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REFERENCE: B-5239

PROJECT: 42841

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5239	1	9

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE(S)
5-6	CROSS SECTION(S)
7-8	BORE LOG(S)
9	SITE PHOTOGRAPH(S)

COUNTY ALAMANCE
PROJECT DESCRIPTION BRIDGE 126 ON NC 87
OVER HAW RIVER MILL RACE

SITE DESCRIPTION _____

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 1919 TOT-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. 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.

PERSONNEL

C.C. MURRAY

J.E. ESTEP

M.R. MOORE

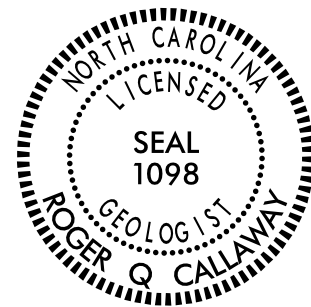
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DRAWN BY J.K. McCLURE

CHECKED BY C.B. LITTLE

SUBMITTED BY C.B. LITTLE

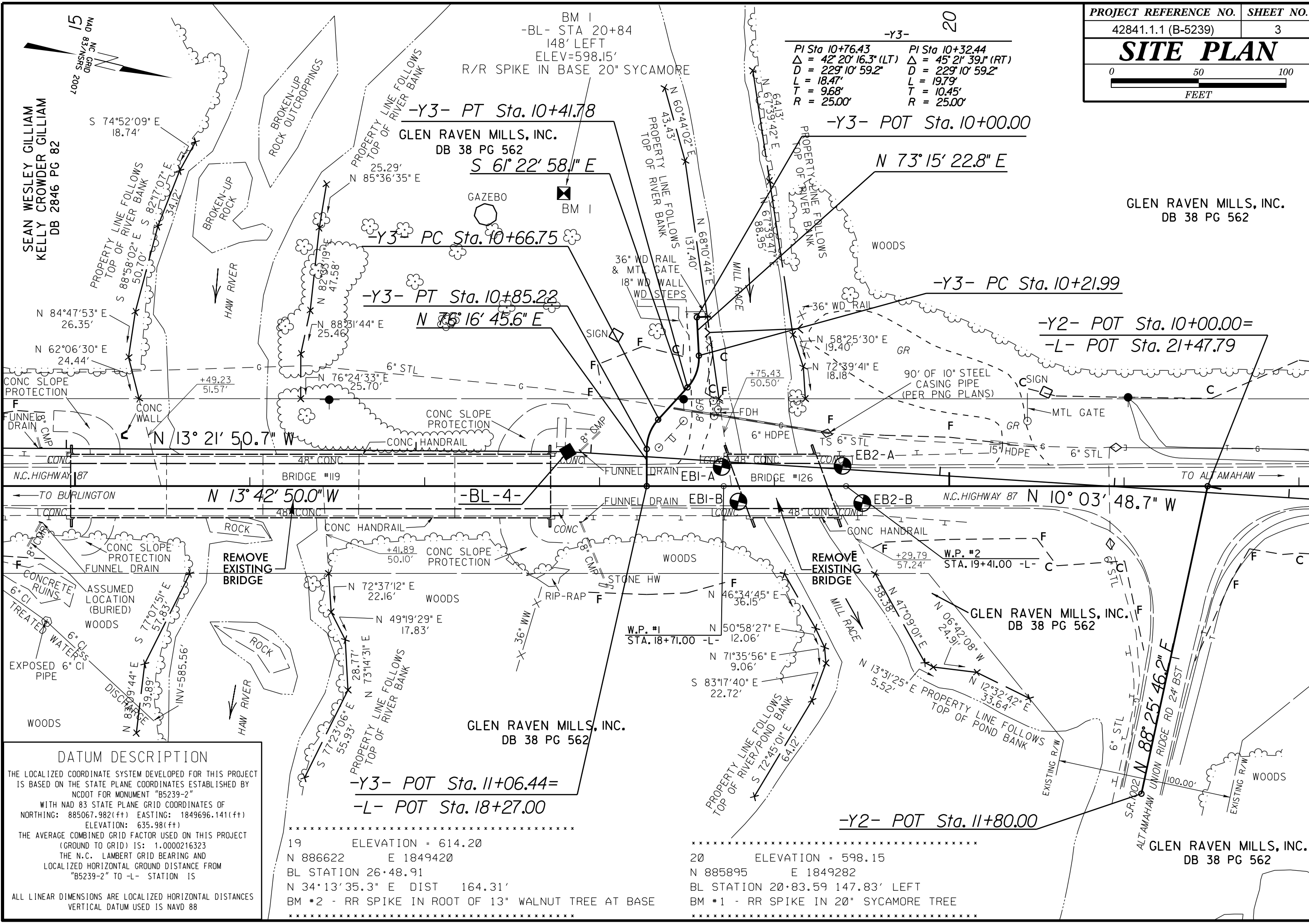
DATE OCTOBER 2014



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Roger Callaway 11/3/2014
SIGNATURE DATE
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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																																																																																																																																					
<p>SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>				<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>				<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, 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:</p>				<p>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, SUCH 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 DISLOGGED 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 (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 (SREC.) - 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.</p>																																																																																																																																					
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<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p>				<p>25/025 DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p>				<p>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.</p>				<p>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</p>																																																																																																																																					
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<p>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.</p>				<p><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p>				<p>CAN BE GROUDED 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.</p>																																																																																																																																									
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				<p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>				<p>STA. 17+81.86 -L- 19.70 LT. = 20+86.84 -BL- N 885932.4497 E 1849425.3896 ELEVATION: 608.29 FEET</p>																																																																																																																																									



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5239-2"

WITH NAD 83 STATE PLANE GRID COORDINATES OF
 NORTHING: 885067.982(±) EASTING: 1849696.141(±)
 ELEVATION: 635.98(±)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000216323

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5239-2" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NAVD 88

19 ELEVATION = 614.20
 N 886622 E 1849420
 BL STATION 26+48.91
 N 34°13'35.3" E DIST 164.31'
 BM *2 - RR SPIKE IN ROOT OF 13" WALNUT TREE AT BASE

20 ELEVATION = 598.15
 N 885895 E 1849282
 BL STATION 20+83.59 147.83' LEFT
 BM *1 - RR SPIKE IN 20" SYCAMORE TREE

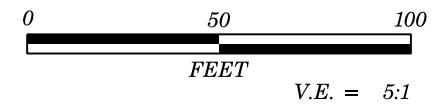
-Y3-
 PI Sta 10+76.43 Δ = 42°20'16.3" (LT) Δ = 45°21'39.1" (RT)
 D = 229'10" 59.2" D = 229'10" 59.2"
 L = 18.47' L = 19.79'
 T = 9.68' T = 10.45'
 R = 25.00' R = 25.00'

GLEN RAVEN MILLS, INC.
 DB 38 PG 562

GLEN RAVEN MILLS, INC.
 DB 38 PG 562

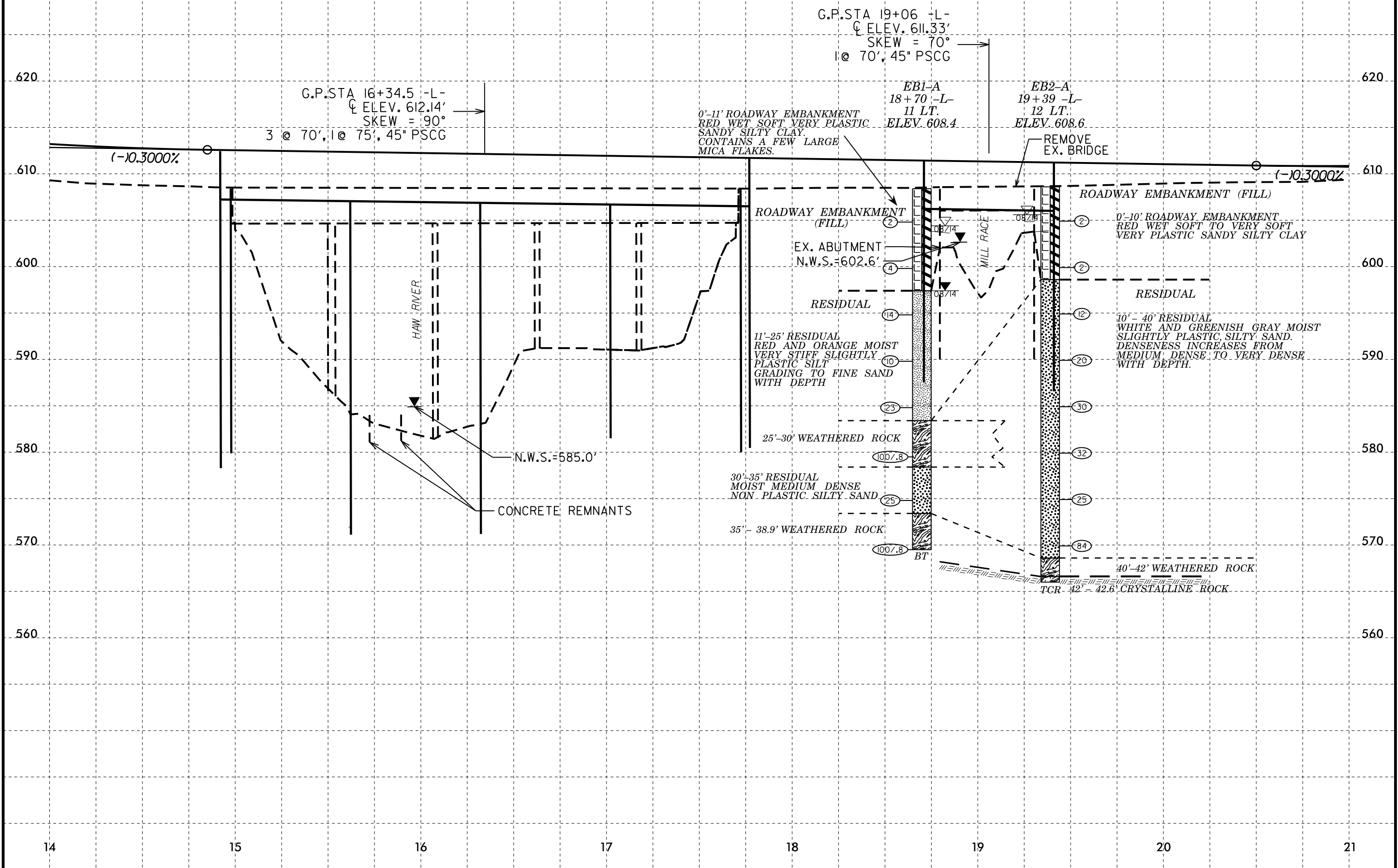
GLEN RAVEN MILLS, INC.
 DB 38 PG 562

GLEN RAVEN MILLS, INC.
 DB 38 PG 562



BM 1
-BL- STA. 20+83.59
147.83' LEFT
ELEVATION = 598.15'
R/R SPIKE IN 20" SYCAMORE

-L-



G.P. STA 16+34.5 -L-
ELEV. 612.14'
SKEW = 90°
3 @ 70', 1 @ 75', 45" PSCG

G.P. STA 19+06 -L-
ELEV. 611.33'
SKEW = 70°
1 @ 70', 45" PSCG

0'-11' ROADWAY EMBANKMENT
RED WET SOFT VERY PLASTIC
SANDY SILTY CLAY.
CONTAINS A FEW LARGE
MICA FLAKES.

EB1-A
18+70 -L-
11 LT.
ELEV. 608.4

EB2-A
19+39 -L-
12 LT.
ELEV. 608.6

REMOVE
EX. BRIDGE

ROADWAY EMBANKMENT
(FILL)

ROADWAY EMBANKMENT (FILL)

EX. ABUTMENT
N.W.S. = 602.6'

0'-10' ROADWAY EMBANKMENT
RED WET SOFT TO VERY SOFT
VERY PLASTIC SANDY SILTY CLAY

RESIDUAL

RESIDUAL

11'-25' RESIDUAL
RED AND ORANGE MOIST
VERY STIFF SLIGHTLY
PLASTIC SILT
GRADING TO FINE SAND
WITH DEPTH

10'-40' RESIDUAL
WHITE AND GREENISH GRAY MOIST
SLIGHTLY PLASTIC SILTY SAND.
DENSENESS INCREASES FROM
MEDIUM DENSE TO VERY DENSE
WITH DEPTH.

25'-30' WEATHERED ROCK

30'-35' RESIDUAL
MOIST MEDIUM DENSE
NON PLASTIC SILTY SAND

35'-38.9' WEATHERED ROCK

40'-42' WEATHERED ROCK

TCR 42' - 42.6' CRYSTALLINE ROCK

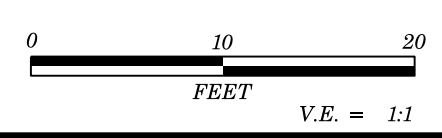
(-10.3000%)

(-10.3000%)

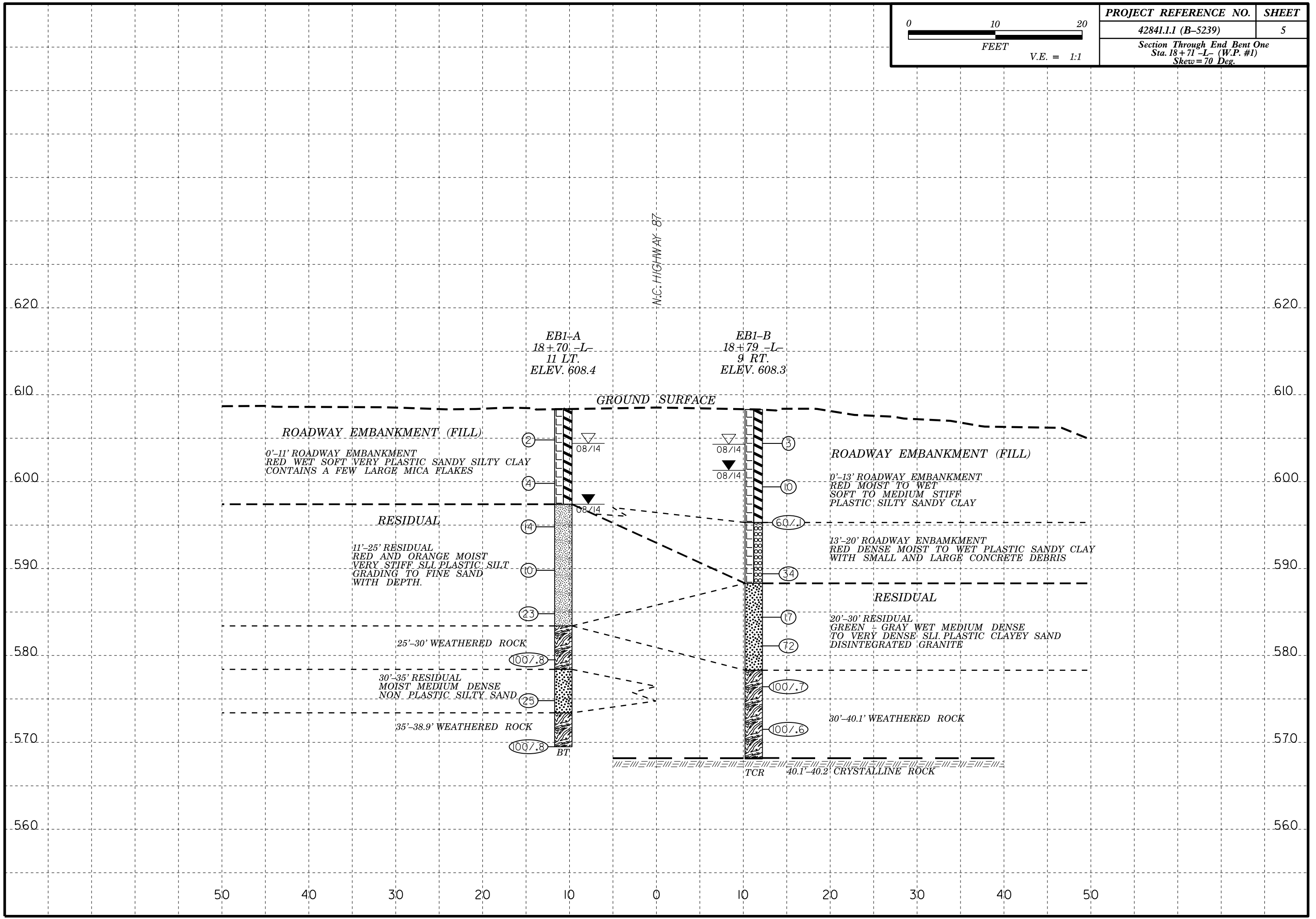
HAW RIVER

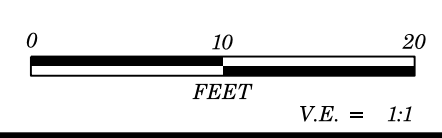
N.W.S. = 585.0'

CONCRETE REMNANTS

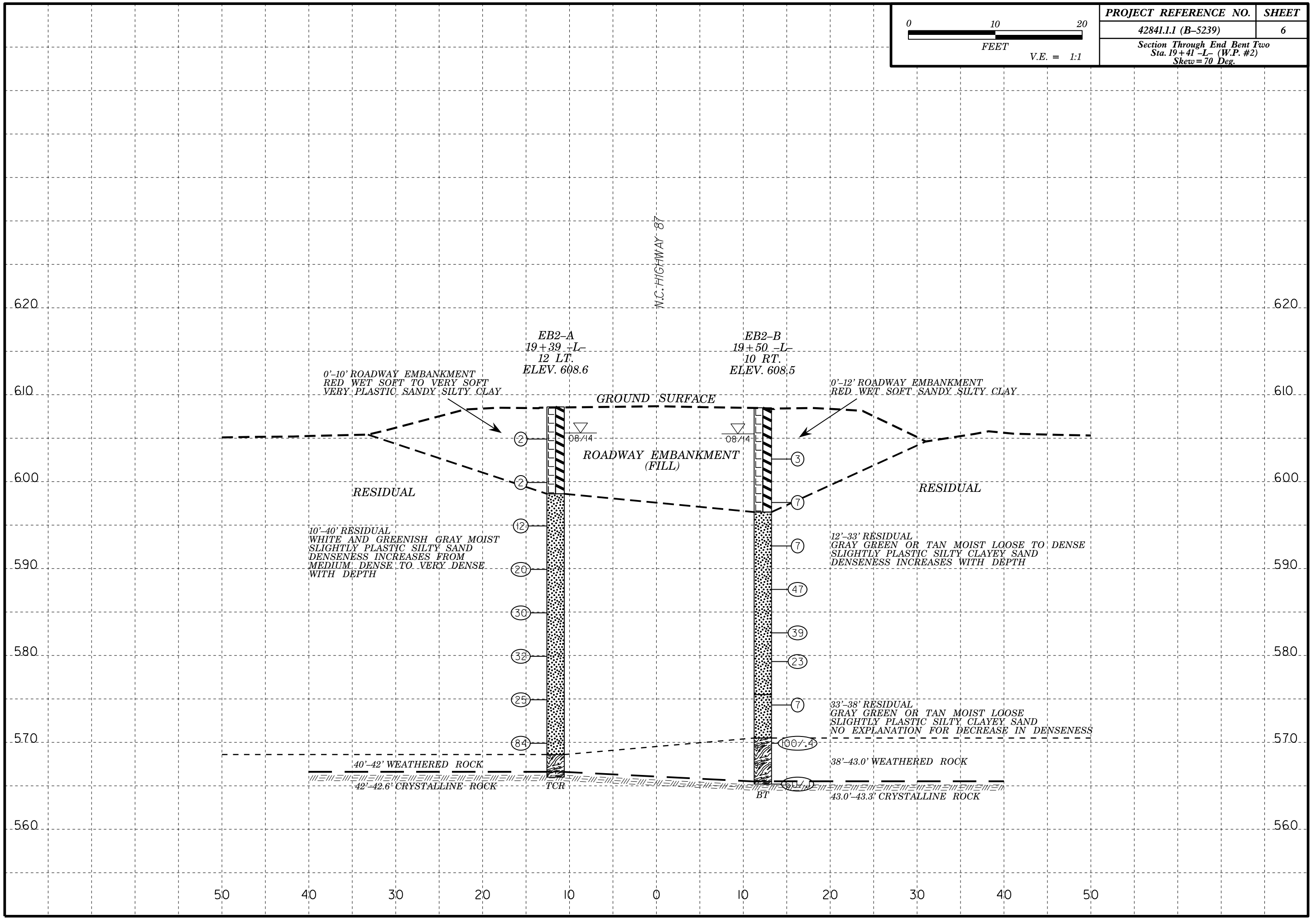


PROJECT REFERENCE NO.	SHEET
42841.1.1 (B-5239)	5
Section Through End Bent One Sta. 18+71 -L- (W.P. #1) Skew = 70 Deg.	



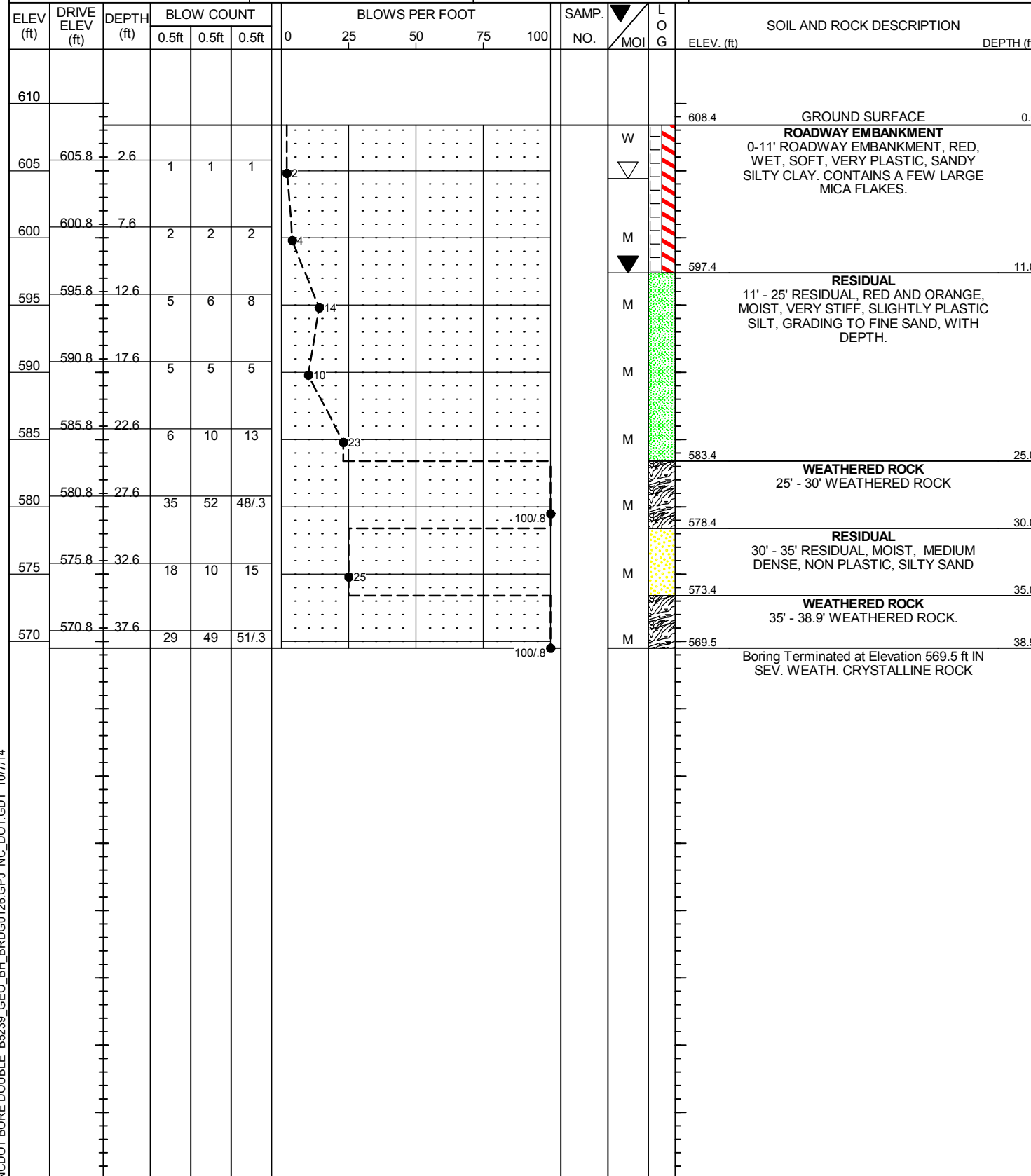


PROJECT REFERENCE NO.	SHEET
42841.1.1 (B-5239)	6
Section Through End Bent Two Sta. 19+41 -L- (W.P. #2) Skew = 70 Deg.	

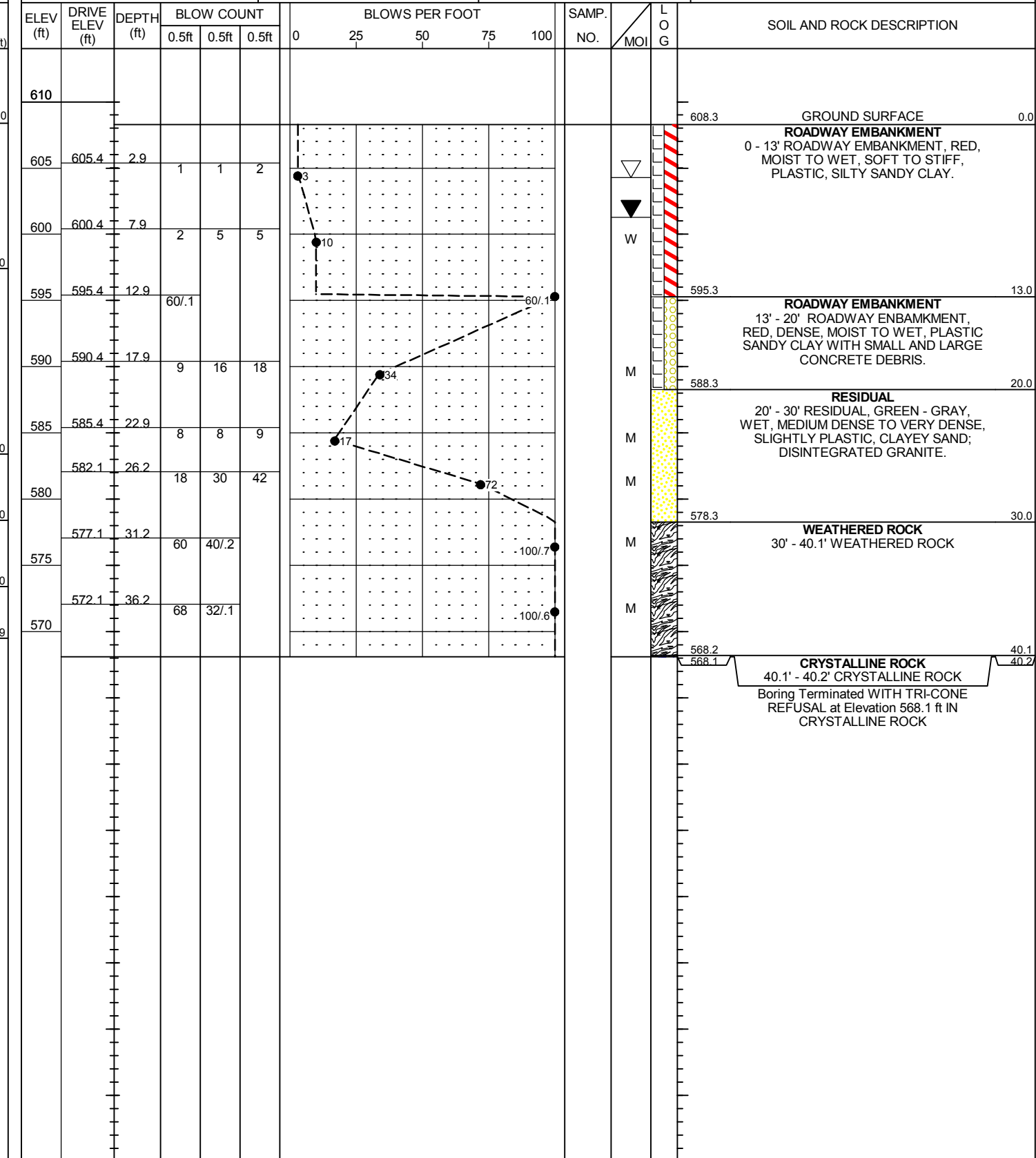


NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER MILL RACE			GROUND WTR (ft)
BORING NO. EB1-A	STATION 18+70	OFFSET 11 ft LT	ALIGNMENT -L-
COLLAR ELEV. 608.4 ft	TOTAL DEPTH 38.9 ft	NORTHING 886,020	EASTING 1,849,413
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/20/14	COMP. DATE 08/20/14	SURFACE WATER DEPTH N/A



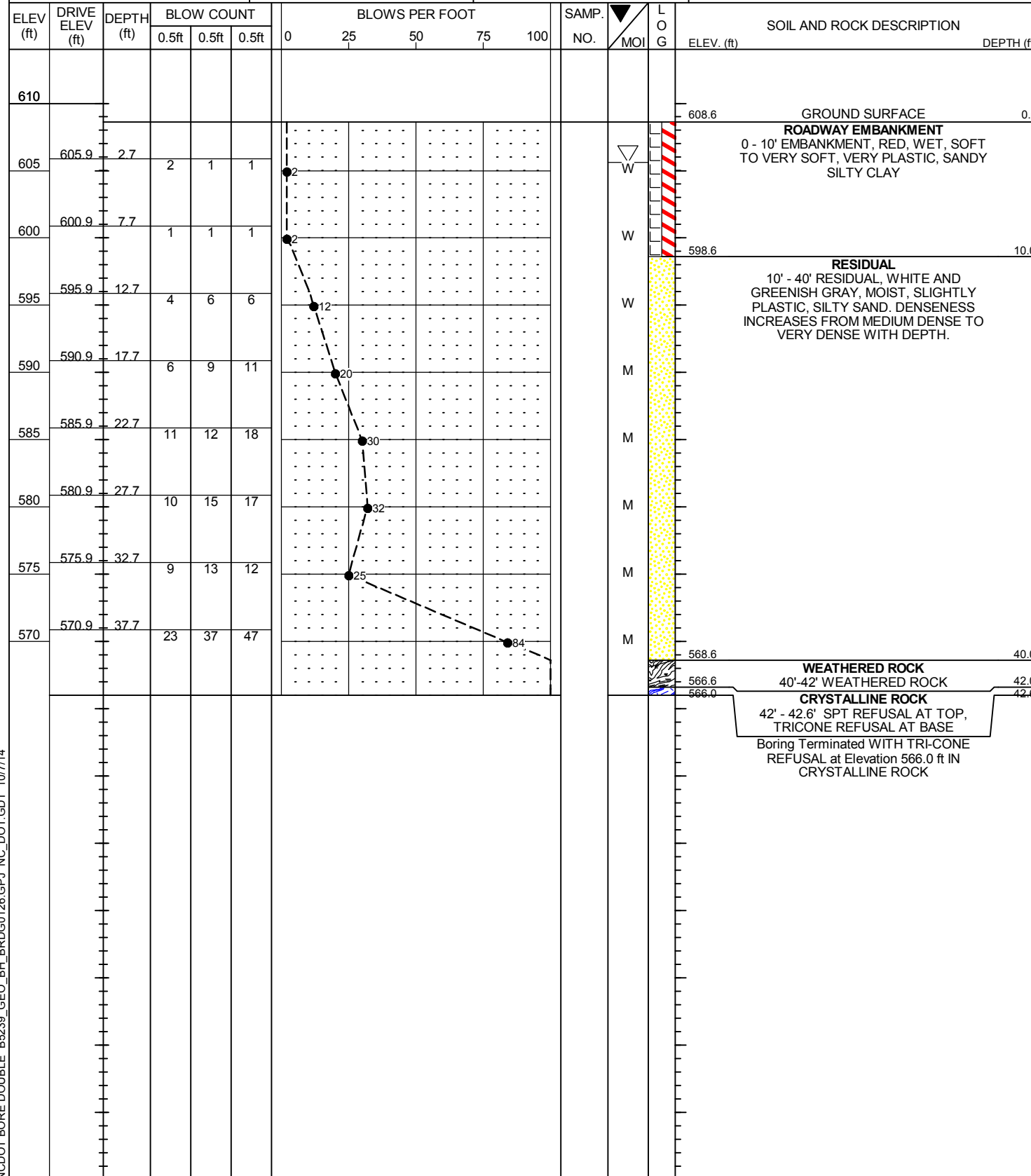
WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER MILL RACE			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+79	OFFSET 9 ft RT	ALIGNMENT -L-
COLLAR ELEV. 608.3 ft	TOTAL DEPTH 40.2 ft	NORTHING 886,034	EASTING 1,849,430
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/19/14	COMP. DATE 08/19/14	SURFACE WATER DEPTH N/A



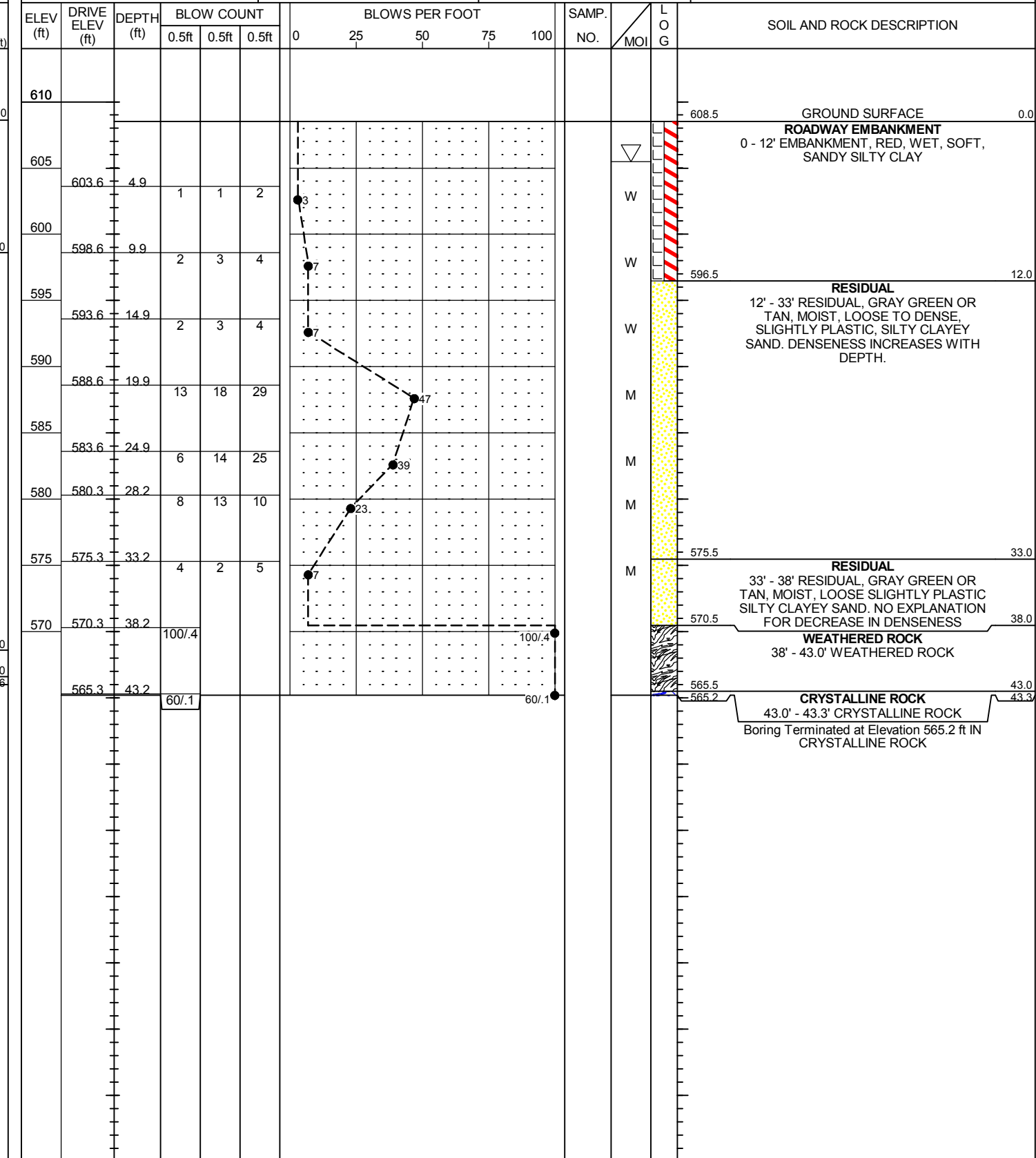
NCDOT BORE DOUBLE B5239_GEO_BH_BRD0126.GPJ NC_DOT.GDT 10/7/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

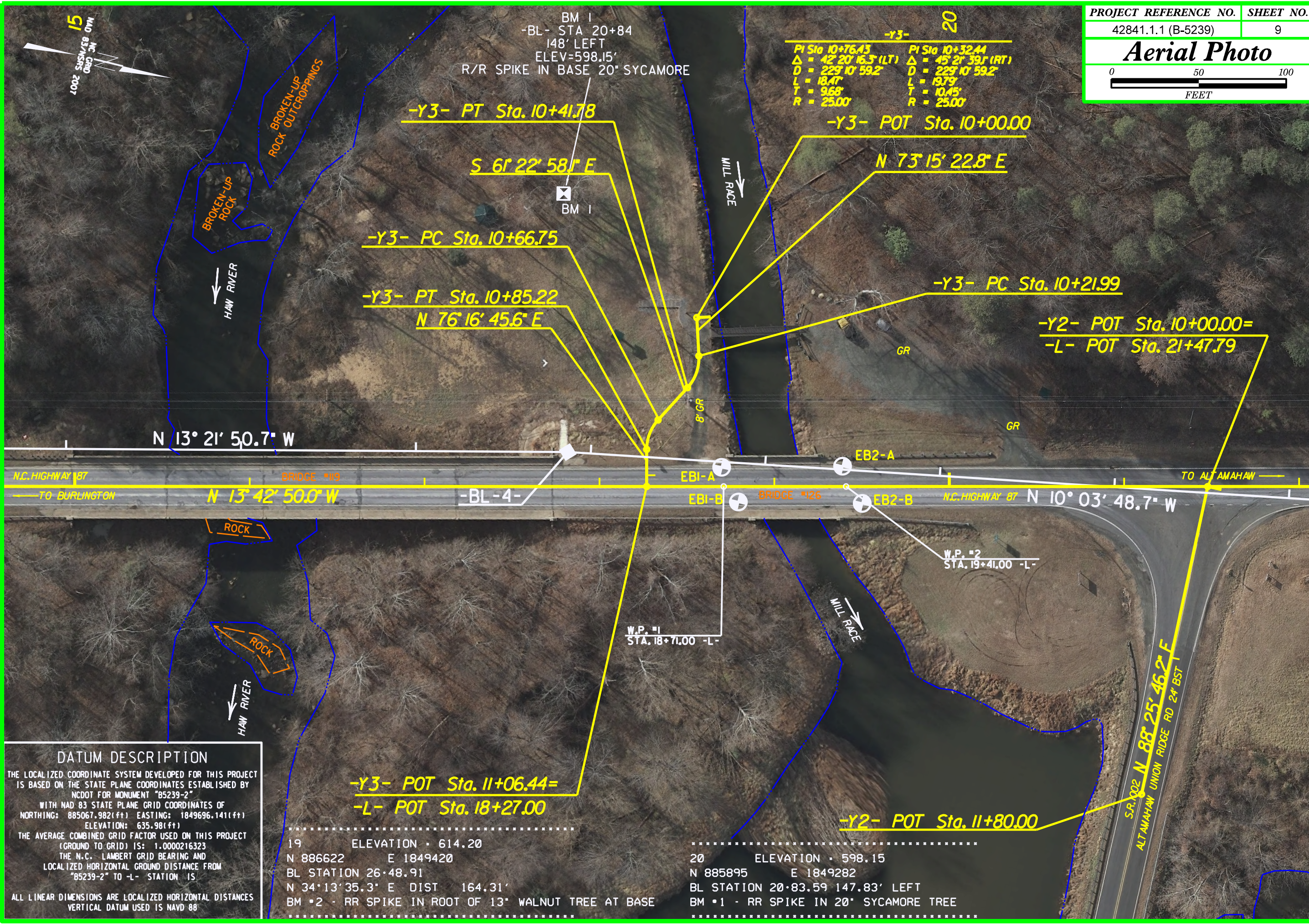
WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER MILL RACE			GROUND WTR (ft)
BORING NO. EB2-A	STATION 19+39	OFFSET 12 ft LT	ALIGNMENT -L-
COLLAR ELEV. 608.6 ft	TOTAL DEPTH 42.6 ft	NORTHING 886,087	EASTING 1,849,396
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/20/14	COMP. DATE 08/20/14	SURFACE WATER DEPTH N/A



WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 126 ON NC 87 OVER HAW RIVER MILL RACE			GROUND WTR (ft)
BORING NO. EB2-B	STATION 19+50	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 608.5 ft	TOTAL DEPTH 43.3 ft	NORTHING 886,103	EASTING 1,849,414
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/19/14	COMP. DATE 08/19/14	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B5239_GEO_BH_BRD0126.GPJ NC_DOT.GDT 10/7/14



15
 NAD 83
 NC GRID
 07/01/2007

BM 1
 -BL- STA 20+84
 148' LEFT
 ELEV=598.15'
 R/R SPIKE IN BASE 20' SYCAMORE

-Y3- 20
 PI Sta 10+76.43 Δ = 42° 20' 16.3" (LT)
 D = 229' 10" 59.2" L = 18.47'
 T = 9.68' R = 25.00'
 PI Sta 10+32.44 Δ = 45° 21' 39.1" (RT)
 D = 229' 10" 59.2" L = 19.79'
 T = 10.45' R = 25.00'

-Y3- PT Sta. 10+41.78

S 61° 22' 58.1" E

-Y3- POT Sta. 10+00.00

N 73° 15' 22.8" E

-Y3- PC Sta. 10+66.75

-Y3- PC Sta. 10+21.99

-Y3- PT Sta. 10+85.22

N 76° 16' 45.6" E

-Y2- POT Sta. 10+00.00 =

-L- POT Sta. 21+47.79

N 13° 21' 50.7" W

N.C. HIGHWAY 187
 TO BURLINGTON

N 13° 42' 50.0" W

-BL-4-

EB1-A
 EB1-B

BRIDGE #126

EB2-A
 EB2-B

N.C. HIGHWAY 87
 TO ALTA MAHAW
 N 10° 03' 48.7" W

ROCK

ROCK

W.P. #2
 STA. 19+41.00 -L-

W.P. #1
 STA. 18+71.00 -L-

-Y3- POT Sta. 11+06.44 =

-L- POT Sta. 18+27.00

-Y2- POT Sta. 11+80.00

S.R. 002 N 88° 25' 46.2" F
 ALTA MAHAW UNION RIDGE RD 24' BST

DATUM DESCRIPTION
 THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5239-2" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 885067.982(ft) EASTING: 1849696.141(ft) ELEVATION: 635.98(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000216323 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5239-2" TO -L- STATION IS
 ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

.....
 19 ELEVATION = 614.20
 N 886622 E 1849420
 BL STATION 26+48.91
 N 34° 13' 35.3" E DIST 164.31'
 BM #2 - RR SPIKE IN ROOT OF 13" WALNUT TREE AT BASE

.....
 20 ELEVATION = 598.15
 N 885895 E 1849282
 BL STATION 20+83.59 147.83' LEFT
 BM #1 - RR SPIKE IN 20' SYCAMORE TREE

REFERENCE: B-5239

PROJECT: 42841

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY ALAMANCE
PROJECT DESCRIPTION BRIDGE 119 ON NC 87
OVER HAW RIVER

SITE DESCRIPTION _____

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE(S)
5-9	CROSS SECTION(S)
10-17	BORE LOG(S) & CORE REPORT(S)
18-23	CORE PHOTOGRAPH(S)
24	SITE PHOTOGRAPH(S)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5239	1	24

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 1919 TOT-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. 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.

PERSONNEL

C.C. MURRAY

J.E. ESTEP

M.R. MOORE

INVESTIGATED BY R.Q. CALLAWAY

DRAWN BY J.K. McCLURE

CHECKED BY C.B. LITTLE

SUBMITTED BY C.B. LITTLE

DATE OCTOBER 2014



DocuSigned by:
Roger Q Callaway 11/4/2014
SIGNATURE DATE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for General Class, Group Class, Symbol, % Passing, Material Passing, Group Index, and Usual Types of Major Materials. Includes soil legend patterns and AASHTO classification codes (A-1 to A-7).

PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

Table mapping Primary Soil Type to Consistency and Range of Standard Penetration Resistance. Categories include Generally Granular Material, Generally Silty-Clay Material, and Soil Moisture.

TEXTURE OR GRAIN SIZE

Table showing U.S. Std. Sieve Size and corresponding percentages for various soil fractions: Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS

Table correlating Soil Moisture Scale (Atterberg Limits) with Field Moisture Description and Guide for Field Moisture Description. Includes Liquid Limit (LL), Plastic Limit (PL), and Optimum Moisture Shrinkage Limit (OM).

PLASTICITY

Table showing Plasticity Index (PI) ranges and corresponding Dry Strength levels: Very Low, Slight, Medium, and High.

COLOR

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.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES 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.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

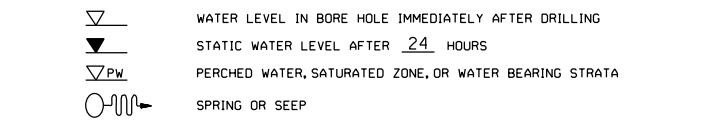
COMPRESSIBILITY

Table showing Compressibility levels: Slightly Compressible (LL < 31), Moderately Compressible (LL = 31 - 50), and Highly Compressible (LL > 50).

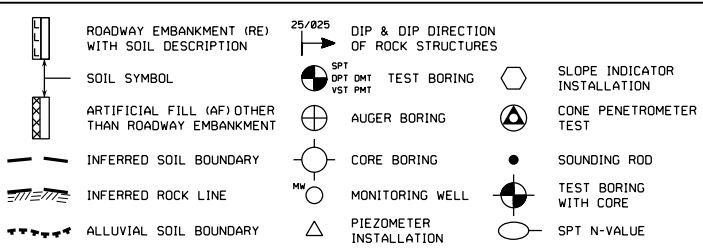
PERCENTAGE OF MATERIAL

Table showing Organic Material, Granular Soils, Silty-Clay Soils, and Other Material percentages (e.g., Trace of Organic Matter, Little Organic Matter, Moderately Organic, Highly Organic).

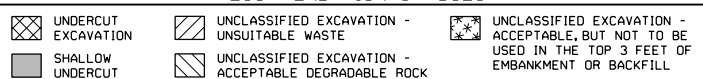
GROUND WATER



MISCELLANEOUS SYMBOLS



RECOMMENDATION SYMBOLS



ABBREVIATIONS

Table of abbreviations for soil and rock tests and methods: 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, FOSS - Fossiliferous, FRAC - Fractured, FRAGS - Fragments, HI - Highly, MED - Medium, MICA - Micaceous, MOD - Moderately, NP - Non Plastic, ORG - Organic, PMT - Pressuremeter Test, SAP - Saprolitic, SD - Sand, 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 - Recompact Triaxial, CBR - California Bearing Ratio.

EQUIPMENT USED ON SUBJECT PROJECT

Checklist for equipment used on subject project: Drill Units (CME-45C, CME-55, CME-550, Vane Shear Test, Portable Hoist), Advancing Tools (Clay Bits, 6" Continuous Flight Auger, 8" Hollow Augers, Hard Faced Finger Bits, Tung-Carbide Inserts, Casing w/ Advancer, Tricone 2 1/16" Steel Teeth, Tricone Tung-Carb., Core Bit), Hammer Type (Automatic, Manual), Core Size (-B, -H, -N O/NQ), Hand Tools (Post Hole Digger, Hand Auger, Sounding Rod, Vane Shear Test).

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. 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:

Table defining Rock Types: Weathered Rock (WR), Crystalline Rock (CR), Non-Crystalline Rock (NCR), and Coastal Plain Sedimentary Rock (CP). Includes descriptions and SPT values.

WEATHERING

Table defining Weathering degrees: Fresh, Very Slight (V SLI), Slight (SLI), Moderate (MOD), Moderately Severe (MOD. SEV.), Severe (SEV.), Very Severe (V SEV.), and Complete. Includes descriptions of rock characteristics and SPT values.

ROCK HARDNESS

Table defining Rock Hardness levels: Very Hard, Hard, Moderately Hard, Medium Hard, Soft, and Very Soft. Includes descriptions of rock characteristics and testing methods.

FRACTURE SPACING

Table defining Fracture Spacing levels: Very Wide, Wide, Moderately Close, Close, and Very Close. Includes descriptions and thicknesses.

BEDDING

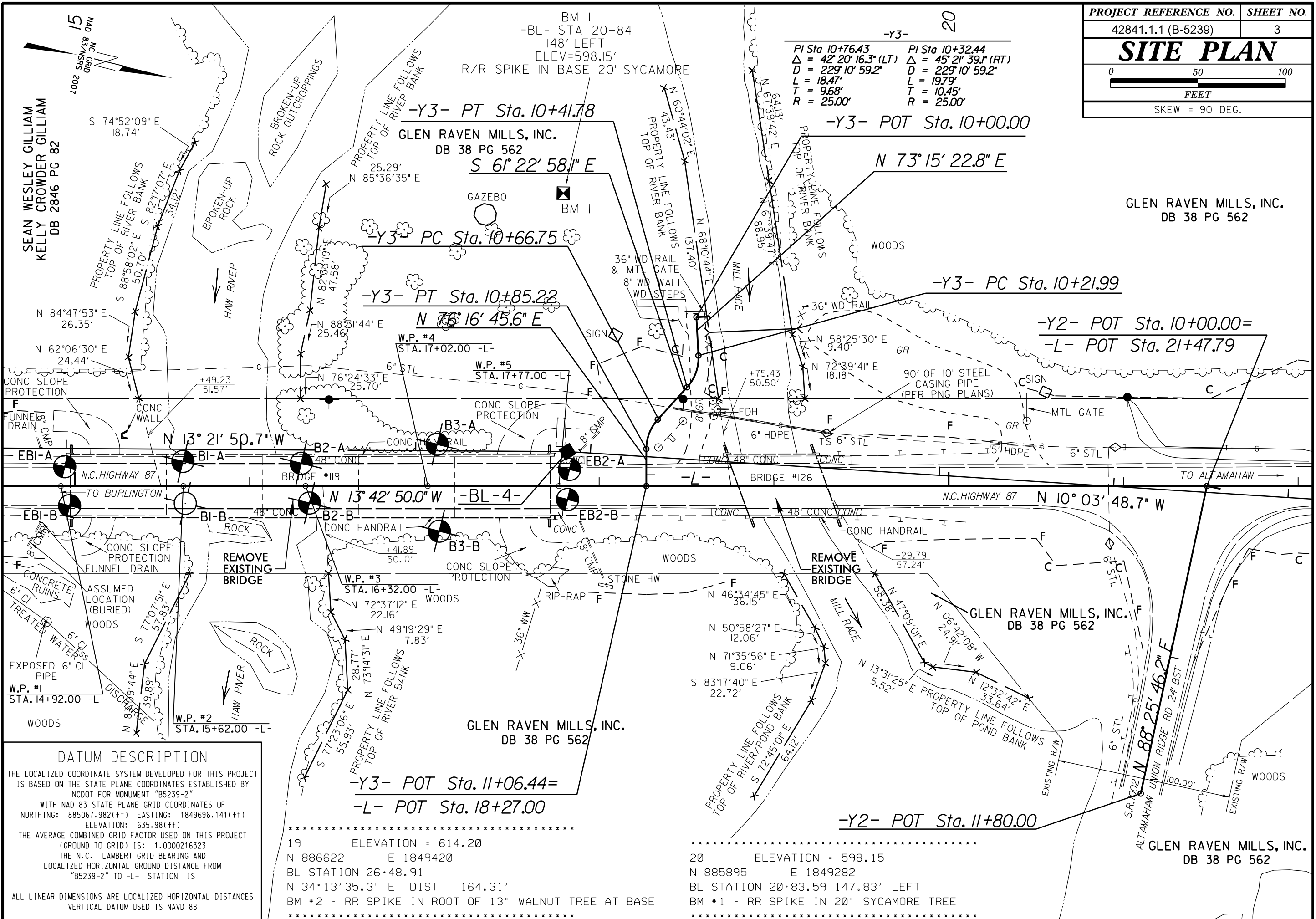
Table defining Bedding types: Very Thickly Bedded, Thickly Bedded, Thinly Bedded, Very Thinly Bedded, Thickly Laminated, and Thinly Laminated. Includes descriptions and thicknesses.

TERMS AND DEFINITIONS

Table of definitions for geotechnical terms: Alluvium (ALLUV.), Aquifer, Arenaceous, Argillaceous, Artesian, Calcareous (CALC.), Colluvium, Core Recovery (REC.), Dike, Dip, Dip Direction (DIP AZIMUTH), Fault, Fissile, Floated, Flood Plain (FP), Formation (FM), Joint, Ledger, Lens, Mottled (MOT.), Saprolite (SAP.), Sill, Slickenside, Standard Penetration Test (PENETRATION RESISTANCE) (SPT), Strata Rock Quality Designation (SROD), Topsoil (TS).

NOTES:

SOIL STRATIGRAPHY IS THROUGH THE BORINGS FOR PROFILE AND CROSS-SECTIONS.



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5239-2"

WITH NAD 83 STATE PLANE GRID COORDINATES OF
 NORTHING: 885067.982(±) EASTING: 1849696.141(±)
 ELEVATION: 635.981(±)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000216323

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5239-2" TO -L- STATION IS

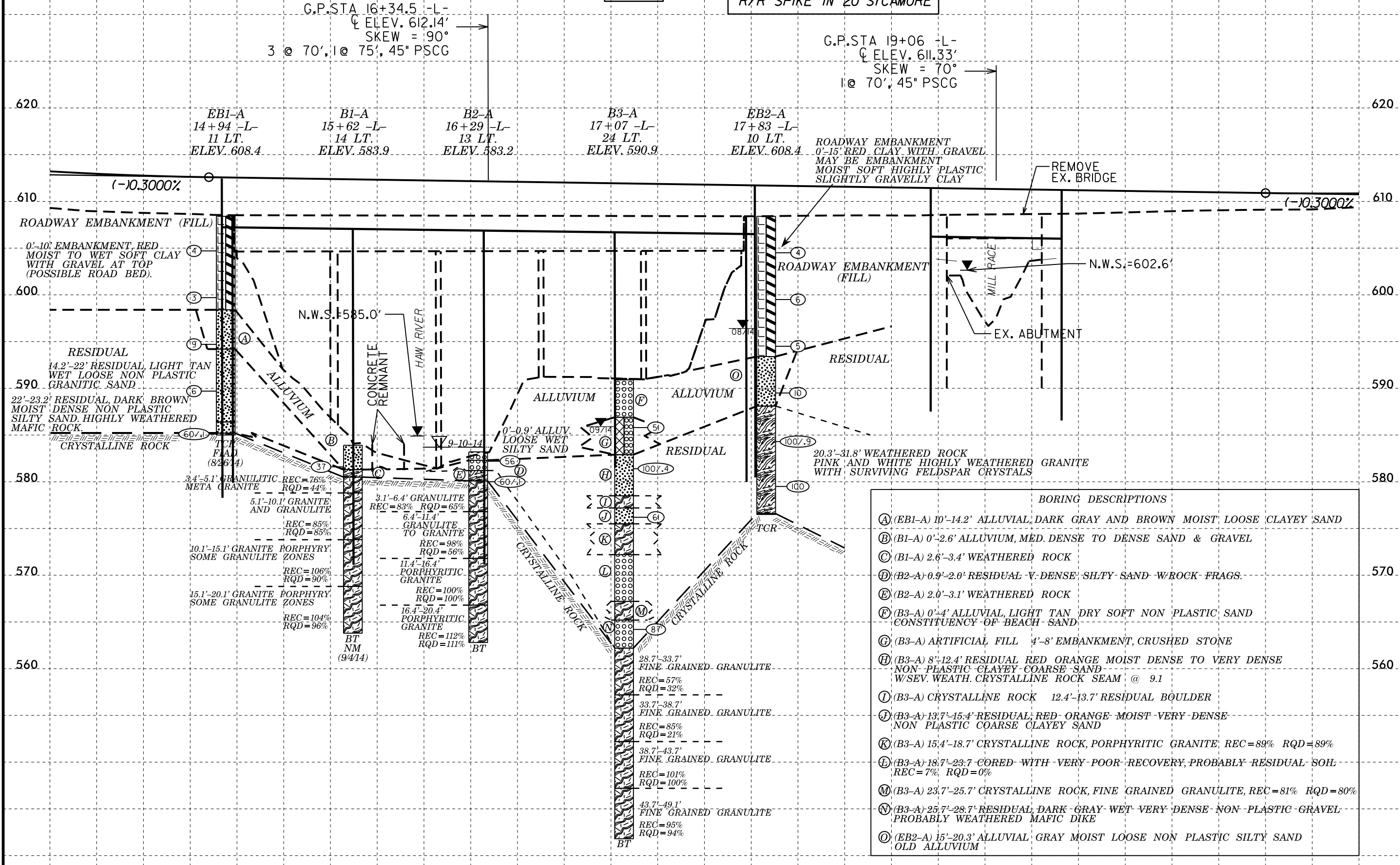
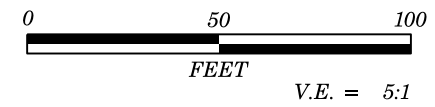
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS NAVD 88

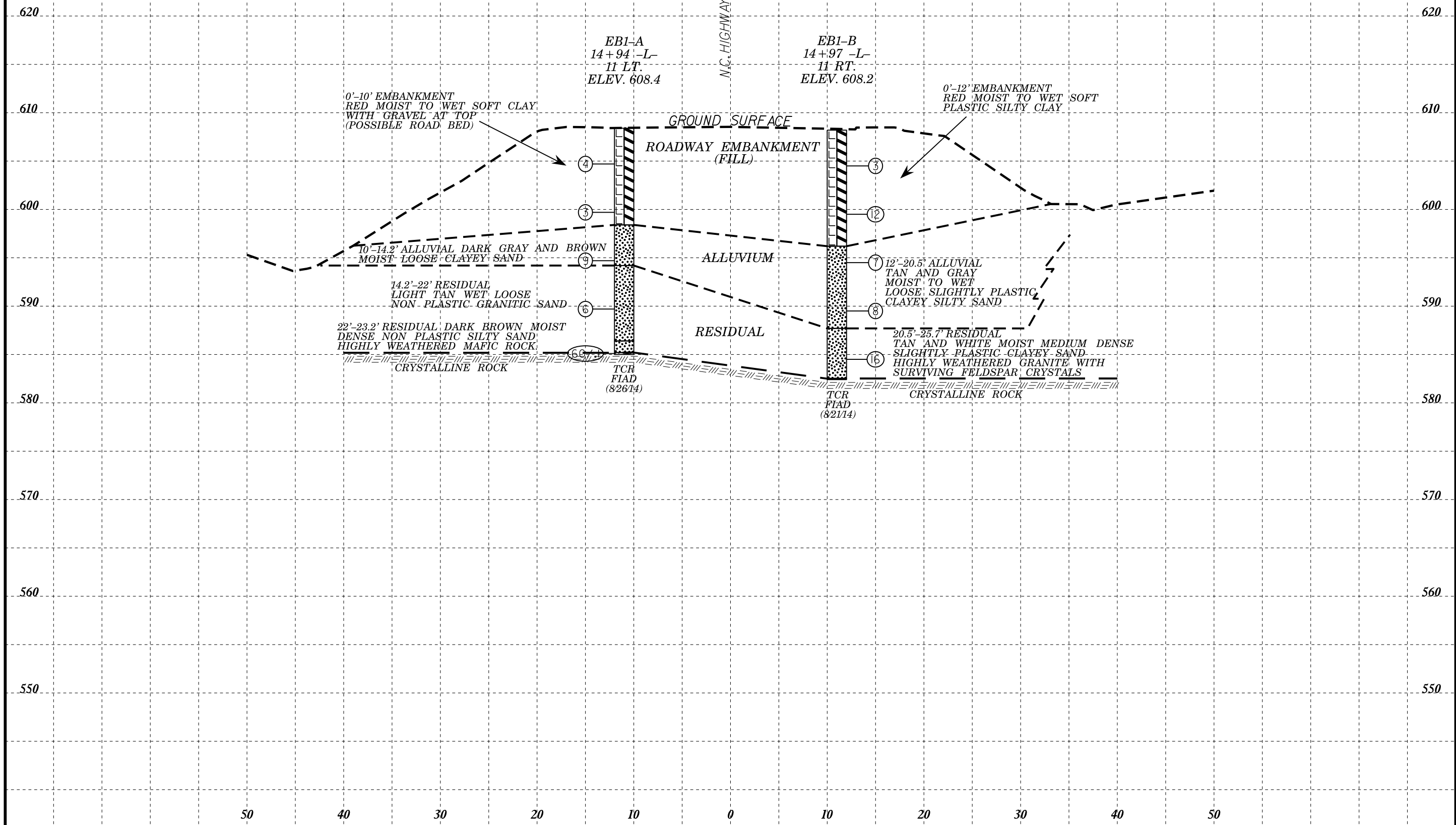
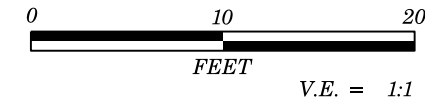
19 ELEVATION = 614.20
 N 886622 E 1849420
 BL STATION 26+48.91
 N 34°13'35.3" E DIST 164.31'
 BM #2 - RR SPIKE IN ROOT OF 13" WALNUT TREE AT BASE

20 ELEVATION = 598.15
 N 885895 E 1849282
 BL STATION 20+83.59 147.83' LEFT
 BM #1 - RR SPIKE IN 20" SYCAMORE TREE

GLEN RAVEN MILLS, INC.
 DB 38 PG 562

BM 1
-BL- STA. 20+83.59
147.83' LEFT
ELEVATION = 598.15'
R/R SPIKE IN 20" SYCAMORE





EB1-A
14+94 -L-
11 LT.
ELEV. 608.4

EB1-B
14+97 -L-
11 RT.
ELEV. 608.2

N.C. HIGHWAY 87

0'-10' EMBANKMENT
RED MOIST TO WET SOFT CLAY
WITH GRAVEL AT TOP
(POSSIBLE ROAD BED)

0'-12' EMBANKMENT
RED MOIST TO WET SOFT
PLASTIC SILTY CLAY

GROUND SURFACE
ROADWAY EMBANKMENT
(FILL)

10'-14.2' ALLUVIAL DARK GRAY AND BROWN
MOIST LOOSE CLAYEY SAND

ALLUVIUM

12'-20.5' ALLUVIAL
TAN AND GRAY
MOIST TO WET
LOOSE SLIGHTLY PLASTIC
CLAYEY SILTY SAND

14.2'-22' RESIDUAL
LIGHT TAN WET LOOSE
NON PLASTIC GRANITIC SAND

RESIDUAL

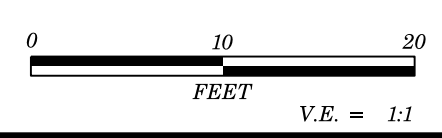
20.5'-25.7' RESIDUAL
TAN AND WHITE MOIST MEDIUM DENSE
SLIGHTLY PLASTIC CLAYEY SAND
HIGHLY WEATHERED GRANITE WITH
SURVIVING FELDSPAR CRYSTALS

22'-23.2' RESIDUAL DARK BROWN MOIST
DENSE NON PLASTIC SILTY SAND
HIGHLY WEATHERED MAFIC ROCK
CRYSTALLINE ROCK

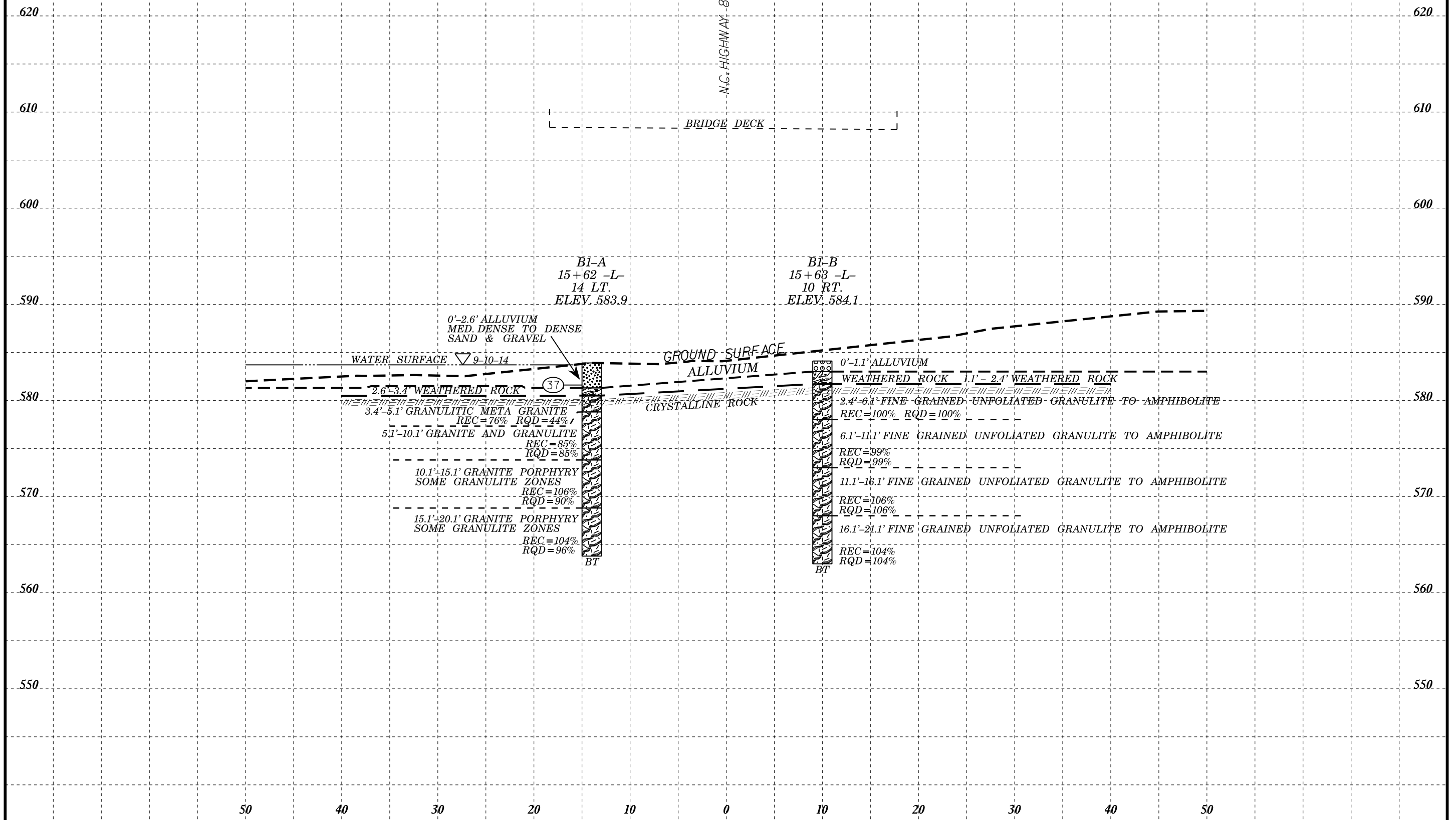
TCR
FIAD
(826/14)

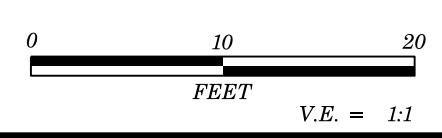
TCR
FIAD
(821/14)

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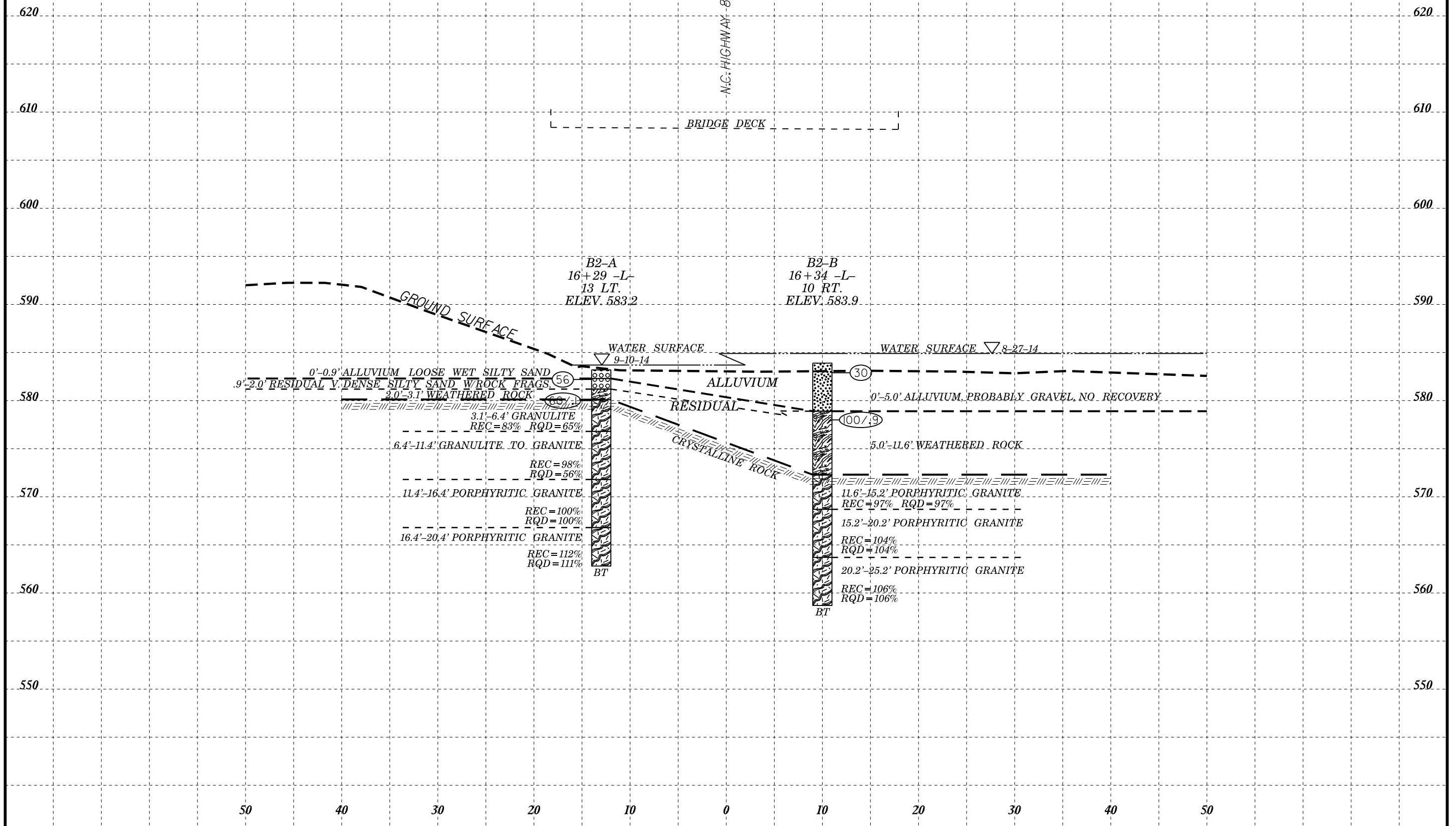


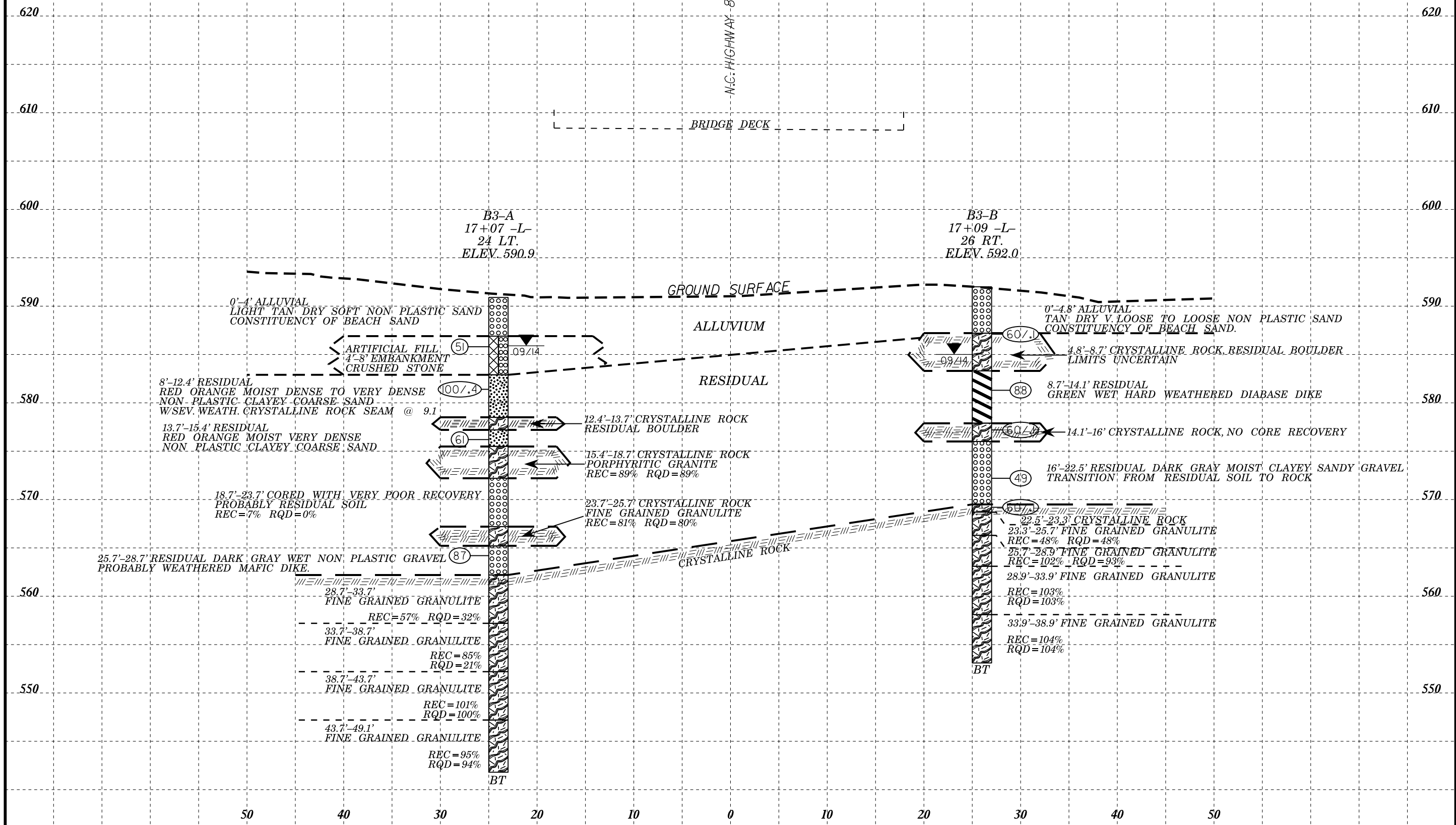
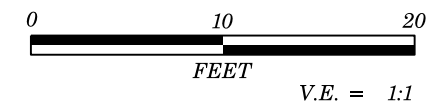
PROJECT REFERENCE NO.	SHEET
42841.1.1 (B-5239)	6
Section Through Bent One Sta. 15+62 -L- (W.P. #2) Skew = 90 Deg.	





PROJECT REFERENCE NO.	SHEET
42841.1.1 (B-5239)	7
Section Through Bent Two Sta. 16+32 -L- (W.P. #3) Skew = 90 Deg.	





B3-A
17+07 -L-
24 LT.
ELEV. 590.9

B3-B
17+09 -L-
26 RT.
ELEV. 592.0

BRIDGE DECK

GROUND SURFACE

ALLUVIUM

RESIDUAL

0'-4' ALLUVIAL
LIGHT TAN DRY SOFT NON PLASTIC SAND
CONSTITUENCY OF BEACH SAND

0'-4.8' ALLUVIAL
TAN DRY V. LOOSE TO LOOSE NON PLASTIC SAND
CONSTITUENCY OF BEACH SAND.

ARTIFICIAL FILL
4'-8' EMBANKMENT
CRUSHED STONE

4.8'-8.7' CRYSTALLINE ROCK RESIDUAL BOULDER
LIMITS UNCERTAIN

8'-12.4' RESIDUAL
RED ORANGE MOIST DENSE TO VERY DENSE
NON PLASTIC CLAYEY COARSE SAND
W/SEV. WEATH. CRYSTALLINE ROCK SEAM @ 9.1

8.7'-14.1' RESIDUAL
GREEN WET HARD WEATHERED DIABASE DIKE

13.7'-15.4' RESIDUAL
RED ORANGE MOIST VERY DENSE
NON PLASTIC CLAYEY COARSE SAND

12.4'-13.7' CRYSTALLINE ROCK
RESIDUAL BOULDER

14.1'-16' CRYSTALLINE ROCK, NO CORE RECOVERY

15.4'-18.7' CRYSTALLINE ROCK
PORPHYRITIC GRANITE
REC=89% RQD=89%

16'-22.5' RESIDUAL DARK GRAY MOIST CLAYEY SANDY GRAVEL
TRANSITION FROM RESIDUAL SOIL TO ROCK

18.7'-23.7' CORED WITH VERY POOR RECOVERY
PROBABLY RESIDUAL SOIL
REC=7% RQD=0%

23.7'-25.7' CRYSTALLINE ROCK
FINE GRAINED GRANULITE
REC=81% RQD=80%

25.7'-28.7' RESIDUAL DARK GRAY WET NON PLASTIC GRAVEL
PROBABLY WEATHERED MAFIC DIKE.

CRYSTALLINE ROCK

28.7'-33.7' FINE GRAINED GRANULITE
REC=57% RQD=32%

22.5'-23.3' CRYSTALLINE ROCK
23.3'-25.7' FINE GRAINED GRANULITE
REC=48% RQD=48%

25.7'-28.9' FINE GRAINED GRANULITE
REC=102% RQD=93%

28.9'-33.9' FINE GRAINED GRANULITE
REC=103% RQD=103%

33.7'-38.7' FINE GRAINED GRANULITE
REC=85% RQD=21%

33.9'-38.9' FINE GRAINED GRANULITE
REC=104% RQD=104%

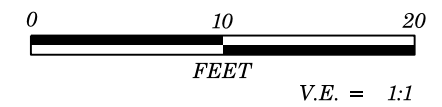
38.7'-43.7' FINE GRAINED GRANULITE
REC=101% RQD=100%

43.7'-49.1' FINE GRAINED GRANULITE
REC=95% RQD=94%

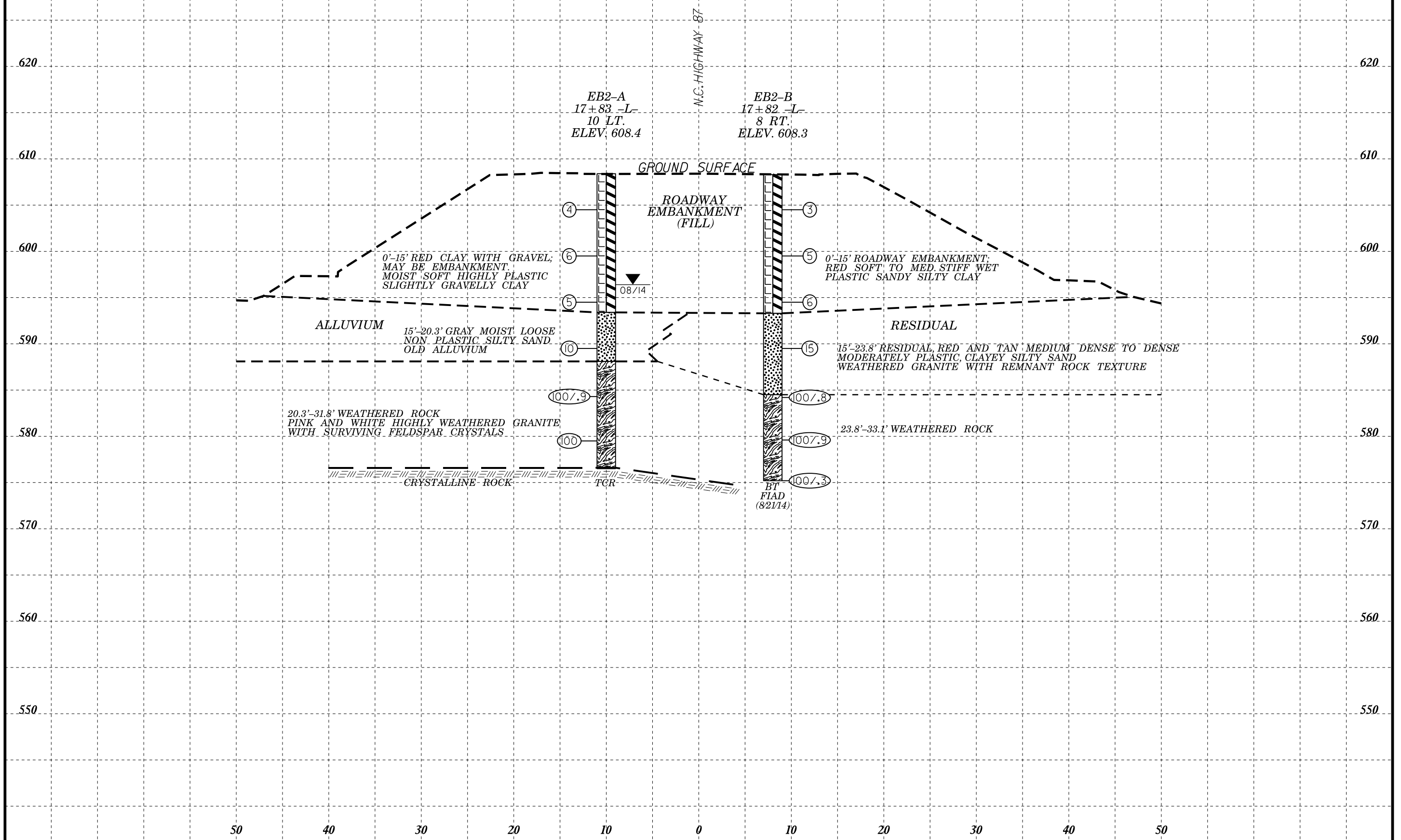
BT

BT

50 40 30 20 10 0 10 20 30 40 50



PROJECT REFERENCE NO.	SHEET
42841.1.1 (B-5239)	9
Section Through End Bent Two Sta. 17+77 -L- (W.P. #5) Skew = 90 Deg.	





NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 42841.1.1		TIP B-5239		COUNTY ALAMANCE		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576							GROUND WTR (ft)									
BORING NO. EB1-A	STATION 14+94	OFFSET 11 ft LT	ALIGNMENT -L-			0 HR. 15.0										
COLLAR ELEV. 608.4 ft	TOTAL DEPTH 23.4 ft	NORTHING 885,655	EASTING 1,849,502			24 HR. FIAD										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014			DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
DRILLER Estep, J. E.		START DATE 08/26/14	COMP. DATE 08/26/14	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						
610														608.4	0.0	GROUND SURFACE
605	605.7	2.7	2	2	2								M			ROADWAY EMBANKMENT 0' - 10' EMBANKMENT, RED, MOIST TO WET, SOFT CLAY WITH GRAVEL AT TOP. (POSSIBLE ROAD BED).
600	600.7	7.7	2	2	1								W			
595	595.7	12.7	4	4	5								W			ALLUVIAL 10' - 14.2' ALLUVIAL, DARK GRAY AND BROWN, MOIST, LOOSE CLAYEY SAND.
590	590.7	17.7	3	3	3								W			RESIDUAL 14.2' - 22' RESIDUAL, LIGHT TAN, WET, LOOSE, NON PLASTIC, GRANITIC SAND.
	585.7	22.7	31	60/1									W			RESIDUAL 22' - 23.2' RESIDUAL, DARK BROWN, MOIST, DENSE, NON PLASTIC SILTY SAND. HIGHLY WEATHERED MAFIC ROCK.
																CRYSTALLINE ROCK 23.2' - 23.4' SPT REFUSAL, ROCK. Boring Terminated WITH TRI-CONE REFUSAL at Elevation 585.0 ft IN CRYSTALLINE ROCK

WBS 42841.1.1		TIP B-5239		COUNTY ALAMANCE		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576							GROUND WTR (ft)									
BORING NO. EB1-B	STATION 14+97	OFFSET 11 ft RT	ALIGNMENT -L-			0 HR. 15.0										
COLLAR ELEV. 608.2 ft	TOTAL DEPTH 25.8 ft	NORTHING 885,663	EASTING 1,849,523			24 HR. FIAD										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014			DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
DRILLER Estep, J. E.		START DATE 08/21/14	COMP. DATE 08/21/14	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						
610														608.2	0.0	GROUND SURFACE
605	605.5	2.7	1	1	2								M			ROADWAY EMBANKMENT 0 - 12' EMBANKMENT, RED, MOIST TO WET, SOFT, PLASTIC, SILTY CLAY
600	600.5	7.7	2	6	6								W			
595	595.5	12.7	3	4	3								W			ALLUVIAL 12' - 20.5' ALLUVIAL, TAN AND GRAY, MOIST TO WET, LOOSE, SLIGHTLY PLASTIC, CLAYEY SILTY SAND
590	590.5	17.7	3	2	6								W			
585	585.5	22.7	6	8	8								W			RESIDUAL 20.5' - 25.7' RESIDUAL, TAN AND WHITE, MOIST, MEDIUM DENSE, SLIGHTLY PLASTIC, CLAYEY SAND. HIGHLY WEATHERED GRANITE WITH SURVIVING FELDSPAR CRYSTALS.
																CRYSTALLINE ROCK 25.7-25.8 ROLLER CONE REFUSAL; CRYSTALLINE ROCK Boring Terminated WITH TRI-CONE REFUSAL at Elevation 582.4 ft ON CRYSTALLINE ROCK

NCDOT BORE DOUBLE B5239_GEO_BH_BRD0119.GPJ NC_DOT.GDT 10/27/14

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+62	OFFSET 14 ft LT	ALIGNMENT -L-
COLLAR ELEV. 583.9 ft	TOTAL DEPTH 20.1 ft	NORTHING 885,720	EASTING 1,849,483
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/04/14	COMP. DATE 09/04/14	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					
585														583.9	0.0
	582.6	1.3												581.3	2.6
			10	13	24									580.5	3.4
580														578.8	5.1
														573.8	10.1
575														568.8	15.1
														563.8	20.1
570															
565															

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+62	OFFSET 14 ft LT	ALIGNMENT -L-
COLLAR ELEV. 583.9 ft	TOTAL DEPTH 20.1 ft	NORTHING 885,720	EASTING 1,849,483
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/04/14	COMP. DATE 09/04/14	SURFACE WATER DEPTH N/A

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC (ft) %	RQD (ft) %		REC (ft) %	RQD (ft) %			
580.48											Begin Coring @ 3.4 ft	
	580.5	3.4	1.7		(1.2)	(1.0)		(1.3)	(0.7)		CRYSTALLINE ROCK	3.4
	578.8	5.1			72%	61%		76%	44%		3.4' - 5.1' FRESH, HARD, WIDELY FRACTURED, GRANULITIC META GRANITE.	5.1
			5.0		(5.0)	(5.0)		(4.3)	(4.3)		R1=15, R2=8, R3= 20, R4= 20, R5=4 RMR=67, GOOD ROCK, CLASS II, TYPE D	
575											CRYSTALLINE ROCK	10.1
	573.8	10.1			(5.0)	(4.8)		(5.3)	(4.5)		5.1' - 10.1' FRESH, VERY HARD, WIDELY FRACTURED, GRAY AND WHITE, GRANITE AND GRANULITE.	
			5.0		100%	96%		106%	90%		R1=15, R2=20, R3= 25, R4= 25, R5=4 RMR 89, VERY GOOD ROCK, CLASS II, TYPE D & E POINT LOAD STRENGTH INDEX: 8.2' : 178KSF, 8.6' : 202KSF	
570											CRYSTALLINE ROCK	15.1
	568.8	15.1			(5.0)	(5.0)		(5.2)	(4.8)		10.1' - 15.1' FRESH, VERY HARD, WIDELY FRACTURED, GRAY AND WHITE, GRANITE PORPHYRY, SOME GRANULITE ZONES.	
			5.0		100%	100%		104%	96%		R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE E	
565											CRYSTALLINE ROCK	20.1
	563.8	20.1									15.1' - 20.1' FRESH, VERY HARD, WIDELY FRACTURED, GRAY AND WHITE, GRANITE PORPHYRY, SOME GRANULITE ZONES.	
											R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE E	
											Boring Terminated at Elevation 563.8 ft IN CRYSTALLINE ROCK	

NCDOT BORE SINGLE B5239_GEO_BH_BRD0119.GPJ NC_DOT.GDT 10/27/14

NCDOT CORE SINGLE B5239_GEO_BH_BRD0119.GPJ NC_DOT.GDT 10/27/14

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B1-B	STATION 15+63	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 584.1 ft	TOTAL DEPTH 21.1 ft	NORTHING 885,727	EASTING 1,849,506
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/03/14	COMP. DATE 09/03/14	SURFACE WATER DEPTH N/A

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B1-B	STATION 15+63	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 584.1 ft	TOTAL DEPTH 21.1 ft	NORTHING 885,727	EASTING 1,849,506
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/03/14	COMP. DATE 09/03/14	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					
585															584.1 GROUND SURFACE 0.0
															583.0 ALLUVIAL 1.1
															581.7 0 - 1.1' ALLUVIUM 2.4
580															578.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 6.1
															578.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 6.1
															578.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 6.1
575															573.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 11.1
															573.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 11.1
															573.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 11.1
570															568.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 16.1
															568.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 16.1
															568.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 16.1
565															563.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 21.1
															563.0 WEATHERED ROCK 1.1' - 2.4' WEATHERED ROCK 21.1

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
581.74											Begin Coring @ 2.4 ft	
580	581.7	2.4	3.7		(3.7) 100%	(3.7) 100%		(3.7) 100%	(3.7) 100%		CRYSTALLINE ROCK	2.4
	578.0	6.1	5.0		(5.0) 100%	(5.0) 100%		(4.9) 99%	(4.9) 99%		2.4' - 6.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE GRAINED, UNFOLIATED GRANULITE TO AMPHIBOLITE. R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE D	6.1
575	573.0	11.1	5.0		(5.0) 100%	(5.0) 100%		(5.3) 106%	(5.3) 106%		6.1' - 11.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE GRAINED, UNFOLIATED GRANULITE TO AMPHIBOLITE R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE D	11.1
570	568.0	16.1	5.0		(5.0) 100%	(5.0) 100%		(5.2) 104%	(5.2) 104%		11.1' - 16.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE GRAINED, UNFOLIATED GRANULITE TO AMPHIBOLITE R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE D POINT LOAD STRENGTH INDEX: 13.4' : 208KSF, 13.6': 206KSF	16.1
565	563.0	21.1									16.1' - 21.1' FRESH, VERY HARD, GRAY, TO DARK GRAY, FINE GRAINED, UNFOLIATED GRANULITE TO AMPHIBOLITE R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS II, TYPE D Boring Terminated at Elevation 563.0 ft IN CRYSTALLINE ROCK	21.1

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NCDOT CORE SINGLE B5239_GEO_BH_BRD0119.GPJ NC_DOT.GDT 10/27/14

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B2-A	STATION 16+29	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 583.2 ft	TOTAL DEPTH 20.4 ft	NORTHING 885,786	EASTING 1,849,468
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/10/14	COMP. DATE 09/10/14	SURFACE WATER DEPTH 0.5ft

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				
585													GROUND SURFACE	0.0
	583.2	0.0	8	29	27								ALLUVIAL	0.9
													0 - 0.9' ALLUVIUM LOOSE WET SILTY SAND	2.0
580	580.1	3.1	60/1										RESIDUAL	3.1
													0.9-2.0' RESIDUAL V. DENSE SILTY SAND W/ ROCK FRAGS.	6.4
575													WEATHERED ROCK	6.4
													2.0' - 3.1' WEATHERED ROCK	11.4
													CRYSTALLINE ROCK	11.4
													3.1' - 6.4' CRYSTALLINE ROCK, CORED FROM 3.2' - 6.4'	16.4
570													CRYSTALLINE ROCK	16.4
													6.4' - 11.4' CORED ROCK	20.4
													CRYSTALLINE ROCK	20.4
													11.4' - 16.4' CORED ROCK	20.4
565													CRYSTALLINE ROCK	20.4
													16.4' - 20.4' CORED ROCK	20.4
													Boring Terminated at Elevation 562.8 ft IN CRYSTALLINE ROCK	20.4

NCDOT BORE SINGLE B5239_GEO_BH_BRD00119.GPJ NC_DOT_GDT 10/27/14

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B2-A	STATION 16+29	OFFSET 13 ft LT	ALIGNMENT -L-
COLLAR ELEV. 583.2 ft	TOTAL DEPTH 20.4 ft	NORTHING 885,786	EASTING 1,849,468
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/10/14	COMP. DATE 09/10/14	SURFACE WATER DEPTH 0.5ft

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
579.98											Begin Coring @ 3.2 ft	
	580.0	3.2	3.2		(2.7) 83%	(2.1) 65%					CRYSTALLINE ROCK	
	576.8	6.4			(4.9) 99%	(2.7) 53%	RS-B2-A-1	(4.9)	(2.8)		3.1' - 6.4' FRESH, VERY HARD, MODERATELY CLOSE FRACTURED, GRAY AND WHITE, GRANULITE. REMNANT FELDSPAR PORPHYROCLASTS.	6.4
575			5.0				RS-B2-A-2	98%	56%		R1=15, R2=13, R3= 20, R4= 20, R5=4 RMR 72, GOOD ROCK, CLASS II, TYPE D POINT LOAD STRENGTH INDEX: 5.4' : 130KSF, 5.8' : 199.8KSF (continued)	11.4
	571.8	11.4			(5.0) 100%	(5.0) 100%	RS-B2-A-3	(5.0)	(5.0)		CRYSTALLINE ROCK	11.4
570			5.0				RS-B2-A-4	100%	100%		6.4' - 11.4' FRESH, VERY HARD, MODERATELY CLOSE FRACTURED, INCLUDES TRANSITION ZONE FROM GRAY GRANULITE TO WHITE GRANITE.	16.4
	566.8	16.4			(4.0) 100%	(4.0) 100%		(4.5)	(4.4)		R1=15, R2=13, R3= 20, R4= 20, R5=4 RMR 72, GOOD ROCK, CLASS II, TYPE E	16.4
	562.8	20.4						112%	111%		CRYSTALLINE ROCK	20.4
											11.4' - 16.4' FRESH, VERY HARD, WIDELY FRACTURED, WHITE PORPHYRITIC GRANITE.	20.4
											R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERYGOOD ROCK, CLASS I, TYPE E POINT LOAD STRENGTH INDEX: 11.8' : 201.3KSF, 12.2' : 190.3KSF	20.4
											CRYSTALLINE ROCK	20.4
											16.4' - 20.4' FRESH, VERY HARD, VERY WIDELY FRACTURED, WHITE PORPHYRITIC GRANITE.	20.4
											R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE E	20.4
											Boring Terminated at Elevation 562.8 ft IN CRYSTALLINE ROCK	20.4

NCDOT CORE SINGLE B5239_GEO_BH_BRD00119.GPJ NC_DOT_GDT 10/27/14

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+34	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 583.9 ft	TOTAL DEPTH 25.2 ft	NORTHING 885,796	EASTING 1,849,489
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/27/14	COMP. DATE 08/27/14	SURFACE WATER DEPTH 1.0ft

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				
585	583.9	0.0											583.9 GROUND SURFACE	0.0
580	578.9	5.0	11	12	18							W	0 - 5.0' ALLUVIAL, PROBABLY GRAVEL, NO RECOVERY	5.0
575			32	68/4								W	5.0' - 11.6' WEATHERED ROCK, REFUSAL AT BASE	11.6
570													11.6' - 15.2' CRYSTALLINE ROCK, CORED FROM 11.7' TO 15.2	15.2
565													15.2' - 20.2' CORED ROCK	20.2
560													20.2' - 25.2' CORED ROCK	25.2

Boring Terminated at Elevation 558.7 ft IN CRYSTALLINE ROCK														
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NCDOT BORE SINGLE B5239_GEO_BH_BRD0119.GPJ NC_DOT.GDT 10/27/14

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+34	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 583.9 ft	TOTAL DEPTH 25.2 ft	NORTHING 885,796	EASTING 1,849,489
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/27/14	COMP. DATE 08/27/14	SURFACE WATER DEPTH 1.0ft

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC (ft) %	RQD (ft) %		REC (ft) %	RQD (ft) %			
572.24	572.2	11.7	3.5		(3.4) 97%	(3.4) 97%					Begin Coring @ 11.7 ft	
570	568.7	15.2	5.0		(5.0) 100%	(5.0) 100%		(5.2) 104%	(5.2) 104%		11.7' - 15.2' FRESH, VERY HARD, VERY WIDELY FRACTURED, WHITE PORPHYRITIC GRANITE. R1=15, R2=20, R3=30, R4=25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE E (continued)	15.2
565	563.7	20.2	5.0		(5.0) 100%	(5.0) 100%		(5.3) 106%	(5.3) 106%		15.2' - 20.2' FRESH, VERY HARD, VERY WIDELY FRACTURED, WHITE PORPHYRITIC GRANITE. R1=15, R2=20, R3=30, R4=25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE E	20.2
560	558.7	25.2					RS-B2-B-1 RS-B2-B-2				20.2' - 25.2' FRESH, VERY HARD, VERY WIDELY FRACTURED, WHITE PORPHYRITIC GRANITE. R1=15, R2=20, R3=30, R4=25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE E POINT LOAD STRENGTH INDEX: 22.5' : 237KSF, 22.8' : 205KSF Boring Terminated at Elevation 558.7 ft IN CRYSTALLINE ROCK	25.2

NCDOT CORE SINGLE B5239_GEO_BH_BRD0119.GPJ NC_DOT.GDT 10/27/14

WBS 42841.1.1		TIP B-5239		COUNTY ALAMANCE		GEOLOGIST Murray, C. C.							
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576							GROUND WTR (ft)						
BORING NO. B3-A		STATION 17+07		OFFSET 24 ft LT		ALIGNMENT -L-							
COLLAR ELEV. 590.9 ft		TOTAL DEPTH 49.1 ft		NORTHING 885,859		EASTING 1,849,439							
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic									
DRILLER Estep, J. E.		START DATE 09/16/14		COMP. DATE 09/16/14		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				
595													
590													
585	586.8	4.1	20	32	19								
580	581.8	9.1	100/4										
575	577.2	13.7	18	31	30								
570													
565	565.2	25.7	20	35	52								
560													
555													
550													
545													
Boring Terminated at Elevation 541.8 ft IN CRYSTALLINE ROCK													

WBS 42841.1.1		TIP B-5239		COUNTY ALAMANCE		GEOLOGIST Murray, C. C.						
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576							GROUND WTR (ft)					
BORING NO. B3-A		STATION 17+07		OFFSET 24 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 590.9 ft		TOTAL DEPTH 49.1 ft		NORTHING 885,859		EASTING 1,849,439						
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Estep, J. E.		START DATE 09/16/14		COMP. DATE 09/16/14		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
578.47												
	578.5	12.4	1.3		(0.2)	(0.0)					Begin Coring @ 12.4 ft	12.4
	577.2	13.7	1.7	N=61	15%	0%					CRYSTALLINE ROCK	13.7
575	575.5	15.4	3.3		(0.0)	(0.0)		(2.9)	(2.9)		RESIDUAL	15.4
	572.2	18.7	5.0		(2.9)	(2.9)		(0.4)	(0.0)		CRYSTALLINE ROCK	18.7
570			5.0		(0.3)	(0.0)		7%	0%		15.4' - 18.7' FRESH, VERY HARD, CLOSELY FRACTURED, WHITE PORPHYRITIC GRANITE. R1=15, R2=17, R3= 20, R4= 20, R5=4 RMR 76, GOOD ROCK, CLASS II, TYPE E	18.7
	567.2	23.7	5.0		(1.6)	(1.6)	RS-B3-A-1	(1.6)	(1.6)		RESIDUAL	23.7
565			5.0	N=87	32%	32%		81%	80%		CRYSTALLINE ROCK	25.7
	562.2	28.7	5.0		(2.8)	(1.6)		(2.9)	(1.6)		23.7' - 25.7' VERY HARD, FRESH, DARK GRAY, CLOSELY FRACTURED FINE GRAINED GRANULITE. R1=15, R2=17, R3= 10, R4= 12, R5=4 RMR 58, FAIR ROCK, CLASS III, TYPE D	28.7
560			5.0		(2.8)	(1.6)		(2.9)	(1.6)		POINT LOAD STRENGTH INDEX: 24' : 208.9KSF, 24.4': 263.1KSF	28.7
	557.2	33.7	5.0		(4.2)	(1.1)		(4.3)	(1.1)		CRYSTALLINE ROCK	33.7
555			5.0		(4.2)	(1.1)		(4.3)	(1.1)		28.7' - 33.7' VERY HARD, FRESH, DARK GRAY, CLOSELY FRACTURED FINE GRAINED GRANULITE. R1=15, R2=8, R3= 10, R4= 20, R5=4 RMR 57, FAIR ROCK, CLASS III, TYPE D	33.7
	552.2	38.7	5.0		(5.0)	(5.0)		(5.0)	(5.0)		CRYSTALLINE ROCK	38.7
550			5.0		(5.0)	(5.0)		(5.0)	(5.0)		33.7' - 38.7' TRANSITION FROM MODERATELY SEVERE WEATHERED AT TOP TO TO FRESH AT BASE. DARK GRAY, CLOSELY FRACTURED FINE GRAINED GRANULITE. R1=7, R2=8, R3= 10, R4= 6, R5=4 RMR 35, POOR ROCK, CLASS IV, TYPE D	38.7
	547.2	43.7	5.4		(5.0)	(5.0)		(5.1)	(5.1)		CRYSTALLINE ROCK	43.7
545			5.4		(5.0)	(5.0)		(5.1)	(5.1)		38.7' - 43.7' VERY HARD, FRESH, DARK GRAY, WIDELY FRACTURED FINE GRAINED GRANULITE. R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE D	43.7
	541.8	49.1									CRYSTALLINE ROCK	49.1
											Boring Terminated at Elevation 541.8 ft IN CRYSTALLINE ROCK	

NCDOT BORE SINGLE B5239_GEO_BH_BRD00119.GPJ NC_DOT.GDT 10/27/14

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WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B3-B	STATION 17+09	OFFSET 26 ft RT	ALIGNMENT -L-
COLLAR ELEV. 592.0 ft	TOTAL DEPTH 38.9 ft	NORTHING 885,872	EASTING 1,849,487
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/11/14	COMP. DATE 09/11/14	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					
595														GROUND SURFACE	0.0
590	587.2	4.8											W	ALLUVIAL 0 - 4.8 ALLUVIAL TAN DRY, V. LOOSE TO LOOSE NON PLASTIC SAND. CONSTITUENCY OF BEACH SAND.	4.8
585	582.3	9.7	18	38	50								W	CRYSTALLINE ROCK 4.8' - 8.7' RESIDUAL BOULDER. LIMITS UNCERTAIN	8.7
580	577.3	14.7											W	RESIDUAL 8.7' - 14.1' RESIDUAL, GREEN, WET, HARD, WEATHERED DIABASE DIKE.	14.1
575	573.2	18.8	49	34	15								W	CRYSTALLINE ROCK 14.1' - 16' CRYSTALLINE ROCK, NO CORE RECOVERY.	16.0
570	569.3	22.7											W	RESIDUAL 16' - 22.5' DARK GRAY, MOIST, CLAYEY SANDY GRAVEL. TRANSITION FROM RESIDUAL SOIL TO ROCK.	22.5
565														CRYSTALLINE ROCK 22.5' - 23.3' CRYSTALLINE ROCK SPT REFUSAL AT TOP, ROLLER CONE REFUSAL AT BASE.	23.3
560														CRYSTALLINE ROCK 23.3' - 25.7' CORED ROCK	25.7
555														CRYSTALLINE ROCK 25.7' - 28.9' CORED ROCK	28.9
														CRYSTALLINE ROCK 28.9' - 33.9' CORED ROCK	33.9
														CRYSTALLINE ROCK 33.9' - 38.9' CORED ROCK	38.9
Boring Terminated at Elevation 553.1 ft IN CRYSTALLINE ROCK															

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. B3-B	STATION 17+09	OFFSET 26 ft RT	ALIGNMENT -L-
COLLAR ELEV. 592.0 ft	TOTAL DEPTH 38.9 ft	NORTHING 885,872	EASTING 1,849,487
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 09/11/14	COMP. DATE 09/11/14	SURFACE WATER DEPTH N/A

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
586.91											Begin Coring @ 5.1 ft	
585	586.9	5.1	0.6		(0.5)	(0.6)					CRYSTALLINE ROCK (continued)	
580	586.3	5.7	13.1	N=88	77%	100%					RESIDUAL	8.7
575				N=60/1	(0.6)	(0.0)					CRYSTALLINE ROCK	14.1
570				N=49	(0.7)	(0.0)					CRYSTALLINE ROCK	16.0
565				N=60/1	(1.3)	(1.2)					CRYSTALLINE ROCK	22.5
560					(3.1)	(3.1)					CRYSTALLINE ROCK 23.3' - 25.7' VERY HARD, FRESH, DARK GRAY, CLOSELY FRACTURED FINE GRAINED GRANULITE. R1=15, R2=8, R3= 20, R4= 20, R5=4 RMR 67, GOOD ROCK, CLASS II, TYPE D	25.7
555					(5.0)	(5.0)					CRYSTALLINE ROCK 25.7' - 28.9' VERY HARD, FRESH, DARK GRAY, WIDELY FRACTURED, FINE GRAINED GRANULITE. R1=15, R2=20, R3= 25, R4= 20, R5=4 RMR 84, VERY GOOD ROCK, CLASS I, TYPE D	28.9
					(5.0)	(5.0)					CRYSTALLINE ROCK 28.9' - 33.9' VERY HARD, FRESH, DARK GRAY, WIDELY FRACTURED FINE GRAINED GRANULITE. R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE D POINT LOAD STRENGTH INDEX: 30.6' : 274KSF, 30.9' : 300KSF	33.9
					(5.2)	(5.2)					CRYSTALLINE ROCK 33.9' - 38.9' VERY HARD, FRESH, DARK GRAY, CLOSELY FRACTURED FINE GRAINED GRANULITE. R1=15, R2=20, R3= 30, R4= 25, R5=4 RMR 94, VERY GOOD ROCK, CLASS I, TYPE D	38.9
Boring Terminated at Elevation 553.1 ft IN CRYSTALLINE ROCK												

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. EB2-A	STATION 17+83	OFFSET 10 ft LT	ALIGNMENT -L-
COLLAR ELEV. 608.4 ft	TOTAL DEPTH 31.9 ft	NORTHING 885,936	EASTING 1,849,435
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/26/14	COMP. DATE 08/26/14	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				
610													GROUND SURFACE	608.4
605	605.5	2.9	2	2	2							M	ROADWAY EMBANKMENT 0 - 15 RED CLAY WITH GRAVEL; MAY BE EMBANKMENT. MOIST, SOFT, HIGHLY PLASTIC, SLIGHTLY GRAVELLY CLAY.	
600	600.5	7.9	2	2	4							W		
595	595.5	12.9	2	2	3							W		
590	590.5	17.9	2	2	8							W	ALLUVIAL 15' - 20.3' GRAY, MOIST, LOOSE, NON PLASTIC, SILTY SAND. OLD ALLUVIUM.	15.0
585	585.2	23.2	45	55/4								W	WEATHERED ROCK 20.3' - 31.8' WEATHERED ROCK. PINK, AND WHITE, HIGHLY WEATHERED GRANITE WITH SURVIVING FELDSPAR CRYSTALS.	20.3
580	580.5	27.9	31	69/5										

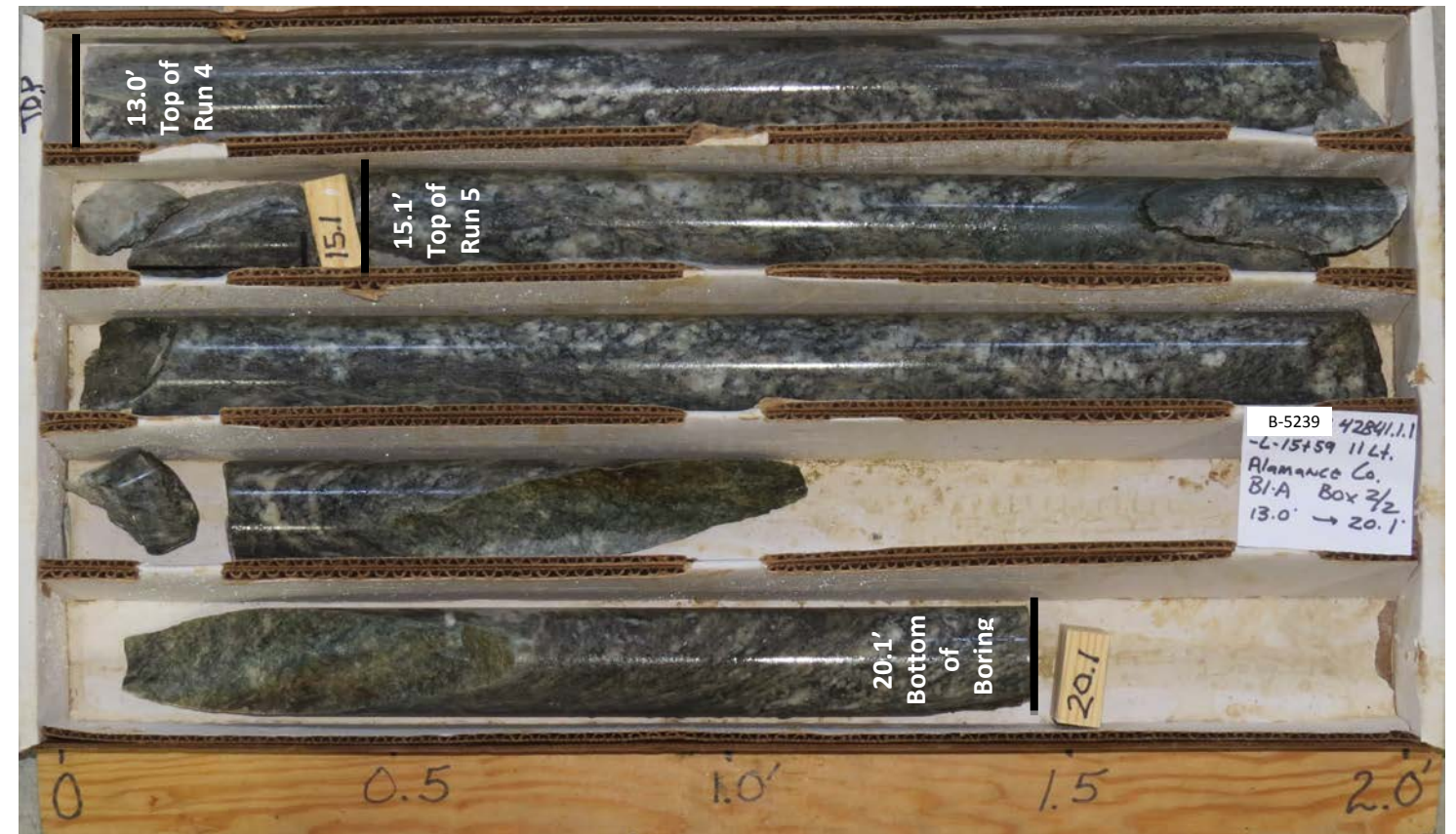
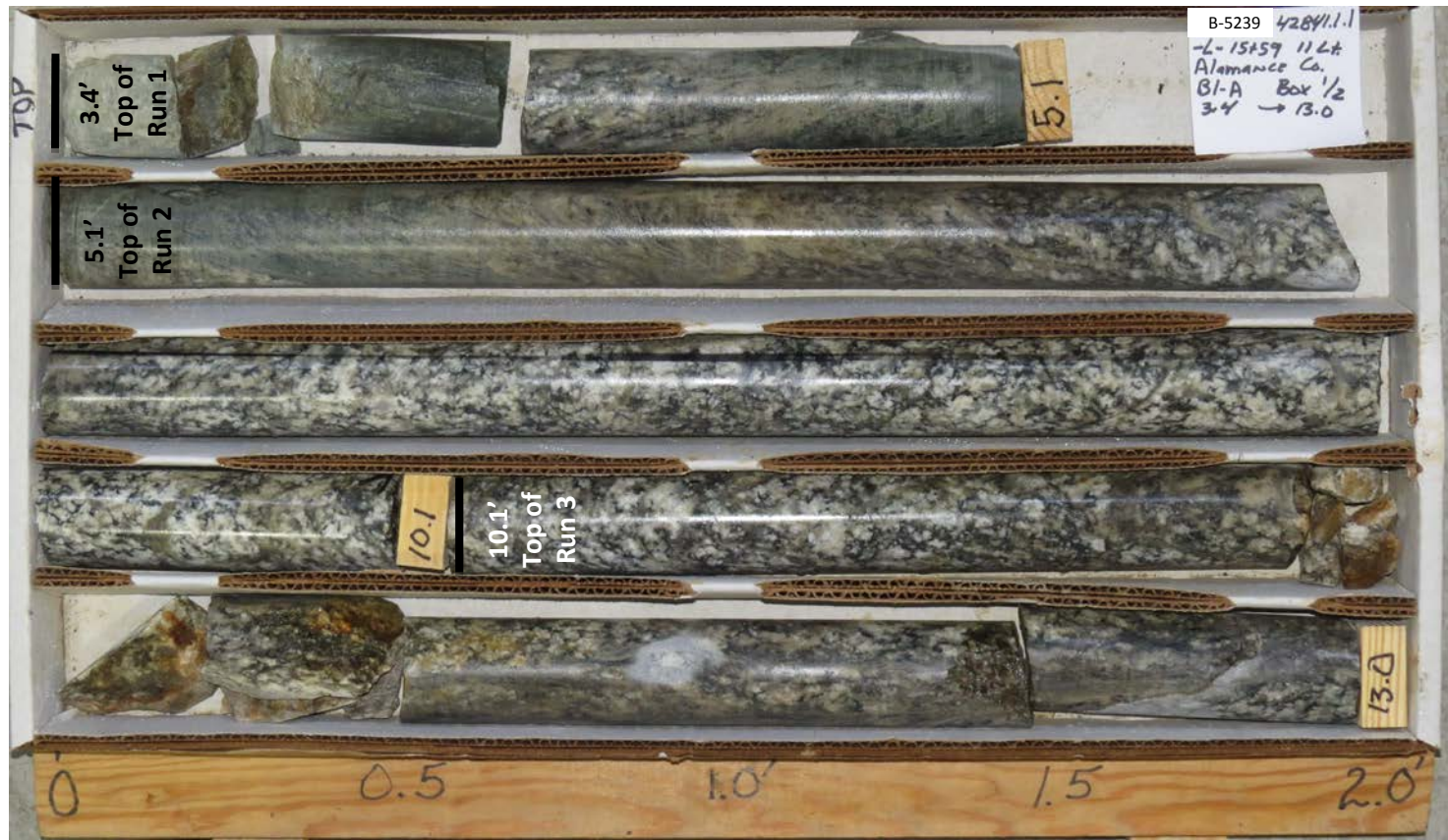
													CRYSTALLINE ROCK 31.8' - 31.9' CRYSTALLINE ROCK, ROLLER CONE REFUSAL Boring Terminated WITH TRI-CONE REFUSAL at Elevation 576.5 ft ON CRYSTALLINE ROCK	31.8 31.9

WBS 42841.1.1	TIP B-5239	COUNTY ALAMANCE	GEOLOGIST Murray, C. C.
SITE DESCRIPTION BRIDGE 119 OVER HAW RIVER ON HIGHWAY 87 BETWEEN SR 1530 AND SR 1576			GROUND WTR (ft)
BORING NO. EB2-B	STATION 17+82	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. 608.3 ft	TOTAL DEPTH 33.1 ft	NORTHING 885,939	EASTING 1,849,452
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 03/19/2014		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/21/14	COMP. DATE 08/21/14	SURFACE WATER DEPTH N/A

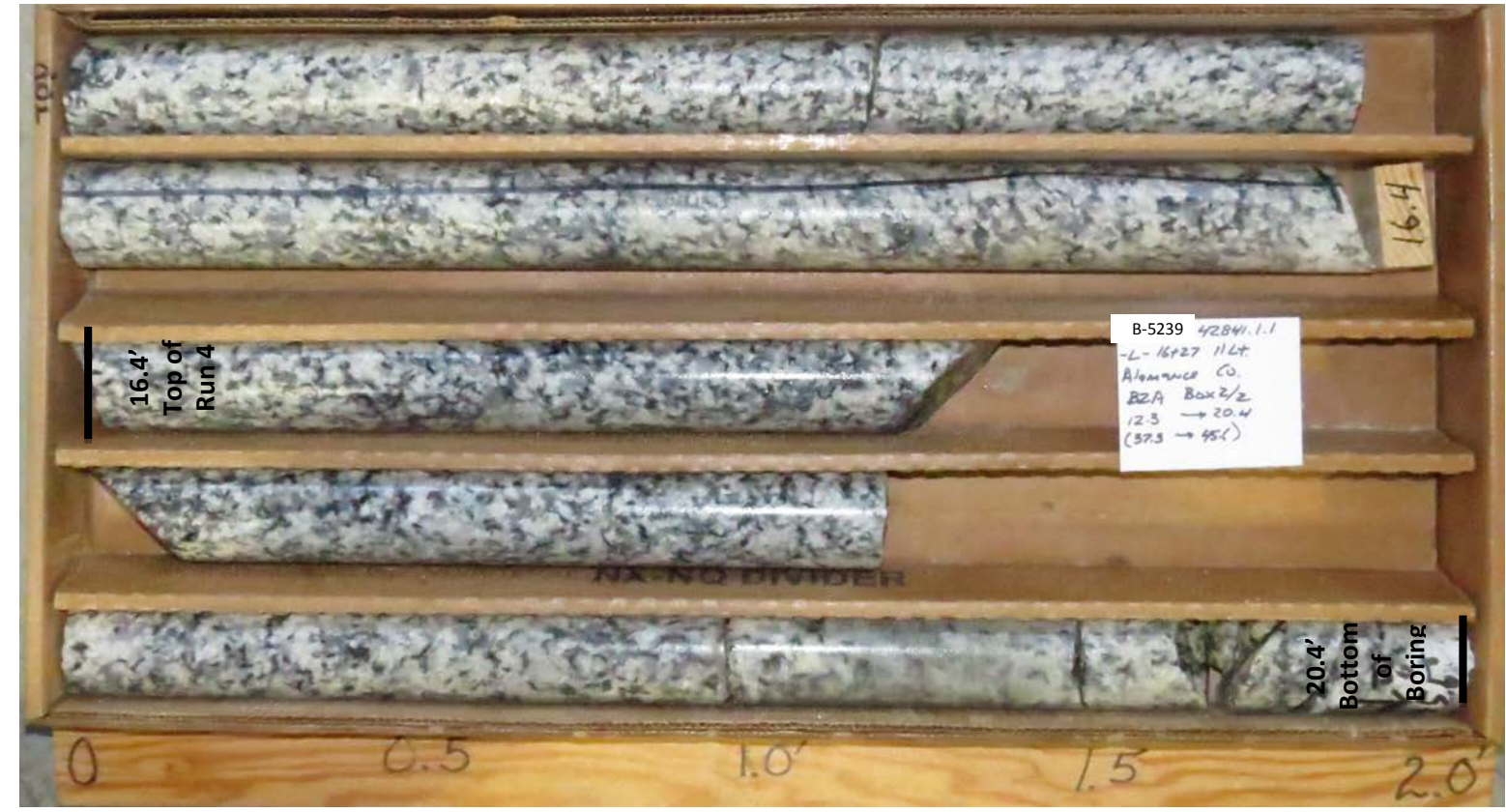
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
610													GROUND SURFACE	608.3
605	605.5	2.8	2	1	2							W	ROADWAY EMBANKMENT 0 - 15' ROADWAY EMBANKMENT; RED, SOFT TO MED. STIFF, WET, PLASTIC, SANDY SILTY CLAY	
600	600.5	7.8	2	2	3							W		
595	595.5	12.8	2	2	4							W		
590	590.5	17.8	2	9	6							W	RESIDUAL 15' - 23.8' RESIDUAL, RED AND TAN, MEDIUM DENSE TO DENSE, MODERATELY PLASTIC, CLAYEY SILTY SAND. WEATHERED GRANITE WITH REMNANT ROCK TEXTURE.	15.0
585	585.5	22.8	26	49	51/3							W	WEATHERED ROCK 23.8' - 33.1 WEATHERED ROCK	23.8
580	580.5	27.8	45	55/4										

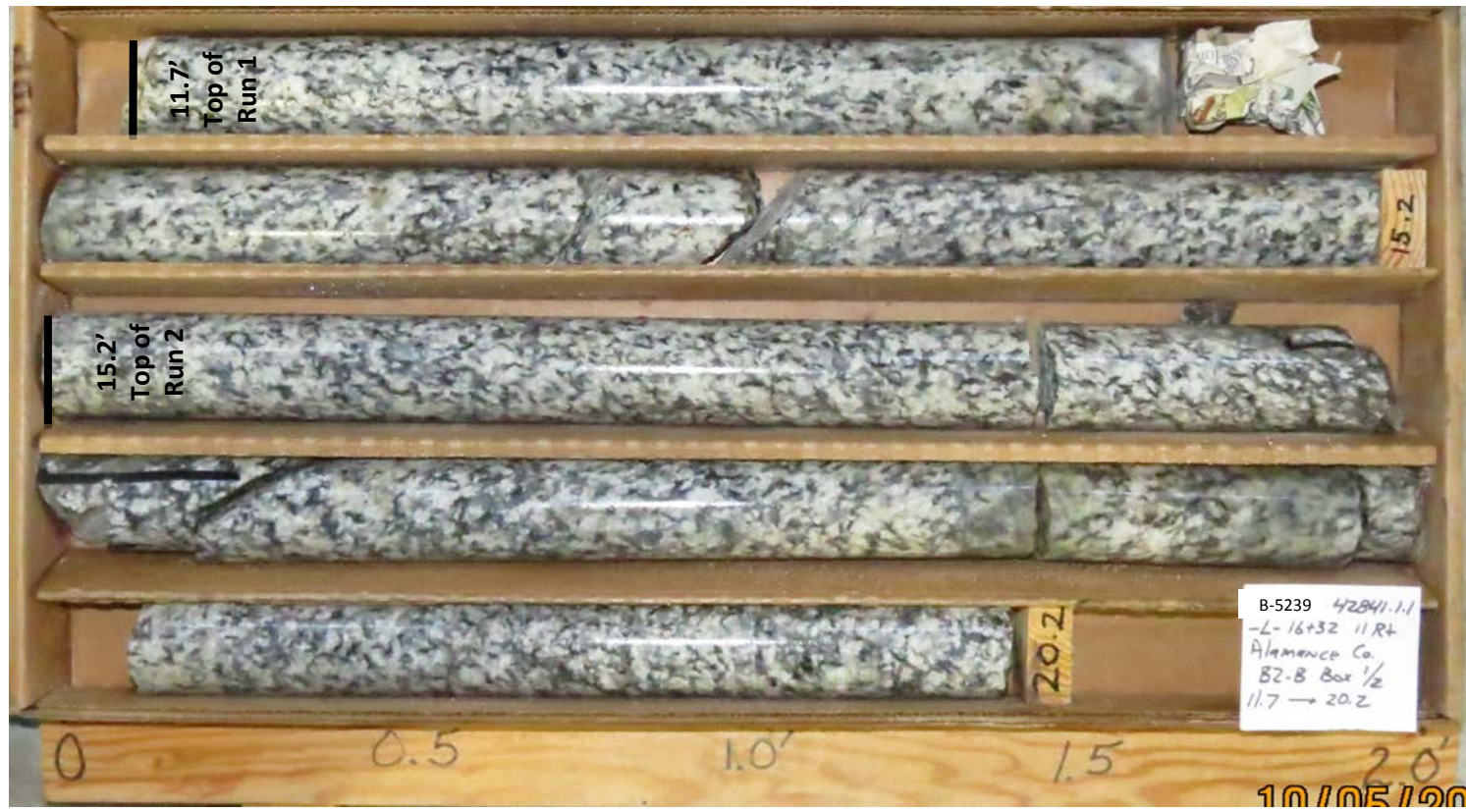
													Boring Terminated at Elevation 575.2 ft IN SEV. WEATH. CRYSTALLINE ROCK	33.1

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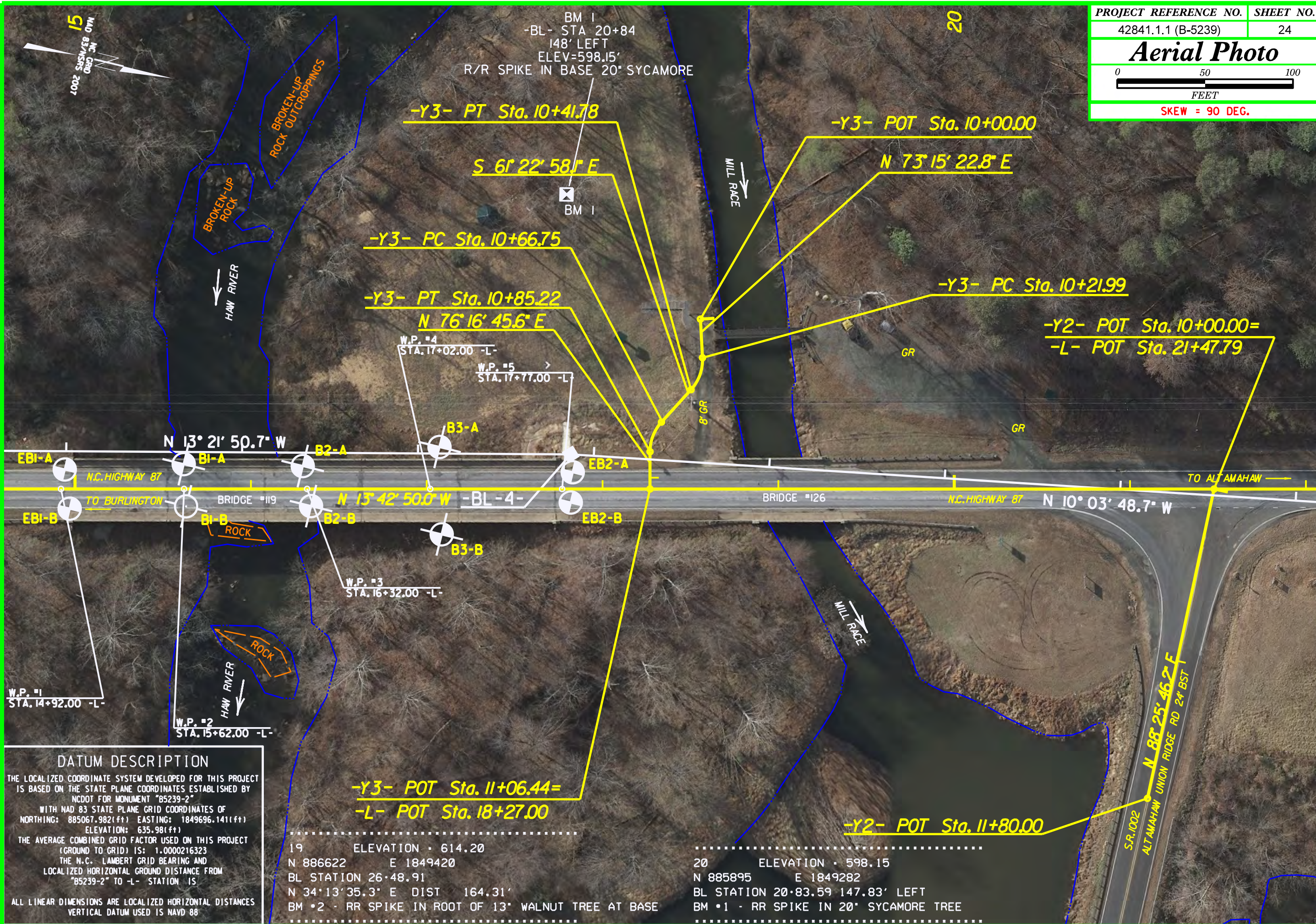












DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5239-2" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 885067.982(ft) EASTING: 1849696.141(ft) ELEVATION: 635.98(ft)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000216323

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5239-2" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

.....
 19 ELEVATION - 614.20
 N 886622 E 1849420
 BL STATION 26+48.91
 N 34°13'35.3" E DIST 164.31'
 BM #2 - RR SPIKE IN ROOT OF 13" WALNUT TREE AT BASE

.....
 20 ELEVATION - 598.15
 N 885895 E 1849282
 BL STATION 20+83.59 147.83' LEFT
 BM #1 - RR SPIKE IN 20" SYCAMORE TREE
