CUY-90-14.90

PID 82119

APPENDIX GE-10

Soil Profile from CCG1
(Reference Document)

State of Ohio Department of Transportation
Jerry Wray, Director

Innerbelt Bridge
Construction Contract Group 2 (CCG2)

Revision Date: March 27, 2013

INDEX OF SHEETS

LOCATION FROM STA.	TO STA.	PLAN VIEW & PROFILE SHEET NUMBERS
W.B. I-90 MAINLINE		
97+02.06	198+50	47, 49, 51-53, 56-61, 64-66, 69-70, 73, 73A
TEMPORARY W.B. I-90 MAINLINE		
501+50.00	515+50.00	64, 69, 71
TEMPORARY RAMP A3		
2999+00	3009+20.95	69, 73, 74
RAMP A4		
600+26.44	609+41.34	64, 69, 72
RAMP A5		
697+89.30	720+42.80	59, 62-64, 67
RAMP A6		
800+00	814+00	51, 54, 56
RAMP A7		
1000+00	1013+96	47-50
W. 14TH ST. EXT.		
100+00	108+80.78	51, 55
ONTARIO ST.		
690+69.56	697+89.30	64, 68
COMMERCIAL RD.		
10+00	20+07.23	64, 75, 77
E. 9TH ST.		
11+54.79	26+00	59, 75-76, 78
BROADWAY AVE.		
10+00	24+73.88	78-79
E. 14TH ST.		
10+01.13	14+75.51	78, 80

STATION	CROSS SECTION SHEET NUMBERS
W.B. I-90 MAINLINE	
111+00	81
114+00	82
115+00	83
118+50	84-85
126+50	86-87
128+00	88-89
131+00	90-91
134+00	92-93
137+00	94-95
139+50	96-97
158+50	98-99
161+00	100-101
167+00	102
171+50	103
WEST ABUTMENT	
A-A′	104-105
B-B′	106-107
C-C′	108-109
D-D′	110-111
E-E′	112-113
TEMPORARY RAMP A3	
3000+10	114
3003+50	115
RAMP A6	
806+50	116

LEGEND

DESCRIPTION	ODOT CLASS
GRAVEL AND/OR STONE FRAGMENTS	*A-1-a*
GRAVEL AND/OR STONE FRAGMENTS W/ SAND	*A-1-b*
GRAVEL AND/OR STONE FRAGMENTS W/ SAND & SILT	*A-2-4*
GRAVEL AND/OR STONE FRAGMENTS W/ SAND, SILT, & CLAY	*A-2-6*
FINE SAND	*A-3*
COURSE & FINE SAND	*A-3a*
SANDY SILT	*A-4a*
SILT	*A-4b*
SILT AND CLAY	*A-6a*
SILTY CLAY	*A-6b*
ELASTIC CLAY	*A-7-5*
CLAY	*A-7-6*
ORGANIC SILT	*A-8a*
ORGANIC CLAY	*A-8b*
ORGANIC	*VISUAL*
WOODY PEAT	*VISUAL*
BOULDERY ZONE	*VISUAL*
SHALE	*VISUAL*
WEATHERED SHALE	*VISUAL*
UNCONTROLLED FILL	*VISUAL*
CONCRETE	*VISUAL*
PAVEMENT OR BASE = X = APPROXIMATE THICKNESS (ASPHALT, CONCRETE, BRICK, SANDSTONE OR GRANITE PAVERS, BERM)	*VISUAL*
SOD AND TOPSOIL = X = APPROXIMATE THICKNESS	*VISUAL*

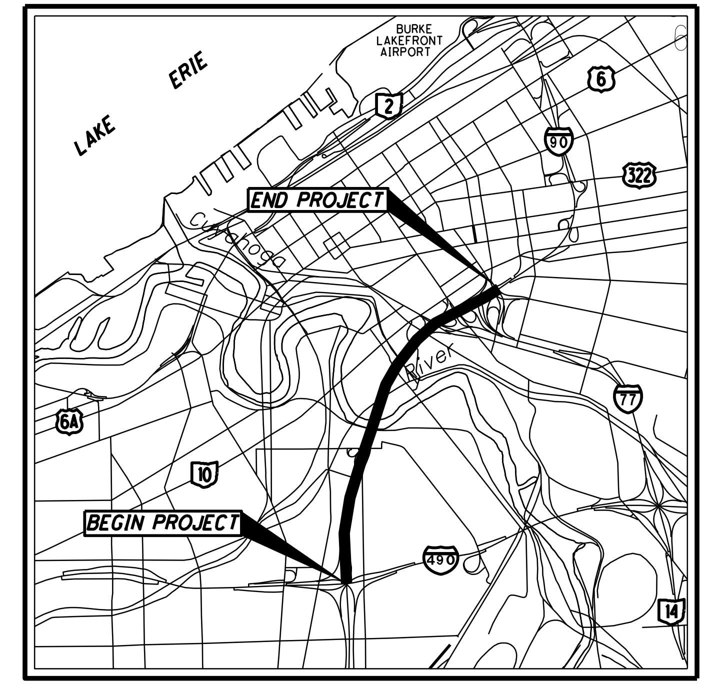
BORING LOCATION - PLAN VIEW

INSTRUMENTED BORING LOCATION - PLAN VIEW

HISTORIC BORING LOCATION (PRE-2006) - PLAN VIEW

DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY.

N_{60}	INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.
X/Y/Z	INDICATES NUMBER OF BLOWS FOR "STANDARD PENETRATION TEST" X = NUMBER OF BLOWS FOR FIRST 6 INCHES Y = NUMBER OF BLOWS FOR SECOND 6 INCHES Z = NUMBER OF BLOWS FOR THIRD 6 INCHES
N	INDICATES NUMBER OF BLOWS FOR 12 INCHES.
$N^{\diamond}$	INDICATES NUMBER OF BLOWS FOR 12 INCHES IN 6-INCH INCREMENTS.
WC	INDICATES WATER CONTENT IN PERCENT.
▼	INDICATES STATIC WATER ELEVATION.
W	INDICATES FREE WATER ELEVATION.
●	INDICATES A PLASTIC MATERIAL WITH A MOISTURE CONTENT EQUAL TO OR GREATER THAN THE LIQUID LIMIT MINUS 3.
⊖	INDICATES A NON-PLASTIC MATERIAL WITH A MOISTURE CONTENT GREATER THAN 25 % OR GREATER THAN 19 % WITH A WET APPEARANCE.
R	REFUSAL OF SPLIT-BARREL SAMPLER IN HARD OR VERY-DENSE SOIL.
P	INDICATES A SHELBY TUBE OR PRESS SAMPLE.
ST	INDICATES A SHELBY TUBE.
TR	INDICATES TOP OF BEDROCK.



LOCATION MAP

SCALE IN MILES

0 0.5 1 1.5 2

N

NOTE: PROJECT RFP BORING LOGS AND/OR PROFILES (BASED ON INFORMATION AVAILABLE AT THE TIME OF SUBMITTAL) ARE SUBMITTED IN A BINDER UNDER SEPARATE COVER. SHANNON & WILSON (S&W) BORING LOGS ARE SUBMITTED AS APPENDIX B OF THE PROJECT GEOTECHNICAL REPORT. COPIES OF THE PROJECT GEOTECHNICAL REPORT ARE LOCATED IN THE ODOT DISTRICT OFFICE, THE ODOT OFFICE OF GEOTECHNICAL ENGINEERING, AND THE ODOT OFFICE OF STRUCTURAL ENGINEERING.

PROJECT DESCRIPTION

AS PART OF THE CUY-90-14.90 (FORMERLY CUY-90-14.52) PROJECT, IT IS PLANNED TO RECONFIGURE APPROXIMATELY 1.6 MILES OF WESTBOUND I-90 (STA. 97+02.06 TO APPROXIMATE STA. 177+65) IN CLEVELAND, CUYAHOGA COUNTY, OHIO. ASSOCIATED WORK INVOLVED IN THIS PROJECT IS THE CONSTRUCTION OF A NEW FIVE-LANE BRIDGE STRUCTURE OVER THE CUYAHOGA RIVER VALLEY. ENTRANCE AND EXIT RAMPS AT EAST 14TH STREET, EAST 9TH STREET, ONTARIO STREET AND ABBEY AVENUE WILL BE RECONFIGURED AND CONSTRUCTED. RECONFIGURATION OF THE WEST 14TH STREET EXTENSION, COMMERCIAL ROAD, BROADWAY AVENUE, AND EAST 9TH STREET IS ALSO INCLUDED IN THIS PROJECT.

- CONTINUED ON SHEET 2 -

PARTICLE SIZE DEFINITIONS

BOULDERS	COBBLES	GRAVEL	COARSE SAND	FINE SAND	SILT	CLAY
12"	3"	2.0 mm	0.42 mm	0.074 mm	0.005 mm	
		No. 10 SIEVE	No. 40 SIEVE	No. 200 SIEVE		

RECON. - VARIOUS (BBCM, B&P, S&W) 2006, 2009, 2010, 2011

DRILLING - BBCM 2006, 2009; B&P 2009, 2010; S&W 2010, 2011

DRAWN - TJM/MRM

REVIEWED - BKS/JLS

REVISIONS TO ADD S&W 2010, 2011 INFORMATION

DRAWN - CNT

REVIEWED - MDH

"This document was originally issued by BBCM Engineering Inc. on 5/28/10. This document is not considered a sealed document."

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

BBCM

PID NO. 77332

SOIL PROFILE

CUY-90-14.90

AVAILABLE INFORMATION

NUMEROUS HISTORICAL RECORDS WERE SEARCHED TO GATHER HISTORICAL BORING INFORMATION IN THE GENERAL VICINITY OF THIS PROJECT. SEVERAL SUBSURFACE INVESTIGATIONS HAVE BEEN PERFORMED IN THE GENERAL PROJECT VICINITY AS EARLY AS 1923. AVAILABLE INFORMATION WITHIN THE PROJECT LIMITS OBTAINED FROM THE HISTORICAL RECORDS SEARCH IS LISTED AS FOLLOWS:

- SOIL PROFILES WERE AVAILABLE FOR THE 1923 INVESTIGATION PERFORMED BY THE CLEVELAND UNION TERMINAL COMPANY FOR THE CUYAHOGA VIADUCT BRIDGE, WHICH IS NOW OWNED AND OPERATED BY THE GREATER CLEVELAND REGIONAL TRANSIT AUTHORITY.
- MULTIPLE SUBSURFACE INVESTIGATIONS WERE CONDUCTED BY ODOT IN 1958, 1963, 1964, 1990 AND 1992. THE PRE-1990 ODOT INVESTIGATIONS WERE GENERALLY PERFORMED FOR THE PLANNED INNERBELT FREEWAY AND BRIDGE. THE 1990 AND 1992 ODOT BORINGS WERE PERFORMED TO INVESTIGATE THE OBSERVED SLOPE MOVEMENTS IN THE VICINITY OF THE WEST END PIER AND PIER 1 OF THE EXISTING INNERBELT BRIDGE.
- HOWARD, NEEDLES, TAMMEN & BERGENDOFF CONSULTING ENGINEERS (HNTB) PERFORMED INVESTIGATIONS BETWEEN 1954 AND 1956 PRIMARILY AT THE PROPOSED ABUTMENT AND PIER LOCATIONS FOR THE EXISTING INNERBELT BRIDGE.
- SOIL PROFILES WERE AVAILABLE FOR THE 1955 INVESTIGATION BY NEW YORK, CHICAGO AND ST. LOUIS RAILROAD COMPANY (NYC & ST. L.R.R.) FOR THE VERTICAL LIFT BRIDGE CARRYING A RAILROAD LINE (NOW OWNED BY NORFOLK SOUTHERN CORPORATION) OVER THE CUYAHOGA RIVER LOCATED IMMEDIATELY TO THE NORTH OF THE EXISTING INNERBELT BRIDGE.
- IN 1986, BORINGS WERE PERFORMED BY THE DAVID V. LEWIN CORPORATION (LEWIN) AT THE SITE OF A PROPOSED DOMED STADIUM. THE SITE IS NOW OCCUPIED BY PROGRESSIVE FIELD.
- IN 1986 AND 1987, R&R INTERNATIONAL, INC. (R&R) PERFORMED BORINGS FOR THE EXISTING ABBEY AVENUE VIADUCT OVER THE EXISTING NORFOLK SOUTHERN RAILROAD AND SCRANTON ROAD.
- IN 2000 AND 2001, DLZ CORPORATION (DLZ) PERFORMED THREE (3) BORINGS ADJACENT TO THE EXISTING INNERBELT BRIDGE AS A PART OF A STABILITY EVALUATION FOR THE CUY-90-15.24 PROJECT.
- BBC&M ENGINEERING, INC. (BBCM) PERFORMED SUBSURFACE INVESTIGATIONS BETWEEN 1994 AND 2006 GENERALLY TO INVESTIGATE VARIOUS ASPECTS OF THE CUY-90-15.24 AND CUY-90-14.52 PROJECTS. THE SUBSURFACE INVESTIGATIONS ALSO INCLUDED INSTALLATION OF INSTRUMENTATION SUCH AS INCLINOMETERS AND PIEZOMETERS. THE PURPOSE OF THE BBCM INVESTIGATIONS IN THE 1990'S WAS TO MONITOR THE SLOPE MOVEMENTS AT THE WEST END PIER AND PIER 1 OF THE EXISTING INNERBELT BRIDGE AND AID THE DESIGN OF A STABILIZATION STRUCTURE ADJACENT TO PIER 1. THE CONSTRUCTION OF THIS STABILIZATION STRUCTURE WAS COMPLETED IN 1999. AN ADDITIONAL SUBSURFACE INVESTIGATION AT THE WEST BANK OF THE CUYAHOGA RIVER WAS PERFORMED BY BBCM IN 2006 TO EVALUATE THE LIMITS OF INSTABILITY IN THE WEST BANK SLOPE AND EVALUATE VARIOUS ALTERNATIVES FOR STABILIZING THE SLOPE IN SUPPORT OF THE FOUNDATIONS IN THIS AREA FOR THE PROPOSED NEW BRIDGE (WESTBOUND I-90 BRIDGE) TO BE LOCATED JUST NORTH OF THE EXISTING INNERBELT BRIDGE. OHIO UNIVERSITY PERFORMED SEVERAL CPT TESTS IN CONJUCTION WITH BBCM'S 2006 INVESTIGATION.
- BBCM PERFORMED A PRELIMINARY SUBSURFACE INVESTIGATION IN 2006 FOR THE PROPOSED WESTBOUND I-90 BRIDGE ALIGNMENT. IN ADDITION TO THE BORINGS PERFORMED FOR THE PROPOSED WESTBOUND I-90 BRIDGE, BORINGS WERE PERFORMED FOR THE FOLLOWING: EXISTING ROADWAYS TO BE REHABILITATED OR RECONFIGURED; NEW ROADWAYS; NEW, REHABILITATED AND/OR RECONFIGURED INTERCHANGE RAMPS; THE I-90 MAINLINE; AND, ASSOCIATED NEW AND REHABILITATED STRUCTURES (I.E. BRIDGES AND RETAINING WALLS).

ALL AVAILABLE SOIL INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE SOIL PROFILE SHEETS HAS BEEN SO REPORTED. THE LOGS OF PRE-DESIGN PHASE BORINGS, SOIL PROFILES (WHERE BORINGS WERE NOT AVAILABLE), AND CPT LOGS HAVE BEEN SUBMITTED SEPERATELY FROM THESE SOIL PROFILE SHEETS IN A BINDER PER ODOT'S REQUEST. THIS BINDER ALSO CONTAINS MANY BORINGS THAT ARE SHOWN ON THE PLAN SHEETS BUT HAVE BEEN EXCLUDED FROM THE PROFILES AND CROSS-SECTIONS EITHER FOR CLARITY OF PRESENTATION OR DUE TO THEIR RELATIVELY LARGE DISTANCE FROM PROJECT CENTERLINES AND BASELINES. ADDITIONAL NOTES REGARDING THE LOCATION OF SUBSURFACE DATA ARE PROVIDED ON THE INDIVIDUAL PLAN AND PROFILE SHEETS.

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.

SUBSURFACE EXPLORATION

TO SUPPLEMENT THE SUBSURFACE INVESTIGATIONS PERFORMED BY BBCM BETWEEN 1994 AND 2006 BASED ON THE MOST RECENT PLANS FOR THE CUY-90-14.90 PROJECT, BARR & PREVOST (B&P) PERFORMED 80 BORINGS BETWEEN MAY AND OCTOBER OF 2009 AND BBCM PERFORMED SEVEN (7) BORINGS BETWEEN JUNE AND SEPTEMBER OF 2009. ADDITIONALLY, ODOT PERFORMED TWO (2) CPT TESTS ON AUGUST 18, 2009. AN ADDITIONAL SIX (6) BORINGS WERE PERFORMED BY B&P BETWEEN APRIL AND MAY OF 2010, AT LOCATIONS REQUESTED BY THE DESIGN BUILD TEAM FINALISTS. BETWEEN NOVEMBER 2010 AND JANUARY 2011 SHANNON & WILSON PERFORMED AN ADDITIONAL SEVENTEEN (17) BORINGS AND FOURTEEN (14) CPTS. WALSH CONSTRUCTION ALSO COMPLETED TWO (2) BORINGS, B-047-5-11 AND B-047-6-11, IN NOVEMBER 2011.

THE BORINGS WERE DRILLED WITH EITHER AN ATV-MOUNTED (ALL-TERRAIN VEHICLE) OR A TRUCK-MOUNTED DRILLING RIG. SHANNON & WILSON DESIGN PHASE BORINGS WERE COMPLETED USING TWO DRILL RIGS; A MOBILE B-57 AND A SIMCO 2800 HSHT. DISTURBED, BUT REPRESENTATIVE, SOIL SAMPLES WERE OBTAINED BY LOWERING A 2-INCH O.D. SPLIT-BARREL SAMPLER TO THE BOTTOM OF THE BORING AND DRIVING IT INTO THE SOIL BY BLOWS FROM A 140-POUND HAMMER FREELY FALLING 30 INCHES (ASTM D1586 - STANDARD PENETRATION TEST). THE HAMMERS USED TO DRIVE THE SPLIT-BARREL SAMPLES FOR SHANNON & WILSON'S BORINGS WERE LAST CALIBRATED ON JANUARY 14, 2011 FOR THE MOBILE B-57 AND SIMCO 2800 HSHT AS DELIVERING AVERAGE ENERGY EFFICIENCIES OF 81.3% AND 73.5%, RESPECTIVELY. SPLIT BARREL SAMPLES WERE EXAMINED IMMEDIATELY AFTER RECOVERY AND REPRESENTATIVE PORTIONS WERE PRESERVED IN AIRTIGHT GLASS JARS. WHERE DESIRED AND POSSIBLE, 3-INCH O.D. SHELBY TUBE SAMPLERS WERE HYDRAULICALLY PUSHED IN SOIL EXHIBITING COHESION TO OBTAIN "UNDISTURBED" SAMPLES. WHERE ENCOUNTERED, BEDROCK WAS CORED USING AN NX OR SIMILAR SIZED DIAMOND BIT ROCK CORE BARREL WITH WATER AS A C IRCULATING/COOLING FLUID. RETRIEVED ROCK CORE SAMPLES WERE STORED IN COMPARTMENTAL CORE BOXES. UPON COMPLETION, THE DEPTH TO ANY ACCUMULATED GROUNDWATER WAS MEASURED, THE BORINGS WERE BACKFILLED OR SEALED IN ACCORDANCE WITH ODOT REQUIREMENTS, AND THE SURFACE OF THE EXISTING PAVEMENT AT THE BORING LOCATIONS WAS REPAIRED USING COLD-PATCH ASPHALT OR CONCRETE, WHERE APPROPRIATE.

THE LOGS OF BORINGS FOR THE 2009 SUBSURFACE INVESTIGATIONS HAVE ALSO BEEN INCLUDED SEPARATELY IN THE AFOREMENTIONED BINDER OF LOGS AND SOIL PROFILES. THE LOGS OF SHANNON & WILSON'S 2010/2011 DESIGN PHASE BORINGS WERE SUBMITTED SEPARATELY IN THE PROJECT GEOTECHNICAL REPORT, COPIES OF WHICH ARE MAINTAINED IN THE ODOT DISTRICT OFFICE, OFFICE OF GEOTECHNICAL ENGINEERING, AND OFFICE OF STRUCTURAL ENGINEERING.

GEOLOGY AND EXPLORATION FINDINGS

THE MAJORITY OF THE PROJECT LIMITS LIE WITHIN THE PRESENT CUYAHOGA RIVER VALLEY. A LARGE PORTION OF THE CUYAHOGA RIVER VALLEY IS CLASSIFIED AS "MADE LAND" WITH URBAN COVER COMPOSED OF FILL MATERIALS OF VARIABLE COMPOSITION AND DEPTH. BENEATH THE FILL MATERIALS, SUBSURFACE INVESTIGATIONS PERFORMED BY BBCM, B&P, AND OTHERS HAVE ENCOUNTERED APPROXIMATELY 20 TO 50 FEET OF ALLUVIUM DEPOSITS OF HOLOCENE AGE CONSISTING PREDOMINANTLY OF VERY-LOOSE TO MEDIUM-DENSE SANDS AND SILTS AND VERY-SOFT TO MEDIUM STIFF SILTY CLAY AND CLAY OF VARIABLE ORGANIC CONTENT. THE ALLUVIUM MATERIALS WERE DEPOSITED BY THE PRECURSOR TO THE CUYAHOGA RIVER. BENEATH THE ALLUVIUM DEPOSITS, APPROXIMATELY 55 TO 100 FEET OF LACUSTRINE DEPOSITS CONSISTING PRIMARILY OF MEDIUM-STIFF TO VERY STIFF SILTY CLAYS WERE GENERALLY ENCOUNTERED. THESE LACUSTRINE SOILS WERE DEPOSITED BY A SERIES OF LARGE PROGLACIAL LAKES WHICH COVERED THE GREATER CLEVELAND AREA NEAR THE END OF THE WISCONSINAN GLACIAL PERIOD. SLOPE FAILURES OBSERVED IN THE RIVER VALLEY SIDE SLOPES HAVE OCCURRED PRIMARILY WITHIN THESE LACUSTRINE DEPOSITS. MANY SLOPE FAILURES HAVE BEEN OBSERVED OVER THE YEARS ON THE SIDE SLOPES ADJACENT TO THE CUYAHOGA RIVER. THE LACUSTRINE DEPOSITS OVERLIE APPROXIMATELY 25 TO 65 FEET OF TILL FROM THE WISCONSINAN OR ILLINOIAN GLACIAL PERIODS. THE TILL PRIMARILY CONSISTS OF DENSE TO VERY-DENSE SANDY SILT OR VERY-STIFF TO HARD CLAYEY SILT. BENEATH THE TILL, OHIO DEVONIAN SHALE WAS ENCOUNTERED, WHICH CONTAINS ORGANIC MATTER AND NATURAL GAS. THIS GAS IS KNOWN TO PERCOLATE UPWARDS THROUGH THE SHALE BECOMING TRAPPED IN POCKETS THROUGHOUT THE LOWER PORTION OF THE OVERLYING SEDIMENTS.

SPECIFICATIONS

ALL BORINGS PERFORMED BY BBCM IN 2006 WERE GENERALLY PERFORMED IN ACCORDANCE WITH THE 1995 ODOT "SPECIFICATIONS FOR SUBSURFACE INVESTIGATIONS." BORINGS PERFORMED IN 2006 TO INVESTIGATE THE PAVEMENT SUBGRADES WERE ALSO PERFORMED IN GENERAL ACCORDANCE WITH ODOT OFFICES OF CONSTRUCTION ADMINISTRATION AND GEOTECHNICAL ENGINEERING GEOTECHNICAL BULLETIN GB1, "PLAN SUBGRADES", REVISED JUNE 29, 2005. ALL BORINGS PERFORMED BY BBCM AND B&P IN 2009 AND 2010 WERE GENERALLY PERFORMED IN ACCORDANCE WITH THE ODOT "SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS", REVISED JANUARY 16, 2009. THE BORINGS PERFORMED BY B&P IN 2009 TO INVESTIGATE THE PAVEMENT SUBGRADES WERE ALSO PERFORMED IN GENERAL ACCORDANCE WITH THE GB1 DOCUMENT, REVISED JANUARY 18, 2007. ALL BORINGS PERFORMED BY SHANNON & WILSON IN 2010/2011 WERE PERFORMED IN GENERAL ACCORDANCE WITH THE 2010 ODOT "SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS". THE BORINGS PERFORMED BY ODOT AND BBCM IN THE 1990'S WERE PRESUMABLY PERFORMED IN GENERAL ACCORDANCE WITH THE 1984 ODOT "SPECIFICATIONS FOR SUBSURFACE INVESTIGATIONS" ALTHOUGH THIS COULD NOT BE VERIFIED. IT IS UNKNOWN IF THE OTHER INVESTIGATIONS LOCATED WITHIN THE PROJECT LIMITS WERE PERFORMED IN ACCORDANCE WITH ANY SPECIFICATIONS.

SUMMARY OF UNCONFINED COMPRESSION STRENGTH (UCS) TESTING DATA - SOIL

ORIGINAL BORING NO.	SGE BORING NO.	SAMPLE NO.	SAMPLE ELEVATION (MSL)	UNCONFINED COMREPESSIVE STRENGTH (PSF)
B-044-1-10	B-044-1-10	ST-5	572.9' - 570.9'	1077
B-044-1-10	B-044-1-10	ST-8	558.4' - 556.4'	6620
B-069-1-10	B-069-1-10	ST-14	614.0' - 612.0'	2044
B-069-1-10	B-069-1-10	ST-18	593.5' - 591.5'	4258
B-069-1-10	B-069-1-10	ST-23	568.5' - 566.5'	2876
B-022-1-09*	B-022-1-09*	ST-1	609.4' - 608.4'	3060
B-022-1-09*	B-022-1-09*	ST-3	605.4' - 604.4'	7128
B-023-0-09	B-023-0-09	ST-20	592.5' - 590.5'	2970
B-023-0-09	B-023-0-09	ST-23A	577.5' - 575.5'	1933
B-023-0-09	B-023-0-09	ST-28A	552.5' - 550.5'	3251
B-025-0-09	B-025-0-09	ST-19	613.0' - 612.0'	1370
B-025-0-09	B-025-0-09	ST-29A	563.0' - 561.0'	3617
B-028-0-09	B-028-0-09	ST-18A	618.9' - 617.4'	4233
B-028-0-09	B-028-0-09	ST-26A	578.9' - 576.9'	2301
B-032-0-09	B-032-0-09	ST-20	609.6' - 607.6'	2837
B-032-0-09	B-032-0-09	ST-25	584.6' - 583.6'	2136
B-032-0-09	B-032-0-09	ST-27	574.1' - 573.1'	2183
B-2	B-002-0-00	P-1	539.0' - 537.0'	1640
B-3	B-003-0-00	P-2	517.0' - 515.0'	2100
B-4	B-004-0-00	P-1	562.0' - 560.0'	340
B-4	B-004-0-00	P-2	552.0' - 550.0'	1680
B-4	B-004-0-00	P-5	487.0' - 485.0'	7120
B-4	B-004-0-86	S-12	624.8' - 622.8'	3175
B-4	B-004-0-86	S-13	619.8' - 617.8'	1280
B-4	B-004-0-86	S-15	609.8 - 607.8	1890
B-106A**	B-106-A-58**	93268	628.7' - 627.7'	2960
B-106A**	B-106-A-58**	93269	624.7' - 623.7'	1180
B-106A**	B-106-A-58**	93271	603.7' - 602.7'	3780
B-106A**	B-106-A-58**	93272	584.7' - 583.7'	3740

*BORING B-022-1-09 WAS PERFORMED TO RECOVER SHELBY TUBE SAMPLES AND NO LOG WAS CREATED. RESULTS FOR TESTS FROM BORING B-022-1-09 ARE SHOWN ON LOG FOR BORING B-022-0-09.
**SAMPLE ELEVATIONS ARE APPROXIMATE.

SUMMARY OF SLAKE DURABILITY (SD) TESTING DATA ON SHALE BEDROCK

SGE BORING NO.	SAMPLE NO.	SAMPLE ELEVATION (MSL)	TEST FLUID/ SLURRY TYPE	SLAKE DURABILITY INDEX, Id_2 (%)	SGE BORING NO.	SAMPLE NO.	SAMPLE ELEVATION (MSL)	TEST FLUID/ SLURRY TYPE	SLAKE DURABILITY INDEX, Id_2 (%)
B-022-0-09	NO-1	479.4' - 477.4'	WATER	86.9	B-037-1-09	51	444.7' - 441.0'	POLYMER	88.4
B-022-0-09	NO-1	479.4' - 477.4'	MINERAL	89.7	B-037-1-09	52	440.0' - 435.0'	WATER	85.2
B-022-0-09	NO-1	479.4' - 477.4'	POLYMER	93.1	B-037-1-09	52	440.0' - 435.0'	MINERAL	85.5
B-022-0-09	NO-2	474.4' - 472.4'	WATER	80.6	B-037-1-09	52	440.0' - 435.0'	POLYMER	88.0
B-022-0-09	NO-2	474.4' - 472.4'	MINERAL	91.5	B-039-0-09	NO-1	428.1' - 426.1'	WATER	25.6
B-022-0-09	NO-2	474.4' - 472.4'	POLYMER	92.3	B-039-0-09	NO-2	420.2' - 418.8'	WATER	73.0
B-022-0-09	NO-3	462.4' - 460.4'	WATER	96.8	B-039-0-09	NO-3	409.6' - 407.6'	WATER	79.8
B-031-0-09	NO-1	466.5' - 464.5'	WATER	79.4	B-040-0-09	NO-2	397.7' - 396.7'	WATER	95.2
B-031-0-09	NO-2	461.5' - 459.5'	WATER	73.1	B-040-0-09	NO-3	385.8' - 384.8'	WATER	90.2
B-031-0-09	NO-3	449.5' - 447.5'	WATER	82.7	B-041-0-09	NO-1	394.9' - 392.0'	WATER	88.5
B-035-0-09	55	447.6' - 443.6'	WATER	90.3	B-041-0-09	NO-2	388.8' - 385.9'	WATER	94.6
B-035-0-09	55	447.6' - 443.6'	MINERAL	90.1	B-041-0-09	NO-3	377.9' - 375.9'	WATER	96.4
B-035-0-09	55	447.6' - 443.6'	POLYMER	93.1	B-042-0-09	NO-1	399.5' - 396.7'	WATER	96.7
B-035-0-09	56	440.0' - 436.6'	WATER	85.2	B-042-0-09	NO-2	393.0' - 390.4'	WATER	98.5
B-035-0-09	56	440.0' - 436.6'	MINERAL	87.7	B-042-0-09	NO-3	382.9' - 380.7'	WATER	97.3
B-035-0-09	56	440.0' - 436.6'	POLYMER	92.0	B-043-0-09	NO-3	407.3' - 405.3'	WATER	86.4
B-035-0-09	57	429.0' - 425.0'	WATER	85.3	B-043-0-09	NO-4	400.3' - 398.3'	WATER	88.8
B-035-0-09	57	429.0' - 425.0'	MINERAL	80.9	B-043-0-09	NO-5	389.3' - 386.3'	WATER	97.3
B-035-0-09	57	429.0' - 425.0'	POLYMER	86.4	B-044-0-09	NO-1	421.1' - 418.6'	WATER	93.9
B-037-1-09	50	452.6' - 450.0'	WATER	81.0	B-044-0-09	NO-2	416.1' - 413.6'	WATER	97.1
B-037-1-09	50	452.6' - 450.0'	MINERAL	86.1	B-044-0-09	NO-2	409.9' - 405.8'	WATER	96.6
B-037-1-09	50	452.6' - 450.0'	POLYMER	87.6	B-044-0-09	NO-3	404.6' - 402.6'	WATER	96.4
B-037-1-09	51	444.7' - 441.0'	WATER	84.9	B-045-0-09	NO-1	417.7' - 415.7'	WATER	95.8
B-037-1-09	51	444.7' - 441.0'	MINERAL	85.7	B-045-0-09	NO-3	402.9' - 399.7'	WATER	89.9

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

BBCM

PID NO. 77332

SOIL PROFILE

CUY-90-14.90

SHEET INDEX OF SOIL BORING LOCATIONS

ORIGINAL BORING NO.	SGE BORING NO.	COMPANY (ABBREVIATED)	LOCATION OF BORING	
			BORING MARKER (PLAN)	BORING PROFILE
B-039-1-10	B-039-1-10	B&P	56	57
B-044-1-10	B-044-1-10	B&P	59	60
B-047-2-10	B-047-2-10	B&P	64	65, 100
B-069-1-10	B-069-1-10	B&P	73	73A
B-069-2-10	B-069-2-10	B&P	73	73A
B-074-1-10	B-074-1-10	B&P	75	76
B-001-0-09	B-001-0-09	B&P	47	48
B-002-0-09	B-002-0-09	B&P	47	47
B-003-0-09	B-003-0-09	B&P	47	48
B-004-0-09	B-004-0-09	B&P	47	47
B-005-0-09	B-005-0-09	B&P	47	47
B-006-0-09	B-006-0-09	B&P	47	48
B-007-0-09	B-007-0-09	B&P	47	47
B-008-0-09	B-008-0-09	B&P	47	48
B-009-0-09	B-009-0-09	B&P	47	47
B-010-0-09	B-010-0-09	B&P	47	47
B-011-0-09	B-011-0-09	B&P	47	48
B-012-0-09	B-012-0-09	B&P	47	47
B-012-1-09	B-012-1-09	B&P	47	48
B-012-2-09	B-012-2-09	B&P	49	50
B-013-0-09	B-013-0-09	B&P	49	49
B-014-0-09	B-014-0-09	B&P	49	50
B-015-0-09	B-015-0-09	B&P	49	49
B-016-0-09	B-016-0-09	B&P	49	81
B-017-0-09	B-017-0-09	B&P	49	49
B-018-0-09	B-018-0-09	B&P	49	82
B-019-0-09	B-019-0-09	B&P	51	83
B-019-1-09	B-019-1-09	B&P	51	83
B-020-0-09	B-020-0-09	B&P	51	52, 83
B-021-0-09	B-021-0-09	B&P	51	52
B-022-0-09	B-022-0-09	B&P	51	52, 84
B-022-1-09	B-022-1-09	B&P	51	N/A - NO LOG
B-022-2-10	B-022-2-10	S&W	51	52
B-023-0-09	B-023-0-09	B&P	51	52
B-023-1-09	B-023-1-09	B&P	51	116
B-023-2-09	B-023-2-09	B&P	51	54, 116
B-024-0-09	B-024-0-09	B&P	51	55
B-025-0-09	B-025-0-09	B&P	51	52
B-027-0-09	B-027-0-09	B&P	51	54
B-027-1-09	B-027-1-09	B&P	51	54
B-028-0-09	B-028-0-09	B&P	51	54
B-029-0-09	B-029-0-09	B&P	51	55
B-029-1-10	B-029-1-10	S&W	51	52
B-030-0-09	B-030-0-09	B&P	51	54
B-031-0-09	B-031-0-09	B&P	51	52
B-032-0-09	B-032-0-09	B&P	51	54, 55
B-033-0-09	B-033-0-09	B&P	51	54
B-033-1-10	B-033-1-10	S&W	51	54
B-033-2-10	B-033-2-10	S&W	51	52
B-034-0-09	B-034-0-09	B&P	51	55, 86
B-034-1-10	B-034-1-10	S&W	51	52
B-035-0-09	B-035-0-09	BBCM	56	57, 88
B-036-0-09	B-036-0-09	BBCM	56	112
B-037-0-09	B-037-0-09	BBCM	56	112
B-037-1-09	B-037-1-09	BBCM	56	57, 90
B-037-2-09	B-037-2-09	BBCM	56	113
B-038-0-09	B-038-0-09	BBCM	56	112
B-038-1-09	B-038-1-09	BBCM	56	113
B-038-1-10	B-038-1-10	S&W	56	57
B-039-0-09	B-039-0-09	B&P	56	94
B-039-3-10	B-039-3-10	S&W	56	57
B-040-0-09	B-040-0-09	B&P	56	57
B-041-0-09	B-041-0-09	B&P	59	60
B-042-0-09	B-042-0-09	B&P	59	60
B-042-1-10	B-042-1-10	S&W	59	60
B-043-0-09	B-043-0-09	B&P	59	60
B-043-1-10	B-043-1-10	S&W	59	60
B-044-0-09	B-044-0-09	B&P	59	60
B-045-0-09	B-045-0-09	B&P	64	65
B-046-1-10	B-046-1-10	S&W	64	65
B-047-0-09	B-047-0-09	B&P	64	67, 98
B-047-1-09	B-047-1-09	B&P	64	65, 98
B-047-3-10	B-047-3-10	S&W	64	65
B-047-5-11	B-047-5-11	WALSH	64	N/A
B-047-6-11	B-047-6-11	WALSH	64	N/A
B-048-0-09	B-048-0-09	B&P	64	65, 67
B-048-1-10	B-048-1-10	S&W	64	65

SHEET INDEX OF SOIL BORING LOCATIONS

ORIGINAL BORING NO.	SGE BORING NO.	COMPANY (ABBREVIATED)	LOCATION OF BORING	
			BORING MARKER (PLAN)	BORING PROFILE
B-050-0-09	B-050-0-09	B&P	64	67
B-051-0-09	B-051-0-09	B&P	64	65
B-051-1-10	B-051-1-10	S&W	64	67
B-051-2-10	B-051-2-10	S&W	64	65
B-052-0-09	B-052-0-09	B&P	64	67
B-053-0-09	B-053-0-09	B&P	64	68
B-053-2-10	B-053-2-10	S&W	64	65
B-054-0-09	B-054-0-09	B&P	64	72, 102
B-055-0-09	B-055-0-09	B&P	64	65, 71, 102
B-056-0-09	B-056-0-09	B&P	64	72
B-058-0-09	B-058-0-09	B&P	64	71
B-059-0-09	B-059-0-09	B&P	64	65
B-060-0-09	B-060-0-09	B&P	69	70, 71, 103
B-061-0-09	B-061-0-09	B&P	69	72, 103
B-062-0-09	B-062-0-09	B&P	69	103
B-063-0-09	B-063-0-09	B&P	69	70
B-066-0-10	B-066-0-10	S&W	69	70
B-064-0-09	B-064-0-09	B&P	69	71
B-067-0-09	B-067-0-09	B&P	69	74

B&P = BARR & PREVOST
BBCM = BBC&M ENGINEERING, INC.
DLZ = DLZ CORPORATION
LEWIN = DAVID V. LEWIN CORPORATION
ODOT = OHIO DEPARTMENT OF TRANSPORTATION
R&R = R&R INTERNATIONAL, INC.
S&W = SHANNON & WILSON, INC.
WALSH = WALSH CONSTRUCTION CO.

SHEET INDEX OF SOIL BORING LOCATIONS

ORIGINAL BORING NO.	SGE BORING NO.	COMPANY (ABBREVIATED)	LOCATION OF BORING	
			BORING MARKER (PLAN)	BORING PROFILE
B-068-0-09	B-068-0-09	B&P	69	74
B-069-0-09	B-069-0-09	B&P	69	74, 115
B-069-3-10	B-069-3-10	S&W	73	N/A - NO LOG
B-070-0-09	B-070-0-09	B&P	59, 75	76
B-070-1-09	B-070-1-09	B&P	59, 75	76
B-070-2-09	B-070-2-09	B&P	75	N/A - SEE BINDER
B-070-3-09	B-070-3-09	B&P	75	N/A - SEE BINDER
B-071-0-09	B-071-0-09	B&P	75	76
B-072-0-09	B-072-0-09	B&P	75	76
B-073-0-09	B-073-0-09	B&P	75	76
B-073-1-09	B-073-1-09	B&P	75	76
B-074-0-09	B-074-0-09	B&P	75	76
B-075-0-09	B-075-0-09	B&P	78	79
B-076-0-09	B-076-0-09	B&P	78	79
B-076-1-09	B-076-1-09	B&P	78	79
B-076-2-09	B-076-2-09	B&P	78	79
B-076-3-09	B-076-3-09	B&P	78	79
B-077-0-09	B-077-0-09	B&P	78	80
B-05-01	B-001-0-06	BBCM	56	57
B-05-02	B-002-0-06	BBCM	56	110
B-05-03	B-003-0-06	BBCM	56	104
B-05-04	B-004-0-06	BBCM	56	108
B-05-07	B-007-0-06	BBCM	51	88
B-05-08	B-008-0-06	BBCM	51	52, 86
B-05-11	B-011-0-06	BBCM	56	88
B-05-12	B-012-0-06	BBCM	56	90
B-05-13	B-013-0-06	BBCM	56	94
B-05-14	B-014-0-06	BBCM	56	94
B-05-15	B-015-0-06	BBCM	56	57, 96
B-05-16	B-016-0-06	BBCM	56	57, 92
B-105A	B-105-A-06	BBCM	56	92, 106
B-108A	B-108-A-06	BBCM	56	110
B-2	B-002-0-00	DLZ	56	94
B-3	B-003-0-00	DLZ	56	96
B-4	B-004-0-00	DLZ	59	N/A - SEE BINDER
B-204	B-204-0-98	BBCM	56	N/A - NO LOG
B-303	B-303-0-98	BBCM	56	N/A - NO LOG
B-201	B-201-0-96	BBCM	56	N/A - SEE BINDER
B-202	B-202-0-96	BBCM	56	N/A - SEE BINDER
B-203	B-203-0-96	BBCM	56	N/A - SEE BINDER
B-1	B-001-0-96	BBCM	64	N/A - SEE BINDER
B-2	B-002-0-96	BBCM	64	N/A - SEE BINDER
B-101	B-101-0-94	BBCM	56	104
B-102	B-102-0-94	BBCM	56	104
B-103	B-103-0-94	BBCM	56	N/A - SEE BINDER
B-104	B-104-0-94	BBCM	56	N/A - SEE BINDER
B-105	B-105-0-94	BBCM	56	N/A - SEE BINDER
B-106	B-106-0-94	BBCM	56	N/A - SEE BINDER
B-107	B-107-0-94	BBCM	56	110
B-108	B-108-0-94	BBCM	56	N/A - SEE BINDER
B-109	B-109-0-94	BBCM	56	92, 110
B-110	B-110-0-94	BBCM	56	92
B-10	B-010-0-92	ODOT	56	N/A - SEE BINDER
B-1	B-001-0-90	ODOT	56	N/A - SEE BINDER
B-2	B-002-0-90	ODOT	56	108
B-3	B-003-0-90	ODOT	56	106
B-4	B-004-0-90	ODOT	56	N/A - SEE BINDER
B-5	B-005-0-90	ODOT	56	108
B-6	B-006-0-90	ODOT	56	N/A - SEE BINDER
B-7	B-007-0-90	ODOT	56	N/A - SEE BINDER
B-8	B-008-0-90	ODOT	56	92, 108
B-9	B-009-0-90	ODOT	56	N/A - SEE BINDER
B-4	B-004-0-86	LEWIN	69	N/A - SEE BINDER
B-5	B-005-0-86	LEWIN	64	N/A - SEE BINDER
B-8	B-008-0-86	R & R	51	N/A - SEE BINDER
B-10	B-010-0-64	ODOT	49	49, 82
B-84	B-084-0-64	ODOT	49	81
B-90	B-090-0-64	ODOT	49	N/A - SEE BINDER
B-6	B-006-0-63	ODOT	51	N/A - SEE BINDER
B-13	B-013-0-63	ODOT	51	N/A - SEE BINDER
B-23	B-023-0-63	ODOT	51	N/A - SEE BINDER
B-103	B-103-0-58	ODOT	69	71
B-106	B-106-0-58	ODOT	69	N/A - SEE BINDER
B-106A	B-106-A-58	ODOT	69	N/A - SEE BINDER
B-111	B-111-0-58	ODOT	73	N/A - SEE BINDER
B-114	B-114-0-58	ODOT	73	N/A - SEE BINDER
B-121	B-121-0-58	ODOT	78	N/A - SEE BINDER

SHEET INDEX OF SOIL BORING LOCATIONS

ORIGINAL BORING NO.	SGE BORING NO.	COMPANY (ABBREVIATED)	LOCATION OF BORING: BORING MARKER (PLAN)	LOCATION OF BORING: BORING PROFILE
BE-1	B-001-E-56	HNTB	64	N/A - SEE BINDER
BE-2	B-002-E-56	HNTB	64	N/A - SEE BINDER
BE-3	B-003-E-56	HNTB	64	N/A - SEE BINDER
BE-4	B-004-E-56	HNTB	64	N/A - SEE BINDER
BE-5	B-005-E-56	HNTB	64	N/A - SEE BINDER
BE-6	B-006-E-56	HNTB	64	N/A - SEE BINDER
BE-7	B-007-E-56	HNTB	64	71
BE-8	B-008-E-56	HNTB	64	N/A - SEE BINDER
BE-9	B-009-E-56	HNTB	64	N/A - SEE BINDER
BE-10	B-010-E-56	HNTB	69	N/A - SEE BINDER
BE-11	B-011-E-56	HNTB	69	N/A - SEE BINDER
B-1	B-001-0-55	NYC & ST LRR	56	112
B-2	B-002-0-55	NYC & ST LRR	56	92, 112
B-3	B-003-0-55	NYC & ST LRR	56	94
B-4	B-004-0-55	NYC & ST LRR	56	N/A - SEE BINDER
Boring-1	B-001-1-55	HNTB	56	N/A - SEE BINDER
Boring-2	B-002-1-55	HNTB	56	N/A - SEE BINDER
BW-1	B-001-W-55	HNTB	56	N/A - SEE BINDER
BW-2	B-002-W-55	HNTB	56	106
BW-3	B-003-W-55	HNTB	56	N/A - SEE BINDER
BW-4	B-004-W-55	HNTB	51	N/A - SEE BINDER
BW-5	B-005-W-55	HNTB	51	N/A - SEE BINDER
BW-6	B-006-W-55	HNTB	51	86
A	B-00A-0-54	HNTB	59	N/A - SEE BINDER
B	B-00B-0-54	HNTB	59	N/A - SEE BINDER
C	B-00C-0-54	HNTB	64	N/A - SEE BINDER
1	B-001-0-54	HNTB	56	N/A - SEE BINDER
2	B-002-0-54	HNTB	56	N/A - SEE BINDER
3	B-003-0-54	HNTB	56	N/A - SEE BINDER
4	B-004-0-54	HNTB	56	N/A - SEE BINDER
5	B-005-0-54	HNTB	56	N/A - SEE BINDER
6	B-006-0-54	HNTB	56	N/A - SEE BINDER
7	B-007-0-54	HNTB	56	N/A - SEE BINDER
8	B-008-0-54	HNTB	56	N/A - SEE BINDER
9	B-009-0-54	HNTB	59	N/A - SEE BINDER
10	B-010-0-54	HNTB	59	N/A - SEE BINDER
11	B-011-0-54	HNTB	59	N/A - SEE BINDER
12	B-012-0-54	HNTB	59	N/A - SEE BINDER
13	B-013-0-54	HNTB	59	N/A - SEE BINDER
14	B-014-0-54	HNTB	59	N/A - SEE BINDER
15	B-015-0-54	HNTB	59	N/A - SEE BINDER
16	B-016-0-54	HNTB	59	N/A - SEE BINDER
17	B-017-0-54	HNTB	64	N/A - SEE BINDER
18	B-018-0-54	HNTB	64	N/A - SEE BINDER
19	B-019-0-54	HNTB	64	N/A - SEE BINDER
20	B-020-0-54	HNTB	64	N/A - SEE BINDER
C-012-3-10	C-012-3-10	S&W	49	N/A - SEE REPORT
C-012-4-10	C-012-4-10	S&W	49	N/A - SEE REPORT
C-015-1-10	C-015-1-10	S&W	49	N/A - SEE REPORT
C-015-1-10A	C-015-1-10A	S&W	49	N/A - SEE REPORT
C-015-2-10	C-015-2-10	S&W	49	N/A - SEE REPORT
C-022-3-10	C-022-3-10	S&W	51	N/A - SEE REPORT
C-047-4-11	C-047-4-11	S&W	64	N/A - SEE REPORT
C-049-0-09	C-049-0-09	ODOT	64	N/A - SEE BINDER
C-051-3-10	C-051-3-10	S&W	64	N/A - SEE REPORT
C-053-1-10	C-053-1-10	S&W	64	N/A - SEE REPORT
C-053-1-10A	C-053-1-10A	S&W	64	N/A - SEE REPORT
C-057-0-09	C-057-0-09	ODOT	64	N/A - SEE BINDER
C-062-1-10	C-062-1-10	S&W	69	N/A - SEE REPORT
C-065-0-10	C-065-0-10	S&W	69	N/A - SEE REPORT
C-074-2-10	C-074-2-10	S&W	75	N/A - SEE REPORT
C-074-2-10A	C-074-2-10A	S&W	75	N/A - SEE REPORT
C-05-01	C-001-0-06	OU	56	N/A - SEE BINDER
C-05-02	C-002-0-06	OU	56	N/A - SEE BINDER
C-05-03	C-003-0-06	OU	56	N/A - SEE BINDER
C-05-04	C-004-0-06	OU	56	N/A - SEE BINDER
C-05-05	C-005-0-06	OU	51	N/A - SEE BINDER
C-05-06	C-006-0-06	OU	51	N/A - SEE BINDER
C-05-07	C-007-0-06	OU	51	N/A - SEE BINDER
C-05-08	C-008-0-06	OU	51	N/A - SEE BINDER
C-05-09	C-009-0-06	OU	51	N/A - SEE BINDER
C-05-10	C-010-0-06	OU	51	N/A - SEE BINDER
C-05-11	C-011-0-06	OU	56	N/A - SEE BINDER
C-05-12	C-012-0-06	OU	56	N/A - SEE BINDER
C-05-13	C-013-0-06	OU	56	N/A - SEE BINDER
C-05-14	C-014-0-06	OU	56	N/A - SEE BINDER
C-05-15	C-015-0-06	OU	56	N/A - SEE BINDER

SHEET INDEX OF SOIL BORING LOCATIONS

ORIGINAL BORING NO.	SGE BORING NO.	COMPANY (ABBREVIATED)	LOCATION OF BORING: BORING MARKER (PLAN)	LOCATION OF BORING: BORING PROFILE
P-1	P-001-0-94	BBCM	56	N/A - SEE BINDER
P-2	P-002-0-94	BBCM	56	106
P-3	P-003-0-94	BBCM	56	N/A - SEE BINDER
P-4	P-004-0-94	BBCM	56	N/A - SEE BINDER
P-5	P-005-0-94	BBCM	56	N/A - SEE BINDER
RB-1	R-001-0-06	BBCM	47	48
RB-2	R-002-0-06	BBCM	49	50
RB-3	R-003-0-06	BBCM	49	50
RB-4	R-004-0-06	BBCM	49	49
RB-5	R-005-0-06	BBCM	73	N/A - SEE BINDER
RB-6	R-006-0-06	BBCM	73	N/A - SEE BINDER
RB-7	R-007-0-06	BBCM	59, 75	76
RB-8	R-008-0-06	BBCM	75	76
RB-9	R-009-0-06	BBCM	75	76

BBCM = BBC&M ENGINEERING, INC.
CUT = CLEVELAND UNION TERMINAL COMPANY
HNTB = HOWARD, NEEDLES, TAMMEN & BERGENDOFF CONSULTING ENGINEERS
NYC&ST LRR = NEW YORK, CHICAGO & ST. LOUIS RAILROAD COMPANY
ODOT = OHIO DEPARTMENT OF TRANSPORTATION
OU = OHIO UNIVERSITY
S&W = SHANNON & WILSON, INC.

SHEET INDEX OF SOIL BORING LOCATIONS

ORIGINAL BORING NO.	SGE BORING NO.	COMPANY (ABBREVIATED)	LOCATION OF BORING: BORING MARKER (PLAN)	LOCATION OF BORING: BORING PROFILE
RB-10	R-010-0-06	BBCM	78	N/A - SEE BINDER
RB-11	R-011-0-06	BBCM	78	79
RB-12	R-012-0-06	BBCM	78	79, 80
RB-13	R-013-0-06	BBCM	78	79
RB-14	R-014-0-06	BBCM	75	77
RB-15	R-015-0-06	BBCM	64	77
RB-16	R-016-0-06	BBCM	78	80
RB-17	R-017-0-06	BBCM	73	N/A - SEE BINDER
RB-18	R-018-0-06	BBCM	73	N/A - SEE BINDER
RB-22	R-022-0-06	BBCM	73	N/A - SEE BINDER
RB-23	R-023-0-06	BBCM	73	N/A - SEE BINDER
R-201	R-201-0-58	ODOT	69	N/A - SEE BINDER
R-202	R-202-0-58	ODOT	69	N/A - SEE BINDER
R-204	R-204-0-58	ODOT	73	N/A - SEE BINDER
SB-1	S-001-0-06	BBCM	49	49
SB-2	S-002-0-06	BBCM	49	50
SB-3	S-003-0-06	BBCM	49	49
SB-4	S-004-0-06	BBCM	49	50
SB-5	S-005-0-06	BBCM	49	50
SB-6	S-006-0-06	BBCM	49	49
SB-7	S-007-0-06	BBCM	49	50
SB-8	S-008-0-06	BBCM	49	49
SB-9	S-009-0-06	BBCM	51	52
SB-10	S-010-0-06	BBCM	51	84
SB-11	S-011-0-06	BBCM	51	52
SB-12	S-012-0-06	BBCM	51	52
SB-13	S-013-0-06	BBCM	69	70, 72
SB-14	S-014-0-06	BBCM	69	70
SB-15	S-015-0-06	BBCM	69	70
SB-16	S-016-0-06	BBCM	69	74
SB-17	S-017-0-06	BBCM	69	74
SB-18	S-018-0-06	BBCM	69	74
SB-19	S-019-0-06	BBCM	73	114
SB-20	S-020-0-06	BBCM	73	74, 114
SB-21	S-021-0-06	BBCM	73	N/A - SEE BINDER
SB-22	S-022-0-06	BBCM	73	N/A - SEE BINDER
SB-23	S-023-0-06	BBCM	73	N/A - SEE BINDER
SB-27	S-027-0-06	BBCM	75	76
SB-28	S-028-0-06	BBCM	75	76
SB-29	S-029-0-06	BBCM	78	76, 79
T-9	T-009-0-23	CUT	78	N/A - SEE BINDER
T-9-1/2	T-009-1-23	CUT	78	N/A - SEE BINDER
T-11	T-011-0-23	CUT	78	N/A - SEE BINDER
T-12	T-012-0-23	CUT	78	N/A - SEE BINDER
T-13-1/2	T-013-1-23	CUT	75	N/A - SEE BINDER
T-14	T-014-0-23	CUT	75	N/A - SEE BINDER
T-16-1/2	T-016-1-23	CUT	75	N/A - SEE BINDER
T-17	T-017-0-23	CUT	75	N/A - SEE BINDER
T-18	T-018-0-23	CUT	64	N/A - SEE BINDER
T-18-1/2	T-018-1-23	CUT	64	N/A - SEE BINDER
T-19	T-019-0-23	CUT	64	N/A - SEE BINDER
VB-2	V-002-0-06	BBCM	56	96
VB-3	V-003-0-06	BBCM	56	N/A - SEE BINDER
VB-4	V-004-0-06	BBCM	59	60
VB-5	V-005-0-06	BBCM	59	60
VB-7	V-007-0-06	BBCM	59	62
VB-8	V-008-0-06	BBCM	59	62
VB-9	V-009-0-06	BBCM	59	62
VB-10	V-010-0-06	BBCM	59	62
VB-11	V-011-0-06	BBCM	64	65
VB-11A	V-011-A-06	BBCM	64	67
VB-12	V-012-0-06	BBCM	64	98
VB-13	V-013-0-06	BBCM	64	77, 100
VB-14	V-014-0-06	BBCM	64	65
VB-15	V-015-0-06	BBCM	64	65
VB-16	V-016-0-06	BBCM	64	102
VB-17	V-017-0-06	BBCM	64	65, 71
VB-18	V-018-0-06	BBCM	64	72
WB-1	W-001-0-06	BBCM	51	53
WB-2	W-002-0-06	BBCM	51	53
WB-3	W-003-0-06	BBCM	51	54
WB-4	W-004-0-06	BBCM	51	54
WB-5	W-005-0-06	BBCM	69	74
WB-6	W-006-0-06	BBCM	69	115
WB-7	W-007-0-06	BBCM	73	74
WB-8	W-008-0-06	BBCM	69	72

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

BBCM

PID NO. 77332

SOIL PROFILE

CUY-90-14.90

One Dimensional Consolidation Properties (Oedometer) — Pro Geotech, Inc.

Client	Shannon & Wilson, Inc	Lab Ref	
Project	CUY-90-14.90	Job	G10022G
Borehole	B-022-2-10	Sample	ST-17
Location	Cleveland OH	Depth	63.0'

Test Details

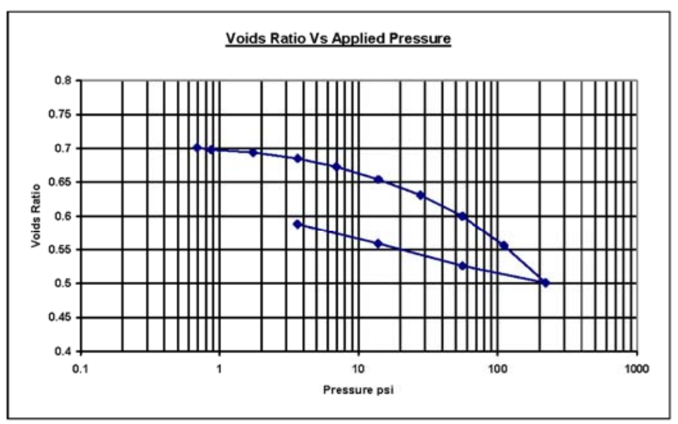
Standard	ASTM D2435-96 / AASHTO T216-94	Particle Specific Gravity	2.75
Sample Type	Thin walled push in sample	Lab. Temperature	72.0 deg.F
Method of Testing (A/B)	B		
Sample Description	Gray SILT AND CLAY (A-6a), trace sand, trace rock fragments		
Variations from Procedure	None		

Specimen Details

Specimen Reference	B	Description	No fissures
Depth within Sample	22.0000in	Orientation within Sample	Random
Specimen Mass	0.2842 lb	Condition	Inundated
Specimen Height	0.7880 in	Preparation	Undisturbed (very minor patching)
Comments			

Apparatus

Ring Number	1	Ring Diameter	2.5030 in
Ring Height	0.7880 in	Ring Weight	0.1431 lb
Lever Ratio	10.00 : 1	Drainage	Double-Sided



One Dimensional Consolidation Properties (Oedometer) — Pro Geotech, Inc.

Client	Shannon & Wilson, Inc	Lab Ref	
Project	CUY-90-14.90	Job	G10022G
Borehole	B-022-2-10	Sample	ST-17
Location	Cleveland OH	Depth	63.0'

Initial Moisture Content*	25.4 % (trimmings: 22.2 %)	Final Moisture Content	22.8 %
Initial Bulk Density	126.66 lb/ft3	Final Bulk Density	132.79 lb/ft3
Initial Dry Density	100.96 lb/ft3	Final Dry Density	108.14 lb/ft3
Initial Void Ratio	0.7010	Final Void Ratio	0.5882
Initial Degree of Saturation	99.87%	Final Degree of Saturation	106.65%
Seating Pressure	0.69 psi		

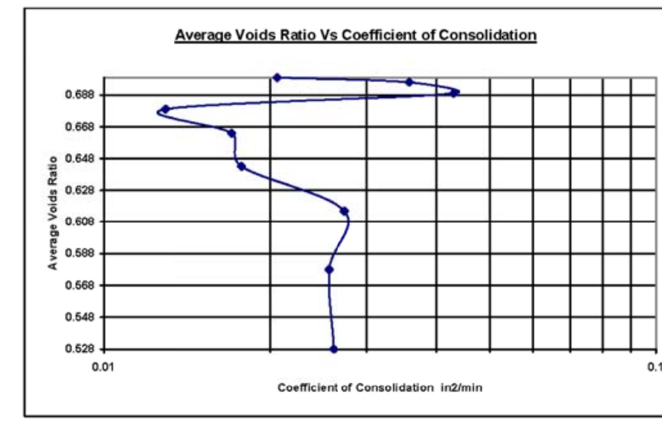
* Calculated from initial and dry weights of whole specimen

Pressure (Loading)	Load Increment Duration	Deformation (Corrected)	d_{100} (Corrected)	Coefficient of Consolidation (c_v)
0.00				
0.87 psi	1260.000 min	0.0014 in	0.0011 in	0.02061 in2/min
1.74 psi	1080.000 min	0.0033 in	0.0024 in	0.03577 in2/min
3.63 psi	1440.000 min	0.0074 in	0.0054 in	0.04297 in2/min
6.95 psi	381.000 min	0.0131 in	0.0119 in	0.01291 in2/min
13.87 psi	960.000 min	0.0216 in	0.0197 in	0.01705 in2/min
27.74 psi	1260.000 min	0.0326 in	0.0305 in	0.01776 in2/min
55.55 psi	480.000 min	0.0469 in	0.0436 in	0.02732 in2/min
111.00 psi	960.000 min	0.0674 in	0.0632 in	0.02560 in2/min
221.80 psi	1440.000 min	0.0928 in	0.0873 in	0.02610 in2/min
55.55 psi	1440.000 min	0.0811 in	---------	---------
13.86 psi	1080.000 min	0.0658 in	---------	---------
3.63 psi	240.000 min	0.0523 in	---------	---------

Method of Time Fitting Used	Square Root Time

One Dimensional Consolidation Properties (Oedometer) — Pro Geotech, Inc.

Client	Shannon & Wilson, Inc	Lab Ref	
Project	CUY-90-14.90	Job	G10022G
Borehole	B-022-2-10	Sample	ST-17
Location	Cleveland OH	Depth	63.0'



Tested By and Date:	FB/11/15/2010
Checked By and Date:	SS/1/12/2011
Approved By and Date:	wn/1/13/2011

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

BBCM

SOIL PROFILE
LABORATORY TEST DATA

CUY-90-14.90

One Dimensional Consolidation Properties (Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc	**Lab Ref**	
Project	CUY-90-14.90	**Job**	G10022G
Borehole	B-022-2-10	**Sample**	ST-19
Location	Cleveland, OH	**Depth**	73.5'

Test Details			
Standard	ASTM D2435-96 / AASHTO T216-94	**Particle Specific Gravity**	2.74
Sample Type	Thin walled push in sample	**Lab. Temperature**	72.0 deg.F
Method of Testing (A/B)	B		
Sample Description	Gray SILT AND CLAY (A-6a), trace sand, trace rock fragments		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	C	**Description**	No fissures
Depth within Sample	20.0000in	**Orientation within Sample**	Random
Specimen Mass	0.2768 lb	**Condition**	Inundated
Specimen Height	0.7900 in	**Preparation**	Undisturbed (very minor patching)
Comments			

Apparatus			
Ring Number	1	**Ring Diameter**	2.5030 in
Ring Height	0.7900 in	**Ring Weight**	0.1431 lb
Lever Ratio	10.00 : 1	**Drainage**	Double-Sided

Voids Ratio Vs Applied Pressure

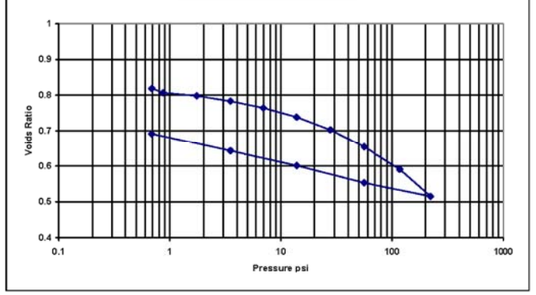


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Figure E-35
Sheet 1 of 12

One Dimensional Consolidation Properties (Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc	**Lab Ref**	
Project	CUY-90-14.90	**Job**	G10022G
Borehole	B-022-2-10	**Sample**	ST-19
Location	Cleveland, OH	**Depth**	73.5'

Initial Moisture Content*	30.7 % (trimmings: 29.2 %)	**Final Moisture Content**	26.8 %
Initial Bulk Density	123.05 lb/ft3	**Final Bulk Density**	128.41 lb/ft3
Initial Dry Density	94.18 lb/ft3	**Final Dry Density**	101.28 lb/ft3
Initial Void Ratio	0.8189	**Final Void Ratio**	0.6913
Initial Degree of Saturation	102.71%	**Final Degree of Saturation**	106.32%
Seating Pressure	0.69 psi		

* Calculated from initial and dry weights of whole specimen

Pressure (Loading)	Load Increment Duration	Deformation (Corrected)	d_{100} (Corrected)	Coefficient of Consolidation (c_v)
0.00				
0.87 psi	1080.000 min	0.0051 in	0.0035 in	0.03279 in2/min
1.74 psi	381.000 min	0.0090 in	0.0073 in	0.02807 in2/min
3.48 psi	960.000 min	0.0155 in	0.0127 in	0.02218 in2/min
6.95 psi	605.000 min	0.0239 in	0.0219 in	0.00903 in2/min
13.86 psi	762.000 min	0.0353 in	0.0331 in	0.00874 in2/min
27.74 psi	480.000 min	0.0506 in	0.0479 in	0.01062 in2/min
55.55 psi	960.000 min	0.0715 in	0.0676 in	0.01068 in2/min
117.10 psi	1260.000 min	0.0989 in	0.0939 in	0.01252 in2/min
221.80 psi	1080.000 min	0.1319 in	0.1249 in	0.01778 in2/min
55.55 psi	480.000 min	0.1157 in	---------	---------
13.86 psi	960.000 min	0.0945 in	---------	---------
3.48 psi	480.000 min	0.0763 in	---------	---------
0.69 psi	1080.000 min	0.0554 in	---------	---------

Method of Time Fitting Used	Square Root Time

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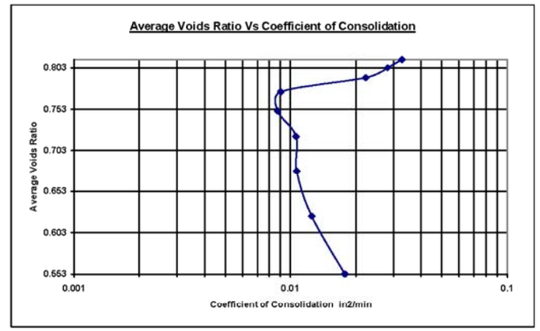
Figure E-35
Sheet 2 of 12

One Dimensional Consolidation Properties (Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc	**Lab Ref**	
Project	CUY-90-14.90	**Job**	G10022G
Borehole	B-022-2-10	**Sample**	ST-19
Location	Cleveland, OH	**Depth**	73.5'

Average Voids Ratio Vs Coefficient of Consolidation



Tested By and Date:	FB/12/22/2010
Checked By and Date:	SS/1/14/2011
Approved By and Date:	WN/1/17/2011

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Figure E-35
Sheet 3 of 12

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

BBCM

SOIL PROFILE
LABORATORY TEST DATA
CUY-90-14.90
46B/116

One Dimensional Consolidation Properties
(Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	**Lab Ref**	
Project	CUY-90-14.90	**Job**	G100022G
Borehole	B-022-2-10	**Sample**	ST-21
Location	Cleveland, OH	**Depth**	83.0'

Test Details			
Standard	ASTM D2435-96 / AASHTO T216-94	**Particle Specific Gravity**	2.71
Sample Type	Thin walled push in sample	**Lab. Temperature**	72.0 deg.F
Method of Testing (A/B)	A		
Sample Description	Gray SILT "and" clay, trace sand		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	A	**Description**	No fissures
Depth within Sample	22.0000in	**Orientation within Sample**	Random
Specimen Mass	0.2920 lb	**Condition**	Inundated
Specimen Height	0.7900 in	**Preparation**	Undisturbed
Comments			

Apparatus			
Ring Number	1	**Ring Diameter**	2.5030 in
Ring Height	0.7900 in	**Ring Weight**	0.1431 lb
Lever Ratio	10.00 : 1	**Drainage**	Double-Sided

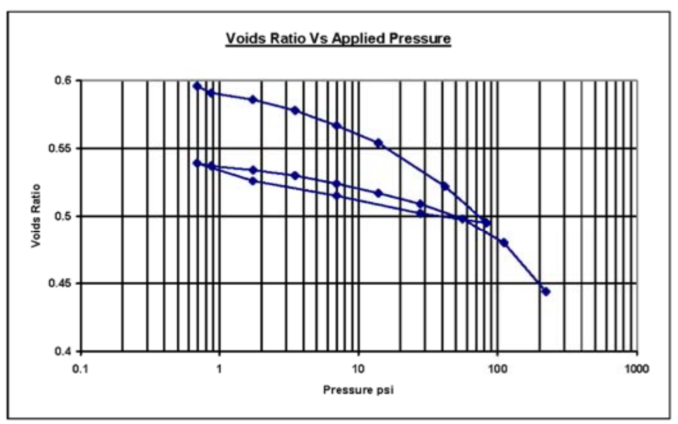


Figure E-36
Sheet 1 of 20

One Dimensional Consolidation Properties
(Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	**Lab Ref**	
Project	CUY-90-14.90	**Job**	G100022G
Borehole	B-022-2-10	**Sample**	ST-21
Location	Cleveland, OH	**Depth**	25.30

Initial Moisture Content*	22.3 % (trimmings: 23.4 %)	**Final Moisture Content**	18.2 %
Initial Bulk Density	129.79 lb/ft3	**Final Bulk Density**	138.66 lb/ft3
Initial Dry Density	106.16 lb/ft3	**Final Dry Density**	117.35 lb/ft3
Initial Void Ratio	0.5960	**Final Void Ratio**	0.4438
Initial Degree of Saturation	101.38%	**Final Degree of Saturation**	111.04%
Seating Pressure	0.69 psi		

* Calculated from initial and dry weights of whole specimen

Pressure (Loading)	Load Increment Duration	Deformation (Corrected)	d_{100} (Corrected)	Coefficient of Consolidation (c_v)
0.00				
0.87 psi	1440.000 min	0.0025 in	0.0019 in	0.00396 in2/min
1.74 psi	1920.000 min	0.0050 in	0.0043 in	0.00522 in2/min
3.48 psi	1260.000 min	0.0088 in	0.0076 in	0.01217 in2/min
6.95 psi	1260.000 min	0.0143 in	0.0129 in	0.01452 in2/min
13.87 psi	1080.000 min	0.0210 in	0.0193 in	0.02378 in2/min
41.62 psi	1440.000 min	0.0368 in	0.0341 in	0.03314 in2/min
83.11 psi	1440.000 min	0.0500 in	0.0463 in	0.04897 in2/min
27.74 psi	1080.000 min	0.0463 in	---------	---------
6.95 psi	2880.000 min	0.0401 in	---------	---------
1.74 psi	1260.000 min	0.0348 in	---------	---------
0.69 psi	1080.000 min	0.0283 in	---------	---------
0.87 psi	302.000 min	0.0294 in	0.0291 in	0.01348 in2/min
1.74 psi	1260.000 min	0.0306 in	0.0303 in	0.01144 in2/min
3.48 psi	1080.000 min	0.0329 in	0.0322 in	0.01562 in2/min
6.95 psi	381.000 min	0.0356 in	0.0353 in	0.01663 in2/min
13.87 psi	762.000 min	0.0392 in	0.0386 in	0.02840 in2/min
27.74 psi	302.000 min	0.0433 in	0.0427 in	0.05330 in2/min
55.55 psi	1680.000 min	0.0488 in	0.0475 in	0.09079 in2/min
111.00 psi	1080.000 min	0.0575 in	0.0548 in	0.07304 in2/min
221.80 psi	1440.000 min	0.0753 in	0.0701 in	0.06865 in2/min

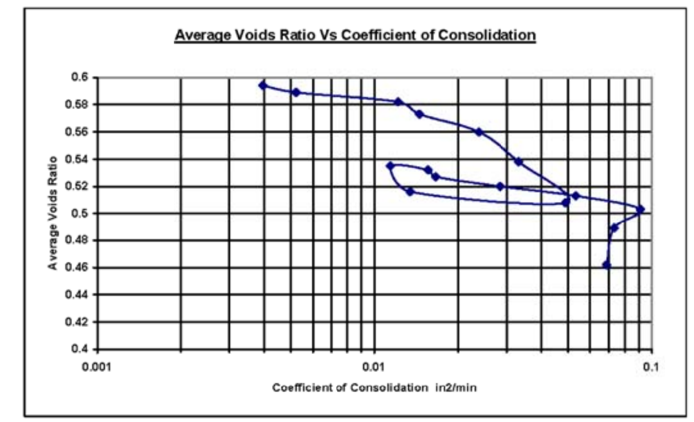
Method of Time Fitting Used	Square Root Time

Figure E-36
Sheet 2 of 20

One Dimensional Consolidation Properties
(Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	**Lab Ref**	
Project	CUY-90-14.90	**Job**	G100022G
Borehole	B-022-2-10	**Sample**	ST-21
Location	Cleveland, OH	**Depth**	83.0'



Tested By and Date:	FB/1/6/2011
Checked By and Date:	SS/1/28/2011
Approved By and Date:	WN/1/31/2011

Figure E-36
Sheet 3 of 20

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

SOIL PROFILE
LABORATORY TEST DATA

CUY-90-14.90

46C / 116

One Dimensional Consolidation Properties (Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	Lab Ref	
Project	CUY-90-14.90	Job	G100022G
Borehole	B-053-2-10	Sample	ST-26
Location	Cleveland, OH	Depth	105.5'

Test Details

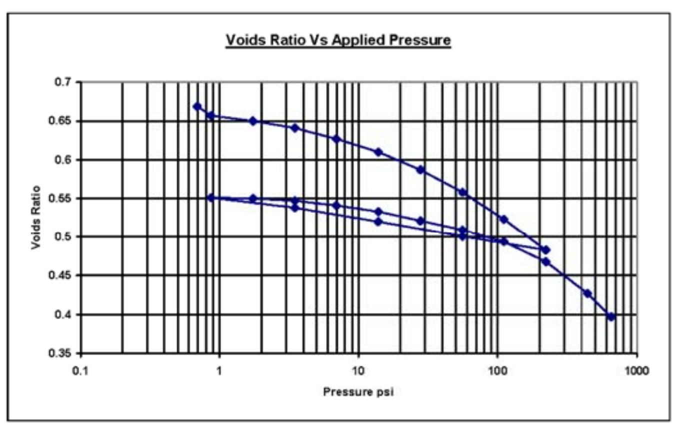
Standard	ASTM D2435-96 / AASHTO T216-94	Particle Specific Gravity	2.73
Sample Type	Thin walled push in sample	Lab. Temperature	72.0 deg.F
Method of Testing (A/B)	B		
Sample Description	Gray SILT "and" clay trace sand trace rock fragments		
Variations from Procedure	None		

Specimen Details

Specimen Reference	A	Description	No fissures
Depth within Sample	20.00in	Orientation within Sample	Random
Specimen Mass	0.2875 lb	Condition	Inundated
Specimen Height	0.7900 in	Preparation	Undisturbed
Comments			

Apparatus

Ring Number	1	Ring Diameter	2.5030 in
Ring Height	0.7900 in	Ring Weight	0.1431 lb
Lever Ratio	10.00 : 1	Drainage	Double-Sided



One Dimensional Consolidation Properties (Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	Lab Ref	
Project	CUY-90-14.90	Job	G100022G
Borehole	B-053-2-10	Sample	ST-26
Location	Cleveland, OH	Depth	105.5'

Initial Moisture Content*	25.1 % (trimmings: 22.5 %)	Final Moisture Content	18.2 %
Initial Bulk Density	127.78 lb/ft3	Final Bulk Density	144.19 lb/ft3
Initial Dry Density	102.11 lb/ft3	Final Dry Density	121.99 lb/ft3
Initial Void Ratio	0.6690	Final Void Ratio	0.3971
Initial Degree of Saturation	102.59%	Final Degree of Saturation	125.13%
Seating Pressure	0.69 psi		

* Calculated from initial and dry weights of whole specimen

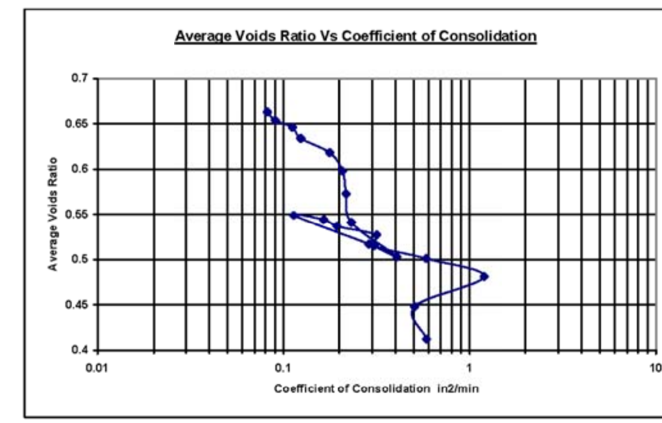
Pressure (Loading)	Load Increment Duration	Deformation (Corrected)	d_{100} (Corrected)	Coefficient of Consolidation (c_v)
0.00				
0.87 psi	960.000 min	0.0058 in	0.0046 in	0.08198 in2/min
1.74 psi	1260.000 min	0.0088 in	0.0076 in	0.09026 in2/min
3.48 psi	605.000 min	0.0133 in	0.0117 in	0.11168 in2/min
6.95 psi	762.000 min	0.0199 in	0.0179 in	0.12382 in2/min
13.87 psi	480.000 min	0.0281 in	0.0258 in	0.17702 in2/min
27.74 psi	1080.000 min	0.0390 in	0.0360 in	0.20811 in2/min
55.55 psi	1260.000 min	0.0524 in	0.0493 in	0.21814 in2/min
111.00 psi	1440.000 min	0.0689 in	0.0653 in	0.23239 in2/min
221.80 psi	960.000 min	0.0879 in	0.0830 in	0.40739 in2/min
55.55 psi	480.000 min	0.0798 in	---------	---------
13.87 psi	1080.000 min	0.0704 in	---------	---------
3.48 psi	302.000 min	0.0619 in	---------	---------
0.87 psi	762.000 min	0.0558 in	---------	---------
1.74 psi	480.000 min	0.0563 in	0.0561 in	0.28895 in2/min
3.48 psi	2160.000 min	0.0578 in	0.0574 in	0.11305 in2/min
6.95 psi	302.000 min	0.0604 in	0.0598 in	0.16441 in2/min
13.87 psi	240.000 min	0.0646 in	0.0638 in	0.19368 in2/min
27.74 psi	762.000 min	0.0699 in	0.0689 in	0.31738 in2/min
55.55 psi	605.000 min	0.0759 in	0.0752 in	0.30870 in2/min
111.00 psi	762.000 min	0.0829 in	0.0818 in	0.58393 in2/min
221.90 psi	960.000 min	0.0953 in	0.0921 in	1.19459 in2/min
441.54 psi	190.000 min	0.1143 in	0.1107 in	0.50681 in2/min

Method of Time Fitting Used	Square Root Time

One Dimensional Consolidation Properties (Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	Lab Ref	
Project	CUY-90-14.90	Job	G100022G
Borehole	B-053-2-10	Sample	ST-26
Location	Cleveland, OH	Depth	105.5'



Tested By and Date:	FB/2/2/2011
Checked By and Date:	SS/2/14/2011
Approved By and Date:	WN/2/14/2011

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

BBCM

SOIL PROFILE
LABORATORY TEST DATA

CUY-90-14.90

One Dimensional Consolidation Properties
(Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	Lab Ref	
Project	CUY-90-14.90	Job	G10022G
Borehole	B-053-2-10	Sample	ST-30
Location	Cleveland, OH	Depth	117.5'

Test Details

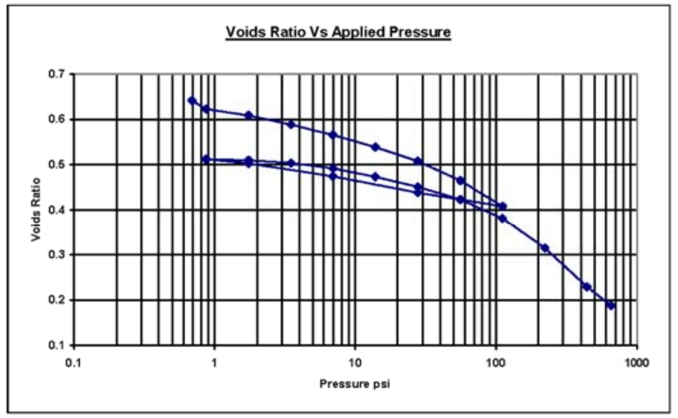
Standard	ASTM D2435-96 / AASHTO T216-94	Particle Specific Gravity	2.746
Sample Type	Thin walled push in sample	Lab. Temperature	72.0 deg.F
Method of Testing (A/B)	B		
Sample Description	Gray SILT AND CLAY trace sand		
Variations from Procedure	None		

Specimen Details

Specimen Reference	B	Description	No fissures
Depth within Sample	16.0000in	Orientation within Sample	Random
Specimen Mass	0.3030 lb	Condition	Inundated
Specimen Height	0.7840 in	Preparation	Undisturbed
Comments			

Apparatus

Ring Number	1	Ring Diameter	2.5030 in
Ring Height	0.7840 in	Ring Weight	0.1431 lb
Lever Ratio	10.00 : 1	Drainage	Double-Sided



Page 1 of 3

Figure E-38
Sheet 1 of 22

One Dimensional Consolidation Properties
(Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	Lab Ref	
Project	CUY-90-14.90	Job	G10022G
Borehole	B-053-2-10	Sample	ST-30
Location	Cleveland, OH	Depth	117.5'

Initial Moisture Content*	30.3 % (trimmings: 28.3 %)	Final Moisture Content	25.1 %
Initial Bulk Density	135.73 lb/ft3	Final Bulk Density	180.14 lb/ft3
Initial Dry Density	104.19 lb/ft3	Final Dry Density	143.99 lb/ft3
Initial Void Ratio	0.6417	Final Void Ratio	0.1880
Initial Degree of Saturation	129.27%	Final Degree of Saturation	365.97%
Seating Pressure	0.69 psi		

* Calculated from initial and dry weights of whole specimen, Note: Final weight of the wet soil was estimated because some soil was pushed out of the ring during consolidation.

Pressure (Loading)	Load Increment Duration	Deformation (Corrected)	d_{100} (Corrected)	Coefficient of Consolidation (c_v)
0.00				
0.87 psi	960.000 min	0.0091 in	0.0065 in	0.10794 in2/min
1.74 psi	302.000 min	0.0154 in	0.0125 in	0.07737 in2/min
3.48 psi	960.000 min	0.0251 in	0.0213 in	0.03959 in2/min
6.95 psi	381.000 min	0.0360 in	0.0326 in	0.01600 in2/min
13.87 psi	1080.000 min	0.0488 in	0.0471 in	0.01178 in2/min
27.74 psi	151.000 min	0.0638 in	0.0611 in	0.01828 in2/min
55.55 psi	1260.000 min	0.0845 in	0.0794 in	0.02554 in2/min
111.00 psi	302.000 min	0.1116 in	0.1062 in	0.02159 in2/min
27.74 psi	605.000 min	0.0973 in	---------	---------
6.95 psi	480.000 min	0.0800 in	---------	---------
1.74 psi	762.000 min	0.0662 in	---------	---------
0.87 psi	480.000 min	0.0621 in	---------	---------
1.74 psi	762.000 min	0.0628 in	0.0627 in	0.01298 in2/min
3.48 psi	302.000 min	0.0655 in	0.0650 in	0.00888 in2/min
6.95 psi	381.000 min	0.0716 in	0.0710 in	0.00752 in2/min
13.87 psi	480.000 min	0.0805 in	0.0794 in	0.01048 in2/min
27.74 psi	151.000 min	0.0912 in	0.0899 in	0.01864 in2/min
55.55 psi	381.000 min	0.1045 in	0.1029 in	0.02532 in2/min
111.00 psi	762.000 min	0.1244 in	0.1207 in	0.02627 in2/min
221.80 psi	190.000 min	0.1561 in	0.1508 in	0.02450 in2/min
441.54 psi	95.000 min	0.1969 in	0.1914 in	0.02853 in2/min
651.67 psi	95.000 min	0.2167 in	0.2118 in	0.03106 in2/min

Method of Time Fitting Used	Square Root Time

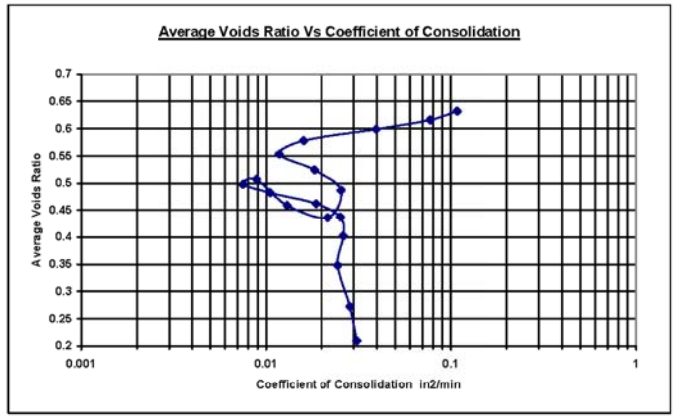
Page 2 of 3

Figure E-38
Sheet 2 of 22

One Dimensional Consolidation Properties
(Oedometer)

Pro Geotech, Inc.

Client	Shannon & Wilson, Inc.	Lab Ref	
Project	CUY-90-14.90	Job	G10022G
Borehole	B-053-2-10	Sample	ST-30
Location	Cleveland, OH	Depth	117.5'



Tested By and Date:	FB/2/17/2011
Checked By and Date:	SS/2/24/2011
Approved By and Date:	WN/2/25/2011

Page 3 of 3

Figure E-38
Sheet 3 of 22

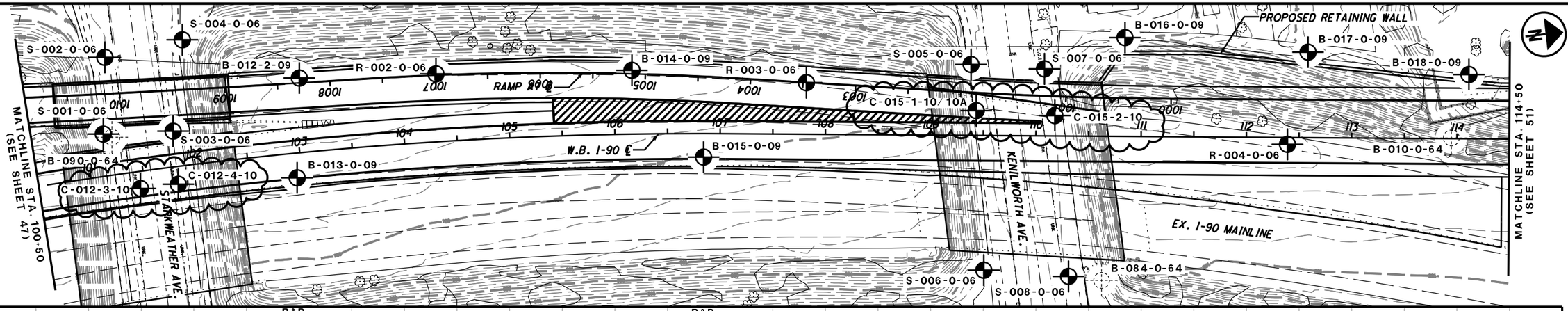
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

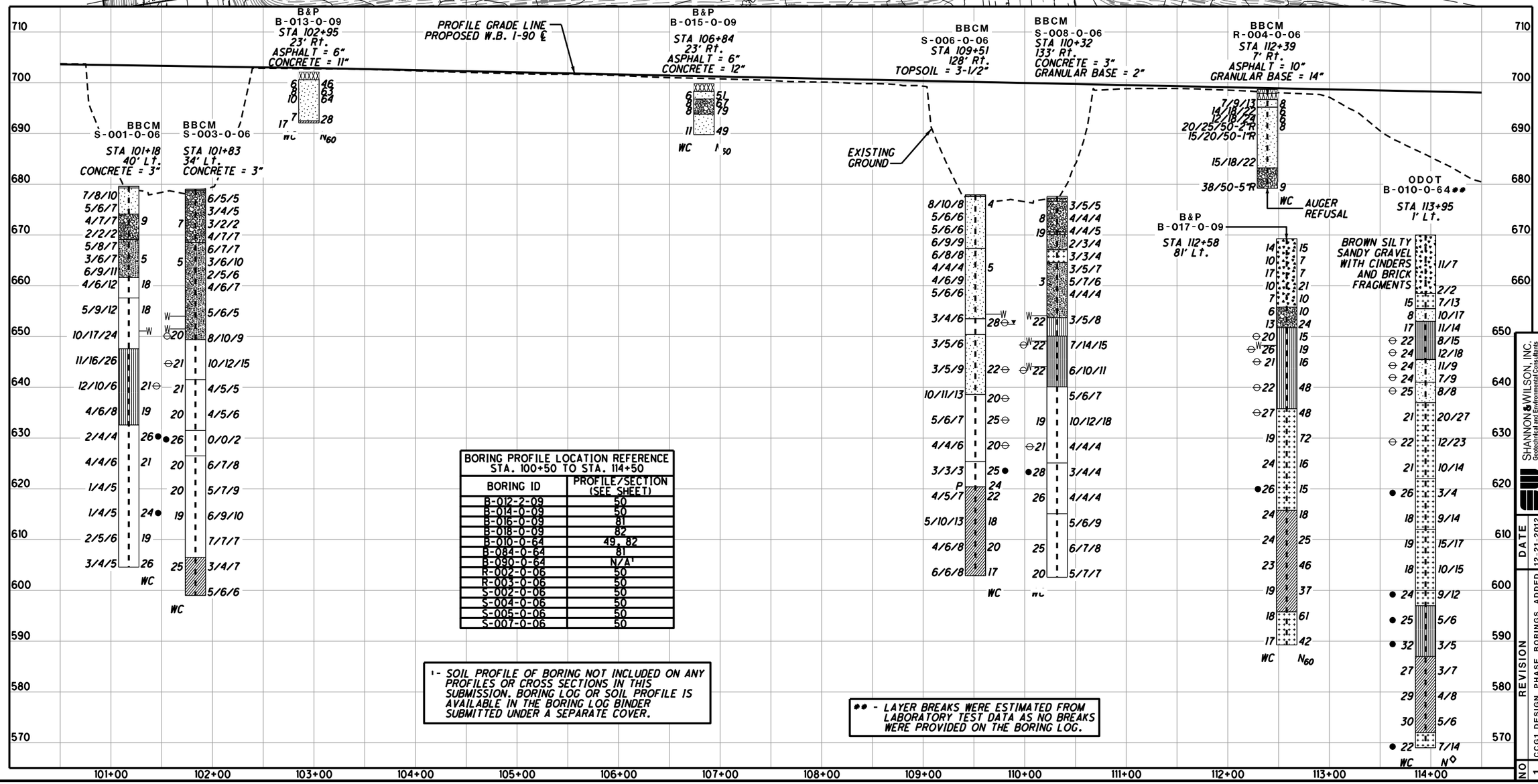
BBCM

SOIL PROFILE
LABORATORY TEST DATA

CUY-90-14.90

46E / 116





BORING PROFILE LOCATION REFERENCE STA. 100+50 TO STA. 114+50	
BORING ID	PROFILE/SECTION (SEE SHEET)
B-012-2-09	50
B-014-0-09	50
B-016-0-09	81
B-018-0-09	82
B-010-0-64	49, 82
B-084-0-64	81
B-090-0-64	N/A'
R-002-0-06	50
R-003-0-06	50
S-002-0-06	50
S-004-0-06	50
S-005-0-06	50
S-007-0-06	50

' - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

** - LAYER BREAKS WERE ESTIMATED FROM LABORATORY TEST DATA AS NO BREAKS WERE PROVIDED ON THE BORING LOG.

BBCM

HORIZONTAL SCALE IN FEET
0 50 100

SOIL PROFILE - W.B. I-90
STA. 100+50 TO STA. 114+50

CUY-90-14.52

49 / 114

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

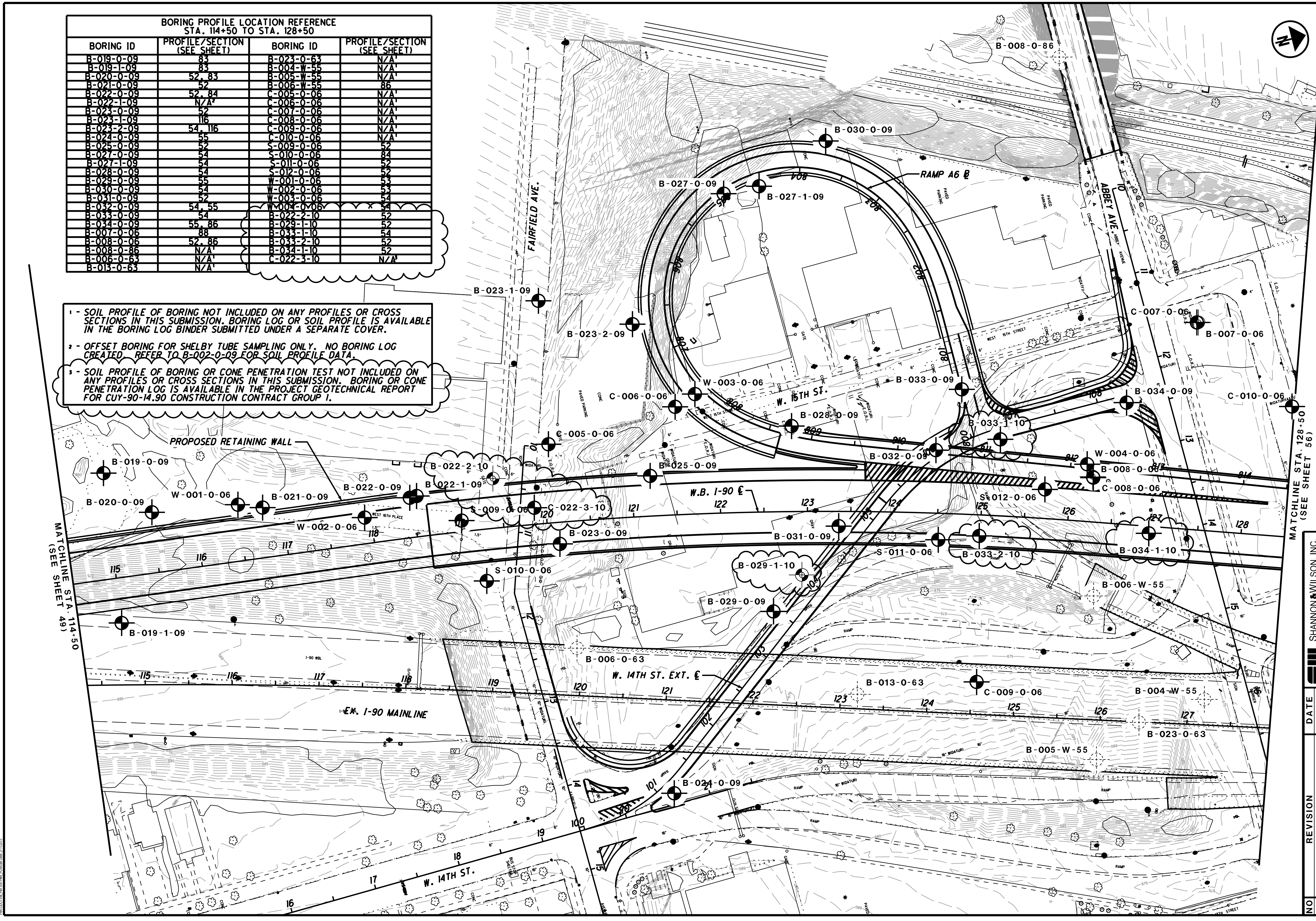
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

BORING PROFILE LOCATION REFERENCE STA. 114+50 TO STA. 128+50			
BORING ID	PROFILE/SECTION (SEE SHEET)	BORING ID	PROFILE/SECTION (SEE SHEET)
B-019-0-09	83	B-023-0-63	N/A[1]
B-019-1-09	83	B-004-W-55	N/A[1]
B-020-0-09	52, 83	B-005-W-55	N/A[1]
B-021-0-09	52	B-006-W-55	86
B-022-0-09	52, 84	C-005-0-06	N/A[1]
B-022-1-09	N/A[2]	C-006-0-06	N/A[1]
B-023-0-09	52	C-007-0-06	N/A[1]
B-023-1-09	116	C-008-0-06	N/A[1]
B-023-2-09	54, 116	C-009-0-06	N/A[1]
B-024-0-09	55	C-010-0-06	N/A[1]
B-025-0-09	52	S-009-0-06	52
B-027-0-09	54	S-010-0-06	84
B-027-1-09	54	S-011-0-06	52
B-028-0-09	54	S-012-0-06	52
B-029-0-09	55	W-001-0-06	53
B-030-0-09	54	W-002-0-06	53
B-031-0-09	52	W-003-0-06	54
B-032-0-09	54, 55	W-004-0-06	54
B-033-0-09	54	B-022-2-10	52
B-034-0-09	55, 86	B-029-1-10	52
B-007-0-06	88	B-033-1-10	54
B-008-0-06	52, 86	B-033-2-10	52
B-008-0-86	N/A[1]	B-034-1-10	52
B-006-0-63	N/A[1]	C-022-3-10	N/A[3]
B-013-0-63	N/A[1]		

1 - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

2 - OFFSET BORING FOR SHELBY TUBE SAMPLING ONLY. NO BORING LOG CREATED. REFER TO B-002-0-09 FOR SOIL PROFILE DATA.

3 - SOIL PROFILE OF BORING OR CONE PENETRATION TEST NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING OR CONE PENETRATION LOG IS AVAILABLE IN THE PROJECT GEOTECHNICAL REPORT FOR CUY-90-14.90 CONSTRUCTION CONTRACT GROUP 1.



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

SOIL PROFILE - W.B. I-90
STA. 114+50 TO STA. 128+50

CUY-90-14.52

START OF W.B. I-90 BRIDGE
STA. 118+64.6

BRIDGE PROFILE
PROPOSED W.B. I-90 ℄

EXISTING GROUND

B&P
B-020-0-09
STA 115+51
70' Lt.
TOPSOIL = 4"

B&P
B-021-0-09
STA 116+78
57' Lt.
CONCRETE = 12"

(Shifted for Clarity)

S&W
B-022-2-10
STA 119+44
57' Lt.

B&P
B-022-0-09
STA 118+47
46' Lt.

BBCM
S-009-0-06
STA 119+02
13' Lt.
CONCRETE = 15"

B&P
B-023-0-09
STA 120+13
25' Rt.
TOPSOIL = 3.6"

B&P
B-025-0-09
STA 121+21
47' Lt.
TOPSOIL = 2.4"

(Shifted for Clarity)

S&W
B-029-1-10
STA 122+93
73' Rt.

B&P
B-031-0-09
STA 123+36
17' Rt.
ASPHALT = 6"

BBCM
S-011-0-06
STA 124+51
31' Rt.
ASPHALT = 3"
CONCRETE = 11"
GRANULAR BASE = 4"

(Shifted for Clarity)

BBCM
S-012-0-06
STA 125+71
34' Lt.
TOPSOIL = 4"

11 COBBLES

BBCM
B-008-0-09
STA 126+25
52' Lt.
TOPSOIL = 8"

(Shifted for Clarity)

S&W
B-034-1-10
STA 127+02
0'

S&W
B-033-2-10
STA 124+99
25' Rt.

WC N60

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 51.

MATCHLINE EL. 530

710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530

115+00 116+00 117+00 118+00 119+00 120+00 121+00 122+00 123+00 124+00 125+00 126+00 127+00 128+00

BBCM

HORIZONTAL SCALE IN FEET
0 50 100

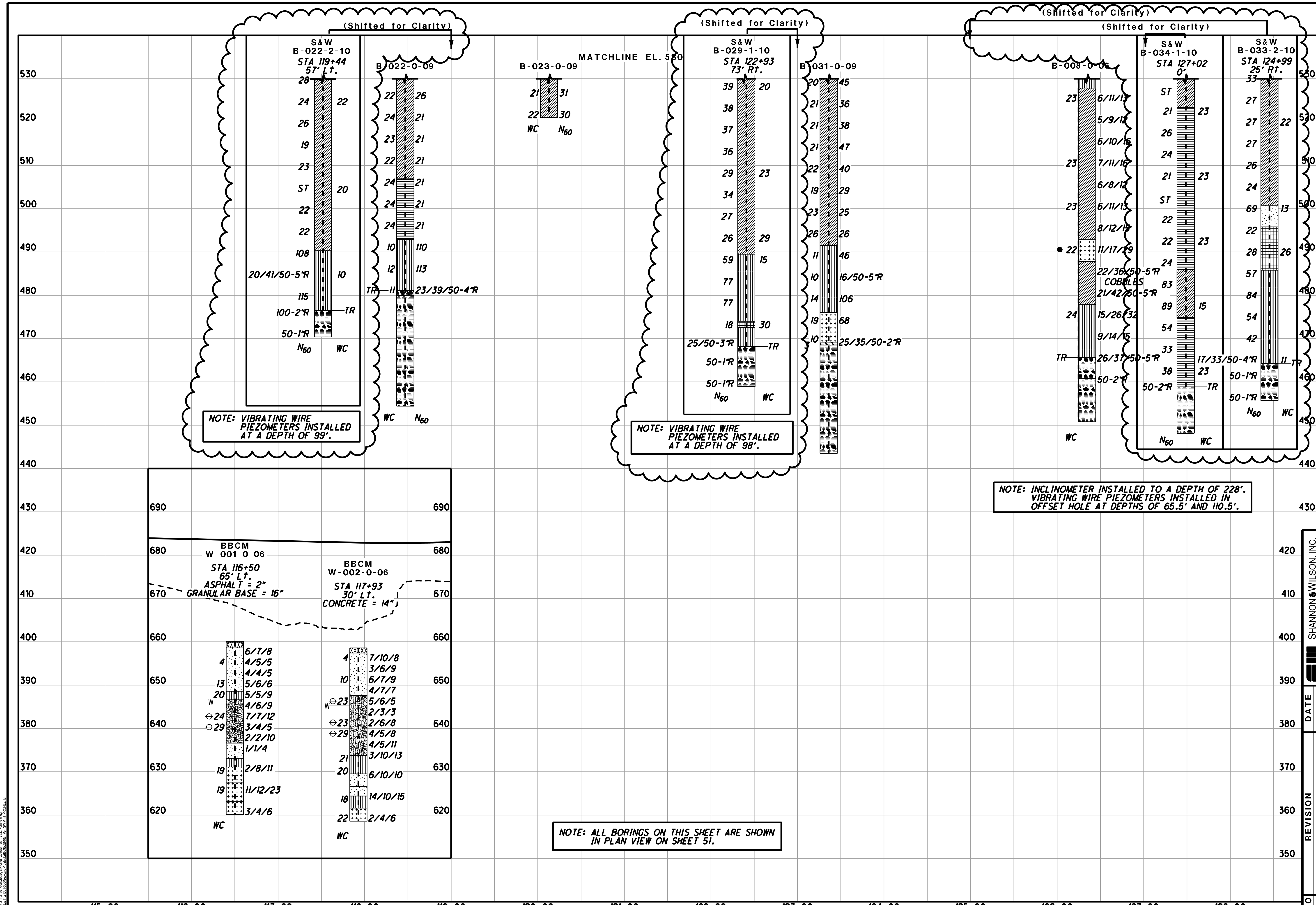
SOIL PROFILE - W.B. I-90
STA. 114+50 TO STA. 128+50

CUY-90-14.52

52 / 114

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012



BBCM

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

SOIL PROFILE - W.B. I-90
STA. 114+50 TO STA. 128+50

CUY-90-14.52

53 / 114

START OF RAMP A6 BRIDGE
STA. 808+63.6

MATCH PROPOSED I-90 W.B.
P.V.I. STA. 809+63.86
ELEV = 698.97'

PROFILE GRADE LINE
PROPOSED RAMP A6 ℄

(Shifted for Clarity)

EXISTING GROUND

SOFT, BROWN, ELASTIC SILT AND CLAY; SLIGHTLY ORGANIC (2.0%)

B&P
B-033-0-09
STA 800+56
On ℄
BERM MATERIAL = 3"

B&P
B-030-0-09
STA 803+79
33' Rt.

B&P
B-027-1-09
STA 804+49
16' Lt.
BERM MATERIAL = 3"

B&P
B-027-0-09
STA 804+96
5' Lt.
TOPSOIL = 8"

B&P
B-023-2-09
STA 806+66
40' Rt.
CONCRETE = 4"
GRANULAR BASE = 4"

BBCM
W-003-0-06
STA 807+57
9' Rt.
TOPSOIL = 3"

B&P
B-028-0-09
STA 808+74
11' Lt.
CONCRETE = 3"
GRANULAR BASE = 3"

B&P
B-032-0-09
STA 810+44
4' Lt.
TOPSOIL = 12"

BBCM
W-004-0-06
STA 812+19
5' Lt.
TOPSOIL = 11"

S&W
B-033-1-10
STA 125+18
88' Lt.

MATCHLINE EL. 530

S&W
B-033-1-10
STA 125+18
88' Lt.

WC N_{60}

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 51.

710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530

800+00 801+00 802+00 803+00 804+00 805+00 806+00 807+00 808+00 809+00 810+00 811+00 812+00 813+00 814+00

BBCM

HORIZONTAL SCALE IN FEET
0 50 100

SOIL PROFILE - RAMP A6
STA. 800+00 TO STA. 814+00

CUY-90-14.52

54 / 114

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

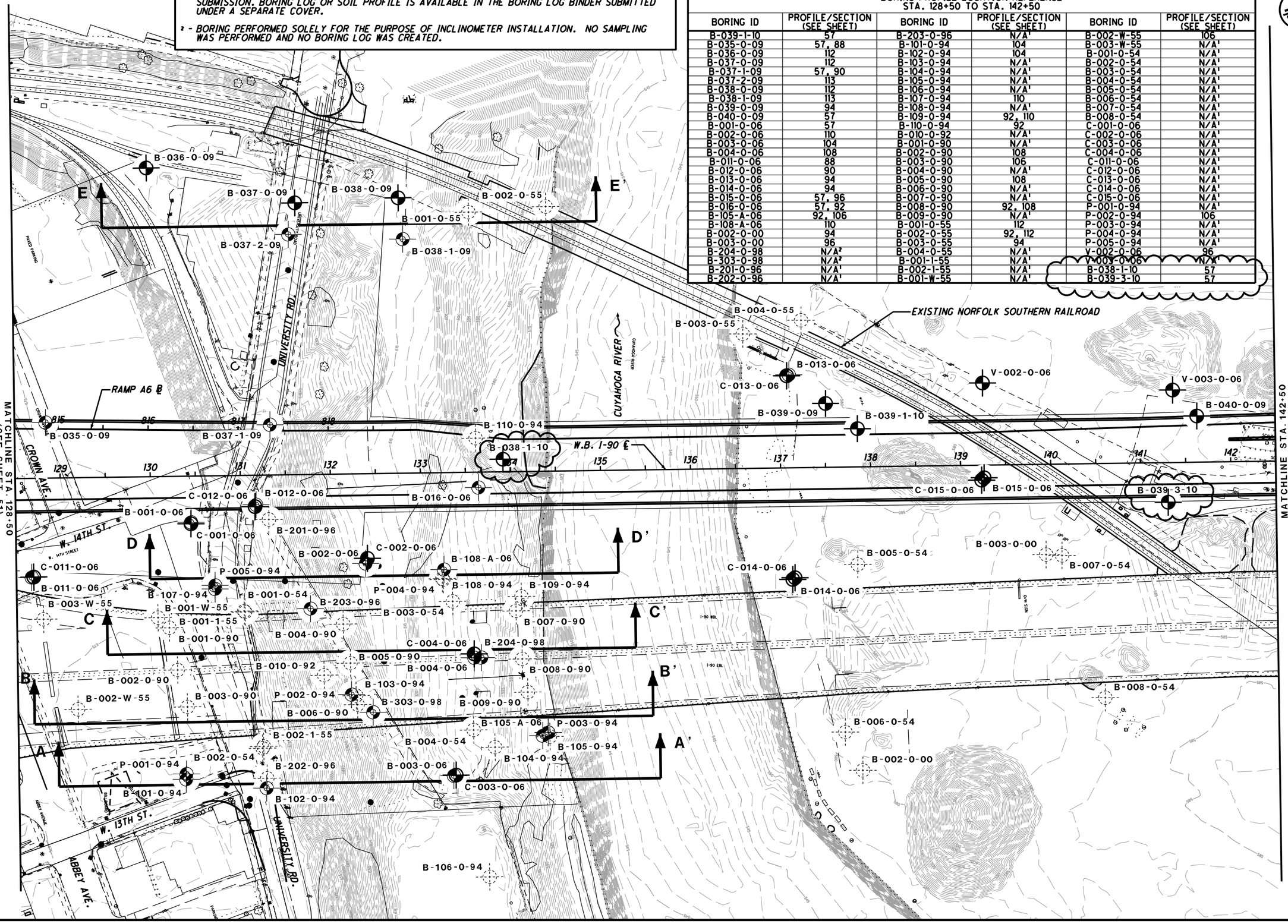
NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

1 - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

2 - BORING PERFORMED SOLELY FOR THE PURPOSE OF INCLINOMETER INSTALLATION. NO SAMPLING WAS PERFORMED AND NO BORING LOG WAS CREATED.

BORING PROFILE LOCATION REFERENCE
STA. 128+50 TO STA. 142+50

BORING ID	PROFILE/SECTION (SEE SHEET)	BORING ID	PROFILE/SECTION (SEE SHEET)	BORING ID	PROFILE/SECTION (SEE SHEET)
B-039-1-10	57	B-203-0-96	N/A[1]	B-002-W-55	106
B-035-0-09	57, 88	B-101-0-94	104	B-003-W-55	N/A[1]
B-036-0-09	112	B-102-0-94	104	B-001-0-54	N/A[1]
B-037-0-09	112	B-103-0-94	N/A[1]	B-002-0-54	N/A[1]
B-037-1-09	57, 90	B-104-0-94	N/A[1]	B-003-0-54	N/A[1]
B-037-2-09	113	B-105-0-94	N/A[1]	B-004-0-54	N/A[1]
B-038-0-09	112	B-106-0-94	N/A[1]	B-005-0-54	N/A[1]
B-038-1-09	113	B-107-0-94	110	B-006-0-54	N/A[1]
B-039-0-09	94	B-108-0-94	N/A[1]	B-007-0-54	N/A[1]
B-040-0-09	57	B-109-0-94	92, 110	B-008-0-54	N/A[1]
B-001-0-06	57	B-110-0-94	92	C-001-0-06	N/A[1]
B-002-0-06	110	B-010-0-92	N/A[1]	C-002-0-06	N/A[1]
B-003-0-06	104	B-001-0-90	N/A[1]	C-003-0-06	N/A[1]
B-004-0-06	108	B-002-0-90	108	C-004-0-06	N/A[1]
B-011-0-06	88	B-003-0-90	106	C-011-0-06	N/A[1]
B-012-0-06	90	B-004-0-90	N/A[1]	C-012-0-06	N/A[1]
B-013-0-06	94	B-005-0-90	108	C-013-0-06	N/A[1]
B-014-0-06	94	B-006-0-90	N/A[1]	C-014-0-06	N/A[1]
B-015-0-06	57, 96	B-007-0-90	N/A[1]	C-015-0-06	N/A[1]
B-016-0-06	57, 92	B-008-0-90	92, 108	P-001-0-94	N/A[1]
B-105-A-06	92, 106	B-009-0-90	N/A[1]	P-002-0-94	106
B-108-A-06	110	B-001-0-55	112	P-003-0-94	N/A[1]
B-002-0-00	94	B-002-0-55	92, 112	P-004-0-94	N/A[1]
B-003-0-00	96	B-003-0-55	94	P-005-0-94	N/A[1]
B-204-0-98	N/A[2]	B-004-0-55	N/A[1]	V-002-0-06	96
B-303-0-98	N/A[2]	B-001-1-55	N/A[1]	V-003-0-06	N/A[1]
B-201-0-96	N/A[1]	B-002-1-55	N/A[1]	B-038-1-10	57
B-202-0-96	N/A[1]	B-001-W-55	N/A[1]	B-039-3-10	57



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

HORIZONTAL SCALE IN FEET
0 50 100

SOIL PROFILE - W.B. I-90
STA. 128+50 TO STA. 142+50

CUY-90-14.52

56 / 114

SOIL PROFILE - W.B. I-90
STA. 128+50 TO STA. 142+50

BRIDGE PROFILE
PROPSED W.B. I-90 ℄

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 56.

BBCM B-035-0-09
STA 128+85
62' Lt.
ASPHALT = 1-3/4"
GRANITE PAVEMENT = 4"
CONCRETE = 10"

BBCM B-001-0-06
STA 130+45
51' Rt.
ASPHALT = 4"
CONCRETE = 9"

BBCM B-037-1-09
STA 131+34
56' Lt.
ASPHALT = 5"
CONCRETE = 7"

(Shifted for Clarity)

BBCM B-016-0-06
STA 133+64
17' Rt.
TOPSOIL/ROOTMAT = 2-1/2"

S&W B-038-1-10
STA 133+92
14' Lt.

EXISTING GROUND

B&P B-039-1-10
STA 137+86
43' Lt.
CONCRETE = 8"

BBCM B-015-0-06
STA 139+26
14' Rt.
GRANULAR BASE = 16"

(Shifted for Clarity)

S&W B-039-3-10
STA 141+30
44' Rt.
CINDERS AND SLAG

B&P B-040-0-09
STA 141+63
51' Lt.
ASPHALT = 4"

MATCHLINE EL. 530

710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530

129+00 130+00 131+00 132+00 133+00 134+00 135+00 136+00 137+00 138+00 139+00 140+00 141+00 142+00

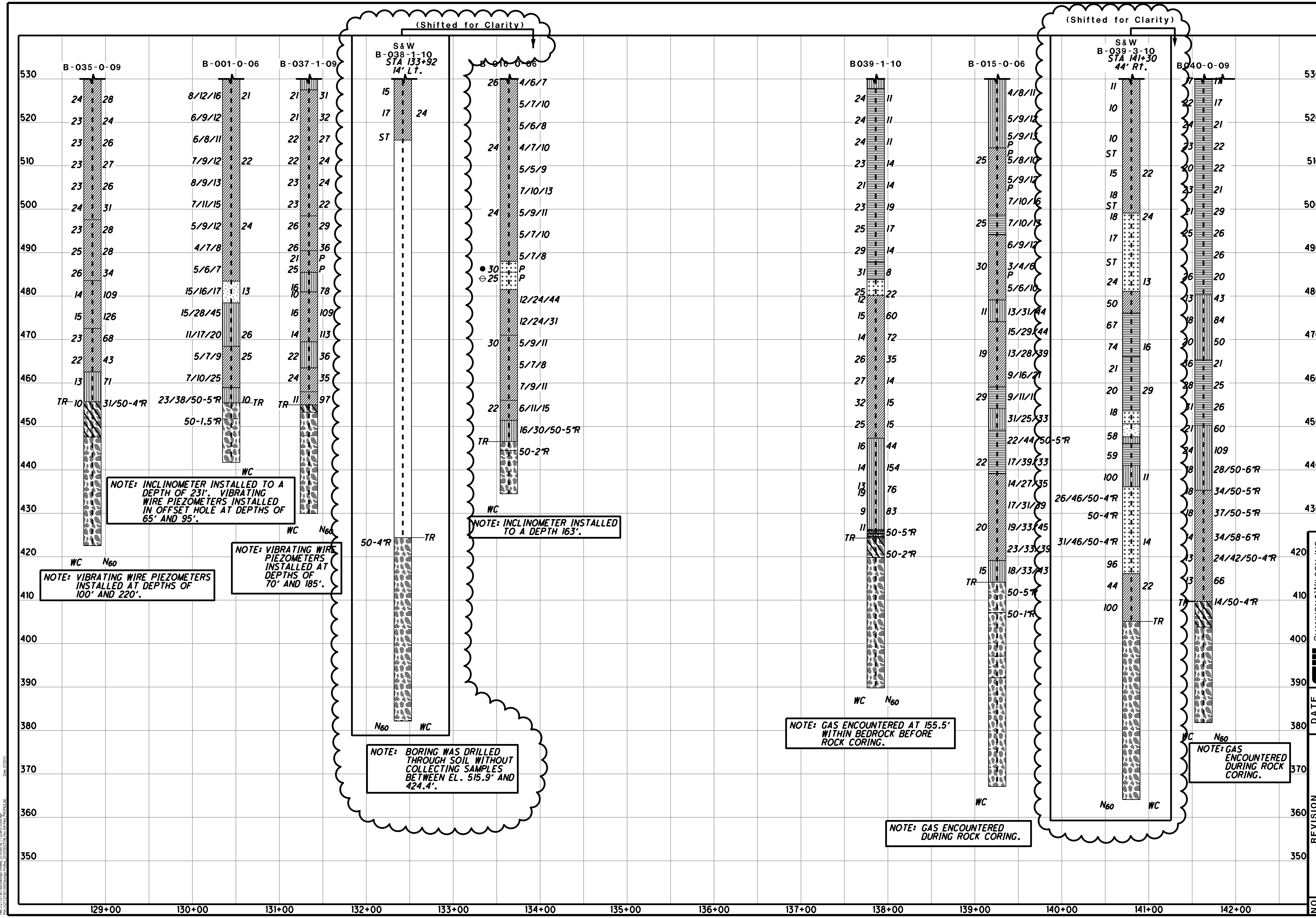
HORIZONTAL SCALE IN FEET
0 50 100

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

57 / 114



BBCM

HORIZONTAL SCALE IN FEET

0 50 100

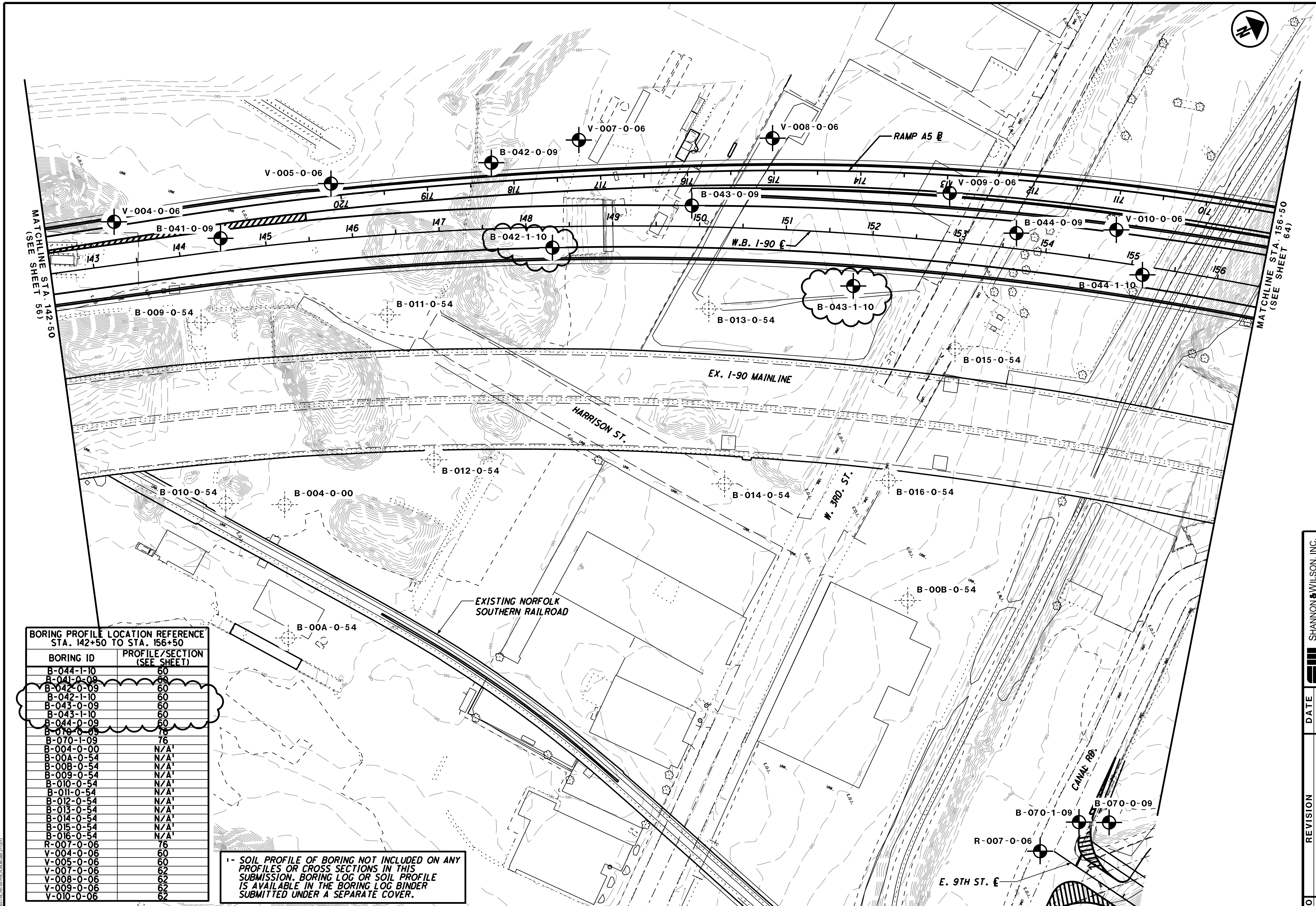
SOIL PROFILE - W.B. I-90
STA. 128+50 TO STA. 142+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

58 / 114



BORING PROFILE LOCATION REFERENCE STA. 142+50 TO STA. 156+50	
BORING ID	PROFILE/SECTION (SEE SHEET)
B-044-1-10	60
B-041-0-09	60
B-042-0-09	60
B-042-1-10	60
B-043-0-09	60
B-043-1-10	60
B-044-0-09	60
B-070-0-09	76
B-070-1-09	76
B-004-0-00	N/A[1]
B-00A-0-54	N/A[1]
B-00B-0-54	N/A[1]
B-009-0-54	N/A[1]
B-010-0-54	N/A[1]
B-011-0-54	N/A[1]
B-012-0-54	N/A[1]
B-013-0-54	N/A[1]
B-014-0-54	N/A[1]
B-015-0-54	N/A[1]
B-016-0-54	N/A[1]
R-007-0-06	76
V-004-0-06	60
V-005-0-06	60
V-007-0-06	62
V-008-0-06	62
V-009-0-06	62
V-010-0-06	62

1 - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

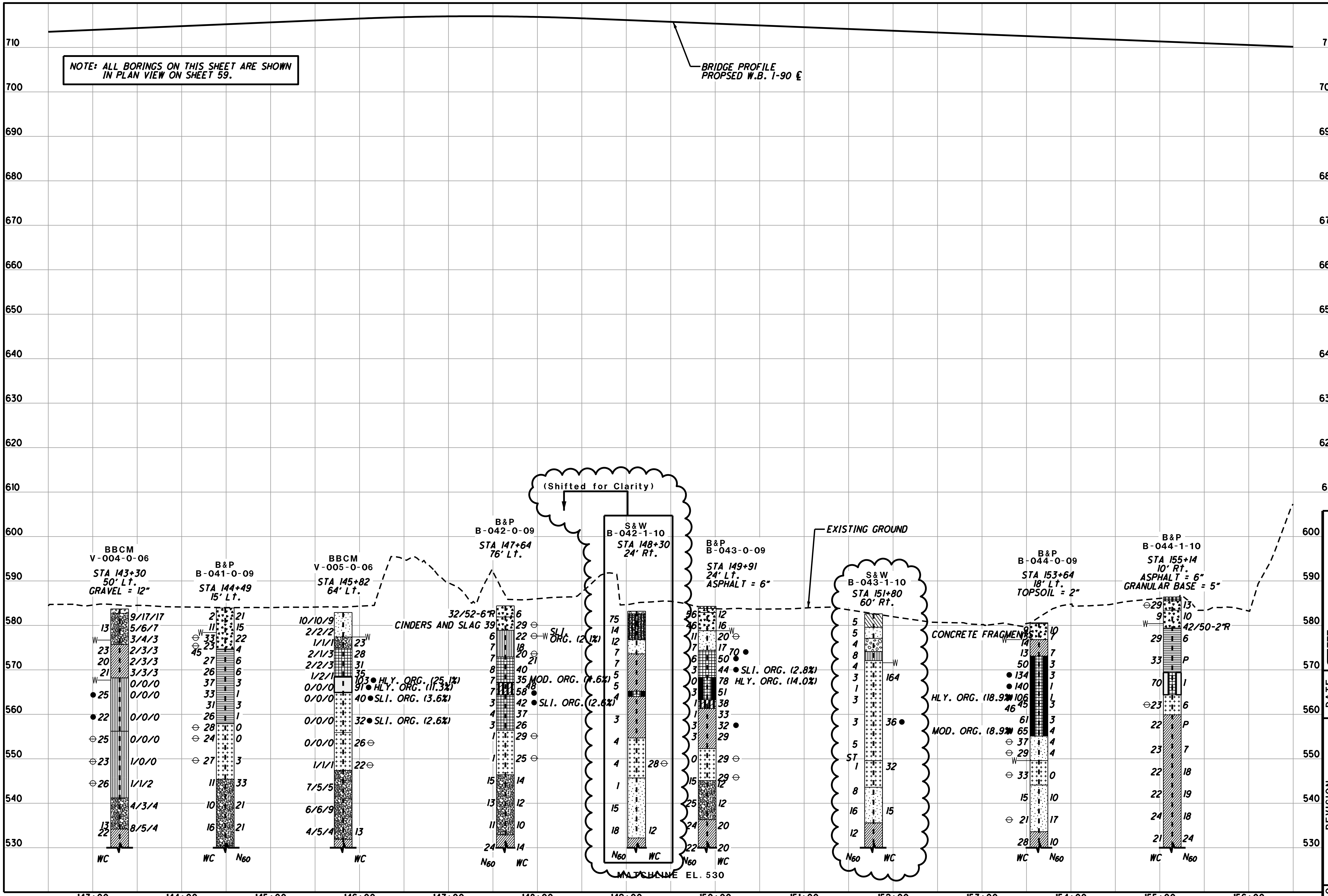
BBCM

SOIL PROFILE - W.B. I-90 STA. 142+50 TO STA. 156+50

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52


NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 59.
BRIDGE PROFILE PROPSED W.B. I-90 ℄
EXISTING GROUND
(Shifted for Clarity)
BBCM V-004-0-06 STA 143+30 50' Lt. GRAVEL = 12"
B&P B-041-0-09 STA 144+49 15' Lt.
BBCM V-005-0-06 STA 145+82 64' Lt.
B&P B-042-0-09 STA 147+64 76' Lt.
S&W B-042-1-10 STA 148+30 24' Rt.
B&P B-043-0-09 STA 149+91 24' Lt. ASPHALT = 6"
S&W B-043-1-10 STA 151+80 60' Rt.
B&P B-044-0-09 STA 153+64 18' Lt. TOPSOIL = 2"
B&P B-044-1-10 STA 155+14 10' Rt. ASPHALT = 6" GRANULAR BASE = 5"
CINDERS AND SLAG
CONCRETE FRAGMENTS
HLY. ORG. (25.1%)
HLY. ORG. (11.3%)
SLI. ORG. (3.6%)
SLI. ORG. (2.6%)
SLI. ORG. (2.1%)
MOD. ORG. (4.6%)
SLI. ORG. (2.6%)
SLI. ORG. (2.8%)
HLY. ORG. (14.0%)
HLY. ORG. (18.9%)
MOD. ORG. (8.9%)
MATCHLINE EL. 530
WC
N60
710
700
690
680
670
660
650
640
630
620
610
600
590
580
570
560
550
540
530
143+00
144+00
145+00
146+00
147+00
148+00
149+00
150+00
151+00
152+00
153+00
154+00
155+00
156+00

BBCM

HORIZONTAL SCALE IN FEET

0 50 100

SOIL PROFILE - W.B. I-90 STA. 142+50 TO STA. 156+50

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

60 / 114

V-004-0-06

21	3/5/6
	3/4/7
22	4/5/6
21	3/5/7
	3/5/6
22	3/5/6
24	3/5/7
	3/5/6
27	3/5/6
28	2/2/3

WC

B-041-0-09

22	8
21	14
21	15
22	20
21	24
21	17
22	18
24	17
29	11
29	4
28	4
18	70
21	53
29	17
31	11
23	15
32	11
12	46
20	45
20	52
24	46
21	32
20	39
20	46
25	31
21	40
19	54
TR	
	50-3"R

WC N60

NOTE: GAS ENCOUNTERED AT 204' DURING ROCK CORING.

V-005-0-06

2/4/6	
2/5/6	24
2/4/6	
2/4/6	24
2/4/7	
2/5/6	24
3/5/7	22
3/4/6	

WC

B-042-0-09

22	20
20	21
20	22
14	22
15	20
18	22
17	12
13	31
6	29
6	26
66	20
45	5
39	20
22	22
24	26
75	15
91	16
31/45/50-5"R	12
84	16
39	22
40	22
57	21
60-6"R	32
20/36/50-4"R	10
	TR
60-6"R	9
50-3"R	12

N60 WC

NOTE: GAS ENCOUNTERED AT 199' DURING ROCK CORING.

(Shifted for Clarity)

S&W B-042-1-10

30	
ST	
24	21
20	
20	
ST	
23	23
22	
15	
8	28
ST	
103	8
76	
51	
31	17
ST	
41	
127	
47	
14/35/50-5"R	
92	12
73	
41	21
39	
47	27
26/53/50-5"R	
50-2"R	TR

N60 WC

MATCHLINE EL. 530

B-043-0-09

22	20
24	21
22	20
18	22
17	23
18	23
20	23
24	22
29	15
39	11
46	12
72	17
41	21
31	26
25	15
53	15
72	18
72	16
53	19
50-4"R	8
128	6
	TR
50-4"R	6

N60 WC

NOTE: GAS ENCOUNTERED AT 200' DURING ROCK CORING.

S&W B-043-1-10

18	21
ST	
18	
ST	
14	24
16	
23	
15	26
9	
ST	
14	
12	28
34	
75	
136	
107	10
57	
51	
69	
57	15
81	
66	
50-3"R	13
50-4"R	

TR

N60 WC

B-044-0-09

17	16
22	24
22	21
20	21
23	18
14	56
24	23
23	23
30	11
27	14
35	6
22	
12	83
14	34/57-6"R
⊖20	27/44/50-2"R
⊖23	85
13	63
⊖27	44
20	78
21	56
12	65
TR	22/50-6"R
6	
9	

WC N60

B-044-1-10

22	24
20	22
15	22
22	18
22	17
20	18
22	18
23	22
24	18
24	17
31	21
11	70
12	83
12	
19	70
19	104
12	63
16	101
21	
9	72
24	64
19	93
TR	11
7	35/50-4"R

WC N60

NOTE: GAS ENCOUNTERED AT 159' DURING DRILLING.

530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370 360 350

143+00 144+00 145+00 146+00 147+00 148+00 149+00 150+00 151+00 152+00 153+00 154+00 155+00 156+00

BBCM

HORIZONTAL SCALE IN FEET
0 50 100

SOIL PROFILE - W.B. I-90
STA. 142+50 TO STA. 156+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

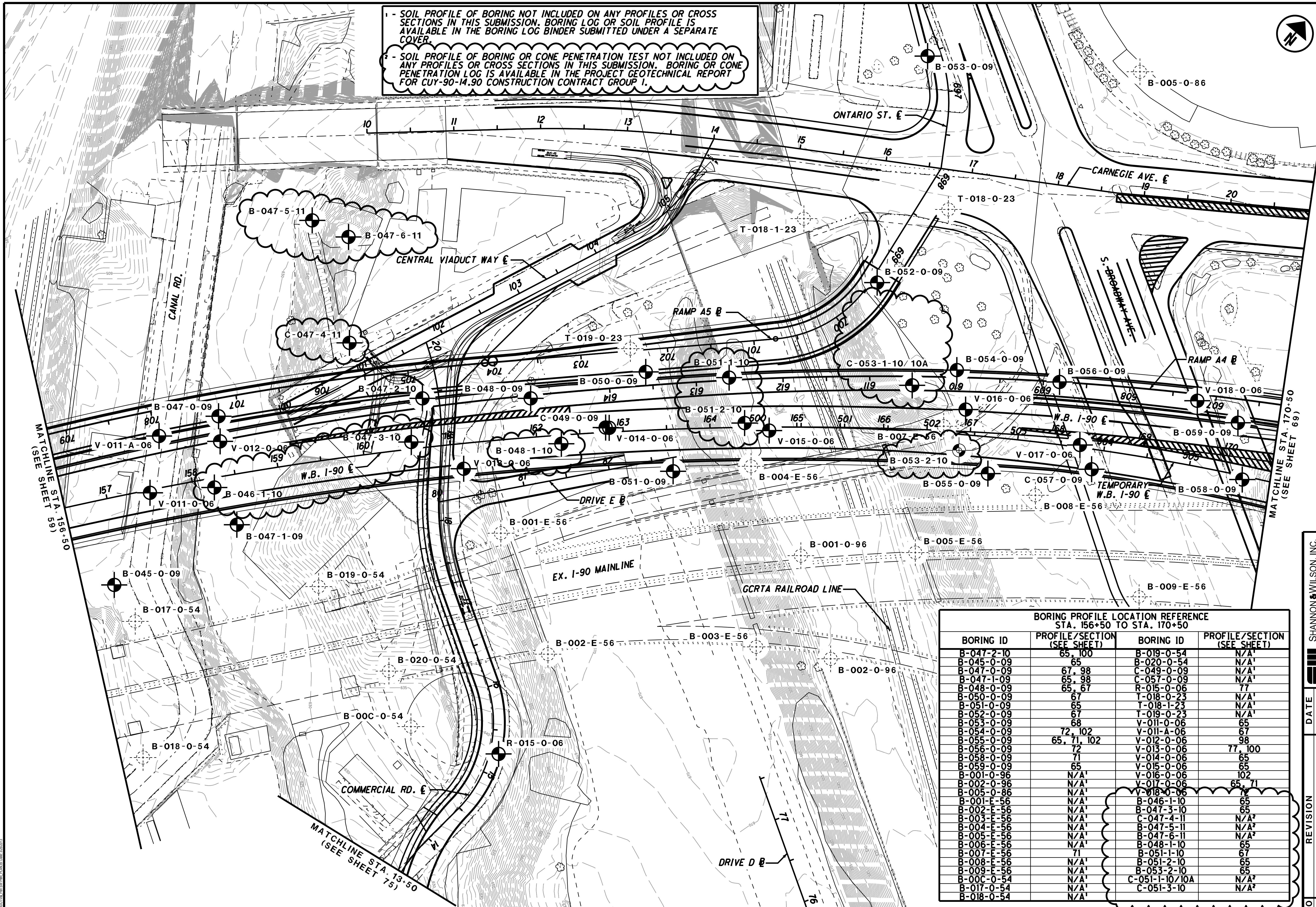
NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

61 / 114

1 - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

2 - SOIL PROFILE OF BORING OR CONE PENETRATION TEST NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING OR CONE PENETRATION LOG IS AVAILABLE IN THE PROJECT GEOTECHNICAL REPORT FOR CUY-90-14.90 CONSTRUCTION CONTRACT GROUP 1.



BORING PROFILE LOCATION REFERENCE
STA. 156+50 TO STA. 170+50

BORING ID	PROFILE/SECTION (SEE SHEET)	BORING ID	PROFILE/SECTION (SEE SHEET)
B-047-2-10	65, 100	B-019-0-54	N/A[1]
B-045-0-09	65	B-020-0-54	N/A[1]
B-047-0-09	67, 98	C-049-0-09	N/A[1]
B-047-1-09	65, 98	C-057-0-09	N/A[1]
B-048-0-09	65, 67	R-015-0-06	77
B-050-0-09	67	T-018-0-23	N/A[1]
B-051-0-09	65	T-018-1-23	N/A[1]
B-052-0-09	67	T-019-0-23	N/A[1]
B-053-0-09	68	V-011-0-06	65
B-054-0-09	72, 102	V-011-A-06	67
B-055-0-09	65, 71, 102	V-012-0-06	98
B-056-0-09	72	V-013-0-06	77, 100
B-058-0-09	71	V-014-0-06	65
B-059-0-09	65	V-015-0-06	65
B-001-0-96	N/A[1]	V-016-0-06	102
B-002-0-96	N/A[1]	V-017-0-06	65, 71
B-005-0-86	N/A[1]	V-018-0-06	72
B-001-E-56	N/A[1]	B-046-1-10	65
B-002-E-56	N/A[1]	B-047-3-10	65
B-003-E-56	N/A[1]	C-047-4-11	N/A[2]
B-004-E-56	N/A[1]	B-047-5-11	N/A[2]
B-005-E-56	N/A[1]	B-047-6-11	N/A[2]
B-006-E-56	N/A[1]	B-048-1-10	65
B-007-E-56	71	B-051-1-10	67
B-008-E-56	N/A[1]	B-051-2-10	65
B-009-E-56	N/A[1]	B-053-2-10	65
B-00C-0-54	N/A[1]	C-051-1-10/10A	N/A[2]
B-017-0-54	N/A[1]	C-051-3-10	N/A[2]
B-018-0-54	N/A[1]		

BBCM

HORIZONTAL SCALE IN FEET (0, 50, 100)

SOIL PROFILE - W.B. I-90
STA. 156+50 TO STA 170+50

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 64.

NOTE: V-011-0-06 ABANDONED DUE TO STRONG PETROLEUM ODOR FROM 8.5' TO 13.0'. SEE OFFSET BOREHOLE V-011-A-06 ON SHEET 67 FOR CONTINUATION OF PROFILE DATA.

BRIDGE PROFILE
PROPOSED W.B. I-90 ℄

EXISTING GROUND

(Shifted for Clarity)

BBCM V-011-0-06
STA 157+50
3' Rt.
ASPHALT = 1"
GRANITE PAVER = 6"
SAND = 1"
CONCRETE = 6"

B&P B-047-1-09
STA 158+42
58' Rt.

S&W B-046-1-10
STA 158+24
11' Rt.

B&P B-045-0-09
STA 156+87
99' Rt.
50-4"Ø

STRONG PETROLEUM ODOR NOTED FROM 9.5' TO 13.0'.

S&W B-047-3-10
STA 160+56
8' Lt.

B&P B-047-2-10
STA 160+75
56' Lt.
CONCRETE = 8"

B&P B-048-0-09
STA 161+97
45' Lt.
GRAVEL = 16.8"

BBCM V-014-0-06
STA 162+84
6' Lt.
ASPHALT = 2"
CONCRETE = 10"
GRANULAR BASE = 6"

B&P B-051-0-09
STA 163+56
48' Rt.

S&W B-048-1-10
STA 162+28
10' Rt.

BBCM V-015-0-06
STA 164+68
4' Rt.
TOPSOIL = 42"

S&W B-051-2-10
STA 164+40
6' Lt.

B&P B-055-0-09
STA 167+23
47' Rt.
TOPSOIL = 2.4"

BBCM V-017-0-06
STA 168+27
6' Rt.

S&W B-053-2-10
STA 166+88
22' Rt.

B&P B-059-0-09
STA 170+04
39' Lt.
TOPSOIL = 6"

365 Lt. Org. 6 (2.6%)

MATCHLINE EL. 520

Elevation 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530 520

157+00 158+00 159+00 160+00 161+00 162+00 163+00 164+00 165+00 166+00 167+00 168+00 169+00 170+00

N_{60} WC

BBCM

HORIZONTAL SCALE IN FEET
0 50 100

SOIL PROFILE - W.B. I-90
STA. 156+50 TO STA. 170+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

65 / 114

1

(Shifted for Clarity)

(Shifted for Clarity)

(Shifted for Clarity)

(Shifted for Clarity)

(Shifted for Clarity)

MATCHLINE EL. 520

B-045-0-09

B-047-1-09

S&W B-046-1-10 STA 158+24 11' Rt.

S&W B-047-3-10 STA 160+56 8' Lt.

B-047-2-10

S&W B-048-1-10 STA 162+28 10' Rt.

S&W B-051-2-10 STA 164+40 6' Lt.

S&W B-053-2-10 STA 166+88 22' Rt.

NOTE: VIBRATING WIRE PIEZOMETER INSTALLED AT A DEPTH OF 62'.

520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370 360 350 340

157+00 158+00 159+00 160+00 161+00 162+00 163+00 164+00 165+00 166+00 167+00 168+00 169+00 170+00

HORIZONTAL SCALE IN FEET 0 50 100

BBGM

SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

SOIL PROFILE - W.B. I-90
STA. 156+50 TO STA. 170+50

CUY-90-14.52

66 / 114

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 64.

BRIDGE PROFILE
PROPOSED RAMP A5 ℄

EXISTING GROUND

B&P
B-047-0-09
STA 707+24
21' Lt.
BROKEN CONCRETE AND GRAVEL = 12 INCHES

BBCM
V-011-A-06
STA 707+96
30' Lt.
ASPHALT = 14"

B&P
B-048-0-09
STA 703+62
45' Lt.
GRAVEL = 16.8"

B&P
B-050-0-09
STA 702+27
25' Lt.
ASPHALT = 2.4"

S&W
B-051-1-10
STA 701+32
40' Lt.

B&P
B-052-0-09
STA 699+39
8' Lt.
TOPSOIL = 2.5"

MATCHLINE EL. 520
B-047-0-09

MATCHLINE EL. 520

MATCHLINE EL. 520
S&W
B-051-1-10
STA 701+32
40' Lt.

700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530 520

710+00 709+00 708+00 707+00 706+00 705+00 704+00 703+00 702+00 701+00 700+00 699+00 698+00

HORIZONTAL SCALE IN FEET
0 50 100

BBCM

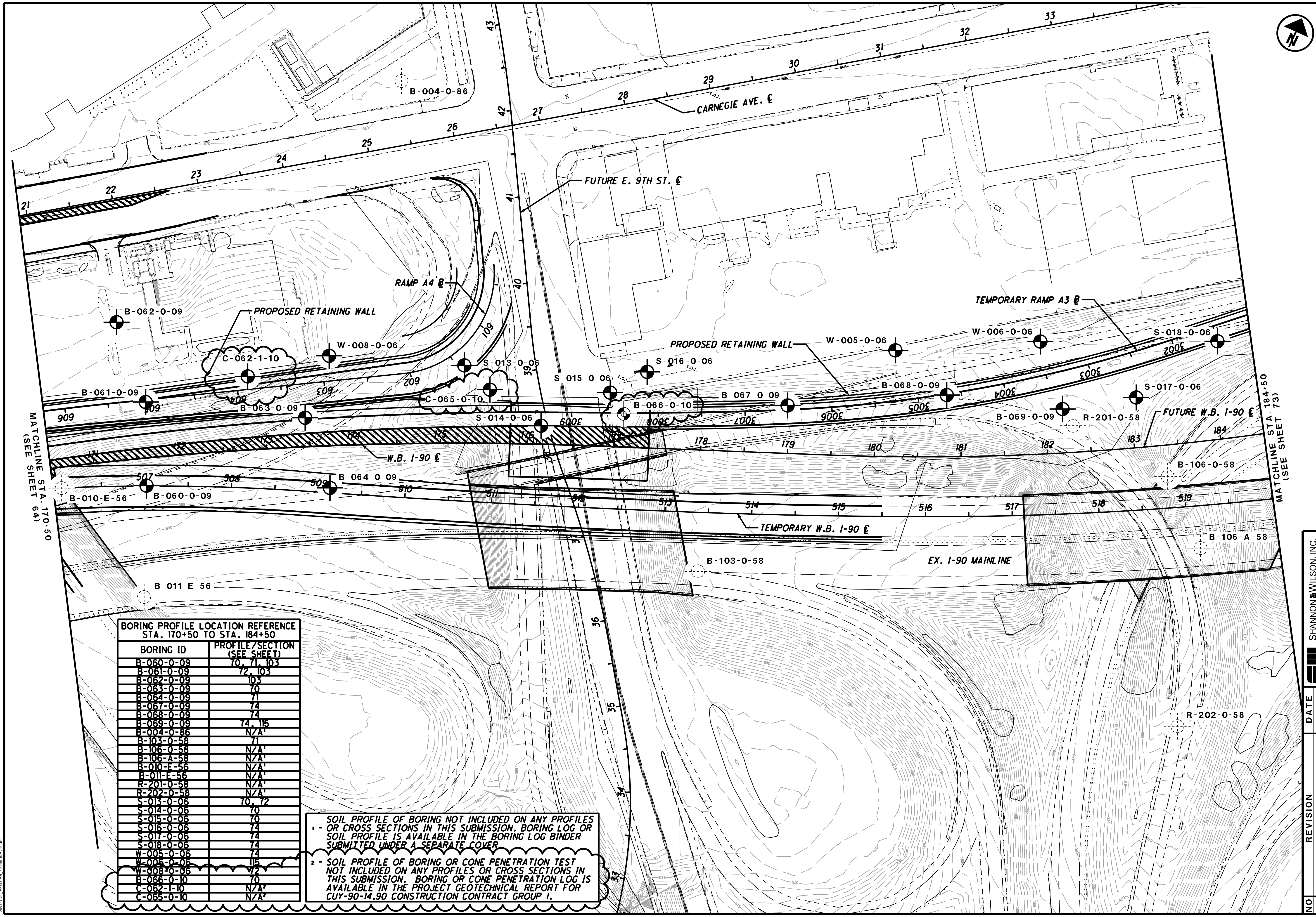
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

SOIL PROFILE - RAMP A5
STA. 697+89.30 TO STA. 709+21

CUY-90-14.52

67 / 114

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012



BORING PROFILE LOCATION REFERENCE STA. 170+50 TO STA. 184+50

BORING ID	PROFILE/SECTION (SEE SHEET)
B-060-0-09	70, 71, 103
B-061-0-09	72, 103
B-062-0-09	103
B-063-0-09	70
B-064-0-09	71
B-067-0-09	74
B-068-0-09	74
B-069-0-09	74, 115
B-004-0-86	N/A[1]
B-103-0-58	71
B-106-0-58	N/A[1]
B-106-A-58	N/A[1]
B-010-E-56	N/A[1]
B-011-E-56	N/A[1]
R-201-0-58	N/A[1]
R-202-0-58	N/A[1]
S-013-0-06	70, 72
S-014-0-06	70
S-015-0-06	70
S-016-0-06	74
S-017-0-06	74
S-018-0-06	74
W-005-0-06	74
W-006-0-06	115
W-008-0-06	72
B-066-0-10	70
C-062-1-10	N/A[2]
C-065-0-10	N/A[2]

1 - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

2 - SOIL PROFILE OF BORING OR CONE PENETRATION TEST NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING OR CONE PENETRATION LOG IS AVAILABLE IN THE PROJECT GEOTECHNICAL REPORT FOR CUY-90-14.90 CONSTRUCTION CONTRACT GROUP 1.

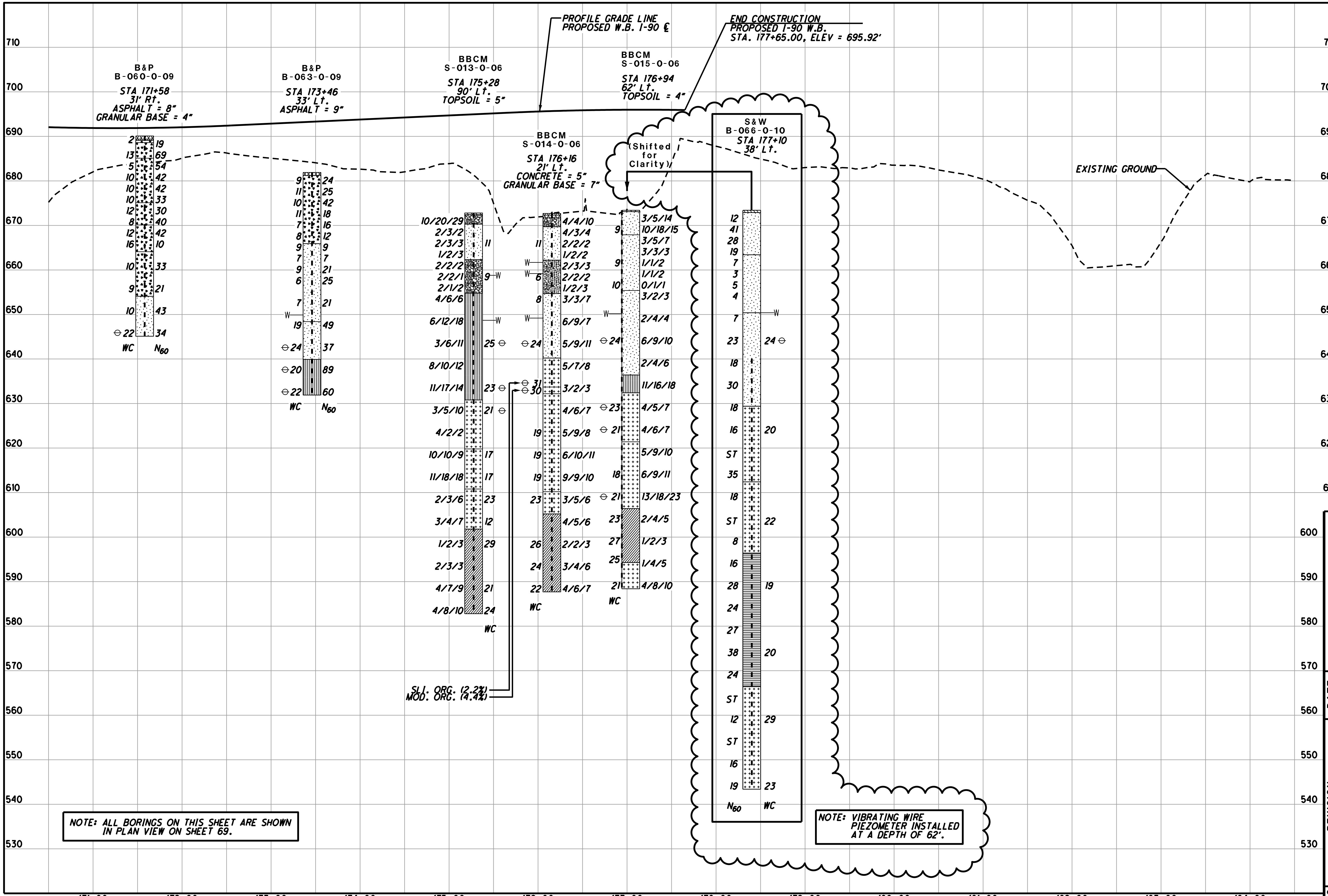
BBCM

SOIL PROFILE - W.B. I-90
STA. 170+50 TO STA. 184+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52



BBCM

HORIZONTAL SCALE IN FEET
0 50 100

SOIL PROFILE - W.B. I-90
STA. 170+50 TO STA. 177+65

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

70/114

R-022-0-06
R-023-0-06
R-018-0-06
E. 14TH ST.
E. 18TH ST.
CENTRAL AVE.
CARNEGIE AVE.
W-007-0-06
TEMPORARY RAMP A3 ℄
S-023-0-06
S-022-0-06
S-020-0-06
S-021-0-06
S-019-0-06
R-005-0-06
FUTURE W.B. I-90 ℄
R-006-0-06
R-017-0-06
MATCHLINE STA. 184+50
(SEE SHEET 69)
R-204-0-58
TEMPORARY W.B. I-90 ℄
EX. I-90 MAINLINE
B-111-0-58
B-069-3-10
B-069-1-10
B-069-2-10
B-114-0-58

1- SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

BORING PROFILE LOCATION REFERENCE
STA. 184+50 TO END

BORING ID	PROFILE/SECTION (SEE SHEET)
B-069-1-10	73A
B-069-2-10	73A
B-111-0-58	N/A[1]
B-114-0-58	N/A[1]
R-005-0-06	N/A[1]
R-006-0-06	N/A[1]
R-017-0-06	N/A[1]
R-018-0-06	N/A[1]
R-022-0-06	N/A[1]
R-023-0-06	N/A[1]
R-204-0-58	N/A[1]
S-019-0-06	114
S-020-0-06	74, 114
S-021-0-06	N/A[1]
S-022-0-06	N/A[1]
S-023-0-06	N/A[1]
W-007-0-06	74
B-069-3-10	73A

BBGM

HORIZONTAL SCALE IN FEET
0 50 100

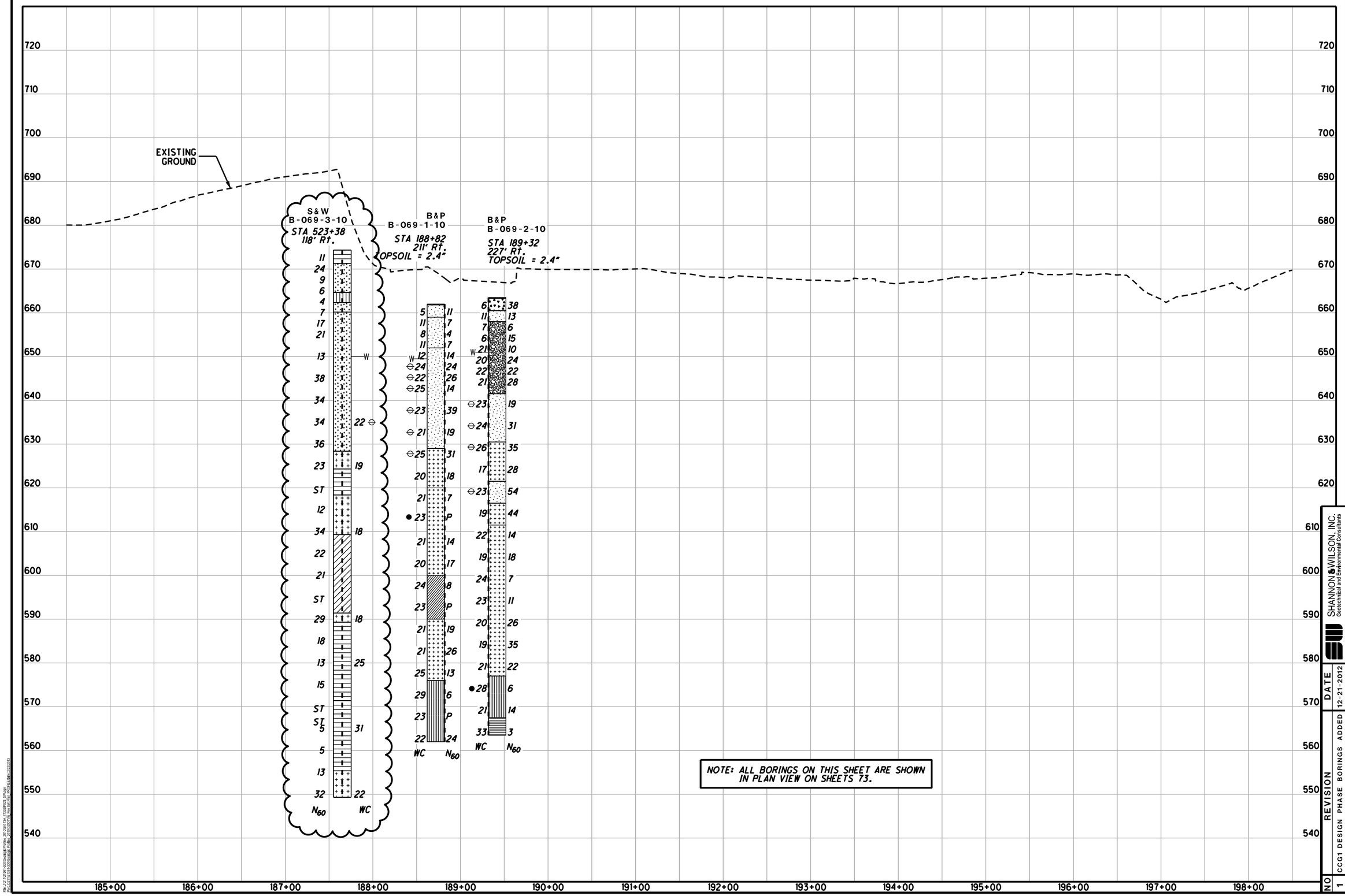
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

SOIL PROFILE - W.B. I-90
STA. 184+50 TO END

CUY-90-14.52

73 / 114

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012



NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEETS 73.

BBCM

HORIZONTAL SCALE IN FEET
0 50 100

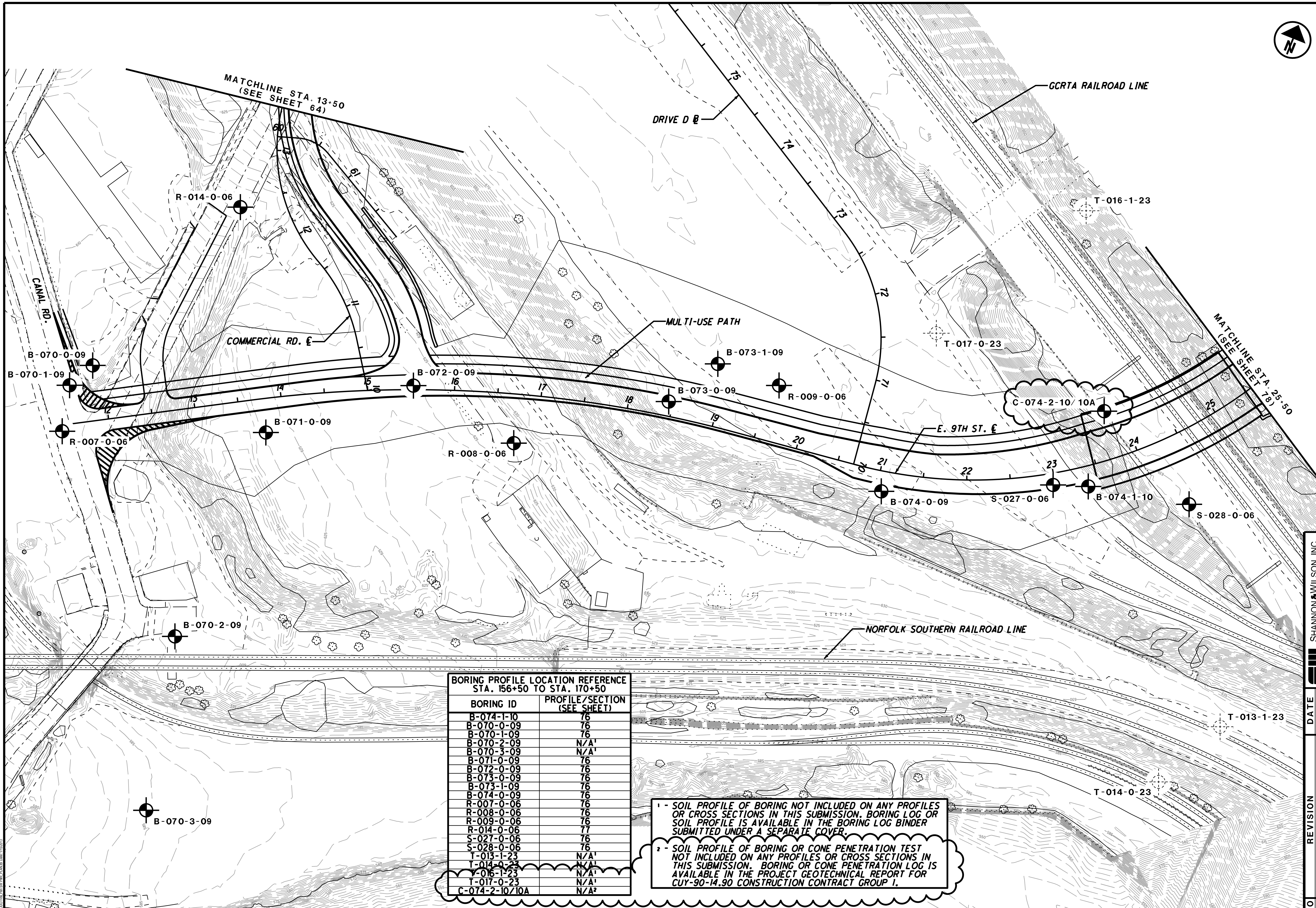
SOIL PROFILE - W.B. I-90
STA. 184+50 TO STA. 198+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.90

73A / 116



BORING PROFILE LOCATION REFERENCE STA. 156+50 TO STA. 170+50

BORING ID	PROFILE/SECTION (SEE SHEET)
B-074-1-10	76
B-070-0-09	76
B-070-1-09	76
B-070-2-09	N/A[1]
B-070-3-09	N/A[1]
B-071-0-09	76
B-072-0-09	76
B-073-0-09	76
B-073-1-09	76
B-074-0-09	76
R-007-0-06	76
R-008-0-06	76
R-009-0-06	76
R-014-0-06	77
S-027-0-06	76
S-028-0-06	76
T-013-1-23	N/A[1]
T-014-0-23	N/A[1]
T-016-1-23	N/A[1]
T-017-0-23	N/A[1]
C-074-2-10/10A	N/A[2]

1 - SOIL PROFILE OF BORING NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING LOG OR SOIL PROFILE IS AVAILABLE IN THE BORING LOG BINDER SUBMITTED UNDER A SEPARATE COVER.

2 - SOIL PROFILE OF BORING OR CONE PENETRATION TEST NOT INCLUDED ON ANY PROFILES OR CROSS SECTIONS IN THIS SUBMISSION. BORING OR CONE PENETRATION LOG IS AVAILABLE IN THE PROJECT GEOTECHNICAL REPORT FOR CUY-90-14.90 CONSTRUCTION CONTRACT GROUP 1.

BBCM

SOIL PROFILE - E. 9TH ST.
STA. 11+54.79 TO STA 25+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.52

* - PROFILE DATA PRESENTED HAS BEEN INTERPRETED FROM ORIGINAL SOIL PROFILE DRAWINGS THAT CONTAINED LIMITED INFORMATION NOT IN ACCORDANCE WITH CURRENT ODOT STANDARDS. A BORING LOG WAS NOT AVAILABLE.

BRIDGE SECTION
PROPOSED W.B. I-90

EXISTING GROUND

B&P
B-034-0-09
STA 126+57
140' Lt.
BERM MATERIAL = 4"

WC N_{60}

BBCM
B-008-0-06
STA 126+25
52' Lt.
TOPSOIL = 8"

S&W
B-034-1-10
STA 127+02
0'

HNTB
B-006-W-55*
STA 126+36
85' Rt.

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 51.

MATCHLINE EL. 550

730 720 710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550

400' 300' 200' 100' ℄ 100' 200' 300' 400'

HORIZONTAL SCALE IN FEET
0 30 60

SOIL PROFILE - W.B. I-90
CROSS SECTION STA. 126+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.90

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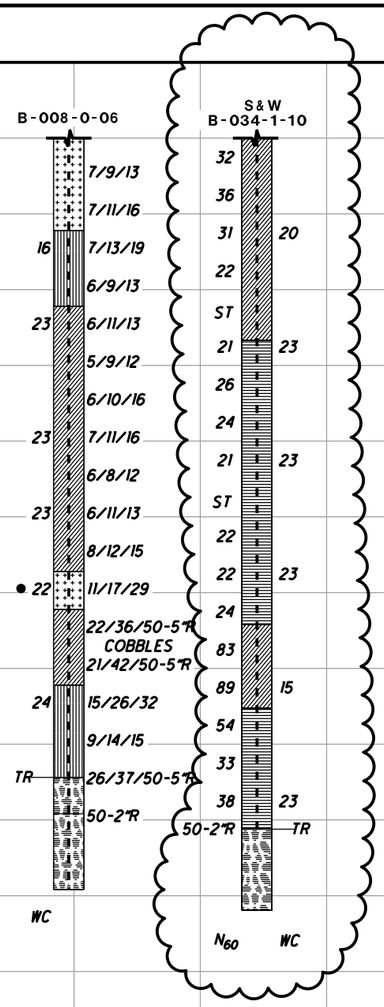
MATCHLINE EL. 550



NOTE: INCLINOMETER INSTALLED TO A DEPTH OF 228'. VIBRATING WIRE PIEZOMETERS INSTALLED IN OFFSET HOLE AT DEPTHS OF 65.5' AND 110.5'.

550 540 530 520 510 500 490 480 470 460 450 440 430 420 410 400 390 380 370

400' 300' 200' 100' ℄ 100' 200' 300' 400'

BBCM

HORIZONTAL SCALE IN FEET
0 30 60

SOIL PROFILE - W.B. I-90
CROSS SECTION STA. 126+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

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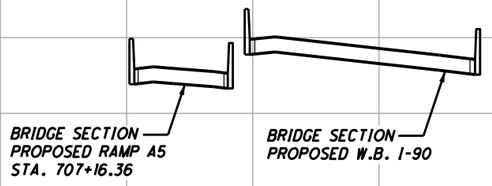

B&P
B-047-0-09
STA 158+43
69' Lt.
BROKEN CONCRETE AND GRAVEL = 12"

BBCM
V-012-0-06
STA 158+40
40' Lt.
ASPHALT = 7"

S&W
B-046-1-10
STA 158+24
11' Rt.

B&P
B-047-1-09
STA 158+42
58' Rt.

EXISTING GROUND

NOTE: ALL BORINGS ON THIS SHEET ARE SHOWN IN PLAN VIEW ON SHEET 64.

MATCHLINE EL. 530

710 700 690 680 670 660 650 640 630 620 610 600 590 580 570 560 550 540 530

400' 300' 200' 100' ℄ 100' 200' 300' 400'

BBCM

HORIZONTAL SCALE IN FEET
0 30 60

SOIL PROFILE - W.B. I-90
CROSS SECTION STA. 158+50

CUY-90-14.90

98 116

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

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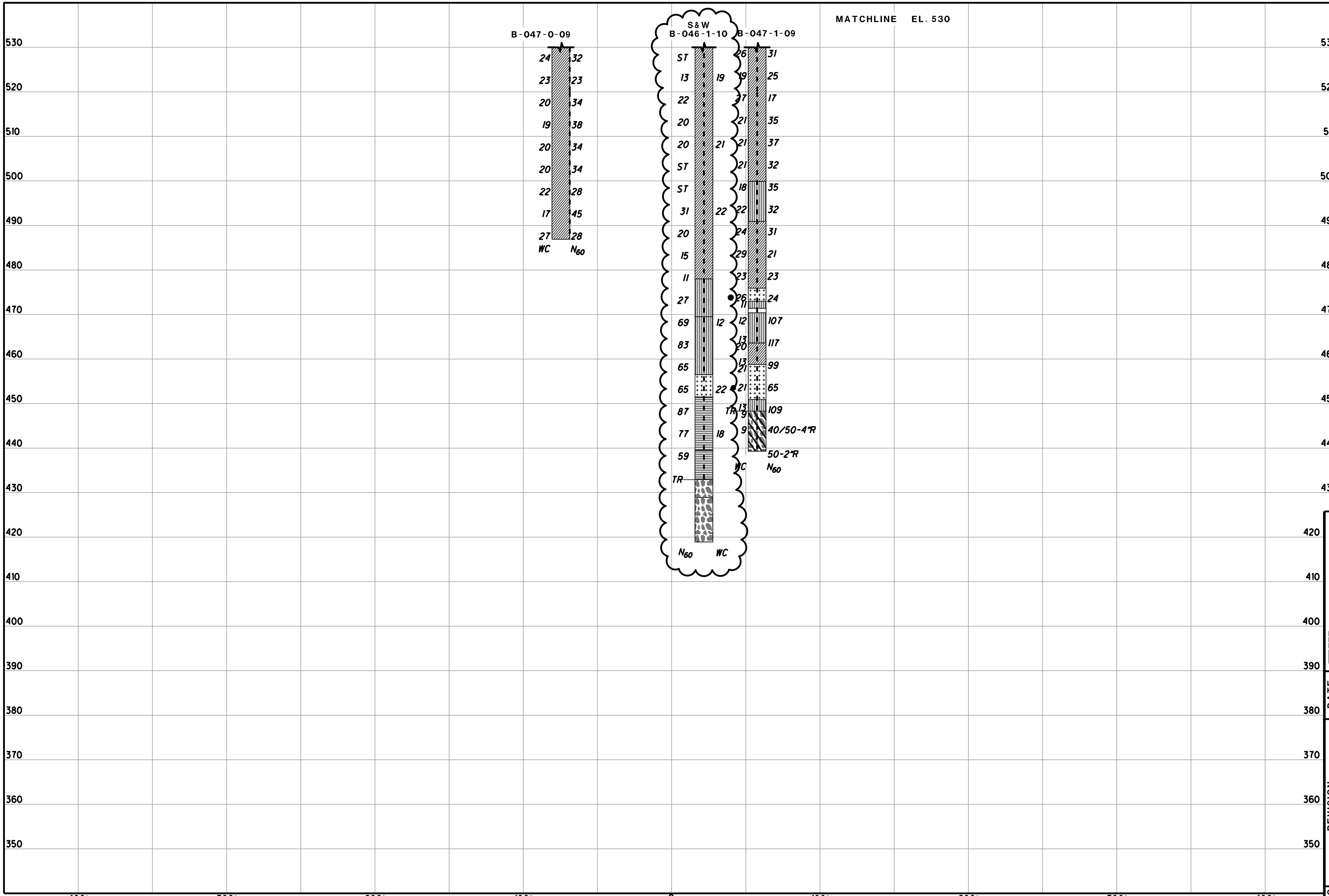

HORIZONTAL SCALE IN FEET

0 30 60

SOIL PROFILE - W.B. I-90
CROSS SECTION STA. 158+50

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

NO	REVISION	DATE
1	CCG1 DESIGN PHASE BORINGS ADDED	12-21-2012

CUY-90-14.90

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