

**EXHIBIT C**  
**Reports and Additional Information**  
**for Shady Shores Road Project**

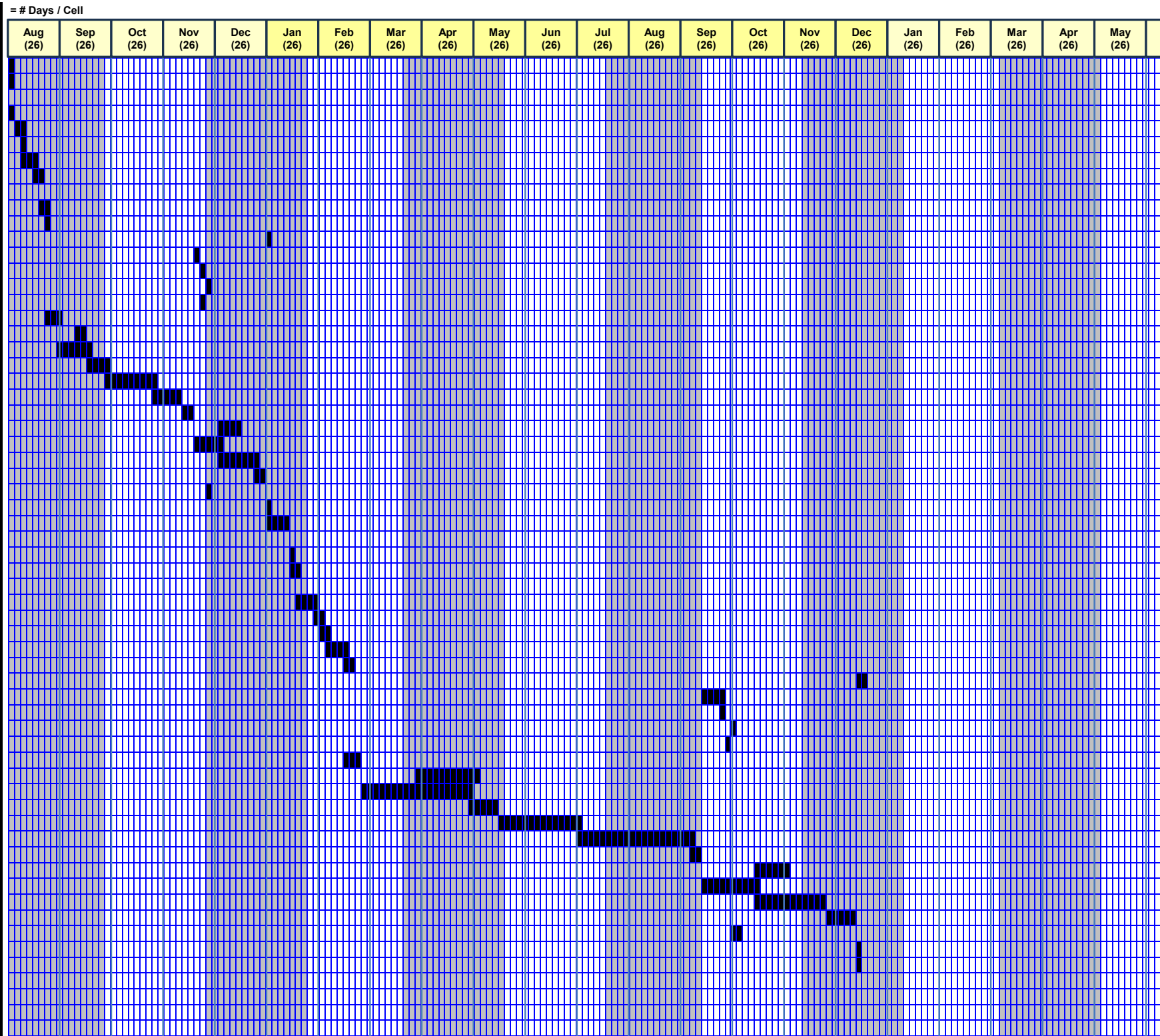
**Contract Time Estimate**

Rd: Shady Shores County: Denton  
 CSJ: 0918-46-316 Project: ITB Number 25-2861

1. This project is a 6-day workweek
2. 429 days x 1.22 = 524 working days
3. Barricades months = 524 days/26 days/month = 21 months ~ 612 Calendar Days



TASK #	Description	Quantity	Unit	Daily Rate	Duration	Pred Task	% Comp	Pred Task	% Comp	Pred Task	% Comp	Start Day	Finish Day
1	Mobilization	1	LS	1	1							1	1
2	Advance signs	1	LS	1	1	1	100					2	2
3	PHASE 1												
4	TCP/SW3P	1	LS	2	1	2	100	0	100			3	3
5	Preparing ROW	11	STA	3	4	4	100					4	7
6	Remov Conc (Pav)	302	SY	1970	1	5	100					8	8
7	Remov STR (Pipe)	219	LF	40	6	6	100					9	14
8	Remov STR (Box Culvert)	86	LF	40	3	6	100	7	100			15	17
9	Remov STR (Ret Wall)	-	LF	40		6	100	8	100				
10	Excavation	3,087	CY	2050	2	7	100	8	100	9	100	18	19
11	Embankment	1,447	CY	2030	1	10	75					20	20
12	Sodding/Seeding	4,508	SY	2500	2	28	100	23	100	27	100	130	131
13	Flex Base	1,985	CY	750	3	11	100	23	100	10	100	94	96
14	Prime Coat	496	GAL	4500	1	13	100	23	100			97	97
15	Superpave HMA	110	TON	1000	1	14	100	16	100			100	100
16	Conc Pvm (CRCP)	1,734	SY	1500	2	14	100	23	100			98	99
17	Temp Shoring	2,823	SF	538	6	10	75					20	25
18	Drilled Shafts	372	LF	104	4	17	100	19	50			34	37
19	Wall, MSE	5,508	SF	358	16	17	100					26	41
20	Concrete Abutment	2	EA	0.25	8	17	100	19	100			42	49
21	Prestr Conc Girder	5	EA	0.2	25	20	100					50	74
22	Bridge Deck	10,827	SF	900	13	21	100					75	87
23	Bridge Approach Slab	59	CY	11	6	22	100					88	93
24	Reinforced Concrete Pipe	916	LF	110	9	10	100	25	100	23	100	107	115
25	Junction Box/Manhole	9	EA	0.7	13	10	100	23	100			94	106
26	Inlet	13	EA	0.7	19	10	100	25	100	28	100	107	125
27	Concrete Sidewalks	409	SY	132	4	28	100	26	100			126	129
28	Conc Curb	625	LF	554	2	16	100					100	101
29	Pavement Marking	4,969	LF	50000	1	27	100	28	100			130	130
30	Clean Up	11	STA	1	11	29	100	16	100			131	141
31	PHASE 2												
32	TCP/SW3P	1	LS	2	1	30	100	26	100			142	142
33	Preparing ROW	36	STA	10	4	32	100					143	146
34	Remov Conc (Pav)	-	SY	1974		33	100						
35	Remov STR (Pipe)	372	LF	50	8	34	100					147	154
36	Remov STR (Box Culvert)	193	LF	50	4	34	100	35	100			155	158
37	Remov STR (Ret Wall)	96	LF	50	2	34	100	36	100			159	160
38	Excavation	20,579	CY	2050	11	35	100	36	100	37	100	161	171
39	Embankment	6,907	CY	2030	4	38	75					170	173
40	Sodding/Seeding	13,521	SY	2500	6	56	100	51	100	55	100	427	432
41	Flex Base	7,528	SY	750	11	39	100	51	100	38	100	349	359
42	Prime Coat	1,331	GAL	4500	1	41	100	51	100			360	360
43	Superpave HMA	74	TON	1000	1	42	100	44	100			364	364
44	Conc Pvm (CRCP)	6,528	SY	2463	3	42	100	51	100			361	363
45	Temp Shoring	4,568	SF	600	8	38	75					170	177
46	Drilled Shafts	3,221	LF	110	30	45	100	47	50			206	235
47	Wall, MSE	20,256	SF	375	55	45	100					178	232
48	Concrete Abutment	4	EA	0.3	14	45	100	47	100			233	246
49	Prestr Conc Girder	10	EA	0.25	40	48	100					247	286
50	Bridge Deck	55,221	SF	975	57	49	100					287	343
51	Bridge Approach Slab	118	CY	25	5	50	100					344	348
52	Reinforced Concrete Pipe	1,991	LF	119	17	38	100	53	100	51	100	377	393
53	Junction Box/Manhole	21	EA	0.75	28	38	100	51	100			349	376
54	Inlet	26	EA	0.75	35	38	100	53	100	56	100	377	411
55	Concrete Sidewalks	2,154	SY	150	15	56	100	54	100			412	426
56	Conc Curb	3,246	LF	554	6	44	100					364	369
57	Pavement Marking	13,715	LF	50000	1	55	100	56	100			427	427
58	Clean Up	36	STA	25	2	57	100	44	100			428	429
59													
60													
61													
62													



Note: Bar chart is based on calculated work days and does not show the weather day adjustment at the top of the spreadsheet.

STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT  
NH XX (XX) XX  
CSJ: 0918-46-316

SHADY SHORES RD CROSS SECTIONS

DENTON COUNTY

CSJ: 0918-46-316

LIMITS: FROM SILKTREE COURT  
TO WEST SHADY SHORES ROAD

TOTAL LENGTH OF PROJECT =	ROADWAY = 2,854	FT. = 0.540	MI.
	BRIDGE = 1,710	FT. = 0.324	MI.
	TOTAL = 4,564	FT. = 0.864	MI.

FOR THE CONSTRUCTION OF RECONSTRUCT LOCAL ROAD  
CONSISTING OF RECONSTRUCT ROAD FROM  
2 TO 2 LANES TO ELEVATE  
OUT OF FLOODPLAIN WITH  
DRAINAGE IMPROVEMENTS

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			
\$DES\$	6				
GRAPHICS	STATE	CONT	SECT	JOB	HIGHWAY NO.
\$GRA\$	TEXAS	0918	46	316	VA
CHECK	CHECK	DIST	COUNTY		SHEET NO.
\$CHK1\$	\$CHK2\$	DAL	DENTON		1

FUNCTIONAL CLASS = MAJOR COLLECTOR

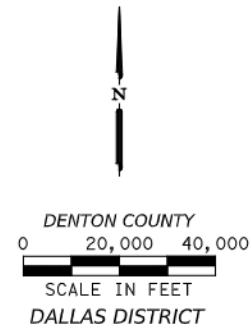
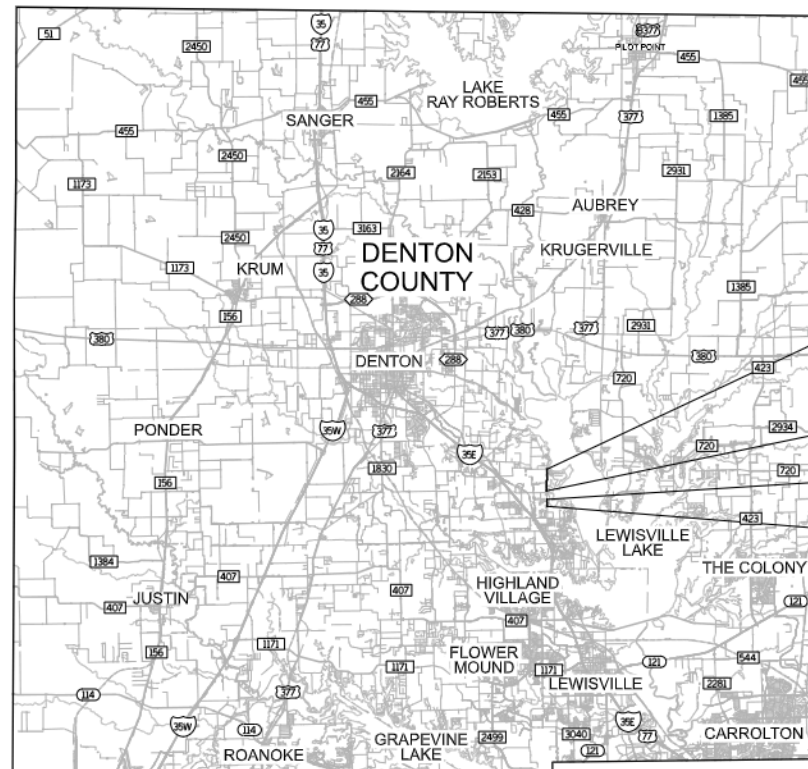
DESIGN SPEEDS = 35 MPH (SHADY SHORES RD)  
30 MPH (CROSS STREETS)

ADT (2024) = 7,200  
ADT (2044) = 13,000

NOTE:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024, AND THE CONTRACT PROVISIONS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, October 23, 2023)

Registered Accessibility Specialist (RAS) inspection  
required. TDLR No. TABS2025007570



END PROJECT  
END CSJ 0918-46-316  
STA 105+63.00  
TRM N/A

BEGIN CONSTRUCTION  
STA 70+35.77

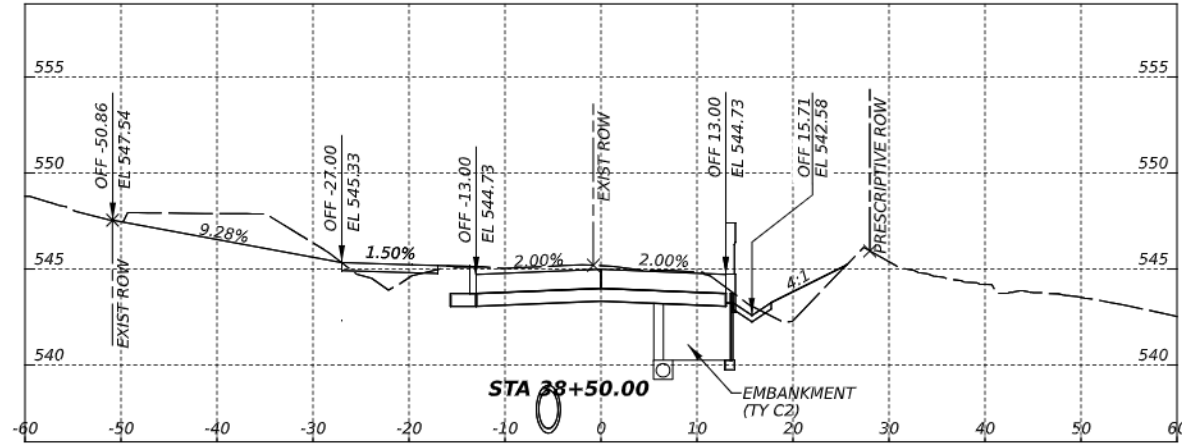
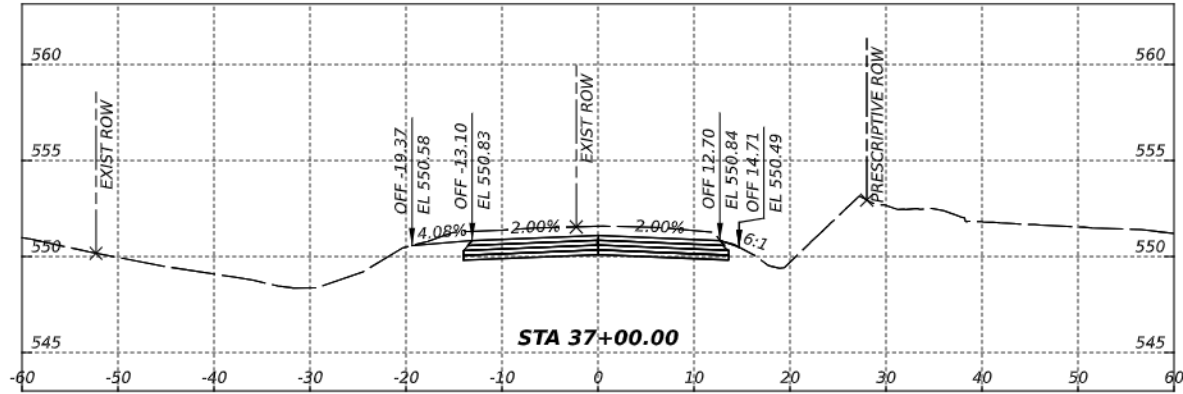
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STA 47+00.00

BEGIN PROJECT  
BEGIN CSJ 0918-46-316  
STA 36+40.00  
TRM N/A

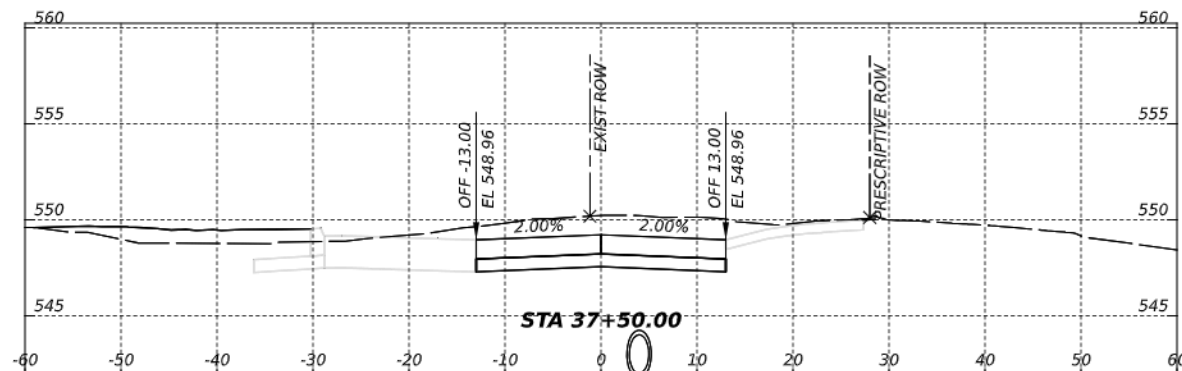
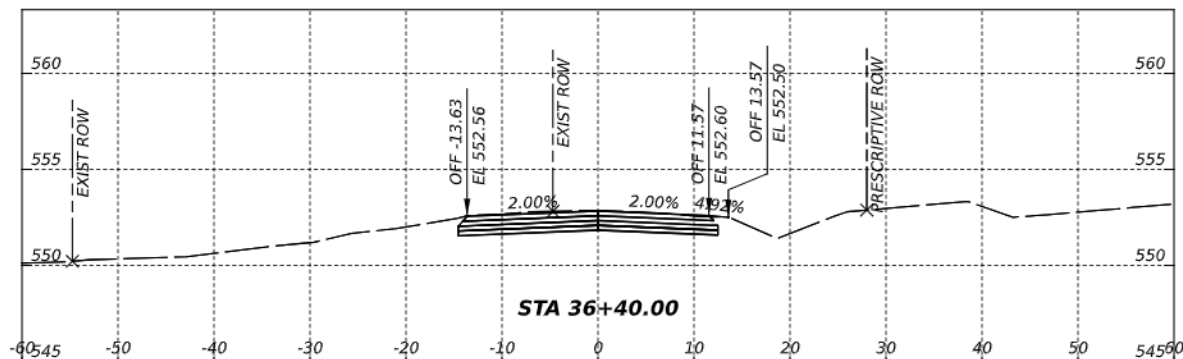
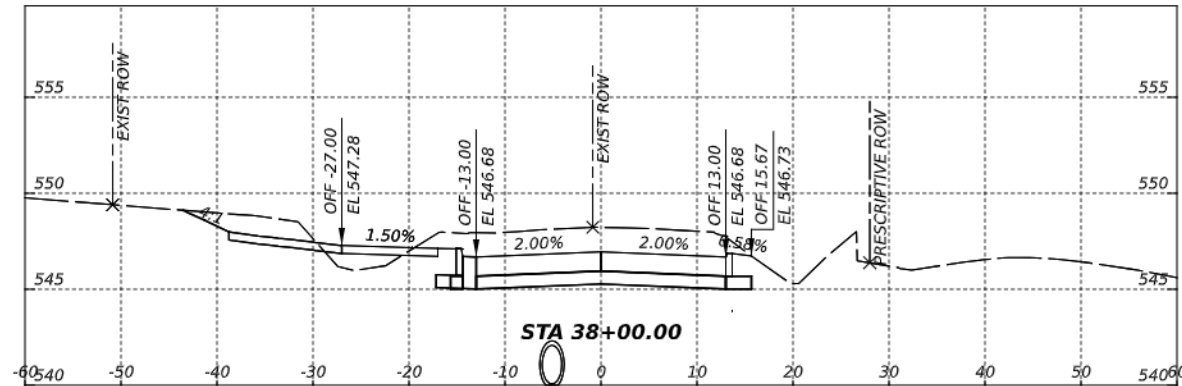
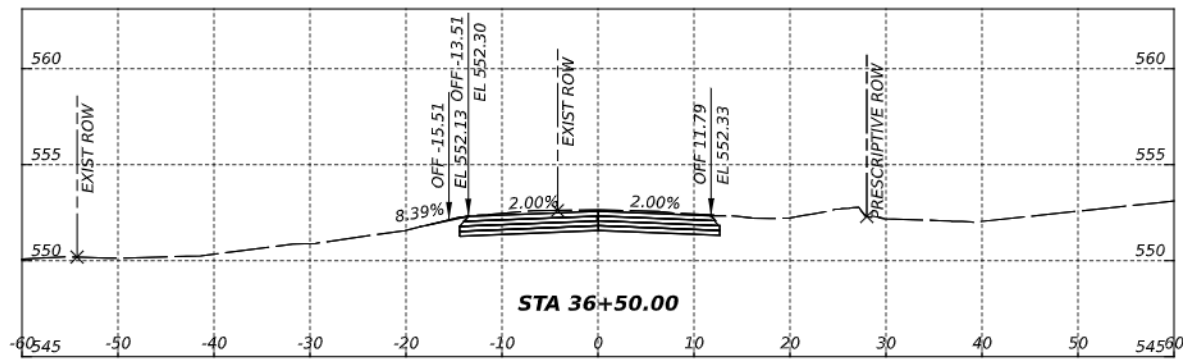
TEXAS DEPARTMENT OF TRANSPORTATION

EQUATIONS: NONE  
EXCEPTIONS: NONE  
RAILROAD CROSSINGS: NONE

DN: CC: DW: CP:



NOTE:  
FOR GRADING ELEVATIONS UNDER BRIDGES, REFER TO BRIDGE GRADING SHEETS.



David A. Burnett  
12-01-2025

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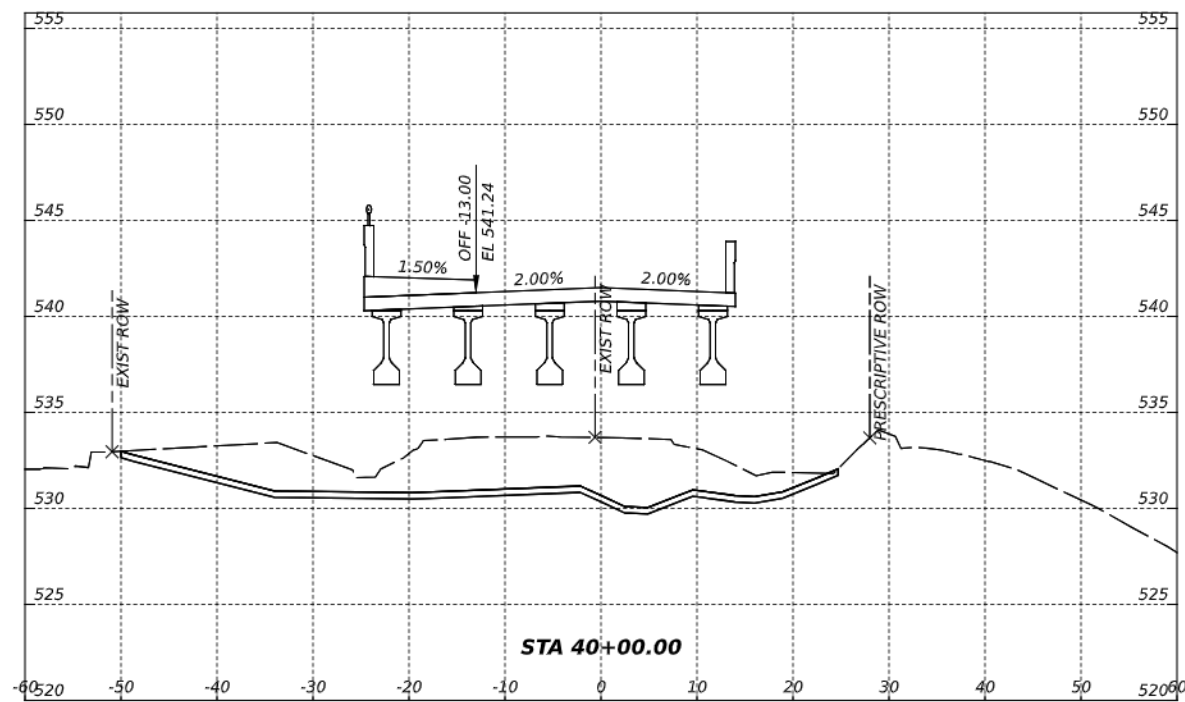
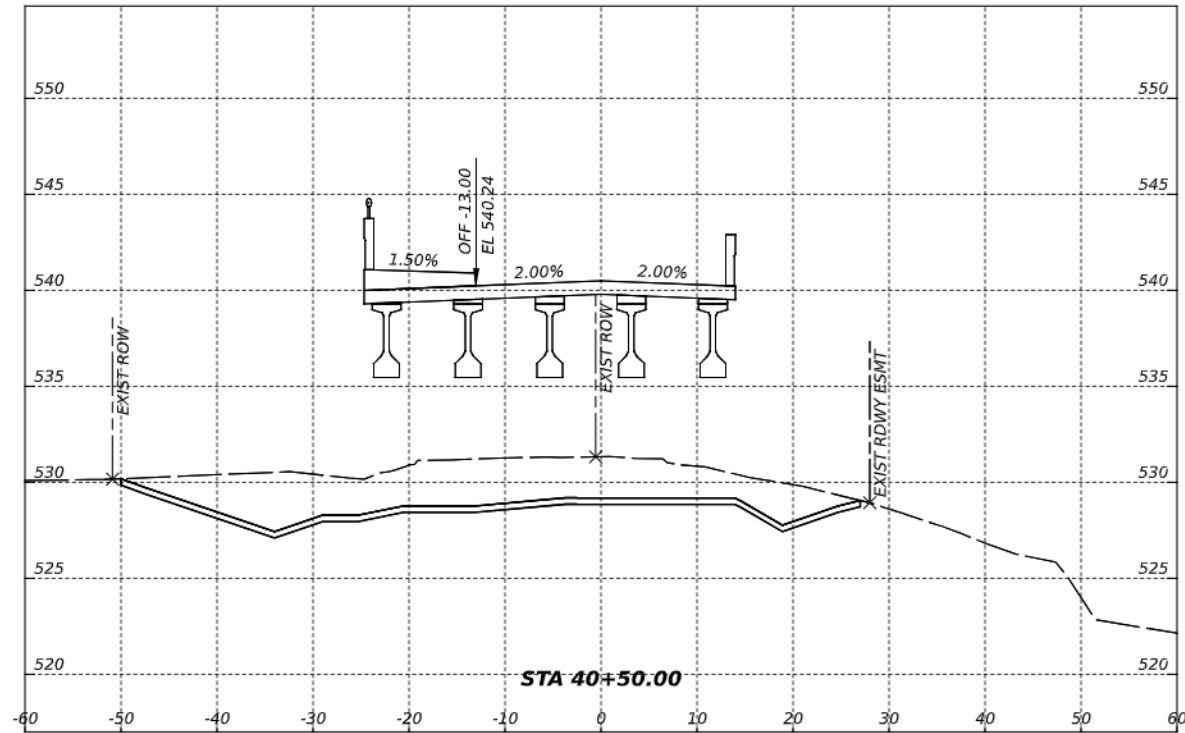
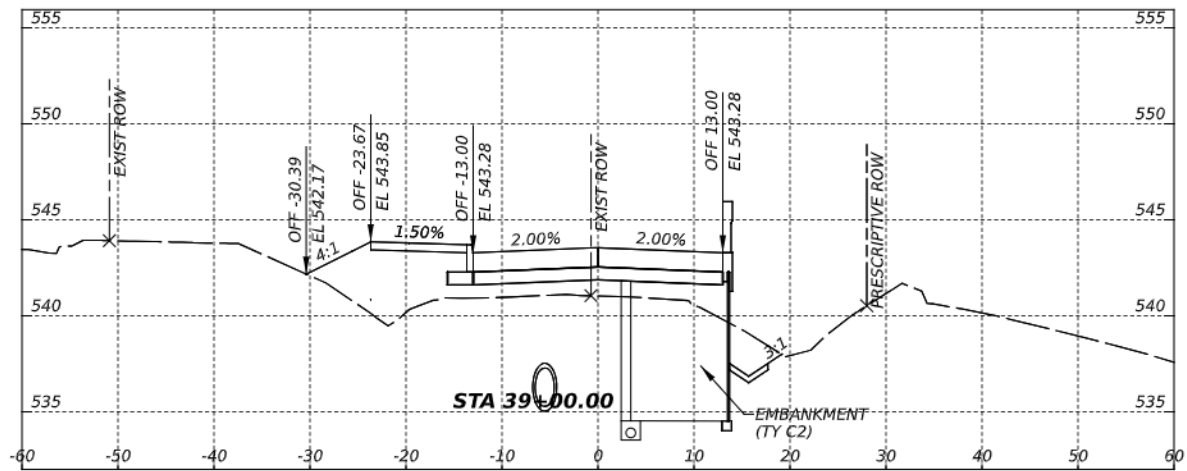
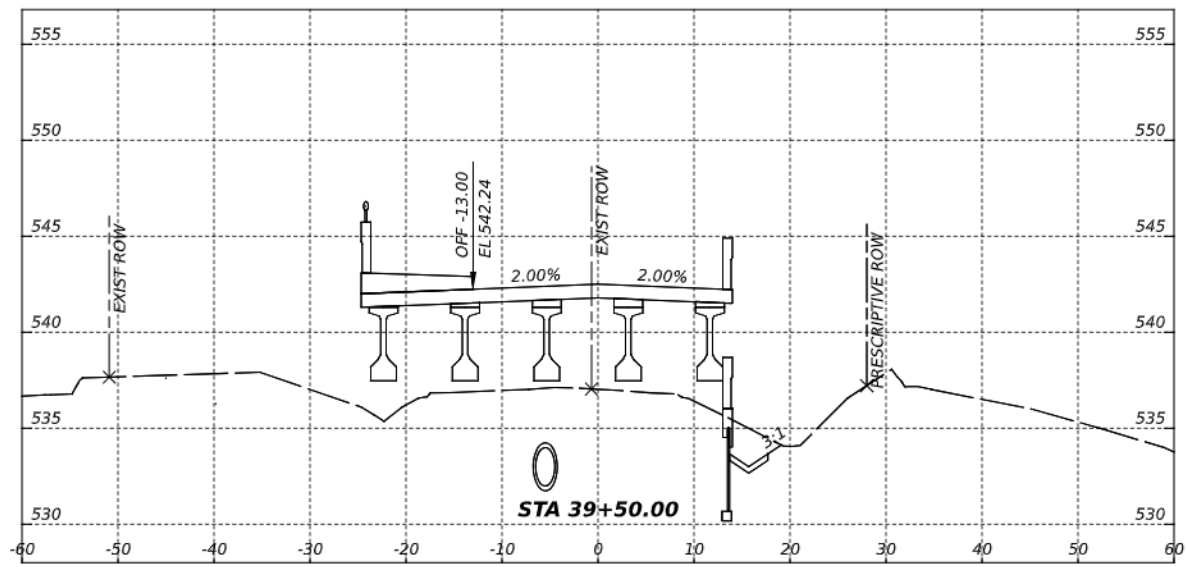
SHADY SHORES  
CROSS SECTIONS

SHEET 1 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	1	

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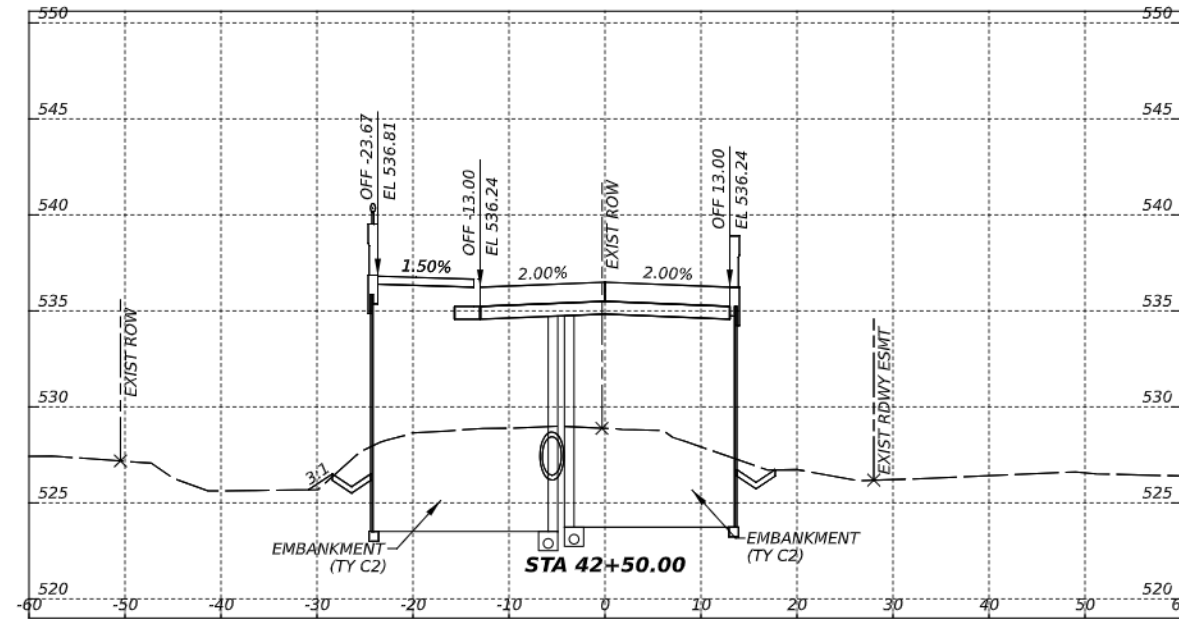
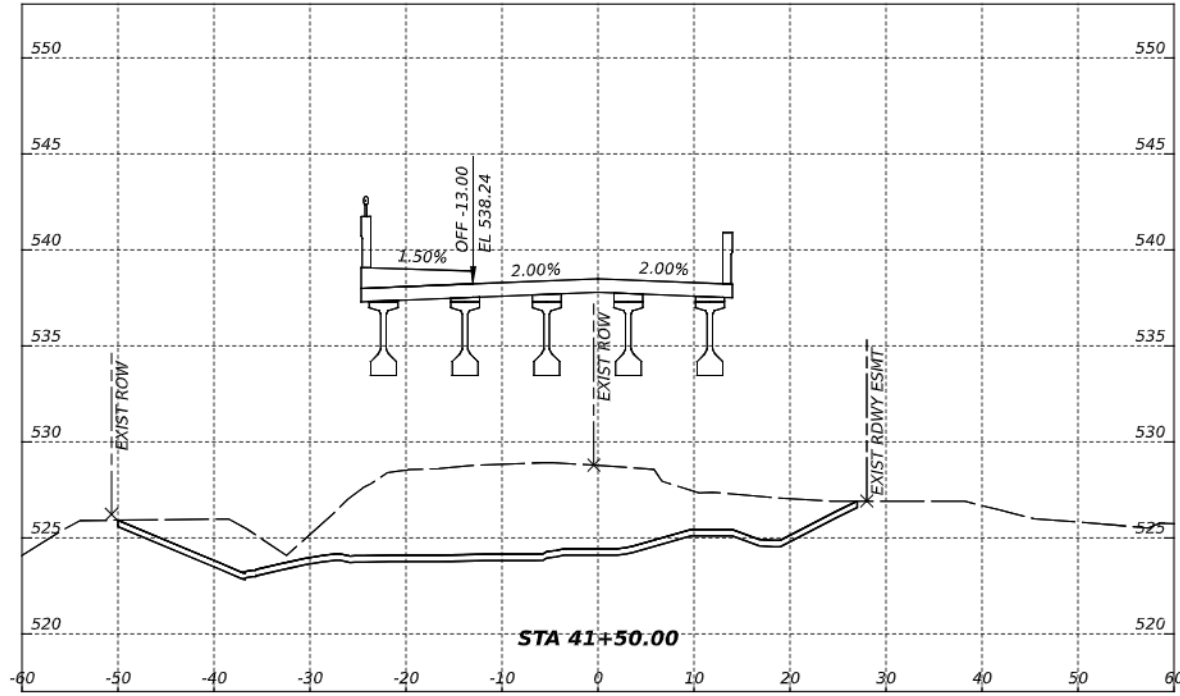


SHADY SHORES  
 CROSS SECTIONS

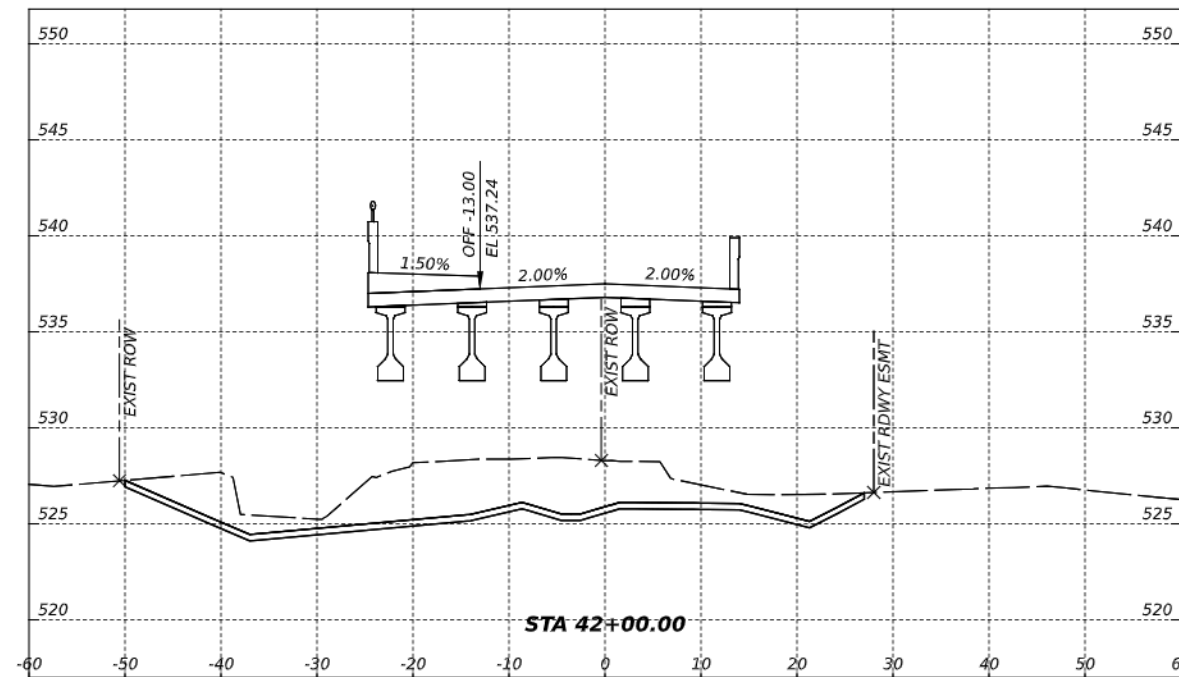
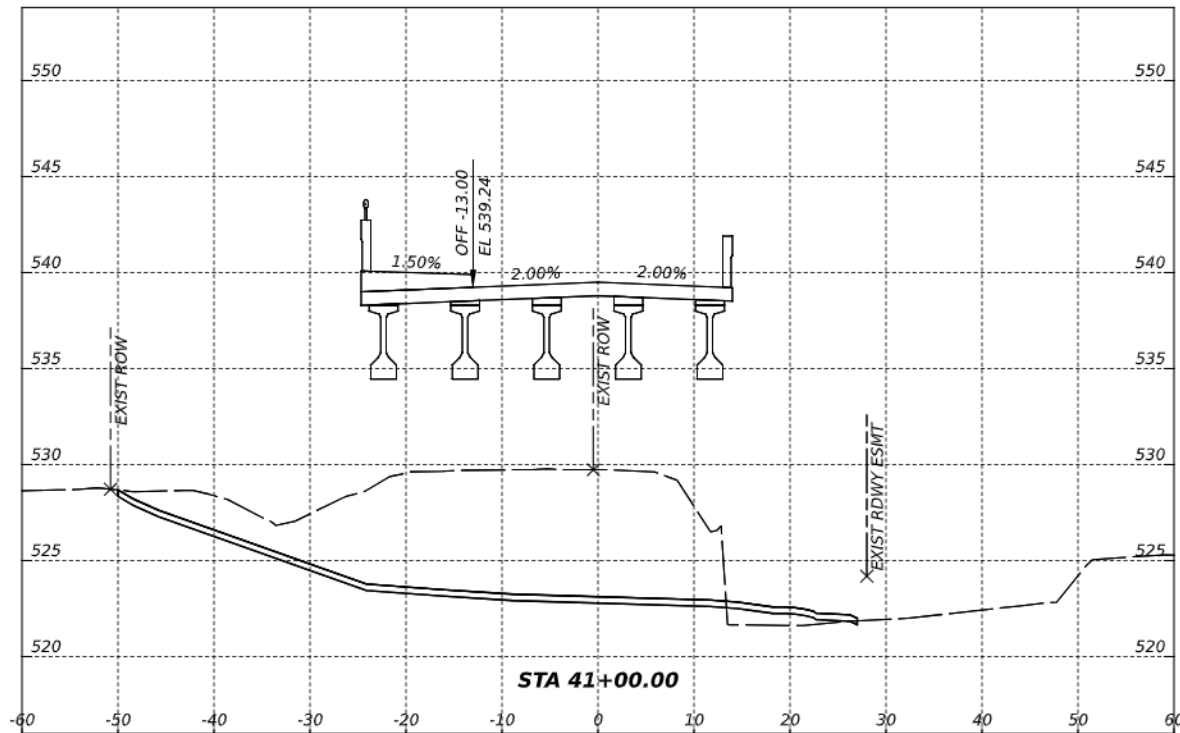
SHEET 2 OF 23

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0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	2	

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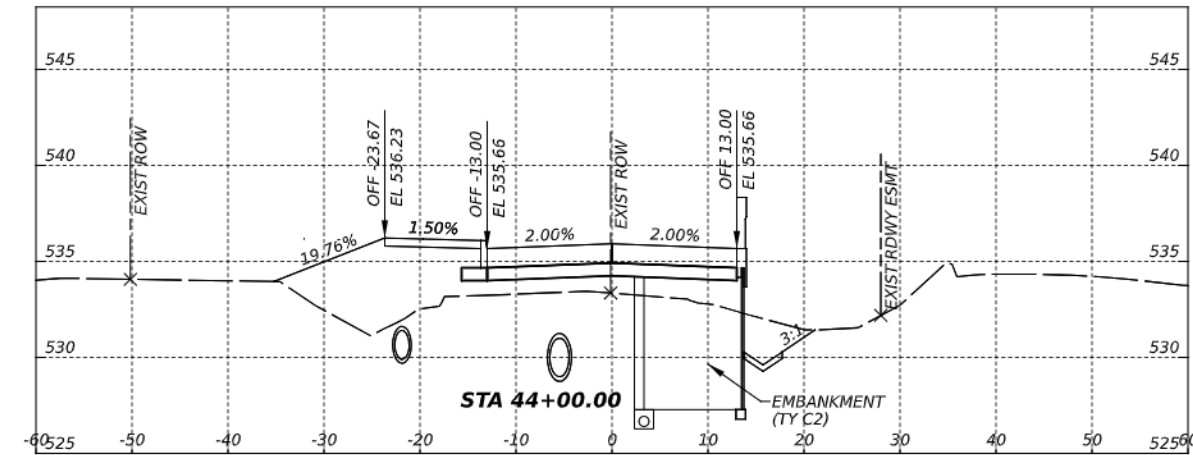
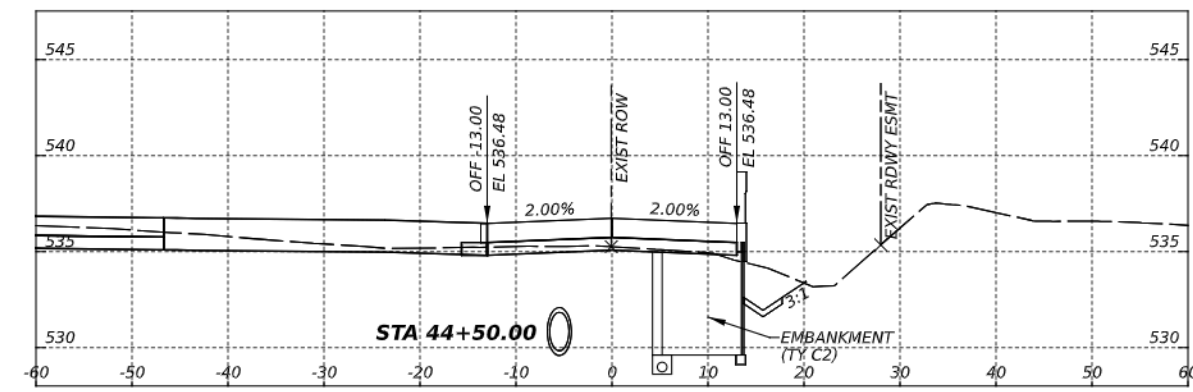
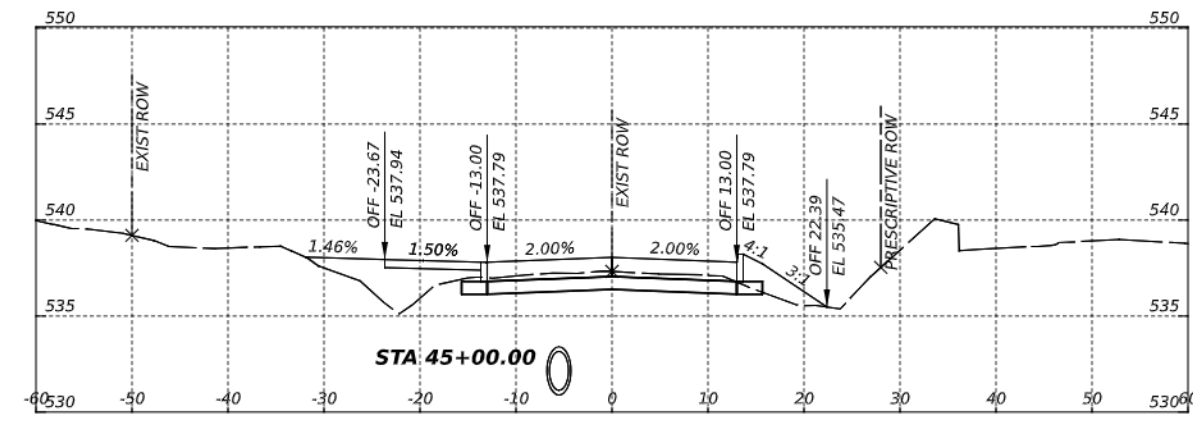
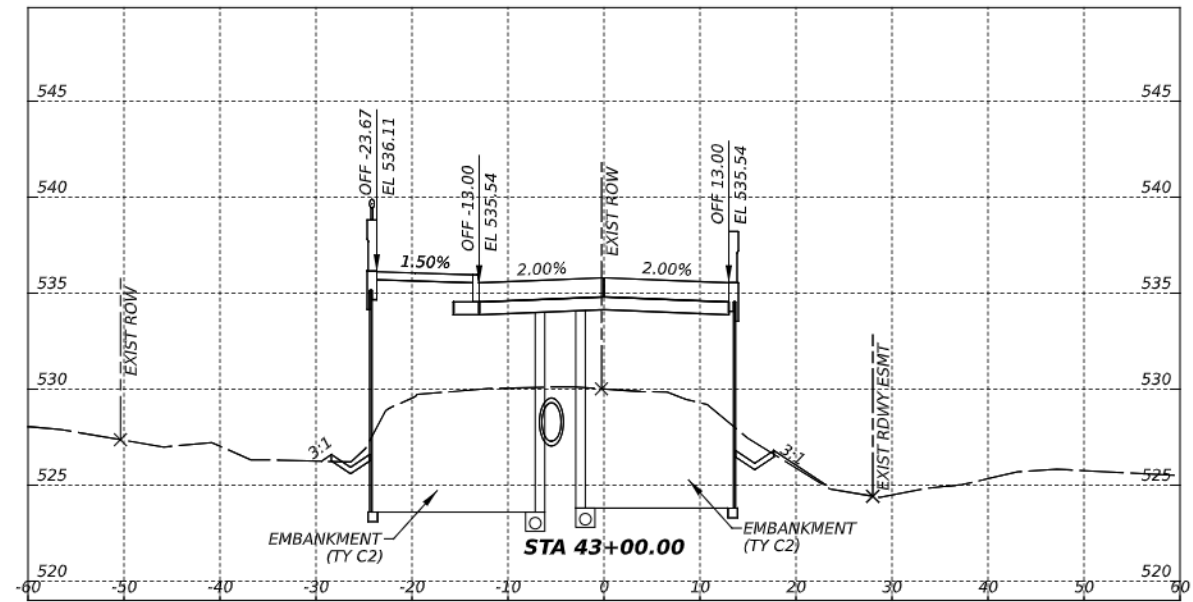
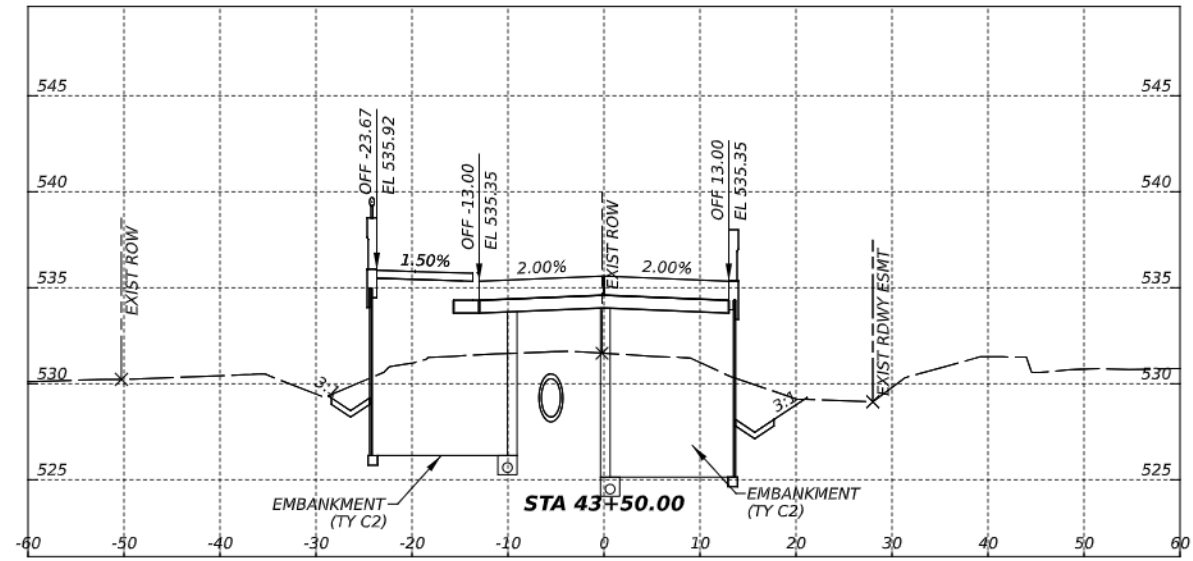


SHADY SHORES  
 CROSS SECTIONS

SHEET 3 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	3	

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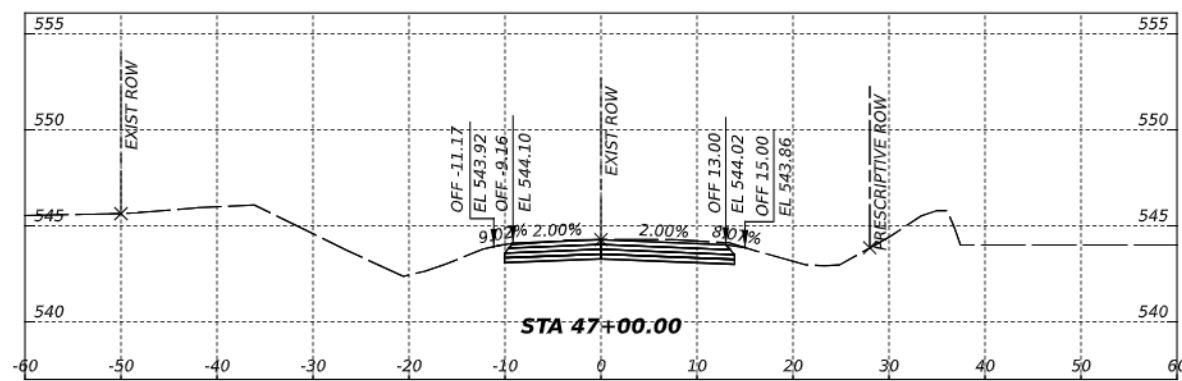
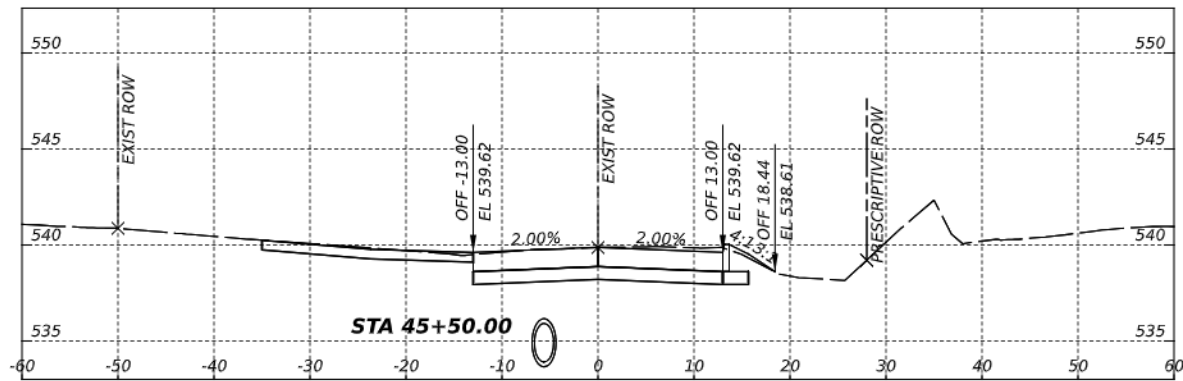
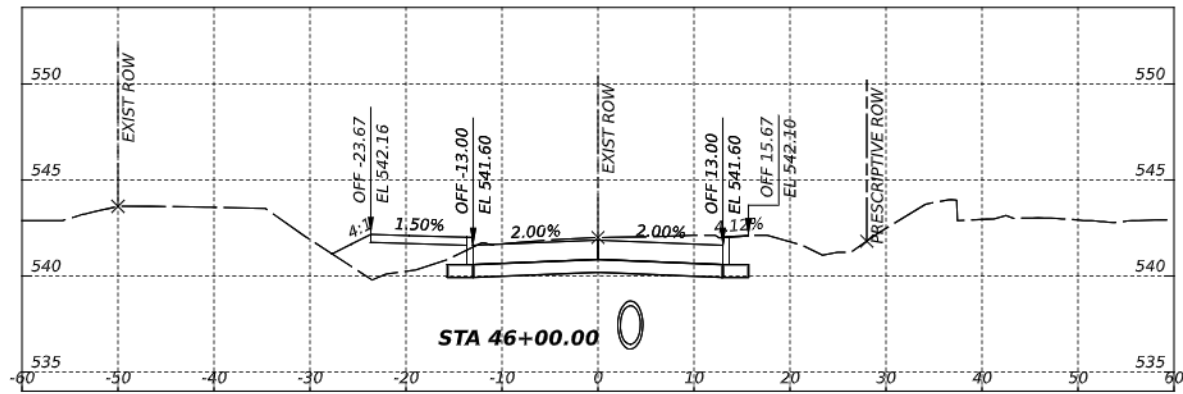
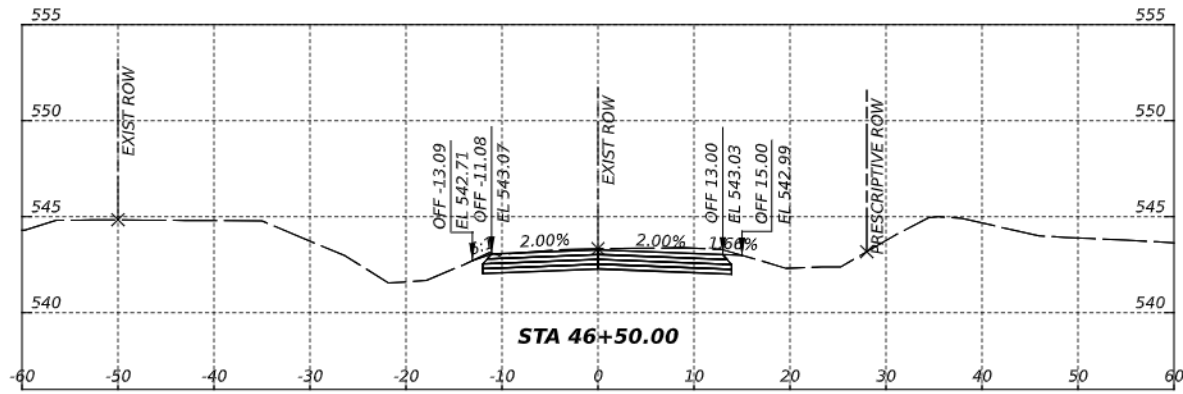
SHADY SHORES  
 CROSS SECTIONS

SHEET 4 OF 23

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0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	4	

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DN:  
 CC:  
 DW:  
 CF:



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 12-01-2025

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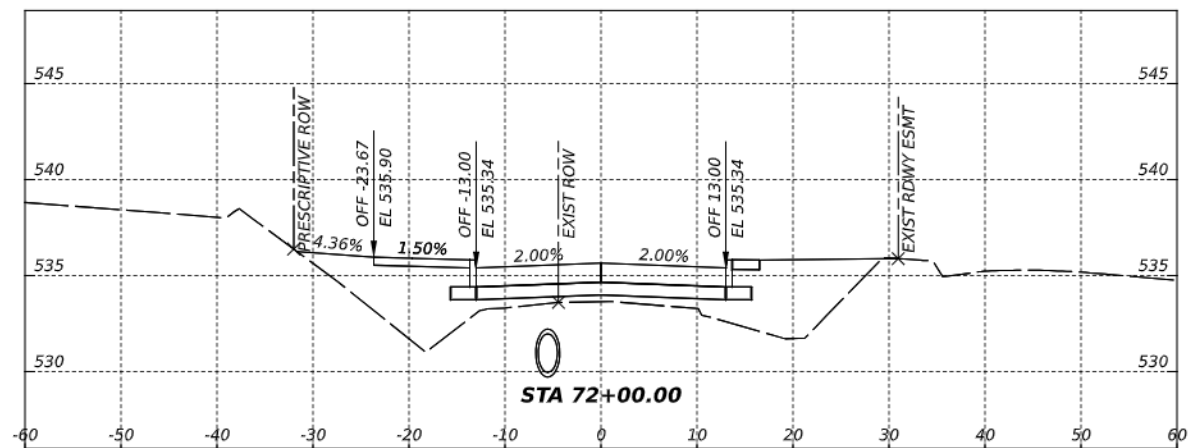
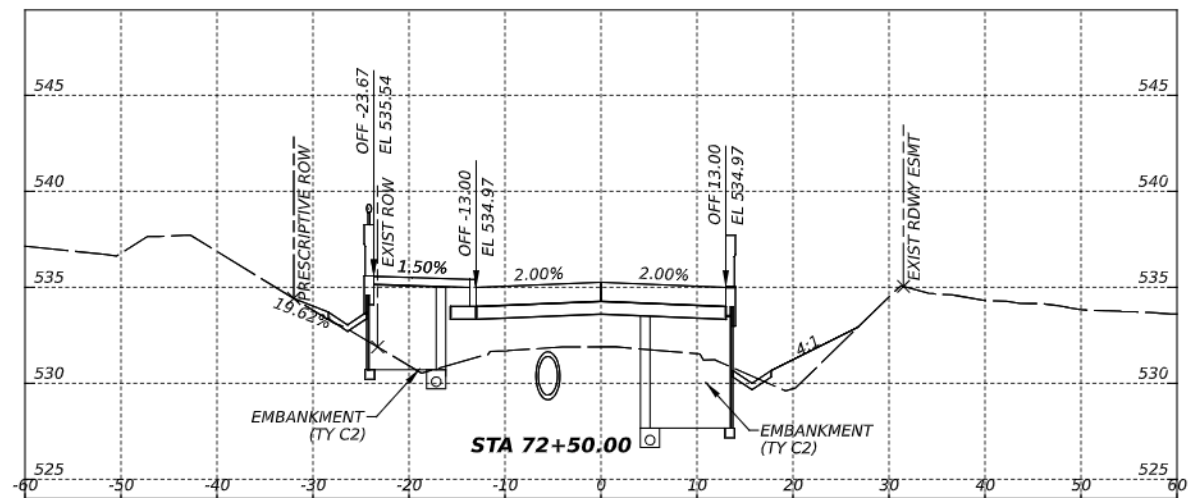
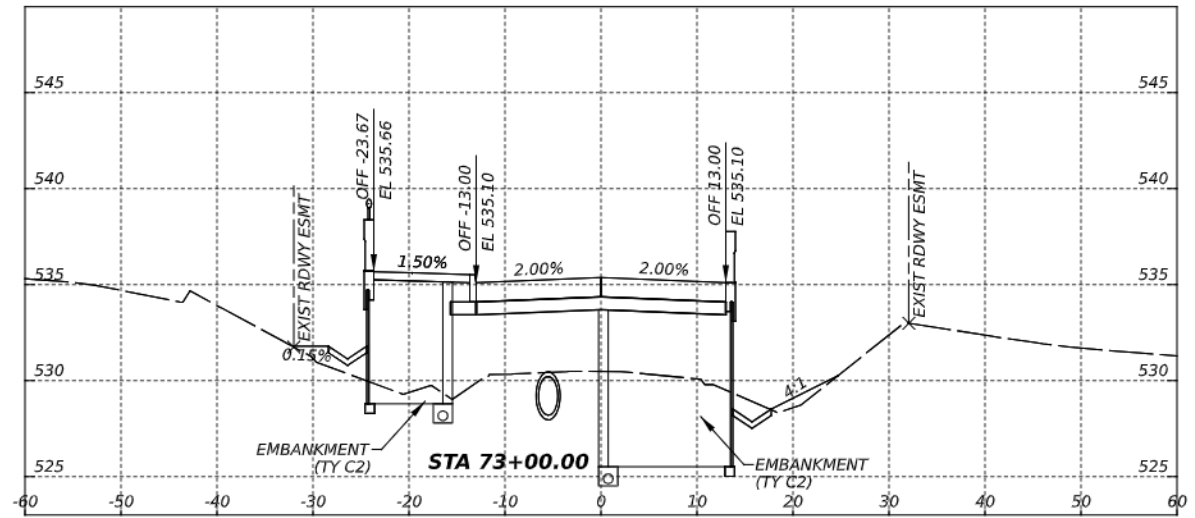
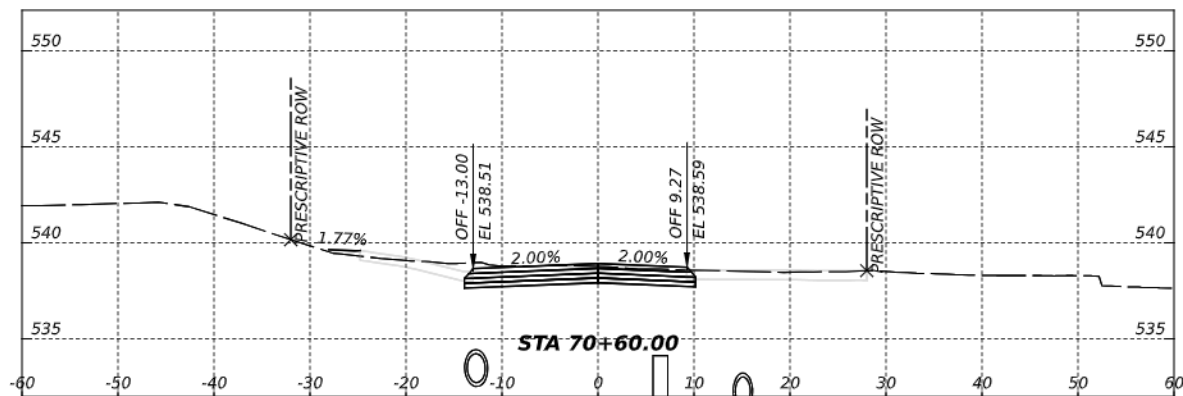
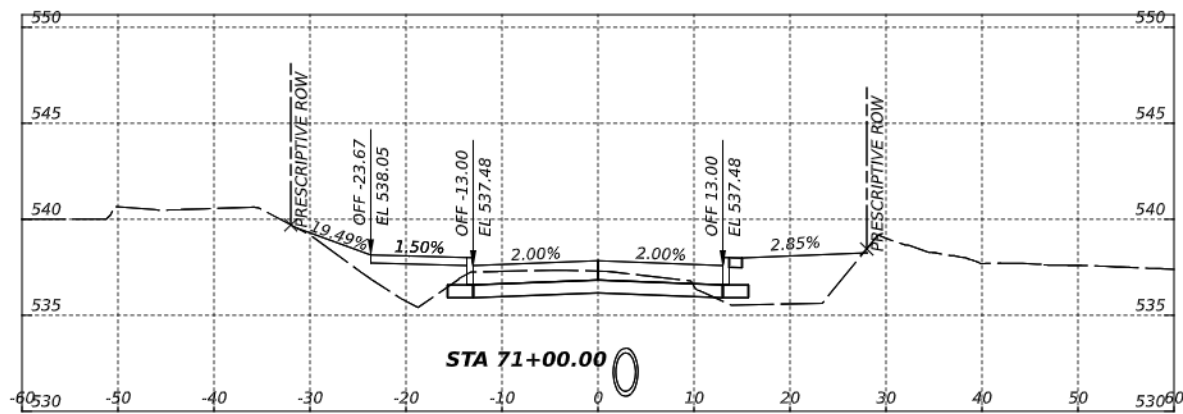
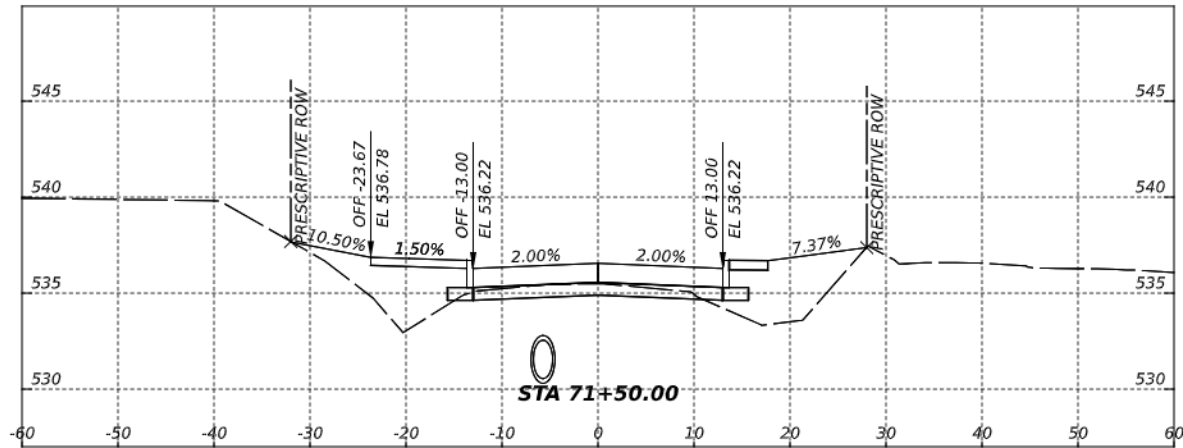


SHADY SHORES  
 CROSS SECTIONS

SHEET 5 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	5	

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NOTE:  
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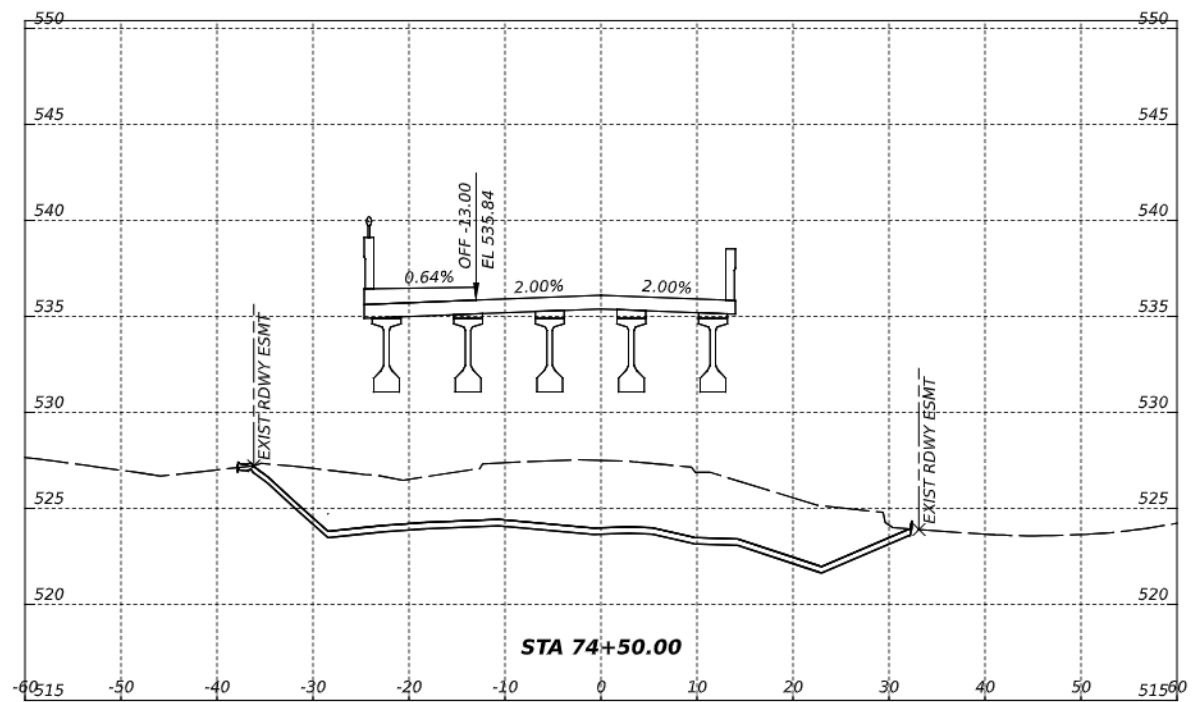
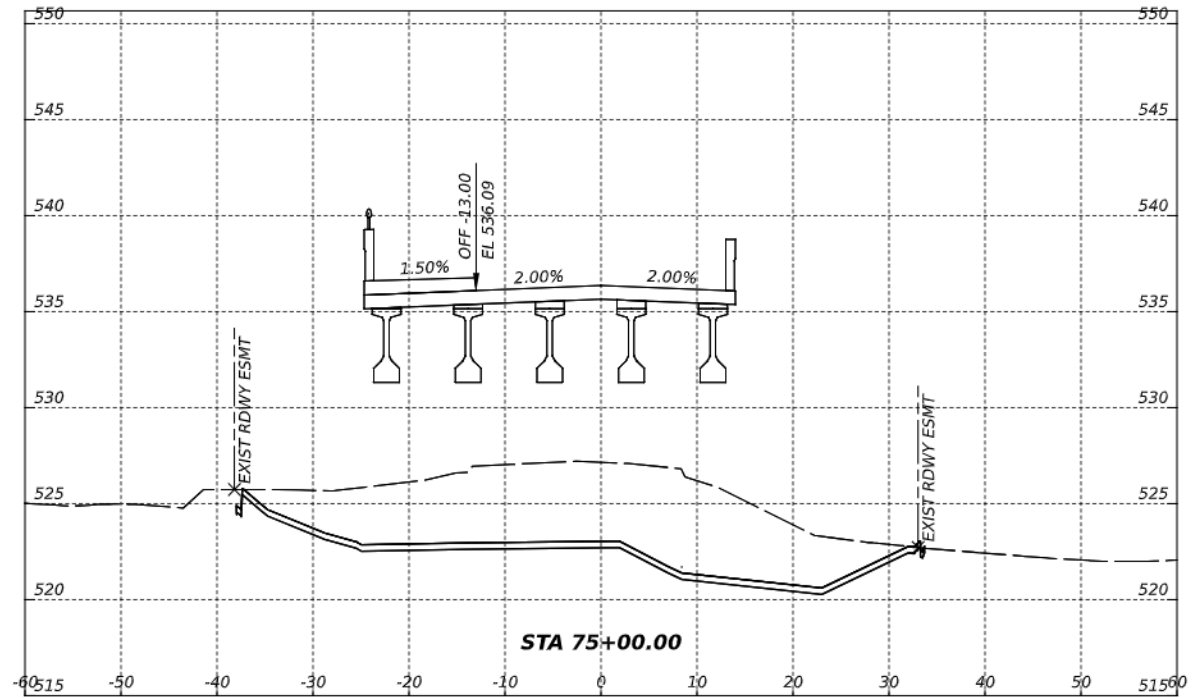
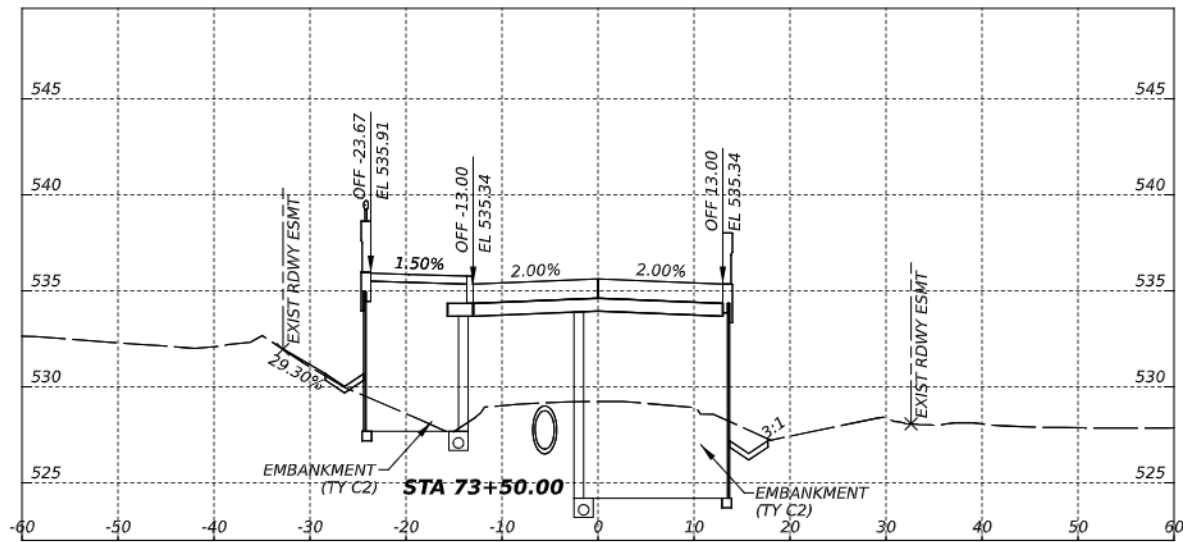
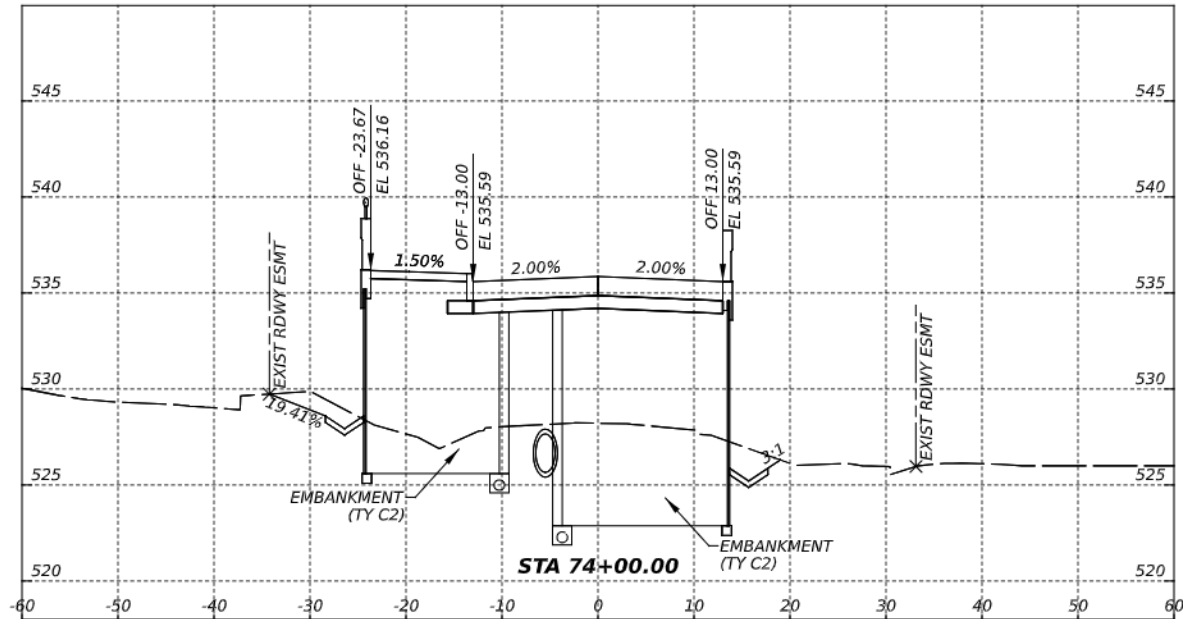
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SHADY SHORES  
 CROSS SECTIONS

SHEET 6 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	6	



NOTE:  
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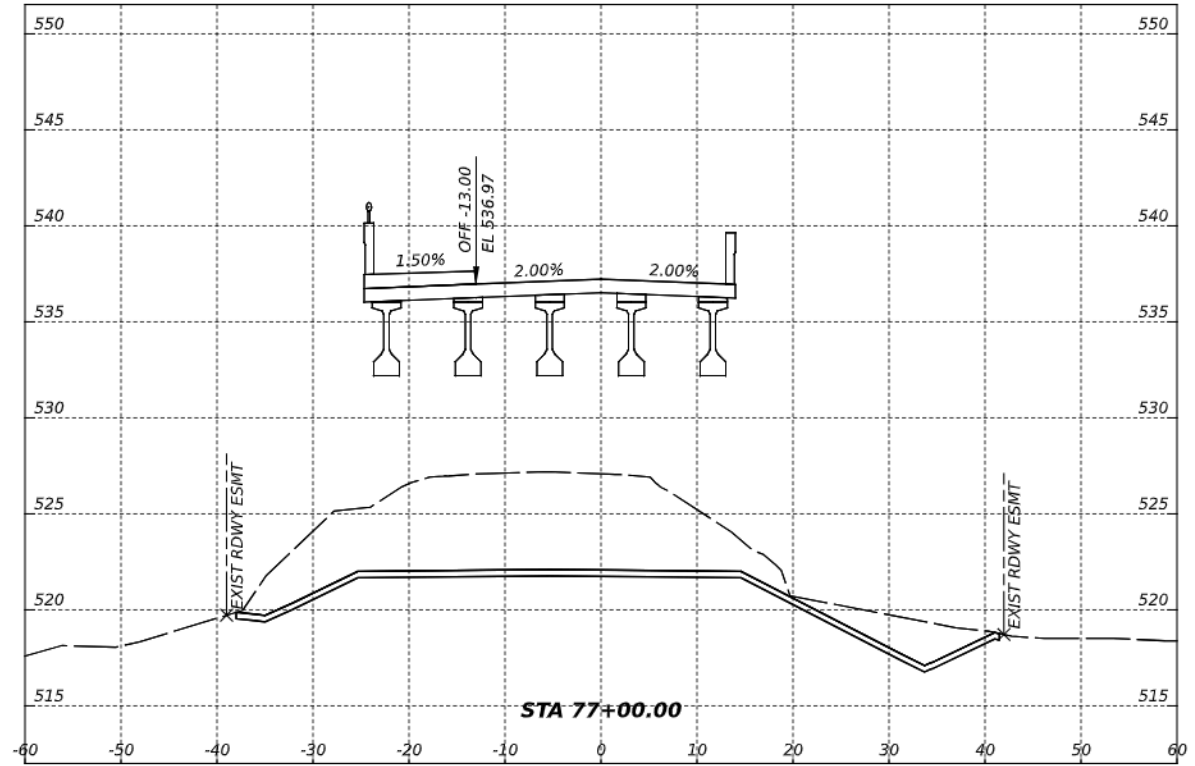
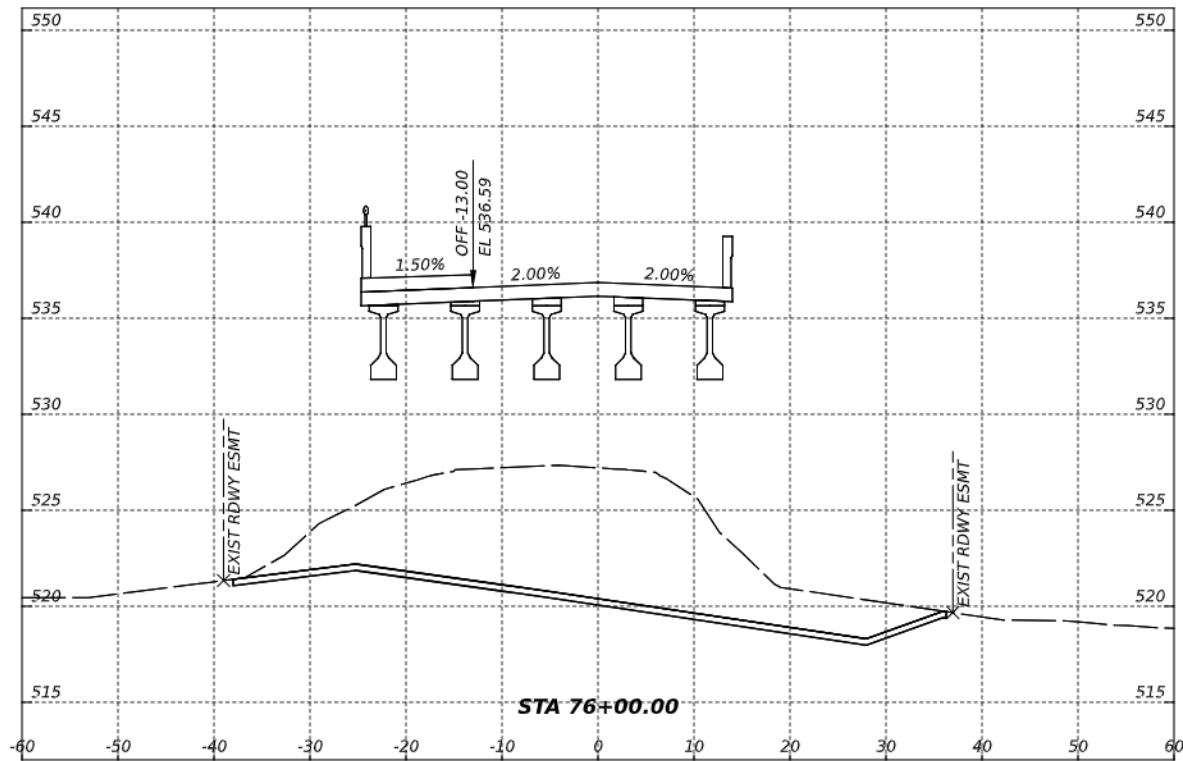
SHADY SHORES  
 CROSS SECTIONS

SHEET 7 OF 23

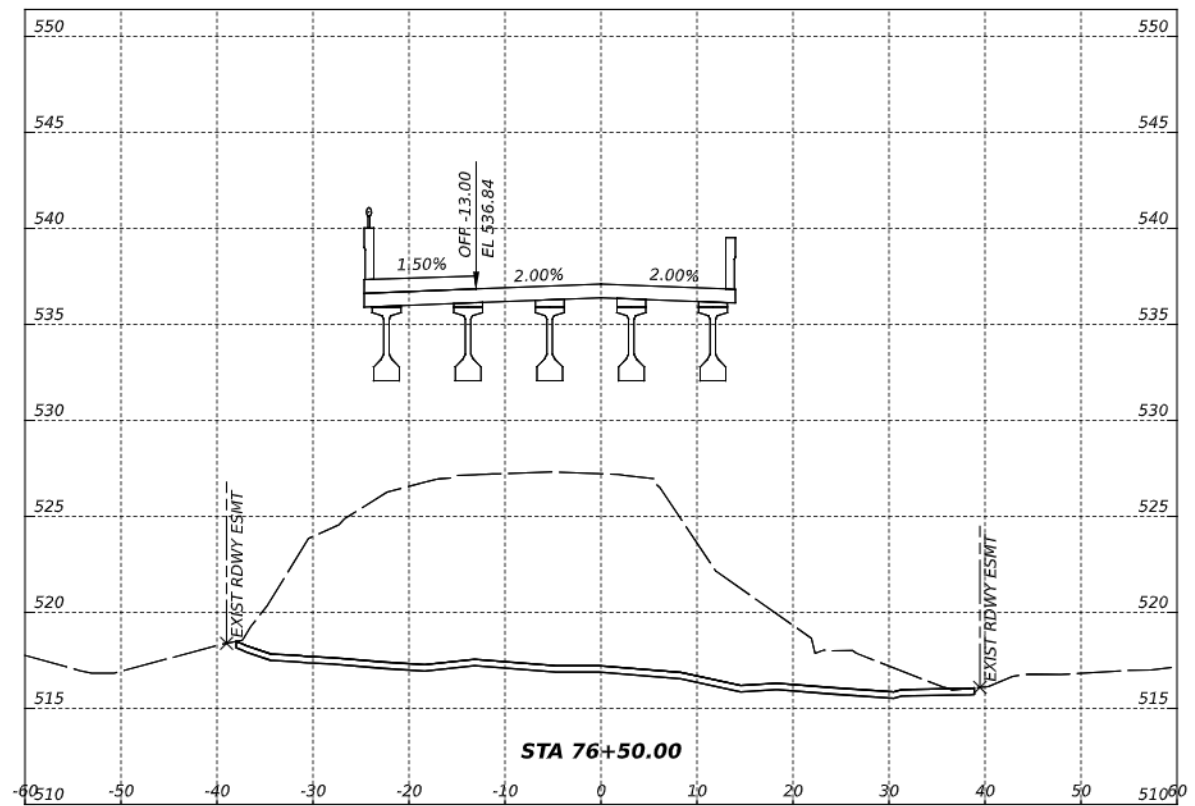
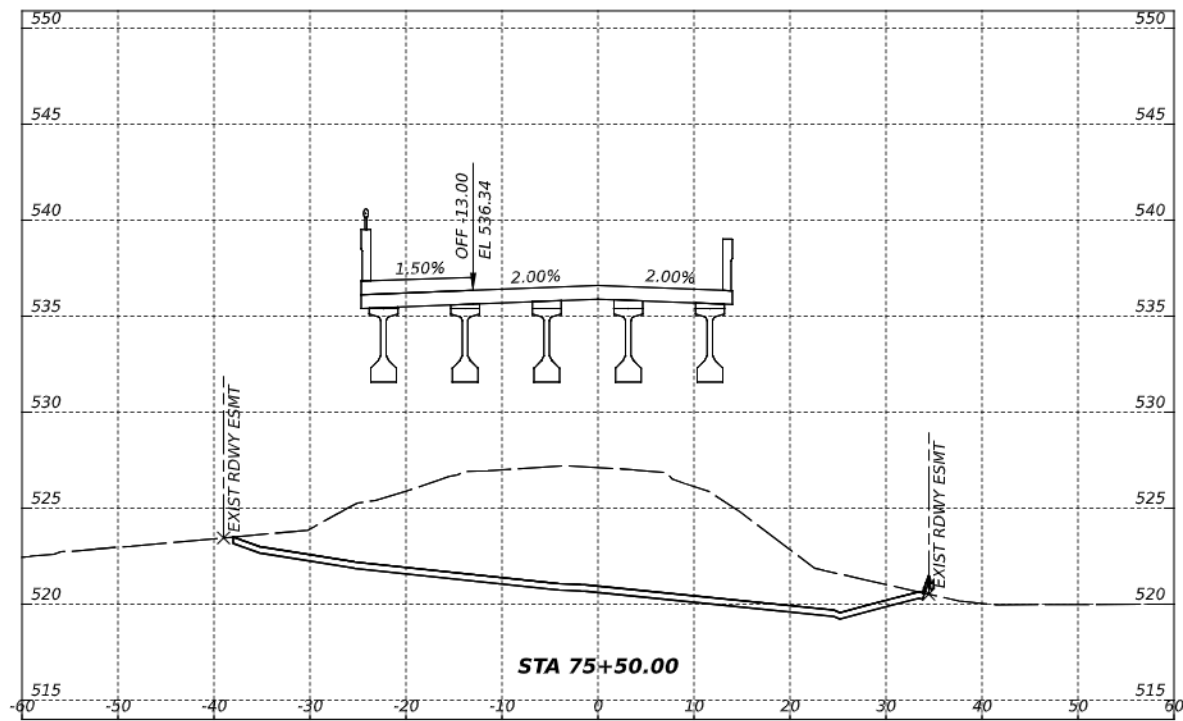
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0918	46	316	VA
DIST	COUNTY		SHEET NO.
DAL	DENTON		7

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CC:  
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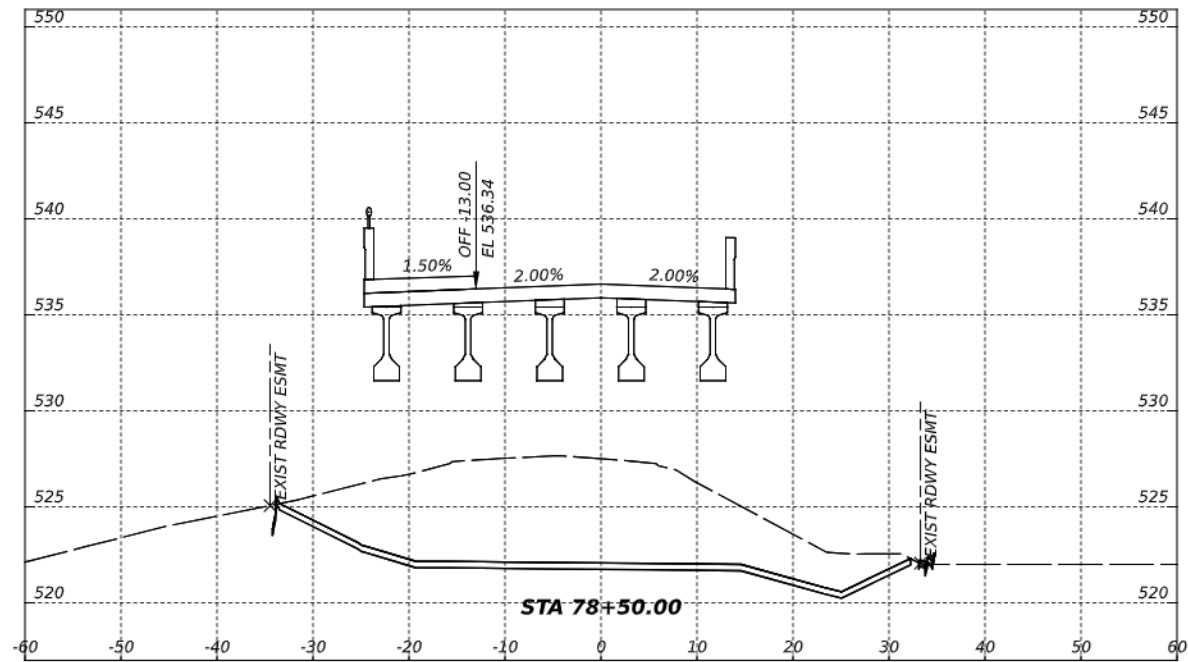
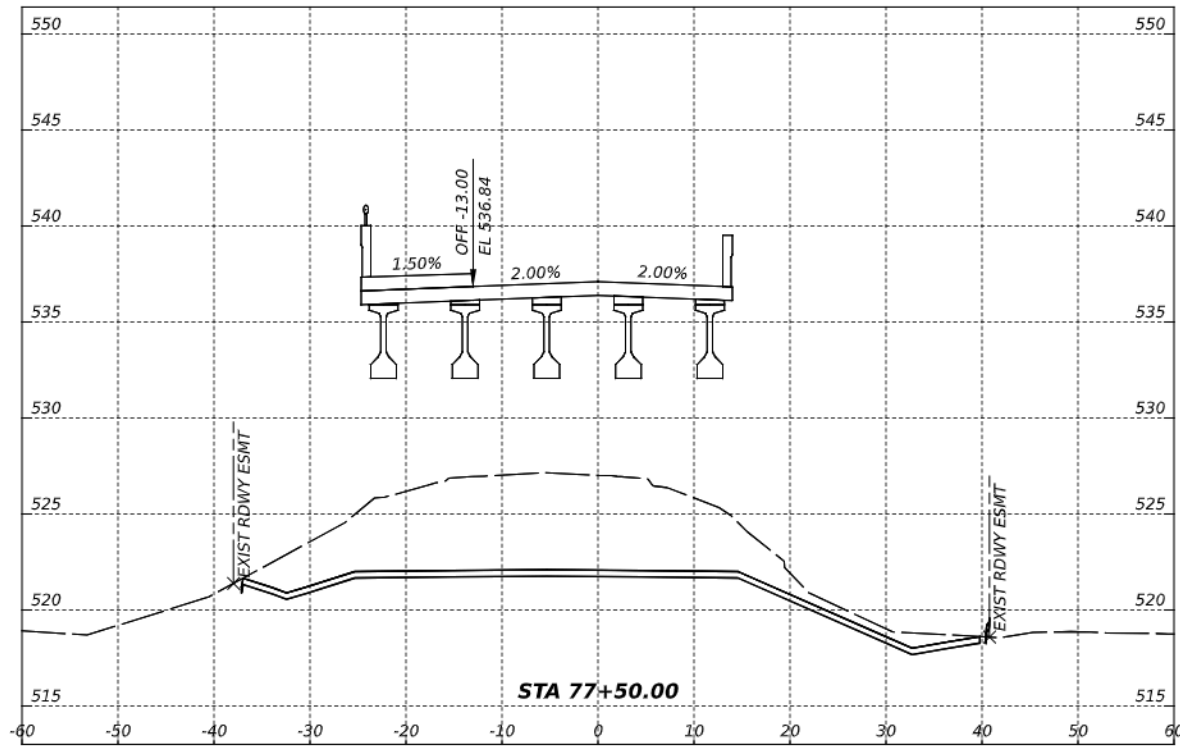
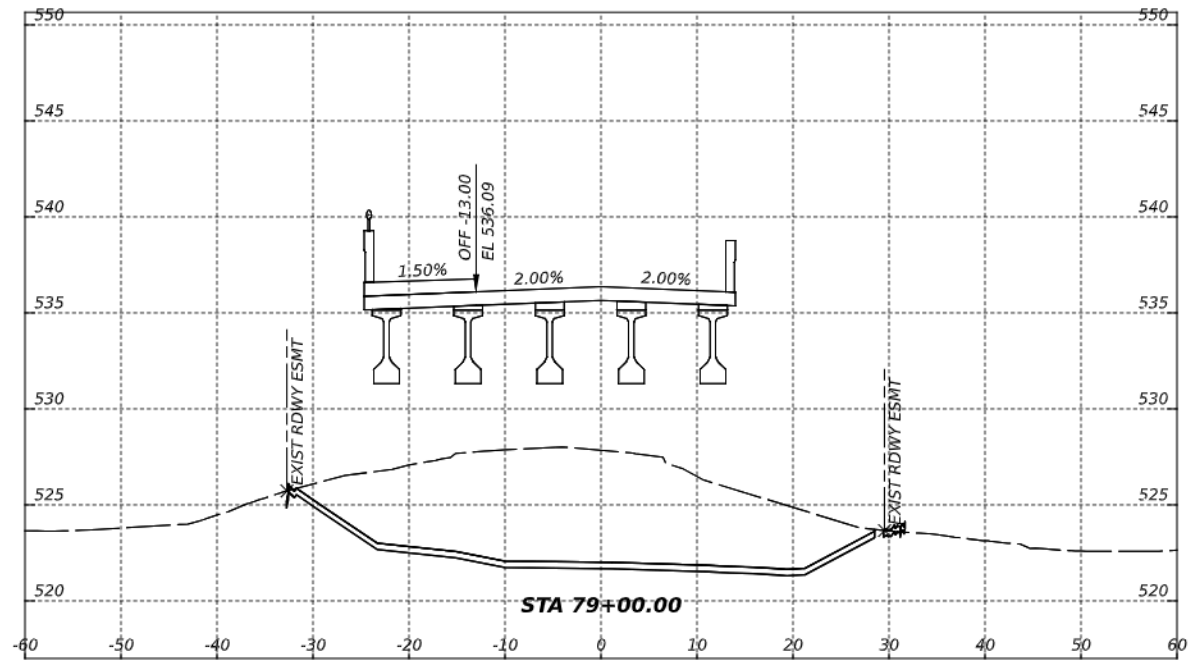
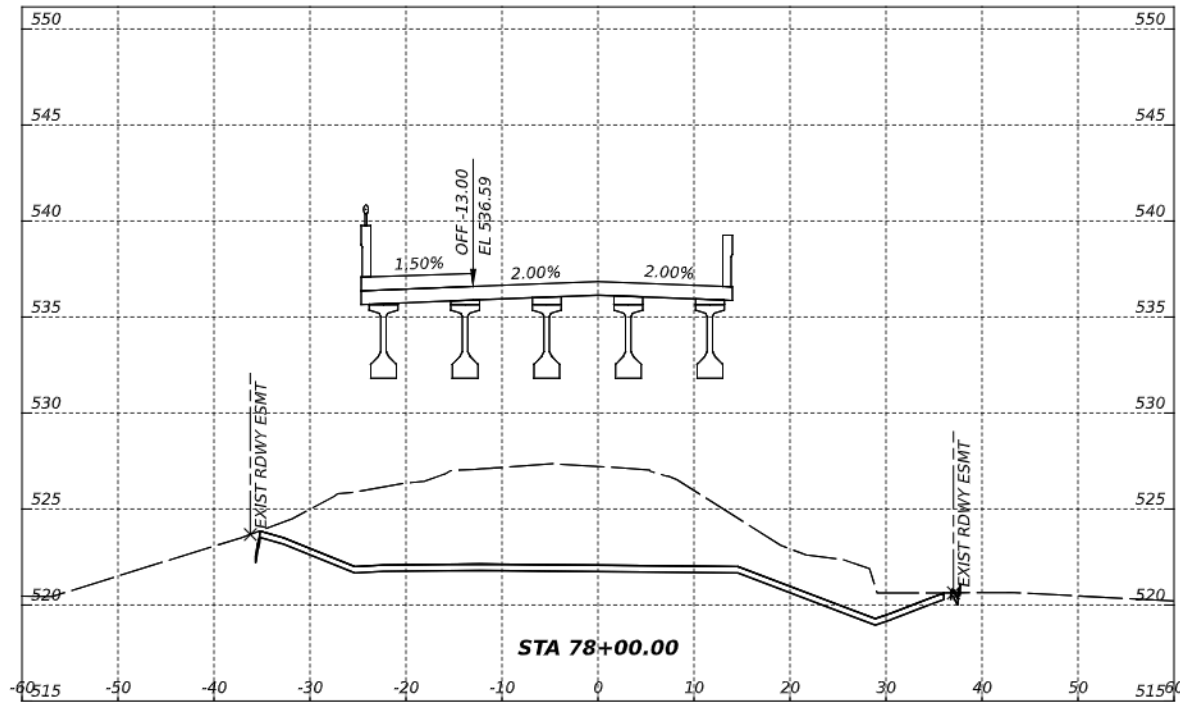
Texas Department of Transportation

**SHADY SHORES**

**CROSS SECTIONS**

SHEET 8 OF 23			
CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST		COUNTY	SHEET NO.
DAL		DENTON	8

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 12-01-2025

TBPELS FIRM #312

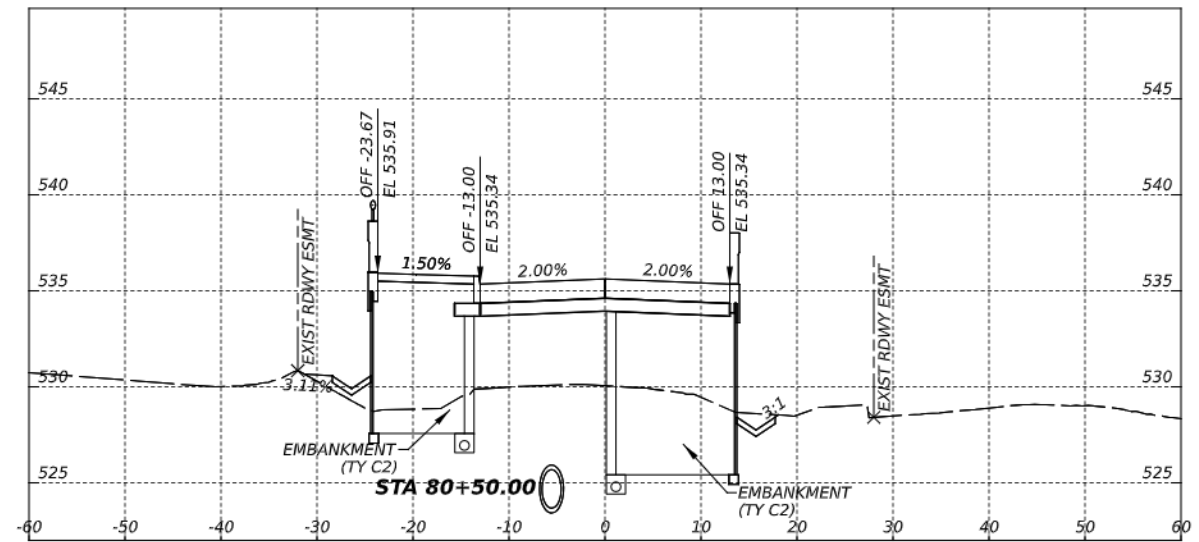
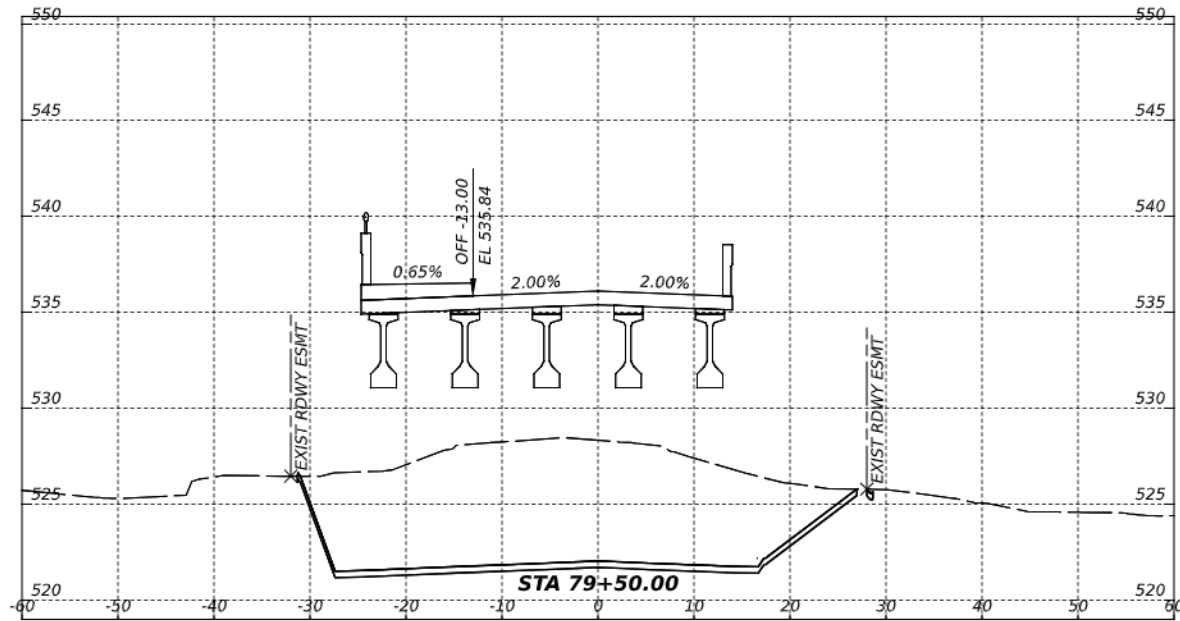
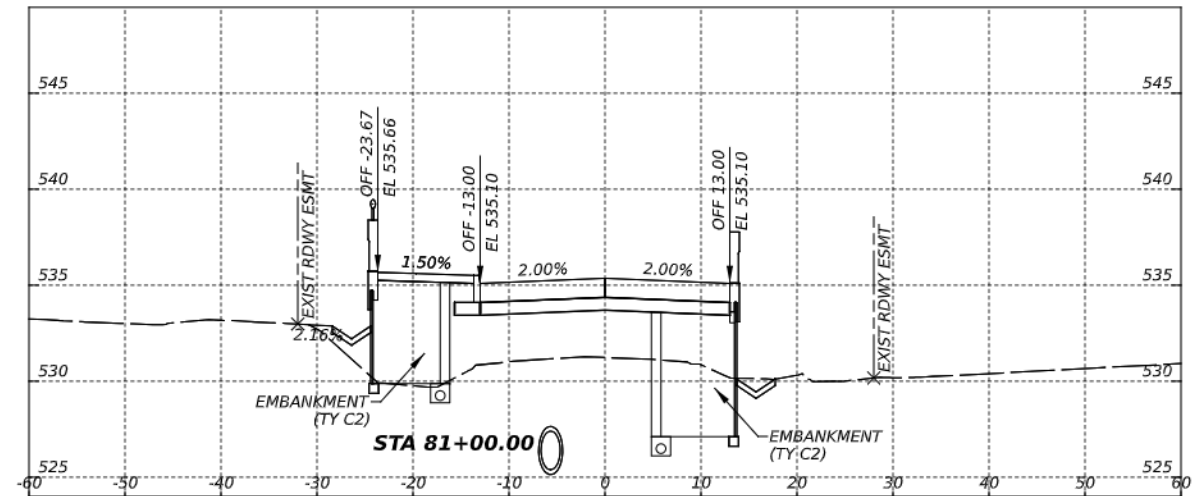
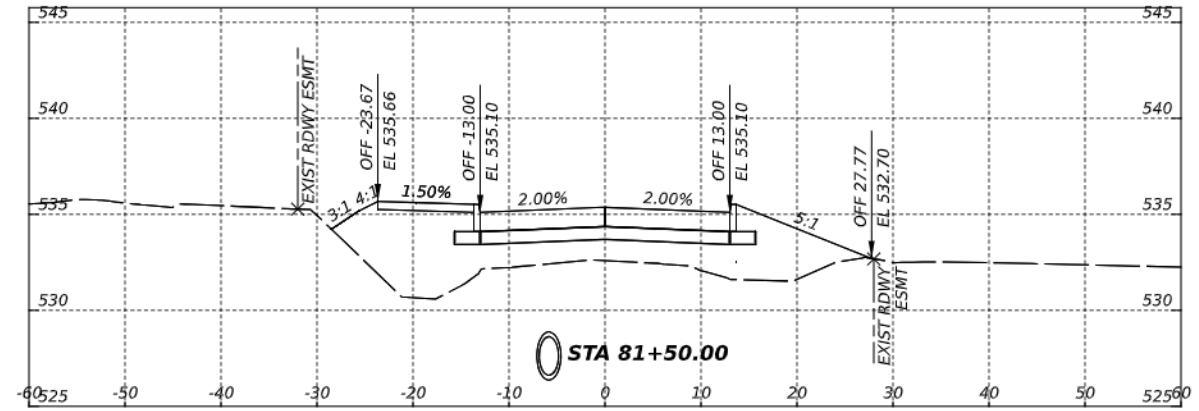
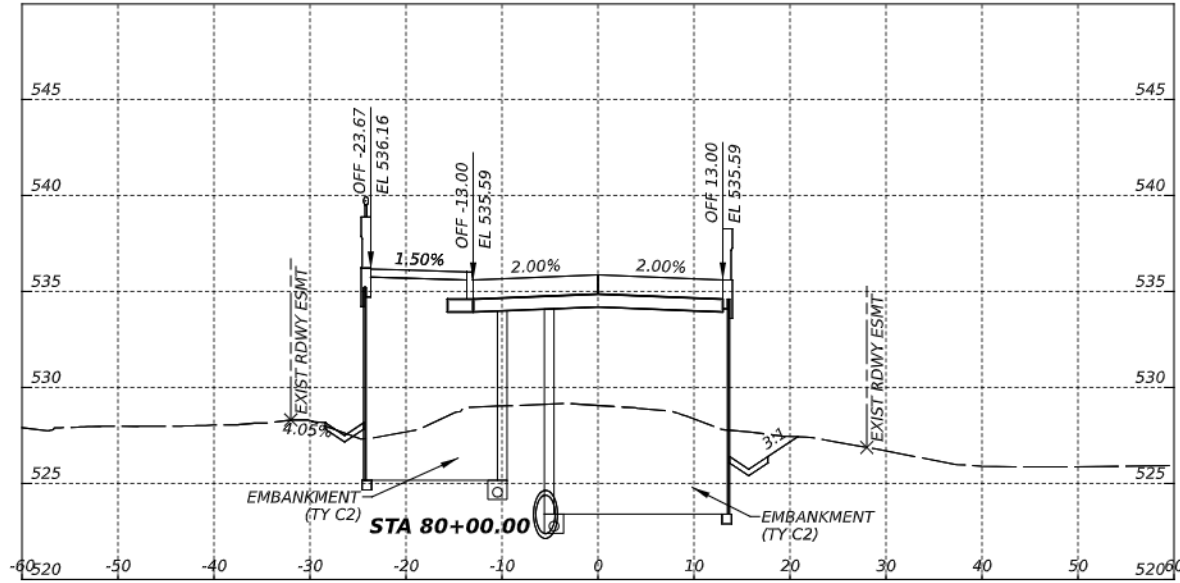


SHADY SHORES  
 CROSS SECTIONS

SHEET 9 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY		SHEET NO.
DAL	DENTON		9

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NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



David A. Burnett  
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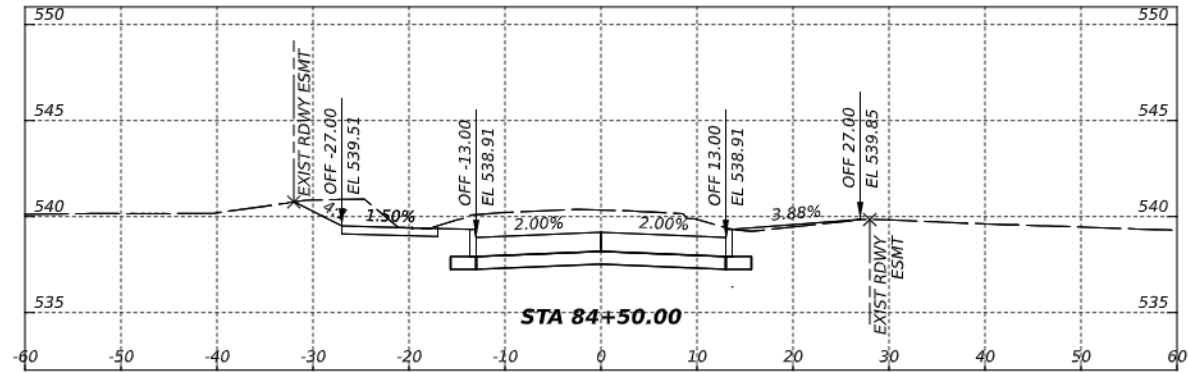
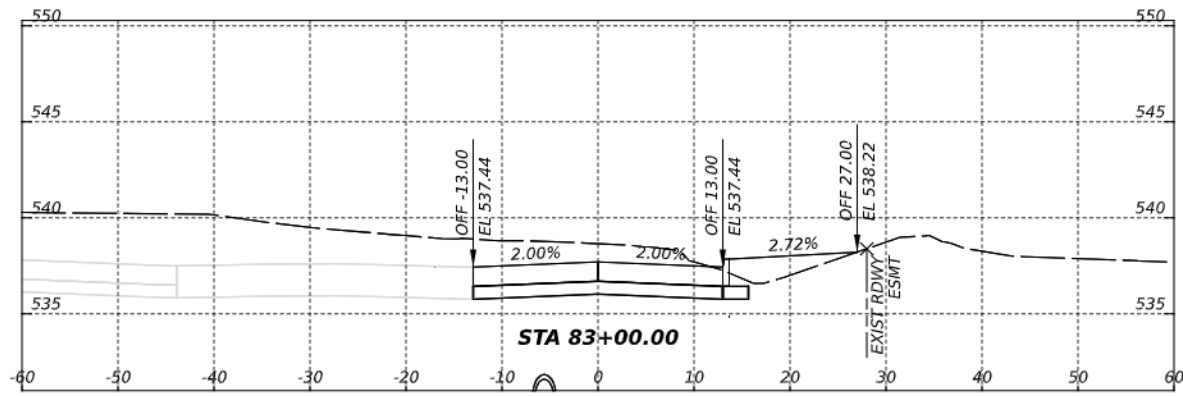
TBPELS FIRM #312



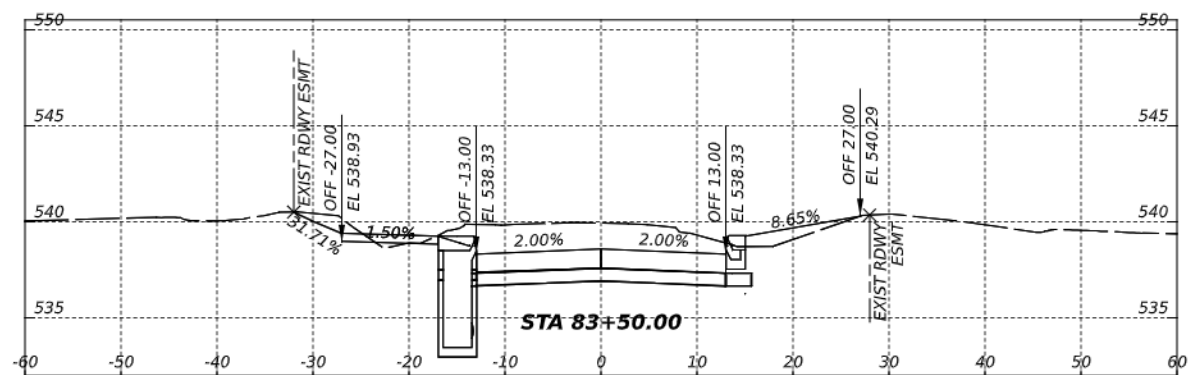
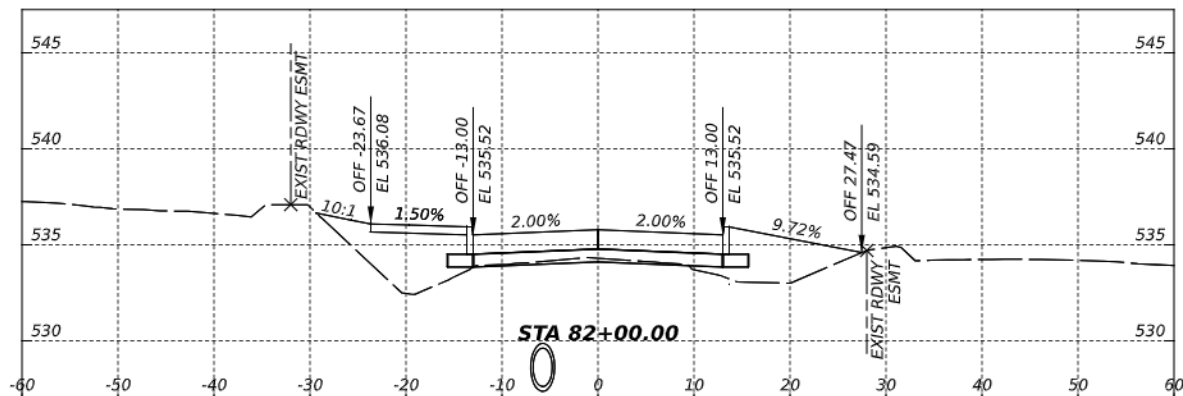
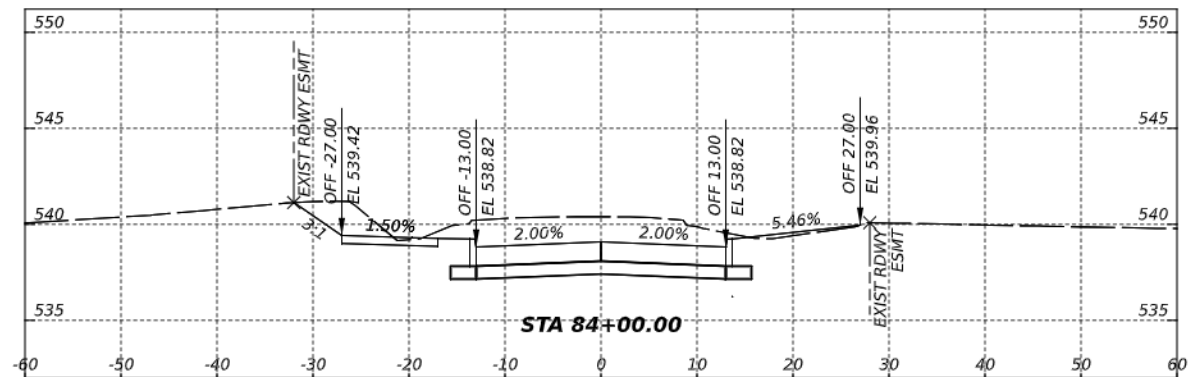
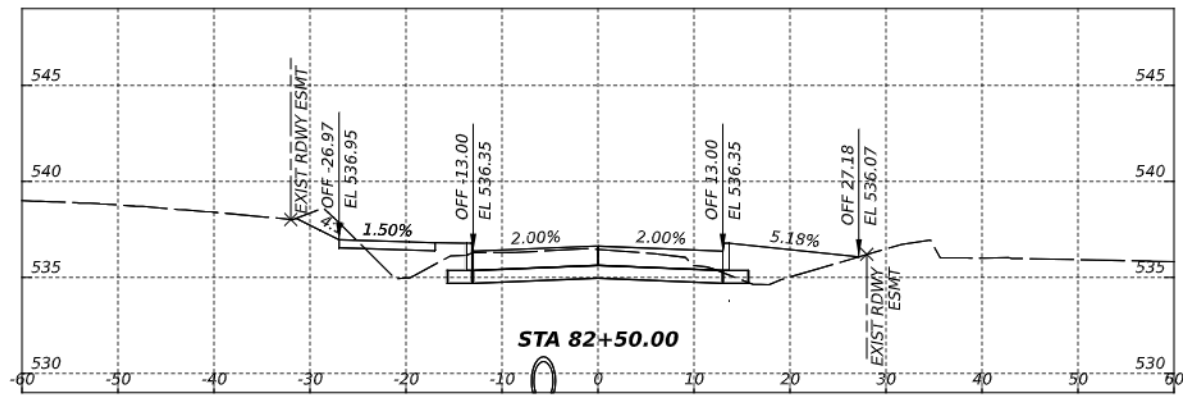
SHADY SHORES  
 CROSS SECTIONS

SHEET 10 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	10	



NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



David A. Burnett  
 12-01-2025

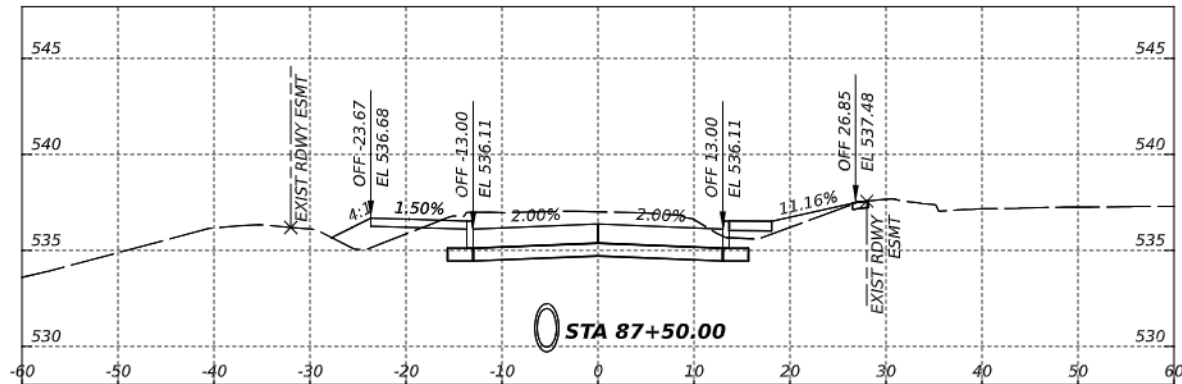
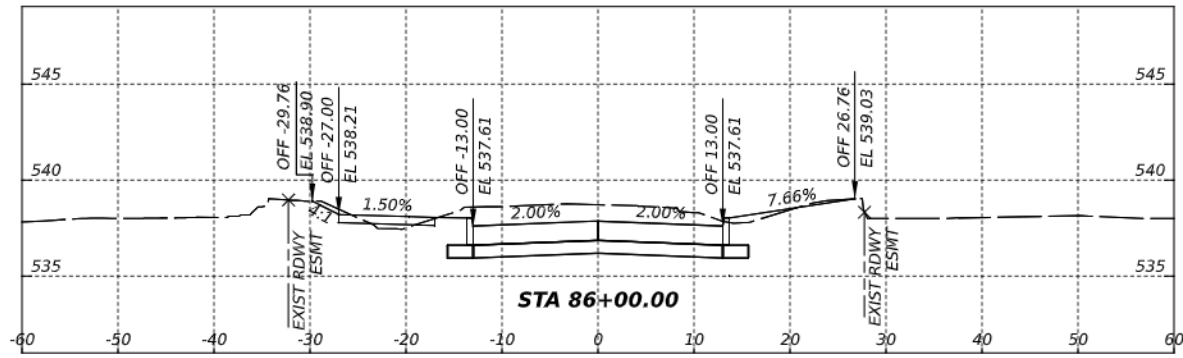
TBPELS FIRM #312



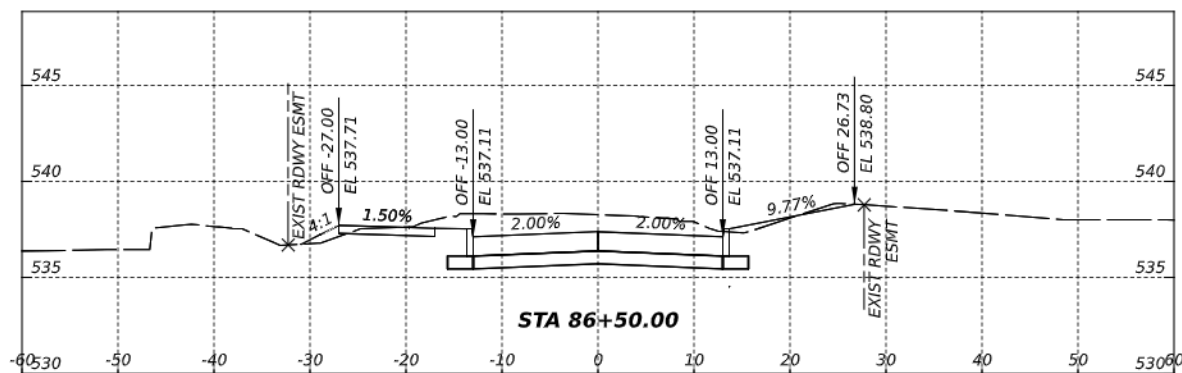
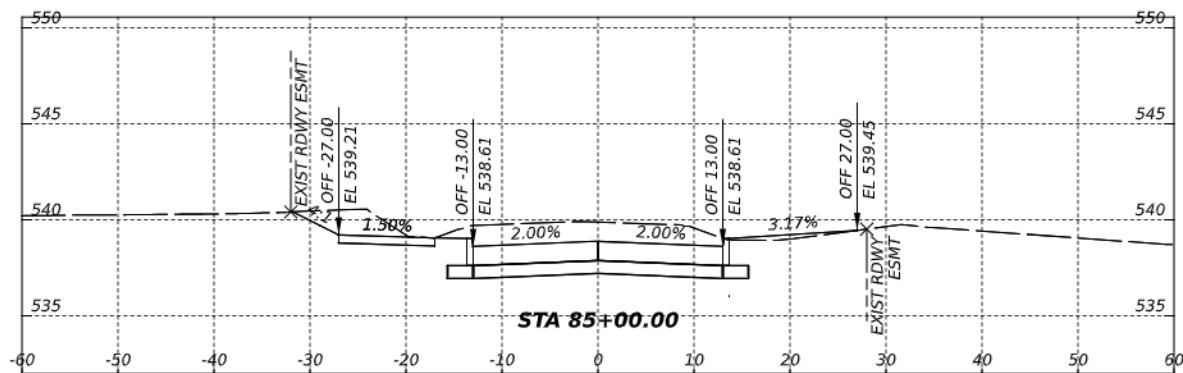
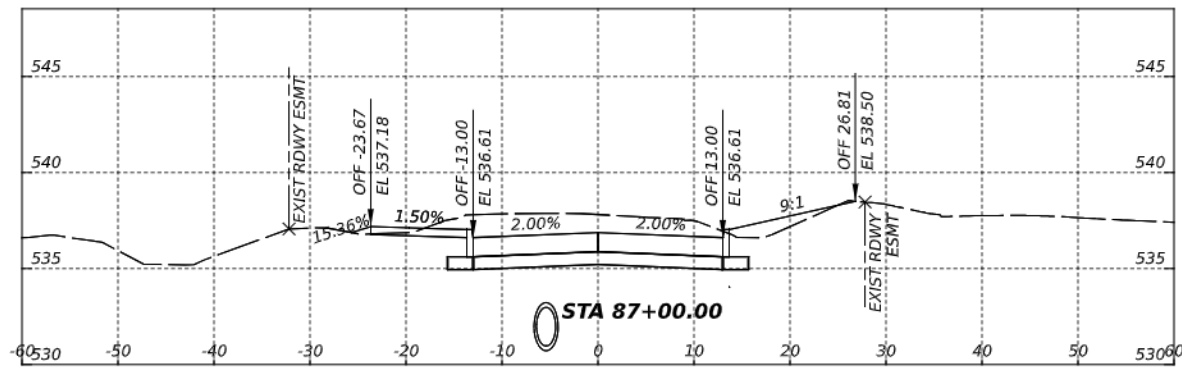
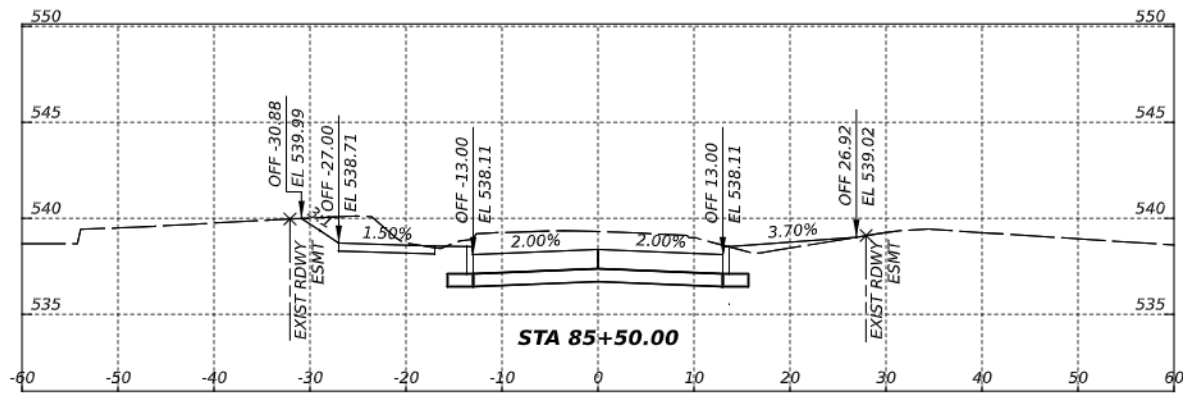
**SHADY SHORES**  
**CROSS SECTIONS**

SHEET 11 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	11	



NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



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 12-01-2025

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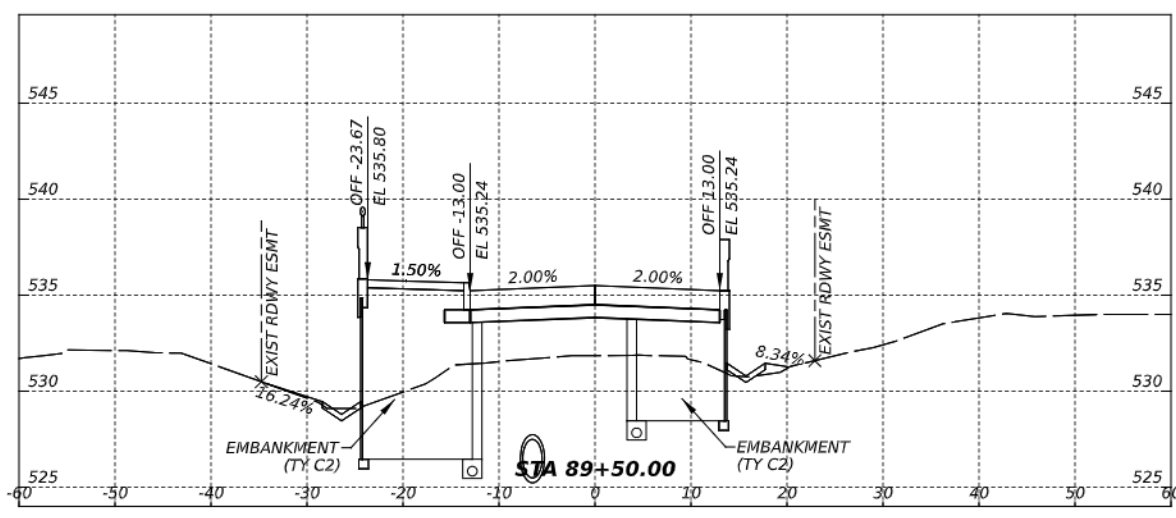
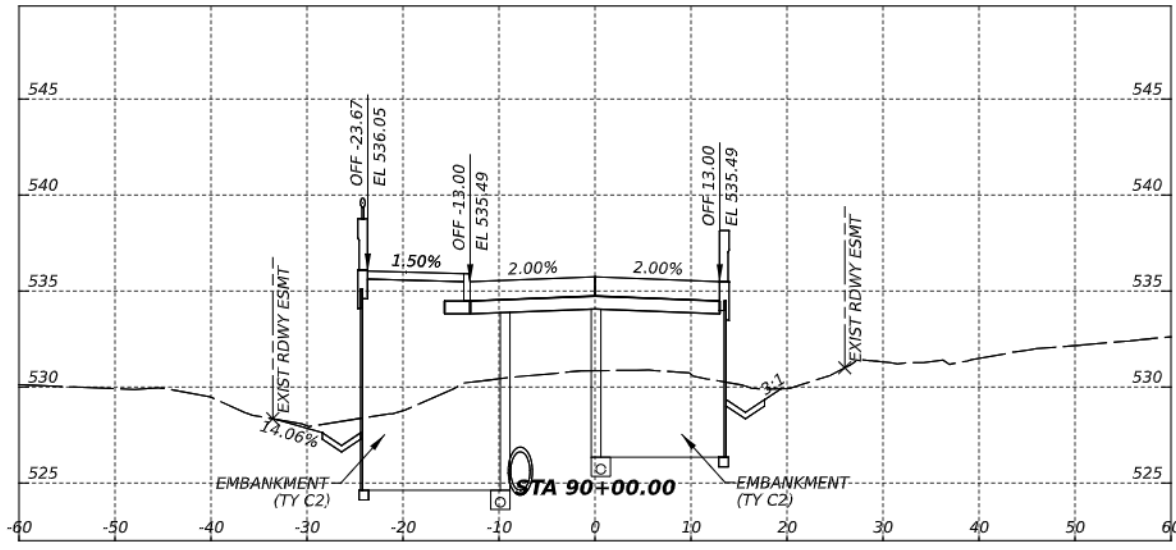
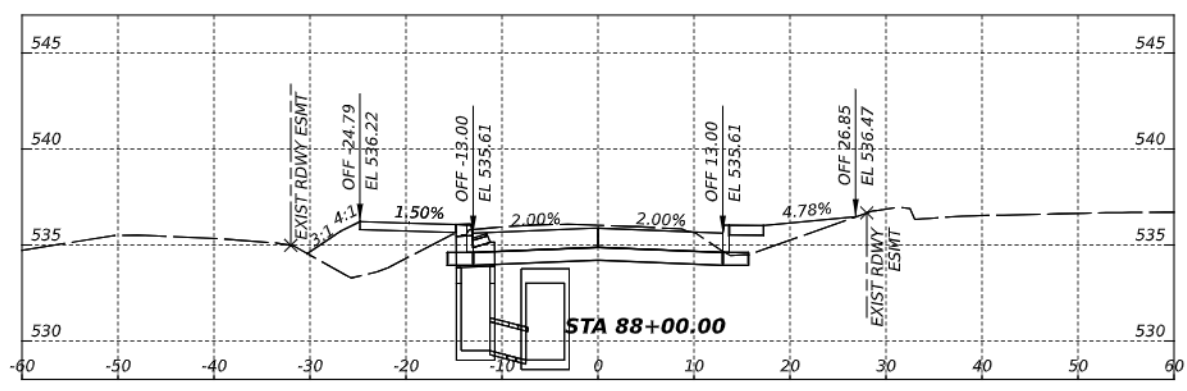
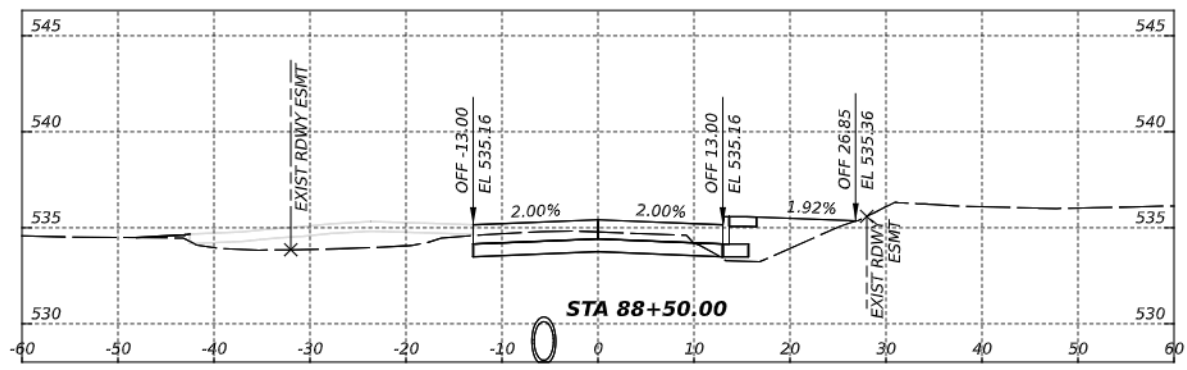
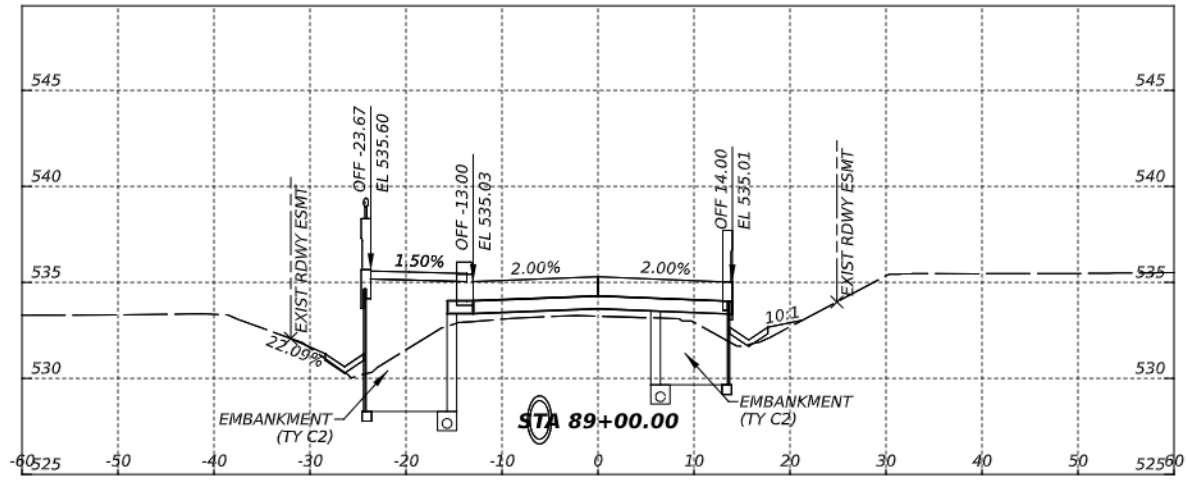
SHADY SHORES  
 CROSS SECTIONS

SHEET 12 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	12	

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NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



David A. Burnett  
 12-01-2025

TBPELS FIRM #312



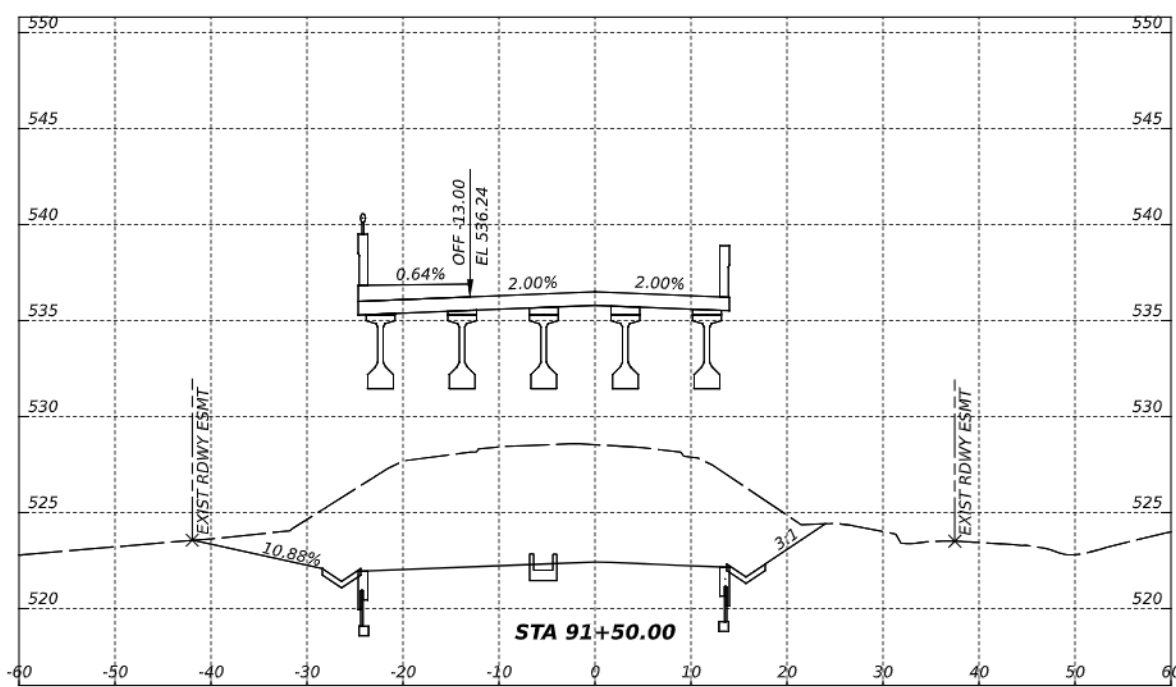
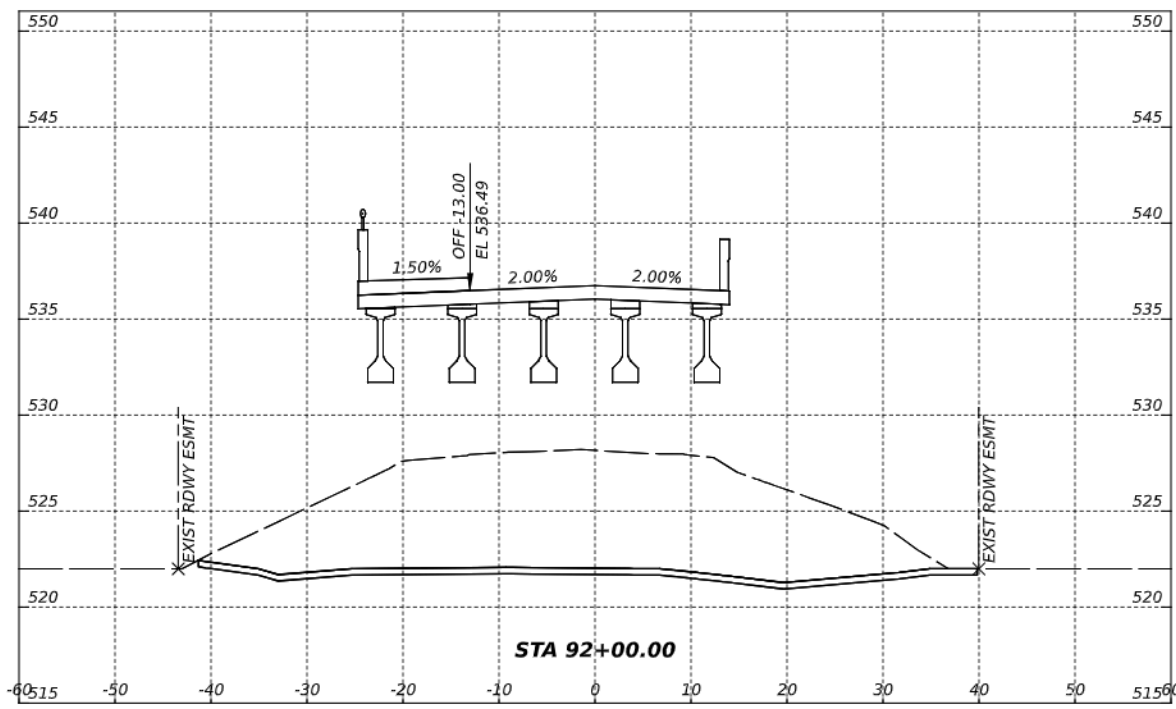
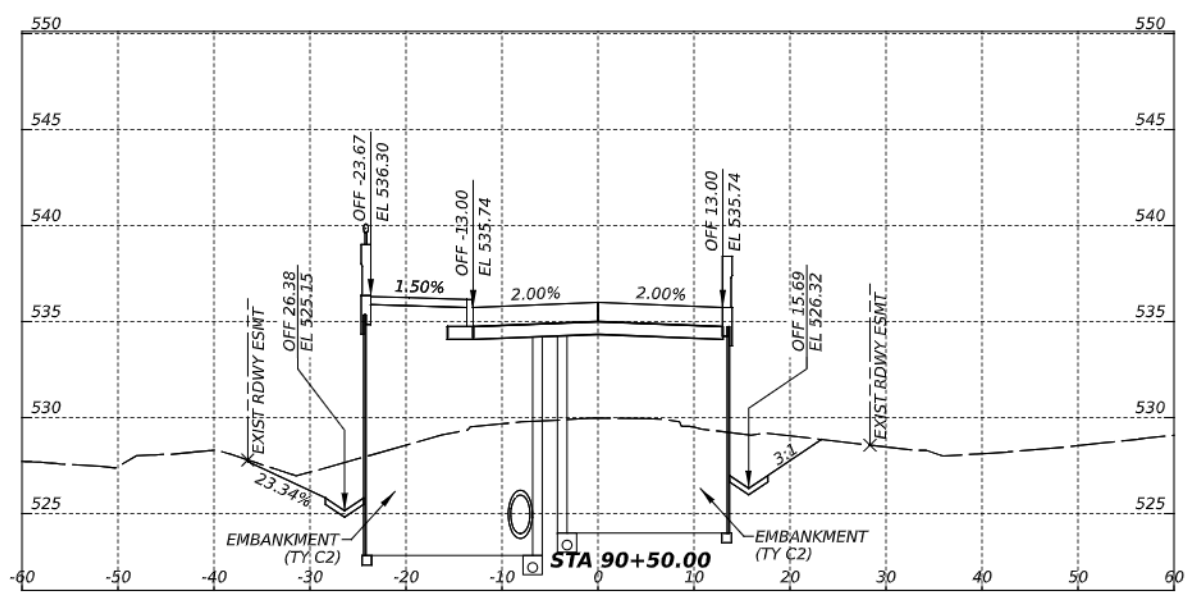
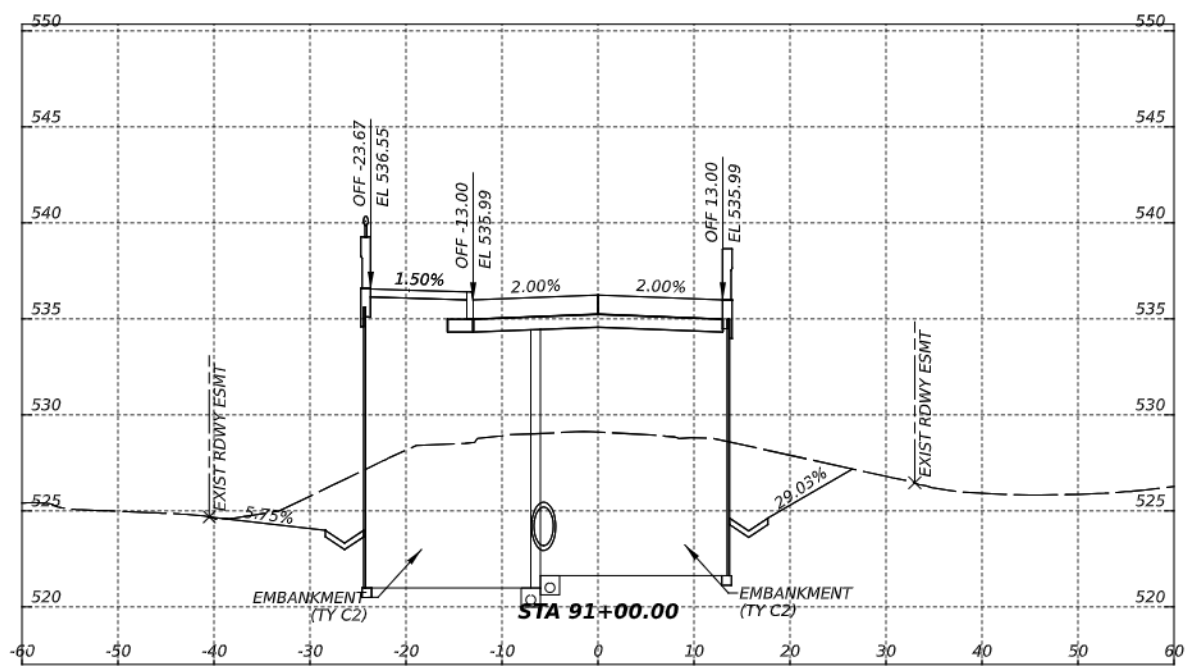
SHADY SHORES  
 CROSS SECTIONS

SHEET 13 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	13	

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NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



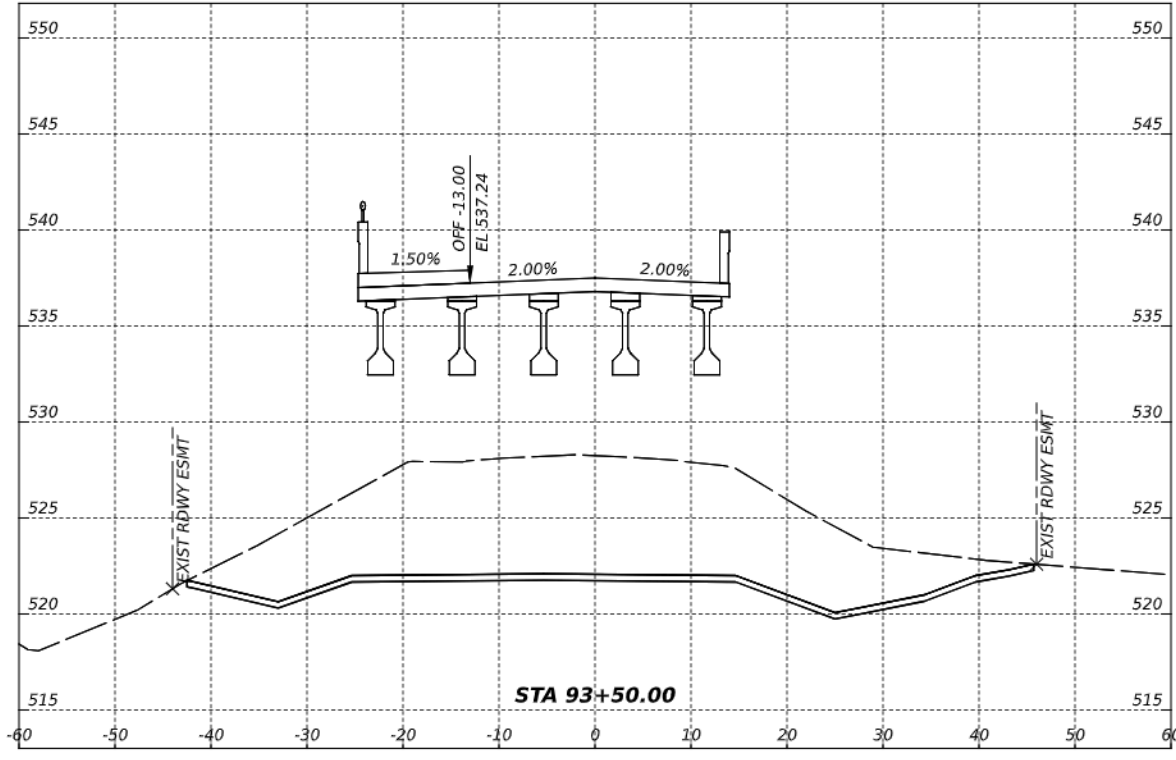
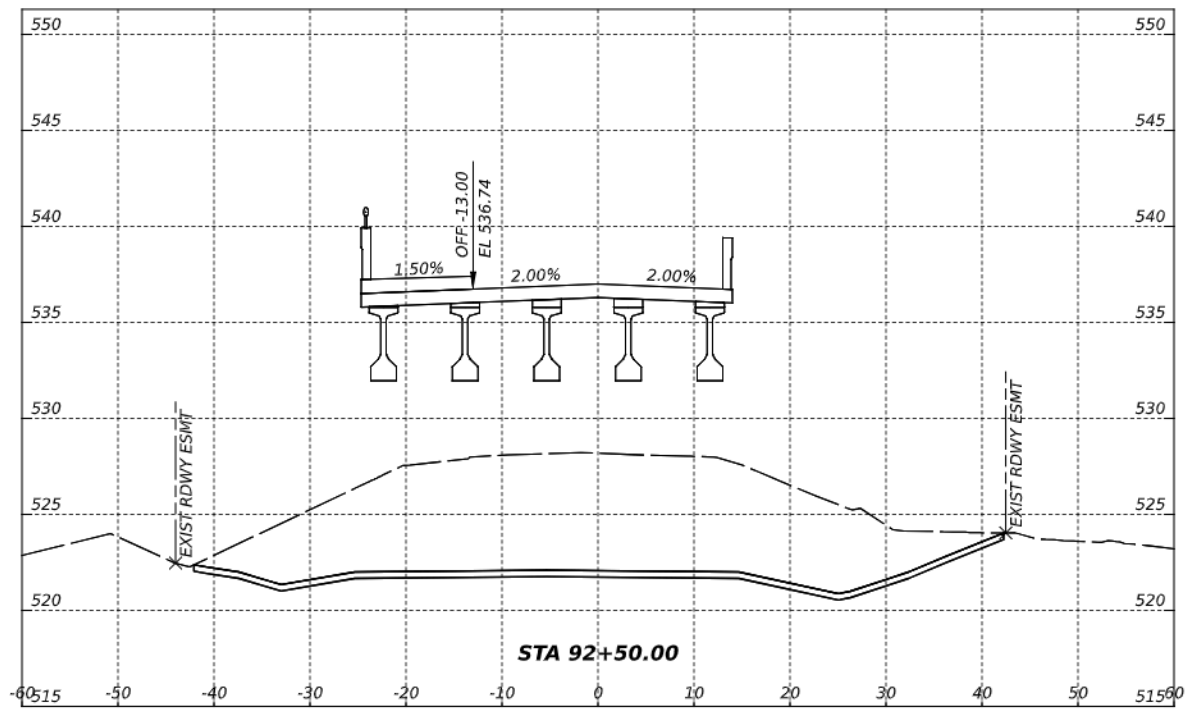
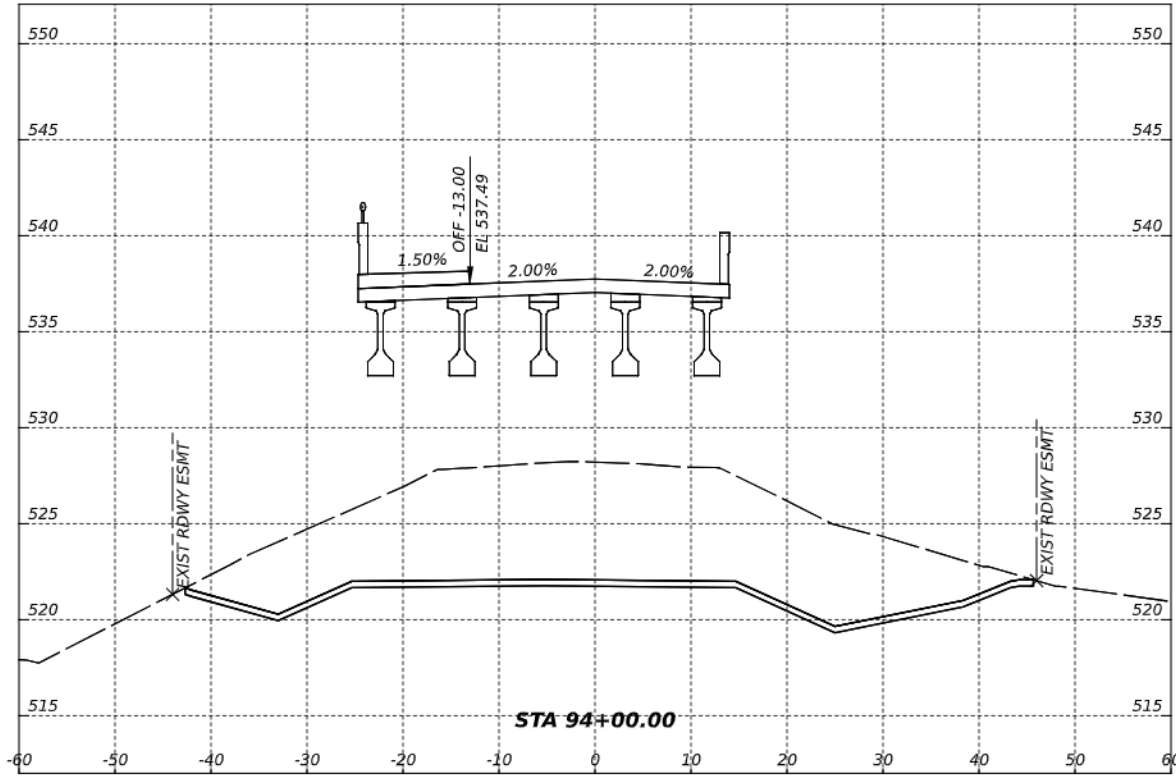
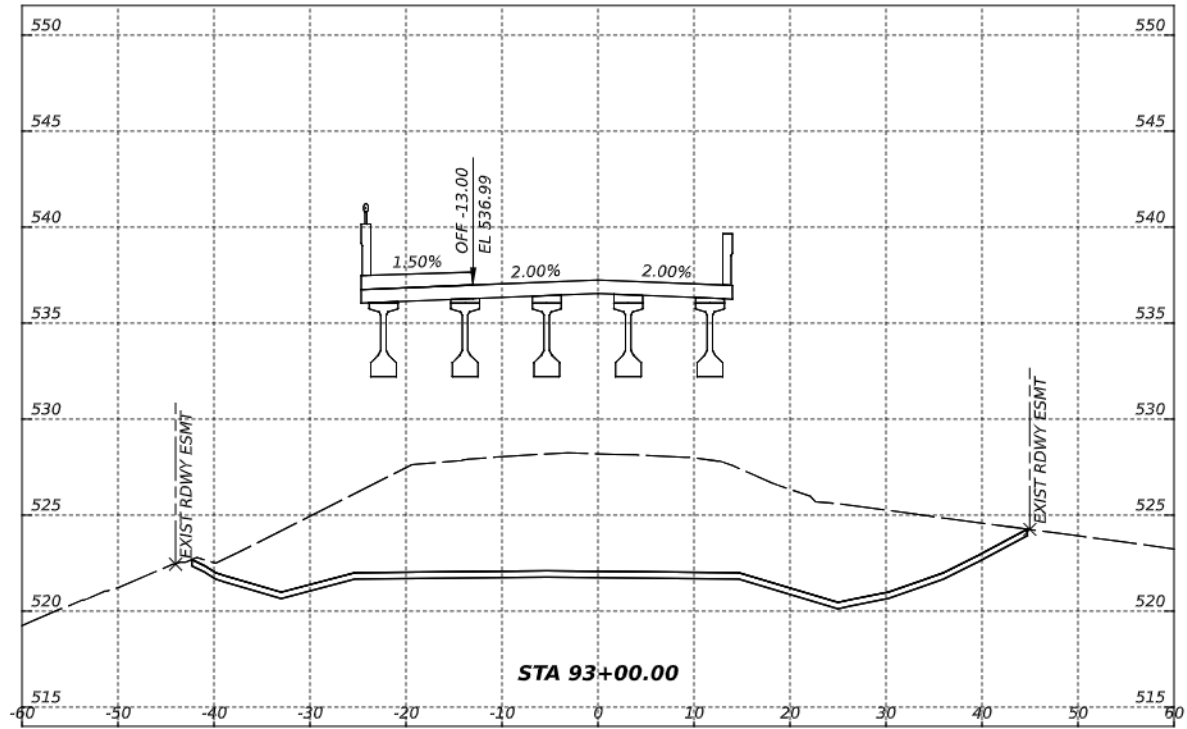
David A. Burnett  
 12-01-2025

TBPELS FIRM #312



SHADY SHORES  
 CROSS SECTIONS

SHEET 14 OF 23			
CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	14	



NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



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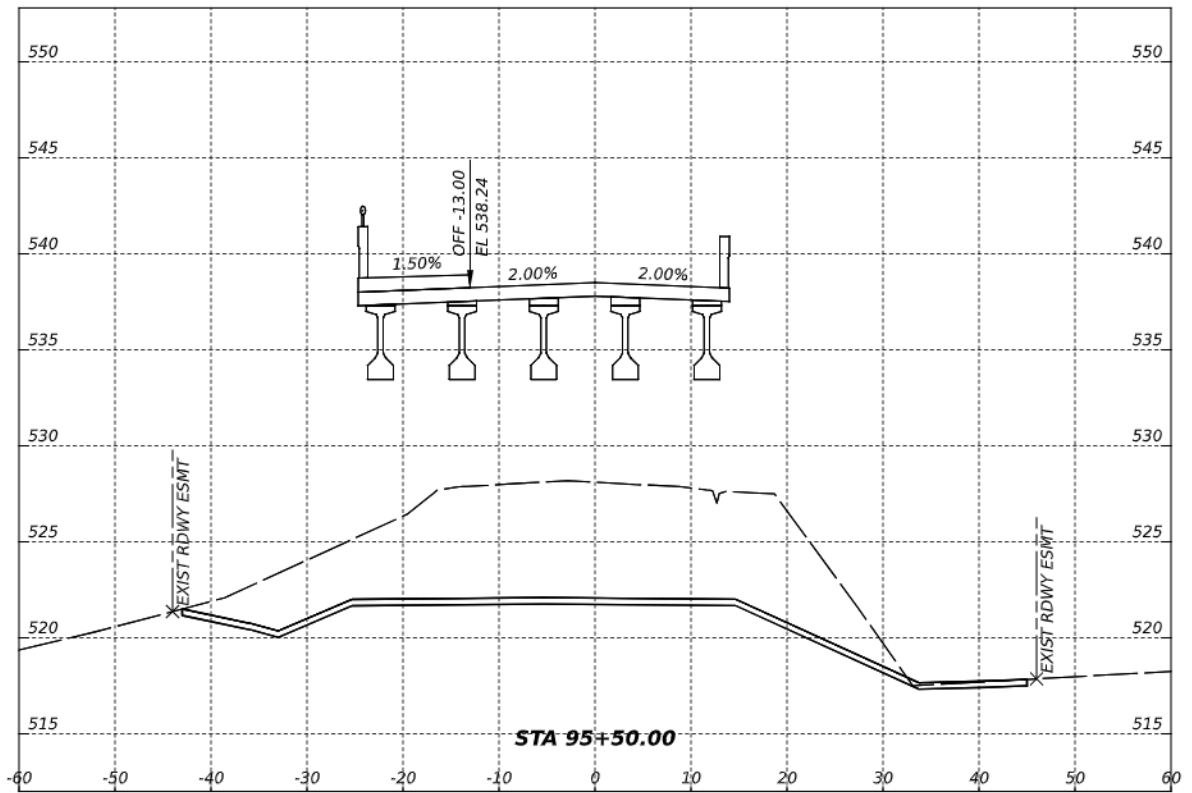
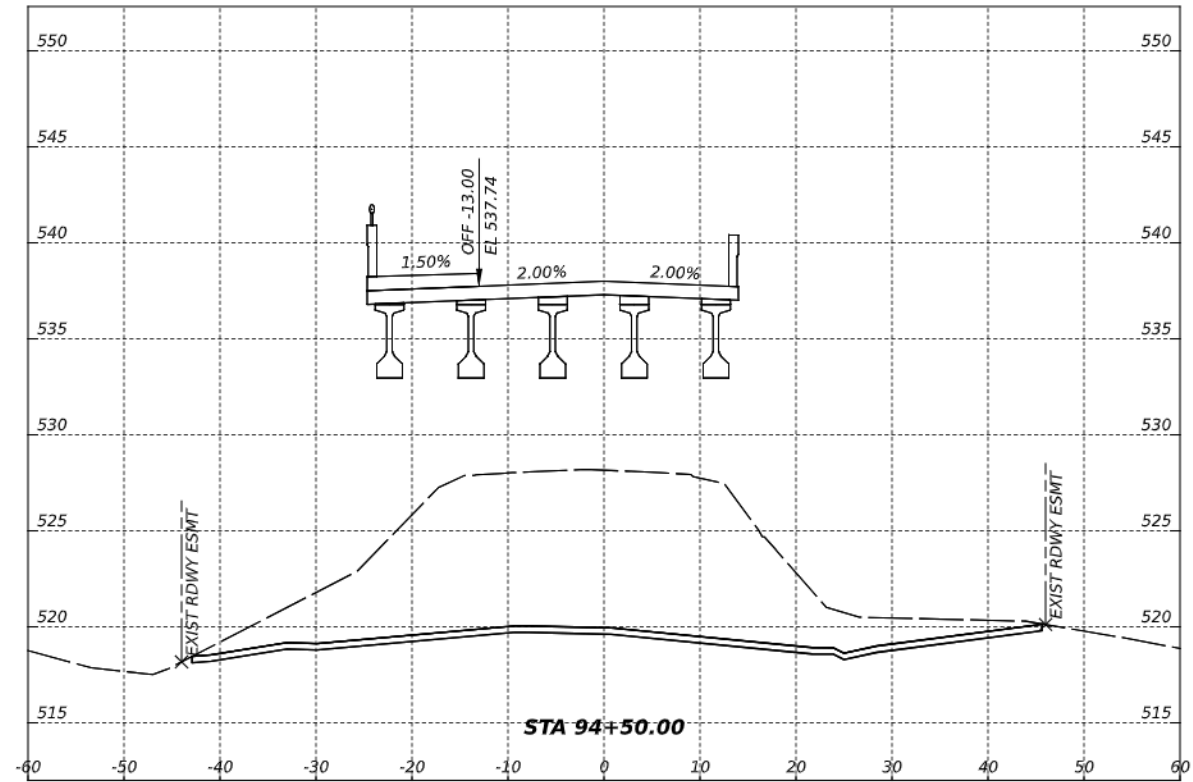
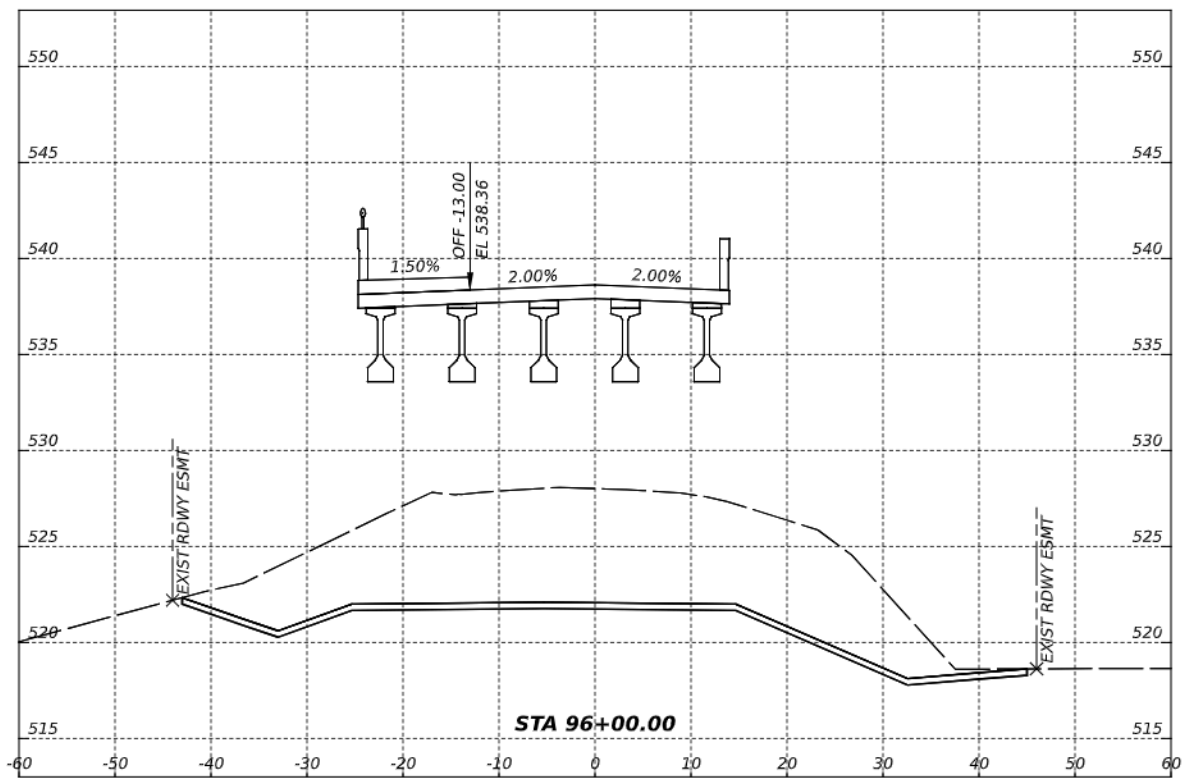
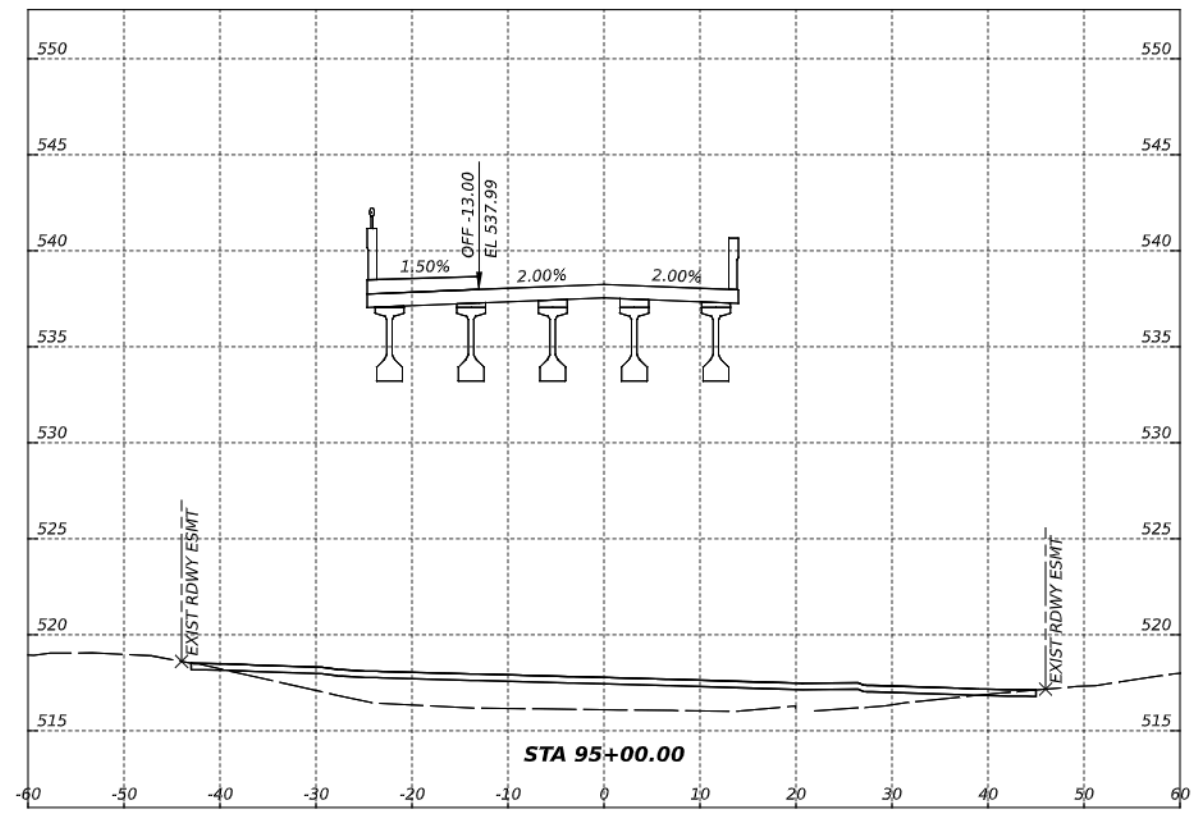


SHADY SHORES  
 CROSS SECTIONS

SHEET 15 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	15	

CC:   
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NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.

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 12-01-2025

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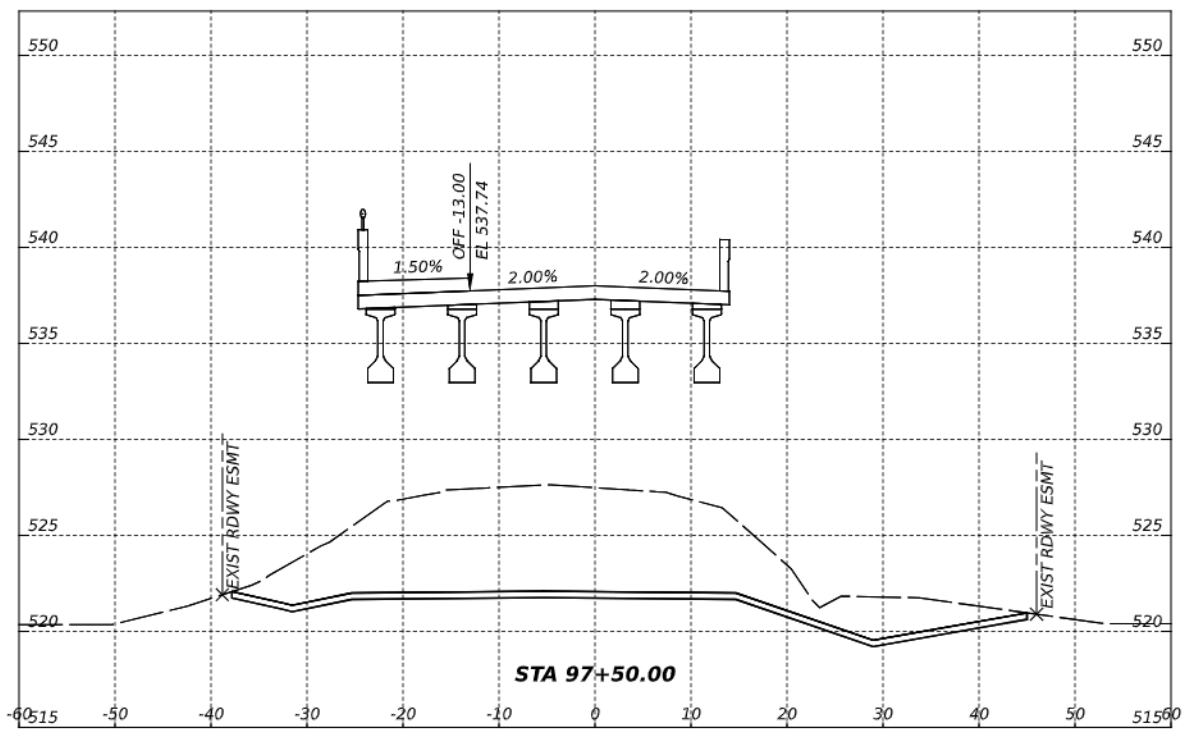
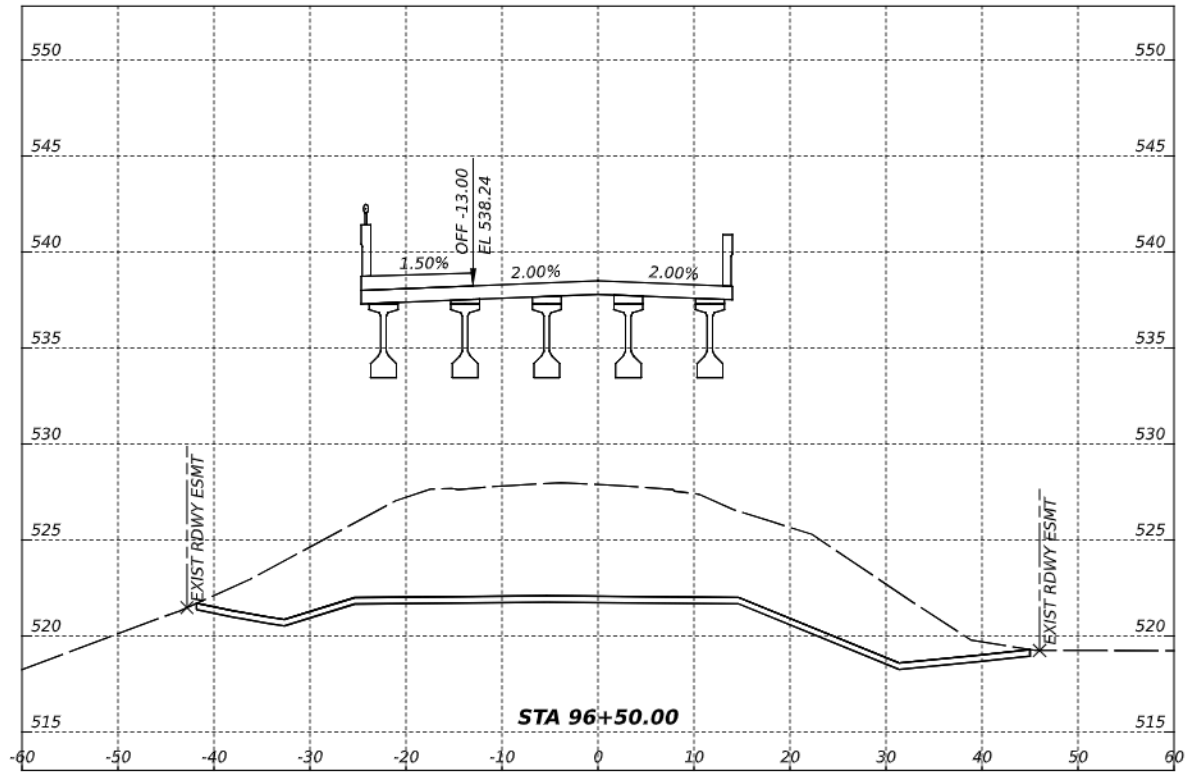
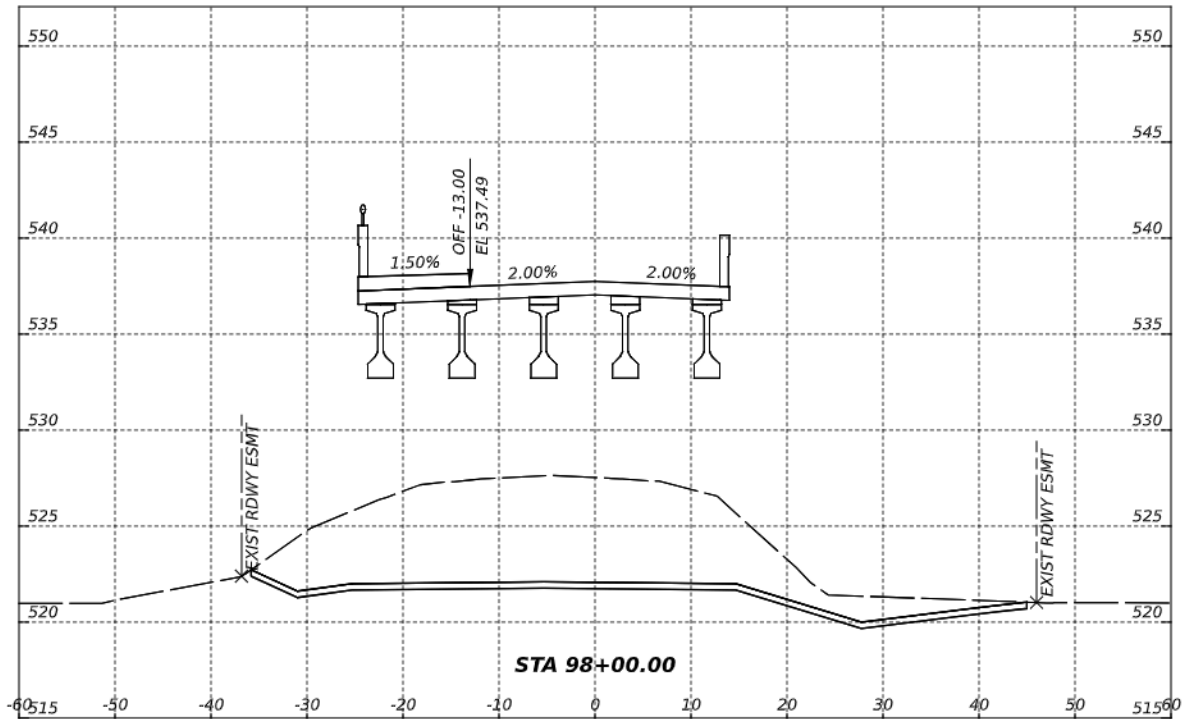
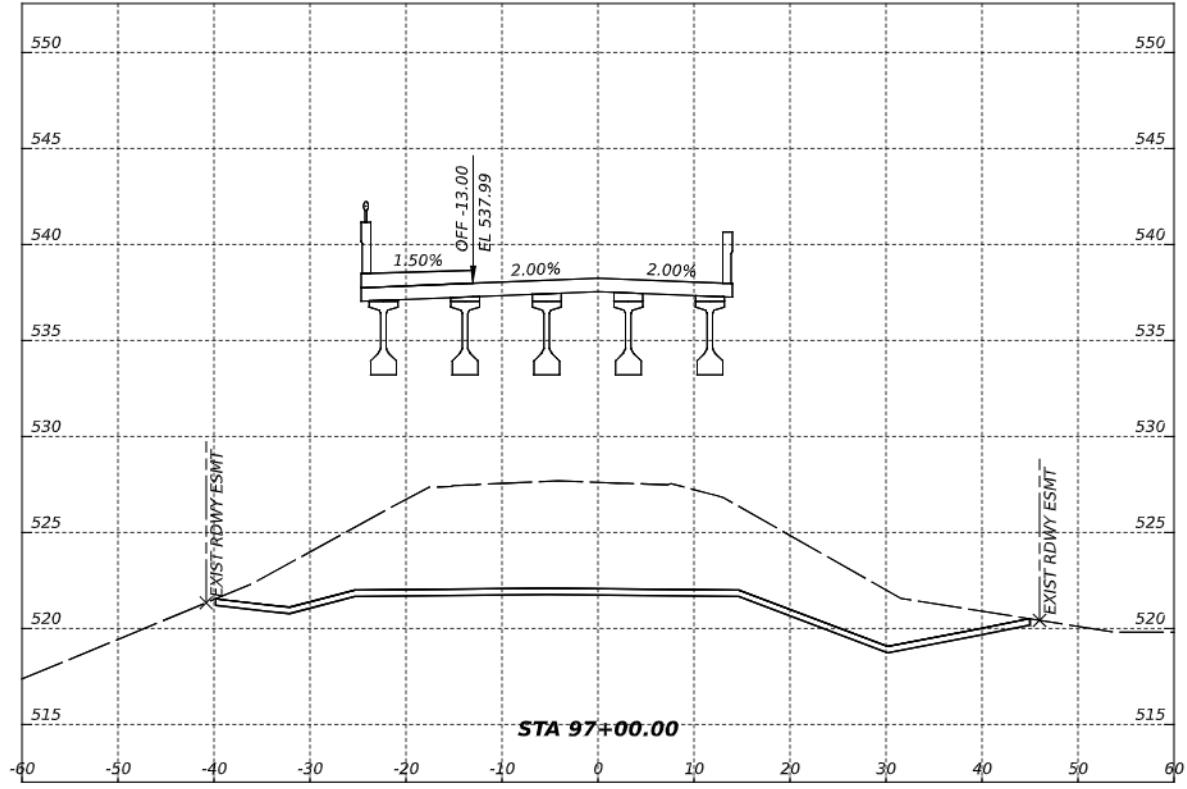
SHADY SHORES  
 CROSS SECTIONS

SHEET 16 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	16	

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NOTE:   
 FOR GRADING ELEVATIONS UNDER BRIDGES,   
 REFER TO BRIDGE GRADING SHEETS.

David A. Burnett   
 12-01-2025   
 TBPELS FIRM #312

Texas Department of Transportation

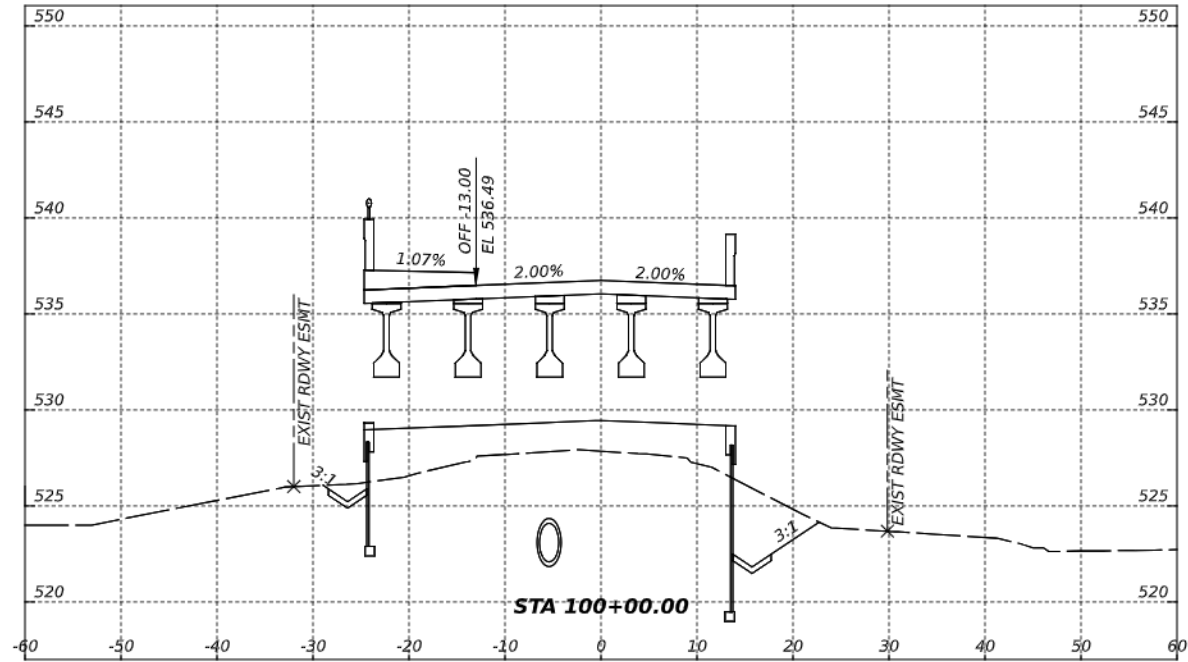
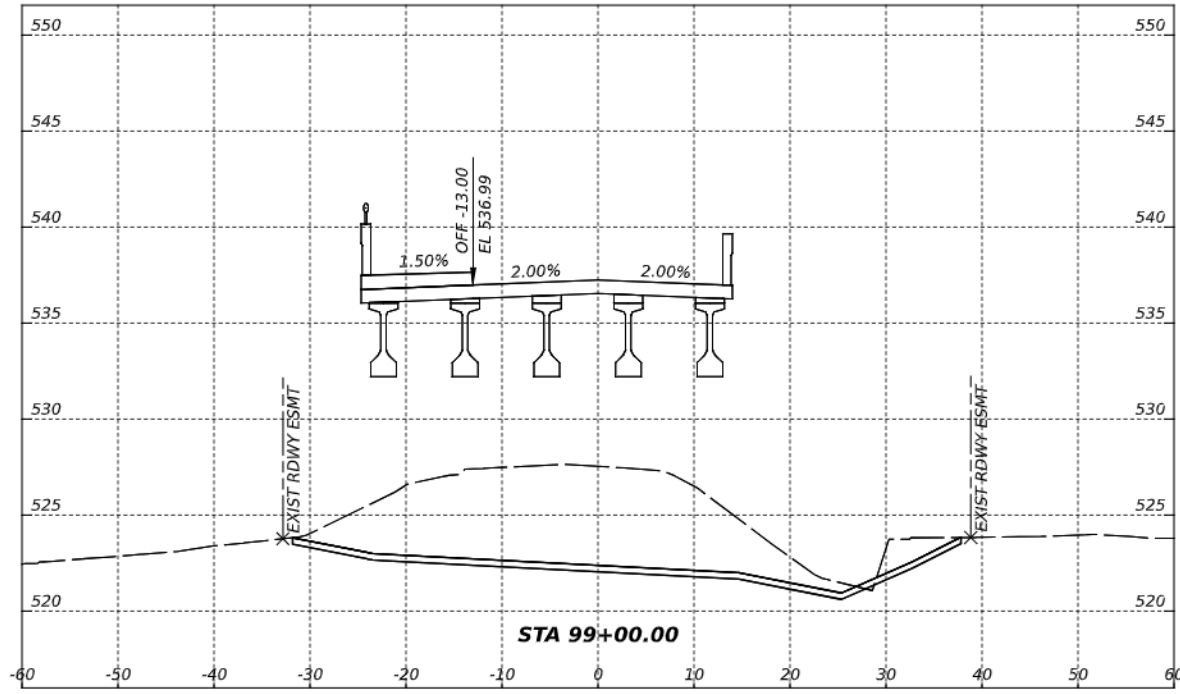
**SHADY SHORES**   
**CROSS SECTIONS**

SHEET 17 OF 23

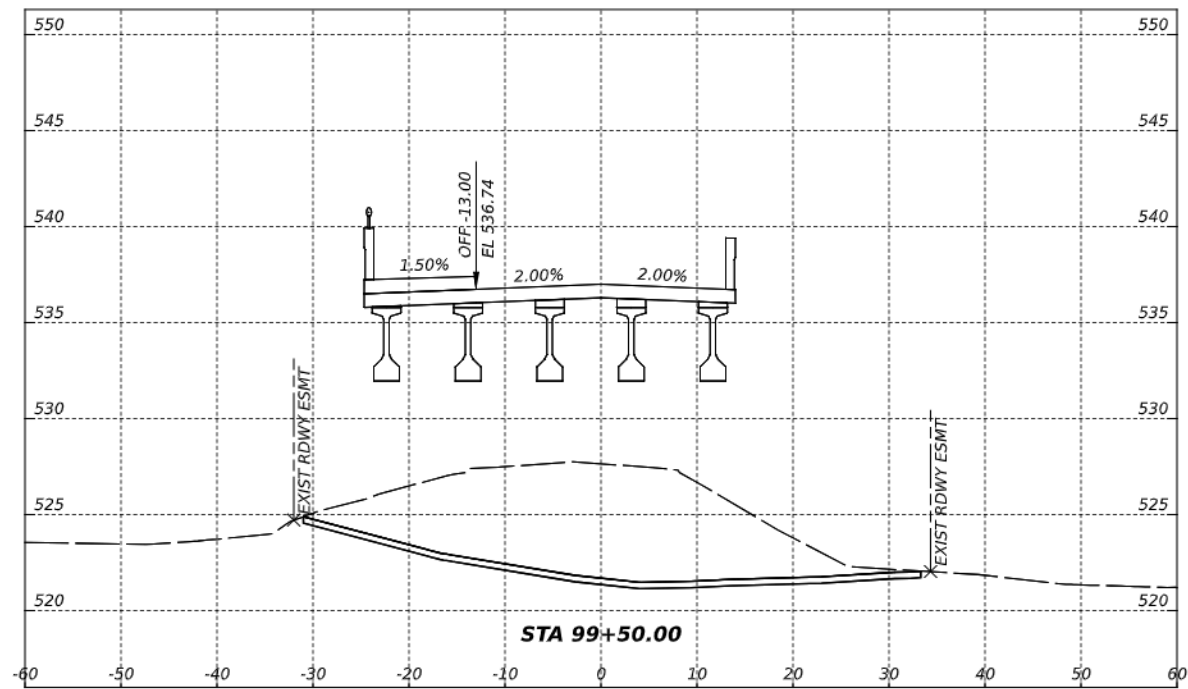
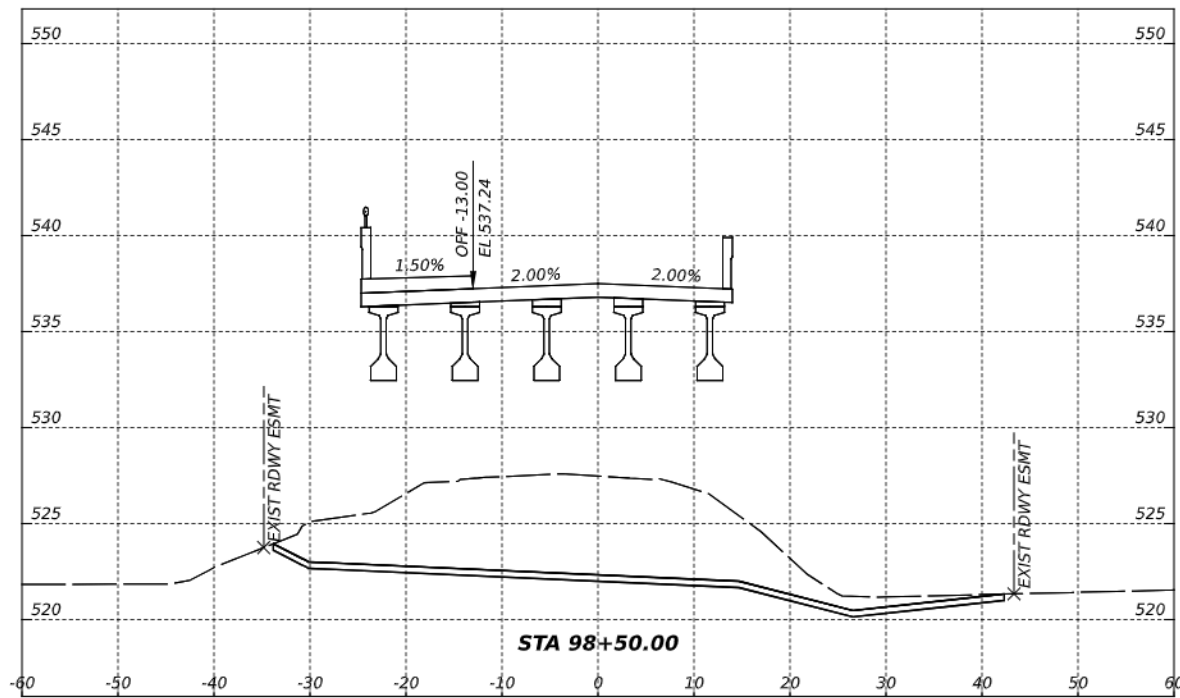
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0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	17	

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NOTE:  
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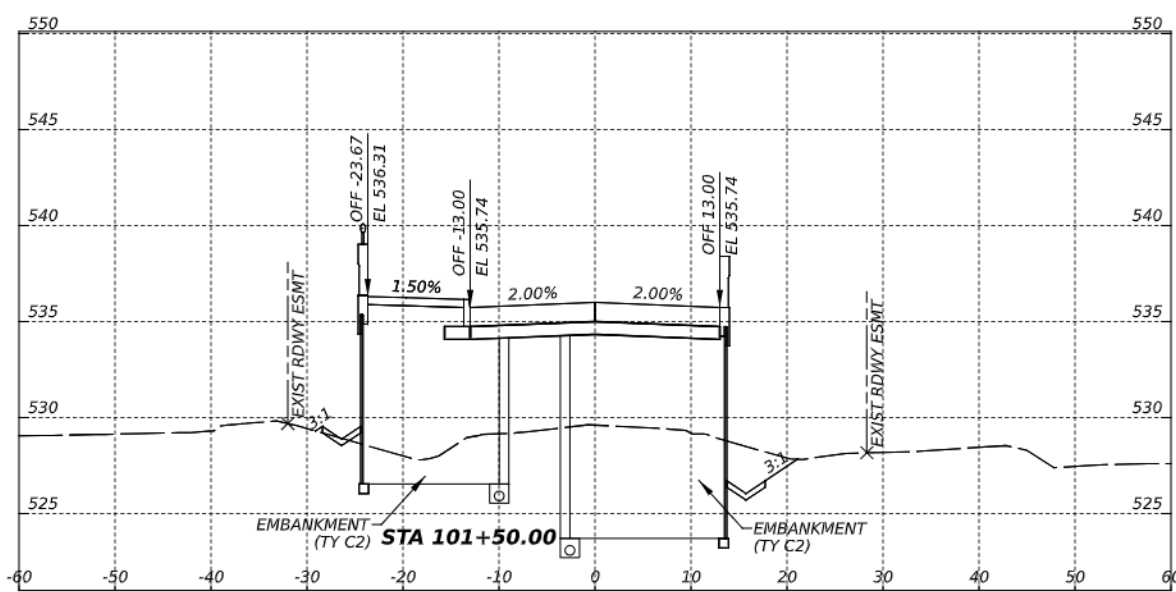
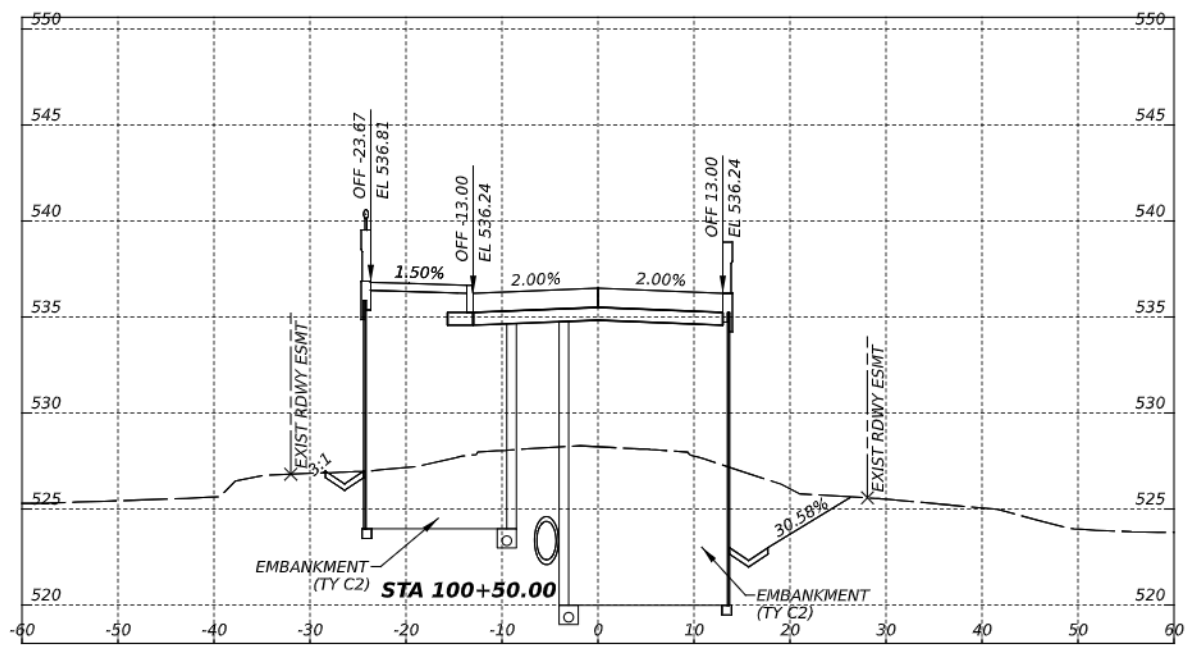
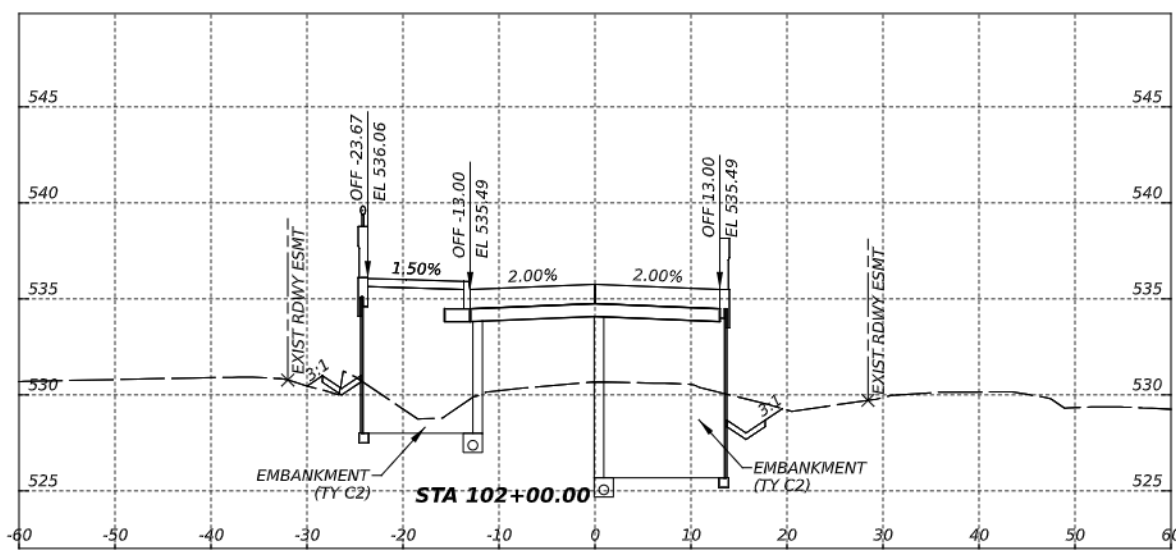
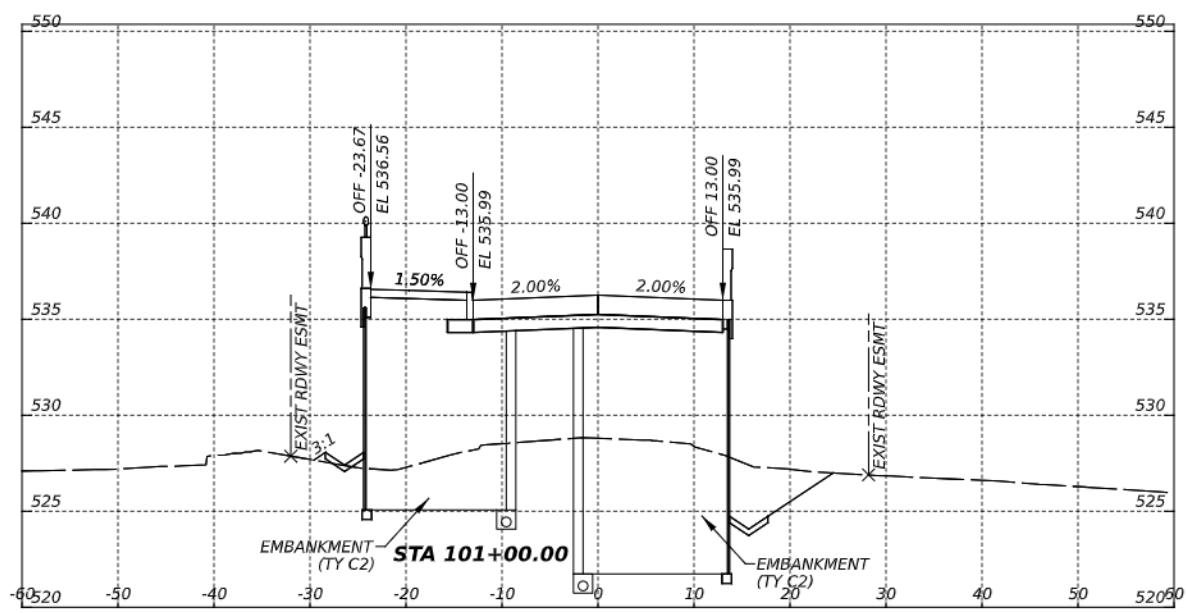
David A. Burnett  
 12-01-2025  
 TBPELS FIRM #312

Texas Department of Transportation

**SHADY SHORES**

**CROSS SECTIONS**

SHEET 18 OF 23			
CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST		COUNTY	SHEET NO.
DAL		DENTON	18



NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



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 12-01-2025

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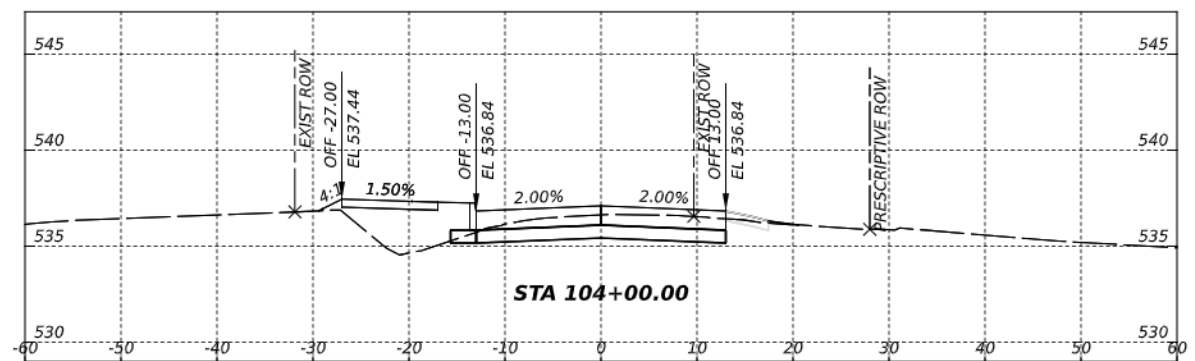
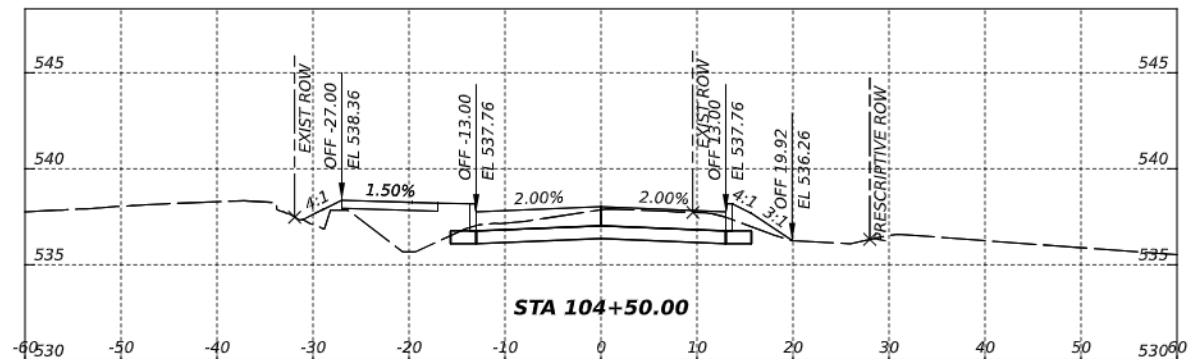
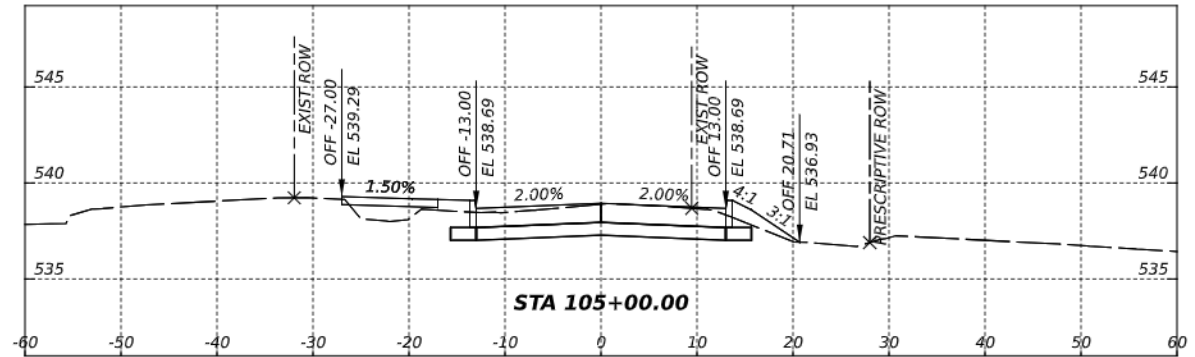
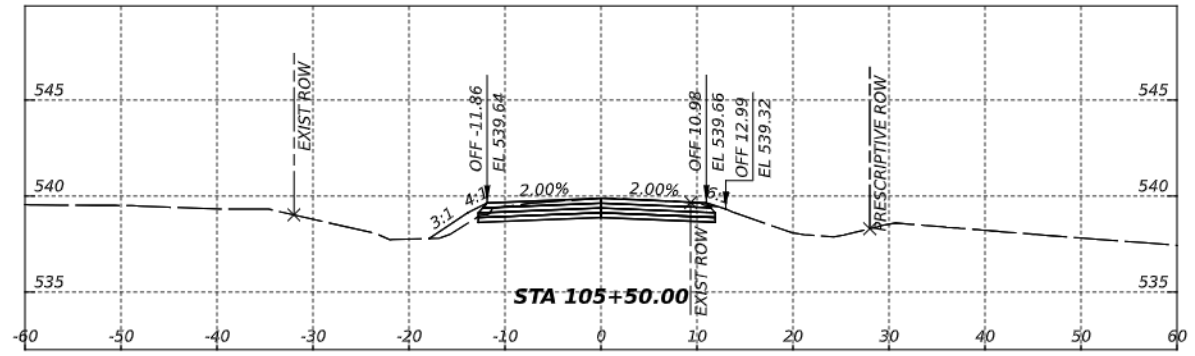
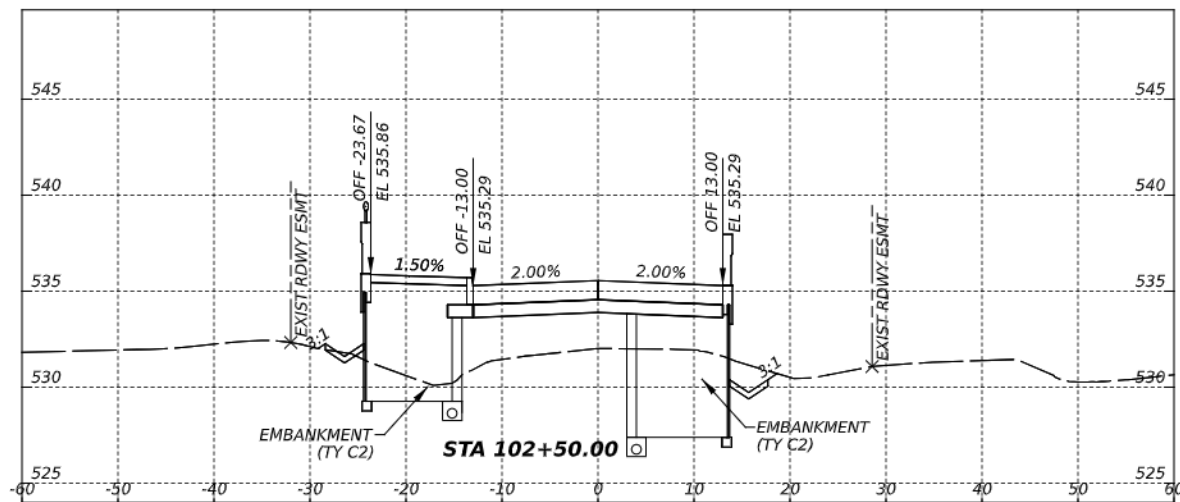
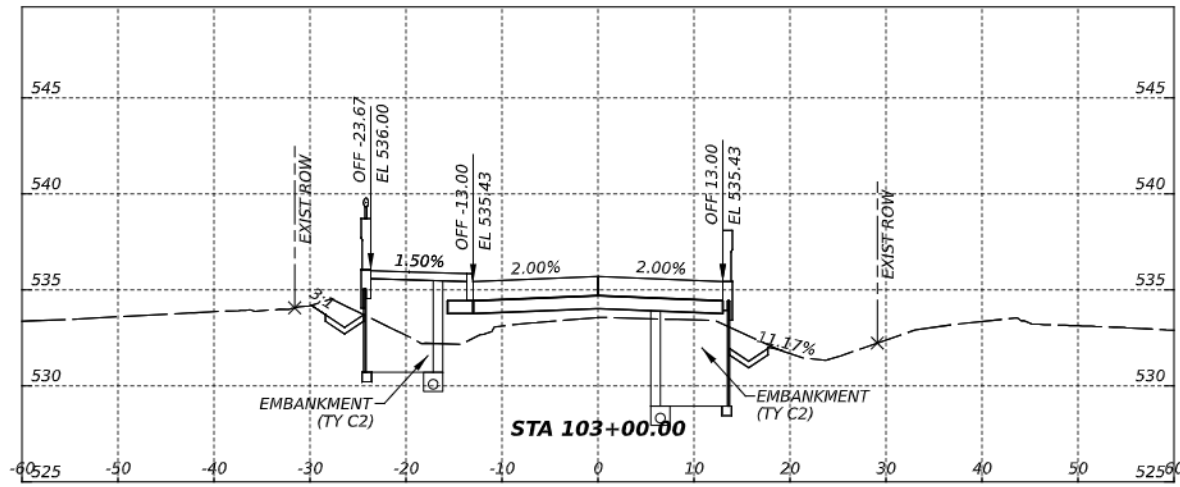
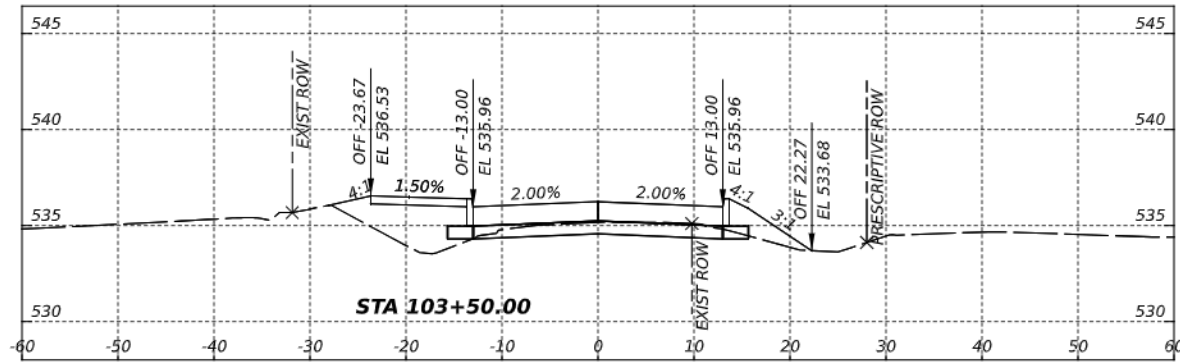


SHADY SHORES  
 CROSS SECTIONS

SHEET 19 OF 23

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0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	19	

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NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



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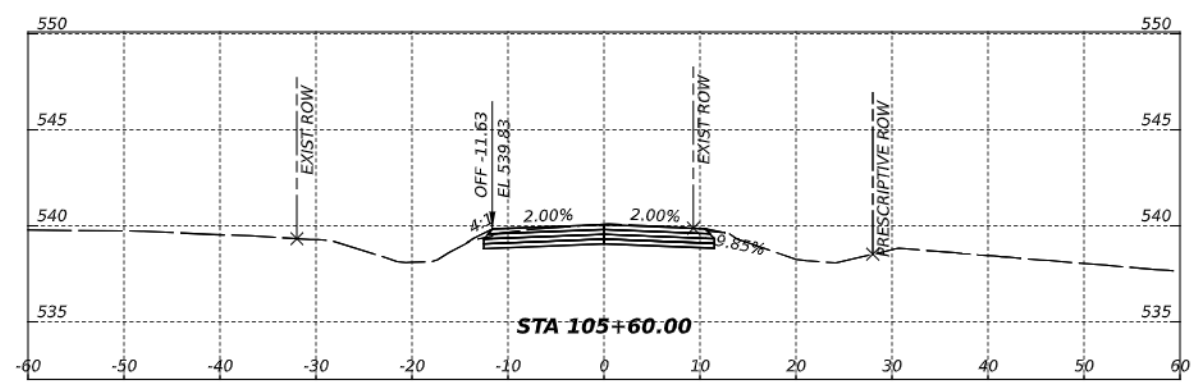
SHADY SHORES  
 CROSS SECTIONS

SHEET 20 OF 23

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0918	46	316	VA
DIST	COUNTY	SHEET NO.	
DAL	DENTON	20	

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NOTE:  
 FOR GRADING ELEVATIONS UNDER BRIDGES,  
 REFER TO BRIDGE GRADING SHEETS.



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 12-01-2025

TBPELS FIRM #312



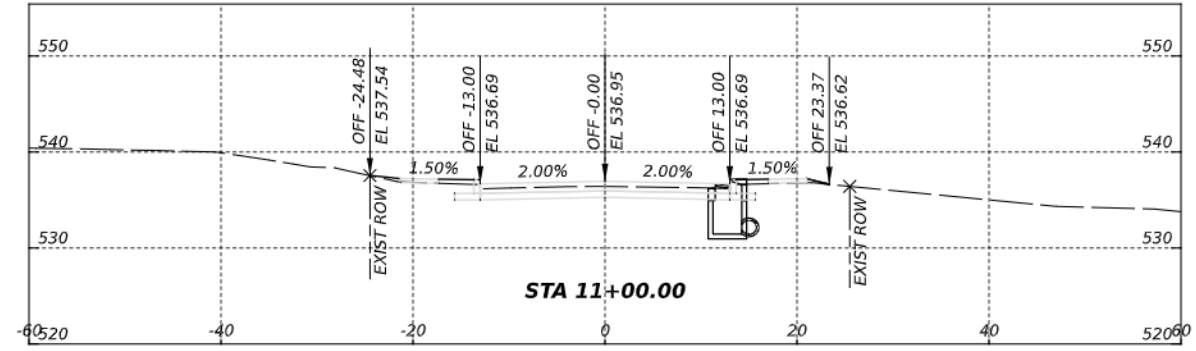
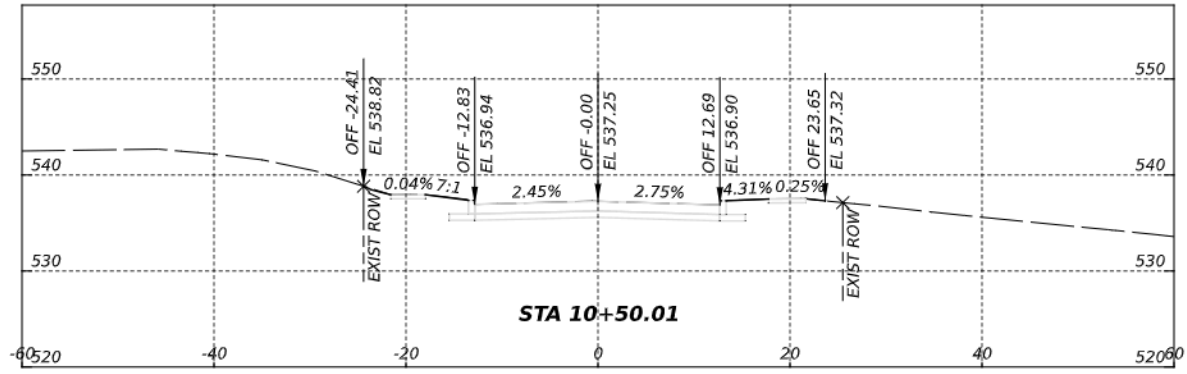
SHADY SHORES  
 CROSS SECTIONS

SHEET 21 OF 23

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DIST	COUNTY	SHEET NO.	
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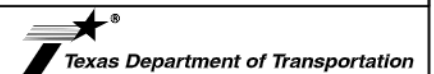
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 FILE: \$FILE\$



*David A. Burnett*  
 12-01-2025

TBPELS FIRM #312



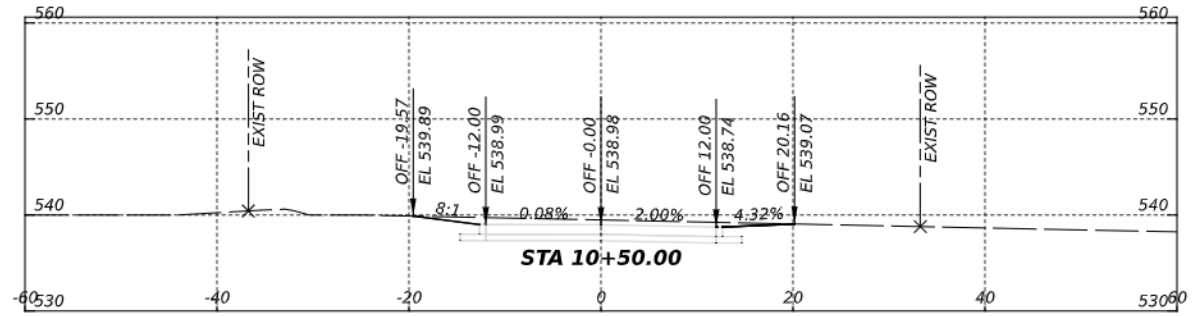
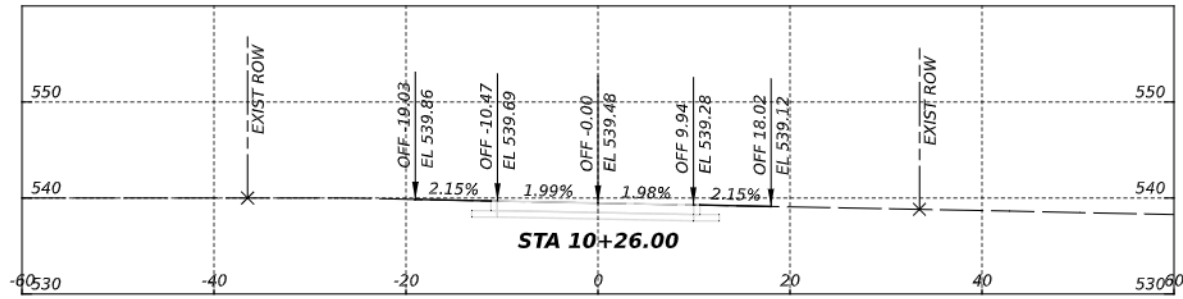
SHADY SHORES

CROSS SECTIONS  
 PARKSIDE LANE

SHEET 22 OF 23

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY	SHEET NO.	
DAL	DENTON	23	

CP:  
DW:  
CK:  
DN:



DATE: \$DATE\$  
FILE: \$FILE\$

\$TIMES



*David A. Burnett*  
12-01-2025

TBPELS FIRM #312



SHADY SHORES

CROSS SECTIONS  
OAKWOOD CIR

SHEET 23 OF 23

CONT	SECT	JOB	HIGHWAY
0918	46	316	VA
DIST	COUNTY		SHEET NO.
DAL	DENTON		23



**SHADY SHORES ROAD  
DENTON COUNTY, TEXAS**

**LIMITS: FROM SILKTREE COURT TO PARKSIDE COURT AND  
FROM NORTH OF DOBBS ROAD TO SOUTH OF W. SHADY SHORES ROAD**

**CSJ: 0918-46-316  
JANUARY 2, 2024**

**PAVEMENT DESIGN REPORT**



January 2, 2024



Halff Associates, Inc.  
2601 Meacham Blvd  
Fort Worth, TX 76137  
Attn: David Burkett, PE  
Email: [dburkett@halff.com](mailto:dburkett@halff.com)  
Phone: 817-688-6720

**PAVEMENT DESIGN REPORT  
SHADY SHORES ROAD  
FROM SILKTREE COURT TO PARKSIDE COURT AND  
FROM NORTH OF DOBBS ROAD TO SOUTH OF W. SHADY SHORES ROAD  
DENTON COUNTY, TEXAS  
CSJ 0918-46-316  
GEOTEX ENGINEERING #G22-4003-1**

Mr. Burkett,

Transmitted herewith is the pavement design report, completed by Geotex Engineering, LLC, for the above-reference project. This investigation was conducted in accordance with the Standard Subcontract for Subsurface/Underground Services dated September 5, 2023.

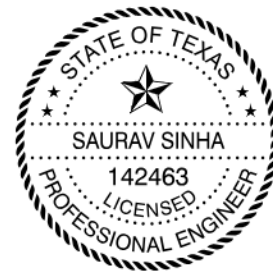
We appreciate the opportunity to provide professional geotechnical engineering services to you. We are available to discuss any questions which may arise regarding this report. Please do not hesitate to call when we can provide any additional services.

Sincerely,

**Geotex Engineering, LLC**

A handwritten signature in blue ink that reads "Hachem".

Hussein Hachem, P.E.  
Geotechnical Engineer



A handwritten signature in blue ink that reads "Saurav Sinha".

Saurav Sinha, P.E.  
Director of Transportation

Digitally signed by Saurav Sinha, P.E.  
Date: 2024.01.02 15:51:40 -06'00'

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# PAVEMENT DESIGN REPORT SHADY SHORES ROAD DENTON COUNTY, TEXAS

## 1.0 PROJECT DESCRIPTION

This report presents the results of the geotechnical investigation conducted for the proposed improvements of two sections of Shady Shores Road, an existing two-lane road. The limits of the two sections are from Silktree Court to Parkside Court, and from North of Dobbs Road to South of W. Shady Shores Road. Portions of the road are owned by three entities: Denton County, the Town of Shady Shores, and the City of Lake Dallas. The total alignment length is approximately 4,600 feet. The general location and orientation of the site are provided in Appendix A.

The project is intended to raise the elevation of the roadway to mitigate the occurrence of frequent inundation. Bridges are proposed at these locations, along with necessary retaining walls for the proposed grade changes. The purpose of this report is to present the pavement design recommendations and doesn't necessarily have to meet the Texas Department of Transportation (TxDOT) pavement design criteria as per the information provided by the client.

At the time of the field investigation, the project site was covered with asphalt pavement. Final grading plans along the roadway were not available at the time of writing this report, however we do understand that a grade difference of up to 10 feet in fill is proposed at the locations of the new bridges. Recommended design parameters provided herein should be expected to change should there be significant quantities of cut or fill along the new roadway; therefore, we recommend that this office be permitted to review final grading and design plans prior to construction to confirm and/or revise the conclusions and recommendations provided herein.

## 2.0 PURPOSE AND SCOPE

The purpose of this investigation was to:

- Identify the subsurface stratigraphy and groundwater conditions present at the site.
- Evaluate the physical and engineering properties of the subsurface soil strata for use in geotechnical analyses.
- Provide geotechnical recommendations for use in the design and construction of the proposed pavements and related site work.

The scope of this investigation consisted of:

- Drilling and sampling of a total of eleven (11) soil borings (P1 to P11) within the road alignment, to depths of about 10 feet.
- Laboratory testing of selected soil samples obtained during field investigation.
- Preparation of a Pavement Design Report that includes:

- Evaluation of potential soil heave through Potential Vertical Rise (PVR) estimates.
- Recommendations for excavations.
- Pavement and pavement subgrade preparation and pavement sections in accordance with guidelines and recommendations of AASHTO Guide for the Design of Pavement Structures (1993), published by the American Association of State Highway and Transportation Officials (AASHTO) and TxDOT Pavement Design Manual (2021), published by the Texas Department of Transportation (TxDOT).

### **3.0 FIELD AND LABORATORY INVESTIGATION**

#### **3.1 General**

The borings were advanced utilizing truck-mounted drilling equipment outfitted with continuous flight augers. Undisturbed samples of soil strata were obtained using 3-inch diameter tube samplers, which were advanced into the soils in 1-to 2-foot increments by the continuous thrust of a hydraulic ram located on the drilling equipment. After sample extrusion, a hand penetrometer measurement was performed on each soil sample to provide an estimate of soil stiffness.

Additionally, granular materials were tested and sampled in general accordance with the Standard Penetration Test (ASTM D1586). During this test, disturbed samples of subsurface material are recovered using a nominal 2-inch O.D. split-barrel sampler. The sampler is driven into the soil strata with an automatic hammer utilizing the energy equivalent of a 140-pound hammer falling freely from a height of 30 inches and striking an anvil located at the top of the drill string. The number of blows required to advance the sampler in three consecutive 6-inch increments is recorded, and the number of blows required for the final 12 inches is noted as the "N"-value. The test is terminated at the first occurrence of either of the following: 1) when the sampler has advanced a total of 18 inches; 2) When the sampler has advanced less than one complete 6-inch increment after 50 blows of the hammer; 3) when the total number of blows reaches 100; or 4) if there is no advancement of the sampler in any 10-blow interval.

All samples obtained were extruded in the field, placed in plastic bags to minimize changes in the natural moisture condition, labeled according to the appropriate boring number and depth, and placed in protective cardboard boxes for transportation to the laboratory. The approximate locations of the borings performed at the site are shown on the boring location diagram that is included in Appendix B. The specific depths, thicknesses, and descriptions of the strata encountered are presented on the individual Boring Log illustrations, which are included in Appendix C. Strata boundaries shown on the boring logs are approximate.

The subgrade materials within the pavement borings were also tested in situ using Dynamic Cone Penetrometer (DCP) tests to measure their resistance to penetration. DCP tests were conducted at each boring location to depths of about 3 feet below the bottom of the existing pavement or recovered base, in general accordance with ASTM D6951. Results of these tests are presented in Appendix C.

### 3.2 Laboratory Testing

Laboratory tests were performed to identify the relevant engineering characteristics of the subsurface materials encountered and to provide data for developing engineering design parameters. The subsurface materials recovered during the field exploration were initially logged in the field by the drill crew and were later described by a Staff Engineer after the samples arrived in the laboratory. These descriptions were later refined by a Geotechnical Engineer based on results of the laboratory tests performed. All recovered soil samples were classified and described in part using the Unified Soil Classification System (USCS) and other accepted procedures.

In order to determine soil characteristics and to aid in classifying the soils, classification testing was performed on selected samples as requested by the Geotechnical Engineer. Classification testing was performed in general accordance with the following ASTM or TxDOT testing standards:

- |                                                 |            |
|-------------------------------------------------|------------|
| • Moisture Content                              | ASTM D2216 |
| • Atterberg Limits                              | ASTM D4318 |
| • Percent of Particles Finer than No. 200 Sieve | ASTM D1140 |
| • Particle Size Analysis                        | ASTM D7928 |

Additional advanced tests were performed to aid in evaluating volume change and chemical characteristics, which consisted of the following:

- |                                          |            |
|------------------------------------------|------------|
| • Overburden Swells                      | ASTM D4546 |
| • Soluble Sulfates - Colorimetric Method | Tex-145-E  |
| • Chloride and Sulfate Content           | Tex-620-J  |
| • Soil pH                                | Tex-128-E  |
| • Soil Resistivity                       | Tex-129-E  |
| • Bar Linear Shrinkage                   | Tex-107-E  |

The results of the classification tests are presented at the corresponding sample depths on the appropriate Boring Log illustrations. The results of the advanced tests are presented in Appendix C.

### **3.2.1 Overburden Swell Test**

Samples of the near-surface soils were subjected to overburden swell testing. For this test, a sample is placed in a consolidometer and subjected to the estimated overburden pressure. The sample is then inundated with water and is allowed to swell. Moisture contents are determined both before and after completion of the test. Test results are recorded as the percent swell, with initial and final moisture content. The results from overburden swell tests performed generally indicate a low potential for swell with changes in soil moisture content except for Borings P2, P7 and P11 in which high swell values were measured ranging from 2.3 to 11.7 percent indicating moderate to very high potential for swell with changes in moisture content.

### **3.2.2 Soluble Sulfates**

Soluble sulfate tests were performed, per Tex-145-E, on representative samples obtained. Subgrade materials in some areas of Texas have experienced sulfate-induced heave after treatment with calcium-based additives such as lime, cement, cement kiln dust and other calcium-rich materials. Sulfates can occur in any type of soil, particularly soils with high plasticity, but also can occur in granular soils found in arid regions. Typically, high sulfate concentrations occur in localized areas, seams or veins and are not uniformly distributed. Also, in Texas it is found that sulfate concentrations typically occur in the 3 to 6 feet range below the surface.

In general, a sulfate level less than 3,000 parts per million (ppm) is considered to have an acceptably low potential for sulfate induced heaving and conventional lime/cement treatment is adequate.

A sulfate concentration from 3,000 ppm to 8,000 ppm is considered to have a moderate to high risk for both lime and cement treatment. For lime treatment an extended mellowing time and a mellowing moisture content at 2 to 5 percent above optimum is recommended. Mellowing is the process whereby the lime reacts with the sulfate rich uncompacted soil. A single lime application is recommended. After the mellowing period, the lime treated soil should be reworked to bring the moisture content down close to optimum and achieve 95% of the maximum dry density.

A sulfate concentration greater than 8,000 ppm is considered too high for lime or cement stabilization.

The test results indicate that the soils from these test borings have sulfate contents up to 180 ppm within the overburden soils. Based on these results, the soils have a low potential for lime or cement-induced heave to occur if lime or cement stabilization is used for the construction of the pavement at the proposed site. However, additional sulfate testing is recommended to be performed prior to construction for the subgrade to receive cement or lime treatment.

### 3.2.3 Chemical Tests

Corrosion suite testing comprising of chlorides and sulfates (per Tex-620-J), resistivity (per Tex-129-E) and pH tests (Tex-128-E) were conducted on selected samples. Chlorides and sulfates tests were performed by a 3rd-party analytical laboratory. The test results are presented in Table 1.

**Table 1. Corrosion Suite Test Results**

Boring No.	Sample Depth (ft)	Chloride Content (ppm)	Sulfate Content (ppm)	Soil Resistivity (ohm-cm)	pH
P2	2-4	303	468	2002	6.52
P3	0-2	265	226	858	7.28
P4	2-4	368	82.3	2931.5	8.29
P5	2-4	283	128	3503.5	8.19
P6	0-2	255	37.6	4075.5	8.21
P7	2-4	242	19.7	3718	7.75
P8	4-6	881	132	514.8	8.05
P9	0-2	226	50	6077.5	9.44
P10	2-4	284	144	2860	8.30
P11	4-6	269	162	3289	8.79

### 3.2.4 Bar Linear Shrinkage

Bar linear shrinkage tests were conducted on selected samples in accordance with Tex-107-E. Results are provided in Table 2 below.

**Table 2. Bar Linear Shrinkage Test Results**

Boring No.	Sample Depth (feet)	Length of Wet Soil Bar (inches)	Length of Dry Soil Bar (inches)	Linear Shrinkage (%)
P2	0-2	5	4.85	3.0
P3	2-4	5	4.59	8.2
P4	4-6	5	4.33	13.8
P5	4-6	5	4.72	5.6
P6	2-4	5	4.49	10.2
P7	4-6	5	4.32	13.6
P8	4-6	5	4.34	13.2
P9	2-4	5	4.84	3.2
P10	4-6	5	4.34	13.2
P11	0-2	5	4.64	7.2

## 4.0 SITE CONDITIONS

### 4.1 Stratigraphy

Based upon a review of the recovered samples, as well as the Geologic Atlas of Texas, Sherman Sheet, the subsurface conditions at this site within the boring depths drilled are characterized by soils associated with the Woodbine Formation and the Terrace Deposits.

- The Woodbine Formation is considered to have formed in a deltaic depositional environment, and as a result, it is highly variable in composition, both laterally and vertically. The deposition of the sand, sandy clay, clay, sandstone, and shale layers can be very erratic and highly variable. Subsurface materials of the Woodbine geological formation typically consist of sands, sandy clays, and clays underlain by shale and/or sandstone bedrock. Dense and irregular shaped masses of very hard well cemented sandstone and concretions occur at random throughout the formation where often coring equipment is needed to penetrate the very hard sandstone.
- Terrace deposits consists of sands, gravels, silt and clays.

A United States Geological Survey (USGS) topographic map of the site is provided in Appendix D, and a geologic map is presented in Appendix E.

A National Resources Conservation Service soil map and soil description are provided in Appendix F. Based on the map, the soil subgrade type consists predominantly of Birome fine sandy loam, Callisburg fine sandy loam, Gowen clay loam and Navo clay loam along the proposed alignment.

Pavement thicknesses obtained during our pavement coring operations are presented in Table 3 below. Pavement core photographs are also presented in Appendix C.

**Table 3. Existing Pavement Sections along the Alignment**

<b>Core Location</b>	<b>Direction</b>	<b>Approximate Thickness of Pavement Structure</b>
P1	Northbound	1.5 inches of asphalt over 3 inches of cement-treated base
P2	Northbound	7.5 inches of asphalt over 6 inches of cement-treated base
P3	Northbound	2.5 inches of asphalt over 3 inches of cement-treated base
P4	Northbound	2.5 inches of asphalt over 4 inches of cement-treated base
P5	Southbound	2.5 inches of asphalt over 6.5 inches of cement-treated base

<b>Core Location</b>	<b>Direction</b>	<b>Approximate Thickness of Pavement Structure</b>
P6	Northbound	2.5 inches of asphalt over 6.5 inches of cement-treated base
P7	Northbound	4.5 inches of asphalt over 3 inches of cement-treated base
P8	Northbound	2.5 inches of asphalt over 6 inches of cement-treated base
P9	Southbound	2.5 inches of asphalt over 6.5 inches of cement-treated base
P10	Northbound	2.5 inches of asphalt over 4.5 inches of cement-treated base
P11	Southbound	2.5 inches of asphalt over 7.5 inches of cement-treated base

Below the existing pavement, the native subgrade consisted of sand and lean/fat clay, with various amounts of silt. The sand ranged in density from slightly compact to compact, in color from reddish tan to reddish brown, and contained various amounts of oxide stains and ferrous nodules. The clays were soft to very stiff in consistency, ranged in color from light brown to dark reddish brown, and contained various amounts of ferrous and calcareous nodules.

#### **4.2 Groundwater**

Groundwater seepage was not encountered in any boring during or after completion of drilling. However, groundwater levels should be anticipated to fluctuate with seasonal and annual variations in rainfall and may vary because of development and landscape irrigation.

### **5.0 ENGINEERING ANALYSIS**

#### **5.1 Estimated Potential Vertical Rise (PVR)**

Potential Vertical Rise (PVR) was evaluated utilizing the TxDOT TEX-124-E Potential Vertical Rise (PVR) Method. An active zone or seasonal moisture variation depth of about 10 feet were considered in our analysis.

At the time of our field investigation, the overburden soils were generally found to be dry to wet in moisture condition. Based upon the results of our analysis, the site is estimated to possess an average PVR of up to 1 to 2 inches at the soil moisture conditions existing at the time of the field investigation. If the near surface soils are allowed to dry appreciably to significant depth prior to or during construction, the potential for post-construction vertical movement may increase. Please note that dry, average, and wet are relative terms based on moisture content and plasticity. The estimated PVR values in existing

conditions are summarized in Table 4 below. Detailed calculations for the PVR estimates at each pavement boring are provided in Appendix G.

**Table 4. Estimated PVR Values at Existing Conditions.**

<b>Boring No.</b>	<b>PVR (inches) in Existing Conditions</b>
P1	0.14
P2*	2.30
P3	0.70
P4	0.68
P5*	0.95
P6	0.24
P7	1.21
P8	1.49
P9*	0.14
P10	0.25
P11	1.33

\*Borings P2, P5 and P9 are located in areas where expected fill heights are greater than 5 to 10 feet.

## **6.0 PAVEMENT SUBGRADE RECOMMENDATIONS**

### **6.1 General**

The pavement design recommendations provided herein are derived from the subgrade information that was obtained from our geotechnical investigation, design assumptions based on project information, our experience with similar projects in this area, on the guidelines and recommendations of the 2021 TxDOT Pavement Manual and the 1993 AASHTO Guide for the Design of Pavement Structures.

### **6.2 Behavior of Soils Beneath Pavement**

Near-surface soils at this site are considered to have a low to moderate potential for volume change with changes in soil moisture content. However, increased moisture content can result in reduced soil stiffness. The moisture content can be “stabilized” to some degree in these soils by covering them with an impermeable surface, such as pavement. However, if moisture is introduced as a result of surface water percolation through pavement joints and cracks or poor drainage, the soil strength can reduce, causing distress to pavements as traffic passes over.

The edges of pavement are particularly prone to moisture variations, and so these areas therefore often experience the most distress. When cracks appear on the surface of the pavement, these openings can allow moisture to enter the pavement subgrade, which can lead to further weakening of the pavement section as well as accelerated failure of the pavement surface.

In order to minimize the potential impacts of expansive soil on paved areas and to improve the long-term performance of the pavement, we have the following recommendations:

- Design a crowned or sloped pavement which provides maximum drainage away from the pavement. A minimum slope of 5 percent within the first 5 feet is considered ideal.
- Subgrade treatments intended to increase the subgrade stability should extend to at least 48-inches beyond the back of curbs or edges of pavements. In addition, we recommend a moisture barrier be placed at least 72 inches beyond the back of curbs or edges of pavements. The moisture barrier should slope away from the pavement edge.
- In order to minimize the potential differential movement across the pavement areas, all joints including contraction, isolation, construction joints and expansion joints should be sealed to minimize the potential for infiltration of surface water. Rubberized asphalt, silicone or another suitable flexible sealant may be used to seal the joints. Maintenance should include periodic inspection of these joints and the joints resealed, as necessary.

### **6.3 Subgrade Strength Characteristics**

For concrete pavements, traffic loads are distributed over a large area, whereas for asphalt pavements traffic loads are more concentrated. As a result, the zone of influence, or bulb of pressure, for concrete pavements for primarily automobile traffic with 2% trucks extends approximately up to 3 feet below the top of pavement. The zone of influence for flexible pavements will extend below the aggregate base zone into the underlying native subgrade materials.

Based on the DCP testing performed along the alignment, we recommend a resilient modulus of 10,000 psi for native soils. For compacted aggregate base or cement treated subgrade, we recommend using a resilient modulus of 20,000 psi. We have used a Modulus of Subgrade Reaction (k) of 200 pci for the on-site subgrade soils prepared in accordance with the recommendations in this report.

### **6.4 Pavement Subgrade Preparation Recommendations**

The anticipated subgrade soils in the proposed paving areas will consist predominately of silty sand and sandy lean/fat clay. It is common for these soils to pump when subjected to high levels of moisture. In addition, these soils located at and near the ground surface will allow surface water to infiltrate until the water becomes perched on a less permeable layer at depth. These soils can become weak with appreciable increases in moisture content. A commonly used method to reduce the potential for pumping, improve the strength properties of the subgrade soils, provide a working platform, reduce PVR and provide a uniform subgrade is to treat them with cement or hydrated lime depending on

the PI of the typical soil to be encountered. For PI's greater than about 15, lime is generally preferred. For this site, PI's of the soils are generally in a range of 6 to 39. For budgetary purposes and uniformity, we would recommend cement treatment as sandy soils were predominately encountered along the proposed alignment. As an alternative to lime or cement treatment, a similar thickness of an aggregate base course can be used. The following recommendations discuss the subgrade preparation and three subgrade preparation alternatives.

#### **6.4.1 Soil Preparation for Pavements**

- Strip the site of any existing pavements, all vegetation and remove any remaining organic or deleterious material under the planned paved areas, including all tree stumps and root balls of previously existing trees. Typically, 6 to 12 inches are sufficient for this purpose. Perform any cut operations as needed.
- After stripping and performing necessary cuts, the exposed subgrade should be proof rolled. Proof rolling should consist of rolling the entire pavement subgrade in mutually perpendicular directions with a heavily loaded, tandem-axle dump truck weighing at least 25 tons or other approved equipment capable of applying similar loading conditions. Any soft, wet, or weak soils that are observed to rut or pump excessively during proof rolling should be removed and replaced with well-compacted, on-site clayey material as outlined below. The proof rolling operation should be performed under the observation of a qualified geotechnical engineer.
- After proof rolling, all exposed surfaces in areas to receive fill should be scarified and reworked to a depth of 12 inches. The soils should then be recompacted to a minimum of 95 percent of the maximum dry density obtained in accordance with ASTM D698 (standard Proctor) and placed at optimum moisture content or at most two (2) percentage points above optimum ( $\geq+2\%$ ), as determined by the same test.
- In areas to receive fill, fill may be derived from on-site or may be imported. The fill should be placed in maximum 8-inch compacted lifts, compacted to at least 95 percent of the maximum dry density, as determined by ASTM D698 (standard Proctor), and be placed at optimum moisture content or at most two (2) percentage points above optimum ( $\geq+2\%$ ), as determined by the same test. Fill materials may be derived from on-site or may be imported as long as the materials are essentially free of organic materials and particles in excess of 4 inches their maximum direction. Fill materials should have no less than 35 percent material passing a No. 200 mesh sieve and a Plasticity Index of no more than 30. Prior to compaction, each lift of fill should first be processed throughout its thickness to break up and reduce clod sizes and blended to achieve a material of uniform density and

moisture content. Once blended, compaction should be performed with a heavy tamping foot roller. Once compacted, if the surface of the embankment is too smooth, it may not bond properly with the succeeding layer. If this occurs, the surface of the compacted lift should be roughened and loosened by dicing before the succeeding layer is placed.

- Water required to bring the fill material to the proper moisture content should be applied evenly through each layer. Any layers that become significantly altered by weather conditions should be reprocessed in order to meet recommended requirements. On hot or windy days, the use of water spraying methods may be required in order to keep each lift moist prior to placement of the subsequent lift. Furthermore, the subsurface soil should be kept moist prior to placing the pavement by water sprinkling or spraying methods.
- Fill materials should be placed on a properly prepared subgrade as outlined above. The combined excavation, placement, and spreading operation should be performed in such a manner as to obtain blending of the material, and to assure that, once compacted, the materials will have the most practicable degree of compaction and stability. Materials obtained on-site must be mixed and not segregated.
- Soil imported from offsite sources should be tested for compliance with the recommendations herein and approved by the project geotechnical engineer prior to being used as fill. Imported materials should consist of lean clays (maximum Plasticity Index of 30) that are essentially free of organic materials and particles larger than 4 inches in their maximum dimension.
- Field density and moisture content testing are recommended to be performed at the rate of at least three (3) tests per 1,000 linear feet of roadway, per lift, per day.

#### **6.4.2 Lime Treatment**

Once the subgrade has been brought to rough final grade, the surface should be treated with lime in accordance with the following recommendations.

- After completion of proof rolling and any grade raise fills, mix lime slurry into the prepared subgrade soil after scarifying to the lime treatment depth to achieve a treated subgrade with a minimum of 6 percent lime by dry weight (measured to be approximately 27 pounds per square yard for a 6-inch treatment depth, or 36 pounds per square yard for an 8-inch treatment depth). However, the final amount of lime used should be determined once subgrade preparation is nearly complete. The amount of lime used should

be sufficient to reduce the Plasticity Index of the soil below 15 (Atterberg Lime series), or to increase pH of the soil-lime mixture to 12.4 (pH series). To account for error, an additional 1 to 2 percent lime should be added to these test quantities. The hydrated lime should be applied only in an area where the initial mixing operations can be completed the same working day. The area of lime treated subgrade should extend a minimum of 2 feet beyond the back of roadway curbs or edges.

- Hydrated lime should be applied such that mixing operations can be completed during the same working day. The hydrated lime should be placed by the slurry method, meaning that the hydrated lime should be mixed with water in trucks or in tanks and applied as a thin water suspension or slurry. The distributor truck or tank should be equipped with an agitator, which will maintain the lime and water in a uniform mixture. The material and hydrated lime should be thoroughly mixed by a rotary mixer or other device to obtain a homogeneous, friable mixture of material and lime that is free from clods and left to cure from one to four days.
- Within our experience, we have found that a curing period of 48 to 72 hours is adequate. During the curing period, the material should be kept moist. After the specified “mellowing duration”, the soil-lime mixture should be remixed and tested for sufficient pulverization and mixing in accordance with TxDOT Item 260. After the required curing time, the material should be uniformly mixed using a rotary mixer capable of reducing the size of the particles so that, when all non-slaking aggregates retained on a no. 4 sieve are removed, the remainder of the material shall meet the following requirements when tested dry by laboratory sieves:
  - Minimum passing 1-3/4” sieve: 100%
  - Minimum passing No. 4 sieve: 60%
- After being sufficiently re-mixed, the soil and lime mixture should be compacted to a minimum of 95 percent of Standard Proctor (ASTM D698) and to a moisture content that is at or above optimum moisture, as determined by the same test.
- During the interval of time between application and mixing, the hydrated lime should not be exposed to the open air for a period exceeding six hours.
- To reduce the potential for subgrade soil moisture changes at the edges of pavements, the lime treated subgrade should extend a minimum of 2 feet past the back of the roadway curbs.

- Field density testing should be performed within all paving areas at the rate of at least three (3) tests per 1,000 linear feet of roadway, per lift, per day. These tests are necessary to determine if the recommended moisture and compaction requirements have been attained. After the required compaction is reached, the subgrade should be brought to the required lines and grades and finished by rolling with a pneumatic tire or other suitable roller sufficiently light to prevent hairline cracking.

### 6.4.3 Cement Treatment

Once the subgrade has been brought to rough final grade the surface should be treated with cement in accordance with the following recommendations.

- Cement treated subgrade should be prepared in accordance with TxDOT Item 275 to the elevations shown on the plans using an estimated three (3) percent cement by dry weight measure of the subgrade soil. The actual percentage to be used should be determined once the subgrade is at rough grade elevation. The amount of cement used should be the minimum amount required to achieve a 7-day cured unconfined compressive strength of 100 pounds per square inch.
- Cement should be applied such that mixing operations for a given area can be completed during the same working day.
- The cement may be placed dry or by the slurry method (meaning that the cement should be mixed with water in trucks or in tanks and applied as a thin slurry).
- After mixing, the soil-cement mixture should be tested for sufficient pulverization and mixing in accordance with TxDOT Item 275. The mixed material should meet the following requirements when tested dry by laboratory sieves:
  - Minimum passing 1-3/4-inch sieve = 100%
  - Minimum passing 3/4" sieve = 85%
  - Minimum passing no. 4 sieve = 60%
- After sufficient re-mixing, the soil/cement mixture (or milled asphalt and base, if reclaiming those materials) should be compacted to a minimum of 95% of Standard Proctor (ASTM D698) and to a moisture content that is at or above the optimum moisture, as determined by that same test. Compaction should be completed within 2 hours after the application of water to the mixture of soil and cement.
- Cure for at least 3 days by "sprinkling" as described in TxDOT Item 204.

- To reduce the potential for reflective cracking up through the pavement, particularly with asphalt pavement, the cement treated subgrade should be rolled with a vibratory roller 1 to 2 days after final compaction to create a network of hairline cracks (microcracking). Cure for at least 2 days by “sprinkling” as described in TxDOT Item 204 after completion of microcracking.
- Field density and moisture content testing should be performed at the rate of at least three (3) tests per 1,000 linear feet of roadway, per lift, per day. These tests are necessary to determine if the recommended moisture and compaction requirements have been attained.

#### **6.4.4 Aggregate Base**

As an alternative to or in conjunction with lime or cement treatment, aggregate base may be placed over the prepared subgrade in accordance with the following recommendations prior to placing the pavement.

- After proof rolling, and prior to the placement of aggregate base, the exposed subgrade beneath pavement areas should be scarified and reworked to a depth of 12 inches, moisture added or removed as required, and the subgrade soils recompacted to a minimum of 95 percent of the maximum dry density of the materials obtained in accordance with ASTM D698 (standard Proctor test) and that is above the material’s optimum moisture content, as determined by the same test ( $\geq +0\%$ ). The rework and aggregate base should extend to at least 24-inches beyond the back of curbs, edges of roadways or adjacent sidewalks.
- The aggregate base should be TxDOT Type A or D and meeting the gradation, durability, and plasticity requirements of TxDOT Item 247 Grade 1-2 or better (2014). Aggregate base material should be uniformly compacted to a minimum of 95% of the maximum standard Proctor dry density (ASTM D698) and placed at a moisture content that is sufficient to achieve density.
- Field density and moisture content testing should be performed at the rate of at least three (3) tests per 1,000 linear feet of roadway, per lift, per day.

## **7.0 PAVEMENT RECOMMENDATIONS**

### **7.1 Traffic Data and Traffic Design Parameters**

The traffic analysis data provided by Halff Associates, Inc. is presented in Appendix H. According to this provided data, the average daily traffic (ADT) on S. Shady Shores Road between W. Shady Shores Road and Swisher Road is 7,200 vehicles/day. The below

parameters were used in the calculation of the equivalent single axle loads (ESAL's) over the design life of the roadway.

- Design Life: 20 and 30 years (for flexible and rigid pavement design)
- Average Daily Traffic: 7,200 vehicles/day
- Design Lane Factor: 100%
- Directional Factor: 50%
- Growth Rate: 2%
- Percent of Heavy Trucks: 18%
- Rigid ESAL/Truck: 1.70
- Flexible ESAL/Truck: 1.13

These traffic volume and intensity yield the following ESAL's over the design life of the roadway. Please contact this office if significant deviations from the assumptions above are anticipated. WinPAS 12 ESAL results are presented in Appendix I.

**Table 5. ESAL's Calculations**

	Equivalent Single Axle Loads (ESAL's)	
	Rigid ESAL's	Flexible ESAL's
20-Year Design Life	9,776,275	6,498,348
30-Year Design Life	16,322,948	10,849,960

## 7.2 Rigid Pavement Design

Table 6 below contains design inputs used for the rigid pavement design recommendations. The recommended pavement section was computed using WinPAS 12 from the American Concrete Pavement Association (ACPA) using the following input values.

**Table 6. Rigid Pavement Design Inputs**

Input	Design Values
Initial Serviceability	4.5
Terminal Serviceability	2.3
Flexural Strength	570 psi
Modulus of Elasticity	4,000,000 psi
Modulus of Subgrade Reaction	200 psi/in
Reliability	95%
Standard Deviation	0.35
Load Transfer Coefficient	3.0
Drainage Coefficient	1.0

Based on WinPAS 12, and the traffic data presented in Section 7.1, we recommend the following minimum reinforced Rigid Portland Cement Concrete and treated subgrade thicknesses. WinPAS 12 results are presented in Appendix I.

**Table 7. Rigid Pavement Design for 20-Year Design Life**

10.5-inches of Portland Cement Concrete, over 8-inches of Lime or Cement Treated Subgrade or 8-inches of TxDOT Grade 1-2 aggregate base
-----------------------------------------------------------------------------------------------------------------------------------------------

**Table 8. Rigid Pavement Design for 30-Year Design Life**

11.5-inches of Portland Cement Concrete, over 8-inches of Lime or Cement Treated Subgrade or 8-inches of TxDOT Grade 1-2 aggregate base
-----------------------------------------------------------------------------------------------------------------------------------------------

- Recommended minimum design compressive strength: 3,600 psi with nominal aggregate size no greater than 1 inch.
- Class P1 or P2 concrete should be used.
- 15 to 20 percent fly ash, Type F may be used with the approval of the Civil Engineer of record.
- Curing compounds should be applied within one hour of finishing operations.

### 7.3 Flexible Pavement Design

Table 9 below contains design inputs used for the flexible pavement design recommendations. The recommended pavement section was computed using WinPAS 12 from the American Concrete Pavement Association (ACPA) using the following input values.

**Table 9. Flexible Pavement Design Inputs**

Input	Design Values
Initial Serviceability	4.2
Terminal Serviceability	2.3
Reliability	95%
Overall Standard Deviation	0.45
Subgrade Resilient Modulus	10,000 psi
Layer Coefficient, Asphalt Cement Concrete	0.44
Layer Coefficient, Cemented-treated Aggregate Base	0.20
Drainage Coefficient	1.0

A subgrade modulus of 10,000 psi was used for this project based on the DCP tests performed for the proposed alignment. Average field CBR in percentage was calculated and the correlation provided in the TxDOT Pavement Design Manual Revised June 2021 edition was used for calculating the subgrade moduli.

Based on WinPAS 12, and the traffic data presented in Section 7.1, we recommend the following minimum hot mix asphaltic concrete (HMAC) pavement and cement treated base (CTB) thicknesses. We recommend 3 inches of Type C or D surface course over 5 inches of Type B base course as specified by TxDOT or the minimums required by the City/County if more stringent. We recommend 6 inches of Class M Cement Treated Base (CTB) conforming to Item 275, 276 as specified by TxDOT or the minimums required by the City/County if more stringent. WinPAS 12 results are presented in Appendix I.

**Table 10. Flexible Pavement Design for 20- and 30-Year Design Life**

8-inches of Hot mix asphaltic concrete (HMAC), over 6-inches of Cement-Treated Aggregate Base (CTB), over 6-inches of Lime or Cement-Treated Subgrade or 6-inches of TxDOT Grade 1-2 aggregate base
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### 7.3.1 Flexible Pavement Installation and Testing

Flexible pavement surface course should conform to TxDOT Item 341 or SS 3076 – “Dense-graded Hot Mix Asphalt” (HMA), or TxDOT Item 340 or SS 3076 – “Dense-graded Hot Mix Asphalt” (Small Quantity).

The following is recommended for HMA:

- HMAC should be placed and compacted to contain between 5 and 9 percent of air voids.
- The target density for asphalt lifts should be 91 to 95 percent of the Maximum Theoretical Specific Gravity as determined by laboratory testing.

The following tests should be performed:

- In place field density tests to establish a rolling pattern.
- One extraction and gradation test per day’s HMAC placement.
- Two cores to verify thickness and density per 5,000 feet of roadway placed.

## 7.4 Pavement Joints and Cutting

The performance of concrete pavement depends to a large degree on the design, construction, and long-term maintenance of concrete joints. The following recommendations and observations are offered for consideration by the Civil Engineer and/or pavement Designer-of-Record.

The concrete pavements should have adequately spaced contraction joints to control shrinkage cracking. Past experience indicates that reinforced concrete pavements with sealed contraction joints on a 12 to 15-foot spacing, cut to a depth of one-quarter to one-third of the pavement thickness, have exhibited less uncontrolled post-construction cracking than pavements with wider spacing. The contraction joint pattern should divide the pavement into panels that are approximately square where the panel length should not exceed 25 percent more than the panel width. Saw cut, post placement formed contraction joints should be saw cut as soon as the concrete can support the saw cutting equipment and personnel and before shrinkage cracks appear, about 6 to 12 hours after concrete placement.

Isolation joints should be used wherever the pavement will abut a structural element subject to a different magnitude of movement, e.g., light poles, retaining walls, existing pavement, stairways, entryway piers, building walls, or manholes.

In order to minimize the potential differential movement across the pavement areas, all joints including contraction, isolation and construction joints should be sealed to minimize the potential for infiltration of surface water. Rubberized asphalt, silicone or other suitable flexible sealant may be used to seal the joints. Maintenance should include periodic inspection of these joints and resealed, as necessary.

The recommendations provided herein in regard to expansion joints for jointed reinforced concrete pavement (JRCP) are derived from our experience and on the guidelines and recommendations of the American Concrete Institute (ACI), Federal Highway Administration (FHWA) and Texas Department of Transportation (TXDOT). The following recommendations and observations are offered for consideration by the Civil Engineer and/or pavement Designer-of-Record who are responsible to seal the final pavement plans and associated specifications for the project. An expansion joint is provided to allow for thermal expansion of the concrete pavement in order to prevent spalling at the joints. Where provided the joint is full pavement depth with dowel bars at the mid-section of the joint. It can be argued that the closely spaced contraction joints allow for this potential thermal expansion and therefore widely spaced expansion joints would be appropriate. This has the benefit of strengthening the contraction joints and not allowing the joints to open up causing premature failure of the joint sealant. Isolation joints however should be provided at the edges of the pavement where the pavement abuts a structural element. Due to the potential for excessive thermal expansion caused by high temperatures encountered in the DFW Metroplex it can also be argued to provide expansion joints with maximum spacing on the order of 60 to 600 feet depending on the author. The overuse of expansion joints should be avoided however, because contraction joints may open over time resulting in sealant failure.

#### **7.4.1 Pavement Reinforcing Steel**

Grade 60 or above deformed steel bars that meet the requirements of Item 440 should be used. ASTM A966 Type R bars may only be used in this project as

straight bars, upon TxDOT's approval. We recommend that a minimum of 0.1 percent of steel be used for all concrete pavements. For 10- to 12-inch thick concrete pavement section, this reinforcement ratio is approximately equivalent to No. 4 bars spaced at 16-inches on-center. Reinforcement requirements may increase depending on specific traffic loading and design life parameters.

## **8.0 OTHER CONSTRUCTION**

### **8.1 Utility and Service Lines**

Backfill for utility lines should consist of on-site material and should be placed in accordance with the following recommendations. The on-site fill soil should be placed in maximum 6-inch compacted lifts, compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D698 (standard Proctor), and placed at a moisture content that is at least the optimum moisture content to four (4) percent above optimum moisture content., as determined by that same test. It is not uncommon to realize some settlement along the trench backfill. We also recommend that the utility trenches be visually inspected during the excavation process to ensure that undesirable fill that was not detected by the test borings does not exist at the site. This office should be notified immediately if any such fill is detected.

Utility lines connected to the structure may experience differential movement in response to changing moisture conditions in expansive soil. These movements may result in damage to the lines, especially at connections. Flexible connections may be considered to account for potential differential movement between the building and utilities.

Utility excavations should be sloped so that water within excavations will flow to a low point away from the active construction where it can be removed before backfilling. Compaction of bedding material should not be water jetted. Compacted backfill above the utilities should be on-site clays to limit the percolation of surface water.

### **8.2 Exterior Flatwork (Sidewalks)**

Concrete flatwork should include high tensile steel reinforcement to reduce the formation and size of cracks. Flatwork should also include frequent and regularly spaced expansion/control joints and dowels to limit vertical offsets between neighboring flatwork slabs. Structure entrances should either be part of the structure or designed to tolerate vertical movement without inhibiting access. The moisture content of the subgrade should be maintained up to the time of concrete placement. If subgrade soils are allowed to dry below the levels recommended herein, additional moisture conditioning of the soils may be required. These recommendations are intended to reduce possible distress to exterior flatwork but will not prevent movement and/or vertical offsets between slabs.

The concrete flatwork should have adequately spaced contraction joints to control shrinkage cracking. Past experience indicates that reinforced concrete pavements with sealed contraction joints on a 5 to 6-foot spacing (for 10-foot-wide sidewalks), cut to a

depth of one-quarter to one-third of the pavement thickness, have generally exhibited less uncontrolled post-construction cracking than pavements with wider spacing. The contraction joint pattern should divide the pavement into panels that are approximately square where the panel length should not exceed 25 percent more than the panel width. Saw cut, post placement formed contraction joints should be saw cut as soon as the concrete can support the saw cutting equipment and personnel and before shrinkage cracks appear, on the order of 6 to 12 hours after concrete placement. Rubberized asphalt, silicone or other suitable flexible sealant could be used to seal the joints. Isolation joints should be used wherever the pavement will abut a structural element subject to a different magnitude of movement, e.g., light poles, retaining walls, existing pavement, stairways, entryway piers, building walls, or manholes.

Consideration may be given to improving the subgrade beneath the ground supported flatwork. One option is to incorporate a 12-inch layer of select fill placed atop the subgrade soils. This would improve the strength properties of the subgrade soils, provide a working platform, reduce the PVR and provide a more uniform subgrade. Select fill should have a Liquid Limit (LL) of less than 35, a Plasticity Index (PI) between 6 and 18 and a minimum of 35% of the material passing a No. 200 mesh sieve and be essentially free of particles in excess of 4 inches in their longest direction. The select fill should be placed in maximum 6-inch compacted lifts, compacted to at least 95 percent of the maximum density as determined by the Standard Moisture Density Relationship test (ASTM D698), and should be placed at a moisture content that is at least the optimum moisture content, as determined by that same test.

### **8.3 Surface Drainage**

Proper drainage is critical to the performance of paved areas. Positive surface drainage should be provided that directs surface water away from pavement edges. Where possible, we recommend that a slope of at least 5 percent in the first 5 feet be provided, but in no case should the slope be less than 2 percent unless curbs and gutters are provided along with adequate storm drainage. The slopes should direct water away from the pavement edges and should be maintained throughout construction and the life of the structure.

Construction joints must be maintained and any cracks that develop must be sealed. Inspection and resealing (as needed) should be part of the maintenance program.

### **8.4 Landscaping**

Trees (if planned) should not be placed in proximity to the pavements, as trees are known to cause localized soil shrinkage due to desiccation of the soil by the root system, possibly leading to pavement distress. Root barriers should be used if trees and other plants are provided close to pavements.

Note: A moist but not overly wet soil condition should be maintained at all times in all landscaped areas near the pavement after construction to minimize soil volume changes caused by changing soil moisture conditions.

### **8.5 Site Grading**

Expansive clay cut and fill slopes should be gentle and preferably should not exceed 4 horizontals to 1 vertical (4H: 1V).

Excess water ponding on and beside roadways, sidewalks, and ground-supported slabs can cause unacceptable heave of these structures. To reduce this potential heave, good surface drainage should be established. In addition, final grades in the vicinity of structures, pavements, and flatwork should provide for positive drainage away from these elements.

### **8.6 Excavations**

Excavations greater than 5 feet in height/depth should be in accordance with OSHA 29CFR 1926, Subpart P. Temporary construction slopes should incorporate excavation protection systems or should be sloped back. Where the excavation does not extend close to building lines, these areas may be laid back. Where space allows, temporary slopes should be sloped at 1.5 horizontal to 1 vertical (1.5H: 1V) or flatter.

Where excavation slopes greater than five (5) feet in height cannot be laid back, these areas will require the installation of a temporary retention system or shoring to protect the existing construction, restrain the subsurface soils and maintain the integrity of the excavation. We recommend that monitoring points be established around the retention system and that these locations be monitored during and after the excavation activities to confirm the integrity of the retention system.

The slopes and temporary retention system should be designed and verified by the contractor's engineer and should not be surcharged by traffic, construction equipment, or permanent structures. The slopes and temporary retention system should be adequately maintained and periodically inspected to ensure the safety of the excavation and surrounding property.

### **8.7 Erosion Protection Recommendations**

This is a supplemental recommendation in case the pavements in some areas will be subjected to frequent flooding and erosion. For the pavements lying in this zone, stone riprap may be utilized along the stretch to aid in erosion control. Stone Riprap slope protection should be constructed using processed durable rock that conforms to TxDOT Standard Specification Item 432. Riprap materials, embedment depths and details can be found in the standard TxDOT riprap sheets. It should be noted that the riprap should only be considered as erosion mitigation and not be considered as improvements to the global stability of the slopes. The erosion mitigation provided by these implements will

improve resistance to erosion and further steepening of otherwise unprotected slopes, which will consequently reduce the factor of safety for unprotected slopes. A filter fabric should be placed over the compacted slope surface and secured with suitable pins or nails prior to the placement of riprap material.

Where the riprap will transition into adjacent protected or natural slopes, the slope should be cut sufficiently deep so that the finished grade of the riprap will match that of the surrounding area. We have the following additional recommendations for stone riprap construction:

- Stone riprap material should be placed on the filter fabric to achieve a reasonably well-graded mass. To achieve this, riprap should not be placed by dumping it in chutes, pushing it from the top of the slope, or any method likely to cause segregation.
- Avoid pockets of small stones and clusters of larger stones by rearranging individual stones by mechanical equipment or by hand if necessary.
- Open joints and voids should be filled with spalls and smaller stone sufficiently small to obtain a tight fit.

Alternatively, flexamat or approved equivalent product could be utilized in lieu of stone riprap. Flexamat consists of concrete shapes, rectangular or round, that are tied together with high strength geogrid. Specifications and procedures for installations are developed and performed by specialty contractors. It is the responsibility of the specialty contractor to employ competent personnel to observe, monitor and examine to determine the accomplishment of intended objectives.

## 9.0 LIMITATIONS

The professional geotechnical engineering services performed for this project, the findings obtained, and the recommendations prepared were accomplished in accordance with currently accepted geotechnical engineering principles and practices.

Variations in the subsurface conditions are noted at the specific boring locations for this study. As such, all users of this report should be aware that differences in depths and thicknesses of strata encountered can vary between the boring locations. Statements in the report as to subsurface conditions across the site are extrapolated from the data obtained at the specific boring locations. The number and spacing of the exploration borings were chosen to obtain geotechnical information for the design and construction of pavements. If there are any conditions differing significantly from those described herein, Geotex should be notified to re-evaluate the recommendations contained in this report.

Recommendations contained herein are not considered applicable for an indefinite period of time. Our office must be contacted to re-evaluate the contents of this report if construction does not begin within a one-year period after completion of this report.

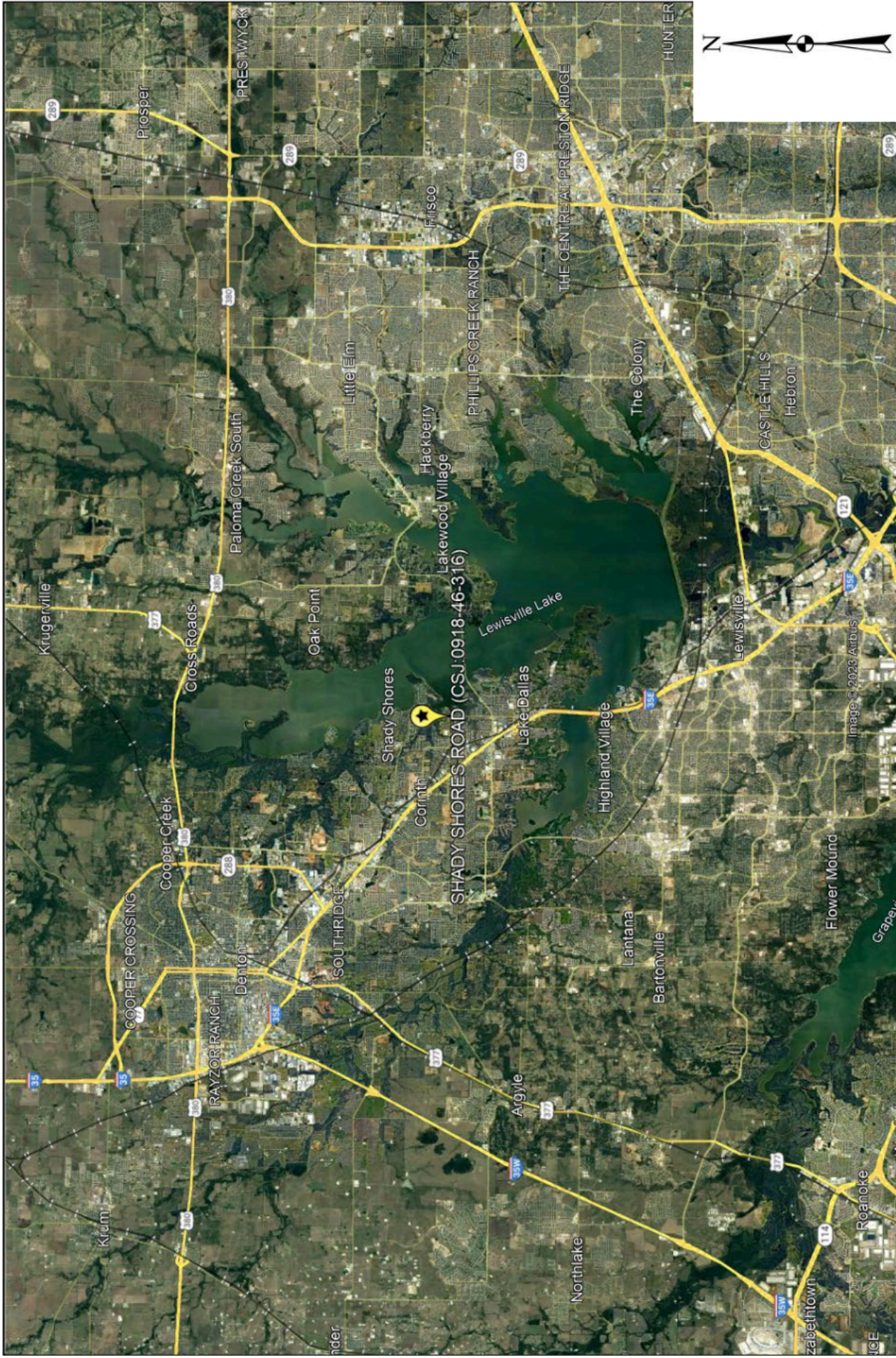
The scope of services provided herein does not include an environmental assessment of the site or investigation for the presence or absence of hazardous materials in the soil, surface water, or groundwater.

All contractors referring to this geotechnical report should draw their own conclusions regarding excavations, construction, etc. for bidding purposes. Geotex is not responsible for conclusions, opinions or recommendations made by others based on these data. The report is intended to guide preparation of project specifications and should not be used as a substitute for the project specifications.

Recommendations provided in this report are based on our understanding of information provided by the Client to us regarding the scope of work for this project. If the Client notes any differences, our office should be contacted immediately since this may materially alter the recommendations.

This report has been prepared for the exclusive use of our client for specific applications to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Geotex reviews the changes and either verifies or modifies the conclusions of this report in writing.

**APPENDIX A – PROJECT LOCATION DIAGRAM**



LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

PROJECT LOCATION DIAGRAM - GENERAL

SHADY SHORES ROAD

CSJ: 0918-46-316



DENTON COUNTY

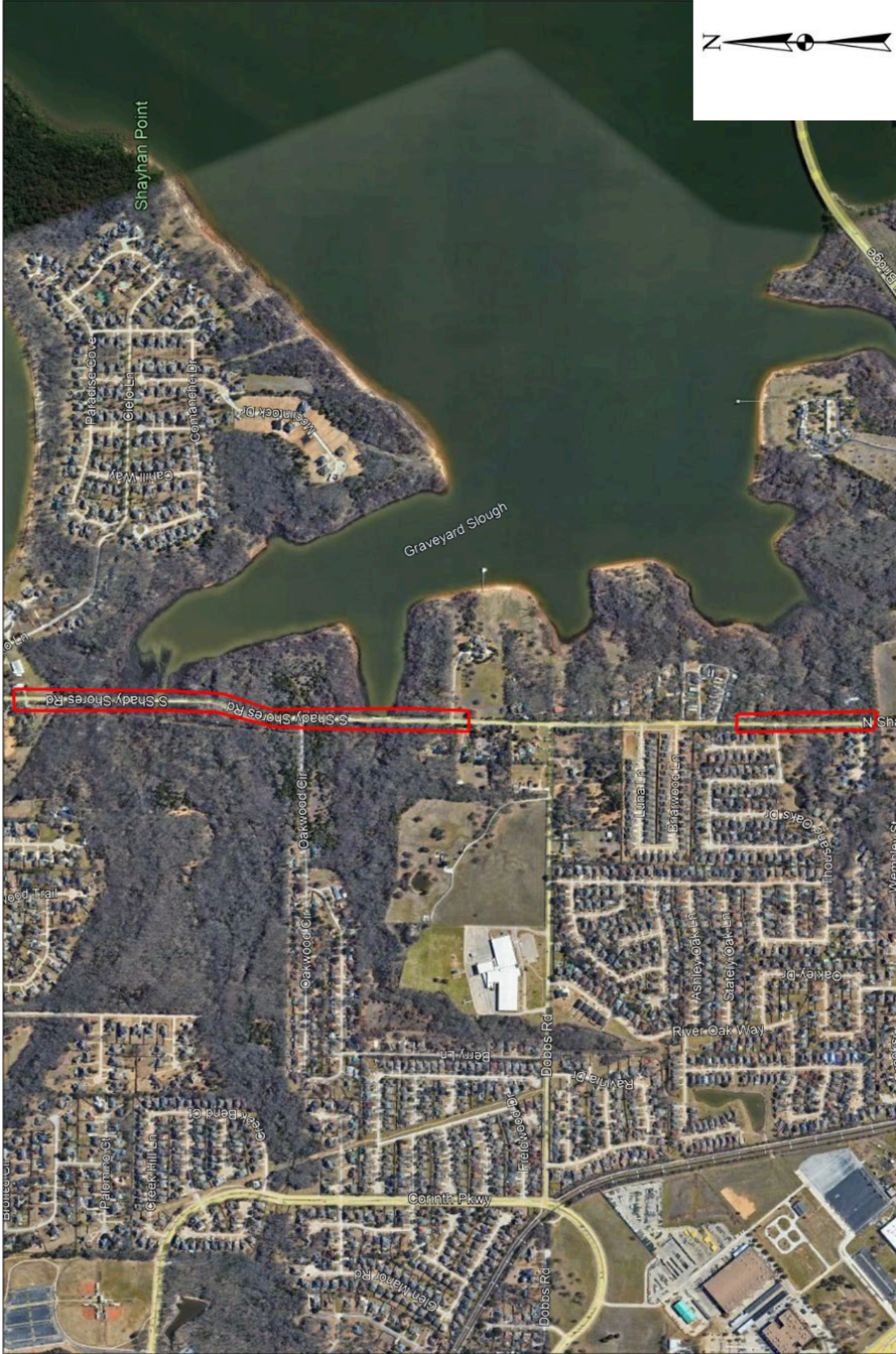


SHEET NO.

**G1**

TEXAS

**APPENDIX B – BORING LOCATION DIAGRAM**



LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

PROJECT LOCATION DIAGRAM - LOCAL

SHADY SHORES ROAD

CSJ: 0918-46-316



DENTON COUNTY

SHEET NO.

**G2**

TEXAS





\*\*BORING LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



**GEOTEX**  
ENGINEERING

**BORING LOCATION DIAGRAM**  
**SHADY SHORES ROAD**  
**CSJ: 0918-46-316**

**SHEET NO.**  
**G3**

DENTON COUNTY

TEXAS

October 11-20, 2023



79	2418806.9942	0° 50' 15.26" (LT)	5000.00	36.55	73.09	N 0° 46' 17.91" W	73.09	53+93.03	54+66.12	N 0° 21' 10.28" W	N 1° 11' 25.54" W
39	2418790.2808	1° 58' 30.40" (RT)	5000.00	86.19	172.36	N 0° 12' 10.34" W	172.35	61+47.86	63+20.22	N 1° 11' 25.54" W	N 0° 08' 39.82" W
26	2418802.8195	0° 55' 44.68" (LT)	2000.00	16.22	32.43	N 0° 19' 12.52" E	32.43	71+33.39	71+65.82	N 0° 47' 04.86" E	N 0° 08' 39.82" W
05	2418802.1781	0° 43' 51.00" (RT)	3000.00	19.13	38.27	N 0° 13' 15.68" E	38.27	73+84.97	74+23.24	N 0° 08' 39.82" W	N 0° 35' 11.18" E
68	2418811.8307	2° 35' 09.00" (LT)	5100.00	11.51	23.02	N 0° 42' 23.32" W	23.02	83+35.69	83+58.71	N 1° 59' 57.82" W	N 0° 35' 11.18" E
09	2418801.5662	4° 16' 28.00" (RT)	5100.00	109.68	216.07	N 10° 08' 16.18" E	214.46	85+31.72	87+47.79	N 1° 59' 57.82" W	N 1° 59' 57.82" W
78	2418937.7371	0° 46' 28.00" (RT)	2000.00	13.52	199.87	N 11° 02' 52.68" E	198.59	89+04.51	91+04.58	N 2° 16' 30.18" E	N 2° 16' 30.18" E
53	2418940.3204	0° 46' 12.46" (LT)	2000.00	13.44	26.88	N 0° 12' 29.18" E	27.03	100+06.91	100+33.94	N 0° 10' 44.82" W	N 0° 10' 44.82" W
54	2418938.2538	8° 25' 19.88" (LT)	5100.00	37.55	74.97	N 4° 23' 09.23" W	74.90	109+08.86	109+83.82	N 0° 10' 29.29" W	N 0° 10' 29.29" W
53	2418927.0272	8° 25' 19.88" (RT)	5100.00	37.55	74.97	N 4° 23' 09.23" W	74.90	109+08.86	109+83.82	N 0° 10' 29.29" W	N 0° 10' 29.29" W

\*\*BORING LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

BORING LOCATION DIAGRAM  
 SHADY SHORES ROAD  
 CSJ: 0918-46-316

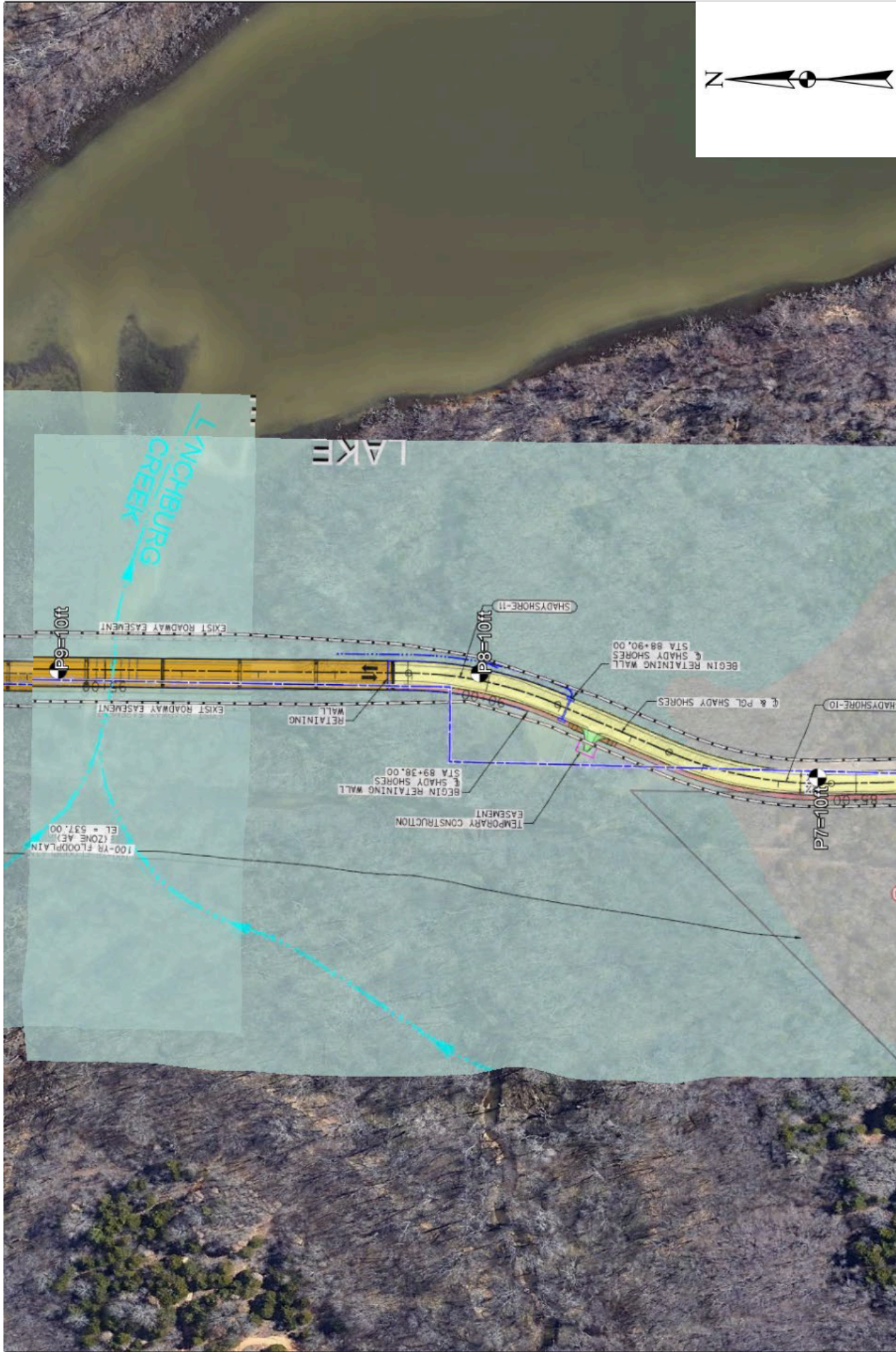


SHEET NO.  
**G4**

DENTON COUNTY

TEXAS

October 11-20, 2023



\*\*BORING LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

**BORING LOCATION DIAGRAM**  
**SHADY SHORES ROAD**  
**CSJ: 0918-46-316**

SHEET NO.  
**G5**

October 11-20, 2023

TEXAS



**GEOTEX**  
 ENGINEERING

DENTON COUNTY



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**BORING LOCATION DIAGRAM**  
**SHADY SHORES ROAD**  
**CSJ: 0918-46-316**



N.T.S.



DENTON COUNTY

TEXAS

SHEET NO.  
**G6**

October 11-20, 2023

**APPENDIX C – BORING LOGS AND SUPPORTING DATA**

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## Boring Logs

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WinCore  
Version 3.1

# DRILLING LOG

1 of 1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P1  
Structure Pavement  
Station 37+27.74  
Offset 5.99' RT

District Dallas  
Date 10/11/23  
Grnd. Elev. 550.52 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
550.3			ASPHALT, 1.5 inches							
550.1			BASE, 3 inches							
1			SAND, compact; reddish tan, light brown; trace oxide stains; silty (SM)							
2						9.2				P.P. = 4.5+
3										
4						8.4	NP	NP	101.3	P.P. = 4.5+, -#200: 34.9
5										
6						10.7				P.P. = 4.5+
7										
8						15.0				P.P. = 3.0, -#200: 23.6
9										P.P. = 0.25
540.5						7.9	NP	NP		SPT MOD: 39, 50 = 3" (50), -#200: 22.0
10										
11										
12										
13										
14										
15										

Remarks: N 7100956.5840, E 2418842.2250  
 -dry during drilling  
 -dry at completion  
 -SPT modified with 170 lb hammer and a 24" drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P2  
Structure Pavement  
Station 40+64.78  
Offset 0.92' RT

District Dallas  
Date 10/19/23  
Grnd. Elev. 530.57 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)		
530.0			ASPHALT, 7.5 inches								
529.5	1		BASE, 6 inches								
	2		CLAY, very stiff; gray, light brown; trace to few oxide stains (CH)			6.2				P.P. = 4.5+; Sulfate PPM = 140	
	3										
	4						15.4	60	39	113.0	P.P. = 4.5+, #200: 96.3
	5										
524.6	6		CLAY, very stiff; gray, light brown; trace to few oxide stains; with sand (CL)			12.3				P.P. = 4.5+, #200: 94.7	
	7										
	8						12.2	43	22		P.P. = 4.5+, #200: 71.3
	9										
520.6	10					11.1				P.P. = 4.5+	
	11										
	12										
	13										
	14										
	15										

Remarks: N 7101293.3000, E 2418829.4060  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P3  
Structure Pavement  
Station 46+99.14  
Offset 8.20' RT

District Dallas  
Date 10/12/23  
Grnd. Elev. 544.18 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
544.1			ASPHALT, 2.5 inches							
543.8			BASE, 3 inches							
	1		CLAY, very stiff; reddish brown, light brown; trace ferrous nodules and oxide stains; sandy (CL)							P.P. = 4.5+
	2			11.5	34	15				P.P. = 4.5+, #200: 57.4
	3									
	4			9.7						P.P. = 4.5+; Sulfate PPM = 160
	5									
	6			9.6	37	19	131.1			P.P. = 4.5+, #200: 55.6
	7									
	8			10.2						P.P. = 4.5+
	9									
534.2	10						16.0			P.P. = 4.5+, #200: 55.4
	11									
	12									
	13									
	14									
	15									

Remarks: N 7101927.6670, E 2418823.3980  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P4  
Structure Pavement  
Station 70+62.97  
Offset 3.35' RT

District Dallas  
Date 10/12/23  
Grnd. Elev. 538.49 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
538.3			ASPHALT, 2.5 inches							
538.0			BASE, 4 inches							
	1		CLAY, very stiff; reddish brown, light gray, light brown; few to little ferrous nodules and oxide stains; sandy (CL)							Sulfate PPM = 180
	2					11.4				P.P. = 4.5+
	3									
	4					9.6	30	13	110.0	P.P. = 4.5+, #200: 66.2
	5									
	6					10.3				P.P. = 4.5+, #200: 74.9
	7									
	8					10.3				P.P. = 4.5+
	9									
528.5	10					10.7	37	19		P.P. = 4.5+, #200: 64.9
	11									
	12									
	13									
	14									
	15									

Remarks: N 7104291.0100, E 2418806.9820  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P5  
Structure Pavement  
Station 75+55.40  
Offset 9.21' LT

District Dallas  
Date 10/19/23  
Grnd. Elev. 526.85 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
526.7			ASPHALT, 2.5 inches							
			BASE, 6.5 inches							
526.1	1		CLAY, stiff; light brown, reddish brown; trace ferrous nodules; sandy (CL)							
	2					5.7				P.P. = 3.0
	3									
	4					18.1	37	26		P.P. = 1.5; Sulfate PPM = 160, #200: 69.6
	5									
520.9	6		SAND, loose to slightly compact; reddish tan, gray; silty (SM)			19.2				P.P. = 2.0
	7									
	8					9.8	NP	NP	114.3	P.P. = 1.0, #200: 40.3
	9									
516.9	10					15.3				P.P. = 1.75, #200: 39.3
	11									
	12									
	13									
	14									
	15									

Remarks: N 7104783.5680, E 2418796.5140  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P6  
Structure Pavement  
Station 80+62.66  
Offset 3.09' RT

District Dallas  
Date 10/12/23  
Grnd. Elev. 530.19 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)		
530.0			ASPHALT, 2.5 inches								
			BASE, 6.5 inches								
529.4	1		SAND, slightly compact; reddish brown, brown; trace ferrous nodules and cemented sand fragments; silty; clayey (SC-SM)			7.2	20	7		P.P. = 4.0; Sulfate PPM = 160, #200: 30.1	
	2										
	3										
526.2	4		SAND, slightly compact to compact; reddish brown, brown; trace ferrous nodules and cemented sand fragments (SC)			11.8				P.P. = 4.5+	
	5										
	6						11.1	24	10	119.5	P.P. = 4.5+, #200: 42.3
	7										
	8					5.3				P.P. = 4.5+	
	9										
520.2	10					8.9				P.P. = 0.25, #200: 36.9	
	11										
	12										
	13										
	14										
	15										

Remarks: N 7105290.6780, E 2418814.0150  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P7  
Structure Pavement  
Station 85+41.02  
Offset 4.88' RT

District Dallas  
Date 10/20/23  
Grnd. Elev. 539.16 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
538.9			ASPHALT, 4.5 inches							
538.6			BASE, 3 inches							
	1		CLAY, very stiff; gray, reddish tan; few to little ferrous nodules and oxide stains; with sand; clayey sand inclusion at 8 feet (CL)							
	2					15.9				P.P. = 4.5+; Sulfate PPM = 120
	3									
	4					11.2	36	20	121.0	P.P. = 4.5+, #200: 71.5
	5									
	6					11.1				P.P. = 4.5+
	7									
	8					9.8				P.P. = 4.5+, #200: 25.6
	9									
529.2	10					12.9	39	23		P.P. = 4.5+, #200: 81.5
	11									
	12									
	13									
	14									
	15									

Remarks: N 7105769.0210, E 2418812.0360  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P8  
Structure Pavement  
Station 90+13.71  
Offset 5.47' RT

District Dallas  
Date 10/12/23  
Grnd. Elev. 530.41 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
530.2			ASPHALT, 2.5 inches							
			BASE, 6 inches							
529.6	1		CLAY, very stiff; reddish brown, light brown; trace ferrous nodules and oxide stains; sandy (CL)							
	2					9.8				P.P. = 4.5; Sulfate PPM = 120
	3									
	4					10.7	39	23		P.P. = 4.5, #200: 63.8
	5									
	6					13.7				P.P. = 4.5
	7									
522.4	8		CLAY, very stiff; reddish brown, brown; trace ferrous nodules and oxide stains (CL)							
	9					17.8				P.P. = 4.5, #200: 95.2
520.4	10									
	11									
	12									
	13									
	14									
	15					17.0	45	26		P.P. = 4.25, #200: 91.8

Remarks: N 7106219.5350, E 2418940.2640  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P9  
Structure Pavement  
Station 95+78.96  
Offset 7.90' LT

District Dallas  
Date 10/12/23  
Grnd. Elev. 527.87 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
527.7			ASPHALT, 2.5 inches							
			BASE, 6.5 inches							
527.1	1		CLAY, very stiff; dark brown, brown; sandy, silty (CL-ML)							
	2					22.2	26	6		P.P. = 4.5+; Sulfate PPM = 160, #200: 56.9
	3									
523.9	4		SILT, soft to stiff; dark brown, brown; sandy (ML)							
	5									
	6					11.1				P.P. = 4.0
	7									
	8					12.3	NP	NP	118.4	P.P. = 1.75, #200: 57.8
	9									
519.1	9		CLAY, soft; dark brown, brown; with silt seams (CL) (CL)							
	10					19.8				P.P. = 0.5
517.9	10									
	11					22.8				P.P. = 1.25, #200: 50.1
	12									
	13									
	14									
	15									

Remarks: N 7106785.2540, E 2418933.2200  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P10  
Structure Pavement  
Station 100+81.73  
Offset 4.50' RT

District Dallas  
Date 10/12/23  
Grnd. Elev. 528.29 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
528.1			ASPHALT, 2.5 inches							
			BASE, 4.5 inches							
527.5	1		SAND, compact; reddish brown, light brown; trace ferrous nodules and cemented sand fragments; clayey (SC)							
	2					18.6				P.P. = 4.5+; Sulfate PPM = 120
	3									
	4					9.5	22	10	113.6	P.P. = 4.5+, -#200: 41.6
	5									
	6					9.0				P.P. = 4.5+
	7									
520.3	8		CLAY, soft to very stiff: reddish brown, brown; trace ferrous nodules; sandy (CL)							
	9					11.2				P.P. = 4.5+, -#200: 46.0
518.3	10					15.1	30	16		P.P. = 1.0, -#200: 56.1
	11									
	12									
	13									
	14									
	15									

Remarks: N 7107287.9990, E 2418944.8760  
-dry during drilling  
-dry at completion



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole P11  
Structure Pavement  
Station 105+69.04  
Offset 5.97' LT

District Dallas  
Date 10/12/23  
Grnd. Elev. 540.06 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
539.9			ASPHALT, 2.5 inches							
			BASE, 7.5 inches							
539.2	1		SAND, loose to slightly compact; reddish brown; some cemented sand fragments; poorly graded with silt (SP-SM)			8.3	NP	NP		P.P. = 2.0, #200: 8.8
538.1	2		CLAY, very stiff; brown; trace to few ferrous and calcareous nodules; with sand (CL)							
	3									
	4					16.6				P.P. = 4.5+; Sulfate PPM = 140
	5									
	6					13.6	43	27	114.3	P.P. = 4.5+, #200: 77.6
533.1	7		CLAY, very stiff; reddish tan; sandy (CL)							
	8					12.7				P.P. = 4.5+
	9									
530.1	10					8.9				P.P. = 4.5+, #200: 51.2
	11									
	12									
	13									
	14									
	15									

Remarks: N 7107775.3230, E 2418935.4370  
-dry during drilling  
-dry at completion

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## Pavement Core Photographs

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P1



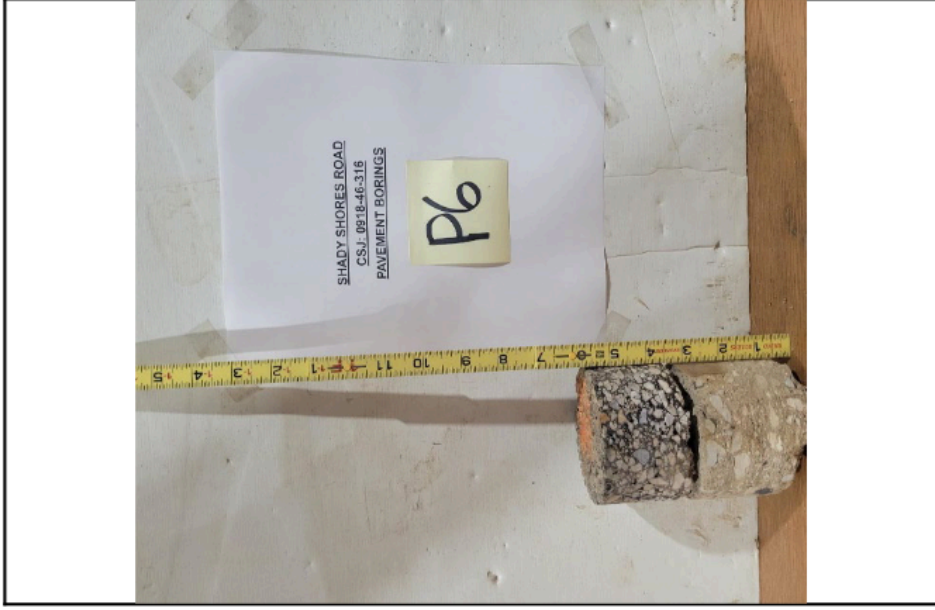
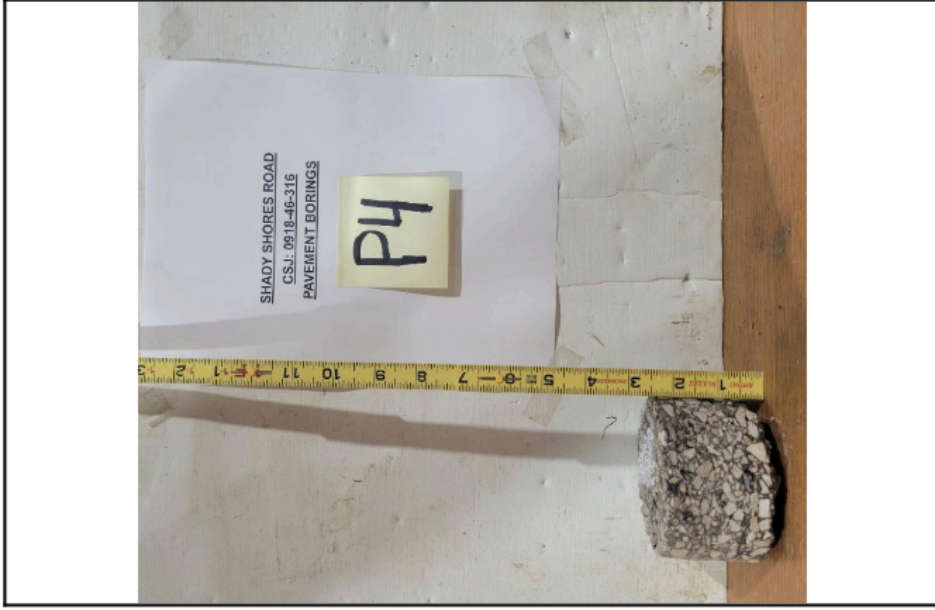
P2



P3

Boring	Description
P1	Asphalt 1.5 inches, Cement Treated Base 3.0 inches*
P2	Asphalt 7.5 inches, Cement Treated Base 6.0 inches*
P3	Asphalt 2.5 inches, Cement Treated Base 3.0 inches*

\*Base not recovered/ partially recovered



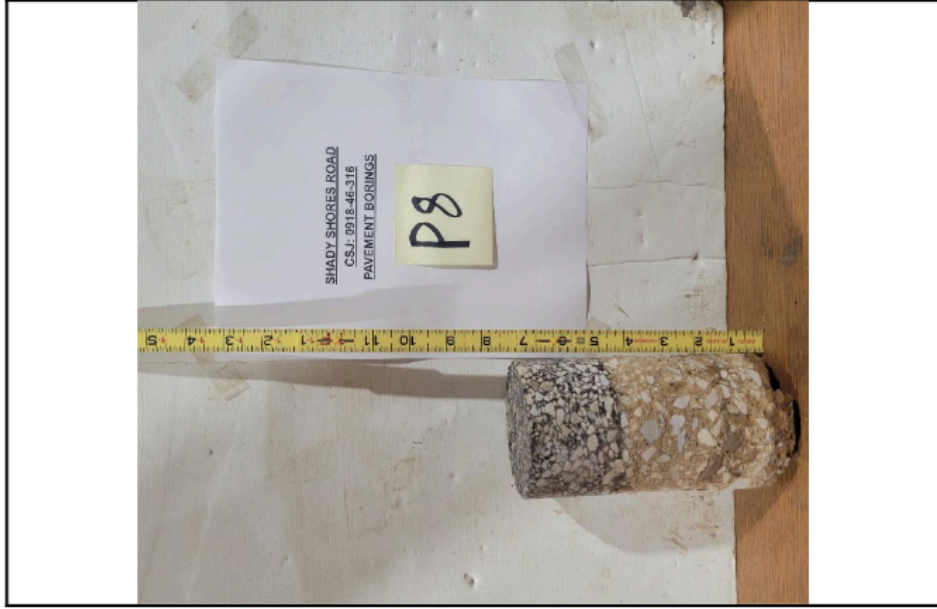
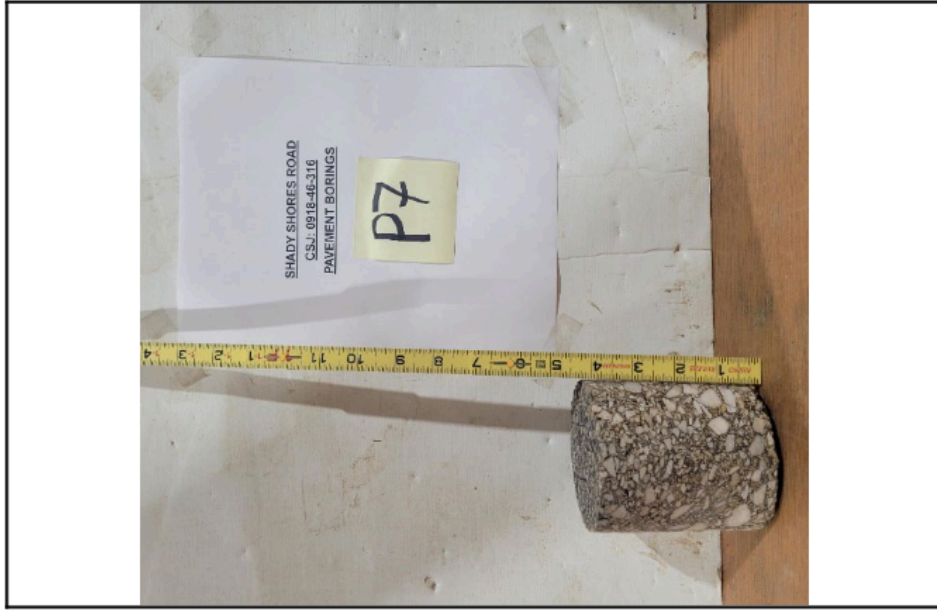
P4

P5

P6

Boring	Description
P4	Asphalt 2.5 inches, Cement Treated Base 4.0 inches*
P5	Asphalt 2.5 inches, Cement Treated Base 6.5 inches*
P6	Asphalt 2.5 inches, Cement Treated Base 6.5 inches*

\*Base not recovered/ partially recovered



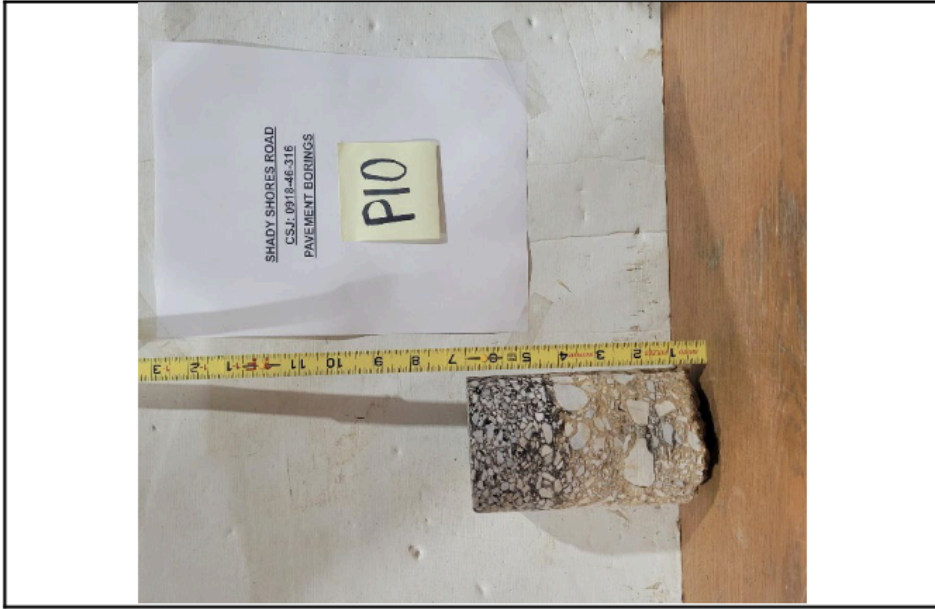
P7

P8

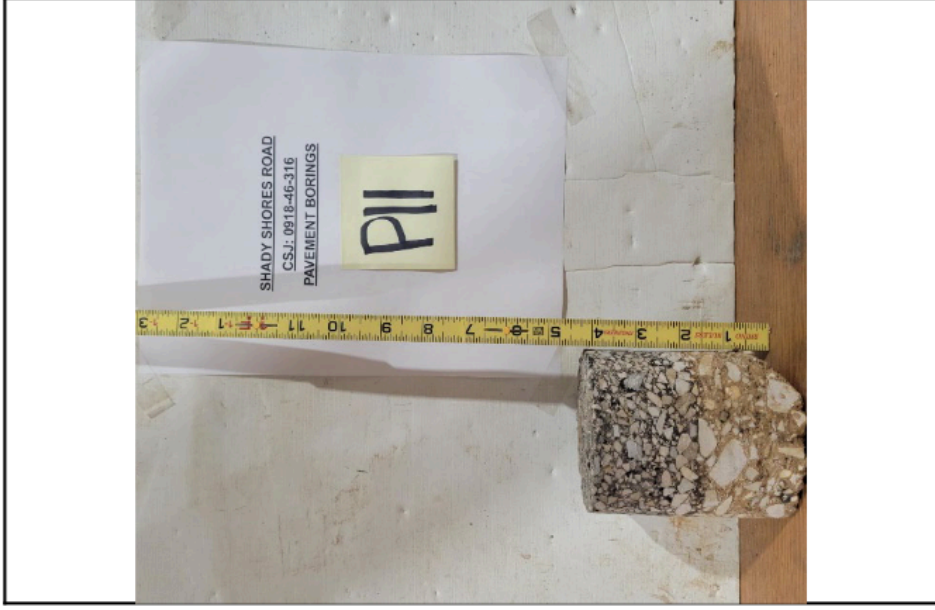
P9

Boring	Description
P7	Asphalt 4.5 inches, Cement Treated Base 3.0 inches*
P8	Asphalt 2.5 inches, Cement Treated Base 6.0 inches*
P9	Asphalt 2.5 inches, Cement Treated Base 6.5 inches*

\*Base not recovered/ partially recovered



P10



P11

Boring	Description
P10	Asphalt 2.5 inches, Cement Treated Base 4.5 inches*
P11	Asphalt 2.5 inches, Cement Treated Base 7.5 inches*

\*Base not recovered/ partially recovered

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## Swell Tests

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# SWELL TEST RESULTS

COUNTY: Denton  
HIGHWAY: Shady Shores Road  
CSJ: 0918-46-316

DATE: 10/11/2023  
DRILLED BY: Dustin Smith (Geotex)  
LOGGED BY: Dylan McAden (Geotex)

Boring Number	Depth feet	Initial Moisture Content, %	Final Moisture Content, %	Applied Pressure, psf	Vertical Swell, %
P1	2-3	8.4	22.2	260	0.0
P2	2-3	15.4	28.8	260	11.7
P3	4-5	9.6	22.6	520	0.0
P4	2-3	9.6	20.0	260	1.5
P5	6-7	9.8	14.9	780	0.0
P6	4-5	11.1	14.0	520	0.1
P7	2-3	11.2	19.0	263	5.1
P8	2-3	10.7	15.9	263	0.0
P9	4-5	12.3	13.0	525	0.0
P10	2-3	9.5	15.5	260	0.0
P11	4-5	13.6	20.1	519	2.3

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## Soil Chemical Results

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Corrosion Suite Testing  
Chloride & Sulfate (Tex-620-J),  
pH (Tex-128-E), Resistivity (Tex-129-E)

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**Chemical Laboratory Test Results**

Project Name: Shady Shores Road (CSJ: 0918-46-316)  
Project No: G22-4003-1  
Location: Shady Shores/Lake Dallas, Texas

Boring	Depth (ft)	Soil pH TEX-128-E	Chloride(ppm) TEX-620-J	Sulfate (ppm) TEX-620-J	Electrical Resistivity (Ohm-cm) TEX-129-E
P2	2-4	6.52	303	468.0	2002.0
P3	0-2	7.28	265	226.0	858.0
P4	2-4	8.29	368	82.3	2931.5
P5	2-4	8.19	283	128.0	3503.5
P6	0-2	8.21	255	37.6	4075.5
P7	2-4	7.75	242	19.7	3718.0
P8	4-6	8.05	881	132.0	514.8
P9	0-2	9.44	226	50.0	6077.5
P10	2-4	8.30	284	144.0	2860.0
P11	4-6	8.79	269	162.0	3289.0

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## Sulfate Test Results

(Tex-145-E)

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# SOLUBLE SULFATE CONTENT RESULTS

## TEX 145-E

PROJECT: Shady Shores Road (CSJ: 0918-46-316)

PROJECT NUMBER: G22-4003-1

CLIENT: Half Associates

LOCATION: Shady Shores/Lake Dallas, Texas

Boring Number:	Depth (feet):	Soil Description	Soluble Sulfate Content (ppm)
P2	1-2	<b>SAND</b> ; reddish brown, brown (SP-SM)	140
P3	2-4	<b>CLAY</b> ; light brown, reddish brown (CL)	160
P4	0-2	<b>CLAY</b> ; reddish brown, light gray, light brown (CL)	180
P5	2-4	<b>CLAY</b> ; light brown, reddish brown (CL)	160
P6	2-4	<b>SAND</b> ; reddish brown, brown (SC-SM)	160
P7	0-2	<b>CLAY</b> ; reddish tan, gray (CL)	120
P8	1-2	<b>CLAY</b> ; reddish brown, light brown (CL)	120
P9	2-4	<b>CLAY</b> ; dark brown, brown (CL-ML)	160
P10	0-2	<b>SAND</b> ; reddish brown, light brown (SC)	120
P11	2-4	<b>CLAY</b> ; brown (CL)	140

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Dynamic Cone Penetrometer (DCP)  
(ASTM D6951/D6951M)

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### DYNAMIC CONE PENETROMETER TEST RESULTS

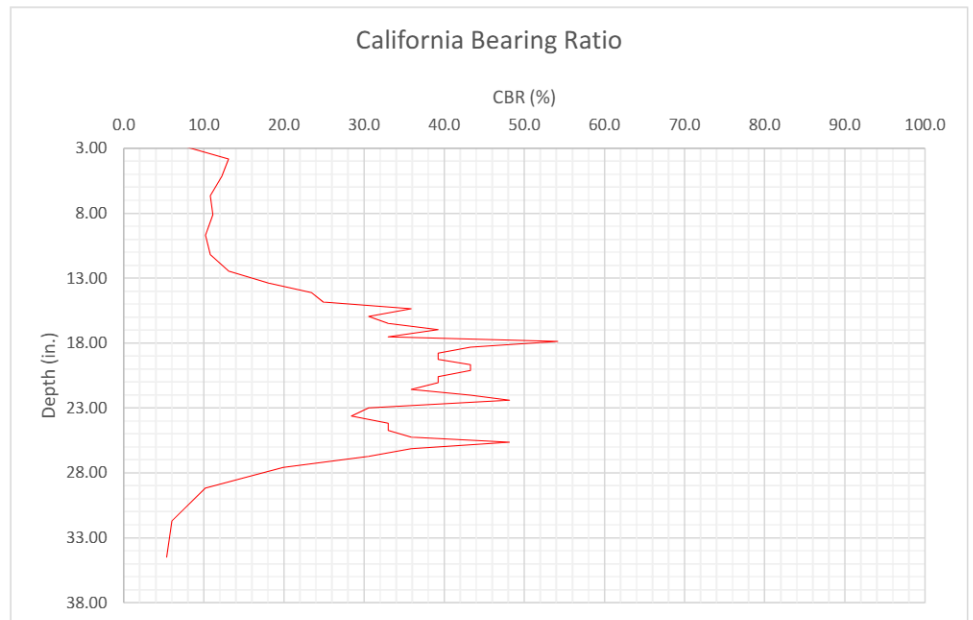
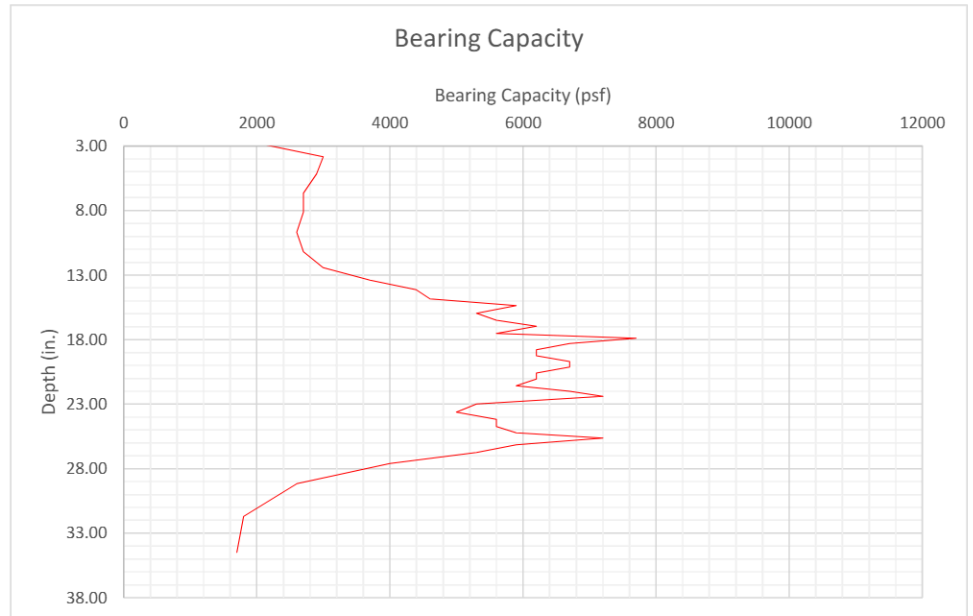
**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P1

**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	5.9	1800
2	2.56	5.9	1800
4	3.82	13.1	3000
6	5.16	12.2	2900
8	6.65	10.8	2700
10	8.11	11.1	2700
12	9.69	10.2	2600
14	11.18	10.8	2700
16	12.44	13.1	3000
18	13.39	18.1	3700
20	14.13	23.5	4400
22	14.84	24.9	4600
24	15.35	35.9	5900
26	15.94	30.6	5300
28	16.50	33.0	5600
30	16.97	39.3	6200
32	17.52	33.0	5600
34	17.87	54.2	7700
36	18.31	43.3	6700
38	18.78	39.3	6200
40	19.25	39.3	6200
42	19.69	43.3	6700
44	20.12	43.3	6700
46	20.59	39.3	6200
48	21.06	39.3	6200
50	21.57	35.9	5900
52	22.01	43.3	6700
54	22.40	48.1	7200
56	22.99	30.6	5300
58	23.62	28.4	5000
60	24.17	33.0	5600
62	24.72	33.0	5600
64	25.24	35.9	5900
66	25.63	48.1	7200
68	26.14	35.9	5900
70	26.73	30.6	5300
72	27.60	19.9	4000
74	29.17	10.2	2600
76	31.69	6.0	1800
78	34.49	5.4	1700



Adjusted Average 12.6  
 Adjusted Modulus 12883.1 psi  
 12.9 ksi

CBR(OTHER) =  $292 / (\text{inPerBlow} * 25.4)^{1.12}$  [ASTM D6951-09]  
 CBR(CL) =  $1 / (0.432283 * \text{inPerBlow})^2$  CBR<10 [ASTM D6951-09]  
 CBR(CH) =  $1 / (0.072923 * \text{inPerBlow})$  [ASTM D6951-09]  
 Bearing (psf) =  $3.794 * \text{CBR}^{0.664} * 144$  [Portland Cement Assoc. 1955]

## DYNAMIC CONE PENETROMETER TEST RESULTS

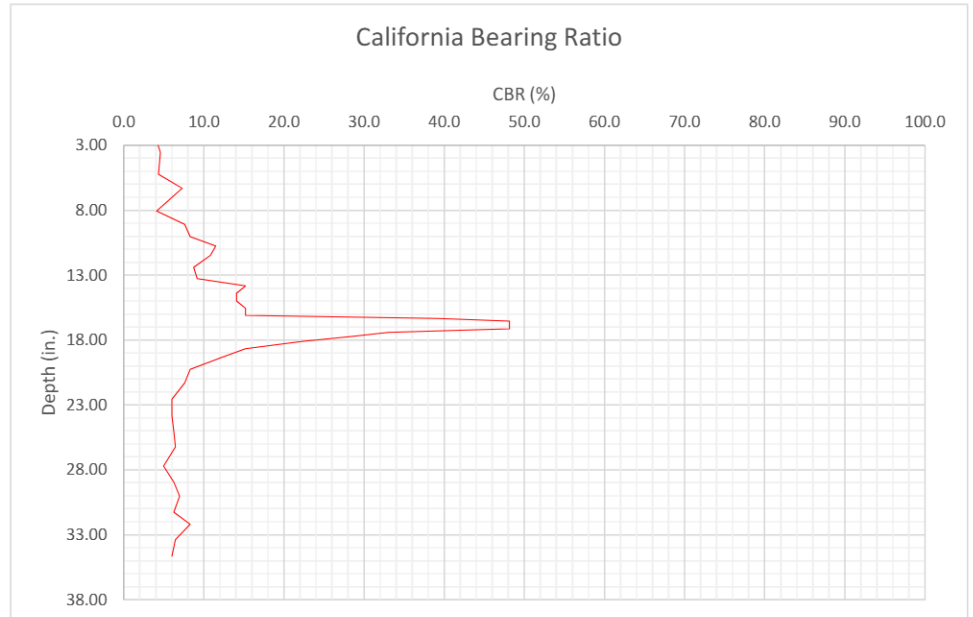
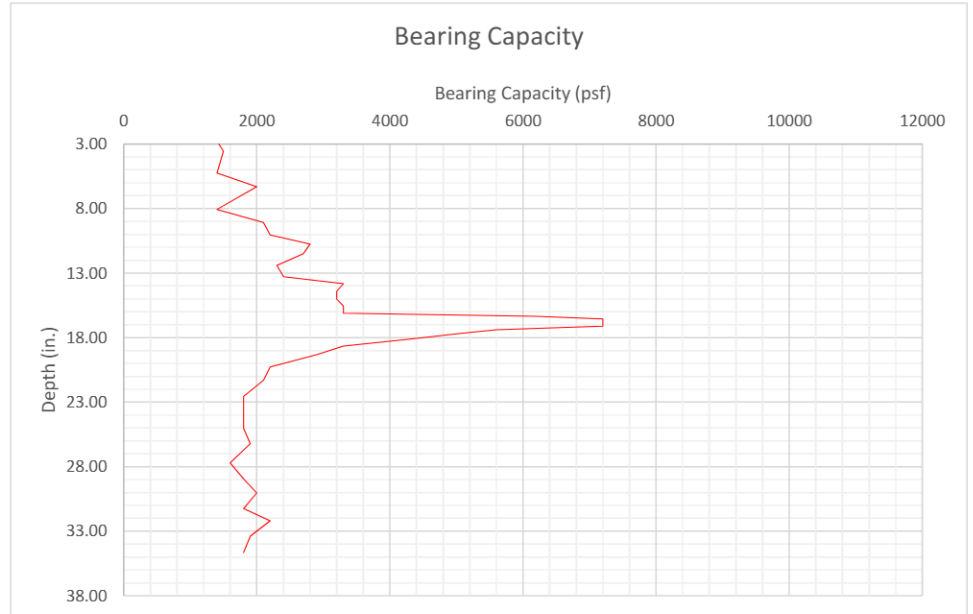
**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P2

**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	3.7	1300
1	1.93	3.7	1300
2	3.54	4.6	1500
3	5.24	4.3	1400
4	6.30	7.3	2000
5	8.07	4.1	1400
6	9.09	7.6	2100
7	10.04	8.3	2200
8	10.75	11.5	2800
9	11.50	10.8	2700
10	12.40	8.7	2300
11	13.27	9.2	2400
12	13.82	15.2	3300
13	14.41	14.1	3200
14	15.00	14.1	3200
15	15.55	15.2	3300
16	16.10	15.2	3300
17	16.34	39.3	6200
18	16.54	48.1	7200
19	16.73	48.1	7200
20	16.93	48.1	7200
21	17.13	48.1	7200
22	17.40	33.0	5600
23	17.72	28.4	5000
24	18.11	22.2	4300
25	18.66	15.2	3300
26	19.33	12.2	2900
27	20.28	8.3	2200
28	21.30	7.6	2100
29	22.56	6.0	1800
30	23.82	6.0	1800
31	25.04	6.2	1800
32	26.22	6.5	1900
33	27.72	5.0	1600
34	28.94	6.2	1800
35	30.04	7.0	2000
36	31.26	6.2	1800
37	32.20	8.3	2200
38	33.39	6.5	1900
39	34.65	6.0	1800



Adjusted Average      10.3  
 Adjusted Modulus    11347.0      psi  
                                  11.3            ksi

CBR(OTHER) =  $292 / (\text{inPerBlow} * 25.4)^{1.12}$  [ASTM D6951-09]  
 CBR(CL) =  $1 / (0.432283 * \text{inPerBlow})^2$  CBR<10 [ASTM D6951-09]  
 CBR(CH) =  $1 / (0.072923 * \text{inPerBlow})$  [ASTM D6951-09]  
 Bearing (psf) =  $3.794 * \text{CBR}^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

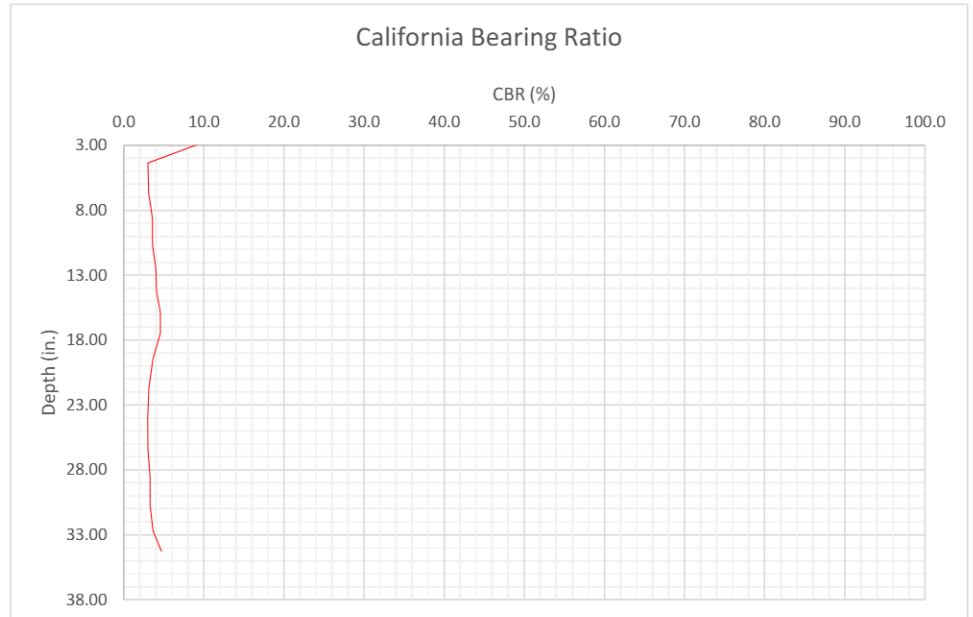
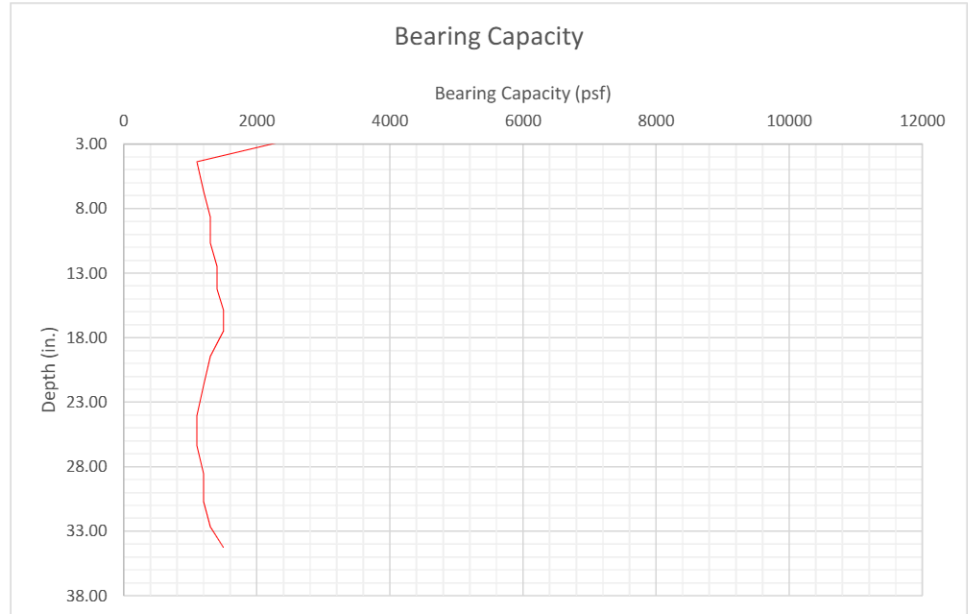
Project Name: Shady Shores  
 Project Number: G22-4003-1  
 Report Number: 1  
 Test Location: P4

Service Date: 11/3/2023  
 Report Date: 12/15/2023  
 Hammer Weight: 17.6 lbs.  
 Soil Type: Other

100.8135

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	5.3	1600
1	1.42	5.3	1600
2	2.05	13.1	3000
3	4.37	3.0	1100
4	6.65	3.1	1200
5	8.66	3.6	1300
6	10.67	3.6	1300
7	12.48	4.0	1400
8	14.25	4.1	1400
9	15.87	4.6	1500
10	17.48	4.6	1500
11	19.45	3.7	1300
12	21.69	3.2	1200
13	24.06	3.0	1100
14	26.38	3.0	1100
15	28.54	3.3	1200
16	30.71	3.3	1200
17	32.68	3.7	1300
18	34.25	4.7	1500

Adjusted Average      4.3  
 Adjusted Modulus      6494.5      psi  
                                          6.0      ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

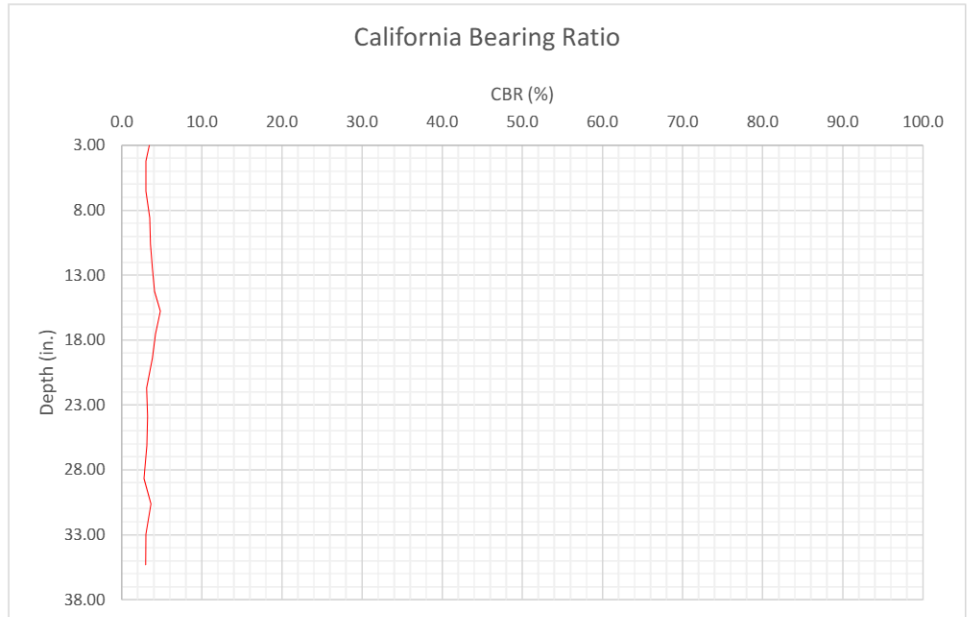
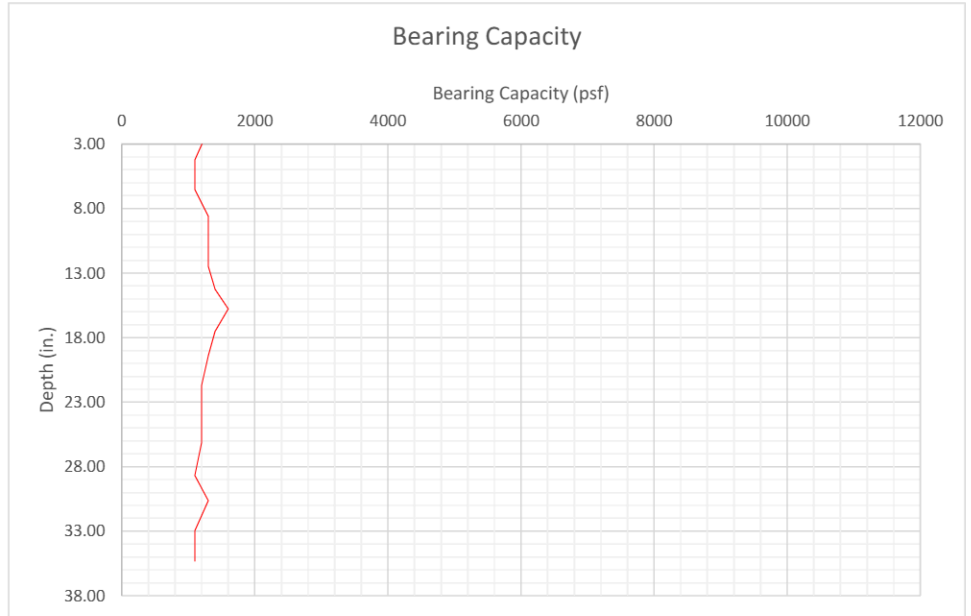
Project Name: Shady Shores  
 Project Number: G22-4003-1  
 Report Number: 1  
 Test Location: P4

Service Date: 11/3/2023  
 Report Date: 12/15/2023  
 Hammer Weight: 17.6 lbs.  
 Soil Type: Other

100.8135

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	3.8	1300
1	1.89	3.8	1300
2	4.21	3.0	1100
3	6.54	3.0	1100
4	8.58	3.5	1300
5	10.59	3.6	1300
6	12.48	3.8	1300
7	14.25	4.1	1400
8	15.79	4.8	1600
9	17.52	4.2	1400
10	19.41	3.8	1300
11	21.69	3.1	1200
12	23.90	3.2	1200
13	26.14	3.2	1200
14	28.66	2.8	1100
15	30.63	3.7	1300
16	32.95	3.0	1100
17	35.31	3.0	1100

Adjusted Average      3.5  
 Adjusted Modulus    5712.3      psi  
                                  5.7      ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P5

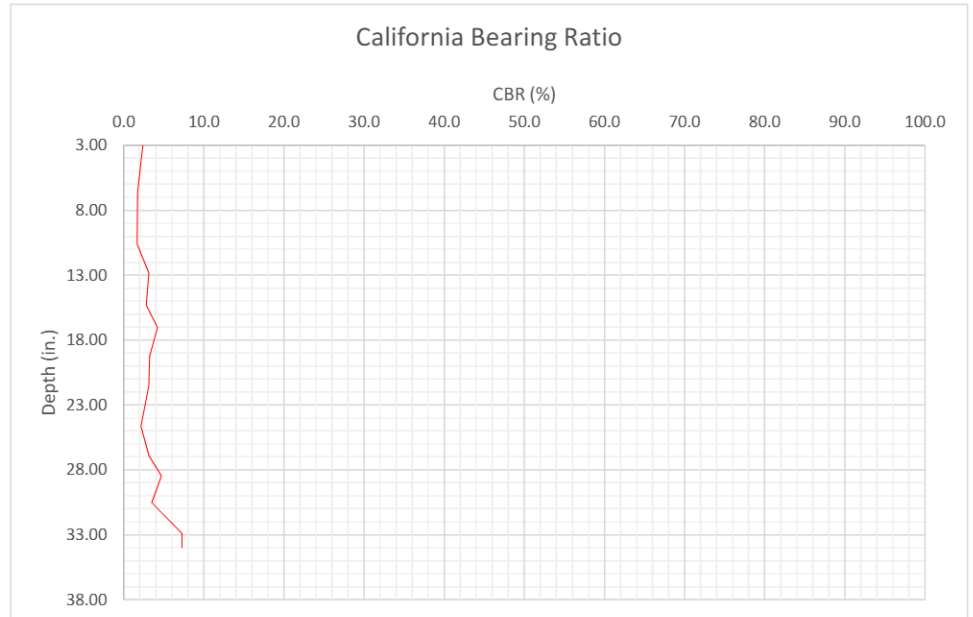
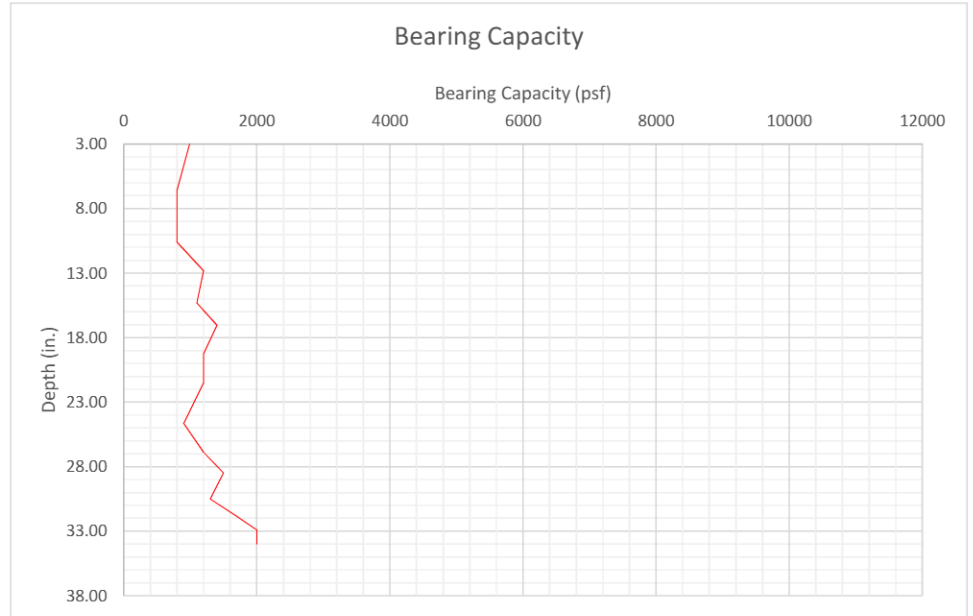
**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	2.4	1000
1	2.83	2.4	1000
2	6.61	1.8	800
3	10.59	1.7	800
4	12.83	3.2	1200
5	15.31	2.8	1100
6	17.05	4.2	1400
7	19.25	3.2	1200
8	21.50	3.2	1200
9	24.65	2.2	900
10	26.89	3.2	1200
11	28.46	4.7	1500
12	30.51	3.5	1300
13	31.85	5.6	1700
14	32.91	7.3	2000
15	33.98	7.3	2000

Adjusted Average      3.7  
 Adjusted Modulus      5847.4      psi  
                                          5.8      ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P6

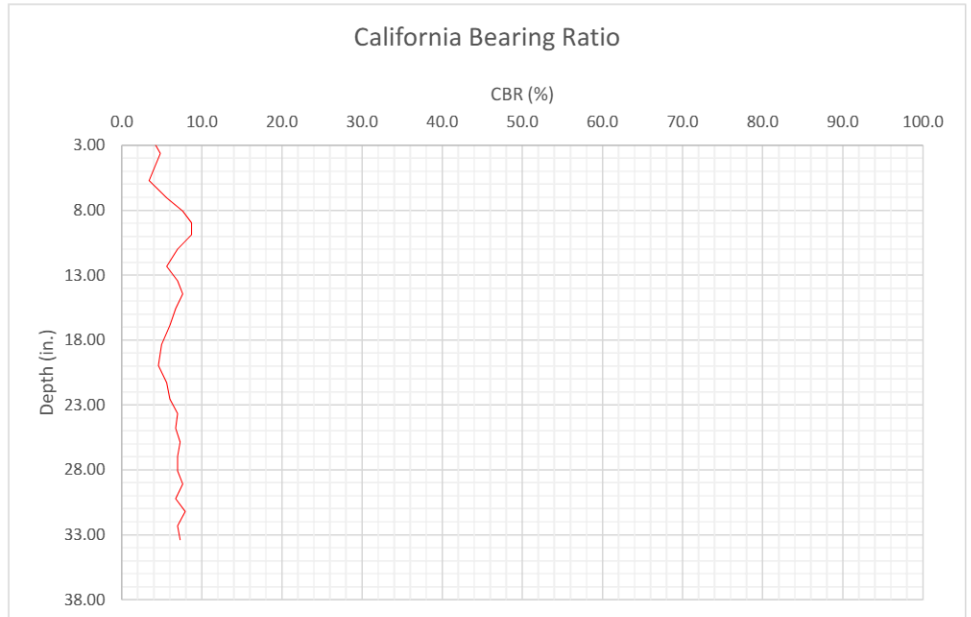
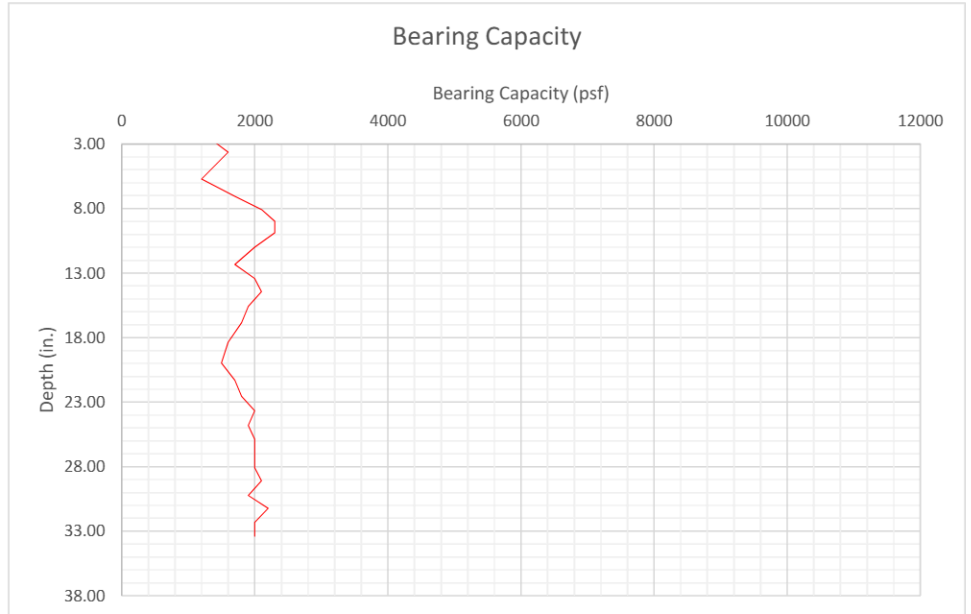
**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	3.4	1200
1	2.09	3.4	1200
2	3.62	4.8	1600
3	5.71	3.4	1200
4	7.05	5.6	1700
5	8.07	7.6	2100
6	8.98	8.7	2300
7	9.88	8.7	2300
8	10.98	7.0	2000
9	12.32	5.6	1700
10	13.43	7.0	2000
11	14.45	7.6	2100
12	15.59	6.7	1900
13	16.85	6.0	1800
14	18.35	5.0	1600
15	19.96	4.6	1500
16	21.30	5.6	1700
17	22.56	6.0	1800
18	23.66	7.0	2000
19	24.80	6.7	1900
20	25.87	7.3	2000
21	26.97	7.0	2000
22	28.07	7.0	2000
23	29.09	7.6	2100
24	30.24	6.7	1900
25	31.22	7.9	2200
26	32.32	7.0	2000
27	33.39	7.3	2000

Adjusted Average      6.4  
 Adjusted Modulus      8340.6      psi  
                                  8.3              ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

Project Name: Shady Shores  
 Project Number: G22-4003-1  
 Report Number: 1  
 Test Location: P7

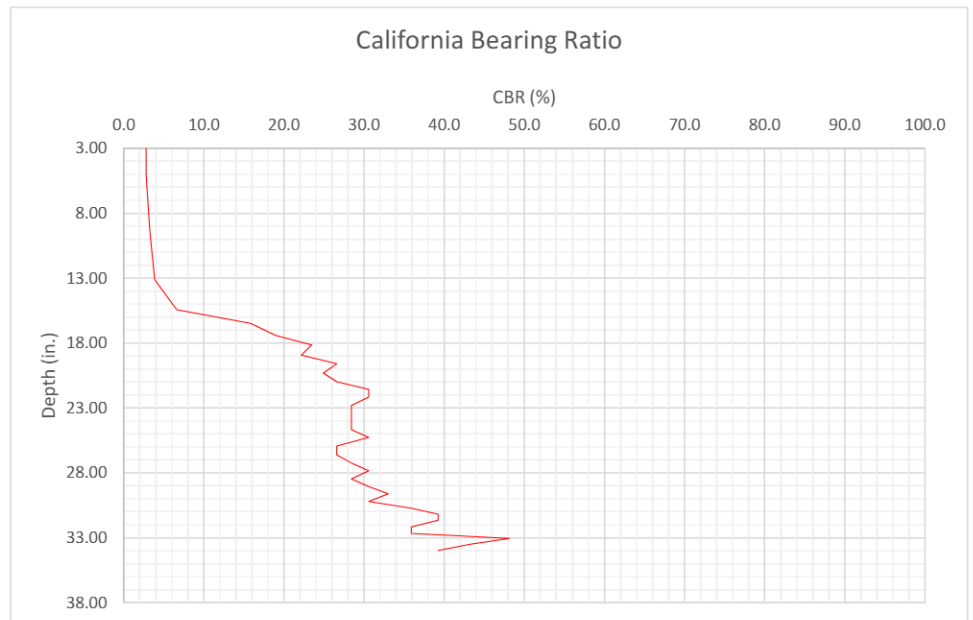
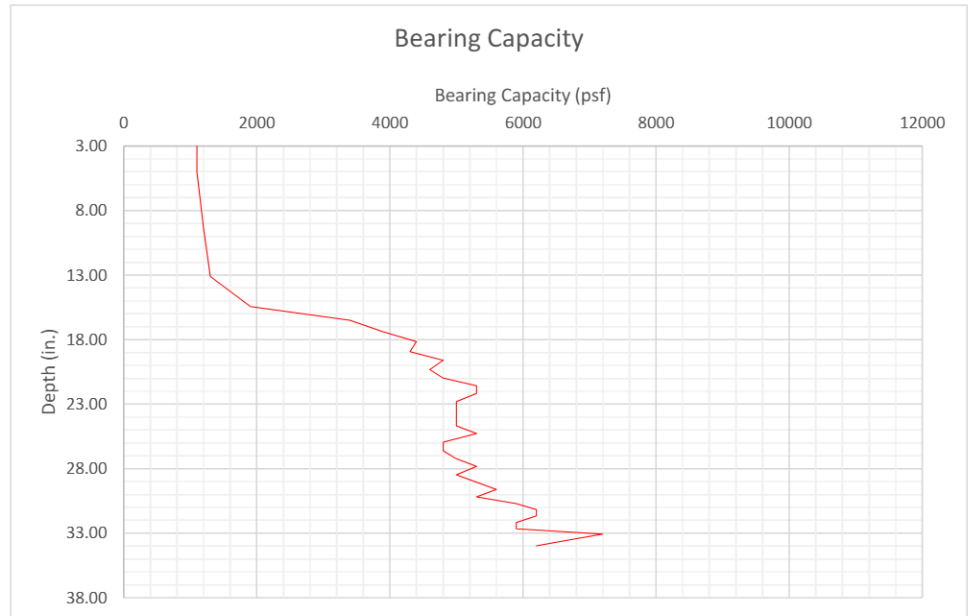
Service Date: 11/3/2023  
 Report Date: 12/15/2023  
 Hammer Weight: 17.6 lbs.  
 Soil Type: Other

100.8135

Starting Depth: 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	2.8	1100
2	5.00	2.8	1100
4	9.37	3.2	1200
6	13.11	3.9	1300
8	15.43	6.6	1900
10	16.50	15.8	3400
12	17.40	18.9	3900
14	18.15	23.5	4400
16	18.94	22.2	4300
18	19.61	26.6	4800
20	20.31	24.9	4600
22	20.98	26.6	4800
24	21.57	30.6	5300
26	22.17	30.6	5300
28	22.80	28.4	5000
30	23.43	28.4	5000
32	24.06	28.4	5000
34	24.69	28.4	5000
36	25.28	30.6	5300
38	25.94	26.6	4800
40	26.61	26.6	4800
42	27.24	28.4	5000
44	27.83	30.6	5300
46	28.46	28.4	5000
48	29.06	30.6	5300
50	29.61	33.0	5600
52	30.20	30.6	5300
54	30.71	35.9	5900
56	31.18	39.3	6200
58	31.65	39.3	6200
60	32.17	35.9	5900
62	32.68	35.9	5900
64	33.07	48.1	7200
66	33.50	43.3	6700
68	33.98	39.3	6200

Adjusted Average      26.7  
 Adjusted Modulus    20873.7    psi  
                                  20.9            ksi



$CBR(OTHER) = 292 / (\text{inPerBlow} * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * \text{inPerBlow})^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * \text{inPerBlow})$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P8

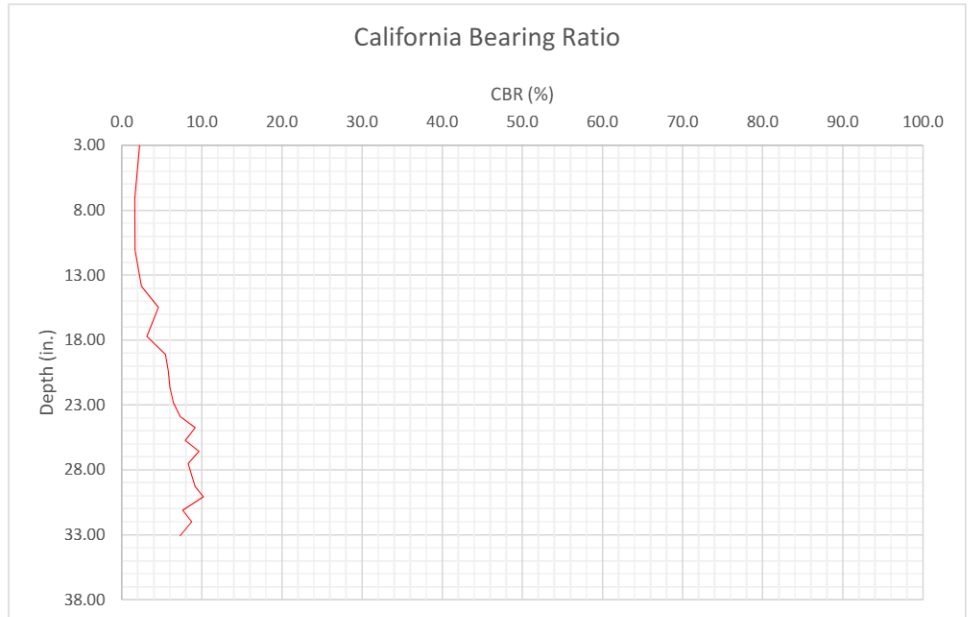
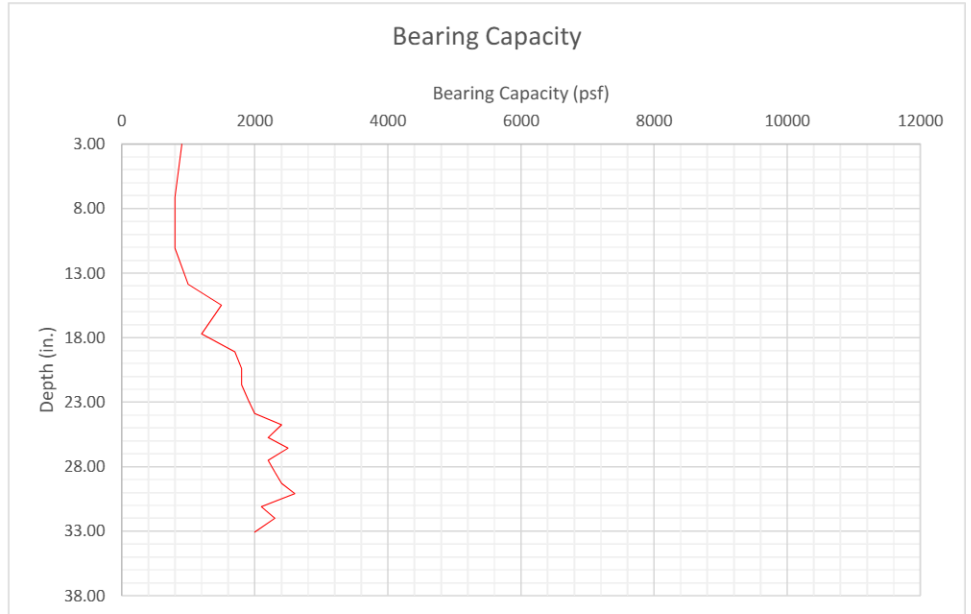
**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	2.2	900
1	3.07	2.2	900
2	7.13	1.6	800
3	11.06	1.7	800
4	13.86	2.5	1000
5	15.47	4.6	1500
6	17.72	3.2	1200
7	19.09	5.4	1700
8	20.39	5.8	1800
9	21.65	6.0	1800
10	22.83	6.5	1900
11	23.90	7.3	2000
12	24.76	9.2	2400
13	25.75	7.9	2200
14	26.57	9.6	2500
15	27.52	8.3	2200
16	28.43	8.7	2300
17	29.29	9.2	2400
18	30.08	10.2	2600
19	31.10	7.6	2100
20	32.01	8.7	2300
21	33.07	7.3	2000

Adjusted Average      6.2  
 Adjusted Modulus      8169.4      psi  
                                          8.2      ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P9

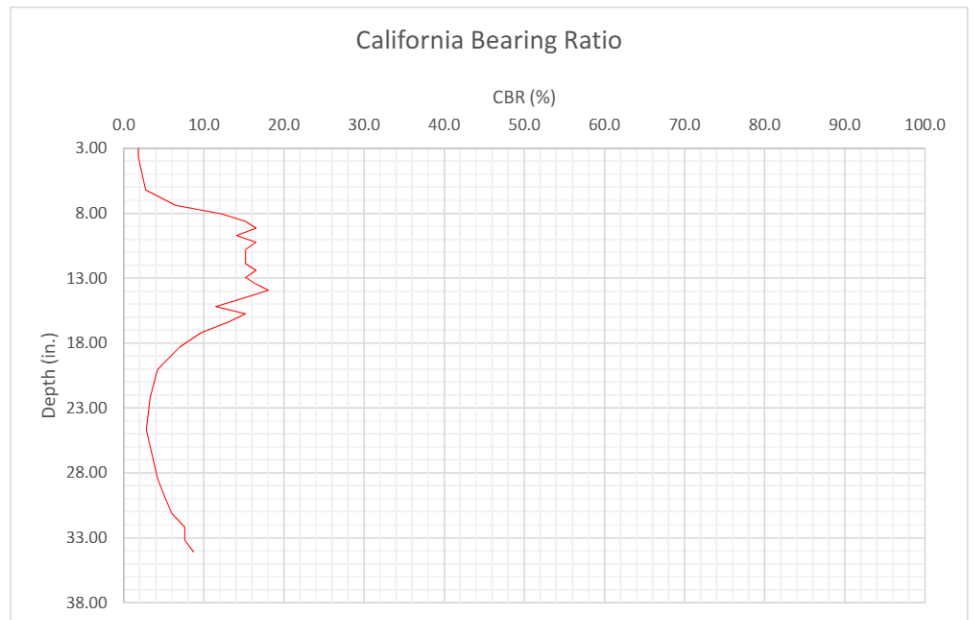
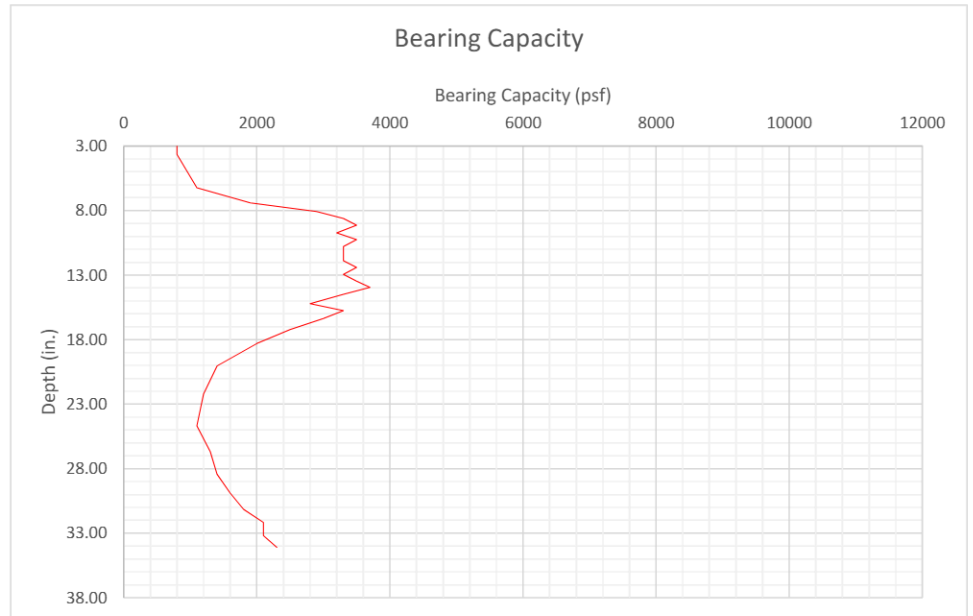
**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	1.8	800
1	3.66	1.8	800
2	6.22	2.7	1100
3	7.40	6.5	1900
4	8.07	12.2	2900
5	8.62	15.2	3300
6	9.13	16.5	3500
7	9.72	14.1	3200
8	10.24	16.5	3500
9	10.79	15.2	3300
10	11.34	15.2	3300
11	11.89	15.2	3300
12	12.40	16.5	3500
13	12.95	15.2	3300
14	13.46	16.5	3500
15	13.94	18.1	3700
16	14.49	15.2	3300
17	15.20	11.5	2800
18	15.75	15.2	3300
19	16.38	13.1	3000
20	17.20	9.6	2500
21	18.31	7.0	2000
22	20.04	4.2	1400
23	22.20	3.3	1200
24	24.69	2.8	1100
25	26.69	3.6	1300
26	28.43	4.2	1400
27	29.88	5.1	1600
28	31.14	6.0	1800
29	32.17	7.6	2100
30	33.19	7.6	2100
31	34.09	8.7	2300

Adjusted Average      10.1  
 Adjusted Modulus      11218.7      psi  
                                          11.2      ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

Project Name: Shady Shores  
 Project Number: G22-4003-1  
 Report Number: 1  
 Test Location: P10

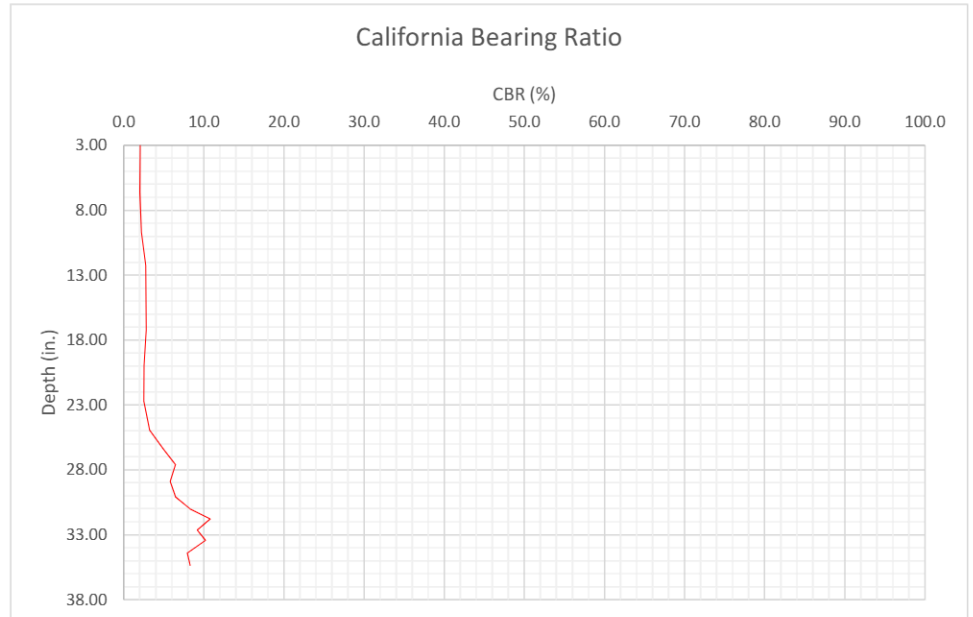
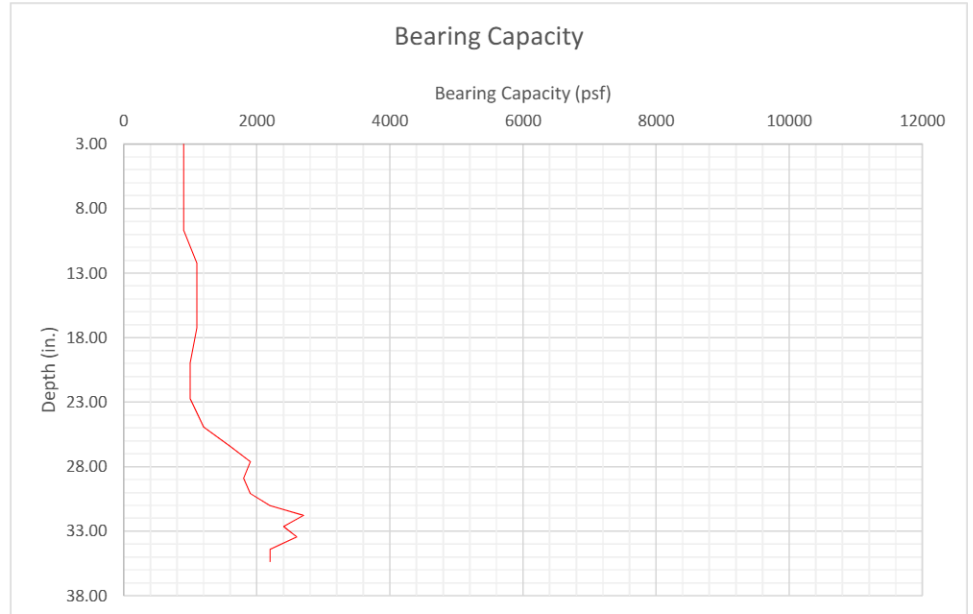
Service Date: 11/3/2023  
 Report Date: 12/15/2023  
 Hammer Weight: 17.6 lbs.  
 Soil Type: Other

100.8135

Starting Depth: 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	2.1	900
1	3.27	2.1	900
2	6.61	2.0	900
3	9.69	2.2	900
4	12.24	2.7	1100
5	14.76	2.8	1100
6	17.24	2.8	1100
7	19.96	2.5	1000
8	22.72	2.5	1000
9	24.92	3.2	1200
10	26.42	5.0	1600
11	27.60	6.5	1900
12	28.90	5.8	1800
13	30.08	6.5	1900
14	31.02	8.3	2200
15	31.77	10.8	2700
16	32.64	9.2	2400
17	33.43	10.2	2600
18	34.41	7.9	2200
19	35.35	8.3	2200

Adjusted Average CBR: 5.2  
 Adjusted Modulus: 7296.6 psi / 7.3 ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

### DYNAMIC CONE PENETROMETER TEST RESULTS

**Project Name:** Shady Shores  
**Project Number:** G22-4003-1  
**Report Number:** 1  
**Test Location:** P11

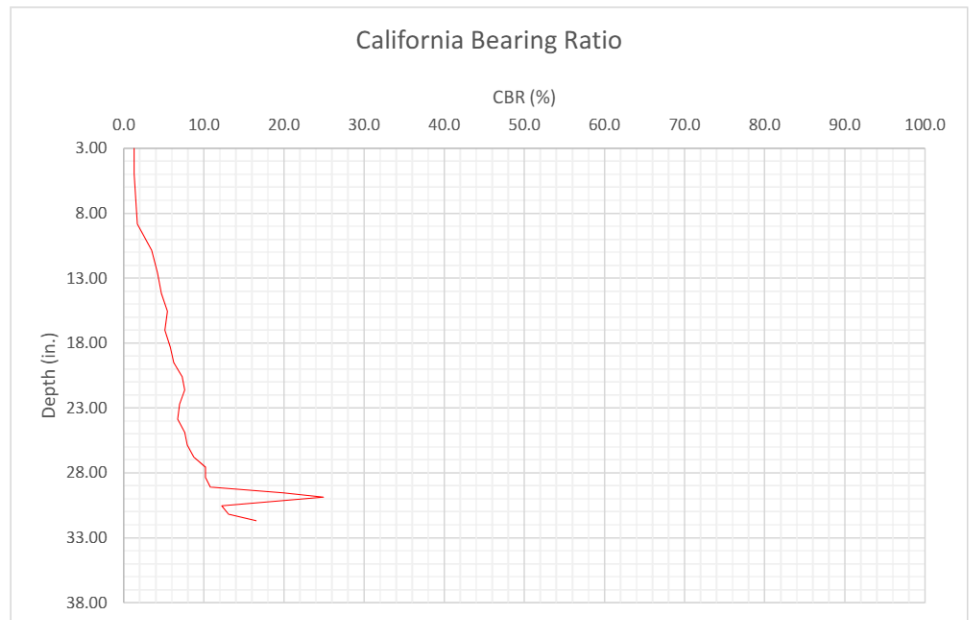
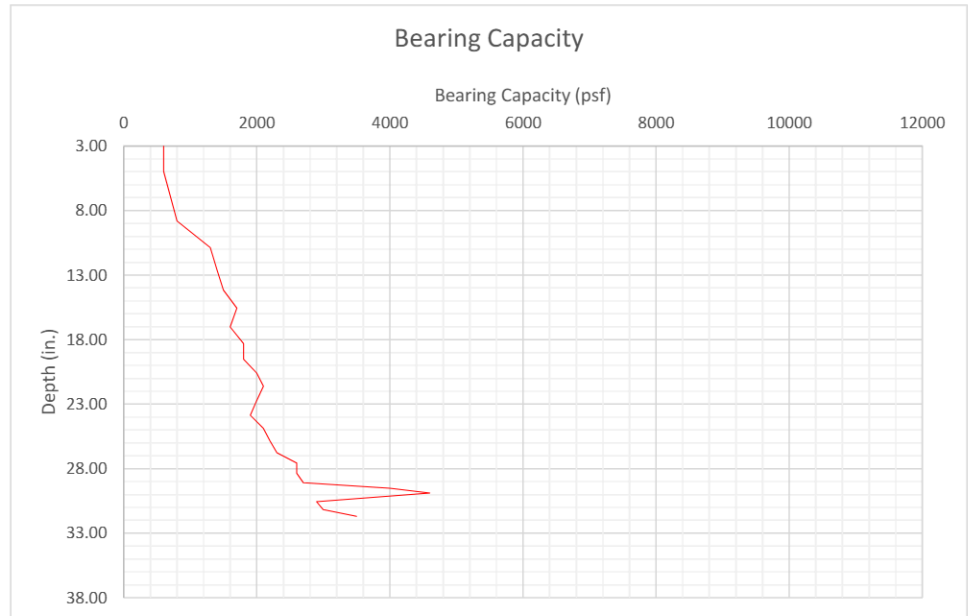
**Service Date:** 11/3/2023  
**Report Date:** 12/15/2023  
**Hammer Weight:** 17.6 lbs.  
**Soil Type:** Other

100.8135

**Starting Depth:** 0 in

Blow Number	Depth (in)	CBR (%)	Bearing (psf)
0	0.00	1.3	600
1	4.96	1.3	600
2	8.82	1.7	800
3	10.87	3.5	1300
4	12.60	4.2	1400
5	14.17	4.7	1500
6	15.55	5.4	1700
7	17.01	5.1	1600
8	18.31	5.8	1800
9	19.53	6.2	1800
10	20.59	7.3	2000
11	21.61	7.6	2100
12	22.72	7.0	2000
13	23.86	6.7	1900
14	24.88	7.6	2100
15	25.87	7.9	2200
16	26.77	8.7	2300
17	27.56	10.2	2600
18	28.35	10.2	2600
19	29.09	10.8	2700
20	29.53	19.9	4000
21	29.88	24.9	4600
22	30.55	12.2	2900
23	31.18	13.1	3000
24	31.69	16.5	3500

**Adjusted Average** 8.4  
**Adjusted Modulus** 9955.8 psi  
 10.0 ksi



$CBR(OTHER) = 292 / (inPerBlow * 25.4)^{1.12}$  [ASTM D6951-09]  
 $CBR(CL) = 1 / (0.432283 * inPerBlow)^2$  CBR<10 [ASTM D6951-09]  
 $CBR(CH) = 1 / (0.072923 * inPerBlow)$  [ASTM D6951-09]  
 $Bearing (psf) = 3.794 * CBR^{0.664} * 144$  [Portland Cement Assoc. 1955]

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Bar Linear Shrinkage  
(Tex-107-E)

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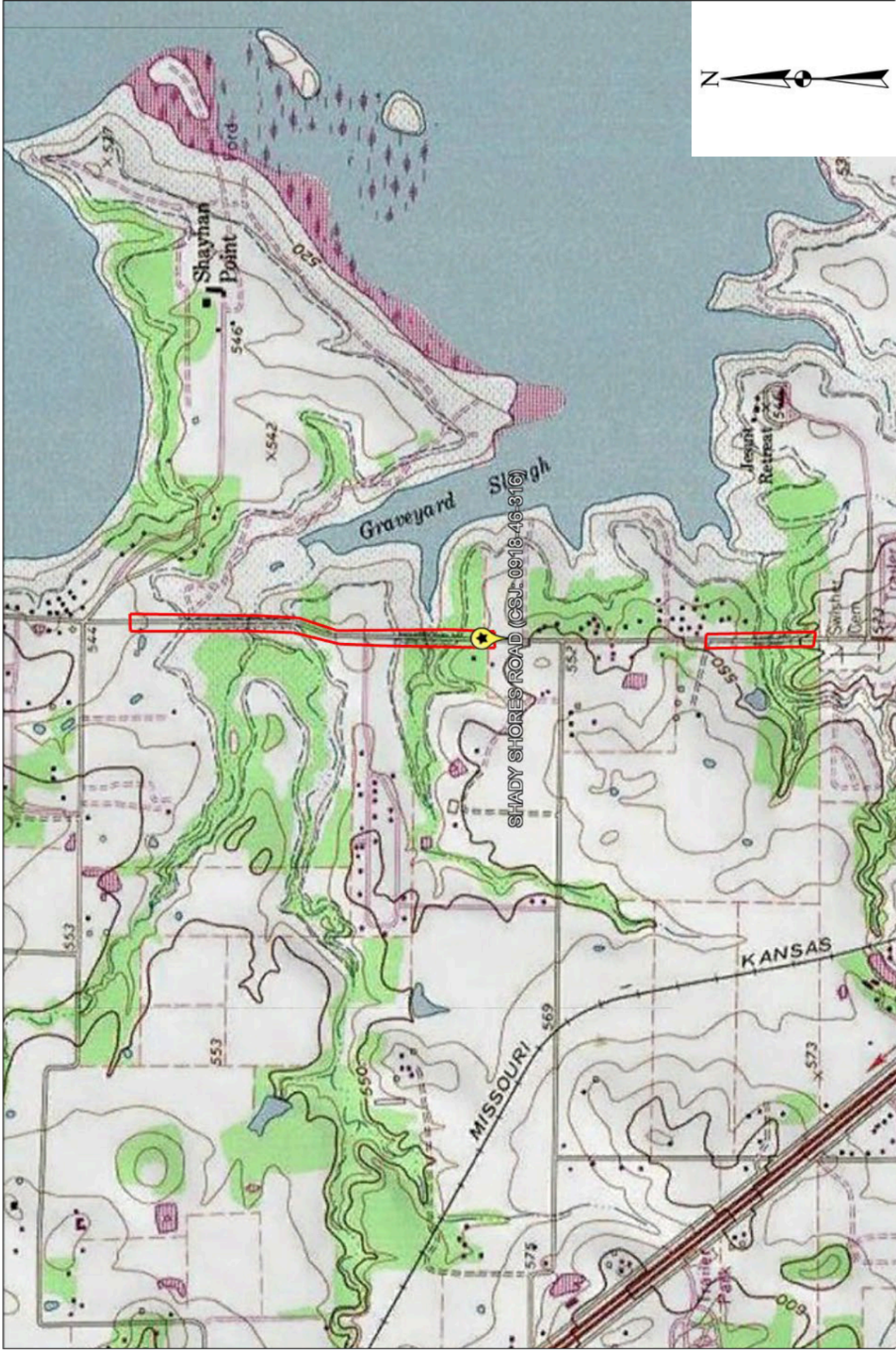
### BAR LINEAR SHRINKAGE OF SOILS (TEX-107-E)

Project Name: Shady Shores Road (CSJ:0918-46-316)  
Project No: G22-4003-1  
Location: Shady Shores, Texas

Boring No.	Sample Depth (ft)	Length of Wet Soil Bar (inches)	Length of Dry Soil Bar (inches)	Linear Shrinkage (%)
P2	0-2	5	4.85	3
P3	2-4	5	4.59	8.2
P4	4-6	5	4.33	13.8
P5	4-6	5	4.72	5.6
P6	2-4	5	4.49	10.2
P7	4-6	5	4.32	13.6
P8	4-6	5	4.34	13.2
P9	2-4	5	4.84	3.2
P10	4-6	5	4.34	13.2
P11	0-2	5	4.64	7.2

Texas Firm Registration #: F-12796

**APPENDIX D – USGS TOPOGRAPHIC MAP**



\*\* LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



**GEOTEX**  
ENGINEERING

USGS TOPOGRAPHIC MAP  
**SHADY SHORES ROAD**  
CSJ: 0918-46-316

DENTON COUNTY

SHEET NO.

**G1**

TEXAS

## **APPENDIX E – GEOLOGIC INFORMATION**



\*\* LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



GEOLOGIC ATLAS

**SHADY SHORES ROAD**  
**CSJ: 0918-46-316**

DENTON COUNTY

SHEET NO.

**G1**

TEXAS





## Mineral Resources On-Line Spatial Data

[Mineral Resources](#) > [Online Spatial Data](#) > [Geology](#) > [by state](#) > [Texas](#)

### Woodbine Formation

#### *Woodbine Formation*

*State* [Texas](#)

*Name* Woodbine Formation

*Geologic age* Phanerozoic | Mesozoic | Cretaceous-Late [Gulfian]

*Original map label* Kwb

*Comments* NE Texas. Texarkana Sheet (1966) Woodbine Formation-- various interlensing sequence of nonmarine, brackish-water, and marine beds of sand, clay, sandstone, and shale 350-600 ft thick. Woodbine fossils include ammonites, gastropods, pelecypods, brachiopods, and foraminifers. Contains volcanic sand and tuff, coarse grained, crossbedded, dk green and olive green; fossil plants and a few marine megafossils; thickness 500 ft, thins eastward.

*Primary rock type* [shale](#)

*Secondary rock type* [sand](#)

*Other rock types* [clay or mud](#); [limestone](#); [coal](#); [tuff](#)

*Lithologic constituents* Major

Sedimentary > Clastic > Mixed-clastic > Sandstone-Mudstone  
(*Tuffaceous*)

*Map references* Bureau of Economic Geology, 1992, Geologic Map of Texas: University of Texas at Austin, Virgil E. Barnes, project supervisor, Hartmann, B.M. and Scranton, D.F., cartography, scale 1:500,000

*Unit references* Bureau of Economic Geology, 1966, Texarkana Sheet, Geologic Atlas of Texas, University of Texas, Bureau of Economic Geology, scale 1:250,000.

*Counties* [Cooke](#) - [Denton](#) - [Fannin](#) - [Grayson](#) - [Hill](#) - [Johnson](#) - [Lamar](#) - [McLennan](#) - [Tarrant](#)

Show this information as [[XML](#)] - [[JSON](#)]

U.S. Department of the Interior | U.S. Geological Survey

URL: <http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=TXKwb;0>

Page Contact Information: [Peter Schweitzer](#)



## Mineral Resources On-Line Spatial Data

[Mineral Resources](#) > [Online Spatial Data](#) > [Geology](#) > [by state](#) > [Texas](#)

### Terrace deposits

#### *Terrace deposits*

*State* [Texas](#)

*Name* Terrace deposits

*Geologic age* Phanerozoic | Cenozoic | Quaternary | Pleistocene  
Holocene

*Original map label* Qt

*Comments* Sand, silt, clay, and gravel in various proportions, with gravel more predominant in older, higher terrace deposits. Locally indurated with calcium carbonate (caliche) in terraces along streams. Along Colorado River clasts mostly limest., chert, quartz, and various igneous and metamorphic rocks from Llano region and Edwards Plateau. Includes point bar, natural levee, stream channel deposits along valley walls; probably in large part correlatives of Deweyville, Beaumont, Lissie, and Willis deposits. In upland regions (Rolling Plains, Edwards Plateau, etc.) unit includes fluvial terrace deposits, undivided. Light-brown, reddish-brown, gray, or yellowish-brown, gravelly quartz and lithic sand and silt to sandy gravel (Moore and Wermund, 1993). Deposits become increasingly fine grained on Coastal and Nueces Plains. Locally, calcium carbonate-cemented quartz sand, silt, clay, and gravel intermixed and interbedded. Low terraces of major rivers are capped by 2-4 m of clayey sand and silt. Sandy gravel on higher terraces varies somewhat in composition from river to river. Gravel commonly is rounded to angular limestone and chert pebbles and cobbles, some boulders, sparse igneous pebbles along Brazos river in places. In Bastrop Co., a deposit 27 m above Colorado River contains the Lava Creek B (Pearlette O) volcanic ash (age 0.6 Ma). Along the Frio, Leona, and Sabinal Rivers east of Uvalde, gravel is chiefly basalt and pyclastic clasts, locally cemented by iron oxide. Gravel along the Rio Grande is subrounded clasts of locally derived limestone and chert and rounded clasts of basalt, volcanic

porphyry, quartzite, milky quartz, and banded chalcidony derived from the west.

*Primary rock type* terrace

*Secondary rock type* sand

*Other rock types* gravel; silt; clay or mud

*Lithologic constituents* Major

Unconsolidated > Fine-detrital > Silt (Bed)

Unconsolidated > Coarse-detrital > Sand (Bed)

Minor

Unconsolidated > Coarse-detrital > Gravel (Bed)

Unconsolidated > Fine-detrital > Clay (Bed)

*Map references* Bureau of Economic Geology, 1992, Geologic Map of Texas: University of Texas at Austin, Virgil E. Barnes, project supervisor, Hartmann, B.M. and Scranton, D.F., cartography, scale 1:500,000

*Unit references* Moore, D.W. and Wermund, E.G., Jr., 1993a, Quaternary geologic map of the Austin 4 x 6 degree quadrangle, United States: U.S. Geological Survey Miscellaneous Investigations Series Map I-1420 (NH-14), scale 1:1,000,000.  
[[http://pubs.er.usgs.gov/publication/i1420\(NH14\)](http://pubs.er.usgs.gov/publication/i1420(NH14))]

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Bureau of Economic Geology, 1975, Beeville-Bay City Sheet, Geologic Atlas of Texas, Bureau of Economic Geology, University of Texas at Austin, scale 1:250,000.

---

Bureau of Economic Geology, 1974, Seguin Sheet, Geologic Atlas of Texas, University of Texas, Bureau of Economic Geology, scale 1:250,000.

*Counties* Anderson - Angelina - Archer - Armstrong - Atascosa - Austin - Bandera - Bastrop - Baylor - Bee - Bell - Bexar - Blanco - Borden - Bosque - Bowie - Brazos - Brewster - Briscoe - Brown - Burleson - Burnet - Caldwell - Callahan - Camp - Cass - Cherokee - Childress - Clay - Coke - Coleman - Collin - Collingsworth - Colorado - Comal - Comanche - Concho - Cooke - Coryell - Cottle - Crane - Crosby - Dallam - Dallas - Delta - Denton - DeWitt - Dickens - Dimmit - Donley - Duval - Eastland - Ellis - Erath - Falls - Fannin - Fayette - Fisher - Foard - Franklin - Freestone - Frio - Garza - Gillespie - Glasscock - Goliad - Gonzales - Gray - Grayson - Gregg - Grimes - Guadalupe - Hall - Hamilton - Hansford - Hardeman - Hardin - Harris - Harrison - Hartley - Haskell - Hays - Hemphill - Henderson - Hidalgo - Hill - Hood - Hopkins - Houston - Hunt - Hutchinson - Jackson - Jasper - Jeff Davis - Jim Wells - Johnson - Jones - Karnes - Kaufman - Kendall - Kent - Kerr - Kimble - Kinney - Knox - Lamar - Lampasas - La Salle - Lavaca - Lee - Leon - Limestone - Lipscomb - Live Oak - Llano - McCulloch - McLennan - McMullen - Madison - Marion - Mason - Maverick - Medina - Menard - Midland - Milam - Mills - Mitchell - Montague - Montgomery - Moore - Morris - Motley - Nacogdoches - Navarro - Newton - Nolan - Oldham - Palo Pinto - Panola - Parker - Pecos - Polk - Potter - Rains - Reagan - Red River - Reeves - Refugio - Roberts - Robertson - Rockwall - Runnels - Rusk - Sabine - San Augustine - San Jacinto - San Patricio - San Saba - Schleicher - Scurry - Shackelford - Shelby -

Smith - Somervell - Starr - Stephens - Stonewall - Tarrant - Taylor -  
Throckmorton - Titus - Tom Green - Travis - Trinity - Tyler - Upshur -  
Uvalde - Val Verde - Van Zandt - Victoria - Walker - Waller -  
Washington - Webb - Wheeler - Wichita - Wilbarger - Williamson -  
Wilson - Wise - Wood - Young - Zapata - Zavala

Show this information as [[XML](#)] - [[JSON](#)]

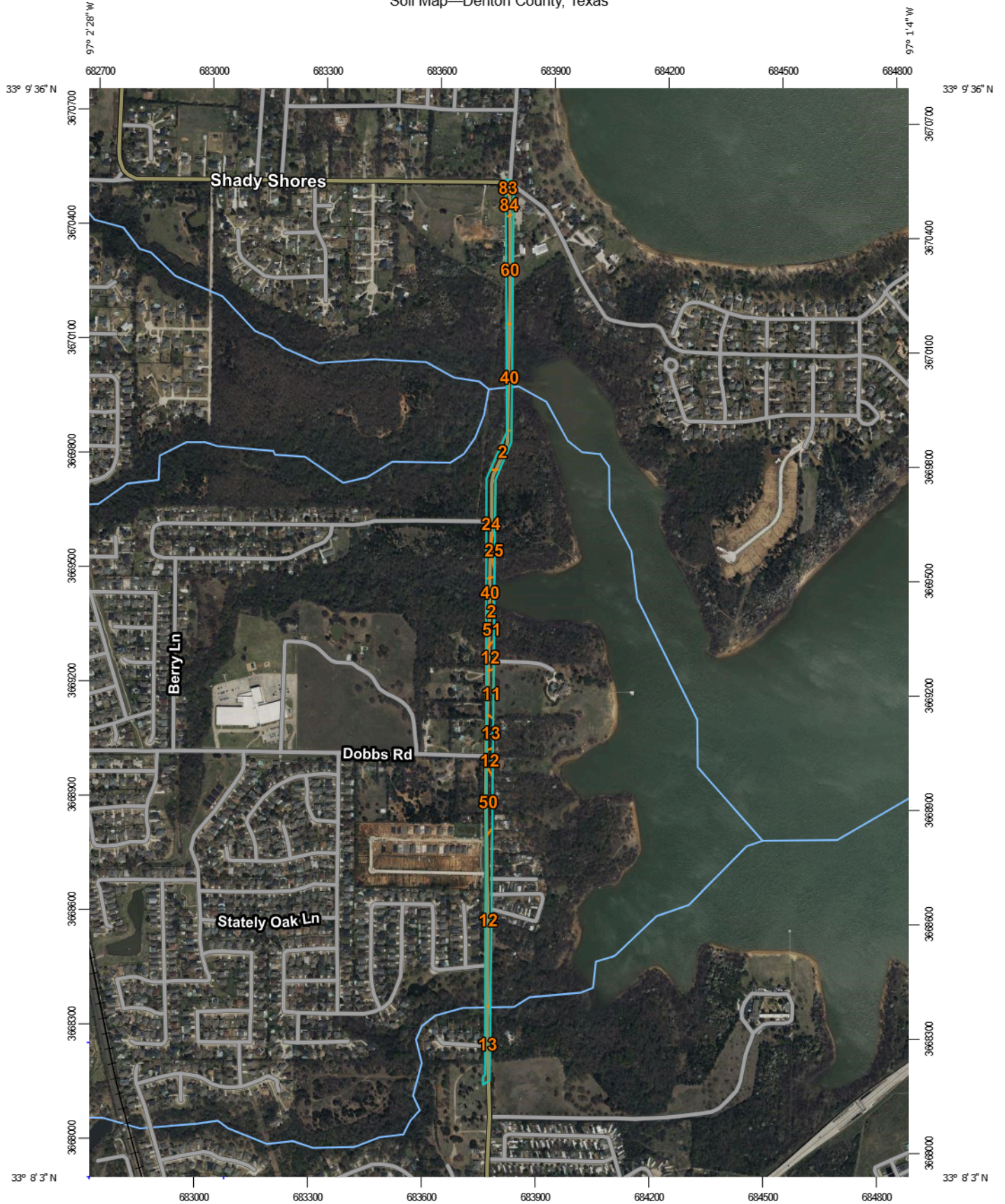
U.S. Department of the Interior | U.S. Geological Survey

URL: <http://mrdata.usgs.gov/geology/state/sgmc-unit.php?unit=TXQt;0>

Page Contact Information: [Peter Schweitzer](#)

**APPENDIX F – NRCS SOIL MAP**

Soil Map—Denton County, Texas



Map Scale: 1:13,900 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84







































Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

11/29/2023  
Page 1 of 3

## MAP LEGEND

-  Area of Interest (AOI)
- Soils**
-  Soil Map Unit Polygons
-  Soil Map Unit Lines
-  Soil Map Unit Points
- Special Point Features**
-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features
- Water Features**
-  Streams and Canals
- Transportation**
-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads
- Background**
-  Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Denton County, Texas  
 Survey Area Data: Version 20, Aug 31, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 3, 2022—Mar 31, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Altoga silty clay, 2 to 5 percent slopes	0.7	6.4%
11	Birome fine sandy loam, 1 to 3 percent slopes	0.6	5.6%
12	Birome fine sandy loam, 3 to 5 percent slopes	2.3	22.1%
13	Birome-Rayex-Aubrey complex, 2 to 15 percent slopes	1.1	10.1%
24	Callisburg fine sandy loam, 3 to 5 percent slopes	1.5	14.0%
25	Callisburg soils, 2 to 5 percent slopes, severely erode d	0.2	1.5%
40	Gowen clay loam, frequently flooded	1.4	13.3%
50	Konsil fine sandy loam, 1 to 3 percent slopes	0.7	6.7%
51	Konsil fine sandy loam, 3 to 8 percent slopes	0.4	3.9%
60	Navo clay loam, 1 to 3 percent slopes	1.3	12.0%
83	Wilson clay loam, 0 to 1 percent slopes	0.1	1.1%
84	Wilson clay loam, 1 to 3 percent slopes	0.4	3.3%
<b>Totals for Area of Interest</b>		<b>10.5</b>	<b>100.0%</b>

## **APPENDIX G – PVR CALCULATIONS**

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

SAMPLE ID: Shady Shores Rd		SAMPLED DATE: 10/11/2023	
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ: 0918-46-316	
COUNTY: Denton		SPEC YEAR:	
SAMPLED BY: Geotex Engineering		SPEC ITEM:	
SAMPLE LOCATION: Shady Shores / Lake Dallas, TX		SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:		PROJECT MANAGER:	
AREA ENGINEER:			
COURSE/LIFT: P1		DIST. FROM CL: 5.99 RT	
STATION: 137+27.74			
Boring Number: P1	Ground Elevation (z): 550.52	Longitude (x): 33.137418	Latitude (y): -97.029867

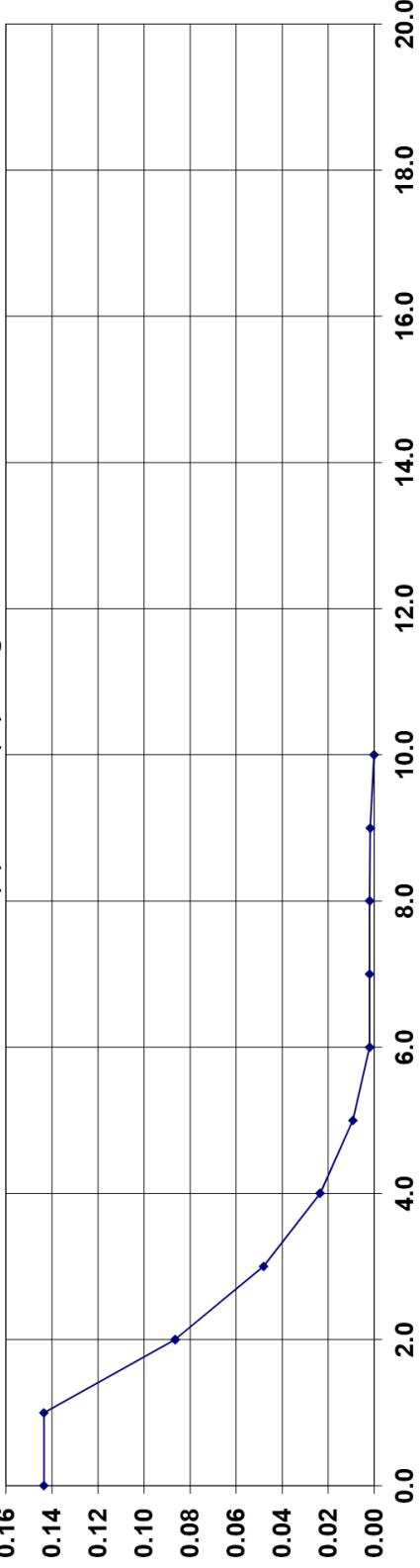
PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	20	13.0	11.4	9.2	Dry	92.0	3	-0.8	1.8	0.00	0.00	0.00	0.92	1.00	-	0.14
1.0	0.5	20	13.0	11.4	9.2	Dry	92.0	3	-0.8	1.8	0.00	0.06	0.06	0.92	1.00	0.06	0.14
2.0	1.5	20	13.0	11.4	8.4	Dry	92.0	3	-0.8	1.8	0.06	0.10	0.04	0.92	1.00	0.04	0.09
3.0	2.5	20	13.0	11.4	8.4	Dry	92.0	3	-0.8	1.8	0.10	0.13	0.03	0.92	1.00	0.04	0.05
4.0	3.5	20	13.0	11.4	8.4	Dry	92.0	3	-0.8	1.8	0.13	0.15	0.02	0.92	1.00	0.02	0.02
5.0	4.5	20	13.0	11.4	10.7	Dry	92.0	3	-0.8	1.8	0.15	0.15	0.01	0.92	1.00	0.01	0.01
6.0	5.5	20	13.0	11.4	10.7	Dry	92.0	3	-0.8	1.8	0.15	0.15	0.00	0.92	1.00	0.01	0.00
7.0	6.5	20	13.0	11.4	15.0	Wet	92.0	3	-2.2	0.2	0.15	0.15	0.00	0.92	1.00	0.00	0.00
8.0	7.5	20	13.0	11.4	15.0	Wet	92.0	3	-2.2	0.2	0.16	0.16	0.00	0.92	1.00	0.00	0.00
9.0	8.5	20	13.0	11.4	7.9	Dry	92.0	3	-0.8	1.8	0.16	0.16	0.00	0.92	1.00	0.00	0.00
10.0	9.5	20	13.0	11.4	7.9	Dry	92.0	3	-0.8	1.8	0.16	0.16	0.00	0.92	1.00	0.00	0.00

Fields are chat inputs  
Fields are final answers per layer  
Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.

DEPTH (ft) VS PVR (in) using Excel



Remarks:

Test Method: TX124  
Tested By: Hussien Hachem, P.E.  
Tested Date: 12/06/23

Test Stamp Code: \_\_\_\_\_  
Omit Test: \_\_\_\_\_  
Completed Date: \_\_\_\_\_  
Reviewed By: \_\_\_\_\_

Locked By: TXDOT: \_\_\_\_\_  
District: \_\_\_\_\_  
Area: \_\_\_\_\_

Authorized By: \_\_\_\_\_  
Authorized Date: \_\_\_\_\_

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

Refresh Workbook

File Version: 03/09/15 10:25:48

SAMPLE ID:	Shady Shores Rd	SAMPLED DATE:	10/19/23
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	0918-46-316
COUNTY:	Denton	SPEC YEAR:	
SAMPLED BY:	Geotex Engineering	SPEC ITEM:	
SAMPLE LOCATION:	Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	0.92'

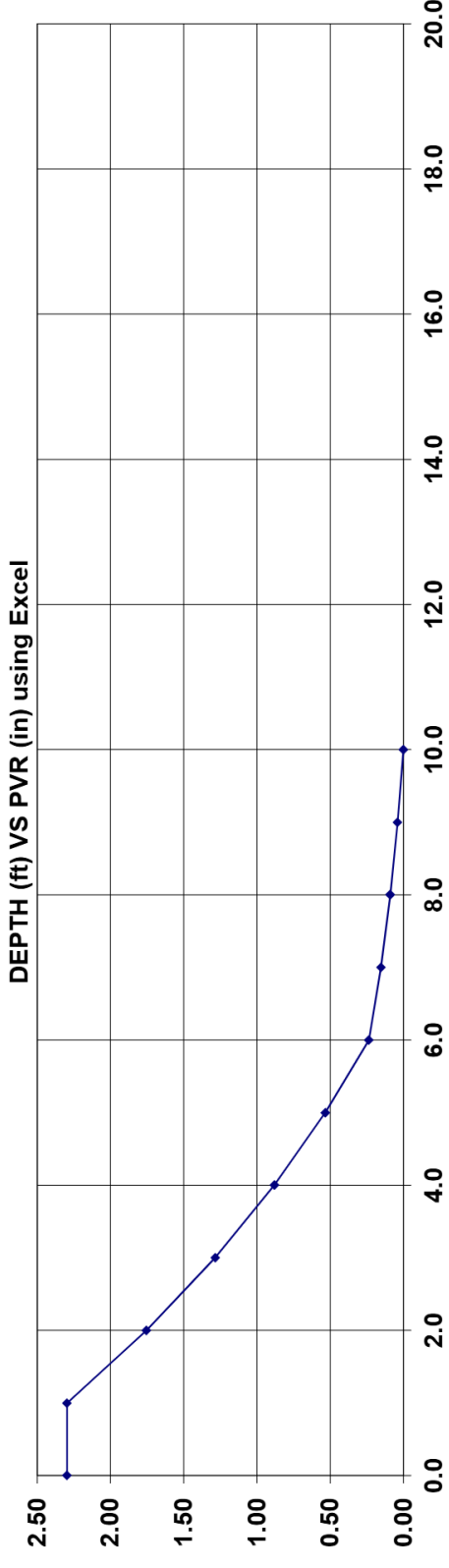
Boring Number:	P2	Ground Elevation (z):	530.57	Longitude (x):	33.138341	Latitude (y):	-97.029939
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PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differentia l Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	60	21.0	30.2	6.2	Dry	97.0	39	10.9	14.3	0.00	0.00	0.00	0.97	1.00	-	2.30
1.0	0.5	60	21.0	30.2	6.2	Dry	97.0	39	10.9	14.3	0.00	0.56	0.56	0.97	1.00	0.00	2.30
2.0	1.5	60	21.0	30.2	6.2	Dry	97.0	39	10.9	14.3	0.56	1.04	0.48	0.97	1.00	0.54	1.75
3.0	2.5	60	21.0	30.2	15.4	Dry	97.0	39	10.9	14.3	1.04	1.46	0.42	0.97	1.00	0.47	1.29
4.0	3.5	60	21.0	30.2	15.4	Dry	97.0	39	10.9	14.3	1.46	1.82	0.36	0.97	1.00	0.40	0.88
5.0	4.5	60	21.0	30.2	12.3	Dry	97.0	39	10.9	14.3	1.82	2.12	0.31	0.97	1.00	0.35	0.53
6.0	5.5	60	21.0	30.2	12.3	Dry	97.0	39	10.9	14.3	2.12	1.11	0.09	0.97	1.00	0.30	0.24
7.0	6.5	43	17.6	22.2	12.2	Dry	97.0	22	5.4	8.4	1.11	1.17	0.07	0.97	1.00	0.08	0.15
8.0	7.5	43	17.6	22.2	12.2	Dry	97.0	22	5.4	8.4	1.17	1.23	0.05	0.97	1.00	0.06	0.09
9.0	8.5	43	17.6	22.2	11.1	Dry	97.0	22	5.4	8.4	1.23	1.27	0.04	0.97	1.00	0.05	0.04
10.0	9.5	43	17.6	22.2	11.1	Dry	97.0	22	5.4	8.4	1.27	1.27	0.04	0.97	1.00	0.04	0.00

Fields are chat inputs Fields are final answers per layer Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.



Remarks:

Test Method: TX124 Hussein Hachem, P.E. Tested Date: 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TXDOT: District: Area

Authorized By: Authorized Date:

# POTENTIAL VERTICAL RISE (PVR) TEX-124-E

SAMPLE ID:	Shady Shores Rd		
TEST NUMBER:	SAMPLED DATE:	10/12/2023	
SAMPLE STATUS:	LETTING DATE:		
COUNTY:	CONTROLLING CSJ:	0918-46-316	
SAMPLED BY:	SPEC YEAR:		
SAMPLE LOCATION:	SPECIAL PROVISION:		
MATERIAL CODE:	GRADE:		
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:	PROJECT MANAGER:		
COURSE/LIFT:	STATION:	146+99.14	
	DIST. FROM CL:	8.20 RT	
Boring Number:	P3	Ground Elevation (z):	544.18
		Longitude (x):	33.14007
		Latitude (y):	-97.029904

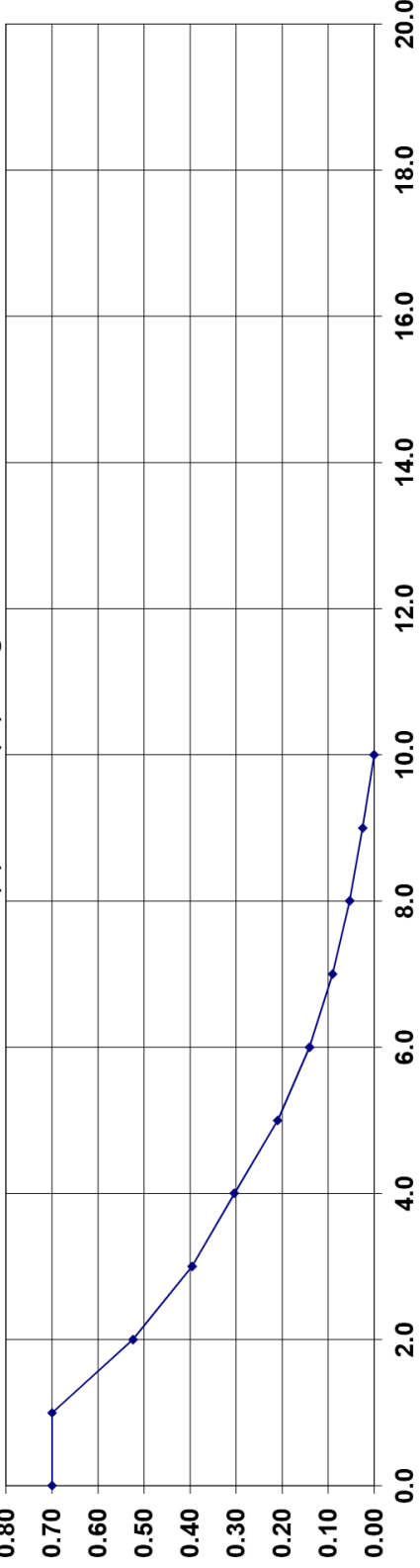
## PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0																0.70
1.0	0.5	34	15.8	18.0	11.5	Dry	84.0	15	3.1	5.9	0.00	0.00	0.00	0.84	1.00	0.00	0.70
2.0	1.5	34	15.8	18.0	11.5	Dry	84.0	15	3.1	5.9	0.00	0.21	0.21	0.84	1.00	0.18	0.52
3.0	2.5	34	15.8	18.0	9.7	Dry	84.0	15	3.1	5.9	0.21	0.36	0.15	0.84	1.00	0.13	0.40
4.0	3.5	34	15.8	18.0	9.7	Dry	84.0	15	3.1	5.9	0.36	0.47	0.11	0.84	1.00	0.09	0.30
5.0	4.5	37	16.4	19.4	9.6	Dry	84.0	19	4.4	7.3	0.62	0.73	0.11	0.84	1.00	0.09	0.21
6.0	5.5	37	16.4	19.4	9.6	Dry	84.0	19	4.4	7.3	0.73	0.81	0.08	0.84	1.00	0.07	0.14
7.0	6.5	37	16.4	19.4	10.2	Dry	84.0	19	4.4	7.3	0.87	0.87	0.06	0.84	1.00	0.05	0.09
8.0	7.5	37	16.4	19.4	10.2	Dry	84.0	19	4.4	7.3	0.91	0.91	0.04	0.84	1.00	0.04	0.05
9.0	8.5	37	16.4	19.4	15.0	Dry	84.0	19	4.4	7.3	0.91	0.95	0.03	0.84	1.00	0.03	0.02
10.0	9.5	37	16.4	19.4	15.0	Dry	84.0	19	4.4	7.3	0.95	0.98	0.03	0.84	1.00	0.02	0.00

Fields are chart inputs      Fields are final answers per layer      Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.

## DEPTH (ft) VS PVR (in) using Excel



Remarks:

dry

Test Method: Hussein Hachem, P.E.      Tested Date: 12/06/23

Test Stamp Code:      Omit Test:      Completed Date:      Reviewed By:

Locked By: TXDOT:      District:      Area:

Authorized By:      Authorized Date:

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

SAMPLE ID: Shady Shores Rd		SAMPLED DATE: 10/12/2023	
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ: 0918-46-316	
COUNTY: Denton		SPEC YEAR:	
SAMPLED BY: Geotex Engineering		SPEC ITEM:	
SAMPLE LOCATION: Shady Shores / Lake Dallas, TX		SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT: P4		DIST. FROM CL: 3.35' RT	
STATION: 70+62.97			
Boring Number: P4	Ground Elevation (z): 538.49	Longitude (x): 33.146584	Latitude (y): -97.146584

PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	30	15.0	16.1	11.4	Dry	99.0	13	2.5	5.2	0.00	0.00	0.00	0.99	1.00	-	0.68
1.0	0.5	30	15.0	16.1	11.4	Dry	99.0	13	2.5	5.2	0.00	0.15	0.15	0.99	1.00	0.00	0.68
2.0	1.5	30	15.0	16.1	9.6	Dry	99.0	13	2.5	5.2	0.15	0.26	0.10	0.99	1.00	0.15	0.53
3.0	2.5	30	15.0	16.1	9.6	Dry	99.0	13	2.5	5.2	0.26	0.33	0.07	0.99	1.00	0.10	0.42
4.0	3.5	30	15.0	16.1	10.3	Dry	99.0	19	4.4	7.3	0.62	0.73	0.11	0.99	1.00	0.07	0.36
5.0	4.5	37	16.4	19.4	10.3	Dry	99.0	19	4.4	7.3	0.73	0.81	0.08	0.99	1.00	0.11	0.25
6.0	5.5	37	16.4	19.4	10.3	Dry	99.0	19	4.4	7.3	0.81	0.87	0.06	0.99	1.00	0.08	0.17
7.0	6.5	37	16.4	19.4	10.3	Dry	99.0	19	4.4	7.3	0.87	0.91	0.04	0.99	1.00	0.06	0.11
8.0	7.5	37	16.4	19.4	10.7	Dry	99.0	19	4.4	7.3	0.91	0.95	0.03	0.99	1.00	0.04	0.06
9.0	8.5	37	16.4	19.4	10.7	Dry	99.0	19	4.4	7.3	0.95	0.98	0.03	0.99	1.00	0.03	0.03
10.0	9.5	37	16.4	19.4	10.7	Dry	99.0	19	4.4	7.3	0.95	0.98	0.03	0.99	1.00	0.03	0.00

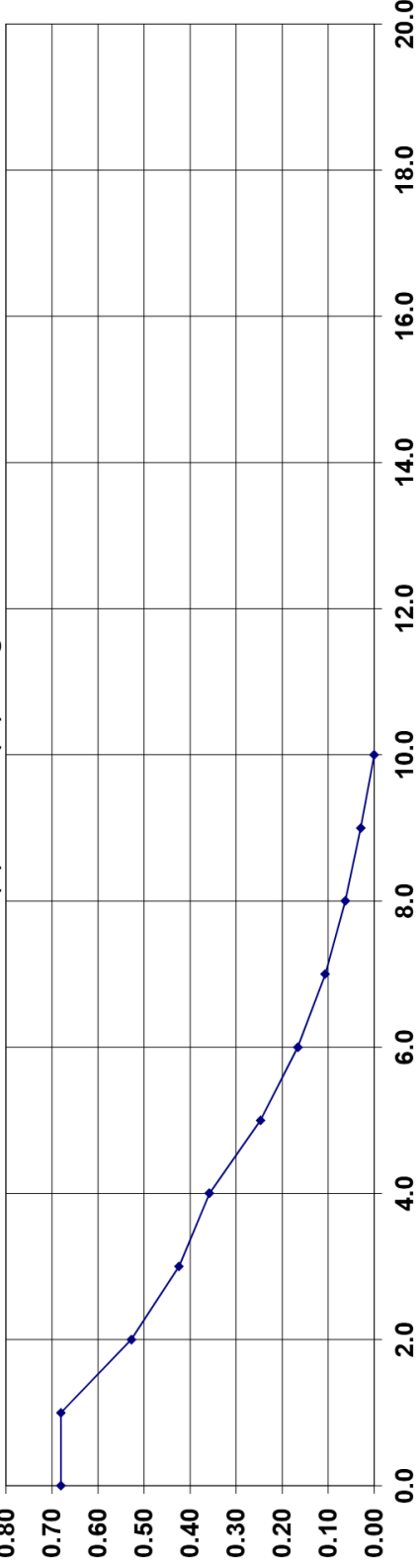
Fields are chat inputs

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.

DEPTH (ft) VS PVR (in) using Excel



Remarks:

Test Method: Hussein Hachem, P.E. Tested Date: 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TXDOT: District: Area

Authorized By: Authorized Date:



POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

Refresh Workbook

File Version: 03/09/15 10:25:48

SAMPLE ID:	Shady Shores Rd	SAMPLED DATE:	10/19/2023
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	0918-46-316
COUNTY:	Denton	SPEC YEAR:	
SAMPLED BY:	Geotex Engineering	SPEC ITEM:	
SAMPLE LOCATION:	Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	9.21 RT

Boring Number:	P5	Ground Elevation (z):	526.85	Longitude (x):	33.147976	Latitude (y):	-97.029855
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PVR Data BH

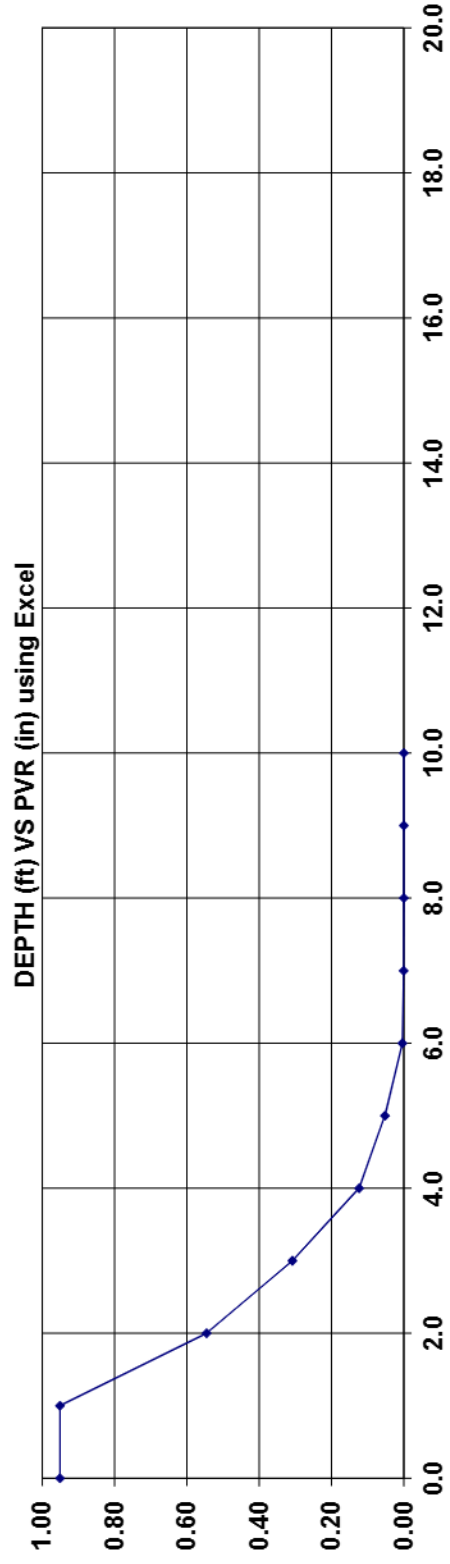
Depth to Bottom of Layer [ft]	Average Load [psf]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	37	16.4	19.4	5.7	Dry	95.0	26	6.7	9.8	0.00	0.00	0.00	-	-	-	0.95
1.0	0.5	37	16.4	19.4	5.7	Dry	95.0	26	6.7	9.8	0.00	0.43	0.43	0.95	1.00	0.41	0.55
2.0	1.5	37	16.4	19.4	18.1	Avg	95.0	26	4.7	7.7	0.32	0.57	0.25	0.95	1.00	0.24	0.31
3.0	2.5	37	16.4	19.4	18.1	Avg	95.0	26	4.7	7.7	0.32	0.57	0.19	0.95	1.00	0.18	0.12
4.0	3.5	37	16.4	19.4	18.1	Avg	95.0	26	2.7	5.5	0.47	0.55	0.08	0.95	1.00	0.07	0.05
5.0	4.5	37	16.4	19.4	19.2	Wet	95.0	26	2.7	5.5	0.55	0.60	0.05	0.95	1.00	0.05	0.00
6.0	5.5	37	16.4	19.4	19.2	Wet	95.0	26	2.7	5.5	0.55	0.60	0.00	0.95	1.00	0.00	0.00
7.0	6.5	20	13.0	11.4	9.8	Dry	95.0	3	-0.8	1.8	0.16	0.16	0.00	0.95	1.00	0.00	0.00
8.0	7.5	20	13.0	11.4	9.8	Dry	95.0	3	-0.8	1.8	0.16	0.16	0.00	0.95	1.00	0.00	0.00
9.0	8.5	20	13.0	11.4	15.3	Wet	95.0	3	-2.2	0.2	0.16	0.16	0.00	0.95	1.00	0.00	0.00
10.0	9.5	20	13.0	11.4	15.3	Wet	95.0	3	-2.2	0.2	0.16	0.16	0.00	0.95	1.00	0.00	0.00

Fields are chart inputs

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.



Remarks:

Test Method:	Tested By:	Tested Date:
TX 124	Husseini Hachem, P.E.	12/06/23
Test Stamp Code:	Omited Test:	Completed Date:
Locked By:	TxDOT:	District:
Authorized By:		Authorized Date:

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

File Version: 03/09/15 10:25:48

Refresh Workbook

SAMPLE ID:	Shady Shores Rd	SAMPLED DATE:	10/12/2023
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	G22-4003-1
COUNTY:	Denton	SPEC YEAR:	
SAMPLED BY:	Geotex Engineering	SPEC ITEM:	
SAMPLE LOCATION:	Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	3.09 RT
Boring Number:	P6	Ground Elevation (z):	530.19
		Longitude (x):	33.149314
		Latitude (y):	-97.029776

PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differentia l Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	20	13.0	11.4	7.2	Dry	96.0	7	0.5	3.2	0.00	0.00	0.00	0.96	1.00	0.00	0.24
1.0	0.5	20	13.0	11.4	7.2	Dry	96.0	7	0.5	3.2	0.00	0.09	0.09	0.96	1.00	0.09	0.16
2.0	1.5	20	13.0	11.4	7.2	Dry	96.0	7	0.5	3.2	0.09	0.16	0.06	0.96	1.00	0.06	0.10
3.0	2.5	20	13.0	11.4	11.8	Dry	96.0	7	0.5	3.2	0.16	0.20	0.04	0.96	1.00	0.04	0.06
4.0	3.5	20	13.0	11.4	11.8	Dry	96.0	7	0.5	3.2	0.26	0.29	0.03	0.96	1.00	0.03	0.03
5.0	4.5	24	13.8	13.3	11.1	Dry	96.0	10	1.5	4.2	0.29	0.31	0.02	0.96	1.00	0.02	0.01
6.0	5.5	24	13.8	13.3	11.1	Dry	96.0	10	1.5	4.2	0.31	0.31	0.01	0.96	1.00	0.01	0.01
7.0	6.5	24	13.8	13.3	5.3	Dry	96.0	10	1.5	4.2	0.31	0.32	0.00	0.96	1.00	0.00	0.00
8.0	7.5	24	13.8	13.3	5.3	Dry	96.0	10	1.5	4.2	0.32	0.32	0.00	0.96	1.00	0.00	0.00
9.0	8.5	24	13.8	13.3	8.9	Dry	96.0	10	1.5	4.2	0.32	0.32	0.00	0.96	1.00	0.00	0.00
10.0	9.5	24	13.8	13.3	8.9	Dry	96.0	10	1.5	4.2	0.32	0.32	0.00	0.96	1.00	0.00	0.00

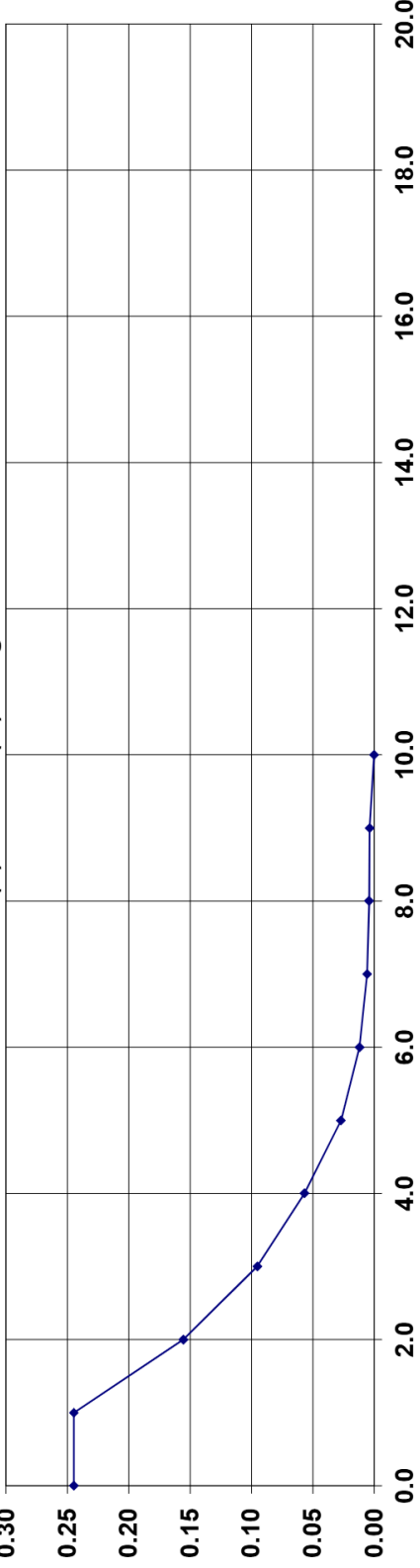
Fields are chat inputs

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.

DEPTH (ft) VS PVR (in) using Excel



Remarks:

Test Method: Hussein Hachem, P.E. Tested Date: 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TXDOT: District: Area

Authorized By: Authorized Date:

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

SAMPLE ID: Shady Shores Rd		SAMPLED DATE: 10/20/2023	
TEST NUMBER:	LETTING DATE:		
SAMPLE STATUS:	CONTROLLING CSJ: 0918-46-316		
COUNTY: Denton	SPEC YEAR:		
SAMPLED BY: Geotex Engineering	SPEC ITEM:		
SAMPLE LOCATION: Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:		
MATERIAL CODE:	GRADE:		
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:	PROJECT MANAGER:		
COURSE/LIFT: P7	DIST. FROM CL: 4.88 RT		
STATION: 185+41.02	Latitude (y): -97.029788		
Boring Number: P7	Ground Elevation (z): 530.41	Longitude (x): 33.150669	Latitude (y): -97.029788

PVR Data BH

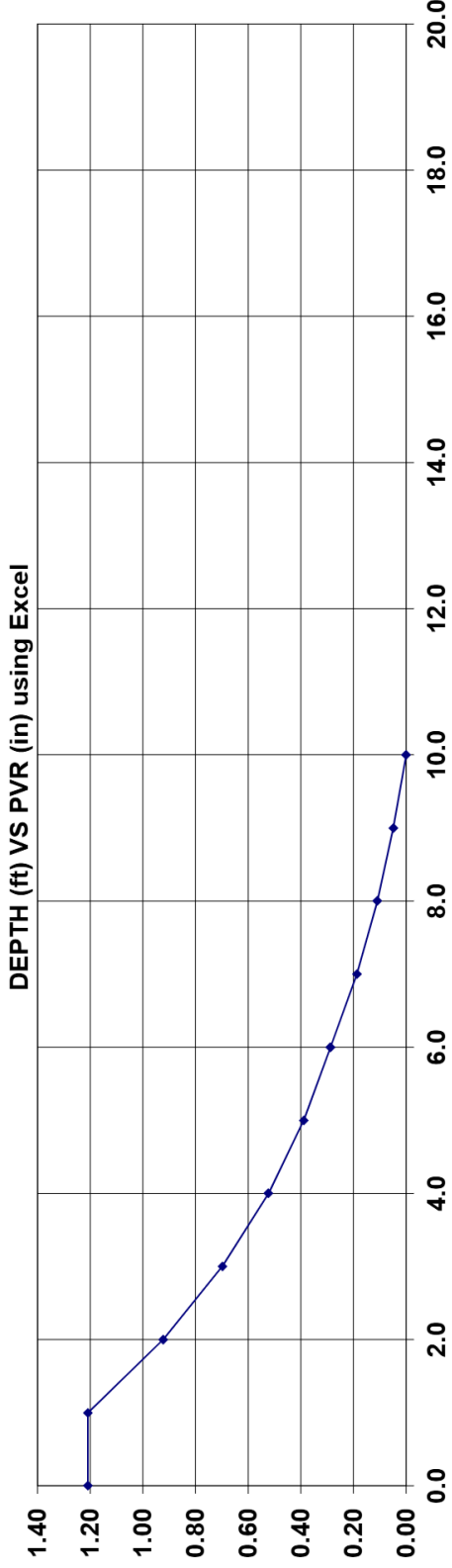
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	36	16.2	18.9	15.9	Dry	90.0	20	4.8	7.7	0.00	0.00	0.00	0.90	1.00	-	1.21
1.0	0.5	36	16.2	18.9	15.9	Dry	90.0	20	4.8	7.7	0.00	0.32	0.32	0.90	1.00	0.00	1.21
2.0	1.5	36	16.2	18.9	15.9	Dry	90.0	20	4.8	7.7	0.32	0.57	0.25	0.90	1.00	0.29	0.92
3.0	2.5	36	16.2	18.9	11.2	Dry	90.0	20	4.8	7.7	0.57	0.76	0.19	0.90	1.00	0.23	0.70
4.0	3.5	36	16.2	18.9	11.2	Dry	90.0	20	4.8	7.7	0.76	0.91	0.15	0.90	1.00	0.17	0.52
5.0	4.5	36	16.2	18.9	11.1	Dry	90.0	20	4.8	7.7	0.91	1.02	0.11	0.90	1.00	0.13	0.39
6.0	5.5	36	16.2	18.9	11.1	Dry	90.0	20	4.8	7.7	1.02	1.11	0.09	0.90	1.00	0.10	0.29
7.0	6.5	39	16.8	20.3	9.8	Dry	90.0	23	5.7	8.7	1.11	1.24	0.11	0.90	1.00	0.10	0.19
8.0	7.5	39	16.8	20.3	9.8	Dry	90.0	23	5.7	8.7	1.24	1.35	0.09	0.90	1.00	0.08	0.11
9.0	8.5	39	16.8	20.3	12.9	Dry	90.0	23	5.7	8.7	1.35	1.43	0.07	0.90	1.00	0.06	0.05
10.0	9.5	39	16.8	20.3	12.9	Dry	90.0	23	5.7	8.7	1.43	1.56	0.05	0.90	1.00	0.05	0.00

Fields are final answers per layer

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.



Remarks:

dry

Test Method: Hussein Hachem, P.E. Tested Date: 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TXDOT: District: Area

Authorized By: Authorized Date:

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

SAMPLE ID: Shady Shores Rd		SAMPLED DATE: 10/12/2023	
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ: 0918-46-316	
COUNTY: Denton		SPEC YEAR:	
SAMPLED BY: Geotex Engineering		SPEC ITEM:	
SAMPLE LOCATION: Shady Shores / Lake Dallas, TX		SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	5.47 RT
Boring Number: P8	Ground Elevation (z): 530.41	Longitude (x): 33.151866	Latitude (y): -97.029348

PVR Data BH

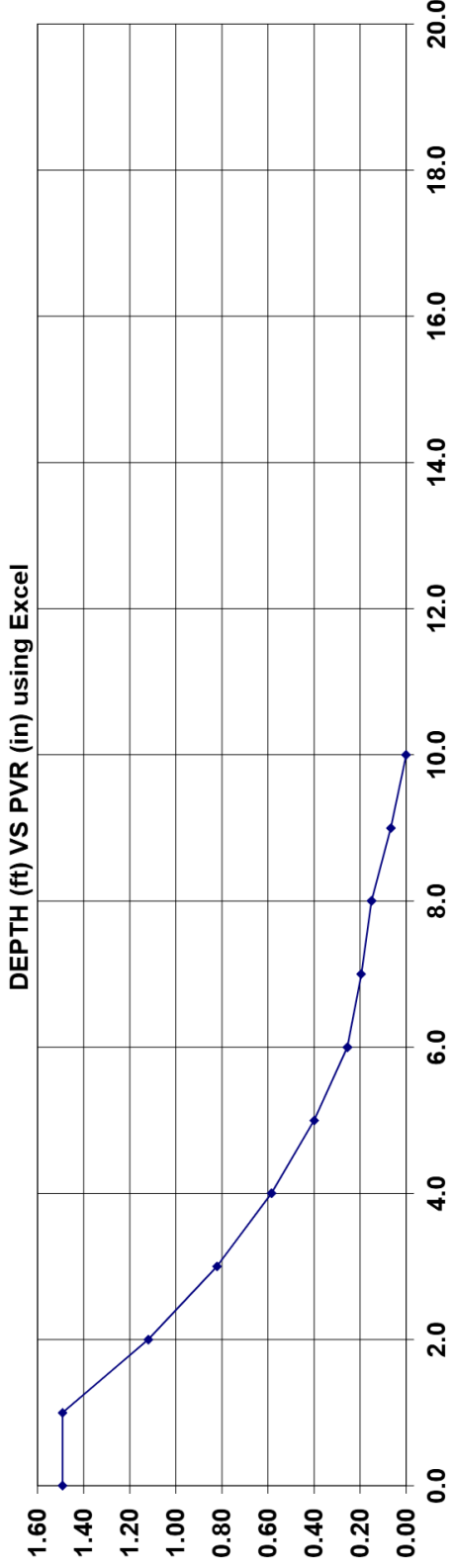
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	39	16.8	20.3	9.8	Dry	100.0	23	5.7	8.7	0.00	0.00	0.00	1.00	1.00	-	1.49
1.0	0.5	39	16.8	20.3	9.8	Dry	100.0	23	5.7	8.7	0.00	0.37	0.37	1.00	1.00	0.00	1.49
2.0	1.5	39	16.8	20.3	10.7	Dry	100.0	23	5.7	8.7	0.37	0.67	0.30	1.00	1.00	0.30	1.12
3.0	2.5	39	16.8	20.3	10.7	Dry	100.0	23	5.7	8.7	0.67	0.91	0.24	1.00	1.00	0.24	0.82
4.0	3.5	39	16.8	20.3	13.7	Dry	100.0	23	5.7	8.7	0.91	1.09	0.19	1.00	1.00	0.19	0.58
5.0	4.5	39	16.8	20.3	13.7	Dry	100.0	23	5.7	8.7	1.09	1.24	0.14	1.00	1.00	0.14	0.40
6.0	5.5	39	16.8	20.3	17.8	Avg	100.0	23	3.9	6.7	1.09	1.24	0.06	1.00	1.00	0.06	0.25
7.0	6.5	39	16.8	20.3	17.8	Avg	100.0	23	3.9	6.7	0.87	0.91	0.04	1.00	1.00	0.04	0.15
8.0	7.5	39	16.8	20.3	17.0	Dry	100.0	26	6.7	9.8	1.69	1.78	0.08	1.00	1.00	0.08	0.07
9.0	8.5	45	18.0	23.2	17.0	Dry	100.0	26	6.7	9.8	1.78	1.85	0.07	1.00	1.00	0.07	0.00
10.0	9.5	45	18.0	23.2	17.0	Dry	100.0	26	6.7	9.8	1.78	1.85	0.07	1.00	1.00	0.07	0.00

Fields are chat inputs

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.



Remarks:

Test Method: TX124 Hussein Hachem, P.E. Tested Date: 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TXDOT: District: Area

Authorized By: Authorized Date:

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

Refresh Workbook File Version: 03/09/15 10:25:48

SAMPLE ID:	Shady Shores Rd	SAMPLED DATE:	10/12/2023
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	0918-46-316
COUNTY:	Denton	SPEC YEAR:	
SAMPLED BY:	Geotex Engineering	SPEC ITEM:	
SAMPLE LOCATION:	Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	7.90' LT
Boring Number:	P9	Ground Elevation (z):	527.87
		Longitude (x):	33.15337
		Latitude (y):	-97.029311

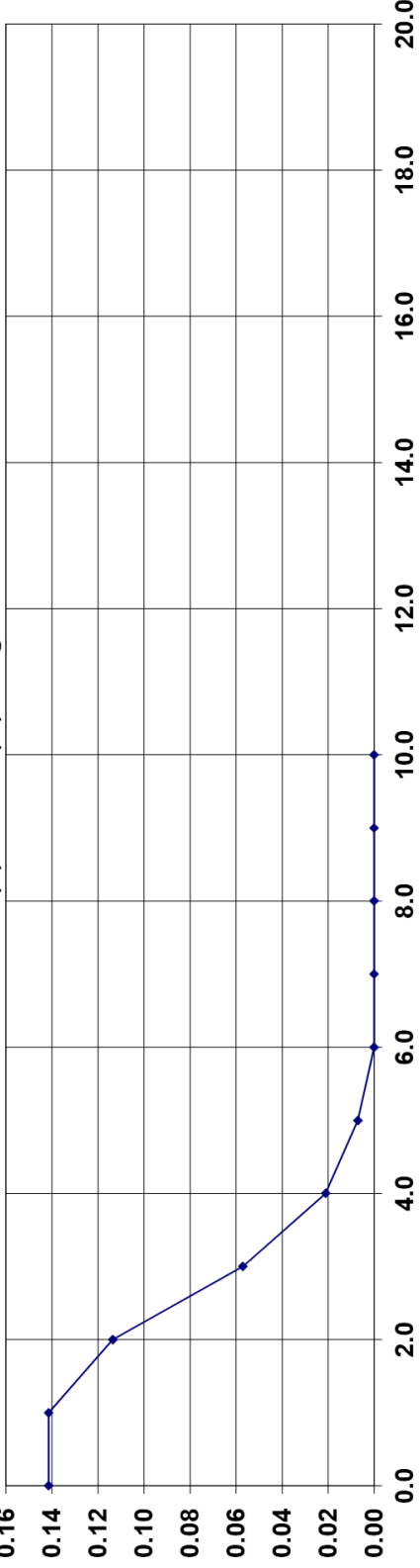
PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differentia l Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	26	14.2	14.2	22.2	Wet	90.0	6	-1.6	0.9	0.00	0.00	0.00	0.90	1.00	-	0.14
1.0	0.5	26	14.2	14.2	22.2	Wet	90.0	6	-1.6	0.9	0.00	0.03	0.03	0.90	1.00	0.03	0.11
2.0	1.5	26	14.2	14.2	11.1	Dry	90.0	6	0.2	2.8	0.09	0.16	0.06	0.90	1.00	0.06	0.06
3.0	2.5	26	14.2	14.2	11.1	Dry	90.0	6	0.2	2.8	0.16	0.20	0.04	0.90	1.00	0.04	0.02
4.0	3.5	26	14.2	14.2	12.3	Dry	90.0	3	-0.8	1.8	0.13	0.15	0.02	0.90	1.00	0.01	0.01
5.0	4.5	20	13.0	11.4	12.3	Dry	90.0	3	-0.8	1.8	0.15	0.15	0.01	0.90	1.00	0.01	0.00
6.0	5.5	20	13.0	11.4	19.8	Wet	90.0	3	-2.2	0.2	0.15	0.15	0.00	0.90	1.00	0.00	0.00
7.0	6.5	20	13.0	11.4	19.8	Wet	90.0	3	-2.2	0.2	0.15	0.15	0.00	0.90	1.00	0.00	0.00
8.0	7.5	20	13.0	11.4	22.8	Wet	90.0	3	-2.2	0.2	0.15	0.15	0.00	0.90	1.00	0.00	0.00
9.0	8.5	20	13.0	11.4	22.8	Wet	90.0	3	-2.2	0.2	0.15	0.15	0.00	0.90	1.00	0.00	0.00
10.0	9.5	20	13.0	11.4	22.8	Wet	90.0	3	-2.2	0.2	0.15	0.15	0.00	0.90	1.00	0.00	0.00

Fields are chart inputs Fields are final answers per layer Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.

DEPTH (ft) VS PVR (in) using Excel



Remarks:

Test Method:  Tested By:  Tested Date:

TX124 Hussein Hachem, P.E.  Completed Date:  Reviewed By:

Test Stamp Code:  Omit Test:  District:  Area:

Locked By:  Authorized Date:

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

Refresh Workbook

File Version: 03/09/15 10:25:48

SAMPLE ID:	Shady Shores Rd	SAMPLED DATE:	10/12/2023
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	0918-46-316
COUNTY:	Denton	SPEC YEAR:	
SAMPLED BY:	Geotex Engineering	SPEC ITEM:	
SAMPLE LOCATION:	Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	4.50 RT
Boring Number:	P10	Ground Elevation (z):	528.29
		Longitude (x):	33.154753
		Latitude (y):	-97.029261

PVR Data BH

Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differentia l Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	22	13.4	12.3	18.6	Wet	88.0	10	-0.7	1.8	0.00	0.00	0.00	0.88	1.00	-	0.25
1.0	0.5	22	13.4	12.3	18.6	Wet	88.0	10	-0.7	1.8	0.00	0.06	0.06	0.88	1.00	0.00	0.25
2.0	1.5	22	13.4	12.3	9.5	Dry	88.0	10	1.5	4.2	0.12	0.21	0.08	0.88	1.00	0.05	0.20
3.0	2.5	22	13.4	12.3	9.5	Dry	88.0	10	1.5	4.2	0.12	0.21	0.08	0.88	1.00	0.07	0.13
4.0	3.5	22	13.4	12.3	9.0	Dry	88.0	10	1.5	4.2	0.26	0.29	0.03	0.88	1.00	0.05	0.08
5.0	4.5	22	13.4	12.3	9.0	Dry	88.0	10	1.5	4.2	0.29	0.31	0.02	0.88	1.00	0.01	0.05
6.0	5.5	22	13.4	12.3	9.0	Dry	88.0	10	1.5	4.2	0.31	0.31	0.01	0.88	1.00	0.01	0.04
7.0	6.5	22	13.4	12.3	11.2	Dry	88.0	10	1.5	4.2	0.31	0.32	0.00	0.88	1.00	0.01	0.03
8.0	7.5	22	13.4	12.3	11.2	Dry	88.0	10	1.5	4.2	0.65	0.67	0.02	0.88	1.00	0.00	0.03
9.0	8.5	30	15.0	16.1	15.1	Dry	88.0	16	3.5	6.3	0.65	0.67	0.02	0.88	1.00	0.02	0.02
10.0	9.5	30	15.0	16.1	15.1	Dry	88.0	16	3.5	6.3	0.67	0.69	0.02	0.88	1.00	0.02	0.00

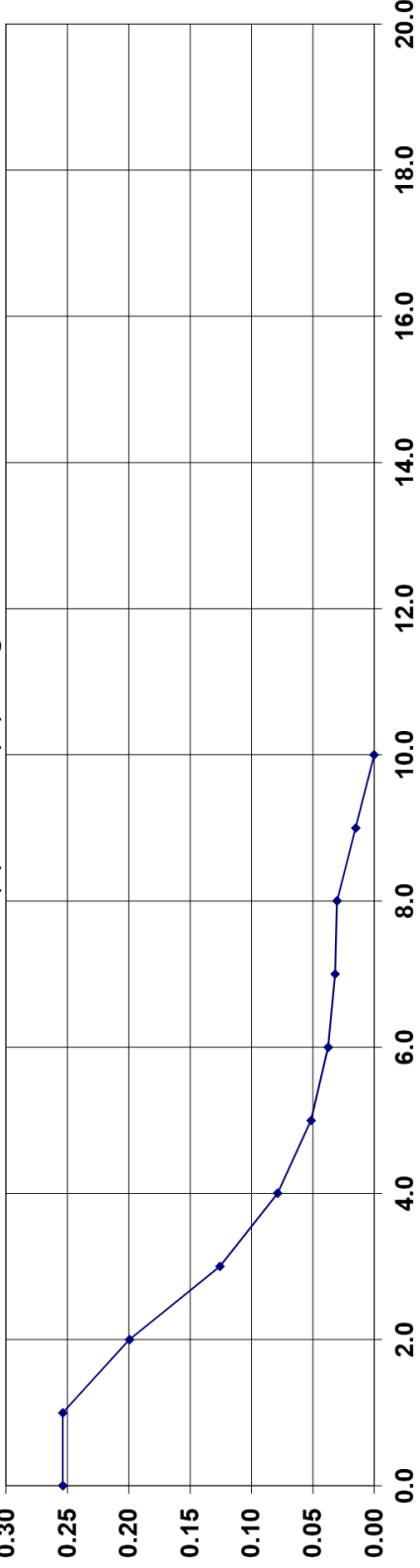
Fields are chat inputs

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.

DEPTH (ft) VS PVR (in) using Excel



Remarks:

Test Method: Hussein Hachem, P.E. Tested Date: 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TXDOT: District: Area

Authorized By: Authorized Date:



POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

Refresh Workbook

File Version: 03/09/15 10:25:48

SAMPLE ID:	Shady Shores Rd	SAMPLED DATE:	10/12/2023
TEST NUMBER:		LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	0918-46-316
COUNTY:	Denton	SPEC YEAR:	
SAMPLED BY:	Geotex Engineering	SPEC ITEM:	
SAMPLE LOCATION:	Shady Shores / Lake Dallas, TX	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		DIST. FROM CL:	5.97' LT

Boring Number:	P11	Ground Elevation (z):	540.06	Longitude (x):	33.156126	Latitude (y):	-97.029285
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PVR Data BH

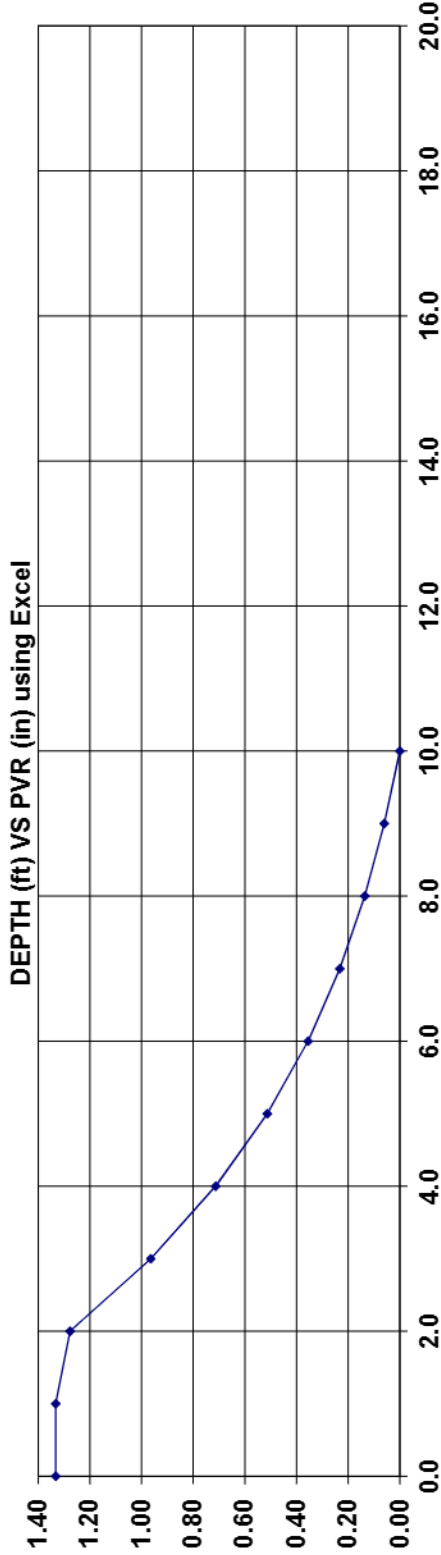
Depth to Bottom of Layer [ft]	Average Load [psf]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0																1.33
1.0	0.5	20	13.0	11.4	8.3	Dry	90.0	3	-0.8	1.8	0.00	0.00	0.00	0.90	1.00	0.00	1.33
2.0	1.5	20	13.0	11.4	8.3	Dry	90.0	3	-0.8	1.8	0.00	0.06	0.06	0.90	1.00	0.06	1.28
3.0	2.5	43	17.6	22.2	16.6	Dry	90.0	27	7.0	10.1	0.43	0.77	0.35	0.90	1.00	0.31	0.96
4.0	3.5	43	17.6	22.2	16.6	Dry	90.0	27	7.0	10.1	0.77	1.05	0.28	0.90	1.00	0.25	0.71
5.0	4.5	43	17.6	22.2	13.8	Dry	90.0	27	7.0	10.1	1.05	1.27	0.22	0.90	1.00	0.20	0.51
6.0	5.5	43	17.6	22.2	13.8	Dry	90.0	27	7.0	10.1	1.27	1.45	0.18	0.90	1.00	0.16	0.36
7.0	6.5	43	17.6	22.2	12.7	Dry	90.0	27	7.0	10.1	1.45	1.59	0.14	0.90	1.00	0.12	0.23
8.0	7.5	43	17.6	22.2	12.7	Dry	90.0	27	7.0	10.1	1.59	1.69	0.11	0.90	1.00	0.10	0.14
9.0	8.5	43	17.6	22.2	8.9	Dry	90.0	27	7.0	10.1	1.69	1.78	0.08	0.90	1.00	0.08	0.06
10.0	9.5	43	17.6	22.2	8.9	Dry	90.0	27	7.0	10.1	1.78	1.85	0.07	0.90	1.00	0.06	0.00

Fields are chart inputs

Fields are final answers per layer

Final Total PVR for the borehole

Note: PVR calculations are based on future pavement grade being the same as present grade. Bold numbers are interpolated and extrapolated values.



Remarks:

Test Method: Tested By: Tested Date:

TX 124 | Hussain Hachem, P.E. | 12/06/23

Test Stamp Code: Omit Test: Completed Date: Reviewed By:

Locked By: TxDOT: District: Area:

Authorized By: Authorized Date:

**APPENDIX H – TRAFFIC DATA**

## MEMORANDUM

**TO:** David Burkett, PE  
**FROM:** Stephen Moore, PE  
**EMAIL:** [sMoore@halff.com](mailto:sMoore@halff.com)



**DATE:** July 13, 2021  
**AVO:** 36886



**SUBJECT:** S. Shady Shores Road Traffic Projections

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Halff Associates, Inc. (Halff) produced this memorandum to define the procedures used to develop projected traffic volumes along S. Shady Shores Road between W. Shady Shores Road and Swisher Road, to be utilized for design and environmental (noise) analysis and other design purposes. Traffic projections were developed using historical traffic count data, current traffic count data collected for the project, and planned development information within or near the study area. The section of Shady Shores Road between W. Shade Shores Road and Swisher Road is currently under design. The opening year for the reconstruction of S. Shady Shores Road is projected to be by end of year 2024. Design year (opening year + 20 years) and pavement design year (opening year + 30 years) are years 2044 and 2054, respectively.

### Study Area

The study area for the project is within the limits of the city of Lake Dallas and the town of Shady Shores in Denton County, Texas, and runs along S. Shady Shores Road with corridor limits from W. Shady Shores Road to Swisher Road. The project limits are shown in **Figure 1**.

### Project Background

The S. Shady Shores Road corridor mainly serves as a collector facility connecting residential communities to Swisher Road, a major arterial, and provides access towards IH-35 and the Lewisville Lake Toll Bridge. S. Shady Shores Road within the corridor limits is a two-lane undivided facility with a posted speed limit of 35 miles per hour (mph). The purpose for the reconstruction of S. Shady Shores Road within the corridor limits is to mitigate frequent road inundation at three locations caused by the fluctuating water levels of the adjacent Lake Lewisville. The three areas of flooding along S. Shady Shores Road and the jurisdiction that manages each flood area are listed below:

- Flooding Area #1: Between W. Shady Shores Road and Oakwood Circle; owned and managed by Denton County
- Flooding Area #2: Between Oakwood Circle and Dobbs Road; owned and managed by the town of Shady Shores
- Flooding Area #3: Between Parkside Lane and Silktree Court; owned and managed by the city of Lake Dallas

The existing top of road elevation at these three low points along the corridor is approximately 527 feet, 10 feet below the Lake Lewisville 100-year water surface elevation of 537 feet. These low points today have a history of being inundated during severe rain events.

## Historical Volumes

Historical traffic count data on or near S. Shady Shores Road within the corridor limits was obtained from the Texas Department of Transportation (TxDOT) Traffic Count Database System (TCDS). The historical locations containing traffic information used are described below:

- 3 annual accumulative count recorder (ACR) counts along S. Shady Shores Road within the corridor limits
  - 61HP124 – S. Shady Shores Road between W. Shady Shores Road and Oakwood Circle
  - 61U364 – S Shady Shores Road between Oakwood Circle and Dobbs Road
  - 61U363 – S. Shady Shores Road between Parkside Lane and Silktree Court
- 5 annual ACR counts outside of the S. Shady Shores Road corridor limits
  - 61HP5068 – Lakeshore Road north of W. Shady Shores Road
  - 61U360 – Dobbs Road east of Corinth Parkway
  - 61H4T – Swisher Road west of Lake Lewisville Toll Bridge
  - 61HP5245 – Swisher Road east of S. Shady Shores Road
  - 61U6996 – S. Shady Shores Road south of Swisher Road

The TxDOT TCDS did not contain any relevant vehicle classification information on or near S. Shady Shores Road within the corridor limits. Additionally, no historical traffic count information was available from the city of Lake Dallas, town of Shady Shores, or Denton County.

Due to the lack of recent and consistent historic and classification counts on or near S. Shady Shores Road within the corridor limits, turning movement and link traffic counts were collected and used instead of TxDOT TCDS volumes to establish the most accurate existing conditions.

## Existing Volumes

Weekday AM and PM peak period turning movement traffic counts were collected at four existing intersections on Wednesday April 14, 2021, from 7:00 AM – 9:00 AM and from 4:30 – 6:30 PM. The traffic count data sheets collected at the existing intersections are included in this memorandum in the **Appendix**. The existing intersections at which traffic count data was collected are:

- Intersection 1: S. Shady Shores Road / Lakeview Road at W. Shady Shores Road / Cielo Lane
- Intersection 2: S. Shady Shores Road at Oakwood Circle
- Intersection 3: S. Shady Shores Road at Dobbs Drive
- Intersection 4: S. Shady Shores Road at Swisher Road

The AM and PM peak hours for the entire study area were determined by selecting the highest one-hour sum of the total volumes at the four existing intersections. The AM and PM peak hours during the traffic count data collection were calculated to be the following:

- AM Peak Hour: 7:15 – 8:15 AM
- PM Peak Hour: 5:00 – 6:00 PM

The 2021 raw existing peak hour volumes are shown in **Figure 2**.

The 2020 COVID-19 worldwide pandemic, which caused Texan residents to limit travel for essential reasons and placed commercial and recreational restrictions to prevent the spread of the virus resulted in a shift in commute volume throughout the state in 2020 and in the beginning months of 2021. On March 10, 2021, Governor Greg Abbott lifted the statewide mask mandate and opened the state to one hundred percent (100%), with no business restrictions in relation to the pandemic, as the number of Texan residents vaccinated against the virus increased. According to a published article from Inrix, an analytics company that specializes in analyzing traffic movements, AM and PM peak hour trips in the Dallas-Fort Worth metroplex were up to approximately eighty-two percent (82%) and ninety-four percent (94%), respectively, of the pre-COVID-19 baseline conditions at the time the traffic count data was collected for this project in April 2021.. For purposes of calculating projected traffic volumes, Half increased the AM and PM peak hour volumes collected on April 14, 2021 by ten percent (10%) to adjust the traffic to the estimated year 2021 pre-COVID-19 baseline conditions.

The 2021 adjusted peak hour volumes are shown in **Figure 3**.

24 hour-bi-directional traffic counts at eight locations within the study area were also collected on April 14, 2021. The link volume count locations and associated unadjusted and adjusted 24-hour volumes are shown in **Table 1**. (The adjusted volumes represent a 10% increase of the unadjusted volumes.) The traffic count data sheets for the eight link locations, categorized by vehicle classification as defined by the Federal Highway Administration (FHWA), are included in this memorandum in the **Appendix**.

**Table 1: Existing Link Volume Counts**

<b>Location</b>	<b>Type (direction)</b>	<b>Volume (vehicles per day) unadjusted / adjusted</b>
Location A: S. Shady Shores Road between W. Shady Shores Road and Oakwood Circle	Bi-Directional (NB and SB)	953 / <b>1,048</b> vpd NB 941 / <b>1,035</b> vpd SB 1,894 / <b>2,083</b> vpd total
Location B: S. Shady Shores Road between Oakwood Circle and Dobbs Road	Bi-Directional (NB and SB)	1,004 / <b>1,104</b> vpd NB 991 / <b>1,090</b> vpd SB 1,995 / <b>2,195</b> vpd total
Location C: S. Shady Shores Road between Parkside Lane and Silktree Court	Bi-Directional (NB and SB)	1,590 / <b>1,749</b> vpd NB 1,605 / <b>1,766</b> vpd SB 3,195 / <b>3,515</b> vpd total
Location D: W. Shady Shores Road west of S. Shady Shores Road	Bi-Directional (EB and WB)	881 / <b>969</b> vpd EB 875 / <b>963</b> vpd WB 1,756 / <b>1,932</b> vpd total
Location E: Oakwood Circle west of S. Shady Shores Road	Bi-Directional (EB and WB)	99 / <b>109</b> vpd EB 93 / <b>102</b> vpd WB 192 / <b>211</b> vpd total
Location F: Dobbs Road west of S. Shady Shores Road	Bi-Directional (EB and WB)	845 / <b>930</b> vpd EB 833 / <b>916</b> vpd WB 1,678 / <b>1,846</b> vpd total
Location G: Swisher Road west of S. Shady Shores Road	Bi-Directional (EB and WB)	10,297 / <b>11,327</b> vpd EB 10,341 / <b>11,375</b> vpd WB 20,638 / <b>22,702</b> vpd total
Location H: Swisher Road east of S. Shady Shores Road	Bi-Directional (EB and WB)	11,323 / <b>12,455</b> vpd EB 10,397 / <b>11,437</b> vpd WB 21,720 / <b>23,892</b> vpd total

### Future Development and Projected Opening Year (2024) Volumes

Known future developments to be built before the opening year (2024) of the S. Shady Shores Road construction project include one single-family residential development within the limits of Lake Dallas and three single-family residential developments within the limits of Shady Shores. Site-generated trips were calculated using the historical trip generation data published by the Institute of Transportation Engineer's *Trip Generation Manual, 10<sup>th</sup> Edition*. These development trips were distributed along S. Shady Shores Road and the adjacent roads in the study area. The site-generated trips that were distributed along S. Shady Shores Road within the corridor limits were included as part of the year 2024 peak hour volumes.

Background growth of the existing adjusted 2021 peak hour volumes shown in **Figure 3** was developed by increasing the volumes by an annual growth rate of two percent (2%) for 3 years to the assumed project opening year 2024. Determination of the annual growth rate is further explained in the following section. These background volumes were then added to the future development-generated trips to estimate the total year 2024 peak hour volumes along S. Shady Shores Road within the corridor limits.

The estimated year 2024 peak hour volumes are shown in **Figure 4**.

### Annual Growth Rate & Factors

**Table 2** shows the calculated annual growth rate from several historic traffic count locations available from TxDOT TCDS. The growth rate is calculated by applying a linear growth rate based on the earliest and latest volume information available per count location. Since the growth rate varies greatly from location to location, with a couple locations indicating negative growth, a growth rate based on TxDOT's Statewide Planning Map was used.

**Table 2: Existing Link Volume Counts**

Location	AADT Year Range	Annual Growth Rate
61HP124 – S. Shady Shores Road between W. Shady Shores Road and Oakwood Circle	2009 – 2015	-2.9%
61U364 – S Shady Shores Road between Oakwood Circle and Dobbs Road	2004 – 2014	-0.7%
61U363 – S. Shady Shores Road between Parkside Lane and Silktree Court	2004 – 2019	-2.7%
61HP5068 – Lakeshore Road north of W. Shady Shores Road	2009 – 2015	-3.2%
61U360 – Dobbs Road east of Corinth Parkway	2004 – 2019	1.6%
61H4T – Swisher Road west of Lake Lewisville Toll Bridge	2018 – 2019	14.6%

Halff reviewed historical traffic count data and future traffic projections published on TxDOT's Statewide Planning Map along S. Shady Shores Road within the corridor limits. Based on the data for two segments along S. Shady Shores Road within the corridor limits, shown in **Table 3**, a recommended annual growth rate of two percent (2.0%) was used to project existing volume growth out to 20 and 30 years following the completion of the S. Shady Shores Road project.

**Table 3: TxDOT Statewide Planning Map Annual Growth Rate – S. Shady Shores Road**

Segment	Route Name	Annual Growth Rate
S. Shady Shores Road between W. Shady Shores Road and Silktree Court	267975	2.0%
S. Shady Shores Road between W. Shady Silktree Court and Swisher Road	270236	1.7%
<b>Recommendation</b>		<b>2.0%</b>

K and D factors were obtained from the link volume traffic count data collected along S. Shady Shores Road shown in **Table 1** (Locations A – C). The overall K-Factor was found to be 9.5% and the D-factor was 50% in the northbound and southbound directions.

**Table 4** shows the recommended growth rates and factors that will be used for the projected traffic volumes along the S. Shady Shores Road corridor.

**Table 4: Calculated Traffic Growth Values**

Factor / Rate	Major Direction	Value
Annual Growth Rate (up to year 2054)	-	2.0%
K-Factor	-	9.5%
D-Factor	NB/SB	50%

#### Vehicle Classification Percentages

**Table 5** shows the vehicle classification percentages observed along S. Shady Shores Road based on the traffic count data collected on April 14, 2021. S. Shady Shores Road mainly serves residential communities with some amount of commercial vehicle activity, which is reflected by the observed existing daily truck percentage of 18.0% and a design hourly volume truck percentage of 16.2%. Individual classifications outlined under FHWA guidelines were grouped into three main classes: light duty (classes 1-3), medium duty (classes 4-5), and heavy duty (classes 6-14). The truck percentages for the different general classifications were calculated by taking the average of the selected classification data for the study area. Link volumes collected at locations A and C were selected for the calculation of vehicle classification percentages. Link volumes collected at location B were excluded because the classification percentages at that location, compared to those from locations A and C, were significantly lower.

**Table 5: Vehicle Classification**

Classification	ADT	DHV
Light Duty (Classes 1-3)	82.0%	83.8%
Medium Duty (Classes 4-5)	14.9%	15.3%
Heavy Duty (Classes 6-14)	3.1%	0.9%
<b>Total Trucks</b>	<b>18.0%</b>	<b>16.2%</b>

### **Traffic Projection Line Diagrams**

A line diagram showing the projected turning movement traffic volumes along S. Shady Shores Road from W. Shady Shores Road to Swisher Road was developed using the calculated growth rate and adjusted peak hour volumes collected along the corridor and cross streets. Projected daily traffic volumes were obtained by applying the overall K-Factor (9.5%) to the average of the AM and PM peak hour volumes for each movement on the opening day (2024) volumes shown in **Figure 4**. The projected year 2024 daily traffic volumes were then grown by a two percent (2%) annual growth rate for twenty and thirty years, respectively, to develop the projected year 2044 and 2054 daily traffic volumes. The line diagram for the projected year 2024, 2044, and 2054 daily traffic volumes is attached to this memorandum as **Figure 5**.

Line diagrams showing the projected AM and PM peak hour volumes for years 2044 and 2054 along S. Shady Shores Road within the same study limits were developed by applying the AM K-Factor (9.1%) and PM K-Factor (9.9%) to the projected year 2044 and 2054 daily traffic volumes shown in **Figure 5**. The line diagrams for the projected year 2044 and 2054 AM and PM peak hour volumes are attached to this memorandum as **Figures 6 and 7**.

**END OF MEMORANDUM**

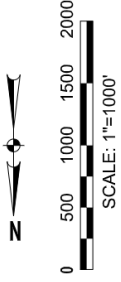
### **APPENDIX:**

S. Shady Shores Road Traffic Volume Line Diagrams  
Traffic Analysis for Highway Design (TAHD) Report  
Existing Traffic Counts

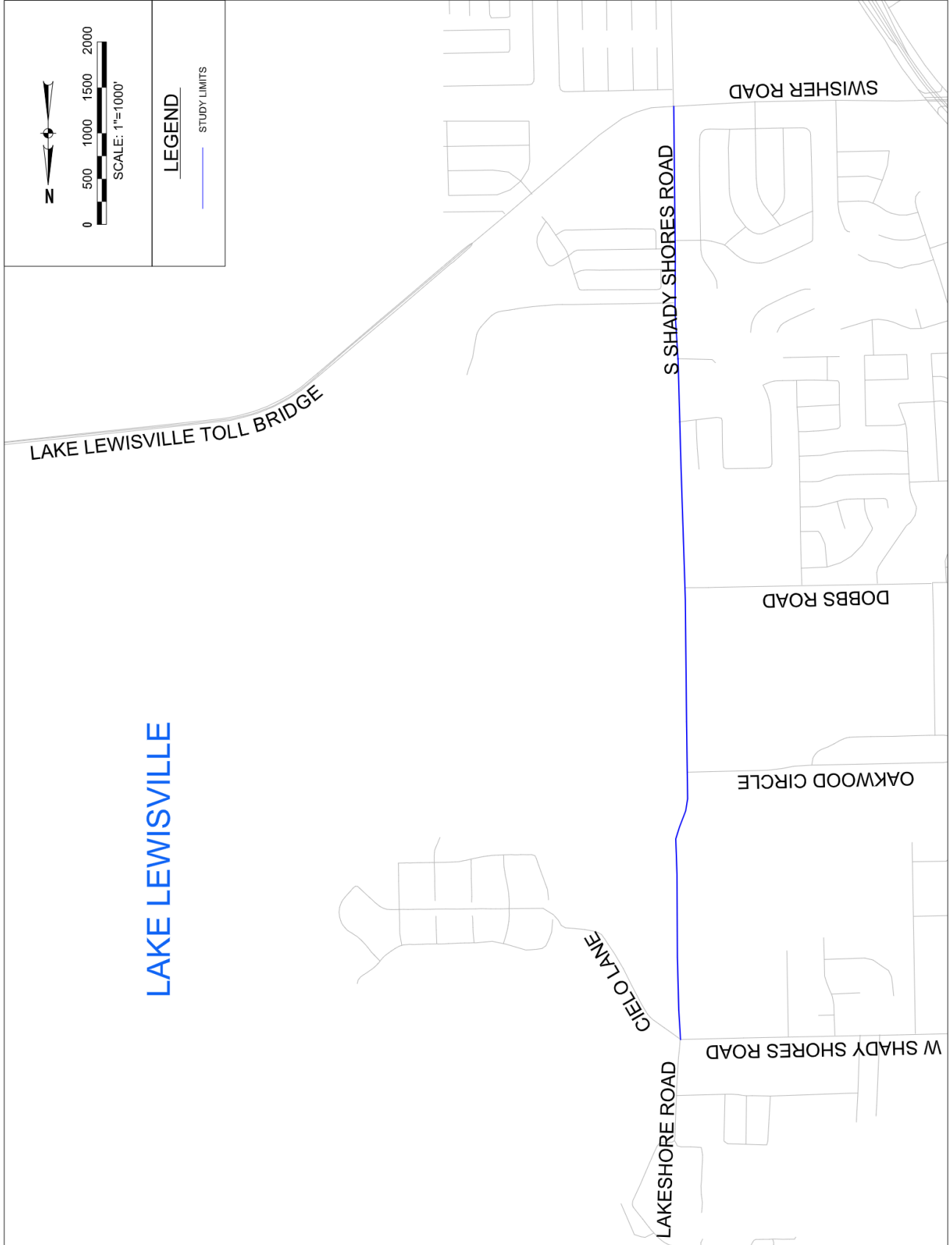
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DENTON COUNTY, TEXAS



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Issued:	7/12/2021
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Checked By:	SM
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Sheet Number	FIGURE 1



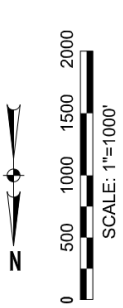
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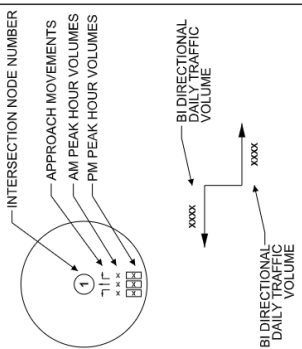
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DENTON COUNTY, TEXAS



1021 NORTH BOWERS ROAD  
RICHMOND, TEXAS 75081-2275  
TEL (214) 346-6200  
FAX (214) 728-0855  
TBP# FIRM # F-312

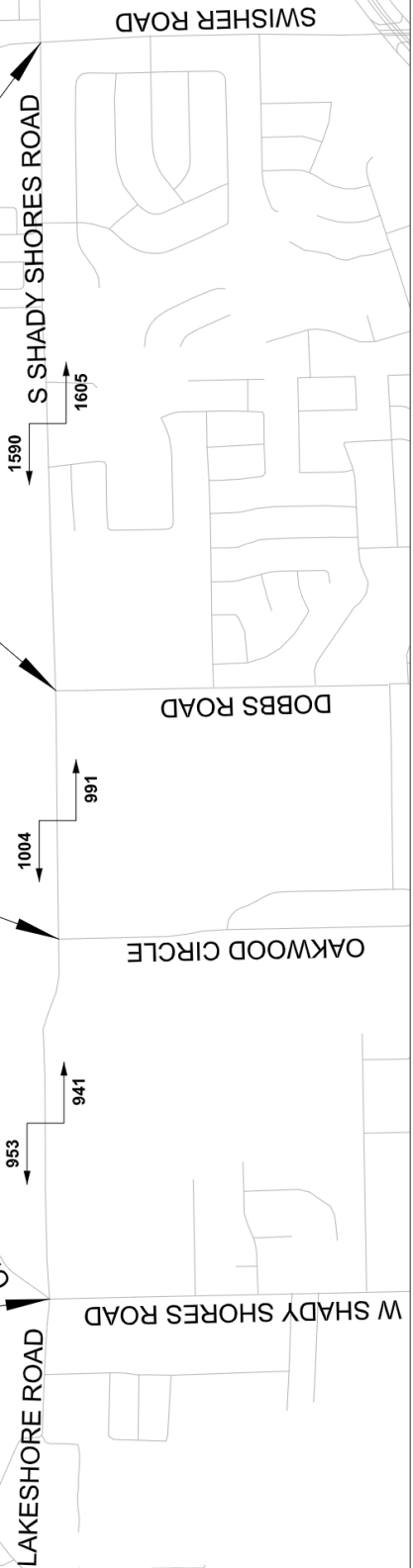
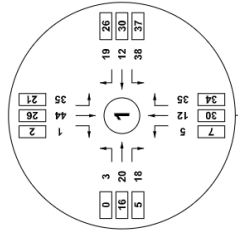
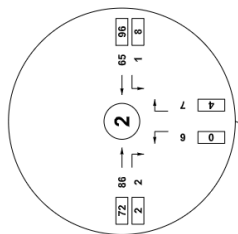
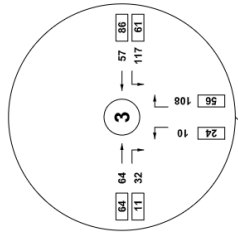
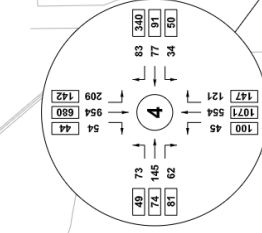


**LEGEND**



LAKE LEWISVILLE TOLL BRIDGE

**LAKE LEWISVILLE**



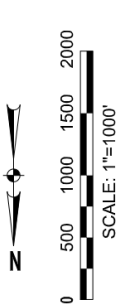
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Issued:	7/12/2021
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Checked By:	SM
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**FIGURE 2**  
Sheet Number

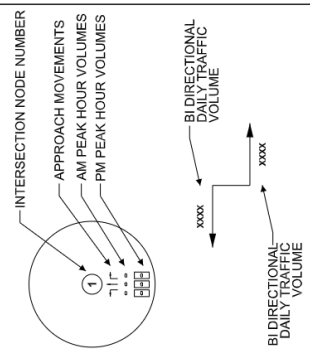
S SHADY SHORES ROAD  
DENTON COUNTY, TEXAS



1021 NORTH BOWERS ROAD  
RICHMOND, TEXAS 75081-2275  
TEL (214) 346-6200  
FAX (214) 728-0855  
TBP# FIRM # F-312

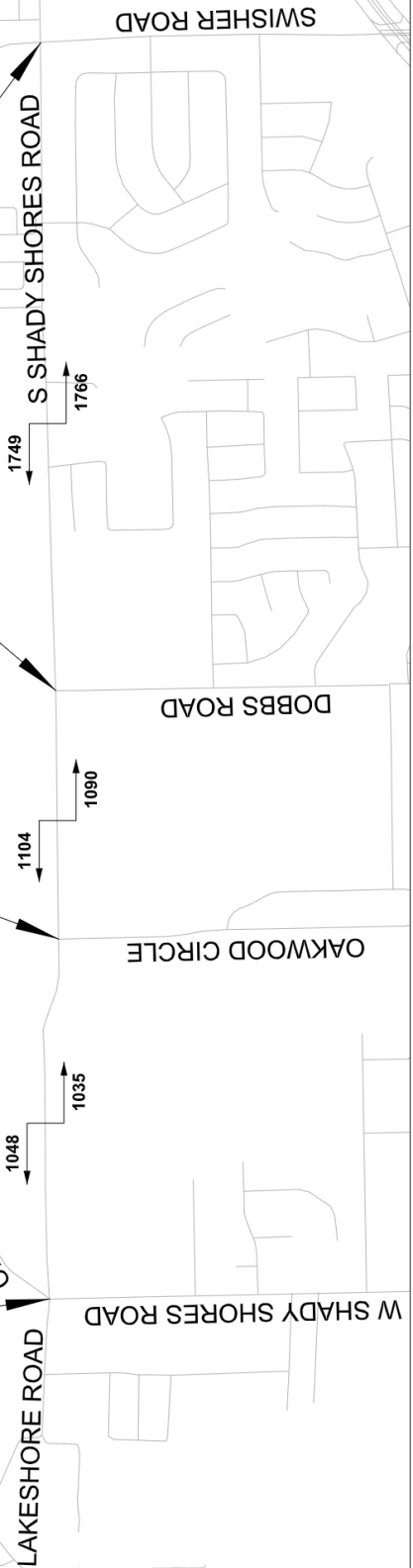
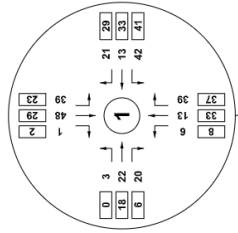
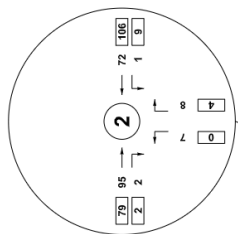
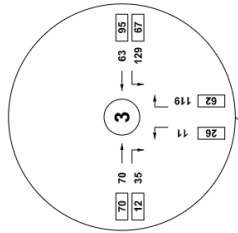
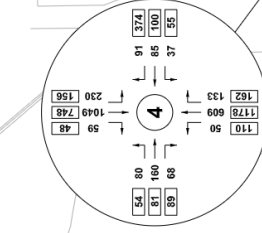


**LEGEND**



LAKE LEWISVILLE TOLL BRIDGE

LAKE LEWISVILLE

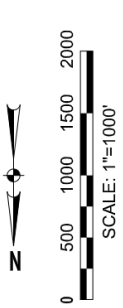


Project No.:	36886
Issued:	7/12/2021
Drawn By:	CM
Checked By:	SM
Scale:	1" = 1000'
Sheet Title	2021 ADJUSTED EXISTING VOLUMES
Sheet Number	FIGURE 3

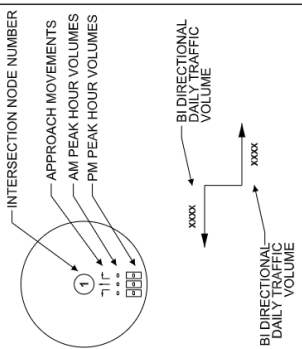
S SHADY SHORES ROAD  
DENTON COUNTY, TEXAS



1021 NORTH BOWERS ROAD  
RICHMOND, TEXAS 75081-2275  
TEL (214) 346-6200  
FAX (214) 728-0855  
TPE FIRM # F-312

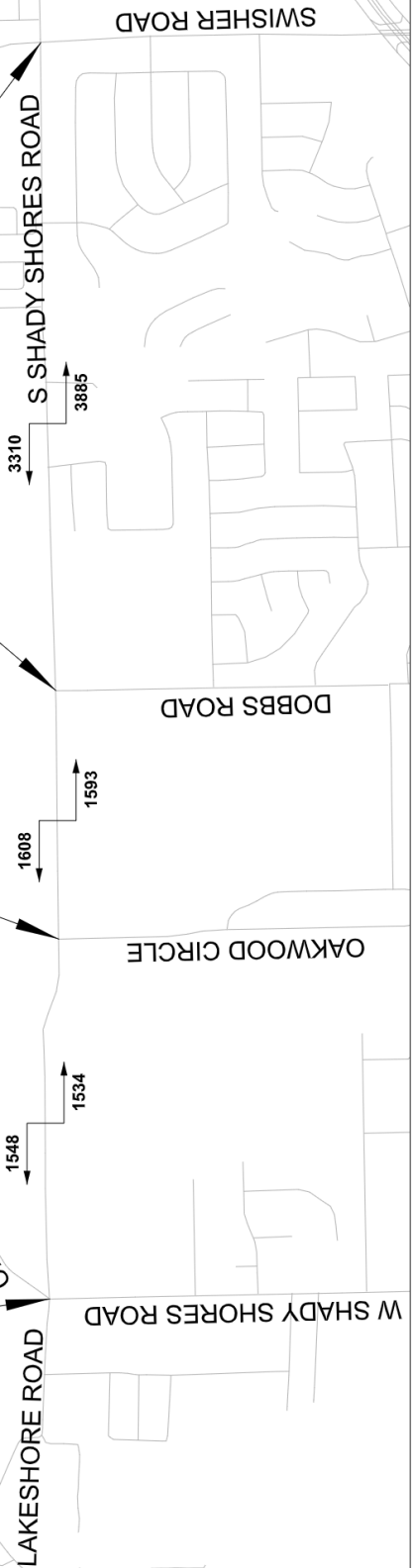
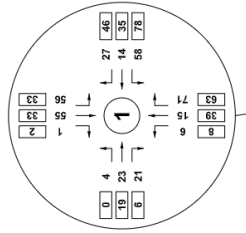
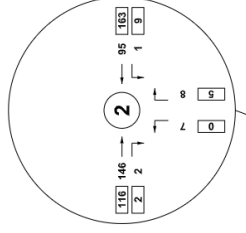
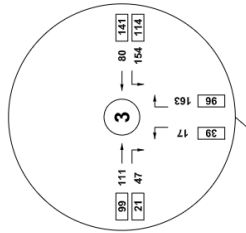
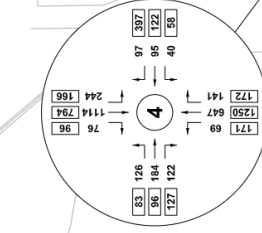


**LEGEND**



LAKE LEWISVILLE TOLL BRIDGE

**LAKE LEWISVILLE**



Project No.:	36886
Issued:	7/12/2021
Drawn By:	CM
Checked By:	SM
Scale:	1" = 1000'
Sheet Title	PROJECTED 2024 PEAK HOUR VOLUMES
Sheet Number	FIGURE 4

S SHADY SHORES ROAD  
DENTON COUNTY, TEXAS



**LEGEND**

XXXX 2024 AADT  
XXXX 2044 AADT  
XXXX 2054 AADT

SWISHER ROAD

CIELO LANE

ESAL  
CUTLINE

ESAL  
CUTLINE

ESAL  
CUTLINE

ESAL  
CUTLINE

20 30 35	930 1385 1685	385 570 695	1395 2070 2530	1415 2100 2565	2575 3825 4665	910 1350 1650 18120 22090	2600 3865 4710
335 495 605	980 1455 1775	1455 2160 2635	1410 2095 2555	1105 1640 2000	515 765 935	2400 3565 4345	1655 2460 3000
720 1070 1305	305 455 550	1410 2095 2555	1105 1640 2000	1105 1640 2000	515 765 935	1105 1260 1870 2280 20085	1105 1640 2000
470 700 850	20 30 35	1105 1640 2000	1105 1640 2000	1105 1640 2000	10565 15685 19120	3625 5385 6570	11245 1645 2445 2980
1180 1735 2140	55 80 100	1105 1640 2000	1105 1640 2000	1105 1640 2000	2575 3825 4665	11245 16705 20365	1645 2445 2980
240 355 435	360 535 650	1105 1640 2000	1105 1640 2000	1105 1640 2000	290 430 525	11245 16705 20365	1645 2445 2980
140 210 255	25 35 45	1105 1640 2000	1105 1640 2000	1105 1640 2000	1310 1945 2475	11245 16705 20365	1645 2445 2980

LAKESHORE ROAD

S SHADY SHORES ROAD

S SHADY SHORES ROAD

W SHADY SHORES ROAD

OAKWOOD CIRCLE

DOBBS ROAD

SWISHER ROAD

ESAL  
CUTLINE

ESAL  
CUTLINE

ESAL  
CUTLINE

ESAL  
CUTLINE

Project No.: 36886  
Issued: 7/12/2021  
Drawn By: CM  
Checked By: SM  
Scale: N.T.S.  
Sheet Title  
PROJECTED ANNUAL AVERAGE  
DAILY TRAFFIC VOLUMES

**FIGURE 5**  
Sheet Number

S SHADY SHORES ROAD  
DENTON COUNTY, TEXAS

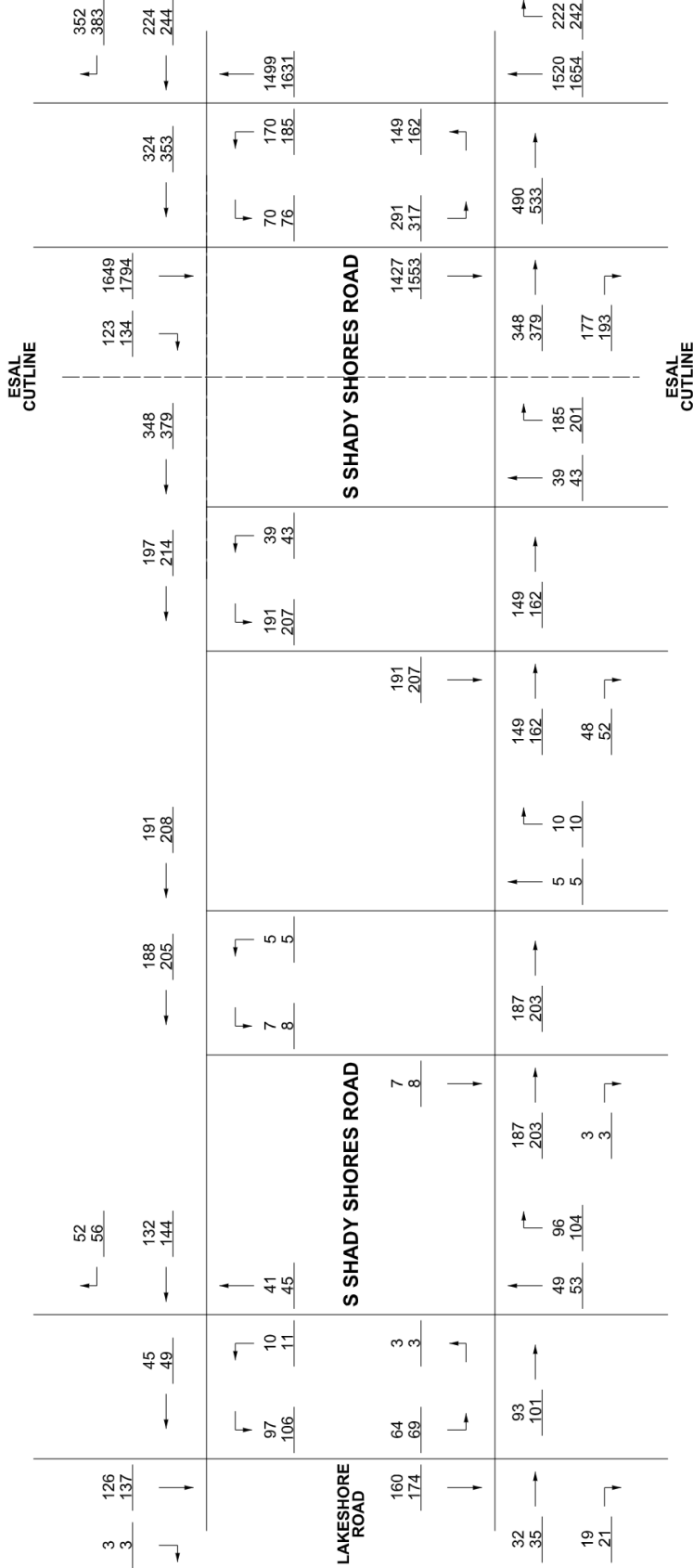


**LEGEND**

XXXX AM PEAK HOUR VOLUME (2044)  
XXXX PM PEAK HOUR VOLUME (2044)

CIELO LANE

SWISHER ROAD



W SHADY SHORES ROAD

OAKWOOD CIRCLE

DOBBS ROAD

SWISHER ROAD

Project No.: 36886  
 Issued: 7/12/2021  
 Drawn By: CM  
 Checked By: SM  
 Scale: N.T.S.  
 Sheet Title  
 PROJECTED YEAR 2044  
 PEAK HOUR VOLUMES

**FIGURE 6**  
 Sheet Number

S SHADY SHORES ROAD  
DENTON COUNTY, TEXAS



**LEGEND**

XXXX AM PEAK HOUR VOLUME (2054)  
XXXX PM PEAK HOUR VOLUME (2054)

CIELO LANE

SWISHER ROAD

ESAL  
CUTLINE

S SHADY SHORES ROAD

S SHADY SHORES ROAD

OAKWOOD CIRCLE

DOBBS ROAD

SWISHER ROAD

ESAL  
CUTLINE

3 3	153 167	63 69	55 60	230 250	233 254	240 261	425 462	150 163	2010 2187	395 430	429 466	
119 129	12 13	50 54	9 10	6 6	233 253	182 198	253 261	233 253	1740 1893	85 93	207 226	1828 1988
195 212	77 84	3 3	9 10	233 253	182 198	182 198	48 52	1740 1893	355 387	598 650	182 198	1853 2016
40 43	114 124	59 64	228 248	228 248	182 198	182 198	48 52	425 462	216 235	216 245	271 295	2016 295
23 25	4 4	6 6	6 6	6 6	59 64	59 64	216 245	216 235	216 235	216 245	271 295	2016 295

LAKESHORE ROAD

S SHADY SHORES ROAD

DOBBS ROAD

S SHADY SHORES ROAD

ESAL  
CUTLINE

Project No.: 36886

Issued: 7/12/2021

Drawn By: CM

Checked By: SM

Scale: N.T.S.

Sheet Title

PROJECTED YEAR 2054  
PEAK HOUR VOLUMES

FIGURE 7

Sheet Number

TRAFFIC ANALYSIS FOR HIGHWAY DESIGN

7/12/2021

Description of Location	Base Year				Dir Dist %	K Factor	Percent Trucks		ATHWILD	Percent Tandem Axles in ATHWILD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 20 Year Period (2024 to 2044)	
	Average Daily Traffic		ADT	DHV			S	N				
	2024	2044									Flexible Pavement	Rigid Pavement
	2024	2044	ADT	DHV			Flexible Pavement	Rigid Pavement				
S. Shady Shores Road (No-Build Condition)  Section 1  From W. Shady Shores Road To Swisher Road  Denton County	7,200	10,700	9.5	18.0	16.2							
Data for Use for Air & Noise Analysis												
Vehicle Class	Base Year											
	% of ADIT	% of DHV										
Light Duty	82.0	83.8										
Medium Duty	14.9	15.3										
Heavy Duty	3.1	0.9										
Description of Location	Base Year				Dir Dist %	K Factor	Percent Trucks		ATHWILD	Percent Tandem Axles in ATHWILD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 20 Year Period (2024 to 2044)	
	Average Daily Traffic		ADT	DHV			S	N				
	2024	2044									Flexible Pavement	Rigid Pavement
	2024	2044	ADT	DHV			Flexible Pavement	Rigid Pavement				

TRAFFIC ANALYSIS FOR HIGHWAY DESIGN

7/12/2021

Description of Location	Base Year					Percent Tandem Axles in ATHWLD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 20 Year Period (2024 to 2044)		
	Average Daily Traffic		Dir Dist %	K Factor	Percent Trucks		ATHWLD	Flexible Pavement	Rigid Pavement
	2024	2044							
							S	N	
S. Shady Shores Road (Build Condition)  Section 1  From W. Shady Shores Road To Swisher Road  Denton County	7,200	10,700	50-50	9.5	18.0	16.2			
Data for Use for Air & Noise Analysis									
Vehicle Class	Base Year								
	% of ADIT	% of DHV							
Light Duty	82.0	83.8							
Medium Duty	14.9	15.3							
Heavy Duty	3.1	0.9							
Description of Location	Base Year					Percent Tandem Axles in ATHWLD	Total Number of Equivalent 18k Single Axle Load Applications One Direction Expected for a 20 Year Period (2024 to 2044)		
	Average Daily Traffic		Dir Dist %	K Factor	Percent Trucks		ATHWLD	Flexible Pavement	Rigid Pavement
	2024	2044							
							S	N	
S. Shady Shores Road (Build Condition)  Section 1  From W. Shady Shores Road To Swisher Road  Denton County	7,200	13,000	50-50	9.5	18.0	16.2			





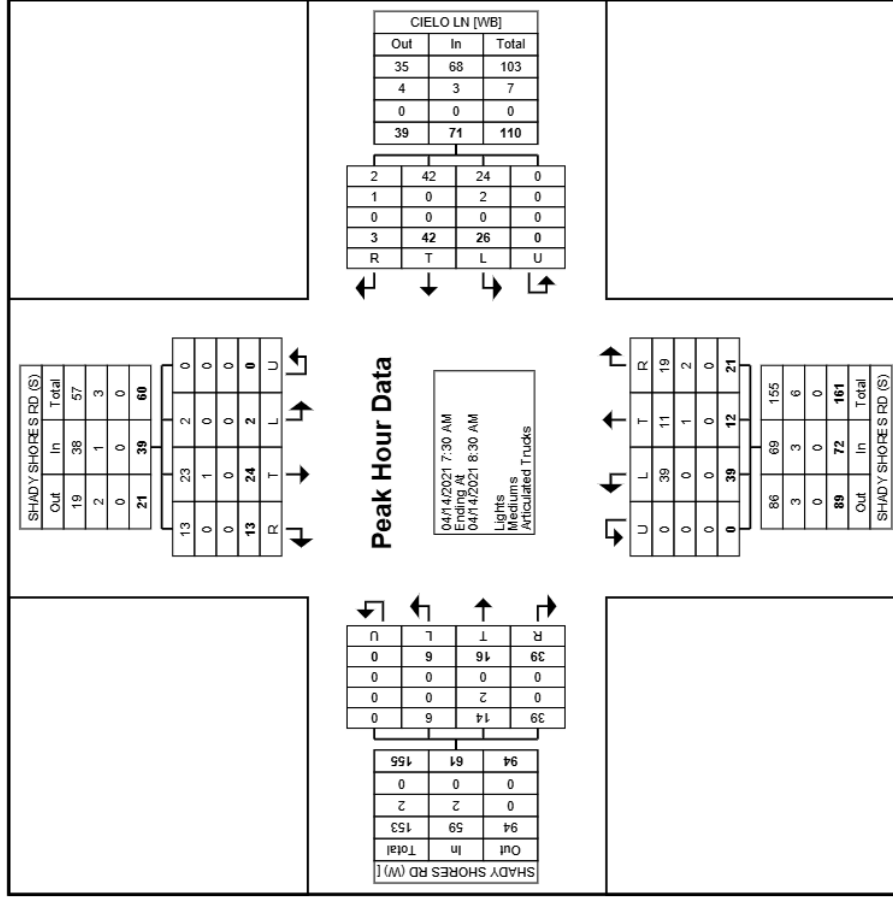
GRAM Traffic NTX Inc.  
1120 W. Lovers Lane

Arlington, Texas, United States 76013  
817.265.8968

Count Name: SHADY SHORES RD (S) @  
SHADY SHORES RD (W)  
Site Code:  
Start Date: 04/14/2021  
Page No.: 3

### Turning Movement Peak Hour Data (7:30 AM)

Start Time	SHADY SHORES RD (S)						CIELO LN						SHADY SHORES RD (S)						SHADY SHORES RD (W)												
	Southbound			Westbound			Northbound			Eastbound			Northbound			Eastbound			Northbound			Eastbound									
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:30 AM	1	9	5	0	15	8	11	0	0	19	13	3	8	0	24	0	4	8	0	12	0	4	8	0	12	0	4	8	0	12	70
7:45 AM	0	3	4	0	7	10	9	1	0	20	11	6	4	0	21	2	0	14	0	16	2	0	14	0	16	2	0	14	0	16	64
8:00 AM	1	5	4	0	10	5	15	0	0	20	7	1	2	0	10	1	7	7	0	15	1	7	7	0	15	1	7	7	0	15	55
8:15 AM	0	7	0	0	7	3	7	2	0	12	8	2	7	0	17	3	5	10	0	18	3	5	10	0	18	3	5	10	0	18	54
Total	2	24	13	0	39	26	42	3	0	71	39	12	21	0	72	6	16	39	0	61	6	16	39	0	61	6	16	39	0	61	243
Approach %	5.1	61.5	33.3	0.0	-	36.6	59.2	4.2	0.0	-	54.2	16.7	29.2	0.0	-	9.8	26.2	63.9	0.0	-	9.8	26.2	63.9	0.0	-	9.8	26.2	63.9	0.0	-	-
Total %	0.8	9.9	5.3	0.0	16.0	10.7	17.3	1.2	0.0	29.2	16.0	4.9	8.6	0.0	29.6	2.5	6.6	16.0	0.0	25.1	2.5	6.6	16.0	0.0	25.1	2.5	6.6	16.0	0.0	25.1	-
PHF	0.500	0.667	0.850	0.000	0.650	0.650	0.700	0.375	0.000	0.888	0.750	0.500	0.656	0.000	0.750	0.500	0.571	0.686	0.000	0.847	0.500	0.571	0.686	0.000	0.847	0.500	0.571	0.686	0.000	0.847	0.868
Lights	2	23	13	0	38	24	42	2	0	68	39	11	19	0	69	6	14	39	0	59	6	14	39	0	59	6	14	39	0	59	234
% Lights	100.0	95.8	100.0	-	97.4	92.3	100.0	66.7	-	95.8	100.0	91.7	90.5	-	95.8	100.0	87.5	100.0	-	96.7	100.0	87.5	100.0	-	96.7	100.0	87.5	100.0	-	96.3	96.3
Mediums	0	1	0	0	1	2	0	1	0	3	0	1	2	0	3	0	2	0	0	2	0	2	0	0	0	2	0	0	0	0	9
% Mediums	0.0	4.2	0.0	-	2.6	7.7	0.0	33.3	-	4.2	0.0	8.3	9.5	-	4.2	0.0	12.5	0.0	-	3.3	0.0	12.5	0.0	-	3.3	0.0	12.5	0.0	-	3.7	3.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0



Turning Movement Peak Hour Data Plot (7:30 AM)

GRAM Traffic NTX Inc.  
1120 W. Lovers Lane

Arlington, Texas, United States 76013  
817.265.8968

Count Name: SHADY SHORES RD (S) @  
SHADY SHORES RD (W)  
Site Code:  
Start Date: 04/14/2021  
Page No.: 5

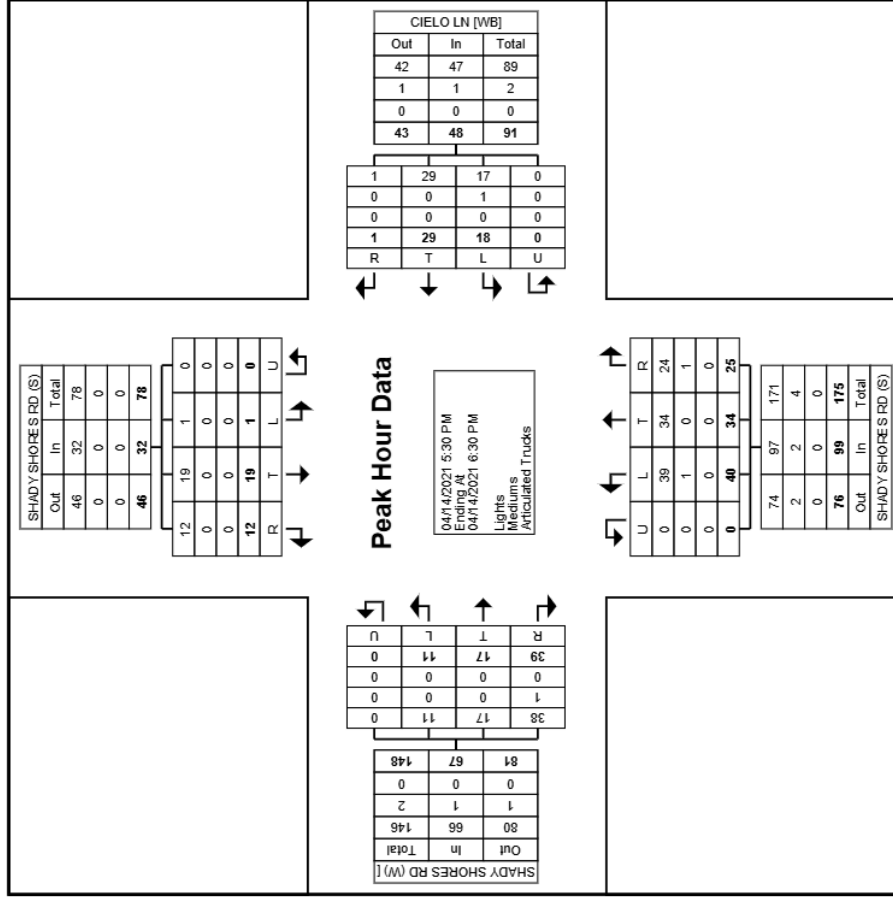
### Turning Movement Peak Hour Data (5:30 PM)

Start Time	SHADY SHORES RD (S) Southbound						CIELO LN Westbound						SHADY SHORES RD (S) Northbound						SHADY SHORES RD (W) Eastbound					
	Thru		Right		U-Turn		Thru		Right		U-Turn		Thru		Right		U-Turn		Thru		Right		U-Turn	
	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total
5:30 PM	0	3	3	7	1	0	11	6	10	7	0	23	2	8	0	12	2	8	0	8	0	0	12	49
5:45 PM	0	9	5	9	0	0	14	12	10	7	0	29	4	8	0	16	4	8	0	8	0	0	16	68
6:00 PM	0	6	3	8	0	0	11	14	10	3	0	27	2	12	0	21	2	12	0	12	0	0	21	65
6:15 PM	1	14	7	5	0	0	12	8	4	8	0	20	3	11	0	18	3	11	0	11	0	0	18	64
Total	1	32	18	29	1	0	48	40	34	25	0	99	11	39	0	67	11	39	0	39	0	0	67	246
Approach %	3.1	59.4	37.5	60.4	2.1	0.0	-	40.4	34.3	25.3	0.0	-	16.4	25.4	58.2	0.0	-	16.4	25.4	58.2	0.0	-	-	-
Total %	0.4	7.7	4.9	11.8	0.4	0.0	19.5	16.3	13.8	10.2	0.0	40.2	4.5	6.9	15.9	0.0	27.2	4.5	6.9	15.9	0.0	27.2	-	-
PHF	0.250	0.679	0.429	0.806	0.250	0.000	0.857	0.714	0.850	0.781	0.000	0.853	0.688	0.607	0.813	0.000	0.798	0.688	0.607	0.813	0.000	0.798	0.904	0.904
Lights	1	32	17	29	1	0	47	39	34	24	0	97	11	38	0	66	11	38	0	38	0	0	66	242
% Lights	100.0	100.0	100.0	100.0	100.0	-	97.9	97.5	100.0	96.0	-	98.0	100.0	100.0	97.4	-	98.5	100.0	100.0	97.4	-	-	98.5	98.4
Mediums	0	0	0	0	0	0	1	1	0	1	0	2	0	1	0	1	0	0	0	1	0	0	1	4
% Mediums	0.0	0.0	0.0	0.0	0.0	-	2.1	2.5	0.0	4.0	-	2.0	0.0	0.0	2.6	-	1.5	0.0	0.0	2.6	-	-	1.5	1.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0

GRAM Traffic NTX Inc.  
1120 W. Lovers Lane

Arlington, Texas, United States 76013  
817.265.8968

Count Name: SHADY SHORES RD (S) @  
SHADY SHORES RD (W)  
Site Code:  
Start Date: 04/14/2021  
Page No.: 6



Turning Movement Peak Hour Data Plot (5:30 PM)

GRAM Traffic NTX Inc.  
1120 W. Lovers Lane

Arlington, Texas, United States 76013  
817.265.8968

Count Name: SHADY SHORES RD (S) @  
OAKWOOD CIR  
Site Code:  
Start Date: 04/14/2021  
Page No.: 1

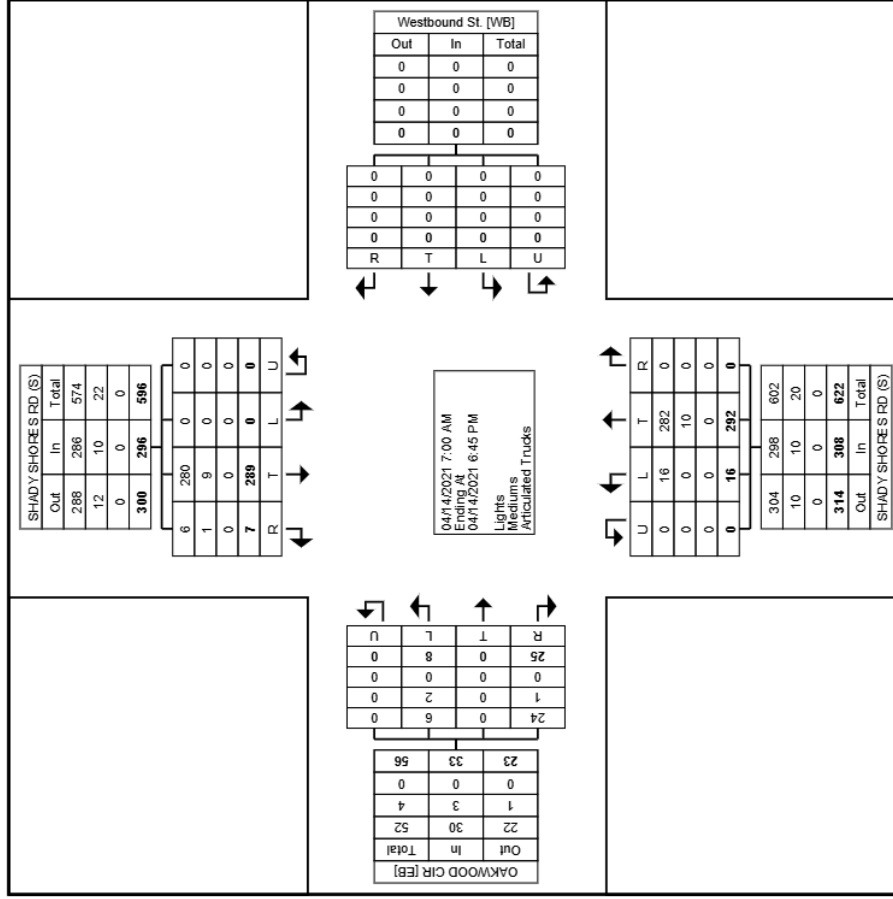
### Turning Movement Data

Start Time	SHADY SHORES RD (S) Southbound						SHADY SHORES RD (S) Northbound						OAKWOOD CIR Eastbound								
	Thru		Right		U-Turn		Thru		Right		U-Turn		Thru		Right		U-Turn				
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:00 AM	0	14	0	0	14	0	0	0	0	0	0	5	0	0	5	0	0	2	0	2	21
7:15 AM	0	20	0	0	20	0	0	0	0	0	1	14	0	0	15	0	0	1	0	1	36
7:30 AM	0	22	0	0	22	0	0	0	0	0	0	22	0	0	22	3	0	3	0	6	50
7:45 AM	0	28	1	0	29	0	0	0	0	0	0	19	0	0	19	3	0	2	0	5	53
Hourly Total	0	84	1	0	85	0	0	0	0	0	1	60	0	0	61	6	0	8	0	14	160
8:00 AM	0	16	1	0	17	0	0	0	0	0	0	10	0	0	10	0	0	1	0	1	28
8:15 AM	0	19	0	0	19	0	0	0	0	0	1	18	0	0	19	0	0	2	0	2	40
8:30 AM	0	16	0	0	16	0	0	0	0	0	1	7	0	0	8	0	0	1	0	1	25
8:45 AM	0	15	0	0	15	0	0	0	0	0	2	12	0	0	14	0	0	1	0	1	30
Hourly Total	0	66	1	0	67	0	0	0	0	0	4	47	0	0	51	0	0	5	0	5	123
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	14	0	0	14	0	0	0	0	0	0	23	0	0	23	0	0	0	0	0	37
4:45 PM	0	13	1	0	14	0	0	0	0	0	1	21	0	0	22	0	0	1	0	1	37
Hourly Total	0	27	1	0	28	0	0	0	0	0	1	44	0	0	45	0	0	1	0	1	74
5:00 PM	0	18	0	0	18	0	0	0	0	0	1	22	0	0	23	0	0	1	0	1	42
5:15 PM	0	21	2	0	23	0	0	0	0	0	1	22	0	0	23	0	0	0	0	0	46
5:30 PM	0	15	0	0	15	0	0	0	0	0	2	27	0	0	29	0	0	2	0	2	46
5:45 PM	0	18	0	0	18	0	0	0	0	0	4	25	0	0	29	0	0	1	0	1	48
Hourly Total	0	72	2	0	74	0	0	0	0	0	8	96	0	0	104	0	0	4	0	4	182
6:00 PM	0	18	1	0	19	0	0	0	0	0	0	27	0	0	27	0	0	4	0	4	50
6:15 PM	0	22	1	0	23	0	0	0	0	0	2	18	0	0	20	2	0	3	0	5	48
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	289	7	0	296	0	0	0	0	0	16	292	0	0	308	8	0	25	0	33	637
Approach %	0.0	97.6	2.4	0.0	-	0.0	0.0	0.0	0.0	0.0	5.2	94.8	0.0	0.0	-	24.2	0.0	75.8	0.0	-	-
Total %	0.0	45.4	1.1	0.0	46.5	0.0	0.0	0.0	0.0	0.0	2.5	45.8	0.0	0.0	48.4	1.3	0.0	3.9	0.0	5.2	-
Lights	0	280	6	0	286	0	0	0	0	0	16	282	0	0	298	6	0	24	0	30	614
% Lights	-	96.9	85.7	-	96.6	-	-	-	-	-	100.0	96.6	-	-	96.8	75.0	-	96.0	-	90.9	96.4
Mediums	0	9	1	0	10	0	0	0	0	0	0	10	0	0	10	2	0	1	0	3	23
% Mediums	-	3.1	14.3	-	3.4	-	-	-	-	-	0.0	3.4	-	-	3.2	25.0	-	4.0	-	9.1	3.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	-	0.0	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0

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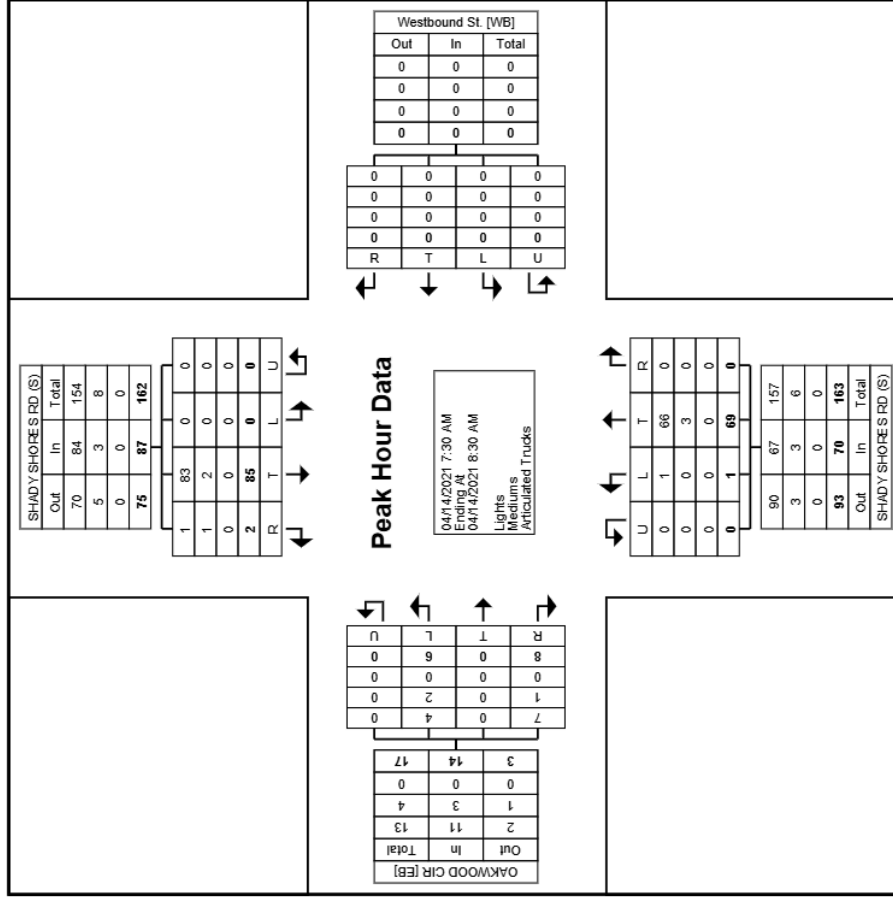
Count Name: SHADY SHORES RD (S) @  
OAKWOOD CIR  
Site Code:  
Start Date: 04/14/2021  
Page No.: 2



Turning Movement Data Plot

### Turning Movement Peak Hour Data (7:30 AM)

Start Time	SHADY SHORES RD (S) Southbound					SHADY SHORES RD (S) Westbound St.					SHADY SHORES RD (S) Northbound					OAKWOOD CIR Eastbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:30 AM	0	22	0	0	22	0	0	0	0	0	0	22	0	0	22	3	0	3	0	6	50
7:45 AM	0	28	1	0	29	0	0	0	0	0	0	19	0	0	19	3	0	2	0	5	53
8:00 AM	0	16	1	0	17	0	0	0	0	0	0	10	0	0	10	0	0	1	0	1	28
8:15 AM	0	19	0	0	19	0	0	0	0	0	1	18	0	0	19	0	0	2	0	2	40
Total	0	85	2	0	87	0	0	0	0	0	1	69	0	0	70	6	0	8	0	14	171
Approach %	0.0	97.7	2.3	0.0	-	0.0	0.0	0.0	0.0	-	1.4	98.6	0.0	0.0	-	42.9	0.0	57.1	0.0	-	-
Total %	0.0	49.7	1.2	0.0	50.9	0.0	0.0	0.0	0.0	0.0	0.6	40.4	0.0	0.0	40.9	3.5	0.0	4.7	0.0	8.2	-
PHF	0.000	0.759	0.500	0.000	0.750	0.000	0.000	0.000	0.000	0.000	0.250	0.784	0.000	0.000	0.795	0.500	0.000	0.667	0.000	0.583	0.807
Lights	0	83	1	0	84	0	0	0	0	0	1	66	0	0	67	4	0	7	0	11	162
% Lights	-	97.6	50.0	-	96.6	-	-	-	-	-	100.0	95.7	-	-	95.7	66.7	-	87.5	-	78.6	94.7
Mediums	0	2	1	0	3	0	0	0	0	0	0	3	0	0	3	2	0	1	0	3	9
% Mediums	-	2.4	50.0	-	3.4	-	-	-	-	-	0.0	4.3	-	-	4.3	33.3	-	12.5	-	21.4	5.3
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	-	0.0	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0



Turning Movement Peak Hour Data Plot (7:30 AM)

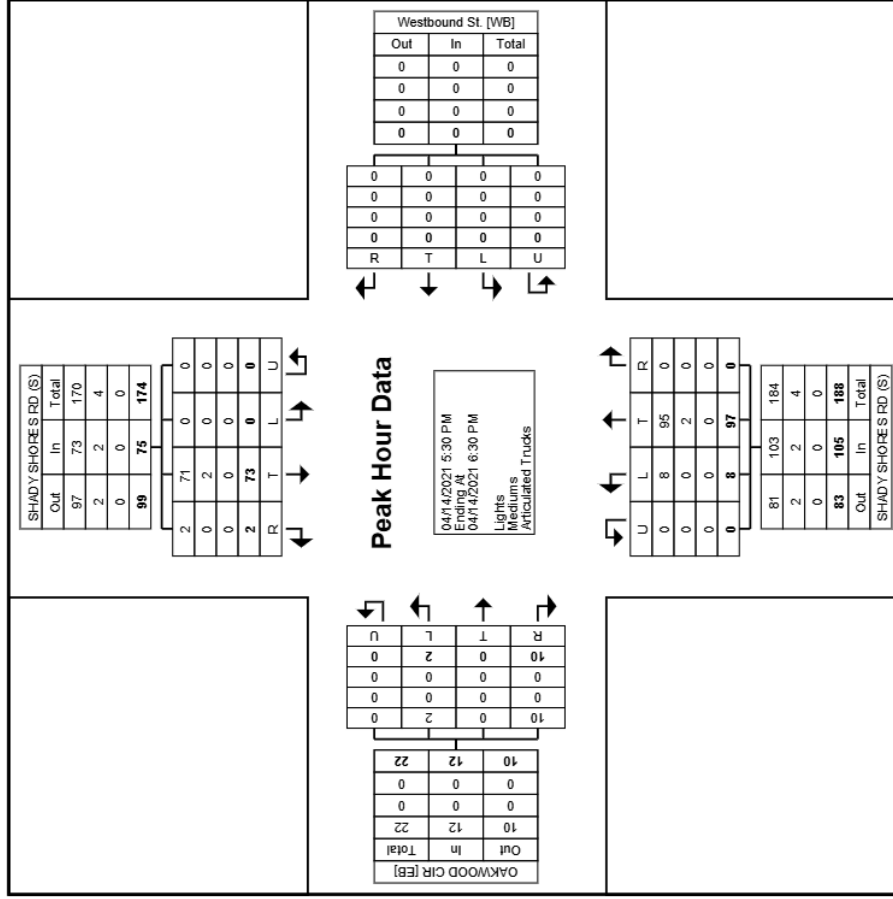
### Turning Movement Peak Hour Data (5:30 PM)

Start Time	SHADY SHORES RD (S) Southbound						SHADY SHORES RD (S) Northbound						OAKWOOD CIR Eastbound						
	Left		Right		U-Turn		Left		Right		U-Turn		Left		Right		U-Turn		
	Thru	App. Total	Thru	App. Total	Thru	App. Total	Thru	App. Total	Thru	App. Total	Thru	App. Total	Thru	App. Total	Thru	App. Total	Thru	App. Total	
5:30 PM	0	15	0	0	0	0	2	27	0	0	0	29	0	0	2	2	0	0	2
5:45 PM	0	18	0	0	0	0	4	25	0	0	0	29	0	0	0	1	0	0	1
6:00 PM	0	18	1	0	0	0	0	27	0	0	0	27	0	0	0	4	0	0	4
6:15 PM	0	22	1	0	0	0	2	18	0	0	0	20	2	0	3	0	0	0	5
Total	0	73	2	0	0	0	8	97	0	0	0	105	2	0	10	0	0	0	12
Approach %	0.0	97.3	2.7	0.0	0.0	0.0	7.6	92.4	0.0	0.0	0.0	-	16.7	0.0	83.3	0.0	0.0	0.0	-
Total %	0.0	36.0	1.0	0.0	0.0	0.0	4.2	50.5	0.0	0.0	0.0	54.7	1.0	0.0	5.2	0.0	0.0	0.0	6.3
PHF	0.000	0.830	0.500	0.000	0.000	0.000	0.500	0.898	0.000	0.000	0.000	0.905	0.250	0.000	0.625	0.000	0.000	0.000	0.600
Lights	0	71	2	0	0	0	8	95	0	0	0	103	2	0	10	0	0	0	12
% Lights	-	97.3	100.0	-	-	-	100.0	97.9	-	-	-	98.1	100.0	-	100.0	-	-	-	100.0
Mediums	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0
% Mediums	-	2.7	0.0	-	-	-	0.0	2.1	-	-	-	1.9	0.0	-	0.0	-	-	-	0.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	-	0.0	0.0	-	-	-	0.0	0.0	-	-	-	0.0	0.0	-	0.0	-	-	-	0.0

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Count Name: SHADY SHORES RD (S) @  
OAKWOOD CIR  
Site Code:  
Start Date: 04/14/2021  
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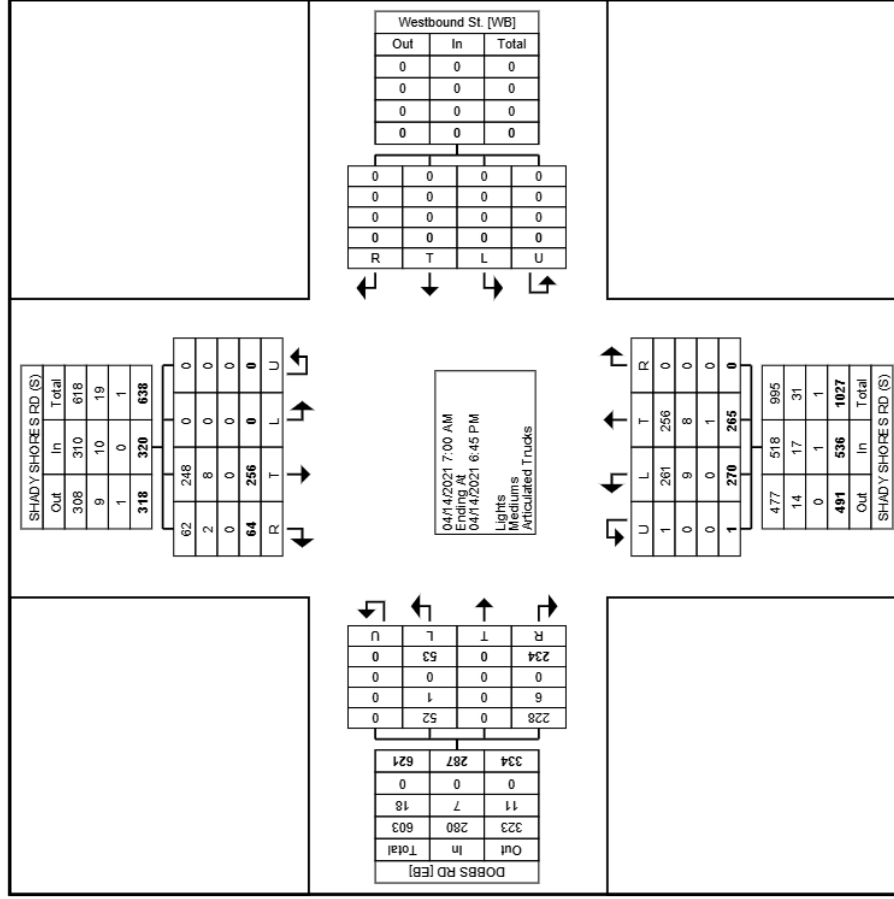
Turning Movement Peak Hour Data Plot (5:30 PM)

### Turning Movement Data

Start Time	SHADY SHORES RD (S) Southbound						SHADY SHORES RD (S) Northbound						DOBBS RD Eastbound																		
	Thru		Right		U-Turn		Left		Thru		Right		U-Turn		App.Total		Left		Thru		Right		U-Turn		App.Total		Int.Total				
	Left	Thru	Right	U-Turn	App.Total	Left	Thru	Right	U-Turn	App.Total	Left	Thru	Right	U-Turn	App.Total	Left	Thru	Right	U-Turn	App.Total	Left	Thru	Right	U-Turn	App.Total	Left	Thru	Right	U-Turn	App.Total	Int.Total
7:00 AM	0	11	5	0	16	0	0	0	0	12	5	0	0	17	0	0	3	0	0	3	0	0	3	0	0	17	0	0	3	36	
7:15 AM	0	16	7	0	23	0	0	0	0	40	14	0	0	54	1	0	19	0	0	20	0	0	0	0	54	1	0	19	0	97	
7:30 AM	0	9	14	0	23	0	0	0	0	44	20	0	0	64	3	0	37	0	0	40	3	0	0	0	64	3	0	37	0	127	
7:45 AM	0	24	4	0	28	0	0	0	0	18	15	0	0	33	4	0	36	0	0	40	4	0	0	0	33	4	0	36	0	101	
Hourly Total	0	60	30	0	90	0	0	0	0	114	54	0	0	168	8	0	95	0	0	103	8	0	0	0	168	8	0	95	0	361	
8:00 AM	0	15	7	0	22	0	0	0	0	15	8	0	0	23	2	0	16	0	0	18	2	0	0	0	23	2	0	16	0	63	
8:15 AM	0	18	6	0	24	0	0	0	0	15	18	0	0	33	2	0	8	0	0	10	2	0	0	0	33	2	0	8	0	67	
8:30 AM	0	15	1	0	16	0	0	0	0	5	7	0	0	12	1	0	6	0	0	7	1	0	0	0	12	1	0	6	0	35	
8:45 AM	0	16	2	0	18	0	0	0	0	7	14	0	0	21	1	0	5	0	0	6	1	0	0	0	21	1	0	5	0	45	
Hourly Total	0	64	16	0	80	0	0	0	0	42	47	0	0	89	6	0	35	0	0	41	6	0	0	0	89	6	0	35	0	210	
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:30 PM	0	11	3	0	14	0	0	0	0	11	19	0	0	30	4	0	13	0	0	17	0	0	0	0	30	4	0	13	0	61	
4:45 PM	0	15	0	0	15	0	0	0	0	16	20	0	0	36	2	0	11	0	0	13	2	0	0	0	36	2	0	11	0	64	
Hourly Total	0	26	3	0	29	0	0	0	0	27	39	0	0	66	6	0	24	0	0	30	6	0	0	0	66	6	0	24	0	125	
5:00 PM	0	17	2	0	19	0	0	0	0	19	21	0	0	40	3	0	13	0	0	16	3	0	0	0	40	3	0	13	0	75	
5:15 PM	0	18	1	0	19	0	0	0	0	14	22	0	0	36	4	0	14	0	0	18	4	0	0	0	36	4	0	14	0	73	
5:30 PM	0	12	5	0	17	0	0	0	0	12	20	0	0	32	10	0	17	0	0	27	10	0	0	0	32	10	0	17	0	76	
5:45 PM	0	17	3	0	20	0	0	0	0	16	23	0	0	39	7	0	12	0	0	19	7	0	0	0	39	7	0	12	0	78	
Hourly Total	0	64	11	0	75	0	0	0	0	61	86	0	0	147	24	0	56	0	0	80	24	0	0	0	147	24	0	56	0	302	
6:00 PM	0	20	1	0	21	0	0	0	0	9	21	0	0	30	6	0	15	0	0	21	6	0	0	0	30	6	0	15	0	72	
6:15 PM	0	22	3	0	25	0	0	0	0	17	18	0	1	36	3	0	9	0	0	12	3	0	0	0	36	3	0	9	0	73	
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	256	64	0	320	0	0	0	0	270	265	0	1	536	53	0	234	0	0	287	53	0	0	0	536	53	0	234	0	1143	
Approach %	0.0	80.0	20.0	0.0	-	0.0	0.0	0.0	0.0	50.4	49.4	0.0	0.2	-	18.5	0.0	81.5	0.0	0.0	-	18.5	0.0	0.0	0.0	-	-	-	-	-	-	
Total %	0.0	22.4	5.6	0.0	28.0	0.0	0.0	0.0	0.0	23.6	23.2	0.0	0.1	46.9	4.6	0.0	20.5	0.0	0.0	25.1	4.6	0.0	0.0	0.0	46.9	4.6	0.0	20.5	0.0	-	
Lights	0	248	62	0	310	0	0	0	0	261	256	0	1	518	52	0	228	0	0	280	52	0	0	0	518	52	0	228	0	1108	
% Lights	-	96.9	96.9	-	96.9	-	-	-	-	96.7	96.6	-	100.0	96.6	98.1	-	97.4	-	-	97.6	98.1	-	-	-	-	96.6	98.1	-	97.4	-	96.9
Mediums	0	8	2	0	10	0	0	0	0	9	8	0	0	17	1	0	6	0	0	7	1	0	0	0	17	1	0	6	0	34	
% Mediums	-	3.1	3.1	-	3.1	-	-	-	-	3.3	3.0	-	0.0	3.2	1.9	-	2.6	-	-	2.4	1.9	-	-	-	-	3.2	1.9	-	2.6	-	3.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	
% Articulated Trucks	-	0.0	0.0	-	0.0	-	-	-	-	0.0	0.4	-	0.0	0.2	0.0	-	0.0	-	-	0.0	0.0	-	-	-	-	0.2	0.0	-	0.0	-	0.1

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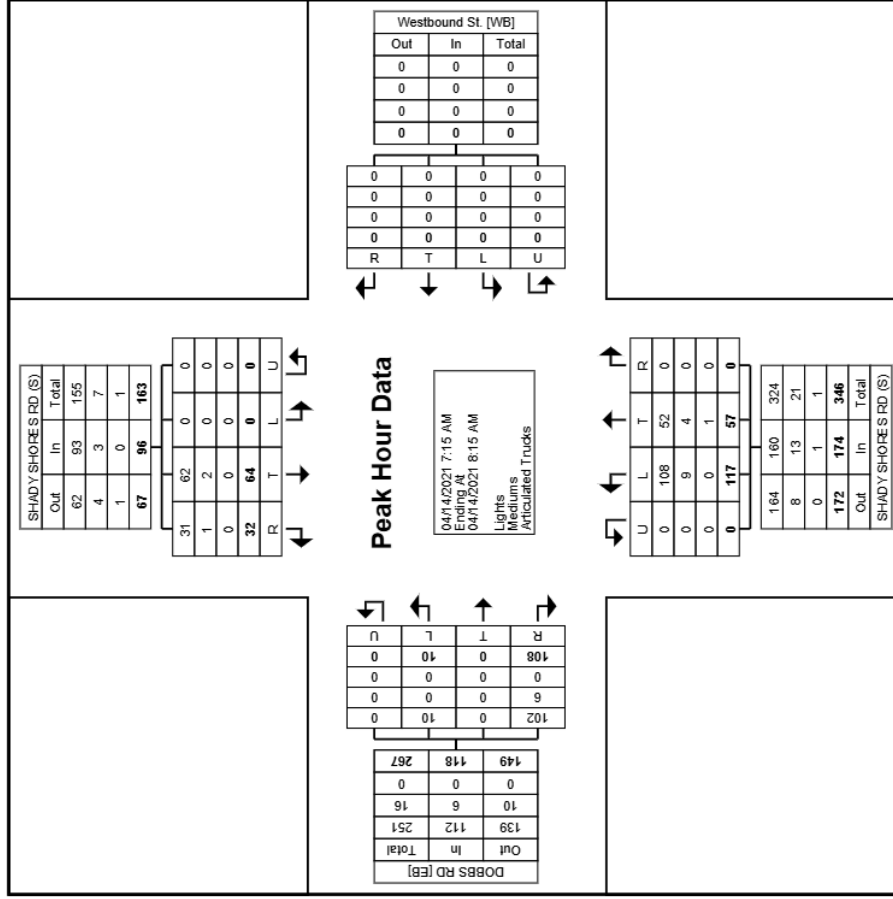
Count Name: SHADY SHORES RD (S) @  
 DOBBS RD  
 Site Code:  
 Start Date: 04/14/2021  
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Turning Movement Data Plot

### Turning Movement Peak Hour Data (7:15 AM)

Start Time	SHADY SHORES RD (S) Southbound						SHADY SHORES RD (S) Northbound						DOBBS RD Eastbound					
	Thru		Right		U-Turn		Thru		Right		U-Turn		Thru		Right		U-Turn	
	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total	Left	App. Total
7:15 AM	0	23	0	0	0	0	40	14	0	0	0	54	1	0	19	0	20	97
7:30 AM	0	23	0	0	0	0	44	20	0	0	0	64	3	0	37	0	40	127
7:45 AM	0	28	0	0	0	0	18	15	0	0	0	33	4	0	36	0	40	101
8:00 AM	0	22	0	0	0	0	15	8	0	0	0	23	2	0	16	0	18	63
Total	0	96	0	0	0	0	117	57	0	0	0	174	10	0	108	0	118	388
Approach %	0.0	-	0.0	0.0	0.0	0.0	67.2	32.8	0.0	0.0	0.0	-	8.5	0.0	91.5	0.0	-	-
Total %	0.0	24.7	0.0	0.0	0.0	0.0	30.2	14.7	0.0	0.0	0.0	44.8	2.6	0.0	27.8	0.0	30.4	-
PHF	0.000	0.857	0.000	0.000	0.000	0.000	0.865	0.713	0.000	0.000	0.000	0.880	0.625	0.000	0.730	0.000	0.738	0.764
Lights	0	93	0	0	0	0	108	52	0	0	0	160	10	0	102	0	112	365
% Lights	-	96.9	-	-	-	-	92.3	91.2	-	-	-	92.0	100.0	-	94.4	-	94.9	94.1
Mediums	0	3	0	0	0	0	9	4	0	0	0	13	0	0	6	0	6	22
% Mediums	-	3.1	-	-	-	-	7.7	7.0	-	-	-	7.5	0.0	-	5.6	-	5.1	5.7
Articulated Trucks	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
% Articulated Trucks	-	0.0	-	-	-	-	0.0	1.8	-	-	-	0.6	0.0	-	0.0	-	0.0	0.3



Turning Movement Peak Hour Data Plot (7:15 AM)

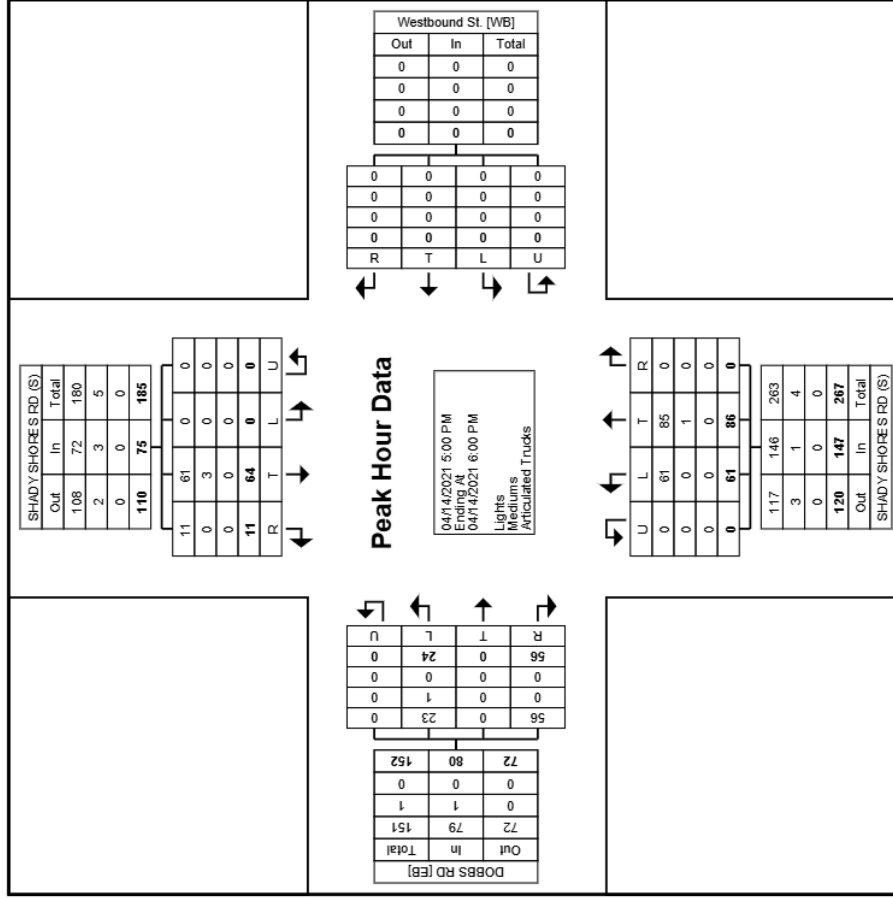
### Turning Movement Peak Hour Data (5:00 PM)

Start Time	SHADY SHORES RD (S) Southbound					SHADY SHORES RD (S) Northbound					DOBBS RD Eastbound										
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total					
5:00 PM	0	17	2	0	19	0	0	0	0	0	19	21	0	0	40	3	0	13	0	16	75
5:15 PM	0	18	1	0	19	0	0	0	0	0	14	22	0	0	36	4	0	14	0	18	73
5:30 PM	0	12	5	0	17	0	0	0	0	0	12	20	0	0	32	10	0	17	0	27	76
5:45 PM	0	17	3	0	20	0	0	0	0	0	16	23	0	0	39	7	0	12	0	19	78
Total	0	64	11	0	75	0	0	0	0	0	61	86	0	0	147	24	0	56	0	80	302
Approach %	0.0	85.3	14.7	0.0	-	0.0	0.0	0.0	0.0	-	41.5	58.5	0.0	0.0	-	30.0	0.0	70.0	0.0	-	-
Total %	0.0	21.2	3.6	0.0	24.8	0.0	0.0	0.0	0.0	0.0	20.2	28.5	0.0	0.0	48.7	7.9	0.0	18.5	0.0	26.5	-
PHF	0.000	0.889	0.550	0.000	0.938	0.000	0.000	0.000	0.000	0.000	0.803	0.935	0.000	0.000	0.919	0.600	0.000	0.824	0.000	0.741	0.968
Lights	0	61	11	0	72	0	0	0	0	0	61	85	0	0	146	23	0	56	0	79	297
% Lights	-	95.3	100.0	-	96.0	-	-	-	-	-	100.0	98.8	-	-	99.3	95.8	-	100.0	-	98.8	98.3
Mediums	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	5
% Mediums	-	4.7	0.0	-	4.0	-	-	-	-	-	0.0	1.2	-	-	0.7	4.2	-	0.0	-	1.3	1.7
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Articulated Trucks	-	0.0	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0

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Count Name: SHADY SHORES RD (S) @  
DOBBS RD  
Site Code:  
Start Date: 04/14/2021  
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Turning Movement Peak Hour Data Plot (5:00 PM)

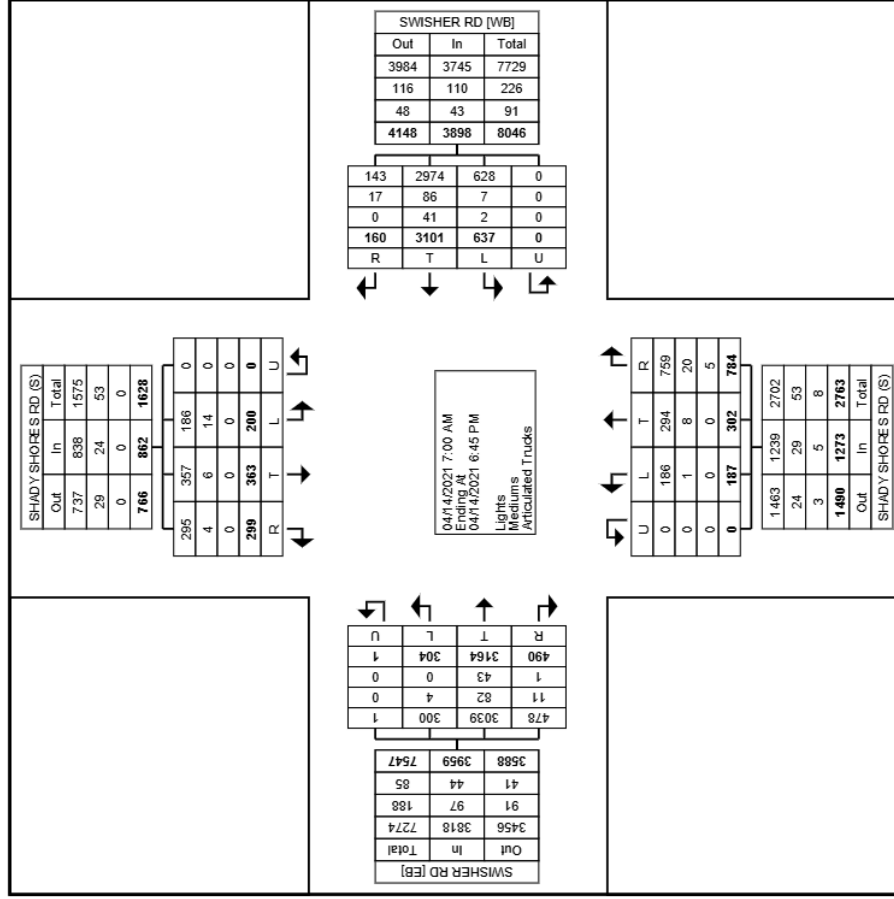
### Turning Movement Data

Start Time	SHADY SHORES RD (S) Southbound						SHADY SHORES RD (S) Northbound						SWISHER RD Eastbound								
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:00 AM	9	21	13	0	43	51	207	12	0	270	6	16	15	0	37	11	115	12	0	138	488
7:15 AM	18	23	14	0	55	53	264	15	0	332	7	19	17	0	43	8	123	15	0	146	576
7:30 AM	17	40	17	0	74	48	261	20	0	329	7	18	23	0	48	13	156	32	0	201	652
7:45 AM	18	48	13	0	79	58	220	13	0	291	6	19	20	0	45	16	149	35	0	200	615
Hourly Total	62	132	57	0	251	210	952	60	0	1222	26	72	75	0	173	48	543	94	0	685	2331
8:00 AM	20	34	18	0	72	50	209	6	0	265	14	21	23	0	58	8	126	39	0	173	568
8:15 AM	13	19	13	0	45	58	223	8	0	289	8	22	18	0	48	12	143	29	0	184	566
8:30 AM	11	10	28	0	49	51	174	3	0	228	4	5	17	0	26	12	146	23	0	181	484
8:45 AM	8	13	17	0	38	31	211	7	0	249	11	7	25	0	43	18	121	20	0	159	489
Hourly Total	52	76	76	0	204	190	817	24	0	1031	37	55	83	0	175	50	536	111	0	697	2107
***BREAK***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:30 PM	8	25	20	0	53	20	162	2	0	184	18	26	78	0	122	28	269	33	0	330	689
4:45 PM	7	12	23	0	42	24	165	12	0	201	18	17	83	0	118	28	266	36	0	330	691
Hourly Total	15	37	43	0	95	44	327	14	0	385	36	43	161	0	240	56	535	69	0	660	1380
5:00 PM	16	14	23	0	53	34	144	9	0	187	13	35	88	0	136	37	244	35	0	316	692
5:15 PM	10	21	23	0	54	35	209	17	0	261	17	22	101	0	140	17	285	31	0	333	788
5:30 PM	12	17	19	0	48	38	174	11	0	223	13	18	95	0	126	23	257	32	0	312	709
5:45 PM	11	22	16	0	49	35	153	7	0	195	7	16	56	0	79	23	285	49	0	357	680
Hourly Total	49	74	81	0	204	142	680	44	0	866	50	91	340	0	481	100	1071	147	0	1318	2869
6:00 PM	12	15	18	0	45	28	156	10	0	194	18	20	65	0	103	20	243	38	1	302	644
6:15 PM	10	29	24	0	63	23	169	8	0	200	20	21	60	0	101	30	236	31	0	297	661
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	200	363	299	0	862	637	3101	160	0	3898	187	302	784	0	1273	304	3164	490	1	3959	9992
Approach %	23.2	42.1	34.7	0.0	-	16.3	79.6	4.1	0.0	-	14.7	23.7	61.6	0.0	-	7.7	79.9	12.4	0.0	-	-
Total %	2.0	3.6	3.0	0.0	8.6	6.4	31.0	1.6	0.0	39.0	1.9	3.0	7.8	0.0	12.7	3.0	31.7	4.9	0.0	39.6	-
Lights	186	357	295	0	838	628	2974	143	0	3745	186	294	759	0	1239	300	3039	478	1	3818	9640
% Lights	93.0	98.3	98.7	-	97.2	98.6	95.9	89.4	-	96.1	99.5	97.4	96.8	-	97.3	98.7	96.0	97.6	100.0	96.4	96.5
Mediums	14	6	4	0	24	7	86	17	0	110	1	8	20	0	29	4	82	11	0	97	260
% Mediums	7.0	1.7	1.3	-	2.8	1.1	2.8	10.6	-	2.8	0.5	2.6	2.6	-	2.3	1.3	2.6	2.2	0.0	2.5	2.6
Articulated Trucks	0	0	0	0	0	2	41	0	0	43	0	0	5	0	5	0	43	1	0	44	92
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.3	1.3	0.0	-	1.1	0.0	0.0	0.6	-	0.4	0.0	1.4	0.2	0.0	1.1	0.9

GRAM Traffic NTX Inc.  
1120 W. Lovers Lane

Arlington, Texas, United States 76013  
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Count Name: SHADY SHORES RD (S) @  
SWISHER RD  
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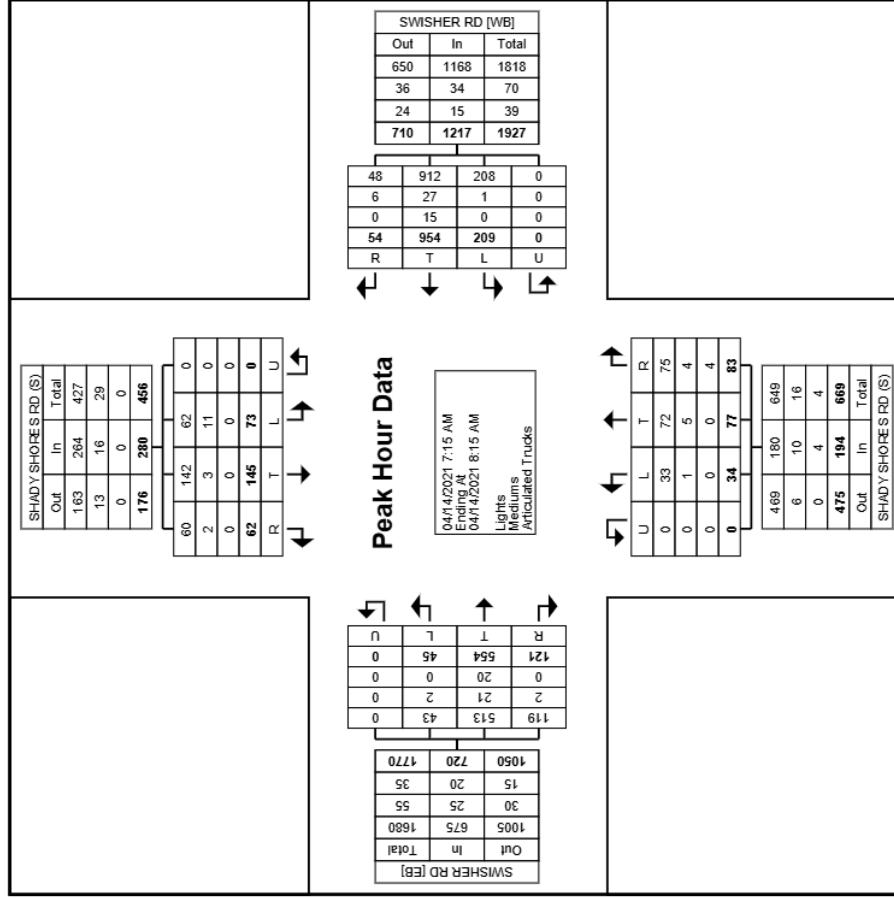
Turning Movement Data Plot

### Turning Movement Peak Hour Data (7:15 AM)

Start Time	SHADY SHORES RD (S) Southbound						SHADY SHORES RD (S) Northbound						SWISHER RD Eastbound					
	Left	Thru	Right	U-Turn	App. Total	Int. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
7:15 AM	18	23	14	0	55	-	7	19	17	0	43	-	8	123	15	0	146	576
7:30 AM	17	40	17	0	74	-	7	18	23	0	48	-	13	156	32	0	201	662
7:45 AM	18	48	13	0	79	-	6	19	20	0	45	-	16	149	35	0	200	615
8:00 AM	20	34	18	0	72	-	14	21	23	0	58	-	8	126	39	0	173	568
Total	73	145	62	0	280	-	34	77	83	0	194	-	45	554	121	0	720	2411
Approach %	26.1	51.8	22.1	0.0	-	-	17.5	39.7	42.8	0.0	-	-	6.3	76.9	16.8	0.0	-	-
Total %	3.0	6.0	2.6	0.0	11.6	-	1.4	3.2	3.4	0.0	8.0	-	1.9	23.0	5.0	0.0	29.9	-
PHF	0.913	0.755	0.881	0.000	0.886	-	0.807	0.917	0.902	0.000	0.836	-	0.703	0.888	0.776	0.000	0.896	0.924
Lights	62	142	60	0	264	-	33	72	75	0	180	-	43	513	119	0	675	2287
% Lights	84.9	97.9	96.8	-	94.3	-	97.1	93.5	90.4	-	92.8	-	95.6	92.6	98.3	-	93.8	94.9
Mediums	11	3	2	0	16	-	1	5	4	0	10	-	2	21	2	0	25	85
% Mediums	15.1	2.1	3.2	-	5.7	-	2.9	6.5	4.8	-	5.2	-	4.4	3.8	1.7	-	3.5	3.5
Articulated Trucks	0	0	0	0	0	-	0	0	4	0	4	-	0	20	0	0	20	39
% Articulated Trucks	0.0	0.0	0.0	-	0.0	-	0.0	0.0	4.8	-	2.1	-	0.0	3.6	0.0	-	2.8	1.6

GRAM Traffic NTX Inc.  
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 817.265.8968

Count Name: SHADY SHORES RD (S) @  
 SWISHER RD  
 Site Code:  
 Start Date: 04/14/2021  
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Turning Movement Peak Hour Data Plot (7:15 AM)

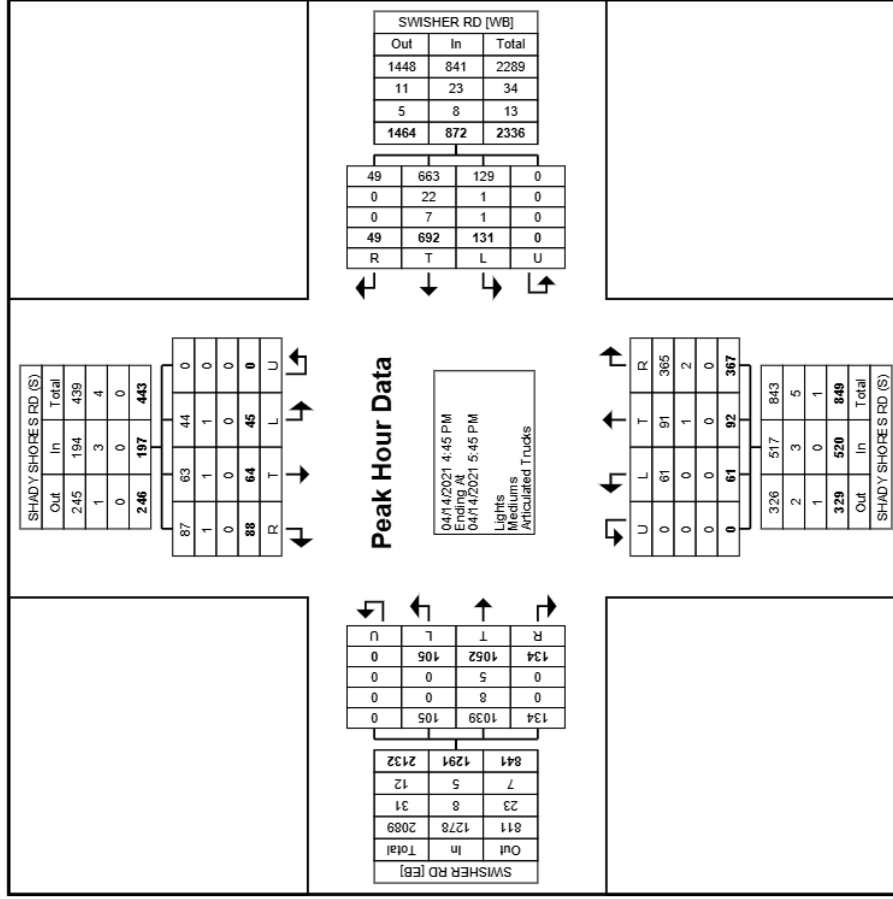
### Turning Movement Peak Hour Data (4:45 PM)

Start Time	SHADY SHORES RD (S) Southbound					SWISHER RD Westbound					SHADY SHORES RD (S) Northbound					SWISHER RD Eastbound					
	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
4:45 PM	7	12	23	0	42	24	165	12	0	201	18	17	83	0	118	28	266	36	0	330	691
5:00 PM	16	14	23	0	53	34	144	9	0	187	13	35	88	0	136	37	244	35	0	316	682
5:15 PM	10	21	23	0	54	35	209	17	0	261	17	22	101	0	140	17	285	31	0	333	788
5:30 PM	12	17	19	0	48	38	174	11	0	223	13	18	95	0	126	23	257	32	0	312	709
Total	45	64	88	0	197	131	692	49	0	872	61	92	367	0	520	105	1052	134	0	1291	2880
Approach %	22.8	32.5	44.7	0.0	-	15.0	79.4	5.6	0.0	-	11.7	17.7	70.6	0.0	-	8.1	81.5	10.4	0.0	-	-
Total %	1.6	2.2	3.1	0.0	6.8	4.5	24.0	1.7	0.0	30.3	2.1	3.2	12.7	0.0	18.1	3.6	36.5	4.7	0.0	44.8	-
PHF	0.703	0.762	0.957	0.000	0.912	0.862	0.828	0.721	0.000	0.835	0.847	0.657	0.908	0.000	0.929	0.709	0.923	0.931	0.000	0.969	0.914
Lights	44	63	87	0	194	129	663	49	0	841	61	91	365	0	517	105	1039	134	0	1278	2830
% Lights	97.8	98.4	98.9	-	98.5	98.5	95.8	100.0	-	96.4	100.0	98.9	99.5	-	99.4	100.0	98.8	100.0	-	99.0	98.3
Mediums	1	1	1	0	3	1	22	0	0	23	0	1	2	0	3	0	8	0	0	8	37
% Mediums	2.2	1.6	1.1	-	1.5	0.8	3.2	0.0	-	2.6	0.0	1.1	0.5	-	0.6	0.0	0.8	0.0	-	0.6	1.3
Articulated Trucks	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	0	5	0	0	5	13
% Articulated Trucks	0.0	0.0	0.0	-	0.0	0.8	1.0	0.0	-	0.9	0.0	0.0	0.0	-	0.0	0.0	0.5	0.0	-	0.4	0.5

GRAM Traffic NTX Inc.  
1120 W. Lovers Lane

Arlington, Texas, United States 76013  
817.265.8968

Count Name: SHADY SHORES RD (S) @  
SWISHER RD  
Site Code:  
Start Date: 04/14/2021  
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Turning Movement Peak Hour Data Plot (4:45 PM)



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	5	6	0	1	0	0	0	0	0	0	0	0	0	12
54	4/14/2021	11:30 AM	0	9	2	0	1	0	0	0	0	0	0	0	0	0	12
55	4/14/2021	11:45 AM	0	10	6	0	4	0	0	0	0	0	0	0	0	0	20
56	4/14/2021	12:00 PM	0	8	3	0	4	0	0	0	0	0	0	0	0	0	15
57	4/14/2021	12:15 PM	0	10	2	0	5	0	0	0	0	0	0	0	0	0	17
58	4/14/2021	12:30 PM	0	8	4	0	3	0	0	1	0	0	0	0	0	0	16
59	4/14/2021	12:45 PM	0	12	1	0	1	0	0	0	0	0	0	0	0	0	14
60	4/14/2021	01:00 PM	0	7	4	0	2	0	0	0	0	0	0	0	0	0	13
61	4/14/2021	01:15 PM	0	9	5	0	2	0	0	1	0	0	0	0	0	0	17
62	4/14/2021	01:30 PM	0	1	1	0	7	0	0	0	0	0	0	0	0	0	9
63	4/14/2021	01:45 PM	0	16	6	0	3	0	0	2	0	0	0	0	0	0	27
64	4/14/2021	02:00 PM	0	7	4	0	2	0	0	1	0	0	0	0	0	0	14
65	4/14/2021	02:15 PM	0	13	4	0	3	0	0	0	0	0	0	0	0	0	20
66	4/14/2021	02:30 PM	0	10	6	0	2	0	0	0	0	0	0	0	0	0	18
67	4/14/2021	02:45 PM	0	10	3	0	2	0	0	0	0	0	0	0	0	0	15
68	4/14/2021	03:00 PM	0	9	8	1	3	0	0	0	0	0	0	0	0	0	21
69	4/14/2021	03:15 PM	0	15	7	0	8	0	0	0	0	0	0	0	0	0	30
70	4/14/2021	03:30 PM	0	4	6	0	1	0	0	0	0	0	0	0	0	0	11
71	4/14/2021	03:45 PM	1	16	4	0	5	0	0	0	0	0	0	0	0	0	26
72	4/14/2021	04:00 PM	0	22	11	0	2	0	0	0	0	0	0	0	0	0	35
73	4/14/2021	04:15 PM	0	10	7	1	3	0	0	0	0	0	0	0	0	0	21
74	4/14/2021	04:30 PM	1	15	5	0	4	0	0	0	0	0	0	0	0	0	25
75	4/14/2021	04:45 PM	0	14	6	0	1	0	0	0	0	0	0	0	0	0	21
76	4/14/2021	05:00 PM	0	9	3	0	6	1	0	1	0	0	0	0	0	0	20
77	4/14/2021	05:15 PM	0	19	3	0	1	0	0	0	0	0	0	0	0	0	23
78	4/14/2021	05:30 PM	0	15	6	0	4	0	0	0	0	0	0	0	0	0	25
79	4/14/2021	05:45 PM	0	13	10	0	3	0	0	0	0	0	0	0	0	1	27
80	4/14/2021	06:00 PM	0	11	9	0	8	0	0	0	0	0	0	0	0	0	28
81	4/14/2021	06:15 PM	0	13	3	0	2	0	0	1	0	0	0	0	0	0	19
82	4/14/2021	06:30 PM	0	5	2	0	5	0	0	0	0	0	0	0	0	0	12
83	4/14/2021	06:45 PM	0	12	3	0	1	0	0	0	0	0	0	0	0	0	16
84	4/14/2021	07:00 PM	0	6	1	0	2	0	0	0	0	0	0	0	0	0	9
85	4/14/2021	07:15 PM	0	9	4	0	0	0	0	0	0	0	0	0	0	0	13
86	4/14/2021	07:30 PM	0	6	1	0	2	0	0	0	0	0	0	0	0	0	9
87	4/14/2021	07:45 PM	0	9	6	0	1	0	0	0	0	0	0	0	0	0	16
88	4/14/2021	08:00 PM	0	2	3	0	0	0	0	0	0	0	0	0	0	0	5
89	4/14/2021	08:15 PM	0	9	6	0	0	0	0	0	0	0	0	0	0	0	15
90	4/14/2021	08:30 PM	0	6	4	0	3	0	0	0	0	0	0	0	0	0	13
91	4/14/2021	08:45 PM	0	2	1	0	2	0	0	0	0	0	0	0	0	0	5
92	4/14/2021	09:00 PM	0	2	3	0	0	0	0	0	0	0	0	0	0	0	5
93	4/14/2021	09:15 PM	0	3	2	0	1	0	0	0	0	0	0	0	0	0	6
94	4/14/2021	09:30 PM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
95	4/14/2021	09:45 PM	0	5	0	0	2	0	0	0	0	0	0	0	0	0	7
96	4/14/2021	10:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
97	4/14/2021	10:15 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
98	4/14/2021	10:30 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
99	4/14/2021	10:45 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
100	4/14/2021	11:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
101	4/14/2021	11:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
102	4/14/2021	11:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			2	511	251	8	161	3	0	15	1	0	0	0	0	1	953

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
1	SHADY SHORES RD (S) BETWEEN SHADY SHORES RD (W) & OAKWOOD CIR																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 902																
6	Direction: Southbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	TOTAL
8	4/14/2021	12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	4/14/2021	12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	4/14/2021	12:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11	4/14/2021	12:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
12	4/14/2021	01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	4/14/2021	01:15 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
14	4/14/2021	01:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
15	4/14/2021	01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	4/14/2021	02:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
17	4/14/2021	02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	4/14/2021	02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	4/14/2021	02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	4/14/2021	03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	4/14/2021	03:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22	4/14/2021	03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	4/14/2021	03:45 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
24	4/14/2021	04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4/14/2021	04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	4/14/2021	04:30 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
27	4/14/2021	04:45 AM	0	1	1	0	1	0	0	0	0	0	0	0	0	0	3
28	4/14/2021	05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	4/14/2021	05:15 AM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
30	4/14/2021	05:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
31	4/14/2021	05:45 AM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
32	4/14/2021	06:00 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
33	4/14/2021	06:15 AM	0	1	1	0	2	0	0	1	0	0	0	0	0	0	5
34	4/14/2021	06:30 AM	1	3	2	0	2	0	0	0	0	0	0	0	0	0	8
35	4/14/2021	06:45 AM	0	7	4	0	1	0	0	0	0	0	0	0	0	0	12
36	4/14/2021	07:00 AM	0	13	1	0	1	0	0	0	0	0	0	0	0	0	14
37	4/14/2021	07:15 AM	0	9	7	1	2	0	0	1	0	0	0	0	0	0	20
38	4/14/2021	07:30 AM	0	18	5	0	1	0	0	0	0	0	0	0	0	0	24
39	4/14/2021	07:45 AM	0	16	9	3	0	0	0	0	0	0	0	0	0	0	28
40	4/14/2021	08:00 AM	0	10	4	0	3	0	0	0	0	0	0	0	0	0	17
41	4/14/2021	08:15 AM	0	11	6	0	2	0	0	2	0	0	0	0	0	0	21
42	4/14/2021	08:30 AM	0	6	7	0	3	0	0	0	0	0	0	0	0	0	16
43	4/14/2021	08:45 AM	0	9	7	0	0	0	0	0	0	0	0	0	0	0	16
44	4/14/2021	09:00 AM	0	2	3	0	2	0	0	0	0	0	0	0	0	0	7
45	4/14/2021	09:15 AM	0	8	5	0	1	0	0	1	0	0	0	0	0	0	15
46	4/14/2021	09:30 AM	0	0	9	0	3	0	0	2	0	0	0	0	0	0	14
47	4/14/2021	09:45 AM	0	4	1	0	3	0	0	1	0	0	0	0	0	0	9
48	4/14/2021	10:00 AM	0	4	5	0	2	0	0	1	0	0	0	0	0	0	11
49	4/14/2021	10:15 AM	0	6	5	0	0	0	0	1	1	0	0	0	0	0	13
50	4/14/2021	10:30 AM	0	7	3	0	3	0	0	0	0	0	0	0	0	0	13
51	4/14/2021	10:45 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
52	4/14/2021	11:00 AM	0	7	7	1	0	0	0	3	0	1	0	0	0	0	19

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	5	4	0	1	0	0	0	0	0	0	0	0	0	20
54	4/14/2021	11:30 AM	1	8	7	0	3	0	0	1	0	0	0	0	0	0	10
55	4/14/2021	11:45 AM	0	10	7	0	2	0	0	0	0	0	0	0	0	0	19
56	4/14/2021	12:00 PM	0	12	4	0	3	0	0	0	0	0	0	0	0	0	19
57	4/14/2021	12:15 PM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
58	4/14/2021	12:30 PM	0	13	2	1	1	0	0	1	0	0	0	0	0	0	18
59	4/14/2021	12:45 PM	0	5	6	0	1	0	0	0	0	0	0	0	0	0	12
60	4/14/2021	01:00 PM	0	7	4	0	3	0	0	0	0	0	0	0	0	0	14
61	4/14/2021	01:15 PM	0	7	5	0	3	0	0	0	0	0	0	0	0	0	15
62	4/14/2021	01:30 PM	0	2	8	0	2	0	0	0	0	0	0	0	0	0	12
63	4/14/2021	01:45 PM	0	9	2	0	3	1	0	0	0	0	0	0	0	0	15
64	4/14/2021	02:00 PM	0	9	4	0	3	0	0	1	0	0	0	0	0	0	17
65	4/14/2021	02:15 PM	0	12	8	0	2	0	0	0	0	0	0	0	0	0	22
66	4/14/2021	02:30 PM	0	9	5	0	3	0	0	0	0	0	0	0	0	0	17
67	4/14/2021	02:45 PM	0	10	7	0	1	0	0	1	0	0	0	0	0	0	19
68	4/14/2021	03:00 PM	0	8	5	1	3	0	0	0	0	0	0	0	0	0	17
69	4/14/2021	03:15 PM	0	15	1	0	2	0	0	0	0	0	0	0	0	0	18
70	4/14/2021	03:30 PM	0	14	9	0	3	0	0	0	0	0	0	0	0	0	26
71	4/14/2021	03:45 PM	1	11	10	0	5	0	0	0	0	0	0	0	0	0	27
72	4/14/2021	04:00 PM	0	15	5	0	3	0	0	1	0	0	0	0	0	0	24
73	4/14/2021	04:15 PM	0	7	3	1	3	0	0	0	0	0	0	0	0	0	14
74	4/14/2021	04:30 PM	0	8	5	0	0	0	0	0	0	0	0	0	0	0	13
75	4/14/2021	04:45 PM	0	9	2	0	1	1	0	0	0	0	0	0	0	0	13
76	4/14/2021	05:00 PM	1	4	11	0	2	0	0	0	0	0	0	0	0	0	18
77	4/14/2021	05:15 PM	0	11	10	0	0	1	0	0	0	0	0	0	0	0	23
78	4/14/2021	05:30 PM	0	8	5	0	2	0	0	0	0	0	0	0	0	0	15
79	4/14/2021	05:45 PM	0	9	7	0	4	0	0	0	0	0	0	0	0	0	20
80	4/14/2021	06:00 PM	0	11	5	0	1	0	0	0	0	0	0	0	0	0	17
81	4/14/2021	06:15 PM	0	9	9	0	5	0	0	0	0	0	0	0	0	0	23
82	4/14/2021	06:30 PM	0	12	5	0	0	0	0	1	0	0	0	0	0	0	18
83	4/14/2021	06:45 PM	0	14	4	0	1	0	0	0	0	0	0	0	0	0	19
84	4/14/2021	07:00 PM	0	8	2	0	0	0	0	0	0	0	0	0	0	0	10
85	4/14/2021	07:15 PM	0	7	3	0	0	0	0	0	0	0	0	0	0	0	11
86	4/14/2021	07:30 PM	0	2	4	0	0	0	0	0	0	0	0	0	0	0	6
87	4/14/2021	07:45 PM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
88	4/14/2021	08:00 PM	0	3	5	0	0	0	0	0	0	0	0	0	0	0	8
89	4/14/2021	08:15 PM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
90	4/14/2021	08:30 PM	0	7	2	0	0	0	0	0	0	0	0	0	0	0	9
91	4/14/2021	08:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
92	4/14/2021	09:00 PM	0	3	3	0	1	0	0	0	0	0	0	0	0	0	7
93	4/14/2021	09:15 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
94	4/14/2021	09:30 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
95	4/14/2021	09:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
96	4/14/2021	10:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
97	4/14/2021	10:15 PM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
98	4/14/2021	10:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
99	4/14/2021	10:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
100	4/14/2021	11:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
101	4/14/2021	11:15 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			4	509	294	8	102	3	0	18	2	1	1	0	0	0	941







	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	9	2	1	0	0	0	0	0	0	0	0	0	0	12
54	4/14/2021	11:30 AM	1	17	4	0	0	0	0	0	0	0	0	0	0	0	22
55	4/14/2021	11:45 AM	0	21	1	0	0	0	0	0	0	0	0	0	0	0	22
56	4/14/2021	12:00 PM	0	16	3	0	0	0	0	0	0	0	0	0	0	0	19
57	4/14/2021	12:15 PM	1	6	0	0	0	0	0	0	0	0	0	0	0	0	7
58	4/14/2021	12:30 PM	0	19	2	0	0	1	0	0	0	0	0	0	0	0	22
59	4/14/2021	12:45 PM	0	10	2	0	0	0	0	0	0	0	0	0	0	0	12
60	4/14/2021	01:00 PM	0	10	3	0	0	0	0	0	0	0	0	0	0	0	13
61	4/14/2021	01:15 PM	0	16	3	0	0	0	0	0	0	0	0	0	0	0	19
62	4/14/2021	01:30 PM	0	10	2	0	0	0	0	0	0	0	0	0	0	0	12
63	4/14/2021	01:45 PM	0	15	1	0	1	1	0	0	0	0	0	0	0	0	18
64	4/14/2021	02:00 PM	0	14	3	0	0	0	0	0	0	0	0	0	0	0	17
65	4/14/2021	02:15 PM	0	22	3	0	0	0	0	0	0	0	0	0	0	0	25
66	4/14/2021	02:30 PM	0	14	2	0	0	0	0	0	0	0	0	0	0	0	16
67	4/14/2021	02:45 PM	0	18	1	0	0	0	0	1	0	0	0	0	0	0	20
68	4/14/2021	03:00 PM	0	16	2	0	1	0	0	0	0	0	0	0	0	0	19
69	4/14/2021	03:15 PM	0	17	1	0	0	0	0	0	0	0	0	0	0	0	18
70	4/14/2021	03:30 PM	0	19	4	0	0	0	0	0	0	0	0	0	0	0	23
71	4/14/2021	03:45 PM	1	26	2	0	0	0	0	0	0	0	0	0	0	0	29
72	4/14/2021	04:00 PM	1	17	3	0	0	0	0	0	0	0	0	0	0	0	21
73	4/14/2021	04:15 PM	0	12	3	0	0	0	0	0	0	0	0	0	0	0	15
74	4/14/2021	04:30 PM	0	13	0	0	0	0	0	0	0	0	0	0	0	0	13
75	4/14/2021	04:45 PM	0	13	1	0	0	1	0	0	0	0	0	0	0	0	15
76	4/14/2021	05:00 PM	1	16	2	0	0	0	0	0	0	0	0	0	0	0	19
77	4/14/2021	05:15 PM	0	19	1	0	0	1	0	0	0	0	0	0	0	0	21
78	4/14/2021	05:30 PM	0	15	2	0	0	0	0	0	0	0	0	0	0	0	17
79	4/14/2021	05:45 PM	0	16	2	0	0	0	0	0	0	0	0	0	0	0	18
80	4/14/2021	06:00 PM	0	20	0	0	0	0	0	0	0	0	0	0	0	0	20
81	4/14/2021	06:15 PM	0	21	4	0	0	0	0	0	0	0	0	0	0	0	25
82	4/14/2021	06:30 PM	0	18	1	0	0	0	0	0	0	0	0	0	0	0	19
83	4/14/2021	06:45 PM	0	18	1	0	0	0	0	0	0	0	0	0	0	0	19
84	4/14/2021	07:00 PM	0	11	0	0	0	0	0	0	0	0	0	0	0	0	11
85	4/14/2021	07:15 PM	2	8	0	0	0	1	0	0	0	0	0	0	0	0	11
86	4/14/2021	07:30 PM	0	9	0	0	0	0	0	0	0	0	0	0	0	0	9
87	4/14/2021	07:45 PM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
88	4/14/2021	08:00 PM	0	7	0	0	0	0	0	0	0	0	0	0	0	0	7
89	4/14/2021	08:15 PM	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
90	4/14/2021	08:30 PM	0	8	0	0	0	0	0	0	0	0	0	0	0	0	8
91	4/14/2021	08:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
92	4/14/2021	09:00 PM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
93	4/14/2021	09:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
94	4/14/2021	09:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
95	4/14/2021	09:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
96	4/14/2021	10:00 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
97	4/14/2021	10:15 PM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
98	4/14/2021	10:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
99	4/14/2021	10:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
100	4/14/2021	11:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
101	4/14/2021	11:15 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			9	870	98	1	4	6	0	2	1	0	0	0	0	0	991



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	9	6	0	3	0	0	0	2	0	0	0	0	0	20
54	4/14/2021	11:30 AM	0	8	6	0	0	0	0	1	0	0	0	0	0	0	15
55	4/14/2021	11:45 AM	0	15	8	1	4	2	0	0	0	0	0	0	0	0	30
56	4/14/2021	12:00 PM	0	13	6	0	3	0	0	0	0	0	0	0	0	0	22
57	4/14/2021	12:15 PM	0	13	8	0	4	0	0	0	0	0	0	0	0	0	25
58	4/14/2021	12:30 PM	0	11	7	1	2	0	0	1	0	0	0	0	0	0	22
59	4/14/2021	12:45 PM	0	9	2	0	3	0	0	0	0	0	0	0	0	0	14
60	4/14/2021	01:00 PM	0	10	9	0	1	0	0	0	0	0	0	0	0	0	20
61	4/14/2021	01:15 PM	0	13	5	0	3	0	0	2	0	0	0	0	0	0	23
62	4/14/2021	01:30 PM	0	9	5	0	4	0	0	0	0	0	0	0	0	0	18
63	4/14/2021	01:45 PM	0	20	10	1	2	0	0	2	0	0	0	0	0	0	35
64	4/14/2021	02:00 PM	0	10	8	0	4	0	0	1	0	0	0	0	0	0	23
65	4/14/2021	02:15 PM	0	31	9	0	2	0	0	0	0	0	0	0	0	0	42
66	4/14/2021	02:30 PM	0	23	7	4	9	0	0	0	0	0	0	0	0	0	43
67	4/14/2021	02:45 PM	0	24	5	0	2	0	0	0	0	0	0	0	0	0	31
68	4/14/2021	03:00 PM	1	15	10	0	3	0	0	0	0	0	0	0	0	1	30
69	4/14/2021	03:15 PM	0	11	8	0	7	0	0	0	0	0	0	0	0	0	26
70	4/14/2021	03:30 PM	0	8	5	0	4	0	0	0	0	0	0	0	0	0	17
71	4/14/2021	03:45 PM	1	34	11	0	4	1	0	0	0	0	0	0	0	0	51
72	4/14/2021	04:00 PM	0	24	14	3	3	0	0	1	0	0	0	0	0	0	45
73	4/14/2021	04:15 PM	0	22	10	0	2	1	0	0	0	0	0	0	0	0	35
74	4/14/2021	04:30 PM	1	19	8	0	4	0	0	0	0	0	0	0	0	0	32
75	4/14/2021	04:45 PM	0	21	11	0	0	0	0	0	0	0	0	0	0	0	32
76	4/14/2021	05:00 PM	0	29	8	0	4	1	0	1	0	0	0	0	0	0	43
77	4/14/2021	05:15 PM	0	26	6	0	1	0	0	1	0	0	0	0	0	0	34
78	4/14/2021	05:30 PM	0	17	8	0	5	0	0	0	0	0	0	0	0	0	30
79	4/14/2021	05:45 PM	1	22	13	0	2	0	0	0	0	0	0	0	0	0	38
80	4/14/2021	06:00 PM	0	12	10	0	6	0	0	0	0	0	0	0	0	0	28
81	4/14/2021	06:15 PM	0	21	12	0	3	0	0	1	0	0	0	0	0	0	37
82	4/14/2021	06:30 PM	0	14	12	0	3	0	0	0	0	0	0	0	0	0	29
83	4/14/2021	06:45 PM	0	18	1	0	3	0	0	0	0	0	0	0	0	0	22
84	4/14/2021	07:00 PM	0	8	7	0	1	0	0	0	0	0	0	0	0	0	16
85	4/14/2021	07:15 PM	0	12	4	0	0	0	0	0	0	0	0	0	0	0	16
86	4/14/2021	07:30 PM	0	14	3	0	2	0	0	0	0	0	0	0	0	0	19
87	4/14/2021	07:45 PM	0	11	3	0	1	0	0	0	0	0	0	0	0	0	15
88	4/14/2021	08:00 PM	0	9	5	0	3	0	0	0	0	0	0	0	0	0	17
89	4/14/2021	08:15 PM	0	10	3	0	2	0	0	0	0	0	0	0	0	0	15
90	4/14/2021	08:30 PM	0	14	3	0	2	0	0	0	0	0	0	0	0	0	19
91	4/14/2021	08:45 PM	0	6	3	0	1	0	0	0	0	0	0	0	0	0	10
92	4/14/2021	09:00 PM	0	7	4	0	0	0	0	0	0	0	0	0	0	0	11
93	4/14/2021	09:15 PM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
94	4/14/2021	09:30 PM	0	12	0	0	1	0	0	0	0	0	0	0	0	0	13
95	4/14/2021	09:45 PM	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
96	4/14/2021	10:00 PM	0	5	0	0	1	0	0	0	0	0	0	0	0	0	6
97	4/14/2021	10:15 PM	0	4	1	0	1	0	0	0	0	0	0	0	0	0	5
98	4/14/2021	10:30 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
99	4/14/2021	10:45 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
100	4/14/2021	11:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2
101	4/14/2021	11:15 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
102	4/14/2021	11:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
103	4/14/2021	11:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
104			8	889	436	18	181	27	2	23	4	0	0	0	0	2	1590

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
SHADY SHORES RD (S) BTWN PARKSIDE LN & SILKTREE CIRCUIT																
Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	TOTAL
1																
2																
3	Start Date: 4/14/2021															
4	Start Time: 12:00:00 AM															
5	Site Code: 932															
6	Direction: Southbound															
7																
8	4/14/2021	12:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
9	4/14/2021	12:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
10	4/14/2021	12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4/14/2021	12:45 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	5
12	4/14/2021	01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	4/14/2021	01:15 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
14	4/14/2021	01:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
15	4/14/2021	01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	4/14/2021	02:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
17	4/14/2021	02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	4/14/2021	02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	4/14/2021	02:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	1
20	4/14/2021	03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	4/14/2021	03:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
22	4/14/2021	03:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
23	4/14/2021	03:45 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
24	4/14/2021	04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4/14/2021	04:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	1
26	4/14/2021	04:30 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	3
27	4/14/2021	04:45 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	3
28	4/14/2021	05:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	2
29	4/14/2021	05:15 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	5
30	4/14/2021	05:30 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	3
31	4/14/2021	05:45 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	4
32	4/14/2021	06:00 AM	0	3	2	0	0	0	0	0	0	0	0	0	0	5
33	4/14/2021	06:15 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	5
34	4/14/2021	06:30 AM	1	7	4	0	0	0	0	0	0	0	0	0	0	16
35	4/14/2021	06:45 AM	0	9	3	0	0	0	0	0	0	0	0	0	0	15
36	4/14/2021	07:00 AM	0	12	2	0	0	0	0	0	0	0	0	0	0	16
37	4/14/2021	07:15 AM	1	11	17	0	0	0	0	0	0	0	0	0	0	40
38	4/14/2021	07:30 AM	0	25	14	0	0	0	0	0	0	0	0	0	0	47
39	4/14/2021	07:45 AM	0	25	19	3	10	2	0	0	0	0	0	0	0	59
40	4/14/2021	08:00 AM	0	22	6	1	2	3	0	0	0	0	0	0	0	34
41	4/14/2021	08:15 AM	0	13	9	0	5	1	0	2	0	0	0	0	0	30
42	4/14/2021	08:30 AM	0	8	9	0	0	0	0	0	0	0	0	0	0	22
43	4/14/2021	08:45 AM	0	11	5	0	3	0	0	2	0	0	0	0	0	21
44	4/14/2021	09:00 AM	0	5	6	0	3	4	0	0	0	0	0	0	0	18
45	4/14/2021	09:15 AM	0	12	7	0	2	1	0	1	0	0	0	0	0	23
46	4/14/2021	09:30 AM	0	3	5	0	5	1	0	3	0	0	0	0	0	17
47	4/14/2021	09:45 AM	0	7	3	0	3	2	0	1	0	0	0	0	0	16
48	4/14/2021	10:00 AM	0	6	5	0	5	0	0	0	0	0	0	0	0	16
49	4/14/2021	10:15 AM	0	6	5	0	3	1	0	1	0	0	0	0	0	17
50	4/14/2021	10:30 AM	0	7	5	0	4	0	0	0	0	0	0	0	0	16
51	4/14/2021	10:45 AM	0	8	4	0	1	1	0	1	0	0	0	0	0	15
52	4/14/2021	11:00 AM	0	13	9	1	3	2	0	2	0	0	0	0	0	30

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	11	3	0	3	2	0	1	0	0	0	0	0	0	21
54	4/14/2021	11:30 AM	1	10	13	0	9	0	0	0	0	0	0	0	0	0	33
55	4/14/2021	11:45 AM	0	14	8	0	3	2	0	0	0	0	0	0	0	0	27
56	4/14/2021	12:00 PM	0	16	5	0	6	2	0	0	0	0	0	0	0	0	29
57	4/14/2021	12:15 PM	0	8	5	0	2	0	0	0	0	0	0	0	0	0	15
58	4/14/2021	12:30 PM	0	15	6	1	1	2	0	1	0	0	0	0	0	0	26
59	4/14/2021	12:45 PM	0	7	7	0	6	0	0	0	0	0	0	0	0	0	20
60	4/14/2021	01:00 PM	0	11	3	0	8	0	0	0	0	0	0	0	0	0	22
61	4/14/2021	01:15 PM	0	13	7	0	7	0	0	0	0	0	0	0	0	0	27
62	4/14/2021	01:30 PM	0	7	5	0	5	0	0	0	0	0	0	0	0	0	17
63	4/14/2021	01:45 PM	0	8	10	0	7	1	0	0	0	0	0	0	0	0	26
64	4/14/2021	02:00 PM	0	15	4	0	5	0	0	1	0	0	0	0	0	0	25
65	4/14/2021	02:15 PM	0	15	9	0	6	0	0	0	0	0	0	0	0	0	30
66	4/14/2021	02:30 PM	0	12	6	0	10	0	0	0	0	0	0	0	0	0	28
67	4/14/2021	02:45 PM	0	21	9	0	8	0	0	2	0	0	0	0	0	0	40
68	4/14/2021	03:00 PM	0	30	12	4	8	1	0	0	0	0	0	0	0	0	55
69	4/14/2021	03:15 PM	0	25	7	0	1	0	0	0	0	0	0	0	0	0	33
70	4/14/2021	03:30 PM	0	28	15	0	8	0	0	0	0	0	0	0	0	0	51
71	4/14/2021	03:45 PM	1	21	7	0	7	0	0	0	0	0	0	0	0	0	36
72	4/14/2021	04:00 PM	0	18	14	2	9	0	0	2	0	0	0	0	0	0	45
73	4/14/2021	04:15 PM	0	14	7	0	4	0	0	0	0	0	0	0	0	0	25
74	4/14/2021	04:30 PM	0	15	8	1	0	0	0	0	0	0	0	0	0	0	24
75	4/14/2021	04:45 PM	0	18	5	0	2	1	0	0	0	0	0	0	0	0	26
76	4/14/2021	05:00 PM	1	18	11	0	4	0	0	0	0	0	0	0	0	0	34
77	4/14/2021	05:15 PM	0	21	10	0	5	1	0	0	0	0	0	0	0	0	37
78	4/14/2021	05:30 PM	0	18	8	0	4	0	0	0	0	0	0	0	0	0	30
79	4/14/2021	05:45 PM	0	13	7	0	8	0	0	0	0	0	0	0	0	0	28
80	4/14/2021	06:00 PM	0	12	20	0	2	1	0	0	0	0	0	0	0	0	35
81	4/14/2021	06:15 PM	0	16	7	0	10	0	0	0	0	0	0	0	0	0	33
82	4/14/2021	06:30 PM	1	20	5	0	2	0	0	2	0	0	0	0	0	0	30
83	4/14/2021	06:45 PM	0	17	7	0	3	0	0	0	0	0	0	0	0	0	27
84	4/14/2021	07:00 PM	0	18	2	0	3	0	0	0	0	0	0	0	0	0	23
85	4/14/2021	07:15 PM	1	6	4	0	2	1	0	0	0	0	0	0	0	0	14
86	4/14/2021	07:30 PM	0	8	0	0	5	0	0	0	0	0	0	0	0	0	13
87	4/14/2021	07:45 PM	0	6	3	0	2	0	0	0	0	0	0	0	0	0	11
88	4/14/2021	08:00 PM	0	6	9	0	2	0	0	0	0	0	0	0	0	0	17
89	4/14/2021	08:15 PM	0	4	2	0	1	0	0	0	0	0	0	0	0	0	7
90	4/14/2021	08:30 PM	0	10	2	0	1	0	0	0	0	0	0	0	0	0	13
91	4/14/2021	08:45 PM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
92	4/14/2021	09:00 PM	0	8	1	0	3	0	0	0	0	0	0	0	0	0	12
93	4/14/2021	09:15 PM	0	3	1	0	3	0	0	0	0	0	0	0	0	0	7
94	4/14/2021	09:30 PM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
95	4/14/2021	09:45 PM	0	3	1	0	1	0	0	0	0	0	0	0	0	0	5
96	4/14/2021	10:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
97	4/14/2021	10:15 PM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	4
98	4/14/2021	10:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
99	4/14/2021	10:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
100	4/14/2021	11:00 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
101	4/14/2021	11:15 PM	0	4	0	0	1	0	0	0	0	0	0	0	0	0	5
102	4/14/2021	11:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			7	821	429	13	272	36	0	25	1	1	0	0	0	0	1605

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
SHADY SHORES RD (W) W OF SHADY SHORES RD (S)																	
Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classified	TOTAL	
1	SHADY SHORES RD (W) W OF SHADY SHORES RD (S)																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 709																
6	Direction: Eastbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classified	TOTAL
8	4/14/2021	12:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
9	4/14/2021	12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	4/14/2021	12:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
11	4/14/2021	12:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	4/14/2021	01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	4/14/2021	01:15 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
14	4/14/2021	01:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
15	4/14/2021	01:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
16	4/14/2021	02:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
17	4/14/2021	02:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	4/14/2021	02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	4/14/2021	02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	4/14/2021	03:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	4/14/2021	03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	4/14/2021	03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	4/14/2021	03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	4/14/2021	04:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
25	4/14/2021	04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	4/14/2021	04:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
27	4/14/2021	04:45 AM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
28	4/14/2021	05:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	4/14/2021	05:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
30	4/14/2021	05:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	4/14/2021	05:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
32	4/14/2021	06:00 AM	0	1	1	0	1	0	0	0	0	0	0	0	0	0	3
33	4/14/2021	06:15 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
34	4/14/2021	06:30 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	4
35	4/14/2021	06:45 AM	0	3	4	1	1	0	0	0	0	0	0	0	0	0	9
36	4/14/2021	07:00 AM	0	7	2	0	0	0	0	0	0	0	0	0	0	0	9
37	4/14/2021	07:15 AM	0	6	2	0	0	1	0	1	0	0	0	0	0	0	10
38	4/14/2021	07:30 AM	0	5	3	0	1	0	0	1	0	0	0	0	0	0	10
39	4/14/2021	07:45 AM	0	10	6	0	3	0	0	0	0	0	0	0	0	0	19
40	4/14/2021	08:00 AM	0	10	4	0	4	0	0	0	0	0	0	0	0	0	18
41	4/14/2021	08:15 AM	0	6	7	1	1	0	0	1	0	0	0	0	0	0	16
42	4/14/2021	08:30 AM	0	4	4	0	2	1	0	1	0	0	0	0	0	0	12
43	4/14/2021	08:45 AM	0	7	4	0	3	0	0	0	0	0	0	0	0	0	14
44	4/14/2021	09:00 AM	0	4	3	0	4	0	0	0	0	0	0	0	0	0	11
45	4/14/2021	09:15 AM	0	7	3	0	3	0	0	0	0	0	0	0	0	0	13
46	4/14/2021	09:30 AM	0	1	4	0	3	0	0	2	0	0	0	0	0	0	10
47	4/14/2021	09:45 AM	0	5	1	0	1	0	0	0	0	0	0	0	0	0	7
48	4/14/2021	10:00 AM	0	1	1	0	3	0	0	1	0	0	0	0	0	0	5
49	4/14/2021	10:15 AM	0	7	1	0	3	0	0	1	0	0	0	0	0	0	12
50	4/14/2021	10:30 AM	0	7	3	0	0	0	0	0	0	0	0	0	0	0	10
51	4/14/2021	10:45 AM	0	5	3	0	0	0	0	0	0	0	0	0	0	0	8
52	4/14/2021	11:00 AM	0	5	6	1	3	0	0	2	0	0	0	0	0	0	17

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	8	3	0	3	0	0	1	0	1	0	0	0	0	16
54	4/14/2021	11:30 AM	0	7	5	0	2	0	0	1	0	0	0	0	0	0	15
55	4/14/2021	11:45 AM	0	3	3	1	2	0	0	0	0	0	0	0	0	0	9
56	4/14/2021	12:00 PM	0	9	1	0	4	0	0	0	0	0	0	0	0	0	14
57	4/14/2021	12:15 PM	0	4	4	0	1	0	0	0	0	0	0	0	0	0	9
58	4/14/2021	12:30 PM	0	11	4	0	3	0	0	2	0	0	0	0	0	0	20
59	4/14/2021	12:45 PM	0	2	8	0	4	0	0	0	0	0	0	0	0	0	14
60	4/14/2021	01:00 PM	1	7	4	0	3	0	0	0	0	0	0	0	0	0	15
61	4/14/2021	01:15 PM	0	6	1	0	1	0	0	0	0	0	0	0	0	0	8
62	4/14/2021	01:30 PM	0	6	6	0	2	0	0	0	0	0	0	0	0	0	14
63	4/14/2021	01:45 PM	0	11	2	0	3	0	0	0	0	0	0	0	0	0	16
64	4/14/2021	02:00 PM	0	4	6	0	2	0	0	0	0	0	0	0	0	0	12
65	4/14/2021	02:15 PM	0	8	7	0	2	0	0	0	0	0	0	0	0	0	17
66	4/14/2021	02:30 PM	0	10	1	0	1	0	0	0	0	0	0	0	0	0	12
67	4/14/2021	02:45 PM	0	7	3	0	0	0	0	1	0	0	0	0	0	0	11
68	4/14/2021	03:00 PM	0	9	7	0	4	0	0	2	0	0	0	0	0	0	22
69	4/14/2021	03:15 PM	0	13	3	0	2	0	0	0	0	0	0	0	0	0	18
70	4/14/2021	03:30 PM	0	7	8	0	4	0	0	0	0	0	0	0	0	0	19
71	4/14/2021	03:45 PM	0	14	11	0	6	0	0	0	0	0	0	0	0	0	31
72	4/14/2021	04:00 PM	0	19	4	0	4	0	0	1	0	0	0	0	0	0	28
73	4/14/2021	04:15 PM	0	13	5	0	6	0	0	0	0	0	0	0	0	0	24
74	4/14/2021	04:30 PM	0	13	7	0	1	0	0	0	0	0	0	0	0	0	21
75	4/14/2021	04:45 PM	0	9	4	0	2	0	0	0	0	0	0	0	0	0	15
76	4/14/2021	05:00 PM	2	8	6	2	4	0	0	0	0	0	0	0	0	0	22
77	4/14/2021	05:15 PM	0	15	6	0	1	0	0	1	0	0	0	0	0	0	23
78	4/14/2021	05:30 PM	0	7	2	0	3	0	0	0	0	0	0	0	0	0	12
79	4/14/2021	05:45 PM	1	6	4	0	6	0	0	0	0	0	0	0	0	0	17
80	4/14/2021	06:00 PM	0	10	5	0	5	0	0	0	0	0	0	0	0	0	20
81	4/14/2021	06:15 PM	0	7	8	0	3	0	0	1	0	0	0	0	0	0	19
82	4/14/2021	06:30 PM	0	10	4	0	1	0	0	0	0	0	0	0	0	0	15
83	4/14/2021	06:45 PM	0	13	3	0	2	0	0	0	0	0	0	0	0	0	18
84	4/14/2021	07:00 PM	0	15	2	0	2	0	0	0	0	0	0	0	0	0	19
85	4/14/2021	07:15 PM	0	6	2	0	2	0	0	0	0	1	0	0	0	0	11
86	4/14/2021	07:30 PM	0	5	2	0	2	0	0	0	0	0	0	0	0	0	9
87	4/14/2021	07:45 PM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
88	4/14/2021	08:00 PM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
89	4/14/2021	08:15 PM	0	4	2	0	2	0	0	0	0	0	0	0	0	0	8
90	4/14/2021	08:30 PM	0	5	5	0	3	0	0	0	0	0	0	0	0	0	13
91	4/14/2021	08:45 PM	1	3	1	0	1	0	0	0	0	0	0	0	0	0	6
92	4/14/2021	09:00 PM	0	5	2	0	3	0	0	0	0	0	0	0	0	0	10
93	4/14/2021	09:15 PM	0	4	1	0	1	0	0	0	0	0	0	0	0	0	6
94	4/14/2021	09:30 PM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
95	4/14/2021	09:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
96	4/14/2021	10:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
97	4/14/2021	10:15 PM	0	4	1	0	1	0	0	0	0	0	0	0	0	0	6
98	4/14/2021	10:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
99	4/14/2021	10:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
100	4/14/2021	11:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
101	4/14/2021	11:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
102	4/14/2021	11:30 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
103	4/14/2021	11:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
104			5	464	239	6	144	2	0	19	1	1	0	0	0	0	881

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	SHADY SHORES RD (W) W OF SHADY SHORES RD (S)																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 709																
6	Direction: Westbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classified	TOTAL
8	4/14/2021	12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	4/14/2021	12:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	4/14/2021	12:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4/14/2021	12:45 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
12	4/14/2021	01:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	4/14/2021	01:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	4/14/2021	01:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	4/14/2021	01:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	4/14/2021	02:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	4/14/2021	02:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
18	4/14/2021	02:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	4/14/2021	02:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	4/14/2021	03:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
21	4/14/2021	03:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	4/14/2021	03:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	4/14/2021	03:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	4/14/2021	04:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4/14/2021	04:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	4/14/2021	04:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	4/14/2021	04:45 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
28	4/14/2021	05:00 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
29	4/14/2021	05:15 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
30	4/14/2021	05:30 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
31	4/14/2021	05:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
32	4/14/2021	06:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
33	4/14/2021	06:15 AM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
34	4/14/2021	06:30 AM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
35	4/14/2021	06:45 AM	0	7	6	0	2	0	0	0	0	0	0	0	0	0	15
36	4/14/2021	07:00 AM	0	5	6	0	2	0	0	0	0	0	0	0	0	0	13
37	4/14/2021	07:15 AM	1	12	7	0	4	0	0	0	0	0	0	0	0	0	24
38	4/14/2021	07:30 AM	0	14	10	0	5	0	0	1	0	0	0	0	0	0	30
39	4/14/2021	07:45 AM	0	12	8	0	3	0	0	0	0	0	0	0	0	0	23
40	4/14/2021	08:00 AM	0	11	10	0	2	0	0	0	0	0	0	0	0	0	23
41	4/14/2021	08:15 AM	0	5	5	0	5	0	0	0	0	0	0	0	0	0	15
42	4/14/2021	08:30 AM	0	7	6	0	3	0	0	0	0	0	0	0	0	0	16
43	4/14/2021	08:45 AM	1	5	4	0	0	0	0	0	0	0	0	0	0	0	10
44	4/14/2021	09:00 AM	0	9	2	1	4	0	0	0	0	0	0	0	0	0	16
45	4/14/2021	09:15 AM	0	3	1	0	2	0	0	0	0	0	0	0	0	0	6
46	4/14/2021	09:30 AM	0	5	7	1	0	1	0	0	0	0	0	0	0	0	14
47	4/14/2021	09:45 AM	0	4	2	0	1	0	0	0	0	0	0	0	0	0	7
48	4/14/2021	10:00 AM	0	2	7	0	2	0	0	0	0	0	0	0	0	0	11
49	4/14/2021	10:15 AM	0	7	4	0	3	0	0	2	0	0	0	0	0	0	16
50	4/14/2021	10:30 AM	0	4	2	0	1	0	0	1	0	0	0	0	0	0	8
51	4/14/2021	10:45 AM	0	11	2	0	1	0	0	0	0	0	0	0	0	0	14
52	4/14/2021	11:00 AM	0	7	5	0	1	0	0	1	0	0	0	0	0	0	14

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	10	4	0	3	0	0	0	0	0	0	0	0	0	17
54	4/14/2021	11:30 AM	0	4	4	0	3	0	0	0	0	0	0	0	0	0	11
55	4/14/2021	11:45 AM	0	7	5	0	1	1	0	0	0	0	0	0	0	0	14
56	4/14/2021	12:00 PM	0	3	2	1	5	0	0	0	0	0	0	0	0	0	11
57	4/14/2021	12:15 PM	0	9	6	0	5	0	0	0	0	0	0	0	0	0	20
58	4/14/2021	12:30 PM	0	5	7	0	1	0	0	1	0	0	0	0	0	0	14
59	4/14/2021	12:45 PM	0	8	4	0	0	0	0	1	0	0	0	0	0	0	13
60	4/14/2021	01:00 PM	0	8	3	0	1	0	0	0	0	0	0	0	0	0	12
61	4/14/2021	01:15 PM	0	5	9	0	2	0	0	0	0	0	0	0	0	0	16
62	4/14/2021	01:30 PM	0	8	2	0	3	0	0	0	0	0	0	0	0	0	13
63	4/14/2021	01:45 PM	0	9	8	0	4	0	0	2	0	0	0	0	0	0	23
64	4/14/2021	02:00 PM	0	6	3	0	3	0	0	0	0	0	0	0	0	0	12
65	4/14/2021	02:15 PM	0	7	5	0	1	0	0	0	0	0	0	0	0	0	13
66	4/14/2021	02:30 PM	0	9	6	0	0	0	0	0	0	0	0	0	0	0	15
67	4/14/2021	02:45 PM	0	6	7	0	2	0	0	0	0	0	0	0	0	0	15
68	4/14/2021	03:00 PM	0	4	4	0	2	0	0	0	0	0	0	0	0	0	10
69	4/14/2021	03:15 PM	0	11	7	1	5	0	0	0	0	0	0	0	0	0	24
70	4/14/2021	03:30 PM	1	6	5	0	2	0	0	0	0	0	0	0	0	0	14
71	4/14/2021	03:45 PM	0	9	4	0	6	0	0	0	0	0	0	0	0	0	19
72	4/14/2021	04:00 PM	0	15	6	0	4	0	0	0	0	0	0	0	0	0	25
73	4/14/2021	04:15 PM	0	10	1	0	1	0	0	0	0	0	0	0	0	0	12
74	4/14/2021	04:30 PM	0	12	3	0	4	0	0	0	0	0	0	0	0	0	19
75	4/14/2021	04:45 PM	0	11	2	0	1	0	0	0	0	0	0	0	0	0	14
76	4/14/2021	05:00 PM	0	5	6	1	5	0	0	0	0	0	0	0	0	0	17
77	4/14/2021	05:15 PM	0	9	4	0	1	0	0	1	0	0	0	0	0	0	15
78	4/14/2021	05:30 PM	0	11	3	0	3	0	0	0	0	0	0	0	0	0	17
79	4/14/2021	05:45 PM	2	9	4	0	5	0	0	1	0	0	0	0	0	0	21
80	4/14/2021	06:00 PM	0	8	6	0	7	0	0	0	0	0	0	0	0	0	21
81	4/14/2021	06:15 PM	0	12	3	0	5	0	0	1	0	0	0	0	0	0	21
82	4/14/2021	06:30 PM	0	6	1	0	3	0	0	0	0	0	0	0	0	0	10
83	4/14/2021	06:45 PM	1	9	3	0	2	0	0	0	0	0	0	0	0	0	15
84	4/14/2021	07:00 PM	0	5	2	0	1	0	0	1	0	0	0	0	0	0	9
85	4/14/2021	07:15 PM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
86	4/14/2021	07:30 PM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
87	4/14/2021	07:45 PM	0	3	6	0	1	0	0	0	0	0	0	0	0	0	10
88	4/14/2021	08:00 PM	0	4	2	0	1	0	0	0	0	0	0	0	0	0	7
89	4/14/2021	08:15 PM	0	5	5	0	1	0	0	0	0	0	0	0	0	0	11
90	4/14/2021	08:30 PM	0	6	2	0	1	0	0	0	0	0	0	0	0	0	9
91	4/14/2021	08:45 PM	0	3	1	0	2	0	0	0	0	0	0	0	0	0	6
92	4/14/2021	09:00 PM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
93	4/14/2021	09:15 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
94	4/14/2021	09:30 PM	0	4	0	0	1	0	0	0	0	0	0	0	0	0	5
95	4/14/2021	09:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
96	4/14/2021	10:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
97	4/14/2021	10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	4/14/2021	10:30 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
99	4/14/2021	10:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
100	4/14/2021	11:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
101	4/14/2021	11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
104			6	444	262	5	143	2	0	13	0	0	0	0	0	0	875



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
56	4/14/2021	12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	4/14/2021	12:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
58	4/14/2021	12:30 PM	0	1	0	0	2	0	0	0	0	0	0	0	0	0	3
59	4/14/2021	12:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
60	4/14/2021	01:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
61	4/14/2021	01:15 PM	0	3	0	0	2	0	0	0	0	0	0	0	0	0	5
62	4/14/2021	01:30 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
63	4/14/2021	01:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
64	4/14/2021	02:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
65	4/14/2021	02:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
66	4/14/2021	02:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
67	4/14/2021	02:45 PM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
68	4/14/2021	03:00 PM	0	1	2	0	0	0	0	0	0	0	0	0	0	0	3
69	4/14/2021	03:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
70	4/14/2021	03:30 PM	1	1	0	0	1	0	0	0	0	0	0	0	0	0	3
71	4/14/2021	03:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
72	4/14/2021	04:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
73	4/14/2021	04:15 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
74	4/14/2021	04:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
75	4/14/2021	04:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
76	4/14/2021	05:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
77	4/14/2021	05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	4/14/2021	05:30 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
79	4/14/2021	05:45 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
80	4/14/2021	06:00 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
81	4/14/2021	06:15 PM	0	3	0	0	2	0	0	0	0	0	0	0	0	0	5
82	4/14/2021	06:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
83	4/14/2021	06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	4/14/2021	07:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
85	4/14/2021	07:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
86	4/14/2021	07:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
87	4/14/2021	07:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
88	4/14/2021	08:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
89	4/14/2021	08:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
90	4/14/2021	08:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	4/14/2021	08:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	4/14/2021	09:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
93	4/14/2021	09:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	4/14/2021	09:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	4/14/2021	09:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	4/14/2021	10:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
97	4/14/2021	10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	4/14/2021	10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	4/14/2021	10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	4/14/2021	11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101	4/14/2021	11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			2	46	27	3	17	2	0	2	0	0	0	0	0	0	99



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
56	4/14/2021	12:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
57	4/14/2021	12:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
58	4/14/2021	12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	4/14/2021	12:45 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
60	4/14/2021	01:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
61	4/14/2021	01:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
62	4/14/2021	01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	4/14/2021	01:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
64	4/14/2021	02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	4/14/2021	02:15 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
66	4/14/2021	02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
67	4/14/2021	02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	4/14/2021	03:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
69	4/14/2021	03:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
70	4/14/2021	03:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
71	4/14/2021	03:45 PM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
72	4/14/2021	04:00 PM	0	2	0	1	0	0	0	0	0	0	0	0	0	0	3
73	4/14/2021	04:15 PM	0	1	1	0	2	0	0	0	0	0	0	0	0	0	4
74	4/14/2021	04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	4
75	4/14/2021	04:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
76	4/14/2021	05:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
77	4/14/2021	05:15 PM	0	1	2	0	1	0	0	0	0	0	0	0	0	0	4
78	4/14/2021	05:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
79	4/14/2021	05:45 PM	0	2	2	0	0	0	0	0	0	0	0	0	0	0	4
80	4/14/2021	06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	4/14/2021	06:15 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
82	4/14/2021	06:30 PM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
83	4/14/2021	06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	4/14/2021	07:00 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
85	4/14/2021	07:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
86	4/14/2021	07:30 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
87	4/14/2021	07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88	4/14/2021	08:00 PM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
89	4/14/2021	08:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
90	4/14/2021	08:30 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
91	4/14/2021	08:45 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
92	4/14/2021	09:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
93	4/14/2021	09:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
94	4/14/2021	09:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
95	4/14/2021	09:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
96	4/14/2021	10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	4/14/2021	10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	4/14/2021	10:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	4/14/2021	10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	4/14/2021	11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101	4/14/2021	11:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			0	50	22	2	17	0	0	2	0	0	0	0	0	0	93



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	5	3	0	1	0	0	0	0	0	0	0	0	0	9
54	4/14/2021	11:30 AM	0	6	10	0	0	0	0	0	0	0	0	0	0	0	16
55	4/14/2021	11:45 AM	0	11	2	0	0	0	0	0	0	0	0	0	0	0	13
56	4/14/2021	12:00 PM	0	9	3	0	1	0	0	0	0	0	0	0	0	0	13
57	4/14/2021	12:15 PM	0	5	2	0	3	0	0	0	0	0	0	0	0	0	10
58	4/14/2021	12:30 PM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
59	4/14/2021	12:45 PM	0	11	3	0	0	0	0	0	0	0	0	0	0	0	14
60	4/14/2021	01:00 PM	0	9	4	0	2	0	0	0	0	0	0	0	0	0	15
61	4/14/2021	01:15 PM	0	6	1	0	1	0	0	0	0	0	0	0	0	0	8
62	4/14/2021	01:30 PM	0	6	6	0	1	0	0	0	0	0	0	0	0	0	13
63	4/14/2021	01:45 PM	0	5	6	0	2	0	0	0	0	0	0	0	0	0	13
64	4/14/2021	02:00 PM	0	11	0	0	3	0	0	0	0	0	0	0	0	0	14
65	4/14/2021	02:15 PM	0	4	2	0	1	0	0	0	0	0	0	0	0	0	7
66	4/14/2021	02:30 PM	0	9	5	0	3	0	0	0	0	0	0	0	0	0	17
67	4/14/2021	02:45 PM	0	13	6	0	3	0	0	0	0	0	0	0	0	0	22
68	4/14/2021	03:00 PM	0	26	10	4	3	0	0	0	0	0	0	0	0	0	43
69	4/14/2021	03:15 PM	0	15	7	0	0	0	0	0	0	0	0	0	0	0	22
70	4/14/2021	03:30 PM	0	24	7	0	0	0	0	0	0	0	0	0	0	0	31
71	4/14/2021	03:45 PM	0	10	2	0	1	0	0	0	0	0	0	0	0	0	13
72	4/14/2021	04:00 PM	0	13	14	2	2	0	0	0	0	0	0	0	0	0	31
73	4/14/2021	04:15 PM	0	12	5	0	2	0	0	0	0	0	0	0	0	0	19
74	4/14/2021	04:30 PM	0	11	4	0	0	0	0	0	0	0	0	0	0	0	15
75	4/14/2021	04:45 PM	0	10	2	0	0	0	0	0	0	0	0	0	0	0	12
76	4/14/2021	05:00 PM	0	13	2	0	1	0	0	1	0	0	0	0	0	0	17
77	4/14/2021	05:15 PM	0	13	4	0	0	0	0	0	0	0	0	0	0	0	17
78	4/14/2021	05:30 PM	0	18	8	0	1	0	0	0	0	0	0	0	0	0	27
79	4/14/2021	05:45 PM	0	12	7	0	0	0	0	0	0	0	0	0	0	0	19
80	4/14/2021	06:00 PM	0	10	9	0	2	0	0	0	0	0	0	0	0	0	21
81	4/14/2021	06:15 PM	0	7	4	0	0	0	0	0	0	0	0	0	0	0	11
82	4/14/2021	06:30 PM	1	10	4	0	0	0	0	0	0	0	0	0	0	0	15
83	4/14/2021	06:45 PM	0	7	2	0	1	0	0	0	0	0	0	0	0	0	10
84	4/14/2021	07:00 PM	0	13	0	0	1	0	0	0	0	0	0	0	0	0	14
85	4/14/2021	07:15 PM	0	7	2	0	1	0	0	0	0	0	0	0	0	0	10
86	4/14/2021	07:30 PM	0	2	4	0	0	0	0	0	0	0	0	0	0	0	6
87	4/14/2021	07:45 PM	0	4	2	0	0	0	0	0	0	0	0	0	0	0	6
88	4/14/2021	08:00 PM	0	4	6	0	1	0	0	0	0	0	0	0	0	0	11
89	4/14/2021	08:15 PM	0	1	3	0	0	0	0	0	0	0	0	0	0	0	4
90	4/14/2021	08:30 PM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
91	4/14/2021	08:45 PM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
92	4/14/2021	09:00 PM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
93	4/14/2021	09:15 PM	0	5	1	0	1	0	0	0	0	0	0	0	0	0	7
94	4/14/2021	09:30 PM	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3
95	4/14/2021	09:45 PM	0	3	1	0	0	0	0	0	0	0	0	0	0	0	4
96	4/14/2021	10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	4/14/2021	10:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	4/14/2021	10:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
99	4/14/2021	10:45 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
100	4/14/2021	11:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
101	4/14/2021	11:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104			2	531	244	8	51	1	1	6	0	1	1	0	0	0	845



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	0	4	0	0	1	0	0	0	0	0	0	0	0	0	5
54	4/14/2021	11:30 AM	0	3	2	0	1	0	0	1	0	0	0	0	0	0	7
55	4/14/2021	11:45 AM	0	7	5	0	1	0	0	0	0	0	0	0	0	0	13
56	4/14/2021	12:00 PM	0	11	3	0	1	0	0	0	0	0	0	0	0	0	15
57	4/14/2021	12:15 PM	0	5	1	0	0	0	0	0	0	0	0	0	0	0	6
58	4/14/2021	12:30 PM	0	9	4	1	1	0	0	0	0	0	0	0	0	0	15
59	4/14/2021	12:45 PM	0	4	1	0	2	0	0	0	0	0	0	0	0	0	7
60	4/14/2021	01:00 PM	0	7	6	0	1	0	0	0	0	0	0	0	0	0	14
61	4/14/2021	01:15 PM	0	7	2	0	0	0	0	0	0	0	0	0	0	0	9
62	4/14/2021	01:30 PM	0	8	0	0	0	0	0	0	0	0	0	0	0	0	8
63	4/14/2021	01:45 PM	0	12	4	1	0	0	0	0	0	0	0	0	0	0	17
64	4/14/2021	02:00 PM	0	7	3	0	1	0	0	0	0	0	0	0	0	0	11
65	4/14/2021	02:15 PM	0	15	5	0	2	0	0	0	0	0	0	0	0	0	22
66	4/14/2021	02:30 PM	0	16	5	4	5	0	0	0	0	0	0	0	0	0	30
67	4/14/2021	02:45 PM	0	17	3	0	1	0	0	0	0	0	0	0	0	0	21
68	4/14/2021	03:00 PM	1	9	6	0	2	0	0	0	0	0	0	0	0	0	18
69	4/14/2021	03:15 PM	0	6	2	0	3	0	0	0	0	0	0	0	0	0	11
70	4/14/2021	03:30 PM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
71	4/14/2021	03:45 PM	0	16	9	0	0	0	0	0	0	0	0	0	0	0	25
72	4/14/2021	04:00 PM	0	12	5	1	1	0	0	0	0	0	0	0	0	0	19
73	4/14/2021	04:15 PM	0	10	2	0	2	0	0	0	0	0	0	0	0	0	14
74	4/14/2021	04:30 PM	0	10	3	0	1	0	0	0	0	0	0	0	0	0	14
75	4/14/2021	04:45 PM	0	14	2	0	0	0	0	0	0	0	0	0	0	0	16
76	4/14/2021	05:00 PM	0	16	5	0	0	0	0	0	0	0	0	0	0	0	21
77	4/14/2021	05:15 PM	0	9	5	0	1	0	0	0	0	0	0	0	0	0	15
78	4/14/2021	05:30 PM	0	8	4	0	4	0	0	0	0	0	0	0	0	0	16
79	4/14/2021	05:45 PM	0	12	7	0	1	0	0	0	0	0	0	0	0	0	20
80	4/14/2021	06:00 PM	0	7	2	0	0	0	0	0	0	0	0	0	0	0	9
81	4/14/2021	06:15 PM	0	9	11	0	0	0	0	0	0	0	0	0	0	0	20
82	4/14/2021	06:30 PM	0	6	6	0	0	0	0	0	0	0	0	0	0	0	12
83	4/14/2021	06:45 PM	0	9	4	0	1	0	0	0	0	0	0	0	0	0	14
84	4/14/2021	07:00 PM	0	4	1	0	1	0	0	0	0	0	0	0	0	0	6
85	4/14/2021	07:15 PM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
86	4/14/2021	07:30 PM	0	8	1	0	1	0	0	0	0	0	0	0	0	0	10
87	4/14/2021	07:45 PM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
88	4/14/2021	08:00 PM	0	4	3	0	1	0	0	0	0	0	0	0	0	0	8
89	4/14/2021	08:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
90	4/14/2021	08:30 PM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
91	4/14/2021	08:45 PM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
92	4/14/2021	09:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
93	4/14/2021	09:15 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
94	4/14/2021	09:30 PM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	5
95	4/14/2021	09:45 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
96	4/14/2021	10:00 PM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
97	4/14/2021	10:15 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
98	4/14/2021	10:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
99	4/14/2021	10:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	4/14/2021	11:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
101	4/14/2021	11:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
102	4/14/2021	11:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	4/14/2021	11:45 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
104			2	518	230	12	63	2	0	5	1	0	0	0	0	0	833

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	SWISHER RD W OF SHADYS SHORE RD (S)																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 807_962																
6	Direction: Eastbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classified	TOTAL
8	4/14/2021	12:00 AM	0	20	2	0	0	0	0	1	0	0	0	0	0	0	23
9	4/14/2021	12:15 AM	0	17	9	0	0	0	0	1	0	0	0	0	0	0	27
10	4/14/2021	12:30 AM	0	16	2	0	0	1	0	0	0	0	0	0	0	0	19
11	4/14/2021	12:45 AM	0	15	2	0	0	0	0	0	0	0	0	0	0	0	17
12	4/14/2021	01:00 AM	0	14	0	0	0	0	0	0	0	0	0	0	0	0	14
13	4/14/2021	01:15 AM	0	12	1	0	1	0	0	1	0	0	0	0	0	0	15
14	4/14/2021	01:30 AM	0	7	4	0	0	0	0	0	0	0	0	0	0	0	11
15	4/14/2021	01:45 AM	0	7	2	0	1	0	0	0	0	0	0	0	0	0	10
16	4/14/2021	02:00 AM	0	11	2	0	0	0	0	0	0	0	0	0	0	0	13
17	4/14/2021	02:15 AM	0	10	0	1	0	0	0	0	0	0	0	0	0	0	11
18	4/14/2021	02:30 AM	0	9	1	0	0	0	0	0	0	0	0	0	0	0	10
19	4/14/2021	02:45 AM	0	5	5	0	0	0	0	0	0	0	0	0	0	0	10
20	4/14/2021	03:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
21	4/14/2021	03:15 AM	0	6	2	0	2	0	0	0	0	0	0	0	0	0	10
22	4/14/2021	03:30 AM	0	5	0	0	0	2	0	0	0	0	0	0	0	0	7
23	4/14/2021	03:45 AM	0	6	2	0	0	0	0	0	0	0	0	0	0	0	8
24	4/14/2021	04:00 AM	0	7	3	0	1	0	0	0	0	0	0	0	0	0	11
25	4/14/2021	04:15 AM	0	8	3	0	1	0	0	0	1	0	0	0	0	0	13
26	4/14/2021	04:30 AM	0	7	4	0	1	0	0	0	0	0	0	0	0	0	12
27	4/14/2021	04:45 AM	0	9	2	1	3	0	0	1	0	0	0	0	0	0	16
28	4/14/2021	05:00 AM	0	15	3	0	1	0	0	0	2	0	0	0	0	0	21
29	4/14/2021	05:15 AM	0	25	14	0	0	0	2	0	3	0	0	0	0	0	44
30	4/14/2021	05:30 AM	0	24	12	1	1	0	0	1	0	1	0	0	0	0	40
31	4/14/2021	05:45 AM	1	26	12	0	5	2	0	1	2	0	0	0	0	0	49
32	4/14/2021	06:00 AM	0	38	24	1	2	2	0	0	0	0	0	0	0	2	69
33	4/14/2021	06:15 AM	1	70	32	3	12	3	0	2	5	0	1	0	0	0	129
34	4/14/2021	06:30 AM	2	62	36	1	2	2	0	1	4	0	0	1	0	1	112
35	4/14/2021	06:45 AM	3	94	33	1	8	7	1	2	4	1	0	1	0	1	156
36	4/14/2021	07:00 AM	0	55	25	1	7	3	0	4	3	1	0	1	0	6	106
37	4/14/2021	07:15 AM	1	85	37	2	9	3	0	4	1	1	0	1	1	1	146
38	4/14/2021	07:30 AM	8	68	45	3	10	1	0	2	3	0	0	1	1	3	145
39	4/14/2021	07:45 AM	4	70	34	2	5	0	0	6	2	1	0	0	0	1	125
40	4/14/2021	08:00 AM	2	77	26	0	10	1	0	4	2	0	1	0	1	2	126
41	4/14/2021	08:15 AM	4	71	30	1	18	0	0	8	3	2	0	0	0	2	139
42	4/14/2021	08:30 AM	6	80	36	0	9	2	0	3	0	0	0	0	0	0	137
43	4/14/2021	08:45 AM	2	76	34	0	9	0	0	10	3	1	0	0	0	2	137
44	4/14/2021	09:00 AM	2	77	33	2	9	1	0	12	7	0	0	1	0	0	144
45	4/14/2021	09:15 AM	6	76	44	1	6	2	0	1	2	0	0	1	1	4	144
46	4/14/2021	09:30 AM	2	83	45	3	7	3	0	9	3	1	0	0	0	1	157
47	4/14/2021	09:45 AM	3	67	29	1	12	1	0	6	4	2	0	0	1	1	127
48	4/14/2021	10:00 AM	0	62	27	1	12	0	0	7	5	0	0	0	0	0	114
49	4/14/2021	10:15 AM	0	80	40	0	9	2	0	9	6	2	1	0	0	1	150
50	4/14/2021	10:30 AM	3	75	33	0	16	1	0	0	3	0	0	0	0	0	132
51	4/14/2021	10:45 AM	0	94	22	0	14	3	0	5	4	0	0	0	0	2	144
52	4/14/2021	11:00 AM	2	81	33	0	10	0	0	3	2	1	0	0	0	1	133

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	1	88	34	3	5	2	0	2	1	0	0	0	0	2	138
54	4/14/2021	11:30 AM	2	70	21	1	8	2	0	0	2	1	0	0	0	0	109
55	4/14/2021	11:45 AM	1	77	29	1	9	1	0	7	3	0	0	0	0	2	130
56	4/14/2021	12:00 PM	0	96	32	0	14	0	0	5	1	0	0	0	0	0	148
57	4/14/2021	12:15 PM	4	83	35	1	6	2	0	6	3	0	0	0	0	2	142
58	4/14/2021	12:30 PM	1	107	31	0	12	1	0	4	3	2	0	0	0	0	161
59	4/14/2021	12:45 PM	2	103	44	0	10	1	0	3	1	0	0	0	0	2	166
60	4/14/2021	01:00 PM	1	89	37	2	11	0	0	6	1	0	0	0	0	2	149
61	4/14/2021	01:15 PM	2	102	36	1	7	1	0	10	0	0	0	0	1	2	162
62	4/14/2021	01:30 PM	2	112	38	1	10	0	0	6	1	0	0	0	0	0	170
63	4/14/2021	01:45 PM	1	117	38	3	9	0	0	4	2	1	1	0	0	3	179
64	4/14/2021	02:00 PM	3	114	45	0	6	1	0	5	3	0	0	0	1	2	180
65	4/14/2021	02:15 PM	5	127	36	0	11	3	0	5	2	0	0	0	0	0	192
66	4/14/2021	02:30 PM	2	135	42	2	5	1	0	5	1	2	0	0	0	0	196
67	4/14/2021	02:45 PM	6	131	36	2	13	1	0	2	1	1	0	0	0	1	194
68	4/14/2021	03:00 PM	3	125	47	0	10	1	0	4	0	1	1	0	0	4	197
69	4/14/2021	03:15 PM	4	124	51	1	6	1	0	6	2	1	0	1	0	2	199
70	4/14/2021	03:30 PM	0	85	30	1	5	1	0	3	1	0	0	0	0	5	132
71	4/14/2021	03:45 PM	2	78	28	0	3	0	0	4	0	0	0	0	0	5	120
72	4/14/2021	04:00 PM	4	130	43	3	8	0	0	4	0	0	0	1	0	2	197
73	4/14/2021	04:15 PM	8	123	37	3	11	0	0	6	0	0	0	0	1	6	196
74	4/14/2021	04:30 PM	3	116	32	2	12	0	0	4	0	0	0	0	0	4	173
75	4/14/2021	04:45 PM	6	129	38	2	4	0	1	3	0	0	0	0	0	1	184
76	4/14/2021	05:00 PM	6	104	38	1	7	0	0	3	1	0	0	0	0	2	162
77	4/14/2021	05:15 PM	2	90	40	2	5	1	1	6	0	0	0	0	1	1	149
78	4/14/2021	05:30 PM	3	91	31	0	5	0	0	2	0	0	0	0	0	3	138
79	4/14/2021	05:45 PM	1	96	31	1	4	0	0	4	0	0	0	0	0	3	140
80	4/14/2021	06:00 PM	3	87	23	3	5	1	0	1	1	0	0	0	0	8	132
81	4/14/2021	06:15 PM	4	114	30	0	8	2	0	2	1	0	0	0	0	2	163
82	4/14/2021	06:30 PM	6	129	35	1	3	0	0	4	0	0	0	0	0	3	182
83	4/14/2021	06:45 PM	3	125	42	1	5	2	0	3	0	0	0	1	0	0	183
84	4/14/2021	07:00 PM	0	118	29	0	7	0	0	3	0	0	0	0	0	1	158
85	4/14/2021	07:15 PM	2	153	45	1	5	1	0	4	0	1	0	0	0	0	212
86	4/14/2021	07:30 PM	2	113	28	0	7	0	0	5	0	0	0	0	0	1	156
87	4/14/2021	07:45 PM	0	120	34	0	4	0	0	5	0	0	0	0	0	0	164
88	4/14/2021	08:00 PM	1	75	25	0	5	0	0	1	0	0	0	0	0	4	111
89	4/14/2021	08:15 PM	1	95	36	0	8	0	0	5	0	0	0	0	0	1	147
90	4/14/2021	08:30 PM	1	104	23	1	5	1	1	1	0	0	0	0	0	4	142
91	4/14/2021	08:45 PM	2	98	26	0	3	0	0	1	0	0	0	0	0	0	130
92	4/14/2021	09:00 PM	0	79	40	1	5	0	0	0	1	0	0	0	0	0	126
93	4/14/2021	09:15 PM	1	88	19	0	5	1	0	3	0	0	0	0	0	0	118
94	4/14/2021	09:30 PM	0	76	12	1	2	0	0	3	0	0	0	0	0	0	94
95	4/14/2021	09:45 PM	0	73	9	0	2	0	0	0	0	0	0	0	0	0	84
96	4/14/2021	10:00 PM	0	62	19	0	2	0	0	3	0	0	0	0	0	0	86
97	4/14/2021	10:15 PM	1	48	13	1	1	0	0	1	0	0	0	0	0	0	65
98	4/14/2021	10:30 PM	2	38	15	0	2	0	0	0	0	0	0	0	0	0	57
99	4/14/2021	10:45 PM	0	37	9	1	4	0	0	0	0	0	0	0	0	0	51
100	4/14/2021	11:00 PM	0	36	7	0	1	0	0	0	0	0	0	0	0	0	44
101	4/14/2021	11:15 PM	0	31	5	0	0	0	0	0	1	0	0	0	0	1	38
102	4/14/2021	11:30 PM	0	22	11	0	1	0	0	0	0	0	0	0	0	0	34
103	4/14/2021	11:45 PM	0	27	5	0	0	0	0	0	0	0	0	0	0	0	32
104			156	6613	2306	69	520	70	7	270	108	24	12	18	10	114	10297

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	SWISHER RD W OF SHADYS SHORE RD (S)																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 807 962																
6	Direction: Westbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	TOTAL
8	4/14/2021	01:00 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
9	4/14/2021	01:15 AM	0	6	1	0	1	0	0	0	0	0	0	0	0	0	8
10	4/14/2021	01:30 AM	0	6	1	0	2	1	0	0	0	0	0	0	0	0	10
11	4/14/2021	01:45 AM	0	13	0	0	0	0	0	0	0	0	0	0	0	0	13
12	4/14/2021	02:00 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
13	4/14/2021	02:15 AM	0	6	1	1	0	0	0	0	0	0	0	0	0	0	8
14	4/14/2021	02:30 AM	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
15	4/14/2021	02:45 AM	0	5	4	0	1	0	0	0	0	0	0	0	0	0	10
16	4/14/2021	03:00 AM	0	3	1	0	1	0	0	1	1	1	0	0	0	0	7
17	4/14/2021	03:15 AM	0	6	4	0	0	0	0	1	0	0	0	0	0	0	11
18	4/14/2021	03:30 AM	0	12	7	0	1	0	0	1	0	0	0	0	0	0	21
19	4/14/2021	03:45 AM	0	16	3	0	0	0	0	1	0	0	0	0	0	0	20
20	4/14/2021	04:00 AM	0	14	12	0	3	0	0	0	1	0	0	0	0	0	30
21	4/14/2021	04:15 AM	0	14	10	0	0	0	0	0	0	2	0	0	0	0	26
22	4/14/2021	04:30 AM	0	25	16	0	3	0	0	0	0	0	0	0	0	0	44
23	4/14/2021	04:45 AM	1	28	10	0	6	1	0	1	0	0	0	0	0	0	47
24	4/14/2021	05:00 AM	0	45	19	0	9	0	0	2	0	0	0	0	0	0	75
25	4/14/2021	05:15 AM	0	47	15	1	12	0	0	6	0	0	0	0	0	0	81
26	4/14/2021	05:30 AM	0	68	33	1	9	0	0	5	1	1	0	0	0	0	119
27	4/14/2021	05:45 AM	0	66	25	1	13	1	1	8	0	1	0	0	0	3	119
28	4/14/2021	06:00 AM	1	79	42	0	11	1	1	8	1	2	0	1	0	2	149
29	4/14/2021	06:15 AM	2	79	42	1	15	3	0	12	0	2	0	0	1	1	158
30	4/14/2021	06:30 AM	5	95	47	2	16	3	0	19	2	0	0	1	0	3	193
31	4/14/2021	06:45 AM	1	102	31	6	10	0	0	13	4	2	0	1	0	2	172
32	4/14/2021	07:00 AM	4	107	41	1	12	0	0	5	2	1	0	1	0	2	176
33	4/14/2021	07:15 AM	7	128	39	3	13	0	0	7	1	3	0	0	1	3	205
34	4/14/2021	07:30 AM	8	123	46	3	7	4	0	4	0	0	0	0	0	2	197
35	4/14/2021	07:45 AM	3	120	40	3	13	2	0	4	1	1	0	0	2	3	192
36	4/14/2021	08:00 AM	2	112	36	7	16	2	1	8	4	0	1	1	1	7	197
37	4/14/2021	08:15 AM	7	82	25	1	5	5	0	6	0	1	0	0	0	2	134
38	4/14/2021	08:30 AM	5	92	32	2	11	4	1	6	0	0	1	0	1	3	158
39	4/14/2021	08:45 AM	4	120	54	0	11	1	1	13	3	1	0	0	0	2	211
40	4/14/2021	09:00 AM	1	100	30	1	9	1	1	7	2	1	0	1	1	0	155
41	4/14/2021	09:15 AM	5	99	33	0	4	4	0	5	2	1	0	0	3	157	
42	4/14/2021	09:30 AM	3	92	24	1	12	2	1	6	2	3	0	2	0	1	149
43	4/14/2021	09:45 AM	0	70	33	1	14	4	0	8	1	4	0	0	0	1	136
44	4/14/2021	10:00 AM	3	95	34	5	10	7	0	3	1	1	1	1	2	0	162
45	4/14/2021	10:15 AM	0	62	30	1	11	1	2	4	3	1	0	0	1	2	119
46	4/14/2021	10:30 AM	1	90	30	3	6	2	1	0	2	1	0	0	2	3	149
47	4/14/2021	10:45 AM	0	88	35	2	9	3	0	7	1	1	1	0	1	1	149
48	4/14/2021	11:00 AM	2	95	35	2	13	4	1	7	6	1	1	0	1	1	169
49	4/14/2021	11:15 AM	1	92	34	2	16	7	0	12	4	2	1	0	4	0	175
50	4/14/2021	11:30 AM	1	83	39	1	15	2	0	7	1	0	0	1	1	0	151
51	4/14/2021	11:45 AM	0	76	34	0	8	3	0	8	2	2	0	0	1	3	137
52	4/14/2021	12:00 PM	1	90	26	1	9	1	0	5	2	0	1	0	0	3	139

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	12:15 PM	0	91	31	0	12	0	0	4	0	2	0	0	0	4	145
54	4/14/2021	12:30 PM	0	73	22	1	10	2	0	10	0	0	1	0	0	0	119
55	4/14/2021	12:45 PM	0	84	34	0	11	0	0	8	2	3	0	0	1	3	146
56	4/14/2021	01:00 PM	0	79	25	2	9	5	0	8	2	2	1	0	1	2	136
57	4/14/2021	01:15 PM	1	92	39	5	10	3	0	8	3	6	0	1	0	1	169
58	4/14/2021	01:30 PM	0	70	24	0	11	1	0	9	0	0	0	0	2	0	117
59	4/14/2021	01:45 PM	1	85	34	0	12	2	0	5	3	0	0	1	0	2	145
60	4/14/2021	02:00 PM	1	89	37	1	12	2	0	7	1	1	0	2	0	0	153
61	4/14/2021	02:15 PM	0	108	36	2	8	1	0	5	0	2	0	1	1	0	165
62	4/14/2021	02:30 PM	0	82	19	1	12	0	0	6	3	0	0	1	2	3	129
63	4/14/2021	02:45 PM	2	75	36	0	14	1	0	5	0	0	1	0	0	2	136
64	4/14/2021	03:00 PM	1	89	32	4	8	5	0	7	1	2	0	0	0	0	149
65	4/14/2021	03:15 PM	0	87	27	1	7	2	1	7	1	2	1	0	0	1	137
66	4/14/2021	03:30 PM	1	71	40	2	11	3	0	11	2	0	0	0	0	0	141
67	4/14/2021	03:45 PM	0	99	40	1	18	0	0	3	1	1	1	0	0	1	165
68	4/14/2021	04:00 PM	0	101	40	0	4	5	0	7	2	1	2	0	0	4	166
69	4/14/2021	04:15 PM	2	84	38	1	14	0	0	7	0	3	0	0	0	0	149
70	4/14/2021	04:30 PM	1	122	46	1	2	0	0	9	2	0	0	1	1	0	185
71	4/14/2021	04:45 PM	0	129	31	1	10	2	0	10	0	3	0	0	0	1	188
72	4/14/2021	05:00 PM	0	114	29	1	10	2	0	2	1	0	1	1	1	2	164
73	4/14/2021	05:15 PM	2	144	44	0	10	4	0	13	1	1	0	0	0	2	221
74	4/14/2021	05:30 PM	0	116	25	0	5	2	0	6	3	0	0	0	0	2	159
75	4/14/2021	05:45 PM	0	78	36	1	11	3	0	13	1	1	0	0	0	0	144
76	4/14/2021	06:00 PM	0	110	35	0	8	0	0	7	0	1	0	2	0	2	165
77	4/14/2021	06:15 PM	4	95	50	0	8	2	1	5	0	0	0	0	0	2	167
78	4/14/2021	06:30 PM	0	101	32	1	10	3	0	9	0	1	0	0	1	1	159
79	4/14/2021	06:45 PM	0	87	39	3	6	1	0	3	2	1	0	0	1	1	144
80	4/14/2021	07:00 PM	2	104	34	3	4	2	0	9	1	0	0	0	0	0	160
81	4/14/2021	07:15 PM	1	57	35	2	5	0	0	3	0	0	0	0	0	2	105
82	4/14/2021	07:30 PM	0	82	21	2	12	0	1	5	1	0	0	0	0	0	124
83	4/14/2021	07:45 PM	1	81	25	0	3	0	1	3	0	2	1	0	0	1	118
84	4/14/2021	08:00 PM	2	61	26	1	7	1	0	6	0	1	0	1	1	1	108
85	4/14/2021	08:15 PM	2	49	13	0	5	0	0	3	0	0	0	0	1	1	74
86	4/14/2021	08:30 PM	1	55	13	0	2	0	0	3	0	0	0	0	0	0	74
87	4/14/2021	08:45 PM	1	47	18	1	7	0	0	1	0	0	0	0	0	0	75
88	4/14/2021	09:00 PM	0	52	15	0	5	0	1	2	0	1	0	0	0	0	76
89	4/14/2021	09:15 PM	0	58	10	0	3	0	0	1	1	0	0	0	0	0	73
90	4/14/2021	09:30 PM	0	75	16	0	4	1	0	1	0	0	0	0	0	0	97
91	4/14/2021	09:45 PM	1	42	6	0	0	0	0	1	0	0	0	1	0	1	53
92	4/14/2021	10:00 PM	0	32	6	0	2	0	0	2	0	0	0	0	0	0	42
93	4/14/2021	10:15 PM	0	30	9	0	4	0	0	1	1	0	0	0	0	0	45
94	4/14/2021	10:30 PM	0	18	8	0	4	0	0	0	0	0	0	0	0	0	30
95	4/14/2021	10:45 PM	0	21	5	0	1	0	0	0	0	0	0	0	0	0	27
96	4/14/2021	11:00 PM	1	19	3	0	3	0	0	2	0	0	0	0	0	0	28
97	4/14/2021	11:15 PM	0	16	4	0	0	0	0	0	0	0	0	0	0	0	20
98	4/14/2021	11:30 PM	0	15	5	0	1	0	0	0	0	0	0	0	0	0	21
99	4/14/2021	11:45 PM	0	17	4	0	1	0	0	0	0	0	0	0	0	0	22
100	4/15/2021	12:00 AM	0	13	5	0	0	0	0	0	0	0	0	0	0	0	18
101	4/15/2021	12:15 AM	0	9	4	0	1	0	0	0	0	0	0	0	0	0	14
102	4/15/2021	12:30 AM	0	9	2	0	1	0	0	0	0	0	0	0	0	0	12
103	4/15/2021	12:45 AM	0	9	1	0	0	0	0	0	0	0	0	0	0	0	10
104			96	6287	2271	91	675	125	15	451	88	71	15	24	35	97	10341

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	SWISHER RD E OF SHADY SHORE RD (S)																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 866 966																
6	Direction: Eastbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axle Double	5 Axle Double	>6 Axle Double	<6 Axle Multi	6 Axle Multi	>6 Axle Multi	Not Classified	TOTAL
8	4/14/2021	12:00 AM	0	10	1	1	1	0	0	1	0	0	0	0	0	0	15
9	4/14/2021	12:15 AM	0	17	3	0	1	0	0	2	0	0	0	0	0	0	23
10	4/14/2021	12:30 AM	0	8	4	0	0	1	0	0	0	0	0	0	0	0	16
11	4/14/2021	12:45 AM	0	9	1	0	0	0	0	0	0	0	0	0	0	0	10
12	4/14/2021	01:00 AM	0	11	1	0	0	0	0	0	0	0	0	0	0	0	12
13	4/14/2021	01:15 AM	0	18	3	0	2	0	0	0	0	0	0	0	0	0	23
14	4/14/2021	01:30 AM	0	5	4	0	1	0	0	2	0	0	0	0	0	0	12
15	4/14/2021	01:45 AM	0	6	3	0	0	0	0	1	0	0	0	0	0	0	10
16	4/14/2021	02:00 AM	0	9	0	0	2	0	0	0	0	0	0	0	0	0	11
17	4/14/2021	02:15 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
18	4/14/2021	02:30 AM	0	8	2	0	1	0	0	0	0	0	0	0	0	0	11
19	4/14/2021	02:45 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	4
20	4/14/2021	03:00 AM	0	2	1	0	1	0	0	0	0	0	0	0	0	0	4
21	4/14/2021	03:15 AM	0	3	2	0	2	0	0	0	0	0	0	0	0	0	7
22	4/14/2021	03:30 AM	0	3	0	0	1	1	0	0	0	0	0	0	0	0	5
23	4/14/2021	03:45 AM	0	6	1	0	0	0	0	0	0	0	0	0	0	0	7
24	4/14/2021	04:00 AM	0	4	1	0	3	0	0	1	0	1	0	0	0	0	9
25	4/14/2021	04:15 AM	0	8	1	0	2	0	0	0	2	0	0	0	0	0	13
26	4/14/2021	04:30 AM	0	10	5	0	2	0	0	0	0	0	0	0	0	0	17
27	4/14/2021	04:45 AM	0	6	1	1	6	0	0	1	0	0	0	0	0	0	15
28	4/14/2021	05:00 AM	0	13	3	0	2	0	0	1	2	0	0	0	0	0	21
29	4/14/2021	05:15 AM	1	18	6	1	4	1	2	1	1	1	0	0	0	0	35
30	4/14/2021	05:30 AM	0	21	6	0	6	0	0	1	0	1	0	0	0	0	35
31	4/14/2021	05:45 AM	1	24	10	2	5	1	0	0	0	0	0	0	0	0	43
32	4/14/2021	06:00 AM	2	31	18	2	17	3	0	4	1	0	0	0	0	0	79
33	4/14/2021	06:15 AM	0	43	18	1	16	1	0	6	4	0	0	0	0	2	91
34	4/14/2021	06:30 AM	0	49	22	1	20	2	1	6	2	0	0	0	0	1	105
35	4/14/2021	06:45 AM	3	63	37	3	19	8	0	6	2	0	0	0	0	1	143
36	4/14/2021	07:00 AM	1	57	25	4	13	6	0	12	4	0	0	1	2	0	125
37	4/14/2021	07:15 AM	3	54	34	4	27	4	0	12	3	1	1	0	0	3	146
38	4/14/2021	07:30 AM	1	62	33	4	38	7	0	15	1	2	1	0	0	0	164
39	4/14/2021	07:45 AM	3	61	43	3	24	5	0	10	3	5	1	0	0	0	158
40	4/14/2021	08:00 AM	1	75	35	6	23	3	0	10	3	3	0	1	1	1	162
41	4/14/2021	08:15 AM	3	64	47	5	24	3	2	9	4	2	0	0	2	1	166
42	4/14/2021	08:30 AM	2	74	29	1	25	1	1	19	1	1	1	0	0	1	157
43	4/14/2021	08:45 AM	2	53	39	4	28	0	0	13	3	0	0	0	0	0	143
44	4/14/2021	09:00 AM	3	51	26	2	19	4	1	12	2	0	0	0	0	1	122
45	4/14/2021	09:15 AM	1	50	30	1	17	6	0	9	2	3	0	1	1	0	121
46	4/14/2021	09:30 AM	2	78	39	6	28	1	0	12	4	3	0	1	1	1	176
47	4/14/2021	09:45 AM	2	46	22	2	22	3	1	8	2	2	0	1	0	1	112
48	4/14/2021	10:00 AM	2	46	17	3	16	1	0	14	4	1	0	0	0	0	104
49	4/14/2021	10:15 AM	0	51	29	3	18	4	0	13	2	0	0	0	0	1	121
50	4/14/2021	10:30 AM	0	58	14	0	31	2	0	12	4	1	1	0	2	1	126
51	4/14/2021	10:45 AM	0	60	16	0	22	3	0	9	3	3	0	0	1	0	117
52	4/14/2021	11:00 AM	1	49	25	1	16	3	0	6	2	0	0	0	0	1	105

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	3	60	25	3	14	2	1	8	0	3	0	0	0	1	120
54	4/14/2021	11:30 AM	1	70	30	3	28	2	0	3	2	0	0	0	0	1	140
55	4/14/2021	11:45 AM	1	73	40	2	21	4	0	10	1	0	0	1	1	2	156
56	4/14/2021	12:00 PM	0	51	32	3	15	1	0	9	0	0	0	0	2	1	114
57	4/14/2021	12:15 PM	0	61	21	4	18	3	0	9	3	2	1	0	0	1	123
58	4/14/2021	12:30 PM	1	81	21	2	29	0	2	5	4	0	0	0	1	2	148
59	4/14/2021	12:45 PM	2	65	26	1	15	1	2	7	3	0	0	0	1	2	125
60	4/14/2021	01:00 PM	0	77	31	1	18	1	0	15	2	1	1	0	0	3	150
61	4/14/2021	01:15 PM	0	54	34	0	16	2	1	5	0	3	1	0	0	1	117
62	4/14/2021	01:30 PM	2	77	34	2	29	1	0	12	1	1	3	1	1	2	166
63	4/14/2021	01:45 PM	2	90	24	1	19	1	0	16	2	1	0	1	1	3	161
64	4/14/2021	02:00 PM	0	73	26	2	23	3	0	10	3	5	1	0	0	1	147
65	4/14/2021	02:15 PM	1	80	27	1	17	2	0	9	1	5	0	0	2	1	146
66	4/14/2021	02:30 PM	1	104	36	3	22	2	0	7	1	1	0	0	0	1	178
67	4/14/2021	02:45 PM	1	84	32	2	16	0	0	20	2	2	2	0	1	2	164
68	4/14/2021	03:00 PM	3	90	45	3	27	1	0	13	0	0	1	0	0	2	185
69	4/14/2021	03:15 PM	2	111	40	0	31	2	1	14	0	3	0	0	1	2	207
70	4/14/2021	03:30 PM	1	133	37	2	29	2	0	15	2	1	0	1	2	5	230
71	4/14/2021	03:45 PM	1	125	41	4	25	2	0	13	1	3	1	1	1	1	219
72	4/14/2021	04:00 PM	1	154	60	3	29	3	0	23	1	1	1	0	1	3	280
73	4/14/2021	04:15 PM	2	160	53	2	39	3	0	20	2	3	0	2	1	0	287
74	4/14/2021	04:30 PM	0	181	45	3	45	1	0	18	2	3	2	0	0	8	308
75	4/14/2021	04:45 PM	4	177	66	4	37	1	0	15	0	3	1	0	1	1	310
76	4/14/2021	05:00 PM	2	176	51	3	32	2	1	25	0	4	1	0	0	1	298
77	4/14/2021	05:15 PM	1	190	61	6	48	6	0	23	1	3	1	2	0	2	344
78	4/14/2021	05:30 PM	2	184	59	1	34	1	0	21	0	4	0	1	0	4	311
79	4/14/2021	05:45 PM	0	174	49	3	39	1	0	17	1	3	1	1	2	2	293
80	4/14/2021	06:00 PM	0	174	55	2	25	2	0	14	0	1	1	0	0	0	274
81	4/14/2021	06:15 PM	1	156	43	1	38	4	0	20	0	2	2	0	1	3	271
82	4/14/2021	06:30 PM	0	131	49	0	27	1	1	11	4	1	1	0	0	2	228
83	4/14/2021	06:45 PM	0	125	32	0	28	2	1	7	0	1	2	1	1	2	202
84	4/14/2021	07:00 PM	1	110	28	0	26	0	0	6	0	0	1	0	0	1	176
85	4/14/2021	07:15 PM	1	98	28	2	26	0	0	10	0	1	0	1	1	1	169
86	4/14/2021	07:30 PM	4	101	20	2	19	2	0	14	0	1	2	0	0	3	168
87	4/14/2021	07:45 PM	2	89	22	0	10	0	0	7	1	0	1	1	0	0	133
88	4/14/2021	08:00 PM	3	73	20	0	10	0	0	9	0	1	0	0	0	1	117
89	4/14/2021	08:15 PM	2	55	23	0	18	0	0	9	0	0	0	0	1	0	109
90	4/14/2021	08:30 PM	0	77	17	0	10	1	0	5	0	1	1	0	0	2	113
91	4/14/2021	08:45 PM	1	67	25	0	10	1	0	7	1	0	0	1	0	0	113
92	4/14/2021	09:00 PM	1	66	27	2	19	0	0	7	1	0	0	0	0	1	124
93	4/14/2021	09:15 PM	0	60	18	1	9	0	0	8	1	0	0	0	0	0	97
94	4/14/2021	09:30 PM	0	56	15	0	9	1	0	4	0	0	0	0	0	0	85
95	4/14/2021	09:45 PM	0	54	10	0	5	0	0	3	0	0	0	0	0	0	72
96	4/14/2021	10:00 PM	0	42	7	2	5	0	0	5	0	0	0	0	0	1	62
97	4/14/2021	10:15 PM	0	34	10	1	6	0	0	5	0	0	0	0	0	0	56
98	4/14/2021	10:30 PM	0	34	10	0	7	0	0	2	0	0	0	0	0	0	53
99	4/14/2021	10:45 PM	0	24	9	1	5	0	0	1	0	0	0	0	0	0	40
100	4/14/2021	11:00 PM	0	27	4	0	2	0	0	2	0	0	0	0	0	0	35
101	4/14/2021	11:15 PM	0	26	3	0	2	1	0	1	1	0	0	0	0	0	34
102	4/14/2021	11:30 PM	1	16	9	0	3	0	0	0	0	0	0	0	0	0	29
103	4/14/2021	11:45 PM	1	19	3	0	4	0	1	0	0	0	0	0	0	0	28
104			86	6071	2191	139	1548	141	21	746	105	93	34	21	37	90	11323

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	SWISHER RD E OF SHADY SHORE RD (S)																
2																	
3	Start Date: 4/14/2021																
4	Start Time: 12:00:00 AM																
5	Site Code: 866 966																
6	Direction: Westbound																
7	Date	Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	TOTAL
8	4/14/2021	12:00 AM	1	8	4	0	0	0	0	0	0	0	0	0	0	0	13
9	4/14/2021	12:15 AM	0	7	4	0	0	0	0	0	0	0	0	0	0	0	11
10	4/14/2021	12:30 AM	0	6	1	0	3	0	0	0	0	0	0	0	0	0	10
11	4/14/2021	12:45 AM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
12	4/14/2021	01:00 AM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
13	4/14/2021	01:15 AM	1	2	2	0	0	0	0	0	0	0	0	0	0	0	5
14	4/14/2021	01:30 AM	0	8	0	0	2	1	0	0	0	0	0	0	0	0	11
15	4/14/2021	01:45 AM	0	13	0	0	0	0	0	0	0	0	0	0	0	0	13
16	4/14/2021	02:00 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
17	4/14/2021	02:15 AM	0	7	1	1	0	0	0	0	0	0	0	0	0	0	9
18	4/14/2021	02:30 AM	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
19	4/14/2021	02:45 AM	0	4	3	0	0	0	0	0	0	0	0	0	0	0	7
20	4/14/2021	03:00 AM	0	3	2	0	1	0	0	1	0	1	0	0	0	0	8
21	4/14/2021	03:15 AM	0	4	1	0	0	0	0	0	0	0	0	0	0	0	6
22	4/14/2021	03:30 AM	0	11	5	0	0	0	0	1	0	0	0	0	0	0	17
23	4/14/2021	03:45 AM	0	9	4	0	0	0	0	1	0	0	0	0	0	0	14
24	4/14/2021	04:00 AM	0	14	7	0	3	0	0	1	0	1	0	0	0	0	25
25	4/14/2021	04:15 AM	0	13	11	0	1	0	0	0	2	0	0	0	0	0	27
26	4/14/2021	04:30 AM	0	22	11	0	5	0	0	1	0	0	0	0	0	0	39
27	4/14/2021	04:45 AM	0	26	9	0	8	0	0	2	0	0	0	0	0	0	45
28	4/14/2021	05:00 AM	0	46	15	1	8	0	0	1	0	0	0	0	0	0	71
29	4/14/2021	05:15 AM	1	38	25	0	7	0	0	2	0	0	0	0	0	0	73
30	4/14/2021	05:30 AM	1	69	39	1	8	0	1	2	1	0	0	0	0	0	122
31	4/14/2021	05:45 AM	1	77	35	1	15	0	0	3	0	1	0	0	0	0	134
32	4/14/2021	06:00 AM	2	88	37	0	16	0	1	2	2	3	0	0	2	1	154
33	4/14/2021	06:15 AM	4	113	45	1	17	1	3	4	1	2	0	0	1	2	194
34	4/14/2021	06:30 AM	5	136	62	0	14	1	0	14	1	2	0	0	1	3	239
35	4/14/2021	06:45 AM	7	120	44	4	16	2	1	8	2	3	0	0	0	3	210
36	4/14/2021	07:00 AM	8	113	43	3	13	2	0	4	1	4	0	1	0	11	203
37	4/14/2021	07:15 AM	6	88	31	0	9	1	1	5	0	1	0	0	0	2	144
38	4/14/2021	07:30 AM	3	65	26	1	6	2	1	4	0	1	1	0	0	12	122
39	4/14/2021	07:45 AM	3	106	44	1	13	2	0	6	1	2	1	0	0	7	186
40	4/14/2021	08:00 AM	2	115	51	2	14	2	2	11	3	0	1	0	0	5	208
41	4/14/2021	08:15 AM	7	118	26	1	7	6	0	8	1	4	0	1	0	8	187
42	4/14/2021	08:30 AM	3	127	39	1	12	3	1	6	3	1	0	0	0	2	198
43	4/14/2021	08:45 AM	6	126	49	0	13	3	0	5	2	1	0	0	0	3	208
44	4/14/2021	09:00 AM	5	98	38	1	6	1	0	7	6	1	0	0	1	0	164
45	4/14/2021	09:15 AM	1	107	39	0	9	2	0	5	5	1	0	0	0	0	169
46	4/14/2021	09:30 AM	2	94	34	2	8	1	0	5	2	3	0	2	1	3	157
47	4/14/2021	09:45 AM	3	78	41	2	11	2	1	4	4	1	0	1	0	4	152
48	4/14/2021	10:00 AM	7	85	36	3	15	2	1	2	4	0	0	1	1	3	160
49	4/14/2021	10:15 AM	0	104	35	1	14	1	1	4	2	2	0	0	0	2	166
50	4/14/2021	10:30 AM	1	90	29	4	15	2	0	6	2	0	0	0	0	2	151
51	4/14/2021	10:45 AM	2	89	36	1	15	7	0	4	3	2	0	0	1	0	160
52	4/14/2021	11:00 AM	3	83	26	1	19	3	0	5	5	2	1	0	0	4	152

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
53	4/14/2021	11:15 AM	1	74	30	0	14	2	0	4	6	2	2	1	0	0	138
54	4/14/2021	11:30 AM	1	81	32	1	11	3	0	7	5	2	0	0	0	2	145
55	4/14/2021	11:45 AM	1	94	29	1	10	4	1	1	2	1	1	0	1	4	149
56	4/14/2021	12:00 PM	1	80	36	2	5	3	0	6	2	1	0	0	1	1	139
57	4/14/2021	12:15 PM	1	78	33	0	9	0	0	8	0	2	0	0	1	0	132
58	4/14/2021	12:30 PM	0	70	38	1	14	1	0	4	1	1	1	0	1	0	131
59	4/14/2021	12:45 PM	1	80	43	1	13	1	2	4	1	1	0	0	2	1	150
60	4/14/2021	01:00 PM	1	78	39	2	7	2	1	4	2	0	1	0	0	0	137
61	4/14/2021	01:15 PM	2	99	46	2	14	1	0	3	1	2	0	0	0	0	172
62	4/14/2021	01:30 PM	2	81	18	0	11	2	0	5	2	0	0	0	1	0	122
63	4/14/2021	01:45 PM	6	84	41	2	14	0	0	5	1	0	0	0	0	1	154
64	4/14/2021	02:00 PM	3	84	32	1	7	0	1	4	3	1	0	0	0	0	137
65	4/14/2021	02:15 PM	2	94	32	1	10	2	1	4	0	1	0	0	0	2	149
66	4/14/2021	02:30 PM	2	85	19	1	14	0	1	5	2	0	0	2	0	2	133
67	4/14/2021	02:45 PM	1	70	38	0	14	1	0	8	2	1	0	0	0	0	135
68	4/14/2021	03:00 PM	4	79	33	1	13	6	0	7	0	0	1	0	0	3	147
69	4/14/2021	03:15 PM	0	87	36	2	10	1	1	4	3	1	0	0	0	1	146
70	4/14/2021	03:30 PM	2	83	36	3	8	3	0	5	1	1	0	0	0	2	144
71	4/14/2021	03:45 PM	2	92	36	4	11	0	0	3	0	1	0	0	1	2	151
72	4/14/2021	04:00 PM	2	98	40	1	3	3	2	2	1	1	0	0	0	3	156
73	4/14/2021	04:15 PM	2	94	34	1	19	1	0	5	2	1	0	0	1	6	166
74	4/14/2021	04:30 PM	3	103	42	3	9	1	1	8	1	0	0	0	1	1	173
75	4/14/2021	04:45 PM	1	120	41	1	9	1	0	6	0	0	0	2	1	2	184
76	4/14/2021	05:00 PM	3	99	33	0	10	1	0	3	1	2	0	0	1	2	155
77	4/14/2021	05:15 PM	7	127	37	1	16	3	0	9	2	0	0	0	0	3	205
78	4/14/2021	05:30 PM	6	138	41	1	9	0	0	7	0	0	0	0	0	3	206
79	4/14/2021	05:45 PM	2	96	52	0	15	3	0	9	1	1	0	1	0	4	184
80	4/14/2021	06:00 PM	2	108	52	0	16	0	0	4	0	0	1	1	0	1	186
81	4/14/2021	06:15 PM	0	93	49	0	20	1	1	4	0	0	0	0	1	0	169
82	4/14/2021	06:30 PM	3	78	32	2	14	0	0	7	0	0	0	0	1	2	139
83	4/14/2021	06:45 PM	1	74	36	3	6	1	0	1	1	0	0	1	0	1	125
84	4/14/2021	07:00 PM	1	72	43	2	10	1	0	4	1	0	1	0	0	1	136
85	4/14/2021	07:15 PM	0	74	38	0	5	0	0	1	0	0	0	0	0	0	118
86	4/14/2021	07:30 PM	0	77	28	2	18	1	0	1	1	0	0	0	0	0	128
87	4/14/2021	07:45 PM	1	67	33	0	5	1	0	0	0	0	0	0	0	0	107
88	4/14/2021	08:00 PM	1	61	33	1	9	0	0	1	0	0	0	0	0	1	107
89	4/14/2021	08:15 PM	2	46	20	0	5	0	0	1	0	0	0	2	0	0	76
90	4/14/2021	08:30 PM	1	51	19	0	1	0	0	1	0	0	0	0	0	0	73
91	4/14/2021	08:45 PM	0	41	11	1	6	0	0	3	0	0	0	0	0	0	62
92	4/14/2021	09:00 PM	2	50	14	0	2	0	0	0	0	0	0	0	0	1	69
93	4/14/2021	09:15 PM	1	55	11	0	2	0	0	0	1	0	0	0	0	0	70
94	4/14/2021	09:30 PM	1	63	14	0	3	0	0	1	0	0	0	0	0	0	82
95	4/14/2021	09:45 PM	0	43	7	0	4	1	0	1	0	0	0	0	0	0	56
96	4/14/2021	10:00 PM	0	24	7	0	0	0	0	0	0	0	0	0	0	0	32
97	4/14/2021	10:15 PM	0	24	12	0	3	0	0	0	1	0	0	0	0	0	40
98	4/14/2021	10:30 PM	0	9	11	0	0	0	0	0	0	0	0	0	0	0	23
99	4/14/2021	10:45 PM	0	17	2	0	1	0	0	0	0	0	0	0	0	0	20
100	4/14/2021	11:00 PM	0	19	2	0	3	0	0	1	0	0	0	0	0	0	25
101	4/14/2021	11:15 PM	0	17	1	0	0	0	0	0	0	0	0	0	0	0	18
102	4/14/2021	11:30 PM	0	16	3	0	1	0	0	0	0	0	0	0	0	0	20
103	4/14/2021	11:45 PM	0	12	5	0	0	0	0	0	0	0	0	0	0	0	17
104			160	6179	2445	77	760	99	26	302	104	61	10	18	20	136	10397

## **APPENDIX I – WINPAS 12 ANALYSIS OUTPUTS**

---

## ESAL Calculations

---

# WinPAS 12

Pavement Thickness Design According to  
**1993 AASHTO Guide for Design of Pavements Structures**  
American Concrete Pavement Association

## ESAL Determination by Traffic Factor

Project Name: Shady Shores Road  
Route:  
Location: Shady Shores  
Owner/Agency: Geotex  
Design Engineer:

### Traffic Factor

Estimated Rigid Thickness	8.00 inches
Estimated Structural Number	4.0
Terminal Serviceability	2.3
Design Life	20 years
Annual Growth Rate	2.00 percent
Traffic Input by	Day

### Traffic Input by

Total Traffic 2-way	
Design Lane Distribution	100 percent
Directional Distribution	50 percent

## ESAL Determination by Traffic Input

### Traffic Input As

Average Daily Traffic (ADTT)	0.00
> Average Daily Traffic (ADT)	7,200.00
% of Heavy trucks	18.00

## ESAL Traffic Factors

Rigid ESAL/Truck	1.70
Flexible ESAL/Truck	1.13

Total Rigid ESAL	9,776,275
Total Flexible ESAL	6,498,348

# WinPAS 12

Pavement Thickness Design According to  
**1993 AASHTO Guide for Design of Pavements Structures**  
American Concrete Pavement Association

## ESAL Determination by Traffic Factor

Project Name: Shady Shores Road  
Route:  
Location: Shady Shores  
Owner/Agency: Geotex  
Design Engineer:

### Traffic Factor

Estimated Rigid Thickness	8.00 inches
Estimated Structural Number	4.0
Terminal Serviceability	2.3
Design Life	30 years
Annual Growth Rate	2.00 percent
Traffic Input by	Day

### Traffic Input by

Total Traffic 2-way	
Design Lane Distribution	100.00 percent
Directional Distribution	50.00 percent

## ESAL Determination by Traffic Input

### Traffic Input As

Average Daily Traffic (ADTT)	0.00
> Average Daily Traffic (ADT)	7,200.00
% of Heavy trucks	18.00

## ESAL Traffic Factors

Rigid ESAL/Truck	1.70
Flexible ESAL/Truck	1.13

Total Rigid ESAL	16,322,948
Total Flexible ESAL	10,849,960

---

Rigid and Flexible Pavement Design Outputs  
20-year Design Life

---

# WinPAS

Pavement Thickness Design According to  
**1993 AASHTO Guide for Design of Pavements Structures**  
American Concrete Pavement Association

## Flexible Design Inputs

Project Name: Shady Shores Road  
Route:  
Location: Shady Shores  
Owner/Agency: Geotex  
Design Engineer:

## Flexible Pavement Design/Evaluation

<b>Structural Number</b>	4.33	<b>Subgrade Resilient Modulus</b>	10,000.00 psi
<b>Total Flexible ESALs</b>	6,498,348	<b>Initial Serviceability</b>	4.20
<b>Reliability</b>	95.00 percent	<b>Terminal Serviceability</b>	2.30
<b>Overall Standard Deviation</b>	0.45		

## Layer Pavement Design/Evaluation

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	8.00	3.52
Cement Treated Agg. Base	0.20	1.00	6.00	1.20
			$\Sigma$ SN	4.72

# WinPAS

Pavement Thickness Design According to  
**1993 AASHTO Guide for Design of Pavements Structures**  
American Concrete Pavement Association

## Rigid Design Inputs

Project Name: Shady Shores Road  
Route:  
Location: Shady Shores  
Owner/Agency: Geotex  
Design Engineer:

## Rigid Pavement Design/Evaluation

Concrete Thickness	10.55 inches	Load Transfer Coefficient	3.00
Total Rigid ESALS	9,776,275	Modulus of Subgrade Reaction	200 psi/in.
Reliability	95.00 percent	Drainage Coefficient	1.00
Overall Standard Deviation	0.35	Initial Serviceability	4.50
Flexural Strength	570 psi	Terminal Serviceability	2.30
Modulus of Elasticity	4,000,000 psi		

### Modulus of Subgrade Reaction (k-value) Determination

Resilient Modulus of the Subgrade	0.0
Unadjusted Modulus of Subgrade Reaction	1
Depth to Rigid Foundation	0.00
Loss of Support Value (0,1,2,3)	0.0

<b>Modulus of Subgrade Reaction</b>	<b>200 psi/in.</b>
-------------------------------------	--------------------

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Rigid and Flexible Pavement Design Outputs  
30-year Design Life

---

# WinPAS

Pavement Thickness Design According to  
**1993 AASHTO Guide for Design of Pavements Structures**  
American Concrete Pavement Association

## Flexible Design Inputs

Project Name: Shady Shores Road  
Route:  
Location: Shady Shores  
Owner/Agency: Geotex  
Design Engineer:

## Flexible Pavement Design/Evaluation

<b>Structural Number</b>	4.67	<b>Subgrade Resilient Modulus</b>	10,000.00 psi
<b>Total Flexible ESALs</b>	10,849,960	<b>Initial Serviceability</b>	4.20
<b>Reliability</b>	95.00 percent	<b>Terminal Serviceability</b>	2.30
<b>Overall Standard Deviation</b>	0.45		

## Layer Pavement Design/Evaluation

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.44	1.00	8.00	3.52
Cement Treated Agg. Base	0.20	1.00	6.00	1.20
			$\Sigma$ SN	4.72

# WinPAS

Pavement Thickness Design According to  
**1993 AASHTO Guide for Design of Pavements Structures**  
American Concrete Pavement Association

## Rigid Design Inputs

Project Name: Shady Shores Road  
Route:  
Location: Shady Shores  
Owner/Agency: Geotex  
Design Engineer:

## Rigid Pavement Design/Evaluation

Concrete Thickness	11.43 inches	Load Transfer Coefficient	3.00
Total Rigid ESALS	16,322,948	Modulus of Subgrade Reaction	200 psi/in.
Reliability	95.00 percent	Drainage Coefficient	1.00
Overall Standard Deviation	0.35	Initial Serviceability	4.50
Flexural Strength	570 psi	Terminal Serviceability	2.30
Modulus of Elasticity	4,000,000 psi		

### Modulus of Subgrade Reaction (k-value) Determination

Resilient Modulus of the Subgrade	0.0
Unadjusted Modulus of Subgrade Reaction	1
Depth to Rigid Foundation	0.00
Loss of Support Value (0,1,2,3)	0.0

<b>Modulus of Subgrade Reaction</b>	<b>200 psi/in.</b>
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**APPENDIX J – KEY TO TERMS & SYMBOLS**

**LITHOLOGIC SYMBOLS**

<b>ARTIFICIAL</b>		Asphalt
		Aggregate Base
		Concrete
		Fill

<b>SOIL</b>		CH: High Plasticity Clay
		CL: Low Plasticity Clay
		GP: Poorly-graded Gravel
		GW: Well-graded Gravel
		SC: Clayey Sand
		SP: Poorly-graded Sand
		SW: Well-graded Sand

<b>ROCK</b>		Limestone
		Mudstone
		Shale
		Sandstone
		Weathered Limestone
		Weathered Shale
		Weathered Sandstone

**CONSISTENCY OF SOILS**

CONSISTENCY: FINE GRAINED SOILS		
Consistency	SPT (blowcounts)	PP (tsf)
Very Soft	0 - 2	< 0.25
Soft	3 - 4	0.25 - 0.5
Medium Stiff	5 - 8	0.5 - 1.0
Stiff	9 - 15	1.0 - 2.0
Very Stiff	16 - 30	2.0 - 4.0
Hard	> 30	> 4.0

**CONDITION OF SOILS**

CONDITION: COARSE GRAINED SOILS			
Condition	SPT (blowcounts)	TCP (values)	Relative Density (%)
Very Loose	0 - 4	< 8	0 - 15
Loose	5 - 10	8 - 20	15 - 35
Medium Dense	11 - 30	20 - 80	35 - 65
Dense	31 - 50	80 - 5 in./100	65 - 85
Very Dense	> 50	0 in. - 5 in./100	85 - 100

**SECONDARY COMPONENTS**

QUANTITY DESCRIPTORS	
Trace	< 5% of sample
Few	5% to 10%
Little	10% to 25%
Some	25% to 35%
With	> 35%

**RELATIVE HARDNESS OF ROCK MASS**

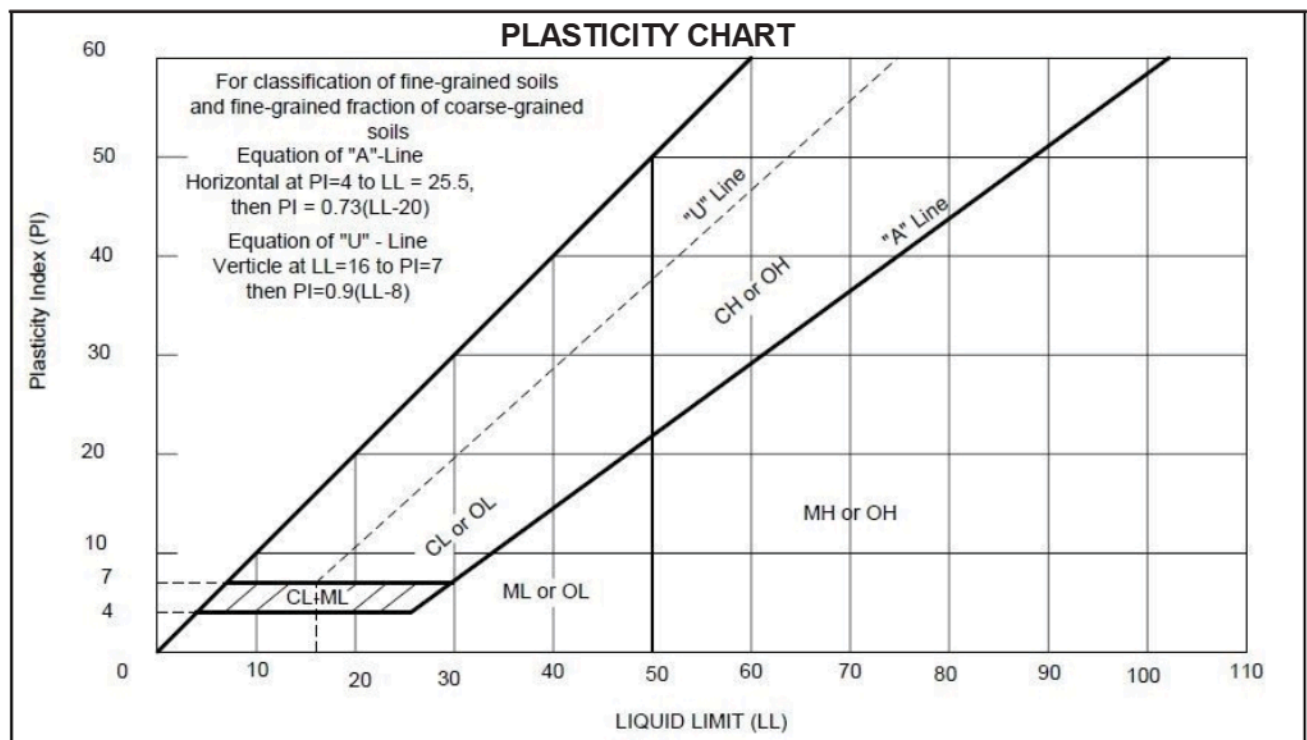
Designation	Description
Very Soft	Can be carved with a knife. Can be excavated readily with point of pick. Pieces 1" or more in thickness can be broken by finger pressure. Readily scratched with fingernail.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows with the pick point. Small, thin pieces can be broken by finger pressure.
Medium Hard	Can be grooved or gouged 1/4" deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1" maximum size by hard blows with the point of a pick.
Moderately Hard	Can be scratched with knife or pick. Gouges or grooves 1/4" deep can be excavated by hard blow of the point of a pick. Hand specimens can be detached by a moderate blow.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach a hand specimen.
Very Hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows from a hammer or pick.

**WEATHERING OF ROCK MASS**

Designation	Description
Fresh	No visible sign of weathering
Slightly weathered	Penetrative weathering on open discontinuity surfaces, but only slight weathering of rock material
Moderately weathered	Weathering extends throughout rock mass, but the rock material is not friable
Highly weathered	Weathering extends throughout rock mass, and the rock material is partly friable
Completely weathered	Rock is wholly decomposed and in a friable condition but the rock texture and structure are preserved
Residual Soil	A soil material with the original texture, structure, and mineralogy of the rock completely destroyed

## SOIL CLASSIFICATION CHART

MAJOR DIVISIONS		GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS  MORE THAN 50% OF MATERIAL IS RETAINED ON THE NO. 200 SIEVE	GRAVELS  MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS $Cu \geq 4$ and $1 \leq Cc \leq 3$ (LESS THAN 5% FINES)	<b>GW</b> WELL-GRADED GRAVEL
		$Cu < 4$ and/or $[Cc < 1$ or $Cc > 3]$	<b>GP</b> POORLY-GRADED GRAVEL
	GRAVELS WITH FINES (MORE THAN 12% FINES)	Fines classify as ML or MH	<b>GM</b> SILTY GRAVEL
		Fines classify as CL or CH	<b>GC</b> CLAYEY GRAVEL
	SANDS  MORE THAN 50% OF COARSE FRACTION PASSING THE NO. 4 SIEVE	CLEAN SANDS $Cu \geq 6$ and $1 \leq Cc \leq 3$ (LESS THAN 5% FINES)	<b>SW</b> WELL-GRADED SAND
		$Cu < 6$ and/or $[Cc < 1$ or $Cc > 3]$	<b>SP</b> POORLY-GRADED SAND
SANDS WITH FINES (MORE THAN 12% FINES)	Fines classify as ML or MH	<b>SM</b> SILTY SAND	
	Fines classify as CL or CH	<b>SC</b> CLAYEY SAND	
FINE GRAINED SOILS  MORE THAN 50% OF MATERIAL PASSES THROUGH THE NO. 200 SIEVE	SILTS AND CLAYS  LIQUID LIMIT LESS THAN 50	INORGANIC $PI > 7$ and plots on or above "A" line	<b>CL</b> LEAN CLAY
		$PI < 4$ or plots below "A" line	<b>ML</b> SILT
	ORGANIC $\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	<b>OL</b> ORGANIC CLAY ORGANIC SILT	
	SILTS AND CLAYS  LIQUID LIMIT GREATER THAN 50	INORGANIC $PI$ plots on or above "A" line	<b>CH</b> FAT CLAY
		$PI$ plots below "A" line	<b>MH</b> ELASTIC SILT
	ORGANIC $\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$	<b>OH</b> ORGANIC CLAY ORGANIC SILT	
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR	<b>PT</b> PEAT	





**SHADY SHORES ROAD  
DENTON COUNTY, TEXAS**

**LIMITS: FROM SILKTREE COURT TO PARKSIDE COURTY AND  
FROM NORTH OF DOBBS ROAD TO SOUTH OF W. SHADY SHORES ROAD**

**CSJ: 0918-46-316**

**SEPTEMBER 10, 2025**

**GEOTECHNICAL ENGINEERING REPORT**





September 10, 2025

Half Associates, Inc.  
2601 Meacham Blvd  
Fort Worth, TX 76137  
Attn: David Burkett, PE  
Email: [dburkett@half.com](mailto:dburkett@half.com)  
Phone: 817-688-6720

**BRIDGE AND RETAINING WALL DESIGN REPORT  
SHADY SHORES ROAD  
FROM SILKTREE COURT TO PARKSIDE COURT AND  
FROM NORTH OF DOBBS ROAD TO SOUTH OF W. SHADY SHORES ROAD  
DENTON COUNTY, TEXAS  
CSJ 0918-46-316  
GEOTEX ENGINEERING #G22-4003-1-B**

Mr. Burkett,

Transmitted herewith is the draft bridge and retaining wall design report, completed by Geotex Engineering, LLC, for the above-reference project. This investigation was conducted in accordance with the Standard Subcontract for Subsurface/Underground Services dated September 5, 2023.

We appreciate the opportunity to provide professional geotechnical engineering services to you. We are available to discuss any questions which may arise regarding this report. Please do not hesitate to call when we can provide any additional services.

Sincerely,


**Geotex Engineering, LLC**



W. Blake Gibson, P.E.

Director of Geotechnical Engineering

*September 10, 2025*



*Mark G. Thomas*

Mark G. Thomas, P.E., P.G.  
Vice President of Engineering

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**APPENDIX A – PROJECT LOCATION DIAGRAM**

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**APPENDIX H – GLOBAL STABILITY OUTPUTS**

**BRIDGE AND RETAINING WALL DESIGN REPORT  
SHADY SHORES ROAD  
DENTON COUNTY, TEXAS**

**1.0 PROJECT DESCRIPTION**

This report presents the results of the geotechnical investigation conducted for the proposed improvements along two sections of the existing two-lane Shady Shores Road. The limits of the two sections are from Silktree Court to Parkside Court, and from North of Dobbs Road to South of W. Shady Shores Road. Portions of the road are under the jurisdiction of three entities: Denton County, the Town of Shady Shores, and the City of Lake Dallas. The total alignment length is approximately 4,600 feet. The general location, alignment and orientation of the site are provided in Appendix A.

Bridges are proposed at several locations, along with the necessary retaining walls for the proposed grade changes. The purpose of this report is to present the bridge and retaining wall geotechnical design parameters.

At the time of the field investigation, the project site was covered with asphalt pavement. Final grading plans along the roadway were not available at the time of writing this report, however we do understand that a grade difference of up to 10 feet in fill is proposed at the locations of the new bridges. Recommended design parameters provided herein should be expected to change should there be significant quantities of cut or fill along the new roadway; therefore, we recommend that this office be permitted to review final grading and design plans prior to construction to confirm and/or revise the conclusions and recommendations provided herein.

**2.0 PURPOSE AND SCOPE**

The purpose of this investigation was to:

- Identify the subsurface stratigraphy and groundwater conditions present at the site.
- Evaluate the physical and engineering properties of the subsurface materials for use in geotechnical analyses.
- Provide geotechnical recommendations for use in the design of the proposed bridge and retaining wall structures, as well as recommendations for related site work.

The scope of the Bridge and Retaining wall portion of the investigation consisted of:

- Drilling and sampling thirty-three (33) borings – nine (9) borings for bridges and twenty-four (24) borings for retaining walls, below existing grades.
- Laboratory testing of selected soil and bedrock samples obtained during field investigation.
- Preparation of a Geotechnical Report that includes:

- Recommendations for bridge foundation design, in accordance with guidelines and recommendations of TxDOT Geotechnical Manual (July 2020).
- Retaining wall recommendations:
  - Lateral Earth Pressures
  - Recommend reinforcement lengths
  - External and Global Stabilities
  - Drainage and Backfill
- Recommendations for earthwork and foundation construction.

### **3.0 FIELD AND LABORATORY INVESTIGATION**

#### **3.1 General**

The borings were advanced utilizing truck-mounted drilling rigs outfitted with continuous flight augers, as well as wet rotary drilling equipment. Undisturbed samples of cohesive soil were obtained using 3-inch diameter tube samplers that were advanced into the soils in 1 to 2-foot increments by the continuous thrust of a hydraulic ram located on the drilling equipment. After sample extrusion, an estimate of the material stiffness of each cohesive soil was obtained in the field using a hand penetrometer.

Soil and bedrock materials were periodically tested in situ using Texas Cone penetration tests in order to examine the resistance of the soil and bedrock materials to penetration. For this test, a 3-inch diameter steel cone is driven utilizing the energy of a 170-pound hammer falling freely from a height of 24 inches and striking an anvil located at the top of the drill string. Depending on the resistance of the materials, either the number of blows of the hammer required to provide 12 inches of penetration is recorded (as two increments of 6 inches each), or the inches of penetration of the cone resulting from 100 blows of the hammer are recorded (as two increments of 50 blows each).

Additionally, granular materials were tested and sampled in general accordance with the Standard Penetration Test (ASTM D1586). During this test, disturbed samples of subsurface material are recovered using a nominal 2-inch O.D. split-barrel sampler. The sampler is driven into the soil strata with an automatic hammer utilizing the energy equivalent of a 140-pound hammer falling freely from a height of 30 inches and striking an anvil located at the top of the drill string. The number of blows required to advance the sampler in three consecutive 6-inch increments is recorded, and the number of blows required for the final 12 inches is noted as the "N"-value. The test is terminated at the first occurrence of either of the following: 1) when the sampler has advanced a total of 18 inches; 2) When the sampler has advanced less than one complete 6-inch increment after 50 blows of the hammer; 3) when the total number of blows reaches 100; or 4) if there is no advancement of the sampler in any 10-blow interval.

The bedrock strata present within some of the borings were cored and sampled using a double-tube core barrel fitted with a tungsten-carbide, saw-tooth drilling bit. The length of core recovered (REC), expressed as a percentage of the cored interval length, along with the Rock Quality Designation (RQD), is tabulated at the appropriate depths on the Log of Boring illustrations. The RQD is the sum of all core pieces longer than four inches divided by the total length of the cored interval. Pieces shorter than four inches which were determined to be broken by drilling or handling were fitted together and considered as one piece.

All samples obtained were extruded in the field, placed in plastic bags to minimize changes in the natural moisture condition, labeled as to appropriate boring number and depth, and placed in protective cardboard boxes for transportation to the laboratory. The samples were described and preserved in the field. The approximate locations of the borings performed at the site are shown on the boring location map that is included in Appendix B. The specific depths, thicknesses and descriptions of the strata encountered are presented on the individual Boring Log illustrations, which are included in Appendix C. Strata boundaries shown on the boring logs are approximate.

The as-drilled locations of each boring were surveyed for location and elevation and provided to us by Halff Associates. This information (NAD83 Texas State Plane surface coordinates) is presented on the WinCore boring logs.

### 3.2 Laboratory Testing

Laboratory tests were performed to classify the soil types. The samples recovered during the field exploration were described by a geotechnical engineer or engineering geologist in the field. These descriptions were later refined by a geotechnical engineer based on the results of the laboratory tests performed.

Samples were classified and described, in part, using TxDOT, ASTM and Unified Soil Classification System (USCS) procedures. Bedrock strata were described using standard geologic nomenclature.

In order to determine soil characteristics and to aid in classifying the soils, classification testing was performed on selected samples as requested by the geotechnical engineer. The tests were performed in general accordance with the following test procedures.

- Moisture Content TEX-103-E
- Atterberg Limits TEX-104-E, TEX-105-E, TEX-106-E
- Percentage of Particles Finer than No. 200 Sieve TEX-111-E
- Grain Size Distribution TEX-110-E

Additional tests were performed to aid in evaluating strength and chemical characteristics of subsurface materials which consisted of the following:

- Unconfined Compressive Strength of Soil Samples                   ASTM D2166
- Unconfined Compressive Strength of Rock Cores                    ASTM D7012
- Direct Shear under Consolidated Drained Conditions                ASTM D3080
- Consolidated-Undrained Triaxial Compression (Soil)                ASTM D4767
- Soluble Sulfates – Colorimetric Method                                TEX-145-E

The results of the classification tests are presented at the corresponding sample depths on the appropriate Boring Log illustrations in Appendix C. The results of the advanced tests are presented in Appendix C.

### **3.2.1 Unconfined Compression Tests**

Unconfined compression strength testing was performed on the selected samples of soils and sections of intact bedrock cores. These tests were performed in general accordance with ASTM D2166 for soil samples and ASTM D7012 Method C for core samples. During each test, a cylindrical specimen is subjected to an axial load that is applied at a constant rate of strain until either failure or a large strain (i.e., greater than 15 percent) occurs. Once the test is completed, the unit weight of the sample is determined based on the moisture content.

### **3.2.2 Direct Shear**

Direct shear tests were performed on selected samples of the soils. Those tests were performed in general accordance with ASTM D3080. The test consists of placing a sample of relatively undisturbed soil and subjecting it to full saturation and consolidation. A horizontal shear force is then applied on the sample at a rate appropriate to maintain drained soil conditions. Test results are recorded and plotted in a shear stress vs. horizontal deformation graph, from where peak stress is calculated. A graph of shear stress vs. normal stress allows computation of cohesion and friction angle effective values. This information is presented in Appendix C.

### **3.2.3 Consolidated Undrained Triaxial Tests**

Consolidated Undrained Triaxial Compression (CU) tests were performed on selected soil samples. The test was performed in general accordance with ASTM D4767. During this test, cylindrical specimens are isotopically consolidated and sheared in compression without drainage at a constant rate of axial deformation (strain controlled). This allows the calculation of total and effective stresses and axial compression by measurement of axial load, axial deformation, and pore-water pressure. Generally, three specimens are tested

at different effective consolidation stresses to define a strength envelope. This information is presented in Appendix C.

### **3.2.4 Soluble Sulfates**

Soluble sulfate tests were performed on representative samples of soil. The results are provided in the boring logs in Appendix C. Typically, high sulfate concentrations occur in localized areas, seams or veins and are not uniformly distributed.

The measured soluble sulfate concentrations from this study ranged from about 120 to 1,480 ppm. They indicate that concrete has low susceptibility to sulfate degradation and that ASTM C150 Type I or II cement is suitable.

## **4.0 SITE CONDITIONS**

### **4.1 Stratigraphy**

Based upon a review of the recovered samples, as well as the Geologic Atlas of Texas, Sherman Sheet, the subsurface conditions at this site within the boring depths drilled are characterized by soils associated with the Woodbine Formation and the Terrace Deposits.

- The Woodbine Formation is considered to have formed in a deltaic depositional environment, and as a result, it is highly variable in composition, both laterally and vertically. The deposition of the sand, sandy clay, clay, sandstone, and shale layers can be very erratic and highly variable. Subsurface materials of the Woodbine geological formation typically consist of sands, sandy clays, and clays underlain by shale and/or sandstone bedrock. Dense and irregular shaped masses of very hard well cemented sandstone and concretions occur at random throughout the formation where often coring equipment is needed to penetrate the very hard sandstone.
- Terrace deposits consists of sands, gravels, silt and clays.

A geologic map is presented in Appendix D.

At the surface, asphalt and/or concrete pavements ranging in thickness from 2 to 12 inches are present. Below the pavements, base course materials, where encountered, ranged in thickness from 1 to 20 inches.

At the ground surface, fill materials were encountered in 4 borings, consisting predominately of clayey sands, with various amounts of gravel.

Below the pavement sections and/or below the fill soils within the borings, native lean and fat clays and sandy soils are present. The clay soils present are generally soft to stiff in consistency, are various shades of brown and gray in color and contain variable

amounts of sand, silt, gravel and ferrous nodules. The sand soils present are generally loose to dense in condition, are various shades of brown in color and contain variable amounts of clay, gravel, and silt.

The native soils are underlain by shale and/or sandstone bedrock, generally soft to very hard in rock hardness, various shades of gray in color, and containing variable zones of argillaceous content. In a few locations where the intensity of erosion was less intense, the uppermost portions of the bedrock are variably weathered, having been leached by percolating groundwater. A summary of the subsurface conditions encountered below the pavement sections during our field investigation is provided in Table 1 below.

**Table 1. Subsurface Stratigraphy**

Boring No.	Boring Ground Elevation (ft.)	Depth of Fill (ft.)	Depth of Weathered Shale (ft.)	Depth of Fresh Shale (ft.)	Depth of Weakly to Well Cemented Sandstone (ft.)
<b>Bridge Borings</b>					
BR1	534.41	0-2	10-15	15-60	60-80
BR2	528.02	-	-	41-52	19-41 52-80
BR3	527.25	-	29-39	45-80	39-45
BR4	526.84	-	-	40-71	71-80
BR5	527.54	-	-	55-80	-
BR6	528.42	-	-	45-61	61-80
BR7	527.90	-	-	55-65	65-75
BR8	527.27	-	-	49-60	60-80
BR9	527.68	-	-	50-61	61-80
<b>Retaining Wall Borings</b>					
RW1	539.96	-	10-35	-	-
RW2	536.13	-	6-24	24-35	-
RW3	528.53	-	-	24-35	-
RW4	531.89	1-2.5	10-20	20-35	-
RW5	528.39	1-4	20-30	30-35	-
RW6	531.52	-	-	15-35	-
RW7	531.41	0.5-1.5	15-25	25-35	-
RW8	528.21	0.5-1	-	30-35	-
RW9	529.81	-	-	18-35	-
RW10	527.20	-	-	25-35	-
RW11	528.81	-	-	-	-
RW12	531.72	-	-	-	-
RW13	528.24	-	-	-	-
RW14	532.14	-	-	-	-

Boring No.	Boring Ground Elevation (ft.)	Depth of Fill (ft.)	Depth of Weathered Shale (ft.)	Depth of Fresh Shale (ft.)	Depth of Weakly to Well Cemented Sandstone (ft.)
RW15	532.99	-	-	-	-
RW16	529.36	-	25-35	-	-
RW17	531.86	-	25-35	-	-
RW18	528.57	-	-	-	-
RW19	527.60	-	-	-	-
RW20	529.61	-	-	-	-
RW21	533.08	-	-	-	-
RW22	527.63	-	-	-	-
RW23	529.63	-	-	-	-
RW24	508.47	-	-	-	-

#### 4.2 Groundwater

Groundwater table was encountered at depths ranging from 3 to 30 feet during drilling operations prior to the introduction of water for rock coring purposes. Groundwater levels may be anticipated to fluctuate with seasonal and annual variations in rainfall and also may vary as a result of development. However, groundwater is often contained within the joints, fractures and other rock mass defects present in bedrock strata. When intercepted, these defects can produce appreciable amounts of water for a period of time, especially if those defects are extensive and well inter-connected.

The groundwater observations present across the site are summarized in Table 2.

**Table 2. Groundwater Observations**

Boring No.	Seepage Depth During Drilling (ft.)	Approximate Groundwater Elevation (ft.)
<b>Bridge Borings</b>		
BR1	30	504.4
BR2	3	525.0
BR3	10	517.3
BR4	19	507.8
BR5	10	517.5
BR6	19	509.4
BR7	13	514.9
BR8	15	512.3
BR9	20	507.7
<b>Retaining Wall Borings</b>		
RW1	30	510.0
RW2	30	506.1
RW3	14	514.5
RW4	15	516.9
RW5	17	511.4

Boring No.	Seepage Depth During Drilling (ft.)	Approximate Groundwater Elevation (ft.)
RW6	28	503.5
RW7	22	509.4
RW8	16	512.2
RW9	22	507.8
RW10	14	513.2
RW11	19.4	508.8
RW12	17	514.7
RW13	14	514.2
RW14	NE	NE
RW15	25	508.0
RW16	20	509.4
RW17	18	513.9
RW18	20	508.6
RW19	20	507.6
RW20	24	505.6
RW21	20	513.1
RW22	NE	NE
RW23	13	516.6
RW24	25	508.5
NE - Not Encountered		

## 5.0 BRIDGE FOUNDATION RECOMMENDATIONS

Conventional drilled shafts, driven piles, socketed piles, or augered cast-in-place piles (ACIP) are all technically feasible foundation alternatives for support of structural loads for this project; however, each has its own set of benefits and challenges, including constructability and economic considerations. As conventional drilled shafts are by far the most widely used foundation support system by TxDOT in North Texas, this section will discuss primarily drilled shaft foundations. We anticipate that drilled shafts will require use of temporary casing to control groundwater seepage and maintain shaft sidewall integrity during installation and placement of concrete. However, use of bentonite slurry may be a feasible alternative to temporary casing.

### 5.1 Drilled Shaft Foundations

We recommend that drilled shafts used for bridge foundations support consist of auger-excavated reinforced concrete, straight-sided drilled shafts. Based on the TxDOT Geotechnical Manual, and using TxDOT's WinCore computer program, we have calculated the minimum shaft length based on the maximum loading for 36-inch diameter shafts. The computed lengths are shown in Table 3 below. Shaft capacity worksheets are included in Appendix E.

**Table 3: Maximum Allowable Drilled Shaft Service Loads and Minimum Drilled Shaft Lengths**

Boring ID	Estimated Minimum Shaft Length (ft)	
	Shaft Diameter (in) / Max Load (tons)	
	36/130	36/260
BR1	20	22
BR2	25	28
BR3	50	60
BR4	50	50
BR5	60	67
BR6	50	52
BR7	60	60
BR8	55	55
BR9	55	55

Drilled Shafts should penetrate a minimum of 5 feet into the target bearing stratum. If temporary casing is used, the friction values only apply to that portion of the shaft below the bottom of any temporary casing used.

The shafts should be provided with sufficient steel reinforcement throughout their length to resist potential uplift pressures that will be exerted. For the near-surface soils, these pressures are approximated to be on the order of 500 pounds per square foot (psf) of shaft area over an average depth of 7 feet within clay or fill soils. Often, 1/2 of a percent of steel by cross-sectional area is sufficient for the purpose of shaft reinforcement (ACI 318). However, the final amount of reinforcement required should be determined based on the information provided herein and should be the greater of that determination, or ACI 318. Uplift forces acting on individual shafts will be resisted by the dead weight of the structure, plus the bearing stratum-to-concrete adhesion acting on that portion of the shaft that is in contact with the limestone strata below depths indicated for available skin friction.

**5.1.1 Lateral Load Parameters**

The following soils and rock geo-parameters for lateral analysis of drilled shafts for use in LPILE® or other lateral load software. These values are based on stratigraphy, laboratory data and experience. The recommended model layer is “Stiff Clay w/o Free Water”, “Sand (Reese)”, and “Weak Rock”. The depth ranges are based on the borings drilled. We recommend that the lateral resistance parameters be neglected for the uppermost 3 feet of soil materials to account for seasonal and annual cyclic variations in soil desiccation and contraction and a lack of confining pressure. These parameters were selected to conservatively approximate the subsurface conditions across the site.

**Table 4. Material Designations and Unit Weights**

Stratum	Software Material Designation	Unit Weight (pcf)
Clay	Stiff Clay w/o Free Water	125
Sand	Sand (Reese)	110
Weathered Shale	Weak Rock	130
Fresh Shale	Weak Rock	130
Weakly Cemented Sandstone	Weak Rock	130
Well Cemented Sandstone	Weak Rock	130

**Table 5. Recommended Geotechnical Parameters - Soil and Bedrock**

Stratum	Undrained Cohesion (psf)	Friction Angle (degrees)	Unconfined Compressive Strength - Rock (psi)	Modulus (k) (pci)	RQD	Strain Factor, $\epsilon_{50}$	Strain Factor, $K_{rm}$
Clay	1,500	NA	NA	NA	NA	0.015	NA
Sand	NA	30	NA	60	NA	NA	NA
Weathered Shale	NA	NA	100	10,000	70	NA	0.007
Fresh Shale	NA	NA	200	20,000	90	NA	0.0004
Weakly Cemented Sandstone	NA	NA	150	20,000	60	NA	0.0005
Well Cemented Sandstone	NA	NA	200	50,000	70	NA	0.0005

### 5.1.2 Drilled Shaft Construction Considerations

Groundwater seepage was observed within 31 out of 33 borings. Groundwater levels should be anticipated to fluctuate with seasonal and annual variations in rainfall and may vary as a result of development and landscape irrigation.

Temporary casing may be required and should be available on site in the event that excessive groundwater seepage is encountered that cannot be controlled with conventional pumps, sumps, or other means, or in the event that excessive sidewall sloughing occurs. Ideally, concrete should be onsite during drilling operations, so it can be placed immediately after drilling of each shaft is complete.

During construction of the drilled shafts, care should be taken to avoid creating an oversized cap ("mushroom") near the ground surface that is larger than the shaft diameter. These "mushrooms" provide a resistance surface that near-

surface soils can heave against. If near-surface soils are prone to sloughing, a condition which can result in “mushrooming”, the tops of the shafts should be formed in the sloughing soils using cardboard or other circular forms equal to the diameter of the shaft.

## 6.0 MSE RETAINING WALL RECOMMENDATIONS

Mechanically-Stabilized Earth (MSE) retaining walls are planned to be constructed along the sides of Shady Shores Road. The latest information presented for the retaining walls is presented in Table 6 below, and was provided by Halff Associates on August 22, 2024. The wall layouts are presented in Appendix F.

**Table 6. Recommended Geotechnical Parameters - Soil and Bedrock**

Wall ID	Shady Shores CL Wall Limits		Wall Limits		Wall Length (ft.)	Applicable Borings	Max. Wall Height (ft.)
	STA	STA	STA	STA			
A	38+40.00	39+65.00	10+00.00	11+25.00	125	RW1, RW2	11.5
B	43+80.00	42+15.00	10+00.00	11+65.00	165	RW4, RW3	14
C	42+15.00	44+70.00	10+00.00	12+55.00	255	RW5, RW6	13
D	74+40.00	72+20.00	10+00.00	12+20.31	220	RW7, RW8	12.5
E	72+20.00	74+23.22	10+00.00	12+19.82	203.22	RW9, RW10	13
F	81+35.00	79+50.00	10+00.00	11+85.00	185	RW11, RW12	12
G	79+50.00	81+25.00	10+00.00	11+75.00	175	RW13, RW14	15
H	91+51.75	88+60.00	10+00.00	12+82.08	291.75	RW17, RW18	17
I	89+03.72	91+51.75	10+00.00	12+57.24	248.03	RW15, RW16	15.5
J	103+20.00	99+77.45	10+00.00	13+42.55	342.55	RW19, RW20, RW21	16
K	99+77.25	103+20.00	10+00.00	13+42.75	342.75	RW22, RW23, RW24	17

The internal stability of the retaining walls, including stem lengths and required facing height will be provided by the respective suppliers, however, recommended minimum wall reinforcement lengths are provided in the following sections based on external and global stability analyses.

TxDOT requires the base width of all MSE walls be a minimum of 0.7 times the wall height or 8 feet, whichever is greater. In addition, the minimum embedment depth should be 2 feet from the finished grade elevation. The following analyses were completed in accordance with the above requirements, using a live load surcharge load of 250 psf due to traffic.

Backfill material and construction for the MSE wall should be in accordance with Item 423 of TxDOT Standard Specification. Type DS backfill should be used within the reinforced

zone in accordance with Item 423. Type DS is intended for use in MSE walls that are subject to inundation. To reduce the base width, we recommend placement of a select backfill (granular) material with a slope of 1H:1V behind the MSE wall fill. The retained select backfill material should be in accordance with TXDOT Standard Specification Item 132 with a minimum friction angle of 30 degrees. Summary of design parameters for the reinforced zone fill and retained fill used in the analysis for the external and global stability are summarized in Table 7 below. The foundation soil parameters are presented in Appendix G.

**Table 7. Soil Properties used for External and Global Stability analysis**

Short-Term Analysis	Material	Cohesion	Friction Angle	Unit Weight
	MSE Wall Item 423 Type DS	0	34°	105/125 <sup>(1)</sup>
	Retained Soil	0	30°	125

(1) A unit weight of 105 pcf should be used for pullout, sliding, overturning and eccentricity checks. A unit weight of 125 pcf should be used for bearing and internal rupture checks.

### 6.1 External Stability Analysis (Bearing Pressure, Sliding and Overturning)

Bearing capacity, sliding and overturning analyses were performed to evaluate ground improvement requirements using computer program MSEW version 3.0. The analyses were performed using the provided section drawings with a live load traffic surcharge of 250 psf. Minimum embedment depth is taken as 2 feet from the finished grade elevation. Granular backfill material within the reinforced section should be in accordance with TxDOT Standard and Specifications Item 423 Type DS fill material. Minimum Factor of Safety required by TxDOT are presented below.

**Table 8. Minimum Recommended Factors of Safety**

Bearing Pressure	2.0
Sliding	1.5
Overturning	2.0

Computed Factors of Safety for each wall are presented in Appendix G. Based on our analysis, no foundation soil improvement below the walls is needed for stability.

### 6.2 MSE Wall Global Stability Analysis

The global stability of the MSE wall was evaluated using SLOPE/W computer program. Global stability analyses were performed for the short-term (end of construction), long-term and rapid drawdown cases.

- Short-Term. The short-term case models the initial undrained condition of the soil. For this analysis, undrained soil parameters were used. A minimum Factor of Safety (FS)  $\geq 1.5$  is typically required for global stability.
- Long-Term. The long-term design case represents steady state piezometric and stress conditions. At completion of construction, the undrained strength of the soils is mobilized due to the applied altered loads. Over time, these

excess pore pressures dissipate and drained shear strength conditions govern the global stability. A minimum Factor of Safety (FS)  $\geq 1.5$  is required for global stability.

- **Rapid Drawdown:** The rapid drawdown condition arises when submerged slopes experience a rapid reduction of the external water level. This unbalanced force increases the shear stresses in the soils. Two water levels were considered in the analysis: at the FEMA 100-year flood elevation and at the bottom of the wall (modeling post-reduction water levels). A minimum Factor of Safety (FS)  $\geq 1.1$  is required per the US Army Corps of Engineers Engineering Manual 1110-2-1902, for drawdown conditions from maximum surcharge pool.

The factor of Safety of the most critical slip surface of the maximum wall height was calculated using the Modified Bishop Method. The calculated factors of safety for the analyses are presented for each wall in Appendix G. Graphical plots for both short and long-term case are shown in Appendix H.

### 6.3 Wall Reinforcement Recommendations

Preliminary strap lengths up to 110% of the wall height are recommended for external stability and/or global stability at the wall locations. If the final recommended strap length as percentage of wall height is less than 8 feet, then an 8 feet minimum strap length should be used. Wall reinforcement minimum recommendations are presented in Table 9 below.

**Table 9. MSE Wall Preliminary Recommendations Summary**

Wall ID	Start STA	End STA	STA with Maximum Height	Max. Wall Height (ft.)	Minimum Needed Reinforcement Length (ft or %H) <sup>(1)</sup>	Min. Embedment Depth (ft)
A	10+00.00	11+25.00	11+10.00	11.5	0.8 H	2
B	10+00.00	10+40.00	10+40.00	8	8 feet	2
	10+40.00	11+65.00	11+50.00	13.5	0.95 H	2
C	10+00.00	11+40.00	10+15.00	13	0.75 H	2
	11+40.00	12+55.00	11+40.00	8	8 feet	2
D	10+00.00	12+20.31	10+15.00	12.5	0.85 H	2
E	10+00.00	10+80.00	10+80.00	8	8 feet	2
	10+80.00	12+19.82	12+04.82	13	0.75 H	2
F	10+00.00	10+40.00	10+40.00	8	8 feet	2
	10+40.00	11+85.00	11+60.00	12	0.75 H	2

Wall ID	Start STA	End STA	STA with Maximum Height	Max. Wall Height (ft.)	Minimum Needed Reinforcement Length (ft or %H) <sup>(1)</sup>	Min. Embedment Depth (ft)
G	10+00.00	11+28.00	10+20.00	15	0.7 H	2
	11+28.00	11+75.00	11+28.00	8	8 feet	2
H	10+00.00	11+80.00	10+26.75	16.5	0.7 H	2
	11+80.00	12+82.08	11+80.00	10	0.8 H	2
I	10+00.00	11+00.00	11+20.00	8	8 feet	2
	11+00.00	12+45.49	12+30.49	15.5	1.1 H	2
J	10+00.00	11+00.00	11+00.00	8	8 feet	2
	11+00.00	12+00.00	12+00.00	12	0.75 H	2
	12+00.00	13+42.55	13+15.00	17	0.8 H	2
K	10+00.00	12+00.00	10+27.75	17	0.75 H	2
	12+00.00	13+30.00	12+00.00	11	0.7 H	2

(1) The minimum required strap length for all walls should be 8 feet, or the indicated percentage of wall height, whichever is larger unless otherwise indicated above.

#### 6.4 Lateral Earth Pressures

Retaining walls will be subjected to lateral earth pressures and must be designed in consideration of these forces. Earth pressures will be influenced by the structural design of the walls, conditions of wall restraint, methods of construction and/or compaction, the strength of the materials being restrained, and drainage conditions.

Active earth pressures are anticipated for use in the design. This method assumes some small outward rotation of the wall. Soil friction angle and unit weight parameters are provided in Table 10, and recommendations for lateral earth pressures are presented in Table 11. The design lateral earth pressures recommended in Table 11 below do not include a Factor of Safety and do not provide for hydrostatic or dynamic pressures on the walls. Lateral loads due to surcharge need to be considered, and should be calculated as shown in Table 11. For this project we have assumed a surcharge value of 250 psf.

**Table 10. Effective Friction Angle and Unit Weight**

Backfill Type	Effective Friction Angle	Total Unit Weight (pcf)
Type DS Backfill	34°	110
Retained Wedge	30°	120

Drained equivalent fluid pressures should be used for free-draining backfill materials. However, due to the presence of appreciable fines in some of the on-site soils and clay based select fill soils, these materials have greatly reduced permeability. If a drained condition is selected, the wall must include a drainage system to prevent hydrostatic pressure from developing behind the wall. The equivalent fluid pressure values summarized in Table 11 require a triangular wedge of granular fill behind the wall. The granular backfill must extend 2 feet from the base of the wall and sloped

upward away from the bottom of the heel of the wall foundation at a slope of 1H:1V or flatter.

**Table 11. Earth Pressure Recommendations**

Earth Pressure Conditions	Coefficient for Backfill Type	Drained Equivalent Fluid Density (EFD) (pcf)	Undrained Equivalent Fluid Density (pcf)	Earth Pressure (psf)
<b>Active (K<sub>a</sub>)</b>	Type DS Backfill – 0.28	32	NA	(EFD)H
	Retained Wedge – 0.33	42	84	(EFD)H

### 6.5 Wall Drainage

The design lateral earth pressures recommended below do not include a Factor of Safety and do not provide for hydrostatic or dynamic pressures on the walls. Wall height (H) should be taken from the bottom of the wall footing.

Positive drainage should be provided behind the walls to preclude development of hydrostatic pressure behind the walls, and to prevent saturation of backfill and foundation soils. Free-draining backfill should meet TxDOT requirements. Filter fabric should be placed between free-draining backfill and on-site retained or backfill soils. A minimum 2-foot thick backfill cap utilizing on-site clays or imported clays should be placed over free-draining wall backfill from the outer edge of the wall excavation to a distance of at least two (2) feet beyond the wall excavation limits in order to minimize water infiltration into the wall backfill.

We recommend that a perimeter drain, such as a perforated pipe drain, be installed along the base of the fill behind the walls to rapidly remove water from behind the wall. The perimeter drain should discharge collected water at least at 5 feet away from any structure foundations.

## 7.0 EARTHWORK RECOMMENDATIONS

The following are recommendations for general fills for approaches, behind abutments, and behind the wing walls during construction of the new bridges.

- Fills should be placed in layer-compacted lifts not exceeding 8 inches in compacted thickness. These fills should be compacted to at least 95 percent of the maximum density as determined by TEX-114-E for embankment soils, or TEX-113-E for flexible base materials. The moisture content for embankment soil fill should be at or above the materials optimum moisture content ( $\geq +0\%$ ). Where used beneath bridge approach slabs, flexible base should be treated with cement according to the plans, typically at the rate of about 2-1/2% by dry weight of base material.
- Each lift of fill or backfill should be tested for moisture content and compaction by a testing laboratory, with a minimum of 2 tests per lift within each fill area.

## **8.0 SEISMIC CONSIDERATIONS**

North Texas is generally regarded as an area of low seismic activity. The seismic site classification is based on the 2018 International Building Code (IBC) and is a classification of the site based on the type of soils encountered at the site and their engineering properties. Per Table 20.3-1 of ASCE 7-10, the seismic site classification for this site varies between B (shallower limestone) and C (deeper limestone).

## **9.0 LIMITATIONS**

The professional geotechnical engineering services performed for this project, the findings obtained, and the recommendations prepared were accomplished in accordance with currently accepted geotechnical engineering principles and practices.

Variations in the subsurface conditions are noted at the specific boring locations for this study. As such, all users of this report should be aware that differences in depths and thicknesses of strata encountered can vary between the boring locations. The number and spacing of the exploration borings were chosen to obtain geotechnical information for the design and construction of heavily-loaded bridge structure foundations. Statements in the report as to subsurface conditions across the site are extrapolated from the data obtained at the specific boring locations. If there are any conditions differing significantly from those described herein, Geotex should be notified to re-evaluate the recommendations contained in this report.

Recommendations contained herein are not considered applicable for an indefinite period of time. Our office must be contacted to re-evaluate the contents of this report if construction does not begin within a one-year period after the completion of this report.

The scope of services provided herein does not include an environmental assessment of the site or investigation for the presence or absence of hazardous materials in the soil, surface water, or groundwater.

All contractors referring to this geotechnical report should draw their own conclusions regarding excavations, construction, etc. for bidding purposes. Geotex is not responsible for conclusions, opinions or recommendations made by others based on these data. The report is intended to guide preparation of project specifications and should not be used as a substitute for the project specifications.

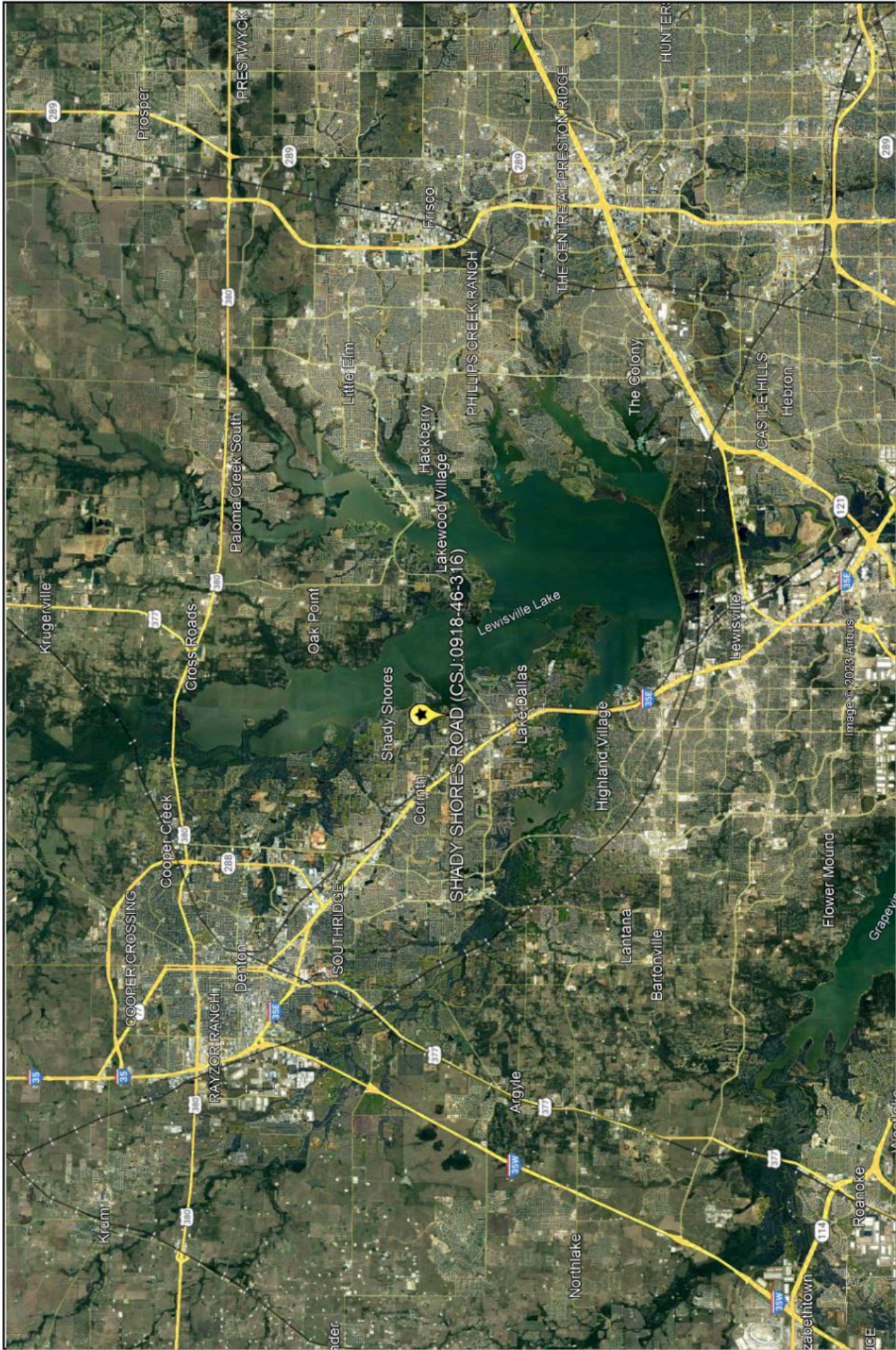
Recommendations provided in this report are based on our understanding of information provided by the Client to us regarding the scope of work for this project. If the Client notes any differences, our office should be contacted immediately since this may materially alter the recommendations.

All contractors referring to this geotechnical report should draw their own conclusions regarding excavations, construction, etc. for bidding purposes. Geotex is not responsible for conclusions, opinions or recommendations made by others based on these data. The

report is intended to guide preparation of project specifications and should not be used as a substitute for the project specifications.

Recommendations provided in this report are based on our understanding of information provided by the Client to us regarding the scope of work for this project. If the Client notes any differences, our office should be contacted immediately since this may materially alter the recommendations.

**APPENDIX A – PROJECT LOCATION DIAGRAM**



LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



PROJECT LOCATION DIAGRAM - GENERAL

**SHADY SHORES ROAD**  
CSJ: 0918-46-316

SHEET NO.

**G1**

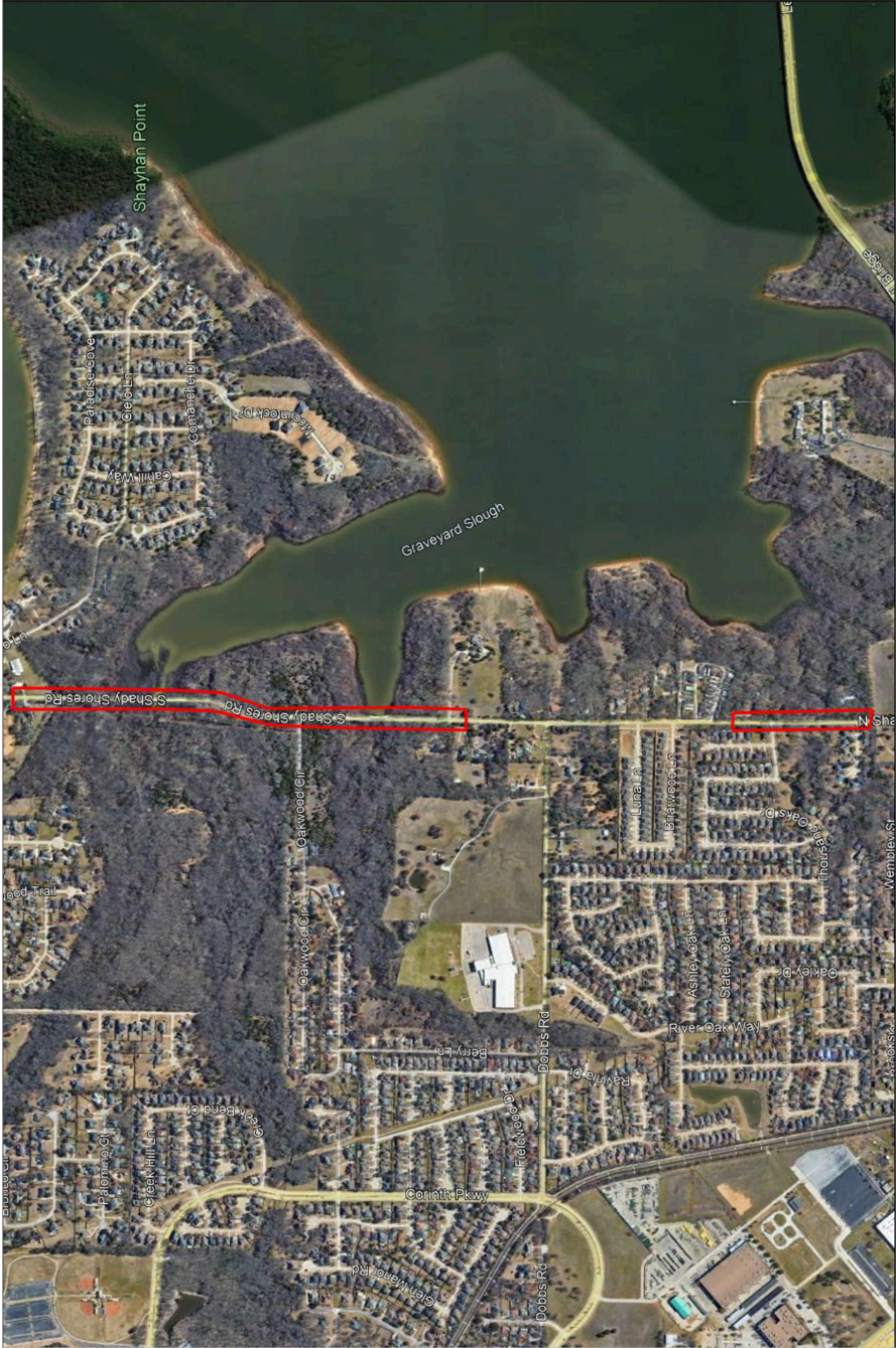
DATE DRILLED

DENTON COUNTY

TEXAS

October 12 - December 1, 2023





LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



N.T.S.

SHEET NO.

**G2**

DATE DRILLED

TEXAS

October 12 – December 1, 2023

PROJECT LOCATION DIAGRAM - LOCAL

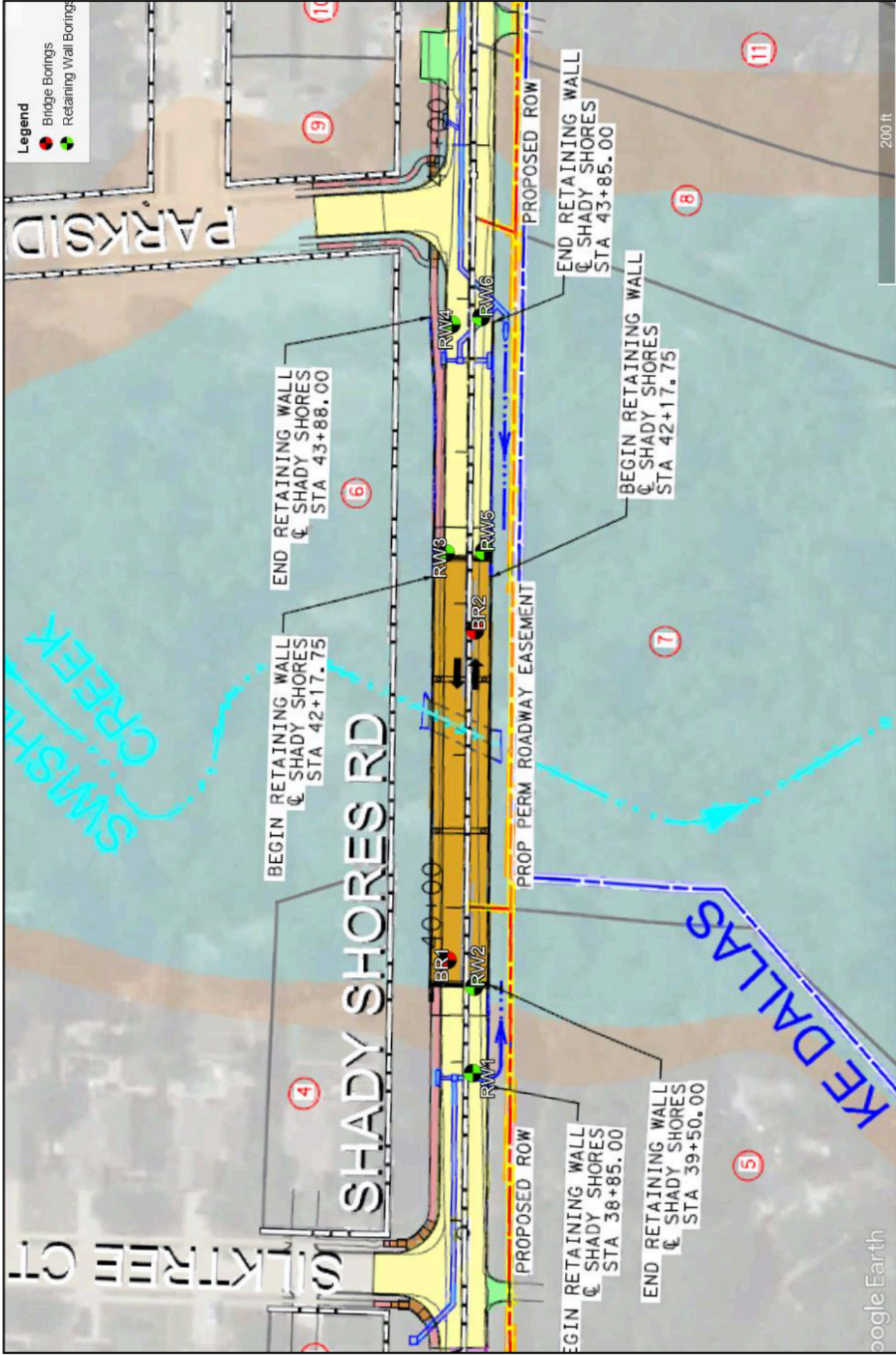
**SHADY SHORES ROAD**

CSJ: 0918-46-316



DENTON COUNTY

**APPENDIX B – BORING LOCATION DIAGRAM**



LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



BORING LOCATION DIAGRAM  
 SHADY SHORES ROAD  
 CSJ: 0918-46-316

SHEET NO.

**G3**

DATE DRILLED

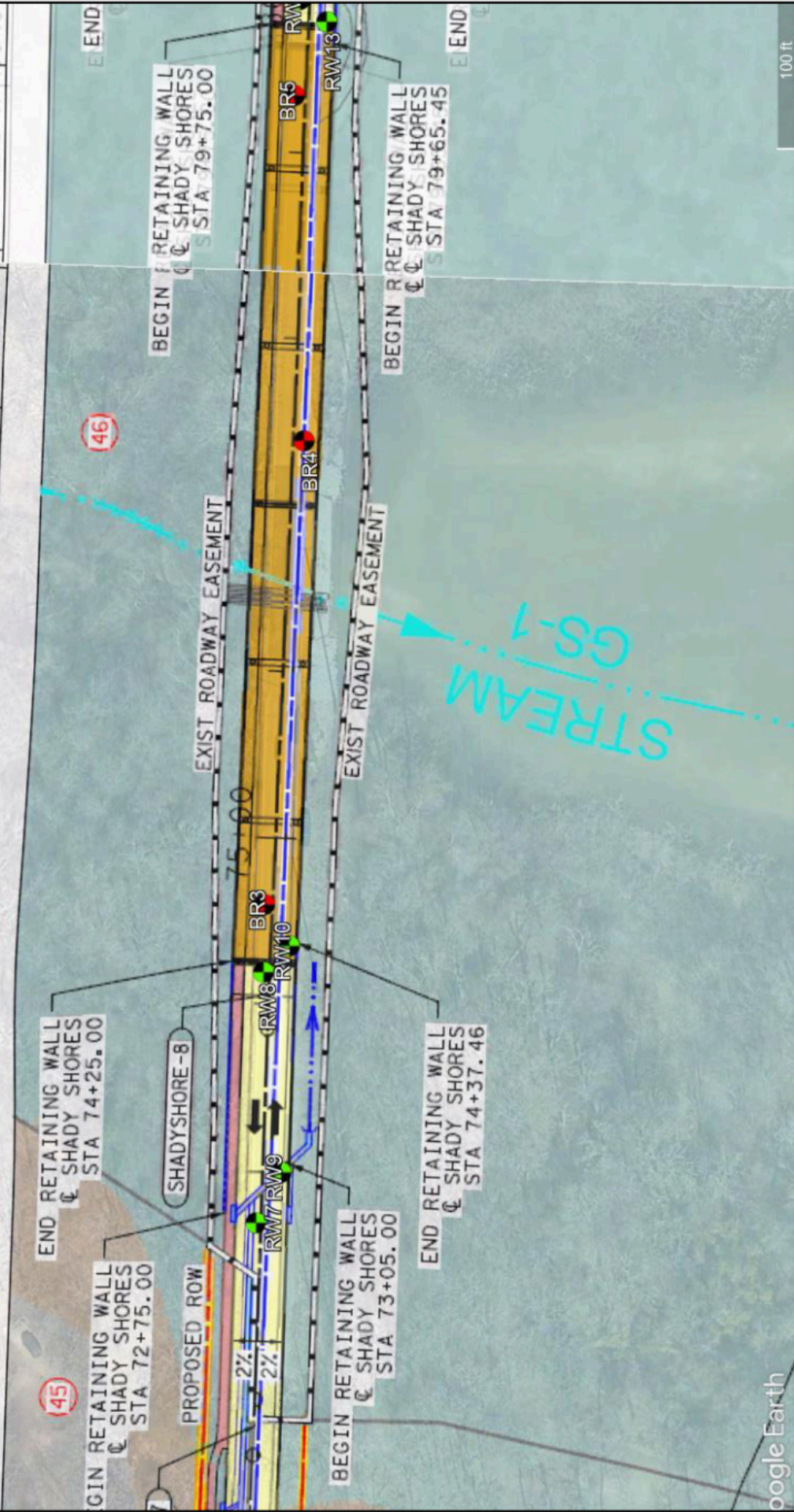
October 12 - December 1, 2023

TEXAS

DENTON COUNTY



2° 27' 15.00" (LT)	510.00	101.23	199.87	N 11°02' 52.68" E	514.90	03°31.72	81°18.13	N 22°11' 00" W
0° 46' 28.00" (RT)	2000.00	13.52	27.03	N 0°12' 29.18" E	198.59	89+04.51	91+04.38	N 0°11' 00" W
0° 46' 12.46" (LT)	2000.00	13.44	26.88	N 0°12' 36.95" E	27.03	100+06.91	100+33.94	N 0°11' 00" W
8° 25' 19.88" (LT)	510.00	37.55	74.97	N 4°23' 09.23" W	26.88	102+55.61	102+82.49	N 0°35' 43.18" E
8° 25' 19.88" (RT)	510.00	37.55	74.97	N 4°23' 09.23" W	74.90	109+08.86	109+83.82	N 0°10' 29.29" W
					74.90	109+83.82	110+58.79	N 8°35' 49.16" W



LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

BORING LOCATION DIAGRAM  
**SHADY SHORES ROAD**  
 CSJ: 0918-46-316

SHEET NO.

**G4**

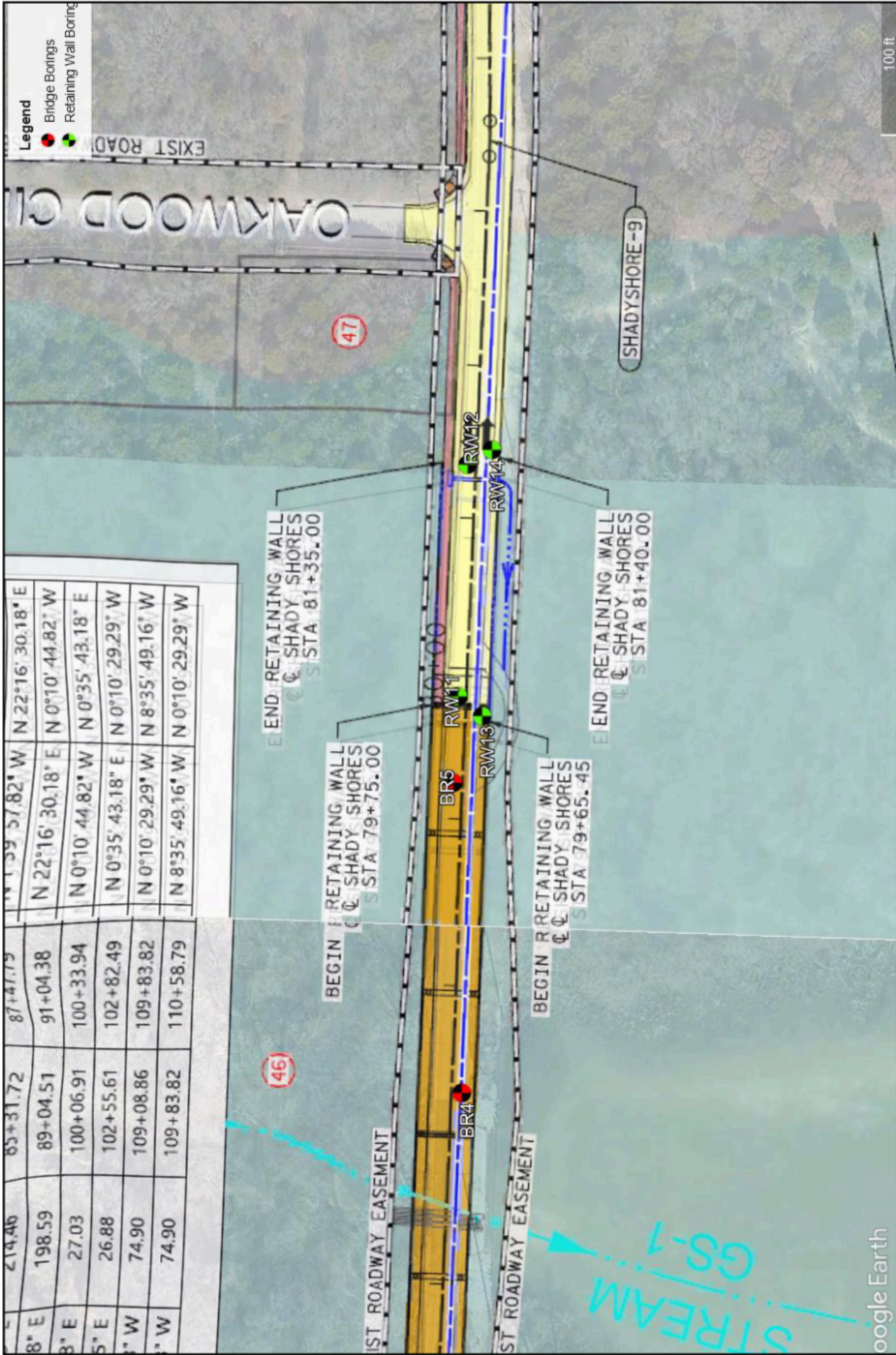
DATE DRILLED

TEXAS

DENTON COUNTY

October 12 - December 1, 2023





LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

BORING LOCATION DIAGRAM  
**SHADY SHORES ROAD**  
 CSJ: 0918-46-316



DENTON COUNTY

SHEET NO.

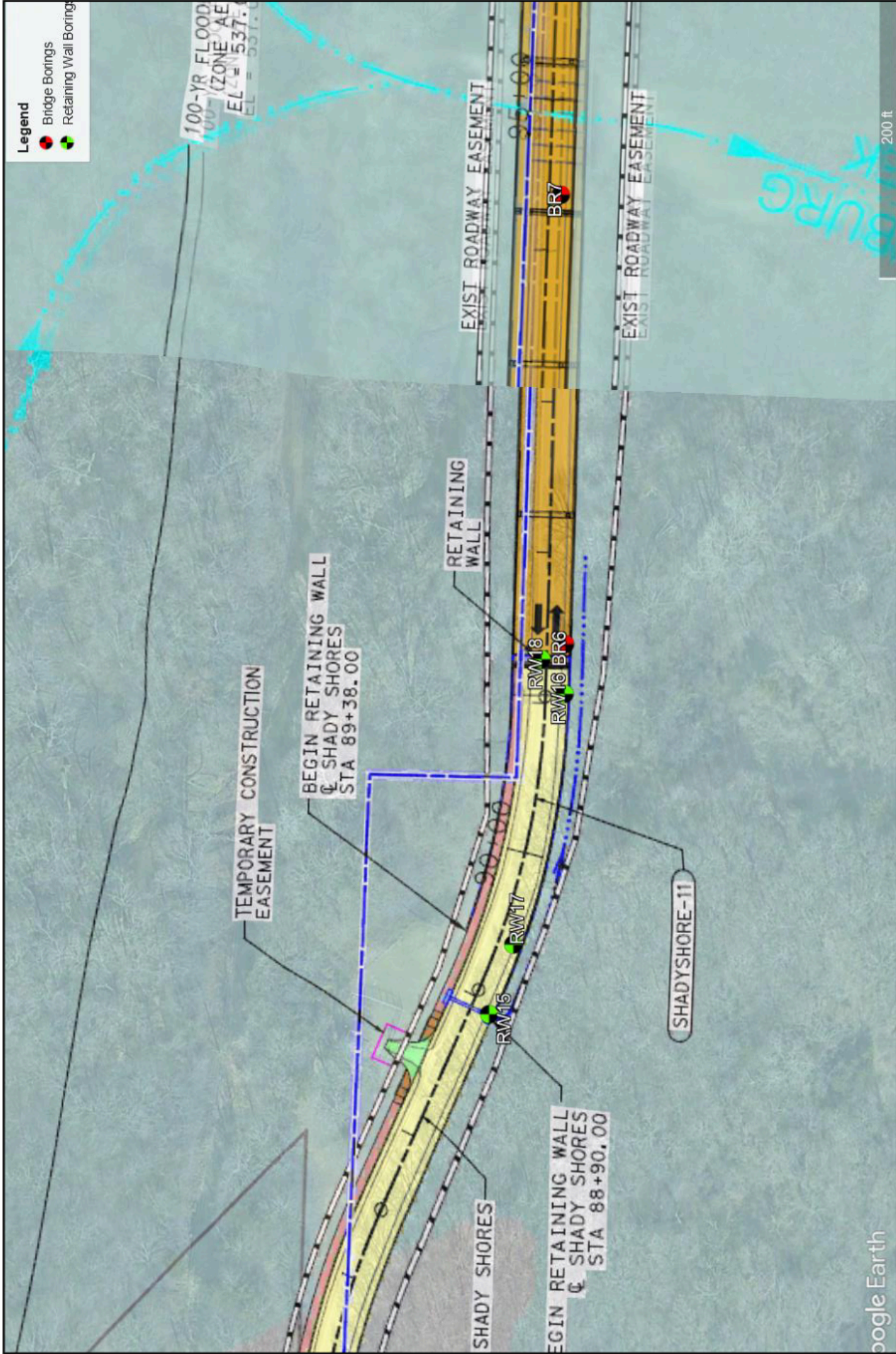
**G5**

DATE DRILLED

TEXAS

October 12 - December 1, 2023





LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



BORING LOCATION DIAGRAM  
**SHADY SHORES ROAD**  
 CSJ: 0918-46-316

SHEET NO.



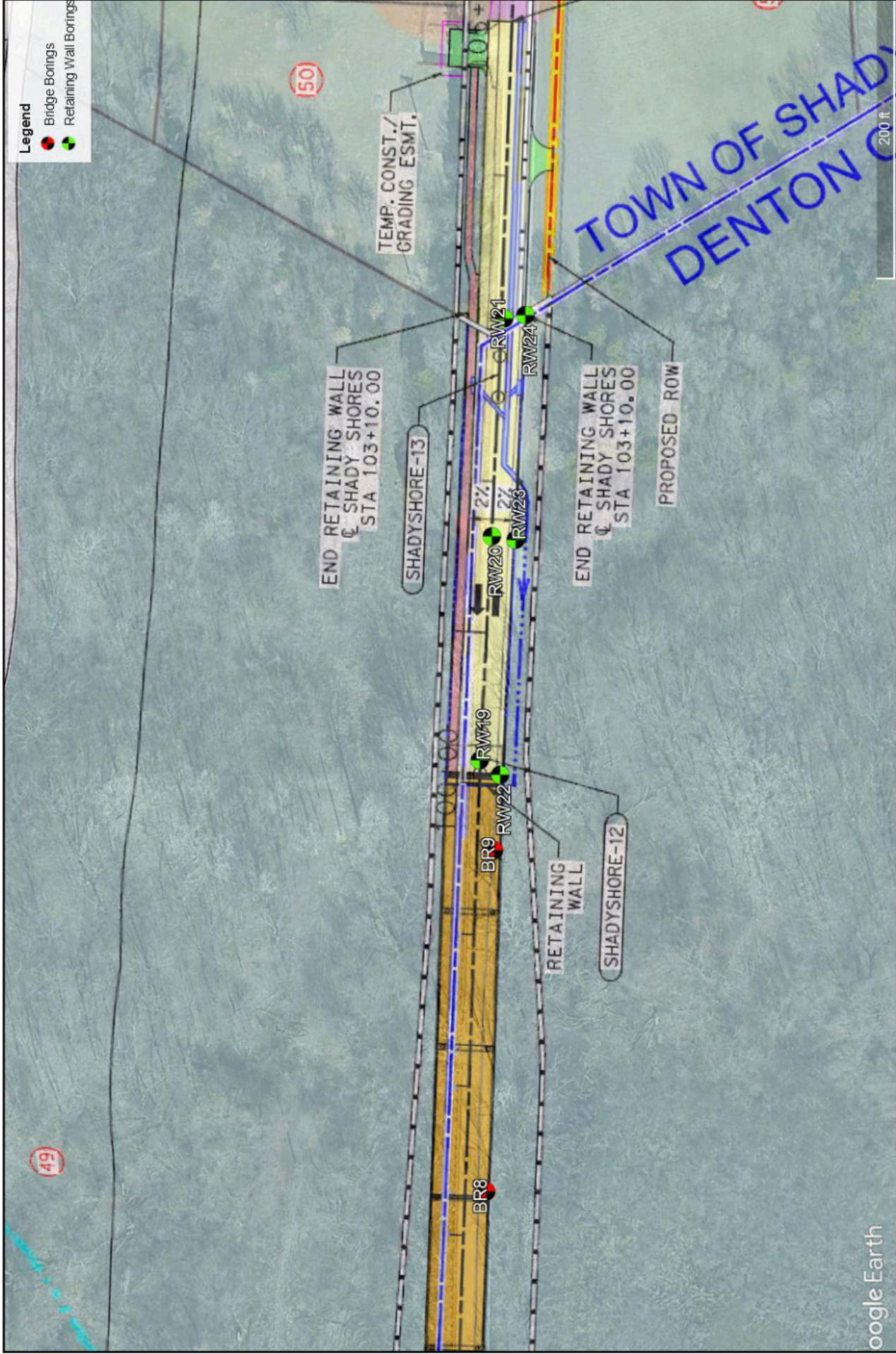
**G6**

DATE DRILLED

DENTON COUNTY

TEXAS

October 12 - December 1, 2023



LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*

BORING LOCATION DIAGRAM  
**SHADY SHORES ROAD**  
 CSJ: 0918-46-316



DENTON COUNTY

SHEET NO.

**G7**

DATE DRILLED

October 12 – December 1, 2023

TEXAS



**APPENDIX C – BORING LOGS AND SUPPORTING DATA**

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## Boring Logs

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# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
534.2			ASPHALT, 2 inches						
533.7			CONCRETE, 6 inches						
532.9			BASE, 10 inches						
532.4			FILL, CLAY; hard; brown, dark brown, gray; some gravel			12.0	28	15	P.P. = 4.5+, -#200: 90.5
		50 (4.75) 50 (4.25)	SILT, hard; brown; with sand (ML)						P.P. = 4.5+
	5					11.7			P.P. = 4.5+
						10.4	NP	NP	SPT MOD = 24, 37, 32 (69), -#200: 84.9
524.4	10	50 (4) 50 (4.5)	SHALE, highly to completely weathered; soft; brown, gray			16.4			Bag Sample
519.4	15	50 (1.5) 50 (0.25)	SHALE, fresh; soft to very hard; gray, dark gray			14.9			Bag Sample
	20	50 (2) 50 (1)				16.8			Bag Sample
	25	37 (6) 50 (3)				21.2			Bag Sample
	30	50 (1.5) 50 (0.75)				13.9			P.P. = 4.5+; 30-35' %REC= 77; %RQD= 68
	35	50 (1.5) 50 (0.5)			415.4	17.9		130.0	Bag Sample

Remarks: -Northing/Easting: 7101210.8864, 2418818.5354  
 -seepage at 30 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)		
40		50 (4) 50 (1.5)	SHALE, fresh; soft to very hard; gray, dark gray							Bag Sample; 40-45' %REC= 99; %RQD= 43	
45		50 (0.25) 50 (0.25)			33.1	8.6			152.6	45-50' %REC= 15; %RQD= 0	
50		50 (0.25) 50 (0.25)									
55		50 (0.25) 50 (0.25)									SPT MOD = 50=3" (50)
474.4	60	50 (0.25) 50 (0.25)					30.5				Bag Sample
65		50 (0.25) 50 (0.25)	SANDSTONE, weakly to well cemented; soft to very hard; gray, dark gray; few to little shale seams							SPT MOD = 50=2" (50)	
70		50 (5) 50 (1.5)					16.3				Bag Sample

Remarks: -Northing/Easting: 7101210.8864, 2418818.5354  
 -seepage at 30 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (0.25) 50 (0.25)	SANDSTONE, weakly to well cemented; soft to very hard; gray, dark gray; few to little shale seams							Bag Sample
454.4 80		50 (0.25) 50 (0.25)				26.0				Bag Sample
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7101210.8864, 2418818.5354  
 -seepage at 30 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
527.7			ASPHALT, 3.5 inches						
527.0			BASE, 8.5 inches; chemically treated						
			SAND, very loose; reddish brown, tan; silty (SM)			6.6			P.P. = 0.25, -#200: 11.1
						8.5	NP	NP	SPT MOD = 29, 21, 12 (42), -#200: 32.8
523.0	5	3 (6) 3 (6)	SAND, very loose; reddish brown, tan; clayey (SC)			22.2			P.P. = 0.25
						18.5	22	8	P.P. = 0.5, -#200: 41.3
518.0	10	4 (6) 3 (6)	SAND, loose; reddish brown, tan; silty (SM)			20.6			P.P. = 0.5, -#200: 32.9
	15	5 (6) 5 (6)				14.9	NP	NP	P.P. = 2.0, -#200: 23.2
509.0	20	50 (0.25) 50 (0.5)	SANDSTONE, weakly cemented; soft to very hard; gray, dark gray; occasional shale seams			5.8			20-25' %REC= 21; %RQD= 0
	25	21 (6) 46 (6)				7.0			25-30' %REC= 94; %RQD= 84
	30	50 (2.75) 50 (0.5)				3.9			30-35' %REC= 88; %RQD= 9
	35	50 (2.25) 50 (1.5)				15.5			35-40' %REC= 88; %RQD= 10

Remarks: -Northing/Easting: 7101451.0145, 2418824.8691  
 -seepage at 3 feet during drilling  
 -water measured at 10 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
487.0		50 (2) 50 (2.25)	SANDSTONE, weakly cemented; soft to very hard; gray, dark gray; occasional shale seams							40-45' %REC= 72; %RQD= 62
45		50 (5.25) 50 (4.75)	SHALE, fresh; soft to very hard; gray, dark gray; occasional sandstone seams			14.1				45-50' %REC= 94; %RQD= 91
50		50 (0.25) 50 (0.25)								50-55' %REC= 70; %RQD= 57
476.0		50 (1.25) 50 (1.5)	SANDSTONE, well cemented; hard to very hard; gray; trace shale seams		66.6	13.8		140.6		55-60' %REC= 80; %RQD= 7
60		50 (0.75) 50 (0.25)				18.2				60-65' %REC= 80; %RQD= 5
65		50 (0.25) 50 (0.25)								65-70' %REC= 93; %RQD= 65
70		50 (1) 50 (0.25)			2593.3	11.5		144.6		70-75' %REC= 77; %RQD= 22

Remarks: -Northing/Easting: 7101451.0145, 2418824.8691  
 -seepage at 3 feet during drilling  
 -water measured at 10 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (0.5) 50 (0.5)	SANDSTONE, well cemented; hard to very hard; gray; trace shale seams							75-80' %REC= 5; %RQD= 0
448.0 80		50 (0.5) 50 (0.5)								
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7101451.0145, 2418824.8691  
 -seepage at 3 feet during drilling  
 -water measured at 10 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height





# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
488.3			SHALE, slightly to moderately weathered; soft; brown, gray							
40			SANDSTONE, weakly cemented; very soft; light brown; trace shale seams			40.6				40' Bag Sample
482.3		38 (6) 37 (6)	SHALE, fresh; very soft to soft; gray							SPT MOD = 15, 25, 36 (61)
50		50 (6) 50 (5)				25.2				SPT MOD = 22, 43, 50=4" (93)
55		22 (6) 31 (6)								SPT MOD = 22, 41, 50=5.5"(91)
467.3		50 (1) 50 (0.25)	SHALE, fresh; soft to very hard; gray; trace sandstone seams		93.6	7.7		156.2		60-65' %REC= 100; %RQD= 72
65		50 (0.5) 50 (0.25)								65-70' %REC= 87; %RQD= 87
70		50 (5) 50 (5.5)			6.3	21.7		125.6		

Remarks: -Northing/Easting: 7104675.8433, 2418808.2758  
 -seepage at 10 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (1.5) 50 (3)	SHALE, fresh; soft to very hard; gray; trace sandstone seams			30.5				75' Bag Sample
447.2 80		50 (1) 50 (0.25)								80' Bag Sample
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7104675.8433, 2418808.2758  
 -seepage at 10 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
526.6			CONCRETE, 2 inches						
526.5			BASE, 1 inches						
			CLAY, soft; brown, reddish brown, dark brown; trace oxide stains; sandy; silty (CL-ML) (CL)			6.5			P.P. = 4.5+
						14.9			P.P. = 2.5
5		7 (6) 5 (6)				14.7	17	5	P.P. = 1.75, -#200: 53.5
						12.0			P.P. = 1.0
10		6 (6) 5 (6)				15.0	17	6	P.P. = 1.0, -#200: 63.1
512.8			SAND, loose to slightly compact; brown, dark brown; trace cemented sand fragments; silty (SM)			13.3			Bag Sample, -#200: 41.0
15		8 (6) 11 (6)							
						18.3			SPT MOD = 7, 3, 5 (8)
20		7 (6) 6 (6)				16.6	NP	NP	-#200: 47.5
25		13 (6) 13 (6)							SPT MOD = 22, 22, 23 (45)
						17.6			
30		6 (6) 8 (6)							SPT MOD = 4, 6, 7 (13)
						23.4			
492.8			CLAY, soft; brown, dark brown; trace cemented sand fragments; sandy (CL)						SPT MOD = 5, 4, 4 (8)
35		5 (6) 5 (6)							

Remarks: -Northing/Easting:7104950.2204, 2418807.7487  
 -seepage at 19 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
486.8		6 (6) 9 (6)	CLAY, soft; brown, dark brown; trace cemented sand fragments; sandy (CL)			20.9	27	14	#200: 56.3
45		50 (1) 50 (0.5)	SHALE, fresh; soft to very hard; dark gray; trace sandstone seams			33.6			P.P. = 0.25
50		50 (0.25) 50 (0.25)							P.P. = 0.5
55		50 (3) 50 (2.25)			18.7				50-55' %REC= 83; %RQD= 58
60		50 (0.5) 50 (1.5)							55-60' %REC= 48; %RQD= 48
65		34 (6) 48 (6)		62.1	18.8			74.8	60-65' %REC= 100; %RQD= 89
70		30 (6) 42 (6)						147.0	65-70' %REC= 92; %RQD= 92
455.8									70-75' %REC= 93; %RQD= 90

Remarks: -Northing/Easting:7104950.2204, 2418807.7487  
 -seepage at 19 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (0.25) 50 (0.5)	SANDSTONE, well cemented; very hard; gray, dark gray; trace shale seams		165.9	8.6			149.7	75-80' %REC= 27; %RQD= 11
446.8		50 (0.25) 50 (0.25)								
80										
85										
90										
95										
100										
105										

Remarks: -Northing/Easting:7104950.2204, 2418807.7487  
 -seepage at 19 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
525.5			CLAY, medium to very stiff; reddish brown; trace ferrous nodules, sandy (CL)			14.7				P.P. = 2.0
			SILT, soft to stiff; brown, reddish brown; silty (ML)			12.3				P.P. = 2.5
5		8 (6) 10 (6)			11.8	12.4	NP	NP	132.7	P.P. = 3.5, -#200: 51.3
										P.P. = 0.5
10		11 (6) 10 (6)				17.4	NP	NP		P.P. = 0.25, -#200: 9.0
15		10 (6) 11 (6)				10.4				Bag Sample
20		13 (6) 11 (6)				17.1				P.P. = 0.25
506.5			SAND, slightly compact to compact; light brown, brown; poorly-graded with silt (SP-SM)							
										SPT MOD = 5, 8, 14 (22)
25		16 (6) 14 (6)				19.5				-#200: 6.5
30		20 (6) 18 (6)				19.1	NP	NP		SPT MOD = 10, 27, 50=6' (77)
35		16 (6) 11 (6)				21.7				SPT MOD = 8, 22, 32 (54)

Remarks: -Northing/Easting: 7105153.5646, 2418812.8995  
 -seepage at 10 feet during drilling  
 -water measured at 10 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)		
40		16 (6) 14 (6)	SAND, slightly compact to compact; light brown, brown; poorly-graded with silt (SP-SM)			20.2	NP	NP		SPT MOD = 6, 8, 13 (21), -#200: 6.3	
45		13 (6) 10 (6)				16.1				Bag Sample	
50		31 (6) 34 (6)								SPT MOD = 13, 23, 35 (58)	
472.5		50 (3) 50 (1)		SHALE, fresh; very soft to hard; gray			18.7				Bag Sample
60		41 (6) 50 (6)									SPT MOD = 20, 33, 37 (70)
65		37 (6) 37 (6)								SPT MOD = 14, 24, 24 (48)	
70		50 (2.5) 50 (3.5)				35.8				SPT MOD = 50=5.75" (50)	

Remarks: -Northing/Easting: 7105153.5646, 2418812.8995  
 -seepage at 10 feet during drilling  
 -water measured at 10 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (1) 50 (1)	SHALE, fresh; very soft to hard; gray			16.4				SPT MOD = 38, 50=3" (50)
447.5 80		50 (2) 50 (1.25)								SPT MOD = 43, 50=3" (50)
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7105153.5646, 2418812.8995  
 -seepage at 10 feet during drilling  
 -water measured at 10 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
528.1	[Hatched pattern]		ASPHALT, 3 inches							
527.9			BASE, 2.5 inches; chemically treated							
			CLAY, soft to stiff; light brown; few to some calcareous nodules, trace to few ferrous nodules; sandy (CL)			13.1				P.P. = 4.5+
524.4	5 [Dotted pattern]	6 (6) 4 (6)	SAND, loose to slightly compact; light brown; clayey (SC)	46.3	11.8	26	12	128.0	P.P. = 4.5+, #200: 58.4	
				23.7	7.8			124.0	P.P. = 3.75, #200: 47.7	
						14.8			P.P. = 1.0	
	10	15 (6) 16 (6)				14.1	22	9	P.P. = 1.0, #200: 43.0	
515.4	15 [Dotted pattern]	50 (5) 50 (1.5)	SAND, loose to dense; brown; trace to few gravel; poorly-graded (SP)			24.1				Bag Sample, #200: 4.9
	20	19 (6) 26 (6)				16.5	NP	NP	SPT MOD = 3, 11, 15 (26), #200: 8.3	
	25	23 (6) 26 (6)				25.0			SPT MOD = 2, 3, 10 (13)	
	30	27 (6) 23 (6)				23.0			SPT MOD = 3, 12, 23 (35)	
	35	5 (6) 6 (6)				21.7			SPT MOD = 18, 11, 12 (23)	

Remarks: -Northing/Easting: 7106345.4360, 2418945.0837  
 -seepage at 19 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
40		14 (6) 16 (6)	SAND, loose to dense; brown; trace to few gravel; poorly-graded (SP)			23.4	NP	NP	SPT MOD = 5, 12, 23 (35), #200: 8.0
483.4		50 (5) 50 (2.5)	SHALE, fresh; soft to hard; gray, dark gray; trace to few sandstone seams			12.0			Bag Sample
50		50 (3.25) 50 (3)				14.4			SPT MOD = 15, 27, 42 (69)
55		50 (4.5) 50 (3.25)				14.6			Bag Sample
60		50 (1.25) 50 (1)	SANDSTONE, weakly to well cemented; hard to very hard; gray; trace shale seams					135.0	60-65' %REC= 75; %RQD= 53
467.4		50 (2) 50 (1)			67.9	11.2		140.0	65-70' %REC= 80; %RQD= 52
70		50 (0.5) 50 (0.25)			92.8	10.2		142.4	70-75' %REC= 0; %RQD= 0

Remarks: -Northing/Easting: 7106345.4360, 2418945.0837  
 -seepage at 19 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (0.25) 50 (0.25)	SANDSTONE, weakly to well cemented; hard to very hard; gray; trace shale seams							75-80' %REC=0; %RQD=0
448.4 80		50 (0.25) 50 (0.25)								
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7106345.4360, 2418945.0837  
 -seepage at 19 feet during drilling  
 -water measured at 19 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
527.6			ASPHALT, 3 inches							
526.9			BASE, 9 inches; chemically treated							
			SILT, stiff; brown, reddish brown; sandy (ML)			10.6				
						12.5				P.P. = 3.75
	5	11 (6) 9 (6)				14.6				P.P. = 1.5, #200: 14.9
			SAND, loose to compact; brown, reddish brown, gray; silty (SM)			13.7	17	2		P.P. = 0.75, #200: 50.4
519.9		20 (6) 17 (6)				15.5				P.P. = 2.25
	15	11 (6) 12 (6)				20.6				P.P. = 3.0, #200: 49.0
	20	9 (6) 9 (6)				16.2				Bag sample
	25	28 (6) 30 (6)				20.6	NP	NP		SPT MOD = 4, 3, 5 (8), #200: 40.7
	30	15 (6) 16 (6)				22.9				SPT MOD = 11, 12, 11 (23)
	35	20 (6) 28 (6)				18.9				SPT MOD = 7, 6, 7 (13)

Remarks: -Northing/Easting: 7106628.0755, 2418935.1176  
 -seepage at 13 feet during drilling  
 -water measured at 13 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
40		28 (6) 24 (6)	SAND, loose to compact; brown, reddish brown, gray; silty (SM)			15.5	NP	NP		SPT MOD = 18, 10, 24 (34), -#200: 26.6
45		20 (6) 14 (6)								SPT MOD = 3, 2, 6 (8)
478.9		3 (6) 4 (6)	SAND, very loose; brown, reddish brown; poorly-graded (SP)			20.2	NP	NP		SPT MOD = 6, 5, 9 (14), -#200: 2.9
472.9		50 (1) 50 (0.25)	SHALE, fresh; hard to very hard; trace sandstone seams			57.5				SPT MOD = 50=4" (50)
60		50 (0.5) 50 (0.5)								60-65' %REC= 4; %RQD= 0
462.9		50 (2) 50 (0.25)				52.3				65-70' %REC=0; %RQD= 0
70		50 (0.25) 50 (0.25)	SANDSTONE, weakly to well cemented; very hard; reddish tan; trace shale							70-75' %REC=0; %RQD= 0

Remarks: -Northing/Easting: 7106628.0755, 2418935.1176  
 -seepage at 13 feet during drilling  
 -water measured at 13 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
452.9	75	50 (0.25) 50 (0.25)	SANDSTONE, weakly to well cemented; very hard; reddish tan; trace shale							
80										
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7106628.0755, 2418935.1176  
 -seepage at 13 feet during drilling  
 -water measured at 13 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks		
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)			
527.0			ASPHALT, 3 inches									
			BASE, 18 inches; chemically treated									
525.5			CLAY, soft to stiff; dark brown; with sand (CL)						17.5	126.0	P.P. = 4.5+	
					23.9					18.3	127.4	P.P. = 2.75
	5	4 (6) 5 (6)								17.9		P.P. = 1.5, #200: 73.6
										15.1	18.2 21 8 127.0	P.P. = 2.25, #200: 73.7
517.3	10	5 (6) 5 (6)	SAND, loose ; brown; clayey (SC)						15.3		P.P. = 2.25	
										17.9		P.P. = 0.25, #200: 39.8
	15	7 (6) 8 (6)										
508.3	20	10 (6) 13 (6)	CLAY, soft; brown; sandy (CL)						19.9	23 11	P.P. = 0.25, #200: 62.8	
	25	17 (6) 18 (6)								21.2		P.P. = 0.25
498.3	30	37 (6) 45 (6)	SAND, dense; dark brown; silty; clayey (SC-SM)						16.7	18 5	P.P. = 1.0, #200: 36.0	
495.3	35	23 (6) 22 (6)	SAND, compact; reddish brown, tan; poorly-graded with silt (SP-SM)						19.6		SPT MOD = 6, 12, 9 (21)	

Remarks: -Northing/Easting: 7106948.4022, 2418941.2348  
 -seepage at 15 feet during drilling  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
40		23 (6) 40 (6)	SAND, compact; reddish brown, tan; poorly-graded with silt (SP-SM)			15.8	NP	NP		SPT MOD = 13, 24, 17 (41), #200: 9.1
45		28 (6) 23 (6)				19.7				
478.3		50 (3) 50 (1)	SHALE, fresh; soft to very hard; dark gray; occasional sandstone seams			20.4				50' Bag Sample
55		50 (0.25) 50 (0.25)								55' Bag Sample
467.3		50 (1) 50 (0.5)	SANDSTONE, weakly cemented; hard to very hard; gray							60-65' %RED= 0; %RQD= 0
65		50 (0.25) 50 (0.25)								65-70' %RED= 0; %RQD= 0
70		50 (0.25) 50 (0.25)								70-75' %RED= 0; %RQD= 0

Remarks: -Northing/Easting: 7106948.4022, 2418941.2348  
 -seepage at 15 feet during drilling  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (0.25) 50 (0.25)	SANDSTONE, weakly cemented; hard to very hard; gray							
447.3 80		50 (0.25) 50 (0.25)								SPT MOD = 50=1.0" (50)
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7106948.4022, 2418941.2348  
 -seepage at 15 feet during drilling  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
527.4			ASPHALT, 4 inches						
526.7			BASE, 8 inches; chemically treated						
			SAND, slightly compact; tan, brown; clayey (SC)			12.4			P.P. = 4.5+
						11.6	24	11	P.P. = 4.5+, #200: 43.0
522.7	5	14 (6) 13 (6)	CLAY, soft to very stiff; reddish brown; trace to few calcareous nodules; sandy (CL)			9.5			P.P. = 3.5, #200: 26.7
				69.0		13.0		120.0	P.P. = 4.5+
	10	8 (6) 10 (6)				16.1	29	13	P.P. = 4.5+, #200: 58.7
						13.8		135.0	P.P. = 1.0, #200: 54.7
507.7	20	36 (6) 50 (6)	SAND, compact to dense; reddish tan, brown; some gravel; poorly-graded with silt (SP-SM)			16.6			P.P. = 1.0
						22.5			SPT MOD = 2, 2, 7 (9), #200: 6.4
	25	24 (6) 29 (6)				23.7			SPT MOD = 5, 6, 9 (15)
						16.5			SPT MOD = 5, 6, 7 (13)
492.7	35	22 (6) 18 (6)							

Remarks: -Northing/Easting: 7107158.2626, 2418941.0905  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
40		28 (6) 23 (6)	SAND, loose to compact; reddish tan, brown; some gravel; silty (SM)			21.2				SPT MOD = 14, 15, 43 (58)
45		8 (6) 10 (6)				14.8	NP	NP		SPT MOD = 10, 50=5.5" (50), #200: 16.2
477.7			SHALE, fresh; very hard; dark gray; with sandstone seams			18.0				50' Bag Sample
55		50 (0.25) 50 (0.25)				31.4				55' Bag Sample; 55-60' %REC= 0; %RQD= 0
60		50 (0.25) 50 (0.25)								
466.7			SANDSTONE, weakly cemented; very hard; gray							
65		50 (0.25) 50 (0.25)								SPT MOD = 50=1.5" (50)
70		50 (0.25) 50 (0.25)								SPT MOD = 50=3.0" (50)

Remarks: -Northing/Easting: 7107158.2626, 2418941.0905  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
75		50 (0.25) 50 (0.25)	SANDSTONE, weakly cemented; very hard; gray							SPT MOD = 50=2.75" (50)
447.7 80		50 (0.25) 50 (0.25)								SPT MOD = 50= 3.0" (50)
85										
90										
95										
100										
105										

Remarks: -Northing/Easting: 7107158.2626, 2418941.0905  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with 170 lb hammer and 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW1  
Structure Retaining Wall  
Station 39+10.56  
Offset 2.53' RT

District Dallas  
Date 10/11/23  
Grnd. Elev. 539.96 ft  
GW Elev. 509.96 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
539.5			ASPHALT, 6 inches							
539.2			BASE, 3 inches							
		33 (6) 31 (6)	CLAY, very stiff to hard; reddish brown; trace ferrous nodules; sandy (CL)			5.3				P.P. = 4.5+
						9.6	34	21		P.P. = 4.5+; Sulfate PPM : 320, #200: 52.0
535.0	5	44 (6) 47 (6)	CLAY, very stiff; reddish brown; trace ferrous nodules; with sand (CL)			12.6				P.P. = 4.5+
						10.6	32	19		P.P. = 4.5+, #200: 88.0
530.0	10	21 (6) 50 (5)	SHALE, moderately weathered; soft to very hard; brown, gray; with sand seams			11.2				P.P. = 4.5+
	15	50 (1.5) 50 (0.5)				16.1				P.P. = 4.5+
	20	50 (0.5) 50 (0.75)				14.0				P.P. = 4.5+
	25	50 (1.5) 50 (0.75)				15.4				Bag Sample (Grab)
	30	50 (0.5) 50 (0.5)				16.3				Bag Sample (Grab)
505.0	35	50 (3) 50 (2)				29.6				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7101139.1482 2418834.2471  
 -seepage at 30 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW2  
Structure Retaining Wall  
Station 39+53.64  
Offset 3.26' RT

District Dallas  
Date 10/23/23  
Grnd. Elev. 536.13 ft  
GW Elev. 506.13 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)		
535.6			ASPHALT, 6 inches								
535.4			BASE, 2 inches								
		4 (6) 13 (6)	CLAY, soft to stiff; brown, reddish tan; trace ferrous nodules; with shale fragments below 2 feet (CH)			7.3				P.P. = 4.5+	
							13.6	53	36		P.P. = 4.5+, #200: 92.0
		50 (3) 50 (4.5)				9.6				P.P. = 4.5+	
530.1			SHALE, highly to completely weathered; soft to hard; brown, tan, gray; trace ferrous stains, sand seams			15.1				SPT MOD = 14, 16, 22 (38), #200: 83.0	
		50 (5.5) 50 (4)					13.2				SPT MOD = 4, 11, 31 (42)
		50 (1) 50 (1.5)					12.7				P.P. = 4.5+
		50 (1.5) 50 (1.5)					14.1				Bag Sample (Grab)
512.1		50 (1) 50 (2)	SHALE, fresh; soft to hard; gray, dark gray; with sandstone layers			15.7				Bag Sample (Grab)	
		38 (6) 47 (6)					19.5				Bag Sample (Grab)
501.1		50 (2.5) 20 (2.5)				28.5				Bag Sample (Grab)	

Remarks: -Northing/ Easting: 7101182.2282 2418834.0766  
 -seepage at 30 feet during drilling  
 -water measured at 30 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW3  
Structure Retaining Wall  
Station 42+34.70  
Offset 12.57' LT

District Dallas  
Date 11/21/23  
Grnd. Elev. 528.53 ft  
GW Elev. 514.53 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
528.5			ASPHALT, 1 inch							
527.5			CONCRETE, 11 inches							
			SAND, loose; brown; silty (SM)			12.7				P.P. = 1.5
		7 (6) 5 (6)								
523.5		8 (6) 9 (6)	SAND, loose to slightly compact; brown; silty, clayey (SC-SM)			14.6	NP	NP		P.P. = 1.0, -#200: 35.0
						14.8				P.P. = 1.75
		2 (6) 4 (6)				16.3	20	5		P.P. = 0.5, -#200: 41.0
514.5		13 (6) 13 (6)	GRAVEL, slightly compact; tan; poorly-graded; with clay (GP-GC)			17.4				P.P. = 1.0
		10 (6) 12 (6)				11.9				Bag Sample (Grab), -#200: 8.0
504.5		16 (6) 15 (6)	SHALE, fresh; very soft to hard; gray, dark gray			15.3				Bag Sample (Grab)
		50 (2.5) 50 (0.25)				24.6				Bag Sample (Grab)
493.5		50 (1) 50 (6)				18.8				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7101462.8996 2418812.3574  
 -seepage at 14 feet during drilling  
 -water measured at 14 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW4  
Structure Retaining Wall  
Station 43+64.01  
Offset 11.94' LT

District Dallas  
Date 11/21/23  
Grnd. Elev. 531.89 ft  
GW Elev. 516.89 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
531.5			ASPHALT, 4.5 inches						
531.3			CONCRETE, 3 inches			18.1			P.P. = 4.5+
529.4		25 (6) 15 (6)	FILL, SAND; slightly compact; reddish tan, brown, gray; trace cemented sand fragments (SC)			7.9			P.P. = 4.5+
5		4 (6) 3 (6)	SAND, loose; reddish tan, brown, gray; trace cemented sand fragments; clayey (SC)			7.9	23	9	P.P. = 4.5+, -#200: 28.0
						15.5			P.P. = 1.25
521.9		16 (6) 31 (6)	SHALE, highly to completely weathered; soft to hard; brown, gray; trace sand seams			17.9			P.P. = 3.75
15		50 (2) 50 (1)				19.0			P.P. = 1.5
511.9		50 (0.25) 50 (1)	SHALE, fresh; soft to very hard; gray, dark gray			20.1			Bag Sample (Grab)
25		50 (1) 50 (0.5)				15.1			Bag Sample (Grab)
30		50 (4) 34 (6)				19.0			Bag Sample (Grab)
496.9		50 (1.5) 50 (0.25)				22.1			Bag Sample (Grab)

Remarks: -Northing/ Easting: 7101592.1953 2418810.2811  
 -seepage at 15 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW5  
Structure Retaining Wall  
Station 42+30.23  
Offset 0.20' LT

District Dallas  
Date 10/23/23  
Grnd. Elev. 528.39 ft  
GW Elev. 511.39 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
527.6			ASPHALT, 10 inches			43.5				P.P. = 3.0
		4 (6) 16 (6)	FILL, SAND; slightly compact; reddish brown, dark gray; trace gravel (SM)			7.3	NP	NP		P.P. = 1.5, #200: 36.0
523.4	5	4 (6) 5 (6)	SAND, slightly compact; brown; silty, clayey (SC-SM)			17.1				P.P. = 1.5
						21.7				P.P. = 0.25
	10	6 (6) 16 (6)				19.7	20	5		P.P. = 1.0, #200: 37.0
515.4			SAND, loose; brown; clayey (SC)							
	15	5 (6) 8 (6)				20.6	34	18		P.P. = 1.75, #200: 42.0
508.4	20	50 (0.5) 50 (0.25)	SHALE, highly to completely weathered; soft to very hard; brown, gray			26.7				Bag Sample (Grab)
	25	28 (6) 44 (6)				34.0				Bag Sample (Grab)
498.4	30	50 (1.5) 50 (1)	SHALE, fresh; hard; gray			36.8				Bag Sample (Grab)
493.4	35	50 (1.5) 50 (0.25)				17.7				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7101458.6863 2418824.8219  
 -seepage at 17 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW6  
Structure Retaining Wall  
Station 43+51.78  
Offset 1.34' RT

District Dallas  
Date 10/31/23  
Grnd. Elev. 531.52 ft  
GW Elev. 503.52 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
531.0			ASPHALT, 6.5 inches							
		24 (6) 26 (6)	SAND, loose to compact; reddish brown; trace ferrous nodules; silty (SM)			6.3				P.P. = 4.5+
		28 (6) 28 (6)				9.6	20	3		P.P. = 4.5+, #200: 17.0
5						7.3				
						11.0	NP	NP		P.P. = 2.5, #200: 17.0
521.5		31 (6) 42 (6)	SILT, very stiff; brown, gray (ML)			17.4				P.P. = 4.0
516.5		21 (6) 50 (1.5)	SHALE, fresh; soft to hard; gray			15.7	NP	NP		P.P. = 3.0, #200: 67.0
		50 (3.25) 50 (4.5)				19.7				Bag Sample (Grab)
		50 (1.75) 50 (0.25)				25.1				Bag Sample (Grab)
		28 (6) 29 (6)				35.1				Bag Sample (Grab)
496.5		50 (1.75) 50 (1.25)				24.1				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7101580.2352 2418823.7688  
 -seepage at 28 feet during drilling  
 -water measured at 28 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW7  
Structure Retaining Wall  
Station 72+54.50  
Offset 5.36' RT

District Dallas  
Date 11/21/23  
Grnd. Elev. 531.41 ft  
GW Elev. 509.41 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
531.3			ASPHALT, 1 inch							
530.8			CONCRETE, 4 inches							
529.9			FILL, SAND; slightly compact; reddish tan, brown, gray; trace cemented sand fragments (SC)			14.2				P.P. = 4.5+
		22 (6) 17 (6)				5.4				P.P. = 4.5+
		14 (6) 12 (6)	SAND, slightly compact; reddish brown, light brown; trace ferrous nodules; poorly-graded with silt (SP-SM)			1.8	NP	NP		Bag Sample (Grab), -#200: 8.0
525.4			CLAY, soft to stiff; brown, reddish brown; trace ferrous nodules; with sand (CL)			14.8				P.P. = 4.5+
		6 (6) 6 (6)				18.8	47	32		P.P. = 4.5+, -#200: 77.0
		50 (6) 50 (3.5)				18.7				P.P. = 4.5+
516.4			SHALE, highly to completely weathered; soft to hard; brown							
		23 (6) 19 (6)				22.5				Bag Sample (Grab)
		50 (2.75) 50 (1.25)				24.0				Bag Sample (Grab)
506.4			SHALE, fresh; soft to hard; gray							
		50 (1) 50 (1)				16.5				Bag Sample (Grab)
		50 (3.5) 50 (4.5)				20.8				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7104482.3953 2418809.9523  
seepage at 22 feet during drilling  
-SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW8  
Structure Retaining Wall  
Station 73+86.74  
Offset 4.89' RT

District Dallas  
Date 11/20/23  
Grnd. Elev. 528.21 ft  
GW Elev. 512.21 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
528.0			ASPHALT, 2.5 inches							
527.2			FILL, SAND; slightly compact; brown; some gravel (SC)			13.1				P.P. = 4.5+
		13 (6) 16 (6)	CLAY, stiff; reddish brown; trace ferrous nodules; sandy, silty (CL-ML) (CL)			12.9				P.P. = 4.5+
523.2	5	11 (6) 12 (6)	SAND, slightly compact; reddish brown; trace ferrous nodules; silty (SM)			5.7	19	6		P.P. = 4.5+, -#200: 50.0
						9.9				P.P. = 1.5
	10	7 (6) 7 (6)				13.9	NP	NP		P.P. = 1.75, -#200: 34.0
	15	15 (6) 15 (6)				16.6				P.P. = 0.5
510.2			SAND, very loose to slightly compact; brown, reddish brown; silty (SM)							
	20	11 (6) 8 (6)				19.8				P.P. = 0.5
	25	2 (6) 1 (6)				17.5	NP	NP		P.P. = 0.75, -#200: 27.0
498.2	30	19 (6) 14 (6)	SHALE, fresh; hard; gray			22.5				SPT MOD = 42, 50=6" (50)
493.2	35	50 (1) 50 (1.25)				19.8				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7104614.8320 2418809.1105  
 -seepage at 16 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW9  
Structure Retaining Wall  
Station 73+14.23  
Offset 5.70' RT

District Dallas  
Date 10/31/23  
Grnd. Elev. 529.81 ft  
GW Elev. 507.81 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
529.7			ASPHALT, 2 inches							
529.3			CONCRETE, 4 inches							
		2 (6) 2 (6)	CLAY, soft to stiff; reddish brown; trace ferrous nodules; sandy (CL)			11.5				P.P. = 4.5+
						10.2	25	12		P.P. = 4.5+, #200: 68.0
524.8	5	30 (6) 25 (6)	CLAY, soft; brown, gray; with sand (CL)			7.7				Bag Sample (Grab)
						13.1	43	25		P.P. = 3.0, #200: 81.0
	10	8 (6) 9 (6)				13.4				P.P. = 2.5
516.8			CLAY, soft; brown; sandy (CL)							
	15	6 (6) 10 (6)				17.3	31	17		P.P. = 0.25, #200: 50.0
511.8			SHALE, fresh; soft to hard; gray, dark gray							
	20	50 (2.75) 50 (1.5)				20.2				Bag Sample (Grab)
	25	50 (1.25) 50 (0.75)				18.5				P.P. = 1.25
	30	50 (3) 50 (0.5)				30.4				Bag Sample (Grab)
494.8	35	50 (2) 50 (3.5)				21.8				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7104542.3256 2418810.1032  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW10  
Structure Retaining Wall  
Station 74+38.46  
Offset 4.35' RT

District Dallas  
Date 11/1/23  
Grnd. Elev. 527.20 ft  
GW Elev. 513.20 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
527.0			ASPHALT, 2 inches							
526.6			BASE, 5.5 inches							
		3 (6) 2 (6)	CLAY, soft to stiff; reddish brown, brown; trace ferrous nodules; sandy; some gravel below 25 feet (CL)			16.3				P.P. = 4.5+
		8 (6) 10 (6)				17.2	28	15		P.P. = 2.0
5										P.P. = 1.5, -#200: 68.0
						15.1				P.P. = 3.0
10		6 (6) 9 (6)				15.3	25	13		P.P. = 2.5, -#200: 66.0
15		4 (6) 11 (6)				19.8				P.P. = 2.0
20		16 (6) 10 (6)			11.1	23	10		Bag Sample (Grab), -#200: 55.0	
502.2		50 (4) 50 (1.25)	SHALE, fresh; soft to hard; gray, dark gray; trace sandstone fragments			29.0				Bag Sample (Grab)
30		50 (3.25) 50 (1)				19.3				P.P. = 4.5+
492.2		50 (4) 50 (1)			24.9				Bag Sample (Grab)	

Remarks: -Northing/ Easting: 7104666.4912 2418808.8807  
 -seepage at 14 feet during drilling  
 -water measured at 14 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW11  
Structure Retaining Wall  
Station 80+03.54  
Offset 2.46' RT

District Dallas  
Date 11/20/23  
Grnd. Elev. 528.81 ft  
GW Elev. 508.81 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)		
528.5			ASPHALT, 3.5 inches								
			BASE, 20 inches								
526.8		24 (6) 30 (6)	SAND, compact; brown, reddish brown; clayey, silty (SC-SM)			11.8				P.P. = 4.5+	
							10.8				P.P. = 4.5+
5		24 (6) 24 (6)				7.1	18	6		P.P. = 4.5+, -#200: 29.0	
520.8			SAND, compact; brown, reddish brown; clayey (SC)			16.2				P.P. = 0.25	
		12 (6) 13 (6)					11.0	20	8		P.P. = 0.50, -#200: 34.0
513.8		9 (6) 9 (6)	SAND, loose to compact; brown, gray; trace gravel and ferrous nodules; poorly-graded with silt (SP-SM)			15.6				Bag Sample (Grab)	
		14 (6) 17 (6)					16.5				P.P. = 0.25
		25 (6) 25 (6)					17.1	NP	NP		SPT MOD = 18, 18, 24 (42), -#200: 7.0
		12 (6) 11 (6)				15.9				SPT MOD = 24, 23, 22 (45)	
493.8		18 (6) 18 (6)				17.1				SPT MOD = 20, 27, 26 (53)	

Remarks: -Northing/ Easting: 7105231.5676 2418812.7774  
 -seepage at 20 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW12  
Structure Retaining Wall  
Station 81+32.18  
Offset 4.38' RT

District Dallas  
Date 11/20/23  
Grnd. Elev. 531.72 ft  
GW Elev. 514.72 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
531.5			ASPHALT, 2.5 inches						
530.2			BASE, 17 inches						
		24 (6) 25 (6)	SAND, compact; reddish brown; trace to few ferrous nodules; clayey (SC)			11.9			P.P. = 4.5+
						10.6			P.P. = 4.5+
5		24 (6) 36 (6)				10.9	26	13	P.P. = 4.5+, -#200: 49.0
						6.8			P.P. = 4.5+
521.7	10	17 (6) 13 (6)	SAND, loose to slightly compact; reddish brown, tan; poorly-graded with silt (SP-SM)			5.0			P.P. = 0.25
15		15 (6) 13 (6)				15.3	NP	NP	P.P. = 0.25, -#200: 11.0
20		10 (6) 8 (6)				17.5			P.P. = 1.25
508.7		17 (6) 18 (6)	SAND, slightly compact to compact; reddish brown, tan; silty (SM)			18.8	NP	NP	Bag Sample (Grab), -#200: 18.0
		23 (6) 24 (6)				20.1			SPT MOD = 14, 24, 29 (54)
496.7	35	37 (6) 27 (6)				17.6			SPT MOD = 24, 27, 22 (49)

Remarks: -Northing/ Easting: 7105360.1815 2418816.0089  
 -seepage at 17 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW13  
Structure Retaining Wall  
Station 79+74.84  
Offset 2.68' RT

District Dallas  
Date 11/1/23  
Grnd. Elev. 528.24 ft  
GW Elev. 514.24 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
527.6			ASPHALT, 8 inches							
			SAND, loose to compact; reddish brown, tan; clayey (SC)			8.1				P.P. = 4.5+
		3 (6) 6 (6)				13.0				P.P. = 4.5+
5										
		23 (6) 19 (6)				9.3	25	13		P.P. = 4.5+, -#200: 47.0
520.2			SAND, loose to slightly compact; reddish brown, tan; little to few gravel; silty (SP-SM)			8.4				P.P. = 3.5
10						7.2	NP	NP		Bag Sample (Grab), -#200: 12.0
		15 (6) 14 (6)								
15										
		8 (6) 9 (6)				16.9				Bag Sample (Grab)
510.2			SAND, compact; reddish brown, tan; poorly-graded (SP)							
20						17.8	NP	NP		SPT MOD = 3, 2, 2 (4), -#200: 4.0
		28 (6) 22 (6)								
25										
		25 (6) 35 (6)				19.6				SPT MOD = 6, 17, 30 (47)
500.2			SAND, slightly compact; reddish brown, tan; poorly-graded with silt (SP-SM)							
30						17.3	NP	NP		Bag Sample (Grab), -#200: 11.0
		16 (6) 19 (6)								
493.2										
		15 (6) 17 (6)				16.8				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7105202.8594 2418812.6982  
 -seepage at 14 feet during drilling  
 -water measured at 14 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW14  
Structure Retaining Wall  
Station 81+47.22  
Offset 3.75' RT

District Dallas  
Date 11/1/23  
Grnd. Elev. 532.14 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
532.1			ASPHALT, 1 inch							
531.5			CONCRETE, 6.5 inches							
		4 (6) 5 (6)	CLAY, soft to very stiff; reddish brown; trace ferrous nodules and gravel; sandy (CL)			14.2				P.P. = 4.5+
						12.9				P.P. = 4.5+
	5	30 (6) 36 (6)				10.8	28	16		P.P. = 4.5+, -#200: 50.0
524.1			SAND, loose to slightly compact; reddish brown; some gravel; poorly-graded (SP)			7.1				P.P. = 4.5+
	10	12 (6) 20 (6)				4.4				P.P. = 0.25
	15	14 (6) 16 (6)				19.0	NP	NP		SPT MOD = 2, 6, 40 (46), -#200: 4.0
	20	5 (6) 6 (6)				17.0				SPT MOD = 8, 21, 21 (42)
509.1			SAND, slighty compact; reddish brown; clayey (SC)			14.5	25	10		Bag Sample (Grab), -#200: 21.0
	25	6 (6) 14 (6)								
503.1			CLAY, stiff; brown, gray; trace cemented sandstone fragments (CL)			19.2				Bag Sample (Grab)
	30	10 (6) 13 (6)								
497.1	35	15 (6) 10 (6)				21.7				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7105375.2250 2418815.5357  
 -dry during drilling  
 -dry upon completion  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW15  
Structure Retaining Wall  
Station 89+01.99  
Offset 3.11' RT

District Dallas  
Date 10/20/23  
Grnd. Elev. 532.99 ft  
GW Elev. 507.99 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
532.4			ASPHALT, 7 inches							
		6 (6) 8 (6)	CLAY, soft to stiff; brown, reddish brown, gray; trace ferrous nodules; sandy; with shale fragments (CL)			9.2				P.P. = 4.5+
							7.6	24	11	
5		11 (6) 15 (6)	CLAY, very stiff; brown, reddish brown, gray; with sand and shale fragments (CL)			9.5				P.P. = 4.5+
526.0							11.3	41	28	
		27 (6) 20 (6)	CLAY, very stiff; gray; with ferrous stains; with sand and shale fragments (CH)			9.1				P.P. = 4.5+
519.0							24.3	60	40	
		16 (6) 13 (6)	SAND, compact; dark brown, tan; trace to few cemented sand fragments; silty (SM)			16.0				P.P. = 0.75
514.0		32 (6) 35 (6)					18.5	NP	NP	
		20 (6) 25 (6)	SAND, compact; dark brown, tan; trace to few cemented sand fragments; silty (SM)			14.7				Bag Sample (Grab)
		24 (6) 30 (6)					19.9			
498.0		26 (6) 20 (6)								

Remarks: -Northing/ Easting: 7106112.2410 2418906.6144  
 -seepage at 25 feet during drilling  
 -water measured at 25 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW16  
Structure Retaining Wall  
Station 90+82.04  
Offset 3.18' RT

District Dallas  
Date 10/20/23  
Grnd. Elev. 529.36 ft  
GW Elev. 509.36 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
528.9			ASPHALT, 6 inches							
		10 (6) 10 (6)	SAND, slightly compact to compact; reddish brown; with ferrous and calcareous nodules; clayey (SC)			8.9				P.P. = 2.0
		15 (6) 25 (6)				12.0				P.P. = 4.5+
523.4			CLAY, very stiff; brown; with some ferrous nodules, ferrous stains, calcareous nodules and shale fragments (CL)			8.3	25	14		P.P. = 4.5+; Sulfate PPM : 120, #200: 32.0
		20 (6) 18 (6)				11.1				P.P. = 4.5+
		11 (6) 20 (6)				15.2	46	32		P.P. = 4.5+, #200: 92.0
515.4			SAND, slightly compact to compact; brown, gray; silty (SM)			21.2				P.P. = 0.75
		21 (6) 43 (6)				20.9				SPT MOD = 6, 6, 9
504.4			SHALE, completely weathered; soft; brown			16.0				SPT MOD = 14, 30, 32 (62)
		8 (6) 22 (6)				16.3				SPT MOD = 12, 19, 33 (52)
494.4						11.5				SPT MOD = 18, 20, 40 (60)

Remarks: -Northing/ Easting: 7106288.2389 2418945.3587  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW17  
Structure Retaining Wall  
Station 89+41.34  
Offset 3.92' RT

District Dallas  
Date 11/21/23  
Grnd. Elev. 531.86 ft  
GW Elev. 513.86 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
531.7			ASPHALT, 2.5 inches						
531.4			CONCRETE, 3.25 inches						
530.4			BASE, 11 inches			11.4			P.P. = 4.5+
		13 (6) 11 (6)	CLAY, soft to stiff; brown; with sand (CL)			11.8			P.P. = 4.5+
5		9 (6) 8 (6)				15.2	43	27	P.P. = 4.5+, -#200: 79.0
						18.7			P.P. = 4.5+
10		9 (6) 11 (6)				17.5	42	27	P.P. = 4.5+, -#200: 77.0
15		13 (6) 13 (6)	CLAY, stiff; brown; sandy (CL)			17.7			P.P. = 1.5
20		12 (6) 12 (6)				17.8	28	16	P.P. = 0.75, -#200: 59.0
25		50 (4) 50 (3.25)	SHALE, highly to completely weathered; soft; brown; trace to some sand seams			19.7			P.P. = 1.5
30		32 (6) 28 (6)				19.7			Bag Sample (Grab)
35		50 (5) 50 (5)				21.1			Bag Sample (Grab)

Remarks: -Northing/ Easting: 7106149.1076 2418921.0898  
 -seepage at 18 feet during drilling  
 -water measured at 18 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW18  
Structure Retaining Wall  
Station 91+30.69  
Offset 8.25' LT

District Dallas  
Date 11/20/23  
Grnd. Elev. 528.57 ft  
GW Elev. 508.57 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
528.4	[Diagonal Hatching]		ASPHALT, 2.5 inches						
527.9			CONCRETE, 6 inches						
		7 (6) 7 (6)	CLAY, soft to stiff; reddish brown; trace ferrous nodules; sandy (CL)			12.4	27	15	P.P. = 4.5+, -#200: 54.0
523.6	5	13 (6) 8 (6)	SAND, slightly compact to dense; light brown; silty, clayey (SC-SM)			7.1			P.P. = 4.5+
						12.7			P.P. = 2.0
	10	11 (6) 13 (6)				16.6			P.P. = 1.5
	15	17 (6) 27 (6)				17.1	19	5	P.P. = 0.75, -#200: 48.0
508.6	20	35 (6) 50 (5)	SAND, slightly compact to compact brown; reddish brown; some gravel; poorly-graded with silt (SP-SM)			18.1			P.P. = 0.25
	25	15 (6) 22 (6)				13.1			SPT MOD = 2, 3, 9 (12)
	30	20 (6) 24 (6)				11.4	NP	NP	SPT MOD = 10, 18, 19 (33), -#200: 7.0
493.6	35	9 (6) 14 (6)			16.7			SPT MOD = 4, 3, 3 (6)	

Remarks: -Northing/ Easting: 7106336.9897 2418934.2645  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW19  
Structure Retaining Wall  
Station 100+01.25  
Offset 8.70' LT

District Dallas  
Date 11/17/23  
Grnd. Elev. 527.60 ft  
GW Elev. 507.60 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
527.4			ASPHALT, 2.5 inches						
			BASE, 14.5 inches			23.5			P.P. = 2.5
526.1		10 (6) 12 (6)	CLAY, stiff; reddish tan; trace to few gravel; sandy (CL)			18.1	28	17	P.P. = 4.0, #200: 58.0
523.6		10 (6) 10 (6)	SAND, loose to slightly compact; reddish brown; silty, clayey (SC-SM)			20.7			P.P. = 0.5
	5					10.2			P.P. = 1.0
	10	6 (6) 4 (6)				13.9	21	5	P.P. = 1.0, #200: 31.0
512.6	15	7 (6) 7 (6)	SAND, loose to compact; brown; poorly-graded with silt (SP-SM)			18.1			SPT MOD = 4, 6, 6 (12)
	20	29 (6) 25 (6)				16.8			SPT MOD = 3, 3, 3 (6)
	25	19 (6) 18 (6)				17.7	NP	NP	SPT MOD = 12, 14, 16 (30), #200: 9.0
	30	19 (6) 17 (6)				17.3			SPT MOD = 9, 10, 15 (25)
492.6	35	8 (6) 12 (6)				18.8			SPT MOD = 5, 5, 7 (12)

Remarks: -Northing/ Easting: 7107207.5449 2418931.0949  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW20  
Structure Retaining Wall  
Station 101+67.61  
Offset 5.23' LT

District Dallas  
Date 11/17/23  
Grnd. Elev. 529.61 ft  
GW Elev. 505.61 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
529.4			ASPHALT, 3 inches							
			BASE, 13 inches			12.2				P.P. = 4.5+
528.1		6 (6) 7 (6)	CLAY, soft; brown, reddish brown; trace to calcareous nodules; sandy (CL)			13.6				P.P. = 3.5
524.6	5	9 (6) 9 (6)	SAND, loose to slightly compact; brown, reddish tan; silty (SM)			18.4	38	23		P.P. = 3.75, -#200: 69.0
						12.8				P.P. = 4.5+
	10	9 (6) 9 (6)				9.1	NP	NP		P.P. = 0.25, -#200: 18.0
	15	9 (6) 15 (6)				17.1				P.P. = 0.25
509.6	20	15 (6) 18 (6)	SAND, slightly compact to compact; brown; poorly-graded (SP)			22.9				Bag Sample (Grab)
	25	35 (6) 23 (6)				18.8	NP	NP		SPT MOD = 16, 11, 11 (22), -#200: 4.0
	30	11 (6) 9 (6)				17.0				SPT MOD = 12, 12, 12 (24)
494.6	35	46 (6) 33 (6)				18.2				SPT MOD = 50=4.5" (50)

Remarks: -Northing/ Easting: 7107373.9718 2418936.0397  
 -seepage at 24 feet during drilling  
 -water measured at 24 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW21  
Structure Retaining Wall  
Station 102+93.21  
Offset 6.10' RT

District Dallas  
Date 10/19/23  
Grnd. Elev. 533.08 ft  
GW Elev. 513.08 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
532.6			ASPHALT, 6 inches							
			BASE, 12 inches							
531.1			CLAY, soft to stiff; light brown; sandy (CL)			12.1				P.P. = 4.5+
529.1						14.6				P.P. = 4.5+
529.1	5	6 (6) 11 (6)	SAND, loose to slightly compact; reddish tan, light brown; trace to few ferrous nodules; silty, clayey (SC-SM)			5.4	18	4		P.P. = 2.0, -#200: 30.0
525.1			SILT, hard; brown, gray; trace ferrous nodules (ML)			8.4				P.P. = 3.0
525.1	10	49 (6) 42 (6)				18.2	NP	NP		P.P. = 2.5, -#200: 86.0
519.1	15	26 (6) 29 (6)	SAND, slightly compact to dense; reddish brown; brown; silty (SM)			20.7	NP	NP		Bag Sample (Grab)
519.1	20	50 (4.5) 50 (3)								
508.1	25	11 (6) 15 (6)	SAND, slightly compact; brown; few to little sandstone fragments; clayey (SC)			18.2				Bag Sample (Grab)
508.1	30	18 (6) 18 (6)				20.7	41	28		Bag Sample (Grab), -#200: 19.0
498.1	35	10 (6) 14 (6)				23.9				Bag Sample (Grab)

Remarks: -Northing/ Easting: 7107499.5302 2418948.3459  
 -seepage at 20 feet during drilling  
 -water measured at 20 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW22  
Structure Retaining Wall  
Station 99+94.74  
Offset 7.45' LT

District Dallas  
Date 11/7/23  
Grnd. Elev. 527.63 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks	
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI		Wet Den. (pcf)
527.3			ASPHALT, 4 inches							
526.6			BASE, 8 inches							
		8 (6) 13 (6)	CLAY, soft to very stiff; reddish brown, tan; trace ferrous nodules; sandy (CL)			8.5			P.P. = 4.5+	
							12.0			P.P. = 4.5+
5		28 (6) 34 (6)					10.6	26	11	P.P. = 4.5+, -#200: 54.0
							7.0			P.P. = 4.5+
									P.P. = 3.5	
517.6		6 (6) 7 (6)	SAND, loose to slightly compact; tan, brown; trace to few gravel; poorly-graded with silt; with weathered shale fragments below 34 feet (SP-SM)			14.4				
15		10 (6) 12 (6)					16.7	NP	NP	SPT MOD = 2, 3, 4 (7), -#200: 6.0
20		16 (6) 21 (6)					18.1			SPT MOD = 6, 4, 4 (8)
25		14 (6) 22 (6)					17.0			SPT MOD = 22, 20, 18 (38)
30		9 (6) 11 (6)				17.2	NP	NP	SPT MOD = 10, 7, 5 (12), -#200: 10.0	
492.6		50 (3.75) 50 (3)				12.9			SPT MOD = 28, 32, 31 (63)	

Remarks: -Northing/ Easting: 7107201.0346 2418932.3660  
 -dry during drilling  
 -dry upon completion  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW23  
Structure Retaining Wall  
Station 101+64.48  
Offset 5.20' RT

District Dallas  
Date 11/14/23  
Grnd. Elev. 529.63 ft  
GW Elev. 516.63 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
529.4			ASPHALT, 3 inches							
528.9			BASE, 6 inches							
		16 (6) 15 (6)	CLAY, stiff; tan; reddish brown; sandy, silty (CL-ML) (CL)			8.4				P.P. = 4.5+
						8.3	20	4		P.P. = 4.5+, #200: 58.0
524.6	5	16 (6) 18 (6)	SAND, loose; reddish brown; silty, clayey (SC-SM)			11.8				P.P. = 4.5+
						13.8				P.P. = 4.5+
	10	9 (6) 8 (6)				14.8	22	6		P.P. = 4.5+, #200: 49.0
516.6		15 (6) 15 (6)	SAND, slightly compact to compact; reddish tan, brown; trace gravel; poorly-graded with silt (SP-SM)			19.6				SPT MOD = 6, 7, 6 (13)
	20	16 (6) 13 (6)				16.1	NP	NP		SPT MOD = 13, 16, 20 (36), #200: 9.0
	25	16 (6) 18 (6)				15.4				SPT MOD = 12, 14, 25 (39)
	30	20 (6) 24 (6)				15.7	NP	NP		SPT MOD = 27, 20, 16 (36), #200: 9.0
494.6	35	28 (6) 26 (6)				15.0				SPT MOD = 40, 50=4.5" (50)

Remarks: -Northing/ Easting: 7107370.7332 2418946.4304  
 -seepage at 13 feet during drilling  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height



# DRILLING LOG

WinCore  
Version 3.1

County Denton  
Highway Shady Shores Road  
CSJ 0918-46-316

Hole RW24  
Structure Retaining Wall  
Station 103+06.06  
Offset 5.80' RT

District Dallas  
Date 11/17/23  
Grnd. Elev. 533.47 ft  
GW Elev. 508.47 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
533.2			ASPHALT, 3 inches						
532.2			BASE, 12 inches						
531.5			SAND, loose; brown, light brown; silty (SM)			14.1			P.P. = 4.5+
		11 (6) 8 (6)	SAND, loose to compact; brown; trace ferrous nodules; silty (SM)			6.9			P.P. = 3.5
5		12 (6) 16 (6)				11.2	NP	NP	P.P. = 0.25, -#200: 39.0
						23.2			P.P. = 3.5
523.5		8 (6) 10 (6)	SAND, loose to compact; brown; trace ferrous nodules; silty, clayey (SC-SM)			27.1			P.P. = 4.0
15		14 (6) 16 (6)				11.8	20	6	P.P. = 0.25, -#200: 32.0
20		37 (6) 42 (6)				15.0			P.P. = 0.25
508.5		11 (6) 16 (6)	CLAY, stiff to hard; brown, reddish tan; with weathered shale fragments; sandy (CL)			26.1			SPT MOD = 8, 10, 13 (23)
30		50 (3) 50 (5)				21.0	36	20	Bag Sample (Grab), -#200: 67.0
498.5		12 (6) 12 (6)				16.7			SPT MOD = 5, 4, 4 (8)

Remarks: -Northing/ Easting: 7107512.3860 2418948.0027  
 -seepage at 25 feet during drilling  
 -water measured at 25 feet after 15 minutes  
 -SPT Modified with a 170 lb hammer and a 24 inch drop height

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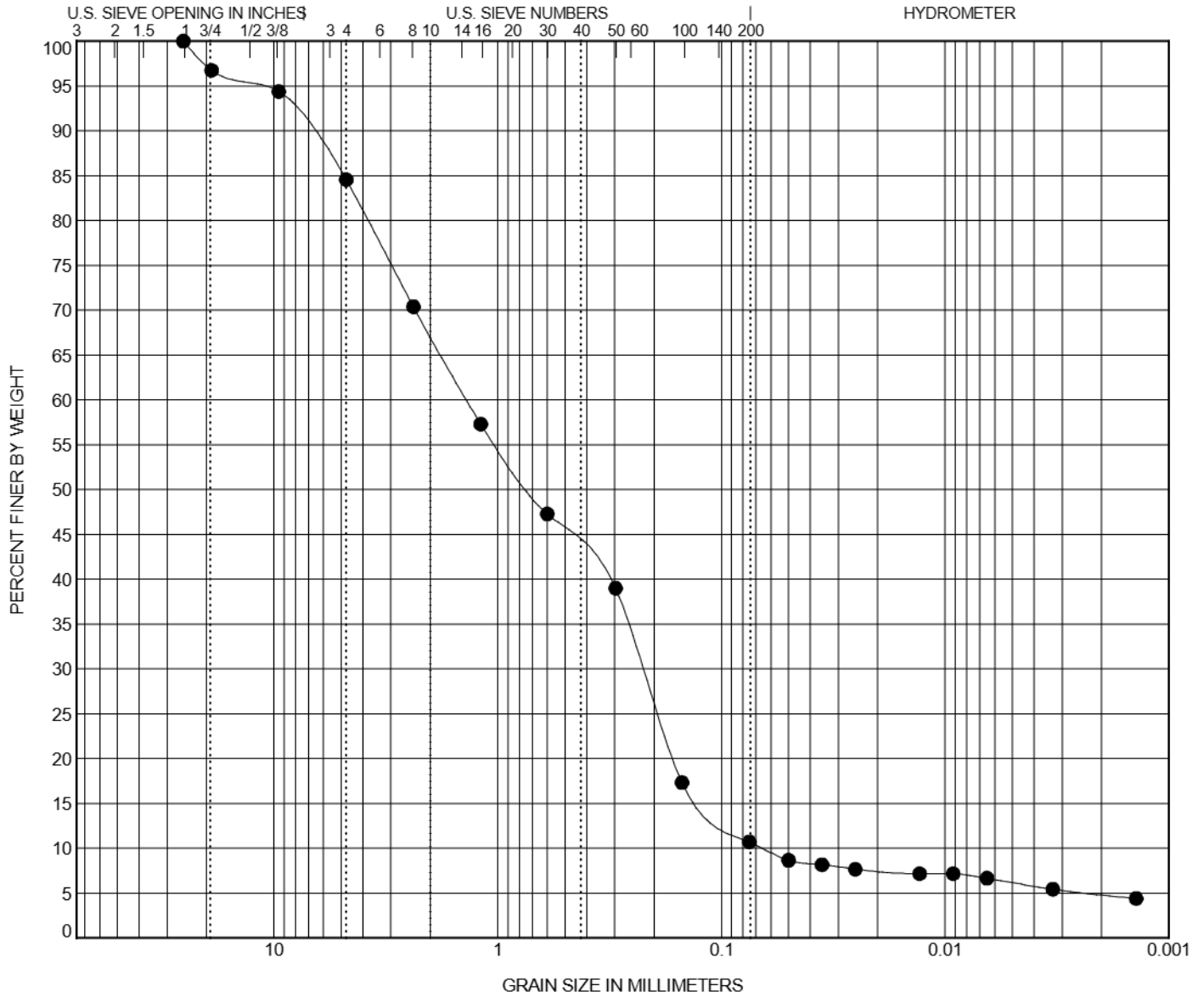
## Sieve and Hydrometer Tests

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# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/2/2023  
 DRILLED BY: Kevin Kavadas  
 LOGGED BY: Dylan McAden (Geotex)



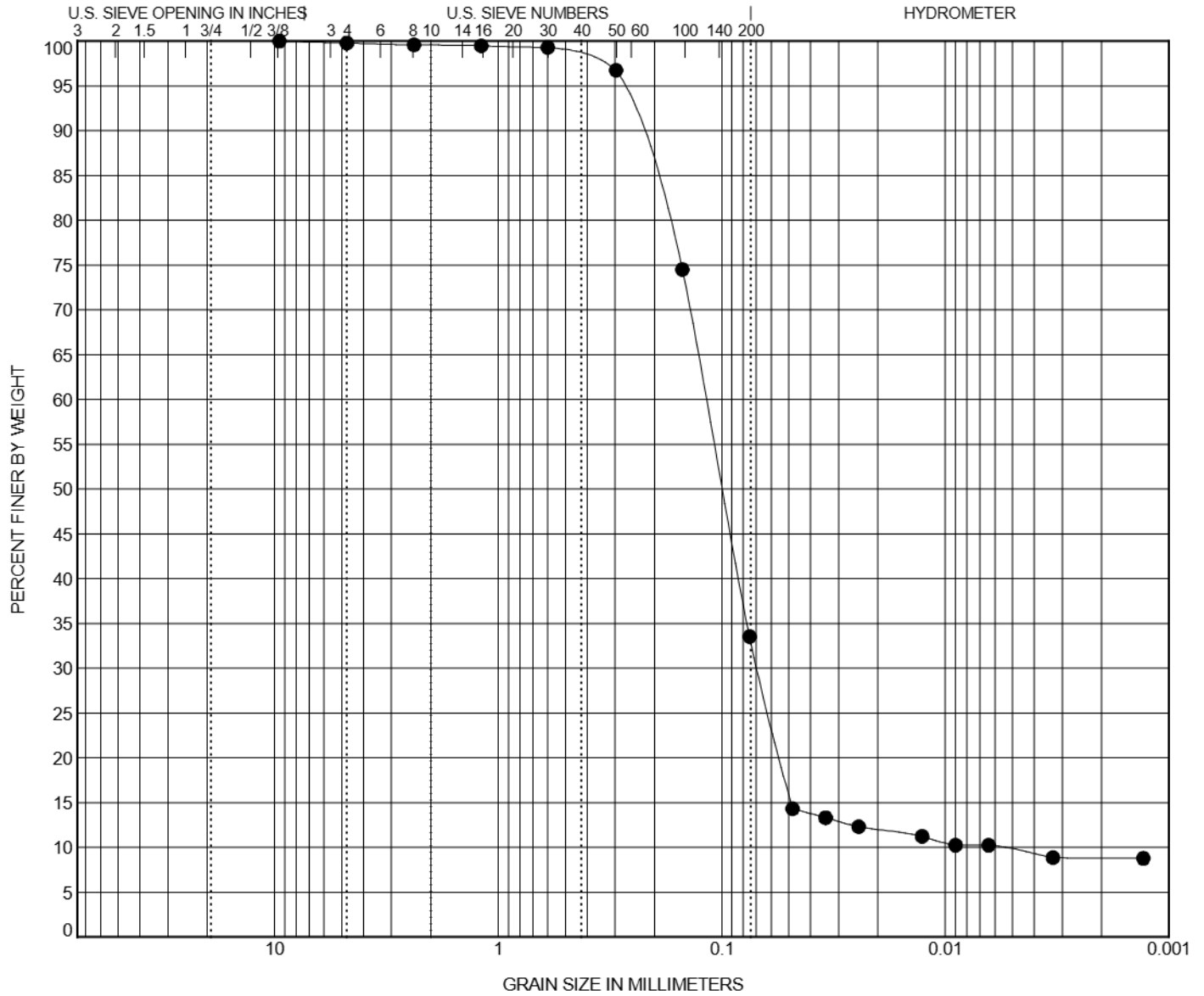
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
										0.56	21.04
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR2	2.0	25.4	1.373	0.723	0.224	15.4	73.9	4.5	6.2		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
HIGHWAY: Shady Shores Road  
CSJ: 0918-46-316

DATE: 11/2/2023  
DRILLED BY: Kevin Kavadas  
LOGGED BY: Dylan McAden (Geotex)



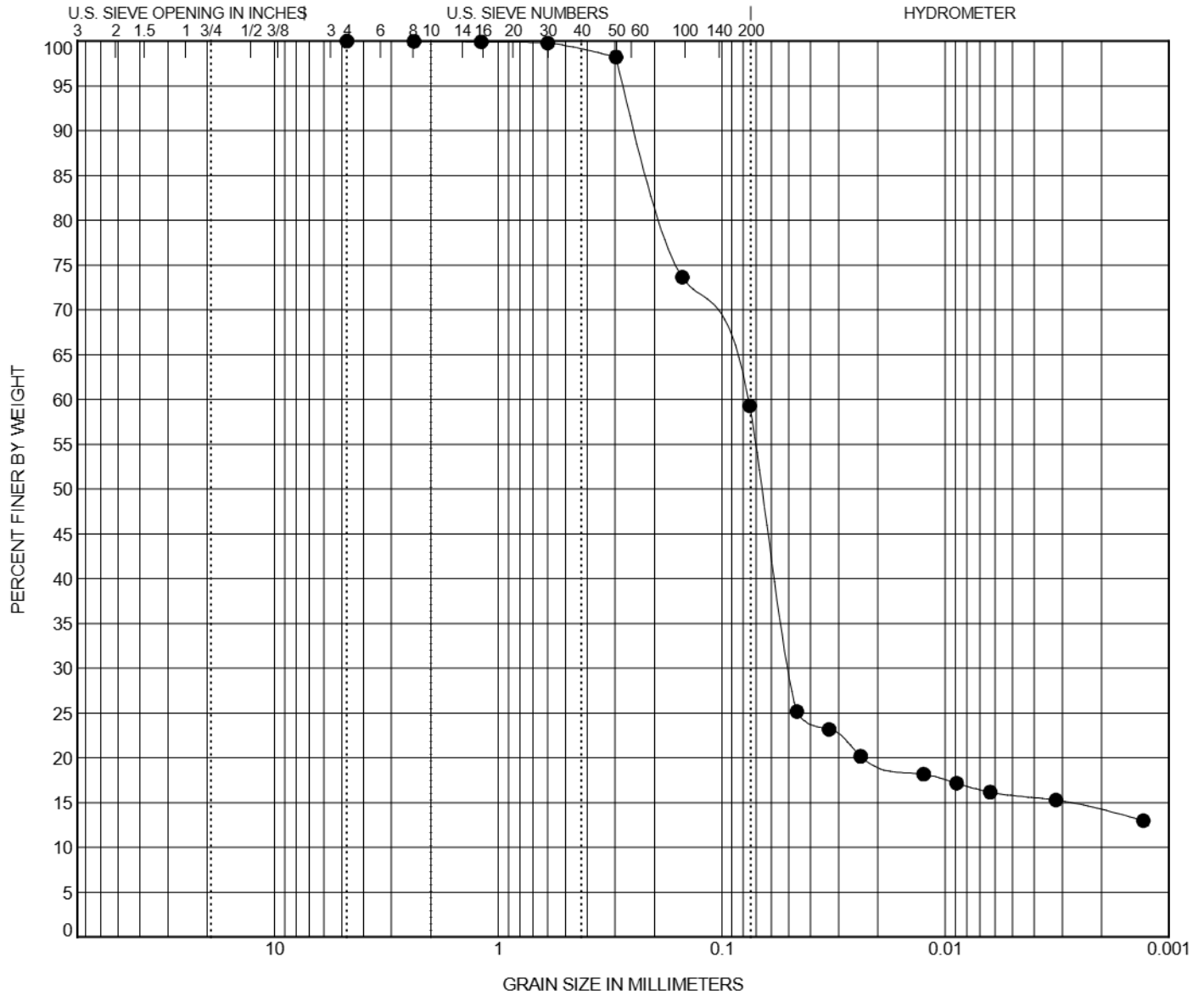
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; very loose; reddish brown, tan; clayey (SC)										7.15	20.59
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR2	10.0	9.51	0.117	0.099	0.069	0.2	66.2	23.8	9.7		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
HIGHWAY: Shady Shores Road  
CSJ: 0918-46-316

DATE: 11/28/2023  
DRILLED BY: Octavio Herrerra (Geotex)  
LOGGED BY: Dylan McAden (Geotex)



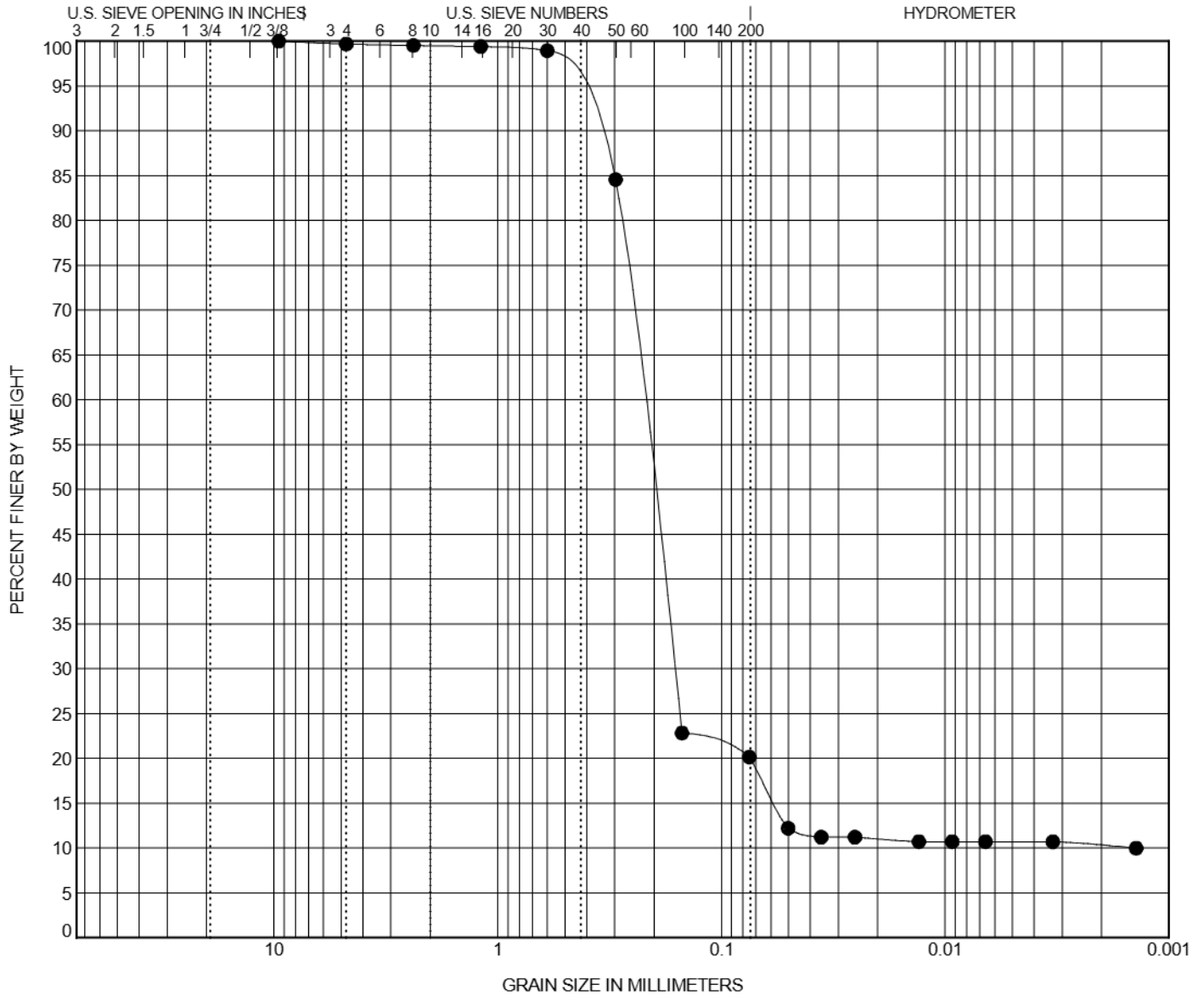
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SILT; stiff to very stiff, brown, light brown; trace ferrous nodules and oxide stains; with sand (ML)							<b>NP</b>	<b>NP</b>	<b>NP</b>		
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
<b>BR3</b>	<b>10.0</b>	<b>4.75</b>	<b>0.078</b>	<b>0.066</b>	<b>0.049</b>	<b>0.0</b>	<b>40.7</b>	<b>43.4</b>	<b>15.9</b>		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
HIGHWAY: Shady Shores Road  
CSJ: 0918-46-316

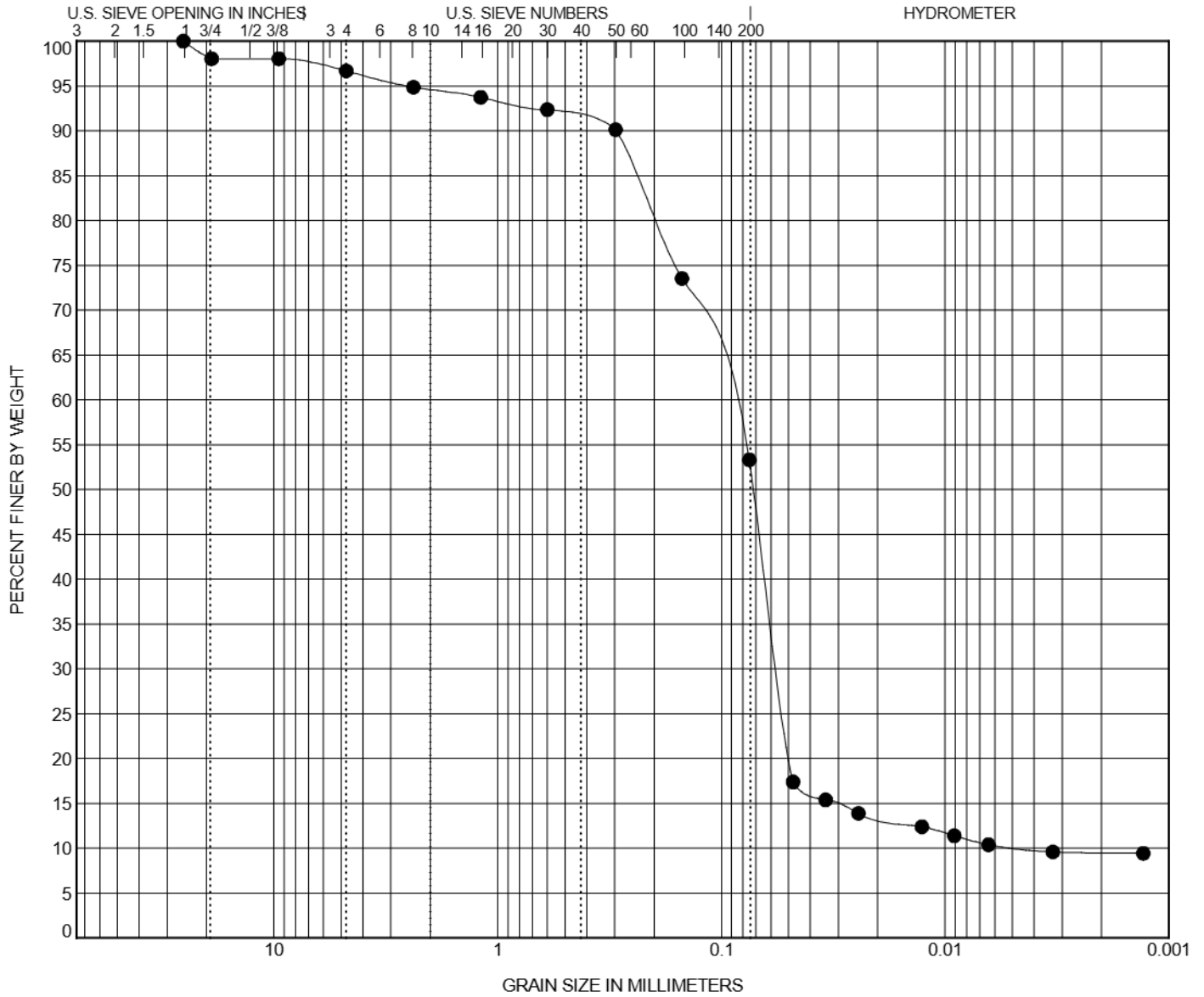
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DRILLED BY: Octavio Herrerra (Geotex)  
LOGGED BY: Dylan McAden (Geotex)



# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/6/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



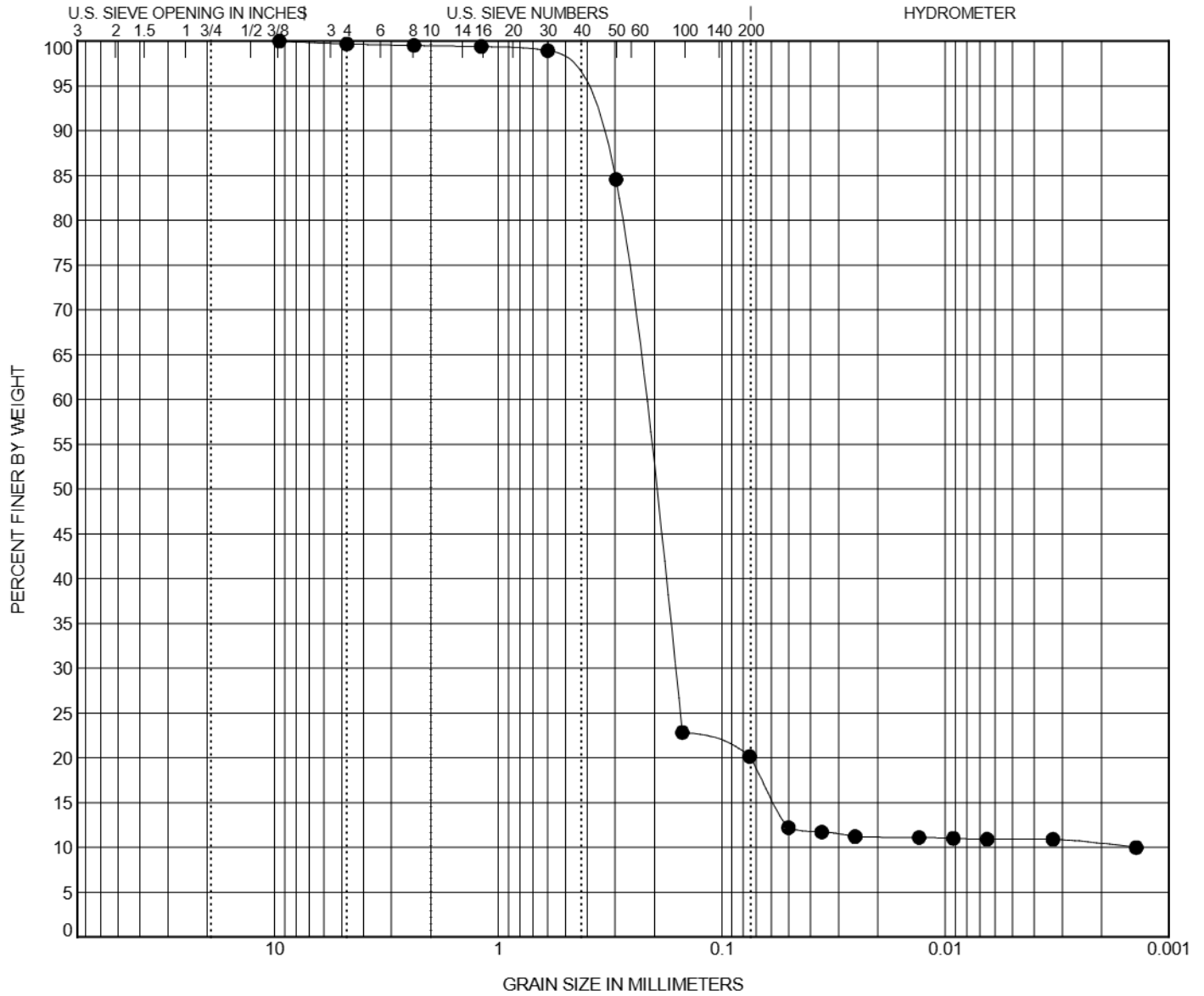
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; loose to slightly compact; brown, dark brown; trace cemented sand fragments; silty (SM)										7.22	20.48
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR4	15.0	25.4	0.094	0.072	0.056	3.3	43.4	43.2	10.1		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/27/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



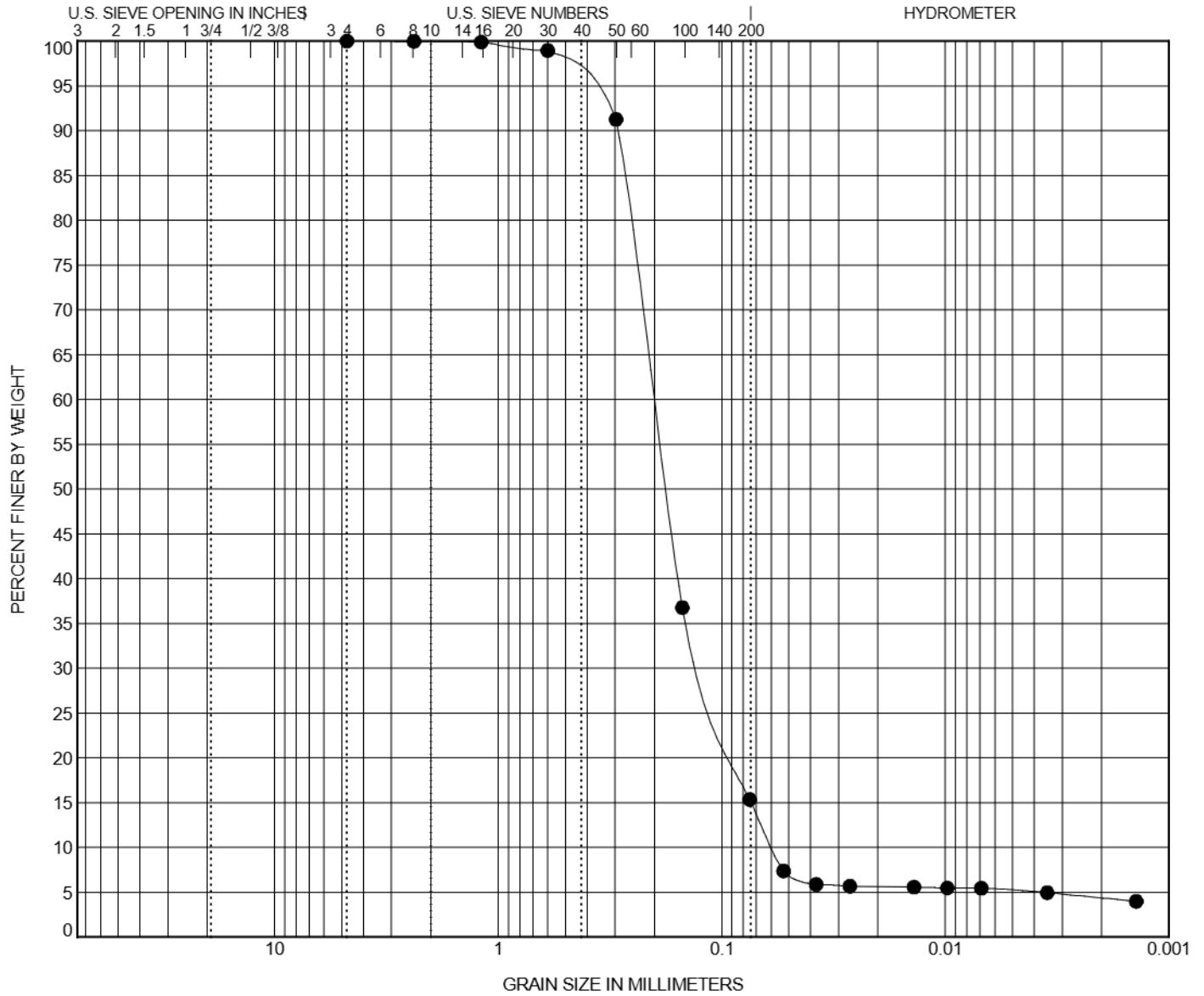
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SILT; soft to stiff, brown, reddish brown; silty (ML)							<b>NP</b>	<b>NP</b>	<b>NP</b>	<b>81.89</b>	<b>159.06</b>
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
<b>BR5</b>	<b>10.0</b>	<b>9.51</b>	<b>0.226</b>	<b>0.203</b>	<b>0.162</b>	<b>0.3</b>	<b>79.5</b>	<b>9.2</b>	<b>10.9</b>		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

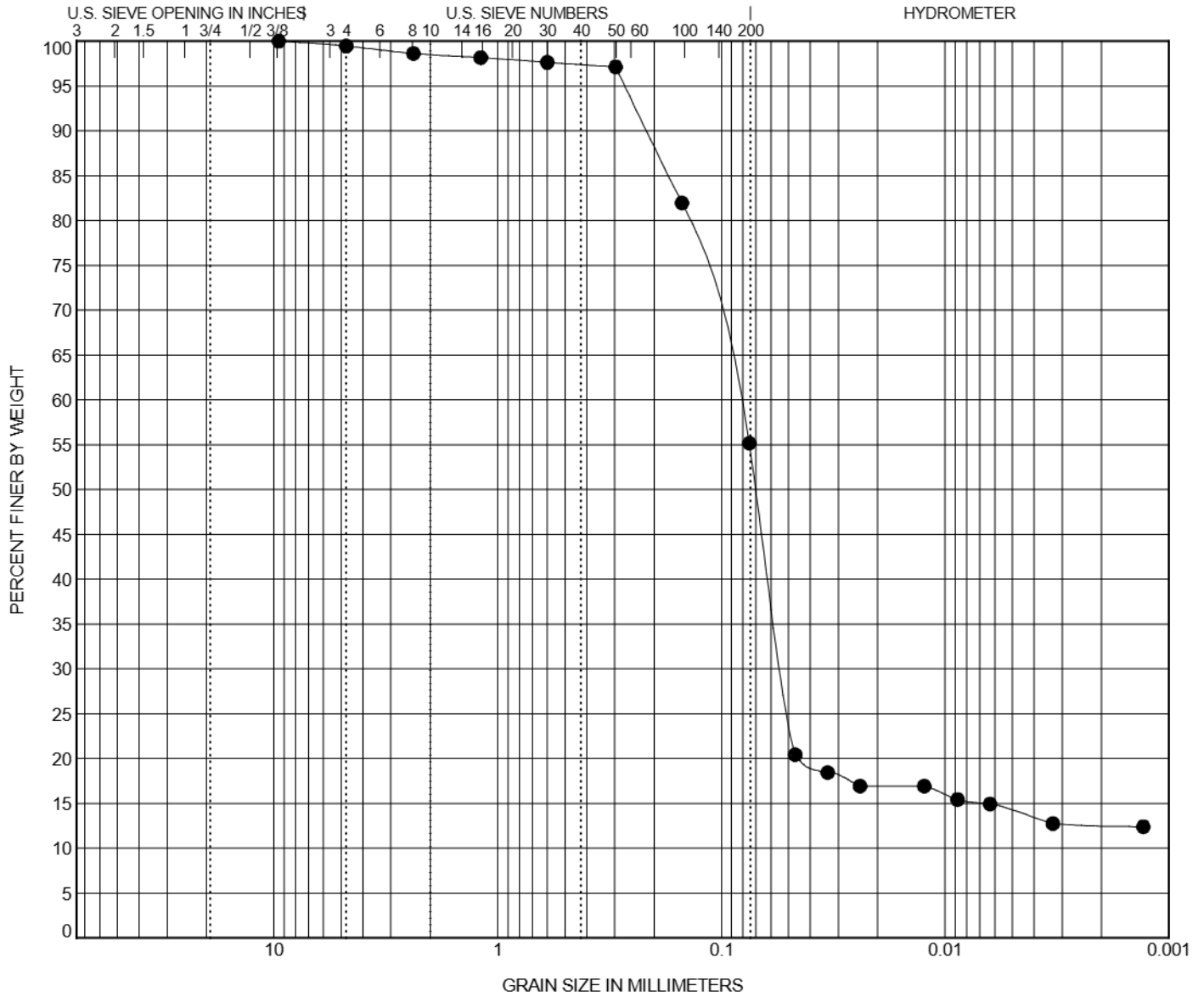
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 LOGGED BY: Dylan McAden (Geotex)



# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/7/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



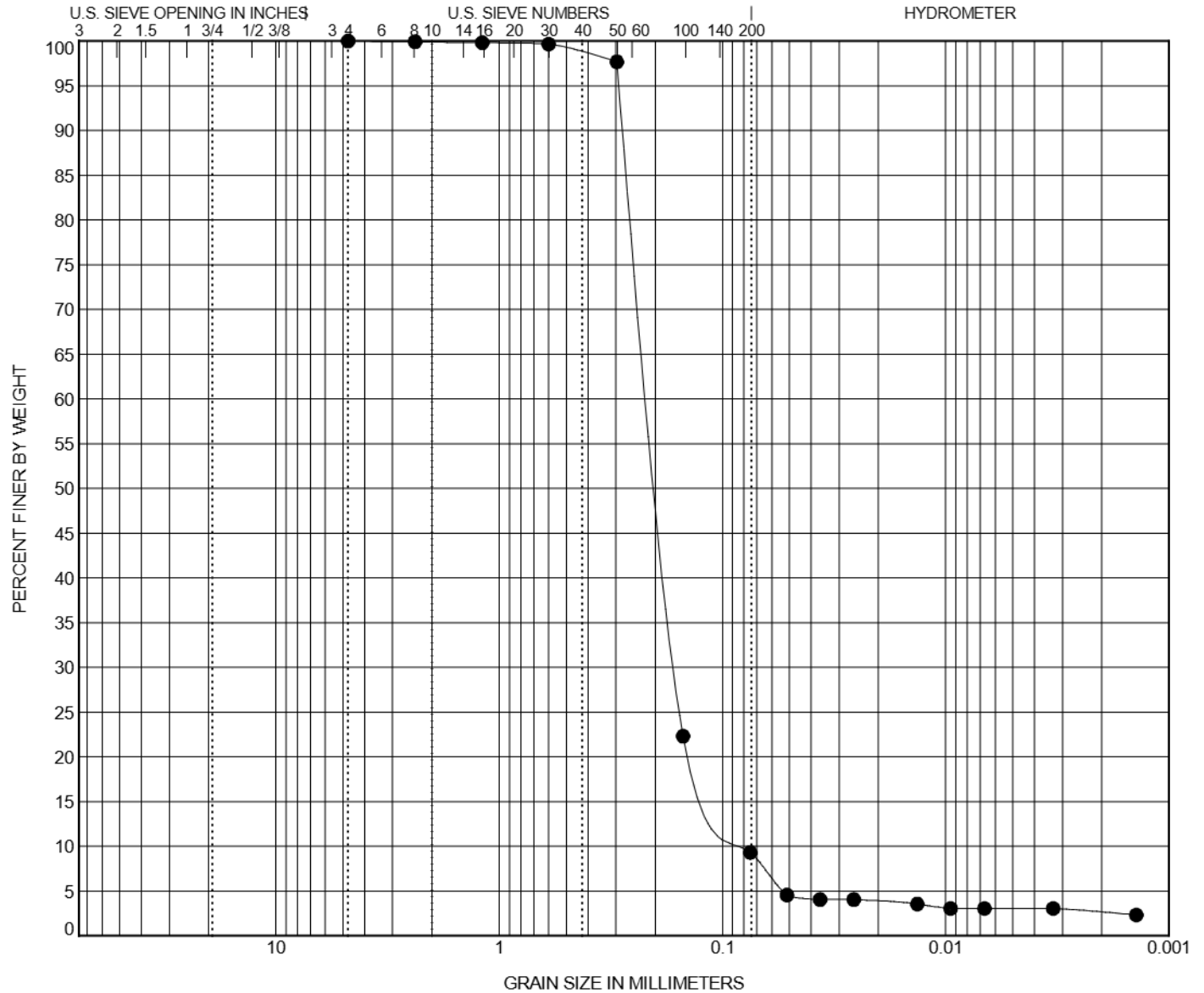
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; loose to slightly compact; light brown; clayey (SC)											
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR6	5.0	9.51	0.085	0.07	0.053	0.5	44.3	41.0	14.2		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/7/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



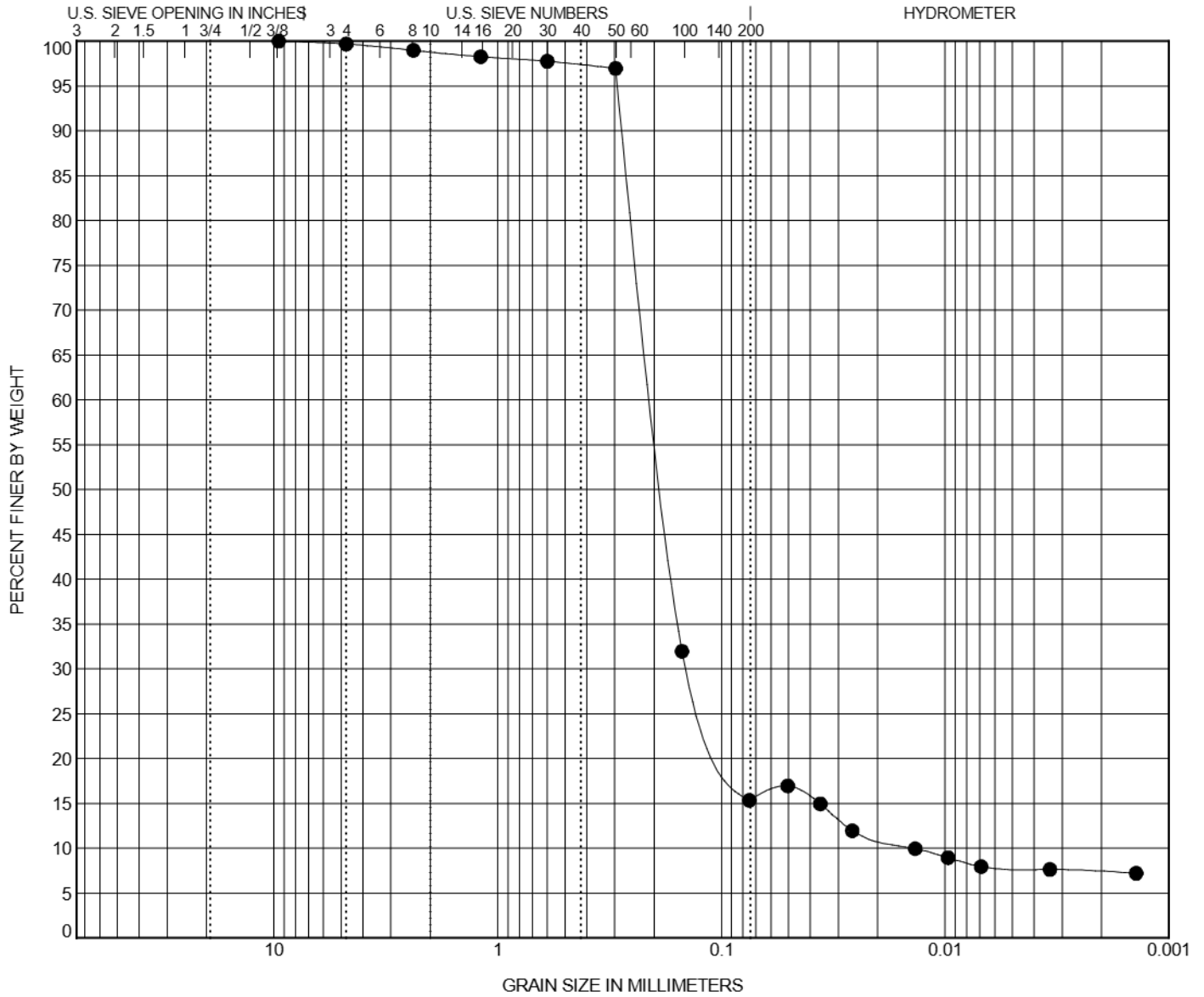
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; loose to slightly compact; light brown; clayey (SC)										1.58	2.71
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR6	15.0	4.75	0.211	0.193	0.161	0.0	90.7	6.3	3.1		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/16/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



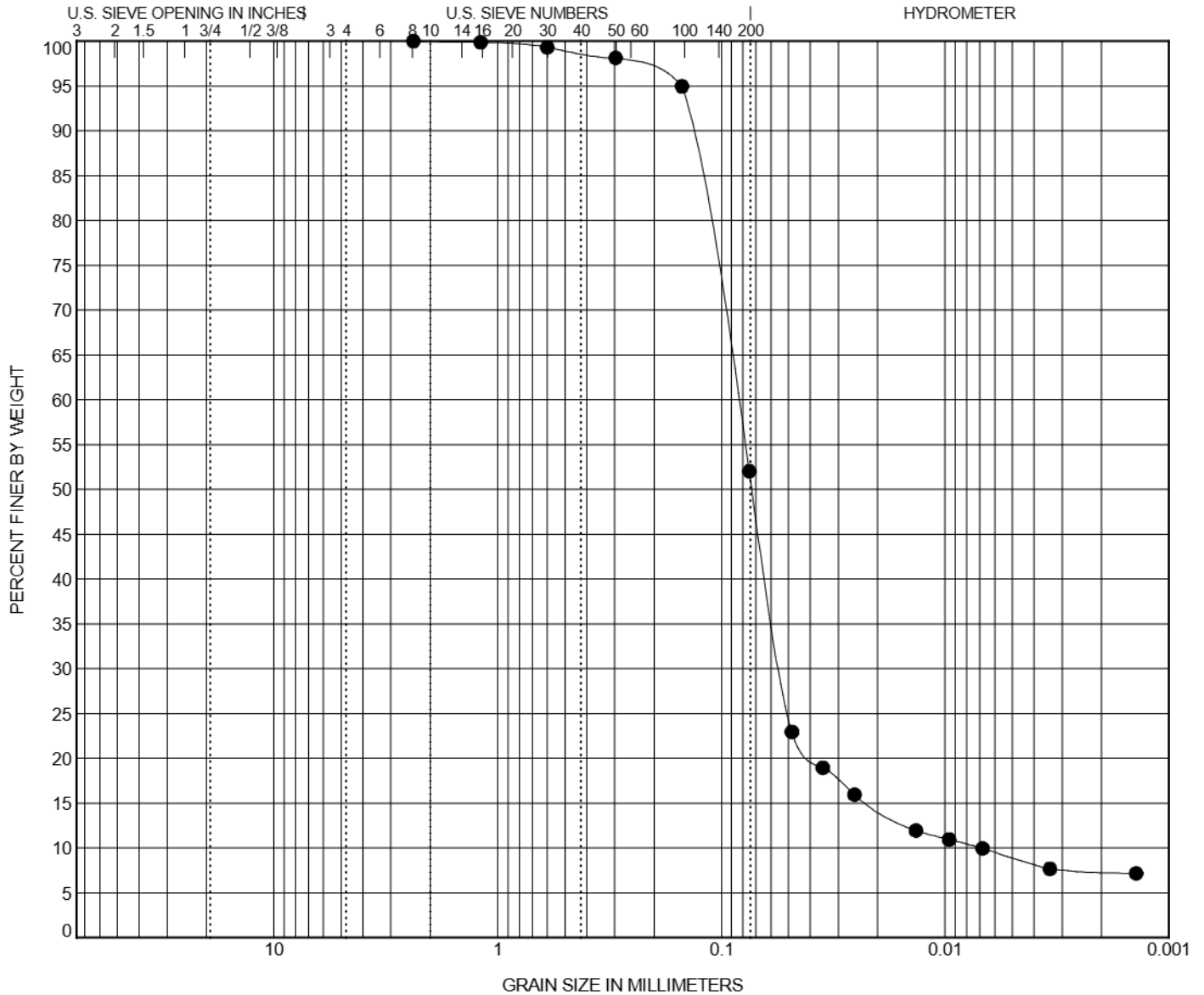
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SILT; stiff, brown, reddish brown; sandy (ML)										<b>6.08</b>	<b>14.58</b>
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
<b>BR7</b>	<b>5.0</b>	<b>9.51</b>	<b>0.201</b>	<b>0.181</b>	<b>0.13</b>	<b>0.3</b>	<b>84.3</b>	<b>7.5</b>	<b>7.8</b>		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/16/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



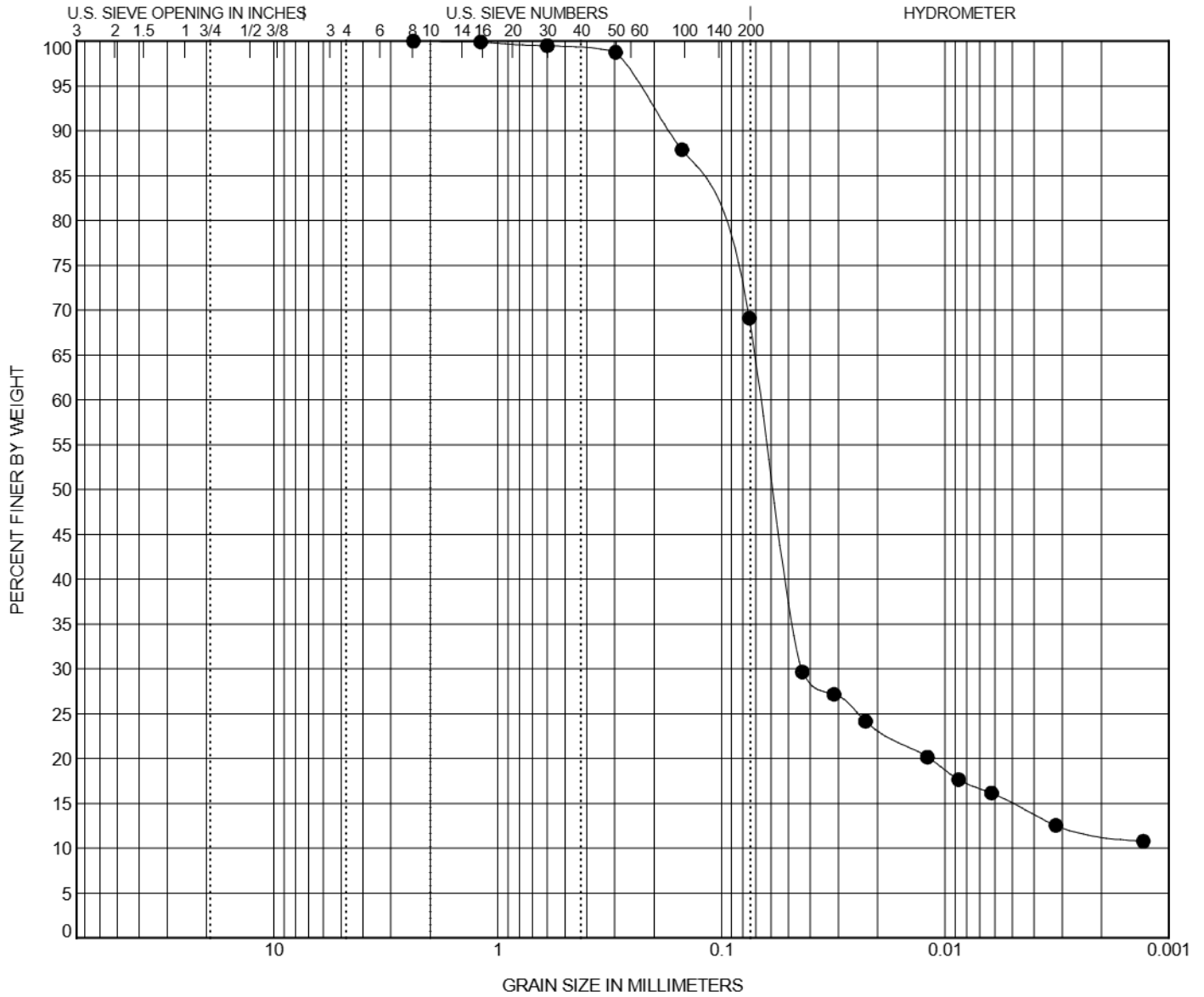
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; loose to compact, brown, reddish brown, gray, silty (SM)										4.91	12.34
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR7	15.0	2.38	0.085	0.073	0.054	0.0	48.0	43.1	8.9		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/10/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



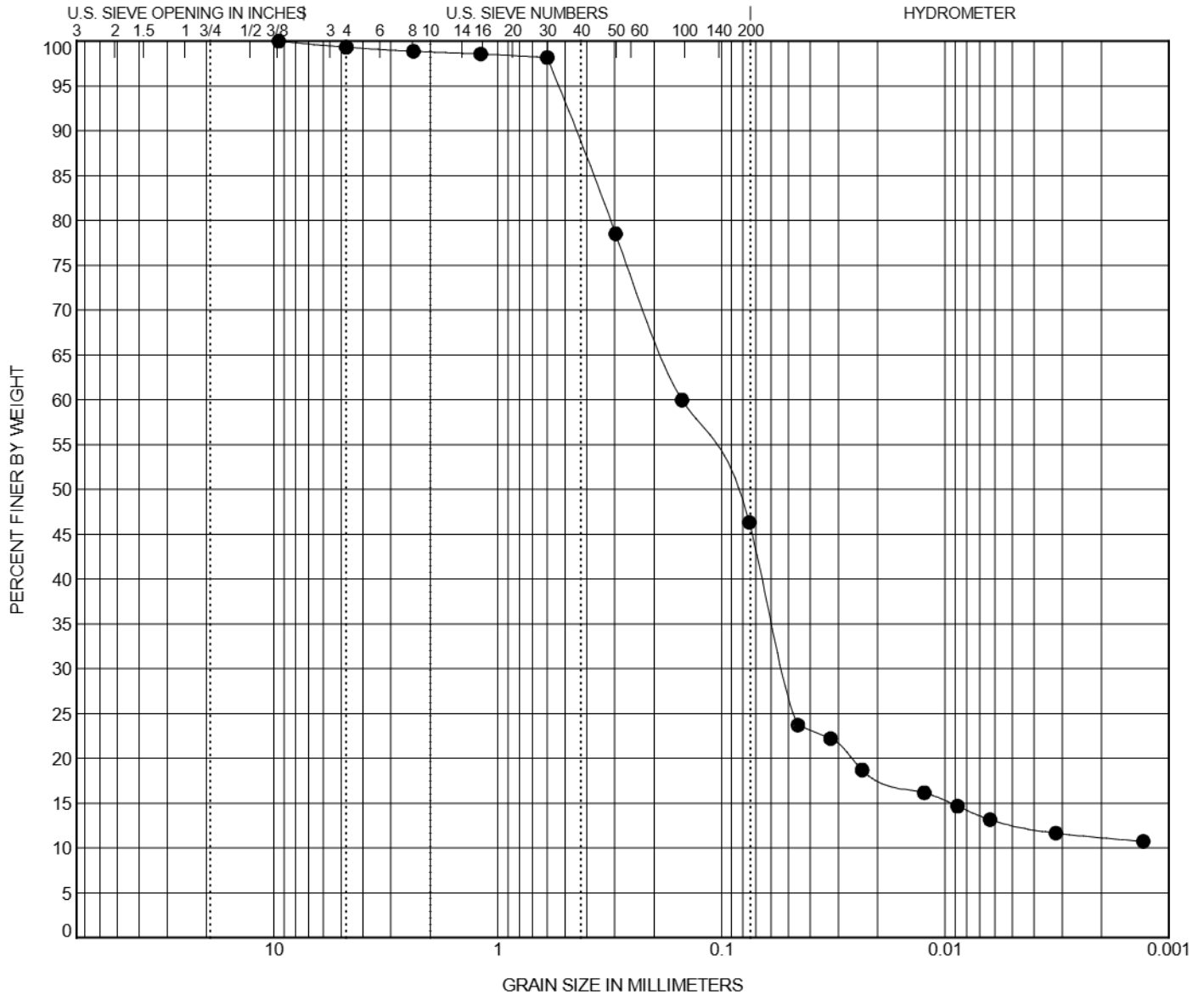
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
CLAY; soft to stiff, dark brown; with sand (CL)											
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR8	5.0	2.38	0.066	0.058	0.044	0.0	30.9	54.1	15.0		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/10/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



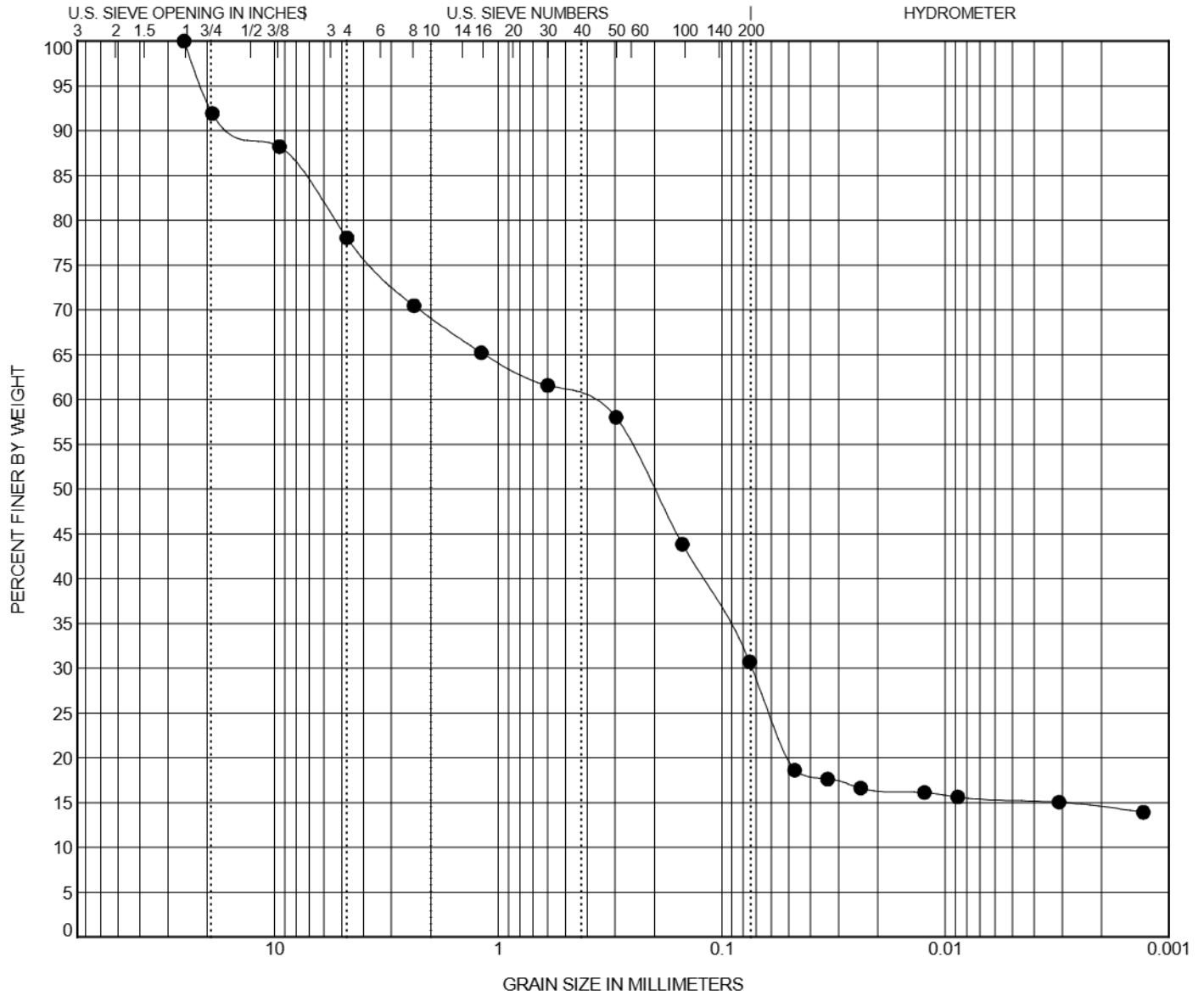
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; loose; brown; clayey (SC)											
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
<b>BR8</b>	<b>15.0</b>	<b>9.51</b>	<b>0.15</b>	<b>0.09</b>	<b>0.052</b>	<b>0.7</b>	<b>53.0</b>	<b>33.7</b>	<b>12.7</b>		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/15/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



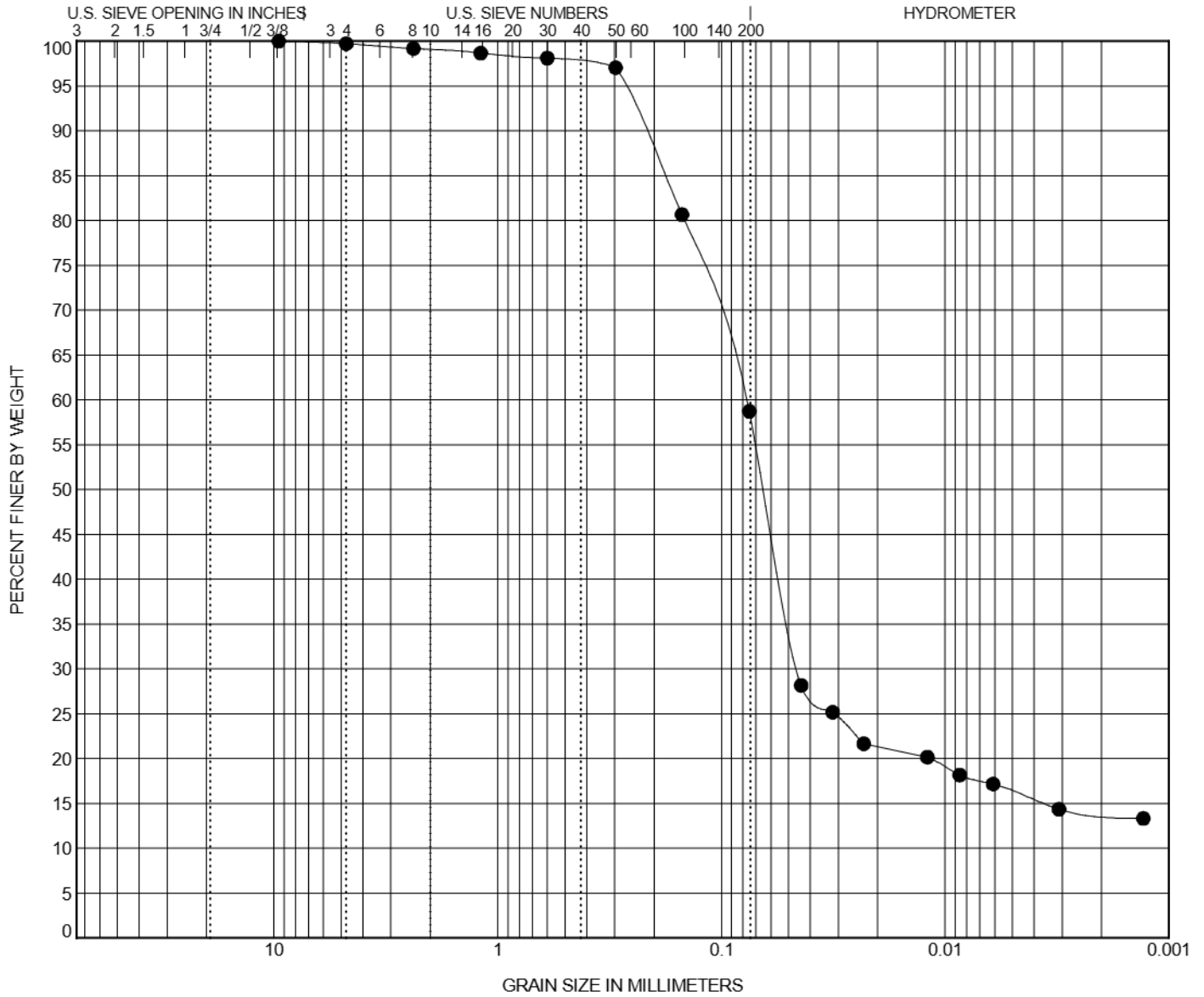
GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
SAND; slightly compact; tan, brown; clayey (SC)											
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR9	5.0	25.4	0.44	0.202	0.073	22.0	47.3	15.4	15.3		

# GRAIN SIZE DISTRIBUTION

COUNTY: Denton  
 HIGHWAY: Shady Shores Road  
 CSJ: 0918-46-316

DATE: 11/15/2023  
 DRILLED BY: Octavio Herrerra (Geotex)  
 LOGGED BY: Dylan McAden (Geotex)



GRAVEL		SAND			SILT OR CLAY
coarse	fine	coarse	medium	fine	

Description							LL	PL	PI	Cc	Cu
CLAY; soft to very stiff, reddish brown; trace to few calcareous nodules; sandy (CL)											
BOREHOLE	DEPTH	D100	D60	D50	D30	%Gravel	%Sand	%Silt	%Clay		
BR9	15.0	9.51	0.078	0.064	0.045	0.3	41.0	42.4	16.3		

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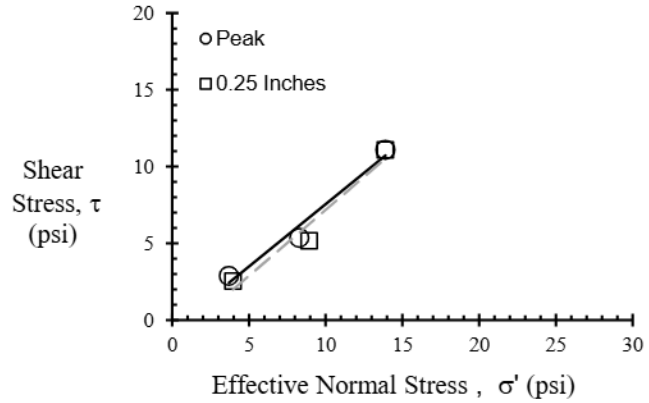
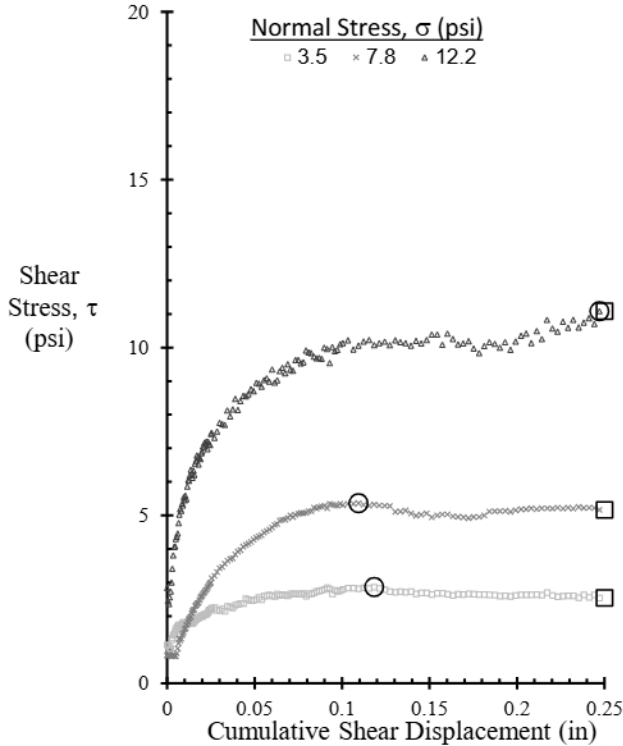
## Direct Shear Tests

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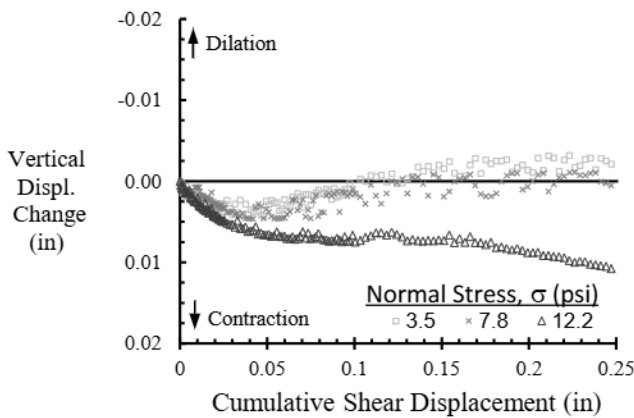
### Direct Shear of Soil Under Consolidated-Drained Conditions

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW3 (6-8)

TRI Log#: 23-004886.1  
 Test Method: ASTM D3080



Note: Area Correction Has Been Applied



Specimen Number		1	2	3
Initial Condition	Diameter, in	2.50	2.50	2.50
	Height, in	1.00	1.00	1.00
	Water Content, %	17.9	18.2	17.9
	Saturation, %	95.5	96.1	95.1
	Dry Density, pcf	113.3	112.7	113.1
	Void Ratio	0.51	0.52	0.52
Consolidation Stress, $\sigma'$ (psi)		3.4722	7.8125	12.153
Post-Consol	Height, in	0.97	0.95	0.94
	Dry Density, pcf	116.6	118.6	120.7
	Void Ratio	0.46	0.44	0.41
Displacement rate (in/min)		1E-04		
Final Water Content, %		18.5	17.9	17.4
Peak	Normal Stress, $\sigma'$ (psi)	3.69	8.27	13.90
	Shear Stress, $\tau$ (psi)	2.87	5.36	11.08
	Secant Friction Angle, Degrees	37.8	32.9	38.6
	Displacement (in)	0.12	0.11	0.25
	$\phi'_d$ , degrees	Negative Intercept, Refer to Secant Friction Angles		
	$c'_d$ , psi	Negative Intercept, Refer to Secant Friction Angles		
0.25 Inches	Normal Stress, $\sigma'$ (psi)	3.97	8.94	13.90
	Shear Stress, $\tau$ (psi)	2.54	5.17	11.08
	Secant Friction Angle, Degrees	32.6	30.0	38.6
	$\phi'_d$ , degrees	Negative Intercept, Refer to Secant Friction Angles		
	$c'_d$ , psi	Negative Intercept, Refer to Secant Friction Angles		

Note: The intact soil sample was extruded and specimens were prepared using a trimming turntable. A specific gravity of 2.75 was assumed for weight-volume calculations.

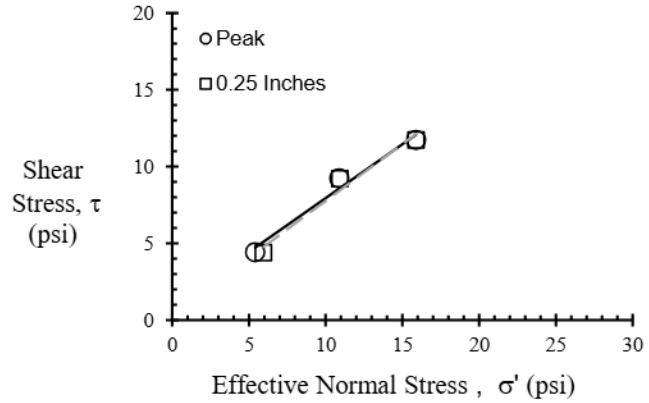
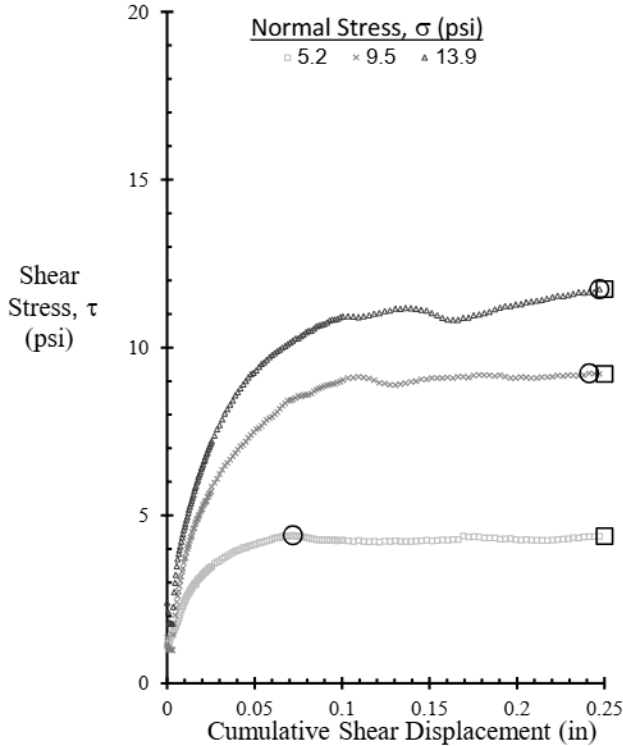
Jeffrey A. Kuhn, Ph.D., P.E. 1/26/24

Analysis & Quality Review/Date

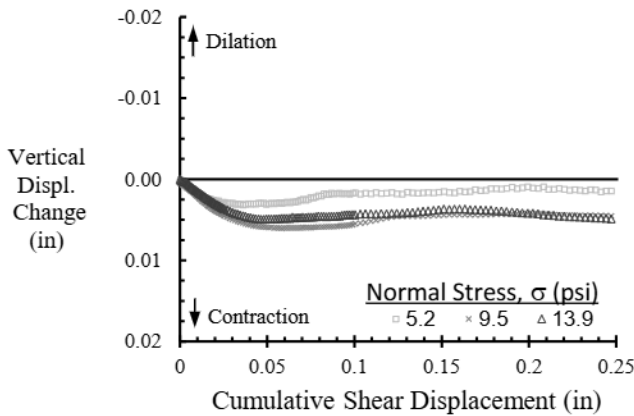
### Direct Shear of Soil Under Consolidated-Drained Conditions

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW6 (8-10)

TRI Log#: 23-004886.2  
 Test Method: ASTM D3080



Note: Area Correction Has Been Applied



Specimen Number		1	2	3
Initial Condition	Diameter, in	2.50	2.50	2.50
	Height, in	1.00	1.00	1.00
	Water Content, %	17.4	17.3	17.4
	Saturation, %	93.5	92.8	93.1
	Dry Density, pcf	113.6	113.4	113.4
	Void Ratio	0.51	0.51	0.51
Consolidation Stress, $\sigma'$ (psi)		5.2083	9.5486	13.889
Post-Consol	Height, in	0.98	1.05	0.97
	Dry Density, pcf	116.2	108.1	116.5
	Void Ratio	0.47	0.58	0.46
Displacement rate (in/min)		1E-04		
Final Water Content, %		21.0	19.8	20.1
Peak	Normal Stress, $\sigma'$ (psi)	5.41	10.88	15.88
	Shear Stress, $\tau$ (psi)	4.41	9.23	11.74
	Secant Friction Angle, Degrees	39.2	40.3	36.5
	Displacement (in)	0.07	0.24	0.25
	$\phi'_d$ , degrees	35.1		
	$c'_d$ , psi	0.9		
0.25 Inches	Normal Stress, $\sigma'$ (psi)	5.96	10.92	15.88
	Shear Stress, $\tau$ (psi)	4.39	9.21	11.74
	Secant Friction Angle, Degrees	36.4	40.1	36.5
	$\phi'_d$ , degrees	36.5		
	$c'_d$ , psi	0.4		

Note: The intact soil sample was extruded and specimens were prepared using a trimming turntable. A specific gravity of 2.75 was assumed for weight-volume calculations.

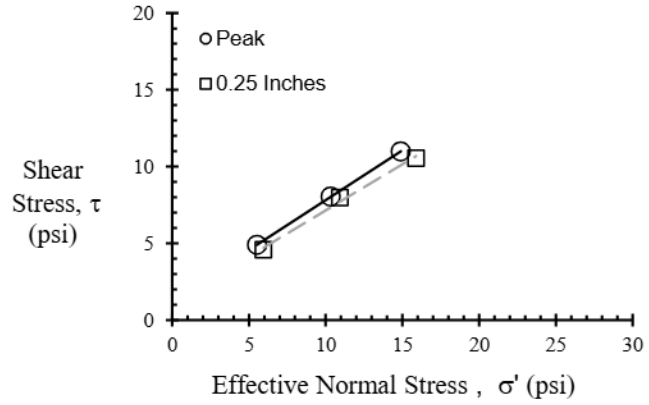
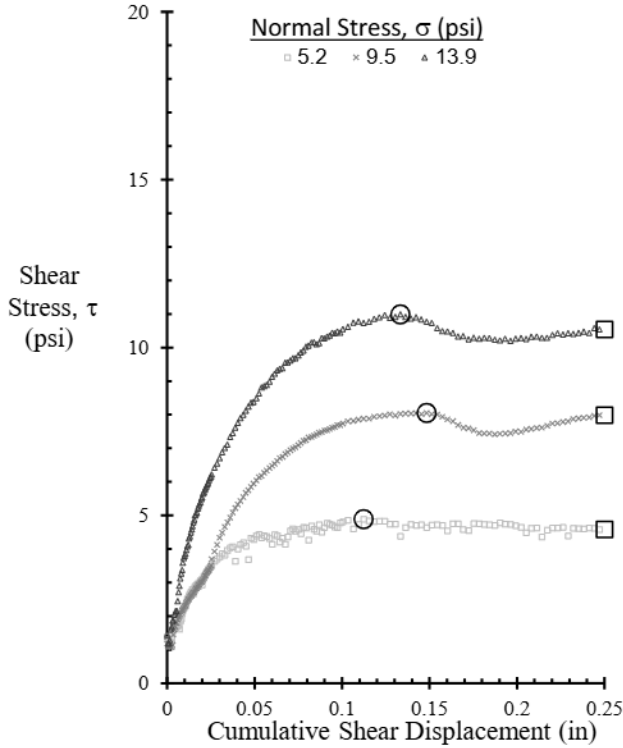
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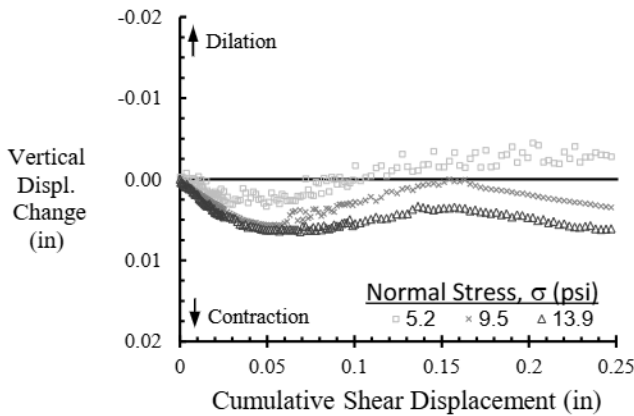
### Direct Shear of Soil Under Consolidated-Drained Conditions

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW13 (8-10)

TRI Log#: 23-004886.3  
 Test Method: ASTM D3080



Note: Area Correction Has Been Applied



Specimen Number		1	2	3
Initial Condition	Diameter, in	2.50	2.50	2.50
	Height, in	1.00	1.00	1.00
	Water Content, %	18.1	17.6	18.4
	Saturation, %	95.7	92.6	96.9
	Dry Density, pcf	112.8	112.8	112.8
	Void Ratio	0.52	0.52	0.52
Consolidation Stress, $\sigma'$ (psi)		5.2083	9.5486	13.889
Post-Consol	Height, in	1.03	0.95	0.96
	Dry Density, pcf	109.2	118.5	117.0
	Void Ratio	0.56	0.44	0.46
Displacement rate (in/min)		1E-04		
Final Water Content, %		18.1	18.6	18.1
Peak	Normal Stress, $\sigma'$ (psi)	5.52	10.33	14.90
	Shear Stress, $\tau$ (psi)	4.89	8.05	10.99
	Secant Friction Angle, Degrees	41.5	37.9	36.4
	Displacement (in)	0.11	0.15	0.13
	$\phi'_d$ , degrees	33.0		
$c'_d$ , psi		1.3		
0.25 Inches	Normal Stress, $\sigma'$ (psi)	5.96	10.92	15.88
	Shear Stress, $\tau$ (psi)	4.58	7.98	10.54
	Secant Friction Angle, Degrees	37.5	36.2	33.6
	$\phi'_d$ , degrees	31.0		
	$c'_d$ , psi		1.1	

Note: The intact soil sample was extruded and specimens were prepared using a trimming turntable. A specific gravity of 2.75 was assumed for weight-volume calculations.

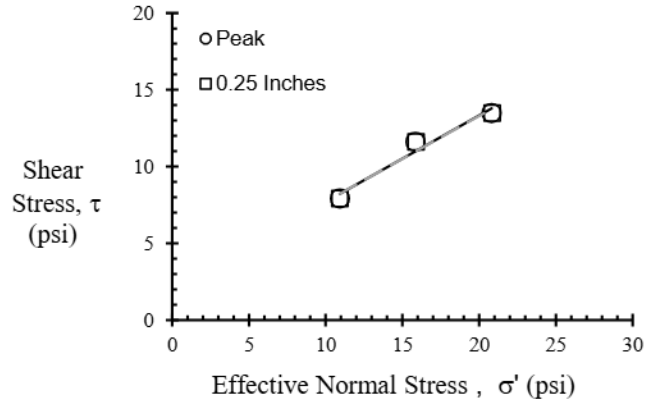
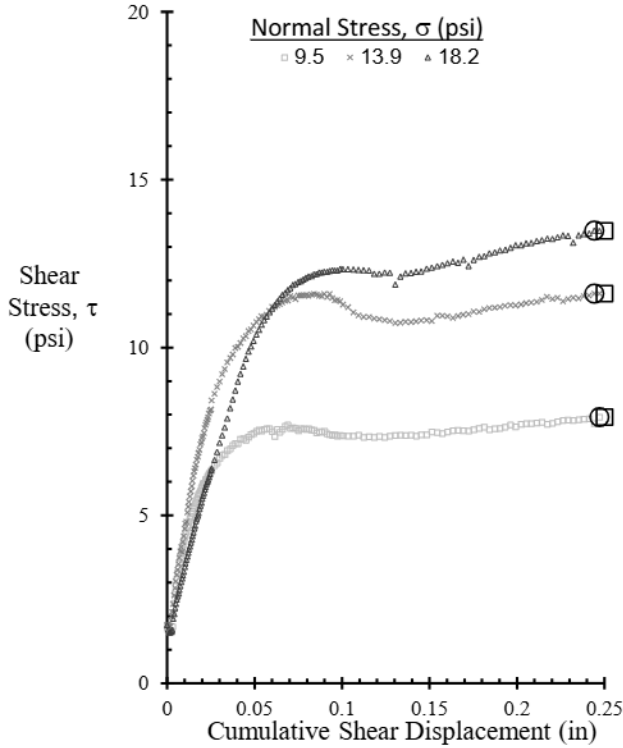
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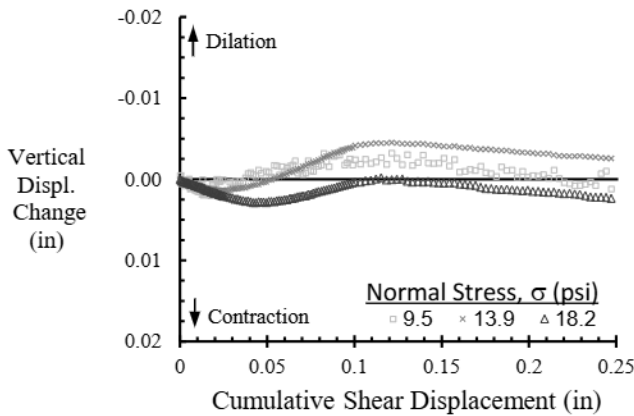
### Direct Shear of Soil Under Consolidated-Drained Conditions

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW21 (14-15)

TRI Log#: 23-004886.4  
 Test Method: ASTM D3080



Note: Area Correction Has Been Applied



Specimen Number		1	2	3
Initial Condition	Diameter, in	2.50	2.50	2.50
	Height, in	1.00	1.00	1.00
	Water Content, %	19.5	18.8	19.6
	Saturation, %	99.1	96.6	102.3
	Dry Density, pcf	111.3	111.8	112.5
	Void Ratio	0.54	0.53	0.53
Consolidation Stress, $\sigma'$ (psi)		9.5486	13.889	18.229
Post-Consol	Height, in	0.98	0.98	0.98
	Dry Density, pcf	113.4	113.8	114.8
	Void Ratio	0.50	0.50	0.48
Displacement rate (in/min)		1E-04		
Final Water Content, %		20.5	21.3	20.9
Peak	Normal Stress, $\sigma'$ (psi)	10.92	15.86	20.81
	Shear Stress, $\tau$ (psi)	7.92	11.60	13.48
	Secant Friction Angle, Degrees	36.0	36.2	32.9
	Displacement (in)	0.25	0.24	0.24
	$\phi'_d$ , degrees	29.3		
	$c'_d$ , psi	2.1		
0.25 Inches	Normal Stress, $\sigma'$ (psi)	10.92	15.88	20.85
	Shear Stress, $\tau$ (psi)	7.92	11.60	13.48
	Secant Friction Angle, Degrees	36.0	36.1	32.9
	$\phi'_d$ , degrees	29.2		
	$c'_d$ , psi	2.1		

Note: The intact soil sample was extruded and specimens were prepared using a trimming turntable. A specific gravity of 2.75 was assumed for weight-volume calculations.

Jeffrey A. Kuhn, Ph.D., P.E. 1/26/24

Analysis & Quality Review/Date

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## Consolidated Undrained (CU) Triaxial Tests

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## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW10 (4-5)

TRI Log #: 23-004886-05  
 Test Method: ASTM D4767 Mod

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	15.0	-
Initial Specimen Properties				
Avg. Diameter (in)	1.41	1.39	1.31	-
Avg. Height (in)	2.95	2.85	2.81	-
Avg. Water Content (%)	16.6	-	-	-
Bulk Density (pcf)	127.4	-	-	-
Dry Density (pcf)	109.3	-	-	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	79.9	-	-	-
Void Ratio, n	0.57	0.47	0.30	-
B-Value, End of Saturation	0.98	-	-	-

Test Setup				
Specimen Condition	Undisturbed / Intact			
Specimen Preparation	Trimmed			
Mounting Method	Wet			
Consolidation	Isotropic			

Post-Consolidation / Pre-Shear				
Void Ratio	0.47	0.30	0.29	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	-	-	14.6	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$				Ratio, $(\sigma_1'/\sigma_3')_{max}$			
Axial Strain at Failure (%), $\epsilon_{a,f}$	-	-	-	-	1.3	1.3	2.6	-
Minor Effective Stress (psi), $\sigma_3'$	-	-	-	-	4.4	8.1	13.2	-
Principal Stress Difference (psi), $(\sigma_1 - \sigma_3)_f$	-	-	-	-	14.3	24.5	36.2	-
Pore Water Pressure, $\Delta u_f$ (psi)	-	-	-	-	0.6	1.9	1.8	-
Major Effective Stress (psi), $\sigma_1'$	-	-	-	-	18.7	32.6	49.3	-
Secant Friction Angle (degrees)	-	-	-	-	38.2	37.0	35.3	-
Effective Friction Angle (degrees)	-				33.6			
Effective Cohesion (psi)	-				1.0			

Note: Multi-stage testing was performed for this sample. The first two stages were terminated in accordance with stress path tangency and/or peak principal stress ratio. The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio are presented in tabular form on the first page of the report. There are alternate interpretations to this failure criterion including but not limited to peak principal stress difference and strain compatibility.

Jeffrey A. Kuhn, Ph.D., P.E., 1/29/2024  
 Analysis & Quality Review/Date

## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW10 (4-5)

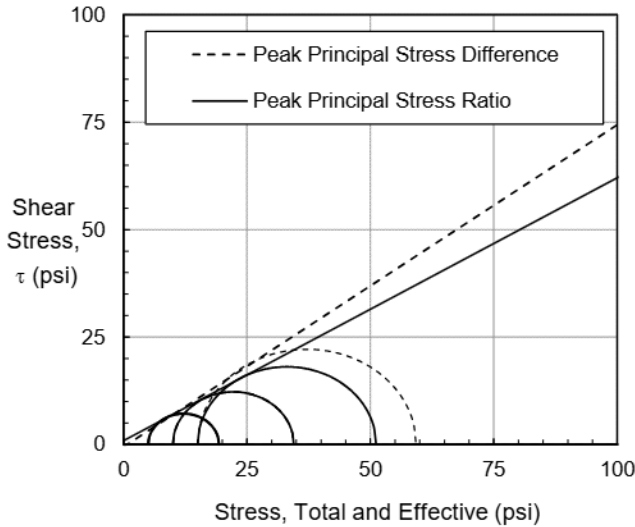
TRI Log #: 23-004886-05  
 Test Method: ASTM D4767 Mod

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Friction Angle (deg)	$\phi_R$	36.8	31.5
Cohesion (psi)	$c_R$	-0.6	0.9

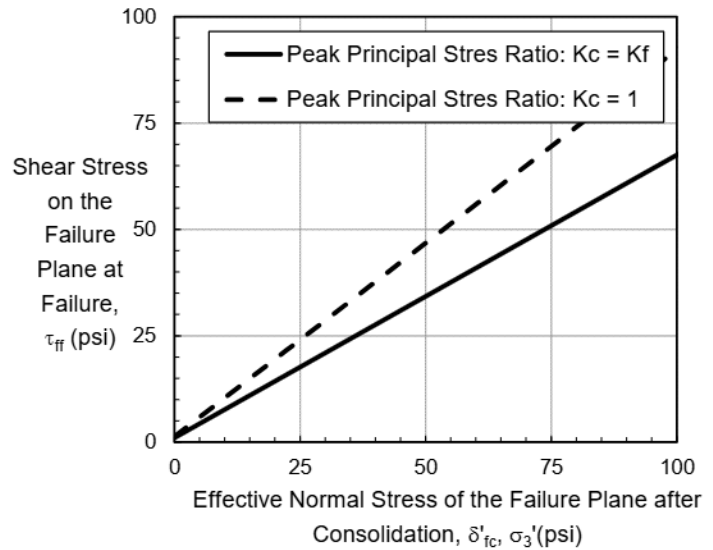
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	$\phi'$	32.5	33.6
Effective Cohesion (psi)	$c'$	1.3	1.0

Kc = 1 ( $\tau_{ff}$ vs $\sigma'_{fc}$ ) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	51.6	42.3
Cohesion (psi)	$\Psi_{Kc=1}$	-1.0	1.3

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown Envelopes

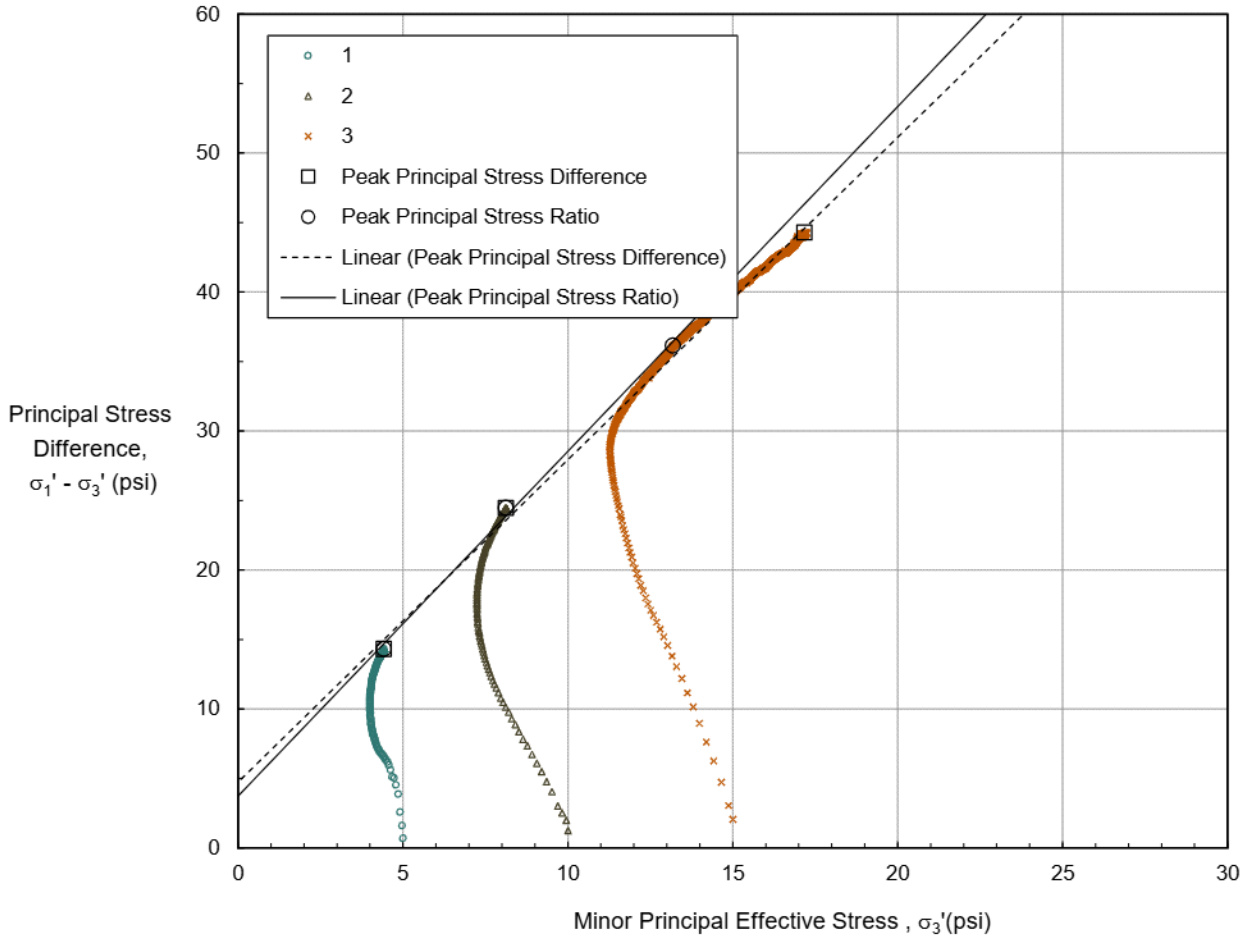


### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW10 (4-5)

TRI Log #: 23-004886-05  
 Test Method: ASTM D4767 Mod

Modified Mohr-Coulomb



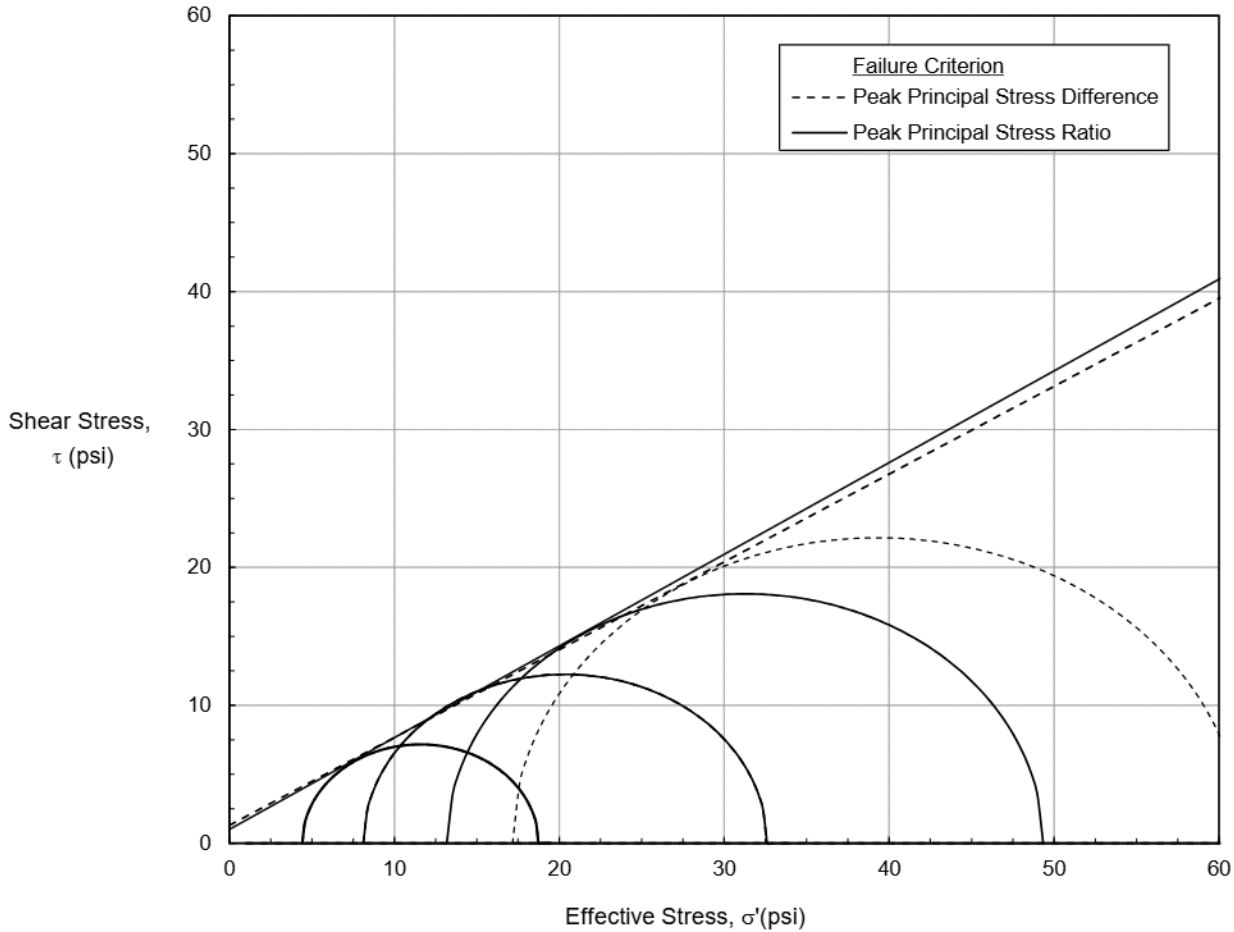
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	-	33.6
Effective Cohesion (psi)	-	1.0

### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW10 (4-5)

TRI Log #: 23-004886-05  
 Test Method: ASTM D4767 Mod

#### Mohr-Coulomb

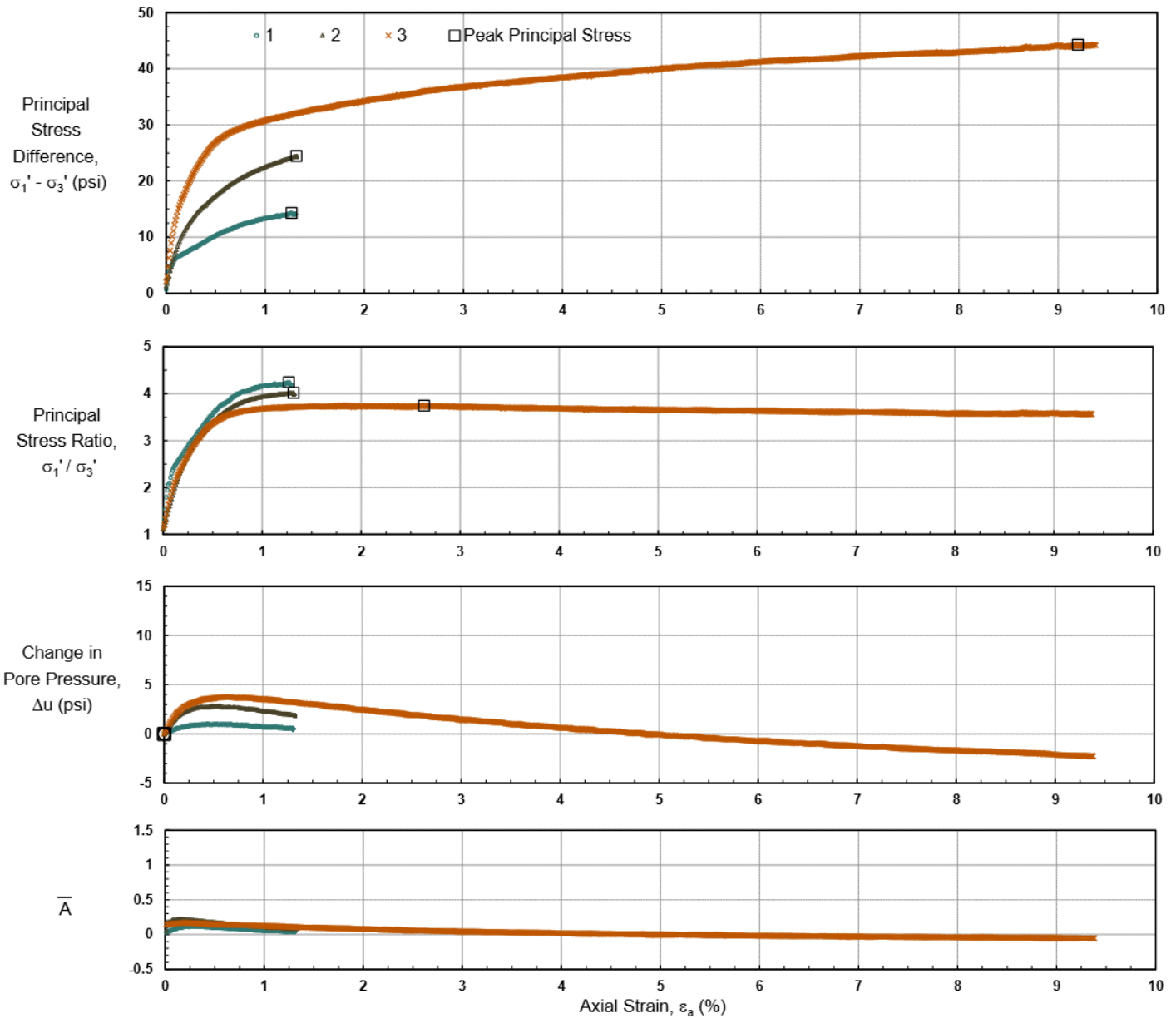


Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	-	33.6
Effective Cohesion (psi)	-	1.0

### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW10 (4-5)

TRI Log #: 23-004886-05  
 Test Method: ASTM D4767 Mod

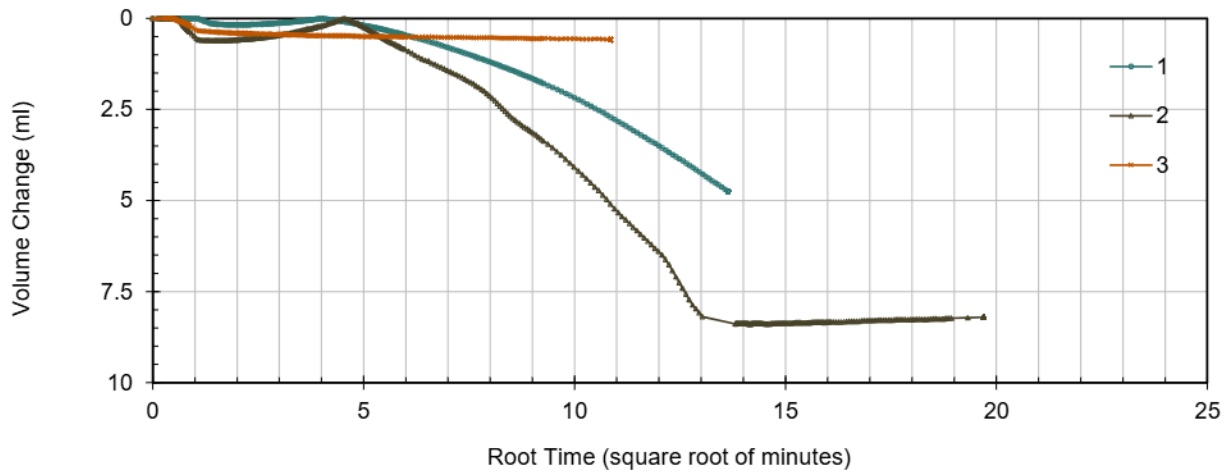
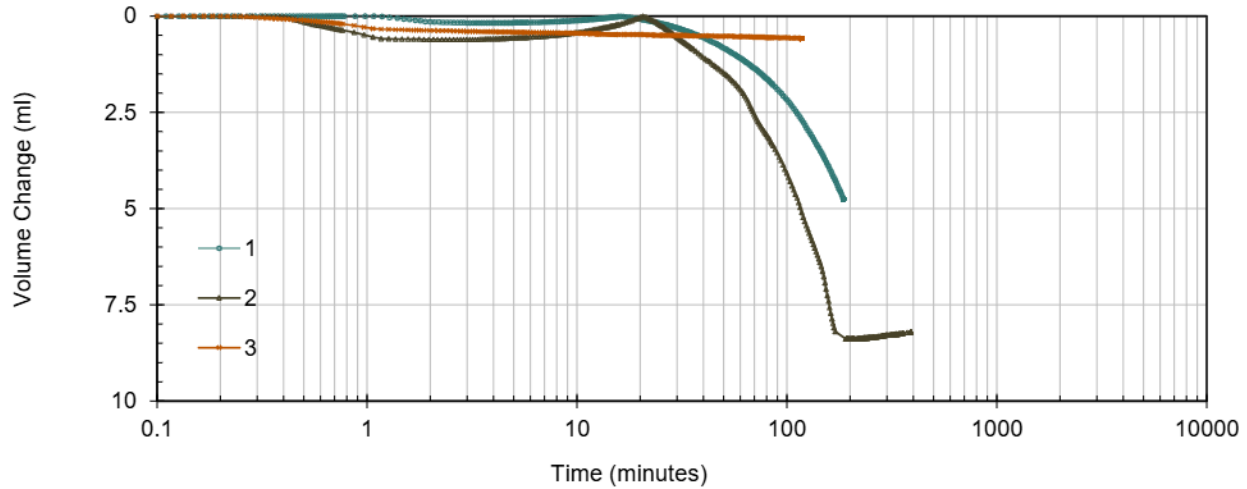


### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW10 (4-5)

TRI Log #: 23-004886-05  
 Test Method: ASTM D4767 Mod

#### Consolidation



## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW16 (8-10)

TRI Log #: 23-004886-06  
 Test Method: ASTM D4767 Mod

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	15.0	-
Initial Specimen Properties				
Avg. Diameter (in)	1.38	1.36	1.36	-
Avg. Height (in)	3.01	3.03	2.97	-
Avg. Water Content (%)	14.7	-	-	-
Bulk Density (pcf)	130.0	-	-	-
Dry Density (pcf)	113.4	-	-	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	78.6	-	-	-
Void Ratio, n	0.51	0.49	0.47	-
B-Value, End of Saturation	0.95	-	-	-

Test Setup				
Specimen Condition	Undisturbed / Intact			
Specimen Preparation	Trimmed			
Mounting Method	Wet			
Consolidation	Isotropic			

Post-Consolidation / Pre-Shear				
Void Ratio	0.49	0.47	0.46	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	-	-	18.8	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')$ <sub>max</sub>				Ratio, $(\sigma_1' / \sigma_3')$ <sub>max</sub>			
Axial Strain at Failure (%), $\epsilon_{a,f}$	-	-	-	-	1.4	2.0	1.8	-
Minor Effective Stress (psi), $\sigma_3'$ <sub>f</sub>	-	-	-	-	2.9	6.8	11.4	-
Principal Stress Difference (psi), $(\sigma_1 - \sigma_3)$ <sub>f</sub>	-	-	-	-	10.5	18.8	25.8	-
Pore Water Pressure, $\Delta u_f$ (psi)	-	-	-	-	2.1	3.2	3.6	-
Major Effective Stress (psi), $\sigma_1'$ <sub>f</sub>	-	-	-	-	13.3	25.7	37.2	-
Secant Friction Angle (degrees)	-	-	-	-	40.3	35.4	32.0	-
Effective Friction Angle (degrees)	-				28.0			
Effective Cohesion (psi)	-				1.8			

Note: Multi-stage testing was performed for this sample. The first two stages were terminated in accordance with stress path tangency and/or peak principal stress ratio. The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio are presented in tabular form on the first page of the report. There are alternate interpretations to this failure criterion including but not limited to peak principal stress difference and strain compatibility.

Jeffrey A. Kuhn, Ph.D., P.E., 1/29/2024  
 Analysis & Quality Review/Date

## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW16 (8-10)

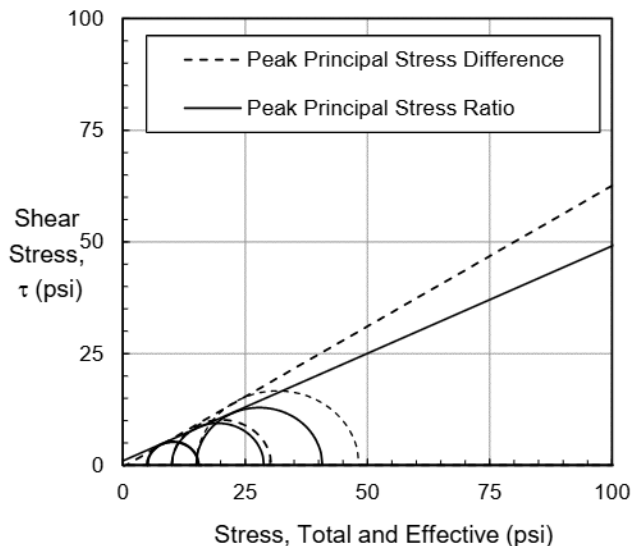
TRI Log #: 23-004886-06  
 Test Method: ASTM D4767 Mod

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$\phi_R$	32.2	25.7
Cohesion (psi)	$c_R$	-0.4	1.0

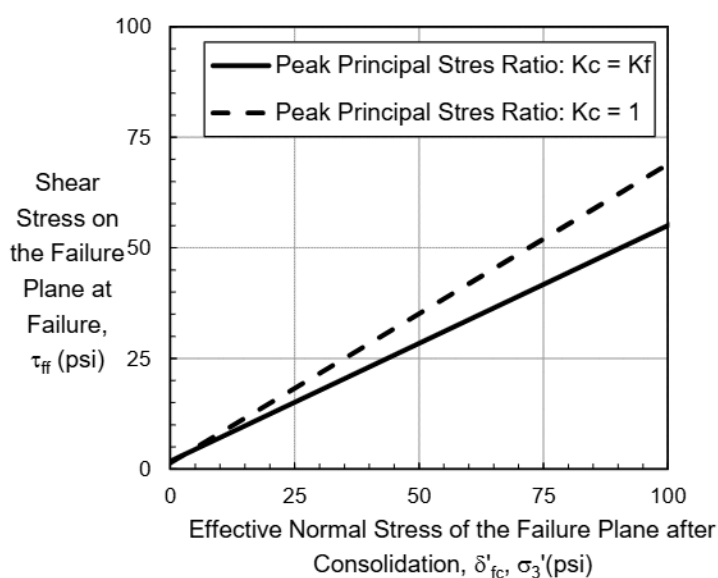
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	$\phi'$	24.7	28.0
Effective Cohesion (psi)	$c'$	2.5	1.8

Kc = 1 ( $\tau_{ff}$ vs $\sigma'_{fc}$ ) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	46.0	34.0
Cohesion (psi)	$\Psi_{Kc=1}$	-0.7	1.4

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown Envelopes

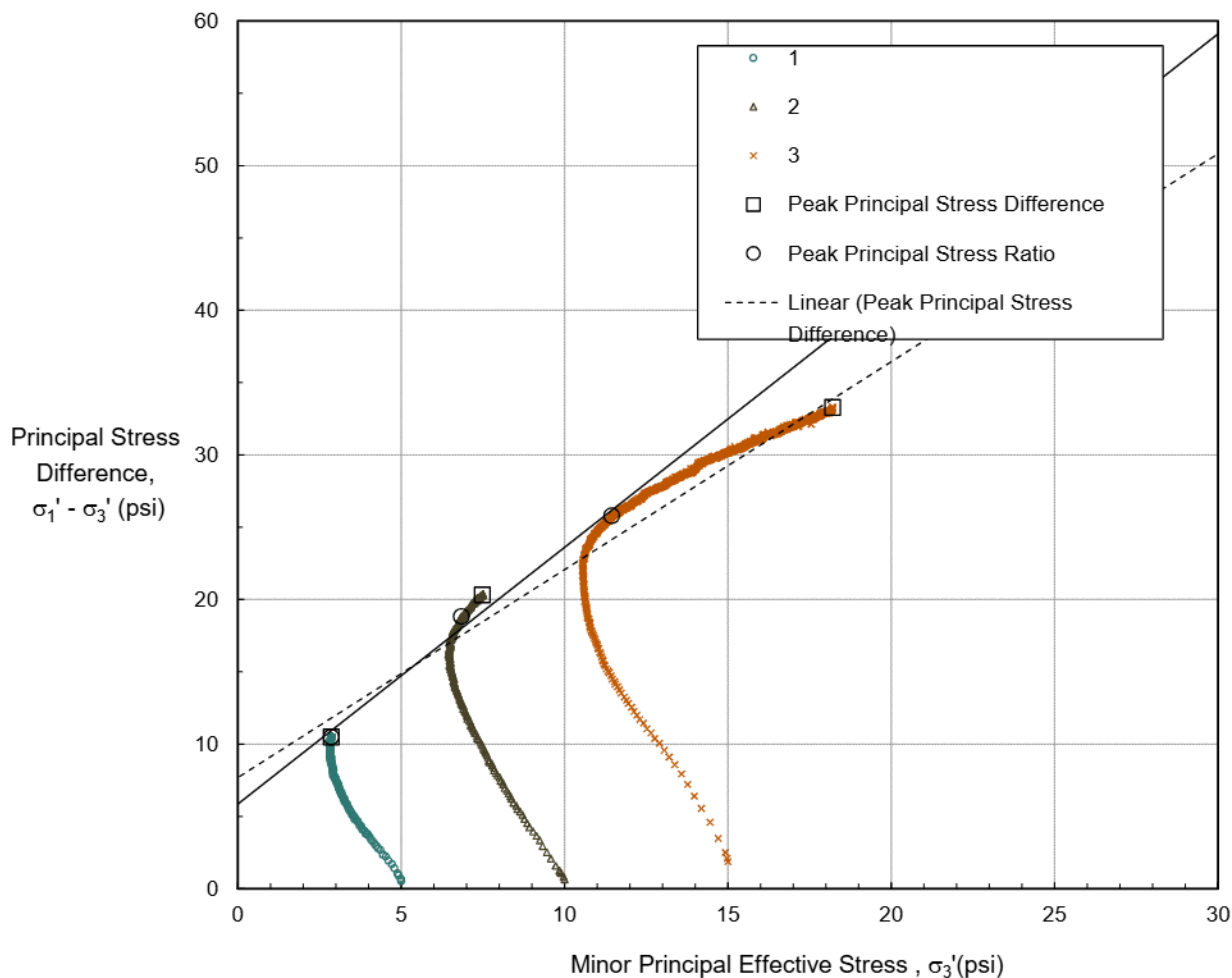


### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW16 (8-10)

TRI Log #: 23-004886-06  
 Test Method: ASTM D4767 Mod

Modified Mohr-Coulomb



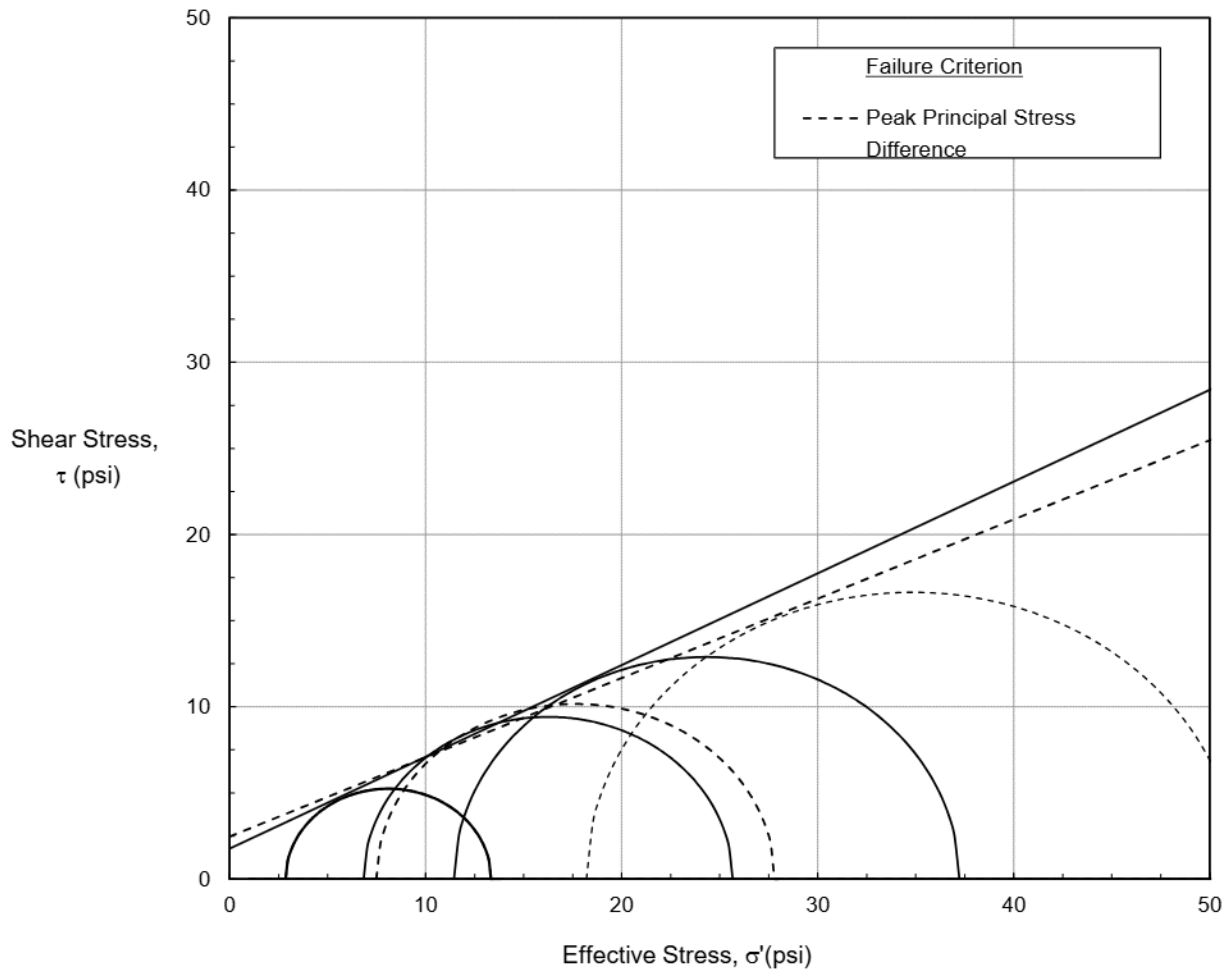
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	-	28.0
Effective Cohesion (psi)	-	1.8

### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW16 (8-10)

TRI Log #: 23-004886-06  
 Test Method: ASTM D4767 Mod

#### Mohr-Coulomb

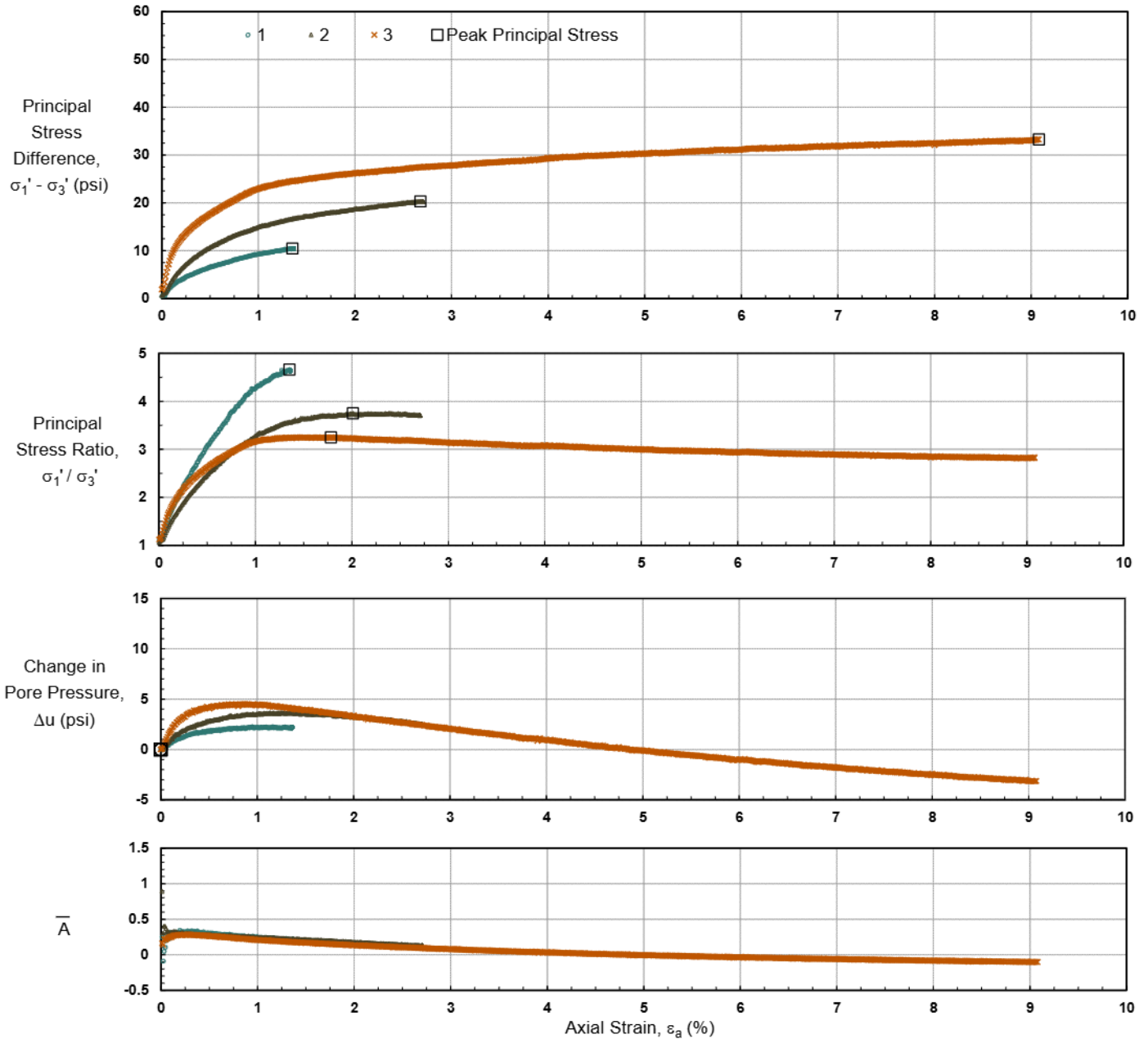


Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	-	28.0
Effective Cohesion (psi)	-	1.8

### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW16 (8-10)

TRI Log #: 23-004886-06  
 Test Method: ASTM D4767 Mod

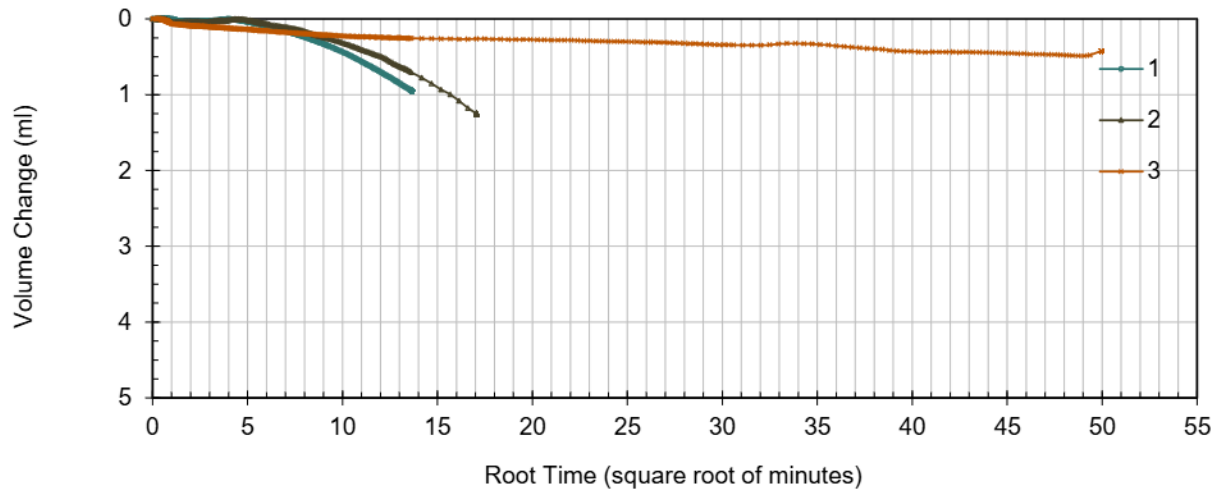
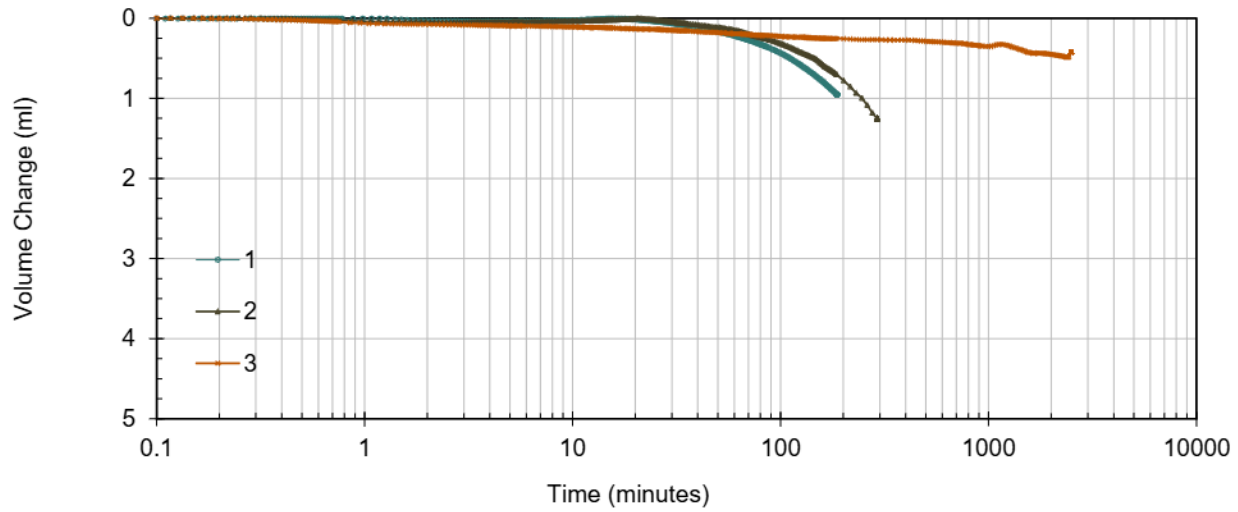


## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW16 (8-10)

TRI Log #: 23-004886-06  
 Test Method: ASTM D4767 Mod

### Consolidation



## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW24 (8-10)

TRI Log #: 23-004886-07  
 Test Method: ASTM D4767 Mod

Specimens				
Identification	1	2	3	4
Depth/Elev. (ft)	-	-	-	-
Eff. Consol. Stress (psi)	5.0	10.0	15.0	-
Initial Specimen Properties				
Avg. Diameter (in)	1.39	1.39	1.41	-
Avg. Height (in)	3.19	3.15	3.03	-
Avg. Water Content (%)	23.3	-	-	-
Bulk Density (pcf)	125.8	-	-	-
Dry Density (pcf)	102.0	-	-	-
Specific Gravity (Assumed)	2.75			
Saturation (%)	93.9	-	-	-
Void Ratio, n	0.68	0.68	0.66	-
B-Value, End of Saturation	0.97	-	-	-

Test Setup	
Specimen Condition	Undisturbed / Intact
Specimen Preparation	Trimmed
Mounting Method	Wet
Consolidation	Isotropic

Post-Consolidation / Pre-Shear				
Void Ratio	0.68	0.66	0.63	-

Shear / Post-Shear				
Rate of Strain (%/hr)	1.00	1.00	1.00	-
Avg. Water Content (%)	-	-	29.1	-

At Failure								
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$				Ratio, $(\sigma_1' / \sigma_3')_{max}$			
Axial Strain at Failure (%), $\epsilon_{a,f}$	-	-	-	-	0.7	1.4	0.9	-
Minor Effective Stress (psi), $\sigma_3'_f$	-	-	-	-	4.4	8.5	12.1	-
Principal Stress Difference (psi), $(\sigma_1 - \sigma_3)_f$	-	-	-	-	10.8	15.7	19.2	-
Pore Water Pressure, $\Delta u_f$ (psi)	-	-	-	-	0.5	1.5	3.0	-
Major Effective Stress (psi), $\sigma_1'_f$	-	-	-	-	15.2	24.2	31.3	-
Secant Friction Angle (degrees)	-	-	-	-	33.4	28.7	26.3	-
Effective Friction Angle (degrees)	-				20.9			
Effective Cohesion (psi)	-				2.1			

Note: Multi-stage testing was performed for this sample. The first two stages were terminated in accordance with stress path tangency and/or peak principal stress ratio. The presented M-C parameters are based on a linear regression in modified stress space, across all assigned effective consolidation stresses. This fit does not purported to capture typical curvature of envelopes that may, in particular, be observed across broader range in effective stresses. Please note that the stresses associated with peak principal stress ratio are presented in tabular form on the first page of the report. There are alternate interpretations to this failure criterion including but not limited to peak principal stress difference and strain compatibility.

Jeffrey A. Kuhn, Ph.D., P.E., 1/29/2024  
 Analysis & Quality Review/Date

## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW24 (8-10)

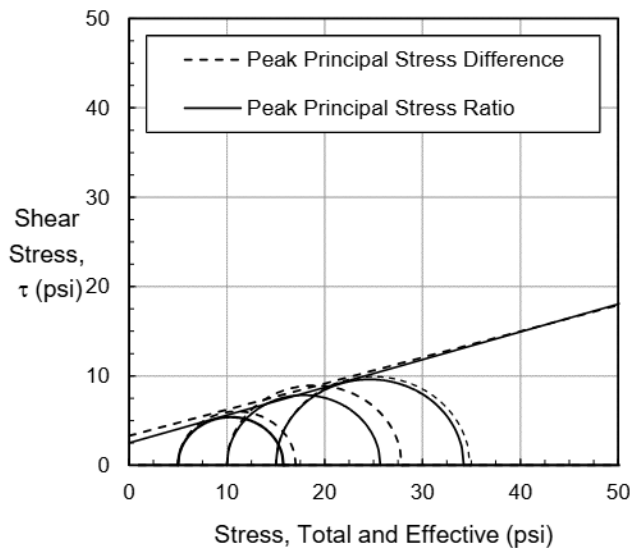
TRI Log #: 23-004886-07  
 Test Method: ASTM D4767 Mod

R / "Total Stress" Envelope			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$\phi_R$	16.3	17.3
Cohesion (psi)	$c_R$	3.3	2.5

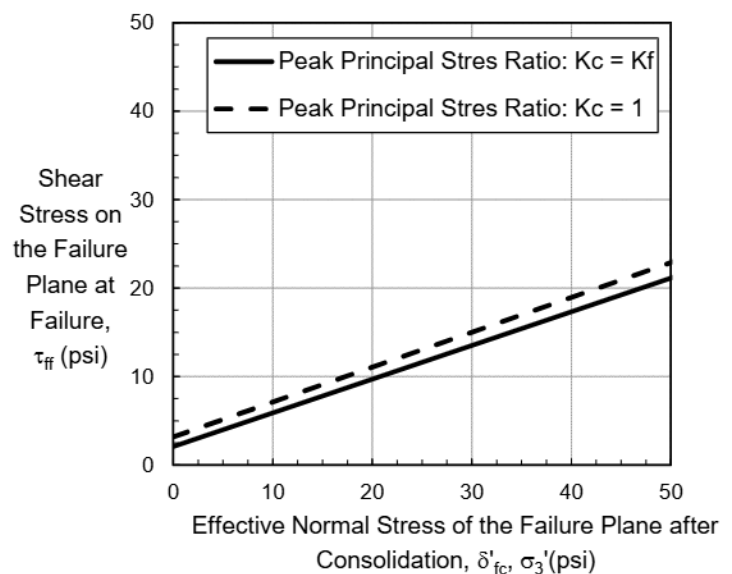
Kc = Kf Envelope, Effective Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Effective Friction Angle (deg)	$\phi'$	13.9	20.9
Effective Cohesion (psi)	$c'$	3.7	2.1

Kc = 1 ( $\tau_{ff}$ vs $\sigma'_{fc}$ ) Envelope, Total Stress Envelope (Duncan et al. 1990)			
Failure Criterion: Peak Principal Stress		Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1'/\sigma_3')_{max}$
Friction Angle (deg)	$d_{Kc=1}$	20.8	21.5
Cohesion (psi)	$\Psi_{Kc=1}$	4.3	3.2

R / "Total Stress" Envelope



Three-Stage Rapid Drawdown Envelopes

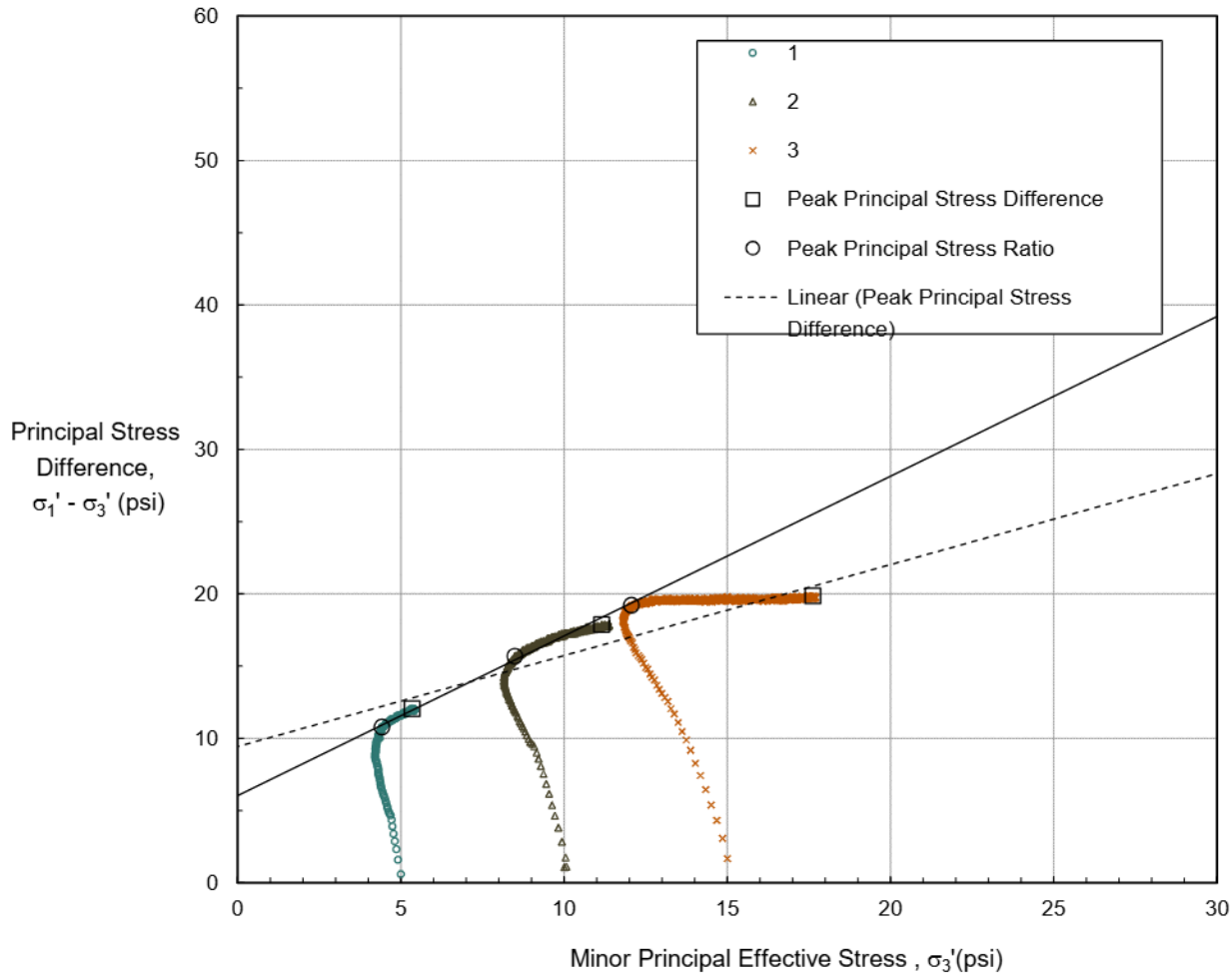


### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW24 (8-10)

TRI Log #: 23-004886-07  
 Test Method: ASTM D4767 Mod

Modified Mohr-Coulomb



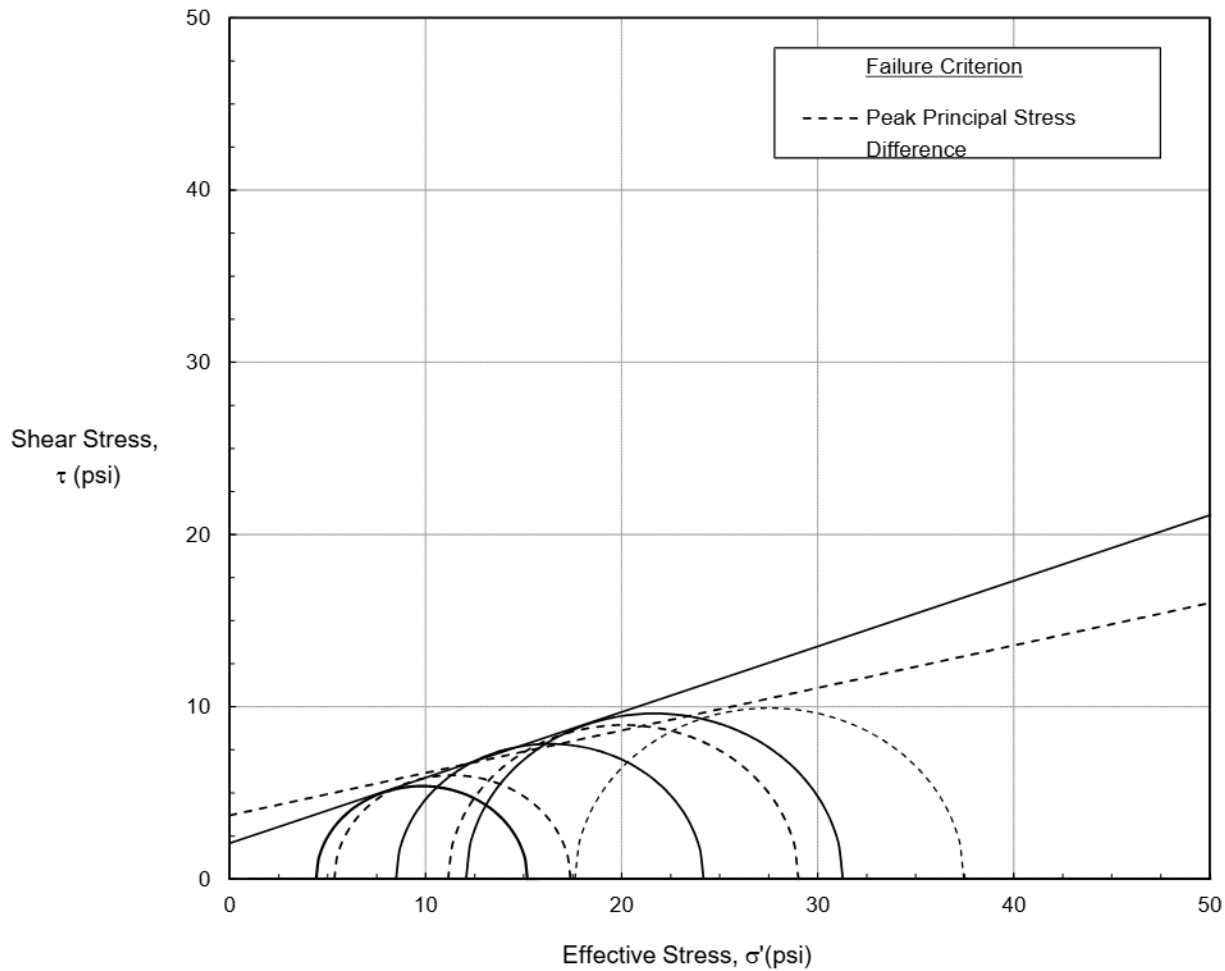
Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	-	20.9
Effective Cohesion (psi)	-	2.1

### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW24 (8-10)

TRI Log #: 23-004886-07  
 Test Method: ASTM D4767 Mod

#### Mohr-Coulomb

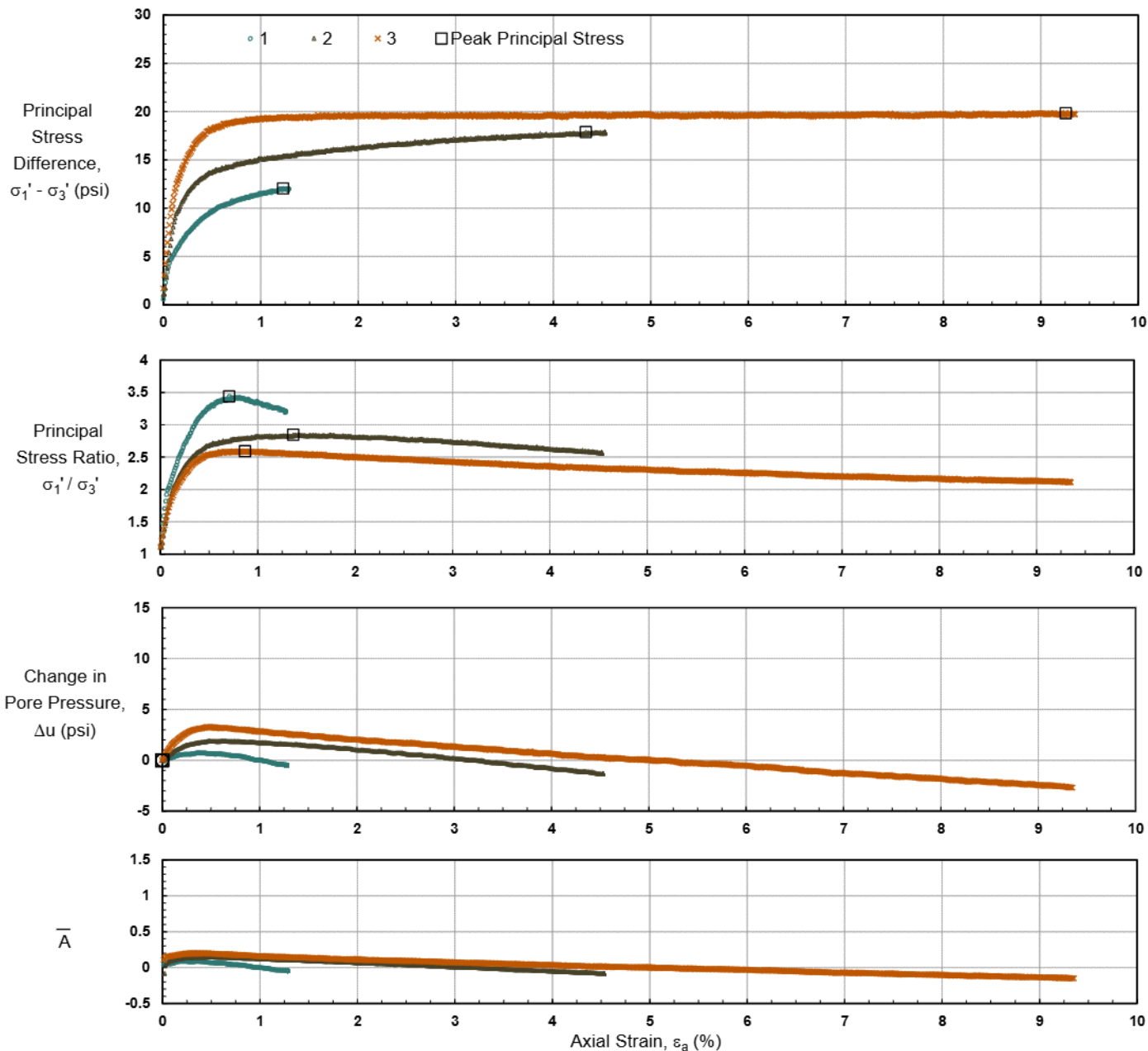


Failure Criterion: Peak Principal Stress	Difference, $(\sigma_1' - \sigma_3')_{max}$	Ratio, $(\sigma_1' / \sigma_3')_{max}$
Effective Friction Angle (deg)	-	20.9
Effective Cohesion (psi)	-	2.1

### Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW24 (8-10)

TRI Log #: 23-004886-07  
 Test Method: ASTM D4767 Mod

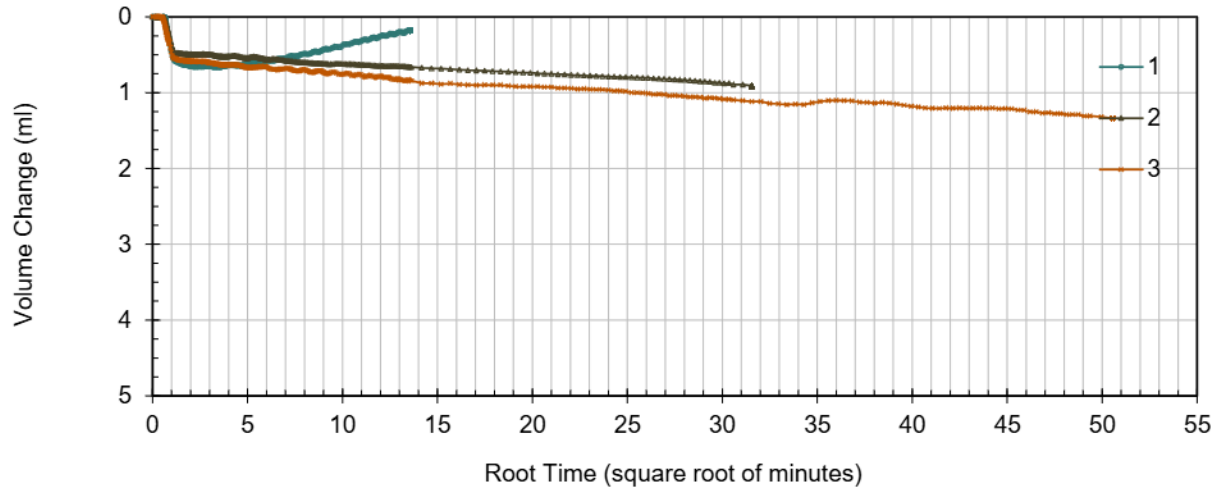
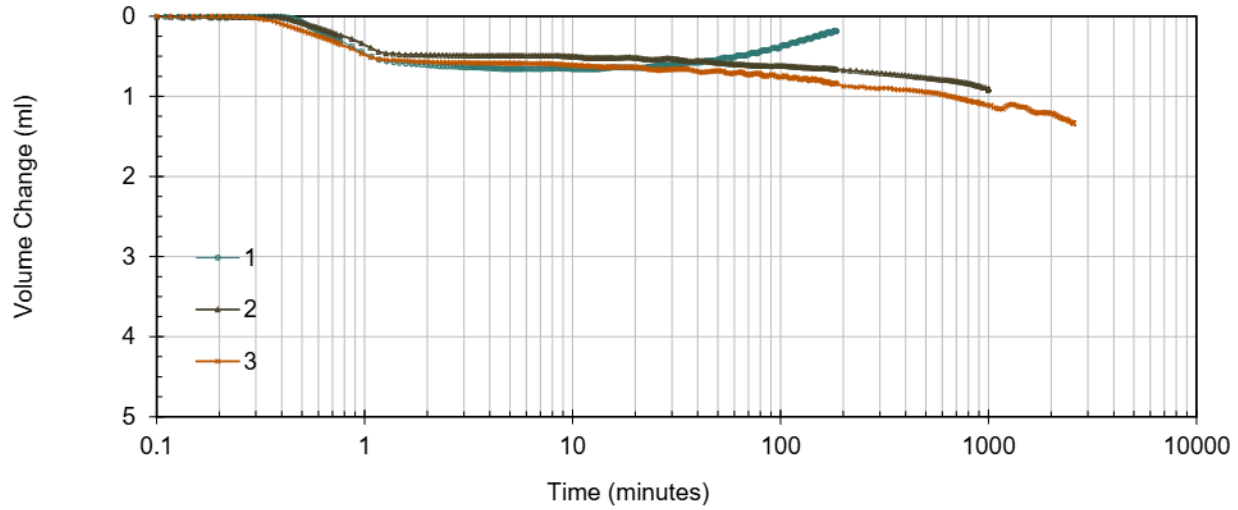


## Multi-Stage Consolidated-Undrained Triaxial Compression

Client: Geotex Engineering, LLC  
 Project: G22-4003-1 Shady Shores Road  
 Sample: RW24 (8-10)

TRI Log #: 23-004886-07  
 Test Method: ASTM D4767 Mod

### Consolidation



## **APPENDIX D – GEOLOGIC INFORMATION**



\*\* LOCATIONS ARE INTENDED FOR GRAPHICAL REFERENCE ONLY\*\*



**SHADY SHORES ROAD**  
**CSJ: 0918-46-316**

GEOLOGIC ATLAS

DENTON COUNTY

TEXAS

SHEET NO.

**G1**

## **APPENDIX E – AXIAL CAPACITIES OF DRILLED SHAFTS**

# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	534.4	534.2	OTHER	80	0	0.00	0.00
2	534.2	533.7	OTHER	80	0	0.00	0.00
3	533.7	532.9	OTHER	80	0	0.00	0.00
4	532.9	532.4	OTHER	80	0	0.00	0.00
5	532.4	524.4	ML	80	133	0.85	6.80
6	524.4	519.4	OTHER	80	141	0.85	11.05
7	519.4	516.4	OTHER	80	686	3.25	20.80
7	516.4	511.4	OTHER	80	400	2.25	32.05
7	511.4	506.4	OTHER	80	137	0.85	36.30
7	506.4	501.4	OTHER	80	533	3.00	51.29
7	501.4	496.4	OTHER	80	600	3.25	67.54
7	496.4	491.4	OTHER	80	218	1.23	73.67
7	491.4	486.4	OTHER	80	2400	3.25	89.92
7	486.4	481.4	OTHER	80	2400	3.25	106.17
7	481.4	474.4	OTHER	80	2400	3.25	128.92
8	474.4	471.4	OTHER	80	2400	3.25	138.67
8	471.4	466.4	OTHER	80	2400	3.25	154.92
8	466.4	461.4	OTHER	80	185	1.04	160.12
8	461.4	456.9	OTHER	80	2400	3.25	174.74
8	456.9	454.4	OTHER	80	2400	3.25	182.87

# POINT BEARING DESIGN

WinCore  
Version 3.3

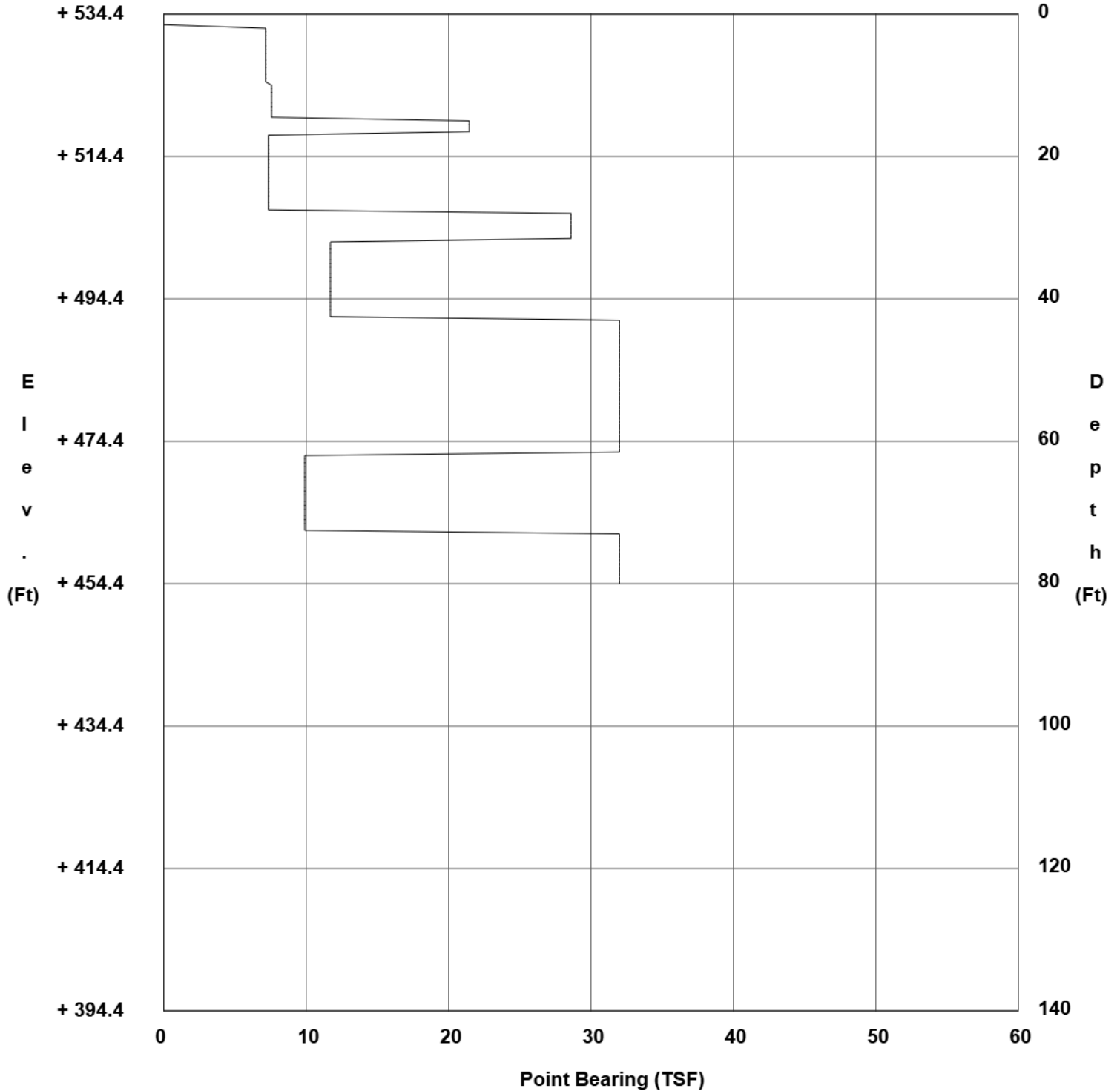
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

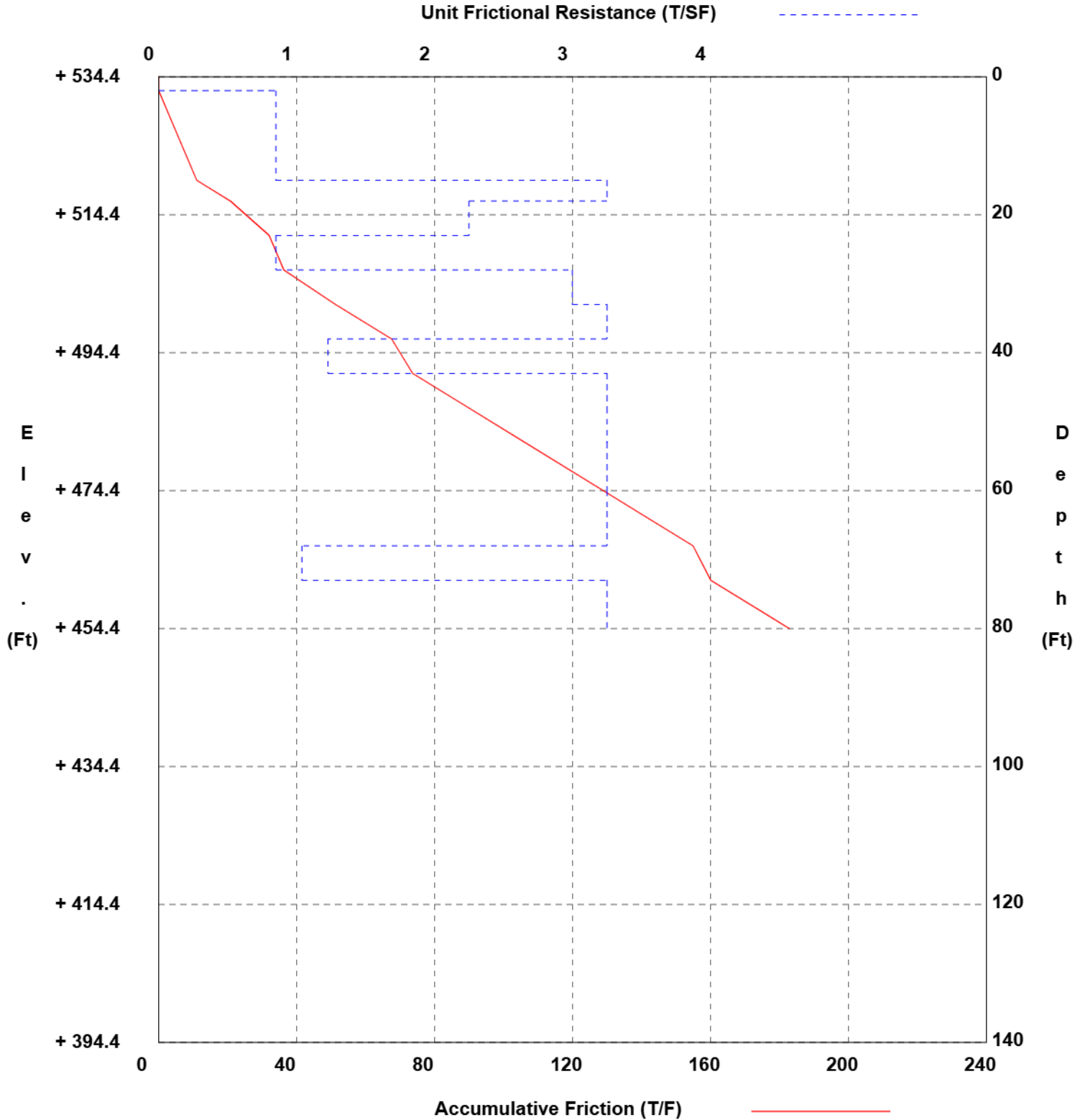
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

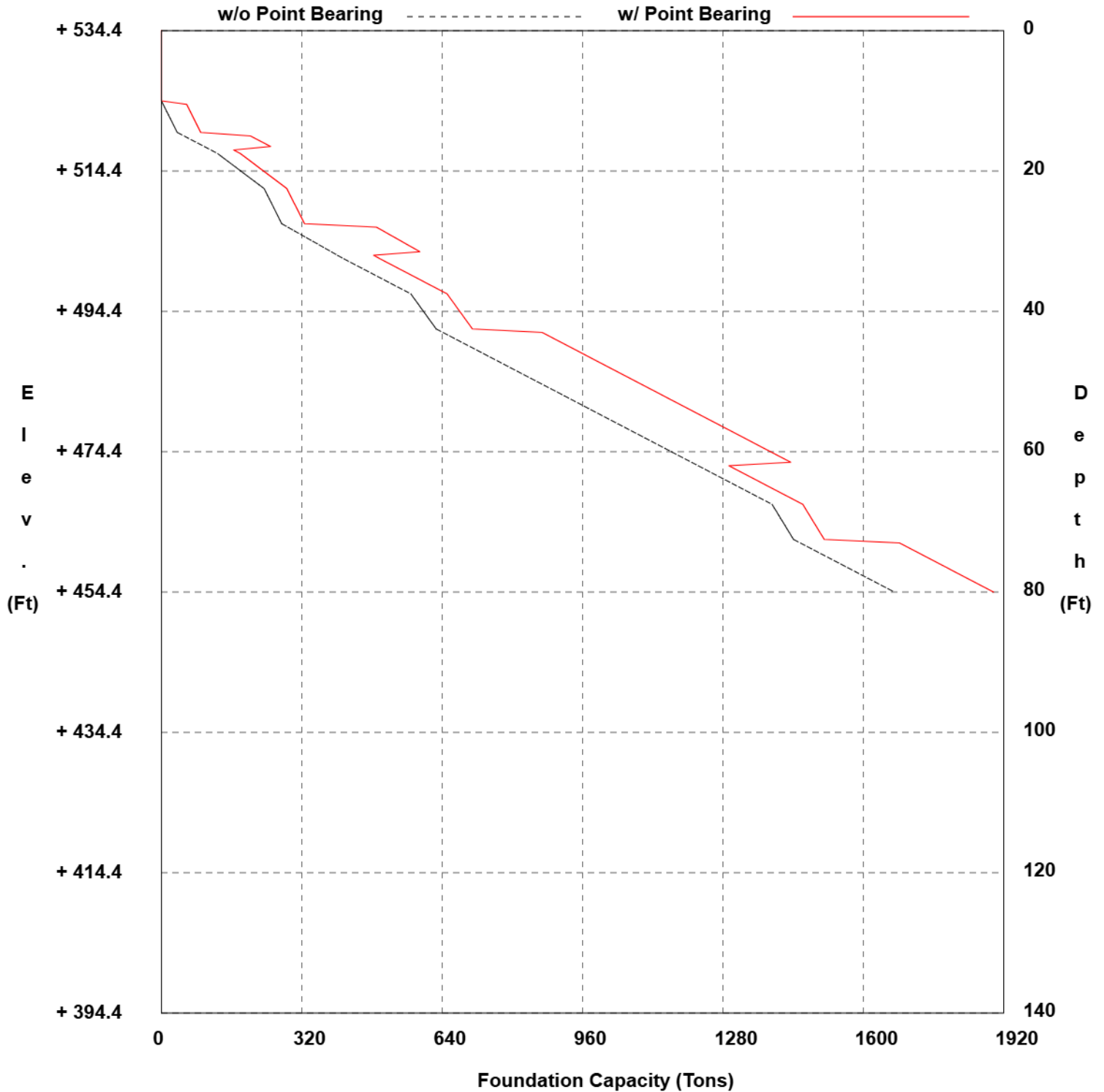
Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 519.41

+534.41 Top Hole Elevation  
+524.41 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

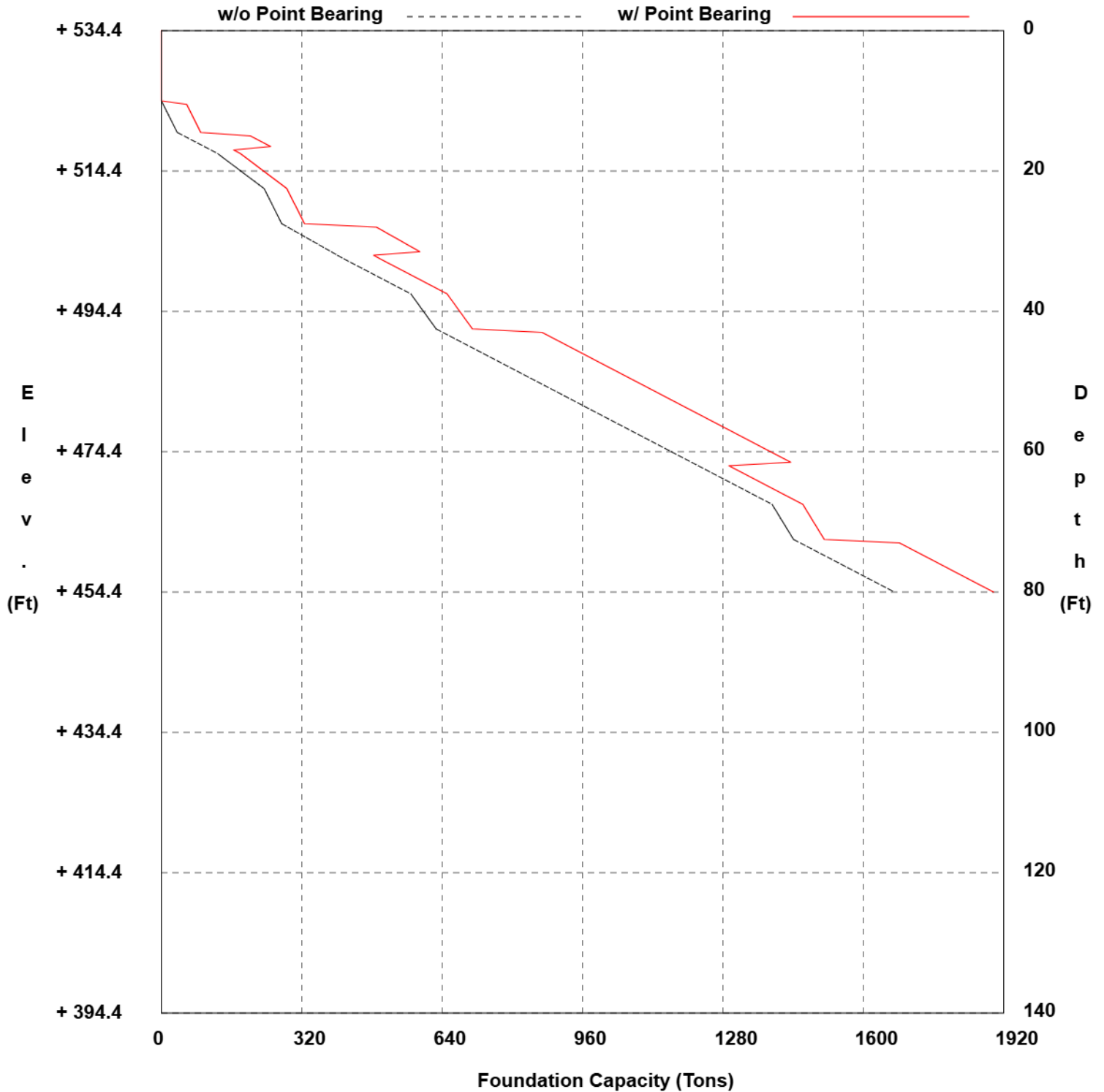
Hole BR1  
Structure Bridge  
Station 39+82.62  
Offset 11.68' LT

District Dallas  
Date 11/29/23  
Grnd. Elev. 534.41 ft  
GW Elev. 504.41 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 512.91

+534.41 Top Hole Elevation  
+524.41 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	528.0	527.7	OTHER	80	0	0.00	0.00
2	527.7	527.0	OTHER	80	0	0.00	0.00
3	527.0	523.0	SM	80	0	0.00	0.00
4	523.0	518.0	SC	70	6	0.06	0.30
5	518.0	515.0	SM	80	7	0.06	0.48
5	515.0	509.0	SM	80	10	0.09	1.01
6	509.0	505.0	OTHER	80	1600	3.25	14.01
6	505.0	500.0	OTHER	80	67	0.59	16.94
6	500.0	495.0	OTHER	80	369	2.08	27.32
6	495.0	490.0	OTHER	80	320	1.80	36.32
6	490.0	487.0	OTHER	80	282	1.59	41.08
7	487.0	480.0	OTHER	80	120	0.85	47.03
7	480.0	476.0	OTHER	80	2400	3.25	60.03
8	476.0	470.0	OTHER	80	436	2.45	74.75
8	470.0	465.0	OTHER	80	1200	3.25	91.00
8	465.0	460.0	OTHER	80	2400	3.25	107.25
8	460.0	455.0	OTHER	80	960	3.25	123.50
8	455.0	450.5	OTHER	80	1200	3.25	138.13
8	450.5	448.0	OTHER	80	1200	3.25	146.25

# POINT BEARING DESIGN

WinCore  
Version 3.3

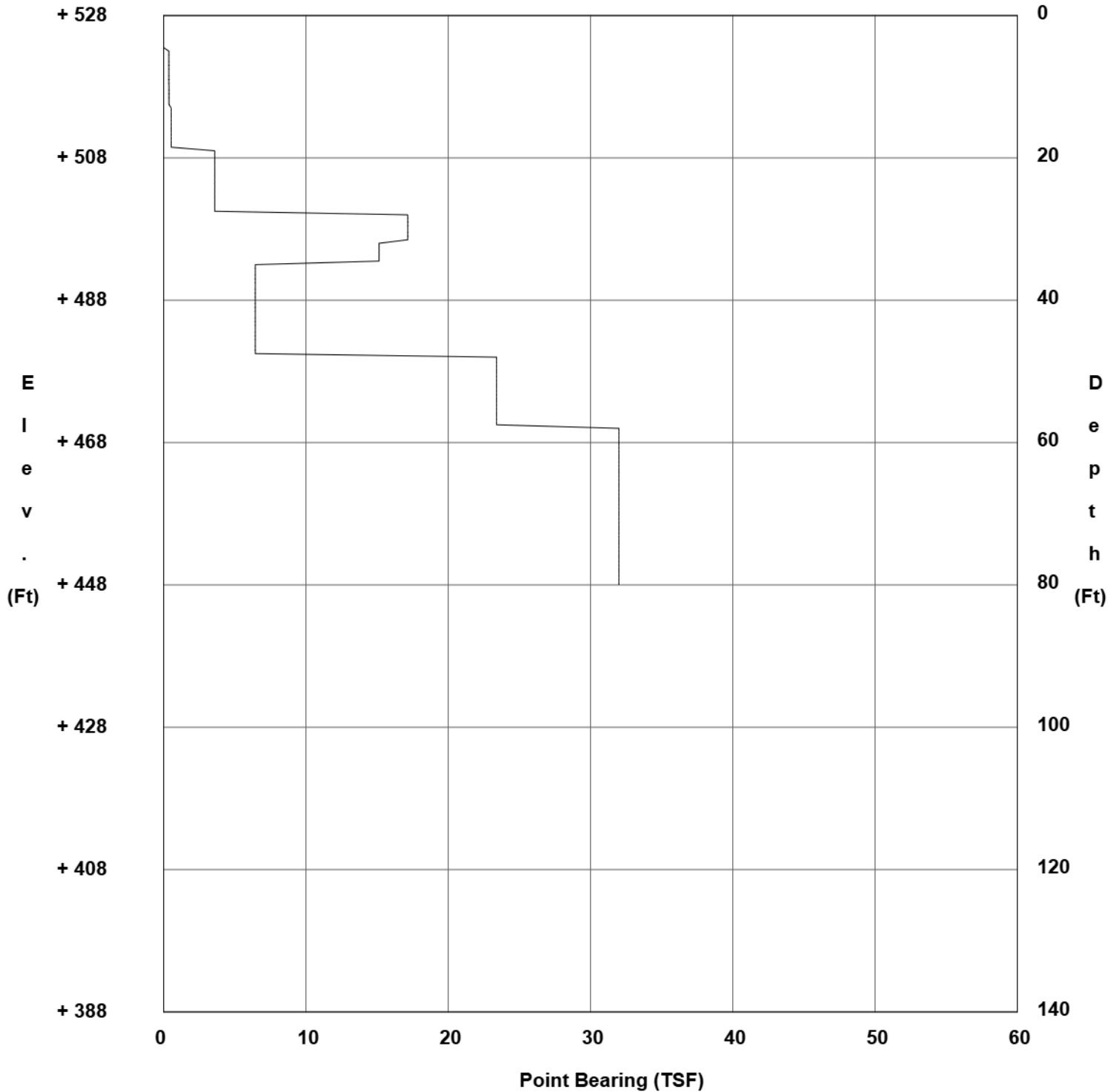
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

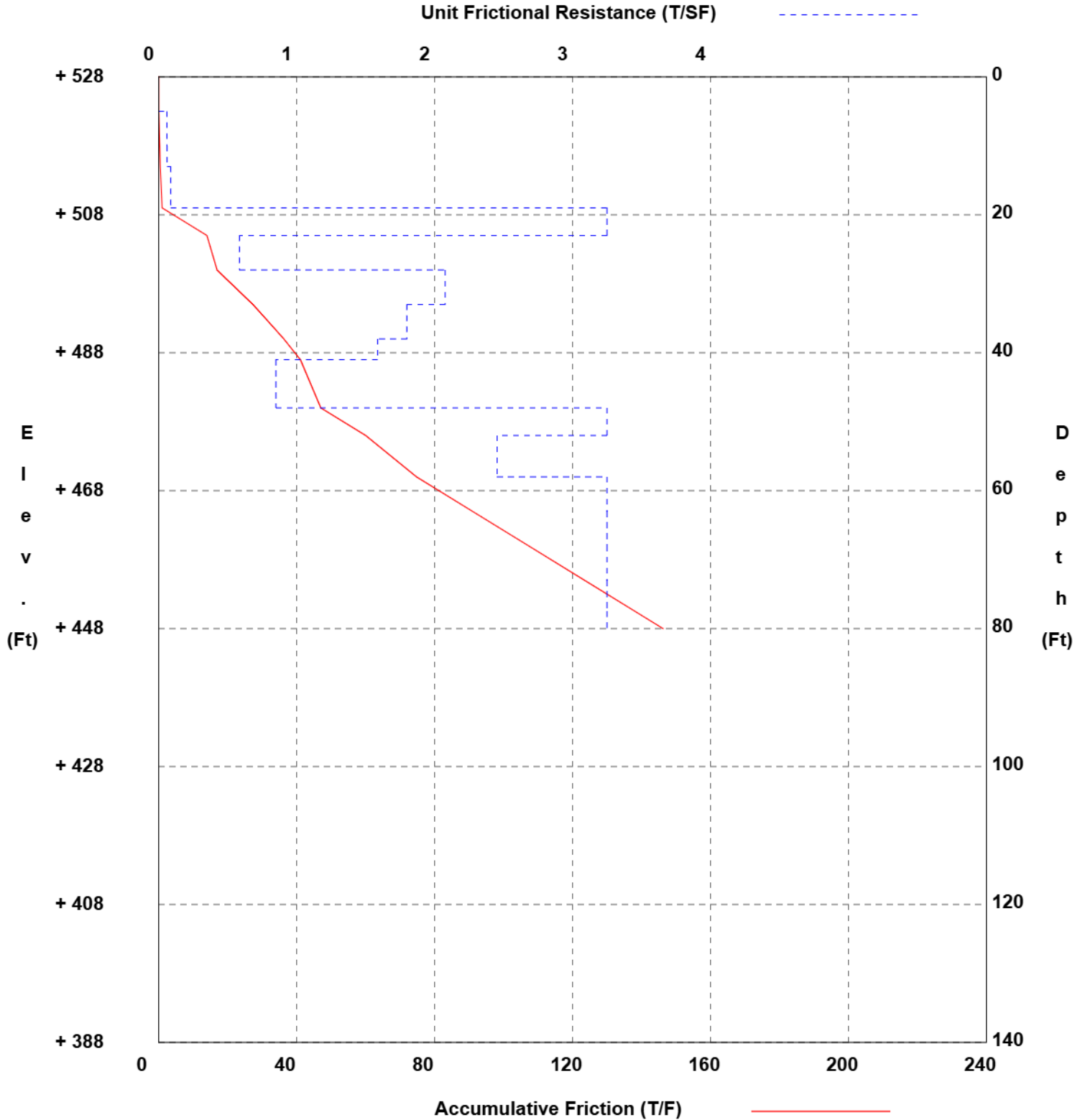
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

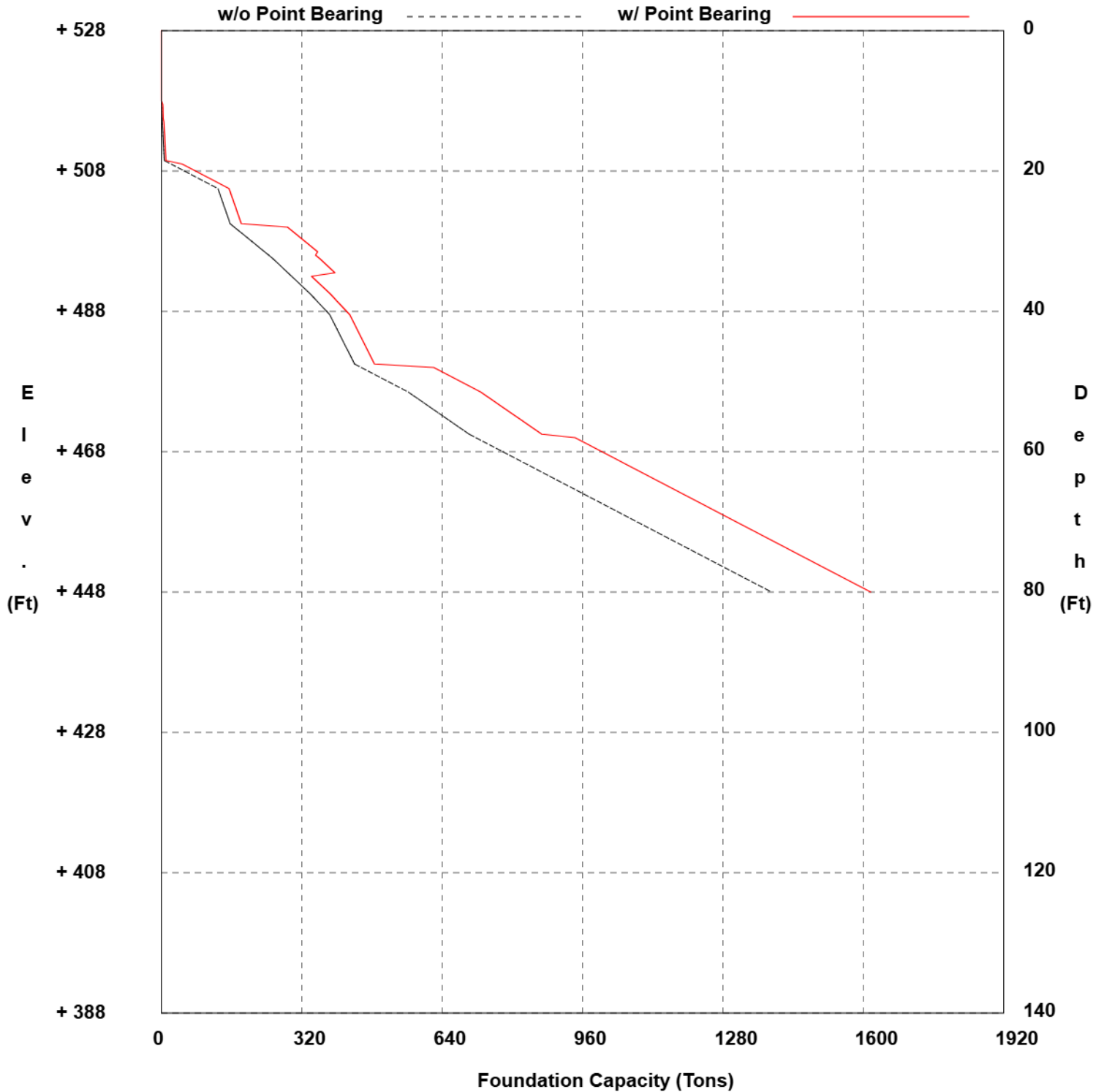
Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 506.02

+528.02 Top Hole Elevation  
+518.02 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

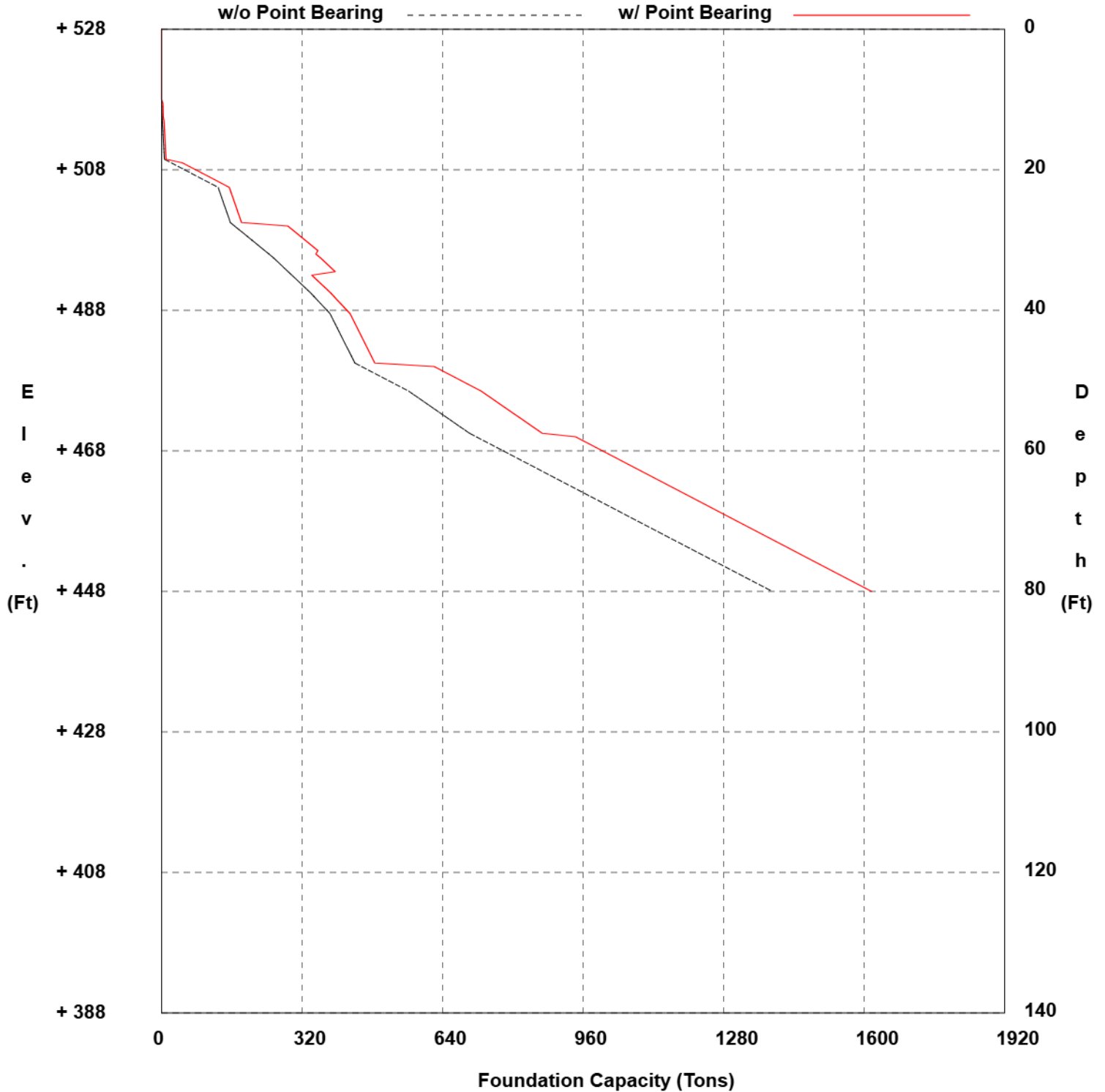
Hole BR2  
Structure Bridge  
Station 42+22.56  
Offset 0.31' LT

District Dallas  
Date 11/2/23  
Grnd. Elev. 528.02 ft  
GW Elev. 525.02 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 500.02

+528.02 Top Hole Elevation  
+518.02 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	527.3	527.1	OTHER	80	0	0.00	0.00
2	527.1	527.0	OTHER	80	0	0.00	0.00
3	527.0	521.3	CL	60	17	0.20	1.13
4	521.3	514.3	ML	80	20	0.18	2.36
4	514.3	507.3	ML	80	45	0.39	5.11
5	507.3	504.3	SM	80	30	0.26	5.90
5	504.3	498.3	SM	80	32	0.28	7.58
6	498.3	494.3	OTHER	80	45	0.39	9.15
6	494.3	488.3	OTHER	80	140	0.85	14.25
7	488.3	482.3	OTHER	80	0	0.00	14.25
8	482.3	479.3	OTHER	80	75	0.66	16.22
8	479.3	474.3	OTHER	80	109	0.85	20.47
8	474.3	467.3	OTHER	80	53	0.46	23.72
9	467.3	464.3	OTHER	80	960	3.25	33.47
9	464.3	459.3	OTHER	80	1600	3.25	49.72
9	459.3	454.3	OTHER	80	114	0.85	53.97
9	454.3	449.3	OTHER	80	267	1.50	61.47
9	449.3	447.2	OTHER	80	960	3.25	68.29

# POINT BEARING DESIGN

WinCore  
Version 3.3

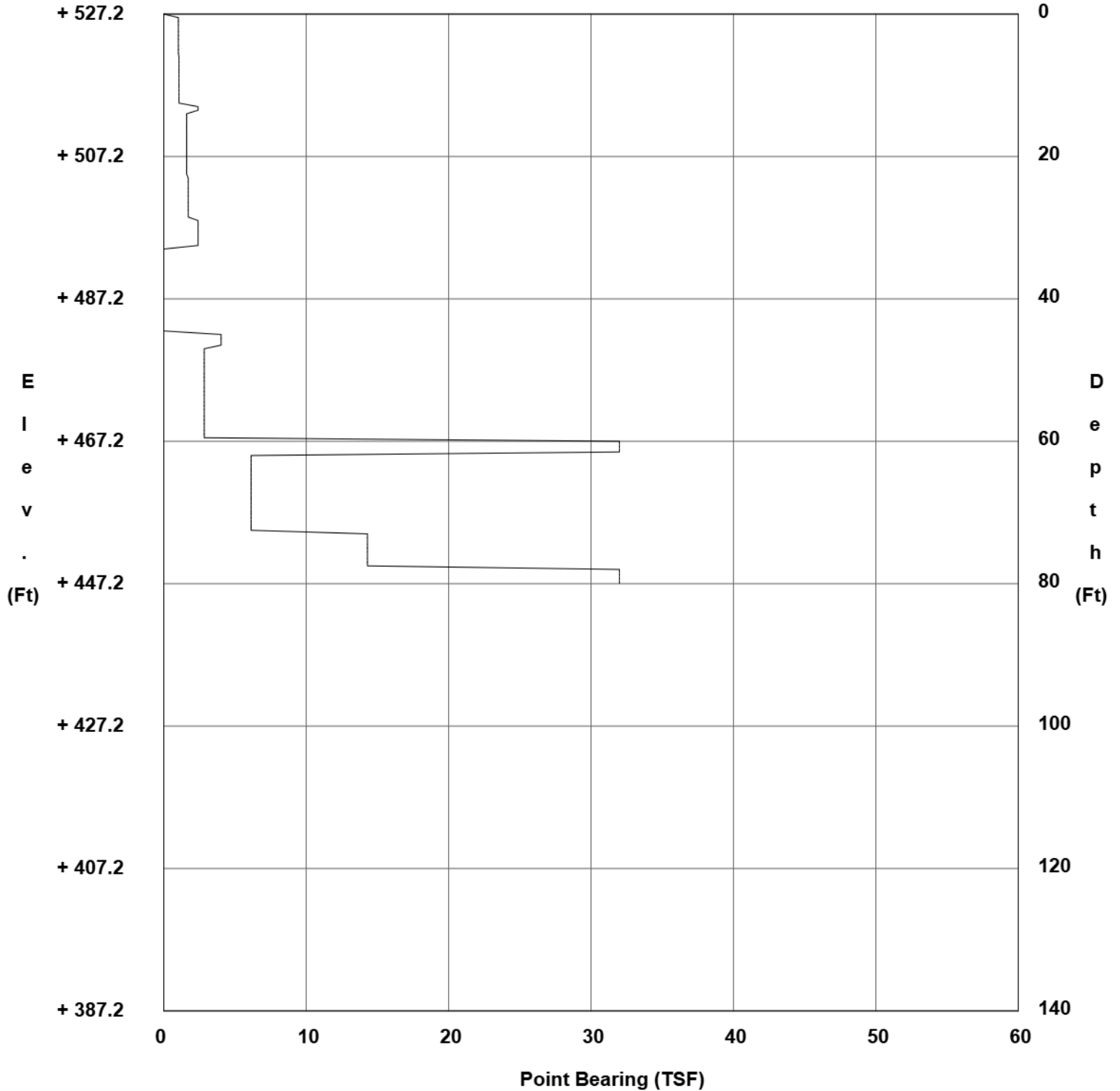
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

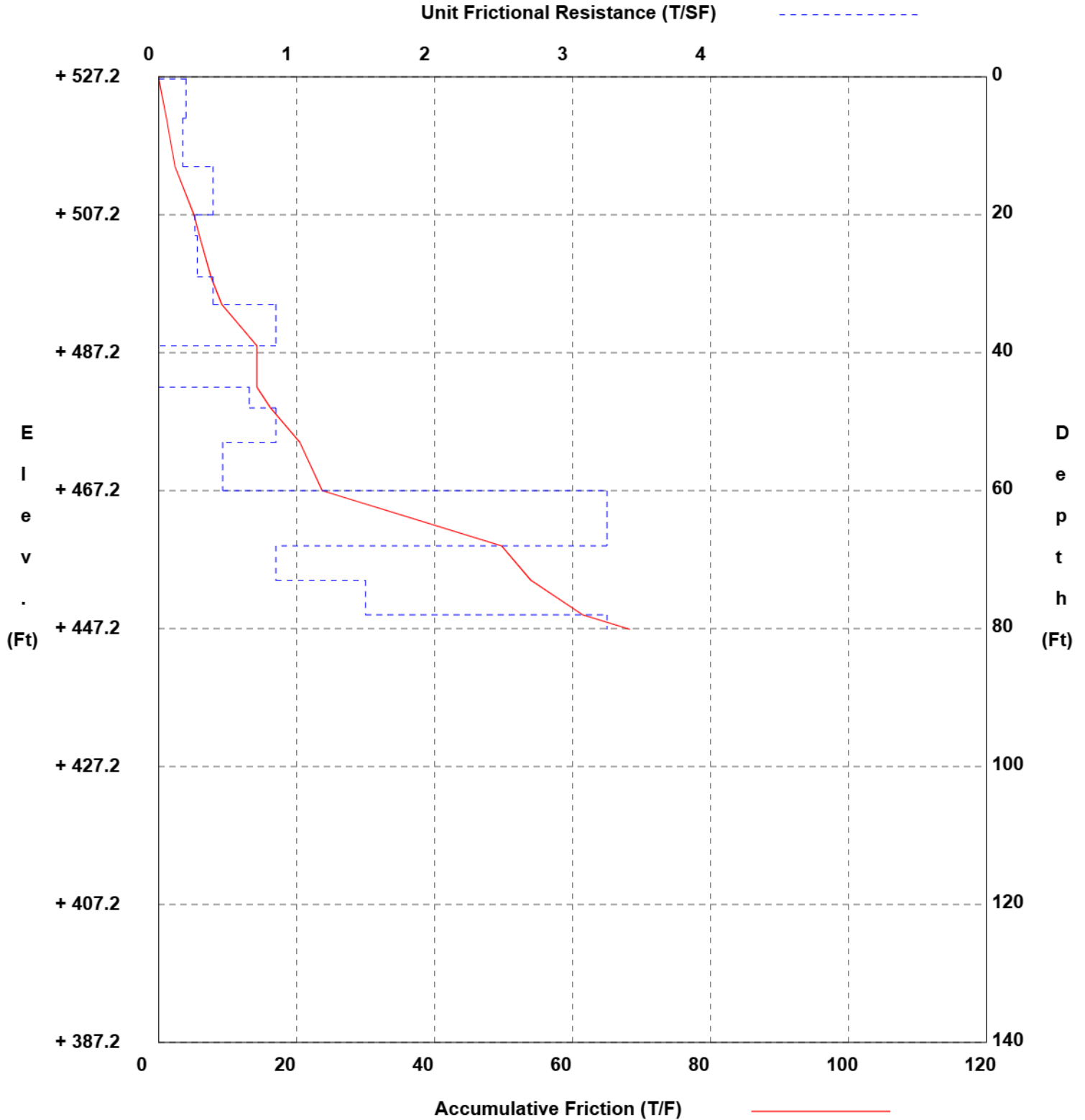
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

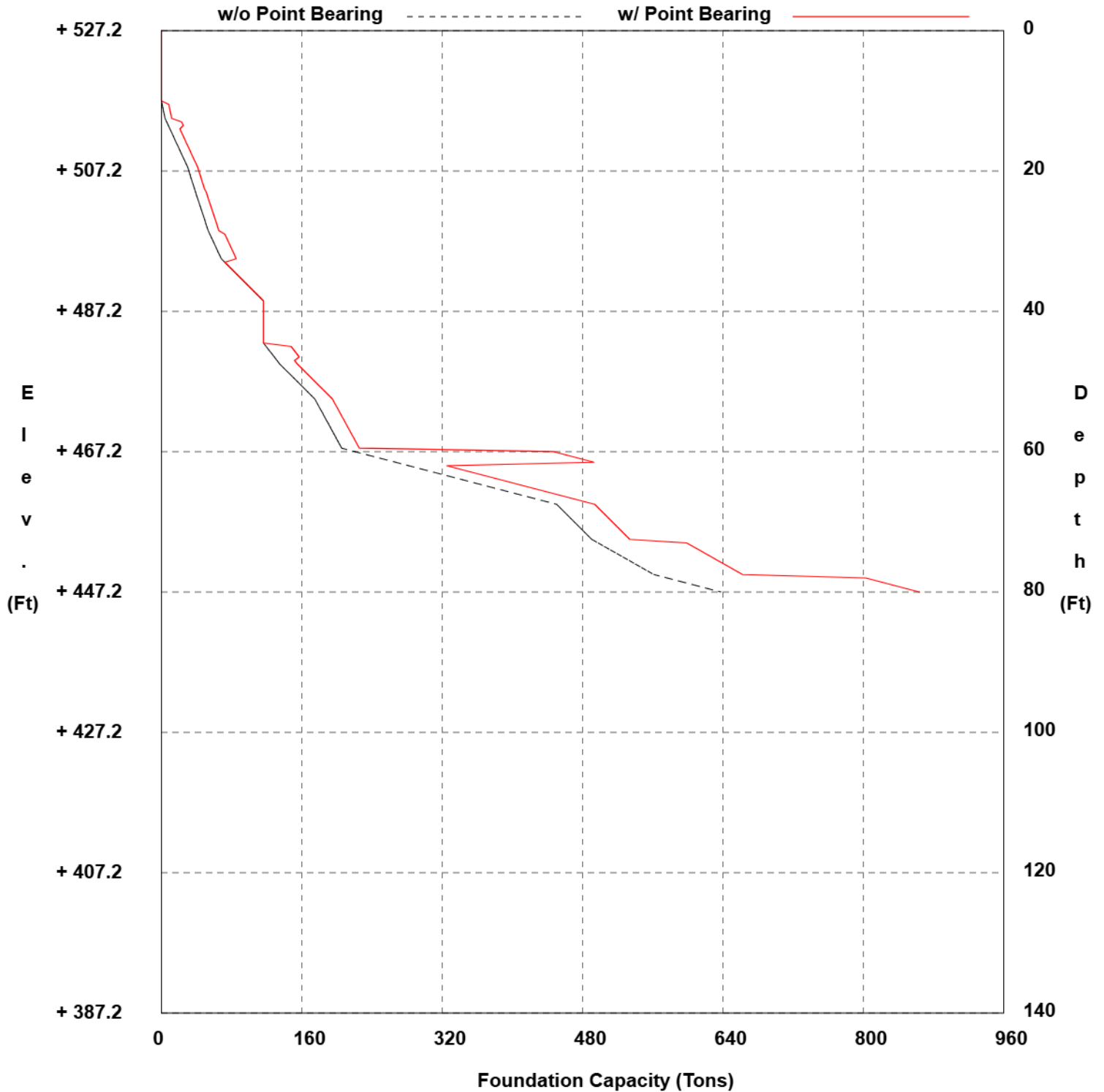
Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 482.25

+527.25 Top Hole Elevation  
+517.25 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

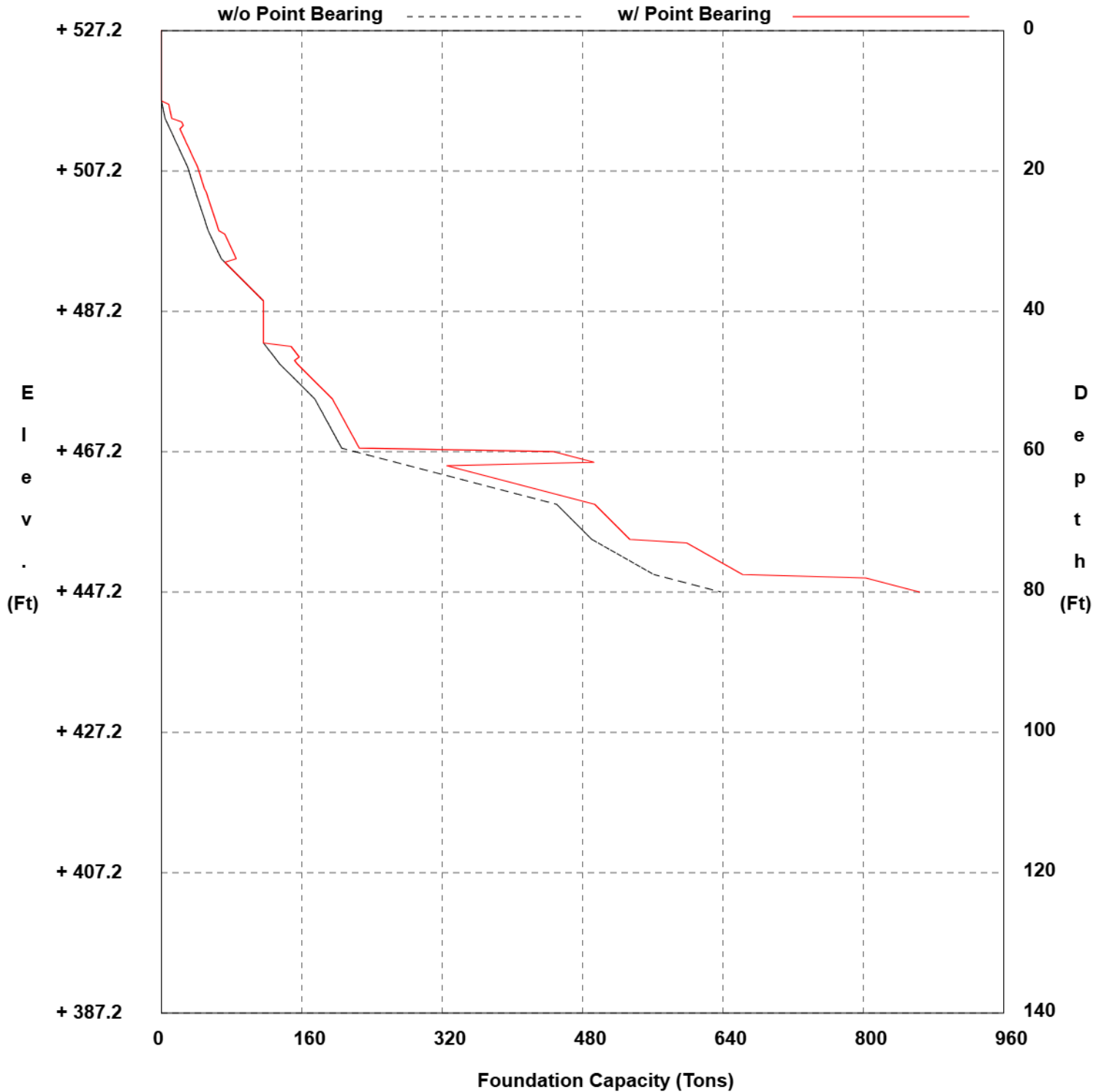
Hole BR3  
Structure Bridge  
Station 74+47.80  
Offset 3.65' RT

District Dallas  
Date 11/28/23  
Grnd. Elev. 527.25 ft  
GW Elev. 517.25 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 467.25

+527.25 Top Hole Elevation  
+517.25 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	526.8	526.6	OTHER	80	0	0.00	0.00
2	526.6	526.5	OTHER	80	0	0.00	0.00
3	526.5	518.8	CL	60	12	0.14	1.08
3	518.8	512.8	CL	60	11	0.13	1.85
4	512.8	508.8	SM	80	19	0.17	2.51
4	508.8	503.8	SM	80	13	0.11	3.08
4	503.8	498.8	SM	80	26	0.23	4.22
4	498.8	492.8	SM	80	14	0.12	4.95
5	492.8	486.8	CL	60	10	0.12	5.65
6	486.8	483.8	OTHER	80	15	0.13	6.05
6	483.8	478.8	OTHER	80	800	3.25	22.30
6	478.8	473.8	OTHER	80	2400	3.25	38.55
6	473.8	468.8	OTHER	80	229	1.29	44.97
6	468.8	463.8	OTHER	80	600	3.25	61.22
6	463.8	458.8	OTHER	80	82	0.72	64.81
6	458.8	455.8	OTHER	80	72	0.63	66.70
7	455.8	449.3	OTHER	80	1600	3.25	87.83
7	449.3	446.8	OTHER	80	2400	3.25	95.95

# POINT BEARING DESIGN

WinCore  
Version 3.3

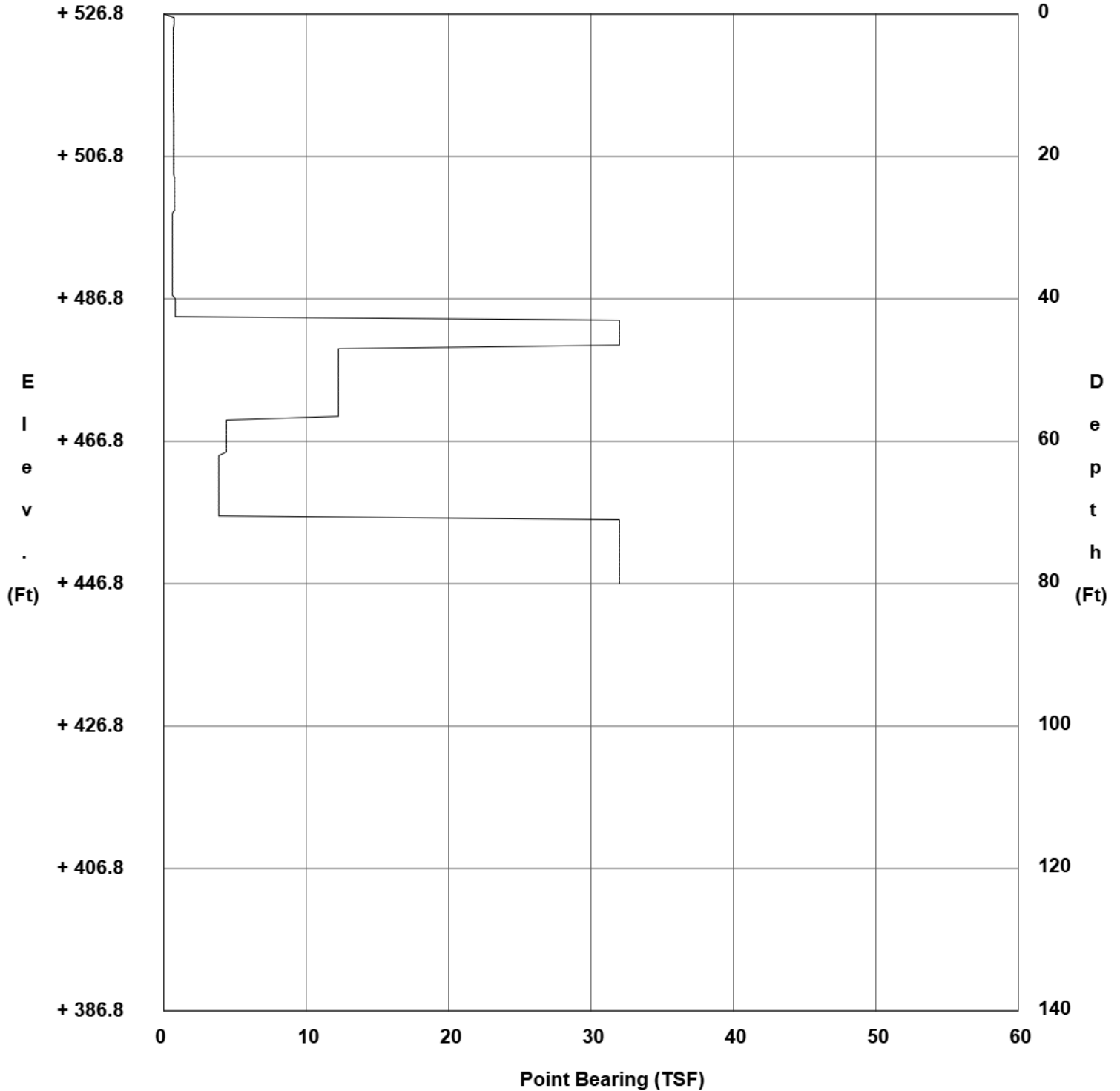
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

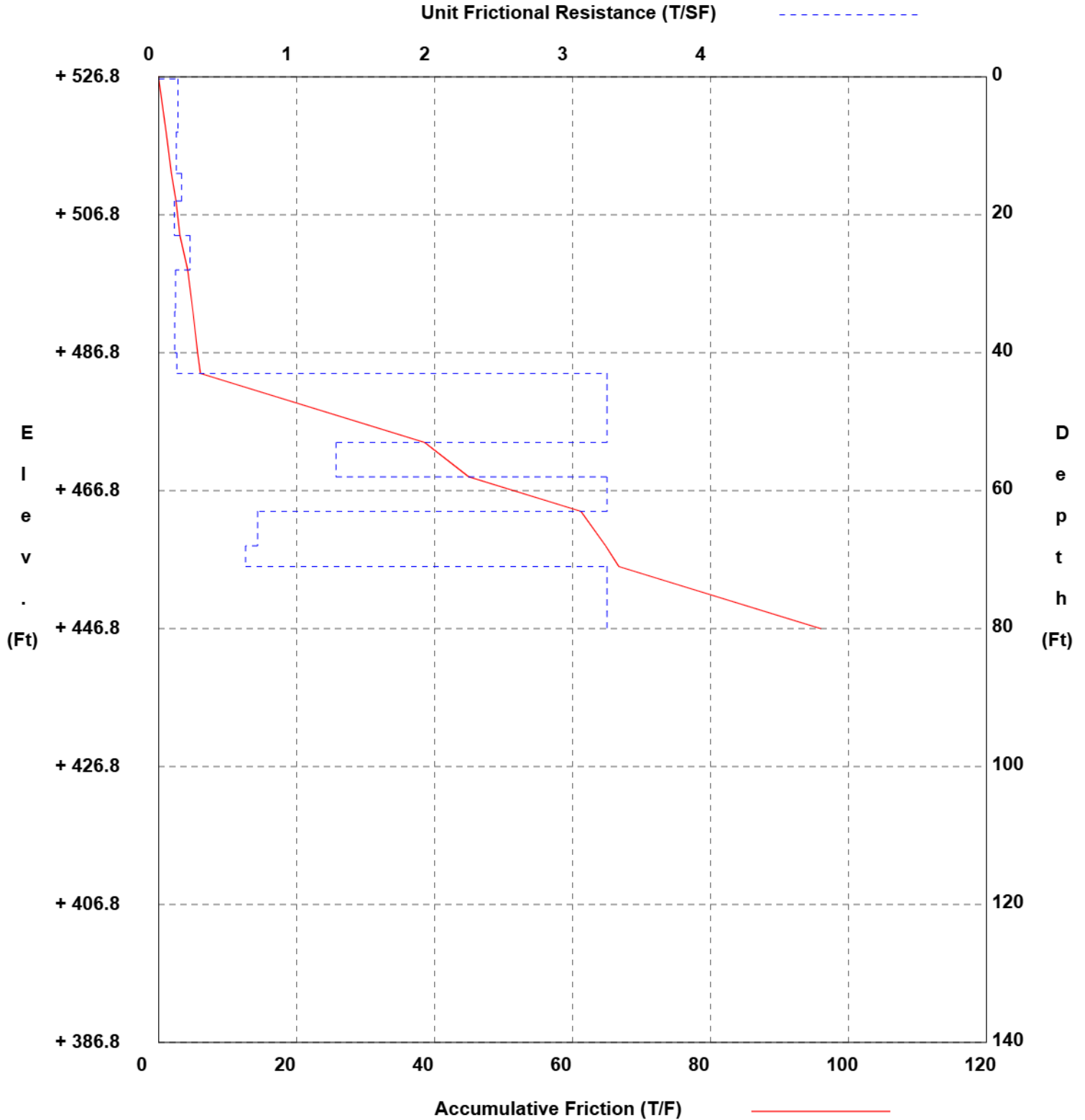
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

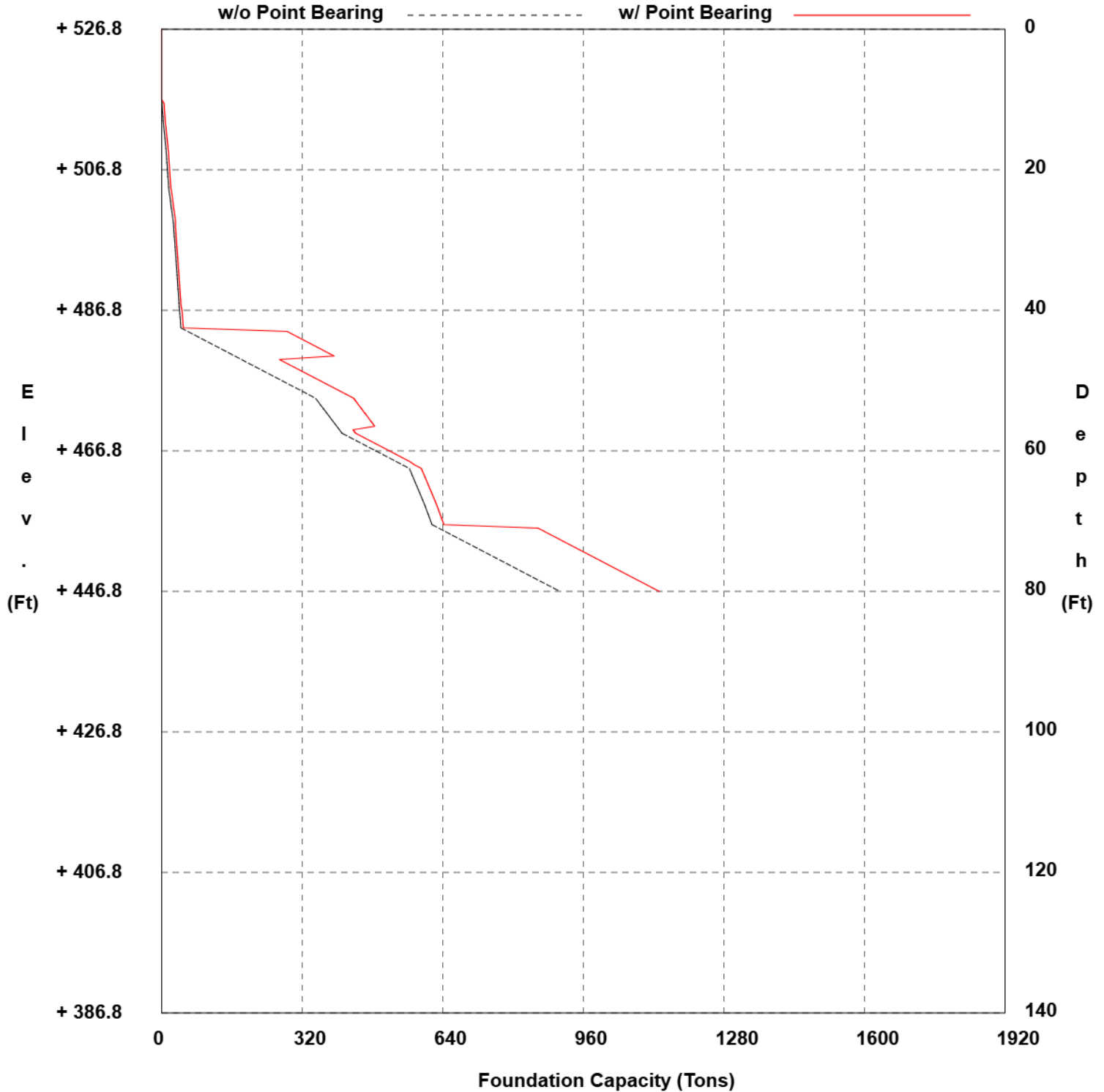
Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 483.84

+526.84 Top Hole Elevation  
+516.84 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

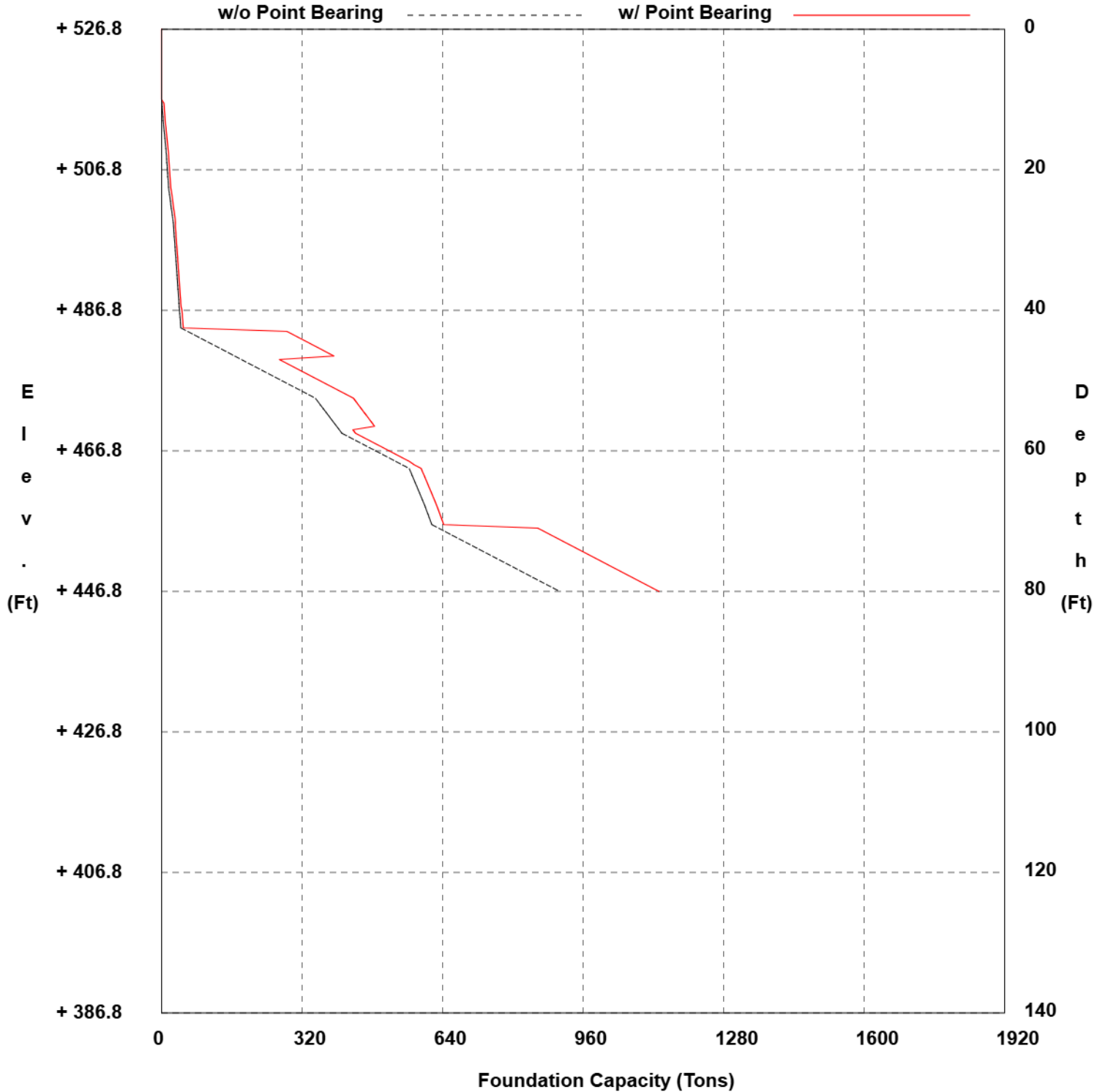
Hole BR4  
Structure Bridge  
Station 77+22.16  
Offset 0.32' RT

District Dallas  
Date 11/6/23  
Grnd. Elev. 526.84 ft  
GW Elev. 507.84 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 483.84

+526.84 Top Hole Elevation  
+516.84 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	527.5	525.5	CL	60	0	0.00	0.00
2	525.5	519.5	ML	80	18	0.16	0.95
2	519.5	514.5	ML	80	21	0.18	1.86
2	514.5	509.5	ML	80	21	0.18	2.78
2	509.5	506.5	ML	80	24	0.21	3.41
3	506.5	499.5	SP-SM	80	30	0.26	5.25
3	499.5	494.5	SP-SM	80	38	0.33	6.91
3	494.5	489.5	SP-SM	80	27	0.24	8.09
3	489.5	484.5	SP-SM	80	30	0.26	9.41
3	484.5	479.5	SP-SM	80	23	0.20	10.41
3	479.5	472.5	SP-SM	80	65	0.57	14.39
4	472.5	469.5	OTHER	80	300	1.69	19.45
4	469.5	464.5	OTHER	80	91	0.80	23.44
4	464.5	459.5	OTHER	80	74	0.65	26.67
4	459.5	454.5	OTHER	80	200	1.12	32.30
4	454.5	450.0	OTHER	80	600	3.25	46.92
4	450.0	447.5	OTHER	80	369	2.08	52.11

# POINT BEARING DESIGN

WinCore  
Version 3.3

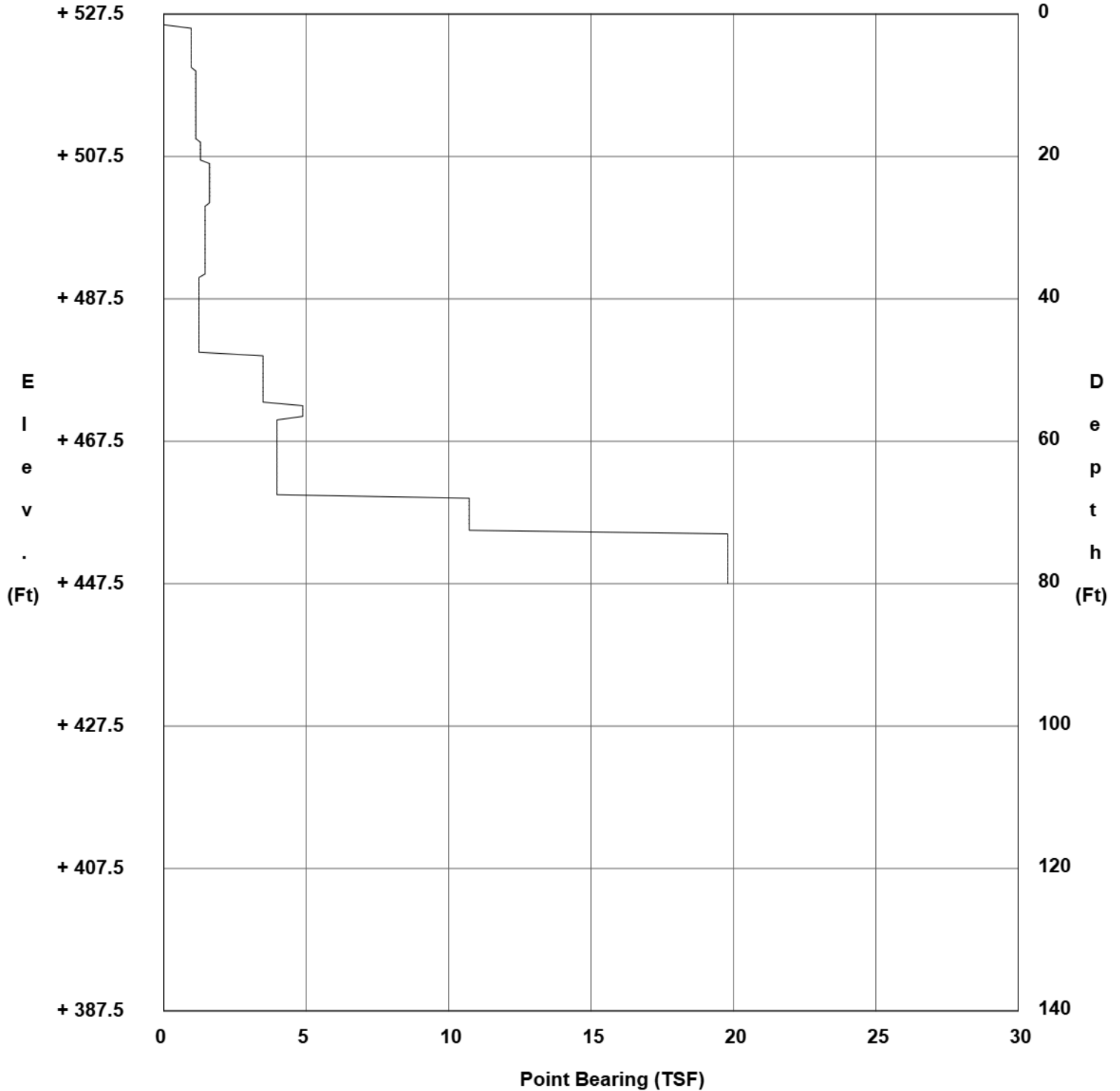
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

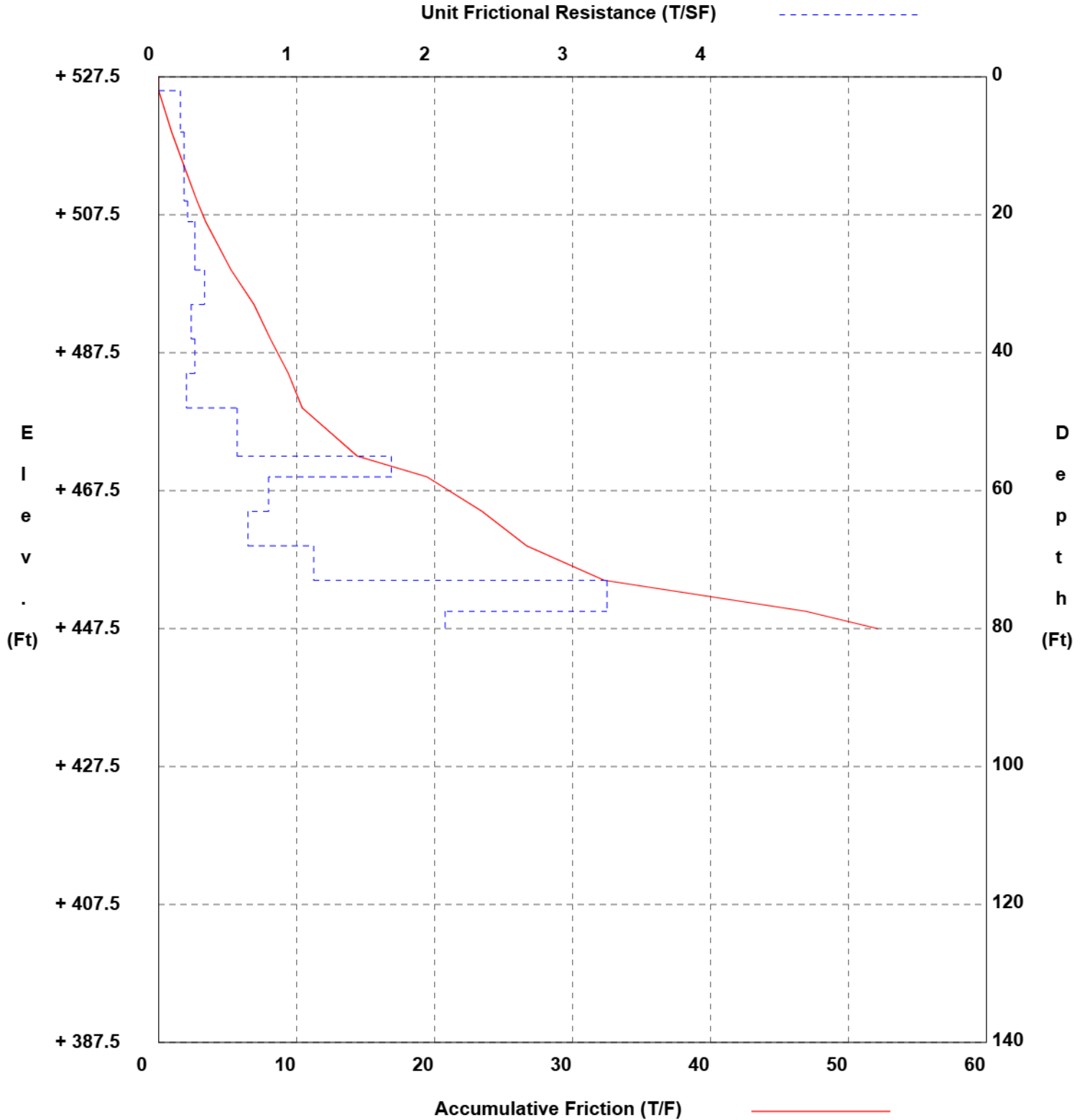
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

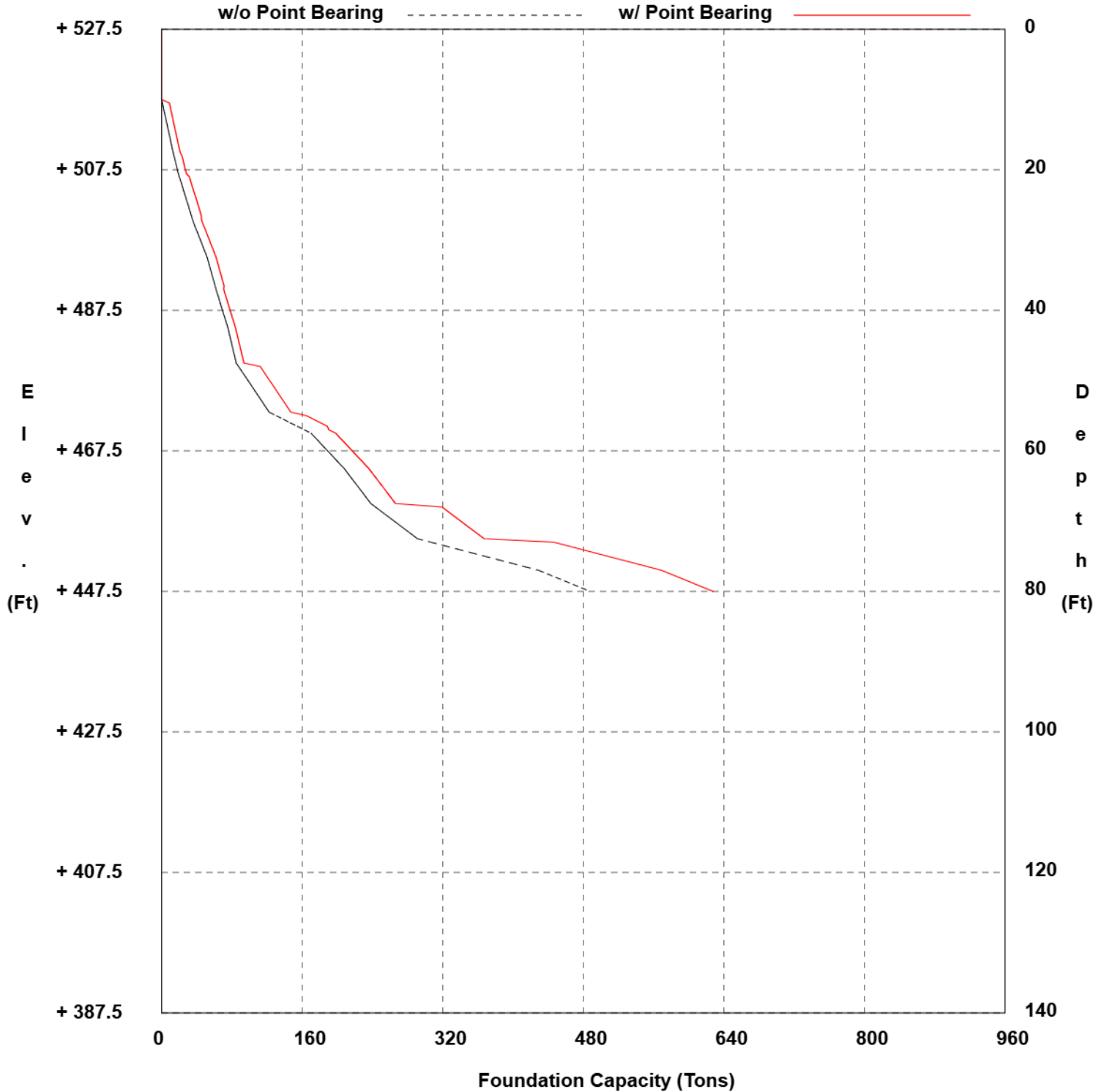
Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 476.04

+527.54 Top Hole Elevation  
+517.54 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

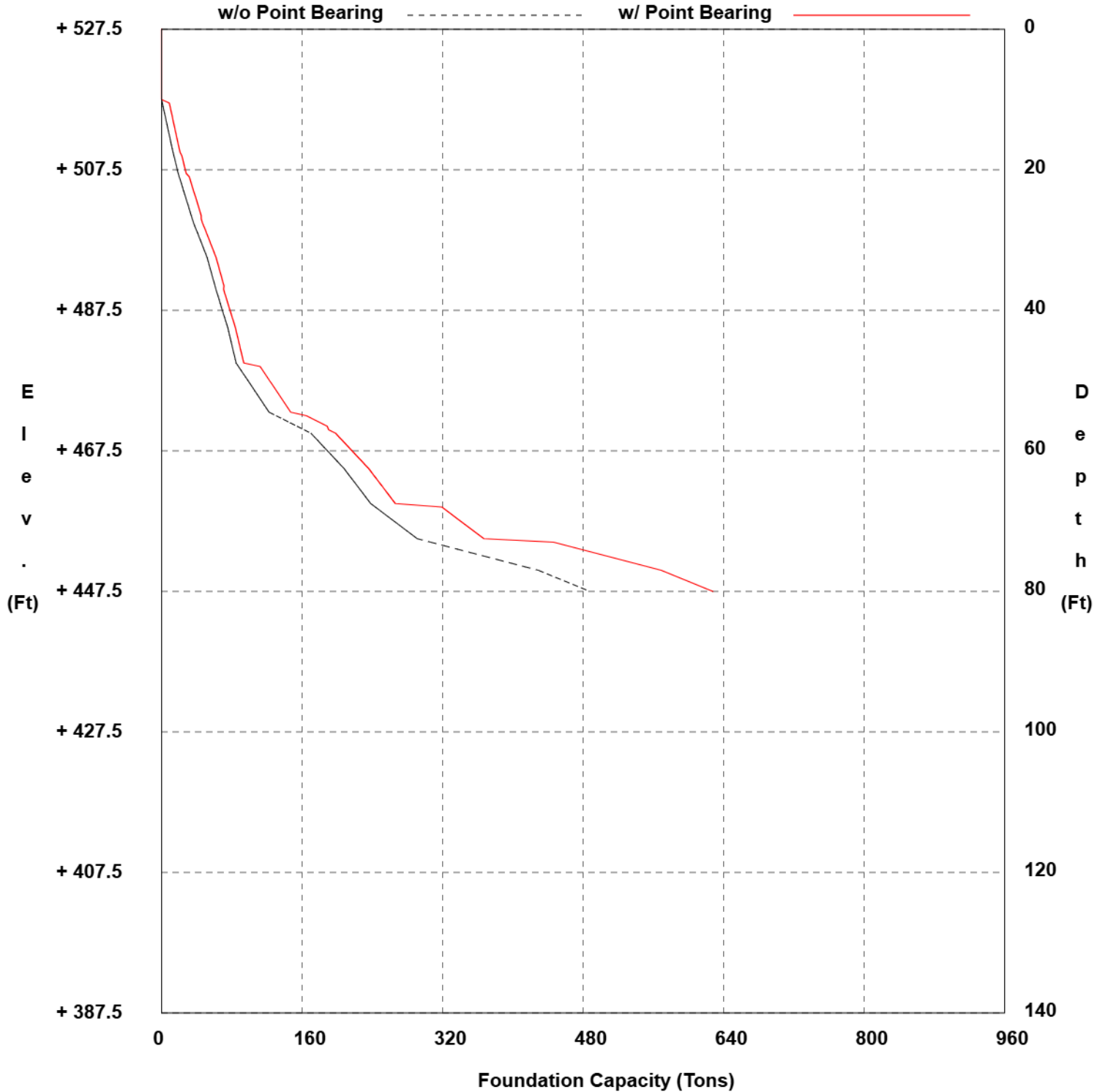
Hole BR5  
Structure Bridge  
Station 79+25.55  
Offset 3.38' RT

District Dallas  
Date 11/27/23  
Grnd. Elev. 527.54 ft  
GW Elev. 517.54 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 461.04

+527.54 Top Hole Elevation  
+517.54 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	528.4	528.1	OTHER	80	0	0.00	0.00
2	528.1	527.9	OTHER	80	0	0.00	0.00
3	527.9	524.4	CL	60	0	0.00	0.00
4	524.4	520.4	SC	70	10	0.10	0.40
4	520.4	515.4	SC	70	31	0.31	1.95
5	515.4	510.4	SP	80	185	1.04	7.14
5	510.4	505.4	SP	80	45	0.39	9.11
5	505.4	500.4	SP	80	49	0.43	11.25
5	500.4	495.4	SP	80	50	0.44	13.44
5	495.4	490.4	SP	80	11	0.10	13.92
5	490.4	483.4	SP	80	30	0.26	15.76
6	483.4	480.4	OTHER	80	160	0.90	18.46
6	480.4	475.4	OTHER	80	192	1.08	23.86
6	475.4	470.4	OTHER	80	155	0.87	28.21
6	470.4	467.4	OTHER	80	533	3.00	37.21
7	467.4	460.4	OTHER	80	400	2.25	52.95
7	460.4	455.4	OTHER	80	1600	3.25	69.20
7	455.4	450.9	OTHER	80	2400	3.25	83.83
7	450.9	448.4	OTHER	80	2400	3.25	91.95

# POINT BEARING DESIGN

WinCore  
Version 3.3

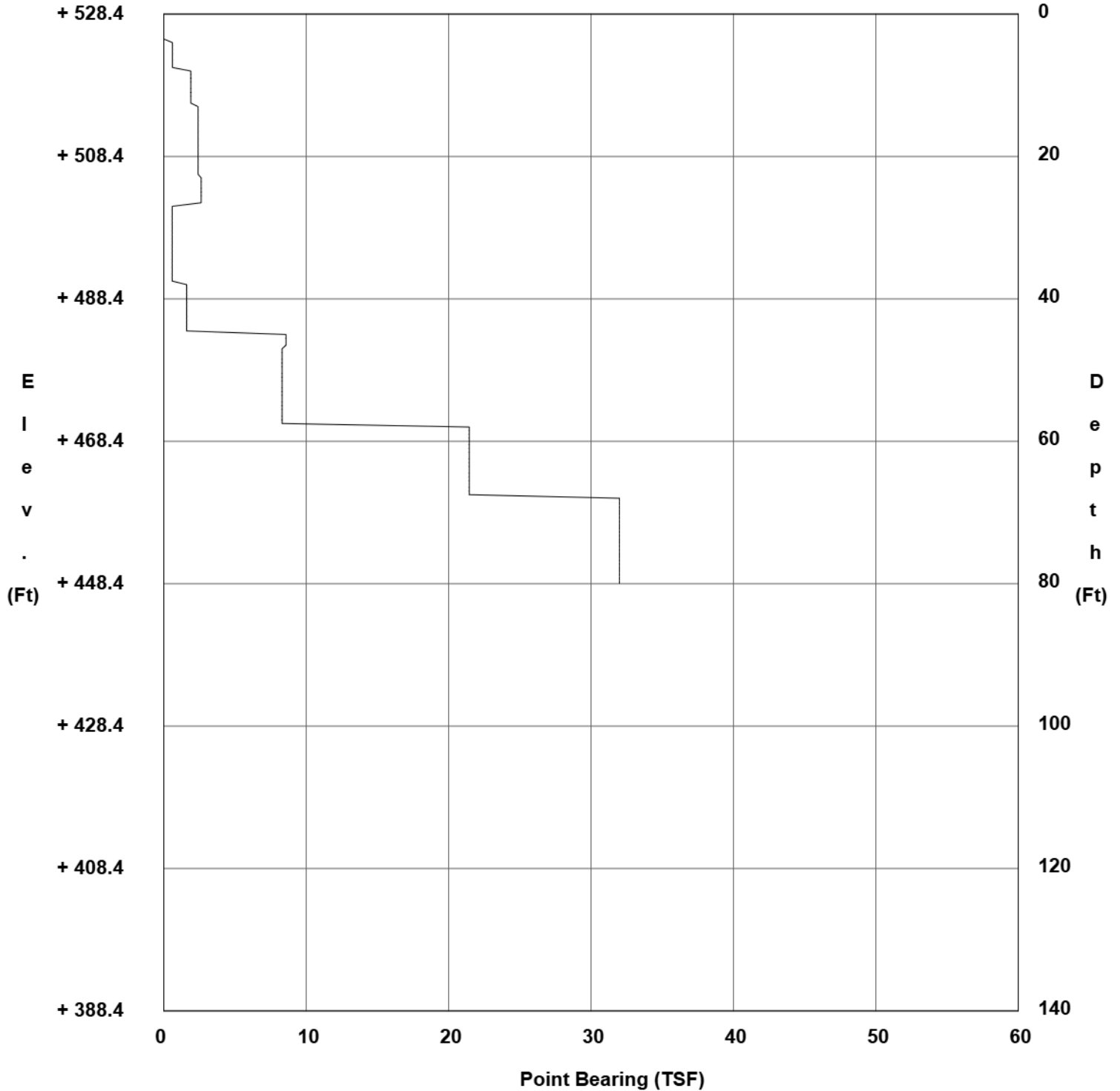
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

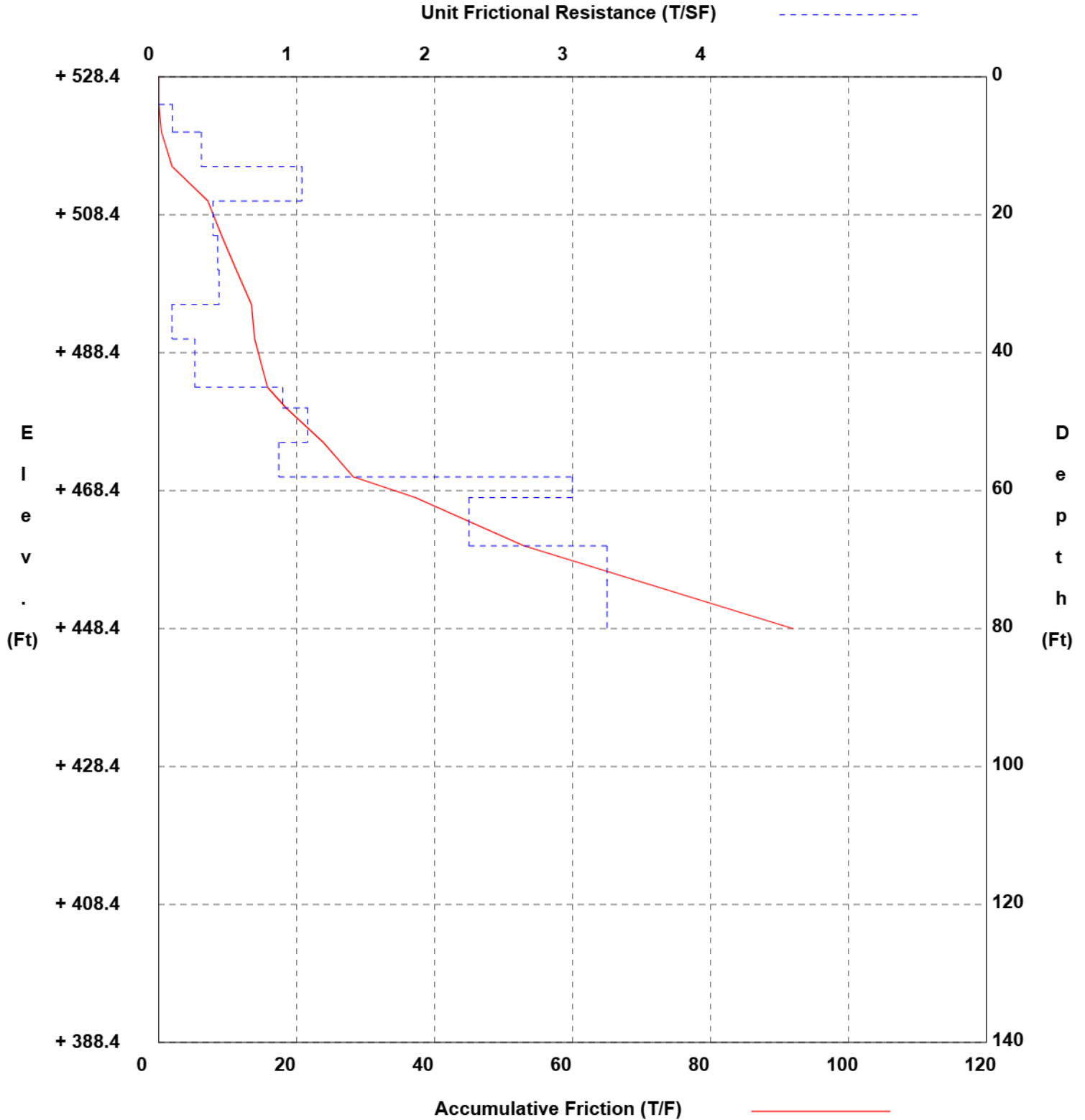
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

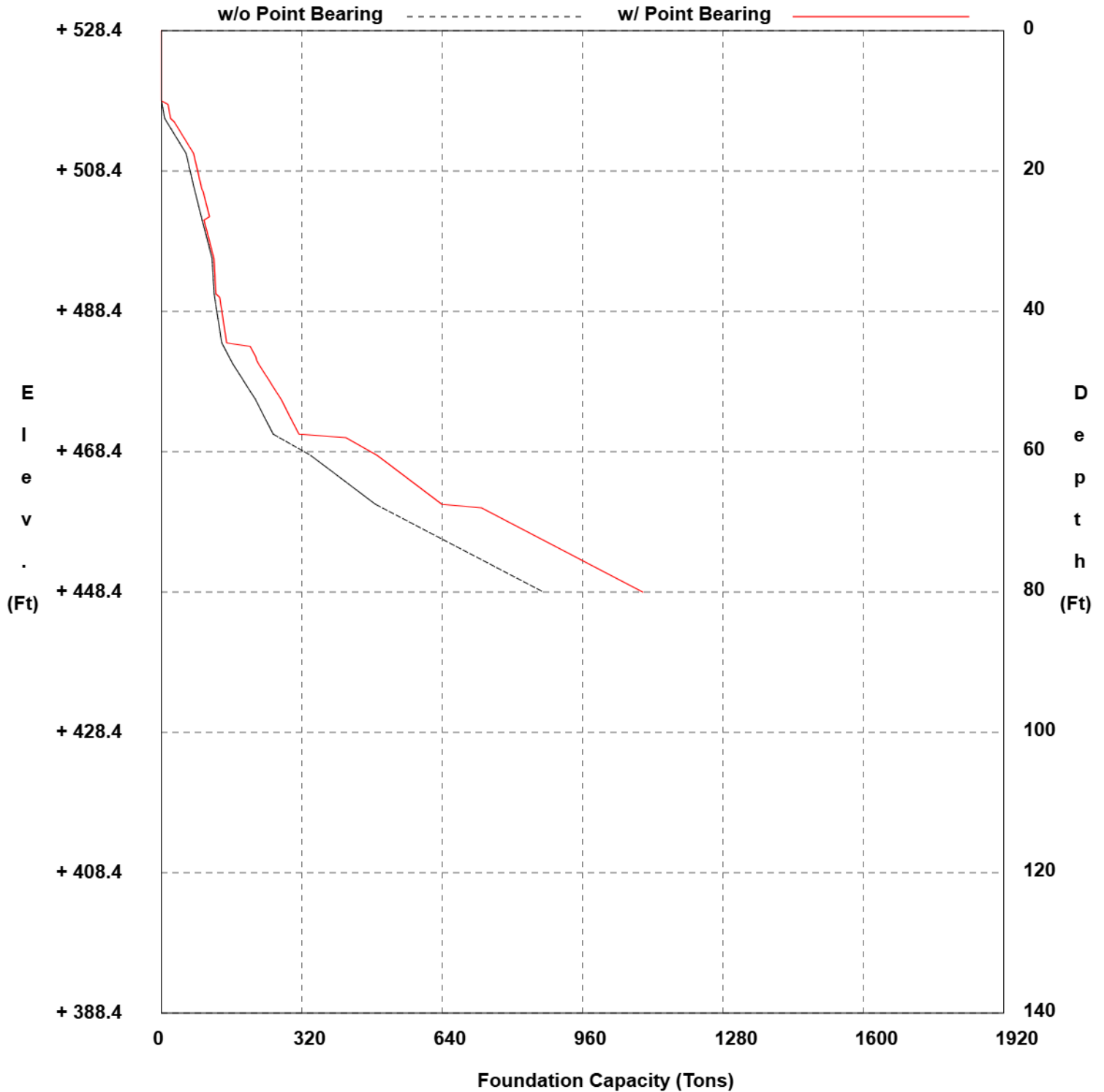
Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 490.42

+528.42 Top Hole Elevation  
+518.42 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

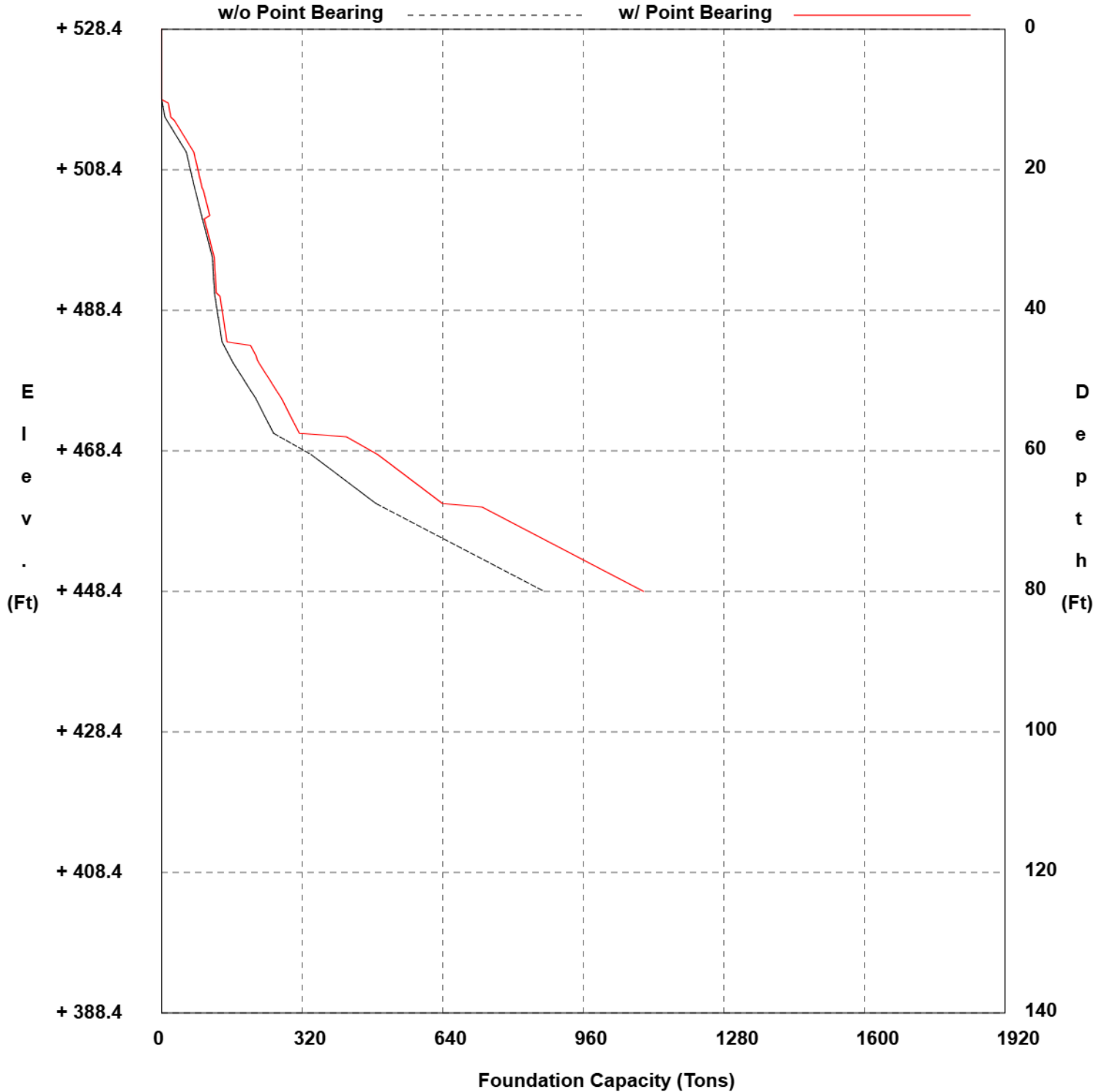
Hole BR6  
Structure Bridge  
Station 91+39.10  
Offset 2.59' RT

District Dallas  
Date 11/7/23  
Grnd. Elev. 528.42 ft  
GW Elev. 509.42 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 476.92

+528.42 Top Hole Elevation  
+518.42 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County	Denton	Hole	BR7	District	Dallas
Highway	Shady Shores Road	Structure	Bridge	Date	11/16/23
Control	0918-46-316	Station	94+21.77	Grnd. Elev.	527.90 ft
		Offset	5.49' LT	GW Elev.	514.90 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	527.9	527.6	OTHER	80	0	0.00	0.00
2	527.6	526.9	OTHER	80	0	0.00	0.00
3	526.9	519.9	ML	80	20	0.18	1.23
4	519.9	514.9	SM	80	37	0.32	2.84
4	514.9	509.9	SM	80	23	0.20	3.85
4	509.9	504.9	SM	80	18	0.16	4.64
4	504.9	499.9	SM	80	58	0.51	7.18
4	499.9	494.9	SM	80	31	0.27	8.53
4	494.9	489.9	SM	80	48	0.42	10.63
4	489.9	484.9	SM	80	52	0.46	12.91
4	484.9	478.9	SM	80	34	0.30	14.69
5	478.9	472.9	SP	80	7	0.06	15.06
6	472.9	469.9	OTHER	80	960	3.25	24.81
6	469.9	462.9	OTHER	80	1200	3.25	47.56
7	462.9	459.9	OTHER	80	533	3.00	56.56
7	459.9	455.4	OTHER	80	2400	3.25	71.18
7	455.4	452.9	OTHER	80	2400	3.25	79.31

# POINT BEARING DESIGN

WinCore  
Version 3.3

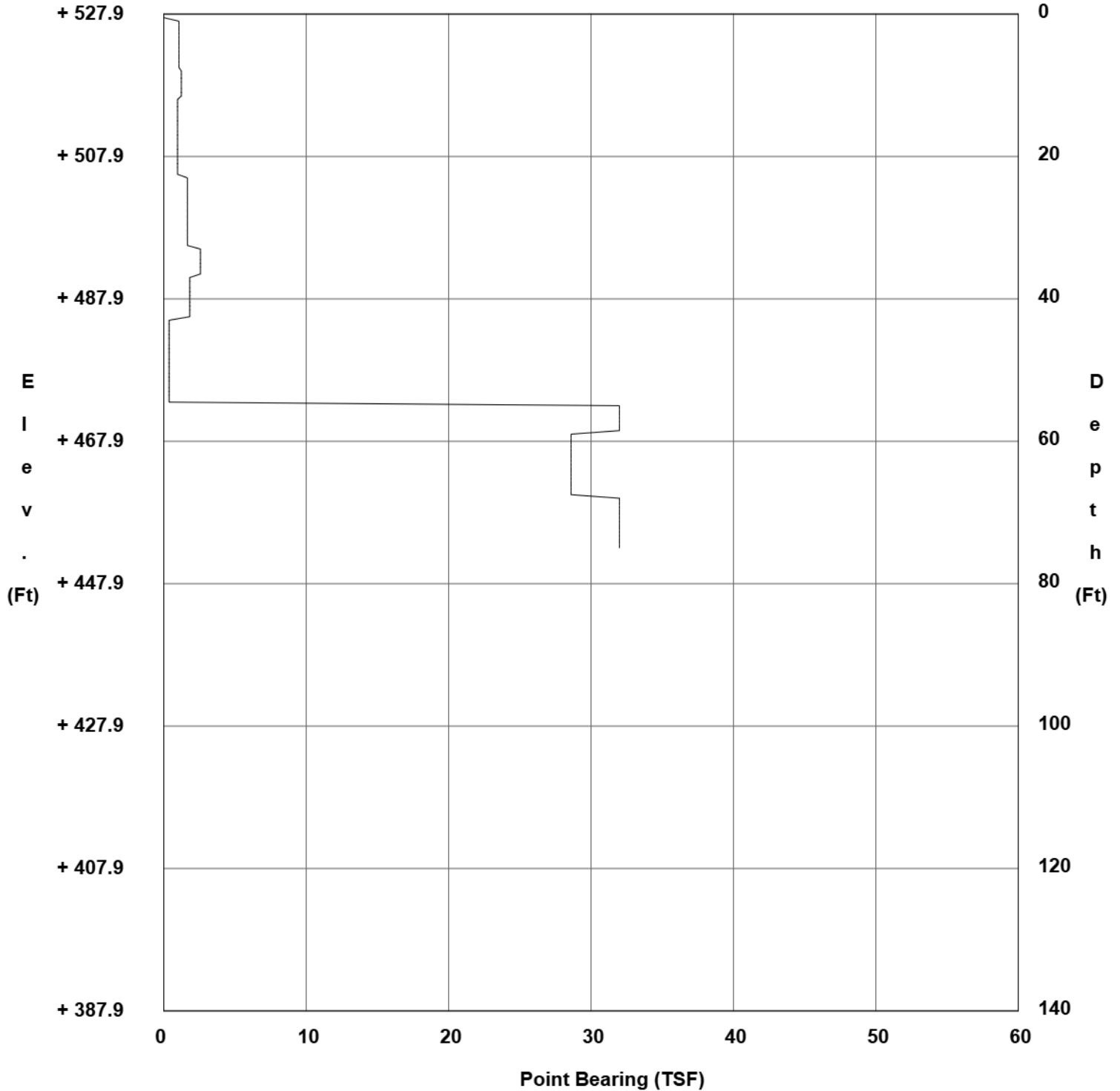
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

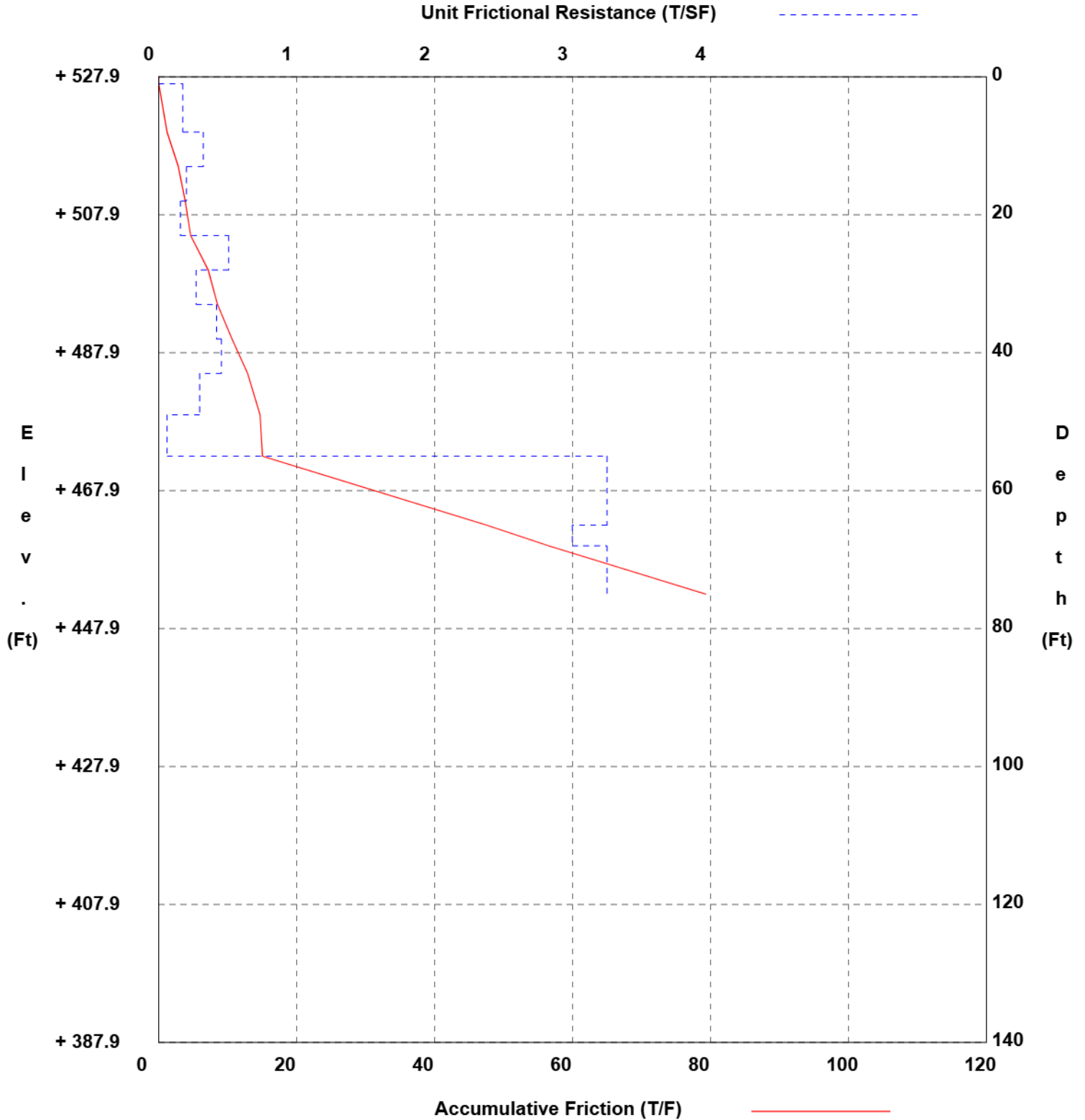
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

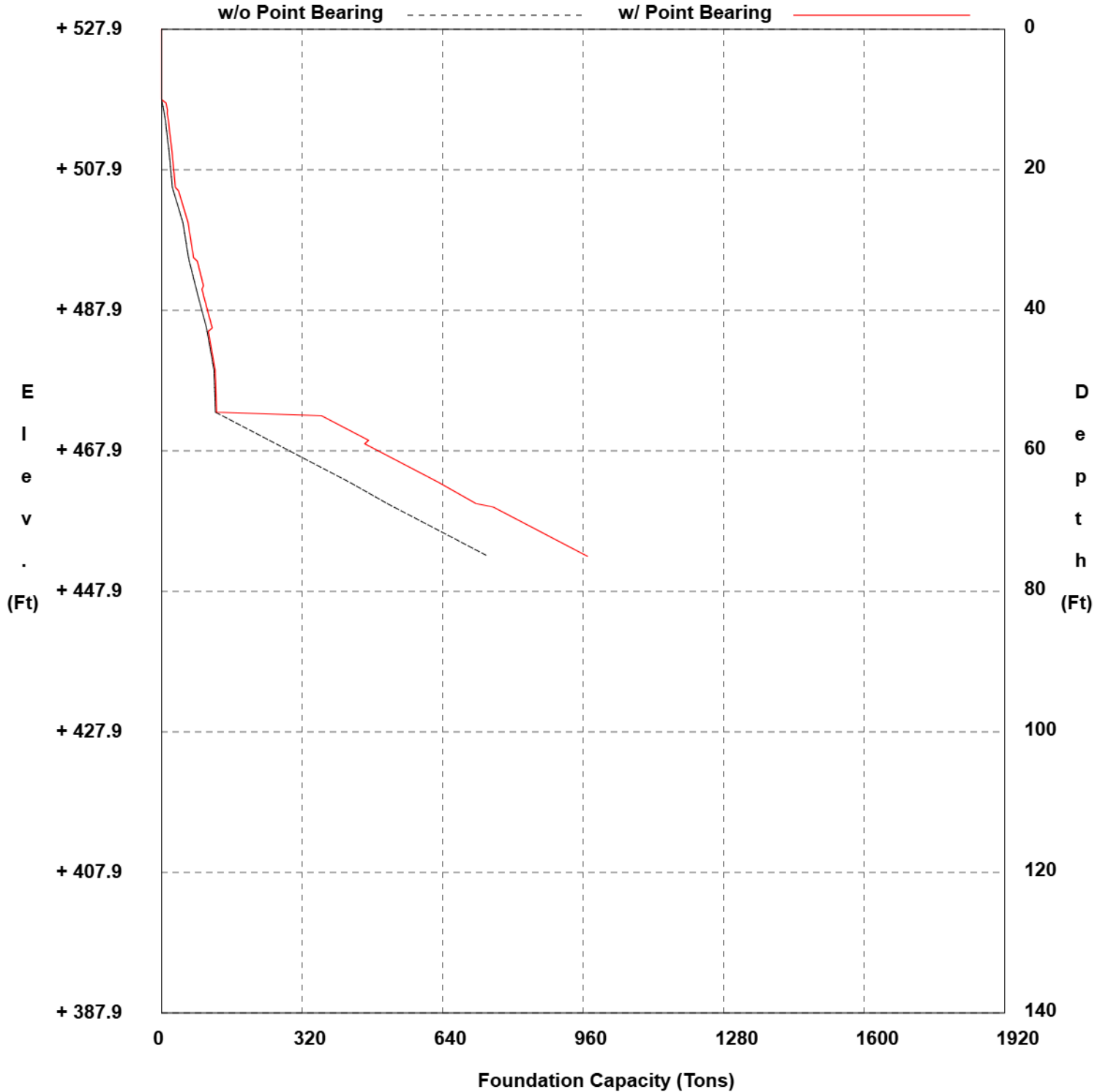
Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

36 inch Drilled Shaft  
140 ton Design Load  
Tip Elevation = + 472.9

+527.9 Top Hole Elevation  
+517.9 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

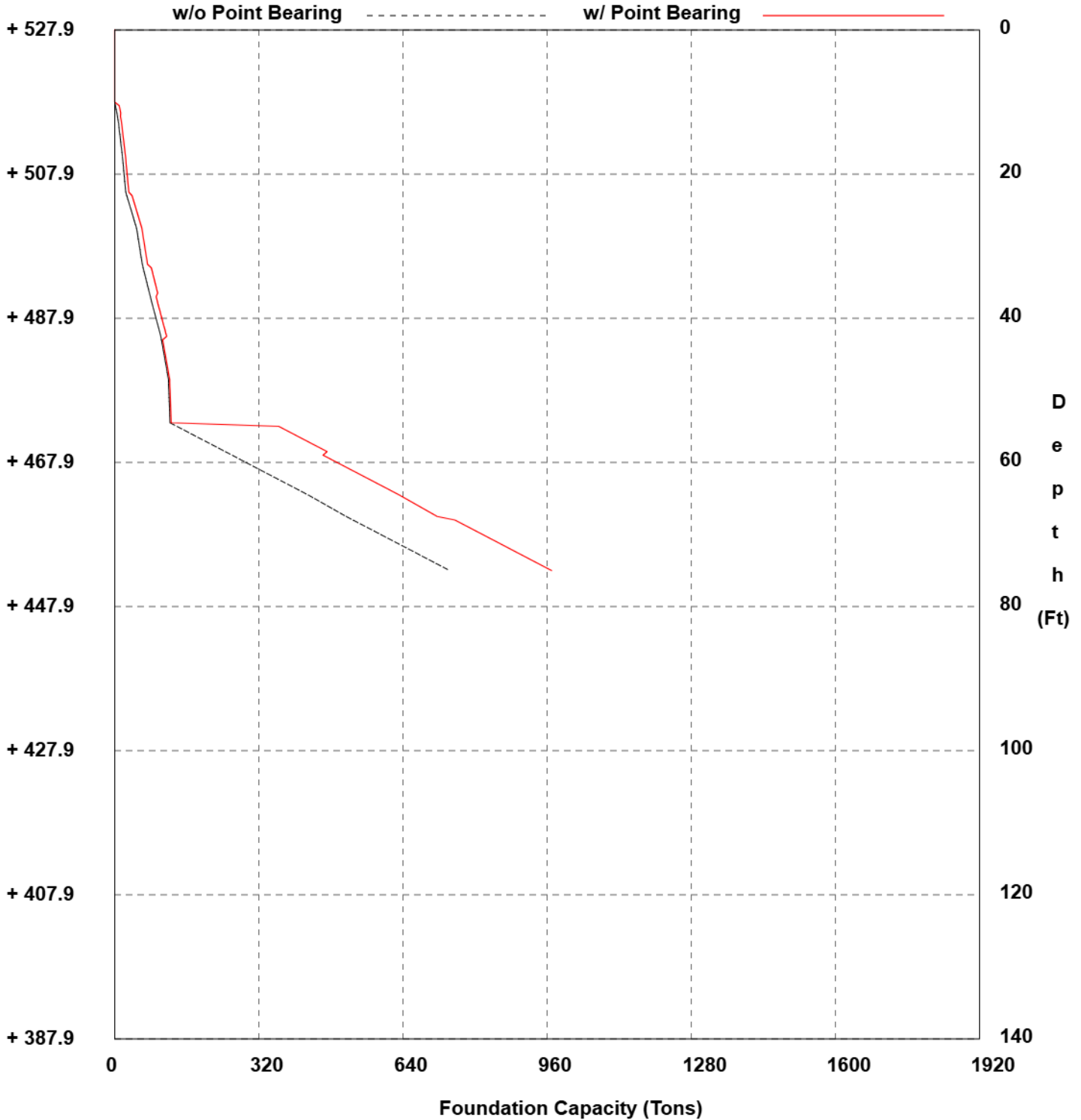
Hole BR7  
Structure Bridge  
Station 94+21.77  
Offset 5.49' LT

District Dallas  
Date 11/16/23  
Grnd. Elev. 527.90 ft  
GW Elev. 514.90 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 472.9

+527.9 Top Hole Elevation  
+517.9 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	527.3	527.0	OTHER	80	0	0.00	0.00
2	527.0	525.5	OTHER	80	0	0.00	0.00
3	525.5	517.3	CL	60	9	0.11	0.86
4	517.3	514.3	SC	70	10	0.10	1.16
4	514.3	508.3	SC	70	15	0.15	2.06
5	508.3	504.3	CL	60	23	0.27	3.13
5	504.3	498.3	CL	60	35	0.41	5.58
6	498.3	495.3	SC-SM	80	82	0.72	7.74
7	495.3	489.3	SP-SM	80	45	0.39	10.10
7	489.3	484.3	SP-SM	80	63	0.55	12.86
7	484.3	478.3	SP-SM	80	51	0.45	15.53
8	478.3	474.3	OTHER	80	300	1.69	22.28
8	474.3	467.3	OTHER	80	2400	3.25	45.03
9	467.3	464.3	OTHER	80	800	3.25	54.78
9	464.3	459.3	OTHER	80	2400	3.25	71.03
9	459.3	454.3	OTHER	80	2400	3.25	87.28
9	454.3	449.8	OTHER	80	2400	3.25	101.91
9	449.8	447.3	OTHER	80	2400	3.25	110.03

# POINT BEARING DESIGN

WinCore  
Version 3.3

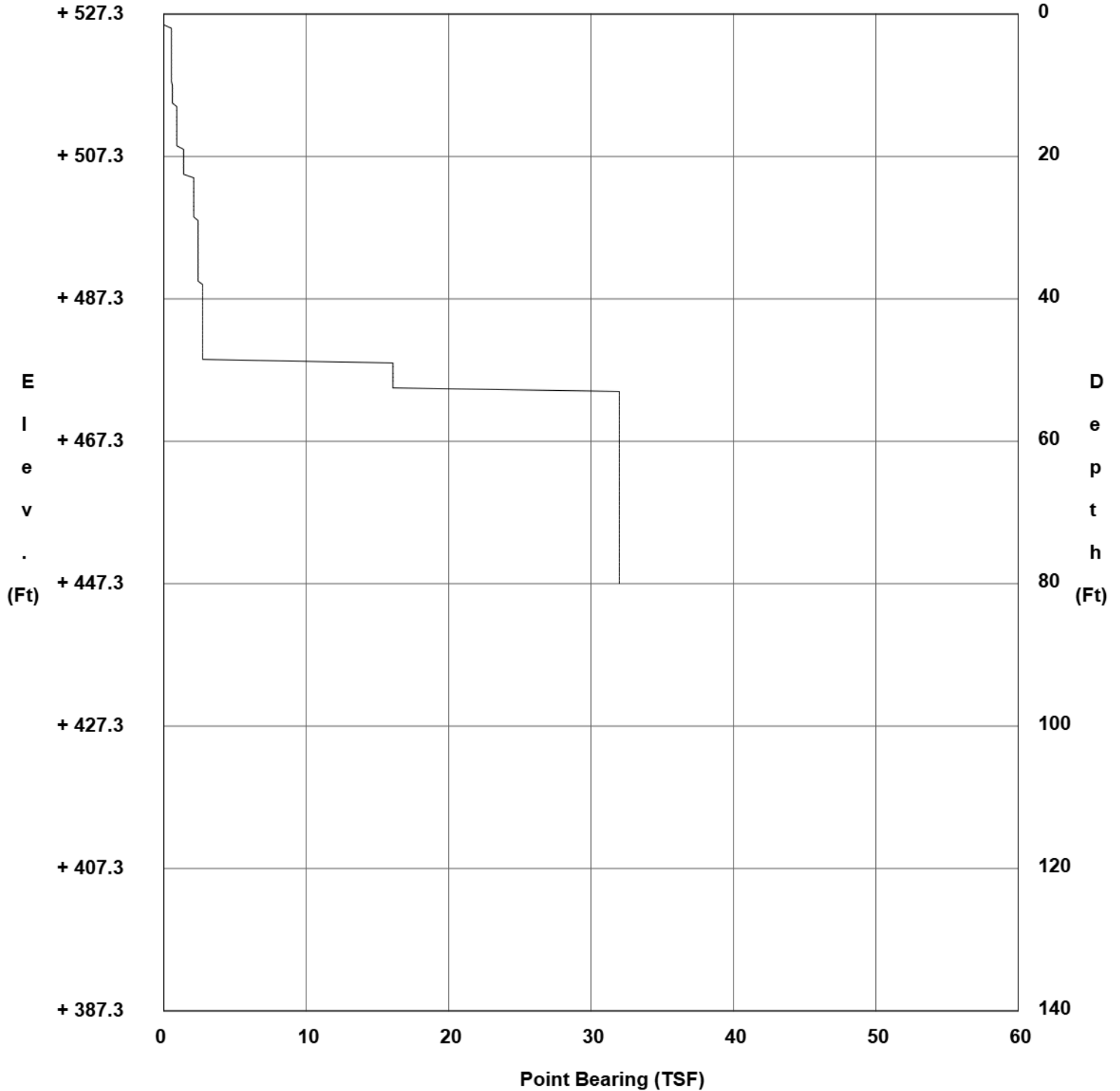
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

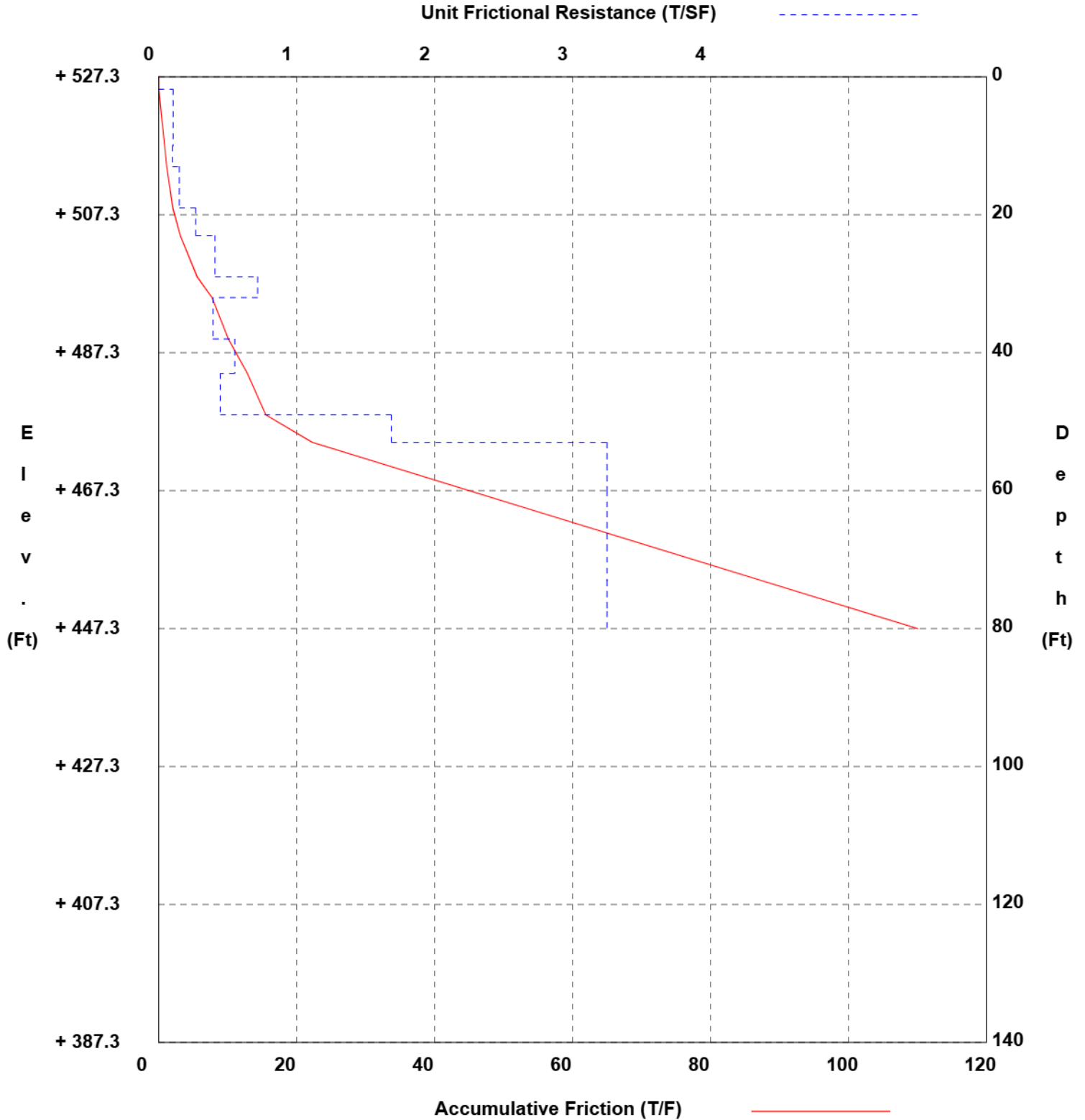
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

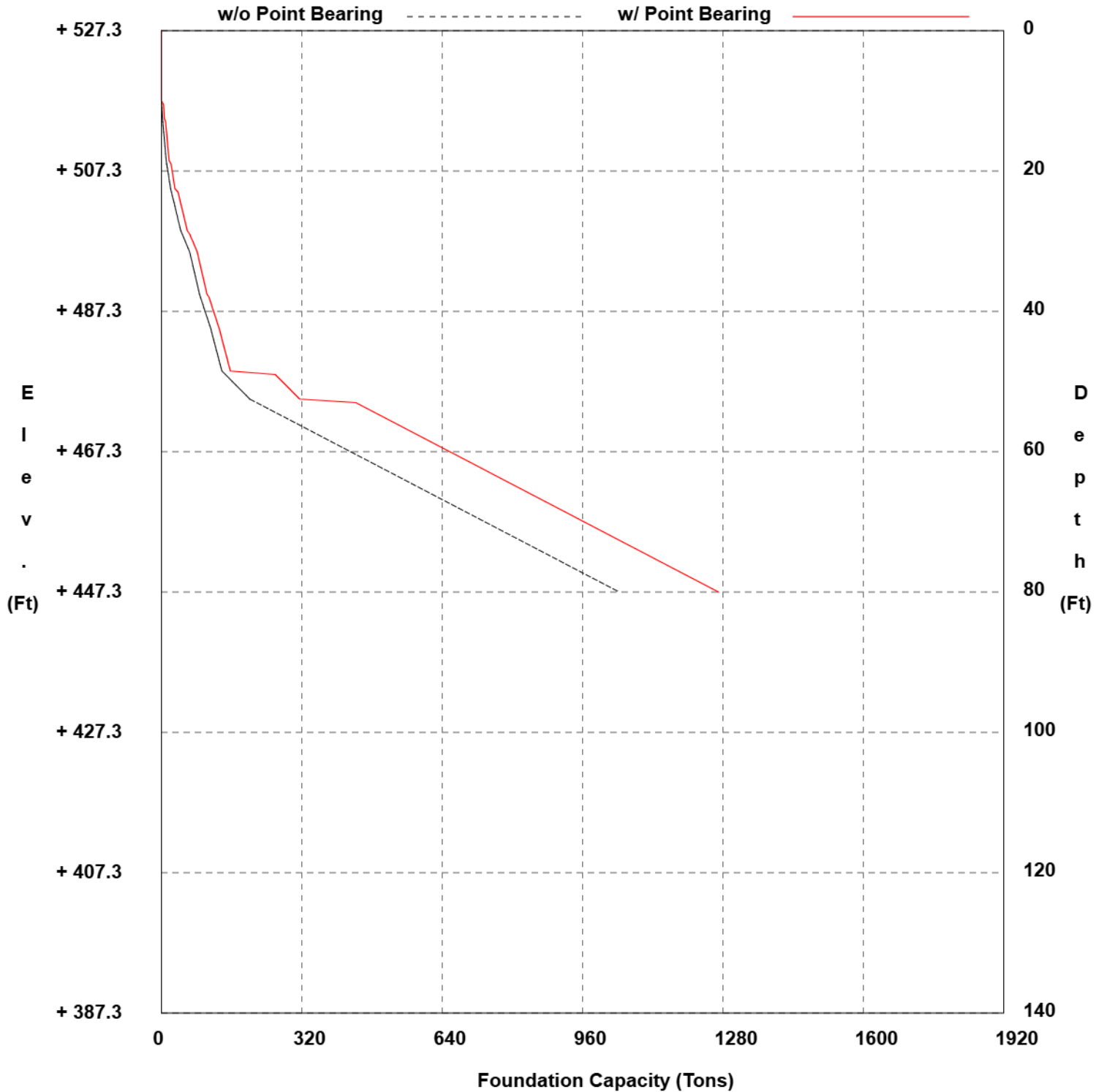
Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 484.77

+527.27 Top Hole Elevation  
+517.27 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

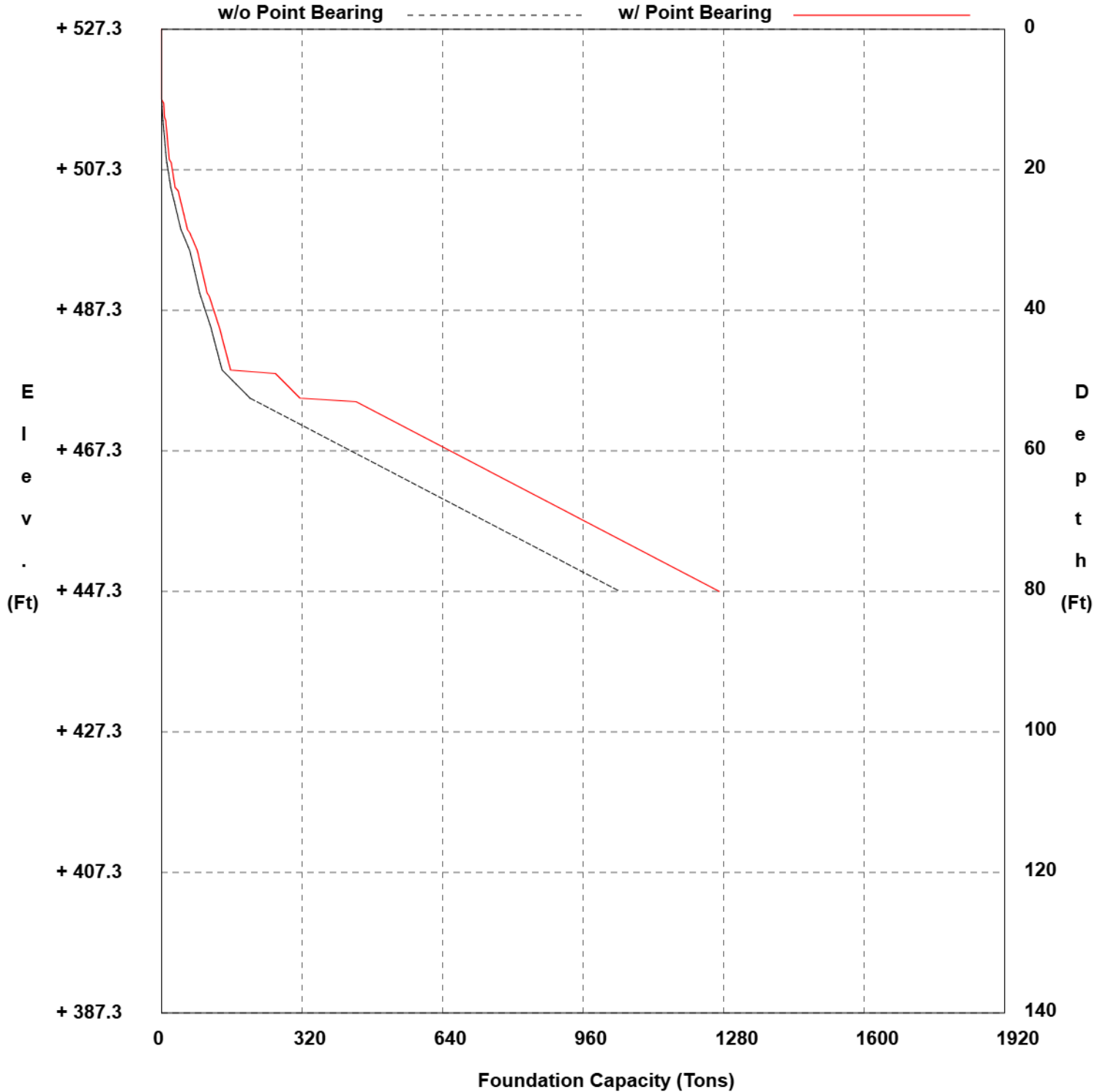
Hole BR8  
Structure Bridge  
Station 97+42.08  
Offset 0.63' RT

District Dallas  
Date 11/10/23  
Grnd. Elev. 527.27 ft  
GW Elev. 512.27 ft

36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 477.77

+527.27 Top Hole Elevation  
+517.27 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# SOIL STRENGTH ANALYSIS

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

TCP Capacity Values Used

Soil reduction factor of 0.7 applied

Strata No.	Elev. (Feet)		Design Type	Soil Factor	TCP N Value	TCP Unit Friction (TSF)	Accumulative Friction (T/F)
	From	To					
1	527.7	527.4	OTHER	80	0	0.00	0.00
2	527.4	526.7	OTHER	80	0	0.00	0.00
3	526.7	522.7	SC	70	0	0.00	0.00
4	522.7	519.7	CL	60	27	0.32	0.95
4	519.7	514.7	CL	60	18	0.21	2.00
4	514.7	507.7	CL	60	22	0.26	3.79
5	507.7	504.7	SP-SM	80	86	0.75	6.05
5	504.7	499.7	SP-SM	80	53	0.46	8.37
5	499.7	492.7	SP-SM	80	58	0.51	11.92
6	492.7	489.7	SM	80	40	0.35	12.97
6	489.7	484.7	SM	80	51	0.45	15.20
6	484.7	477.7	SM	80	18	0.16	16.30
7	477.7	469.7	OTHER	80	2400	3.25	42.30
7	469.7	466.7	OTHER	80	2400	3.25	52.05
8	466.7	459.7	OTHER	80	2400	3.25	74.80
8	459.7	454.7	OTHER	80	2400	3.25	91.05
8	454.7	450.2	OTHER	80	2400	3.25	105.68
8	450.2	447.7	OTHER	80	2400	3.25	113.80

# POINT BEARING DESIGN

WinCore  
Version 3.3

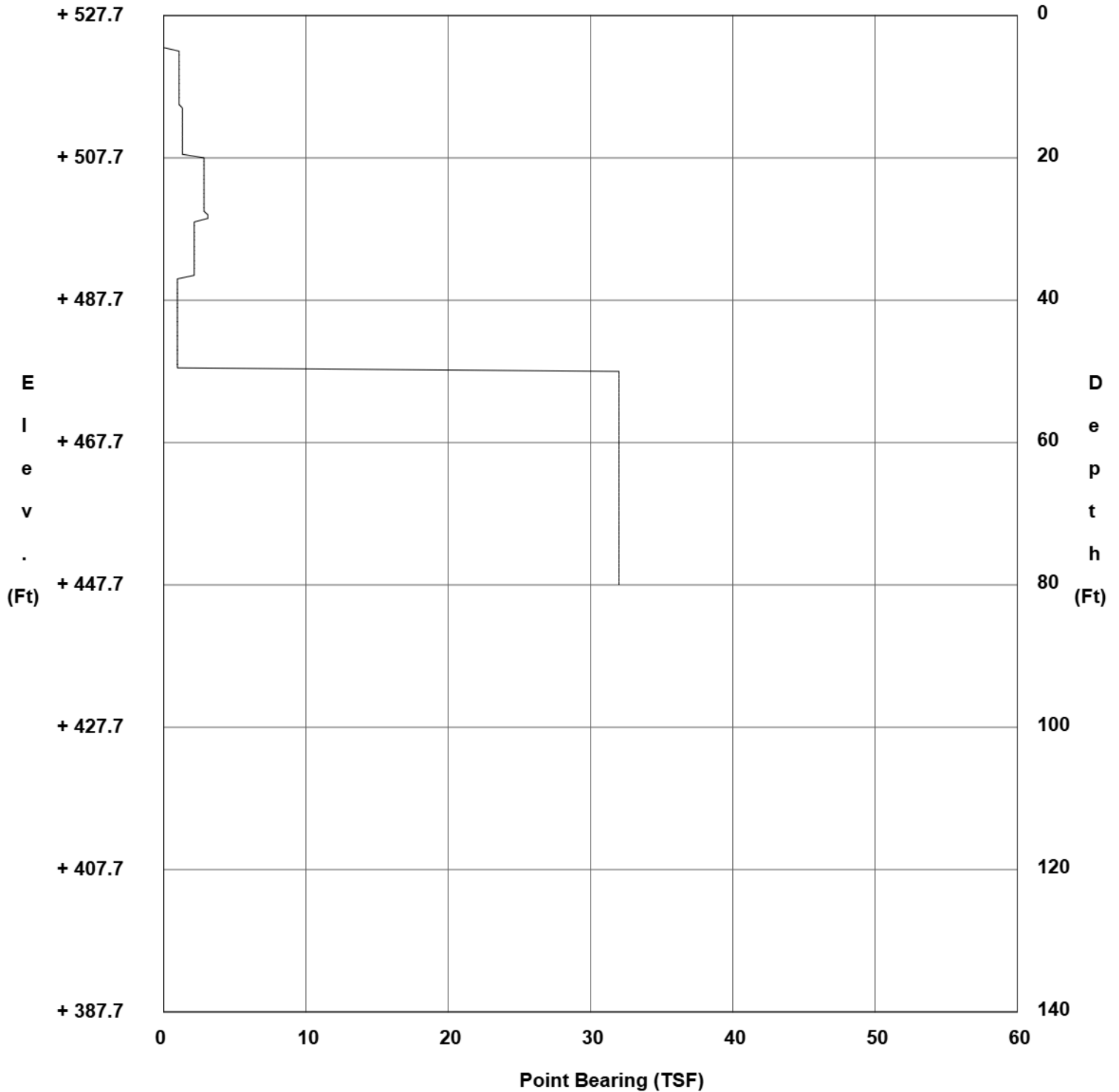
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

Diameters Below Tip Checked = 2

TCP Bearing Values Used



# SKIN FRICTION DESIGN

WinCore  
Version 3.3

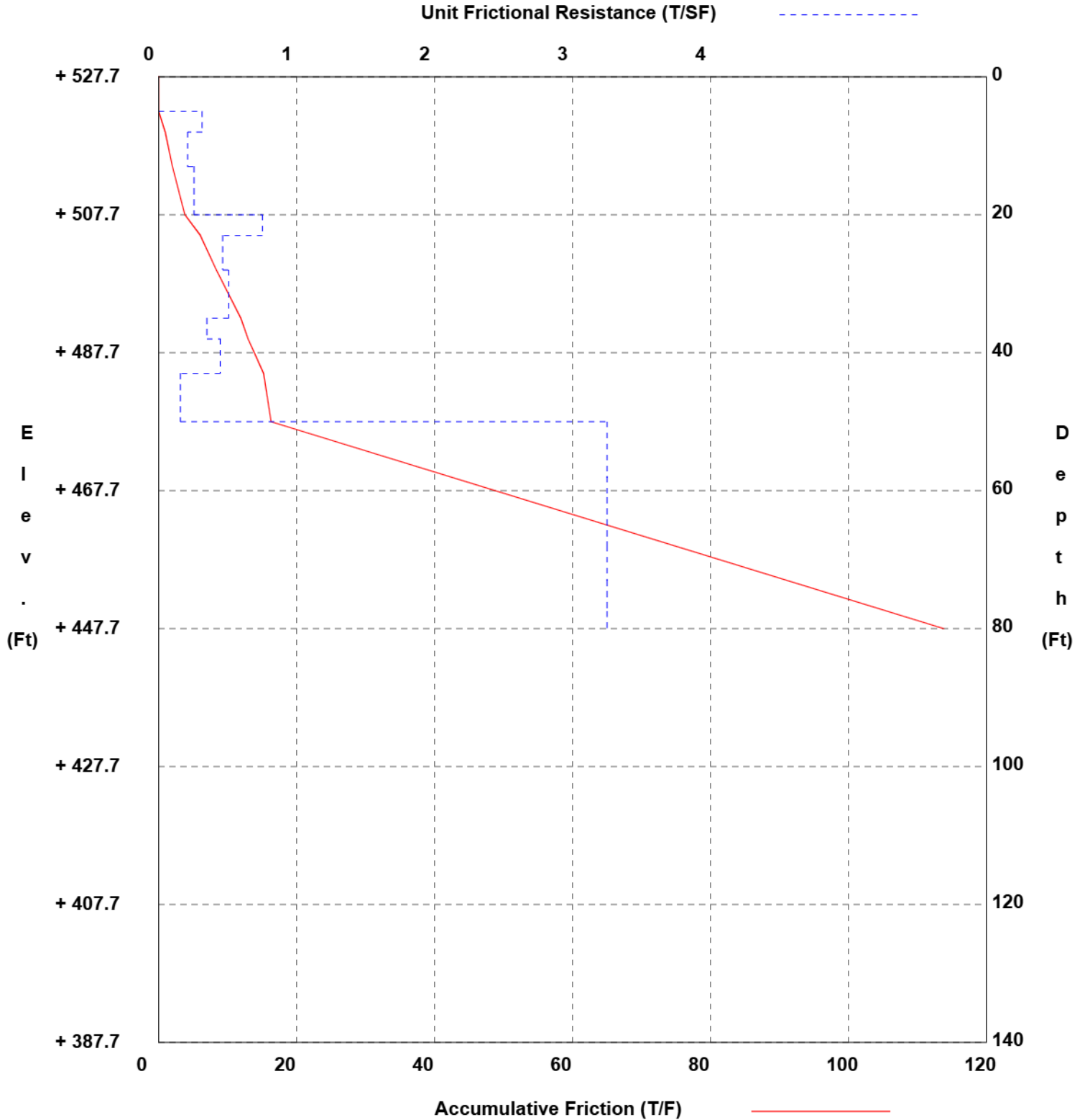
County Denton  
Highway Shady Shores Road  
Control 0918-46-316

Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

Drilled Shaft Design: Soil Reduction Factor = 0.7

TCP Friction Values Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

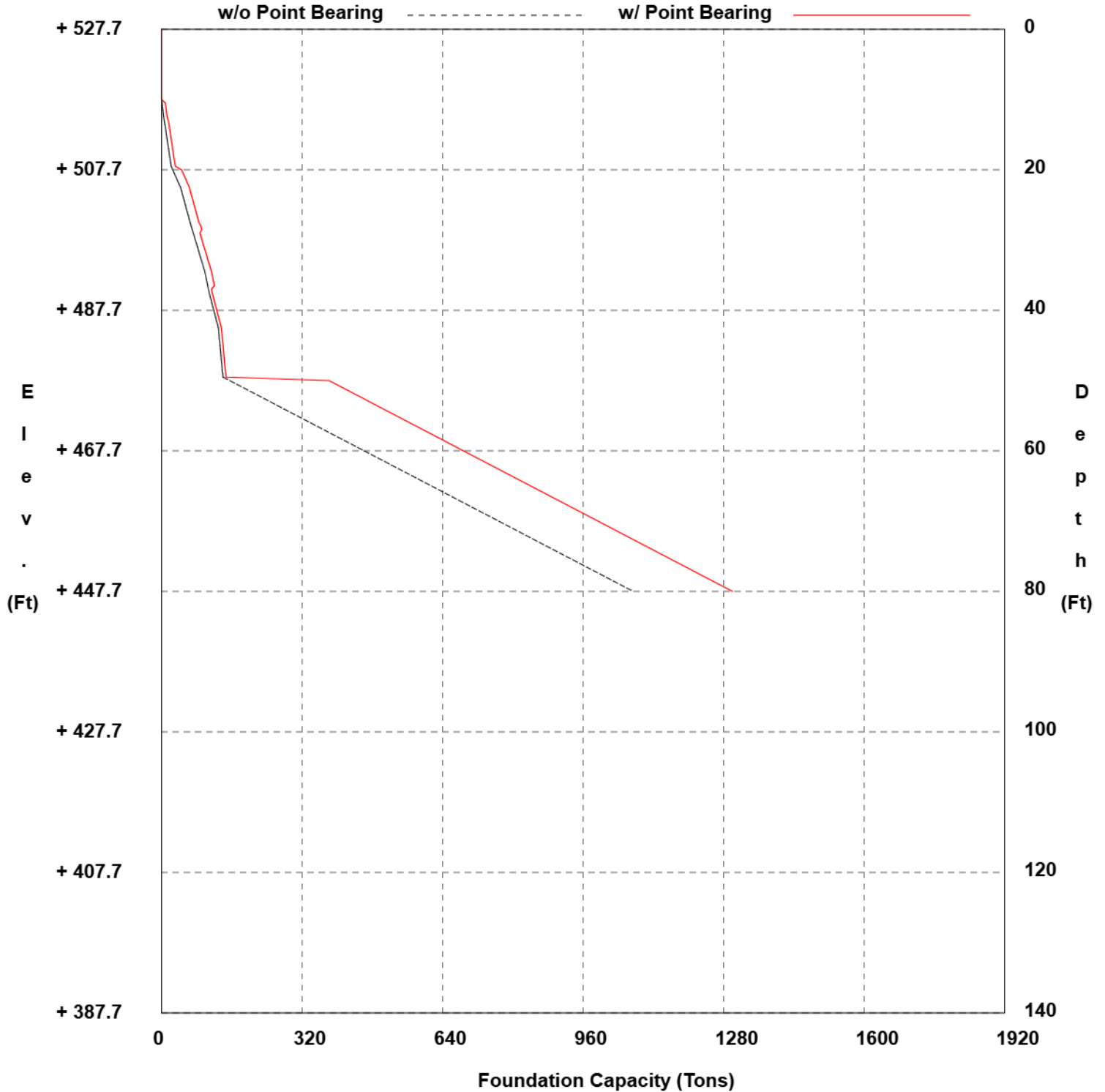
Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

36 inch Drilled Shaft  
130 ton Design Load  
Tip Elevation = + 486.18

+527.68 Top Hole Elevation  
+517.68 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



# FOUNDATION CAPACITY

WinCore  
Version 3.3

County Denton  
Highway Shady Shores Road  
Control 0918-46-316

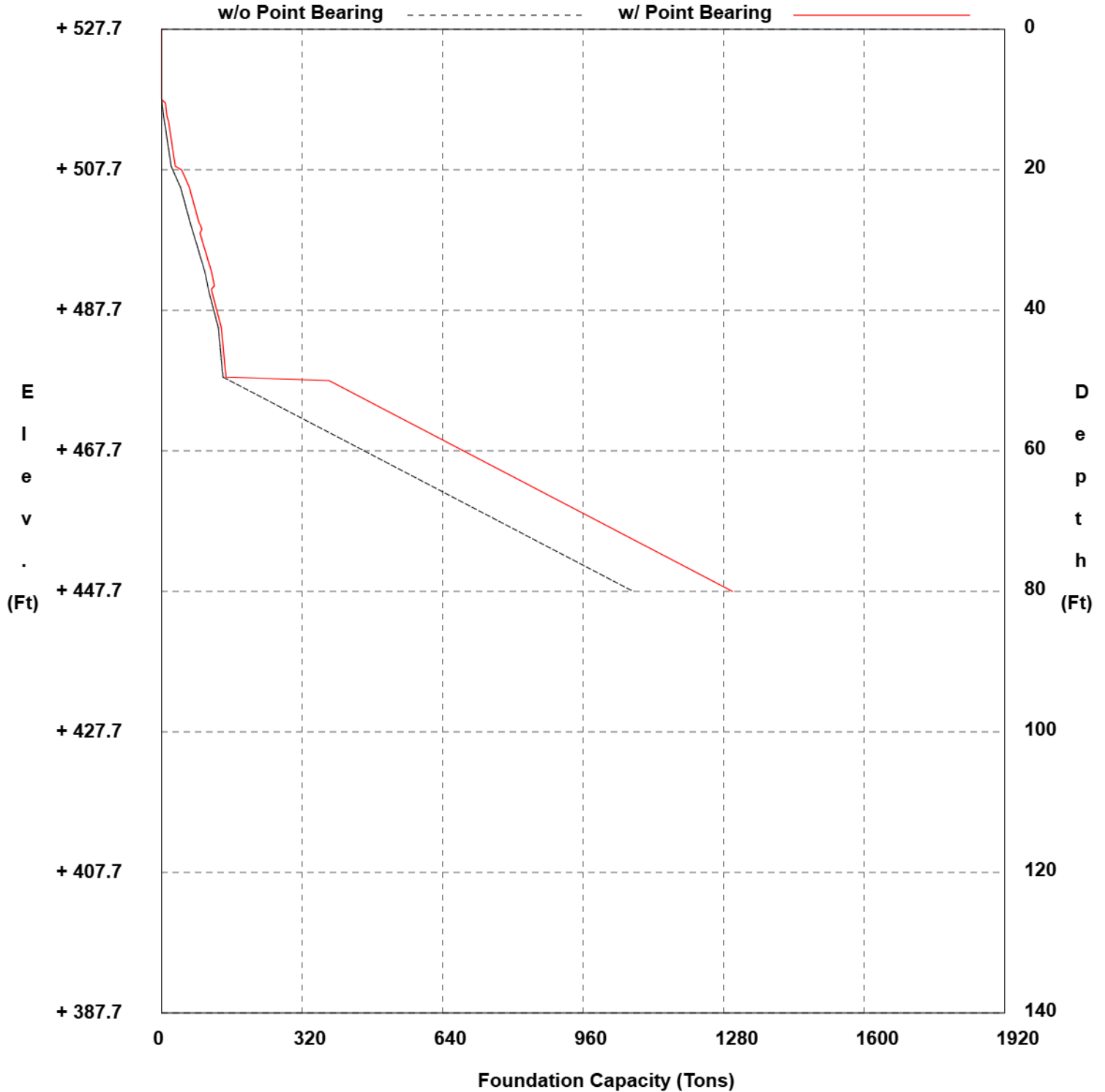
Hole BR9  
Structure Bridge  
Station 99+51.94  
Offset 1.14' RT

District Dallas  
Date 11/15/23  
Grnd. Elev. 527.68 ft  
GW Elev. 507.68 ft

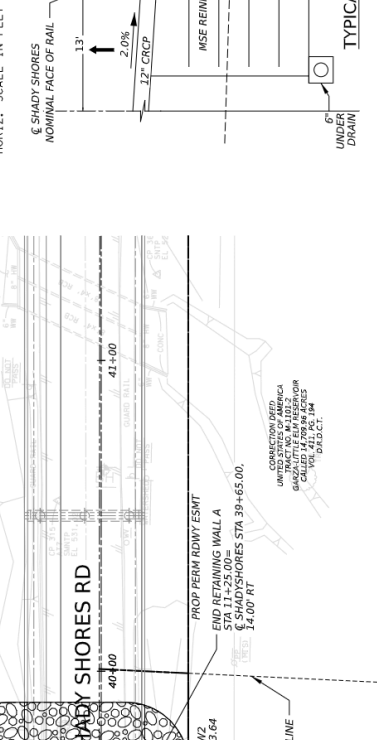
36 inch Drilled Shaft  
260 ton Design Load  
Tip Elevation = + 477.68

+527.68 Top Hole Elevation  
+517.68 Disregard Elevation

Disregard above hard strata disabled  
Pb: 2 Diameters Below Tip Checked  
TCP Capacity Values Used  
0.7 Soil Reduction Factor Used



**APPENDIX F – MSE WALL LAYOUTS**



TYPICAL SECTION  
N.T.S.  
JAMES C. VESTER RESPONSIBLE FOR STRUCTURAL WALL DESIGN.  
DAVID A. BURKETT RESPONSIBLE FOR WALL LAYOUT,  
DIMENSIONING & OTHER CIVIL ELEMENTS

# 95% PRELIMINARY

## FOR INTERIM REVIEW ONLY

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DAVID A. BURKETT  
100068  
100068  
P.E. NO.  
11/17/2025  
TEPELS FIRM #312

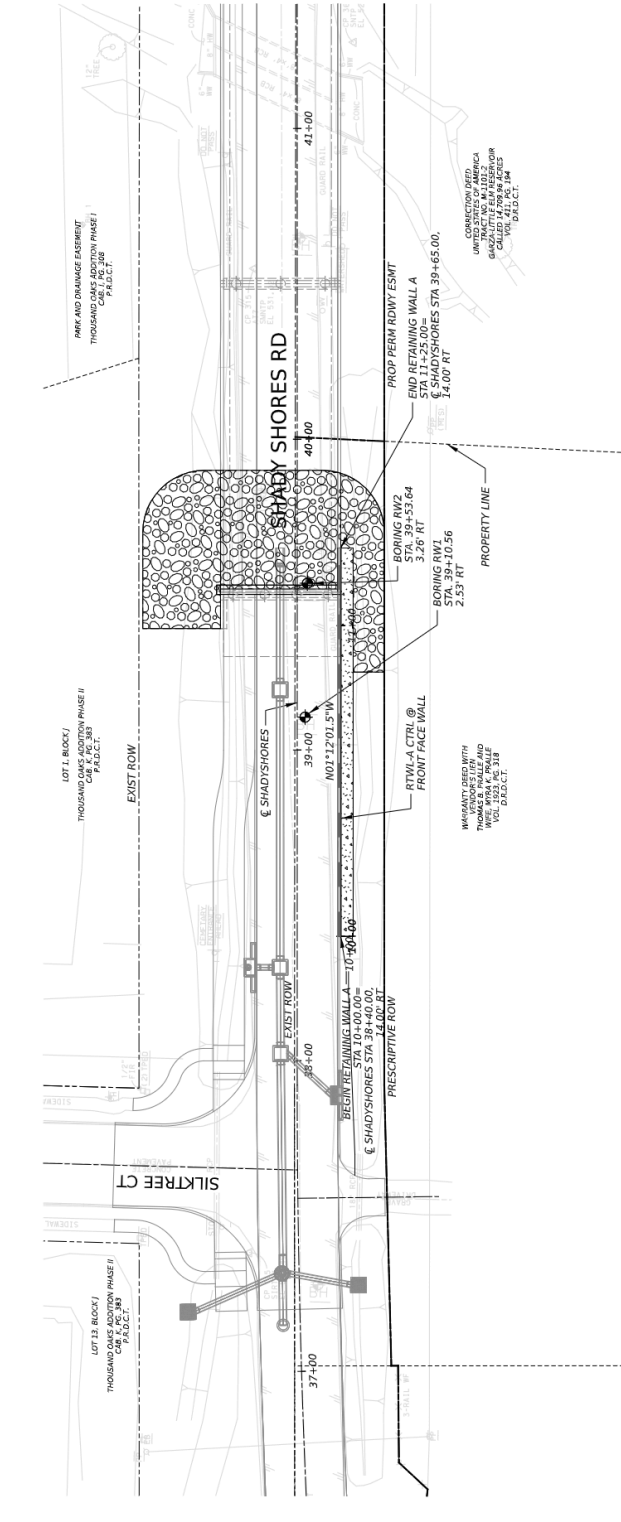
Sheet 1 of 1 Sheets



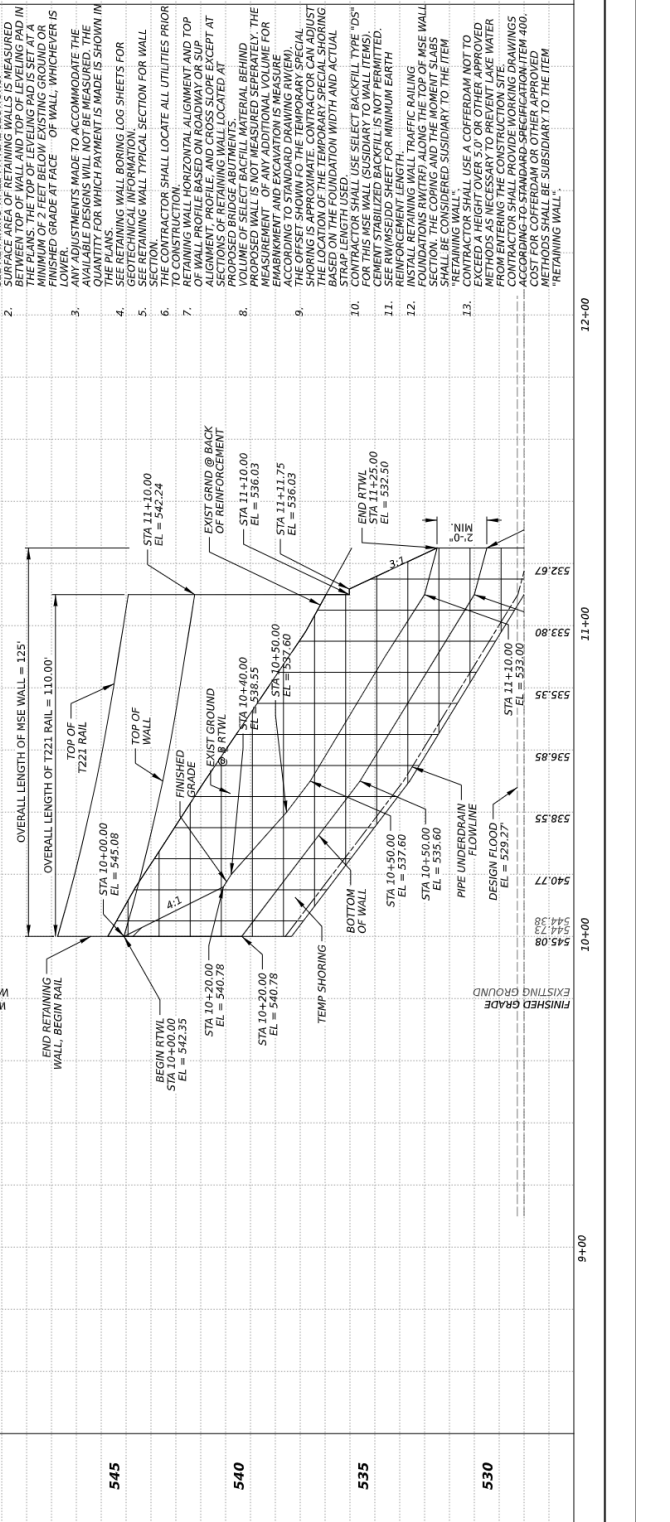
Texas Department of Transportation  
SHADY SHORES ROAD  
RETAINING WALL A  
LAYOUT

REV	DATE	BY	CHK	APP	DESCRIPTION
01/07	2024				REVISED
09/18	24				VA

DATE	BY	CHK	APP	DESCRIPTION
11/17/2025				VA



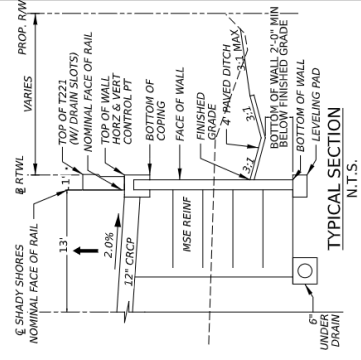
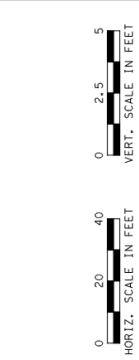
GENERAL NOTES:  
1. ALL RETAINING WALL MEASUREMENTS ARE TO THE FACE UNLESS OTHERWISE NOTED.  
2. SEE RETAINING WALL TYPICAL SECTIONS FOR SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF FINISHED GRADE AND TOP OF FINISHED GRADE OF LEVELING PAD OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. ANY ADJUSTMENTS MADE TO ACCOMMODATE THE AVAILABLE DESIGN WILL NOT BE MEASURED. THE PLANS, SPECIFICATIONS AND CONTRACT SHALL BE USED FOR THE RETAINING WALL BORING LOG SHEETS FOR THE RETAINING WALL TYPICAL SECTION FOR WALL SECTION.  
3. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO WALL CONSTRUCTION.  
4. RETAINING WALL HORIZONTAL ALIGNMENT AND TOP OF WALL PROFILE BASED ON ROADWAY OR SURFACE OF FINISHED GRADE UNLESS OTHERWISE NOTED.  
5. SECTIONS OF RETAINING WALL LOCATED AT PROPOSED BRIDGE ABUTMENTS.  
6. PROPOSED WALLS SHALL NOT MEASURED BY THE MEASUREMENT OF ANY ADDITIONAL VOLUME FOR ENHANCEMENT AND EXCAVATION IS TO BE MEASURED AS SHOWN IN THE PLANS.  
7. THE OFFSET SHOWN TO THE TEMPORARY SPECIAL SHORING IS APPROXIMATE. CONTRACTOR CAN ADJUST SHORING TO THE ACTUAL FOUNDATION WIDTH AND ACTUAL STRAP LENGTH USED.  
8. SEE SHEET FOR WALL TYPE "DS" FOR THIS MSE WALL (SUBSIDIARY TO WALLS). CEMENT STABILIZED BACKFILL IS NOT PERMITTED.  
9. INSTALL RETAINING WALL TRAFFIC RAILING FOUNDATIONS (RWTRF) ALONG THE TOP OF MSE WALL UNLESS OTHERWISE NOTED. TRAFFIC RAILING SHALL BE CONSIDERED SUBSIDIARY TO THE RETAINING WALL.  
10. USE A CHECKERMAN NOT TO EXCEED A HEIGHT COVER SA OR OTHER APPROVED METHODS AS NECESSARY TO PREVENT LAKE WATER FROM ENTERING THE CONSTRUCTION SITE. DRAWINGS ACCORDING TO STANDARD SPECIFICATION ITEM 400-COST FOR COVERMAN OR OTHER APPROVED METHOD SHALL BE SUBSIDIARY TO THE ITEM "RETAINING WALL".









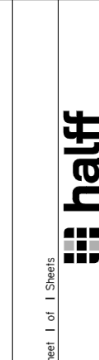


JAMES C. VESTER RESPONSIBLE FOR STRUCTURAL WALL DESIGN.  
 JAMES C. VESTER RESPONSIBLE FOR SUBSTRUCTURE LAYOUT,  
 DIMENSIONING & OTHER CIVIL ELEMENTS

# 95% PRELIMINARY

## FOR INTERIM REVIEW ONLY

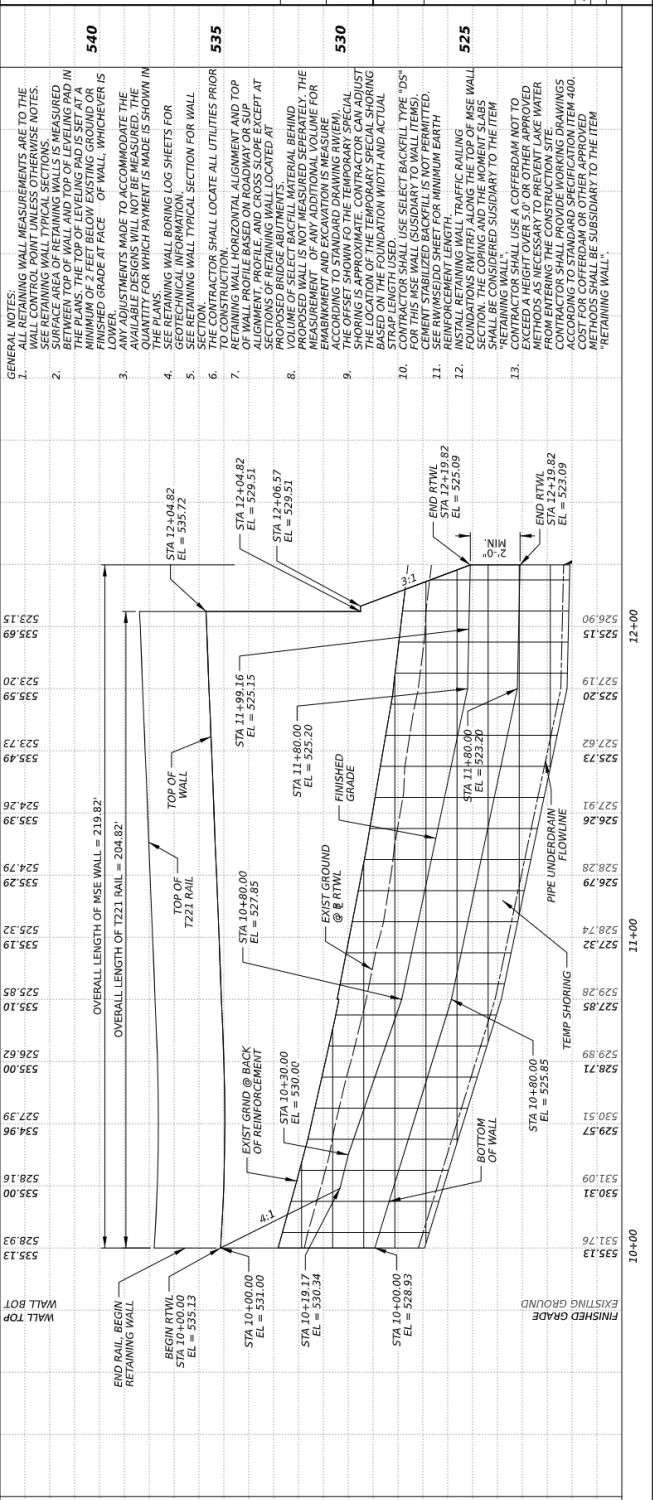
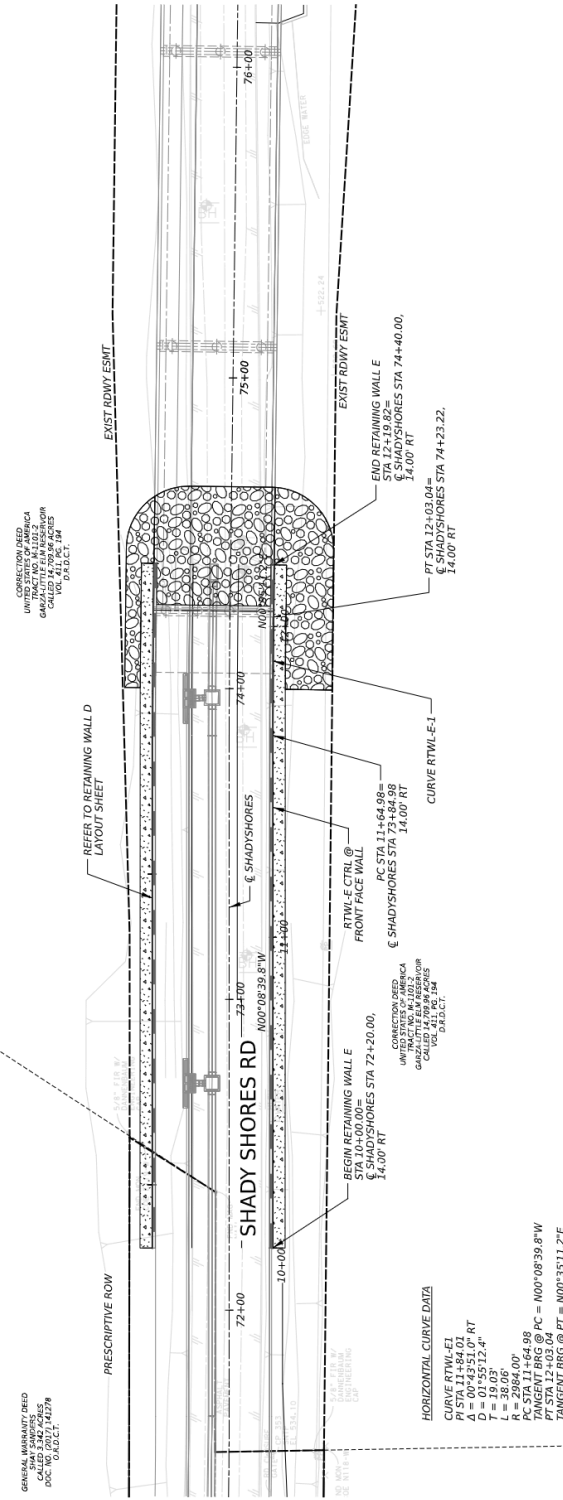
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 DAVID A. BURKETT  
 LICENSE NO. 120858  
 100068  
 P.E. NO.  
 DATE: 11/7/2025  
 TPEPELS FIRM #312



Texas Department of Transportation  
 Dallas  
 Bridge

### SHADY SHORES ROAD RETAINING WALL E LAYOUT

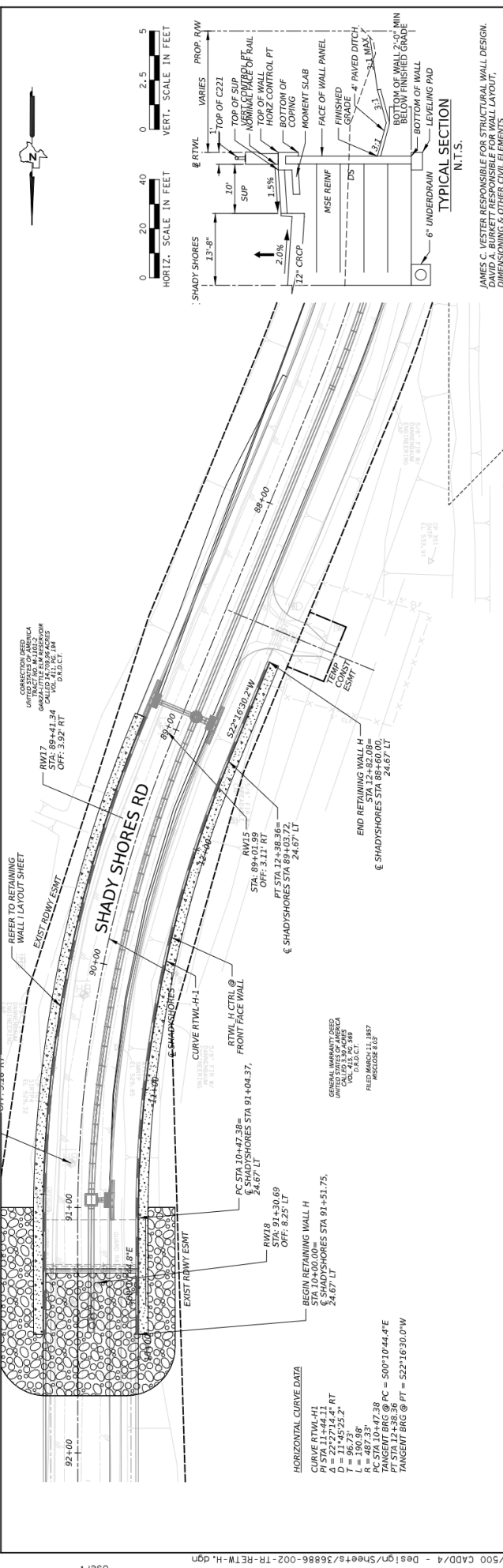
REV	DATE	BY	CHK	DESCRIPTION
01	09/18/24	DA	JB	ISSUE FOR PERMITS
02	09/18/24	DA	JB	REVISED PERMITS



- 540 GENERAL NOTES:
  - ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE UNLESS NOTED OTHERWISE.
  - SEE RETAINING WALL TYPICAL SECTIONS.
  - MEASUREMENTS OF RETAINING WALLS IS MEASURED BETWEEN TOP OF FINISHED GRADE AND TOP OF FINISHED GRADE AT FACE OF WALL, WHICHEVER IS MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. ADJUSTMENTS MADE TO ACCOMMODATE THE AVAILABLE DESIGN WILL NOT BE MADE. THE MEASUREMENTS FOR WHICH PAYMENT IS MADE IS SHOWN IN THE PLANS.
  - SEE RETAINING WALL BORING LOG SHEETS FOR MEASUREMENT INFORMATION.
  - SEE RETAINING WALL TYPICAL SECTION FOR WALL SECTION.
  - THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION.
  - RETAINING WALL HORIZONTAL ALIGNMENT AND TOP OF WALL PROFILE BASED ON ROADWAY OR SUPPLEMENTARY SURVEY DATA. ACCEPT AT SECTIONS OF RETAINING WALL LOCATED AT PROPOSED BRIDGE ABUTMENTS.
  - PROPOSED WALLS SHALL NOT MEASURED SEPARATELY. THE MEASUREMENT OF ANY ADDITIONAL VOLUME FOR EMBANKMENT AND EXCAVATION IS MEASURED TO THE OFFSET SHOWN TO THE TEMPORARY SPECIAL SHORING IS APPROXIMATE. CONTRACTOR CAN ADJUST SHORING TO THE TEMPORARY SPECIAL SHORING BASED ON THE FOUNDATION WIDTH AND ACTUAL STRAP LENGTH USED.
  - SEE SHEET 11-10-00 FOR "DS" FOR THIS MSE WALL (SUBSIDIARY TO WALL ITEMS). CEMENT STABILIZED BACKFILL IS NOT PERMITTED.
  - SEE REINFORCED SHEET FOR MINIMUM EARTH FOUNDATIONS (RWTF) ALONG THE TOP OF MSE WALL. FOUNDATIONS SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM "RETAINING WALL".
  - SEE SHEET 11-10-00 FOR OTHER APPROVED METHODS AS NECESSARY TO PREVENT LAKE WATER FROM ENTERING THE CONSTRUCTION SITE. MEASUREMENTS SHALL BE SUBSIDIARY TO ITEM 400-COST FOR CONFORMER OR OTHER APPROVED "RETAINING WALL".
- 535
- 530
- 525







DATE: 1/17/2025 TIME: 5:06:14 PM  
 FILE: p:\172025\TME\Bentley.com\h\17-dw-01\Documents\36886.002 Shady Shores Road P&E/500 CADD/4 - Design/Sheets/36886-002-TR-RET-W-H.dgn  
 User:

# 95% PRELIMINARY

## FOR INTERIM REVIEW ONLY

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 DAVID A. BURKETT  
 LICENSE NO. 120858  
 P.E. NO. 100058

NAME: DAVID A. BURKETT  
 DATE: 1/17/2025  
 TPELS FIRM #312

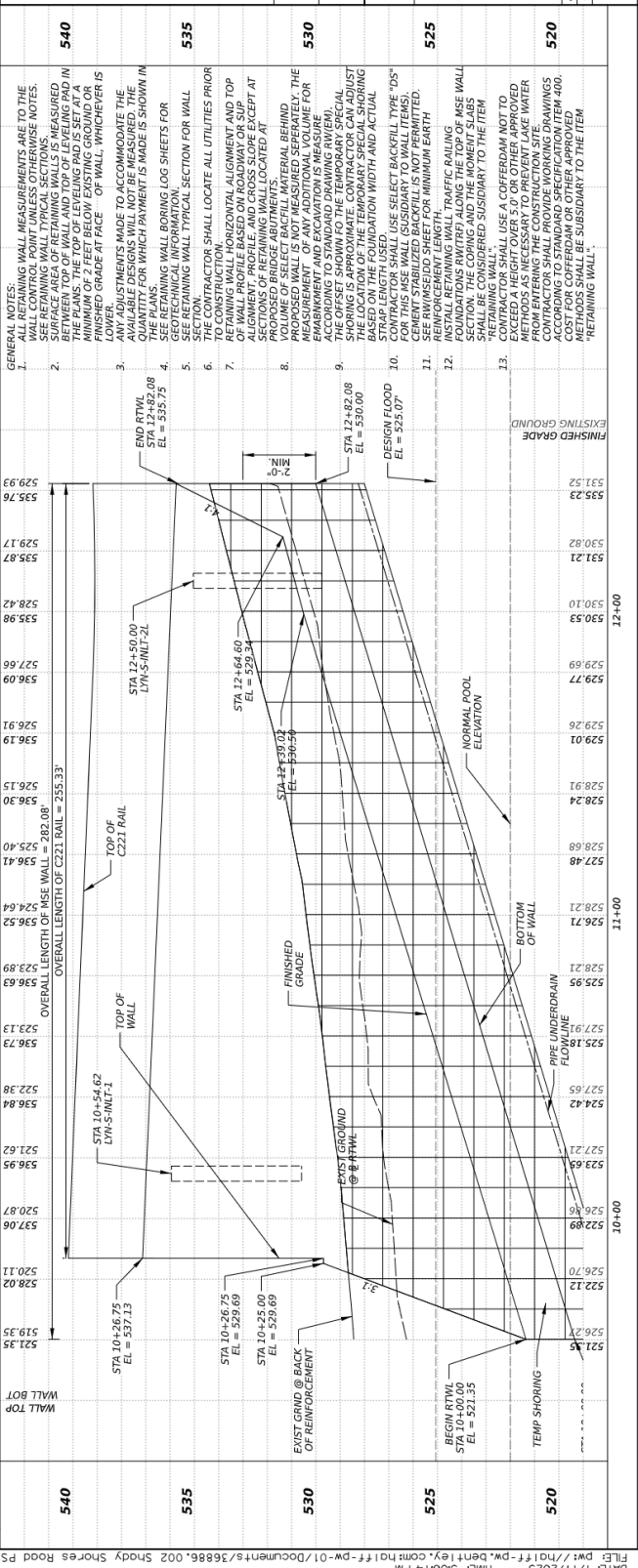
Sheet 1 of 1 Sheets

half

Texas Department of Transportation

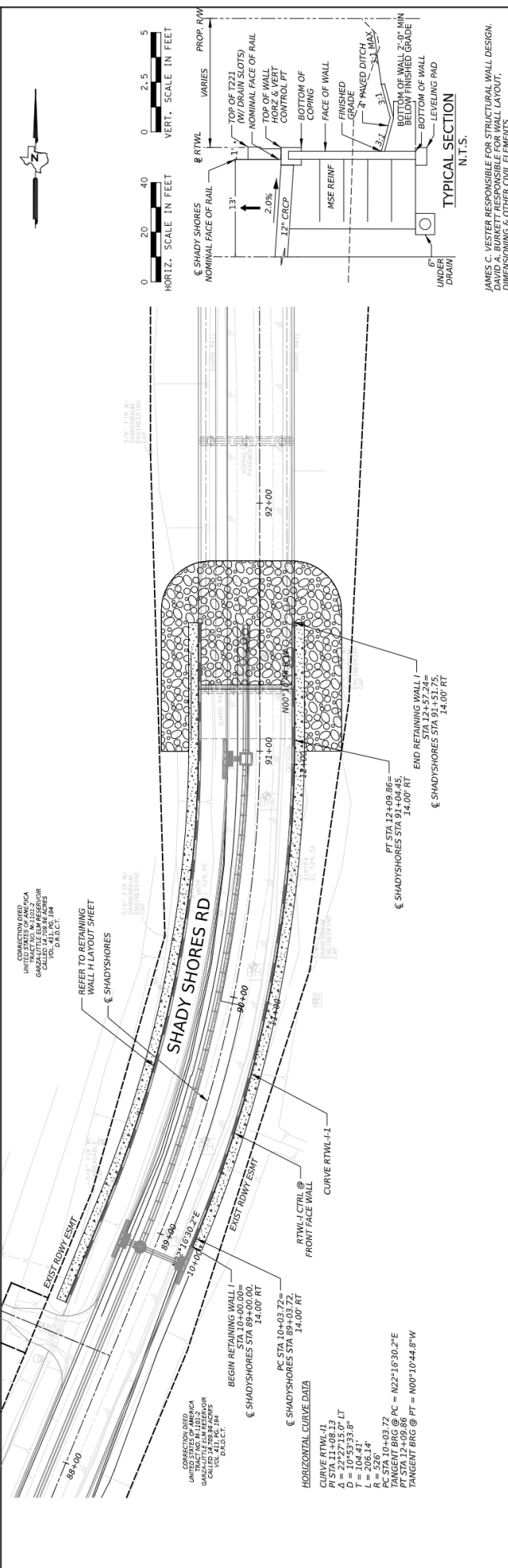
Shady Shores Road  
 Retaining Wall H  
 Layout

REV	DATE	BY	CHKD	DESCRIPTION
01	09/18/2024	REC	316	VA
02	09/18/2024	REC	316	VA



GENERAL NOTES:  
 1. ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE OF THE WALL UNLESS NOTED OTHERWISE. SEE RETAINING WALL TYPICAL SECTIONS FOR DETAILS.  
 2. SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF FINISHED GRADE AND TOP OF FINISHED GRADE OF EXISTING GROUND OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. ANY ADJUSTMENTS MADE TO ACCOMMODATE THE AVAILABLE DESIGN WILL NOT BE MADE. THE PLANS OR WHICH PAYMENT IS MADE IS SHOWN IN THE PLANS.  
 3. SEE RETAINING WALL BORING LOG SHEETS FOR RETAINING WALL INFORMATION.  
 4. SEE RETAINING WALL TYPICAL SECTION FOR WALL SECTION.  
 5. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION.  
 6. RETAINING WALL HORIZONTAL ALIGNMENT AND TOP OF WALL PROFILE BASED ON ROADWAY OR SURFACE OF EXISTING GROUND UNLESS NOTED OTHERWISE. SECTIONS OF RETAINING WALL LOCATED AT PROPOSED BRIDGE ABUTMENTS.  
 7. PROPOSED WALLS SHALL NOT BE MEASURED BEHIND FINISHED GRADE. ANY ADDITIONAL VOLUME FOR ENHANCEMENT AND EXCAVATION IS MEASURED TO THE OFFSET SHOWN TO THE TEMPORARY SPECIAL SHORING IS APPROXIMATE. CONTRACTOR CAN ADJUST THE OFFSET TO ACCOMMODATE THE FINISHED GRADE BASED ON THE FOUNDATION WIDTH AND ACTUAL STRAP LENGTH USED. USE SET BACK WALL TYPE "DS" FOR THIS MSE WALL (SUBSIDIARY TO WALL ITEMS). CEMENT STABILIZED BACKFILL IS NOT PERMITTED.  
 8. SEE RETAINING WALL TYPICAL SECTION FOR WALL SECTION.  
 9. INSTALL RETAINING WALL TRAFFIC RAILING FOUNDATIONS RW(TRF) ALONG THE TOP OF MSE WALL UNLESS NOTED OTHERWISE. TRAFFIC RAILING SHALL BE CONSIDERED SUBSIDIARY TO THE ITEM "RETAINING WALL".  
 10. EXCEED A HEIGHT COVER SO OR OTHER APPROVED METHODS AS NECESSARY TO PREVENT LAKE WATER FROM ENTERING THE CONSTRUCTION SITE. DRAWINGS ACCORDING TO STANDARD SPECIFICATION ITEM 400-1.1 FOR CONCRETE OR OTHER APPROVED MATERIALS SHALL BE SUBSIDIARY TO THE ITEM "RETAINING WALL".

540  
 535  
 530  
 525  
 520



**CORRECTION NEEDED:**  
 UNITS: FEET AND INCHES  
 SCALE: 1/4" = 1'-0"  
 DATE: 11/17/2025

**REFER TO RETAINING WALL LAYOUT SHEET**  
 SHADY SHORES

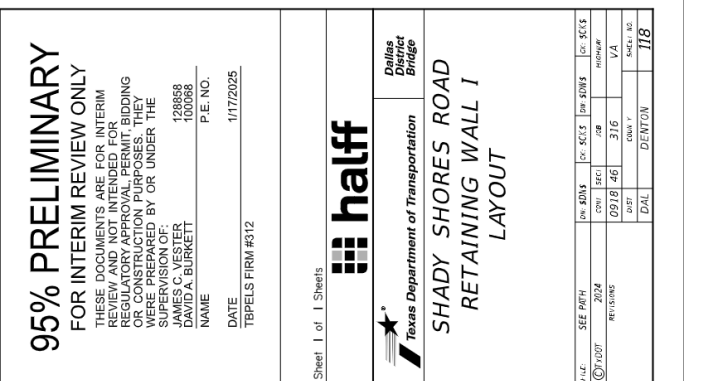
**HORIZONTAL CURVE DATA**  
 PC STA 10+03.72 PC = N227+16.30.2"E  
 PT STA 12+09.86 PT = N00+10.44.8"W  
 TANGENT BRG @ PT = N00+10.44.8"W  
 R = 526.14'  
 T = 104.41'  
 D = 10+53.33.8"  
 A = 27.27172 IT  
 PI STA 12+27.172 IT  
 CURVE RTWL-II  
 R = 14.00 RT

**RTWL-I CTRL @ FRONT FACE WALL**  
 RTWL-I CTRL @ FRONT FACE WALL  
 RTWL-I CTRL @ FRONT FACE WALL

**RTWL-II CTRL @ FRONT FACE WALL**  
 RTWL-II CTRL @ FRONT FACE WALL  
 RTWL-II CTRL @ FRONT FACE WALL

**RTWL-I CTRL @ FRONT FACE WALL**  
 RTWL-I CTRL @ FRONT FACE WALL  
 RTWL-I CTRL @ FRONT FACE WALL

**RTWL-II CTRL @ FRONT FACE WALL**  
 RTWL-II CTRL @ FRONT FACE WALL  
 RTWL-II CTRL @ FRONT FACE WALL



**TYPICAL SECTION**  
 N.T.S.

JAMES C. VESTER RESPONSIBLE FOR STRUCTURAL WALL DESIGN.  
 JAMES C. VESTER RESPONSIBLE FOR RETAINING WALL LAYOUT,  
 DIMENSIONING & OTHER CIVIL ELEMENTS

Station	Description	Notes
540	END RAIL BEGIN RETAINING WALL	GENERAL NOTES: 1. ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE OF THE WALL UNLESS NOTED OTHERWISE. 2. SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF WALL AND FINISHED GRADE OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. DESIGNERS WILL NOT BE MEASURED. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION.
535	BEGIN RTWL	1. ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE OF THE WALL UNLESS NOTED OTHERWISE. 2. SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF WALL AND FINISHED GRADE OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. DESIGNERS WILL NOT BE MEASURED. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION.
530	FINISHED GRADE	1. ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE OF THE WALL UNLESS NOTED OTHERWISE. 2. SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF WALL AND FINISHED GRADE OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. DESIGNERS WILL NOT BE MEASURED. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION.
525	TEMP SHORING	1. ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE OF THE WALL UNLESS NOTED OTHERWISE. 2. SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF WALL AND FINISHED GRADE OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. DESIGNERS WILL NOT BE MEASURED. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION.
520	PIPE UNDERPASS FLOWLINE	1. ALL RETAINING WALL MEASUREMENTS ARE TO THE SURFACE OF THE WALL UNLESS NOTED OTHERWISE. 2. SURFACE AREA OF RETAINING WALLS IS MEASURED BETWEEN TOP OF WALL AND FINISHED GRADE OR MINIMUM OF 2 FEET BELOW EXISTING GROUND OR FINISHED GRADE AT FACE OF WALL, WHICHEVER IS AVAILABLE. DESIGNERS WILL NOT BE MEASURED. THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION. CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO WALL CONSTRUCTION.

**95% PRELIMINARY**  
 FOR INTERIM REVIEW ONLY

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UNDER SUPERVISION OF:  
 DAVID A. BURKETT  
 100068  
 P.E. NO.

DATE: 11/17/2025  
 TPELS FIRM #312

Sheet 1 of 1 Sheets

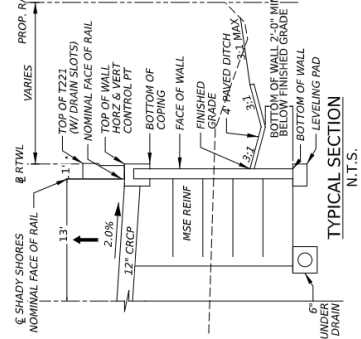
**half**  
 Texas Department of Transportation

**SHADY SHORES ROAD**  
**RETAINING WALL I**  
**LAYOUT**

REV	DATE	BY	CHKD	DESCRIPTION
01	09/18/24	316	316	ISSUE FOR PERMITS
02	11/17/25	316	316	REVISED PER COMMENTS

DAL DENVER T18





**TYPICAL SECTION**  
N.T.S.

JAMES C. VESTER RESPONSIBLE FOR STRUCTURAL WALL DESIGN.  
DIMENSIONS & OTHER CIVIL ELEMENTS

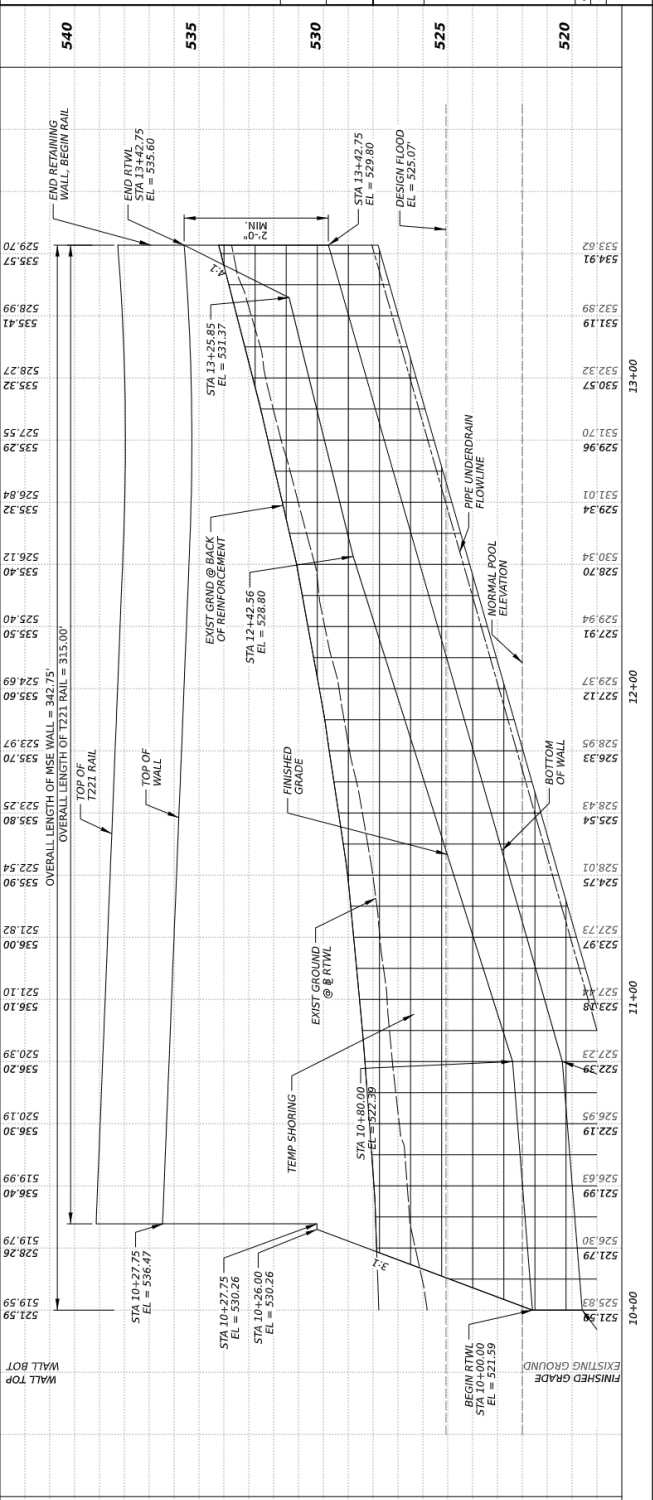
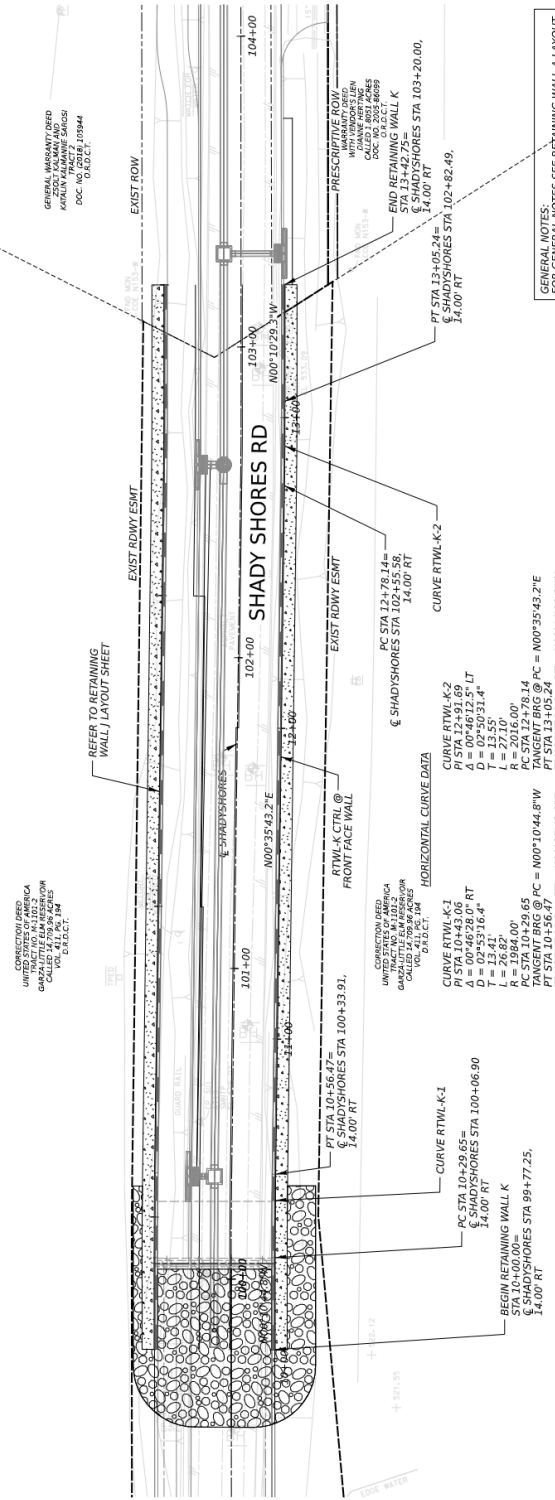
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DAVID A. BURKETT  
120858  
100068  
P.E. NO.  
11/7/2025  
DATE  
TPELS FIRM #312

Sheet 1 of 1 Sheets

Texas Department of Transportation  
Shady Shores Road  
Retaining Wall K  
Layout

REV	DATE	BY	CHK	DESCRIPTION
01	09/18/24	DA	JB	ISSUE FOR PERMITS
02	09/18/24	DA	JB	REVISED PER COMMENTS



**APPENDIX G – MSE WALL RECOMMENDATIONS**

Wall ID	Start STA	End STA	Max. Wall Height (ft.)	Applicable Borings	Foundation Soils under Walls				Factors of Safety										Min. Embedment Depth (ft)	Ground Improvement Required		
					Long Term Design		Short Term Design		Long Term FOS					Short Term FOS							Minimum Needed Reinforcement Length, ft or %H <sup>(1)</sup>	
					Cohesion (psf)	Friction Angle (deg.)	Cohesion (psf)	Friction Angle (deg.)	Bearing	Sliding	Overturning	e/L <sup>(1)</sup>	Global	Bearing	Sliding	Overturning	e/L <sup>(1)</sup>	Global				Rapid Drawdown
A	10+00.00	11+25.00	11.5	RW1, RW2	50	25	2500	0	259	1.77	3.67	0.1361	2.36	>5	2.38	3.67	0.1361	>5	1.92	0.8H	2	-
B	10+00.00	10+40.00	8	RW4, RW3	0	29	0	29	>5	2.42	>5	0.0892	1.75	>5	2.42	>5	0.0892	1.75	1.14	8feet	2	-
C	10+00.00	11+65.00	14	RW5, RW6	0	30	0	30	>5	2.361	>5	0.0937	1.8	>5	2.361	>5	0.0937	1.8	1.13	0.95H	2	-
D	10+00.00	11+40.00	13	RW5, RW6	0	30	0	30	4.34	2.02	3.62	0.1381	1.76	4.34	2.02	3.62	0.1381	1.76	1.1	0.75H	2	-
E	10+00.00	12+55.00	8	RW8, RW7	50	26	900	0	>5	2.52	>5	0.0892	1.97	>5	2.52	>5	0.0892	1.97	1.3	8feet	2	-
F	10+00.00	12+40.31	12.5	RW8, RW7	50	28	1000	0	3.68	2.08	4.71	0.1062	1.78	2.09	2.3	4.71	0.1062	2.29	1.14	0.85H	2	-
G	10+00.00	10+80.00	8	RW9, RW10	50	28	1000	0	>5	2.52	>5	0.0892	2.19	3.47	2.94	>5	0.0892	3.93	1.51	8feet	2	-
H	10+00.00	12+19.82	13	RW12, RW11	0	30	0	30	3.76	1.97	3.62	0.1381	1.8	2.09	2.172	3.62	0.1381	2.45	1.18	0.75H	2	-
I	10+00.00	10+40.00	8	RW12, RW11	0	30	0	30	>5	2.52	>5	0.0892	2.27	>5	2.52	>5	0.0892	2.27	1.45	8feet	2	-
J	10+00.00	11+85.00	12	RW13, RW14	50	29	1500	0	4.01	1.962	3.4	0.1472	1.9	4.01	1.962	3.4	0.1472	1.9	1.17	0.75H	2	-
K	10+00.00	11+28.00	8	RW13, RW14	50	29	1500	0	3.96	1.97	3.36	0.1486	1.88	2.7	2.28	3.36	0.1486	3.15	1.19	0.7H	2	-
L	10+00.00	11+75.00	8	RW18, RW17	0	31	0	31	>5	2.62	>5	0.0892	2.44	>5	2.94	>5	0.0892	>5	1.66	8feet	2	-
M	10+00.00	11+80.00	17	RW18, RW17	0	31	0	31	4.38	1.973	3.17	0.1575	1.82	4.38	1.973	3.17	0.1575	1.82	1.12	0.7H	2	-
N	11+80.00	12+82.08	10	RW15, RW16	50	27	1100	0	3.46	1.95	3.74	0.1335	1.99	2.9	2.4	3.74	0.1335	3.57	1.32	0.8H	2	-
O	10+00.00	11+00.00	8	RW15, RW16	50	24	1300	0	3.35	2.14	>5	0.0892	1.97	4.52	2.94	>5	0.0892	>5	1.33	8feet	2	-
P	11+00.00	12+45.49	15.5	RW21, RW20, RW19	0	30	0	30	4	2.39	>5	0.0661	1.8	2.71	3.42	>5	0.0661	2.77	1.1	1.1H	2	-
Q	10+00.00	11+00.00	8	RW21, RW20, RW19	0	30	0	30	>5	2.52	>5	0.0892	2.21	>5	2.52	>5	0.0892	2.21	1.42	8feet	2	-
R	11+00.00	12+00.00	12	RW22, RW23, RW24	50	29	1250	0	4.01	1.96	3.4	0.1472	1.86	4.01	1.96	3.4	0.1472	1.86	1.15	0.75H	2	-
S	12+00.00	13+42.55	16	RW22, RW23, RW24	50	29	1250	0	>5	2.173	4.17	0.1199	1.87	>5	2.173	4.17	0.1199	1.87	1.12	0.8H	2	-
T	10+00.00	12+00.00	17	RW22, RW23, RW24	50	29	1250	0	4.37	2.06	3.73	0.1342	1.83	2.08	2.19	3.73	0.1342	2.35	1.16	0.75H	2	-
U	12+00.00	13+30.00	11	RW22, RW23, RW24	50	29	1250	0	3.75	1.93	3.15	0.1589	1.96	2.87	2.21	3.15	0.1589	3.62	1.31	0.7H	2	-






(1) Eccentricity/Wall Width

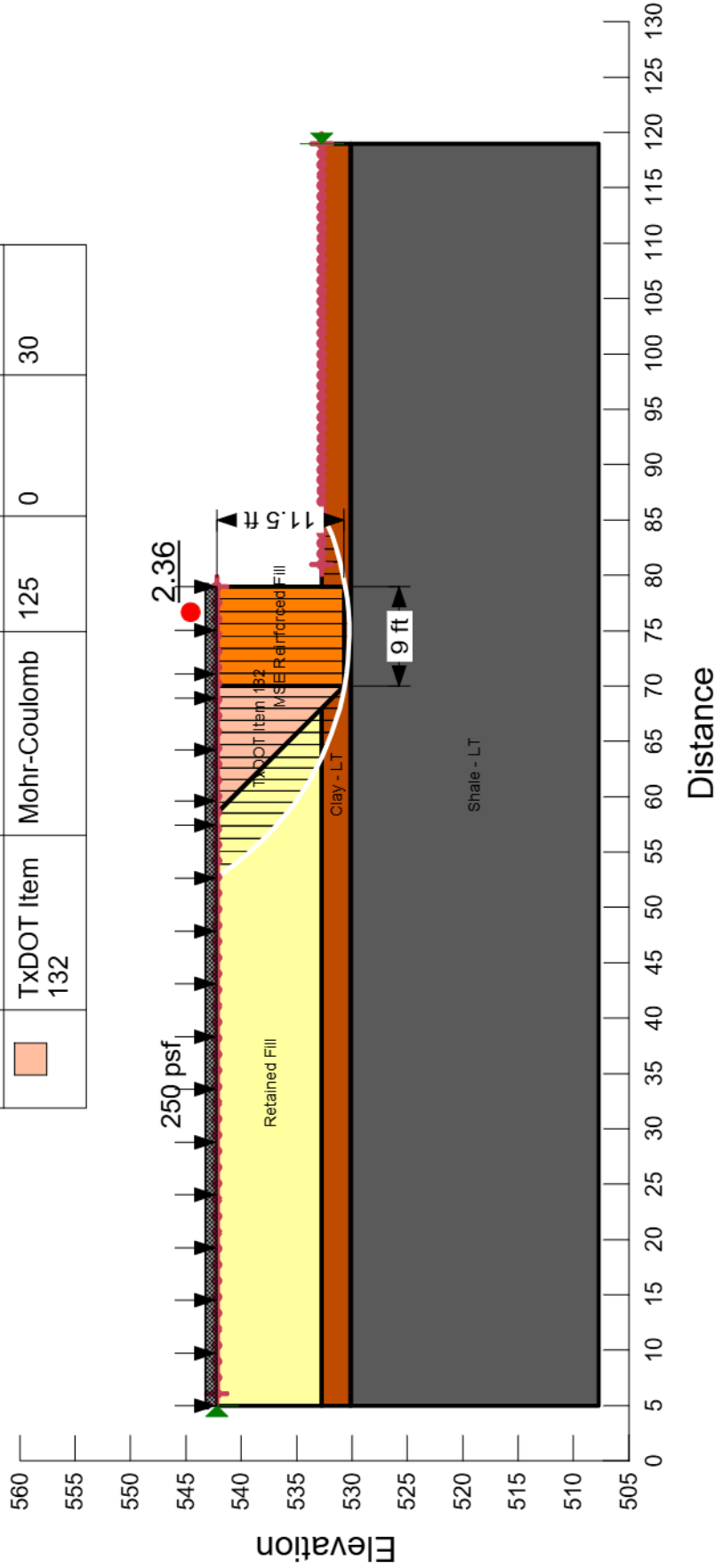
(2) H = Wall Height. The minimum required strap length for all walls should be 8 feet, or the indicated percentage of wall height, whichever is larger unless otherwise indicated above.

## **APPENDIX H – GLOBAL STABILITY OUTPUTS**

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall A  
 Analysis at STA 11+10  
 Exposed Wall Height = 9.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 11.5 feet  
 Strap Length = 9 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	25
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TXDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term






Retaining Wall A - STA 11+10 - 11.5 foot-high.gsz

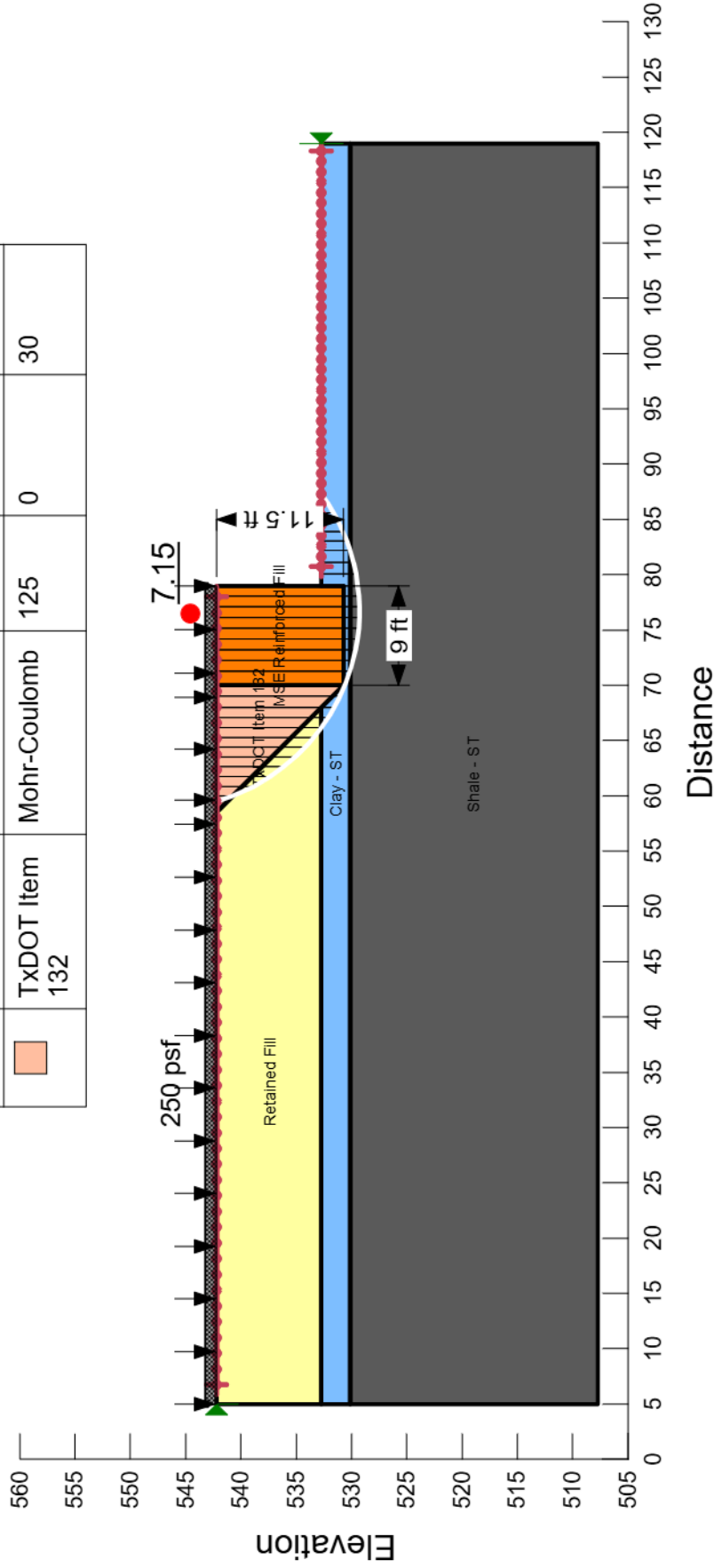
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall A  
 Analysis at STA 11+10  
 Exposed Wall Height = 9.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 11.5 feet  
 Strap Length = 9 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - ST	Mohr-Coulomb	125	2,500	0.01
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - ST	Mohr-Coulomb	130	3,000	0.01
	TXDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Short-Term






Retaining Wall A - STA 11+10 - 11.5 foot-high.gsz

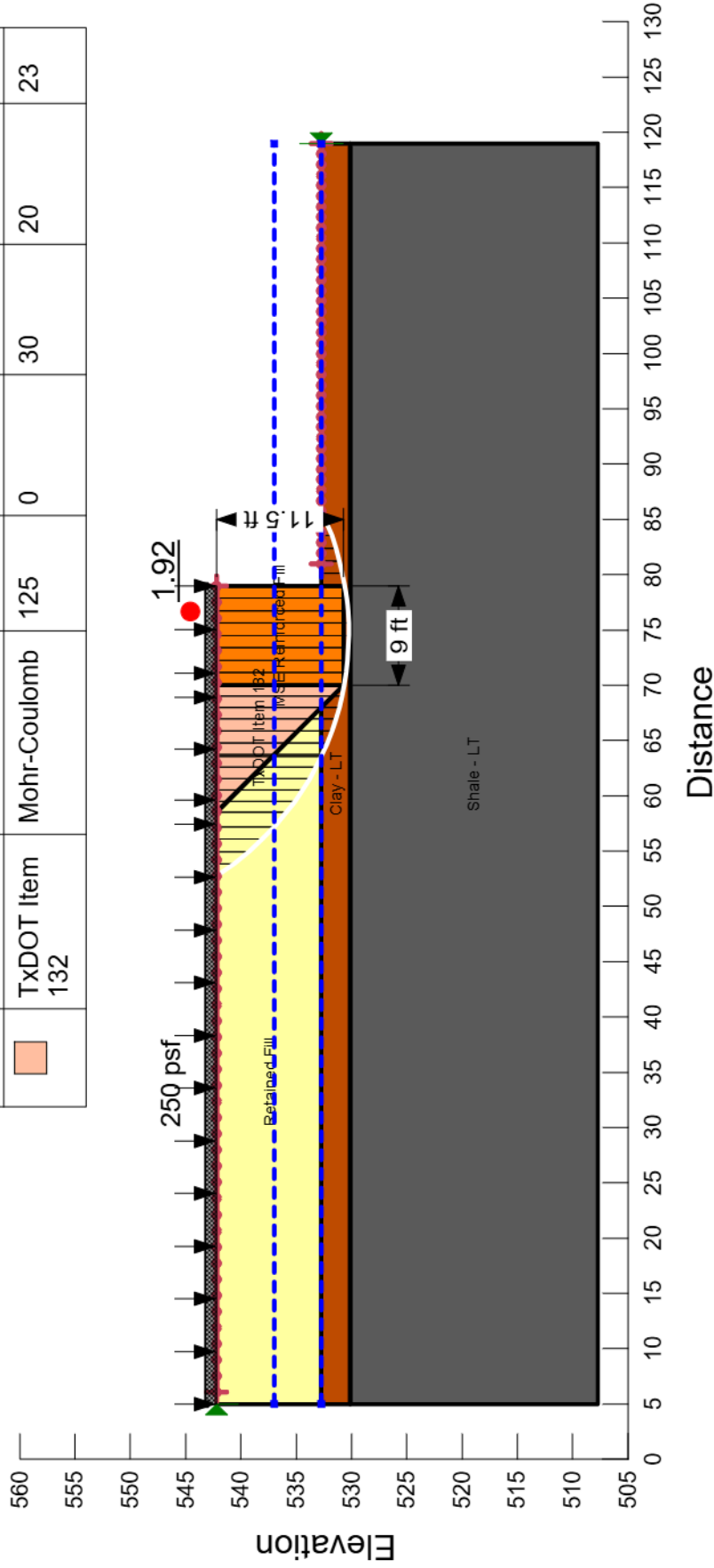
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall A  
 Analysis at STA 11+10  
 Exposed Wall Height = 9.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 11.5 feet  
 Strap Length = 9 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	25	75	18
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TXDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown

Retaining Wall A - STA 11+10 - 11.5 foot-high.gsz

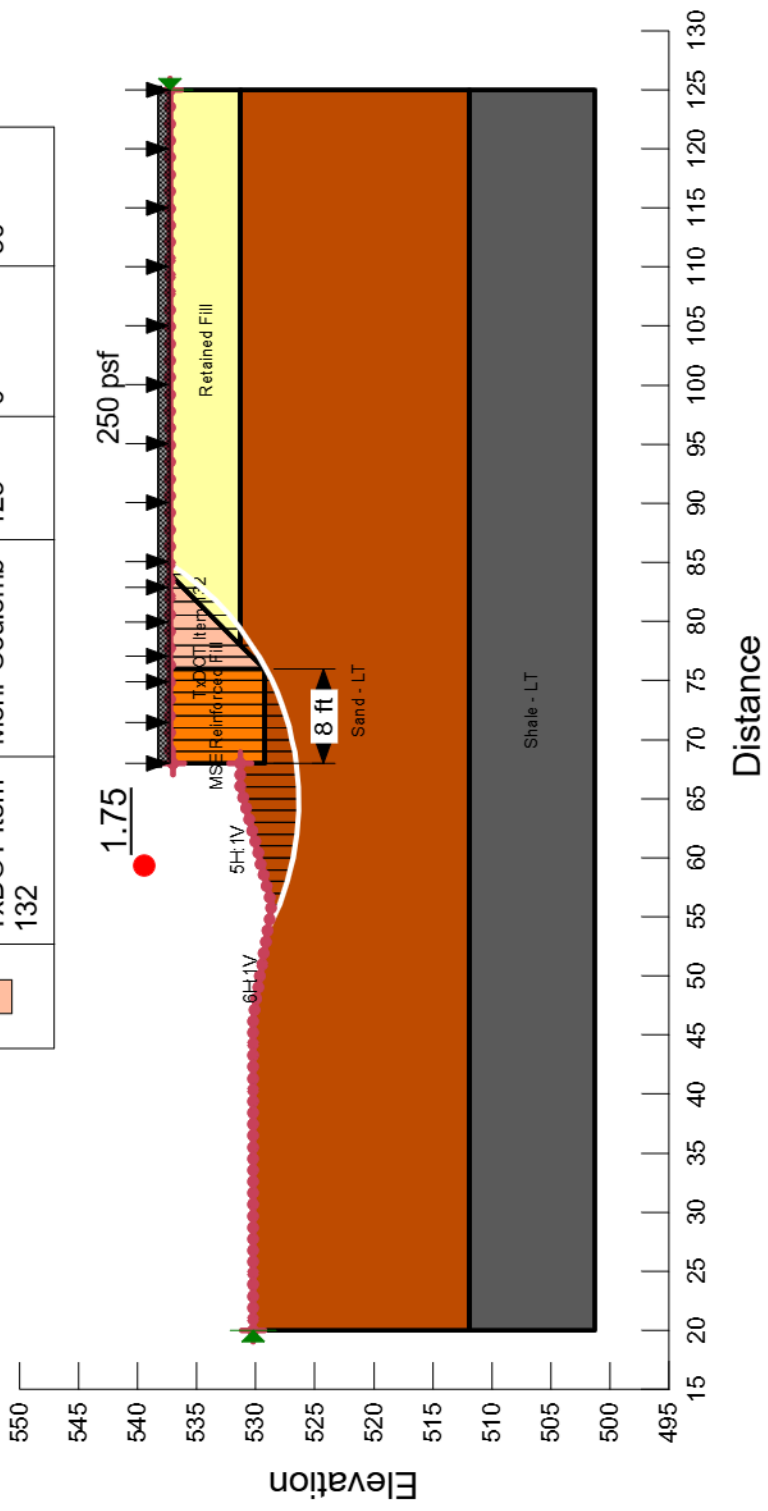
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall B  
 Analysis at STA 10+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Brown	Sand - LT	Mohr-Coulomb	125	0	29
Grey	Shale - LT	Mohr-Coulomb	130	300	30
Pink	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall B - STA 10+40 - 8-foot-high.gsz

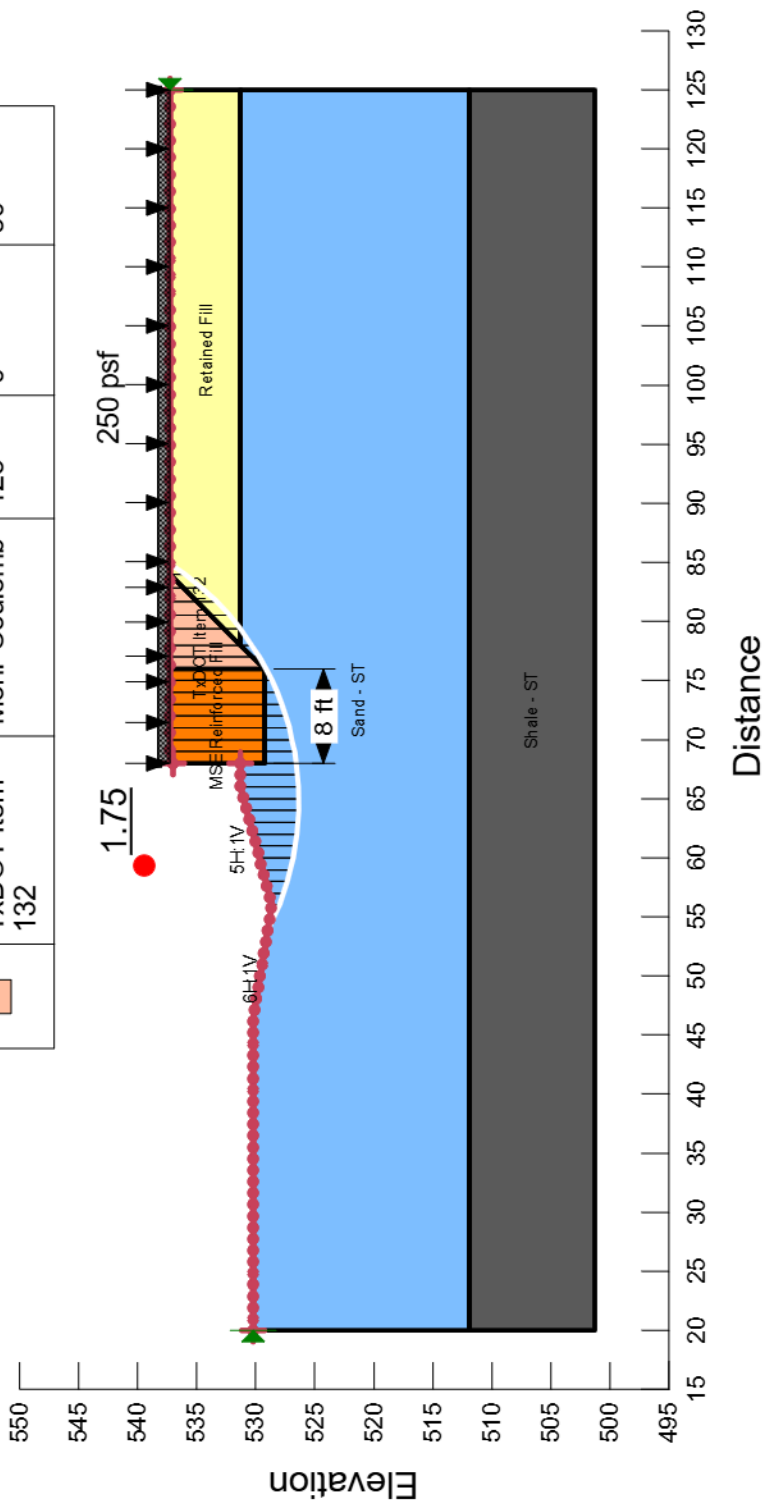
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall B  
 Analysis at STA 10+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	29
Grey	Shale - ST	Mohr-Coulomb	130	3,000	0.01
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term






Retaining Wall B - STA 10+40 - 8-foot-high.gsz

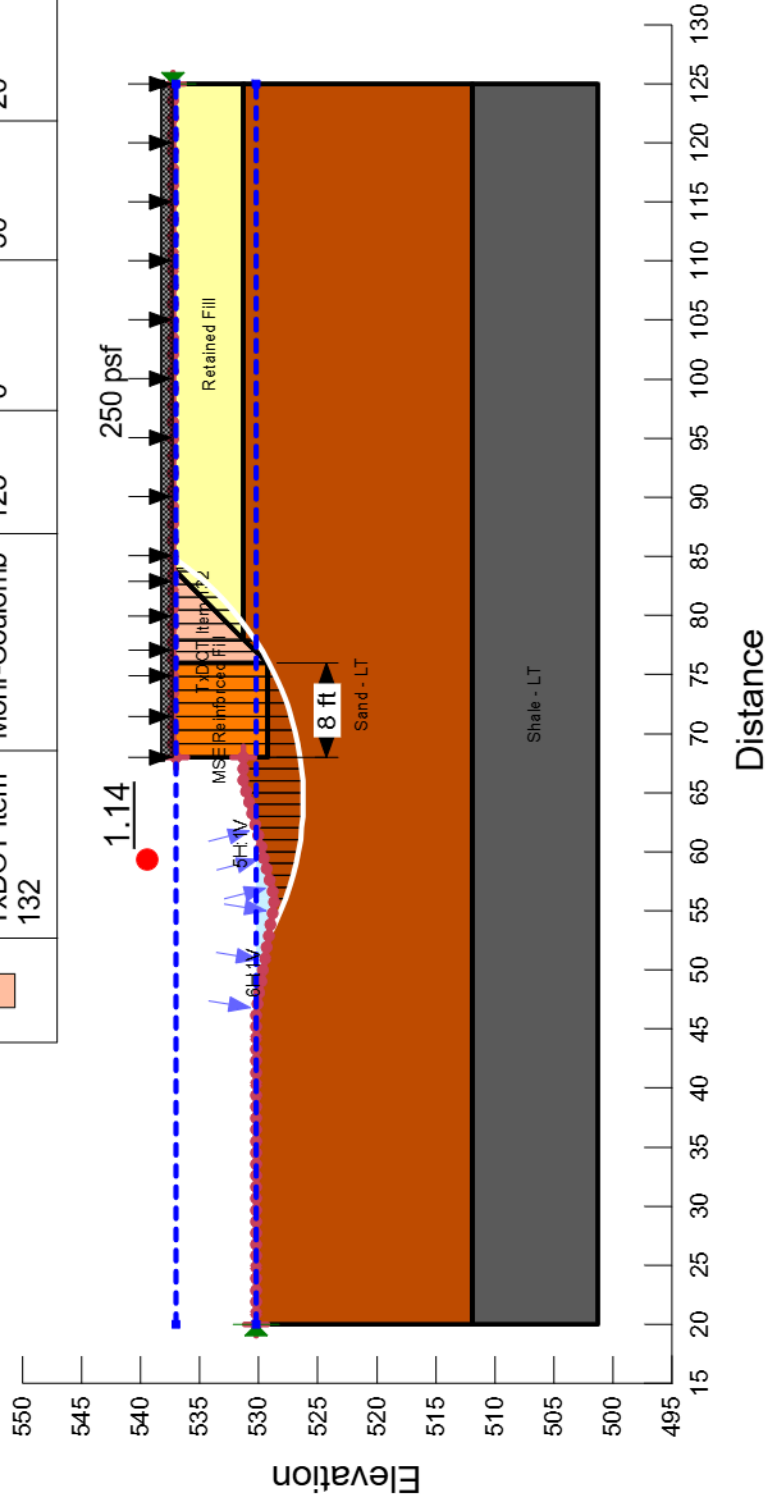
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall B  
 Analysis at STA 10+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	29	20	22
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown

Retaining Wall B - STA 10+40 - 8-foot-high.gsz

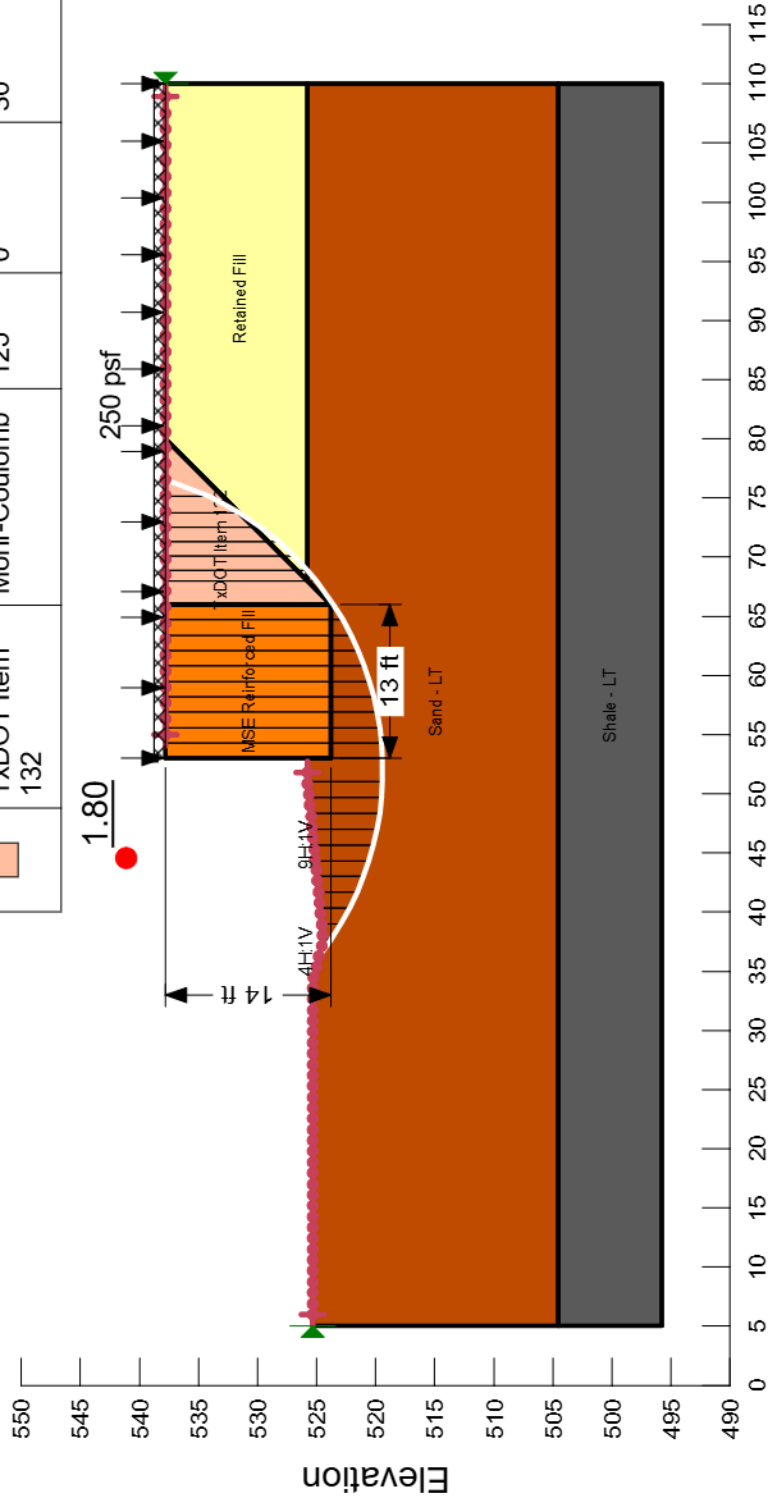
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall B  
 Analysis at STA 11+50  
 Exposed Wall Height = 12 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 14 feet  
 Strap Length = 13 feet (0.95H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Brown	Sand - LT	Mohr-Coulomb	125	0	29
Grey	Shale - LT	Mohr-Coulomb	130	300	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Long-Term

Retaining Wall B - STA 10+40 - 14-foot-high.gsz

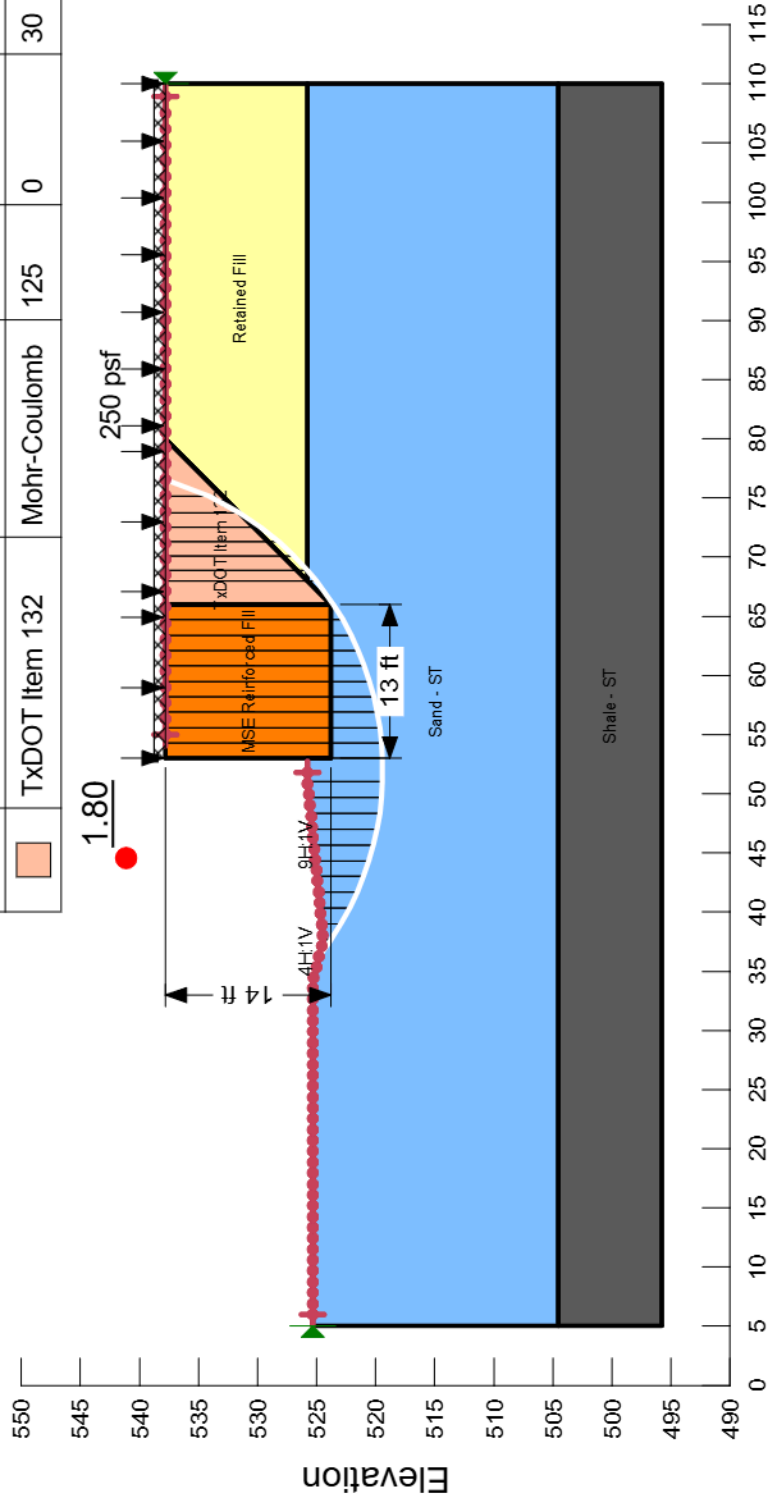
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall B  
 Analysis at STA 11+50  
 Exposed Wall Height = 12 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 14 feet  
 Strap Length = 13 feet (0.95H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	29
Grey	Shale - ST	Mohr-Coulomb	130	3,000	0.01
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Short-Term

Retaining Wall B - STA 10+40 - 14-foot-high.gsz

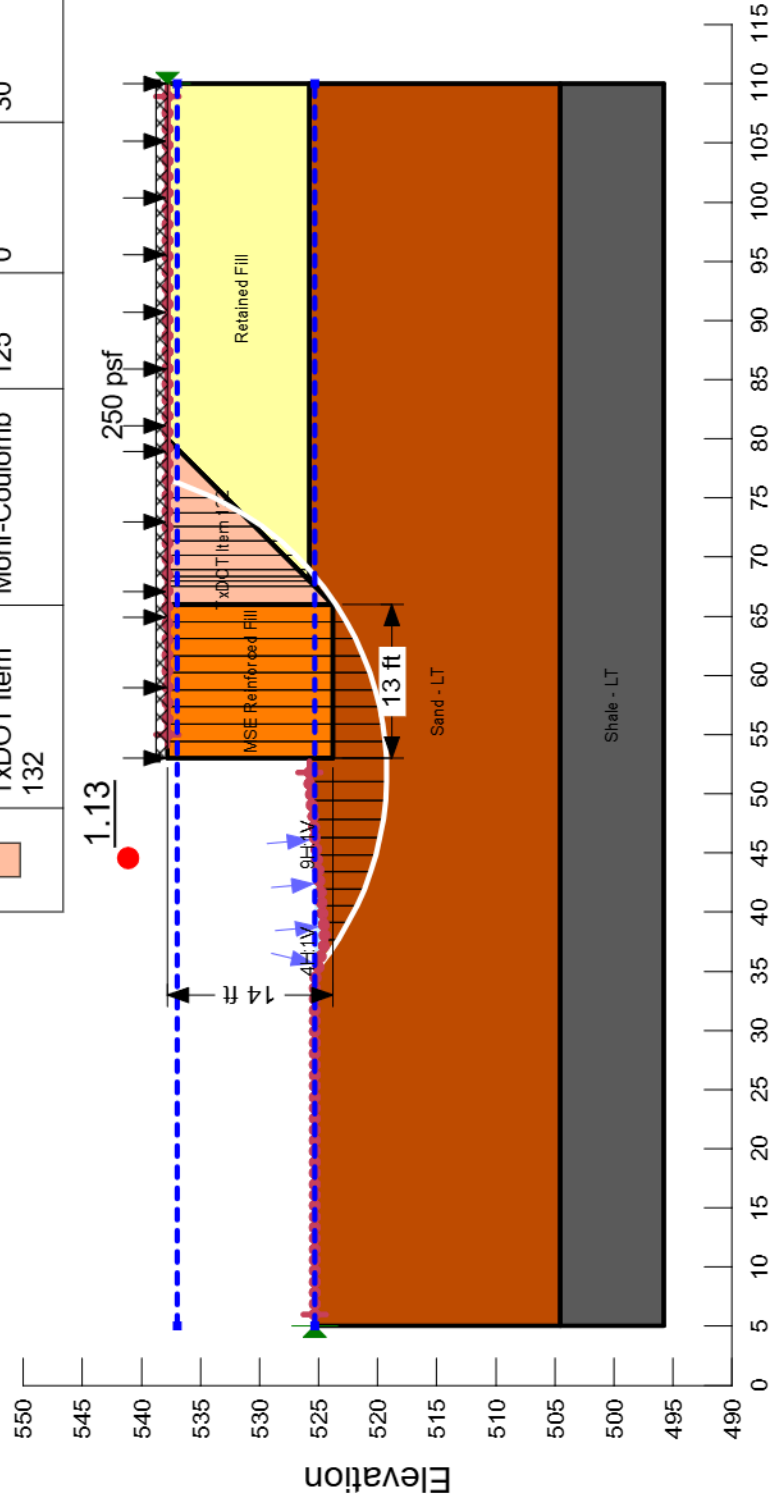
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall B  
 Analysis at STA 11+50  
 Exposed Wall Height = 12 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 14 feet  
 Strap Length = 13 feet (0.95H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	29	20	22
Grey	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Distance

Slope Stability - Rapid Drawdown






Retaining Wall B - STA 10+40 - 14-foot-high.gsz

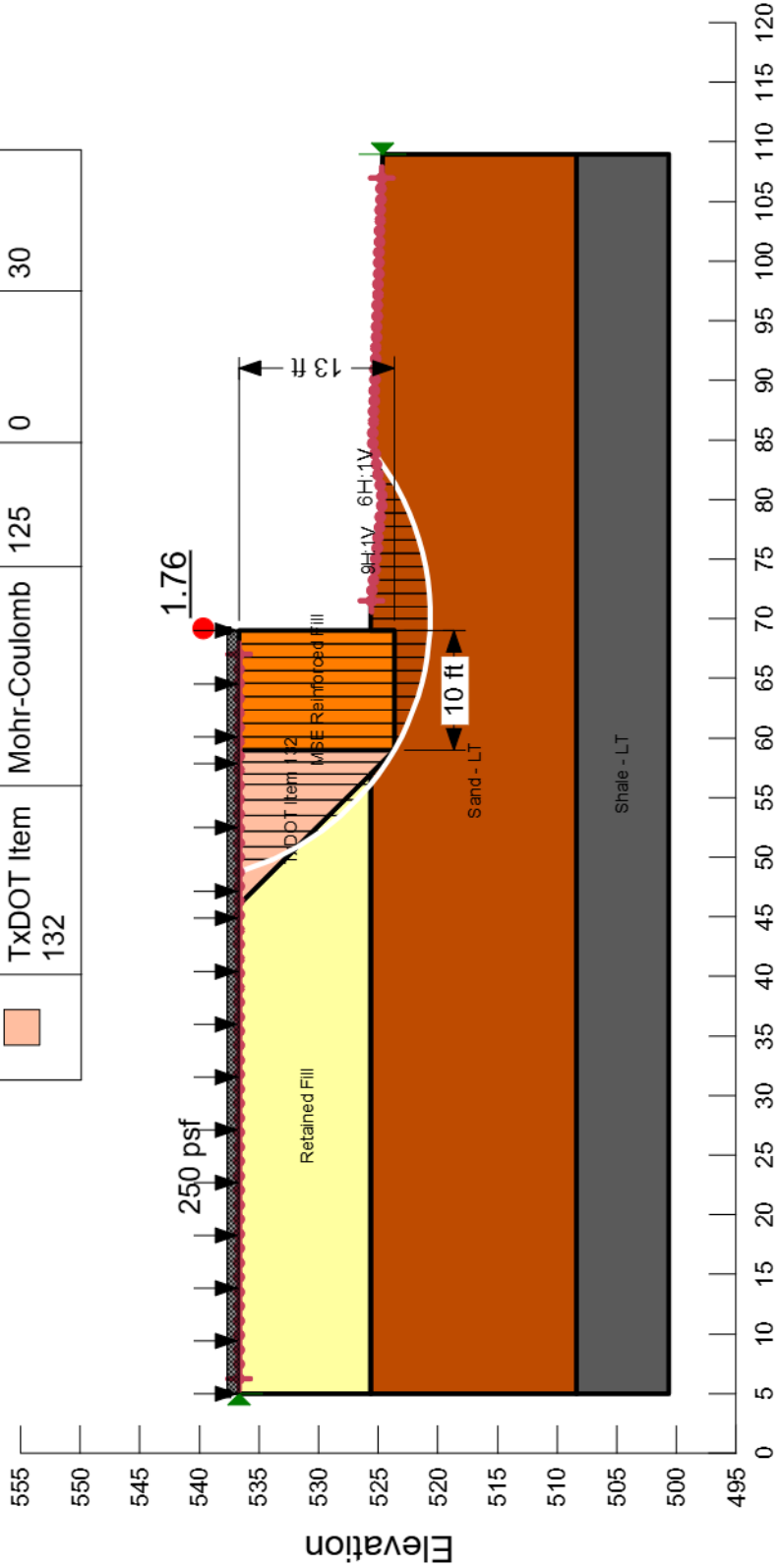
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall C  
 Analysis at STA 10+15  
 Exposed Wall Height = 11 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 13 feet  
 Strap Length = 10 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Long-Term

Retaining Wall C - STA 10+15 - 13 foot-high.gsz

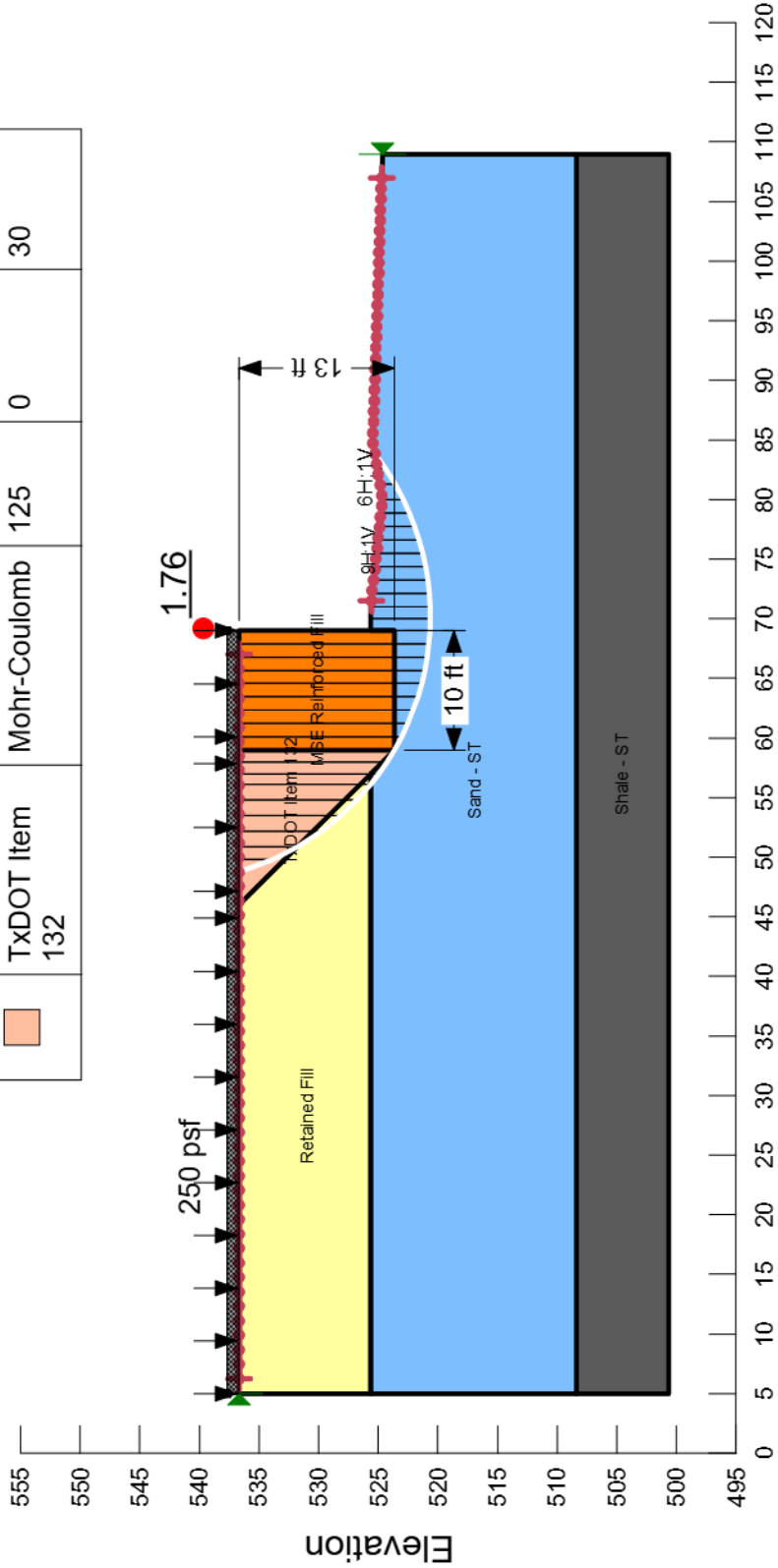
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall C  
 Analysis at STA 10+15  
 Exposed Wall Height = 11 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 13 feet  
 Strap Length = 10 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	30
Grey	Shale - ST	Mohr-Coulomb	130	3,000	0.01
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Short-Term






Retaining Wall C - STA 10+15 - 13 foot-high.gsz

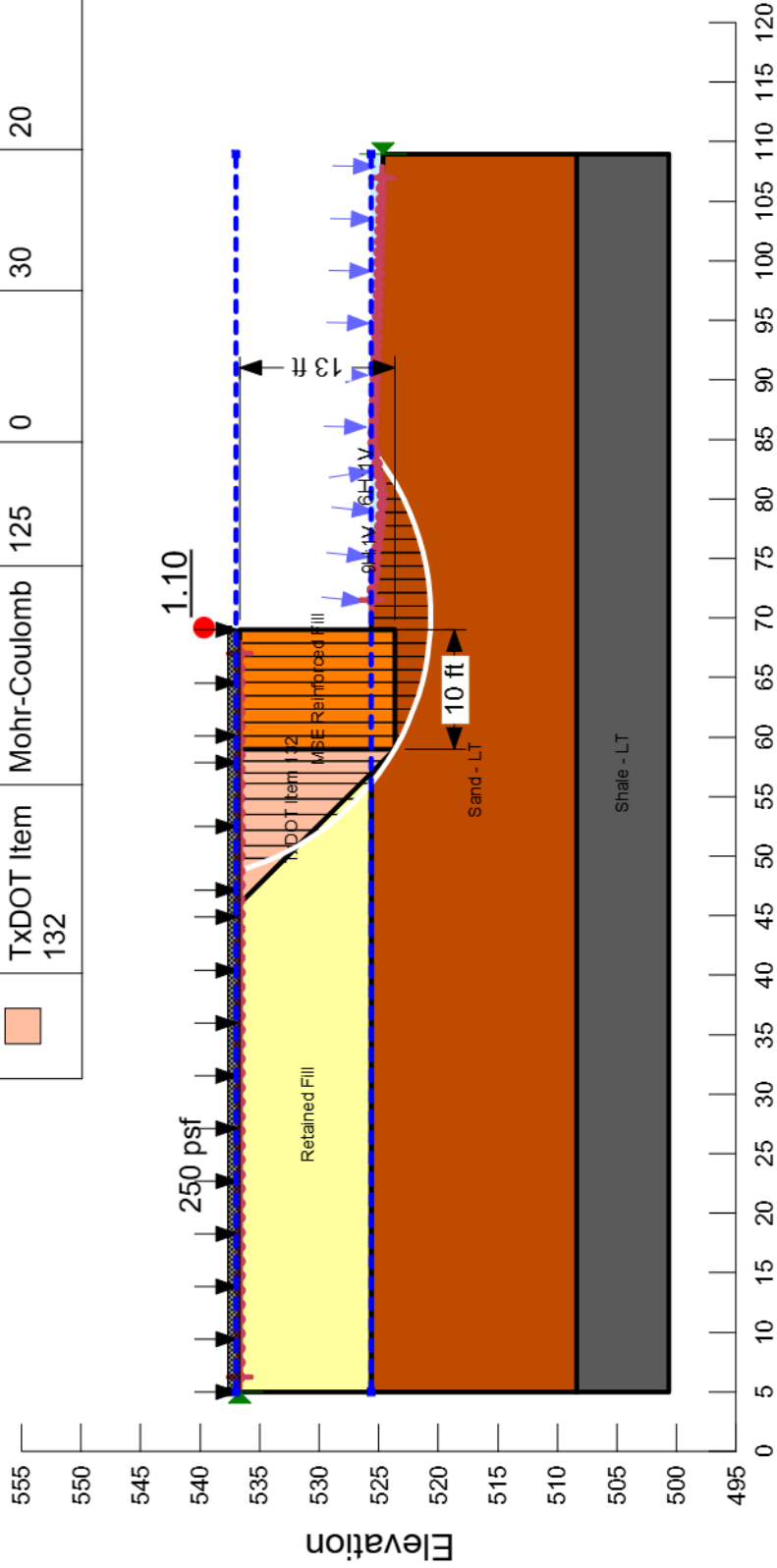
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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall C  
 Analysis at STA 10+15  
 Exposed Wall Height = 11 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 13 feet  
 Strap Length = 10 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	30	20	23
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Distance

Slope Stability - Rapid Drawdown






Retaining Wall C - STA 10+15 - 13 foot-high.gsz

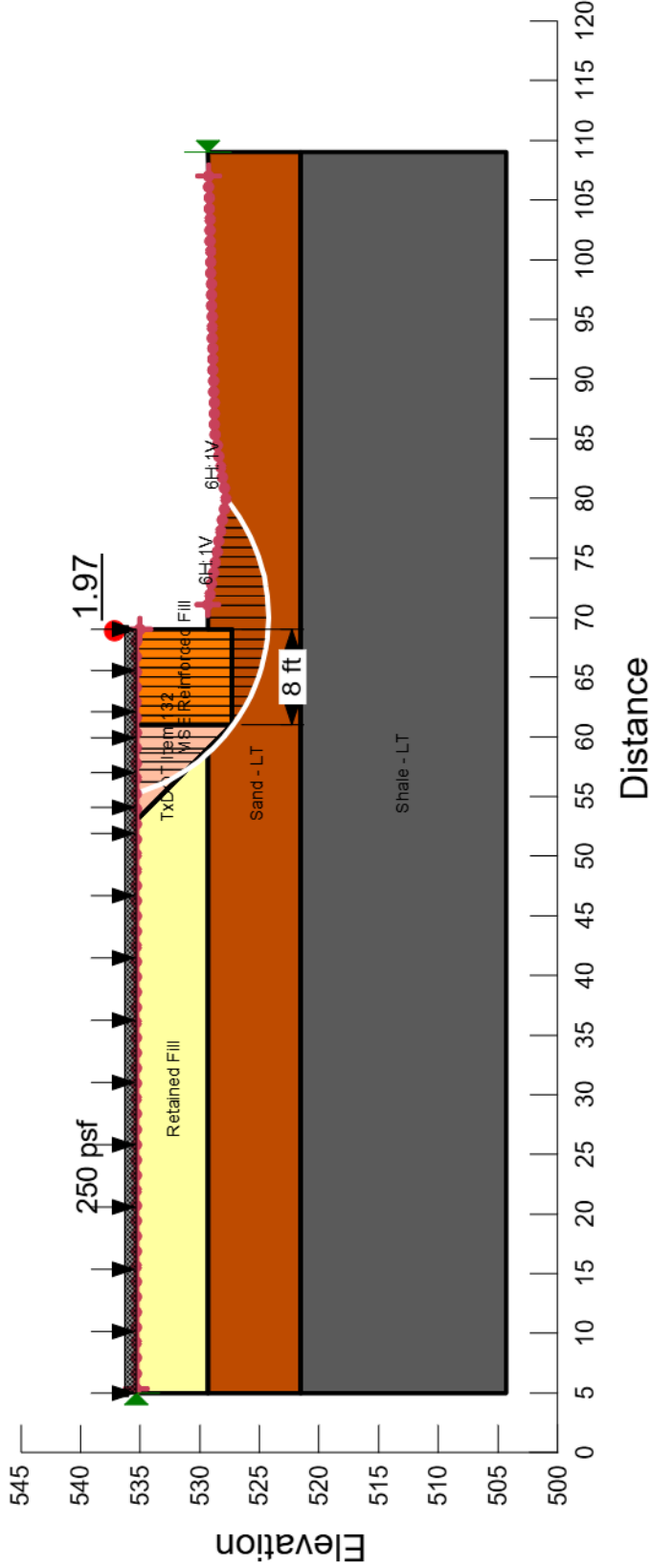
09/17/2024

1:190

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall C  
 Analysis at STA 11+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall C - STA 11+40 - 8 foot-high.gsz

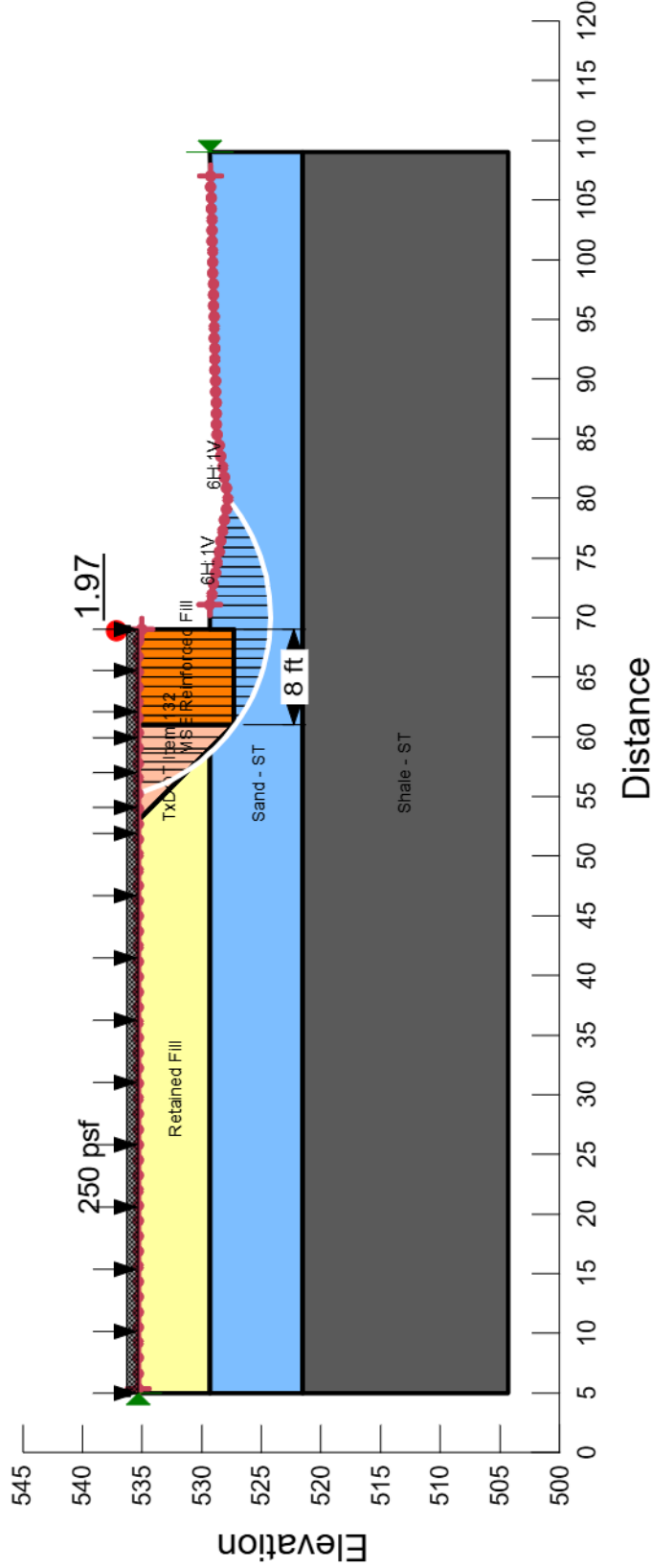
09/17/2024

1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall C  
 Analysis at STA 11+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	30
Grey	Shale - ST	Mohr-Coulomb	130	3,000	0.01
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall C - STA 11+40 - 8 foot-high.gsz

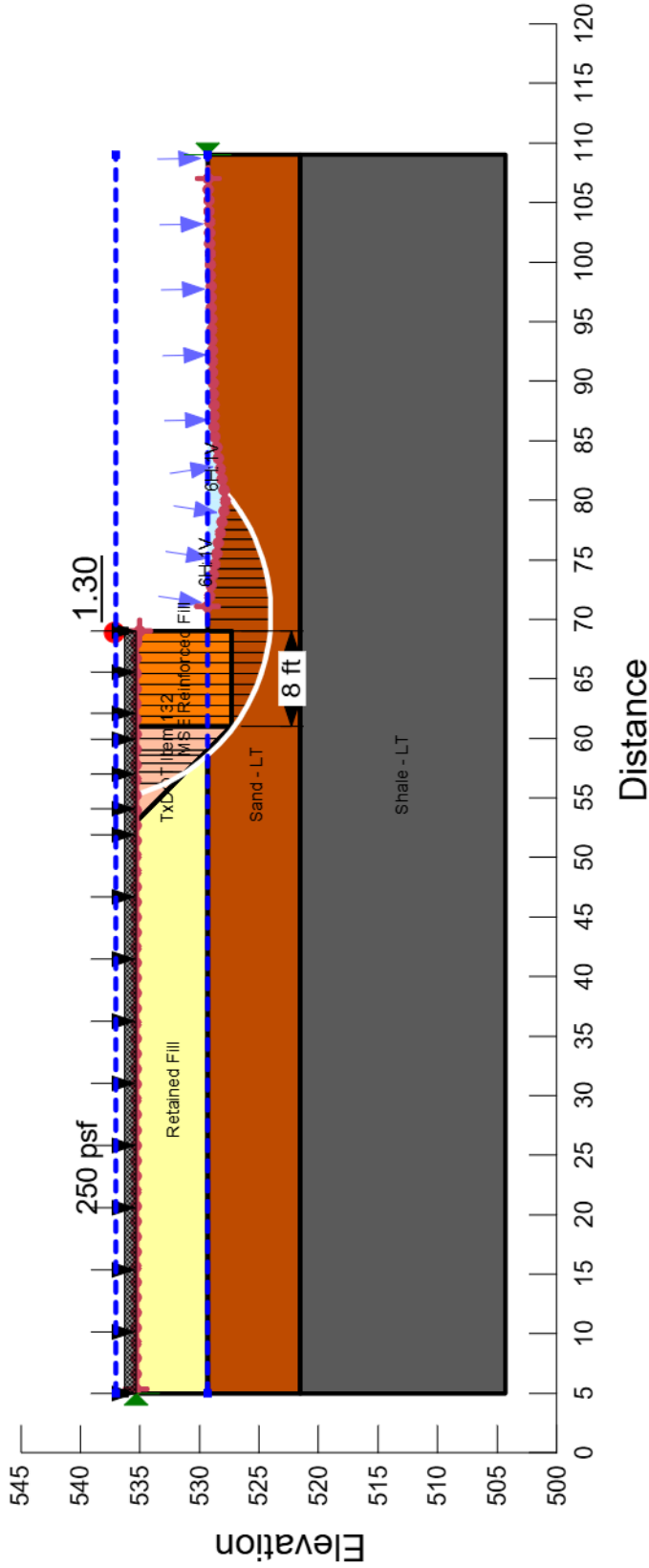
09/17/2024

1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall C  
 Analysis at STA 11+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	30	20	23
Grey	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown






Retaining Wall C - STA 11+40 - 8 foot-high.gsz

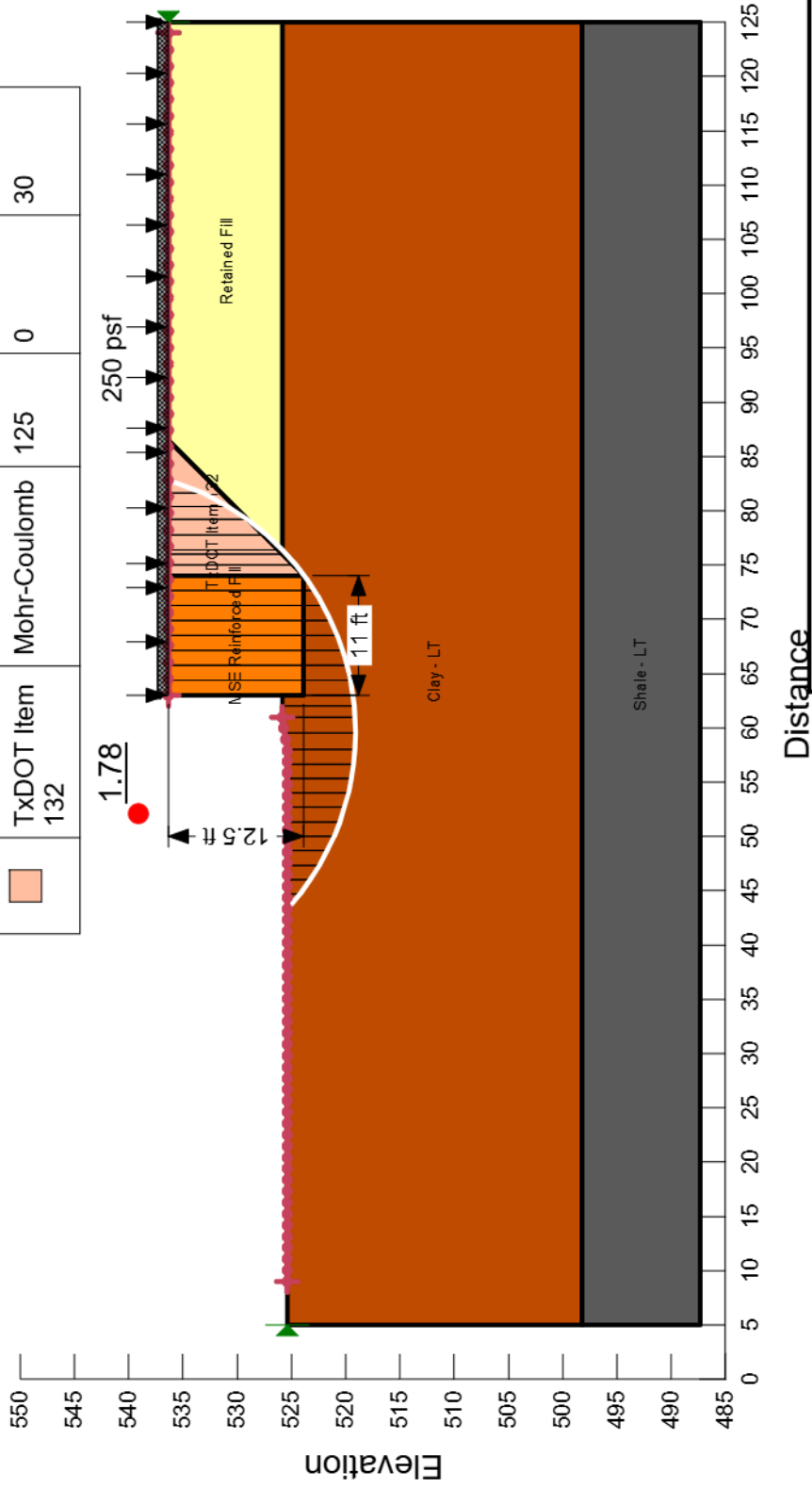
09/17/2024

1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall D  
 Analysis at STA 10+15  
 Exposed Wall Height = 10.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12.5 feet  
 Strap Length = 11 feet (0.85H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	26
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30

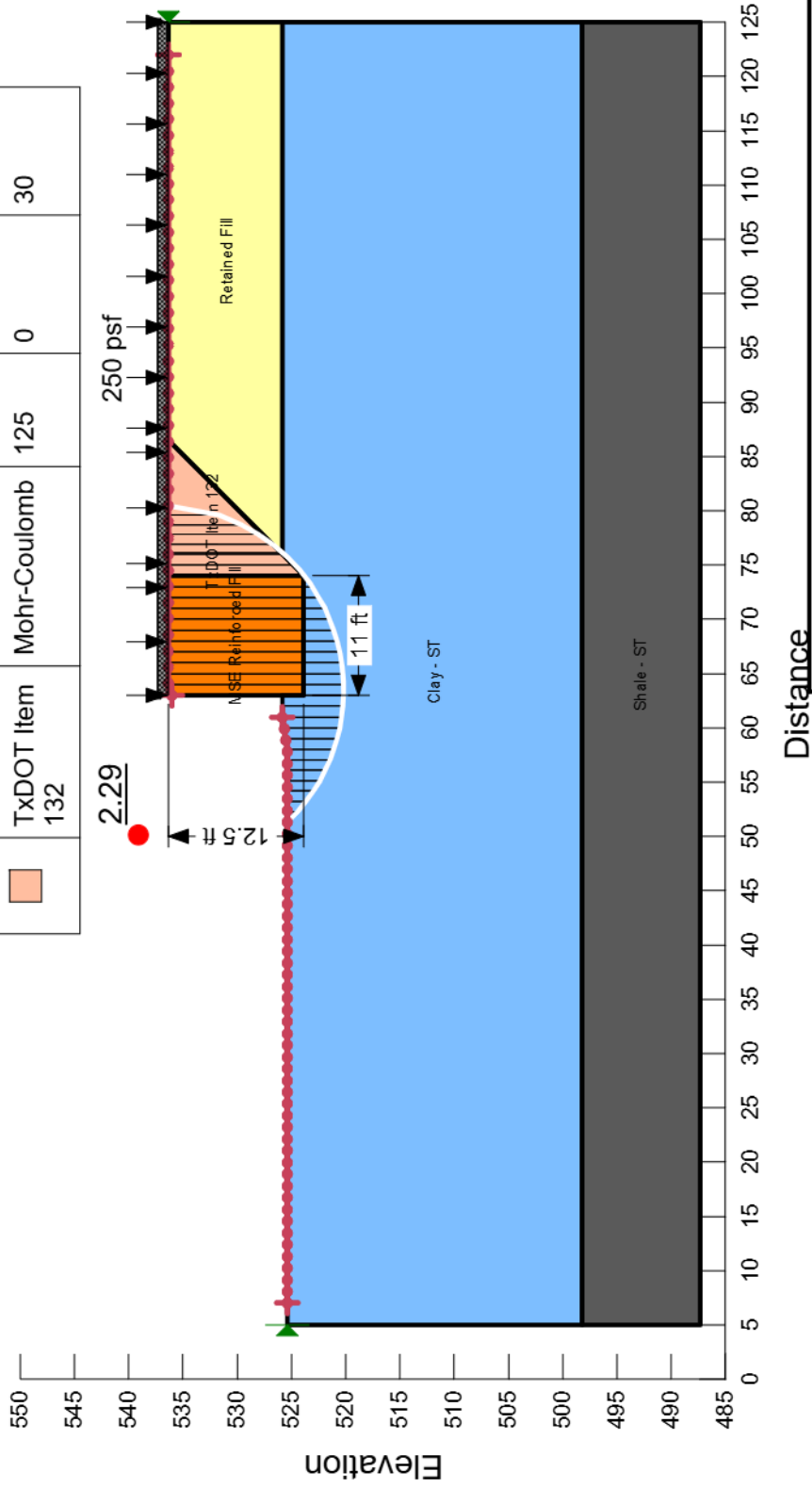


<b>Distance</b>	
Slope Stability - Long-Term	
Retaining Wall D - STA 10+15 - 12.5-foot-high.gsz	
09/17/2024	
1:200	

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall D  
 Analysis at STA 10+15  
 Exposed Wall Height = 10.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12.5 feet  
 Strap Length = 11 feet (0.85H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Blue	Clay - ST	Mohr-Coulomb	125	900	0.01
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Grey	Shale - ST	Mohr-Coulomb	130	3,000	0.01
Light Blue	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall D - STA 10+15 - 12.5-foot-high.gsz

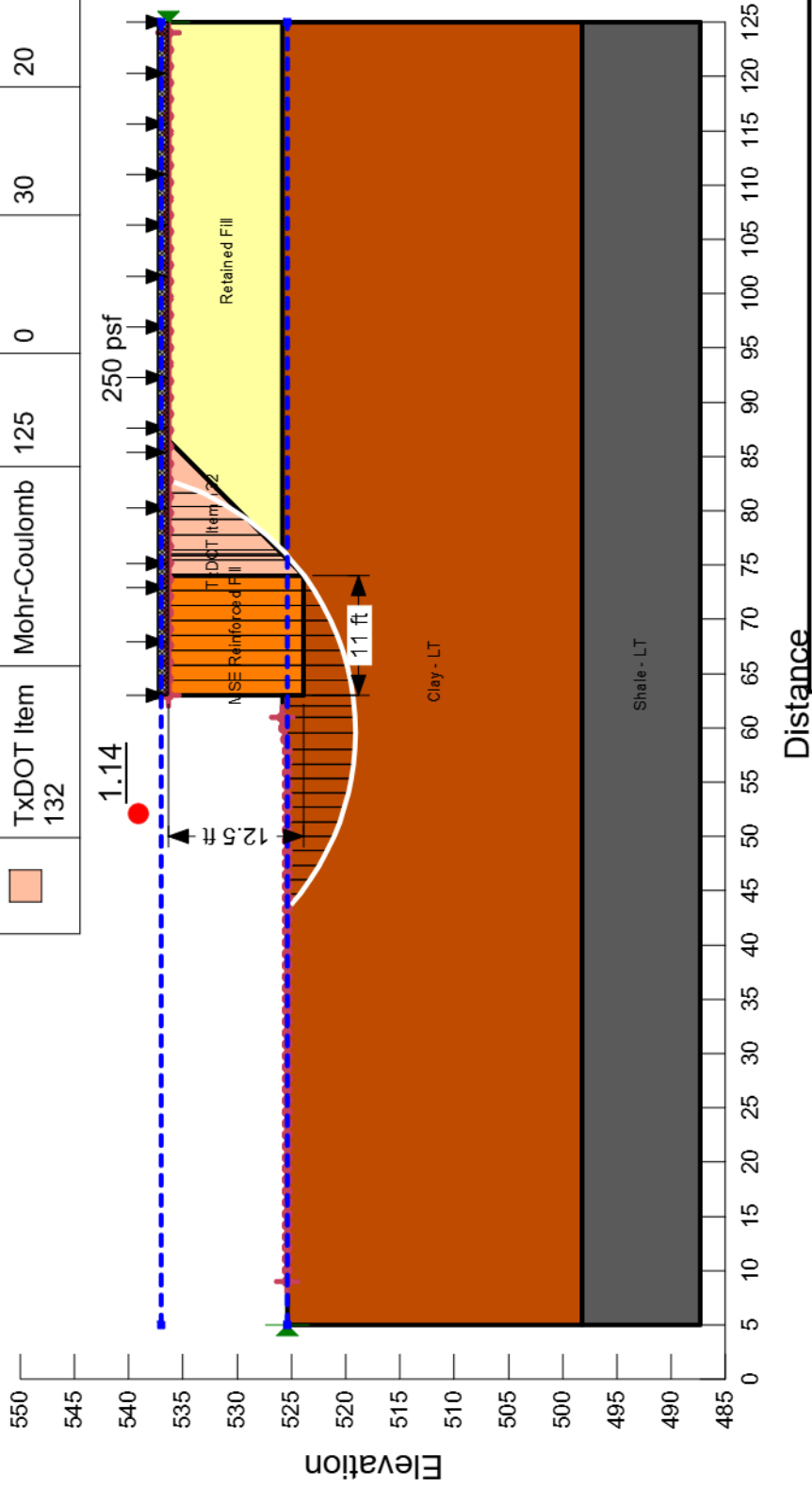
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall D  
 Analysis at STA 10+15  
 Exposed Wall Height = 10.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12.5 feet  
 Strap Length = 11 feet (0.85H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	Clay - LT	Mohr-Coulomb	125	50	26	75	19
Light Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Dark Grey	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Distance

Slope Stability - Rapid Drawdown






Retaining Wall D - STA 10+15 - 12.5-foot-high.gsz

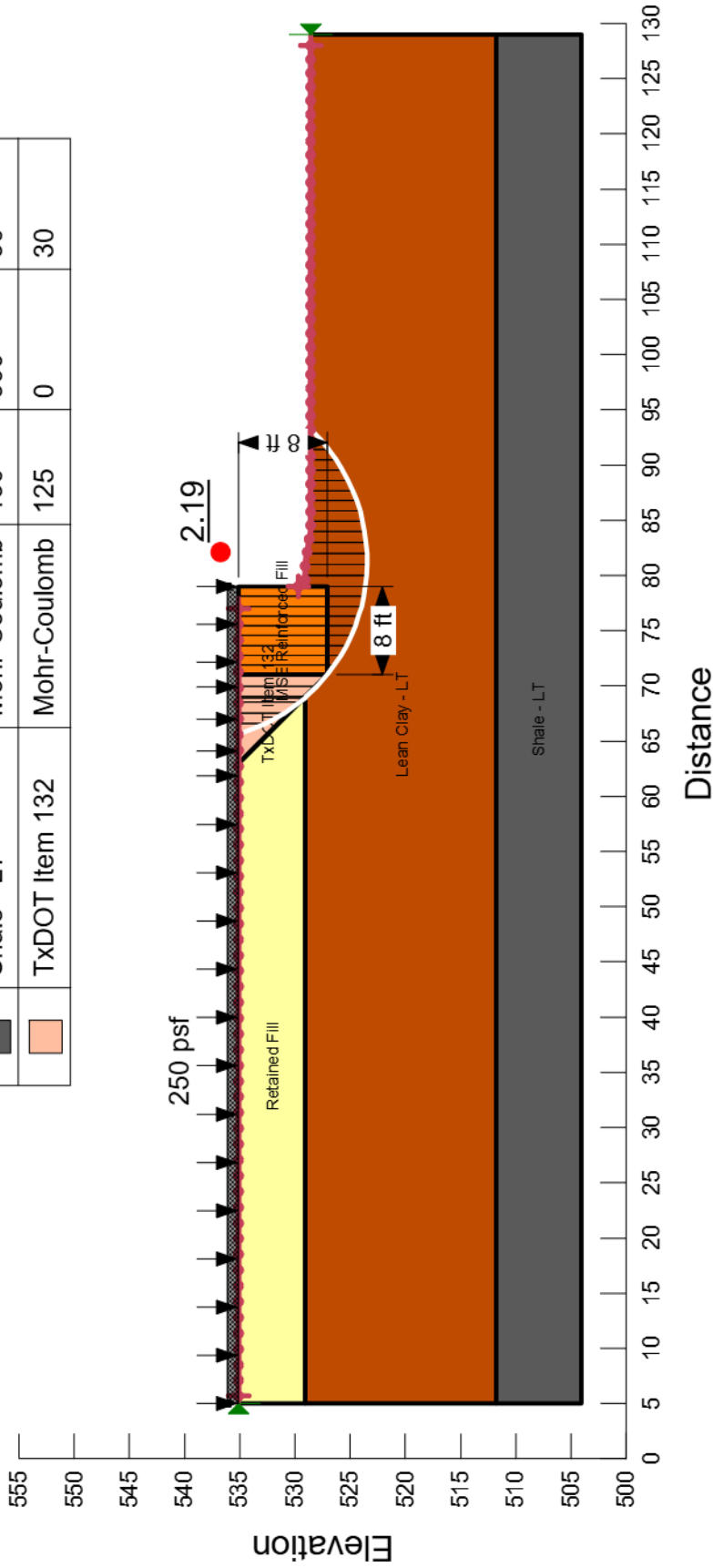
09/17/2024

1:200

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall E  
 Analysis at STA 10+80  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Lean Clay - LT	Mohr-Coulomb	125	50	28
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TXDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term






Retaining Wall E - STA 10+80 - 8-foot-high.gsz

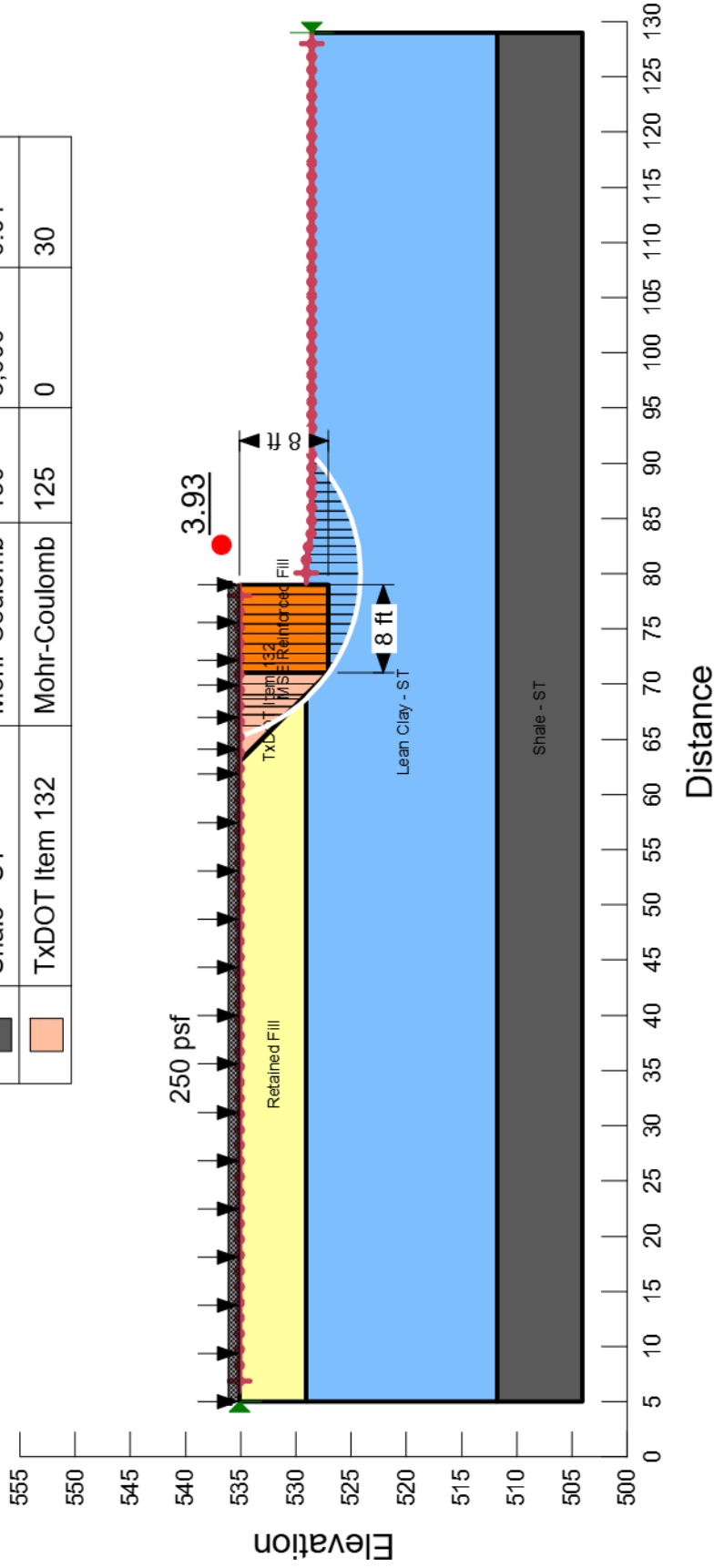
09/17/2024

1:190

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall E  
 Analysis at STA 10+80  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Lean Clay - ST	Mohr-Coulomb	125	1,000	0.01
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - ST	Mohr-Coulomb	130	3,000	0.01
	TXDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term






Retaining Wall E - STA 10+80 - 8-foot-high.gsz

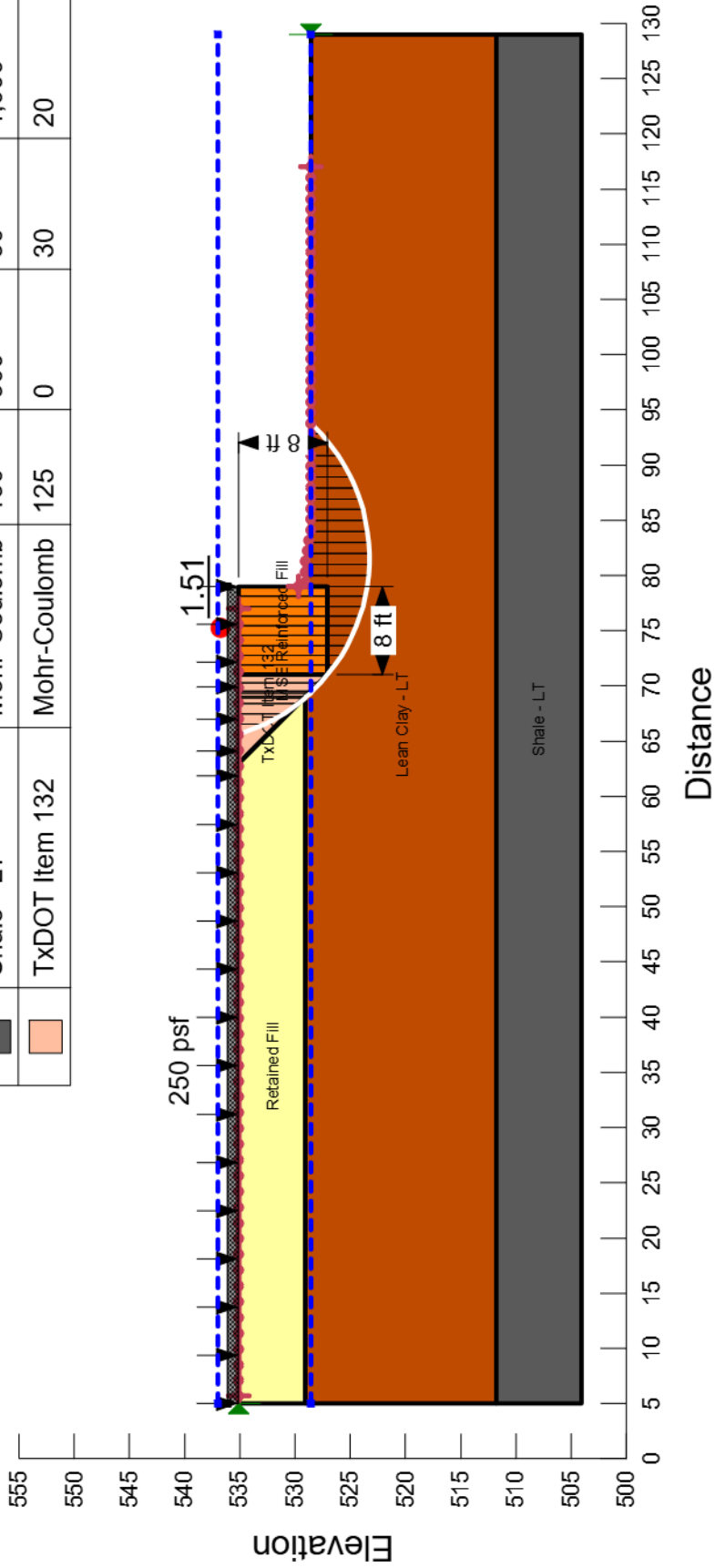
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall E  
 Analysis at STA 10+80  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Lean Clay - LT	Mohr-Coulomb	125	50	28	75	21
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TXDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown






Retaining Wall E - STA 10+80 - 8-foot-high.gsz

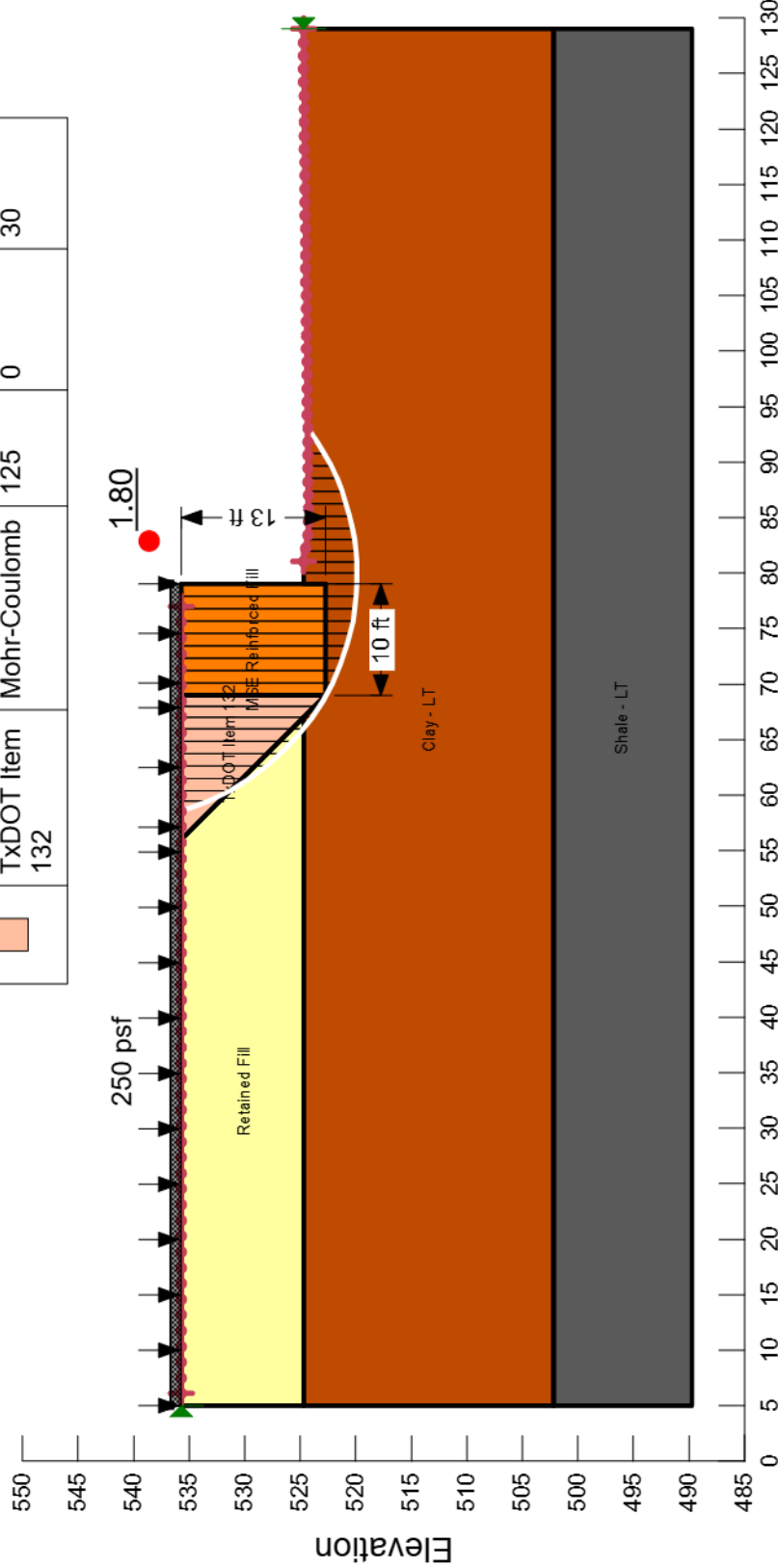
09/17/2024

1:190

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall E  
 Analysis at STA 12+04.82  
 Exposed Wall Height = 11 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 13 feet  
 Strap Length = 10 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	28
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Long-Term






Retaining Wall E - STA 12+05 - 13-foot-high.gsz

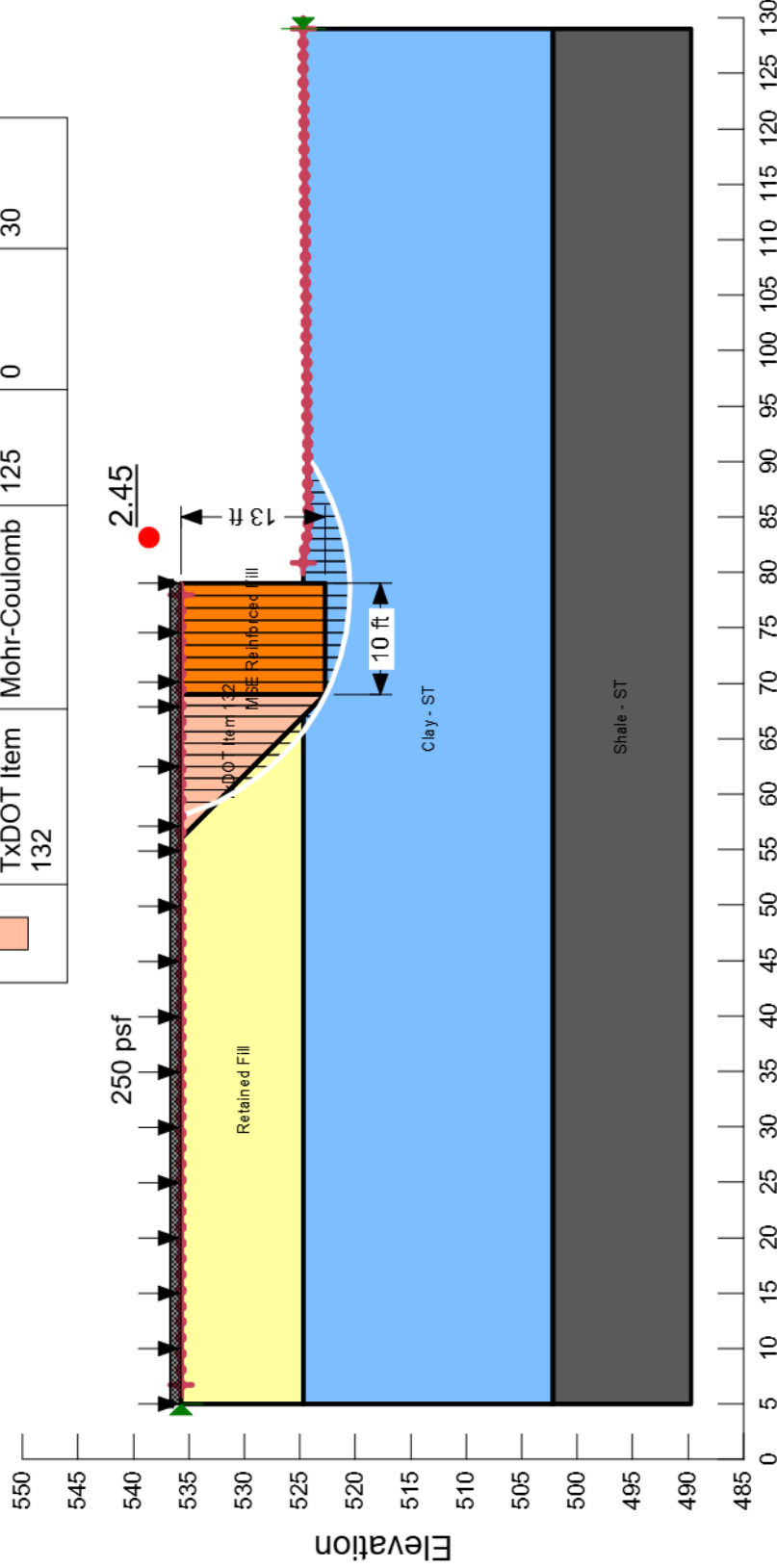
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall E  
 Analysis at STA 12+04.82  
 Exposed Wall Height = 11 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 13 feet  
 Strap Length = 10 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - ST	Mohr-Coulomb	125	1,000	0.01
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - ST	Mohr-Coulomb	130	3,000	0.01
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Distance

Slope Stability - Short-Term






Retaining Wall E - STA 12+05 - 13-foot-high.gsz

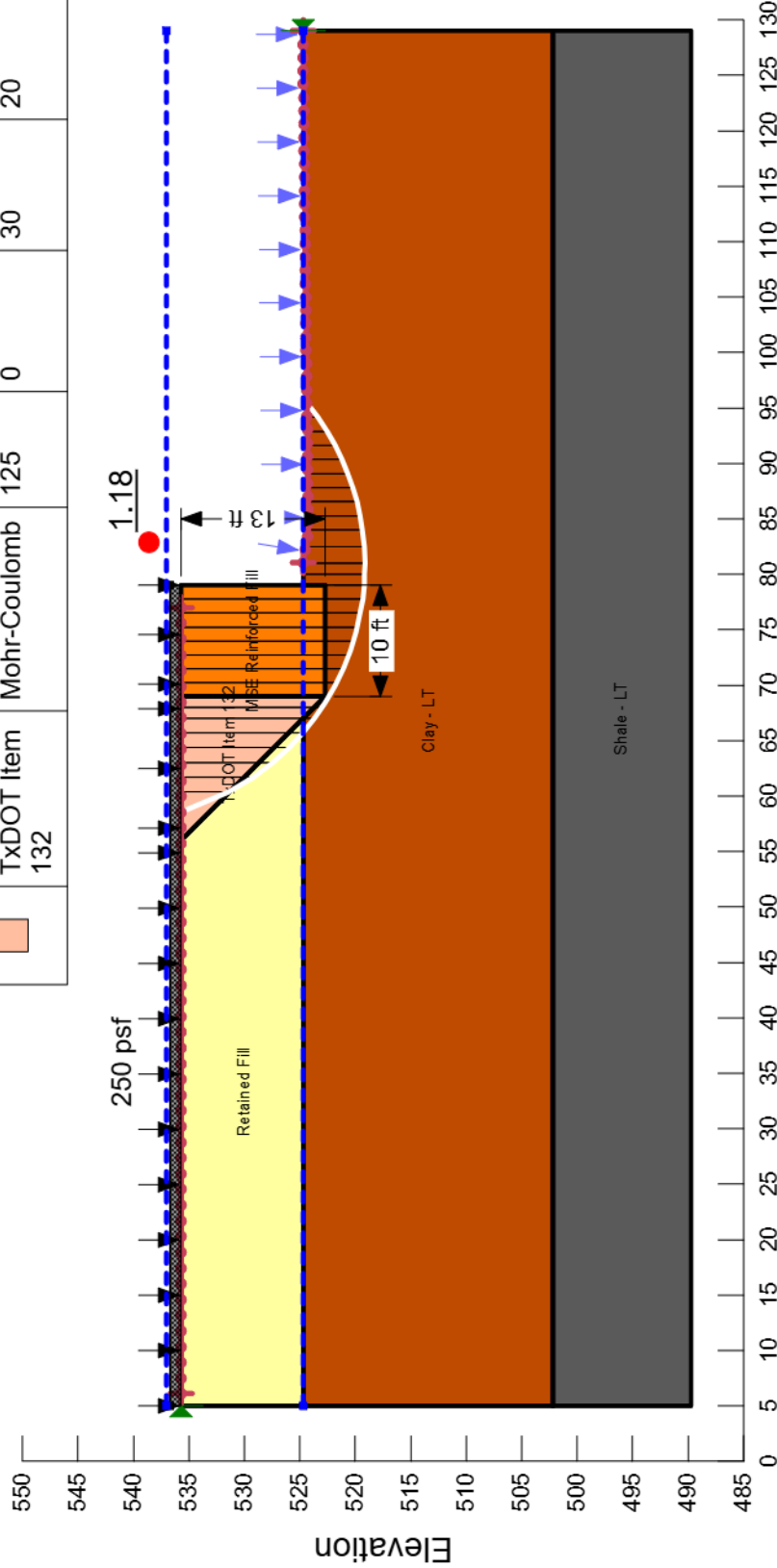
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall E  
 Analysis at STA 12+04.82  
 Exposed Wall Height = 11 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 13 feet  
 Strap Length = 10 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	28	75	21
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Distance

Slope Stability - Rapid Drawdown





Retaining Wall E - STA 12+05 - 13-foot-high.gsz

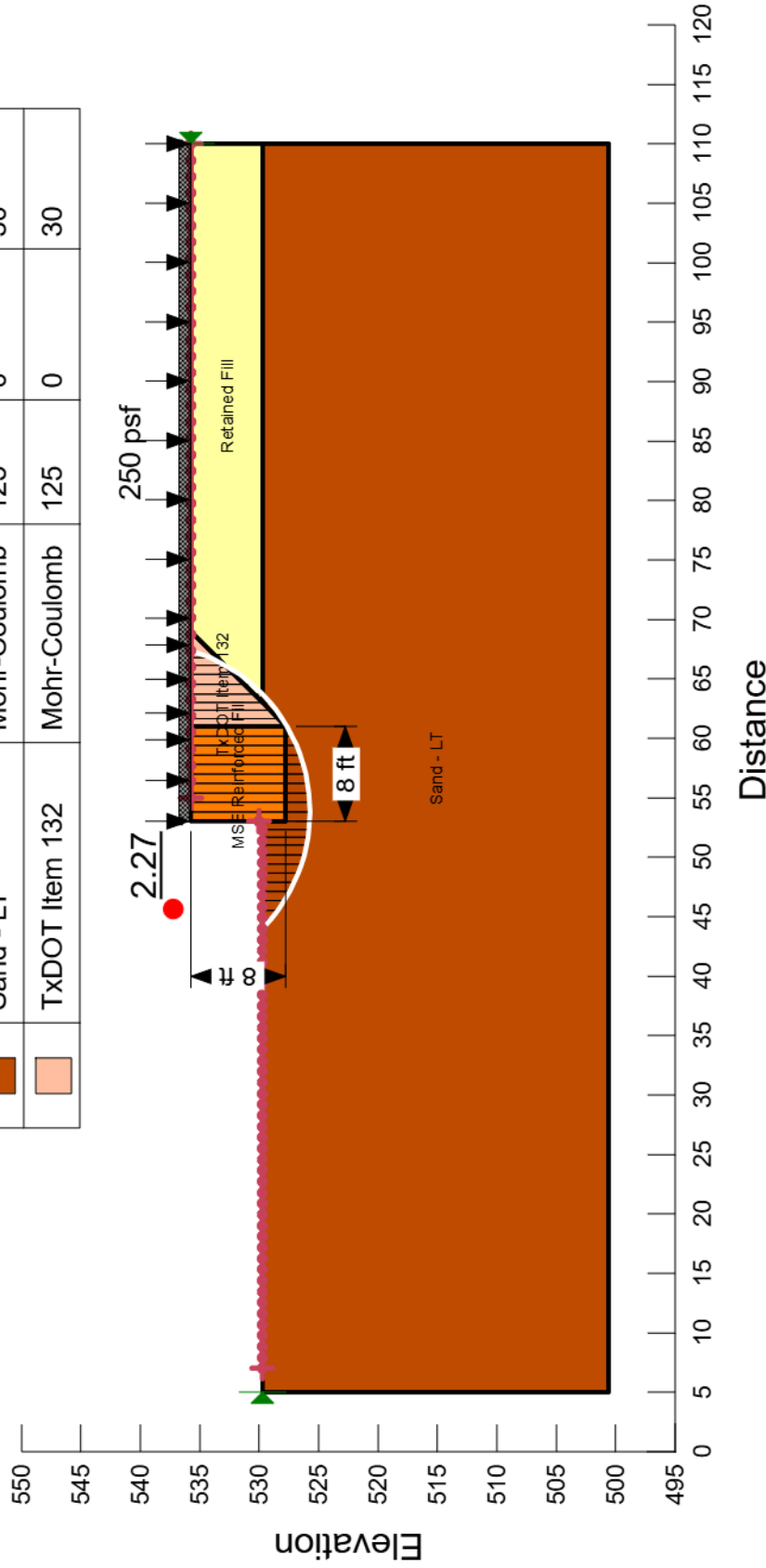
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall F  
 Analysis at STA 10+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall F - STA 10+40 - 8-foot-high.gsz

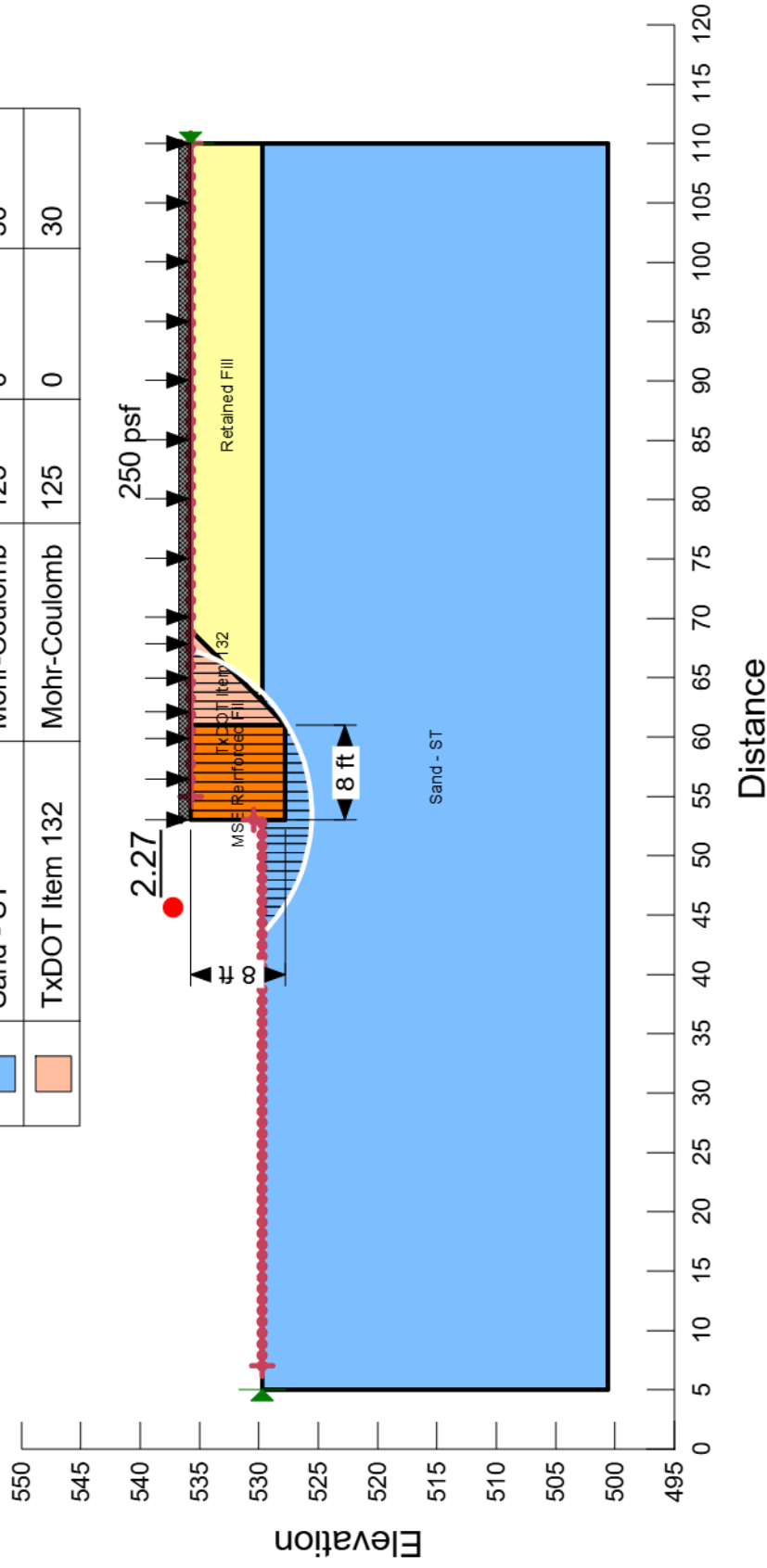
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall F  
 Analysis at STA 10+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall F - STA 10+40 - 8-foot-high.gsz

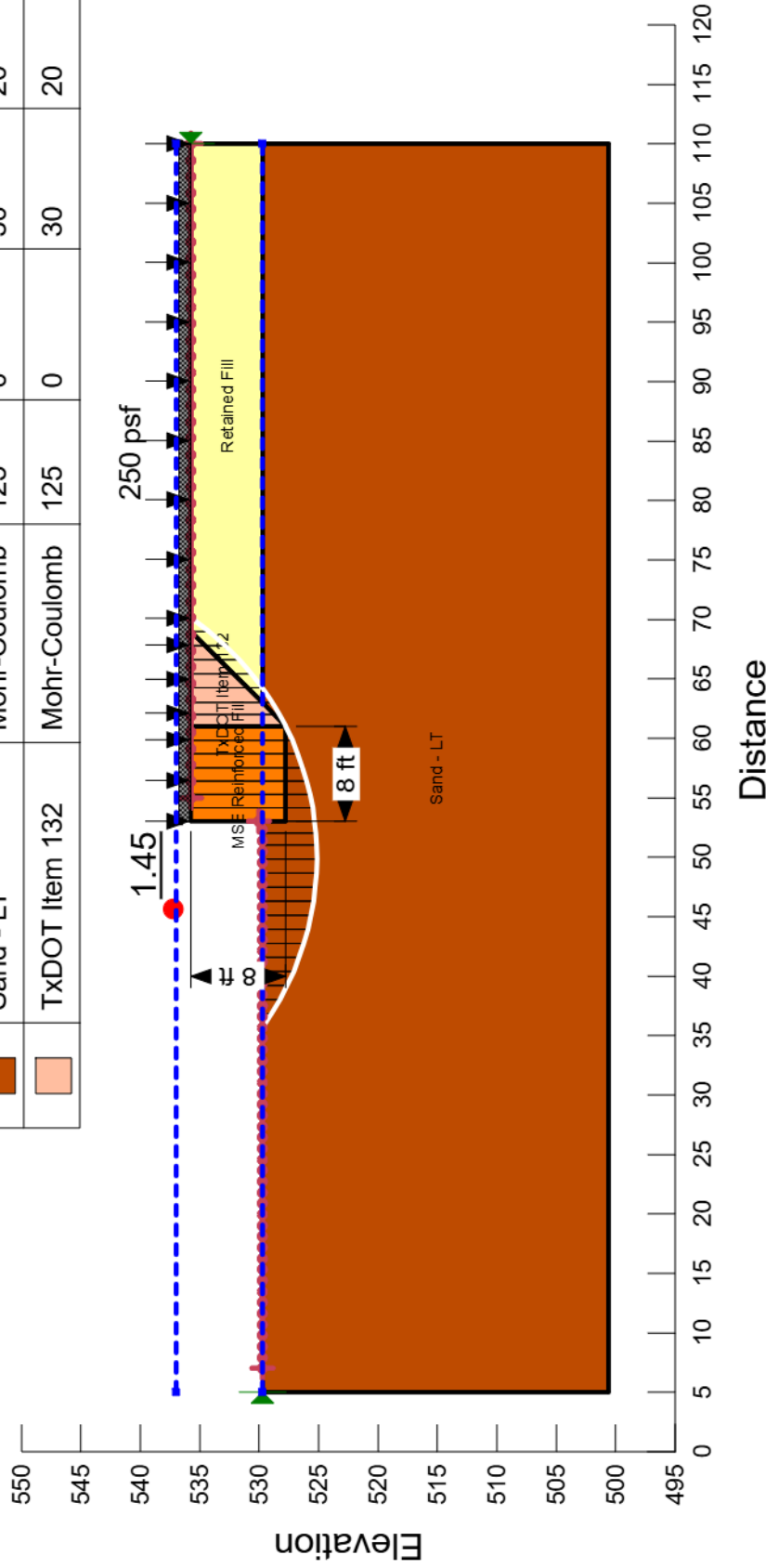
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall F  
 Analysis at STA 10+40  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	30	20	23
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown

Retaining Wall F - STA 10+40 - 8-foot-high.gsz

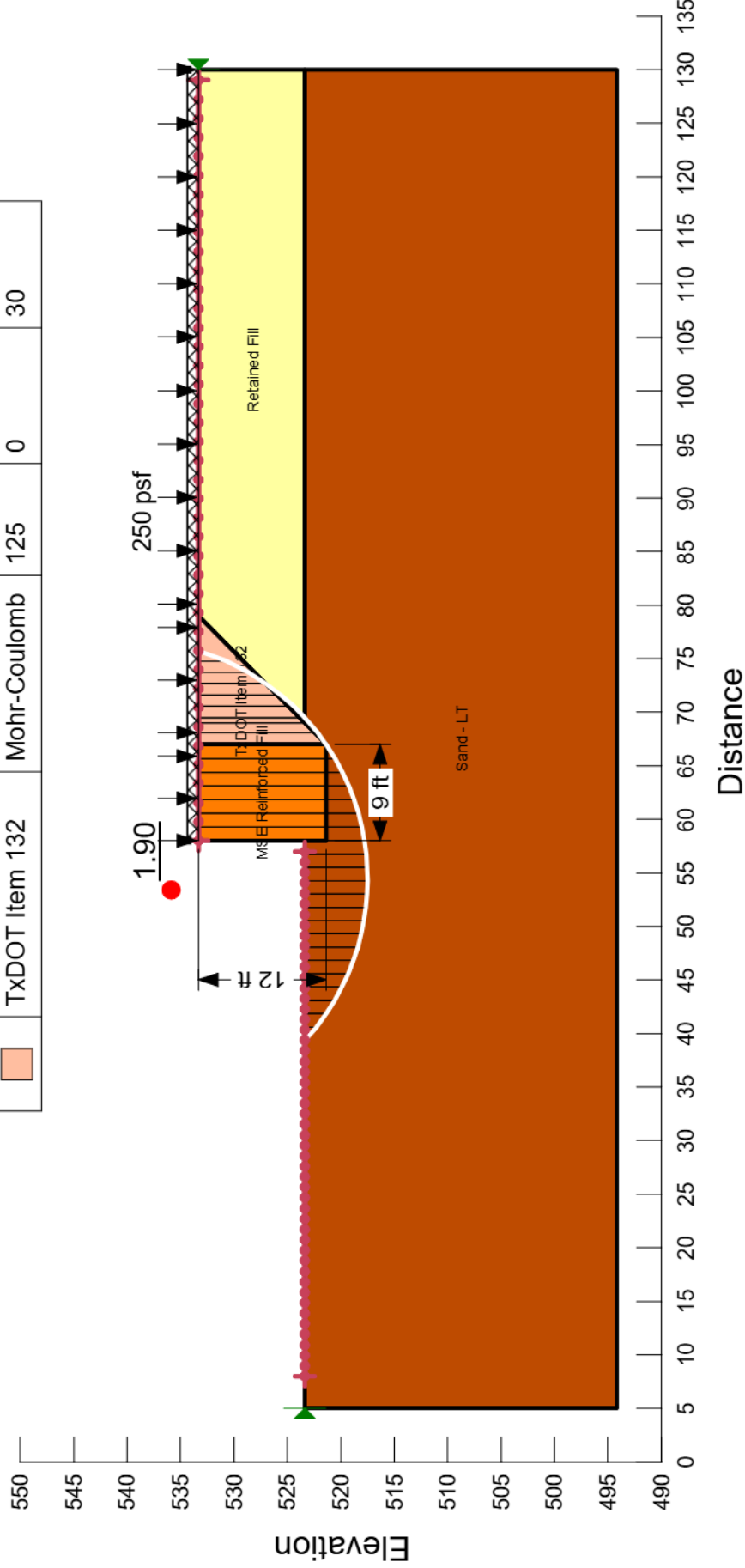
09/17/2024

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall F  
 Analysis at STA 11+60  
 Exposed Wall Height = 10 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12 feet  
 Strap Length = 9 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Brown	Sand - LT	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



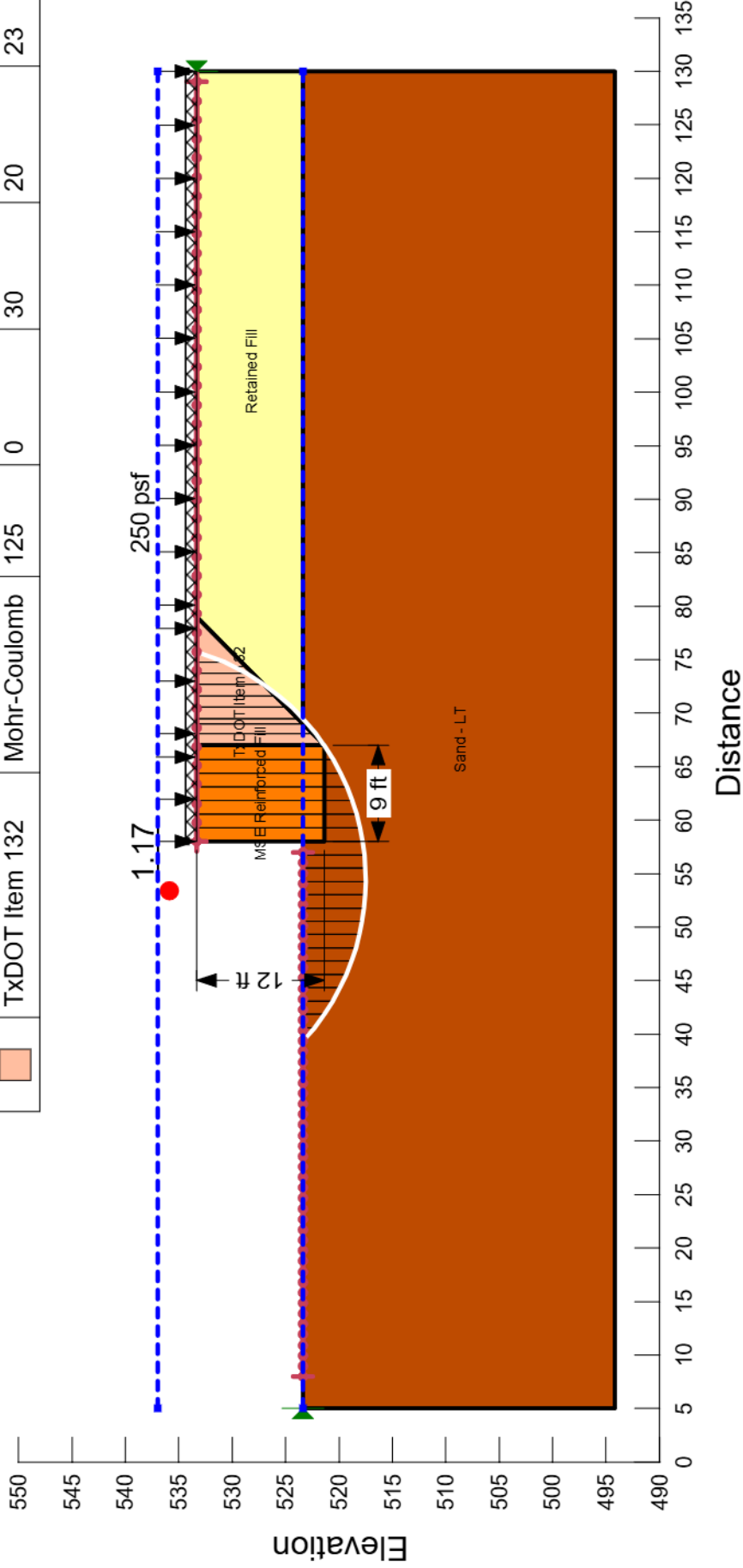
Slope Stability - Long-Term
Retaining Wall F - STA 11+60 - 12-foot-high.gsz
02/10/2025
1:185



Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall F  
 Analysis at STA 11+60  
 Exposed Wall Height = 10 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12 feet  
 Strap Length = 9 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	30	20	23
Light Brown	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown





Retaining Wall F - STA 11+60 - 12-foot-high.gsz

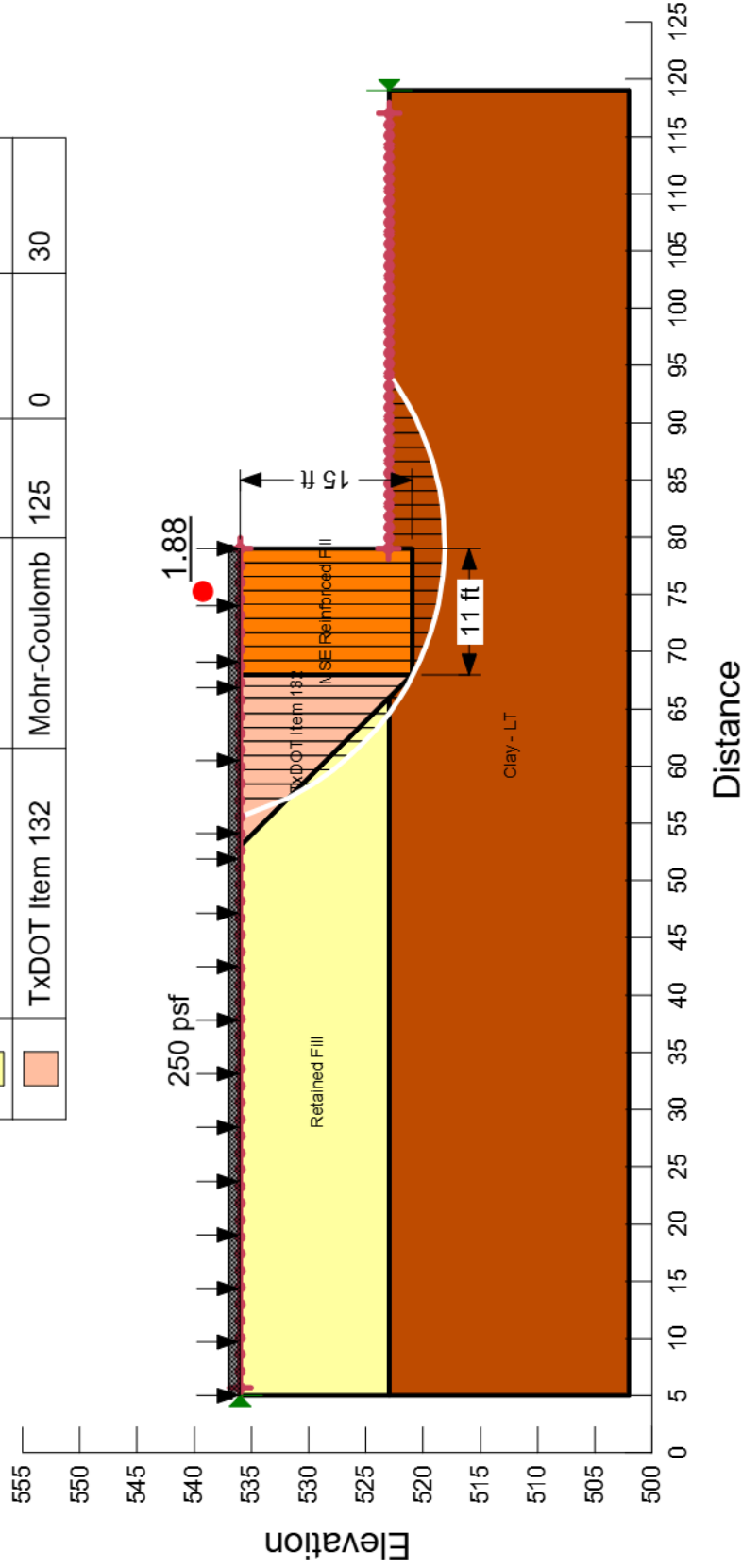
02/10/2025

1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall G  
 Analysis at STA 10+20  
 Exposed Wall Height = 13 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 15 feet  
 Strap Length = 11 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	29
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall G - STA 10+20 - 15-foot-high.gsz

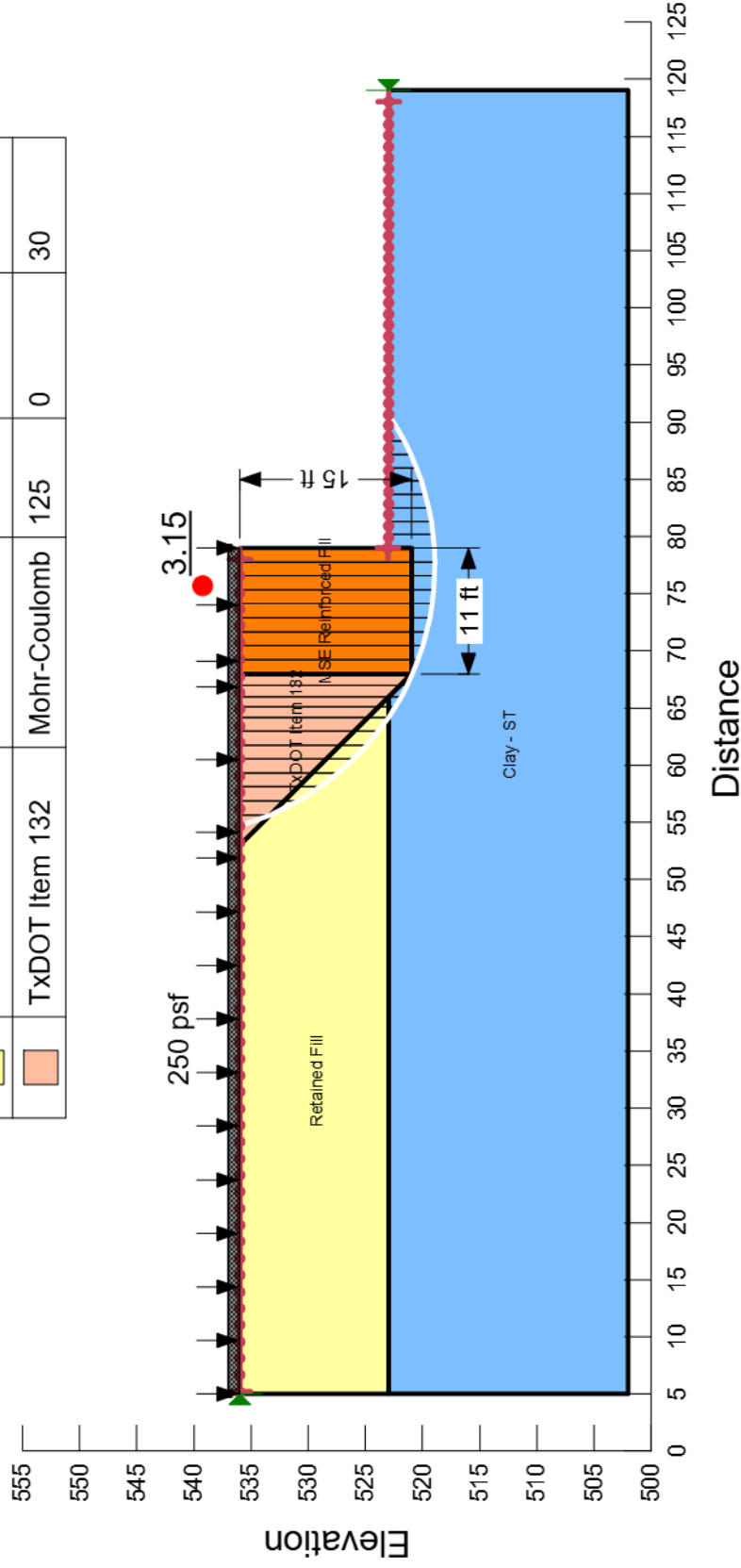
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall G  
 Analysis at STA 10+20  
 Exposed Wall Height = 13 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 15 feet  
 Strap Length = 11 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Blue	Clay - ST	Mohr-Coulomb	125	1,500	0.01
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Light Blue	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall G - STA 10+20 - 15-foot-high.gsz

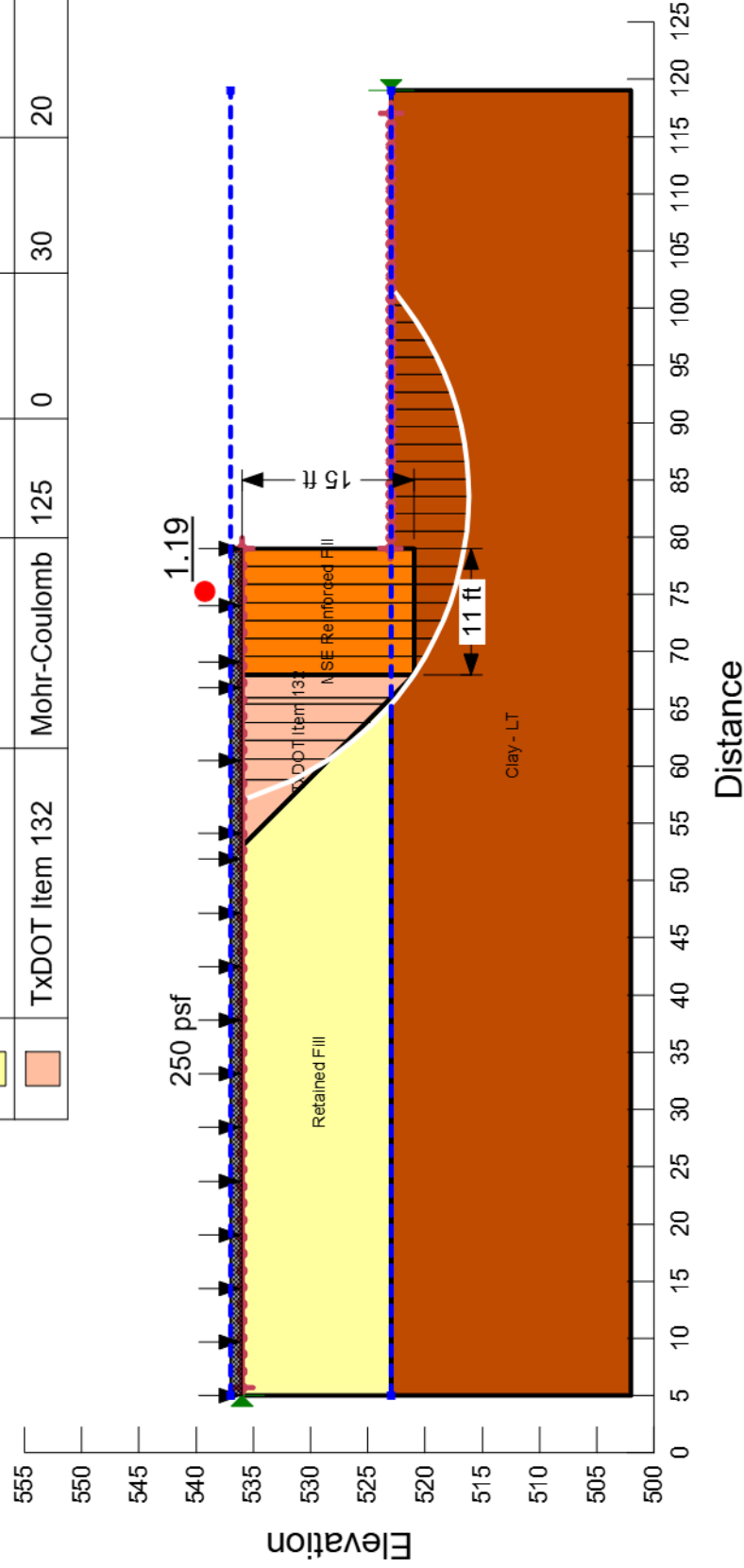
09/17/2024

1:190

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall G  
 Analysis at STA 10+20  
 Exposed Wall Height = 13 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 15 feet  
 Strap Length = 11 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	Clay - LT	Mohr-Coulomb	125	50	29	75	22
Yellow	MSE Reinforced Fill	High Strength	150				
Light Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown





Retaining Wall G - STA 10+20 - 15-foot-high.gsz

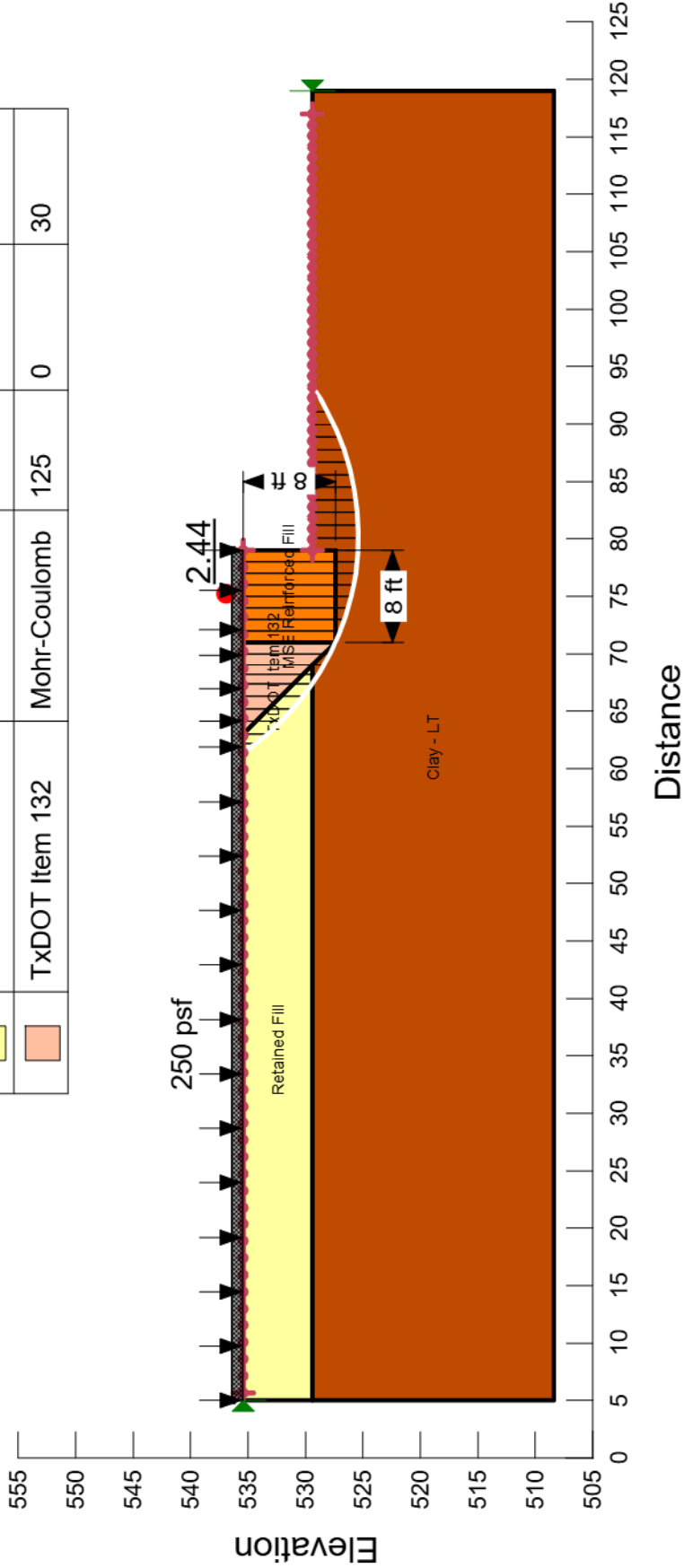
09/17/2024

1:190

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall G  
 Analysis at STA 11+28  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	29
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall G - STA 11+28 - 8-foot-high.gsz

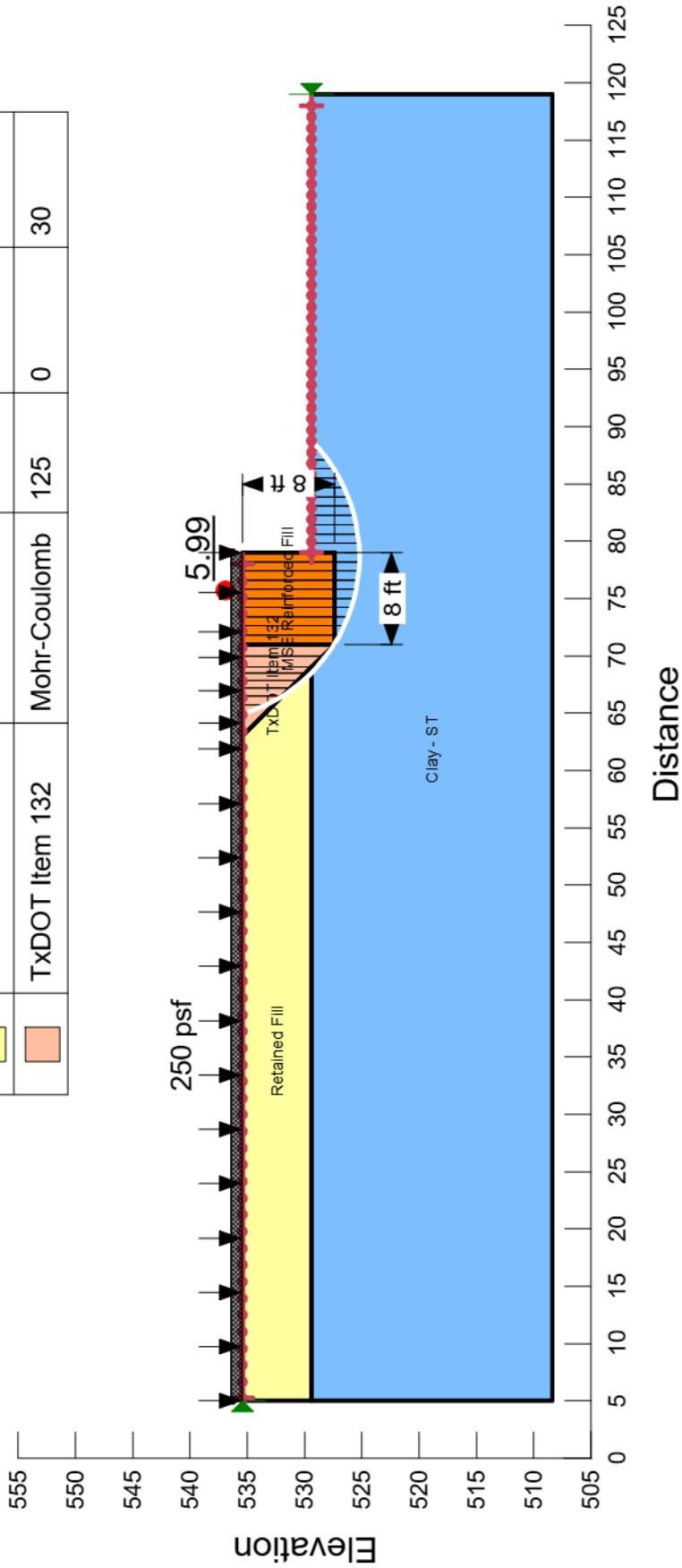
09/17/2024

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall G  
 Analysis at STA 11+28  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Blue	Clay - ST	Mohr-Coulomb	125	1,500	0.01
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall G - STA 11+28 - 8-foot-high.gsz

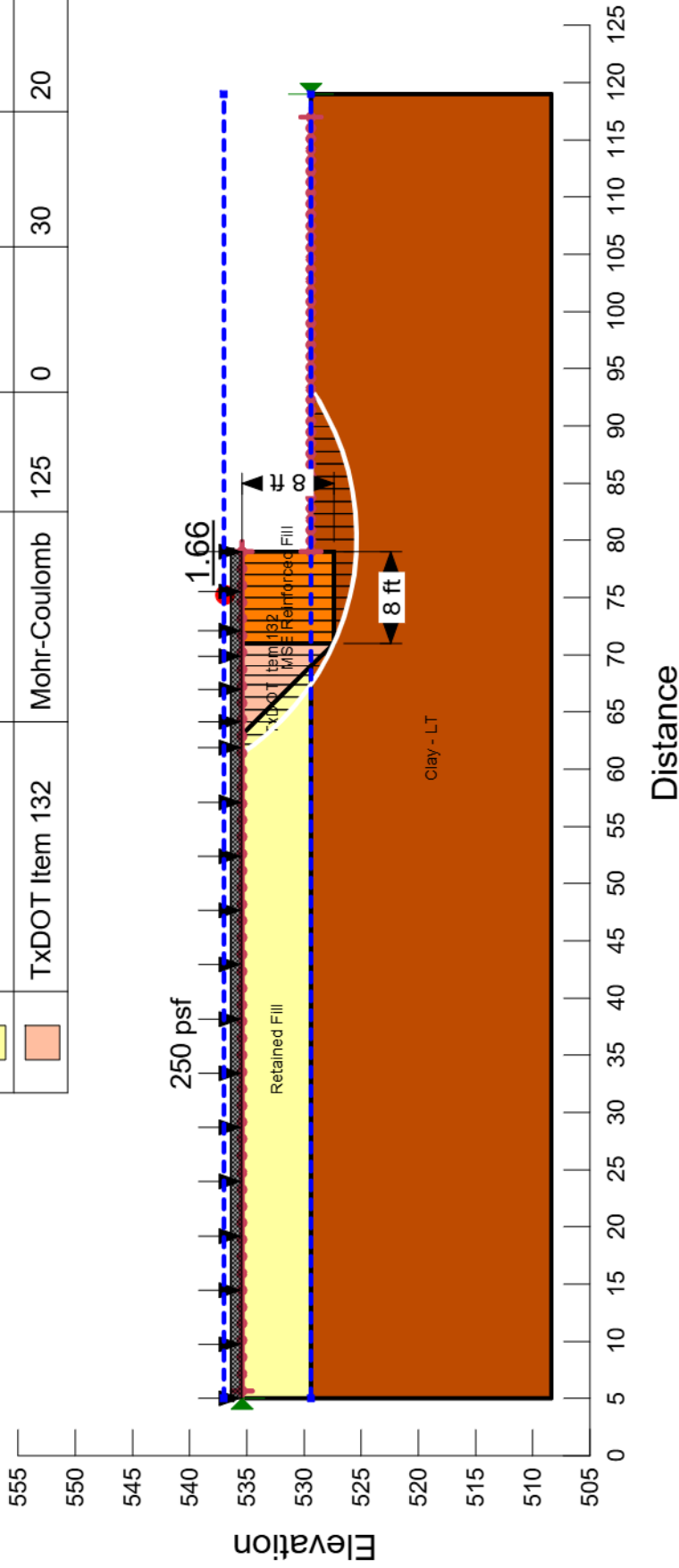
09/17/2024

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall G  
 Analysis at STA 11+28  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 8 feet  
 Strap Length = 8 feet



Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
<span style="display:inline-block; width:15px; height:15px; background-color: #8B4513;"></span>	Clay - LT	Mohr-Coulomb	125	50	29	75	22
<span style="display:inline-block; width:15px; height:15px; background-color: #FF8C00;"></span>	MSE Reinforced Fill	High Strength	150				
<span style="display:inline-block; width:15px; height:15px; background-color: #FFFF00;"></span>	Retained Fill	Mohr-Coulomb	125	0	30	20	23
<span style="display:inline-block; width:15px; height:15px; background-color: #FFDAB9;"></span>	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23

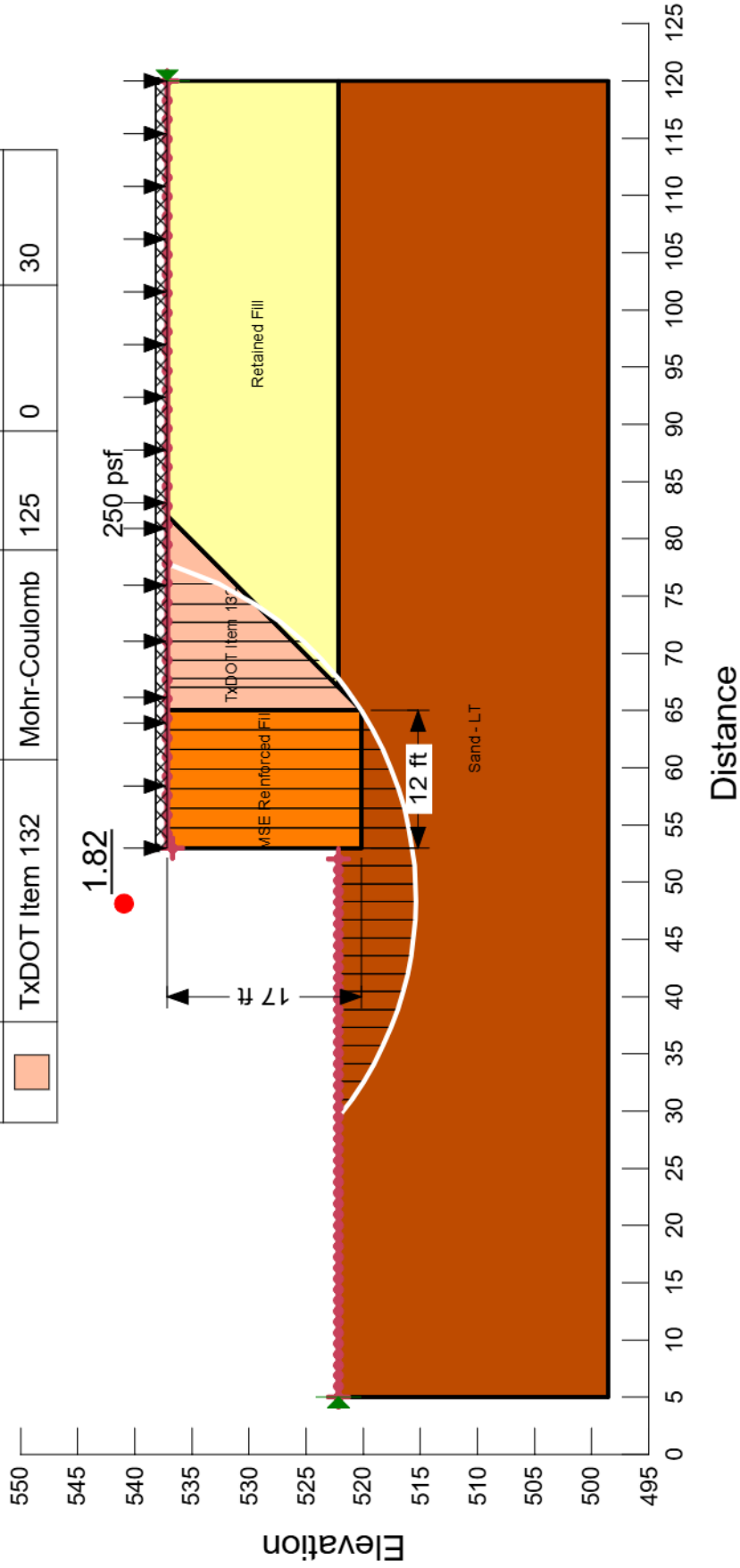


Slope Stability - Rapid Drawdown
Retaining Wall G - STA 11+28 - 8-foot-high.gsz
09/17/2024
1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall H  
 Analysis at STA 10+26.75  
 Exposed Wall Height = 15 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 17 feet  
 Strap Length = 12 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	31
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall H - STA 10+26.75 - 17-foot-high.gsz

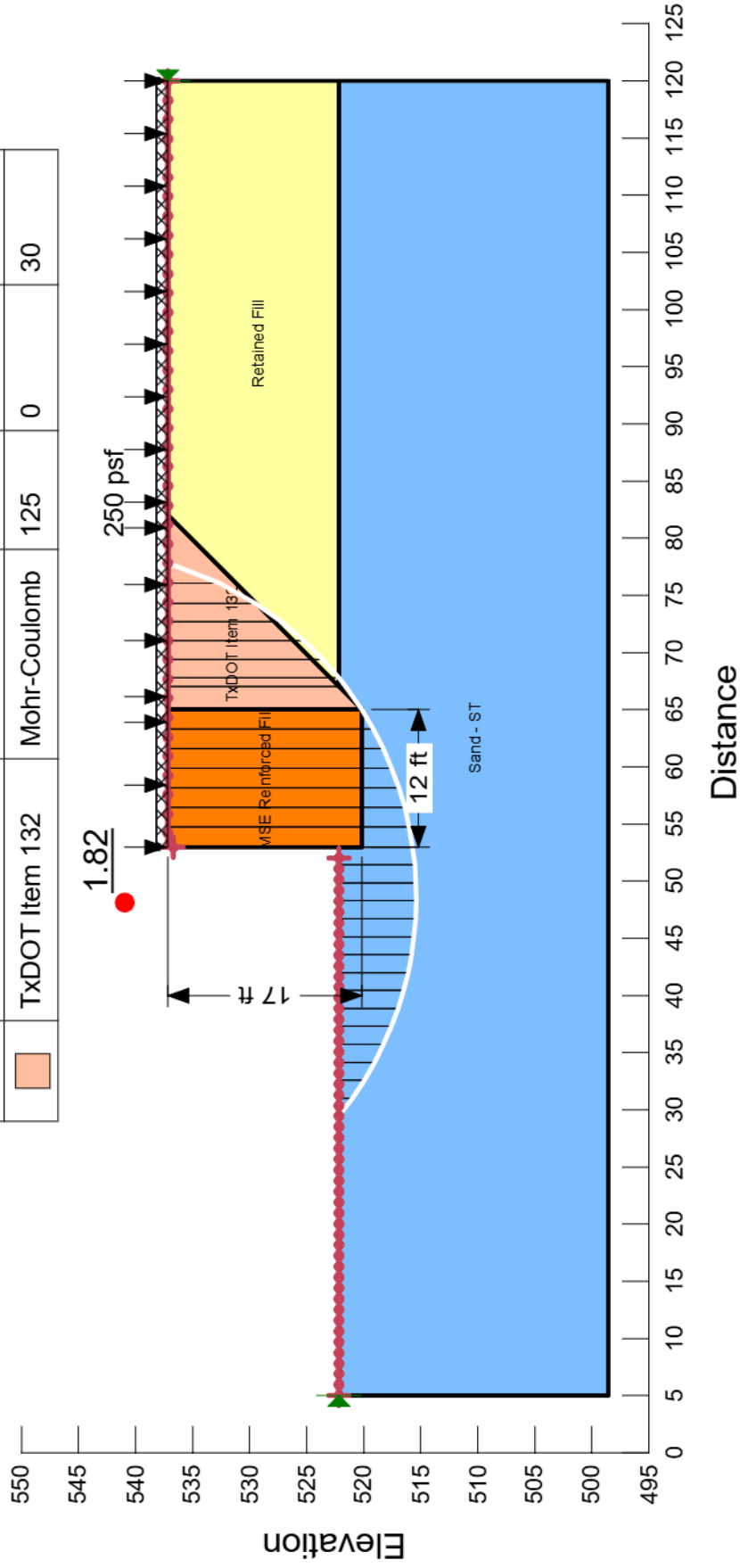
02/10/2025

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall H  
 Analysis at STA 10+26.75  
 Exposed Wall Height = 15 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 17 feet  
 Strap Length = 12 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	31
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term





Retaining Wall H - STA 10+26.75 - 17-foot-high.gsz

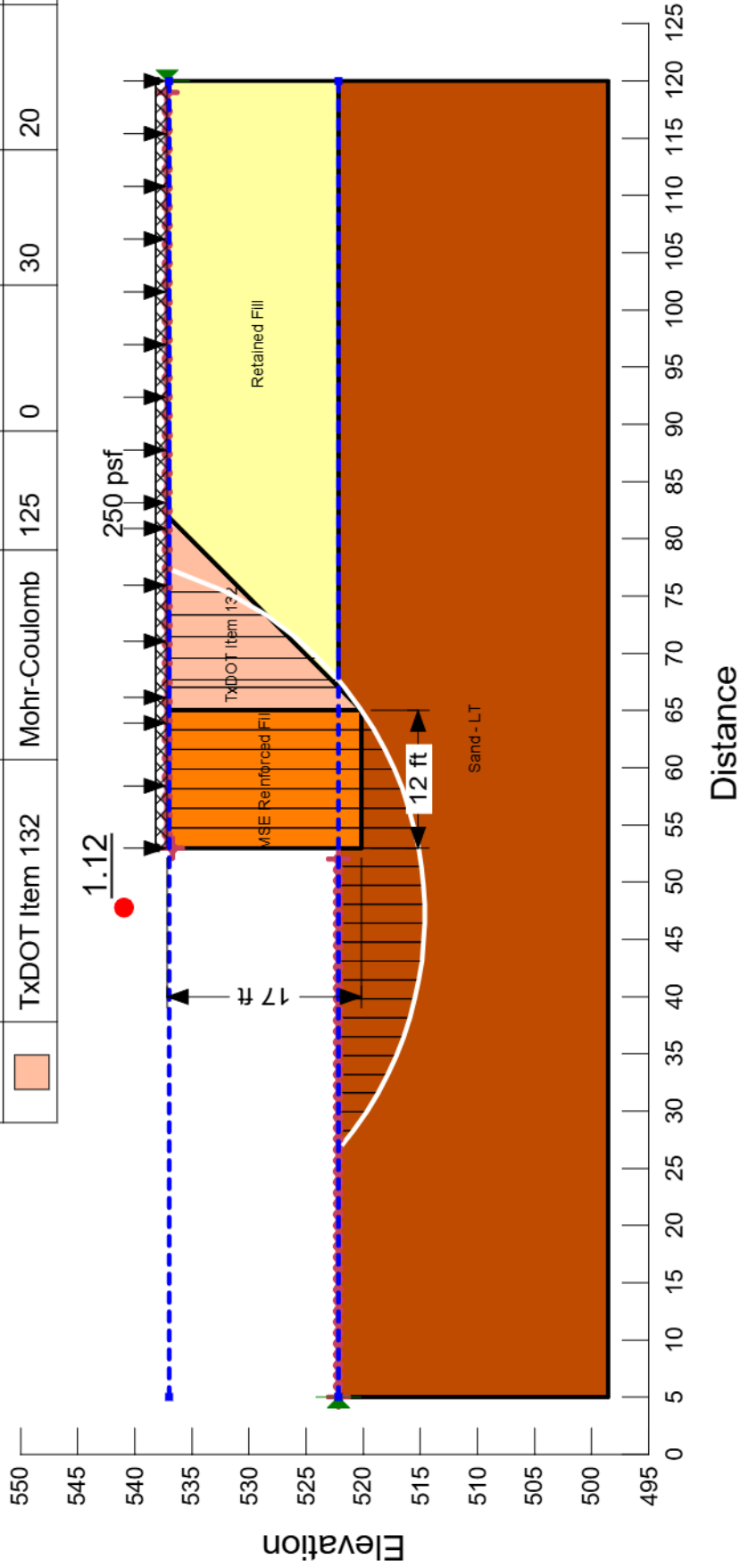
02/10/2025

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall H  
 Analysis at STA 10+26.75  
 Exposed Wall Height = 15 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 17 feet  
 Strap Length = 12 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	31	20	24
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown






Retaining Wall H - STA 10+26.75 - 17-foot-high.gsz

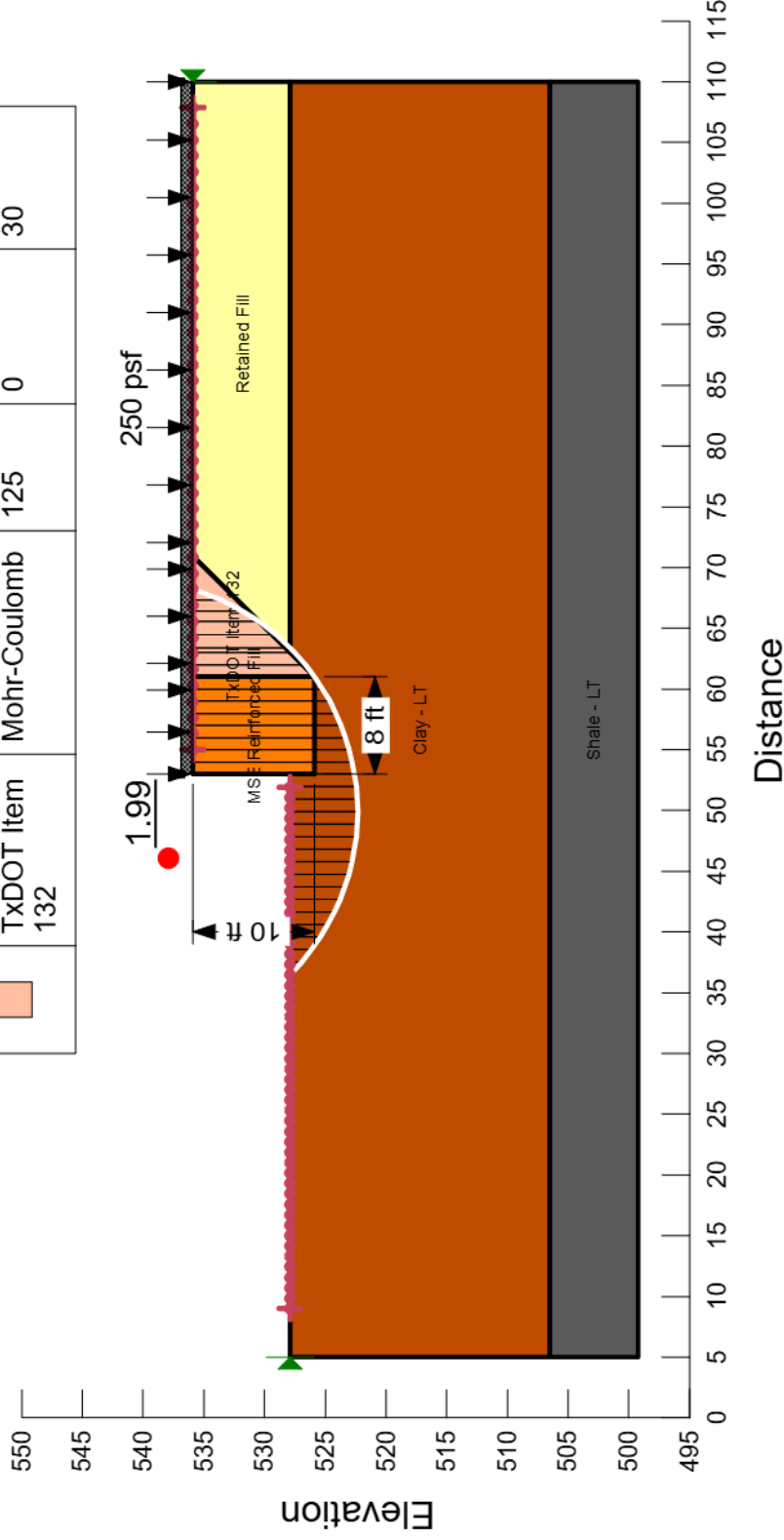
02/10/2025

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall H  
 Analysis at STA 11+80  
 Exposed Wall Height = 8 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 10 feet  
 Strap Length = 8 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	27
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - LT	Mohr-Coulomb	130	300	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term






Retaining Wall H - STA 11+80 - 10-foot-high.gsz

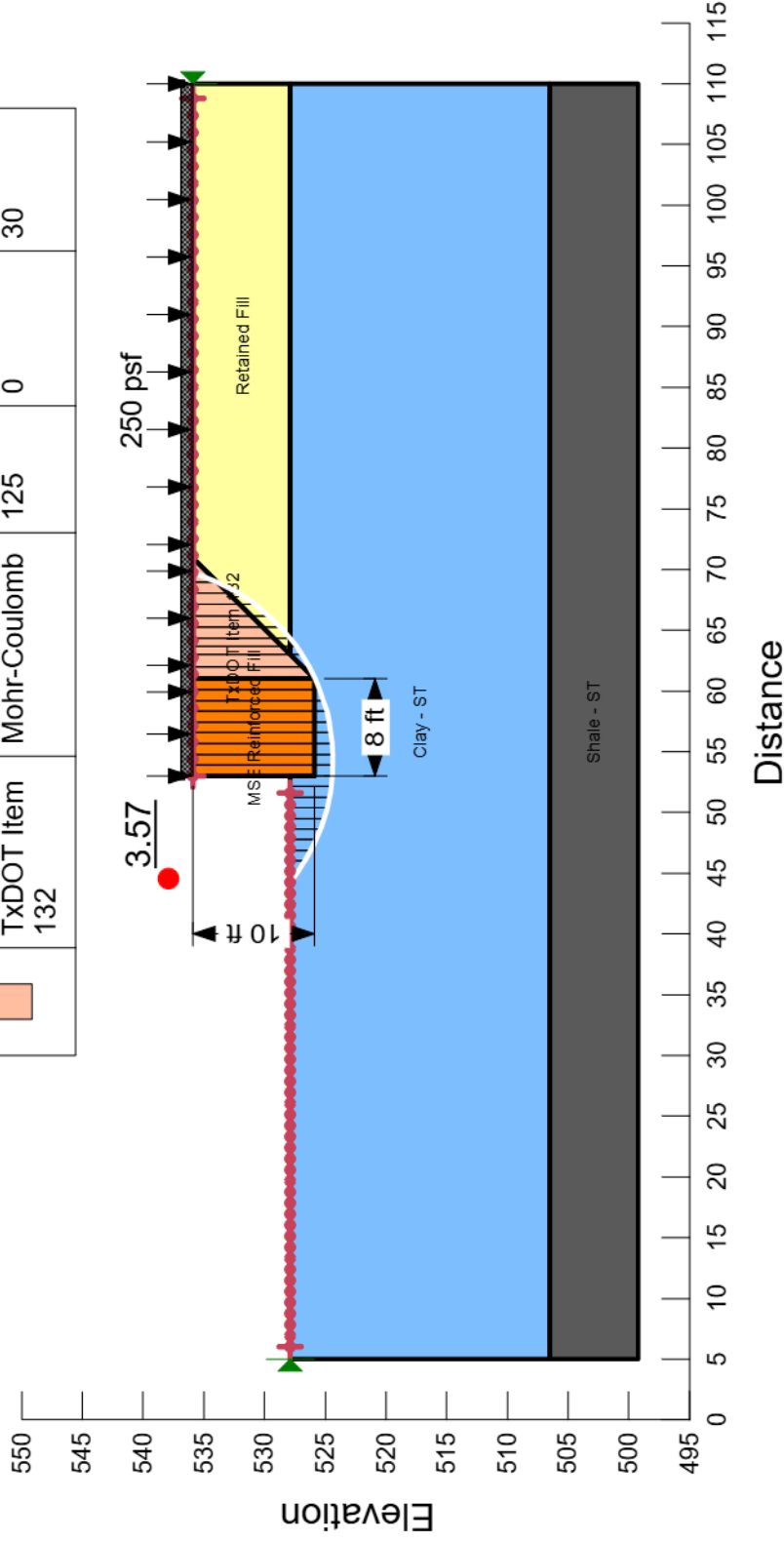
09/17/2024

1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall H  
 Analysis at STA 11+80  
 Exposed Wall Height = 8 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 10 feet  
 Strap Length = 8 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - ST	Mohr-Coulomb	125	1,100	0.01
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Shale - ST	Mohr-Coulomb	130	3,000	0.01
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term






Retaining Wall H - STA 11+80 - 10-foot-high.gsz

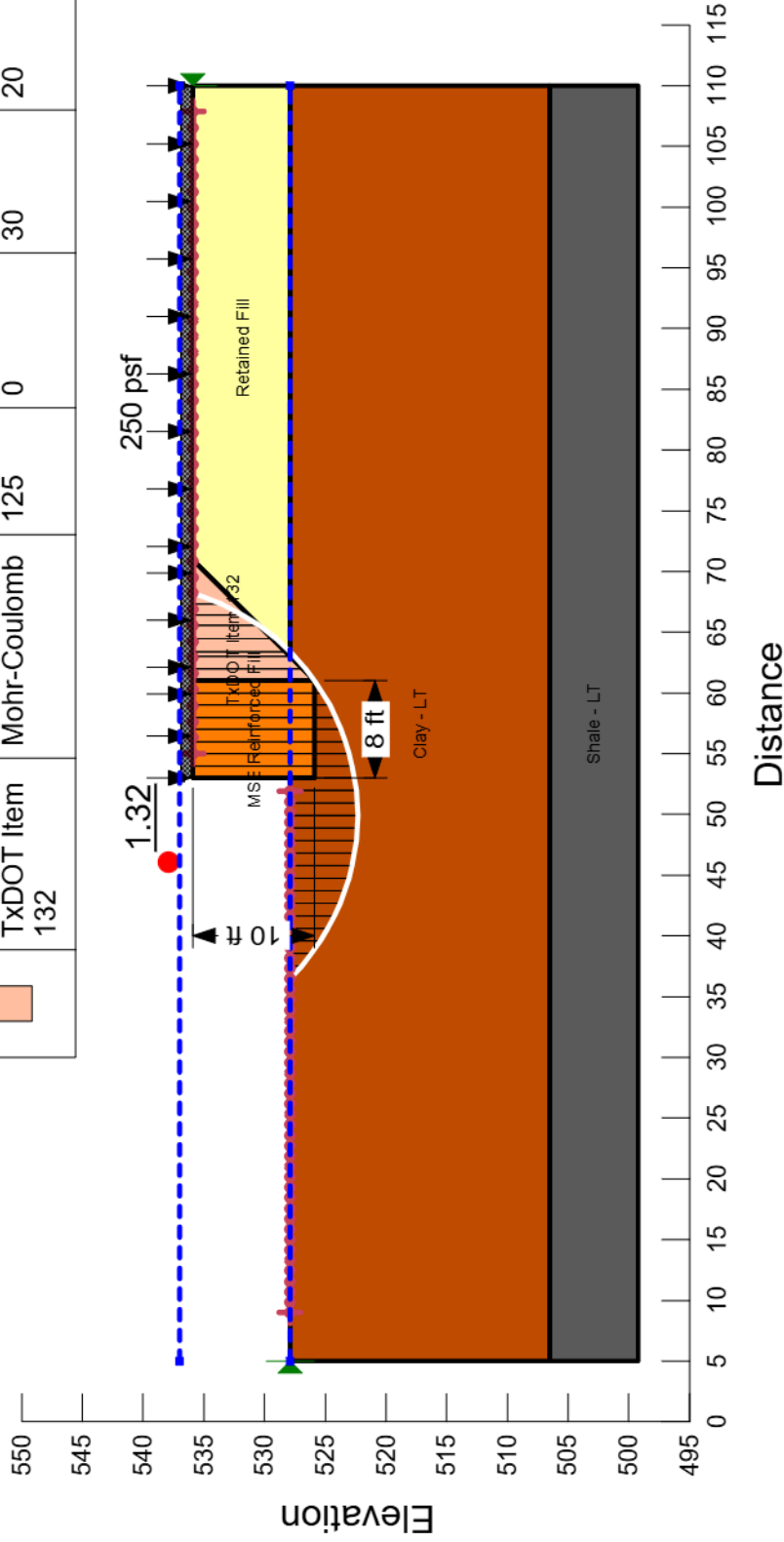
09/17/2024

1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall H  
 Analysis at STA 11+80  
 Exposed Wall Height = 8 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 10 feet  
 Strap Length = 8 feet (0.8H)






Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	27	75	20
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23

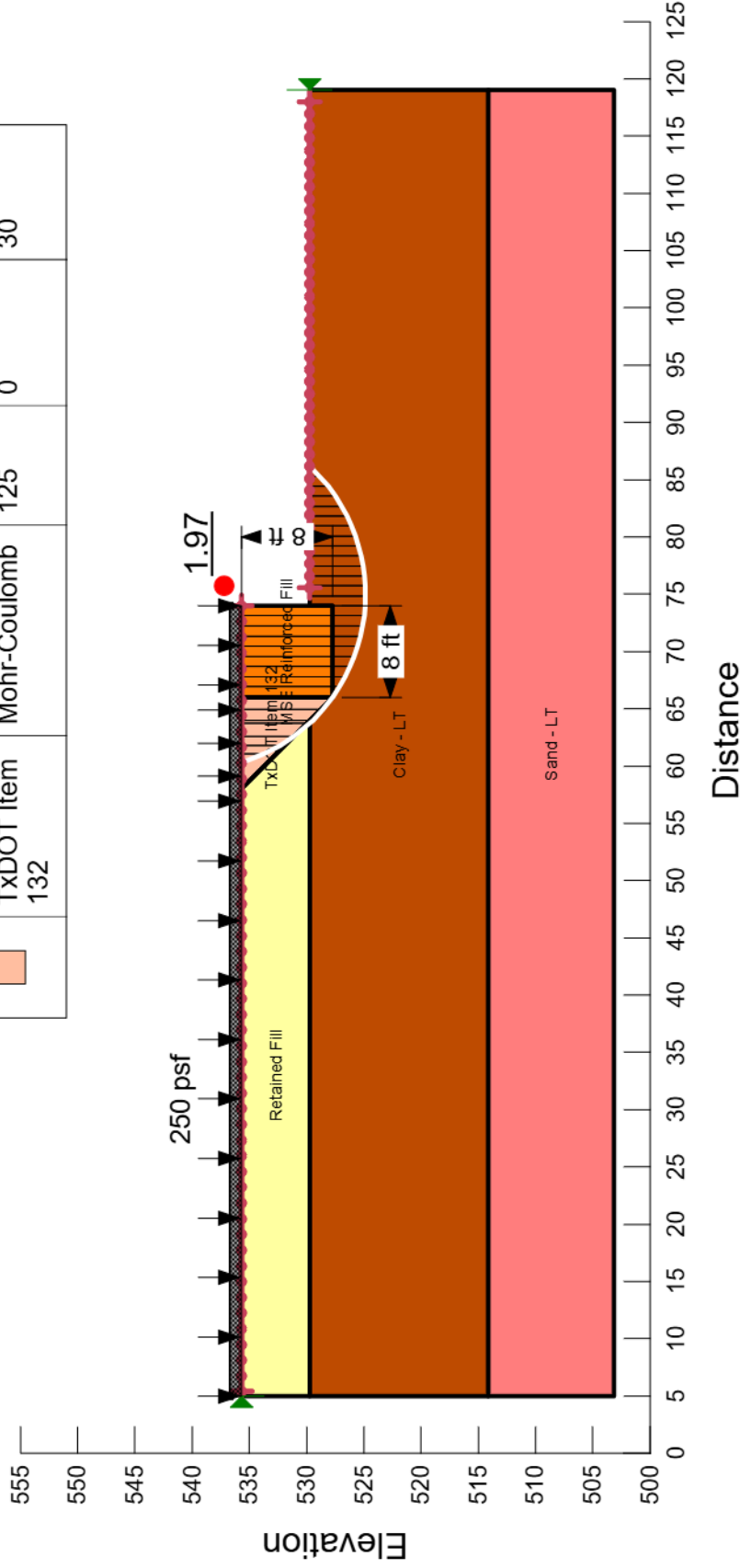


Slope Stability - Rapid Drawdown
Retaining Wall H - STA 11+80 - 10-foot-high.gsz
09/17/2024
1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall I  
 Analysis at STA 11+00  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	24
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	31
	TxDOT Item 132	Mohr-Coulomb	125	0	30








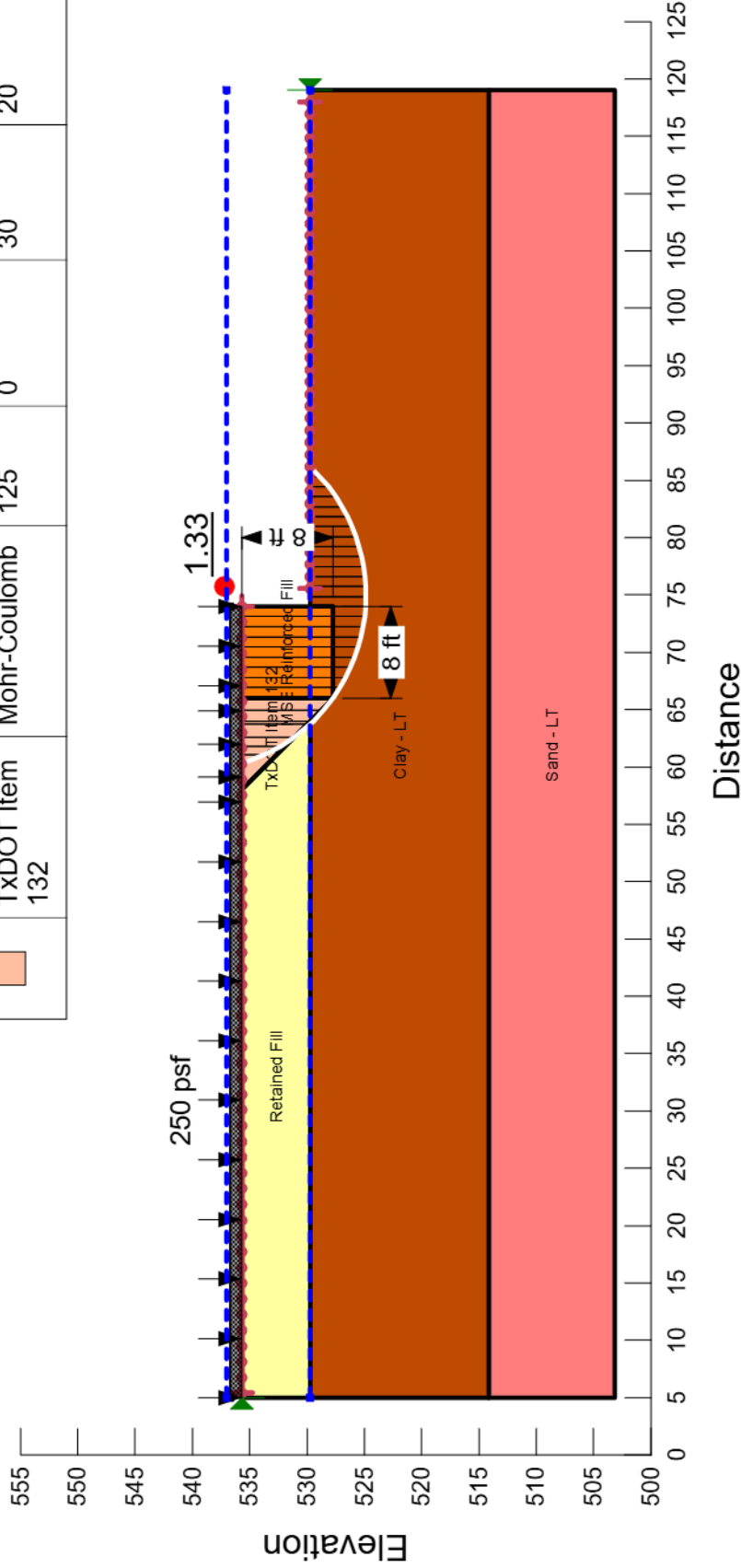
Slope Stability - Long-Term
Retaining Wall I - STA 11+00 - 8-foot-high.gsz
09/17/2024
1:185



Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall I  
 Analysis at STA 11+00  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet







Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	24	75	17
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	31	20	24
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23

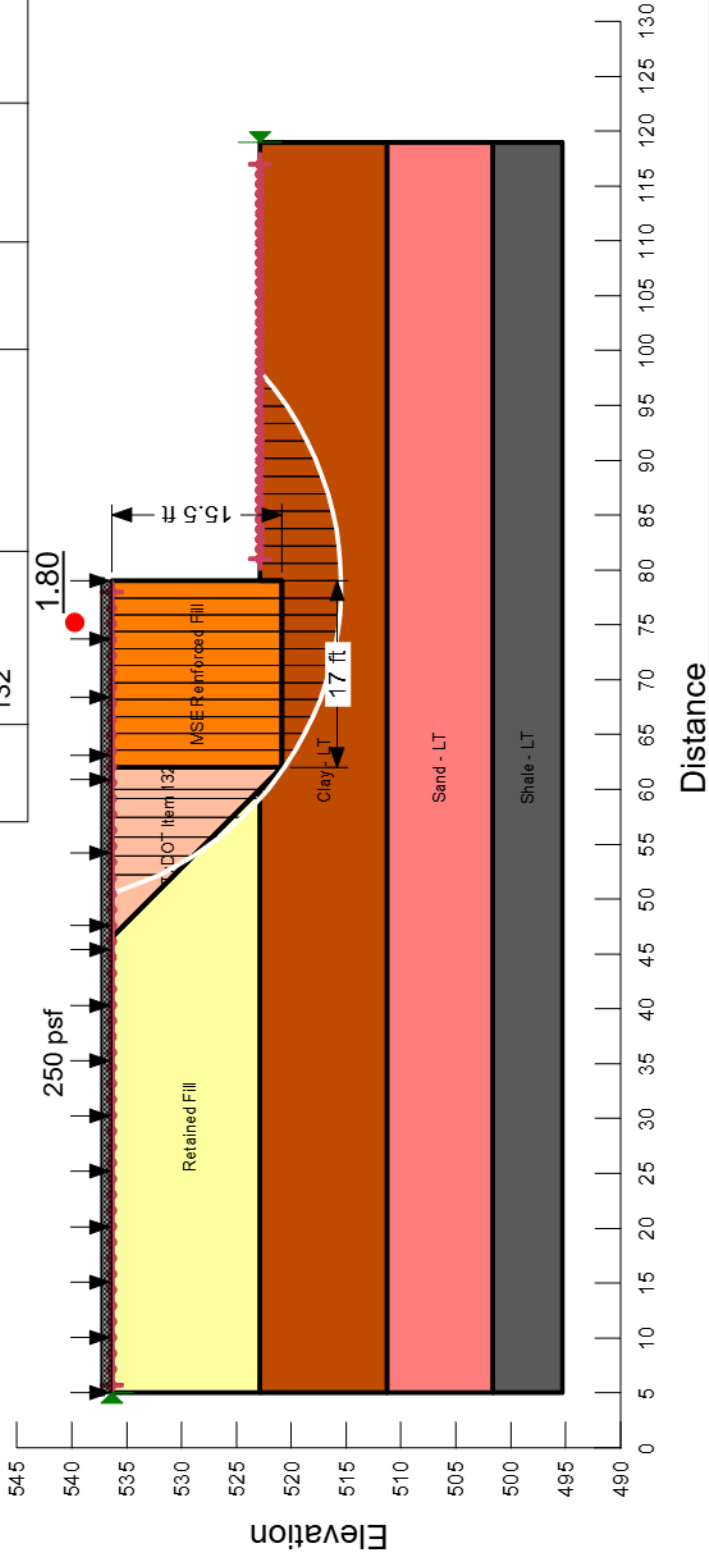


Slope Stability - Rapid Drawdown
Retaining Wall I - STA 11+00 - 8-foot-high.gsz
09/17/2024
1:185

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall I  
 Analysis at STA 12+30.49  
 Exposed Wall Height = 13.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 15.5 feet  
 Strap Length = 17 feet (1.1H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	24
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	31
	Shale - LT	Mohr-Coulomb	130	300	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall I - STA 12+30.49 - 15.5-foot-high.gsz

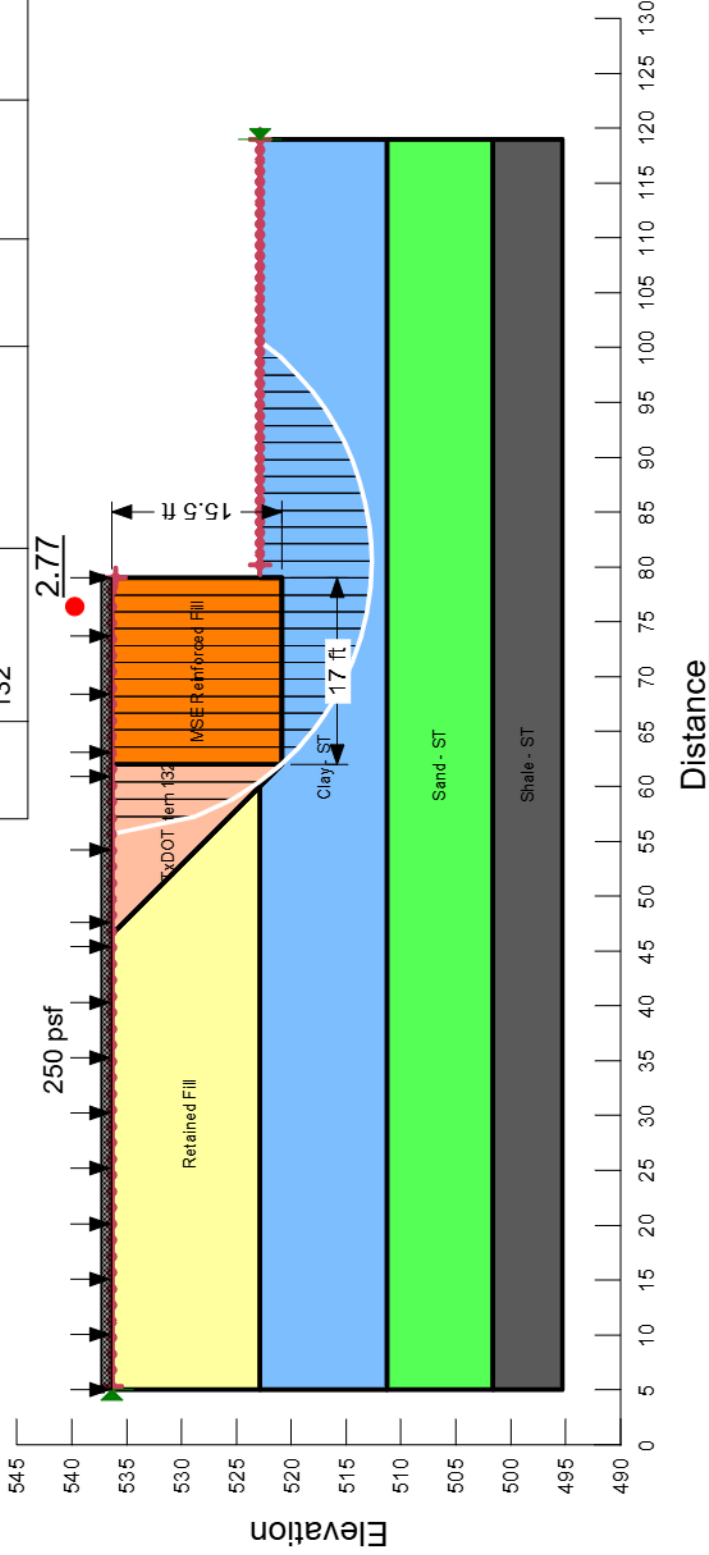
09/17/2024

1:210

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall I  
 Analysis at STA 12+30.49  
 Exposed Wall Height = 13.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 15.5 feet  
 Strap Length = 17 feet (1.1H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Blue	Clay - ST	Mohr-Coulomb	125	1,300	0.01
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Green	Sand - ST	Mohr-Coulomb	125	0	31
Grey	Shale - ST	Mohr-Coulomb	130	3,000	0.01
Light Blue	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term







Retaining Wall I - STA 12+30.49 - 15.5-foot-high.gsz

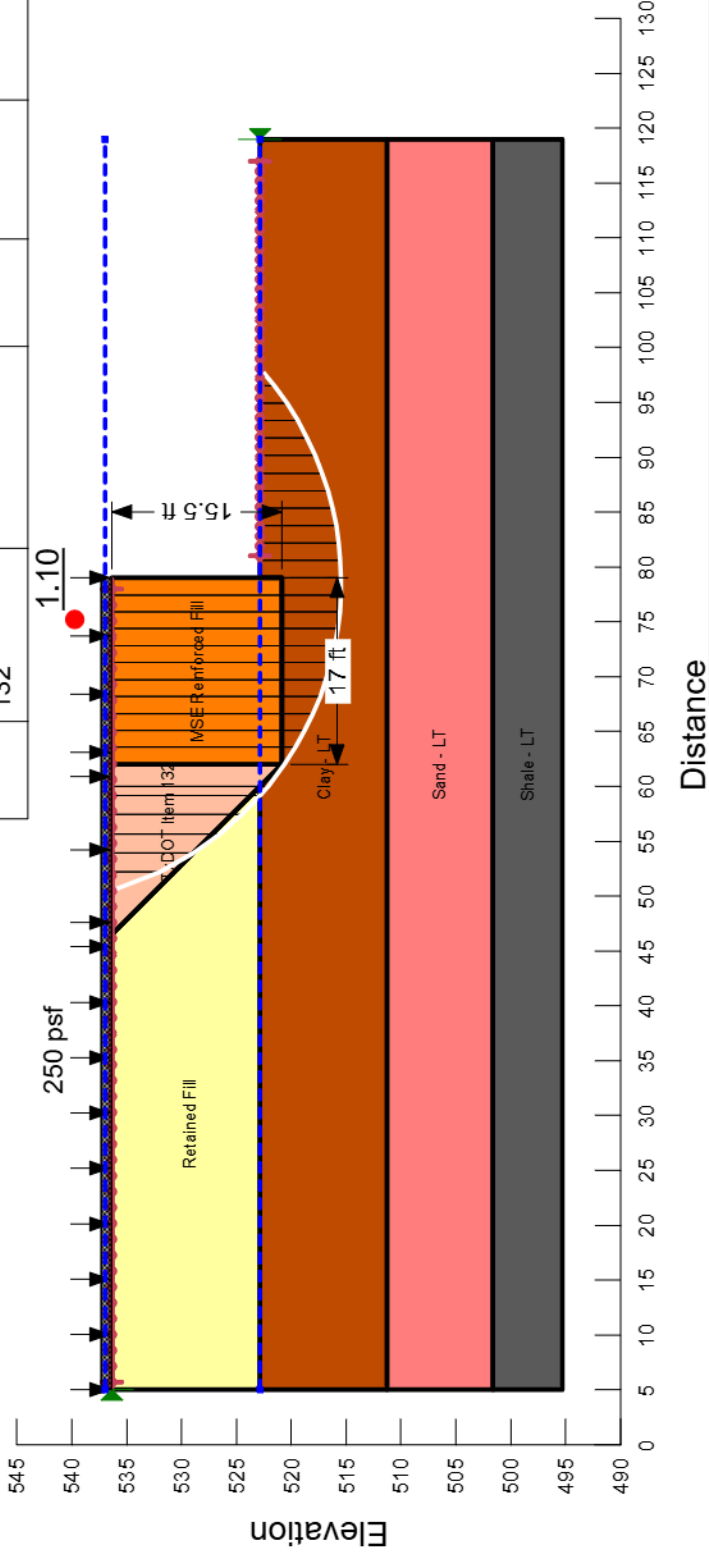
09/17/2024

1:210

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall I  
 Analysis at STA 12+30.49  
 Exposed Wall Height = 13.5 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 15.5 feet  
 Strap Length = 17 feet (1.1H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	24	75	17
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	31	20	24
	Shale - LT	Mohr-Coulomb	130	300	30	1,000	15
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown

Retaining Wall I - STA 12+30.49 - 15.5-foot-high.gsz

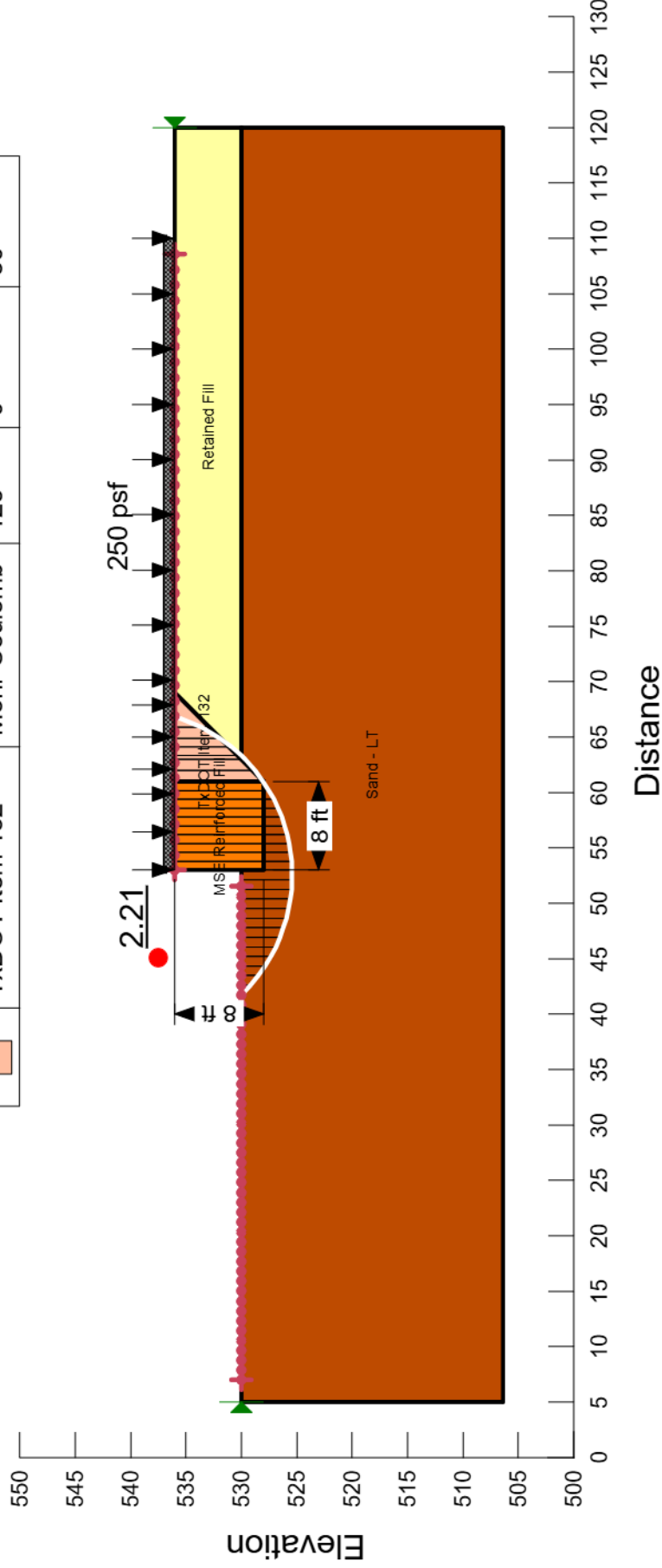
09/17/2024

1:210

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 11+00  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Brown	Sand - LT	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30

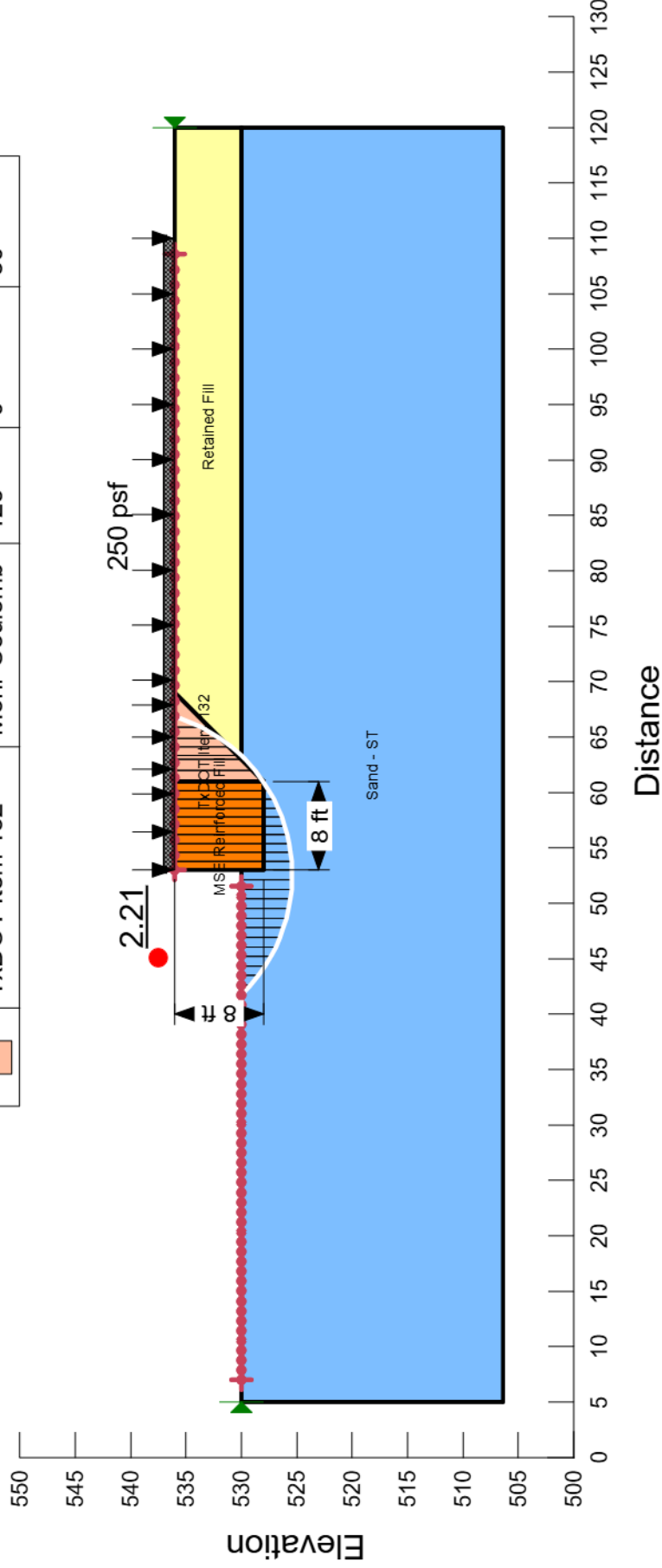


Slope Stability - Long-Term
Retaining Wall J - STA 11+20 - 8-foot-high.gsz
09/17/2024
1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 11+00  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	30
Light Blue	TxDOT Item 132	Mohr-Coulomb	125	0	30

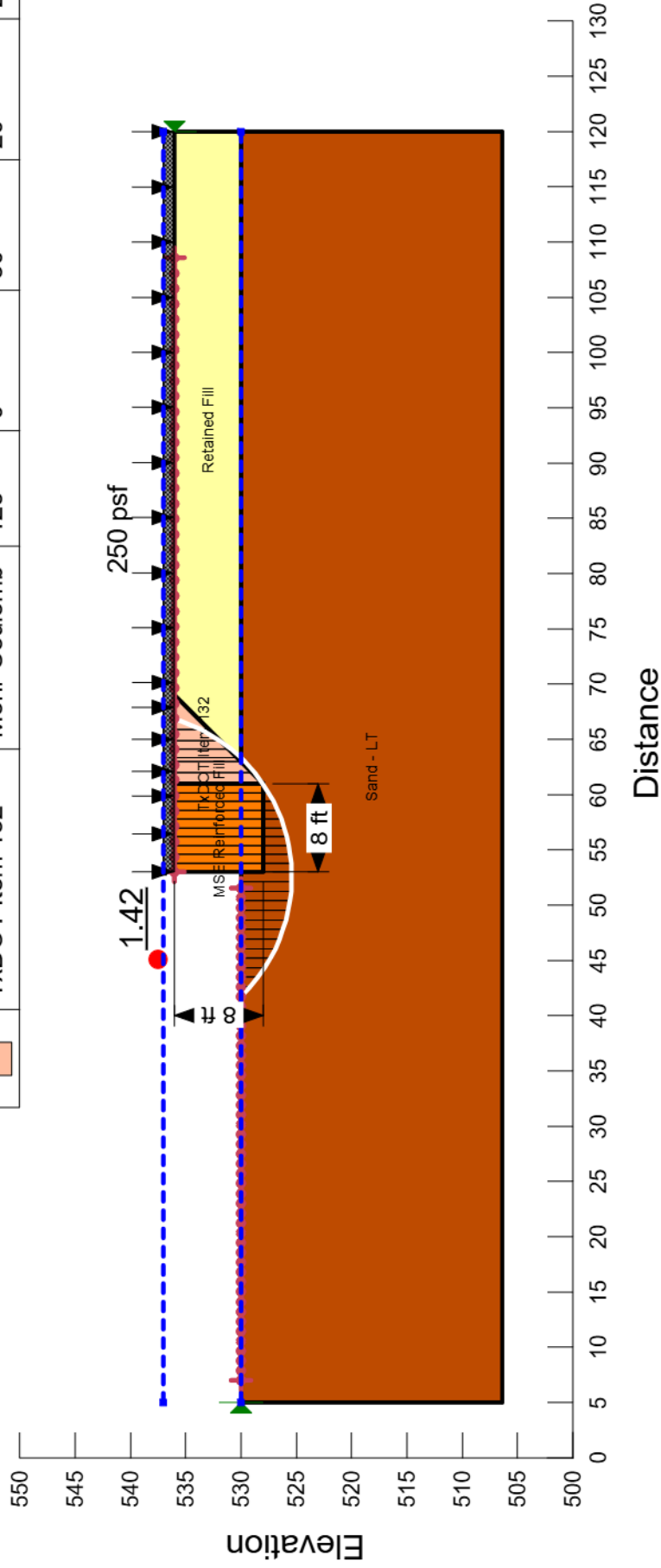


Slope Stability - Short-Term
Retaining Wall J - STA 11+20 - 8-foot-high.gsz
09/17/2024
1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 11+00  
 Exposed Wall Height = 6 feet  
 Embedment = 2 feet  
 Total Wall Height = 8 feet  
 Strap Length = 8 feet





Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	30	20	23
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23

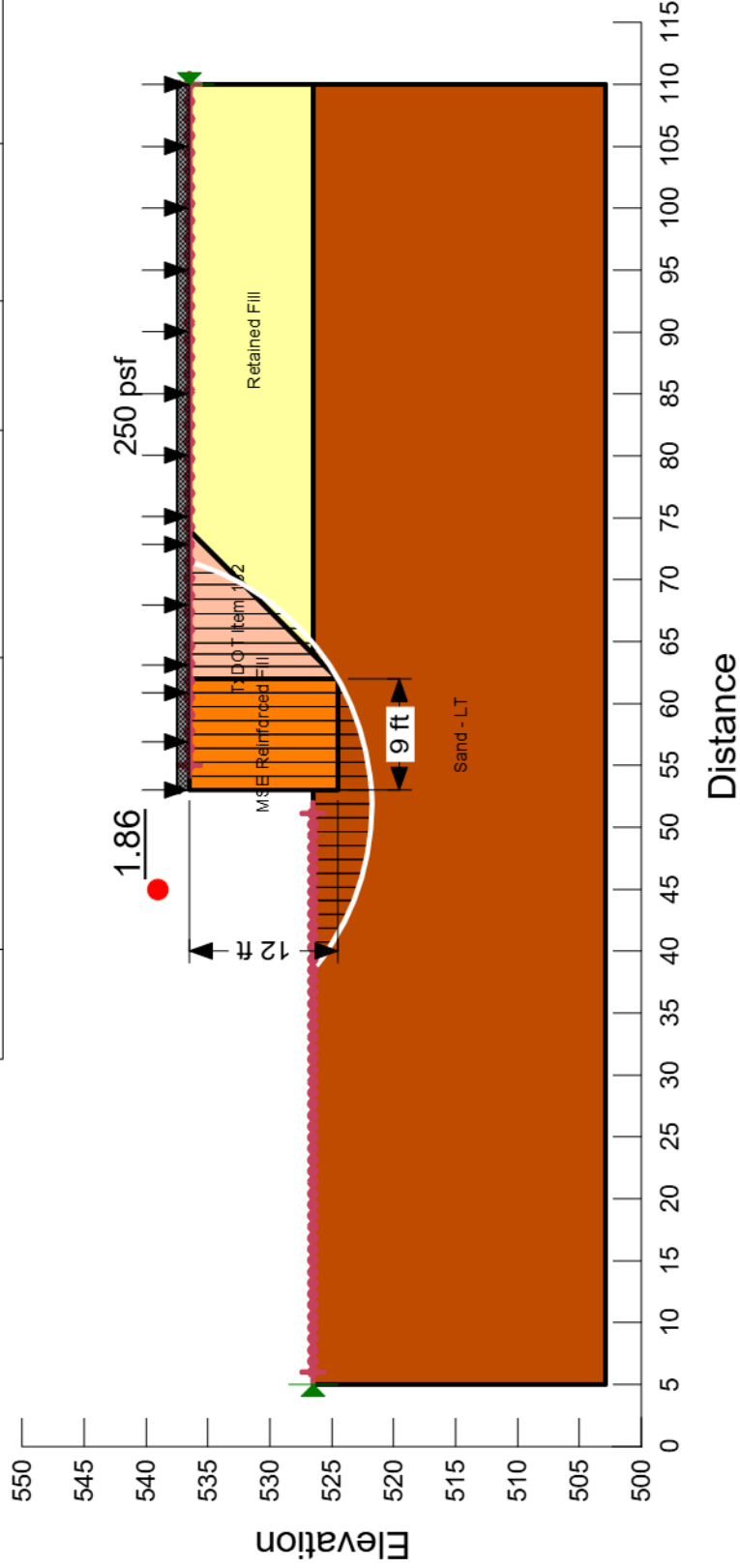


Slope Stability - Rapid Drawdown  
 Retaining Wall J - STA 11+20 - 8-foot-high.gsz  
 09/17/2024

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 12+00  
 Exposed Wall Height = 10 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12 feet  
 Strap Length = 9 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	30
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall J - STA 12+40 - 12-foot-high.gsz

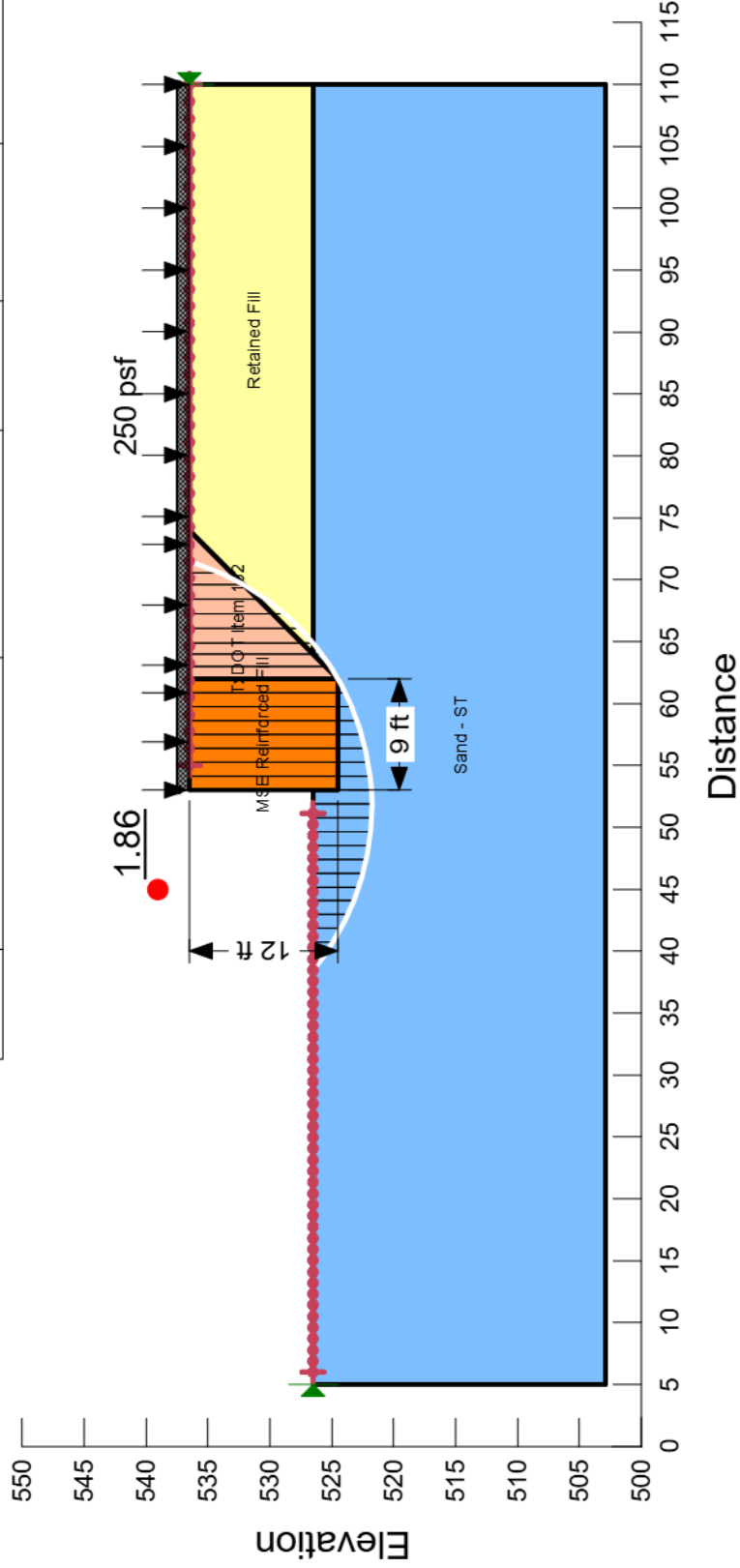
09/17/2024

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 12+00  
 Exposed Wall Height = 10 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12 feet  
 Strap Length = 9 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall J - STA 12+40 - 12-foot-high.gsz

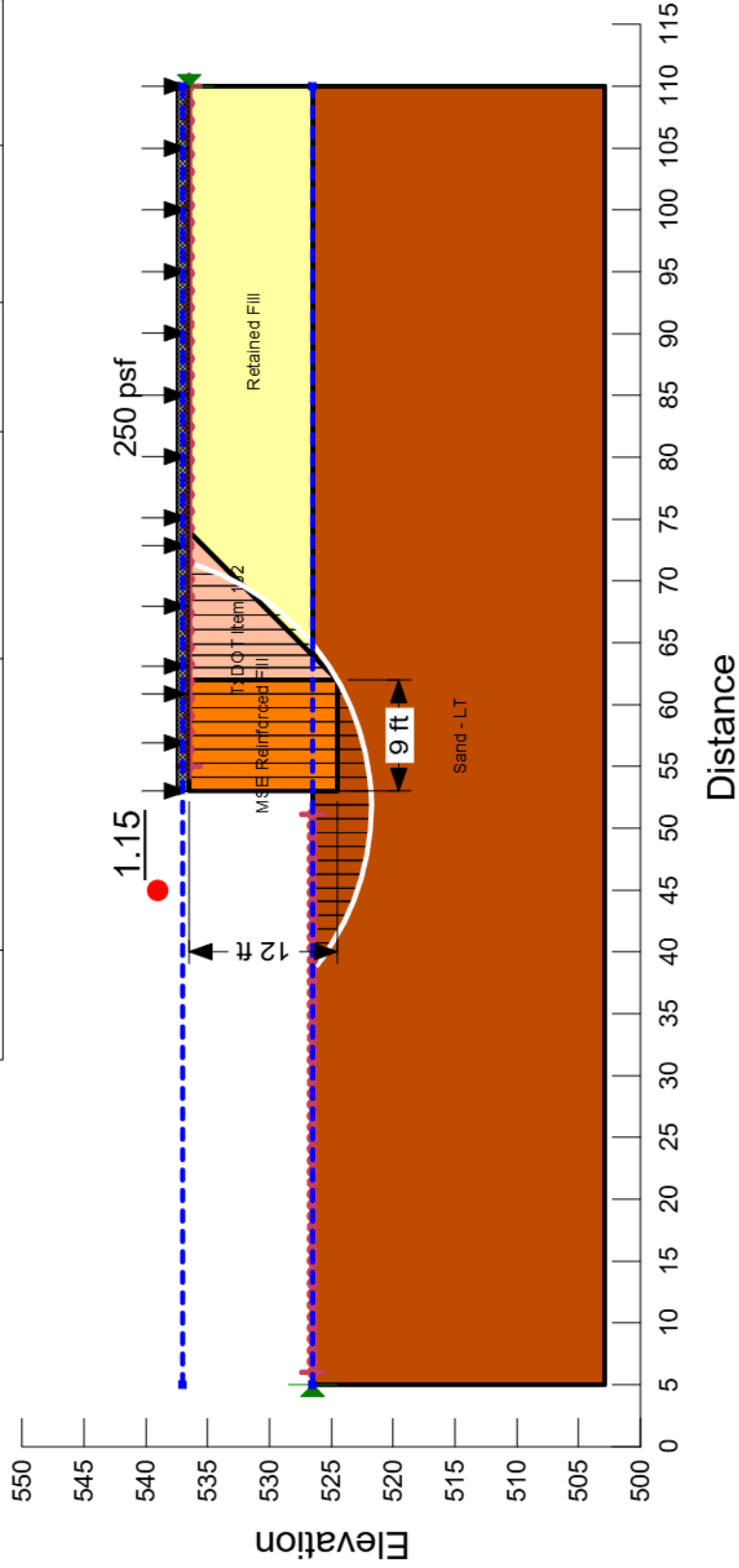
09/17/2024

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 12+00  
 Exposed Wall Height = 10 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 12 feet  
 Strap Length = 9 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	30	20	23
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown

Retaining Wall J - STA 12+40 - 12-foot-high-gsz

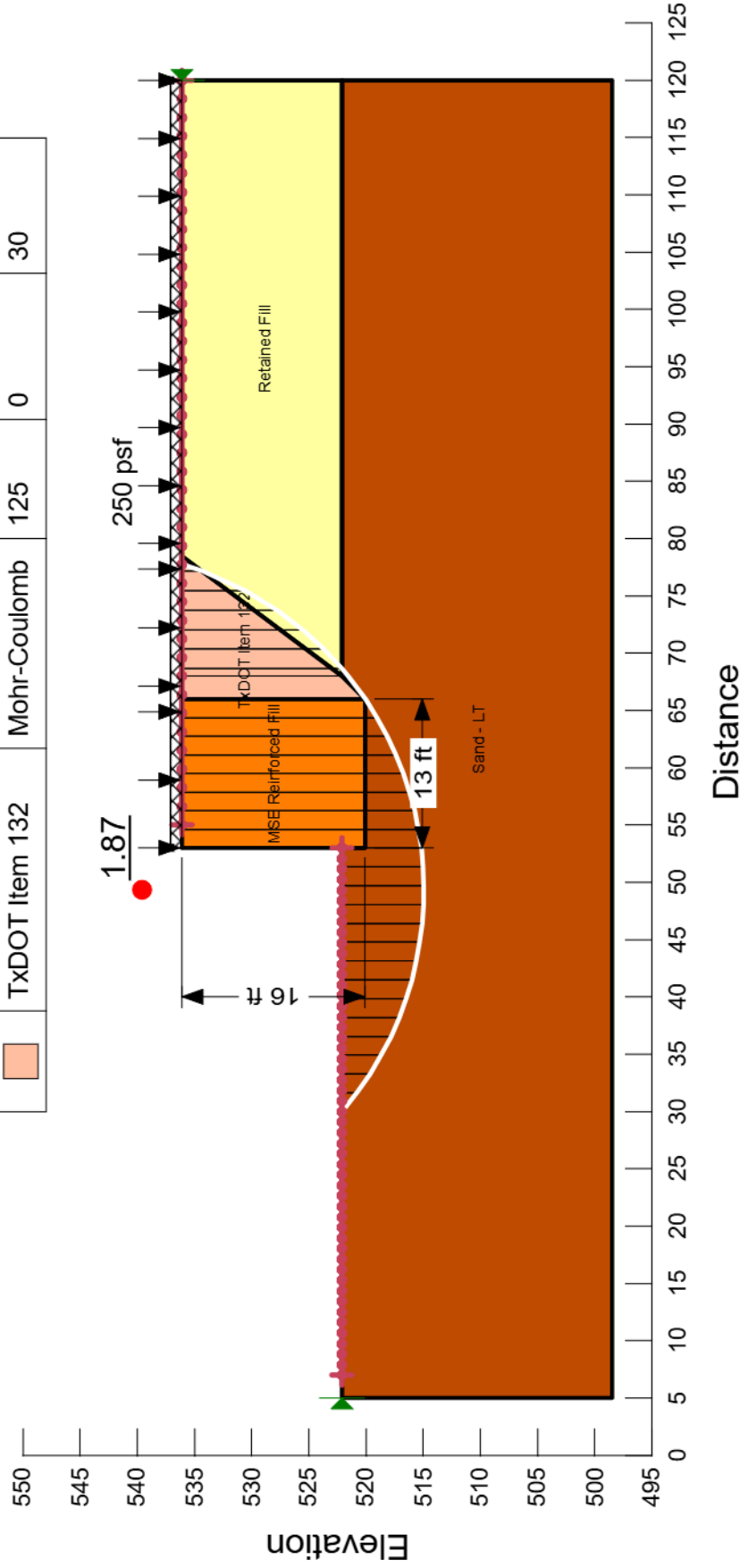
09/17/2024

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 13+15  
 Exposed Wall Height = 14 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 16 feet  
 Strap Length = 13 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Brown	Sand - LT	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall J - STA 13+15 - 16-foot-high.gsz

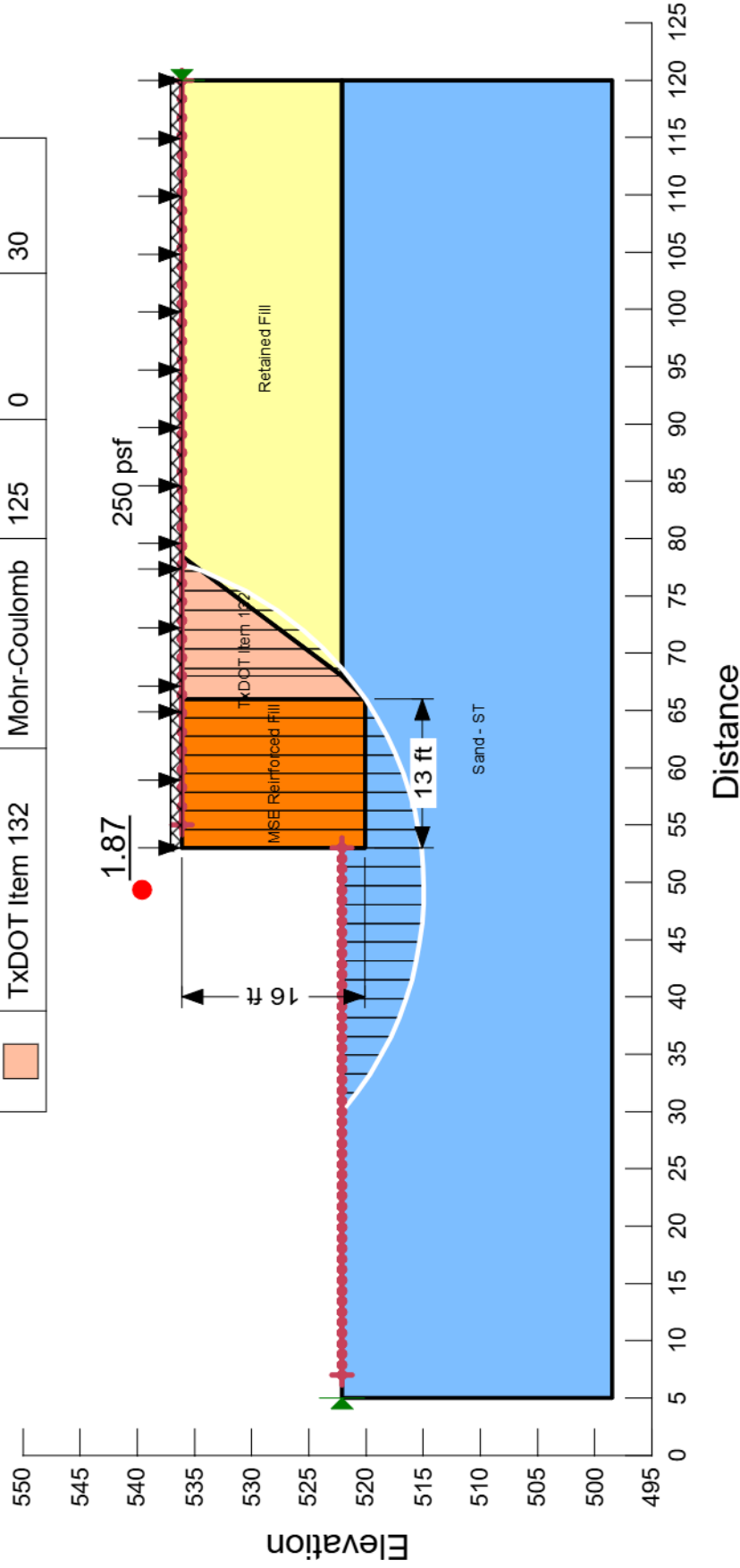
02/10/2025

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 13+15  
 Exposed Wall Height = 14 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 16 feet  
 Strap Length = 13 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Blue	Sand - ST	Mohr-Coulomb	125	0	30
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Short-Term

Retaining Wall J - STA 13+15 - 16-foot-high.gsz

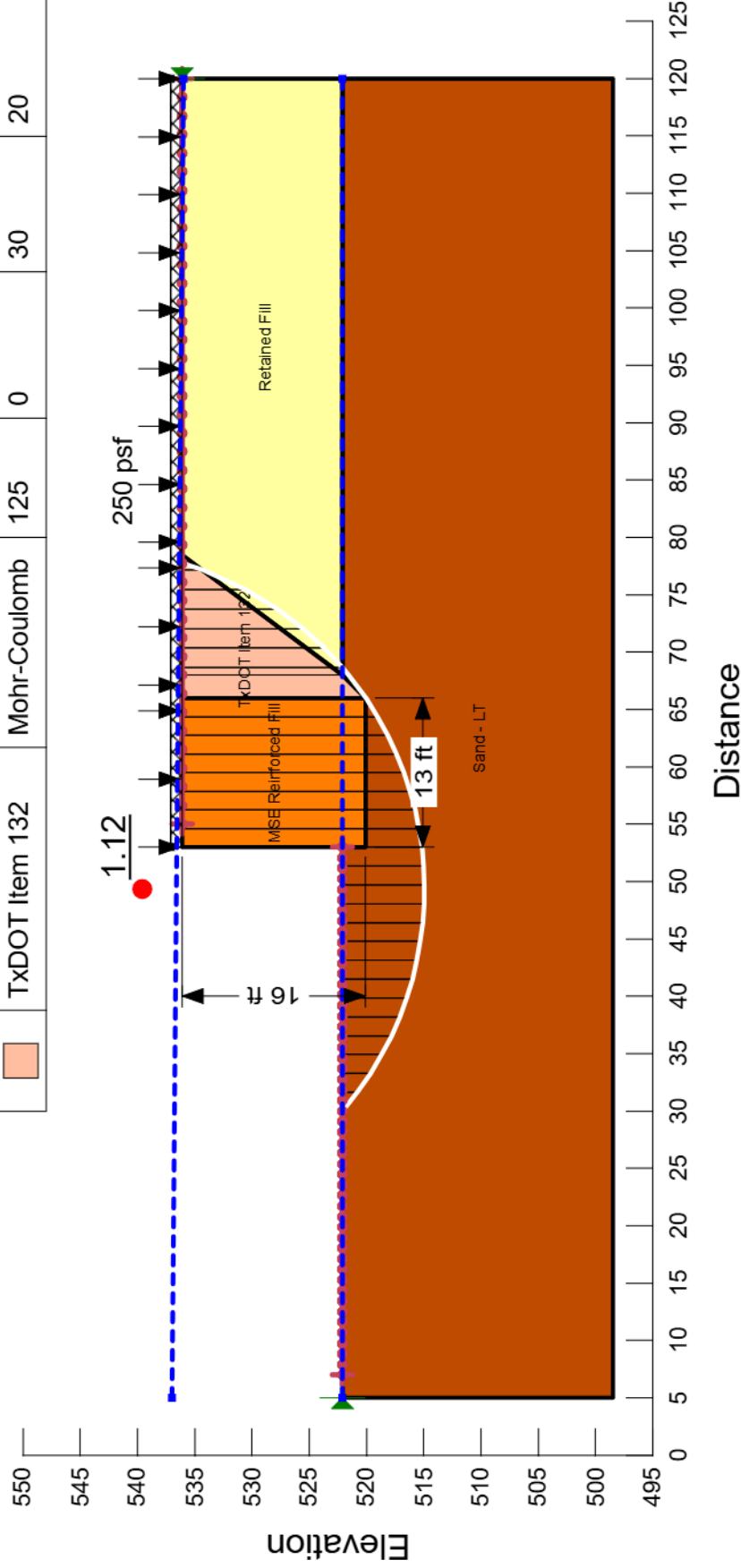
02/10/2025

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Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall J  
 Analysis at STA 13+15  
 Exposed Wall Height = 14 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 16 feet  
 Strap Length = 13 feet (0.8H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
Orange	MSE Reinforced Fill	High Strength	150				
Yellow	Retained Fill	Mohr-Coulomb	125	0	30	20	23
Brown	Sand - LT	Mohr-Coulomb	125	0	30	20	23
Light Orange	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown






Retaining Wall J - STA 13+15 - 16-foot-high.gsz

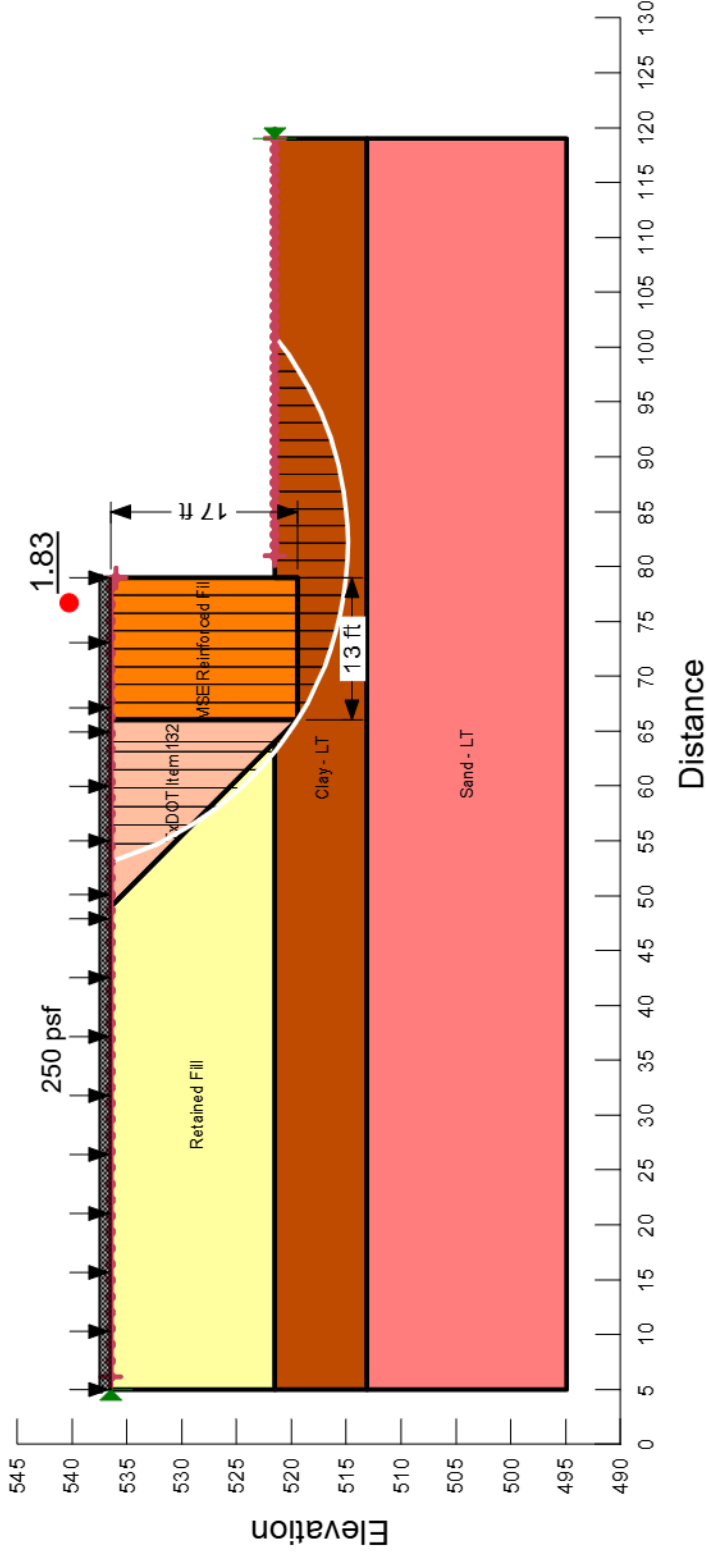
02/10/2025

1:180

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall K  
 Analysis at STA 10+27.75  
 Exposed Wall Height = 15 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 17 feet  
 Strap Length = 13 feet (0.75H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - LT	Mohr-Coulomb	125	50	29
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - LT	Mohr-Coulomb	125	0	31
	TxDOT Item 132	Mohr-Coulomb	125	0	30



Slope Stability - Long-Term

Retaining Wall K - STA 10+27.75 - 17-foot-high.gsz

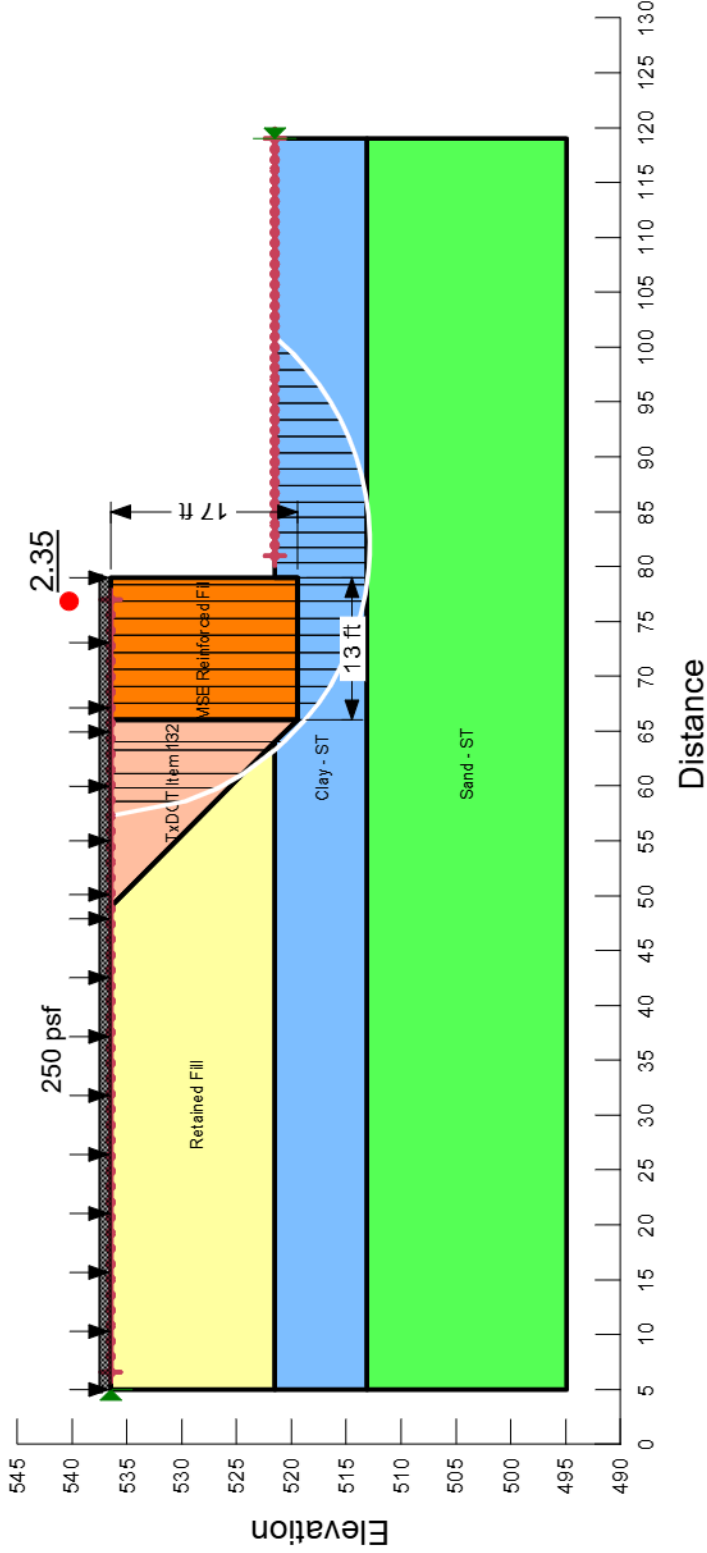
09/17/2024

1:210

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Blue	Clay - ST	Mohr-Coulomb	125	1,250	0.01
Orange	MSE Reinforced Fill	High Strength	150		
Yellow	Retained Fill	Mohr-Coulomb	125	0	30
Green	Sand - ST	Mohr-Coulomb	125	0	31
Light Blue	TxDOT Item 132	Mohr-Coulomb	125	0	30

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall K  
 Analysis at STA 10+27.75  
 Exposed Wall Height = 15 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 17 feet  
 Strip Length = 13 feet (0.75H)








Slope Stability - Short-Term

Retaining Wall K - STA 10+27.75 - 17-foot-high.gsz

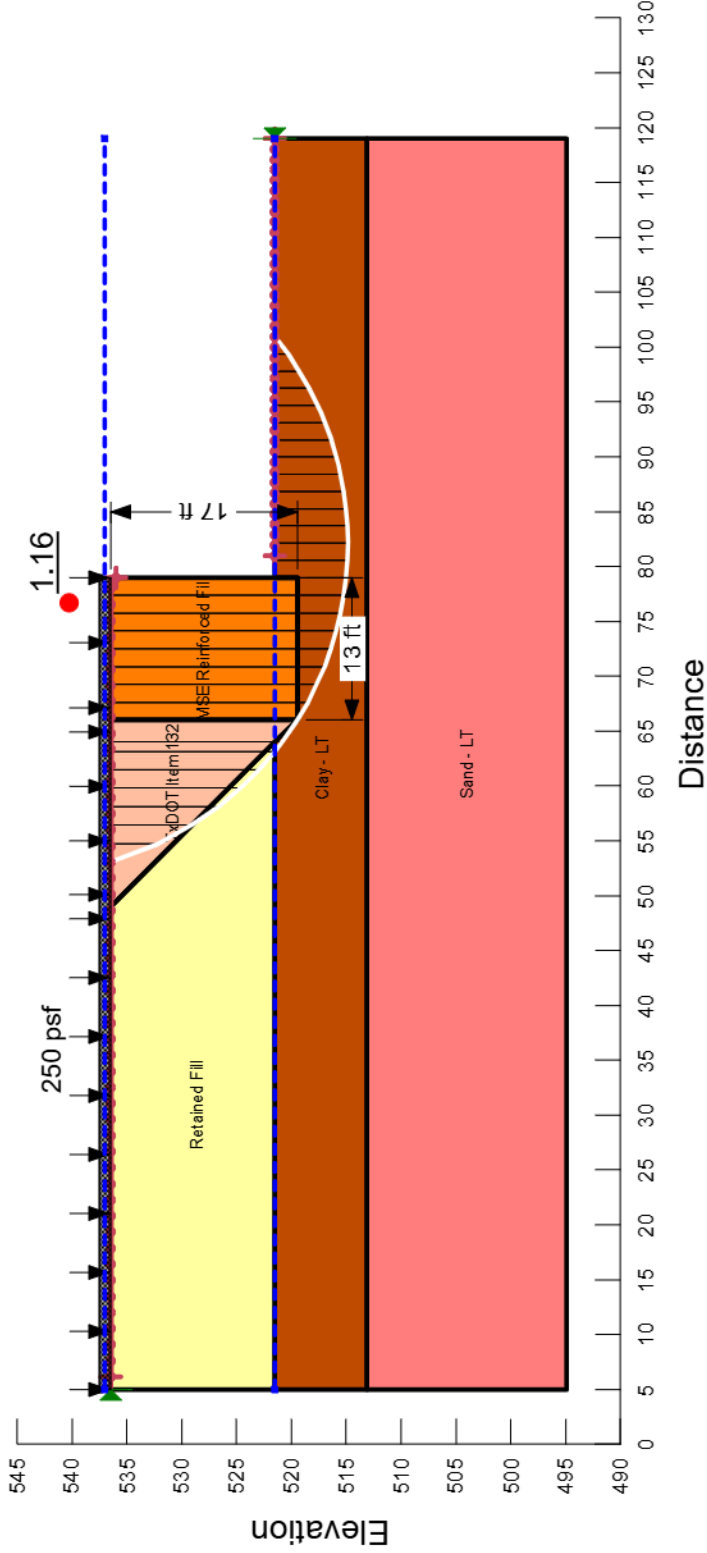
09/17/2024

1:210

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	29	75	22
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	31	20	24
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall K  
 Analysis at STA 10+27.75  
 Exposed Wall Height = 15 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 17 feet  
 Strap Length = 13 feet (0.75H)



Slope Stability - Rapid Drawdown

Retaining Wall K - STA 10+27.75 - 17-foot-high.gsz






09/17/2024

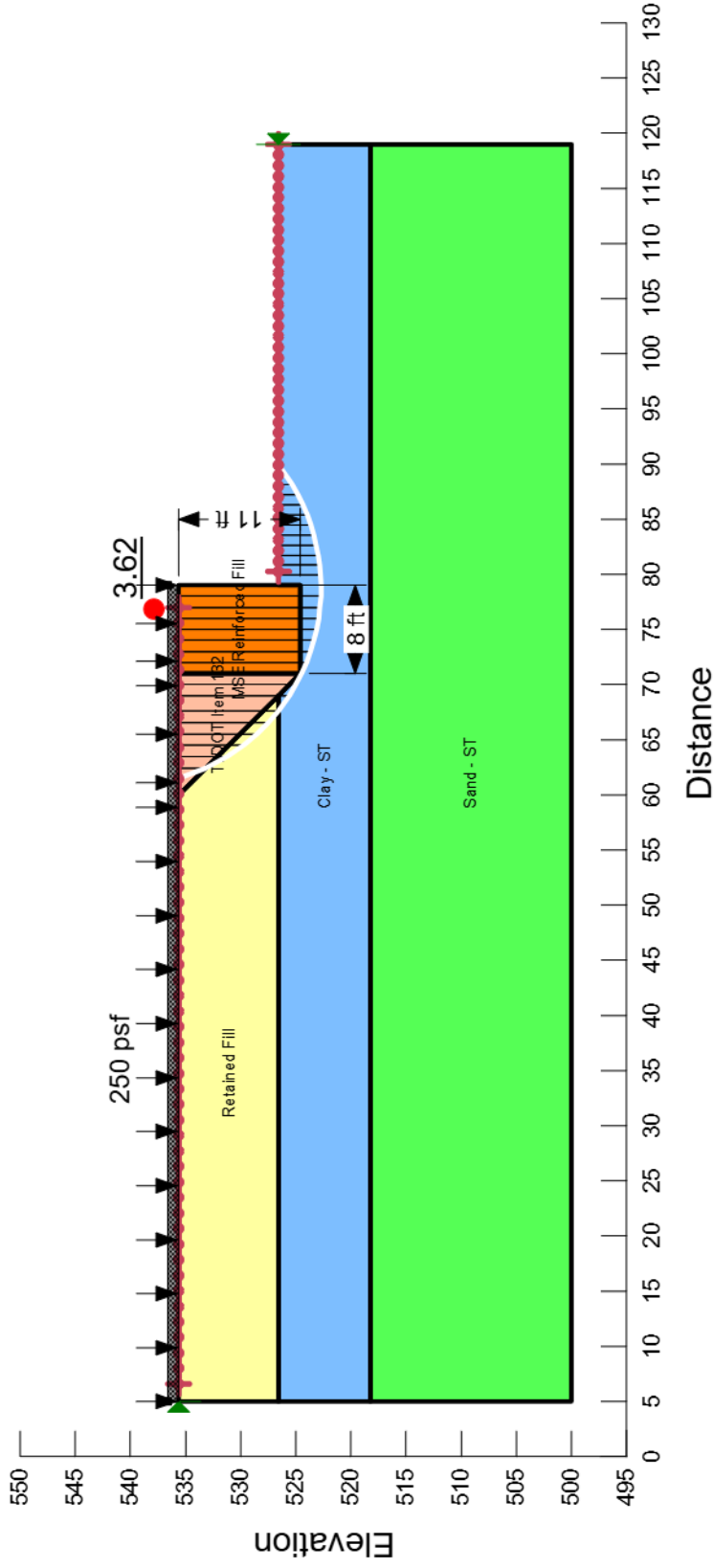
1:210



Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall K  
 Analysis at STA 12+00  
 Exposed Wall Height = 9 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 11 feet  
 Strap Length = 8 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Clay - ST	Mohr-Coulomb	125	1,250	0.01
	MSE Reinforced Fill	High Strength	150		
	Retained Fill	Mohr-Coulomb	125	0	30
	Sand - ST	Mohr-Coulomb	125	0	31
	TxDOT Item 132	Mohr-Coulomb	125	0	30








Slope Stability - Short-Term

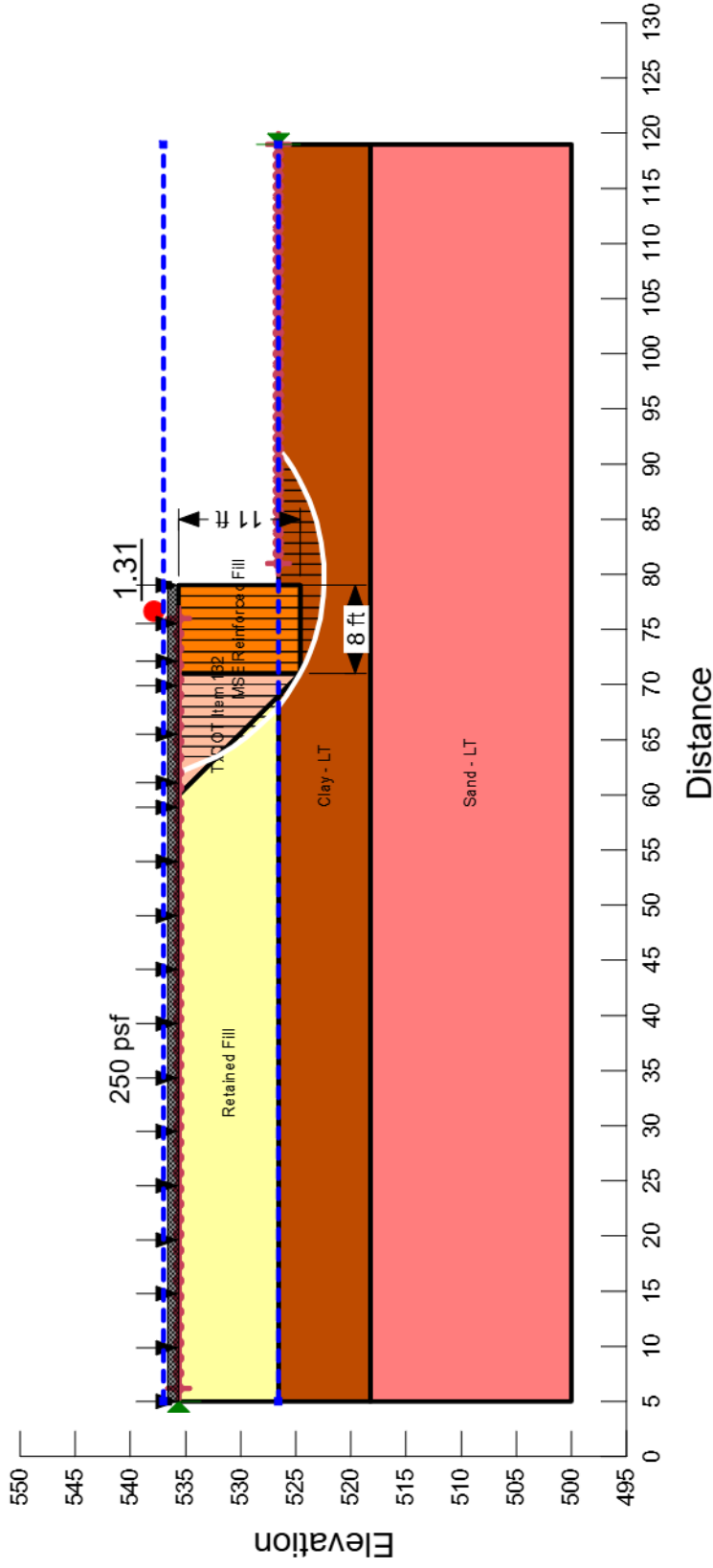
Retaining Wall K - STA 11+00 - 11-foot-high.gsz

1:200

Project Number: G22-4003-1  
 Project Name: Shady Shores Road

MSE Retaining Wall K  
 Analysis at STA 12+00  
 Exposed Wall Height = 9 feet  
 Embedment = 2 feet  
 Total Wall Height, H = 11 feet  
 Strap Length = 8 feet (0.7H)

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)	Cohesion R (psf)	Phi R (°)
	Clay - LT	Mohr-Coulomb	125	50	29	75	22
	MSE Reinforced Fill	High Strength	150				
	Retained Fill	Mohr-Coulomb	125	0	30	20	23
	Sand - LT	Mohr-Coulomb	125	0	31	20	24
	TxDOT Item 132	Mohr-Coulomb	125	0	30	20	23



Slope Stability - Rapid Drawdown

Retaining Wall K - STA 11+00 - 11-foot-high.gsz

1:200

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