

**PROJECT DESCRIPTION**

THE PROJECT CONSISTS IN PART OF PLACING TWIN STRUCTURES FOR THE PROPOSED SR 823 OVER LUCASVILLE-MINFORD ROAD (CR 28). THE TWO STRUCTURES AS PLANNED, ARE BOTH THREE-SPAN STRUCTURES WITH SPILL THROUGH SLOPES AT THE ABUTMENTS.

**HISTORIC RECORDS**

HISTORIC BORING RECORDS FOR THE AREA WERE REQUESTED FROM THE ODOT OFFICE OF GEOTECHNICAL ENGINEERING AND THE DISTRICT, HOWEVER, NO SUCH RECORDS EXISTED.

**GEOLOGY**

THE AREA OF THIS STRUCTURE IS CHARACTERIZED BY GENTLY SLOPING TO STEEPLY SLOPING TOPOGRAPHY. THE PROJECT AREA IS LOCATED IN THE SHAWNEE-MISSISSIPPIAN PLATEAU OF THE UNGLACIATED PORTION OF THE APPALACHIAN PLATEAU PHYSIOGRAPHIC REGION. THE SHAWNEE-MISSISSIPPIAN PLATEAU IS CHARACTERIZED BY DEVONIAN AGED TO PENNSYLVANIAN AGED ROCKS AND CONTAINS RESIDUAL, COLLUVIAL, GLACIAL, ALLUVIAL, AND LACUSTRINE SOILS.

**RECONNAISSANCE**

SEVERAL SITE RECONNAISSANCE VISITS WERE MADE BETWEEN JUNE 2004 AND SEPTEMBER 2006. THE SURROUNDING AREA IS DESCRIBED AS RURAL. THERE ARE SEVERAL RESIDENTIAL STRUCTURES AND AGRICULTURAL OUTBUILDINGS IN THE PROJECT AREA. GROUND COVER IN THE PROJECT AREA CONSISTS OF GRASS, BRUSH, AND OCCASIONAL TREES.

**SUBSURFACE EXPLORATION**

THE FIELD EXPLORATION CONSISTED OF FOUR STRUCTURAL BORINGS. THE STRUCTURAL BORINGS (TR-11 THROUGH TR-14) WERE DRILLED BETWEEN JUNE 7, 2004 AND MARCH 17, 2005 WITH AN ATV MOUNTED ROTARY DRILL RIG, USING 3 1/4 -INCH I.D. HOLLOW STEM AUGERS TO ADVANCE THE HOLES THROUGH SOIL. DISTURBED SOIL SAMPLES WERE OBTAINED IN ACCORDANCE WITH THE STANDARD PENETRATION TEST (AASHTO T206) AT 1.5 TO 5.0-FOOT INTERVALS FOR THE FULL DEPTH OF THE SOIL PORTION OF THE BORINGS. UNDISTURBED SOIL SAMPLES WERE OBTAINED AT THE DEPTHS SHOWN ON THE LOGS AND IN THE PROFILE, IN ACCORDANCE WITH AASHTO T207. WHERE BEDROCK WAS ENCOUNTERED, THE BORINGS WERE ADVANCED AND THE ROCK WAS SAMPLED USING A TYPE NO SERIES CORE BARREL, WATER METHOD.

**EXPLORATION FINDINGS**

ALL BORINGS ENCOUNTERED SURFICIAL MATERIAL CONSISTING OF 4 TO 6 INCHES OF TOPSOIL. THE TOPSOIL WAS UNDERLAIN BY NATIVE SOIL DEPOSITS. ALL BORINGS ENCOUNTERED NATIVE COHESIVE AND GRANULAR SOIL DEPOSITS BELOW THE SURFICIAL MATERIAL EXCEPT BORING TR-12 WHERE POSSIBLE FILL WAS ENCOUNTERED CONSISTING OF MEDIUM STIFF TO STIFF SANDY SILT (A-4A). THE COHESIVE DEPOSITS GENERALLY CONSISTED OF STIFF TO VERY STIFF SILT AND CLAY (A-6A), STIFF SANDY SILT (A-4A), STIFF TO VERY STIFF SILTY CLAY (A-6B), AND SOFT TO VERY STIFF CLAY (A-7-6), WHILE THE GRANULAR SOIL DEPOSITS CONSISTED MAINLY OF VERY DENSE SANDY SILT (A-4A). THE NATIVE SOIL DEPOSITS EXTENDED TO AN APPROXIMATE DEPTH RANGING BETWEEN 33.5 AND 43.0 FEET BELOW THE GROUND SURFACE WHERE BEDROCK WAS ENCOUNTERED.

IN THE AREA OF THE PROPOSED STRUCTURE, BEDROCK WAS ENCOUNTERED IN ALL BORINGS. A LAYER OF SEVERELY WEATHERED ROCK, RANGING IN THICKNESS BETWEEN 3.0 TO 4.0 FEET, WAS ENCOUNTERED ABOVE THE MORE COMPETENT CORED BEDROCK IN BORINGS TR-11 AND TR-12, WHILE A 10.5-FOOT THICK SEVERELY WEATHERED SILTSTONE LAYER WAS ENCOUNTERED IN BORING TR-14. THE BEDROCK CONSISTED OF MEDIUM HARD, BROKEN TO HIGHLY FRACTURED SANDSTONE AND SILTSTONE. THE AMOUNT OF ROCK RECOVERED IN EACH CORE RUN VARIED BETWEEN 51 AND 100 PERCENT. IN BORING TR-13, CORE LOSS WAS ENCOUNTERED BETWEEN APPROXIMATE DEPTHS OF 40.0 AND 44.9 FEET BELOW THE GROUND SURFACE CORRESPONDING TO ELEVATIONS 673.5 AND 668.9, RESPECTIVELY. THE ROCK QUALITY DESIGNATION (ROD) OF THE BEDROCK RANGED BETWEEN 25 AND 92 PERCENT WITH AN AVERAGE OF 71 PERCENT, INDICATING FAIR ROCK.

SEEPAGE WAS ENCOUNTERED IN ALL BORINGS BETWEEN APPROXIMATE DEPTHS OF 10.5 AND 38.5 FEET. MEASURABLE WATER LEVELS IN THE BORINGS PRIOR TO ROCK CORING WERE ENCOUNTERED ONLY IN BORING TR-14 AT AN APPROXIMATE DEPTH OF 24.8 FEET. WATER WAS USED DURING ROCK CORING OPERATIONS AND MASKED ANY SEEPAGE ZONES THAT MIGHT EXIST IN THE ROCK.

**SPECIFICATIONS**

THIS GEOTECHNICAL EXPLORATION WAS PERFORMED IN ACCORDANCE WITH THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, OFFICE OF GEOTECHNICAL ENGINEERING, SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS, DATED NOVEMBER 1995.

**AVAILABLE INFORMATION**

ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE SOIL PROFILE SHEETS HAS BEEN SO REPORTED. ADDITIONAL SUBSURFACE EXPLORATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY, MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE, THE OFFICE OF GEOTECHNICAL ENGINEERING AT 1600 WEST BROAD STREET OR THE OFFICE OF STRUCTURAL ENGINEERING AT 1980 WEST BROAD STREET.

DESCRIPTION		ODOT CLASS	CLASSIFIED MECH./VISUAL	
	SANDY SILT	A-4a	2	3
	SILT AND CLAY	A-6a	1	2
	SILTY CLAY	A-6b	1	3
	CLAY	A-7-6	6	37
	TOTAL		10	45
	WEATHERED SILTSTONE	VISUAL		
	SILTSTONE	VISUAL		
	SANDSTONE	VISUAL		

	BORING LOCATION - PLAN VIEW
	DRIVE SAMPLE AND/OR CORE BORING LOCATION PLOTTED TO VERTICAL SCALE ONLY
W —	INDICATES FREE WATER ELEVATION
∇ —	INDICATES STATIC WATER ELEVATION
—TR	INDICATES THE TOP OF ROCK ELEVATION

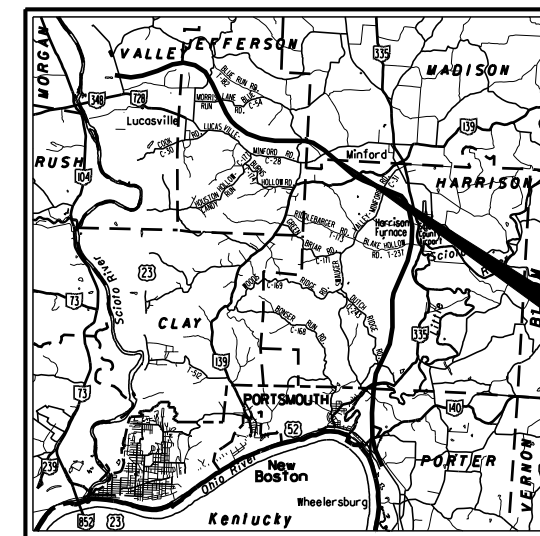
FIGURES BESIDE THE BORING IN PROFILE INDICATE THE NUMBER OF BLOWS FOR STANDARD PENETRATION TEST

X/Y/Z  
 X = NUMBER OF BLOWS FOR FIRST 6 INCHES  
 Y = NUMBER OF BLOWS FOR SECOND 6 INCHES  
 Z = NUMBER OF BLOWS FOR THIRD 6 INCHES

50 (n)  
 INDICATES NUMBER OF BLOWS (50) TO DRIVE A SPLIT-BARREL SAMPLER A DEPTH OF (n) INCHES OTHER THAN THE NORMAL 6 INCH INCREMENT.

**PARTICLE SIZE DEFINITIONS**

12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm
Boulders	Cobbles	Gravel	Coarse Sand	Fine Sand	Silt
		No. 10 SIEVE	No. 40 SIEVE	No. 200 SIEVE	Clay



LOCATION MAP



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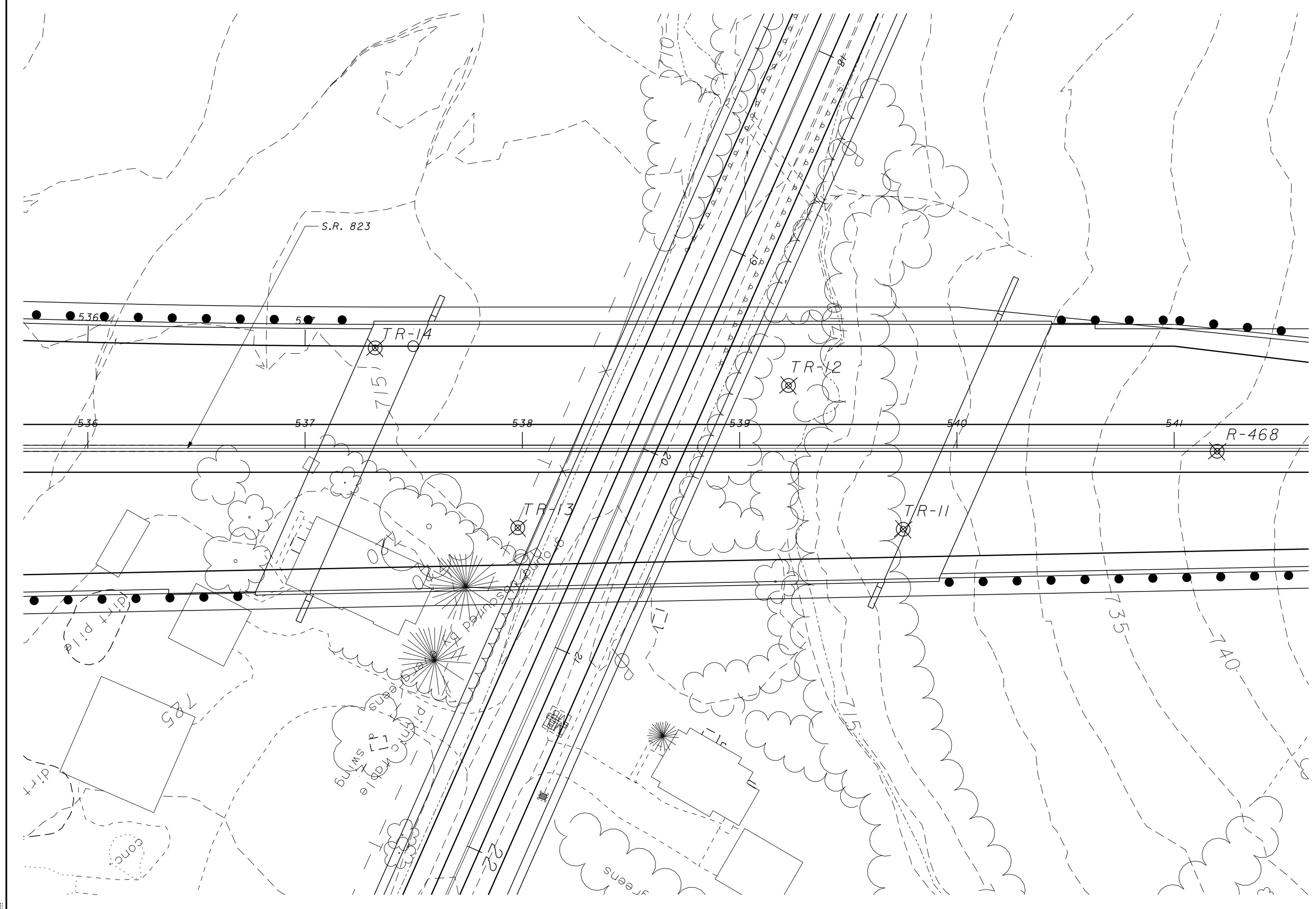


PID NO. 79977

STRUCTURE FOUNDATION INVESTIGATION  
 BRIDGE NO. SCI-823-1018  
 SR823 OVER LUCASVILLE-MINFORD ROAD

SCI-823-10.13

RECON. - AMJ AND SJR 06/04 to 06/06  
 DRILLING - DW 03/16/05 TO 03/17/05, 06/04/04 TO 06/07/04  
 DRAWN - RLS & AMJ 8/09  
 REVIEWED - AEN 8/19/09

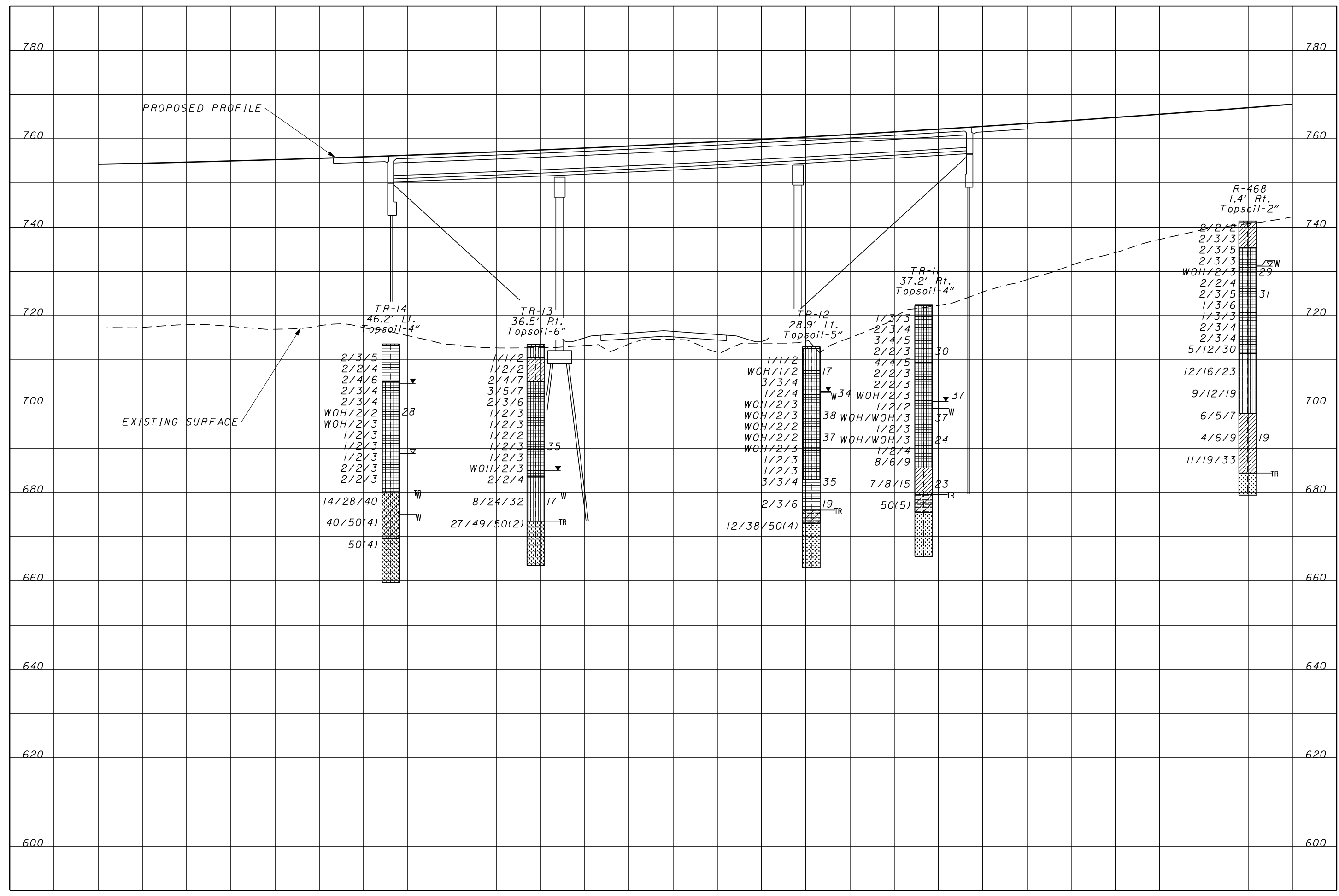


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**STRUCTURE FOUNDATION INVESTIGATION**  
**BRIDGE NO. SCI-823-1018**  
**SR823 OVER LUCASVILLE-MINFORD ROAD**

**SCI-823-10.13**



**STRUCTURE FOUNDATION INVESTIGATION**  
**BRIDGE NO. SCI-823-1018**  
**SR823 OVER LUCASVILLE-MINFORD ROAD**



Client: TranSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03				
LOG OF: Boring R-468		Location: Sta. 541+19.8, 1.4 ft. RT of SR 823 CL		Date Drilled: 04/15/05 to 04/18/05				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION	STANDARD PENETRATION (N)
						Water seepage at: 10.0'		
						Water level at completion: 10.2 (prior to coring)	% C. Sand	PL
						8.6' (includes drilling water)	% M. Sand	Blows per foot - ○
							% F. Sand	
							% Silt	
							% Clay	
						DESCRIPTION		
0	741.4					Topsoil - 2"		
0.4	741.4	2	7	1	3.5	Very stiff to hard brown SILT AND CLAY (A-6a), little fine sand; damp.		
5		2	3	2	4.5+			
6.0	735.4	2	5	3	3.75	Stiff to very stiff brown CLAY (A-7-6), trace gravel, fine sand; damp to moist.		
10		2	3	4	2.0	@ 9.9'-10.0', silt seam.		
15		2	4	6	1.5			
20		2	3	7	1.25			
25		2	4	10	1.25			
30.0	711.4	5	12	12	3.0	@ 26.0'-26.5', SILT AND CLAY (A-6a) seam, highly laminated.		
35		12	16	13		Medium dense to dense brown SANDY SILT (A-4a), little gravel, trace clay; contains sandstone fragments; damp.		
40		9	12	14				
43.5	697.9	8	5	15	-	Stiff brown SILT AND CLAY (A-6a), trace fine to coarse sand, trace gravel; moist.		
45		4	6	16	-			
50		11	19	17	-			
55		4	6	16	-			
57.0	684.4					Medium hard dark gray SANDSTONE; very fine to fine grained, highly to moderately weathered, argillaceous, micaceous, thinly laminated to medium bedded, moderately fractured to broken.		
60								

Client: TranSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03				
LOG OF: Boring R-468		Location: Sta. 541+19.8, 1.4 ft. RT of SR 823 CL		Date Drilled: 04/15/05 to 04/18/05				
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:	GRADATION	STANDARD PENETRATION (N)
						Water seepage at: 10.0'		
						Water level at completion: 10.2 (prior to coring)	% C. Sand	PL
						8.6' (includes drilling water)	% M. Sand	Blows per foot - ○
							% F. Sand	
							% Silt	
							% Clay	
						DESCRIPTION		
60	681.4					Medium hard dark gray SANDSTONE; very fine to fine grained.		
62.0	679.4					Bottom of Boring - 62.0'		
65								
70								
75								
80								
85								
90								

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 STRUCTURE FOUNDATION INVESTIGATION  
 BRIDGE NO. SCI-823-1018  
 SR823 OVER LUCASVILLE-MINFORD ROAD

SCI-823-10.13

Client: TransSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03									
LOG OF: Boring TR-11		Location: Sta. 539+75.3, 37.2 ft. RT of SR 823 CL		Date Drilled: 3/16/05 to 3/17/05									
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive Press / Core	Hand Penetrometer (tsf)	GRADATION					STANDARD PENETRATION (N)		
						% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - PL	LL
WATER OBSERVATIONS:						DESCRIPTION							
Water seepage at: 23.5' Water level at completion: 21.9' (Includes drilling water)													
0.3	722.2					Topsoil - 4" Stiff to very stiff light brown CLAY (A-7-6), little to some silt, trace fine sand; damp.							
1		3	18	1	2.5								
2		3	18	2	2.5								
3		4	18	3	1.5								
4		2	18	4	2.0	0	0	1	20	79	56		
5		4	18	5	2.5	@ 11.0', gray.							
13.0	709.5					Medium stiff gray CLAY (A-7-6); moist.							
15		2	18	6	0.75								
17		2	18	7	0.75								
19		2	18	8	0.5								
21		1	18	9	0.5								
23		1	18	10	0.5	0	0	0	14	86	58		
25		1	18	11	0.5								
27		1	18	12	0.5	@ 28.5', contains sandstone fragments.							
29		1	18	13	0.5								
31		8	18	14	0.75								
33		8	18	15	2.5	Very stiff gray SILT AND CLAY (A-6a), trace fine sand; damp to moist.							
35		8	18	16	2.5	0	0	1	50	49	50+		
37.0	685.5					Severely weathered gray SHALE.							
43.0	679.5	5	5	16									
47.0	675.5					Medium hard gray SANDSTONE; very fine to fine grained, slightly to moderately weathered, argillaceous, micaceous, thinly laminated to very thinly bedded, slightly fractured, contains abundant argillaceous laminations.							
50													
55													
57.0	665.5					Bottom of Boring - 57.0'							
60													

Client: TransSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03									
LOG OF: Boring TR-12		Location: Sta. 539+22.5, 28.9 ft. LT of SR 823 CL		Date Drilled: 3/17/05									
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive Press / Core	Hand Penetrometer (tsf)	GRADATION					STANDARD PENETRATION (N)		
						% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - PL	LL
WATER OBSERVATIONS:						DESCRIPTION							
Water seepage at: 10.5'-30.5' Water level at completion: 10.1' (includes drilling water)													
0.4	713.0					Topsoil - 5" POSSIBLE FILL: Medium stiff brown SANDY SILT (A-4s), some gravel, little clay; damp to moist.							
1	712.6	1	18	1	0.75								
2		2	18	2	-	30	15	-	11	27	17		
3		3	18	3	2.5	Very stiff brown and gray CLAY (A-7-6); varved; moist.							
4		2	18	4	2.25	@ 11.0'-30.0', soft to medium stiff, brownish gray.							
5	707.5												
6		2	18	6	0.75	0	0	0	11	89	86		
7		2	18	7	0.5								
8		2	18	8	0.5								
9		2	18	9	0.5								
10		1	18	10	0.75								
11		1	18	11	0.5								
12		3	18	12	0.5								
13		2	18	13	1.5	1	5	-	8	59	28		
30.0	683.0					Stiff gray and brown SILTY CLAY (A-6b), little fine to coarse sand, trace gravel; varved; damp to moist.							
35		2	18	14		Severely weathered gray SHALE.							
37.0	676.0												
40.0	673.0					Medium hard gray SANDSTONE; very fine grained, highly weathered to decomposed, argillaceous, micaceous, slightly fractured, contains ferric bands and abundant argillaceous laminations, fissile after desiccation.							
45						@ 45.9'-48.2', light brown siltstone layer.							
50.0	663.0					Bottom of Boring - 50.0'							
55													
60													

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STRUCTURE FOUNDATION INVESTIGATION  
BRIDGE NO. SCI-823-1018  
SR823 OVER LUCASVILLE-MINFORD ROAD

Client: TranSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03		
LOG OF: Boring TR-13		Location: Sta. 537+97.9, 36.5 ft. RT of SR 823 CL		Date Drilled: 6/8/04		
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:
						Water seepage at: 33.5'-35.0' Water level at completion: 28.6' (includes drilling water)
GRADATION						
STANDARD PENETRATION (N)						
Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○						
DESCRIPTION						
0	713.5					Topsoil - 6"
0.5	713.0	1	10	1	1.75	Stiff gray SANDY SILT (A-4a), some clay, trace gravel; moist.
3.0	710.5	1	16	2	1.25	Stiff to very stiff brown SILT AND CLAY (A-6a), little fine to coarse sand, trace to little gravel; moist.
5		2	18	3	3.5	@ 6.0'-7.5', mottled brown and gray.
8.5	705.0	3	18	4	3.25	Stiff to very stiff mottled brown and gray CLAY (A-7-6), trace fine to coarse sand; moist.
10		2	18	5	2.25	
15		1	18	6	1.25	@ 16.0'-27.5', gray.
20		1	18	7	2.0	
25		1	18	8	1.5	
30		1	18	9	0.75	@ 21.0'-22.5', medium stiff.
35		1	18	10	1.0	
40		WOH	18	11	1.5	@ 26.0', contains sand seams.
45		2	18	12	1.5	
50	683.5	8	18	13		Very dense gray and brown SANDY SILT (A-4a), little clay, trace gravel; contains sandstone fragments; damp to moist.
55		27	18	14		Medium hard gray SILTSTONE; fissile.
60		49	16			@40.0' - 44.9', core loss.
		50/2				@46.6' - 46.8', clay seam.
						@47.8' - 50.0', broken to highly fractured with occasional clay seams.
						Bottom of Boring - 50.0'

Client: TranSystems, Inc.		Project: SCI-823-0.00		Job No. 0121-3070.03		
LOG OF: Boring TR-14		Location: Sta. 537+32.3, 46.2 ft. LT of SR 823 CL		Date Drilled: 6/4/04 to 6/7/04		
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No.	Hand Penetrometer (tsf)	WATER OBSERVATIONS:
						Water seepage at: 33.5', 38.5' Water level at completion: 24.8' (Prior to coring) 8.9' (includes drilling water)
GRADATION						
STANDARD PENETRATION (N)						
Natural Moisture Content, % - ● PL ——— LL Blows per foot - ○						
DESCRIPTION						
0.3	713.3					Topsoil - 4"
2.25		2	18	1	2.25	Very stiff brown and gray SILTY CLAY (A-6b), little fine to coarse sand; moist.
3.75		2	18	2	3.75	
5		2	18	3	2.75	@ 6.0'-7.5', gray.
8.5	705.1	2	18	4	2.75	Stiff to very stiff brown CLAY (A-7-6), trace to little fine to coarse sand; varved; damp to moist.
10		2	18	5	2.25	
15		WOH	18	6	1.0	@ 13.5', gray; qu=3820 psf.
20		WOH	18	7	1.5	
25		1	18	8	1.25	@ 23.5', gray and brown.
30		2	18	11	1.25	@ 28.5', contains sand seams.
35		2	18	12	2.0	Stiff to very stiff gray and brown CLAY (A-7-6), trace to little fine to coarse sand; varved; contains sand seams; damp to moist.
40		14	18	13		Severely weathered gray SILTSTONE.
45		40	12	14		
50		50/4	4	15		Medium hard gray SILTSTONE; fissile.
55		Core 60"	Rec 54"	RQD 72% R-1		@ 45.7', 46.4', 49.3', 50.7', 53.0', clay seams.
60		Core 60"	Rec 56"	RQD 77% R-2		@ 46.1'-46.7', 49.0'-49.3', broken to highly fractured.
						@ 53.5'-53.7', vertical fracture.
						Bottom of Boring - 54.0'

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SCI-823-10.13