with the geotechnical engineer at Bauer resulted in recommendations of a lime treatment or a lime plus cement treatment of the subgrade to reduce the expansive potential of this subgrade soil. Possible locations may require geogrid stabilization of the subgrades due to their limited size and location.

Ground water was not found when the borings were performed. However, during several site visits throughout the year, water was observed to be leaching up through the asphalt surface near the paving joints in a few locations on the apron.

3. DESIGN STANDARDS

3.1 APPLICABLE ADVISORY CIRCULARS

The methodologies used in developing designs for this Project are in conformance with applicable FAA standards. The following Advisory Circulars have been reviewed during the preliminary design of the Project and will continue to be referenced through design completion:

- AC 150/5300-13A *Airport Design*
- AC 150/5320-5D *Airport Drainage Design*
- AC 150/5320-6G *Airport Pavement Design and Evaluation*
- AC 150/5340-1M *Standards for Airport Markings*
- AC 150/5370-2G *Operational Safety on Airports During Construction*
- AC 150/5370-10H *Standard Specifications for Construction of Airports*

4. CONSIDERATIONS FOR AIRPORT OPERATIONAL SAFETY

A Construction Safety and Phasing Plan (CSPP) has been developed in accordance with AC 150/5370-2G. The CSPP details the proposed phasing and sequence of work, work area limits and pavement closure(s), haul routes and staging areas; and impacts to procedures and FAA NAVAIDS. The CSPP is included in the Project specification book.



5. PAVEMENT DESIGN

5.1 FLEET MIX

The aircraft mix at the Airport was reviewed to determine the existing loading imposed on the pavement. A pavement design analysis indicated the existing pavement was inadequate for existing truck and service vehicle traffic. It was determined that the loads generated by the heavy fuel truck activity on the apron were a contributing load factor and were included into the fleet mix to calculate the new pavement section. To simulate the fuel truck loads, 1,200 annual departures by a 37,480-lb tandem axle truck were added to the existing aircraft mix of 12,500-lb single-wheel gear (SWG). The 12,000-lb aircraft operations were estimated based on 20 passes a day within any given taxilane.

The mix used for pavement design is summarized as follows:

| Category per Maximum Take-off Weight (MTOW) | Estimated Annual Operations |
|--|-----------------------------|
| Single and Dual Wheel Aircraft (less than 12,500 lbs.) | 7,300 |
| Fuel Tanker Truck (37,480-lb tandem axle truck) | 1,200 |

5.2 LIFE CYCLE COST ANALYSIS

Life Cycle Cost Analysis (LCCA) is a procedure to economically compare competing design alternates by considering all significant costs and benefits over the economic life of each alternate. LCCA equates all present and future costs (and benefits) over the life of a project by accounting for the effects of the time value of money. Because life cycle costing compares alternates, it is necessary that each alternate 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 method for evaluating airport pavement design or rehabilitation alternatives.

The fundamental factors that should be considered in LCCA are:

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

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

Based on the existing pavement condition, a reconstruction is needed to properly strengthen the subgrade. This limits the number of viable alternatives for pavement design. A Portland cement concrete (PCC)



pavement section is only economical for fleet mixes with heavier aircraft since the minimum required thickness is already 6 inches. Based on the pavement design process detailed below, an AC pavement section with the minimum required FAA thickness of 3 inches will achieve the desired strength to support the fleet mix. For this reason, a life cycle cost analysis was not necessary for this Project.

5.3 MATERIAL AVAILABILITY AND CAPACITY TO DELIVER

Within the greater Sonoma County area, there are multiple pits and quarries owned by multiple entities. Local aggregates have historically passed Department of Transportation standards, including the previous projects performed at Petaluma Municipal Airport.

5.4 PAVEMENT IMPROVEMENT JUSTIFICATION AND METHOD

The Project has been split into two work areas based on the distresses observed in the visual condition survey. Work Area A represents the area that is the most damaged, due to poor drainage and inadequate pavement strength. Work Area A is generally correlated with the south section identified in the visual condition survey. A full pavement reconstruction is recommended for Work Area A. The existing pavement section will be removed, including existing AC and underlying base. The contractor will have the option to cold mill the AC and base to generate recycled material. The recycled material can be used for subgrade stabilization if needed. Subgrade stabilization and pavement section construction details are shown in the sections below.

The pavement distress in Work Area B appears to be age related and there is no evidence of load induced distress. Work Area B is generally correlated with the north section identified in the visual condition survey. A surface treatment, consisting of a slurry seal, is recommended for Work Area B in order to extend the life of the pavement. Due to the presence of frequent longitudinal, transverse, and block cracking, two coats of slurry seal are recommended in lieu of minor crack repair, which will be more cost effective and achieve intended Project results.

5.5 SUBGRADE STABILIZATION

The geotechnical investigation report (provided in *Appendix D*) indicates that the area is generally underlain by clayey subgrade soils. The clayey subgrade was generally moist when encountered and had properties that would indicate a high expansion potential. The CBR (California Bearing Ratio) for the soil is 1.

In conformance with design guidelines, the lowest resulting lab test for the subgrade CBR value is used to design the new pavement section. In the event that this CBR value is exceptionally low, the removal and replacement of the existing subgrade material with a higher CBR value is recommended, if it is economical. The existing subgrade material has a CBR value of 1 and extends at least 14 feet below the existing pavement section. Removal is not an option, and the subgrade should be treated in place with lime or cement or both.

The subgrade will be treated with lime and cement in order to reduce the expansive potential of the underlying soil and increase the CBR of the in-place material. As an added benefit, the lime and cement treated soil will provide a stabilized surface on which to build the pavement section. This surface will provide a working platform during the construction process on which subsequent layers can be placed.



5.6 FAARFIELD PAVEMENT DESIGN

A pavement section was designed using FAARFIELD and meeting the requirements of AC 150/5320-6G using a CBR value of 1. Per AC 150/5320-6G, the lime-treated subgrade was modeled as a 15-inch user defined layer with an assigned modulus. Based on previous similar projects, geotechnical investigations have determined that treating low-strength subgrade with lime or cement results in CBRs in the range of 50 to 80, which correlate to modulus values of 75,000 to 120,000 psi. For this design, in lieu of lime or cement treated CBR tests, a conservative value of 30,000 psi was used.

Per AC 150/5320-6G, the minimum pavement section for aircraft under 60,000 lbs is 3 inches of AC over 6 inches of AB. The FAARFIELD analysis showed that using a modulus of 30,000 psi at 9.6 inches of thickness will allow the minimum FAA pavement section shown to support the fleet mix. The geotechnical investigation recommended using a treatment depth of at least 15 inches.

The resulting pavement section is as follows:

New AC Section

- 3 inches of Asphalt Concrete (P-403)
- 6 inches of Crushed Aggregate base (P-209)
- 15 inches of Lime or Cement-treated Subgrade

The FAARFIELD pavement design is included as *Appendix A*.

6. DRAINAGE DESIGN

Surface drainage on the apron has been disrupted by the paving joints, which indicate the start of a previous construction project and the end of another. Over time, these joints have collected water, disrupting free flow to the outlet points. Combined with this is the expansive subgrade soils that expand and contract throughout the year, based on moisture content. This swelling and shrinking of the subgrade has caused consolidation, differential settlement, and grade irregularities on the surface which results in ponding.

To improve the drainage characteristics of the apron, a new 5-foot-wide valley gutter is proposed in front of and parallel to Hangar Building 1. On the west edge of the apron, new concrete curb and gutter is proposed and adjustment of the pavement grades in the adjacent area to remove low spots will improve the run-off characteristics of this section of the apron as well.

7. PAVEMENT MARKINGS

Based on the ALP that was approved by the FAA in 2020, the Airport's reference code is A-II for small aircraft. Proposed marking for the Project will be designed to meet these minimum standards where possible. Proper taxiway/taxilane widths, as well as taxiway/taxilane separation distances, have been incorporated in this Project's design. All new markings will be in accordance with FAA AC 150/5340-1M.

8. ENVIRONMENTAL CONSIDERATIONS

The Project is covered by FAA Order 1050.1F, Section 5-6.4 (Categorical Exclusions (CATEX) for Facility Siting, Construction, and Maintenance), Paragraph e. The FAA determined the Project was categorically excluded on August 24, 2021. A copy of the CATEX approval letter is included as *Appendix B*.



9. UTILITY LINES IN WORK AREA

There are several underground utility lines within the work area which include the following:

- 16-inch and 20-inch Pacific Gas & Electric (PG&E) gas mains
- 66-inch storm drain culvert
- 12-inch water main
- Electrical line for apron lighting

Existing utilities are identified on the plans as a "Utility Corridor Zone". The plans and specifications include language for the Contractor to pothole and field verify utilities prior to excavation, coordinate work inside gas main easement with PG&E throughout construction, and protect the gas line as required by PG&E.

10. SPONSOR REQUESTED MODIFICATIONS TO AIP STANDARDS

Based on the design thus far, there is a not a need to submit a request for design modifications or construction modifications to standards.

11. DELINEATION OF AIP ELIGIBLE AND INELIGIBLE WORK ITEMS

The Project construction will be funded by FAA AIP grant 3-06-0186-029-2022. At this time, it is anticipated all Project elements will be AIP eligible. The FAA share of AIP eligible work is assumed to be 90%. The City's share will be provided from reserve funding sources.

12. DBE PARTICIPATION

The FAA grant for this Project will exceed \$250,000; therefore, a Disadvantaged Business Enterprise (DBE) program is required. Language will be included in the bidding documents to encourage DBE participation. The DBE goal will be established at the time of bidding and will be based on the City's DBE program.

13. PROJECT SCHEDULE

13.1 DESIGN AND BIDDING SCHEDULE

The Project Design and Bidding Schedule is as follows:

- Late 2012 Original 99% Design Submitted – Complete
- December 17, 2020 Repackage and Bid Contract Notice to Proceed – Complete
- August 20, 2021 Revised CATEX Letter Sent to FAA – Complete
- August 24, 2021 FAA Approval of CATEX – Complete
- October 29, 2021 Repackage 99% Design Submittal – Complete
- November 29, 2021 City and FAA Review of 99% Submittal
- January 28, 2022 Bid Set Submittal
- March 17, 2022 Bid Opening



13.2 CONSTRUCTION SCHEDULE

The construction schedule will be contingent upon FAA grant award date, anticipated to occur in 2022. The overall Project duration is 72 working days; 30 working days for Mobilization and 42 working days for construction. After the construction contract is executed, a notice to proceed will be issued for the Mobilization Element. The purpose of the Mobilization Element is to accomplish pre-construction activities, such as submittal review and material procurement.

After the Mobilization Element is complete, a notice to proceed will be issued for the Construction Element. The Construction Element will consist of two phases: Phase 1 will consist of a majority of the Project and be completed within 40 working days; Phase 2 will consist of the final marking application, which will be completed within 2 working days and occur no earlier than 30 calendar days after the placement of asphalt surface course and slurry seal.

The phasing and timeline requirements for the Project are detailed in the CSPP.

14. ESTIMATED PROJECT COST

The Project will be funded by a grant from FAA AIP, as well as City funds. The Project / Contract will be awarded for construction based on the competitive bidding process. A construction cost estimate was prepared representing the work defined. Unit prices for the work defined are based on recent bid tabulations compiled from similar work previously performed at this Airport, and from more recent bids received at other nearby airports. The total estimated Project cost for the work, including construction administration and inspection is One Million Eight Hundred Eleven Thousand Seven Hundred Seventy-eight Dollars (\$1,832,250.00) as shown in the table below:

| Element | Total | FAA Share | Local Share |
|-----------------------------|-----------------------|-----------------------|---------------------|
| BIDDING REIMBURSEMENT | \$7,358.00 | \$6,622.20 | \$735.80 |
| DBE PROGRAM UPDATE | \$20,472.00 | \$18,424.80 | \$2,047.20 |
| CITY ADMINISTRATION | \$22,000.00 | \$19,800.00 | \$2,200.00 |
| CONSTRUCTION | \$1,574,420.00 | \$1,416,978.00 | \$157,442.00 |
| CONSTRUCTION ADMINISTRATION | \$75,000.00 | \$67,500.00 | \$7,500.00 |
| CONSTRUCTION OBSERVATION | \$93,000.00 | \$83,700.00 | \$9,300.00 |
| MATERIALS TESTING | \$40,000.00 | \$36,000.00 | \$4,000.00 |
| TOTAL | \$1,832,250.00 | \$1,649,025.00 | \$183,225.00 |

A detailed cost breakdown, including Engineer's Estimate of Probable Construction Cost, and total Project cost, is included as *Appendix C*.



15. SPONSOR CERTIFICATIONS

Sponsor Certifications for Project Plans and Specifications and for Equipment/Construction Contracts are included as *Appendix E*.

End of Report

Prepared and submitted by,

MEAD & HUNT, Inc.

A handwritten signature in black ink that reads "Alex Radovanovich".

Alex Radovanovich, PE
Project Manager



Appendices:

- Appendix A* *FAARFIELD Pavement Design*
- Appendix B* *CATEX Approval Letter*
- Appendix C* *Engineer's Estimate of Probable Construction Cost*
- Appendix D* *Geotechnical Investigation Report*
- Appendix E* *Sponsor Certifications for Project Plans and Specifications and Equipment and Construction Contracts*

APPENDICES

APPENDIX A – FAARFIELD PAVEMENT DESIGN

Federal Aviation Administration FAARFIELD 2.0 Section Report

FAARFIELD 2.0.7 (Build 09/14/2021)

Job Name: O69 Based Aircraft Apron

Section: New AC Section

Analysis Type: HMA on Aggregate

Last Run: Thickness Design 2021-10-27 11:30:29

Design Life = 20 Years

Total thickness to the top of the subgrade = 18.6in.

Pavement Structure Information by Layer

| No. | Type | Thickness in. | Modulus psi | Poisson's Ratio | Strength R psi |
|-----|-------------------------|---------------|-------------|-----------------|----------------|
| 1 | P-401/P-403 HMA Surface | 3.0 | 200000 | 0.35 | 0 |
| 2 | P-209 Crushed Aggregate | 6.0 | 66552 | 0.35 | 0 |
| 3 | User Defined | 9.6 | 30000 | 0.35 | 0 |
| 4 | Subgrade | 0 | 1500 | 0.35 | 0 |

Airplane Information

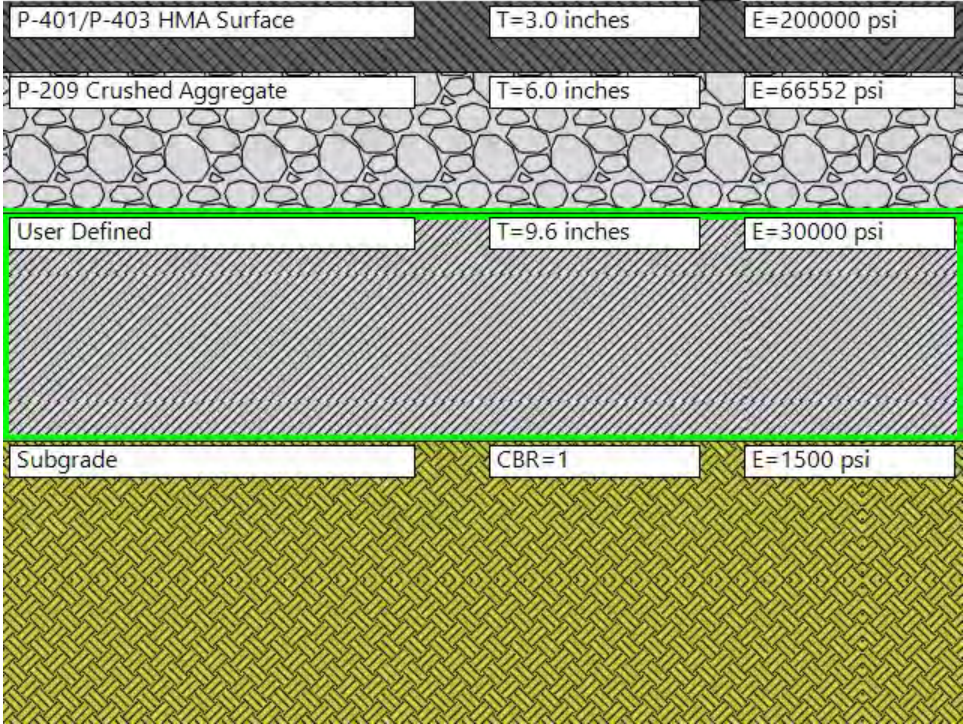
| No. | Name | Gross Wt. lbs | Annual Departures | % Annual Growth |
|-----|-------------------|---------------|-------------------|-----------------|
| 1 | Truck Axle Tandem | 37480 | 1200 | 0 |
| 2 | S-12.5 | 12500 | 7300 | 0 |

Additional Airplane Information

Subgrade CDF

| No. | Name | CDF Contribution | CDF Max for Airplane | P/C Ratio |
|-----|-------------------|------------------|----------------------|-----------|
| 1 | Truck Axle Tandem | 1.00 | 1.00 | 2.85 |
| 2 | S-12.5 | 0.00 | 0.00 | 2.82 |

User Is responsible For checking frost protection requirements.



APPENDIX B – CATEX APPROVAL LETTER



U.S. Department
of Transportation
**Federal Aviation
Administration**

Western-Pacific Region
Airports Division

San Francisco Airports District Office
831 Mitten Road, Room 210
Burlingame, CA 94010

August 24, 2021

Dan Cohen
Airport Manager
City of Petaluma
Post Office Box 61
Petaluma, CA 94953-0061

Subject: Categorical Exclusion for Proposed Based Aircraft Apron Rehabilitation at
Petaluma Municipal Airport

Dear Mr. Cohen:

The Federal Aviation Administration (FAA) has reviewed the environmental information you submitted for the proposed rehabilitation of the Based Aircraft Apron at Petaluma Municipal Airport, Petaluma, California. The FAA has determined the proposed project is Categorically Excluded (CE) 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.

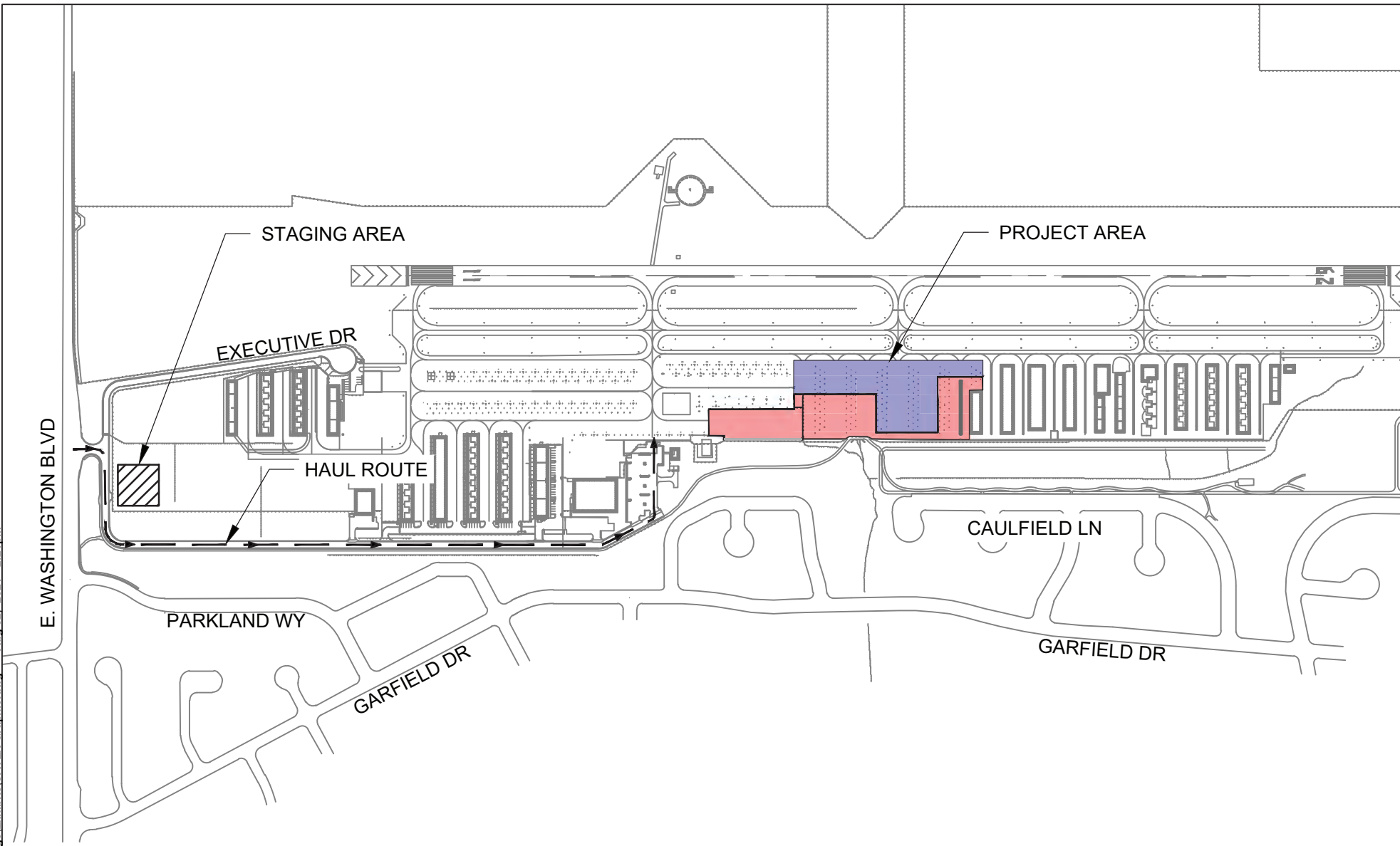
This letter notifies you that the proposed projects have complied with NEPA only. This is not a notice of final project Airport Layout Plan, airspace evaluation or funding availability approval.

If you have any questions regarding this matter I am available at 650-827-7613, or email me at Camille.Garibaldi@faa.gov.

Sincerely,

**CAMILLE A
GARIBALDI** Digitally signed by
CAMILLE A GARIBALDI
Date: 2021.08.24
07:34:07 -07'00'

Camille Garibaldi
Environmental Protection Specialist



E. WASHINGTON BLVD

STAGING AREA

EXECUTIVE DR

HAUL ROUTE

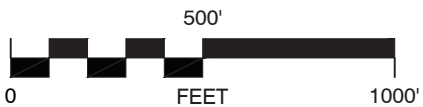
PARKLAND WY

GARFIELD DR

PROJECT AREA

CAULFIELD LN

GARFIELD DR



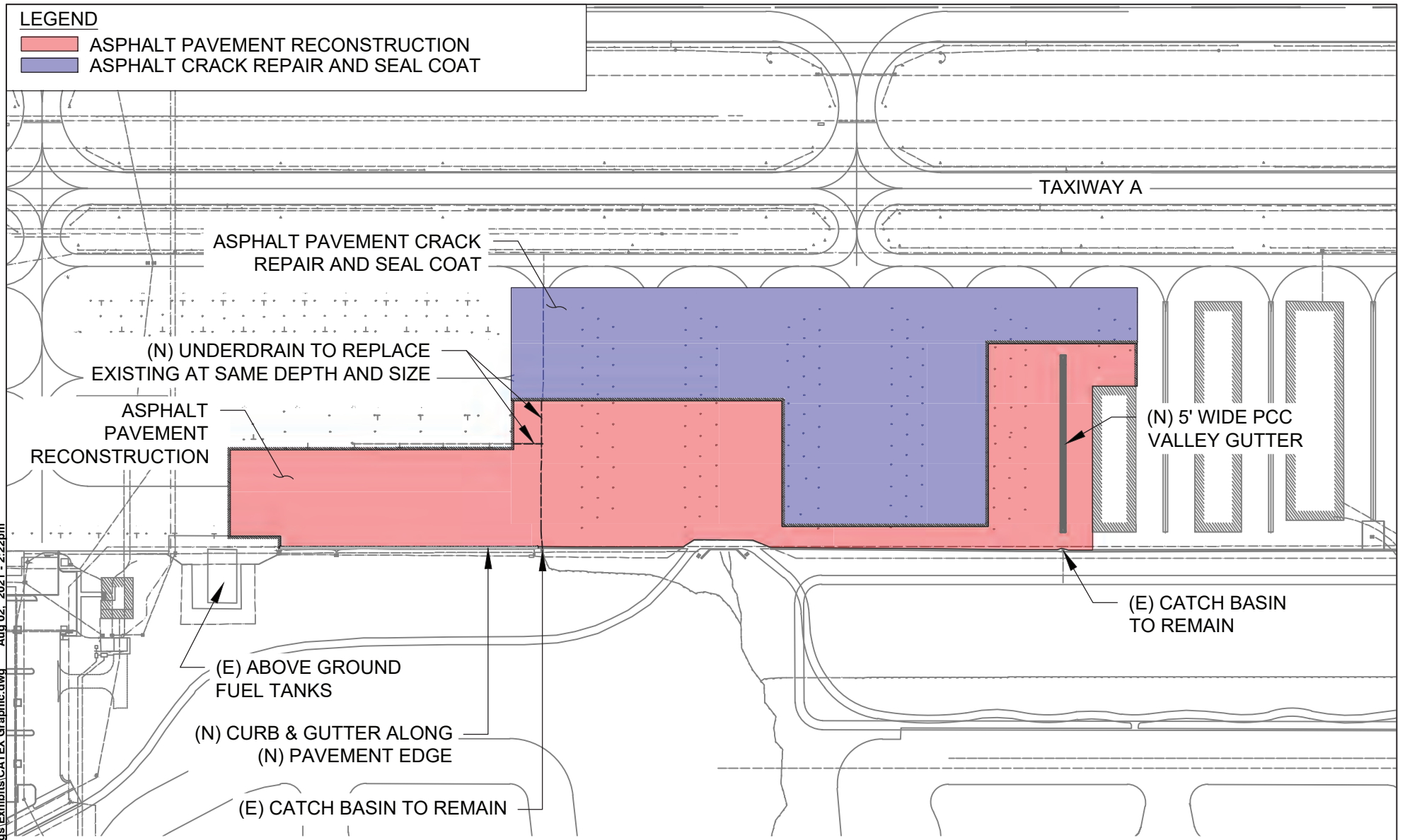
Source: Mead & Hunt, Inc

AIRPORT OVERVIEW

Petaluma Municipal Airport
Petaluma, CA

LEGEND

-  ASPHALT PAVEMENT RECONSTRUCTION
-  ASPHALT CRACK REPAIR AND SEAL COAT



TAXIWAY A

ASPHALT PAVEMENT CRACK REPAIR AND SEAL COAT

(N) UNDERDRAIN TO REPLACE EXISTING AT SAME DEPTH AND SIZE

ASPHALT PAVEMENT RECONSTRUCTION

(N) 5' WIDE PCC VALLEY GUTTER

(E) CATCH BASIN TO REMAIN

(E) ABOVE GROUND FUEL TANKS

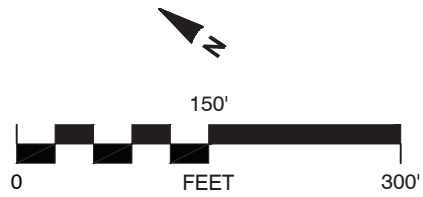
(N) CURB & GUTTER ALONG (N) PAVEMENT EDGE

(E) CATCH BASIN TO REMAIN

BASED AIRCRAFT APRON REHABILITATION

**Petaluma Municipal Airport
Petaluma, CA**

X:\1619500\210165.01\TECH\CAD\Drawings\Exhibits\CATEX Graphic.dwg Aug 02, 2021 - 2:22pm



Source: Mead & Hunt, Inc

**APPENDIX C – ENGINEER’S ESTIMATE OF PROBABLE
CONSTRUCTION COST**

**Petaluma Municipal Airport
Engineer's Estimate of Project Construction Cost (Final Submittal)
Based Aircraft Apron Rehabilitation
AIP 3-06-0186-029-2022**

Base Bid

| Item | Spec. Section | Description | Unit | Qty | Unit Cost | Total | FAA Share | Local Share |
|--------------|---------------|--|------|--------|--------------|-----------------------|-----------------------|---------------------|
| 1 | SP-100-3.1 | Airfield Safety and Traffic Control | LS | 1 | \$55,000.00 | \$55,000.00 | \$49,500.00 | \$5,500.00 |
| 2 | SP-100-3.2 | Existing Survey Verification | LS | 1 | \$7,500.00 | \$7,500.00 | \$6,750.00 | \$750.00 |
| 3 | SP-100-3.3 | Construction Staking and Survey Layout | LS | 1 | \$20,000.00 | \$20,000.00 | \$18,000.00 | \$2,000.00 |
| 4 | SP-100-3.4 | Underground Utility Investigation and Potholing | HR | 8 | \$500.00 | \$4,000.00 | \$3,600.00 | \$400.00 |
| 5 | C-100 | Contractor Quality Control Program | LS | 1 | \$20,000.00 | \$20,000.00 | \$18,000.00 | \$2,000.00 |
| 6 | C-102-5.1a | SWPPP Preparation, Management, and Monitoring | LS | 1 | \$7,000.00 | \$7,000.00 | \$6,300.00 | \$700.00 |
| 7 | C-102-5.1b | Inlet Protection | EA | 2 | \$500.00 | \$1,000.00 | \$900.00 | \$100.00 |
| 8 | C-102-5.1c | Additional BMP Measures for SWPPP Compliance | LS | 1 | \$5,000.00 | \$5,000.00 | \$4,500.00 | \$500.00 |
| 9 | C-105-6.1a | Mobilization | LS | 1 | \$143,200.00 | \$143,200.00 | \$128,880.00 | \$14,320.00 |
| 10 | C-105-6.1b | Engineer/RPR Field Office | LS | 1 | \$10,000.00 | \$10,000.00 | \$9,000.00 | \$1,000.00 |
| 11 | P-101-5.1 | Asphalt and Base Removal, Stockpile, and Disposal | SY | 13,000 | \$7.00 | \$91,000.00 | \$81,900.00 | \$9,100.00 |
| 12 | P-101-5.2 | Sawcut and Remove Asphalt Pavement Join (3-ft-wide) | LF | 1,630 | \$5.50 | \$8,965.00 | \$8,068.50 | \$896.50 |
| 13 | P-101-5.3 | Surface Preparation for Work Area B | LS | 1 | \$18,000.00 | \$18,000.00 | \$16,200.00 | \$1,800.00 |
| 14 | P-101-5.4 | Crack Repair (Over 1-1/2 inch wide) | LF | 500 | \$15.00 | \$7,500.00 | \$6,750.00 | \$750.00 |
| 15 | P-101-5.5 | Isolated Asphalt Pavement Repair | SF | 1,700 | \$20.00 | \$34,000.00 | \$30,600.00 | \$3,400.00 |
| 16 | P-101-5.6 | Removal of PCC Tie-down Anchors | EA | 105 | \$150.00 | \$15,750.00 | \$14,175.00 | \$1,575.00 |
| 17 | P-101-5.7 | Removal of PCC Valley Gutter with Rebar | SY | 66 | \$50.00 | \$3,300.00 | \$2,970.00 | \$330.00 |
| 18 | P-101-5.8 | Adjust Water Valve Box | EA | 4 | \$500.00 | \$2,000.00 | \$1,800.00 | \$200.00 |
| 19 | P-152-4.1 | Unclassified Excavation and Off-haul | CY | 720 | \$25.00 | \$18,000.00 | \$16,200.00 | \$1,800.00 |
| 20 | P-152-4.2 | Subgrade Preparation | SY | 13,000 | \$3.00 | \$39,000.00 | \$35,100.00 | \$3,900.00 |
| 21 | P-155-8.1 | Subgrade Treatment, 15-inch Depth | SY | 13,000 | \$10.50 | \$136,500.00 | \$122,850.00 | \$13,650.00 |
| 22 | P-155-8.2 | Lime | TON | 240 | \$120.00 | \$28,800.00 | \$25,920.00 | \$2,880.00 |
| 23 | P-156-8.1 | Cement | TON | 240 | \$124.00 | \$29,760.00 | \$26,784.00 | \$2,976.00 |
| 24 | SP-100-3.5 | In-Place Drying of Subgrade | SY | 3,300 | \$4.00 | \$13,200.00 | \$11,880.00 | \$1,320.00 |
| 25 | SP-100-3.6 | Excavation and Off-haul of Unsuitable Material | CY | 870 | \$30.00 | \$26,100.00 | \$23,490.00 | \$2,610.00 |
| 26 | SP-100-3.7 | Multi-axial Geogrid | SY | 2,600 | \$4.50 | \$11,700.00 | \$10,530.00 | \$1,170.00 |
| 27 | SP-100-3.8 | Recycled Base | CY | 870 | \$40.00 | \$34,800.00 | \$31,320.00 | \$3,480.00 |
| 28 | P-209-5.1 | Crushed Aggregate Base Course | CY | 2,200 | \$95.00 | \$209,000.00 | \$188,100.00 | \$20,900.00 |
| 29 | P-403-8.1 | Asphalt Mixture Surface Course | TON | 2,700 | \$150.00 | \$405,000.00 | \$364,500.00 | \$40,500.00 |
| 30 | P-626-6.1 | Emulsified Asphalt Slurry Seal, Double Application | SY | 11,500 | \$6.50 | \$74,750.00 | \$67,275.00 | \$7,475.00 |
| 31 | P-620-5.1a | Pavement Markings, Yellow, Initial Application | SF | 3,600 | \$1.50 | \$5,400.00 | \$4,860.00 | \$540.00 |
| 32 | P-620-5.1b | Pavement Markings, Yellow with Reflective Media, Final Application | SF | 3,400 | \$2.50 | \$8,500.00 | \$7,650.00 | \$850.00 |
| 33 | P-620-5.1c | Pavement Markings, Yellow, No Reflective Media, Final Application | SF | 270 | \$1.50 | \$405.00 | \$364.50 | \$40.50 |
| 34 | P-620-5.1d | Pavement Markings, White, Single Application | SF | 500 | \$3.00 | \$1,500.00 | \$1,350.00 | \$150.00 |
| 35 | P-620-5.1e | Pavement Markings, Black, Single Application | SF | 6,700 | \$1.50 | \$10,050.00 | \$9,045.00 | \$1,005.00 |
| 36 | D-705-5.1 | Remove and Replace 6-inch Underdrain | LF | 200 | \$40.00 | \$8,000.00 | \$7,200.00 | \$800.00 |
| 37 | D-754-5.1 | Structural Concrete, Reinforced (Valley Gutter) | CY | 30 | \$1,000.00 | \$30,000.00 | \$27,000.00 | \$3,000.00 |
| 38 | D-754-5.2 | PCC Curb and Gutter | LF | 290 | \$50.00 | \$14,500.00 | \$13,050.00 | \$1,450.00 |
| 39 | SP-100-3.9 | Install PCC Tie-down Anchors and Chains | EA | 71 | \$200.00 | \$14,200.00 | \$12,780.00 | \$1,420.00 |
| 40 | SP-100-3.10 | Replace Tie-down Anchor Chains | EA | 102 | \$20.00 | \$2,040.00 | \$1,836.00 | \$204.00 |
| TOTAL | | | | | | \$1,574,420.00 | \$1,416,978.00 | \$157,442.00 |

Total Project Cost

| Element | Total | FAA Share | Local Share |
|-----------------------------|-----------------------|-----------------------|---------------------|
| BIDDING REIMBURSEMENT | \$7,358.00 | \$6,622.20 | \$735.80 |
| DBE PROGRAM UPDATE | \$20,472.00 | \$18,424.80 | \$2,047.20 |
| CITY ADMINISTRATION | \$22,000.00 | \$19,800.00 | \$2,200.00 |
| CONSTRUCTION | \$1,574,420.00 | \$1,416,978.00 | \$157,442.00 |
| CONSTRUCTION ADMINISTRATION | \$75,000.00 | \$67,500.00 | \$7,500.00 |
| CONSTRUCTION OBSERVATION | \$93,000.00 | \$83,700.00 | \$9,300.00 |
| MATERIALS TESTING | \$40,000.00 | \$36,000.00 | \$4,000.00 |
| TOTAL | \$1,832,250.00 | \$1,649,025.00 | \$183,225.00 |

APPENDIX D – GEOTECHNICAL INVESTIGATION REPORT

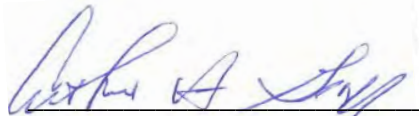
REPORT
GEOTECHNICAL INVESTIGATION
Airport Apron & Tiedown Areas Rehabilitation
Petaluma Municipal Airport
Petaluma, California

Prepared for:

Mr. Scott Van Gompel
Mead & Hunt, Inc.
133 Aviation Blvd, Suite 100
Santa Rosa, California 95403

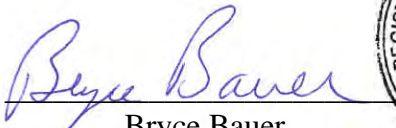
by

BAUER ASSOCIATES
Job No. 800.6



Arthur H. Graff
Geotechnical Engineer





Bryce Bauer
Geotechnical Engineer



October 31, 2011

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Plates 2 - 11 Logs of Test Borings 1 through 19

Plate 12 Soil Classification Chart and Key to Test Data

Plate 13 CBR Test Data

INTRODUCTION

This report presents the results of our geotechnical investigation for the apron and tiedown areas rehabilitation at the Petaluma Municipal Airport in Petaluma, California. The development area is indicated on the undated sheet EX-101, prepared by Mead & Hunt, Inc. The plan is reproduced, in part, and presented on Plate 1.

We understand that the improvements consist of using both: 1) asphalt overlays; and 2) removal of the asphalt and base section, lime treatment of the underlying materials and replacement with a new pavement section. Site grades will remain the same and no structures are planned.

The scope of our investigation, as outlined in our December 1, 2010, agreement included reviewing selected published geologic information from our files, exploring subsurface conditions at the site, and performing laboratory testing on selected samples. Based upon our work, we have developed conclusions and recommendations concerning:

1. Soil and groundwater conditions observed.
2. Site preparation and grading.
3. Geotechnical engineering drainage.
4. Supplemental services.

Our scope of work summarized in this report did not include an evaluation of any potential hazardous waste contamination or corrosion potential of the soil or groundwater at the site.

WORK PERFORMED

We reviewed the published geologic information summarized in the List of References. Mr. Robert Casagrande provided general information regarding the original improvements. We understand that the existing pavements were constructed by placement of imported fills, overlain by the asphalt pavement section.

On September 21, 2011, our engineering geologist explored the subsurface conditions in the development area to the extent of 19 test borings. Locations of the test borings were selected by your personnel. The test borings were drilled with a truck-mounted drill rig equipped with 6-inch diameter, solid stem augers. The completed test borings ranged in depth to about 5 feet. Test borings were backfilled with cuttings that were tamped; however, they were not formally compacted. The test borings were capped with concrete.

The test borings were located by our geologist by pacing from features indicated on the plan provided. The approximate test boring locations are shown on Plate 1. Our geologist logged the conditions exposed and obtained samples at selected intervals for visual identification and laboratory testing. Relatively undisturbed samples were obtained with a 2.4-inch, inside-diameter, split-spoon sampler driven with a 140-pound hammer. The stroke during driving was about 30 inches. The blows required to drive the sampler were recorded and converted to equivalent standard penetration blow counts for correlation with other data. Logs of the borings

showing the materials encountered, sample depths, and converted blow counts are presented on Plates 2 through 11. The soils are classified in accordance with the Unified Soil Classification System presented on Plate 12.

The logs show our interpretation of the subsurface conditions on the date and locations indicated, and it is not warranted that they are representative of the subsurface conditions at other locations and times. Also, the stratification lines on the logs represent the approximate boundaries between soil types; the transition may be gradual.

A California Bearing Ratio (CBR) test was performed on a sample of natural material. The CBR test data is presented on Plate 13.

SITE AND SOIL CONDITIONS

The airport facility is relatively level. The planned improvement area is currently blanketed by asphalt pavement. Isolated areas of minor to moderate cracking were observed.

The results of our field exploration and laboratory tests indicate that the asphalt pavements are generally underlain by baserock and imported fills. The thickness of the asphalt typically ranged from about 2 to 3 inches except in Test Boring Nos. 14, 15, and 16. In these three test borings, the asphalt was 3-1/2 to 4 inches in thickness. Aggregate Base thicknesses typically ranged from about 2-1/2 to 6-1/2 inches, however, baserock was not encountered in

Test Borings 15 and 16. The quality of the baserock varies and may not conform to Class II Aggregate Base specifications. The approximate thicknesses of the structural sections are shown on the test boring logs.

The pavement sections are underlain in most of the test borings by about 1/2 to 2 feet of loose to medium dense clayey sand and gravel, and medium stiff gravelly and sandy clay and silt old fills. Underlying the old fill soils are stiff to hard sandy clays. Weak soils and variable density, old fills, where present, may continue to consolidate or yield when loaded and saturated. The underlying alluvial clay soils have moderate to high strength. The clay soils are generally of moderate to high expansion potential. Expansive soils experience volume changes with different moisture contents.

Groundwater was not encountered in our test borings. We have previously observed in the project vicinity, during and after periods of prolonged rainfall, temporarily perched groundwater can occur within several feet of the ground surface.

DISCUSSION & CONCLUSIONS

Based on the results of our investigation, we conclude that from a geotechnical engineering standpoint, the pavements can be improved as planned. The most significant geotechnical engineering factor that must be considered in design and construction is the presence of expansive natural soils and variable density old fills.

Upon saturation, weak/porous soils and variable density old fills may lose strength and yield under vehicle loadings. Saturation will occur when the natural evaporation of soil moisture is inhibited by new fill and structural elements. Expansive soils experience volume changes with different moisture contents and can result in heaving or cracking.

Where pavements will be improved by removal of the existing asphalt and base, the underlying materials can be improved by either: 1) lime treatment of the existing import fill and natural expansive soils; or 2) placement of a new select fill section. Where lime treatment is used, the section treated is typically on the order of 15 to 18 inches (in-place thickness). Where the treated section has less extensive expansive materials, treatment of the soils with lime and cement may be more appropriate. Grading operations are similar with lime plus; however, two placement operations are used.

Alternatively, the underlying select fill could be improved by removal and replacement with a new select fill section. The select fill can be derived from the asphalt grindings and salvaging of existing select fill and baserock. Typically, the select fill would be separated from the natural clay soils with stabilization fabric.

A California Bearing Ratio (CBR) test was performed on a combined bulk sample obtained from most of the test borings, from 1-1/2 to 3 feet deep. The CBR test results indicated a CBR of 1. The results are presented on Plate 13.

Control of surface run-off will significantly enhance the stability of the site. The introduction of water into, or onto, the soils can cause soil instability and must be avoided. The site should be sloped to discharged into the storm drain system or well away from the pavement areas.

RECOMMENDATIONS

A. Site Preparation and Grading

Existing asphalt and baserock should be excavated and stockpiled for future use as aggregate subbase or select fill. Similarly, suitable select fill exposed in planned excavations should be separated and stockpiled for reuse.

If excessively weak or organic soils are exposed during planned excavations, the weak soils should be excavated as recommended by us in the field. In lime treatment areas, the excavations should be lime treated to at least 15 to 18 inches deep (as specified on the project plans). Use of lime plus cement should be determined by us after the excavation bottom is exposed and after the quality of the soils to be treated are known.

Where lime treatment is planned, the lime treated materials should be prepared with Quicklime, in accordance with Section 24 of Caltrans Standard Specifications, latest edition, in maximum lifts of 12 inches. A lift thickness of 18 inches can be used where the contractor can

demonstrate that the compaction equipment to be used will compact the full depth. The percent lime should be determined in accordance with ASTM test procedures and our recommendations. Typically, 5 to 6 percent lime will be required.

If lime treatment is not used or in areas where new pavements are planned, the soils exposed by required excavations should be scarified to a depth of 6 inches, moisture conditioned to at least four percent above optimum moisture content (two percent above optimum for low expansion soils), and compacted to at least 90 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same soil, as determined by ASTM D 1557-01 or AASHTO T 180-01. Optimum moisture content is the water content (percentage by dry weight) corresponding to the maximum dry density. The moisture conditioning and recompaction should extend to the bottom of any shrinkage cracks (if present).

If isolated deeper zones of soft, saturated, dry (shrinkage cracks), highly porous or organic soils are encountered during excavation and recompaction, the soils should be removed to expose firm soils. The depth and extent of overexcavation should be approved in the field by us.

Non-expansive select fill, should be free of organic matter, and should conform to the following requirements:

| <u>Sieve Size</u> | <u>Percent Passing</u> |
|-------------------|------------------------|
| 6-Inch | 100 |
| 4-Inch | 90 - 100 |
| No. 200 | 15 - 60 |

Liquid Limit - 40 Maximum
Plasticity Index - 15 Maximum
(ASTM D 4318-84 Wet Test Method)

Fill should be placed in thin lifts (normally 6 to 8 inches depending on compaction equipment), moisture conditioned to at least four percent above optimum (two percent above optimum for low expansion soils) and compacted to at least 90 percent relative compaction. Granular backfill should be vibrated in place. All surfaces should be finished to present a smooth, unyielding subgrade. In pavement areas, the upper 6 inches (subgrade) should be further compacted to at least 95 percent relative compaction (93 percent for expansive soils).

Fill and cutslopes should be constructed no steeper than 2:1. Fill and cutslopes should be planted with erosion-resistant vegetation, or protected from erosion by other measures upon completion of grading. Ground cover should be maintained on all slopes.

B. Geotechnical Engineering Drainage

The site should be graded to provide positive drainage away from the pavements and finished cut and fill slopes. Site drainage should be discharged into storm drains.

C. Supplemental Services

We should review the final plans for conformance with the intent of our recommendations. During grading and foundation construction, we should provide intermittent geotechnical engineering observations, along with necessary field and laboratory testing, during: 1) removal of weak soil and variable density, old fills; 2) fill placement and compaction; 3) subdrainage placement; 4) preparation and compaction of subgrade; and 5) placement and compaction of Class II Aggregate Base. These observations and tests would allow us to check that the contractor's work conforms with the intent of our recommendations and the project plans and specifications. These observations also permit us to check that conditions encountered are as anticipated, and modify our recommendations, as necessary.

These supplemental services are performed on an as-requested basis, and we can accept absolutely no responsibility for items that we are not notified to observe. These supplemental services are in addition to this investigation, and are charged for on an hourly basis in accordance with our Schedule of Charges. We must be provided with at least 48 hours notice for scheduling our initial site visit, and 24 hours thereafter.

MAINTENANCE

Periodic land maintenance will be required. Surface and subsurface drains should be checked frequently, and cleaned and maintained as necessary.

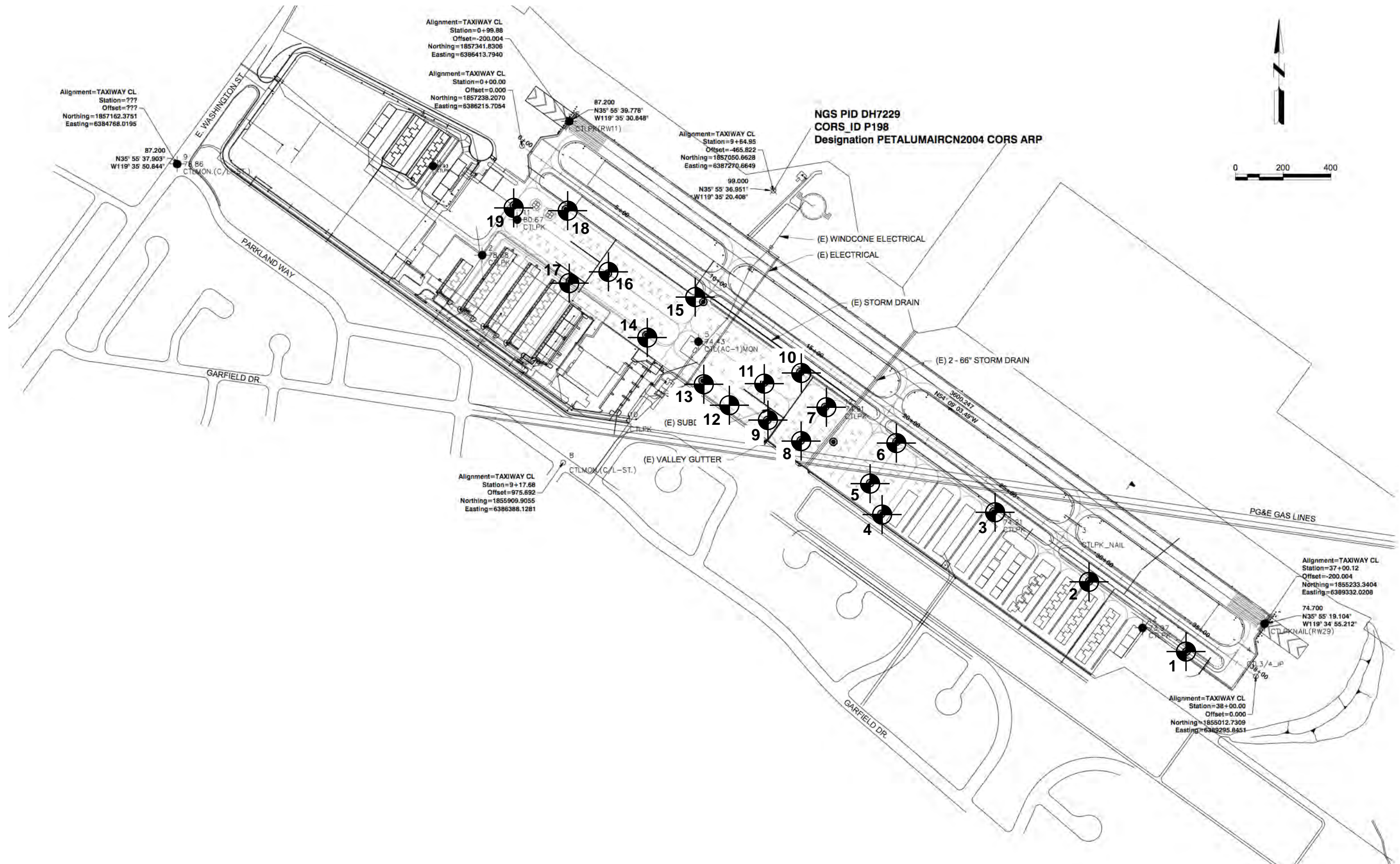
LIMITATIONS

We performed the investigation and prepared this report in accordance with generally accepted standards of the geotechnical engineering profession. No other warranty, either express or implied, is given.

If the project is revised, or if conditions different from those described in this report are encountered during construction, we should be notified immediately so that we can take timely action to modify our recommendations, if warranted.

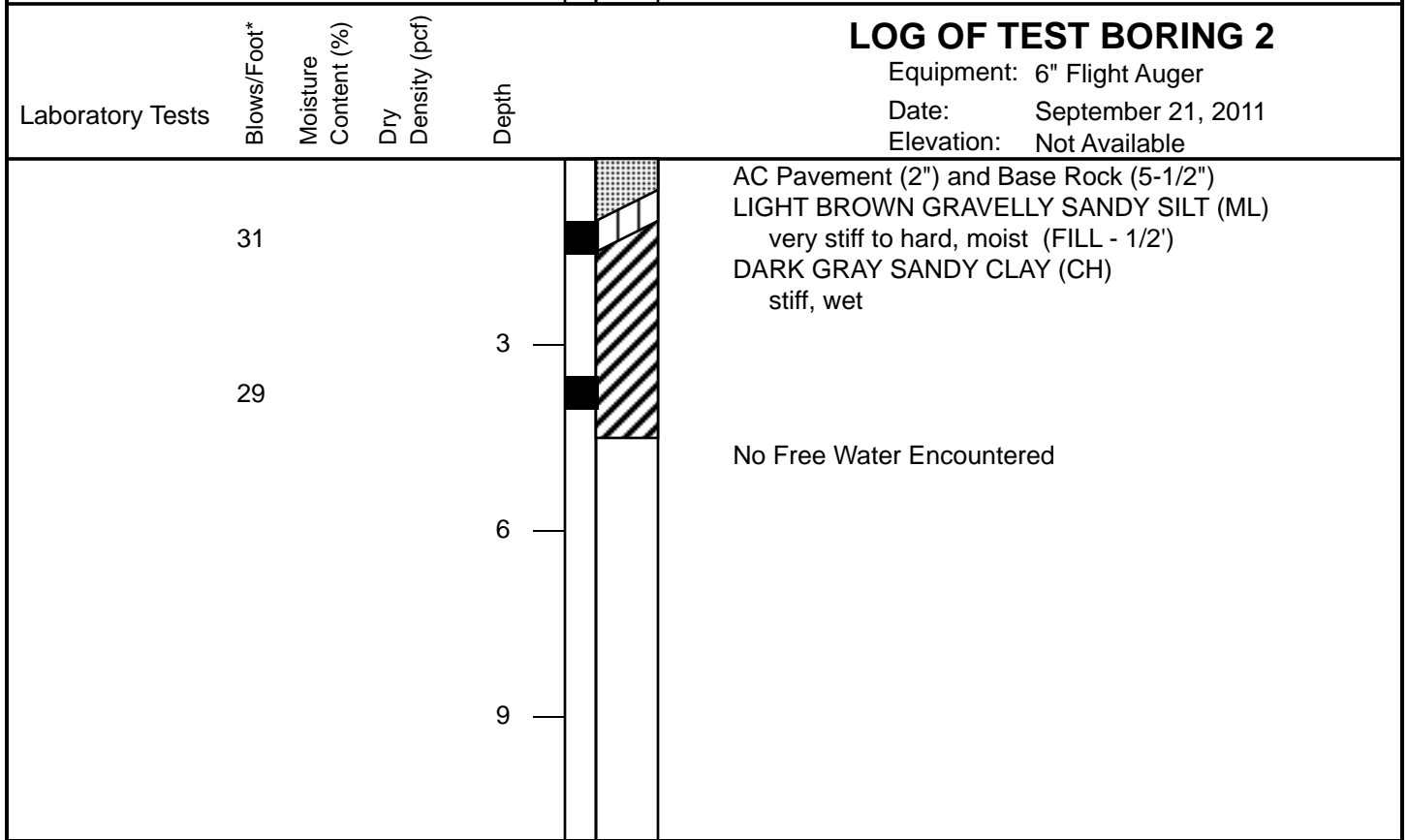
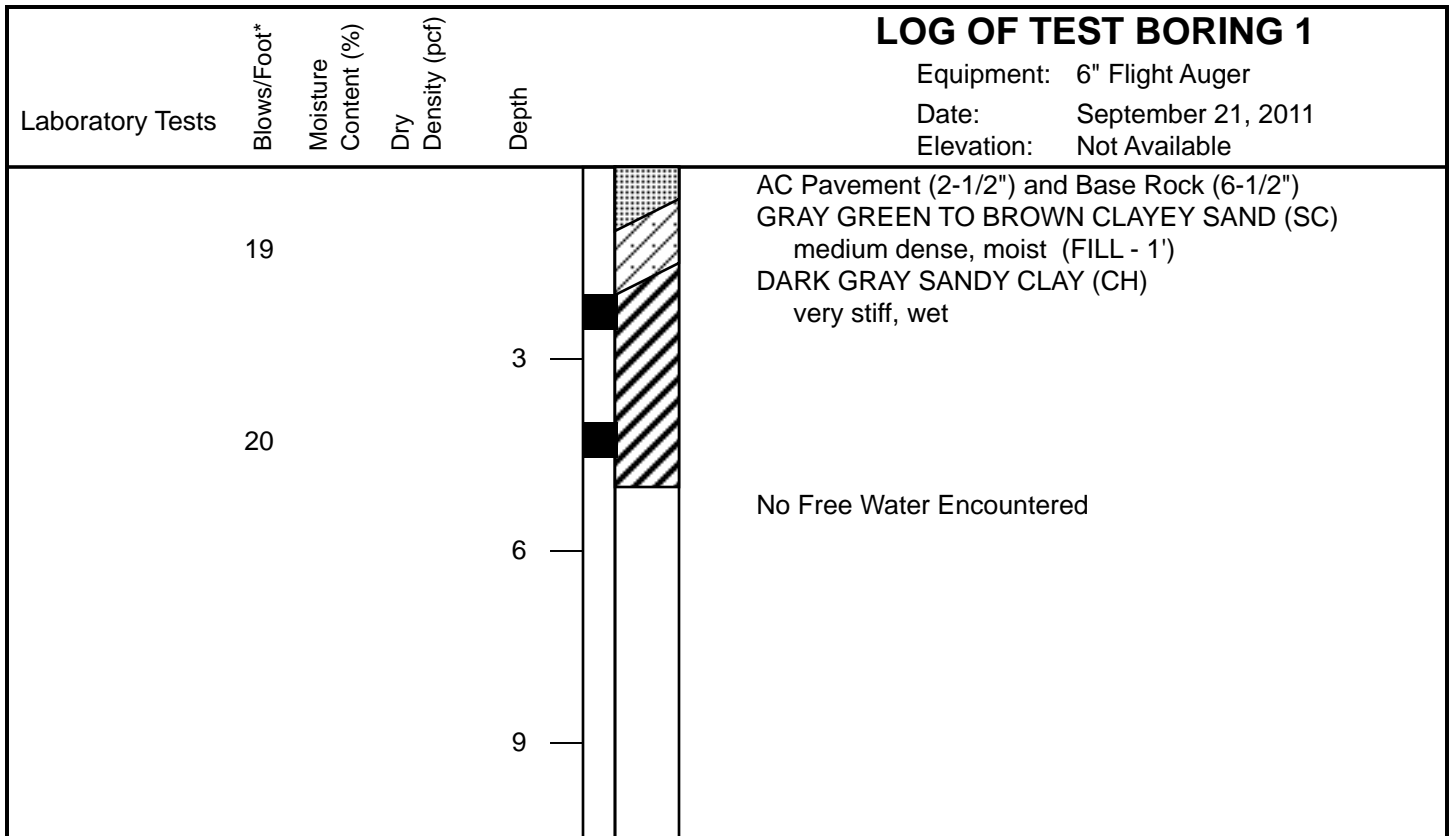
Site conditions and standards of practice change. Therefore, we should be notified to update this report if construction is not performed within 24 months of the submittal date.

ILLUSTRATIONS

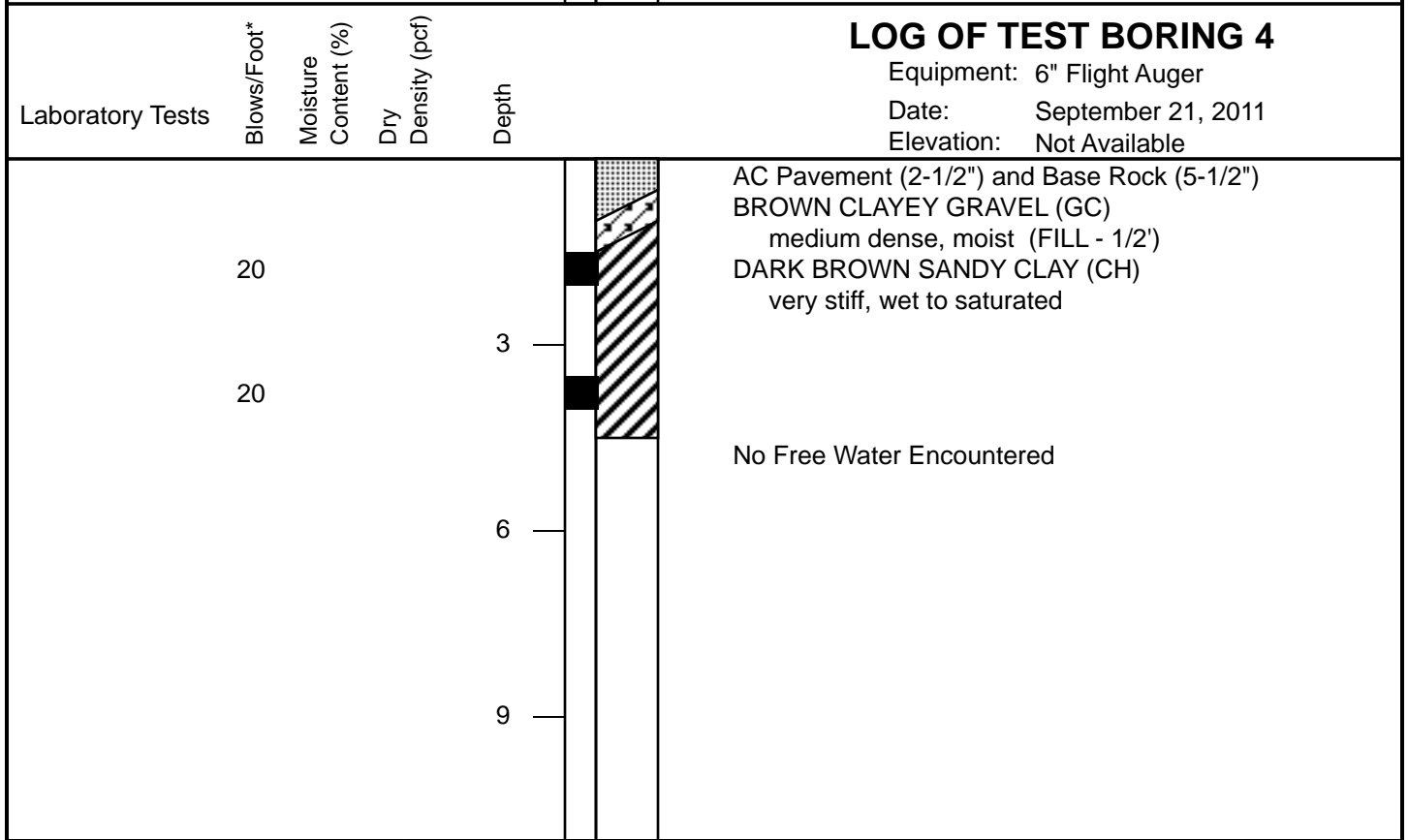
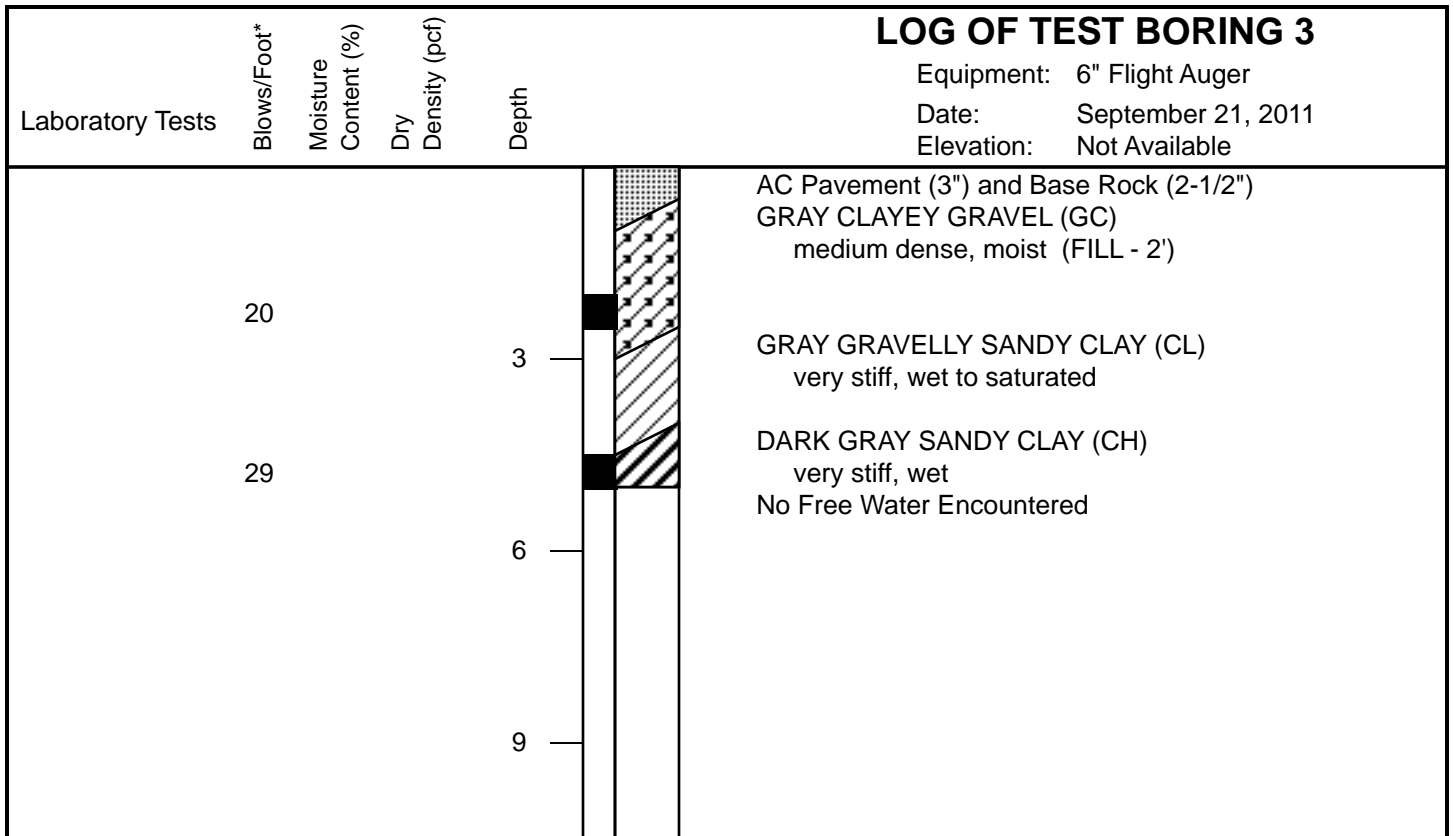


Reference: Sheet EX-101, Project Survey, Petaluma Municipal Airport; prepared by Mead & Hunt; undated.
 Note: The locations of all features are approximate and may vary.

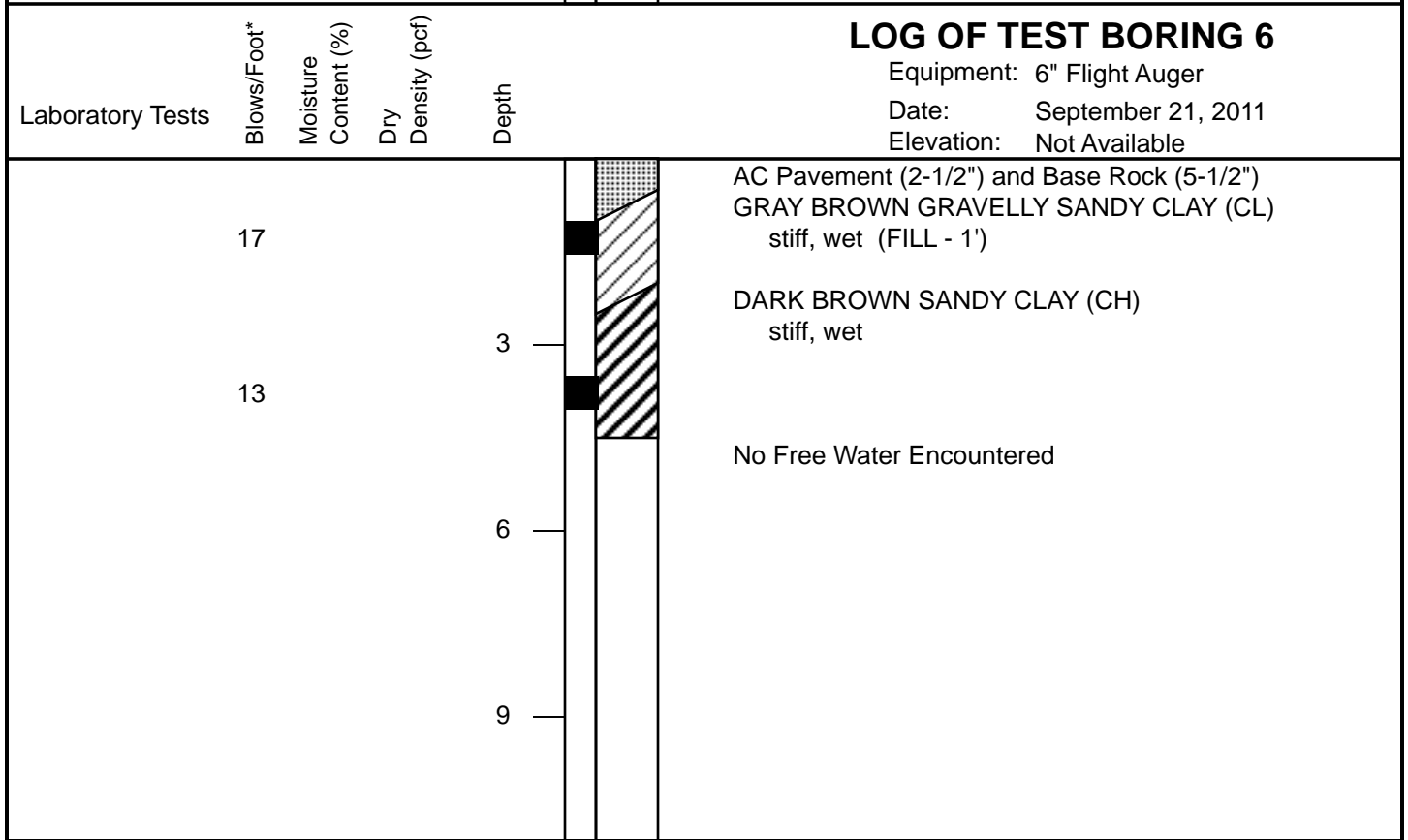
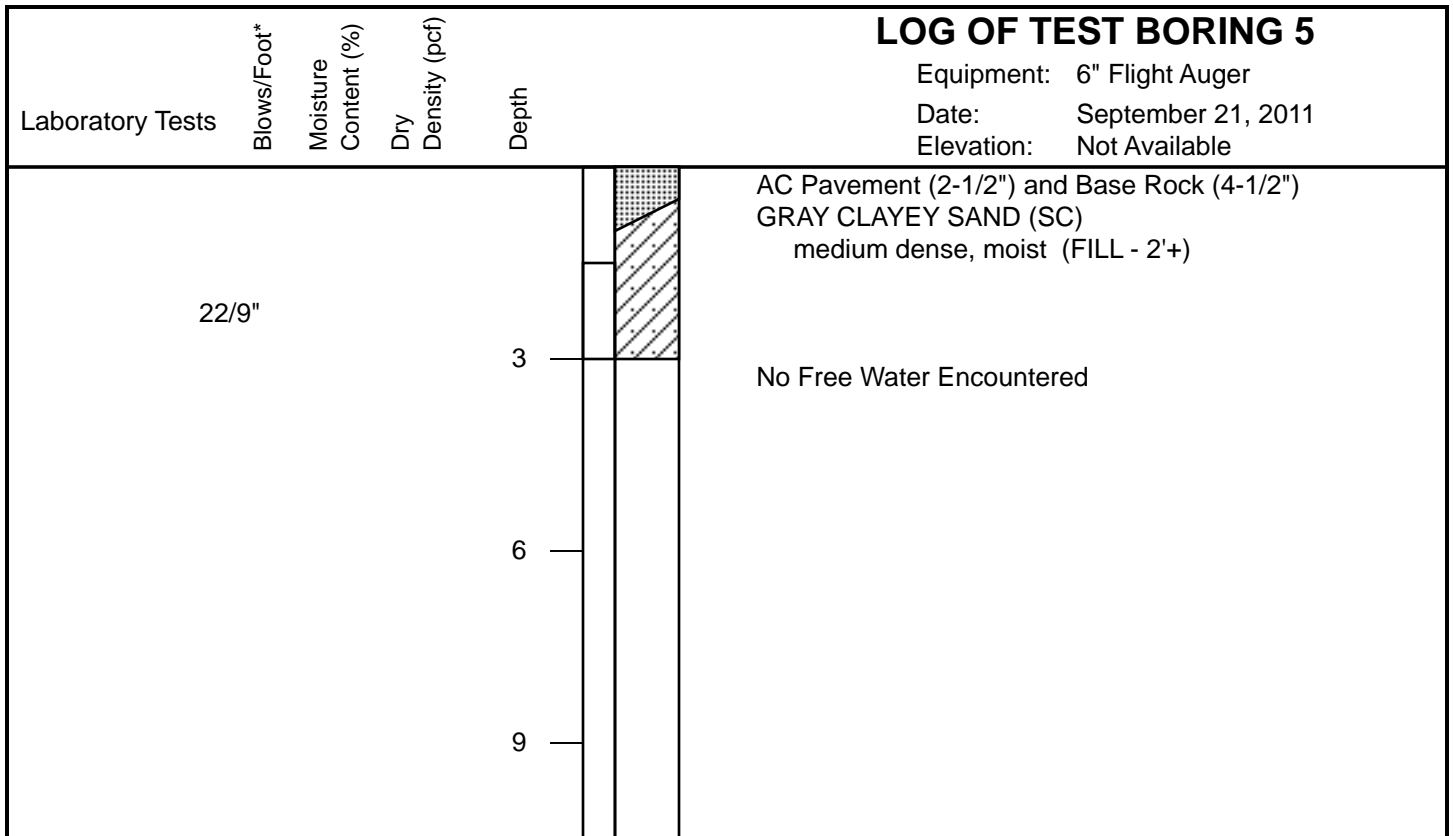
| | | | |
|---|------------------------|--|-------------------|
| BAUER ASSOCIATES GEOTECHNICAL CONSULTANTS | Job No: 800.6 | SITE PLAN | PLATE 1 |
| | Date: 12/11 By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | |



| | | | |
|--------------------------|---------------|--|----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 1 & 2 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 2 |



| | | | |
|--------------------------|---------------|--|----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 3 & 4 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 3 |



| | | | |
|--------------------------|---------------|--|----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 5 & 6 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 4 |

| | | | | | | LOG OF TEST BORING 7 | |
|------------------|-------------|----------------------|-------------------|-------|--|--|--|
| Laboratory Tests | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | | | Equipment: 6" Flight Auger Date: September 21, 2011 Elevation: Not Available |
| | 17 | | | 3 | | AC Pavement (2-1/2") and Base Rock (5-1/2") LIGHT GRAY SILTY SAND (SM) medium dense, wet to saturated (FILL - 1') DARK BROWN SANDY CLAY (CH) stiff, moist to wet | |
| | 20 | | | 6 | | No Free Water Encountered | |
| | | | | 9 | | | |

| | | | | | | LOG OF TEST BORING 8 | |
|------------------|-------------|----------------------|-------------------|-------|--|--|--|
| Laboratory Tests | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | | | Equipment: 6" Flight Auger Date: September 21, 2011 Elevation: Not Available |
| | 18 | | | 3 | | AC Pavement (2-1/2") and Base Rock (5") GRAY SILTY SAND (SM) medium dense, wet to saturated (FILL - 1/2') DARK BROWN SANDY CLAY (CH) very stiff to hard, wet | |
| | 33 | | | 6 | | No Free Water Encountered | |
| | | | | 9 | | | |

| | | | |
|--------------------------|---------------|--|----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 7 & 8 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 5 |

| | | | | | | LOG OF TEST BORING 9 | |
|------------------|-------------|----------------------|-------------------|-------|--|-----------------------------|--|
| Laboratory Tests | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | | | |
| | 51 | | | 3 | AC Pavement (2") and Base Rock (4") GRAY SANDY CLAYEY GRAVEL (GC) medium dense, moist to wet (FILL - 1') | | |
| | 28 | | | 6 | DARK GRAY SANDY CLAY (CH) very stiff, moist to wet | | |
| | | | | 9 | No Free Water Encountered | | |

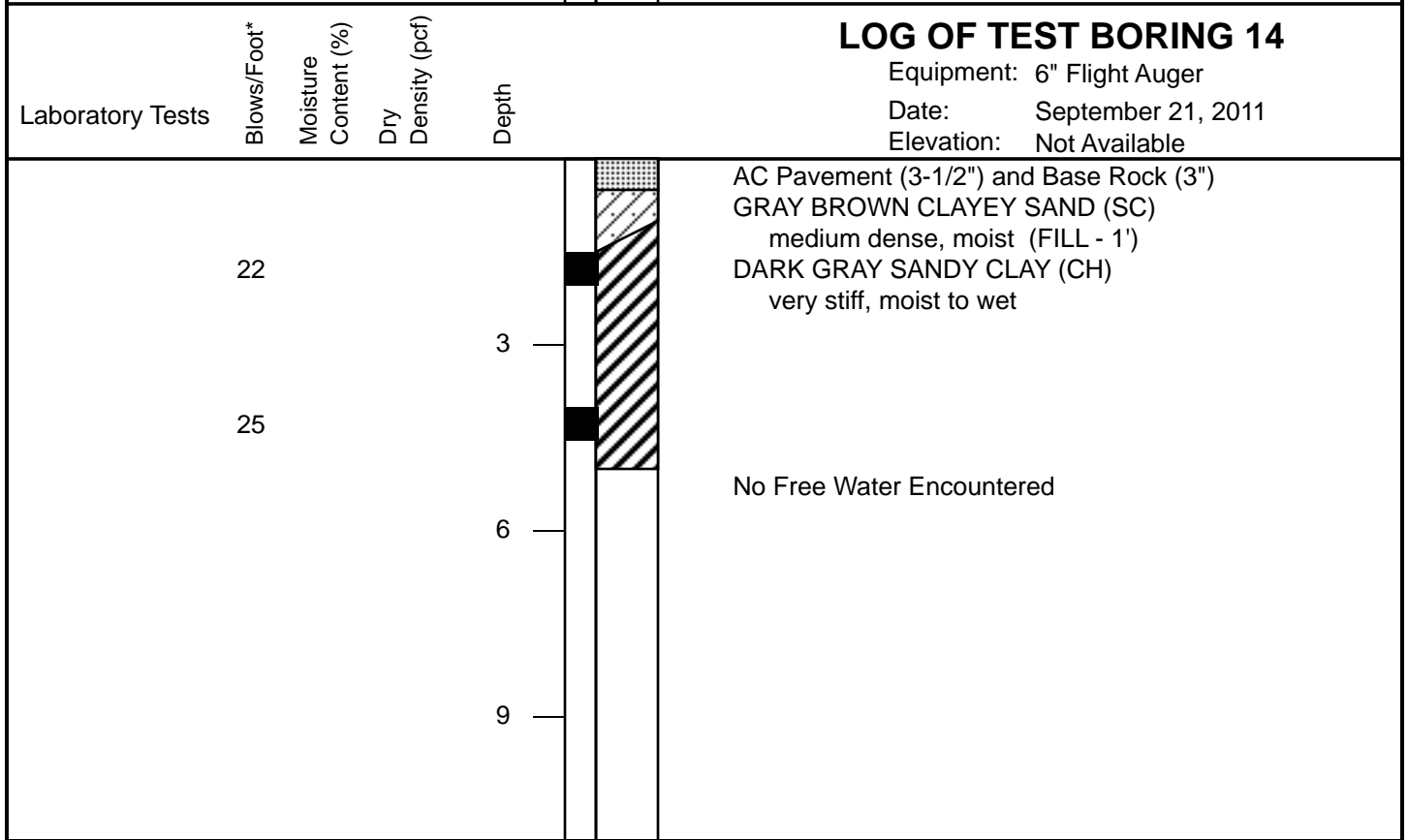
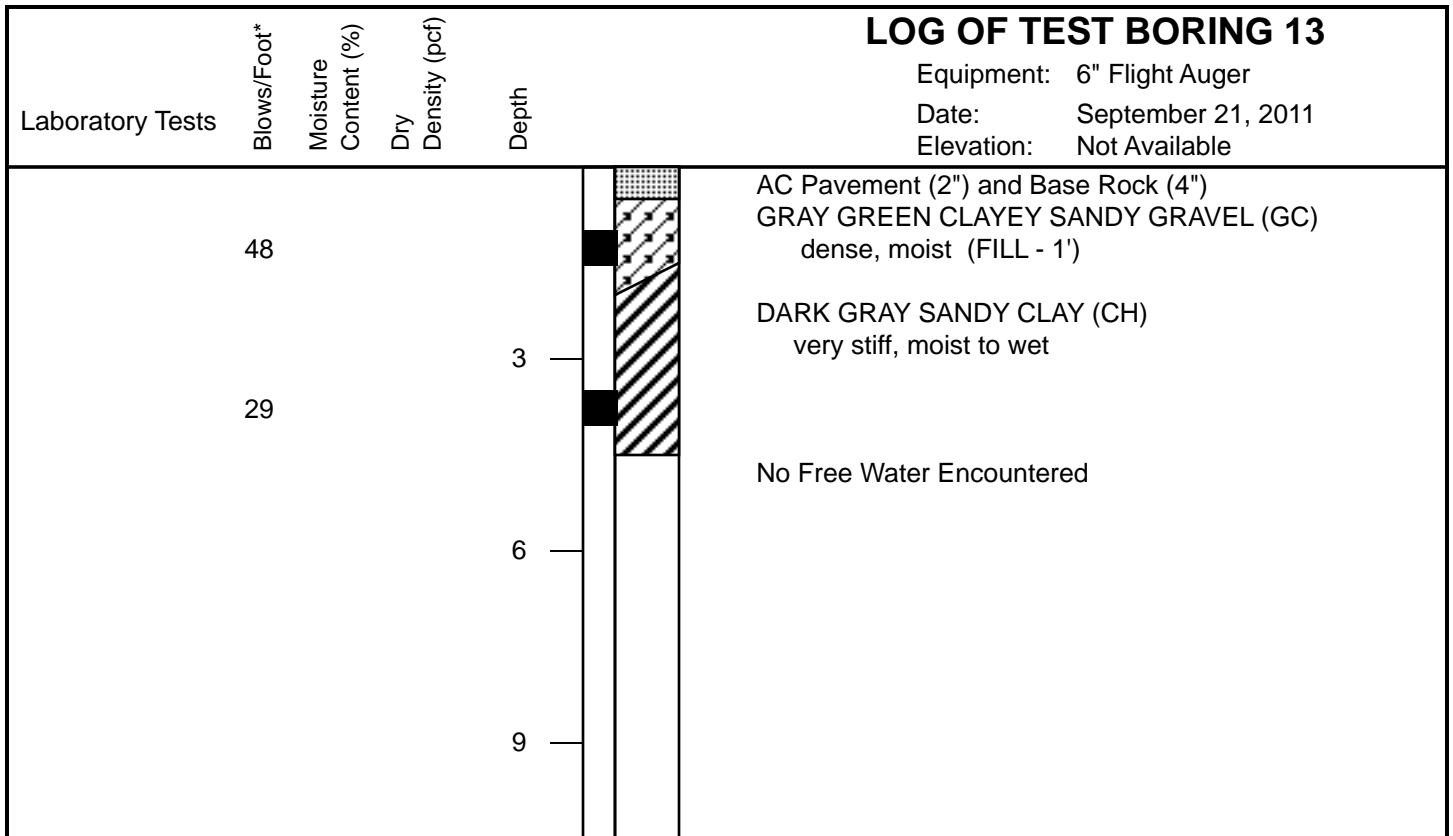
| | | | | | | LOG OF TEST BORING 10 | |
|------------------|-------------|----------------------|-------------------|-------|---|------------------------------|--|
| Laboratory Tests | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | | | |
| | 56 | | | 3 | AC Pavement (2-1/2") and Base Rock (5") GRAY CLAYEY SANDY GRAVEL (GC) medium dense, moist (FILL - 1/2') | | |
| | 28 | | | 6 | DARK GRAY SANDY CLAY (CH) very stiff, moist to wet | | |
| | | | | 9 | No Free Water Encountered | | |

| | | | |
|--------------------------|---------------|--|----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 9 & 10 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 6 |

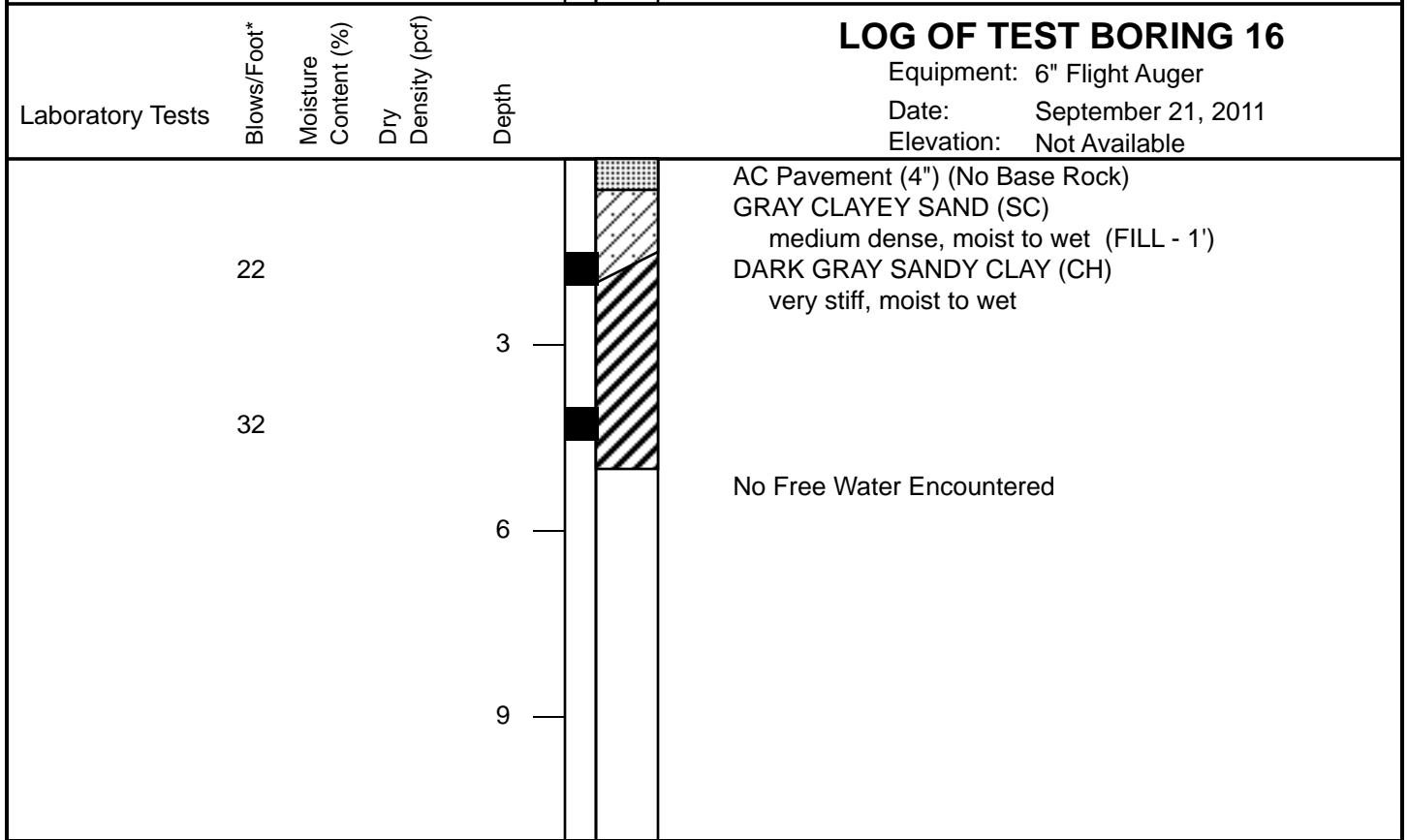
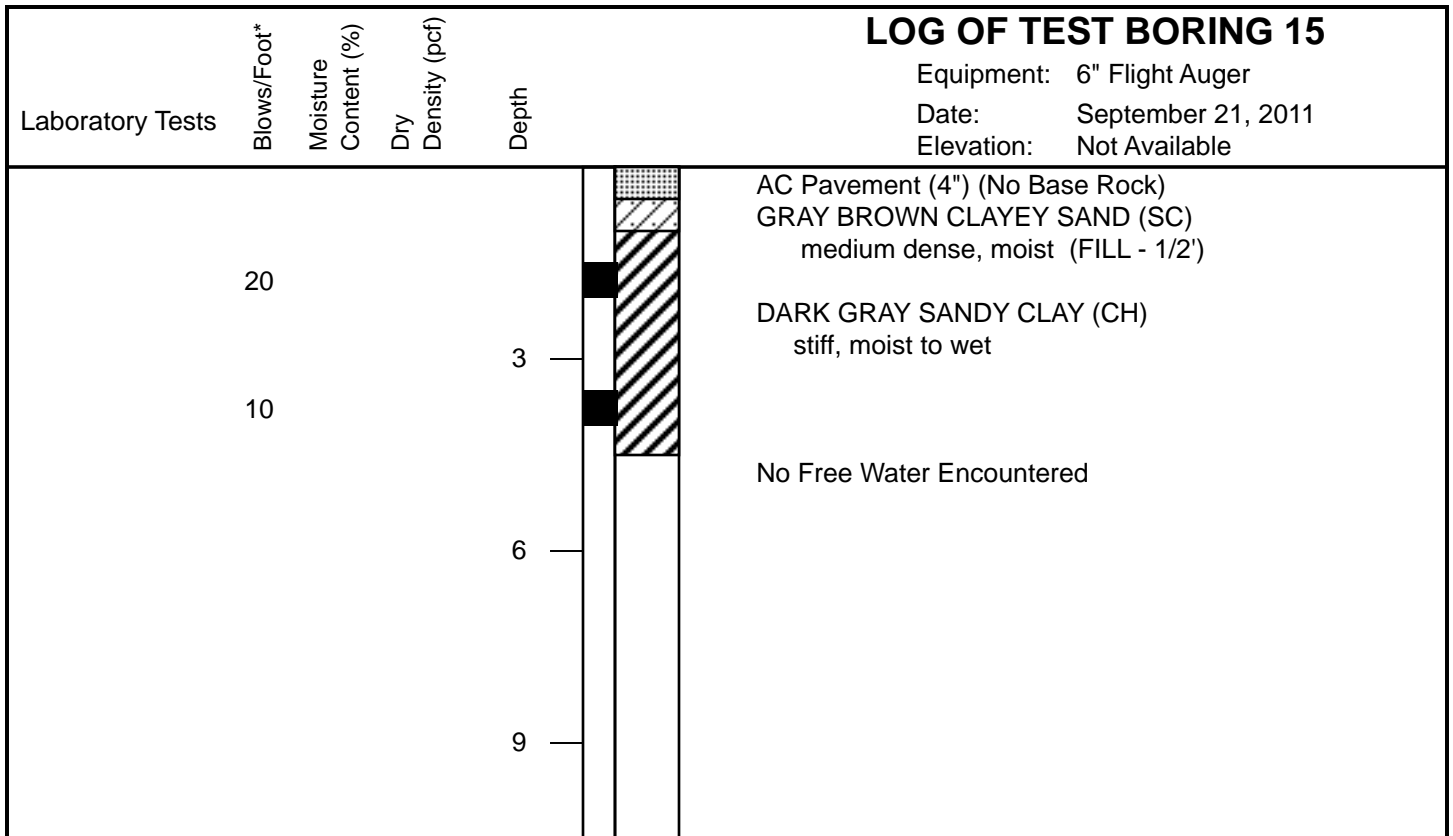
| | | | | | | LOG OF TEST BORING 11 | |
|------------------|-------------|----------------------|-------------------|-------|--|------------------------------|--|
| Laboratory Tests | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | | | |
| | | | | | Equipment: 6" Flight Auger | | |
| | | | | | Date: September 21, 2011 | | |
| | | | | | Elevation: Not Available | | |
| | 19 | | | 3 | AC Pavement (2") and Base Rock (4") | | |
| | | | | | BROWN GRAVELLY SANDY CLAY (CL) | | |
| | | | | | very stiff, wet to saturated (FILL - 1') | | |
| | | | | | DARK GRAY SANDY CLAY (CH) | | |
| | | | | | very stiff, moist to wet | | |
| | 24 | | | | No Free Water Encountered | | |
| | | | | 6 | | | |
| | | | | 9 | | | |

| | | | | | | LOG OF TEST BORING 12 | |
|------------------|-------------|----------------------|-------------------|-------|--|------------------------------|--|
| Laboratory Tests | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | | | |
| | | | | | Equipment: 6" Flight Auger | | |
| | | | | | Date: September 21, 2011 | | |
| | | | | | Elevation: Not Available | | |
| | 21 | | | 3 | AC Pavement (2") and Base Rock (5-1/2") | | |
| | | | | | BROWN GRAVELLY SANDY CLAY (CL) | | |
| | | | | | very stiff, wet to saturated (FILL - 1') | | |
| | | | | | DARK GRAY SANDY CLAY (CH) | | |
| | | | | | very stiff, moist to wet | | |
| | 30 | | | | No Free Water Encountered | | |
| | | | | 6 | | | |
| | | | | 9 | | | |

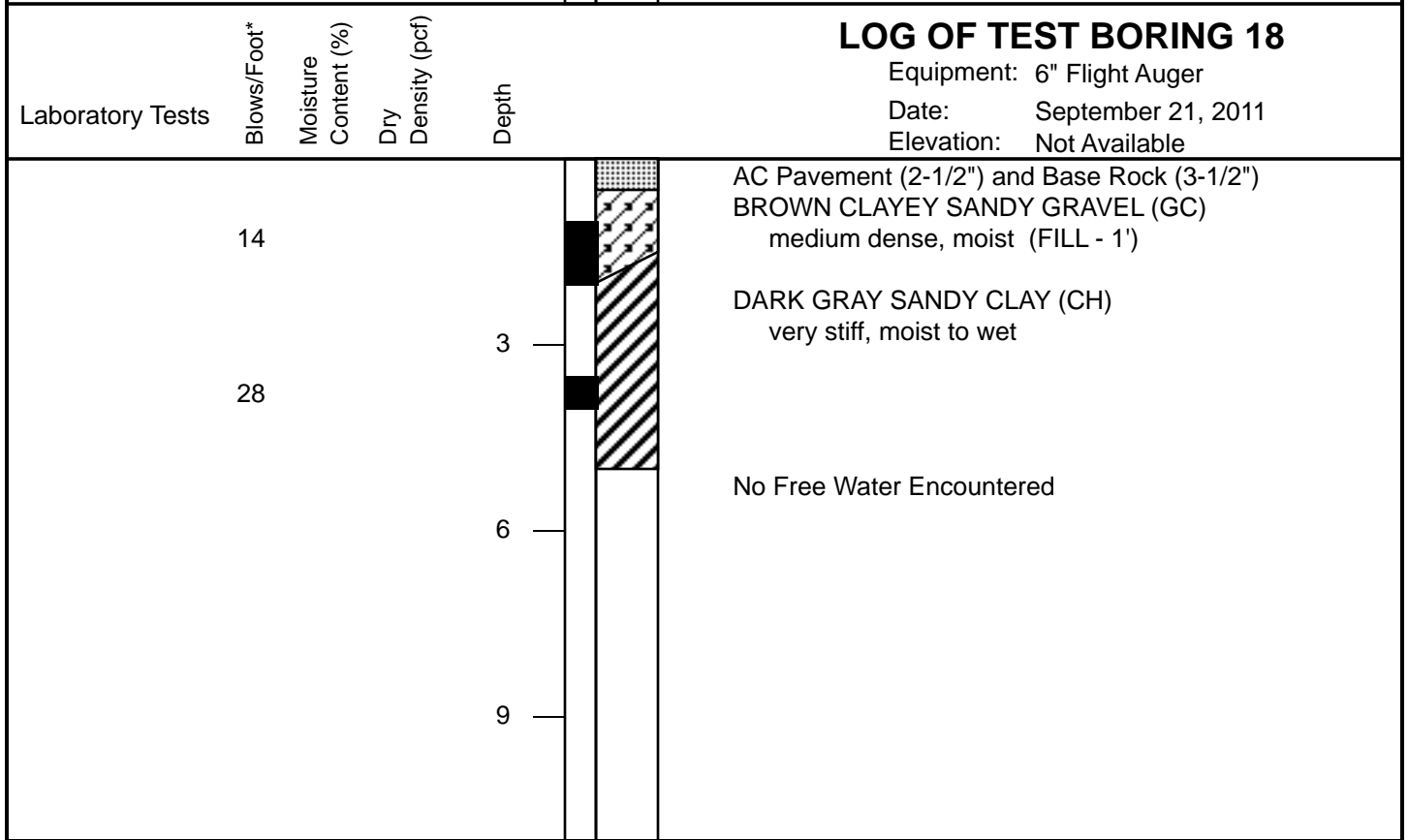
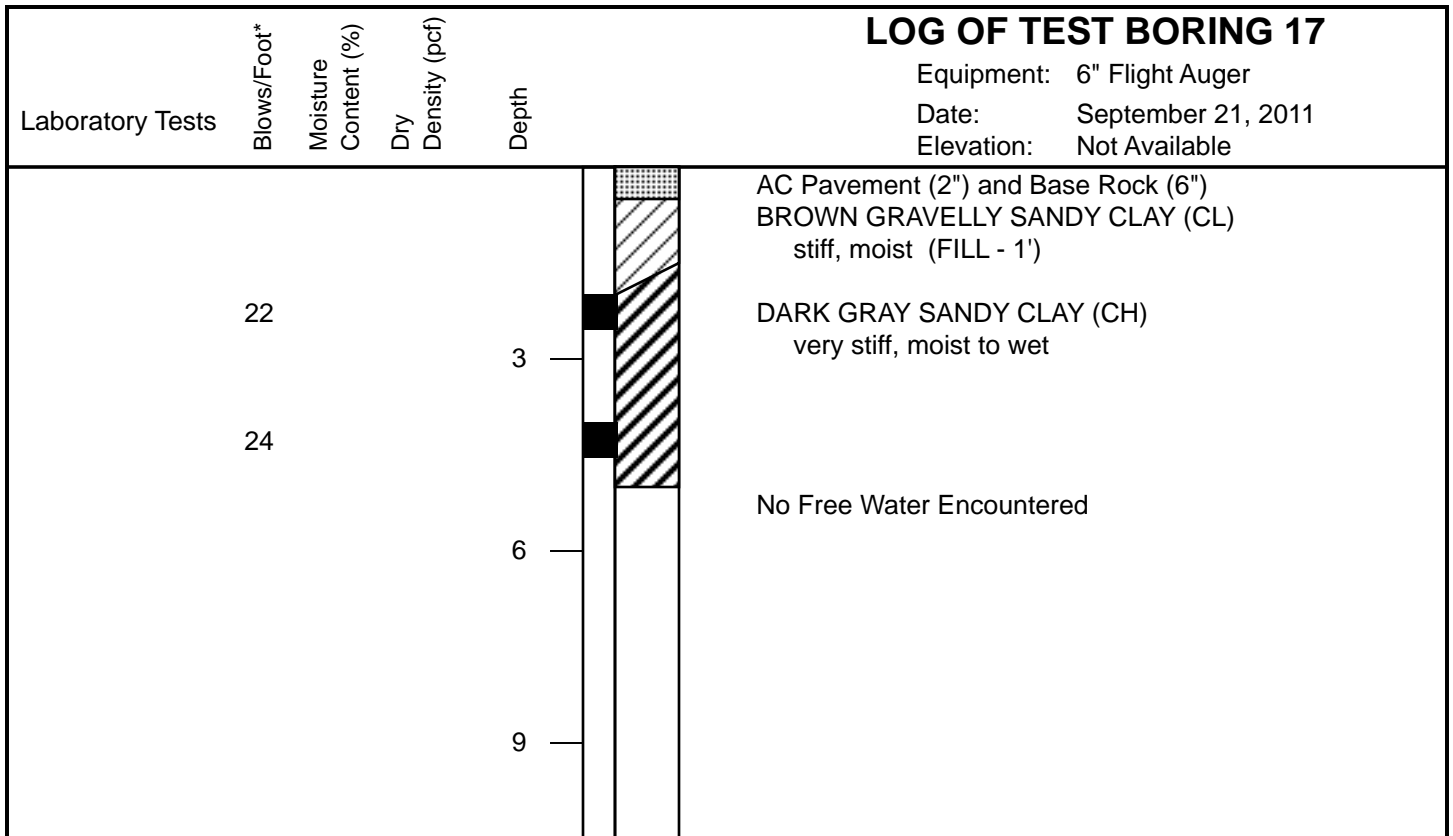
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|--------------------------|---------------|--|----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 11 & 12 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 7 |



| | | | |
|--------------------------|---------------|--|-------------------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 13 & 14 | PLATE 8 |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | |

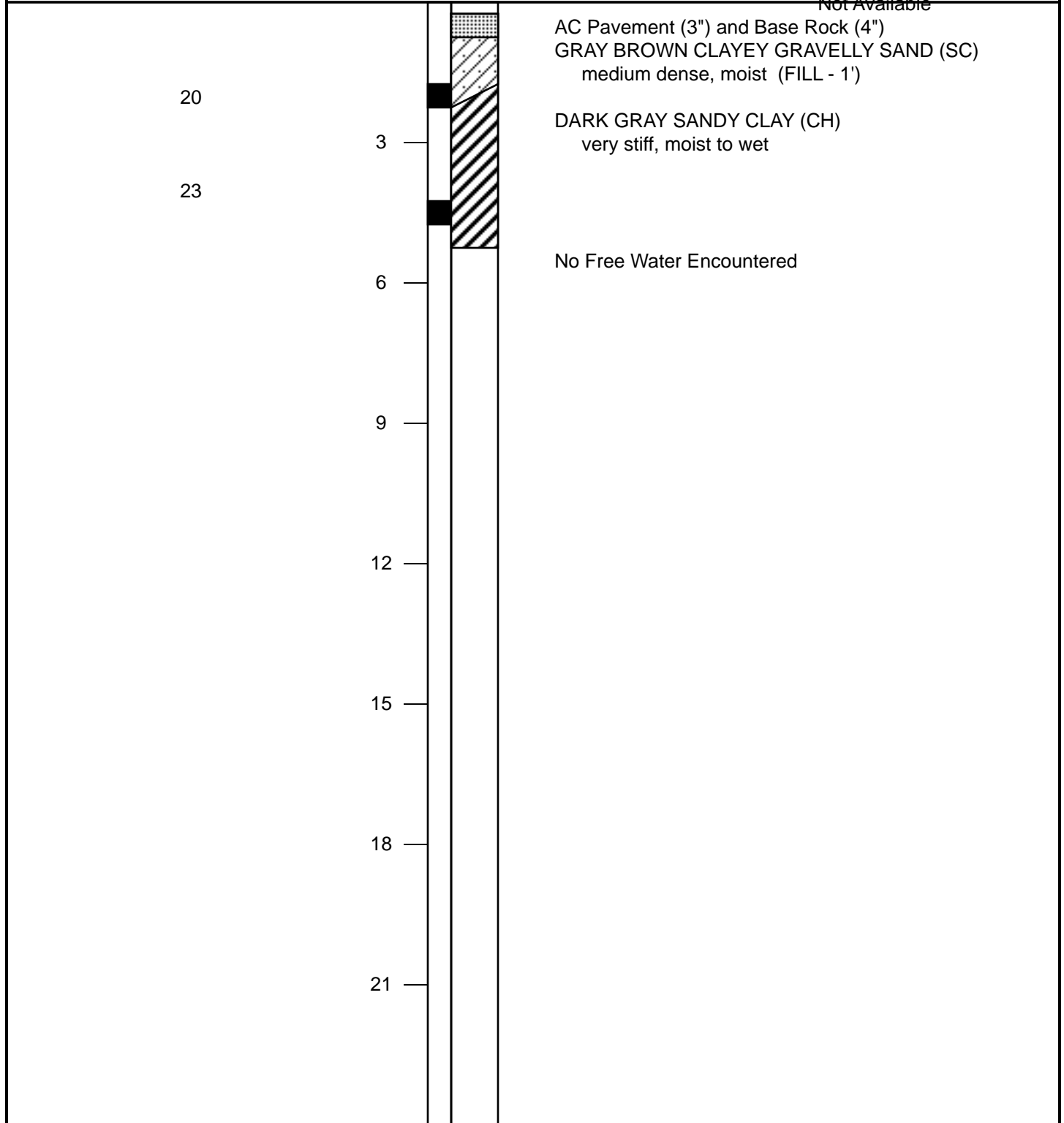


| | | | | |
|--------------------------|---------------|--|--|-------------------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 15 & 16 | PETALUMA MUNICIPAL AIRPORT Petaluma, California | PLATE 9 |
| | Date: 12/11 | | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | | | |



| | | | |
|--------------------------|---------------|--|-----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORINGS 17 & 18 | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 10 |

| | | | | | |
|------------------|-------------|----------------------|-------------------|-------|----------------------------|
| | Blows/Foot* | Moisture Content (%) | Dry Density (pcf) | Depth | Equipment: 6" Flight Auger |
| Laboratory Tests | | | | | Date: September 21, 2011 |
| | | | | | Elevation: Not Available |



| | | | |
|--------------------------|---------------|--|-----------|
| BAUER ASSOCIATES | Job No: 800.6 | LOG OF TEST BORING 19 | PLATE |
| | Date: 12/11 | | 11 |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | |

| MAJOR DIVISIONS | | | | TYPICAL NAMES | |
|---|--|---------------------------------------|----|---------------|---|
| COARSE GRAINED SOILS More than half is larger than #200 sieve | GRAVELS more than half coarse fraction is larger than no. 4 sieve size | CLEAN GRAVELS WITH LITTLE OR NO FINES | GW | | WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES |
| | | | GP | | POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES |
| | | GRAVELS WITH OVER 12% FINES | GM | | SILTY GRAVELS, POORLY GRADED GRAVEL-SAND MIXTURES |
| | | | GC | | CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND MIXTURES |
| | SANDS more than half coarse fraction is smaller than no. 4 sieve size | CLEAN SANDS WITH LITTLE OR NO FINES | SW | | WELL GRADED SANDS, GRAVELLY SANDS |
| | | | SP | | POORLY GRADED SANDS, GRAVEL-SAND MIXTURES |
| | | SANDS WITH OVER 12% FINES | SM | | SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES |
| | | | SC | | CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES |
| FINE GRAINED SOILS More than half is smaller than #200 sieve | SILTS AND CLAYS LIQUID LIMIT LESS THAN 50 | | ML | | INORGANIC SILTS, SILTY OR CLAYEY FINE SANDS, VERY FINE SANDS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY |
| | | | CL | | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS OR LEAN CLAYS |
| | | | OL | | ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY |
| | SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 | | 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 |
| HIGHLY ORGANIC SOILS | | | Pt | | PEAT AND OTHER HIGHLY ORGANIC SOILS |

KEY TO TEST DATA

- LL — Liquid Limit (in %)
- PL — Plastic Limit (in %)
- G — Specific Gravity
- SA — Sieve Analysis
- Consol — Consolidation
- "Undisturbed" Sample
- Bulk or Disturbed Sample
- No Sample Recovery

| | | | |
|-------|-------------|-----------------------------------|--|
| | | Shear Strength, psf | |
| | | ↓ | |
| | | Confining Pressure, psf | |
| | | ↓ | |
| *Tx | 320 (2600) | Unconsolidated Undrained Triaxial | |
| Tx CU | 320 (2600) | Consolidated Undrained Triaxial | |
| DS | 2750 (2000) | Consolidated Drained Direct Shear | |
| FVS | 470 | Field Vane Shear | |
| *UC | 2000 | Unconfined Compression | |
| LVS | 700 | Laboratory Vane Shear | |

Notes: (1) All strength tests on 2.8" or 2.4" diameter sample unless otherwise indicated
(2) * Indicates 1.4" diameter sample

| | | | |
|--------------------------|---------------|---|-----------|
| BAUER ASSOCIATES | Job No: 800.6 | SOIL CLASSIFICATION CHART & KEY TO TEST DATA | PLATE |
| | Date: 12/11 | | |
| GEOTECHNICAL CONSULTANTS | By: CLK | PETALUMA MUNICIPAL AIRPORT Petaluma, California | 12 |

LIST OF REFERENCES

Harding Lawson Associates, August 9, 1983, Geotechnical Investigation, Petaluma Municipal Airport, Petaluma, California, Project Number 13,210,002.01.

Huffman, M.E., and Armstrong, C.F., 1980; Geology for Planning in Sonoma County: California Division of Mines and Geology, Special Report 120, Scale 1:62,500.

DISTRIBUTION

Recipient

Copies

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133 Aviation Blvd, Suite 100
Santa Rosa, California 95403

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AHG/BB (gi/pet airport)



GEOTECHNICAL CONSULTANTS

December 6, 2021
Job No. 800.9

Mead & Hunt, Inc.
Attention: Mr. Alex Radovanovich
1360 19th Hole Drive, Suite 200
Windsor, CA 95492-7717

Geotechnical Investigation Report Update
Airport Apron & Tiedown Areas Rehabilitation
Petaluma Municipal Airport
Petaluma, California

This letter transmits the results of our geotechnical investigation report update for the subject project. We previously performed a geotechnical investigation for the project and transmitted the results in our October 31, 2011 report. We are performing this consultation as requested by Mr. Alex Radovanovich.

Based on the results of our work, we judge that the conclusions and recommendations presented in the previous referenced report remain generally applicable to this site. As an additional recommendation, lime treated materials should be prepared in accordance with Section 24 of Caltrans Standard Specifications, latest edition, and in accordance with Item P-155 of FAA Advisory Circular 150/5370-10H.

Our scope of work for our 2011 investigation did not include completing CBR testing on samples treated with lime. Upon request, we would be pleased to perform additional testing to evaluate CBR's on treated samples.

We trust this provides the information you require at this time. If you have questions or wish to discuss this further, please call.

Very truly yours,

BAUER ASSOCIATES, INC.

A handwritten signature in blue ink, appearing to read 'Arthur H. Graff', is written over a light blue rectangular background.

Arthur H. Graff
Geotechnical Engineer



AHG/BB (consult/petaluma airport update)
Email only

Westside Center
6470 Mirabel Road
Post Office Box 460
Forestville, CA 95436
707.887.2505

APPENDIX E – SPONSOR CERTIFICATIONS

- 1. Project Plans and Specifications**
- 2. Equipment and Construction Contracts**



Project Plans and Specifications

Airport Improvement Program Sponsor Certification

Sponsor: City of Petaluma

Airport: Petaluma Municipal Airport

Project Number: 3-06-0186-022

Description of Work: Based Aircraft Arpon Rehabilitation

Application

49 USC § 47105(d) authorizes the Secretary to require certification from the sponsor that it will comply with the statutory and administrative requirements in carrying out a project under the Airport Improvement Program (AIP). Labor and civil rights standards applicable to AIP are established by the Department of Labor (www.dol.gov/). AIP Grant Assurance C.1—General Federal Requirements identifies applicable federal laws, regulations, executive orders, policies, guidelines and requirements for assistance under AIP. A list of current advisory circulars with specific standards for procurement, design or construction of airports, and installation of equipment and facilities is referenced in standard airport sponsor Grant Assurance 34 contained in the grant agreement.

Certification Statements

Except for certification statements below marked as not applicable (N/A), this list includes major requirements of the construction project. Selecting “Yes” represents sponsor acknowledgement and confirmation of the certification statement. The term “will” means Sponsor action taken at appropriate time based on the certification statement focus area, but no later than the end of the project period of performance. This list is not comprehensive and does not relieve the sponsor from fully complying with all applicable statutory and administrative standards. The source of the requirement is referenced within parenthesis.

1. The plans and specifications were or will be prepared in accordance with applicable federal standards and requirements, so that no deviation or modification to standards set forth in the advisory circulars, or FAA-accepted state standard, is necessary other than those explicitly approved by the Federal Aviation Administration (FAA) (14 USC § 47105).

Yes No N/A

2. Specifications incorporate or will incorporate a clear and accurate description of the technical requirement for the material or product that does not contain limiting or proprietary features that unduly restrict competition (2 CFR §200.319).

Yes No N/A

3. The development that is included or will be included in the plans is depicted on the current airport layout plan as approved by the FAA (14 USC § 47107).
 Yes No N/A
4. Development and features that are ineligible or unallowable for AIP funding have been or will be omitted from the plans and specifications (FAA Order 5100.38, par. 3-43).
 Yes No N/A
5. The specification does not use or will not use "brand name" or equal to convey requirements unless sponsor requests and receives approval from the FAA to use brand name (FAA Order 5100.38, Table U-5).
 Yes No N/A
6. The specification does not impose or will not impose geographical preference in their procurement requirements (2 CFR §200.319(b) and FAA Order 5100.38, Table U-5).
 Yes No N/A
7. The use of prequalified lists of individuals, firms or products include or will include sufficient qualified sources that ensure open and free competition and that does not preclude potential entities from qualifying during the solicitation period (2 CFR §319(d)).
 Yes No N/A
8. Solicitations with bid alternates include or will include explicit information that establish a basis for award of contract that is free of arbitrary decisions by the sponsor (2 CFR § 200.319(a)(7)).
 Yes No N/A
9. Concurrence was or will be obtained from the FAA if Sponsor incorporates a value engineering clause into the contract (FAA Order 5100.38, par. 3-57).
 Yes No N/A
10. The plans and specifications incorporate or will incorporate applicable requirements and recommendations set forth in the federally approved environmental finding (49 USC §47106(c)).
 Yes No N/A
11. The design of all buildings comply or will comply with the seismic design requirements of 49 CFR § 41.120. (FAA Order 5100.38d, par. 3-92)
 Yes No N/A
12. The project specification include or will include process control and acceptance tests required for the project by as per the applicable standard:
- a. Construction and installation as contained in Advisory Circular (AC) 150/5370-10.
 Yes No N/A

b. Snow Removal Equipment as contained in AC 150/5220-20.

Yes No N/A

c. Aircraft Rescue and Fire Fighting (ARFF) vehicles as contained in AC 150/5220-10.

Yes No N/A

13. For construction activities within or near aircraft operational areas(AOA):

a. The Sponsor has or will prepare a construction safety and phasing plan (CSPP) conforming to Advisory Circular 150/5370-2.

b. Compliance with CSPP safety provisions has been or will be incorporated into the plans and specifications as a contractor requirement.

c. Sponsor will not initiate work until receiving FAA's concurrence with the CSPP (FAA Order 5100.38, Par. 5-29).

Yes No N/A

14. The project was or will be physically completed without federal participation in costs due to errors and omissions in the plans and specifications that were foreseeable at the time of project design (49 USC §47110(b)(1) and FAA Order 5100.38d, par. 3-100).

Yes No N/A

Attach documentation clarifying any above item marked with "No" response.

Sponsor's Certification

I certify, for the project identified herein, responses to the forgoing items are accurate as marked and additional documentation for any item marked "no" is correct and complete.

Executed on this day of , .

Name of Sponsor: City of Petaluma

Name of Sponsor's Authorized Official:

Title of Sponsor's Authorized Official:

Signature of Sponsor's Authorized Official: _____

I declare under penalty of perjury that the foregoing is true and correct. I understand that knowingly and willfully providing false information to the federal government is a violation of 18 USC § 1001 (False Statements) and could subject me to fines, imprisonment, or both.



Equipment and Construction Contracts Airport Improvement Sponsor Certification

Sponsor: City of Petaluma

Airport: Petaluma Municipal Airport

Project Number: 3-06-0186-022

Description of Work: Based Aircraft Arpon Rehabilitation

Application

49 USC § 47105(d) authorizes the Secretary to require certification from the sponsor that it will comply with the statutory and administrative requirements in carrying out a project under the Airport Improvement Program (AIP). General procurement standards for equipment and construction contracts within Federal grant programs are described in 2 CFR §§ 200.317-200.326. Labor and Civil Rights Standards applicable to the AIP are established by the Department of Labor (www.dol.gov) AIP Grant Assurance C.1—General Federal Requirements identifies all applicable Federal Laws, regulations, executive orders, policies, guidelines and requirements for assistance under the AIP. Sponsors may use state and local procedures provided the procurement conforms to these federal standards.

This certification applies to all equipment and construction projects. Equipment projects may or may not employ laborers and mechanics that qualify the project as a “covered contract” under requirements established by the Department of Labor requirements. Sponsor shall provide appropriate responses to the certification statements that reflect the character of the project regardless of whether the contract is for a construction project or an equipment project.

Certification Statements

Except for certification statements below marked as not applicable (N/A), this list includes major requirements of the construction project. Selecting “Yes” represents sponsor acknowledgement and confirmation of the certification statement. The term “will” means Sponsor action taken at appropriate time based on the certification statement focus area, but no later than the end of the project period of performance. This list is not comprehensive and does not relieve the sponsor from fully complying with all applicable statutory and administrative standards. The source of the requirement is referenced within parenthesis.

1. A written code or standard of conduct is or will be in effect prior to commencement of the project that governs the performance of the sponsor’s officers, employees, or agents in soliciting, awarding and administering procurement contracts (2 CFR § 200.318).

Yes No N/A

2. For all contracts, qualified and competent personnel are or will be engaged to perform contract administration, engineering supervision, construction inspection, and testing (Grant Assurance C.17).
- Yes No N/A
3. Sponsors that are required to have a Disadvantage Business Enterprise (DBE) program on file with the FAA have included or will include clauses required by Title VI of the Civil Rights Act and 49 CFR Part 26 for Disadvantaged Business Enterprises in all contracts and subcontracts.
- Yes No N/A
4. Sponsors required to have a DBE program on file with the FAA have implemented or will implement monitoring and enforcement measures that:
- a. Ensure work committed to Disadvantaged Business Enterprises at contract award is actually performed by the named DBEs (49 CFR § 26.37(b));
 - b. Include written certification that the sponsor has reviewed contract records and has monitored work sites for performance by DBE firms (49 CFR § 26.37(b)); and
 - c. Provides for a running tally of payments made to DBE firms and a means for comparing actual attainments (i.e. payments) to original commitments (49 CFR § 26.37(c)).
- Yes No N/A
5. Sponsor procurement actions using the competitive sealed bid method (2 CFR § 200.320(c)). was or will be:
- a. Publicly advertised, allowing a sufficient response time to solicit an adequate number of interested contractors or vendors;
 - b. Prepared to include a complete, adequate and realistic specification that defines the items or services in sufficient detail to allow prospective bidders to respond;
 - c. Publicly opened at a time and place prescribed in the invitation for bids; and
 - d. Prepared in a manner that result in a firm fixed price contract award to the lowest responsive and responsible bidder.
- Yes No N/A
6. For projects the Sponsor proposes to use the competitive proposal procurement method (2 CFR § 200.320(d)), Sponsor has requested or will request FAA approval prior to proceeding with a competitive proposal procurement by submitting to the FAA the following:
- a. Written justification that supports use of competitive proposal method in lieu of the preferred sealed bid procurement method;
 - b. Plan for publicizing and soliciting an adequate number of qualified sources; and
 - c. Listing of evaluation factors along with relative importance of the factors.
- Yes No N/A
7. For construction and equipment installation projects, the bid solicitation includes or will include the current federal wage rate schedule(s) for the appropriate type of work classifications (2 CFR Part 200, Appendix II).
- Yes No N/A

8. Concurrence was or will be obtained from the Federal Aviation Administration (FAA) prior to contract award under any of the following circumstances (Order 5100.38D):

- a. Only one qualified person/firm submits a responsive bid;
- b. Award is to be made to other than the lowest responsible bidder; and
- c. Life cycle costing is a factor in selecting the lowest responsive bidder.

Yes No N/A

9. All construction and equipment installation contracts contain or will contain provisions for:

- a. Access to Records (§ 200.336)
- b. Buy American Preferences (Title 49 U.S.C. § 50101)
- c. Civil Rights - General Provisions and Title VI Assurances(41 CFR part 60)
- d. Federal Fair Labor Standards (29 U.S.C. § 201, et seq)
- e. Occupational Safety and Health Act requirements (20 CFR part 1920)
- f. Seismic Safety – building construction (49 CFR part 41)
- g. State Energy Conservation Requirements - as applicable(2 CFR part 200, Appendix II)
- h. U.S. Trade Restriction (49 CFR part 30)
- i. Veterans Preference (49 USC § 47112(c))

Yes No N/A

10. All construction and equipment installation contracts exceeding \$2,000 contain or will contain the provisions established by:

- a. Davis-Bacon and Related Acts (29 CFR part 5)
- b. Copeland “Anti-Kickback” Act (29 CFR parts 3 and 5)

Yes No N/A

11. All construction and equipment installation contracts exceeding \$3,000 contain or will contain a contract provision that discourages distracted driving (E.O. 13513).

Yes No N/A

12. All contracts exceeding \$10,000 contain or will contain the following provisions as applicable:

- a. Construction and equipment installation projects - Applicable clauses from 41 CFR Part 60 for compliance with Executive Orders 11246 and 11375 on Equal Employment Opportunity;
- b. Construction and equipment installation - Contract Clause prohibiting segregated facilities in accordance with 41 CFR part 60-1.8;
- c. Requirement to maximize use of products containing recovered materials in accordance with 2 CFR § 200.322 and 40 CFR part 247; and
- d. Provisions that address termination for cause and termination for convenience (2 CFR Part 200, Appendix II).

Yes No N/A

13. All contracts and subcontracts exceeding \$25,000: Measures are in place or will be in place (e.g. checking the System for Award Management) that ensure contracts and subcontracts are not awarded to individuals or firms suspended, debarred, or excluded from participating in federally assisted projects (2 CFR parts 180 and 1200).

Yes No N/A

14. Contracts exceeding the simplified acquisition threshold (currently \$250,000) include or will include provisions, as applicable, that address the following:

- a. Construction and equipment installation contracts - a bid guarantee of 5%, a performance bond of 100%, and a payment bond of 100% (2 CFR § 200.325);
- b. Construction and equipment installation contracts - requirements of the Contract Work Hours and Safety Standards Act (40 USC 3701-3708, Sections 103 and 107);
- c. Restrictions on Lobbying and Influencing (2 CFR part 200, Appendix II);
- d. Conditions specifying administrative, contractual and legal remedies for instances where contractor or vendor violate or breach the terms and conditions of the contract (2 CFR §200, Appendix II); and
- e. All Contracts - Applicable standards and requirements issued under Section 306 of the Clean Air Act (42 USC 7401-7671q), Section 508 of the Clean Water Act (33 USC 1251-1387, and Executive Order 11738.

Yes No N/A

Attach documentation clarifying any above item marked with "No" response.

Sponsor's Certification

I certify, for the project identified herein, responses to the forgoing items are accurate as marked and additional documentation for any item marked "no" is correct and complete.

Executed on this day of , .

Name of Sponsor: City of Petaluma

Name of Sponsor's Authorized Official:

Title of Sponsor's Authorized Official:

Signature of Sponsor's Authorized Official: _____

I declare under penalty of perjury that the foregoing is true and correct. I understand that knowingly and willfully providing false information to the federal government is a violation of 18 USC § 1001 (False Statements) and could subject me to fines, imprisonment, or both.