

**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. R-4047 F.A. PROJ. STP-209(2)  
 COUNTY HAYWOOD  
 PROJECT DESCRIPTION NC 209 FROM US 23 BUS. TO NORTH OF  
SR 1523 (OLD CLYDE RD.)

SITE DESCRIPTION WALL 2 LT. OF -RPB- STA. 13+00 TO 20+41

**CONTENTS**

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
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**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL

M.M. HAGER

R.D. CHILDERS

G.K. ROSE

INVESTIGATED BY P.Q. LOCKAMY

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE 11.03.10

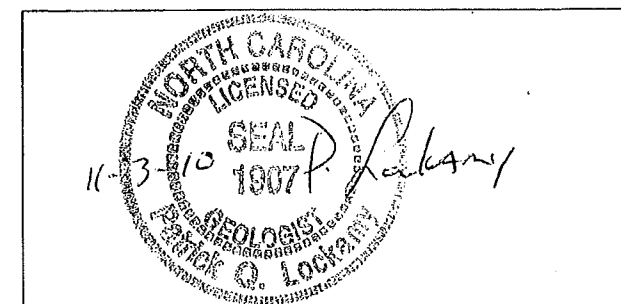
**ID: R-4047**

**PROJECT: 34599.1.1**

DRAWN BY: J.T. WILLIAMS

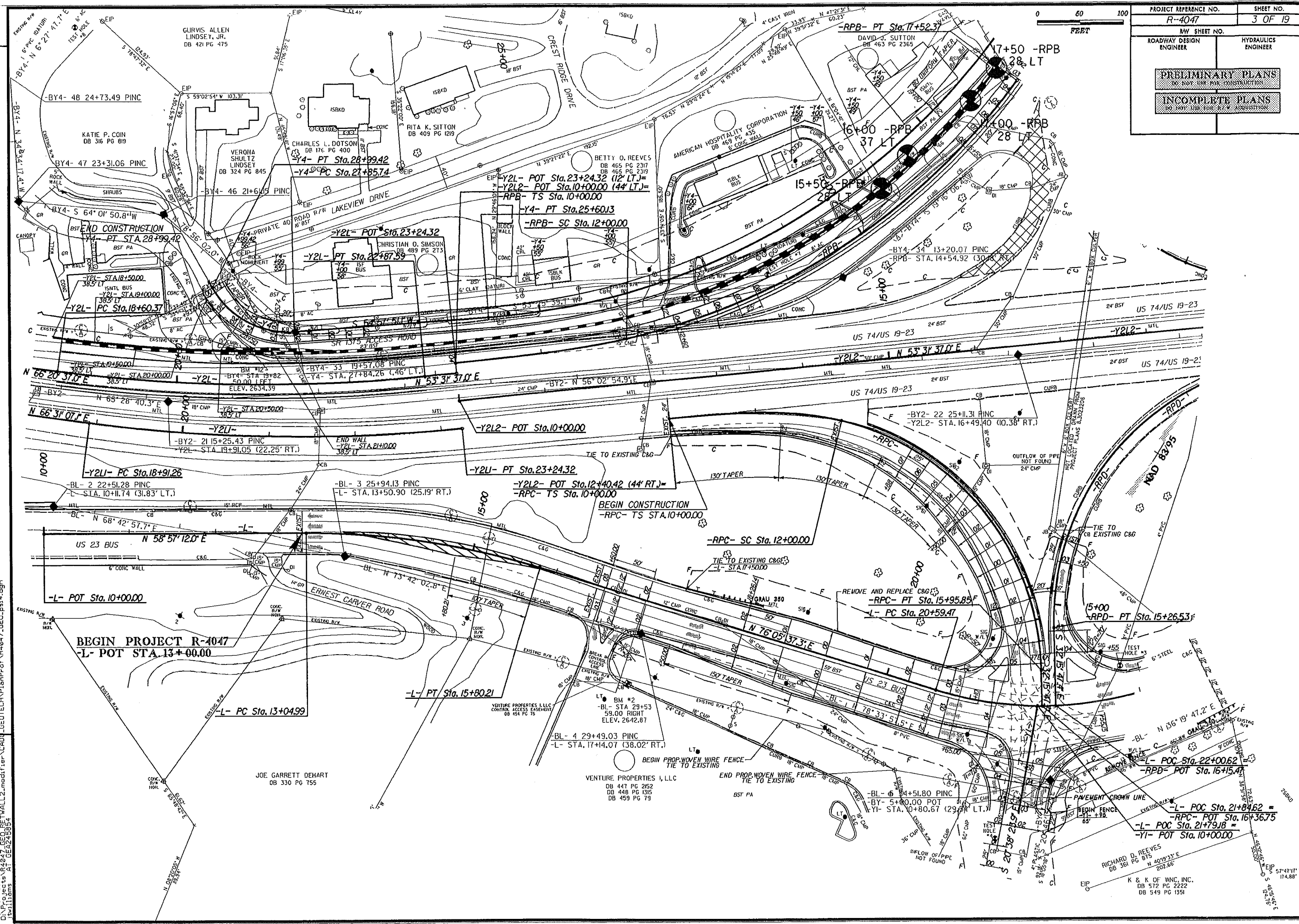
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THE INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREON AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.





PROJECT REFERENCE NO.	SHEET NO.
R-4047	3 OF 19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS <small>DO NOT BE USED FOR CONSTRUCTION</small>	
INCOMPLETE PLANS <small>DO NOT BE USED FOR ACQUISITION</small>	



REVISIONS

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DB 572 PG 2222  
DB 549 PG 1351

**BEGIN PROJECT R-4047**  
-L- POT STA. 13+00.00

**BEGIN CONSTRUCTION**  
-RPC- TS STA. 10+00.00

**BEGIN FENCE**  
-YI- POT STA. 10+00.00

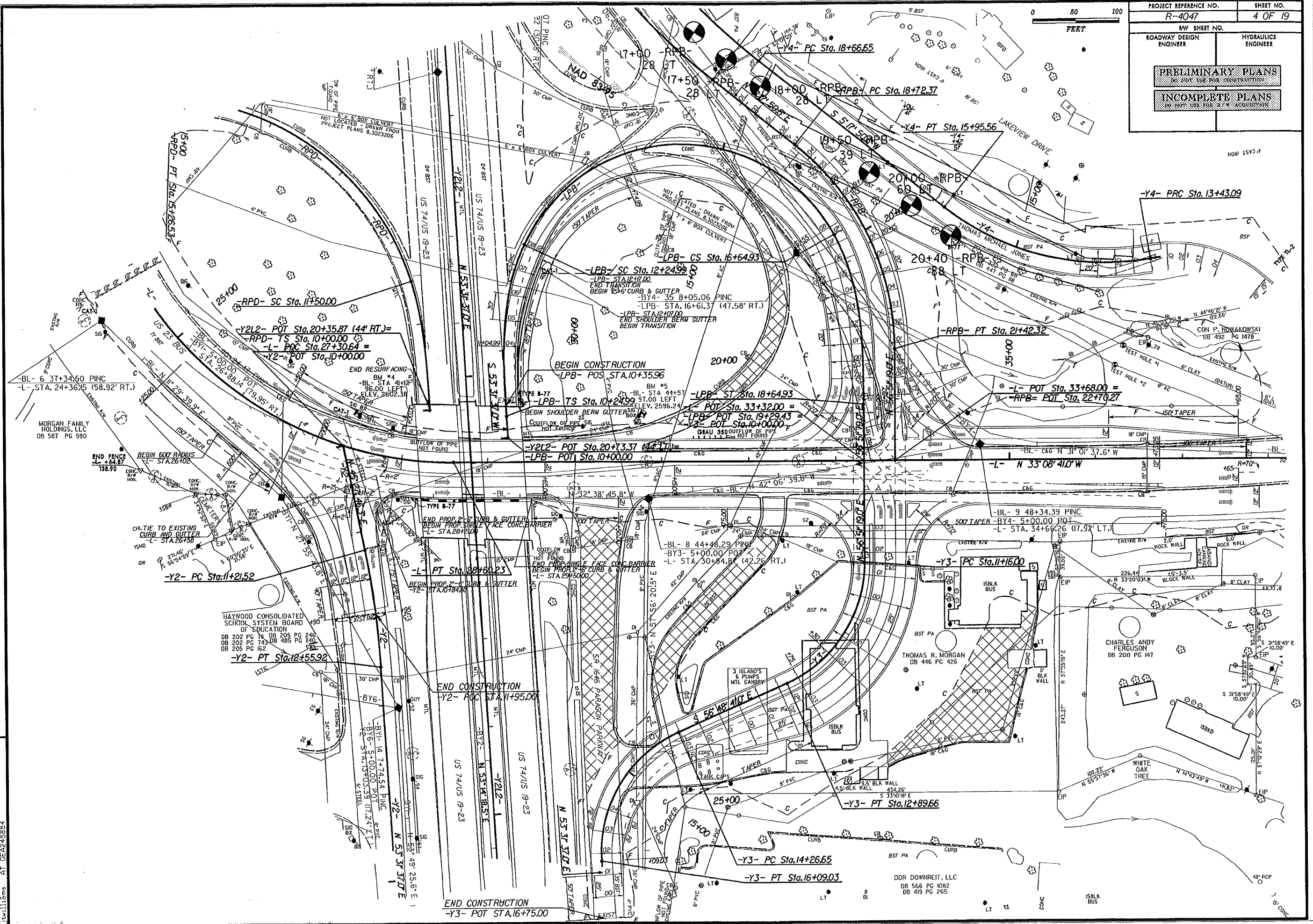
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DB 441 PG 2652  
DB 448 PG 1315  
DB 459 PG 79

JOE GARRETT DEHART  
DB 330 PG 755

RICHARD D. REEVES  
DB 361 PG 875  
DB 572 PG 2222  
DB 549 PG 1351

K & K OF WNC, INC.  
DB 572 PG 2222  
DB 549 PG 1351

PROJECT REFERENCE NO.		SHEET NO.	
R-4047		4 OF 19	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION		INCOMPLETE PLANS DO NOT USE FOR R.F.W. ACQUISITION	



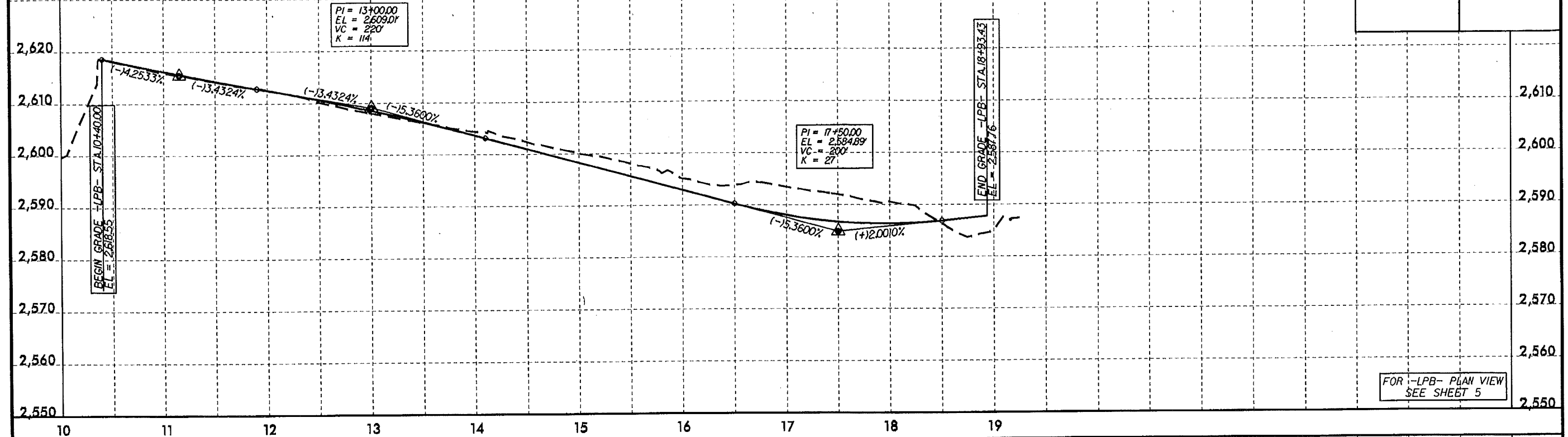
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5/26/99

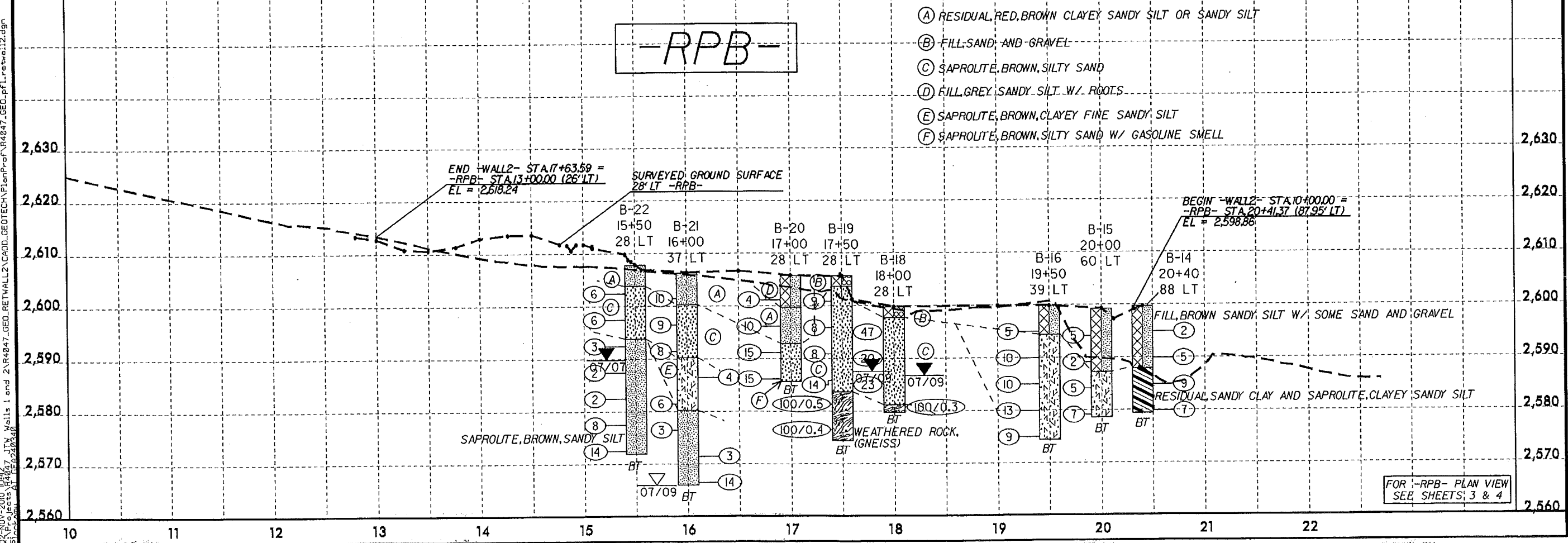
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

# -LPB-



FOR -LPB- PLAN VIEW SEE SHEET 5

# -RPB-

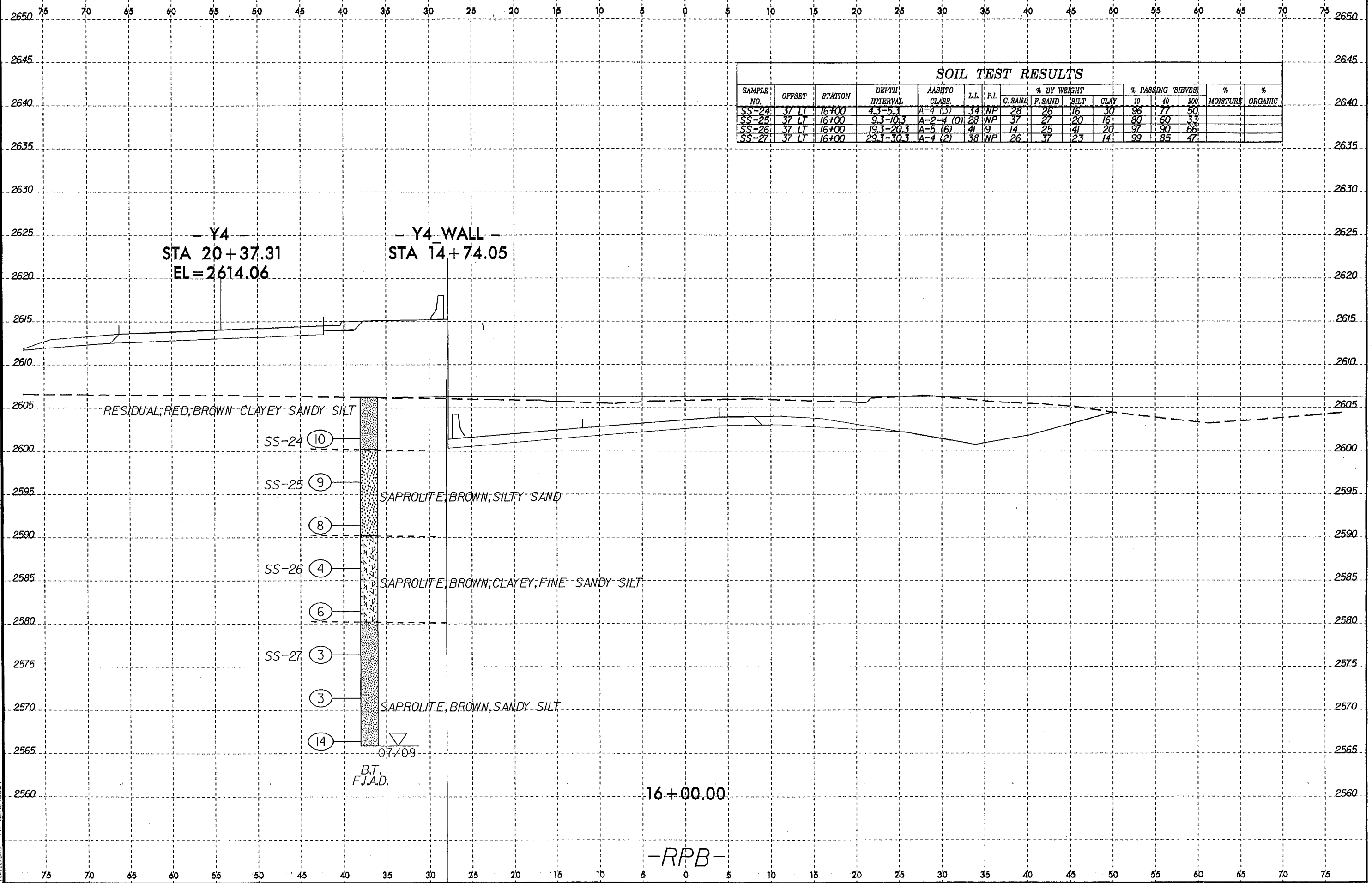


FOR -RPB- PLAN VIEW SEE SHEETS 3 & 4

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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-24	37 LT	16+00	4.3-5.3	A-4 (5)	34	NP	28	26	16	30	96	77	50		
SS-25	37 LT	16+00	9.3-10.3	A-2-4 (0)	28	NP	37	27	20	16	80	60	33		
SS-26	37 LT	16+00	19.3-20.3	A-5 (6)	41	9	14	25	41	20	97	90	66		
SS-27	37 LT	16+00	29.3-30.3	A-4 (2)	38	NP	26	37	23	14	99	85	47		

- Y4 -  
 STA 20+37.31  
 EL=2614.06

- Y4 WALL -  
 STA 16+74.05

RESIDUAL, RED, BROWN CLAYEY SANDY SILT

SS-24 (10)

SS-25 (9)

(8)

SS-26 (4)

(6)

SS-27 (3)

(3)

(14)

SAPROLITE, BROWN, SILTY SAND

SAPROLITE, BROWN, CLAYEY, FINE SANDY SILT

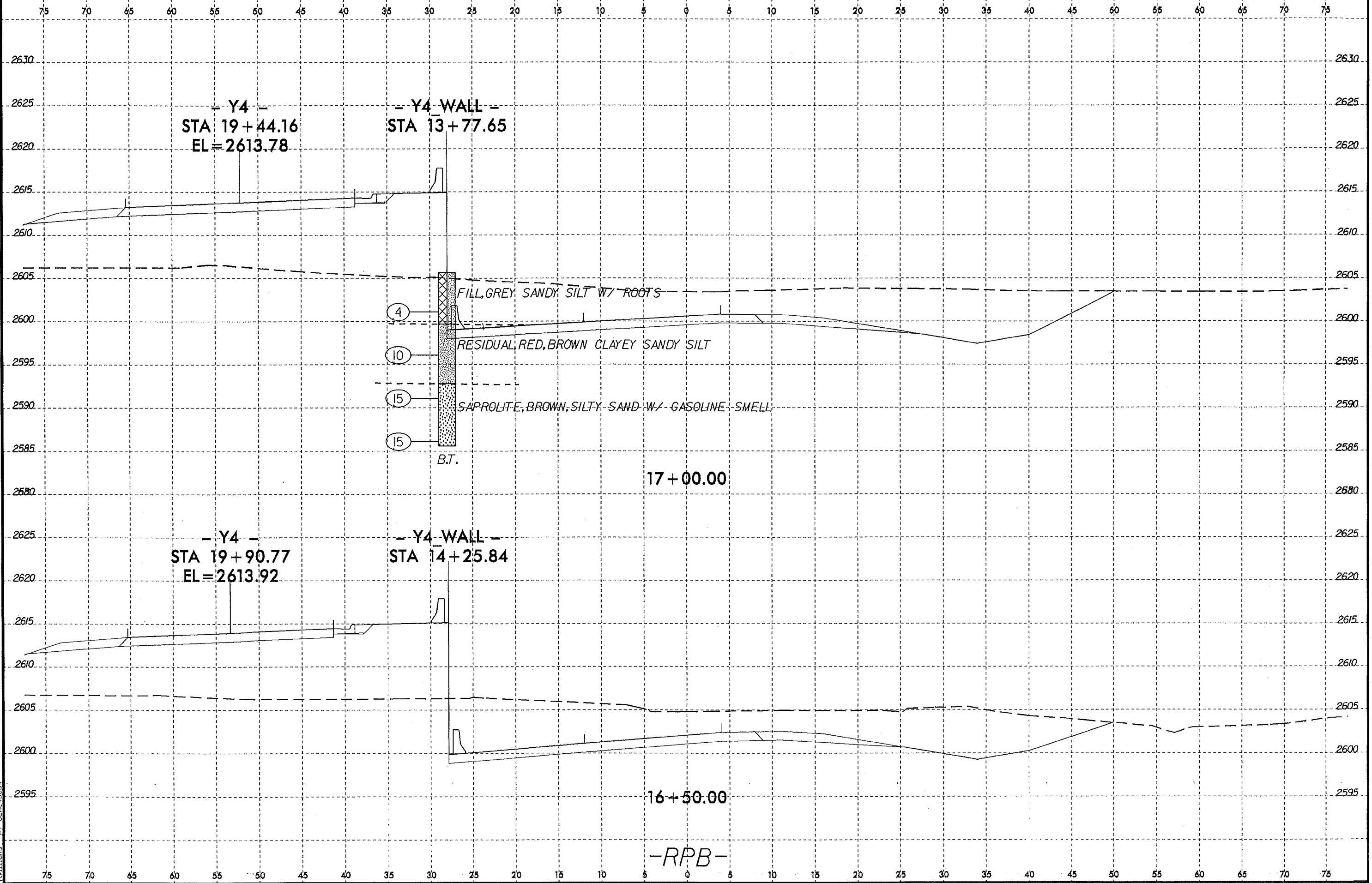
SAPROLITE, BROWN, SANDY SILT

B.T.  
 F.I.A.D.

16+00.00

-RPB-

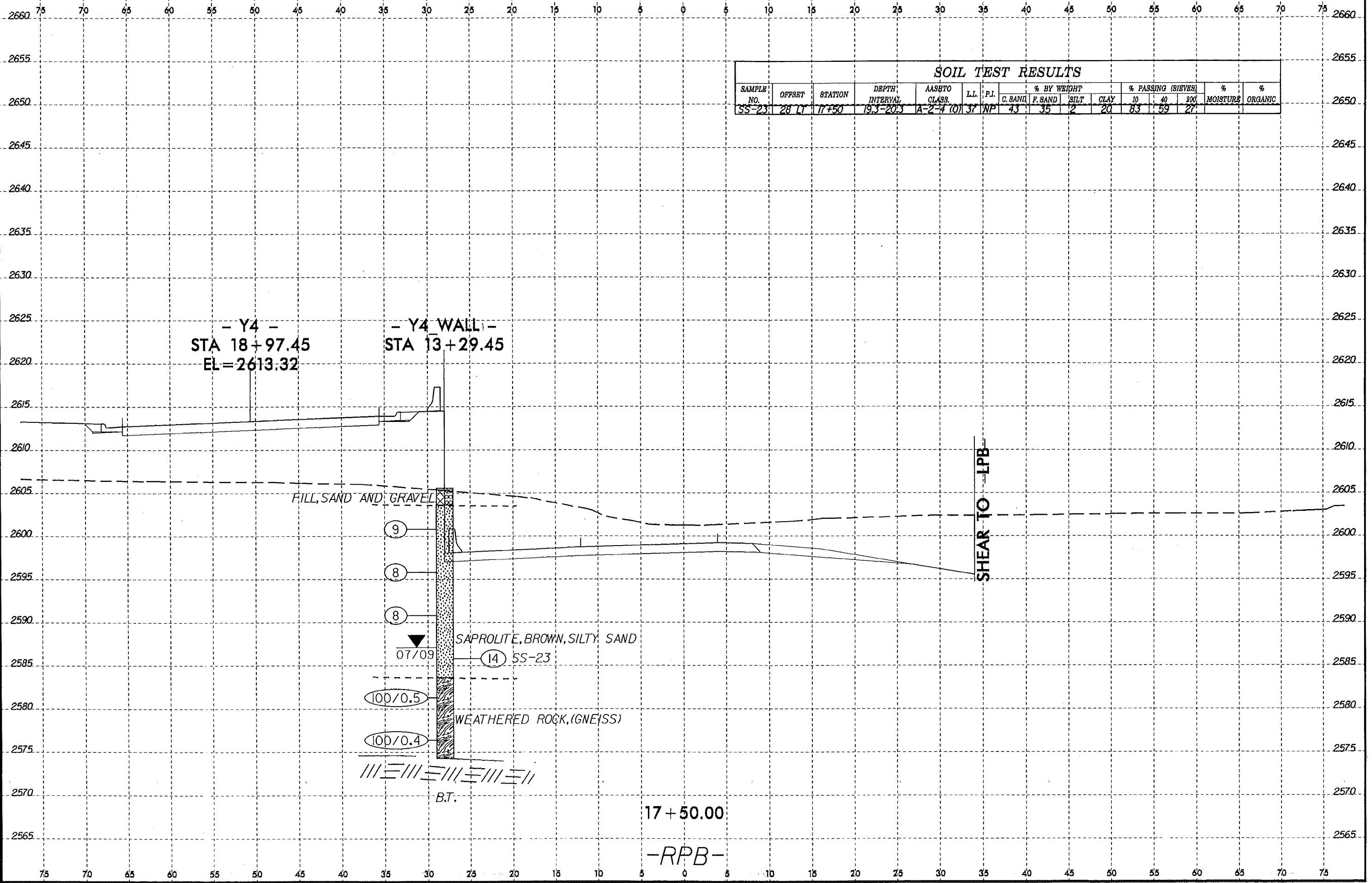
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-RPB-



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11/11/00



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							G. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-23	28 LT	17+50	19.3-20.3	A-2-4 (0)	37	NP	43	35	2	20	83	59	27		

- Y4 -  
STA 18+97.45  
EL=2613.32

- Y4 WALL -  
STA 13+29.45

FILL, SAND AND GRAVEL

9

8

8

07/09

SAPROLITE, BROWN, SILTY SAND

14 SS-23

100/0.5

WEATHERED ROCK, (GNE)SS

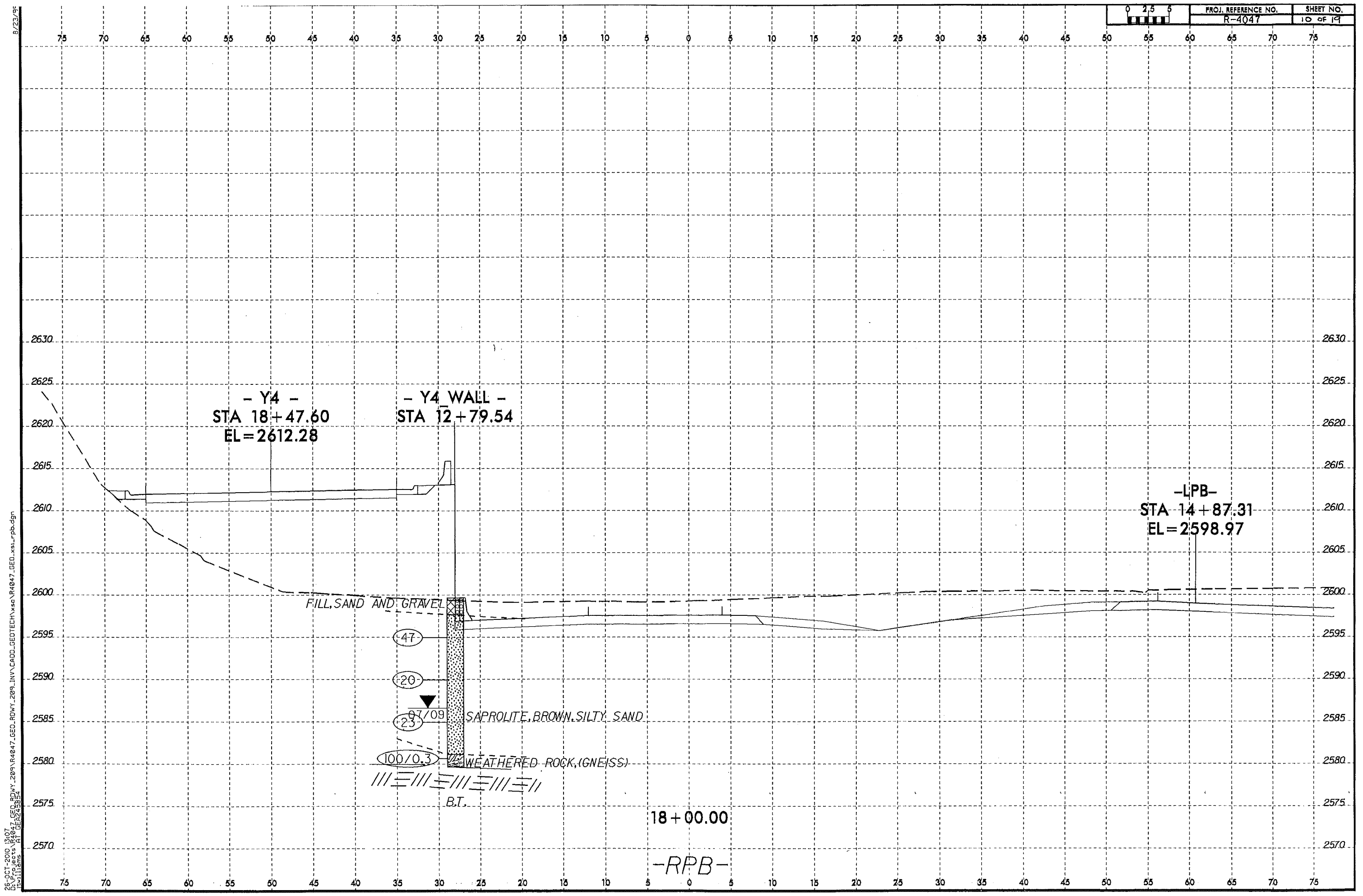
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B.T.

SHEAR TO LPB

17+50.00

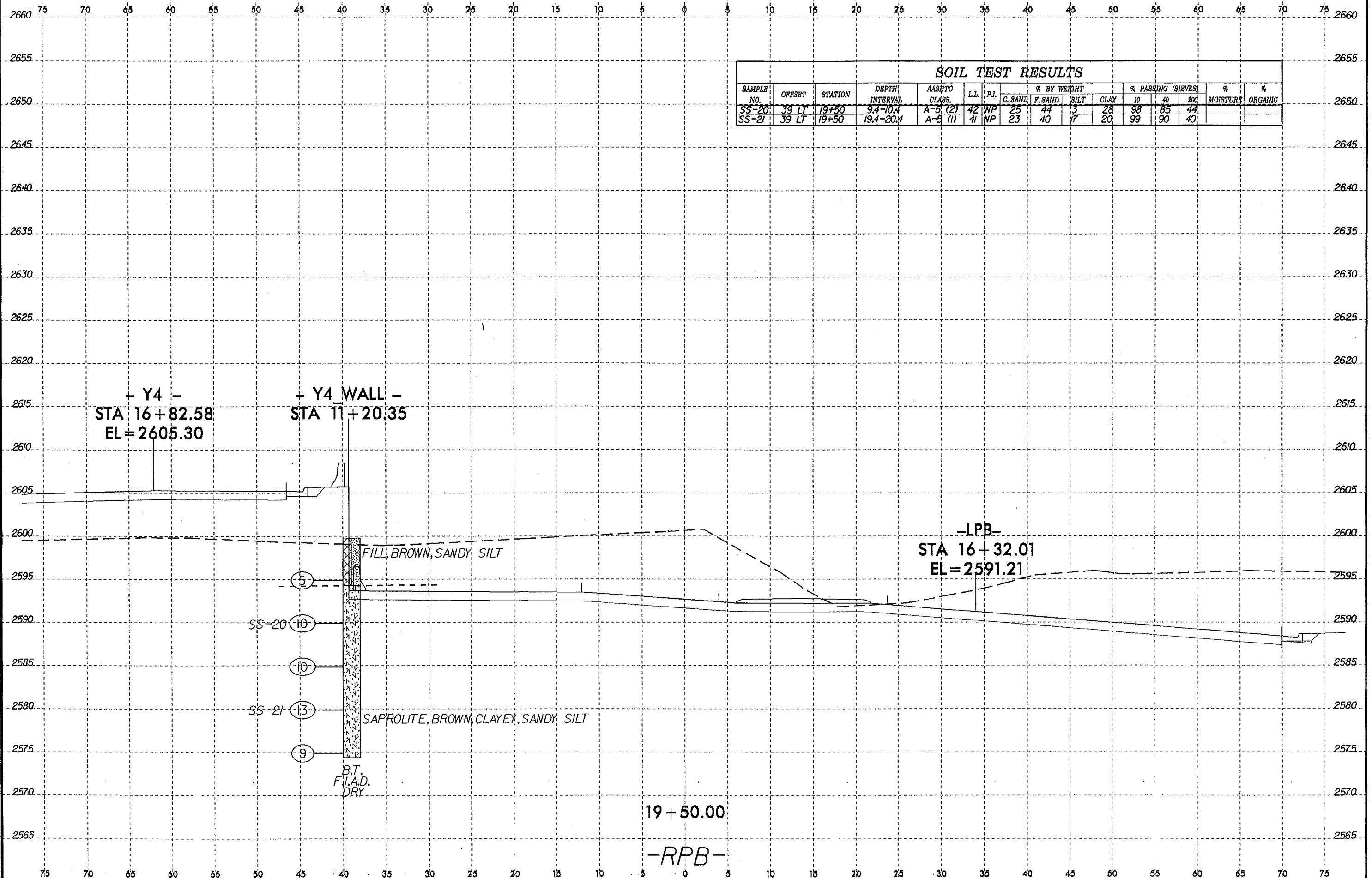
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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-20	39 LT	19+50	9.4-10.4	A-5 (2)	42	NP	25	44	13	28	98	85	44		
SS-21	39 LT	19+50	19.4-20.4	A-5 (1)	41	NP	23	40	17	20	99	90	40		

- Y4 -  
 STA 16+82.58  
 EL = 2605.30

- Y4 WALL -  
 STA 11+20.35

-LPB-  
 STA 16+32.01  
 EL = 2591.21

19+50.00

-RPB-

FILL, BROWN, SANDY SILT

SAPROLITE, BROWN, CLAYEY, SANDY SILT

B.T. FLAD. DRY

SS-20

SS-21

5

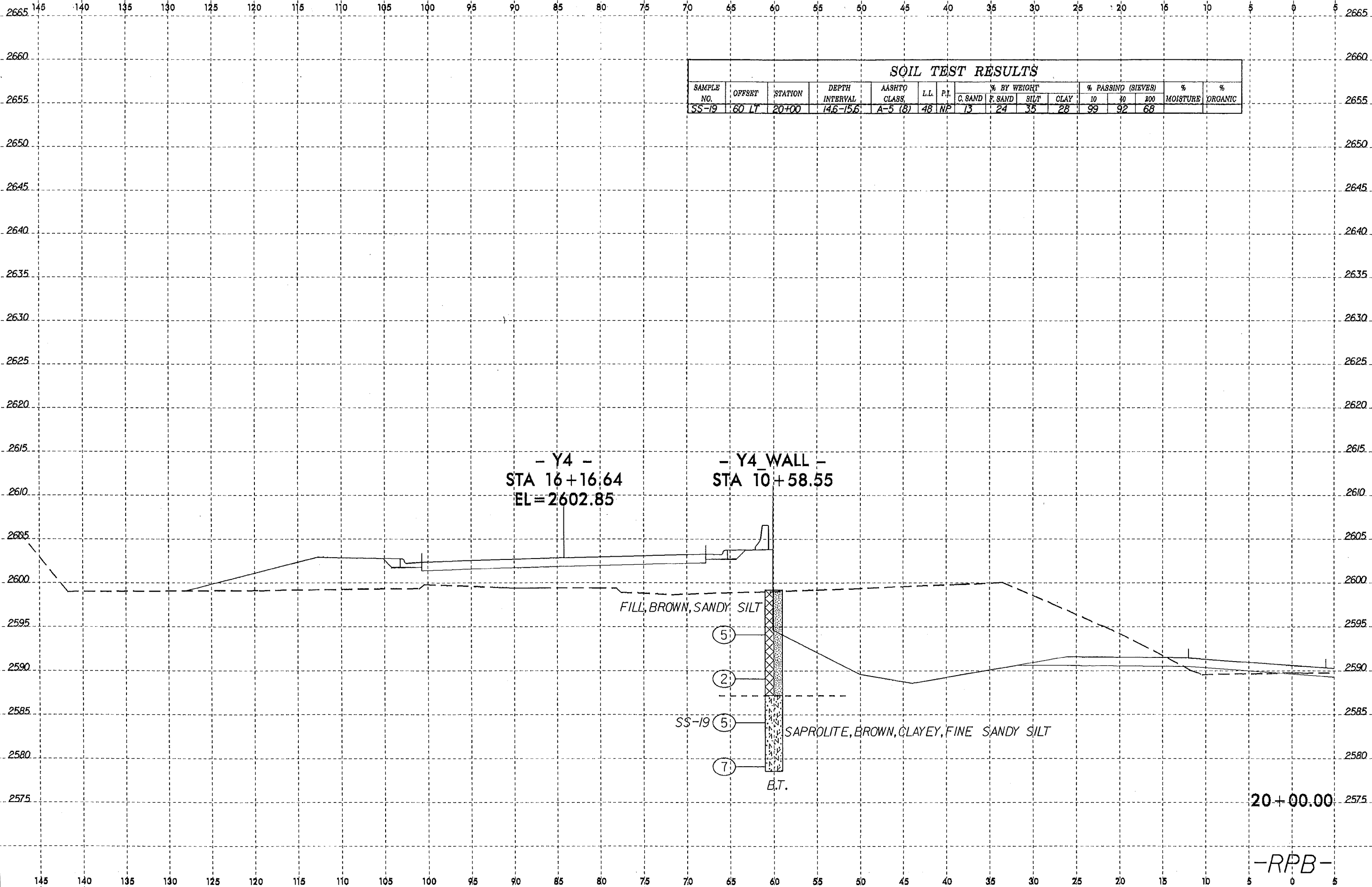
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 User: jessie

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-19	60 LT	20+00	14.6-15.6	A-5 (6)	48	NP	13	24	35	28	99	92	68		



-RPB-



PROJECT NO. 34599.1.1		ID. R4047		COUNTY HAYWOOD		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)							GROUND WTR (ft)									
BORING NO. B-22		STATION 15+50		OFFSET 28 ft LT		ALIGNMENT -RPB-										
COLLAR ELEV. 2,607.8 ft		TOTAL DEPTH 35.9 ft		NORTHING 668,725		EASTING 822,269										
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 07/07/09		COMP. DATE 07/07/09		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75						100	
2610														2,607.8	GROUND SURFACE	0.0
2605	2,603.4	4.4	1	3	3							D	RESIDUAL RED BROWN, SANDY SILT	2,603.8	4.0	
2600	2,598.4	9.4	2	2	4							D	SAPROLITE BROWN, SILTY SAND			
2595	2,593.4	14.4	1	2	1					SS-28	M		SAPROLITE BROWN, SANDY SILT	2,593.8	14.0	
2590	2,588.4	19.4	0	1	1						W					
2585	2,583.4	24.4	1	1	1						W					
2580	2,578.4	29.4	2	3	5						W					
2575	2,573.4	34.4	3	6	8						W					
2570														2,571.9	Boring Terminated at Elevation 2,571.9 ft IN SAPROLITE	35.9
2565																
2560																
2555																
2550																
2545																
2540																
2535																
2530																

NCDOT BORE SINGLE R4047\_GEO\_RETWALL2.GPJ NC\_DOT\_GDT 10/26/10

PROJECT NO. 34599.1.1		ID. R4047		COUNTY HAYWOOD		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)							GROUND WTR (ft)									
BORING NO. B-21		STATION 16+00		OFFSET 37 ft LT		ALIGNMENT -RPB-										
COLLAR ELEV. 2,606.2 ft		TOTAL DEPTH 40.3 ft		NORTHING 668,773		EASTING 822,275										
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 07/07/09		COMP. DATE 07/07/09		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75						100	
2610														2,606.2	GROUND SURFACE	0.0
2605	2,600.2	5.2										D	RESIDUAL RED, BROWN SANDY SILT	2,600.2	5.2	
2600	2,600.2	5.2	2	5	5					SS-24	D		SAPROLITE BROWN, SILTY SAND	2,600.2	6.0	
2595	2,597.4	8.8	2	4	5					SS-25	M					
2590	2,592.4	13.8	1	3	5						M					
2585	2,587.4	18.8	1	1	3						M					
2580	2,582.4	23.8	1	2	4						M					
2575	2,577.4	28.8	1	1	2						W					
2570	2,572.4	33.8	1	1	2					SS-27	W					
2565	2,567.4	38.8	2	5	9											
2560														2,565.9	Boring Terminated at Elevation 2,565.9 ft IN SAPROLITE	40.3
2555																
2550																
2545																
2540																
2535																
2530																

NCDOT BORE SINGLE R4047\_GEO\_RETWALL2.GPJ NC\_DOT\_GDT 10/26/10



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34599.1.1	ID. R4047	COUNTY HAYWOOD	GEOLOGIST Hager, M. M.
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)			GROUND WTR (ft)
BORING NO. B-20	STATION 17+00	OFFSET 28 ft LT	ALIGNMENT -RPB-
COLLAR ELEV. 2,605.7 ft	TOTAL DEPTH 20.1 ft	NORTHING 668,864	EASTING 822,305
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 07/06/09	COMP. DATE 07/06/09	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2610															
2605															
2600	2,602.1	3.6	2	2	2										
2595	2,597.1	8.6	2	5	5										
2590	2,592.1	13.6	4	8	7										
2585	2,587.1	18.6	3	6	9										
2580															
2575															
2570															
2565															
2560															
2555															
2550															
2545															
2540															
2535															
2530															

NCDOT BORE SINGLE R4047\_GEO\_RETWALL2.GPJ NC\_DOT.GDT 10/26/10



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34599.1.1	ID. R4047	COUNTY HAYWOOD	GEOLOGIST Hager, M. M.
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)			GROUND WTR (ft)
BORING NO. B-19	STATION 17+50	OFFSET 28 ft LT	ALIGNMENT -RPB-
COLLAR ELEV. 2,605.6 ft	TOTAL DEPTH 31.3 ft	NORTHING 668,912	EASTING 822,311
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 07/06/09	COMP. DATE 07/06/09	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2610															
2605															
2600	2,601.8	3.8	2	4	5										
2595	2,596.8	8.8	2	4	4										
2590	2,591.8	13.8	3	4	4										
2585	2,586.8	18.8	6	7	7										
2580	2,581.8	23.8	91	9/0.0											
2575	2,576.8	28.8	100/0.0	100/0.4											
2570															
2565															
2560															
2555															
2550															
2545															
2540															
2535															
2530															

NCDOT BORE SINGLE R4047\_GEO\_RETWALL2.GPJ NC\_DOT.GDT 10/26/10



PROJECT NO. 34599.1.1	ID. R4047	COUNTY HAYWOOD	GEOLOGIST Hager, M. M.
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)			GROUND WTR (ft)
BORING NO. B-18	STATION 18+00	OFFSET 28 ft LT	ALIGNMENT -RPB-
COLLAR ELEV. 2,599.7 ft	TOTAL DEPTH 20.0 ft	NORTHING 668,962	EASTING 822,316
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 07/01/09	COMP. DATE 07/01/09	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2600													2,599.7 GROUND SURFACE 0.0		
													2,597.7 FILL, SAND AND GRAVEL 2.0		
2595	2,596.0	3.7		12	23	24								SAPROLITE BROWN, SILTY SAND	
2590	2,591.0	8.7		6	9	11									
2585	2,586.0	13.7		6	11	12									
2580	2,581.0	18.7		100/0.3										2,581.2 WEATHERED ROCK (GNEISS) 18.5	
														2,579.7 CRYSTALLINE ROCK (GNEISS) 20.0	
2575														Boring Terminated with Standard Penetration Test Refusal at Elevation 2,579.7 ft IN CRYSTALLINE ROCK	
2570															
2565															
2560															
2555															
2550															
2545															
2540															
2535															
2530															
2525															
2520															

NCDOT BORE SINGLE R4047 GEO\_RET WALL2.GPJ NC\_DOT.GDT 10/26/10

PROJECT NO. 34599.1.1	ID. R4047	COUNTY HAYWOOD	GEOLOGIST Hager, M. M.
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)			GROUND WTR (ft)
BORING NO. B-16	STATION 19+50	OFFSET 39 ft LT	ALIGNMENT -RPB-
COLLAR ELEV. 2,599.8 ft	TOTAL DEPTH 25.4 ft	NORTHING 669,120	EASTING 822,331
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 06/30/09	COMP. DATE 06/30/09	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2600													2,599.8 GROUND SURFACE 0.0		
													2,594.3 FILL, BROWN, SANDY SILT 5.5		
2595	2,595.9	3.9		1	2	3								SAPROLITE BROWN, CLAYEY, SANDY SILT	
2590	2,590.9	8.9		1	4	6						SS-20	D		
2585	2,585.9	13.9		2	4	6									
2580	2,580.9	18.9		2	5	8						SS-21	D		
2575	2,575.9	23.9		3	4	5								2,574.4 Boring Terminated at Elevation 2,574.4 ft IN SAPROLITE 25.4	
2570															
2565															
2560															
2555															
2550															
2545															
2540															
2535															
2530															
2525															
2520															

NCDOT BORE SINGLE R4047 GEO\_RET WALL2.GPJ NC\_DOT.GDT 10/26/10

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34599.1.1		ID. R4047		COUNTY HAYWOOD		GEOLOGIST Hager, M. M.											
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)							GROUND WTR (ft)										
BORING NO. B-15		STATION 20+00		OFFSET 60 ft LT		ALIGNMENT -RPB-											
COLLAR ELEV. 2,599.2 ft		TOTAL DEPTH 20.6 ft		NORTHING 669,182		EASTING 822,336											
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic													
DRILLER Rose, G. K.		START DATE 06/30/09		COMP. DATE 06/30/09		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2600															2,599.2	GROUND SURFACE	0.0
																FILL, BROWN, SANDY SILT	
2595	2,595.1	4.1	1	2	3												
2590	2,590.1	9.1	1	1	1												
2585	2,585.1	14.1	1	2	3										2,587.2	SAPROLITE	12.0
																BROWN, CLAYEY, FINE SANDY SILT	
2580	2,580.1	19.1	2	3	4										2,578.6		20.6
																Boring Terminated at Elevation 2,578.6 ft IN SAPROLITE	
2575																	
2570																	
2565																	
2560																	
2555																	
2550																	
2545																	
2540																	
2535																	
2530																	
2525																	
2520																	

NCDOT BORE SINGLE R4047\_GEO\_RETWALL2.GPJ, NC\_DOT\_GDT\_10/26/10

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34599.1.1		ID. R4047		COUNTY HAYWOOD		GEOLOGIST Hager, M. M.											
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)							GROUND WTR (ft)										
BORING NO. B-14		STATION 20+40		OFFSET 88 ft LT		ALIGNMENT -RPB-											
COLLAR ELEV. 2,599.6 ft		TOTAL DEPTH 20.3 ft		NORTHING 669,239		EASTING 822,341											
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic													
DRILLER Rose, G. K.		START DATE 06/30/09		COMP. DATE 06/30/09		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2600															2,599.6	GROUND SURFACE	0.0
																FILL, BROWN SANDY SILT W/ CLAY	
2595	2,595.8	3.8	0	1	1												
2590	2,590.8	8.8	2	2	3												
2585	2,585.8	13.8	3	4	5										2,587.8	RESIDUAL SANDY CLAY	11.8
2580	2,580.8	18.8	2	3	4										2,579.3		20.3
																Boring Terminated at Elevation 2,579.3 ft IN SAPROLITE	
2575																	
2570																	
2565																	
2560																	
2555																	
2550																	
2545																	
2540																	
2535																	
2530																	
2525																	
2520																	

NCDOT BORE SINGLE R4047\_GEO\_RETWALL2.GPJ, NC\_DOT\_GDT\_10/26/10

JCS  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT  
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #: R-4047

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	34599.1.1	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	6.09	DATE RECEIVED:	7.7.09	DATE REPORTED:	7.20.09
SAMPLED FROM:	n/a	SAMPLED BY:	P. Q. Lockamy		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-17	SS-18	SS-19	SS-20	SS-21	SS-22
Lab Sample No. A	161172	161173	161174	161175	161176	161177
HiCAMS Sample #	--	--	--	--	--	--
Retained #4 Sieve %	0.0	1.2	0.0	0.0	0.0	0.0
Passing #10 Sieve %	90	92	99	98	99	92
Passing #40 Sieve %	75	75	92	85	90	67
Passing #200 Sieve %	49	49	68	44	40	33

MINUS #10 FRACTION

Soil Mortar - 100%						
Coarse Sand -Ret. #60	27	29	13	25	23	41
Fine Sand - Ret. #270	23	22	24	44	40	29
Silt 0.05-0.005 mm %	14	8	35	3	17	10
Clay < 0.005 mm %	36	41	28	28	20	20
Passing # 40 Sieve %	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--

Liquid Limit	37	36	48	42	41	36
Plastic Index	9	11	NP	NP	NP	NP
AASHTO Classification	A-4 (3)	A-6 (3)	A-5 (8)	A-5 (2)	A-5 (1)	A-2-4 (0)
Quantity						
Texture						
Station	20+40	20+40	20+00	19+50	19+50	19+00
Hole No.						
Depth (ft) From:	4.3	14.3	14.6	9.4	n/a	19.5
To:	5.3	15.3	15.6	10.4	n/a	20.5
	OK	OK	OK	OK	OK	OK

Remarks:

A-161170 - 161177

CC:

P. Q. Lockamy	
File	

SOILS ENGINEER:

JCS  
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS-MATERIALS AND TESTS UNIT  
SOILS TEST REPORT-SOILS LABORATORY

T.I.P. ID #: R-4047

REPORT ON SAMPLES OF: Soils for Quality

PROJECT:	34599.1.1	COUNTY:	n/a	Owner:	NCDOT
DATE SAMPLED:	6.09	DATE RECEIVED:	7.7.09	DATE REPORTED:	7.20.09
SAMPLED FROM:	n/a	SAMPLED BY:	P. Q. Lockamy		
SUBMITTED BY:	W. D. Frye	2002	STANDARD SPECIFICATION		
LABORATORY:	Asheville				

TEST RESULTS

Project Sample No.	SS-23	SS-24	SS-25	SS-26	SS-27	SS-28
Lab Sample No. A	161178	161179	161180	161181	161182	161183
HiCAMS Sample #	--	--	--	--	--	--
Retained #4 Sieve %	0.0	0.0	6.9	0.0	0.0	0.0
Passing #10 Sieve %	83	96	80	97	99	99
Passing #40 Sieve %	59	77	60	90	85	87
Passing #200 Sieve %	27	50	33	66	47	42

MINUS #10 FRACTION

Soil Mortar - 100%						
Coarse Sand -Ret. #60	43	28	37	14	26	28
Fine Sand - Ret. #270	35	26	27	25	37	39
Silt 0.05-0.005 mm %	2	16	20	41	23	19
Clay < 0.005 mm %	20	30	16	20	14	14
Passing # 40 Sieve %	--	--	--	--	--	--
Passing # 200 Sieve %	--	--	--	--	--	--

Liquid Limit	37	34	28	41	38	37
Plastic Index	NP	NP	NP	9	NP	NP
AASHTO Classification	A-2-4 (0)	A-4 (3)	A-2-4 (0)	A-5 (6)	A-4 (2)	A-4 (1)
Quantity						
Texture						
Station	17+50	16+00	16+00	16+00	16+00	15+50
Hole No.						
Depth (ft) From:	19.3	4.3	9.3	19.3	29.3	14.9
To:	20.3	5.3	10.3	20.3	30.3	15.9
	OK	OK	OK	OK	OK	OK

Remarks:

A-161178 - 161183

CC:

P. Q. Lockamy	
File	

SOILS ENGINEER:

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34599.1.1(R-4047)	1	10

**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34599.1.1(R-4047) F.A. PROJ. STP-209(2)  
COUNTY HAYWOOD  
PROJECT DESCRIPTION NC 209 FROM US 23 BUSINESS TO NORTH  
OF SR 1523 (OLD CLYDE RD.)

SITE DESCRIPTION BRIDGE ON NORFOLK SOUTHERN RAILROAD  
OVER NC 209 AND RICHLAND CREEK

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-9	BORING LOGS
10	SITE PHOTOGRAPHS

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU IN-PLACE TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

**PROJECT: 34599.1.1 ID: R-4047**

PERSONNEL  
P. PETRUCCI  
R. CUTTER  
R. WHITWORTH  
W. SALISBURY

INVESTIGATED BY P. WEAVER  
CHECKED BY B. WELCH  
SUBMITTED BY P. WEAVER  
DATE 06/10/2013

DRAWN BY: P. PETRUCCI

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.





NOTE - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

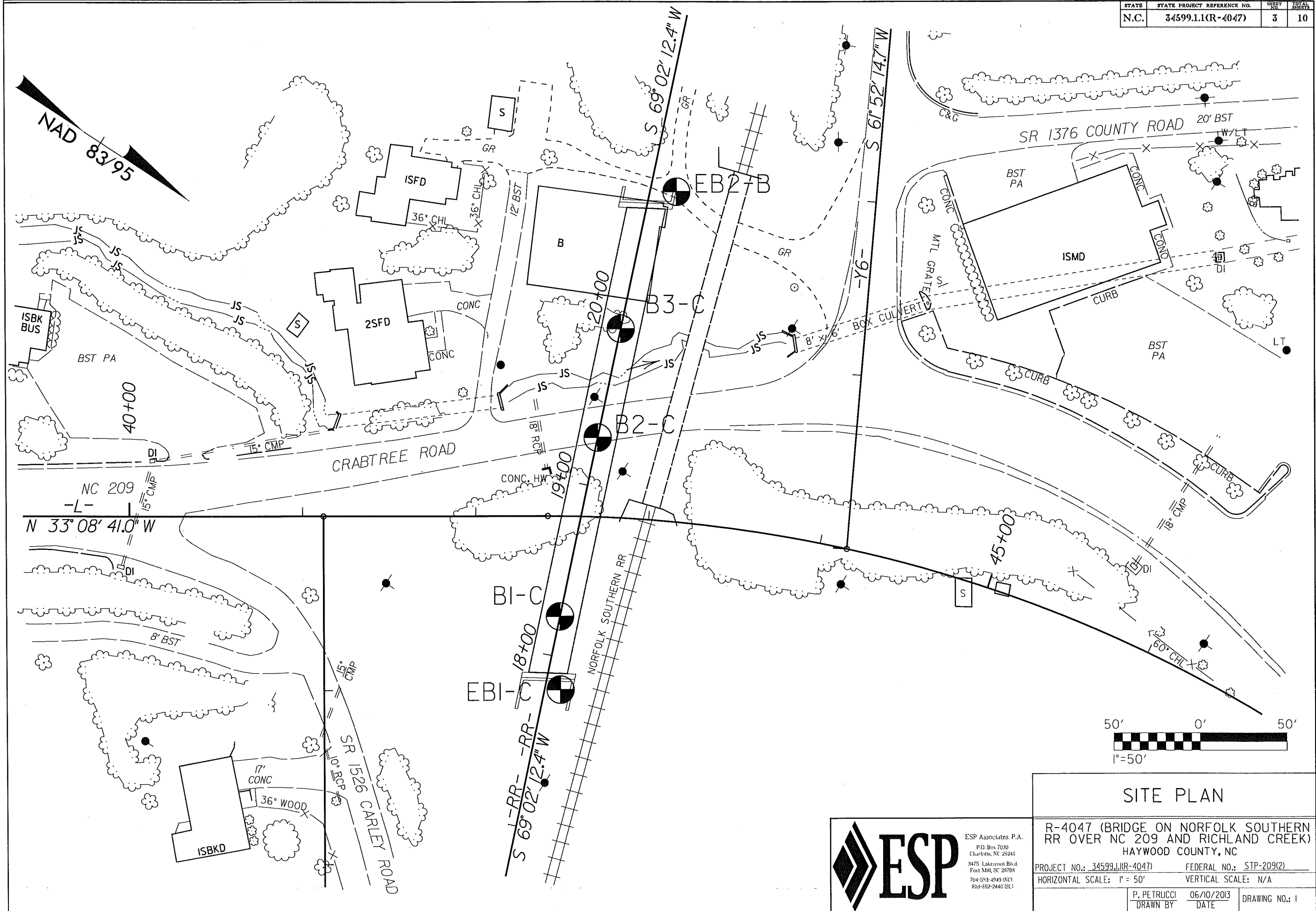
PROJECT REFERENCE NO. 34599.1.(R-4047)	SHEET NO. 2
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>	WELL-GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.  ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:  WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK (CPS)  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - A FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>	<b>MINERALOGICAL COMPOSITION</b>	<b>WEATHERING</b>	
GENERAL CLASS. GRANULAR MATERIALS (< 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF. VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF. COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	DIKE DIP DIP DIRECTION (DIP AZIMUTH) FAULT FISSILE FLOAT FLOOD PLAIN (FP) FORMATION (FM) JOINT LEDGE LENS MOTTLED (MOT.) PERCHED WATER RESIDUAL (RES.) SOIL ROCK QUALITY DESIGNATION (RQD) SAPROLITE (SAP.) SILL SLICKENSIDE STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) STRATA CORE RECOVERY (SCREC) STRATA ROCK QUALITY DESIGNATION (SROD) TOPSOIL (TS)
<b>COMPRESSION</b>	<b>PERCENTAGE OF MATERIAL</b>	<b>GROUND WATER</b>	<b>MISCELLANEOUS SYMBOLS</b>
SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES
<b>TEXTURE OR GRAIN SIZE</b>	<b>GROUND WATER</b>	<b>MISCELLANEOUS SYMBOLS</b>	<b>MISCELLANEOUS SYMBOLS</b>
U.S. STD. SIEVE SIZE OPENING (MM)	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES	TEST BORING WITH SPT TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES	TEST BORING WITH SPT TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>	<b>ABBREVIATIONS</b>	<b>ABBREVIATIONS</b>	<b>ABBREVIATIONS</b>
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FIAO - FILLED IN AFTER DRILLING FRAC - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI - HIGHLY	MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY	VST - VANE SHEAR TEST WEA. - WEATHERED UNIT WEIGHT DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO
<b>PLASTICITY</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>
PLASTICITY INDEX (PI) NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY	DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME-550X	ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 3/8" STEEL TEETH TRICONE TUNG-CARB. CORE BIT	HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST
<b>COLOR</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>	<b>EQUIPMENT USED ON SUBJECT PROJECT</b>
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME-550X	ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 3/8" STEEL TEETH TRICONE TUNG-CARB. CORE BIT	HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST
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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34599.1.1(R-4047)	3	10



**SITE PLAN**

R-4047 (BRIDGE ON NORFOLK SOUTHERN RR OVER NC 209 AND RICHLAND CREEK)  
 HAYWOOD COUNTY, NC

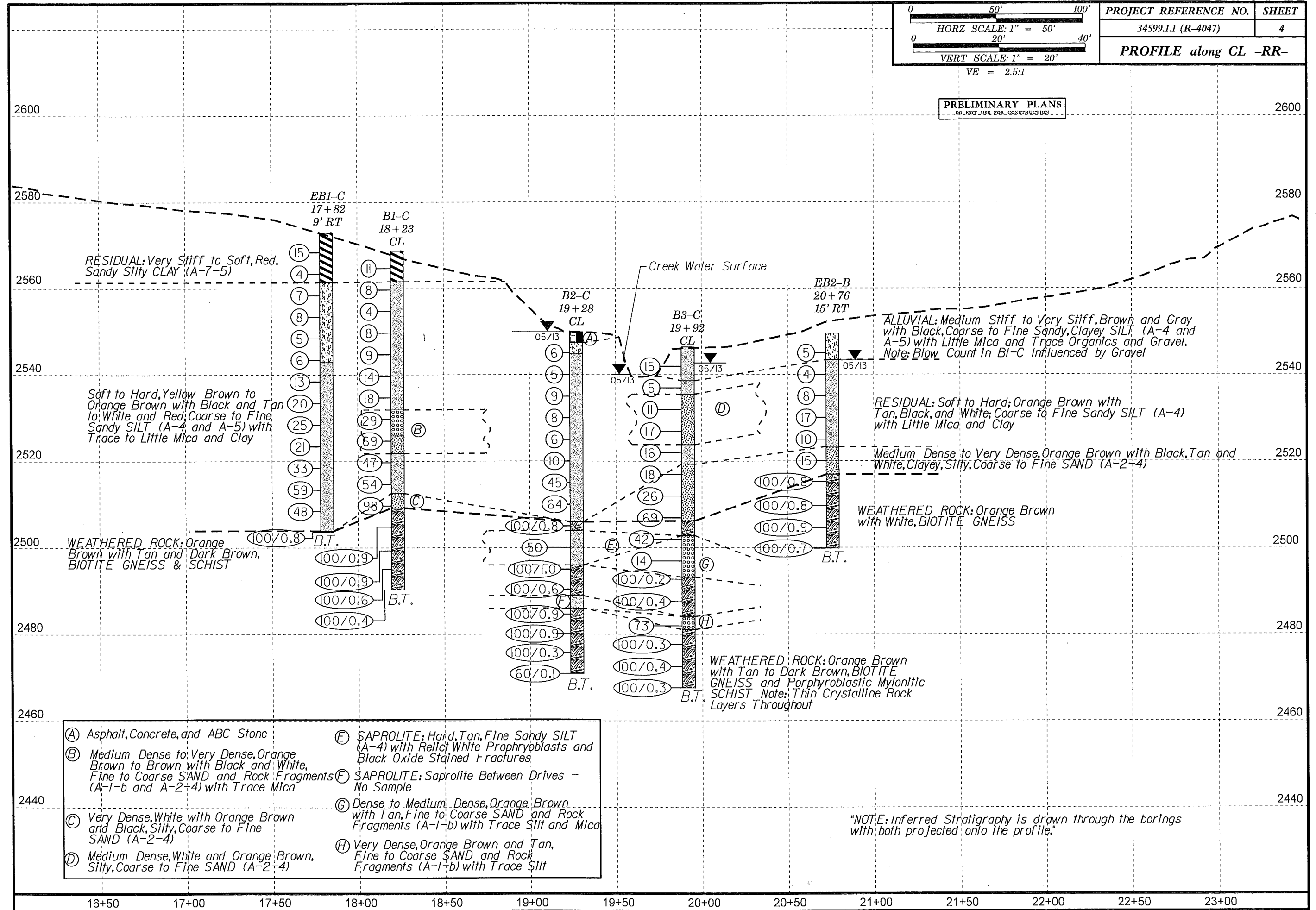
PROJECT NO.: 34599.1.1(R-4047) FEDERAL NO.: STP-209(2)

HORIZONTAL SCALE: 1" = 50' VERTICAL SCALE: N/A

ESP Associates, P.A.  
 P.O. Box 7030  
 Charlotte, NC 28241  
 3475 Lakemont Blvd  
 Fort Mill, SC 29708  
 704-583-4949 (NC)  
 803-502-2440 (SC)

P. PETRUCCI 06/10/2013  
 DRAWN BY DATE DRAWING NO.: 1

PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION



- |  |   |
|--|---|
| (A) Asphalt, Concrete, and ABC Stone   | (E) SAPROLITE: Hard, Tan, Fine Sandy SILT (A-4) with Relict White Porphyroblasts and Black Oxide Stained Fractures        |
| (B) Medium Dense to Very Dense, Orange Brown to Brown with Black and White, Fine to Coarse SAND and Rock Fragments (A-1-b and A-2+4) with Trace Mica | (F) SAPROLITE: Saprolite Between Drives - No Sample   |
| (C) Very Dense, White with Orange Brown and Black, Silty, Coarse to Fine SAND (A-2-4)  | (G) Dense to Medium Dense, Orange Brown with Tan, Fine to Coarse SAND and Rock Fragments (A-1-b) with Trace Silt and Mica |
| (D) Medium Dense, White and Orange Brown, Silty, Coarse to Fine SAND (A-2-4)   | (H) Very Dense, Orange Brown and Tan, Fine to Coarse SAND and Rock Fragments (A-1-b) with Trace Silt                      |

"NOTE: Inferred Stratigraphy is drawn through the borings with both projected onto the profile."

WBS 34599.1.1		TIP R-4047		COUNTY HAYWOOD		GEOLOGIST Hager, M.M.										
SITE DESCRIPTION Bridge on Norfolk Southern Railroad over NC 209 and Richland Creek							GROUND WTR (ft)									
BORING NO. EB1-C		STATION 17+82		OFFSET 9 ft RT		ALIGNMENT -RR-										
0 HR.		N/A														
COLLAR ELEV. 2,572.9 ft		TOTAL DEPTH 69.3 ft		NORTHING 670,117		EASTING 822,194										
24 HR.		24.8														
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Rose, G.K.		START DATE 06/22/09		COMP. DATE 06/22/09		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2575														2,572.9	GROUND SURFACE	0.0
2570	2,569.4	3.5	2	5	10	15							M	RESIDUAL Very Stiff to Soft, Red, Silty CLAY (A-7-5) with Fine Sand		
2565	2,564.4	8.5	2	2	2	4							M			
2560	2,559.4	13.5	1	3	4	7							M	2,561.4	SAPROLITE	11.5
2555	2,554.4	18.5	2	4	4	8							M	Medium Stiff to Stiff, Yellow Brown, Clayey SILT (A-5) with Fine Sand		
2550	2,549.4	23.5	1	1	4	5							M			
2545	2,544.4	28.5	1	2	4	6							W	2,542.9	Stiff to Hard, Yellow Brown, Sandy SILT (A-4)	30.0
2540	2,539.4	33.5	2	5	8	13							M			
2535	2,534.4	38.5	5	8	12	20							M			
2530	2,529.4	43.5	5	11	14	25							M			
2525	2,524.4	48.5	5	9	12	21							M			
2520	2,519.4	53.5	7	13	20	33							M			
2515	2,514.4	58.5	10	22	37	59							M			
2510	2,509.4	63.5	18	21	27	48							M			
2505	2,504.4	68.5	40	60/0.3									M	2,503.9	WEATHERED ROCK	69.0
														2,503.6	BIOTITE GNEISS	69.3
														Boring Terminated at Elevation 2,503.6 ft in Weathered Rock: BIOTITE GNEISS		





WBS 34599.1.1		TIP R-4047		COUNTY HAYWOOD		GEOLOGIST Lockamy, P. Q.											
SITE DESCRIPTION Bridge on Norfolk Southern Railroad over NC 209 and Richland Creek						GROUND WTR (ft)											
BORING NO. B2-C		STATION 19+28		OFFSET CL		ALIGNMENT -RR-											
COLLAR ELEV. 2,549.9 ft		TOTAL DEPTH 79.0 ft		NORTHING 670,056		EASTING 822,061											
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic													
DRILLER Cheek, D. O.		START DATE 06/25/12		COMP. DATE 06/25/12		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2550														2,549.9	0.0	GROUND SURFACE	
																Asphalt, Concrete, and ABC Stone	
2545	2,546.0	3.9	2	3	3								M	2,547.4	2.5	RESIDUAL	
														2,544.9	5.0	Tan to Orange, Clayey SILT (A-5) with Fine Sand	
2540	2,541.0	8.9	2	1	4								W			SAPROLITE	
																Medium Stiff to Hard, Tan, Fine Sandy SILT (A-4) with Numerous 1/8 to 1/4 inch White Porphyroblasts and Occasional Layers of White Silty Sand	
2535	2,536.0	13.9	2	4	5								W				
2530	2,531.0	18.9	2	4	4								W				
2525	2,526.0	23.9	1	2	4								M				
2520	2,521.0	28.9	5	5	5								M				
2515	2,516.0	33.9	8	20	25								M				
2510	2,511.0	38.9	12	26	38								M				
2505	2,506.0	43.9	34	66/0.3										2,506.0	43.9	WEATHERED ROCK	
														2,503.9	46.0	SCHIST	
2500	2,501.0	48.9	14	16	34								D			SAPROLITE	
																Hard, Tan, Fine Sandy SILT (A-4) with Relict White Porphyroblasts and Black Oxide Stained Fractures	
2495	2,496.0	53.9	26	74										2,496.0	53.9	WEATHERED ROCK	
																SCHIST	
2490	2,491.0	58.9	30	70/1										2,488.9	61.0	SAPROLITE	
																Saprolite Between Drives - No Sample	
2485	2,486.0	63.9	12	40	60/0.4									2,486.0	63.9	WEATHERED ROCK	
																Porphyroblastic Mylonitic SCHIST with Occasional Discordant One Inch to 12 Inch Leucocratic Veins	
2480	2,481.0	68.9	40	60/0.4													
2475	2,476.0	73.9	100/0.3														
	2,471.0	78.9	60/0.1											2,471.0	78.9	CRYSTALLINE ROCK	
														2,470.9	79.0		

WBS 34599.1.1		TIP R-4047		COUNTY HAYWOOD		GEOLOGIST Lockamy, P. Q.												
SITE DESCRIPTION Bridge on Norfolk Southern Railroad over NC 209 and Richland Creek						GROUND WTR (ft)												
BORING NO. B2-C		STATION 19+28		OFFSET CL		ALIGNMENT -RR-												
COLLAR ELEV. 2,549.9 ft		TOTAL DEPTH 79.0 ft		NORTHING 670,056		EASTING 822,061												
DRILL RIG/HAMMER EFF./DATE AFO0070 CME-550X 81% 09/03/2009		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic														
DRILLER Cheek, D. O.		START DATE 06/25/12		COMP. DATE 06/25/12		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100								
2470																Match Line		
																	BIOTITE GNEISS	
																	Boring Terminated at Elevation 2,470.9 ft on Crystalline Rock: BIOTITE GNEISS	

NCDOT BORE DOUBLE R4047\_GEO\_BRDGRR\_GINTLOGS.GPJ NC\_DOT\_GDT 7/22/13



WBS 34599.1.1		TIP R-4047		COUNTY HAYWOOD		GEOLOGIST Weaver, P.M.								
SITE DESCRIPTION Bridge on Norfolk Southern Railroad over NC 209 and Richland Creek							GROUND WTR (ft)							
BORING NO. EB2-B		STATION 20+76		OFFSET 15 ft RT		ALIGNMENT -RR-								
0 HR. 10.0		24 HR. 6.2												
COLLAR ELEV. 2,549.5 ft		TOTAL DEPTH 49.7 ft		NORTHING 670,017		EASTING 821,917								
DRILL RIG/HAMMER EFF./DATE AME9553 CME-550X 83% 05/04/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER Cutter, R.		START DATE 05/28/13		COMP. DATE 05/28/13		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
2550														2,549.5 GROUND SURFACE 0.0
2545	2,546.0	3.5	2	2	3								W	ALLUVIAL Medium Stiff, Brown and Gray, Coarse to Fine Sandy, Clayey SILT (A-5) with Little Mica - Low Plasticity
2540	2,541.0	8.5	1	2	2								W	RESIDUAL Soft to Very Stiff; Orange Brown with Tan, Black, and White; Coarse to Fine Sandy SILT (A-4) with Little Mica and Clay
2535	2,536.0	13.5	2	3	5								M	
2530	2,531.0	18.5	4	6	11								M	
2525	2,526.0	23.5	2	3	7								M	
2520	2,521.0	28.5	3	6	9								M	2,523.3 Medium Dense, Orange Brown with Black and White, Clayey, Silty, Coarse to Fine SAND (A-2-4) 28.2
2515	2,516.0	33.5	30	70/0.3										2,516.9 WEATHERED ROCK 32.6 Orange Brown with White, BIOTITE GNEISS
2510	2,511.0	38.5	31	63	37/0.3									
2505	2,506.0	43.5	25	49	51/0.4									
2500	2,501.0	48.5	19	45	65/0.2									2,499.8 Boring Terminated at Elevation 2,499.8 ft in Weathered Rock: BIOTITE GNEISS 49.7

**SITE PHOTOGRAPHS**  
State Project No. 34599.1.1 – TIP No. R-4047 – Bridge on Norfolk Southern Railroad over NC 209 and Richland Creek – Haywood County, NC



View of Existing Bridge Looking South



View Along CL Looking Upstation from End Bent-1



View Along CL Looking Upstation from NC 209



View Looking Downstation From End Bent-2

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-4047 34599.1.1	1	8

**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

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4	PROFILE
5	CROSS SECTIONS
6-7	BORE LOGS
8	SOIL TEST RESULTS

PROJ. REFERENCE NO. R-4047 F.A. PROJ. STP-209(2)  
COUNTY HAYWOOD  
PROJECT DESCRIPTION NC 209 FROM US 23 BUS. TO NORTH OF  
SR 1523 (OLD CLYDE RD.)

SITE DESCRIPTION WALL 1 LT. OF -Y2L- STA. 17+60 TO 21+10

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UNPLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED BY THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

**PROJECT: 34599.1.1 ID: R-4047**

PERSONNEL

M.M. HAGER

R.D. CHILDERS

G.K. ROSE

INVESTIGATED BY P.Q. LOCKAMY

CHECKED BY W.D. FRYE

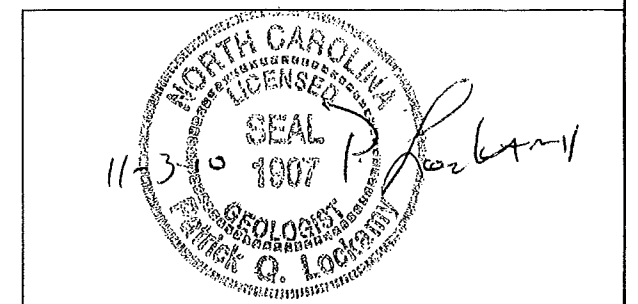
SUBMITTED BY W.D. FRYE

DATE 11.03.10

DRAWN BY: J.T. WILLIAMS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.



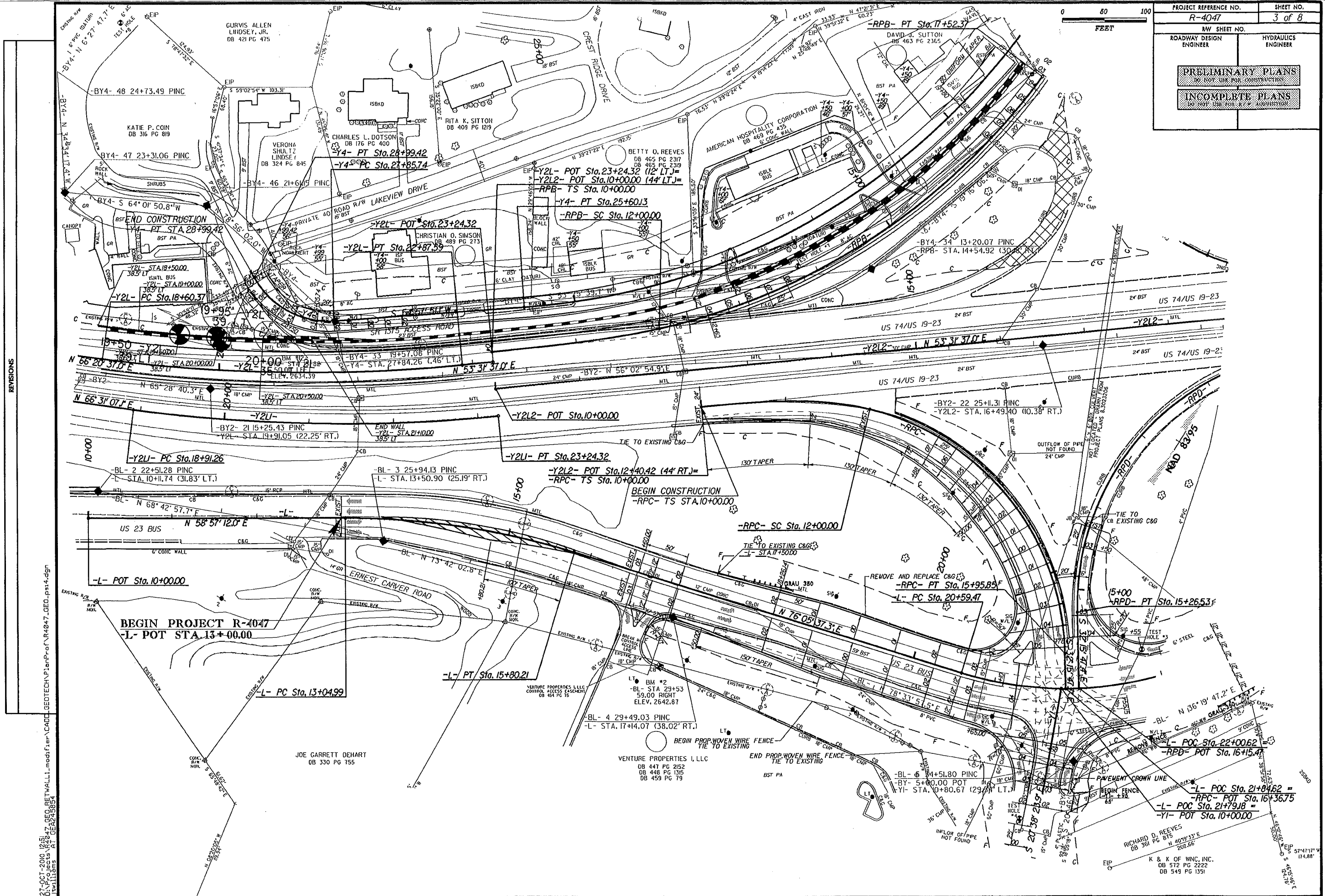
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS							
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6				WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 60 BLOWS PER FOOT IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)				ALLOVIUM (ALLOV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOOED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 60 BLOWS PER FOOT. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.							
SOIL LEGEND AND AASHTO CLASSIFICATION				MINERALOGICAL COMPOSITION				WEATHERING											
GENERAL CLASS. GRANULAR MATERIALS (<= 36% PASSING #200) SILT-CLAY MATERIALS (> 36% PASSING #200) ORGANIC MATERIALS GROUP CLASS. A-1, A-1-b, A-3, A-2, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5, A-7-6, A-7-7, A-3, A-4, A-5, A-6, A-7 SYMBOL % PASSING #10, #40, #200 LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX USUAL TYPES OF MAJOR MATERIALS GEN. RATING AS A SUBGRADE				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, OTHER MATERIAL TRACE OF ORGANIC MATTER, LITTLE ORGANIC MATTER, MODERATELY ORGANIC, HIGHLY ORGANIC GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP				FRESH VERY SLIGHT (V SL.) SLIGHT (SL.) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF. ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF. ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.											
CONSISTENCY OR DENSENESS				MISCELLANEOUS SYMBOLS				ROCK HARDNESS											
PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) GENERALLY GRANULAR MATERIAL (NON-COHESIVE) GENERALLY SILT-CLAY MATERIAL (COHESIVE)				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD				SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL				VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.							
TEXTURE OR GRAIN SIZE				ABBREVIATIONS				EQUIPMENT USED ON SUBJECT PROJECT				FRACTURE SPACING				BEDDING			
U.S. STD. SIEVE SIZE OPENING (MM), BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CS, SD.), FINE SAND (F, SD.), SILT (SL.), CLAY (CL.) GRAIN SIZE (MM, IN.)				AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST V - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PHT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL W - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED Y - UNIT WEIGHT Yd - DRY UNIT WEIGHT				DRILL UNITS: MOBILE B-51, BK-51, CME-4BC, CME-550, PORTABLE HOIST ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING W/ ADVANCER, TRICONE STEEL TEETH, TRICONE TUNG-CARB., CORE BIT HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST				TERM, SPACING, THICKNESS VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, 0.008 - 0.03 FEET, < 0.008 FEET				BENCH MARK: BMI2 -Y4- STA. 28+27.00 (28 LT) ELEVATION: 2634.39 FT.			
SOIL MOISTURE - CORRELATION OF TERMS				EQUIPMENT USED ON SUBJECT PROJECT				INDURATION											
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION LIQUID LIMIT, PLASTIC LIMIT, OPTIMUM MOISTURE SHRINKAGE LIMIT SATURATED - (SAT.), WET - (W), MOIST - (M), DRY - (D)				DRILL UNITS, ADVANCING TOOLS, HAMMER TYPE, CORE SIZE, HAND TOOLS				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.											
PLASTICITY				EQUIPMENT USED ON SUBJECT PROJECT															
NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY PLASTICITY INDEX (PI), DRY STRENGTH				DRILL UNITS, ADVANCING TOOLS, HAMMER TYPE, CORE SIZE, HAND TOOLS															
COLOR				EQUIPMENT USED ON SUBJECT PROJECT															
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				DRILL UNITS, ADVANCING TOOLS, HAMMER TYPE, CORE SIZE, HAND TOOLS															

PROJECT REFERENCE NO.		SHEET NO.	
R-4047		3 of 8	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
DAVID J. SUTTON DB 463 PG 2365		RICHARD D. REEVES DB 361 PG 876	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION			
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R.F.P. ACQUISITION			



REVISIONS

27-OCT-2010 12:51  
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 Williams

**BEGIN PROJECT R-4047**  
**-L- POT STA. 13+00.00**

**BEGIN CONSTRUCTION**  
**-RPC- TS STA. 10+00.00**

**-L- POT STA. 21+00.00**  
**-RPC- POT STA. 16+36.75**  
**-YI- POT STA. 10+00.00**

**-L- POT STA. 21+84.62**  
**-RPC- POT STA. 16+36.75**  
**-YI- POT STA. 10+00.00**



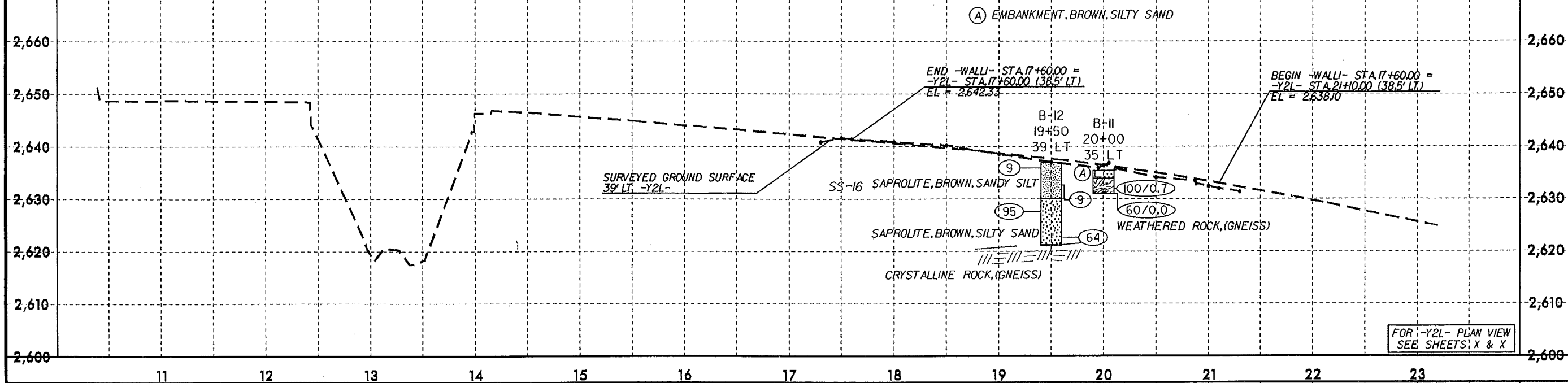
5/28/99

BM #12 EL = 2634.39  
CHISELED \*X\* ON CONC. PAD  
-BY4- STA.19+82 (50.00' LT.)  
-Y2L- STA.20+85.00 (40.14' LT.)

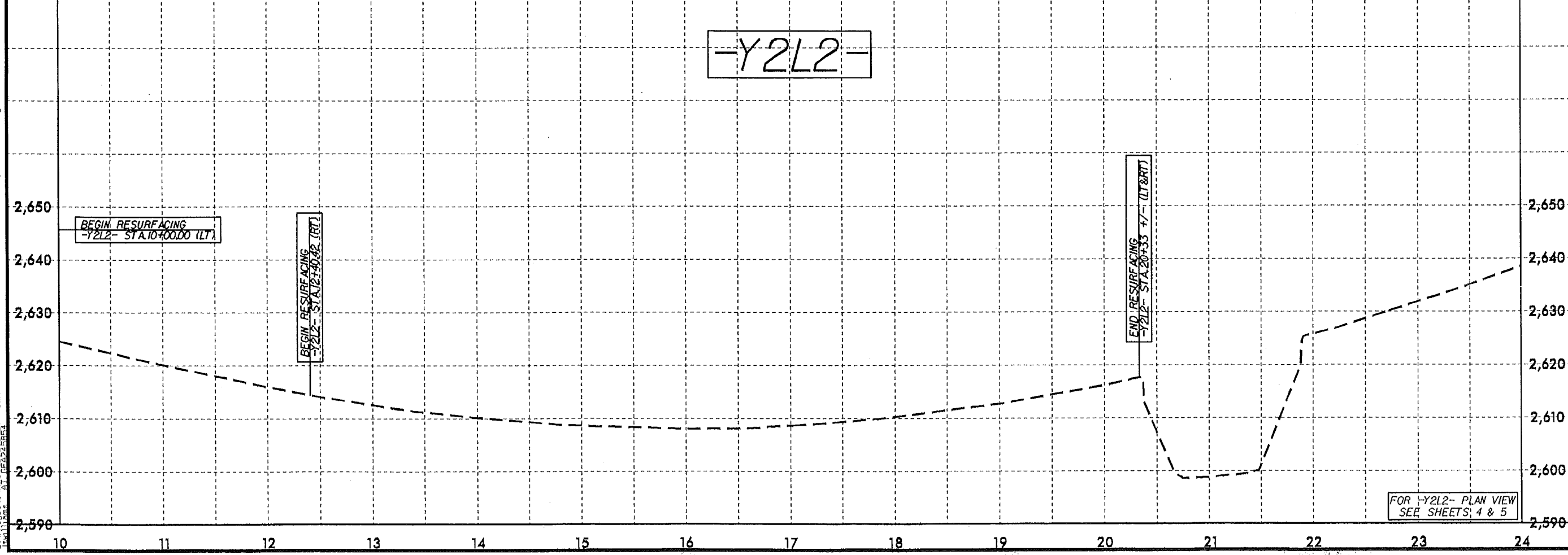
PROJECT REFERENCE NO. R-4047	SHEET NO. 4 of 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

**SOIL TEST RESULTS**

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	100		
SS-16	39 LT	19+50	3.8-4.8	A-4 (U)	36	NP	31	35	16	18	99	80	43		



28-OCT-2010 08:53 C:\GEO\BETWALL1.mxd for \CADD\GEO\TECH\plan\pof\4047\_GEO.pfl -otwall1.dgn





PROJECT NO. 34599.1.1	ID. R4047	COUNTY HAYWOOD	GEOLOGIST Hager, M. M.
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)			GROUND WTR (ft)
BORING NO. B-12	STATION 19+50	OFFSET 39 ft LT	ALIGNMENT -Y2L-
COLLAR ELEV. 2,637.9 ft	TOTAL DEPTH 15.8 ft	NORTHING 668,127	EASTING 821,622
DRILL RIG/HAMMER EFF/DATE CME-550X		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Rose, G. K.	START DATE 06/25/09	COMP. DATE 06/25/09	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
2640																	
	2,637.9	0.0													2,637.9	0.0	
			2	4	5	•	••	•••	••••								
2635	2,634.6	3.3															
			2	4	5	•	••	•••	••••								
2630	2,629.6	8.3													2,631.1	6.8	
			7	29	66	•••••	••••••	•••••••	••••••••								
2625	2,624.6	13.3															
			12	22	42	•••••	•••••	•••••	•••••								
2620															2,622.3	15.6	
															2,622.1	15.8	
2615																	
2610																	
2605																	
2600																	
2595																	
2590																	
2585																	
2580																	
2575																	
2570																	
2565																	
2560																	

NCDOT BORE SINGLE R4047\_GEO\_RET WALL1.GPJ, NC\_DOT\_GDT\_10/26/10

CRYSTALLINE ROCK (GNEISS)  
 Boring Terminated with Standard Penetration Test Refusal at Elevation 2,622.1 ft ON CRYSTALLINE ROCK



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

SHEET 7 OF 8

PROJECT NO. 34599.1.1		ID. R4047		COUNTY HAYWOOD		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)							GROUND WTR (ft)									
BORING NO. B-13		STATION 19+95		OFFSET 39 ft LT		ALIGNMENT -Y2L-										
COLLAR ELEV. 2,637.7 ft		TOTAL DEPTH 7.0 ft		NORTHING 668,147		EASTING 821,661										
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 06/25/09		COMP. DATE 06/25/09		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2640	2,637.7	0.0													GROUND SURFACE	0.0
2635	2,634.7	3.0	4	8	10									D	EMBANKMENT, GRAVEL AND SAND SAPROLITE BROWN, SILTY SAND	1.3
2630	2,630.7	7.0	28	27	26										WEATHERED ROCK (GNEISS) CRYSTALLINE ROCK (GNEISS)	6.0 7.0
2625															Boring Terminated with Standard Penetration Test Refusal at Elevation 2,630.7 ft ON CRYSTALLINE ROCK	
2620																
2615																
2610																
2605																
2600																
2595																
2590																
2585																
2580																
2575																
2570																
2565																
2560																

NCDOT BORE SINGLE R4047\_GEO\_RDWY.GPJ NC\_DOT\_GDT 10/27/10



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

SHEET 8 OF 8

PROJECT NO. 34599.1.1		ID. R4047		COUNTY HAYWOOD		GEOLOGIST Hager, M. M.										
SITE DESCRIPTION NC 209 FROM US BUS. TO NORTH OF SR 1523 (OLD CLYDE RD.)							GROUND WTR (ft)									
BORING NO. B-11		STATION 20+00		OFFSET 35 ft LT		ALIGNMENT -Y2L-										
COLLAR ELEV. 2,637.4 ft		TOTAL DEPTH 4.4 ft		NORTHING 668,146		EASTING 821,667										
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Rose, G. K.		START DATE 06/25/09		COMP. DATE 06/25/09		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2640															GROUND SURFACE	0.0
2635	2,634.0	3.4												D	EMBANKMENT, BROWN, SILTY SAND WEATHERED ROCK (GNEISS)	1.5 4.4
2630	2,633.0	4.4	28	72/0.2											CRYSTALLINE ROCK (GNEISS)	4.4
2625															Boring Terminated with Standard Penetration Test Refusal at Elevation 2,633.0 ft ON CRYSTALLINE ROCK	
2620																
2615																
2610																
2605																
2600																
2595																
2590																
2585																
2580																
2575																
2570																
2565																
2560																

NCDOT BORE SINGLE R4047\_GEO\_RETWALL1.GPJ NC\_DOT\_GDT 10/26/10