PHOENIX DEER VALLEY AIRPORT

DVT RELOCATE TAXIWAY BRAVO AND CONSTRUCT CONNECTORS B6 AND B9 – GMP 1

AV31000092 FAA

DRAFT ENGINEER'S DESIGN REPORT

APRIL 2023

► Prepared for:

PHX DVT GYR

CITY OF PHOENIX AVIATION DEPARTMENT

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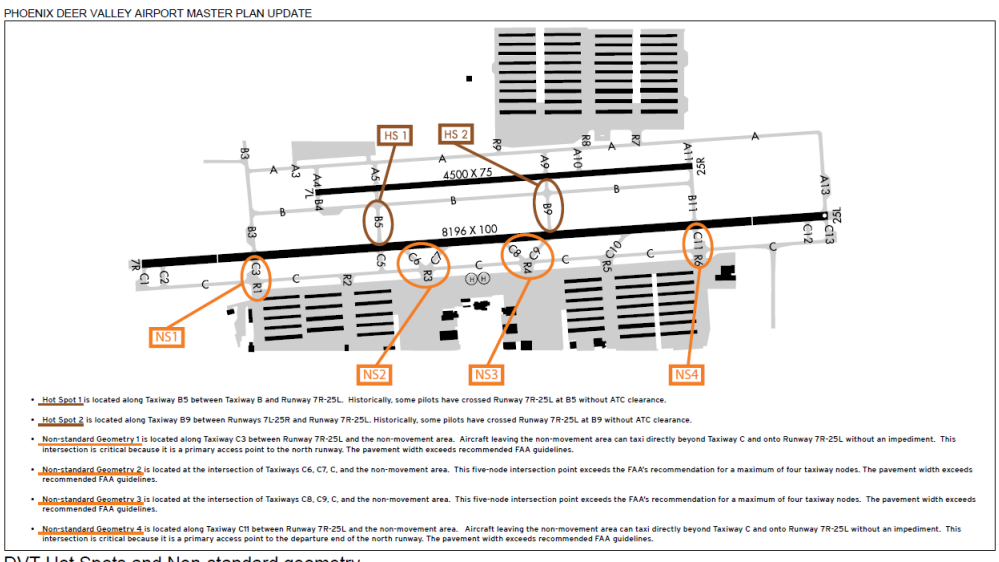
1.0 GENERAL SCOPE OF PROJECT

1.1 Project Narrative and Scope of Work

The purpose of this project is to increase airfield safety and improve airport operations through the design and relocation of parallel Taxiway B at Phoenix Deer Valley Airport (DVT). The project will relocate Taxiway B to a standard FAA regulated distance from the centerline of Runway 7L/25R according to its intended Aircraft Approach Category (AAC) and Airplane Design Group (ADG). In order to decrease the probability of runway incursions, taxiway connector relocation will address hot spot areas where pilots have historically crossed Runway 7R-25L without Air Traffic Control's (ATC) clearance. To improve airport operations, two acute angle taxiway connectors will be constructed to provide greater efficiency in runway usage by allowing aircraft to taxi off the runway at a higher speed than would be required for a 90-degree turn.

The relocation of Taxiway B corrects Hot Spot 1 and Hot Spot 2 as identified by the 2015 Master Plan Update for DVT (See Figure 1) by removing Taxiway B5 and Taxiway B9's extensions south from Taxiway B to Runway 7R-25L and constructing new Taxiways B4 and B10 offset from the north connectors.

Figure 1: DVT Hot Spots and Non-Standard Geometry per 2015 Master Plan Update for DVT



The City of Phoenix has contracted with TRACE Consulting, LLC (TRACE) to prepare construction documents for this project. The contract includes the following services:

- Investigation and inventory of available/visible utilities that affect the project
- Supplemental surveying services
- Geotechnical investigations
- Utility locating and subsurface utility exploration
- Preparation of Engineer's Design Report (EDR)
- Design development for Taxiway B relocation, construction of new Taxiway connectors B6 and B9, and full reconstruction of existing Taxiway B connectors to Runway 7R-25L
- Removal of existing infield materials and construction of asphalt taxiway pavement with P-401 asphalt concrete
- Evaluation and reconstruction of infield drainage areas and construction / relocation of new storm drain as needed
- Evaluation, addition and replacement of electrical lighting and signage as needed
- Evaluation of airfield pavement marking for the new taxiway and connectors
- Development of detailed specifications
- Design documents for bid letting (FAA and Federal funds requirements)
- Development of a Construction Management Plan (CMP)
- Development of a Construction Safety and Phasing Plan (CSPP)

1.2 AIP Eligible and Ineligible Work Items

Most work items associated with this project are anticipated to be AIP eligible at the time of this writing through FAA grant funding.

The design scope of services for this project covers the relocation of the full-length Taxiway B from Taxiway B4 to Taxiway B11. The project will be delivered using the Construction Manager at Risk (CMAR) delivery method. Project deliverables will be divided into several design packages relative to funding of the project. Each design package will corelate with a CMAR Guaranteed Maximum Price (GMP).

1.3 Unique and Unusual Situations

There are no known unique or unusual situations about the project at the time of this writing.

1.4 History of Existing System

DVT was built in 1960 with a single runway, operating as a private airfield. There was no control tower and only minimal amenities. The City of Phoenix (City or COP) bought the 482-acre airport in 1971. A new terminal was constructed four years later when the FAA started directing the air traffic. The City Council adopted a master plan in 1986 that allowed for DVT to accommodate more and different types of aircraft. Operations grew and infrastructure was added throughout the years. In 2007, a new Air Traffic Control Tower (ATCT) was constructed.

Now, DVT is one of the busiest general aviation airports in the nation, with a complex movement area and a mix of traffic that includes business jets and turboprops, piston twins and single engine aircraft, sport aircraft and rotorcraft, as well as a significant level of student pilot activity from the airport's two major flight training schools and by other smaller flight training entities.

The majority of the existing Taxiway B pavement was constructed in 1973. The portion between Taxiway B4 and B5 was constructed with the north runway extension in 1992.

According to the Arizona Department of Transportation (ADOT) Airport Pavement Management System (APMS) web application, the pavement condition index (PCI) of the existing taxiway pavements range from 36 to 52. The pavements had a micro-surfacing and crack seal treatment in 2009. Since then, there are no recorded major maintenance and repair treatments identified by the ADOT APMS web application.

The portion of Taxiway B from Taxiway B3 to Taxiway B4 was removed as part of the Taxiway B3 Relocation project (AV31000088 FAA) in early 2020.

2.0 PHOTOGRAPHS

2.1 Existing Site Conditions

Aerial photographs captured at the beginning of 2023 provide a general perspective of the existing condition of Taxiway B and its associated connectors, Taxiways B4, B5, B9 and B11, see Figures 2-4 below.

Site investigations in preparation for project design included a geotechnical soil investigation and site survey. No site visit photos of the existing site were captured.

Figure 2: Existing Taxiway B, Taxiway B4 and Taxiway B5

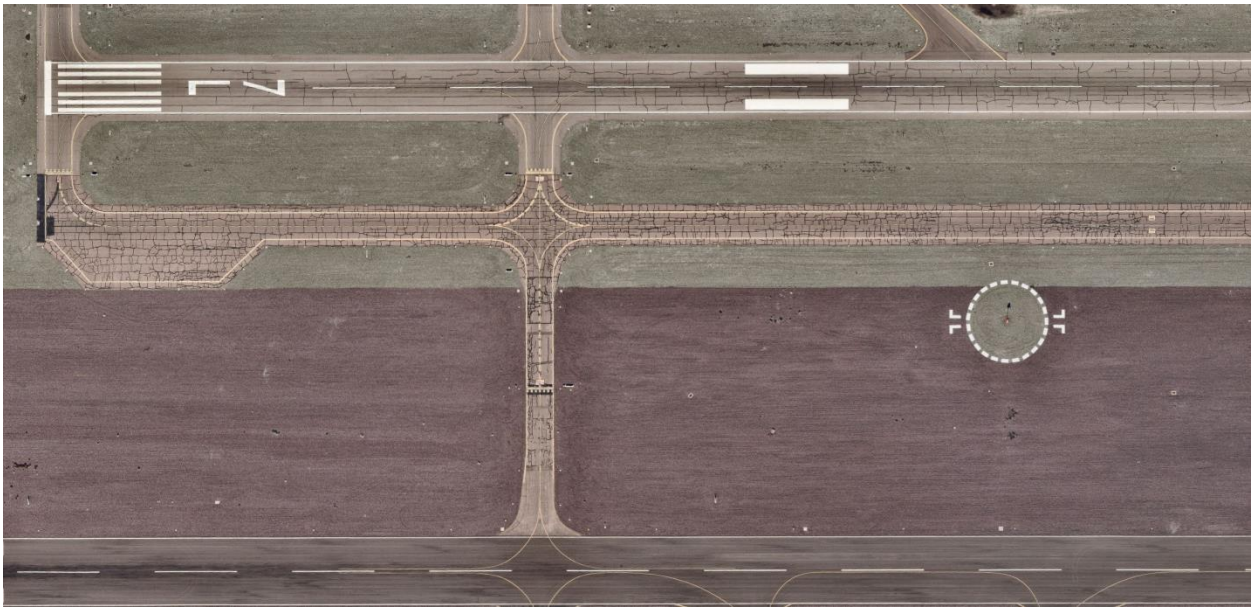
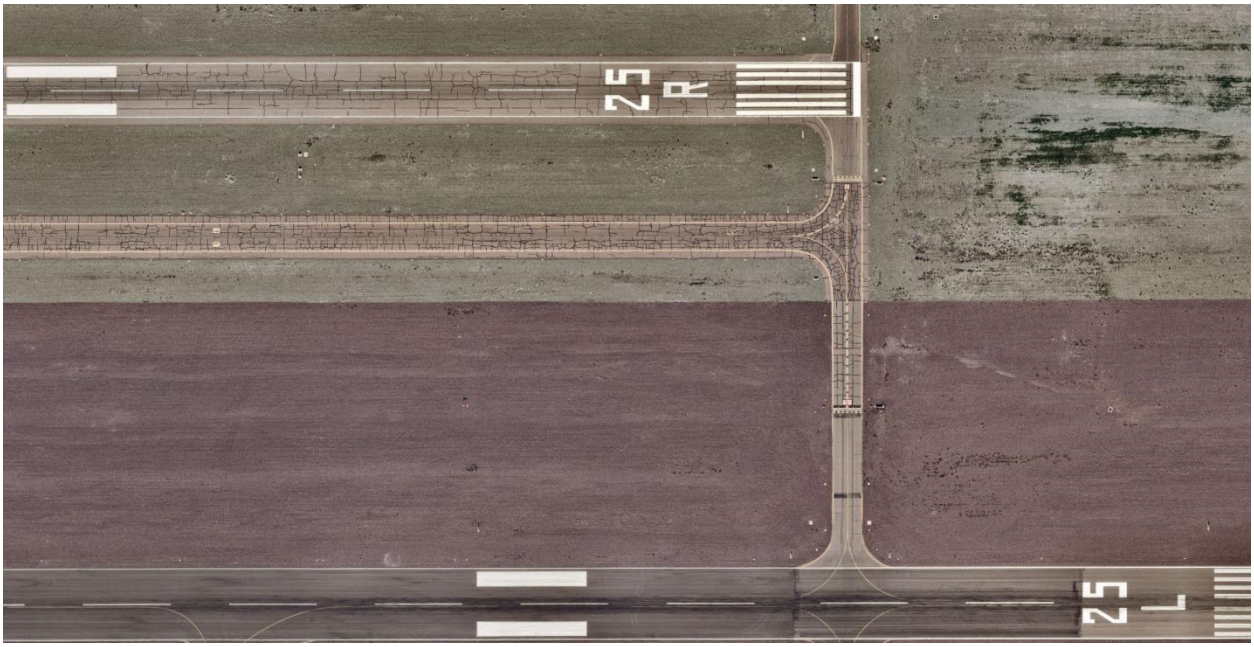


Figure 3: Existing Taxiway B and Taxiway B9

Figure 4: Existing Taxiway B and Taxiway B11



2.2 Existing Safety Area Deficiencies

There are no known existing safety area deficiencies at the time of this writing.

3.0 AIP STANDARDS

3.1 AIP Advisory Circulars Applicable to this Project

This project will be susceptible to the guidelines set forth in FAA ACs. The core discipline ACs that will be applicable to this project are listed below:

150/5300-13B	Airport Design	Mar 31, 2022
150/5320-5G	Airport Drainage Design	Jun 7, 2021
150/5320-6F	Airport Pavement Design and Evaluation	Nov 10, 2016
150/5340-1M	Standards for Airport Markings	May 10, 2019
150/5340-18G	Standards for Airport Sign Systems	May 10, 2019
150/5340-30J	Design and Installation Details for Airport Visual Aids	Feb 12, 2018
150/5345-7F	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits	Aug 19, 2013

150/5345-26E	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories	Dec 16, 2021
150/5345-44K	Specification for Runway and Taxiway Signs	Oct 08, 2015
150/5345-46E	Specification for Runway and Taxiway Light Fixtures	Mar 02, 2016
150/5345-47C	Specification for Series to Series Isolation Transformers for Airport Lighting Systems	Jul 22, 2011
150/5345-53D	Airport Lighting Equipment Certification System	Sep 26, 2012
150/5360-12F	Airport Signing and Graphics	Sept 26, 2013
150/5370-2G	Operational Safety on Airports During Construction	Dec 13, 2017
150/5370-10H	Standards for Specifying Construction of Airports	Dec 21, 2018

Other FAA ACs not specifically identified above may be referenced throughout other ACs and be applicable to the project.

Other design standards and guidelines utilized for this project are the COP design standards (latest edition), COP Storm Water Policies and Standards (SWPS) (latest edition), and Maricopa Association of Governments (MAG) Standard Details and Specifications (latest edition).

3.2 Critical Design Standard Values

Critical design standard values for this project are presented in

Table 1:

Table 1: Critical Design Standard Values for This Project

Critical Design Standard Values (Values per FAA AC 150/5300-13B)	
Aircraft Parameters	
Airport Reference Code (ARC) 7L/25R	B-I
Airport Reference Code (ARC) 7R/25L	C-II
Taxiway Design Group (TDG)	2
Safety Area Dimensions	
RSA Width (ft) 7L/25R	120
RSA Width (ft) 7R/25L	500
ROFA Width (ft) 7L/25R	400
ROFA Width (ft) 7R/25L	800
TSA Width (ft)	79
TOFA Width (ft)	124
Taxiway Geometric Values	
Taxiway Width (ft)	35
Taxiway Shoulder Width (ft)	15
Taxiway Surface Gradients (Longitudinal)	
Longitudinal Maximum Slope (%)	1.50%
Maximum Longitudinal Grade Change (%)	3.00%
Maximum Grade Change without Vertical Curve (%)	<0.40%
Taxiway Surface Gradients (Transverse)	
Maximum Taxiway Pavement Transverse Slope (%)	1.0-1.5%
Maximum Taxiway Shoulder Transverse Slope (%)	1.5-5.0%
Maximum Transverse Slope within TSA (%)	1.5-3.0%
Maximum Allowable Positive Slope between TSA and TOFA (%)	25.00%
Maximum Allowable Positive Slope from (RSA+40') and ROFA	8:1

4.0 CONSIDERATIONS FOR AIRPORT OPERATIONAL SAFETY

4.1 CSPP Related Issues

The project will be divided into three design packages. Each design package will be designated and identified by the CMAR GMP number for that package, starting with GMP 1. Phasing will correlate with each design package. A Construction Safety and Phasing Plan (CSPP) will be developed for each GMP Design Package in conformance with FAA AC 150/5370-2G, *Operational Safety on Airports During Construction*. The phasing of the project will be determined by several factors including: available funding, timing of funds, airfield operational constraints, and construct constraints. The phasing for each GMP will

be discussed below once the GMP Design Package has been sufficiently developed and preliminarily approved.

4.1.1 GMP 1 – Taxiway B Construction East of Existing Taxiway B9

4.1.1.1 GMP 1 Proposed Phasing and Sequencing

Project phasing and sequencing for GMP 1 of this project is discussed in detail in the GMP 1 CSPP. The proposed phasing will attempt to minimize disruption to Airport Operations and minimize construction duration. A Phasing Coordination Workshop with DVT Staff, DVT ATCT, City of Phoenix Project Managers, CMAR and the design team was conducted on March 20, 2023. Workshop outcomes and decisions are incorporated in the GMP 1 CSPP.

4.1.1.2 GMP 1 Work Area Limits and Closures

Work area limits and closures are discussed in detail in the CSPP. The construction will be performed with nighttime closures only. Runway 7R-25L will be required to be closed for nighttime work in order to reconstruct the portion of the connectors located within the Runway Safety Area on the south side of Taxiway B up to the Runway 7R-25L edge. Additionally, Runway 7L-25R will be closed for nighttime work to construct Taxiway B, the acute angle connector Taxiway B9 and the right-angle connector Taxiways B10 and B11 up to the runway edge.

Taxiway B will be closed east of Taxiway B9 for the duration of GMP 1 construction to accommodate the construction of the new Taxiway B and new Taxiways B9, B10 and B11. Taxiway B11 will also be closed between Runway 7L-25R and Runway 7R-25L for the duration of GMP 1 construction and will not be open for day time use.

Construction of the taxiway connections to Runway 7R-25L and Runway 7L-25R will stagger closures to minimize disruptions to airport operations and only allow one runway closure per night.

4.1.2 GMP 1 Haul Routes and Staging Area Location

The Haul Routes are identified on the Project Layout Plan sheet in the GMP 1 design package. Two contractor staging and storage areas on the airfield with their own haul routes are required for GMP 1.

Construction access to the site will be provided at Gate 7 on the east side of the airfield along 7th Avenue north of Deer Valley Road. The haul routes will utilize the airport perimeter service road, where available. All existing pavements used for construction traffic are to be protected and restored to preconstruction conditions per the project specifications.

4.1.2.1 GMP 1 Impacts to Approach Procedures

Construction may impact approach procedures for runways 7R-25L and 7L-25R at DVT. It is anticipated that there will be communication and coordination between DVT Airport Operations Staff and the Contractor to discuss work activities. DVT Airport Operations Staff will issue any appropriate Notice to Airmen (NOTAM) as necessary to communicate to pilots any impact to approach procedures.

4.1.2.1 GMP 1 Impacts to FAA Owned NAVAIDS

No portions of the NAVAID facilities at the Phoenix Deer Valley Airport are owned by the FAA.

4.1.3 GMP 2 – Taxiway B Construction Between Existing Taxiway B5 and New Taxiway B9

The GMP 2 design package was not developed at the time of this submittal. This section will be updated on a subsequent submittal when the GMP 2 design package has been developed.

4.1.4 GMP 3 – Taxiway B Construction at and west of Existing Taxiway B5

The GMP 3 design package was not developed at the time of this submittal. This section will be updated on a subsequent submittal when the GMP 3 design package has been developed.

5.0 PAVEMENT DESIGN

5.1 Geotechnical Report

The final geotechnical report for this project was completed by Quality Testing, LLC. (QT), dated March 30, 2023. A copy of the geotechnical report is included as Appendix A of this report.

5.1.1 Soil Investigation

Field investigation of the site soil was conducted between September 3-5, 2019. A total of 31 borings were performed within the proposed Taxiway B and taxiway connector areas. All borings were drilled to depths ranging from 4.5 feet to 10 feet below the existing site grade. A truck mounted drill-rig (CME-55) was used to perform all borings. Groundwater was not encountered during this investigation.

5.1.2 Soil Characteristics

Laboratory testing was performed on representative soil samples to aid in material classification and to estimate the pertinent engineering properties of the on-site soils for use in developing geotechnical and pavement recommendations. Testing was performed in accordance with applicable ASTM methods and per appropriate guidelines. The following tests were performed on selected samples:

- Soil Classification and Site Characterization:
  - Grain-Size (Sieve) Analyses
  - Atterberg Limits
  - In-Situ Unit Weight and Moisture Contents
  - Direct Shear Test
  - pH & Resistivity
  - Sulfates & Chlorides
- Pavement Design:
  - Maximum Dry Density-Optimum Moisture Content (Proctor)
  - California Bearing Ratio (CBR)

Subsurface soil conditions at the site predominantly consisted of clayey sand (SC), lean clay (CL), fat clay (CH), clayey gravel (GC), poorly graded sand (SP) and poorly graded gravel (GP). Near-surface soils ranged from medium to high plasticity. The percent material passing the No. 200 sieve ranged from 16 percent to 71 percent. CBR values for the samples ranged from 4 to 8 for tests conducted on samples prepared at 95 percent compaction.

Complete discussion of the soil characteristics is in the geotechnical report in Appendix A.

5.2 Fleet Mix

The aircraft fleet mix was obtained by interpreting the Phoenix Deer Valley Airport Master Plan Update Aviation Activity Forecast dated August 2014.

Table 2: Aircraft Fleet Mix

Aircraft Type	Maximum Takeoff Weight (MTOW) (lbs)	Annual Departures
BeechJet-400	15,500	72
Challenger-CL-604	38,650	790
Challenger-CL-604	41,400	731
Chancellor-414	6,000	415
Citation-525	11,800	22
Citation-525	11,800	15
Citation-525	10,500	126
Citation-525	8,650	91
Citation-550B	15,900	59
Citation-550B	12,500	17
Citation-550B	14,000	106
Citation-550B	14,800	96
Citation-V	16,500	118
Citation-V	13,870	141
Citation-VI/VII	23,200	9
Citation-X	35,700	195
D-30	36,000	18
EMB-175 STD	49,816	51
ERJ-135	36,000	71
Falcon-2000	35,000	34
Falcon-50	28,650	23
Falcon-50	38,800	14
Falcon-900	45,500	78
Gulfstream-G-IV	75,000	186
Gulfstream-G-V	90,900	20
Learjet-35A/65A	10,800	97
Learjet-35A/65A	11,800	12
Learjet-35A/65A	14,650	10
Learjet-35A/65A	21,000	49
Learjet-35A/65A	12,900	68
Learjet-55	21,500	34
S-10	10,759	10
S-10	8,600	125
S-10	10,000	18
S-12.5	12,500	50
S-12.5	12,500	54

5.3 Recommended Pavement Design

A FAARFIELD analysis was conducted using the fleet mix from the previous section. The recommended pavement section is presented in the table below:

Table 3: Recommended Pavement Section

Layer No.	Layer Type	Thickness (inch)
1	P-401 Asphaltic Concrete (Surface)	5
2	P-209 Aggregate Base Course	8
3	P-155 Lime Treated Subgrade	12
4	P-152 Compacted Subgrade	6

5.4 Material Availability

On-site materials removed from excavation, grading, and/or trenches will generally be suitable for use as backfill, given that it meets compaction and moisture condition requirements as laid out in the project specifications.

If necessary, import soils may also be utilized as fill, so long as it meets the project specifications.

5.5 Subgrade Stabilization

The site soils within the upper 3 feet, exhibit potentially high plasticity and have a low California Bearing Ratio. It is recommended that a minimum of 12" of subgrade be lime treated per the requirements of FAA Specification P-155.

5.6 Pavement Design

A description of the pavement design procedure is included within the geotechnical report in Appendix A.

5.6.1 FAARFIELD Results

FAARFIELD output is included within the geotechnical report in Appendix A.

6.0 DRAINAGE DESIGN

The draft drainage report for this project was completed by Kimley-Horn and Associates (KHA), dated May 21, 2020. A copy of the drainage report is included as Appendix B of this report.

6.1 Existing Drainage Characteristics and Structures

Existing topography generally slopes from east to west. Runoff from the existing Taxiway B discharges into the adjacent infield drains. The infield drains are connected to existing storm drains that drain to the detention basin at the southwest corner of DVT and off DVT property. Relocating Taxiway B will modify and create new infield areas. New inlets will be constructed to connect to the existing storm drains. The new configuration will require re-routing runoff reaching inlet 10 to a different part of the system. However, the relocation will not increase the total amount of runoff reaching the system.

6.2 On-Site Hydrology

The peak discharges for the proposed inlets were calculated using the Rational Method as outlined in the City of Phoenix Storm Water Policies and Standards Manual (SWPS). The five-year (5-year) storm was used as the design storm in accordance with AC 150/5320-5D. The minimum time of concentration was five (5) minutes, as required by AC 150/5320-5D. National Oceanic and Atmospheric Administration (NOAA) Atlas 14 was used to obtain rainfall intensity for Deer Valley Airport.

6.3 On-Site Hydraulics

Runoff from the new infield areas west of the new B6 connector reach the existing storm drain discharging into the detention basin in the southwest corner of DVT. Runoff east of the new B6 connector reaches the existing 54-inch trunk line that is running north to south. Triple COP 1570 catch basins will be used to capture the runoff. New 24-inch storm drain will be used to connect to the existing systems. Storm drain hydraulics will be completed with the Final Drainage Report.

The HEC-22 Chart 9B was used to size the inlets. A clogging factor of 50% was applied per the SWPS for both area drains. Ponding for the 5-year storm was limited at each inlet to prevent the encroachment of runoff on the taxiway and runway pavements, as required by AC150/5320-5D.

7.0 AIRFIELD LIGHTING AND SIGNAGE

7.1 Existing System

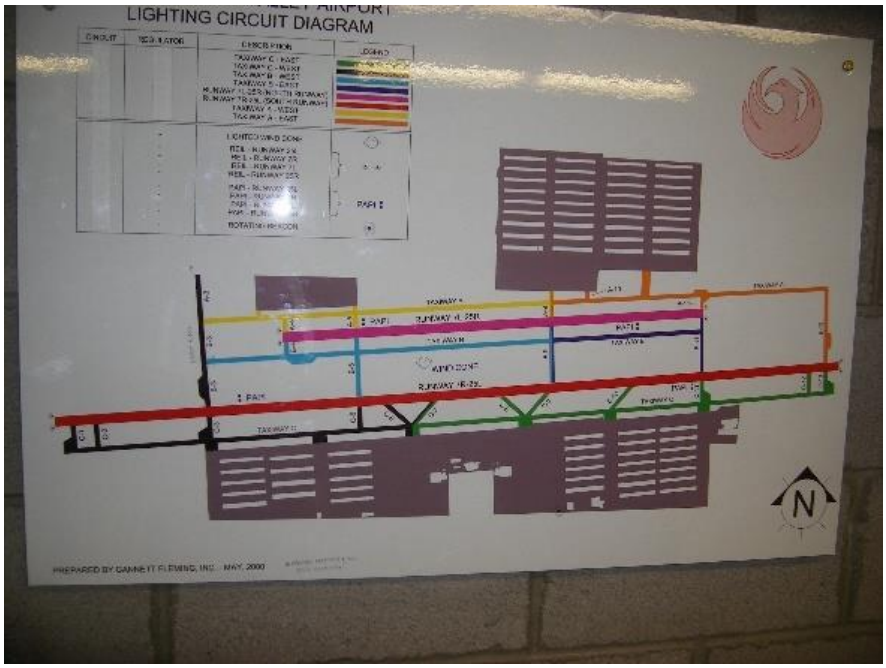
The existing elevated L-861T incandescent taxiway edge lights, isolation transformers, L-867 bases, L-858 airfield guidance signage, associated airfield circuit cable and conduit

along Taxiway B and Connectors have been in service more than 18 years and will be demolished and replaced with new as part of the realignment of parallel Taxiway B and connecting taxiways to both north and south runways.

Existing runway hold position signs at Taxiway B connectors to Runway 7L/25R will also require replacement to relocate runway hold position markings. Any existing taxiway signage affected by hold position relocation will be replaced or relocated as required.

Two existing series circuits are fed by 15kW Constant Current Regulators (CCR's) which serve Taxiway B lighting and signs – TWB East and TWB West – and 'split' at Taxiway B connector B9. Due to Airport's operational requirements and the recent (2017) Airfield Lighting Vault (ALV) modifications, that included all new CCR's and ALCMS, the new parallel Taxiway B and connecting Taxiways will require evaluation to determine if the existing TWB constant current regulators (CCRs) for the new LED taxiway edge lights and signage can be reused based on new load.

Figure 5: Photo of DVT Lighting Circuits Map



The existing duct banks and hand hole structures between runways will be affected by the realignment of parallel Taxiway B. GMP 1 will consist of the new north / south duct bank to provide a bypass to install new airfield lighting home run cables. A directionally bored duct bank under Runway 7R-25L will facilitate a path for new tie in points for circuits to maintain operation of airfield lighting and NAVAIDS during construction. Portions of

existing 2-4” duct bank segments that will be affected by construction of realigned Taxiway Bravo will be replaced with new duct bank segments and hand hole structures to provide circuit separation with adequate conduits and access points that are relocated outside of safety areas.

7.2 Layout of Airfield Lights and Signage

New Taxiway B, new connecting Taxiways B4 through B11 will be laid out as specified in FAA AC 150/5340-30J Design and Installation of Airport Visual Aids in accordance with new pavement and fillet geometry.

Taxiway B edge lighting will be designed with all new light fixtures installed as part of these modifications and will be specified as L-861T(L) LED taxiway edge lights to eliminate need for two Taxiway B circuits.

GMP 1 consists of reconstructing east end of TWB segment from B9 to B11. Existing B9 connectors will be maintained with the existing Taxiway B west circuit operating taxiway lighting west of GMP-1 construction. New B11, B10, B9 connectors and realigned segment of Taxiway B will be reconnected to Taxiway B east circuit with provisions to close the circuit loop if B10 is not constructed as an Additive Alternate 1.

RGL 7L circuit will be modified to relocate elevated runway guard light fixtures to B11 and B9 hold positions. RGL 7R circuit will require modification to add a pair of fixtures at new B10 connecting taxiway.

All new L-858(L) guidance signage will be specified as Size 1 with new Size 2, LED VFR Signs and placed in accordance with FAA AC 150/5340-18G Standards for Airport Sign Systems with a 3’ asphalt maintenance pad around the new concrete sign bases where 3” rock is placed in infields. The new LED systems will improve the guidance information to help pilots acquire and maintain the correct approach. The use of LEDs greatly increases light source life, reduces operating costs and significantly reduces ongoing maintenance costs and periodic re-lamping expenses. The LED light source improves safety and pilot recognition by eliminating color shifts typical of incandescent light sources at lower intensity settings.

GMP 2 and GMP 3 Airfield Lights and Signage have not been developed at the time of this submittal and will be developed and discussed in subsequent submittals as they are designed.

7.3 Electrical Circuit Load Calculations

New Taxiway B edge lighting and signage circuit have been calculated to require a 10kW CCR. The two existing TWB East and West Constant Current Regulators are 15kW each and will be discussed to reuse for the new circuit. See Table 4 for the summary of loads for the new TWB Circuit. Modifications to existing lighting vault are not required for GMP 1 construction, with the two CCRs remaining in service. GMP 2 will require evaluation to determine if the next phase will consist of replacing incandescent with new LED lighting and signage that provides enough load reduction to permit Taxiway B operation on one existing 15kW CCR.

Table 4: New Taxiway B Circuit Loads

Constant Current Regulator Load Summary - Taxiway B Circuit

Prepared by CR Engineers Inc.						
Project Name		DVT Relocate Txy B & Construct High Speed Connectors				
Project No.						
Circuit Identification		Taxiway B				
Maximum CCR Output Current		6.6 Amps				
Number of CCR Steps		3-Step (4.8A-6.6A)				
Input Voltage		480V				
Frequency		60Hz				
CCR Architecture		Ferroresonant				
Load Description	**Device Description**	**Isolation Transformer Used**	**Quantity**	**Individual Device CCR Load VA**	**Subtotal Load VA**	**Total Load Type VA**
Lighting Load 1	L-861T(L) LED Taxiway Edge Lights	10/15W	307	15	4605	
Sign Load 1	L-858(L), Size 1, 2 Module LED	100W	3	59	177	
Sign Load 2	L-858(L), Size 2, 2 Module LED	100W	2	66	132	
Sign Load 3	L-858(L), Size 1, 3 Module LED	100W	18	66	1188	
Sign Load 4	L-858(L), Size 1, 4 Module LED	100W	1	73	73	
Total LED Load						**6,175**
L-824 Wire Load			24,120			**693**
Total Calculated CCR Load						**6,868**
Desired Safety Factor		**25%**				
CCR Load with Safety Factor		**8585**				
Next Largest CCR Size		**10KW**				
Existing TWB CCR Sizes	**TWB East & TWB West**	**Two at 15KW EA**				

8.0 NAVAIDS

8.1 All NAVAIDs and Ownership

Deer Valley Airport owns and operates the NAVAIDS on airport property.

8.2 Impacts to FAA Owned Navigation Aids

There will be no impacts to FAA-owned NAVAIDs.

9.0 PAVEMENT MARKINGS

9.1 Layout of Markings

The layout of pavement markings is included in the construction plans for this project. At the time of this writing, anticipated pavement markings include the following:

- Runway Edge Markings
- Taxiway Centerline Markings
- Enhanced Taxiway Centerline Markings
- Continuous Taxiway Edge Markings
- Runway Holding Position Markings (Pattern A)
- Surface Painted Holding Position Sign Markings

9.2 Temporary Marking Application

Any temporary pavement markings will be applied at an application rate as defined in the project specifications.

The project specifications will address any application of glass beads for temporary pavement markings.

An appropriate waiting period will be defined for all paint types used for pavement marking. Once that period has expired, permanent pavement markings will be applied according to the project specifications.

10.0 ENVIRONMENTAL CONSIDERATIONS

10.1 Storm Water Management Measures

A Storm Water Pollution Prevention Plan will be implemented to mitigate construction debris from entering the storm drain network at DVT. A specification item will require that

the Contractor comply with the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program.

10.2 Permits

The project specification and contract documents will include information for the Contractor to ensure that the necessary permits are acquired.

10.3 Soil and Paint Sampling

The City of Phoenix Environmental Department will need to collect representative samples of paint and soil within the proposed work areas to determine levels of contamination. The results of the environmental testing will assist in the Environmental Department's recommendation of mitigation methods and suitability of material export from the site.

11.0 UTILITY LINES IN WORK AREA

11.1 Existing Underground Utilities

Existing underground utilities consist of, but not limited to the following:

- Electric (Runway and Taxiway Circuits)
- Storm Drain

11.2 Potential Impacts of Existing Utilities

The project will construct new taxiway pavement. As a result, there may be impacts to existing underground utilities.

Overall, it is anticipated that portions of existing storm drain pipe will be removed when it interferes with the proposed drainage plan. Part of the project involves the removal of portions of storm drain and the construction of new storm drain to accommodate the modified infield drainage areas. New storm drain runs may tie into existing catch basin locations and may expose the existing storm drain pipe. Care shall be taken by the Contractor to preserve the existing storm drain pipe in accordance with the project specifications.

The only known electrical utilities in the project area are the airfield electrical lines and duct banks serving the lighting, signage, and various NAVAIDs. The exact layout of these lines is unknown, but they have been shown on the plans in the anticipated locations.

Location of any electrical lines impacting the project shall be confirmed prior to underground work commencing.

Other underground utilities are not anticipated to be impacted.

11.3 Recommended Contacts of Utility Companies

Utility company representative contact information is included below:

Arizona Public Service (APS)	David McCasland	(602) 371-6451
FAA Facilities	Roger Gustafson	(602) 305-2532
Qwest	John O'Dell	(602) 530-0496
Gas (Southwest Gas)	Norma Jardin	(602) 484-5344
City Water/Sewer	Jami Erickson	(602) 261-8229
City Environmental	Rebecca Godley	(602) 273-3396
All Emergency, Fire, Police, Medical	Operator	911
City Electrical	David Thornton	(602) 273-7667
City Communications	Chad Blotkamp	(602) 708-0244
City Utilities	Chad Blotkamp	(602) 708-0244

11.4 Potholes on Potential Conflict Areas

Potholes on potential conflict areas may be necessary during the design phase of this project. Potential pothole locations, if necessary, will be identified on a map to request that the information be located.

12.0 MISCELLANEOUS WORK ITEMS

The following paragraphs identify anticipated miscellaneous work items associated with this project at the time of this writing.

A Storm Water Pollution Prevention Plan will be implemented to mitigate construction debris from entering the storm drain network at DVT. A specification item will require that the Contractor comply with the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program.

The Airport Operations Area (AOA) security fence will be maintained during construction. Details identifying the responsible party for safety maintenance will be addressed in the project specifications.

13.0 REQUESTED MODIFICATIONS TO AIP CONSTRUCTION STANDARDS

No modifications to AIP construction standards are anticipated at the time of this writing.

14.0 DELINEATION OF AIP NON-PARTICIPATING WORK

All work items associated with construction of Taxiway B and associated connectors are anticipated to be AIP eligible at the time of this writing.

AIP Non-participating work will be quantified and tracked independent of the base quantities for the project. This will be represented in the construction plans and the opinion of probable cost.

15.0 DBE PARTICIPATION

At the time of this writing, the City does not establish DBE participation goals for AIP projects. No DBE participation goal has been established for this project.

16.0 PROJECT SCHEDULE

The following are anticipated milestone dates for this project. They are preliminary dates approximated by the anticipated design schedule. The dates presented below are subject to change.

1. Project Initiation (NTP for Design): August 28, 2019
2. Preliminary Investigation and Design: August 2019 through September 2020
3. Initial GMP 1 CMAR Selection: October 22, 2022
4. Availability of Final GMP 1 plans and specifications: To Be Determined (based on grant timing)
5. Award of GMP 1 CMAR contract: To Be Determined (based on grant timing)
6. NTP: To Be Determined (based on GMP design packages and grant timing)
7. Completion: To Be Determined
8. Closeout: To Be Determined

17.0 PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

An itemized summary of the preliminary opinion of probable construction costs was provided at the 30% submittal.

An itemized summary of the GMP 1 90% Submittal opinion of probable construction costs is included in Appendix E of this report.

The opinion of probable construction costs for subsequent GMP design packages will be included when each additional GMP package is developed.

18.0 PRE-DESIGN MEETING AGENDA

A pre-design meeting was held on January 16, 2020. The agenda from the pre-design meeting (design kick-off) is included as Appendix F.

Appendix A: Final Geotechnical Report

Trace Consulting, LLC
1201 East Jefferson Street, Suite #3
Phoenix, Arizona 85034

March 30, 2023

Re: Geotechnical Engineering Services
DVT Taxiway Bravo & Construct HS Connectors B6 & B9
Deer Valley Airport
Phoenix, Arizona
QT Job No. 19051.00

Mr. Jhaveri,

Included herein is the final report that details the geotechnical investigation and pavement design conducted by Quality Testing, LLC (QT) for the above referenced project. The investigation was performed in accordance with our proposal dated May 9, 2019 and subsequently authorized by Trace Consulting, LLC. This report includes details of the geotechnical exploratory program, laboratory testing results, pavement section design options and various other geotechnical recommendations for the site. The report was prepared using project data available as of September 5, 2019 and in accordance with the appropriate FAA design standards and local geotechnical engineering practice.

We appreciate being of service to you during the design development phase of the project and we are prepared to assist you during the construction phases as needed. Should you have any questions during your review of this report, please do not hesitate to contact the undersigned.

Sincerely,

Shekhar R. Shah
Sr. Project Manager

Geotechnical Engineering Services

DVT Taxiway Bravo & Construct HS Connectors B6 & B9
Deer Valley Airport
Phoenix, Arizona

Prepared For:
Trace Consulting, LLC
1201 East Jefferson Street, Suite #3
Phoenix, AZ 85034

Prepared By:
Quality Testing, LLC (QT)
175 S. Hamilton Place
Building 6, Suite 114
Gilbert, AZ 85233

Author:

Shekhar Shah
Sr. Project Manager
Quality Testing, LLC

Professional Engineer:

Jeffery M. Schaper, PE
President
Quality Testing, LLC

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APPENDICES

PROJECT DESCRIPTION

The existing Taxiway Bravo is currently at a non-standard distance from the centerline of Runway 7L-25R per the FAA guidelines and needs to be relocated further south. Taxiway Bravo is currently 200 feet south of the centerline of runway 7L-25R and the minimum distance per FAA is 300 feet, requiring Taxiway Bravo to be moved 100' south from its existing location. Proposed high speed connectors B6 & B9 will be constructed in connection with the relocation of Taxiway Bravo. Construction will also require adjustment to the utilities, including storm drain. The relocation of Taxiway Bravo requires a new pavement design to validate structural pavement and subgrade requirements.

PURPOSE AND SCOPE OF SERVICES

The purpose of our evaluation was to assess the subsurface and surface conditions at the proposed project site and to formulate geotechnical recommendations for the Taxiway Bravo relocation and high speed connectors B6 & B9 pavement design and construction. The scope of QT's services include evaluating the site conditions, performing appropriate laboratory testing, evaluating collected and generated information, developing geotechnical recommendations for pavement design and ultimately preparing this final geotechnical report. All work was conducted in accordance with FAA circular 150/5320-6F (11/10/2016).

GEOTECHNICAL INVESTIGATION

EXPLORATORY PROGRAM

The recommendations found within this report are based upon our field investigation of the site, which occurred on September 3, 4, & 5, 2019. Subsurface soil samples were taken from borings completed at the locations shown in Appendix A of this report.

A total of 31 borings were performed within the proposed Taxiway Bravo and HS connector areas. All borings were drilled to depths ranging from 4.5 feet to 10 feet below the existing site grade. Auger refusal was encountered on borings B-02, B-03, B-04, B-12, B-17, B-19, B-22, B-23, B-24, B-25, B-26, B-27, B-28 & B-29 at various depths ranging from 4.5 feet to 9 feet below the existing site grade. A truck mounted drill-rig (CME-55) was used to perform all borings. Groundwater was not encountered during this investigation.

The boring logs from our investigation are presented in Appendix B of this report. Borings were conducted to identify each stratum of subsurface material and to obtain samples for subsequent laboratory testing. During the drilling operation, each stratum encountered was visually identified and documented by our field engineer. For each stratum, both bulk and relatively undisturbed samples were obtained. All samples were transported to our laboratory in Gilbert, AZ where testing was conducted to establish the engineering properties of each stratum and to evaluate the suitability of the materials for the proposed construction. The final boring logs included in this report summarize field observations, additional engineering interpretations as necessary, and laboratory test data. The soils were classified according to the ASTM Unified Soil Classification System. The soil classification symbols appear on the boring logs and are briefly described at the beginning of Appendix B.

LABORATORY TESTING

Laboratory testing was performed on representative soil samples to aid in material classification and to estimate the pertinent engineering properties of the on-site soils for use in developing geotechnical and pavement recommendations. Testing was performed in accordance with applicable ASTM methods and per appropriate guidelines. The following tests were performed on selected samples and their results are presented in Appendix C of this report.

Soil Classification and Site Characterization:

- Grain-Size (Sieve) Analyses
- Atterberg Limits
- In-Situ Unit Weight and Moisture Contents
- Direct Shear Test
- pH & Resistivity
- Sulfates & Chlorides

Pavement Design:

- Maximum Dry Density-Optimum Moisture Content (Proctor)
- California Bearing Ratio (CBR)

EXISTING SITE CONDITIONS

Airport facilities nearby, or within, the proposed improvements include the existing Runway 7L/25R & 7R/25L, taxiway, associated lighting, utilities and storm drains. The topography of the existing site in the area of the proposed construction is generally covered with green landscaping rocks.

SUBSURFACE CONDITIONS

Subsurface soil conditions at the site predominantly consisted of clayey sand (SC), lean clay (CL), fat clay (CH), clayey gravel (GC), poorly graded sand (SP) and poorly graded gravel (GP). Standard penetration test (SPT) blow counts ranged from 5 to 50 blows per foot and varied throughout the different boring locations.

Near-surface soils ranged from medium to high plasticity. Relatively undisturbed samples obtained within the proposed construction limits exhibited in-situ dry densities ranging from 91.4 pcf to 131.8 pcf. In-situ moisture contents (obtained from ring samples) ranged from 2.6 percent to 16.4 percent. The percent material passing the No. 200 sieve ranged from 16 percent to 71 percent. Six maximum dry density/optimum moisture tests (Proctors) were performed on proposed new pavement subgrade samples. All six samples were tested in accordance with ASTM D698. The maximum dry density of the samples tested ranged from 125.3 pcf to 132.0 pcf with optimum moisture contents ranging from 7.9 percent to 10.0 percent.

Six 3-point California Bearing Ratio (CBR) tests were performed on selected samples within the proposed Taxiway Bravo area. The resulting CBR values ranged from 4 to 8 for tests conducted on samples prepared at 95 percent compaction. The CBR test results indicated that swell was

below 3 percent when tested under a surcharge load of 10 pounds. Based on these test results the subgrade soils require lime treatment to reduce the plasticity and stabilize the subgrade, per FAA 150/5320-6F.

PAVEMENT DESIGN FOR TAXIWAY BRAVO & CONNECTORS

STRUCTURAL SECTION

In accordance with FAA standards, FAARFIELD was used to design the flexible pavement structural section. The aircraft fleet mix was obtained by interpreting the Phoenix Deer Valley Airport master Plan Update Aviation Activity Forecast dated August 2014.

The fleet mix used in our final pavement design is presented in Table 1:

Table 1. Aircraft Fleet Mix

Aircraft Type	Maximum Take-Off Weight (lbs)	Annual Departures
Citation-525	11,800	22
Citation-525	11,800	15
Citation-525	10,500	126
Citation-525	8,650	91
Chancellor-414	6,000	415
ERJ-135	36,000	71
S-10	10,759	10
Falcon-2000	35,000	34
Learjet-55	21,500	34
S-10	8,600	125
S-10	10,000	18
S-12.5	12,500	50
BeechJet-400	15,500	72
Citation-V	16,500	118
Citation-550B	15,900	59
Citation-550B	12,500	17
Citation-V	13,870	141
Citation-550B	14,000	106
Citation-550B	14,800	96

D-30	36,000	18
Falcon-50	28,650	23
Falcon-50	38,800	14
Falcon-900	45,500	78
Learjet-35A/65A	10,800	97
Learjet-35A/65A	11,800	12
Learjet-35A/65A	14,650	10
Challenger-CL-604	38,650	790
Challenger-CL-604	41,400	731
Citation-X	35,700	195
Citation-VI/VII	23,200	9
Learjet-35A/65A	21,000	49
Learjet-35A/65A	12,900	68
EMB-175 STD	49,816	51
Gulfstream-G-IV	75,000	186
Gulfstream-G-V	90,900	20
S-12.5	12,500	54

The average CBR value for the tests performed on soil samples taken within the upper 3 feet of the site was 6.4 and the standard deviation was 1.5. For design purposes a subgrade CBR value one standard deviation less than the average CBR was used. The design inputs used with the FAARFIELD software for the pavement design are summarized in Table 2.

Table 2. FAARFIELD Design Inputs

Aircraft Fleet Mix	Table 1
Design Life	20 Years
Design CBR	5.0
Annual Growth Rate	2.5

FLEXIBLE PAVEMENT DESIGN

The FAARFIELD recommended pavement section for flexible pavement is presented in Table 3. The corresponding FAARFIELD printout for the design flexible pavement section is provided in Appendix D of this report. The design assumes the use of lime treated subgrade (P-155) to stabilize the upper site soils prior to constructing the pavement section.

Table 3. FAARFIELD Flexible Pavement Section

Layer No.	Layer Type	Thickness (inch)
1	P-401/P-403 Asphaltic Concrete (Surface)	5.0
2	P-209 Aggregate Base Course	8.0
3	P-155 Lime Treated Subgrade	12.0
4	P-152 Compacted Subgrade	6.0

SUBGRADE FROST PROTECTION

The Deer Valley Airport is not located in an area subject to seasonal frost or perma frost. As appropriate, our pavement design does not include reduced subgrade strength and general frost protection is not required.

LIME TREATED SUBGRADE

The site soils within the upper 3 feet, exhibit potentially high plasticity and have a low California Bearing Ratio. It is recommended that a minimum of 12" of subgrade be lime treated per the requirements of FAA Specification P-155. Hydrated lime shall conform to the requirements of ASTM C977. Soil shall consist of on-site material which is free of organic materials and has a sulfate content of less than 0.3%. The maximum particle size of the subgrade soil to be treated shall be less than 2.5 inches. Hydrated lime shall be added at an application rate of five percent of dry unit weight of soil.

AGGREGATE BASE COURSE

The aggregate base shall consist of P-209 as the aircraft fleet mix includes aircraft with a gross operating weight greater than 60,000 pounds. Aggregate base should be compacted to 100 percent of the maximum dry density determined using ASTM D698. The material shall be blended to a uniform moisture content within ±2% of optimum moisture.

ASPHALTIC CONCRETE

Asphalt Concrete shall conform to FAA Specification P-401. The asphaltic concrete mix design should be developed using the 75 blow Marshall method. Use gradation option 2 when specifying the mix design aggregate gradation requirements. Asphalt cement should comply with the requirements for PG 76-22 SBS (polymer modified) binder in accordance with AASHTO M-320 Specification for Performance Grade Asphalt Binder.

EARTHWORK RECOMMENDATIONS FOR CONSTRUCTION

Where required, site clearing and grubbing should be performed in accordance with Section P-151, Clearing & Grubbing, of FAA AC No. 150/5370-10H. Although shallow refusals were encountered, the existing site soils are clayey such that excavation can likely be accomplished with conventional equipment.

Compacted subgrade beneath pavement areas should comply with the requirements of Section P-152, Excavation, Subgrade and Embankment, of FAA AC No. 150/5370-10H. Subgrade material should be scarified to a depth of 6 inches, moisture conditioned and then recompacted prior to the placement of the aggregate base course. The compaction requirement for subgrade is a minimum of 95 percent of the maximum density determined using ASTM D698 with moisture content within 2 percent of the optimum moisture content.

For areas where fill material is required, the existing subgrade should be scarified and recompacted to a minimum of 95 percent of the maximum density determined using ASTM D698 prior to the placement of fill material. When required under areas to be paved, fill material should be comparable to the existing site soils, having a CBR not less than 5. The material should be placed in horizontal lifts with thickness not exceeding 8 inches and meet the same requirements for compaction as P-152.

During construction all excavation slopes in undisturbed soil should be maintained at 1.5:1 or flatter per OSHA standard requirements for sandy clay soils. Slopes may have to be flatter to account for actual construction conditions and in all cases should be evaluated by the contractor. Excavations that remain open for a long time, may need to be stabilized with an application of shotcrete, gunite, polymer based spray or other similar treatment to prevent localized caving or erosion. For any trenches deeper than 4 feet, a proper shoring system needs to be designed and installed to comply with OSHA requirements.

CORROSION

The results of samples tested for pH ranged from 7.4 to 6.7 and resistivity ranged from 1275 to 2563 (ohm-cm). This indicates the material may be corrosive to newly constructed utilities. It is recommended that backfill of pipes made of metal have a minimum resistivity of 2000 ohm-cm. The results of samples tested for soil soluble sulfate content ranged from 11 to 64 parts per million (ppm), indicating the soil is not corrosive to concrete. The chloride content of the soil ranged from 7 to 17 ppm which is not considered corrosive to metals.

LIMITATIONS AND CONCLUDING REMARKS

The recommendations contained in this report are based on our field explorations, laboratory tests, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from samples taken during the field study. It is anticipated that some variations in the soil conditions will exist between the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered that are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to the recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this

report, our firm should also be notified. This report was prepared in accordance with the generally accepted standard of practice in Arizona at the time the report was written. No warranty, expressed or implied, is made. It is the Client's responsibility to assure that all current and future parties to the project are made aware of this report in its entirety and are in compliance with the recommendations contained herein. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

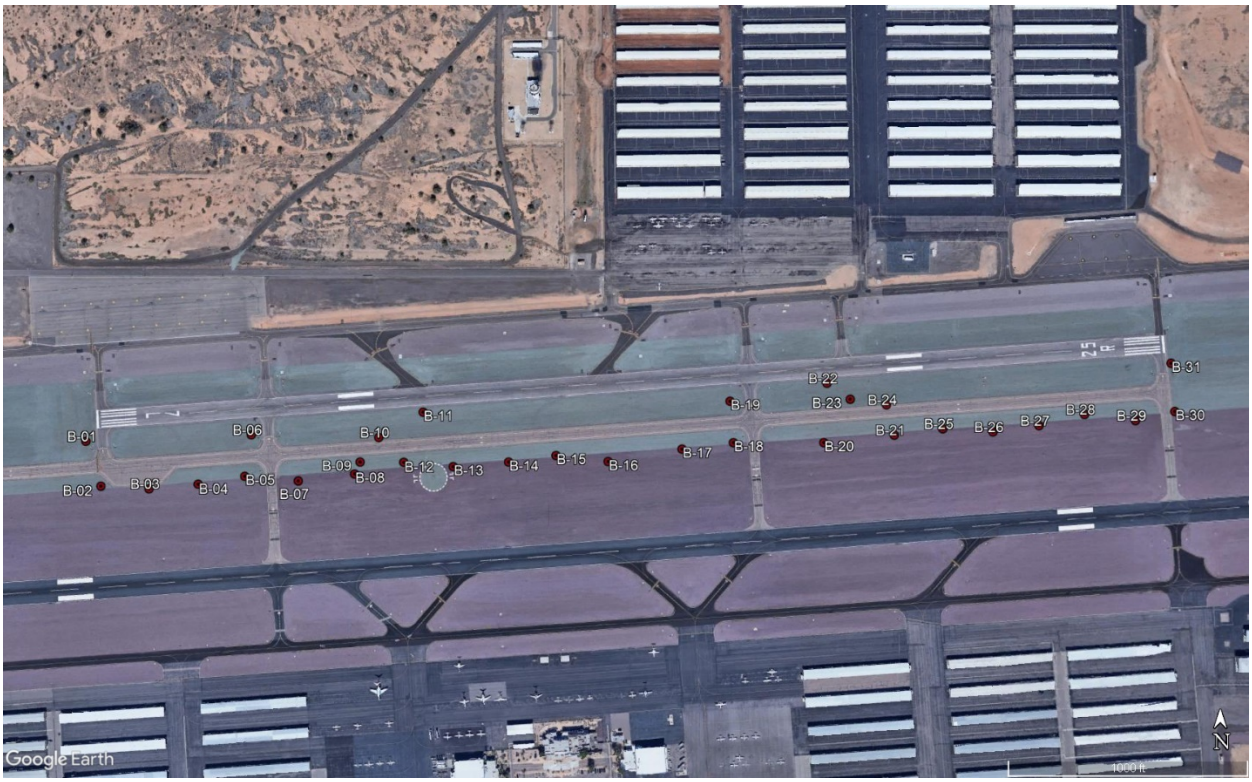
REFERENCES

FAA Advisory Circular AC No: 150/5320-6F

FAA Advisory Circular AC No: 150/5370-10H

FAARFIELD Pavement Thickness Design Software (v 1.42)

APPENDIX A: SITE MAP AND SAMPLE LOCATIONS



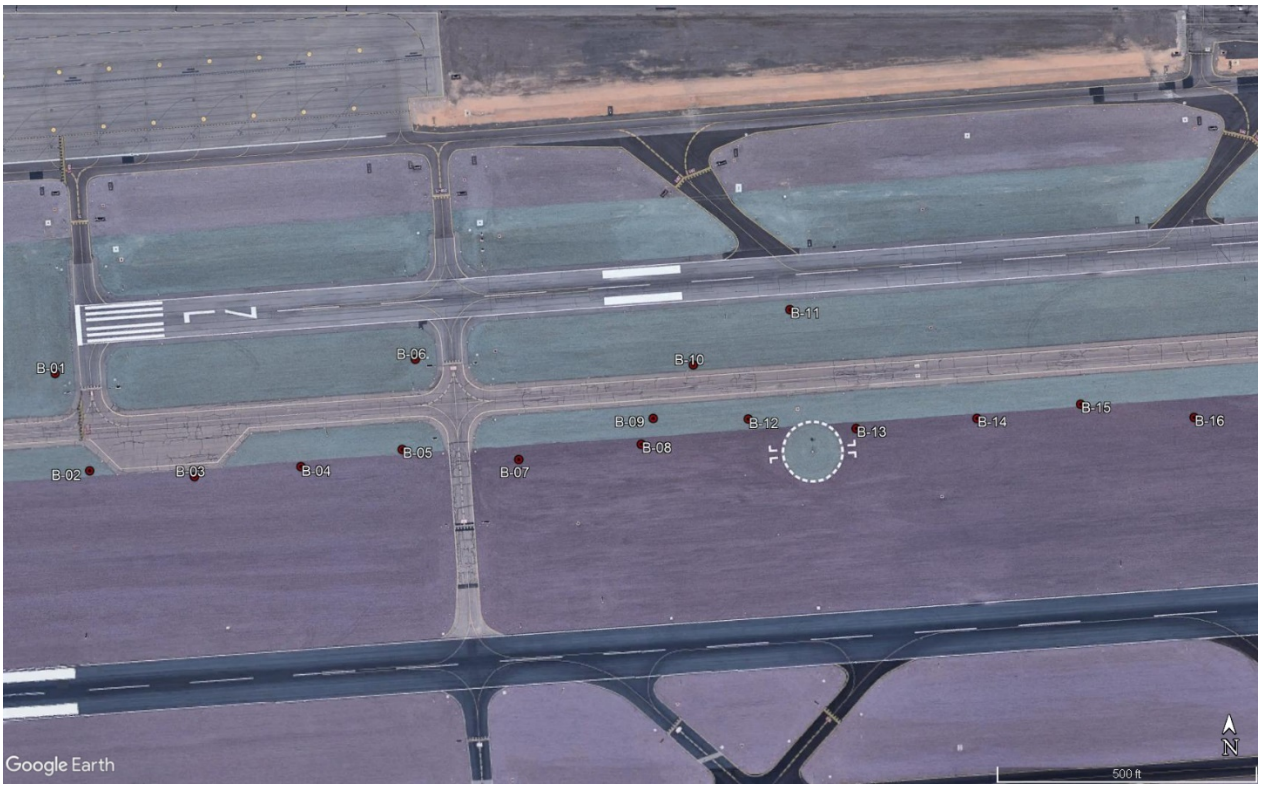
Boring Location

Not To Scale

N

DVT Twy Bravo and HS Connectors B6 & B9 Deer Valley Airport		
QT Job No. 19051.00	Prepared By: SRS	Date: 9/5/2019

Quality Testing, LLC
175 S Hamilton Pl Bldg 6 Ste 114, Gilbert, AZ 85233
(480) 496-2000 • (480) 496-2001 FAX



Boring Location

Not To Scale

N

DVT Twy Bravo and HS Connectors B6 & B9
Deer Valley Airport

QT Job No.	Prepared By:	Date:
19051.00	SRS	9/5/2019

Quality Testing, LLC
175 S Hamilton Pl Bldg 6 Ste 114, Gilbert, AZ 85233
(480) 496-2000 • (480) 496-2001 FAX

Boring Location

Not To Scale

N

DVT Twy Bravo and HS Connectors B6 & B9 Deer Valley Airport		
QT Job No. 19051.00	Prepared By: SRS	Date: 9/5/2019

Quality Testing, LLC
175 S Hamilton Pl Bldg 6 Ste 114, Gilbert, AZ 85233
(480) 496-2000 • (480) 496-2001 FAX

APPENDIX B: BORING LOGS

Quality Testing, LLC
175 S. Hamilton Place, Bldg 6, Suite 114
Gilbert, AZ 85233
Telephone: 480-486-2000
Fax: 480-496-2001

KEY TO SYMBOLS

CLIENT Trace Consulting, LLC
PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9
PROJECT NUMBER 19051.00
PROJECT LOCATION Deer Valley Airport, Phoenix, AZ

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


SC: USCS Clayey Sand


SP: USCS Poorly-graded Sand


CL: USCS Low Plasticity Clay


GC: USCS Clayey Gravel


GP: USCS Poorly-graded Gravel


SM: USCS Silty Sand


CH: USCS High Plasticity Clay

SAMPLER SYMBOLS


Ring Sample


Split Spoon


Bulk Sample

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)
TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
Water Level at Time Drilling, or as Shown
Water Level at End of Drilling, or as Shown
Water Level After 24 Hours, or as Shown

Key to Soil Symbols and Terms

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE-GRAINED SOILS (major portions retained on No. 200 sieve): includes (1) clean gravel and sands and (2) silty or clayey gravels and sands. Condition is rated according to relative density as determined by laboratory tests or standard penetration resistance tests.

Descriptive Terms	Relative Density	SPT Blow Count
Very loose	0 to 15 %	< 4
Loose	15 to 35 %	4 to 10
Medium dense	35 to 65 %	10 to 30
Dense	65 to 85 %	30 to 50
Very dense	85 to 100 %	> 50

FINE-GRAINED SOILS (major portions passing on No. 200 sieve): includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings, SPT blow count, or unconfined compression tests.

Descriptive Terms	Unconfined Compressive Strength kPa	SPT Blow Count
Very soft	< 25	< 2
Soft	25 to 50	2 to 4
Medium stiff	50 to 100	4 to 8
Stiff	100 to 200	8 to 15
Very stiff	200 to 400	15 to 30
Hard	> 400	> 30

GENERAL NOTES

1. Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.

2. Surface elevations are based on topographic maps and estimated locations.

3. Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were made. They are not guaranteed to be representative of subsurface conditions at other locations or times.

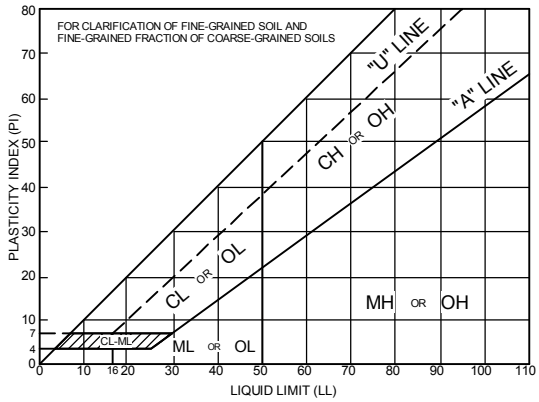
Major Divisions			Group Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravel (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM* d / u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			GC	Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM* d / u	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line or P.I. greater than 7
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 60)		ML	Inorganic silts and very fine sands, rock floor, 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	
	Silts and Clays (Liquid limit greater than 60)		MH	Inorganic silts, micaceous or disto-maceous fine sandy or silty soils, organic 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	

Determine percentages of sand and gravel from grain size curve, Depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows:
Less than 5 percent..... GW, GP, SW, SP
More than 12 percent..... GM, GC, SM, SC
6 to 12 percent..... Borderline case4s requiring dual symbols**

Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

Particle Size	Sieve sizes	Material
mm	< #200	Silt or clay
< 0.074		Sand
0.074 to 0.42	#200 to #40	Fine
0.42 to 2.00	#40 to #10	Medium
2.00 to 4.76	#10 to #4	Coarse



Plasticity Chart

Particle Size	Sieve	Material
mm		Gravel
4.76 to 19.1	#4 to 3/4 in.	Fine
19.1 to 76.2	3/4 in. to 3 in.	Coarse
76.2 to 304.8	3 in. to 12 in.	Cobble
304.8 to 914.4	12 in. to 36 in.	Boulders

* Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg Limits: suffix d used when L.L. is 23 or less and the P.I. is 6 or less; the suffix is used when L.L. is greater than 26.

** Borderline classifications used for soils possessing characteristics of two groups are designated by combinations of groups symbols. For example; GW-GC, well-graded gravel-sand mixture with clay binder.

Quality Testing, LLC 175 S Hamilton Place Bldg 6, Suite 114 Gilbert, AZ 85233	Project Name:	DVT Taxiway Bravo	**Boring No.: B-01**
	Location:	Deer Valley Airport, Phoenix, AZ	
QT Job No: 19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation: ft
Date Started: 9/3/2019	Driller Name:	Andrew	Total Depth: 10.9 ft
Date Finished: 9/3/2019	Drill Rig Type:	CME 75	
Logged By: R.Hartz	Drill Method:	Hollow Stem Auger	
Checked By:	Bore Hole Diameter:	7.5"	Page: 1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown,damp, medium dense											
				R-		7-14 (21)		119	5	29	42	29		
				S-									36	23
5		SP	(SP) Poorly Graded SAND, brown, damp, loose, trace fine-to-coarse gravel, trace clay											
				SS-		4-3-5 (8)								
10		CL	(CL) Lean CLAY, brown, hard, slightly damp, few fine-to-coarse sand, trace fine-to-coarse gravel, weak-to-no cementation	SS-		10-50 (60)								
			Bottom of borehole at 10.9 feet.											

Quality Testing, LLC
175 S Hamilton Place
Bldg 6, Suite 114
Gilbert, AZ 85233

Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-02**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Surface Elevation:	ft
Date Started:	9/3/2019	Driller Name:	Andrew
Total Depth:	7.1 ft
Date Finished:	9/3/2019	Drill Rig Type:	CME 75
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger
Checked By:		Bore Hole Diameter:	7.5"
Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ◧	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, medium dense											
				SS-		17-6-7 (13)								
				S-						33	39	28	38	24
		GC	(GC) Clayey Gravel, greyish brown, moist, very dense, few-to-little fine-to-coarse sand											
5														
			No recovery due to loose and gravelly material Difficult drilling due to possible gravel and cobbles	R-		50								
				SS-		50								
			Refusal at 7.0 feet. Bottom of borehole at 7.1 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-03**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/3/2019	Driller Name: Andrew	Total Depth:	7.1 ft
Date Finished: 9/3/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▞	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND, brown, moist, medium dense, trace fine-to-coarse gravel, scattered caliche filaments, weak cementation											
				R-		6-12 (18)		116	12					
				S-						7	52	41	51	37
				R-		7-10 (17)		106	11					
5														
		GC	(GC) Clayey GRAVEL, greyish brown, damp,very dense, few to little fine to coarse sand, no caliche observed Difficult drilling due to possible gravel and cobbles	SS-		27-50 (77)								
				SS-		50								
			Refusal at 7.0 feet. Bottom of borehole at 7.1 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-04**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Surface Elevation:	ft
Date Started:	9/3/2019	Driller Name:	Andrew
Total Depth:	8.5 ft
Date Finished:	9/3/2019	Drill Rig Type:	CME 75
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger
Checked By:		Bore Hole Diameter:	7.5"
Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, light brown, slightly damp, very dense, scattered caliche nodules, weak cementation											
				SS-		50								
			Difficult drilling due to possible gravel and cobbles	S-						30	46	24	52	31
5														
				R-		50		114	3					
		SP	(SP) Poorly graded SAND, light brown, slightly damp, very dense											
				SS-		50								
			Refusal at 8.0 feet. Bottom of borehole at 8.5 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-05**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/3/2019	Driller Name: Andrew	Total Depth:	10.2 ft
Date Finished: 9/3/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, dense											
				R-		23-31 (54)		123	6					
				S-						29	41	30	41	24
5			Difficult drilling due to possible gravel and cobbles											
			Very dense	SS-		50								
		SP	(SP) Poorly graded SAND, light brown, dry, very dense,											
10				SS-		50								
			Bottom of borehole at 10.2 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-06**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/3/2019	Driller Name: Andrew	Total Depth:	10 ft
Date Finished: 9/3/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, medium dense											
				R-		9-21 (30)		120	7					
				S-						28	40	32	56	40
			Scattered caliche nodules, very dense	SS-		37-50 (87)								
5														
		GC	(GC) Clayey GRAVEL, greyish brown, damp, very dense, few-to-little fine to coarse sand, no caliche observed	R-		50		101	9					
			Difficult drilling due to possible gravel and cobbles											
		SP	(SP) Poorly graded SAND, light brown, slightly damp, medium dense, trace fine to coarse gravel	SS-		21-11-10 (21)								
10			Bottom of borehole at 10.0 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-07**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/3/2019	Driller Name: Andrew	Total Depth:	10.2 ft
Date Finished: 9/3/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R ☐	SS ☒	ST ■	S ▚	RC ▮	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
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▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium: (GC) Clayey GRAVEL with sand, light brown, damp, dense, few-to-little silt											
				SS-		20-20-15 (35)		104	12					
				S-						40	39	21	31	19
5		GC	(GC) Medium dense											
				R-		18-14 (32)								
			Difficult drilling due to possible gravel and cobbles											
		SP	(SP) Poorly graded SAND, light brown, dry, very dense, trace fine-to-coarse gravel											
10				SS-		50								
			Bottom of borehole at 10.2 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-08**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Surface Elevation:	ft
Date Started:	9/3/2019	Driller Name:	Andrew
Total Depth:	10.4 ft
Date Finished:	9/3/2019	Drill Rig Type:	CME 75		
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:		Bore Hole Diameter:	7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, loose											
			No recovery due to gravelly material	R-		12-11 (23)		93	8					
				S-						24	38	38	49	32
5														
			Very Dense, slightly damp	R-		27-50 (77)		132	3					
			Difficult drilling due to possible gravel and cobbles											
			Light brown, scattered caliche nodules											
		SP	(SP) Poorly graded SAND, light brown, damp, very dense, trace fine-to-coarse gravel, scattered caliche nodules											
10				SS-		50								
			Bottom of borehole at 10.4 feet.											

Quality Testing, LLC 175 S Hamilton Place Bldg 6, Suite 114 Gilbert, AZ 85233	Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-09**
	Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/3/2019	Driller Name:	Andrew	Total Depth:	11.5 ft
Date Finished: 9/3/2019	Drill Rig Type:	CME 75		
Logged By: R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:	Bore Hole Diameter:	7.5"	Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▞	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
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▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium: (GC) Clayey GRAVEL with sand, brown, moist, loose, trace fine-to-coarse gravel											
				R-		10-12 (22)		108	12					
				S-						33	31	36	45	30
			Damp	R-		10-12 (22)		103	8					
5														
		SP	(SP) Poorly graded SAND, light brown, damp, loose, few-to-little clay											
				SS-		5-3-2 (5)								
			Difficult drilling due to possible gravel and cobbles											
10			Very dense, few-to-little silt											
		SC	(SC) Clayey SAND, moist, brown, very dense, scattered caliche nodules, moderate cementation	SS-		23-25-28 (53)								
			Bottom of borehole at 11.5 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-10**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Date Started:	9/3/2019	Driller Name:	Andrew
Date Finished:	9/3/2019	Drill Rig Type:	CME 75
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger
Checked By:		Bore Hole Diameter:	7.5"
Surface Elevation:	ft		
Total Depth:	10.1 ft		
Page:	1 of 1		

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, medium dense, scattered caliche nodules, weak cementation											
				SS-		7-13-14 (27)								
		GP	(GP) Poorly graded GRAVEL, greyish brown, slightly damp, dense, few-to-little clay, no caliche or cementation observed	S-						30	42	28	34	20
5														
		SC	(SC) Clayey SAND, brown, damp, very dense, few fine-to-coarse gravel, weak cementation	R-		50		118	4					
10				SS-		50								
			Bottom of borehole at 10.1 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-11**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/3/2019	Driller Name: Andrew	Total Depth:	10.1 ft
Date Finished: 9/3/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, moist, medium dense, scattered caliche filaments, weak cementation											
				R-		12-9 (21)		113	10					
				S-						20	37	43	53	35
5														
				SS-		9-19-28 (47)								
			Difficult drilling due to possible gravel and cobbles											
10				SS-		50								
			Bottom of borehole at 10.1 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-12**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	5.3 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, moist, loose											
			Wet	R-		6-8 (14)		106	16					
				S-						24	38	38	44	27
			Medium dense, damp	R-		19-18 (37)		102	9					
5		SP	(SP) Poorly graded SAND, light brown, dry, very dense, few fine-to-coarse gravel	SS-		50								
			Refusal at 5.0 feet. Bottom of borehole at 5.3 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-13**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	11.5 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R ☐	SS ☒	ST ■	S ▞	RC ▮	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, dense		▞									
				SS-	▞	6-10-31 (41)				44	35	21	35	20
		SP	(SP) Poorly graded SAND, light brown, damp, dense, scattered caliche nodules	S-	▞					30	42	28	47	31
				R-	▞	27-33 (60)		96	7					
5					▞									
			Very dense	SS-	╳	50								
10			Medium dense, no cementation or caliche nodules observed	SS-	╳	4-4-11 (15)								
			Bottom of borehole at 11.5 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-14**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	10.1 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, greyish brown, damp, medium dense											
				R-		12-20 (32)		112	8					
				S-						36	40	24	26	10
5														
			Dense	SS-		5-9-13 (22)								
10			Very dense, few-to-little silt	SS-		50								
			Bottom of borehole at 10.1 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-15**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	11.5 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, slightly damp, medium dense											
				R-		14-10 (24)		100	4					
				S-						39	41	21	25	10
			Very dense, slightly damp	R-		19-50 (69)		120	4					
5														
		SP	(SP) Poorly graded SAND, light brown, slightly damp, very dense, trace fine-to-coarse gravel Difficult drilling due to possible gravel and cobbles	SS-		28-50 (78)								
10			Medium dense, scattered caliche nodules	SS-		13-14-14 (28)								
			Bottom of borehole at 11.5 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-16**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	8.6 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		CL	Alluvium:(CL) Lean CLAY with sand, brown, moist, loose, trace fine-to-coarse gravel	SS-		6-3-5 (8)				10	19	71	36	23
5			Medium Dense, damp	R-		24-24 (48)		103	7					
			Difficult drilling due to possible gravel and cobbles											
		SP	(SP) Poorly graded SAND, light brown, dry, very dense											
				SS-		50								
			Refusal at 8.0 feet. Bottom of borehole at 8.6 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-17**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	8.6 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown,damp, medium dense, trace fine-to-coarse gravel											
				R-		17-15 (32)								
				S-				116	7	32	39	29	37	24
5														
			Medium dense	SS-		10-8-8 (16)								
			Very dense											
			Refusal at 8.5 feet. Bottom of borehole at 8.6 feet.	SS-		50								
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-18**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name: Andrew	Total Depth:	10.1 ft
Date Finished: 9/4/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▞	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium:(GC) Clayey GRAVEL with sand, brown, slightly damp, medium dense, few-to-little fine to coarse gravel No recovery due to gravelly material											
				SS-		5-6-14 (20)								
				S-						40	36	24	32	19
		SM	(SM) Silty SAND, light brown, slightly damp, dense, few fine-to-coarse gravel No recovery due to gravelly material	R-		23-31 (54)								
5														
		SC	(SC) Clayey SAND, brown, damp, very dense, few fine-to-coarse gravel	R-		50		111	5					
10			Bottom of borehole at 10.1 feet.	SS-		50								

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-19**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started:	9/4/2019	Driller Name:	Andrew	Total Depth:	9.1 ft
Date Finished:	9/4/2019	Drill Rig Type:	CME 75		
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:		Bore Hole Diameter:	7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, moist, loose, few-to-little clay, few-to-little fine to corase sand											
				R-		6-7 (13)		114	11					
				S-						31	32	37	37	22
5			Loose, trace fine to coarse gravel											
			Very dense, sligthly damp	R-		50		116	3					
		SM	(SM) Silty SAND, light brown, dry, very dense, trace fine-to-coarse gravel											
				SS-		50								
			Refusal at 9.0 feet. Bottom of borehole at 9.1 feet.											
10														

Quality Testing, LLC 175 S Hamilton Place Bldg 6, Suite 114 Gilbert, AZ 85233	Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-20**
	Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/4/2019	Driller Name:	Andrew	Total Depth:	10.1 ft
Date Finished: 9/4/2019	Drill Rig Type:	CME 75		
Logged By: R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:	Bore Hole Diameter:	7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, light brown, damp, very dense, scattered caliche nodules, weak cementation											
				SS-		27-26-23 (49)								
				S-						34	39	28	35	19
5														
		SM	(SM) Silty SAND, light brown, moist, dense, few-to-little clay, weak cementation	R-		22-23 (45)		106	12					
			Difficult drilling due to possible gravel and cobbles											
			Very dense, trace fine to coarse gravel											
10				SS-		50								
			Bottom of borehole at 10.1 feet.											

Quality Testing, LLC 175 S Hamilton Place Bldg 6, Suite 114 Gilbert, AZ 85233	Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-21**
	Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name:	Andrew	Total Depth:	11.5 ft
Date Finished: 9/5/2019	Drill Rig Type:	CME 75		
Logged By: R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:	Bore Hole Diameter:	7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, damp, very dense											
				R-		50		102	7					
				S-						28	38	34	46	28
			Slightly damp	R-		50		91	4					
			Difficult drilling due to possible gravel and cobbles											
5														
			Scattered caliche nodules	SS-		50								
10			Medium dense	SS-		11-10-10 (20)								
			Bottom of borehole at 11.5 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-22**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Surface Elevation:	ft		
Date Started:	9/5/2019	Driller Name:	Andrew
Total Depth:	5 ft		
Date Finished:	9/5/2019	Drill Rig Type:	CME 75
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger
Checked By:		Bore Hole Diameter:	7.5"
		Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▚	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▼					
▼					
▼					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium:(SC) Clayey SAND with gravel, light brown, damp, very dense											
				R-		9-14 (23)		103	13					
				S-						21	33	46	45	28
			No recovery due to rock in shoe											
5			Refusal at 5.0 feet. Bottom of borehole at 5.0 feet.	SS-		50								
10														

Quality Testing, LLC 175 S Hamilton Place Bldg 6, Suite 114 Gilbert, AZ 85233	Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-23**
	Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name:	Andrew	Total Depth:	8.1 ft
Date Finished: 9/5/2019	Drill Rig Type:	CME 75		
Logged By: R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:	Bore Hole Diameter:	7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data					
Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	FIELD: Sample Type	FIELD: Ring Sample (blows /6")	FIELD: RQD (%)	LABORATORY: Dry Unit Weight (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Gravel (%)	LABORATORY: Sand (%)	LABORATORY: Fines (%)	LABORATORY: Liquid Limit (%)	LABORATORY: Plasticity Index
		CH	Alluvium: (CH) Fat CLAY with sand, light brown, moist, very dense											
				SS-		7-10-10 (20)								
				S-						4	29	67	51	35
5														
		SC	(SC) Clayey SAND, brown, damp, very dense, few fine-to-coarse gravel Difficult drilling due to possible gravel and cobbles	R-		50		113	8					
				SS-		50								
			Refusal at 8.0 feet. Bottom of borehole at 8.1 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-24**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name: Andrew	Total Depth:	5.1 ft
Date Finished: 9/5/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, light brown, damp, hard, few fine-to-coarse sand, scattered caliche filaments											
				R-		17-50 (67)		120	7					
				S-						25	39	37	43	27
				R-		50								
			Difficult drilling due to possible gravel and cobbles											
5				SS-		50								
			Refusal at 5.0 feet. Bottom of borehole at 5.1 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-25**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name: Andrew	Total Depth:	4.6 ft
Date Finished: 9/5/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R ☐	SS ☒	ST ■	S ◧	RC ▮	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▼					
▼					
▼					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium: (GC) Clayey GRAVEL with sand, brown, damp, very dense											
				SS-		37-50 (87)								
				S-						54	31	16	33	18
				SS-		50								
5			Refusal at 4.5 feet. Bottom of borehole at 4.6 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-26**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Surface Elevation:	ft
Date Started:	9/5/2019	Driller Name:	Andrew
Total Depth:	4.6 ft
Date Finished:	9/5/2019	Drill Rig Type:	CME 75
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger
Checked By:		Bore Hole Diameter:	7.5"
Page:	1 of 1

Symbol	Ring R	Split Spoon SS	Shelby Tube ST	Bulk Sample S	Rock Core RC	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium:(GC) Clayey GRAVEL with sand, greyish brown, dry, very dense	R-		50								
				S-						42	33	25	32	20
			Grey	SS-		50								
5			Refusal at 4.5 feet. Bottom of borehole at 4.6 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-27**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name: Andrew	Total Depth:	6.6 ft
Date Finished: 9/5/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▞	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		CL	Alluvium: (CL) Sandy Lean CLAY, brown, slightly damp, very dense Difficult drilling due to possible gravel and cobbles	R-		50		92	4					
				S-						1	42	58	40	23
				R-		50		98	5					
5		GP	(GP) Poorly graded GRAVEL, grey, slightly damp, very dense, trace clay	SS-		50								
				SS-		50								
			Refusal at 6.5 feet. Bottom of borehole at 6.6 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-28**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.
Surface Elevation:	ft
Date Started:	9/5/2019	Driller Name:	Andrew
Total Depth:	10.9 ft
Date Finished:	9/5/2019	Drill Rig Type:	CME 75
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger
Checked By:		Bore Hole Diameter:	7.5"
Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium: (GC) Clayey GRAVEL with sand, grey, damp, very dense											
				SS-		50								
				S-						38	38	24	30	16
5														
		SC	(SC) Clayey SAND, light brown, slightly damp, medium dense, trace fine-to-coarse gravel	SS-		33-7-8 (15)								
		SP	(SP) Poorly graded SAND,greyish light brown, slightly samp, very dense, scattered caliche nodules											
10				SS-		37-50 (87)								
			Refusal at 8.5 feet. Bottom of borehole at 10.9 feet.											

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-29**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company: Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name: Andrew	Total Depth:	8.7 ft
Date Finished: 9/5/2019	Drill Rig Type: CME 75		
Logged By: R.Hartz	Drill Method: Hollow Stem Auger		
Checked By:	Bore Hole Diameter: 7.5"	Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▚	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		GC	Alluvium: (GC) Clayey GRAVEL with sand, light brown, damp, very stiff, scattered caliche nodules, weak cementation											
				R-		10-10 (20)		107	10					
				S-						46	28	26	54	39
5														
			No recovery due to loose material Medium dense	SS-		6-4-7 (11)								
			Difficult drilling due to possible gravel and cobbles											
		SP	(SP) Poorly graded SAND, light brown, slightly damp, very dense	SS-		50								
			Bottom of borehole at 8.7 feet.											
10														

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Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-30**
Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No:	19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started:	9/5/2019	Driller Name:	Andrew	Total Depth:	10.1 ft
Date Finished:	9/5/2019	Drill Rig Type:	CME 75		
Logged By:	R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:		Bore Hole Diameter:	7.5"	Page:	1 of 1

Symbol	Ring R ☐	Split Spoon SS ☒	Shelby Tube ST ■	Bulk Sample S ▚	Rock Core RC ▮	Casing
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)
▽					
▼					
▽					
▼					
▽					

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND with gravel, brown, moist, medium dense											
				R-		9-10 (19)		114	12					
				S-						25	37	39	38	24
			Damp	R-		10-14 (24)		120	8					
5														
		GC	(GC) Clayey GRAVEL, greyish brown, damp, medium dense											
				SS-		21-12-10 (22)								
			Very dense											
10				SS-		50								
			Bottom of borehole at 10.1 feet.											

Quality Testing, LLC 175 S Hamilton Place Bldg 6, Suite 114 Gilbert, AZ 85233	Project Name:	DVT Taxiway Bravo	**Boring No.:**	**B-31**
	Location:	Deer Valley Airport, Phoenix, AZ		
QT Job No: 19051.00	Drilling Company:	Wildcat Drilling, Inc.	Surface Elevation:	ft
Date Started: 9/5/2019	Driller Name:	Andrew	Total Depth:	10.5 ft
Date Finished: 9/5/2019	Drill Rig Type:	CME 75		
Logged By: R.Hartz	Drill Method:	Hollow Stem Auger		
Checked By:	Bore Hole Diameter:	7.5"	Page:	1 of 1

	Ring	Split Spoon	Shelby Tube	Bulk Sample	Rock Core	Casing
Symbol	R	SS	ST	S	RC	
Inside Diameter (I.D.)	2.42"	1.375"	2.80"	--		
Outside Diameter (O.D.)	3.00"	2.00"	3.00"	--		
Length	18"	18"	30"	--		
Hammer Weight	140 lbs					
Hammer Fall	30"					

Groundwater Data

Symbol	Date	Time	Depth to Water (ft)	Hole Depth (ft)	Casing Depth (ft)

Depth (ft)	Graphic Log	USCS	Material Description	FIELD: Sample ID	Sample Type	Ring Sample (blows /6")	RQD (%)	LABORATORY: Dry Unit Weight (pcf)	Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plasticity Index
		SC	Alluvium: (SC) Clayey SAND, brown, damp, medium dense, few-fine-to coarse gravel											
				R-		14-20 (34)		115	10					
				S-						13	40	47	28	11
			Very dense, slightly damp	R-		50		99	5					
			Difficult drilling due to possible gravel and cobbles											
5														
			Light brown, damp, scattered caliche nodules, weak cementation	SS-		28-29-33 (62)								
10				SS-		50								
			Bottom of borehole at 10.5 feet.											

APPENDIX C: LABORATORY TEST RESULTS

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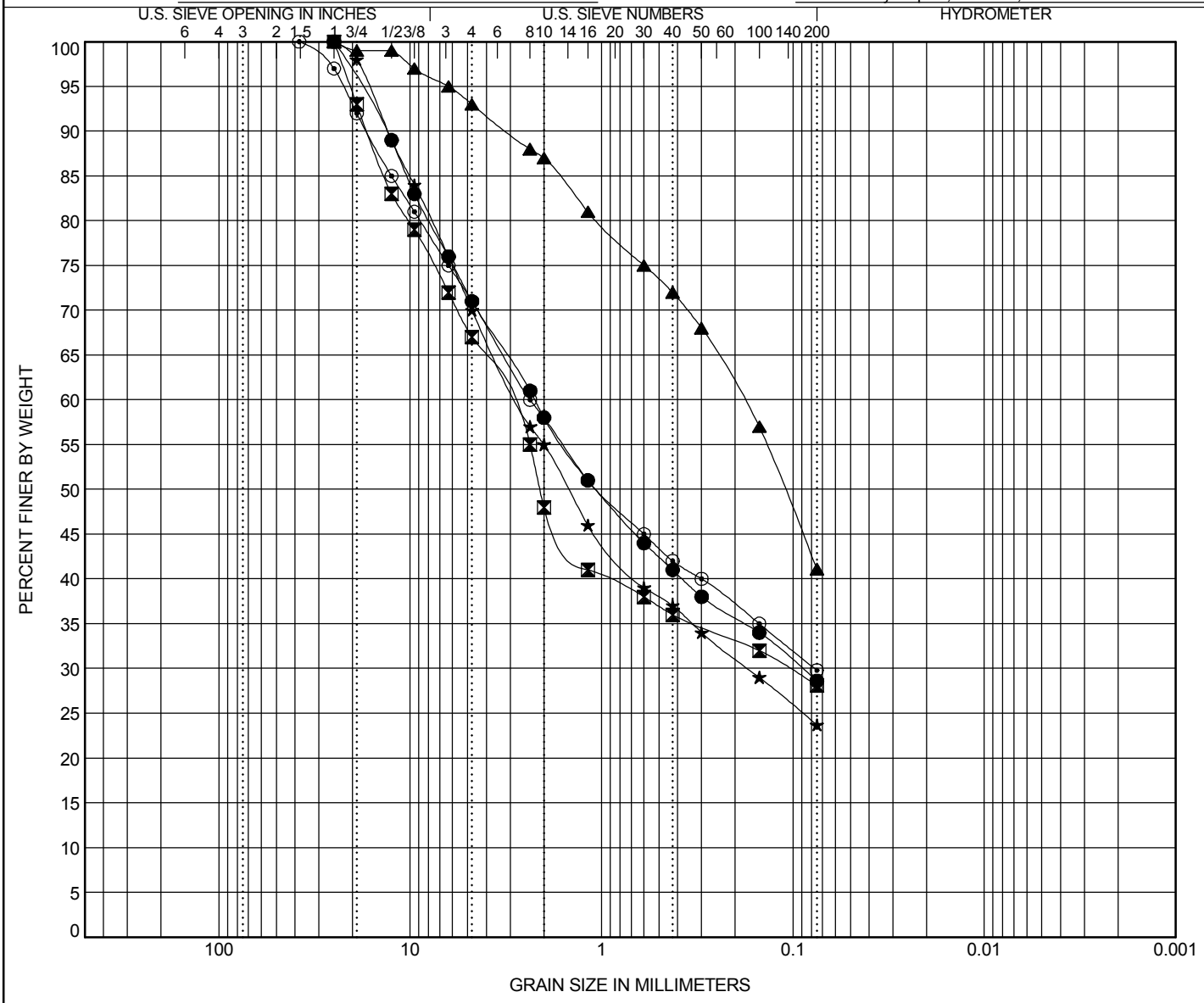
Telephone: 480-486-2000
Fax: 480-496-2001

GRAIN SIZE DISTRIBUTION

CLIENT Trace Consulting, LLC **PROJECT NAME** DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-01	0-5	CLAYEY SAND with GRAVEL(SC)	36	13	23		
⊠ B-02	0-5	bulk	38	14	24		
▲ B-03	0-5	CLAYEY SAND(SC)	51	14	37		
★ B-04	0-5	CLAYEY SAND with GRAVEL(SC)	52	21	31		
⊙ B-05	0-5	CLAYEY SAND with GRAVEL(SC)	41	17	24		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-01	0-5	25	2.233	0.09		29.0	42.4	28.6	
⊠ B-02	0-5	25	3.159	0.105		33.0	38.9	28.1	
▲ B-03	0-5	25	0.181			7.0	51.9	41.1	
★ B-04	0-5	25	2.773	0.172		30.0	46.3	23.7	
⊙ B-05	0-5	38	2.36	0.077		29.0	41.2	29.8	

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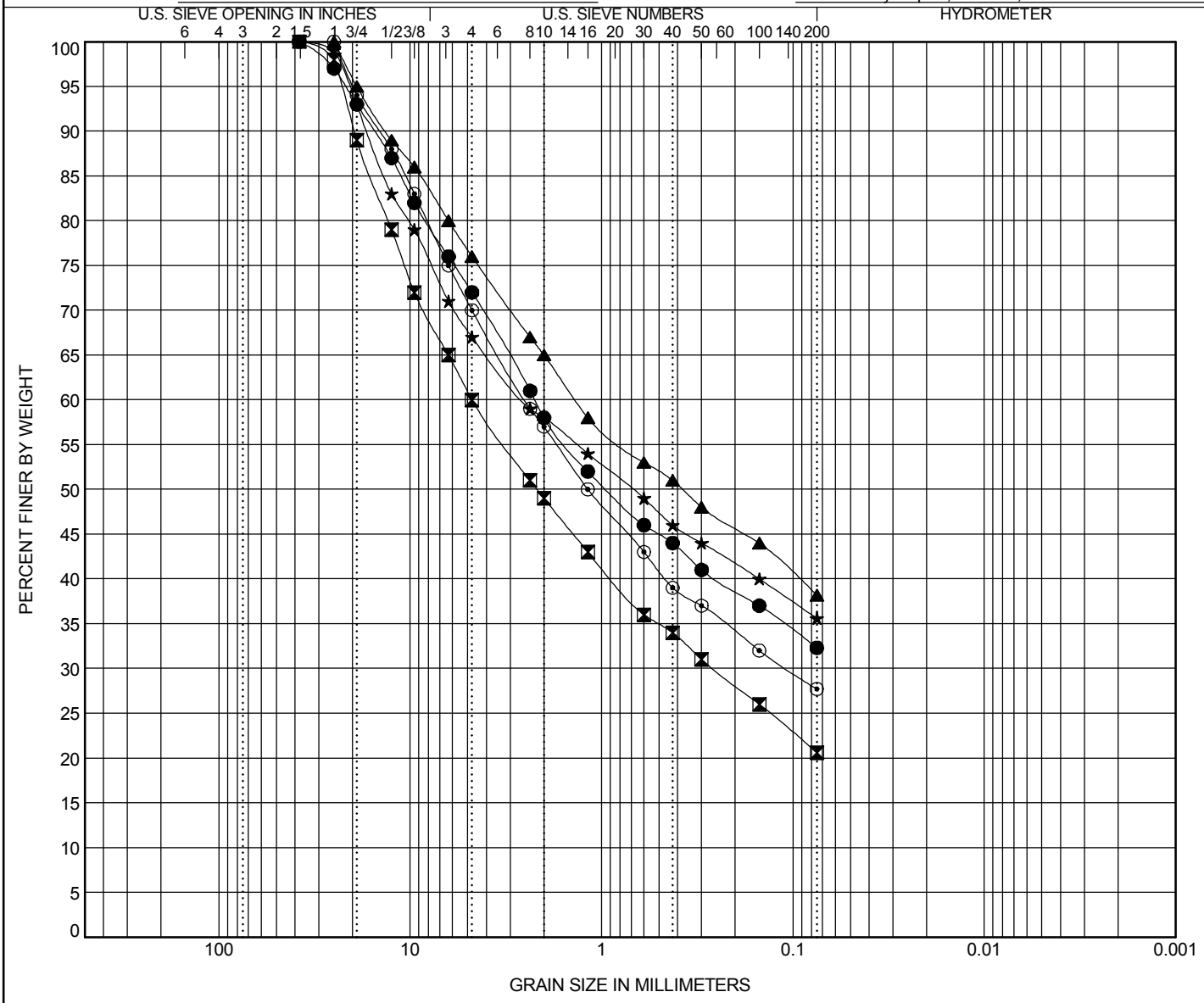
PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-06	0-5	CLAYEY SAND with GRAVEL(SC)	56	16	40		
⊠ B-07	0-5	CLAYEY GRAVEL with SAND(GC)	31	12	19		
▲ B-08	0-5	CLAYEY SAND with GRAVEL(SC)	49	17	32		
★ B-09	0-5	CLAYEY GRAVEL with SAND(GC)	45	15	30		
⊙ B-10	0-5	CLAYEY SAND with GRAVEL(SC)	34	14	20		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-06	0-5	38	2.233			28.0	39.7	32.3	
⊠ B-07	0-5	38	4.75	0.261		40.0	39.4	20.6	
▲ B-08	0-5	25	1.372			24.0	37.8	38.2	
★ B-09	0-5	38	2.576			33.0	31.4	35.6	
⊙ B-10	0-5	25	2.515	0.109		30.0	42.3	27.7	

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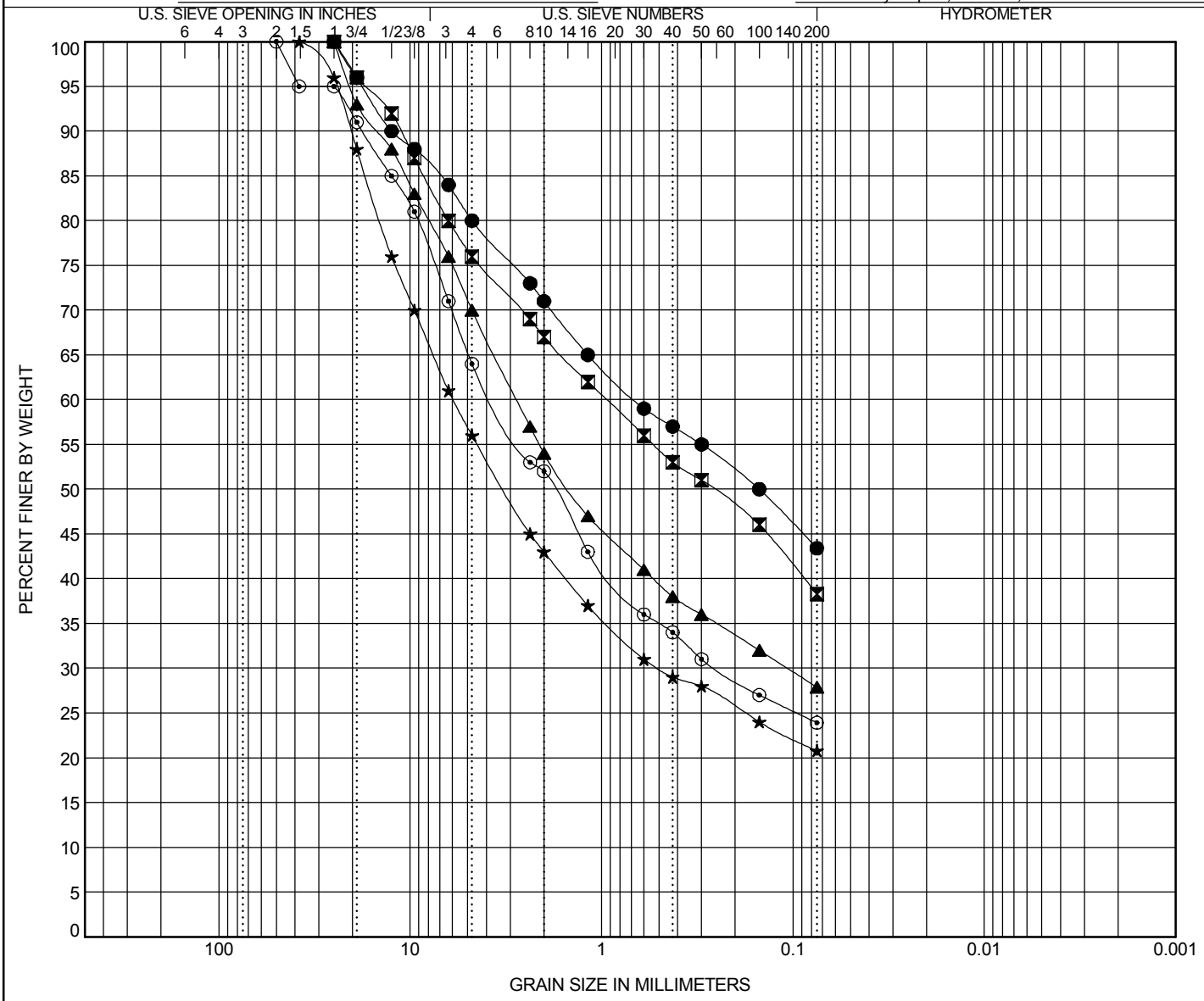

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-11	0-5.0	CLAYEY SAND with GRAVEL(SC)	53	18	35		
⊠ B-12	0-5	CLAYEY SAND with GRAVEL(SC)	44	17	27		
▲ B-13	0-5	CLAYEY SAND with GRAVEL(SC)	47	16	31		
★ B-13	1-2	CLAYEY GRAVEL with SAND(GC)	35	15	20		
⊙ B-14	0-5	CLAYEY SAND with GRAVEL(SC)	26	16	10		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-11	0-5	25	0.672			20.0	36.6	43.4	
⊠ B-12	0-5	25	0.942			24.0	37.7	38.3	
▲ B-13	0-5	25	2.773	0.107		30.0	42.1	27.9	
★ B-13	1-2	38	5.954	0.505		44.0	35.2	20.8	
⊙ B-14	0-5	50	3.683	0.252		36.0	40.1	23.9	

GRAIN SIZE - GINT STD US LAB.GDT - 20/5/28 21:29 - U:\GEOTECH GINT DATA\19051.00 DVT TAXIWAY B\19051.00 DVT TAXIWAY B.GPJ

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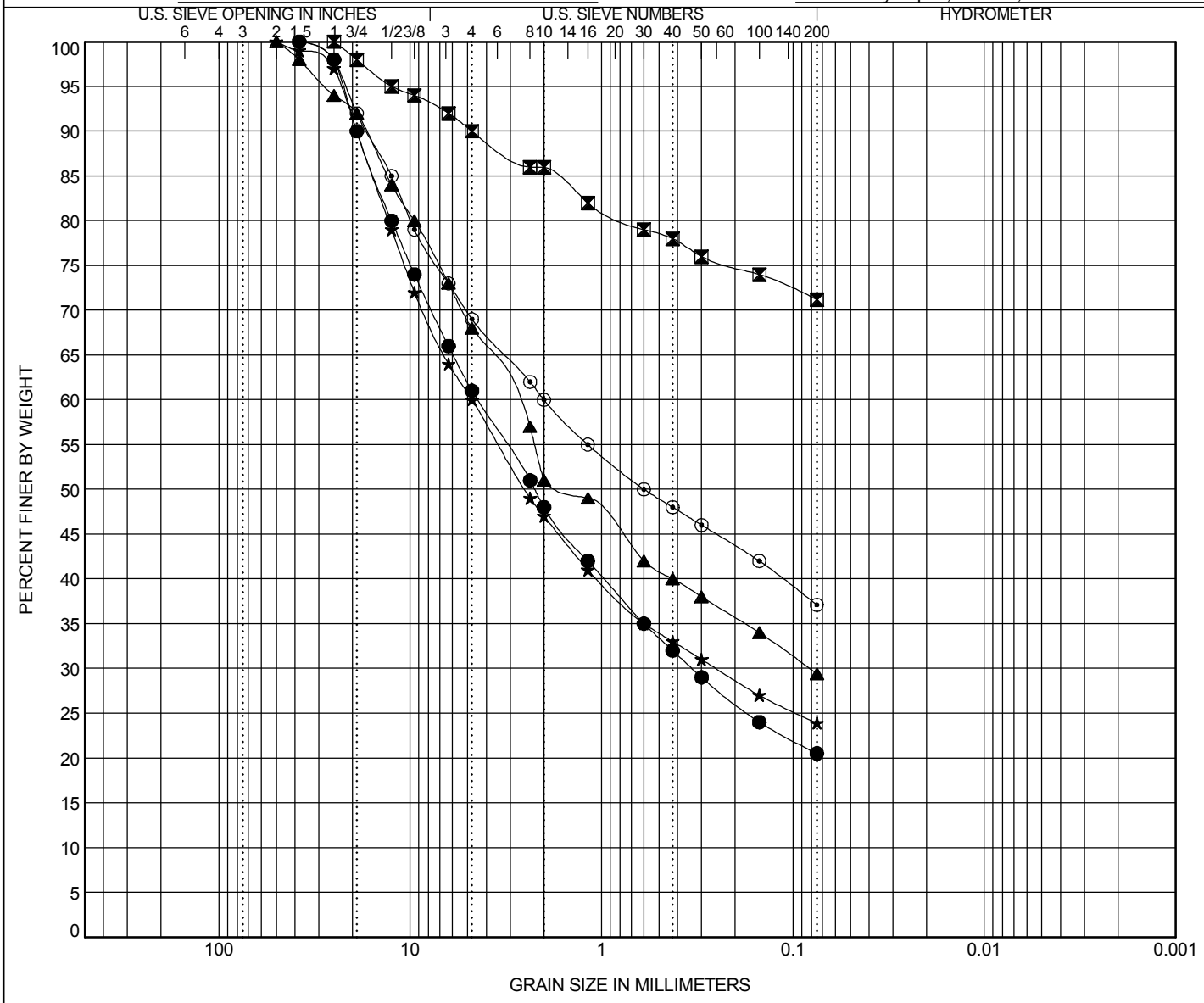

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-15	0-5	CLAYEY SAND with GRAVEL(SC)	25	15	10		
⊠ B-16	0-5	LEAN CLAY with SAND(CL)	36	13	23		
▲ B-17	0-5	CLAYEY SAND with GRAVEL(SC)	37	13	24		
★ B-18	0-5	CLAYEY GRAVEL with SAND(GC)	32	13	19		
⊙ B-19	0-5	CLAYEY SAND with GRAVEL(SC)	37	15	22		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-15	0-5	38	4.429	0.337		39.0	40.5	20.5	
⊠ B-16	0-5	25				10.0	18.8	71.2	
▲ B-17	0-5	50	2.856	0.082		32.0	38.6	29.4	
★ B-18	0-5	50	4.75	0.252		40.0	36.1	23.9	
⊙ B-19	0-5	38	2			31.0	31.9	37.1	

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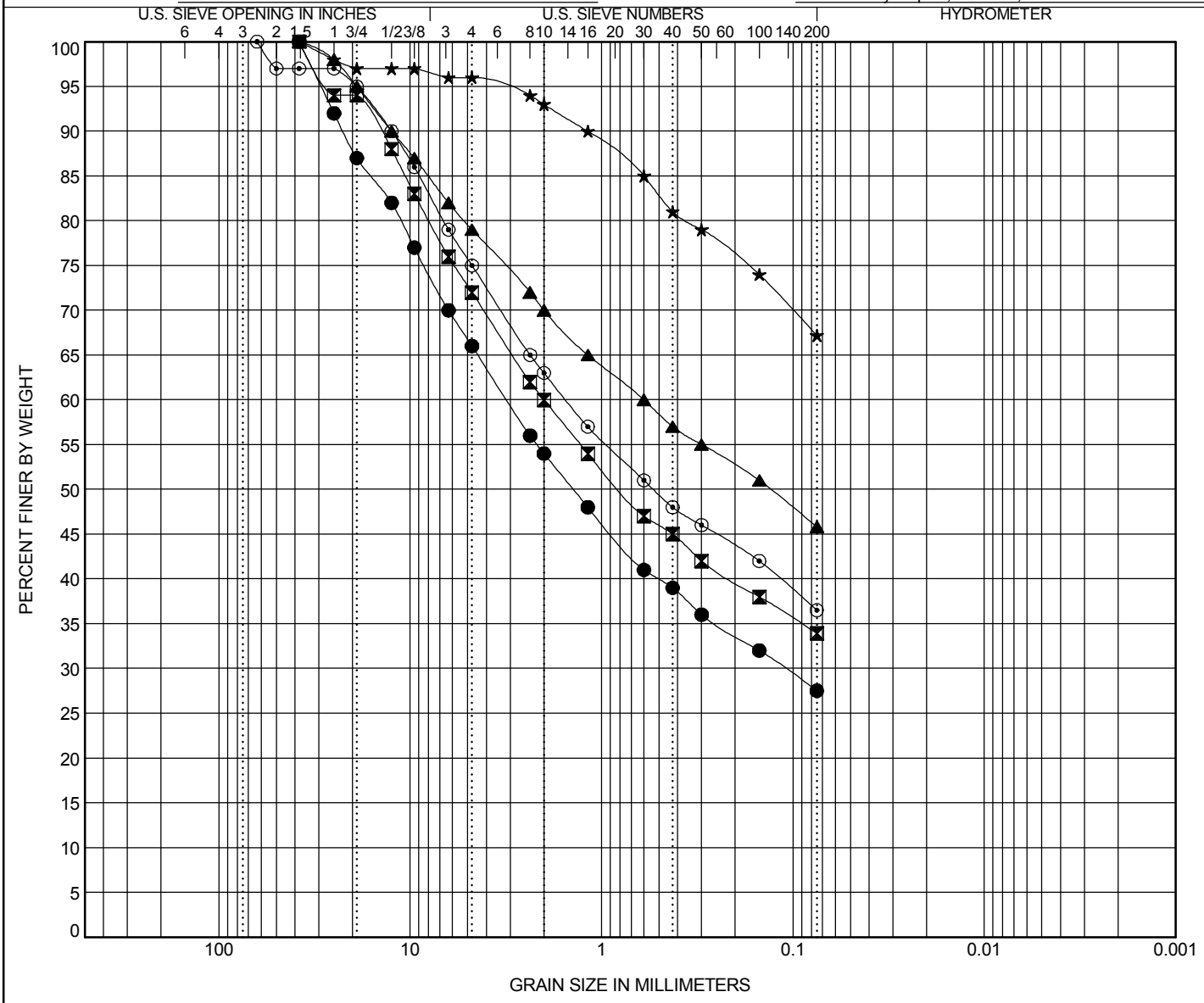

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-20	0-5	CLAYEY SAND with GRAVEL(SC)	35	16	19		
⊠ B-21	0-5	CLAYEY SAND with GRAVEL(SC)	46	18	28		
▲ B-22	0-5	CLAYEY SAND with GRAVEL(SC)	45	17	28		
★ B-23	0-5	SANDY FAT CLAY(CH)	51	16	35		
⊙ B-24	0-5	CLAYEY SAND with GRAVEL(SC)	43	16	27		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-20	0-5	38	3.122	0.11		34.0	38.5	27.5	
⊠ B-21	0-5	38	2			28.0	38.1	33.9	
▲ B-22	0-5	38	0.6			21.0	33.2	45.8	
★ B-23	0-5	38				4.0	28.8	67.2	
⊙ B-24	0-5	63	1.536			25.0	38.5	36.5	

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GRAIN SIZE DISTRIBUTION

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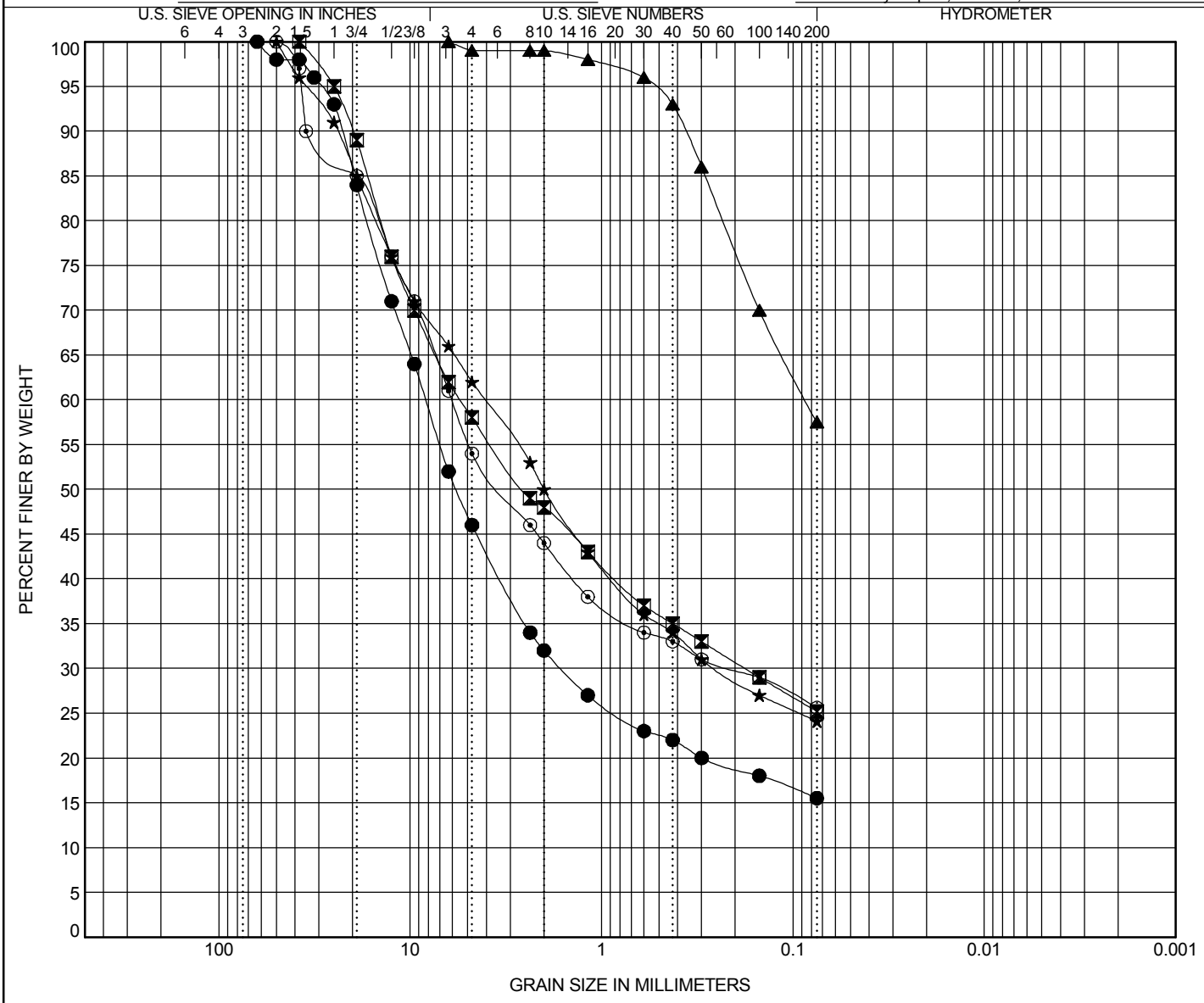

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-25	0-5	CLAYEY GRAVEL with SAND(GC)	33	15	18		
⊠ B-26	0.-5	CLAYEY GRAVEL with SAND(GC)	32	12	20		
▲ B-27	0-5	SANDY LEAN CLAY(CL)	40	17	23		
★ B-28	0-5	CLAYEY GRAVEL with SAND(GC)	30	14	16		
⊙ B-29	0-5	CLAYEY GRAVEL with SAND(GC)	54	15	39		

BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-25	0-5	63	8.284	1.619		54.0	30.5	15.5	
⊠ B-26	0-5	38	5.47	0.178		42.0	32.8	25.2	
▲ B-27	0-5	6.3	0.086			1.0	41.5	57.5	
★ B-28	0-5	50	4.066	0.252		38.0	37.9	24.1	
⊙ B-29	0-5	50	6.051	0.212		46.0	28.4	25.6	

GRAIN SIZE - GINT STD US LAB.GDT - 20/5/28 21:41 - U:\GEOTECH GINT DATA\19051.00 DVT TAXIWAY B\19051.00 DVT TAXIWAY B.GPJ

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GRAIN SIZE DISTRIBUTION

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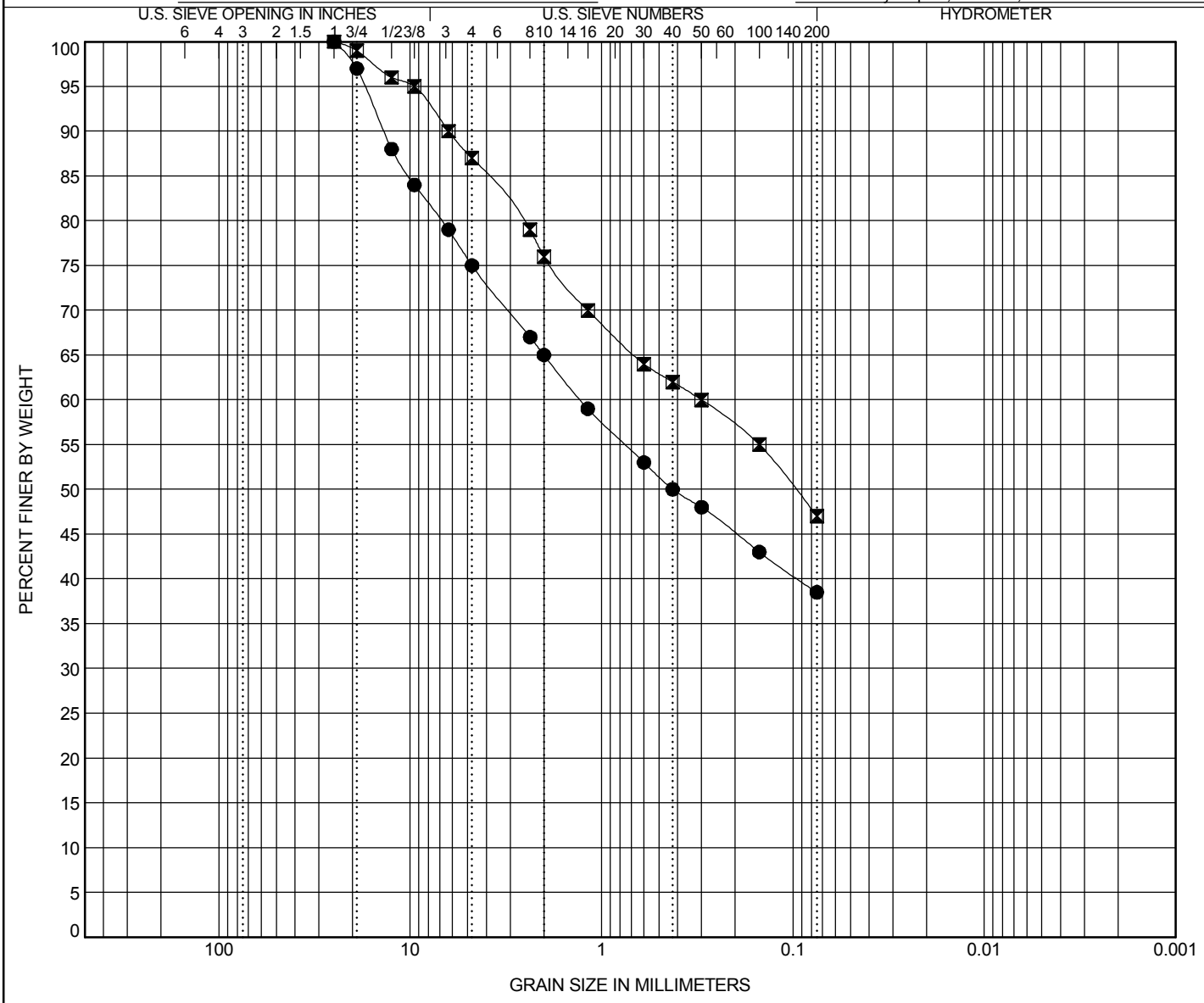
PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**B-30**	**0-5**	**CLAYEY SAND with GRAVEL(SC)**	**38**	**14**	**24**		
⊠	**B-31**	**0-5**	**CLAYEY SAND(SC)**	**28**	**17**	**11**		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B-30**	**0-5**	**25**	**1.288**			**25.0**	**36.5**	**38.5**	
⊠	**B-31**	**0-5**	**25**	**0.3**			**13.0**	**40.0**	**47.0**	

GRAIN SIZE - GINT STD US LAB.GDT - 20/5/28 21:41 - U:\GEOTECH GINT DATA\19051.00 DVT TAXIWAY B\19051.00 DVT TAXIWAY B.GPJ

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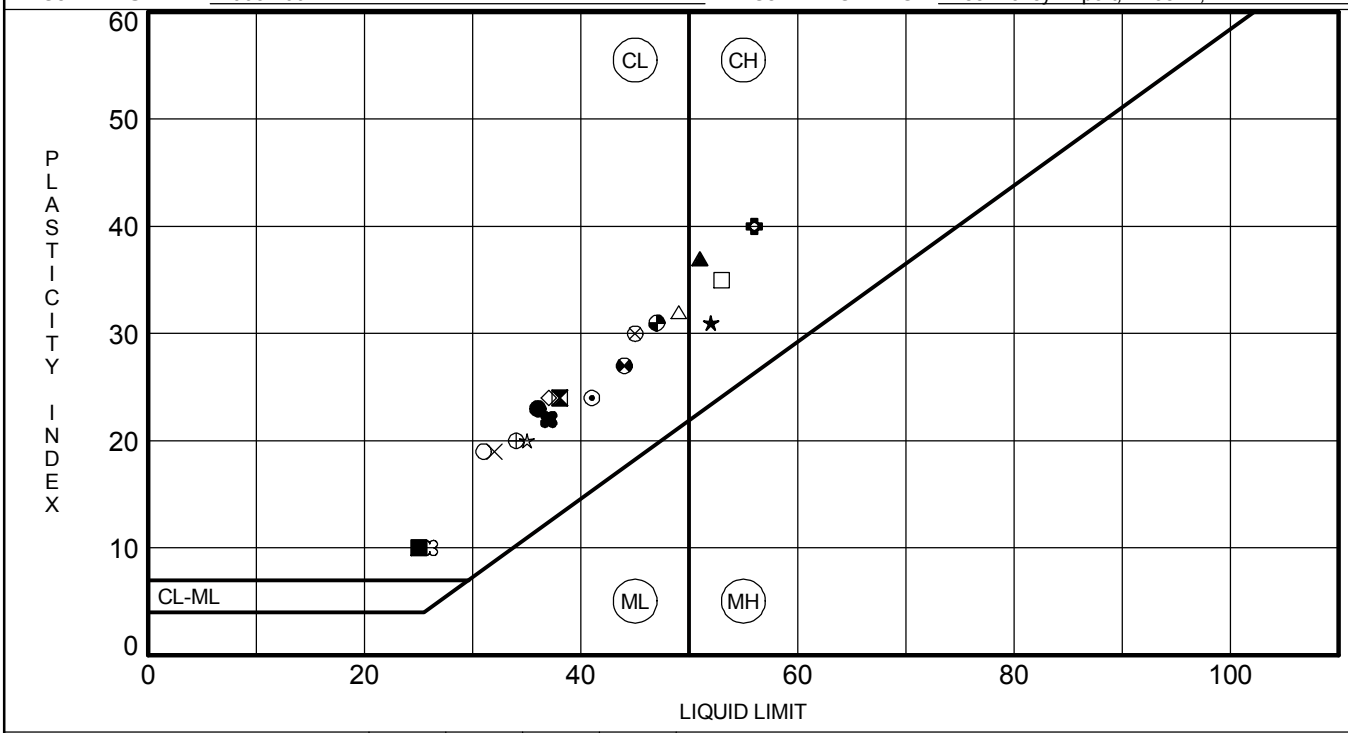
ATTERBERG LIMITS' RESULTS

CLIENT Trace Consulting, LLC **PROJECT NAME** DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ



BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
● B-01	0-5	36	13	23	29	CLAYEY SAND with GRAVEL(SC)
⊠ B-02	0-5	38	14	24	28	bulk
▲ B-03	0-5	51	14	37	41	CLAYEY SAND(SC)
★ B-04	0-5	52	21	31	24	CLAYEY SAND with GRAVEL(SC)
⊙ B-05	0-5	41	17	24	30	CLAYEY SAND with GRAVEL(SC)
✿ B-06	0-5	56	16	40	32	CLAYEY SAND with GRAVEL(SC)
○ B-07	0-5	31	12	19	21	CLAYEY GRAVEL with SAND(GC)
△ B-08	0-5	49	17	32	38	CLAYEY SAND with GRAVEL(SC)
⊗ B-09	0-5	45	15	30	36	CLAYEY GRAVEL with SAND(GC)
⊕ B-10	0-5	34	14	20	28	CLAYEY SAND with GRAVEL(SC)
□ B-11	0-5	53	18	35	43	CLAYEY SAND with GRAVEL(SC)
⊛ B-12	0-5	44	17	27	38	CLAYEY SAND with GRAVEL(SC)
◒ B-13	0-5	47	16	31	28	CLAYEY SAND with GRAVEL(SC)
☆ B-13	1-2	35	15	20	21	CLAYEY GRAVEL with SAND(GC)
⊠ B-14	0-5	26	16	10	24	CLAYEY SAND with GRAVEL(SC)
■ B-15	0-5	25	15	10	21	CLAYEY SAND with GRAVEL(SC)
◆ B-16	0-5	36	13	23	71	LEAN CLAY with SAND(CL)
◇ B-17	0-5	37	13	24	29	CLAYEY SAND with GRAVEL(SC)
× B-18	0-5	32	13	19	24	CLAYEY GRAVEL with SAND(GC)
⊠ B-19	0-5	37	15	22	37	CLAYEY SAND with GRAVEL(SC)

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ATTERBERG LIMITS' RESULTS

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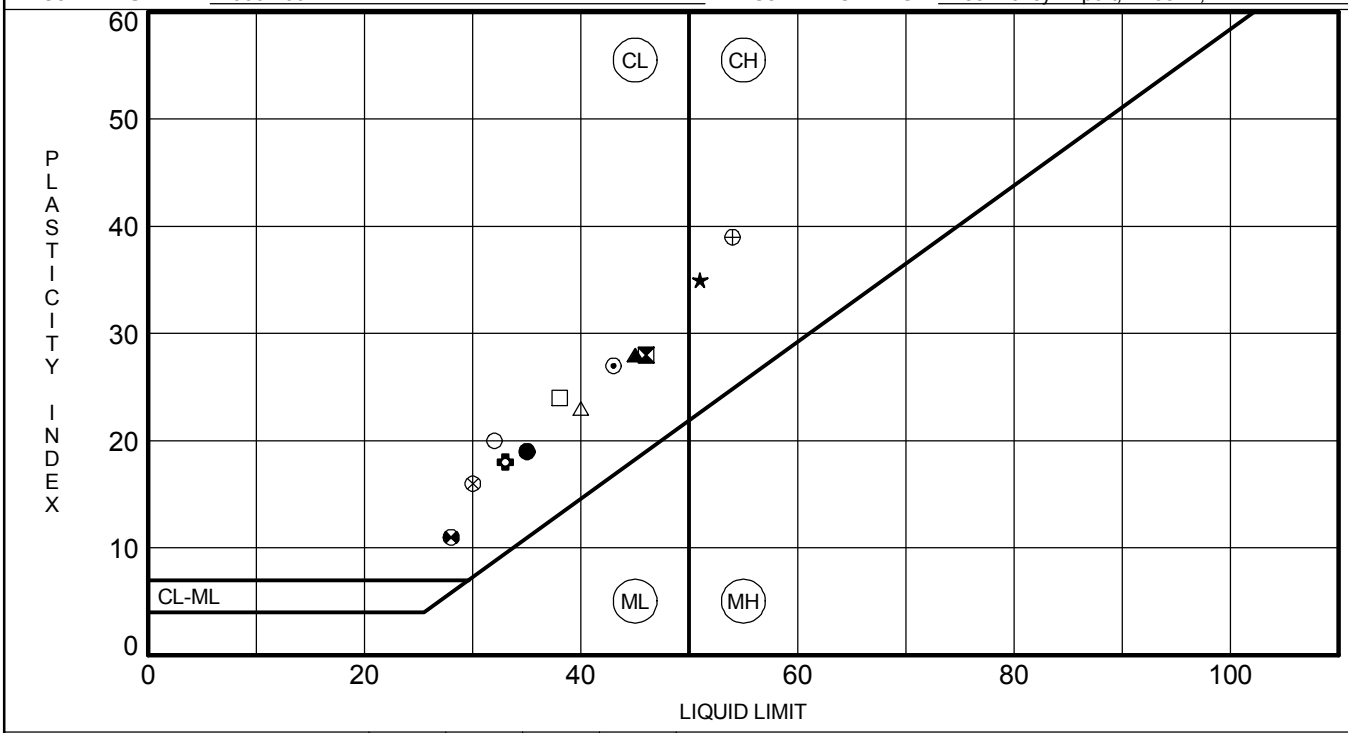
PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-20**	**0-5**	**35**	**16**	**19**	**28**	**CLAYEY SAND with GRAVEL(SC)**
⊠	**B-21**	**0-5**	**46**	**18**	**28**	**34**	**CLAYEY SAND with GRAVEL(SC)**
▲	**B-22**	**0-5**	**45**	**17**	**28**	**46**	**CLAYEY SAND with GRAVEL(SC)**
★	**B-23**	**0-5**	**51**	**16**	**35**	**67**	**SANDY FAT CLAY(CH)**
⊙	**B-24**	**0-5**	**43**	**16**	**27**	**37**	**CLAYEY SAND with GRAVEL(SC)**
✿	**B-25**	**0-5**	**33**	**15**	**18**	**16**	**CLAYEY GRAVEL with SAND(GC)**
○	**B-26**	**0-5**	**32**	**12**	**20**	**25**	**CLAYEY GRAVEL with SAND(GC)**
△	**B-27**	**0-5**	**40**	**17**	**23**	**58**	**SANDY LEAN CLAY(CL)**
⊗	**B-28**	**0-5**	**30**	**14**	**16**	**24**	**CLAYEY GRAVEL with SAND(GC)**
⊕	**B-29**	**0-5**	**54**	**15**	**39**	**26**	**CLAYEY GRAVEL with SAND(GC)**
□	**B-30**	**0-5**	**38**	**14**	**24**	**39**	**CLAYEY SAND with GRAVEL(SC)**
⊛	**B-31**	**0-5**	**28**	**17**	**11**	**47**	**CLAYEY SAND(SC)**

Quality Testing, LLC
175 S. Hamilton Place, Bldg 6, Suite 114
Gilbert, AZ 85233
Telephone: 480-486-2000
Fax: 480-496-2001

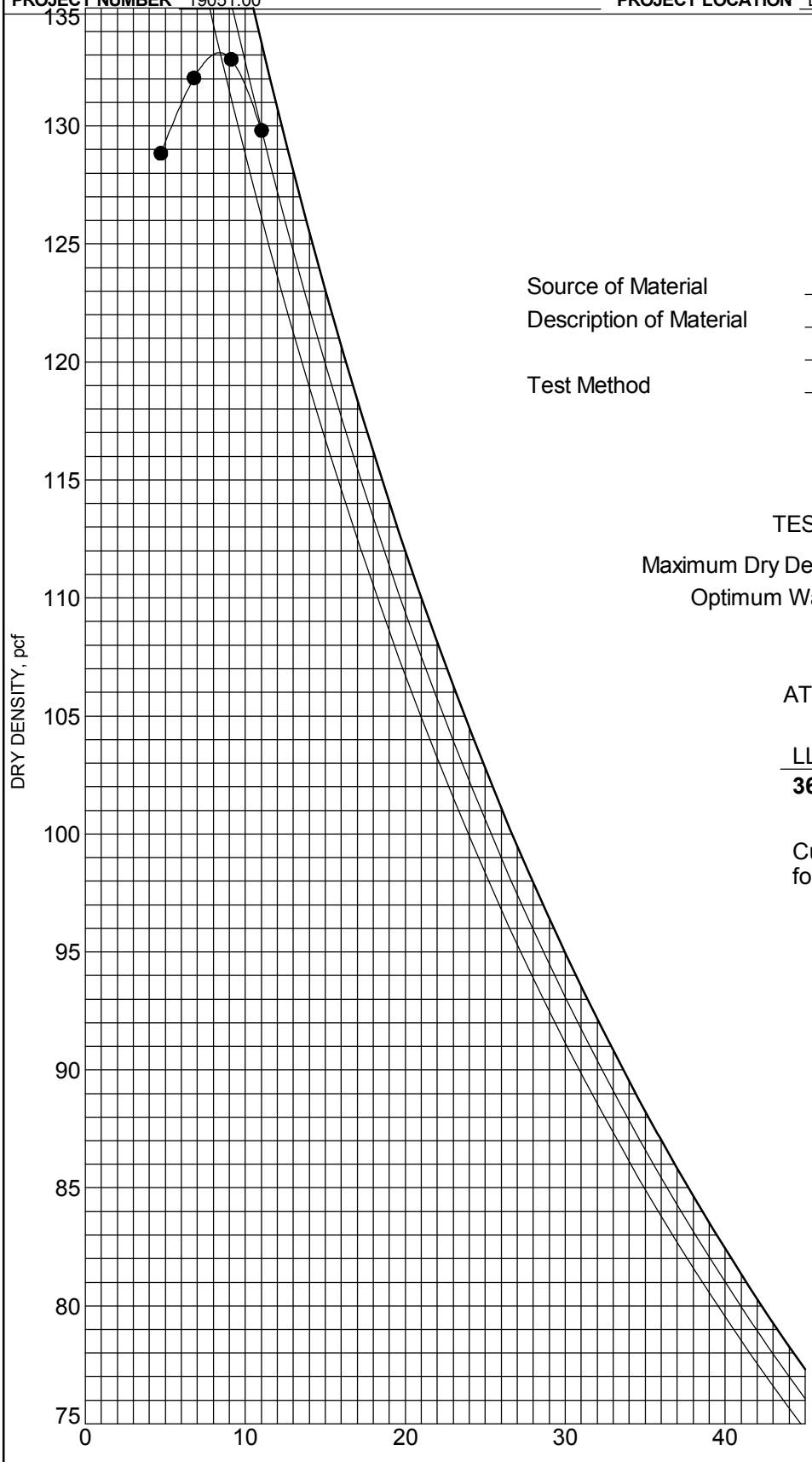
MOISTURE-DENSITY RELATIONSHIP

CLIENT Trace Consulting, LLC

PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00

PROJECT LOCATION Deer Valley Airport, Phoenix, AZ



Source of Material	**B-01 (0-5)**
Description of Material	**CLAYEY SAND with GRAVEL(SC)**
Test Method	**ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density	**132.6**	**PCF**
Optimum Water Content	**8.4**	**%**

ATTERBERG LIMITS

LL	PL	PI
36	**13**	**23**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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MOISTURE-DENSITY RELATIONSHIP

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PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9

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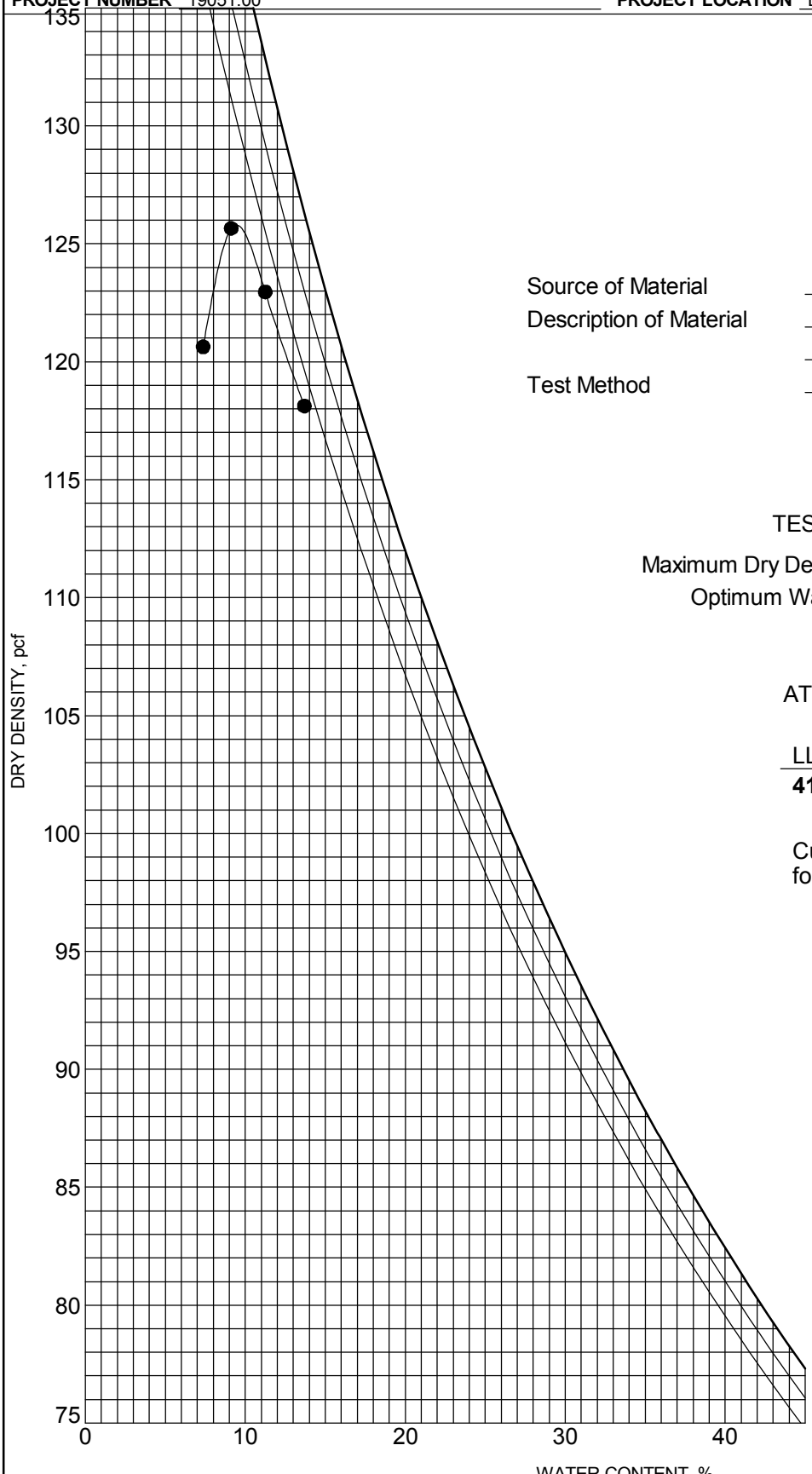

Source of Material	**B-05 (0-5)**
Description of Material	**CLAYEY SAND with GRAVEL(SC)**
Test Method	**ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density	**125.9**	**PCF**
Optimum Water Content	**9.4**	**%**

ATTERBERG LIMITS

LL	PL	PI
41	**17**	**24**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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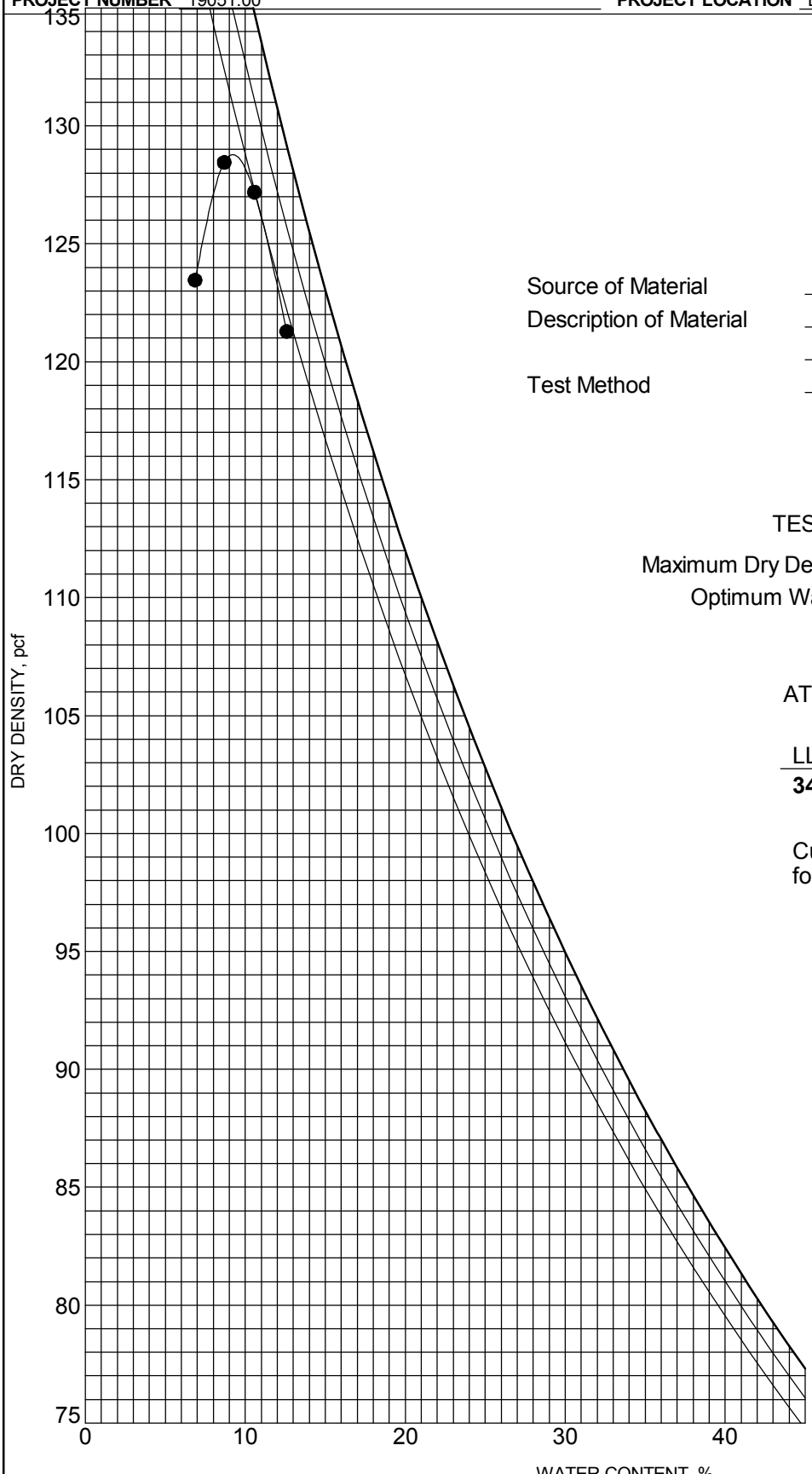
MOISTURE-DENSITY RELATIONSHIP

CLIENT Trace Consulting, LLC

PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00

PROJECT LOCATION Deer Valley Airport, Phoenix, AZ



Source of Material **B-10 (0-5)**

Description of Material **CLAYEY SAND with GRAVEL(SC)**

Test Method **ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density **128.8** **PCF**

Optimum Water Content **9.2** **%**

ATTERBERG LIMITS

LL	PL	PI
34	**14**	**20**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 20/5/28 22:05 - U:\GEOTECH GINT DATA\19051.00 DVT TAXIWAY B\19051.00 DVT TAXIWAY B.GPJ

Quality Testing, LLC
175 S. Hamilton Place, Bldg 6, Suite 114
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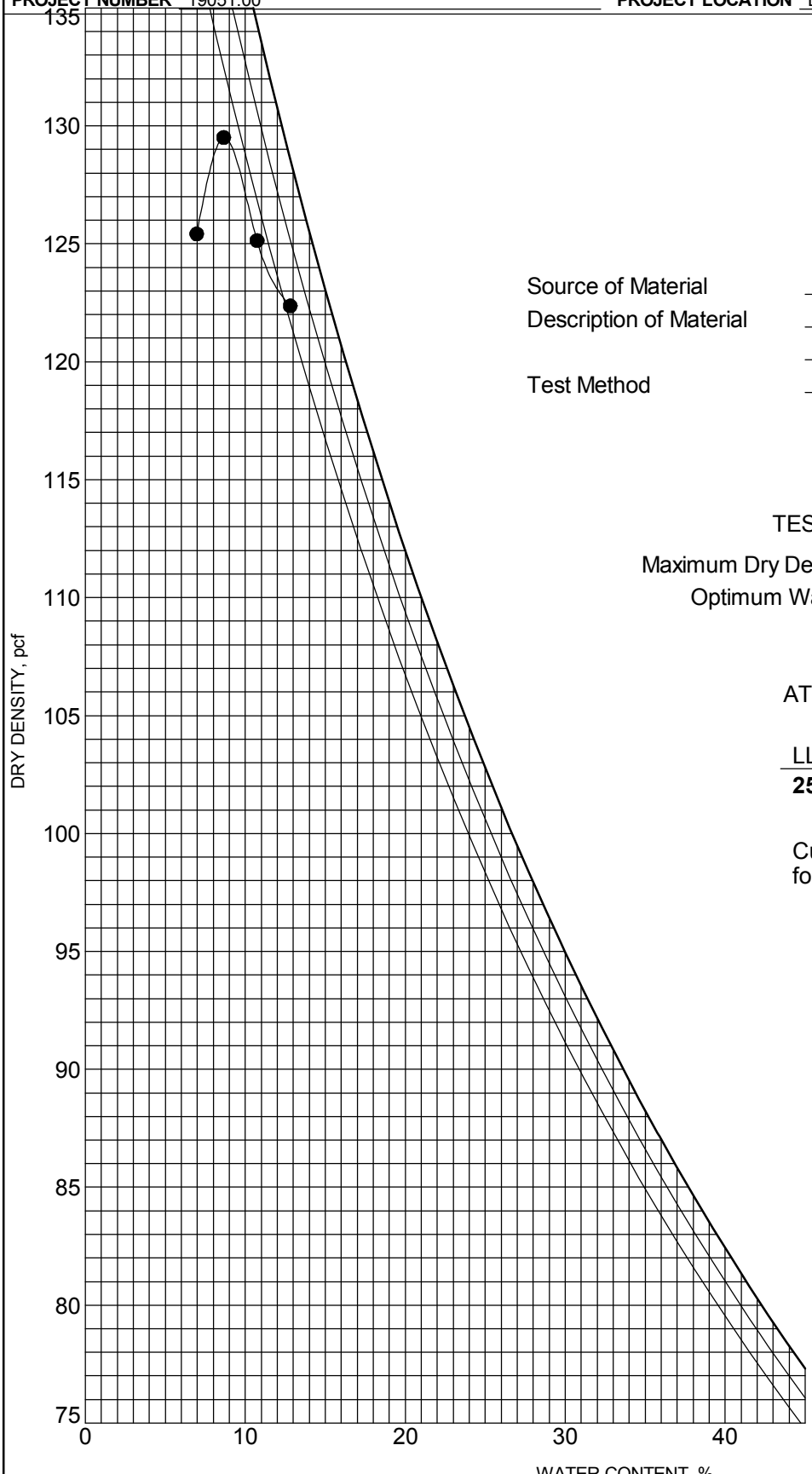
MOISTURE-DENSITY RELATIONSHIP

CLIENT Trace Consulting, LLC
PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9
PROJECT NUMBER 19051.00
PROJECT LOCATION Deer Valley Airport, Phoenix, AZ



Source of Material **B-15 (0-5)**
Description of Material **CLAYEY SAND with GRAVEL(SC)**
Test Method **ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density **129.6** **PCF**
Optimum Water Content **8.7** **%**

ATTERBERG LIMITS

LL	PL	PI
25	**15**	**10**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80
2.70
2.60

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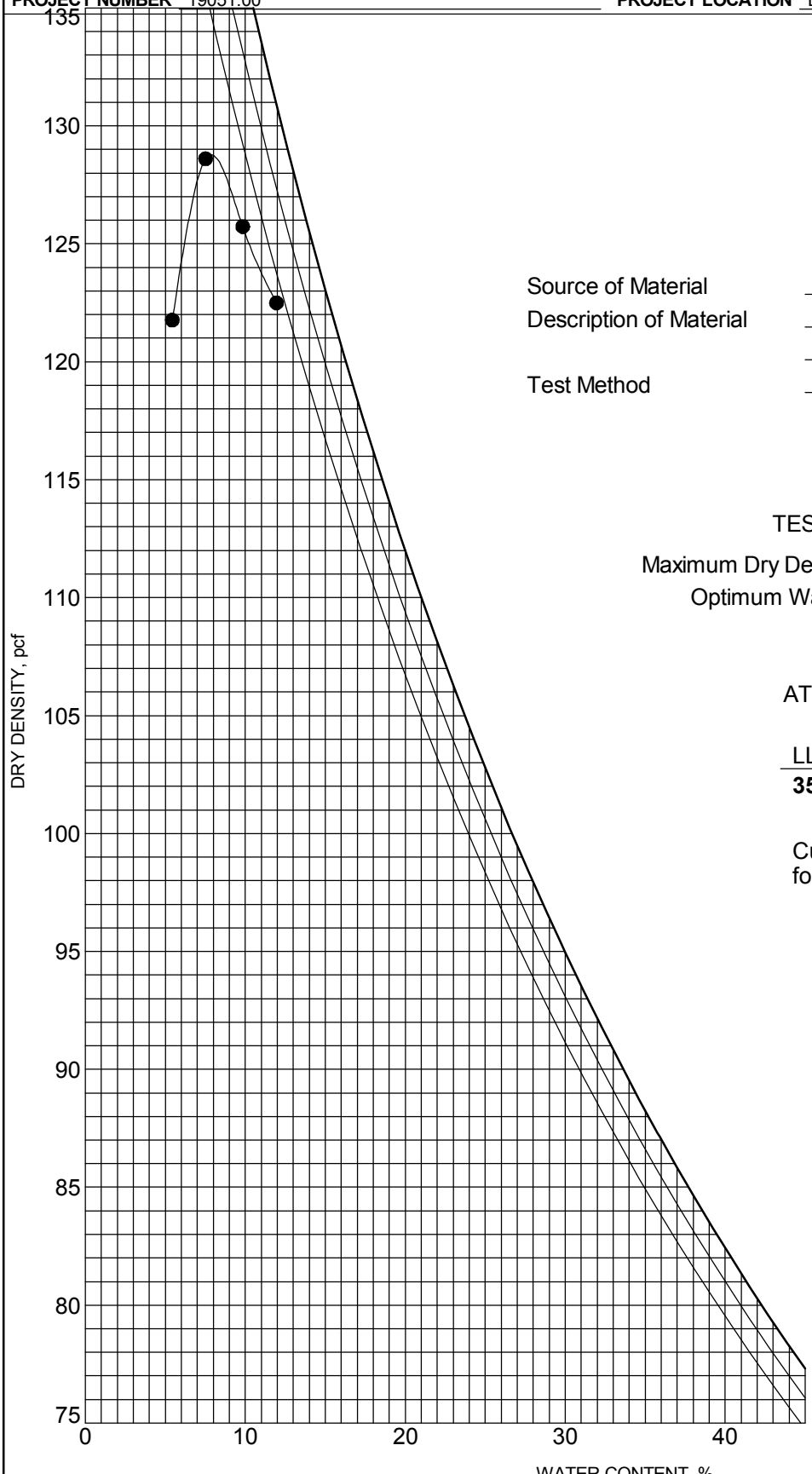
MOISTURE-DENSITY RELATIONSHIP

CLIENT Trace Consulting, LLC

PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00

PROJECT LOCATION Deer Valley Airport, Phoenix, AZ



Source of Material	**B-20 (0-5)**
Description of Material	**CLAYEY SAND with GRAVEL(SC)**
Test Method	**ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density	**128.8**	**PCF**
Optimum Water Content	**7.9**	**%**

ATTERBERG LIMITS

LL	PL	PI
35	**16**	**19**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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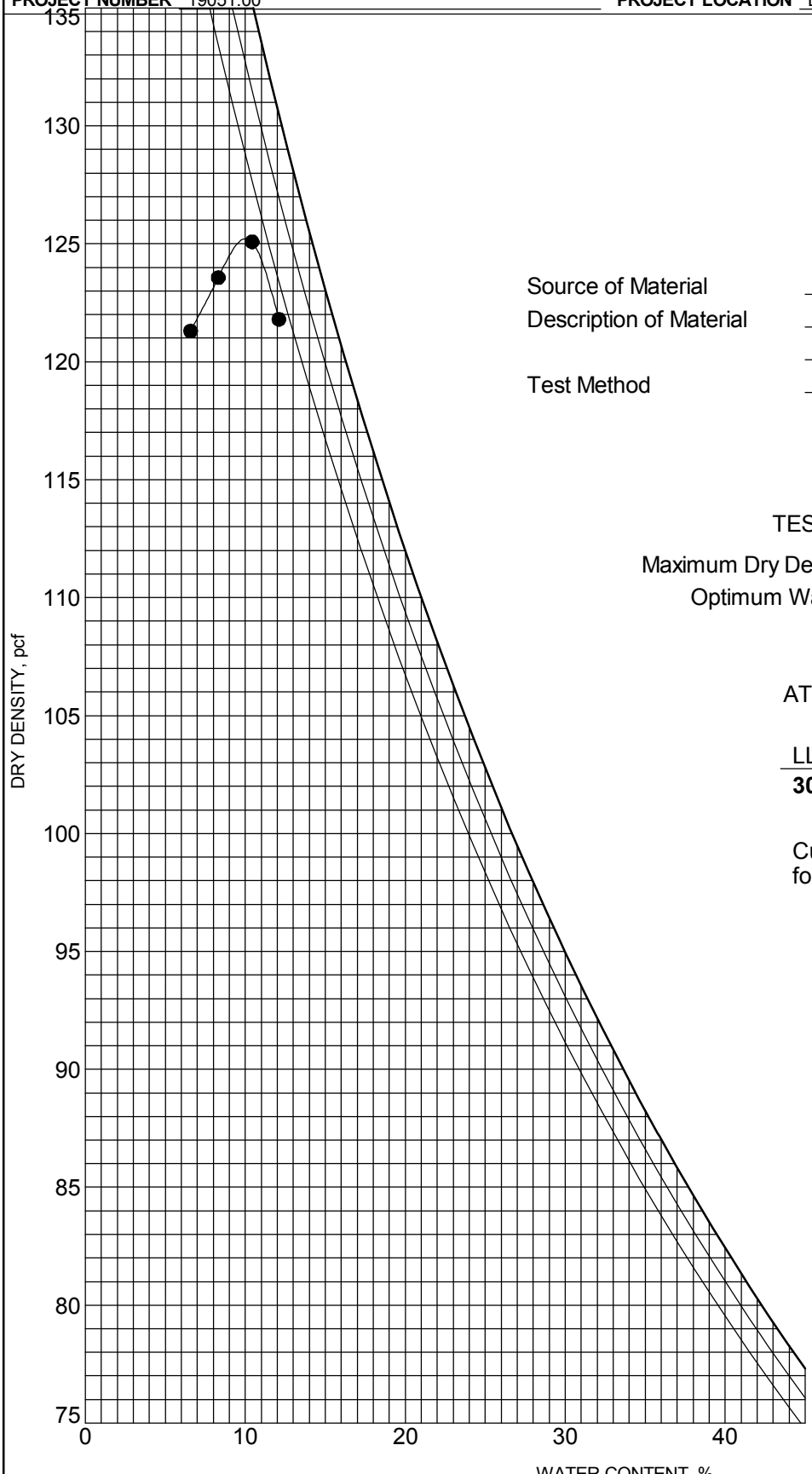
MOISTURE-DENSITY RELATIONSHIP

CLIENT Trace Consulting, LLC

PROJECT NAME DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00

PROJECT LOCATION Deer Valley Airport, Phoenix, AZ



Source of Material **B-28 (0-5)**

Description of Material **CLAYEY GRAVEL with SAND(GC)**

Test Method **ASTM D698 Method C**

TEST RESULTS

Maximum Dry Density **125.3** **PCF**

Optimum Water Content **10.0** **%**

ATTERBERG LIMITS

LL	PL	PI
30	**14**	**16**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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SUMMARY OF LABORATORY RESULTS

CLIENT Trace Consulting, LLC **PROJECT NAME** DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	USCS	Water Content (%)	Dry Density (pcf)	Surcharge (ksf)	Expansion (%)
B-01	0-5	36	13	23	25	29	SC				
B-01	1-2							5.2	119.0	0.144	0.4
B-02	0-5	38	14	24	25	28	SC				
B-03	0-5	51	14	37	25	41	SC				
B-03	1-2							12.1	115.8		
B-03	3.5-4.5							10.8	105.7		
B-04	0-5	52	21	31	25	24	SC				
B-04	6-7							2.6	114.0		
B-05	0-5	41	17	24	38	30	SC				
B-05	1-2							5.6	123.0		
B-06	0-5	56	16	40	38	32	SC				
B-06	1-2							6.5	120.0		
B-06	6-7							8.8	101.1		
B-07	0-5	31	12	19	38	21	GC				
B-07	1-2							11.9	103.6		
B-08	0-5	49	17	32	25	38	SC				
B-08	1-2							7.7	92.7		
B-08	6.0							2.7	131.8		
B-09	0.0	45	15	30	38	36	GC				
B-09	1.0							11.7	107.8		
B-09	3.5-4.5							7.5	103.3		
B-10	0-5	34	14	20	25	28	SC				
B-10	6-7							4.3	118.0		
B-11	0-5	53	18	35	25	43	SC				
B-11	1-2							10.3	112.8		
B-12	0-5	44	17	27	25	38	SC				
B-12	1-2							16.4	105.9		
B-12	3.5-4.5							9.0	102.3		
B-13	0-5	47	16	31	25	28	SC				
B-13	1-2	35	15	20	38	21	GC				
B-13	3.5-4.5							6.9	95.9		
B-14	0-5	26	16	10	50	24	SC				
B-14	1-2							8.4	111.9		
B-15	0-5	25	15	10	38	21	SC				
B-15	1-2							4.1	100.0		
B-15	3.5-4.5							4.2	120.4		
B-16	0-5	36	13	23	25	71	CL				
B-16	6-7							7.4	102.8		
B-17	0-5	37	13	24	50	29	SC	6.9	115.5		
B-18	0-5	32	13	19	50	24	GC				
B-18	6-7							5.0	110.6		
B-19	0-5	37	15	22	38	37	SC				
B-19	1-2							10.8	113.7		

Quality Testing, LLC
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Gilbert, AZ 85233
Telephone: 480-486-2000
Fax: 480-496-2001

SUMMARY OF LABORATORY RESULTS

CLIENT Trace Consulting, LLC **PROJECT NAME** DVT Taxiway Bravo & HS Connectors B6 & B9

PROJECT NUMBER 19051.00 **PROJECT LOCATION** Deer Valley Airport, Phoenix, AZ

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	USCS	Water Content (%)	Unit Weight (pcf)	Surcharge (ksf)	Expansion (%)
B-19	6-7							2.8	116.4		
B-20	0-5	35	16	19	38	28	SC				
B-20	6-7							11.6	106.1		
B-21	0-5	46	18	28	38	34	SC				
B-21	1-2							6.8	102.2		
B-21	3.54.5							3.9	91.4		
B-22	0-5	45	17	28	38	46	SC				
B-22	1-2							13.4	103.4	0.144	2.4
B-23	0-5	51	16	35	38	67	CH				
B-23	6-7							8.4	113.1		
B-24	0-5	43	16	27	63	37	SC				
B-24	1-2							7.3	119.6		
B-25	0-5	33	15	18	63	16	GC				
B-26	0-5	32	12	20	38	25	GC				
B-27	0-5	40	17	23	6.3	58	CL				
B-27	1-2							4.3	92.5		
B-27	3.5-4.5							4.6	97.7		
B-28	0-5	30	14	16	50	24	GC				
B-29	0-5	54	15	39	50	26	GC				
B-29	1-2							9.8	106.8	0.144	1.0
B-30	0-5	38	14	24	25	39	SC				
B-30	1-2							12.4	113.6		
B-30	3.5-4.5							8.4	119.5		
B-31	0-5	28	17	11	25	47	SC				
B-31	1-2							9.5	114.9		
B-31	3.5-4.5							5.0	98.8		

MOTZZ LABORATORY, INC.

Soil Analysis Report

Quality Testing
Jaye Richardson
175 S. Hamilton Place
Bldg 6, Ste 114
Gilbert, AZ 85233

Project: 19051.00
Date Received: 9/13/2019
Date Reported: 9/17/2019
PO Number: 440

Lab Number: 930082-1 **B-03 (0-5), S-4561,**

Sulfate & Chloride	Method	Result	Units	Levels
Sulfate, SO4	ARIZ 733b	51	ppm	
Chloride, Cl	ARIZ 736b	9	ppm	

Lab Number: 930082-2 **B-14 (0-5), S-4589**

Sulfate & Chloride	Method	Result	Units	Levels
Sulfate, SO4	ARIZ 733b	64	ppm	
Chloride, Cl	ARIZ 736b	17	ppm	

Lab Number: 930082-3 **B-21 (0-5), S-4606**

Sulfate & Chloride	Method	Result	Units	Levels
Sulfate, SO4	ARIZ 733b	14	ppm	
Chloride, Cl	ARIZ 736b	7	ppm	

Lab Number: 930082-4 **B-29 (0-5), S-4623**

Sulfate & Chloride	Method	Result	Units	Levels
Sulfate, SO4	ARIZ 733b	11	ppm	
Chloride, Cl	ARIZ 736b	7	ppm	

APPENDIX D: FAARFIELD OUTPUT

FAARFIELD

FAARFIELD v 1.42 - Airport Pavement Design

Section NewFlexib~01 in Job DVA_Taxiway_B.

Working directory is Z:\Shared Folders\Projects\19051.00 - DVA Relocate Txy Bravo & Construct HS Connectors B6 & B9 (Geo)\Pavement Design\faarfield\

The structure is New Flexible. Asphalt CDF was not computed.

Design Life = 20 years.

A design for this section was completed on 05/29/20 at 10:26:45.

Compaction requirements for this section were computed on 05/29/20 at 10:26:53.

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	5.00	200,000	0.35	0
2	P-209 Cr Ag	8.00	38,759	0.35	0
3	User Defined	11.53	12,500	0.35	0
4	Subgrade	0.00	7,500	0.35	0

Total thickness to the top of the subgrade = 24.53 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Citation-525	11,800	22	2.50
2	Citation-525	11,800	15	2.50
3	Citation-525	10,500	126	2.50
4	Citation-525	8,650	91	2.50
5	Chancellor-414	6,000	415	2.50
6	ERJ-135	36,000	71	2.50
7	S-10	10,759	10	2.50
8	Falcon-2000	35,000	34	2.50
9	Learjet-55	21,500	34	2.50
10	S-10	8,600	125	2.50
11	S-10	10,000	18	2.50
12	S-12.5	12,500	50	2.50
13	BeechJet-400	15,500	72	2.50
14	Citation-V	16,500	118	2.50
15	Citation-550B	15,900	59	2.50
16	Citation-550B	12,500	17	2.50
17	Citation-550B	12,500	65	2.50
18	Citation-V	13,870	141	2.50
19	Citation-550B	14,000	106	2.50
20	Citation-550B	14,800	96	2.50
21	D-30	36,000	18	2.50
22	Falcon-50	28,650	23	2.50

23	Falcon-50	38,800	14	2.50
24	Falcon-900	45,500	78	2.50
25	Learjet-35A/65A	10,800	97	2.50
26	Learjet-35A/65A	11,800	12	2.50
27	Learjet-35A/65A	14,650	10	2.50
28	Challenger-CL-604	38,650	790	2.50
29	Challenger-CL-604	41,400	731	2.50
30	Citation-X	35,700	195	2.50
31	Citation-VI/VII	23,200	9	2.50
32	Learjet-35A/65A	21,000	49	2.50
33	Learjet-35A/65A	12,900	68	2.50
34	EMB-175 STD	49,816	51	2.50
35	Gulfstream-G-IV	75,000	186	2.50
36	Gulfstream-G-V	90,900	20	2.50
37	S-12.5	12,500	57	2.50

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Citation-525	0.00	0.00	2.60
2	Citation-525	0.00	0.00	2.60
3	Citation-525	0.00	0.00	2.60
4	Citation-525	0.00	0.00	2.60
5	Chancellor-414	0.00	0.00	2.60
6	ERJ-135	0.00	0.00	1.69
7	S-10	0.00	0.00	2.44
8	Falcon-2000	0.00	0.00	1.88
9	Learjet-55	0.00	0.00	1.98
10	S-10	0.00	0.00	2.44
11	S-10	0.00	0.00	2.44
12	S-12.5	0.00	0.00	2.37
13	BeechJet-400	0.00	0.00	2.47
14	Citation-V	0.00	0.00	2.56
15	Citation-550B	0.00	0.00	2.56
16	Citation-550B	0.00	0.00	2.56
17	Citation-550B	0.00	0.00	2.56
18	Citation-V	0.00	0.00	2.56
19	Citation-550B	0.00	0.00	2.56
20	Citation-550B	0.00	0.00	2.56
21	D-30	0.00	0.00	1.78
22	Falcon-50	0.00	0.00	1.87
23	Falcon-50	0.00	0.00	1.87
24	Falcon-900	0.00	0.00	1.82
25	Learjet-35A/65A	0.00	0.00	1.98
26	Learjet-35A/65A	0.00	0.00	1.98
27	Learjet-35A/65A	0.00	0.00	1.98
28	Challenger-CL-604	0.00	0.00	1.71
29	Challenger-CL-604	0.00	0.00	1.71
30	Citation-X	0.00	0.00	1.94
31	Citation-VI/VII	0.00	0.00	2.08
32	Learjet-35A/65A	0.00	0.00	1.98
33	Learjet-35A/65A	0.00	0.00	1.98

34	EMB-175 STD	0.00	0.00	1.46
35	Gulfstream-G-IV	0.71	0.71	1.73
36	Gulfstream-G-V	0.29	0.30	1.64
37	S-12.5	0.00	0.00	2.37

Subgrade Compaction Requirements

NonCohesive Soil

Percent Maximum Dry Density(%)	Depth of compaction from pavement surface (in)	Depth of compaction from top of subgrade (in)	Critical Airplane for Compaction
100	0 - 21	--	Gulfstream-G-V
95	21 - 40	0 - 16	Gulfstream-G-V
90	40 - 62	16 - 37	Gulfstream-G-V
85	62 - 88	37 - 64	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 - 20	--	Gulfstream-G-V
90	20 - 33	0 - 8	Gulfstream-G-V
85	33 - 46	8 - 22	Gulfstream-G-V
80	46 - 61	22 - 36	Gulfstream-G-V

Subgrade Compaction Notes:

1.Noncohesive soils, for the purpose of determining compaction control, are those with a plasticity index (PI) less than 3.

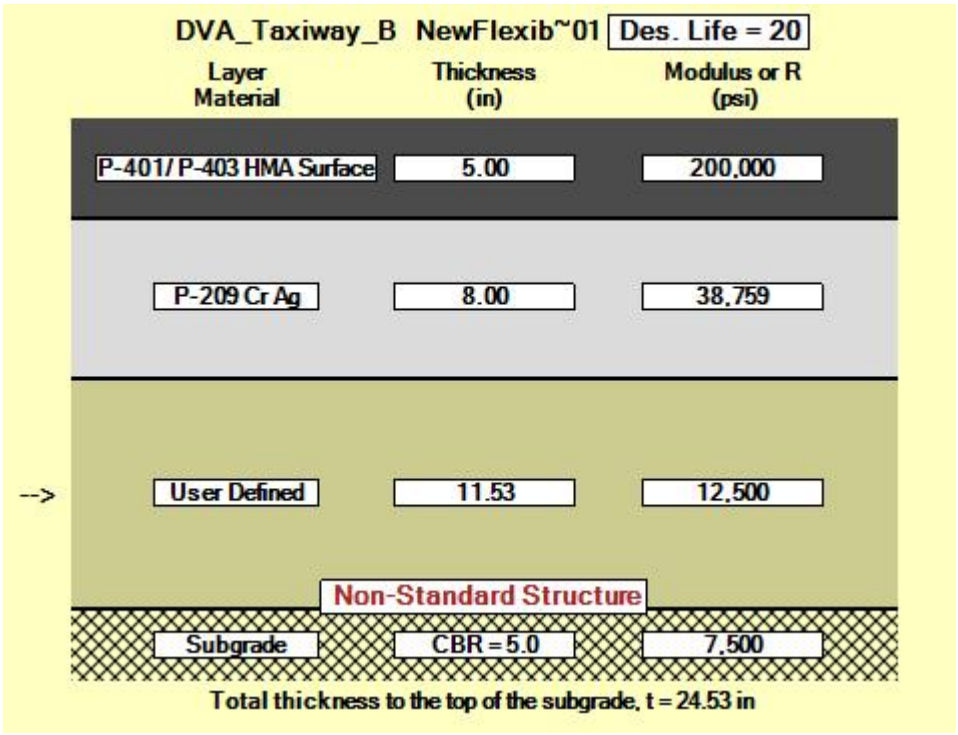
2.Tabulated values indicate depth ranges within which densities should equal or exceed the indicated percentage of the maximum dry density as specified in item P-152.

3.Maximum dry density is determined using ASTM Method D 698.

4.The subgrade in cut areas should have natural densities shown or should (a) be compacted from the surface to achieve the required densities, (b) be removed and replaced at the densities shown, or (c) when economics and grades permit, be covered with sufficient select or subbase material so that the uncompacted subgrade is at a depth where the in-place densities are satisfactory.

5.For swelling soils refer to AC 150/5320-6F paragraph 3.10.

User is responsible for checking frost protection requirements.


DVA_Taxiway_B NewFlexib~01
Des. Life = 20
Layer Material
Thickness (in)
Modulus or R (psi)
P-401/ P-403 HMA Surface
5.00
200,000
P-209 Cr Ag
8.00
38,759
-->
User Defined
11.53
12,500
Non-Standard Structure
Subgrade
CBR = 5.0
7,500
Total thickness to the top of the subgrade, t = 24.53 in

Appendix B: Draft Drainage Report

Draft Drainage Report

Phoenix Deer Valley Airport

Taxiway B Relocation

Phoenix, Arizona

COP Project #AV31000092

Prepared for:
City of Phoenix

Prepared by:
Kimley-Horn
7740 N. 16th Street, Suite 300
Phoenix, Arizona 85020
(602) 944-5500

KHA Project Number 091385034

May 21, 2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

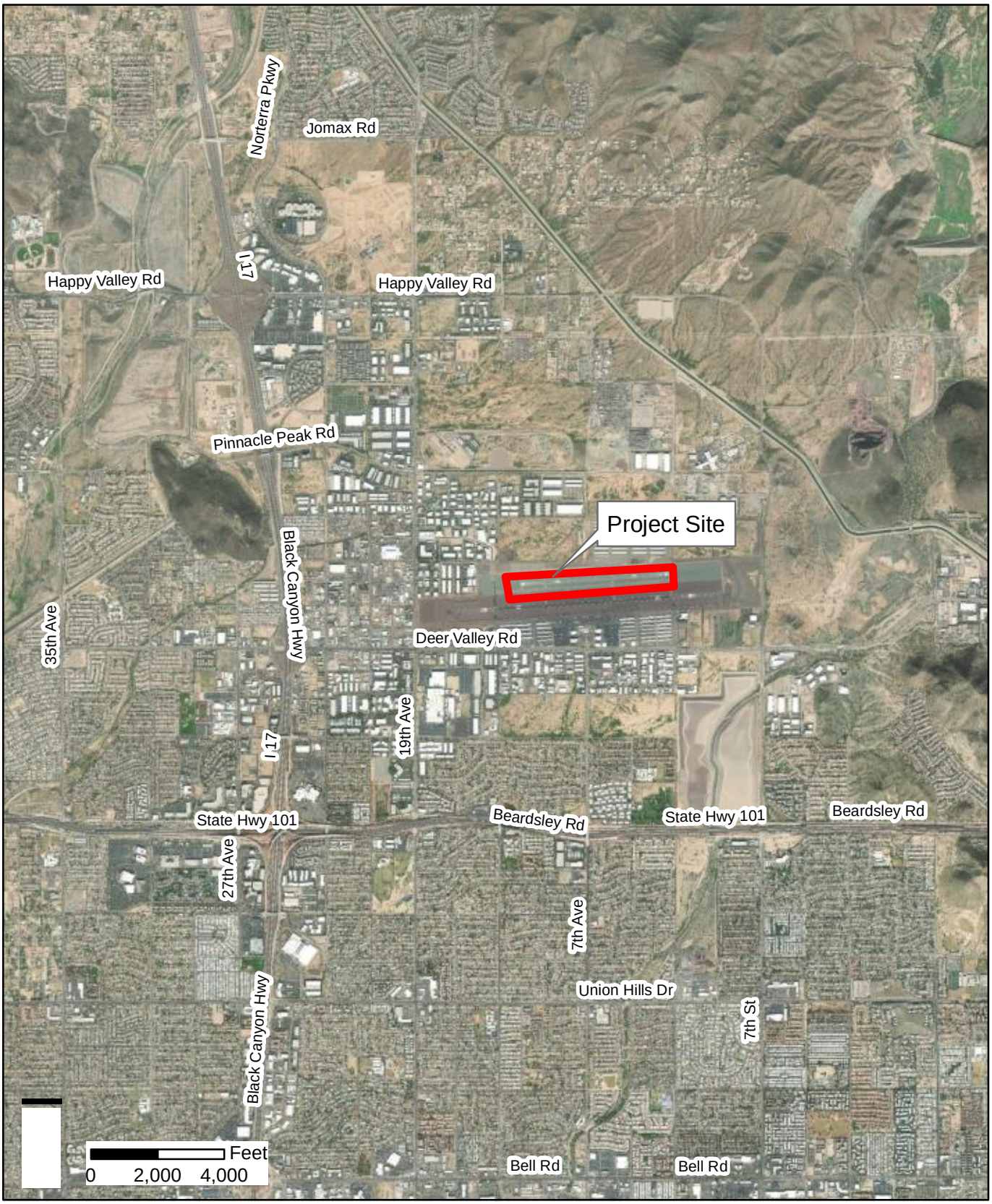
This report has been prepared to document the design procedures for the drainage improvements associated with the proposed relocation of the Taxiway B at the Deer Valley Airport (DVT).

The purpose of this report is to document the design for the drainage improvements associated with the taxiway construction. This report has been prepared based on the following criteria:

- U.S. Department of Transportation Federal Aviation Administration Advisory Circular 150/5320-5D, Unified Facilities Criteria: Surface Drainage Design, August 2013 (AC150/5320-5D)
- City of Phoenix Storm Water Policies and Standards, December 2013 (SWPS)
- Flood Control District of Maricopa County Drainage Design Manual, Volume II, Hydraulics, December 2018 (DDM)
- Federal Highway Administration's Hydraulic Engineering Circular No. 22, Urban Drainage Design Manual, August 2013 (HEC-22)

2.0 LOCATION

The project is located in the northern portion of the City of Phoenix (City), at DVT. DVT is located within Sections 17 and 18, Township 4 North, Range 3 East of the Gila and Salt River Base and Meridian. It is bounded on the north by Airport Boulevard, south by Deer Valley Road, east by 7th Street, and west by 19th Avenue. The improvements are located on the northern portion of DVT. Refer to Figure 1 for the Area Location Map.



Kimley»Horn Expect More. Experience Better.	**DVT Taxiway B Relocation**	**COP No. AV31000092** **KHA No. 091385034**
	Figure 1. Location Map	

3.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

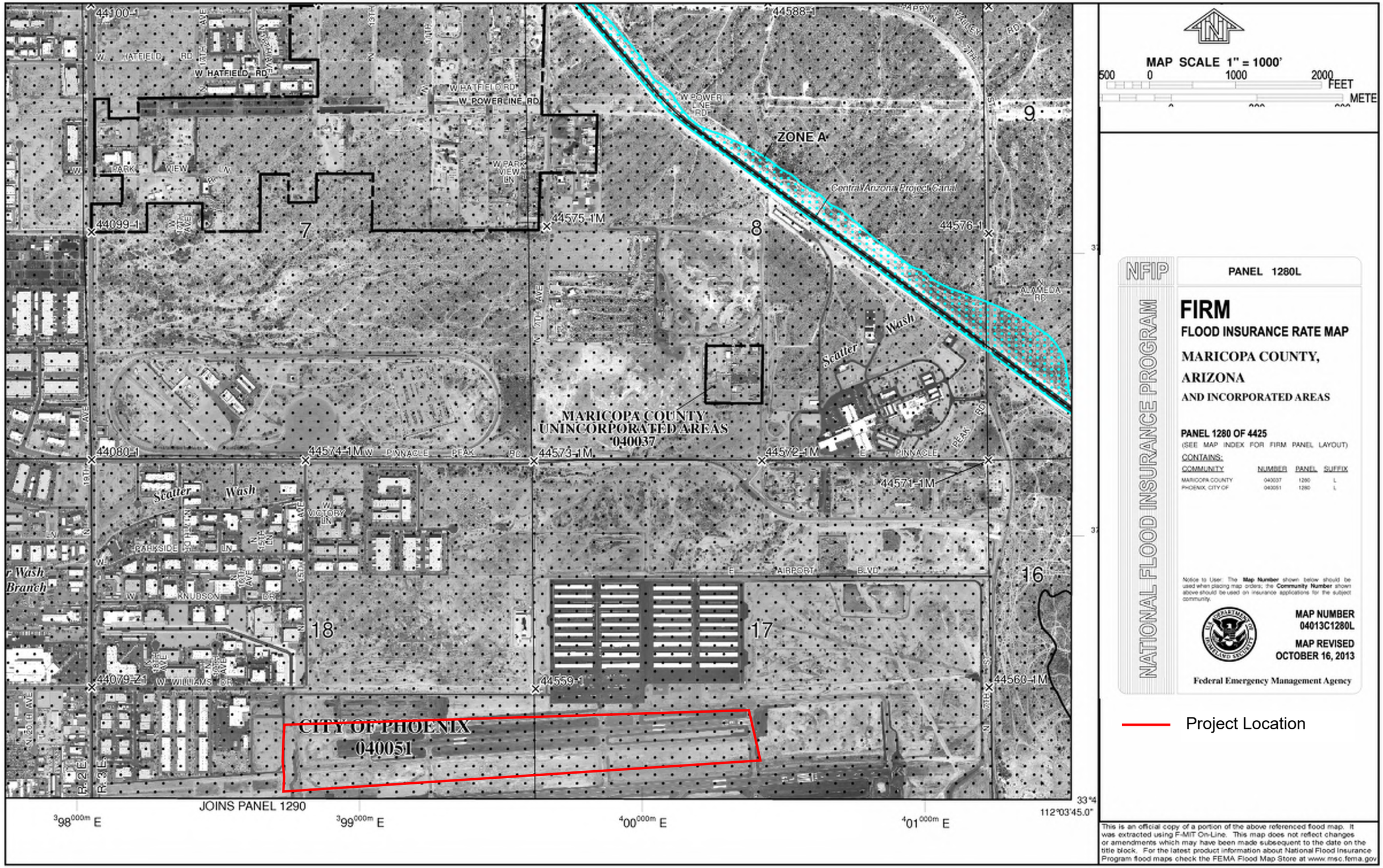
The existing taxiway is currently at a non-standard distance from the centerline of Runway 7L-25R. Improvements include relocating Taxiway B to the south 300 feet. The project also includes the design of connectors B6 and B9.

Existing topography is from east to west. Runoff from the existing Taxiway discharges into the adjacent infield drains. The infield drains are connected to existing storm drains that drain to the detention basin at the southwest corner of DVT and off DVT property. Relocating the Taxiway B will modify and create new infield areas. New inlets will be constructed to connect to the existing storm drains. The new configuration will require re-routing runoff reaching inlet 10 to a different part of the system. However, the relocation will not increase the total amount of runoff reaching the system. Refer to Figure 3 for the onsite drainage map.

4.0 FEMA FLOODPLAIN CLASSIFICATION

The project area does not lie within a Federal Emergency Management Agency (FEMA) regulatory floodway or floodplain. It is located within an area Zone X Shaded on the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, Panels 04013C1280L, effective October 16, 2013. Zone X Shaded is classified as "Areas of 0.2% annual chance of flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood." Figure 2 contains the FIRM panels that cover the project site.

Figure 2. FEMA Floodplain Map



This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

5.0 OFFSITE DRAINAGE

No offsite analysis was conducted.

6.0 ONSITE DRAINAGE

6.1 Onsite Hydrology

The peak discharges for the proposed inlets were calculated using the Rational Method as outlined in the SWPS. The five-year (5-year) storm was used as the design storm in accordance with AC 150/5320-5D. The minimum time of concentration was five (5) minutes, as required by AC 150/5320-5D. *National Oceanic and Atmospheric Administration (NOAA) Atlas 14* was used to obtain rainfall intensity for Deer Valley Airport. Most of the area is lined with aggregate. Therefore, a Rational Coefficient of 0.7 was used for "Gravelled Surface" based on SWPS Table 6.2.2. Results from the Rational Method calculations appear in Table 1. Refer to Figure 3 for the onsite drainage map.

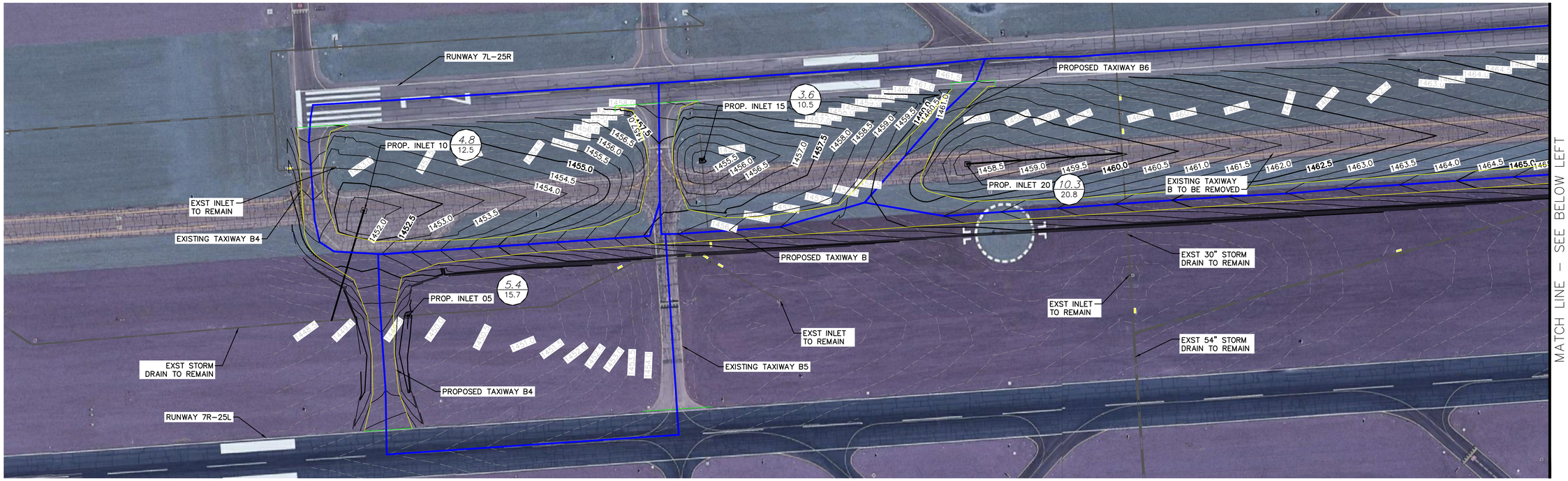
Table 1. Rational Method Runoff Summary

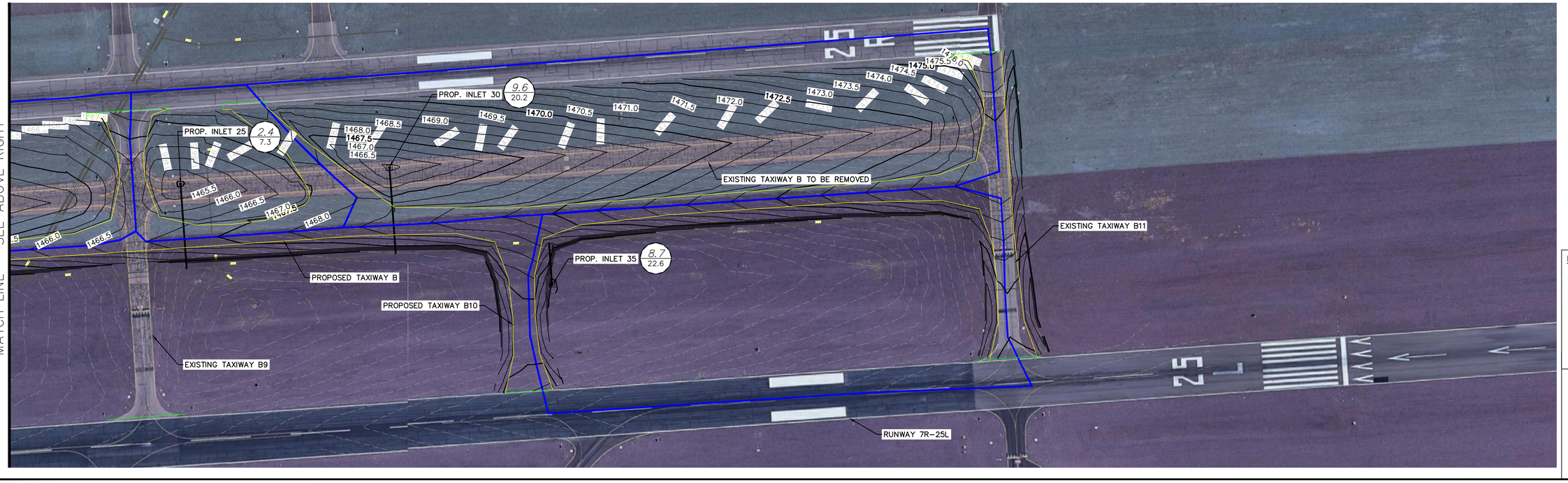
Inlet Name	Area (ac)	Time of Concentration (min)	5-Year Rainfall Intensity (in/hr)	5-Year Runoff (cfs)
05	5.4	6.9	4.1	15.7
10	4.8	8.9	3.7	12.5
15	3.6	7.1	4.1	10.5
20	10.3	15.2	2.9	20.8
25	2.4	5.7	4.4	7.3
30	9.6	13.8	3.0	20.2
35	8.7	9.0	3.7	22.6

Refer to Appendix A for Rational Method calculations.

6.2 Onsite Hydraulics

Runoff from the new infield areas west of the new B6 connector reach the existing storm drain discharging into the detention basin in the southwest corner of DVT. Runoff east of the new B6 connector reaches the existing 54-inch trunkline that is running north to south. Triple COP 1570 catch basins will be used to capture the runoff. New 24-inch storm drain will be used to connect to the existing systems. Storm drain hydraulics will be completed with the Final Drainage Report. The HEC-22 Chart 9B was used to size the inlets. A clogging factor of 50% was applied per the SWPS for both area drains. Ponding for the 5-year storm was limited at each inlet to prevent the encroachment of runoff on the taxiway and runway pavements, as required by AC150/5320-5D. Refer to Appendix B for HEC-22 Chart 9B.





LEGEND

- DRAINAGE FLOWPATH
- DRAINAGE AREA
- SAWCUT PAVEMENT
- X.XX / X.X — DRAINAGE AREA SIZE (AC) / 5-YR RUNOFF (CFS)

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

K:\PHX_Aviation\091385034 Taxiway B\CADD\Drainage\Onsite Drainage Map.dwg Layout1 May 21, 2020 4:55pm by: ryan.burkett

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DEER VALLEY AIRPORT TAXIWAY B

FIGURE 3 ONSITE DRAINAGE MAP

JOB NUMBER:	091385034
SCALE:	1" = 100'
DATE:	MAY 2020
SHEET:	

Appendix A Hydrology Results

- *Rational Method Calculations*

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Rainfall Information

General Project Information			
Project	DVT Taxiway B Relocation		
Project #	091385034		
Designed by	ZRS	Date	5/21/20

NOAA 14 Rainfall Depth Data [in]										
	Storm Event [yr]									
Duration	1	2	5	10	25	50	100	200	500	1000
5-min:	0.22	0.28	0.38	0.46	0.56	0.64	0.72	0.80	0.90	0.98
10-min:	0.33	0.43	0.58	0.70	0.85	0.97	1.09	1.21	1.37	1.50
15-min:	0.41	0.54	0.72	0.87	1.06	1.20	1.35	1.50	1.70	1.85
30-min:	0.55	0.72	0.97	1.17	1.42	1.62	1.82	2.02	2.29	2.50
60-min:	0.68	0.89	1.20	1.44	1.76	2.00	2.25	2.50	2.83	3.09
2-hr:	0.80	1.03	1.37	1.63	1.98	2.25	2.52	2.80	3.17	3.47
3-hr:	0.84	1.07	1.40	1.66	2.03	2.31	2.61	2.92	3.36	3.71
6-hr:	0.99	1.25	1.59	1.86	2.24	2.53	2.84	3.15	3.57	3.91
12-hr:	1.12	1.41	1.78	2.07	2.46	2.77	3.08	3.39	3.81	4.13
24-hr:	1.27	1.62	2.09	2.46	2.98	3.40	3.83	4.28	4.91	5.40
2-day:	1.36	1.73	2.26	2.69	3.28	3.74	4.24	4.75	5.46	6.03
3-day:	1.44	1.84	2.42	2.89	3.55	4.08	4.65	5.24	6.08	6.76
4-day:	1.52	1.95	2.58	3.09	3.82	4.42	5.05	5.73	6.69	7.48
7-day:	1.72	2.19	2.91	3.49	4.32	4.99	5.71	6.48	7.58	8.47
10-day:	1.87	2.39	3.17	3.79	4.68	5.40	6.16	6.97	8.11	9.05
20-day:	2.30	2.96	3.92	4.64	5.63	6.40	7.18	7.99	9.09	9.94
30-day:	2.70	3.48	4.60	5.45	6.60	7.49	8.41	9.34	10.60	11.60
45-day:	3.16	4.08	5.39	6.36	7.66	8.64	9.65	10.70	12.00	13.10
60-day:	3.50	4.53	5.98	7.03	8.42	9.46	10.50	11.50	12.90	14.00

NOAA 14 Rainfall Intensity [in/hr]										
	Storm Event									
Duration	1	2	5	10	25	50	100	200	500	1000
5-min:	2.60	3.40	4.58	5.50	6.71	7.63	8.58	9.54	10.80	11.78
10-min:	1.99	2.59	3.49	4.19	5.11	5.81	6.54	7.26	8.22	9.00
15-min:	1.64	2.14	2.88	3.46	4.24	4.80	5.40	6.00	6.80	7.40
30-min:	1.10	1.44	1.94	2.34	2.84	3.24	3.64	4.04	4.58	5.00
60-min:	0.68	0.89	1.20	1.44	1.76	2.00	2.25	2.50	2.83	3.09
2-hr:	0.40	0.52	0.69	0.82	0.99	1.13	1.26	1.40	1.59	1.74
3-hr:	0.28	0.36	0.47	0.55	0.68	0.77	0.87	0.97	1.12	1.24
6-hr:	0.16	0.21	0.27	0.31	0.37	0.42	0.47	0.53	0.60	0.65
12-hr:	0.093	0.118	0.148	0.173	0.205	0.231	0.257	0.283	0.318	0.344
24-hr:	0.053	0.068	0.087	0.103	0.124	0.142	0.160	0.178	0.205	0.225
2-day:	0.028	0.036	0.047	0.056	0.068	0.078	0.088	0.099	0.114	0.126
3-day:	0.020	0.026	0.034	0.040	0.049	0.057	0.065	0.073	0.084	0.094
4-day:	0.016	0.021	0.027	0.033	0.040	0.047	0.053	0.060	0.070	0.079
7-day:	0.010	0.013	0.017	0.021	0.026	0.030	0.034	0.039	0.045	0.050
10-day:	0.008	0.010	0.013	0.016	0.020	0.023	0.026	0.029	0.034	0.038
20-day:	0.005	0.006	0.008	0.010	0.012	0.013	0.015	0.017	0.019	0.021
30-day:	0.004	0.005	0.006	0.008	0.009	0.010	0.012	0.013	0.015	0.016
45-day:	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.012
60-day:	0.002	0.003	0.004	0.005	0.006	0.007	0.007	0.008	0.009	0.010

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Rational Method Calculations

General Project Information			
Project #	091385034		
Designed by	ZRS	Date	5/21/20
Design Storm Event		5	
Minimum T_c [min]		5	

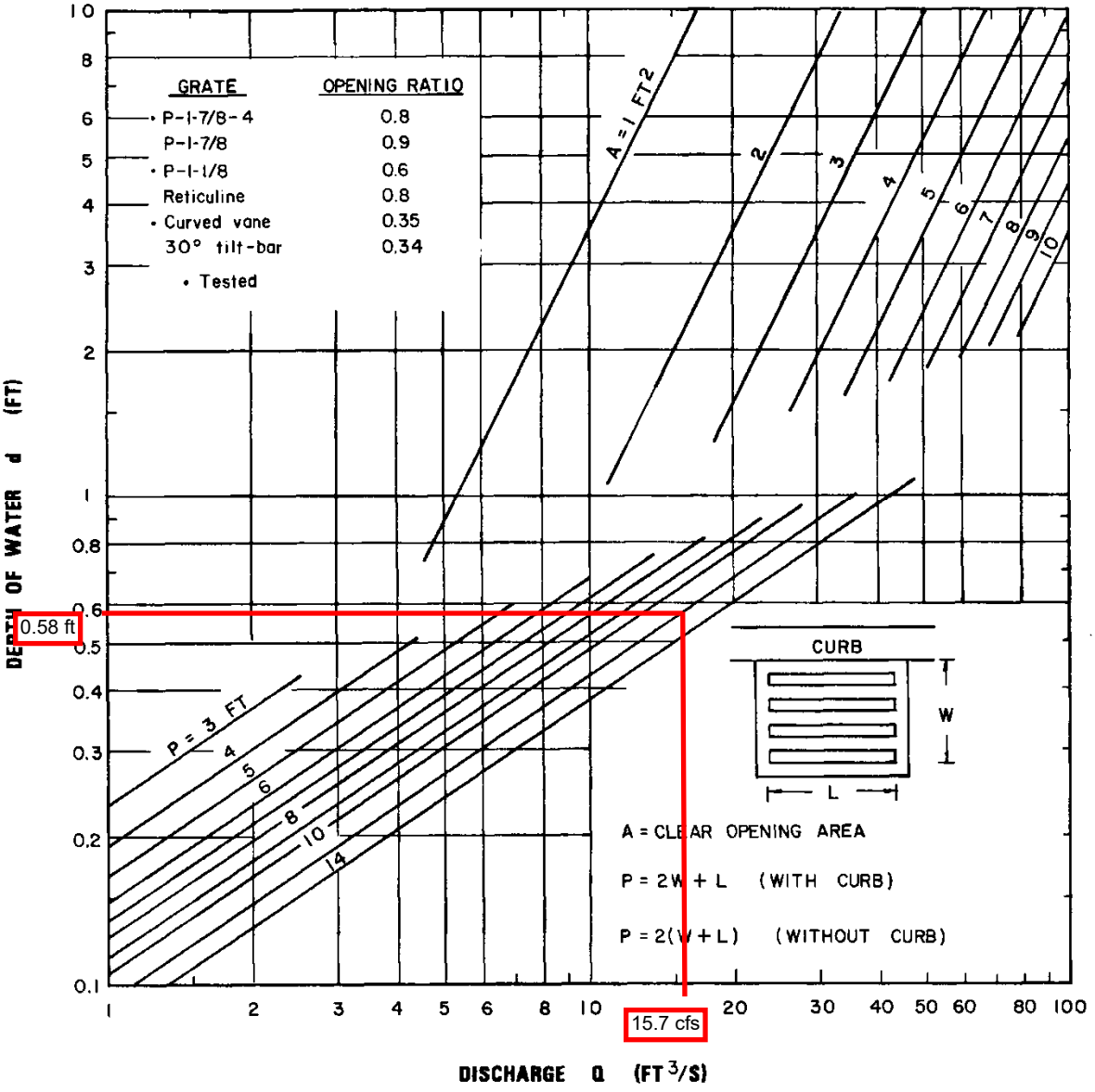
Drainage Area Information					Hydrology				
Drainage Area	Longitudinal Slope, S_l [ft/ft]	Rational Coefficient	Flowpath Length [ft]	Area [ac]	FCDMC Resistance Coefficient Type	Kb	I [in/hr]	T_c [min]	Q [cfs]
CB-05	0.010	0.70	599	5.4	*A*	*0.035*	*4.1*	*6.9*	*15.7*
CB-10	0.006	0.70	680	4.8	*A*	*0.036*	*3.7*	*8.9*	*12.5*
CB-15	0.010	0.70	616	3.6	*A*	*0.037*	*4.1*	*7.1*	*10.5*
CB-20	0.005	0.70	1504	10.3	*A*	*0.034*	*2.9*	*15.2*	*20.8*
CB-25	0.008	0.70	344	2.4	*A*	*0.038*	*4.4*	*5.7*	*7.3*
CB-30	0.005	0.70	1285	9.6	*A*	*0.034*	*3.0*	*13.8*	*20.2*
CB-35	0.010	0.70	964	8.7	*A*	*0.034*	*3.7*	*9.0*	*22.6*

Appendix B Hydraulic Calculations

- *HEC-22 Chart 9B Results*

Inlet CB-05

CHART 9B

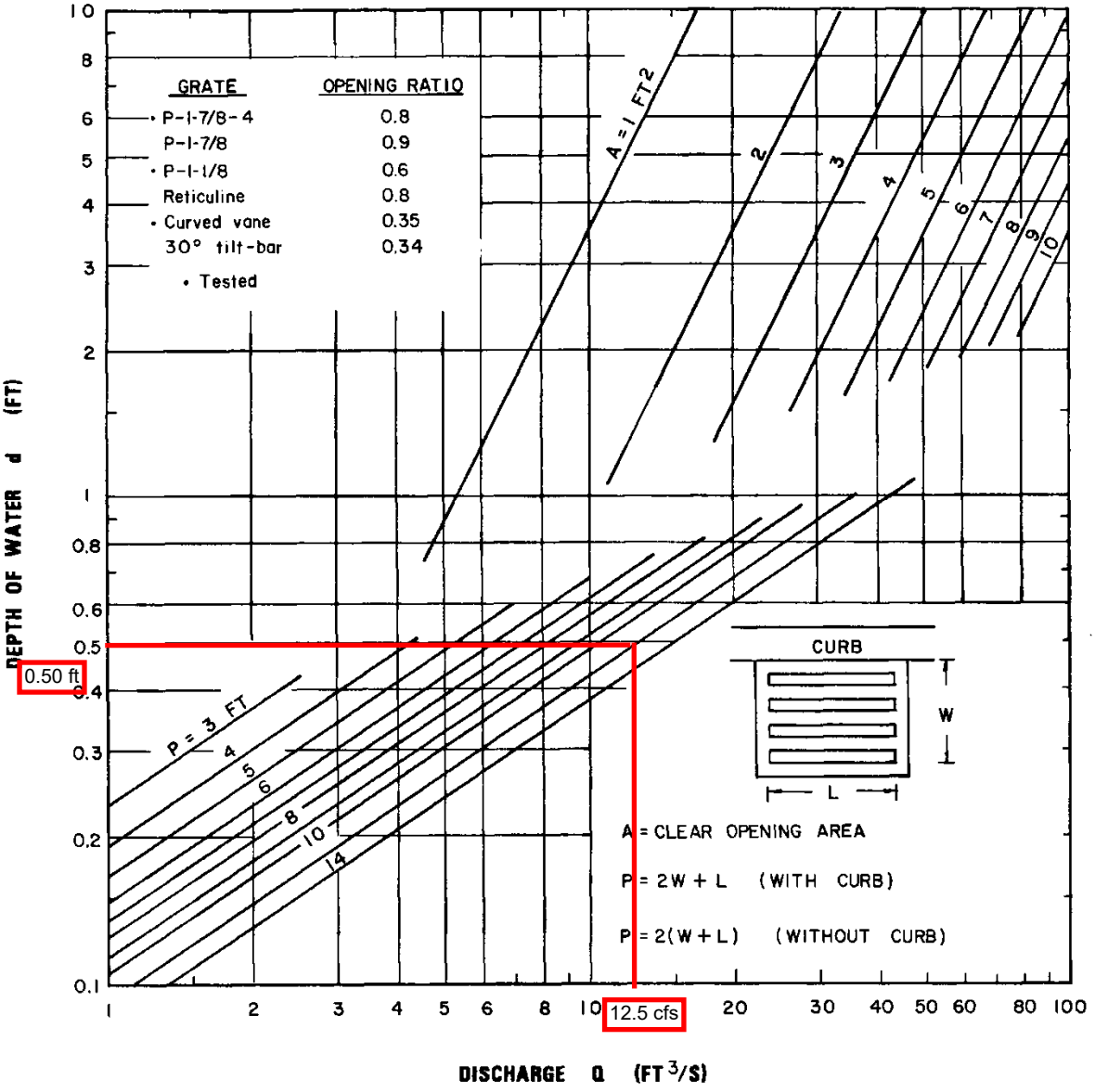


Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Inlet CB-10

CHART 9B

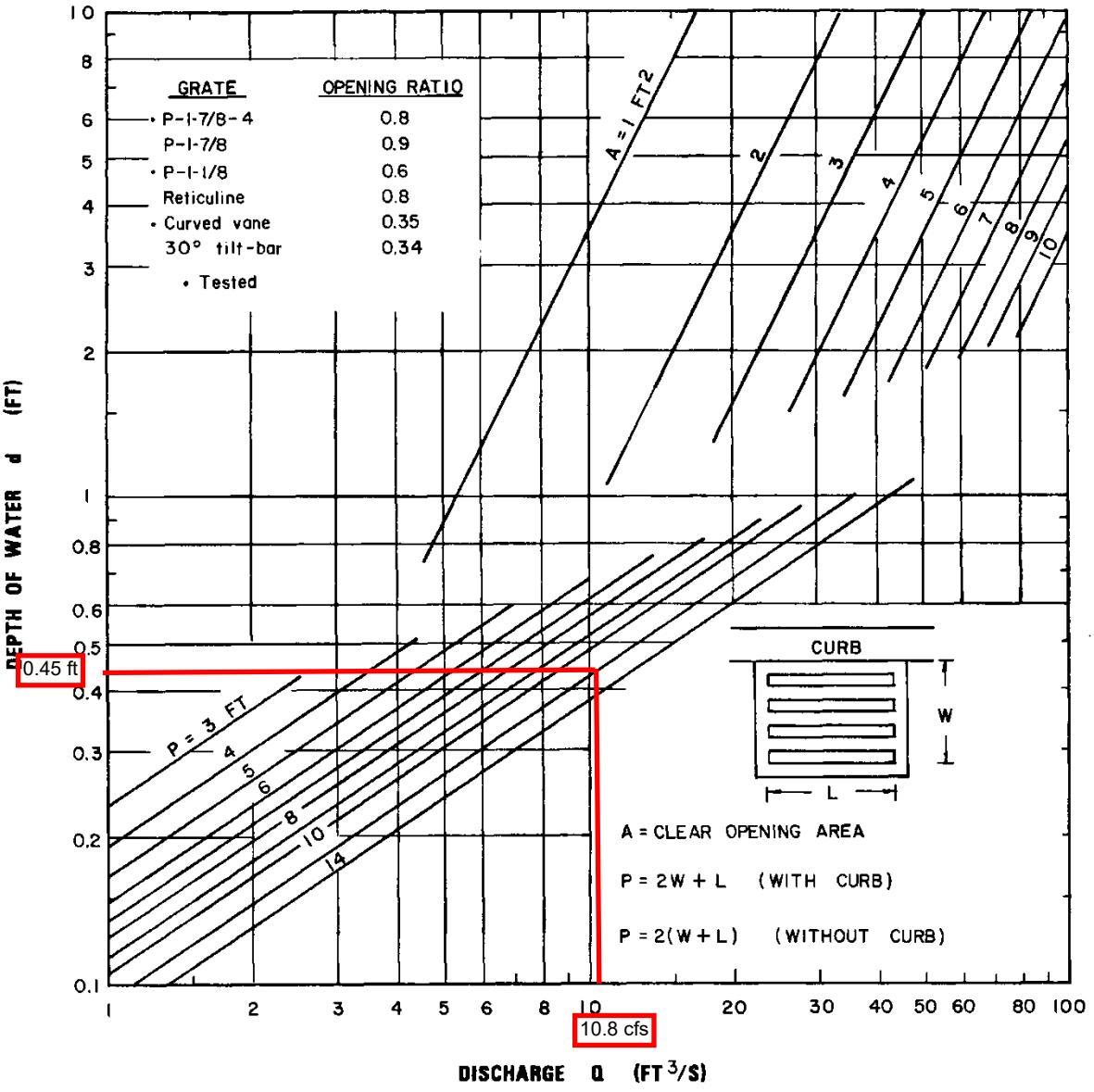


Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Inlet CB-15

CHART 9B

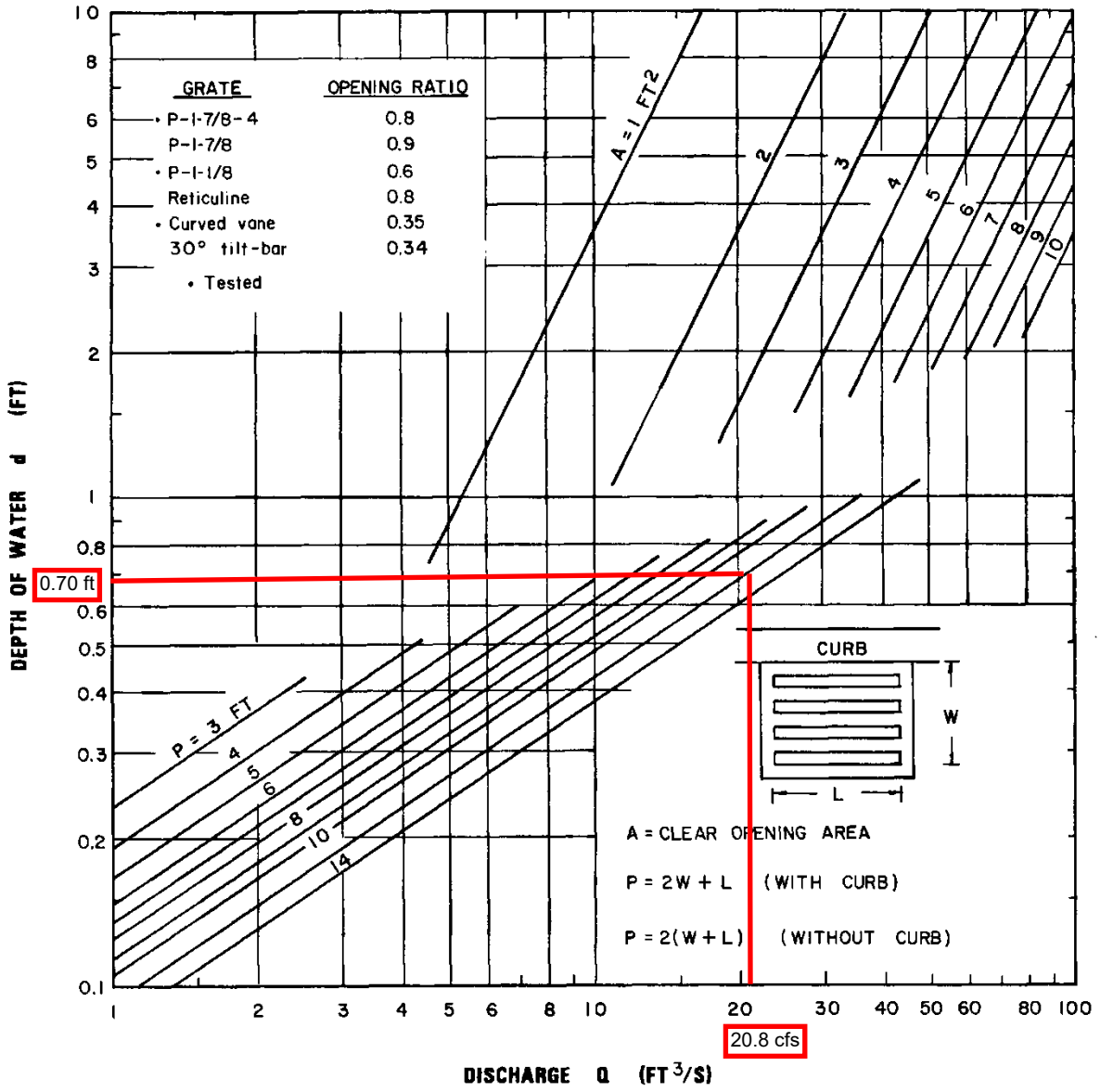


Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Inlet CB-20

CHART 9B

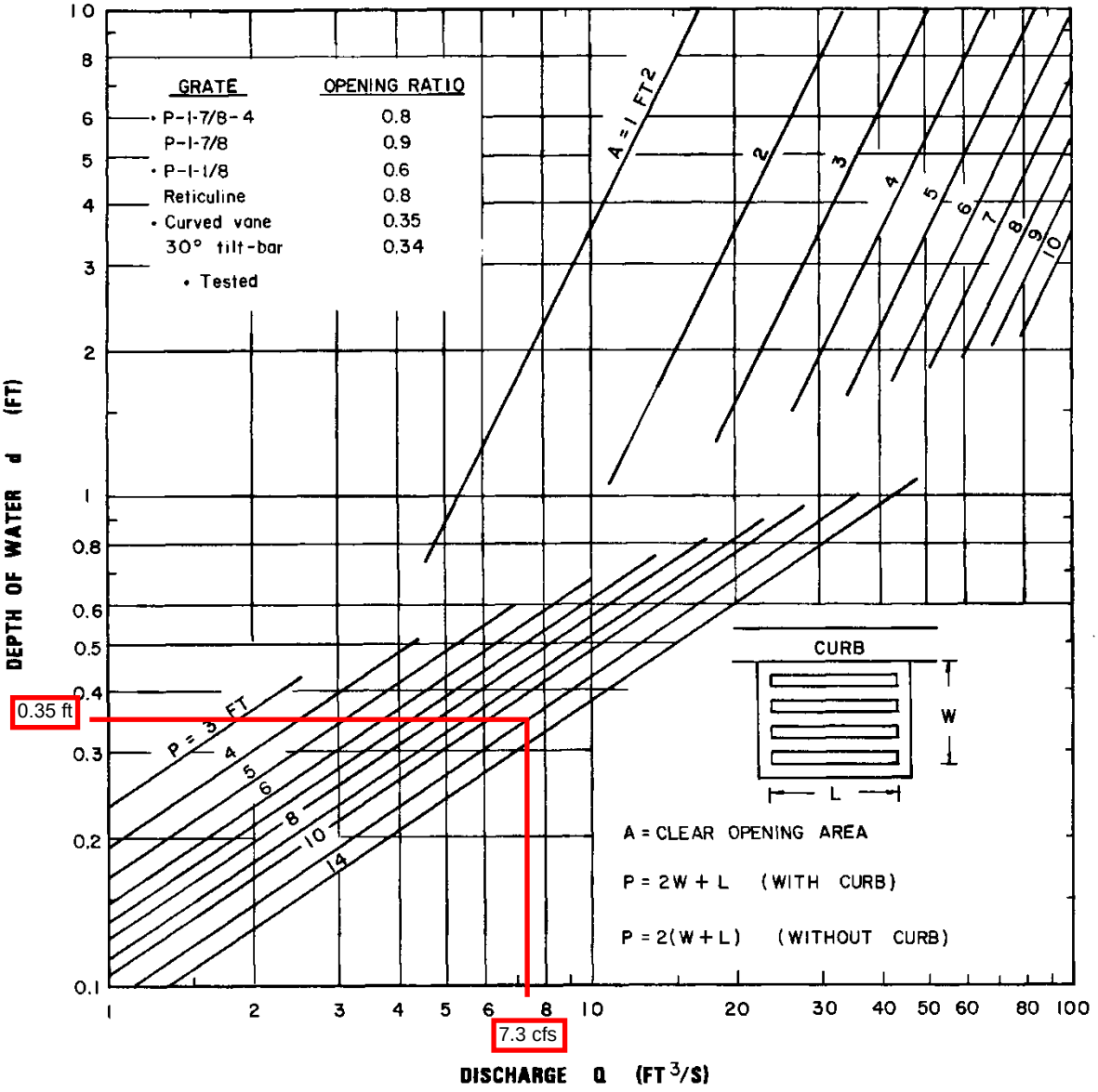


Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Inlet CB-25

CHART 9B

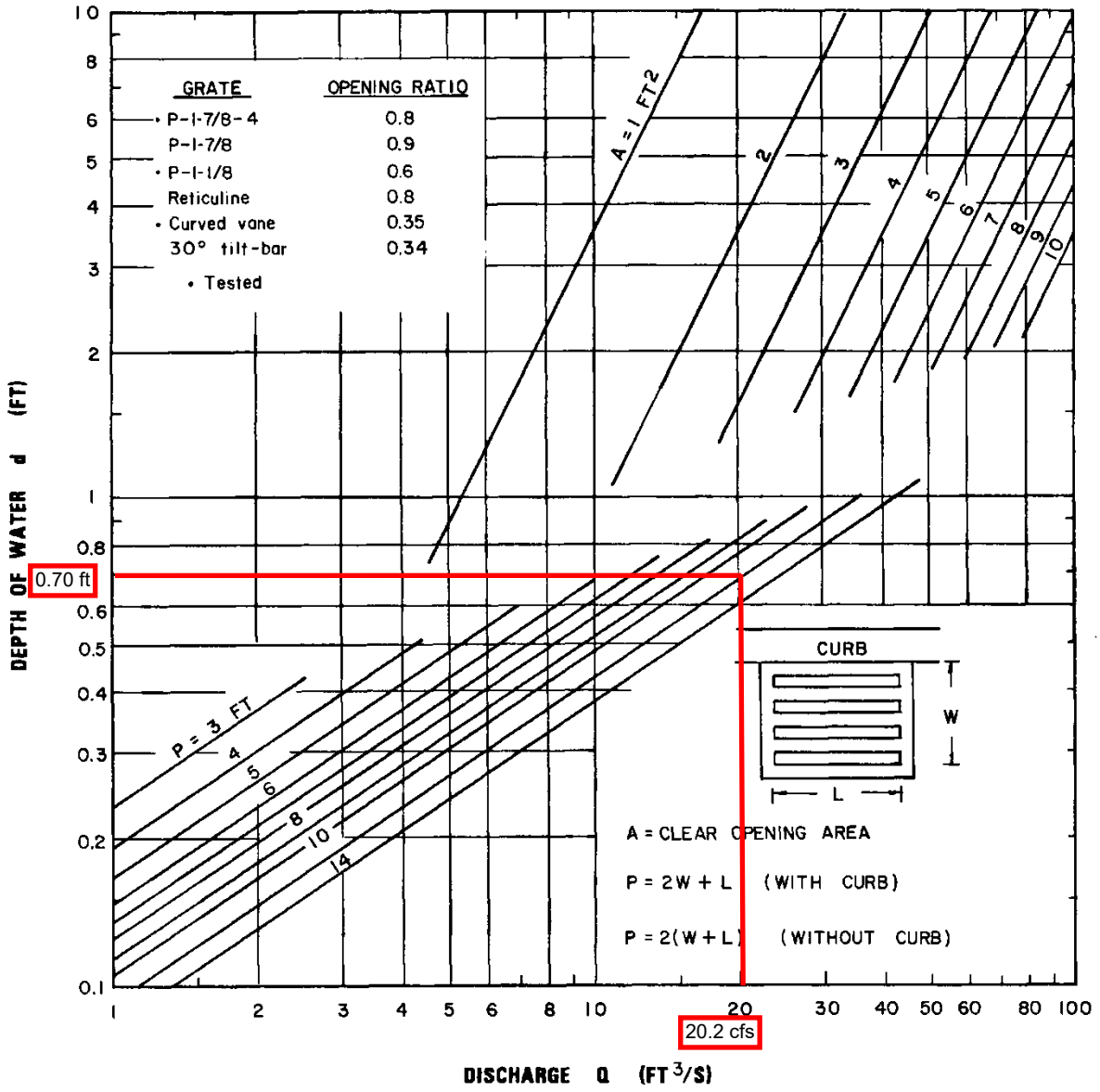


Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Inlet CB-30

CHART 9B

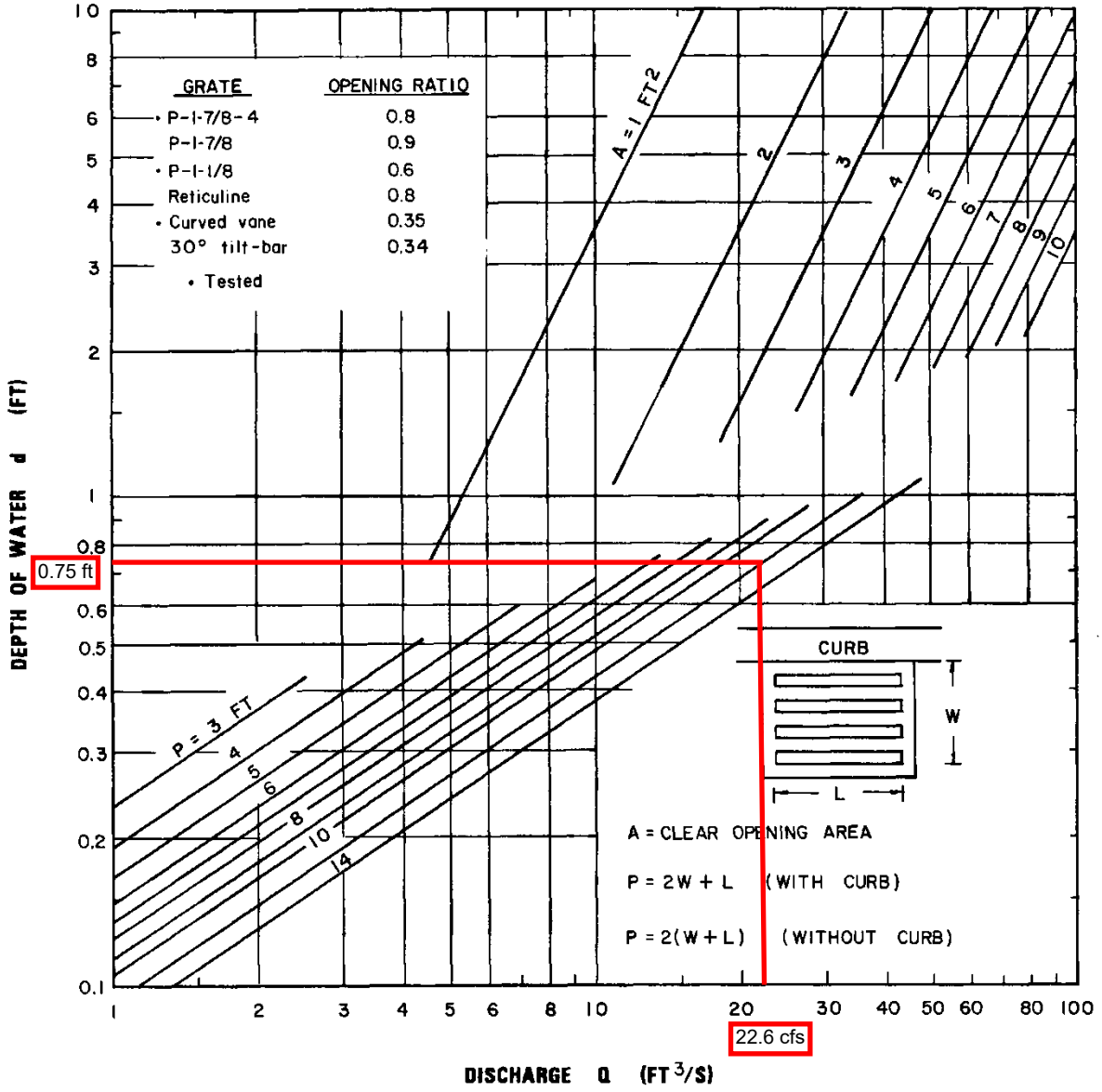


Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Inlet CB-35

CHART 9B



Grate Inlet Capacity in Sump Conditions - English Units

COP 1570 Triple:
P= 12 ft with 50% clogging factor

Appendix C: 30% Preliminary Construction Documents

(Under Separate Cover)

Appendix D: GMP 1 90% Submittal Construction Documents

(Under Separate Cover)

Appendix E: GMP 1 90% Opinion of Probable Construction Costs

Project:	DVT Relocate Taxiway B and Construct Connectors B6 and B9 - GMP1	COP Job #	AV31000092 FAA
Location:	Phoenix Deer Valley Airport	TC Job #	190801
Description:	90% Design - Opinion of Probable Construction Cost	Date:	April 7, 2023

BASE PAY ITEMS

LINE NO.	ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1	M-003-8.1	AIRPORT SAFETY AND SECURITY	LS	1	$200,000.00	$ 200,000.00
2	C-100	CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)	LS	1	$120,000.00	$ 120,000.00
3	U-200-6.1	LOCATION OF UNDERGROUND UTILITIES	LS	1	$20,000.00	$ 20,000.00
4	SP-11.1	PROJECT FIELD OFFICE	LS	1	$55,000.00	$ 55,000.00
5	SP-30.1	CONSTRUCTION SURVEY LAYOUT	LS	1	$70,000.00	$ 70,000.00
6	SP-31.1	MISCELLANEOUS REMOVALS AND OTHER WORK (ALLOWANCE)	ALLOWANCE	1	$60,000.00	$ 60,000.00
7	SP-33.1	ADJUST EXISTING MANHOLE TO FINISHED GRADE, MAG 422	EA	1	$20,000.00	$ 20,000.00
8	SP-34.1	UNFORESEEN UTILITY LOCATING (ALLOWANCE)	ALLOWANCE	1	$7,000.00	$ 7,000.00
9	SP-35.1	EXISTING UTILITY RELOCATIONS (ALLOWANCE)	ALLOWANCE	1	$70,000.00	$ 70,000.00
10	SP-37.1	REMOVE, HAUL, AND STOCKPILE CRUSHED AGGREGATE SLOPE PROTECTION	SY	45,246	$2.50	$ 113,115.00
11	SP-38.1	HAUL AND PLACE CRUSHED AGGREGATE SLOPE PROTECTION	SY	42,304	$2.75	$ 116,336.00
12	P-101-5.1a	REMOVE RUNWAY AND TAXIWAY ASPHALT CONCRETE PAVEMENT FULL DEPTH	SY	10,438	$8.00	$ 83,504.00
13	P-101-5.1b	REMOVE SHOULDER ASPHALT CONCRETE PAVEMENT FULL DEPTH	SY	4,648	$4.00	$ 18,592.00
14	C-105	MOBILIZATION (MAXIMUM 4%)	LS	1	$188,110.00	$ 188,110.00
15	P-151-4.1	CLEARING AND GRUBBING	LS	1	$10,000.00	$ 10,000.00
16	P-152-4.1	UNCLASSIFIED EXCAVATION	CY	12,770	$37.00	$ 472,490.00
17	SP-40.1	OVER EXCAVATION OF UNSUITABLE MATERIALS AND BACKFILL WITH SELECT MATERIAL (ALLOWANCE)	CY	1,000	$48.00	$ 48,000.00
18	P-155-8.1	LIME-TREATED SUBGRADE (12", 5.5%)	SY	15,043	$15.50	$ 233,166.50
19	C-102-6.1	STORMWATER POLLUTION PREVENTION PLAN	LS	1	$60,000.00	$ 60,000.00
20	P-209-5.1	CRUSHED AGGREGATE BASE COURSE (9")	SY	14,088	$27.50	$ 387,420.00
21	P-401-8.1	ASPHALT SURFACE COURSE	TON	3,955	$245.00	$ 968,975.00
22	P-603-5.1	EMULSIFIED ASPHALT TACK COAT	TON	5	$378.00	$ 1,890.00
23	P-620-5.1a	REMOVE EXISTING MARKING	SF	1,390	$5.00	$ 6,950.00
24	P-620-5.2b.1	YELLOW PAINT MARKING	SF	7,993	$3.50	$ 27,975.50
25	P-620-5.2b.2	WHITE PAINT MARKING	SF	761	$3.75	$ 2,853.75
26	P-620-5.2b.3	RED PAINT MARKING	SF	325	$3.80	$ 1,235.00
27	P-620-5.2b.4	BLACK PAINT MARKING	SF	4,492	$2.00	$ 8,984.00

Project:	DVT Relocate Taxiway B and Construct Connectors B6 and B9 - GMP1	COP Job #	AV31000092 FAA
Location:	Phoenix Deer Valley Airport	TC Job #	190801
Description:	90% Design - Opinion of Probable Construction Cost	Date:	April 7, 2023

BASE PAY ITEMS

LINE NO.	ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
28	P-620-5.2c.1	TYPE I GRADATION A REFLECTIVE MEDIA	LB	14	$2.00	$ 28.00
29	P-620-5.2c.2	TYPE III REFLECTIVE MEDIA	LB	789	$1.80	$ 1,420.20
30	P-620-5.4d	TEMPORARY RUNWAY AND TAXIWAY MARKING	LS	1	$2,000.00	$ 2,000.00
31	D-751-5.1	CONSTRUCT TRIPLE CATCH BASIN PER COP DETAIL P1570, WITH CONCRETE APRON PER ADOT DETAIL C-15.80	EA	2	$18,500.00	$ 37,000.00
32	D-751-5.2	CONSTRUCT STORM DRAIN MANHOLE PER COP DETAIL P1520 AND MAG DETAIL 522	EA	2	$16,500.00	$ 33,000.00
33	D-701-5.1a	24 INCH RGRCP, CLASS V	LF	343	$240.00	$ 82,320.00
34	P-101-5.7a	REMOVE 18" RCP	LF	238	$70.00	$ 16,660.00
35	P-101-5.7b	REMOVE CATCH BASIN	EA	1	$4,000.00	$ 4,000.00
36	L-100-5.1	REMOVE AND SALVAGE EXISTING TAXIWAY EDGE LIGHT AND ISOLATION TRANSFORMER, REMOVE EXISTING BASE CAN	EA	41	$300.00	$ 12,300.00
37	L-100-5.2	REMOVE AND SALVAGE EXISTING RUNWAY GUARD LIGHT AND ISOLATION TRANSFORMER, REMOVE EXISTING BASE CAN	EA	4	$360.00	$ 1,440.00
38	L-100-5.3	REMOVE AND SALVAGE EXISTING RUNWAY EDGE LIGHT AND ISOLATION TRANSFORMER, EXISTING BASE CAN TO REMAIN	EA	5	$90.00	$ 450.00
39	L-100-5.4	REMOVE EXISTING JUNCTION CAN / PULL BOX	EA	4	$240.00	$ 960.00
40	L-100-5.5	EXCAVATE AND REMOVE EXISTING CONDUIT AND CONDUCTOR	LF	6,583	$8.40	$ 55,297.20
41	L-100-5.6	REMOVE EXISTING CONDUCTOR, CONDUIT TO REMAIN	LF	3,517	$1.20	$ 4,220.40
42	L-100-5.7	REMOVE EXISTING CONCRETE ENCASED DUCTBANK	LF	355	$14.40	$ 5,112.00
43	L-100-5.8	REMOVE AND SALVAGE AIRFIELD GUIDANCE SIGN AND ISOLATION TRANSFORMER, REMOVE CONCRETE SIGN BASE	EA	9	$1,080.00	$ 9,720.00
44	L-100-5.9	EXCAVATE AND REMOVE EXISTING CONCRETE HAND HOLE	EA	5	$3,840.00	$ 19,200.00
45	L-100-5.10	REMOVE EXISTING CONCRETE HAND HOLE LID TO VERIFY SIZE FOR NEW LID	EA	1	$900.00	$ 900.00
46	L-100-5.11	EXCAVATE AND REMOVE EXISTING CONCRETE DUCT MARKER	EA	2	$300.00	$ 600.00
47	L-100-5.12	TEMPORARY AIRFIELD LIGHTING CIRCUIT JUMPERS	LS	1	$9,000.00	$ 9,000.00
48	L-108-5.1	L-824, TYPE C, 1/C #8 AWG, 5KV CABLE, #6 GROUND	LF	5,255	$3.84	$ 20,179.20
49	L-108-5.2	L-824, TYPE C, 2/C #8 AWG, 5KV CABLE, #6 GROUND	LF	12,370	$4.92	$ 60,860.40
50	L-110-5.1	SINGLE-WAY, (1) - 2" CONDUIT, DIRECT BURIED (TEMPORARY CIRCUIT JUMPER SLEEVE)	LF	355	$18.00	$ 6,390.00
51	L-110-5.2	SINGLE-WAY, (1) - 2" CONDUIT, SLURRY ENCASED	LF	5,940	$21.60	$ 128,304.00
52	L-110-5.3	SINGLE-WAY, (1) - 2" CONDUIT, CONCRETE ENCASED	LF	250	$24.00	$ 6,000.00
53	L-110-5.4	MULTIPLE-WAY, (4) - 2" CONDUIT, SLURRY ENCASED	LF	2,950	$48.00	$ 141,600.00
54	L-110-5.5	MULTIPLE-WAY, (4) - 2" CONDUIT, CONCRETE ENCASED	LF	210	$54.00	$ 11,340.00

BASE PAY ITEMS

LINE NO.	ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
55	L-110-5.6	MULTIPLE-WAY, (6) - 2" CONDUIT, SLURRY ENCASED	LF	335	$66.00	$ 22,110.00
56	L-110-5.7	MULTIPLE-WAY, (6) - 2" CONDUIT, CONCRETE ENCASED	LF	175	$69.60	$ 12,180.00
57	L-110-5.8	MULTIPLE-WAY, (6) - 2" CONDUIT, DIRECTIONAL BORE (HDPE CONDUIT)	LF	220	$84.00	$ 18,480.00
58	L-110-5.9	MULTIPLE-WAY, (10) - 2" CONDUIT, SLURRY ENCASED	LF	140	$114.00	$ 15,960.00
59	L-110-5.10	MULTIPLE-WAY, (10) - 2" CONDUIT, CONCRETE ENCASED	LF	60	$120.00	$ 7,200.00
60	L-110-5.11	MULTIPLE-WAY, (16) - 2" CONDUIT, SLURRY ENCASED	LF	490	$168.00	$ 82,320.00
61	L-110-5.12	MULTIPLE-WAY, (16) - 2" CONDUIT, DIRECTIONAL BORE (HDPE CONDUIT)	LF	250	$144.00	$ 36,000.00
62	L-115-5.1	NEW HANDHOLE, PREFABRICATED CONCRETE 4'X4'X4' WITH AIRCRAFT RATED LID, FURNISHED AND INSTALLED	EA	15	$18,000.00	$ 270,000.00
63	L-115-5.2	NEW HANDHOLE, PREFABRICATED CONCRETE 4'X4'X5' WITH AIRCRAFT RATED LID, FURNISHED AND INSTALLED	EA	5	$21,600.00	$ 108,000.00
64	L-115-5.3	PROVIDE AND INSTALL NEW PRECAST LID WITH CYLINDER ASSISTED, AIRCRAFT RATED HATCH ON EXISTING CONCRETE HAND HOLE	EA	1	$5,400.00	$ 5,400.00
65	L-115-5.4	PROVIDE AND INSTALL RGL ISOLATION BOXES AND CONDUITS IN NEW OR EXISTING CONCRETE HAND HOLE	EA	9	$1,500.00	$ 13,500.00
66	L-115-5.5	NEW L-867B JUNCTION CAN WITH STEEL BLANK COVER	EA	1	$1,200.00	$ 1,200.00
67	L-125-5.1	NEW L-804(L) LED ELEVATED RGL WITH ON/OFF SWITCH AND ISOLATION TRANSFORMER ON NEW L-867 BASE CAN	EA	4	$5,040.00	$ 20,160.00
68	L-125-5.2	INSTALL SALVAGED ELEVATED RGL AND ISOLATION TRANSFORMER ON NEW L-867 BASE CAN	EA	2	$1,440.00	$ 2,880.00
69	L-125-5.3	NEW SURFACE MOUNTED L-853 RETROREFLECTIVE TAXIWAY EDGE MARKER	EA	7	$450.00	$ 3,150.00
70	L-125-5.4	NEW L-858(L) SIZE 1, STYLE 2, 2-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	6	$5,790.00	$ 34,740.00
71	L-125-5.5	NEW L-858(L) SIZE 2, STYLE 2, 2-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	1	$5,370.00	$ 5,370.00
72	L-125-5.6	NEW L-858(L) SIZE 1, STYLE 2, 3-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	1	$7,290.00	$ 7,290.00
73	L-125-5.7	NEW L-858(L) SIZE 1, STYLE 2, 4-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	4	$8,850.00	$ 35,400.00
74	L-125-5.8	NEW L-858(L) SIZE 1, STYLE 2, 5-MODULE (2-MOD + 3-MOD), AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	1	$12,420.00	$ 12,420.00
75	L-125-5.10	NEW ELEVATED L-861T(L) LED TAXIWAY EDGE LIGHT AND ISOLATION TRANSFORMER ON NEW L-867 BASE CAN	EA	98	$1,440.00	$ 141,120.00
76	L-125-5.11	NEW L-867B TAXIWAY EDGE LIGHT BASE WITH STEEL BLANK COVER PLATE	EA	6	$1,200.00	$ 7,200.00
77	L-125-5.12	SALVAGED RUNWAY EDGE LIGHT AND ISOLATION TRANSFORMER ON EXISTING L-867 BASE CAN	EA	1	$300.00	$ 300.00
78	L-125-5.13	NEW L-861T(L) LED TAXIWAY EDGE LIGHT W/ STEMS, FRANGIBLE COUPLINGS AND ISOLATION TRANSFORMERS (SPARES)	EA	10	$540.00	$ 5,400.00

Base Pay Items Sub-Total	$	4,909,678.15
15% Contingency	$	736,451.72
Base Pay Items Total	**$**	**5,646,129.87**

ADDITIVE ALTERNATE 1 PAY ITEMS

LINE NO.	ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1	SP-37.1	REMOVE, HAUL, AND STOCKPILE CRUSHED AGGREGATE SLOPE PROTECTION	SY	4,003	$2.50	$ 10,007.50
2	SP-38.1	HAUL AND PLACE CRUSHED AGGREGATE SLOPE PROTECTION	SY	1,757	$2.75	$ 4,831.75
3	C-105	MOBILIZATION (MAXIMUM 4%)	LS	1	$20,000.00	$ 20,000.00
4	P-151-4.1	CLEARING AND GRUBBING	LS	1	$1,500.00	$ 1,500.00
5	P-152-4.1	UNCLASSIFIED EXCAVATION	CY	58	$37.00	$ 2,146.00
6	SP-40.1	OVER EXCAVATION OF UNSUITABLE MATERIALS AND BACKFILL WITH SELECT MATERIAL (ALLOWANCE)	CY	20	$40.00	$ 800.00
7	P-155-8.1	LIME-TREATED SUBGRADE (12", 5.5%)	SY	2,277	$15.50	$ 35,293.50
8	P-209-5.1	CRUSHED AGGREGATE BASE COURSE (9")	SY	2,137	$27.50	$ 58,767.50
9	P-401-8.1	ASPHALT SURFACE COURSE	TON	601	$245.00	$ 147,245.00
10	P-603-5.1	EMULSIFIED ASPHALT TACK COAT	TON	1	$378.00	$ 378.00
11	P-620-5.2b.1	YELLOW PAINT MARKING	SF	1,381	$3.50	$ 4,833.50
12	P-620-5.2b.2	WHITE PAINT MARKING	SF	168	$3.75	$ 630.00
13	P-620-5.2b.3	RED PAINT MARKING	SF	72	$3.80	$ 273.60
14	P-620-5.2b.4	BLACK PAINT MARKING	SF	1,473	$2.00	$ 2,946.00
15	P-620-5.2c.1	TYPE I GRADATION A REFLECTIVE MEDIA	LB	3	$2.00	$ 6.00
16	P-620-5.2c.2	TYPE III REFLECTIVE MEDIA	LB	135	$1.80	$ 243.00
17	D-751-5.1	CONSTRUCT TRIPLE CATCH BASIN PER COP DETAIL P1570, WITH CONCRETE APRON PER ADOT DETAIL C-15.80	EA	1	$18,500.00	$ 18,500.00
18	D-751-5.2	CONSTRUCT STORM DRAIN MANHOLE PER COP DETAIL P1520 AND MAG DETAIL 522	EA	1	$16,500.00	$ 16,500.00
19	D-701-5.1a	24 INCH RGRCP, CLASS V	LF	84	$240.00	$ 20,160.00
20	L-100-5.3	REMOVE AND SALVAGE EXISTING RUNWAY EDGE LIGHT AND ISOLATION TRANSFORMER, EXISTING BASE CAN TO REMAIN	EA	1	$90.00	$ 90.00
21	L-100-5.5	EXCAVATE AND REMOVE EXISTING CONDUIT AND CONDUCTOR	LF	270	$8.40	$ 2,268.00
22	L-100-5.6	REMOVE EXISTING CONDUCTOR, CONDUIT TO REMAIN	LF	935	$1.20	$ 1,122.00
23	L-100-5.12	TEMPORARY AIRFIELD LIGHTING CIRCUIT JUMPERS	LS	1	$1,800.00	$ 1,800.00
24	L-108-5.1	L-824, TYPE C, 1/C #8 AWG, 5KV CABLE, #6 GROUND	LF	660	$3.84	$ 2,534.40
25	L-108-5.2	L-824, TYPE C, 2/C #8 AWG, 5KV CABLE, #6 GROUND	LF	1,575	$4.92	$ 7,749.00
26	L-110-5.1	SINGLE-WAY, (1) - 2" CONDUIT, DIRECT BURIED (TEMPORARY CIRCUIT JUMPER SLEEVE)	LF	115	$18.00	$ 2,070.00
27	L-110-5.2	SINGLE-WAY, (1) - 2" CONDUIT, SLURRY ENCASED	LF	1,325	$21.60	$ 28,620.00

Project:	DVT Relocate Taxiway B and Construct Connectors B6 and B9 - GMP1	COP Job #	AV31000092 FAA
Location:	Phoenix Deer Valley Airport	TC Job #	190801
Description:	90% Design - Opinion of Probable Construction Cost	Date:	April 7, 2023

ADDITIVE ALTERNATE 1 PAY ITEMS

LINE NO.	ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
28	L-110-5.3	SINGLE-WAY, (1) - 2" CONDUIT, CONCRETE ENCASED	LF	135	$24.00	$ 3,240.00
29	L-115-5.4	PROVIDE AND INSTALL RGL ISOLATION BOXES AND CONDUITS IN NEW OR EXISTING CONCRETE HAND HOLE	EA	2	$1,500.00	$ 3,000.00
30	L-125-5.1	NEW L-804(L) LED ELEVATED RGL WITH ON/OFF SWITCH AND ISOLATION TRANSFORMER ON NEW L-867 BASE CAN	EA	2	$5,040.00	$ 10,080.00
31	L-125-5.4	NEW L-858(L) SIZE 1, STYLE 2, 2-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	2	$5,790.00	$ 11,580.00
32	L-125-5.6	NEW L-858(L) SIZE 1, STYLE 2, 3-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	2	$7,290.00	$ 14,580.00
33	L-125-5.7	NEW L-858(L) SIZE 1, STYLE 2, 4-MODULE, AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	1	$8,850.00	$ 8,850.00
34	L-125-5.8	NEW L-858(L) SIZE 1, STYLE 2, 5-MODULE (2-MOD + 3-MOD), AIRFIELD GUIDANCE SIGN, ON NEW CONCRETE SIGN BASE W/ ASPHALT MAINTENANCE PAD	EA	1	$12,420.00	$ 12,420.00
35	L-125-5.9	INSTALL NEW SIZE 1 SIGN PANELS INSTALLED IN EXISTING SIGNS (B9 TO B8 CHANGE FOR INTERIM BETWEEN GMP 1 AND 2)	EA	20	$300.00	$ 6,000.00
36	L-125-5.10	NEW ELEVATED L-861T(L) LED TAXIWAY EDGE LIGHT AND ISOLATION TRANSFORMER ON NEW L-867 BASE CAN	EA	24	$1,440.00	$ 34,560.00
37	L-125-5.12	SALVAGED RUNWAY EDGE LIGHT AND ISOLATION TRANSFORMER ON EXISTING L-867 BASE CAN	EA	1	$300.00	$ 300.00

Additive Alternate 1 Sub-Total		$	495,924.75
15%	Contingency	$	74,388.71
Additive Alternate 1 Total		**$**	**570,313.46**
Base + Additive Atlernate 1 Sub-Total		$	5,405,602.90
15%	Contingency	$	810,840.44
Base + Additive Atlernate 1 Total		**$**	**6,216,443.34**

Appendix F: Pre-Design Meeting Agenda

MEETING AGENDA

Date: January 16, 2020 **Time:** 2:00 PM – 3:30 PM

Project: DVT Relocate Taxiway B and Construct Connectors B6 and B9 – AV31000092 FAA | TC# 190801

Subject: **Design Kick-off Meeting**

Attendees: See sign-in sheet

I. INTRODUCTIONS

II. KEY DESIGN PHASE CONTACTS

• COP Aviation	John Kliethermes, PE	john.kliethermes@phoenix.gov	602-683-3657
• TRACE Consulting	Chintan Jhaveri, PE	cjhaveri@traceconsulting.us	602-680-8264

III. PROJECT OVERVIEW, SCOPE AND PURPOSE

- Project Scope
  - Relocate Taxiway B 100’ south (300’ separation from RWY 7L/25R)
  - Relocate segmented circle
  - Construct new acute angle taxiway connectors B6 and B9
  - Reconstruct right angle taxiway connectors on north side of TWY B to 10’ beyond holding position markings
  - Reconstruct right angle taxiway connectors on south side up to RWY 7R/25L
- Design Criteria
  - Design Aircraft / ADG / TDG

IV. KEY PROJECT TASKS AND ISSUES

- Records Research and Data Collection
- Field Data Collection
  - Topographic Survey
  - Soil Exploration
  - Utility Designating
- Geotechnical Investigation / Pavement Section
  - Fleet Mix
- Geometrics Development
- Grading / Drainage Design
- Electrical Design
  - Airfield Electrical
- Construction Safety and Phasing Plan

- Other Issues
    - Operations Issues
    - Environmental Issues and Clearances
    - Stakeholder Coordination / Possible T-Hangar Impacts

V. PROJECT SCHEDULE AND CURRENT STATUS

- Design Kick-off – Thursday, January 16, 2020
- 30% Submittal – Friday, May 1, 2020
- 30% Review Meeting – Friday, May 15, 2020
- 90% Submittal – Friday, July 10, 2020
- 90% Review Meeting – Friday, July 17, 2020
- Final Submittal – Friday, July 31, 2020
- Current Status
    - NTP received August 28, 2019.
    - Field Data Collection initiated.

VI. OTHER ITEMS

- FAA Grant Funding / Anticipated Construction Schedule

Distribution: All attendees

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