

**This electronic collection of documents is provided  
for the convenience of the user  
and is Not a Certified Document –**

**The documents contained herein were originally issued  
and sealed by the individuals whose names and license  
numbers appear on each page, on the dates appearing  
with their signature on that page.**

**This file or an individual page  
shall not be considered a certified document.**

PROJECT: 34915 REFERENCE: U-3308

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3-7	RETAINING WALL ENVELOPES
8	SOIL TEST RESULTS

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY DURHAM  
 PROJECT DESCRIPTION NC 55 (ALSTON AVE.) FROM NC 147  
(BUCK DEAN FREEWAY) TO NORTH OF US 70 BUS/NC 98  
(HOLLOWAY ST.)  
 SITE DESCRIPTION RETAINING WALL 1: LEFT OF -LALT- STATION  
38+00  
RETAINING WALL 2: RIGHT OF -LALT- STATION 47+00  
RETAINING WALL 3: LEFT OF -Y14- STATION 10+50  
RETAINING WALL 4: RIGHT OF -LALT- STATION 50+00  
RETAINING WALL 5: RIGHT OF -LALT- STATION 58+00

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3308	1	8

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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

N.D. MOHS

TERRACON

INVESTIGATED BY N.D. MOHS

DRAWN BY T.T. WALKER

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE APRIL 2015



DocuSigned by:  
*Nathan Mohs*

4/13/2015

C4CF720937E246B...

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 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

SOIL LEGEND AND AASHTO CLASSIFICATION Table with columns for General Class, Granular Materials, Silty-Clay Materials, Organic Materials, Group Class, Symbol, % Passing, Material Passing #40 and #200, Group Index, Usual Types of Major Materials, and Gen. Rating as Subgrade.

CONSISTENCY OR DENSENESS Table with columns for Primary Soil Type, Compactness or Consistency, Range of Standard Penetration Resistance (N-value), and Range of Unconfined Compressive Strength (Tons/ft²).

TEXTURE OR GRAIN SIZE Table with columns for U.S. Std. Sieve Size (mm), and categories for Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS Table with columns for Soil Moisture Scale (Atterberg Limits), Field Moisture Description, and Guide for Field Moisture Description (Liquid Limit, Plastic Limit, Optimum Moisture Shrinkage Limit).

PLASTICITY Table with columns for Plasticity Index (PI) and Dry Strength (Very Low, Slight, Medium, 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 SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF MATERIAL Table with columns for Organic Material, Granular Soils, Silty-Clay Soils, and Other Material.

GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP

MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRERD SOIL BOUNDARY INFERRERD ROCK LINE ALLUVIAL SOIL BOUNDARY

RECOMMENDATION SYMBOLS UNDERCUT EXCAVATION SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

ABBREVIATIONS 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, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WE. - WEATHERED UNIT WEIGHT DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO

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 STEEL TEETH, TRICONE TUNG-CARB., CORE BIT HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, H, N 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 INFERRERD ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.

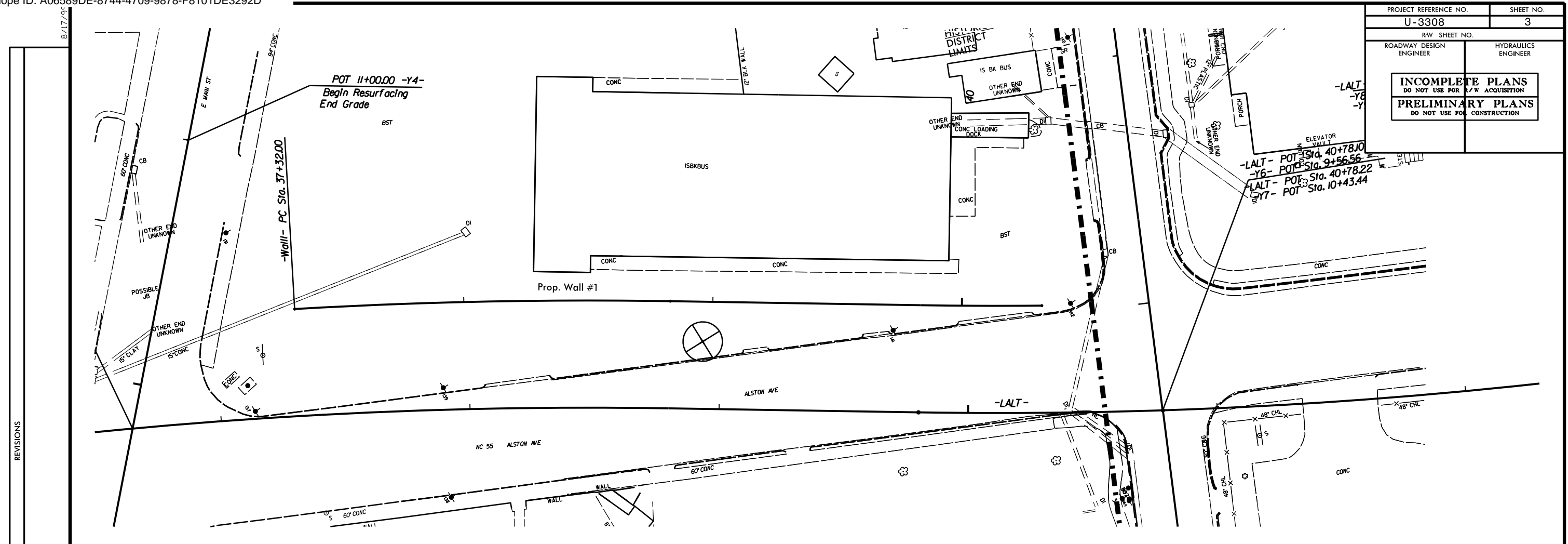
FRACTURE SPACING and BEDDING tables with columns for Term, Spacing, and Thickness.

INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

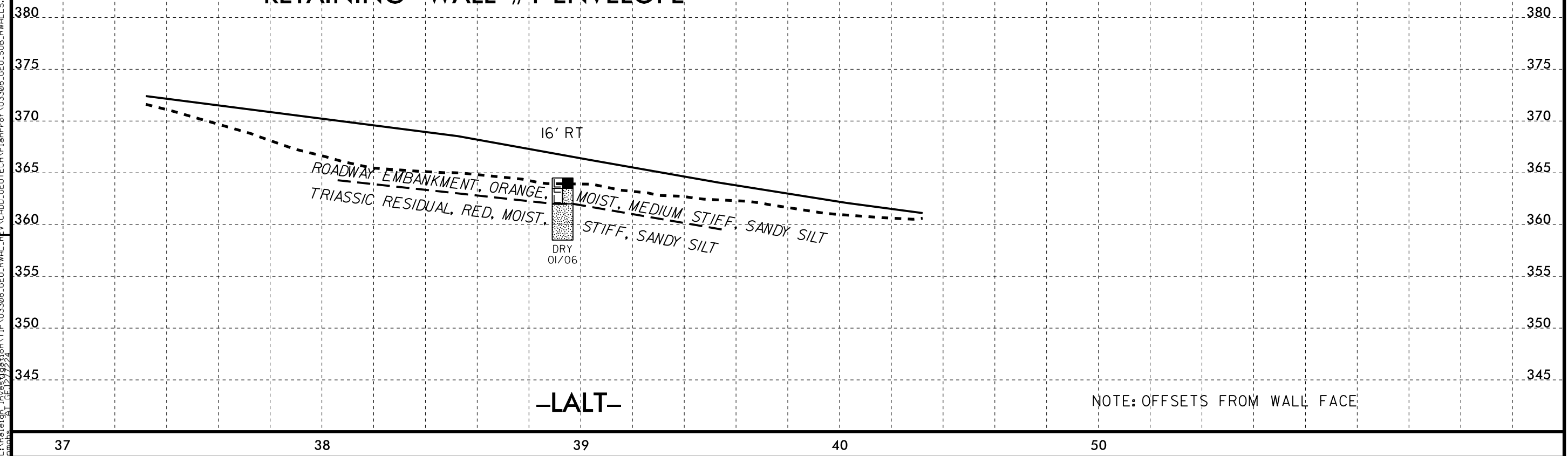
TERMS AND DEFINITIONS ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING 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 DISLODGED 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 (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 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 (SROQ) - 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.

BENCH MARK: ELEVATION: FEET NOTES:

PROJECT REFERENCE NO.	SHEET NO.
U-3308	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



### RETAINING WALL #1 ENVELOPE



NOTE: OFFSETS FROM WALL FACE

REVISIONS

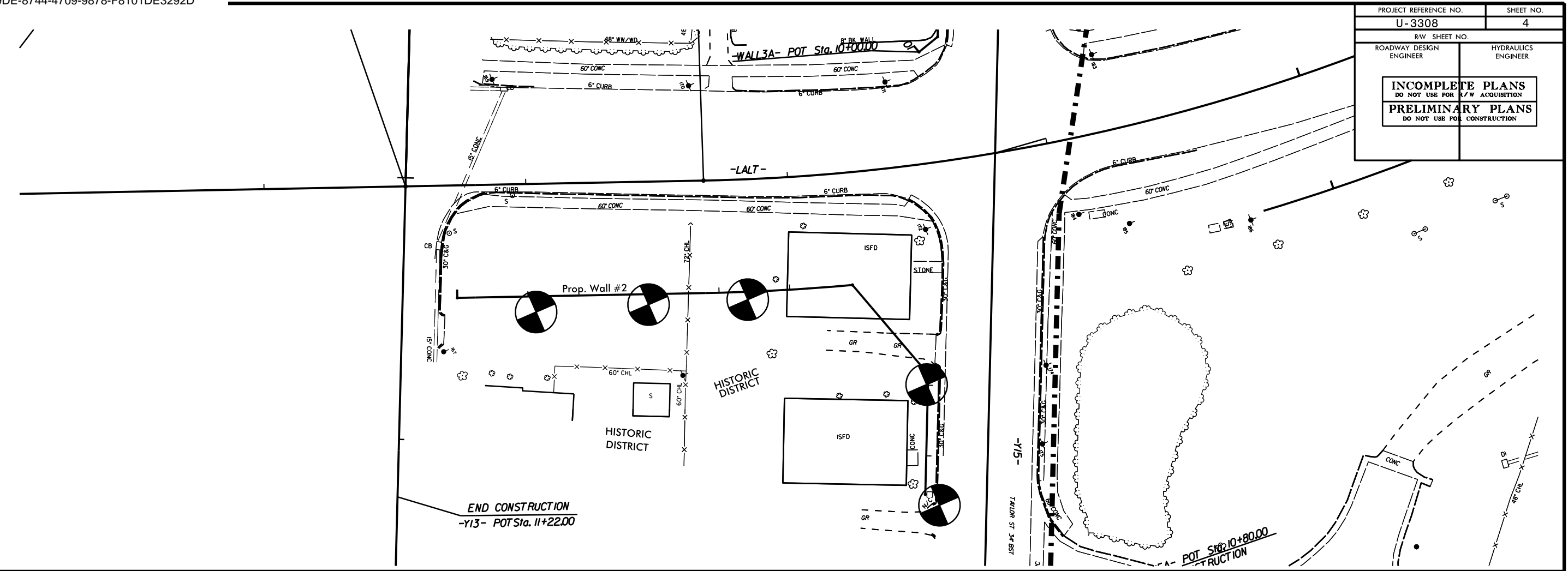
I3-APR-2015 13:39  
 L:\Projects\Investigation\TIP\U3308\GEO\_RWAL\_REV\CADD\_GEO\TECH\Plan\Prof\U3308\_GEO\_SUB\_RWALLS.dgn  
 AT 12/22/24

8/17/19

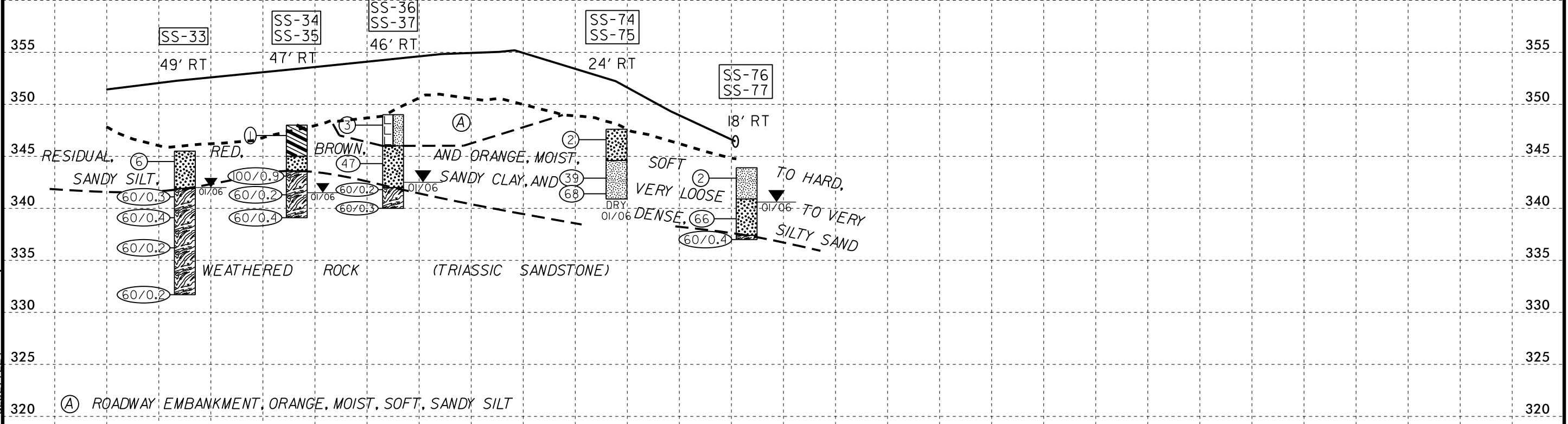
PROJECT REFERENCE NO. U-3308	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR A/W ACQUISITION  
**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

REVISIONS  
13-APR-2015 13:39: [unclear]  
13-APR-2015 13:39: [unclear]



### RETAINING WALL #2 ENVELOPE



**-WALL2-**

NOTE: OFFSETS FROM WALL FACE

10

11

12

320

360

355

350

345

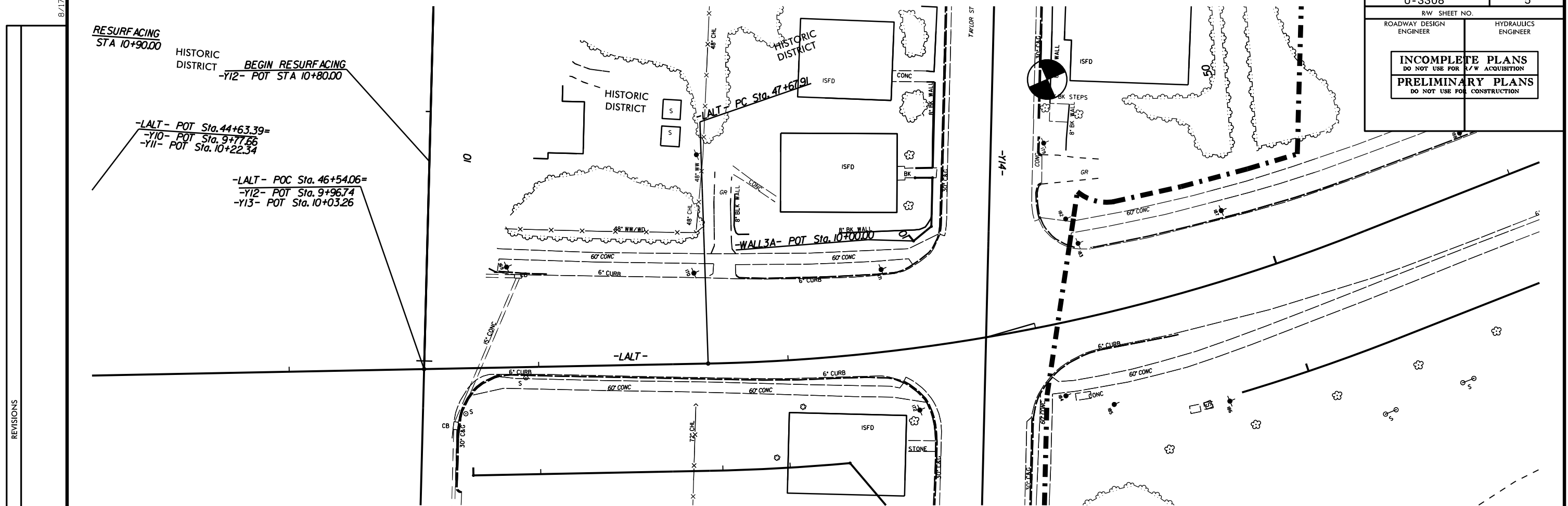
340

335

330

325

PROJECT REFERENCE NO.	SHEET NO.
U-3308	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



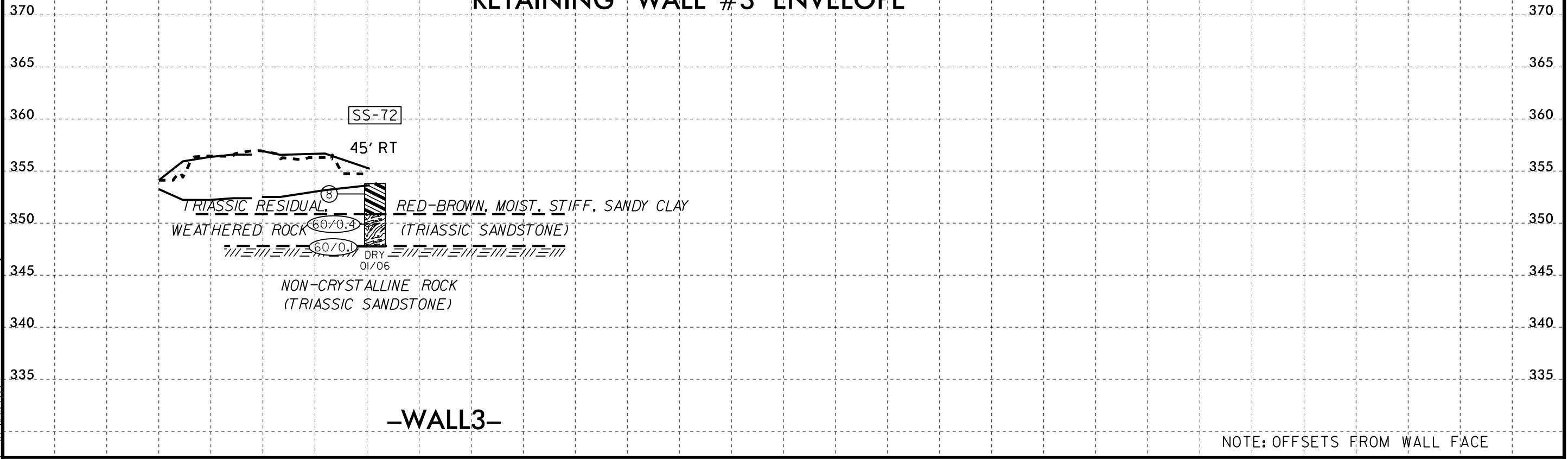
RESURFACING  
STA 10+90.00

HISTORIC DISTRICT  
BEGIN RESURFACING  
-Y12- POT STA 10+80.00

-LALT- POT Sta. 44+63.39=  
-Y10- POT Sta. 9+77.66  
-Y11- POT Sta. 10+22.34

-LALT- POC Sta. 46+54.06=  
-Y12- POT Sta. 9+96.74  
-Y13- POT Sta. 10+03.26

### RETAINING WALL #3 ENVELOPE

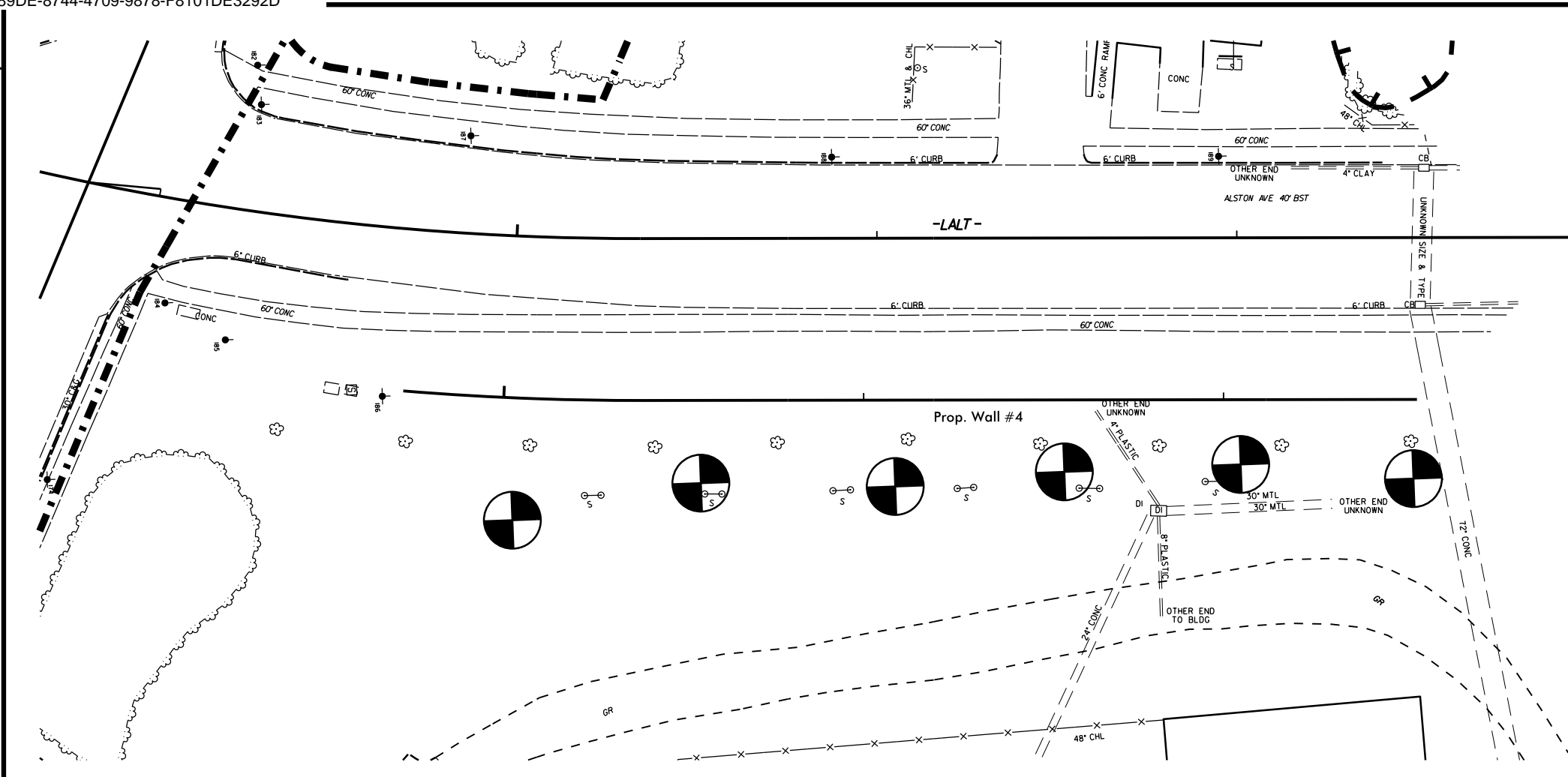


REVISIONS

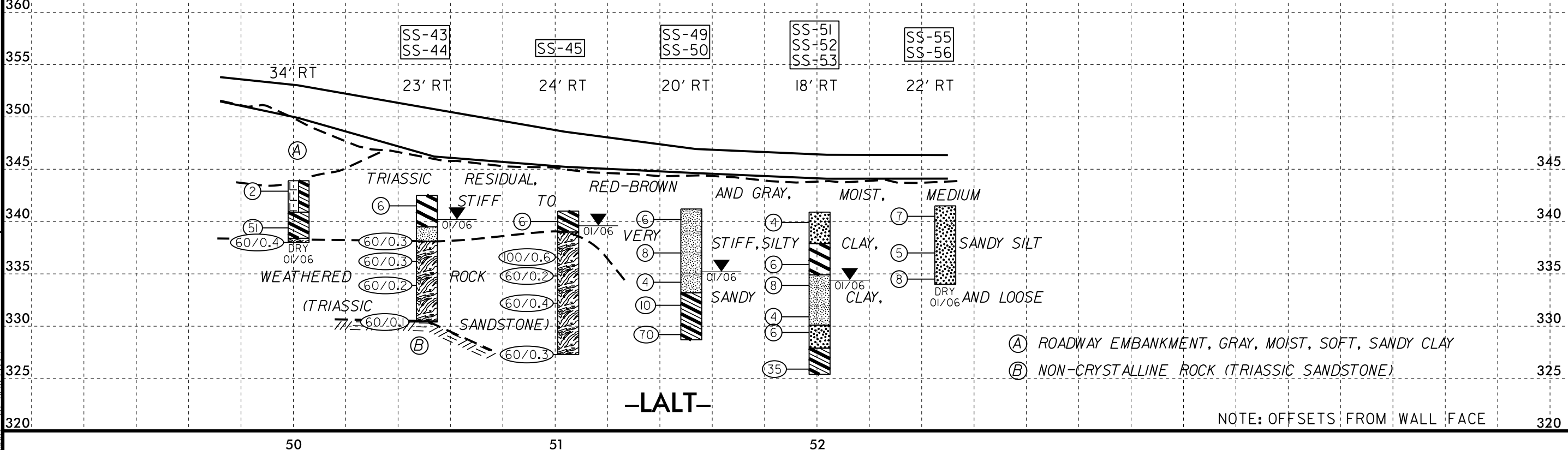
13-APR-2015 13:40  
L:\Projects\Investigation\TIP\U3308\GEO\_RWALL\_REV\CADD\_GEO\TECH\Plan\Prof\U3308\_GEO\_SUB\_RWALL5.dgn  
L:\Projects\Investigation\TIP\U3308\GEO\_RWALL\_REV\REV\127724

PROJECT REFERENCE NO.	SHEET NO.
U-3308	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

REVISIONS



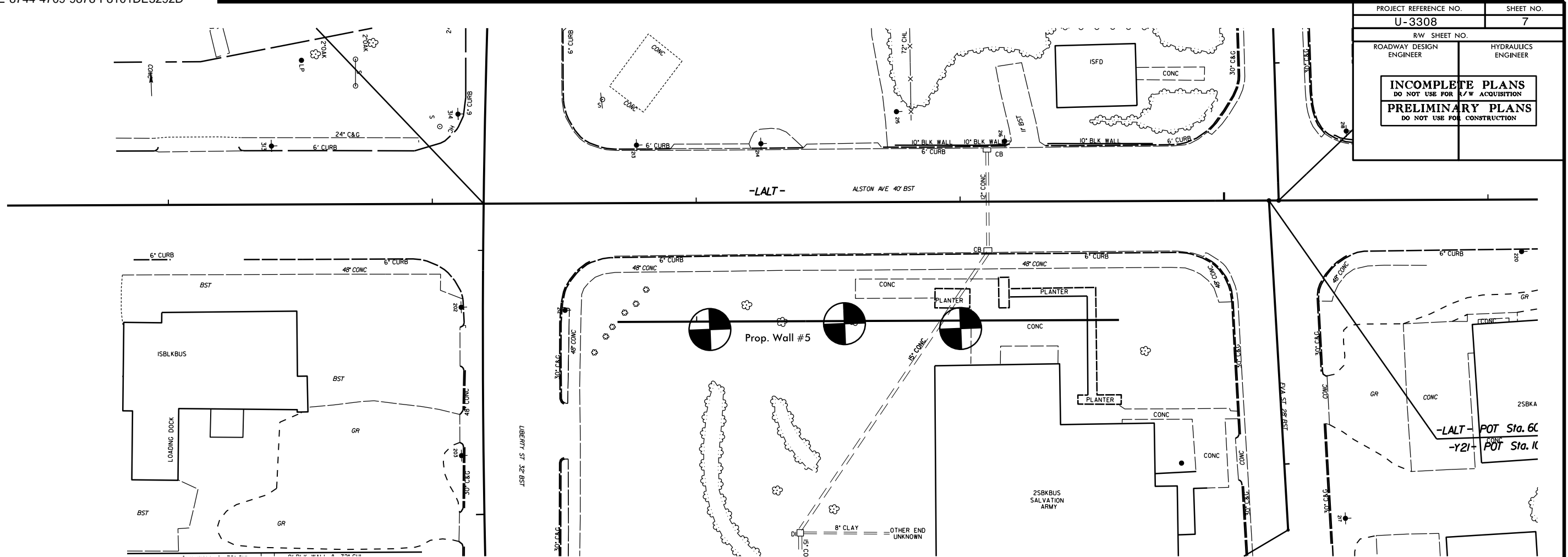
### RETAINING WALL #4 ENVELOPE



13-APR-2015 13:41  
L:\Projects\Investigation\TIP\U3308\_GEO\_RWAL\_REV\3308\_GEO\_SUB\_RWALLS.dgn  
12/22/24

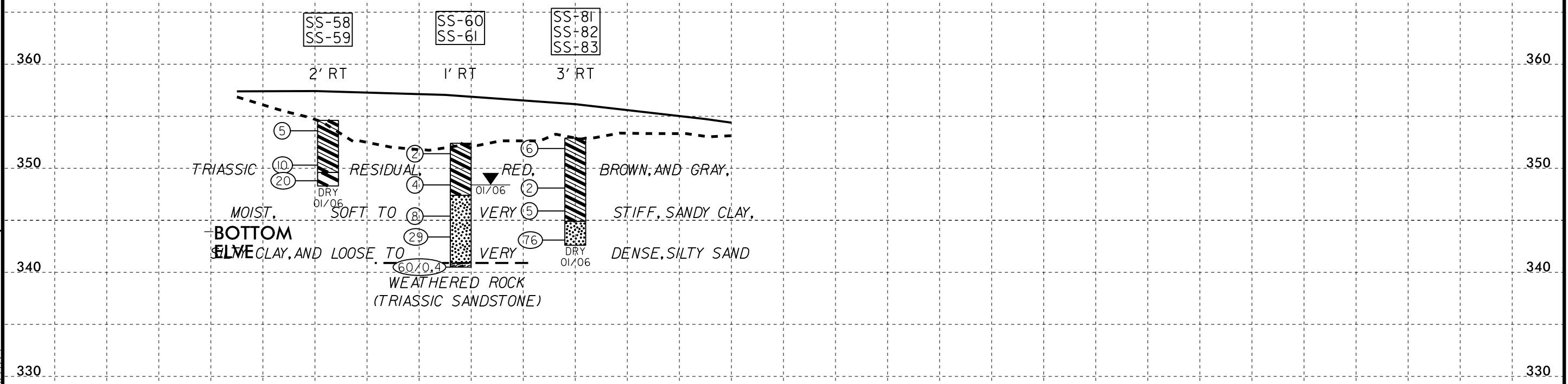
8/17/98

PROJECT REFERENCE NO.	SHEET NO.
U-3308	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



REVISIONS

### RETAINING WALL #5 ENVELOPE



NOTE: OFFSETS FROM WALL FACE

I3-APR-2015 13:41  
 L:\Projects\Investigation\TIP\U3308\GEO\_RWAL\_REV\GEO\_TECH\Plan\Prof\U3308\_GEO\_SUB\_FWALL5.dgn  
 AT 12/22/24

57

58

59



REVISIONS

I3-APR-2015 13:21  
C:\Users\ymotis\Documents\NDM Projects\U3308\GEO\_RWAL\_REV\CADD\_GEO\GEO\_SUB\_GEO\_SUB\_RWALL\_S.dgn  
mchh AT RE 12/22/24

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-33	48 RT	47+03	0.0-1.5	A-2-4(0)	22	4	41.6	25.1	15.2	18.2	78	58	29	-	-
SS-34	44 RT	47+46	0.0-1.5	A-6(3)	25	12	27.8	26.2	17.5	28.5	99	82	51	-	-
SS-35	44 RT	47+46	3.5-5.0	A-2-4(0)	23	4	52.7	21.7	17.4	8.1	100	63	29	-	-
SS-36	42 RT	47+83	0.0-1.5	A-4(1)	24	10	33.1	23.5	19.1	24.3	97	77	46	-	-
SS-37	42 RT	47+83	3.7-5.2	A-2-4(0)	21	1	49.3	22.9	19.7	8.1	100	86	32	-	-
SS-74	18 RT	11+29	0.0-1.5	A-2-4(0)	15	NP	51.0	27.1	13.9	8.1	98	70	25	-	-
SS-75	18 RT	11+29	3.7-5.2	A-4(0)	22	NP	7.3	59.5	13.0	20.2	100	100	39	-	-
SS-76	24 RT	10+83	0.0-1.5	A-4(0)	20	5	43.3	21.8	2.5	32.4	94	69	36	-	-
SS-77	24 RT	10+83	3.9-5.4	A-2-4(0)	23	5	55.0	18.8	10.0	16.2	100	68	29	-	-
SS-72	22 RT	11+10	0.0-1.5	A-6(4)	30	11	8.1	42.7	18.9	30.3	100	96	56	-	-
SS-43	54 RT	50+51	0.0-1.5	A-7-6(8)	44	17	23.3	21.7	34.7	20.3	96	83	57	-	-
SS-44	54 RT	50+51	3.4-4.9	A-4(0)	22	4	13.8	52.1	21.9	12.2	100	95	42	-	-
SS-45	54 RT	51+05	0.0-1.5	A-6(2)	29	11	20.5	38.3	22.9	18.3	100	89	48	-	-
SS-49	52 RT	51+52	3.2-4.7	A-4(0)	16	NP	12.6	47.5	27.8	12.2	100	96	48	-	-
SS-50	52 RT	51+52	8.2-9.7	A-6(18)	38	21	0.4	17.0	50.1	32.5	100	100	89	-	-
SS-51	52 RT	52+01	4.0-5.5	A-7-6(18)	46	26	8.9	25.4	29.2	36.5	100	96	73	-	-
SS-52	52 RT	52+01	9.0-10.5	A-4(0)	24	7	8.3	54.8	14.6	22.3	100	99	45	-	-
SS-53	52 RT	52+01	14.0-15.5	A-6(11)	35	13	8.3	10.1	61.3	20.3	100	94	85	-	-
SS-55	58 RT	52+49	0.0-1.5	A-2-4(0)	31	7	47.3	20.1	24.5	8.1	66	40	25	-	-
SS-56	58 RT	52+49	3.5-5.0	A-2-4(0)	32	4	54.6	18.7	22.7	4.1	81	46	26	-	-
SS-58	48 RT	58+05	0.0-1.5	A-6(8)	35	18	20.5	25.4	35.9	18.3	100	89	60	-	-
SS-59	48 RT	58+05	4.8-6.3	A-7-6(21)	45	22	0.8	14.8	47.9	36.5	100	100	90	-	-
SS-60	46 RT	58+56	0.0-1.5	A-6(4)	29	11	16.6	32.3	30.8	20.3	99	90	58	-	-
SS-61	46 RT	58+56	6.0-7.5	A-2-4(0)	27	6	41.4	26.8	19.7	12.2	100	80	35	-	-
SS-81	35 LT	59+00	0.0-1.5	A-4(0)	20	6	27.7	32.8	7.2	32.4	87	75	39	-	-
SS-82	35 LT	59+00	3.5-5.0	A-7-6(10)	48	27	32.2	19.6	5.8	42.5	100	87	50	-	-
SS-83	35 LT	59+00	6.0-7.5	A-2-4(0)	25	6	60.1	13.3	4.3	22.2	99	56	29	-	-

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34915.1.1 (U-3308) F.A. PROJ. STP-55(20)  
COUNTY DURHAM  
PROJECT DESCRIPTION WIDENING OF NC 55 (ALSTON AVE.) FROM  
NC 147 (BUCK DEAN FREEWAY) TO US 70 BUS/NC 98  
(HOLLOWAY ST.)  
SITE DESCRIPTION BRIDGES ON -NSRR- AND -CSX- OVER -L-  
(NC 55)

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4,5	PROFILES
6-10	CROSS SECTIONS
11-22	BORE LOG & CORE REPORTS
23-24	SOIL TEST RESULTS
25-27	CORE PHOTOGRAPHS
28	SITE PHOTOGRAPH

**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 RALESBY BY CONTRACTORS THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

**PROJECT: 34915.1.1 ID: U-3308**

PERSONNEL

J. L. PEDRO

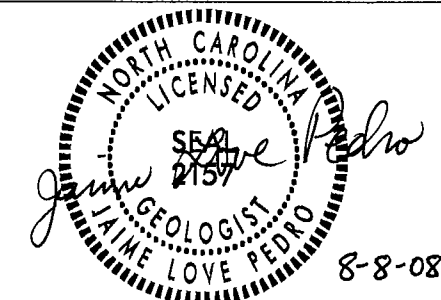
CONSULTANT: TIERRA

INVESTIGATED BY J. L. PEDRO

CHECKED BY N. T. ROBERSON

SUBMITTED BY J. L. PEDRO

DATE JULY 2008



DRAWN BY: J. L. PEDRO, R. E. BEARD

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

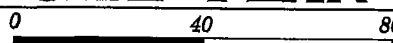
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

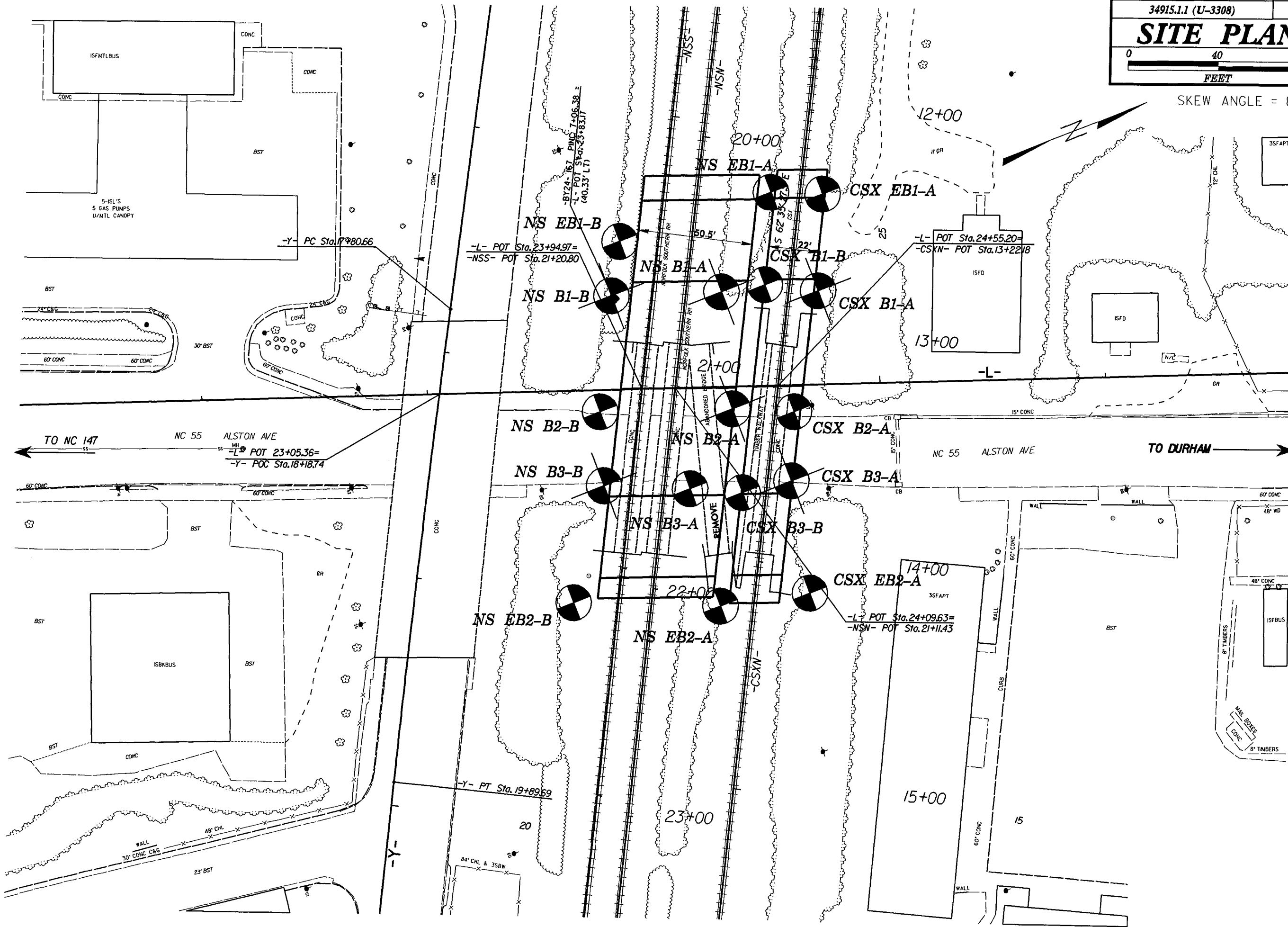
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

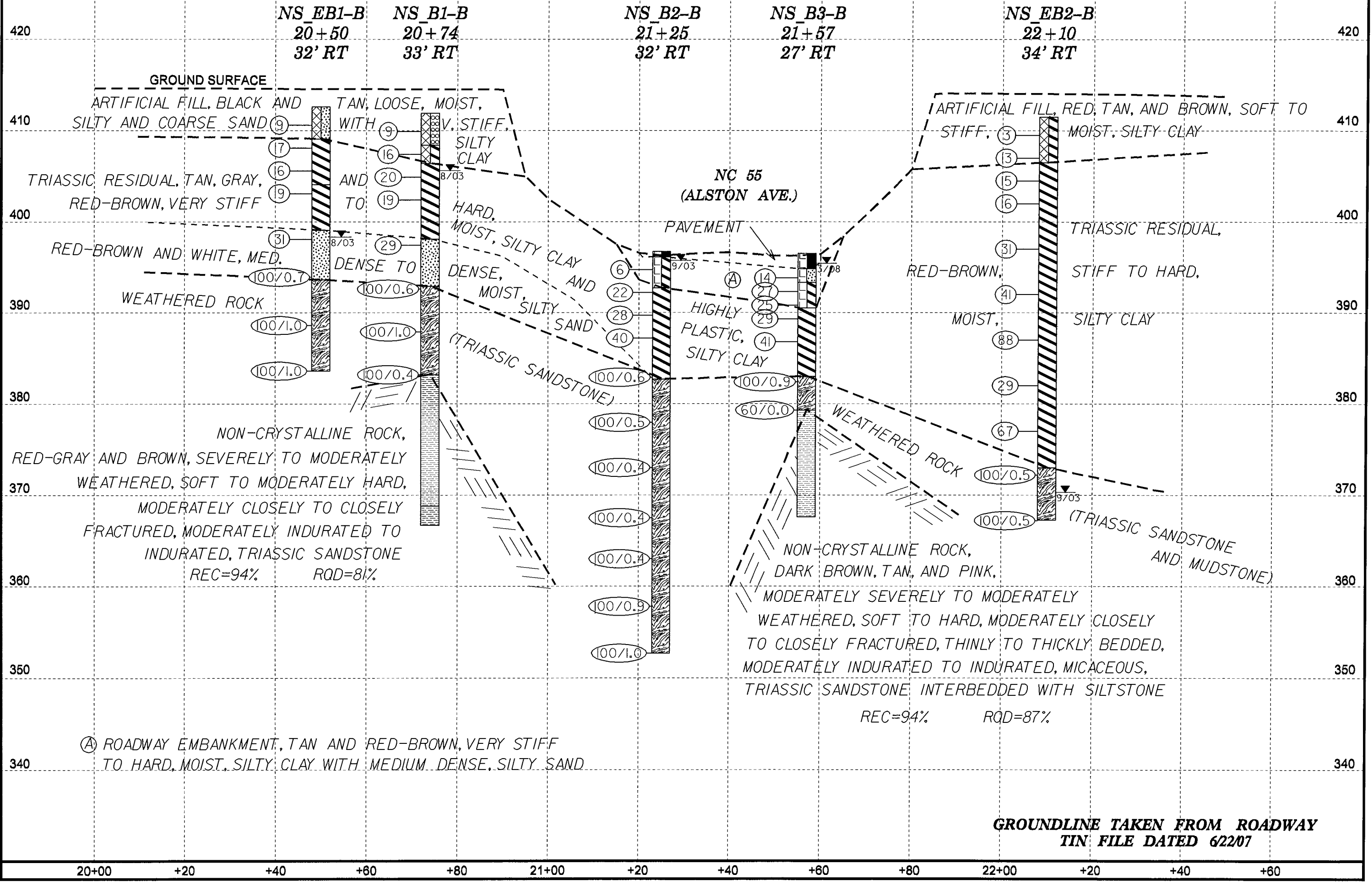
PROJECT REFERENCE NO. 34915.11(U-3308) SHEET NO. 2

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS																																																																																	
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM T208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p><i>VERY STIFF, SANDY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>				<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>				<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</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, 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. FLAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - 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.</p>																																																																																	
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (&lt;= 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-1-b</th> <th>A-3</th> <th colspan="2">A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th colspan="2">A-4, A-5</th> <th>A-6, A-7</th> <th colspan="3"></th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING</th> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> <td>10 20 40 60 100</td> </tr> </table>				GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			GROUP CLASS.	A-1	A-1-b	A-3	A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5		A-6, A-7				SYMBOL																	% PASSING	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				<p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>				<p>COMPRESSIONIBILITY</p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50</p>				<p>WEATHERING</p> <p>FRESH VERY SLIGHT (V SL.) SLIGHT (SL.) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE</p>				<p>ROCK HARDNESS</p> <p>VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT</p>			
GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS																																																																														
GROUP CLASS.	A-1	A-1-b	A-3	A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5		A-6, A-7																																																																															
SYMBOL																																																																																													
% PASSING	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100	10 20 40 60 100																																																																													
<p>COMPACTNESS OR DENSENESS</p> <table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>&lt;4 4 TO 10 10 TO 30 30 TO 50 &gt;50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>&lt;2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 &gt;30</td> <td>&lt;0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 &gt;4</td> </tr> </table>				PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4	<p>GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>STATIC WATER LEVEL AFTER 24 HOURS</p> <p>PERCHED WATER LEVEL, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>SPRING OR SEEP</p>				<p>MISCELLANEOUS SYMBOLS</p> <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>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT TEST BORING</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p>				<p>ABBREVIATIONS</p> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST F - FINE FOSS - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL - HIGHLY</p> <p>MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SO. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL W - MOISTURE CONTENT V - VERY</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W<sub>d</sub> - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS</p> <p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL RATIO CBR - CALIFORNIA BEARING RATIO</p>																																																																					
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )																																																																																										
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A																																																																																										
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4																																																																																										
<p>TEXTURE OR GRAIN SIZE</p> <table border="1"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <td></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </table> <table border="1"> <tr> <th>BOULDER (BLR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE, SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td>MM 305 IN. 12</td> <td>75 3</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> <td></td> </tr> </table>				U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.75	2.00	0.42	0.25	0.075	0.053	BOULDER (BLR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE, SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)	MM 305 IN. 12	75 3	2.0	0.25	0.05	0.005		<p>EQUIPMENT USED ON SUBJECT PROJECT</p> <p>DRILL UNITS:</p> <p>MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME 45B DIEDRICH D50</p> <p>ADVANCING TOOLS:</p> <p>CLAY BITS 6' CONTINUOUS FLIGHT AUGER 8' HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT</p> <p>HAMMER TYPE:</p> <p>AUTOMATIC MANUAL</p> <p>CORE SIZE:</p> <p>B N Q H Q</p> <p>HAND TOOLS:</p> <p>POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST</p>				<p>FRACTURE SPACING</p> <table border="1"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> <p>BEDDING</p> <table border="1"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>&gt; 4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </table>				TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FEET	VERY CLOSE	LESS THAN 0.16 FEET	TERM	THICKNESS	VERY THICKLY BEDDED	> 4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET	<p>INDURATION</p> <p>FRIABLE MODERATELY INDURATED INDURATED EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																											
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																							
	4.75	2.00	0.42	0.25	0.075	0.053																																																																																							
BOULDER (BLR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE, SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																							
MM 305 IN. 12	75 3	2.0	0.25	0.05	0.005																																																																																								
TERM	SPACING																																																																																												
VERY WIDE	MORE THAN 10 FEET																																																																																												
WIDE	3 TO 10 FEET																																																																																												
MODERATELY CLOSE	1 TO 3 FEET																																																																																												
CLOSE	0.16 TO 1 FEET																																																																																												
VERY CLOSE	LESS THAN 0.16 FEET																																																																																												
TERM	THICKNESS																																																																																												
VERY THICKLY BEDDED	> 4 FEET																																																																																												
THICKLY BEDDED	1.5 - 4 FEET																																																																																												
THINLY BEDDED	0.16 - 1.5 FEET																																																																																												
VERY THINLY BEDDED	0.03 - 0.16 FEET																																																																																												
THICKLY LAMINATED	0.008 - 0.03 FEET																																																																																												
THINLY LAMINATED	< 0.008 FEET																																																																																												
<p>PLASTICITY</p> <table border="1"> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>				NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH	LOW PLASTICITY	0-5	VERY LOW	MED. PLASTICITY	6-15	SLIGHT	HIGH PLASTICITY	16-25	MEDIUM		26 OR MORE	HIGH	<p>COLOR</p> <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>NOTES:</p>																																																																						
NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH																																																																																											
LOW PLASTICITY	0-5	VERY LOW																																																																																											
MED. PLASTICITY	6-15	SLIGHT																																																																																											
HIGH PLASTICITY	16-25	MEDIUM																																																																																											
	26 OR MORE	HIGH																																																																																											
<p>PI OF A-7-5 SUBGROUP IS &lt;= LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</p>				<p>PI OF A-7-5 SUBGROUP IS &lt;= LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</p>				<p>BENCH MARK: BY24-I67 of -L- Sta. 23+83.17, 40.33' LT</p> <p>ELEVATION: 411.96 FT.</p>																																																																																					

<b>PROJECT REFERENCE NO.</b>	<b>SHEET</b>
34915.1.1 (U-3308)	3
<b>SITE PLAN</b>	
 FEET	

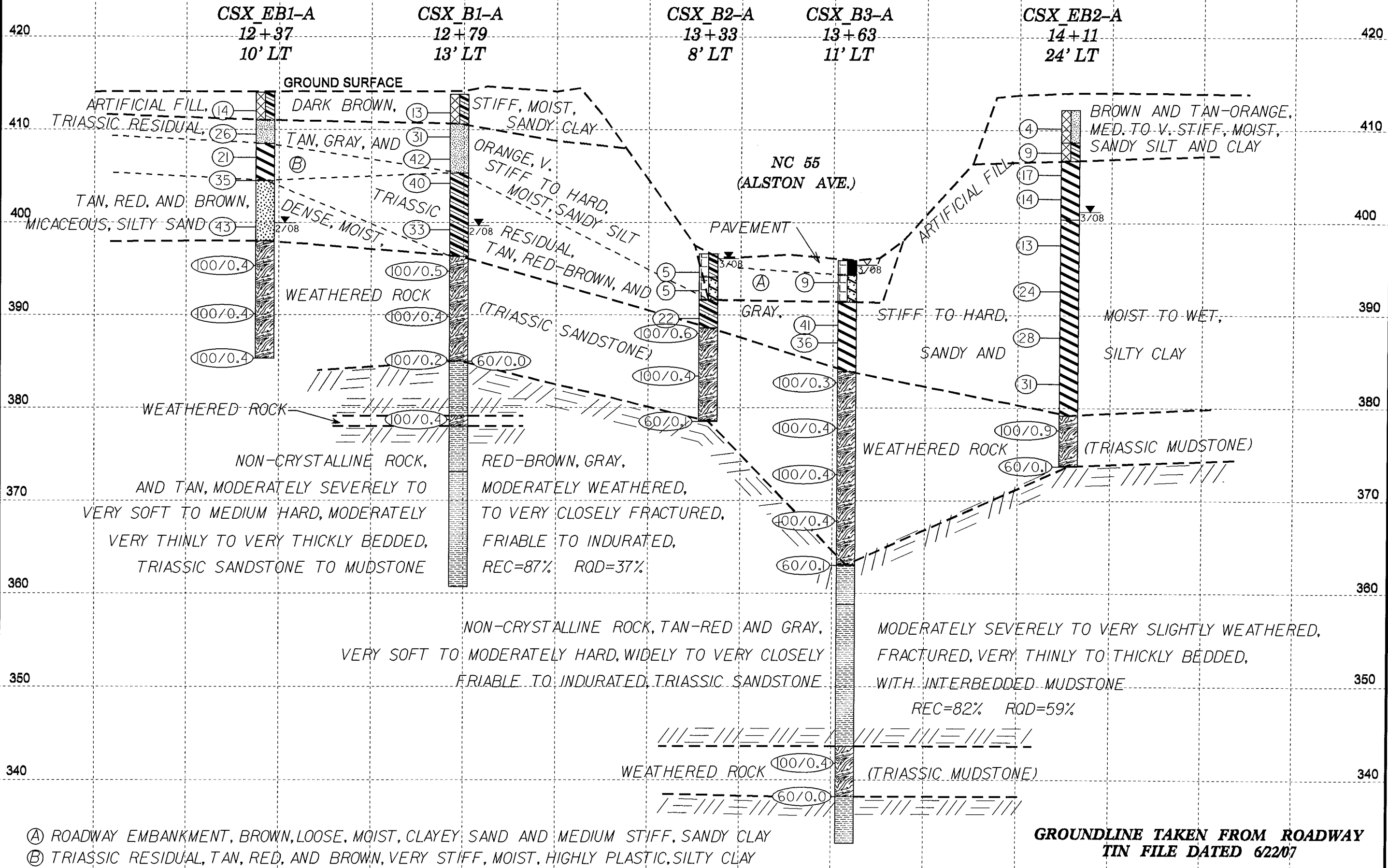
SKIEW ANGLE = 82°





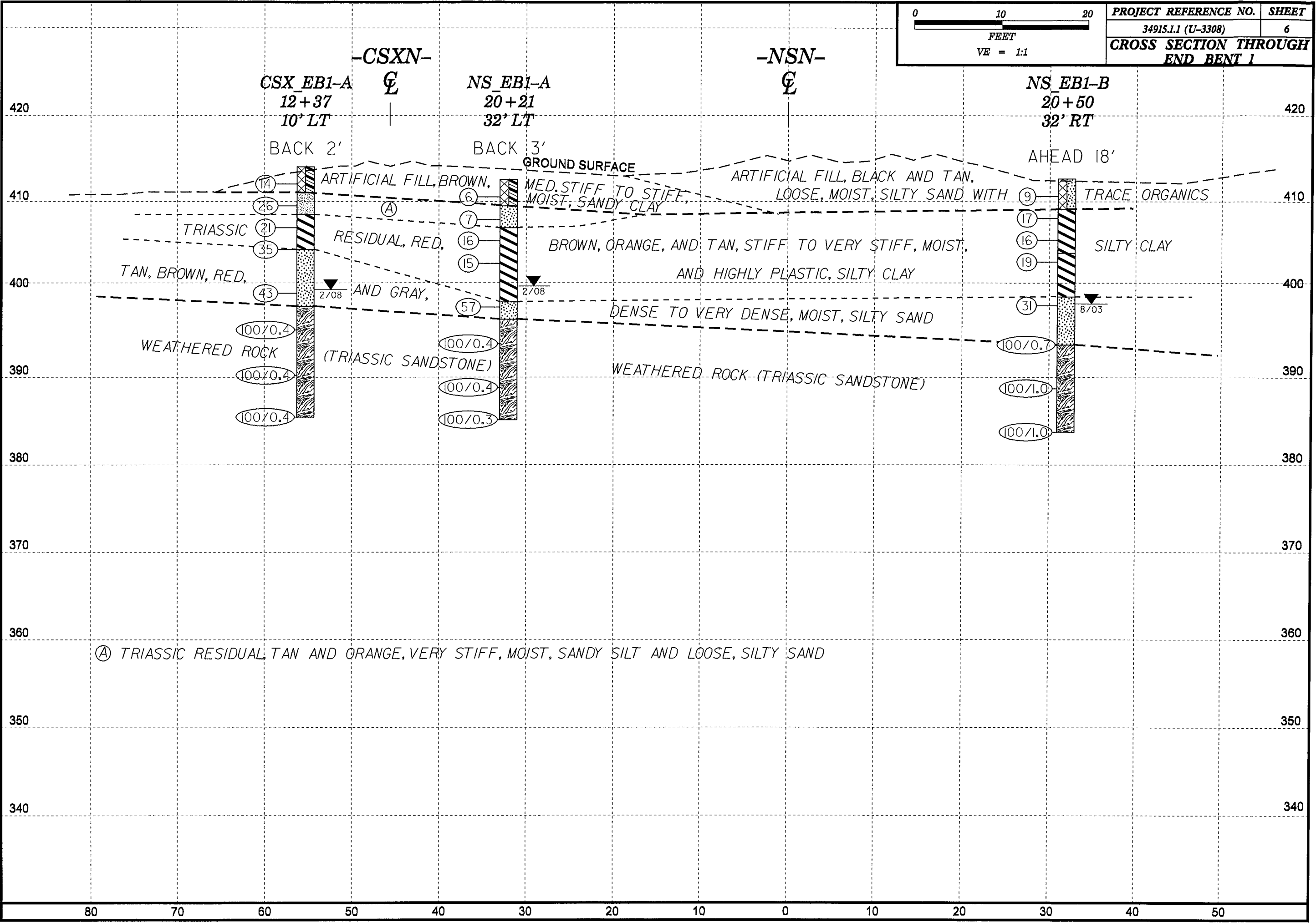
Ⓐ ROADWAY EMBANKMENT, TAN AND RED-BROWN, VERY STIFF TO HARD, MOIST, SILTY CLAY WITH MEDIUM DENSE, SILTY SAND

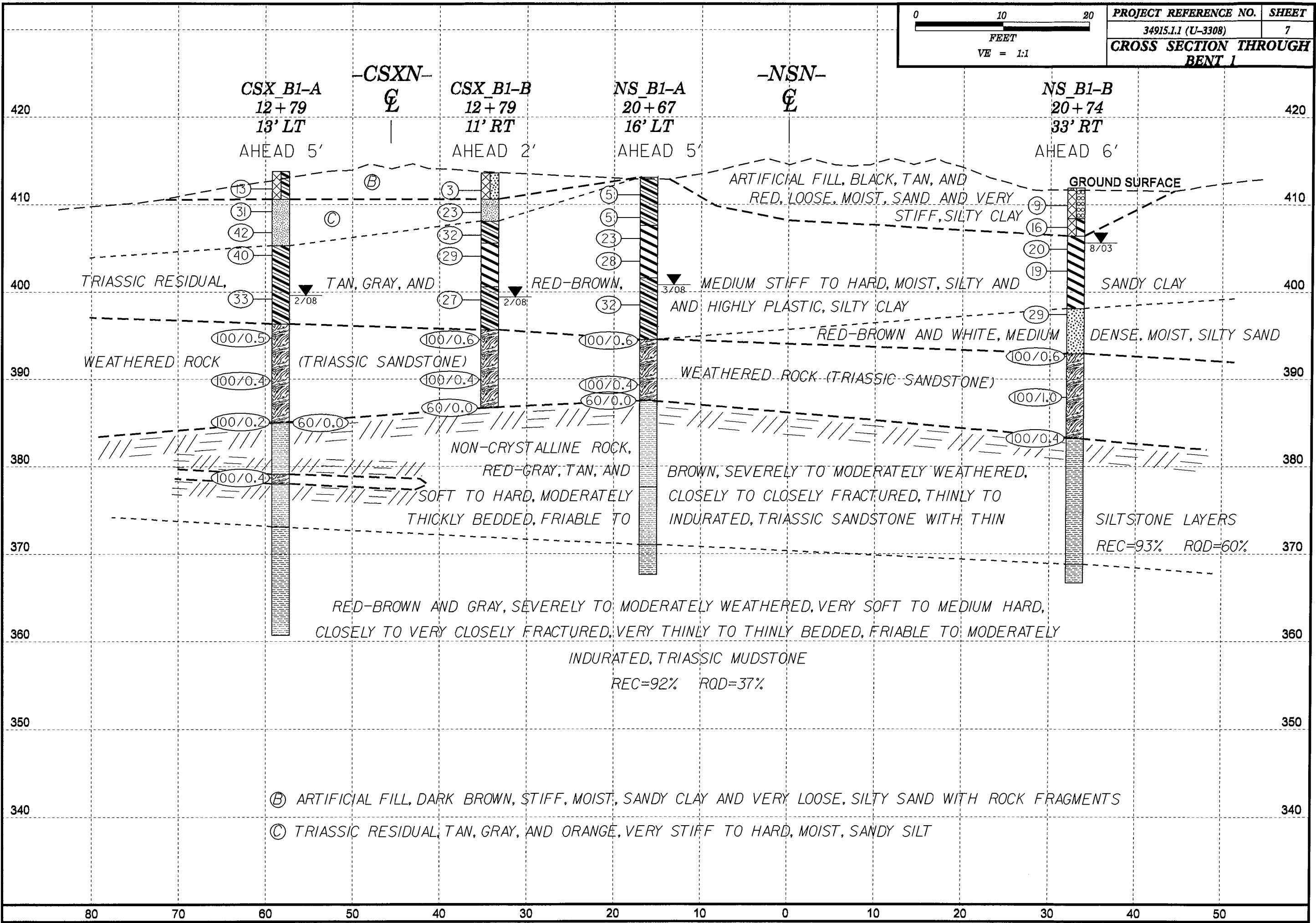
GROUNDLINE TAKEN FROM ROADWAY TIN FILE DATED 6/22/07



(A) ROADWAY EMBANKMENT, BROWN, LOOSE, MOIST, CLAYEY SAND AND MEDIUM STIFF, SANDY CLAY  
 (B) TRIASSIC RESIDUAL, TAN, RED, AND BROWN, VERY STIFF, MOIST, HIGHLY PLASTIC, SILTY CLAY

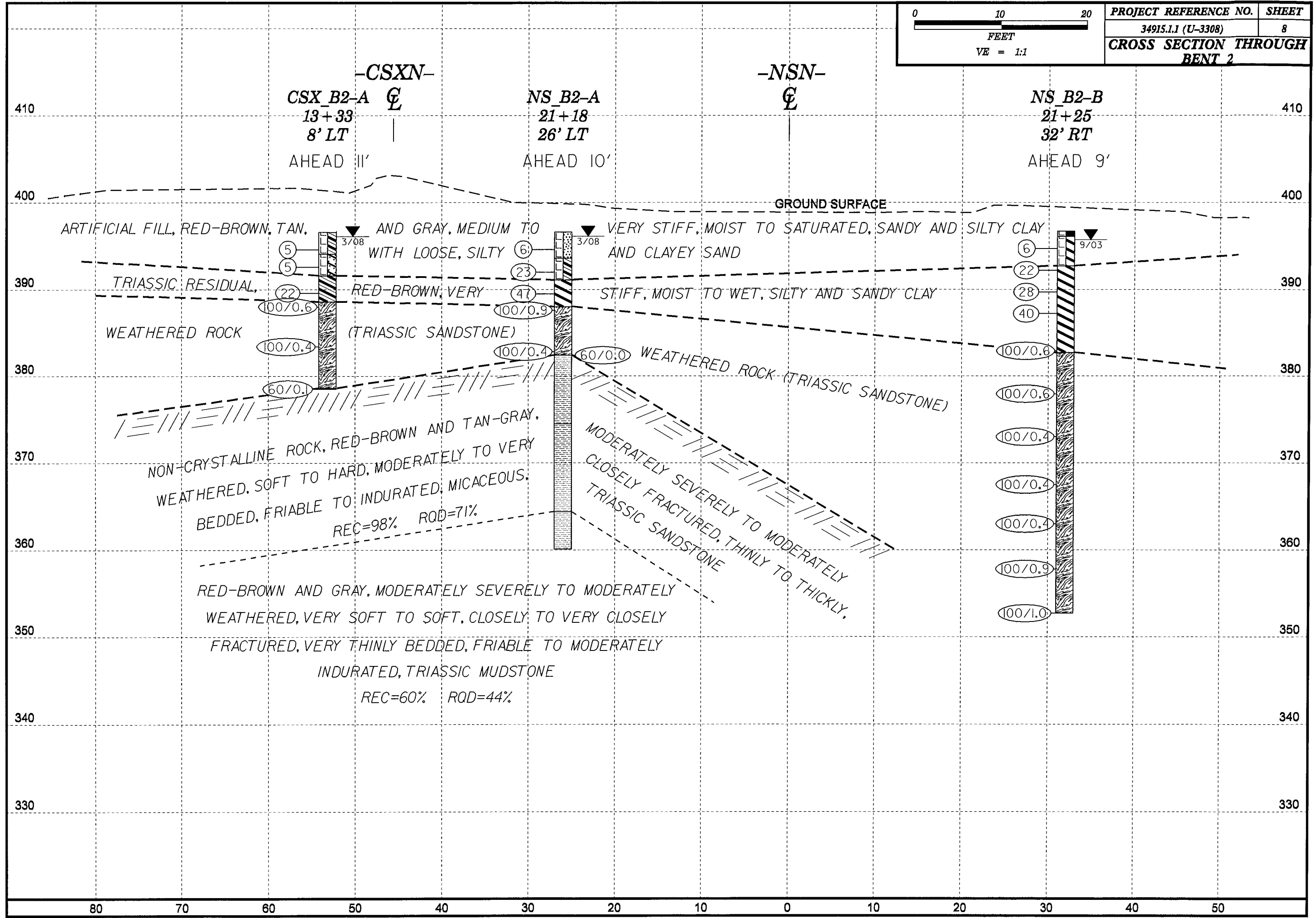
**GROUNDLINE TAKEN FROM ROADWAY TIN FILE DATED 6/22/07**

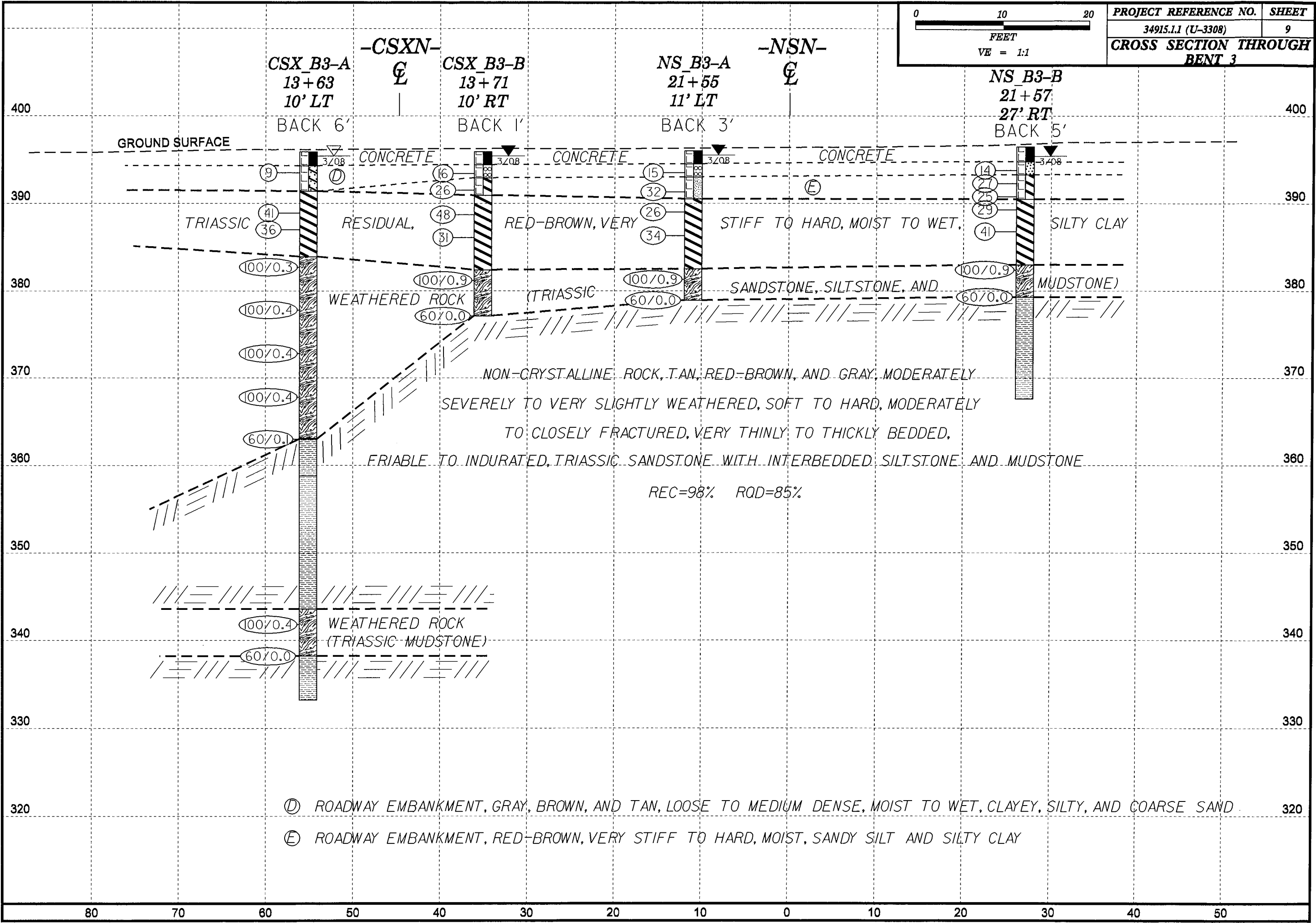


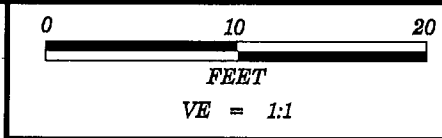


- ⓑ ARTIFICIAL FILL, DARK BROWN, STIFF, MOIST, SANDY CLAY AND VERY LOOSE, SILTY SAND WITH ROCK FRAGMENTS
- ⓒ TRIASSIC RESIDUAL, TAN, GRAY, AND ORANGE, VERY STIFF TO HARD, MOIST, SANDY SILT

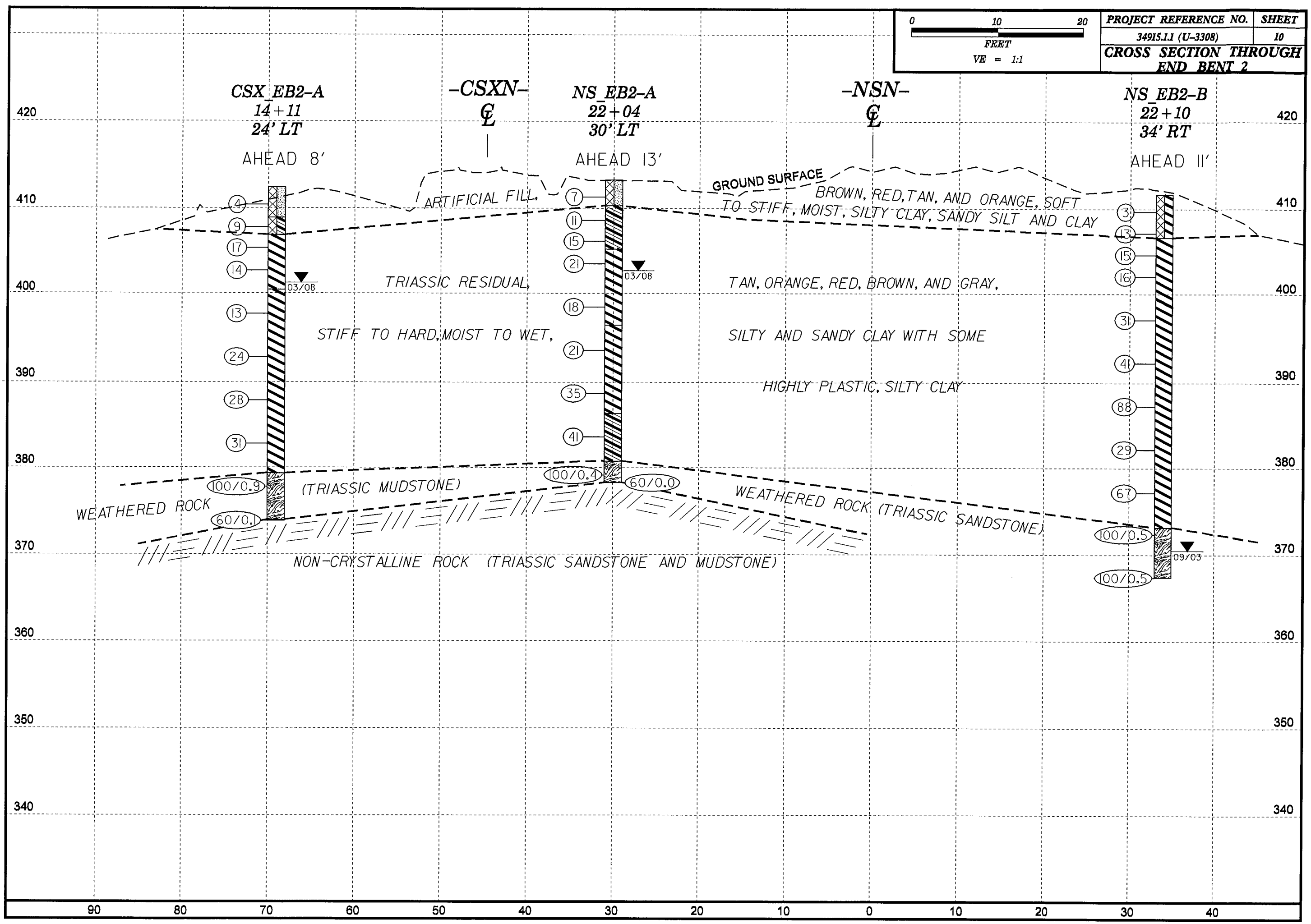








PROJECT REFERENCE NO.	SHEET
34915.1.1 (U-3308)	10
CROSS SECTION THROUGH END BENT 2	

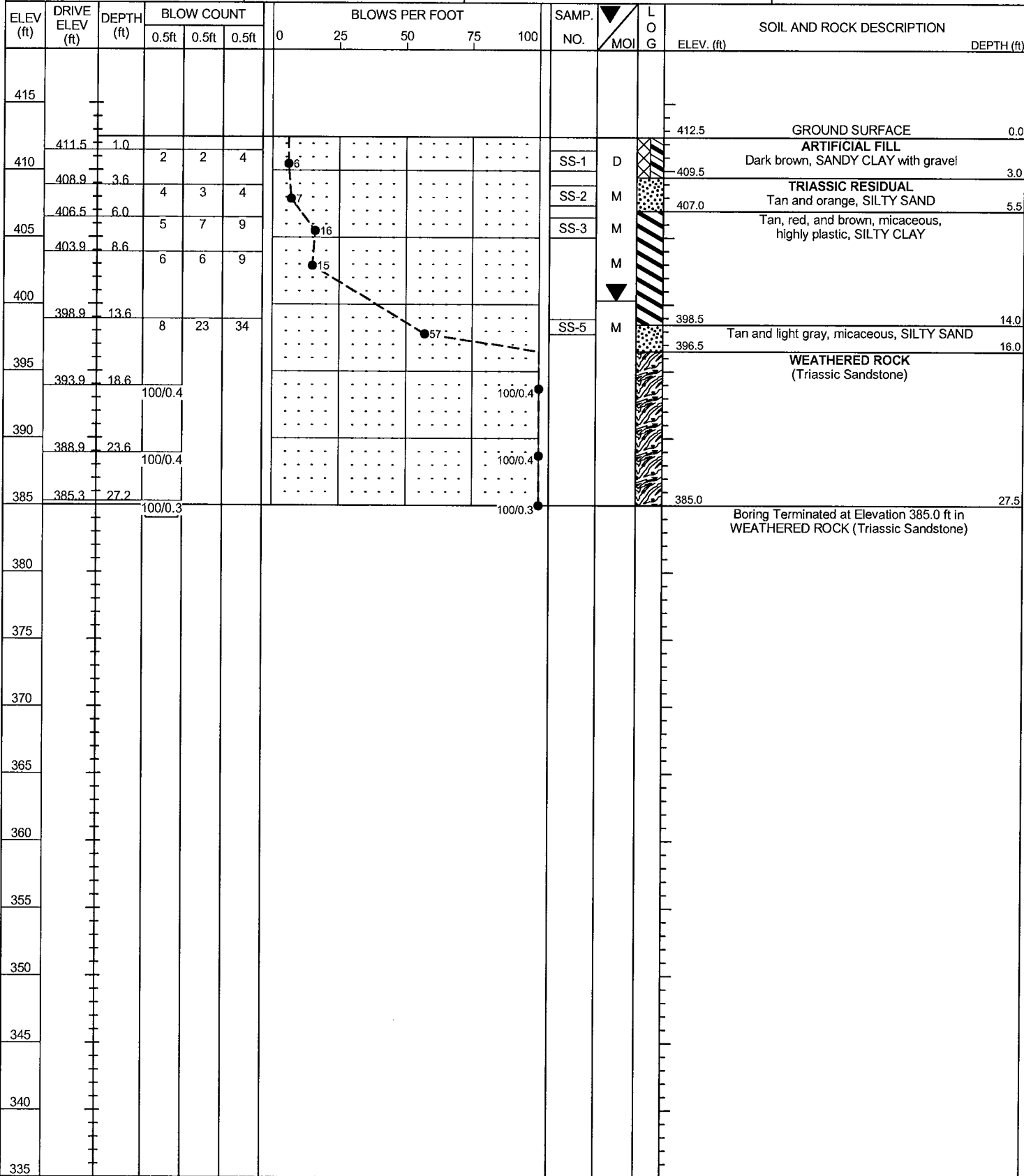




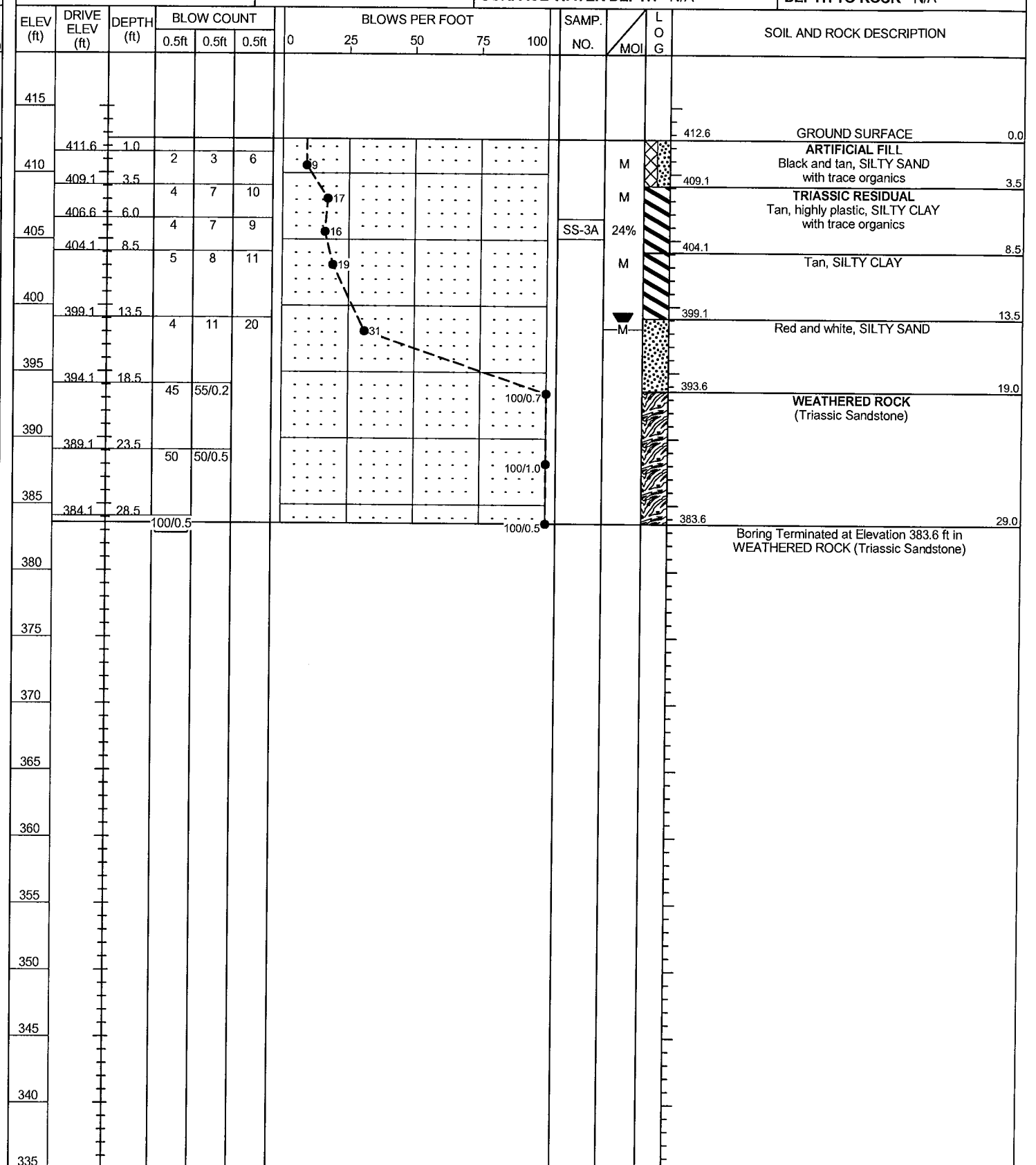
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST C. Bruinsma
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_EB1A	STATION 20+21	OFFSET 32ft LT	ALIGNMENT NSN
COLLAR ELEV. 412.5 ft	TOTAL DEPTH 27.5 ft	NORTHING 813,236	EASTING 2,032,618
DRILL MACHINE CME-45B		DRILL METHOD Mud Rotary	HAMMER TYPE Manual
START DATE 02/19/08	COMP. DATE 02/19/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_EB1B	STATION 20+50	OFFSET 32ft RT	ALIGNMENT NSN
COLLAR ELEV. 412.6 ft	TOTAL DEPTH 29.0 ft	NORTHING 813,166	EASTING 2,032,614
DRILL MACHINE DIEDRICH D50		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
START DATE 08/28/03	COMP. DATE 08/28/03	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ NC\_DOT.GDT 08/08/08

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B1A	STATION 20+67	OFFSET 16ft LT	ALIGNMENT NSN
COLLAR ELEV. 413.1ft	TOTAL DEPTH 45.5 ft	NORTHING 813,200	EASTING 2,032,651
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/28/08	COMP. DATE 03/03/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 25.6 ft

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B1A	STATION 20+67	OFFSET 16ft LT	ALIGNMENT NSN
COLLAR ELEV. 413.1 ft	TOTAL DEPTH 45.5 ft	NORTHING 813,200	EASTING 2,032,651
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/28/08	COMP. DATE 03/03/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 25.6 ft

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						
415																
413.1																GROUND SURFACE
410	412.1	1.0	1	2	3						SS-31	M			TRIASSIC RESIDUAL	
405	409.5	3.6	1	1	4						SS-32	M			Tan-orange, SANDY CLAY	
400	407.1	6.0	7	10	13						SS-33	M			Tan and red-gray, SILTY CLAY	
395	404.5	8.6	8	14	14							M				
390	399.5	13.6	6	12	20						SS-35	M			Red-brown to gray, SANDY CLAY	
385	394.5	18.6	30	60	40/0.1										WEATHERED ROCK (Triassic Sandstone)	
380	389.5	23.6	100/0.4													
375	387.5	25.6	60/0.0												NON-CRYSTALLINE ROCK	
370											RS-1				Red-gray, tan, and brown, moderately severely weathered, soft to hard, moderately closely to closely fractured, very thickly bedded, friable to indurated, TRIASSIC SANDSTONE	
365															REC=93% RQD=70%	
360																
355																
350																
345																
340																
335																

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) %			
387.5	387.5	25.6	2.4	1:13/1.0	(2.3)	(2.1)		(9.2)	(6.9)		Begin Coring @ 25.6 ft	
385	385.1	28.0	2.5	1:05/1.0	96%	88%		93%	70%		NON-CRYSTALLINE ROCK	25.6
380	382.6	30.5	5.0	0:28/0.4	(2.2)	(1.9)	RS-1				Red-gray, tan, and brown, moderately severely weathered, soft to hard, moderately closely to closely fractured, very thickly bedded, friable to indurated, TRIASSIC SANDSTONE	
375	377.6	35.5	5.0	0:30/0.5	88%	76%						
370	372.6	40.5	5.0	2:51/1.0	(4.7)	(2.9)		(6.5)	(4.0)		Red-gray to tan, moderately severely to moderately weathered, soft to hard, moderately closely to very closely fractured, thinly to thickly bedded, indurated to friable, micaceous, interbedded TRIASSIC SANDSTONE and SILTSTONE	35.5
365	367.6	45.5	5.0	3:36/1.0	94%	58%		98%	61%			
360				3:50/1.0	(4.7)	(2.7)	RS-2	(2.9)	(1.8)		Red-gray, moderately severely to moderately weathered, very soft to medium hard, closely to very closely fractured, very thin to thin bedded, moderately indurated to friable, TRIASSIC MUDSTONE	42.1
355				7:39/1.0	94%	54%		85%	53%			
350				2:05/1.0								
345				1:52/1.0								
340				2:32/1.0								
335				8:30/1.0								
330				6:30/1.0								
325				6:00/1.0								
320				6:00/1.0								
315				6:00/1.0								
310				6:00/1.0								

NCDOT BORE DOUBLE US3308\_GEO\_BH.GPJ NC\_DOT.GDT 8/7/08

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B1B	STATION 20+74	OFFSET 33ft RT	ALIGNMENT NSN
COLLAR ELEV. 411.9 ft	TOTAL DEPTH 45.2 ft	NORTHING 813,154	EASTING 2,032,635
DRILL MACHINE DIEDRICH D50	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 08/28/03	COMP. DATE 08/29/03	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.7 ft

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						
415														411.9	GROUND SURFACE	0.0
410	410.9	1.0	2	3	6							M	ARTIFICIAL FILL Black, SAND with trace organics	3.5		
	408.4	3.5	5	7	9							M	Tan and red, SILTY CLAY	5.5		
405	405.9	6.0	8	8	12							M	TRIASSIC RESIDUAL Tan and gray, SILTY CLAY			
	403.4	8.5	5	8	11							M				
400	398.4	13.5	5	13	16							M	Red-brown and white, SILTY SAND	13.8		
395	393.4	18.5	29	84	16/0.1								WEATHERED ROCK (Triassic Sandstone)	19.0		
390	388.4	23.5	50	50/0.5												
385	383.4	28.5	100/0.2										NON-CRYSTALLINE ROCK Red-gray and brown, severely to moderately weathered, soft to moderately hard, moderately closely to closely fractured, moderately indurated to indurated, TRIASSIC SANDSTONE	28.7		
380												RS-1A	REC=94% RQD=81%			
375																
370												RS-2A	Red-gray, severely weathered, soft, closely to very closely fractured, friable to moderately indurated, TRIASSIC MUDSTONE	43.1		
365													REC=100% RQD=24%	45.2		
360													Boring Terminated at Elevation 366.7 ft in NON-CRYSTALLINE ROCK (Triassic Mudstone)			
355																
350																
345																
340																
335																

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B1B	STATION 20+74	OFFSET 33ft RT	ALIGNMENT NSN
COLLAR ELEV. 411.9 ft	TOTAL DEPTH 45.2 ft	NORTHING 813,154	EASTING 2,032,635
DRILL MACHINE DIEDRICH D50	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 08/28/03	COMP. DATE 08/29/03	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.7 ft

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 (%)			
383.2	383.2	28.7	1.8	4:00/1.0 1:15/0.8	(1.6)	(1.5)		(13.6)	(11.7)		Begin Coring @ 28.7 ft NON-CRYSTALLINE ROCK	28.7
380	381.4	30.5	4.8	4:45/1.0 13:00/1.0 7:00/1.0 3:30/1.0 2:00/0.8	(4.5)	(3.2)	RS-1A	94%	67%		Red-gray and brown, severely to moderately weathered, soft to moderately hard, moderately closely to closely fractured, moderately indurated to indurated, TRIASSIC SANDSTONE	
375	376.6	35.3	4.9	4:00/1.0 4:00/1.0 2:45/1.0 2:30/1.0 2:30/0.9	(4.9)	(4.9)		100%	100%			
370	371.7	40.2	5.0	3:45/1.0 4:00/1.0 11:30/1.0 20:00/1.0 4:30/1.0	(4.7)	(2.6)	RS-2A	94%	52%			
365	366.7	45.2			(2.1)	(0.5)		100%	24%		Red-gray, severely weathered, soft, closely to very closely fractured, friable to moderately indurated, TRIASSIC MUDSTONE	43.1
360											Boring Terminated at Elevation 366.7 ft in NON-CRYSTALLINE ROCK (Triassic Mudstone)	45.2
355												
350												
345												
340												
335												

NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ NC\_DOT.GDT 08/08/08

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B2A	STATION 21+18	OFFSET 26ft LT	ALIGNMENT NSN
COLLAR ELEV. 396.6 ft	TOTAL DEPTH 36.5 ft	NORTHING 813,186	EASTING 2,032,701
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 03/05/08	COMP. DATE 03/06/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.2 ft

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B2A	STATION 21+18	OFFSET 26ft LT	ALIGNMENT NSN
COLLAR ELEV. 396.6 ft	TOTAL DEPTH 36.5 ft	NORTHING 813,186	EASTING 2,032,701
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 03/05/08	COMP. DATE 03/06/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 14.2 ft

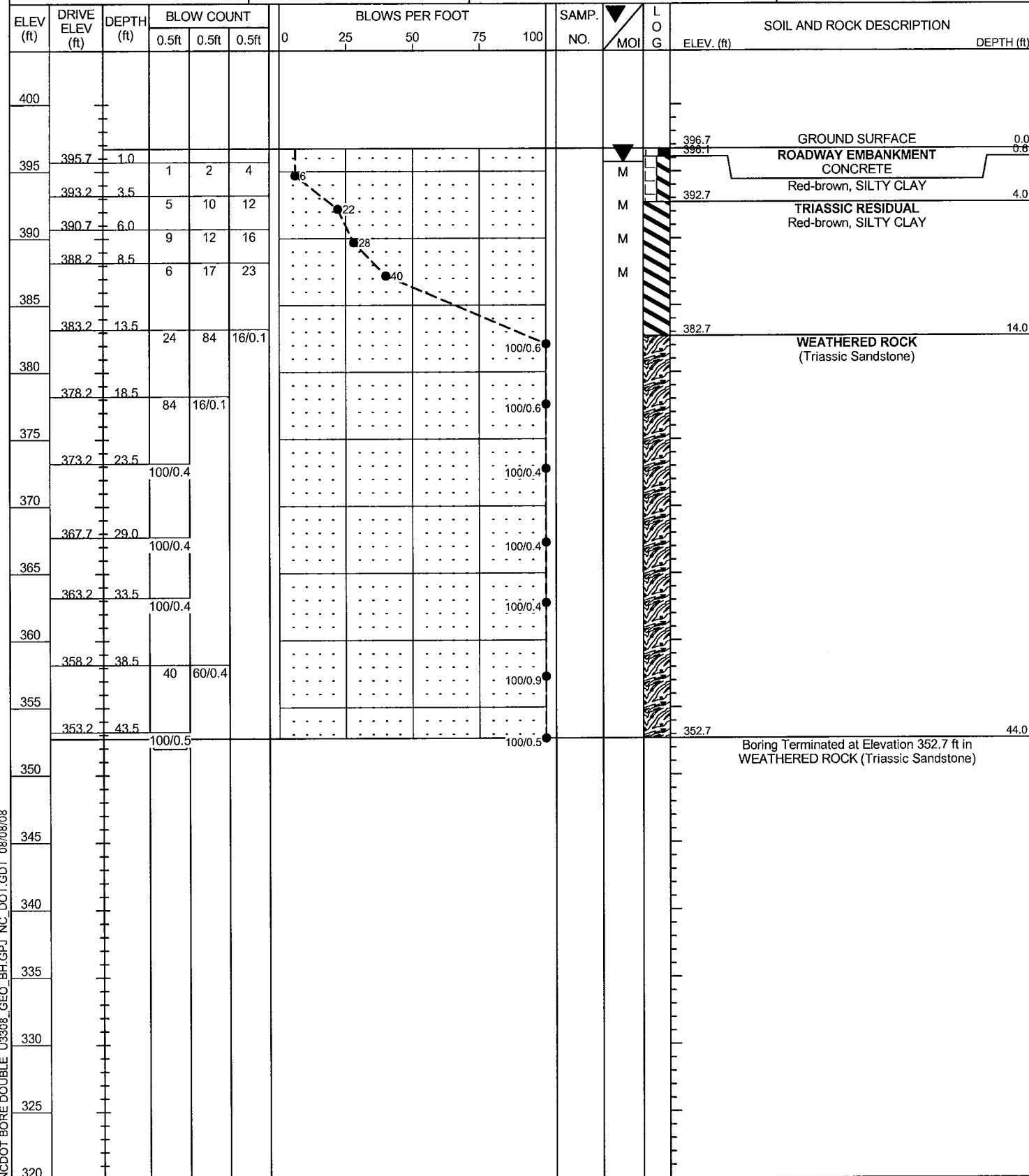
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
400															
395	395.6	1.0												GROUND SURFACE	0.0
			3	3	3									ROADWAY EMBANKMENT	
	393.0	3.6												Tan-gray, SILTY SAND	3.0
			8	10	13									Red-brown, SILTY CLAY	
	390.5	6.1												with rock fragments	5.5
			13	19	28									TRIASSIC RESIDUAL	
	388.0	8.6												Red-brown, SILTY CLAY	
			33	67/0.4										with mica	8.6
														WEATHERED ROCK	
	383.0	13.6												(Triassic Sandstone)	
	382.4	14.2													14.2
			100/0.4											NON-CRYSTALLINE ROCK	
			60/0.0											Pink and tan-gray, moderately severely	
														weathered, soft to hard, moderately closely to	
														closely fractured, thinly to thickly bedded,	
														friable to indurated, micaceous,	
														TRIASSIC SANDSTONE	
															22.1
														REC=99% RQD=64%	
														Red-brown and gray, moderately severely to	
														moderately weathered, soft to hard,	
														moderately closely to very closely fractured,	
														thinly to thickly bedded, friable to indurated,	
														micaceous, TRIASSIC SANDSTONE	
															32.2
														REC=96% RQD=78%	
														Red-brown and gray, moderately severely to	
														moderately weathered, very soft to soft,	
														closely to very closely fractured, very thinly	
														bedded, friable to moderately indurated,	
														TRIASSIC MUDSTONE	
															36.5
														REC=60% RQD=44%	
														Boring Terminated at Elevation 360.1 ft in	
														NON-CRYSTALLINE ROCK (Triassic	
														Mudstone)	

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) %	ROD (ft) %		REC. (ft) %	RQD (ft) %			
382.4	382.4	14.2	1.0	2:01/1.0	(1.0)	(1.0)		(7.8)	(5.1)		Begin Coring @ 14.2 ft	
380	381.4	15.2	5.0	5:30/1.0	100%	100%	RS-3	99%	65%		NON-CRYSTALLINE ROCK	14.2
				3:19/1.0	(4.9)	(2.2)					Pink and tan-gray, moderately severely weathered, soft to hard, moderately	
				4:54/1.0	98%	44%					closely to closely fractured, thinly to thickly bedded, friable to indurated,	
				4:31/1.0							micaceous, TRIASSIC SANDSTONE	
				4:45/1.0								
	376.4	20.2	5.0	11:20/1.0	(4.7)	(2.5)		(9.7)	(7.9)		Red-brown and gray, moderately severely to moderately weathered, soft to	22.1
				8:40/1.0	94%	50%		96%	78%		hard, moderately closely to very closely fractured, thinly to thickly bedded,	
				9:11/1.0							friable to indurated, micaceous, TRIASSIC SANDSTONE	
				10:00/1.0								
				9:32/1.0								
				10:00/1.0								
				10:30/1.0								
				10:00/1.0								
				10:00/1.0								
				11:00/1.0								
	366.4	30.2	4.9	9:00/1.0	(3.7)	(3.3)	RS-4	(2.6)	(1.9)		Red-brown and gray, moderately severely to moderately weathered, very	32.2
				8:00/1.0	76%	67%		60%	44%		soft to soft, closely to very closely fractured, very thinly bedded, friable to	
				10:00/1.0							moderately indurated, TRIASSIC MUDSTONE	
				10:00/1.0								
				10:00/0.9								
				9:30/1.0	(1.3)	(0.9)						
				0:45/0.4	93%	64%					Boring Terminated at Elevation 360.1 ft in NON-CRYSTALLINE ROCK	36.5
											(Triassic Mudstone)	

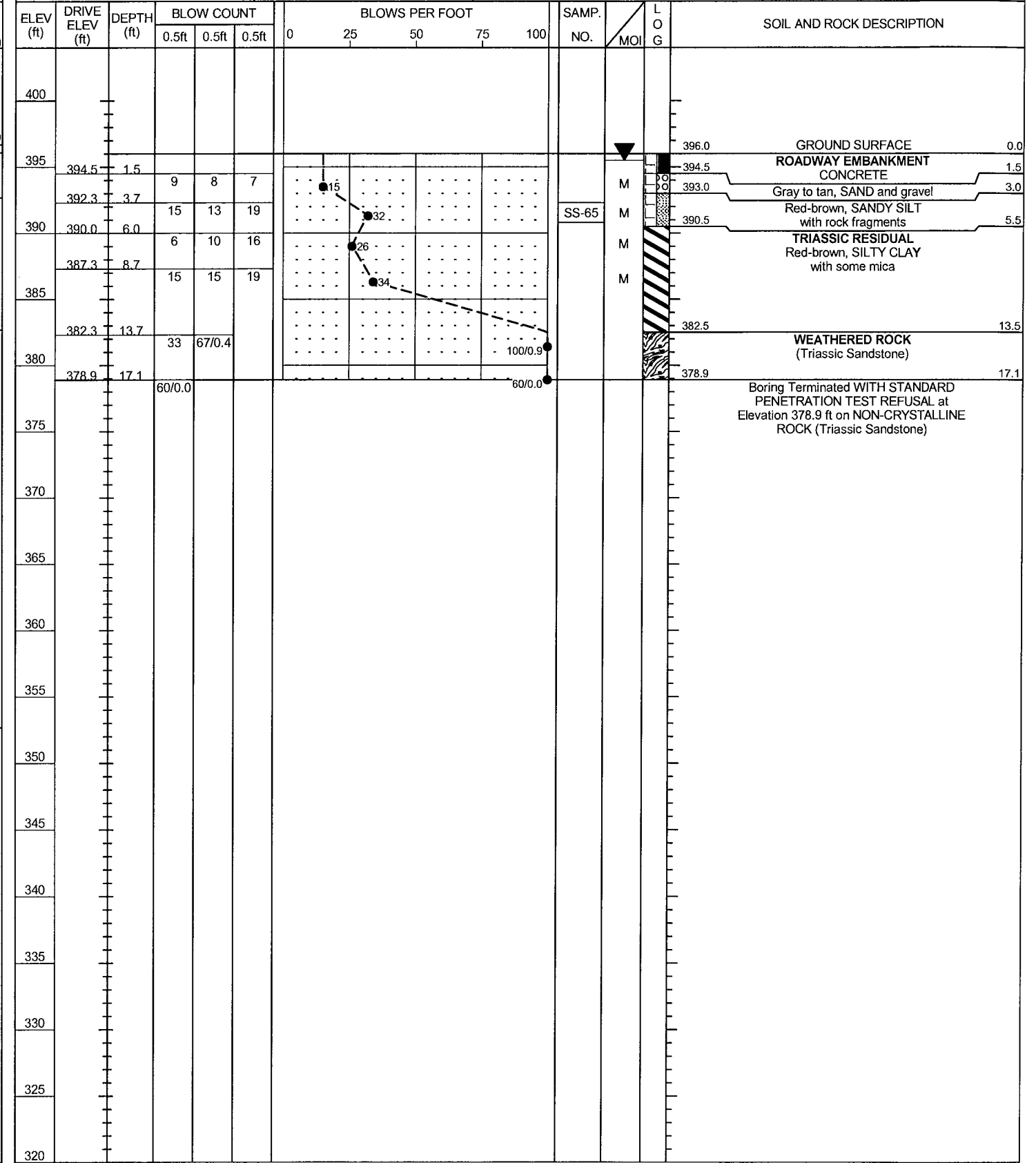
NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ NC\_DOT.GDT 08/08/08

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

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B2B	STATION 21+25	OFFSET 32ft RT	ALIGNMENT NSN
COLLAR ELEV. 396.7 ft	TOTAL DEPTH 44.0 ft	NORTHING 813,131	EASTING 2,032,681
DRILL MACHINE DIEDRICH D50	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 09/04/03	COMP. DATE 09/04/03	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_B3A	STATION 21+55	OFFSET 11ft LT	ALIGNMENT NSN
COLLAR ELEV. 396.0 ft	TOTAL DEPTH 17.1 ft	NORTHING 813,156	EASTING 2,032,727
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 03/05/08	COMP. DATE 03/05/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 17.1 ft



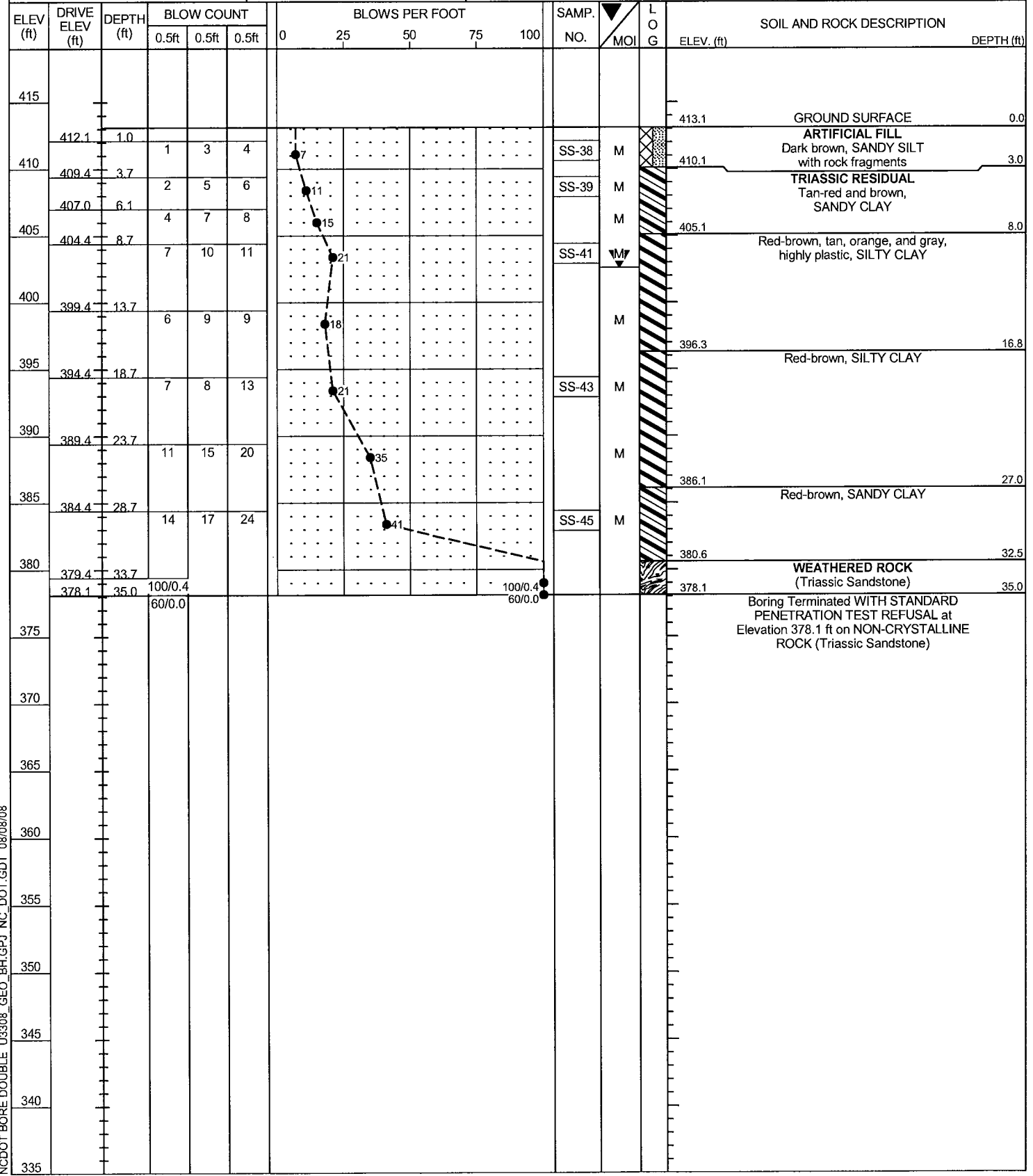
NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ NC DOT.GDT 08/08/08



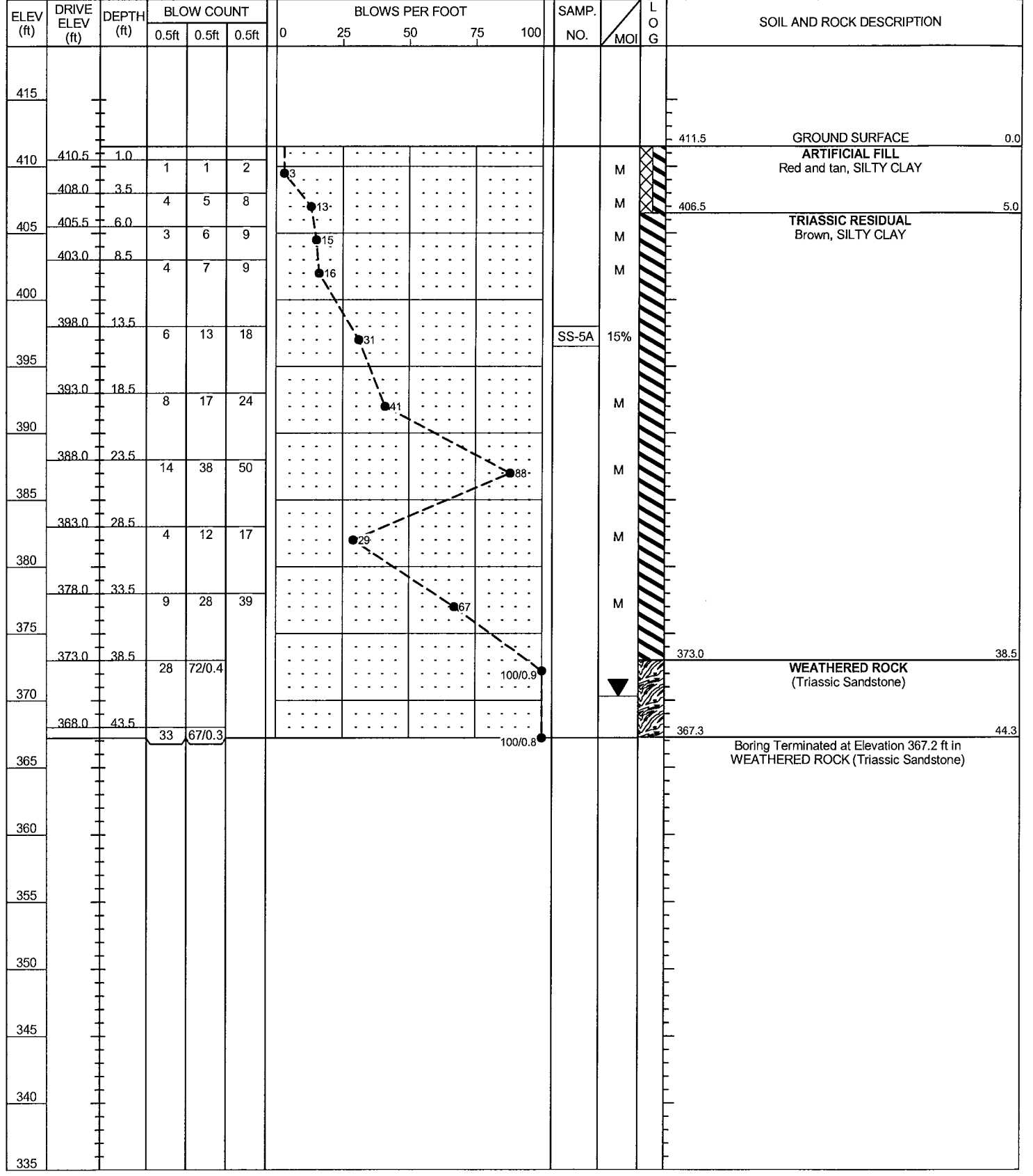


**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_EB2A	STATION 22+04	OFFSET 30ft LT	ALIGNMENT NSN
COLLAR ELEV. 413.1 ft	TOTAL DEPTH 35.0 ft	NORTHING 813,150	EASTING 2,032,780
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/29/08	COMP. DATE 02/29/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 35.0 ft



PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST J. Howard
SITE DESCRIPTION Bridge on -NSRR- over -L- (NC55)			GROUND WTR (ft)
BORING NO. NS_EB2B	STATION 22+10	OFFSET 34ft RT	ALIGNMENT NSN
COLLAR ELEV. 411.5 ft	TOTAL DEPTH 44.3 ft	NORTHING 813,090	EASTING 2,032,755
DRILL MACHINE DIEDRICH D50	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 09/02/03	COMP. DATE 09/02/03	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ, NC\_DOT\_GDT\_08/08/08





PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B1A	STATION 12+79	OFFSET 13ft LT	ALIGNMENT CSX
COLLAR ELEV. 413.8 ft	TOTAL DEPTH 53.1 ft	NORTHING 813,240	EASTING 2,032,666
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/26/08	COMP. DATE 02/27/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.8 ft

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B1A	STATION 12+79	OFFSET 13ft LT	ALIGNMENT CSX
COLLAR ELEV. 413.8 ft	TOTAL DEPTH 53.1 ft	NORTHING 813,240	EASTING 2,032,666
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/26/08	COMP. DATE 02/27/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.8 ft

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				
415													GROUND SURFACE	0.0
410	412.8	1.0	2	6	7							M	ARTIFICIAL FILL Dark brown, SANDY CLAY with rock fragments	3.2
405	410.2	3.6	7	14	17							M	TRIASSIC RESIDUAL Tan, gray, and orange, SANDY SILT	8.5
400	407.8	6.0	15	20	20							M	Tan, red-brown, and gray, micaceous, SANDY CLAY	17.5
395	405.2	8.6	9	12	21							SS-20	WEATHERED ROCK (Triassic Sandstone)	28.8
390	400.2	13.6										SS-21	NON-CRYSTALLINE ROCK Red-gray, tan, brown, moderately severely weathered, soft to medium hard, closely to very closely fractured, very thickly bedded, friable to indurated, TRIASSIC SANDSTONE	34.7
385	395.2	18.6											WEATHERED ROCK (Triassic Sandstone)	35.8
380	390.2	23.6											NON-CRYSTALLINE ROCK Red-brown to tan, moderately severely to moderately weathered, soft to medium hard, moderately closely to very closely fractured, thin to thickly bedded, friable to indurated, TRIASSIC SANDSTONE	40.7
375	385.2	28.6										RS-6	NON-CRYSTALLINE ROCK Red-brown and green-gray, moderate severely to moderately weathered, very soft to medium hard, closely to very closely fractured, very thin to thin bedded, friable to moderately indurated, TRIASSIC MUDSTONE	53.1
370	385.0	28.8											Boring Terminated at Elevation 360.7 ft in NON-CRYSTALLINE ROCK (Triassic Mudstone)	

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 (%)			
385											Begin Coring @ 28.8 ft	
385.0	384.0	28.8	1.0	0:30/1.0	(0.0)	(0.0)		(4.7)	(3.1)		NON-CRYSTALLINE ROCK Red-gray, tan, brown, moderately severely weathered, soft to medium hard, closely to very closely fractured, very thickly bedded, friable to indurated, TRIASSIC SANDSTONE	28.8
380	379.1	34.7	4.9	1:00/1.0	(4.7)	(3.1)						34.7
375	378.7	35.1	4.4	1:03/0.9	(3.5)	(1.2)		(0.2)	(0.0)		WEATHERED ROCK (Triassic Sandstone)	35.8
370	374.7	39.1	4.0	1:30/1.0	(3.1)	(0.4)		(4.9)	(1.6)		NON-CRYSTALLINE ROCK Red-brown to tan, moderately severely to moderately weathered, soft to medium hard, moderately closely to very closely fractured, thin to thickly bedded, friable to indurated, TRIASSIC SANDSTONE	40.7
365	374.3	39.5	5.0	1:56/1.0	(78%)	(10%)		(11.4)	(4.3)			40.7
360	370.7	43.1	5.0	2:14/1.0	(5.0)	(2.0)					Red-brown and green-gray, moderate severely to moderately weathered, very soft to medium hard, closely to very closely fractured, very thin to thin bedded, friable to moderately indurated, TRIASSIC MUDSTONE	53.1
355	365.7	48.1	5.0	2:50/1.0	(4.9)	(2.3)	RS-6					
350	360.7	53.1	5.0	3:00/1.0	(98%)	(46%)						
345				3:34/1.0								
340				5:05/1.0								
335				7:02/1.0								
330				8:14/1.0								
325				8:41/1.0								
320				9:45/1.0								
315				11:20/1.0								
310												
305												

NCDOT BORE DOUBLE U3308 GEO BH.GPJ NC\_DOT.GDT 08/08/08

NCDOT CORE SINGLE U3308 GEO BH.GPJ NC\_DOT.GDT 07/15/08

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

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B1B	STATION 12+79	OFFSET 11ft RT	ALIGNMENT CSX
COLLAR ELEV. 413.6 ft	TOTAL DEPTH 26.9 ft	NORTHING 813,219	EASTING 2,032,655
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/26/08	COMP. DATE 02/26/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 26.9 ft

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					
415														GROUND SURFACE	0.0
412.6	412.6	1.0	2	1	2						SS-25	M	X	ARTIFICIAL FILL Dark brown, SILTY SAND with rock fragments	3.0
410	410.1	3.5	8	11	12						SS-26	M	X	TRIASSIC RESIDUAL Tan-gray, SANDY SILT	5.5
407.5	407.5	6.1									SS-27	M	X	Tan and orange, SANDY CLAY	8.0
405	405.1	8.5	8	13	16						SS-28	M	X	Gray to red, highly plastic, SILTY CLAY	13.0
400	400.1	13.5	5	12	15						SS-29	M	X	Red-brown to gray, SANDY CLAY	18.0
395	395.1	18.5	75	25/1										WEATHERED ROCK (Triassic Sandstone)	26.9
390	390.1	23.5	100/0.4												
385	386.7	26.9	60/0.0											Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 386.7 ft on NON-CRYSTALLINE ROCK (Triassic Sandstone)	

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST C. Bruinsma
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B2A	STATION 13+33	OFFSET 8ft LT	ALIGNMENT CSX
COLLAR ELEV. 396.6 ft	TOTAL DEPTH 18.1 ft	NORTHING 813,211	EASTING 2,032,712
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 03/10/08	COMP. DATE 03/10/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 18.1 ft

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					
400														GROUND SURFACE	0.0
395	395.6	1.0	2	2	3						SS-79	W	X	ROADWAY EMBANKMENT Brown and red-brown, SANDY CLAY	2.5
390	393.6	3.0	2	3	2						SS-80	W	X	Brown, CLAYEY SAND	5.0
385	390.6	6.0	5	10	12						SS-81	W	X	TRIASSIC RESIDUAL Red-brown, SANDY CLAY	8.0
380	388.6	8.0	60	40/0.1										WEATHERED ROCK (Triassic Sandstone)	18.0
375	383.6	13.0	100/0.4												
370	378.6	18.0	60/0.1											NON-CRYSTALLINE ROCK (Triassic Sandstone)	18.1
365														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 378.5 ft on NON-CRYSTALLINE ROCK (Triassic Sandstone)	

NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ NC\_DOT.GDT 8/7/08



PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST C. Bruinsma
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B3A	STATION 13+63	OFFSET 10ft LT	ALIGNMENT CSX
COLLAR ELEV. 395.9 ft	TOTAL DEPTH 62.7 ft	NORTHING 813,199	EASTING 2,032,740
DRILL MACHINE CME-45B	DRILL METHOD Wash Boring	HAMMER TYPE Manual	
START DATE 03/10/08	COMP. DATE 03/11/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 32.8 ft

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST C. Bruinsma
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B3A	STATION 13+63	OFFSET 10ft LT	ALIGNMENT CSX
COLLAR ELEV. 395.9 ft	TOTAL DEPTH 62.7 ft	NORTHING 813,199	EASTING 2,032,740
DRILL MACHINE CME-45B	DRILL METHOD Wash Boring	HAMMER TYPE Manual	
START DATE 03/10/08	COMP. DATE 03/11/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 32.8 ft

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					
400															
395	394.5	1.4	7	5	4								GROUND SURFACE	0.0	
390	389.9	6.0											ROADWAY EMBANKMENT CONCRETE and ABC	1.6	
385	388.0	7.9	8	12	24								Brown, CLAYEY SAND with gravel	4.5	
380	383.0	12.9											TRIASSIC RESIDUAL Red-brown, SILTY CLAY	12.0	
375	378.0	17.9											WEATHERED ROCK (Triassic Sandstone and Siltstone)		
370	373.0	22.9													
365	368.0	27.9													
360	363.1	32.8											NON-CRYSTALLINE ROCK (Triassic Sandstone)	32.8	
355													Tan and red, slightly to very slightly weathered, moderately hard, widely fractured, thickly bedded, indurated, TRIASSIC SANDSTONE	37.1	
350													REC=98% RQD=98%		
345													Red-gray, moderately severely weathered, very soft to medium hard, closely to very closely fractured, very thinly to thinly bedded, friable to moderately indurated, TRIASSIC MUDSTONE		
340													REC=99% RQD=55%		
335													WEATHERED ROCK (Triassic Mudstone)	52.3	
330													NON-CRYSTALLINE ROCK Red-brown and gray, moderately to slightly weathered, soft to moderately hard, widely fractured, thickly bedded, indurated, TRIASSIC SANDSTONE	57.7	
325													REC=100% RQD=100%		
320													Boring Terminated at Elevation 333.2 ft in NON-CRYSTALLINE ROCK (Triassic Sandstone and Siltstone)	62.7	

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 (%)			
363											Begin Coring @ 32.9 ft	
360	363.0 361.4	32.9 34.5	1.6 5.0	4:30/1.0 2:00/0.6	(1.5) 94%	(1.5) 94%		(4.1) 98%	(4.1) 98%		Tan and red, slightly to very slightly weathered, moderately hard, widely fractured, thickly bedded, indurated, TRIASSIC SANDSTONE	32.9
355	356.4	39.5	5.0	5:00/1.0 5:30/1.0 5:00/1.0 8:15/1.0	(4.9) 98%	(4.3) 86%		(15.0) 99%	(8.3) 55%		Red-gray, moderately severely weathered, very soft to medium hard, closely to very closely fractured, very thinly to thinly bedded, friable to moderately indurated, TRIASSIC MUDSTONE	37.1
350	351.4	44.5	5.0	7:41/1.0 3:21/1.0 5:00/1.0 7:00/1.0 8:10/1.0	(4.9) 98%	(1.6) 32%						
345	346.4	49.5	4.2	6:45/1.0 6:15/1.0 7:15/1.0 4:30/1.0 1:00/0.2	(2.8) 67%	(0.4) 10%		(0.0) 0%	(0.0) 0%		WEATHERED ROCK (Triassic Mudstone)	52.3
340	342.2 341.8	53.7 54.1	3.6	4:00/1.0 4:00/1.0 2:00/1.0 1:45/0.6 W=60/0.0	(0.0) 0%	(0.0) 0%						57.7
335	338.2	57.7	5.0	5:15/1.0 4:15/1.0 5:30/1.0 6:00/1.0	(5.0) 100%	(5.0) 100%		(5.0) 100%	(5.0) 100%		NON-CRYSTALLINE ROCK Red-brown and gray, moderately to slightly weathered, soft to moderately hard, widely fractured, thickly bedded, indurated, TRIASSIC SANDSTONE	62.7
330											Boring Terminated at Elevation 333.2 ft in NON-CRYSTALLINE ROCK (Triassic Sandstone and Siltstone)	

NCDOT BORE DOUBLE U3308\_GEO\_BH.GPJ\_NC\_DOT.GDT\_8/7/08

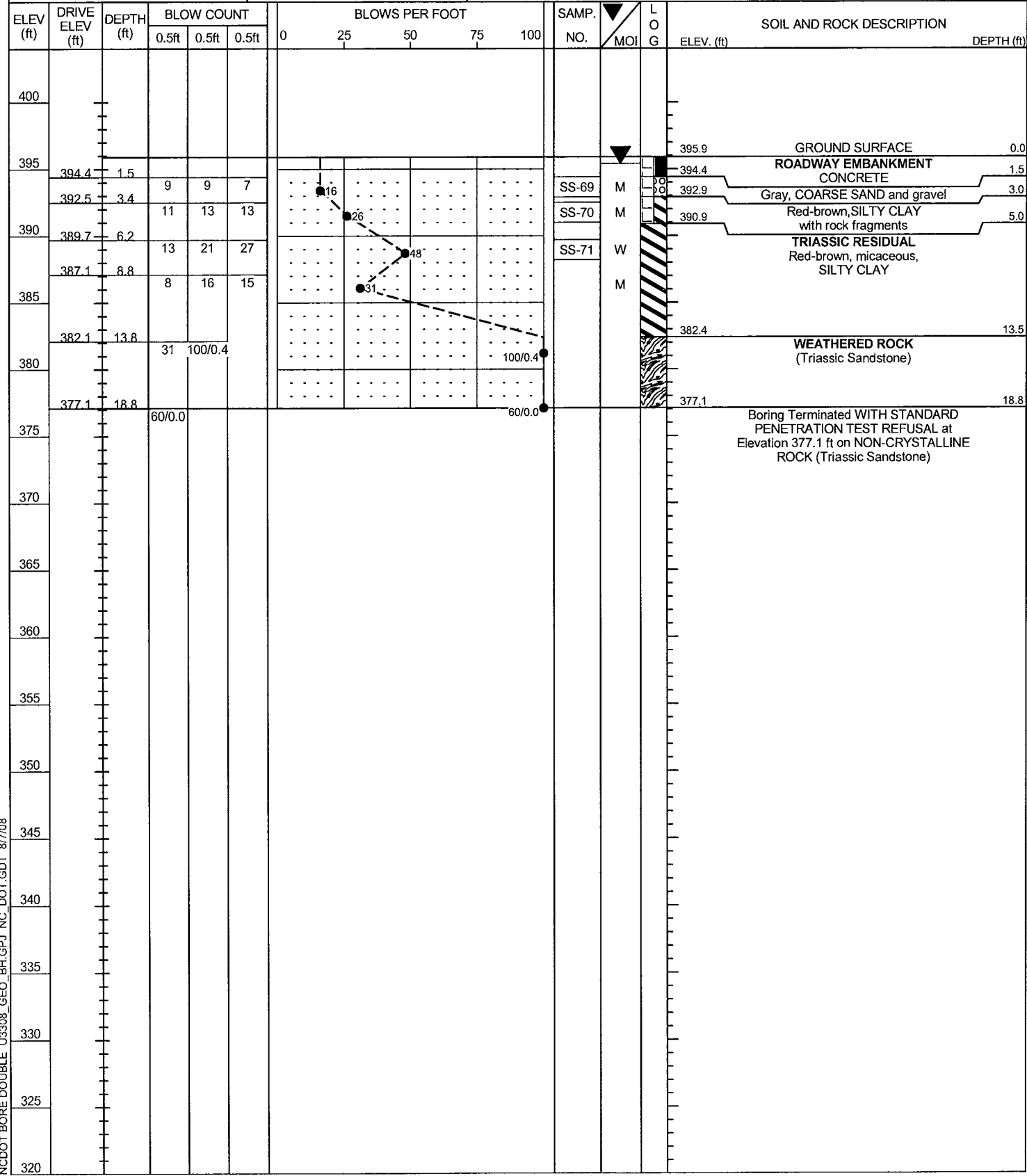
NCDOT CORE SINGLE U3308\_GEO\_BH.GPJ\_NC\_DOT.GDT\_07/15/08



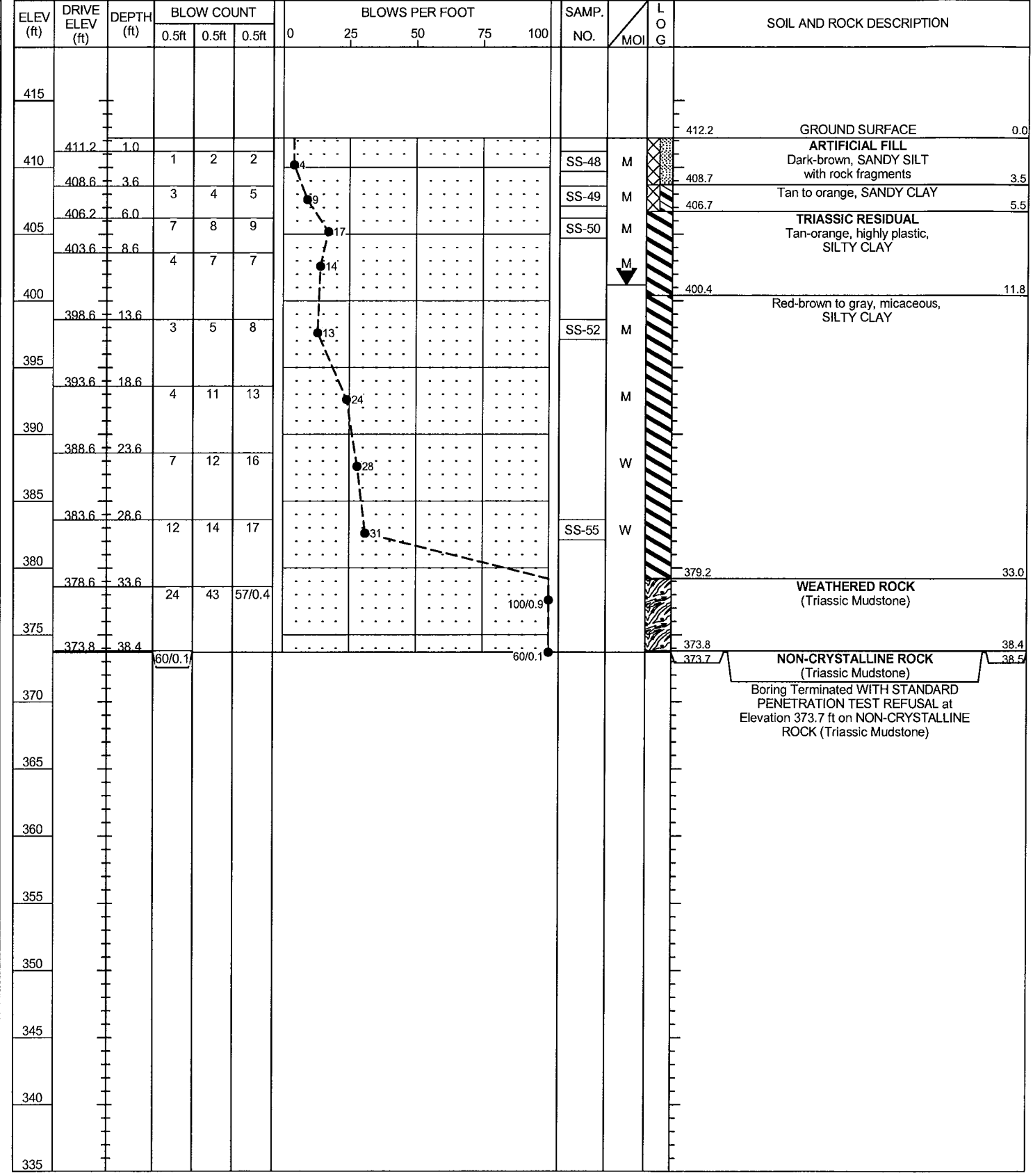
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_B3B	STATION 13+71	OFFSET 10ft RT	ALIGNMENT CSX
COLLAR ELEV. 395.9 ft	TOTAL DEPTH 18.8 ft	NORTHING 813,177	EASTING 2,032,737
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 03/05/08	COMP. DATE 03/05/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 18.8 ft



PROJECT NO. 34915.1.1	ID. U-3308	COUNTY Durham	GEOLOGIST T. Nielsen
SITE DESCRIPTION Bridge on -CSX- over -L- (NC55)			GROUND WTR (ft)
BORING NO. CSX_EB2A	STATION 14+11	OFFSET 24ft LT	ALIGNMENT CSX
COLLAR ELEV. 412.2 ft	TOTAL DEPTH 38.5 ft	NORTHING 813,189	EASTING 2,032,789
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Manual	
START DATE 02/29/08	COMP. DATE 02/29/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 38.5 ft



NCDOT BORE DOUBLE U3308\_GEO\_BH-GPJ\_NC\_DOT\_GDT\_8/7/08

NS EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	32 LT	20+21	1.0-2.5	A-6(4)	29	14	24.9	26.5	6.1	42.5	100	88	53	-	-
SS-2	32 LT	20+21	3.6-5.1	A-2-4(0)	23	NP	43.7	28.5	17.6	10.1	100	73	32	-	-
SS-3	32 LT	20+21	6.0-7.5	A-7-5(21)	56	26	6.7	21.1	19.6	52.6	100	95	76	-	-
SS-5	32 LT	20+21	14.0-15.1	A-2-4(0)	21	3	51.4	19.8	18.6	10.1	100	74	32	-	-

NS EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3A	32 RT	20+50	6.0-7.5	A-7-6	65	37	-	-	-	-	-	-	74	24	-

NS B1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-31	16 LT	20+67	1.0-2.5	A-6(4)	38	15	22.9	26.7	20.0	30.4	93	77	49	-	-
SS-32	16 LT	20+67	3.6-5.1	A-6(2)	24	11	31.0	25.3	19.4	24.3	99	82	46	-	-
SS-33	16 LT	20+67	6.0-7.5	A-7-6(11)	45	18	17.8	20.0	17.6	44.5	100	90	65	-	-
SS-35	16 LT	20+67	13.6-15.1	A-6(6)	34	13	2.0	42.5	31.2	24.3	100	99	62	-	-

NS B1-A

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT <sup>3</sup>	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-1	16 LT	20+67	28.3-29.0	TRIASSIC SANDSTONE	153.1	2.56	0.38
RS-2	16 LT	20+67	38.6-39.0	TRIASSIC SANDSTONE	168.0	8.37	2.11

NS B1-B

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT <sup>3</sup>	UNCONFINED COMP. STRENGTH, PSI	SECTION MOD. @ 40% MPSI
RS-1A	33 RT	20+74	30.0-30.6	TRIASSIC SANDSTONE	142.1	1286	-
RS-2A	33 RT	20+74	41.8-42.5	TRIASSIC MUDSTONE	152.6	3503	-

NS B2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-75	26 LT	21+18	3.6-5.1	A-6(10)	33	12	3.3	5.7	45.8	45.1	96	94	89	-	-
SS-76	26 LT	21+18	6.1-7.6	A-7-6(12)	45	19	0.4	43.9	31.1	24.6	100	100	67	-	-

NS B2-A

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT <sup>3</sup>	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-3	26 LT	21+18	15.9-16.7	TRIASSIC SANDSTONE	149.1	1.76	0.40
RS-4	26 LT	21+18	30.5-31.0	TRIASSIC SANDSTONE	176.2	7.31	2.22

NS B3-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-65	11 LT	21+55	3.7-5.2	A-4(4)	31	10	4.9	27.1	33.1	34.9	84	82	61	-	-

NS B3-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-58	27 RT	21+57	1.7-3.2	A-2-4(0)	24	8	49.0	15.4	23.5	12.1	53	32	20	-	-
SS-59	27 RT	21+57	3.2-4.7	A-7-6(13)	42	17	5.9	7.0	31.7	55.4	84	80	75	-	-
SS-61	27 RT	21+57	6.2-7.7	A-7-6(22)	44	21	1.2	3.1	34.2	61.5	98	97	95	-	-

NS B3-B

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT <sup>3</sup>	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-5	27 RT	21+57	25.4-25.8	TRIASSIC SANDSTONE	162.6	4.29	1.49

NS EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-38	30 LT	22+04	1.0-2.5	A-4(0)	25	7	25.5	31.2	31.2	12.1	95	77	44	-	-
SS-39	30 LT	22+04	3.7-5.2	A-6(4)	31	13	27.3	22.9	17.4	32.4	97	82	51	-	-
SS-41	30 LT	22+04	8.7-10.2	A-7-6(51)	74	45	1.6	3.6	27.9	66.8	100	99	96	-	-
SS-43	30 LT	22+04	18.7-20.2	A-7-6(16)	41	16	0.2	16.4	47.0	36.4	100	100	90	-	-
SS-45	30 LT	22+04	28.7-30.2	A-6(13)	37	15	0.4	16.8	38.3	44.5	100	100	87	-	-

NS EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5A	34 RT	22+10	13.5-15.0	A-7-6	37	12	-	-	-	-	-	-	95	14.8	-



CSX EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	10 LT	12+36	3.5-5.0	A-4(0)	12	3	32.6	35.0	20.2	12.1	100	84	37	-	-
SS-11	10 LT	12+36	6.0-7.5	A-7-6(18)	52	28	20.4	15.4	19.6	44.5	100	93	67	-	-
SS-13	10 LT	12+36	13.5-15.0	A-2-4(0)	26	6	35.2	35.0	17.6	12.1	100	71	33	-	-

CSX B1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-20	13 LT	12+79	6.6-8.1	A-6(8)	37	14	17.0	22.5	20.0	40.5	100	93	65	-	-
SS-21	13 LT	12+79	13.6-15.1	A-6(11)	40	19	2.4	39.7	27.5	30.4	100	99	66	-	-

CSX B1-A

ROCK TEST RESULTS							
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT <sup>3</sup>	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI
RS-6	13 LT	12+79	47.3-47.9	TRIASSIC MUDSTONE	155.8	0.66	0.06

CSX B1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-25	11 RT	12+79	1.0-2.5	A-2-4(0)	27	7	34.8	21.7	21.3	22.3	73	56	34	-	-
SS-26	11 RT	12+79	3.5-5.0	A-4(0)	13	NP	22.5	44.7	20.6	12.1	100	84	37	-	-
SS-27	11 RT	12+79	6.1-7.6	A-6(9)	39	16	17.8	21.5	20.2	40.5	100	91	64	-	-
SS-28	11 RT	12+79	8.5-10.0	A-7-6(17)	47	26	14.2	20.2	23.1	42.5	100	93	69	-	-
SS-29	11 RT	12+79	13.5-15.0	A-6(6)	35	12	2.2	42.7	28.7	26.3	100	100	62	-	-

CSX B2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-79	8 LT	13+33	1.0-2.5	A-6(5)	35	14	21.7	21.3	24.1	32.8	87	74	53	-	-
SS-80	8 LT	13+33	3.0-4.5	A-2-6(1)	37	19	40.4	17.6	21.4	20.5	68	47	30	-	-
SS-81	8 LT	13+33	6.0-7.5	A-6(14)	40	19	2.9	31.6	36.8	28.7	100	98	78	-	-

CSX B3-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-84	10 LT	13+63	1.4-2.9	A-2-6(1)	Not enough		26.3	16.0	16.7	41.0	19	15	11	-	-
SS-85	10 LT	13+63	6.0-7.5	A-7-6(17)	41	18	3.1	10.1	39.7	47.2	100	99	90	-	-

CSX B3-A

ROCK TEST RESULTS								
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ROCK TYPE	UNIT WT LB/FT <sup>3</sup>	UNCONFINED COMP. STRENGTH, KSI	SECTION MOD. @ 40% MPSI	
RS-7	10 LT	13+63	35.0-35.6	TRIASSIC SANDSTONE	170.7	8.33	-29.70	
RS-8	10 LT	13+63	46.2-46.7	TRIASSIC MUDSTONE	154.5	1.15	0.02	

CSX B3-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-69	10 RT	13+71	1.5-3.0	A-1-b(0)	20	3	49.4	30.6	9.7	10.3	56	30	12	-	-
SS-70	10 RT	13+71	3.4-4.9	A-7-6(16)	45	21	3.7	8.6	40.5	47.2	85	83	77	-	-
SS-71	10 RT	13+71	6.2-7.7	A-7-6(16)	41	15	1.0	7.2	42.6	49.2	98	97	92	-	-

CSX EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-48	24 LT	14+11	1.0-2.5	A-4(1)	27	10	32.4	25.1	20.2	22.3	94	75	44	-	-
SS-49	24 LT	14+11	3.6-5.1	A-6(9)	38	20	21.9	23.5	18.2	36.4	99	87	58	-	-
SS-50	24 LT	14+11	6.0-7.5	A-7-6(23)	58	29	13.6	13.2	14.6	58.7	98	90	74	-	-
SS-52	24 LT	14+11	13.6-15.1	A-7-6(18)	45	22	1.2	22.3	32.0	44.5	97	96	81	-	-
SS-55	24 LT	14+11	28.6-30.1	A-7-6(24)	43	23	0.4	2.0	36.8	60.7	100	100	98	-	-

# CORE PHOTOGRAPHS

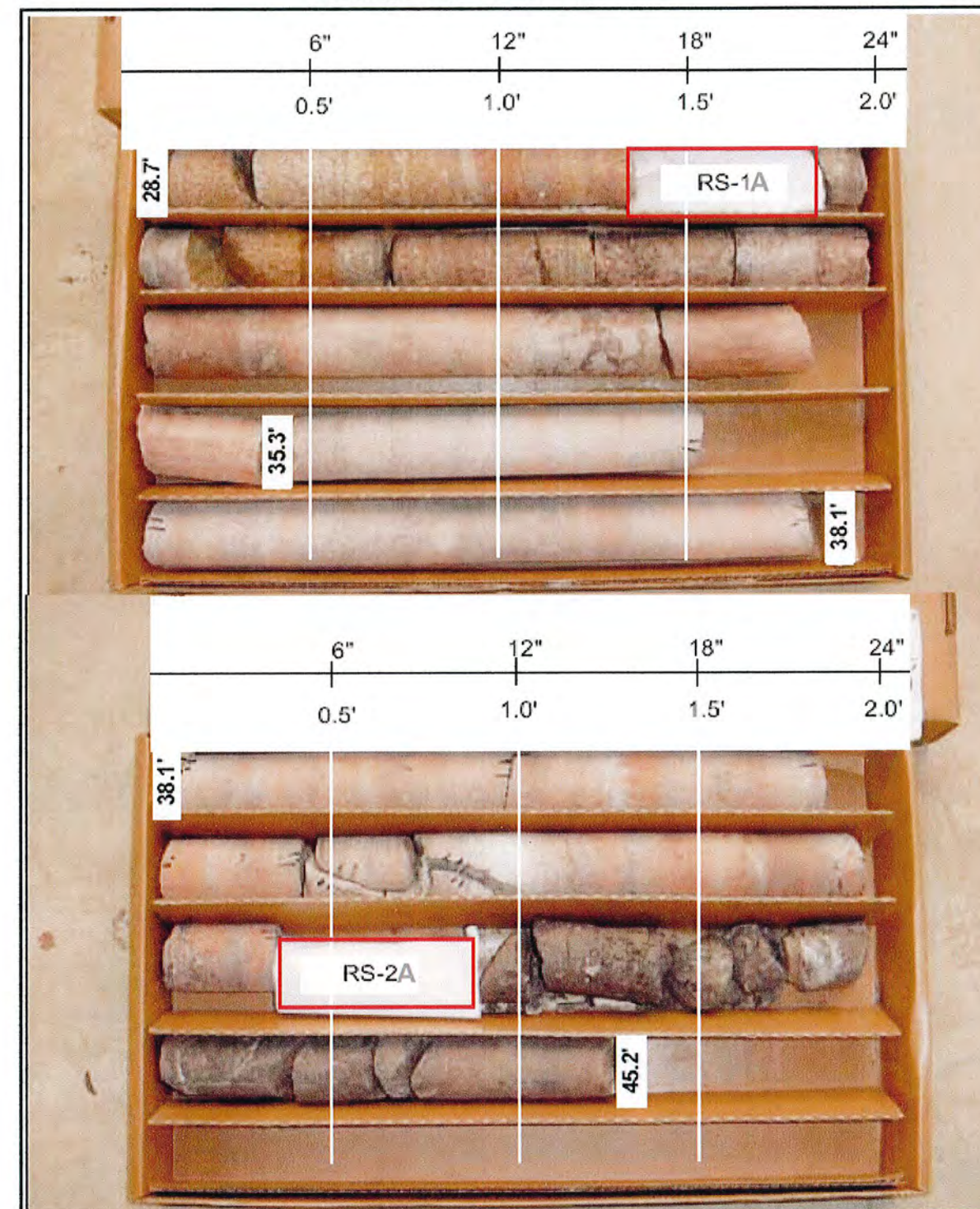
## NS\_B1-A

BOXES 1 & 2: 25.6-45.5 FEET



## NS\_B1-B

BOXES 1 & 2: 28.7-45.2 FEET



# CORE PHOTOGRAPHS

## NS\_B2-A

BOXES 1, 2, & 3: 14.2-36.5 FEET



FEET

## NS\_B3-B

BOXES 1 & 2: 17.2-28.9 FEET



FEET

# CORE PHOTOGRAPHS

## CSX\_B1-A

BOXES 1, 2, & 3: 28.8-53.1 FEET



## CSX\_B3-A

BOXES 1, 2, & 3: 32.9-62.7 FEET



# SITE PHOTOGRAPH

Bridges on -NSRR- and -CSX- over -L- (NC 55/Alston Ave.)



Looking South towards Railroad Bridges