ATTACHMENT B

TAXIWAY L AND RUNWAY 4 – 22 SHOULDERS CONSTRUCTION

BASIS FOR DESIGN

TABLE OF CONTENTS

I. Basis of Design Narrative

Taxiway L and associated taxiways will follow the 30% Advanced Planning Drawings prepared by HNTB and attached below in Item IV. These drawings were included in the Taxiway L Draft Program Definition Document dated May 2021.

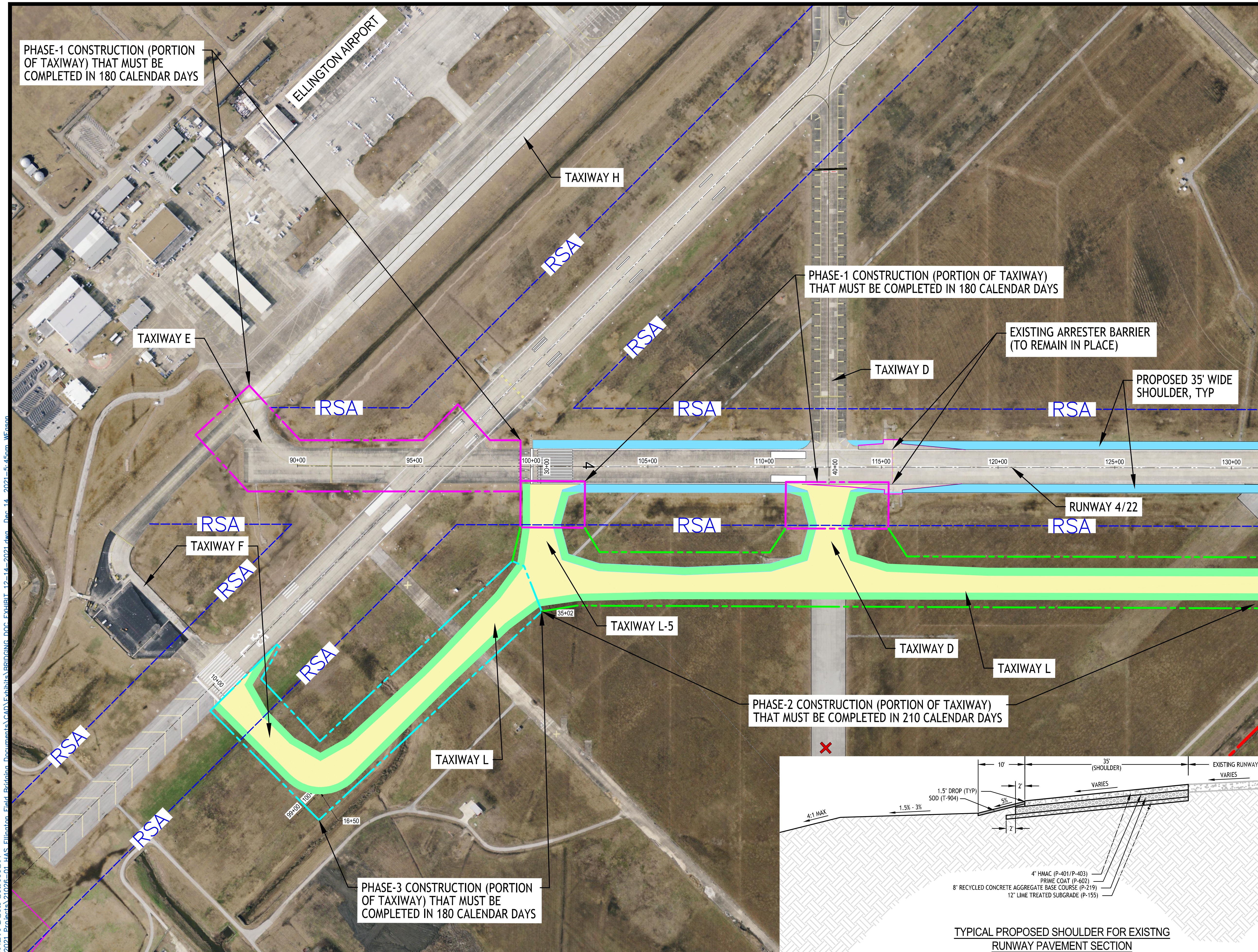
Runway 4-22 improvements will include adding 35 feet wide asphalt shoulders to each side of the runway. The Taxiway L Draft Program Definition Document recommended concrete shoulders. HAS decided asphalt shoulders would be acceptable. The addition of the asphalt shoulder will require the runway edge lights to be replaced and upgraded to LED fixtures to match the recommended fixtures for Taxiway L. Lighting upgrades also be done for the runway end indicator lights. All existing runway edge lights and boxes should be salvaged and delivered to a location determined by HAS. Runway shoulders and lighting upgrades were not part of the 30% Advanced Planning Drawings.

The wind cones for Runway 22, Runway 17R and Runway 35L must be moved outside the Runway Safety Areas. The locations of the relocated wind cones shall meet the requirements for Part 139. These items were noted to not be in compliance during the annual Part 139 inspection.

The recommended pavement section for the asphalt shoulder is shown in Section II of this document. Refer to Exhibits A and B for limits of the of the runway shoulders. Exhibits A and B also show the portion of Taxiway L and associated taxiways that must be completed in order to provide access to Spaceport tenants. All work within the RSA for Runway 4-22 must be completed in the same construction phase in order to provide access to Spaceport tenants.

In order to provide access to Runway 4-22 and the portion of taxiways that need to be completed for Spaceport tenants, HAS wants to utilize a wooden/composite mat roadway as a temporary access to the airfield. The temporary roadway shall be 75 feet wide with a length of approximately 418 linear feet. Refer to Exhibit C for the location of the temporary roadway along with applicable notes. The actual location will be as approved by HAS.

The project may be divided into multiple phases/packages depending upon HAS business need and may be discussed during project design development phase.



TYPICAL PROPOSED SHOULDER FOR EXISTNG RUNWAY PAVEMENT SECTION

SCALE: 1"=10'

0 200' 400'

N

No.	Date	Revisions	App.

LEGEND

	TAXIWAY PAVEMENT
	PROP RUNWAY SHOULDER PAVEMENT
	PROP TAXIWAY SHOULDER PAVEMENT
	ABANDONED RUNWAY PAVEMENT
	PROPOSED SERVICE (LOOP) ROAD
	EXISTING BUILDING
RSA	RUNWAY SAFETY AREA (RSA) (500' WIDE CENTERED ON RUNWAY)
	CETERLINE OF RUNWAY / TAXIWAY
	AIRPORT PROPERTY LINE

NOTES

PACKAGE 1- PRE ENGINEERING/DESIGN/PRE CONSTRUCTION/ENABLING WORK ETC.

PACKAGE 2- PHASE 1 CONSTRUCTION (AREA SHOWN IN MAGENTA BOX, PLUS RWY 4-22 SHOULDER, WIND CONE RELOCATION AND ASSOCIATED DRAINAGE, ELECTRICAL, COMMUNICATION, ILS ETC. WITHIN RSA).

PACKAGE 3-PHASE 2 CONSTRUCTION, (SHOWN IN GREEN BOX) .

PACKAGE 4 -PHASE 3 CONSTRUCTION, (SHOWN IN CYAN BOX ON EXHIBIT-A) .

PRELIMINARY REVIEW ONLY
NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMITTING PURPOSES
STEVE E. STACY, P.E.
P.E. SERIAL No. 80294
DATE: 12/14/21

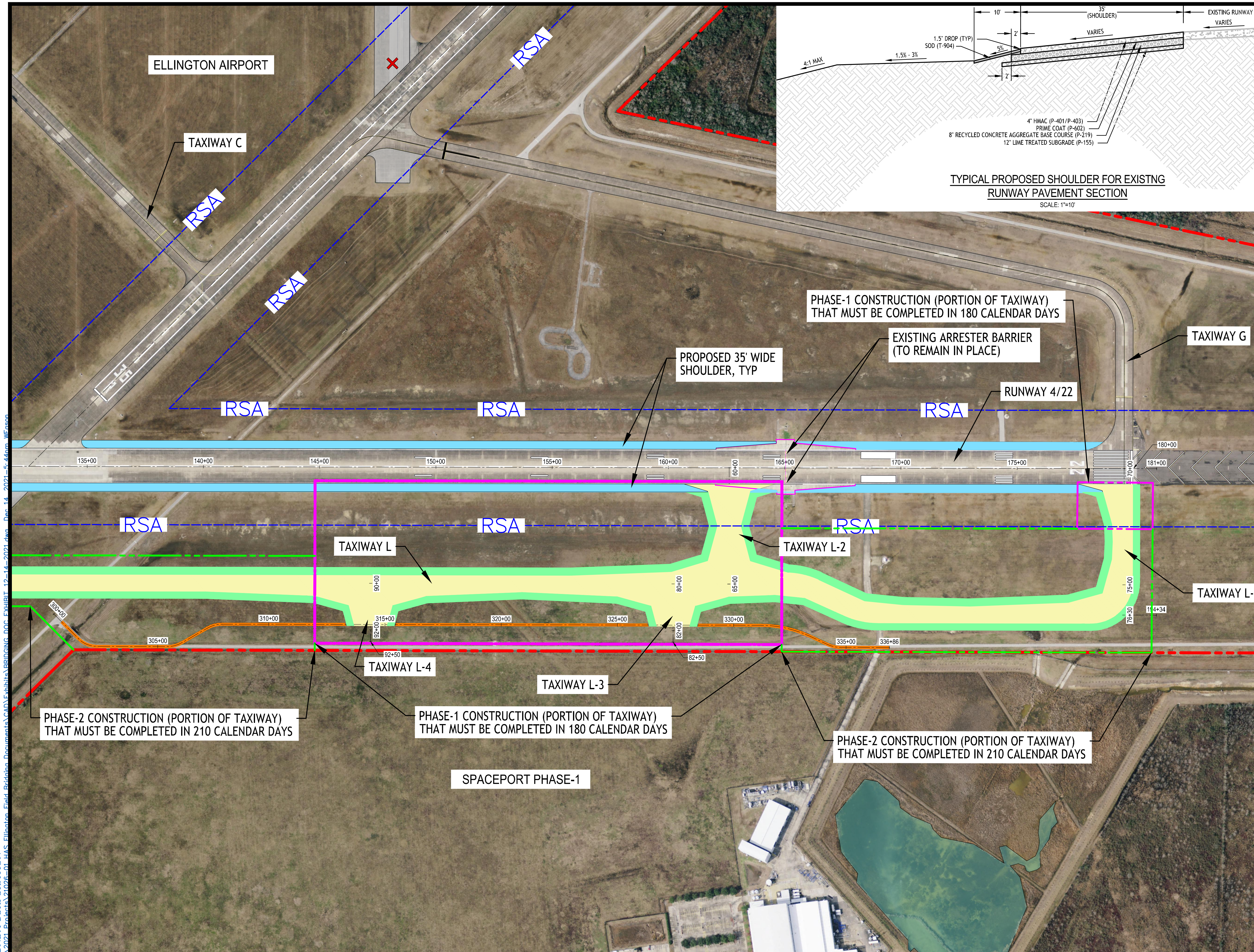
GUNDA CORPORATION
Engineers, Planners & Managers
11750 Katy Freeway, Suite 300
Houston, Texas 77079
713.541.3530 www.gundacorp.com
TBPE Registration Number: F-3531

HOUSTON AIRPORTS

BRIDGING DOCUMENT EXHIBIT PROPOSED WORK AT ELLINGTON AIRPORT EXHIBIT-A

DRAWING SCALE: 1" = 200'

GUNDA CORPORATION



N
0 200' 400'

No.	Date	Revisions	App.

LEGEND

	TAXIWAY PAVEMENT
	PROP RUNWAY SHOULDER PAVEMENT
	PROP TAXIWAY SHOULDER PAVEMENT
	ABANDONED RUNWAY PAVEMENT
	PROPOSED SERVICE (LOOP) ROAD
	EXISTING BUILDING
RSA	RUNWAY SAFETY AREA (RSA) (500' WIDE CENTERED ON RUNWAY)
	CETERLINE OF RUNWAY / TAXIWAY
	AIRPORT PROPERTY LINE

NOTES

PACKAGE 1- PRE ENGINEERING/DESIGN/PRE CONSTRUCTION/ENABLING WORK ETC.

PACKAGE 2- PHASE 1 CONSTRUCTION (AREA SHOWN IN MAGENTA BOX, PLUS RWY 4-22 SHOULDER, WIND CONE RELOCATION AND ASSOCIATED DRAINAGE, ELECTRICAL, COMMUNICATION, ILS ETC. WITHIN RSA).

PACKAGE 3-PHASE 2 CONSTRUCTION, (SHOWN IN GREEN BOX) .

PACKAGE 4 -PHASE 3 CONSTRUCTION, (SHOWN IN CYAN BOX ON EXHIBIT-A) .

PRELIMINARY REVIEW ONLY
NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMITTING PURPOSES
STEVE E. STACY, P.E.
P.E. SERIAL No. 80294
DATE: 12/14/21

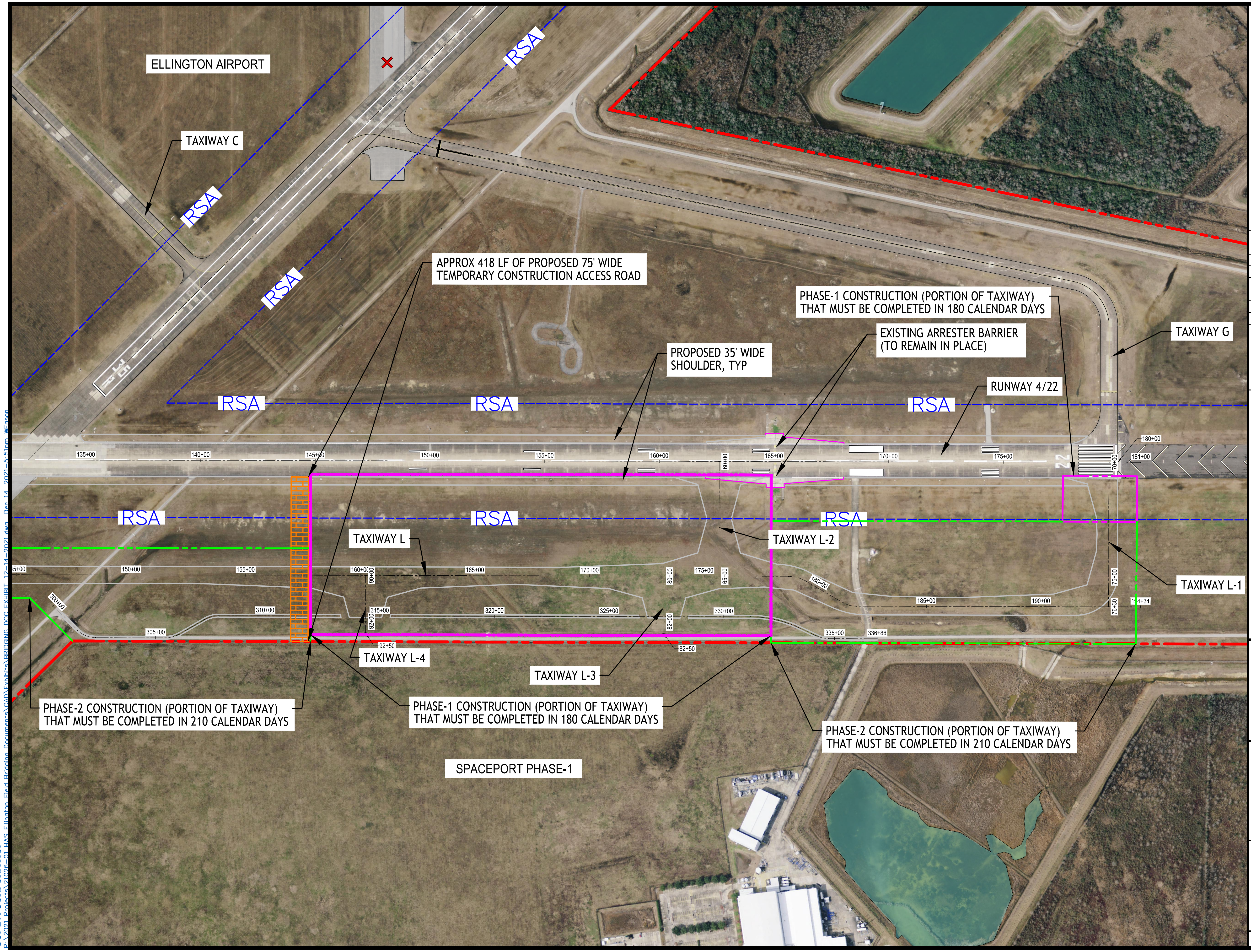
GUNDA CORPORATION
Engineers, Planners & Managers
11750 Katy Freeway, Suite 300
Houston, Texas 77079
713.541.3530 www.gundacorp.com
TBPE Registration Number: F-3531

HOUSTON AIRPORTS

BRIDGING DOCUMENT EXHIBIT
PROPOSED WORK AT
ELLINGTON AIRPORT
EXHIBIT-B

DRAWING SCALE: 1" = 200'

GUNDA CORPORATION



No.	Date	Revisions	App.

LEGEND

- PROPOSED TEMPORARY CONSTRUCTION ROAD
- EXISTING BUILDING
- RSA — RUNWAY SAFETY AREA (RSA) (500' WIDE CENTERED ON RUNWAY)
- CETERLINE OF RUNWAY / TAXIWAY
- AIRPORT PROPERTY LINE

NOTES

1. THE TEMPORARY CONSTRUCTION ACCESS ROAD SHALL BE COMPOSED OF WOODEN MATS OR OTHER ENGINEER APPROVED MATERIAL.
2. THE ACCESS ROAD SHALL NOT BLOCK EXISTING STORM WATER DRAINAGE. TEMPORARY CULVERTS MAY BE REQUIRED.
3. THE ACCESS ROAD SHOULD BE ABLE TO WITHSTAND ALL EXPECTED LOADS FROM CONSTRUCTION EQUIPMENT.
4. ONCE REMOVED, THE ACCESS ROAD AREA MUST BE RESTORED TO ORIGINAL EXISTING CONDITION.
5. REMOVAL OF THE ACCESS ROAD SHALL BE "BACKED" OUT FROM THE RUNWAY TOWARDS THE NEW TAXIWAY.
6. THE ACTUAL LOCATION OF THE ACCESS ROAD SHALL BE DETERMINED BY THE CONTRACTOR.

PRELIMINARY REVIEW ONLY
NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMITTING PURPOSES
STEVE E. STACY, P.E.
P.E. SERIAL No. 80294
DATE: 12/14/21

GUNDA CORPORATION
Engineers, Planners & Managers
11750 Katy Freeway, Suite 300
Houston, Texas 77079
713.541.3530 www.gundacorp.com
TBPE Registration Number: F-3531

HOUSTON AIRPORTS

BRIDGING DOCUMENT EXHIBIT
PROPOSED WORK AT
ELLINGTON AIRPORT
EXHIBIT-C

DRAWING SCALE: 1" = 200'
SHEET NO. 3 OF 3

GUNDA CORPORATION
P:\2021 Projects\21026-01 HAS Ellington Field Bridging Documents\CAD\Exhibits\BRIDGING DOC EXHIBIT 12-14-2021.dwg Dec 14, 2021-5:51pm WGreen

II. Asphalt Shoulder Pavement Design

Refer to next page.

PAVEMENT DESIGN REPORT
HOUSTON AIRPORT SYSTEM ELLINGTON FIELD (EFD)
RUNWAY 4-22 SHOULDER PAVEMENT DESIGN
HOUSTON, TEXAS

SUBMITTED TO
GUNDA CORPORATION
11750 KATY FREEWAY, SUITE 300
HOUSTON, TX 77079

BY
HVJ ASSOCIATES, INC.
1701 DIRECTORS BLVD, STE. 910
AUSTIN, TX 78744

NOVEMBER 2, 2021

REPORT NO. HG 18 10259.1.1-P

1701 Directors Boulevard, Suite 910
Austin, Texas 78744
737-222-5151
www.hvj.com

November 2, 2021

Mr. Steve Stacy, P.E.
Civil Engineering Manager
GUNDA CORPORATION
11750 Katy Freeway, Suite 300
Houston, Texas 77079

Subject: Pavement Design Report
Shoulder Pavement Design
Houston Airport System – Ellington Field (EFD)
Owner: Houston Airport System (HAS) – City of Houston, Texas
HVJ Report No. HG1810259.1.1-P

Dear Mr. Stacy,

Submitted herein is shoulder pavement design report for the above-referenced project. The investigation was performed in accordance with HVJ's Subcontract with Gunda Corporation (GUNDA) for the On-Call Design Services for Small Projects at George Bush Intercontinental (IAH), William P. Hobby Airport (HOU) and Ellington Airport (EFD)- Contract No. 4600015601-Project No. 925G and is subject to limitations presented in this report.

It has been a pleasure to work for GUNDA on this project and we appreciate the opportunity to be of service. Please read the entire report and notify us if there are questions concerning this report or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm No. F-000646

R. F. Carmichael III

Robert F. (Frank) Carmichael III, PE
Senior Pavement Engineer

Anthony Gibson
Graduate Civil Engineer

FC/AG
This document was released for the purpose of interim review under the authority of Robert F. (Frank) Carmichael III, PE 43815 on November 2, 2021. It is not to be used for construction, bidding, or permitting purposes.

The following lists the pages which complete this report:
- Main Text – 7 pages
- Appendix A – 3 page

TABLE OF CONTENTS

APPENDIX

1. INTRODUCTION

HVJ Associates, Inc. was retained by Gunda Corporation (GUNDA) to prepare pavement design engineering as part of HVJ's Subcontract for the On-Call Design Services for Small Projects at George Bush Intercontinental (IAH), William P. Hobby Airport (HOU) and Ellington Airport (EFD)- Contract No. 4600015601-Project No. 925G. HVJ's scope of services is characterized by two main pavement design tasks:

1.1 Review Existing Geotechnical Investigation Report

HVJ is developing the pavement design for new 35 foot wide shoulders on both sides of existing runway Runway 4-22 at EFD. HVJ is using an existing geotechnical report which was completed by Aviles for Atkins on the parallel Taxiway L[1]. This report has the necessary soil parameters needed for the proposed Runway 4-22 shoulder pavement design and was provided by GUNDA to HVJ. HVJ reviewed this report to establish the necessary subgrade design strength and stabilization requirements for the subgrade under the new shoulder design

1.2 Develop Runway 4-22 Shoulder Pavement Design

HVJ used the Aircraft Design Group V aircraft was provided by GUNDA and HAS for the pavement design. FAA Standard Construction Material Specifications were assumed by HVJ for establishing the properties of the new pavement materials. HVJ developed a 15-year hot mix asphalt concrete (HMAC) pavement cross section using the FAA FAARFIELD pavement design procedure. Two alternative base types will be considered (HMAC and CTB) with lime stabilized subgrade assumed to be required.

2. ANALYSIS AND DESIGN

2.1 Task 1 Review of Existing Geotechnical Report

The Taxiway L boring map provided in Appendix A (Plate A-2 of the Aviles report) shows the boring locations for taken for the parallel Taxiway L project. HVJ used the results from Borings B-51, B-53, B-56, B-58, B-60, B-63, and B-64, which were collected at the edge of Runway 4-22, where the connecting taxiways from Taxiway L intersect Runway 4-22. Based on a review of the recommend subgrade California Bearing Ratio (CBR) strength test values in Table 4-1 of the Aviles report, HVJ summarized the values shown in Table 1 below for this project.

Table 1 Recommended CBRs Based on DCP results

Boring	CBR
B-51	5.0
B-53	5.0
B-56	8.0
B-58	8.0
B-60	2.0

[1] AVILES Engineering Corporation, "Geotechnical Investigation Report – Houston Airport System (HAS) Taxiway L at Ellington Field (EFD)," Report No G103-21, September 2021.

Boring	CBR
B-63/CORE	5.0
B-64	5.0
AVERAGE	**5.4**

The subgrade elastic modulus used for the shoulde pavement design was estimated to 8,100 psi based on the CBR of 5.4 and the following relationship of

$$E = CBR \times 1500$$

Consideration of Swelling Soil. The soil types that were encountered in the Aviles borings along the taxiway alignments as summarized in Appendix A generally consist of fat/lean clay (CH/CL) with medium to very high plasticity. Subgrades with high plasticity indexes are capable of swelling beneath pavement structures, so treatment of the soil is necessary to mitigate any swelling effects. According to Section 2.16.12 of the 2015 Houston Airport System (HAS) Design Criteria Manual[2], all subgrades should be lime/fly ash-treated or cement/fly ash-treated. However, Aviles Engineering Corporation (AEC) recommends using lime stabilization to treat the subgrade. Based on the soil conditions, AEC suggests that a minimum of 8 inches of subgrade soils beneath the proposed pavement be stabilized with a minimum of 8 percent lime (by dry soil weight).

Sulfate content of the subgrade can present an adverse reaction with lime stabilization, so the sulfate levels of the soil were checked. The existing subgrade along the taxiway alignment had sulfate contents less than 3,000 ppm, so traditional treatment is acceptable.

PVR (Potential Vertical Rise) is a soil's potential to swell beyond its existing state if moisture is introduced. AEC selected 15 borings to determine PVR. The results are summarized Table 2.

Table 2 AEC's Potential Vertical Rise Results

Boring	PVR (in), based on in-situ moisture conditions
B-1	4.03
B-6	1.55
B-11	4.72
B-17	3.03
B-22	2.90
B-26	2.12
B-33	3.21
B-37	2.23
B-41	1.64
B-47	3.46
B-50	3.44
B-56	2.11
B-64	3.26
B-67	2.22
B-74	2.81

[2] Houston Airport System (HAS) Design Manual, "Section 2.16.12.5 – Subbase and Base Course", April, 2015.

For reference, the TxDOT 2019 Pavement Design Manual[3] requires a maximum allowable PVR of 2.0 inches for highway main lanes. Of the select borings in Table 2, the PVR exceeds 2 inches in 13 of the 15 borings. AEC states the following in their geotechnical report: "If HAS decides to reduce the PVR to at least 2 inches, the top 24 inches of highly expansive clay soils along the project alignment should be excavated and either replaced with lean clay soil with low plasticity, or by stabilizing the excavated clay soil with at least 8 percent hydrated lime and then compacting it back in place." The existing proposed pavement design provides 24 inches on nonswelling material and meets this requirement.

2.2 Task 2 Shoulder Pavement Design

HVJ prepared the hot mix asphalt concrete (HMAC) shoulder pavement thickness designs in accordance with the FAA AC 150/5320-6F Airfield Pavement Design and Evaluation and using the FAARFIELD computer software. The design procedure inputs include: insitu subgrade modulus, pavement materials' modulus values, aircraft mix, and number of departures.

New Pavement Material Strength Values. The Hot Mix Asphalt Concrete (HMAC) Item P-401 /P-403 surface design modulus was assigned to be 200,000 psi. The Recycled Concrete Aggregate Base Course (RCAB) Item P-219 base design modulus was assigned to be 75,000 psi.

Lime stabilized subgrade was selected as for all cross sections due to the high PI subgrade soil. Lime stabilized subgrade is not a listed option within the FAARFIELD software, so a "User Defined" layer was used and HVJ assumed a typical lime stabilized subgrade modulus of 30,000 psi. The Aviles report recommended 8% Lime in their report. HVJ also recommends that the contractor confirm a mix design that will achieve a minimum unconfined compressive strength of 150 psi. Finally based on the high PI of the insitu soils, HVJ recommends that the lime stabilization be to a minimum of 8 inches for the shoulder pavement.

A summary of the new pavement material strengths used in designs is shown in Table 3.

Table 3. New Pavement Material Design Strengths

Pavement Material	Design Resilient Modulus, psi
Item P-401/P-403 Hot Mix Asphalt Concrete	200,000
Item P-219 Recycled Concrete Aggregate Base Course (RCAB)	75,000
Item P-155 Lime Treated Subgrade (LTS)	30,000

Design Aircraft Selection. Based on the Aircraft Design Group (ADG) V established by HAS for this runway, the Boeing 777-300ER aircraft was selected by HVJ for the shoulder thickness design.

Runway 4-22 Shoulder Pavement Design. The FAA software FAARFIELD[4] was used for the pavement thickness design. A hot mix asphalt concrete (HMAC) Item P-401 / P-403 surface was used assumed for the shoulders and the 15-year design life was modeled based on a single annual departure of a Boeing 777-300ER loading. The FAARFIELD models insitu subgrade based on the

[3] TxDOT Pavement Design Manual, Chapter 3, Section 2 –" Geotechnical Investigation for Pavement Structures", Subsection 2.3.2.2 – "Swell Potential", 2019.

modulus of the subgrade and assumes the layer to be elastic, homogeneous, and infinite in thickness. The recommended FAARFIELD pavement thickness design is summarized below in Table 4 and the software output is provided in Appendix B.

Table 4. Runway 4-22 Shoulder Pavement Design

15 year Design Life
4.0" HMAC (Item P-401/P-403)
Prime Coat (Item P-602)
8.0" Recycled Concrete Aggregate Base Course (Item P-219)
12.0" Lime Treated Subgrade (Item P-155)

3. PAVEMENT SPECIFICATIONS

The following FAA Standard Airport Construction Specifications from AC 150/5370-10F[5] Standards for Specifying Construction of Airports are applicable and apply the construction materials assumed for these designs.

Item P-152 Excavation, Subgrade, and Embankment
Item P-155 Lime-Treated Subgrade
Item P-219 Recycled Concrete Aggregate Base Course
Item P-401 Asphalt Mix Pavement
Item P-602 Emulsified Asphalt Prime Coat

4. DESIGN REVIEW

HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

5. LIMITATIONS

The shoulder pavement design was prepared for the exclusive use of GUNDA for the proposed Runway 4-22 shoulder at Ellington Field (EFD) for the Houston Airport System (HAS). The analyses and recommendations contained in this report are based on data obtained from subsurface exploration and laboratory testing prepared by others and provided to HVJ by GUNDA. The subsurface conditions only represent the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations or on different sites. Should any subsurface conditions other than those described in the boring logs be encountered, HVJ Associates, Inc. should be immediately notified so that further investigation and supplemental recommendations can be provided.

[4] FAA, "Airport Pavement Design and Evaluation", Advisory Circular No. 150/5320-6F – FAARFIELD Software, November 10, 2016.
[5] FAA, "Standards for Specifying Construction of Airports", Advisory Circular No. 150/5370-10G, July 21, 2014.

III. Taxiway L Pavement Design Memorandum

ATKINS

Member of the SNC-Lavalin Group

Technical Memorandum

To:	Dev Pokhrel, PE		
From:	Edmond Woods, PE	Email:	Edmond.woods@atkinsglobal.com
Date:	29 October 2021	Phone:	
Ref:	EFD Taxiway L Construction	cc:	John.verburg@atkinsglobal.com
Subject:	Preliminary Pavement Design		

1. Introduction

This technical memorandum summarizes the preliminary pavement design for the construction of Taxiway L at Ellington Field Airport (EFD). An overview of the proposed geometry is shown in Figure 1-1.

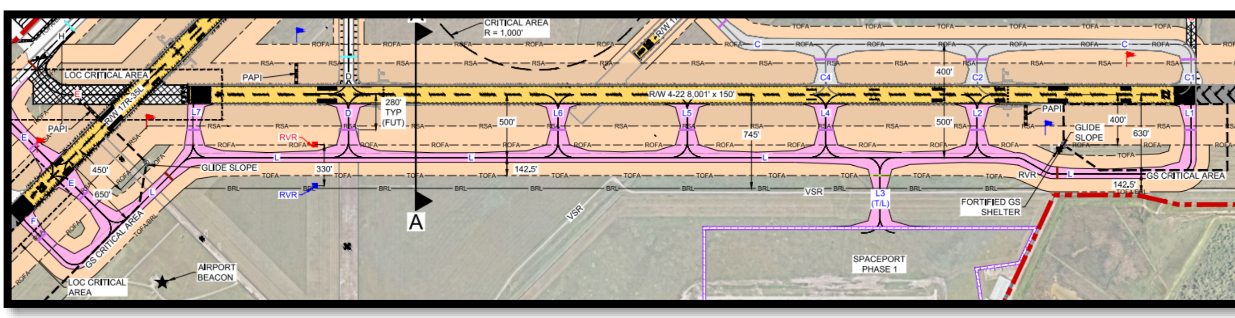


Figure 1-1 – Proposed Draft Geometry

2. Existing Conditions

In general, the proposed Taxiway L is proposed to be located to the east and parallel to existing Runway 4-22. The project area is primarily flat and covered with grass.

2.1. Document Review

TBD. At this time, no information has been provided regarding the area in which the proposed Taxiway L lies within or related to the existing, parallel Runway 4-22.

2.1.1. Taxiway L As-Built Drawings

Not applicable.

3. Geotechnical Investigation

Geotechnical information pertaining to the proposed EFD Taxiway L pavement design is available from the current geotechnical investigation for this project provided by Aviles. The Interim Geotechnical Report was provided on September 23, 2021.

The geotechnical investigation for this project was conducted during the period of 4 through 8 March 2021. The investigation consisted of drilling and sampling seventy-four (74) soil borings to a depth of 16 feet below the existing grade, performing thirty-seven (37) Dynamic Cone Penetrometer (DCP) tests along the proposed taxiways to estimate the field California Bearing Ratio (CBR) values, performing soil laboratory testing on selected soil samples to determine the index and strength properties of the subgrade soils, and performing solid laboratory testing on soil samples collected from sample pits to determine maximum dry density and moisture content of subgrade soils and subgrade CBR. At the time of this memo, the interim geotechnical report has been received which includes boring logs and initial laboratory testing. The interim geotechnical report is provided in Appendix A.

Fieldwork for this project’s geotechnical investigation is complete and laboratory testing is ongoing. An interim geotechnical report has been issued to include boring logs and initial laboratory testing. Outstanding laboratory testing includes moisture-density relationship, soaked CBR, and soil-lime mix design series of the bulk samples. Boring locations are shown in Figure 3-1. This section will be updated, and the preliminary pavement designs will be reviewed upon receipt of the final geotechnical report.

Clay soils in the Greater Houston area typically have secondary features such as slickensides, calcareous/ferrous nodules, and contain sand/silt seams/lenses/layers/pockets. It should be noted that the information in the boring logs is based on 3-inch diameter soil samples which were generally obtained from the borings at intervals of 2 feet continuously from the ground surface to a depth of 16 feet below the existing grade. A detailed description of the soil secondary features may not have been obtained due to the small sample size and sampling interval between the samples.

The subgrade soils beneath the pavement that were encountered in the borings along the taxiway alignments generally consist of fat/lean clay (CH/CL) with medium to very high plasticity. For the construction of the taxiways, it is of the opinion that it will be sound engineering practice for the subgrade soils beneath the pavement to be stabilized to provide uniform and long-lasting subgrade support of the pavement, as well as provide a weather-resistant work platform during construction.

Figure 3-1 – Borings and Coring Location Plan

4. FAA Standard Design Criteria

4.1. Design Considerations

The FAA computer program, FAARFIELD, was used for all pavement thickness designs regardless of aircraft gross weight. FAARFIELD uses layered elastic and three-dimensional finite element-based design procedures for new and overlay designs of flexible and rigid pavements respectively. For rigid pavement design, FAARFIELD uses the horizontal stress at the bottom of the concrete panel as the predictor of the pavement structural life. The maximum horizontal stress for design is determined considering both edge and interior loading conditions. FAARFIELD provides the required thickness of the rigid pavement panel required to support a given aircraft traffic mix for the structural design life over a given base/subbase/subgrade.

4.2. Rigid Pavement Design

Rigid pavements for airports are composed of concrete placed on a granular or stabilized base course supported on a compacted subgrade. The FAARFIELD design process currently considers only one mode of failure for rigid pavement, bottom-up cracking of the concrete panel. Cracking is controlled by limiting the horizontal stress at the bottom of the concrete panel. Rigid pavement design is as referenced in Chapter 3 – Pavement Design, of AC 150/5320-6G.

The concrete surface provides a nonskid texture, minimizes the infiltration of surface water into the subgrade, and provides structural support for aircraft loading. The quality of the concrete, acceptance and control tests, methods of construction and handling, and quality of workmanship is covered in Item P-501Cement Concrete Pavement. See AC 150/5370-10, Item P-501 for concrete pavement specifications.

For pavement design, since the primary action and failure mode of concrete pavement is in flexure the critical strength of the concrete is the flexural strength. A design flexural strength between 600 and 750 psi (4.14 to 5.17 MPa) is recommended for most airfield applications. HAS requires the design flexural strength of 700 psi to be used in the design of airfield pavement.

4.3. Jointing of Concrete Pavement

Variations in temperature and moisture content can cause volume changes and warping of panels which may cause significant stresses. Joints are used to divide the pavement into a series of panels of predetermined dimensions to reduce the detrimental effects of these stresses and to minimize random cracking. Refer to Table 4-1 for recommended maximum joint spacing, according to AC 150/5320-6G, Section 3.16.13 – Joint Spacing. Note that the panel thickness controls the joint spacing, not vice-versa. Table 4-1 is not intended to be used to establish panel thickness based on a predetermined joint spacing. In general, smaller panels have better long-term performance. All joints should be sealed with appropriate joint sealant, using appropriate detail for sizing of joint. See AC 150/5370-10G for standard joint specifications, Item P-604 Compressive Joint Seals for Concrete Pavements, and Item P-605 Joint Sealants for Pavements.

Panel Thickness	Joint Spacing
8–10 inches (203-254 mm)	12.5 feet (3.8 m)
10.5-13 inches (267-330 mm)	15 feet (4.6 m)
13.5-16 inches (343-406 mm)	17.5 feet (5.3 m)
>16 inches (>406 mm)	20 feet (6.1 m)[2,3]

Table 4-1 – Recommended Maximum Joint Spacing (Rigid Pavement)

4.3.1. Joint Type Categories and Details

Pavement joints are categorized according to the function that the joint is intended to perform. Joint types and their uses are as described in Table 4-2 and below. Pavement joint details are shown in Figure 4-1, Figure 4-2, and Figure 4-3, as referenced in AC 15/5320-6G. The categories of joints are:

- Isolation.
- Construction.
- Contraction.

Type	Description	Longitudinal	Transverse
A	Thickened Edge Isolation Joint	Use at: -Pavement Intersections -Free edge that is location of future expansion -edge of structures	Use at: -pavement feature intersections when the pavement intersects atan angle. -free edge that is location of future expansion, -where pavement abuts a structure.
A-1	Reinforced Isolation Joint	For concrete panels > 9 in (230 mm). Use at: -Pavement Intersections -Free edge that is location of future expansion - edge of structures	For concrete panels > 9 in (230 mm). Use at: -Pavement Intersections -Free edge that is location of future expansion - edge of structures
B	Hinged Contraction Joint	Longitudinal contraction jointin panels < 9 in (230 mm) thick; longitudinal contraction joints located 20ft (6m) or less fromthe pavement free edge in panels < 9 in (230 mm) thick	Not used except for panels < 9" when using 'tension ring'
C	Doweled Contraction Joint	For use in longitudinal contraction joints 20 ft (6 m) or less from free edge in panels > 9 in (230 mm) thick. Use at other locations with FAA approval, eg. at gate stands.	Use on the last three joints froma free edge, and for two or three joints on either side of isolation joints. Use at other locations with FAA approval, eg. at gate stands.
D	Dummy Contraction Joint	For all other contraction jointsin pavement.	For all other contraction jointsin pavement.
E	Doweled Construction Joint	All construction joints excluding isolation joints.	Use for construction joints at all locations separating successive paving operations ("headers").
E1	Tied-Doweled Construction Joint	Construction joints on RW or TW in panels <9 in (230mm) thick (Replace every 3rd dowel with tie bar)	N/A
F	Butt Construction Joint	All construction joints for pavement serving aircraft less than 30,000 lbs (13,610 kg) on a stabilized base.	All construction joints for pavements serving aircraft less than 30,000 lbs (13,610 kg) on a stabilized base.

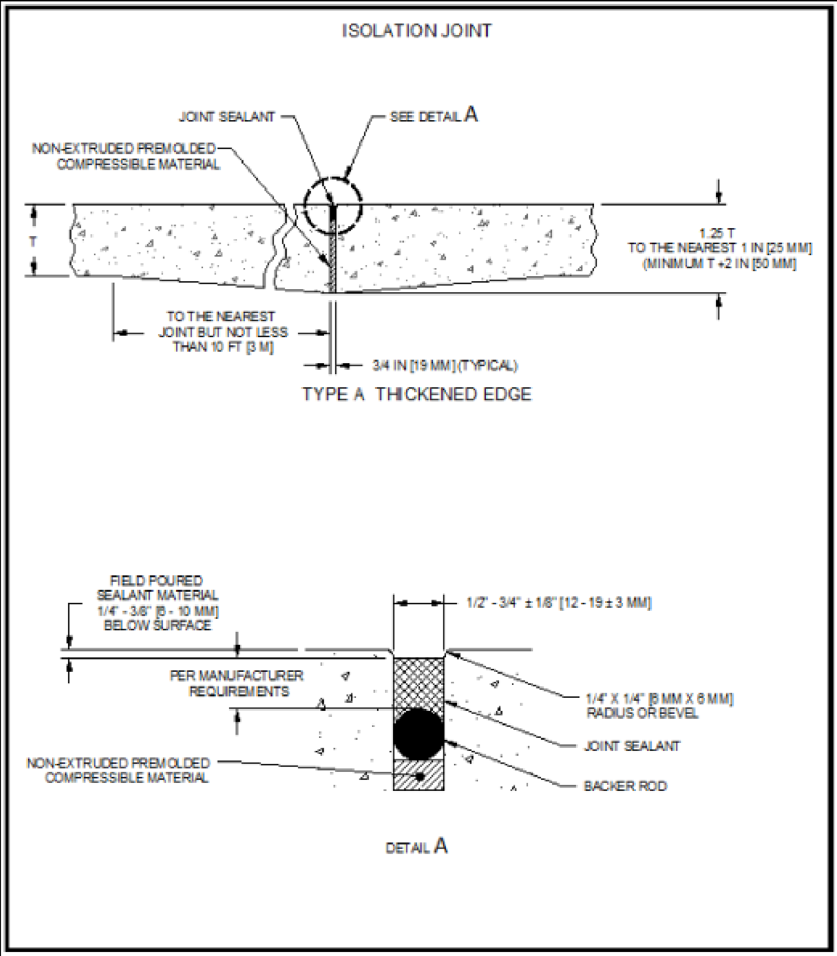
Table 4-2 – Pavement Joint Types.

Isolation joints are needed:

- Where the pavement abuts a structure.
- To isolate intersecting pavements where differences in direction of movement of the pavement may occur (e.g., between a connecting taxiway and a runway).

Note: when connecting new pavement to existing pavement it may be necessary to extend the project back into the existing pavement to construct an isolation joint when the existing edge does not already include a Type A or A1 joint.

Type A joints are created by increasing the thickness of the pavement along the edge of the panel (see Figure 4-1). This thickened edge will accommodate the load that otherwise would be transferred with dowels or by aggregate interlock in contraction and construction joints. Type A-1 joints are reinforced to provide equivalent load carrying capacity as a thickened edge, but may only be used for concrete pavements greater than 9 inches (228 mm), that occur where pavement centerlines intersect at approximately 90 degrees. The joint between the runway and connector, crossover, and exit taxiways are locations where the Type A-1 joint may be considered. When intersecting pavements are at acute angles which results in small irregularly shaped panels on one side of the isolation joint, it may not be possible to install the reinforcement steel.



Note: When isolation joint is adjacent to a fillet, thicken fillet panels for minimum of 10 ft perpendicular to joint. At acute angle intersections transition from full thickened edge back to normal thickness over width of placement lane, perpendicular to isolation joint.

Figure 4-1 – Rigid Pavement Isolation Joint.

Construction joints are required when two abutting panels are placed at different times, such as at the end of a day's placement or between paving lanes. For pavements serving aircraft 30,000 pounds (13,610 kg) or greater, type E construction joints should be used. Type F butt joints may be used for pavements serving aircraft less than 30,000 pounds gross weight, constructed on a stabilized base or for a concrete overlay on a flexible pavement. Details for construction joints are shown in Figure 4-2.

Contraction joints provide controlled cracking of the pavement when the pavement contracts due to a decrease in moisture content or a temperature drop. Contraction joints also decrease stresses caused by panel warping and curling. Details for contraction joints are shown as Types B, C, and D in Figure 4-2. Details for joint sealant are shown in Figure 4-3.

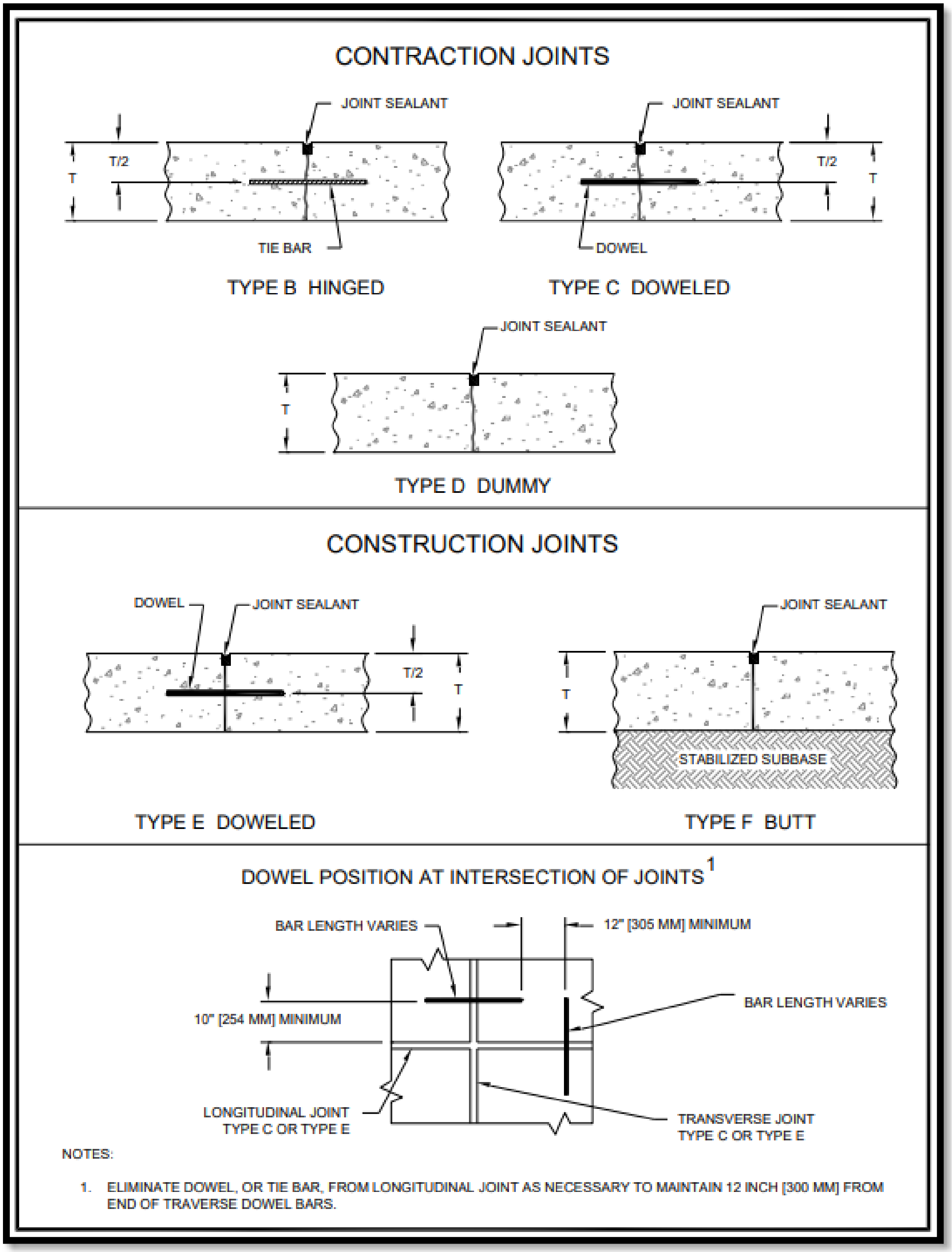


Figure 4-2 – Rigid Pavement Contraction and Construction Joints.

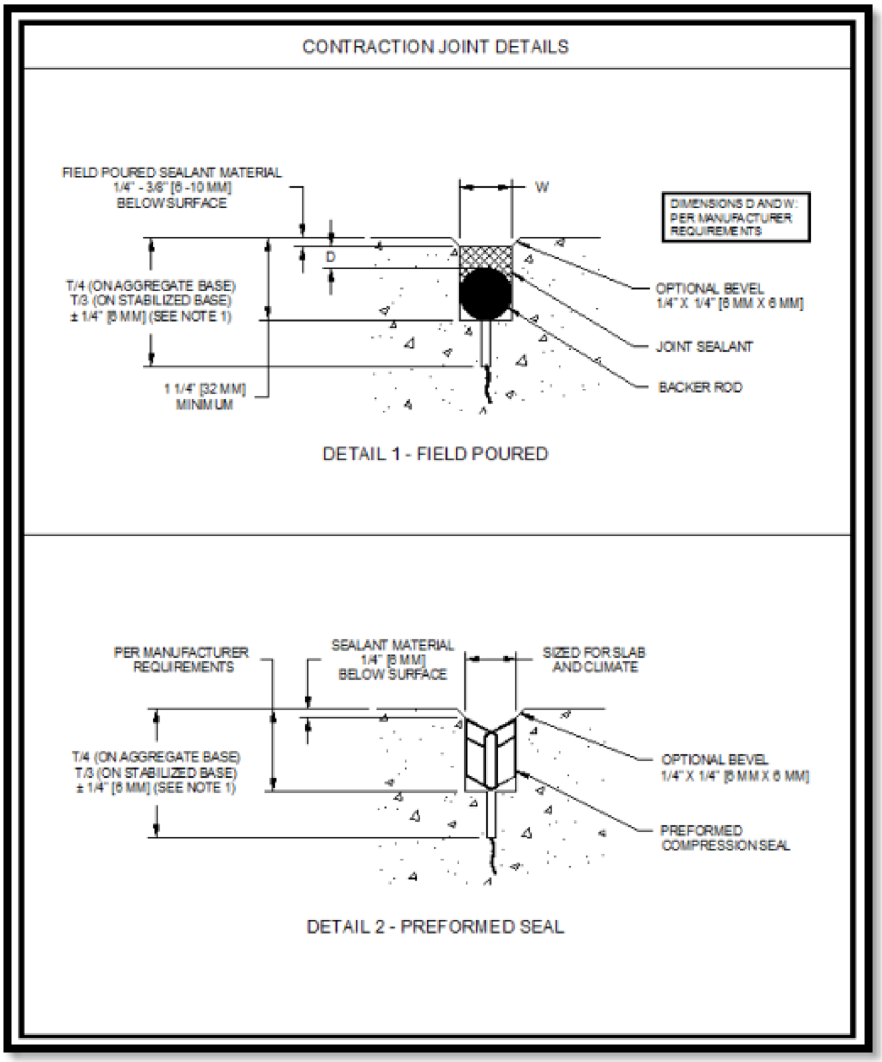


Figure 4-3 – Rigid Pavement Joint Sealant Details.

4.3.2. Dowels

Dowels provide load transfer across the joint and prevent relative vertical displacement of adjacent panel ends. Provide dowels in the last three transverse contraction joints from a free edge. Research indicates that when a stabilized base is included in the pavement section, the stabilized base will provide panel support assisting with load transfer. There is little benefit to providing more than a minimum of dowels in the last three joints from a free edge when the pavement section includes a stabilized base. Dowels are required in all construction joints regardless of if they are longitudinal or transverse, unless a thickened or reinforced edge is provided. Size dowels to resist the shearing and bending stresses produced by the loads on the pavement. Use dowel length and spacing sufficient to prevent failure of the concrete panel due to the bearing stresses exerted on the concrete. Table 4-3 gives dowel dimensions and spacing for various pavement thicknesses, as detailed in AC 150/5320-6G, Section 3.16.10.2.

Thickness of Panel	Diameter	Length	Spacing
5-7 in (125-178 mm)	¾ in (20 mm)	18 in (460 mm)	12 in (305 mm)
7.5-12 in (191-305 mm)	1 in (25 mm)	18 in (460 mm)	12 in (305 mm)
12.5-16 in (318-406 mm)	1 ¼ in (30 mm)	20 in (510 mm)	15 in (380 mm)
16.5-20 in (419-508 mm)	1 ½ in (40 mm)	20 in (510 mm)	18 in (460 mm)
20.5-24 in (521-610 mm)	2 in (50 mm)	24 in (610 mm)	18 in (460 mm)

Table 4-3 – Dimensions and Spacing of Steel Dowels.

4.3.3. Transition Between Concrete and Asphalt

When rigid pavement abuts a flexible pavement section at a location that will be subjected to regular aircraft loading, provide a transition using a detail similar to Figure 4-4, as referenced in AC 150/8320-6G, Section 3.16.2 – Transition Between Concrete and Asphalt.

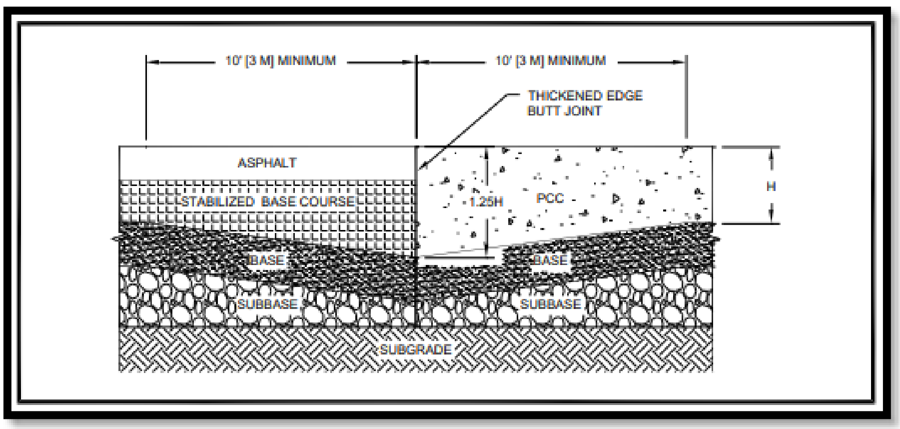


Figure 4-4 – Transition between Rigid and Flexible Pavement Sections.

4.4. Steel Reinforcement

Locations and sizes of reinforcement for crack control of irregularly shaped slabs shall be as detailed in FAA AC 150/5320-6G Section 3.16.12.2. Additional steel may be required at the Owner's direction.

5. Pavement Design

5.1. Traffic

Traffic used for design is derived from the airport's fleet mix provided in Appendix B. Sensitivity analyses were conducted for 1) the entire fleet mix, 2) only those aircraft contributing to the cumulative damage factor, and 3) only those aircraft with greater than 250 departures per year. No difference was noted between the first two options; however, removing aircraft with less than 250 departures per year reduces the P-501 thickness by one inch. Therefore, aircraft with less than 250 departures per year have an impact on the design and are included. The design life provided for FAARFIELD analysis and design was 20 years. The sensitivity analyses are included with the FAARFIELD reports in Appendix C.

5.2. Subgrade Support Conditions

According to Section 2.16.12 of the HAS Design Criteria Manual, all subgrades should be lime/fly ash-treated or cement/fly ash-treated. However, based on the cohesive soils encountered in the borings, it is the geotechnical engineer's opinion that using fly ash or cement will not be effective for subgrade stabilization along the taxiway alignments. It is recommended that lime stabilized subgrade be used alone for the construction of the taxiways. Based on the soil conditions, the geotechnical engineer suggests that a minimum of 12 inches of subgrade soils beneath the proposed pavement be stabilized with a minimum of 8 percent lime (by dry soil weight). Determination of the subgrade resilient modulus, E, the foundation modulus, k, and CBR is required for rigid pavement design. Based on the DCP test results, the interim geotechnical report recommends CBR values of 1 and 5 for the natural subgrade soils along the different alignments of the taxiways. The recommended CBR values were derived from and based on DCP test results are presented in Table 4-1.

Table 5-1 – Recommended CBRs Based on DCP Results

Taxiway Alignment	Nearby Borings	Recommended CBR
Taxiway L/ Connector	B-1 through B-7	5
Taxiway L	B-8	20
Taxiway L	B-9 through B-29	7
Taxiway L	B-30 to B-32	20
Taxiway L	B-33 to B-39	3
Taxiway L	B-40	15
Taxiway L	B-41 to B-43	1
Taxiway L	B-44	9
Taxiway L	B-45 to B-47	2
Taxiway L/ Connectors	B-48 to B-51, B-52, B-53, B-63, B-64	5
Connector	B-54, B-55	20
Connectors	B-56 through B-59	8
Connector	B-60, B-61	2
Taxiway E	B-65 through B-68	5
Taxiway D	B-71 to B-74	8

The stabilized soils should be compacted to 95 percent of their ASTM D 1557 (Modified Proctor) dry density at a moisture content ranging from optimum to 3 percent above optimum. Lime stabilization shall be performed in accordance with Item P-155 of the FAA AC 150/5370-10G Airport Construction Standards.

The geotechnical firm estimated the Potential Vertical Rise (PVR) of soils within the proposed paved areas. However, it is the geotechnical engineer's experience with similar HAS projects that excavation of existing soil for PVR mitigation is not typically performed for taxiway projects. The geotechnical engineer should be notified if PVR mitigation is required so that our recommendations can be updated as necessary.

PVR is an estimate of the potential of an expansive soil to swell from its current state. Expansive clays exhibit a potential to shrink and swell with changes in their moisture contents. The changes in the soil moisture content are usually caused by variations in the seasonal amount of rainfall and evaporation rates or other localized factors like the moisture withdrawal by nearby trees. The geotechnical engineer determined PVR within the zone of seasonal moisture variation, which is typically considered to be 10 feet deep in the Greater Houston area.

Boring	PVR (in), based on in-situ moisture conditions
B-1	4.03
B-6	1.55
B-11	4.72
B-17	3.03
B-22	2.90
B-26	2.12
B-33	3.21
B-37	2.23
B-41	1.64
B-47	3.46
B-50	3.44
B-56	2.11
B-64	3.26
B-67	2.22
B-74	2.81

Table 5-2 – Estimated PVR

Based on Table 5-2, the PVR exceeds 2 inches in Borings B-1, B-11, B-17, B-22, B-26, B-33, B-37, B-47, B-50, B-56, B-64, B-67, and B-74. If HAS decides to reduce the PVR to at least 2 inches, the top 24 inches of highly expansive clay soils along the project alignments should be excavated and either replaced with lean clay soil with low plasticity or by stabilizing the excavated clay soil with at least 8 percent hydrated lime and then compacting it back in place. Compacted soil (whether embankment fill imported from offsite, or existing onsite soil stabilized with lime) should be placed in accordance with Section 3.4.1 (Ordinary Compaction) of Item 132 of the 2014 TxDOT Standard Specifications. Other methods for reducing PVR, such as horizontal or vertical moisture barriers, geosynthetic reinforcement, subgrade drainage, etc. can also be considered if allowed by HAS. However, as noted above, it is the geotechnical engineer's opinion that the PVR mitigation strategies presented above would be cost-excessive and ultimately unnecessary for this category of taxiway project. However, the decision to include PVR mitigation should ultimately be decided by HAS.

At the time of publication of this technical memo, the geotechnical firm was in the process of performing lime-stabilized soil testing to determine the CBRs for the stabilized base material. Per the FAA standards, this value must be greater than 35. The geotechnical firm stated that an updated final report or addendum letter will be provided once the lime-stabilized tests have concluded. Along with the updated final report or addendum letter, the geotechnical firm will provide the corrosion test results.

5.3. Thickness Design

Thickness designs were conducted in accordance with FAA AC 150/5320-6G using FAARFIELD v2.0.3. Outputs from FAARFIELD are provided in Appendix C. The design life used to calculate the Pavement thickness is 30 years, with a flexural strength of 700 psi.

5.3.1. Taxiway L

In order to account for the varying soil conditions presented in the Interim Geotechnical Report, a conservative approach with the soil conditions was taken. To mitigate any detrimental volume change and provide a working platform for construction, the existing infield soils will be lime treated. The lime percent will vary depending on the soil conditions in order to stabilize the first layer and bring it up to a uniform value. Due to the varying CBR calculations, the pavement design was developed using pavement designs with a CBR of 1 for the worst areas, and then a CBR of 5 for the areas with a higher CBR as shown in Table 4-1. Using the equations presented in Figure 4-1, the calculated k-value using a CBR of 1 is 23.53. The calculated E-value using a CBR of 1 is 1500. The calculated k-value using a CBR of 5 is 82.4. The calculated E-value using a CBR of 5 is 7500.

$$k = \left[\frac{1500 \times CBR}{26}\right]^{0.7788}$$

$$E = 26k^{1.284}$$

where:

k = Foundation modulus of the subgrade, in pci

E = Resilient modulus of the subgrade, in psi

Figure 5-1 – Foundation modulus (k) and resilient modulus (E) of the subgrade soil according to FAA AC 150/5360-6E.

According to the Houston Airport System Design Manual, Section 2.16.12.5 – Subbase and Base Course, all full-strength pavements shall include a nine (9) inch Cement Treated Base course as a minimum. A new lift of Cement Treated Base (CTB) shall be installed full width of the pavement. This will provide uniform support to the overlying cement concrete pavement (CCP). The preliminary typical pavement section options are shown in Figure 4-2 through Figure 5-9, as well as located in Appendix D.

Two pavement options were developed for the worst-case soil conditions and the best-case soil conditions, according to the geotechnical report. The worst-case soil conditions have a CBR of 1. The best-case soil conditions have a CBR of 5. Option 1 with a design using CBR of 1 consists of 17.5 inches of P-501 CCP, 6 inches of P-307 Cement-Treated Permeable Base Course (Drainage layer), 12 inches of P-304 CTB, and 12 inches of P-155 lime-treated subgrade (LTS). Option 1 with a design using CBR of 5 consists of 14 inches of P-501 CCP, 6 inches of P-307 Cement-Treated Permeable Base (Drainage layer), 12 inches of P-304 CTB, and 12 inches of P-155 lime-treated subgrade (LTS). Option 2 with a design using CBR of 1 consists of 17 inches of P-501 CCP, 6 inches of P-307 Cement-Treated Permeable Base Course (Drainage layer), 16 inches of P-304 CTB, and 12 inches of P-155 lime-treated subgrade (LTS). Option 2 with a design using CBR of 5 consists of 12.5 inches of P-501 CCP, 6 inches of P-307 Cement-Treated Permeable Base Course (Drainage layer), 16 inches of P-304 CTB, and 12 inches of P-155 lime-treated subgrade (LTS).

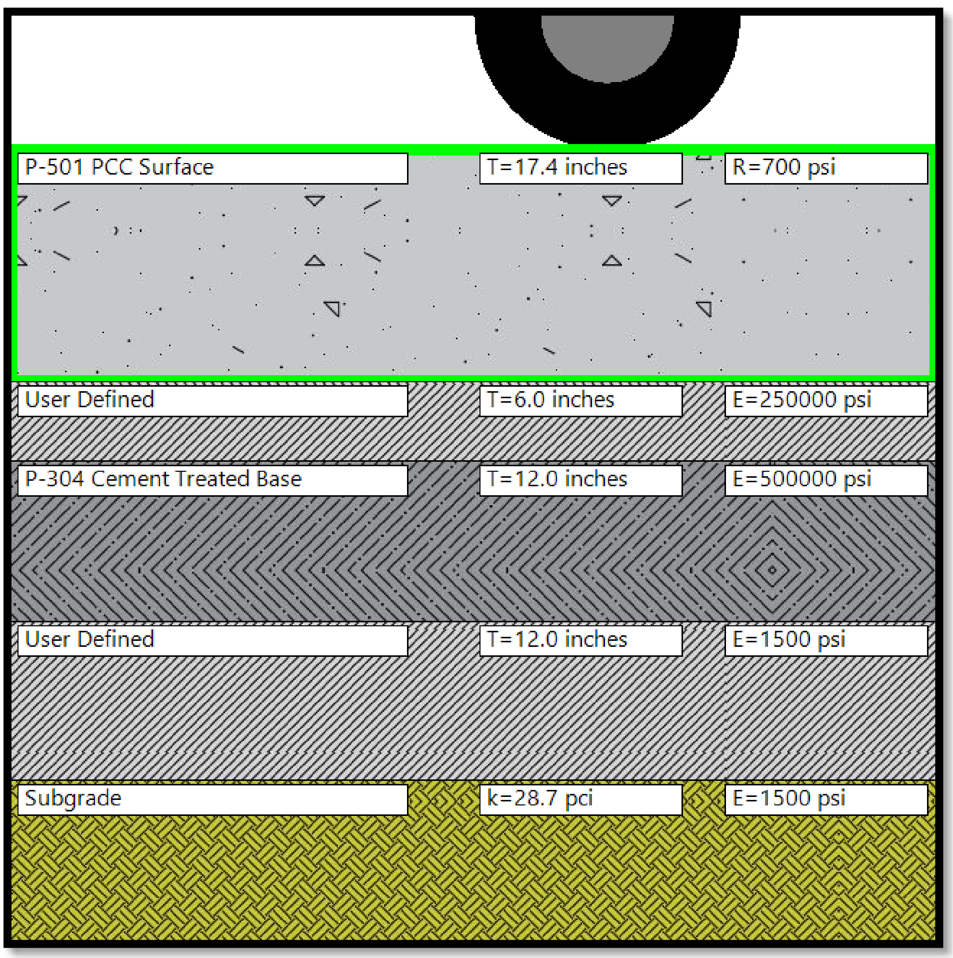


Figure 5-2 – Taxiway Pavement FAARFIELD Output – Option 1 – CBR = 1.

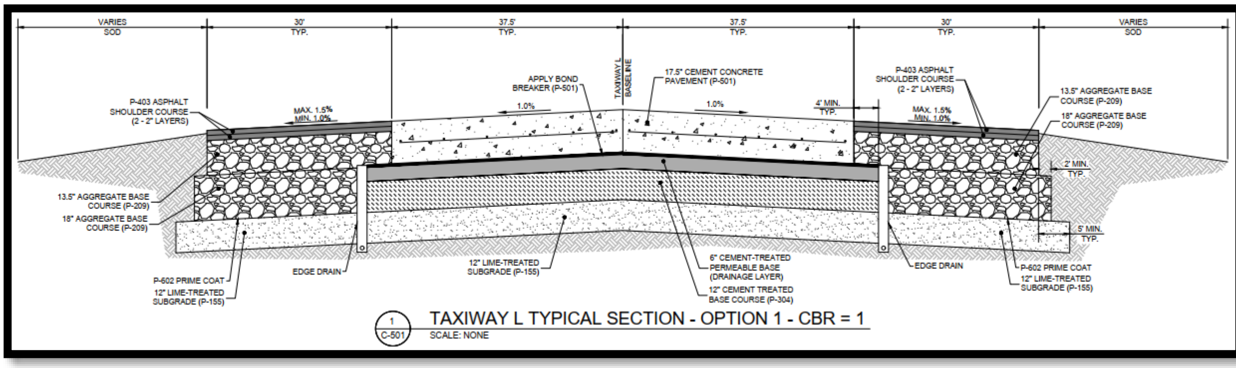


Figure 5-3 – Typical Taxiway and Paved Shoulder Section – Option 1 – CBR = 1.

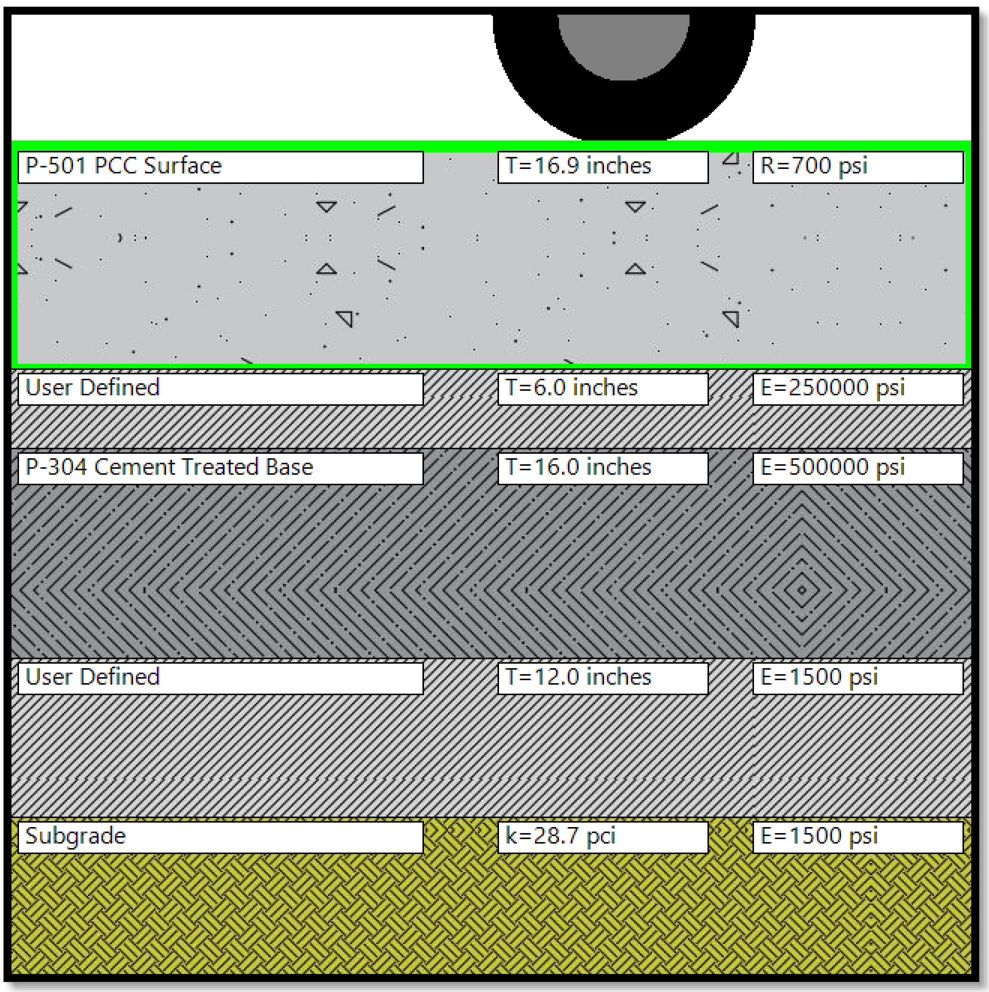


Figure 5-4 – Taxiway Pavement FAARFIELD Output – Option 2 – CBR = 1.

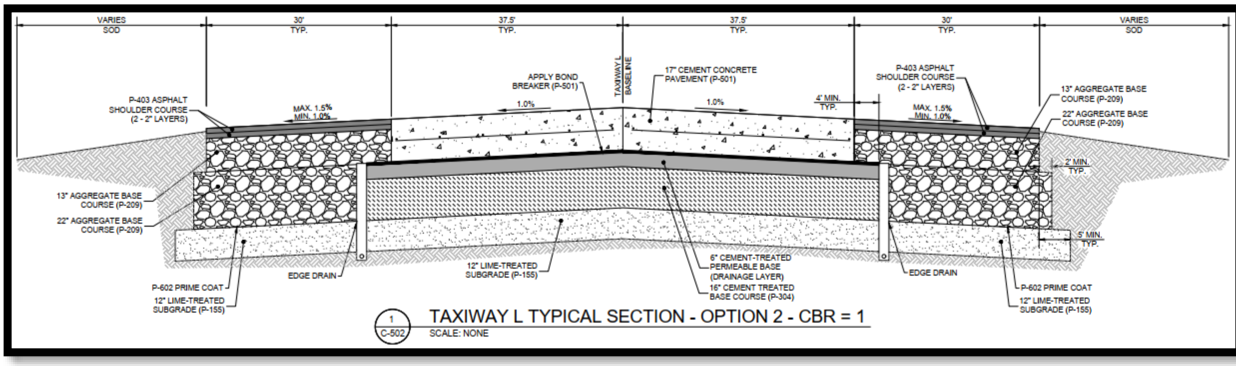


Figure 5-5 – Typical Taxiway and Paved Shoulder Section – Option 2 – CBR = 1.

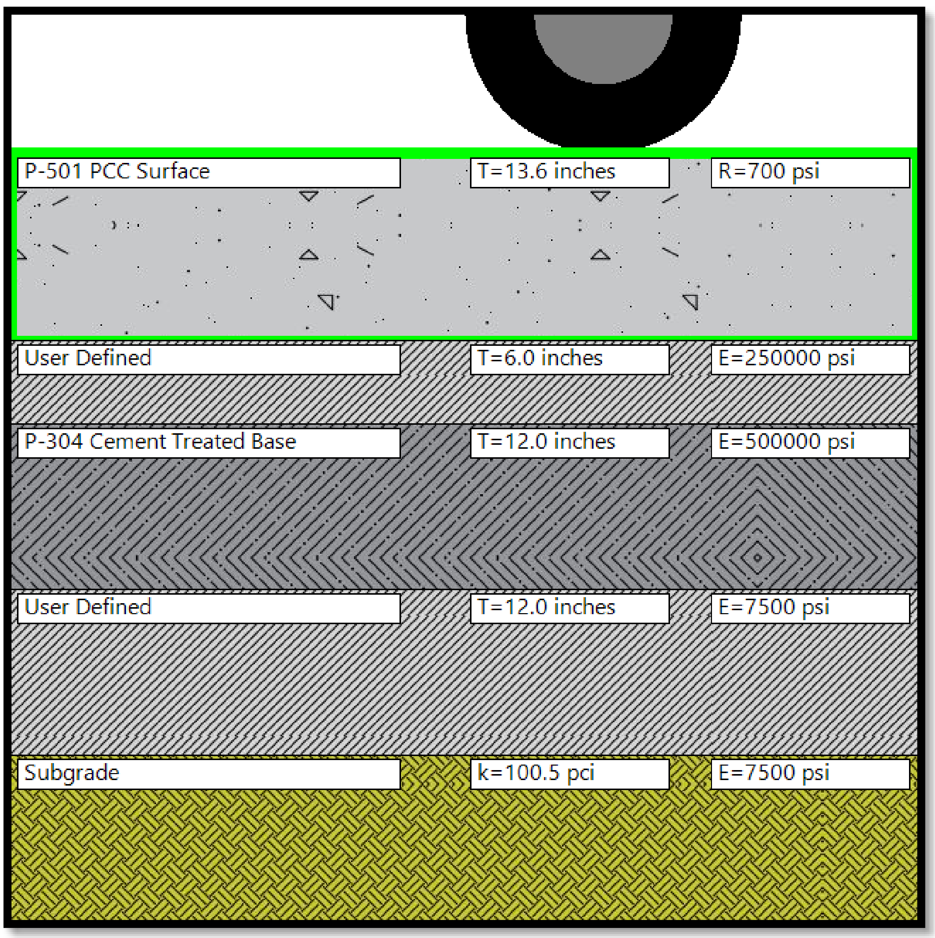


Figure 5-6 – Taxiway Pavement FAARFIELD Output – Option 1 – CBR = 5.

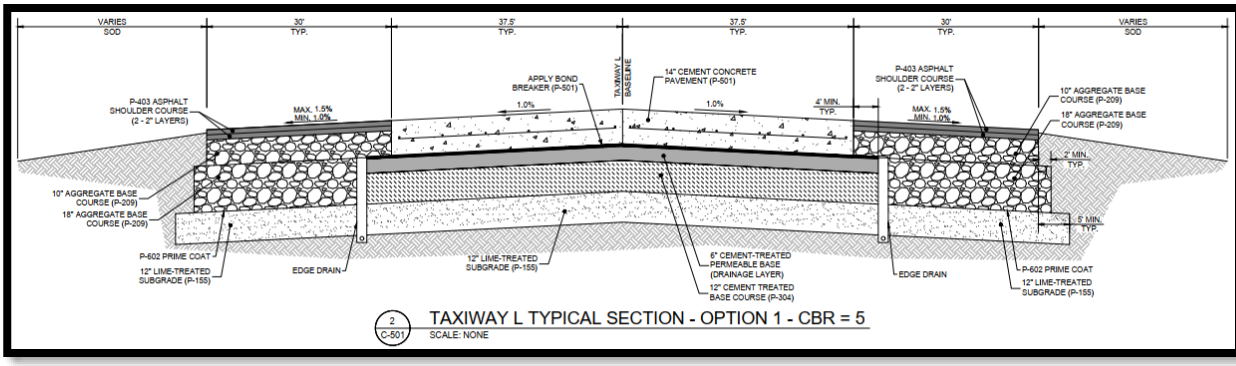


Figure 5-7 – Typical Taxiway and Paved Shoulder Section – Option 1 – CBR = 5.

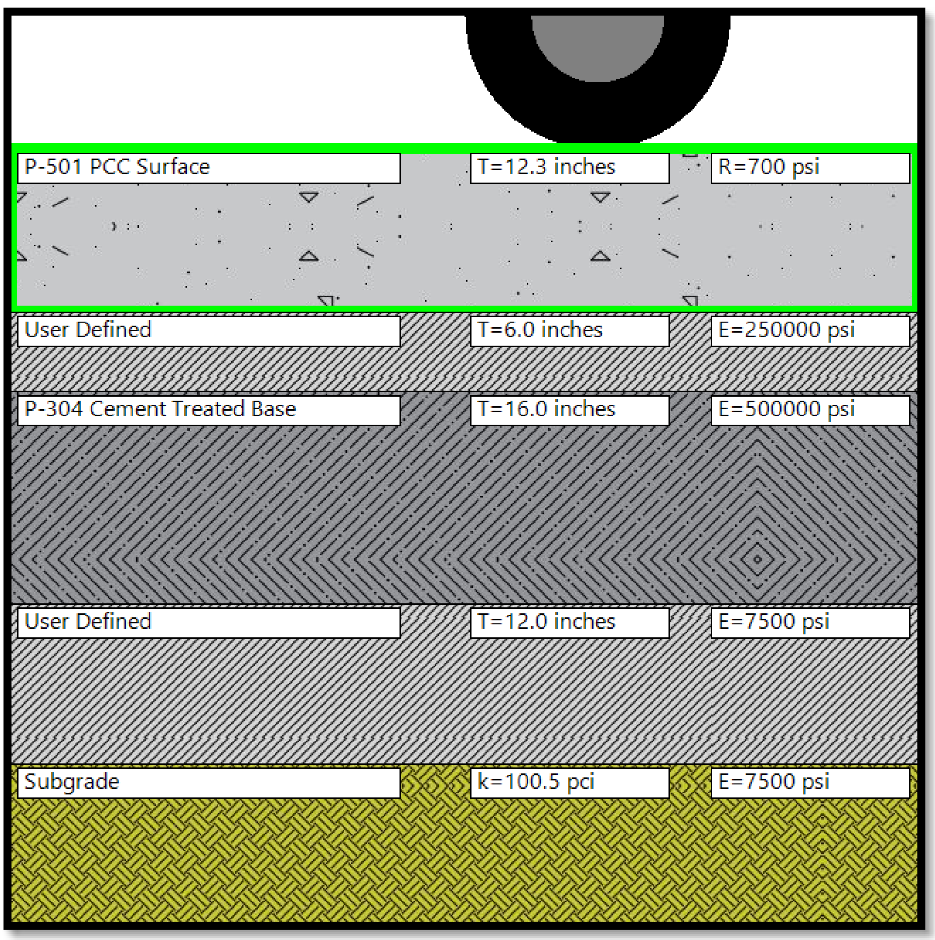


Figure 5-8 – Taxiway Pavement FAARFIELD Output – Option 2 – CBR = 5.

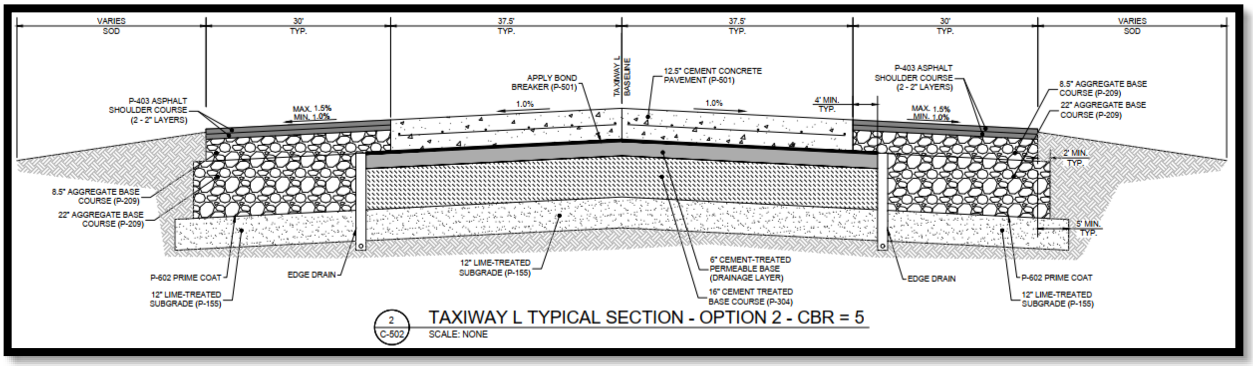


Figure 5-9 – Typical Taxiway and Paved Shoulder Section – Option 2 – CBR = 5.

5.3.2. Paved Shoulder

Similar to the full-strength taxiway pavement, the paved shoulder is constructed on existing infield soils. The proposed shoulder will also utilize a lime-treated subgrade to provide a working platform. The proposed shoulder typical pavement section consists of 4 inches of P-403 Hot Mix Asphalt (HMA), 31.5 inches of P-209 aggregate base course, and 12 inches of Lime Treated Subgrade (LTS).

6. Materials and Construction Recommendations

6.1. Pavement Specifications

6.1.1. P-155 Lime-Treated Subgrade

The lime-treated subgrade is used to provide a working platform not susceptible to weather impacts and to mitigate the high shrink-swell potential of the in-situ soils. Lime slurry is recommended in lieu of dry lime due to the proximity to open taxiways and the apron. Project-specific edits to the specification will be made upon receipt of the soil-lime test results from the bulk samples obtained during the geotechnical investigation. The lime percent will vary depending on the soil conditions. The stabilized soils should be compacted to 95 percent of their ASTM D 1557 (Modified Proctor) dry density at a moisture content ranging from optimum to 3 percent above optimum. Lime stabilization shall be performed in accordance with Item P-155 of the FAA AC 150/5370-10G Airport Construction Standards.

6.1.2. P-209 Crushed Aggregate Base Course

This item consists of a base course composed of a crushed aggregate base constructed on a prepared course. Another alternative to P-209 is the use of P-219, Recycled Aggregate Base Course. This alternative will allow the airport to use material that may already be stockpiled on-site, thus, reducing the cost of this base course overall. This may also be a candidate for a bid alternative.

6.1.3. P-304 Cement-Treated Aggregate Base Course

The cement-treated aggregate base course (CTB) is used as a stabilized base under the taxiway concrete pavement. The mix design will be developed by the contractor and will require a minimum compressive strength of 300 psi at 7 days. Considering reflective cracking can be a concern with P-304 the following measures are taken to mitigate this risk:

- Compact on the dry side of optimum moisture content and to 100 percent maximum density.
- Provide an upper limit on 7-day compressive strength of 500 psi.
- Under asphalt pavement, microcrack the CTB after minimum 24 hours of curing. Under the concrete pavement, apply a double application of curing compound prior to concrete paving.

6.1.4. P-403 Asphalt Mix Pavement

The paved shoulder will be constructed with two 2-inch lifts of P-403. Based on the lift thickness, gradation 2 is recommended. The base asphalt grade for Harris County is PG 64-16 per TxDOT. PG 64-22 is recommended for use as it is more commonly available and will provide additional resistance to low-temperature cracking. Specifying 50 gyrations is recommended to provide a greater asphalt content and, therefore, more durability against environmental distresses such as oxidation.

6.1.5. P-501 Cement Concrete Pavement

Concrete pavement will be provided in accordance with P-501. The minimum flexural strength to be used for acceptance during construction is 650 psi at 28 days. However, during production flexural strength averages are about 5 percent, or more, greater than the minimum specified. Therefore, the flexural strength used for design is 680 psi at 28 days. Use of combined well-graded gradations in accordance with the workability chart guidelines and a 1.5-inch nominal maximum aggregate size is recommended. The 1.5-inch nominal maximum aggregate size is achieved by specifying a concrete mixture using ASTM C33 No. 4 and No. 67, or a No. 467, coarse aggregate. Concrete using these types of gradations is less prone to spalling as compared to previous mixes which were generally high in sand content. As a bond breaker, Fabric shall meet the requirements of AASHTO M 288 Class I woven fabric with elongation less than 50% at the specified strengths. A certificate of compliance (COC) shall be provided by the fabric manufacturer that the material may be used as a bond breaker, or a liquid membrane-forming compound shall be in accordance with paragraph 501-2.7 of FAA Specification P-501, Cement Concrete Pavement. The Engineer will determine the type of bond breaker that is required, and as required at the Owner's direction.

6.1.6. P-307 Cement Treated Permeable Base Course (Drainage Layer)

A stabilized drainage layer should be placed immediately beneath the concrete panel in place of the stabilized base. Drainage layers are recommended for pavements serving aircraft greater than 60,000 pounds, constructed in areas with excessive subsurface moisture and where existing soils have a coefficient of permeability less than 20 ft/day (6 m/day). The use of drainage layers will protect pavements from moisture-related subgrade, subbase, and base failures. Drainage layers facilitate the quick removal of excess moisture from the pavement structure. Construct drainage layers to be free draining, include outlets to ensure that water is not trapped in the layer. Include a geosynthetic separation material when the drainage layer is placed directly above the subgrade. Regularly perform maintenance of drainage outlets to ensure that they are functioning, and that water is not trapped in the drainage layer. The modulus value assigned to the drainage layer for the cement-treated permeable base is 250,000 psi.

ATKINS
Member of the SNC-Lavalin Group

Appendix A –Geotechnical Report

GEOTECHNICAL INVESTIGATION

HOUSTON AIRPORT SYSTEM
TAXIWAY L GEOTECHNICAL INVESTIGATION
AT ELLINGTON AIRPORT (EFD)
HOUSTON, TEXAS

Reported to

Atkins North America, Inc.
Houston, Texas

by

Aviles Engineering Corporation
5790 Windfern
Houston, Texas 77041
713-895-7645

REPORT NO. G103-21

October 2021

October 22, 2021

Mr. John Verburg, P.E.
Sr. Technical Manager, Aviation
Atkins North America, Inc.
200 Westlake Park Blvd, Suite 1100
Houston, TX 77079

Reference: **Geotechnical Investigation**
Houston Airport System
Taxiway L Geotechnical Investigation
At Ellington Airport (EFD)
Houston, Texas
AEC Report No. G103-21

Dear Mr. Verburg,

Aviles Engineering Corporation (AEC) is pleased to present this report of the results of our geotechnical investigation for the above referenced project. This investigation was authorized by Mr. Benedikt Goebel, Division Manager of Atkins North America, Inc. (Atkins) on March 8, 2021, via Task Order No.6 of Subcontract No. 1008665. Project terms and conditions were in accordance with the Master Subcontract Agreement between Atkins and AEC, dated June 24, 2019. The project scope of services is in accordance with AEC Proposal No. G2020-12-12, dated December 30, 2020.

AEC appreciates the opportunity to be of service to you. Please call us if you have any questions or comments concerning this report or when we can be of further assistance.

Respectfully submitted,
Aviles Engineering Corporation
(TBPELS Firm Registration No. F-42)

Wilber L. Wang, P.E. Senior Engineer	10/22/2021	Md. Rakib Hasan, Ph.D., EIT Staff Engineer

Reports Submitted: 1 Atkins North America, Inc. (electronic)

Z:\ENGINEERING\REPORTS\2021\G103-21 ELLINGTON FIELD TAXIWAYS L, E AND D - ATKINS\G103-21 FINAL.DOCX

AVILES ENGINEERING CORP.

TABLE OF CONTENTS

APPENDICES

ILLUSTRATIONS

AVILES ENGINEERING CORP.

GEOTECHNICAL INVESTIGATION

HOUSTON AIRPORT SYSTEM
TAXIWAY L GEOTECHNICAL INVESTIGATION
AT ELLINGTON AIRPORT (EFD)
HOUSTON, TEXAS

1.0 INTRODUCTION

1.1 Project Description

The report submitted herein presents the results of Aviles Engineering Corporation's (AEC) geotechnical investigation as part of the preliminary engineering services for the Houston Airport System's (HAS) proposed Taxiway L at Ellington Airport (IATA Airport Code: EFD) in Houston, Texas (Houston/Harris County Key Map 577U, V, Y & Z, 578S, and 617C). A vicinity map is presented on Plate A-1, in Appendix A.

According to information provided by Atkins North America, Inc. (Atkins), the project consists of design and construction of (i) an approximately 10,000 feet long Taxiway L parallel to Runway 4-22, (ii) Taxiways E and D with approximately 1,200 feet length each, and (iii) additional connector taxiways.

1.2 Purpose and Scope

The purpose of this geotechnical investigation is to evaluate the subsurface soil and groundwater conditions along the proposed taxiways, and to develop geotechnical engineering recommendations for design and construction of the taxiways. The scope of this geotechnical investigation is summarized below:

1. Drilling and sampling seventy-four (74) soil borings to a depth of 16 feet below existing grade.
2. Perform thirty-seven (37) Dynamic Cone Penetrometer (DCP) tests along the proposed taxiways to estimate field California Bearing Ratio (CBR) values.
3. Performing soil laboratory testing on selected soil samples to determine the index and strength properties of the subgrade soils.
4. Soil laboratory testing on soil samples collected from four (4) sample pits to determine maximum dry density and moisture content of subgrade soils and subgrade CBR.
5. Engineering analyses and recommendations for subgrade preparation of the proposed taxiways.

2.0 SUBSURFACE EXPLORATION

Subsurface conditions at the site were investigated by drilling seventy-four soil borings to a depth of 16 feet below existing grade. The total drilling footage was 1,184 feet. Boring locations were marked in the field by

Landtech, Inc. The boring locations were surveyed as they were marked. Boring survey data (in State Plane Grid Coordinates, Texas South Central Zone, US Survey Feet) is presented on the representative boring logs and is also summarized on Table 1. The boring locations are presented on the Boring Location Plan on Plate A-2, in Appendix A.

Table 1. Boring Survey Data

Boring No.	Northing (Grid, ft)	Easting (Grid, ft)	Boring Surface Elevation (ft)
B-1	13783415.92	3187660.15	23.74
B-2	13783422.56	3187859.09	22.68
B-3	13783566.78	3188038.56	22.35
B-4	13783767.15	3188032.25	22.64
B-5	13783960.47	3188025.19	17.12
B-6	13784137.34	3188019.81	24.15
B-7	13784336.88	3188011.52	24.86
B-8	13784585.23	3188001.57	23.67
B-9	13784766.46	3188046.14	23.64
B-10	13784911.62	3188178.70	23.85
B-11	13785057.8	3188312.01	23.51
B-12	13785200.94	3188442.08	24.02
B-13	13785353.95	3188580.17	23.97
B-14	13785502.17	3188713.71	24.50
B-15	13785649.47	3188846.78	26.53
B-16	13785797.47	3188978.40	25.42
B-17	13785943.43	3189107.23	26.76
B-18	13786090.78	3189237.78	27.16
B-19	13786238.83	3189368.77	27.62
B-20	13786382.46	3189495.76	27.49
B-21	13786530.17	3189626.79	27.49
B-22	13786676.7	3189756.41	27.61
B-23	13786826.68	3189888.87	28.40
B-24	13786974.37	3190019.68	27.73
B-25	13787123.06	3190150.63	27.80
B-26	13787273.58	3190283.37	27.76

Boring No.	Northing (Grid, ft)	Easting (Grid, ft)	Boring Surface Elevation (ft)
B-27	13787345.15	3190347.65	28.98
B-28	13787613.52	3190587.56	25.94
B-29	13787763.75	3190722.18	26.82
B-30	13787912.42	3190855.46	28.36
B-31	13788062.33	3190990.08	28.64
B-32	13788214.86	3191126.90	28.58
B-33	13788359.82	3191256.90	28.56
B-34	13788508.18	3191389.97	28.52
B-35	13788656.52	3191523.83	28.58
B-36	13788805.19	3191657.43	28.03
B-37	13788954.42	3191791.89	28.03
B-38	13789103.1	3191927.79	28.23
B-39	13789250.49	3192064.15	27.96
B-40	13789396.53	3192199.30	27.42
B-41	13789546.63	3192338.75	25.39
B-42	13789691.68	3192474.48	26.34
B-43	13789743.19	3192701.02	25.75
B-44	13789860.64	3192800.73	24.91
B-45	13790012.28	3192932.66	25.35
B-46	13790165.72	3193066.91	24.87
B-47	13790317.36	3193199.53	24.87
B-48	13790468.75	3193332.02	24.48
B-49	13790676.93	3193277.37	25.90
B-50	13790781.27	3193142.56	27.33
B-51	13790936.77	3192959.63	29.51
B-52	13789469.79	3192085.20	22.99
B-53	13789619.01	3191884.44	28.80
B-54	13788678.98	3191813.56	28.57
B-55	13788625.07	3191889.04	28.99
B-56	13788726.98	3191085.93	28.61
B-57	13788581.1	3191288.79	24.88
B-58	13787913.22	3190355.29	28.76

Boring No.	Northing (Grid, ft)	Easting (Grid, ft)	Boring Surface Elevation (ft)
B-59	13787800.88	3190514.38	23.57
B-60	13787134.39	3189680.18	28.36
B-61	13786976.9	3189874.38	28.74
B-62	13785900.00	3188564.99	26.27
B-63	13785144.79	3187757.15	25.59
B-64	13784963.94	3187758.98	23.56
B-65	13783900.36	3187914.00	24.07
B-66	13783873.31	3187503.54	25.36
B-67	13783866.81	3187265.19	24.99
B-68	13783851.5	3186896.05	23.83
B-69	13783412.24	3187467.24	26.71
B-70	13783417.81	3187314.31	26.16
B-71	13786754.06	3187613.52	26.11
B-72	13786733.82	3187389.62	24.12
B-73	13786711.34	3187069.64	24.70
B-74	13786699.81	3186704.33	20.79

Soil Borings: The field drilling was performed using a truck-mounted drill rig. Prior to drilling, existing concrete pavement at Borings B-7, B-15, B-27, B-43, B-51, B-62, B-63, and B-69 through B-71 was cut with a core barrel. Existing asphalt pavement and base at Borings B-23, B-55, and B-61 were augered through during drilling. The borings were advanced using dry auger method. Undisturbed samples of cohesive soils were obtained from the borings by pushing 3-inch diameter thin-wall, seamless steel Shelby tube samplers in accordance with ASTM D 1587. Granular soils were sampled with a 2-inch split-barrel sampler in accordance with ASTM D1586. In addition, the 2-inch split-barrel sampler was also used at 5 feet intervals on selected borings (regardless of the soil type encountered) as requested by Atkins. Standard Penetration Test (SPT) resistance value for this sample was recorded as “Blows per foot” and is shown on the representative boring log. Strength of the cohesive soils was estimated in the field using a hand penetrometer. The undisturbed samples of cohesive soils were extruded mechanically from the core barrels in the field and wrapped in aluminum foil; all samples were sealed in plastic bags to reduce moisture loss and disturbance. The samples were then placed in core boxes and transported to the AEC laboratory for testing and further study. Groundwater readings were obtained during drilling and upon completion of drilling. The boreholes were then grouted with cement-bentonite upon completion of drilling, and existing pavement (where present) was patched with high strength non-shrink grout. Details of the soils encountered in our borings are presented on Plates A-3 through A-76, in Appendix A. A key to symbols for the boring logs is presented on Plate A-77, in Appendix A.

Sample Pits: In addition to soil borings, four sample pits were excavated in the vicinity of Borings B-8, B-19, B-31, and B-44 to collect subgrade materials for Modified Proctor (ASTM D 1557) and CBR (ASTM D 1883) testing (see Section 3.0 of this report). AEC used a drill rig with a continuous flight auger to collect samples continuously from a depth of 0 to 4 feet below grade. The samples were then bagged and transported to the AEC laboratory for testing. The pits were backfilled with bentonite chips upon completion of field work.

Dynamic Cone Penetrometer (DCP) Tests: Thirty-seven (37) DCP tests were performed in accordance with ASTM D 6951 adjacent to the locations of Borings B-2, B-4, B-6 through B-8, B-10, B-12, B-14, B-16, B-18, B-20, B-22, B-26, B-28, B-30, B-32, B-34, B-36, B-38, B-40, B-42, B-44, B-46, B-48, B-50, B-53, B-55, B-56, B-58, B-60, B-64, B-66 through B-68, and B-72 through B-74. AEC used the DCP test data to estimate CBR versus penetration depth. CBR values versus penetration depth for each DCP test are presented on Plates B-13 through B-49, in Appendix B.

3.0 LABORATORY TESTING

Soil laboratory testing was performed by AEC personnel. Samples from the borings were examined and classified in the laboratory by a geotechnical technician under supervision of a geotechnical engineer. Laboratory tests were performed on selected soil samples to evaluate the engineering properties of the foundation soils in accordance with applicable ASTM Standards. Atterberg limits, moisture contents, percent passing a No. 200 sieve, grain size analysis, and dry unit weight tests were performed on selected samples to establish the index properties and confirm field classification of the subsurface soils. Strength properties of cohesive soils were estimated by means of torvane (TV), unconfined compression (UC), and unconsolidated-undrained (UU) triaxial tests performed on undisturbed samples. The test results are presented on the representative boring logs. Classification of soils for engineering purposes, terms used on boring logs, and reference ASTM Standards for laboratory testing are presented on Plates A-78 through A-80, in Appendix A. The results of grain size analyses are presented on Plate A-81, in Appendix A.

Sulfate Content Tests: AEC performed sulfate content tests on selected soil samples in accordance with Texas Department of Transportation (TxDOT) test method Tex-145-E to determine if the onsite soils have a potential for sulfate attack on lime-stabilized subgrade for pavements. Sulfate content test results are presented on Table

2.

Table 2. Sulfate Content Test Results

Sample ID and Description	Sulfate Content (mg/kg)	Treatment Level for Roadway Subgrade(1)
B-1, 6'-8', Fat Clay (CH)	20	Level 1
B-2, 4'-6', Fat Clay (CH)	13	Level 1
B-3, 4'-6', Fat Clay (CH)	20	Level 1
B-4, 2'-4', Fat Clay (CH)	80	Level 1
B-5, 0'-2', Fill: Fat Clay (CH)	20	Level 1
B-6, 2'-4', Fat Clay (CH)	42	Level 1
B-7, 4'-6', Fat Clay with Sand (CH)	47	Level 1
B-8, 0'-2', Fat Clay (CH)	20	Level 1
B-9, 2'-4', Fat Clay (CH)	42	Level 1
B-10, 4'-6', Fat Clay (CH)	40	Level 1
B-11, 0'-2', Fat Clay (CH)	40	Level 1
B-12, 4'-6', Fat Clay (CH)	51	Level 1
B-13, 0'-2', Fat Clay (CH)	22	Level 1
B-14, 4'-6', Fat Clay (CH)	33	Level 1
B-15, 2'-4', Fat Clay (CH)	13	Level 1
B-16, 0'-2', Fat Clay (CH)	20	Level 1
B-17, 4'-6', Fat Clay (CH)	60	Level 1
B-18, 6'-8', Fat Clay (CH)	20	Level 1
B-19, 0'-2', Fat Clay with Sand (CH)	0	Level 1
B-20, 4'-6', Fat Clay (CH)	20	Level 1
B-21, 4'-6', Fat Clay (CH)	20	Level 1
B-22, 0'-2', Fat Clay (CH)	40	Level 1
B-23, 6'-8', Fat Clay (CH)	40	Level 1
B-24, 0'-2', Fat Clay (CH)	60	Level 1
B-25, 4'-6', Fat Clay with Sand (CH)	60	Level 1
B-26, 6'-8', Fat Clay (CH)	40	Level 1
B-27, 4'-6', Fat Clay (CH)	40	Level 1

Sample ID and Description	Sulfate Content (mg/kg)	Treatment Level for Roadway Subgrade(1)
B-28, 4’-6’, Lean Clay (CL)	33	Level 1
B-29, 6’-8’, Fat Clay (CH)	9	Level 1
B-30, 0’-2’, Lean Clay (CL)	7	Level 1
B-31, 2’-4’, Fat Clay (CH)	47	Level 1
B-32, 4’-6’, Fat Clay (CH)	80	Level 1
B-33, 0’-2’, Fill: Fat Clay (CH)	20	Level 1
B-34, 4’-6’, Lean Clay with Sand (CL)	33	Level 1
B-35, 0’-2’, Lean Clay (CL)	13	Level 1
B-36, 6’-8’, Fat Clay (CH)	40	Level 1
B-37, 2’-4’, Lean Clay (CL)	47	Level 1
B-38, 2’-4’, Fat Clay (CH)	22	Level 1
B-39, 0’-2’, Fill: Fat Clay (CH)	18	Level 1
B-40, 4’-6’, Fat Clay (CH)	49	Level 1
B-41, 4’-6’, Lean Clay with Sand (CL)	27	Level 1
B-42, 2’-4’, Fill: Lean Clay (CL)	40	Level 1
B-43, 4’-6’, Fat Clay (CH)	20	Level 1
B-44, 4’-6’, Fat Clay (CH)	40	Level 1
B-45, 4’-6’, Fat Clay (CH)	47	Level 1
B-46, 6’-8’, Lean Clay (CL)	20	Level 1
B-47, 0’-2’, Fill: Fat Clay (CH)	27	Level 1
B-48, 4’-6’, Lean Clay with Sand (CL)	20	Level 1
B-49, 4’-6’, Fill: Fat Clay (CH)	60	Level 1
B-50, 6’-8’, Fat Clay (CH)	20	Level 1
B-51, 4’-6’, Fill: Fat Clay with Sand (CH)	40	Level 1
B-52, 2’-4’, Fat Clay (CH)	40	Level 1
B-53, 0’-2’, Fill: Fat Clay (CH)	20	Level 1
B-54, 6’-8’, Fat Clay (CH)	60	Level 1
B-55, 1’-2’, Fat Clay (CH)	60	Level 1
B-56, 4’-6’, Fat Clay (CH)	20	Level 1
B-57, 4’-6’, Fat Clay (CH)	20	Level 1

Sample ID and Description	Sulfate Content (mg/kg)	Treatment Level for Roadway Subgrade(1)
B-58, 0'-2', Fill: Fat Clay (CH)	20	Level 1
B-59, 6'-8', Fat Clay (CH)	40	Level 1
B-60, 4'-6', Fat Clay (CH)	20	Level 1
B-61, 4'-6', Fat Clay (CH)	120	Level 1
B-62, 4'-6', Fat Clay (CH)	40	Level 1
B-63, 6'-8', Fat Clay (CH)	7	Level 1
B-64, 4'-6', Fill: Fat Clay (CH)	40	Level 1
B-65, 6'-8', Fat Clay (CH)	0	Level 1
B-66, 0'-2', Fill: Lean Clay	20	Level 1
B-67, 4'-6', Fat Clay (CH)	60	Level 1
B-68, 6'-8', Fat Clay (CH)	40	Level 1
B-69, 8'-10', Fat Clay (CH)	60	Level 1
B-70, 3'-4', Fill: Fat Clay (CH)	60	Level 1
B-71, 1'-2', Fill: Silty Sand	0	Level 1
B-72, 4'-6', Fat Clay (CH)	20	Level 1
B-73, 2'-4', Fat Clay (CH)	40	Level 1
B-74, 4'-6', Lean Clay (CL)	20	Level 1

Notes: (1) Evaluation of sulfate attack on stabilized subgrade for roadways is based on TxDOT's "Guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures" criteria.

According to TxDOT's "Guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures", different levels of treatment are required if roadway subgrade will be stabilized. As defined by TxDOT's document: (i) Level 1 treatment (Traditional Treatment) can be used for roadway subgrades that have a sulfate content of 3,000 ppm or less; (ii) Level 2 treatment (Modified Treatment) can be used for roadway subgrades that have a sulfate content between 3,000 ppm and 8,000 ppm; and (iii) Level 3 treatment (Alternative Treatment) is required when the sulfate content is greater than 8,000 ppm. Based on Table 2, the existing soils along the alignment have very low sulfate contents (i.e. significantly less than 3,000 ppm). Based on the results presented in Table 2, Level 1 treatment (Traditional Treatment) can be used for roadway subgrade stabilization.

Chemical Tests: To evaluate the potential for chloride attack on pavements, AEC selected nineteen soil samples for chemical analyses. Chemical testing included pH, resistivity, and chloride content. AEC used TxDOT test methods for each test type, Tex-128-E, Tex-129-E, and Tex-620-J, respectively. A summary of the chemical test results are presented on Table 3 below.

Table 3. Resistivity, Chloride, and pH Analysis Results

Sample ID	Resistivity (ohm/cm)	Chloride (mg/kg)	pH	Aggressive Environment
B-1, 0'-2'	992	197	7.94	Yes
B-5, 2'-4'	830	99	8.01	Yes
B-9, 6'-8'	738	329	8.09	Yes
B-13, 4'-6'	821	165	8.08	Yes
B-17, 0'-2'	747	395	6.01	Yes
B-21, 0'-2'	2633	99	5.45	Yes
B-25, 0'-2'	968	148	7.27	Yes
B-31, 2'-4'	632	329	8.02	Yes
B-33, 4'-6'	840	99	8.28	Yes
B-37, 0'-2'	1140	329	8.39	Yes
B-41, 2'-4'	1031	329	8.73	Yes
B-45, 4'-6'	946	329	8.84	Yes
B-49, 0'-2'	1123	197	8.10	Yes
B-53, 4'-6'	747	148	8.23	Yes
B-57, 0'-2'	1390	99	8.51	Yes
B-61, 2'-4'	798	99	7.32	Yes
B-65, 0'-2'	1005	197	7.87	Yes
B-69, 4'-6'	463	296	7.79	Yes
B-73, 4'-6'	1089	99	8.70	Yes

According to the Federal Highway Administration (FHWA) Design Manual "Design and Construction of Driven Pile Foundations", concrete design (AEC recommends that the FHWA foundation design concept also be applied to reinforcing steel for concrete pavement design) should be based on an aggressive subsurface environment whenever the pH value is 4.5 or less. Alternately, if the resistivity is less than 2,000 ohms/cm, the soils should be treated as an aggressive environment. If the soil resistivity is between 2,000 and 5,000 ohms/cm, and the chloride ion content is greater than 100 parts per million (ppm), the pavement design should be based on an aggressive subsurface environment. Resistivity values greater than 5,000 ohms/cm can be considered non-aggressive environments.

Based on the test results in Table 3 and FHWA criteria, the tested soil samples are considered an aggressive environment for reinforcing steel.

Organic Matter Content: AEC performed organic matter content tests on selected soil samples in accordance with ASTM D 2974. Organic content test results are summarized on Table 4 and presented on Plates A-82 and A-83, in Appendix A.

Table 4. Organic Matter Content Test Results (ASTM D 2974)

Sample ID and Description	Organic Content (%)
B-1, 6'-8', Fat Clay (CH)	4.6
B-5, 0'-2', Fill: Fat Clay (CH)	5.0
B-9, 2'-4', Fat Clay (CH)	5.5
B-13, 0'-2', Fat Clay (CH)	5.7
B-17, 0'-2', Fat Clay (CH)	5.7
B-21, 0'-2', Lean Clay (CL)	5.3
B-25, 4'-6', Fat Clay with Sand (CH)	3.0
B-31, 0'-2', Lean Clay with Sand (CL)	3.8
B-33, 0'-2', Fill: Fat Clay (CH)	6.2
B-37, 0'-2', Fat Clay (CH)	5.8
B-41, 0'-2', Fill: Fat Clay (CH)	5.2
B-45, 4'-6', Fat Clay (CH)	3.1
B-49, 2'-4', Fill: Fat Clay (CH)	2.5
B-53, 0'-2', Fill: Fat Clay (CH)	4.1
B-57, 2'-4', Fat Clay (CH)	3.1
B-61, 6'-8', Sandy Lean Clay (CL)	2.5
B-65, 6'-8', Fat Clay (CH)	4.5

Sample ID and Description	Organic Content (%)
B-69, 6'-8', Fat Clay (CH)	5.9
B-73, 0'-2', Fill: Fat Clay with Sand (CH)	3.9

Compaction and CBR: Soil (from the ground surface to a depth of 4 feet below grade) recovered from the sample pits were mixed and split in general accordance with ASTM C 702. After splitting, Atterberg limits and a Percent Passing a 200-sieve analysis were performed to determine the index properties and grain size distribution of the samples. The samples were molded and compacted in accordance with ASTM D 1557 (Modified Proctor). After the samples were compacted, it is soaked for a period of 96 hours and a CBR (ASTM D 1883) test was performed. AEC will perform additional Modified Proctor and CBR tests on lime stabilized soil samples, which will be presented on a separate addendum letter.

Modified Proctor compaction test results on natural soils are presented on Plates B-1 through B-4, in Appendix B. CBR test results are presented on Plates B-5 through B-12, in Appendix B. A summary of sample pit index properties and CBR test results are presented on Table 5 and Table 6.

Table 5. Sample Pit Soil Properties

Sample ID and Description	Liquid Limit (%)	Plasticity Index (%)	Percent Passing #200 Sieve (%)	ASTM D 1557 Maximum Dry Density (pcf)	ASTM D 1557 Optimum Moisture Content (%)
B-8, 0'-4', Fat Clay (CH)	73	51	95.4	107.1	19.8
B-19, 0'-4', Fat Clay (CH)	59	42	90.4	116.3	14.5
B-31, 0'-4', Lean Clay with Sand (CL)	44	30	76.2	125.6	11.1
B-44, 0'-4', Lean Clay (CL)	45	29	91.5	119.8	12.8

Table 6. California Bearing Ratio Test Results (ASTM D 1883)

Sample ID	Percent Compaction (%), ASTM D 1557	Dry Density (pcf)	CBR (%)
B-8, 0'-4', Fat Clay (CH)	100	107.1	1.77
	95	101.7	1.54
	90	96.4	1.32
	85	91.0	1.13

Sample ID	Percent Compaction (%), ASTM D 1557	Dry Density (pcf)	CBR (%)
B-19, 0'-4', Fat Clay (CH)	100	116.3	3.10
	95	110.5	2.10
	90	104.7	1.75
	85	98.9	1.42
B-31, 0'-4', Lean Clay with Sand (CL)	100	125.6	3.36
	95	119.3	2.98
	90	113.0	2.13
	85	106.8	1.26
B-44, 0'-4', Lean Clay (CL)	100	119.8	2.48
	95	113.8	2.45
	90	107.8	2.05
	85	101.8	1.60

4.0 SITE CONDITIONS

In general, Taxiway L is to be located to the east and parallel to existing Runway 4-22. The project area is primarily flat and covered with moved grass. AEC notes that the site experienced greater than normal seasonal rainfall in the period when our field work was taking place (from June 2021 to August 2021). Most of our fieldwork (i.e., soil borings and field DCP tests) was performed when the ground surface was moist or wet.

A summary of pavement sections encountered in AEC's borings is presented on Table 7. Photographs of concrete core sections are presented on Plates 1 through 4, in the Illustrations.

Table 7. Existing Pavement Encountered at Borings

Boring No.	Core Location	Pavement Thickness
B-7	Access Road	6.5" concrete
B-15	Taxiway X	6" concrete
B-23	Runway 35R Extension (demolished)	12" stabilized sand base
B-27	Access Road	2.5" asphalt, 8.25" concrete
B-43	Access Road	17.75" concrete, 7.25" stabilized soil base
B-51	Runway 22	28" concrete, 5.25" stabilized soil base
B-55	Access Road	2" asphalt, 6" sand and gravel base
B-61	Runway 35R	12" sand with shell base

Boring No.	Core Location	Pavement Thickness
	Extension (demolished)	
B-62	Taxiway X	12.5" concrete, 3" asphalt, 7.8" concrete, 13.1" stabilized soil base
B-63	Runway 4	15" concrete, 11.5" cement stabilized base, 10.5" stabilized soil subbase
B-69	Runway 35L	16.25" concrete, 7.75" cement stabilized base, 9.75" stabilized soil subbase
B-70	Taxiway F	15.5" concrete, 8" cement stabilized base, 12" stabilized soil subbase
B-71	Taxiway D	13" concrete

4.1 Subsurface Conditions

Details of the soils encountered during drilling are presented in the boring logs on Plates A-3 through A-76, in Appendix A. Soil strata encountered in our borings are summarized below.

Boring	Depth (ft)	Description of Stratum
B-1	0 - 4	Fill: very stiff to hard, Fat Clay (CH), with calcareous nodules
	4 - 8	Firm to stiff, Fat Clay (CH), with slickensides and ferrous nodules
	8 - 12	Stiff to very stiff, Lean Clay (CL), with slickensides and ferrous nodules
	12 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides, calcareous nodules, and lean clay seams
B-2	0 - 8	Soft to very stiff, Fat Clay (CH), with slickensides
	8 - 10	Firm to stiff, Lean Clay (CL), with fat clay pockets
	10 - 16	Firm to very stiff, Fat Clay (CH), with slickensides and calcareous nodules
B-3	0 - 2	Fill: very stiff, Fat Clay (CH), with roots and shell fragments
	2 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-4	0 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-5	0 - 2	Fill: very stiff, Fat Clay (CH), with calcareous and ferrous nodules
	2 - 8	Stiff to very stiff, Fat Clay (CH), with slickensides and ferrous nodules
	8 - 16	Very stiff to hard, Lean Clay (CL), with fat clay seams and pockets
B-6	0 - 2	Fill: stiff, Fat Clay (CH), with sandy lean clay seams, shell fragments, and roots
	2 - 14	Soft to very stiff, Fat Clay (CH), with slickensides
	14 - 16	Very stiff, Lean Clay (CL), with calcareous nodules, silty clay seams, and fat clay pockets
B-7	0 - 0.54	Pavement: see Table 7 in Section 4.0 of this report
	0.54 - 2	Fill: stiff to very stiff, Fat Clay with Sand (CH), with silty sand seams and ferrous nodules
	2 - 10	Firm to very stiff, Fat Clay with Sand (CH)

Boring	Depth (ft)	Description of Stratum
B-7 (cont.)	10 - 14	Stiff to very stiff, Lean Clay (CL), with ferrous stains
	14 - 16	Stiff to very stiff, brown Fat Clay (CH), with calcareous nodules
B-8	0 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-9	0 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-10	0 - 10	Soft to very stiff, Fat Clay (CH)
	10 - 16	Stiff to very stiff, Lean Clay (CL)
B-11	0 - 10	Firm to very stiff, Fat Clay (CH), with slickensides
	10 - 16	Stiff to hard, Lean Clay (CL)
B-12	0 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-13	0 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-14	0 - 2	Very stiff, Fat Clay with Sand (CH), with calcareous nodules and roots
	2 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-15	0 - 0.5	Pavement: see Table 7 in Section 4.0 of this report
	0.5 - 2	Fill: stiff, Lean Clay (CL), with sandy lean clay pockets
	2 - 14	Firm to very stiff, Fat Clay (CH), with slickensides
	14 - 16	Stiff to very stiff, Lean Clay (CL)
B-16	0 - 10	Soft to hard, Fat Clay (CH)
	10 - 14	Stiff to very stiff, Lean Clay (CL)
	14 - 16	Hard, Silty Clay (CL-ML), with silt seams
B-17	0 - 10	Stiff to very stiff, Fat Clay (CH), with calcareous nodules
	10 - 16	Stiff to very stiff, Lean Clay (CL), with slickensides
B-18	0 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-19	0 - 6	Firm to hard, Fat Clay with Sand (CH)
	6 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-20	0 - 16	Firm to hard, Fat Clay (CH)
B-21	0 - 2	Hard, Lean Clay (CL), with roots
	2 - 6	Stiff, Fat Clay (CH)
	6 - 8	Very stiff, Fat Clay with Sand (CH), with lean clay seams, and calcareous and ferrous nodules
	8 - 10	Very stiff, Fat Clay (CH), with slickensides and calcareous nodules
	10 - 16	Firm to very stiff, Lean Clay (CL), with fat clay seams and pockets
B-22	0 - 8	Stiff to very stiff, Fat Clay (CH)
	8 - 12	Firm to stiff, Lean Clay (CL)
	12 - 14	Silt (ML), with sand pockets and lean clay seams, wet

Boring	Depth (ft)	Description of Stratum
B-22 (cont.)	14 - 16	Medium dense, Silty Clayey Sand (SC-SM), with lean clay pockets and calcareous nodules, wet
B-23	0 - 1	Base: see Table 7 in Section 4.0 of this report
	1 - 10	Stiff to very stiff, Fat Clay (CH), with slickensides
	10 - 14	Stiff to very stiff, Lean Clay (CL)
	14 - 16	Stiff to very stiff, Silty Clay (CL-ML), with sandy lean clay pockets
B-24	0 - 14	Firm to very stiff, Fat Clay (CH), with slickensides
	14 - 16	Medium dense, Silt (ML), with silty clay seams, wet
B-25	0 - 10	Stiff to very stiff, Fat Clay with Sand (CH)
	10 - 12	Very stiff, Lean Clay (CL), with calcareous nodules
	12 - 16	Silt (ML), with sand pockets, wet
B-26	0 - 8	Firm to very stiff, Fat Clay (CH), with slickensides
	8 - 10	Stiff to very stiff, Lean Clay (CL)
	10 -16	Loose, Silt with Sand (ML), wet
B-27	0 - 0.9	Pavement: see Table 7 in Section 4.0 of this report
	0.9 - 2	Fill: hard, Lean Clay with Sand (CL), with gravel
	2 - 10	Very stiff to hard, Fat Clay (CH), with slickensides
	10 - 14	Very stiff, Lean Clay (CL), with clayey sand seams and pockets
	14 - 16	Silt (ML), wet
B-28	0 - 2	Very stiff, Fat Clay (CH)
	2 - 6	Soft to very stiff, Lean Clay (CL), with sand partings
	6 - 10	Medium dense, Silty Sand (SM), wet
	10 - 16	Loose to medium dense, Poorly Graded Sand with Silt (SP-SM), wet
B-29	0 - 2	Very stiff, Fat Clay (CH), with lean clay and silty sand pockets
	2 - 4	Hard, Lean Clay with Sand (CL), with ferrous nodules
	4 - 8	Stiff to very stiff, Fat Clay (CH), with slickensides and calcareous nodules
	8 - 14	Firm to very stiff, Lean Clay (CL)
	14 - 16	Firm to stiff, Silty Clay (CL-ML), with calcareous nodules
B-30	0 - 2	Very stiff, Lean Clay (CL), with sand partings
	2 - 10	Stiff to very stiff, Fat Clay with Sand (CH), with slickensides
	10 - 16	Stiff to very stiff, Lean Clay (CL)
B-31	0 - 2	Very stiff, Lean Clay with Sand (CL), with roots
	2 - 14	Stiff to very stiff, Fat Clay (CH), with slickensides
	14 - 16	Very stiff, Lean Clay (CL)
B-32	0 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-33	0 - 2	Fill: very stiff, Fat Clay (CH), with gravel, ferrous nodules, and roots
	2 - 8	Stiff to very stiff, Fat Clay with Sand (CH), with ferrous and calcareous nodules
	8 - 16	Very stiff to hard, Fat Clay (CH), with slickensides and calcareous nodules

Boring	Depth (ft)	Description of Stratum
B-34	0 - 6	Stiff to hard, Lean Clay with Sand (CL)
	6 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-35	0 - 2	Hard, Lean Clay (CL), with sand partings and roots
	2 - 6	Very stiff, Fat Clay (CH), with ferrous nodules
	6 - 10	Stiff to very stiff, Lean Clay (CL), with fat clay pockets and calcareous nodules
	10 - 16	Very stiff, Fat Clay (CH), with slickensides
B-36	0 - 2	Very stiff, Lean Clay with Sand (CL)
	2 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-37	0 - 2	Hard, Fat Clay (CH), with calcareous nodules
	2 - 4	Very stiff, Lean Clay (CL)
	4 - 8	Stiff to very stiff, Fat Clay with Sand (CH), with calcareous nodules
	8 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides, and calcareous nodules and pockets
B-38	0 - 2	Fill: hard, Lean Clay (CL), with fat clay seams, sand partings, and calcareous nodules
	2 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-39	0 - 2	Fill: stiff, Fat Clay (CH), with slickensides and lean clay seams
	2 - 4	Stiff to very stiff, Lean Clay (CL)
	4 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-40	0 - 2	Fill: very stiff, Fat Clay with Sand (CH), with lean clay seams and roots
	2 - 8	Stiff to very stiff, Fat Clay (CH)
	8 - 10	Very stiff, Lean Clay with Sand (CL), with calcareous nodules and pockets
	10 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-41	0 - 2	Fill: hard, Fat Clay (CH), with calcareous nodules and roots
	2 - 8	Stiff to very stiff, Lean Clay with Sand (CL), with abundant calcareous nodules
	8 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-42	0 - 4	Fill: hard, Lean Clay (CL)
	4 - 8	Stiff to very stiff, Lean Clay (CL)
	8 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-43	0 - 2.65	Pavement and base: see Table 7 in Section 4.0 of this report
	2.65 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-44	0 - 2	Fill: hard, Lean Clay with Sand (CL), with fat clay pockets and roots
	2 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-45	0 - 2	Fill: hard, Fat Clay with Sand (CH), with calcareous nodules and gravel
	2 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-46	0 - 2	Fill: very stiff, Fat Clay (CH), with sandy lean clay pockets and roots
	2 - 4	Fill: Silty Clayey Sand (SC-SM), with shell fragments

Boring	Depth (ft)	Description of Stratum
B-46 (cont.)	4 - 6	Fill: firm to stiff, Lean Clay (CL), with sandy lean clay seams and shell fragments
	6 - 8	Stiff to very stiff, Lean Clay (CL), with ferrous nodules and abundant calcareous nodules
	8 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-47	0 - 2	Fill: hard, Fat Clay (CH), with gravel and roots
	2 - 6	Soft to stiff, Fat Clay (CH), with slickensides
	6 - 10	Stiff to very stiff, Lean Clay with Sand (CL)
	10 - 16	Very stiff, Fat Clay (CH)
B-48	0 - 4	Fill: stiff to hard, Fat Clay (CH), with slickensides and calcareous nodules
	4 - 10	Firm to hard, Lean Clay with Sand (CL)
	10 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-49	0 - 6	Fill: stiff to very stiff, Fat Clay (CH)
	6 - 10	Stiff to very stiff, Lean Clay (CL), with ferrous nodules and fat clay seams
	10 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-50	0 - 2.77	Pavement and base: see Table 7 in Section 4.0 of this report
	2.77 - 6	Fill: very stiff, Fat Clay with Sand (CH)
	6 - 10	Fill: very stiff to hard, Fat Clay (CH)
	10 - 16	Very stiff, Fat Clay (CH), with ferrous nodules
B-51	0 - 2.77	Pavement and base: see Table 7 in Section 4.0 of this report
	2.77 - 6	Fill: very stiff, Fat Clay with Sand (CH)
	6 - 10	Fill: very stiff to hard, Fat Clay (CH)
	10 - 16	Very stiff, Fat Clay (CH), with ferrous nodules
B-52	0 - 2	Fill: very stiff, Fat Clay with Sand (CH), with ferrous and calcareous nodules
	2 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-53	0 - 2	Fill: very stiff, Fat Clay (CH), with ferrous nodules and roots
	2 - 8	Stiff to very stiff, Fat Clay (CH), with ferrous nodules
	8 - 10	Stiff to very stiff, Lean Clay with Sand (CL), with calcareous and ferrous nodules
	10 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-54	0 - 2	Hard, Lean Clay with Sand (CL), with silty sand seams and roots
	2 - 16	Stiff to hard, Fat Clay (CH), with slickensides
B-55	0 - 0.67	Pavement and base: see Table 7 in Section 4.0 of this report
	0.67 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-56	0 - 2	Fill: very stiff, Fat Clay (CH), with ferrous nodules and roots
	2 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-57	0 - 10	Stiff to hard, Fat Clay (CH), with slickensides and calcareous nodules
	10 - 16	Stiff to very stiff, Lean Clay (CL)

Boring	Depth (ft)	Description of Stratum
B-58	0 - 4	Fill: stiff to very stiff, Fat Clay (CH)
	4 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-59	0 - 2	Hard, Sandy Lean Clay (CL), with ferrous and calcareous nodules
	2 - 8	Stiff to hard, Fat Clay (CH), with slickensides
	8 - 12	Soft to stiff, Lean Clay (CL)
	12 - 16	Firm to stiff, Silty Clay (CL-ML)
B-60	0 - 2	Very stiff, Lean Clay with Sand (CL), with roots
	2 - 16	Firm to hard, Fat Clay (CH), with slickensides
B-61	0 - 1	Base: see Table 7 in Section 4.0 of this report
	1 - 6	Stiff to hard, Fat Clay (CH), with ferrous nodules
	6 - 12	Very stiff, Sandy Lean Clay (CL), with slickensides and ferrous nodules
	12 - 16	Sandy Silt (ML)
B-62	0 - 3.03	Pavement and base: see Table 7 in Section 4.0 of this report
	3.03 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-63	0 - 3.08	Pavement and base: see Table 7 in Section 4.0 of this report
	3.08 - 12	Stiff to very stiff, Fat Clay (CH), with slickensides
	12 - 16	Very stiff, Lean Clay (CL), with sand pockets
B-64	0 - 6	Fill: firm to very stiff, Fat Clay (CH), with slickensides
	6 - 10	Stiff to very stiff, Fat Clay (CH), with slickensides
	10 - 12	Hard, Lean Clay (CL)
	12 - 16	Stiff to very stiff, Fat Clay (CH)
B-65	0 - 14	Stiff to hard, Fat Clay (CH), with slickensides
	14 - 16	Silt (ML), with fat clay seams, wet
B-66	0 - 2	Fill: hard, Lean Clay (CL), with calcareous nodules, shell fragments, and roots
	2 - 4	Fill: stiff to very stiff, Fat Clay (CH), with slickensides and ferrous nodules
	4 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-67	0 - 2	Fill: stiff to very stiff, Fat Clay with Sand (CH), with calcareous nodules, sand pockets, shell fragments, and roots
	2 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-68	0 - 10	Firm to hard, Fat Clay (CH), with slickensides
	10 - 14	Stiff to hard, Lean Clay (CL)
	14 - 16	Stiff to very stiff, Fat Clay (CH)
B-69	0 - 2.81	Pavement and base: see Table 7 in Section 4.0 of this report
	2.81 - 4	Fill: very stiff, Fat Clay (CH), with calcareous nodules, sandy lean clay pockets, and gravel
	4 - 16	Firm to very stiff, Fat Clay (CH), with slickensides and ferrous nodules

Boring	Depth (ft)	Description of Stratum
B-70	0 - 2.96	Pavement and base: see Table 7 in Section 4.0 of this report
	2.96 - 8	Fill: stiff to very stiff, Fat Clay (CH), with slickensides
	8 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
B-71	0 - 1.08	Pavement: see Table 7 in Section 4.0 of this report
	1.08 - 2	Fill: Silty Sand (SM), with fat clay seams and pockets
	2 - 14	Stiff to very stiff, Fat Clay (CH), with slickensides
	14 - 16	Stiff to very stiff, Lean Clay (CL), with silt partings
B-72	0 - 2	Fill: hard, Fat Clay (CH), with calcareous nodules and roots
	2 - 12	Firm to very stiff, Fat Clay (CH), with slickensides
	12 - 16	Firm to stiff, Lean Clay (CL)
B-73	0 - 2	Fill: hard, Fat Clay with Sand (CH), with ferrous nodules, shell fragments, gravel, and roots
	2 - 16	Firm to very stiff, Fat Clay (CH), with slickensides
B-74	0 - 2	Fill: very stiff, Fat Clay with Sand (CH), with calcareous nodules
	2 - 4	Stiff to very stiff, Fat Clay (CH), with calcareous and ferrous nodules
	4 - 6	Stiff to hard, Lean Clay (CL), with calcareous nodules and pockets
	6 - 10	Firm to very stiff, Fat Clay (CH), with slickensides
	10 - 16	Firm to stiff, Silty Clay with Sand (CL-ML)

Subsurface Soil Properties: The cohesive soils encountered in the borings (including fill, excluding silty clayey sand) have slight to very high plasticity (see "Degree of Plasticity of Cohesive Soils" on Plate A-78, in Appendix A), with Liquid Limits (LL) ranging from 29 to 90 and Plasticity Indices (PI) ranging from 10 to 65. The cohesive soils encountered are classified as "CL-ML", "CL", and "CH" type soils while the granular soils are classified as "ML", "SM", "SC-SM", and "SP-SM" type soils in accordance with ASTM D 2487.

Groundwater: Groundwater levels encountered in the borings during drilling are summarized in Table 8.

Table 8. Summary of Boring Groundwater Depths

Boring No.	Date Drilled	Boring Depth (ft)	Groundwater Depth (ft)
B-1	8/17/21	16	Dry (Drilling) Dry (Complete)
B-2	8/4/21	16	12 (Drilling) 12 (Complete)
B-3	8/4/21	16	15 (Drilling) 14 (Complete)
B-4	8/5/21	16	15 (Drilling) 13 (Complete)

Boring No.	Date Drilled	Boring Depth (ft)	Groundwater Depth (ft)
B-5	8/5/21	16	Dry (Drilling) Dry (Complete)
B-6	7/1/21	16	15 (Drilling) 13 (Complete)
B-7	7/1/21	16	Dry (Drilling) Dry (Complete)
B-8	7/1/21	16	Dry (Drilling) 14 (Complete)
B-9	7/1/21	16	Dry (Drilling) Dry (Complete)
B-10	8/3/21	16	4(1) (Drilling) Dry (Complete)
B-11	6/21/21	16	14 (Drilling) 10 (Complete)
B-12	6/21/21	16	Dry (Drilling) Dry (Complete)
B-13	6/21/21	16	Dry (Drilling) Dry (Complete)
B-14	6/21/21	16	Dry (Drilling) Dry (Complete)
B-15	7/1/21	16	Dry (Drilling) Dry (Complete)
B-16	8/3/21	16	4.2 (Drilling) 6.3 (Complete)
B-17	8/3/21	16	Dry (Drilling) Dry (Complete)
B-18	8/3/21	16	15 (Drilling)
B-19	8/3/21	16	Dry (Drilling) Dry (Complete)
B-20	8/3/21	16	Dry (Drilling) Dry (Complete)
B-21	8/2/21	16	Dry (Drilling) Dry (Complete)
B-22	8/2/21	16	10 (Drilling) 7.9 (15 mins)
B-23	8/2/21	16	14 (Drilling) 7.1 (15 mins)
B-24	8/2/21	16	15 (Drilling) 7.7 (Complete)
B-25	8/2/21	16	14 (Drilling) 6.6 (15 mins) 6.6 (Complete)
B-26	8/2/21	16	14 (Drilling) 7.9 (15 mins)
B-27	7/1/21	16	14 (Drilling) 11 (Complete)

Boring No.	Date Drilled	Boring Depth (ft)	Groundwater Depth (ft)
B-28	6/21/21	16	Dry (Drilling) 4 (Complete)
B-29	6/21/21	16	14 (Drilling) 7 (Complete)
B-30	6/21/21	16	14 (Drilling) 11 (Complete)
B-31	6/21/21	16	Dry (Drilling) Dry (Complete)
B-32	8/2/21	16	Dry (Drilling) Dry (Complete)
B-33	8/2/21	16	Dry (Drilling) Dry (Complete)
B-34	6/15/21	16	Dry (Drilling) Dry (Complete)
B-35	6/15/21	16	Dry (Drilling) Dry (Complete)
B-36	6/15/21	16	Dry (Drilling) Dry (Complete)
B-37	6/15/21	16	Dry (Drilling) Dry (Complete)
B-38	6/15/21	16	Dry (Drilling) Dry (Complete)
B-39	6/14/21	16	Dry (Drilling) Dry (Complete)
B-40	6/14/21	16	Dry (Drilling) Dry (Complete)
B-41	6/14/21	16	Dry (Drilling) Dry (Complete)
B-42	6/14/21	16	Dry (Drilling) Dry (Complete)
B-43	7/1/21	16	Dry (Drilling) Dry (Complete)
B-44	6/14/21	16	Dry (Drilling) Dry (Complete)
B-45	6/14/21	16	Dry (Drilling) Dry (Complete)
B-46	6/14/21	16	Dry (Drilling) Dry (Complete)
B-47	6/14/21	16	Dry (Drilling) Dry (Complete)
B-48	6/14/21	16	Dry (Drilling) Dry (Complete)
B-49	6/14/21	16	2(1) (Drilling) Dry (Complete)
B-50	8/4/21	16	14 (Drilling) 10 (Complete)

Boring No.	Date Drilled	Boring Depth (ft)	Groundwater Depth (ft)
B-51	8/10/21	16	Dry (Drilling) Dry (Complete)
B-52	8/10/21	16	Dry (Drilling) Dry (Complete)
B-53	8/10/21	16	Dry (Drilling) Dry (Complete)
B-54	6/15/21	16	Dry (Drilling) Dry (Complete)
B-55	8/3/21	16	Dry (Drilling) Dry (Complete)
B-56	8/10/21	16	Dry (Drilling) Dry (Complete)
B-57	8/10/21	16	15 (Drilling) 13 (Complete)
B-58	8/4/21	16	Dry (Drilling) Dry (Complete)
B-59	8/10/21	16	10 (Drilling) 4 (Complete)
B-60	8/4/21	16	12 (Drilling) 10 (Complete)
B-61	8/4/21	16	15 (Drilling) 13 (Complete)
B-62	8/10/21	16	Dry (Drilling) Dry (Complete)
B-63	8/10/21	16	Dry (Drilling) Dry (Complete)
B-64	8/10/21	16	15 (Drilling) 14 (Complete)
B-65	8/5/21	16	14 (Drilling) 11 (Complete)
B-66	8/17/21	16	Dry (Drilling) Dry (Complete)
B-67	8/17/21	16	Dry (Drilling) Dry (Complete)
B-68	8/17/21	16	Dry (Drilling) 15 (Complete)
B-69	8/17/21	16	Dry (Drilling) Dry (Complete)
B-70	8/17/21	16	Dry (Drilling) Dry (Complete)
B-71	8/17/21	16	Dry (Drilling) Dry (Complete)
B-72	8/17/21	16	Dry (Drilling) 11 (Complete)
B-73	8/17/21	16	Dry (Drilling) 10 (Complete)

Boring No.	Date Drilled	Boring Depth (ft)	Groundwater Depth (ft)
B-74	8/17/21	16	10 (Drilling) 8 (5 mins)

Note: (1) Groundwater is likely perched.

The information in this report summarizes conditions found on the dates the borings were drilled. However, it should be noted that our groundwater observations are short term; groundwater depths and subsurface soil moisture contents will vary with environmental variations such as frequency and magnitude of rainfall and the time of year when construction is in progress.

4.2 Hazardous Materials

No signs of visual staining or odors were encountered during field drilling or during processing of the soil samples in the laboratory.

4.3 Subsurface Variations

It should be emphasized that: (i) at any given time, groundwater depths can vary from location to location, and (ii) at any given location, groundwater depths can change with time. Groundwater depths will vary with seasonal rainfall and other climatic/environmental events. Subsurface conditions may vary away from and in between the boring locations.

Clay soils in the Greater Houston area typically have secondary features such as slickensides, calcareous/ferrous nodules, and contain sand/silt seams/lenses/layers/pockets. It should be noted that the information in the boring logs are based on 3-inch diameter soil samples which were generally obtained from the borings at intervals of 2 feet continuously from the ground surface to a depth of 16 feet below existing grade. A detailed description of the soil secondary features may not have been obtained due to the small sample size and sampling interval between the samples. Therefore, while AEC's logs show some soil secondary features, it should not be assumed that the features are absent where not indicated on the logs.

AVILES ENGINEERING CORP.

4.4 Geologic Faults

AEC performed a desktop fault study which included a review of public maps, available literature, and aerial photographs. According to the published maps "Principal Active Faults of the Houston Area (after O'Neill and Van Siclen, May 1984)", and "Principal Surface Faults in the Central Houston Metropolitan Area (after O' Neill, Van Siclen, with additions by C. Norman, May 13, 2004)", the project site is located over the Friendswood Salt Dome. An overlay of the street map over the 1984 fault map indicates numerous faults are located near the Taxiway L alignment, but according to the overlay, the 1984 map shows no faults directly crossing the Taxiway L alignment itself. The closest fault to the Taxiway L alignment, the Liberty Fault is an east-west oriented fault that terminates approximately 0.18 miles west of the Taxiway L alignment. The next closest fault, according to the 1984 fault map, is an un-named northeast-southwest oriented fault that is approximately 0.24 miles southwest of the Taxiway L alignment.

A map in the 1975 publication, "Active Faults in Southeastern Harris County, Texas", Geo I, pages 149 – 154, by Clanton, U.S. and Amsbury, D.L., indicate multiple faults in or near the project area. The map indicates at least two or more faults crossing the southern portion of the Taxiway L alignment. According to the article, these faults were associated with structural damages seen in nearby buildings, streets, and runways.

Fifty-two aerial photographs from 1944 to 2021 were reviewed on Google Earth on the internet. No evidence of faults near or crossing the Taxiway L alignment was observed.

If there are no historical Phase I Fault Investigation studies readily available of the Taxiway L alignment, AEC recommends a Phase I Fault Investigation for the project be performed since there are variations in fault locations on different maps and the article by Clanton, U.S. and Amsbury, D.L indicates multiple faults near and or crossing the southern half of the Taxiway L alignment.

Limitations: The desktop fault study provided in this report is limited to a review of available literature, aerial photographs, and maps. Distances are scaled from maps. Faults may exist in, cross, or adjoin the Project Alignment which were not identified in this report due to the following reasons: limitations of the scope of work and cost, no field observations were conducted; lack of documentation in the literature; and faults may have not been visible on the aerial photographs due to clarity of the aerial photographs, the presence of vegetation and environmental features, and modification of the land surface by human activities. Faults may also be present below ground but do not currently have surface expressions. Identification of these faults is beyond the scope of work for this study.

5.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

According to information provided by Atkins, the project consists of design and construction of (i) approximately 10,000 feet long Taxiway L parallel to Runway 4-22, (ii) Taxiways E and D with approximately 1,200 feet length each, and (iii) additional connector taxiways.

Construction Specifications: For this report, AEC has referenced construction specifications from the Federal Aviation Administration Advisory Circular (FAA AC), where applicable. AEC should be notified if different construction specifications should be used, so that our recommendations can be updated as necessary. AEC has also referenced the 2015 HAS Design Criteria Manual as necessary.

5.1 Taxiway Pavement Subgrade

For the construction of the taxiways, it is AEC's opinion that it will be sound engineering practice for the subgrade soils beneath the pavement to be stabilized to provide uniform and long-lasting subgrade support of the pavement, as well as provide a weather resistant work platform during construction.

Lime Stabilized Subgrade: The subgrade soils beneath the pavement that were encountered in the borings along the taxiway alignments generally consist of fat/lean clay (CH/CL) with medium to very high plasticity. According to Section 2.16.12 of the 2015 HAS Design Criteria Manual, all subgrades should be lime/fly ash-treated or cement/fly ash-treated. However, based on the cohesive soils encountered in the borings, it is AEC's opinion that using fly ash or cement will not be effective for subgrade stabilization along the taxiway alignments. Instead, **AEC recommends lime stabilized subgrade be used alone for the construction of the taxiways**. Based on the subsurface soil conditions, AEC recommends that a minimum of 12 inches of subgrade soils beneath the proposed pavement be stabilized with a minimum of 8 percent lime by dry soil weight. AEC's preliminary lime series tests indicate that an 8 percent application rate (by dry soil weight) will be necessary; however, the actual percentage of lime should be determined by lime-series or pH method by the construction materials testing (CMT) laboratory prior to construction.

5.1.1 Determination of Rigid Pavement Design Parameters

Determination of the subgrade resilient modulus, E, the foundation modulus, k, and CBR is required for rigid pavement design. Based on the DCP test (see Plates B-13 to B-49, in Appendix B) and laboratory CBR test (Table 6 in Section 3.0) results, average CBR values are presented on Table 9.

Table 9. Average CBRs based on DCP and CBR Test Results

Taxiway Alignment	Nearby Borings	Average CBR
Taxiway L/ Connector	B-1 through B-7	5
Taxiway L	B-8 through B-32	8
Taxiway L	B-33 to B-39	3
Taxiway L	B-40	15
Taxiway L	B-41 to B-43	1
Taxiway L	B-44	5
Taxiway L	B-45 to B-47	2
Taxiway L/ Connectors	B-48 to B-51, B-52, B-53, B-63, B-64	5
Connector	B-54, B-55	20
Connectors	B-56 through B-59	8
Connector	B-60, B-61	2
Taxiway E	B-65 through B-68	5
Taxiway D	B-71 to B-74	8

Based on DCP and CBR test results, it is AEC's opinion that using a design CBR of 3 (based on the lab CBR results) for the natural subgrade in the pavement design is reasonable. AEC notes that the CBR results derived from the field DCP tests may be affected by the frequent rainfall that occurred (see Section 4.0 of this report) when the field DCP tests were performed. AEC will perform additional modified proctor and CBR tests on lime stabilized test pit soil samples. Recommended design CBR for lime stabilized subgrade will be presented in a separate addendum letter. Preliminary optimum lime series content test results (which will be included in the addendum letter) indicate the optimum lime stabilization rate for the subgrade soils to be 8 percent by dry soil weight. However, the actual percentage of lime should be determined by lime-series or pH method by the CMT laboratory prior to construction.

Foundation modulus (k) and resilient modulus (E_{SG}) of the subgrade soil can be estimated using the following equations according to Item 326 of FAA AC 150/5360-6E.

$$k = \left[\frac{1500 \times CBR}{26}\right]^{0.7788} \quad \text{.................Equation (1)}$$

$$E_{SG} = 26k^{1.284} \quad \text{..................Equation (2)}$$

where:

k = Foundation modulus of the subgrade, in pci

E_{SG} = Resilient modulus of the subgrade, in psi

5.1.2 Subgrade Preparation

AEC assumes that the pavement will be constructed at or near existing grade. Subgrade preparation should extend to 5 feet beyond the paved area perimeters. The top 6 inches of existing soil and any deleterious materials at the ground surface should be stripped and wasted. In case of the presence of existing pavement and base, removal of existing pavement shall be performed in accordance with Item P-101 of the FAA AC 150/5370-10G Airport Construction Standards. After surface stripping, the subgrade should be cut to grade to accommodate the pavement section. After cutting to grade, we recommend that a competent soil technician inspect the exposed subgrade to determine if there are any unsuitable soils or other deleterious materials. Excavate and dispose of unsuitable soils and other deleterious materials which will not consolidate; the excavation depth should be increased when inspection indicates the presence of organics and deleterious materials to greater depths. The exposed soils should be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials. Excavation and subgrade preparation shall be performed in accordance with Item P-152 of the FAA AC 150/5370-10G Airport Construction Standards.

Scarify the top 12 inches of the exposed subgrade and stabilize with a minimum of 8 percent hydrated lime (by dry weight). The stabilized soils should be compacted to 95 percent of their ASTM D 1557 (Modified Proctor) dry density at a moisture content ranging from optimum to 3 percent above optimum. Lime stabilization shall be performed in accordance with Items P-155 of the FAA AC 150/5370-10G Airport Construction Standards.

5.1.3 Potential Vertical Rise (PVR)

As required by Atkins, AEC estimated the Potential Vertical Rise (PVR) of soils within the proposed paved areas. However, it is AEC's experience with similar HAS projects that excavation of existing soil for PVR mitigation is not typically performed for taxiway projects. AEC should be notified if PVR mitigation is required, so that our recommendations can be updated as necessary.

Estimated Soil Movements: PVR is an estimate of the potential of an expansive soil to swell from its current state. Expansive clays exhibit a potential to shrink and swell with changes in their moisture contents. The changes in the soil moisture content are usually caused by variations in the seasonal amount of rainfall and evaporation rates or other localized factors like the moisture withdrawal by nearby trees. AEC determined PVR within the zone of seasonal moisture variation, which is typically considered to be 10 feet deep in the Greater Houston area.

PVR was computed for selected borings using TxDOT test method Tex-124-E. PVR results based on in-situ moisture contents are presented on Table 10. As a reference, the TxDOT 2019 Pavement Design manual requires a maximum allowable PVR of 2.0 inches for highway main lanes.

Table 10. Estimated PVR

Boring	PVR (in), based on in-situ moisture conditions
B-1	4.03
B-6	1.55
B-11	4.72
B-17	3.03
B-22	2.90
B-26	2.12
B-33	3.21
B-37	2.23
B-41	1.64
B-47	3.46
B-50	3.44
B-56	2.11
B-64	3.26
B-67	2.22
B-74	2.81

PVR Mitigation: Based on Table 10, the PVR exceeds 2 inches in Borings B-1, B-11, B-17, B-22, B-26, B-33, B-37, B-47, B-50, B-56, B-64, B-67, and B-74. If HAS decides to reduce the PVR to at least 2 inches, the top 24 inches of highly expansive clay soils along the project alignments should be excavated and either replaced with lean clay soil with low plasticity, or by stabilizing the excavated clay soil with at least 8 percent hydrated lime and then compacting it back in place. If PVR mitigation is performed, the lime-stabilized subgrade recommendations presented in Section 5.1.2 of this report are not required. Compacted soil (whether embankment fill imported from offsite, or existing onsite soil stabilized with lime) should be placed in accordance with Section 3.4.1 (Ordinary Compaction) of Item 132 of the 2014 TxDOT Standard Specifications. Other methods for reducing PVR, such as horizontal or vertical moisture barriers, geo-synthetic reinforcement, subgrade drainage, etc. can also be considered, if allowed by HAS. However, as noted above, it is AEC's opinion that the PVR mitigation strategies presented above would be cost-excessive and ultimately unnecessary for this category of taxiway project. However, the decision to include PVR mitigation should ultimately be decided by HAS.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation and Grading

To mitigate site problems that may develop following prolonged periods of rainfall, it is essential to have adequate drainage to maintain a relatively dry and firm surface prior to starting any work at the site. Adequate drainage should be maintained throughout the construction period. Methods for controlling surface runoff and ponding include proper site grading, berm construction around exposed areas, and installation of sump pits with pumps.

Pumping Soils: AEC notes that silty sand (SM) fill material was encountered at the ground surface in the vicinity of Boring B-71. **Silty soils are prone to pumping when they are saturated after rainfall. Pumping soils are not able to support construction equipment.** If rainfall occurs and pumping soils are encountered at the ground surface, methods to mitigate the effect of the pumping soils include: (i) providing positive drainage around the pumping soils area, including cutting drainage swales as necessary; (ii) excavate and replace the pumping soils with competent, compacted clay fill that is free from debris or other deleterious materials; (iii) adding lime or fly ash to the pumping soils in order to dry out the soil, as well as increase soil strength; (iv) using woven geotextiles (such as a Mirafi RS series, or equivalent) to reinforce and separate weak/wet underlying soil layers; or (v) a combination of the above methods.

6.2 Construction Monitoring

Site preparation (including clearing and proof-rolling) and earthwork operations should be monitored by qualified geotechnical professionals to check for compliance with project documents and changed conditions, if encountered.

7.0 GENERAL

The information contained in this report summarizes conditions found on the date the borings were drilled. The attached boring log is a true representation of the soils encountered at the specific boring location on the date of drilling. Reasonable variations from the subsurface information presented in this report should be anticipated. AEC should be notified immediately when conditions encountered during construction are significantly different from those presented in this report.

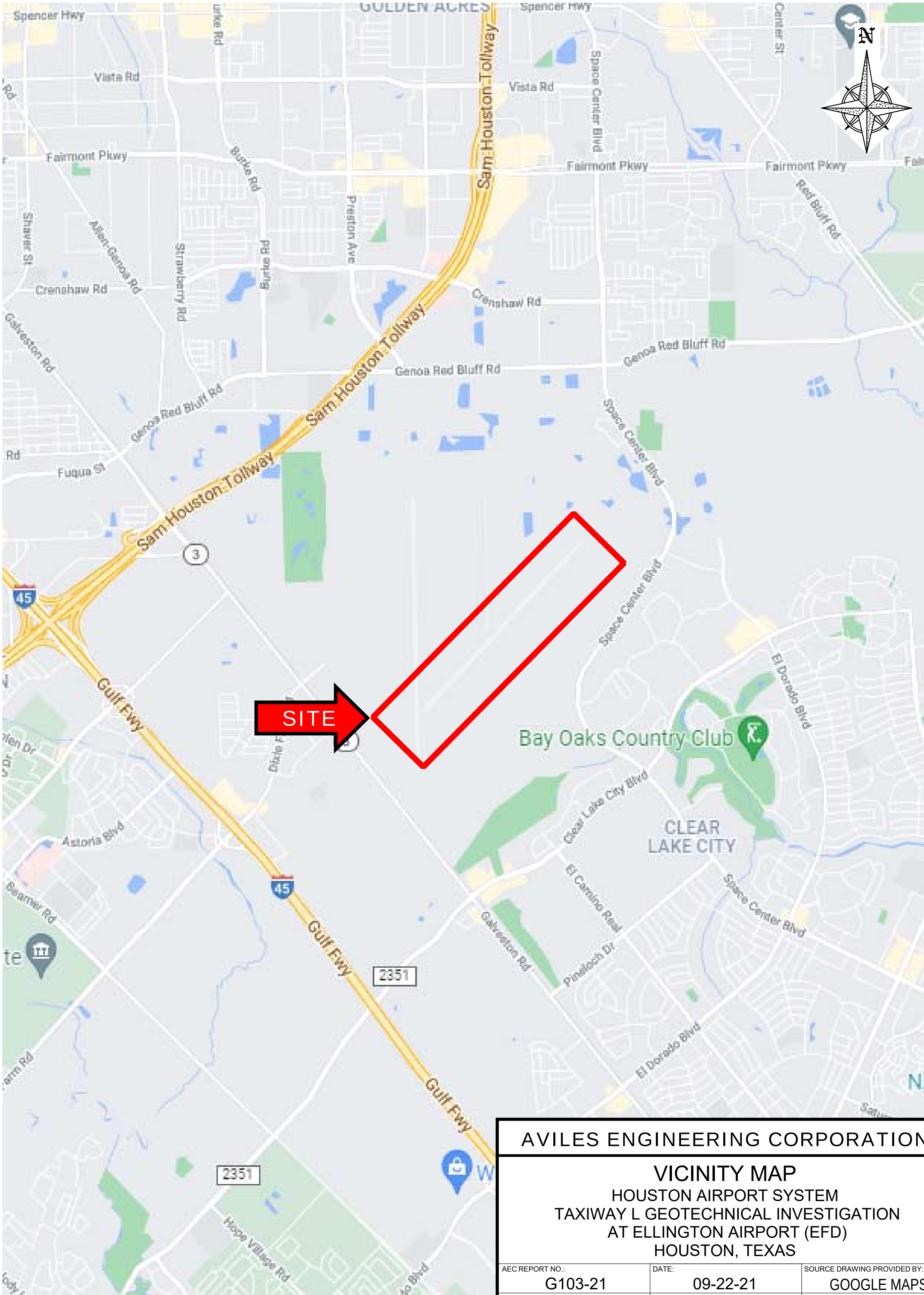
8.0 LIMITATIONS

The investigation was performed using the standard level of care and diligence normally practiced by recognized geotechnical engineering firms in this area, presently performing similar services under similar circumstances. The report has been prepared exclusively for the project and location described in this report and is intended to be used in its entirety. If pertinent project details change or otherwise differ from those described herein, AEC should be notified immediately and retained to evaluate the effect of the changes on the recommendations presented in this report and revise the recommendations if necessary. The scope of services does not include a fault investigation. The recommendations presented in this report should not be used for other structures located at this site or similar structures located at other sites, without additional evaluation and/or investigation.

ENGINEERING CORP.

APPENDIX A

Plate A-1	Vicinity Map
Plate A-2	Boring Location Plan
Plates A-3 to A-76	Boring Logs
Plate A-77	Key to Symbols
Plate A-78	Classification of Soils for Engineering Purposes
Plate A-79	Terms Used on Boring Logs
Plate A-80	ASTM & TXDOT Designation for Soil Laboratory Tests
Plate A-81	Sieve Analysis Results
Plates A-82 and A-83	Organic Content Test Results



AVILES ENGINEERING CORPORATION

VICINITY MAP

HOUSTON AIRPORT SYSTEM
TAXIWAY L GEOTECHNICAL INVESTIGATION
AT ELLINGTON AIRPORT (EFD)
HOUSTON, TEXAS

AEC REPORT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G103-21	09-22-21	GOOGLE MAPS
APPROX. SCALE: NTS	DRAFTED BY: MRH	PLATE NO.: PLATE A-1

LEGEND:

B-#	*BORING LOCATION*
	BORING NO.
B-#/CBR	*CBR TEST PIT INCLUDED*

Notes:
1) AEC boring locations have been surveyed by Landtech, Inc.
2) All the borings are 16 feet deep.

AVILES ENGINEERING CORPORATION

BORING LOCATION PLAN

HOUSTON AIRPORT SYSTEM
TAXIWAY L GEOTECHNICAL INVESTIGATION
AT ELLINGTON AIRPORT (EFD)
HOUSTON, TEXAS

AEC PROJECT NO.: G103-21	DATE: 9-23-2021	SOURCE DRAWING PROVIDED BY: ATKINS/GOOGLE
APPROX. SCALE: 1" = 800'	DRAFTED BY: MRH	PLATE NO.: PLATE A-2

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-1**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

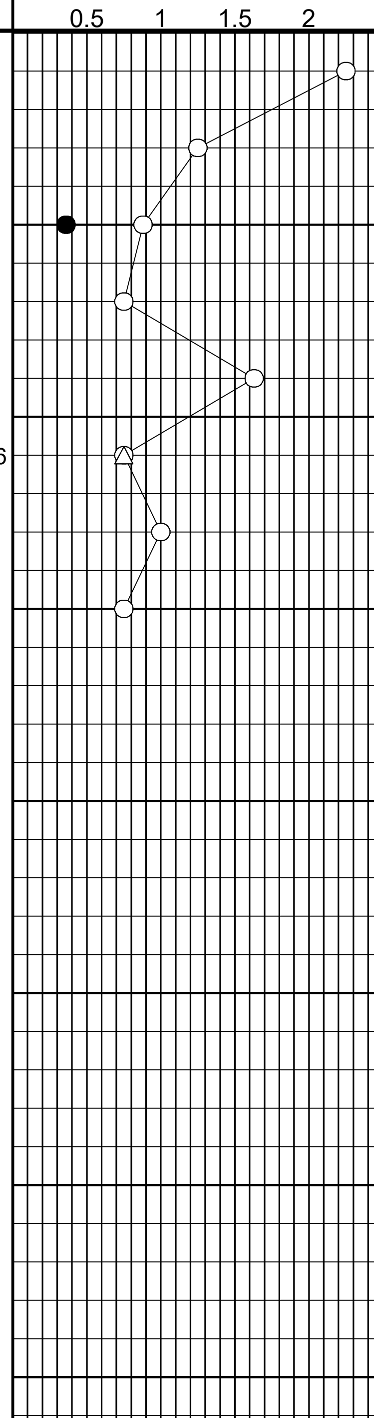
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187660.15
Northing: 13783415.92
Elevation: 23.74

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff to hard, dark gray and dark brown Fat Clay (CH), with calcareous nodules -with roots 0'-2' -gray and dark gray, with ferrous nodules 2'-4'		16					
			37		96	88	25	63
5	Firm to stiff, gray Fat Clay (CH), with slickensides and ferrous nodules -grayish tan, with calcareous nodules 6'-8'		38	81.9				
			40					
	Stiff to very stiff, tan and gray Lean Clay (CL), with slickensides and ferrous nodules -with fat clay seams 8'-10'		29		98	49	16	33
10			24	101.6				
	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides, calcareous nodules, and lean clay seams -tan 14'-16'		22					
15			27					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **JH**

PROJECT NO. G103-21 **PLATE A-3**

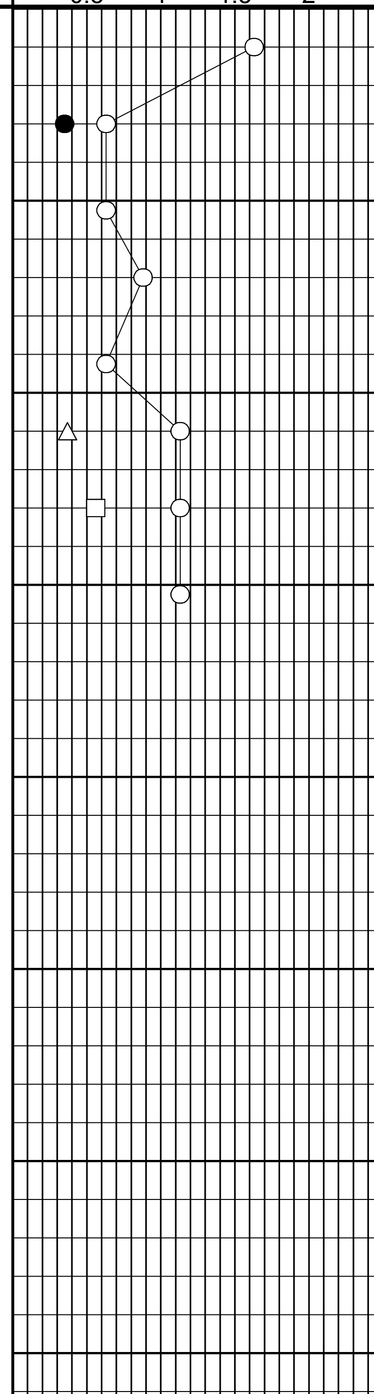
AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-2**

DATE **8/4/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187859.09
Northing: 13783422.56
Elevation: 22.68

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)



DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Soft to very stiff, dark gray Fat Clay (CH), with slickensides -with roots 0'-2' -gray 2'-6', with calcareous nodules 2'-4'				95	72	24	48
			29					
			39	80.9				
5	-with ferrous nodules 4'-8'	3	44					
	-tan and gray, with abundant calcareous nodules 6'-8'		23					
	Firm to stiff, tan Lean Clay (CL), with fat clay pockets	8	21		98	38	16	22
10	Firm to very stiff, tan Fat Clay (CH), with slickensides and calcareous nodules -with silty clay seams 10'-14' -tan and gray 12'-16'		26	97.8				
			37					
15		11	29					
16	Termination Depth = 16 feet							

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **12** FEET WHILE DRILLING
WATER LEVEL AT **12** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-3**

DATE **8/4/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

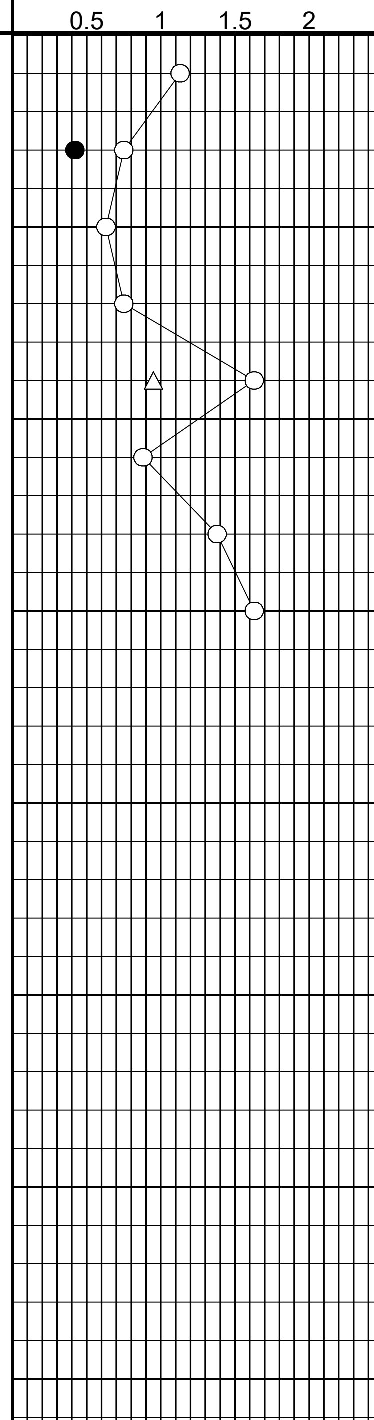
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188038.56
Northing: 13783566.78
Elevation: 22.35

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, dark gray and gray Fat Clay (CH), with roots and shell fragments				95	69	23	46
1			28					
2	Firm to very stiff, gray Fat Clay (CH), with slickensides							
3			35	85.2				
5			37					
6	-gray and tan, with calcareous nodules 6'-8' and ferrous nodules 6'-10'				96	86	25	61
7			36					
8	-reddish tan and gray 8'-10', with lean clay seams 8'-12'							
9			29	97.3				
10	-tan and gray, with calcareous nodules 10'-16'							
11			23					
13			29					
15			27					
16	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **15** FEET WHILE DRILLING
WATER LEVEL AT **14** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

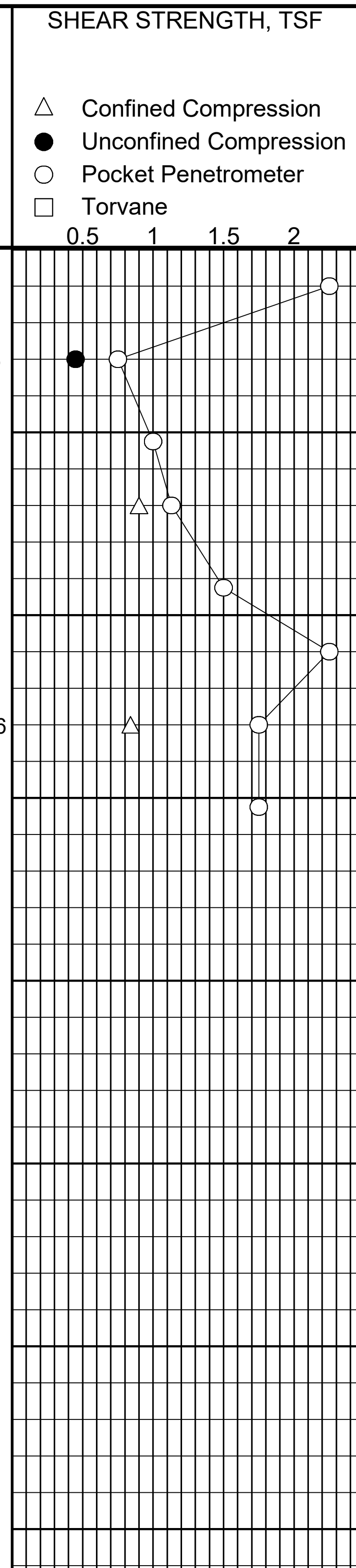
BORING **B-4**

DATE **8/5/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188032.25
Northing: 13783767.15
Elevation: 22.64

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to hard, dark brownish gray Fat Clay (CH), with slickensides -with roots 0'-2' and ferrous nodules 0'-10' -tannish gray 2'-4', with calcareous nodules 2'-6'		23		96	73	22	51
			36	85.5				
5	-gray and tan 4'-8'	6	35					
			29	97.2				
	-reddish tan 8'-10', with calcareous nodules 8'-16'	11	21		96	53	17	36
10	-tan 10'-12'		20					
	-reddish tan 12'-16', with lean clay seams 12'-14'		22	107.6				
15	-with silt seams 14'-16'	8	24					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **15** FEET WHILE DRILLING
WATER LEVEL AT **13** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: EFD Taxiway L Geotechnical Investigation

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING B-5

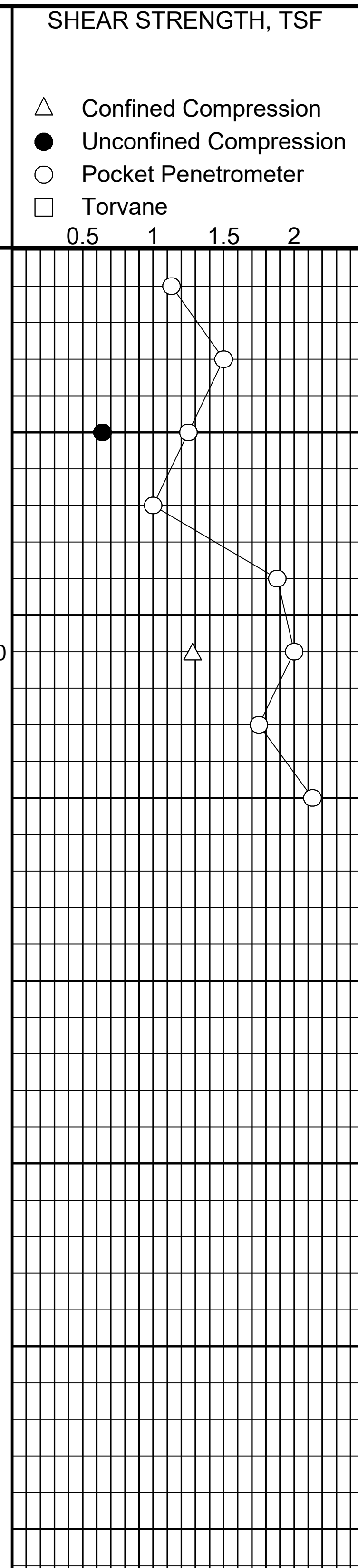
DATE 8/5/2021 **TYPE** 4" Dry Auger **LOCATION** See Boring Location Plan

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188025.19
Northing: 13783960.47
Elevation: 17.12

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, tannish gray and dark gray Fat Clay (CH), with calcareous and ferrous nodules				92	84	24	60
			31					
	Stiff to very stiff, gray and dark gray Fat Clay (CH), with slickensides and ferrous nodules		32					
5	-dark and olive gray 4'-6'		33	89.1				
	-gray and tan 6'-8'		35					
	Very stiff to hard, tan and gray Lean Clay (CL), with fat clay seams and pockets		20		97	44	15	29
10	-reddish tan and tan, with calcareous nodules 10'-12'		24	104.0				
			22					
15	-with calcareous nodules and silt pockets 14'-16'		22					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT N/A FEET WHILE DRILLING

WATER LEVEL AT N/A FEET AFTER COMPLETE

DRILLED BY JH Drilling DRAFTED BY YY/MRH LOGGED BY DN

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-6**

DATE **7/1/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

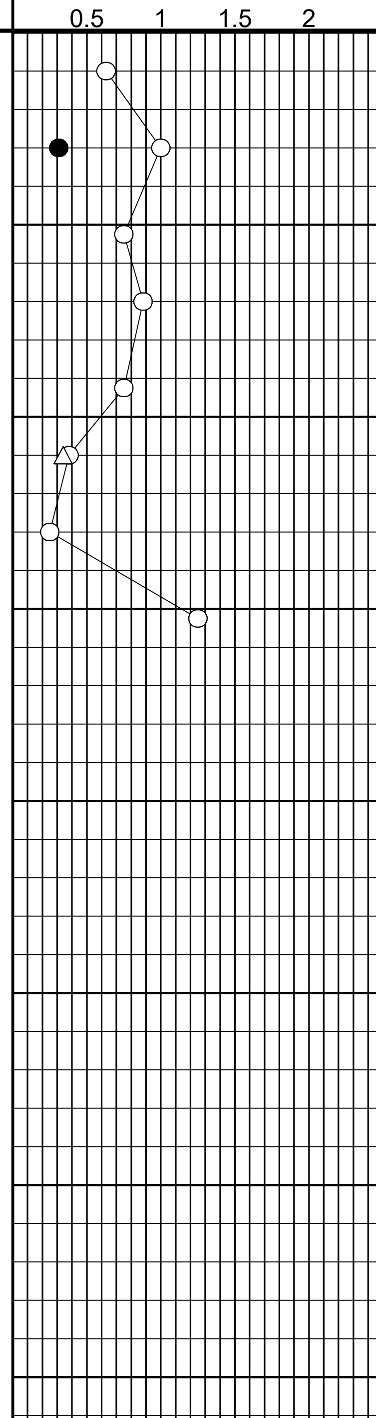
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188019.81
Northing: 13784137.34
Elevation: 24.15

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: stiff, gray Fat Clay (CH), with sandy lean clay seams, shell fragments, and roots		39		93	71	21	50
	Soft to very stiff, gray and tannish gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-4' and calcareous nodules 2'-8'		41	81.6				
5		6	39					
	-tan and gray 6'-14', with ferrous stains 6'-8'		32					
		8	32		98	56	17	39
10	-with calcareous nodules 10'-12'		28	93.7				
			36					
15	Very stiff, tan and gray Lean Clay (CL), with calcareous nodules, silty clay seams, and fat clay pockets	19	19					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING
WATER LEVEL AT **13** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

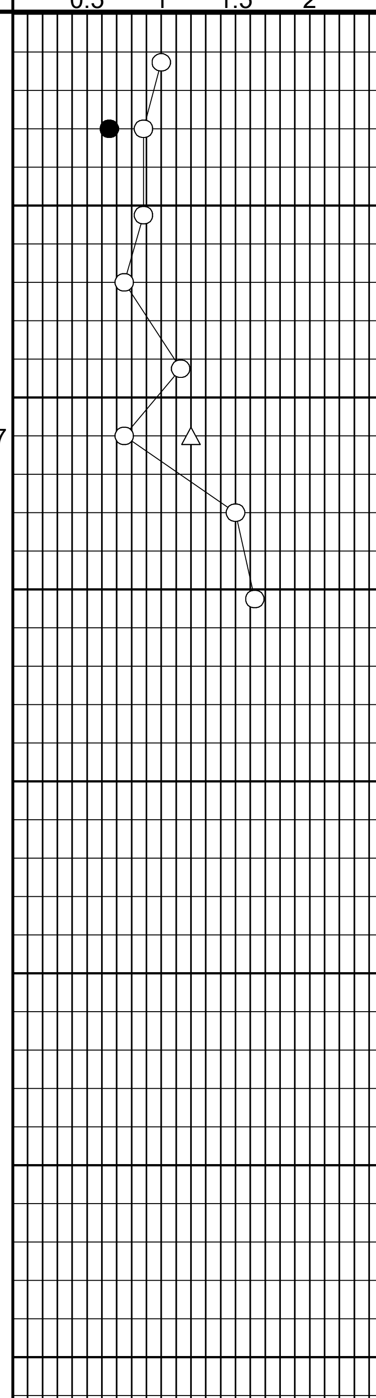
AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-7**

DATE **7/1/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188011.52
Northing: 13784336.88
Elevation: 24.86

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)



DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 6.5" concrete							
	Fill: stiff to very stiff, gray and dark gray Fat Clay with Sand (CH), with silty sand seams and ferrous nodules		17		71	74	21	53
			34	87.2				
	Firm to very stiff, dark gray Fat Clay with Sand (CH) -with ferrous nodules 2'-4' -gray 4'-6', with calcareous nodules 4'-8' -tan and gray 6'-10', with ferrous nodules 6'-8'							
5		8	31					
			34		85	80	23	57
		9	35					
10	Stiff to very stiff, brown and gray Lean Clay (CL), with ferrous stains -with calcareous nodules 12'-14'		23	104.7				
			21					
15	Stiff to very stiff, brown Fat Clay (CH), with calcareous nodules	11	20					
	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **JH**

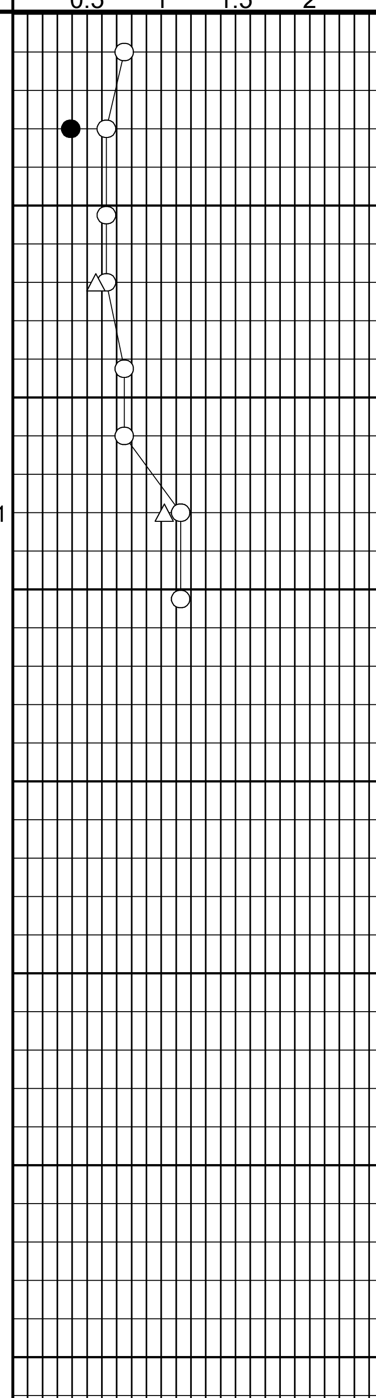
AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-8**

DATE **7/1/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188001.57
Northing: 13784585.23
Elevation: 23.67

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)



DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to very stiff, gray Fat Clay (CH), with slickensides -with roots 0'-2' and ferrous nodules 0'-10'		39					
			37	83.3				
5	-tan and gray 4'-12', with calcareous nodules 4'-10'	7	36		92	88	25	63
			35	90.4				
		10	33					
10					99	54	19	35
			29					
	-brown and gray 12'-16', with ferrous nodules 12'-14' and calcareous nodules 12'-16'		23	105.1				
15		11	24					
16	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING

WATER LEVEL AT **14** FEET AFTER **COMPLETE**

DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-9**

DATE **7/1/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

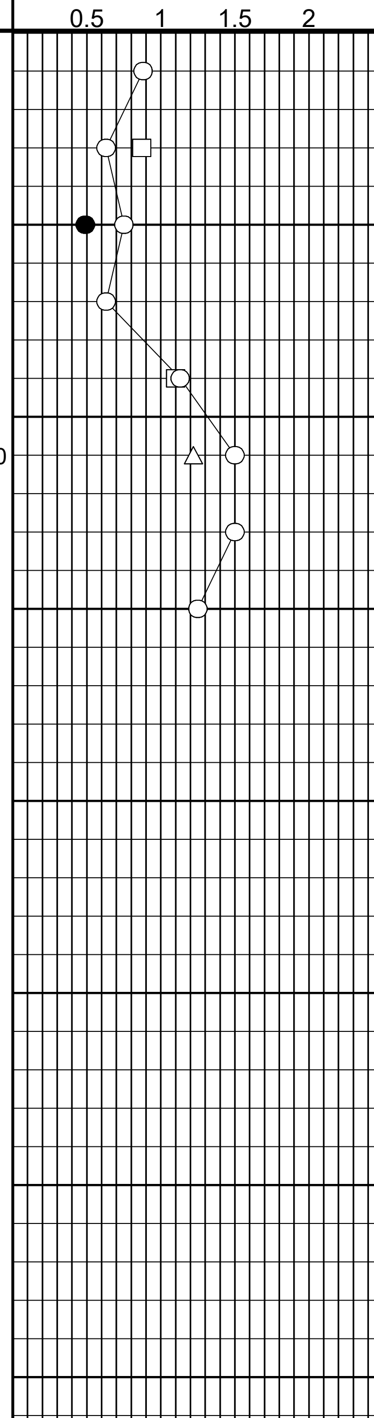
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188046.14
Northing: 13784766.46
Elevation: 23.64

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to very stiff, dark gray Fat Clay (CH), with slickensides -with roots 0'-2' -with ferrous nodules 2'-10'		29		86	69	21	48
			33					
5	-gray and tannish gray 4'-6'		31	90.2				
	-tan and gray 6'-12'		34					
			34		100	73	27	46
10			24	102.0				
	-tan 12'-14', with calcareous nodules and ferrous stains 12'-16'		23					
15	-brown and gray 14'-16'		22					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-11**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-10**

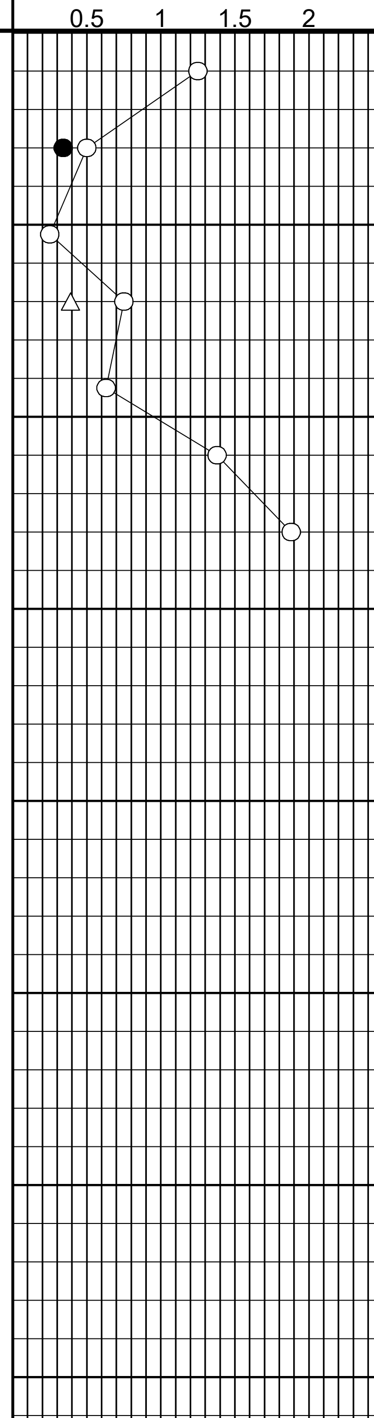
DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188178.70
Northing: 13784911.62
Elevation: 23.85

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Soft to very stiff, gray Fat Clay (CH)				95	87	22	65
					33					
			-with ferrous nodules 2'-8'		37	83.9				
5				2	43					
			-tan and gray 6'-8', with calcareous nodules 6'-10'		33	86.9				
			-brown and gray 8'-10'				98	79	25	54
				8	41					
10			Stiff to very stiff, tan and gray Lean Clay (CL) -with fat clay pockets 10'-12'		21					
			-brown and gray, with ferrous stains 12'-14' and calcareous nodules 12'-16'		22					
15			-light brown 14'-16'	10	24					
			Termination Depth = 16 feet *: groundwater is likely perched							
20										
25										
30										
35										



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **4*** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-11**

DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DEPTH IN FEET | SYMBOL | SAMPLE INTERVAL | DESCRIPTION | S.P.T. BLOWS / FT. | MOISTURE CONTENT, % | DRY DENSITY, PCF | SHEAR STRENGTH, TSF | -200 MESH | LIQUID LIMIT | PLASTIC LIMIT | PLASTICITY INDEX

DESCRIPTION

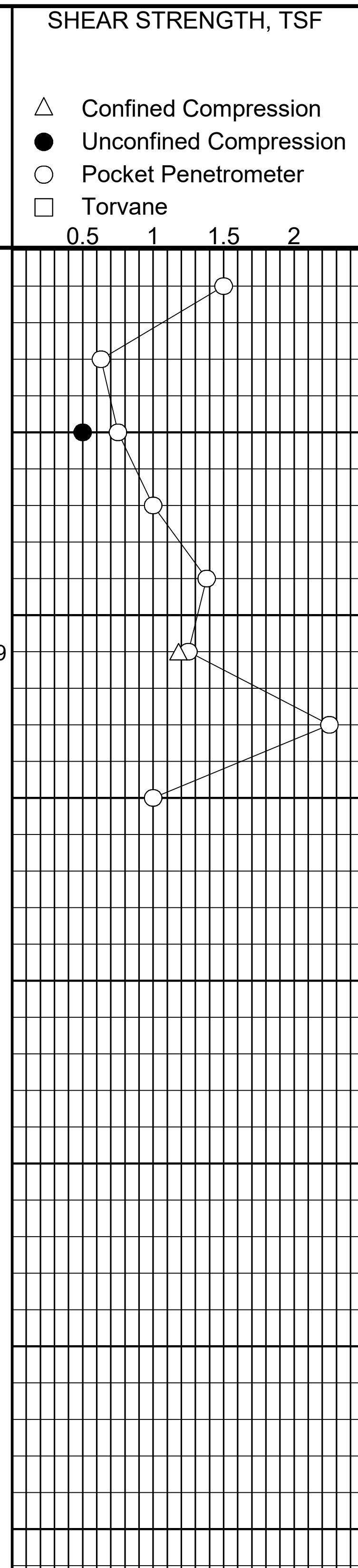
GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188312.01
Northing: 13785057.80
Elevation: 23.51

Firm to very stiff, dark gray Fat Clay (CH), with slickensides
-with roots 0'-2'
-gray 2'-4', with ferrous nodules 2'-6'
-grayish tan 4'-6', with calcareous nodules 4'-10'
-tan and light gray 6'-8'
-tan and gray 8'-10'

Stiff to hard, tan and gray Lean Clay (CL)
-reddish brown and gray, with fat clay pockets 12'-14'
-reddish tan and gray, with silty clay and silty sand seams, and calcareous nodules 14'-16'

Termination Depth = 16 feet

MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
35					
		94	90	24	66
40					
38	83.7				
34					
		96	73	24	49
26					
20	105.9				
		96	43	15	28
21					
22					



Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING
WATER LEVEL AT **10** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-13**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-12**

DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

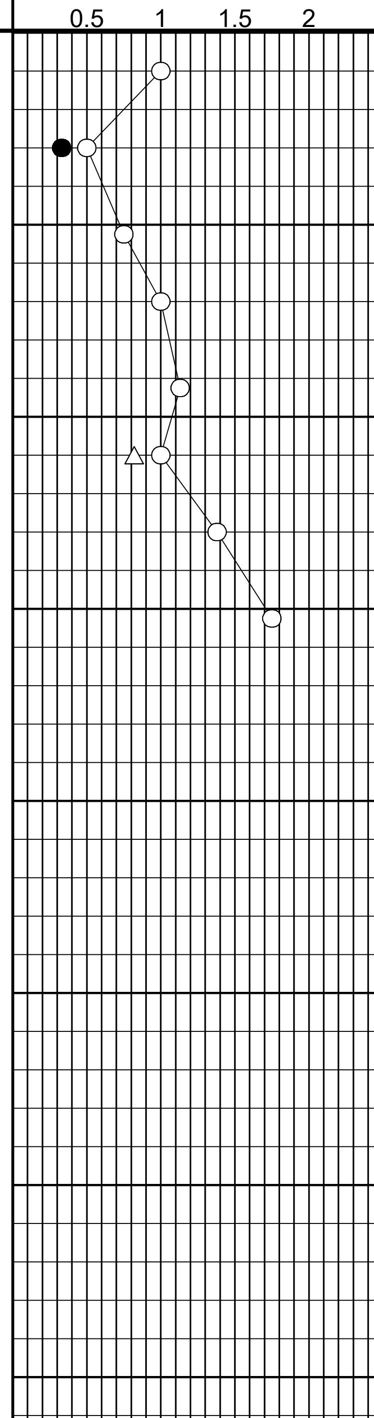
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188442.08
Northing: 13785200.94
Elevation: 24.02

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to very stiff, dark brown Fat Clay (CH), with slickensides -with roots 0'-2' -gray and dark gray 2'-6'		33		96	79	22	57
			37	83.8				
5	-with ferrous nodules 4'-10'	5	37					
	-tan and gray 6'-16', with calcareous nodules 6'-10'		33		95	73	21	52
		11	35					
10			30	93.8				
	-with ferrous nodules 12'-14' and calcareous nodules 12'-16'		25					
15		14	24					
16	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation**

BORING **B-13**

DATE **6/21/2021**

TYPE **4" Dry Auger**

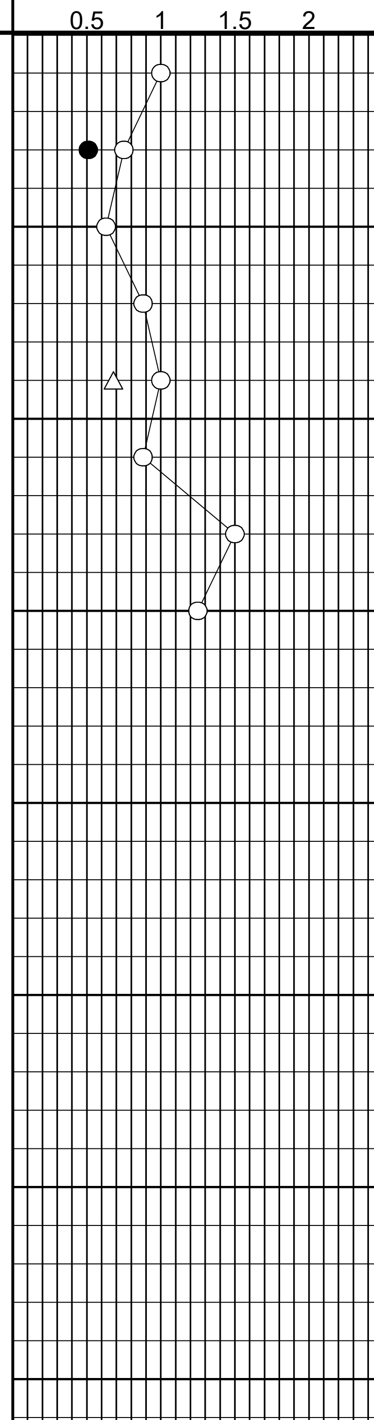
LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188580.17
Northing: 13785353.95
Elevation: 23.97

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to very stiff, dark brown Fat Clay (CH), with slickensides -with roots 0'-2' and ferrous nodules 0'-4'		28					
	-dark gray 2'-4'		28	93.4	95	70	18	52
	-gray 4'-6'		30					
5								
	-tan and gray 6'-14', with ferrous nodules 6'-12'		27					
			30	93.8				
10	-with calcareous nodules 10'-16'		23		93	55	17	38
			23					
	-tan 14'-16'		23					
15								
16	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-14**

DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188713.71
Northing: 13785502.17
Elevation: 24.50

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, dark brown Fat Clay with Sand (CH), with calcareous nodules and roots		22		85	63	21	42
	Firm to hard, gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-4'		35	86.2				
5	-tan and gray 4'-8'	6	32					
	-with calcareous and ferrous nodules 6'-8'		30	95.0				
	-reddish tan and gray 8'-10'	12	32		99	75	25	50
10	-tan and gray 10'-14', with ferrous stains and lean clay seams 10'-12'		21					
	-with calcareous nodules 12'-16'		22					
15	-brown 14'-16'	14	17					
	Termination Depth = 16 feet							

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-15**

DATE **7/1/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

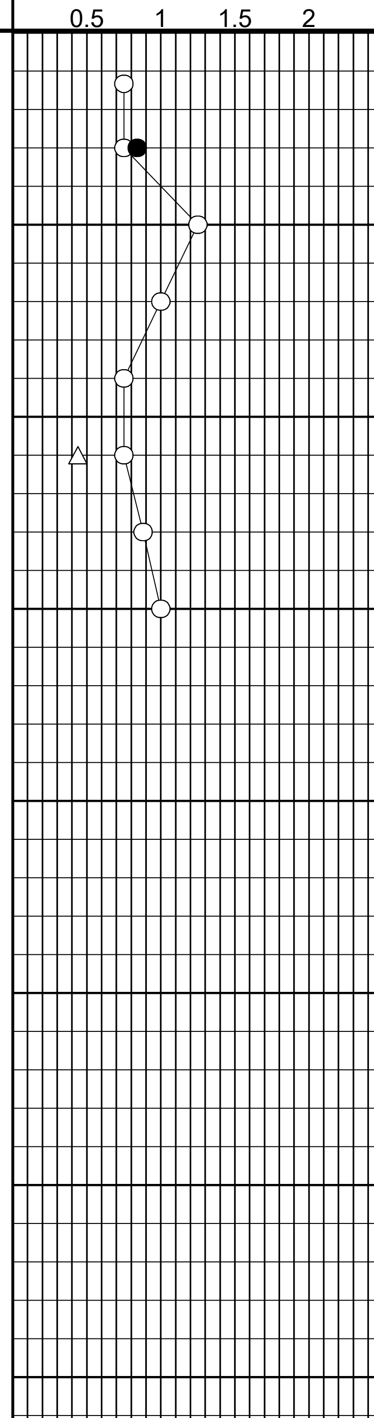
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188846.78
Northing: 13785649.47
Elevation: 26.53

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 6" concrete							
	Fill: stiff, gray and dark gray Lean Clay (CL), with sandy lean clay pockets		28		89	46	19	27
	Firm to very stiff, dark gray Fat Clay (CH), with slickensides		28	92.1				
5			28					
			30					
	-tan and gray 8'-10', with calcareous and ferrous nodules 8'-12'		30		93	68	20	48
10	-brown and dark gray 10'-12'		32	90.8				
	-tan and dark gray, with lean clay seams 12'-14'		31					
15	Stiff to very stiff, tan and gray Lean Clay (CL)		21					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-16**

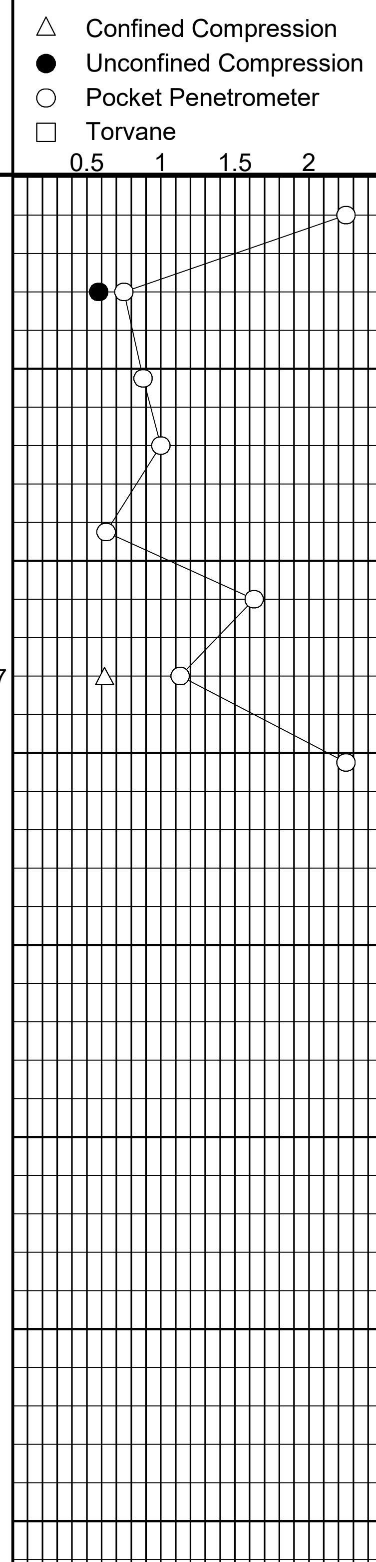
DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188978.40
Northing: 13785797.47
Elevation: 25.42

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Soft to hard, dark brown Fat Clay (CH) -with ferrous nodules and roots 0'-2'		18					
	-light tan and tan, with lean clay seams 2'-4' and calcareous nodules 2'-6'		25	99.6				
5	-gray and grayish tan, with ferrous nodules 4'-6'	4	27		86	50	17	33
	-reddish tan and light gray 6'-8'		33					
	-tan and gray 8'-10'	7	38					
10	Stiff to very stiff, tan and gray Lean Clay (CL) -with silty sand pockets and partings 10'-12'		23		98	49	18	31
	-tan, with calcareous nodules, ferrous stains, and fat clay pockets 12'-14'		24	102.7				
15	Hard, tan Silty Clay (CL-ML), with silt seams	12	11					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **4.2** FEET WHILE DRILLING
WATER LEVEL AT **6.3** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-17**

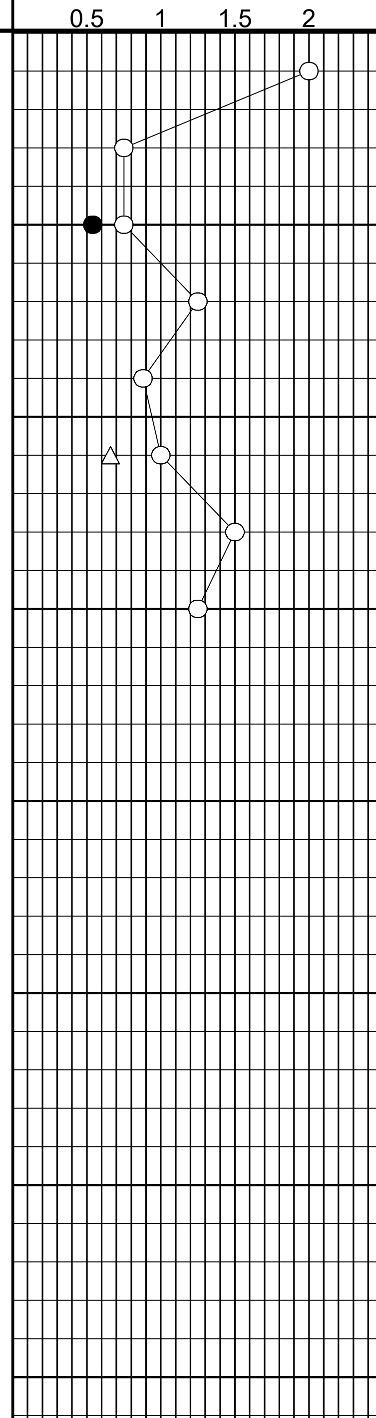
DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189107.23
Northing: 13785943.43
Elevation: 26.76

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to very stiff, brownish gray Fat Clay (CH), with calcareous nodules -with ferrous nodules and roots 0'-2'		27					
	-gray and dark gray 2'-4'		29		91	66	19	47
5	-tannish gray and gray 4'-6', with ferrous nodules 4'-10'		27	96.4				
	-tan and gray 6'-8'		22					
	-reddish tan and gray 8'-10'		32					
10	Stiff to very stiff, tan and gray Lean Clay (CL), with slickensides		23	98.7	100	46	17	29
	-red and gray, with fat clay pockets 12'-14'		24					
15			21					
16	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-18**

DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

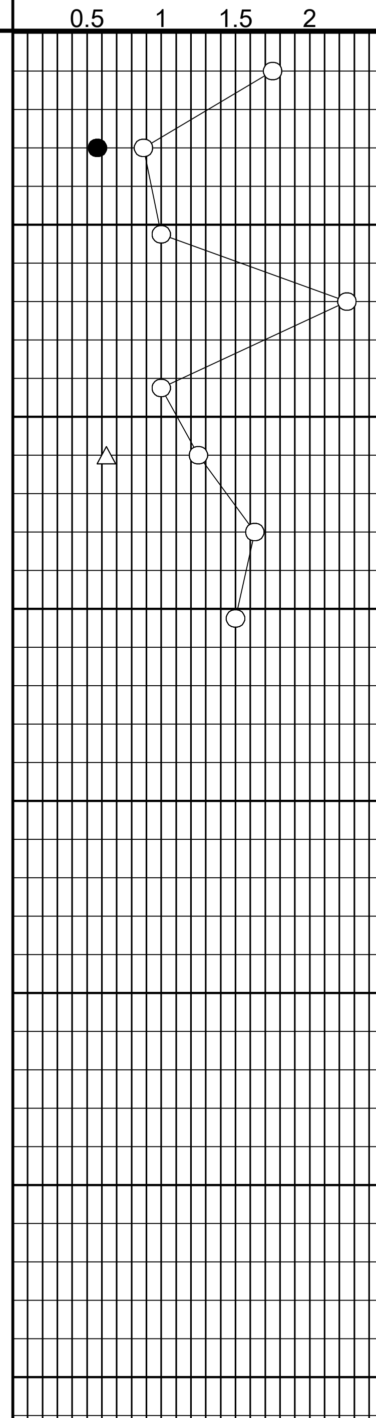
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189237.78
Northing: 13786090.78
Elevation: 27.16

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to hard, dark brown Fat Clay (CH), with slickensides -with roots 0'-2' -dark gray 2'-4'		23		93	55	18	37
			27	94.9				
5	-gray 4'-6', with ferrous nodules 4'-8'	7	27					
	-red and gray 6'-8', with calcareous nodules and pockets 6'-12'		20					
	-reddish brown and gray 8'-10'	11	30		97	63	20	43
10	-tan and gray 10'-16', with ferrous nodules 10'-12'		32	91.1				
			23					
15		9	22					
	Termination Depth = 16 feet							



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **15** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-19**

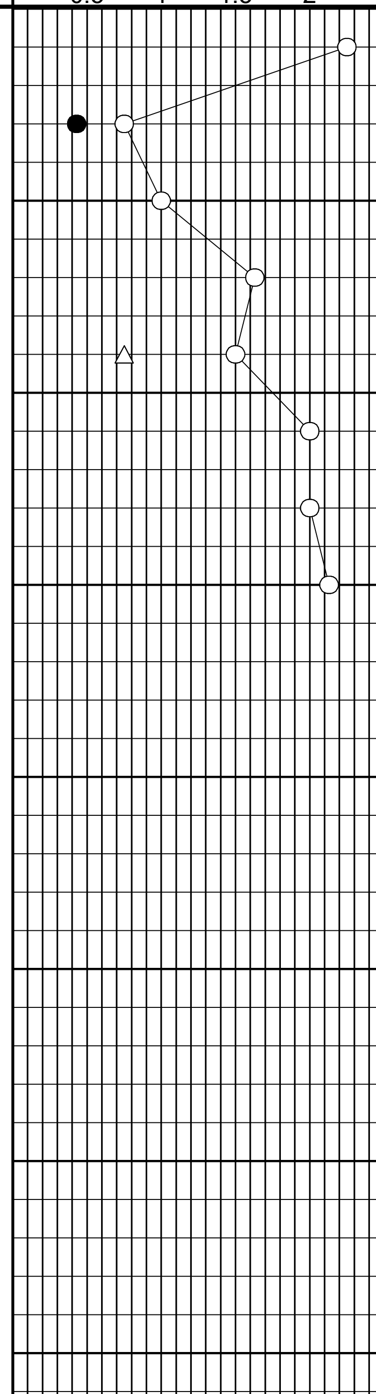
DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189368.77
Northing: 13786238.83
Elevation: 27.62

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to hard, dark brown Fat Clay with Sand (CH) -with roots 0'-2' -gray, with ferrous and calcareous nodules 2'-6'		19					
			26	95.6				
					82	54	16	38
5			22					
	Stiff to hard, tan and gray Fat Clay (CH), with slickensides -with ferrous nodules 6'-8', and calcareous nodules and pockets 6'-10' -reddish tan and gray 8'-10' -brown and gray 10'-12', with ferrous stains 10'-16' -reddish tan 12'-14', with calcareous nodules 12'-16' -brown 14'-16'		19					
			30	93.0				
10			24					
					95	55	19	36
			22					
15			21					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-21**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

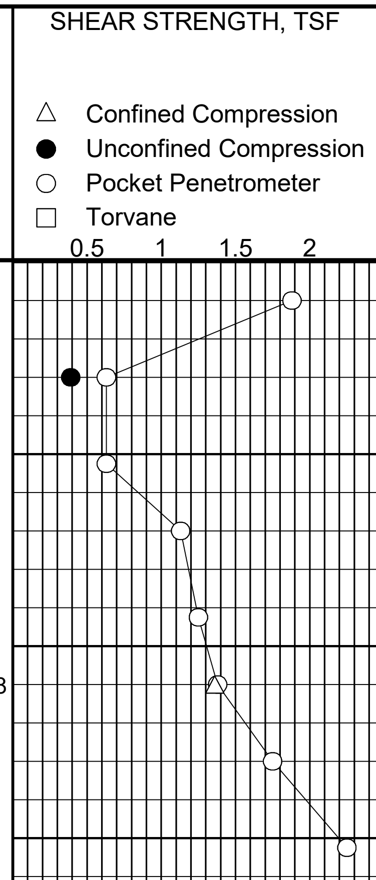
AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-20**

DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189495.76
Northing: 13786382.46
Elevation: 27.49

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to hard, dark gray Fat Clay (CH) -with roots 0'-2'		26					
	-gray 2'-6', with calcareous nodules 2'-10'		33	87.6				
5		6	29		86	68	19	49
	-reddish tan 6'-10', with ferrous stains 6'-8'		23					
		11	29					
10	-brown and gray 10'-16', with ferrous stains 10'-12'		24	103.8				
	-with calcareous nodules and pockets 12'-16'				100	51	20	31
			24					
15		15	20					
16	Termination Depth = 16 feet							



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-21**

DATE **8/2/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189626.79
Northing: 13786530.17
Elevation: 27.49

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Hard, dark brown Lean Clay (CL), with roots		22					
	Stiff, dark gray Fat Clay (CH)		29		88	61	17	44
5	-gray and dark gray, with ferrous nodules 4'-6'		27	97.3				
	Very stiff, gray and tan Fat Clay with Sand (CH), with lean clay seams, and calcareous and ferrous nodules		22		85			
	Very stiff, reddish tan and gray Fat Clay (CH), with slickensides and calcareous nodules		32					
10	Firm to very stiff, light gray and tan Lean Clay (CL), with fat clay seams and pockets -with sand pockets 10'-12'		30		90	36	15	21
	-with silty clay seams and calcareous nodules 12'-14'		22	102.3				
15	-tan and gray 14'-16'	25	26					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-22**

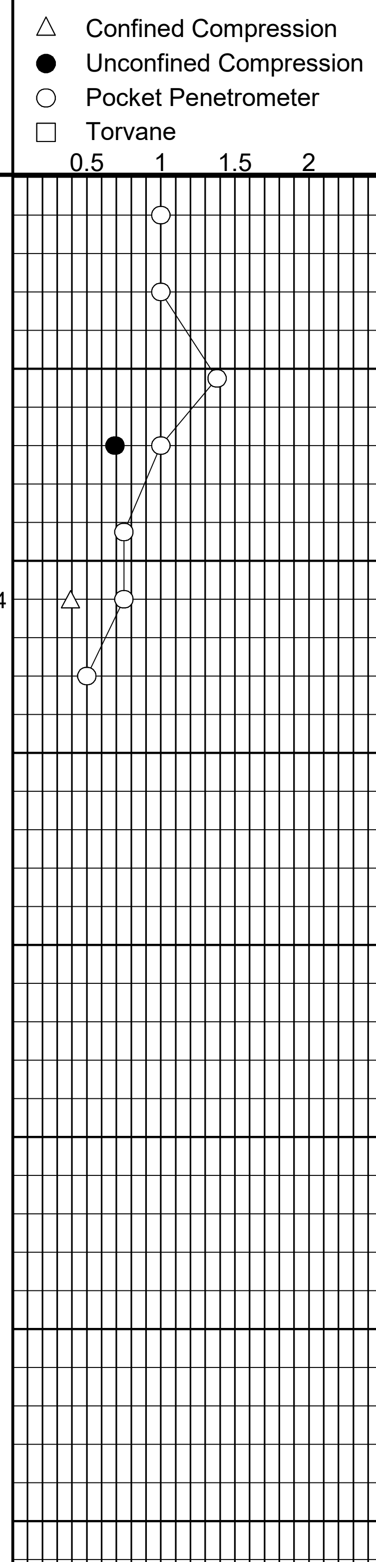
DATE **8/2/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189756.41
Northing: 13786676.70
Elevation: 27.61

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to very stiff, dark gray Fat Clay (CH) -with shell fragments 0'-2' and roots 0'-4'		22					
	-gray 2'-6'				91	65	18	47
			26					
5		9	25					
	-reddish tan and gray, with calcareous nodules and pockets 6'-8'		29	96.0				
	Firm to stiff, tan and gray Lean Clay (CL)	11	20					
10	-with fat clay seams 10'-12'				90	30	17	13
			22	104.4				
	Tan and gray Silt (ML), with sand pockets and lean clay seams, wet		22					
15	Medium dense, tan and gray Silty Clayey Sand (SC-SM), with lean clay pockets and calcareous nodules, wet	11	23					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT 10 FEET WHILE DRILLING
WATER LEVEL AT 7.9 FEET AFTER 15 MINS
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

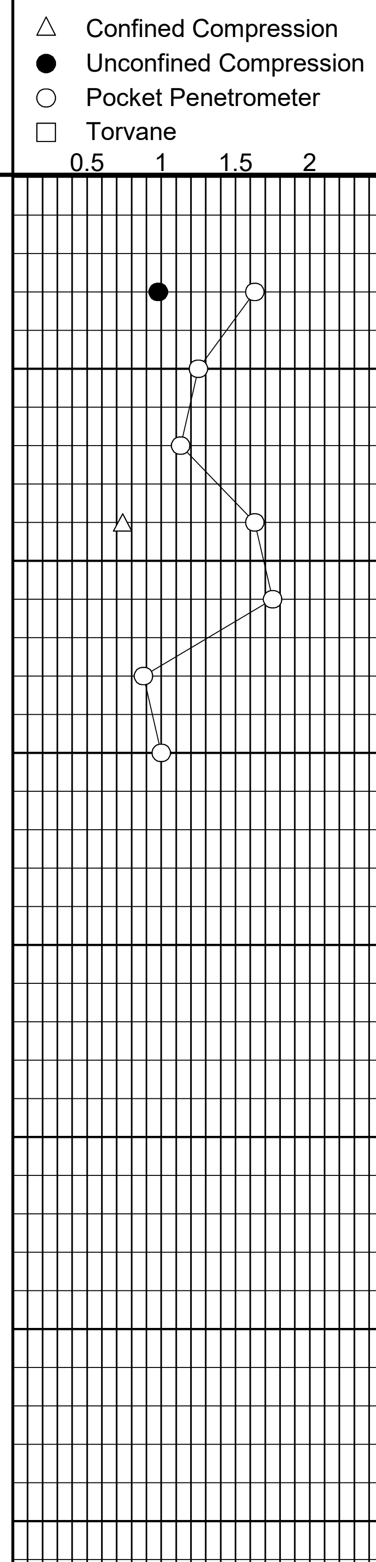
BORING **B-23**

DATE **8/2/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189888.87
Northing: 13786826.68
Elevation: 28.40

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Base:12" stabilized sand with shells		6					
1	<no recovery 1'-2'> Stiff to very stiff, dark gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-8' -gray 4'-6'		26	99.2	90	62	18	44
5			24					
	-tan and gray 6'-8', with calcareous nodules 6'-10'		23					
	-reddish tan and gray 8'-10'		33	94.3				
10	Stiff to very stiff, tan and gray Lean Clay (CL) -with fat clay seams 10'-12'		20		90	33	14	19
	-with silty clay seams and ferrous stains 12'-14'		23					
15	Stiff to very stiff, reddish tan and gray Silty Clay (CL-ML), with sandy lean clay pockets		21					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING ▽
WATER LEVEL AT **7.1** FEET AFTER **15 MINS** ▼
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-24**

DATE **8/2/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190019.68
Northing: 13786974.37
Elevation: 27.73

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to very stiff, gray and dark brown Fat Clay (CH), with slickensides		23	95.9				
	-with sandy lean clay seams and roots 0'-2'							
	-gray 2'-4', with ferrous nodules 2'-8'		21		88	55	15	40
5	-tan 4'-6', with calcareous nodules 4'-14'	7	24					
	-reddish brown and gray, with calcareous pockets 6'-8'		26	99.5				
	-reddish tan and gray 8'-10'	10	26					
10	-tan and gray 10'-14', with calcareous pockets 10'-12'		27		97	61	20	41
	-with lean clay with sand seams 12'-14'		27					
15	Medium dense, reddish tan Silt (ML), with silty clay seams, wet	11	23					
	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **15** FEET WHILE DRILLING

WATER LEVEL AT **7.7** FEET AFTER **15 MINS**

DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-25**

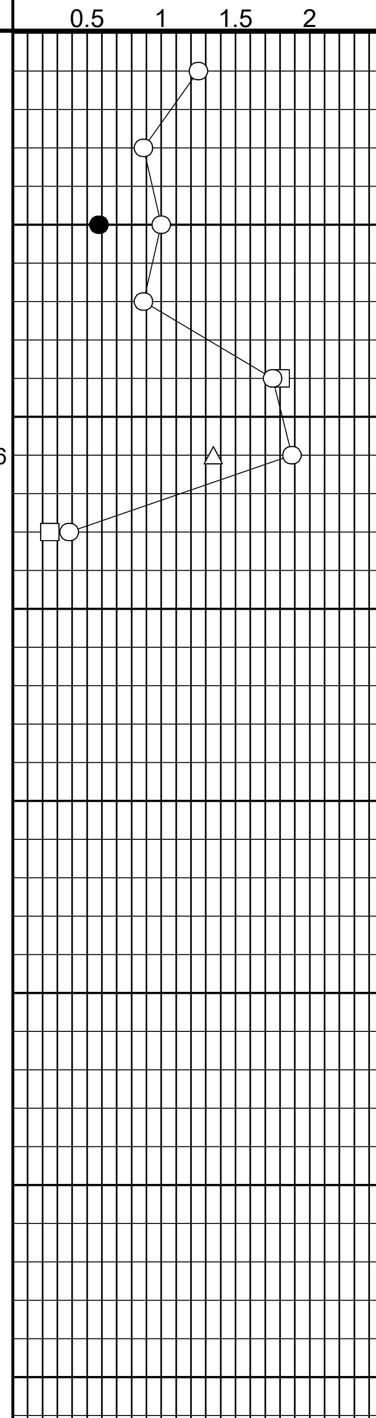
DATE **8/2/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190150.63
Northing: 13787123.06
Elevation: 27.80

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to very stiff, gray Fat Clay with Sand (CH) -with clayey sand seams and roots 0'-2'		27					
	-dark gray 2'-4'				83	54	15	39
			24					
5	-tannish gray and dark gray, with calcareous nodules 4'-6' and ferrous nodules 4'-8'		27	97.1				
	-tan and gray 6'-8' -groundwater measured at 6.6 ft approximately 15 mins afetr initial encounter		25					
	-reddish tan and gray, with calcareous nodules and pockets 8'-10'		24					
10	Very stiff, reddish tan and gray Lean Clay (CL), with calcareous nodules		20	110.6	93	29	18	11
	Tan Silt (ML), with sand pockets, wet		21					
15			21					
	Termination Depth = 16 feet							



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING
WATER LEVEL AT **6.6** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: EFD Taxiway L Geotechnical Investigation

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING B-26

DATE 8/2/2021 **TYPE** 4" Dry Auger **LOCATION** See Boring Location Plan

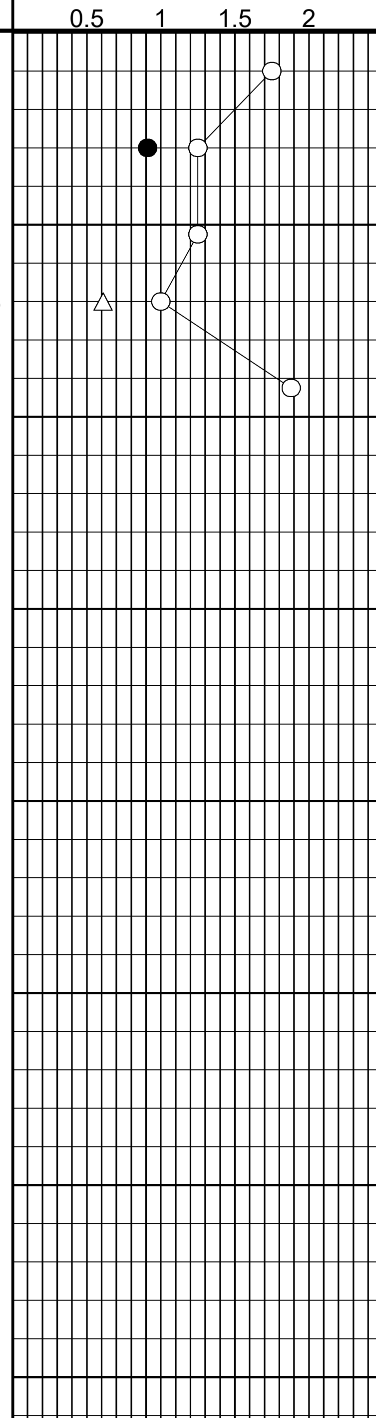
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190283.37
Northing: 13787273.58
Elevation: 27.76

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to very stiff, dark brown Fat Clay (CH), with slickensides -with lean clay pockets and roots 0'-2' -dark gray 2'-4', with ferrous nodules 2'-6'		24					
			25	99.6				
5	-gray 4'-6'	8	24		87	58	16	42
	-reddish tan and gray, with calcareous nodules and pockets 6'-8'		31	92.5				
	Stiff to very stiff, tan and gray Lean Clay (CL)	16	16					
10	Loose, tan Silt with Sand (ML), wet		23		81	23	20	3
	-reddish tan 12'-14'		24					
15		8	27					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT 14 FEET WHILE DRILLING
WATER LEVEL AT 7.9 FEET AFTER 15 MINS
DRILLED BY JH Drilling DRAFTED BY YY/MRH LOGGED BY DN

PROJECT: EFD Taxiway L Geotechnical Investigation

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING B-27

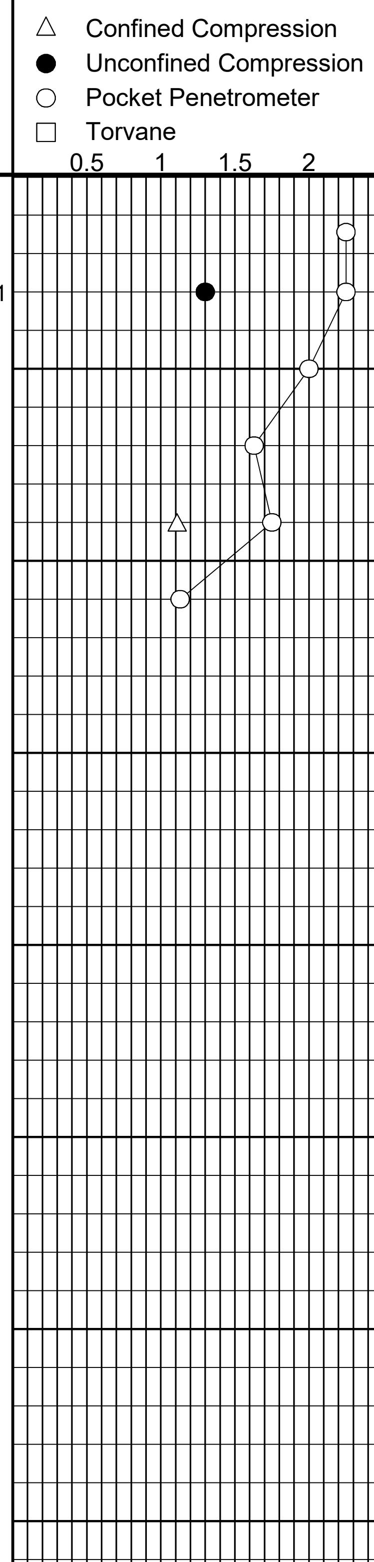
DATE 7/1/2021 **TYPE** 4" Dry Auger **LOCATION** See Boring Location Plan

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190347.65
Northing: 13787345.15
Elevation: 28.98

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 2.5" asphalt							
	Pavement: 8.25" concrete		18		85	48	16	32
	Fill: hard, brown and black Lean Clay with Sand (CL), with gravel		22	104.1				
5	Very stiff to hard, dark brown and black Fat Clay (CH), with slickensides -dark brown 4'-6'		21					
	-gray and dark gray, with ferrous nodules 6'-8'		23		86	60	17	43
	-reddish tan and gray, with calcareous nodules and pockets 8'-10'		28	99.4				
10	Very stiff, tan and reddish tan Lean Clay (CL), with clayey sand seams and pockets		21					
	-tan 12'-14', wet at 12'		23		88	29	19	10
15	Tan Silt (ML), wet		24					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT 14 FEET WHILE DRILLING
WATER LEVEL AT 11 FEET AFTER COMPLETE
DRILLED BY JH Drilling DRAFTED BY YY/MRH LOGGED BY DN

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-28**

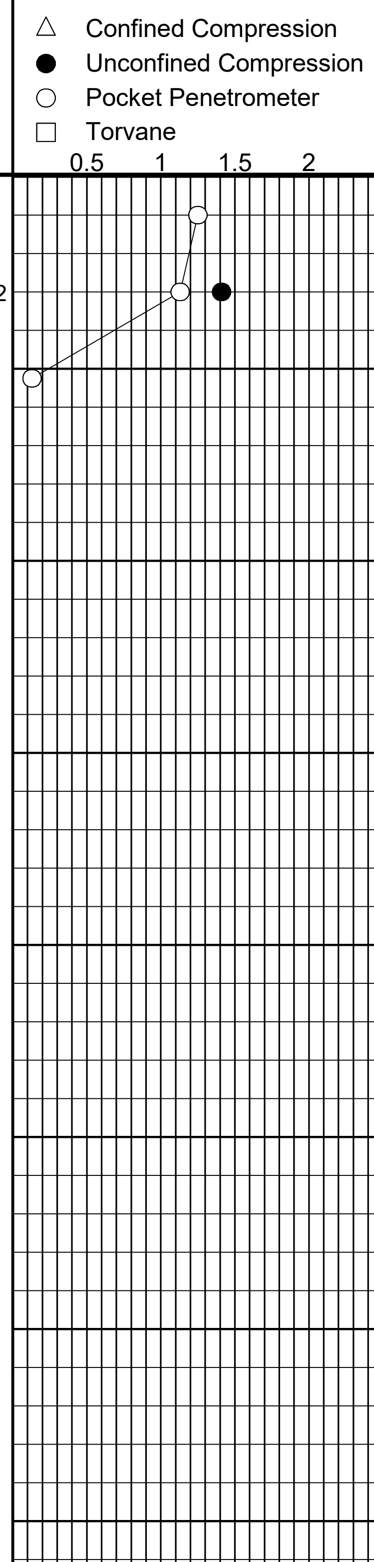
DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190587.56
Northing: 137876613.52
Elevation: 25.94

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, brown and dark gray Fat Clay (CH)		22			58	19	39
	Soft to very stiff, tan and gray Lean Clay (CL), with sand partings -with ferrous nodules 2'-4'		18	109.2				
5		7	22					
	Medium dense, tan and gray Silty Sand (SM), wet -with clayey sand seams 6'-8'		21		13	NP	NP	NP
		14	20					
10	Loose to medium dense, light tan and gray Poorly Graded Sand with Silt (SP-SM), wet -with clayey sand seams 10'-12'		21					
	-grayish tan 12'-14'	17	21		11			
15	-tan, with fat clay seams 14'-16'	9	21					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING

WATER LEVEL AT **4** FEET AFTER **COMPLETE**

DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-29**

DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

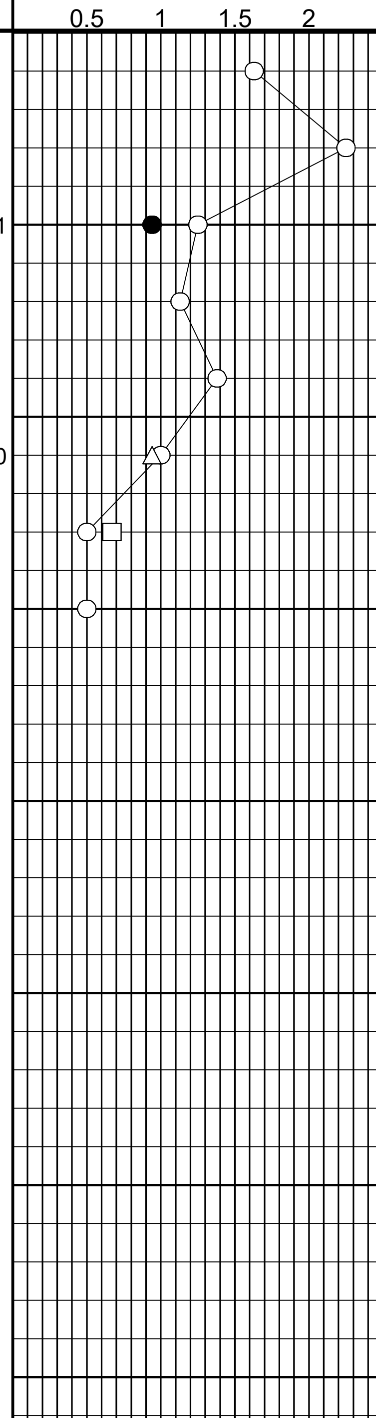
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190722.18
Northing: 13787763.75
Elevation: 26.82

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, gray and dark brown Fat Clay (CH), with lean clay and silty sand pockets		20					
	Hard, tan and gray Lean Clay with Sand (CL), with ferrous nodules		18		75	41	14	27
5	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides and calcareous nodules -with lean clay seams 4'-6'		27	103.1				
	-reddish brown, with sandy lean clay partings 6'-8'		30					
	Firm to very stiff, tan and gray Lean Clay (CL) -with ferrous nodules 8'-12'		20		95	37	15	22
10	-tan 10'-12'		21	107.0				
	-with silty clay seams 12'-14'		24					
15	Firm to stiff, tan Silty Clay (CL-ML), with calcareous nodules		26					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING
WATER LEVEL AT **7** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-31**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

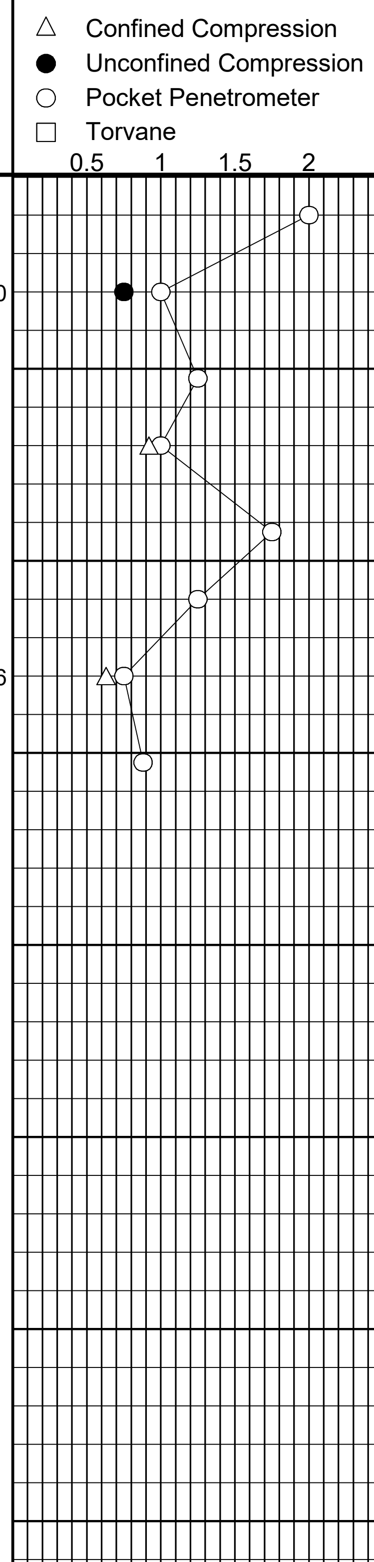
PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-30**

DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190855.46
Northing: 13787912.42
Elevation: 28.36

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, dark brown Lean Clay (CL), with sand partings		16					
	Stiff to very stiff, dark gray Fat Clay with Sand (CH), with slickensides -with ferrous nodules 2'-6'		23	102.0				
5	-tan and dark gray 4'-6', with calcareous nodules 4'-8'	12	22		79	53	16	37
	-reddish tan 6'-8'		33	94.0				
	-brown and gray 8'-10'	13	26					
10	Stiff to very stiff, brown Lean Clay (CL) -with calcareous nodules 10'-12'		21		96	33	16	17
	-with ferrous nodules 12'-14'		22	105.6				
15	-tan and gray, with fat clay pockets and calcareous nodules 14'-16'	13	22					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING
WATER LEVEL AT **11** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

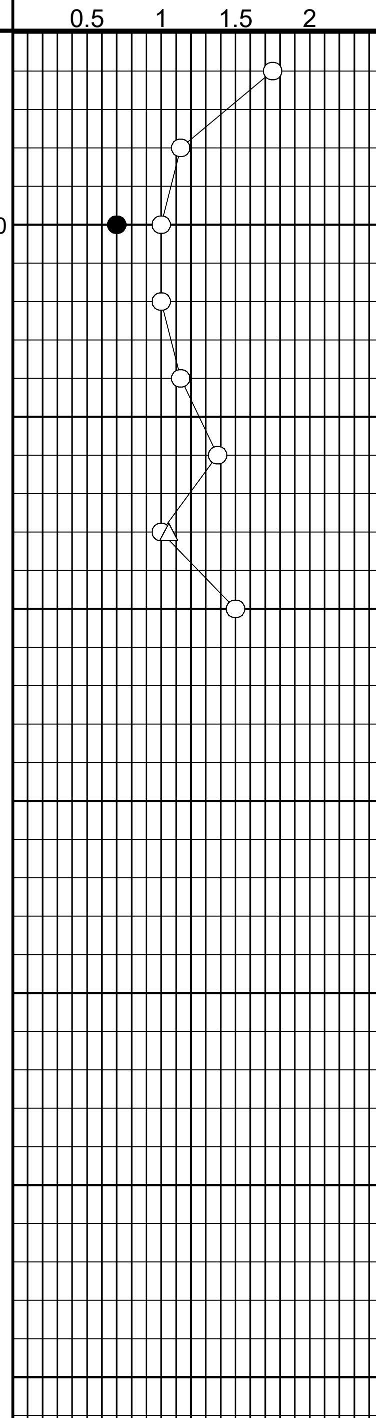
PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-31**

DATE **6/21/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190990.08
Northing: 13788062.33
Elevation: 28.64

Shear strength legend: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, dark brown Lean Clay with Sand (CL), with roots		20			83	40	17	23
	Stiff to very stiff, dark brown Fat Clay (CH), with slickensides -with ferrous nodules 2'-8'		24						
5	-gray and dark gray 4'-6'		24	100.0					
	-tan and reddish tan, with lean clay seams 6'-8'		23						
	-reddish tan 8'-10', with calcareous nodules 8'-14'		27			90	62	24	38
10	-tan 10'-14'		31						
			26	99.6					
15	Very stiff, reddish tan Lean Clay (CL)		23						
	Termination Depth = 16 feet								



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-32**

DATE **8/2/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

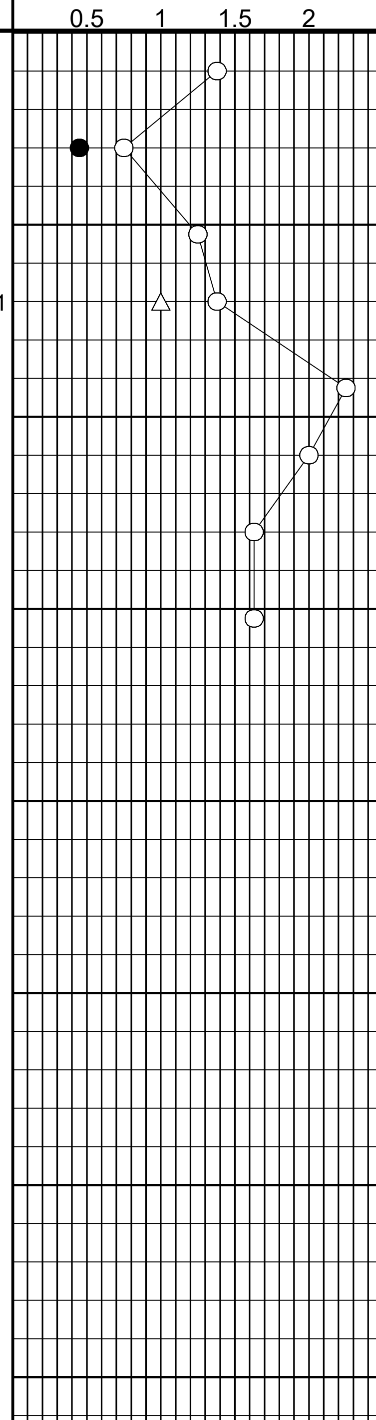
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191126.90
Northing: 13788214.86
Elevation: 28.58

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to hard, dark brown Fat Clay (CH), with slickensides		26		88	54	19	35
	-with roots 0'-2'							
	-dark gray 2'-6'		27	95.0				
5	-with calcareous nodules 4'-16'	7	29					
	-reddish tan and gray 6'-8'		26	102.1				
	-brown, with calcareous pockets 8'-10'	16	19		99	59	22	37
10	-brown and gray 10'-12'		29					
	-tan and gray 12'-14'		28					
15	-brown and gray 14'-16'	19	33					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **DN**

PROJECT: EFD Taxiway L Geotechnical Investigation

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING B-33

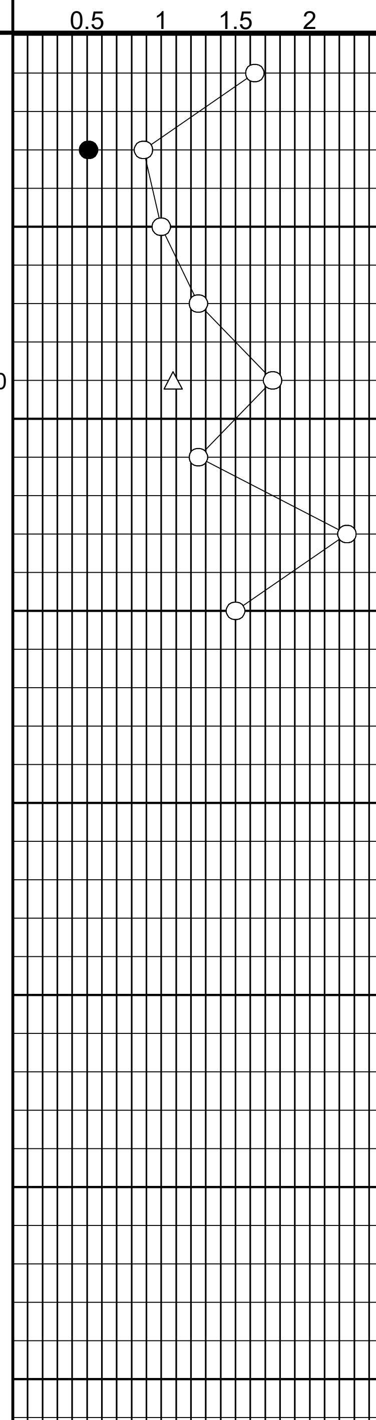
DATE 8/2/2021 **TYPE** 4" Dry Auger **LOCATION** See Boring Location Plan

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191256.90
Northing: 13788359.82
Elevation: 28.56

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, dark brownish gray Fat Clay (CH), with gravel, ferrous nodules, and roots		27					
	Stiff to very stiff, gray and dark gray Fat Clay with Sand (CH), with ferrous and calcareous nodules		29	94.8	85	63	18	45
5	-gray 4'-6'		24					
	-gray and tan 6'-8'		23					
	Very stiff to hard, tan and gray Fat Clay (CH), with slickensides and calcareous nodules		26	100.0				
10			30		98	65	24	41
	-tan, with calcareous pockets 12'-14'		26					
15	-tan and reddish tan 14'-16'		24					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT N/A FEET WHILE DRILLING
WATER LEVEL AT N/A FEET AFTER COMPLETE
DRILLED BY JH Drilling DRAFTED BY MRH LOGGED BY DN

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-34**

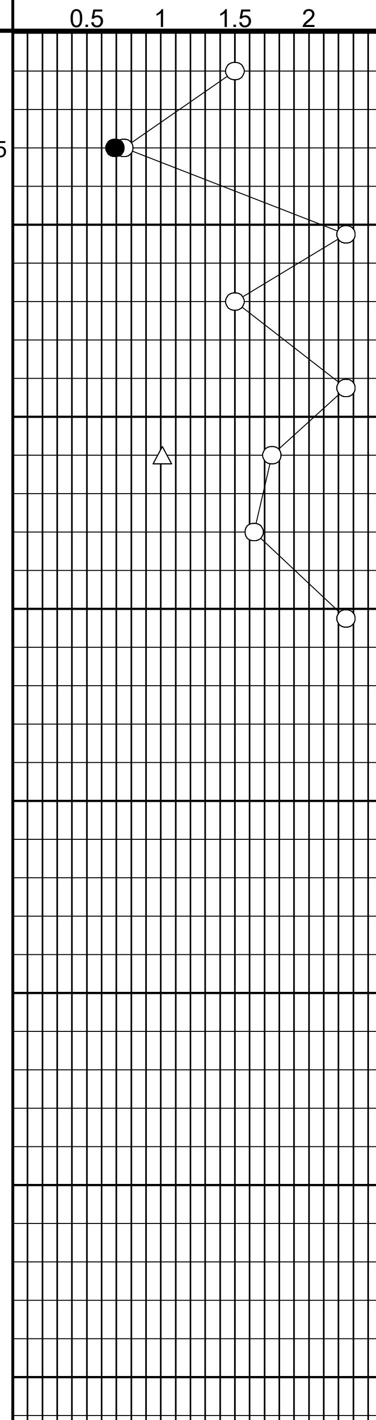
DATE **6/15/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191389.97
Northing: 13788508.18
Elevation: 28.52

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to hard, dark brown Lean Clay with Sand (CL)		22		81	46	19	27
	-with roots 0'-2'							
	-tan and tannish gray 2'-4', with ferrous nodules 2'-6'		23	100.5				
5	-brown and gray, with calcareous nodules 4'-6'	16	16					
	Stiff to hard, reddish tan Fat Clay (CH), with slickensides		26					
	-with calcareous pockets 6'-8' and nodules 6'-12'							
	-brown, with ferrous stains 8'-10'	20	24		99	59	21	38
10	-brown and gray 10'-12'		29	96.0				
	-tan and gray, with ferrous stains 12'-14'		31					
15	-with calcareous nodules 14'-16'	16	30					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**

DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-36**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-35**

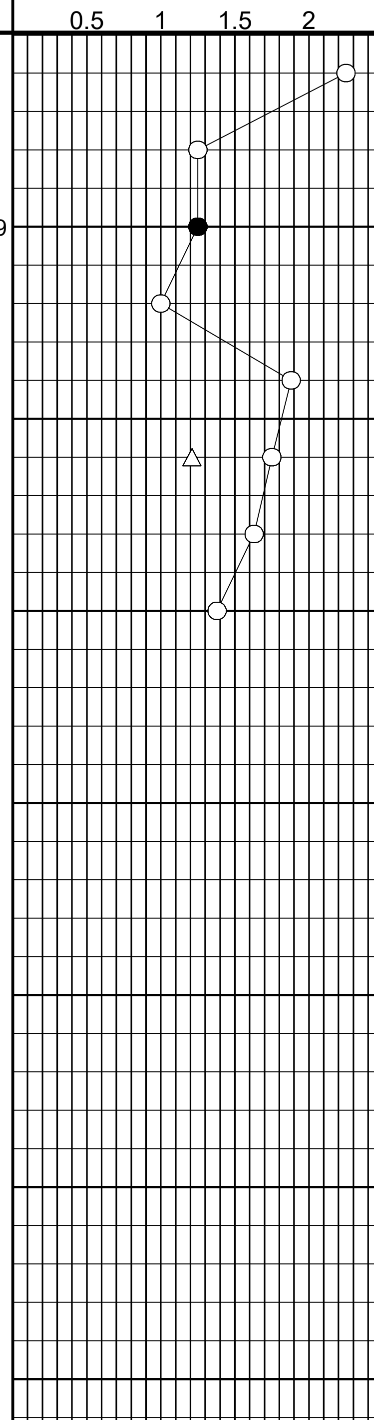
DATE **6/15/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191523.83
Northing: 13788656.52
Elevation: 28.58

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Hard, dark brown Lean Clay (CL), with sand partings and roots		16					
	Very stiff, tannish gray and gray Fat Clay (CH), with ferrous nodules		24		88	59	18	41
5	-tan and gray, with abundant calcareous nodules 4'-6'		16	115.9				
	Stiff to very stiff, tan and reddish tan Lean Clay (CL), with fat clay pockets and calcareous nodules -with ferrous nodules 6'-8'		26					
	-brown, with calcareous pockets 8'-10'		22		89	49	20	29
10	Very stiff, brown and gray Fat Clay (CH), with slickensides -with calcareous nodules 10'-12'		26	99.8				
	-tan and gray, with ferrous nodules 12'-14'		30					
15	-tan, with silty sand seams 14'-16'		32					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-36**

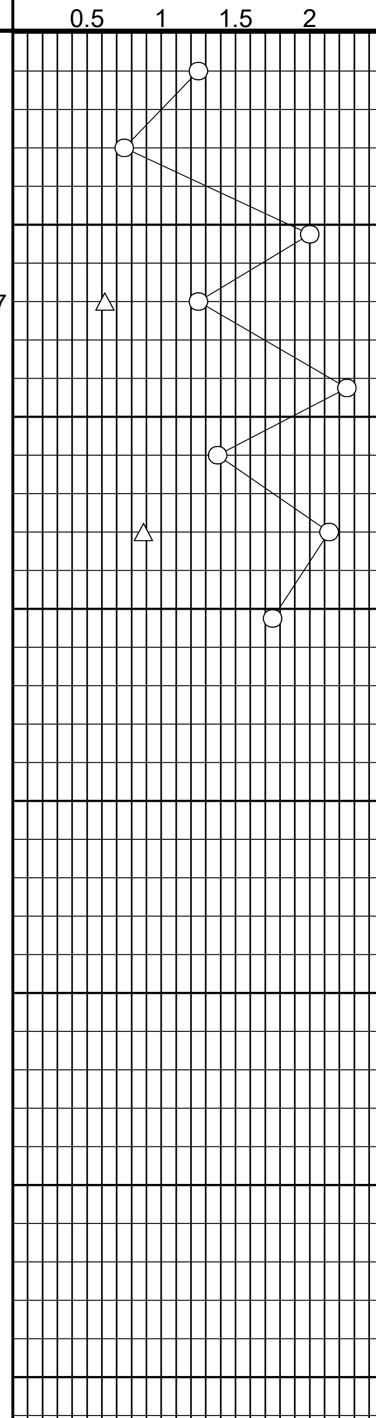
DATE **6/15/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191657.43
Northing: 13788805.19
Elevation: 28.03

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, dark brown Lean Clay with Sand (CL)		20		80	38	16	22
	Firm to hard, dark gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-6'		25					
5	-gray and grayish tan 4'-6', with calcareous nodules 4'-14'	8	19					
	-tan and gray 6'-8'		22	104.7				
	-brown, with calcareous pockets 8'-10'	18	23		97	59	22	37
10	-reddish tan 10'-12'		29					
	-tan and gray, with calcareous pockets 12'-14'		28	99.0				
15	-tan, with ferrous stains 14'-16'	18	30					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21

PROJECT: **EFD Taxiway L Geotechnical Investigation**

ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

BORING **B-37**

DATE **6/15/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

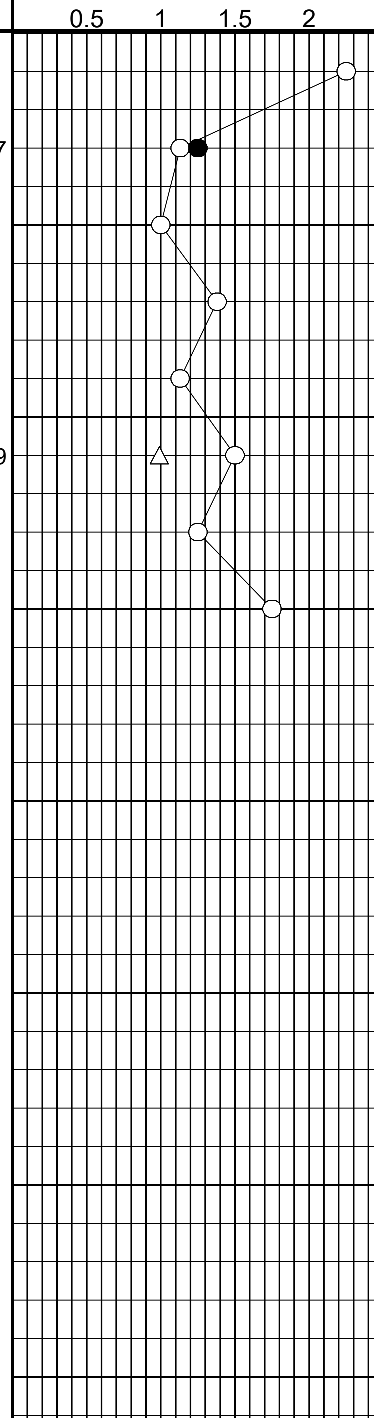
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191791.89
Northing: 13788954.42
Elevation: 28.03

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Hard, brown Fat Clay (CH), with calcareous nodules		20					
	Very stiff, dark gray Lean Clay (CL)		20	105.7				
5	Stiff to very stiff, gray and light gray Fat Clay with Sand (CH), with calcareous nodules -with lean clay seams 4'-6' -tan and gray, with ferrous nodules 6'-8'		22 20		82	58	19	39
10 15	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides, and calcareous nodules and pockets -reddish tan and gray 10'-12' -tan 14'-16'		25 24 31 28	 100.9	100	65	24	41
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-39**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

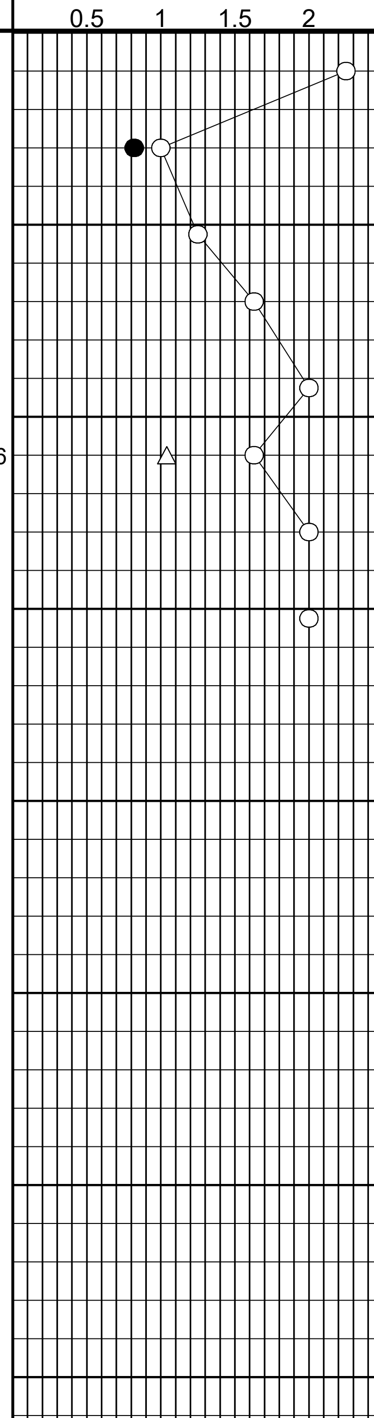
BORING **B-38**

DATE **6/15/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191927.79
Northing: 13789103.10
Elevation: 28.23

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, brown and reddish tan Lean Clay (CL), with fat clay seams, sand partings, and calcareous nodules		18		96	47	18	29
	Stiff to very stiff, dark gray Fat Clay (CH), with slickensides		29	91.4				
5	-with ferrous nodules 4'-8'	10	23					
	-tan and gray 6'-8', with calcareous nodules 6'-16'		20					
	-tan and dark gray 8'-10'	21	19		89	59	22	37
10	-reddish tan, with calcareous pockets 10'-12'		22	102.6				
	-red 12'-14'		30					
15	-brown and gray 14'-16'	22	26					
	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-39**

DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

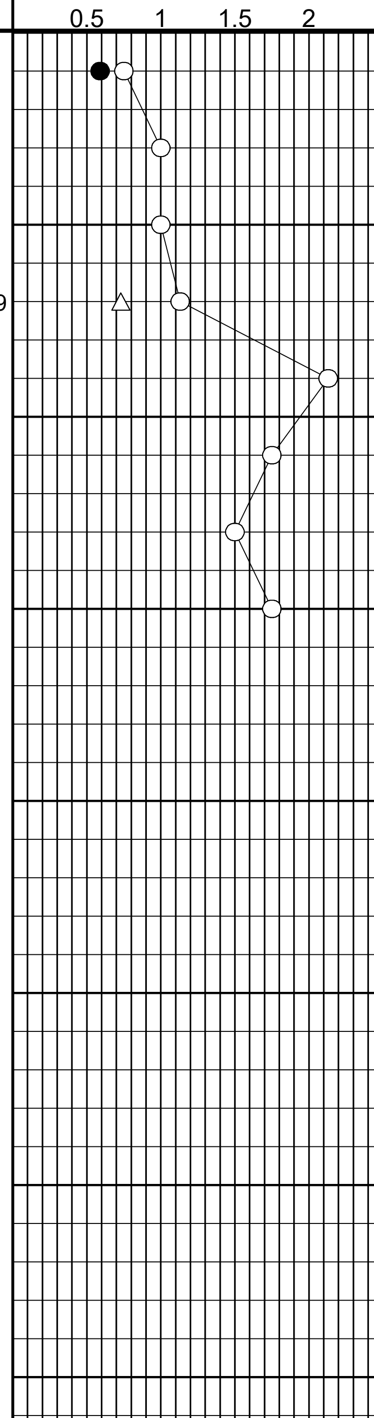
GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192064.15
Northing: 13789250.49
Elevation: 27.96

Depth (ft)	Description
0–2	Fill: stiff, dark brown and tan Fat Clay (CH), with slickensides and lean clay seams
2–4	Stiff to very stiff, dark brown Lean Clay (CL)
4–16	Stiff to hard, gray and dark gray Fat Clay (CH), with slickensides -with ferrous nodules 4'-10' and calcareous nodules 4'-12' -light gray and tan 6'-8' -tan and gray 8'-10' -reddish tan and gray 10'-14' -reddish tan 14'-16'
16	Termination Depth = 16 feet

Depth (ft)	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
1		27	97.7				
2.5				89	49	16	33
3		21					
5		24					
7		21	103.9				
9		18					
10.5				99	57	21	36
11		24					
13		26					
15		29					

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

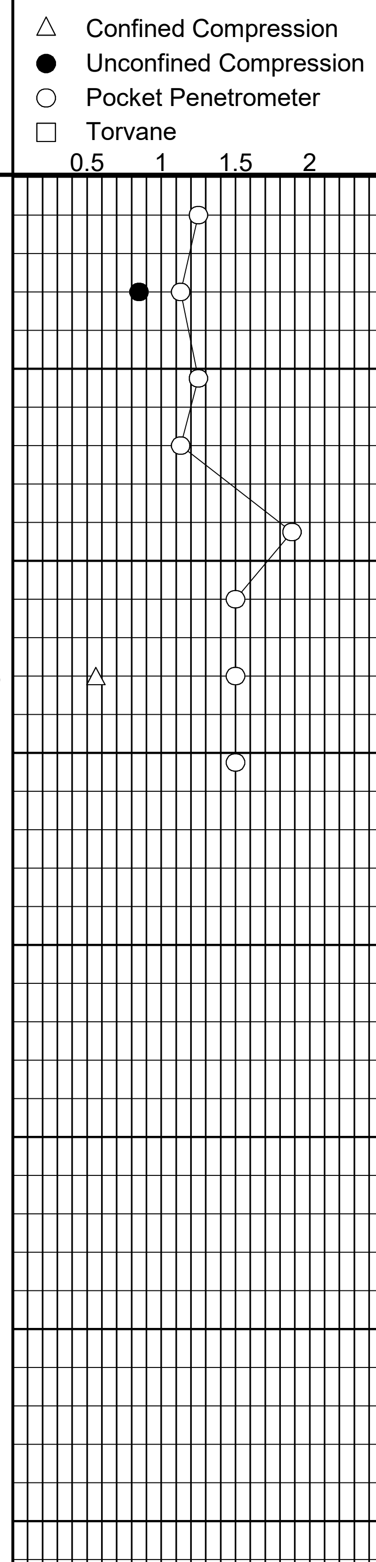
BORING **B-40**

DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192199.30
Northing: 13789396.53
Elevation: 27.42

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, dark gray and tan Fat Clay with Sand (CH), with lean clay seams and roots		22		85	52	17	35
	Stiff to very stiff, gray and dark gray Fat Clay (CH) -with ferrous nodules 2'-4'		24	98.6				
5	-dark gray 4'-6'	9	22					
	-gray and tan, with calcareous and ferrous nodules 6'-8'		16					
	Very stiff, tan and gray Lean Clay with Sand (CL), with calcareous nodules and pockets	17	17		77	43	17	26
10	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides -with calcareous nodules 10'-12'		25					
	-tan and light gray 12'-14'		28	95.5				
15		14	26					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**

DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

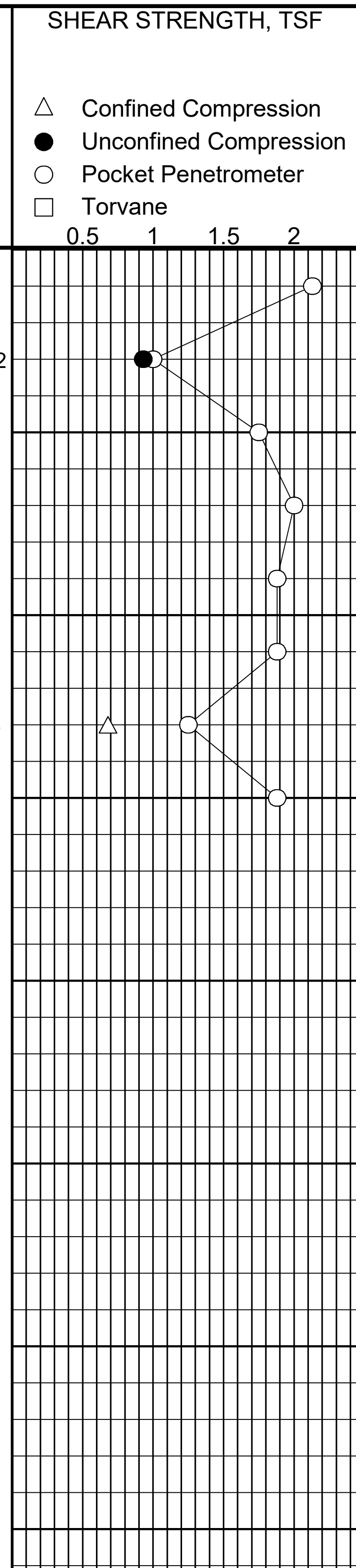
PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-41**

DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192338.75
Northing: 13789546.63
Elevation: 25.39

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, dark gray and brown Fat Clay (CH), with calcareous nodules and roots		25		89	65	22	43
	Stiff to very stiff, light tannish gray Lean Clay with Sand (CL), with abundant calcareous nodules		24	106.2				
5	-tan and gray 4'-6', with ferrous stains 4'-8'		21					
	-tan 6'-8'		16		75	42	16	26
	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides		24					
10	-with calcareous nodules 8'-10' -reddish tan 10'-14'		24					
	-with ferrous nodules 12'-14'		32	90.5				
15	-tan 14'-16'		30		100	72	27	45
	Termination Depth = 16 feet							
20								
25								
30								
35								



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY** LOGGED BY **BJ**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-42**

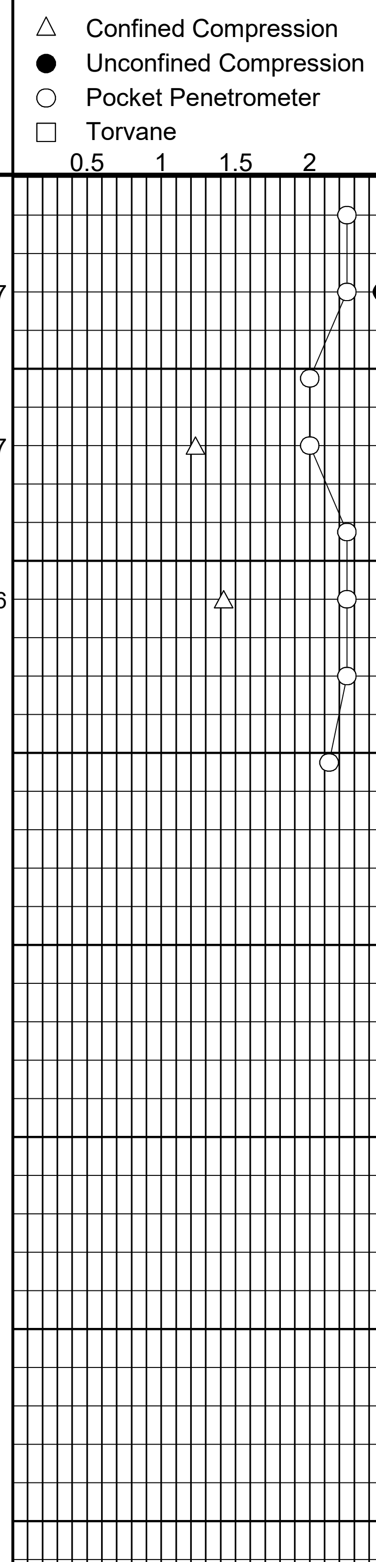
DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192474.48
Northing: 13789691.68
Elevation: 26.34

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, brown Lean Clay (CL) -with silt pockets and roots 0'-2'		13		95	34	16	18
	-dark brown and brown 2'-4'		17	113.7				
5	Stiff to very stiff, brown Lean Clay (CL)	13	15					
	-gray and tan, with ferrous nodules and stains 6'-8'		18	111.7	89	46	15	31
	Stiff to hard, tan and gray Fat Clay (CH), with slickensides	12	21					
10	-with silty sand pockets and calcareous nodules 8'-10' -reddish tan and gray 10'-12'		22	105.6	95	53	20	33
	-reddish tan, with calcareous nodules 12'-16'		26					
15		13	28					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-43**

DATE **7/1/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

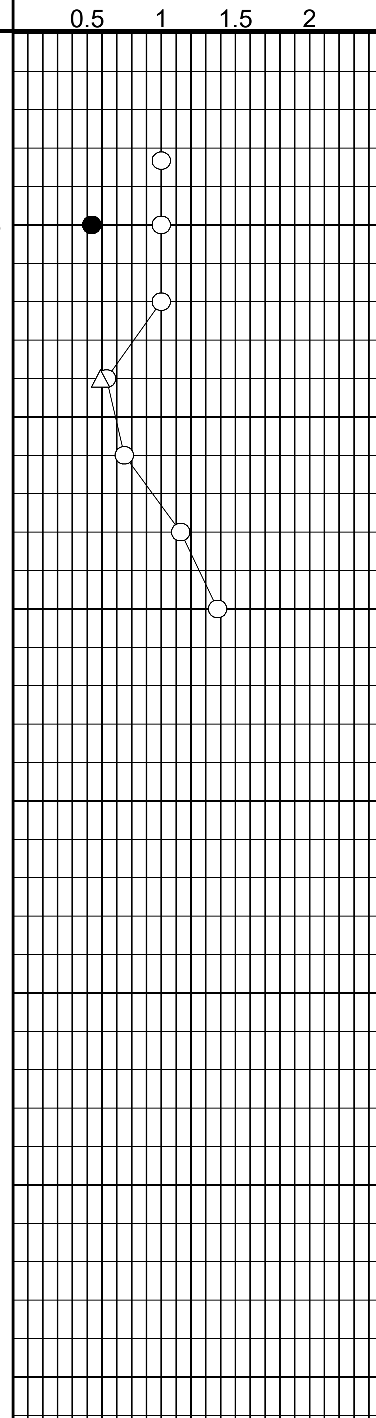
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192701.02
Northing: 13789743.19
Elevation: 25.75

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 10.5" concrete							
	Pavement: 7.25" concrete							
	Base: 14" stabilized soil							
	Stiff to very stiff, gray and dark gray Fat Clay (CH), with slickensides		28					
5	-with calcareous nodules 2.7'-4' -gray 4'-6', with ferrous nodules 4'-8'		24	99.5				
	-with calcareous nodules 6'-8'				92	58	18	40
			26					
	-reddish tan and gray 8'-10'		31	93.6				
10	-tan and gray 10'-12'		31					
	-tan, with ferrous nodules 12'-14'					73	28	45
			34					
15	-brown and gray 14'-16'		34					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

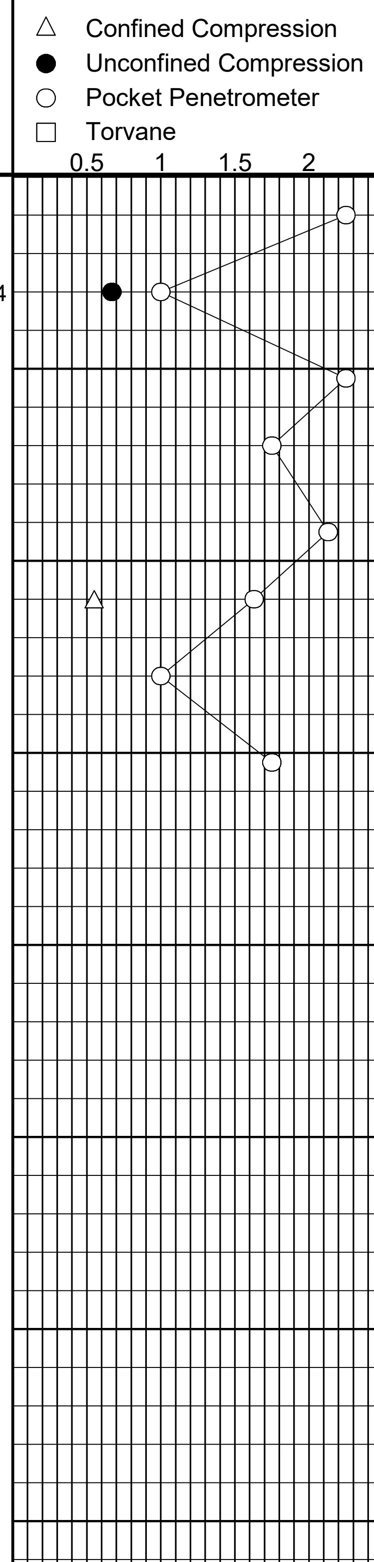
BORING **B-44**

DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192800.73
Northing: 13789860.64
Elevation: 24.91

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, dark gray and dark brown Lean Clay with Sand (CL), with fat clay pockets and roots		17		75	41	16	25
	Stiff to hard, dark gray Fat Clay (CH), with slickensides		22	102.4				
5	-gray and tan, with calcareous nodules 4'-8'	11	15					
	-with ferrous stains 6'-8'		21					
	-reddish tan and gray 8'-10'	14	23			52	21	31
10	-tan, with calcareous nodules 10'-12'		27	96.8				
	-reddish tan 12'-16'		30					
15		15	30					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-46**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-45**

DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

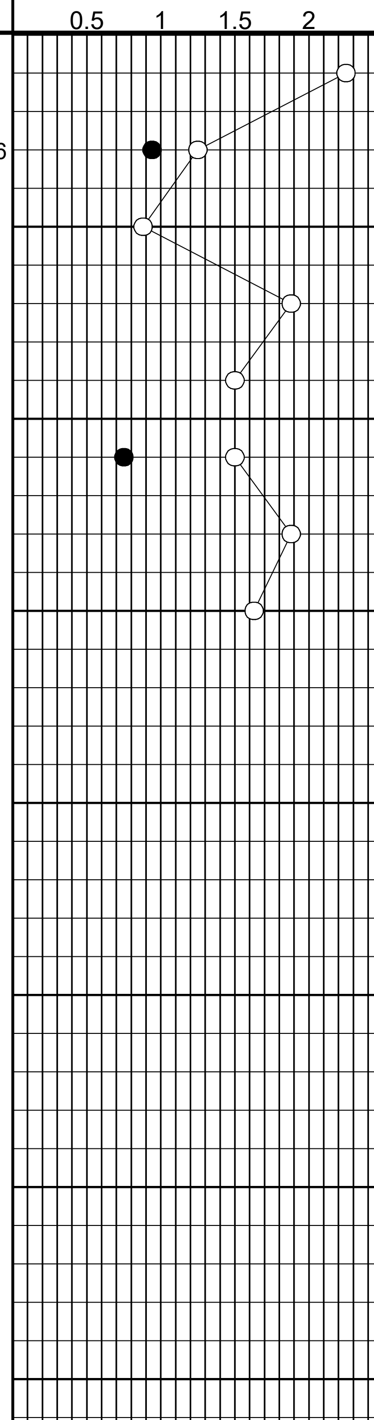
GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192932.66
Northing: 13790012.28
Elevation: 25.35

DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
Fill: hard, brown and tan Fat Clay with Sand (CH), with calcareous nodules and gravel		23		83	55	19	36
Stiff to very stiff, brown and tan Fat Clay (CH), with slickensides -with ferrous nodules 2'-8' -tan and gray, with calcareous nodules 4'-8'		23	101.6				
		23					
		19					
-reddish tan and gray, with calcareous pockets 8'-10'		30		94	62	23	39
-reddish tan 10'-16'		28	97.3				
		30					
		32					
Termination Depth = 16 feet							

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30, 35

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-46**

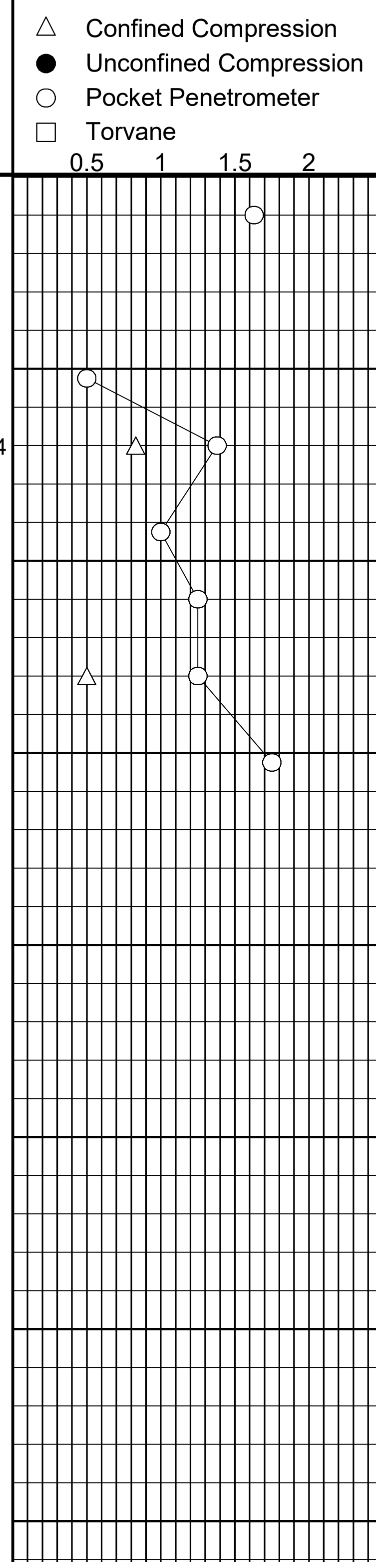
DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3193066.91
Northing: 13790165.72
Elevation: 24.87

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, reddish brown and dark brown Fat Clay (CH), with sandy lean clay pockets and roots		24					
	Fill: dark gray Silty Clayey Sand (SC-SM), with shell fragments		14		41	22	16	6
5	Fill: firm to stiff, tan and gray Lean Clay (CL), with sandy lean clay seams and shell fragments	9	15					
	Stiff to very stiff, tan Lean Clay (CL), with ferrous nodules and abundant calcareous nodules		22	105.4				
	Firm to very stiff, tan and gray Fat Clay (CH), with slickensides	13	24					
10	-reddish tan 10'-14'		26		97	66	23	43
			29	93.9				
15	-reddish tan and gray 14'-16'	12	28					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-47**

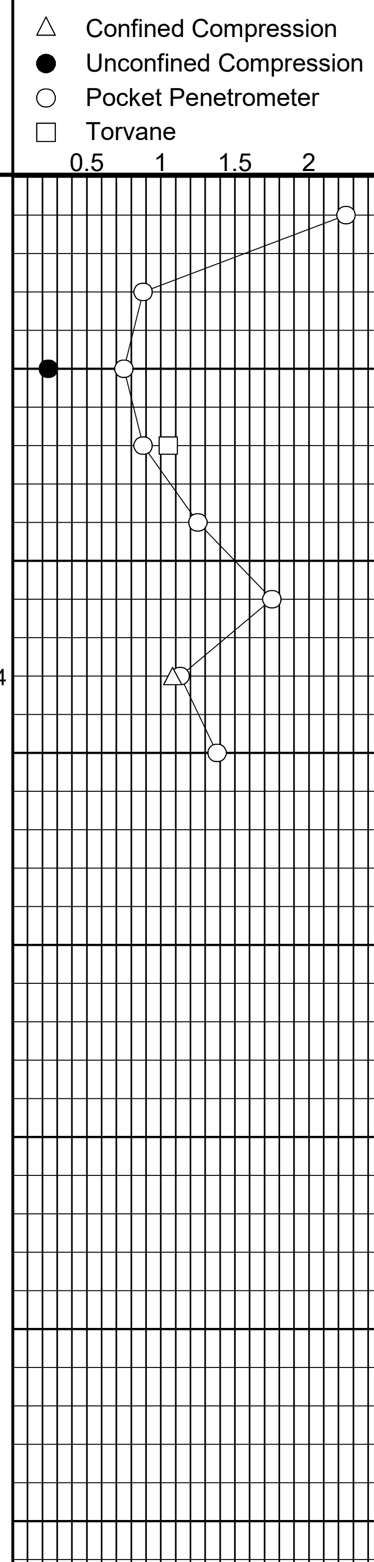
DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3193199.53
Northing: 13790317.36
Elevation: 24.87

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, brown Fat Clay (CH), with gravel and roots		24		94	83	26	57
	Soft to stiff, tan and grayish tan Fat Clay (CH), with slickensides		36					
5	-tan and gray 4'-6'		35	74.0				
	Stiff to very stiff, dark gray Lean Clay with Sand (CL)		21					
	-gray and tan, with ferrous nodules and calcareous pockets 8'-10'		19		83	44	15	29
10	Very stiff, gray and tan Fat Clay (CH) -with ferrous nodules and lean clay pockets 10'-12'		20					
	-with calcareous nodules 12'-16'		23	103.4				
15	-reddish tan 14'-16'		28					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**

DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-48**

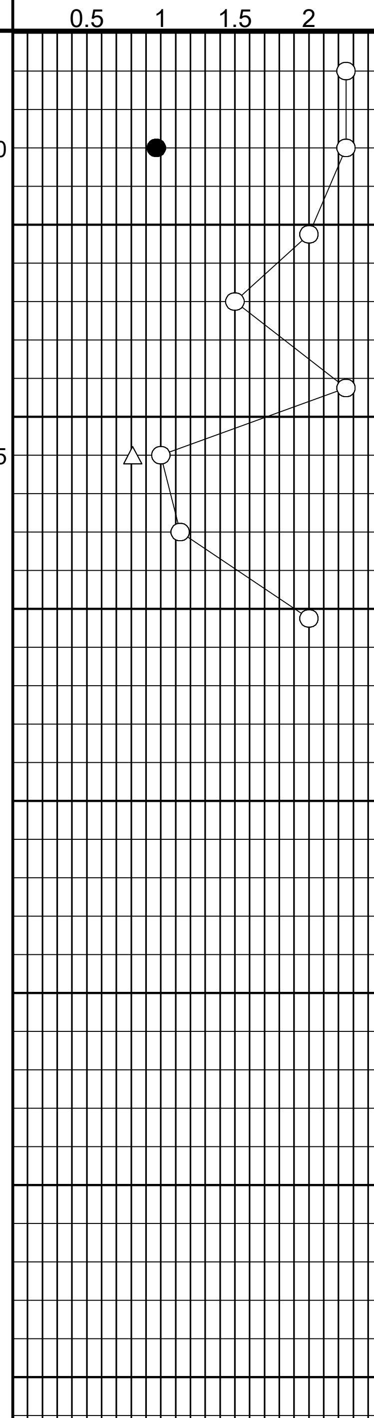
DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3193332.02
Northing: 13790468.75
Elevation: 24.48

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: stiff to hard, reddish brown and gray Fat Clay (CH), with slickensides and calcareous nodules		27		90	66	22	44
	-gray, with silty sand seams and pockets, and ferrous nodules 2'-4'		15	116.0				
5	Firm to hard, dark gray Lean Clay with Sand (CL)	8	19					
	-with ferrous nodules 6'-8'		22					
	-with calcareous nodules 8'-10'	13	22		84	44	15	29
10	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides		26	100.5				
	-with calcareous and ferrous nodules 10'-12'		29					
15	-reddish tan and gray 14'-16'	14	26					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

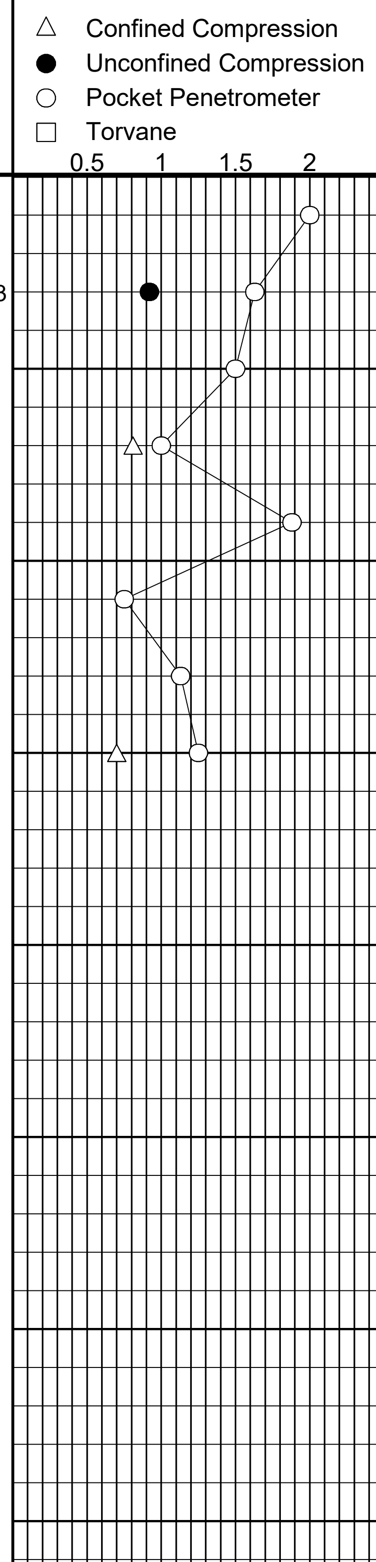
PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-49**

DATE **6/14/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3193277.37
Northing: 13790676.93
Elevation: 25.90

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: stiff to very stiff, dark gray and brown Fat Clay (CH) -with calcareous nodules 0'-4'		19					
	-brown and gray, with sandy lean clay pockets 2'-4'		19	110.3		59	16	43
5	-reddish brown and black, with sand pockets and roots 4'-6'		23					
	Stiff to very stiff, gray and dark gray Lean Clay (CL), with ferrous nodules and fat clay seams		26	98.0				
	-tan and gray, with calcareous nodules and pockets 8'-10'		24		87	49	17	32
10	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides -with calcareous nodules 10'-12'		33					
			34					
15	-reddish tan and gray 14'-16'		35	89.3				
	Termination depth = 16 feet *: groundwater is likely perched							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **2*** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: EFD Taxiway L Geotechnical Investigation

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING B-50

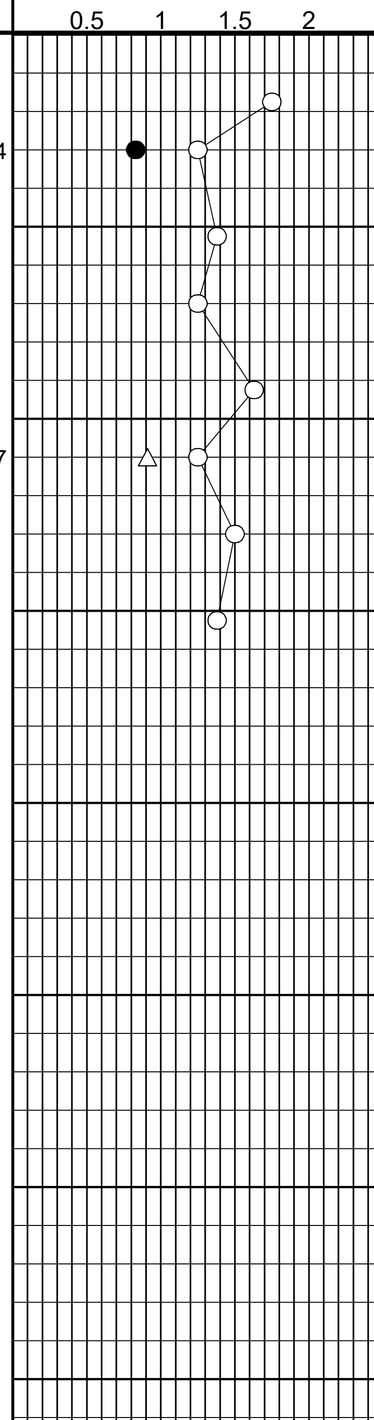
DATE 8/4/2021 **TYPE** 4" Dry Auger **LOCATION** See Boring Location Plan

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3193142.56
Northing: 13790781.27
Elevation: 27.33

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: stiff to very stiff, reddish tan and gray Fat Clay (CH), with calcareous nodules				90	60	20	40
			17					
	-gray and dark gray 2'-6'		23	102.4				
5	-with ferrous nodules 4'-6'	9	19					
	Stiff to very stiff, gray Fat Clay (CH), with slickensides		21					
	-with lean clay seams 6'-8'							
	-gray and tan 8'-14', with ferrous nodules 8'-10' and calcareous nodules 8'-14'	13	22		88	59	16	43
10	-with calcareous pockets 10'-12'		23	105.7				
	-with ferrous stains 12'-14'		24					
15	-reddish tan 14'-16'	9	30					
16	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT 14 FEET WHILE DRILLING

WATER LEVEL AT 10 FEET AFTER COMPLETE

DRILLED BY JH Drilling DRAFTED BY YY/MRH LOGGED BY DN

PROJECT NO. G103-21

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-51**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

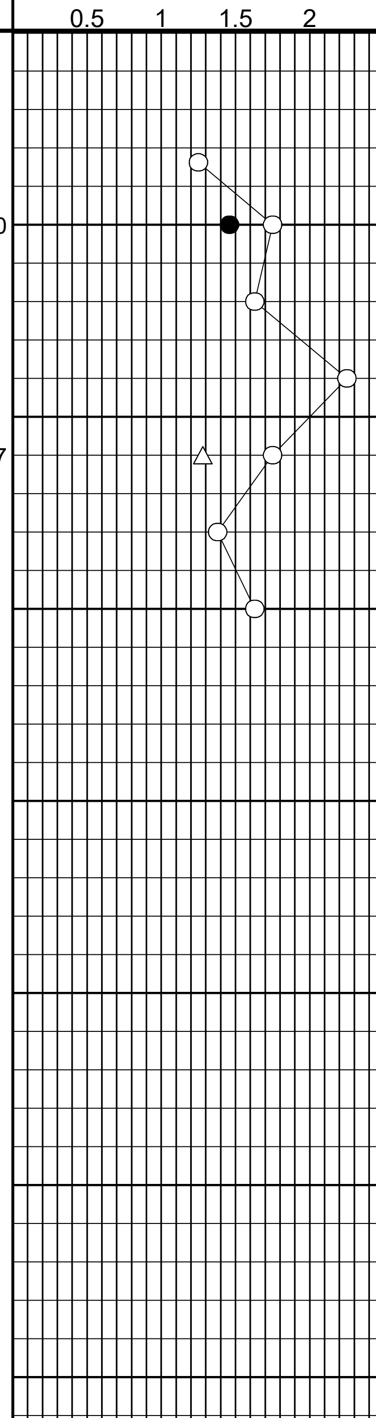
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192959.63
Northing: 13790936.77
Elevation: 29.51

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 15.5" concrete							
	Pavement: 6.6" concrete							
	Pavement: 5.9" concrete							
	Base: 5.25" stabilized soil		23		85	52	17	35
5	Fill: very stiff, dark gray and brown Fat Clay with Sand (CH) -brown and black, with lean clay seams 4'-6'		17	110.0				
	Fill: very stiff to hard, gray and black Fat Clay (CH) -with calcareous nodules and lean clay pockets 6'-8'		24					
			20		91	56	16	40
10	Very stiff, dark gray Fat Clay (CH), with ferrous nodules		22	103.7				
			22					
15	-gray and tan, with calcareous nodules 14'-16'		21					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **JH/DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-52**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

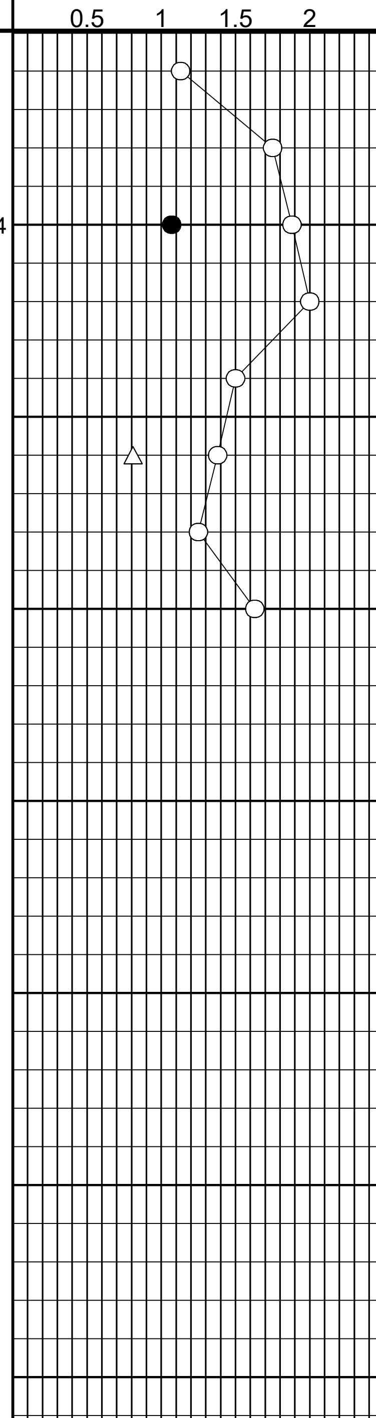
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3192085.20
Northing: 13789469.79
Elevation: 22.99

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, gray and tan Fat Clay with Sand (CH), with ferrous and calcareous nodules		20		84	50	15	35
	Stiff to very stiff, gray and tan Fat Clay (CH), with slickensides		19					
5	-with ferrous nodules 2'-6' -with calcareous nodules 4'-8'		24	102.4				
	-with lean clay seams and calcareous pockets 6'-8'		22					
	-with claystone pockets 8'-10'		27		98	61	23	38
10	-reddish tan and gray, with calcareous nodules 10'-12'		31	92.6				
	-tan 12'-14'		33					
15	-reddish tan and gray, with sandy lean clay seams 14'-16'		33					
	Termination Depth = 16 feet							
20								
25								
30								
35								



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-53**

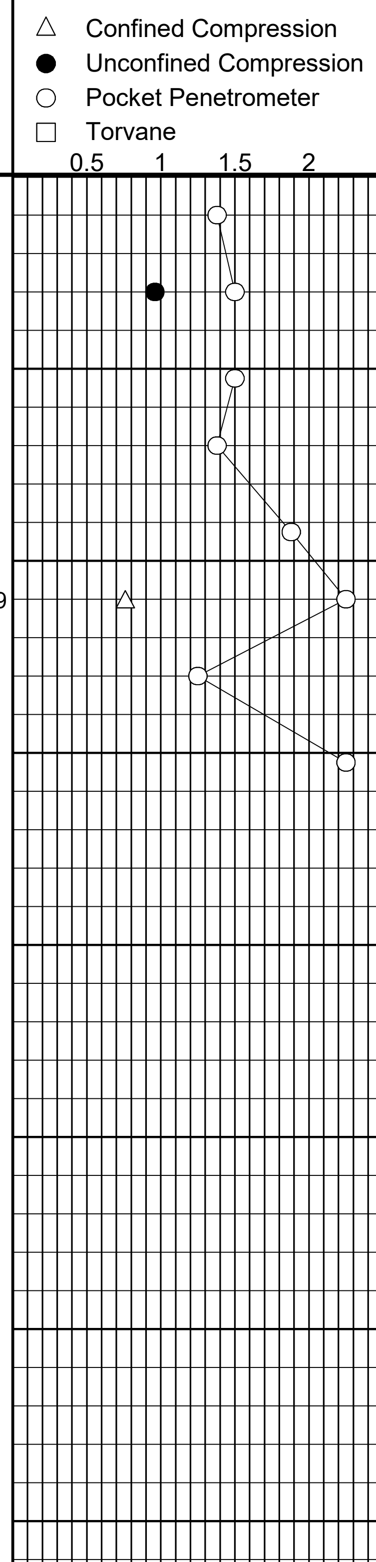
DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191884.44
Northing: 13789619.01
Elevation: 28.80

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, dark and tannish gray Fat Clay (CH), with ferrous nodules and roots		23		92	54	18	36
	Stiff to very stiff, dark gray Fat Clay (CH), with ferrous nodules		25	99.0				
5		11	24					
	-gray, with calcareous nodules 6'-8'		22					
	Stiff to very stiff, tan and gray Lean Clay with Sand (CL), with calcareous and ferrous nodules	10	17		79	48	16	32
10	Stiff to hard, tan and gray Fat Clay (CH), with slickensides		23	102.9				
			27					
15	-with calcareous nodules 14'-16'	10	23					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-54**

DATE **6/15/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

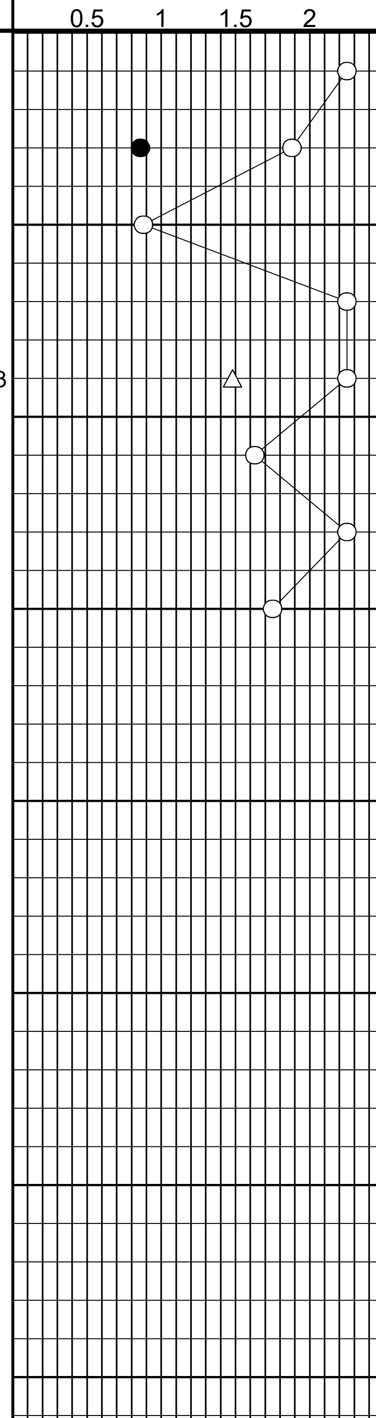
GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191813.56
Northing: 13788678.98
Elevation: 28.57

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Hard, dark brown Lean Clay with Sand (CL), with silty sand seams and roots		20		84	46	18	28
	Stiff to hard, gray and dark gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-4'		24	97.3				
5	-tannish gray, with roots 4'-6'		26					
	-gray and tan, with calcareous and ferrous nodules 6'-8'		16					
	-gray and reddish tan 8'-10', with calcareous pockets 8'-14'		23	101.3				
10	-tan and gray 10'-12'		25		99	62	23	39
	-red and tan, with calcareous nodules 12'-14'		27					
15	-tan and gray 14'-16'		26					
	Termination Depth = 16 feet							

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-56**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-55**

DATE **8/3/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

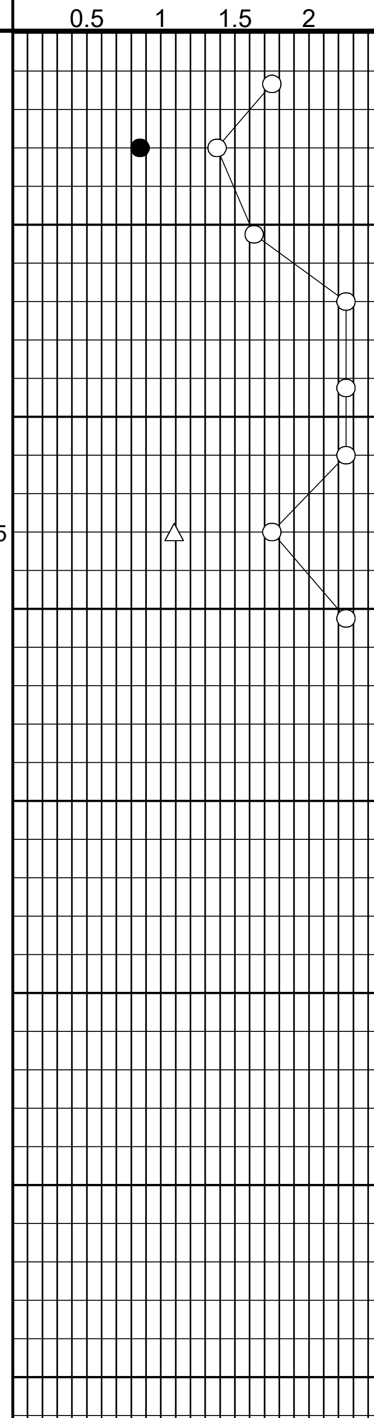
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191889.04
Northing: 13788625.07
Elevation: 28.99

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 2" asphalt							
	Base: 6" sand and gravel		27					
	Firm to hard, dark brown Fat Clay (CH), with slickensides		29	93.8				
	-with sandy lean clay pockets 0.7'-2'							
	-gray and dark gray 2'-4', with ferrous nodules 2'-8'				90	61	18	43
5		8	24					
	-tannish gray 4'-6'							
	-tan and red 6'-8', with calcareous nodules 6'-10'		19					
	-red and gray, with calcareous pockets 8'-10'	15	20					
10	-reddish tan and gray 10'-12'		23		100	57	22	35
	-tan and gray 12'-14'		26	100.5				
15	-reddish tan and gray 14'-16'	14	20					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-56**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191085.93
Northing: 13788726.98
Elevation: 28.61

Fill: very stiff, tannish gray and brown Fat Clay (CH), with ferrous nodules and roots

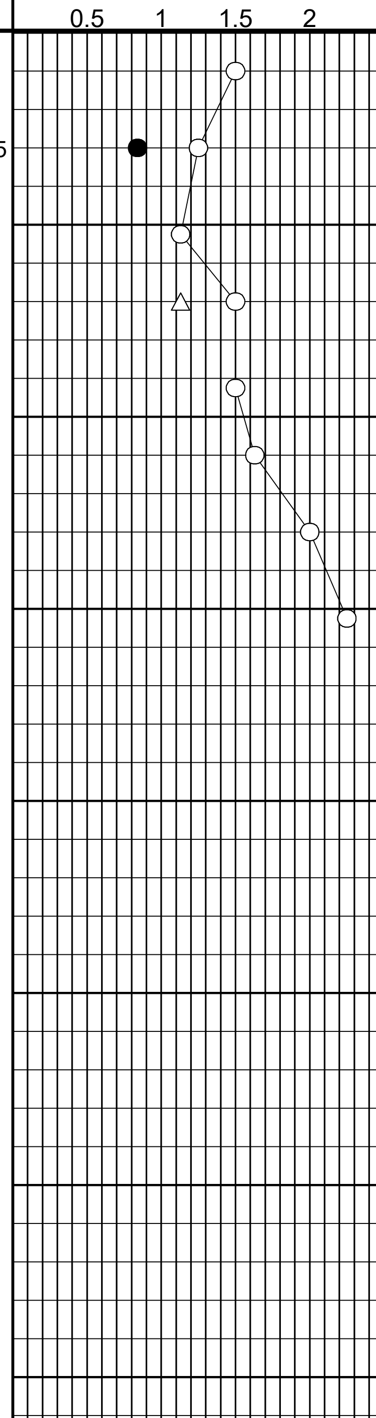
Firm to hard, dark gray Fat Clay (CH), with slickensides
-with ferrous nodules 2'-8'
-gray and dark gray 4'-6'
-reddish tan and tan 6'-8'
-reddish tan 8'-10'
-tan and gray 10'-12', with calcareous nodules 10'-14'
-tan 12'-16', with silt seams 12'-14'
-with ferrous nodules 14'-16'

Termination Depth = 16 feet

DEPTH IN FEET (approx.)	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0-2		28		92	77	24	53
2-4		20	104.5				
4-6	8	25					
6-8		29	99.8				
8-10	11	24		98	55	22	33
10-12		30					
12-14		24					
14-16	12	28					

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-57**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3191288.79
Northing: 13788581.10
Elevation: 24.88

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to hard, tan Fat Clay (CH), with slickensides and calcareous nodules -with ferrous nodules 0'-4' -reddish tan and tan 2'-4'		24						
			23	103.8					
	-tan and gray 4'-8'					93	57	20	37
5			24						
			25						
	-with ferrous stains and silt partings 8'-10'		30	95.7					
10	Stiff to very stiff, tan Lean Clay (CL)					92	33	15	18
			20						
	-with silty clay seams and pockets 12'-16'		21	106.1					
15			23						
16	Termination Depth = 16 feet								

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **15** FEET WHILE DRILLING
WATER LEVEL AT **13** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-58**

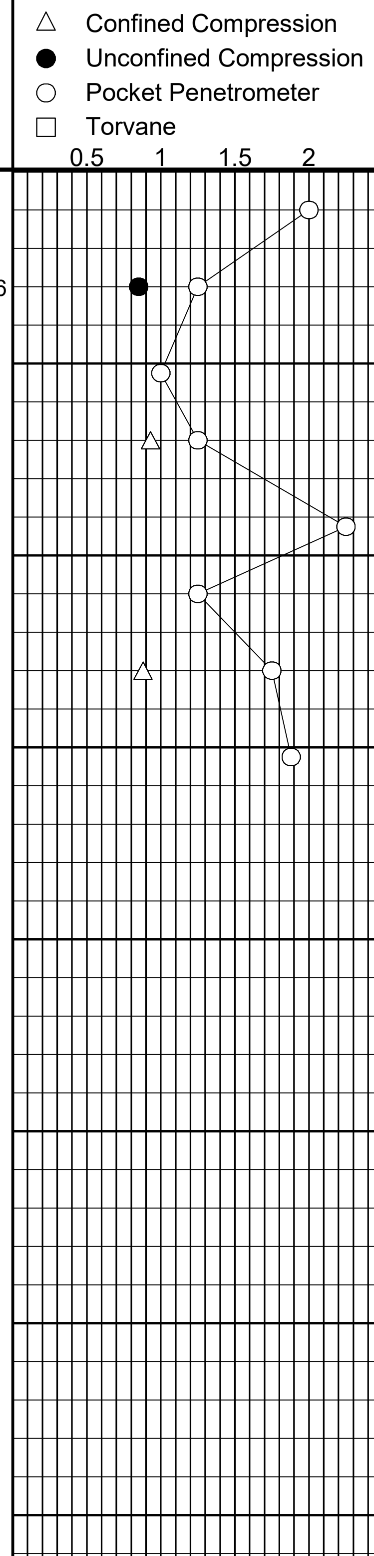
DATE **8/4/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190355.29
Northing: 13787913.22
Elevation: 28.76

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: stiff to very stiff, dark gray Fat Clay (CH) -with shell fragments and roots 0'-2'		21					
	-brownish and dark gray, with calcareous nodules 2'-4'		22	102.6				
5	Firm to hard, dark brownish gray Fat Clay (CH), with slickensides	6	22		87	55	18	37
	-tan and gray 6'-16', with ferrous nodules 6'-8'		27	98.8				
	-with calcareous nodules 8'-10'	16	25					
10	-with ferrous nodules 10'-12'		31		98	70	24	46
	-with calcareous nodules 12'-14'		34	90.6				
15	-with sandy lean clay seams 14'-16'	10	27					
	Termination Depth = 16 feet							

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-59**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

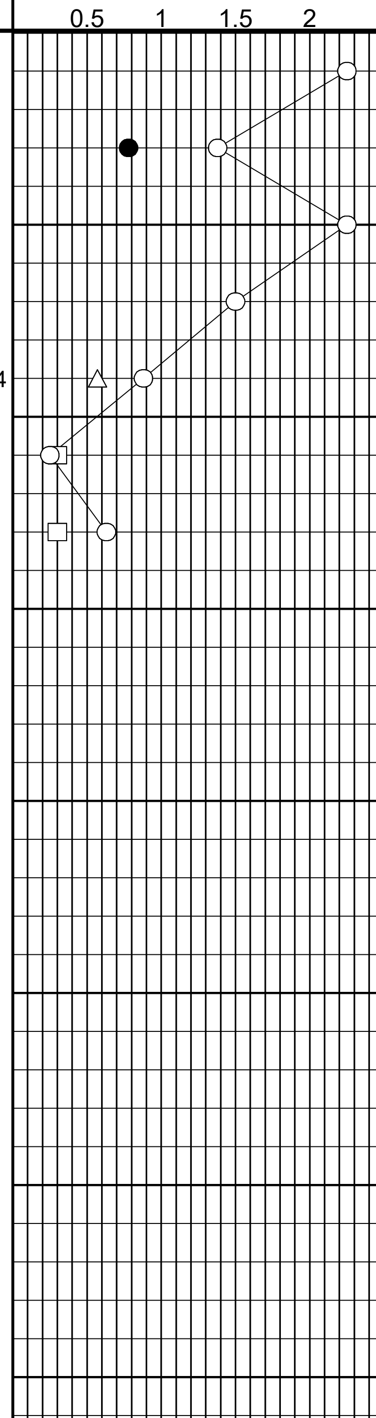
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3190514.38
Northing: 13787800.88
Elevation: 23.57

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Hard, gray and tan Sandy Lean Clay (CL), with ferrous and calcareous nodules		17		58	35	15	20
	Stiff to hard, reddish tan and gray Fat Clay (CH), with slickensides -with calcareous nodules and clayey sand seams 2'-4' -reddish tan, with ferrous nodules 4'-8'		26	99.6				
5			40		97	74	29	45
			38					
	Soft to stiff, tan and gray Lean Clay (CL)		23	104.4				
10	-tan 10'-12'		27		99	30	19	11
	Firm to stiff, tan Silty Clay (CL-ML)		27					
15			25					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **10** FEET WHILE DRILLING
WATER LEVEL AT **4** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT NO. G103-21 **PLATE A-61**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

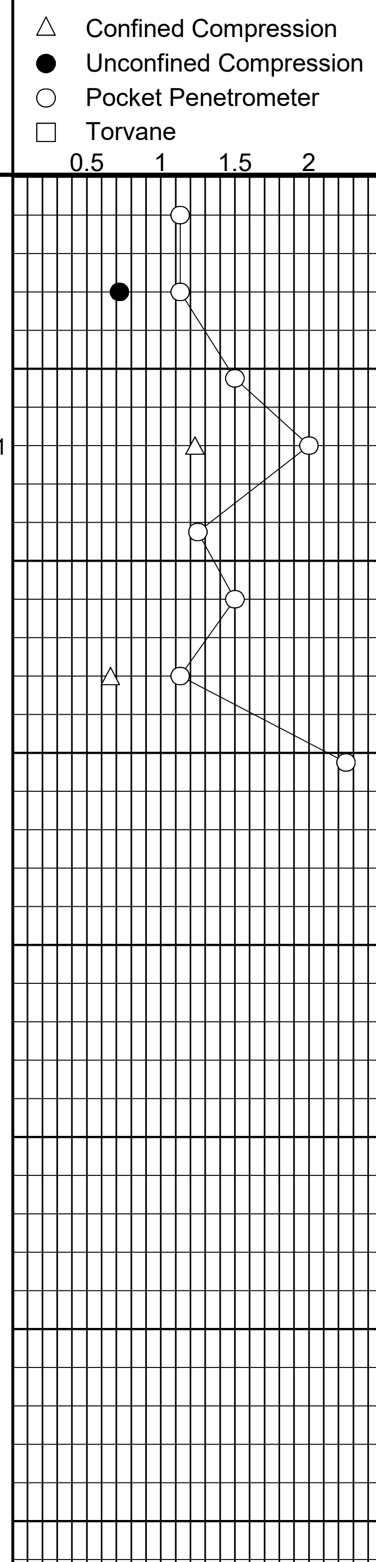
BORING **B-60**

DATE **8/4/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189680.18
Northing: 13787134.39
Elevation: 28.36

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, dark brown Lean Clay with Sand (CL), with roots		20		83	35	16	19
	Firm to hard, gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-6'		23	99.8				
5	-tan and gray, with lean clay seams 4'-6' and calcareous nodules 4'-10'	8	20					
	-reddish tan and gray, with calcareous pockets 6'-8'		27	100.1				
	-tan and gray 8'-12'	9	24		95	54	16	38
10			24					
	-reddish tan, with calcareous nodules and pockets 12'-16'		33	92.6				
15		12	24					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **12** FEET WHILE DRILLING
WATER LEVEL AT **10** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-61**

DATE **8/4/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

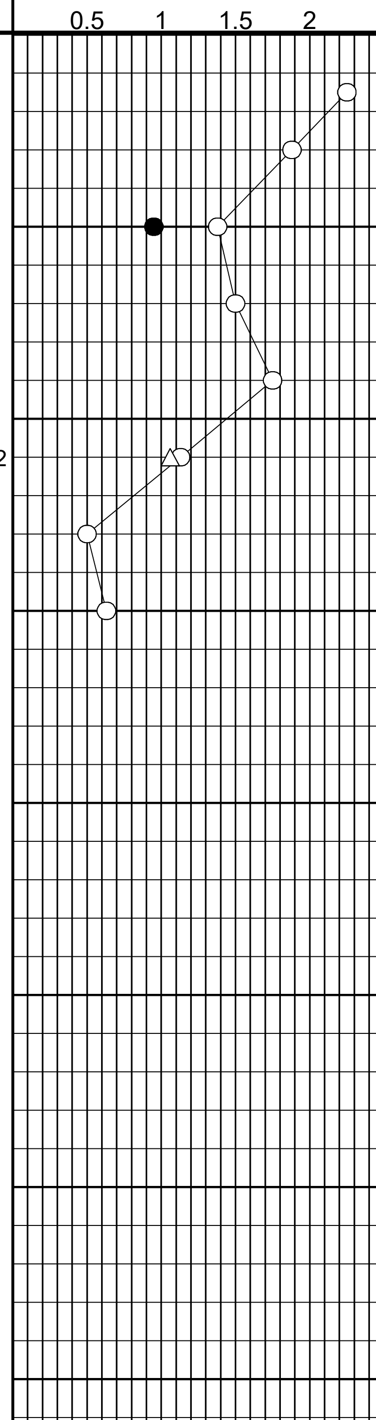
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3189874.38
Northing: 13786976.90
Elevation: 28.74

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Base: 12" sand with shell							
	Stiff to hard, black and dark brown Fat Clay (CH), with ferrous nodules -with roots 1'-2' -dark gray 2'-6'		19					
			22					
5			25	98.8				
	Very stiff, tan and gray Sandy Lean Clay (CL), with slickensides and ferrous nodules -with fat clay pockets and calcareous nodules 6'-10' -with calcareous pockets 8'-10'				63	48	15	33
			20					
			24					
10			21	107.2				
	Gray and tan Sandy Silt (ML) -with silty clay and lean clay pockets 12'-14' -wet at 13' -tan 14'-16'				72	24	21	3
			23					
15			22					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **15** FEET WHILE DRILLING
WATER LEVEL AT **13** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

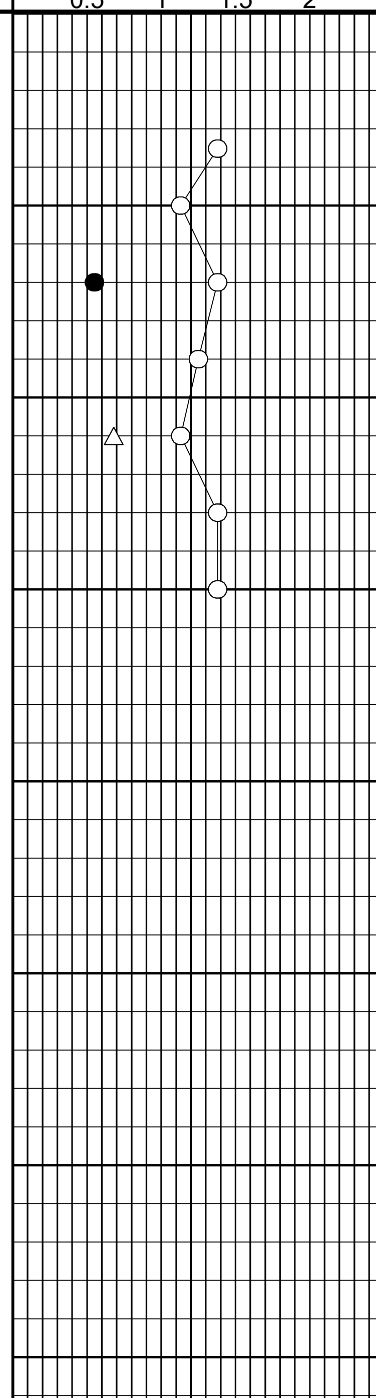
BORING **B-62**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3188564.99
Northing: 13785900.00
Elevation: 26.27

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 12.5" concrete							
	Pavement: 3" asphalt							
	Pavement: 7.8" concrete							
	Base: 13.1" stabilized soil							
	Stiff to very stiff, dark gray Fat Clay (CH), with slickensides		30		96	68	20	48
5	-with ferrous nodules 4'-6'		30					
			32	89.6				
	-tan and gray 8'-12', with ferrous nodules 8'-10' and calcareous nodules 8'-12'		24		87	67	20	47
10			32	90.8				
	-reddish tan 12'-14'		34					
15	-tan and gray, with lean clay seams 14'-16'		30					
	Termination Depth = 16 feet							
20								
25								
30								
35								



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **JH/DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-63**

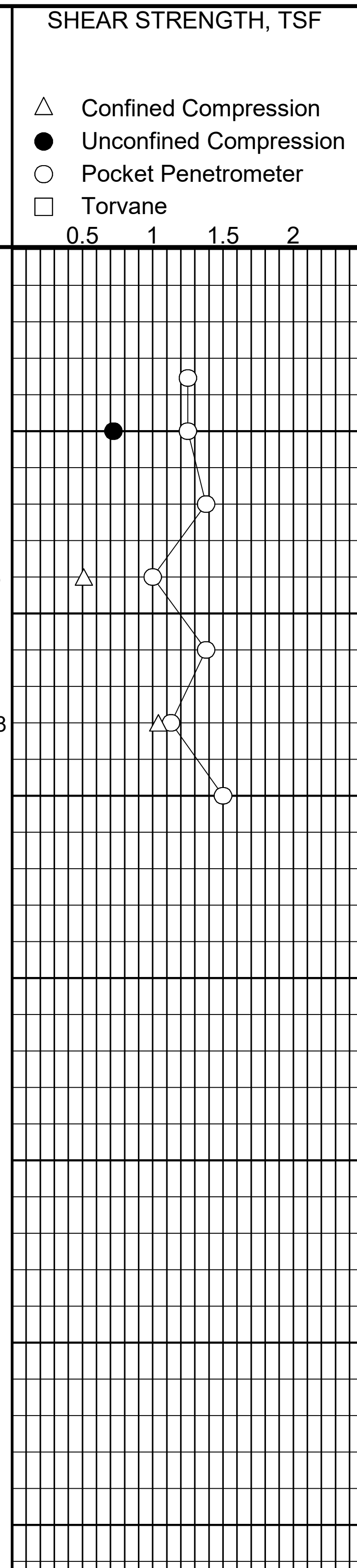
DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187757.15
Northing: 13785144.79
Elevation: 25.59

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 15" concrete							
	Base: 11.5" cement stabilized base							
	Subbase: 10.5" stabilized soil							
	Stiff to very stiff, dark gray Fat Clay (CH), with slickensides		31		96	72	21	51
5	-with ferrous nodules 3'-10'		29	92.6				
	-gray 6'-8'		29					
	-gray and tan, with calcareous nodules 8'-10'		34	88.5	95	77	22	55
10	-reddish tan 10'-12'		34					
	Very stiff, gray and tan Lean Clay (CL), with sand pockets		23	107.8				
15			20					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **JH/DN**

PROJECT NO. G103-21 **PLATE A-65**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-64**

DATE **8/10/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

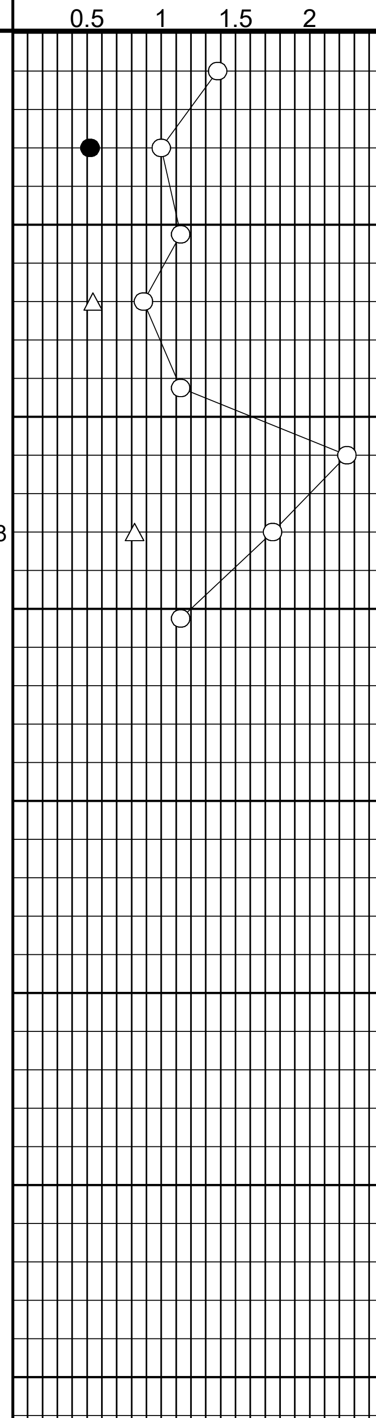
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187758.98
Northing: 13784963.94
Elevation: 23.56

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: firm to very stiff, dark gray Fat Clay (CH), with slickensides -with calcareous nodules and roots 0'-2' -with shell fragments 2'-4'		28		93	73	21	52
			27	94.2				
5	-with ferrous nodules 4'-6'	6	32					
	Stiff to very stiff, tan and gray Fat Clay (CH), with slickensides -with calcareous nodules 6'-8'		30	94.8				
		10	35		100	77	25	52
10	Hard, tan and gray Lean Clay (CL)		18					
	Stiff to very stiff, brown and gray Fat Clay (CH) -with calcareous and ferrous nodules 12'-14'		21	106.8				
15	-tan, with lean clay pockets 14'-16'	6	20					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT 15 FEET WHILE DRILLING
WATER LEVEL AT 14 FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-65**

DATE **8/5/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

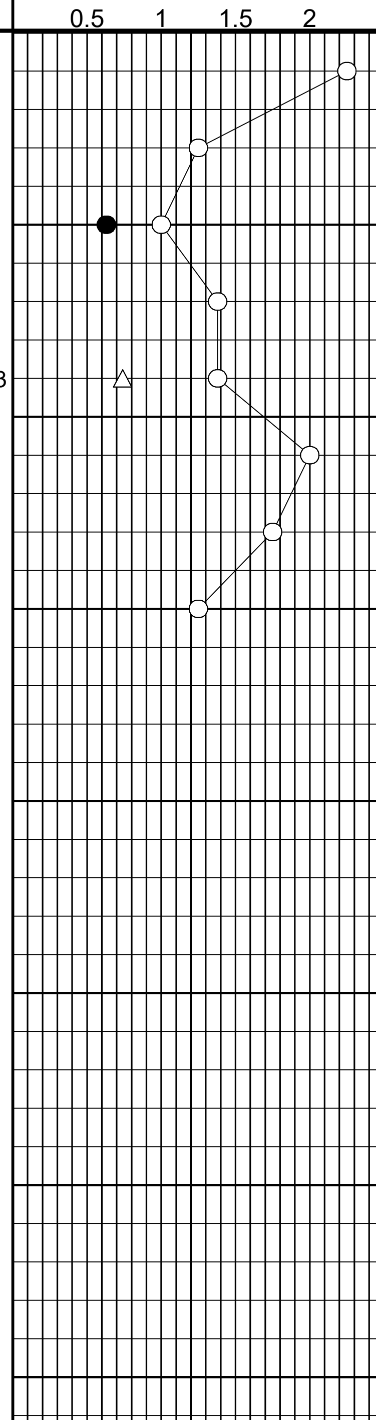
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187914.00
Northing: 13783900.36
Elevation: 24.07

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Stiff to hard, dark brown Fat Clay (CH), with slickensides -with roots 0'-2' and ferrous nodules 0'-10'		23					
	-dark gray 2'-4'		29		96	70	21	49
5	-gray and tannish gray 4'-6'		30	92.4				
	-gray and tan 6'-10'		32					
			25	100.3	98	73	21	52
10	-reddish tan and gray 10'-12', with calcareous nodules 10'-14'		23					
	-tan and gray 12'-14'		22					
15	Tan Silt (ML), with fat clay seams, wet		23					
	Termination Depth = 16 feet							
20								
25								
30								
35								



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING ▽
WATER LEVEL AT **11** FEET AFTER **COMPLETE** ▼
DRILLED BY **JH Drilling** DRAFTED BY **YY/MRH** LOGGED BY **DN**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-66**

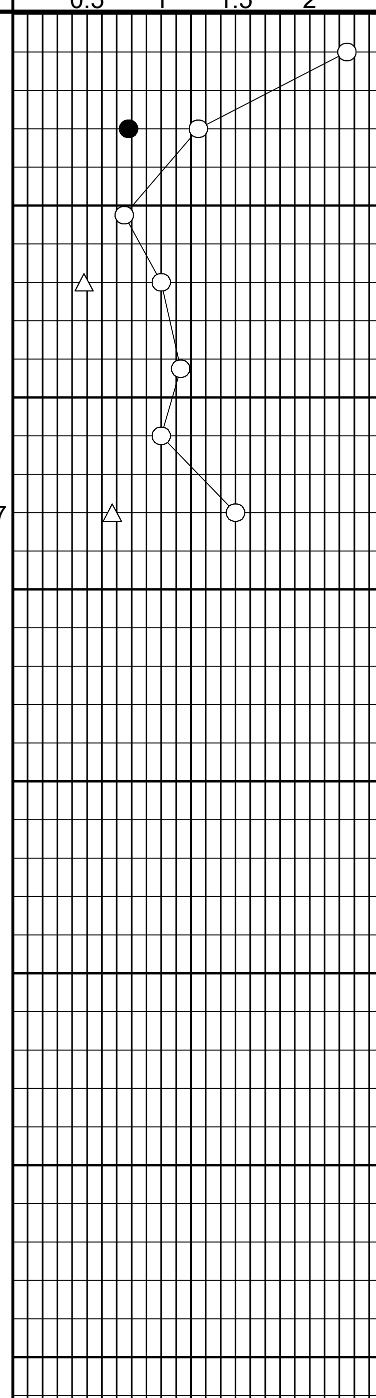
DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187503.54
Northing: 13783873.31
Elevation: 25.36

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, dark brown Lean Clay (CL), with calcareous nodules, shell fragments, and roots		16					
	Fill: stiff to very stiff, gray and dark gray Fat Clay (CH), with slickensides and ferrous nodules		33	87.4				
5	Firm to very stiff, gray Fat Clay (CH), with slickensides -with ferrous nodules 4'-8'	6	38		96	84	24	60
	-grayish tan, with calcareous nodules 6'-8'		36	86.6				
	-tan 8'-12'	6	35					
10			28		98	53	16	37
	-tan and gray 12'-16', with calcareous nodules 12'-14'		24	101.7				
15	-with silt seams 14'-16'	11	20					
	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **BpJ**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

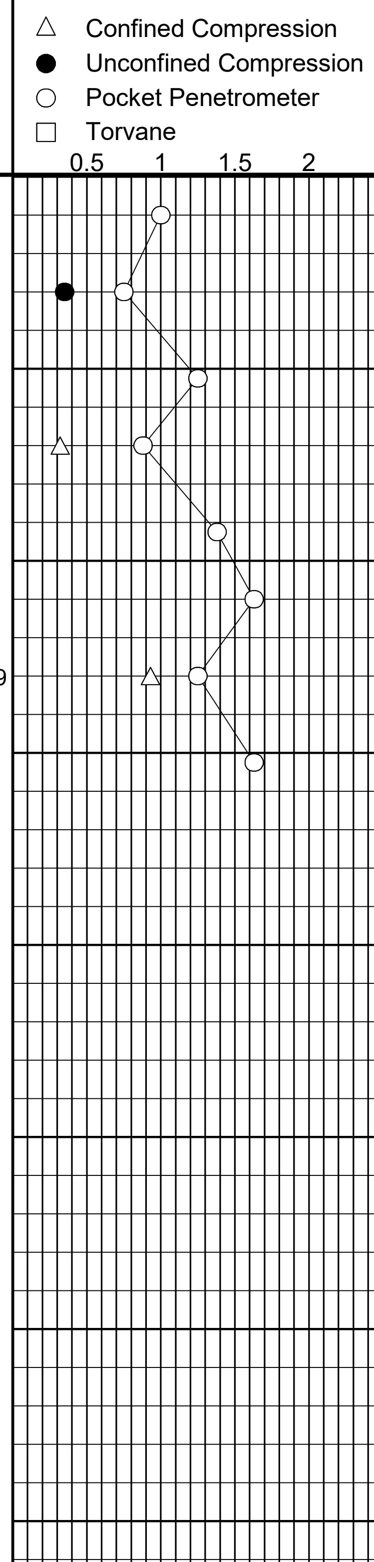
PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-67**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187265.19
Northing: 13783866.81
Elevation: 24.99

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: stiff to very stiff, dark gray Fat Clay with Sand (CH), with calcareous nodules, sand pockets, shell fragments, and roots		31		84	70	21	49
	Firm to very stiff, dark gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-4'		41	80.1				
5	-gray 4'-6'	5	35					
	-tan 6'-16', with ferrous nodules 6'-8' and calcareous nodules 6'-16'		35	84.9				
		11	34		99	71	22	49
10	-with ferrous nodules 10'-12'		23					
			22	105.9				
15		12	22					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **BpJ**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-68**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3186896.05
Northing: 13783851.50
Elevation: 23.83

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Firm to hard, dark gray Fat Clay (CH), with slickensides		25		92	74	23	51
	-with calcareous nodules, shell fragments, and roots 0'-2'							
	-gray 2'-4', with ferrous nodules 2'-6'		41	79.5				
5	-gray and tan 4'-8'		39					
	-with calcareous nodules 6'-8'		36					
	-reddish tan and gray 8'-10'	7	31		99	75	28	47
10	Stiff to hard, tan and gray Lean Clay (CL)		20	108.7				
	-tan, with fat clay pockets 12'-14'		20					
15	Stiff to very stiff, reddish tan Fat Clay (CH)	11	21					
	Termination Depth = 16 feet							

Depth scale: 0, 5, 10, 15, 20, 25, 30, 35

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **15** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **BpJ**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-69**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187467.24
Northing: 13783412.24
Elevation: 26.71

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 16.25" concrete							
	Base: 7.75" cement stabilized base							
	Subbase: 9.75" stabilized soil							
	Fill: very stiff, brown and gray Fat Clay (CH), with calcareous nodules, sandy lean clay pockets, and gravel		37		91	68	20	48
5			42					
	Firm to very stiff, dark grayish brown Fat Clay (CH), with slickensides and ferrous nodules -brownish gray 6'-8'		36	83.4				
	-grayish tan 8'-10', with calcareous nodules 8'-14'		34		96	83	26	57
10	-tan and gray 10'-16'		38	84.6				
			36					
15			23					
	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **DN/JH**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-70**

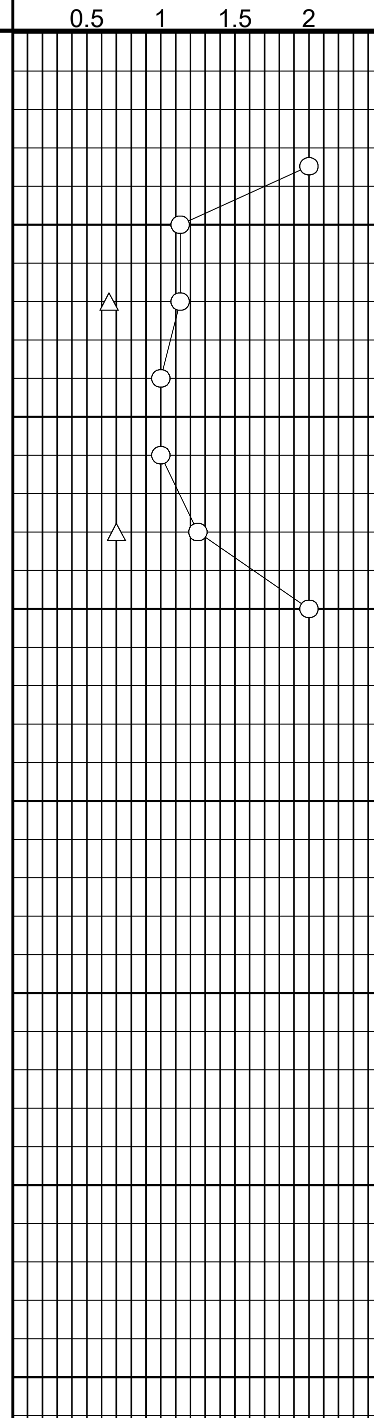
DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187314.31
Northing: 13783417.81
Elevation: 26.16

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 15.5" concrete							
	Base: 8" cement stabilized base							
	Subbase: 12" stabilized soil							
	Fill: stiff to very stiff, dark gray and brown Fat Clay (CH), with slickensides		28					
5	-with gravel 3'-4'		37		98	86	25	51
	-with ferrous and calcareous nodules 6'-8'		30	90.2				
	Stiff to very stiff, gray and tan Fat Clay (CH), with slickensides		38					
10	-with ferrous nodules 8'-14' -tan 10'-12', with calcareous nodules 10'-14'		39		94	80	26	54
	-reddish tan and gray 12'-14'		33	90.9				
15			20					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **DN/JH**

PROJECT NO. G103-21

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-71**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

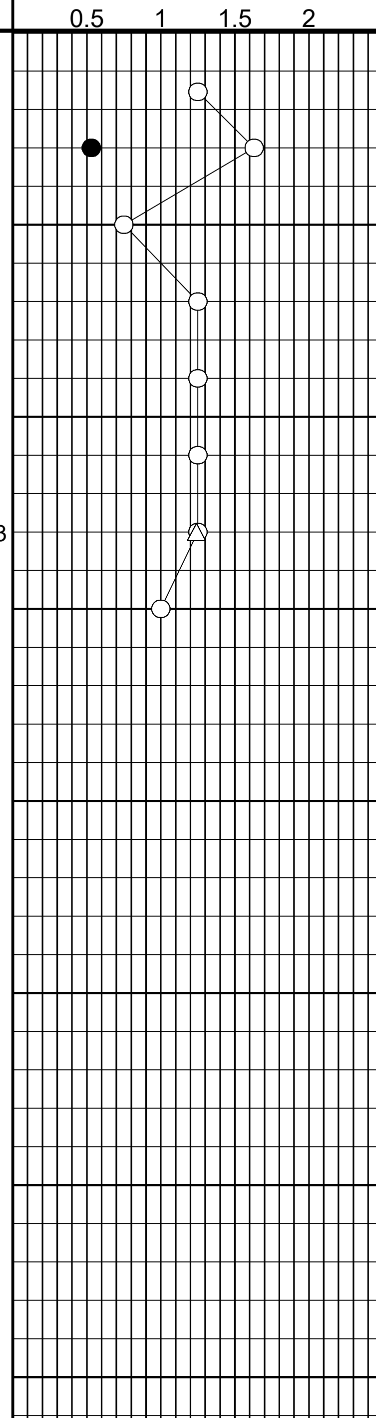
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187613.52
Northing: 13786754.06
Elevation: 26.11

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Pavement: 13" concrete							
	Fill: dark brown Silty Sand (SM), with fat clay seams and pockets		20					
	Stiff to very stiff, dark gray Fat Clay (CH), with slickensides		26	95.3	92	56	19	37
5			26					
	-with ferrous nodules 6'-12'		23					
	-gray and tan 8'-14', with calcareous nodules 8'-10'		28		94	67	20	47
10			31					
	-with lean clay seams 12'-14'		19	108.3				
15	Stiff to very stiff, tan and gray Lean Clay (CL), with silt partings		21					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **BpJ/JH**

AVILES ENGINEERING CORP.
GEOTECHNICAL ENGINEERS

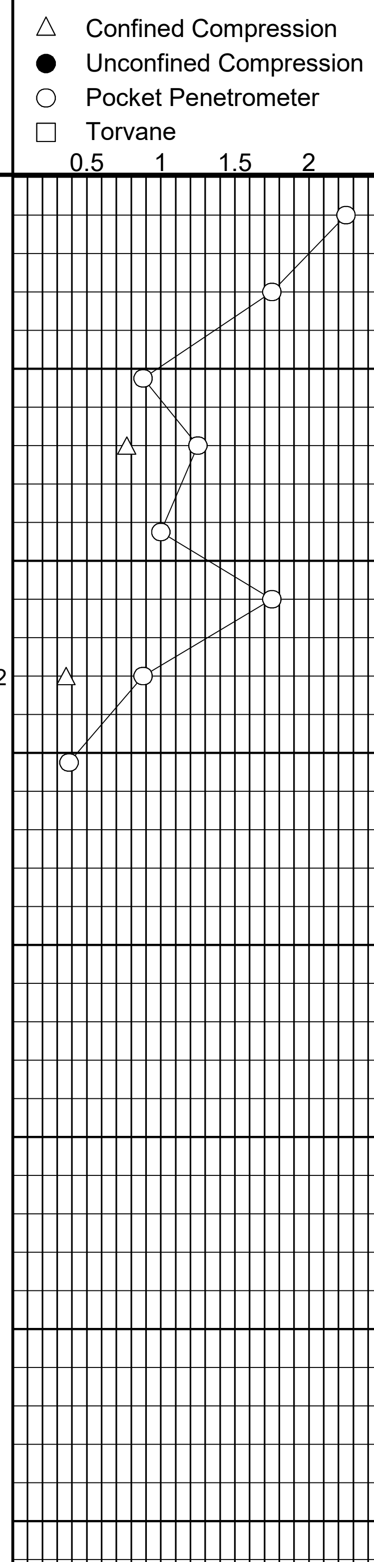
PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-72**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187389.62
Northing: 13786733.82
Elevation: 24.12

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, dark brown Fat Clay (CH), with calcareous nodules and roots		18		89	56	18	38
	Firm to very stiff, dark gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-10' -gray 4'-6'		21					
5		6	24					
	-tan and gray, with calcareous nodules 6'-12'		28	99.0				
		7	33		96	66	20	46
10			21					
	Firm to stiff, tan and gray Lean Clay (CL)		24	103.2				
15	-tan, with silty clay pockets 14'-16'	9	26					
	Termination Depth = 16 feet							

SHEAR STRENGTH, TSF



BORING DRILLED TO 16 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT N/A FEET WHILE DRILLING
WATER LEVEL AT 11 FEET AFTER COMPLETE
DRILLED BY JH Drilling DRAFTED BY MRH LOGGED BY BpJ

AVILES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: **EFD Taxiway L Geotechnical Investigation** BORING **B-73**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

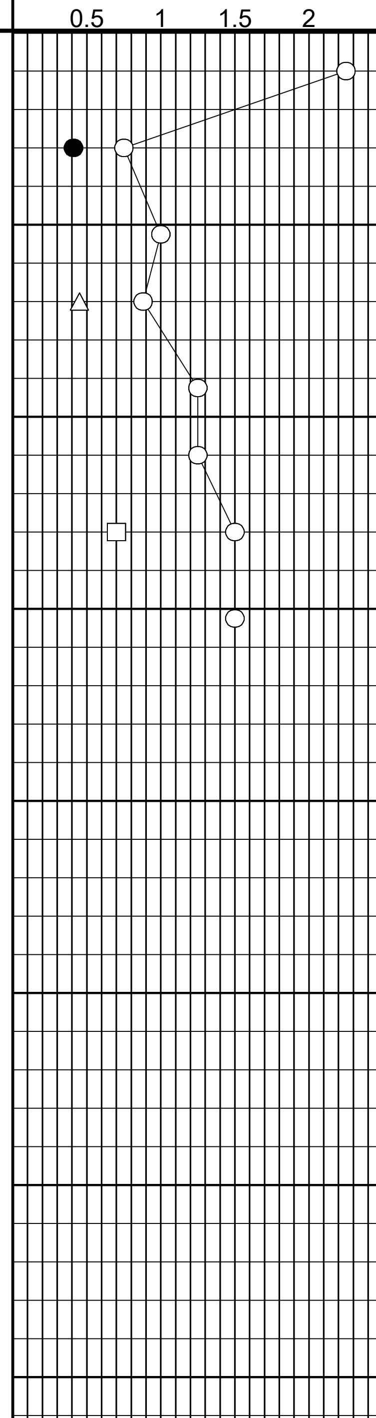
DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3187069.64
Northing: 13786711.34
Elevation: 24.70

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, dark brown Fat Clay with Sand (CH), with ferrous nodules, shell fragments, gravel, and roots		12		81	50	16	34
	Firm to very stiff, dark gray Fat Clay (CH), with slickensides		29	90.0				
	-with calcareous nodules 2'-4'							
5	-gray and tan 4'-8', with sandy lean clay pockets 4'-6'	6	27					
			34	90.4				
	-reddish tan and gray 8'-12'	8	36		100	72	26	46
10	-with ferrous nodules 10'-14'		31					
	-tan and gray 12'-16', with lean clay pockets and silty clay seams 12'-14'		23					
15		8	25					
	Termination Depth = 16 feet							
20								
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane



BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING
WATER LEVEL AT **10** FEET AFTER **COMPLETE**
DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **BpJ**

PROJECT: **EFD Taxiway L Geotechnical Investigation**

ARLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

BORING **B-74**

DATE **8/17/2021** TYPE **4" Dry Auger** LOCATION **See Boring Location Plan**

DESCRIPTION

GRID Coordinates (US Survey ft):
Texas State Plane Zone: 4204
Easting: 3186704.33
Northing: 13786699.81
Elevation: 20.79

SHEAR STRENGTH, TSF: △ Confined Compression; ● Unconfined Compression; ○ Pocket Penetrometer; □ Torvane (scale 0.5, 1, 1.5, 2)

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: very stiff, gray and dark gray Fat Clay with Sand (CH), with calcareous nodules		21		82	61	18	43
	Stiff to very stiff, tan and gray Fat Clay (CH), with calcareous and ferrous nodules		26	104.2				
5	Stiff to hard, reddish tan and tan Lean Clay (CL), with calcareous nodules and pockets	11	17					
	Firm to very stiff, reddish tan and gray Fat Clay (CH), with slickensides		39	87.1				
	-with sandy lean clay seams and sandy silt pockets 8'-10'	7	21		94	62	20	42
10	Firm to stiff, reddish tan Silty Clay with Sand (CL-ML) -with sand seams 10'-12'		23					
	-tan 12'-16'		23		80			
15	-with calcareous nodules 14'-16', wet at 14'	7	26					
	Termination Depth = 16 feet							
20								
25								
30								
35								

BORING DRILLED TO **16** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **10** FEET WHILE DRILLING

WATER LEVEL AT **8** FEET AFTER **5 MINS**

DRILLED BY **JH Drilling** DRAFTED BY **MRH** LOGGED BY **BpJ**

PROJECT NO. G103-21 **PLATE A-76**

KEY TO SYMBOLS

Symbol	Description
	Strata symbols
	Fill
	High plasticity clay
	Low plasticity clay
	Paving
	Silty low plasticity clay
	Silt
	Silty clayey sand
	Silty sand
	Poorly graded sand with clay
	Misc. Symbols
○	Pocket Penetrometer
●	Unconfined Compression
△	Confined Compression
	Water table depth during drilling
	Subsequent water table depth
□	Torvane

Symbol	Description
	Soil Samplers
	Undisturbed thin wall Shelby tube
	Standard penetration test
	Rock core
	Auger
	No recovery

AMLES ENGINEERING CORP.

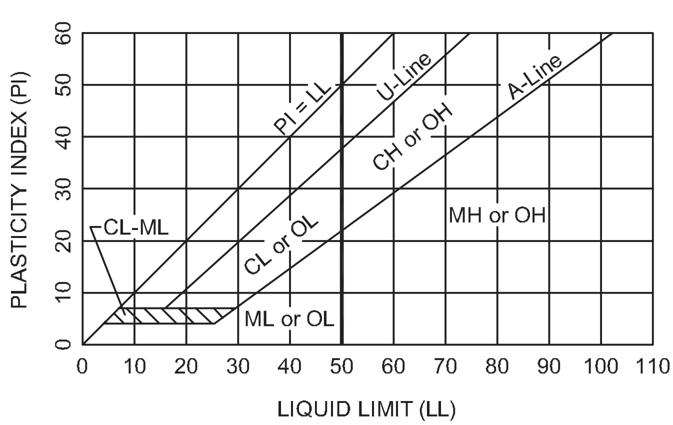
CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation D-2487

MAJOR DIVISIONS				GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (Less than 50% of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)		GW	Well-graded gravel, well-graded gravel with sand
				GP	Poorly-graded gravel, poorly-graded gravel with sand
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	GM	Silty gravel, silty gravel with sand
			Limits plot above "A" line & hatched zone on plasticity chart	GC	Clayey gravel, clayey gravel with sand
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well-graded sand, well-graded sand with gravel
				SP	Poorly-graded sand, poorly-graded sand with gravel
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	SM	Silty sand, silty sand with gravel
			Limits plot above "A" line & hatched zone on plasticity chart	SC	Clayey sand, clayey sand with gravel
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS AND CLAYS (Liquid Limit Less Than 50%)			ML	Silt, silt with sand, silt with gravel, sandy silt, gravelly silt
				CL	Lean clay, lean clay with sand, lean clay with gravel, sandy lean clay, gravelly lean clay
				OL	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt
	SILTS AND CLAYS (Liquid Limit 50% or More)			MH	Elastic silt, elastic silt with sand, sandy elastic silt, gravelly elastic silt
				CH	Fat clay, fat clay with sand, fat clay with gravel, sandy fat clay, gravelly fat clay
				OH	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt

NOTE: Coarse soils between 5% and 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone of the plasticity chart are to have dual symbols.

PLASTICITY CHART



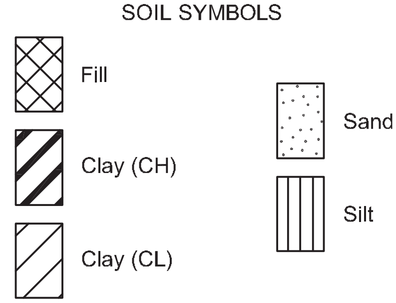
Equation of A-Line: Horizontal at PI=4 to LL=25.5, then PI=0.73(LL-20)

Equation of U-Line: Vertical at LL=16 to PI=7, then PI=0.9(LL-8)

DEGREE OF PLASTICITY OF COHESIVE SOILS

Degree of Plasticity	Plasticity Index
None	0 - 4
Slight	5 - 10
Medium	11 - 20
High	21 - 40
Very High	>40

SOIL SYMBOLS



TERMS USED ON BORING LOGS

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

	6"	3"	3/4"	#4	#10	#40	#200	
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
152	76.2	19.1	4.76	2.00	0.420	0.074	0.002	

SOIL GRAIN SIZE IN MILLIMETERS

STRENGTH OF COHESIVE SOILS

Consistency	Undrained Shear Strength, Kips per Sq. ft.	SPT Blowcount
Very Soft	less than 0.25	< 2 bpf
Soft	0.25 to 0.50	2-4 bpf
Firm	0.50 to 1.00	4-8 bpf
Stiff	1.00 to 2.00	8-16 bpf
Very Stiff	2.00 to 4.00	16-32 bpf
Hard	greater than 4.00	>32 bpf

RELATIVE DENSITY OF COHESIONLESS SOILS FROM STANDARD PENETRATION TEST

Very Loose .... <4 bpf
Loose .... 5-10 bpf
Medium Dense .... 11-30 bpf
Dense .... 31-50 bpf
Very Dense .... >50 bpf

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows per Foot	Description
25	25 blows driving sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows driving sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows driving sampler 3 inches, during initial 6-inches seating interval.

NOTE: To avoid change to sampling tools, driving is limited to 50 blows during or after seating interval.

DRY STRENGTH ASTM D2488

None	Dry specimen crumbles into powder with mere pressure of handling
Low	Dry specimen crumbles into powder with some finger pressure
Medium	Dry specimen breaks into pieces or crumbles with considerable pressure
High	Dry specimen cannot be broken with finger pressure, it can be broken between thumb and hard surface
Very High	Dry specimen cannot be broken between thumb and hard surface

MOISTURE CONDITION ASTM D2488

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the easiness of breaking along these planes.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Friable	Crumbly, can be easily crushed with light pressure.
Blocky	Clays that have a block-like or polyhedral structure.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil types.
Interlayered	Soil sample composed of alternating layers of different soil types.
Intermixed	Soil sample composed of pockets of different soil types and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of calcium material.

AVILES
ENGINEERING CORP.

ASTM & TXDOT DESIGNATION FOR SOIL LABORATORY TESTS

SOIL TEST	ASTM TEST DESIGNATION	TXDOT TEST DESIGNATION
Unified Soil Classification System	D 2487	Tex-142-E
Moisture Content	D 2216	Tex-103-E
Specific Gravity	D 854	Tex-108-E
Sieve Analysis	D 6913	Tex-110-E (Part 1)
Hydrometer Analysis	D 7928	Tex-110-E (Part 2)
Minus No. 200 Sieve	D 1140	Tex-111-E
Liquid Limit	D 4318	Tex-104-E
Plastic Limit	D 4318	Tex-105-E
Standard Proctor Compaction	D 698	Tex-114-E
Modified Proctor Compaction	D 1557	Tex-113-E
California Bearing Ratio	D 1883	-
Swell	D 4546	-
Consolidation	D 2435	-
Unconfined Compression	D 2166	-
Unconsolidated-Undrained Triaxial	D 2850	Tex-118-E
Consolidated-Undrained Triaxial	D 4767	Tex-131-E
Permeability (constant head)	D 5084	-
Pinhole	D 4647	-
Crumb	D 6572	-
Double Hydrometer	D 4221	-
pH of Soil	D 4972	Tex-128-E
Soil Suction	D 5298	-
Soil Sulfate	C 1580	Tex-145-E
Organics	D 2974	Tex-148-E

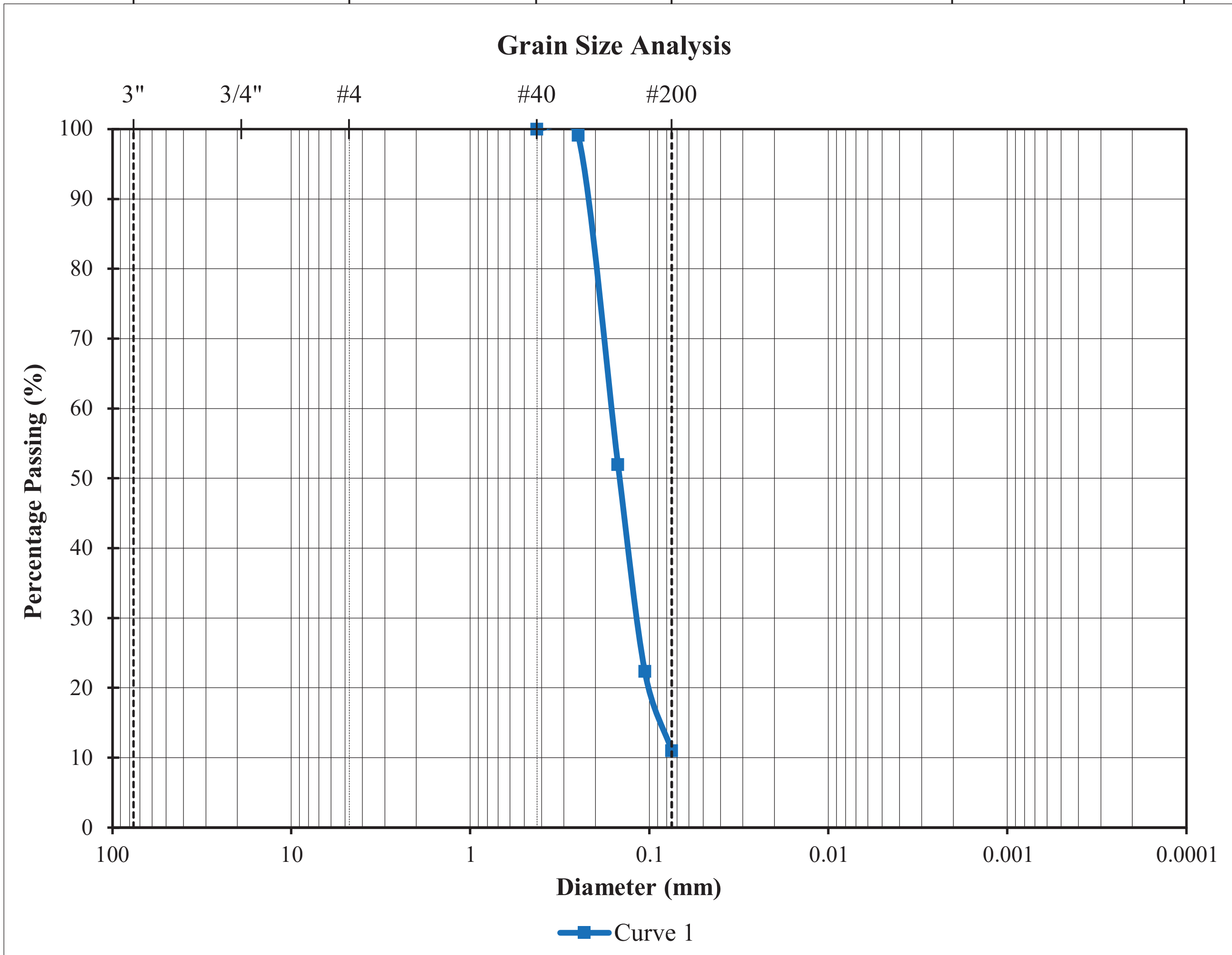
AVILES ENGINEERING CORPORATION

Consulting Engineers - Geotechnical, Construction Materials Testing, Environmental

GRAIN SIZE ANALYSIS - SIEVE

Project : EFD Taxiway L Geotechnical Investigation **Job No.:** G103-21
Location of Project: Houston, TX **Date of Testing:** 7/6/2021

		Sand				
	Gravel	Coarse to Medium	Fine	Silt	Clay	



Curve	Boring	Depth (ft)	Soil Description	Cu	Cc	D_{50} (mm)
1	B-28	12-14	Poorly Graded Sand with Silt (SP-SM)	N/A	N/A	0.147

AVILES ENGINEERING CORPORATION

Consulting Engineers - Geotechnical, Construction Materials Testing, Environmental

ORGANIC MATTER IN SOILS

ASTM D 2974, Test Method C

Project : EFD Taxiway L Geotechnical Investigation
Location of Project: Houston, Texas

Job No.: G103-21
Date of Testing:

Boring	B-1	B-5	B-9	B-13
Depth (ft)	6 to 8	0 to 2	2 to 4	0 to 2
Soil Description	Fat Clay (CH)	Fill: Fat Clay (CH)	Fat Clay (CH)	Fat Clay (CH)
Organic Matter Content	**4.6%**	**5.0%**	**5.5%**	**5.7%**
Furnace Temperature, ^oC	440	440	440	440

Boring	B-17	B-21	B-25	B-31
Depth (ft)	0 to 2	0 to 2	4 to 6	0 to 2
Soil Description	Fat Clay (CH)	Lean Clay (CL)	Fat Clay with Sand (CH)	Lean Clay with Sand (CL)
Organic Matter Content	**5.7%**	**5.3%**	**3.0%**	**3.8%**
Furnace Temperature, ^oC	440	440	440	440

Boring	B-33	B-37	B-41	B-45
Depth (ft)	0 to 2	0 to 2	0 to 2	4 to 6
Soil Description	Fill: Fat Clay (CH)	Fat Clay (CH)	Fill: Fat Clay (CH)	Fat Clay (CH)
Organic Matter Content	**6.2%**	**5.8%**	**5.2%**	**3.1%**
Furnace Temperature, ^oC	440	440	440	440

Boring	B-49	B-53	B-57	B-61
Depth (ft)	2 to 4	0 to 2	2 to 4	6 to 8
Soil Description	Fill: Fat Clay (CH)	Fill: Fat Clay (CH)	Fat Clay (CH)	Sandy Lean Clay (CL)
Organic Matter Content	**2.5%**	**4.1%**	**3.1%**	**2.5%**
Furnace Temperature, ^oC	440	440	440	440

AVILES ENGINEERING CORPORATION

Consulting Engineers - Geotechnical, Construction Materials Testing, Environmental

ORGANIC MATTER IN SOILS

ASTM D 2974, Test Method C

Project : EFD Taxiway L Geotechnical Investigation
Job No.: G103-21
Location of Project: Houston, Texas
Date of Testing:

Boring	**B-65**	**B-69**	**B-73**	
Depth (ft)	6 to 8	6 to 8	0 to 2	
Soil Description	Fat Clay (CH)	Fat Clay (CH)	Fill: Fat Clay with Sand (CH)	
Organic Matter Content	**4.5%**	**5.9%**	**3.9%**	
Furnace Temperature, ^{o}C	440	440	440	

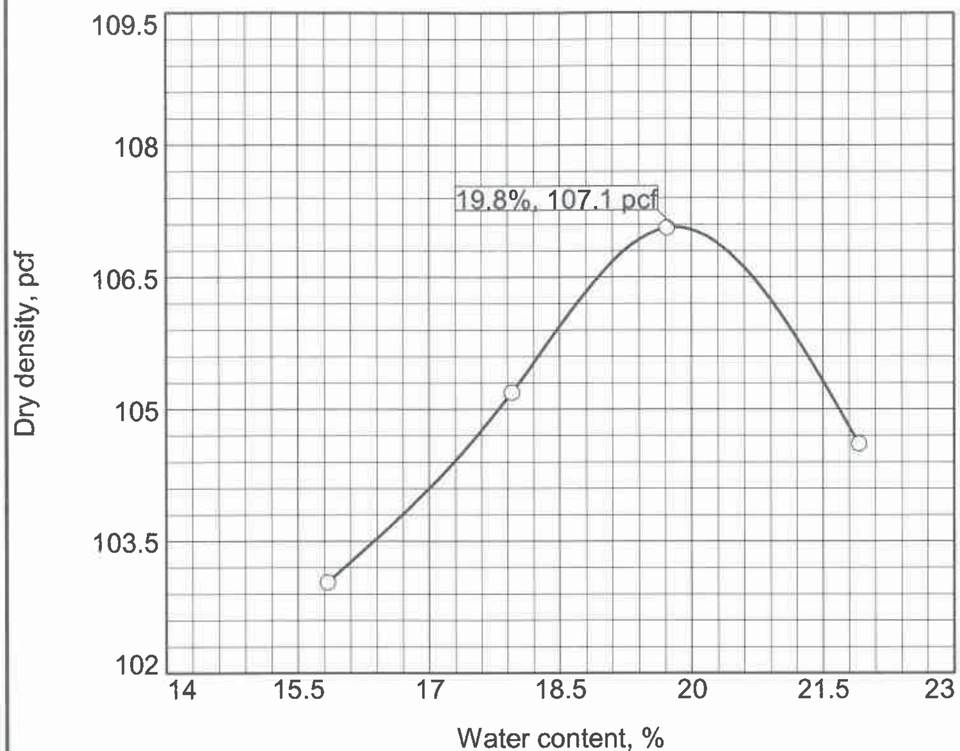
AVILES ENGINEERING CORP.

APPENDIX B

Plates B-1 to B-4	Modified Proctor Test Results
Plates B-5 to B-12	California Bearing Ratio (CBR) Test Results
Plates B-13 to B-49	Dynamic Cone Penetrometer Test Results

COMPACTION TEST REPORT

Curve No.



Test Specification:
ASTM D 1557 Method A Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers 5
Blows per Layer 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM **LL** 73 **PI** 51
Sp.G. (ASTM D 854)
%>#4 **%<No.200** 95.4
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	3793.9	3865.2	3927.3	3917.5		
WM	1989.5	1989.5	1989.5	1989.5		
WW + T #1	802.9	519.7	660.4	617.9		
WD + T #1	716.5	467.2	580.9	538.1		
TARE #1	170.9	174.3	178.0	174.1		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	15.8	17.9	19.7	21.9		
DRY DENSITY	103.0	105.2	107.1	104.6		

TEST RESULTS	Material Description
Maximum dry density = 107.1 pcf Optimum moisture = 19.8 %	Fat Clay (CH)

Project No. G103-21 **Client:**
Project:

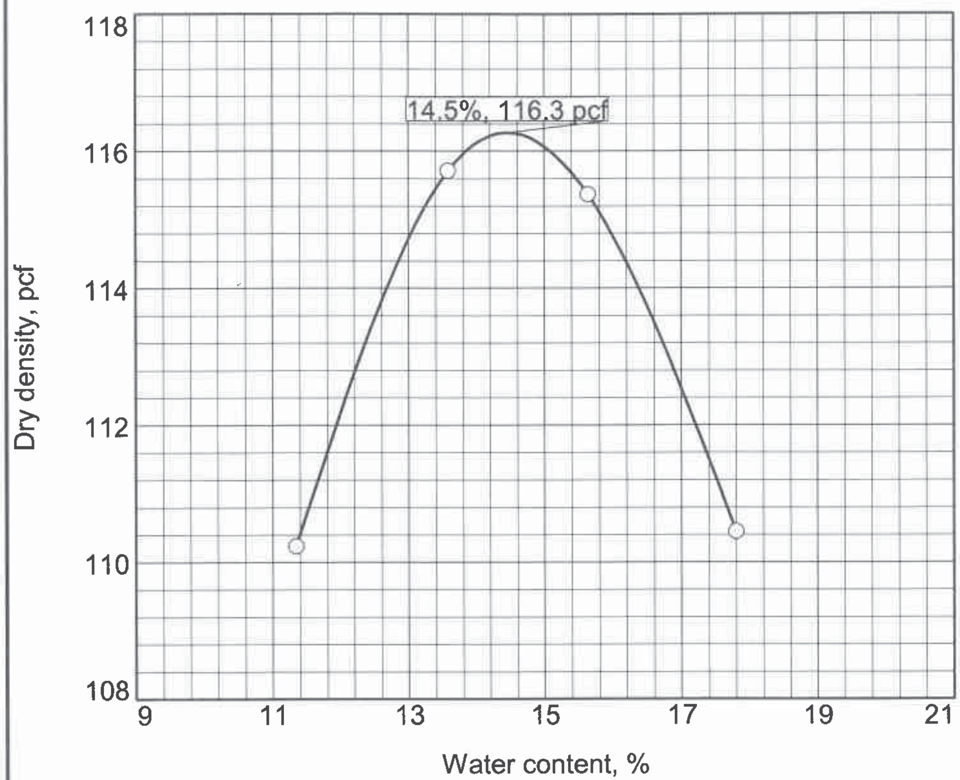
○ **Location:** B-8 CBR

Remarks:

Checked by:
Title:

Aviles Engineering Corp.

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers 5
Blows per Layer 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM **LL** 59 **PI** 42
Sp.G. (ASTM D 854)
%>#4 **%<No.200** 90.4
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	3844.8	3976.1	4006.0	3956.1		
WM	1989.1	1989.1	1989.1	1989.1		
WW + T #1	812.7	728.9	555.8	593.8		
WD + T #1	747.7	662.6	503.7	529.9		
TARE #1	174.5	174.7	170.2	170.6		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	11.3	13.6	15.6	17.8		
DRY DENSITY	110.2	115.7	115.4	110.4		

TEST RESULTS

Maximum dry density = 116.3 pcf

Optimum moisture = 14.5 %

Material Description

Fat Clay (CH)

Remarks:

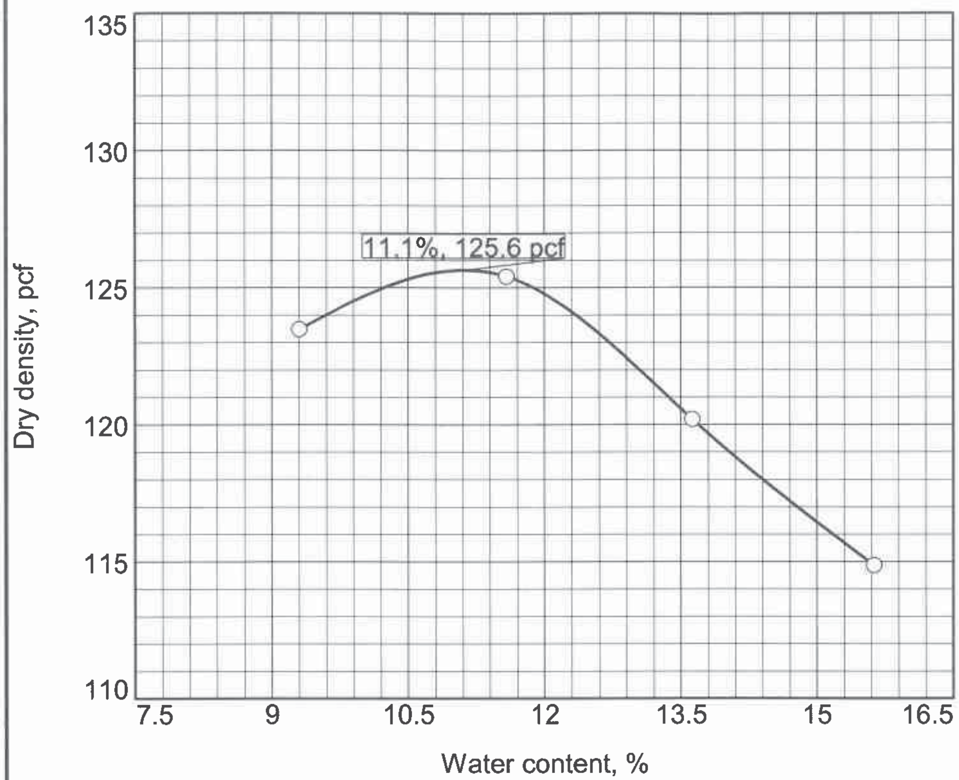
Project No. G103-21 **Client:**
Project:

○ **Location:** B-19 CBR

Checked by:
Title:

Aviles Engineering Corp.

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers 5
Blows per Layer 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM **LL** 44 **PI** 30
Sp.G. (ASTM D 854)
%>#4 **%<No.200** 76.2
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	4030.1	4105.0	4054.3	3997.4		
WM	1989.5	1989.5	1989.5	1989.5		
WW + T #1	645.7	753.2	677.1	640.3		
WD + T #1	605.6	693.5	616.8	576.8		
TARE #1	174.1	177.9	174.2	170.9		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	9.3	11.6	13.6	15.6		
DRY DENSITY	123.5	125.4	120.2	114.9		

TEST RESULTS

Maximum dry density = 125.6 pcf

Optimum moisture = 11.1 %

Material Description

Lean Clay with Sand (CL)

Remarks:

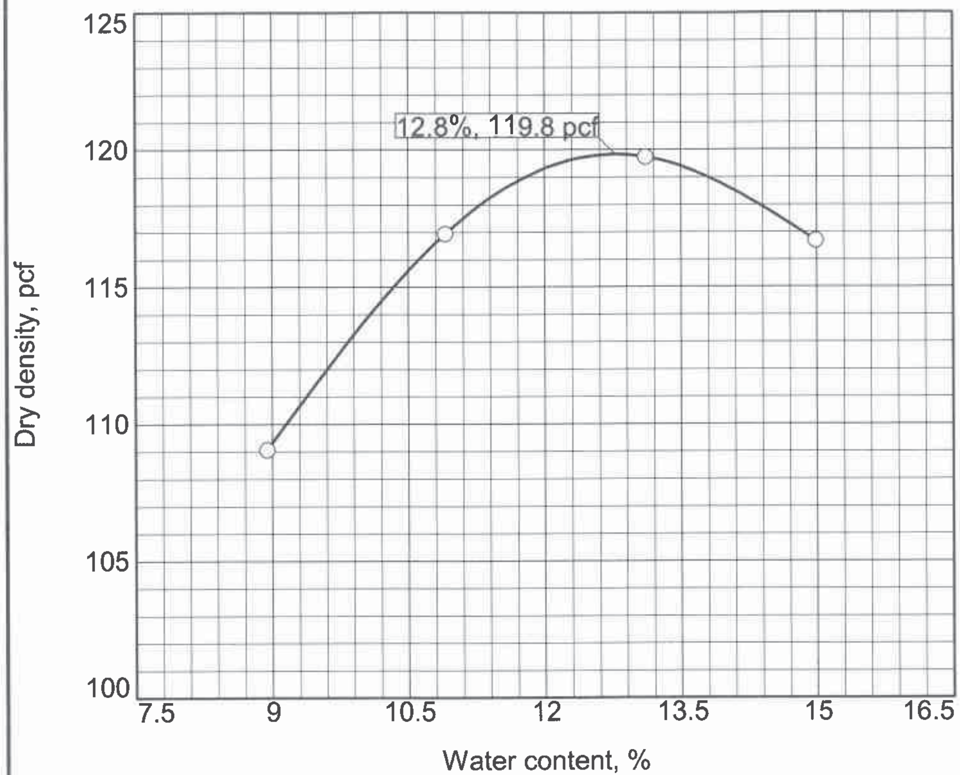
Project No. G103-21 **Client:**
Project:

○ **Location:** B-31 CBR

Aviles Engineering Corp.

Checked by:
Title:

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Preparation Method
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers 5
Blows per Layer 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

NM **LL** 45 **PI** 29
Sp.G. (ASTM D 854)
%>#4 **%<No.200** 91.5
USCS **AASHTO**
Date Sampled
Date Tested
Tested By

TESTING DATA

	1	2	3	4	5	6
WM + WS	3785.7	3950.1	4036.8	4017.8		
WM	1989.3	1989.3	1989.3	1989.3		
WW + T #1	1002.0	866.9	881.4	757.9		
WD + T #1	934.2	798.4	799.6	681.1		
TARE #1	176.0	170.4	175.6	169.1		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	8.9	10.9	13.1	15.0		
DRY DENSITY	109.1	116.9	119.7	116.7		

TEST RESULTS

Maximum dry density = 119.8 pcf

Optimum moisture = 12.8 %

Material Description

Lean Clay (CL)

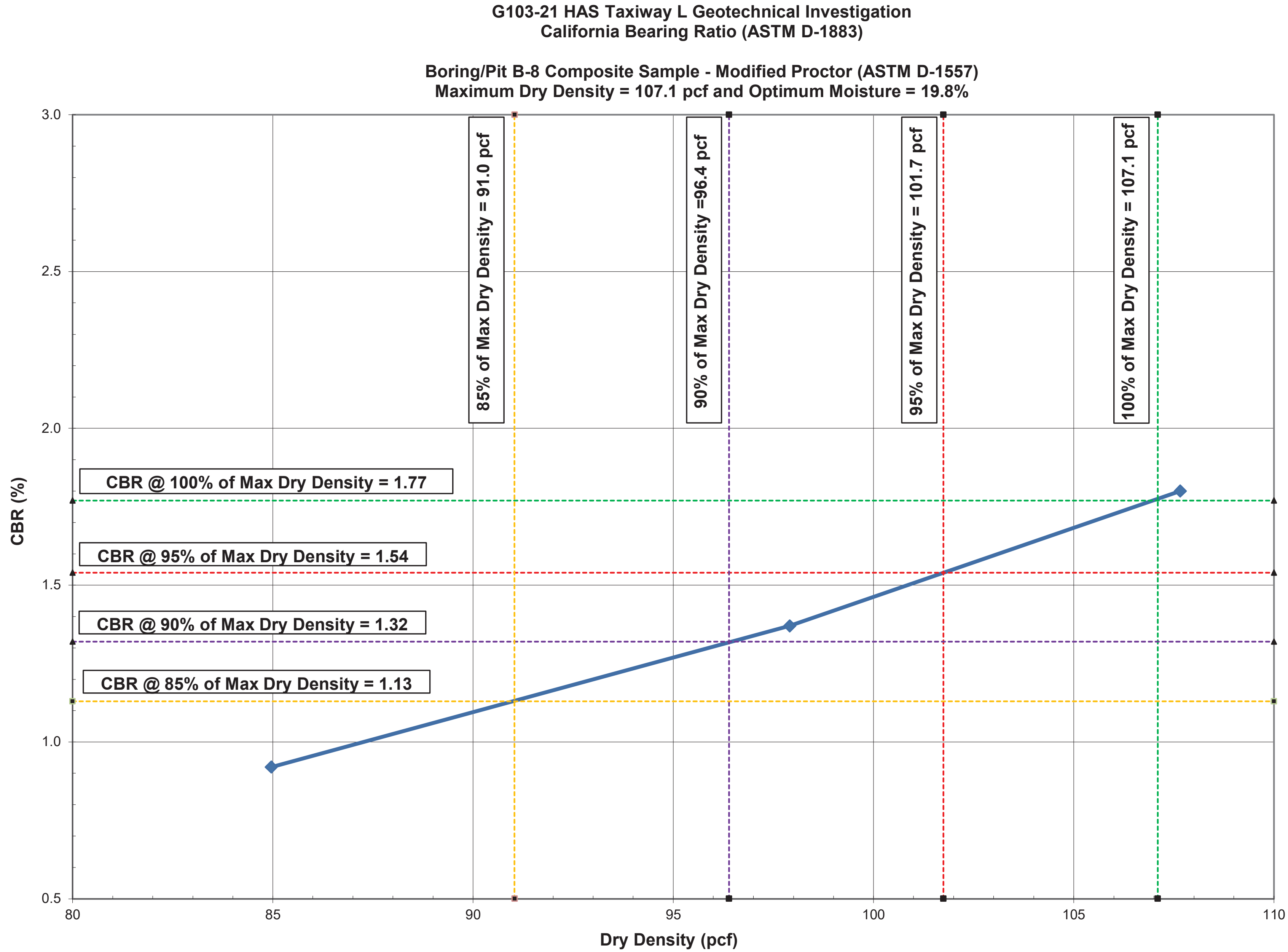
Remarks:

Project No. G103-21 **Client:**
Project:

○ **Location:** B-44 CBR

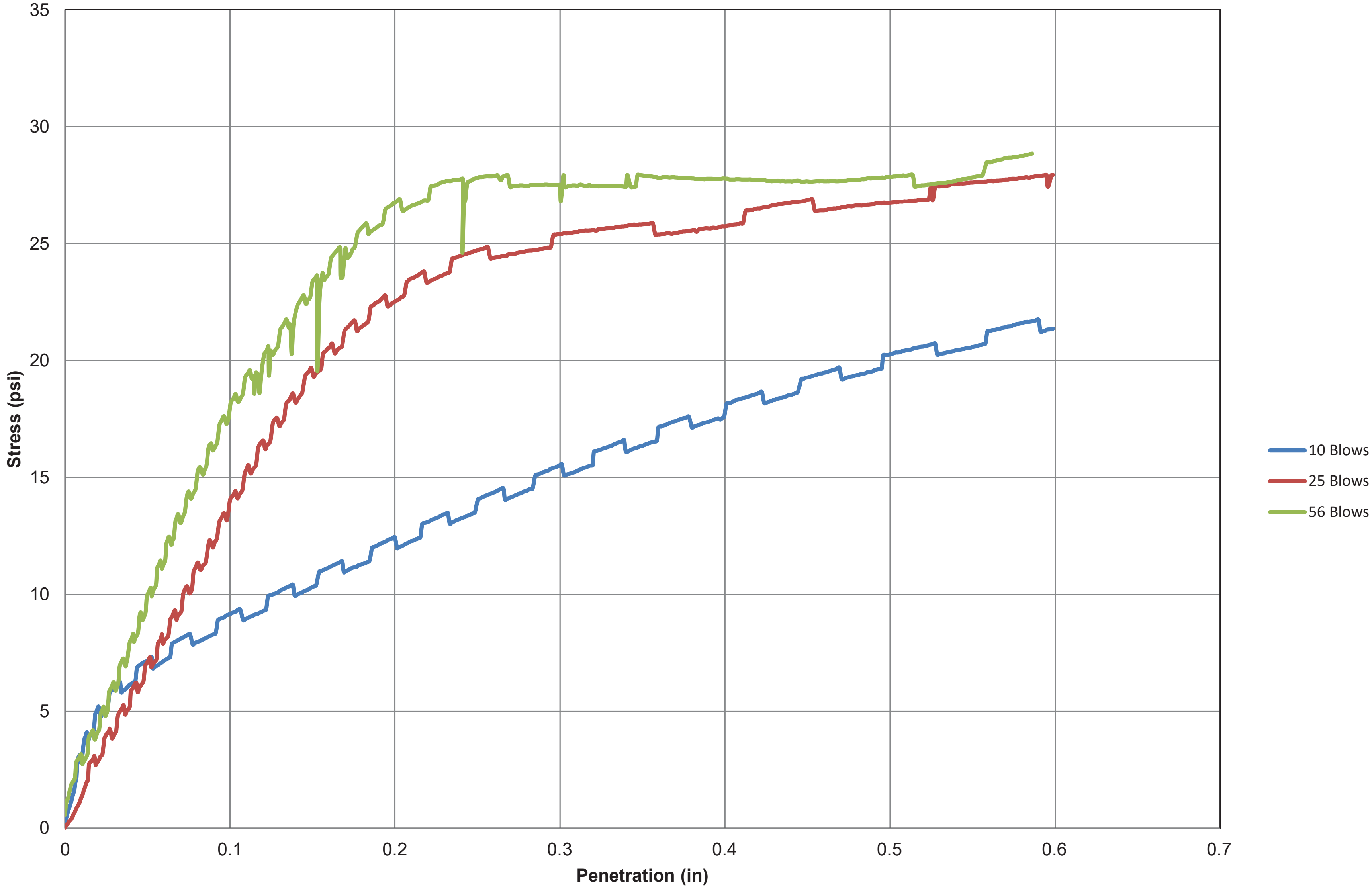
Aviles Engineering Corp.

Checked by:
Title:


G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)
Boring/Pit B-8 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 107.1 pcf and Optimum Moisture = 19.8%
85% of Max Dry Density = 91.0 pcf
90% of Max Dry Density =96.4 pcf
95% of Max Dry Density = 101.7 pcf
100% of Max Dry Density = 107.1 pcf
CBR @ 100% of Max Dry Density = 1.77
CBR @ 95% of Max Dry Density = 1.54
CBR @ 90% of Max Dry Density = 1.32
CBR @ 85% of Max Dry Density = 1.13
CBR (%)
3.0
2.5
2.0
1.5
1.0
0.5
80
85
90
95
100
105
110
Dry Density (pcf)

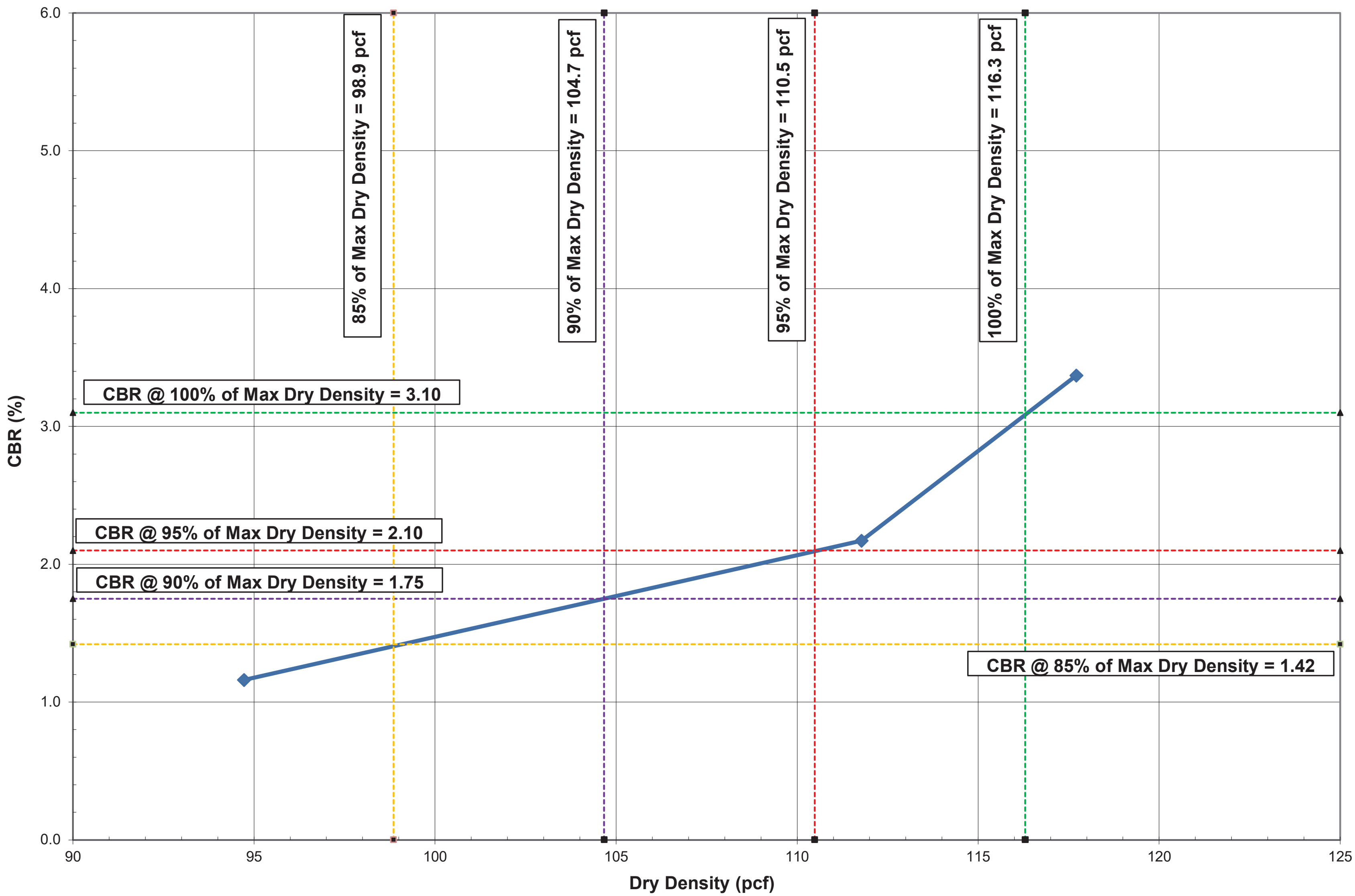
G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

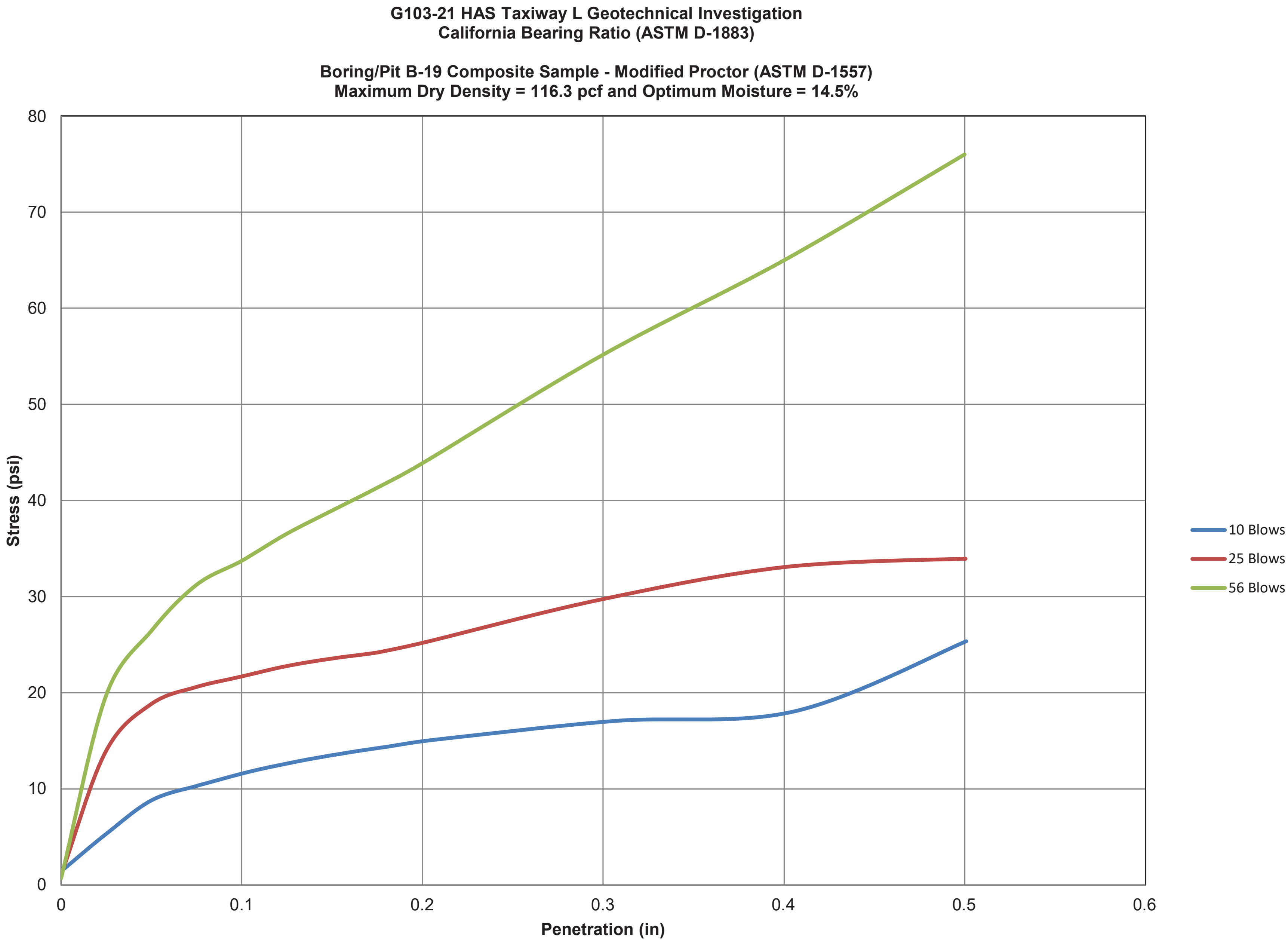
Boring/Pit B-8 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 107.1 pcf and Optimum Moisture = 19.8%



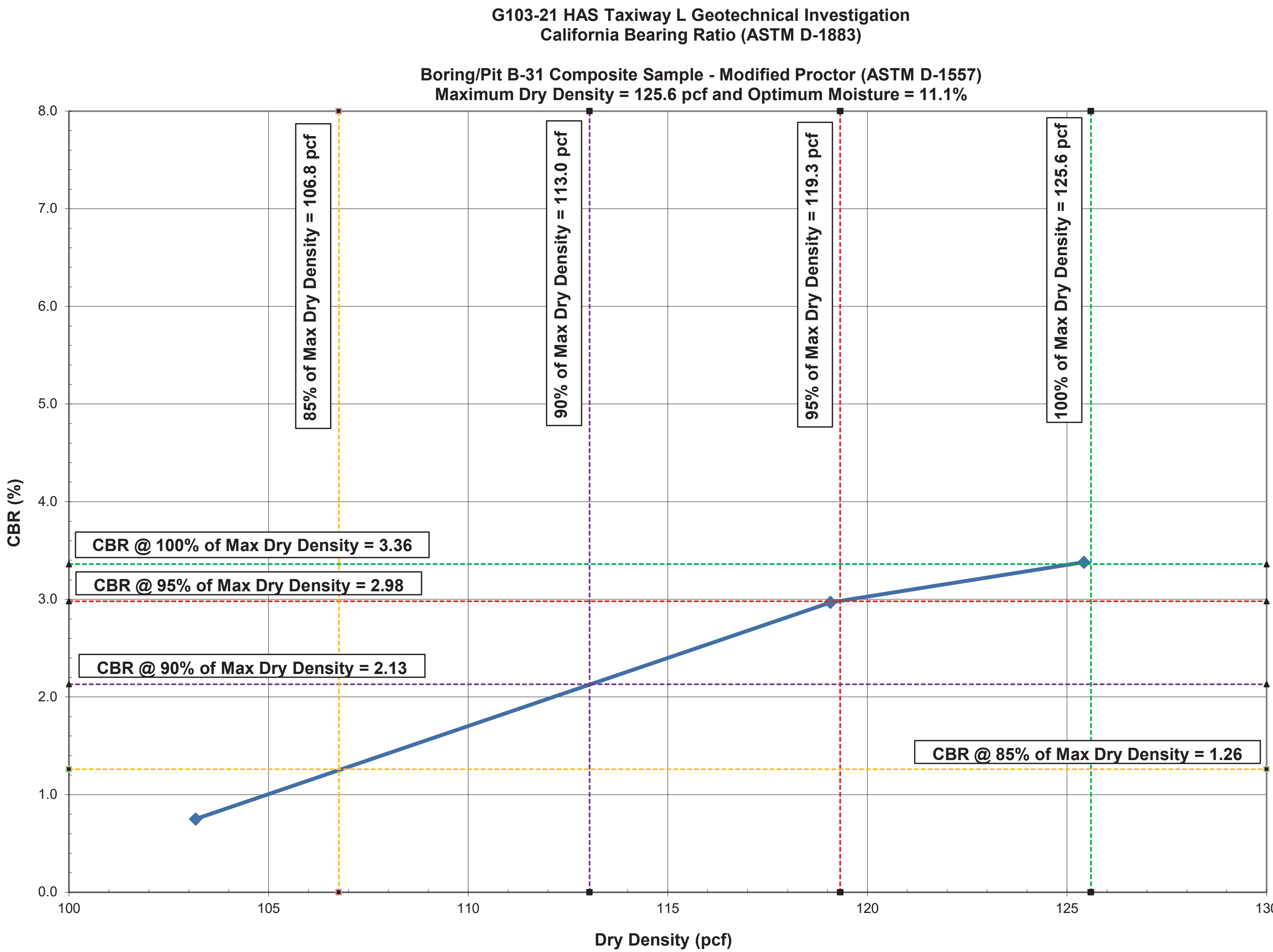
G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-19 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 116.3 pcf and Optimum Moisture = 14.5%



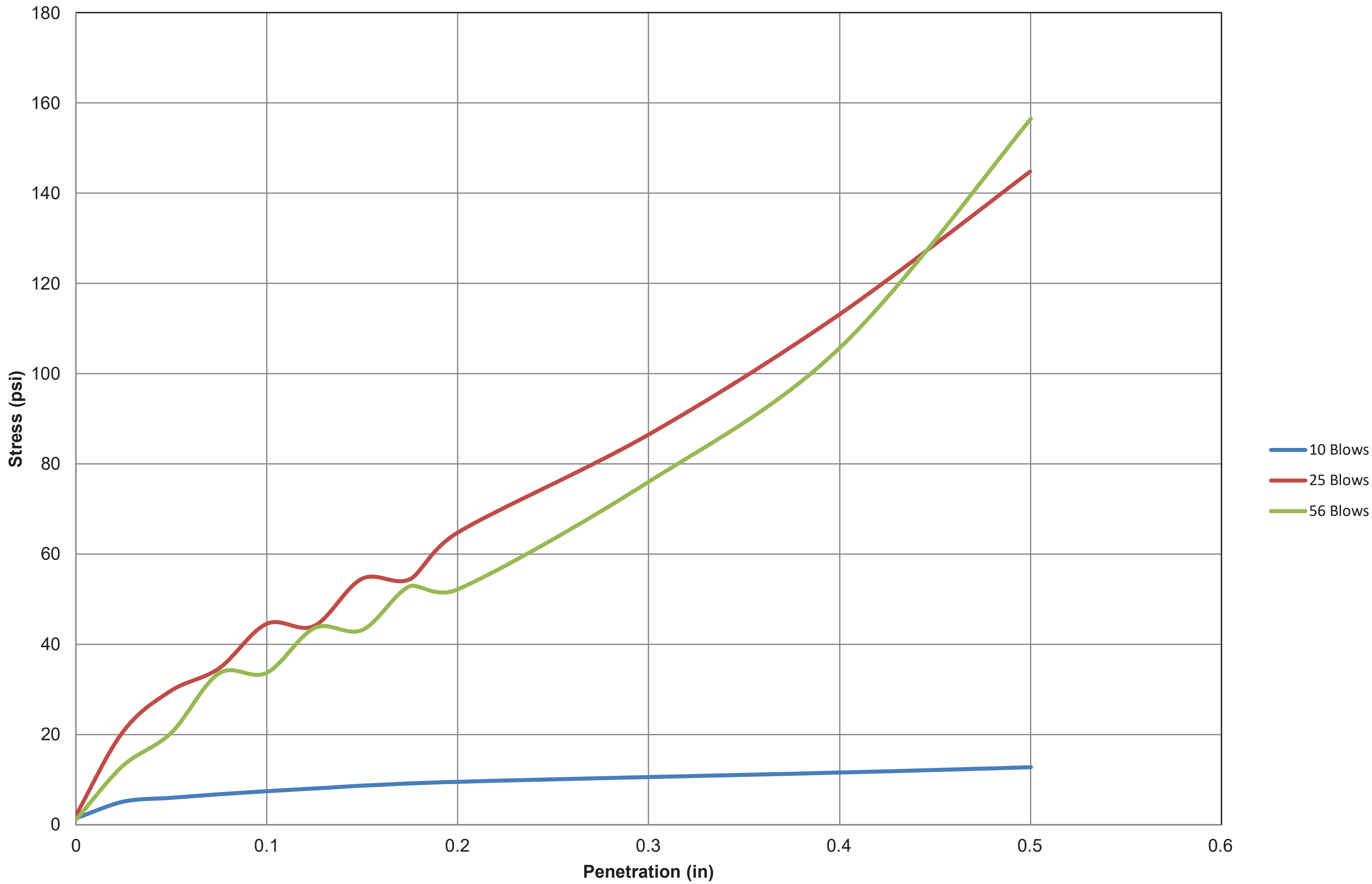


G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)
Boring/Pit B-19 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 116.3 pcf and Optimum Moisture = 14.5%
Stress (psi)
80
70
60
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Penetration (in)
10 Blows
25 Blows
56 Blows


G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)
Boring/Pit B-31 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 125.6 pcf and Optimum Moisture = 11.1%
85% of Max Dry Density = 106.8 pcf
90% of Max Dry Density = 113.0 pcf
95% of Max Dry Density = 119.3 pcf
100% of Max Dry Density = 125.6 pcf
CBR @ 100% of Max Dry Density = 3.36
CBR @ 95% of Max Dry Density = 2.98
CBR @ 90% of Max Dry Density = 2.13
CBR @ 85% of Max Dry Density = 1.26
CBR (%)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
100
105
110
115
120
125
130
Dry Density (pcf)

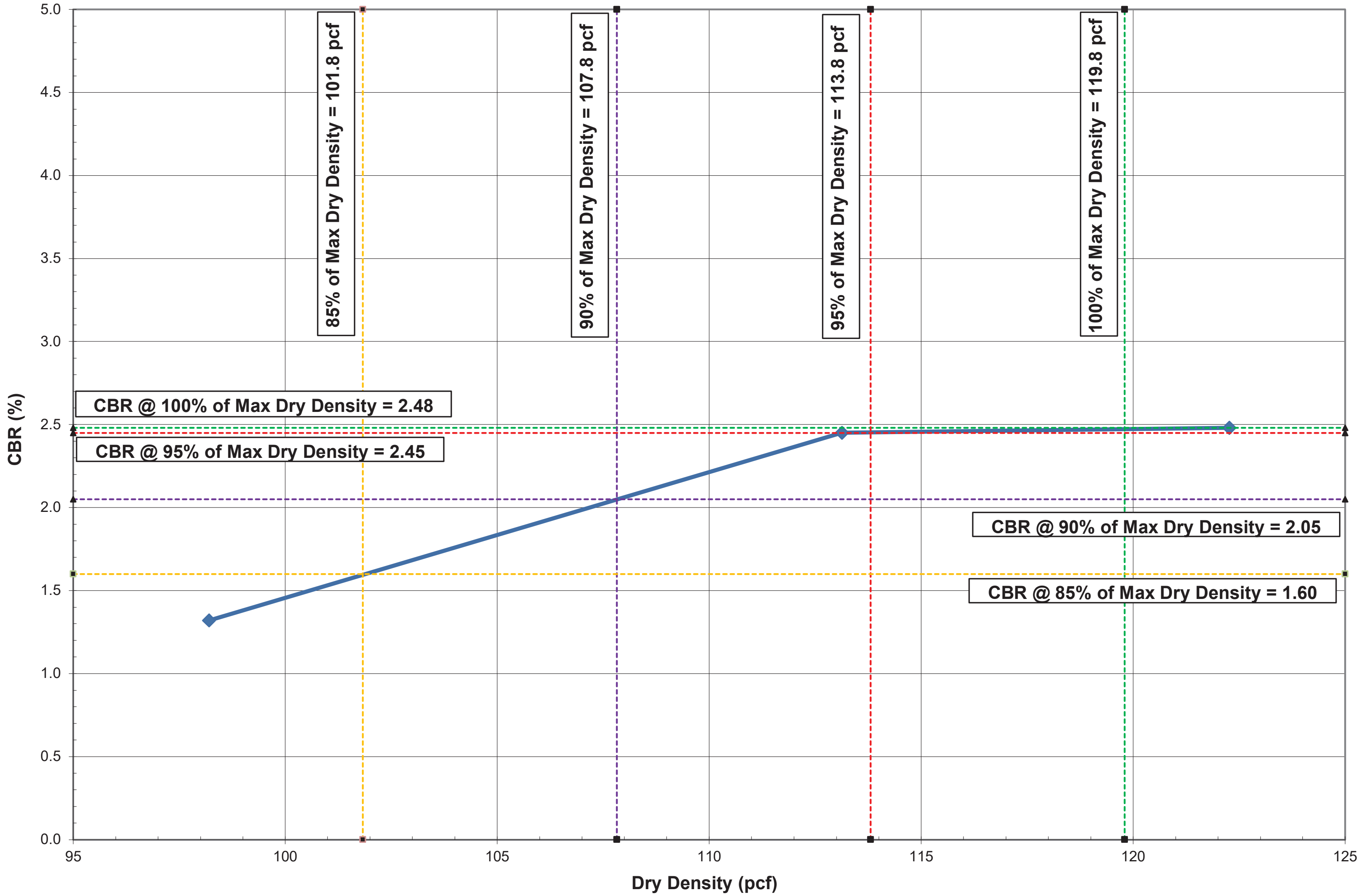
G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

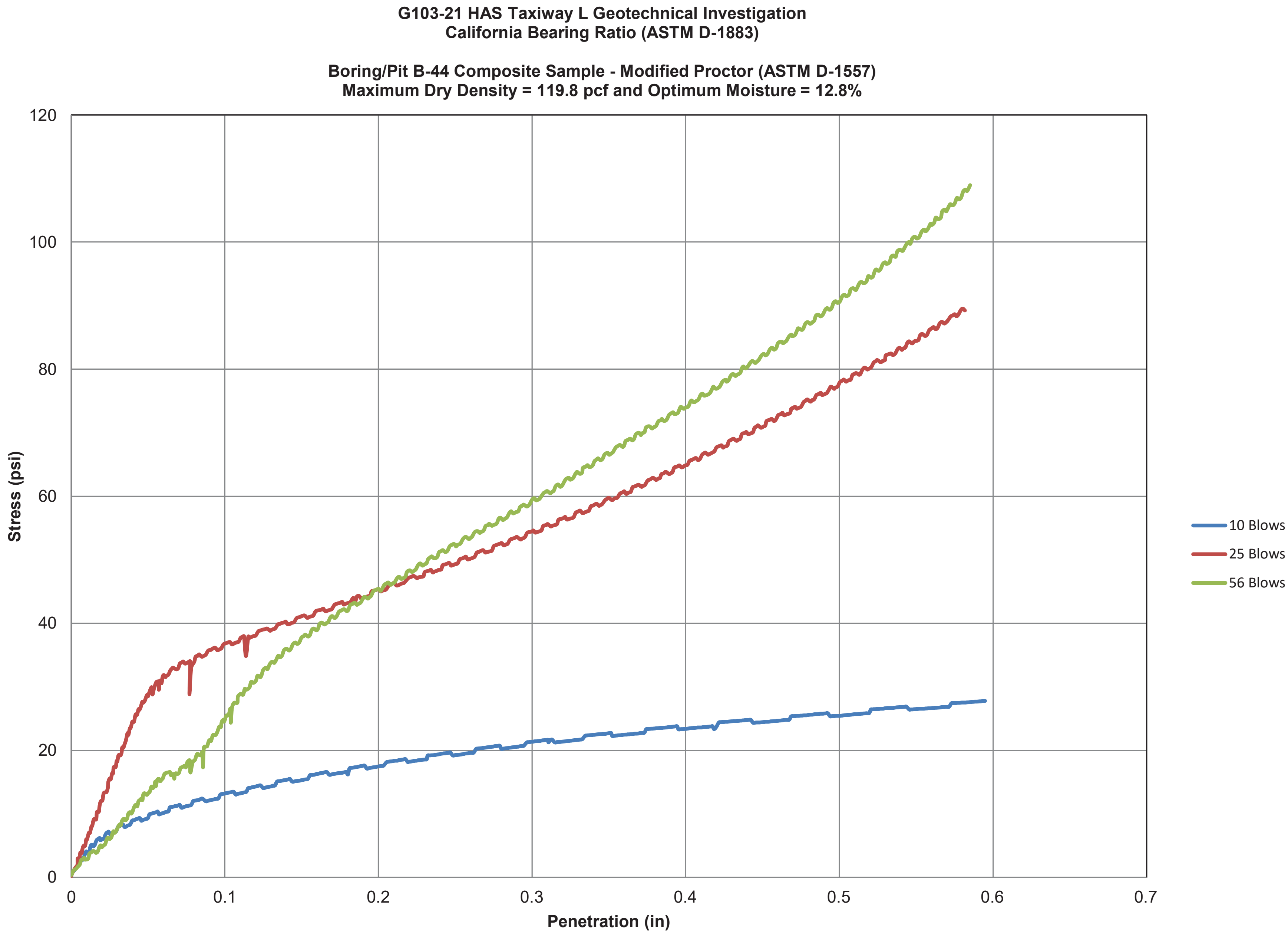
Boring/Pit B-31 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 125.6 pcf and Optimum Moisture = 11.1%



G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-44 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 119.8 pcf and Optimum Moisture = 12.8%




G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)
Boring/Pit B-44 Composite Sample - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 119.8 pcf and Optimum Moisture = 12.8%
Stress (psi)
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
Penetration (in)
10 Blows
25 Blows
56 Blows

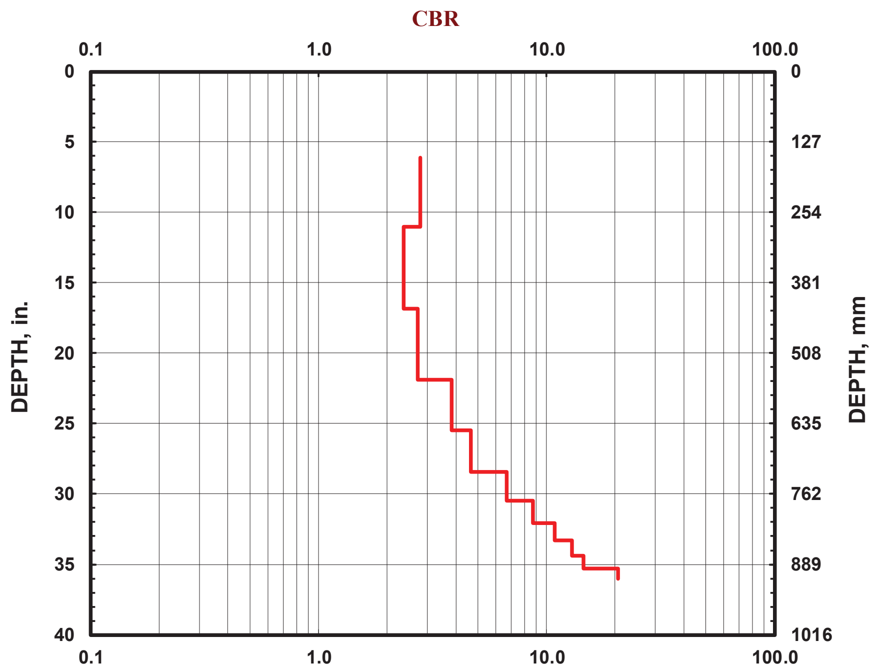
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

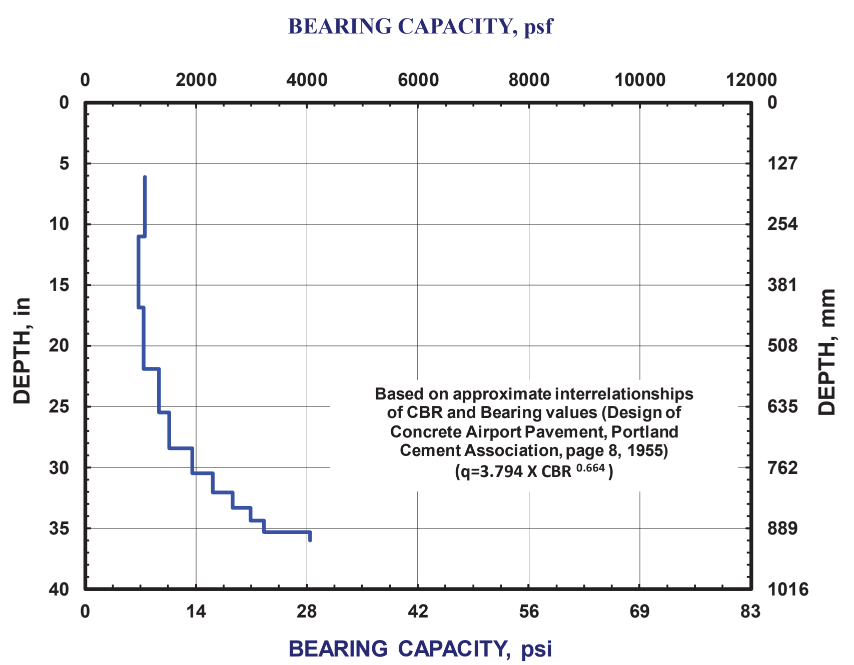
Project: *G103-21* **Date:** 15-Jul-21
Location: B-2 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	155	1
1	280	1
1	428	1
1	556	1
1	647	1
1	722	1
1	774	1
1	814	1
1	846	1
1	873	1
1	897	1
1	914	1





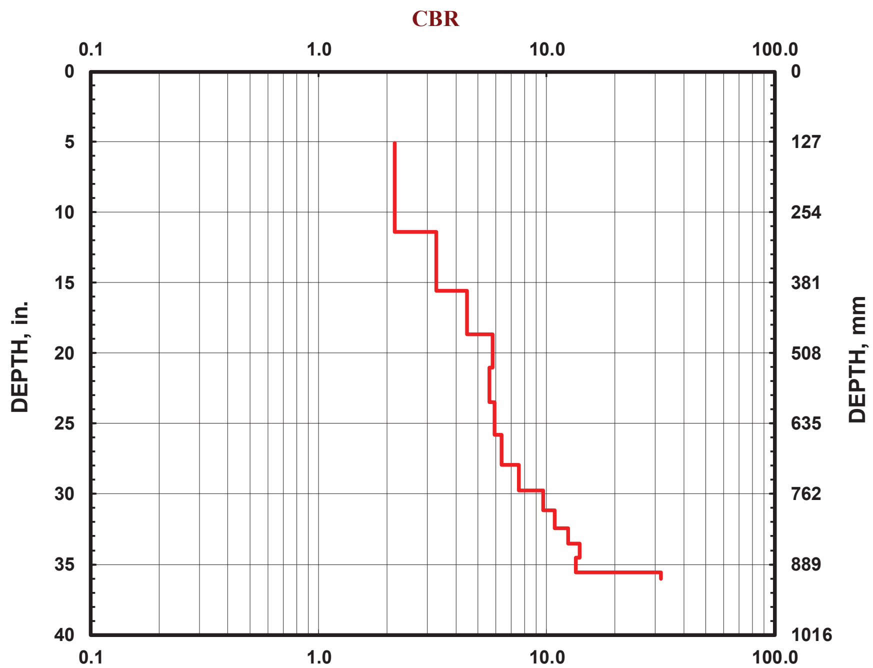
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

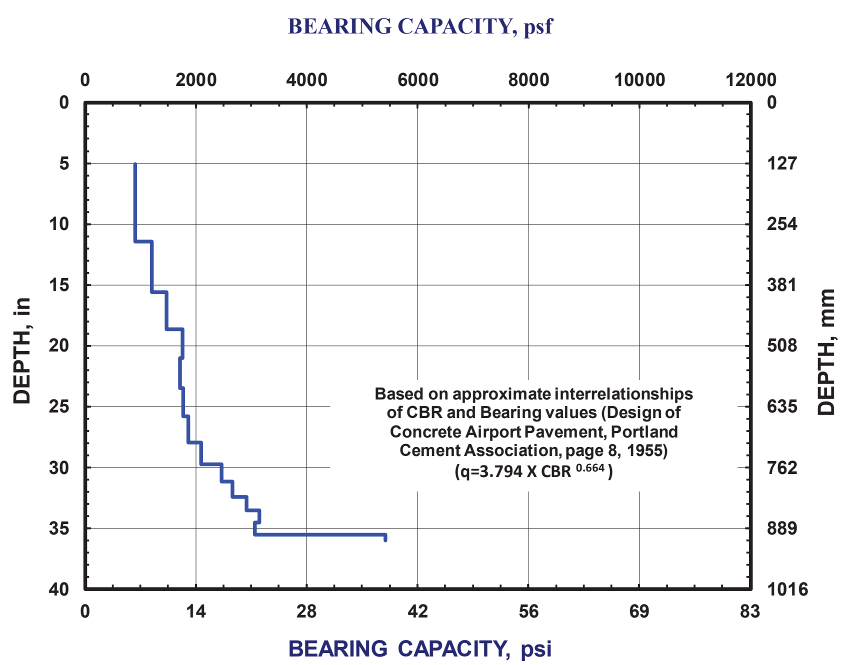
Project: *G103-21*
Location: B-4
Date: 14-Jul-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	128	1
1	290	1
1	396	1
1	474	1
1	534	1
1	596	1
1	655	1
1	710	1
1	756	1
1	792	1
1	824	1
1	852	1
1	877	1
1	903	1
1	914	1





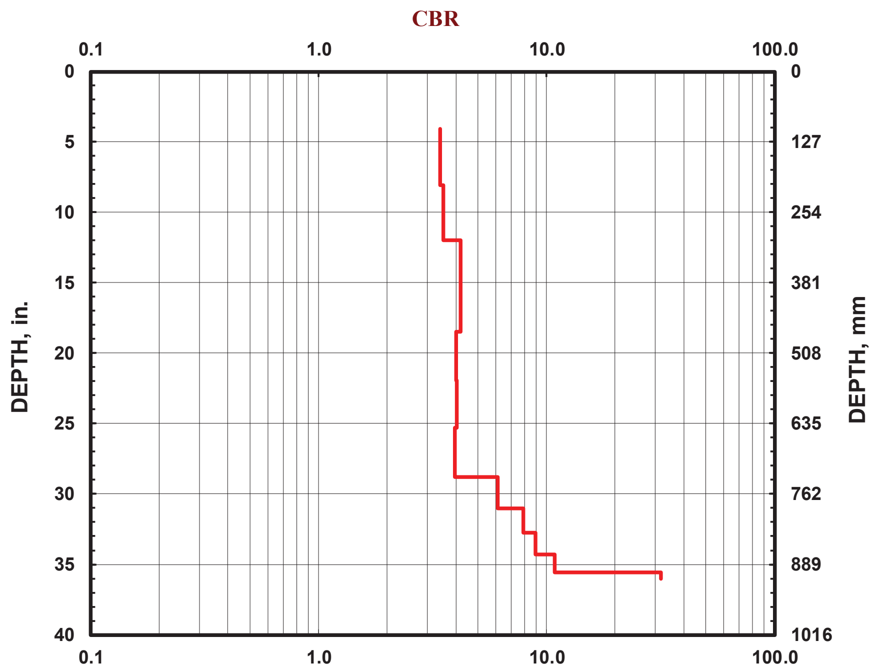
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

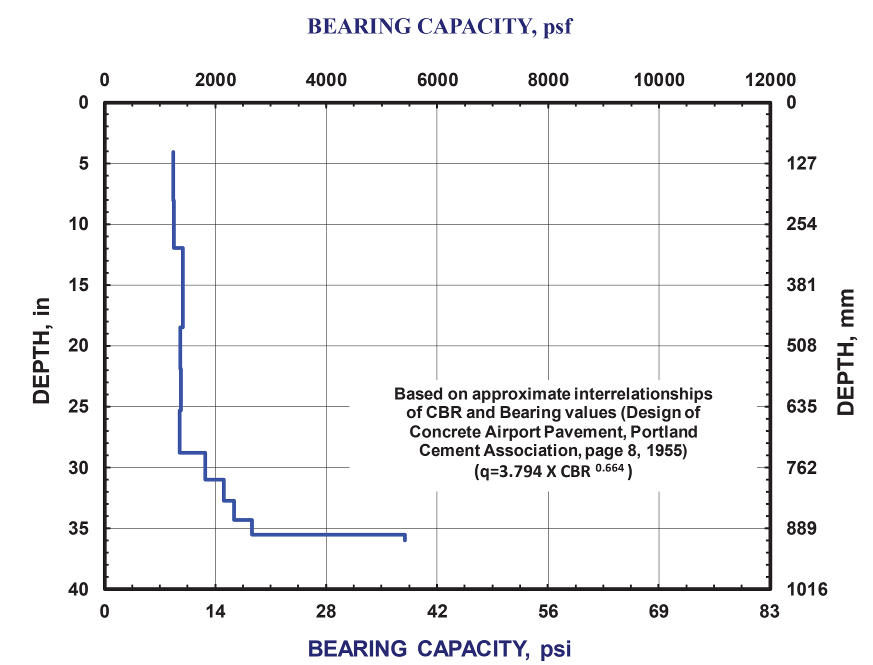
Project: *G103-21*
Location: B-6
Date: 14-Jul-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	103	1
1	205	1
1	304	1
1	387	1
1	470	1
1	557	1
1	643	1
1	731	1
1	788	1
1	832	1
1	871	1
1	903	1
1	914	1





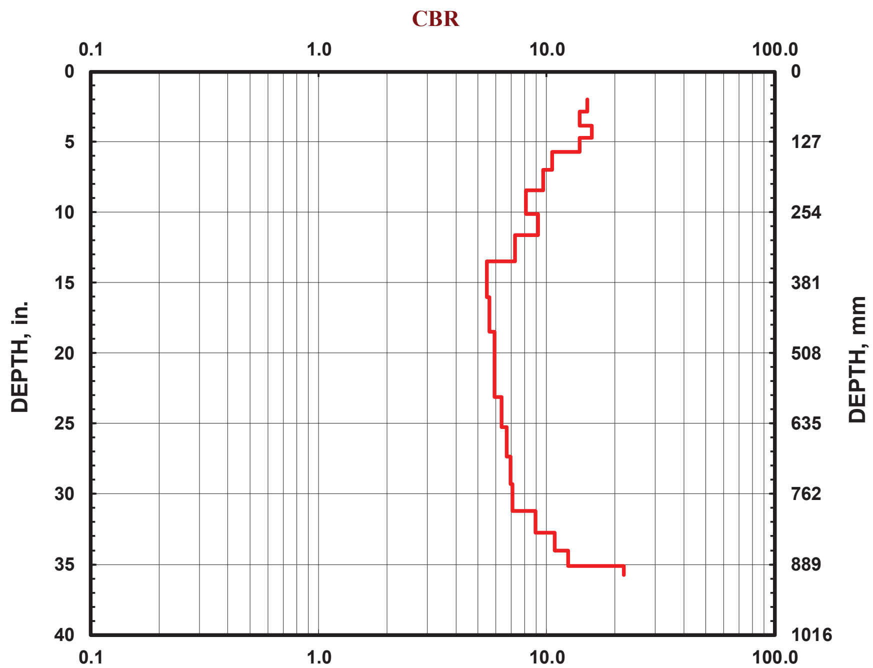
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

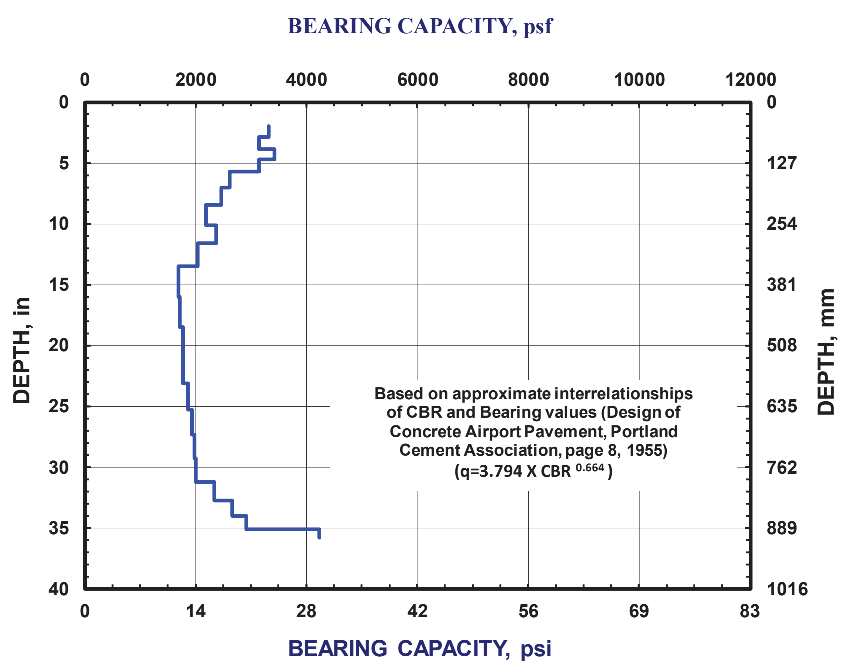
Project: *G103-21* Date: 14-Jul-21
Location: B-7 Soil Type(s): High plasticity Clay

Hammer
- 10.1 lbs.
- 17.6 lbs. (selected)
- Both hammers used

Soil Type
- CH (selected)
- CL
- All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	50	1
1	73	1
1	98	1
1	120	1
1	145	1
1	178	1
1	214	1
1	257	1
1	295	1
1	343	1
1	407	1
1	469	1
1	528	1
1	587	1
1	642	1
1	694	1
1	744	1
1	793	1
1	832	1
1	864	1
1	892	1
1	908	1





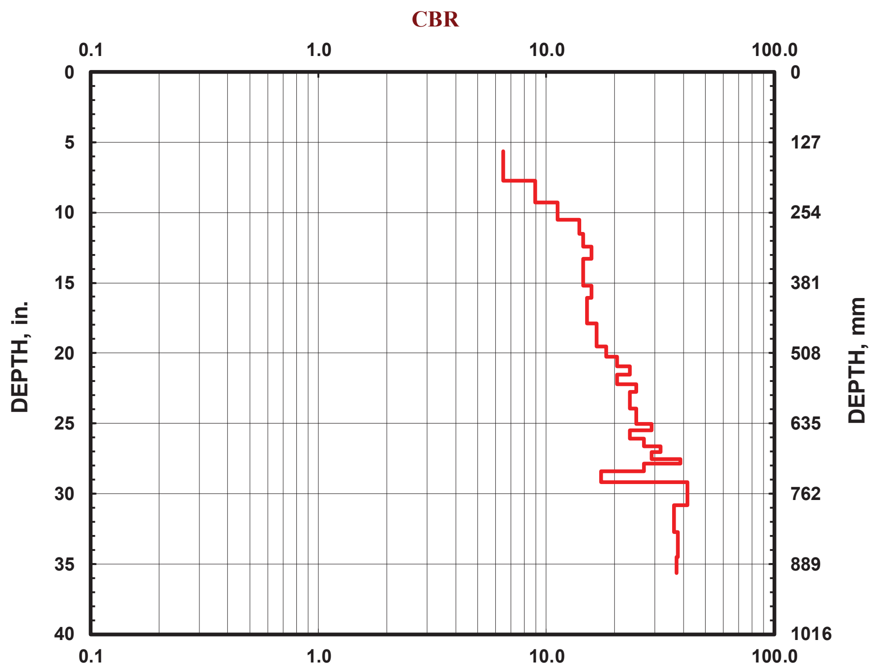
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

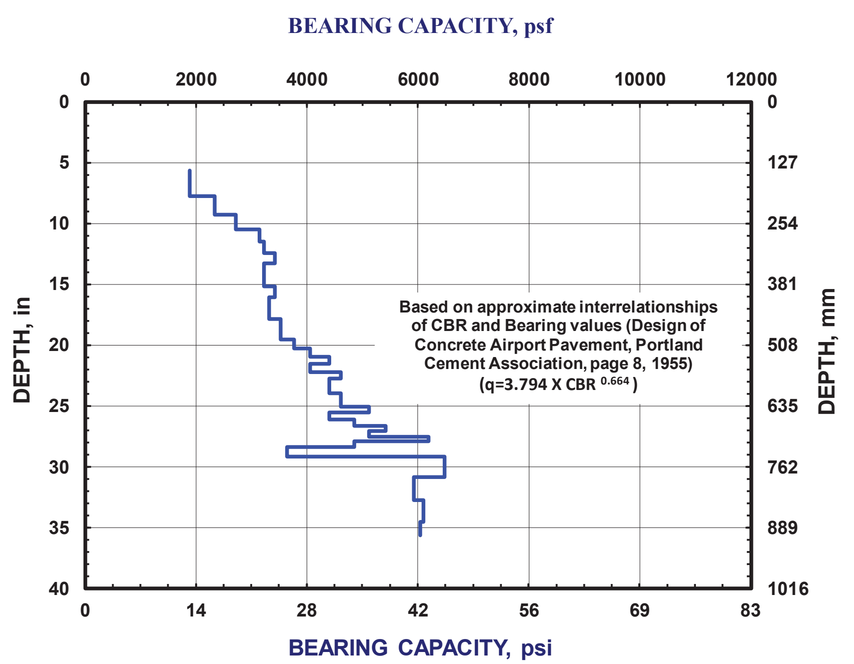
Project: G103-21 **Date:** 14-Jul-21
Location: B-8 **Soil Type(s):** High plasticity Clay

Hammer
- 10.1 lbs.
- 17.6 lbs. (selected)
- Both hammers used

Soil Type
- CH (selected)
- CL
- All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	143	1
1	197	1
1	236	1
1	267	1
1	292	1
1	316	1
1	338	1
1	362	1
1	386	1
1	408	1
1	431	1
1	454	1
1	475	1
1	496	1
1	515	1
1	532	1
1	547	1
1	564	1
1	578	1
1	593	1
1	608	1
1	622	1
1	636	1
1	648	1
1	663	1
1	676	1
1	687	1
1	699	1
1	708	1
1	721	1
1	741	1
5	783	1
5	831	1
5	877	1
3	905	1





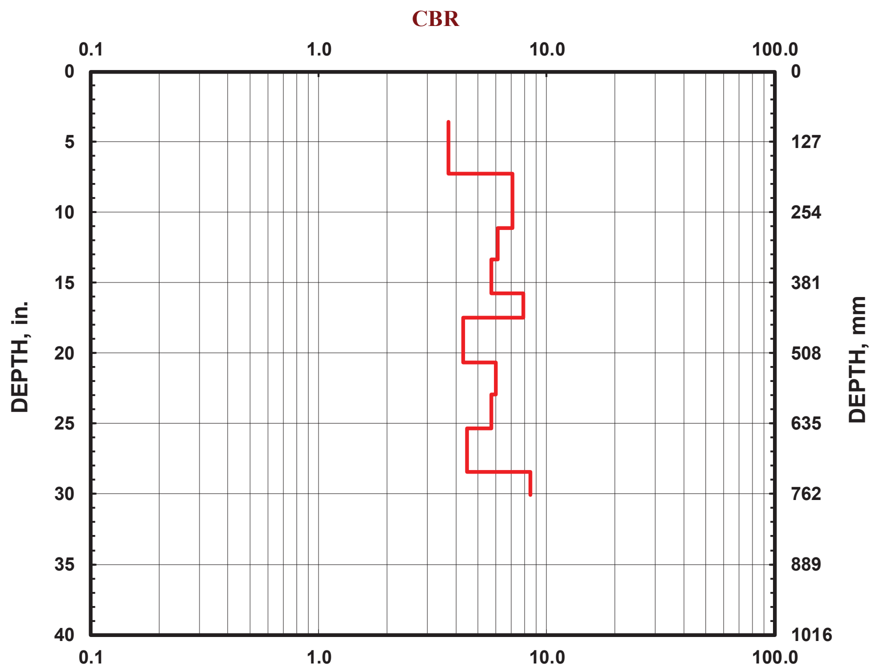
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

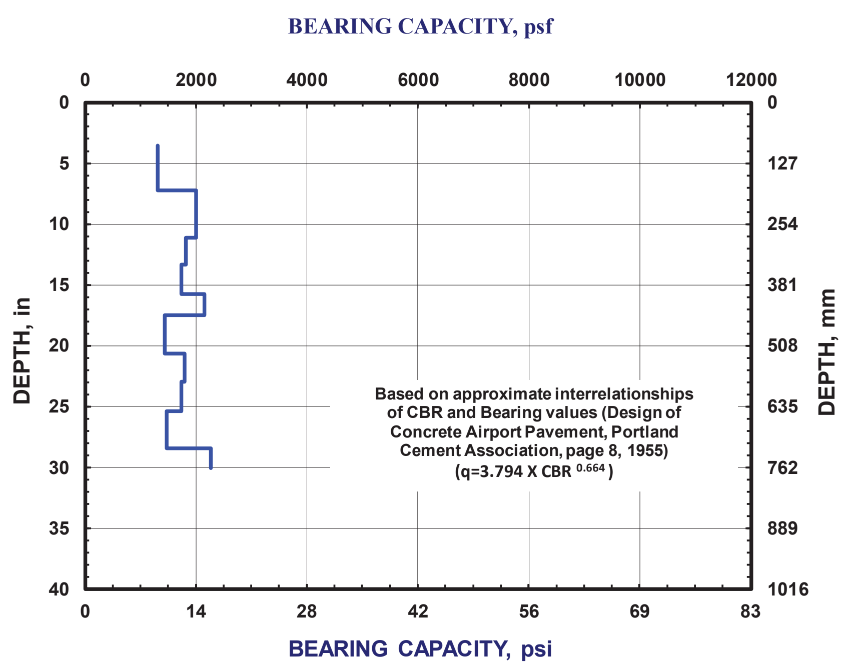
Project: *G103-21*
Date: 13-Jul-21
Location: B-10
Soil Type(s): High plasticity Clay

Hammer
- 10.1 lbs.
- 17.6 lbs. (selected)
- Both hammers used

Soil Type
- CH (selected)
- CL
- All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	90	1
1	184	1
1	233	1
1	282	1
1	339	1
1	400	1
1	444	1
1	525	1
1	583	1
1	644	1
1	722	1
1	763	1





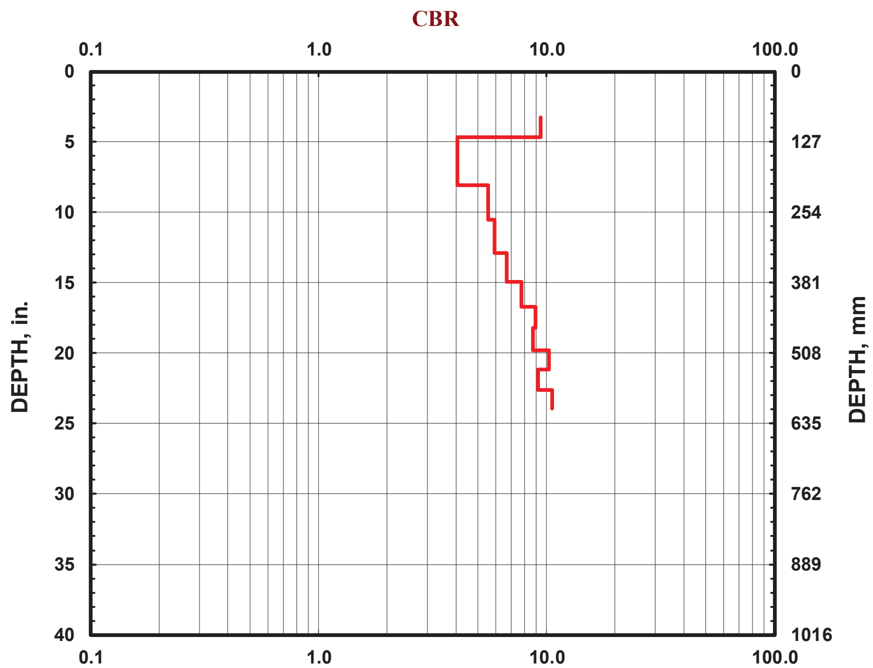
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

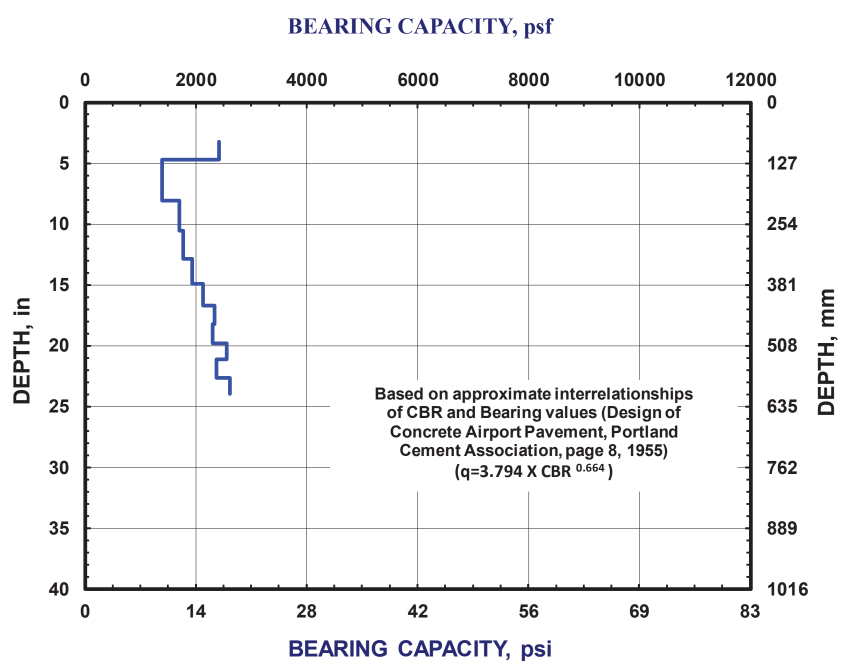
Project: *G103-21*
Location: B-12
Date: 13-Jul-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	82	1
1	119	1
1	205	1
1	268	1
1	327	1
1	379	1
1	424	1
1	463	1
1	503	1
1	537	1
1	575	1
1	608	1





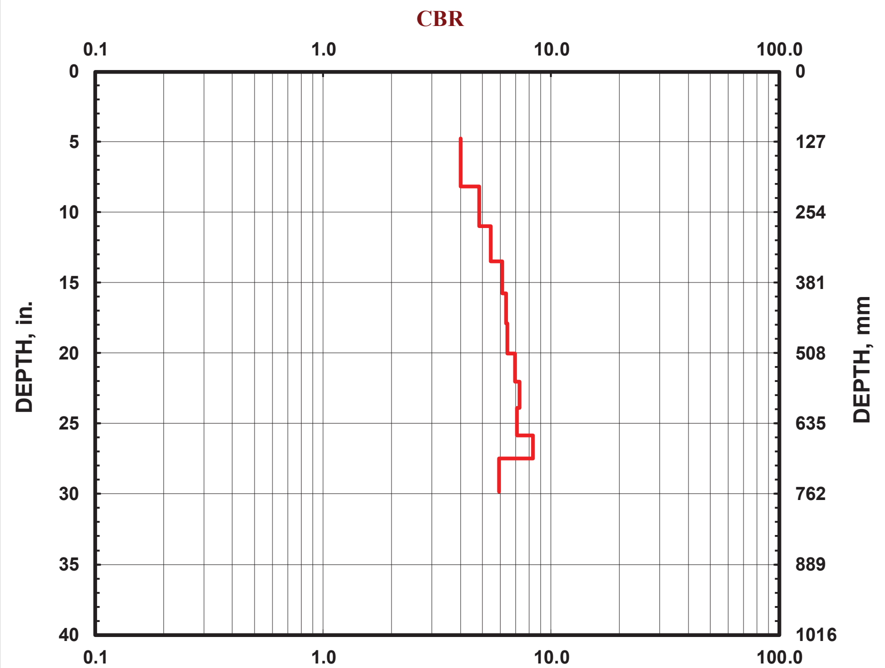
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

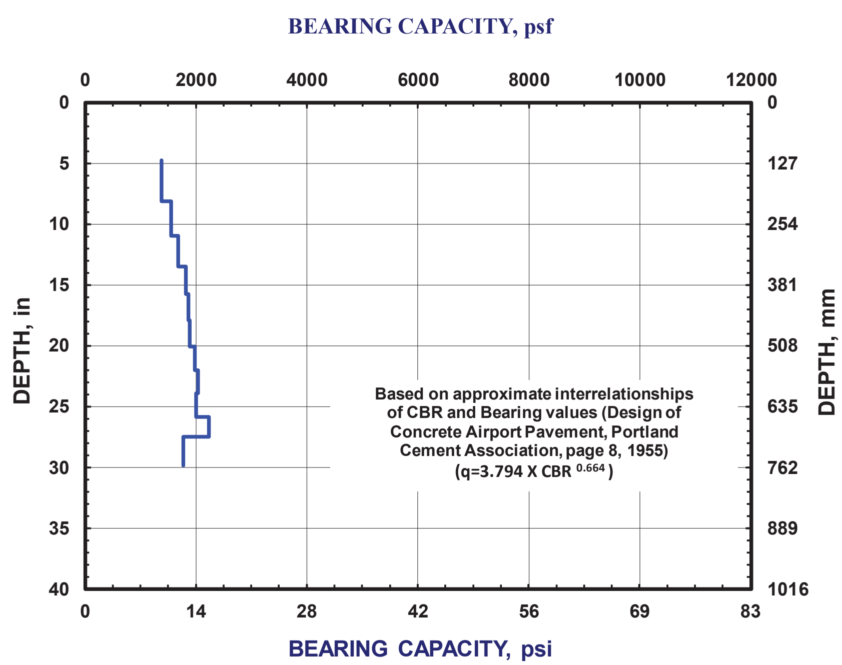
Project: *G103-21* **Date:** 13-Jul-21
Location: B-14 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	120	1
1	207	1
1	279	1
1	343	1
1	400	1
1	455	1
1	509	1
1	559	1
1	607	1
1	656	1
1	698	1
1	757	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

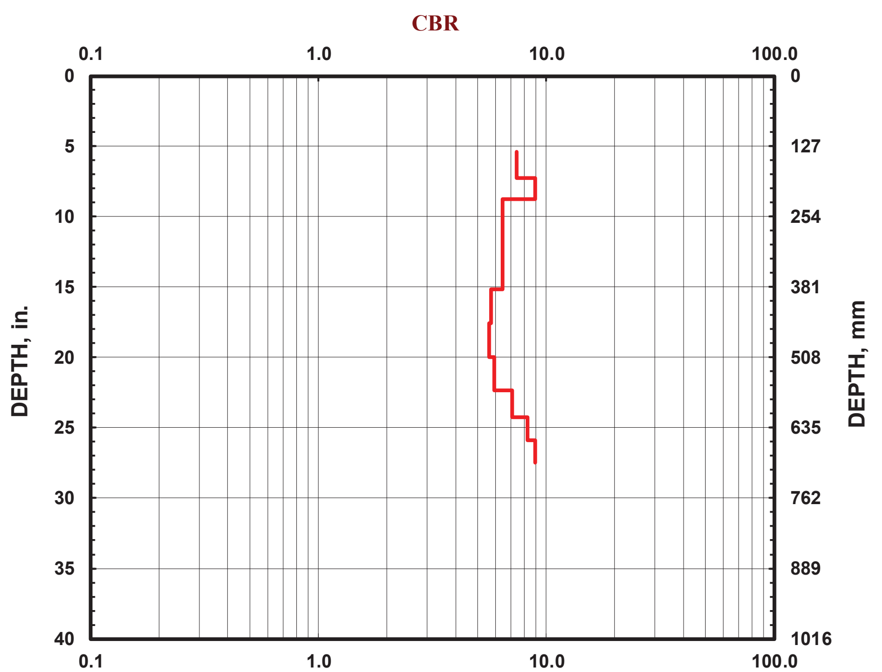
Project: *G103-21*
Location: B-16

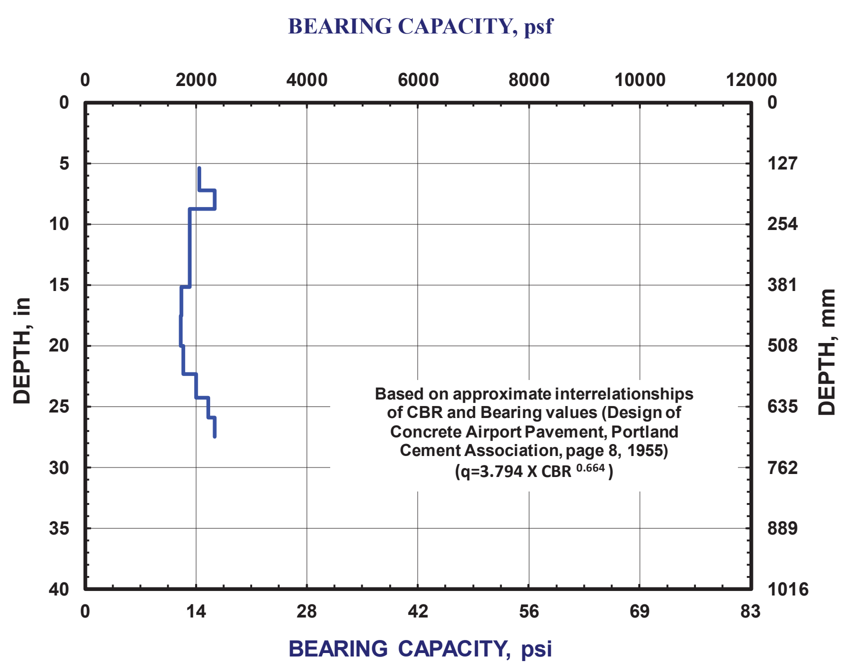
Date: 13-Jul-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	137	1
1	184	1
1	223	1
1	277	1
1	331	1
1	385	1
1	446	1
1	508	1
1	567	1
1	616	1
1	658	1
1	697	1





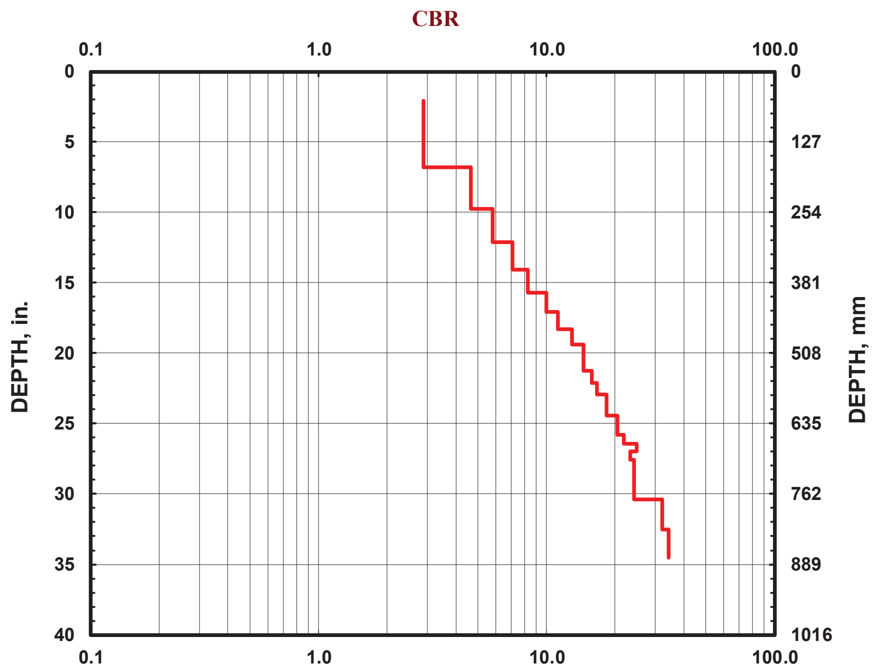
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

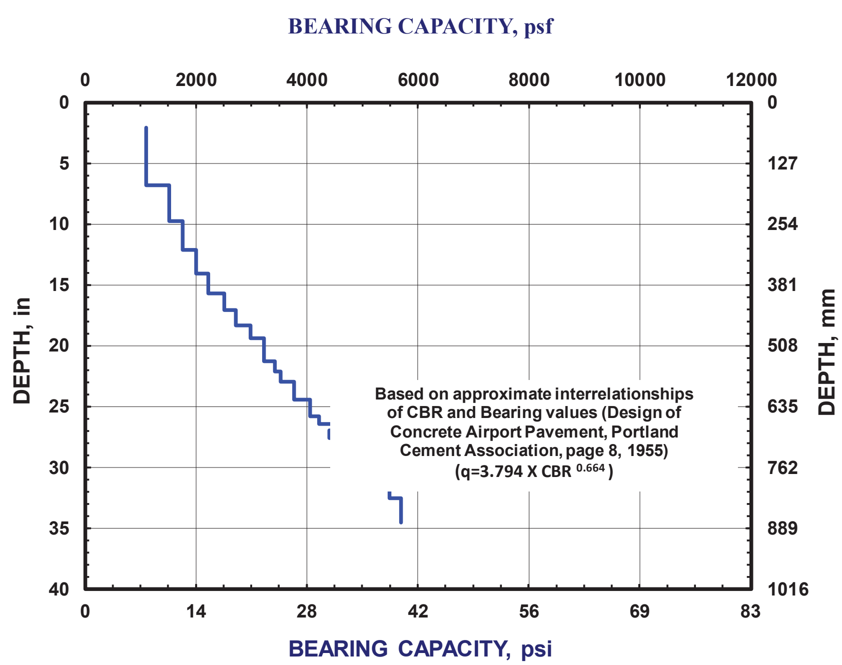
Project: *G103-21* **Date:** 15-Jul-21
Location: B-18 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	52	1
1	173	1
1	248	1
1	308	1
1	357	1
1	399	1
1	434	1
1	465	1
1	492	1
1	516	1
1	540	1
1	562	1
1	583	1
1	602	1
1	621	1
1	638	1
1	655	1
1	671	1
1	685	1
1	700	1
5	772	1
5	826	1
5	877	1





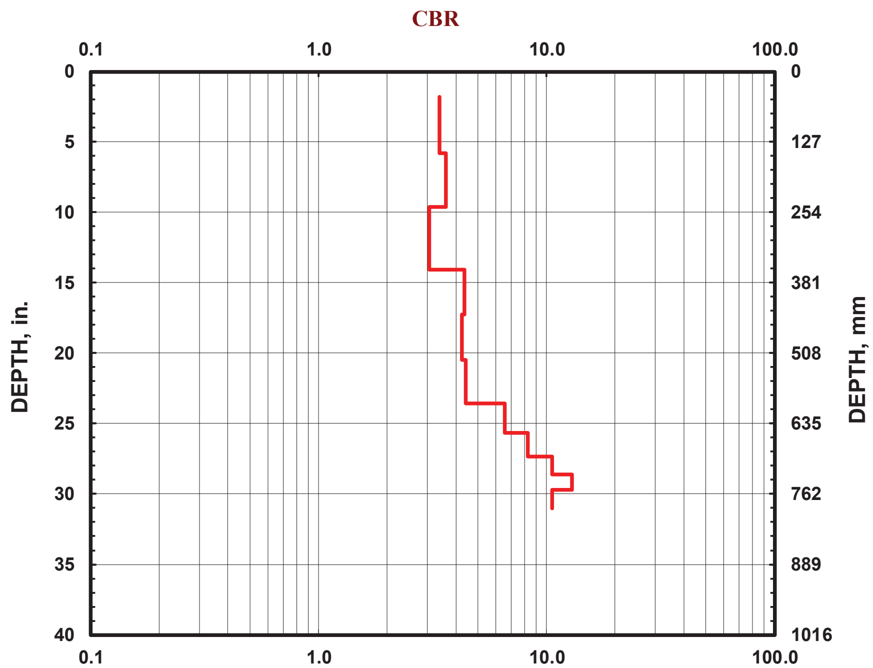
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

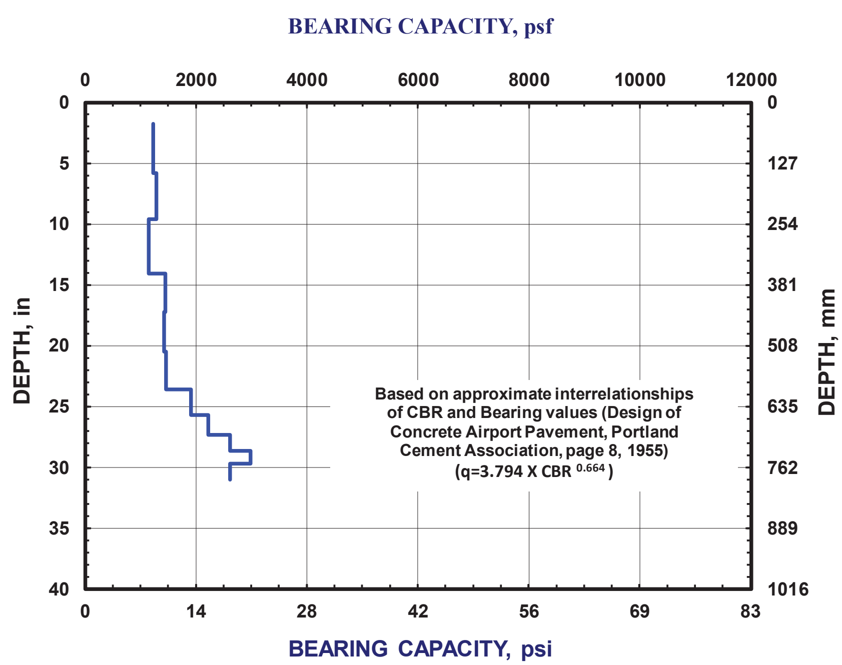
Project: *G103-21*
Date: 13-Jul-21
Location: B-20
Soil Type(s): High plasticity Clay

Hammer
○ 10.1 lbs.
● 17.6 lbs.
○ Both hammers used

Soil Type
● CH
○ CL
○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	45	1
1	148	1
1	244	1
1	358	1
1	438	1
1	520	1
1	599	1
1	652	1
1	694	1
1	727	1
1	754	1
1	787	1





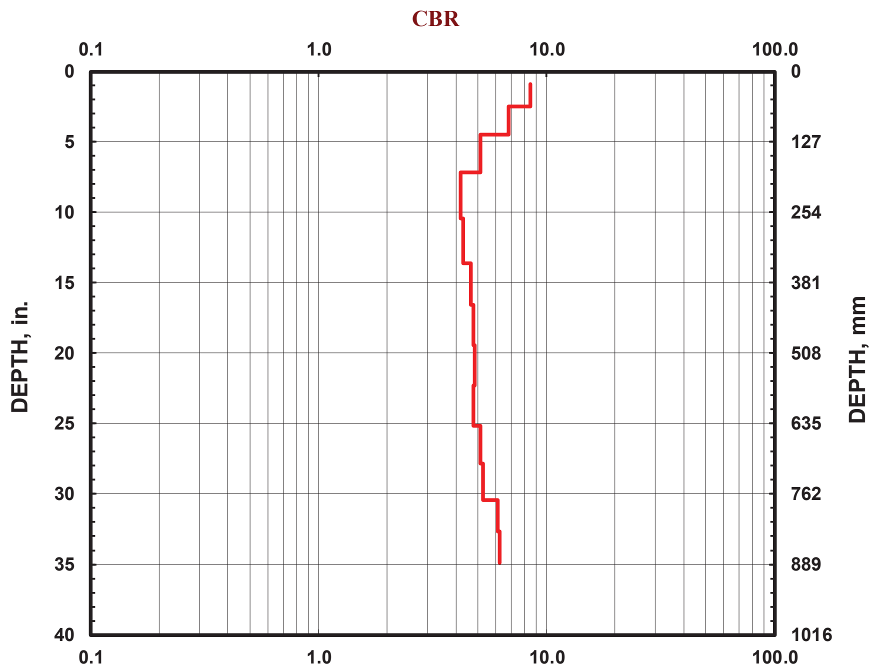
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

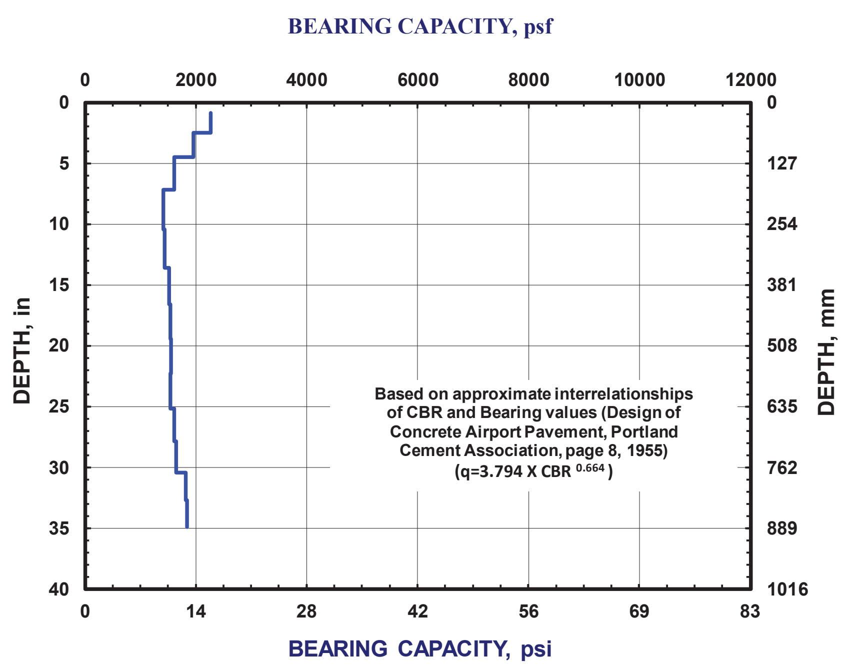
Project: *G103-21* **Date:** 3-Aug-21
Location: B-22 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	22	1
1	63	1
1	114	1
1	182	1
1	265	1
1	346	1
1	421	1
1	494	1
1	566	1
1	639	1
1	707	1
1	773	1
1	830	1
1	886	1





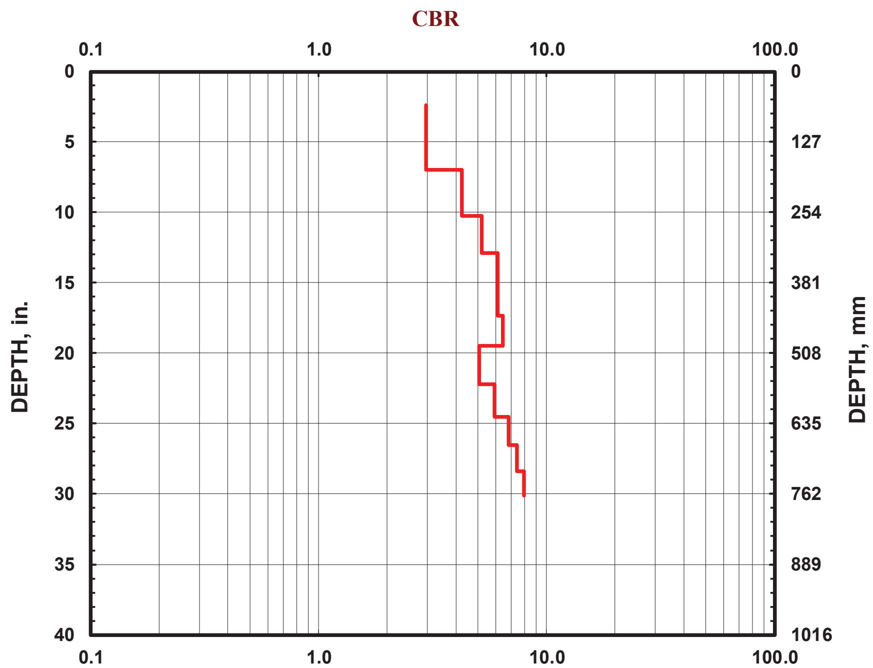
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

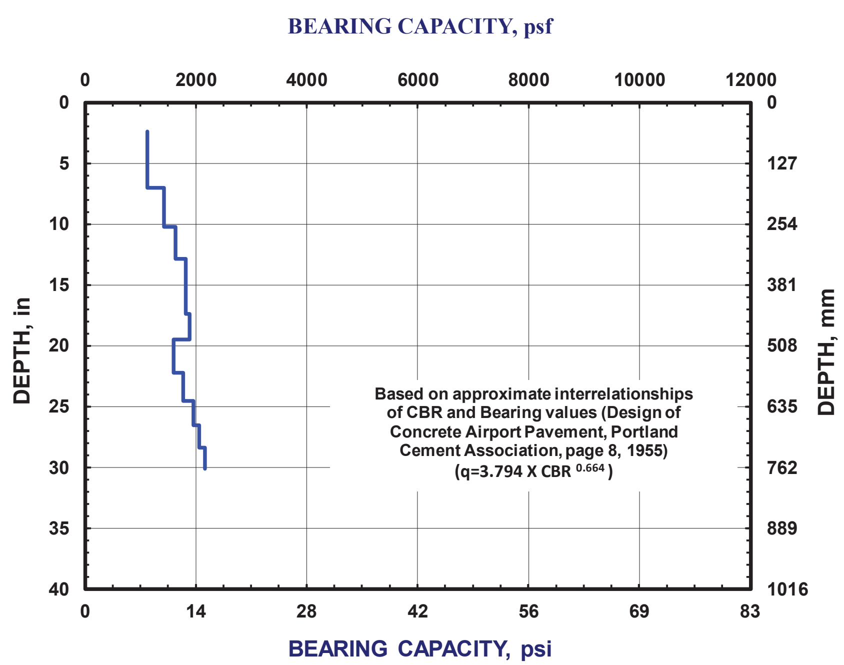
Project: *G103-21*
Location: B-26
Date: 13-Jul-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
0	60	1
1	178	1
1	260	1
1	327	1
1	384	1
1	441	1
1	495	1
1	564	1
1	623	1
1	674	1
1	721	1
1	765	1





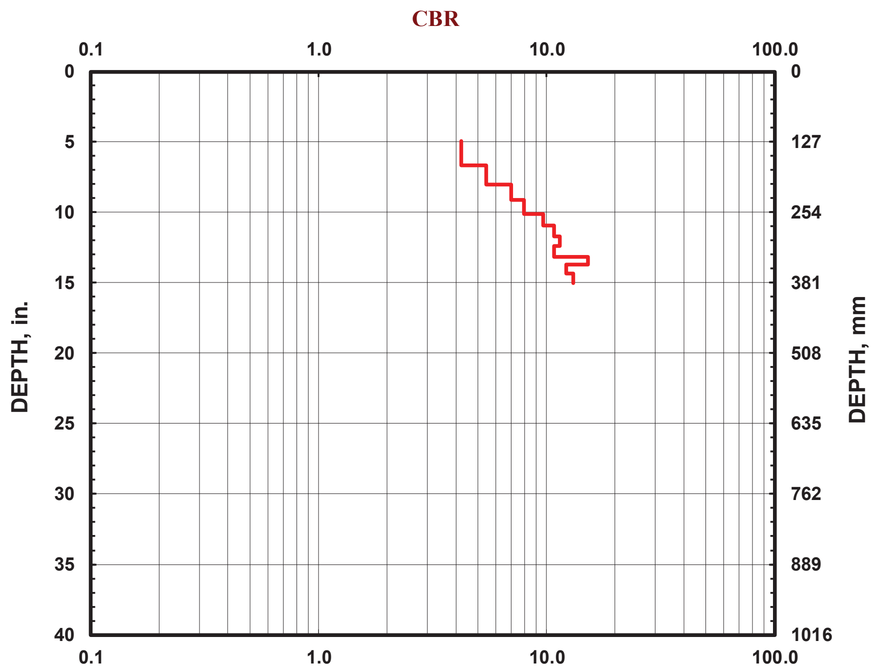
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

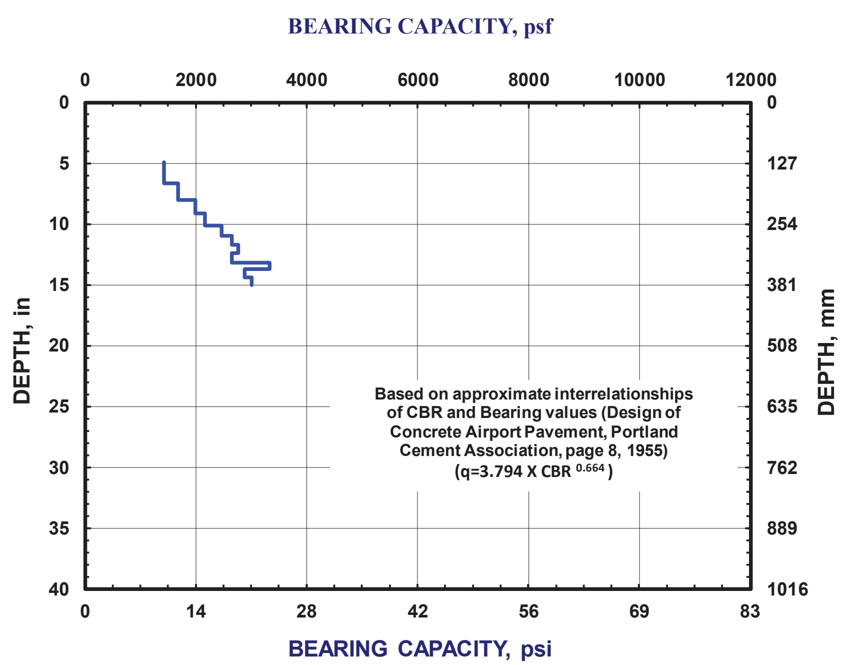
Project: *G103-21*
Location: B-28
Date: 13-Jul-21
Soil Type(s): Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	125	1
1	169	1
1	204	1
1	232	1
1	257	1
1	278	1
1	297	1
1	315	1
1	334	1
1	348	1
1	365	1
1	381	1





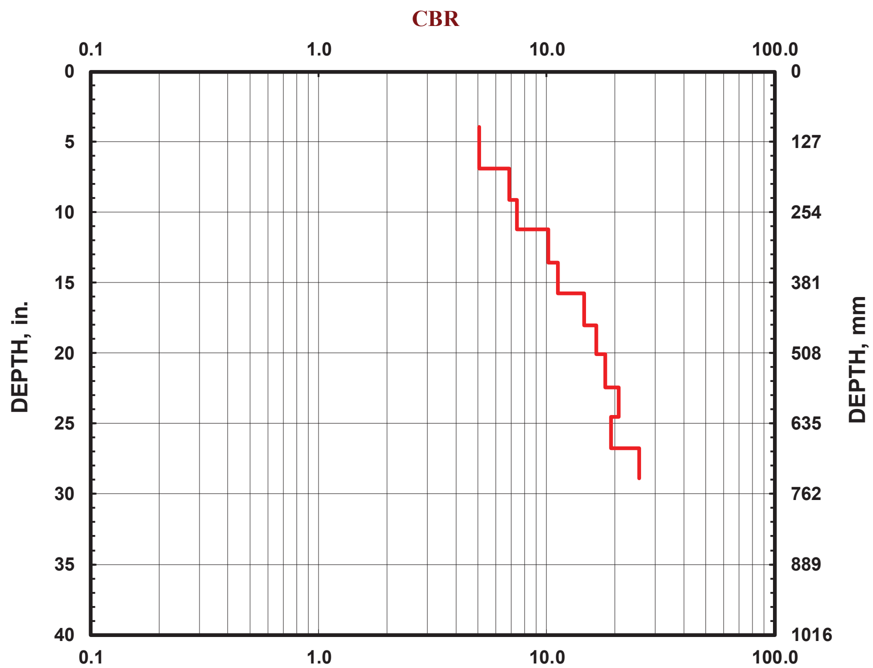
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

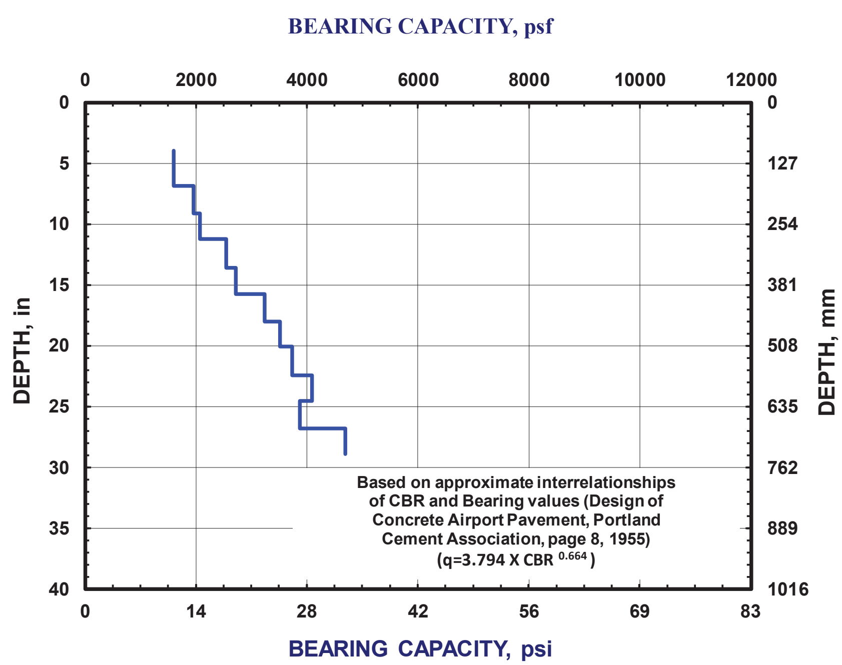
Project: *G103-21*
Location: B-30
Date: 12-Jul-21
Soil Type(s): Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	100	1
2	175	1
2	232	1
2	285	1
3	345	1
3	400	1
4	458	1
4	510	1
5	570	1
5	623	1
5	680	1
6	733	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

Project: *G103-21*

Location: B-32

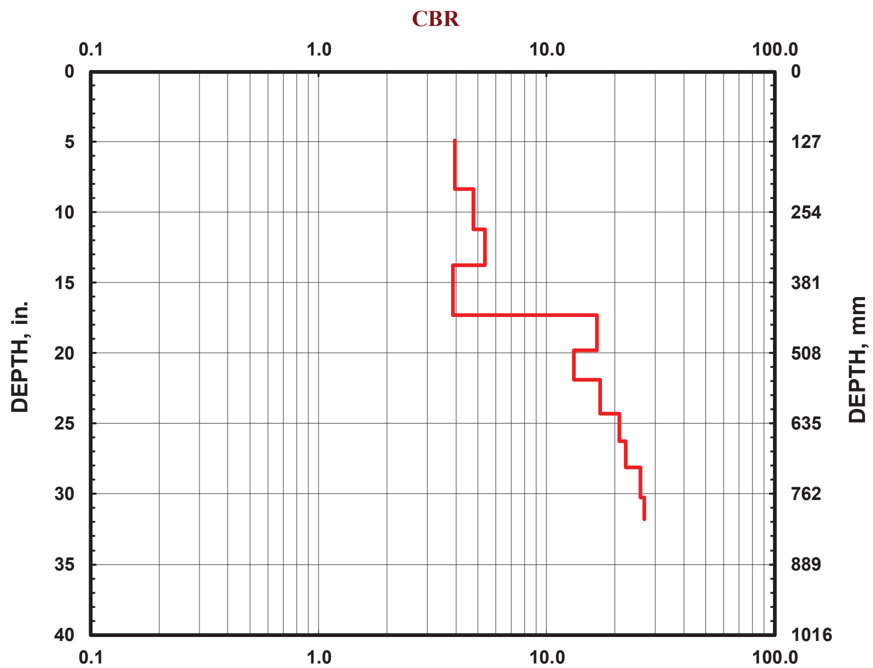
Date: 12-Jul-21

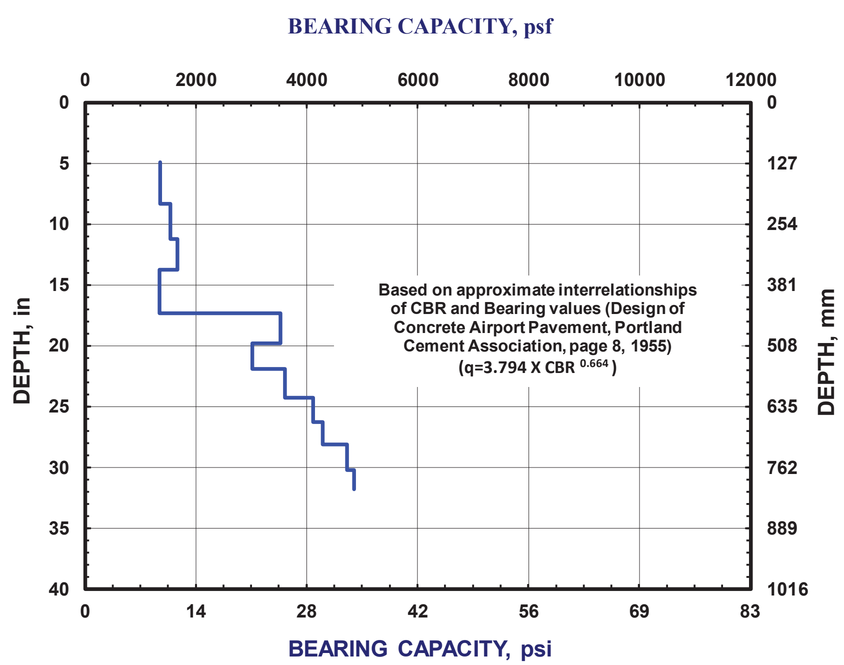
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	124	1
1	212	1
1	285	1
1	350	1
1	440	1
3	503	1
2	556	1
3	617	1
3	667	1
3	714	1
4	768	1
3	807	1





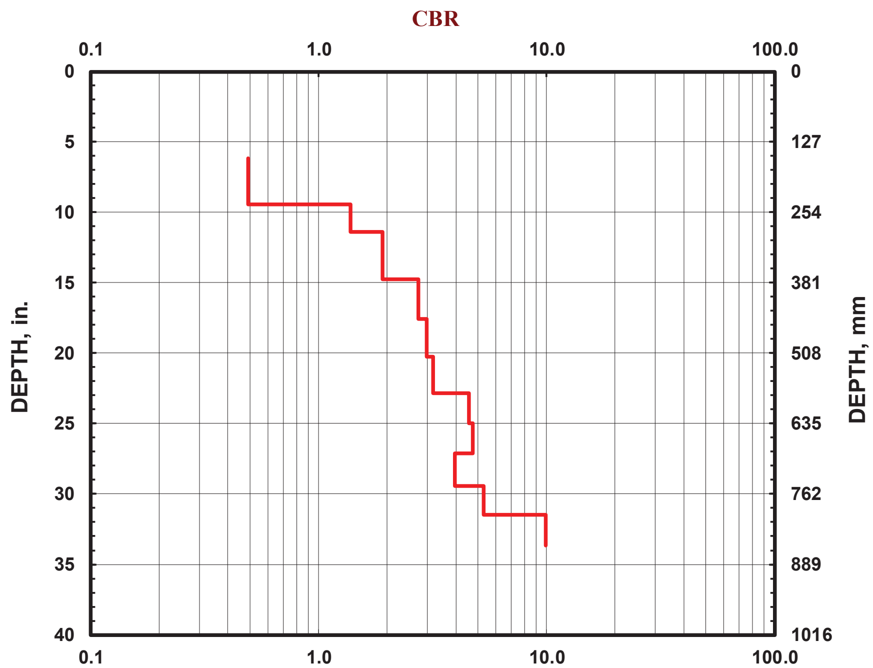
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

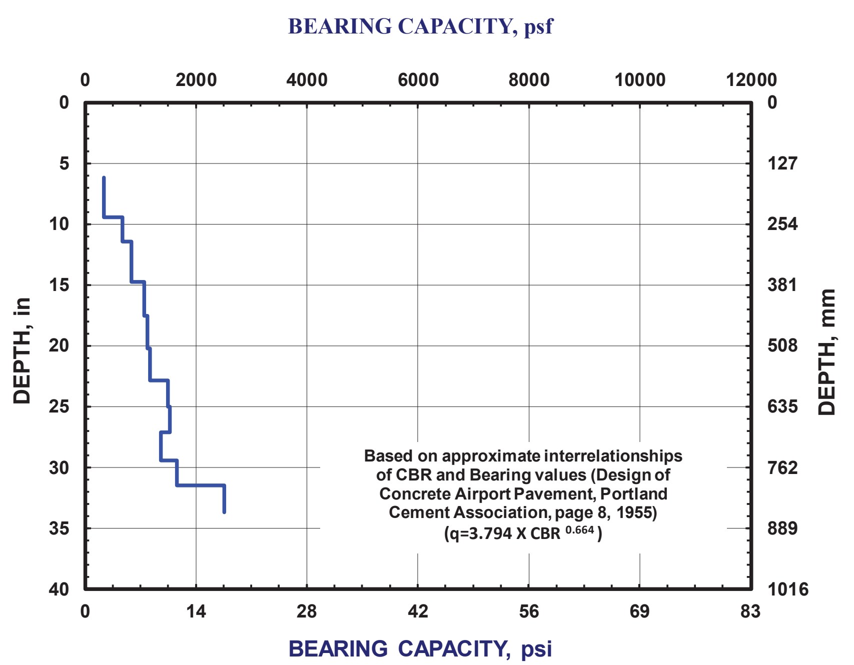
Project: *G103-21*
Location: B-34
Date: 12-Jul-21
Soil Type(s): Low plasticity Clay with CBR<10

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ● CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	156	1
1	240	1
1	290	1
2	375	1
2	446	1
2	514	1
2	580	1
2	635	1
2	689	1
2	748	1
2	799	1
3	855	1





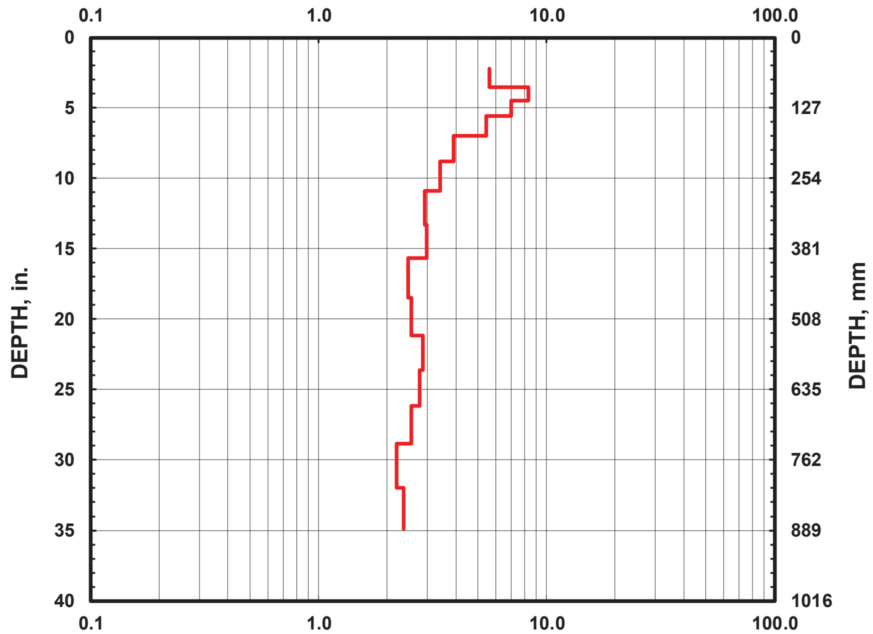
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

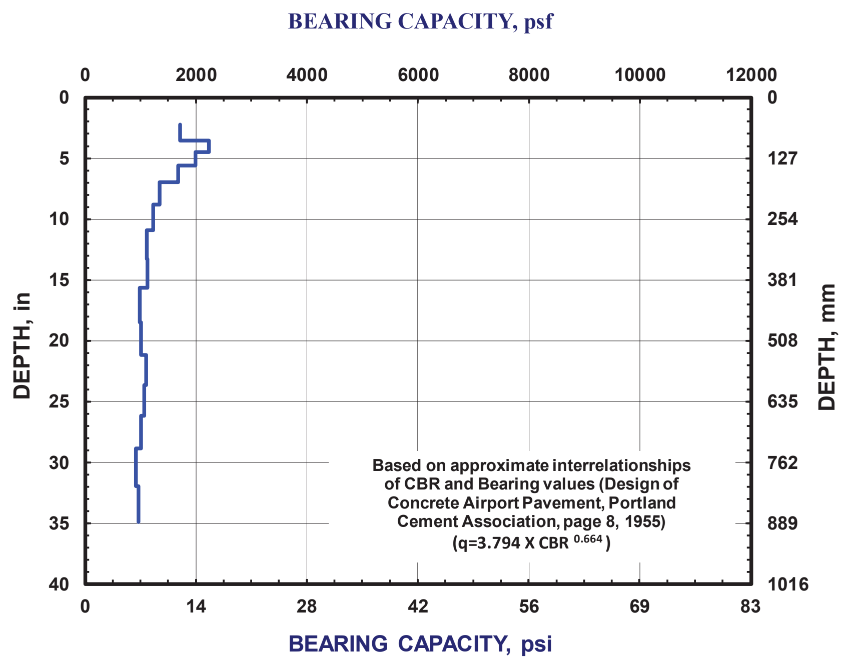
Project: *G103-21*
Date: 10-Aug-21
Location: B-36
Soil Type(s): Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	56	1
1	90	1
1	114	1
1	142	1
1	177	1
1	224	1
1	277	1
1	338	1
1	398	1
1	469	1
1	538	1
1	600	1
1	664	1
1	733	1
1	812	1
1	886	1





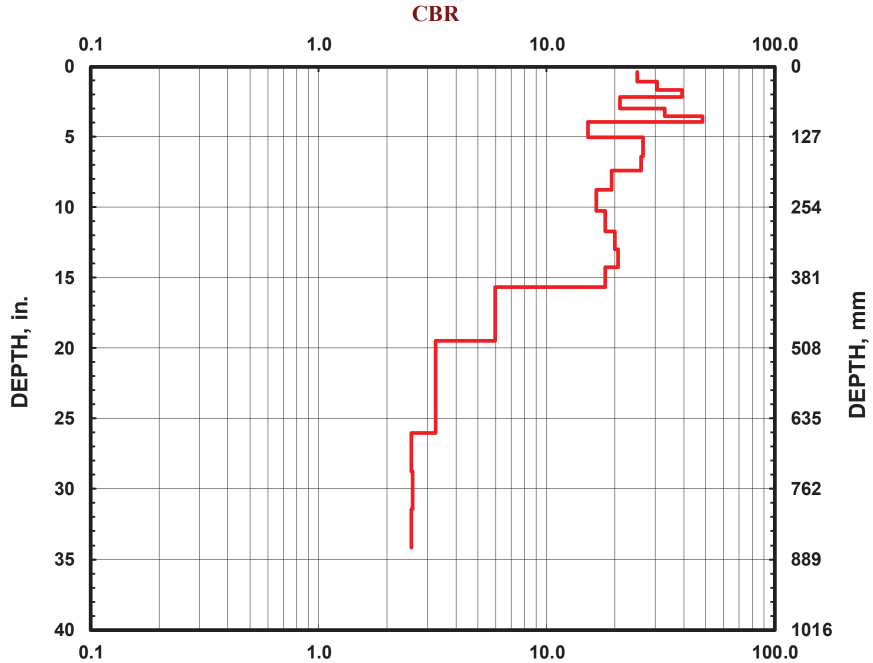
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

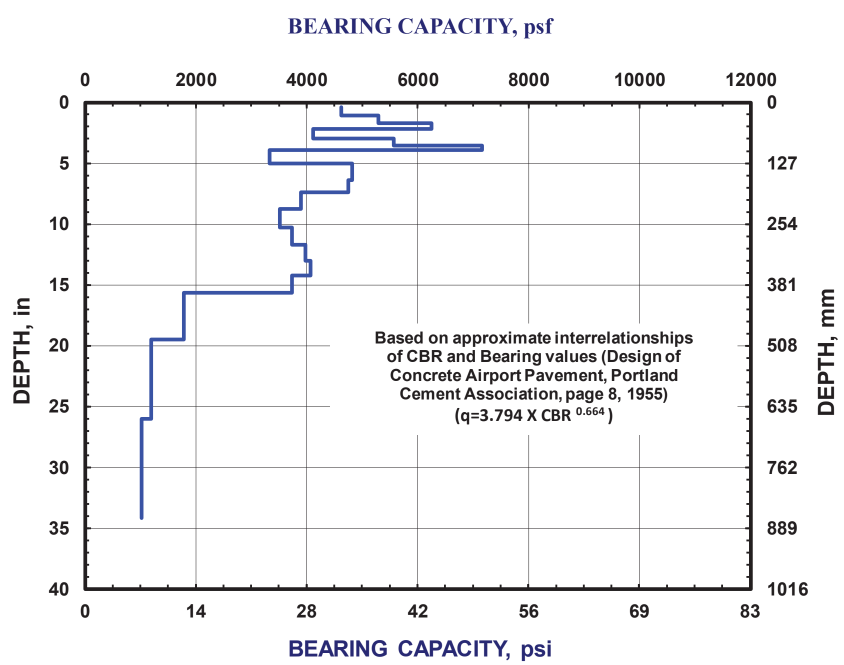
Project: *G103-21* **Date:** 10-Aug-21
Location: B-38 **Soil Type(s):** Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	10	1
2	28	1
2	43	1
2	55	1
2	76	1
2	90	1
2	100	1
2	128	1
2	145	1
2	162	1
3	188	1
3	222	1
3	261	1
3	297	1
3	330	1
3	362	1
3	398	1
3	495	1
3	661	1
1	730	1
1	798	1
1	867	1





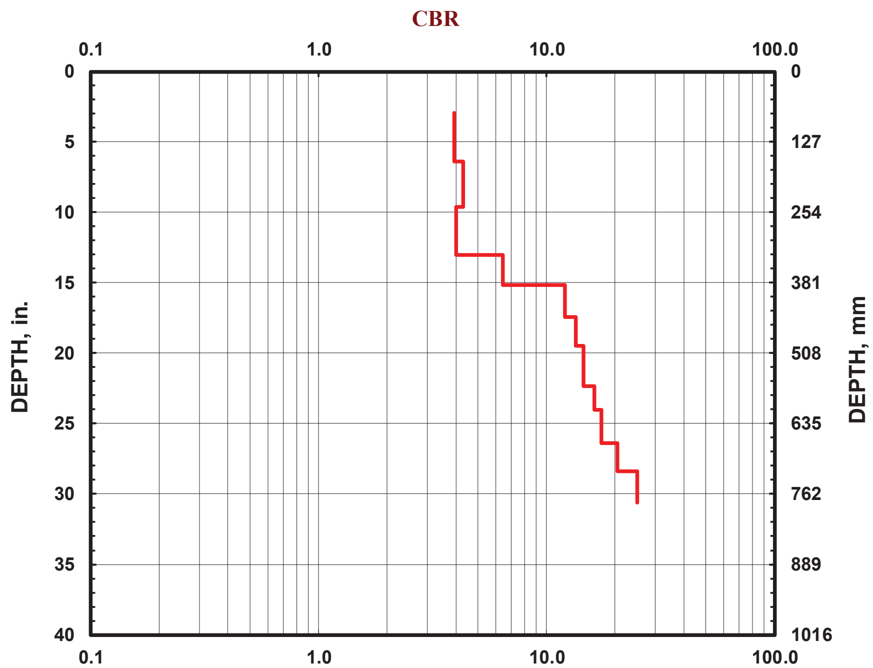
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

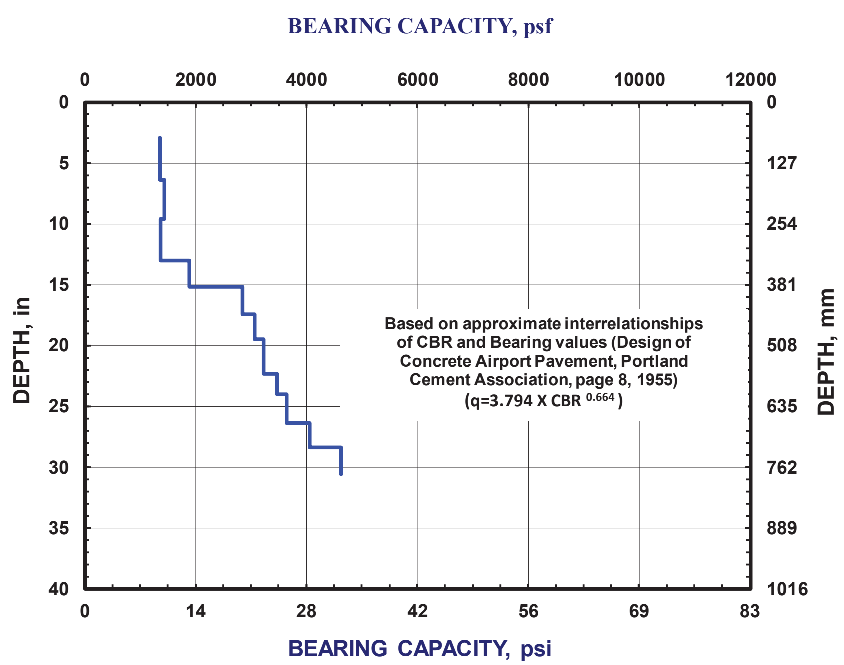
Project: *G103-21* **Date:** 12-Jul-21
Location: B-40 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	74	1
1	163	1
1	244	1
1	331	1
1	385	1
2	443	1
2	495	1
3	567	1
2	610	1
3	670	1
3	721	1
4	777	1





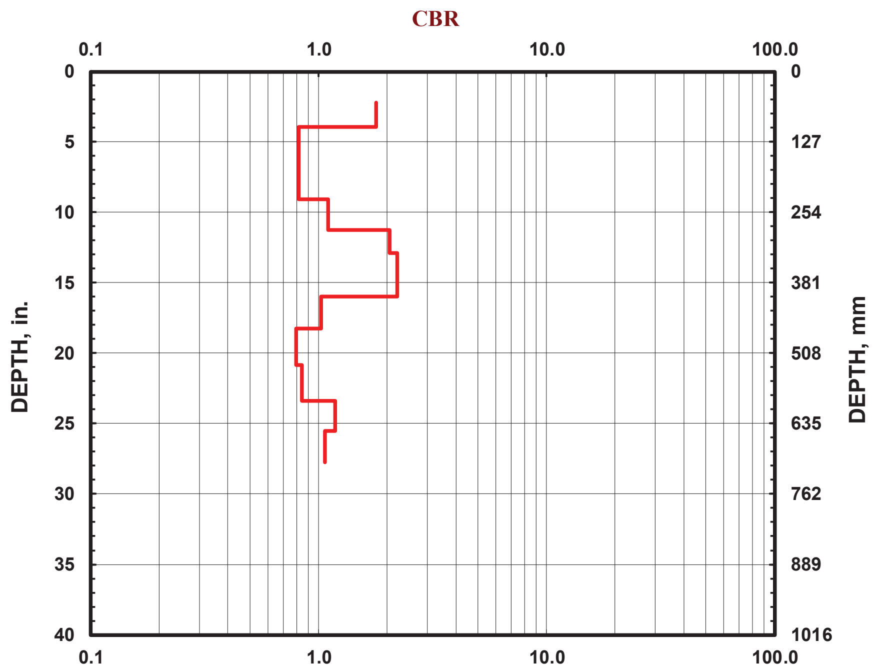
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

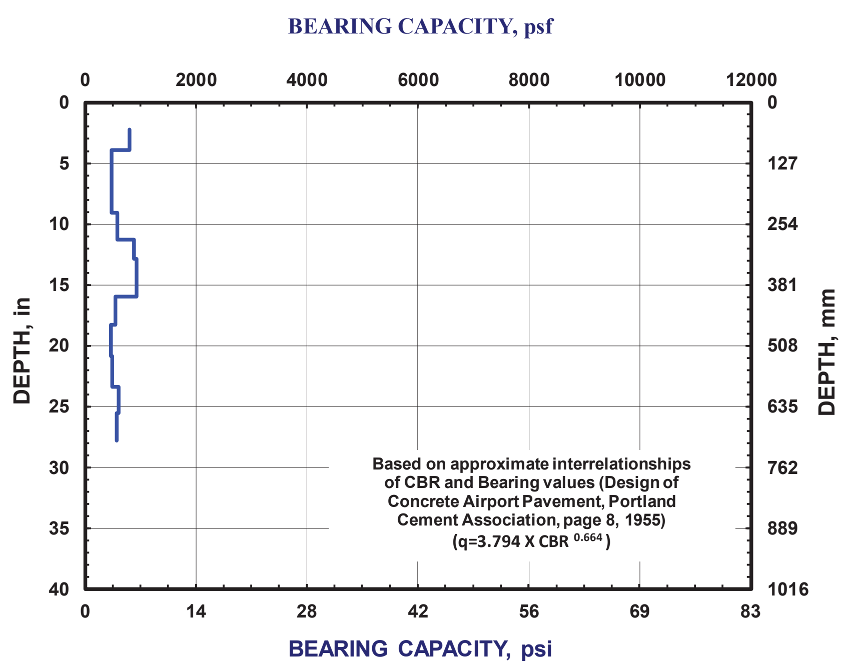
Project: *G103-21*
Location: B-42
Date: 12-Jul-21
Soil Type(s): Low plasticity Clay with CBR<10

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ● CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	56	1
1	100	1
1	165	1
1	230	1
1	286	1
1	327	1
2	406	1
1	464	1
1	530	1
1	594	1
1	648	1
1	705	1





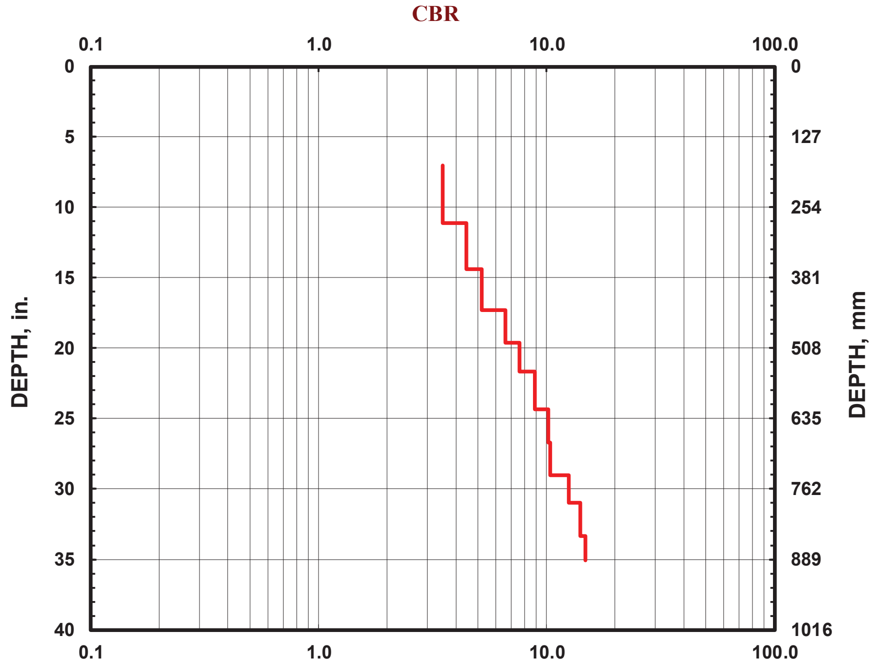
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

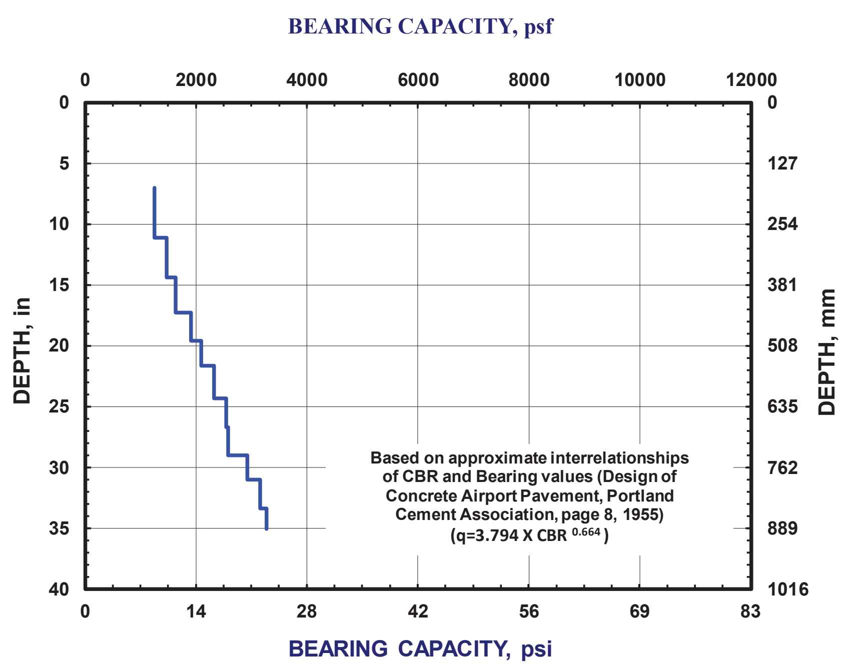
Project: *G103-21*
Location: B-44
Date: 12-Jul-21
Soil Type(s): Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	178	1
2	282	1
2	366	1
2	439	1
2	498	1
2	550	1
3	618	1
3	678	1
3	737	1
3	787	1
4	847	1
3	890	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

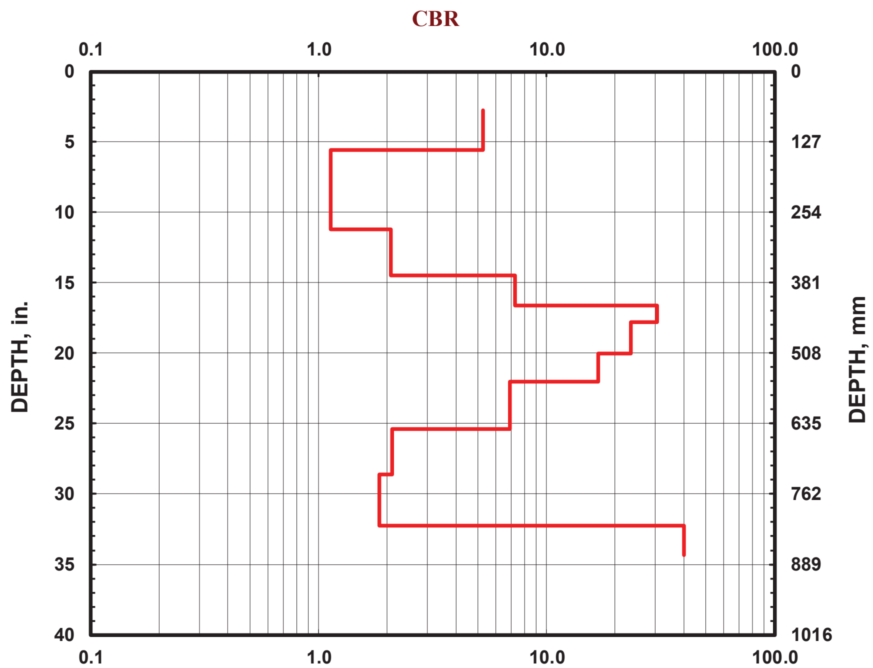
Project: *G103-21*
Location: B-46

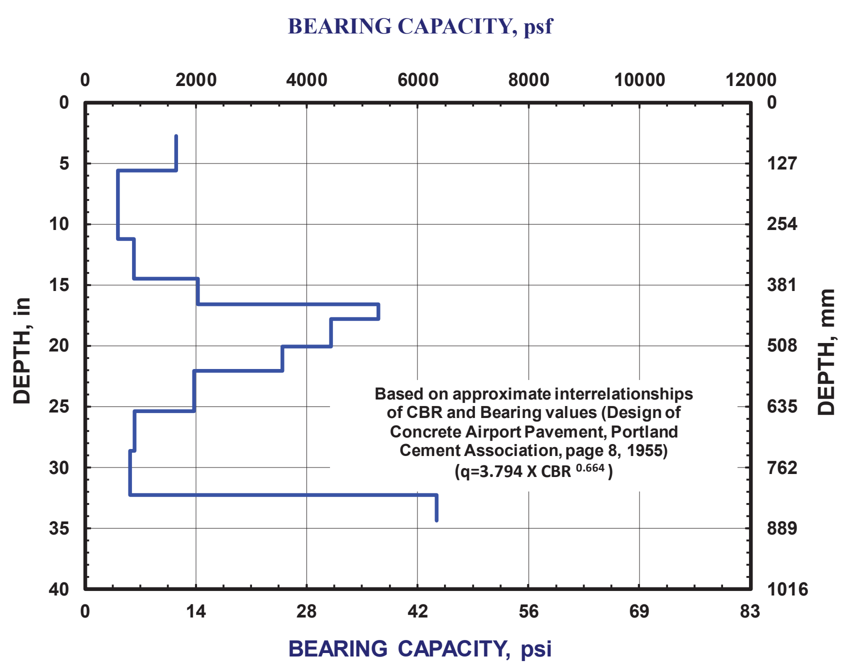
Date: 12-Jul-21
Soil Type(s): Type in the soil type

Hammer
○ 10.1 lbs.
● 17.6 lbs.
○ Both hammers used

Soil Type
○ CH
○ CL
● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	70	1
2	142	1
1	285	1
1	368	1
2	422	1
4	452	1
6	509	1
4	560	1
3	645	1
1	727	1
1	819	1
9	872	1





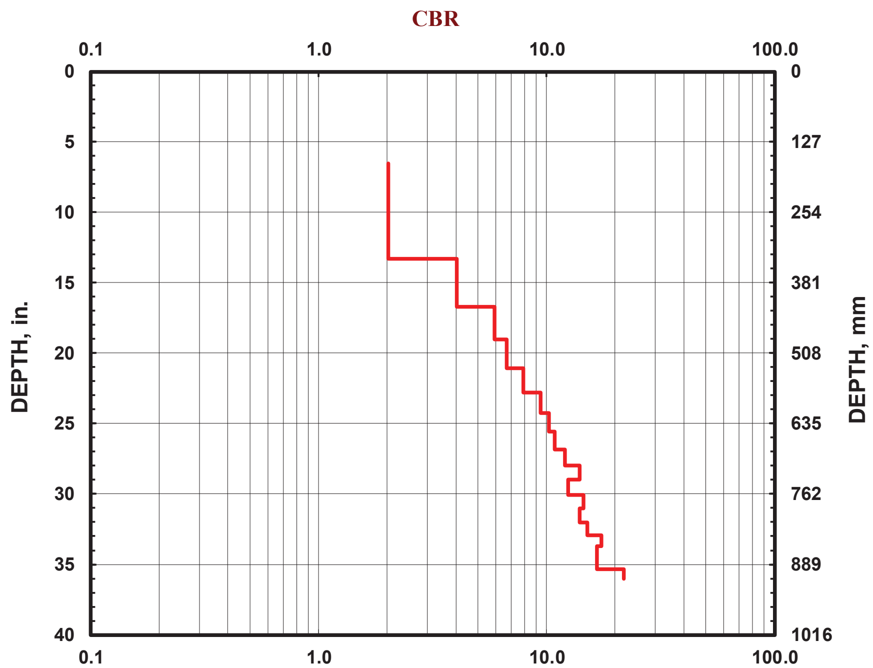
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

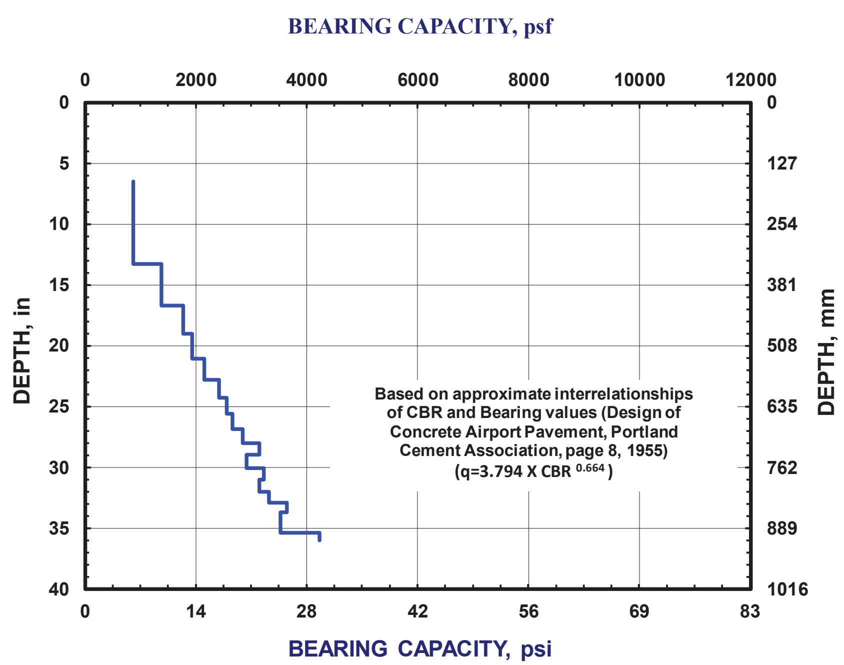
Project: *G103-21* **Date:** 15-Jul-21
Location: B-48 **Soil Type(s):** High plasticity Clay

Hammer
- 10.1 lbs.
- 17.6 lbs. (selected)
- Both hammers used

Soil Type
- CH (selected)
- CL
- All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	165	1
1	338	1
1	424	1
1	483	1
1	535	1
1	579	1
1	616	1
1	650	1
1	682	1
1	711	1
1	736	1
1	764	1
1	788	1
1	813	1
1	836	1
1	856	1
1	877	1
1	898	1
1	914	1





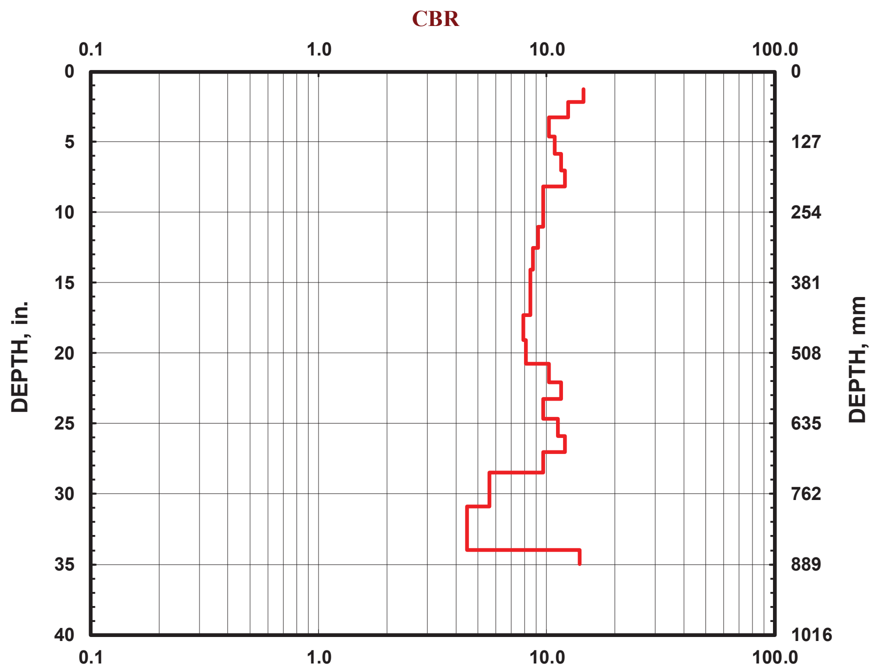
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

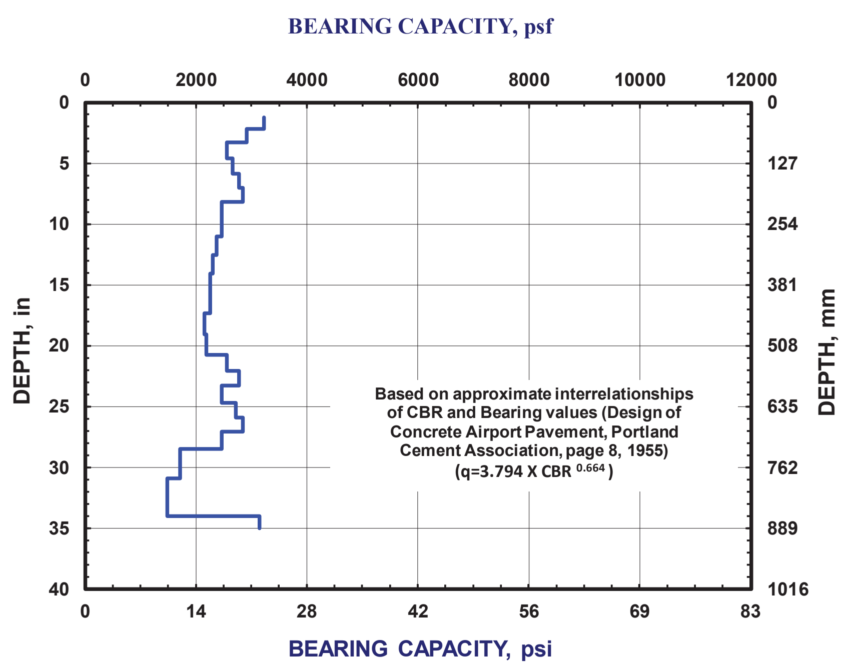
Project: *G103-21* **Date:** 3-Aug-21
Location: B-50 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	31	1
1	55	1
1	83	1
1	117	1
1	149	1
1	179	1
1	208	1
1	244	1
1	280	1
1	318	1
1	358	1
1	399	1
1	440	1
1	484	1
1	527	1
1	561	1
1	591	1
1	627	1
1	658	1
1	687	1
1	723	1
1	785	1
1	863	1
1	888	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

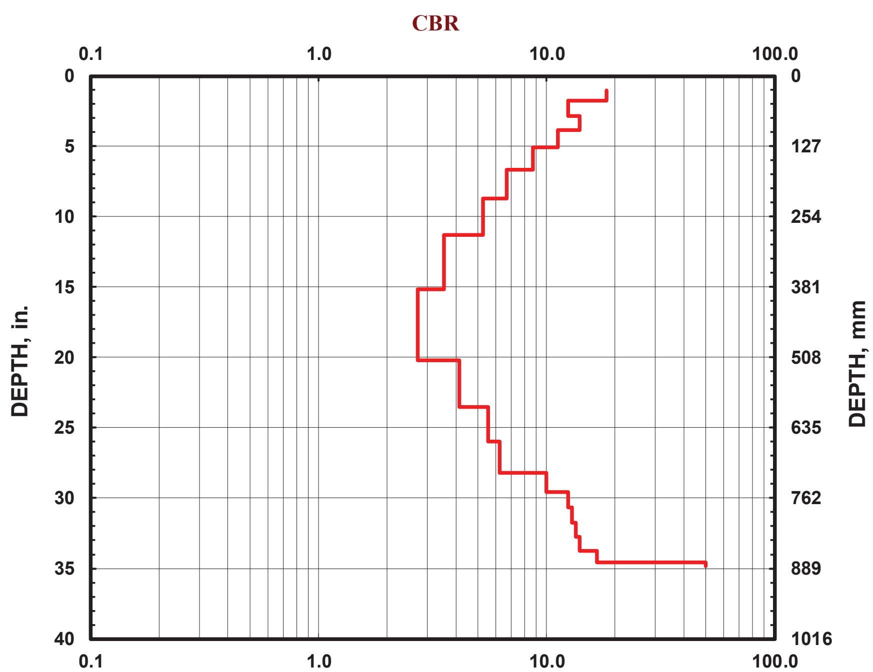
Project: *G103-21* **Date:** 3-Aug-21

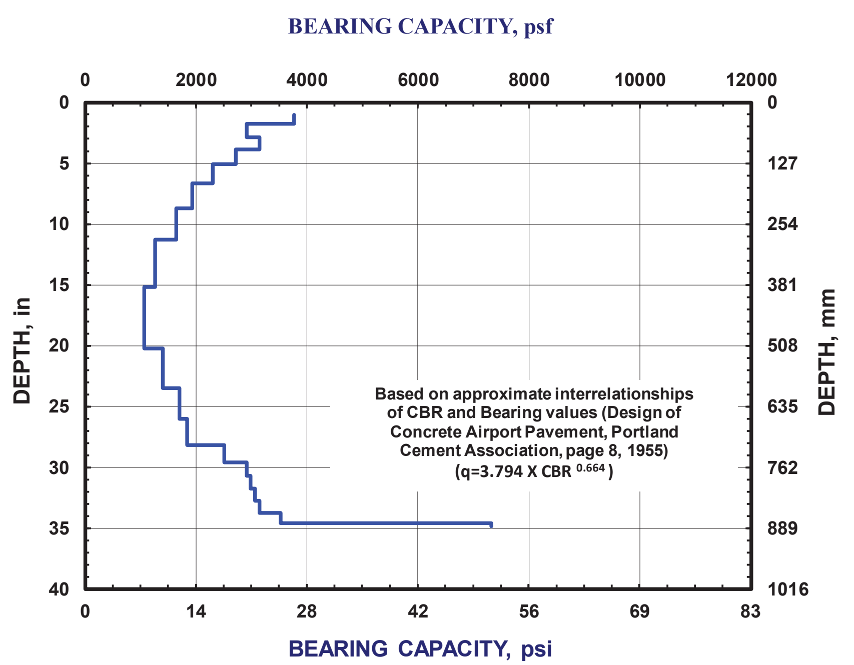
Location: B-53 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	26	1
1	45	1
1	73	1
1	98	1
1	129	1
1	169	1
1	221	1
1	287	1
1	385	1
1	513	1
1	597	1
1	660	1
1	716	1
1	751	1
1	779	1
1	806	1
1	832	1
1	857	1
1	878	1
1	885	1





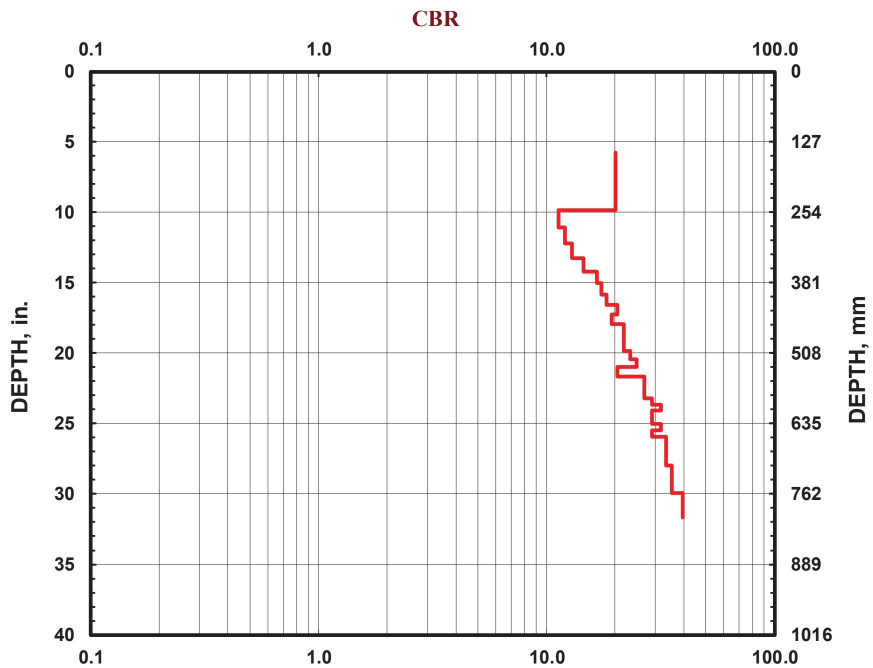
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

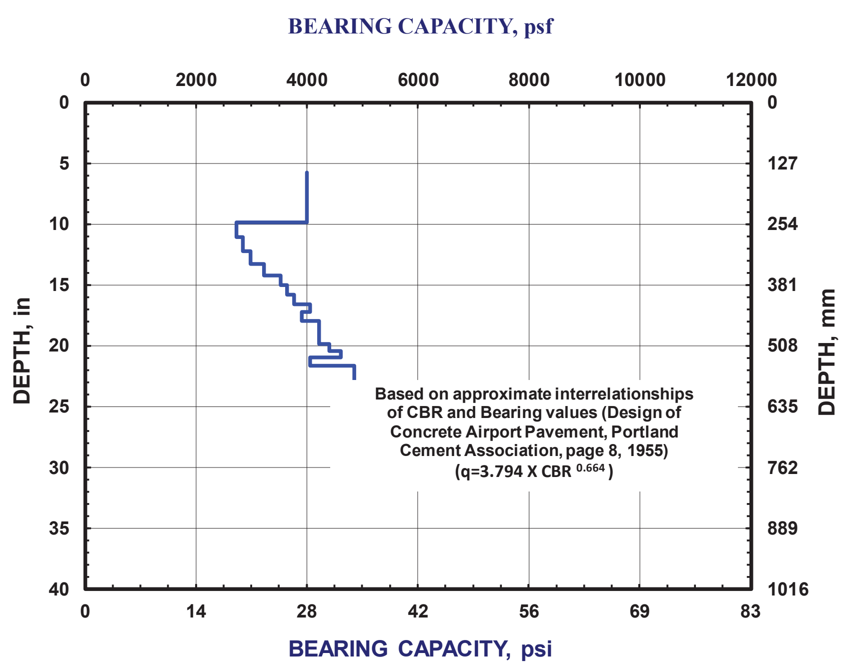
Project: *G103-21*
Location: B-55
Date: 3-Aug-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	146	1
6	250	1
1	281	1
1	310	1
1	337	1
1	361	1
1	382	1
1	402	1
1	421	1
1	438	1
1	456	1
1	472	1
1	488	1
1	504	1
1	519	1
1	533	1
1	550	1
1	563	1
1	576	1
1	589	1
1	601	1
1	612	1
1	624	1
1	636	1
1	647	1
1	659	1
5	711	1
5	760	1
5	804	1





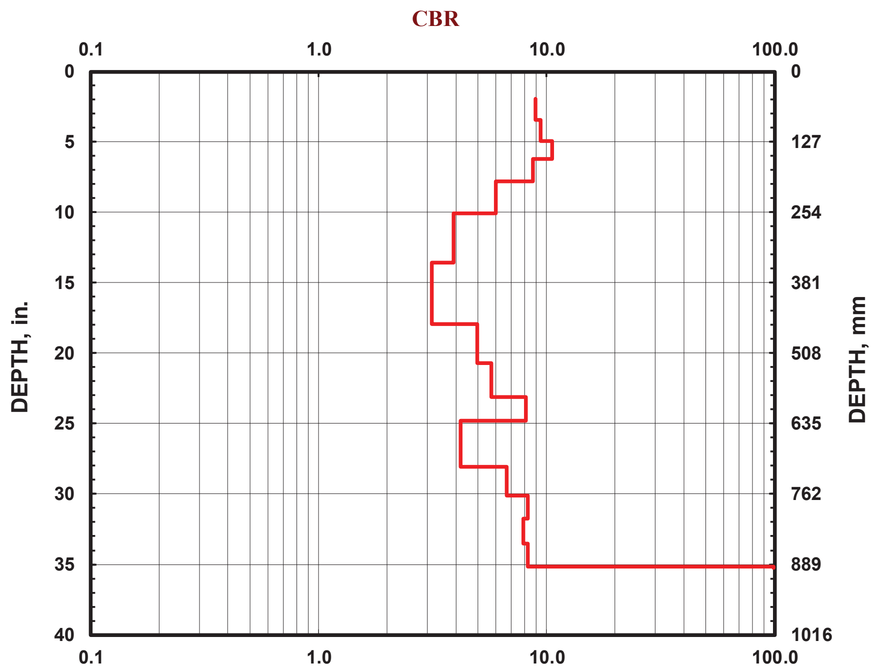
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

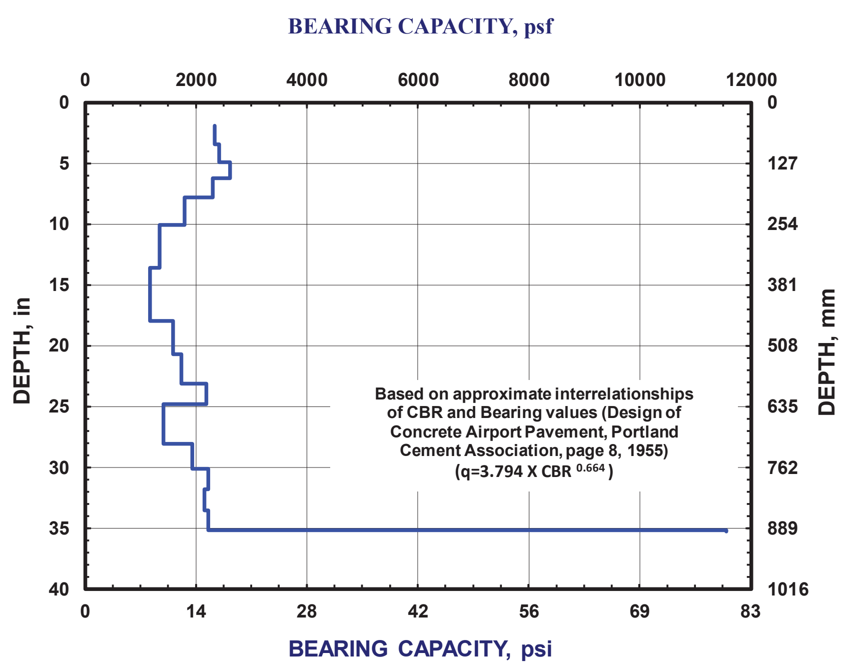
Project: *G103-21*
Location: B-56
Date: 3-Aug-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	49	1
1	88	1
1	125	1
1	158	1
1	198	1
1	256	1
1	345	1
1	456	1
1	526	1
1	587	1
1	630	1
1	713	1
1	765	1
1	807	1
1	851	1
1	893	1
1	895	1





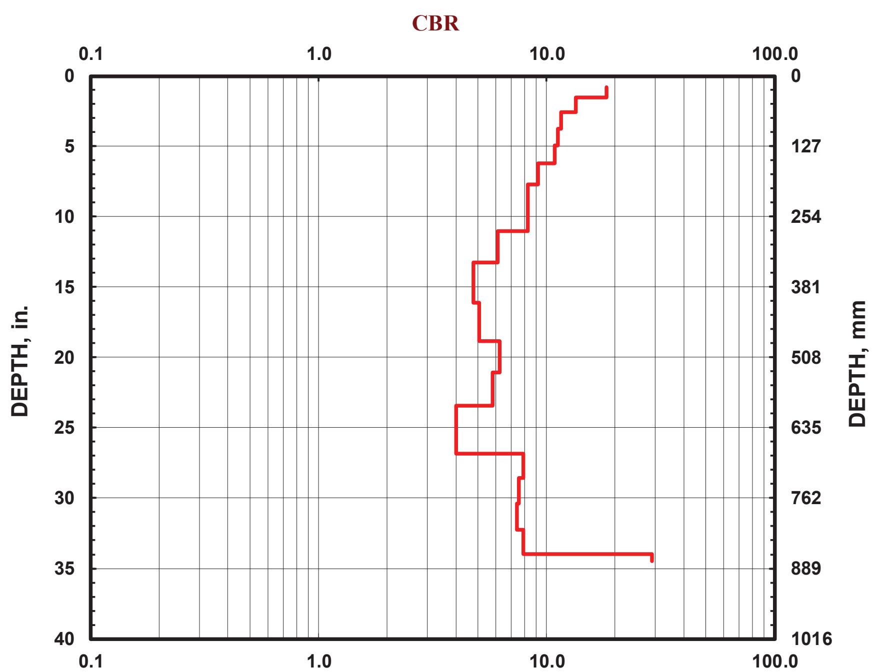
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

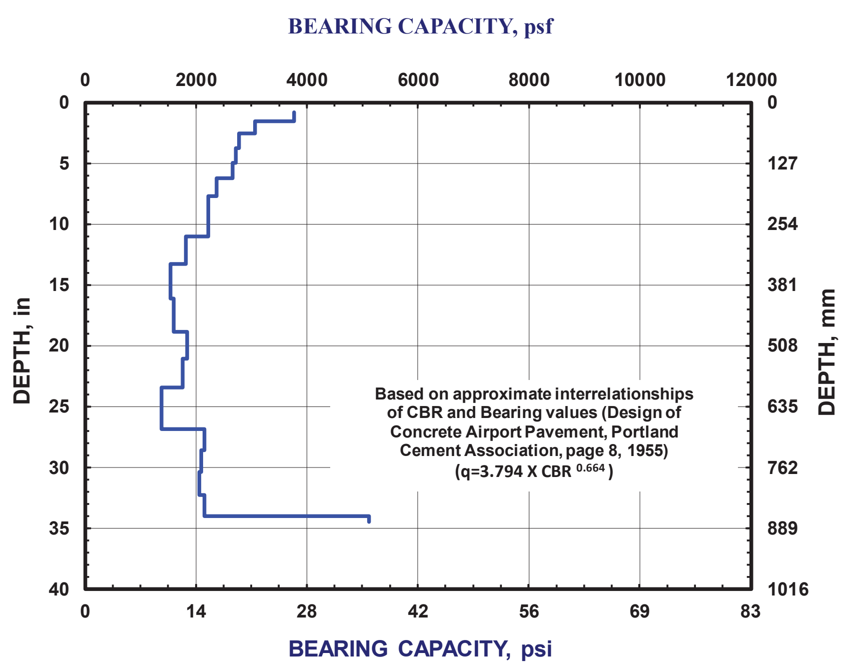
Project: *G103-21* **Date:** 3-Aug-21
Location: B-58 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	20	1
1	39	1
1	65	1
1	95	1
1	126	1
1	158	1
1	196	1
1	238	1
1	280	1
1	337	1
1	410	1
1	479	1
1	535	1
1	595	1
1	682	1
1	726	1
1	772	1
1	819	1
1	863	1
1	875	1





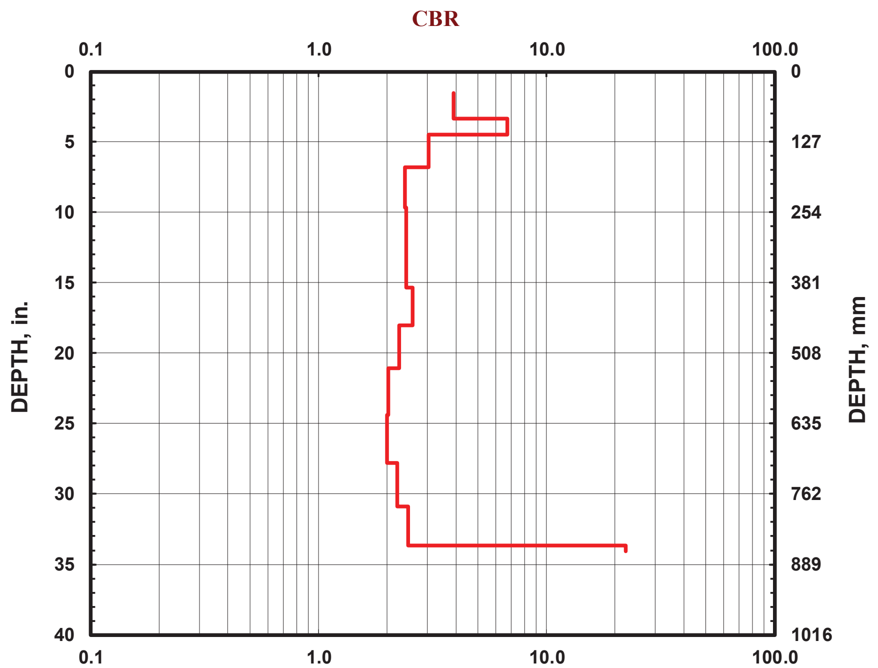
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

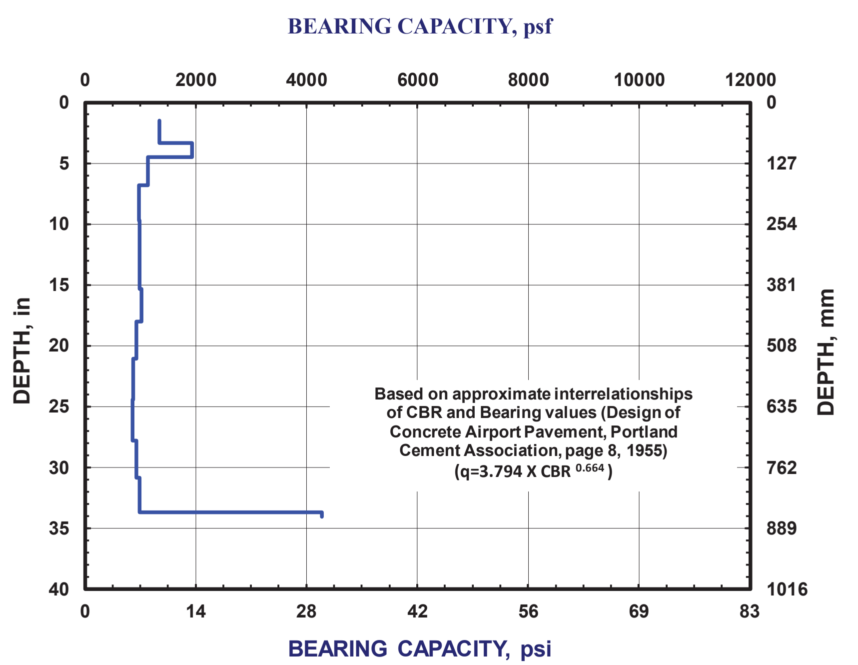
Project: *G103-21* **Date:** 3-Aug-21
Location: B-60 **Soil Type(s):** Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	38	1
1	85	1
1	114	1
1	173	1
1	246	1
1	318	1
1	390	1
1	458	1
1	535	1
1	620	1
1	706	1
1	784	1
1	855	1
1	865	1





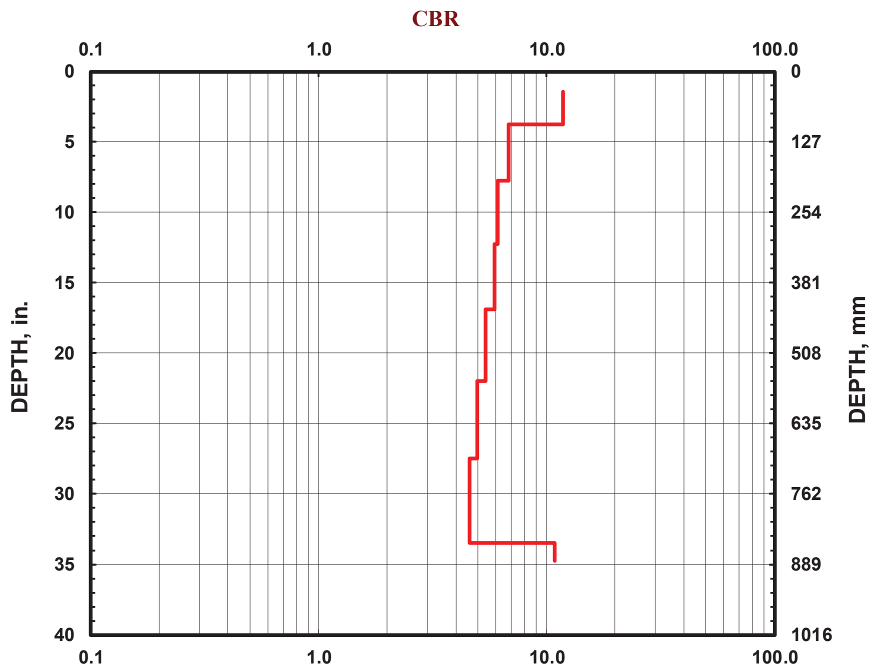
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

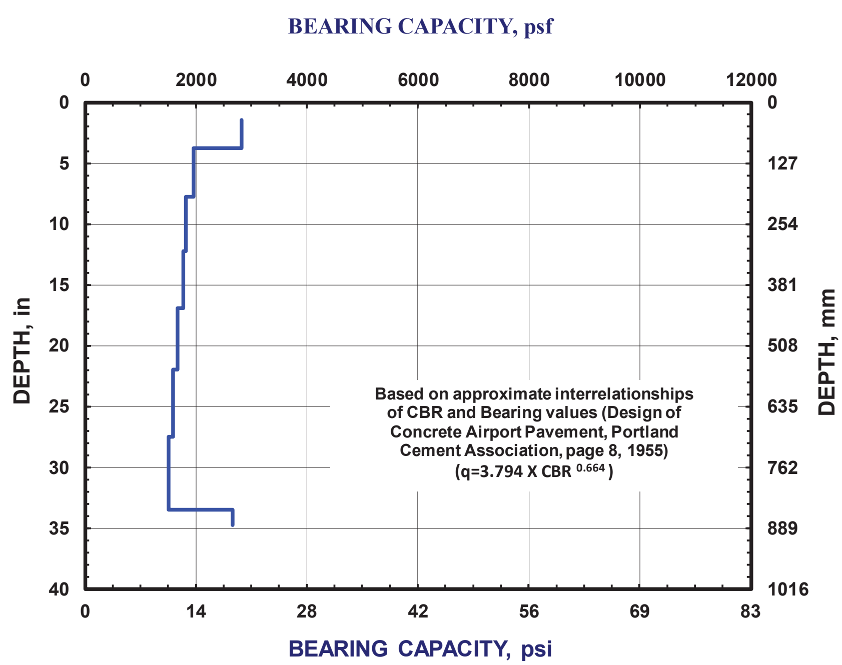
Project: *G103-21* **Date:** 10-Aug-21
Location: B-64 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
2	36	1
2	95	1
2	197	1
2	311	1
2	429	1
2	558	1
2	698	1
2	850	1
1	882	1





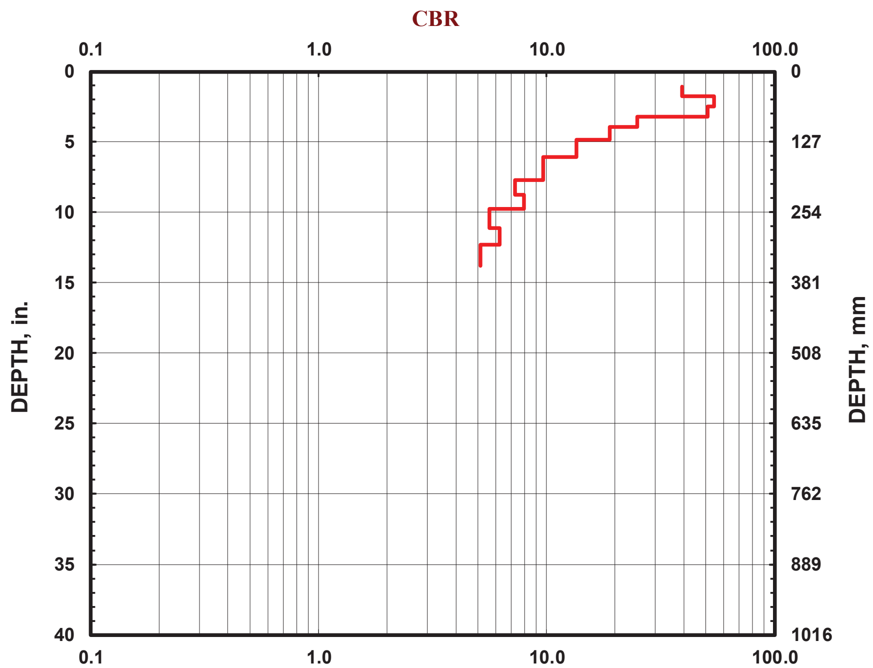
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

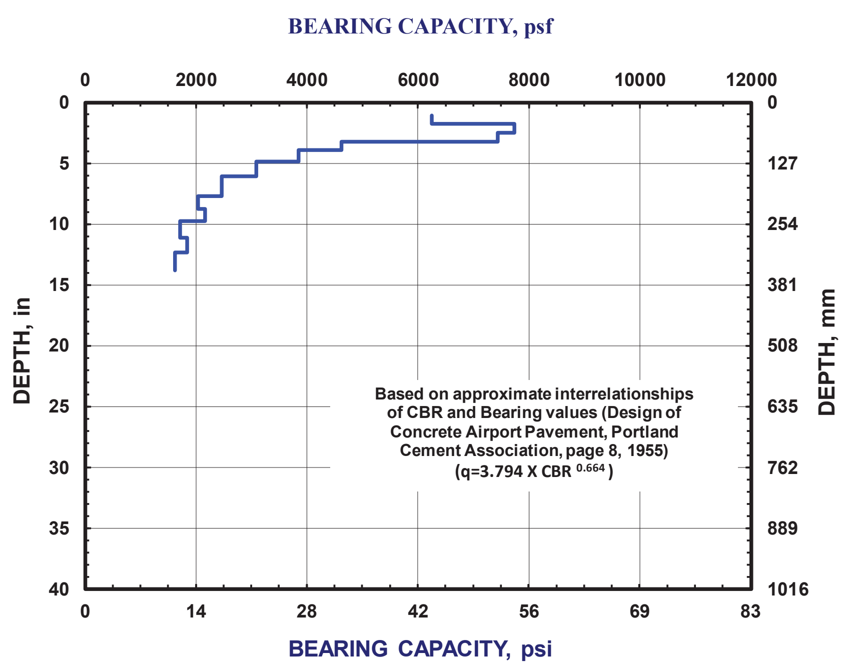
Project: *G103-21* **Date:** 17-Aug-21
Location: B-66 **Soil Type(s):** Type in the soil type

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ○ CH
- ○ CL
- ● All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	27	1
3	45	1
4	63	1
4	82	1
2	100	1
2	123	1
2	154	1
2	196	1
1	223	1
1	248	1
1	282	1
1	313	1
1	350	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

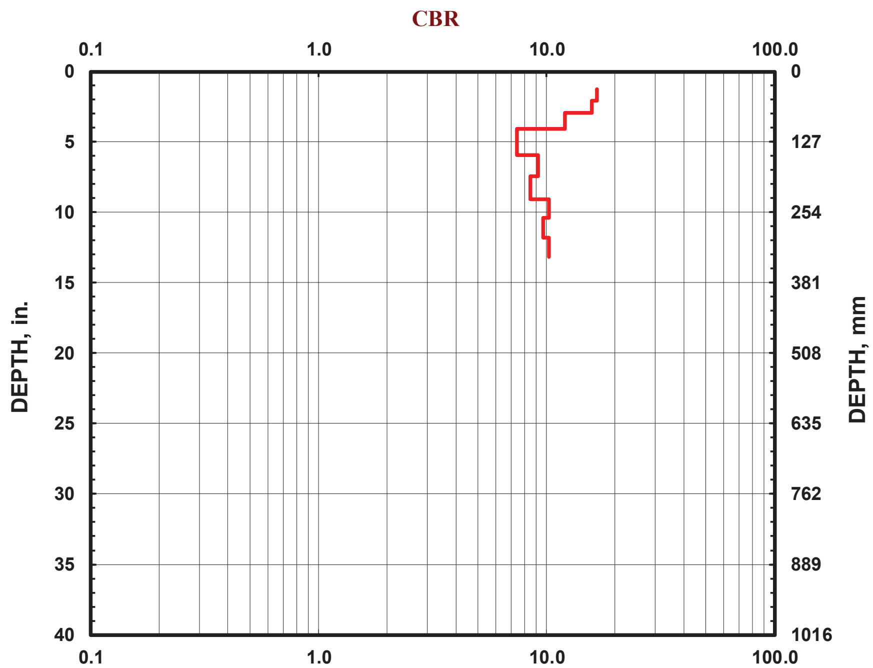
Project: *G103-21*
Location: B-67

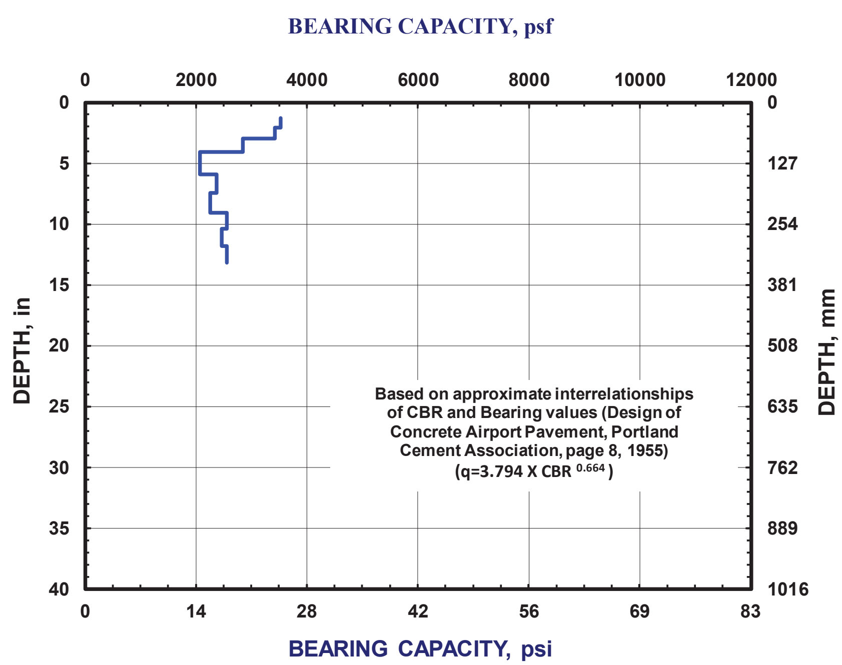
Date: 17-Aug-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	32	1
1	53	1
1	75	1
1	104	1
1	151	1
1	189	1
1	230	1
1	264	1
1	300	1
1	334	1





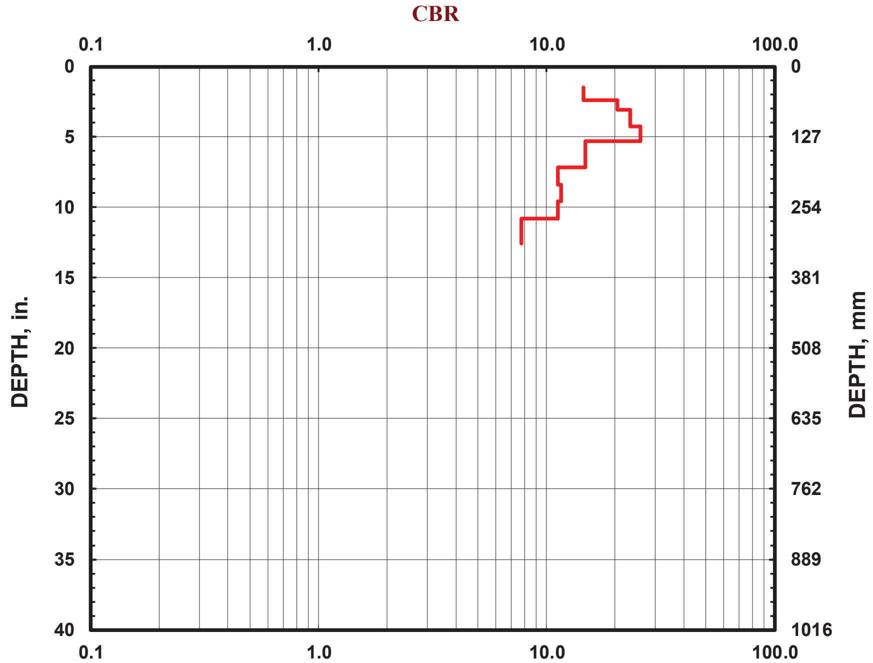
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

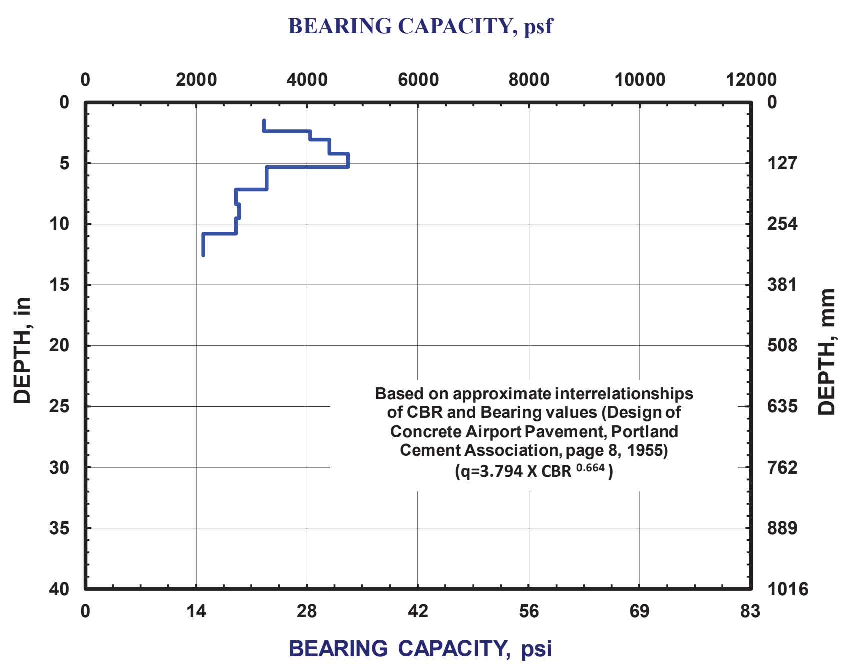
Project: *G103-21* **Date:** 17-Aug-21
Location: B-68 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	37	1
1	61	1
1	78	1
2	108	1
2	135	1
2	182	1
1	213	1
1	243	1
1	274	1
1	319	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

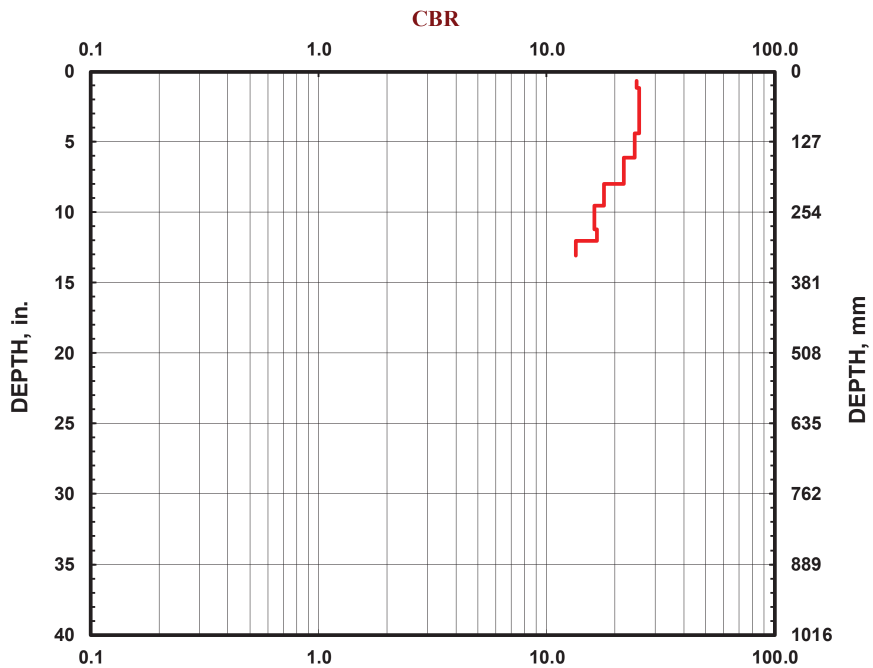
Project: *G103-21*
Location: B-72

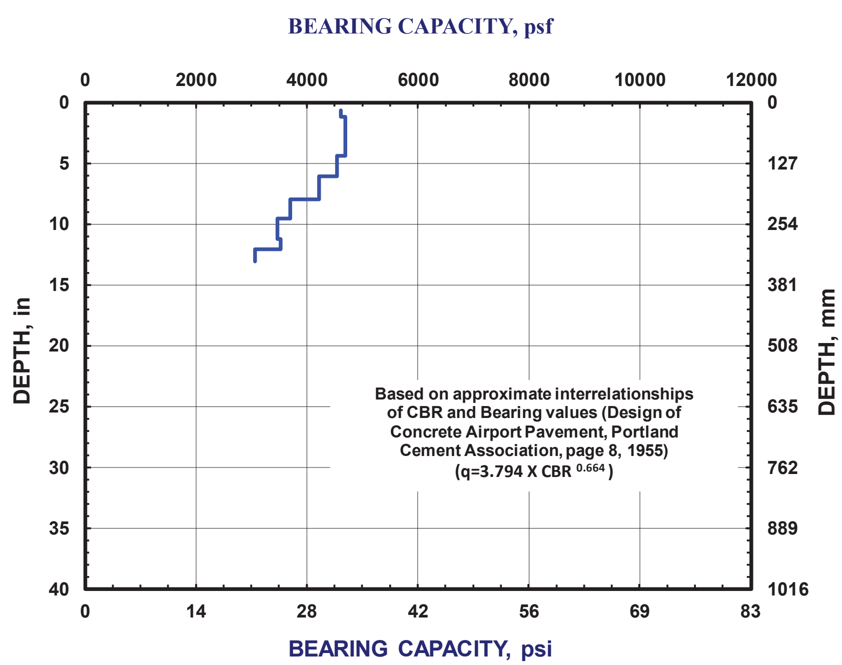
Date: 17-Aug-21
Soil Type(s): High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	16	1
1	30	1
3	71	1
3	112	1
3	155	1
3	203	1
2	242	1
2	285	1
1	306	1
1	332	1





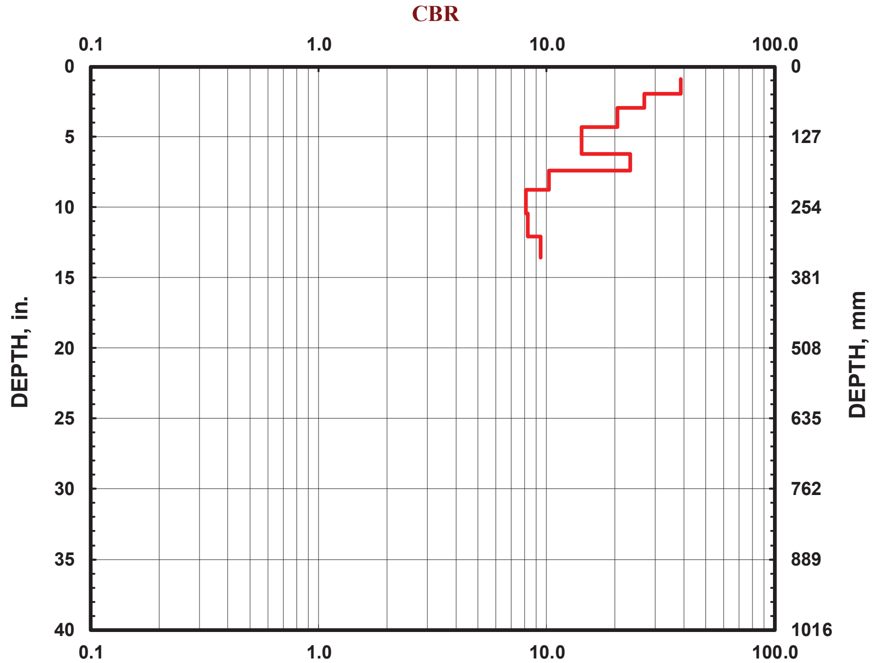
Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

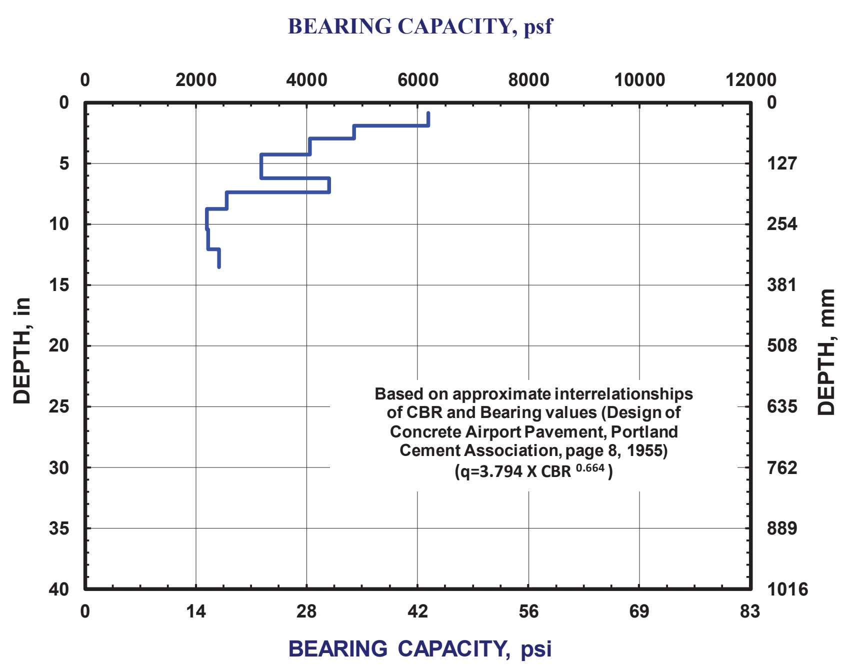
Project: *G103-21* **Date:** 17-Aug-21
Location: B-73 **Soil Type(s):** High plasticity Clay

Hammer
- ○ 10.1 lbs.
- ● 17.6 lbs.
- ○ Both hammers used

Soil Type
- ● CH
- ○ CL
- ○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
1	22	1
3	49	1
2	75	1
2	109	1
2	158	1
2	188	1
1	222	1
1	265	1
1	307	1
1	344	1





Dynamic Cone Penetrometer Test (ASTM D6951)
Ellington Field Taxiways L,E and D

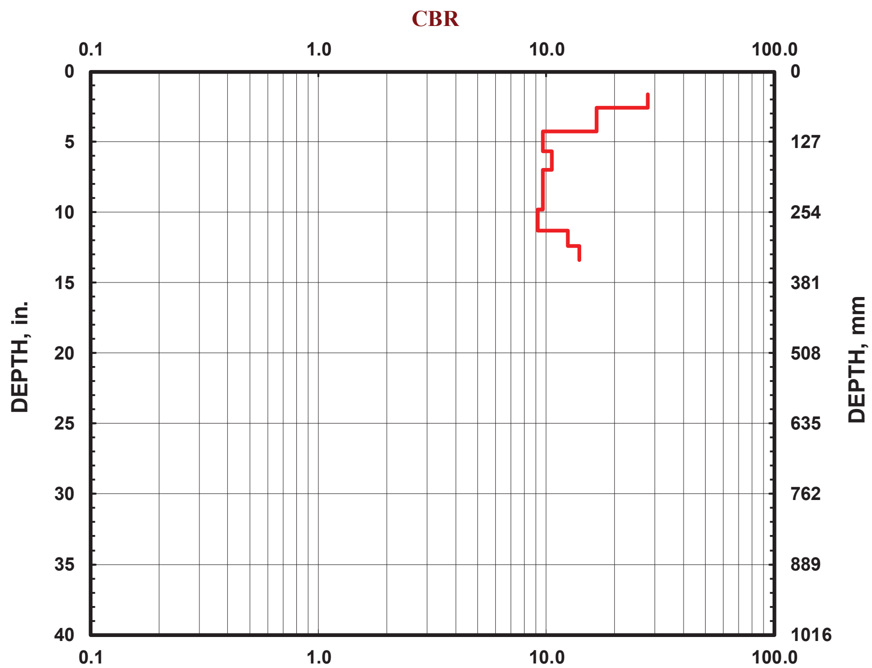
Project: *G103-21*
Location: B-74

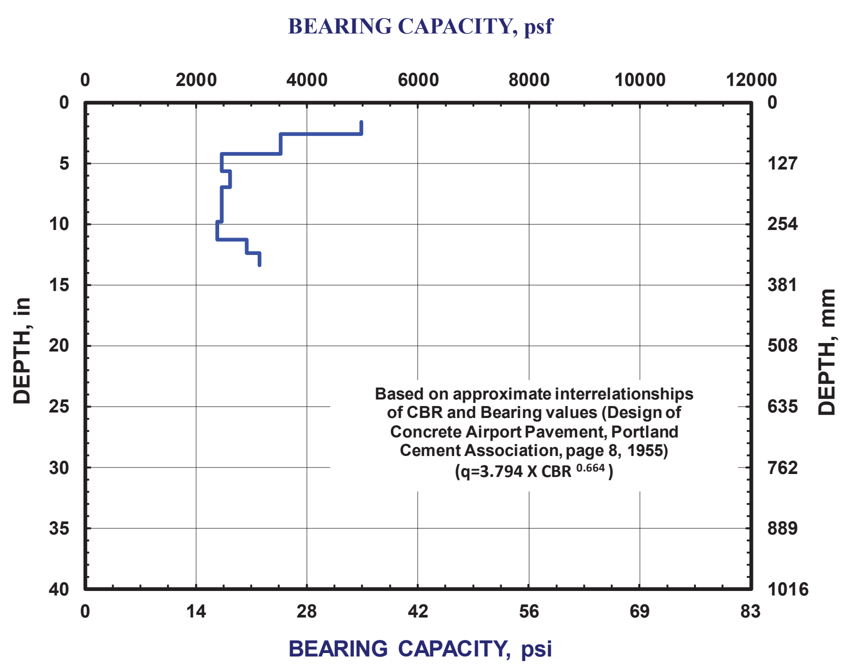
Date: 17-Aug-21
Soil Type(s): High plasticity Clay

Hammer
○ 10.1 lbs.
● 17.6 lbs.
○ Both hammers used

Soil Type
● CH
○ CL
○ All other soils

No. of Blows	Accumulative Penetration (mm)	Type of Hammer
2	41	1
2	66	1
2	108	1
1	144	1
1	177	1
1	213	1
1	249	1
1	287	1
1	315	1
1	340	1





ILLUSTRATIONS

AVILES
ENGINEERING CORP.

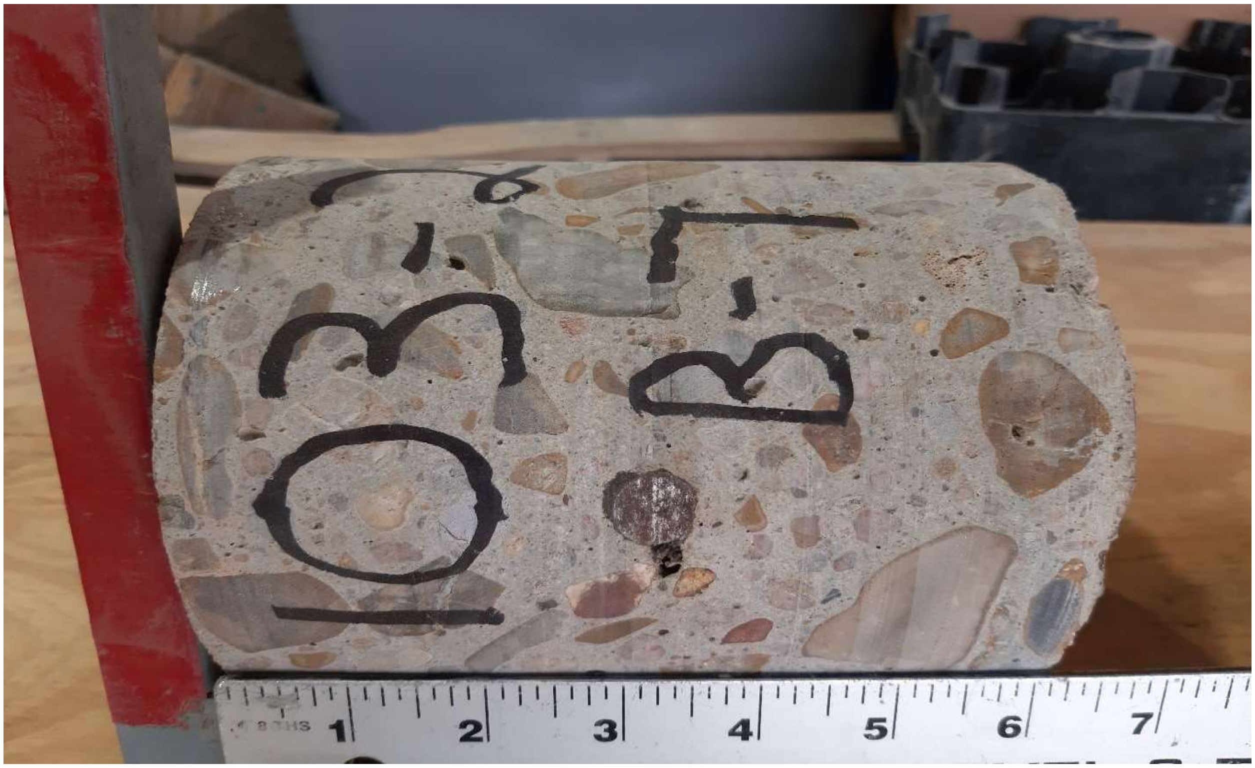


Photo 1 - Boring B-7

Photo 2 - Boring B-15

AYLES ENGINEERING CORP.

Photo 3 - Boring B-27

Photo 4 - Boring B-43

AVILES
ENGINEERING CORP.

Photo 5 - Boring B-51

Photo 6 - Boring B-62

Photo 7 - Boring B-63

Photo 8 - Boring B-69

Photo 9 - Boring B-70

Photo 10 - Boring B-71

Appendix B – Fleet Mix Traffic

Taxiway L Fleet Mix

Aircraft Name	ADG	TDG	Entered into FAARFIELD as:	MTOW (lbs)	Average Annual Departures
Aero Spacelines Super Guppy	IV	TBD	D-200	170000	4
Airbus A310-200	IV	5	A310-200	317465	6
Airbus A330-200	V	5	A330-200 std	533519	50
Airbus Beluga XL	TBD	TBD	A330-200 std	500444	2
Boeing 727-200	III	4	Adv. B727-200 Option	209500	12
Boeing 747-200	V	5	B747-200B Combi Mixed / Belly	833000	50
Boeing 747-400	V	5	B747-400 / Belly	910000	25
Boeing 747-400 Dreamlifter	V	5	B747-400 / Belly	803001	2
Boeing 757-200	IV	4	B757-200	255500	24
Boeing 757-300	IV	4	B757-300	270000	6
Boeing 767-200	IV	5	B767-200	395000	6
Boeing 767-300	IV	5	B767-300	412000	18
Boeing 777-200	V	5	B777-200 ER	766000	25
Boeing 787-8 Dreamliner	V	5	B787-8	502500	25
Lockheed C-130 Hercules	IV	TBD	C-130	164000	185
Lockheed C-5B	VI	TBD	C-5	837000	75
McDonnell Douglas DC-10-10	IV	TBD	DC10-10	455000	6
Various Single Wheel (12,500<MTOW<=15,000)	VARIOUS	VARIOUS	S-15	15000	1793
Various Dual Wheel (12,500<MTOW<=15,000)	VARIOUS	VARIOUS	D-15	15000	32
Various Single Wheel (15,000<MTOW<=25,000)	VARIOUS	VARIOUS	S-25	25000	455
Various Dual Wheel (15,000<MTOW<=25,000)	VARIOUS	VARIOUS	D-25	25000	335
Various Single Wheel (25,000<MTOW<=50,000)	VARIOUS	VARIOUS	S-50	50000	2
Various Dual Wheel (25,000<MTOW<=50,000)	VARIOUS	VARIOUS	D-50	50000	529
Various Dual Wheel (50,000<MTOW<=75,000)	VARIOUS	VARIOUS	D-75	75000	58
Various Dual Wheel (75,000<MTOW<=100,000)	VARIOUS	VARIOUS	D-100	100000	113
Various Dual Wheel (100,000<MTOW<=150,000)	VARIOUS	VARIOUS	D-150	150000	3
Various Dual Wheel (150,000<MTOW<=200,000)	VARIOUS	VARIOUS	D-200	200000	73

Appendix C – FAARFIELD Reports

Federal Aviation Administration FAARFIELD 2.0 Section Report

FAARFIELD 2.0.3 (Build 04/30/2021)

Job Name: EFD Taxiway L - Pavement Options_Updated

Section: Option 1 - CBR = 1

Analysis Type: New Rigid

Last Run: Thickness Design 2021-10-28 15:02:00

Design Life = 30 Years

Total thickness to the top of the subgrade = 47.4in.

Pavement Structure Information by Layer

No.	Type	Thickness in.	Modulus psi	Poisson's Ratio	Strength R psi
1	P-501 PCC Surface	17.4	4000000	0.15	700.0
2	User Defined	6.0	250000	0.35	0
3	P-304 Cement Treated Base	12.0	500000	0.35	0
4	User Defined	12.0	1500	0.35	0
5	Subgrade	0	1500	0.4	0

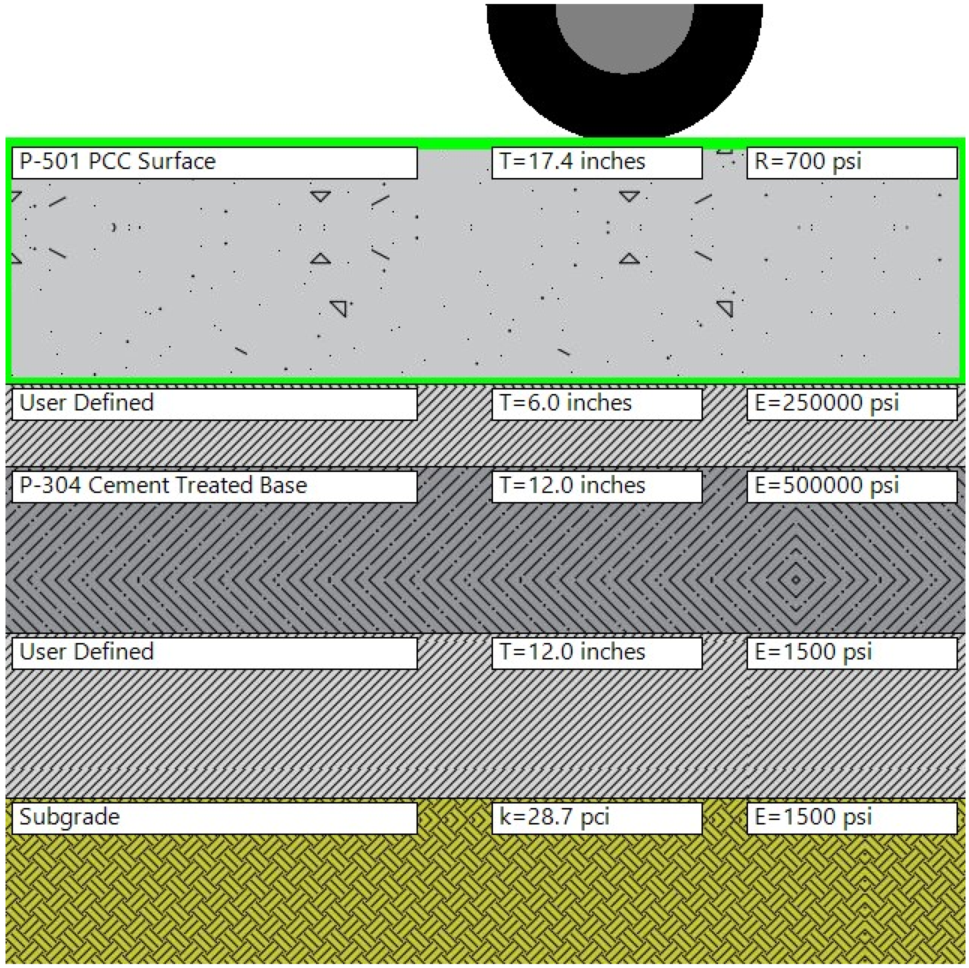
Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	D-200	200000	5	0
2	A310-200	315041	10	0
3	A330-200 WV020	509050	50	0
4	A330-300 std	509050	50	0
5	B727-200 Advanced Option	210000	15	0
6	B747-200/300	836000	50	0
7	B747-200/300 Belly	836000	50	0
8	B747-400	877000	25	0
9	B747-400 Belly	877000	25	0
10	B757-200	256000	25	0
11	B757-300	271000	10	0
12	B767-200	368000	10	0
13	B767-300	352000	20	0
14	B777-200 ER	658000	25	0
15	B787-8	503500	25	0
16	C-130	155000	200	0
17	C-5	769000	75	0
18	DC/MD-10-10/10F	458000	10	0
19	MD-11	633000	10	0
20	MD-11 Belly	633000	10	0
21	S-15	15000	1800	0
22	S-25	25000	35	0
23	S-50	50000	500	0
24	D-15	15000	350	0
25	D-25	25000	5	0
26	D-50	50000	530	0
27	D-75	75000	60	0
28	D-100	100000	115	0
29	D-150	150000	5	0
30	D-200	200000	75	0

Additional Airplane Information

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	D-200	0.00	0.00	3.29
2	A310-200	0.00	0.00	3.69
3	A330-200 WV020	0.23	0.23	1.98
4	A330-300 std	0.23	0.23	1.88
5	B727-200 Advanced Option	0.00	0.00	2.97
6	B747-200/300	0.03	0.03	3.46
7	B747-200/300 Belly	0.00	0.03	3.47
8	B747-400	0.03	0.03	3.47
9	B747-400 Belly	0.00	0.03	3.47
10	B757-200	0.00	0.00	3.92
11	B757-300	0.00	0.00	3.93
12	B767-200	0.00	0.00	3.73
13	B767-300	0.00	0.00	3.86
14	B777-200 ER	0.20	0.20	4.05
15	B787-8	0.19	0.20	3.77
16	C-130	0.00	0.00	4.67
17	C-5	0.00	0.00	1.41
18	DC/MD-10-10/10F	0.01	0.01	3.8
19	MD-11	0.07	0.07	3.67
20	MD-11 Belly	0.00	0.00	3.01
21	S-15	0.00	0.00	3.6
22	S-25	0.00	0.00	3.94
23	S-50	0.00	0.00	2.73
24	D-15	0.00	0.00	5.48
25	D-25	0.00	0.00	5.03
26	D-50	0.00	0.00	3.73
27	D-75	0.00	0.00	3.6
28	D-100	0.00	0.00	3.55
29	D-150	0.00	0.00	3.28
30	D-200	0.00	0.00	3.29

User Is responsible For checking frost protection requirements.



P-501 PCC Surface
T=17.4 inches
R=700 psi
User Defined
T=6.0 inches
E=250000 psi
P-304 Cement Treated Base
T=12.0 inches
E=500000 psi
User Defined
T=12.0 inches
E=1500 psi
Subgrade
k=28.7 pci
E=1500 psi

Federal Aviation Administration FAARFIELD 2.0 Section Report

FAARFIELD 2.0.3 (Build 04/30/2021)

Job Name: EFD Taxiway L - Pavement Options_Updated

Section: Option 1 - CBR = 5

Analysis Type: New Rigid

Last Run: Thickness Design 2021-10-28 15:18:25

Design Life = 30 Years

Total thickness to the top of the subgrade = 43.6in.

Pavement Structure Information by Layer

No.	Type	Thickness in.	Modulus psi	Poisson's Ratio	Strength R psi
1	P-501 PCC Surface	13.6	4000000	0.15	700.0
2	User Defined	6.0	250000	0.35	0
3	P-304 Cement Treated Base	12.0	500000	0.35	0
4	User Defined	12.0	7500	0.35	0
5	Subgrade	0	7500	0.4	0

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	D-200	200000	5	0
2	A310-200	315041	10	0
3	A330-200 WV020	509050	50	0
4	A330-300 std	509050	50	0
5	B727-200 Advanced Option	210000	15	0
6	B747-200/300	836000	50	0
7	B747-200/300 Belly	836000	50	0
8	B747-400	877000	25	0
9	B747-400 Belly	877000	25	0
10	B757-200	256000	25	0
11	B757-300	271000	10	0
12	B767-200	368000	10	0
13	B767-300	352000	20	0
14	B777-200 ER	658000	25	0
15	B787-8	503500	25	0
16	C-130	155000	200	0
17	C-5	769000	75	0
18	DC/MD-10-10/10F	458000	10	0
19	MD-11	633000	10	0
20	MD-11 Belly	633000	10	0
21	S-15	15000	1800	0
22	S-25	25000	35	0
23	S-50	50000	500	0
24	D-15	15000	350	0
25	D-25	25000	5	0
26	D-50	50000	530	0
27	D-75	75000	60	0
28	D-100	100000	115	0
29	D-150	150000	5	0
30	D-200	200000	75	0

Additional Airplane Information

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	D-200	0.00	0.00	3.29
2	A310-200	0.00	0.00	3.69
3	A330-200 WV020	0.18	0.18	1.98
4	A330-300 std	0.14	0.14	1.88
5	B727-200 Advanced Option	0.00	0.00	2.97
6	B747-200/300	0.03	0.03	3.46
7	B747-200/300 Belly	0.00	0.03	3.47
8	B747-400	0.04	0.04	3.47
9	B747-400 Belly	0.00	0.04	3.47
10	B757-200	0.00	0.00	3.92
11	B757-300	0.00	0.00	3.93
12	B767-200	0.00	0.00	3.73
13	B767-300	0.00	0.00	3.86
14	B777-200 ER	0.24	0.24	4.05
15	B787-8	0.29	0.30	3.77
16	C-130	0.00	0.00	4.67
17	C-5	0.00	0.00	1.41
18	DC/MD-10-10/10F	0.01	0.01	3.8
19	MD-11	0.07	0.07	3.67
20	MD-11 Belly	0.00	0.00	3.01
21	S-15	0.00	0.00	3.6
22	S-25	0.00	0.00	3.94
23	S-50	0.00	0.00	2.73
24	D-15	0.00	0.00	5.48
25	D-25	0.00	0.00	5.03
26	D-50	0.00	0.00	3.73
27	D-75	0.00	0.00	3.6
28	D-100	0.00	0.00	3.55
29	D-150	0.00	0.00	3.28
30	D-200	0.00	0.01	3.29

User Is responsible For checking frost protection requirements.

P-501 PCC Surface
T=13.6 inches
R=700 psi
User Defined
T=6.0 inches
E=250000 psi
P-304 Cement Treated Base
T=12.0 inches
E=500000 psi
User Defined
T=12.0 inches
E=7500 psi
Subgrade
k=100.5 pci
E=7500 psi

Federal Aviation Administration FAARFIELD 2.0 Section Report

FAARFIELD 2.0.3 (Build 04/30/2021)

Job Name: EFD Taxiway L - Pavement Options_Updated

Section: Option 2 - CBR = 1

Analysis Type: New Rigid

Last Run: Thickness Design 2021-10-28 17:56:01

Design Life = 30 Years

Total thickness to the top of the subgrade = 50.9in.

Pavement Structure Information by Layer

No.	Type	Thickness in.	Modulus psi	Poisson's Ratio	Strength R psi
1	P-501 PCC Surface	16.9	4000000	0.15	700.0
2	User Defined	6.0	250000	0.35	0
3	P-304 Cement Treated Base	16.0	500000	0.35	0
4	User Defined	12.0	1500	0.35	0
5	Subgrade	0	1500	0.4	0

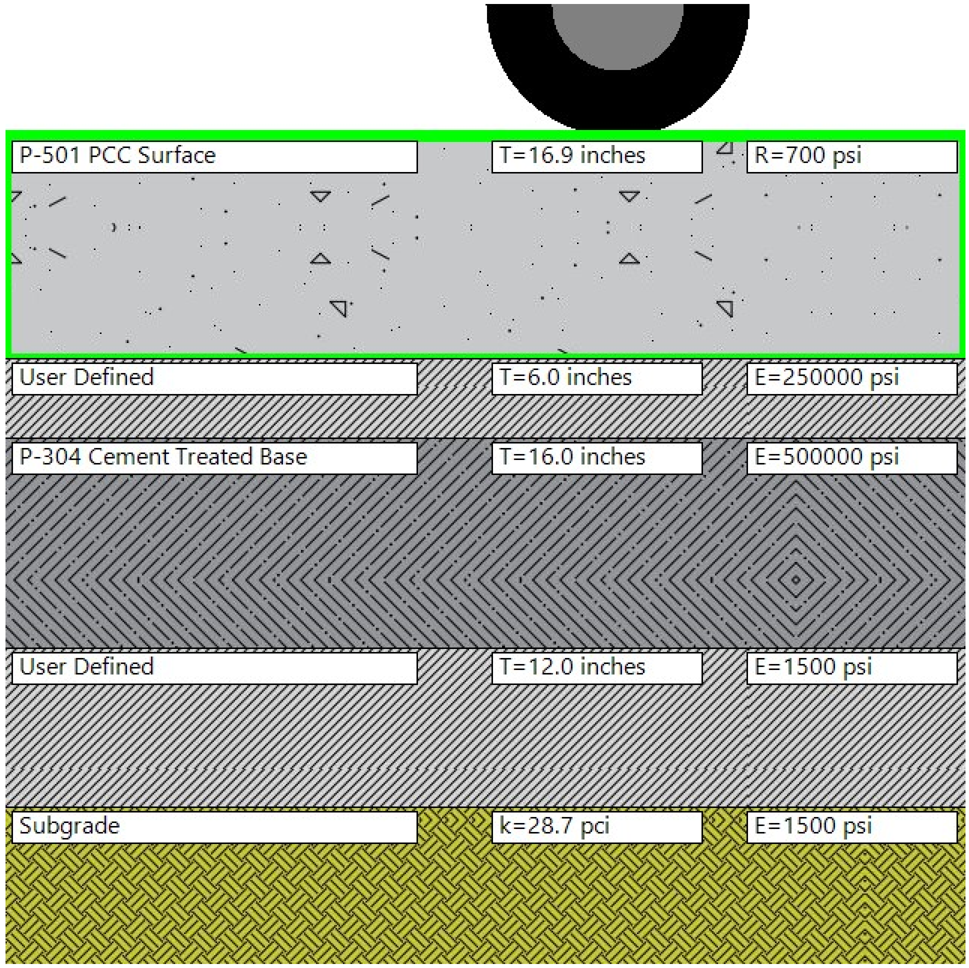
Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	D-200	200000	5	0
2	A310-200	315041	10	0
3	A330-200 WV020	509050	50	0
4	A330-300 std	509050	50	0
5	B727-200 Advanced Option	210000	15	0
6	B747-200/300	836000	50	0
7	B747-200/300 Belly	836000	50	0
8	B747-400	877000	25	0
9	B747-400 Belly	877000	25	0
10	B757-200	256000	25	0
11	B757-300	271000	10	0
12	B767-200	368000	10	0
13	B767-300	352000	20	0
14	B777-200 ER	658000	25	0
15	B787-8	503500	25	0
16	C-130	155000	200	0
17	C-5	769000	75	0
18	DC/MD-10-10/10F	458000	10	0
19	MD-11	633000	10	0
20	MD-11 Belly	633000	10	0
21	S-15	15000	1800	0
22	S-25	25000	35	0
23	S-50	50000	500	0
24	D-15	15000	350	0
25	D-25	25000	5	0
26	D-50	50000	530	0
27	D-75	75000	60	0
28	D-100	100000	115	0
29	D-150	150000	5	0
30	D-200	200000	75	0

Additional Airplane Information

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	D-200	0.00	0.00	3.29
2	A310-200	0.00	0.00	3.69
3	A330-200 WV020	0.23	0.23	1.98
4	A330-300 std	0.23	0.23	1.88
5	B727-200 Advanced Option	0.00	0.00	2.97
6	B747-200/300	0.03	0.03	3.46
7	B747-200/300 Belly	0.00	0.03	3.47
8	B747-400	0.03	0.03	3.47
9	B747-400 Belly	0.00	0.03	3.47
10	B757-200	0.00	0.00	3.92
11	B757-300	0.00	0.00	3.93
12	B767-200	0.00	0.00	3.73
13	B767-300	0.00	0.00	3.86
14	B777-200 ER	0.22	0.22	4.05
15	B787-8	0.18	0.18	3.77
16	C-130	0.00	0.00	4.67
17	C-5	0.00	0.00	1.41
18	DC/MD-10-10/10F	0.01	0.01	3.8
19	MD-11	0.07	0.07	3.67
20	MD-11 Belly	0.00	0.00	3.01
21	S-15	0.00	0.00	3.6
22	S-25	0.00	0.00	3.94
23	S-50	0.00	0.00	2.73
24	D-15	0.00	0.00	5.48
25	D-25	0.00	0.00	5.03
26	D-50	0.00	0.00	3.73
27	D-75	0.00	0.00	3.6
28	D-100	0.00	0.00	3.55
29	D-150	0.00	0.00	3.28
30	D-200	0.00	0.00	3.29

User Is responsible For checking frost protection requirements.



P-501 PCC Surface
T=16.9 inches
R=700 psi
User Defined
T=6.0 inches
E=250000 psi
P-304 Cement Treated Base
T=16.0 inches
E=500000 psi
User Defined
T=12.0 inches
E=1500 psi
Subgrade
k=28.7 pci
E=1500 psi

Federal Aviation Administration FAARFIELD 2.0 Section Report

FAARFIELD 2.0.3 (Build 04/30/2021)

Job Name: EFD Taxiway L - Pavement Options_Updated

Section: Option 2 - CBR = 5

Analysis Type: New Rigid

Last Run: Thickness Design 2021-10-28 18:12:32

Design Life = 30 Years

Total thickness to the top of the subgrade = 46.3in.

Pavement Structure Information by Layer

No.	Type	Thickness in.	Modulus psi	Poisson's Ratio	Strength R psi
1	P-501 PCC Surface	12.3	4000000	0.15	700.0
2	User Defined	6.0	250000	0.35	0
3	P-304 Cement Treated Base	16.0	500000	0.35	0
4	User Defined	12.0	7500	0.35	0
5	Subgrade	0	7500	0.4	0

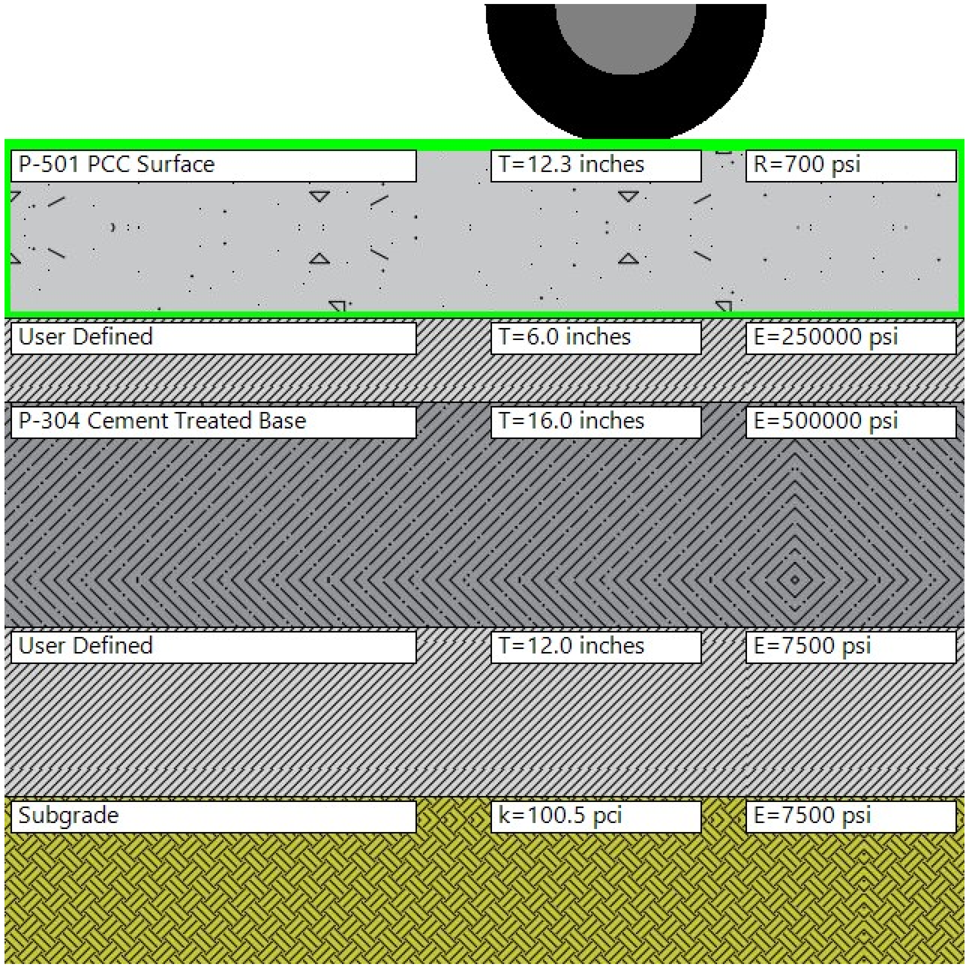
Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	D-200	200000	5	0
2	A310-200	315041	10	0
3	A330-200 WV020	509050	50	0
4	A330-300 std	509050	50	0
5	B727-200 Advanced Option	210000	15	0
6	B747-200/300	836000	50	0
7	B747-200/300 Belly	836000	50	0
8	B747-400	877000	25	0
9	B747-400 Belly	877000	25	0
10	B757-200	256000	25	0
11	B757-300	271000	10	0
12	B767-200	368000	10	0
13	B767-300	352000	20	0
14	B777-200 ER	658000	25	0
15	B787-8	503500	25	0
16	C-130	155000	200	0
17	C-5	769000	75	0
18	DC/MD-10-10/10F	458000	10	0
19	MD-11	633000	10	0
20	MD-11 Belly	633000	10	0
21	S-15	15000	1800	0
22	S-25	25000	35	0
23	S-50	50000	500	0
24	D-15	15000	350	0
25	D-25	25000	5	0
26	D-50	50000	530	0
27	D-75	75000	60	0
28	D-100	100000	115	0
29	D-150	150000	5	0
30	D-200	200000	75	0

Additional Airplane Information

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	D-200	0.00	0.00	3.29
2	A310-200	0.00	0.00	3.69
3	A330-200 WV020	0.21	0.21	1.98
4	A330-300 std	0.15	0.15	1.88
5	B727-200 Advanced Option	0.00	0.00	2.97
6	B747-200/300	0.03	0.03	3.46
7	B747-200/300 Belly	0.00	0.03	3.47
8	B747-400	0.04	0.04	3.47
9	B747-400 Belly	0.00	0.04	3.47
10	B757-200	0.00	0.00	3.92
11	B757-300	0.00	0.00	3.93
12	B767-200	0.00	0.00	3.73
13	B767-300	0.00	0.00	3.86
14	B777-200 ER	0.20	0.20	4.05
15	B787-8	0.29	0.30	3.77
16	C-130	0.00	0.00	4.67
17	C-5	0.00	0.00	1.41
18	DC/MD-10-10/10F	0.01	0.01	3.8
19	MD-11	0.07	0.07	3.67
20	MD-11 Belly	0.00	0.00	3.01
21	S-15	0.00	0.00	3.6
22	S-25	0.00	0.00	3.94
23	S-50	0.00	0.00	2.73
24	D-15	0.00	0.00	5.48
25	D-25	0.00	0.00	5.03
26	D-50	0.00	0.00	3.73
27	D-75	0.00	0.00	3.6
28	D-100	0.00	0.00	3.55
29	D-150	0.00	0.00	3.28
30	D-200	0.00	0.01	3.29

User Is responsible For checking frost protection requirements.



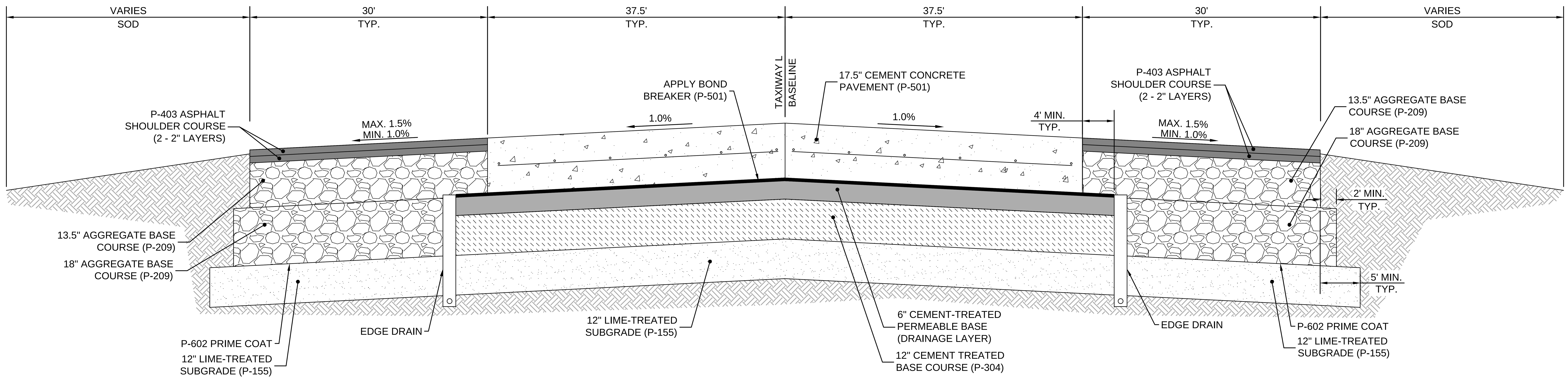
P-501 PCC Surface
T=12.3 inches
R=700 psi
User Defined
T=6.0 inches
E=250000 psi
P-304 Cement Treated Base
T=16.0 inches
E=500000 psi
User Defined
T=12.0 inches
E=7500 psi
Subgrade
k=100.5 pci
E=7500 psi

Member of the SNC-Lavalin Group

Appendix D – Preliminary Typical Pavement Sections

NOTE:

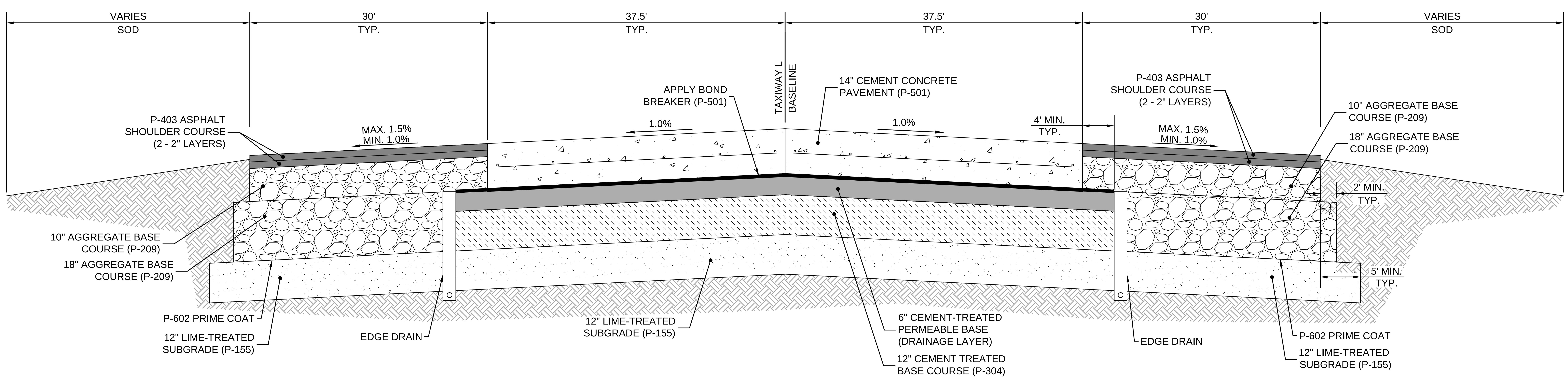
1. LOCATIONS AND SIZES OF THE REINFORCEMENT FOR CRACK CONTROL OF IRREGULARLY SHAPED SLABS SHALL BE AS DETAILED IN FAA AC 150/5320-6G SECTION 3.16.12.2. ADDITIONAL STEEL MAY BE REQUIRED AT THE OWNER'S DIRECTION.



1
C-501

TAXIWAY L TYPICAL SECTION - OPTION 1 - CBR = 1

SCALE: NONE



2
C-501

TAXIWAY L TYPICAL SECTION - OPTION 1 - CBR = 5

SCALE: NONE

HAS FILE: C:\PW_WORK\ATKNATX01\VELE7904\DMS67689\EFD-C-501.DWG
PLOT DATE: 2021-10-28

HOUSTON AIRPORT SYSTEM
GEORGE BUSH INTERCONTINENTAL AIRPORT / HOUSTON, TX

ATKINS
LOCAL OFFICE:
200 WESTLAKE PARK BLVD., STE. 1100
HOUSTON, TX 77079
TEL: (713) 576-8500
ATKINS NORTH AMERICA PE FIRM REG. #F-000474
WWW.ATKINSGLOBAL.COM

REVISIONS

NO.	DESCRIPTION	DATE	BY

ELLINGTON AIRPORT (EFD)
EFD TAXIWAY L
TYPICAL SECTIONS

PROJECT MGR:	JLV
DESIGNER:	EW
DRAWN BY:	KJV
CHECK BY:	JLV
SCALE:	
DATE:	10/28/2021

APPROVED BY:

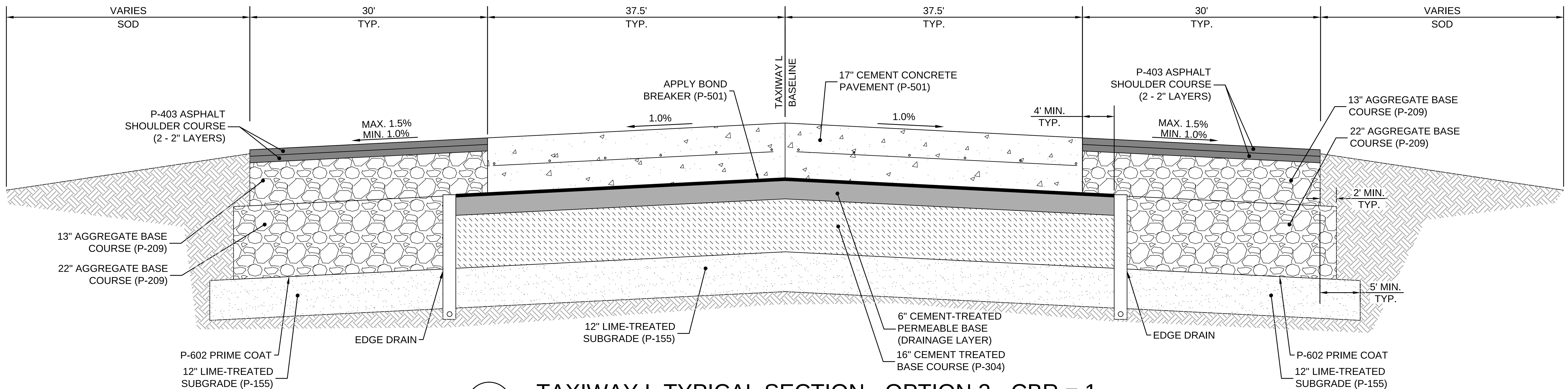
DIRECTOR
HOUSTON AIRPORT SYSTEM

PROJECT NO.
100073798
A.I.P. NO.
C.I.P. NO.
H.A.S. NO.
SHEET NO.

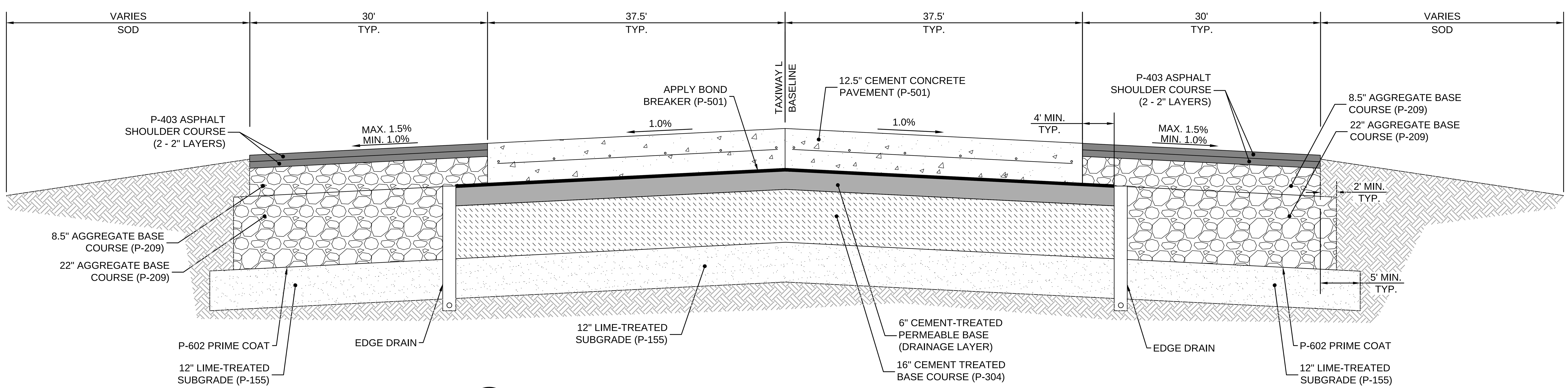
C-501

NOTE:

1. LOCATIONS AND SIZES OF THE REINFORCEMENT FOR CRACK CONTROL OF IRREGULARLY SHAPED SLABS SHALL BE AS DETAILED IN FAA AC 150/5320-6G SECTION 3.16.12.2. ADDITIONAL STEEL MAY BE REQUIRED AT THE OWNER'S DIRECTION.



1
C-502
TAXIWAY L TYPICAL SECTION - OPTION 2 - CBR = 1
SCALE: NONE



2
C-502
TAXIWAY L TYPICAL SECTION - OPTION 2 - CBR = 5
SCALE: NONE

HAS FILE: C:\PW_WORK\ATKNATX01\ELE7904\DMS67689\EFD-C-501.DWG
PLOT DATE: 2021-10-28

HOUSTON AIRPORT SYSTEM
GEORGE BUSH INTERCONTINENTAL AIRPORT / HOUSTON, TX

ATKINS
LOCAL OFFICE:
200 WESTLAKE PARK BLVD., STE. 1100
HOUSTON, TX 77079
TEL: (713) 576-8500
ATKINS NORTH AMERICA PE FIRM REG. #F-000474
WWW.ATKINSGLOBAL.COM

REVISIONS

NO.	DESCRIPTION	DATE	BY

ELLINGTON AIRPORT (EFD)
EFD TAXIWAY L
TYPICAL SECTIONS

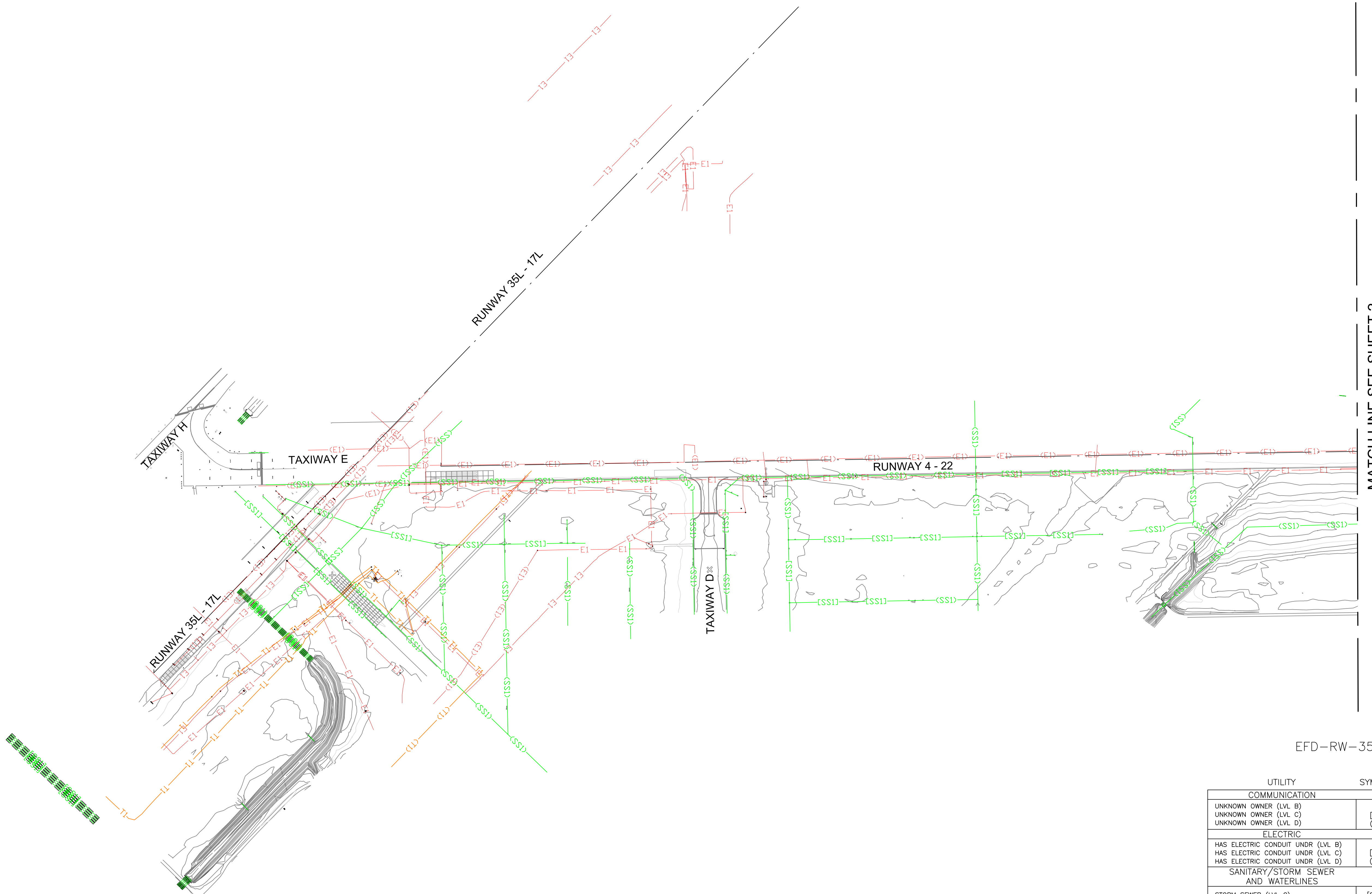
PROJECT MGR:	JLV
DESIGNER:	EW
DRAWN BY:	KJV
CHECK BY:	JLV
SCALE:	
DATE:	10/28/2021

APPROVED BY:

DIRECTOR
HOUSTON AIRPORT SYSTEM

PROJECT NO.
100073798
A.I.P. NO.
C.I.P. NO.
H.A.S. NO.
SHEET NO.
C-502

Appendix F – Existing Utilities Layout



SCALE : 1" = 250' (11X17)

NOTES:

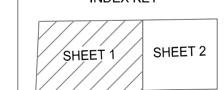
1. THE UTILITY SHOWN ARE DEPICTED IN ACCORDANCE WITH ASCE/CI 38-02 AS SUBSURFACE UTILITY ENGINEERING QUALITY LEVELS B,C & D.

2. THE QUALITY LEVEL C & D UTILITIES ARE TAKEN FROM RESEARCH AND VISIBLE SURFACE FEATURE INFORMATION THAT WAS PROVIDED BY OTHERS WITH VARYING ACCURACY.

THE QUALITY LEVEL B UTILITIES ARE DESIGNATED WITH NONDESTRUCTIVE GEOPHYSICAL TECHNIQUES AND ARE LIMITED BY SIGNAL BLEED OVER DUE TO CONGESTED UTILITIES AND CANNOT NORMALLY DETECT UTILITIES MADE OF NON-CONDUCTIVE MATERIALS SUCH AS PVC OR CONCRETE.

3. THE UTILITY INFORMATION CONTAINED IN THESE DOCUMENTS DOES NOT RELIEVE THE CONTRACTORS FROM THEIR RESPONSIBILITIES TO COMPLY WITH THE STATE OF TEXAS UTILITY DAMAGE PREVENTION LAWS AND REGULATIONS.

INDEX KEY



LEGEND FOR EFD–RW–35L TXWY–D HOUSTON, TX

UTILITY	SYMBOL	COLOR	LINE WEIGHT	LEVEL B OR C/D STYLE
COMMUNICATION				
UNKNOWN OWNER (LVL B)	T1	30	0	——T1——T1——
UNKNOWN OWNER (LVL C)	[T1]	30	0	——[T1]——[T1]——
UNKNOWN OWNER (LVL D)	(T1)	30	0	——(T1)——(T1)——
ELECTRIC				
HAS ELECTRIC CONDUIT UNDR (LVL B)	E1	10	0	——E1——E1——
HAS ELECTRIC CONDUIT UNDR (LVL C)	[E1]	10	0	——[E1]——[E1]——
HAS ELECTRIC CONDUIT UNDR (LVL D)	(E1)	10	0	——(E1)——(E1)——
SANITARY/STORM SEWER AND WATERLINES				
STORM SEWER (LVL C)	[SS1]	90	0	——[SS1]——[SS1]——
STORM SEWER (LVL D)	(SS1)	90	0	——(SS1)——(SS1)——

1. ALL SUE LEVEL B UTILITIES ARE OBTAINED BY GEOPHYSICAL METHODS.
2. ALL SUE LEVEL C UTILITIES ARE DRAW FROM TOPOGRAPHIC SURVEY.
3. ALL SUE LEVEL D UTILITIES ARE DRAWN USING RECORDS RESEARCH AND VISIBLE FEATURES FOUND BY SURVEY.
4. DEPTH OF COVER (DOC).

NO.	REVISIONS	DATE	NAME
△			
△			
△			
△			
△			

RODS SUBSURFACE UTILITY ENGINEERING INC.
STATE OF TEXAS
LANE M. LEASE
98546
LICENSED PROFESSIONAL ENGINEER
F-10 055

09/24/2021
DATE

RODS SUE
SUBSURFACE UTILITY ENGINEERING

6810 LEE RD. STE.300
SPRING, TEXAS 77379
TEL. 281-257-5248
TBPE NO. F-10055

TBPE Registration No. F-10055

PROJECT TITLE: EDF TAXIWAY L GEOTECHNICAL INVESTIGATION

DRAWN BY: KC

CK'D BY: LL

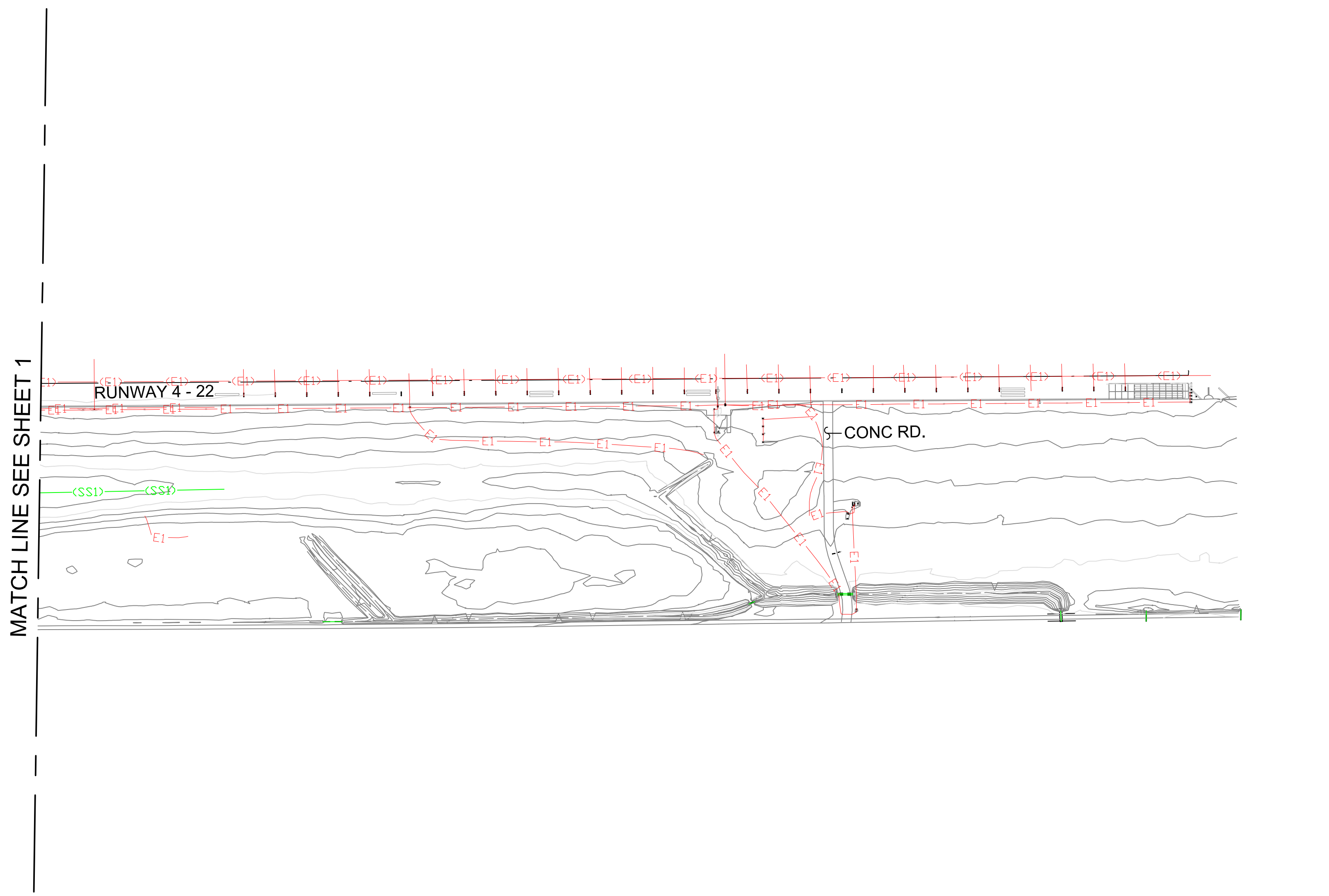
SHEET DESCRIPTION: EXISTING UTILITY LAYOUT

SCALE: 1" = 250'

DATE: 09/24/2021

SHEET NO: 1 / 2

W:\CLIENT\ATKINS 035\21901008 EFD TAXIWAY L\CADD\REFERENCES\SHEETS\SUE Utility_EFD-RW-35L Txwy-D_Sheets.dwg



0 125 250

SCALE : 1" = 250' (11X17)

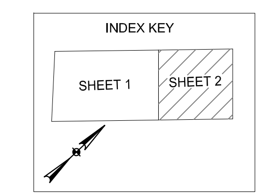
NOTES:

1. THE UTILITY SHOWN ARE DEPICTED IN ACCORDANCE WITH ASCE/CI 38-02 AS SUBSURFACE UTILITY ENGINEERING QUALITY LEVELS B,C & D.

2. THE QUALITY LEVEL C & D UTILITIES ARE TAKEN FROM RESEARCH AND VISIBLE SURFACE FEATURE INFORMATION THAT WAS PROVIDED BY OTHERS WITH VARYING ACCURACY.

THE QUALITY LEVEL B UTILITIES ARE DESIGNATED WITH NONDESTRUCTIVE GEOPHYSICAL TECHNIQUES AND ARE LIMITED BY SIGNAL BLEED OVER DUE TO CONGESTED UTILITIES AND CANNOT NORMALLY DETECT UTILITIES MADE OF NON-CONDUCTIVE MATERIALS SUCH AS PVC OR CONCRETE.

3. THE UTILITY INFORMATION CONTAINED IN THESE DOCUMENTS DOES NOT RELIEVE THE CONTRACTORS FROM THEIR RESPONSIBILITIES TO COMPLY WITH THE STATE OF TEXAS UTILITY DAMAGE PREVENTION LAWS AND REGULATIONS.



LEGEND FOR
EFD–RW–35L TXWY–D HOUSTON, TX

UTILITY	SYMBOL	COLOR	LINE WEIGHT	LEVEL B OR C/D STYLE
COMMUNICATION				
UNKNOWN OWNER (LVL B)	T1	30	0	——T1——T1——
UNKNOWN OWNER (LVL C)	[T1]	30	0	——[T1]——[T1]——
UNKNOWN OWNER (LVL D)	(T1)	30	0	——(T1)——(T1)——
ELECTRIC				
HAS ELECTRIC CONDUIT UNDR (LVL B)	E1	10	0	——E1——E1——
HAS ELECTRIC CONDUIT UNDR (LVL C)	[E1]	10	0	——[E1]——[E1]——
HAS ELECTRIC CONDUIT UNDR (LVL D)	(E1)	10	0	——(E1)——(E1)——
SANITARY/STORM SEWER AND WATERLINES				
STORM SEWER (LVL C)	[SS1]	90	0	——[SS1]——[SS1]——
STORM SEWER (LVL D)	(SS1)	90	0	——(SS1)——(SS1)——

1. ALL SUE LEVEL B UTILITIES ARE OBTAINED BY GEOPHYSICAL METHODS.
2. ALL SUE LEVEL C UTILITIES ARE DRAW FROM TOPOGRAPHIC SURVEY.
3. ALL SUE LEVEL D UTILITIES ARE DRAWN USING RECORDS RESEARCH AND VISIBLE FEATURES FOUND BY SURVEY.
4. DEPTH OF COVER (DOC).

NO.	REVISIONS	DATE	NAME
△			
△			
△			
△			
△			

RODS SUBSURFACE UTILITY ENGINEERING INC. STATE OF TEXAS
LANE M. LEASE
98546
LICENSED PROFESSIONAL ENGINEER
F-10 055

09/24/2021
DATE

RODS SUE
SUBSURFACE UTILITY ENGINEERING

6810 LEE RD. STE.300
SPRING, TEXAS 77379
TEL. 281-257-5248
TBPE NO. F-10055

TBPE Registration No. F-10055

PROJECT TITLE: EDF TAXIWAY L GEOTECHNICAL INVESTIGATION

DRAWN BY: KC

CK'D BY: LL

SHEET DESCRIPTION: EXISTING UTILITY LAYOUT

SCALE: 1" = 250'

DATE: 09/24/2021

SHEET NO: 2 / 2

W:\CLIENT\ATKINS 035\21901008 EFD TAXIWAY L\CADD\REFERENCES\SHEETS\SUE Utility_EFD-RW-35L Txwy-D_Sheets.dwg

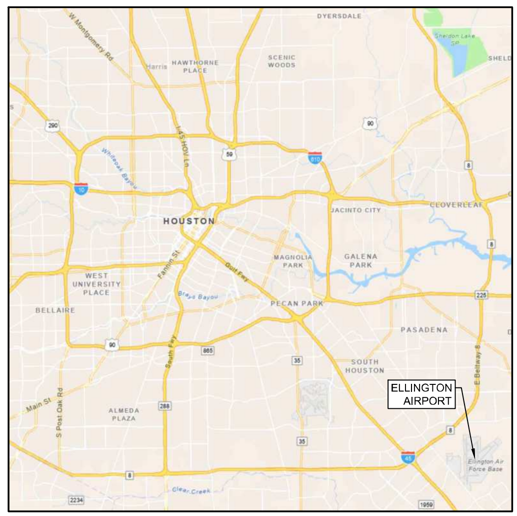
IV. 30% Advanced Planning Drawings (prepared by HNTB)

HOUSTON AIRPORT SYSTEM (HAS)

ELLINGTON AIRPORT

HOUSTON, TEXAS

TAXIWAY L



AIRPORT LOCATION MAP

THIS DESIGN IS SPECIFICALLY PREPARED FOR USE AT THE LOCATION SHOWN. USE IN ANY OTHER MANNER EXCEEDS THE INTENDED DESIGN PURPOSE OF THESE DRAWINGS AND ANY ACCOMPANIED SPECIFICATIONS.

30% ADVANCED PLANNING

APRIL 30, 2021

AVIATION ALLIANCE, INC.
Consulting Engineers
COLLEYVILLE, TEXAS
817-498-0388
TBPE REGISTRATION F - 41

HNTB
1301 Fannin Street
Suite 2000
Houston, Texas 77002
Firm Registration No. 420

GENERAL ABBREVIATIONS

ANT	ANTENNA
APP'D	APPROVED
ASPH	ASPHALT
BLDG	BUILDING
BRL	BUILDING RESTRICTION LINE
CHKD	CHECKED
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
COMM	COMMUNICATION
CONC	CONCRETE
DIA	DIAMETER
DME	DISTANCE MEASURING EQUIPMENT
E	EAST, EASTING
EBOX	ELECTRICAL BOX
EFD	ELLINGTON AIRPORT
ELE, ELEC	ELECTRICAL
ELEV	ELEVATION
EX	EXISTING
FL	FLOWLINE
GS	GLIDESLOPE
H	HEIGHT
HAS	HOUSTON AIRPORT SYSTEM
ILS	INSTRUMENT LANDING SYSTEM
INV	INVERT
L	LEFT
LOC	LOCALIZER
LVC	LENGTH OF VERTICAL CURVE
MALSR	MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM WITH RUNWAY ALIGNMENT INDICATOR LIGHTS
MAX	MAXIMUM
MH	MANHOLE
N	NORTH, NORTHING
NE	NORTHEAST
NO	NUMBER
NONPERF	NON-PERFORATED
NW	NORTHWEST
PAPI	PRECISION APPROACH PATH INDICATOR
PCCP	PORTLAND CEMENT CONCRETE PAVEMENT
PE	PROFESSIONAL ENGINEER
PED	PEDESTAL
PERF	PERFORATED
PVCE	POINT OF VERTICAL CURVE ELEVATION
PVCS	POINT OF VERTICAL CURVE STATION
PVIE	POINT OF VERTICAL INTERSECTION ELEVATION
PVIS	POINT OF VERTICAL INTERSECTION STATION
PVTE	POINT OF VERTICAL TANGENCY ELEVATION
PVTS	POINT OF VERTICAL TANGENCY STATION
R	RIGHT
RCP	REINFORCED CONCRETE PIPE
ROFA	RUNWAY OBJECT FREE AREA
RSA	RUNWAY SAFETY AREA
RVR	RUNWAY VISUAL RANGE
RW, RWY	RUNWAY
S	SOUTH
SE	SOUTHEAST
STA	STATION
STM	STORM
SW	SOUTHWEST
TL	TAXILANE
TOFA	TAXIWAY OBJECT FREE AREA
TSA	TAXIWAY SAFETY AREA
TWY	TAXIWAY
TX	TEXAS
TYP	TYPICAL
T-HANG	T HANGAR
VOR	VERY HIGH-FREQUENCY OMNI-DIRECTIONAL RANGE
VSR	VEHICLE SERVICE ROAD
W	WIDTH, WEST
WSK	WINDSOCK
W/	WITH

SHEET INDEX

SHEET #	SHEET INDEX
G00	COVER SHEET
G01	GENERAL ABBREVIATIONS AND SHEET INDEX
G02	GENERAL AIRPORT LAYOUT PLAN
G03	CONSTRUCTION PHASING PLAN - OVERALL
G04	CONSTRUCTION PHASING PLAN - PHASE 1
G05	CONSTRUCTION PHASING PLAN - PHASE 2A
G06	CONSTRUCTION PHASING PLAN - PHASE 2B
G07	CONSTRUCTION PHASING PLAN - PHASE 3
G08	TYPICAL SECTIONS
G09	GEOMETRIC LAYOUT & PLAN SHEET LAYOUT PLAN
CD01	DEMOLITION PLANS
CD02	DEMOLITION PLANS
CD03	DEMOLITION PLANS
CD04	DEMOLITION PLANS
CD05	DEMOLITION PLANS
CD06	DEMOLITION PLANS
CD07	DEMOLITION PLANS
CD08	DEMOLITION PLANS
CD09	DEMOLITION PLANS
CG01	GRADING AND DRAINAGE PLANS
CG02	GRADING AND DRAINAGE PLANS
CG03	GRADING AND DRAINAGE PLANS
CG04	GRADING AND DRAINAGE PLANS
CG05	GRADING AND DRAINAGE PLANS
CG06	GRADING AND DRAINAGE PLANS
CG07	GRADING AND DRAINAGE PLANS
CG08	GRADING AND DRAINAGE PLANS
CG09	EROSION CONTROL PLANS
CG10	EROSION CONTROL PLANS
CG11	EROSION CONTROL PLANS
CG12	EROSION CONTROL PLANS
CG13	EROSION CONTROL PLANS
CG14	EROSION CONTROL PLANS
CG15	EROSION CONTROL PLANS
CG16	EROSION CONTROL PLANS
CP01	TWY L PAVING PLAN AND PROFILE STA. 99+00.00 TO STA. 109+50.00
CP02	TWY L PAVING PLAN AND PROFILE STA. 109+50.00 TO STA. 118+50.00
CP03	TWY L PAVING PLAN AND PROFILE STA. 118+50.00 TO STA. 131+50.00
CP04	TWY L PAVING PLAN AND PROFILE STA. 131+50.00 TO STA. 144+50.00
CP05	TWY L PAVING PLAN AND PROFILE STA. 144+50 TO STA. 157+50.00
CP06	TWY L PAVING PLAN AND PROFILE STA. 157+50.00 TO 170+50.00
CP07	TWY L PAVING PLAN AND PROFILE STA. 170+50.00 TO STA 183+50.00
CP08	TWY L PAVING PLAN AND PROFILE STA. 183+50.00 TO STA. 194+34.00
CP09	TWY F PAVING PLAN AND PROFILE
CP10	TWY L5 AND TWY D PAVING PLAN AND PROFILE
CP11	TWY L1 AND TWY L2 PAVING PLAN AND PROFILE

SHEET #	SHEET INDEX
CM01	MARKING PLANS
CM02	MARKING PLANS
CM03	MARKING PLANS
CM04	MARKING PLANS
CM05	MARKING PLANS
CM06	MARKING PLANS
CM07	MARKING PLANS
CM08	MARKING PLANS
CM09	MARKING PLANS
ED01	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED02	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED03	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED04	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED05	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED06	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED07	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED08	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED09	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED10	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
ED11	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS
E01	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E02	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E03	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E04	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E05	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E06	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E07	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E08	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E09	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E10	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS
E11	AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

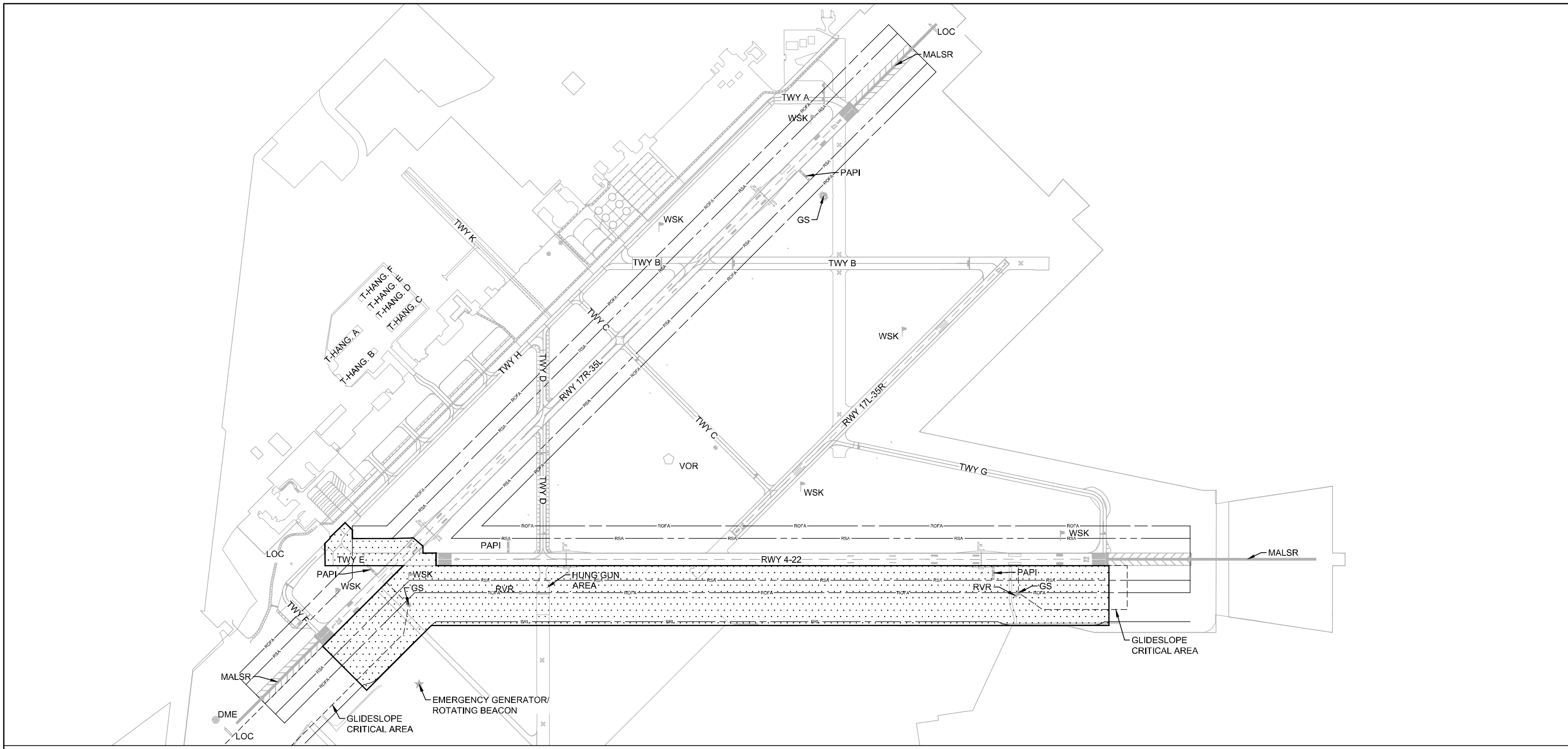
PRELIMINARY
***
HNTB CORPORATION
APPROVED

TAXIWAY L

GENERAL ABBREVIATIONS AND SHEET INDEX

FILE NAME:	EFD-L-G01.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	G01

Plotted: April 30, 2021
Time: 10:03 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- PROPOSED PROJECT LIMITS
- BRL — BUILDING RESTRICTION LINE
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

600 0 600 1200
Scale Feet

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

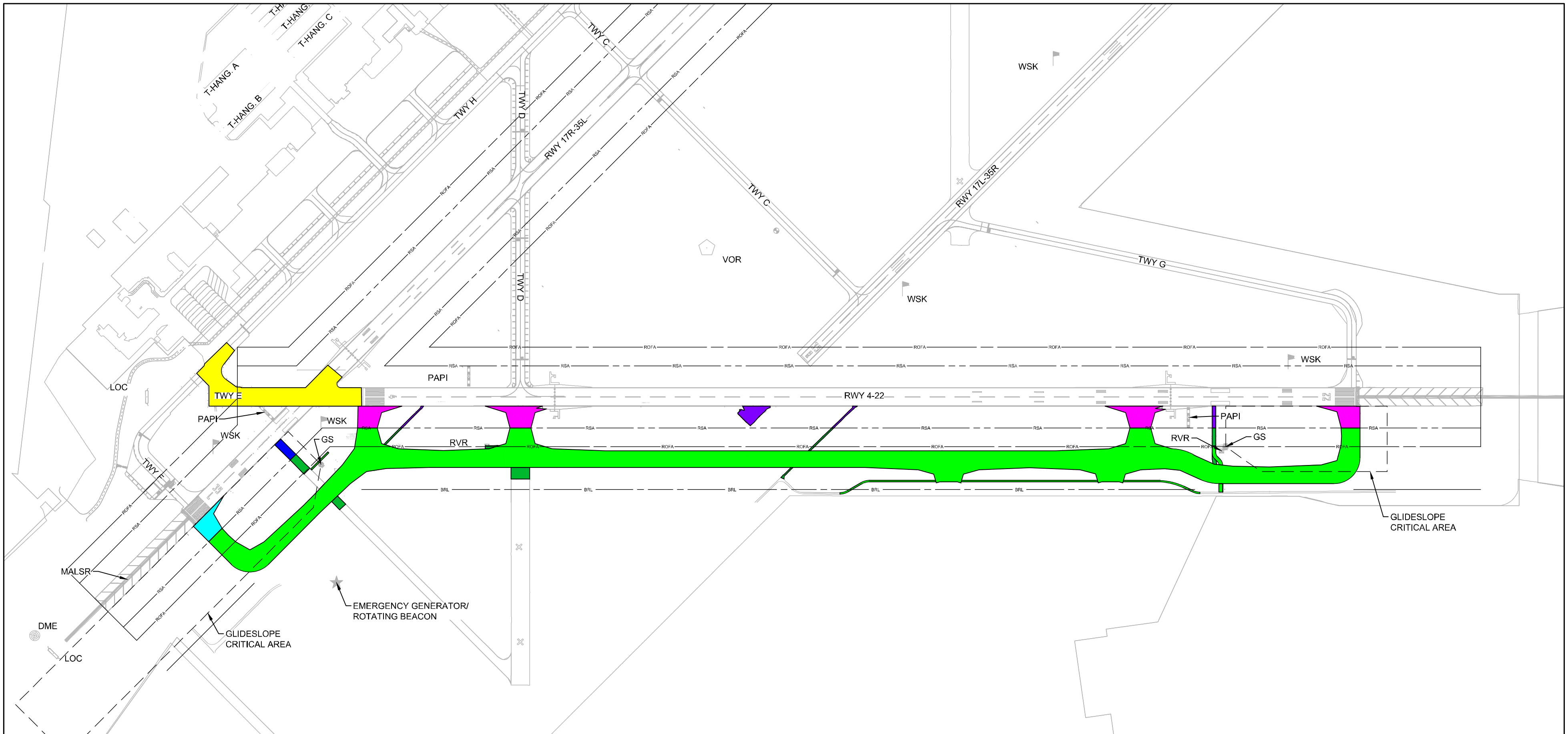
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

GENERAL AIRPORT LAYOUT PLAN

FILE NAME: EFD-L_GENERAL-AIRPORT-LAYOUT.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	G02
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 2:14 PM
By: Nathan Kriss
Job No.:62646-PL-011



CALENDAR DAYS: 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240, 255, 270, 285, 300, 315, 330, 345, 360

PHASE	CALENDAR DAYS
1	225 DAYS
2A	45 DAYS
2B	75 DAYS
3	15

LEGEND

- PHASE 1 / PHASE 1 DEMO
- PHASE 2A / PHASE 2A DEMO
- PHASE 2B / PHASE 2B DEMO
- PHASE 3
- BRL — BUILDING RESTRICTION LINE
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

N

400 0 400 800
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127969
DATE: APRIL 30, 2021
APPROVED

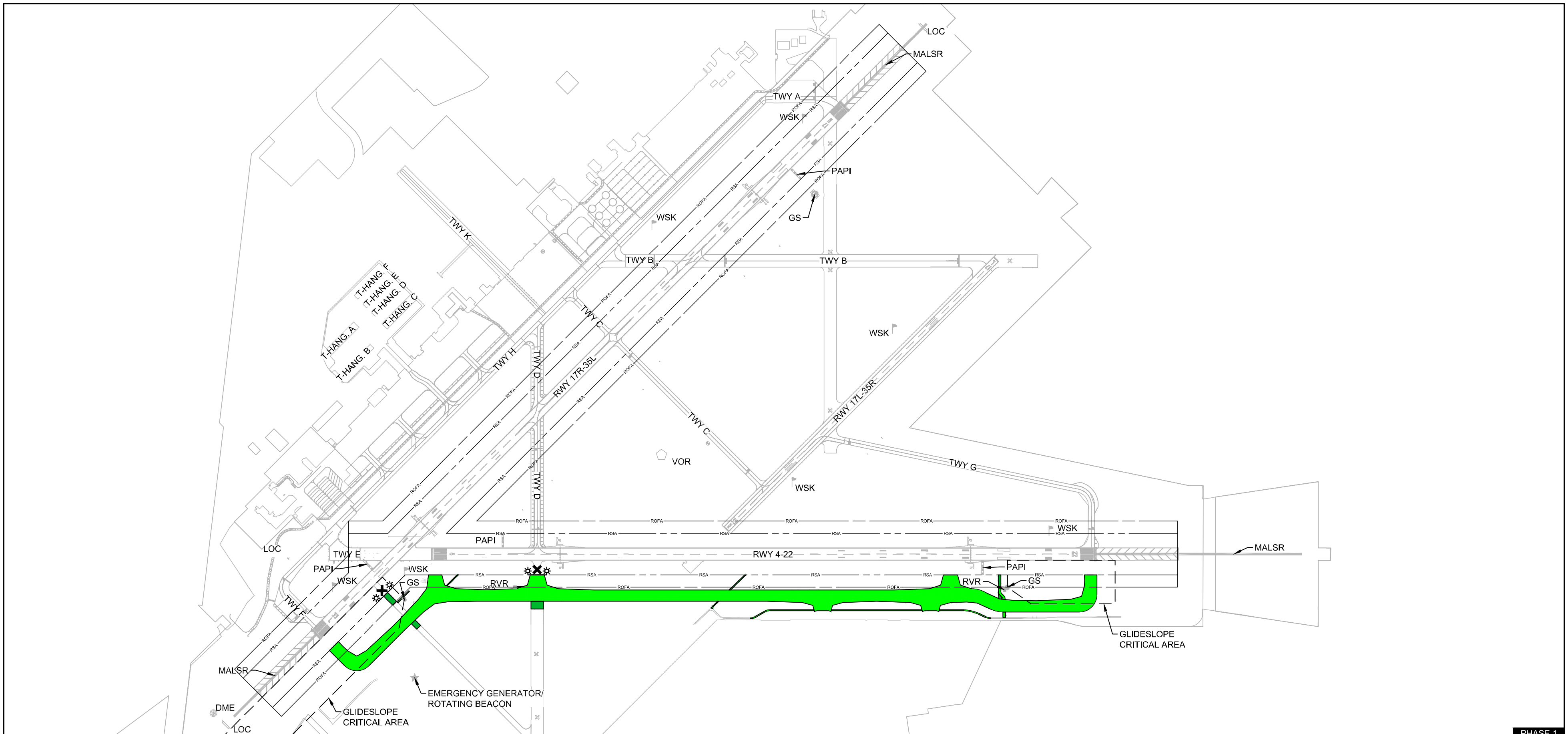
TAXIWAY L

CONSTRUCTION PHASING PLAN - OVERALL

FILE NAME: EFD-L_OVERALL_PHASE.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	G03
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 2:15 PM
By: Nathan Kriss
Job No.:62646-PL-011



PHASE	WORK ACTIVITIES	PAVEMENT CLOSURES	MAX CLOSURE DURATION (CALENDAR DAYS)
PHASE 1	• EXISTING PAVEMENT DEMOLITION; TAXIWAYS AND ACCESS ROADS • FULL DEPTH PCCP CONSTRUCTION; TWY L OUTSIDE RWY 17R-35L & RWY 4-22 RSA • VEHICLE SERVICE ROAD CONSTRUCTION • UNDERDRAIN INSTALLATION • AIRFIELD LIGHTING/SIGNAGE INSTALLATION • TEMPORARY/PERMANENT PAVEMENT MARKING	HUNG GUN AREA SOUTHEAST OF RWY 4-22	225

LEGEND

- PHASE 1 / PHASE 1 DEMO
- TAXIWAY CLOSURE MARKER
- LOW PROFILE FLASHER BARRICADE
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

N

600 0 600 1200
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

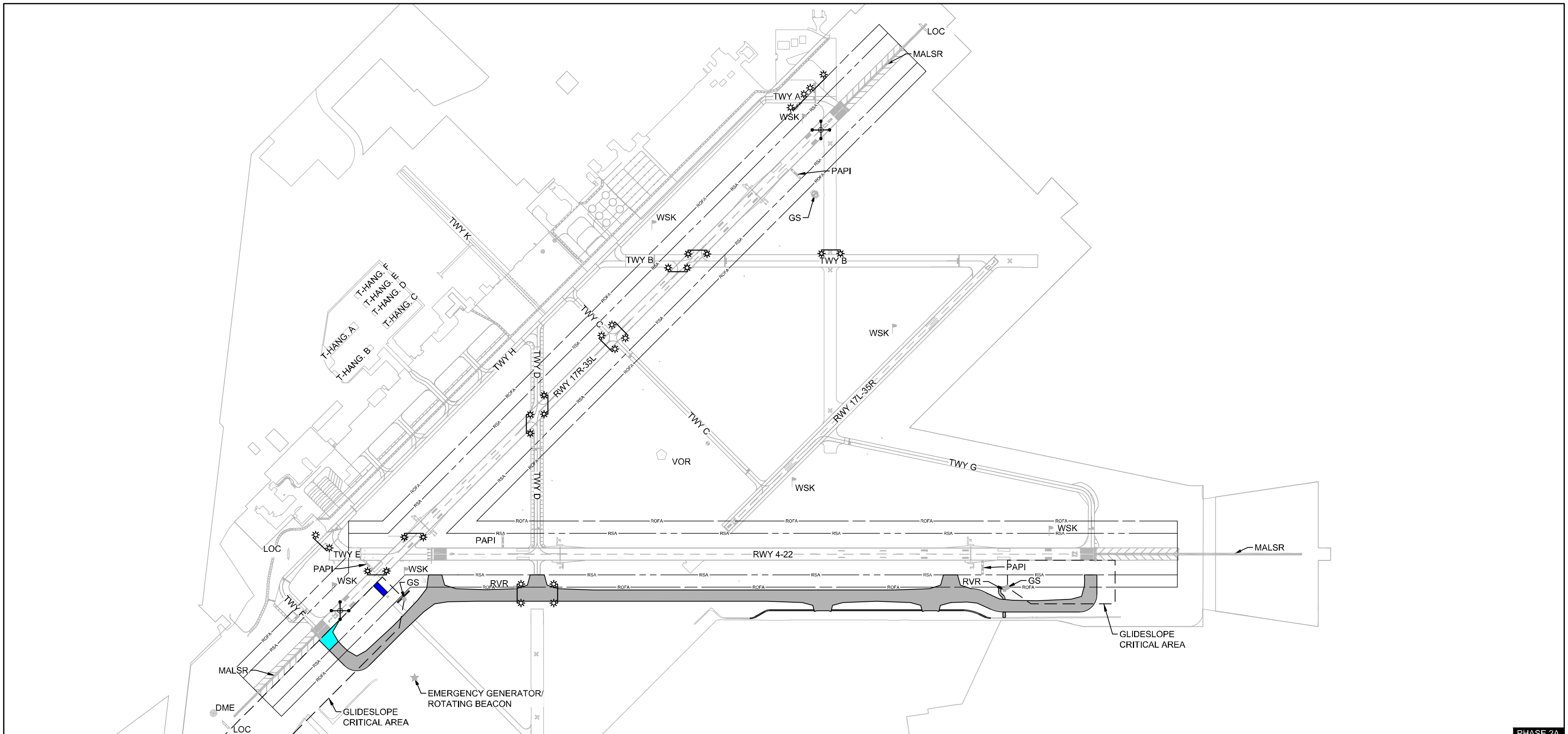
TAXIWAY L

CONSTRUCTION PHASING PLAN - PHASE 1

FILE NAME: EFD-L_PHASE_1.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	G04
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 2:16 PM
By: Nathan Kriss
Job No.:62646-PL-011



PHASE	WORK ACTIVITIES	PAVEMENT CLOSURES	MAX CLOSURE DURATION (CALENDAR DAYS)
PHASE 2A	• EXISTING PAVEMENT DEMOLITION; TAXIWAY • FULL DEPTH PCCP CONSTRUCTION; TWY F WITHIN RWY 17R-35L RSA • UNDERDRAIN INSTALLATION • AIRFIELD LIGHTING/SIGNAGE INSTALLATION • TEMPORARY/PERMANENT PAVEMENT MARKING	RWY 17R-35L TWY H BETWEEN RWY 35L & TWY E TWY A	45

LEGEND

- PHASE 2A / PHASE 2A DEMO
- COMPLETED PAVEMENT
- RUNWAY CLOSURE MARKER
- TAXIWAY CLOSURE MARKER
- LOW PROFILE FLASHER BARRICADE
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

600 0 600 1200
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

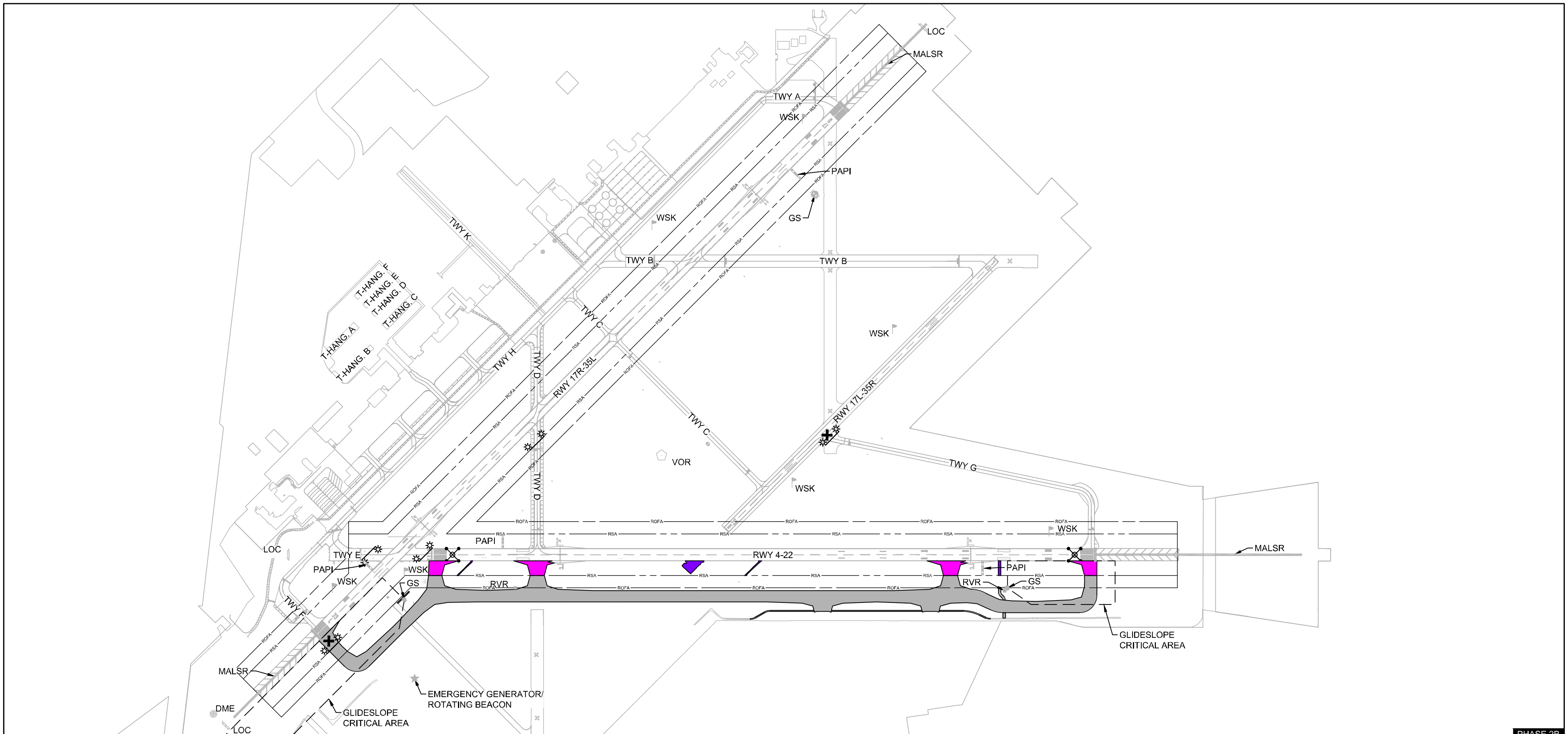
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

CONSTRUCTION PHASING PLAN - PHASE 2A

FILE NAME: EFD-L_PHASE_2.DWG	
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	G05

Plotted: April 30, 2021
Time: 2:17 PM
By: Nathan Kriss
Job No.:62646-PL-011



PHASE	WORK ACTIVITIES	PAVEMENT CLOSURES	MAX CLOSURE DURATION (CALENDAR DAYS)
PHASE 2B	• EXISTING PAVEMENT DEMOLITION; TAXIWAYS AND ACCESS ROADS • FULL DEPTH PCCP CONSTRUCTION • UNDERDRAIN INSTALLATION • AIRFIELD LIGHTING/SIGNAGE INSTALLATION • TEMPORARY/PERMANENT PAVEMENT MARKING	RWY 4-22 TWY G TWY D EAST OF RWY 17R-35L TWY F EAST OF RWY 17R-35L	75

LEGEND

- PHASE 2B / PHASE 2B DEMO
- COMPLETED PAVEMENT
- RUNWAY CLOSURE MARKER
- TAXIWAY CLOSURE MARKER
- LOW PROFILE FLASHER BARRICADE
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

600 0 600 1200
Scale Feet

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

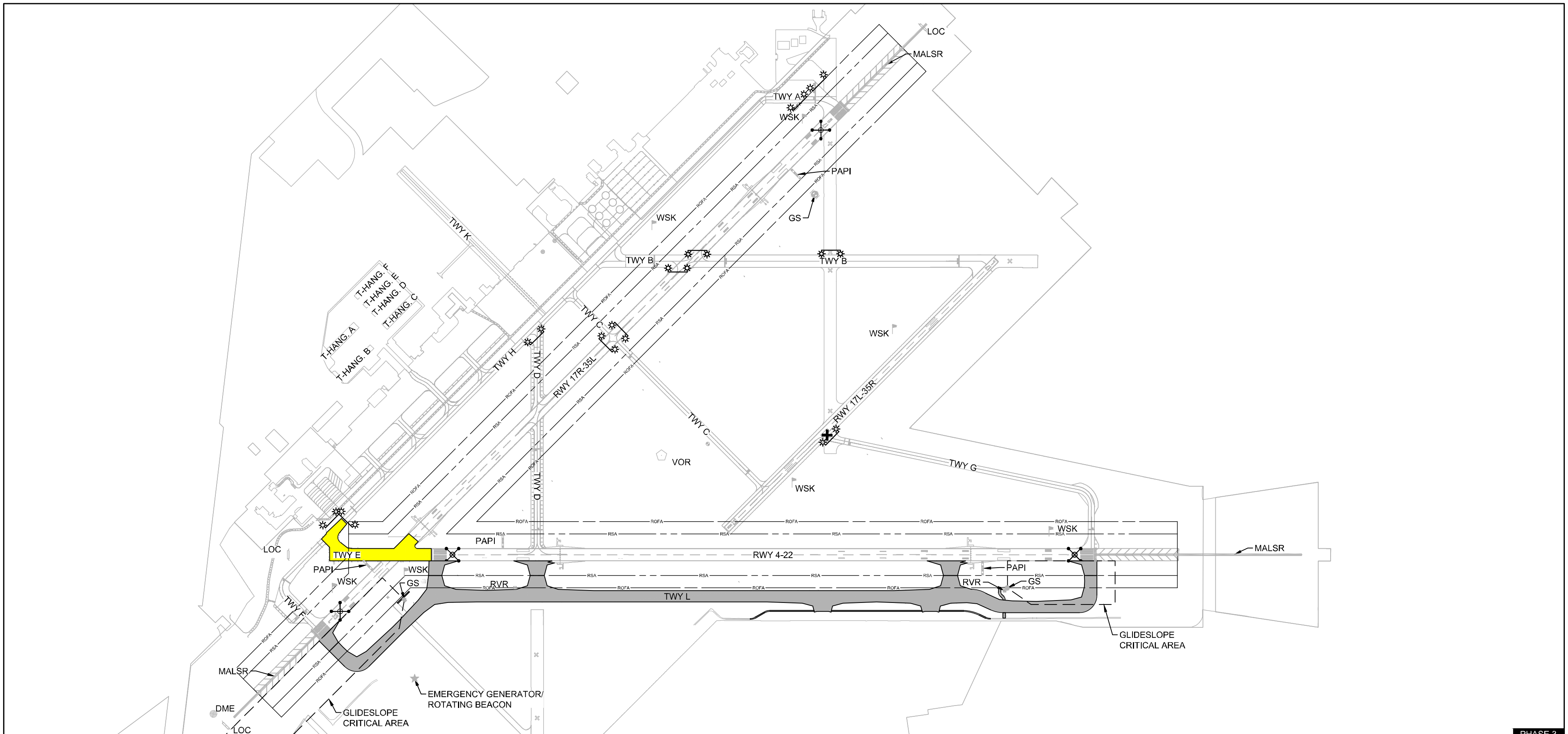
TAXIWAY L

CONSTRUCTION PHASING PLAN - PHASE 2B

FILE NAME: EFD-L_PHASE_2.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	G06
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 2:17 PM
By: Nathan Kriss
Job No.:62646-PL-011



PHASE	WORK ACTIVITIES	PAVEMENT CLOSURES	MAX CLOSURE DURATION (CALENDAR NIGHTS)
PHASE 3	• EXISTING PAVEMENT MARKING REMOVAL • AIRFIELD LIGHTING/SIGNAGE REMOVAL • TEMPORARY/PERMANENT PAVEMENT MARKING	RWY 17R-35L RWY 4-22 TWY D TWY G TWY F TWY L TWY A TWY H (BETWEEN TWY F & ALIGNED TWY E)	15

LEGEND

- PHASE 3
- COMPLETED PAVEMENT
- RUNWAY CLOSURE MARKER
- TAXIWAY CLOSURE MARKER
- LOW PROFILE FLASHER BARRICADE
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

600 0 600 1200
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

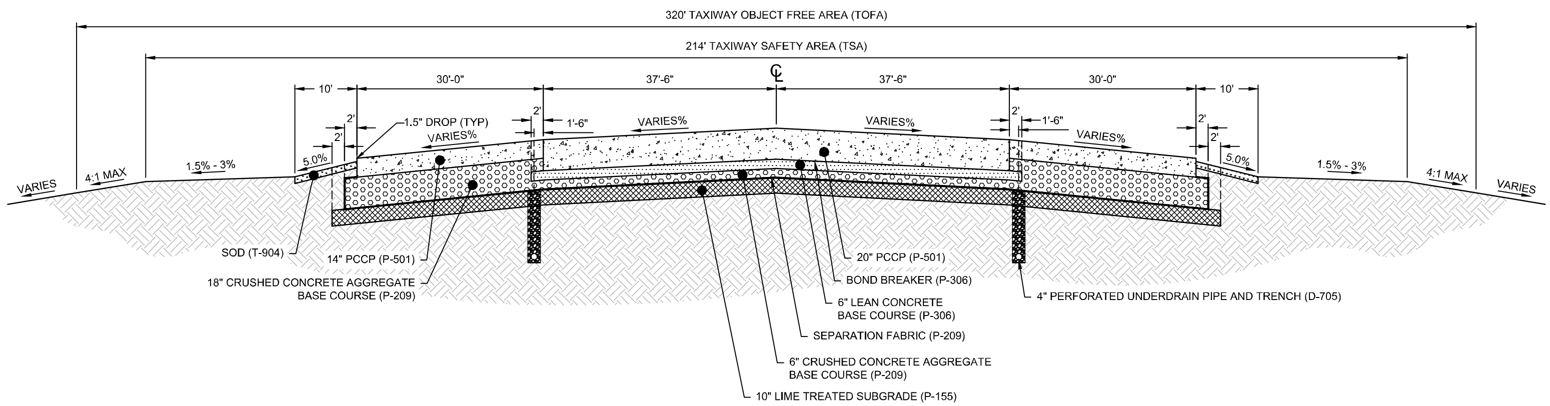
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

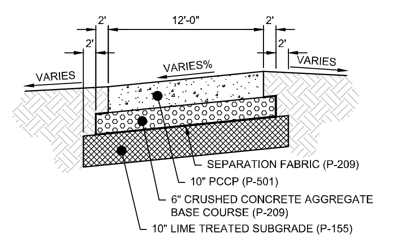
CONSTRUCTION PHASING PLAN - PHASE 3

FILE NAME: EFD-L_PHASE_2.DWG			
DATE: APRIL 30, 2021		30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET	
DRAWN	NICHOLAS ADRALES	G07	
CHECKED	MATT WALSH		
APPROVED	RYAN SHROPSHIRE, P.E.		

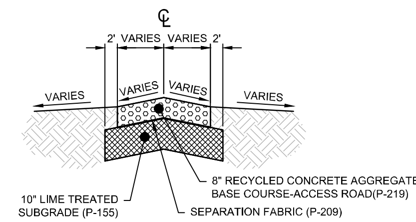
Plotted: April 30, 2021
Time: 2:17 PM
By: Nathan Kriss
Job No.:62646-PL-011



1 TAXIWAY PAVEMENT SECTION
NOT TO SCALE



2 VEHICLE SERVICE ROAD (VSR) PAVEMENT SECTION
NOT TO SCALE



3 AGGREGATE ACCESS ROAD SECTION
Not to Scale

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

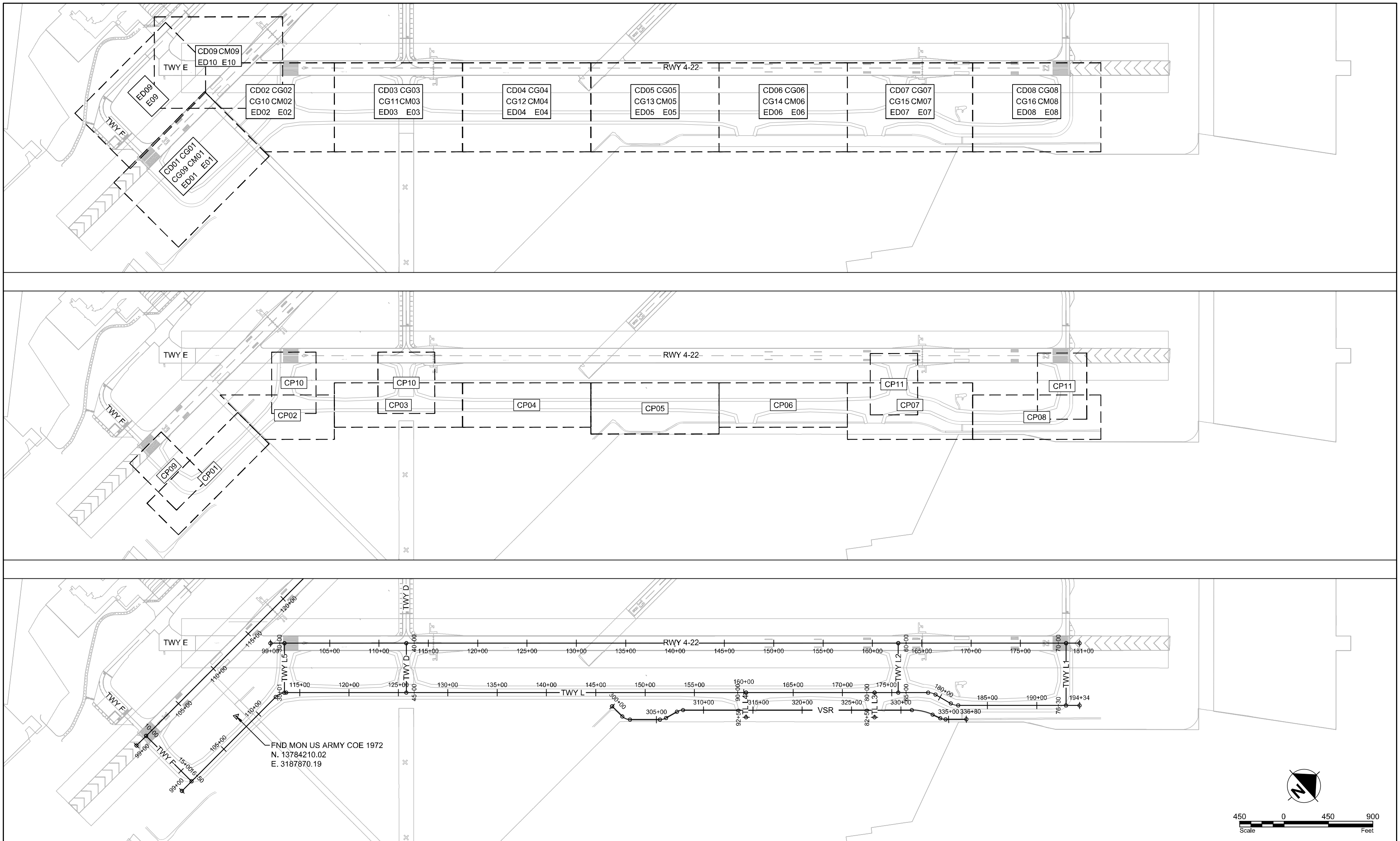
TAXIWAY L

TYPICAL SECTIONS

FILE NAME: EFD-L-TYP-SECTION.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	G08
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:08 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

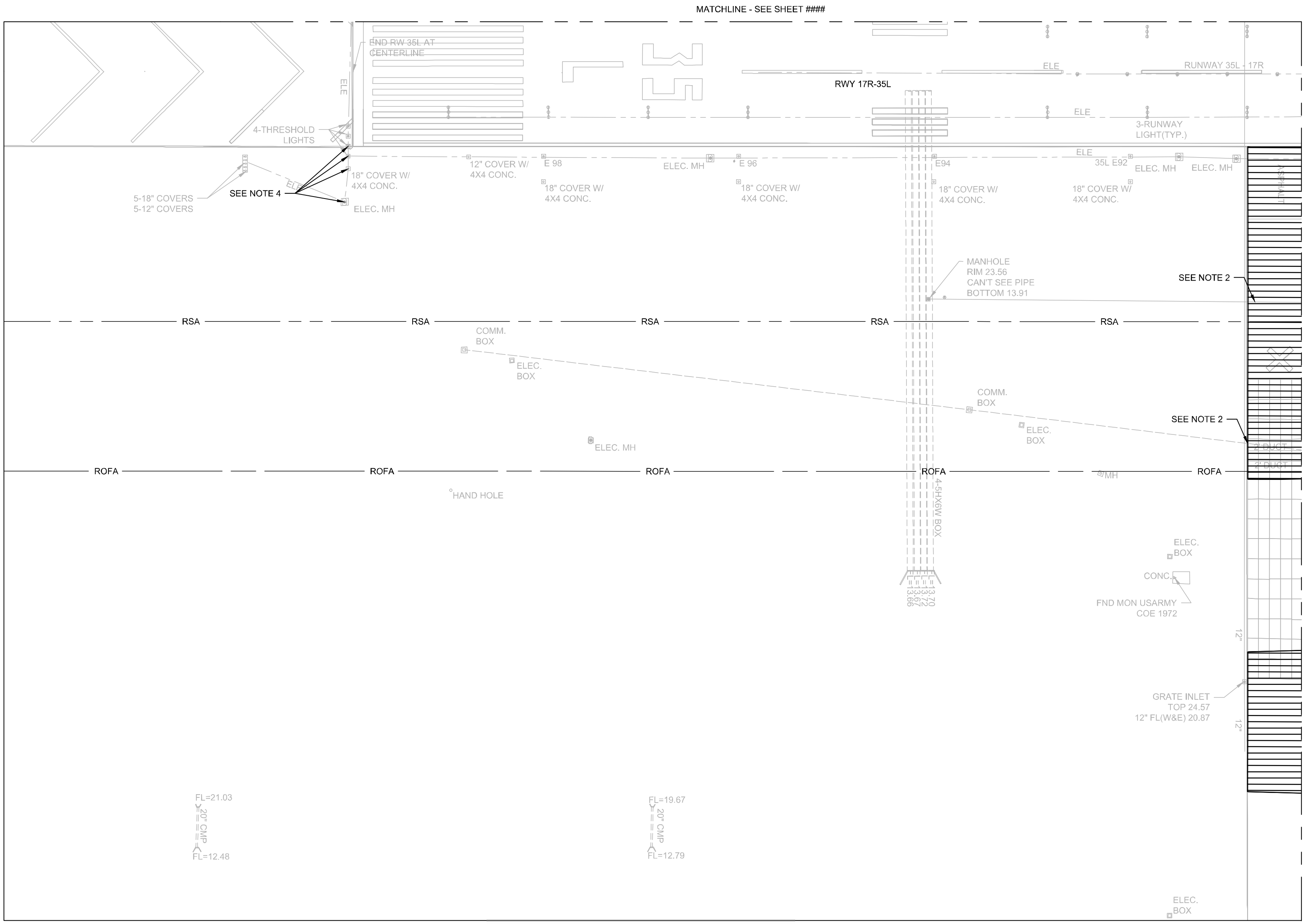
TAXIWAY L

GEOMETRIC LAYOUT &
PLAN SHEET LAYOUT PLAN

FILE NAME: EFD-L_PLAN&GEOMETRIC.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	G09
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:08 AM
By: Nathan Kriss
Job No.:62646-PL-011



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- ASPHALT PAVEMENT REMOVAL
- GRAVEL REMOVAL
- STRUCTURE REMOVAL
- PIPE REMOVAL
- PAVEMENT MARKING REMOVAL
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

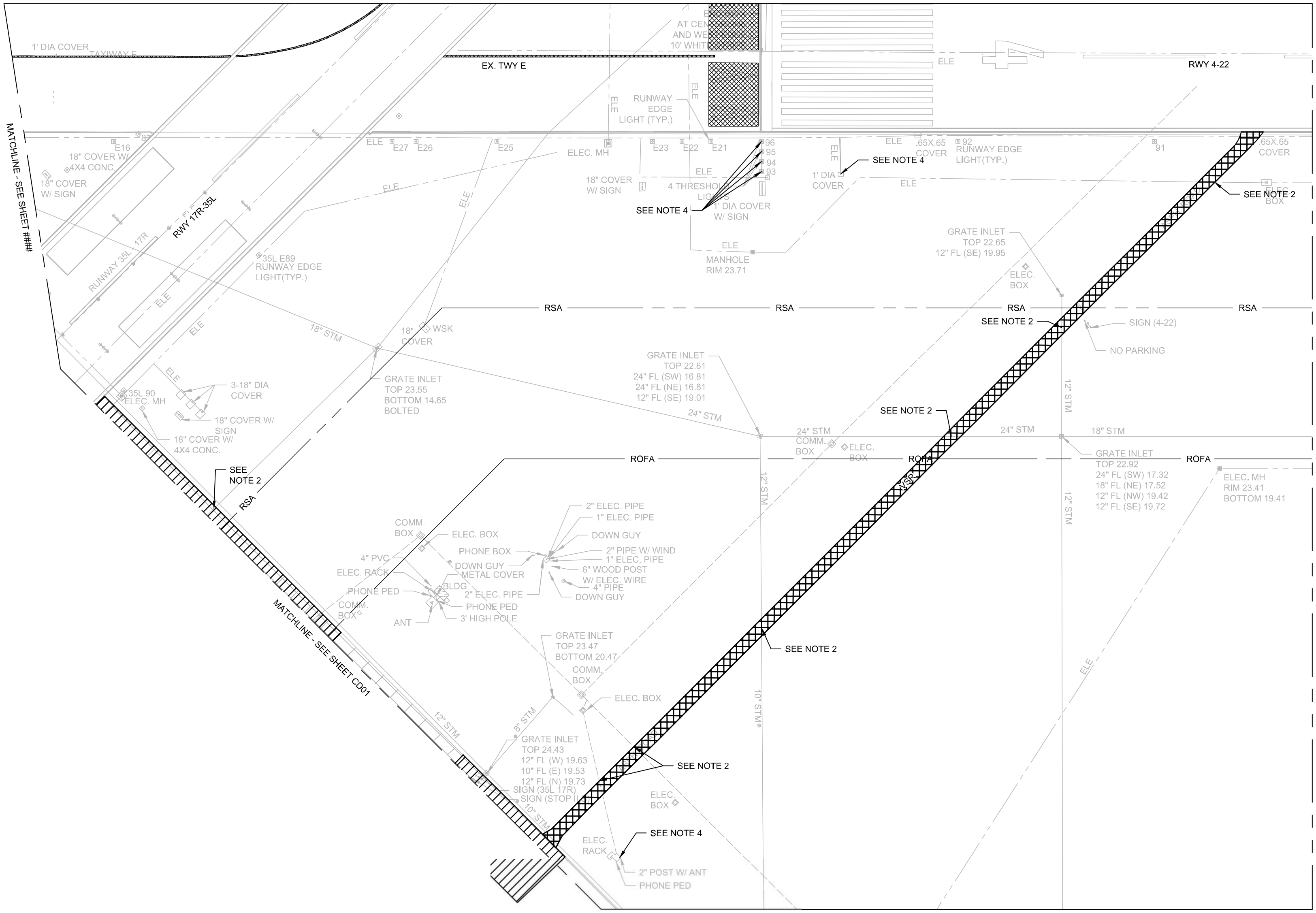
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

DEMOLITION PLANS

FILE NAME:	EFD-L_DEMO&EXIST_SHEETS.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	CD01

Plotted: April 30, 2021
Time: 10:09 AM
By: Nathan Kriss
Job No.:62646-PL-011



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- ASPHALT PAVEMENT REMOVAL
- GRAVEL REMOVAL
- STRUCTURE REMOVAL
- PIPE REMOVAL
- PAVEMENT MARKING REMOVAL
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

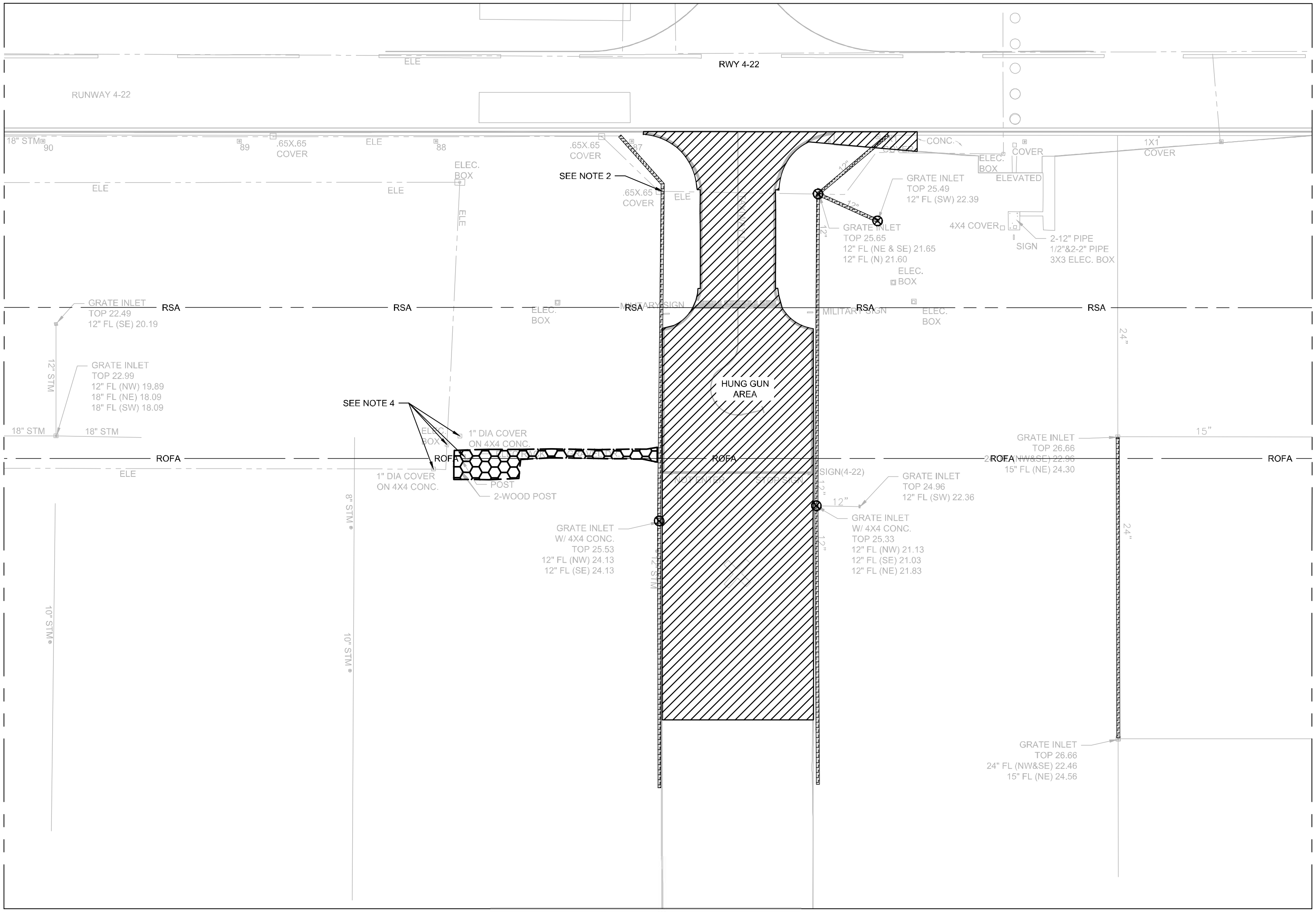
TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CD02
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:09 AM
By: Nathan Kriss
Job No.:62646-PL-011



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- ASPHALT PAVEMENT REMOVAL
- GRAVEL REMOVAL
- STRUCTURE REMOVAL
- PIPE REMOVAL
- PAVEMENT MARKING REMOVAL
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

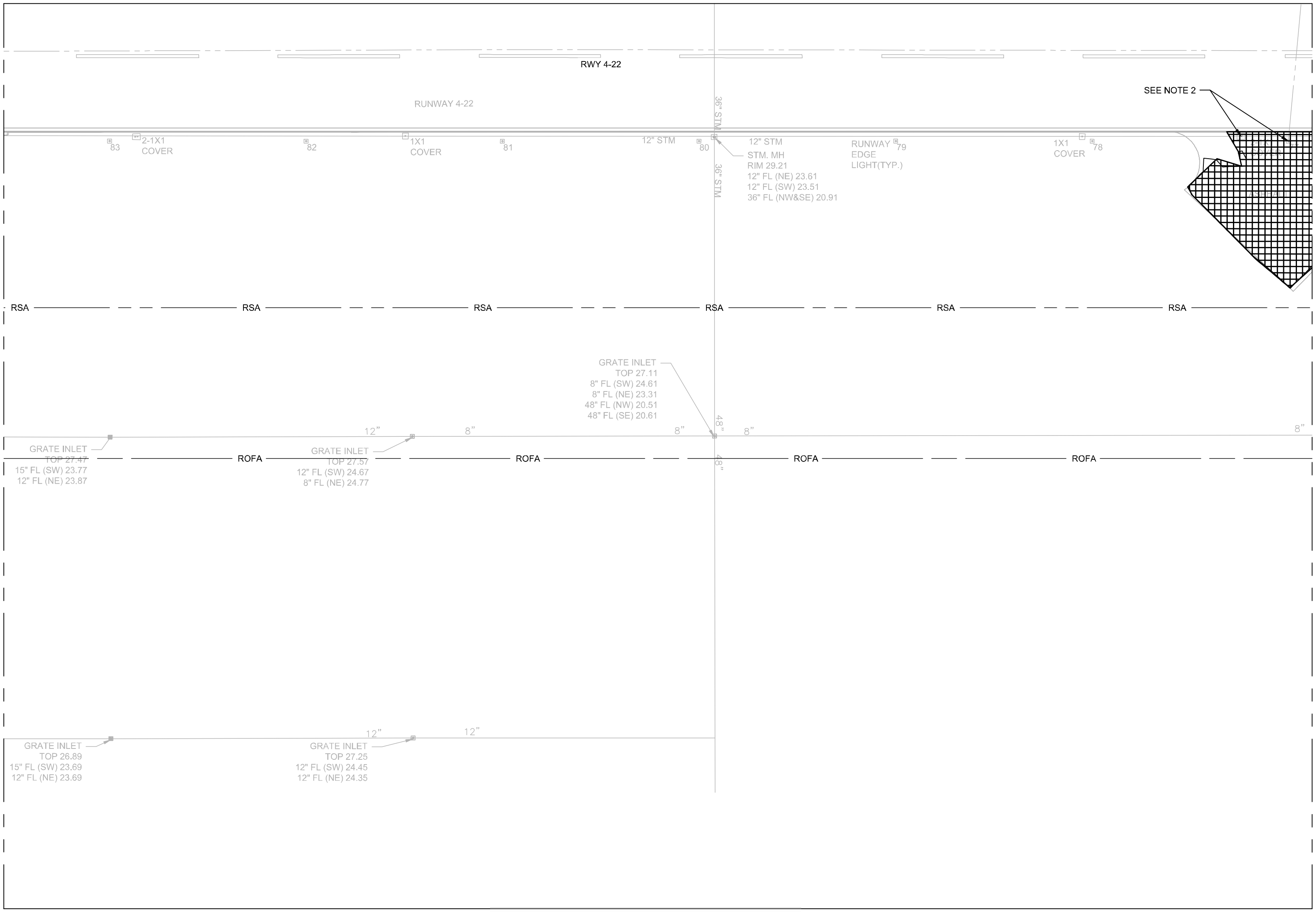
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CD03
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:09 AM
By: Nathan Kriss
Job No.:62646-PL-011



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

CONCRETE PAVEMENT REMOVAL
ASPHALT PAVEMENT REMOVAL
GRAVEL REMOVAL
STRUCTURE REMOVAL
PIPE REMOVAL
PAVEMENT MARKING REMOVAL
— RSA — RUNWAY SAFETY AREA
— ROFA — RUNWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

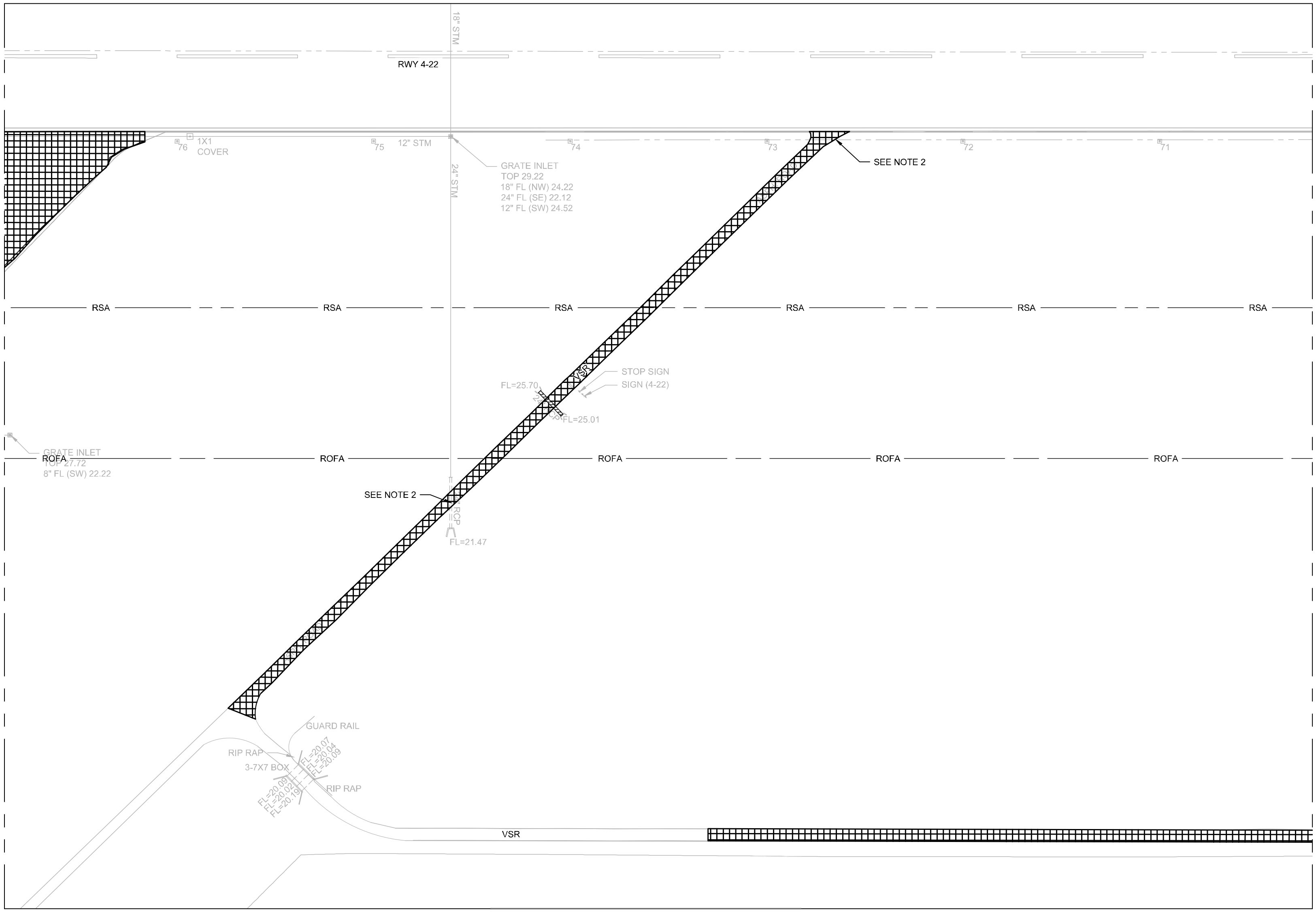
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING
DESIGN: SPENCER PHILLIPS
DRAWN: NICHOLAS ADRALES
CHECKED: MATT WALSH
APPROVED: RYAN SHROPSHIRE, P.E.
SHEET CD04

Plotted: April 30, 2021
Time: 10:10 AM
By: Nathan Kriss
Job No.:62646-PL-011

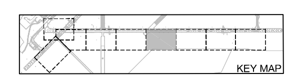


NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

CONCRETE PAVEMENT REMOVAL
ASPHALT PAVEMENT REMOVAL
GRAVEL REMOVAL
STRUCTURE REMOVAL
PIPE REMOVAL
PAVEMENT MARKING REMOVAL
RSA — RUNWAY SAFETY AREA
ROFA — RUNWAY OBJECT FREE AREA



50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

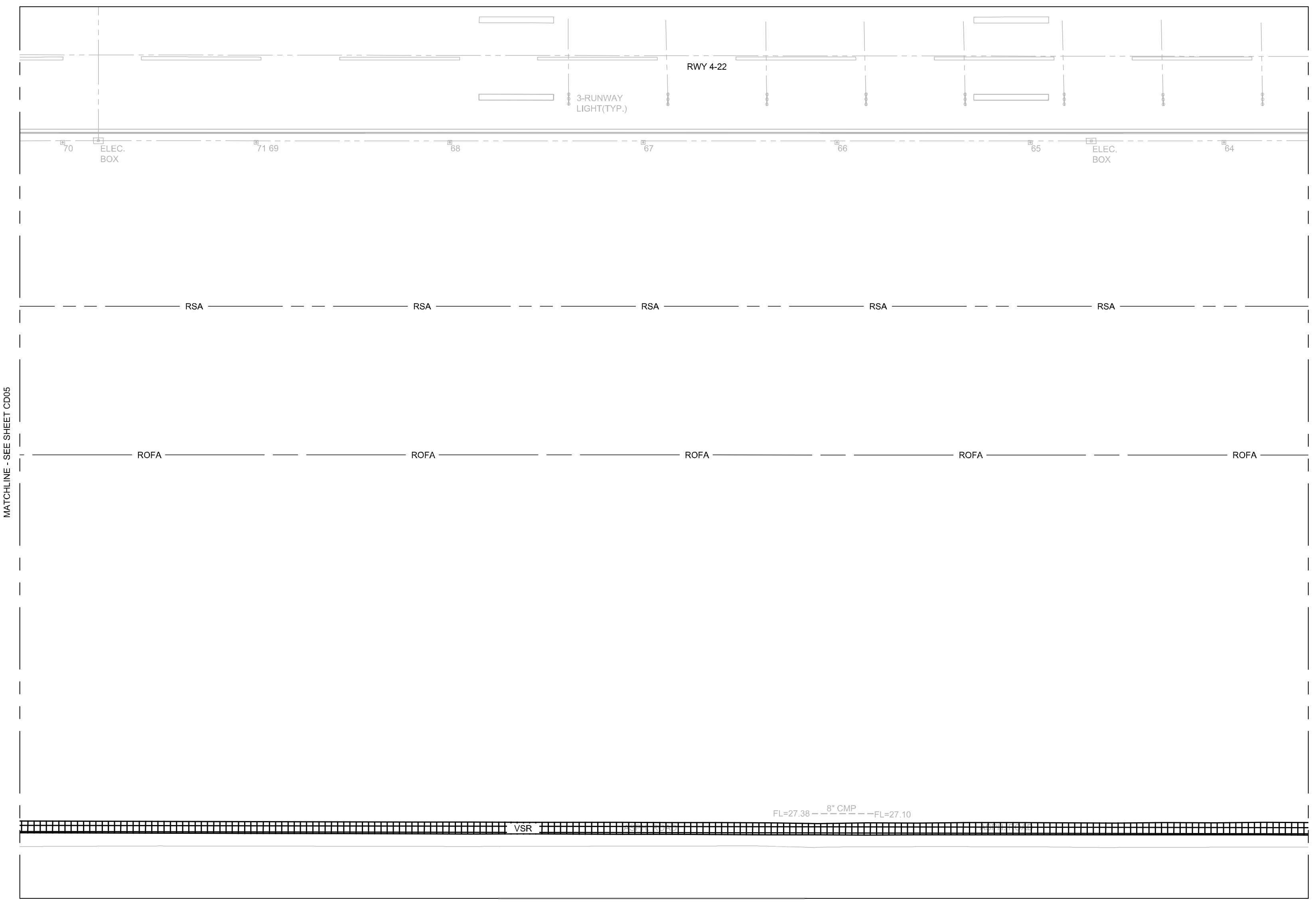
TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CD05
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:10 AM
By: Nathan Kriss
Job No.:62646-PL-011

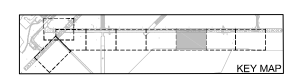


NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

CONCRETE PAVEMENT REMOVAL
ASPHALT PAVEMENT REMOVAL
GRAVEL REMOVAL
STRUCTURE REMOVAL
PIPE REMOVAL
PAVEMENT MARKING REMOVAL
RSA — RUNWAY SAFETY AREA
ROFA — RUNWAY OBJECT FREE AREA



50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

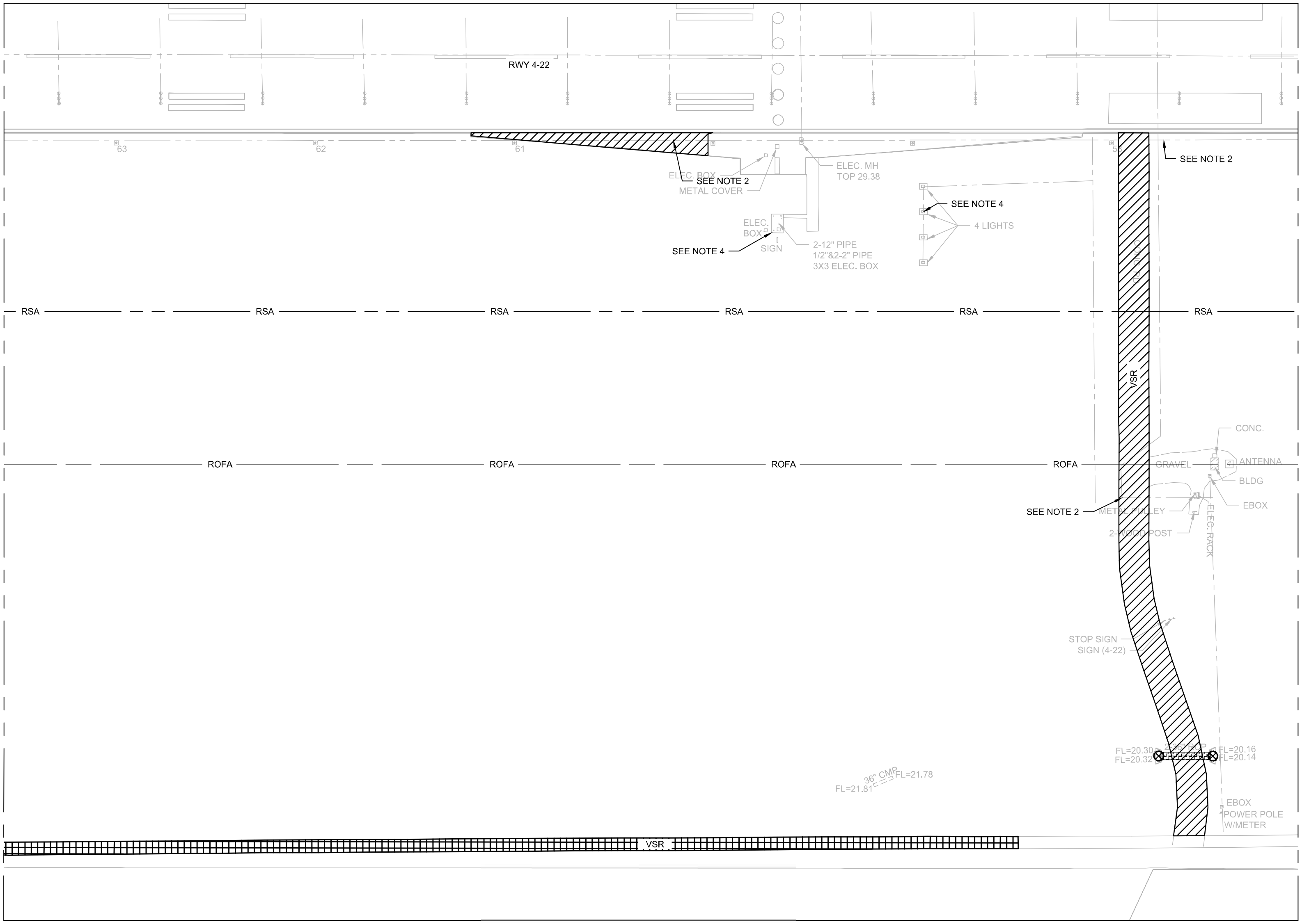
TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING		
DESIGN	SPENCER PHILLIPS	SHEET	
DRAWN	NICHOLAS ADRALES		
CHECKED	MATT WALSH	CD06	
APPROVED	RYAN SHROPSHIRE, P.E.		

Plotted: April 30, 2021
Time: 10:10 AM
By: Nathan Kriss
Job No.:62646-PL-011

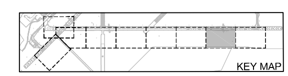


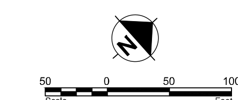
NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- ASPHALT PAVEMENT REMOVAL
- GRAVEL REMOVAL
- STRUCTURE REMOVAL
- PIPE REMOVAL
- PAVEMENT MARKING REMOVAL
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA





HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

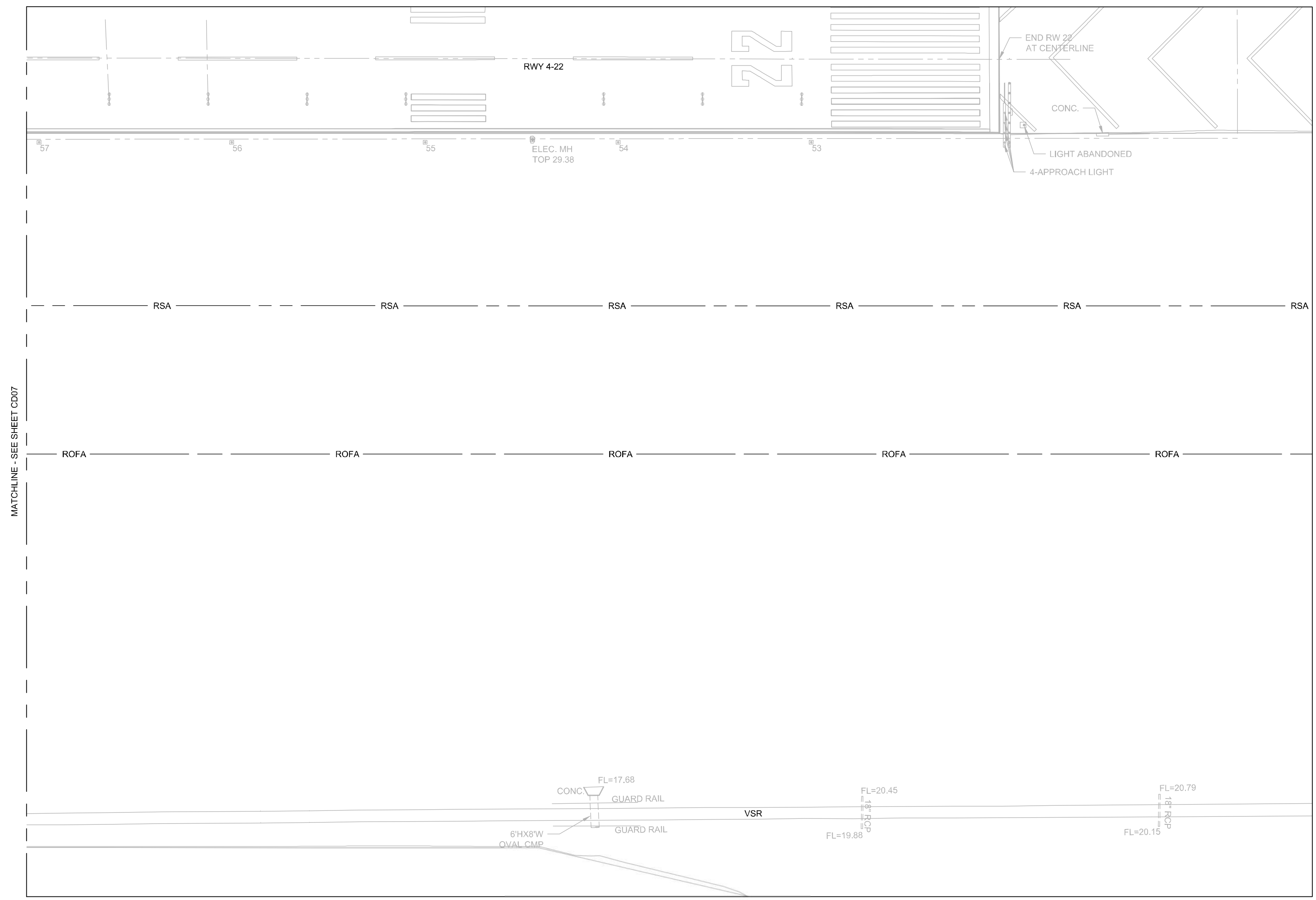
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127909
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CD07
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:10 AM
By: Nathan Kriss
Job No.:62646-PL-011

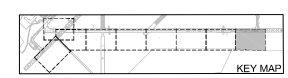


NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- ASPHALT PAVEMENT REMOVAL
- GRAVEL REMOVAL
- STRUCTURE REMOVAL
- PIPE REMOVAL
- PAVEMENT MARKING REMOVAL
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA



50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
HNTB CORPORATION
APPROVED

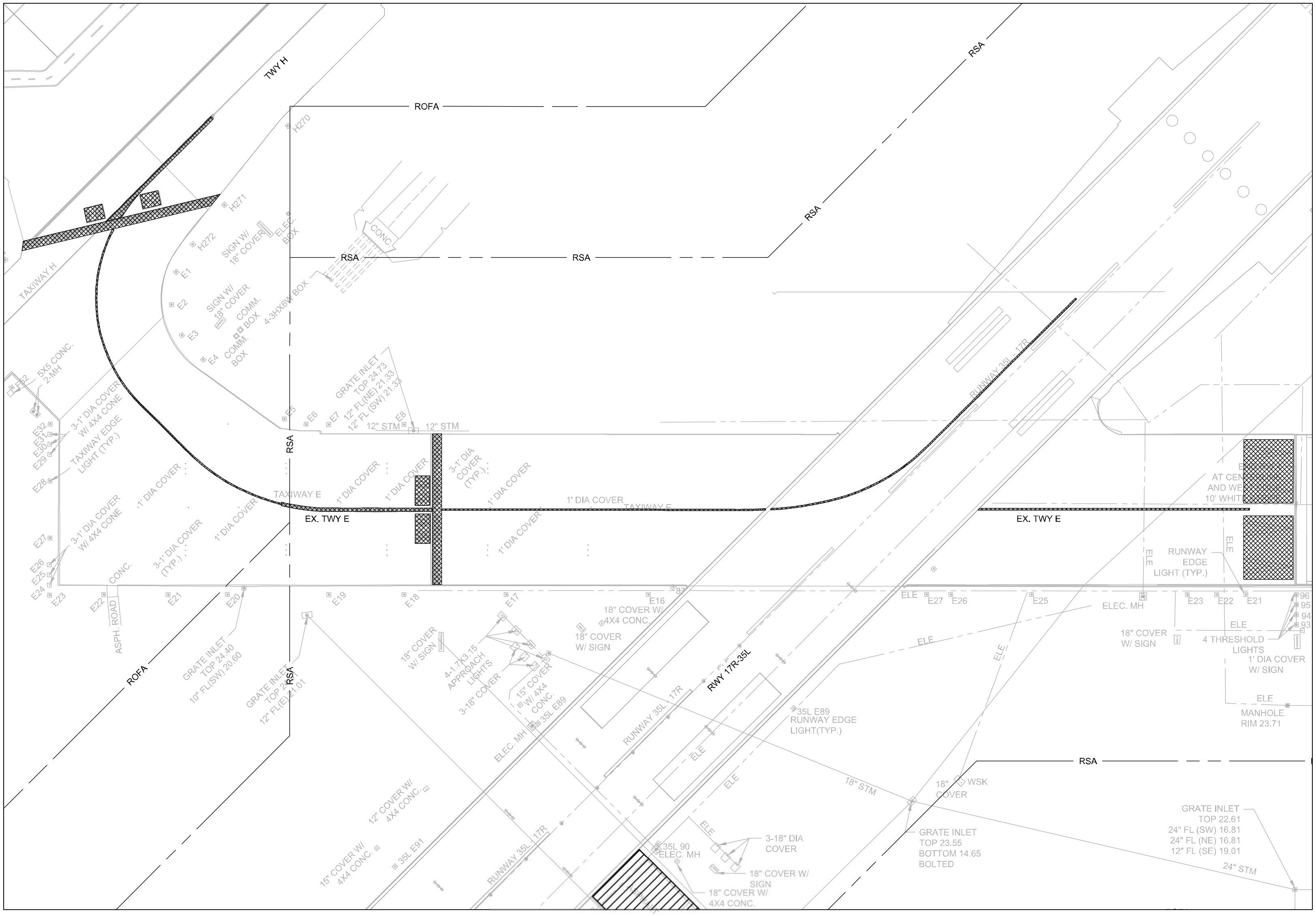
TAXIWAY L

DEMOLITION PLANS

FILE NAME: EFD-L_DEMO&EXIST_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CD08
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:10 AM
By: Nathan Kriss
Job No.:62646-PL-011



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.
2. THE DESIGN ASSUMES EXISTING UTILITIES UNDER PAVEMENT TO BE REMOVED ARE TO REMAIN AND BE PROTECTED IN PLACE.
3. ALL PAVEMENT AND AGGREGATE DEMOLITION WASTE SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.
4. REFER TO ELECTRICAL DEMOLITION PLANS FOR INFORMATION REGARDING ELECTRICAL INFRASTRUCTURE.
5. EXISTING PAVEMENT SECTION INFORMATION TO BE PROVIDED AS PART OF GEOTECHNICAL INVESTIGATION. THE INFORMATION AS SHOWN IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

LEGEND

- CONCRETE PAVEMENT REMOVAL
- ASPHALT PAVEMENT REMOVAL
- GRAVEL REMOVAL
- STRUCTURE REMOVAL
- PIPE REMOVAL
- PAVEMENT MARKING REMOVAL
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA

KEY MAP

N

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
APPROVED

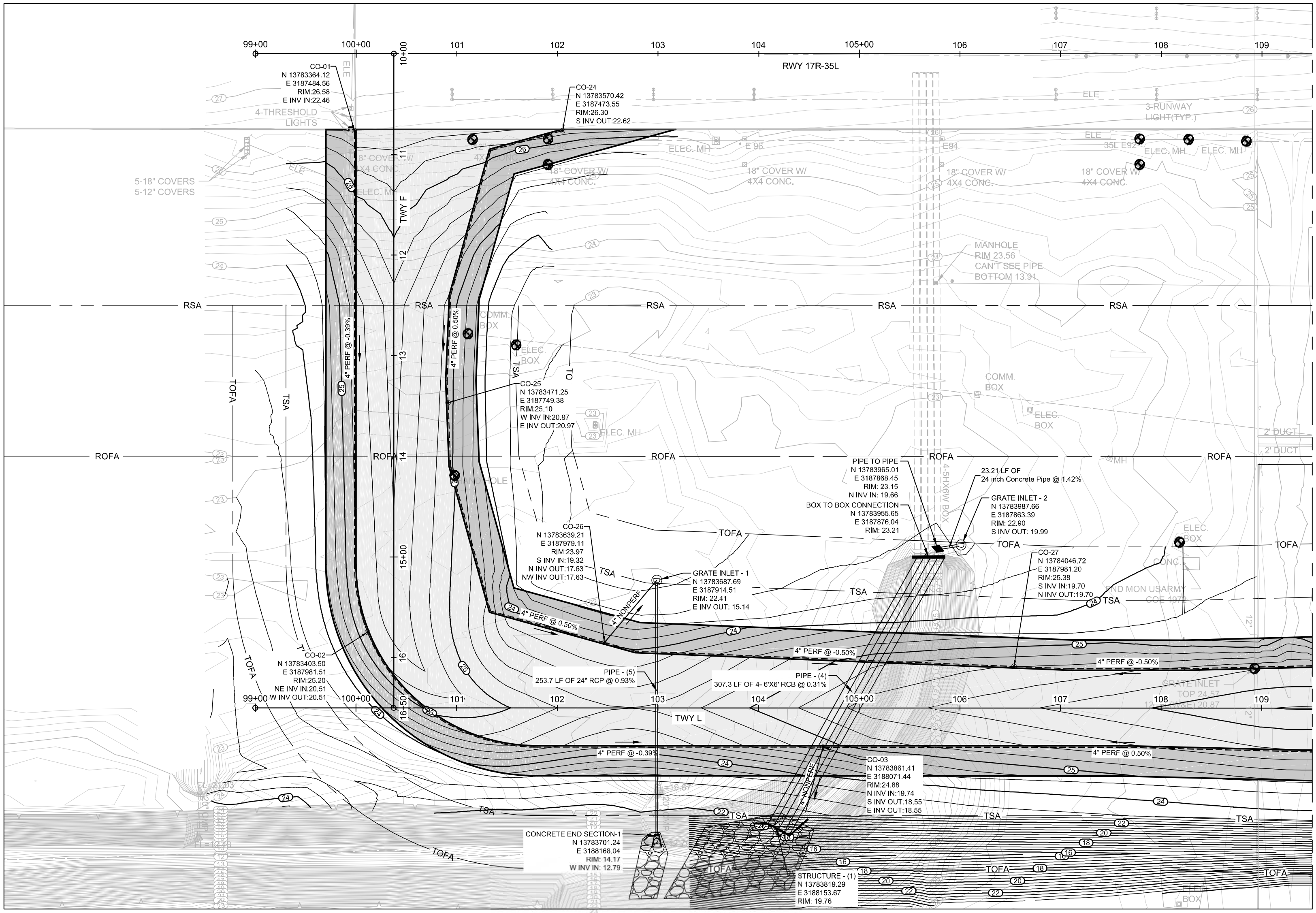
TAXIWAY L

DEMOLITION PLANS

FILE NAME:	EFD-L_DEMO&EXIST_SHEETS.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET
CD09

Plotted: April 30, 2021
Time: 10:10 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

23.80	EXISTING MINOR CONTOURS
23.80	EXISTING MAJOR CONTOURS
23.80	PROPOSED MINOR CONTOUR
23.80	PROPOSED MAJOR CONTOUR
	UNDERDRAIN CLEANOUT
	4" PERFORATED UNDERDRAIN
	4" NON-PERFORATED UNDERDRAIN
	ADJUST STRUCTURE ELEVATION
	PROPOSED PAVEMENT
RSA	RUNWAY SAFETY AREA
ROFA	RUNWAY OBJECT FREE AREA
TSA	TAXIWAY SAFETY AREA
TOFA	TAXIWAY OBJECT FREE AREA

KEY MAP

N

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127869
DATE: APRIL 30, 2021
APPROVED

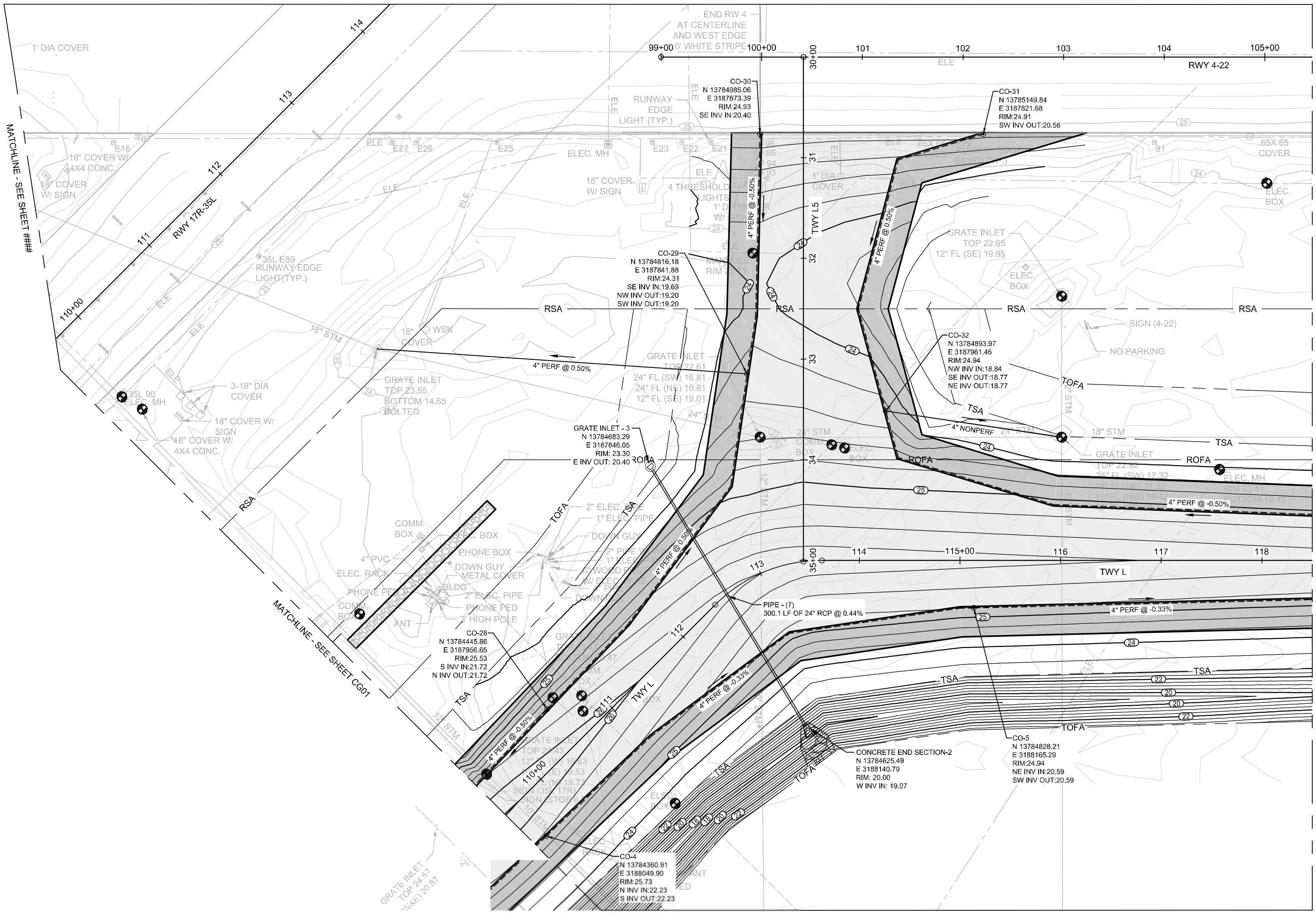
TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME: EFD-L_GRADING&DRAINAGE_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG01
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- 23.80 EXISTING MINOR CONTOURS
- 23.80 EXISTING MAJOR CONTOURS
- 23.80 PROPOSED MINOR CONTOUR
- 23.80 PROPOSED MAJOR CONTOUR
- UNDERDRAIN CLEANOUT
- 4" PERFORATED UNDERDRAIN
- 4" NON-PERFORATED UNDERDRAIN
- ADJUST STRUCTURE ELEVATION
- PROPOSED PAVEMENT
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

KEY MAP

Scale 50 0 50 100 Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

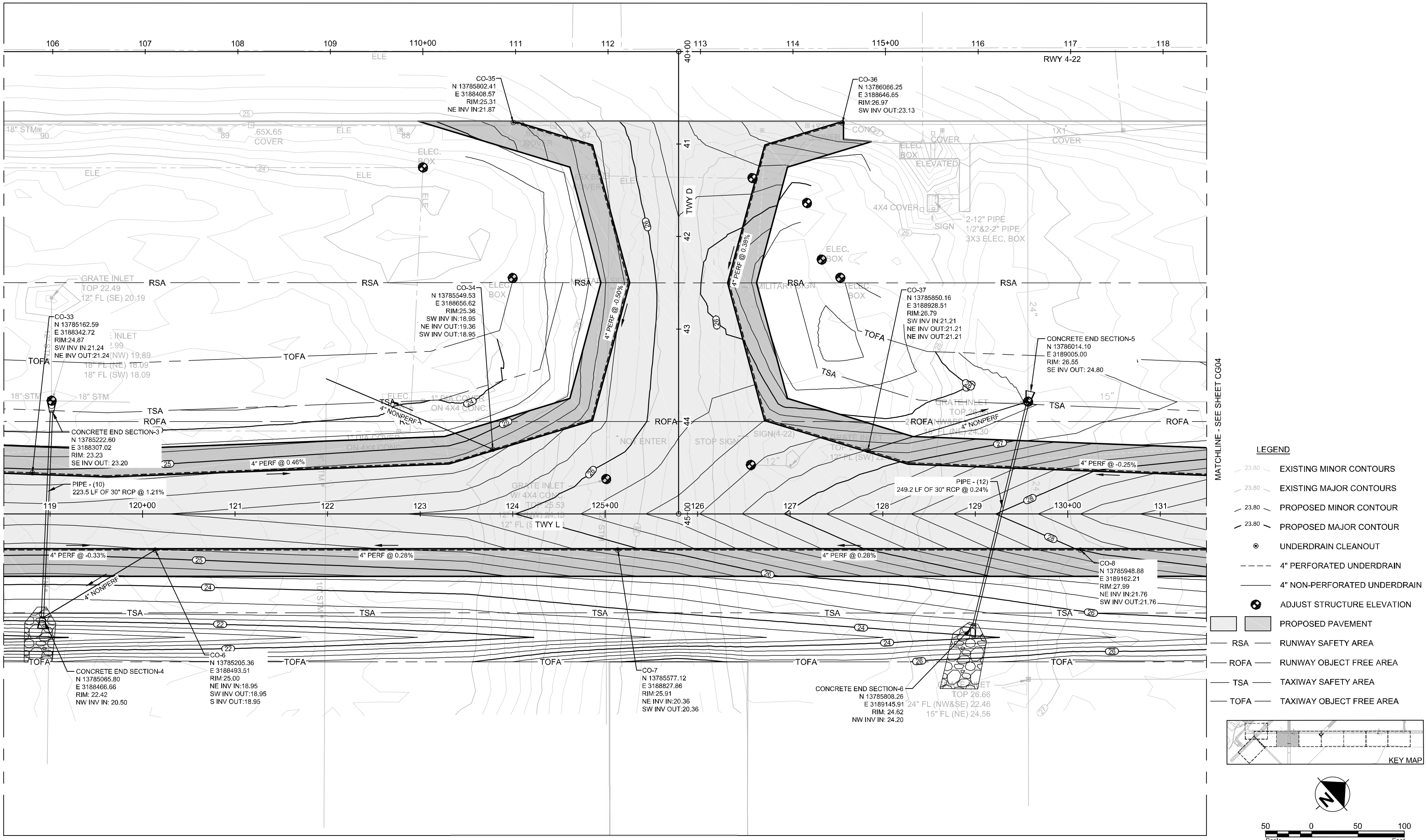
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127869
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME: EFD-L_GRADING&DRAINAGE_SHEETS.DWG			
DATE: APRIL 30, 2021	30% ADVANCED PLANNING		
DESIGN	SPENCER PHILLIPS	SHEET	
DRAWN	NICHOLAS ADRALES		
CHECKED	MATT WALSH	CG02	
APPROVED	RYAN SHROPSHIRE, P.E.		

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
DATE: APRIL 30, 2021
APPROVED

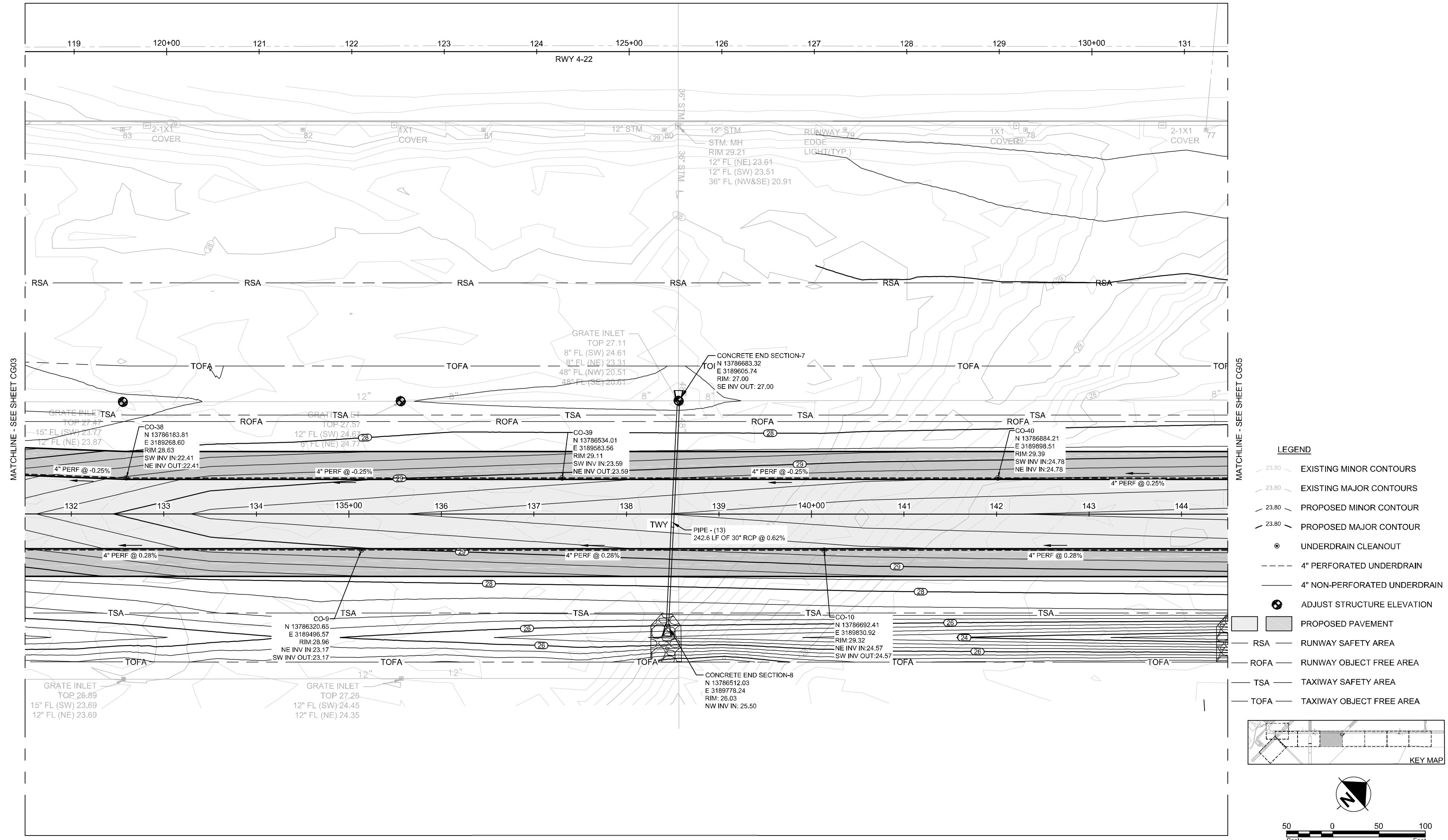
TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME: EFD-L_GRADING&DRAINAGE_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG03
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- 23.80 EXISTING MINOR CONTOURS
- 23.80 EXISTING MAJOR CONTOURS
- 23.80 PROPOSED MINOR CONTOUR
- 23.80 PROPOSED MAJOR CONTOUR
- UNDERDRAIN CLEANOUT
- 4" PERFORATED UNDERDRAIN
- 4" NON-PERFORATED UNDERDRAIN
- ADJUST STRUCTURE ELEVATION
- PROPOSED PAVEMENT
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

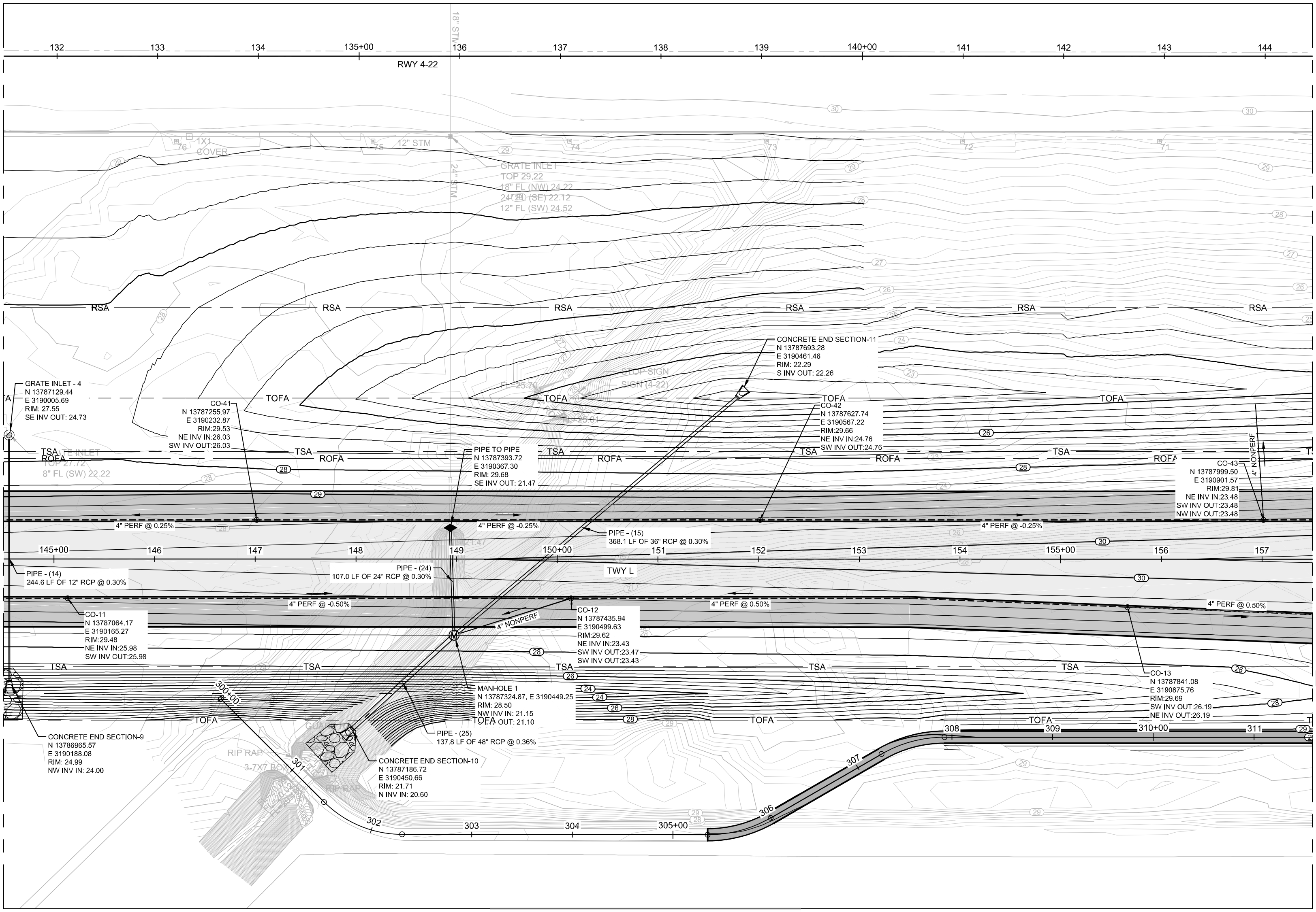
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127869
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME:	EFD-L_GRADING&DRAINAGE_SHEETS.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	CG04

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

23.80	EXISTING MINOR CONTOURS
23.80	EXISTING MAJOR CONTOURS
23.80	PROPOSED MINOR CONTOUR
23.80	PROPOSED MAJOR CONTOUR
	UNDERDRAIN CLEANOUT
	4" PERFORATED UNDERDRAIN
	4" NON-PERFORATED UNDERDRAIN
	ADJUST STRUCTURE ELEVATION
	PROPOSED PAVEMENT
RSA	RUNWAY SAFETY AREA
ROFA	RUNWAY OBJECT FREE AREA
TSA	TAXIWAY SAFETY AREA
TOFA	TAXIWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

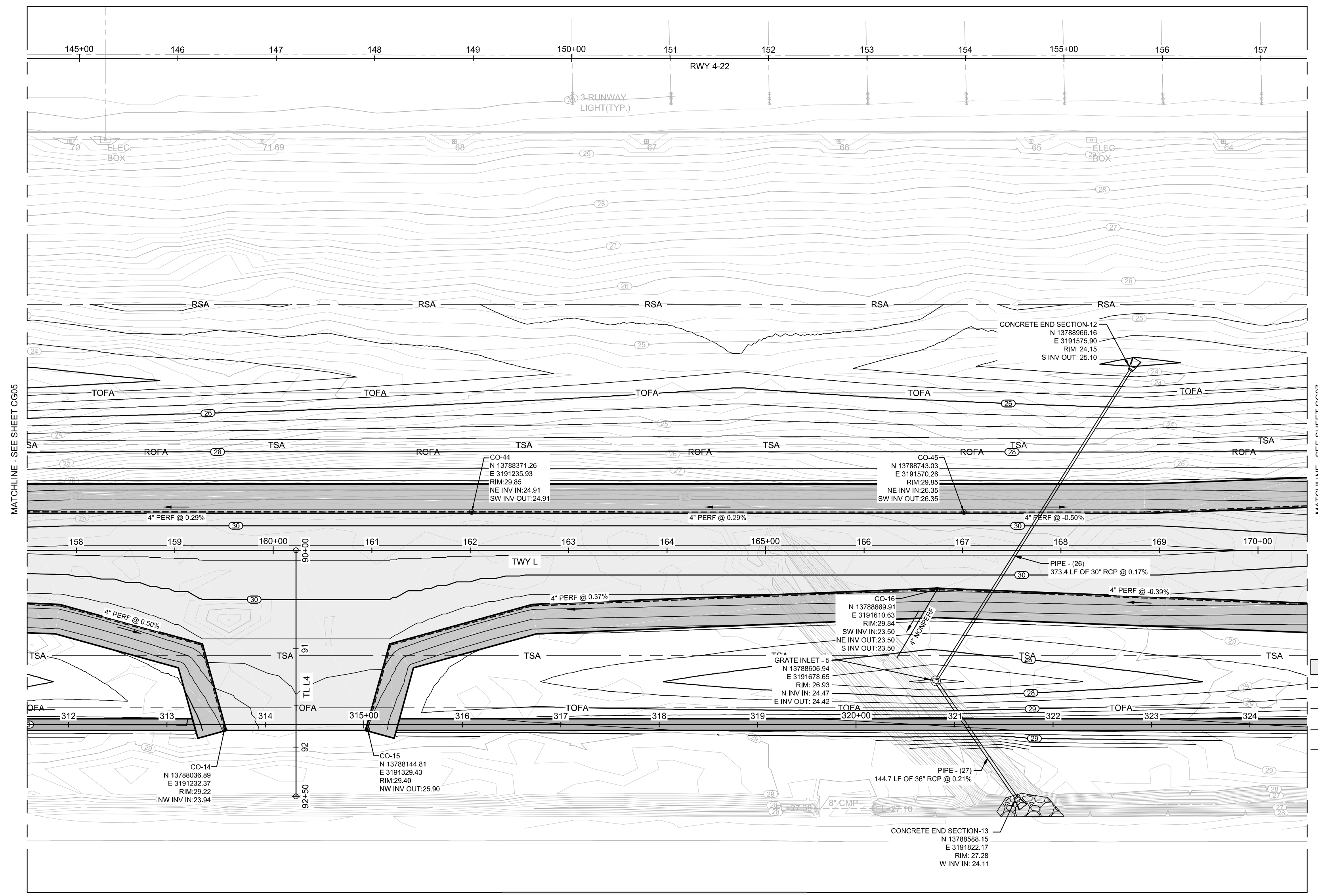
TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME: EFD-L_GRADING&DRAINAGE_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CG05
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- EXISTING MINOR CONTOURS
- EXISTING MAJOR CONTOURS
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- UNDERDRAIN CLEANOUT
- 4" PERFORATED UNDERDRAIN
- 4" NON-PERFORATED UNDERDRAIN
- ADJUST STRUCTURE ELEVATION
- PROPOSED PAVEMENT
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

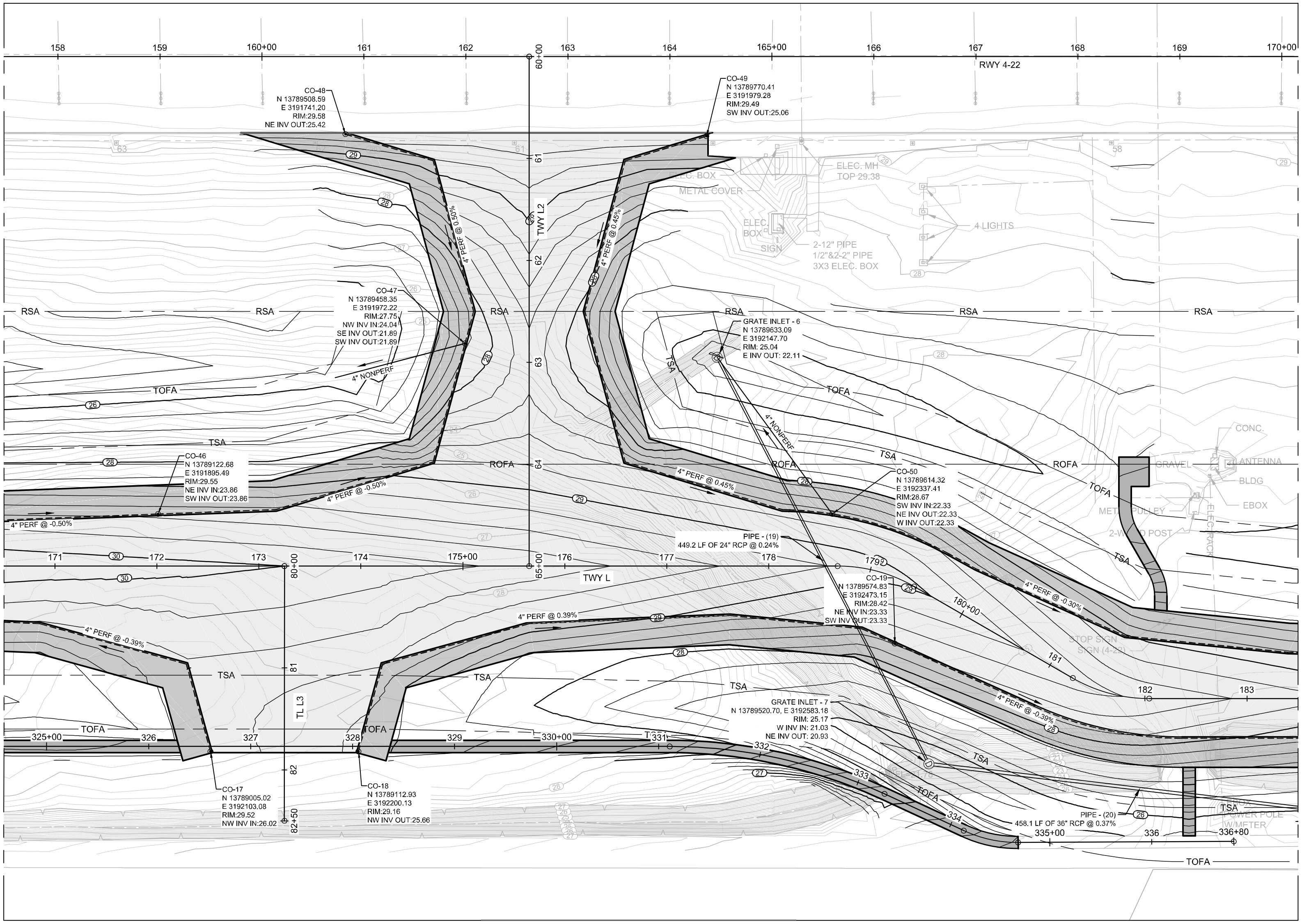
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127869
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME:	EFD-L_GRADING&DRAINAGE_SHEETS.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	CG06

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- 23.80 — EXISTING MINOR CONTOURS
- 23.80 — EXISTING MAJOR CONTOURS
- 23.80 — PROPOSED MINOR CONTOUR
- 23.80 — PROPOSED MAJOR CONTOUR
- UNDERDRAIN CLEANOUT
- 4" PERFORATED UNDERDRAIN
- 4" NON-PERFORATED UNDERDRAIN
- ADJUST STRUCTURE ELEVATION
- PROPOSED PAVEMENT
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

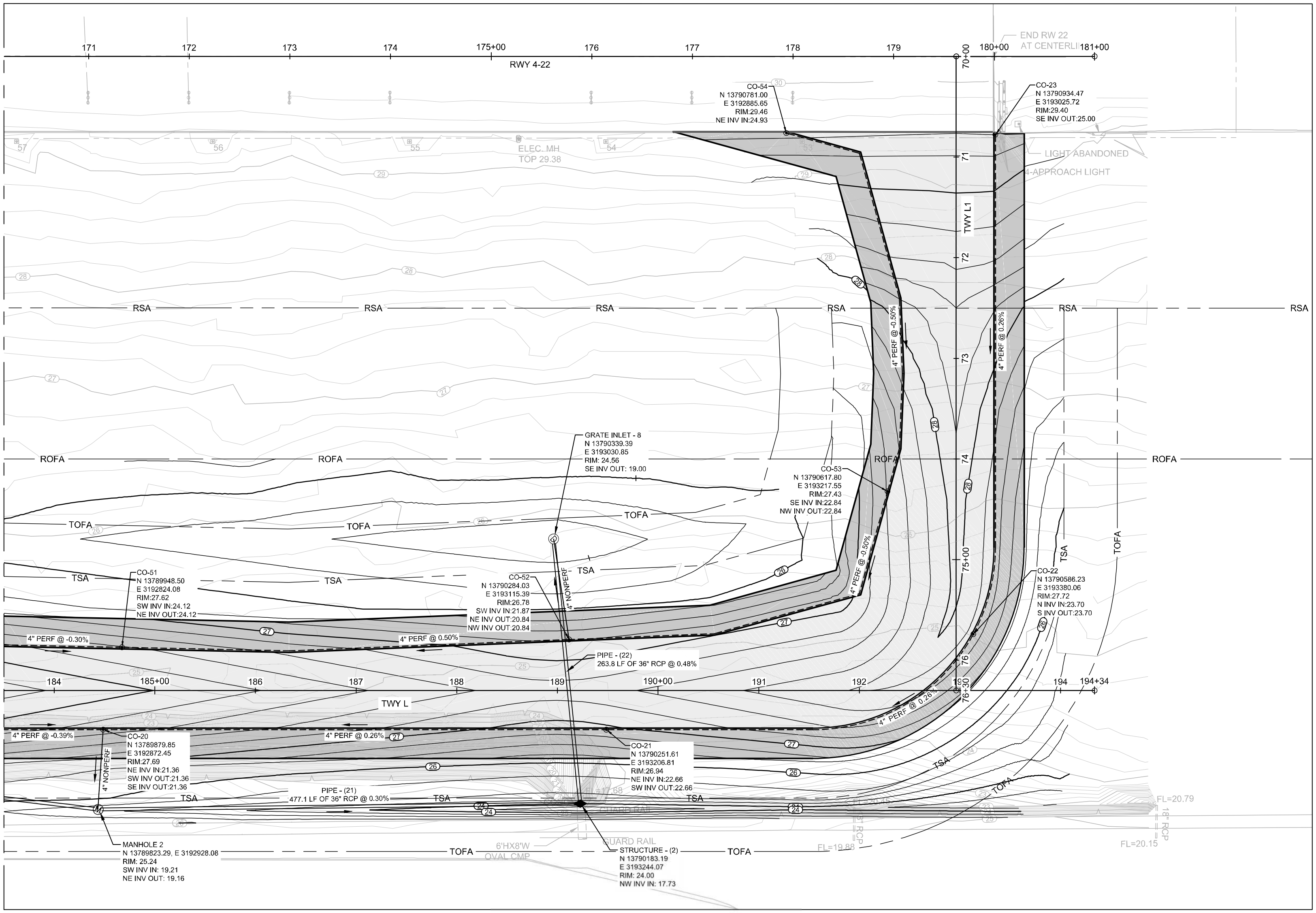
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME:	EFD-L_GRADING&DRAINAGE_SHEETS.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	CG07

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

23.80	EXISTING MINOR CONTOURS
23.80	EXISTING MAJOR CONTOURS
23.80	PROPOSED MINOR CONTOUR
23.80	PROPOSED MAJOR CONTOUR
	UNDERDRAIN CLEANOUT
	4" PERFORATED UNDERDRAIN
	4" NON-PERFORATED UNDERDRAIN
	ADJUST STRUCTURE ELEVATION
	PROPOSED PAVEMENT
RSA	RUNWAY SAFETY AREA
ROFA	RUNWAY OBJECT FREE AREA
TSA	TAXIWAY SAFETY AREA
TOFA	TAXIWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

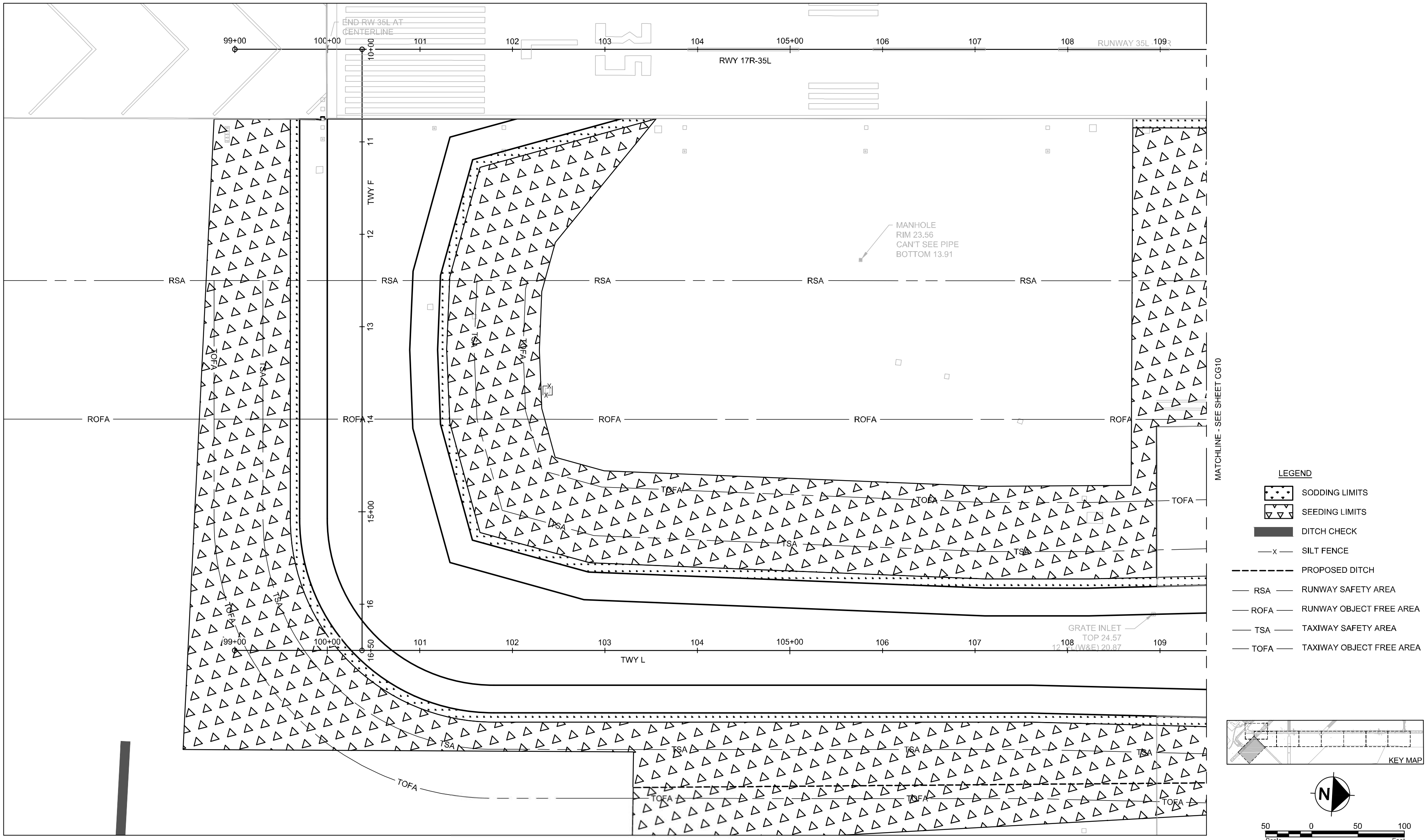
TAXIWAY L

GRADING AND DRAINAGE PLANS

FILE NAME: EFD-L_GRADING&DRAINAGE_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG08
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:12 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY

APPROVED

TAXIWAY L

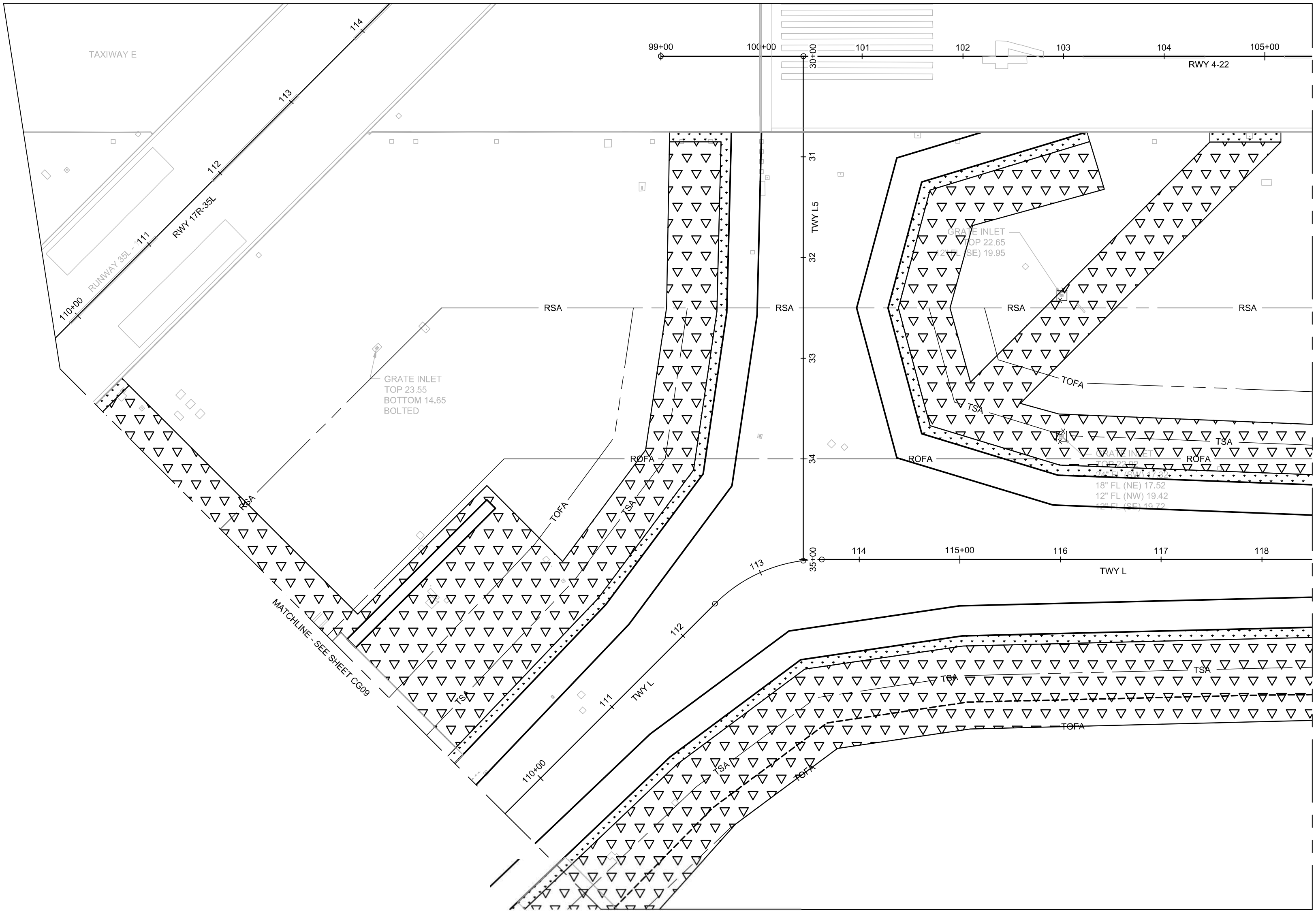
EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG

DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG09
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

SODDING LIMITS
SEEDING LIMITS
DITCH CHECK
—X— SILT FENCE
PROPOSED DITCH
— RSA — RUNWAY SAFETY AREA
— ROFA — RUNWAY OBJECT FREE AREA
— TSA — TAXIWAY SAFETY AREA
— TOFA — TAXIWAY OBJECT FREE AREA

KEY MAP

N

50 0 50 100
Scale Feet

HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
APPROVED

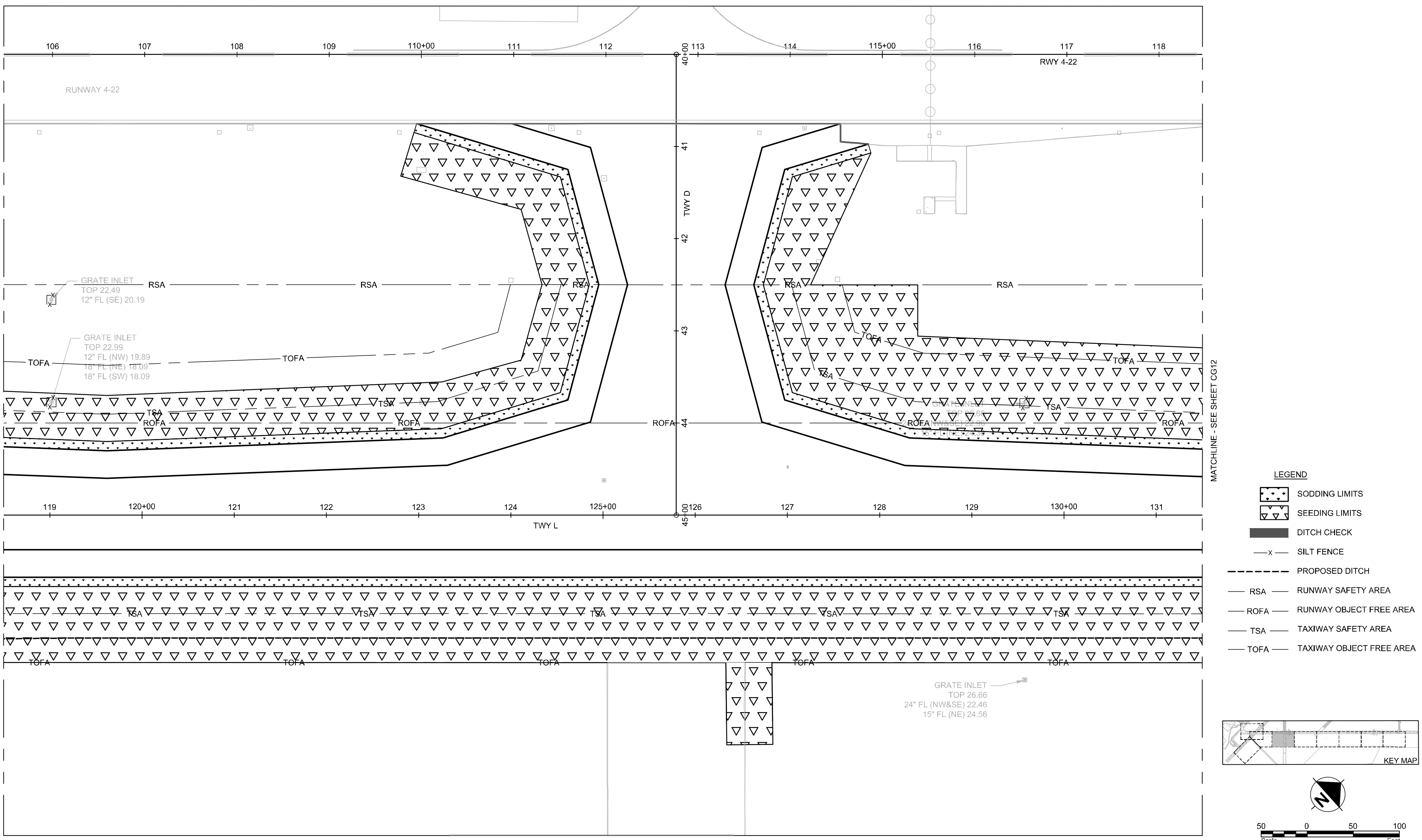
TAXIWAY L

EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG	
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET
CG10

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY

HNTB CORPORATION

APPROVED

TAXIWAY L

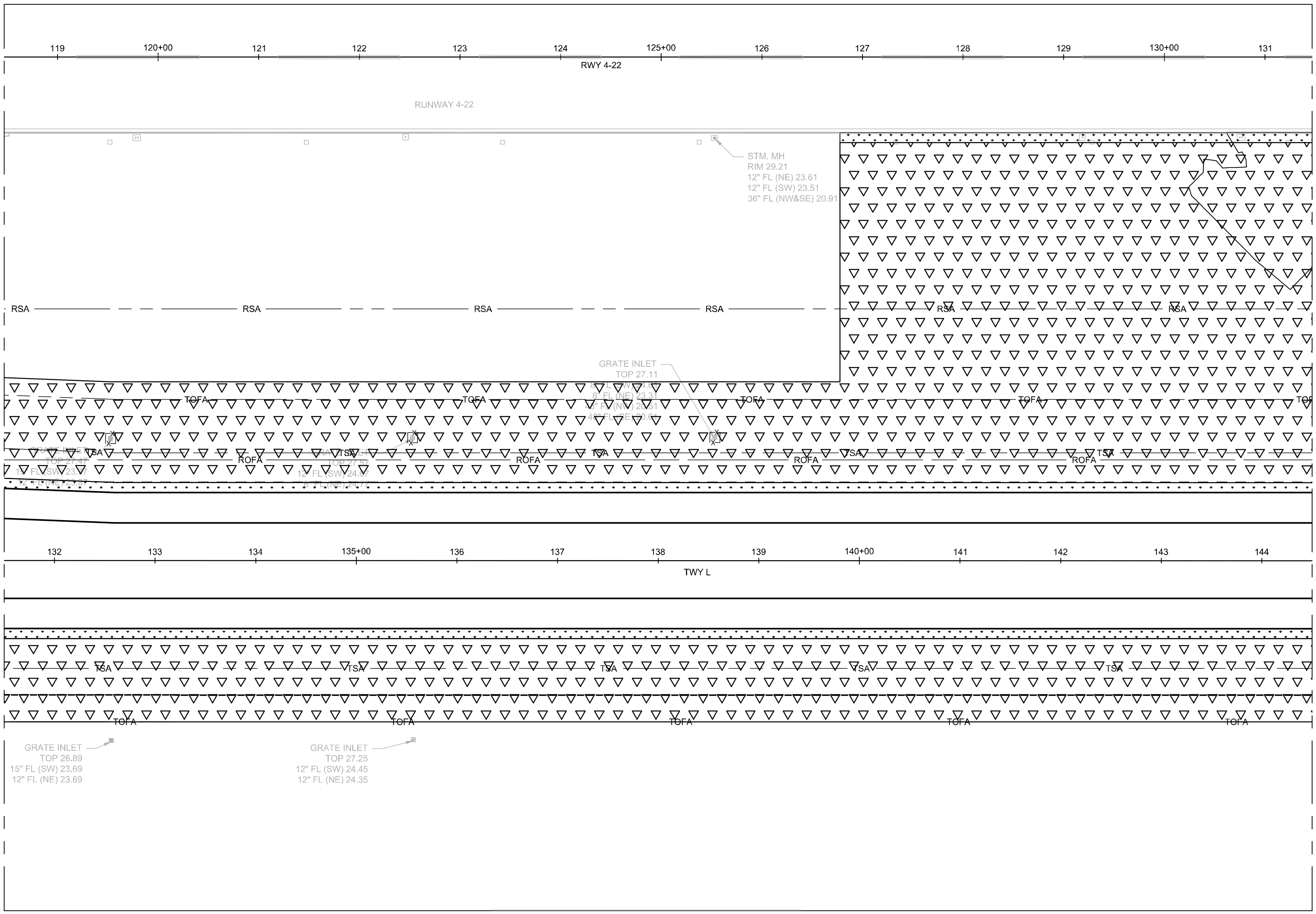
EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG

DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET CG11

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- SODDING LIMITS
- SEEDING LIMITS
- DITCH CHECK
- —X— SILT FENCE
- PROPOSED DITCH
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

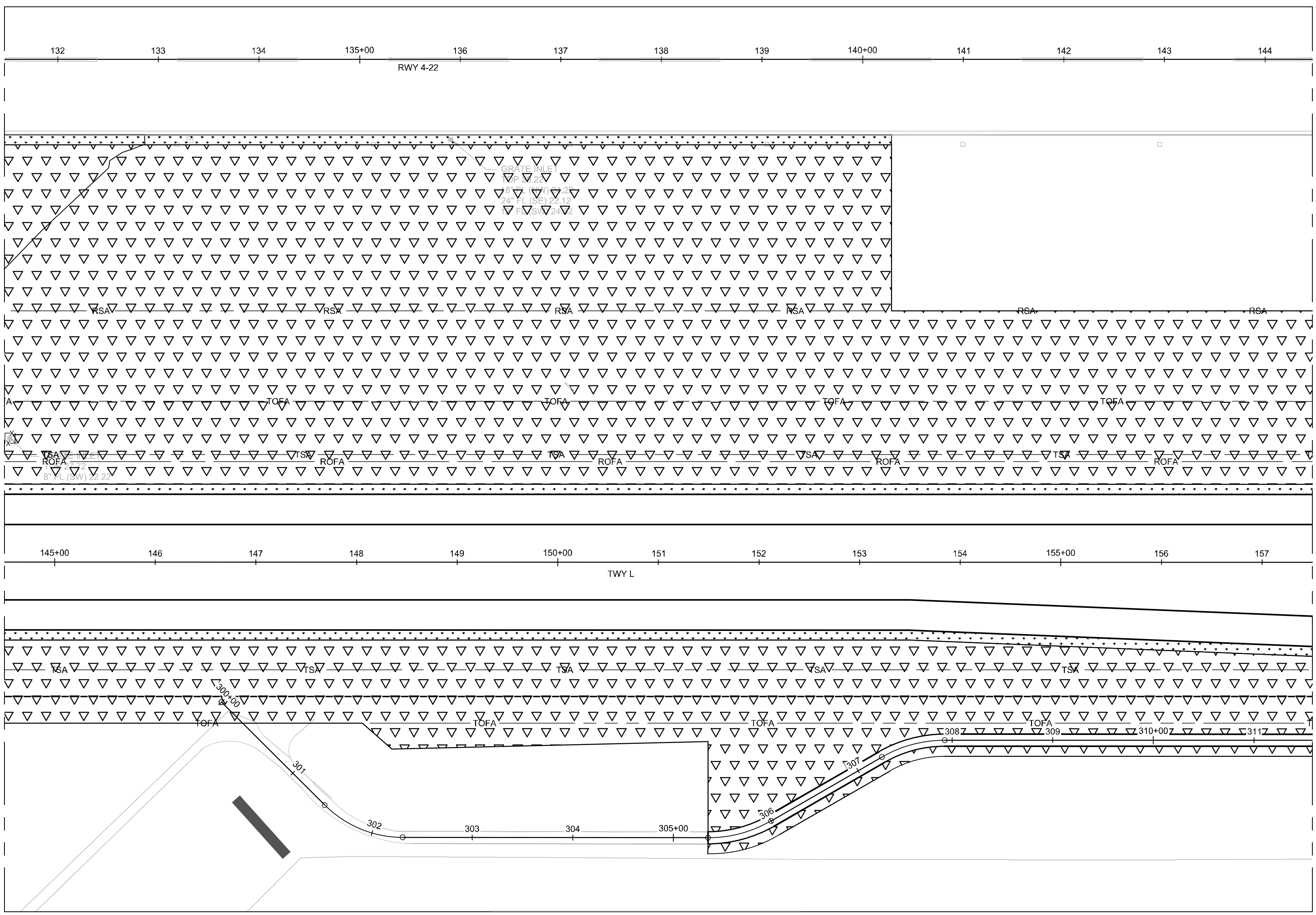
TAXIWAY L

EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG	
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET CG12

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- SODDING LIMITS
- SEEDING LIMITS
- DITCH CHECK
- SILT FENCE
- PROPOSED DITCH
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

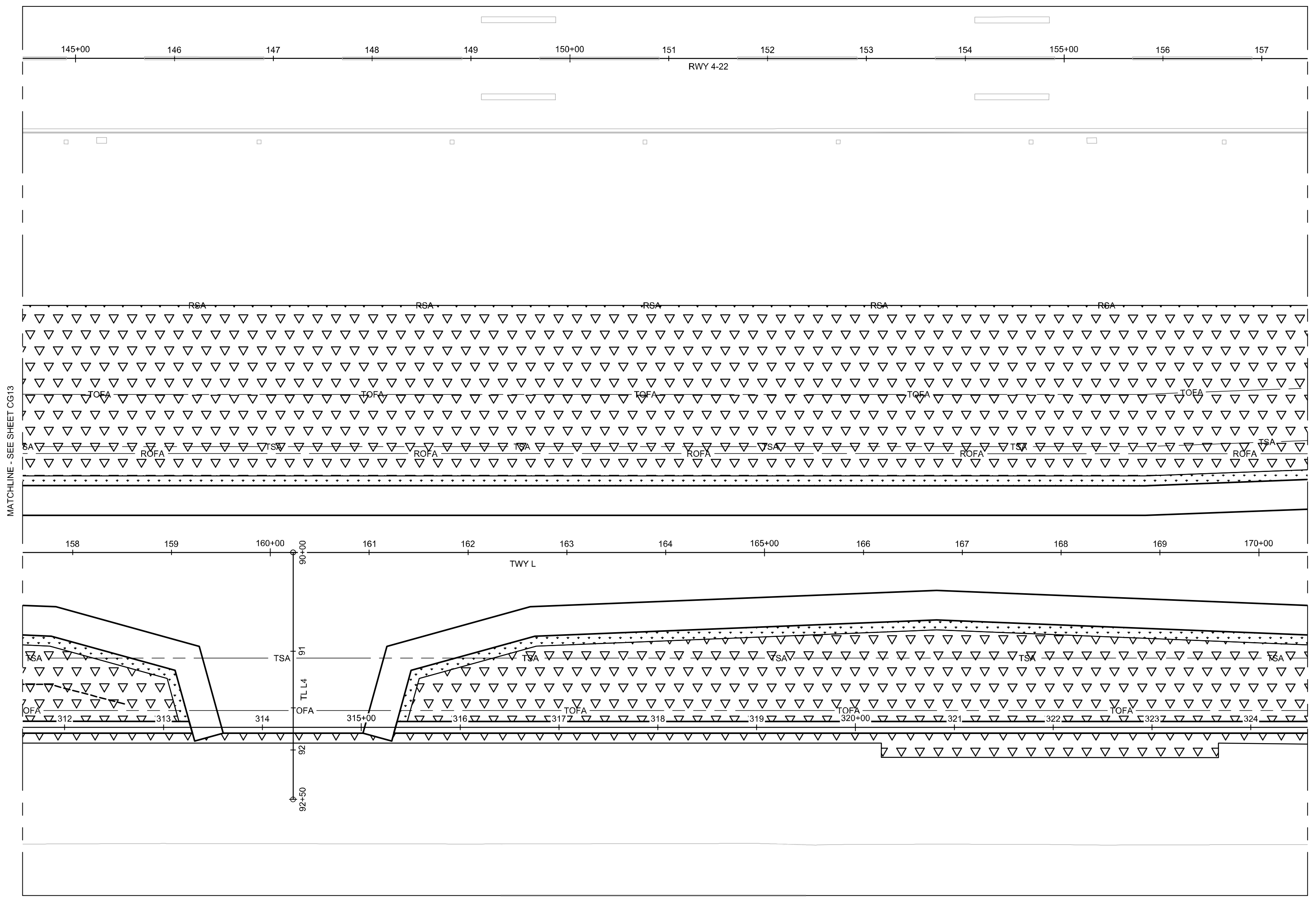
TAXIWAY L

EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

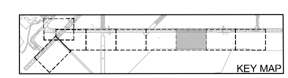
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG13
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- SODDING LIMITS
- SEEDING LIMITS
- DITCH CHECK
- —X— SILT FENCE
- PROPOSED DITCH
- —RSA— RUNWAY SAFETY AREA
- —ROFA— RUNWAY OBJECT FREE AREA
- —TSA— TAXIWAY SAFETY AREA
- —TOFA— TAXIWAY OBJECT FREE AREA



HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

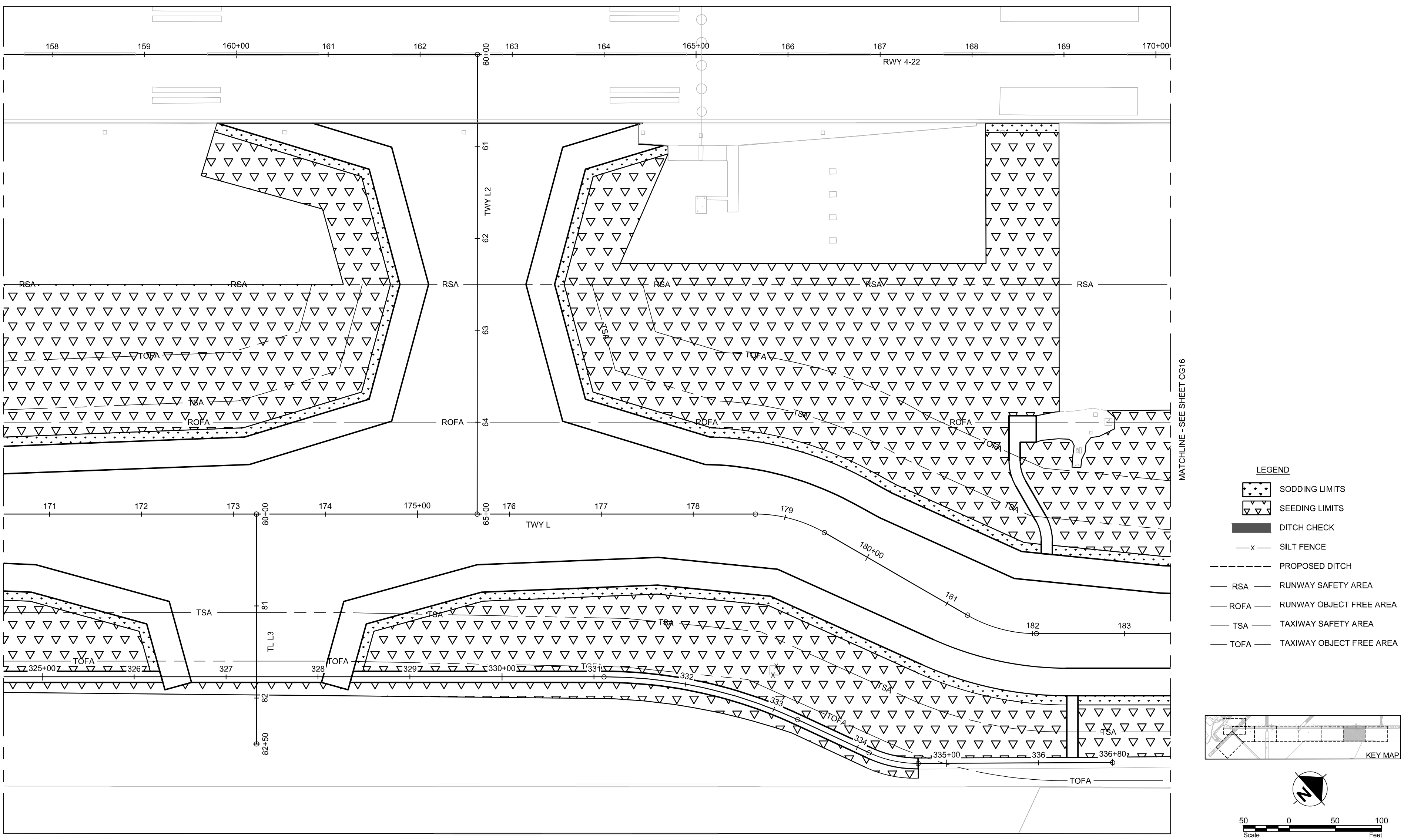
EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG

DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG14
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

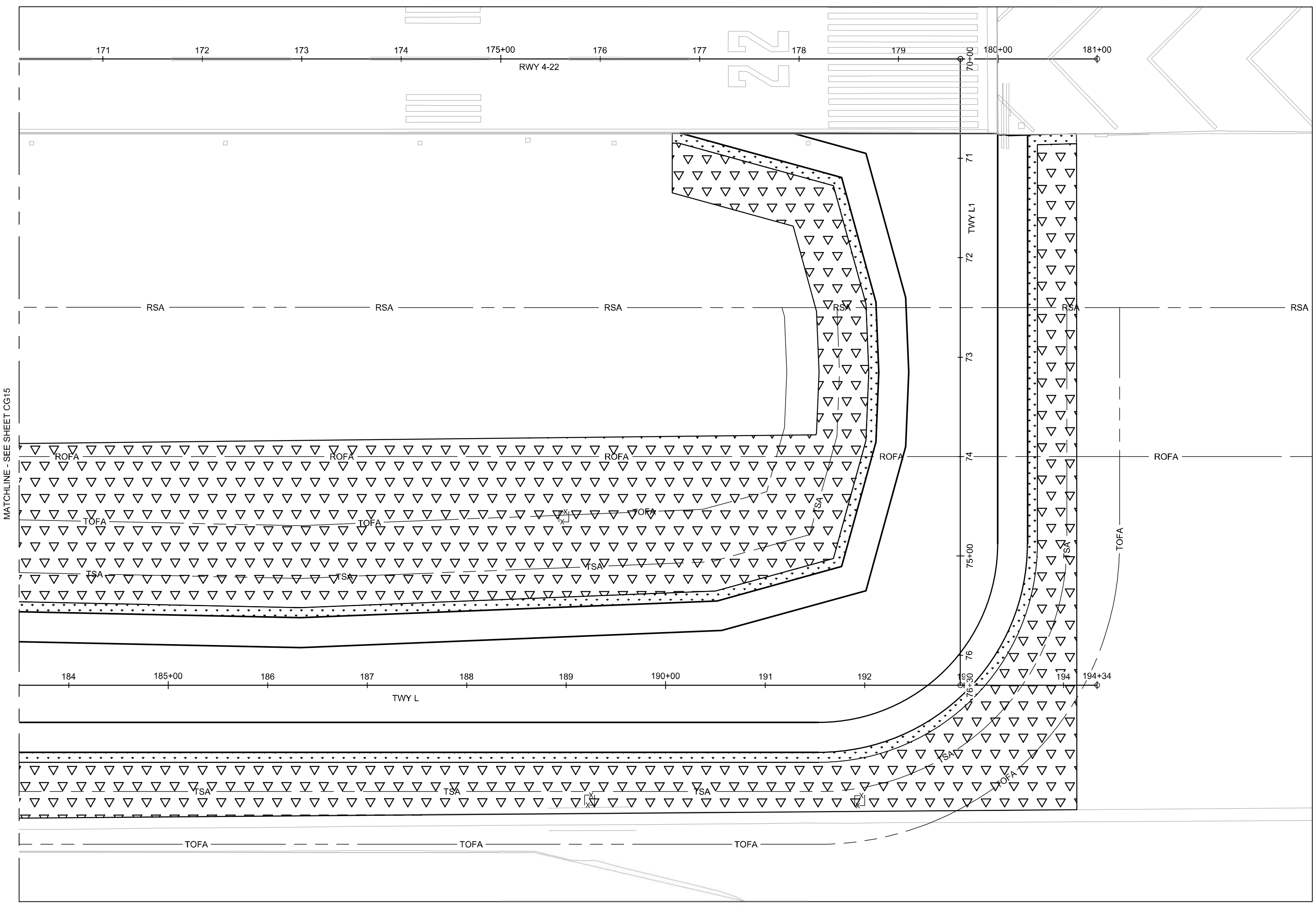
TAXIWAY L

EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG15
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:13 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

- SODDING LIMITS
- SEEDING LIMITS
- DITCH CHECK
- —X— SILT FENCE
- PROPOSED DITCH
- RSA — RUNWAY SAFETY AREA
- ROFA — RUNWAY OBJECT FREE AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

KEY MAP

50 0 50 100
Scale Feet

HNTB

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

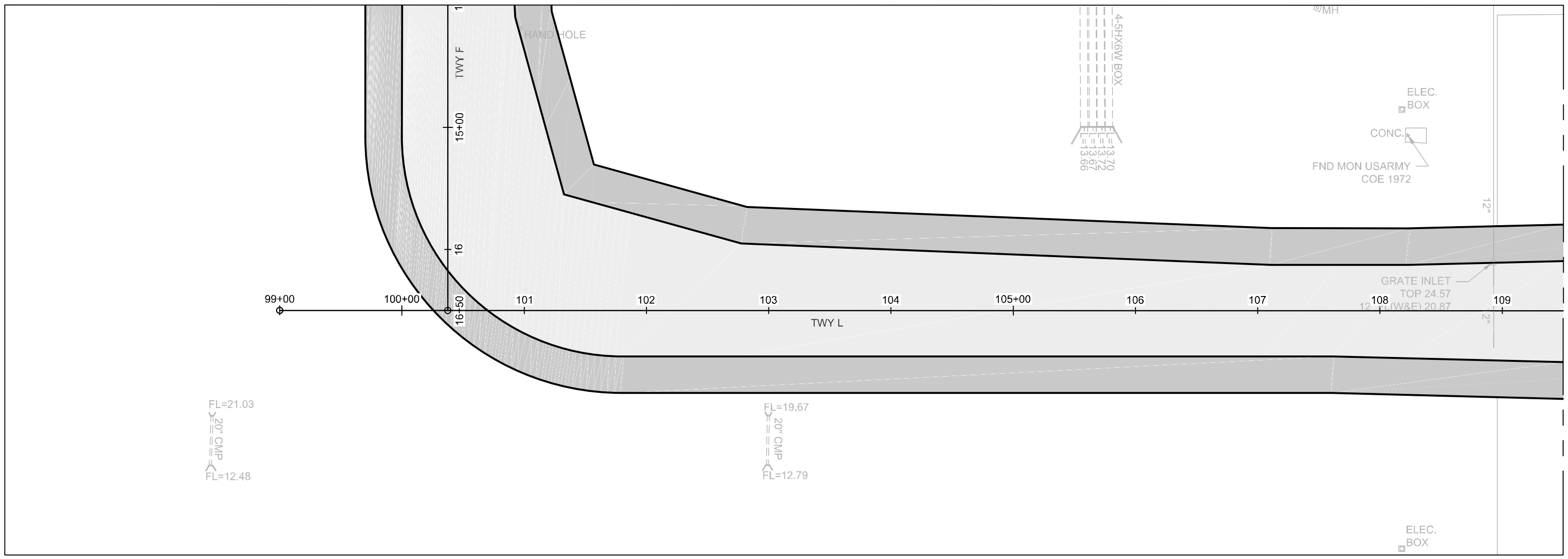
TAXIWAY L

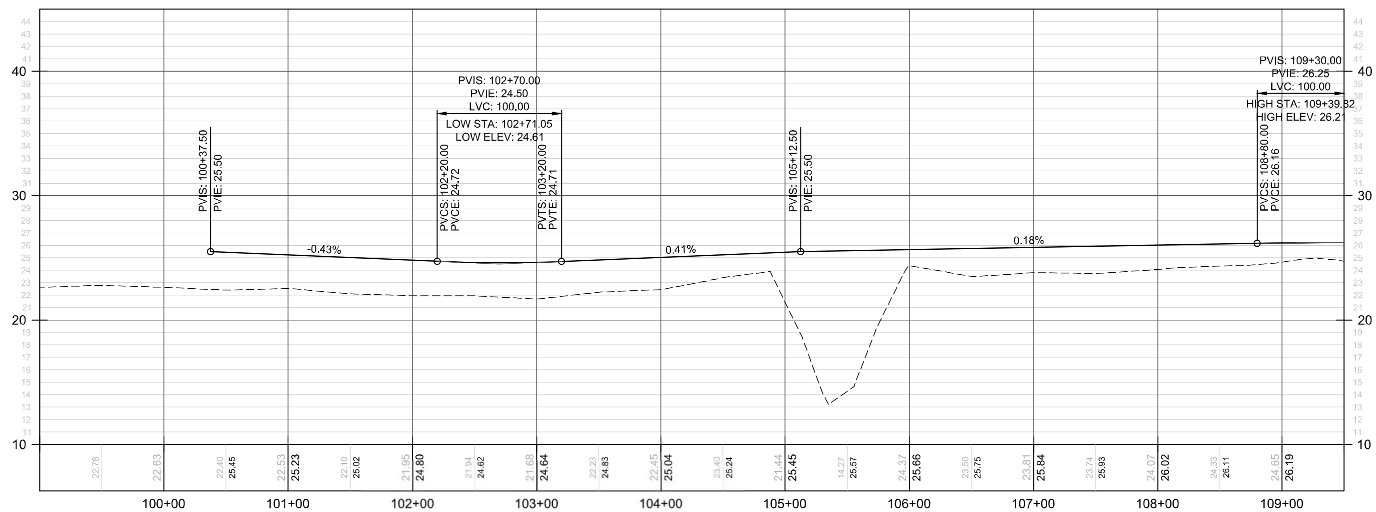
EROSION CONTROL PLANS

FILE NAME: EFD-L_EROSIONCONTROL_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CG16
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:14 AM
By: Nathan Kriss
Job No.:62646-PL-011





LEGEND

20" PCCP 1/G08

14" PCCP 1/G08

10" PCCP 2/G08

KEY MAP

N

Scale 50 0 50 100 Feet

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

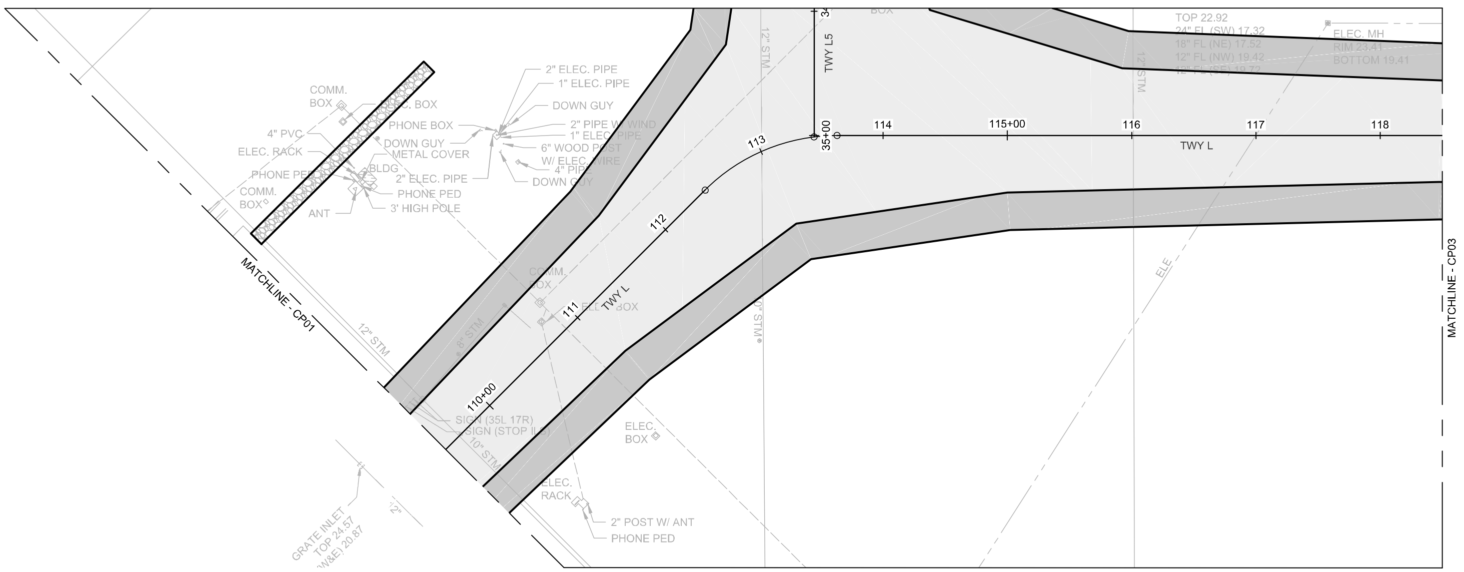
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
APPROVED

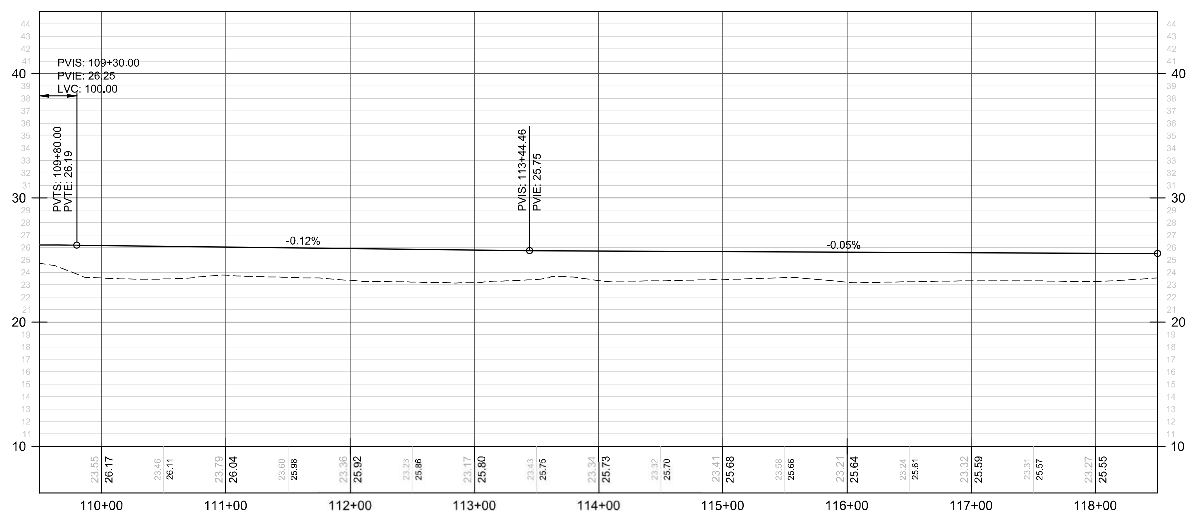
TAXIWAY L

TWY L PAVING PLAN AND PROFILE
STA. 99+00.00 TO STA. 109+50.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CP01
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

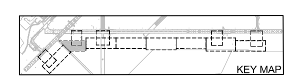
Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011





LEGEND

- 20" PCCP (1/G08)
- 14" PCCP (1/G08)
- 10" PCCP (2/G08)



Scale: 50 0 50 100 Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

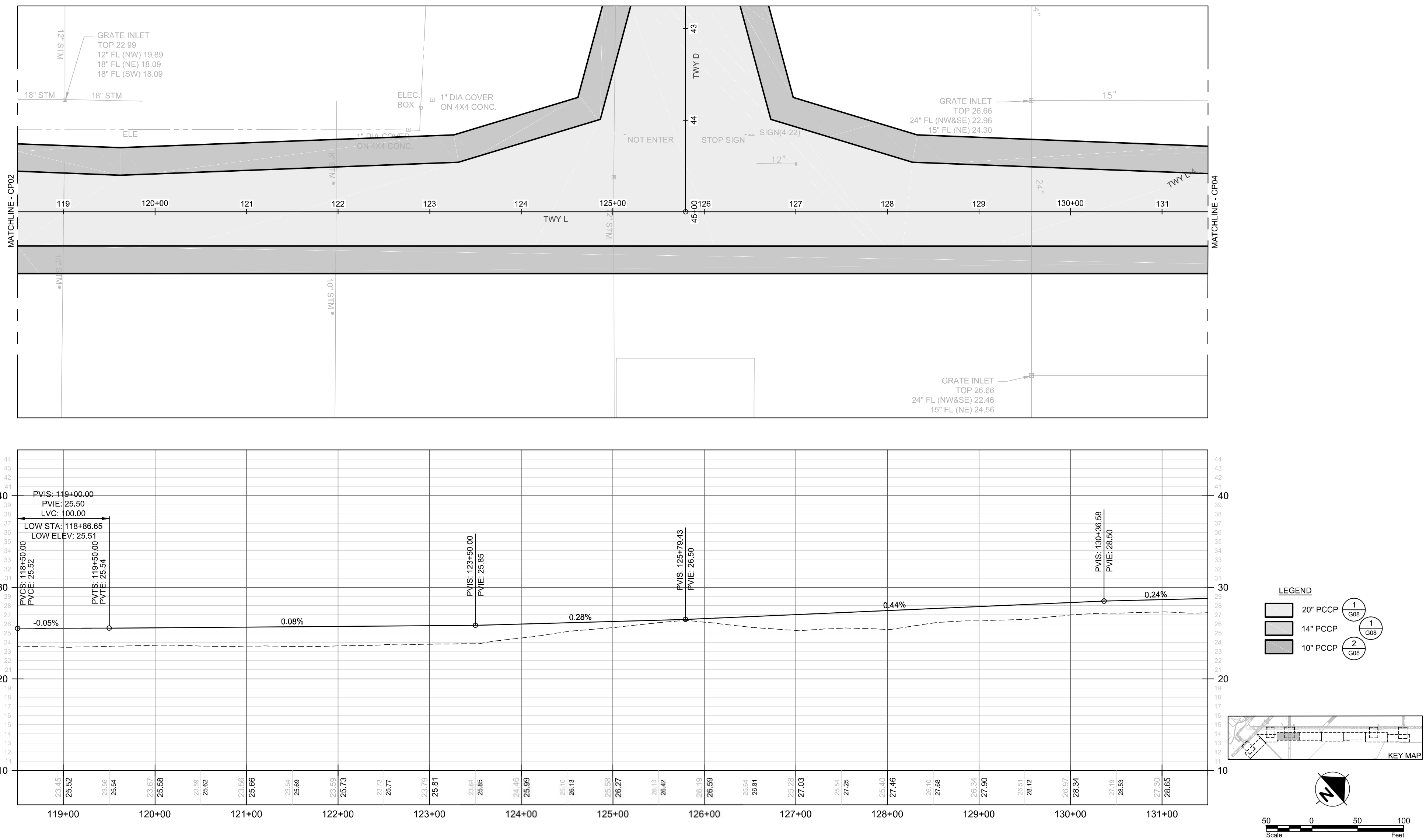
TAXIWAY L

TWY L PAVING PLAN AND PROFILE
STA. 109+50.00 TO STA. 118+50.00

FILE NAME:	EFD-L_PAVING_SHEETS.DWG
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET CP02

Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

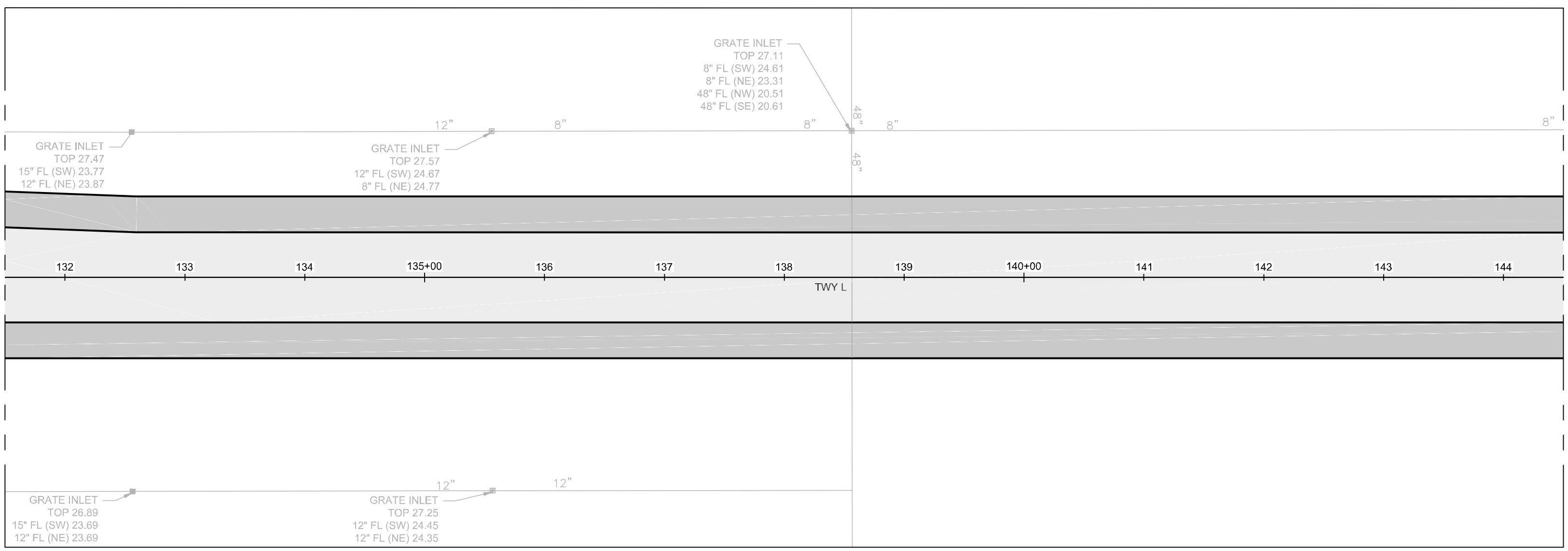
TAXIWAY L

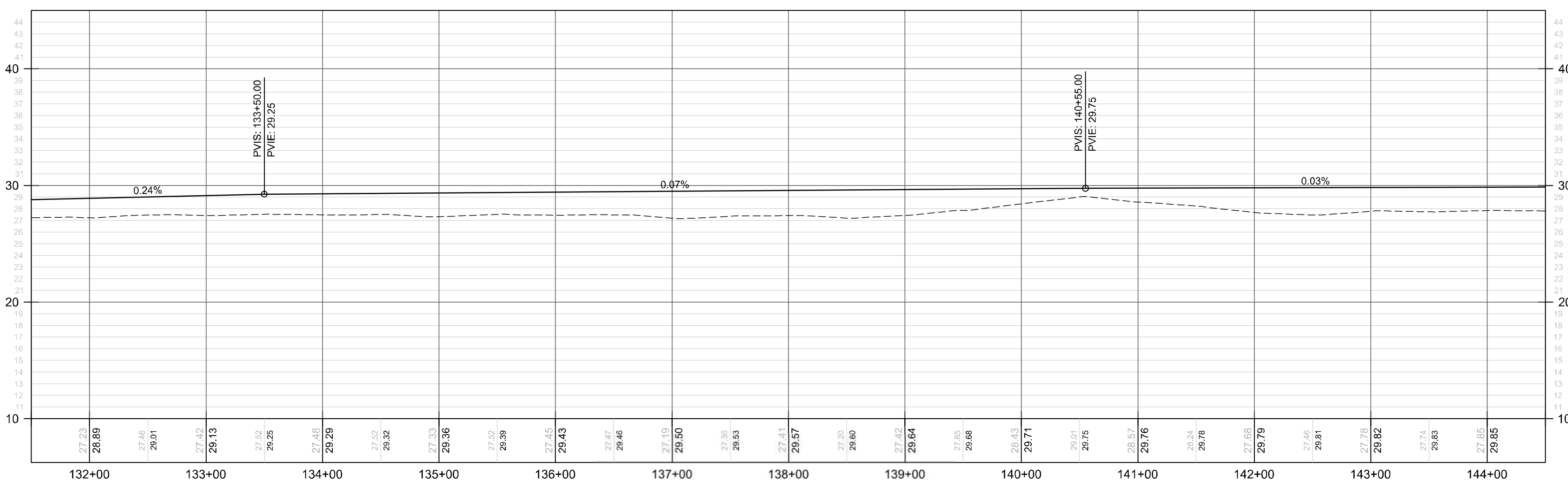
TWY L PAVING PLAN AND PROFILE
STA. 118+50.00 TO STA. 131+50.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CP03
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

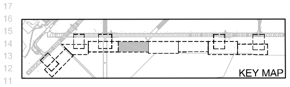
Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011





LEGEND

- 20" PCCP (1/G08)
- 14" PCCP (1/G08)
- 10" PCCP (2/G08)



Scale: 50 0 50 100 Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

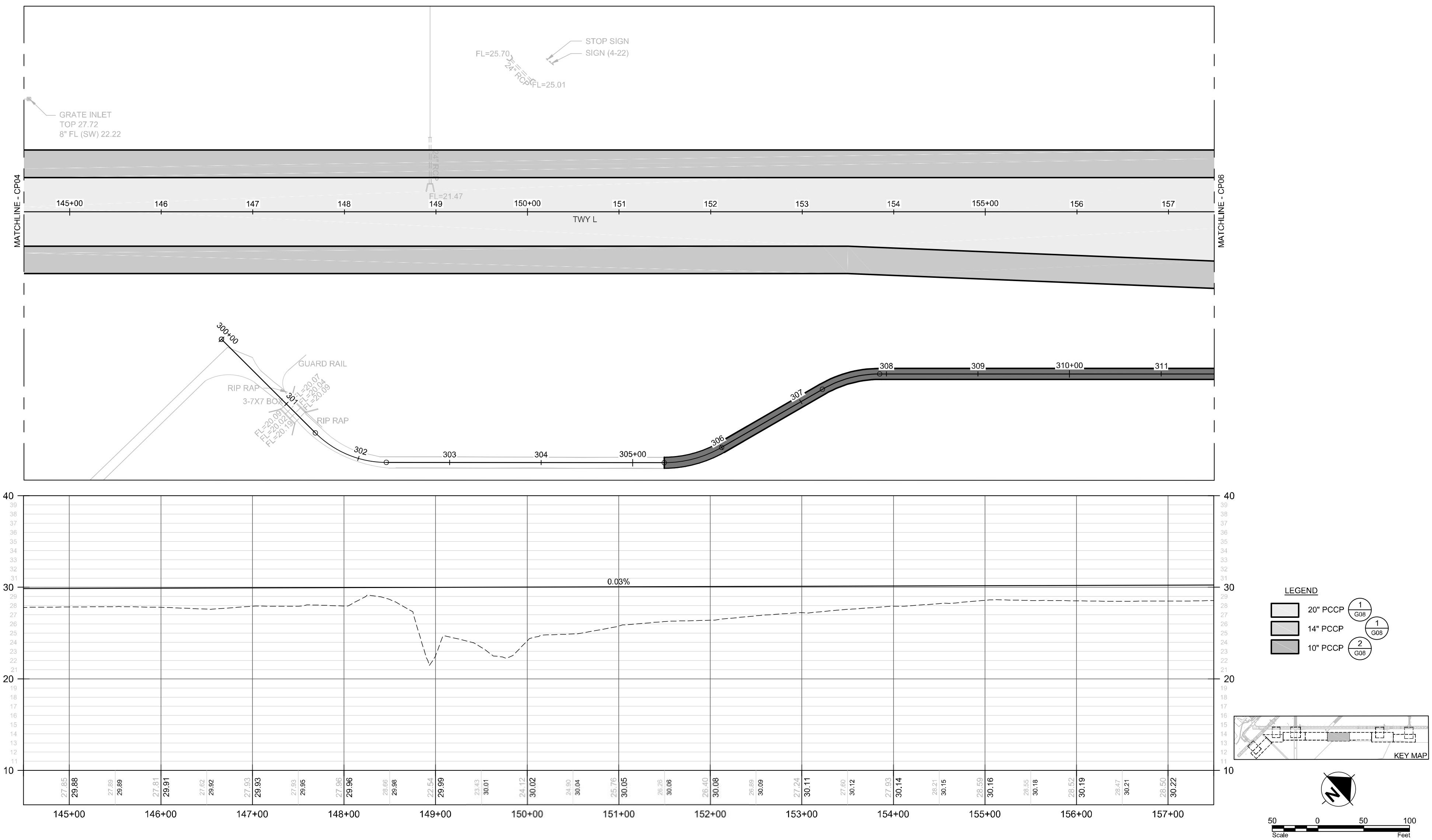
TAXIWAY L

TWY L PAVING PLAN AND PROFILE STA. 131+50.00 TO STA. 144+50.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG	
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET CP04

Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

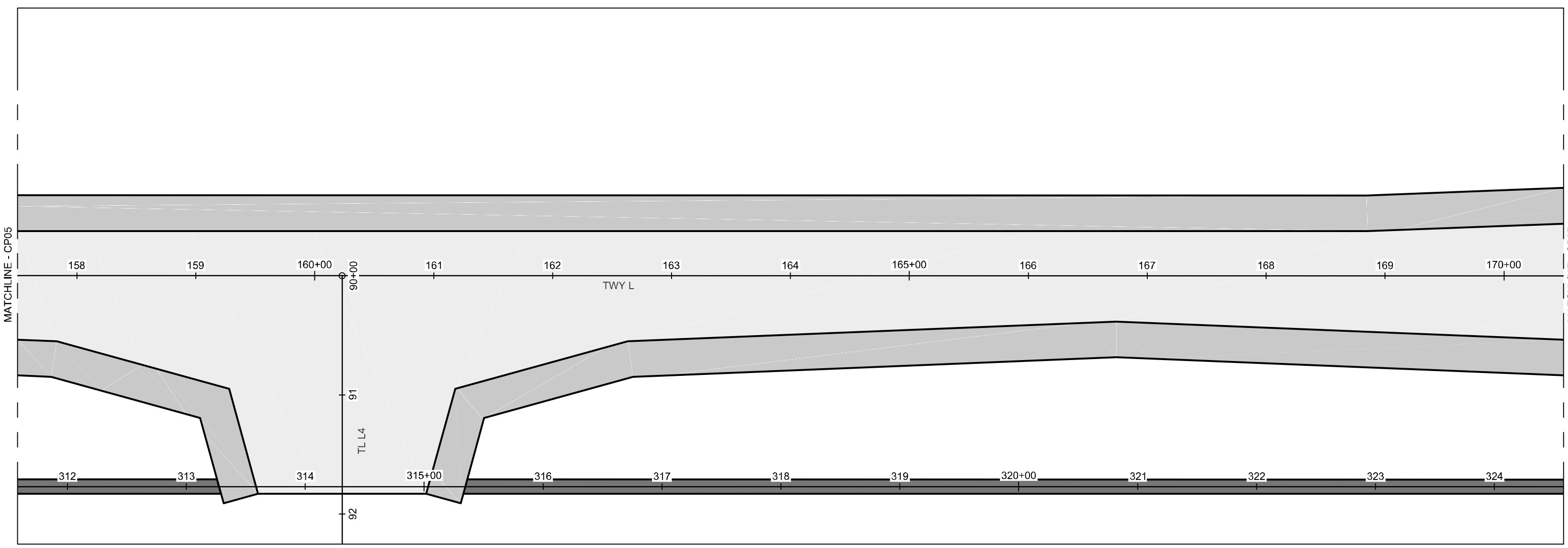
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

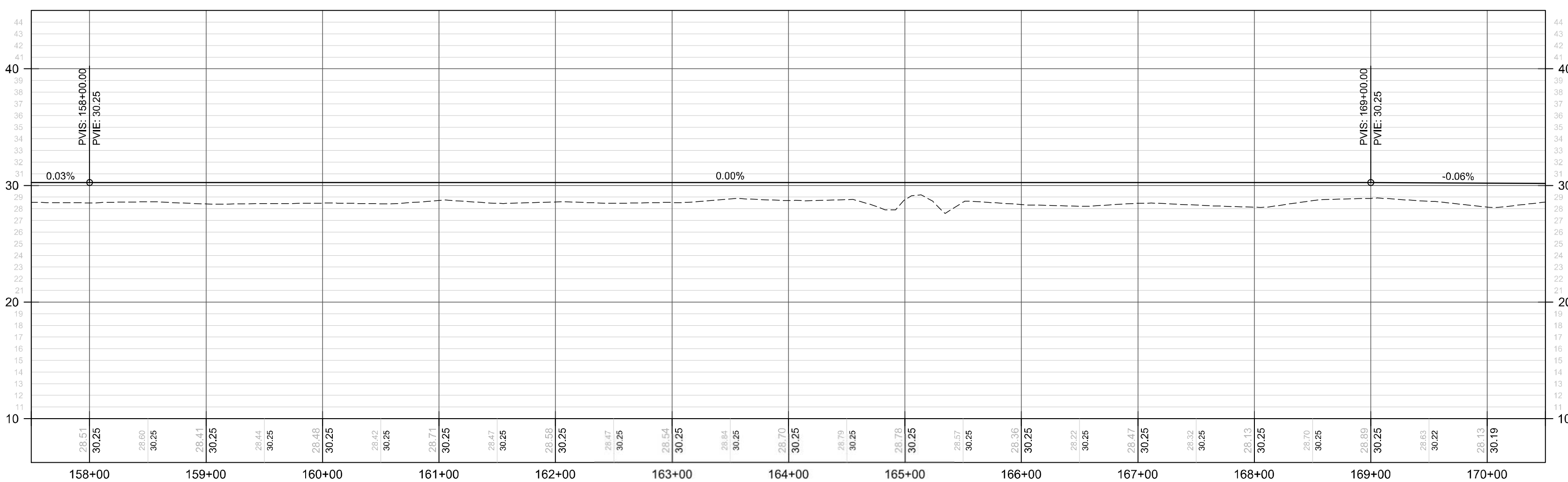
TAXIWAY L

TWY L PAVING PLAN AND PROFILE
STA. 144+50 TO STA. 157+50.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG			
DATE: APRIL 30, 2021		30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET	
DRAWN	NICHOLAS ADRALES		
CHECKED	MATT WALSH	CP05	
APPROVED	RYAN SHROPSHIRE, P.E.		

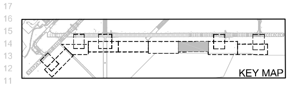
Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011





LEGEND

20" PCCP	1/G08
14" PCCP	1/G08
10" PCCP	2/G08



50 0 50 100
Scale Feet

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127869
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

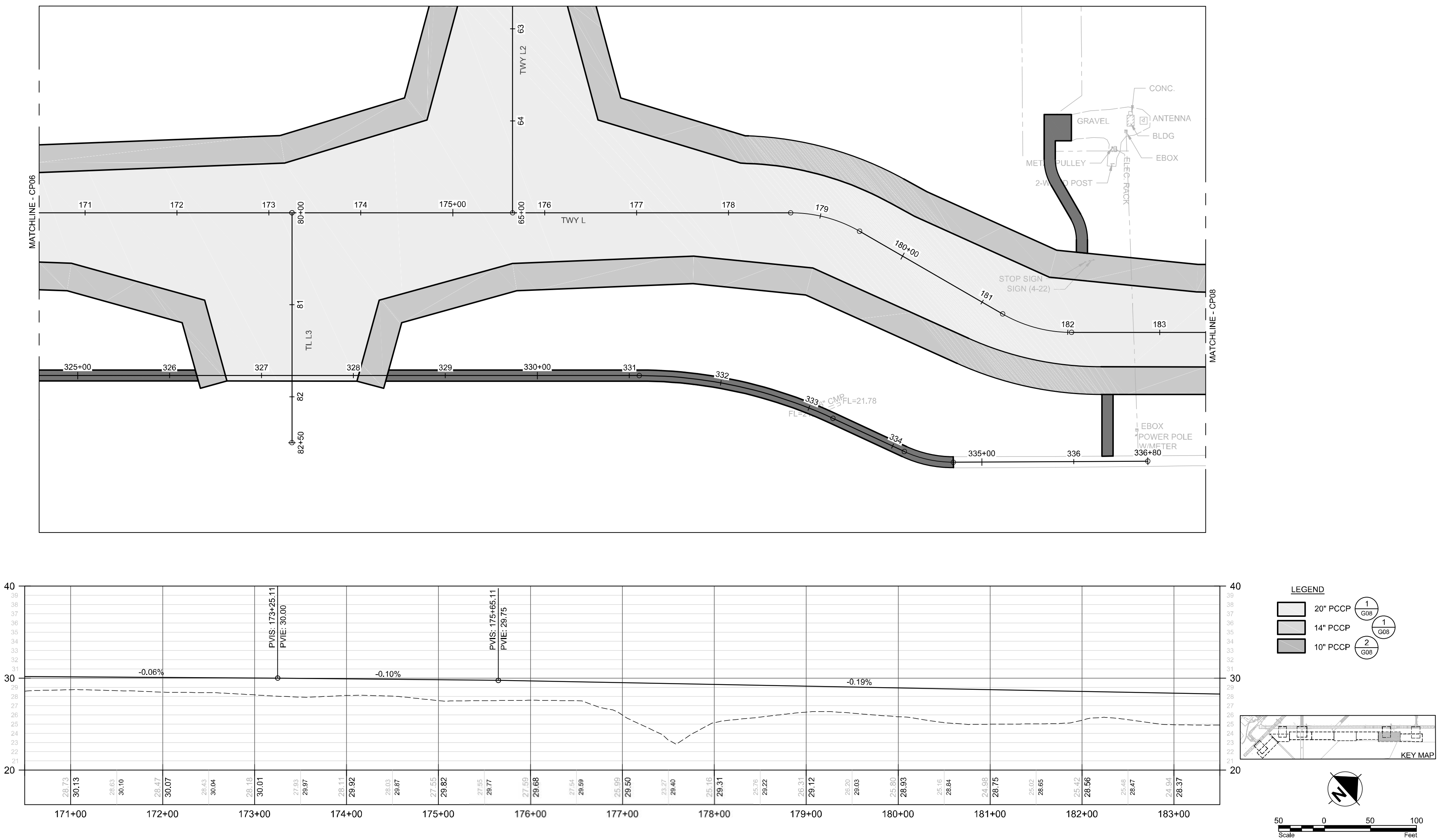
TWY L PAVING PLAN AND PROFILE
STA. 157+50.00 TO 170+50.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG

DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CP06
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

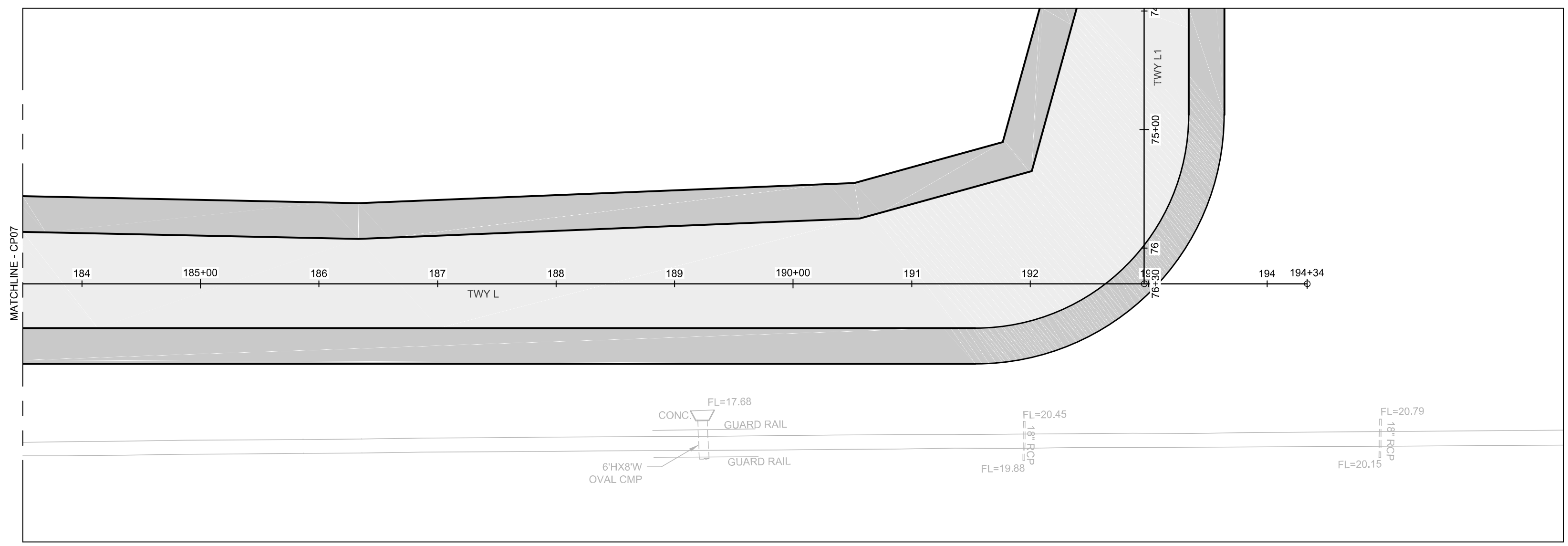
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127669
DATE: APRIL 30, 2021
APPROVED

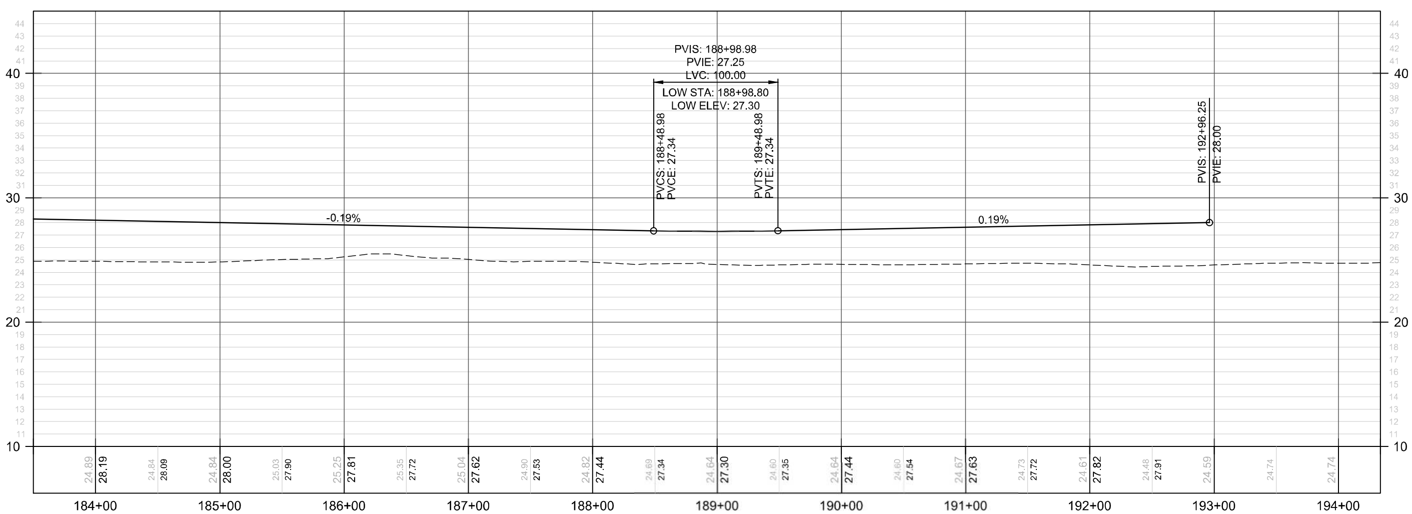
TAXIWAY L

TWY L PAVING PLAN AND PROFILE
STA. 170+50.00 TO STA 183+50.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CP07
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

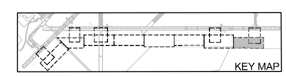
Plotted: April 30, 2021
Time: 10:15 AM
By: Nathan Kriss
Job No.:62646-PL-011





LEGEND

- 20" PCCP (1/G08)
- 14" PCCP (1/G08)
- 10" PCCP (2/G08)



50 0 50 100
Scale Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

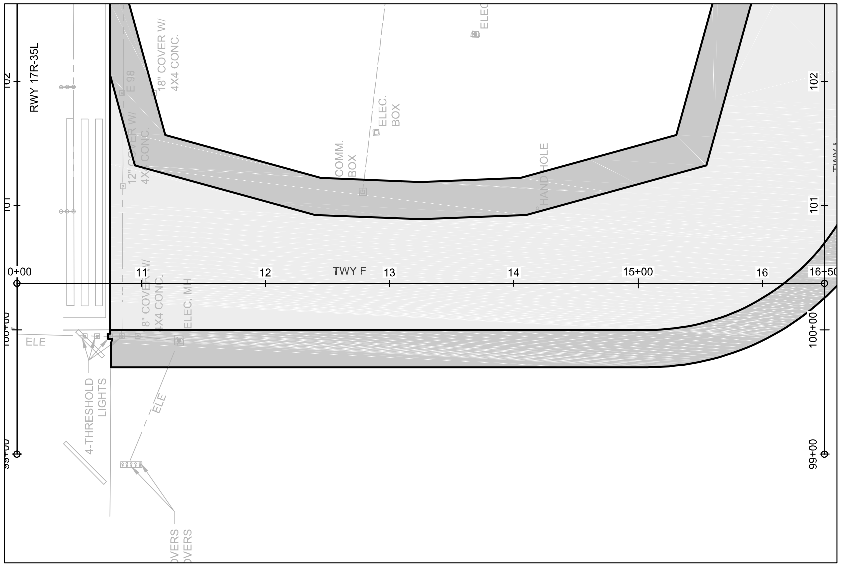
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
APPROVED

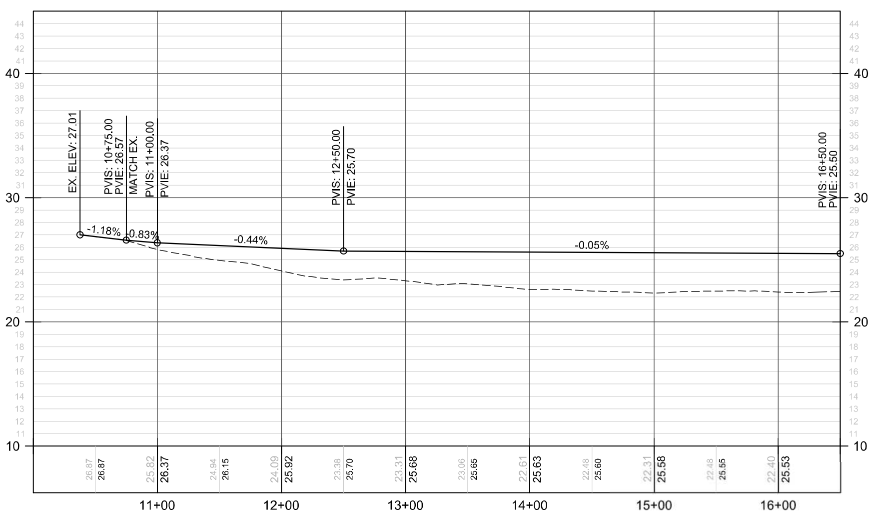
TAXIWAY L

TWY L PAVING PLAN AND PROFILE
STA. 183+50.00 TO STA. 194+34.00

FILE NAME: EFD-L_PAVING_SHEETS.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CP08
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

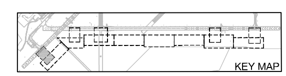
Plotted: April 30, 2021
Time: 10:16 AM
By: Nathan Kriss
Job No.:62646-PL-011





LEGEND

- 20" PCCP (1/G08)
- 14" PCCP (1/G08)
- 10" PCCP (2/G08)



Scale: 50 0 50 100 Feet

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
DATE: APRIL 30, 2021
APPROVED

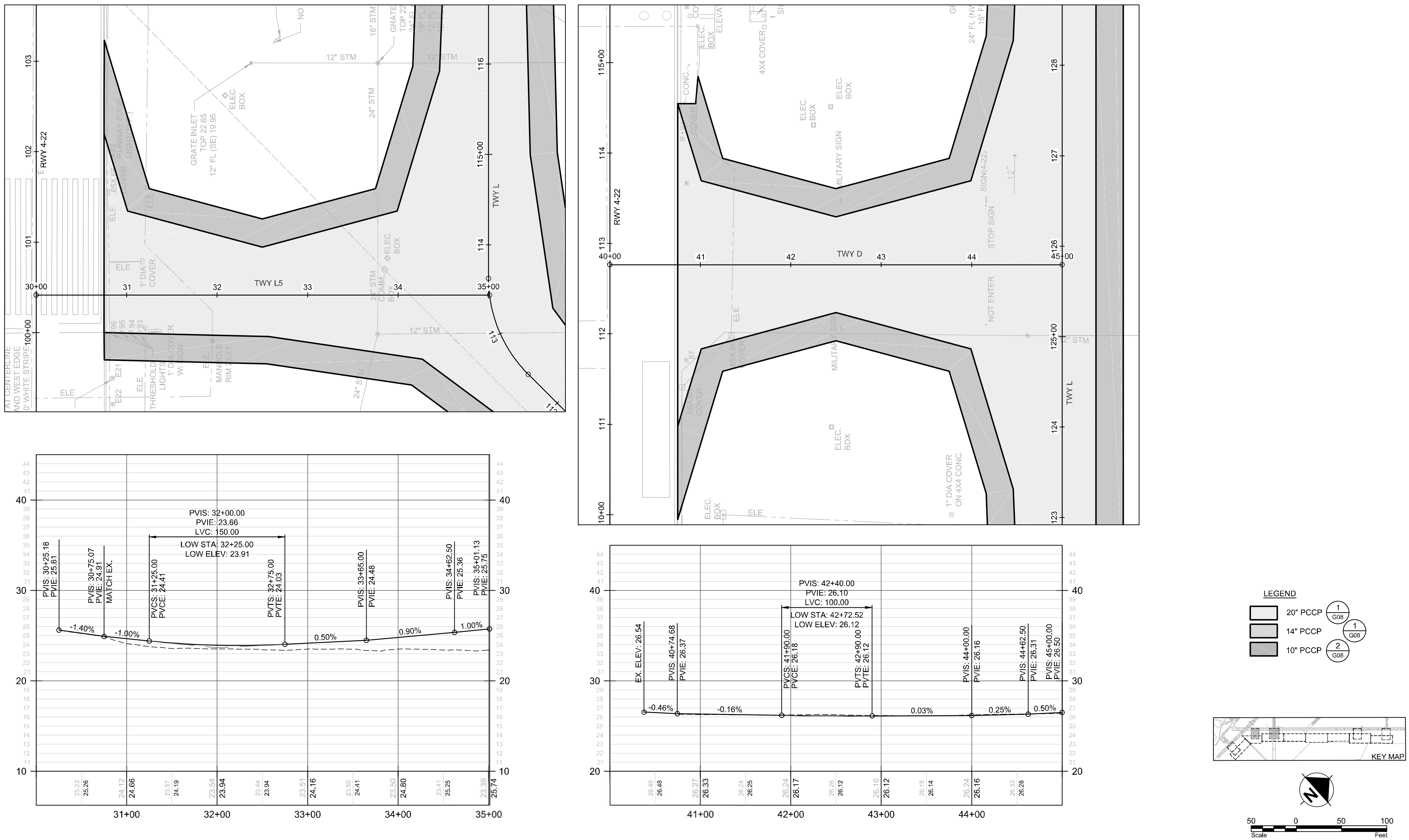
TAXIWAY L

TWY F PAVING PLAN AND PROFILE

FILE NAME: EFD-L_PAVING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CP09
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:16 AM
By: Nathan Kriss
Job No.:62646-PL-011



Plotted: April 30, 2021
Time: 10:16 AM
By: Nathan Kriss
Job No.:62646-PL-011

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

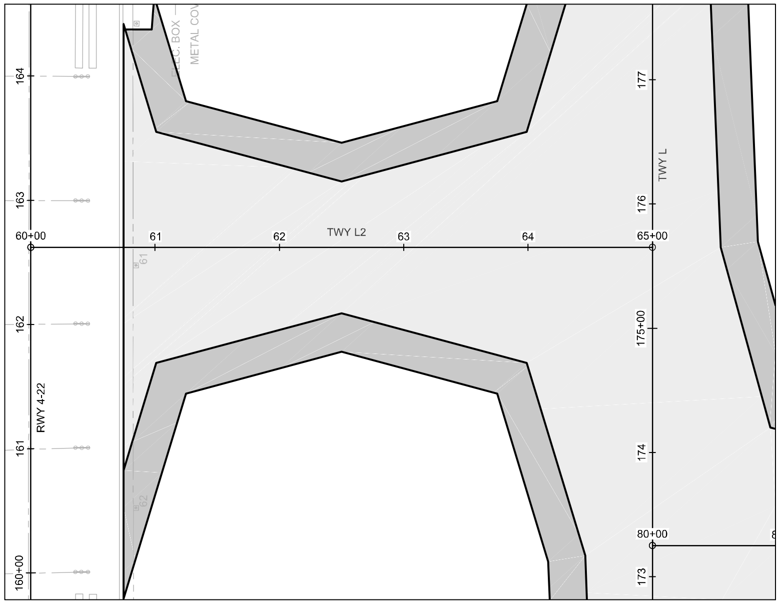
ELLINGTON AIRPORT

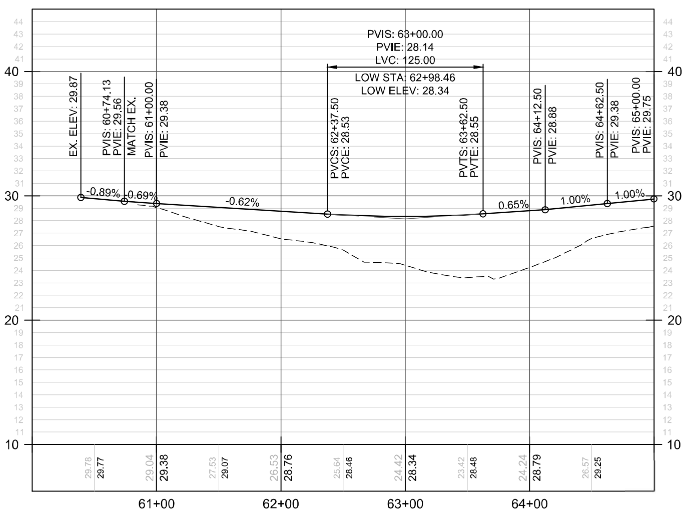
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
APPROVED

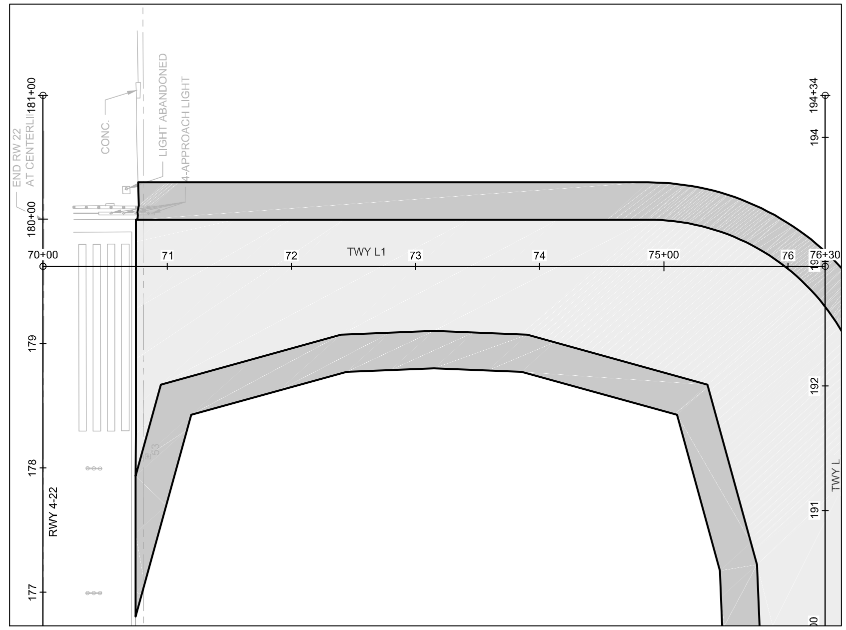
TAXIWAY L

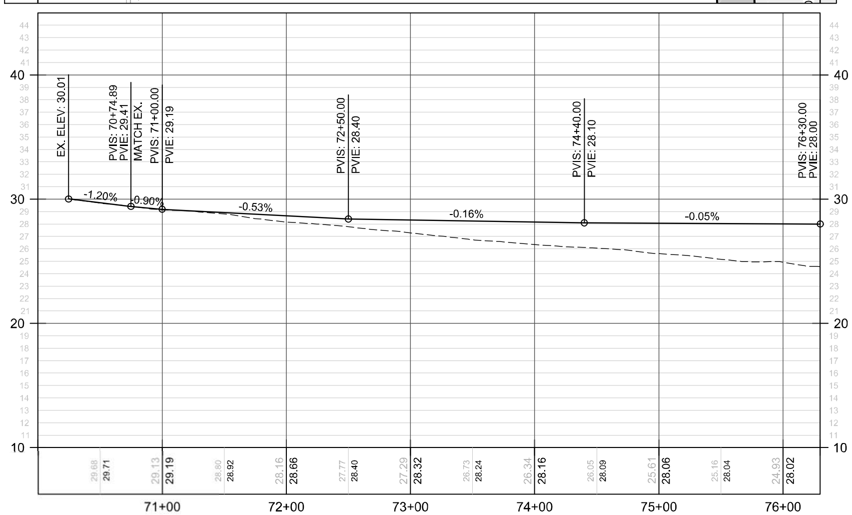
TWY L5 AND TWY D PAVING
PLAN AND PROFILE

FILE NAME: EFD-L_PAVING_SHEETS.DWG	
DATE: APRIL 30, 2021	30% ADVANCED PLANNING
DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.
SHEET	CP10



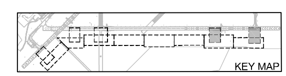






LEGEND

	20" PCCP	1/G08
	14" PCCP	1/G08
	10" PCCP	2/G08



50 0 50 100
Scale Feet

Plotted: April 30, 2021
Time: 10:16 AM
By: Nathan Kriss
Job No.:62646-PL-011

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

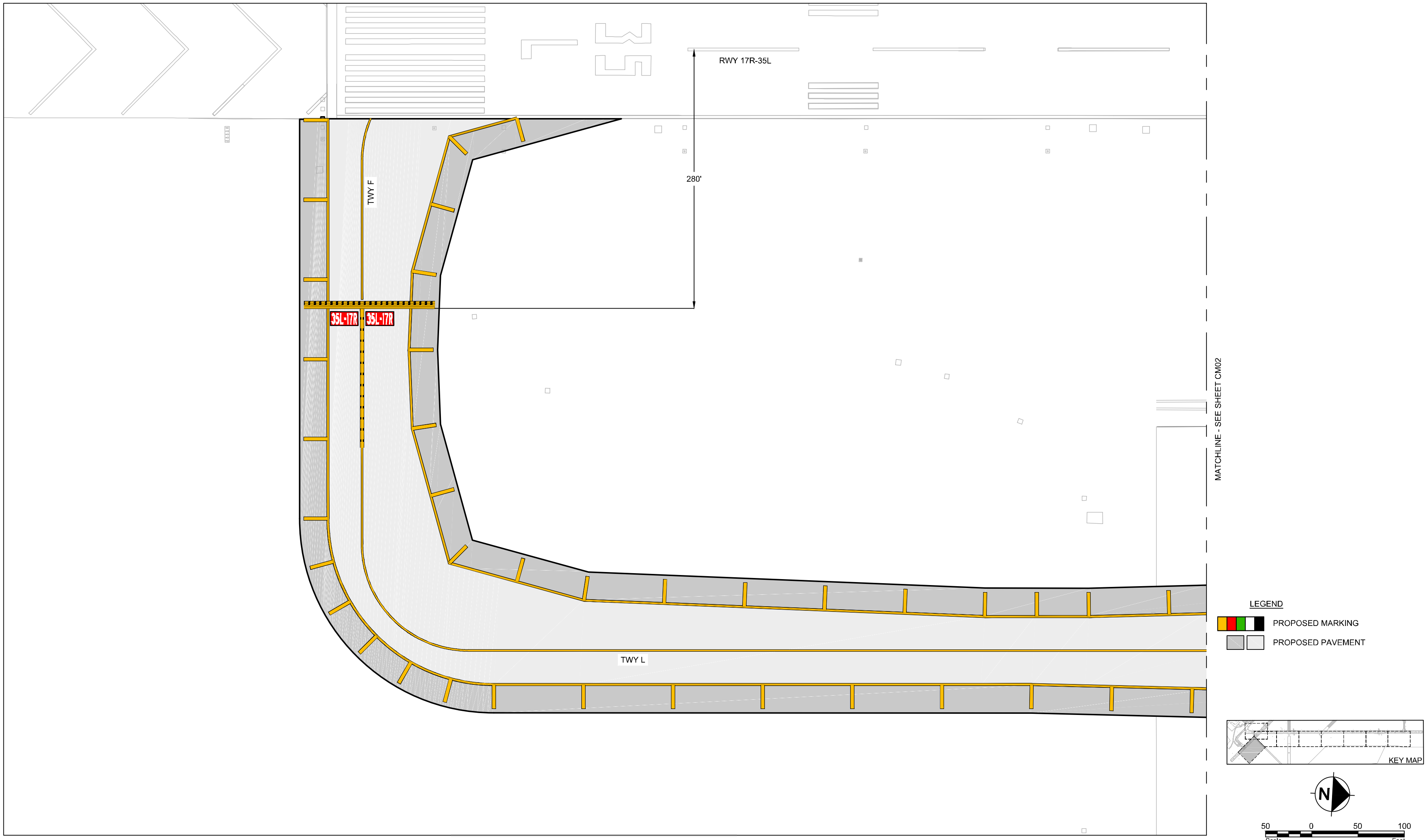
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
APPROVED

TAXIWAY L

TWY L1 AND TWY L2 PAVING
PLAN AND PROFILE

FILE NAME: EFD-L_PAVING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CP11
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

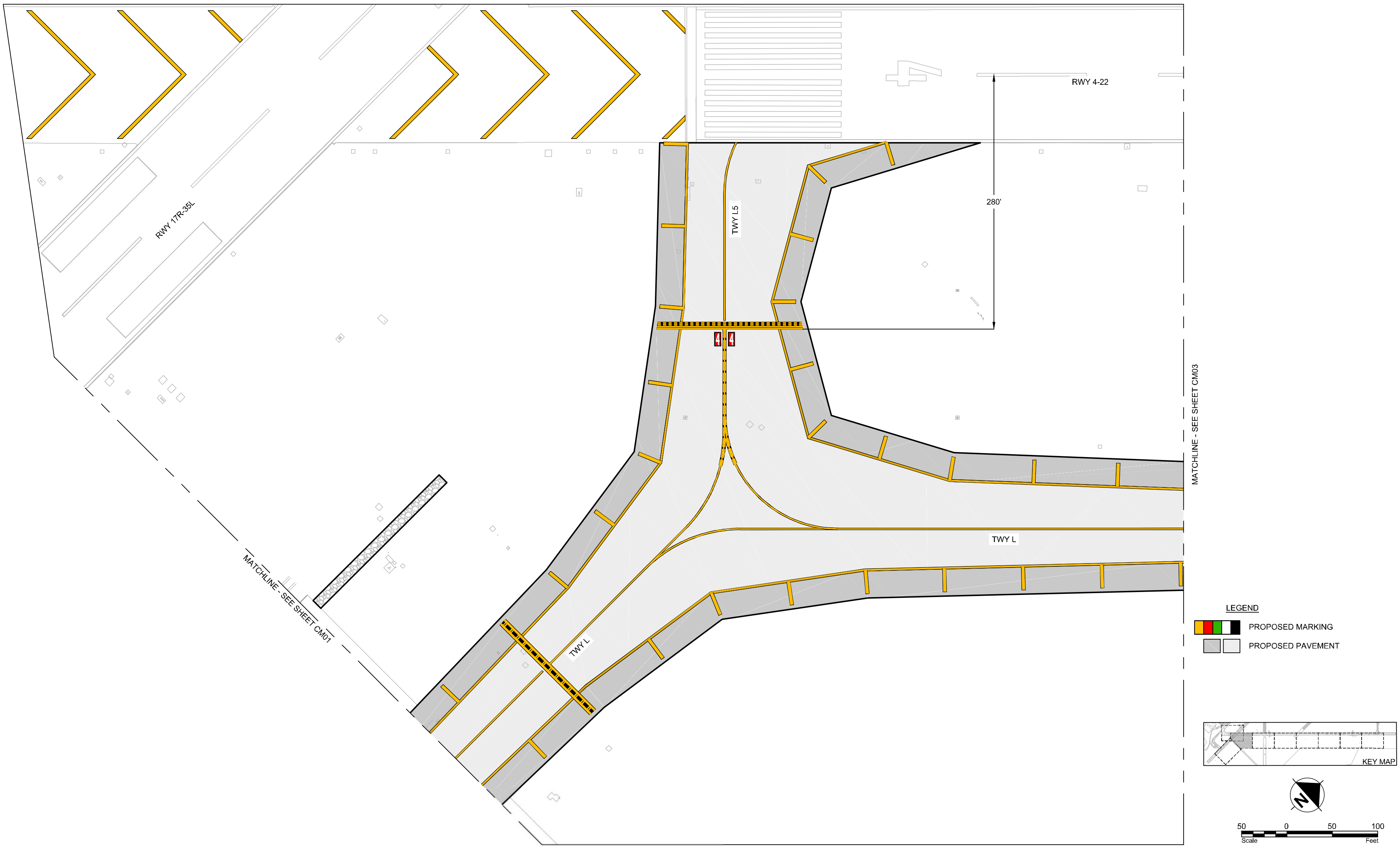
TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CM01
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

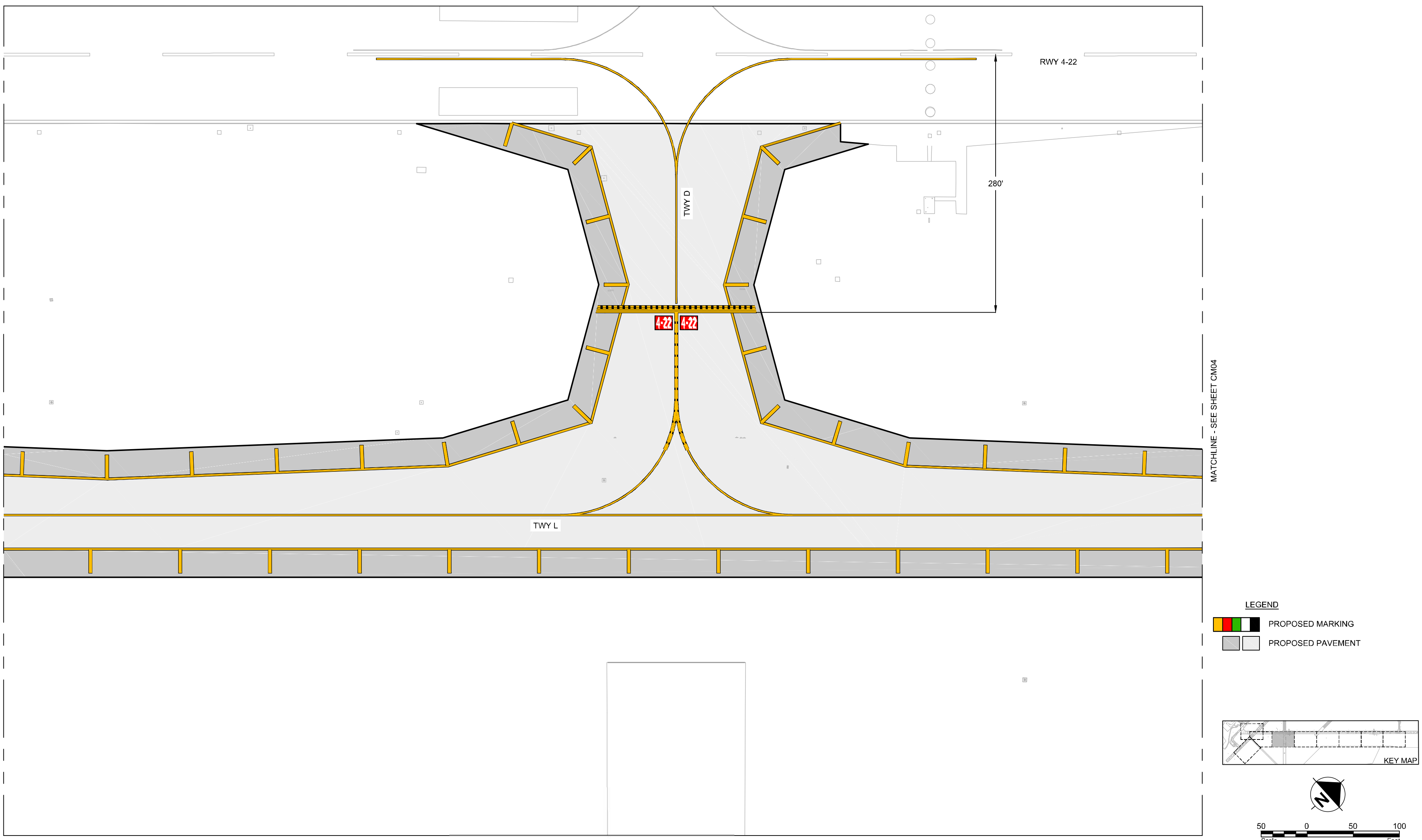
TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CM02
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
APPROVED

TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CM03
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CM04
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

MARKING PLANS

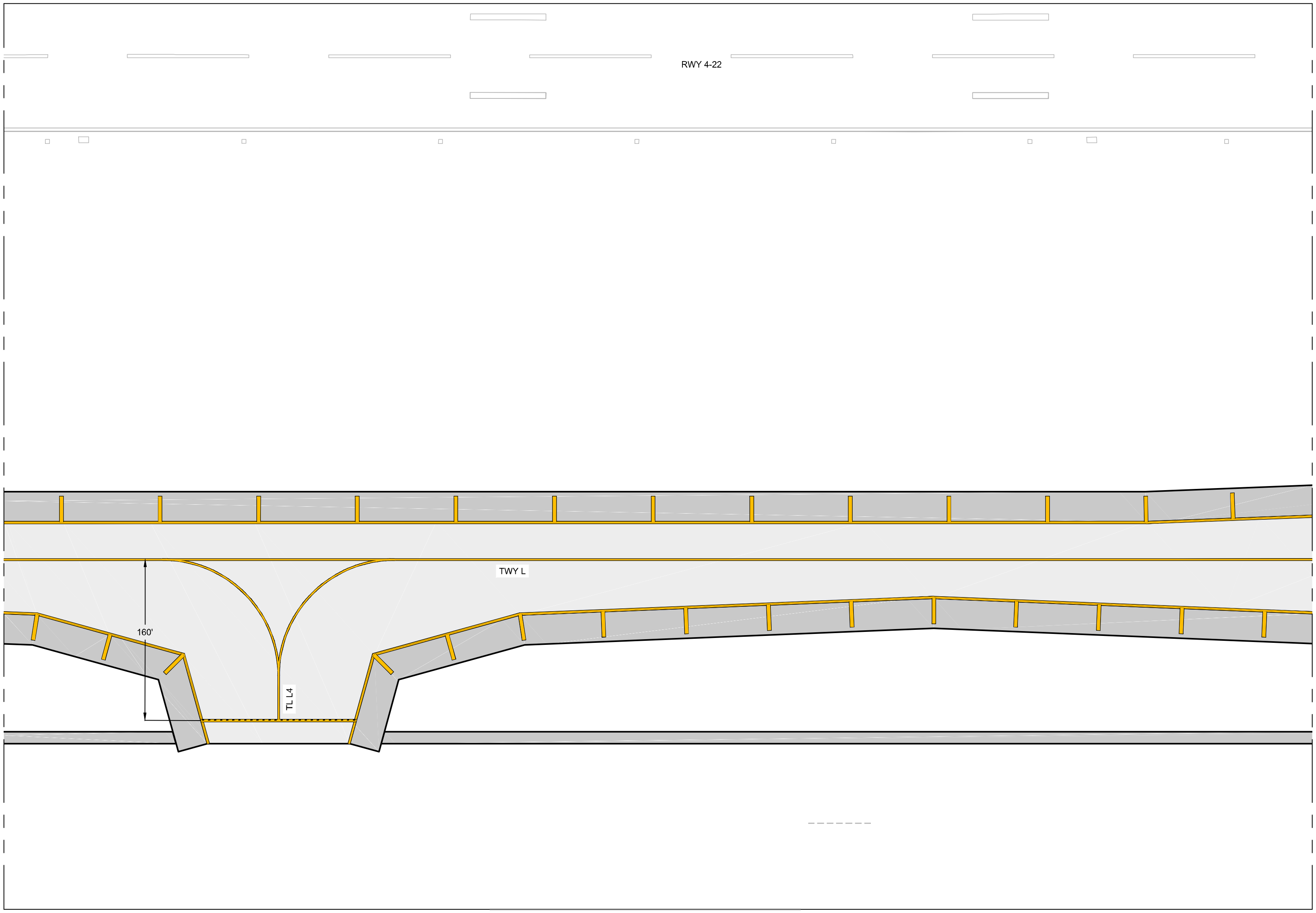
FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS
DRAWN	NICHOLAS ADRALES
CHECKED	MATT WALSH
APPROVED	RYAN SHROPSHIRE, P.E.

SHEET
CM05

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011

MATCHLINE - SEE SHEET CM05

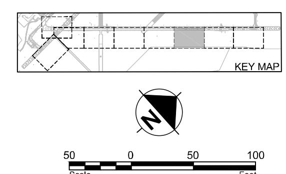


MATCHLINE - SEE SHEET CM07

LEGEND

PROPOSED MARKING

PROPOSED PAVEMENT



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127959
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

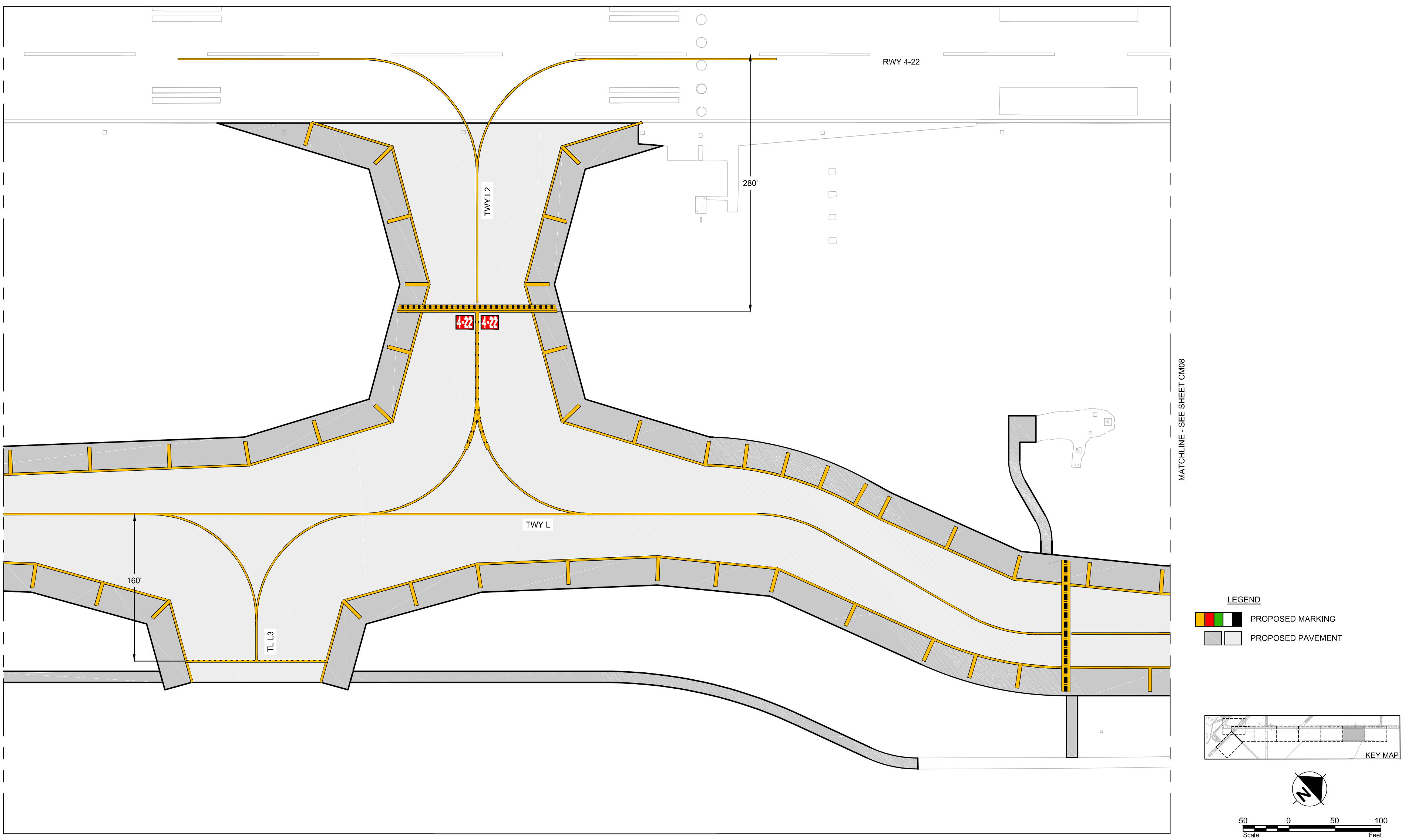
MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG

DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CM06
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011



HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

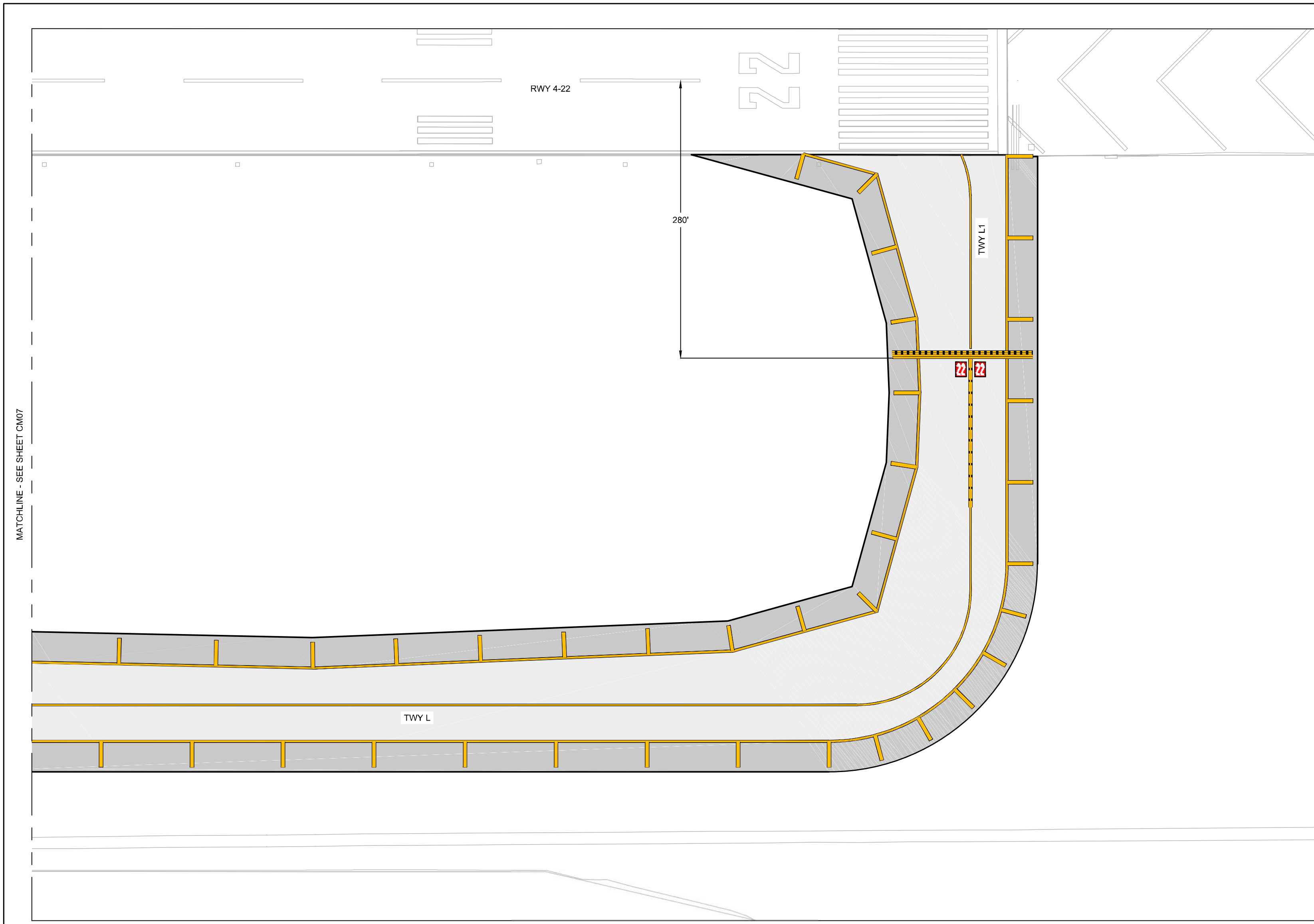
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
DATE: APRIL 30, 2021
APPROVED

TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG		
DATE: APRIL 30, 2021	30% ADVANCED PLANNING	
DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CM07
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011



LEGEND

PROPOSED MARKING

PROPOSED PAVEMENT

KEY MAP

50 0 50 100
Scale Feet

No.	Revision	Date	By	Chkd.	App'd.

HNTB
1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY

APPROVED

TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	CM08
CHECKED	MATT WALSH	
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011

HNTB

1301 Fannin Street, Suite 2000
Houston, TX 77002
Phone 346.352.5620

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES, FOR REVIEW ONLY.
***
HNTB CORPORATION
RYAN SHROPSHIRE, P.E.
REGISTRATION NO. 127969
DATE: APRIL 30, 2021
APPROVED

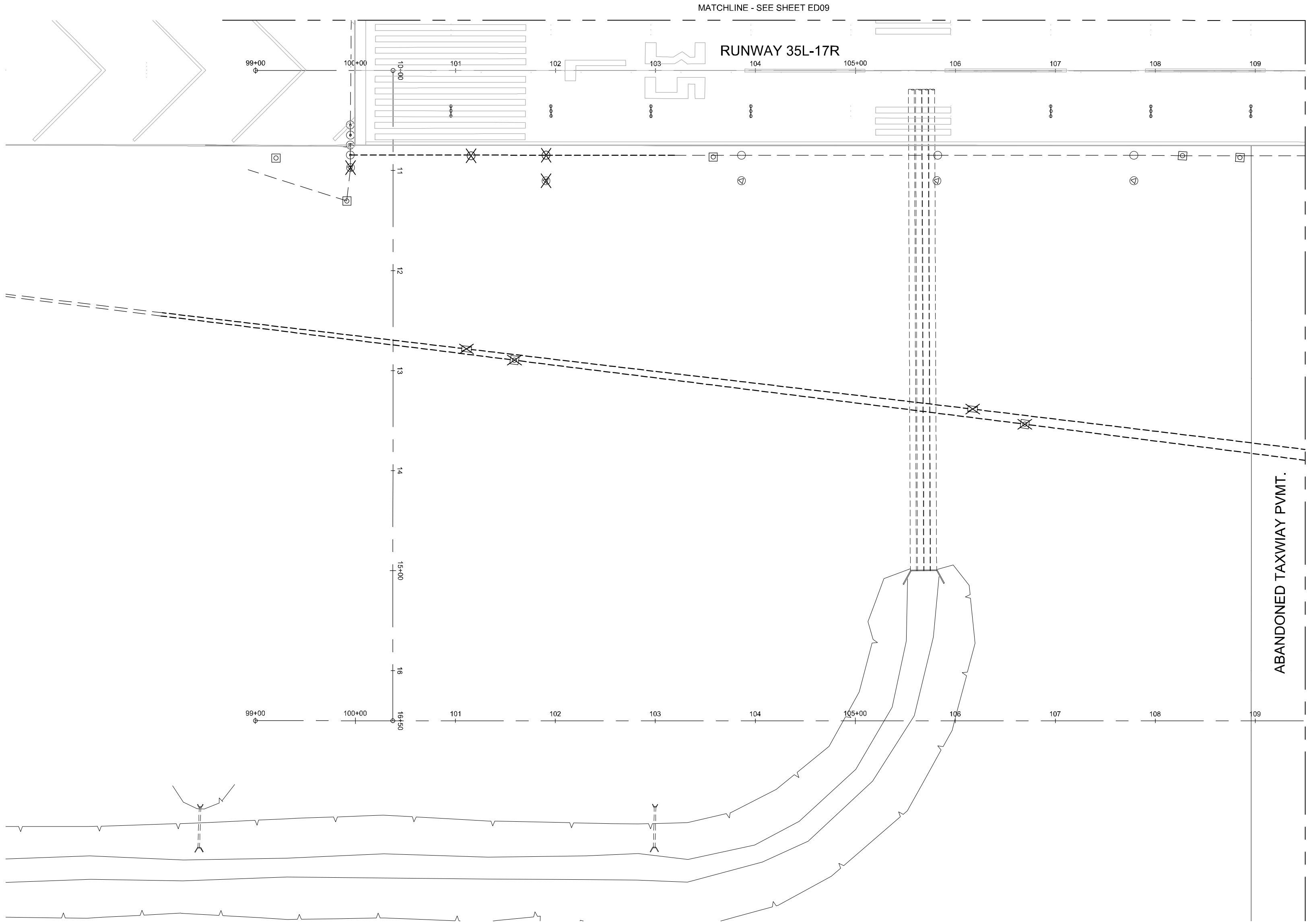
TAXIWAY L

MARKING PLANS

FILE NAME: EFD-L_MARKING_SHEETS.DWG
DATE: APRIL 30, 2021 | 30% ADVANCED PLANNING

DESIGN	SPENCER PHILLIPS	SHEET
DRAWN	NICHOLAS ADRALES	
CHECKED	MATT WALSH	CM09
APPROVED	RYAN SHROPSHIRE, P.E.	

Plotted: April 30, 2021
Time: 10:17 AM
By: Nathan Kriss
Job No.:62646-PL-011



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

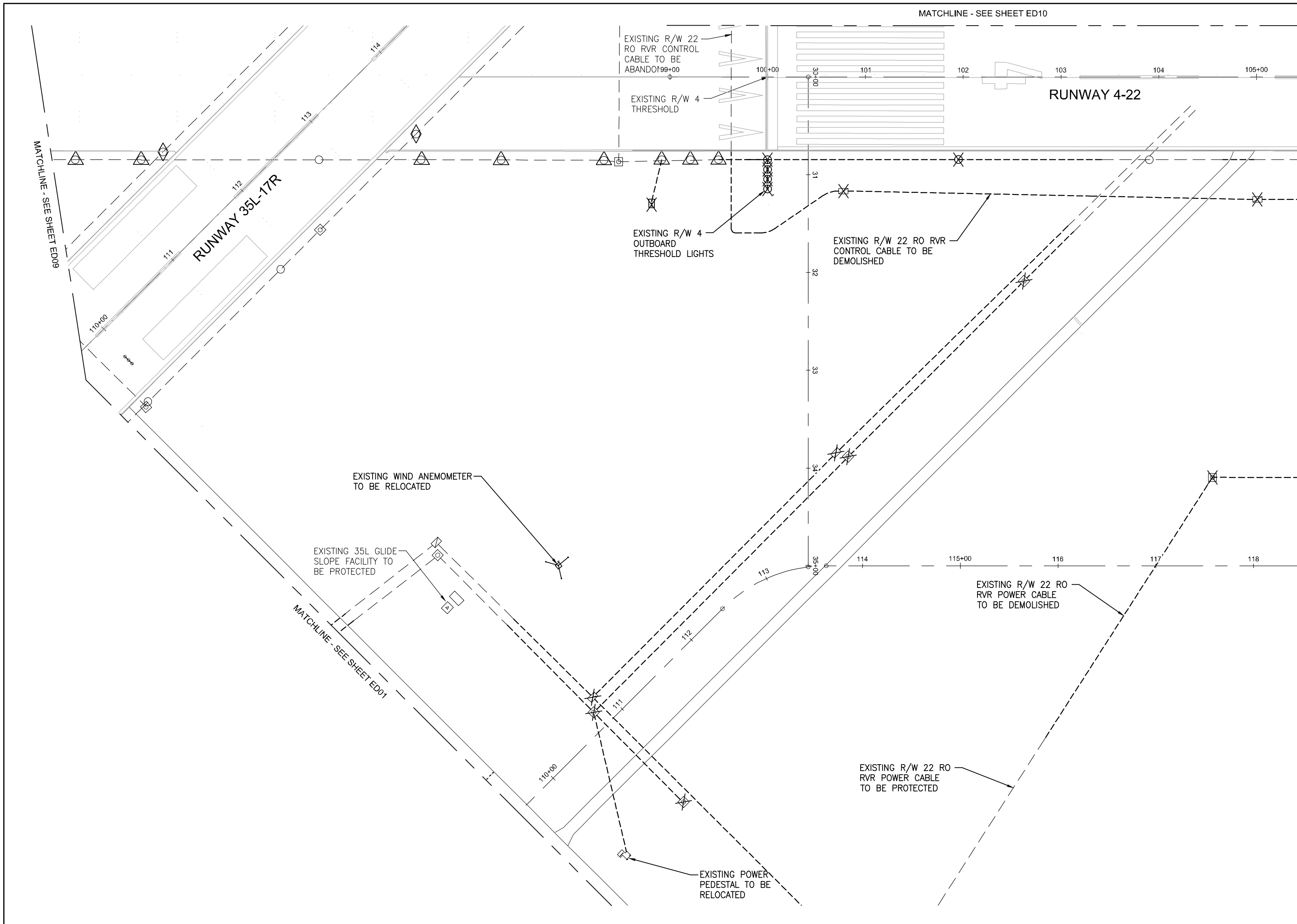
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED01
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

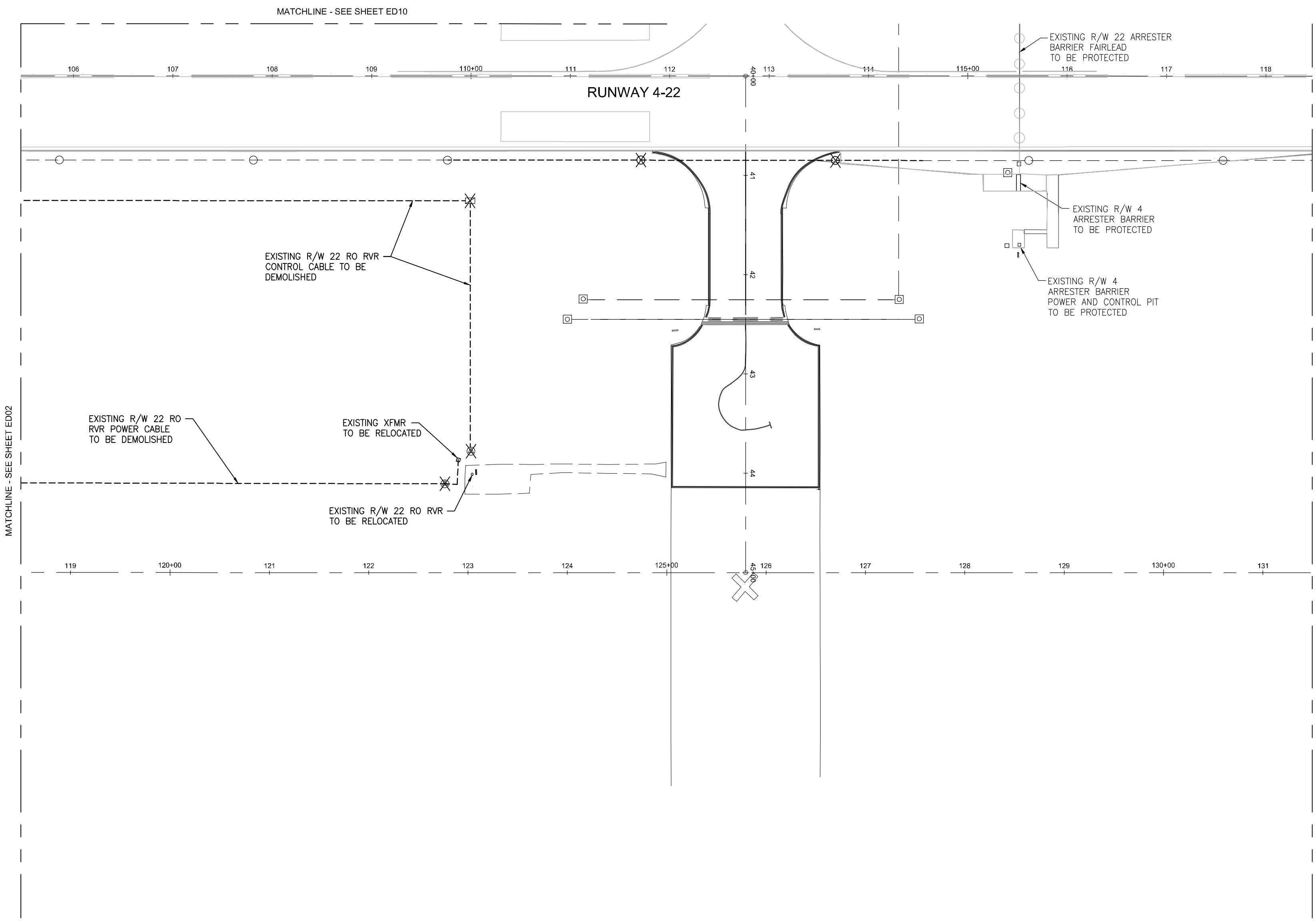
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

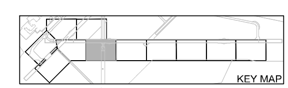
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED02
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT



50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

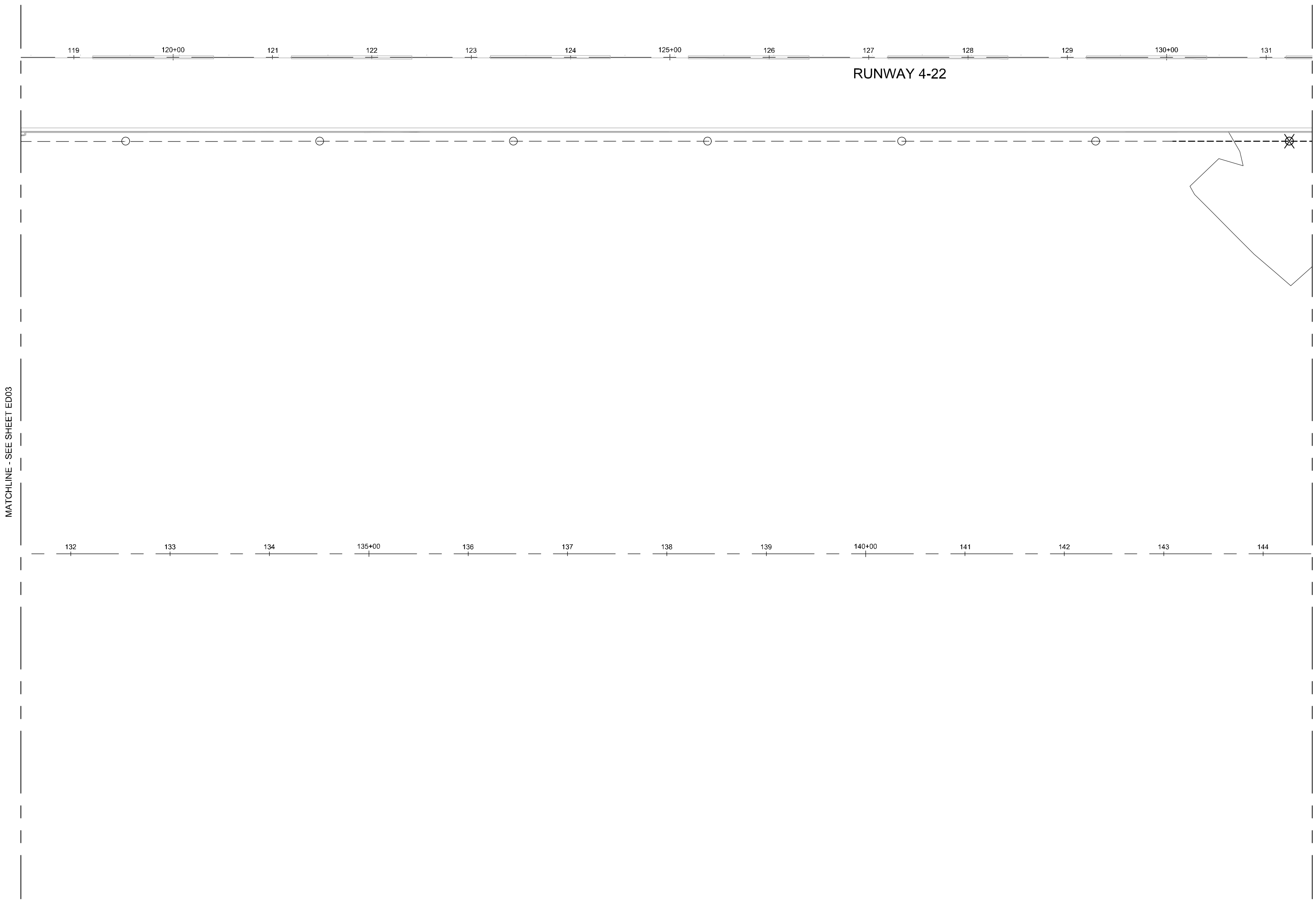
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

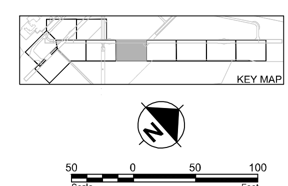
File Name: EFD-L-DEMO.DWG		
Date: APRIL 30, 2021	30% ADVANCED PLANNING	
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED03
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT



HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

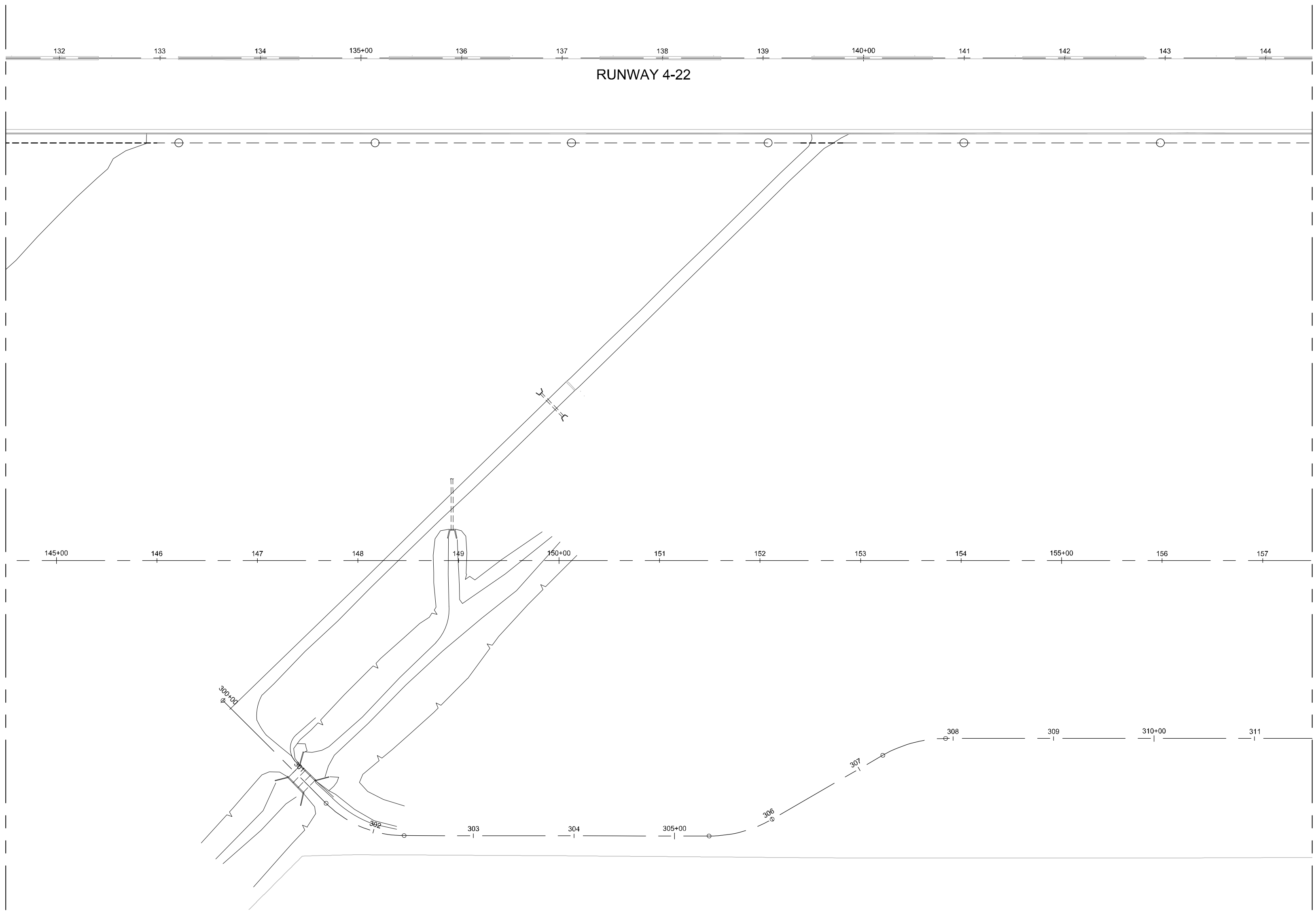
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

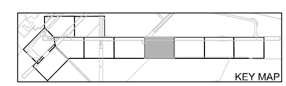
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED04
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT



50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

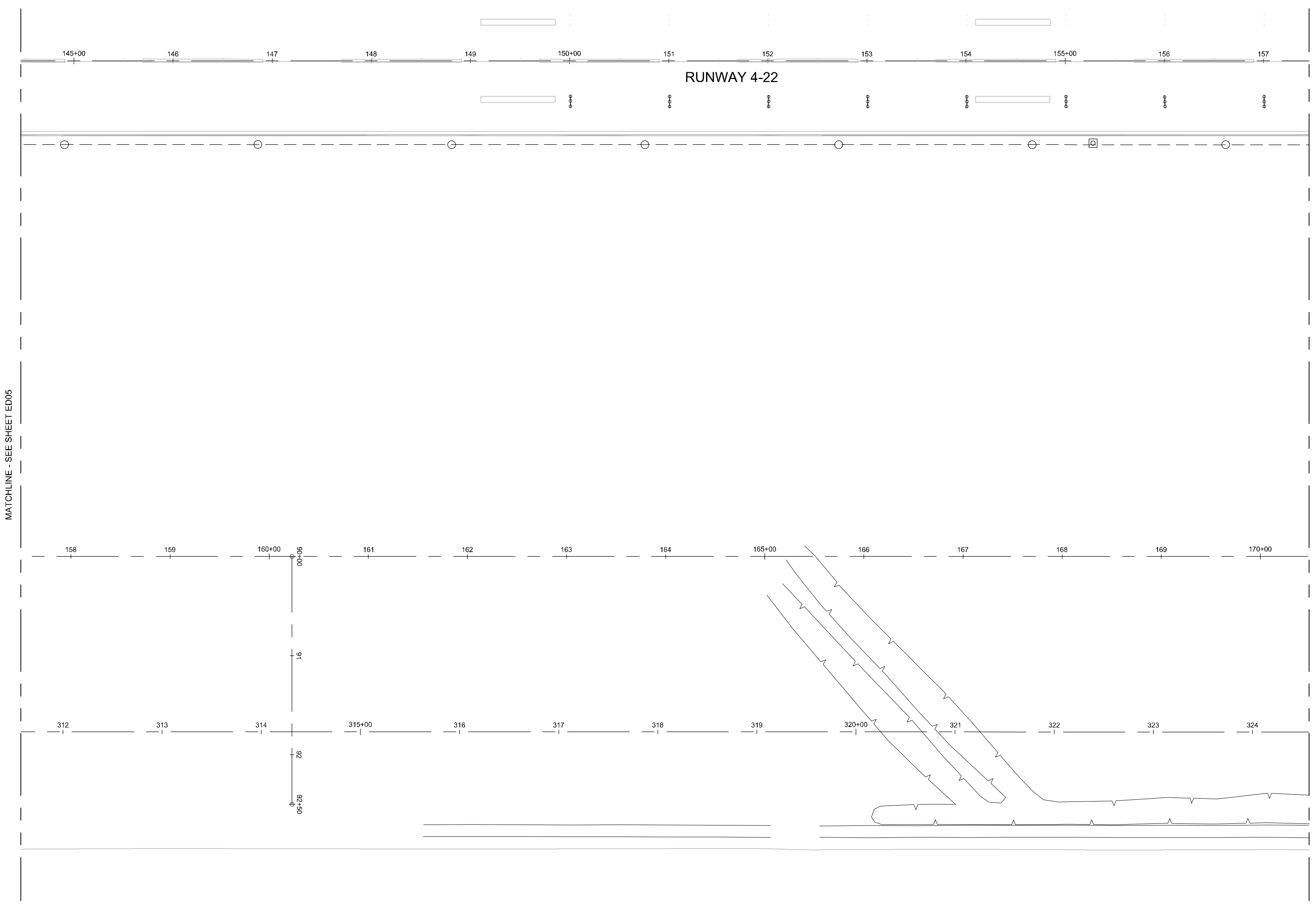
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

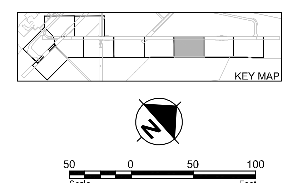
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED05
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT



HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P.O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

TAXIWAY L

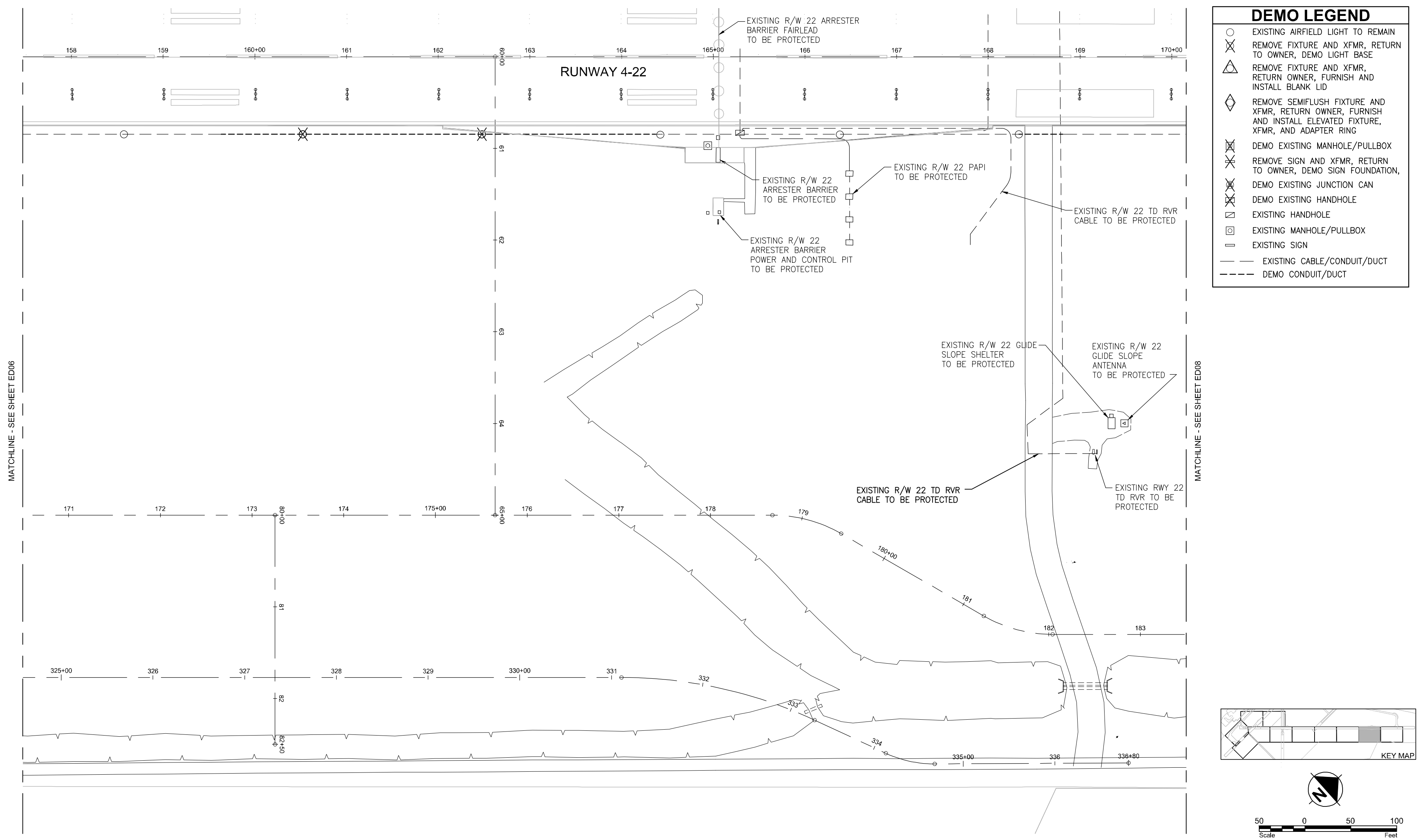
AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.
Drawn	David Flores
Checked	Adam Pilarcik
Approved	Matt Szabo, P.E.

SHEET
ED06

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:----



DEMO LEGEND

Symbol	Description
○	EXISTING AIRFIELD LIGHT TO REMAIN
	REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
△	REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
◇	REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
	DEMO EXISTING MANHOLE/PULLBOX
	REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
	DEMO EXISTING JUNCTION CAN
	DEMO EXISTING HANDHOLE
	EXISTING HANDHOLE
	EXISTING MANHOLE/PULLBOX
	EXISTING SIGN
— —	EXISTING CABLE/CONDUIT/DUCT
- - -	DEMO CONDUIT/DUCT

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

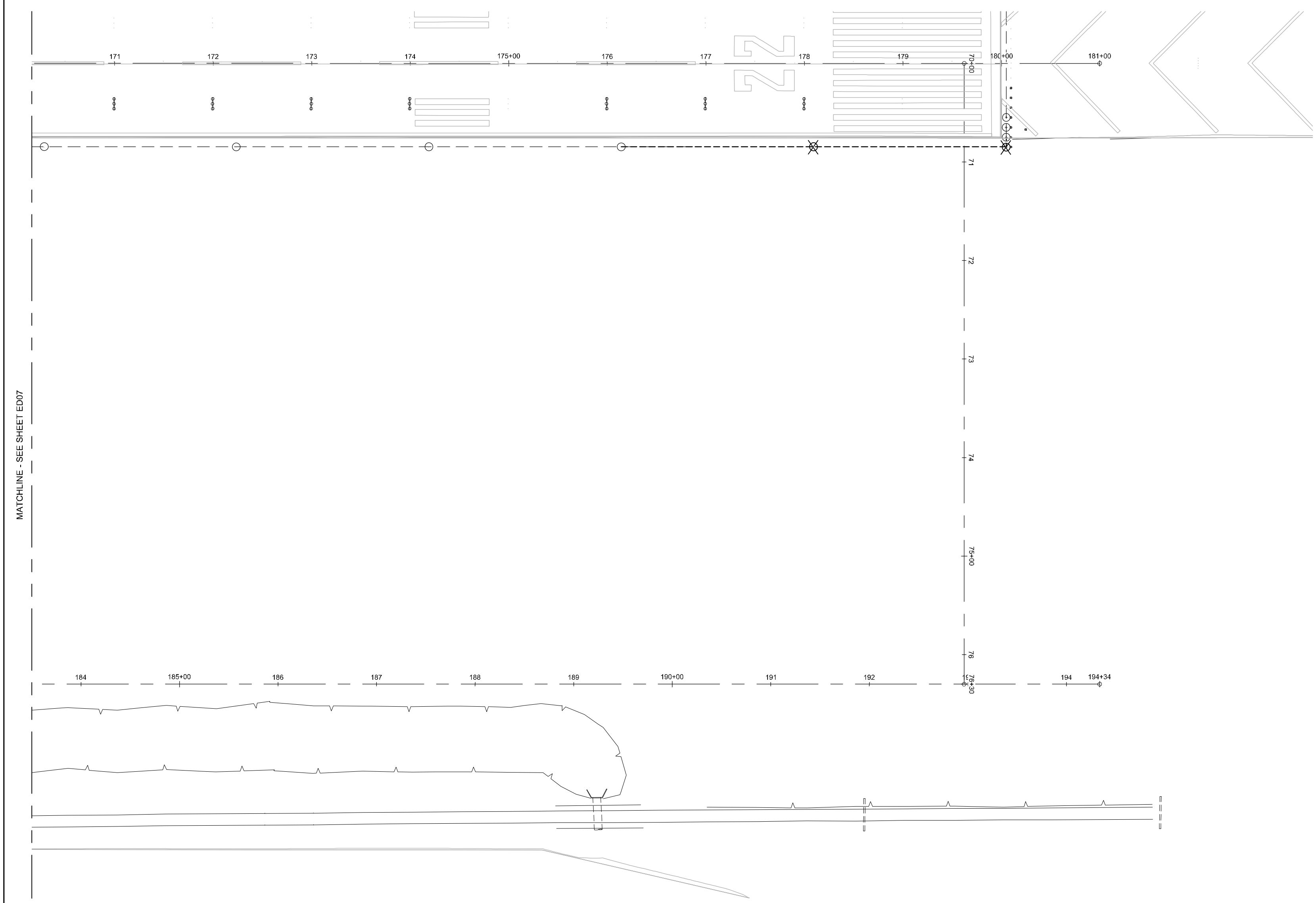
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG	
Date: APRIL 30, 2021	30% ADVANCED PLANNING
Design	Matt Szabo, P.E.
Drawn	David Flores
Checked	Adam Pilarcik
Approved	Matt Szabo, P.E.

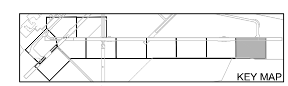
SHEET
ED07

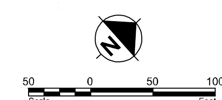
Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT





HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P.O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

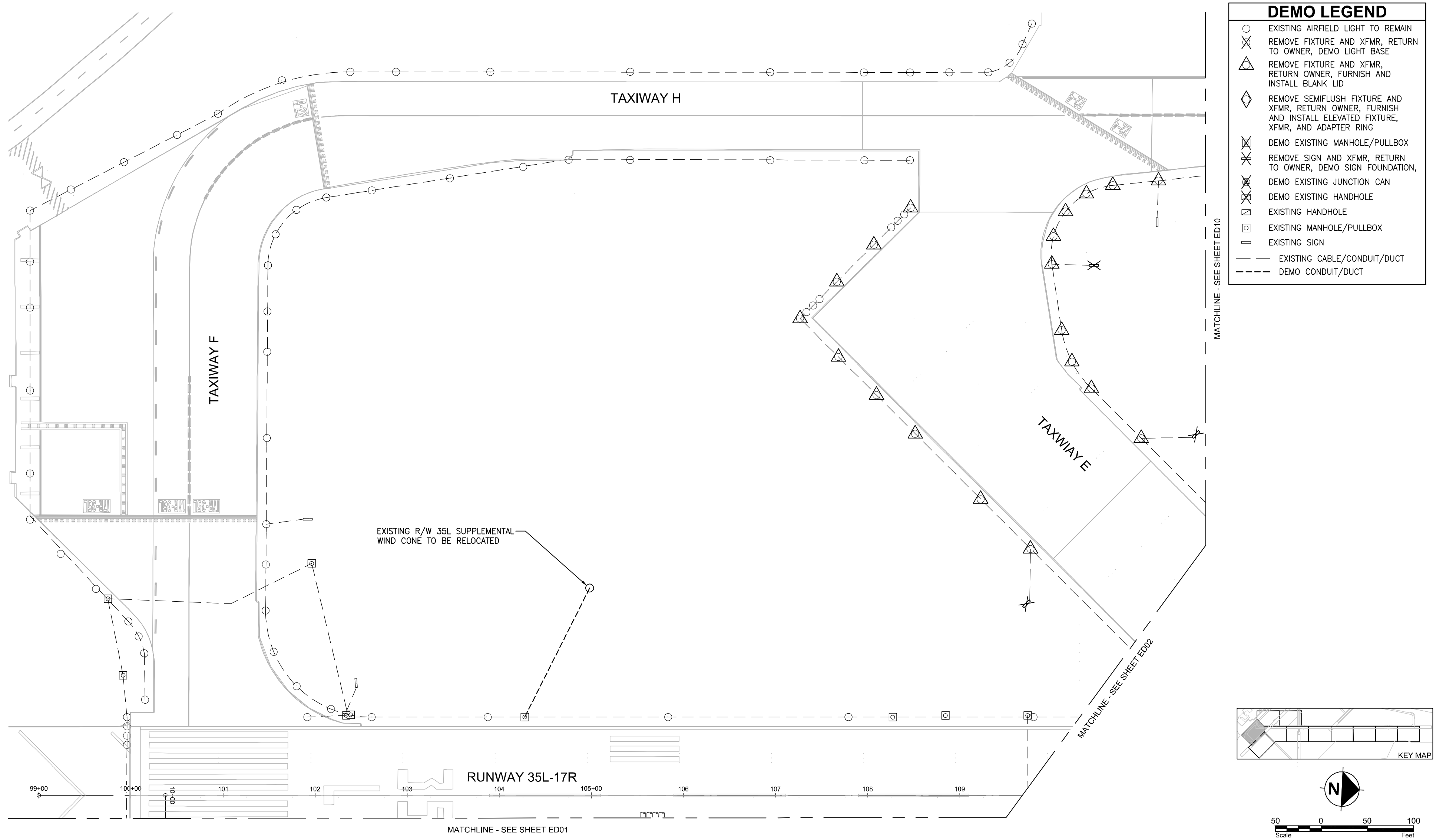
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED08
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

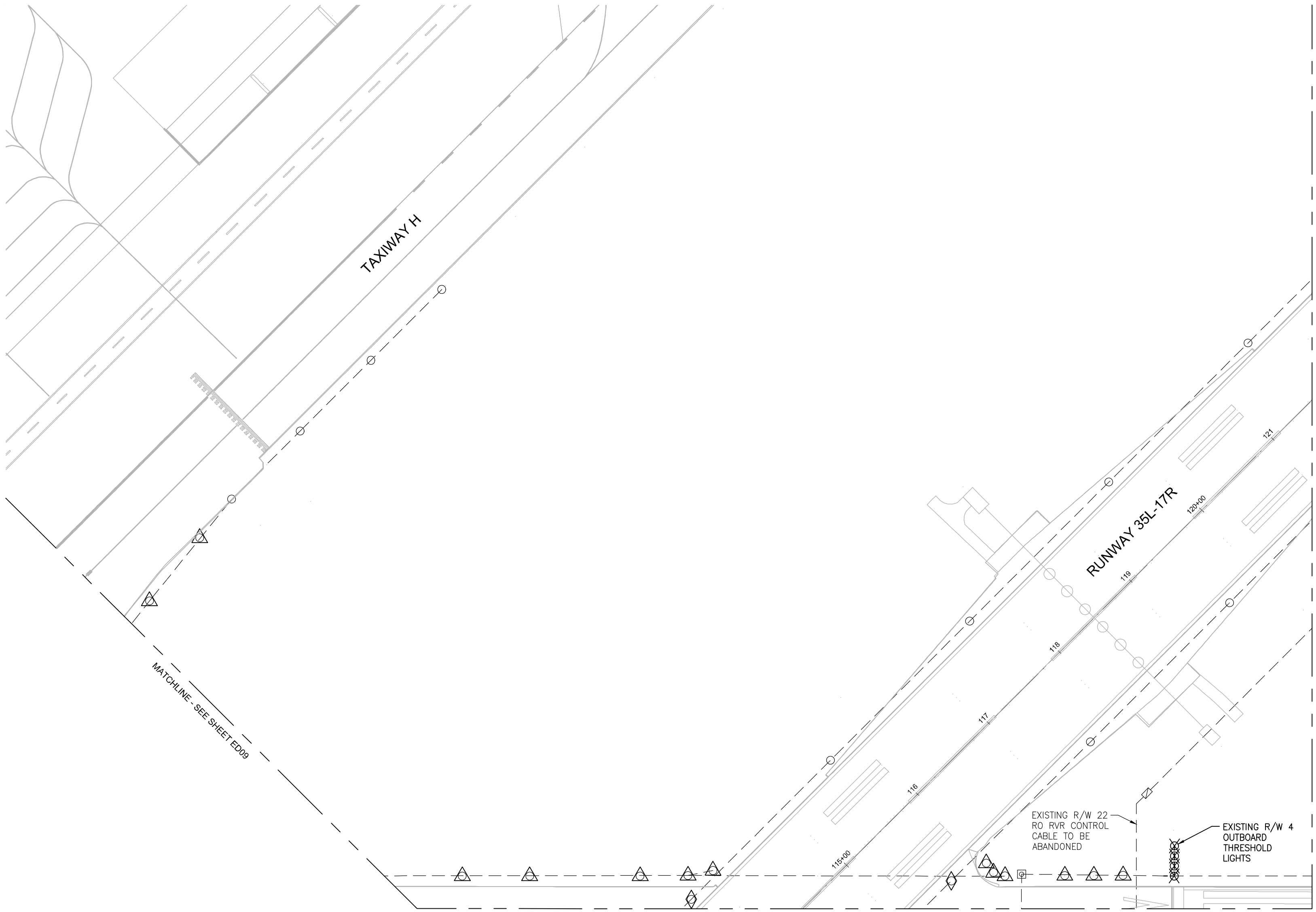
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021
30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED09
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



DEMO LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- REMOVE FIXTURE AND XFMR, RETURN TO OWNER, DEMO LIGHT BASE
- REMOVE FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL BLANK LID
- REMOVE SEMIFLUSH FIXTURE AND XFMR, RETURN OWNER, FURNISH AND INSTALL ELEVATED FIXTURE, XFMR, AND ADAPTER RING
- DEMO EXISTING MANHOLE/PULLBOX
- REMOVE SIGN AND XFMR, RETURN TO OWNER, DEMO SIGN FOUNDATION,
- DEMO EXISTING JUNCTION CAN
- DEMO EXISTING HANDHOLE
- EXISTING HANDHOLE
- EXISTING MANHOLE/PULLBOX
- EXISTING SIGN
- EXISTING CABLE/CONDUIT/DUCT
- DEMO CONDUIT/DUCT

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

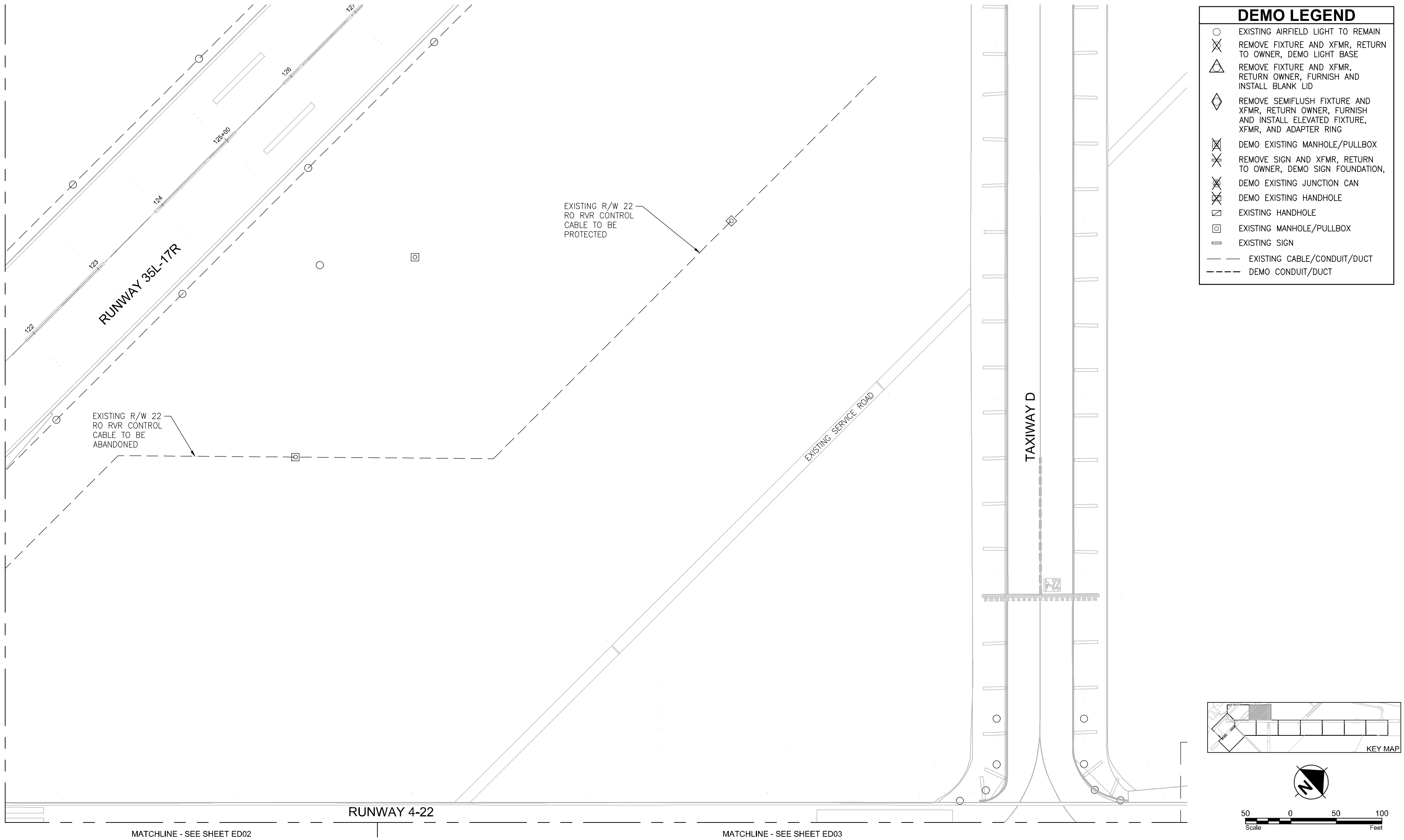
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED10
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

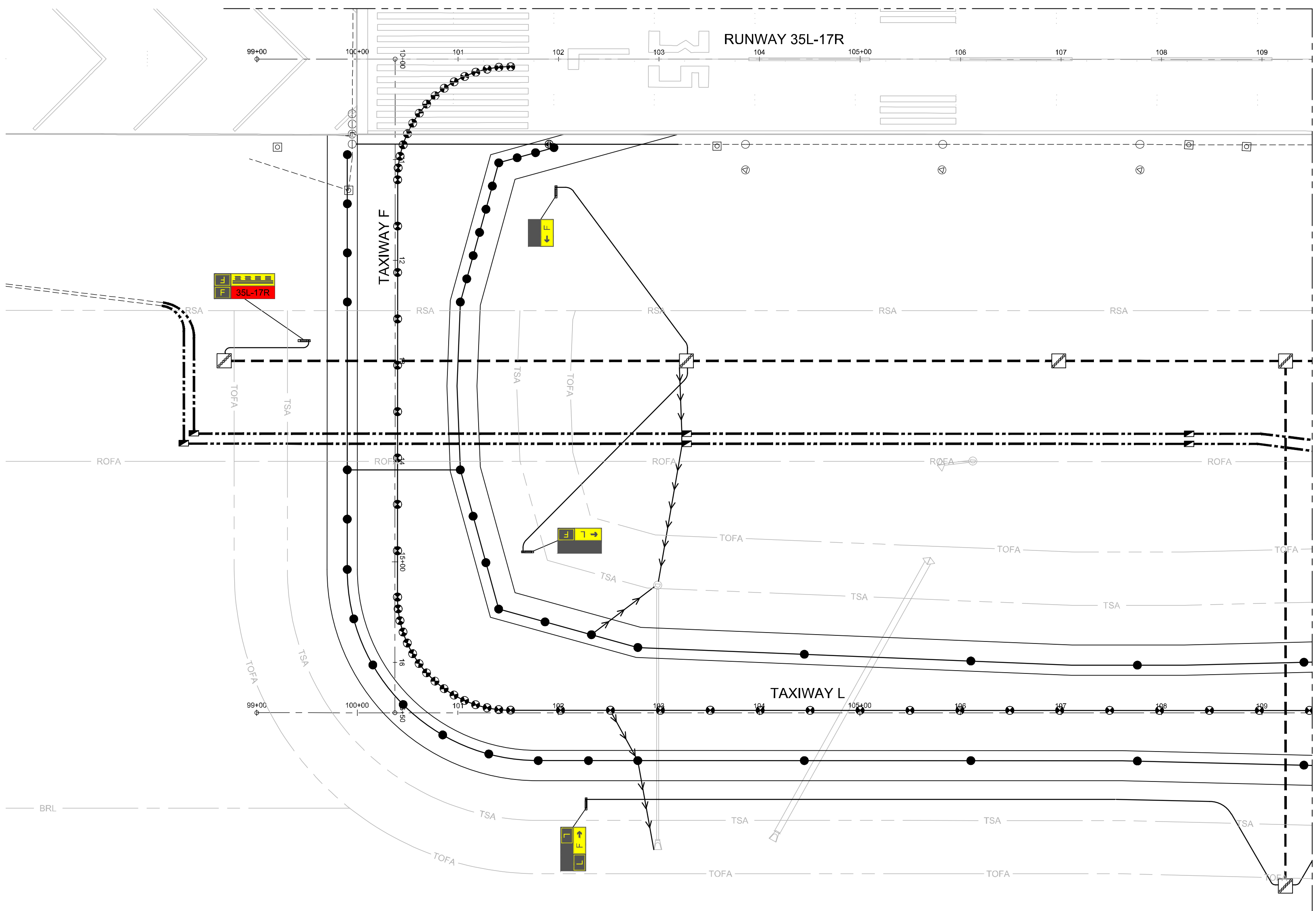
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID DEMOLITION PLANS

File Name: EFD-L-DEMO.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	ED11
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:28 PM
By: Matt Szabo
Job No.:-----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

TAXIWAY L

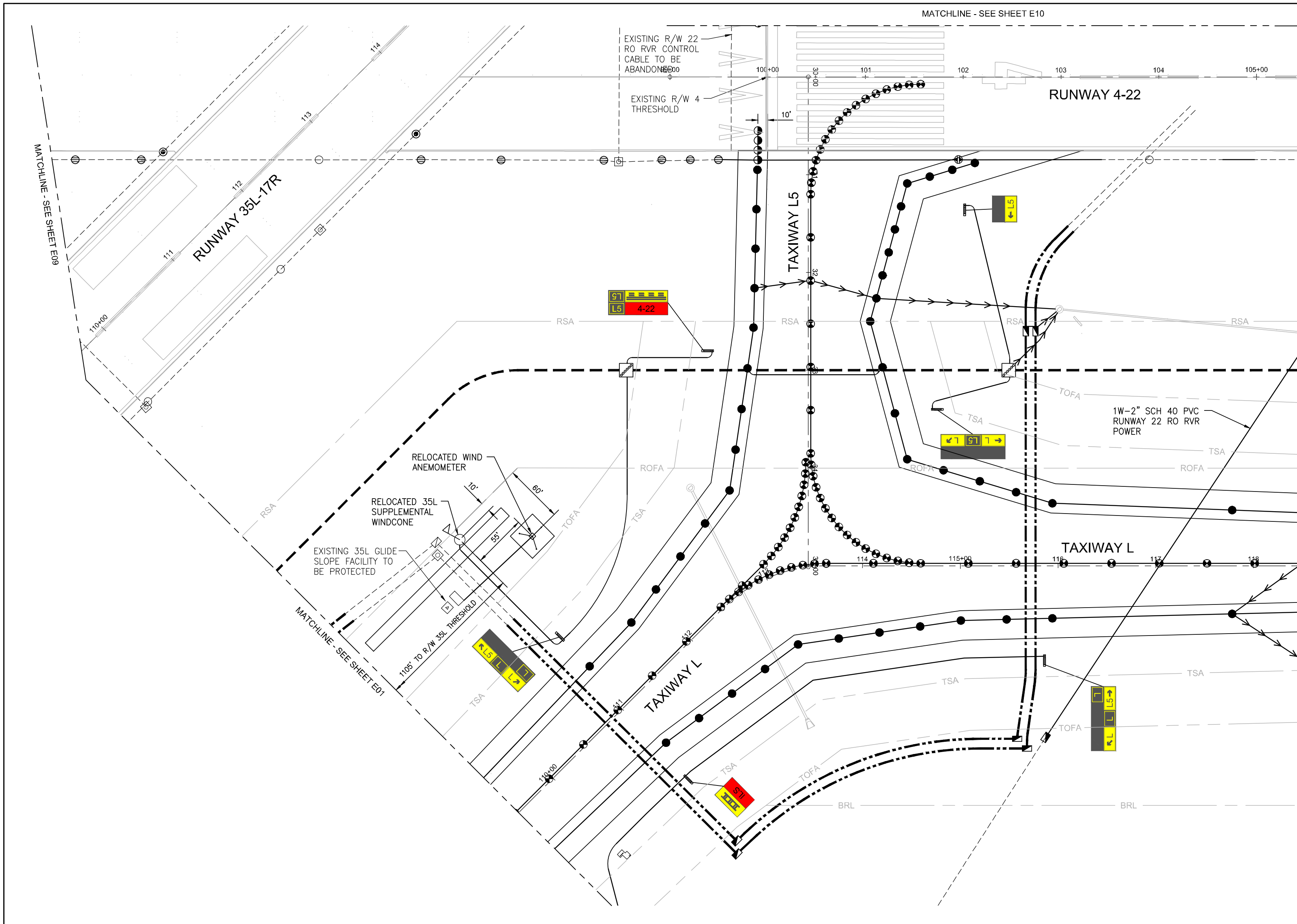
AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021
30% ADVANCED PLANNING

Design	Matt Szabo, P.E.
Drawn	David Flores
Checked	Adam Pilarcik
Approved	Matt Szabo, P.E.

SHEET
E01

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:-----



LEGEND

○	EXISTING AIRFIELD LIGHT TO REMAIN
	RUNWAY EDGE LIGHT (ELEVATED)
	RUNWAY EDGE LIGHT (SEMIFLUSH)
	RUNWAY THRESHOLD LIGHT (ELEVATED)
●	TAXIWAY EDGE LIGHT (ELEVATED)
	TAXIWAY EDGE LIGHT (SEMIFLUSH)
	TAXIWAY CENTERLINE BI-DIRECTIONAL
	TAXIWAY CENTERLINE OMNI-DIRECTIONAL
	L-867 BLANK LID ON EXISTING BASE
	JUNCTION CAN PLAZA (6 CAN)
	EXISTING MANHOLE/PULLBOX
	MANHOLE/PULLBOX
	JUNCTION CAN
	2'x3' PULLBOX
	LIGHTED SIGN
	EXISTING CONDUIT/DUCT
	6W-2" DUCT BANK
	2W-4" DUCT BANK
	1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
	2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED

KEY MAP

50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceinc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

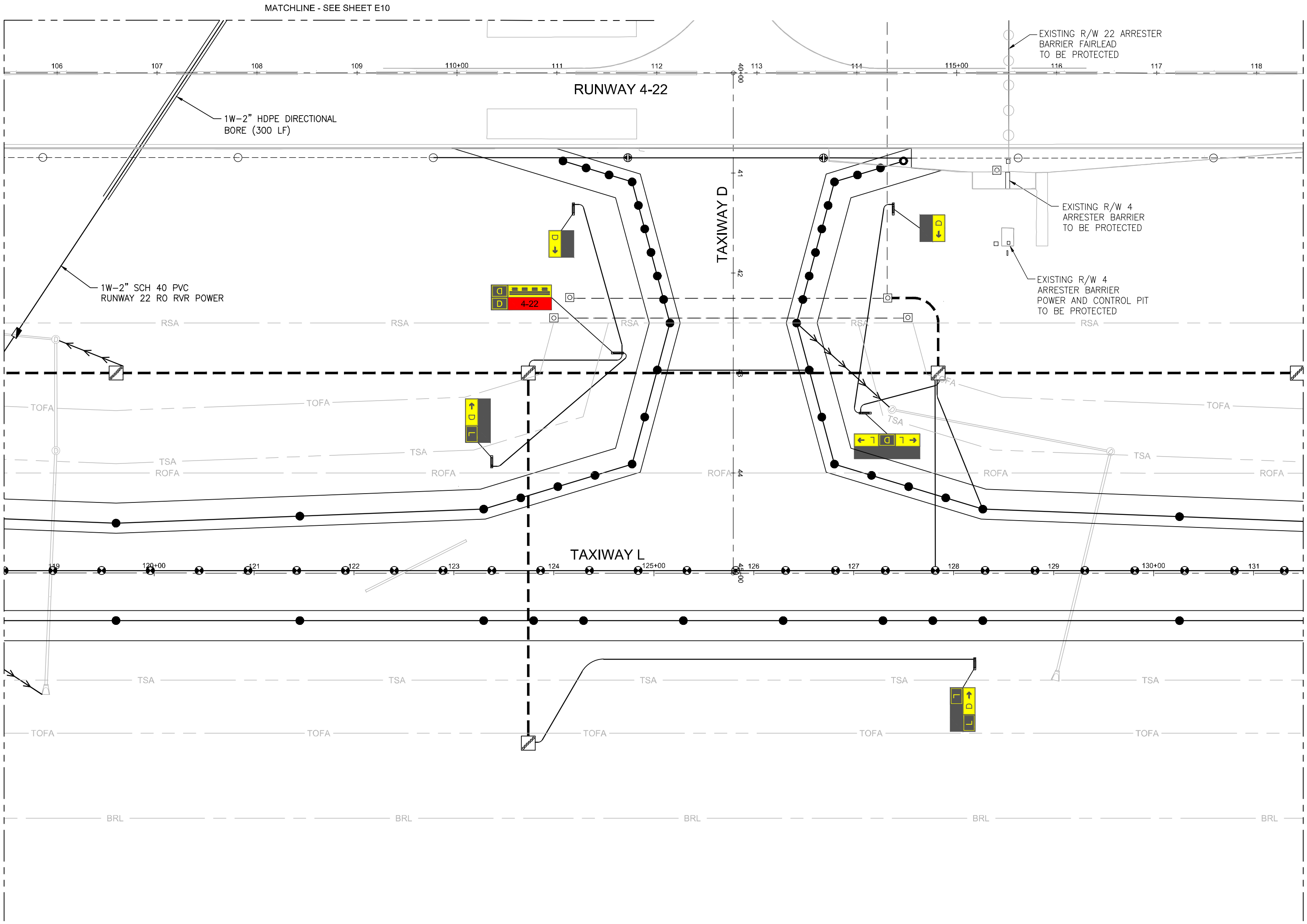
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name:	EFD-L-PROP.DWG
Date: APRIL 30, 2021	30% ADVANCED PLANNING
Design	Matt Szabo, P.E.
Drawn	David Flores
Checked	Adam Pilarcik
Approved	Matt Szabo, P.E.

SHEET
E02

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:-----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

TAXIWAY L

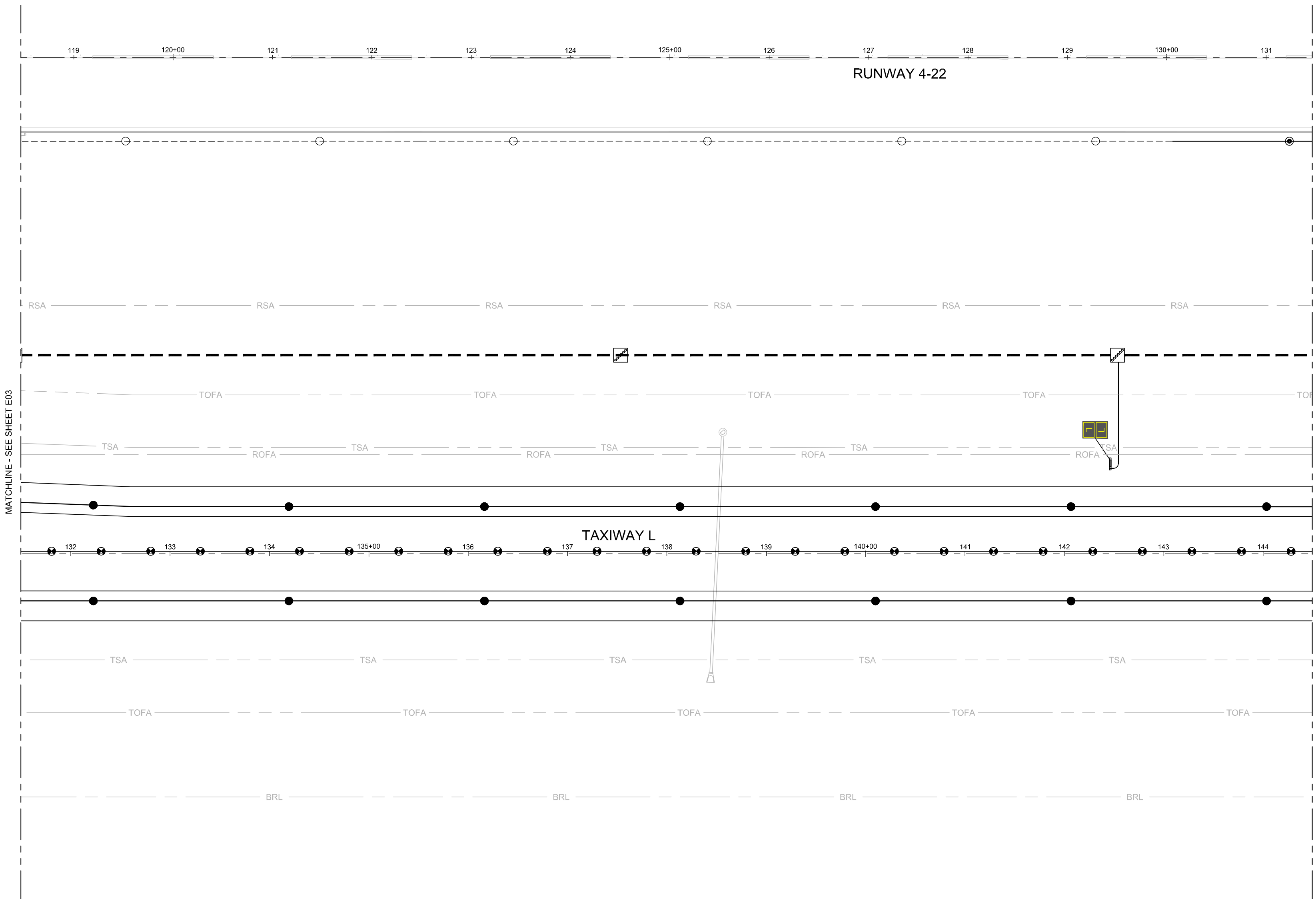
AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021
30% ADVANCED PLANNING

Design	Matt Szabo, P.E.
Drawn	David Flores
Checked	Adam Pilarcik
Approved	Matt Szabo, P.E.

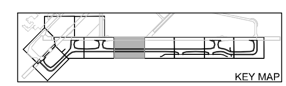
SHEET
E03

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:-----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED



50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

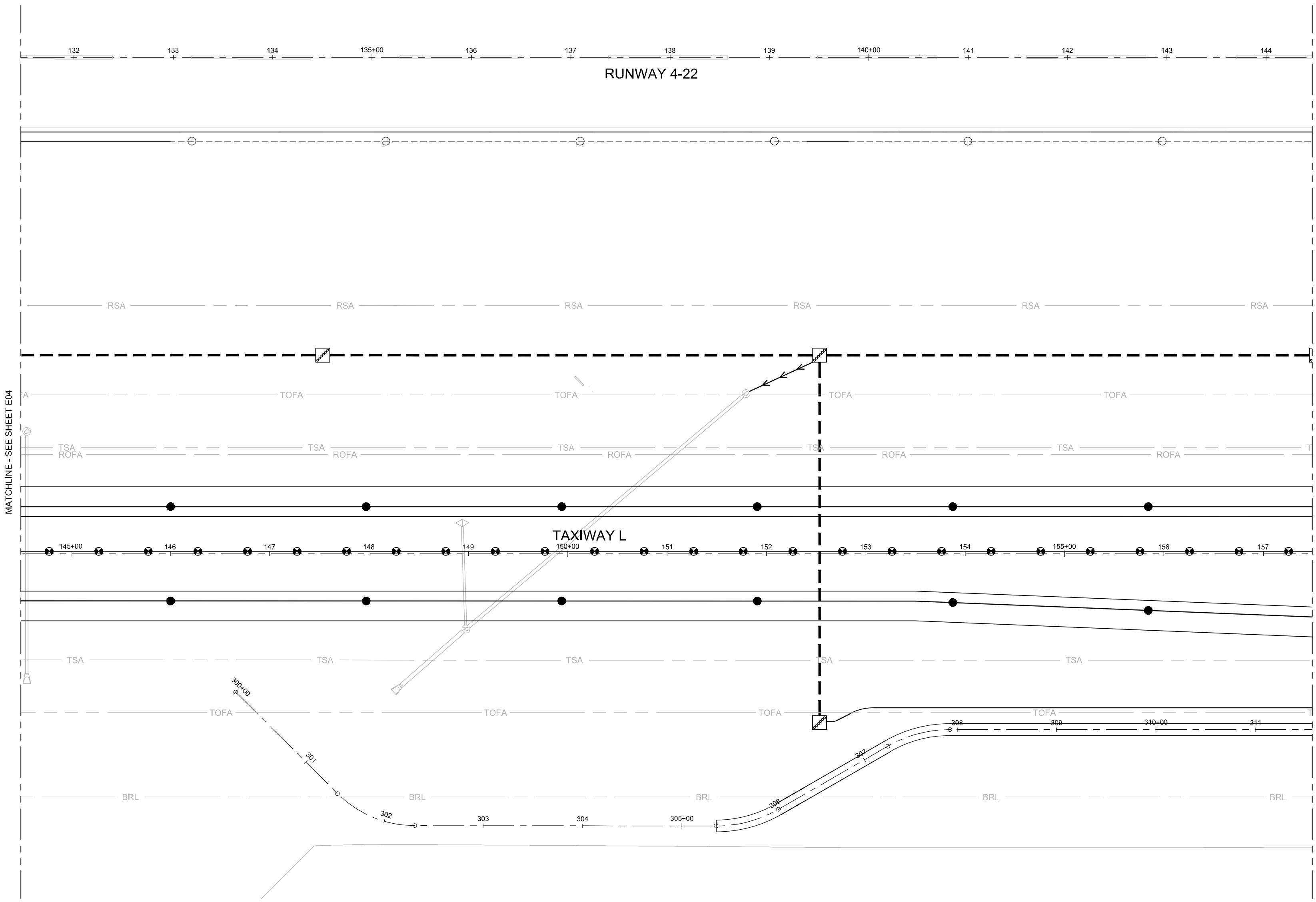
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

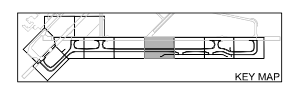
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E04
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

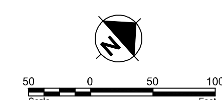
Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:-----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI–DIRECTIONAL
- TAXIWAY CENTERLINE OMNI–DIRECTIONAL
- L–867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W–2" DUCT BANK
- 2W–4" DUCT BANK
- 1W–2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED





HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

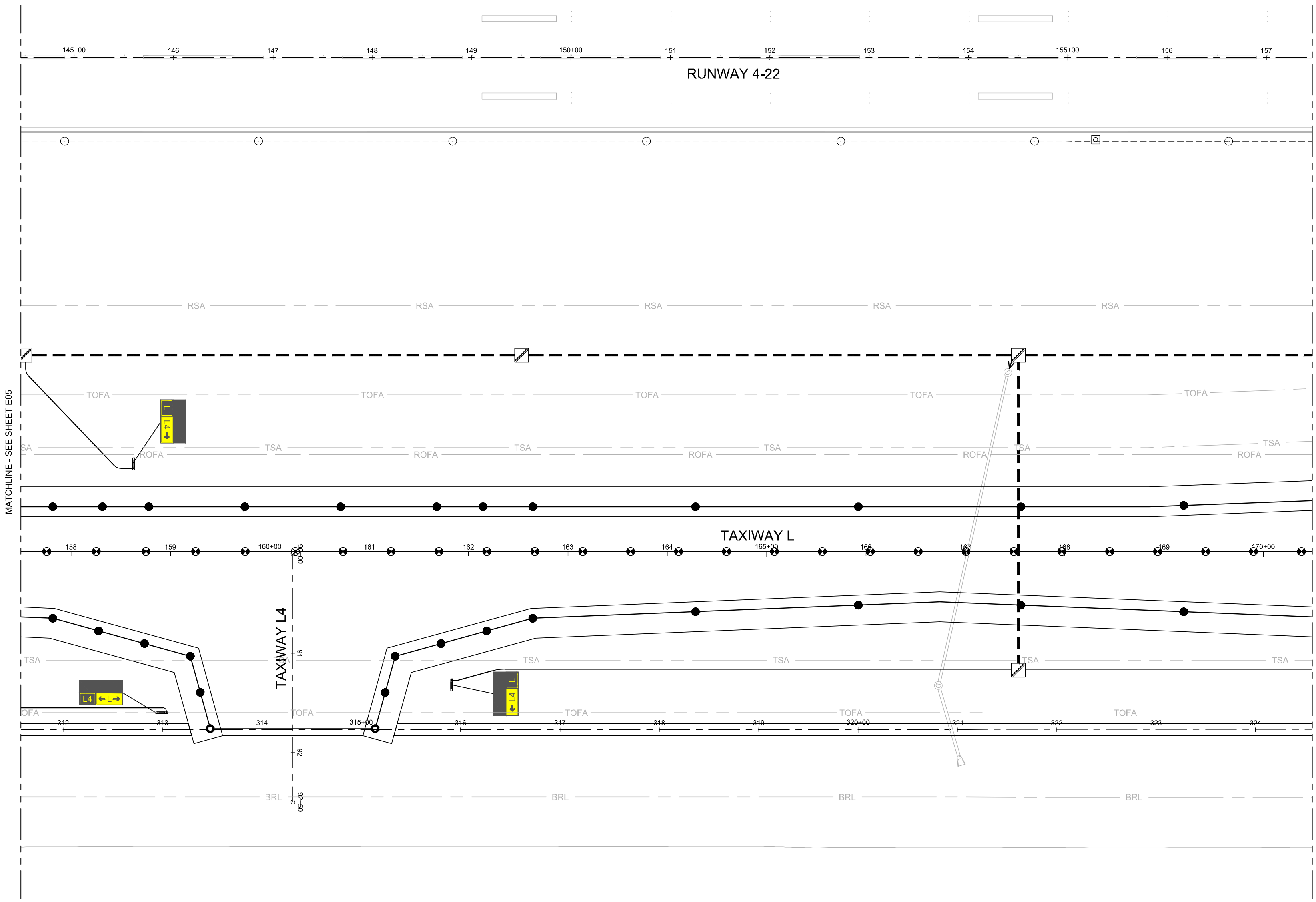
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 — 30% ADVANCED PLANNING

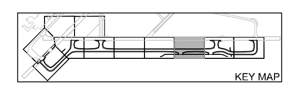
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E05
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED



50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceinc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

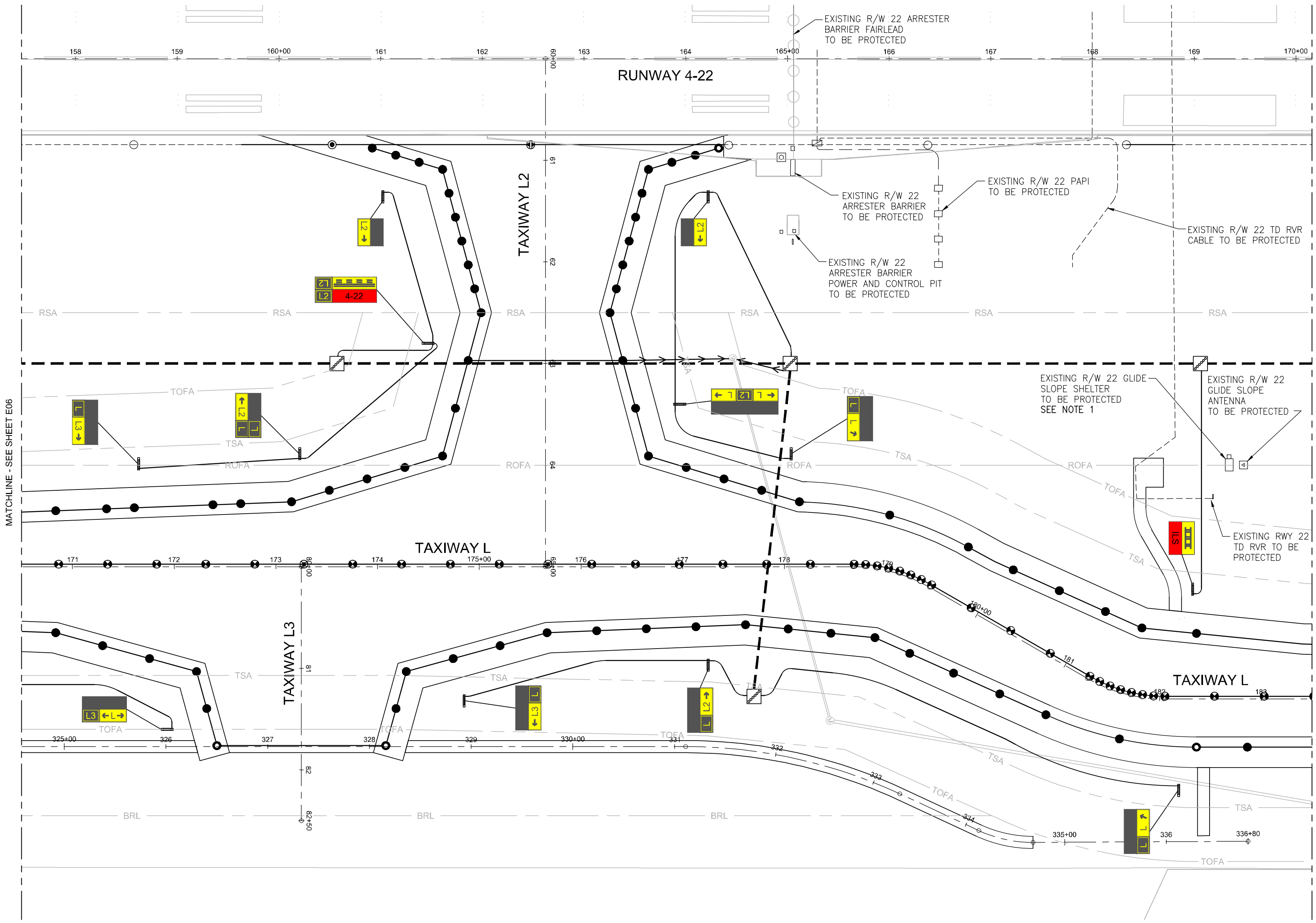
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E06
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI–DIRECTIONAL
- TAXIWAY CENTERLINE OMNI–DIRECTIONAL
- L–867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W–2" DUCT BANK
- 2W–4" DUCT BANK
- 1W–2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED

NOTES:

1. THE EXISTING RUNWAY 22 GLIDE SLOPE SHELTER IS BEING UPGRADED BY FAA AS PART OF A SEPARATE PROJECT (THE ILS HURRICANE RESILIENCY PROJECT). THESE IMPROVEMENTS SHOULD BE INCORPORATED INTO THE FINAL DESIGN OF THIS PROJECT TO CORRECTLY REFLECT EXISTING CONDITIONS, AS THE ILS HURRICANE RESILIENCY PROJECT IS TO START CONSTRUCTION IN THE NEAR FUTURE.

KEY MAP

Scale 50 0 50 100 Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 82776
DATE: 04/30/2021
APPROVED

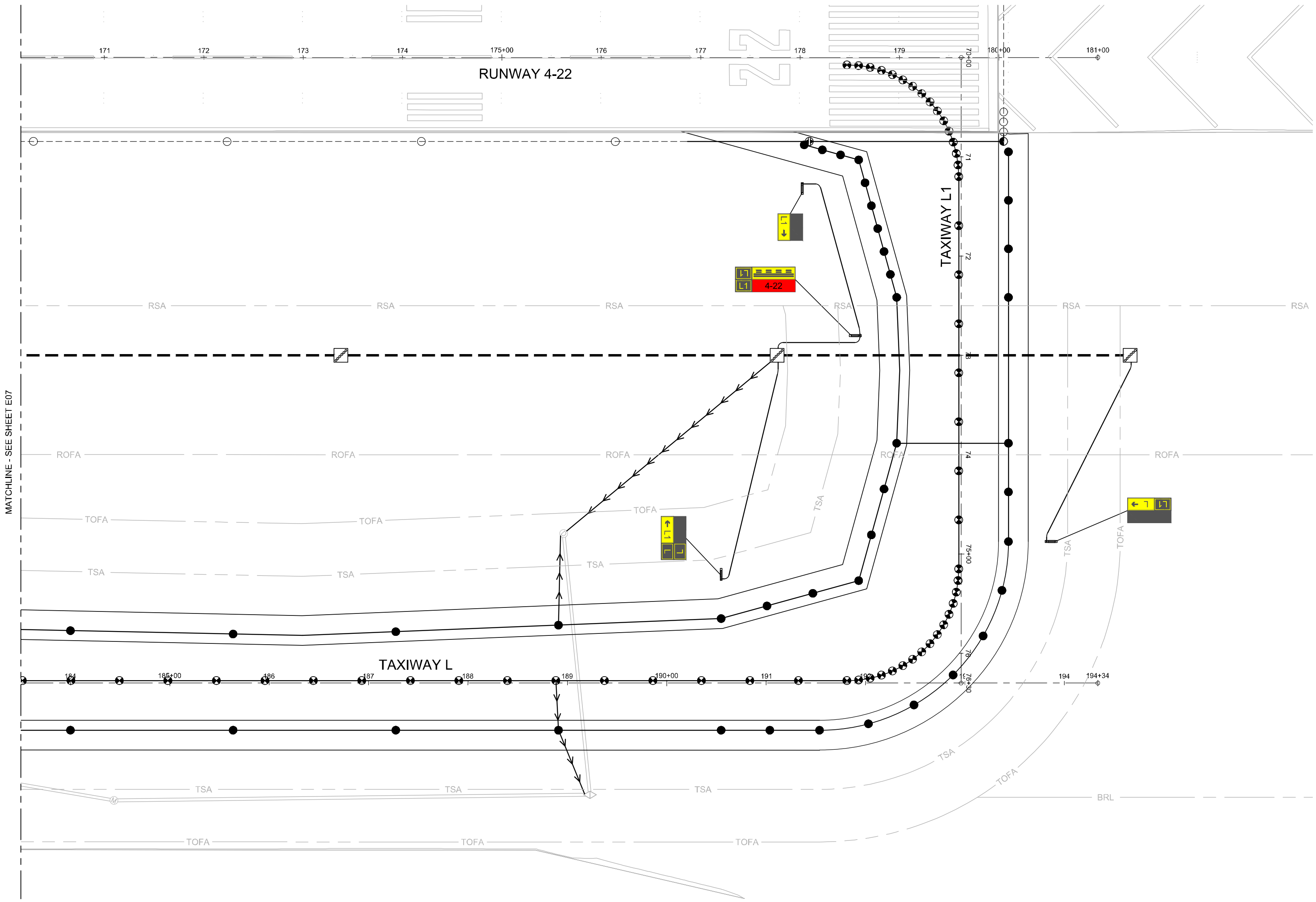
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

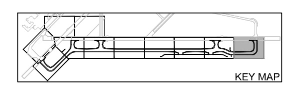
Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E07
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI–DIRECTIONAL
- TAXIWAY CENTERLINE OMNI–DIRECTIONAL
- L–867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W–2" DUCT BANK
- 2W–4" DUCT BANK
- 1W–2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED



50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-488-0388
www.AviationAllianceinc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
***
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

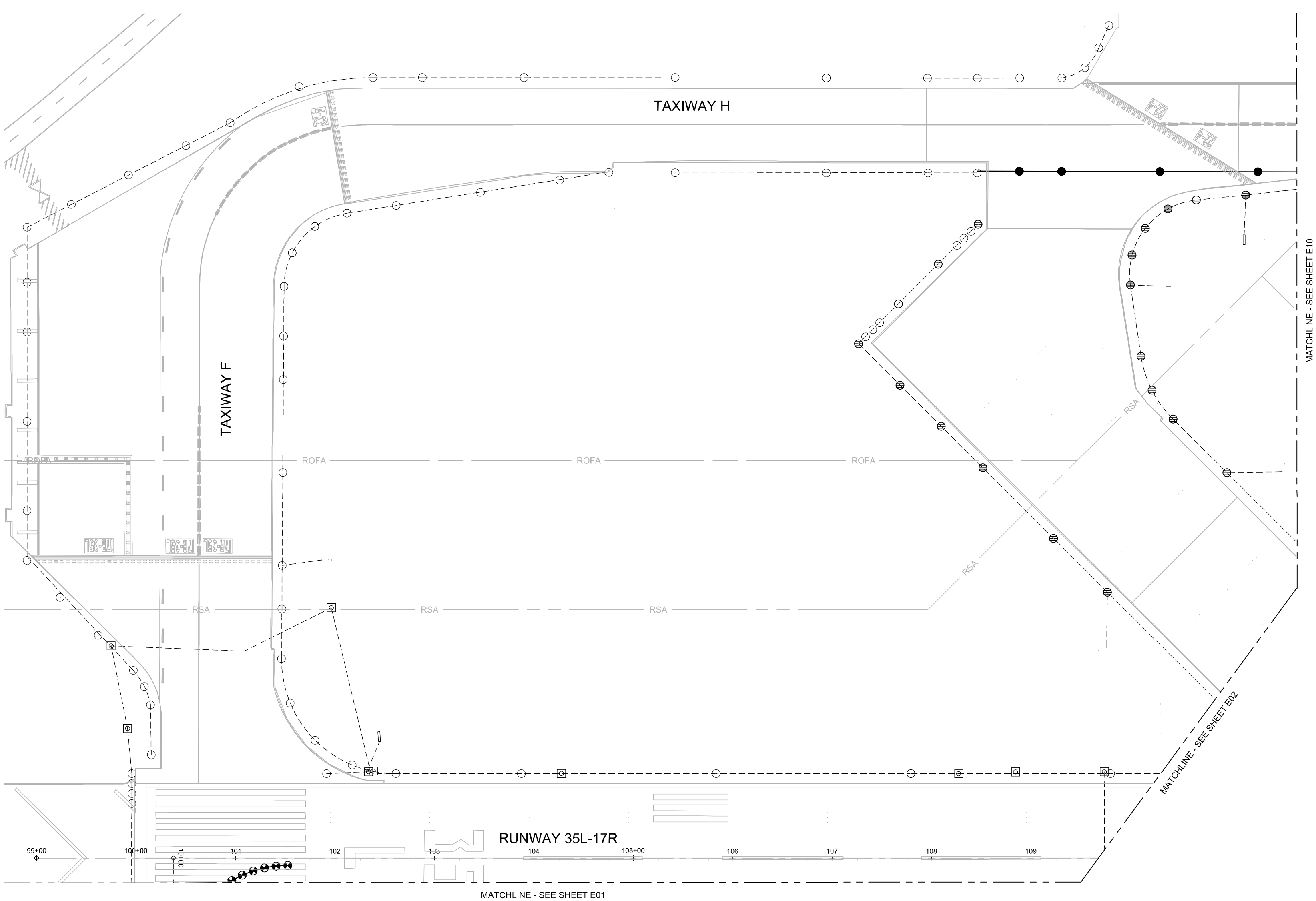
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E08
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:-----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P.O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

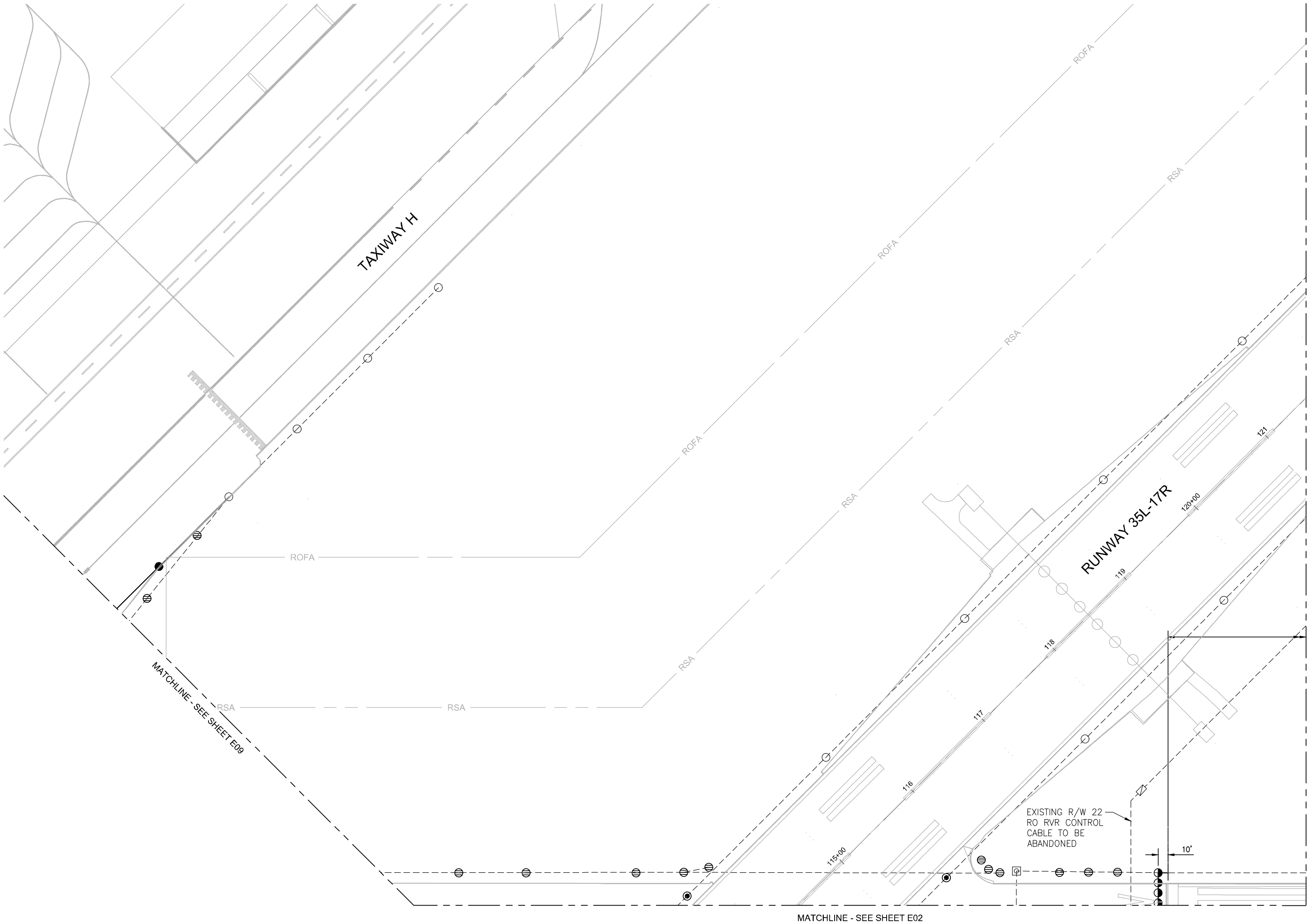
PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

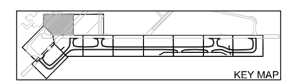
File Name: EFD-L-PROP.DWG			
Date: APRIL 30, 2021		30% ADVANCED PLANNING	
Design	Matt Szabo, P.E.	SHEET	
Drawn	David Flores	E09	
Checked	Adam Pilarcik		
Approved	Matt Szabo, P.E.		

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED



50 0 50 100
Scale Feet

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P.O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

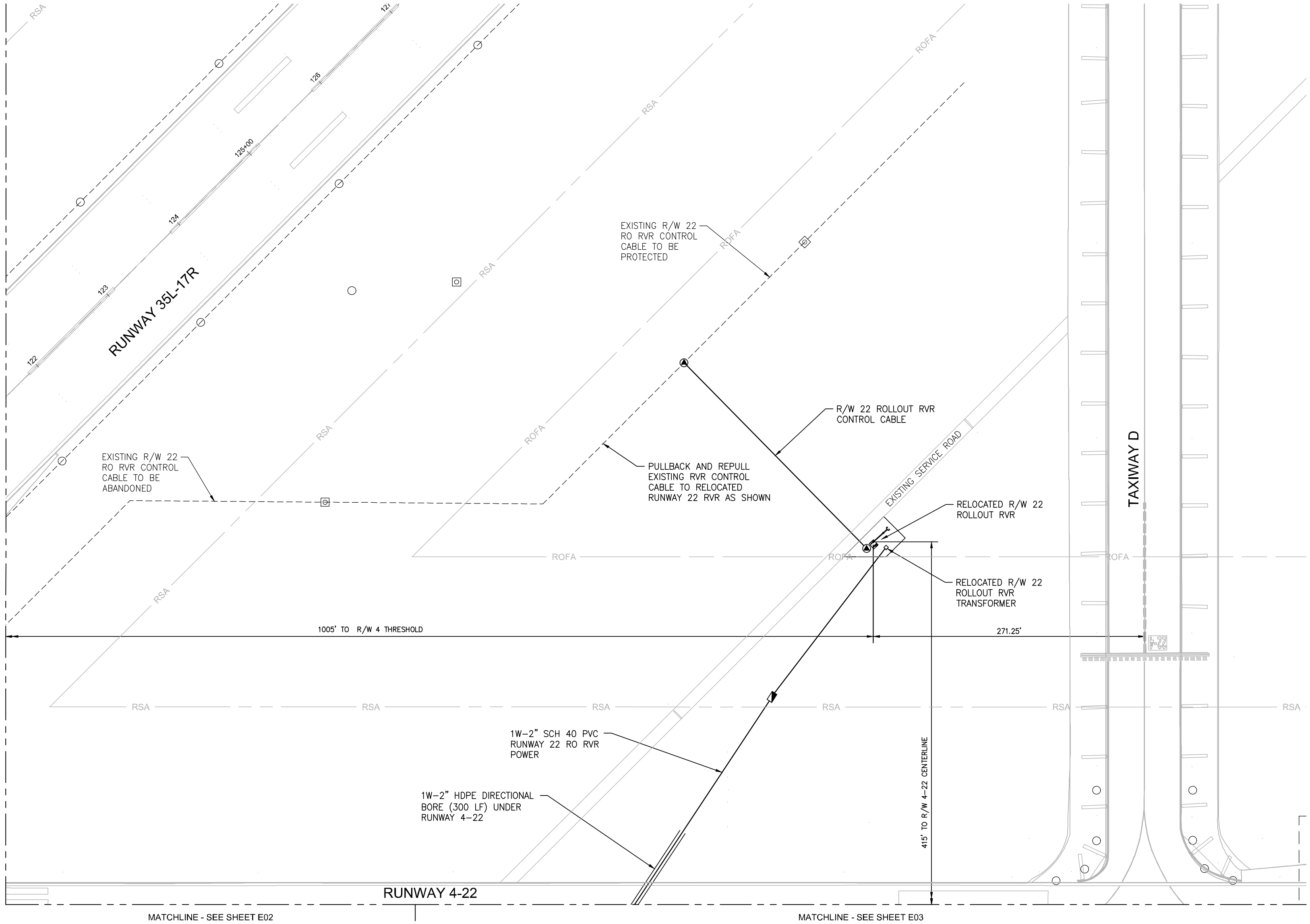
TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E10
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:----



LEGEND

- EXISTING AIRFIELD LIGHT TO REMAIN
- RUNWAY EDGE LIGHT (ELEVATED)
- RUNWAY EDGE LIGHT (SEMIFLUSH)
- RUNWAY THRESHOLD LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (ELEVATED)
- TAXIWAY EDGE LIGHT (SEMIFLUSH)
- TAXIWAY CENTERLINE BI-DIRECTIONAL
- TAXIWAY CENTERLINE OMNI-DIRECTIONAL
- L-867 BLANK LID ON EXISTING BASE
- JUNCTION CAN PLAZA (6 CAN)
- EXISTING MANHOLE/PULLBOX
- MANHOLE/PULLBOX
- JUNCTION CAN
- 2'x3' PULLBOX
- LIGHTED SIGN
- EXISTING CONDUIT/DUCT
- 6W-2" DUCT BANK
- 2W-4" DUCT BANK
- 1W-2" CONDUIT (DEB) UNLESS OTHERWISE NOTED
- 2" SCH 40 PVC DRAIN UNLESS OTHERWISE NOTED

HNTB

AVIATION ALLIANCE, INC.
Consulting Engineers
P. O. BOX 799
COLLEYVILLE, TEXAS
817-498-0388
www.AviationAllianceInc.com

No.	Revision	Date	By	Chkd.	App'd.

HOUSTON AIRPORTS

ELLINGTON AIRPORT

PRELIMINARY
NOT FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. FOR REVIEW ONLY.
AVIATION ALLIANCE, INC.
M. B. SZABO, P.E.
REGISTRATION NO. 92776
DATE: 04/30/2021
APPROVED

TAXIWAY L

AIRFIELD LIGHTING, SIGNAGE, AND NAVAID LAYOUT PLANS

File Name: EFD-L-PROP.DWG
Date: APRIL 30, 2021 | 30% ADVANCED PLANNING

Design	Matt Szabo, P.E.	SHEET
Drawn	David Flores	E11
Checked	Adam Pilarcik	
Approved	Matt Szabo, P.E.	

Plotted: April 30, 2021
Time: 1:29 PM
By: Matt Szabo
Job No.:-----

V. List of Construction Specifications

VI.

Specification Number	Specification Title
C-100	Contractor Quality Control Program (CQCP)
C-102	Temporary Air and Water Pollution, Soil Erosion, and Siltation Control
C-105	Mobilization
C-110	Method of Estimating Percentage of Material Within Specification Limits (PWL)
P-101	Preparation/Removal of Existing Pavements
P-151	Clearing and Grubbing
P-152	Excavation, Subgrade, and Embankment
P-155	Lime-Treated Subgrade
P-209	Crushed Aggregate Base Course
P-306	Lean Concrete Base Course
P-401	Asphalt Mix Pavement
P-501	Cement Concrete Pavement
P-604	Compression Joint Seals for Concrete Pavements
P-605	Joint Sealants for Pavements
P-620	Runway and Taxiway Marking
D-701	Pipe for Storm Drains and Culverts
D-705	Pipe Underdrains for Airports
D-751	Manholes, Catch Basins, Inlets and Inspection Holes
T-901	Seeding
T-904	Sodding
T-908	Mulching
L-107	Airport Wind Cones
L-108	Underground Power Cable for Airports
L-109	Airport Transformer Vault and Vault Equipment
L-110	Airport Underground Electrical Duct Banks and Conduits
L-111	Airfield Electrical Installation Testing
L-115	Electrical Manholes and Junction Structures
L-125	Installation of Airport Lighting Systems
L-1005	Aggregate Cover

AVILES ENGINEERING CORP.

November 29, 2021

Mr. John Verburg, P.E.
Atkins North America, Inc.
200 Westlake Park Blvd, Suite 1100
Houston, Texas 77079

Re: Geotechnical Investigation - Addendum
Lime-stabilized CBR Test Results
Houston Airport System
Taxiway L Geotechnical Investigation
At Ellington Airport (EFD)
Houston, Texas
AEC Job No.: G103-21A

Dear Mr. Verburg,

This letter report is an addendum to Aviles Engineering Corporation's (AEC) Geotechnical Investigation Report G103-21 (dated October 22, 2021) for the Houston Airport System's (HAS) Taxiway L project, located at Ellington Airport (IATA Airport Code: EFD), in Houston, Texas. The contents of this letter should only be used in conjunction with AEC's original report, G103-21.

The purpose of this letter is to: (i) provide the results of optimum lime content (Tex 121E), lime-stabilized Modified Proctor (ASTM D 1557), and lime-stabilized California Bearing Ratio (CBR, ASTM D 1883) tests on soil recovered from four sample pits excavated along the Taxiway L alignment; and (ii) to provide maps from available literature (that were referenced in AEC Report G103-21) that show the approximate locations of geologic faults in the project area.

Lime-Stabilized Soil Test Results

Optimum Lime Content: AEC performed optimum lime content tests on composite samples from the test pits (collected from the ground surface to a depth of 4 feet) in accordance with Texas Department of Transportation (TxDOT) Test Method Tex 121E. The optimum lime content is the percentage of lime (by dry soil weight) that will achieve a pH of 12.4. The results of our optimum lime content tests are summarized on Table 1 and are presented on Plates A-1 through A-4, in Appendix A.

Table 1. Optimum Lime Content Results (Tex 121E)

Sample ID and Description	Optimum Lime Content (pH = 12.4)
B-8, 0'-4', Fat Clay (CH)	10%
B-19, 0'-4', Fat Clay (CH)	8%
B-31, 0'-4', Lean Clay with Sand (CL)	8%
B-44, 0'-4', Lean Clay (CL)	8%

Based on the test results presented in Table 1, **AEC recommends that a lime-stabilization rate of 8 percent be considered for pavement and taxiway subgrade stabilization purposes for this project**.

Compaction and CBR: Soil (from the ground surface to a depth of 4 feet below grade) recovered from the sample pits was mixed and split in general accordance with ASTM C 702. After splitting, the samples were stabilized with 8 or 10 percent lime (by dry soil weight) and were molded and compacted in accordance with ASTM D 1557 (Modified Proctor). After the samples were compacted, there were allowed to cure for 72 hours in a moist state and then soaked for a period of 96 hours (total cure period of 7 days) and a CBR (ASTM D 1883) test was performed.

Modified Proctor compaction test results on soils stabilized with 8 or 10 percent lime (by dry soil weight) are presented on Plates A-5 through A-8, in Appendix A. CBR test results on soils stabilized with 8 or 10 percent lime (by dry soil weight) are presented on Plates A-9 through A-16, in Appendix A. A summary of the Modified Proctor and CBR test results on lime-stabilized soils are presented on Table 2 and Table 3, respectively.

Table 2. Lime-stabilized Modified Proctor Results (ASTM D 1557)

Sample ID and Description	ASTM D 1557 Maximum Dry Density (pcf)	ASTM D 1557 Optimum Moisture Content (%)
B-8, 0'-4', Fat Clay (CH) with 10% lime	104.2	15.8
B-19, 0'-4', Fat Clay (CH) with 8% lime	112.0	12.8
B-31, 0'-4', Lean Clay with Sand (CL) with 8% lime	118.5	11.8
B-44, 0'-4', Lean Clay (CL) with 8% lime	115.7	13.7

Table 3. California Bearing Ratio Test Results (ASTM D 1883)

Sample ID	Percent Compaction (%), ASTM D 1557	Dry Density (pcf)	CBR (%)
B-8, 0'-4', Fat Clay (CH) with 10% lime	100	104.2	97.55
	95	99.0	40.60
	90	93.8	31.20
	85	88.6	<24.40
B-19, 0'-4', Fat Clay (CH) with 8% lime	100	112.0	100.25
	95	106.4	74.00
	90	100.8	46.20
	85	95.2	<31.25
B-31, 0'-4', Lean Clay with Sand (CL) with 8% lime	100	118.5	151.91
	95	112.6	87.7
	90	106.7	<51.47
B-44, 0'-4', Lean Clay (CL) with 8% lime	100	115.7	240.56
	95	109.9	171.50
	90	104.1	107.60
	85	98.3	<58.47

Geologic Fault Maps

Discussion of geologic faults in the project area is presented in Section 4.4 of AEC Report G103-21. As requested by HAS, AEC has included the fault maps discussed in AEC Report G103-21. The fault map from "Principal Surface Faults in the Central Houston Metropolitan Area (after O' Neill, Van Siclen, with additions by C. Norman, May 13, 2004)" is presented on Plate B-1, in Appendix B, while "Active Faults in Southeastern Harris County, Texas", Geo I, pages 149 – 154, by Clanton, U.S. and Amsbury, D.L. is presented on Plate B-2, in Appendix B.

Limitations

This investigation was performed using the standard level of care and diligence normally practiced by recognized geotechnical engineering firms in this area, presently performing similar services under similar circumstances. This letter report is intended to be used in its entirety. The report has been prepared exclusively for the project and location described in this report. If pertinent project details change or otherwise differ from those described herein, AEC should be notified immediately and retained to evaluate the effect of the changes on the recommendations presented in this report, and revise the recommendations if necessary. The recommendations presented in this report should not be used for other structures located along these alignments or similar structures located elsewhere, without additional evaluation and/or investigation.

AVILES ENGINEERING CORPORATION
(TBPELS Firm Registration F-42)

Wilber L. Wang, P.E. 11/29/21
Senior Engineer

Attachments:

Appendix A

Plates A-1 to A-4	Optimum Lime Content Test Results
Plates A-5 to A-8	Lime-stabilized Modified Proctor Test Results
Plates A-9 to A-16	Lime-stabilized California Bearing Ratio (CBR) Test Results

Appendix B

Plate B-1	"Principal Surface Faults of the Houston Central Metropolitan Area"
Plate B-2	"Active Faults in Southeastern Harris County, Texas"

APPENDIX A

Tex-121E
Soil-Lime pH Curve

Project: 103-21 Date: 10/12/2021
Sample ID: B-8

Moisture Content of air dried material:

Tare ID:	G50
Tare Wt (g):	82.22
Wet + Tare (g):	92.36
Dry + Tare (g):	91.99
W=	3.79

0

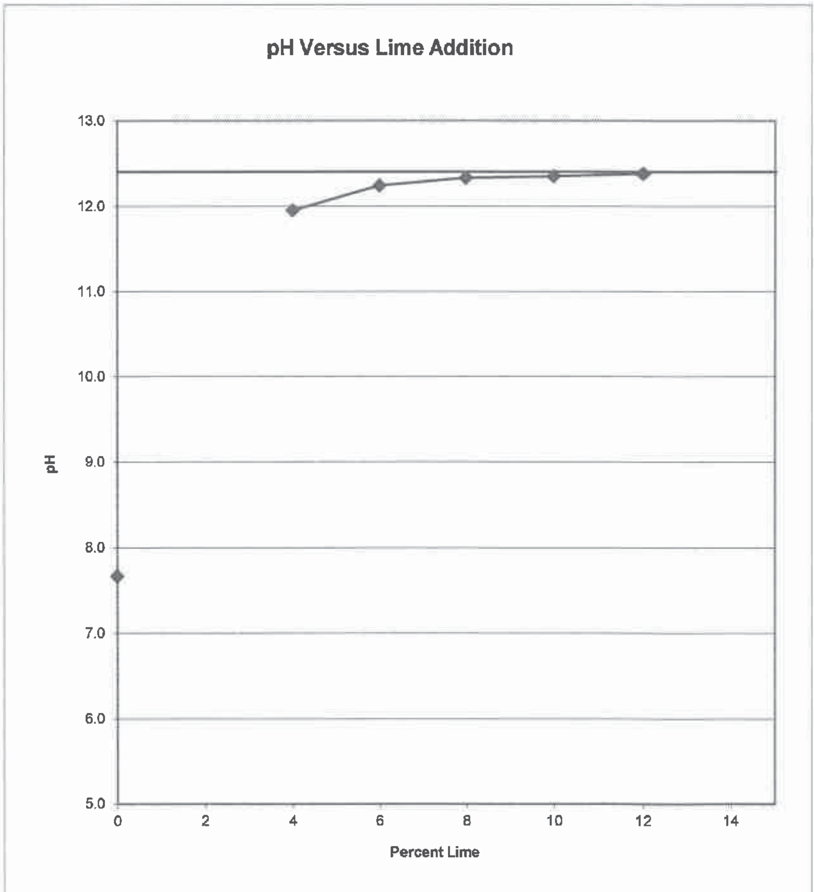
Mass of material equivalent to 30g oven-dried material: 31.14

Lime Additions:

% Lime:	Lime added (g)
0	0.00
2	0.60
4	1.20
6	1.80
8	2.40
10	3.00
12	3.60
	0.00
BLANK	3.00

pH Measurements:

% Lime	pH
0	7.7
2	
4	12.0
6	12.2
8	12.3
10	12.4
12	12.4
BLANK	12.5



Temp (C):	24.3
BUFFER 7 READING:	7
BUFFER 10 READING:	10
BUFFER 12.45 READINC	12.45

Optimum Stabilization (% Lime): 10

Tecn: S.A

Tex-121E
Soil-Lime pH Curve

Project: 103-21 Date: 10/12/2021
Sample ID: B-19

Moisture Content of air dried material:

Tare ID:	G49
Tare Wt (g):	83.2
Wet + Tare (g):	93.94
Dry + Tare (g):	93.71
W=	2.19

0

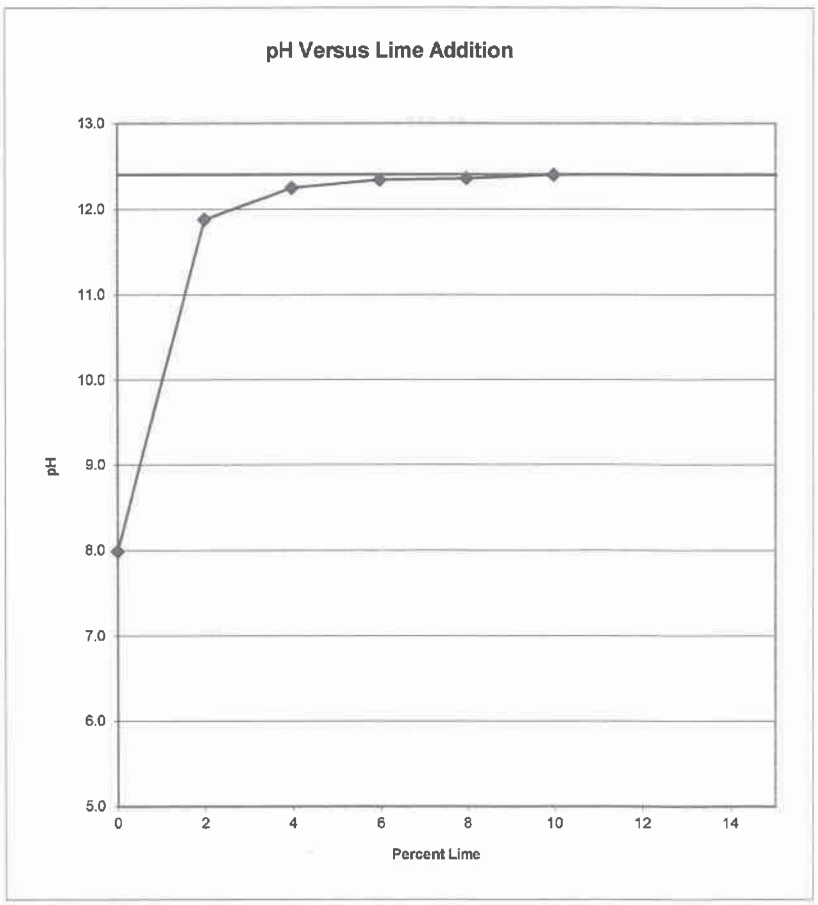
Mass of material equivalent to 30g oven-dried material: 30.66

Lime Additions:

% Lime:	Lime added (g)
0	0.00
2	0.60
4	1.20
6	1.80
8	2.40
10	3.00
	0.00
	0.00
BLANK	3.00

pH Measurements:

% Lime	pH
0	8.0
2	11.9
4	12.3
6	12.3
8	12.4
10	12.4
	12.4
BLANK	12.5



Temp (C): 23.5

BUFFER 7 READING: 7
BUFFER 10 READING: 10
BUFFER 12.45 READING 12.45

Optimum Stabilization (% Lime): 8

Tecn: S.A

Tex-121E
Soil-Lime pH Curve

Project: 103-21 Date: 10/11/2021
Sample ID: B-31

Moisture Content of air dried material:

Tare ID:	G49	
Tare Wt (g):	83.21	
Wet + Tare (g):	93.4	
Dry + Tare (g):	93.25	
W=	1.49	0

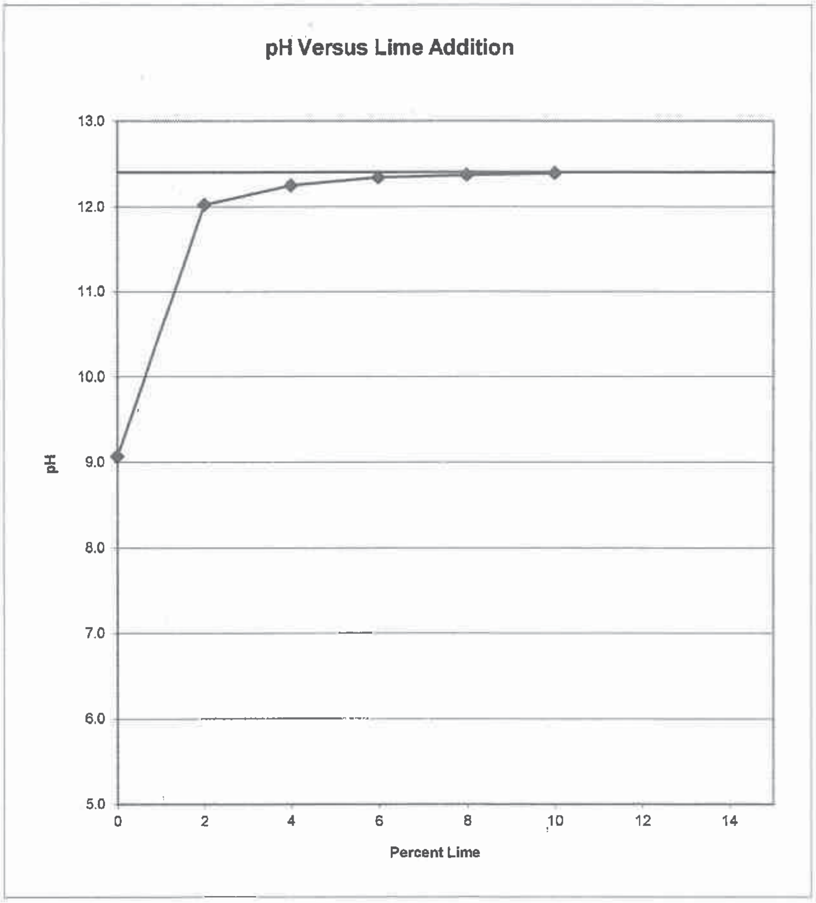
Mass of material equivalent to 30g oven-dried material: 30.45

Lime Additions:

% Lime:	Lime added (g)
0	0.00
2	0.60
4	1.20
6	1.80
8	2.40
10	3.00
	0.00
	0.00
BLANK	3.00

pH Measurements:

% Lime	pH
0	9.1
2	12.0
4	12.3
6	12.3
8	12.4
10	12.4
BLANK	12.5



Temp (C): 23.6

BUFFER 7 READING: 7
BUFFER 10 READING: 10
BUFFER 12.45 READING 12.45

Optimum Stabilization (% Lime): 8

Tecn: S.A

Tex-121E
Soil-Lime pH Curve

Project: 103-21 Date: 10/11/2021
Sample ID: B-44

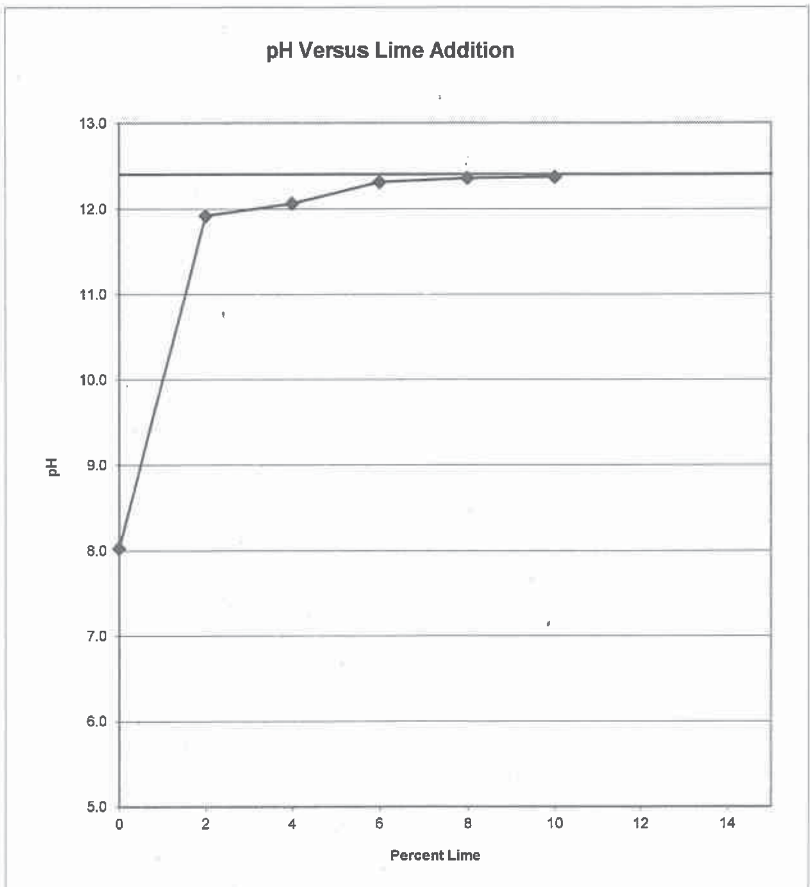
Moisture Content of air dried material:

Tare ID:	G50	
Tare Wt (g):	82.21	
Wet + Tare (g):	92.64	
Dry + Tare (g):	92.42	
W=	2.15	0

Mass of material equivalent to 30g oven-dried material: 30.65

Lime Additions:

% Lime:	Lime added (g)
0	0.00
2	0.60
4	1.20
6	1.80
8	2.40
10	3.00
	0.00
	0.00
BLANK	3.00



pH Measurements:

% Lime	pH
0	8.0
2	11.9
4	12.1
6	12.3
8	12.4
10	12.4
BLANK	12.5

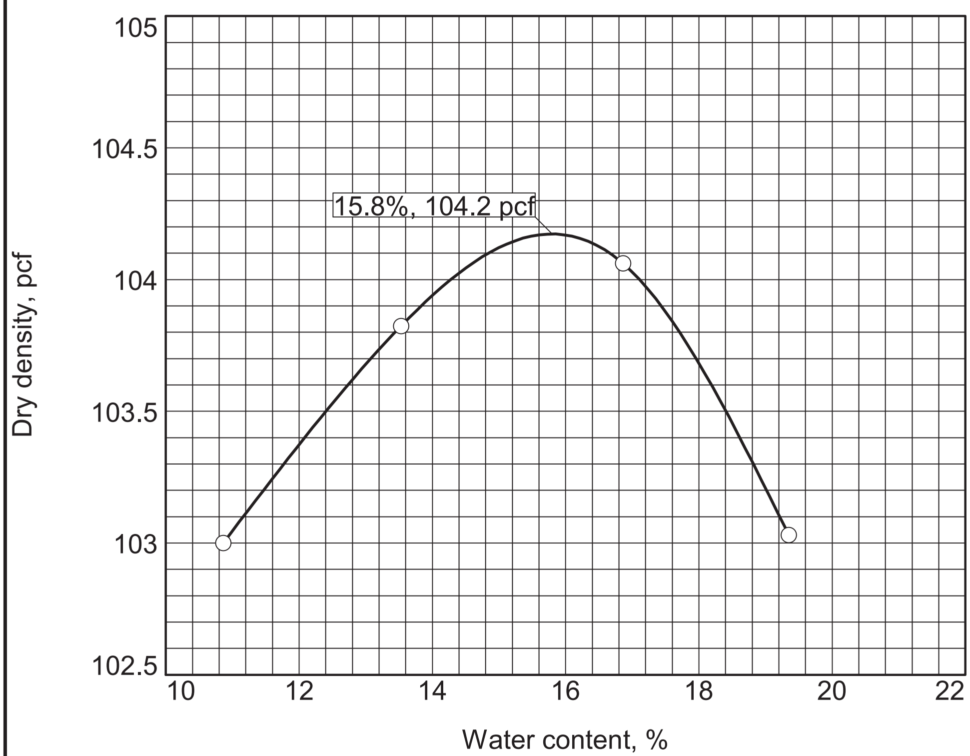
Temp (C): 23.5

BUFFER 7 READING: 7
BUFFER 10 READING: 10
BUFFER 12.45 READING 12.45

Optimum Stabilization (% Lime): 8

Tecn: S.A

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

Soil Data
NM ____ **Sp.G.** ____
LL ____ **PI** ____
%>#4 ____ **%<#200** ____
USCS ____ **AASHTO** ____

TESTING DATA

	1	2	3	4	5	6
WM + WS	3715.0	3770.7	3827.2	3847.7		
WM	1988.7	1988.7	1988.7	1988.7		
WW + T #1	1056.8	1357.8	1039.1	855.9		
WD + T #1	970.4	1216.9	914.0	745.6		
TARE #1	174.9	175.5	172.1	175.5		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	10.9	13.5	16.9	19.3		
DRY DENSITY	103.0	103.8	104.1	103.0		

TEST RESULTS

Maximum dry density = 104.2 pcf

Optimum moisture = 15.8 %

Material Description

Composite Sample with 10% Lime

Project No. **Client:**
Project:

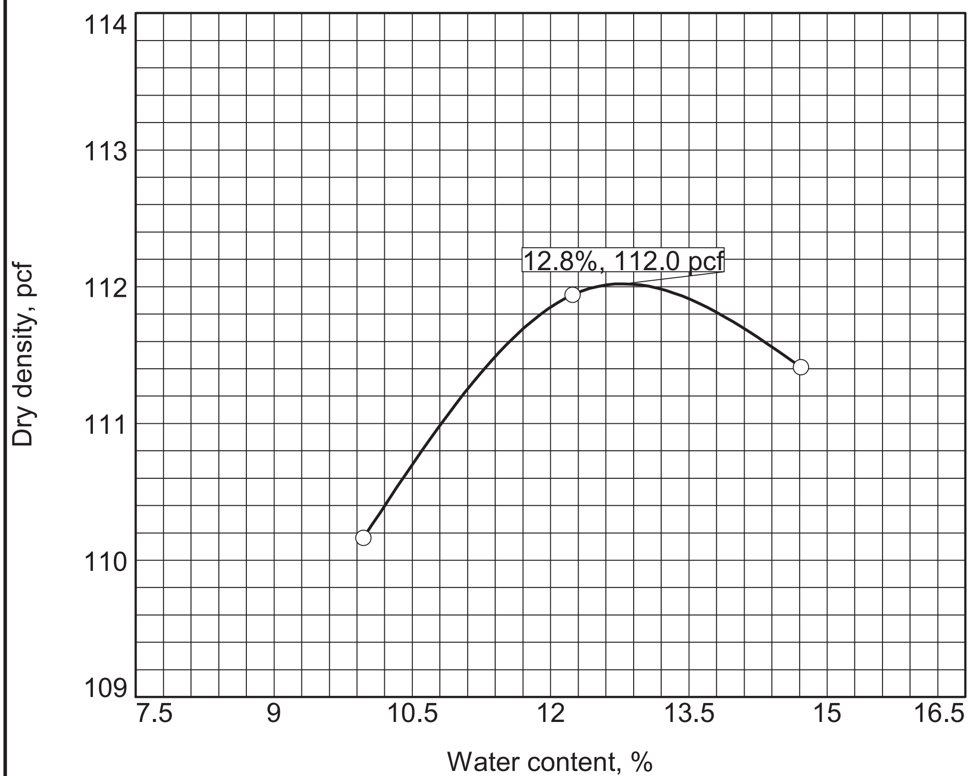
○ **Location:** B-8 + 10% Lime CBR

Remarks:

Aviles Engineering Corp.

Figure

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: 0.03333 cu. ft.

Test Performed on Material Passing #4 **Sieve**

Soil Data

NM ______ **Sp.G.** ______
LL ______ **PI** ______
%>#4 ______ **%<#200** ______
USCS ______ **AASHTO** ______

TESTING DATA

	1	2	3	4	5	6
WM + WS	3820.1	3888.1	3920.8			
WM	1988.6	1988.6	1988.6			
WW + T #1	837.4	774.3	748.7			
WD + T #1	777.1	709.0	675.1			
TARE #1	172.2	175.5	174.9			
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	10.0	12.2	14.7			
DRY DENSITY	110.2	111.9	111.4			

TEST RESULTS

Maximum dry density = 112.0 pcf

Optimum moisture = 12.8 %

Material Description

Composite Sample with 8% Lime

Project No. **Client:**
Project:

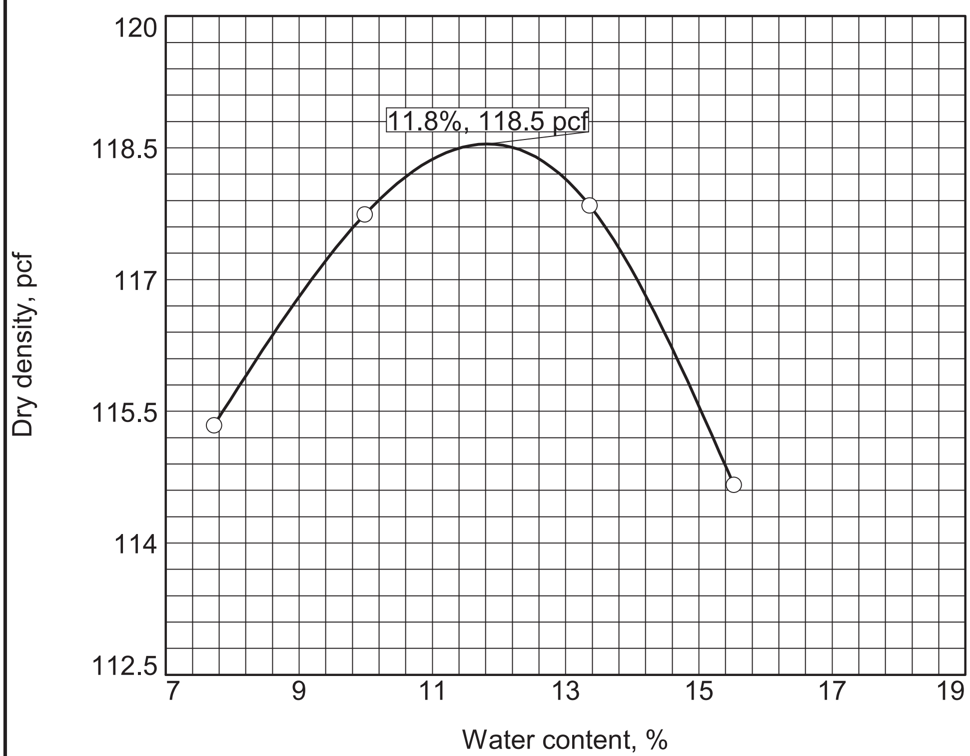
○ **Location:** B-19 + 8% Lime CBR

Remarks:

Aviles Engineering Corp.

Figure

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

Soil Data

NM _____ **Sp.G.** _____
LL _____ **PI** _____
%>#4 _____ **%<#200** _____
USCS _____ **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	3867.2	3946.6	4008.4	3991.4		
WM	1988.8	1988.8	1988.8	1988.8		
WW + T #1	602.5	507.3	625.9	856.7		
WD + T #1	565.5	468.8	561.7	764.4		
TARE #1	85.6	82.8	81.2	170.1		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	7.7	10.0	13.4	15.5		
DRY DENSITY	115.3	117.7	117.8	114.7		

TEST RESULTS

Maximum dry density = 118.5 pcf

Optimum moisture = 11.8 %

Material Description

Composite Sample with 8% Lime

Project No. **Client:**
Project:

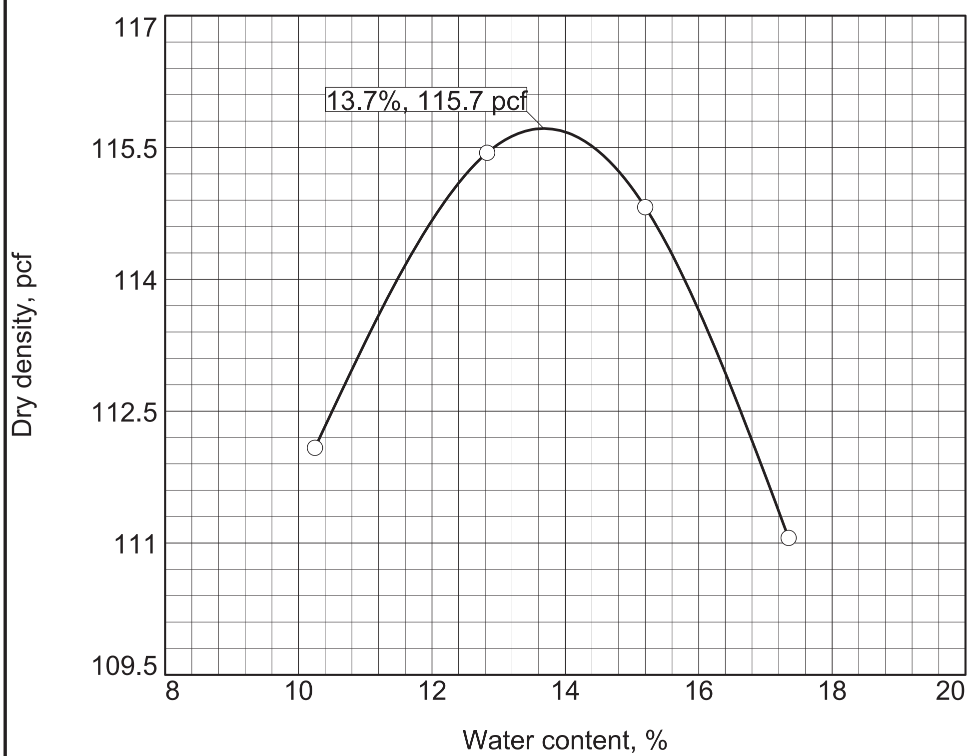
○ **Location:** B-31 + 8% Lime CBR

Aviles Engineering Corp.

Remarks:

Figure

COMPACTION TEST REPORT



Curve No.

Test Specification:
ASTM D 1557 Method A Modified

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: 0.03333 cu. ft.
Test Performed on Material Passing #4 **Sieve**

Soil Data
NM ____ **Sp.G.** ____
LL ____ **PI** ____
%>#4 ____ **%<#200** ____
USCS ____ **AASHTO** ____

TESTING DATA

	1	2	3	4	5	6
WM + WS	3856.8	3957.8	3988.4	3959.0		
WM	1988.7	1988.7	1988.7	1988.7		
WW + T #1	1030.2	984.8	1002.6	1106.9		
WD + T #1	950.3	892.8	893.3	969.2		
TARE #1	170.5	175.6	174.1	175.5		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	10.2	12.8	15.2	17.3		
DRY DENSITY	112.1	115.4	114.8	111.1		

TEST RESULTS

Maximum dry density = 115.7 pcf

Optimum moisture = 13.7 %

Material Description

Composite Sample with 8% Lime

Project No. **Client:**
Project:

○ **Location:** B-44 + 8% Lime

Remarks:

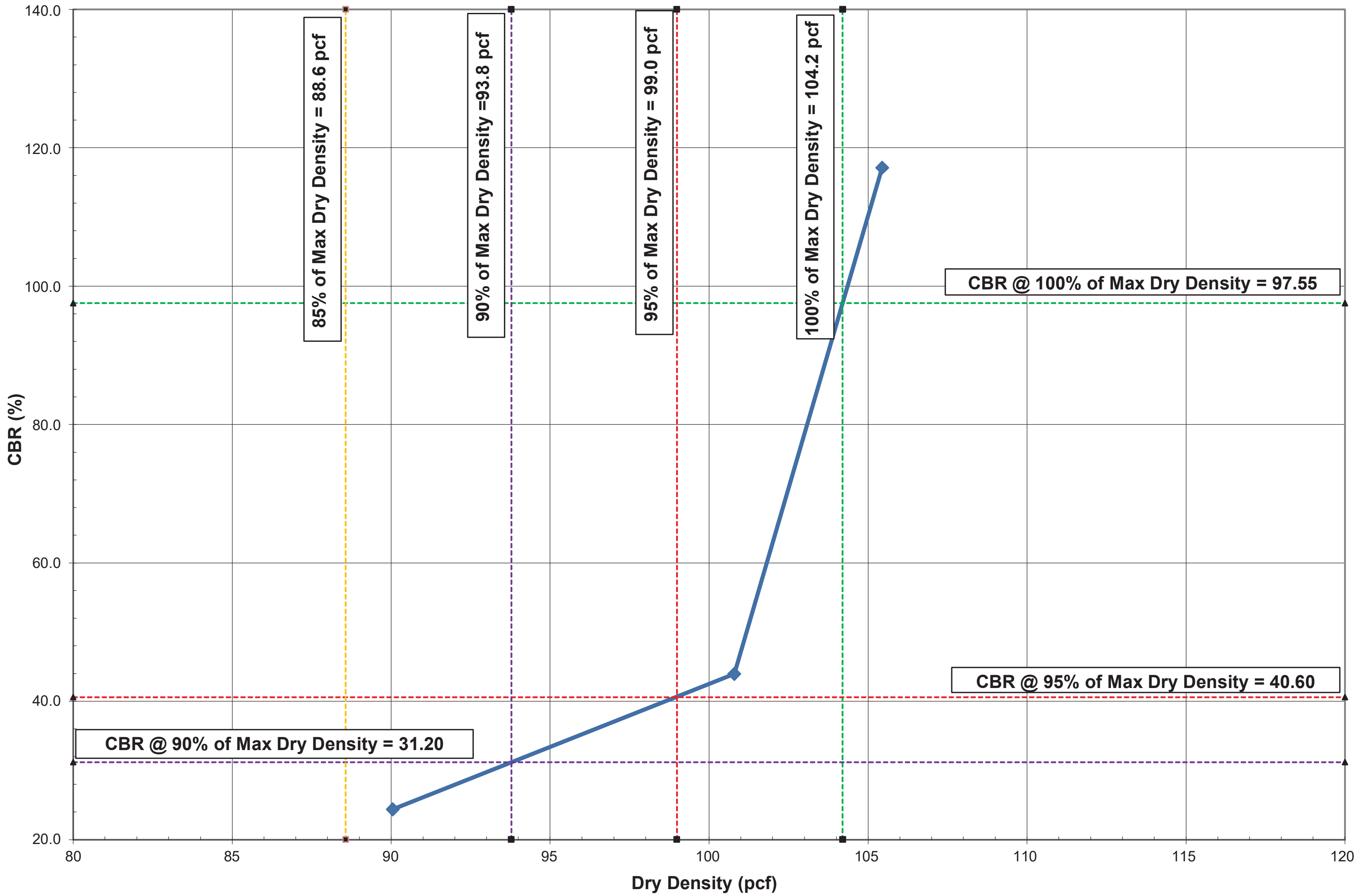
Aviles Engineering Corp.

Figure

PLATE A-8

G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-8 Composite Sample with 10% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 104.2 pcf and Optimum Moisture = 15.8%



G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-8 Composite Sample with 10% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 104.2 pcf and Optimum Moisture = 15.8%

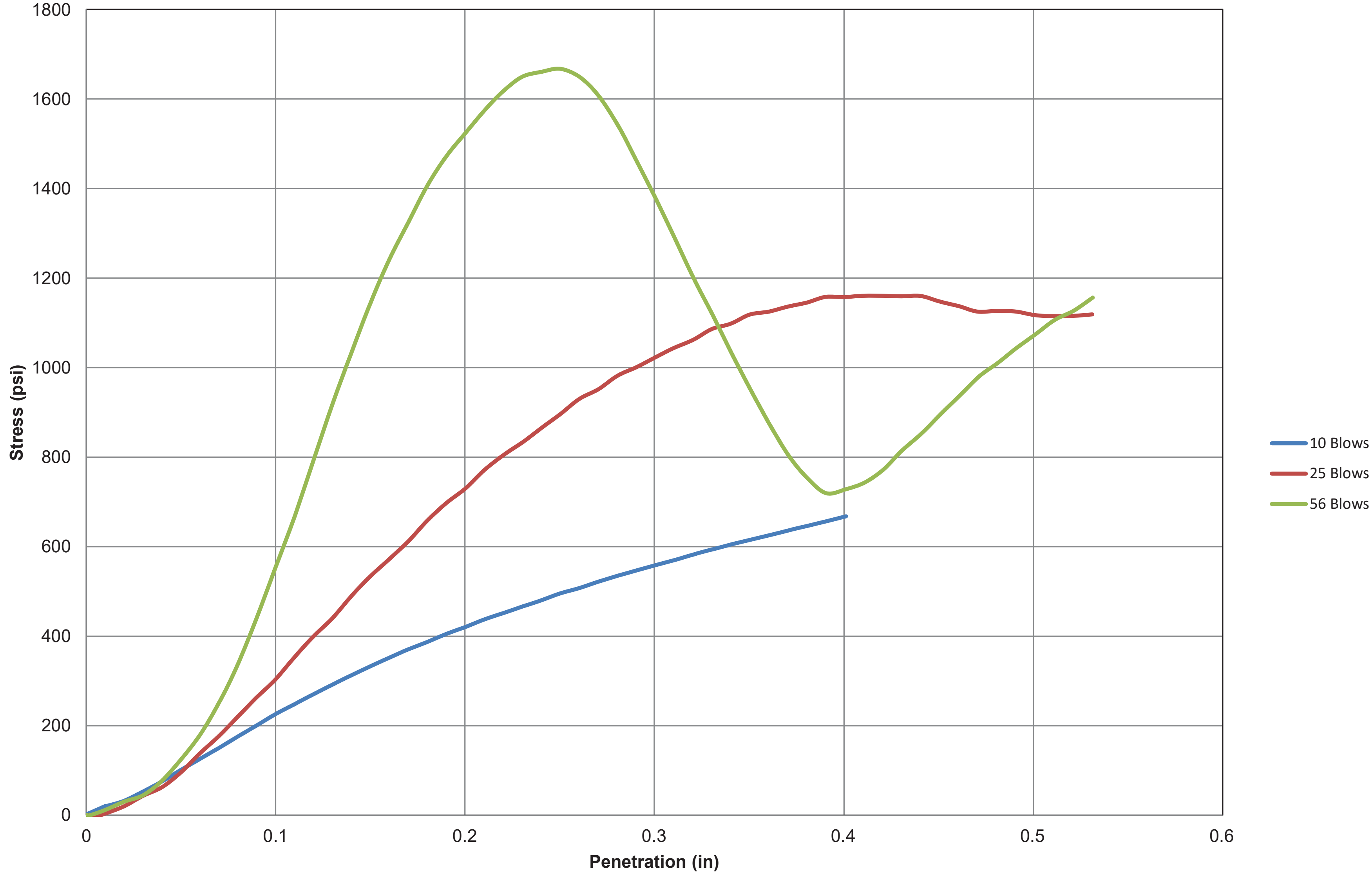
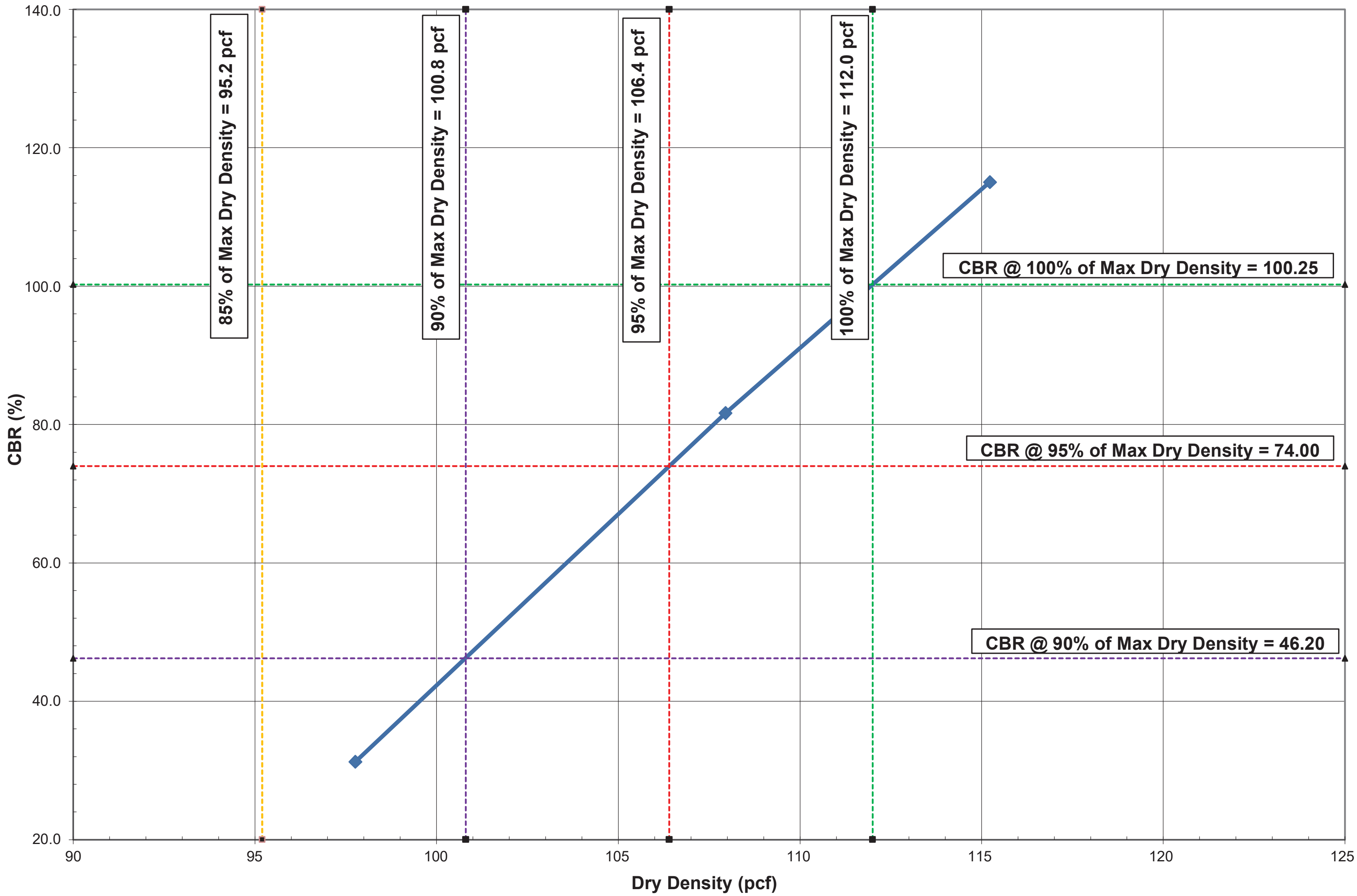


PLATE A-10

G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-19 Composite Sample with 8% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 112.0 pcf and Optimum Moisture = 12.8%



G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-19 Composite Sample with 8% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 112.0 pcf and Optimum Moisture = 12.8%

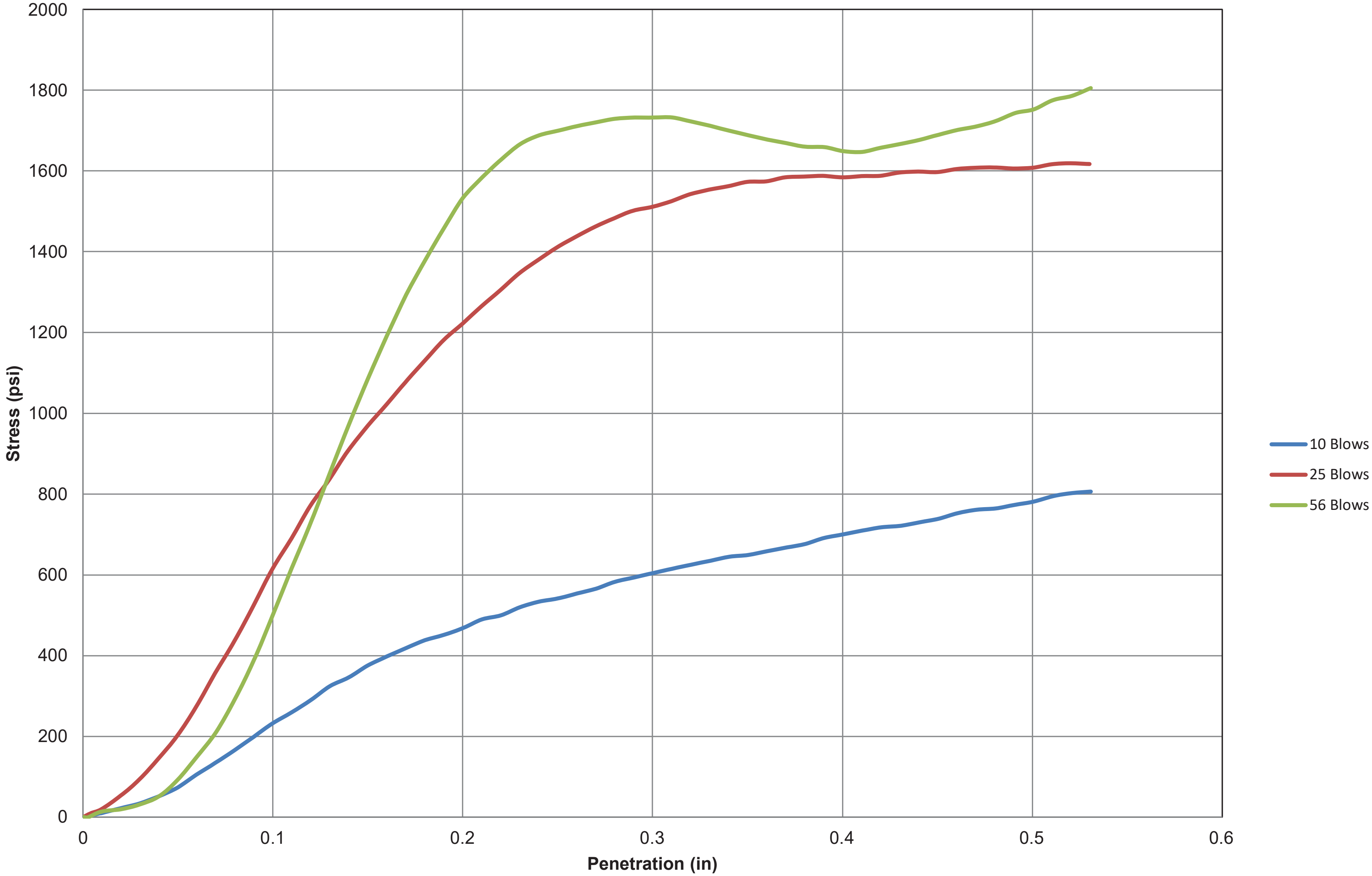
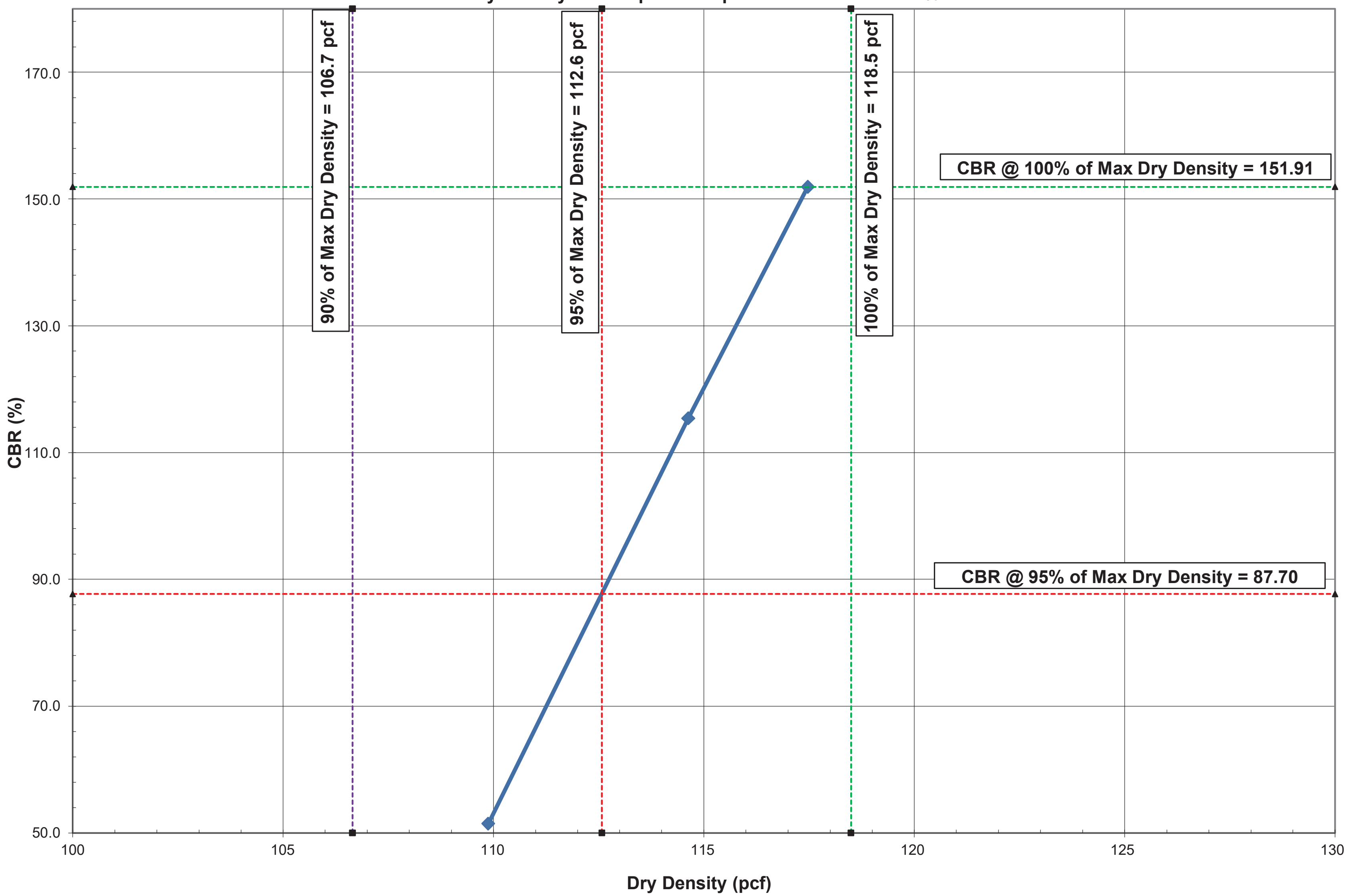
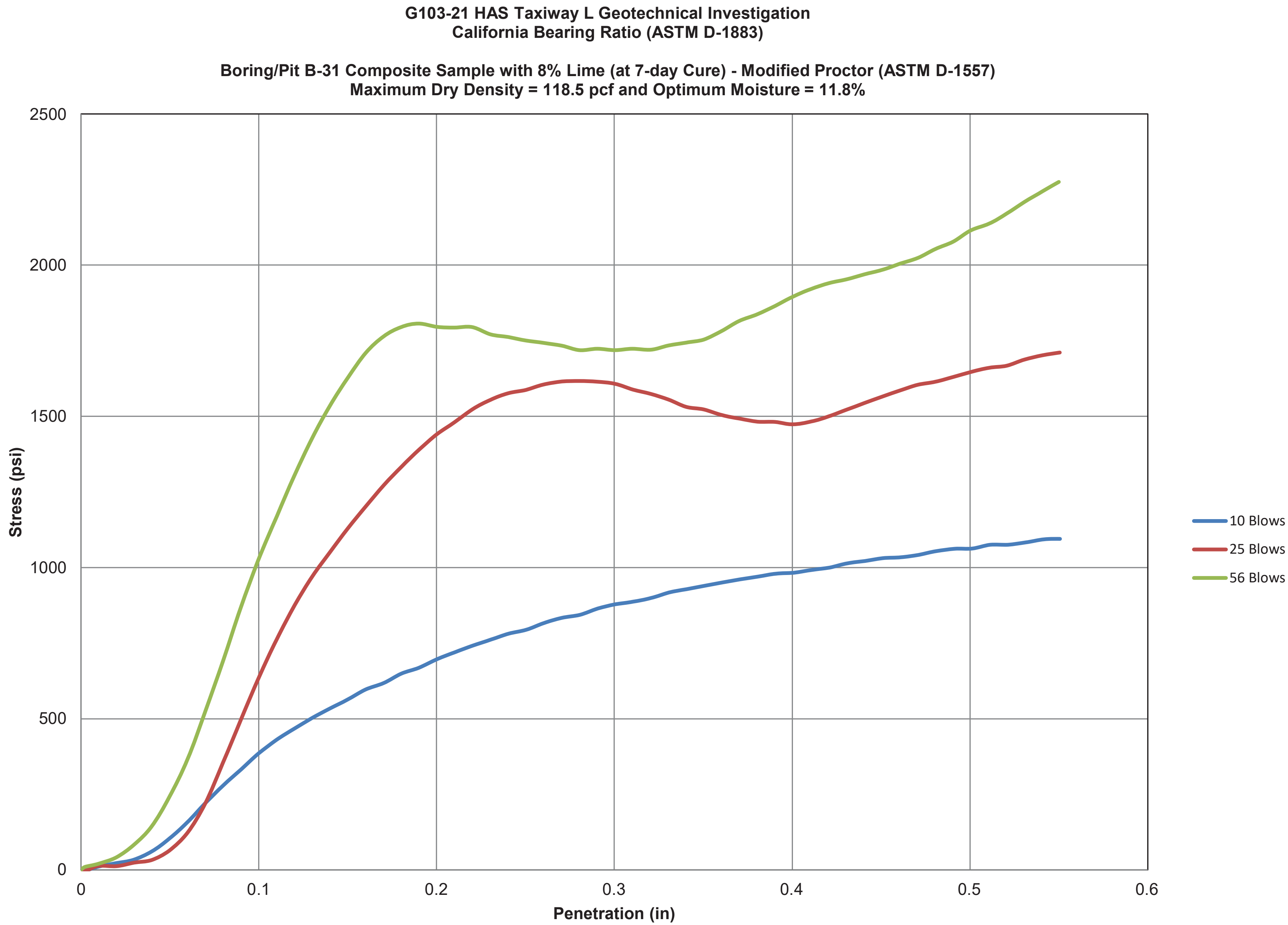


PLATE A-12

G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

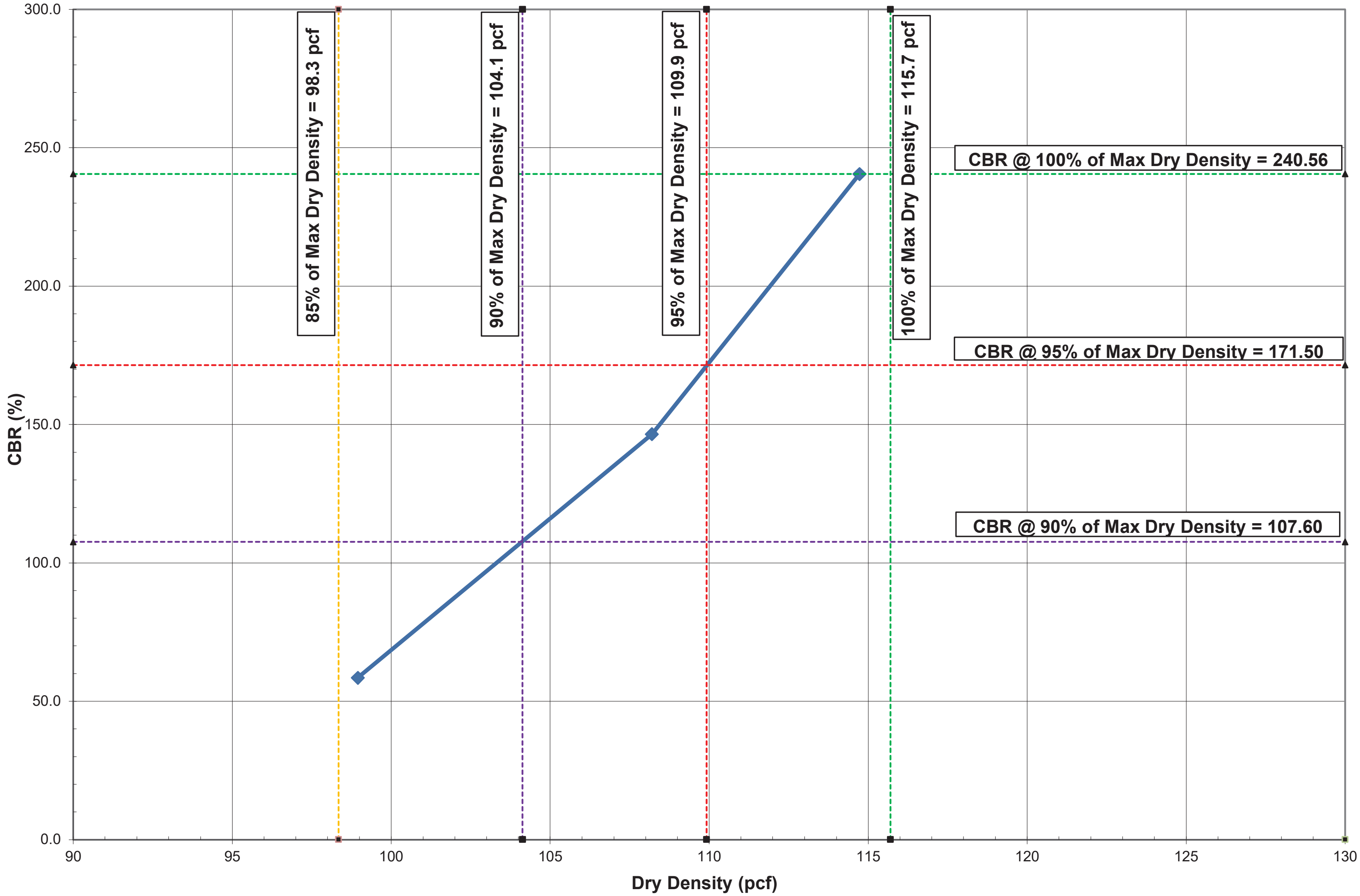
Boring/Pit B-31 Composite Sample with 8% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 118.5 pcf and Optimum Moisture = 11.8%

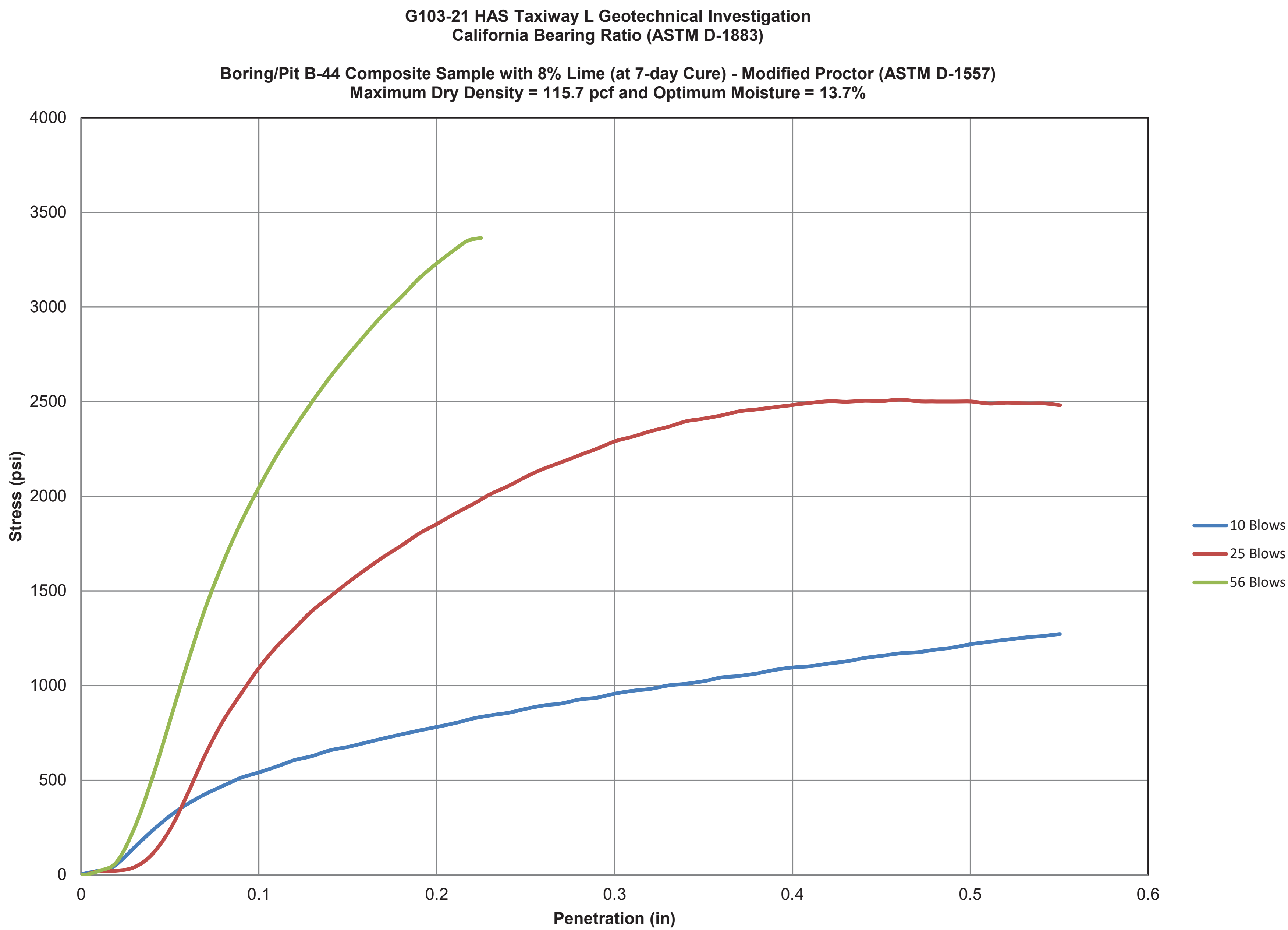



G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)
Boring/Pit B-31 Composite Sample with 8% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 118.5 pcf and Optimum Moisture = 11.8%
Stress (psi)
2500
2000
1500
1000
500
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Penetration (in)
10 Blows
25 Blows
56 Blows

G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)

Boring/Pit B-44 Composite Sample with 8% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 115.7 pcf and Optimum Moisture = 13.7%

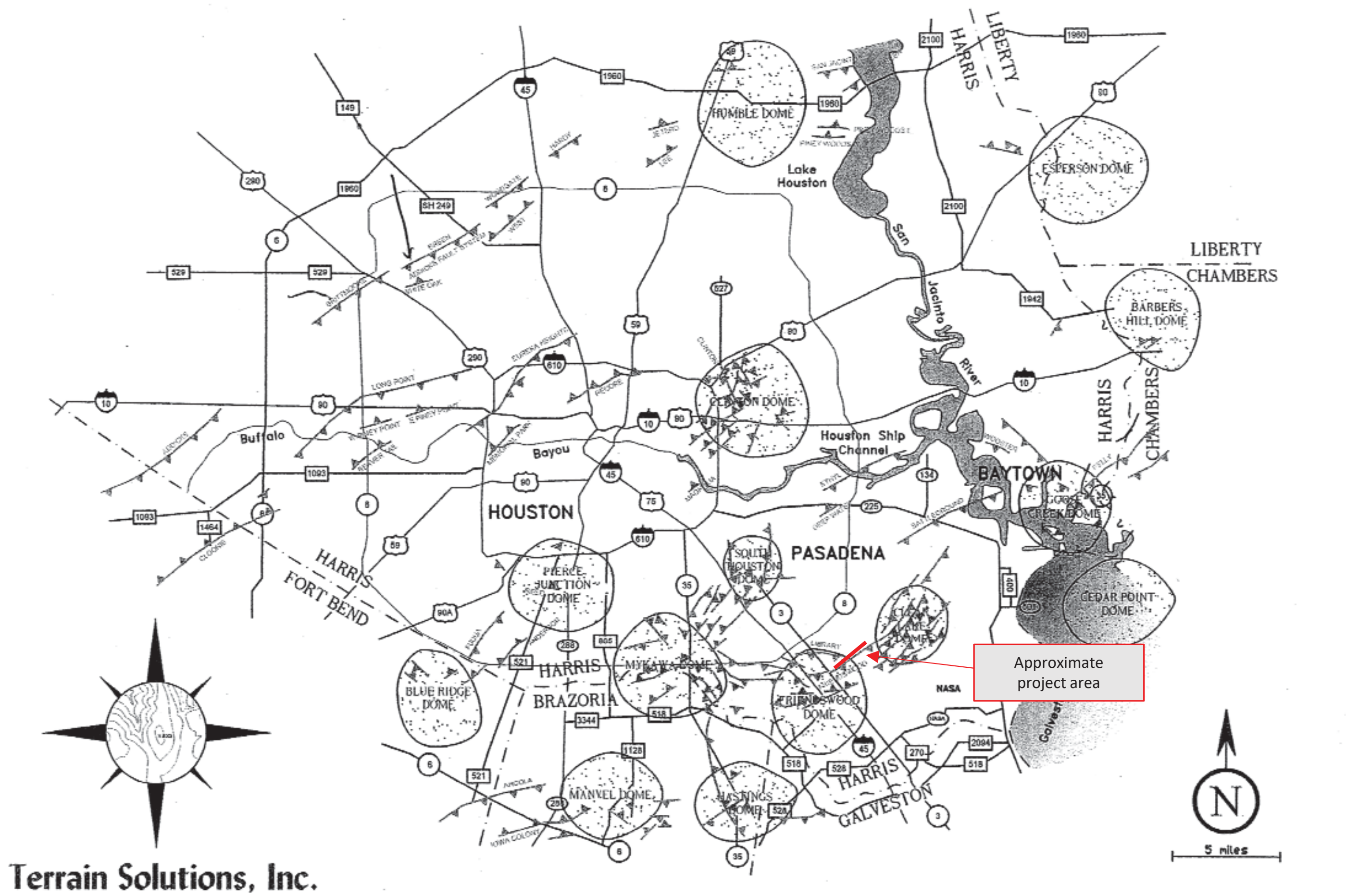



G103-21 HAS Taxiway L Geotechnical Investigation
California Bearing Ratio (ASTM D-1883)
Boring/Pit B-44 Composite Sample with 8% Lime (at 7-day Cure) - Modified Proctor (ASTM D-1557)
Maximum Dry Density = 115.7 pcf and Optimum Moisture = 13.7%
Stress (psi)
4000
3500
3000
2500
2000
1500
1000
500
0
0
0.1
0.2
0.3
0.4
0.5
0.6
Penetration (in)
10 Blows
25 Blows
56 Blows

APPENDIX B

Plate B-1	“Principal Surface Faults of the Houston Central Metropolitan Area”
Plate B-2	“Active Faults in Southeastern Harris County, Texas”

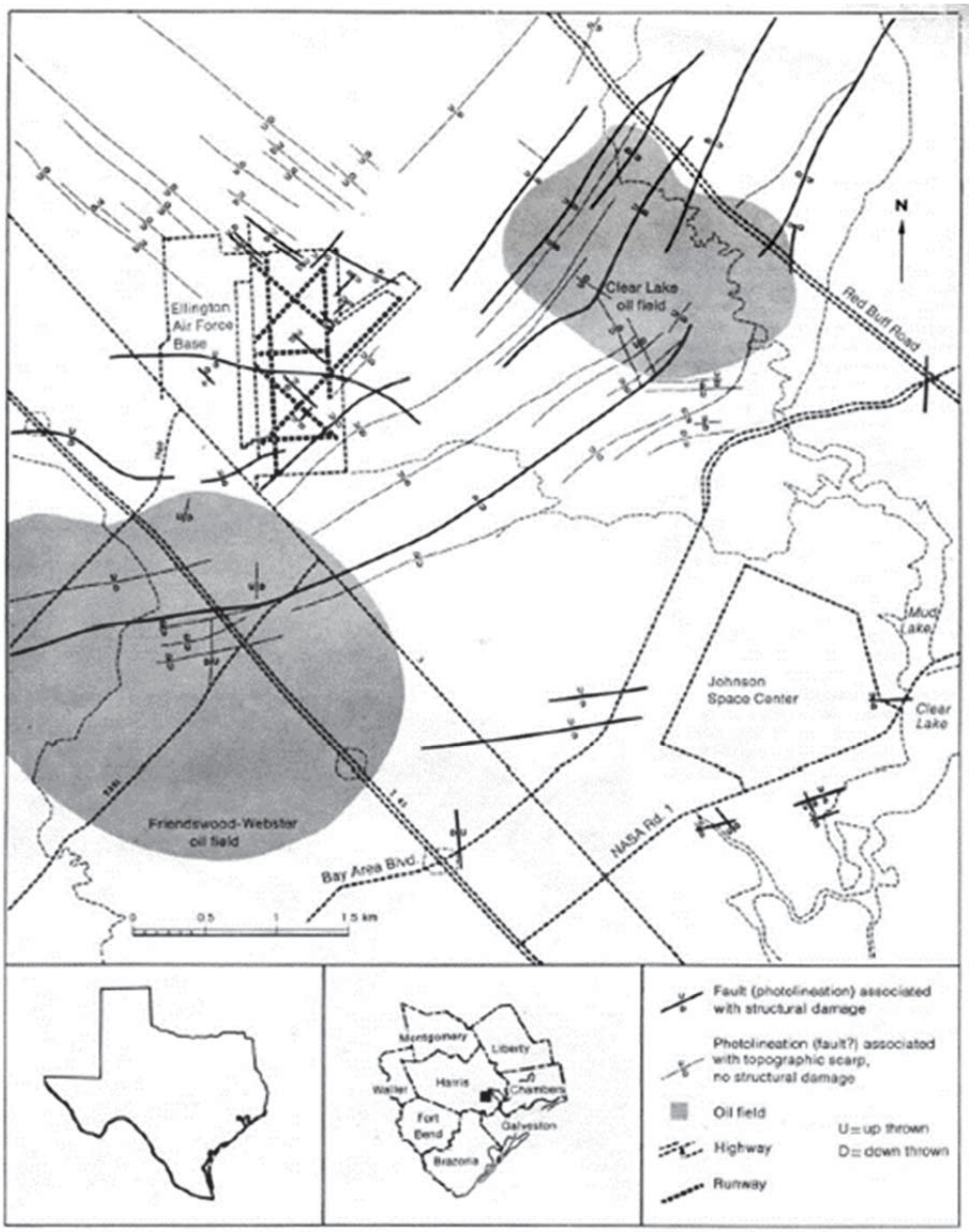
G103-21 Ellington Field Taxiways L, E and D
Fault Study
12/19/2021



Principal Surface Faults of the Houston Central Metropolitan Area

(After O'Neill & Van Siclen with additions by C. Norman)

Rev. 05/13/04



"Active Faults in Southeastern Harris County, Texas", Geo I, pages 151, by Clanton, U.S. and Amsbury, D.L.