STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	36492.1.2(U-4444B)	1	10

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *36492.1.2(U-4444B)* F.A. PROJ. *STP-210(11)*

COUNTY *CUMBERLAND*

PROJECT DESCRIPTION *NC 210 (MURCHISON RD.) FROM NORTH OF HONEYCUTT ROAD TO NORTH OF NC 210 (LILLINGTON RD.) IN SPRING LAKE*

SITE DESCRIPTION *BRIDGE ON -Y3- (RANDOLPH ST. EXT.) OVER -L- (NC 210 - MURCHISON RD)*

INVENTORY

CONTENTS

CAUTION NOTICE

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

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

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

PERSONNEL

O.B. OTI

C.M. BRUINSMA

J.R. TURNAGE

D.W. DIXON

INVESTIGATED BY *O.B. OTI*

CHECKED BY *C.M. BRUINSMA*

SUBMITTED BY *N.T. ROBERSON*

DATE *JANUARY 2011*

NORTH CAROLINA LICENSED SEAL 2031 GEOLOGIST CHRISTINA M. BRUINSMA 1/14/11

DRAWN BY: *T.T. WALKER, C. M. BRUINSMA*

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS 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.

PROJECT: 36492.1.2

ID: U-4444B

PROJECT REFERENCE NO.	SHEET NO.
36942.1.2(U-4444B)	2

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 TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING • 10 • 40 • 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — 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
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / DPT / DMT / VST / PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

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
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - 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:
- ☐ MOBILE B-___
- ☐ BK-51
- ☐ CME-45C
- ■ CME-550
- ☐ PORTABLE HOIST
- ☐ _____
- ☐ _____

ADVANCING TOOLS:
- ■ CLAY BITS
- ☐ 6" CONTINUOUS FLIGHT AUGER
- ■ 8" HOLLOW AUGERS
- ☐ HARD FACED FINGER BITS
- ☐ TUNG.-CARBIDE INSERTS
- ☐ CASING ☐ W/ ADVANCER
- ☐ TRICONE _____" STEEL TEETH
- ☐ TRICONE _____" TUNG.-CARB.
- ☐ CORE BIT
- ☐ _____

HAMMER TYPE:
- ■ AUTOMATIC ☐ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -H_____

HAND TOOLS:
- ☐ POST HOLE DIGGER
- ☐ HAND AUGER
- ☐ SOUNDING ROD
- ☐ VANE SHEAR TEST
- ☐ _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

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	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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS. INDURATION IS THE HARDENING OF THE 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, 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 (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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #84 RR SPIKE IN BASE OF 24" PINE, STA. 107+97 92' RT

ELEVATION: 251.58 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
36942.1.2(U-4444B)	3

SITE PLAN

0 50 100

FEET

-Y3- POT Sta. 10+00.00

-Y3LPD- ST Sta. 23+59.88

-Y3RPD_M- ST Sta. 26+03.16

-L- POT Sta. 132+79.28

-Y3- POT Sta. 11+82.86

= 90° 36' 06.49"

18" RCP

18" RCP

EB1-A

EB2-A

EB1-C

EB2-C

EB1-B

EB2-B

-Y3RPD-

-Y3LPD-

-Y3-

-L-

-Y3LPD-

-Y3RPB-

-Y3RPAA-

-Y3- 15+00

-Y3RPAA- 15+00

-L- 135+00

-Y3RPA

NC 210 MURCHISON RD

NC 87 MURCHI

25

10

11

12

15

10

135

NAD 83/95

0	20	40
FEET		
VE = 2:1		

PROJECT REFERENCE NO.	SHEET
36492.1.1(U-4444B)	4
PROFILE BORINGS PROJECTED ALONG -Y3-	

EB1-C
10+61
℄

EB2-C
12+75
℄

270
260
250
240
230
220
210
200
190

COASTAL PLAIN.

LIGHT GRAY TO ORANGE, MOIST TO WET, MEDIUM DENSE TO VERY DENSE, SILTY SAND AND COARSE SAND

(MIDDENDORF FORMATION)

DARK GRAY, MOIST,

DARK GRAY, MOIST, STIFF, SANDY SILT

STIFF TO HARD,

SANDY AND SILTY CLAY

ORANGE TO RED, MOIST, MEDIUM DENSE, COARSE SAND

GRAY AND BROWN, MOIST, HARD, SILTY CLAY (MUDSTONE)

(CAPE FEAR FORMATION)

ORANGE TO RED, MOIST, MEDIUM DENSE, COARSE SAND

EB1-C: 10, 09/08, 10, 12, 35, 100/0.8, 100/0.8, 100/0.9

EB2-C: 29, 42, 09/08, 24, 17, 4, 10, 26, 56, 18, 98, 100/0.8

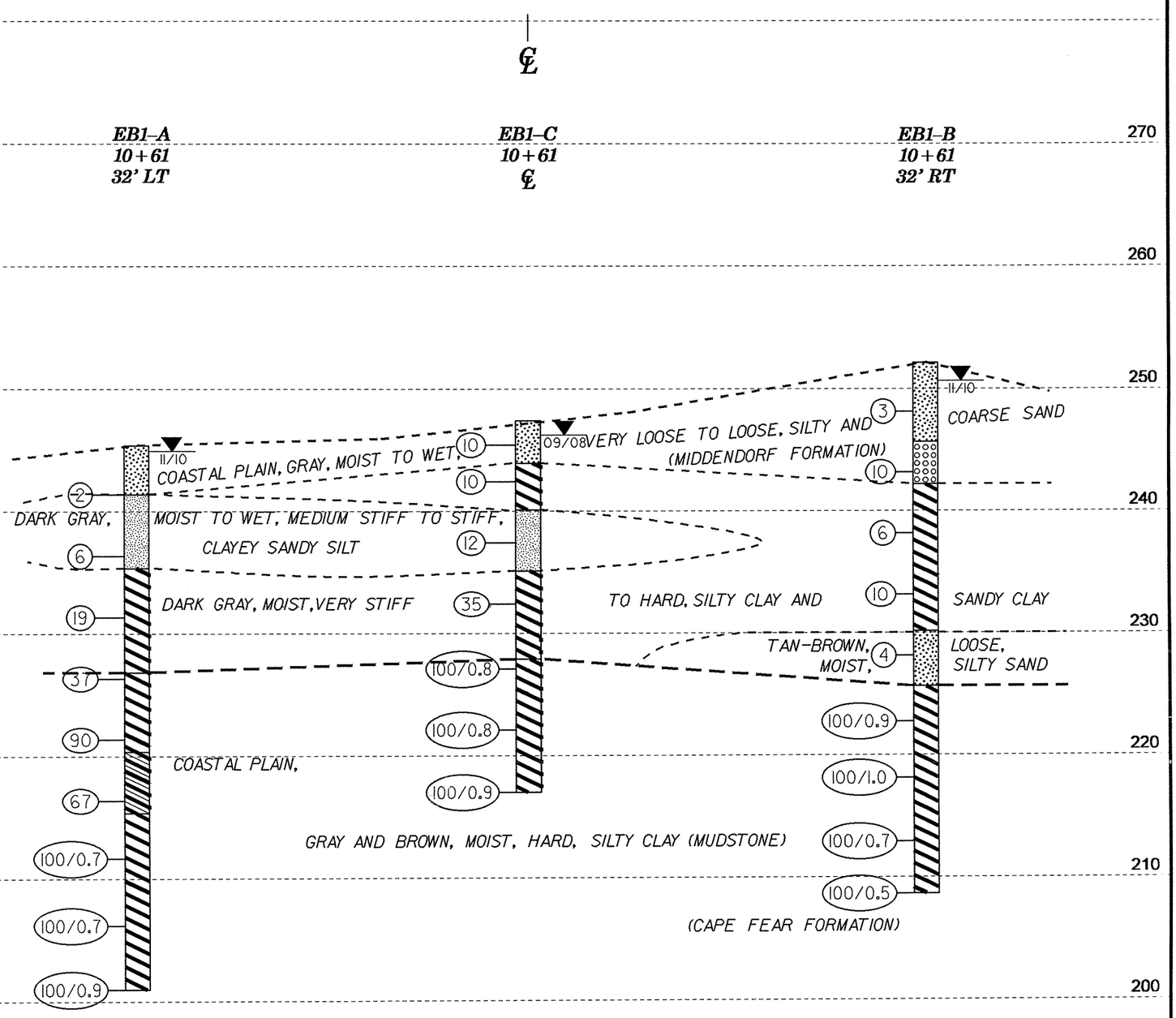
GROUNDLINE PROFILE TAKEN FROM ROADWAY FILE DATED 06/26/2008

11+00 12+00 13+00

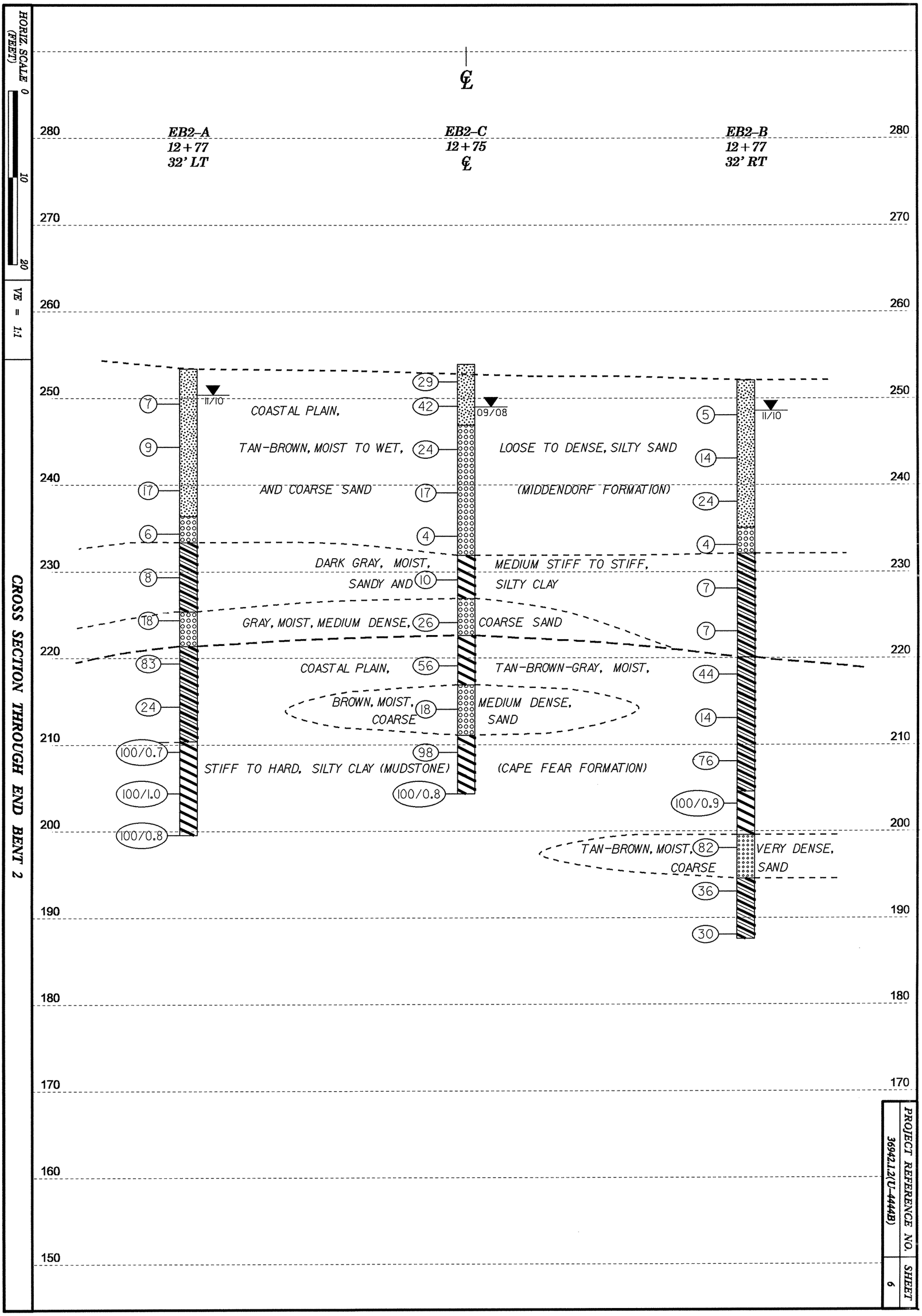
HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH END BENT 1



PROJECT REFERENCE NO.	SHEET
36942.1.2(U-4444B)	5



PROJECT REFERENCE NO.	SHEET
36942.1.2(U-4444B)	6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Oti, O. B.	
SITE DESCRIPTION BRIDGE ON -Y3- (RANDOLPH ST.) OVER -L- (NC 210 MURCHISON RD.)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 10+61	**OFFSET** 32 ft LT	**ALIGNMENT** -Y3-	**0 HR.** N/A
COLLAR ELEV. 245.4 ft	**TOTAL DEPTH** 44.4 ft	**NORTHING** 511,558	**EASTING** 2,010,723	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE RFO0057 CME-550X 73% 12/06/2005		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Dixon, D. W.	**START DATE** 11/16/10	**COMP. DATE** 11/16/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
250										
245										245.4 GROUND SURFACE 0.0
	242.4	3.0								**COASTAL PLAIN** LIGHT GRAY, SILTY SAND (MIDDENDORF FORMATION)
240			1	1	1	2	SS-1	M		241.4 4.0
	237.4	8.0								DARK GRAY, SANDY SILT
235			1	2	4	6	SS-2	M		235.4 10.0
	232.4	13.0								DARK GRAY, SILTY CLAY
230			2	7	12	19	SS-3	M		
	227.4	18.0								226.9 18.5
225			6	14	23	37		M		**COASTAL PLAIN** GRAY, SILTY CLAY (MUDSTONE) (CAPE FEAR FORMATION)
	222.4	23.0								
220			22	45	45	90	SS-4	M		220.4 25.0
	217.4	28.0								TAN-GRAY, SANDY CLAY
215			13	26	41	67	SS-5	M		
	212.4	33.0								215.4 30.0
210			45	55/0.2		100/0.7				GRAY, SILTY CLAY (MUDSTONE)
	207.4	38.0								
205			16	38	62/0.2	100/0.7				
	202.4	43.0								201.0 44.4
200			30	40	60/0.4	100/0.9				Boring Terminated at Elevation 201.0 ft in COASTAL PLAIN, CLAY (MUDSTONE) (CAPE FEAR FORMATION)
195										
190										
185										
180										
175										
170										

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Czajka, C. D.	
SITE DESCRIPTION BRIDGE ON -Y3- (RANDOLPH ST.) OVER -L- (NC 210 MURCHISON RD.)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 10+61	**OFFSET** CL	**ALIGNMENT** -Y3-	**0 HR.** 7.6
COLLAR ELEV. 247.4 ft	**TOTAL DEPTH** 30.4 ft	**NORTHING** 511,581	**EASTING** 2,010,700	**24 HR.** 1.2
DRILL RIG/HAMMER EFF./DATE RFO0057 CME-550X 73% 12/06/2005		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Manual	
DRILLER Dixon, D. W.	**START DATE** 09/03/08	**COMP. DATE** 09/03/08	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
250										247.4 GROUND SURFACE 0.0
	246.4	1.0								**COASTAL PLAIN** GRAY, SILTY SAND (MIDDENDORF FORMATION)
245			2	5	5	10	SS-54	W		243.9 3.5
	243.4	4.0								DARK GRAY, SILTY CLAY
240			4	3	7	10	SS-55	M		240.1 7.3
	238.4	9.0								DARK GRAY, SANDY SILT
235			4	5	7	12	SS-56	W		235.1 12.3
	233.4	14.0								DARK GRAY, SILTY CLAY
230			7	13	22	35		M		
	228.4	19.0								227.9 19.5
225			25	54	46/0.3	100/0.8				**COASTAL PLAIN** DARK GRAY, SILTY CLAY (MUDSTONE) (CAPE FEAR FORMATION)
	223.4	24.0								
220			26	48	52/0.3	100/0.8				
	218.4	29.0								217.0 30.4
215			23	38	62/0.4	100/0.9				Boring Terminated at Elevation 217.0 ft in COASTAL PLAIN, CLAY (MUDSTONE) (CAPE FEAR FORMATION)
210										
205										
200										
195										
190										
185										
180										
175										
170										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Oti, O. B.	
SITE DESCRIPTION BRIDGE ON -Y3- (RANDOLPH ST.) OVER -L- (NC 210 MURCHISON RD.)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 10+61	**OFFSET** 32 ft RT	**ALIGNMENT** -Y3-	**0 HR.** N/A
COLLAR ELEV. 252.1 ft	**TOTAL DEPTH** 43.5 ft	**NORTHING** 511,603	**EASTING** 2,010,677	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE RFO0057 CME-550X 73% 12/06/2005		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Dixon, D. W.	**START DATE** 11/17/10	**COMP. DATE** 11/17/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
255										252.1	
										GROUND SURFACE	0.0
250	249.1	3.0						M		**COASTAL PLAIN** LIGHT GRAY, SILTY SAND (MIDDENDORF FORMATION)	
			1	1	2	3					
245	244.1	8.0								245.6	6.5
			4	4	6	10	SS-6	M		LIGHT GRAY, SAND	
240	239.1	13.0								242.1	10.0
			2	3	3	6		M		DARK GRAY, SILTY CLAY	
235	234.1	18.0									
			3	4	6	10		M			
230	229.1	23.0								230.1	22.0
			1	2	2	4	SS-7	M		TAN-BROWN, SILTY SAND	
225	224.1	28.0								225.6	26.5
			14	40	60/0.4	100/0.9				**COASTAL PLAIN** GRAY, SILTY CLAY (MUDSTONE) (CAPE FEAR FORMATION)	
220	219.1	33.0									
			36	64/0.5		100/1.0					
215	214.1	38.0									
			16	50	50/0.2	100/0.7					
210	209.1	43.0								208.6	43.5
			100/0.5			100/0.5				Boring Terminated at Elevation 208.6 ft in COASTAL PLAIN, CLAY (MUDSTONE) (CAPE FEAR FORMATION)	
205											
200											
195											
190											
185											
180											
175											

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Oti, O. B.	
SITE DESCRIPTION BRIDGE ON -Y3- (RANDOLPH ST.) OVER -L- (NC 210 MURCHISON RD.)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 12+77	**OFFSET** 32 ft LT	**ALIGNMENT** -Y3-	**0 HR.** N/A
COLLAR ELEV. 253.4 ft	**TOTAL DEPTH** 53.8 ft	**NORTHING** 511,405	**EASTING** 2,010,571	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE RFO0057 CME-550X 73% 12/06/2005		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Dixon, D. W.	**START DATE** 11/18/10	**COMP. DATE** 11/18/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
255										253.4	
										GROUND SURFACE	0.0
250	250.4	3.0								**COASTAL PLAIN** TAN-BROWN, SILTY SAND (MIDDENDORF FORMATION)	
			3	4	3	7	SS-8	M			
245	245.4	8.0									
			3	4	5	9		M			
240	240.4	13.0									
			3	6	11	17		M			
235	235.4	18.0								236.4	17.0
			2	2	4	6	SS-9	M		TAN-BROWN, COARSE SAND	
230	230.4	23.0								233.4	20.0
			3	3	5	8	SS-10	M		TAN-GRAY, SANDY CLAY	
225	225.4	28.0									
			3	8	10	18	SS-11	M			
220	220.4	33.0								225.4	28.0
			15	30	53	83	SS-12	M		TAN-RED, COARSE SAND	
215	215.4	38.0								221.4	32.0
			4	12	12	24		M		**COASTAL PLAIN** LIGHT GRAY, SANDY CLAY (MUDSTONE) (CAPE FEAR FORMATION)	
210	210.4	43.0									
			15	60	40/0.2	100/0.7					
205	205.4	48.0								210.4	43.0
			20	80/0.5		100/1.0				LIGHT GRAY, SILTY CLAY (MUDSTONE)	
200	200.4	53.0									
			38	62/0.3		100/0.8				199.6	53.8
195										Boring Terminated at Elevation 199.6 ft in COASTAL PLAIN, CLAY (MUDSTONE) (CAPE FEAR FORMATION)	
190											
185											
180											
175											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Czajka, C. D.	
SITE DESCRIPTION BRIDGE ON -Y3- (RANDOLPH ST.) OVER -L- (NC 210 MURCHISON RD.)				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 12+75	**OFFSET** CL	**ALIGNMENT** -Y3-	**0 HR.** N/A
COLLAR ELEV. 253.9 ft	**TOTAL DEPTH** 49.6 ft	**NORTHING** 511,429	**EASTING** 2,010,550	**24 HR.** 4.9
DRILL RIG/HAMMER EFF./DATE RFO0057 CME-550X 73% 12/06/2005		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Manual	
DRILLER Dixon, D. W.	**START DATE** 09/03/08	**COMP. DATE** 09/03/08	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										253.9 GROUND SURFACE	0.0
	252.9	1.0								**COASTAL PLAIN** LIGHT GRAY TO ORANGE, SILTY SAND (MIDDENDORF FORMATION)	
250	250.1	3.8	15	12	17	29	SS-48	M			
			23	21	21	42				246.9 ORANGE AND RED, COARSE SAND	7.0
245	245.1	8.8									
			9	13	11	24	SS-49	W			
240	240.1	13.8									
			5	7	10	17		W			
235	235.1	18.8								231.9 DARK GRAY, SILTY CLAY	22.0
			2	2	2	4		W			
230	230.1	23.8									
			2	4	6	10	SS-50	M			
225	225.1	28.8								226.9 ORANGE AND RED, COARSE SAND	27.0
			4	12	14	26		W			
220	220.1	33.8								222.6 **COASTAL PLAIN** ORANGE, GRAY, AND RED, SILTY CLAY (MUDSTONE) (CAPE FEAR FORMATION)	31.3
			15	22	34	56	SS-51	W			
215	215.1	38.8								216.9 ORANGE AND WHITE, COARSE SAND	37.0
			1	6	12	18	SS-52	W			
210	210.1	43.8								211.1 GRAY, SILTY CLAY (MUDSTONE)	42.8
			23	40	58	98	SS-53	M			
205	205.1	48.8								204.3 Boring Terminated at Elevation 204.3 ft in COASTAL PLAIN, CLAY (MUDSTONE) (CAPE FEAR FORMATION)	49.6
			43	57/0.3		100/0.8					
200											
195											
190											
185											
180											
175											

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Oti, O. B.	
SITE DESCRIPTION BRIDGE ON -Y3- (RANDOLPH ST.) OVER -L- (NC 210 MURCHISON RD.)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 12+77	**OFFSET** 32 ft RT	**ALIGNMENT** -Y3-	**0 HR.** N/A
COLLAR ELEV. 252.1 ft	**TOTAL DEPTH** 64.5 ft	**NORTHING** 511,450	**EASTING** 2,010,525	**24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE RFO0057 CME-550X 73% 12/06/2005		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Dixon, D. W.	**START DATE** 11/18/10	**COMP. DATE** 11/18/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										252.1 GROUND SURFACE 0.0
										COASTAL PLAIN TAN-BROWN, SILTY SAND (MIDDENDORF FORMATION)
250	249.1	3.0	1	2	3	5		M		
245	244.1	8.0	8	8	6	14		M		
240	239.1	13.0	6	11	13	24		M		
235	234.1	18.0	2	2	2	4		M		235.1 TAN-BROWN, COARSE SAND 17.0
230	229.1	23.0	2	3	4	7		M		232.1 TAN-BROWN-GRAY, SANDY CLAY 20.0
225	224.1	28.0	2	3	4	7		M		
220	219.1	33.0	9	21	23	44		M		220.1 **COASTAL PLAIN** TAN-BROWN-GRAY, SANDY CLAY (MUDSTONE) (CAPE FEAR FORMATION) 32.0
215	214.1	38.0	4	5	9	14		M		
210	209.1	43.0	19	34	42	76		M		
205	204.1	48.0	50	50/0.4		100/0.9		M		204.6 BROWN-GRAY, SILTY CLAY (MUDSTONE) 47.5
200	199.1	53.0	20	42	40	82	SS-13	M		199.6 TAN-BROWN, FINE SAND 52.5
195	194.1	58.0	11	13	23	36		M		194.6 TAN-GRAY, SANDY CLAY 57.5
190	189.1	63.0	9	10	20	30		M		187.6 Boring Terminated at Elevation 187.6 ft in COASTAL PLAIN, CLAY (MUDSTONE) (CAPE FEAR FORMATION) 64.5
185										
180										
175										

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	10+61	3.0-4.0	A-2-4(0)	22	7	49.5	21.2	11.1	18.2	97	78	30	-	-
SS-2	32'LT	10+61	8.0-9.5	A-4(8)	30	10	1.2	27.5	37.0	34.3	100	99	87	-	-
SS-3	32'LT	10+61	13.0-14.5	A-7-6(30)	54	31	5.7	8.7	21.0	64.6	100	98	88	-	-
SS-4	32'LT	10+61	23.0-24.5	A-7-6(24)	48	21	1.0	6.3	30.1	62.6	100	99	98	-	-
SS-5	32'LT	10+61	28.0-29.5	A-6(7)	35	20	29.9	20.6	13.1	36.4	99	81	53	-	-

EB1-C

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-54	CL	10+61	1.0-2.5	A-2-4(0)	14	NP	49.7	29.7	12.5	8.1	98	70	23	-	-
SS-55	CL	10+61	23.0-24.5	A-7-6(26)	52	24	4.6	4.4	24.4	66.5	100	97	93	-	-
SS-56	CL	10+61	9.0-10.5	A-4(0)	23	2	0.8	37.9	37.1	24.2	100	100	82	-	-

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-6	32'RT	10+61	8.0-9.5	A-1-b(0)	18	NP	71.1	16.1	1.7	11.1	83	40	11	-	-
SS-7	32'RT	10+61	23.0-24.5	A-2-4(0)	19	NP	45.7	38.8	1.4	14.1	100	82	17	-	-

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-8	32'LT	12+77	3.0-4.5	A-2-4(0)	23	6	72.7	13.6	0.5	13.1	94	56	13	-	-
SS-9	32'LT	12+77	18.0-19.5	A-1-b(0)	25	6	60.8	20.0	1.0	18.2	76	42	16	-	-
SS-10	32'LT	12+77	23.0-24.5	A-6(14)	34	15	1.6	14.1	35.8	48.5	100	99	93	-	-
SS-11	32'LT	12+77	28.0-29.5	A-1-b(0)	17	NP	86.5	7.4	1.1	5.1	100	29	7	-	-
SS-12	32'LT	12+77	33.0-34.5	A-6(7)	40	22	31.5	20.0	4.0	44.4	99	81	50	-	-

EB2-C

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	CL	12+75	1.0-2.5	A-2-4(0)	18	4	47.1	30.7	9.1	13.1	98	69	25	-	-
SS-49	CL	12+75	8.8-10.3	A-1-b(0)	20	NP	84.9	11.6	2.5	1.0	100	49	4	-	-
SS-50	CL	12+75	23.8-25.3	A-7-6(29)	56	27	1.6	8.5	21.4	68.5	100	99	91	-	-
SS-51	CL	12+75	33.8-35.3	A-7-6(3)	41	21	49.9	14.9	1.9	33.3	100	81	36	-	-
SS-52	CL	12+75	38.8-40.3	A-1-b(0)	23	6	74.6	10.2	3.1	12.1	94	45	15	-	-
SS-53	CL	12+75	43.8-45.3	A-7-6(28)	53	28	6.7	5.6	25.2	62.5	100	95	90	-	-

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-13	32'RT	12+77	53.0-54.5	A-3(0)	20	NP	73.8	19.8	1.3	5.1	100	68	8	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	36492.1.2 (U-4444B)	1	8

ID: U-4444B

PROJECT: 36492.1.2

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	WALL 1
4	WALL 2
5	WALL 3
6	WALL 4
7	WALL 5
8	WALL 6

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 36492.1.2 (U-4444B) F.A. PROJ. STPDA-0210(25)

COUNTY CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE - NC 210 (MURCHISON RD.) FROM FORT BRAGG BOUNDARY TO NC 24-87-210 IN SPRING LAKE

SITE DESCRIPTION
RETAINING WALL 1 - RIGHT OF -Y10- STA. 16+50
RETAINING WALL 2 - LEFT OF -Y10- STA. 24+00
RETAINING WALL 3 - LEFT OF -Y10- STA. 16+50
RETAINING WALL 4 - RIGHT OF -Y6C- STA. 15+00
RETAINING WALL 5 - LEFT OF -Y6C- STA. 15+00
RETAINING WALL 6 - LEFT OF -Y8- STA. 17+00

WALL INVENTORY

CAUTION NOTICE

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

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

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

PERSONNEL
CONSULTANT:
AMEC

INVESTIGATED BY J. L. PEDRO
CHECKED BY N.T. ROBERSON
SUBMITTED BY J. L. PEDRO
DATE JANUARY 2012

DRAWN BY: W. D. FIELDS, J. L. PEDRO

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS 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 LICENSED SEAL 2457 GEOLOGIST JAIME LOVE PEDRO

Jaime Love Pedro 1-25-12

PROJECT REFERENCE NO.	SHEET NO.
36492.1.2 (U-4444B)	2

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 TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — 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
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/026 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

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
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - 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:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

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	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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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, 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 (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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BY2-33, Cap on Shoulder of S. Main St.

ELEVATION: 277.17 FT.

NOTES:

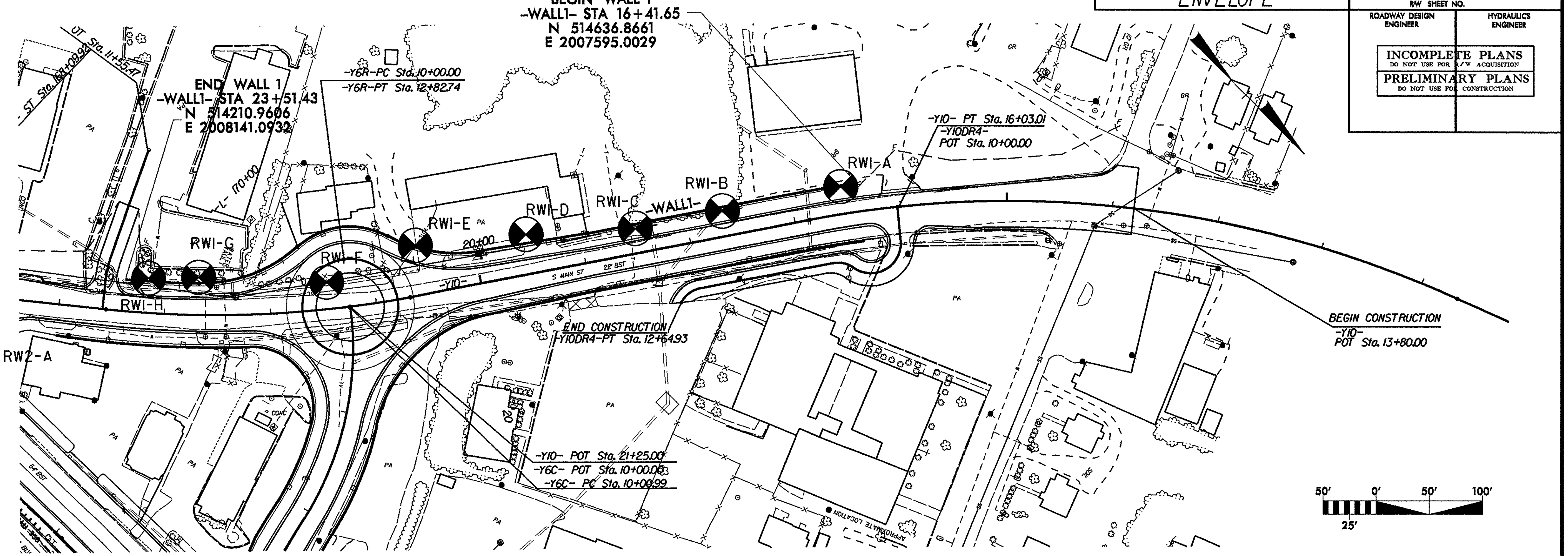
REVISED 09/23/09

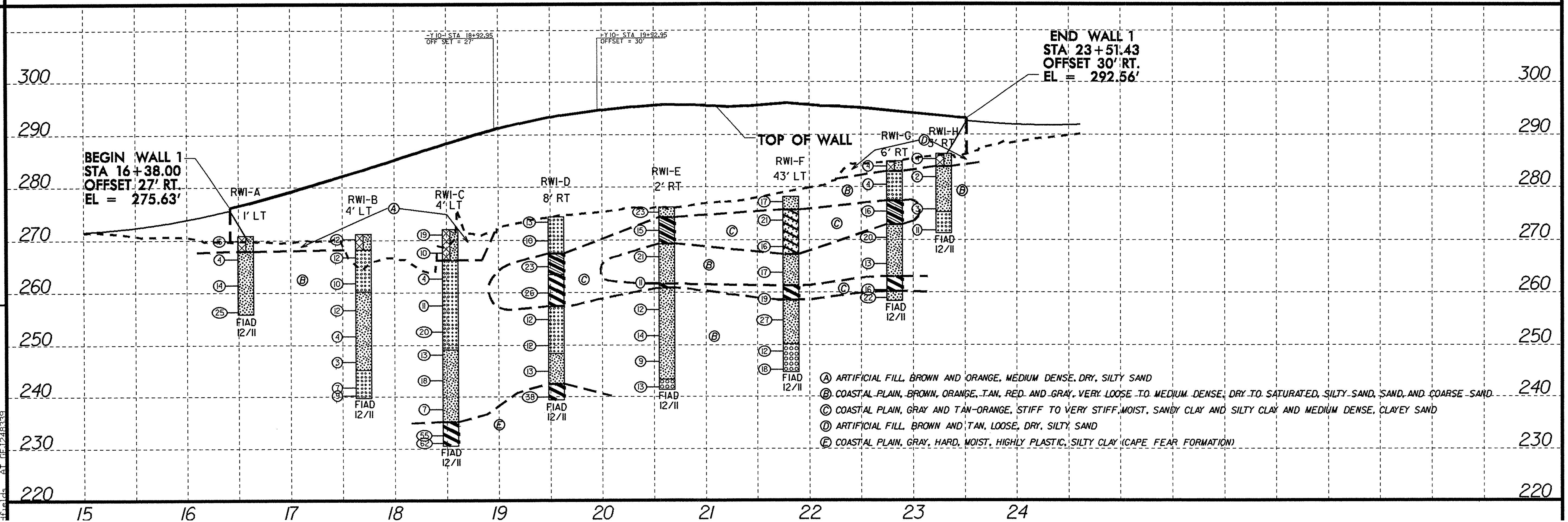
PROJECT REFERENCE NO.	SHEET NO.
U-4444B	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

RETAINING WALL I ENVELOPE





Ⓐ ARTIFICIAL FILL, BROWN AND ORANGE, MEDIUM DENSE, DRY, SILTY SAND

Ⓑ COASTAL PLAIN, BROWN, ORANGE, TAN, RED AND GRAY, VERY LOOSE TO MEDIUM DENSE, DRY TO SATURATED, SILTY SAND, SAND, AND COARSE SAND

Ⓒ COASTAL PLAIN, GRAY AND TAN-ORANGE, STIFF TO VERY STIFF, MOIST, SANDY CLAY AND SILTY CLAY AND MEDIUM DENSE, CLAYEY SAND

Ⓓ ARTIFICIAL FILL, BROWN AND TAN, LOOSE, DRY, SILTY SAND

Ⓔ COASTAL PLAIN, GRAY, HARD, MOIST, HIGHLY PLASTIC, SILTY CLAY (CAPE FEAR FORMATION)

REVISIONS

8/17/99

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RETAINING WALL 2 ENVELOPE

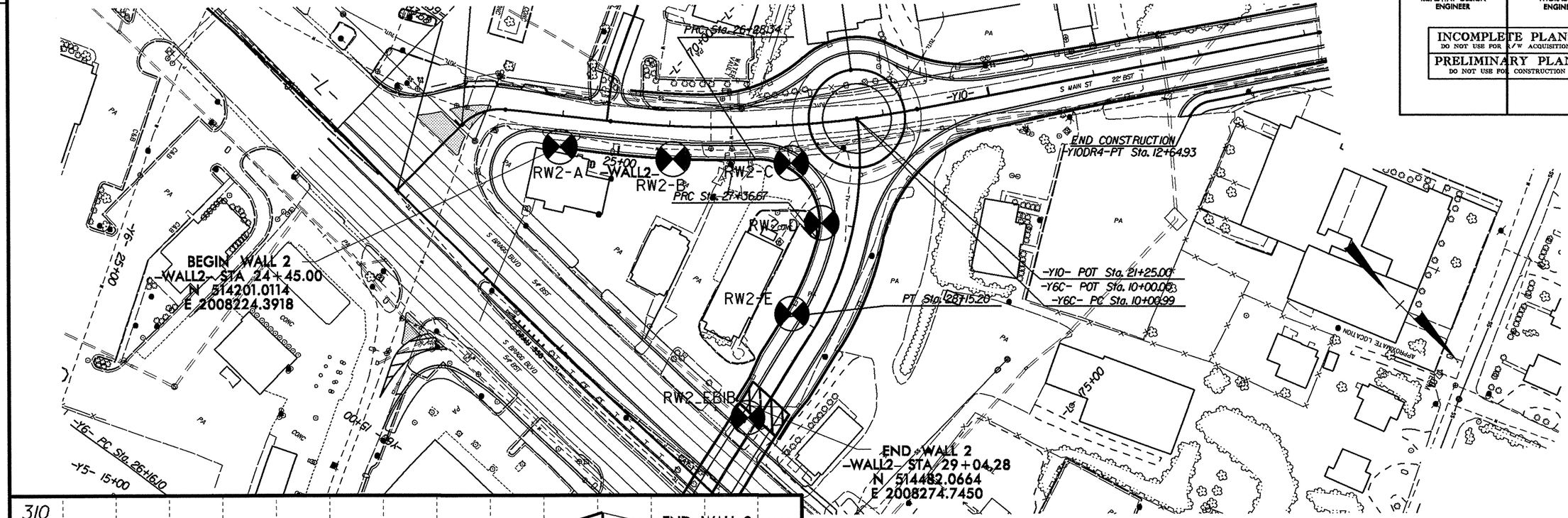
PROJECT REFERENCE NO.	SHEET NO.
U-4444B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

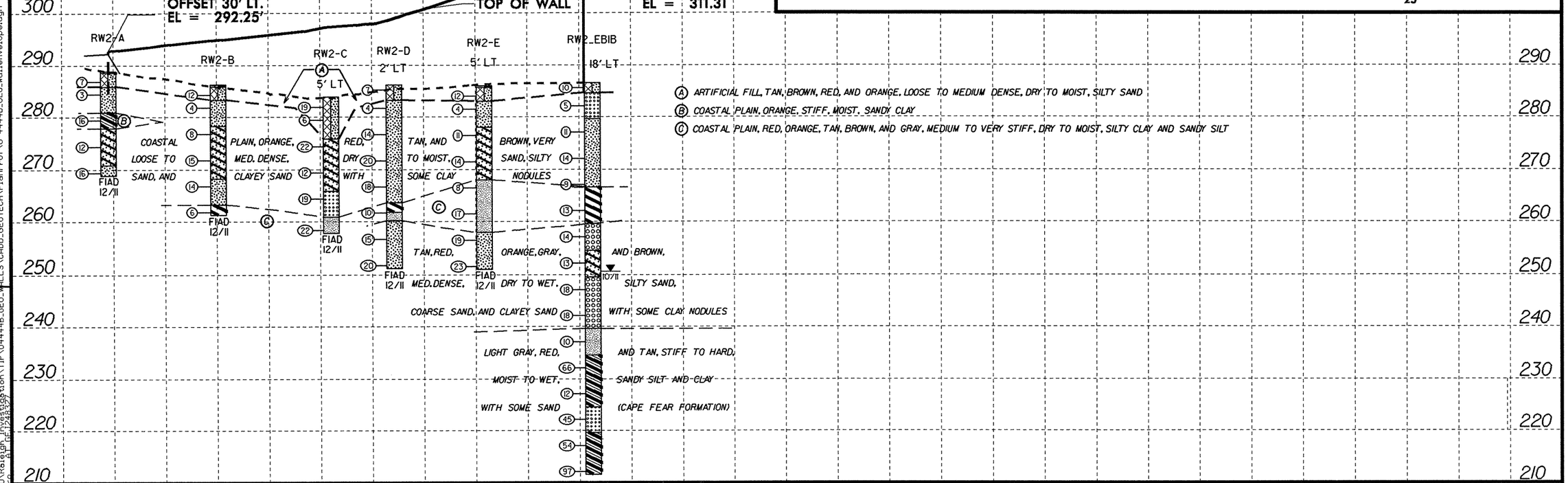
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/99





RETAINING WALL 3 ENVELOPE

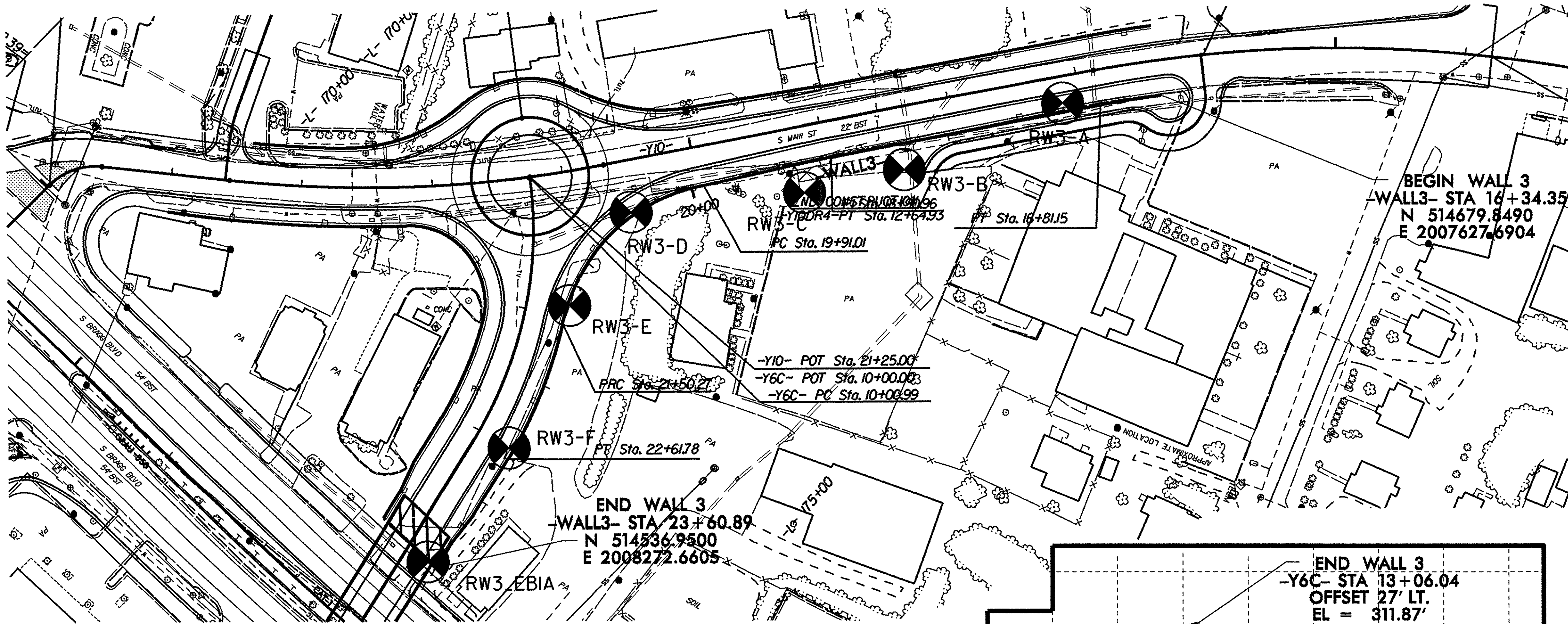
PROJECT REFERENCE NO.	SHEET NO.
U-4444B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

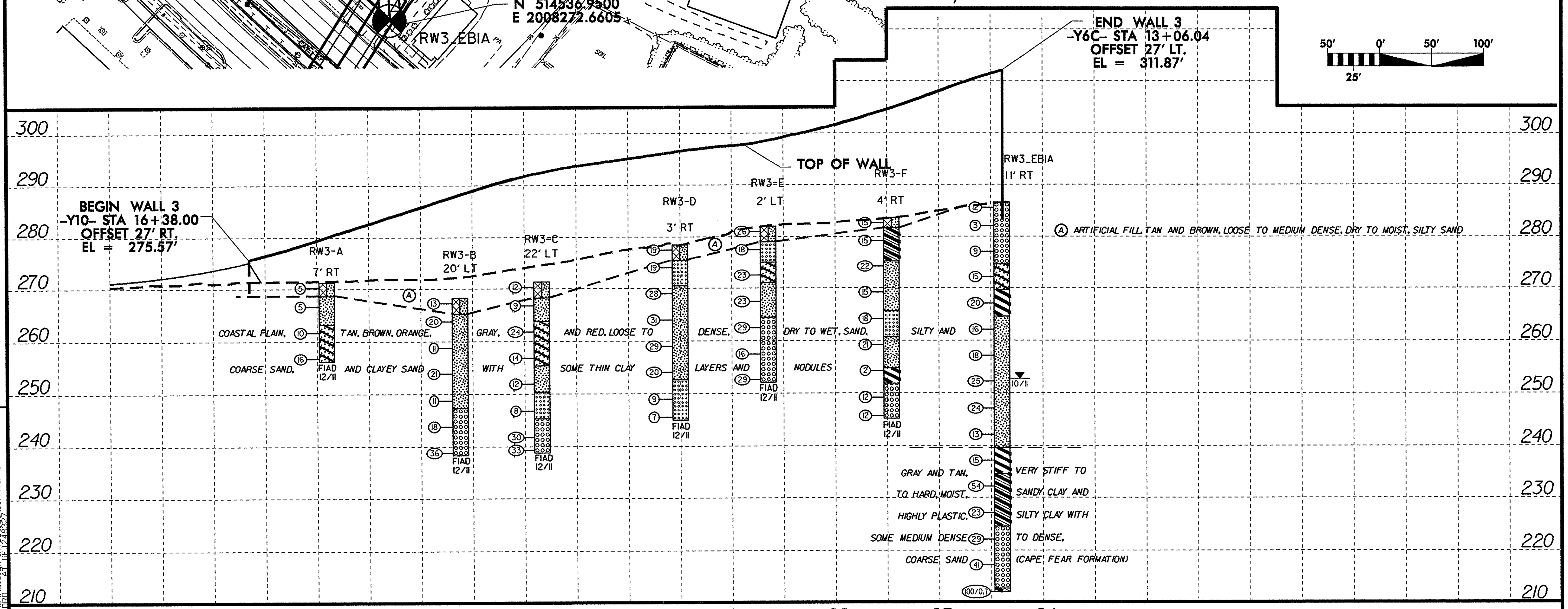
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS





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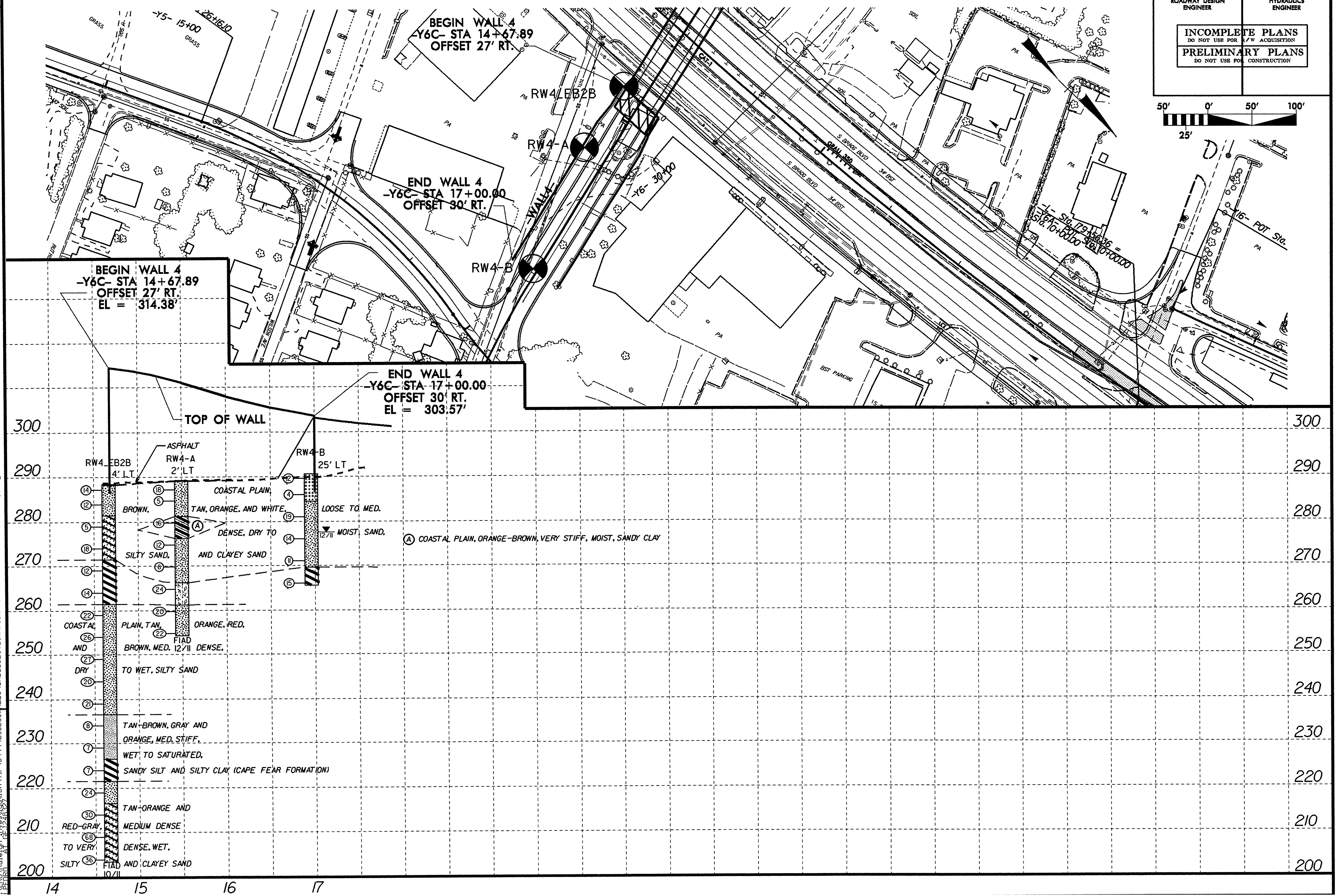
RETAINING WALL 4 ENVELOPE

PROJECT REFERENCE NO.	SHEET NO.
U-4444B	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



REVISIONS

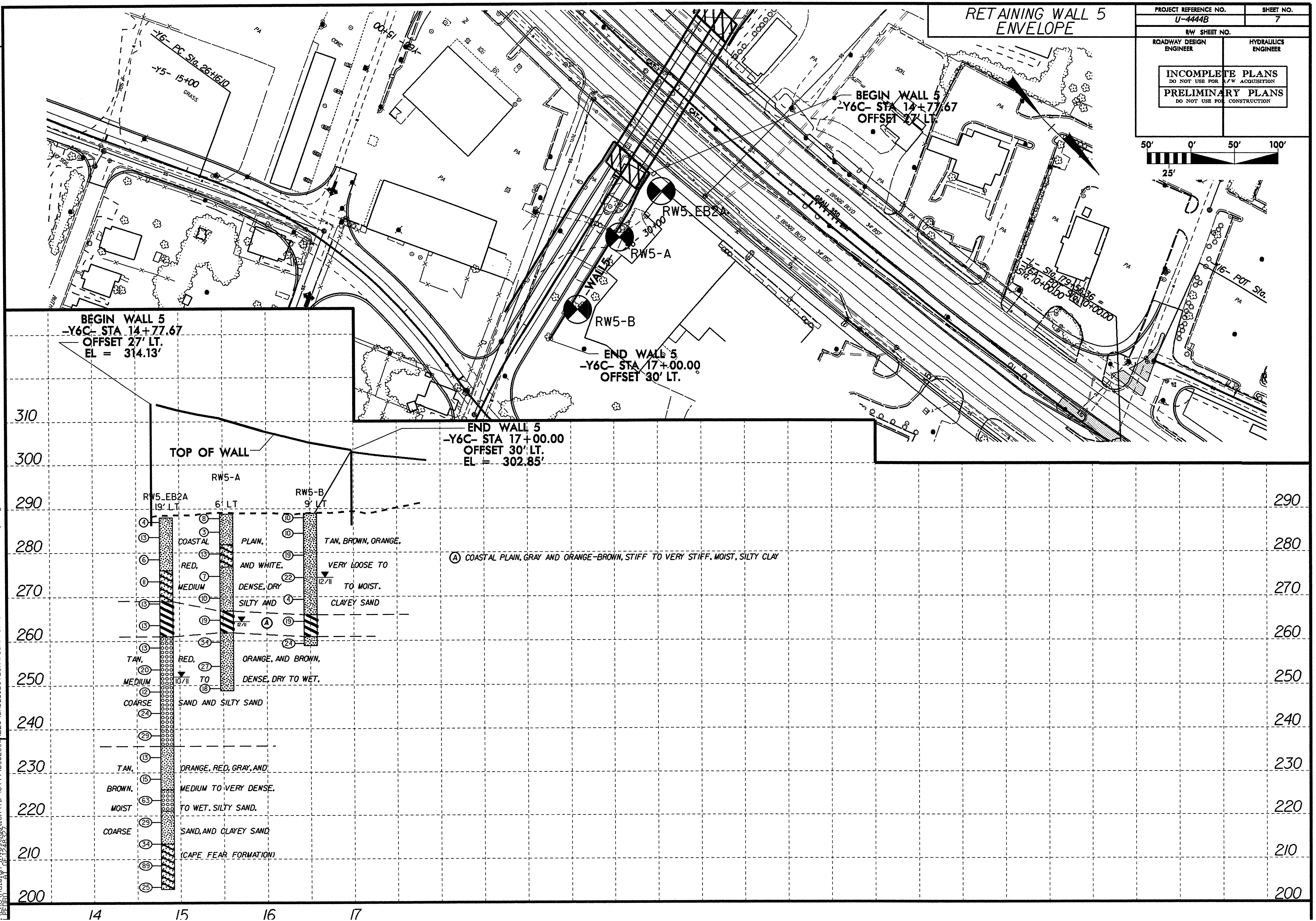
8/17/99

RETAINING WALL 5 ENVELOPE

PROJECT REFERENCE NO.	SHEET NO.
U-4444B	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



RETAINING WALL 6 ENVELOPE

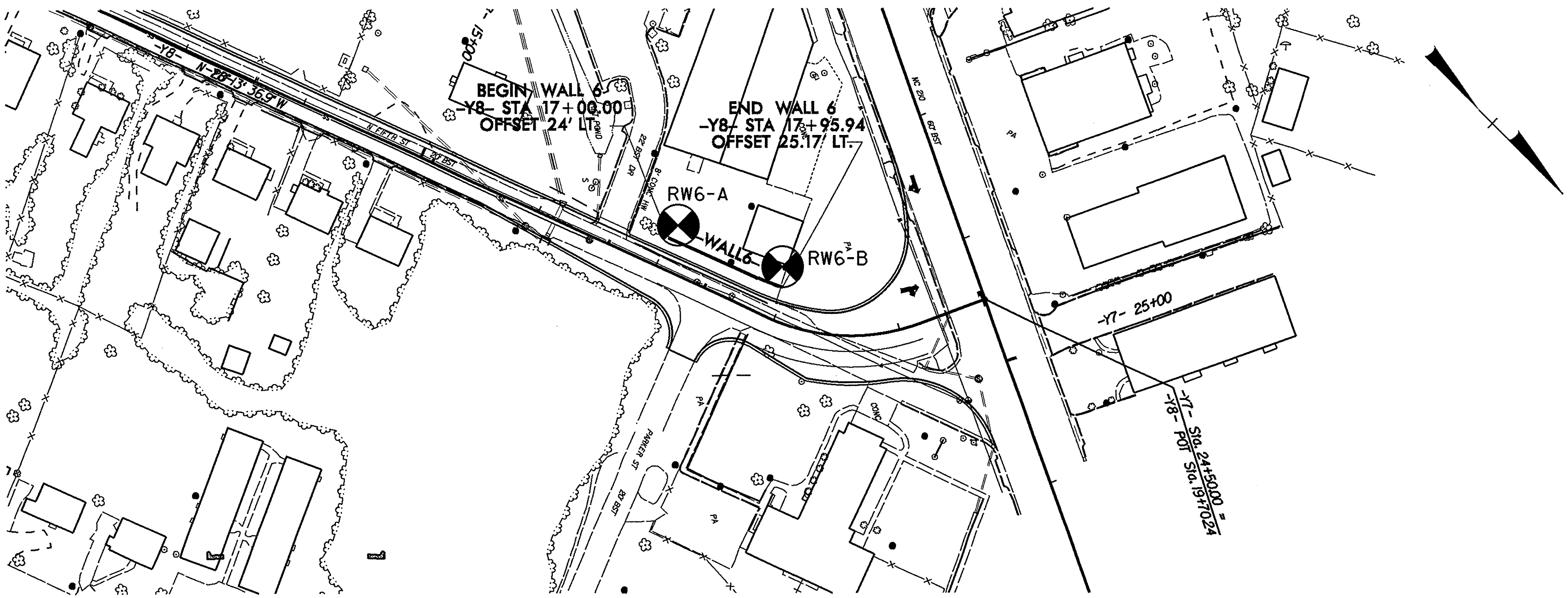
PROJECT REFERENCE NO.	SHEET NO.
U-4444B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

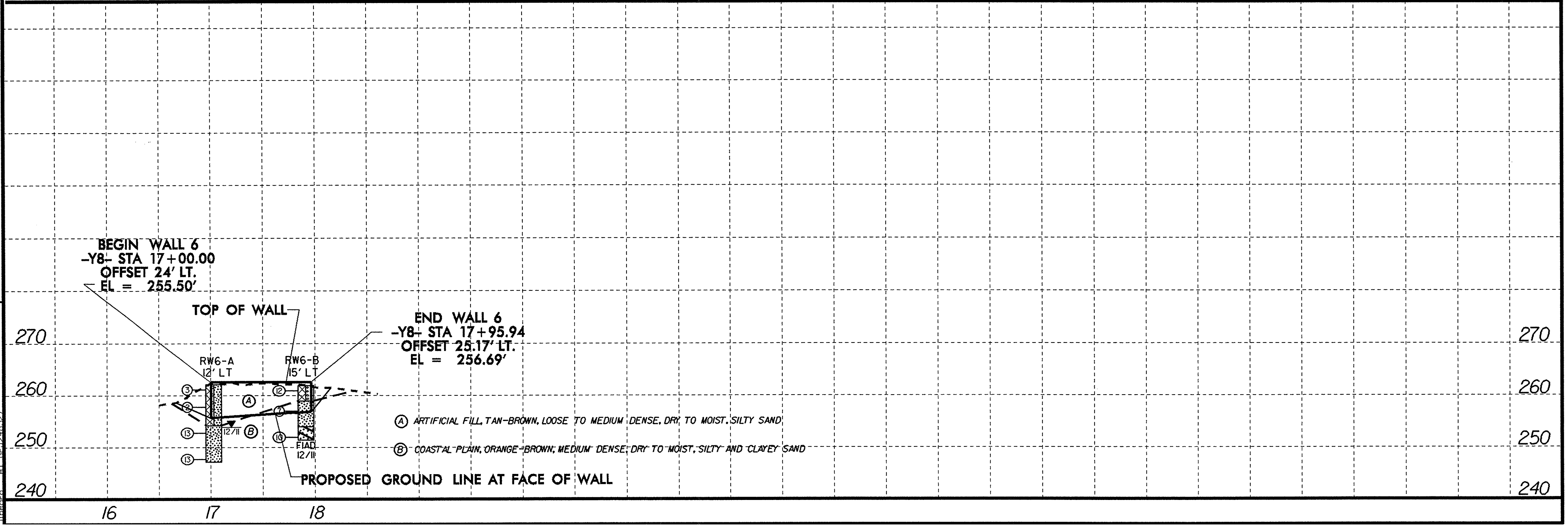
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS





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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	36492.1.2(U-4444B)	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 36492.1.2(U-4444B) F.A. PROJ. STP-210(11)

COUNTY CUMBERLAND

PROJECT DESCRIPTION NC 210 (MURCHISON ROAD) FROM NORTH OF HONEYCUTT ROAD TO NORTH OF NC 210 (LILLINGTON ROAD) IN SPRING LAKE

SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210, BRAGG BLVD.) AT -Y6C- STA. 13+80.85/-L- STA. 172+95.63

INVENTORY

ID: U-4444B

PROJECT: 36492.1.2

CONTENTS

CAUTION NOTICE

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

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

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

PERSONNEL

CONSULTANT:

AMEC

INVESTIGATED BY J.L. PEDRO

CHECKED BY N.T. ROBERSON

SUBMITTED BY J.L. PEDRO

DATE NOVEMBER 2011

NORTH CAROLINA LICENSED SEAL 2157 GEOLOGIST JAIME LOVE PEDRO

11-3-11

DRAWN BY: T.T. WALKER, J.L. PEDRO

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS 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.

PROJECT REFERENCE NO.	SHEET NO.
36492.1.2(U-4444B)	2

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 TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX				36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT (PLASTIC RANGE (PI))		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — 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
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

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
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - 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:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [X] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

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	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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
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 FINGERNAIL.

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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, 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 (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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

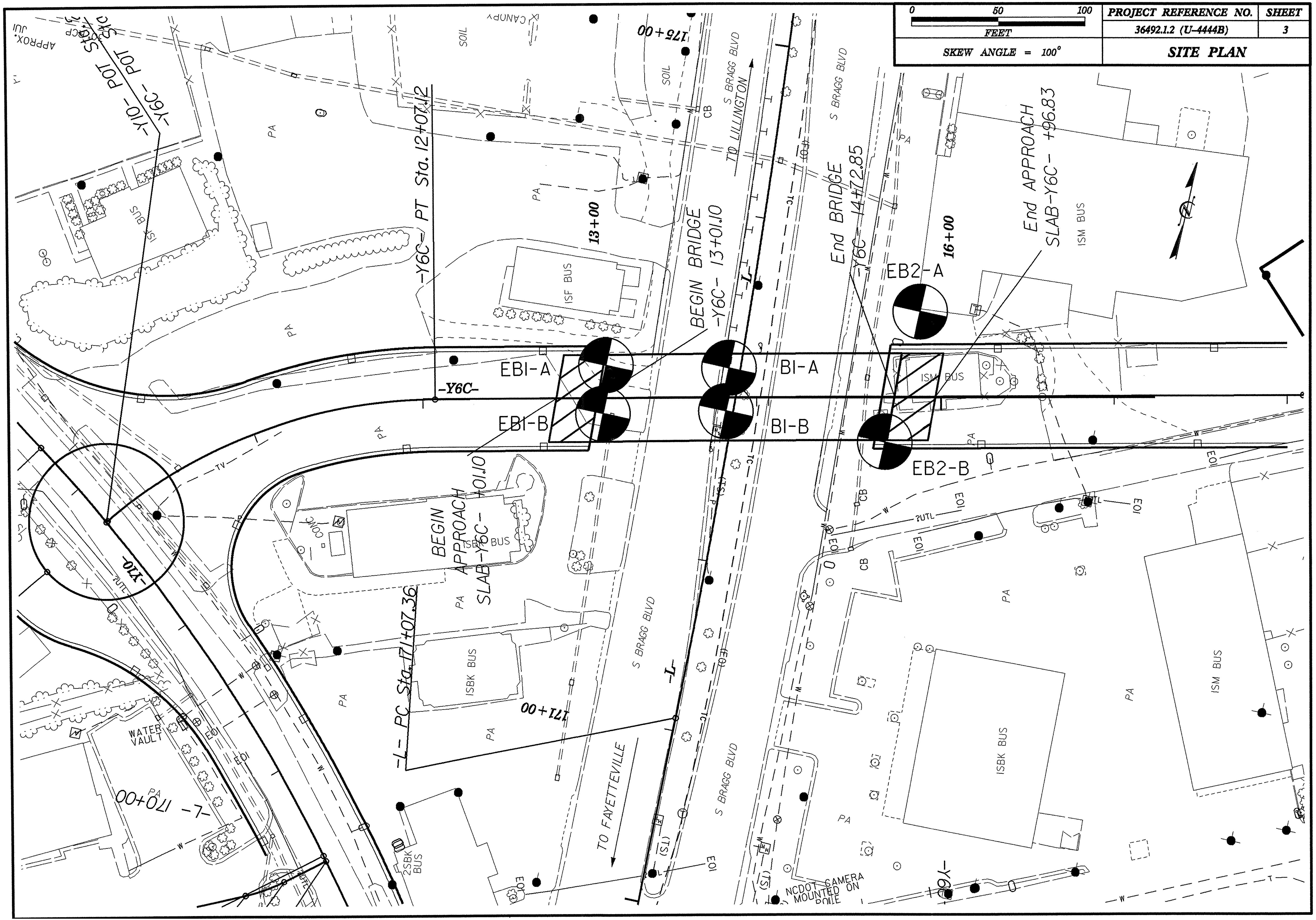
BENCH MARK: BY2-33 CAP ON SHOULDER S. MAIN ST.

ELEVATION: 277.17 FT.

NOTES:

REVISED 09/23/09

0 50 100 FEET	PROJECT REFERENCE NO.	SHEET
	36492.1.2 (U-4444B)	3
SKEW ANGLE = 100°	SITE PLAN	



0	20	40
FEET		
VE = 2:1		

PROJECT REFERENCE NO.	SHEET
36492.1.2(U-4444B)	4
PROFILE BORINGS PROJECTED ALONG -L-	

EB1-A
13+06
19' LT

B1-A
13+77
17' LT

EB2-A
14+88
49' LT

COASTAL PLAIN, TAN, DRY TO MOIST,

BROWN, AND ORANGE, LOOSE TO MEDIUM DENSE, COARSE SAND, SILTY SAND, AND SAND

ORANGE-BROWN, GRAY, AND AND STIFF TO VERY STIFF,

TAN, LOOSE TO MEDIUM DENSE, MOIST, CLAYEY SAND SANDY SILT, SILTY CLAY, AND HIGHLY PLASTIC.

SILTY CLAY

TAN, ORANGE, BROWN, DENSE, MOIST TO WET,

RED, AND GRAY, MEDIUM DENSE TO VERY SILTY SAND AND COARSE SAND

GRAY, RED, TAN, AND BROWN, MOIST TO WET, SANDY CLAY, HIGHLY PLASTIC,

STIFF TO HARD, SANDY SILT, AND SILTY CLAY

TAN-BROWN AND RED-GRAY, COARSE SAND AND

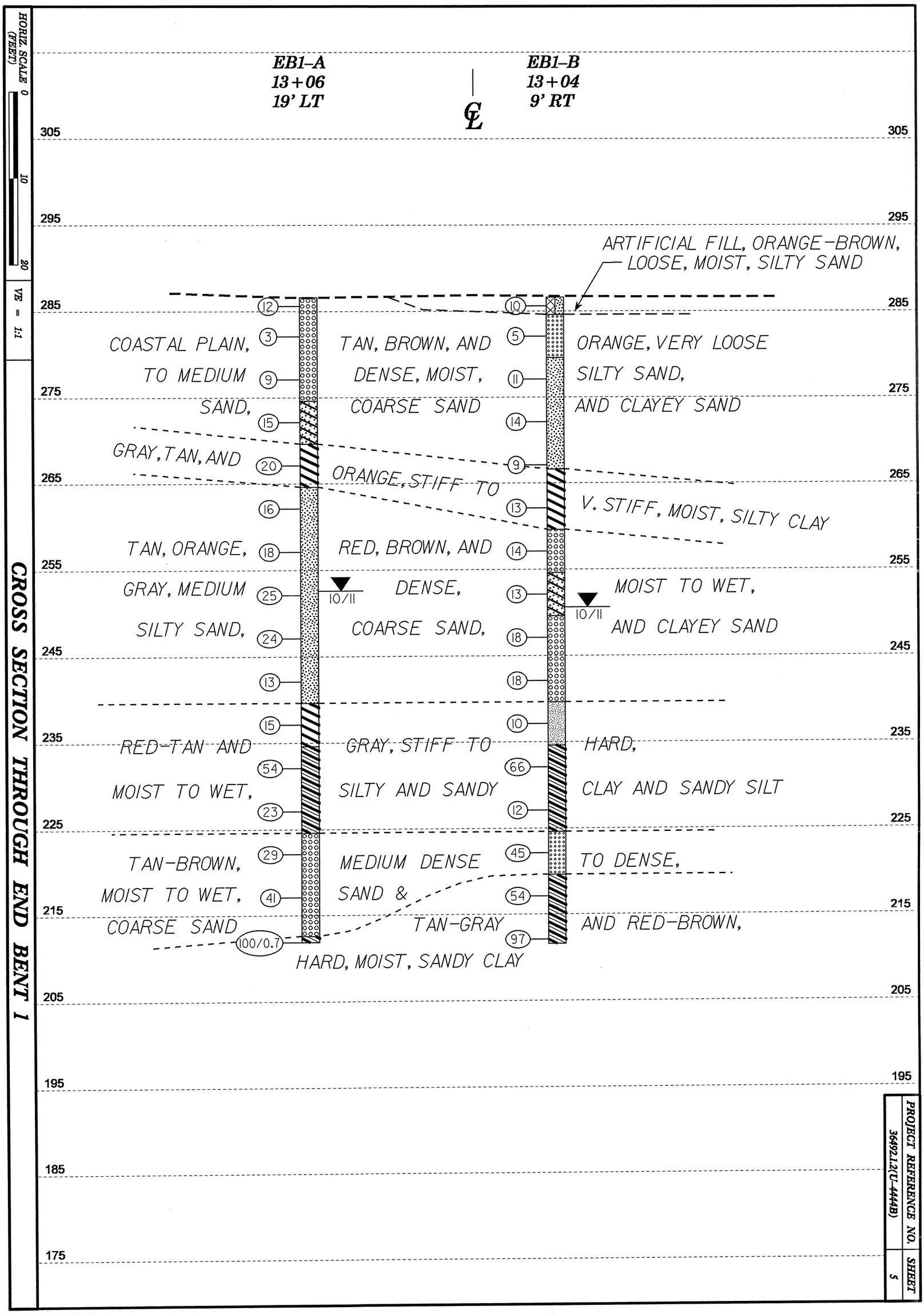
MEDIUM DENSE TO VERY DENSE, MOIST TO WET, SILTY SAND

TAN-GRAY, RED-GRAY, AND

TAN-BROWN, HARD, MOIST, SANDY CLAY AND MEDIUM DENSE TO VERY DENSE, CLAYEY SAND

300 290 280 270 260 250 240 230 220 210 200

+60 +80 13+00 +20 +40 +60 +80 14+00 +20 +40 +60 +80 15+00 +20

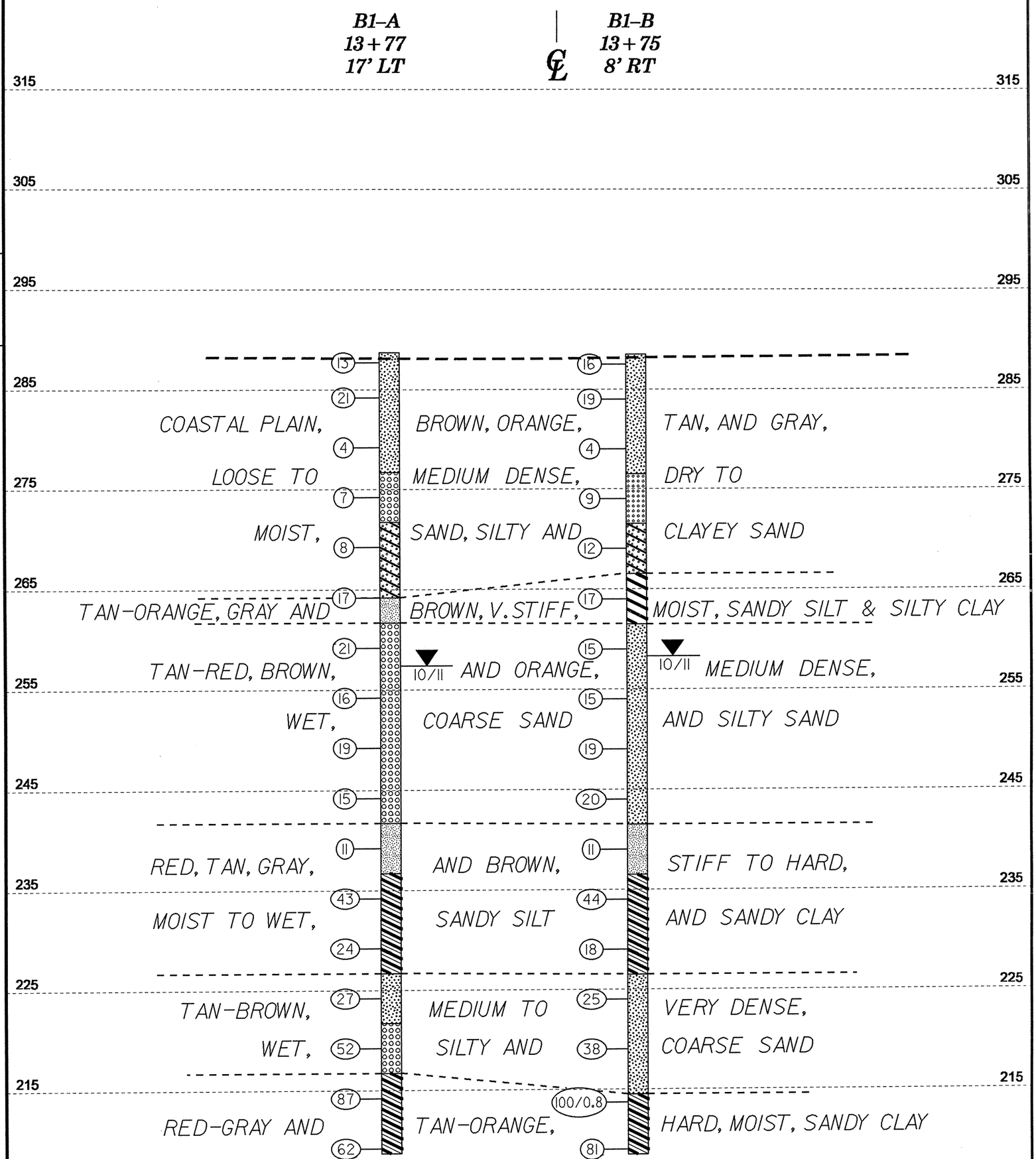


PROJECT REFERENCE NO.	SHEET
36492.1.2(U-4444B)	5

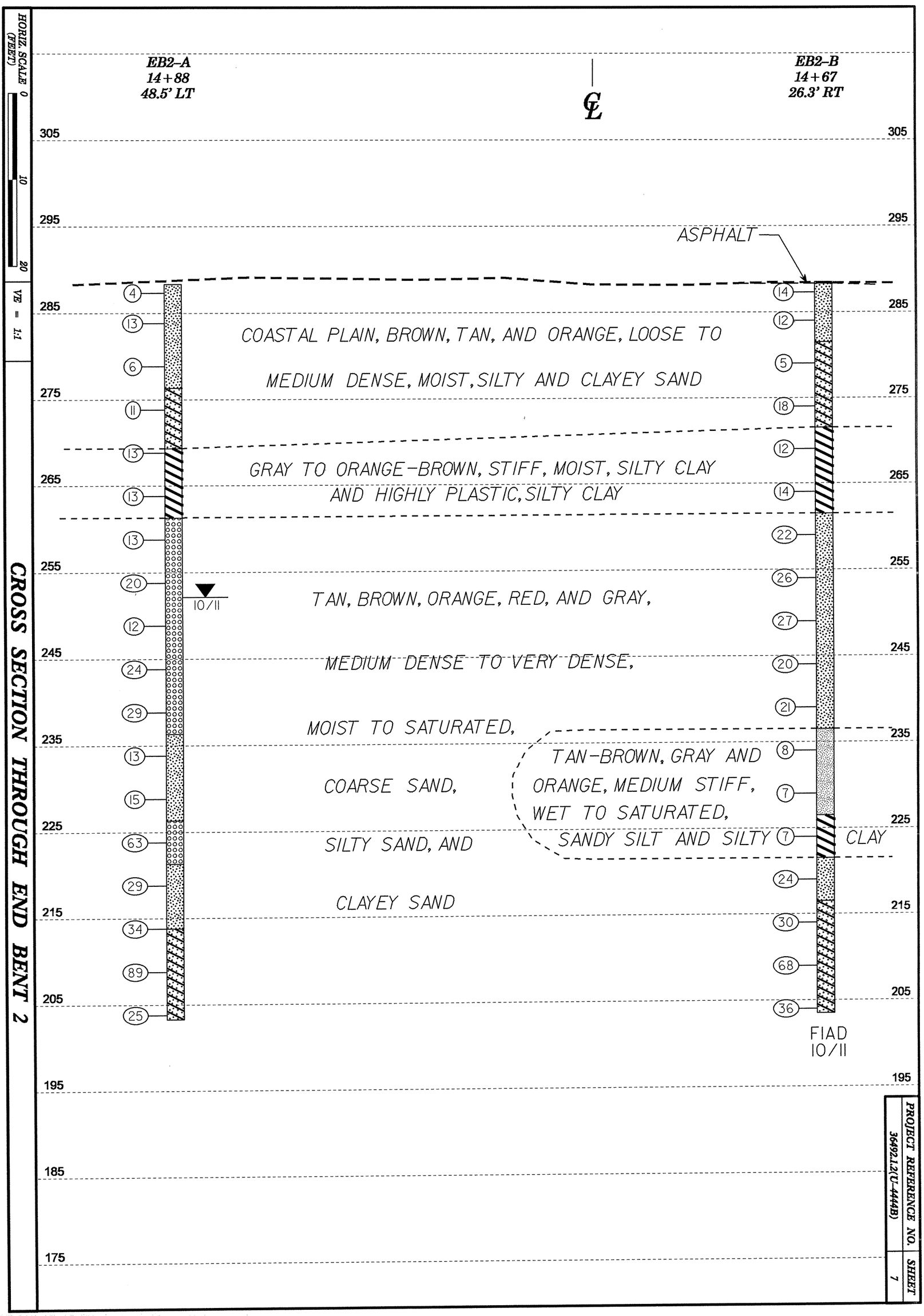
HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH BENT 1



PROJECT REFERENCE NO.	SHEET
36492.1.2(U-4444B)	6



CROSS SECTION THROUGH END BENT 2

PROJECT REFERENCE NO.	SHEET
36492.1.2(U-4444B)	7

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 13+06	**OFFSET** 19 ft LT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 286.6 ft	**TOTAL DEPTH** 74.7 ft	**NORTHING** 514,529	**EASTING** 2,008,274	**24 HR.** 34.0 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/19/11	**COMP. DATE** 10/19/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
295											
290											
	286.6	0.0								286.6 GROUND SURFACE	0.0
285			4	6	6	12		M		**COASTAL PLAIN** TAN AND BROWN, COARSE SAND	
	283.1	3.5									
280			2	1	2	3		M			
	278.1	8.5									
275			2	4	5	9		M			
	273.1	13.5								274.6	12.0
270			8	7	8	15		M		ORANGE-BROWN, CLAYEY SAND	
	268.1	18.5								269.6	17.0
265			4	8	12	20		M		LIGHT GRAY, HIGHLY PLASTIC, SILTY CLAY	
	263.1	23.5								264.6	22.0
260			6	8	8	16		M		TAN-ORANGE, GRAY, AND BROWN, SILTY SAND WITH SOME COARSE SAND	
	258.1	28.5									
255			8	9	9	18		M			
	253.1	33.5							▼		
250			12	12	13	25		M			
	248.1	38.5									
245			5	11	13	24		W			
	243.1	43.5									
240			5	6	7	13		W			
	238.1	48.5								239.6	47.0
235			5	6	9	15		M		GRAY, HIGHLY PLASTIC, SILTY CLAY	
	233.1	53.5								234.6	52.0
230			18	24	30	54		M		GRAY, SANDY CLAY	
	228.1	58.5									
225			10	12	11	23		M			
	223.1	63.5								224.6	62.0
220			9	11	18	29		M		TAN-BROWN, COARSE SAND	
	218.1	68.5									
215			19	22	19	41		M			

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 13+06	**OFFSET** 19 ft LT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 286.6 ft	**TOTAL DEPTH** 74.7 ft	**NORTHING** 514,529	**EASTING** 2,008,274	**24 HR.** 34.0 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/19/11	**COMP. DATE** 10/19/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
215						Match Line				TAN-BROWN, COARSE SAND *(continued)*
	213.1	73.5	27	50	50/0.2	100/0.7				212.6 74.0
										TAN-GRAY, SANDY CLAY 211.9 74.7
										Boring Terminated at Elevation 211.9 ft IN COASTAL PLAIN (SANDY CLAY)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 13+04	**OFFSET** 9 ft RT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 286.6 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 514,501	**EASTING** 2,008,279	**24 HR.** 36.0 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/20/11	**COMP. DATE** 10/20/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
295											
290											
	286.6	0.0	2	4	6	10		M		286.6 GROUND SURFACE	0.0
285										**ARTIFICIAL FILL**	
	283.1	3.5	2	2	3	5		M		284.6 ORANGE-BROWN, SILTY SAND	2.0
280										**COASTAL PLAIN** BROWN, SAND	
	278.1	8.5	4	5	6	11		M		279.6	7.0
275										TAN, ORANGE, AND BROWN, SILTY SAND	
	273.1	13.5	6	7	7	14		M			
270											
	268.1	18.5	4	4	5	9		M		266.6 TAN-GRAY AND ORANGE, SILTY CLAY	20.0
265											
	263.1	23.5	4	6	7	13		M		259.6 RED-BROWN, COARSE SAND	27.0
260											
	258.1	28.5	6	7	7	14		W		254.6 TAN-GRAY, CLAYEY SAND	32.0
255											
	253.1	33.5	3	6	7	13		M		249.6 TAN-ORANGE, COARSE SAND	37.0
250											
	248.1	38.5	8	9	9	18		W			
245											
	243.1	43.5	6	9	9	18		W		239.6 RED-TAN, SANDY SILT	47.0
240											
	238.1	48.5	4	4	6	10		W		234.6 LIGHT GRAY WITH RED, SANDY CLAY	52.0
235											
	233.1	53.5	19	31	35	66		M			
230											
	228.1	58.5	5	5	7	12		M		224.6 TAN, SAND	62.0
225											
	223.1	63.5	12	22	23	45		W		219.6 GRAY AND RED-BROWN, SANDY CLAY	67.0
220											
	218.1	68.5	19	21	33	54		M			
215											

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 13+04	**OFFSET** 9 ft RT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 286.6 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 514,501	**EASTING** 2,008,279	**24 HR.** 36.0 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/20/11	**COMP. DATE** 10/20/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
215						Match Line				
	213.1	73.5	22	37	60	97		M		GRAY AND RED-BROWN, SANDY CLAY *(continued)*
										211.6 75.0
										Boring Terminated at Elevation 211.6 ft IN COASTAL PLAIN (SANDY CLAY)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 13+77	**OFFSET** 17 ft LT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 288.7 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 514,543	**EASTING** 2,008,344	**24 HR.** 31.3 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/20/11	**COMP. DATE** 10/20/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
295										
290										
	288.7	0.0								288.7 GROUND SURFACE 0.0
			5	6	7	13		D		**COASTAL PLAIN** BROWN AND ORANGE, SILTY SAND
285	285.2	3.5								
			6	9	12	21		D		
280	280.2	8.5								
			2	2	2	4		M		
275	275.2	13.5								276.7 12.0 BROWN, COARSE SAND
			3	4	3	7		M		
270	270.2	18.5								271.7 17.0 ORANGE-BROWN, CLAYEY SAND
			4	5	3	8		M		
265	265.2	23.5								264.2 24.5 TAN-ORANGE, SANDY SILT
			6	8	9	17		M		261.7 27.0 TAN-BROWN, COARSE SAND
260	260.2	28.5								
			9	10	11	21		W		
255	255.2	33.5								
			8	7	9	16		W		
250	250.2	38.5								
			7	9	10	19		W		
245	245.2	43.5								
			6	7	8	15		W		
240	240.2	48.5								241.7 47.0 RED-TAN, SANDY SILT
			5	5	6	11		W		
235	235.2	53.5								236.7 52.0 GRAY-BROWN AND RED, SANDY CLAY
			12	21	22	43		M		
230	230.2	58.5								
			7	11	13	24		M		
225	225.2	63.5								226.7 62.0 TAN-BROWN, SILTY SAND
			6	11	16	27		W		
220	220.2	68.5								221.7 67.0 TAN-BROWN, COARSE SAND
			17	26	26	52		W		
215	215.2	73.5								216.7 72.0 RED-GRAY, SANDY CLAY

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 13+77	**OFFSET** 17 ft LT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 288.7 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 514,543	**EASTING** 2,008,344	**24 HR.** 31.3 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/20/11	**COMP. DATE** 10/20/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
215						Match Line				
			28	44	43	87		M		RED-GRAY, SANDY CLAY *(continued)*
210	210.2	78.5								
			14	27	35	62		M		208.7 80.0 Boring Terminated at Elevation 208.7 ft IN COASTAL PLAIN (SANDY CLAY)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 13+75	**OFFSET** 8 ft RT	**ALIGNMENT** -Y6C- — **0 HR.** N/A
COLLAR ELEV. 288.5 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 514,518	**EASTING** 2,008,348 — **24 HR.** 30.2 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/21/11	**COMP. DATE** 10/21/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
290											
	288.5	0.0								288.5 GROUND SURFACE	0.0
			6	7	9	16		D		**COASTAL PLAIN** BROWN AND ORANGE, SILTY SAND	
285	285.0	3.5									
			8	9	10	19		D			
280	280.0	8.5									
			2	2	2	4		M			
275	275.0	13.5								276.5 TAN, SAND	12.0
			3	4	5	9		M			
270	270.0	18.5								271.5 TAN, ORANGE, AND GRAY, CLAYEY SAND	17.0
			7	7	5	12		M			
265	265.0	23.5								266.5 GRAY AND BROWN, SILTY CLAY	22.0
			5	7	10	17		W			
260	260.0	28.5								261.5 TAN-RED AND ORANGE, SILTY SAND	27.0
			6	7	8	15		W			
255	255.0	33.5									
			6	8	7	15		W			
250	250.0	38.5									
			7	10	9	19		W			
245	245.0	43.5									
			5	8	12	20		W			
240	240.0	48.5								241.5 RED-GRAY, SANDY SILT WITH SOME MICA	47.0
			3	4	7	11		W			
235	235.0	53.5								236.5 GRAY, SANDY CLAY	52.0
			7	16	28	44		M			
230	230.0	58.5									
			7	9	9	18		W			
225	225.0	63.5								226.5 TAN, SILTY SAND	62.0
			9	11	14	25		W			
220	220.0	68.5									
			19	20	18	38		W			
215	215.0	73.5									
			16	43	57/0.3	100/0.8				214.5 RED AND GRAY TO TAN AND ORANGE, SANDY CLAY	74.0
210	210.0	78.5									

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 13+75	**OFFSET** 8 ft RT	**ALIGNMENT** -Y6C- — **0 HR.** N/A
COLLAR ELEV. 288.5 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 514,518	**EASTING** 2,008,348 — **24 HR.** 30.2 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/21/11	**COMP. DATE** 10/21/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
210						Match Line				
			26	37	44	81		M		208.5 Boring Terminated at Elevation 208.5 ft IN COASTAL PLAIN (SANDY CLAY) 80.0

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 14+88	**OFFSET** 49 ft LT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 288.3 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 514,598	**EASTING** 2,008,445	**24 HR.** 36.2 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/24/11	**COMP. DATE** 10/24/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
290										
	288.3	0.0	2	2	2	4		M		288.3 / 0.0 GROUND SURFACE
285	284.8	3.5	2	6	7	13		M		COASTAL PLAIN BROWN AND ORANGE, SILTY SAND
280	279.8	8.5	3	3	3	6		M		
275	274.8	13.5	4	6	5	11		M		276.3 / 12.0 ORANGE-BROWN, CLAYEY SAND
270	269.8	18.5	6	6	7	13		M		269.3 / 19.0 GRAY TO ORANGE-BROWN, SILTY CLAY
265	264.8	23.5	3	4	9	13		M		
260	259.8	28.5	6	6	7	13		W		261.3 / 27.0 TAN, RED, ORANGE, AND BROWN, COARSE SAND
255	254.8	33.5	5	9	11	20		M		
250	249.8	38.5	5	6	6	12		W		
245	244.8	43.5	11	11	13	24		W		
240	239.8	48.5	9	15	14	29		W		
235	234.8	53.5	5	6	7	13		W		236.3 / 52.0 TAN, SILTY SAND
230	229.8	58.5	5	6	9	15		W		
225	224.8	63.5	21	28	35	63		W		226.3 / 62.0 TAN-ORANGE-RED, COARSE SAND
220	219.8	68.5	11	12	17	29		W		221.3 / 67.0 RED-GRAY, SILTY SAND
215	214.8	73.5	18	20	14	34		W		213.8 / 74.5 GRAY TO TAN-BROWN, CLAYEY SAND
210										

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 14+88	**OFFSET** 49 ft LT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 288.3 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 514,598	**EASTING** 2,008,445	**24 HR.** 36.2 Caved
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/24/11	**COMP. DATE** 10/24/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
210						Match Line				
	209.8	78.5	22	39	50	89		W		GRAY TO TAN-BROWN, CLAYEY SAND *(continued)*
205	204.8	83.5	9	10	15	25		W		203.3 / 85.0 Boring Terminated at Elevation 203.3 ft IN COASTAL PLAIN (CLAYEY SAND)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+67	**OFFSET** 26 ft RT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 288.5 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 514,521	**EASTING** 2,008,441	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/24/11	**COMP. DATE** 10/25/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
290										
	288.3	0.2								288.5 / 0.0 GROUND SURFACE
			6	7	7	14		M		**ARTIFICIAL FILL** ASPHALT
285	285.0	3.5								**COASTAL PLAIN** BROWN, SILTY SAND
			8	7	5	12		M		
280	280.0	8.5								281.5 / 7.0 TAN-ORANGE, CLAYEY SAND
			2	2	3	5		M		
275	275.0	13.5								
			5	9	9	18		M		
270	270.0	18.5								271.5 / 17.0 GRAY, HIGHLY PLASTIC, SILTY CLAY
			4	5	7	12		M		
265	265.0	23.5								
			6	5	9	14		M		
260	260.0	28.5								261.5 / 27.0 TAN, ORANGE, AND BROWN, SILTY SAND WITH SOME COARSE SAND
			9	11	11	22		W		
255	255.0	33.5								
			11	15	11	26		W		
250	250.0	38.5								
			5	12	15	27		W		
245	245.0	43.5								
			5	10	10	20		W		
240	240.0	48.5								
			5	10	11	21		W		
235	235.0	53.5								236.5 / 52.0 TAN-BROWN, SANDY SILT WITH SOME MICA
			3	4	4	8		Sat.		
230	230.0	58.5								
			3	3	4	7		Sat.		
225	225.0	63.5								226.5 / 62.0 GRAY AND ORANGE, SILTY CLAY
			2	2	5	7		W		
220	220.0	68.5								221.5 / 67.0 TAN-ORANGE, SILTY SAND
			11	11	13	24		Sat.		
215	215.0	73.5								216.5 / 72.0 RED-GRAY TO TAN-ORANGE, CLAYEY SAND
			15	8	22	30		W		
210	210.0	78.5								

WBS 36492.1.2	**TIP** U-4444B	**COUNTY** CUMBERLAND	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION PROPOSED BRIDGE ON -Y6C- (POE ST.) OVER -L- (NC 210)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+67	**OFFSET** 26 ft RT	**ALIGNMENT** -Y6C-	**0 HR.** N/A
COLLAR ELEV. 288.5 ft	**TOTAL DEPTH** 85.0 ft	**NORTHING** 514,521	**EASTING** 2,008,441	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 86% 10/3/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/24/11	**COMP. DATE** 10/25/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
210						Match Line				
			16	30	38	68		W		RED-GRAY TO TAN-ORANGE, CLAYEY SAND *(continued)*
205	205.0	83.5								
			10	13	23	36		W		203.5 / 85.0 Boring Terminated at Elevation 203.5 ft IN COASTAL PLAIN (CLAYEY SAND)