



**SOIL SURVEY REPORT  
SH 121 / SH 183  
From Loop 820 NE to Dallas County Line  
Tarrant County, Texas**

**CSJ No. 0364-01-054  
CSJ No. 0364-05-025  
CSJ No. 0364-05-026  
CSJ No. 0094-02-077**

**April 6, 2005**

**Prepared by:**

**MICHAEL L. LESTER, P.E.  
PRINCIPAL**

**MICHAEL P. BATUNA, P.E.  
PROJECT ENGINEER**



April 4, 2005

Texas Department of Transportation  
P.O. Box 6868  
Fort Worth, Texas 76115-0868

Attention: Mr. Richard S. Williammee Jr., P.E.

Re: Geotechnical Soil Survey Report  
SH 121 / SH 183  
From Loop 820 NE to Dallas County Line  
Tarrant County, Texas  
CSJ No. 0364-01-054  
CSJ No. 0364-05-025  
CSJ No. 0364-05-026  
CSJ No. 0094-02-077  
CTL Job No. DA6710 to DA6713

Dear Mr. Williammee:

CTL | Thompson Texas, LLC (CTL) has completed a Geotechnical Soil Survey Report for the above referenced project and herewith submits three (3) copies of our report. This report has been prepared and submitted in general accordance with Contract No. 02-4XXP0006, and the work authorization No. 02-04-191, No. 02-04-192, No. 02-04-193 and No. 02-04-194 approved on January 12, 2005.

We appreciate the opportunity to be of professional service to you. We will be available at your request to discuss any questions, which may arise concerning this report. Please do not hesitate to call.

Very truly yours,

CTL | Thompson Texas, LLC



Michael Batuna, P.E.  
Project Engineer



Michael L. Lester, P.E.  
Principal



Dist: Texas Department of Transportation (3)  
MB/MLL/jp  
DA6710.rpt



**GEOTECHNICAL SOIL SURVEY REPORT**

**SH 121 / SH 183**

**From Loop 820 NE to SH 121**

**Tarrant County, Texas**

**CSJ No. 0364-01-054**

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**GEOTECHNICAL SOIL SURVEY REPORT**  
**SH 121 / SH 183**  
**From Loop 820 NE to SH 121**  
**Tarrant County, Texas**

**CSJ No. 0364-01-054**

**1.0 INTRODUCTION**

On January 12, 2005, Mr. Richard S. Williammee, Jr., P.E., District Materials Engineer of the Texas Department of Transportation's (TxDOT) Ft. Worth District Office requested a geotechnical investigation be performed to determine the properties of the soils present along SH 183 from Loop 820 NE to SH 121 in Tarrant County, Texas. TxDOT plans to reconstruct this existing section of SH 121/SH 183 (Figure 1).

CTL | Thompson Texas, LLC (CTL) was requested to determine soil properties at nine selected locations in order to complete the pavement design. The preliminary pavement structure design was not available at the time this report was prepared.

The purpose of this investigation was to define subsurface conditions along the SH 183 reconstruction, and to determine the suitability of the subgrade soils for in-place stabilization. As planned and implemented, the investigation included the drilling of nine (9) test borings to the prescribed depths to collect core samples. Five (5) borings (BH-1, BH-3, BH-5, BH-7 and BH-9) were drilled along the shoulder of the existing SH 183 eastbound frontage road. Four borings (BH-2, BH-4, BH-6, and BH-8) were drilled along the eastbound SH 183 mainlane shoulder. These locations were selected by the District's Materials Engineer. CTL coordinated the drilling and sampling on these boring locations. The samples were returned to CTL's laboratory to perform the prescribed series of laboratory tests. The soil descriptions and test results at each boring are included herein.

**2.0 GENERAL SUBSURFACE CONDITIONS**

Based on the Dallas Sheet of the *Geologic Atlas of Texas*, University of Texas, Department of Economic Geology, the project area is primarily situated above the Woodbine Formation (Kwb) with limited areas above the Grayson Marl Formation (Kgm) as shown in Figure 2. The Woodbine Formation consists of sandy clays, clayey sands and clays with some sandstone layers and boulders, cemented sands and shale. The maximum thickness of the formation ranges from one hundred seventy five to two hundred fifty (175-250) feet. The Grayson Marl Formation consists of alternating units of clay, marl, and limestone. The clay is calcareous with some irregular calcareous concretions. The limestone is aphanitic and fossil bearing. The maximum thickness of the formation ranges from sixty to one hundred (60-100) feet.

### 3.0 GENERAL SURFACE CONDITIONS

Based on information in the *Soil Survey of Tarrant County, Texas*, published by the U.S. Department of Agriculture's Soil Conservation Service (SCS) the project area is located through urban land (BH-1), Gasil-Urban land complex (BH-2), Gasil fine sandy loam (BH-3), the Crosstell fine sandy loam (BH-4 and BH-5), the Crosstell-Urban Land complex (BH-6 and BH-7) and the Silstid-Urban land complex soil unit (BH-8 and BH-9). The Gasil fine sandy loam is a deep, well drained, gently sloping, loam. Typically, the surface layer is yellowish brown fine sandy loam and is about nine to twenty one (9 to 21) inches thick underlain by yellowish brown sandy clay with red mottles to a depth of 80 inches. This soil's permeability is moderate and available water capacity is medium. Plasticity Indices range from nine to thirty three (9 to 33) percent.

The Crosstell fine sandy loam is a deep, moderately well drained, gently sloping, loam. Typically, the surface layer is brown fine sand loam and is about four (4) inches thick underlain by yellowish red and brownish yellow sandy clay from depths of four to forty one (4 to 41) inches. This soil is well drained, permeability is slow and available water capacity is medium. Plasticity Indices range from six to twenty two (10-28) percent.

The Silstid-Urban Land complex is deep and gently sloping. The surface and underlying soils consist of dark brown to light brown loamy fine sand to a depth of twenty seven (27) inches followed by yellowish brown sandy clay to a depth of twenty seven to sixty seven (27 to 67) inches underlain by reddish yellow fine sandy loam. The soil is moderately well drained, with medium runoff. Permeability is moderate, and the available water capacity is medium. Plasticity Indices range from nine to fifteen (9-15). Laboratory test results from the nine (9) boreholes drilled in this area are consistent with this published information.

### 4.0 FIELD INVESTIGATION

Surface and subsurface conditions along the highway were evaluated by nine (9) sample borings drilled at the approximate locations as shown on the Project Site Map, Figure 1. The station number and offset along with the ground elevation for each location are indicated on the Drilling Logs, Attachment A. Boreholes BH-1 to BH-9 were drilled to depths of ten to twenty (10-20) feet along the right of way (ROW). The boreholes were terminated after several feet penetration into the sandstone and limestone strata. Samples were taken in all the borings for general soil classification and laboratory testing. The field investigation was conducted on February 3 through 10, 2005 by CTL, under contract to the TxDOT Ft. Worth office. Soil samples were collected using Shelby tubes or split spoon samplers, as deemed appropriate for the nature of the subsurface strata encountered. Borings were logged in the field by CTL's geotechnical project engineer. The samples were brought to the CTL laboratory for visual observation and the testing program assignment by the geotechnical project engineer. Drilling Logs are included as Attachment A to this report.

## 5.0 SOIL CLASSIFICATION

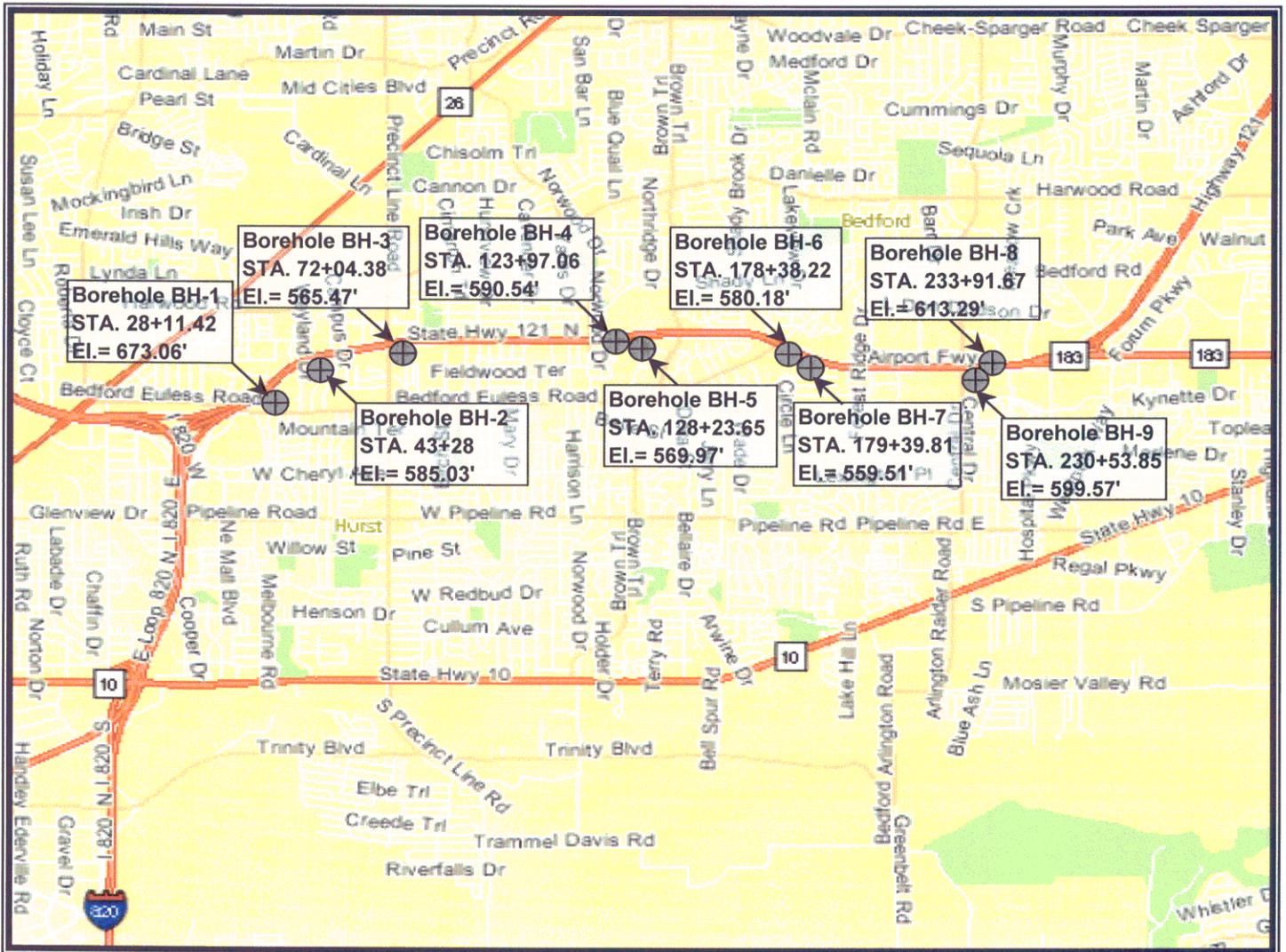
During the boring activities, continuous soil samples were collected. Individual samples were placed in plastic bags, sealed and labeled. Upon completion of the boring program, representative portions of the samples were selected for laboratory analysis based on review of the field boring logs and visual inspection of the samples in the laboratory. The intent was to identify and classify major strata encountered in each designated boring. Samples were tested using TxDOT Test Method TEX-110-E, Part I, to determine the percentages passing the No. 4, No. 40, and No. 200 sieves (standard U. S. sieves). Sampled portions passing the No. 40 sieve were tested to determine Plasticity Indices (PI) from Liquid Limits (LL) and Plastic Limits (PL) using TxDOT Test Methods TEX-104, 105, and 106-E. Based on this information, soil classifications were determined in accordance with TxDOT Test Method TEX-142-E (Unified Soil Classification System). In-situ Moisture Content (MC) values were also determined using TxDOT Test Method TEX-103-E at approximate two (2) foot intervals for use in TxDOT Test Method TEX-124-E (Potential Vertical Rise (PVR)) calculations. Soluble sulfate content of the top 4 feet of soil material was determined in two-foot intervals by using TxDOT Test Method TEX-620-J. The results are reported on Table 1 in the Figures and Tables section of this report.

## 6.0 POTENTIAL VERTICAL RISE

The Potential Vertical Rise (PVR) for each boring was determined, as shown on the spreadsheets and graphs included in Attachment B, and is summarized in Table 2 of this report. The PVR values for these borings ranged from 0.2 inches in boreholes BH-2, BH-7 and BH-9 to 1.5 inches in borehole BH-3.

Please contact Richard Williammee, Jr., P.E., District Materials Engineer, Ft. Worth District Laboratory, at 817-370-6675 with any questions or comments regarding this Geotechnical Soil Survey Report.

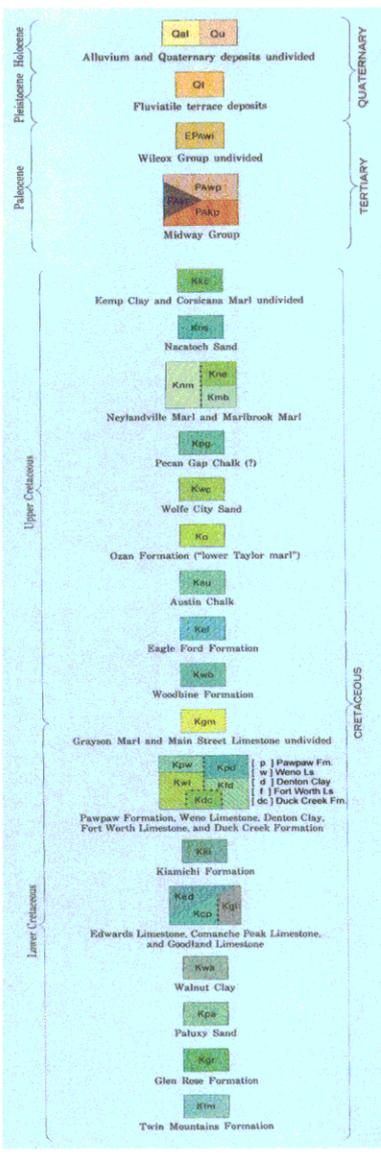
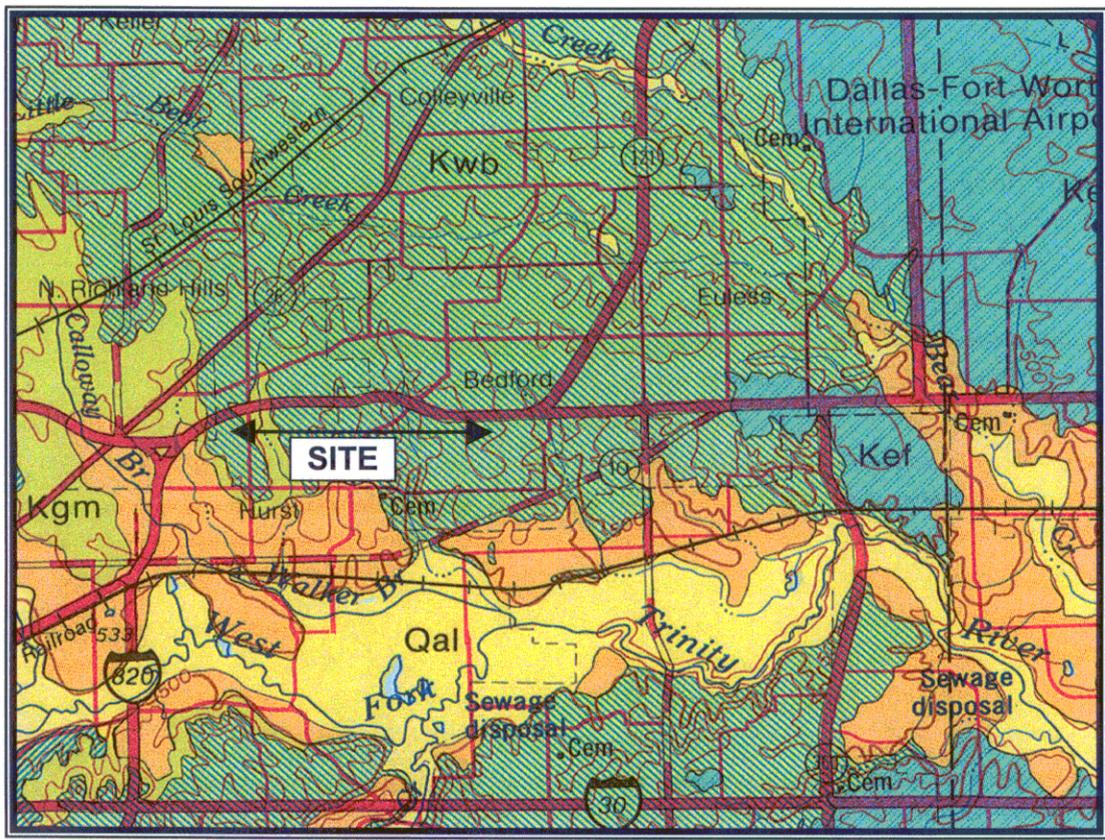
## FIGURES AND TABLES



**Project Site Map**  
**SH 121 / SH 183**  
**From Loop 820 NE to SH 121**  
**Tarrant County, Texas**  
**CSJ 0364-01-054**



Figure 1



Printed by permission of The Bureau of Economic Geology, University of Texas  
Dallas Geologic Atlas Sheet

**Geologic Map of Area**  
**SH 121 / SH 183**  
**From Loop 820 NE to SH 121**  
**Tarrant County, Texas**  
**CSJ 0364-01-054**



**Figure 2**

## Geotechnical Soil Survey

SH 121 / SH 183

From Loop 820 NE to SH 121

Tarrant County, Texas

CSJ Number: 0364-01-054

**TABLE 1: SUMMARY OF LABORATORY TEST RESULTS**

Borehole Number	Sample Depth, ft	Moisture Content, %	Atterberg Limits			Percent Passing, Sieve No. 40	Percent Passing, Sieve No. 200	Soluble Sulfate Content, ppm
			Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)			
BH-1	1 - 2	15	29	14	15	98	67	100
	2 - 3							120
	6 - 8	14	31	15	16	97	61	
	10 - 12	17						
	14 - 16	14	33	15	18	85	58	
	16 - 18	17						
	18 - 20	25	70	25	45	100	99	
BH-2	1 - 2	20	39	18	21	99	81	1,340
	4 - 5.5	14	20	11	9	95	42	
BH-3	2 - 3	17	41	20	21	100	60	
	3 - 4							140
	5 - 6	14						
	8 - 10	16	27	13	14	89	43	
	10 - 12	16						
	14 - 15	14	55	22	33	99	92	
15 - 16	21							
BH-4	3 - 4	14	35	15	20	93	44	120
	5 - 6	14						
	8 - 10	18	41	20	21	89	71	
	14 - 16	16						
	18 - 20	12	28	14	14	96	46	
BH-5	1 - 2							100
	2 - 3	13	28	13	15	56	25	
	3 - 4							100
	4 - 5	17						
	6 - 7.5	12	22	12	10	100	16	
	15 - 15.5	21				100	18	

**TABLE 1: SUMMARY OF LABORATORY TEST RESULTS**

Borehole Number	Sample Depth, ft	Moisture Content, %	Atterberg Limits			Percent Passing, Sieve No. 40	Percent Passing, Sieve No. 200	Soluble Sulfate Content, ppm
			Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)			
BH-6	2 - 3							3,940
	3 - 4	22	49	21	28	95	77	
	6 - 7.5	13	37	17	20	83	44	
	10 - 12	12	29	14	15	86	50	
	14 - 16	17						
	18 - 20	14	23	12	11	97	42	
BH - 7	2 - 3	17	28	14	14	94	74	
	3 - 4							120
	5 - 6	15						
	8 - 10	17						
	12 - 13.5	20	17	11	6	95	38	
	14 - 16	16	39	17	22	98	93	
19 - 19.5	6							
BH - 8	3 - 4							2,800
	4 - 5	15	32	16	16	87	61	
	6 - 8	15						
	9 - 10	27	47	22	25	98	95	
	12 - 14	25						
	18 - 20	18	43	20	23	99	95	
BH - 9	1 - 2	14	22	12	10	90	37	<100
	3 - 4							<100
	4 - 5	15						
	6 - 8	18	29	14	15	94	49	
	8 - 10	18						
	10 - 12	15	21	12	9	100	36	
	14 - 16	17						
	16 - 18	15	28	14	14	98	60	

**Geotechnical Soil Survey**  
**SH 121 / SH 183**  
**From Loop 820 NE to SH 121**  
**Tarrant County, Texas**  
**CSJ Number: 0364-01-054**

**TABLE 2: SUMMARY OF POTENTIAL VERTICAL RISE DATA**

Boring Number	Total PVR [in]	Remove / Replace Depth [ft] to Reduce PVR to:		
		1.0 [in]	1.5 [in]	2.0 [in]
BH-1	0.8	0.0	0.0	0.0
BH-2	0.2	0.0	0.0	0.0
BH-3	1.5	2.3	0.0	0.0
BH-4	1.2	1.0	0.0	0.0
BH-5	0.4	0.0	0.0	0.0
BH-6	1.0	0.0	0.0	0.0
BH-7	0.2	0.0	0.0	0.0
BH-8	0.6	0.0	0.0	0.0
BH-9	0.2	0.0	0.0	0.0

**Geotechnical Soil Survey**  
**SH 121 / SH 183**  
**From Loop 820 NE to SH 121**  
**Tarrant County, Texas**  
**CSJ Number: 0364-01-054**

**TABLE 3: SUMMARY OF FIELD STANDARD PENETRATION TEST RESULTS**

Boring Number	Depth [ft]	Blow counts / depth of penetration		
		6.0 [in]	6.0 [in]	6.0 [in]
BH-2	3.0	50/2"		
BH-2	4.0	41	47	41
BH-4	6.0	10	9	7
BH-4	12.0	9	10	9
BH-5	6.0	6	7	13
BH-5	10.0	50/4"		
BH-5	15.0	50/4"		
BH-6	6.0	7	10	11
BH-7	12.0	15	47	48
BH-7	16.0	50/5"		
BH-7	19.0	50/5"		

**ATTACHMENT A**  
**SOIL DRILLING LOGS**



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-1  
Structure Roadway  
Station 28+11.42  
Offset 118.09 Rt.

District Fort Worth  
Date 2/3/05  
Grnd. Elev. 673.06 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
668.1			CLAY, sandy, dark brown (CL)			15	29	15		Passing #4 sieve = 100 Passing #40 sieve = 98 Passing #200 sieve = 67
			CLAY, sandy, reddish brown, light brown, light gray (CL)			14	31	16		Passing #4 sieve = 99 Passing #40 sieve = 97 Passing #200 sieve = 61  - with iron ore pebbles
10						17				- with calcaroues nodules
15						14	33	18		Passing #4 sieve = 97 Passing #40 sieve = 85 Passing #200 sieve = 58
656.1			SHALE, WEATHERED, light brown, light gray			17				Passing #4 sieve = 100 Passing #40 sieve = 100 Passing #200 sieve = 99
653.1						25	70	45		
25										

Remarks: Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-2  
Structure Roadway  
Station 43+28  
Offset 71.09 Rt.

District Fort Worth  
Date 2/3/05  
Grnd. Elev. 585.03 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)	
583.			CLAY, with sand and ironstones, brown, gray (CL)			20	39	21		Passing #4 sieve = 99 Passing #40 sieve = 99 Passing #200 sieve = 81
5			SANDSTONE, gray			14	20	9		Passing #4 sieve = 100 Passing #40 sieve = 95 Passing #200 sieve = 42
575.	10									
15										
20										
25										

Remarks: Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-3  
Structure Roadway  
Station 72+04.38  
Offset 149.05 Rt.

District Fort Worth  
Date 2/4/05  
Grnd. Elev. 565.47 ft  
GW Elev. 553.47 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
			CLAY, sandy, gray, brown (CL)						
						17	41	21	Passing #4 sieve = 100 Passing #40 sieve = 100 Passing #200 sieve = 60
5						14			- ironstones, reddish brown
557.5			SAND, clayey and gravel, brown, dark brown, reddish brown (SC)			16	27	14	Passing #4 sieve = 95 Passing #40 sieve = 89 Passing #200 sieve = 43
10						16			
553.5			CLAY, light brown, light gray (CH)						
15						14	55	33	Passing #4 sieve = 100 Passing #40 sieve = 99 Passing #200 sieve = 92
549.5			LIMESTONE, gray			21			
547.5									
20									
25									

Remarks: Boring was drilled through 4 inches of asphalt pavement underlain by sand and gravel base. Groundwater seepage was encountered at a depth of 12 feet during drilling. Boring was backfilled with cuttings after drilling.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-4  
Structure Roadway  
Station 123+97.06  
Offset 54.79 Rt.

District Fort Worth  
Date 2/3/05  
Grnd. Elev. 590.54 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
5			FILL, SAND, with clay, light brown, brown, reddish brown, gray			14	35	20	Passing #4 sieve = 95 Passing #40 sieve = 93 Passing #200 sieve = 44
582.5			FILL, CLAY, sandy, brown, grayish brown			18	41	21	Passing #4 sieve = 95 Passing #40 sieve = 89 Passing #200 sieve = 71
578.5			FILL, SAND, with clay, grayish brown			16			
576.5			SAND, clayey, light gray, light brown (SC)			12	28	14	Passing #4 sieve = 99 Passing #40 sieve = 96 Passing #200 sieve = 46
570.5	20								
25									

Remarks: Boring was drilled through 3 inches of asphalt pavement underlain by sand and gravel base. Groundwater seepage was not encountered during drilling or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC

# DRILLING LOG



County Tarrant  
 Highway SH 121 / SH 183  
 CSJ 0364-01-054

Hole BH-5  
 Structure Roadway  
 Station 128+23.65  
 Offset 151.54 Rt.

District Fort Worth  
 Date 2/5/05  
 Grnd. Elev. 569.97 ft  
 GW Elev. 554.97 ft

WinCore  
 Version 3.0

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
564.			SAND, clayey with gravel, brown (SC)						Passing #4 sieve = 63 Passing #40 sieve = 56 Passing #200 sieve = 25
						13	28	15	
						17			
564.			SAND, reddish brown, light brown (SC)			12	22	10	Passing #4 sieve = 100 Passing #40 sieve = 100 Passing #200 sieve = 16
555.	15		SAND, light gray (SC)			21			Passing #4 sieve = 100 Passing #40 sieve = 100 Passing #200 sieve = 18
550.	20								
25									

Remarks: Groundwater was encountered during drilling at a depth of 15 feet. Boring caved at a depth of 16 feet. Boring was backfilled with cuttings after drilling completion.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-6  
Structure Roadway  
Station 178+38.22  
Offset 62.13 Rt.

District Fort Worth  
Date 2/3/05  
Grnd. Elev. 580.18 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
574.2			FILL, CLAY, with sand, brown, grayish brown			22	49	28	Passing #4 sieve = 98 Passing #40 sieve = 95 Passing #200 sieve = 77
570.2			FILL, SAND, clayey, brown, dark brown			13	37	20	Passing #4 sieve = 90 Passing #40 sieve = 83 Passing #200 sieve = 44
570.2	10		FILL, SAND, clayey, reddish brown, grayish brown			12	29	15	Passing #4 sieve = 94 Passing #40 sieve = 86 Passing #200 sieve = 50
562.2			SAND, clayey, grayish brown, dark brown (SC)			14	23	11	Passing #4 sieve = 100 Passing #200 sieve = 97 Passing #200 sieve = 42
560.2	20								
25									

Remarks: Boring was drilled through sand and gravel base. Groundwater seepage was not encountered during drilling or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-7  
Structure Roadway  
Station 179+39.81  
Offset 149.11 Rt.

District Fort Worth  
Date 2/4/05  
Grnd. Elev. 559.51 ft  
GW Elev. 547.51 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	
5	[Hatched pattern]		CLAY, with sand, gray (CL)			17	28	14	Passing #4 sieve = 99 Passing #40 sieve = 94 Passing #200 sieve = 74
						15			
						17			
549.5	10		SAND, with clay, light brown, light gray (SC)			20	17	6	Passing #4 sieve = 98 Passing #40 sieve = 95 Passing #200 sieve = 38
545.5	15		CLAY, with trace of sand, light brown, gray (CL)			16	39	22	Passing #4 sieve = 100 Passing #40 sieve = 98 Passing #200 sieve = 93
543.			SAND, with clay and sandstone layers, light gray, gray (SC)			6			
539.5	20								
25									

Remarks: Boring was drilled through 4 inches of asphalt pavement underlain by sand and gravel base. Seepage was encountered at a depth of 12 feet during drilling, boring was dry after drilling completion. Boring was backfilled with cuttings.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-8  
Structure Roadway  
Station 233+91.67  
Offset 55.36 Rt.

District Fort Worth  
Date 2/10/05  
Grnd. Elev. 613.29 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
5			FILL, CLAY, sandy, brown, grayish brown			15	32	16	Passing #4 sieve = 94 Passing #40 sieve = 87 Passing #200 sieve = 61
605.3			FILL, CLAY, with trace of sand, gray, reddish brown			15			
10			FILL, CLAY, with trace of sand, gray, reddish brown			27	47	25	Passing #4 sieve = 100 Passing #40 sieve = 98 Passing #200 sieve = 95
599.3			FILL, CLAY, with trace of sand, brown			25			
15			FILL, CLAY, with trace of sand, brown			18	43	23	Passing #4 sieve = 99 Passing #40 sieve = 99 Passing #200 sieve = 95
593.3									
20									
25									

Remarks: Boring was drilled through 3 inches of asphalt pavement underlain by sand and gravel base. Groundwater seepage was not encountered during drilling or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 121 / SH 183  
CSJ 0364-01-054

Hole BH-9  
Structure Roadway  
Station 230+53.85  
Offset 94.32 Rt.

District Fort Worth  
Date 2/8/05  
Grnd. Elev. 599.57 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)	
594.6			FILL, SAND, with clay, dark brown			14	22	10		Passing #4 sieve = 97 Passing #40 sieve = 90 Passing #200 sieve = 37
						15				
589.6			SAND, clayey, brown, reddish brown, gray (SC)			18	29	15		Passing #4 sieve = 98 Passing #200 sieve = 94 Passing #200 sieve = 49
						18				
587.6			SAND, clayey, light gray, brown (SC)			15	21	9		Passing #4 sieve = 100 Passing #40 sieve = 100 Passing #200 sieve = 36
						17				
579.6			CLAY, sandy, light brown, light gray, gray (CL)			15	28	14		Passing #4 sieve = 100 Passing #40 sieve = 98 Passing #200 sieve = 60

Remarks: Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC

**ATTACHMENT B**

**POTENTIAL VERTICAL RISE (PVR)  
CALCULATION SPREADSHEETS AND GRAPHS**

TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-1  
Date Sampled: February 3, 2005

Ground Elevation: 673.06'  
Station: 28+11.42  
Offset: 118.09 Rt.

Table 1: PVR Data BH-1

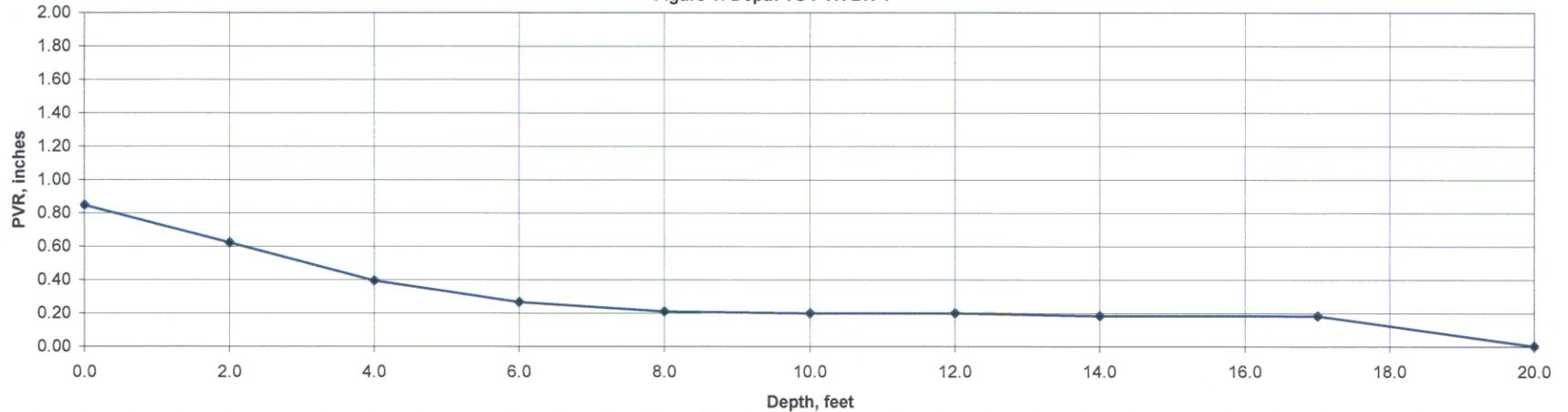
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	0.00	-	-	-	-	-	0.84
2.0	1.0	29	14.8	15.6	15.0	Dry	98.0	15	3.1	5.9	0.23	0.23	0.23	0.98	1.00	0.23	0.62
4.0	3.0	29	14.8	15.6	15.0	Dry	98.0	15	3.1	5.9	0.23	0.46	0.23	0.98	1.00	0.23	0.39
6.0	5.0	31	15.2	16.6	14.0	Dry	97.0	16	3.5	6.3	0.53	0.66	0.13	0.97	1.00	0.13	0.26
8.0	7.0	31	15.2	16.6	14.0	Dry	97.0	16	3.5	6.3	0.66	0.72	0.06	0.97	1.00	0.06	0.21
10.0	9.0	31	15.2	16.6	17.0	Wet	97.0	16	0.6	3.2	0.23	0.24	0.01	0.97	1.00	0.01	0.20
12.0	11.0	31	15.2	16.6	17.0	Wet	97.0	16	0.6	3.2	0.24	0.24	0.00	0.97	1.00	0.00	0.20
14.0	13.0	33	15.6	17.5	14.0	Dry	85.0	18	4.1	7.0	0.97	0.99	0.02	0.85	1.00	0.02	0.18
17.0	15.5	33	15.6	17.5	17.0	Avg	85.0	18	2.4	5.2	0.46	0.46	0.00	0.85	1.00	0.00	0.18
20.0	18.5	70	23.0	34.9	25.0	Dry	100.0	45	12.9	16.4	4.96	5.14	0.18	1.00	1.00	0.18	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-1



Remarks:

[Redacted Remarks]

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 03/08/05  
 Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
 Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-2  
Date Sampled: February 3, 2005

Ground Elevation: 585.03'  
Station: 43+28  
Offset: 71.09 Rt.

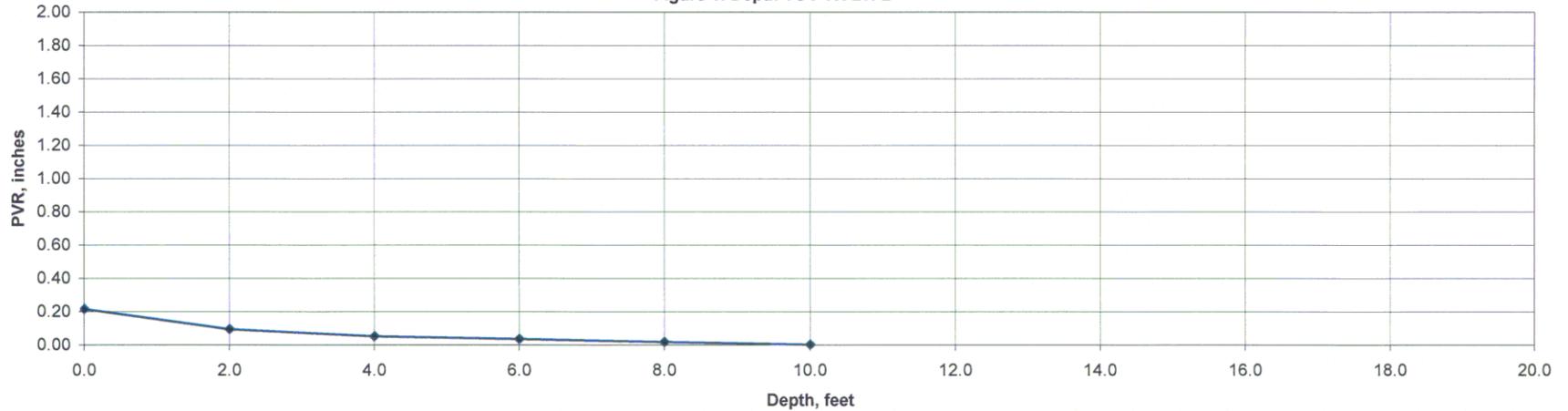
Table 1: PVR Data BH-2

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.21
2.0	1.0	39	16.8	20.3	20.0	Wet	99.0	21	1.7	4.4	0.00	0.12	0.12	0.99	1.00	0.12	0.09
4.0	3.0	20	13.0	11.4	14.0	Wet	95.0	9	-0.9	1.6	0.04	0.09	0.04	0.95	1.00	0.04	0.05
6.0	5.0	20	13.0	11.4	14.0	Wet	95.0	9	-0.9	1.6	0.09	0.10	0.02	0.95	1.00	0.02	0.03
8.0	7.0	20	13.0	11.4	14.0	Wet	95.0	9	-0.9	1.6	0.10	0.12	0.02	0.95	1.00	0.02	0.02
10.0	9.0	20	13.0	11.4	14.0	Wet	95.0	9	-0.9	1.6	0.12	0.14	0.02	0.95	1.00	0.02	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs  
Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-2



Remarks:

[Redacted Remarks]

Test Method: Tx124E  
Tested By: Kumara Marupudi  
Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E.  
Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.  
Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-3  
Date Sampled: February 4, 2005

Ground Elevation: 565.47'  
Station: 72+04.38  
Offset: 149.05 Rt.

Table 1: PVR Data BH-3

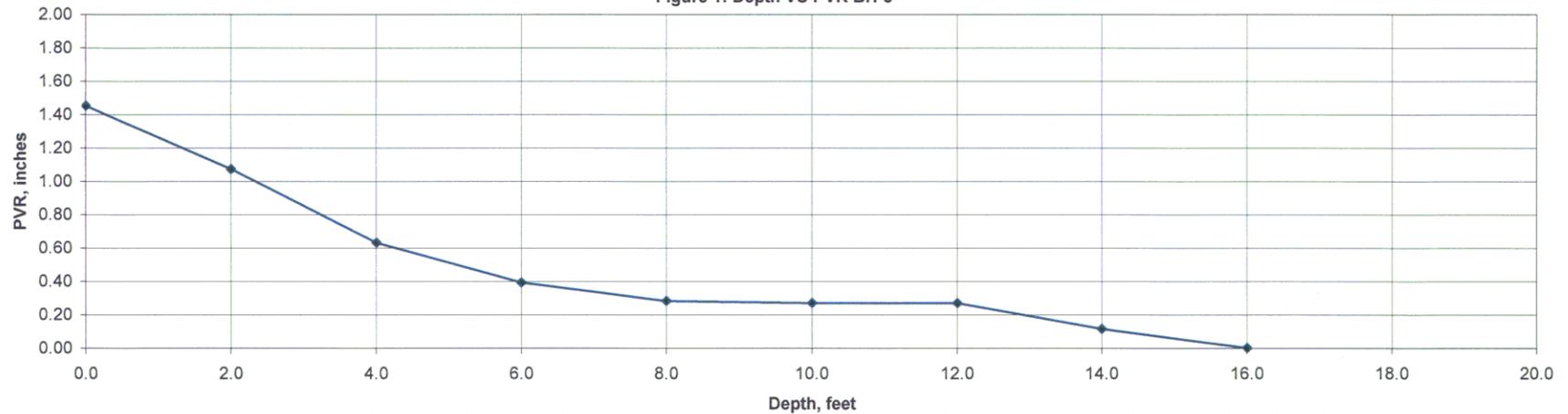
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.45
2.0	1.0	41	17.2	21.3	17.0	Dry	100.0	21	5.1	8.0	0.00	0.38	0.38	1.00	1.00	0.38	1.07
4.0	3.0	41	17.2	21.3	17.0	Dry	100.0	21	5.1	8.0	0.38	0.82	0.44	1.00	1.00	0.44	0.63
6.0	5.0	41	17.2	21.3	14.0	Dry	100.0	21	5.1	8.0	0.82	1.06	0.24	1.00	1.00	0.24	0.39
8.0	7.0	41	17.2	21.3	14.0	Dry	100.0	21	5.1	8.0	1.06	1.17	0.11	1.00	1.00	0.11	0.28
10.0	9.0	27	14.4	14.7	16.0	Wet	89.0	14	0.1	2.7	0.20	0.21	0.01	0.89	1.00	0.01	0.27
12.0	11.0	27	14.4	14.7	16.0	Wet	89.0	14	0.1	2.7	0.21	0.21	0.00	0.89	1.00	0.00	0.27
14.0	13.0	55	20.0	27.9	14.0	Dry	99.0	33	9.0	12.2	2.69	2.84	0.16	0.99	1.00	0.15	0.11
16.0	15.0	55	20.0	27.9	14.0	Dry	99.0	33	9.0	12.2	2.84	2.96	0.12	0.99	1.00	0.11	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-3



Remarks:

[Redacted Remarks]

Test Method: Tx124E      Tested By: Kumara Marupudi      Date: 03/08/05  
 Reviewed By: Michael P. Batuna, P.E.      Date: 03/15/05  
 Authorized By: Michael L. Lester, P.E.      Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-4  
Date Sampled: February 3, 2005

Ground Elevation: 590.54'  
Station: 123+97.06  
Offset: 54.79 Rt.

Table 1: PVR Data BH-4

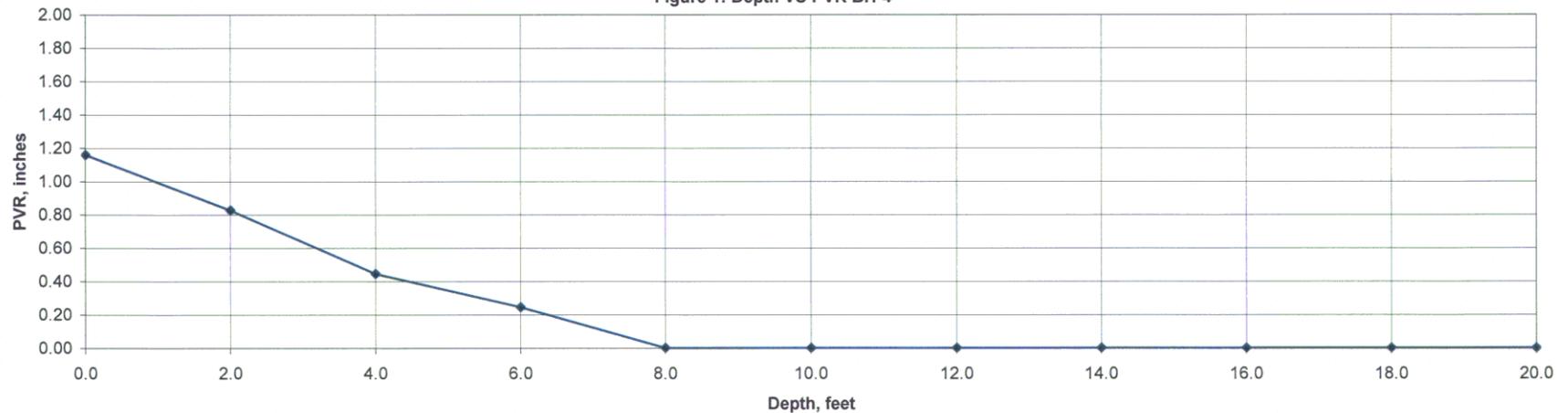
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.16
2.0	1.0	35	16.0	18.5	14.0	Dry	93.0	20	4.8	7.7	0.00	0.36	0.36	0.93	1.00	0.33	0.83
4.0	3.0	35	16.0	18.5	14.0	Dry	93.0	20	4.8	7.7	0.36	0.77	0.41	0.93	1.00	0.38	0.44
6.0	5.0	35	16.0	18.5	14.0	Dry	93.0	20	4.8	7.7	0.77	0.98	0.22	0.93	1.00	0.20	0.24
8.0	7.0	35	16.0	18.5	14.0	Dry	93.0	20	4.8	7.7	0.98	1.09	0.11	0.93	1.00	0.10	0.00
10.0	9.0	41	17.2	21.3	18.0	Dry	89.0	21	5.1	8.0	1.20	1.26	0.07	0.89	1.00	0.06	0.00
12.0	11.0	41	17.2	21.3	18.0	Dry	89.0	21	5.1	8.0	1.26	1.32	0.05	0.89	1.00	0.05	0.00
14.0	13.0	41	17.2	21.3	18.0	Dry	89.0	21	5.1	8.0	1.32	1.36	0.04	0.89	1.00	0.04	0.00
16.0	15.0	28	14.6	15.2	16.0	Wet	96.0	14	0.1	2.7	0.21	0.21	0.00	0.96	1.00	0.00	0.00
18.0	17.0	28	14.6	15.2	12.0	Dry	96.0	14	2.8	5.6	0.00	0.00	0.00	0.96	1.00	0.00	0.00
20.0	19.0	28	14.6	15.2	12.0	Dry	96.0	14	2.8	5.6	0.00	0.00	0.00	0.96	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-4



Remarks:

[Redacted Remarks]

Test Method: Tx124E      Tested By: Kumara Marupudi      Date: 03/08/05  
 Reviewed By: Michael P. Batuna, P.E.      Date: 03/15/05  
 Authorized By: Michael L. Lester, P.E.      Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-5  
Date Sampled: February 5, 2005

Ground Elevation: 569.97'  
Station: 128+23.65  
Offset: 151.54 Rt.

Table 1: PVR Data BH-5

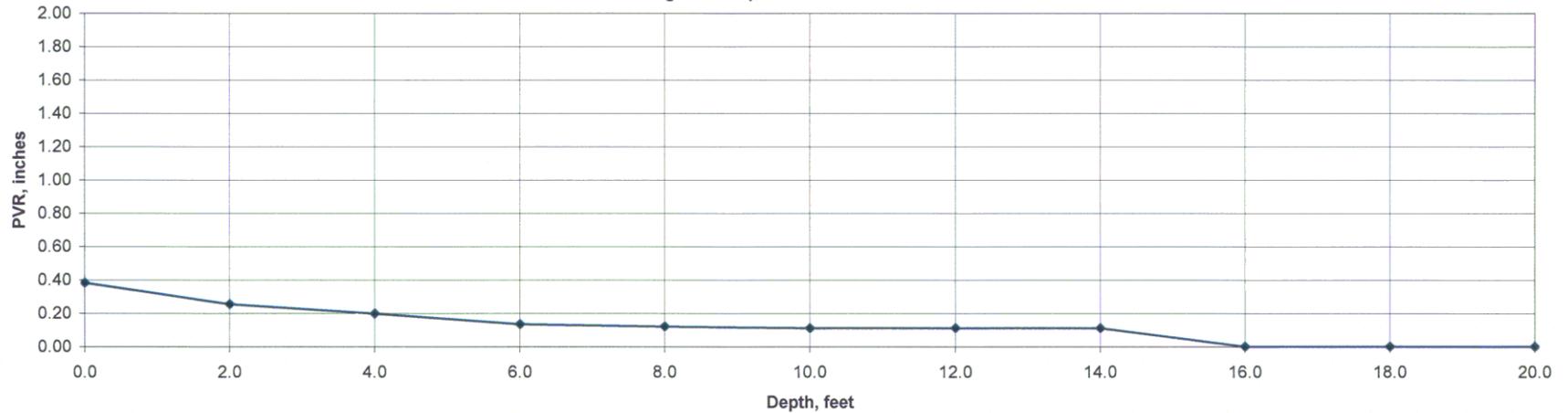
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.38
2.0	1.0	28	14.6	15.2	13.0	Dry	56.0	15	3.1	5.9	0.00	0.23	0.23	0.56	1.00	0.13	0.25
4.0	3.0	28	14.6	15.2	17.0	Wet	56.0	15	0.4	3.0	0.06	0.16	0.10	0.56	1.00	0.06	0.20
6.0	5.0	28	14.6	15.2	12.0	Dry	56.0	15	3.1	5.9	0.46	0.58	0.11	0.56	1.00	0.06	0.13
8.0	7.0	22	13.4	12.3	12.0	Dry	100.0	10	1.5	4.2	0.30	0.31	0.01	1.00	1.00	0.01	0.12
10.0	9.0	22	13.4	12.3	12.0	Dry	100.0	10	1.5	4.2	0.31	0.32	0.01	1.00	1.00	0.01	0.11
12.0	11.0	22	13.4	12.3	12.0	Dry	100.0	10	1.5	4.2	0.32	0.32	0.00	1.00	1.00	0.00	0.11
14.0	13.0	22	13.4	12.3	12.0	Dry	100.0	10	1.5	4.2	0.32	0.32	0.00	1.00	1.00	0.00	0.11
16.0	15.0	22	13.4	12.3	21.0	Wet	100.0	10	-0.7	1.8	0.15	0.27	0.11	1.00	1.00	0.11	0.00
18.0	17.0	22	13.4	12.3	21.0	Wet	100.0	10	-0.7	1.8	0.00	0.00	0.00	1.00	1.00	0.00	0.00
20.0	19.0	22	13.4	12.3	21.0	Wet	100.0	10	-0.7	1.8	0.00	0.00	0.00	1.00	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-5



Remarks:

[Redacted Remarks]

Test Method: Tested By: Date:  
Tx124E Kumara Marupudi 03/08/05  
Reviewed By: Date:  
Michael P. Batuna, P.E. 03/15/05  
Authorized By: Date:  
Michael L. Lester, P.E. 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-6  
Date Sampled: February 3, 2005

Ground Elevation: 580.18'  
Station: 178+38.22  
Offset: 62.13 Rt.

Table 1: PVR Data BH-6

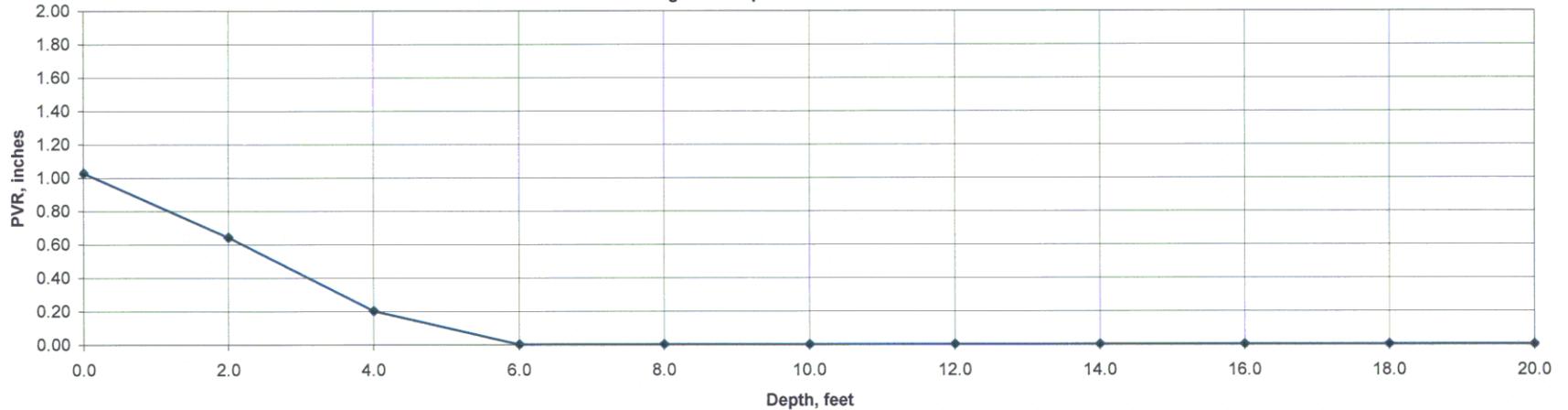
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.03
2.0	1.0	49	18.8	25.0	22.0	Avg	95.0	28	5.3	8.3	0.00	0.40	0.40	0.95	1.00	0.38	0.64
4.0	3.0	49	18.8	25.0	22.0	Avg	95.0	28	5.3	8.3	0.40	0.87	0.46	0.95	1.00	0.44	0.20
6.0	5.0	49	18.8	25.0	22.0	Avg	95.0	28	5.3	8.3	0.87	1.12	0.25	0.95	1.00	0.24	0.00
8.0	7.0	37	16.4	19.4	13.0	Dry	83.0	20	4.8	7.7	0.98	1.09	0.11	0.83	1.00	0.09	0.00
10.0	9.0	37	16.4	19.4	13.0	Dry	83.0	20	4.8	7.7	1.09	1.15	0.06	0.83	1.00	0.05	0.00
12.0	11.0	29	14.8	15.6	12.0	Dry	86.0	15	3.1	5.9	0.64	0.66	0.02	0.86	1.00	0.02	0.00
14.0	13.0	29	14.8	15.6	12.0	Dry	86.0	15	3.1	5.9	0.66	0.67	0.01	0.86	1.00	0.01	0.00
16.0	15.0	29	14.8	15.6	17.0	Wet	86.0	15	0.4	3.0	0.23	0.00	-0.23	0.86	1.00	-0.20	0.00
18.0	17.0	29	14.8	15.6	17.0	Wet	86.0	15	0.4	3.0	0.00	0.00	0.00	0.86	1.00	0.00	0.00
20.0	19.0	23	13.6	12.8	14.0	Wet	97.0	11	-0.5	2.1	0.00	0.00	0.00	0.97	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-6



Remarks:

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	03/08/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-7  
Date Sampled: February 3, 2005

Ground Elevation: 559.51'  
Station: 179+39.81  
Offset: 149.11 Rt.

Table 1: PVR Data BH-7

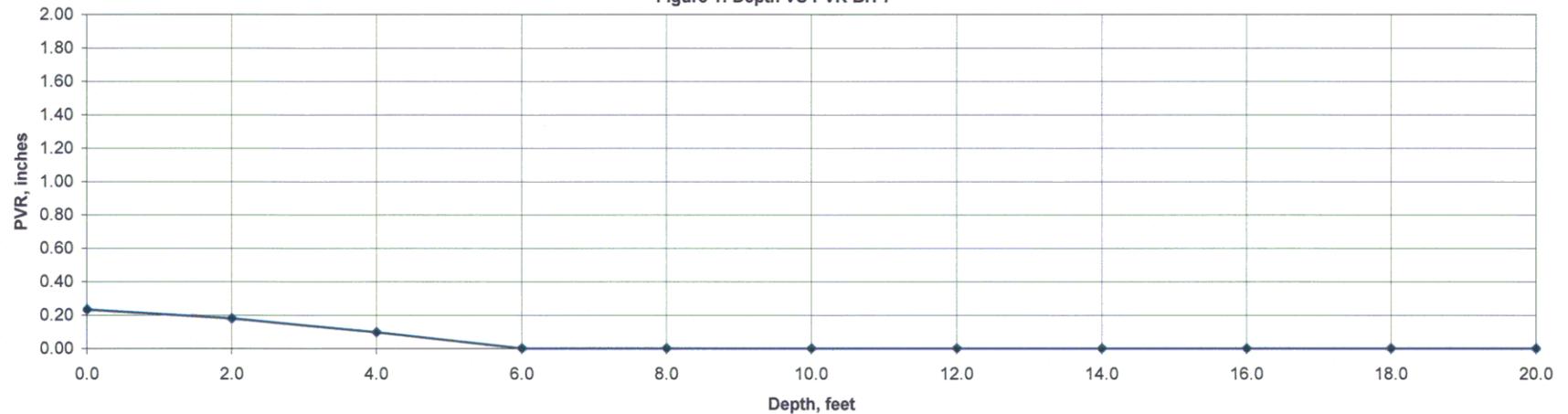
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23
2.0	1.0	28	14.6	15.2	17.0	Wet	94.0	14	0.1	2.7	0.00	0.06	0.06	0.94	1.00	0.05	0.18
4.0	3.0	28	14.6	15.2	17.0	Wet	94.0	14	0.1	2.7	0.06	0.15	0.09	0.94	1.00	0.08	0.10
6.0	5.0	28	14.6	15.2	15.0	Avg	94.0	14	1.2	3.9	0.22	0.27	0.05	0.94	1.00	0.05	0.00
8.0	7.0	28	14.6	15.2	15.0	Avg	94.0	14	1.2	3.9	0.27	0.28	0.01	0.94	1.00	0.01	0.00
10.0	9.0	28	14.6	15.2	17.0	Wet	94.0	14	0.1	2.7	0.20	0.21	0.01	0.94	1.00	0.01	0.00
12.0	11.0	17	12.4	10.0	20.0	Wet	95.0	6	-1.6	0.9	0.00	0.00	0.00	0.95	1.00	0.00	0.00
14.0	13.0	17	12.4	10.0	20.0	Wet	95.0	6	-1.6	0.9	0.00	0.00	0.00	0.95	1.00	0.00	0.00
16.0	15.0	39	16.8	20.3	16.0	Dry	98.0	22	5.4	8.4	1.47	1.50	0.03	0.98	1.00	0.03	0.00
18.0	17.0	17	12.4	10.0	6.0	Dry	95.0	6	0.2	2.8	0.00	0.00	0.00	0.95	1.00	0.00	0.00
20.0	19.0	17	12.4	10.0	6.0	Dry	95.0	6	0.2	2.8	0.00	0.00	0.00	0.95	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-7



Remarks:

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 03/08/05  
 Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
 Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-8  
Date Sampled: February 10, 2005

Ground Elevation: 613.29'  
Station: 233+91.67  
Offset: 55.36 Rt.

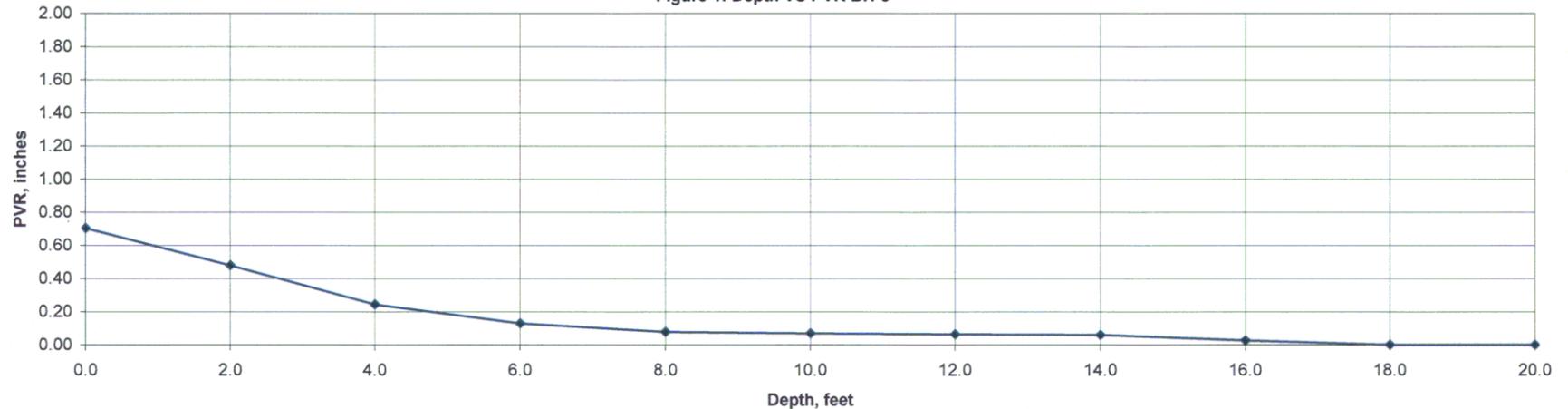
Table 1: PVR Data BH-8

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
2.0	1.0	32	15.4	17.0	15.0	Dry	87.0	16	3.5	6.3	0.00	0.26	0.26	0.87	1.00	0.22	0.48
4.0	3.0	32	15.4	17.0	15.0	Dry	87.0	16	3.5	6.3	0.26	0.53	0.27	0.87	1.00	0.23	0.24
6.0	5.0	32	15.4	17.0	15.0	Dry	87.0	16	3.5	6.3	0.53	0.66	0.13	0.87	1.00	0.11	0.13
8.0	7.0	32	15.4	17.0	15.0	Dry	87.0	16	3.5	6.3	0.66	0.72	0.06	0.87	1.00	0.05	0.08
10.0	9.0	47	18.4	24.1	27.0	Wet	98.0	25	2.5	5.3	0.47	0.48	0.01	0.98	1.00	0.01	0.07
12.0	11.0	47	18.4	24.1	27.0	Wet	98.0	25	2.5	5.3	0.48	0.49	0.01	0.98	1.00	0.01	0.06
14.0	13.0	47	18.4	24.1	25.0	Wet	98.0	25	2.5	5.3	0.49	0.49	0.00	0.98	1.00	0.00	0.06
16.0	15.0	43	17.6	22.2	18.0	Dry	99.0	23	5.7	8.7	1.58	1.61	0.03	0.99	1.00	0.03	0.03
18.0	17.0	43	17.6	22.2	18.0	Dry	99.0	23	5.7	8.7	1.61	1.64	0.03	0.99	1.00	0.03	0.00
20.0	19.0	43	17.6	22.2	18.0	Dry	99.0	23	5.7	8.7	1.64	1.64	0.00	0.99	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs    Orange field is the result of override PVR input to avoid negative PVR    Tan fields are final answers per layer  
Blue fields are chart inputs    Yellow field is Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-8



Remarks:

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0364-01-054  
District: Fort Worth

Boring Number: BH-9  
Date Sampled: February 8, 2005

Ground Elevation: 599.57  
Station: 230+53.85  
Offset: 94.32 Rt.

Table 1: PVR Data BH-9

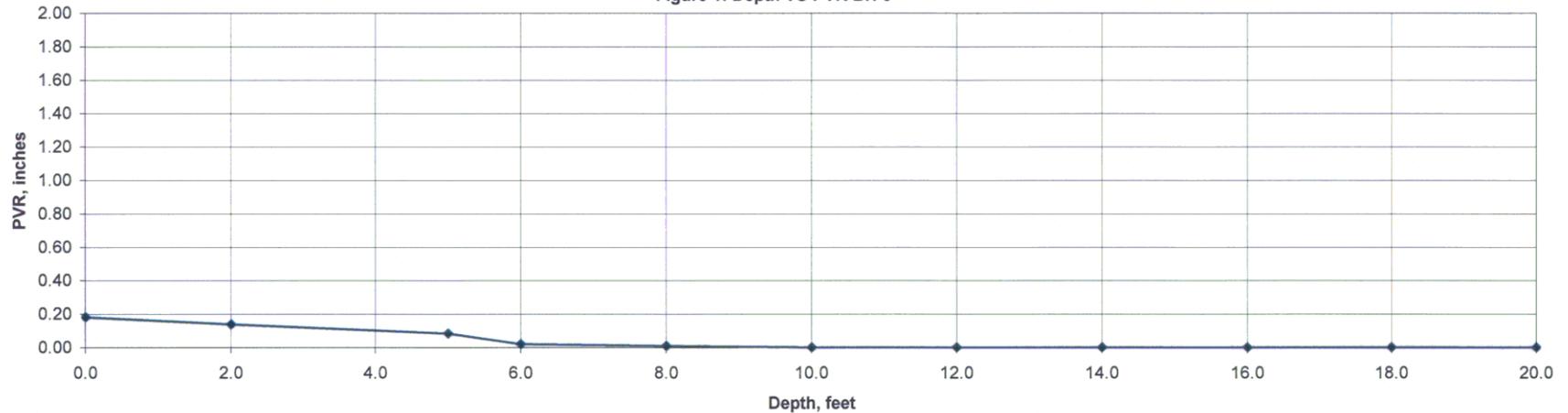
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18
2.0	1.0	22	13.4	12.3	14.0	Wet	90.0	10	-0.7	1.8	0.00	0.05	0.05	0.90	1.00	0.04	0.14
5.0	3.5	22	13.4	12.3	15.0	Wet	90.0	10	-0.7	1.8	0.05	0.11	0.06	0.90	1.00	0.06	0.08
6.0	5.5	29	14.8	15.6	15.0	Dry	94.0	15	3.1	5.9	0.53	0.60	0.07	0.94	1.00	0.06	0.02
8.0	7.0	29	14.8	15.6	18.0	Wet	94.0	15	0.4	3.0	0.21	0.22	0.01	0.94	1.00	0.01	0.01
10.0	9.0	29	14.8	15.6	18.0	Wet	94.0	15	0.4	3.0	0.22	0.23	0.01	0.94	1.00	0.01	0.00
12.0	11.0	21	13.2	11.9	15.0	Wet	100.0	9	-0.9	1.6	0.14	0.14	0.00	1.00	1.00	0.00	0.00
14.0	13.0	28	14.6	15.2	17.0	Wet	98.0	14	0.1	2.7	0.21	0.21	0.00	0.98	1.00	0.00	0.00
16.0	15.0	28	14.6	15.2	17.0	Wet	98.0	14	0.1	2.7	0.21	0.21	0.00	0.98	1.00	0.00	0.00
18.0	17.0	28	14.6	15.2	15.0	Avg	98.0	14	1.2	3.9	0.30	0.30	0.00	0.98	1.00	0.00	0.00
20.0	19.0	28	14.6	15.2	15.0	Avg	98.0	14	1.2	3.9	0.30	0.30	0.00	0.98	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-9



Remarks:

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



0364-05-025

**GEOTECHNICAL SOIL SURVEY REPORT**

**SH 183**

**From SH 121 to FM 157**

**Tarrant County, Texas**

**CSJ No. 0364-05-025**

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**Attachments**

**ATTACHMENT A: Soil Drilling Logs**

**ATTACHMENT B: Potential Vertical Rise (PVR) Calculation Spreadsheets  
and Graphs**

**GEOTECHNICAL SOIL SURVEY REPORT**  
**SH 183**  
**From SH 121 to FM 157**  
**Tarrant County, Texas**

**CSJ No. 0364-05-025**

**1.0 INTRODUCTION**

On January 12, 2005, Mr. Richard S. Williammee, Jr., P.E., District Materials Engineer of the Texas Department of Transportation's (TxDOT) Ft. Worth District Office requested a geotechnical investigation be performed to determine the properties of the soils present along SH 183 from SH 121 to FM 157 in Tarrant County, Texas. TxDOT plans to reconstruct this existing section of SH 183 (Figure 1).

CTL | Thompson Texas, LLC (CTL) was requested to determine soil properties at three selected locations in order to complete the pavement design. The preliminary pavement structure design was not available at the time this report was prepared.

The purpose of this investigation was to define subsurface conditions along the SH 183 reconstruction, and to determine the suitability of the subgrade material for in-place stabilization. As planned and implemented, the investigation included the drilling of three (3) test borings to the prescribed depths to collect core samples. Boring BH-10 was drilled along the existing SH 183 eastbound frontage road, Boring BH-11 was drilled on the mainlane shoulder, and Boring BH-12 was drilled in the turning lane island on FM 157. These locations were selected by the District's Materials Engineer. CTL coordinated the drilling and sampling at these boring locations. The samples were returned to CTL's laboratory to perform the prescribed series of laboratory tests. The soil descriptions and test results at each boring are included herein.

**2.0 GENERAL SUBSURFACE CONDITIONS**

Based on the Dallas Sheet of the Geologic Atlas of Texas, University of Texas, Department of Economic Geology, the project area overlays the Woodbine Formation (Kwb) as shown in Figure 2. The Woodbine Formation consists of clayey sands, clays, and sandy clays with some sandstone layers and boulders, cemented sands and shale. The maximum thickness of the formation ranges from one hundred seventy five to two hundred fifty (175-250) feet.

### 3.0 GENERAL SURFACE CONDITIONS

Based on information in the Soil Survey of Tarrant County, Texas, published by the U.S. Department of Agriculture's Soil Conservation Service (SCS) the project area is located on the Gasil-Urban land complex (BH-10 to BH-12). The Gasil fine sandy loam is a deep, well drained, gently sloping, loam. Typically, the surface layer is yellowish brown fine sandy loam and is about nine (9) inches thick underlain by brownish sandy clay to a depth of seventy (70) inches. This soil's permeability is moderate and available water capacity is high. Plasticity Indices range from ten to thirty (10 to 30) percent. Laboratory test results from the three (3) boreholes drilled in this area are consistent with this published information.

### 4.0 FIELD INVESTIGATION

Surface and subsurface conditions along the highway were evaluated by three (3) sample borings drilled at the approximate locations as shown on the Project Site Map, Figure 1. The station number and offset along with the ground elevation for each location are indicated on the Drilling Logs, Attachment A. Boreholes BH-10 to BH-12 were drilled to a depth of twenty (20) feet along the right of way (ROW). Samples were taken in all the borings for general soil classification and laboratory testing. The field investigation was conducted on February 3 through 8, 2005 by CTL, under contract to the TxDOT Ft. Worth office. Soil samples were collected using Shelby tubes or split spoon samplers, as deemed appropriate for the nature of the subsurface strata encountered. Borings were logged in the field by CTL's geotechnical project engineer. The samples were brought to the CTL laboratory for visual observation and the testing program assignment by the geotechnical project engineer. Drilling Logs are included as Attachment A to this report.

### 5.0 SOIL CLASSIFICATION

During the boring activities, continuous soil samples were collected. Individual samples were placed in plastic bags, sealed and labeled. Upon completion of the boring program, representative portions of the samples were selected for laboratory analysis based on review of the field boring logs and visual inspection of the samples in the laboratory. The intent was to identify and classify major strata encountered in each designated boring. Samples were tested using TxDOT Test Method TEX-110-E, Part I, to determine the percentages passing the No. 4, No. 40, and No. 200 sieves (standard U. S. sieves). Sampled portions passing the No. 40 sieve were tested to determine Plasticity Indices (PI) from Liquid Limits (LL) and Plastic Limits (PL) using TxDOT Test Methods TEX-104, 105, and 106-E. Based on this information, soil classifications were determined in accordance with TxDOT Test Method TEX-142-E (Unified Soil Classification System). In-situ Moisture Content (MC) values were also determined using TxDOT Test Method TEX-103-E at approximate two (2) foot intervals for use in TxDOT Test Method TEX-124-E (Potential Vertical Rise (PVR)) calculations. Soluble sulfate content of the top 4 feet of soil material was determined in two-foot intervals by

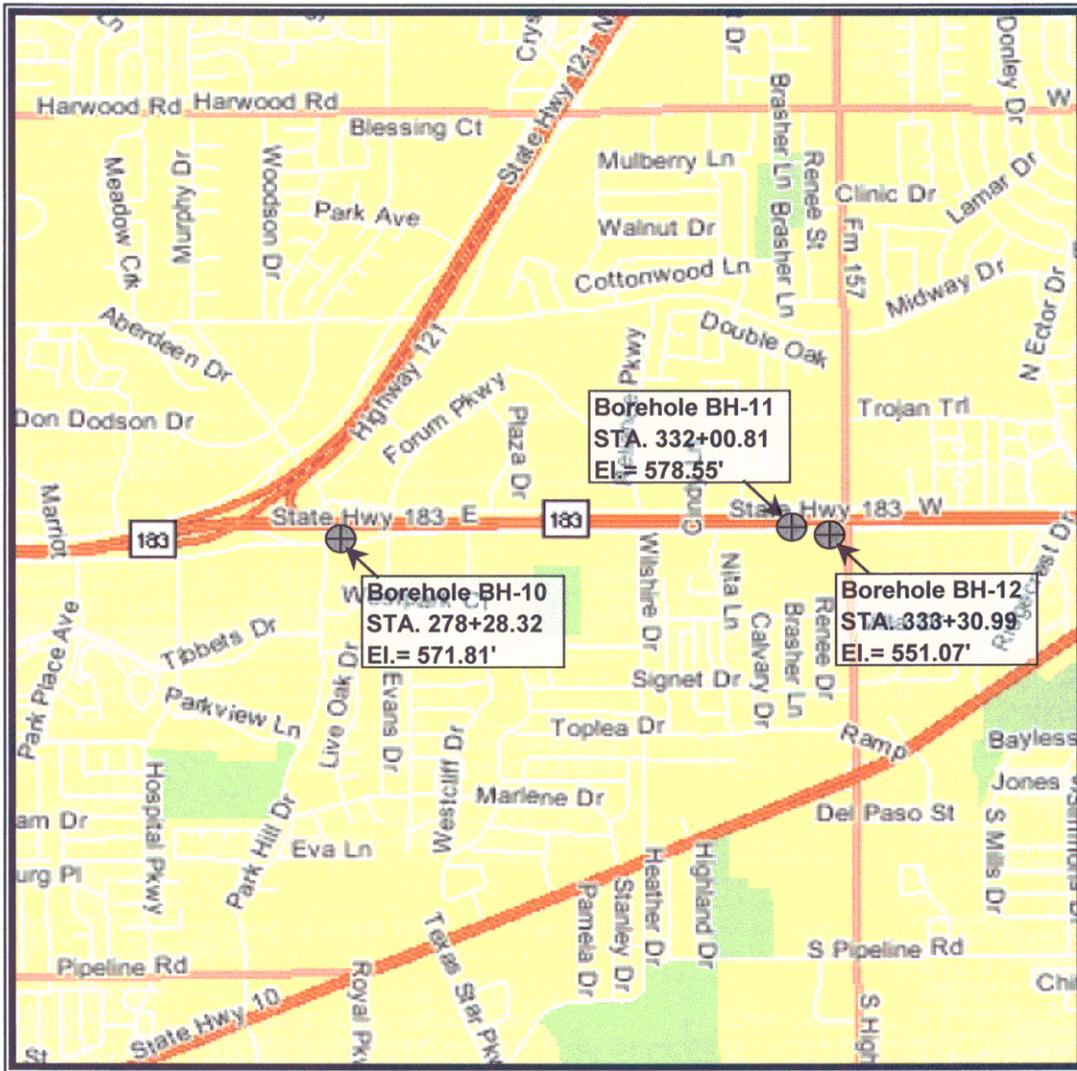
using TxDOT Test Method TEX-620-J. The results are reported on the attached Table 1 included in the Figures and Tables section of this report.

## **6.0 POTENTIAL VERTICAL RISE**

The Potential Vertical Rise (PVR) for each boring was determined, as shown on the worksheets and graphs included in Attachment B, and are summarized in Table 2 of this report. The PVR values for these borings ranged from 0.6 inches in borehole BH-12 to 1.7 inches in borehole BH-10.

Please contact Richard Williammee, Jr., P.E., District Materials Engineer, Ft. Worth District Laboratory, at 817-370-6675 with any questions or comments regarding this Geotechnical Soil Survey Report.

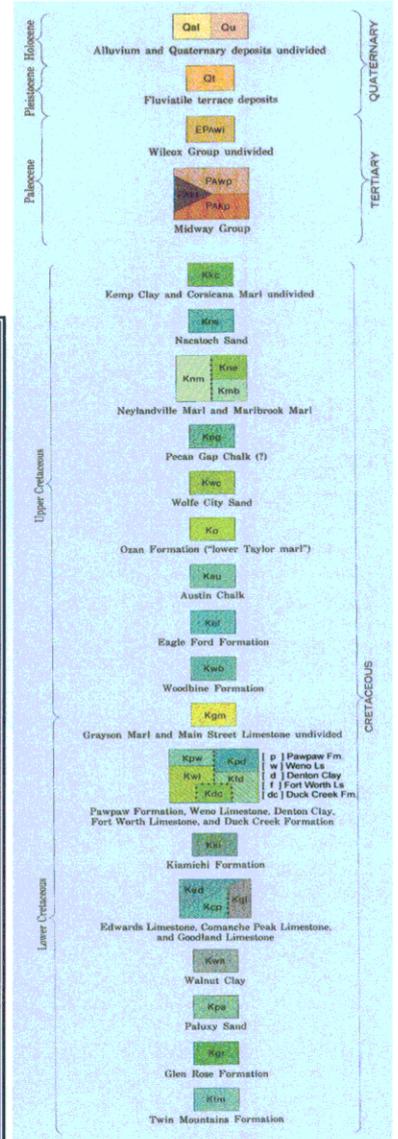
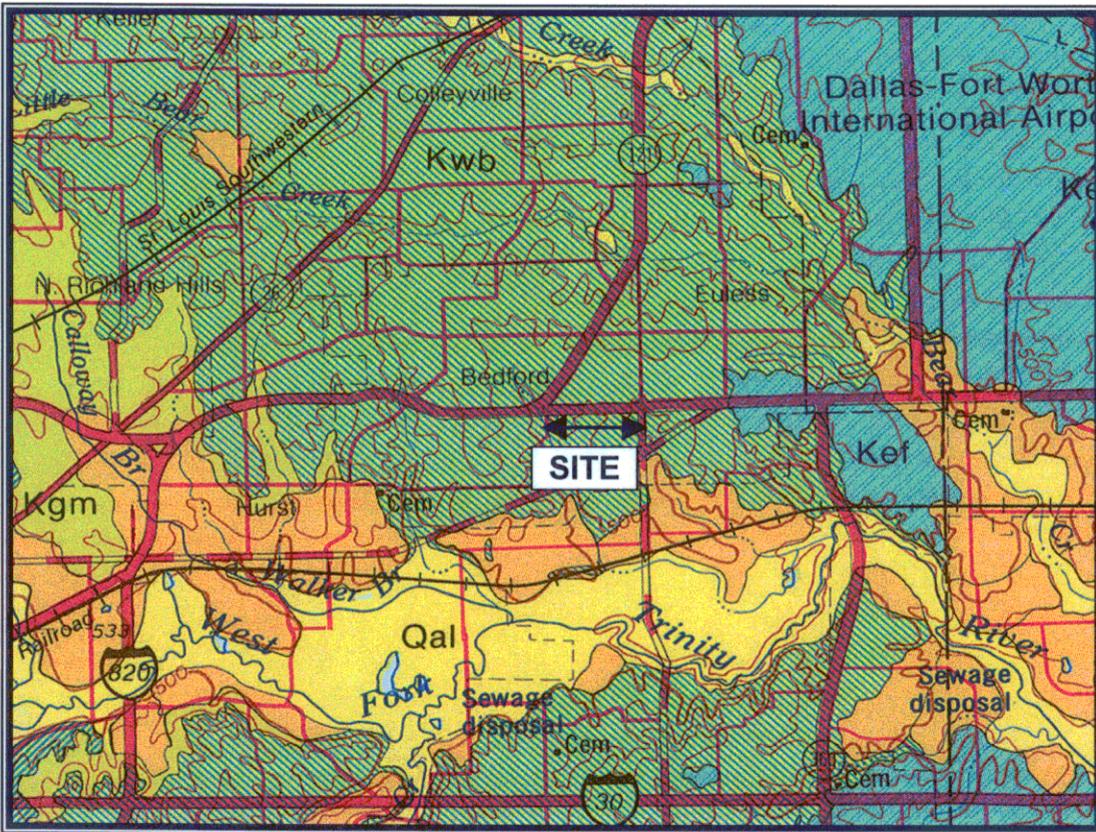
## FIGURES AND TABLES



**Project Site Map**  
**SH 183**  
**From SH121 to FM 157**  
**Tarrant County, Texas**  
**CSJ 0364-05-025**



Figure 1



Printed by permission of The Bureau of Economic Geology, University of Texas  
Dallas Geologic Atlas Sheet

**Geologic Map of Area  
SH 183  
From SH 121 to FM 157  
Tarrant County, Texas  
CSJ 0364-05-025**



Figure 2

## Geotechnical Soil Survey

SH 183

From SH 121 to FM 157

Tarrant County, Texas

CSJ Number: 0364-05-025

**TABLE 1: SUMMARY OF LABORATORY TEST RESULTS**

Borehole Number	Sample Depth, ft	Moisture Content, %	Atterberg Limits			Percent Passing, Sieve No. 40	Percent Passing, Sieve No. 200	Soluble Sulfate Content, ppm
			Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)			
BH - 10	1 - 2							240
	2 - 3	18	51	21	30	90	64	
	3 - 4							260
	6 - 7.5	14	22	12	10	98	23	
	9.5 - 10	14						
	14 - 16	14	43	20	23	95	94	
	16 - 18	13						
	18 - 20	20	56	22	34	100	99	
BH - 11	3 - 4							320
	5 - 6	22	48	21	27	75	51	
	10 - 12	21	33	16	17	79	47	
	14 - 16	19	54	22	32	97	72	
	18 - 20	19						
BH - 12	2 - 3	21						<100
	4 - 5	15	39	18	21	95	59	
	6 - 8	16						
	10 - 12	17	31	15	16	56	24	
	12 - 14	17						
	16 - 18	19	30	15	15	72	65	
	18.5 - 20	19						

**Geotechnical Soil Survey**  
**SH 183**  
**From SH 121 to FM 157**  
**Tarrant County, Texas**  
**CSJ Number: 0364-05-025**

**TABLE 2: SUMMARY OF POTENTIAL VERTICAL RISE DATA**

Boring Number	Total PVR [in]	Remove / Replace Depth [ft] to Reduce PVR to:		
		1.0 [in]	1.5 [in]	2.0 [in]
BH-10	1.7	2.7	0.9	0.0
BH-11	1.3	2.0	0.0	0.0
BH-12	0.6	0.0	0.0	0.0

**Geotechnical Soil Survey**  
**SH 183**  
**From SH 121 to FM 157**  
**Tarrant County, Texas**  
**CSJ Number: 0364-05-025**

**TABLE 3: SUMMARY OF FIELD STANDARD PENETRATION TEST RESULTS**

Boring Number	Depth [ft]	Blow counts / depth of penetration		
		6.0 [in]	6.0 [in]	6.0 [in]
BH-10	6.0	20	22	50/5.5"
BH-10	9.0	50/2"	--	--
BH-12	14.5	29	30	50/5"

**ATTACHMENT A**  
**SOIL DRILLING LOGS**



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0364-05-025

Hole BH-10  
Structure Roadway  
Station 278+28.32  
Offset 52.99 Rt.

District Fort Worth  
Date 2/6/05  
Grnd. Elev. 571.81 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
565.8			CLAY, sandy, dark brown, brown, gray (CH)			18	51	30	Passing #4 Sieve = 96 Passing #40 Sieve = 90 Passing #200 Sieve = 64
			SAND, clayey, light gray, light brown, reddish brown (SC)			14	22	10	Passing #4 Sieve = 100 Passing #40 Sieve = 98 Passing #200 Sieve = 23
558.8			CLAY, with trace of sand, gray, light gray (CL)			14			
553.8			CLAY, shaley, gray, light brown (CH)			20	56	34	Passing #4 Sieve = 100 Passing #40 Sieve = 100 Passing #200 Sieve = 99
551.8									

Remarks: Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore	County Tarrant	Hole BH-11	District Fort Worth
Version 3.0	Highway SH 183	Structure Roadway	Date 2/3/05
	CSJ 0364-05-025	Station 332+00.81	Grnd. Elev. 578.55 ft
		Offset 54.23 Rt.	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	
5			FILL, CLAY, sandy, brown, dark brown			22	48	27	Passing #4 Sieve = 87 Passing #40 Sieve = 75 Passing #200 Sieve = 51
570.6			FILL, SAND, clayey, light brown			21	33	17	Passing #4 Sieve = 87 Passing #40 Sieve = 79 Passing #200 Sieve = 47
565.6			FILL, CLAY, sandy, light brown			19	54	32	Passing #4 Sieve = 100 Passing #40 Sieve = 97 Passing #200 Sieve = 72
558.6	20					19			
25									

Remarks: Boring was drilled through 3 inches of asphalt pavement underlain by sand and gravel base. Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0364-05-025

Hole BH-12  
Structure Roadway  
Station 333+30.99  
Offset 99.84 Rt.

District Fort Worth  
Date 2/8/05  
Grnd. Elev. 551.07 ft  
GW Elev. 541.07 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
5			CLAY, sandy, dark gray, grayish brown (CL)			21			Passing #4 Sieve = 99 Passing #40 Sieve = 95 Passing #200 Sieve = 59
						15	39	21	
						16			
542.1			SAND, clayey with gravel, gray (SC)						Passing #4 Sieve = 86 Passing #40 Sieve = 56 Passing #200 Sieve = 24
10						17	31	16	
						17			
537.1			CLAY, sandy, brown, reddish brown (CL)						Passing #4 Sieve = 91 Passing #40 Sieve = 72 Passing #200 Sieve = 65
15						19	30	15	
						19			
531.1									- sandstone layer
20									
25									

Remarks: Boring was drilled through 2 inches of asphalt pavement underlain by sand and gravel base. Groundwater was encountered at 10 feet during drilling and at 17 feet after drilling completion. Boring was backfilled with cuttings after drilling.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC

**ATTACHMENT B**

**POTENTIAL VERTICAL RISE (PVR)  
CALCULATION SPREADSHEETS AND GRAPHS**

**TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District**

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

County: Tarrant  
Highway: SH 183

CSJ Number: 0364-05-025  
District: Fort Worth

Boring Number: BH-10  
Date Sampled: February 6, 2005

Ground Elevation: 571.81'  
Station: 278+28.32  
Offset: 52.99 Rt.

Table 1: PVR Data BH-10

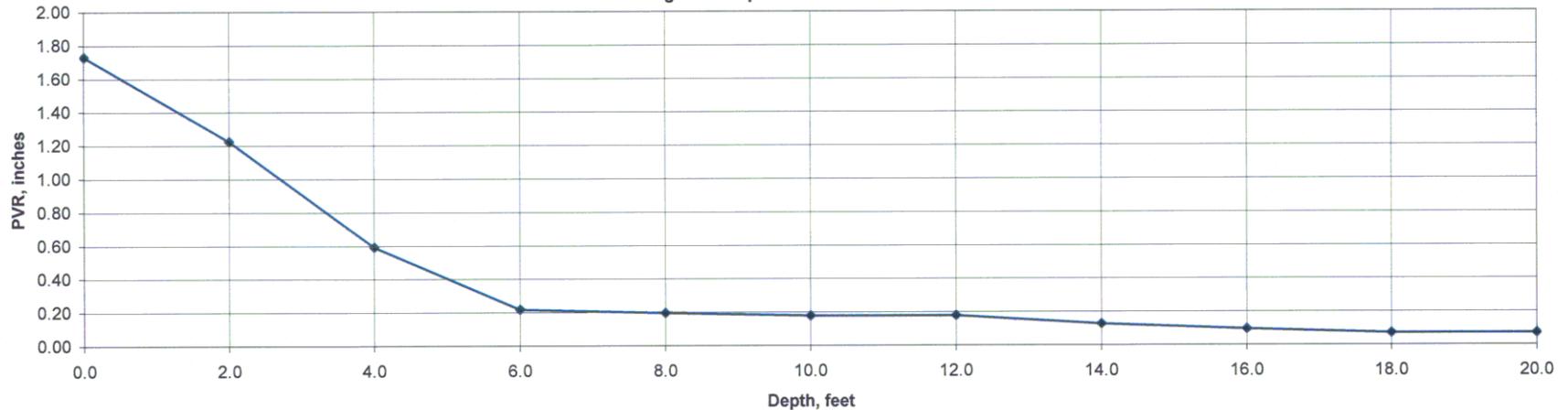
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.73
2.0	1.0	51	19.2	26.0	18.0	Dry	90.0	30	8.0	11.2	0.00	0.56	0.56	0.90	1.00	0.51	1.22
4.0	3.0	51	19.2	26.0	18.0	Dry	90.0	30	8.0	11.2	0.56	1.27	0.70	0.90	1.00	0.63	0.59
6.0	5.0	51	19.2	26.0	18.0	Dry	90.0	30	8.0	11.2	1.27	1.68	0.42	0.90	1.00	0.37	0.21
8.0	7.0	22	13.4	12.3	14.0	Wet	98.0	10	-0.7	1.8	0.12	0.14	0.02	0.98	1.00	0.02	0.19
10.0	9.0	22	13.4	12.3	14.0	Wet	98.0	10	-0.7	1.8	0.14	0.15	0.02	0.98	1.00	0.02	0.18
12.0	11.0	22	13.4	12.3	14.0	Wet	98.0	10	-0.7	1.8	0.15	0.15	0.00	0.98	1.00	0.00	0.18
14.0	13.0	43	17.6	22.2	14.0	Dry	95.0	23	5.7	8.7	1.53	1.58	0.05	0.95	1.00	0.05	0.13
16.0	15.0	43	17.6	22.2	13.0	Dry	95.0	23	5.7	8.7	1.58	1.61	0.03	0.95	1.00	0.03	0.09
18.0	17.0	43	17.6	22.2	13.0	Dry	95.0	23	5.7	8.7	1.61	1.64	0.03	0.95	1.00	0.02	0.07
20.0	19.0	56	20.2	28.3	20.0	Dry	100.0	34	9.3	12.6	3.21	3.28	0.07	1.00	1.00	0.07	0.07

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-10



Remarks:

[Redacted Remarks]

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	02/28/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0364-05-025  
District: Fort Worth

Boring Number: BH-11  
Date Sampled: February 3, 2005

Ground Elevation: 578.55'  
Station: 332+00.81  
Offset: 54.23 Rt.

Table 1: PVR Data BH-11

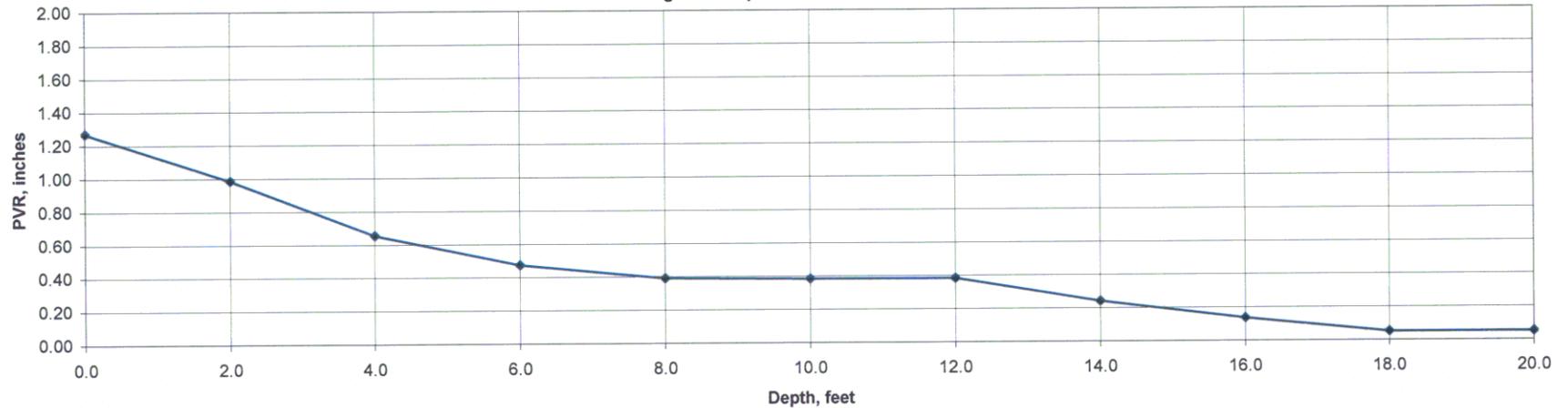
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.27
2.0	1.0	48	18.6	24.6	22.0	Avg	75.0	27	5.0	8.0	0.00	0.38	0.38	0.75	1.00	0.29	0.98
4.0	3.0	48	18.6	24.6	22.0	Avg	75.0	27	5.0	8.0	0.38	0.82	0.44	0.75	1.00	0.33	0.65
6.0	5.0	48	18.6	24.6	22.0	Avg	75.0	27	5.0	8.0	0.82	1.06	0.24	0.75	1.00	0.18	0.47
8.0	7.0	48	18.6	24.6	22.0	Avg	75.0	27	5.0	8.0	1.06	1.17	0.11	0.75	1.00	0.08	0.39
10.0	9.0	33	15.6	17.5	21.0	Wet	79.0	17	0.8	3.4	0.25	0.26	0.01	0.79	1.00	0.01	0.38
12.0	11.0	33	15.6	17.5	21.0	Wet	79.0	17	0.8	3.4	0.26	0.26	0.00	0.79	1.00	0.00	0.38
14.0	13.0	54	19.8	27.4	19.0	Dry	97.0	32	8.7	11.9	2.60	2.74	0.15	0.97	1.00	0.14	0.24
16.0	15.0	54	19.8	27.4	19.0	Dry	97.0	32	8.7	11.9	2.74	2.85	0.11	0.97	1.00	0.10	0.13
18.0	17.0	54	19.8	27.4	19.0	Dry	97.0	32	8.7	11.9	2.85	2.94	0.09	0.97	1.00	0.09	0.05
20.0	19.0	54	19.8	27.4	19.0	Dry	97.0	32	8.7	11.9	2.94	2.99	0.05	0.97	1.00	0.05	0.05

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-11



Remarks:

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	02/28/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0364-05-025  
District: Fort Worth

Boring Number: BH-12  
Date Sampled: February 8, 2005

Ground Elevation: 551.07'  
Station: 333+30.99  
Offset: 99.84 Rt.

Table 1: PVR Data BH-12

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.58
2.0	1.0	39	16.8	20.3	21.0	Wet	95.0	21	1.7	4.4	0.00	0.12	0.12	0.95	1.00	0.12	0.47
4.0	3.0	39	16.8	20.3	21.0	Wet	95.0	21	1.7	4.4	0.12	0.26	0.14	0.95	1.00	0.13	0.33
6.0	5.0	39	16.8	20.3	15.0	Dry	95.0	21	5.1	8.0	0.82	1.06	0.24	0.95	1.00	0.23	0.10
9.0	7.5	39	16.8	20.3	16.0	Dry	95.0	21	5.1	8.0	1.06	1.17	0.11	0.95	1.00	0.10	0.00
12.0	11.0	31	15.2	16.6	17.0	Wet	56.0	16	0.6	3.2	0.24	0.24	0.00	0.56	1.00	0.00	0.00
14.0	13.0	31	15.2	16.6	17.0	Wet	56.0	16	0.6	3.2	0.24	0.24	0.00	0.56	1.00	0.00	0.00
16.0	15.0	30	15.0	16.1	19.0	Wet	72.0	15	0.4	3.0	0.23	0.23	0.00	0.72	1.00	0.00	0.00
18.0	17.0	30	15.0	16.1	19.0	Wet	72.0	15	0.4	3.0	0.00	0.00	0.00	0.72	1.00	0.00	0.00
20.0	19.0	30	15.0	16.1	19.0	Wet	72.0	15	0.4	3.0	0.00	0.00	0.00	0.72	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

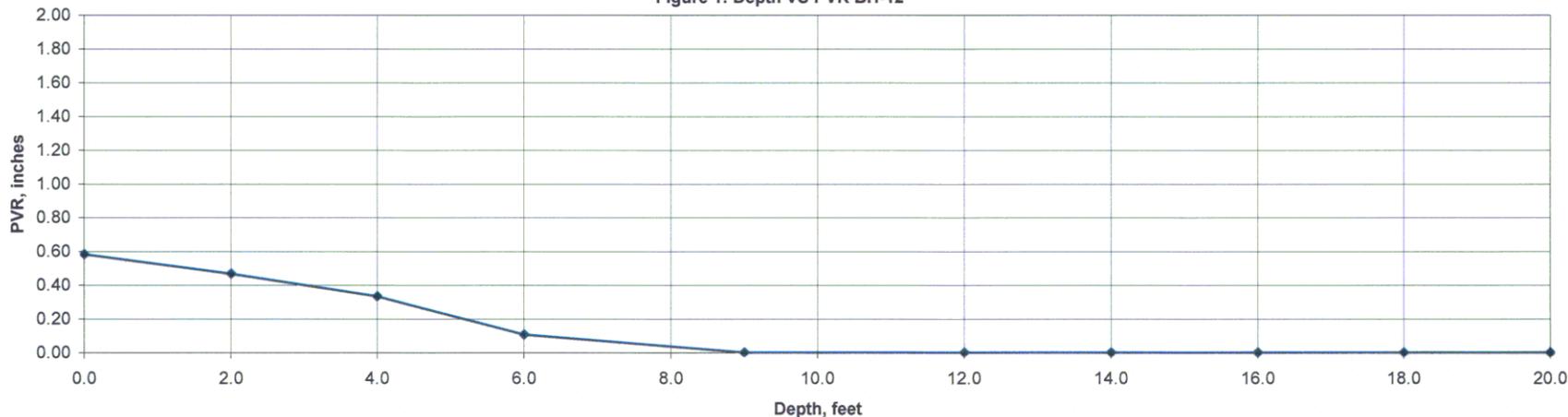
Green fields are test result inputs

Blue fields are chart inputs

Tan fields are final answers per layer

Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-12



Remarks:

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	02/28/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



0364-05-026

**GEOTECHNICAL SOIL SURVEY REPORT  
SH 183  
From FM 157 to SH 10  
Tarrant County, Texas**

**CSJ No. 0364-05-026**

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ATTACHMENT B: Potential Vertical Rise (PVR) Calculation Spreadsheets  
and Graphs**

# GEOTECHNICAL SOIL SURVEY REPORT

SH 183

From FM 157 to SH 10

Tarrant County, Texas

CSJ No. 0364-05-026

## 1.0 INTRODUCTION

On January 12, 2005, Mr. Richard S. Williammee, Jr., P.E., District Materials Engineer of the Texas Department of Transportation's (TxDOT) Ft. Worth District Office requested a geotechnical investigation be performed to determine the properties of the soils present along SH 183 from FM 157 to SH 10 in Tarrant County, Texas. TxDOT plans to reconstruct this existing section of SH 183 (Figure 1).

CTL | Thompson Texas, LLC (CTL) was requested to determine soil properties at two selected locations in order to complete the pavement design. The preliminary pavement structure design was not available at the time this report was prepared.

The purpose of this investigation was to define subsurface conditions along the SH 183 reconstruction, and to determine the suitability of the subgrade soils for in-place stabilization. As planned and implemented, the investigation included the drilling of two test borings to the prescribed depths to collect core samples. Borings BH-13 was drilled along the existing SH 183 eastbound frontage road, and Boring BH-14 was drilled on the mainlane shoulder. These locations were selected by the District's Materials Engineer. CTL coordinated the drilling and sampling at these boring locations. The samples were returned to CTL's laboratory to perform the prescribed series of laboratory tests. The soil descriptions and test results of each boring are included herein.

## 2.0 GENERAL SUBSURFACE CONDITIONS

Based on the Dallas Sheet of the Geologic Atlas of Texas, University of Texas, Department of Economic Geology, the project area overlays the Woodbine Formation (Kwb) and the Eagle Ford Formation (Kef) as shown in Figure 2. The Woodbine Formation typically consists of clayey sands, clays, and sandy clays with some sandstone layers and boulders, cemented sands and shale. The maximum thickness of the formation ranges from one hundred seventy five to two hundred fifty (175-250) feet. The residual clay in the Eagle Ford Formation is calcareous with some irregular calcareous concretions. The clays of this formation are underlain by shale. The maximum thickness of this formation ranges from 200 to 300 feet.

### 3.0 GENERAL SURFACE CONDITIONS

Based on information in the Soil Survey of Tarrant County, Texas, published by the U.S. Department of Agriculture's Soil Conservation Service (SCS) the project area is located on the Urban Land (BH-13) and Navo clay loam soil unit (BH-14). The Navo clay loam is a deep, moderately well drained, gently sloping, loam. Typically, the surface layer is dark brown clay loam and is about twelve (12) inches thick underlain by dark brown to yellow and olive brown clay to a depth of seventy (72) inches. This soil's permeability is very slow and available water capacity is high. Plasticity Indices range from twenty four to thirty six (24 to 36) percent. Laboratory test results from the two (2) boreholes drilled in this area are consistent with this published information.

### 4.0 FIELD INVESTIGATION

Surface and subsurface conditions along the highway were evaluated by two (2) sample borings drilled at the approximate locations as shown on the Project Site Map, Figure 1. The station number and offset along with the ground elevation for each location are indicated on the Drilling Logs, Attachment A. Boreholes BH-13 and BH-14 were drilled to a depth of twenty (20) feet along the right of way (ROW). Samples were taken in all the borings for general soil classification and laboratory testing. The field investigation was conducted on February 3 and 8, 2005 by CTL, under contract to the TxDOT Ft. Worth office. Soil samples were collected using Shelby tubes or split spoon samplers, as deemed appropriate for the nature of the subsurface strata encountered. Borings were logged in the field by CTL's geotechnical project engineer. The samples were brought to the CTL laboratory for visual observation and the testing program assignment by the geotechnical project engineer. Drilling Logs are included as Attachment A to this report.

### 5.0 SOIL CLASSIFICATION

During the boring activities, continuous soil samples were collected. Individual samples were placed in plastic bags, sealed and labeled. Upon completion of the boring program, representative portions of the samples were selected for laboratory analysis based on review of the field boring logs and visual inspection of the samples in the laboratory. The intent was to identify and classify major strata encountered in each designated boring. Samples were tested using TxDOT Test Method TEX-110-E, Part I, to determine the percentages passing the No. 4, No. 40, and No. 200 sieves (standard U. S. sieves). Sampled portions passing the No. 40 sieve were tested to determine Plasticity Indices (PI) from Liquid Limits (LL) and Plastic Limits (PL) using TxDOT Test Methods TEX-104, 105, and 106-E. Based on this information, soil classifications were determined in accordance with TxDOT Test Method TEX-142-E (Unified Soil Classification System). In-situ Moisture Content (MC) values were also determined using TxDOT Test Method TEX-103-E at approximate two (2) foot intervals for use in TxDOT Test Method TEX-124-E (Potential Vertical Rise (PVR)) calculations. Soluble sulfate content of the top 4 feet of soil material was determined in two-foot intervals by

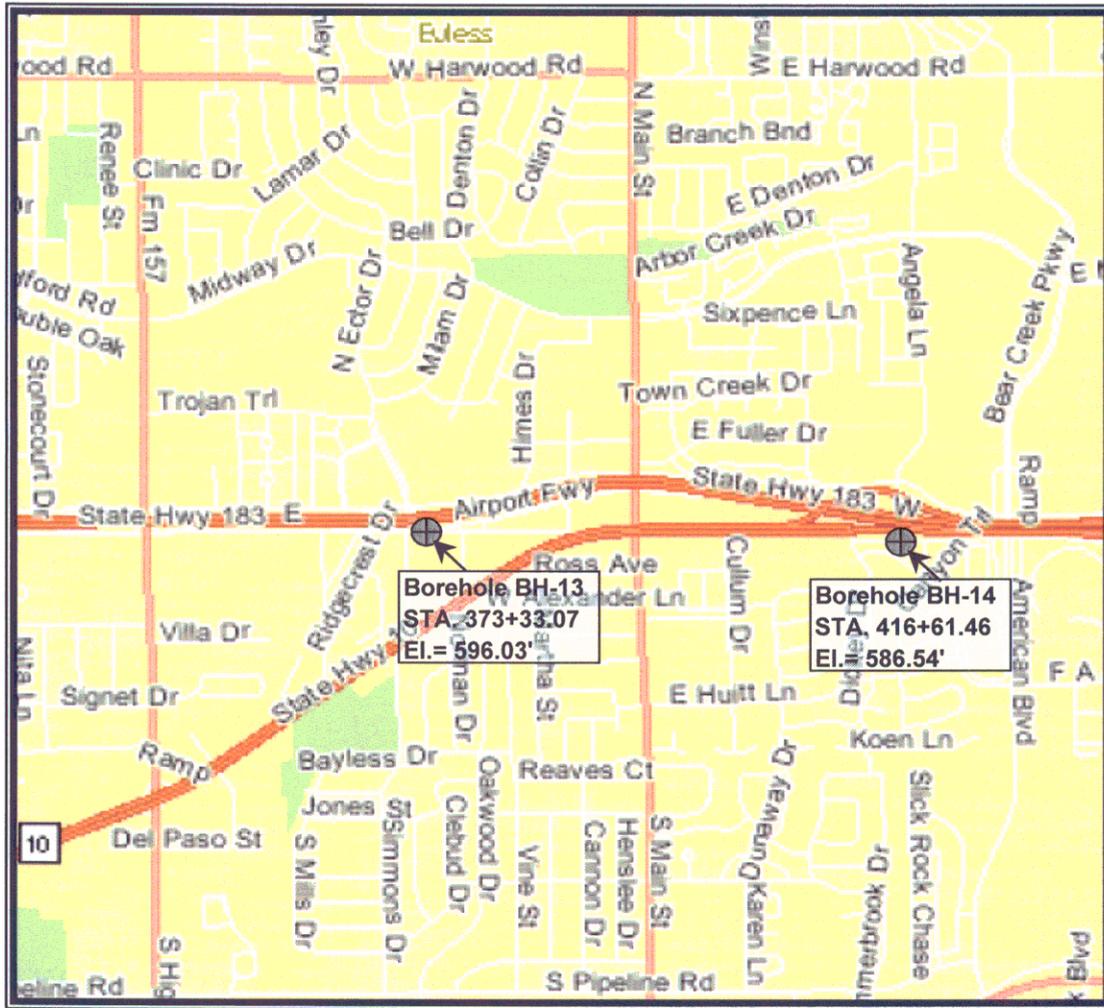
using TxDOT Test Method TEX-620-J. The results are reported on Table 1 in the Figures and Tables section of this report.

## **6.0 POTENTIAL VERTICAL RISE**

The Potential Vertical Rise (PVR) for each boring was determined, as shown on the worksheets and graphs included in Attachment B, and are summarized in Table 2 of this report. The PVR values for these borings ranged from 0.3 inches in borehole BH-13 to 2.2 inches in borehole BH-14.

Please contact Richard Williammee, Jr., P.E., District Materials Engineer, Ft. Worth District Laboratory, at 817-370-6675 with any questions or comments regarding this Geotechnical Soil Survey Report.

## FIGURES AND TABLES



**Project Site Map**  
**SH 183**  
**From FM 157 to SH 10**  
**Tarrant County, Texas**  
**CSJ 0364-05-026**



Figure 1



## Geotechnical Soil Survey

SH 183

From FM 157 to SH 10

Tarrant County, Texas

CSJ Number: 0364-05-026

**TABLE 1: SUMMARY OF LABORATORY TEST RESULTS**

Borehole Number	Sample Depth, ft	Moisture Content, %	Atterberg Limits			Percent Passing, Sieve No. 40	Percent Passing, Sieve No. 200	Soluble Sulfate Content, ppm
			Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)			
BH - 13	1 - 2							100
	2 - 3	21	38	18	20	96	58	
	3 - 4							100
	6 - 7.5	9	24	12	12	99	88	
	14 - 16	22						
	18 - 20	24	54	22	32	99	97	
BH - 14	1 - 2	16	43	19	24	72	55	<100
	3 - 4							1,040
	5 - 6	24	59	23	36	99	99	
	8 - 10	21						
	12 - 14	27	53	22	31	99	96	
	16 - 18	29						
	18 - 20	19	47	20	27	99	73	

**Geotechnical Soil Survey**  
**SH 183**  
**From FM 157 to SH 10**  
**Tarrant County, Texas**  
**CSJ Number: 0364-05-026**

**TABLE 2: SUMMARY OF POTENTIAL VERTICAL RISE DATA**

Boring Number	Total PVR [in]	Remove / Replace Depth [ft] to Reduce PVR to:		
		1.0 [in]	1.5 [in]	2.0 [in]
BH-13	0.3	0.0	0.0	0.0
BH-14	2.2	5.3	3.2	1.5

**Geotechnical Soil Survey**  
**SH 183**  
**From FM 157 to SH 10**  
**Tarrant County, Texas**  
**CSJ Number: 0364-05-026**

**TABLE 3: SUMMARY OF FIELD STANDARD PENETRATION TEST RESULTS**

Boring Number	Depth [ft]	Blow counts / depth of penetration		
		6.0 [in]	6.0 [in]	6.0 [in]
BH-13	6.0	23	18	32
BH-13	10.0	8	9	12
BH-13	16.0	14	16	30
BH-13	18.0	18	22	27

**ATTACHMENT A**  
**SOIL DRILLING LOGS**



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0364-05-026

Hole BH-13  
Structure Roadway  
Station 373+33.07  
Offset 107.47 Rt.

District Tarrant  
Date 2/8/05  
Grnd. Elev. 596.03 ft  
GW Elev. 580.03 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
592.			CLAY, sandy, dark brown, reddish brown (CL)			21	38	20		Passing #4 Sieve = 100 Passing #40 Sieve = 96 Passing #200 Sieve = 58
5			CLAY, with sand, brown, light brown (CL)			9	24	12		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 88
10										
15						22				
578.			CLAY, gray (CH)			24	54	32		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 97
576.	20									
25										

Remarks: Groundwater was encountered during drilling at a depth of 16 feet and was measured at a depth of 18 feet after drilling completion. Boring was backfilled with cuttings after drilling completion.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0364-05-026

Hole BH-14  
Structure Roadway  
Station 416+61.46  
Offset 76.58 Rt.

District Tarrant  
Date 2/3/05  
Grnd. Elev. 586.54 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)	
584.5			FILL, CLAY, sandy, brown			16	43	24		Passing #4 Sieve = 87 Passing #40 Sieve = 72 Passing #200 Sieve = 55
5			CLAY, light brown, light gray (CH)			24	59	36		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 99
10						21				
15						27	53	31		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 96
568.5			CLAY, with sand, light brown, light gray (CL)			19	47	27		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 73
566.5	20									
25										

Remarks: Groundwater was not encountered during drilling or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC

**ATTACHMENT B**

**POTENTIAL VERTICAL RISE (PVR)  
CALCULATION SPREADSHEETS AND GRAPHS**

TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0364-05-026  
District: Fort Worth

Boring Number: BH-13  
Date Sampled: February 8, 2005

Ground Elevation: 596.03'  
Station: 373+33.07  
Offset: 107.47 Rt.

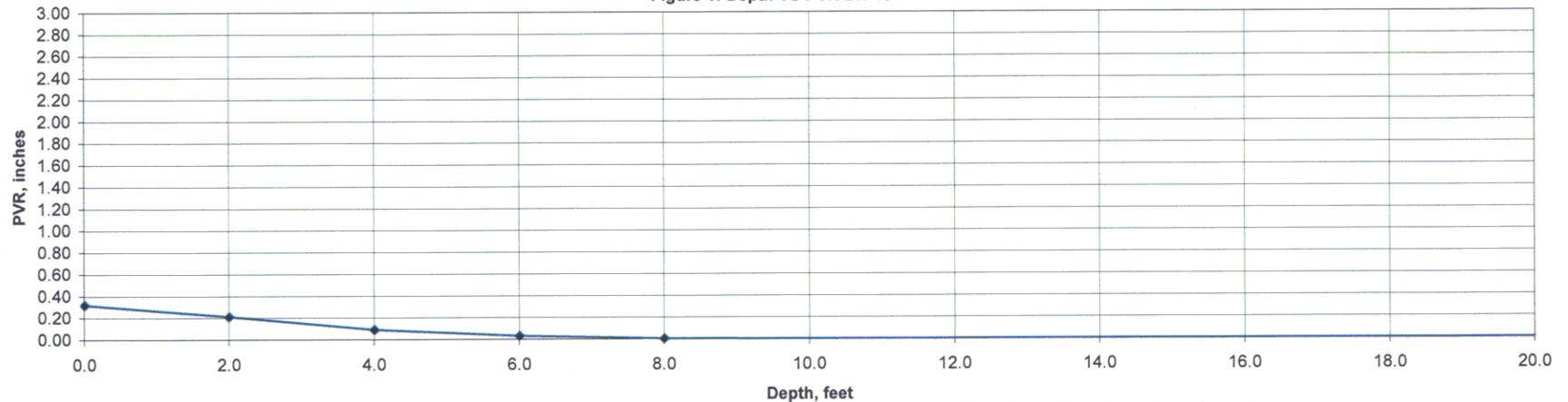
Table 1: PVR Data BH-13

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.31
2.0	1.0	38	16.6	19.9	21.0	Wet	96.0	20	1.4	4.1	0.00	0.11	0.11	0.96	1.00	0.11	0.21
4.0	3.0	38	16.6	19.9	21.0	Wet	96.0	20	1.4	4.1	0.11	0.24	0.13	0.96	1.00	0.12	0.09
6.0	5.0	24	13.8	13.3	9.0	Dry	99.0	12	2.2	4.9	0.30	0.36	0.06	0.99	1.00	0.06	0.03
8.0	7.0	24	13.8	13.3	9.0	Dry	99.0	12	2.2	4.9	0.36	0.39	0.03	0.99	1.00	0.03	0.00
10.0	9.0	24	13.8	13.3	9.0	Dry	99.0	12	2.2	4.9	0.39	0.39	0.00	0.99	1.00	0.00	0.00
12.0	11.0	24	13.8	13.3	9.0	Dry	99.0	12	2.2	4.9	0.39	0.39	0.00	0.99	1.00	0.00	0.00
14.0	13.0	24	13.8	13.3	9.0	Dry	99.0	12	2.2	4.9	0.39	0.39	0.00	0.99	1.00	0.00	0.00
16.0	15.0	24	13.8	13.3	22.0	Wet	99.0	12	-0.3	2.3	0.19	0.19	0.00	0.99	1.00	0.00	0.00
18.0	17.0	24	13.8	13.3	22.0	Wet	99.0	12	-0.3	2.3	0.19	0.19	0.00	0.99	1.00	0.00	0.00
20.0	19.0	54	19.8	27.4	24.0	Avg	99.0	32	6.5	9.6	1.98	1.98	0.00	0.99	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs      Orange field is the result of override PVR input to avoid negative PVR      Tan fields are final answers per layer  
Blue fields are chart inputs      Yellow field is Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-13



Remarks:

[Redacted Remarks]

Test Method: Tx124E      Tested By: Kumara Marupudi      Date: 02/28/05  
Reviewed By: Michael P. Batuna, P.E.      Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.      Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0364-05-025  
District: Fort Worth

Boring Number: BH-14  
Date Sampled: February 3, 2005

Ground Elevation: 586.54'  
Station: 416+61.46  
Offset: 76.58 Rt.

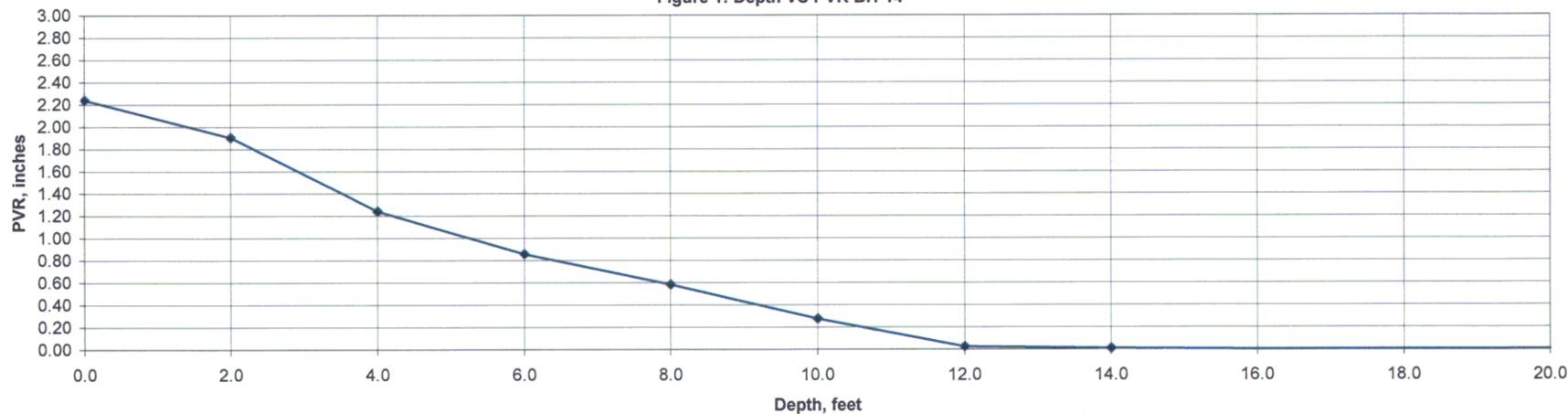
Table 1: PVR Data BH-14

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.24
2.0	1.0	43	17.6	22.2	16.0	Dry	72.0	24	6.1	9.1	0.00	0.47	0.47	0.72	1.00	0.34	1.90
4.0	3.0	59	20.8	29.7	24.0	Avg	99.0	36	7.7	10.8	0.56	1.23	0.67	0.99	1.00	0.66	1.24
6.0	5.0	59	20.8	29.7	24.0	Avg	99.0	36	7.7	10.8	1.23	1.61	0.39	0.99	1.00	0.38	0.85
8.0	7.0	59	20.8	29.7	24.0	Avg	99.0	36	7.7	10.8	1.61	1.89	0.28	0.99	1.00	0.27	0.58
10.0	9.0	59	20.8	29.7	21.0	Dry	99.0	36	10.0	13.2	2.41	2.72	0.31	0.99	1.00	0.31	0.27
12.0	11.0	59	20.8	29.7	21.0	Dry	99.0	36	10.0	13.2	2.72	2.98	0.25	0.99	1.00	0.25	0.02
14.0	13.0	53	19.6	26.9	27.0	Wet	99.0	31	3.8	6.7	0.89	0.90	0.02	0.99	1.00	0.02	0.00
16.0	15.0	53	19.6	26.9	27.0	Wet	99.0	31	3.8	6.7	0.90	0.91	0.01	0.99	1.00	0.01	0.00
18.0	17.0	53	19.6	26.9	29.0	Wet	99.0	31	3.8	6.7	0.91	0.91	0.00	0.99	1.00	0.00	0.00
20.0	19.0	47	18.4	24.1	19.0	Dry	99.0	27	7.0	10.1	2.18	2.18	0.00	0.99	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs    Orange field is the result of override    Tan fields are final answers per layer  
Blue fields are chart inputs    PVR input to avoid negative PVR    Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-14



Remarks:

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 02/28/05  
Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



0094-02-077

**GEOTECHNICAL SOIL SURVEY REPORT  
SH 183  
From SH 10 to Dallas County Line  
Tarrant County, Texas**

**CSJ No. 0094-02-077**

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**ATTACHMENT A: Soil Drilling Logs**

**ATTACHMENT B: Potential Vertical Rise (PVR) Calculation Spreadsheets  
and Graphs**

**GEOTECHNICAL SOIL SURVEY REPORT**  
**SH 183**  
**From SH 10 to Dallas County Line**  
**Tarrant County, Texas**

**CSJ No. 0094-02-077**

**1.0 INTRODUCTION**

On January 12, 2005, Mr. Richard S. Williammee, Jr., P.E., District Materials Engineer of the Texas Department of Transportation's (TxDOT) Ft. Worth District Office requested a geotechnical investigation be performed to determine the properties of the soils present along SH 183 from SH 10 to the Dallas County Line in Tarrant County, Texas. TxDOT plans to reconstruct this existing section of SH 183 (Figure 1).

CTL | Thompson Texas, LLC (CTL) was requested to determine soil properties at nine selected locations in order to complete the pavement design. The preliminary pavement structure design was not available at the time this report was prepared.

The purpose of this investigation was to define subsurface conditions along the SH 183 reconstruction, and to determine the suitability of the subgrade material for in-place stabilization. As planned and implemented, the investigation included the drilling of test borings to the prescribed depths to collect core samples. Nine (9) borings were drilled along the shoulder of the existing SH 183 eastbound and westbound frontage roads, eastbound mainlane shoulder and ramps. These locations were selected by the District's Materials Engineer. CTL coordinated the drilling and sampling at these boring locations. The samples were returned to CTL's laboratory to perform the prescribed series of laboratory tests. The boring soil descriptions and test results at each boring are included herein.

**2.0 GENERAL SUBSURFACE CONDITIONS**

Based on the Dallas Sheet of the Geologic Atlas of Texas, University of Texas, Department of Economic Geology, the project area mostly overlays the Eagle Ford Formation (Kef) and Fluvialite (Qt) and Alluvial Terrace Deposits (Qal) as shown in Figure 2. The Eagle Ford Formation consists of dark gray to dark brown residual calcareous clays underlain by gray shale. The maximum thickness of the formation ranges from two hundred to three hundred (200-300) feet. Fluvialite and Alluvial deposits consists of clay, silt, sand and gravel deposits associated with streams and floodplain deposits of Big Bear Creek.

### 3.0 GENERAL SURFACE CONDITIONS

Based on information in the Soil Survey of Tarrant County, Texas, published by the U.S. Department of Agriculture's Soil Conservation Service (SCS) the project area is located on the Navo clay loam soil unit (BH-15 and BH-16), the Brackett clay loam (BH-17), the loamy Arents (BH-18 to BH-20) and the Bastsil fine sandy loam (BH-21 to BH-23).

The Navo clay loam is a deep, moderately well drained, gently sloping, loam. Typically, the surface layer is dark brown clay loam and is about twelve (12) inches thick underlain by dark brown to yellow and olive brown clay to a depth of seventy two (72) inches. This soil's permeability is very slow and available water capacity is high. Plasticity Indices range from five to forty (5 to 40) percent.

The Brackett clay loam is a shallow, well drained, gently sloping, loam. Typically, the surface layer is light brownish gray clay loam and is about four (4) inches thick followed by light gray clay loam to about 13 inches, underlain by pale yellow silty marl and soft weathered chalk below depth of forty (40) inches. This soil's permeability is moderately slow and available water capacity is very low.

The loamy Arents typically consists of red, brown and yellow clay loam with sand, silt, and gravel. Bastsil fine sandy loam is a deep, well drained, gently sloping, loam. Typically, the surface layer is pale brown fine sandy loam and is about eleven (11) inches thick followed by yellowish red to red sandy clay loam to depths of fifty six to eighty (56-80) inches. This soil's permeability is moderate and available water capacity is high. Plasticity Indices range from thirteen to twenty four (13 to 24) percent. Laboratory test results from the nine (9) boreholes drilled in this area are consistent with this published information.

### 4.0 FIELD INVESTIGATION

Surface and subsurface conditions along the highway were evaluated by nine (9) sample borings drilled at the approximate locations as shown on the Project Site Map, Figure 1. The station number and offset along with the ground elevation for each location are indicated on the Drilling Logs, Attachment A. Boreholes BH-15 to BH-23 were drilled to depths of ten to twenty (10-20) feet along the right of way (ROW). Borings BH-17 and BH-22 were terminated above 20 feet after several feet of penetration into the sand and shale strata. Samples were taken in all the borings for general soil classification and laboratory testing. The field investigation was conducted on February 4 through 10, 2005 by CTL, under contract to the TxDOT Ft. Worth office. Soil samples were collected using Shelby tubes or split spoon samplers, as deemed appropriate for the nature of the subsurface strata encountered. Borings were logged in the field by CTL's geotechnical project engineer. The samples were brought to the CTL laboratory for visual observation and the testing program assignment by the geotechnical project engineer. Drilling Logs are included as Attachment A to this report.

## 5.0 SOIL CLASSIFICATION

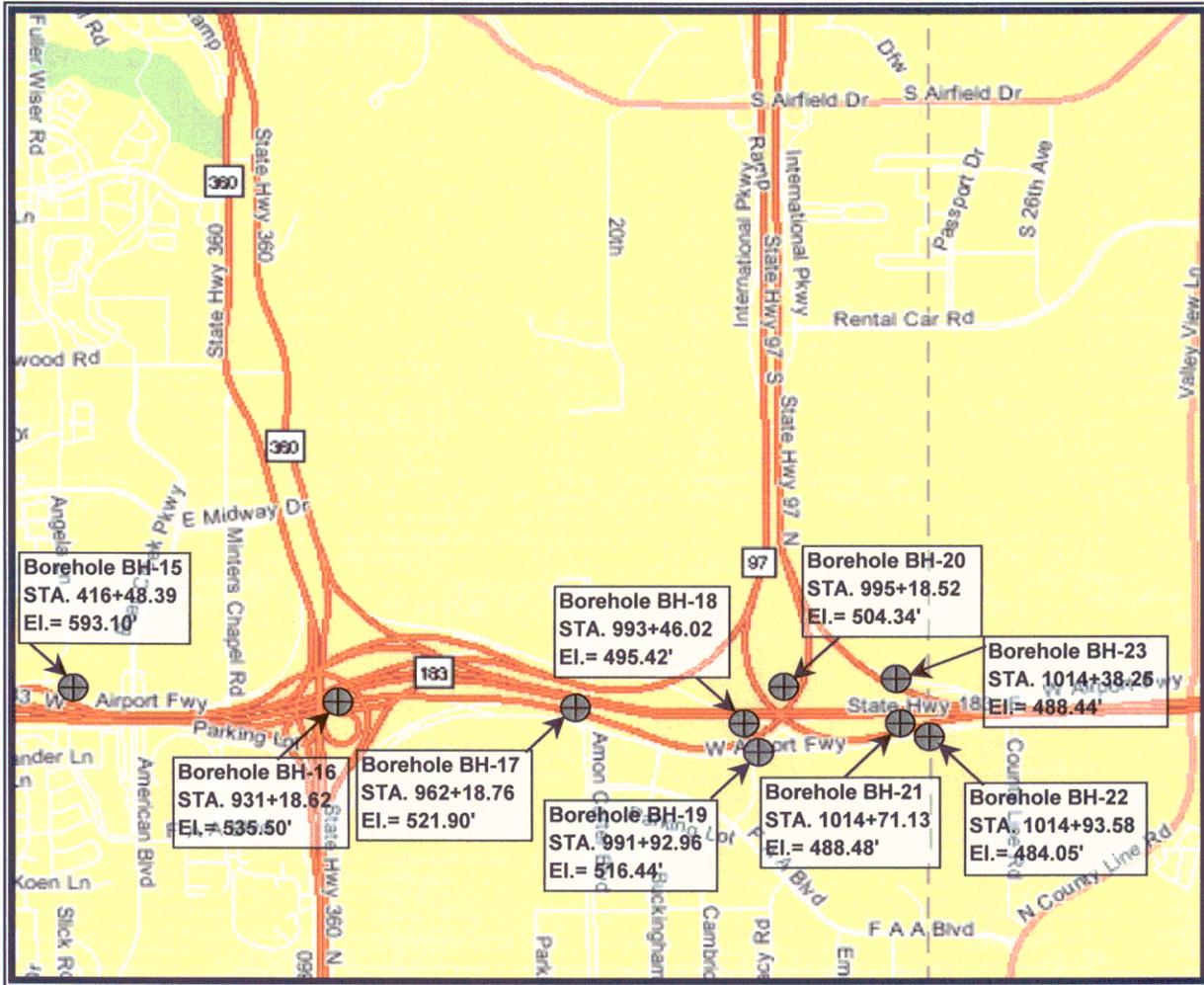
During the boring activities, continuous soil samples were collected. Individual samples were placed in plastic bags, sealed and labeled. Upon completion of the boring program, representative portions of the samples were selected for laboratory analysis based on review of the field boring logs and visual inspection of the samples in the laboratory. The intent was to identify and classify major strata encountered in each designated boring. Samples were tested using TxDOT Test Method TEX-110-E, Part I, to determine the percentages passing the No. 4, No. 40, and No. 200 sieves (standard U. S. sieves). Fractions of the samples passing the No. 40 sieve were tested to determine Plasticity Indices (PI) from Liquid Limits (LL) and Plastic Limits (PL) using TxDOT Test Methods TEX-104, 105, and 106-E. Based on this information, soil classifications were determined in accordance with TxDOT Test Method TEX-142-E (Unified Soil Classification System). In-situ Moisture Content (MC) values were also determined using TxDOT Test Method TEX-103-E at approximate two (2) foot intervals for use in TxDOT Test Method TEX-124-E (Potential Vertical Rise (PVR)) calculations. Soluble sulfate content of the top 4 feet of soil material was determined in two-foot intervals by using TxDOT Test Method TEX-620-J. The results are reported in the attached Table 1 in the Figures and Tables section of this report.

## 6.0 POTENTIAL VERTICAL RISE

The Potential Vertical Rise (PVR) for each boring was determined, as shown on the worksheets and graphs included in Attachment B, and is summarized in Table 2 of this report. The PVR values for these borings ranged from 0.2 inches in borehole BH-16 to 3.2 inches in borehole BH-18.

Please contact Richard Williammee, Jr., P.E., District Materials Engineer, Ft. Worth District Laboratory, at 817-370-6675 with any questions or comments regarding this Geotechnical Soil Survey Report.

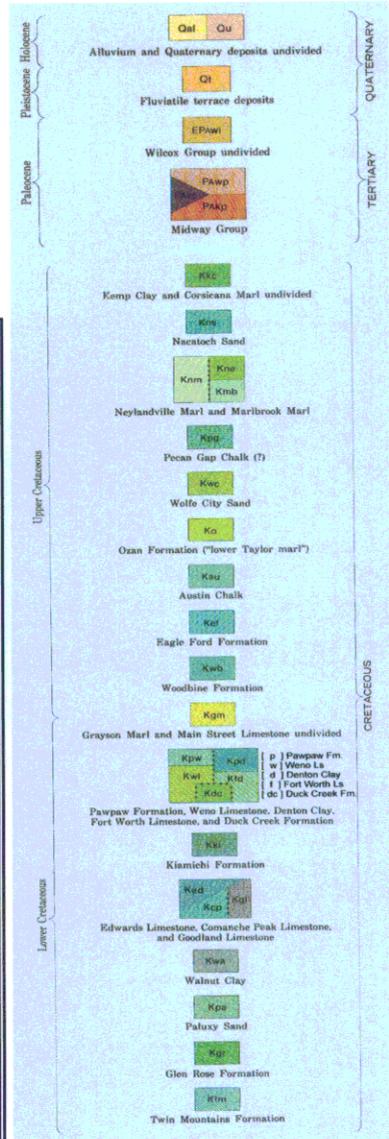
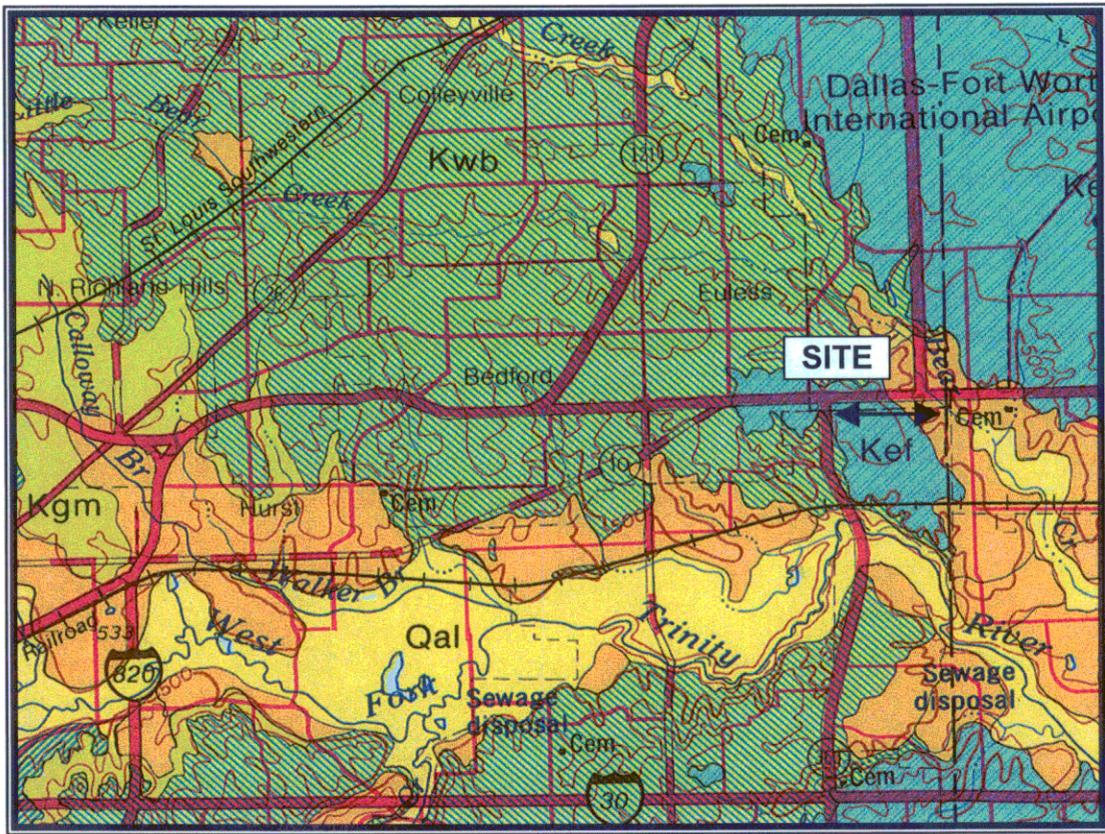
## FIGURES AND TABLES



**Project Site Map**  
**SH 183**  
**From SH 10 to Dallas County Line**  
**Tarrant County, Texas**  
**CSJ 0094-02-077**



Figure 1



Printed by permission of The Bureau of Economic Geology, University of Texas  
Dallas Geologic Atlas Sheet

**Geologic Map of Area  
SH 183  
From SH 10 to Dallas County Line  
Tarrant County, Texas  
CSJ 0094-02-077**



Figure 2

**Geotechnical Soil Survey**  
**SH 183**  
**From SH 10 to Dallas County Line**  
**Tarrant County, Texas**  
**CSJ Number: 0094-02-077**

**TABLE 1: SUMMARY OF LABORATORY TEST RESULTS**

Borehole Number	Sample Depth, ft	Moisture Content, %	Atterberg Limits			Percent Passing, Sieve No. 40	Percent Passing, Sieve No. 200	Soluble Sulfate Content, ppm
			Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)			
BH - 15	0 - 1							< 100
	1 - 2	14	46	21	25	50	37	
	2 - 3							960
	5 - 6	24	64	24	40	97	94	
	8 - 9	23	65	24	41	95	94	
	10 - 12	23				97	94	
	14 - 16	18						
BH - 16	4 - 5.5	8	17	12	5	100	10	
	10 - 11.5	22				100	7	
	14 - 15	28						
	19 - 20	24	53	21	32	99	89	
BH - 17	0 - 1	16						
	1 - 2	19	55	21	34	81	67	2,200
	3 - 4							8,750
	4 - 5	26	52	21	31	96	94	
	6 - 7	22						
	8 - 9	16	47	20	27	100	96	
	9 - 10	16						
BH - 18	0 - 1	21	45	20	25	80	54	
	1 - 2							14,000
	3 - 4							1,500
	4 - 5	23	64	23	41	97	71	
	6 - 8	18						
	9 - 10	19						
	12 - 14	19	51	21	30	100	98	

**TABLE 1: SUMMARY OF LABORATORY TEST RESULTS**

Borehole Number	Sample Depth, ft	Moisture Content, %	Atterberg Limits			Percent Passing, Sieve No. 40	Percent Passing, Sieve No. 200	Soluble Sulfate Content, ppm
			Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)			
BH - 19	1 - 2	27	54	21	33	94	72	< 100 100
	3 - 4							
	4 - 5	31						
	6 - 8	33	72	26	46	99	95	
	8 - 10	30						
	10 - 12	16	32	16	16	98	87	
	12 - 14	14						
	14 - 15	12	20	12	8	93	36	
	17.5 - 19	20				93	70	
BH - 20	1 - 2							15,500
	2 - 3	31	67	24	43	95	91	2,100
	3 - 4							
	6 - 8	14	24	13	11	85	30	
	12 - 13.5	16				33	15	
	16 - 17	25	62	23	39	96	93	
	19 - 20	12						
BH - 21	0 - 1							120
	1 - 2	25	55	22	33	84	75	140
	2 - 3							
	4 - 5	14						
	6 - 8	15	29	14	15	93	46	
	10 - 12	14						
	14 - 16	14	30	14	16	99	52	
	16 - 18	18						
	18 - 20	19	18	11	7	96	31	
BH - 22	2 - 3							100
	3 - 4	18	43	19	24	96	65	
	5 - 6	9						
	8 - 10	14	27	13	14	89	39	
	12 - 13.5	18				55	11	
BH - 23	1 - 2							<100
	2 - 3	16	41	18	23	93	61	180
	3 - 4							
	6 - 8	13	26	13	13	100	50	
	15 - 16	21	54	22	32	97	75	
	19 - 20	17	56	23	33	94	79	

**Geotechnical Soil Survey**  
**SH 183**  
**From SH 10 to Dallas County Line**  
**Tarrant County, Texas**  
**CSJ Number: 0094-02-077**

**TABLE 2: SUMMARY OF POTENTIAL VERTICAL RISE DATA**

Boring Number	Total PVR [in]	Remove / Replace Depth [ft] to Reduce PVR to:		
		1.0 [in]	1.5 [in]	2.0 [in]
BH-15	2.9	9.3	7.0	5.3
BH-16	0.2	0.0	0.0	0.0
BH-17	1.6	2.6	0.5	0.0
BH-18	3.2	6.5	5.4	3.9
BH-19	1.8	4.6	2.1	0.0
BH-20	1.4	1.5	0.0	0.0
BH-21	1.5	2.0	0.0	0.0
BH-22	1.4	1.8	0.0	0.0
BH-23	1.4	2.0	0.0	0.0

**Geotechnical Soil Survey**  
**SH 183**  
**From SH 10 to Dallas County Line**  
**Tarrant County, Texas**  
**CSJ Number: 0094-02-077**

**TABLE 3: SUMMARY OF FIELD STANDARD PENETRATION TEST RESULTS**

Boring Number	Depth [ft]	Blow counts / depth of penetration		
		6.0 [in]	6.0 [in]	6.0 [in]
BH-16	0.5	28	30	50/5"
BH-16	4.0	42	50/3"	
BH-16	10.0	47	23	41
BH-19	16.0	6	6	8
BH-19	18.0	7	10	13
BH-20	12	5	7	8
BH-22	10	9	12	15
BH-22	12.0	10	9	9
BH-23	10.0	7	3	4

**ATTACHMENT A**  
**SOIL DRILLING LOGS**



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-15  
Structure Roadway  
Station 416+48.39  
Offset 359.10 Lt.

District Fort Worth  
Date 2/10/05  
Grnd. Elev. 593.10 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
589.1			FILL, SAND, clayey with gravel, brown, grayish brown			14	46	25	Passing #4 Sieve = 71 Passing #40 Sieve = 50 Passing #200 Sieve = 37
587.1			CLAY, light brown, light gray (CH)			24	64	40	Passing #4 Sieve = 99 Passing #40 Sieve = 97 Passing #200 Sieve = 94
			CLAY, reddish brown, light brown, light gray (CH)			23	65	41	Passing #4 Sieve = 100 Passing #4 Sieve = 95 Passing #200 Sieve = 94
						23			Passing #4 Sieve = 100 Passing #40 Sieve = 97 Passing #200 Sieve = 94
						18			- with sandstone layer
573.1									

Remarks: Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-16  
Structure Roadway  
Station 931+18.62  
Offset 103.30 Rt.

District Fort Worth  
Date 2/8/05  
Grnd. Elev. 535.50 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)	
5			SAND, with clay, light gray, light brown, brown (SC)			8	17	5		Passing #4 Sieve = 100 Passing #40 Sieve = 100 Passing #200 Sieve = 10
10						22				Passing #4 Sieve = 100 Passing #40 Sieve = 100 Passing #200 Sieve = 7
15						28				
517.5			SHALE, WEATHERED, gray			24	53	32		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 89
515.5	20									
25										

Remarks: Groundwater was encountered during and after drilling at a depth of 10 feet. Boring caved at a depth of 16 feet. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-17  
Structure Roadway  
Station 962+18.76  
Offset 60.04 Rt.

District Fort Worth  
Date 2/4/05  
Grnd. Elev. 521.90 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties			Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	
519.9			FILL, CLAY, sandY, brown			16			Passing #4 Sieve = 93 Passing #40 Sieve = 81 Passing #200 Sieve = 67
						19	55	34	
5			SHALE, WEATHERED, with silt, gray			26	52	31	Passing #4 Sieve = 100 Passing #40 Sieve = 96 Passing #200 Sieve = 94
515.9			SHALE, with silt, gray			22			Passing #4 Sieve = 100 Passing #40 Sieve = 100 Passing #200 Sieve = 96
						16	47	27	
						16			
511.9 10									
15									
20									
25									

Remarks: Groundwater was not encountered during or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-18  
Structure Roadway  
Station 993+46.02  
Offset 85.86 Rt.

District Fort Worth  
Date 2/10/05  
Grnd. Elev. 495.42 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
492.9			FILL, CLAY, sandy with limestone pieces, brown, light brown			21	45	25		Passing #4 Sieve = 95 Passing #40 Sieve = 80 Passing #200 Sieve = 54
5			CLAY, with sand, light gray, light brown (CH)			23	64	41		Passing #4 Sieve = 99 Passing #40 Sieve = 97 Passing #200 Sieve = 71
						18				
						19				
10			SHALE, WEATHERED, with silt, gray			19	51	30		Passing #4 Sieve = 100 Passing #40 Sieve = 100 Passing #200 Sieve = 98
484.4										
480.4	15		SANDSTONE, gray							
475.4	20									
25										

Remarks: Groundwater was encountered during drilling at a depth of 11 feet. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-19  
Structure Roadway  
Station 991+92.96  
Offset 528.75 Rt.

District Fort Worth  
Date 2/8/05  
Grnd. Elev. 516.44 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	
512.4	5		FILL, CLAY, with sand, brown, light brown, light gray			27	54	33	Passing #4 Sieve = 100 Passing #40 Sieve = 94 Passing #200 Sieve = 72
			FILL, CLAY, with trace of sand, dark brown			31			
506.4	10		CLAY, with sand, brown (CL)			33	72	46	Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 95
504.4			SAND, clayey and calcareous, brown, reddish brown (SC)			30			
	15					16	32	16	Passing #4 Sieve = 100 Passing #40 Sieve = 98 Passing #200 Sieve = 87
							14		
499.4	20		CLAY, sandy, brown (CL)			12	20	8	Passing #4 Sieve = 98 Passing #40 Sieve = 93 Passing #200 Sieve = 36
496.4						20			
	25								

Remarks: Groundwater was encountered during drilling at a depth of 10 feet. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-20  
Structure Roadway  
Station 995+18.52  
Offset 190.09 Lt.

District Fort Worth  
Date 2/10/05  
Grnd. Elev. 504.34 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
500.3			FILL, CLAY, with sand, dark brown, grayish brown			31	67	43		Passing #4 Sieve = 100 Passing #40 Sieve = 95 Passing #200 Sieve = 91
5			SAND, clayey with trace of gravel, reddish brown, brown (SC)			14	24	11		Passing #4 Sieve = 97 Passing #40 Sieve = 85 Passing #200 Sieve = 30
10						16				Passing #4 Sieve = 79 Passing #40 Sieve = 33 Passing #200 Sieve = 15 - more gravel
489.3	15		SHALE, WEATHERED, gray			25	62	39		Passing #4 Sieve = 100 Passing #40 Sieve = 96 Passing #200 Sieve = 93
484.3	20					12				
25										

Remarks: Groundwater was encountered during drilling at a depth of 14 feet. The boring caved at a depth of 17 feet. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-21  
Structure Roadway  
Station 1014+71.13  
Offset 76.63 Rt.

District Fort Worth  
Date 2/4/05  
Grnd. Elev. 488.48 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
482.5			FILL, CLAY, with sand, brown			25	55	33		Passing #4 Sieve = 93 Passing #40 Sieve = 84 Passing #200 Sieve = 75
						14				
476.5			SAND, clayey, dark brown, brown (SC)			15	29	15		Passing #4 Sieve = 99 Passing #40 Sieve = 93 Passing #200 Sieve = 46
						14				
472.5			CLAY, sandy, dark brown, brown (CL)			14	30	16		Passing #4 Sieve = 100 Passing #40 Sieve = 99 Passing #200 Sieve = 52
						18				
468.5			SAND, silty, clayey, dark brown, brown (SC)			19	18	7		Passing #4 Sieve = 99 Passing #40 Sieve = 96 Passing #200 Sieve = 31
20										

Remarks: Groundwater was encountered during drilling at a depth of 19 feet. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-22  
Structure Roadway  
Station 1014+93.58  
Offset 375.52 Rt.

District Fort Worth  
Date 2/4/05  
Grnd. Elev. 484.05 ft  
GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Deviator Press. (psi)	Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
5			CLAY, sandy, dark brown, grayish brown (CL)			18	43	24		Passing #4 Sieve = 99 Passing #40 Sieve = 96 Passing #200 Sieve = 65
476.1			SAND, clayey and ironstones, reddish brown (SC)			14	27	14		Passing #4 Sieve = 98 Passing #40 Sieve = 89 Passing #200 Sieve = 39
472.1			SAND, with clay, light brown, light gray (SC)			18				Passing #4 Sieve = 84 Passing #40 Sieve = 55 Passing #200 Sieve = 11
469.1										
20										
25										

Remarks: Boring was drilled through 7 inches of asphalt pavement underlain by sand and gravel base. Groundwater seepage was not encountered during drilling or after drilling completion. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC



# DRILLING LOG

WinCore  
Version 3.0

County Tarrant  
Highway SH 183  
CSJ 0094-02-077

Hole BH-23  
Structure Roadway  
Station 1014+38.25  
Offset 391.07 Lt.

District Fort Worth  
Date 2/10/05  
Grnd. Elev. 488.44 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	
482.4	5		CLAY, sandy, reddish brown, grayish brown, brown (CL)			16	41	23	Passing #4 Sieve = 99 Passing #40 Sieve = 93 Passing #200 Sieve = 61
			CLAY, sandy and calcareous, brown (CL)			13	26	13	Passing #4 Sieve = 100 Passing #40 Sieve = 100 Passing #200 Sieve = 50
473.4	15		CLAY, with sand, brown (CH)			21	54	32	Passing #4 Sieve = 98 Passing #40 Sieve = 97 Passing #200 Sieve = 75
471.4			SHALE, WEATHERED, with silt and sand seams, gray			17	56	33	Passing #4 Sieve = 99 Passing #40 Sieve = 94 Passing #200 Sieve = 79
468.4	20								

Remarks: Groundwater was encountered during drilling at a depth of 10 feet. Boring was backfilled with cuttings after drilling completion.

The ground water elevation was not determined during the course of this boring.

Driller: Geotel

Logger: MB

Organization: CTL | Thompson Texas, LLC

**ATTACHMENT B**

**POTENTIAL VERTICAL RISE (PVR)  
CALCULATION SPREADSHEETS AND GRAPHS**

TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-15  
Date Sampled: February 3, 2005

Ground Elevation: 593.10'  
Station: 416+48.39  
Offset: 359.10 Lt.

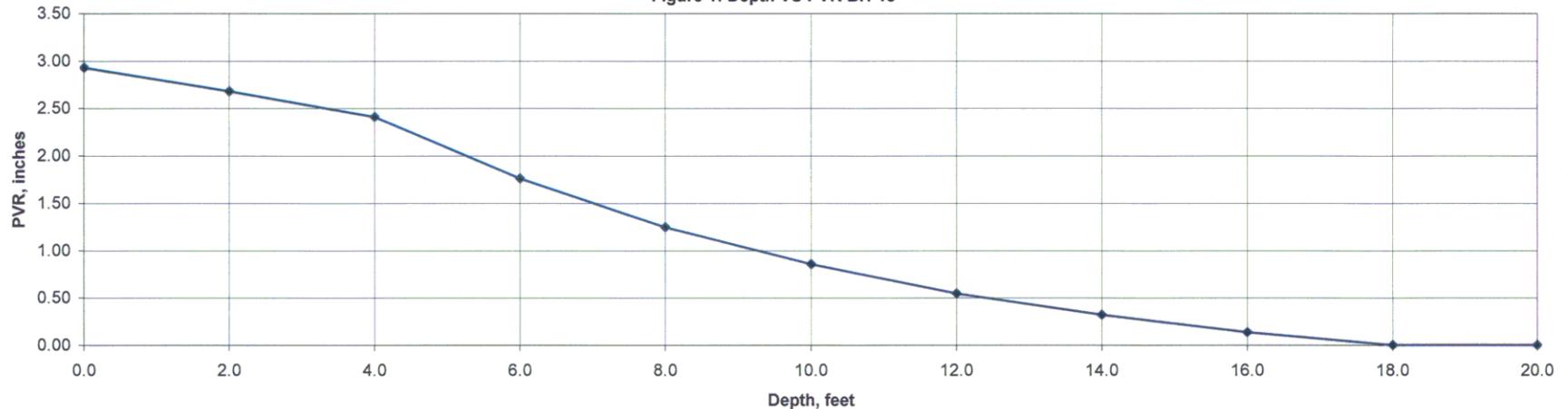
Table 1: PVR Data BH-15

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.93
2.0	1.0	46	18.2	23.6	14.0	Dry	50.0	25	6.4	9.4	0.00	0.50	0.50	0.50	1.00	0.25	2.68
4.0	3.0	46	18.2	23.6	14.0	Dry	50.0	25	6.4	9.4	0.50	1.04	0.54	0.50	1.00	0.27	2.41
6.0	5.0	64	21.8	32.1	24.0	Dry	97.0	40	11.3	14.6	1.56	2.23	0.67	0.97	1.00	0.65	1.76
8.0	7.0	65	22.0	32.6	24.0	Dry	97.0	41	11.6	15.0	2.30	2.83	0.53	0.97	1.00	0.51	1.24
10.0	9.0	65	22.0	32.6	24.0	Dry	95.0	41	11.6	15.0	2.83	3.24	0.41	0.95	1.00	0.39	0.85
12.0	11.0	65	22.0	32.6	23.0	Dry	97.0	41	11.6	15.0	3.24	3.56	0.32	0.97	1.00	0.31	0.54
14.0	13.0	65	22.0	32.6	23.0	Dry	97.0	41	11.6	15.0	3.56	3.79	0.23	0.97	1.00	0.22	0.32
16.0	15.0	65	22.0	32.6	18.0	Dry	97.0	41	11.6	15.0	3.79	3.98	0.19	0.97	1.00	0.18	0.14
18.0	17.0	65	22.0	32.6	18.0	Dry	97.0	41	11.6	15.0	3.98	4.12	0.14	0.97	1.00	0.14	0.00
20.0	19.0	65	22.0	32.6	18.0	Dry	97.0	41	11.6	15.0	4.12	4.12	0.00	0.97	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs    Orange field is the result of override    Tan fields are final answers per layer  
Blue fields are chart inputs    PVR input to avoid negative PVR    Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-15



Remarks:

[Redacted Remarks]

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-16  
Date Sampled: February 3, 2005

Ground Elevation: 535.50'  
Station: 931+18.62  
Offset: 103.30 Rt.

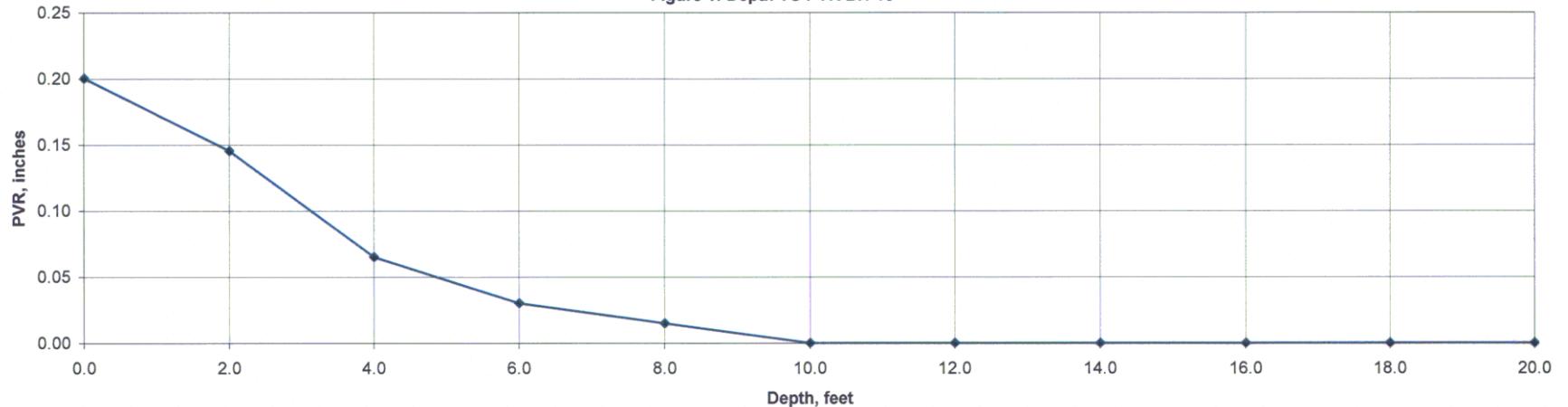
Table 1: PVR Data BH-16

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.20
2.0	1.0	17	12.4	10.0	8.0	Dry	100.0	5	-0.1	2.5	0.00	0.06	0.06	1.00	1.00	0.06	0.15
4.0	3.0	17	12.4	10.0	8.0	Dry	100.0	5	-0.1	2.5	0.06	0.14	0.08	1.00	1.00	0.08	0.07
6.0	5.0	17	12.4	10.0	8.0	Dry	100.0	5	-0.1	2.5	0.14	0.17	0.04	1.00	1.00	0.04	0.03
8.0	7.0	17	12.4	10.0	8.0	Dry	100.0	5	-0.1	2.5	0.17	0.19	0.02	1.00	1.00	0.02	0.02
10.0	9.0	17	12.4	10.0	8.0	Dry	100.0	5	-0.1	2.5	0.19	0.20	0.02	1.00	1.00	0.02	0.00
12.0	11.0	17	12.4	10.0	22.0	Wet	100.0	5	-1.8	0.7	0.00	0.00	0.00	1.00	1.00	0.00	0.00
14.0	13.0	17	12.4	10.0	22.0	Wet	100.0	5	-1.8	0.7	0.00	0.00	0.00	1.00	1.00	0.00	0.00
16.0	15.0	17	12.4	10.0	28.0	Wet	100.0	5	-1.8	0.7	0.00	0.00	0.00	1.00	1.00	0.00	0.00
18.0	17.0	17	12.4	10.0	28.0	Wet	100.0	5	-1.8	0.7	0.00	0.00	0.00	1.00	1.00	0.00	0.00
20.0	19.0	53	19.6	26.9	24.0	Avg	99.0	32	6.5	9.6	1.98	1.98	0.00	0.99	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs    Orange field is the result of override PVR input to avoid negative PVR    Tan fields are final answers per layer  
Blue fields are chart inputs    Yellow field is Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-16



Remarks:

Test Method: Tx124E    Tested By: Kumara Marupudi    Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E.    Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.    Date: 03/15/05



**TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District**

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

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-17  
Date Sampled: February 4, 2005

Ground Elevation: 521.90'  
Station: 962+18.76  
Offset: 60.04 Rt.

Table 1: PVR Data BH-17

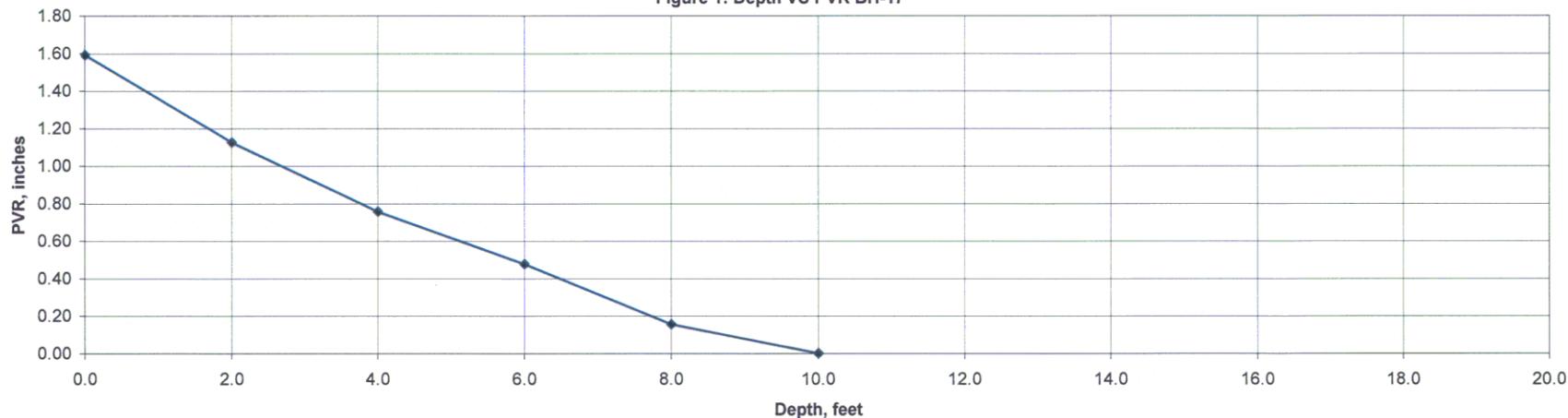
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.59
2.0	1.0	55	20.0	27.9	19.0	Dry	81.0	34	9.3	12.6	0.00	0.58	0.58	0.81	1.00	0.47	1.12
4.0	3.0	52	19.4	26.4	26.0	Wet	96.0	34	4.5	7.4	0.33	0.72	0.38	0.96	1.00	0.37	0.76
6.0	5.0	52	19.4	26.4	22.0	Avg	96.0	31	6.2	9.2	1.01	1.30	0.29	0.96	1.00	0.28	0.48
8.0	7.0	47	18.4	24.1	16.0	Dry	100.0	31	8.3	11.5	1.73	2.05	0.32	1.00	1.00	0.32	0.16
10.0	9.0	47	18.4	24.1	16.0	Dry	100.0	27	7.0	10.1	1.72	1.87	0.16	1.00	1.00	0.16	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-17



Remarks:

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	03/08/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-18  
Date Sampled: February 3, 2005

Ground Elevation: 495.42'  
Station: 993+46.02  
Offset: 85.86 Rt.

Table 1: PVR Data BH-18

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.20
2.0	1.0	45	18.0	23.2	21.0	Avg	80.0	25	4.5	7.4	0.00	0.33	0.33	0.80	1.00	0.27	2.93
4.0	3.0	64	21.8	32.1	23.0	Dry	97.0	41	11.6	15.0	0.60	1.60	1.00	0.97	1.00	0.97	1.96
6.0	5.0	64	21.8	32.1	23.0	Dry	97.0	41	11.6	15.0	1.60	2.30	0.70	0.97	1.00	0.68	1.29
8.0	7.0	64	21.8	32.1	18.0	Dry	97.0	41	11.6	15.0	2.30	2.83	0.53	0.97	1.00	0.51	0.00
10.0	9.0	64	21.8	32.1	19.0	Dry	97.0	41	11.6	15.0	2.83	3.24	0.41	0.97	1.00	0.40	0.00
12.0	11.0	51	19.2	26.0	19.0	Dry	100.0	30	8.0	11.2	2.20	2.35	0.15	1.00	1.00	0.15	0.00
14.0	13.5	51	19.2	26.0	19.0	Dry	100.0	30	8.0	11.2	2.35	2.52	0.17	1.00	1.00	0.17	0.00
15.0	14.5	51	19.2	26.0	19.0	Dry	100.0	30	8.0	11.2	2.52	2.57	0.05	1.00	1.00	0.05	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

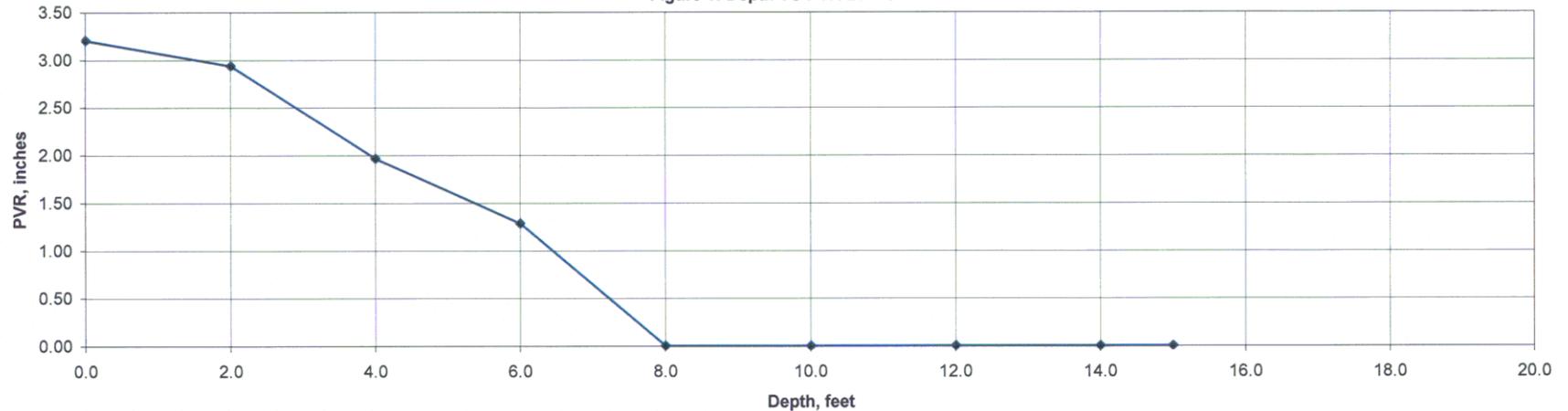
Green fields are test result inputs

Blue fields are chart inputs

Tan fields are final answers per layer

Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-18



Remarks:

Test Method: Tx124E Tested By: Kumara Marupudi Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E. Date: 03/15/05  
Authorized By: Michael L. Lester, P.E. Date: 03/15/05



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-19  
Date Sampled: February 5, 2005

Ground Elevation: 516.44'  
Station: 991+92.96  
Offset: 528.75 Rt.

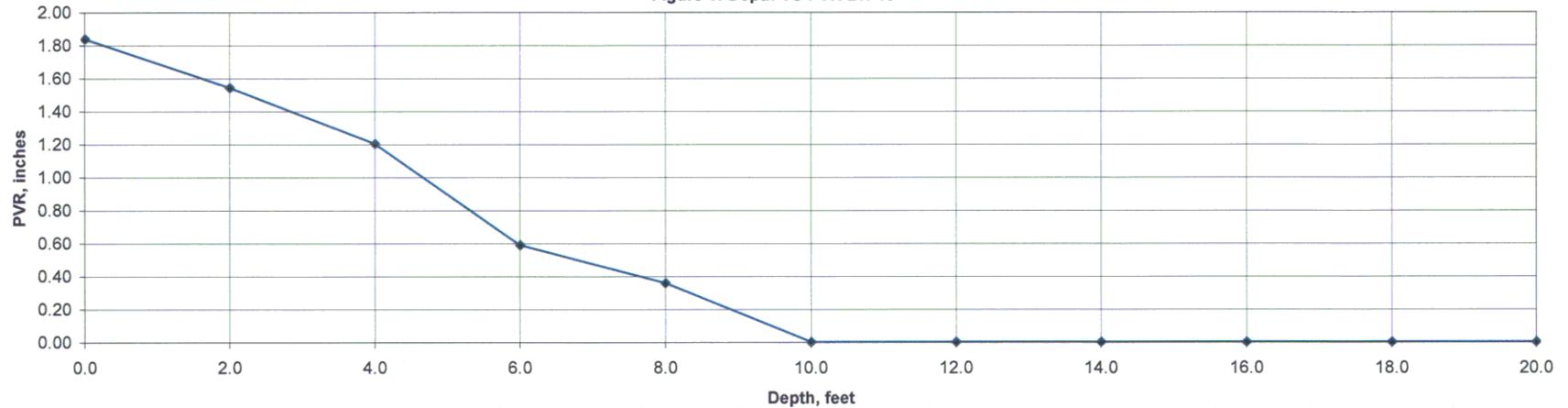
Table 1: PVR Data BH-19

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.84
2.0	1.0	54	19.8	27.4	27.0	Wet	94.0	33	4.3	7.2	0.00	0.32	0.32	0.94	1.00	0.30	1.54
4.0	3.0	54	19.8	27.4	31.0	Wet	94.0	33	4.3	7.2	0.32	0.68	0.36	0.94	1.00	0.34	1.20
6.0	5.0	72	23.4	35.8	31.0	Avg	99.0	46	10.6	14.0	1.50	2.12	0.62	0.99	1.00	0.61	0.59
8.0	7.0	72	23.4	35.8	33.0	Wet	99.0	46	7.1	10.2	1.51	1.74	0.23	0.99	1.00	0.23	0.36
10.0	9.0	72	23.4	35.8	30.0	Avg	99.0	46	10.6	14.0	2.58	2.94	0.36	0.99	1.00	0.36	0.00
12.0	11.0	32	15.4	17.0	16.0	Avg	98.0	16	1.8	4.5	0.35	0.35	0.00	0.98	1.00	0.00	0.00
14.0	13.0	20	13.0	11.4	15.0	Wet	93.0	8	-1.2	1.4	0.12	0.12	0.00	0.93	1.00	0.00	0.00
16.0	15.0	20	13.0	11.4	12.0	Dry	93.0	8	0.9	3.5	0.27	0.27	0.00	0.93	1.00	0.00	0.00
18.0	17.0	20	13.0	11.4	20.0	Wet	93.0	8	-1.2	1.4	0.00	0.00	0.00	0.93	1.00	0.00	0.00
20.0	19.0	20	13.0	11.4	20.0	Wet	93.0	8	-1.2	1.4	0.00	0.00	0.00	0.93	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs      Orange field is the result of override      Tan fields are final answers per layer  
Blue fields are chart inputs      PVR input to avoid negative PVR      Yellow field is Final Total PVR for the borehole

Figure 1: Depth VS PVR BH-19



Remarks:

[Redacted Remarks]

Test Method: Tx124E      Tested By: Kumara Marupudi      Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E.      Date: 03/15/05  
Authorized By: Michael L. Lester, P.E.      Date: 03/15/05



**TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District**

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

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-20  
Date Sampled: February 3, 2005

Ground Elevation: 504.34'  
Station: 995+18.52  
Offset: 190.09 Lt.

Table 1: PVR Data BH-20

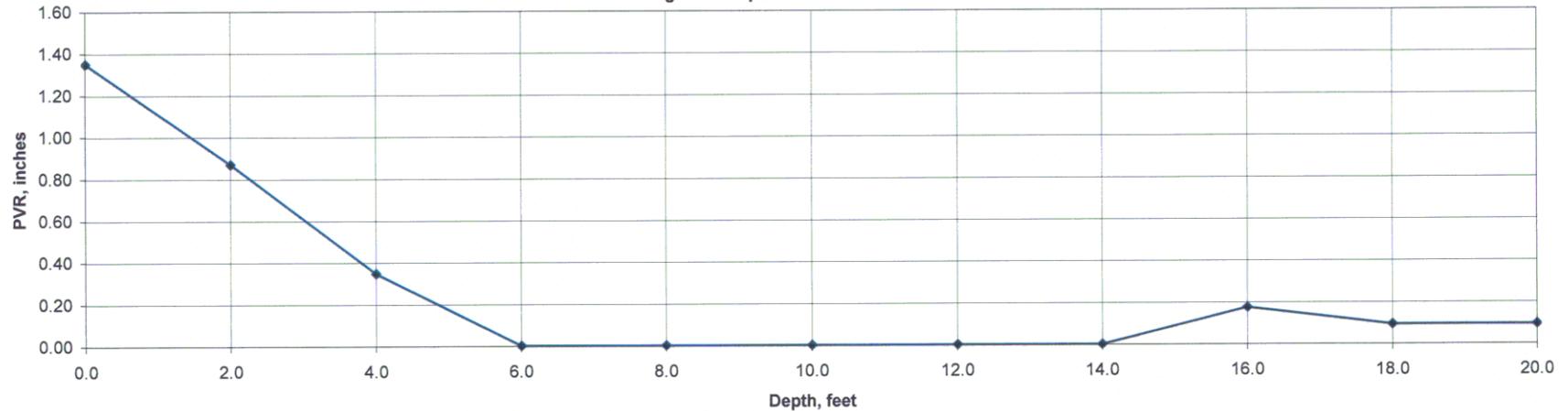
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No. 40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.35
2.0	1.0	67	22.4	33.5	31.0	Wet	95.0	43	6.4	9.5	0.00	0.51	0.51	0.95	1.00	0.48	0.87
4.0	3.0	67	22.4	33.5	31.0	Wet	95.0	43	6.4	9.5	0.51	1.06	0.55	0.95	1.00	0.52	0.35
6.0	5.0	24	13.8	13.3	14.0	Wet	85.0	11	-0.5	2.1	0.28	0.33	0.06	0.85	1.00	0.05	0.00
8.0	7.0	24	13.8	13.3	14.0	Wet	85.0	11	-0.5	2.1	0.33	0.36	0.02	0.85	1.00	0.02	0.00
10.0	9.0	24	13.8	13.3	14.0	Wet	85.0	11	-0.5	2.1	0.36	0.36	0.00	0.85	1.00	0.00	0.00
12.0	11.0	24	13.8	13.3	16.0	Wet	33.0	11	-0.5	2.1	0.18	0.18	0.00	0.33	1.00	0.00	0.00
14.0	13.0	24	13.8	13.3	16.0	Wet	33.0	11	-0.5	2.1	0.18	0.18	0.00	0.33	1.00	0.00	0.00
16.0	15.0	62	21.4	31.1	25.0	Avg	96.0	39	8.6	11.8	2.70	2.81	0.11	0.96	1.00	0.10	0.17
18.0	17.0	62	21.4	31.1	25.0	Avg	96.0	39	8.6	11.8	2.81	2.90	0.09	0.96	1.00	0.08	0.09
20.0	19.0	62	21.4	31.1	12.0	Dry	96.0	39	10.9	14.3	3.85	3.94	0.10	0.96	1.00	0.09	0.09

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-20



Remarks:

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	03/08/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-21  
Date Sampled: February 3, 2005

Ground Elevation: 488.48'  
Station: 1014+71.13  
Offset: 76.63 Rt.

Table 1: PVR Data BH-21

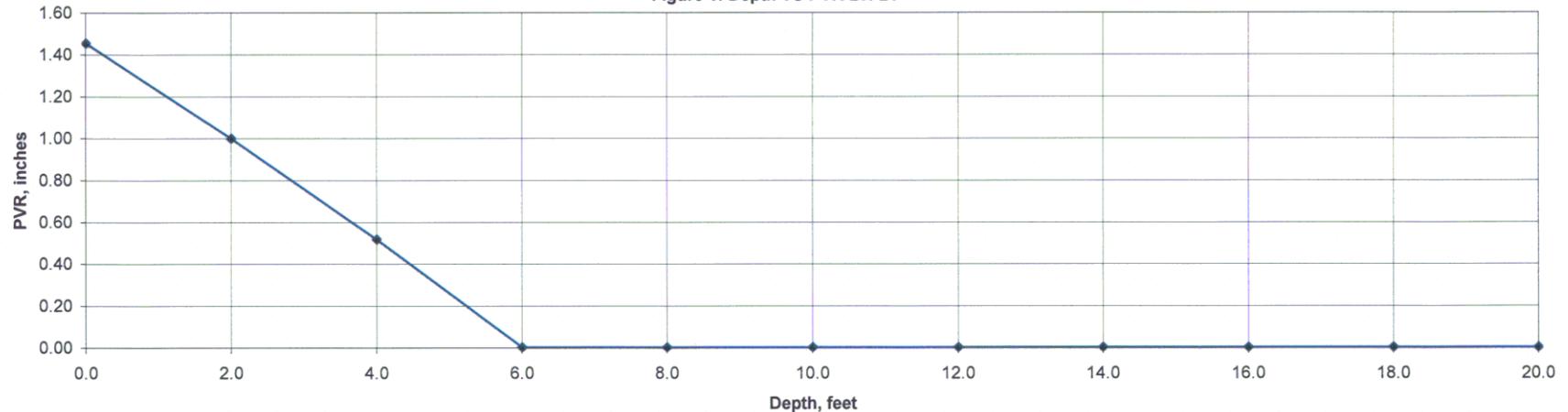
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.45
2.0	1.0	55	20.0	27.9	25.0	Avg	84.0	33	6.8	9.9	0.00	0.54	0.54	0.84	1.00	0.45	1.00
4.0	3.0	55	20.0	27.9	25.0	Avg	84.0	33	6.8	9.9	0.54	1.12	0.57	0.84	1.00	0.48	0.52
6.0	5.0	55	20.0	27.9	14.0	Dry	84.0	33	9.0	12.2	1.34	1.85	0.50	0.84	1.00	0.42	0.00
8.0	7.0	29	14.8	15.6	15.0	Dry	93.0	15	3.1	5.9	0.58	0.62	0.04	0.93	1.00	0.04	0.00
10.0	9.0	29	14.8	15.6	15.0	Dry	93.0	15	3.1	5.9	0.62	0.64	0.03	0.93	1.00	0.03	0.00
12.0	11.0	29	14.8	15.6	14.0	Dry	93.0	15	3.1	5.9	0.64	0.66	0.02	0.93	1.00	0.02	0.00
14.0	13.0	30	15.0	16.1	14.0	Dry	99.0	16	3.5	6.3	0.77	0.79	0.01	0.99	1.00	0.01	0.00
16.0	15.0	30	15.0	16.1	14.0	Dry	99.0	16	3.5	6.3	0.79	0.79	0.00	0.99	1.00	0.00	0.00
18.0	17.0	18	12.6	10.5	18.0	Wet	96.0	7	-1.4	1.1	0.00	0.00	0.00	0.96	1.00	0.00	0.00
20.0	19.0	18	12.6	10.5	19.0	Wet	96.0	7	-1.4	1.1	0.00	0.00	0.00	0.96	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-21



Remarks:

Test Method: Tested By: Date:  
Tx124E Kumara Marupudi 03/08/05  
Reviewed By: Date:  
Michael P. Batuna, P.E. 03/15/05  
Authorized By: Date:  
Michael L. Lester, P.E. 03/15/05



**TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District**

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

County: Tarrant  
Highway: SH 121 / SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-22  
Date Sampled: February 10, 2005

Ground Elevation: 484.05'  
Station: 1014+93.58  
Offset: 375.52 Rt.

Table 1: PVR Data BH-22

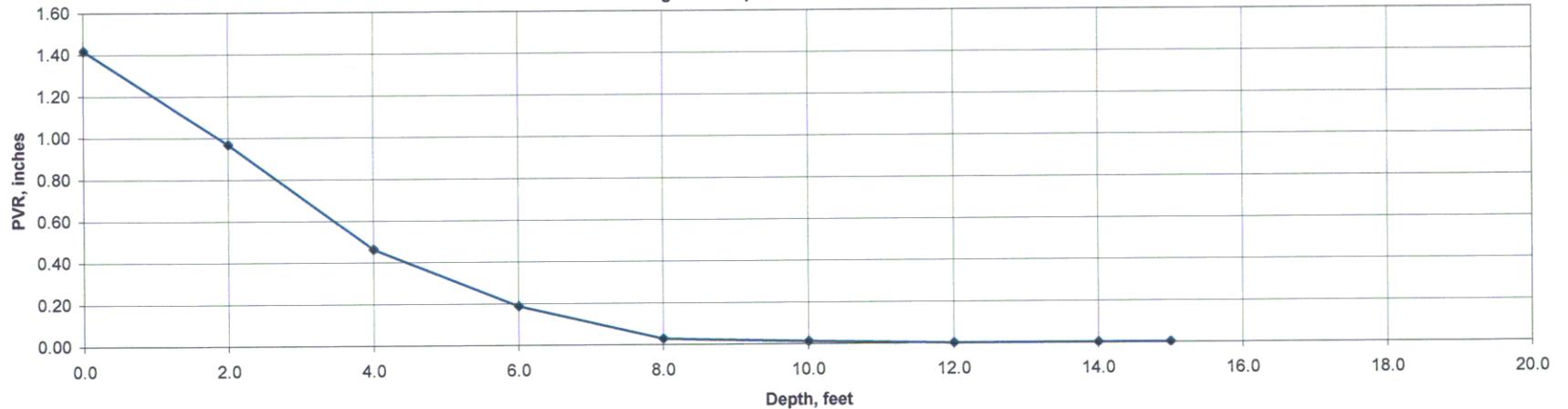
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.42
2.0	1.0	43	17.6	22.2	18.0	Dry	96.0	24	6.1	9.1	0.00	0.47	0.47	0.96	1.00	0.45	0.97
4.0	3.0	43	17.6	22.2	18.0	Dry	96.0	24	6.1	9.1	0.47	1.00	0.53	0.96	1.00	0.50	0.46
6.0	5.0	43	17.6	22.2	9.0	Dry	96.0	24	6.1	9.1	1.00	1.28	0.29	0.96	1.00	0.27	0.19
8.0	7.0	43	17.6	22.2	9.0	Dry	96.0	24	6.1	9.1	1.28	1.45	0.17	0.96	1.00	0.16	0.03
10.0	9.0	27	14.4	14.7	14.0	Dry	89.0	14	2.8	5.6	0.54	0.56	0.02	0.89	1.00	0.02	0.01
12.0	11.0	27	14.4	14.7	14.0	Dry	89.0	14	2.8	5.6	0.56	0.57	0.01	0.89	1.00	0.01	0.00
14.0	13.0	27	14.4	14.7	18.0	Wet	55.0	14	0.1	2.7	0.21	0.21	0.00	0.55	1.00	0.00	0.00
15.0	14.5	27	14.4	14.7	18.0	Wet	55.0	14	0.1	2.7	0.21	0.21	0.00	0.55	1.00	0.00	0.00

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-22



Remarks:

Test Method:	Tested By:	Date:
Tx124E	Kumara Marupudi	03/08/05
Reviewed By:	Date:	
Michael P. Batuna, P.E.	03/15/05	
Authorized By:	Date:	
Michael L. Lester, P.E.	03/15/05	



TEXAS DEPARTMENT OF TRANSPORTATION  
Fort Worth District

POTENTIAL VERTICAL RISE (PVR)  
TEX-124-E

County: Tarrant  
Highway: SH 183

CSJ Number: 0094-02-077  
District: Fort Worth

Boring Number: BH-23  
Date Sampled: February 8, 2005

Ground Elevation: 488.44'  
Station: 1014+38.25  
Offset: 391.07 Lt.

Table 1: PVR Data BH-23

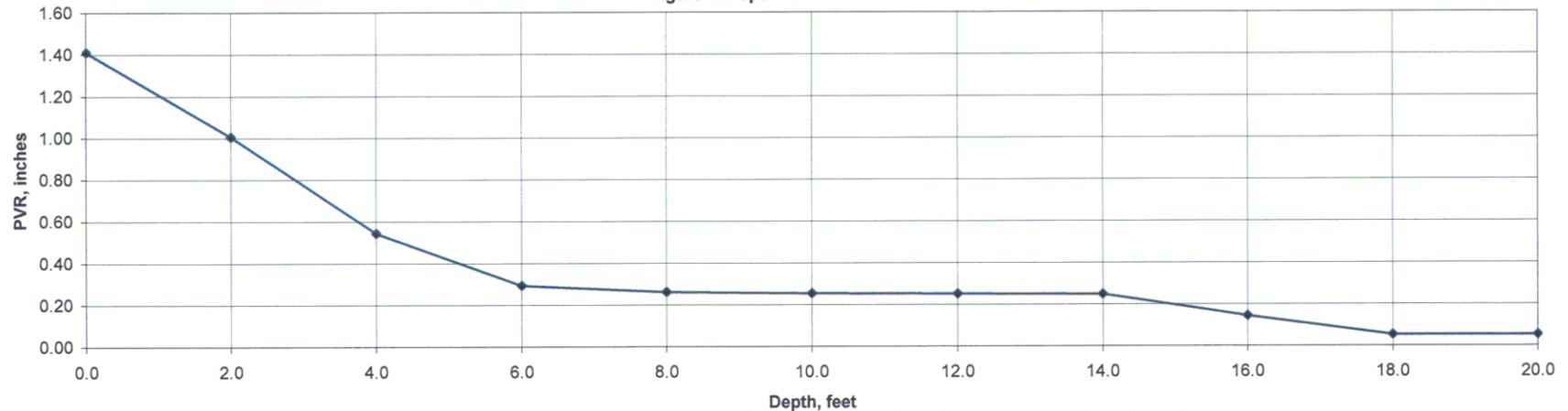
Depth to Bottom of Layer [ft]	Average Load [psi]	Liquid Limit (LL)	Dry 0.2LL+9	Wet 0.47LL+2	Percent Moisture	Dry Avg Wet	Percent -No.40	Plasticity Index (PI)	Percent Volume Swell	Percent Free Swell	PVR [in] Top of Layer	PVR [in] Bottom of Layer	Differential Swell [in]	Modified -No.40 Factor	Modified Density Factor	PVR in Layers [in]	Total PVR [in]
0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.41
2.0	1.0	41	17.2	21.3	16.0	Dry	93.0	23	5.7	8.7	0.00	0.44	0.44	0.93	1.00	0.41	1.00
4.0	3.0	41	17.2	21.3	16.0	Dry	93.0	23	5.7	8.7	0.44	0.93	0.50	0.93	1.00	0.46	0.54
6.0	5.0	41	17.2	21.3	16.0	Dry	93.0	23	5.7	8.7	0.93	1.20	0.27	0.93	1.00	0.25	0.29
8.0	7.0	26	14.2	14.2	13.0	Dry	100.0	13	2.5	5.2	0.42	0.45	0.03	1.00	1.00	0.03	0.26
10.0	9.0	26	14.2	14.2	13.0	Dry	100.0	13	2.5	5.2	0.45	0.45	0.01	1.00	1.00	0.01	0.25
12.0	11.0	26	14.2	14.2	13.0	Dry	100.0	13	2.5	5.2	0.45	0.46	0.00	1.00	1.00	0.00	0.25
14.0	13.0	26	14.2	14.2	13.0	Dry	100.0	13	2.5	5.2	0.46	0.46	0.00	1.00	1.00	0.00	0.25
16.0	15.0	54	19.8	27.4	21.0	Dry	97.0	32	8.7	11.9	2.74	2.85	0.11	0.97	1.00	0.10	0.14
18.0	17.0	56	20.2	28.3	17.0	Dry	94.0	33	9.0	12.2	2.96	3.06	0.10	0.94	1.00	0.09	0.05
20.0	19.0	56	20.2	28.3	17.0	Dry	94.0	33	9.0	12.2	3.06	3.11	0.06	0.94	1.00	0.05	0.05

Note: PVR calculations are based on future pavement grade being the same as present grade.

Green fields are test result inputs  
Blue fields are chart inputs

Tan fields are final answers per layer  
Yellow fields are final Total PVR for the borehole

Figure 1: Depth VS PVR BH-23



Remarks:

Test Method: Tx124E Tested By: Kumara Marupudi Date: 03/08/05  
Reviewed By: Michael P. Batuna, P.E. Date: 03/15/05  
Authorized By: Michael L. Lester, P.E. Date: 03/15/05

