ID: B-4555

CONTRACT: C202822

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33767.1.1 (B-4555) F.A. PROJ. BRNHS-70(72)

COUNTY JOHNSTON

PROJECT DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33767.1.1 (B-4555)	1	15

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33767.1.1	BRNHS-70(72)	P.E.
-	-	R/W & UTIL.
-	-	-
-	-	-
-	-	-
-	-	-

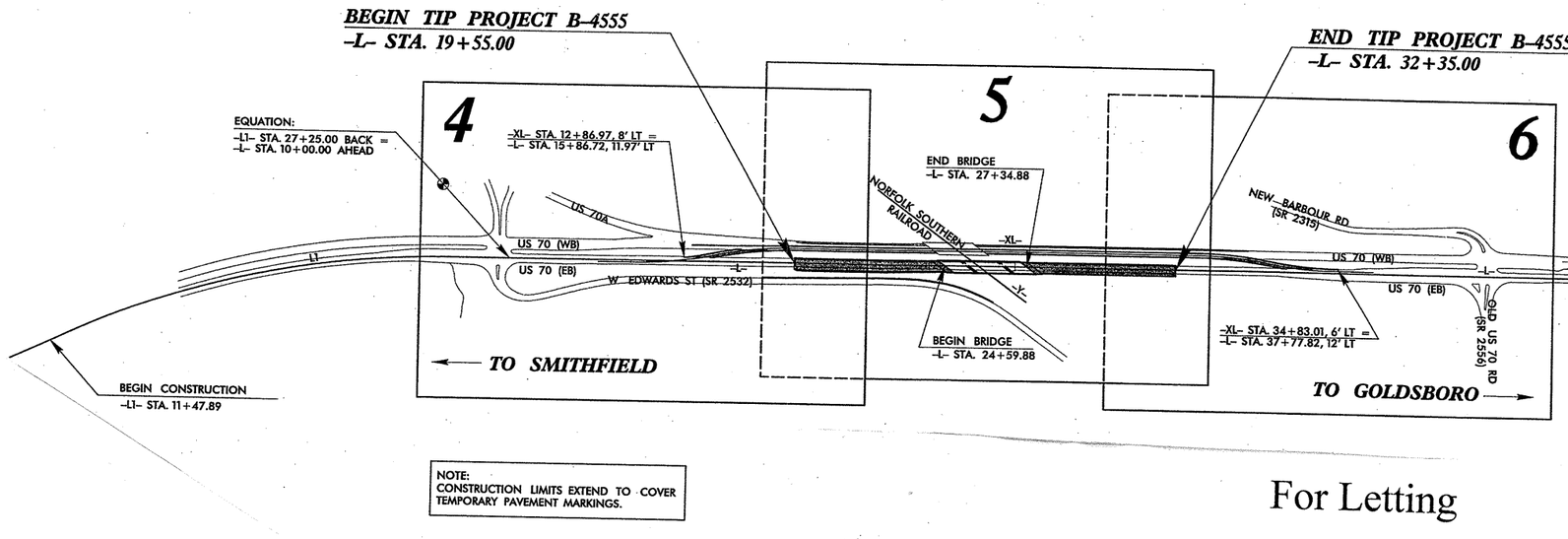
CAUTION NOTICE

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.

NAD 83/95 NC GRID



NOTE:
CONSTRUCTION LIMITS EXTEND TO COVER TEMPORARY PAVEMENT MARKINGS.

PERSONNEL

J. HAMM

P. ZHANG

G. LANG

M. ROBERTSON

INVESTIGATED BY J. HAMM

CHECKED BY G. LANG/M. ROBERTSON

SUBMITTED BY FALCON

DATE 7/23/09

For Letting

NORTH CAROLINA LICENSED SEAL 241 GEOLOGIST MARGARET AIRD ROBERTSON

DRAWN BY: J. HAMM

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.
33767.1.1 (B-4555)	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
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT PMT VST — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS
S - BULK SAMPLE
SS - SPLIT SPOON SAMPLE
ST - SHELBY TUBE SAMPLE
RS - ROCK SAMPLE
RT - RECOMPACTED TRIAXIAL SAMPLE
CBR - CALIFORNIA BEARING RATIO SAMPLE

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-__
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] CME-45B
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 3 " 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: BM#3; -BYI- STA. 6+35.36, 8.85' LT

ELEVATION: 165.4 FT.

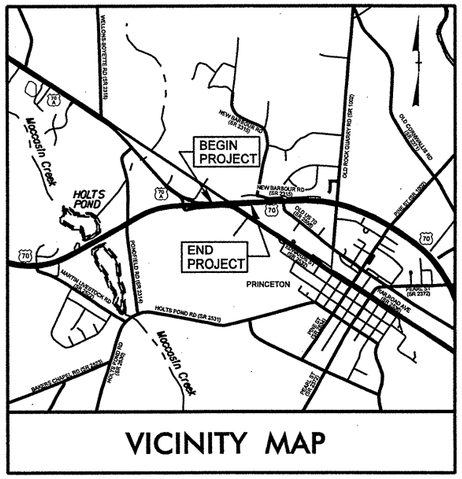
NOTES:
FIAD - BORING FILLED IN AFTER DRILLING

REVISED 02/23/06

CONTRACT: TIP PROJECT: B-4555

25% PLANS
$$$$$$$SYSTIMES$$$$$

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Standard Symbology Sheet



VICINITY MAP

25% PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

JOHNSTON COUNTY

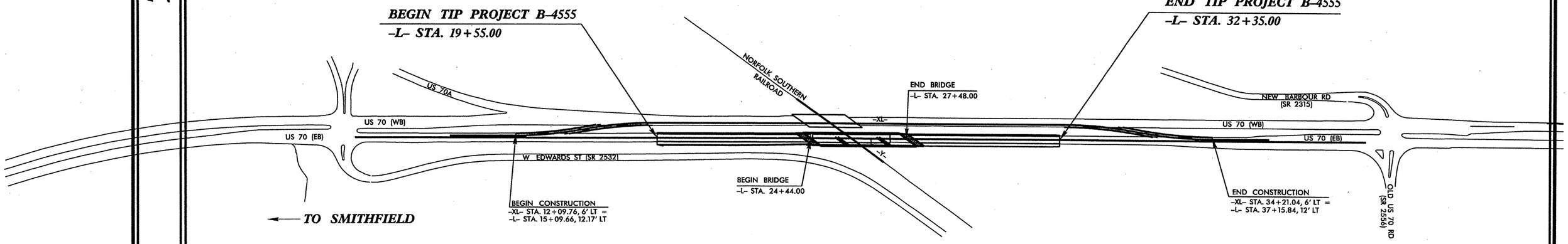
LOCATION: BRIDGE NO. 97 ON US 70 (EAST) OVER NORFOLK SOUTHERN RAILROAD

TYPE OF WORK: GRADING, PAVING, DRAINAGE AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4555	2A	15

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33767.1.1	BRNHS-70(72)	P.E.

NC GRID
NAD 83



THIS IS A CONTROLLED ACCESS PROJECT
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS
50 25 0 50 100
PROFILE (HORIZONTAL)
5 2.5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2009 = 35,000
ADT 2030 = 65,800
DHV = 10 %
D = 60 %
T = 12 % *
V = 60 MPH
RURAL ARTERIAL
*(TTST 5% + DUAL 7%)

PROJECT LENGTH

LENGTH ROADWAY STATE PROJECT 33767.1.1 = *0.18 Miles*
LENGTH STRUCTURE STATE PROJECT 33767.1.1 = *0.06 Miles*
TOTAL LENGTH STATE PROJECT 33767.1.1 = *0.24 Miles*
NOTE: -L- ALIGNMENT USED FOR CALCULATION

PREPARED FOR NCDOT
DIVISION OF HIGHWAYS
RALEIGH, NC
NCDOT CONTACT:
DOUG TAYLOR, PE – Project Engineer – Roadway Design Unit

Prepared In the Office of:
STV/RALPH WHITEHEAD ASSOCIATES, INC.
1000 West Morehead St., Ste. 200, Charlotte NC, 28208

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: August 21, 2009

LETTING DATE: AUGUST 16, 2011

JOSEPH A. FREEMAN, PE
PROJECT ENGINEER

BERNADETTE CLONINGER, EI
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER *P.E.*

STATE PROJECT NO.: 33767.1.1 (B-4555)
FEDERAL PROJECT: BRNHS-70(72)
COUNTY: Johnston
DESCRIPTION: Bridge No. 97 over Norfolk Southern Railroad on US 70
SUBJECT: **Roadway Subsurface Investigation – Inventory**

PROJECT DESCRIPTION

The project site is located on US 70 (eastbound lanes only) just east of the town of Princeton in Johnston County, North Carolina. The project involves the construction of new approaches associated with the replacement of the existing eastbound bridge over Norfolk Southern Railroad. Also included in the roadway portion of the project is the construction of new pavement sections temporarily rerouting eastbound traffic onto the westbound side of the highway while construction of the new bridge and embankment is completed.

The geotechnical field investigation was conducted in May, 2009. A total of nine (9) Standard Penetration Test (SPT) borings were advanced using a CME-45B rubber track mounted drill machine equipped with an automatic hammer. Additional borings were drilled for the bridge and retaining wall structures included in the project. Where appropriate, some of those borings are utilized in this report since they provide additional pertinent subsurface information. Representative soil samples, collected with a split-barrel sampler, were selected for laboratory testing to verify visual field classifications.

The following alignments, totaling approximately 1908 feet (.36 miles) were investigated. Subsurface profiles and cross sections of these alignments are included in this report.

Line	Station
-L-	19+55 – 24+44, 27+48 – 32+55
-XL-	11+89 – 16+53, 29+53 – 34+21

AREAS OF SPECIAL GEOTECHNICAL INTEREST

The following areas contained wet, relatively soft cohesive soils which may present slope/embankment and subgrade stability issues during construction.

Station	Offset
-L- 27+90 – 30+40	60 – 118ft RT
-L- 20+76 – 24+44	25ft LT – 30ft RT

PHYSIOGRAPHY AND GEOLOGY

The project site is located near the boundary of the Coastal Plain and Piedmont Physiographic Provinces. Although the site appears to be generally surrounded by Coastal Plain material, the site itself is located largely on resistant Piedmont material.

Topographically, the site vicinity is gently rolling. The site is generally a topographic high attributed to the more resistant Piedmont material.

An outcrop of metavolcanic rock is present north of the project site along the existing Norfolk Southern Railroad. The rock was exposed by excavation during construction activity associated with the railroad. The rock is intruded by numerous quartz stringers, as well as some larger granitic intrusions.

Surface drainage from the project site flows either west toward Moccasin Creek, or east toward Beaverdam Creek, both of which eventually flow into the Neuse River.

Surficial soils in the area consist of either roadway embankment or residual soils weathered from underlying rock. Residual soils were encountered at elevations up to approximately 180 feet (NGVD). Above this elevation only roadway embankment was encountered.

SOIL PROPERTIES

In general, the soils encountered consist of roadway embankment and residual soils, underlain by weathered rock.

Roadway embankment soils were encountered in most borings. They largely consist of approximately 6.5 to 18.5 feet of gray, tan, orange, brown, and red sandy silts and clays (A-4, A-6), along with loose silty sands (A-2-4). These soils are occasionally micaceous and contain trace amounts of organic material, gravel and fragments of weathered rock. The embankment extends to residual soils. Residual soils were encountered at the ground surface and underneath roadway embankments. They consist of white, green-gray, orange, and brown medium stiff to hard sandy and clayey silts (A-4, A-5).

Weathered rock was encountered beneath roadway embankments and residual soils. It consists of material weathered from the green-gray, tan, and red phyllite and metavolcanic rock.

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in some cases after at least 24 hours. Borings drilled in close proximity to the existing roadway were backfilled immediately after drilling due to safety considerations. Groundwater was encountered at depths of approximately 10 feet below the ground surface (BGS) in boring R-6 and R-8, drilled near the toe of the existing slope east of the bridge structure. In boring EB1-A, drilled in the existing roadway embankment, groundwater was encountered at a depth of approximately 25.5 feet BGS. Groundwater was not encountered in the remainder of the borings.

APPENDIX A

UNDISTURBED SAMPLES

An undisturbed "Shelby tube" sample was collected at the following location to be tested for consolidation and direct shear data if warranted.

Sample No.	Location	Depth (feet)
ST-1	-L- 28+88, 79ft LT	18.0 – 20.0

BULK SAMPLES

The following bulk samples were collected to be tested for optimum moisture contents and CBR values of soils in new pavement sections.

Sample No.	Location	Depth (feet)
BS-1	-L- 20+76-22+76, 28-29ft LT	0 – 5.0
BS-2	-L- 30+12, 16ft LT	0 – 5.0

Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT B-4555 COUNTY: Johnston DATE: 12-Mar COMPILED BY: STV-RALPH WHITEHEAD SHEET 1 OF 2 SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +25%		ROCK	SUITABLE	UNSUIT.	TOTAL
-XL- 13+39.67	-XL- 15+30.88	68				68	110		110	138	70				
	SUBTOTAL	68				68	110		110	138	70				
-XL- 31+32.15	-XL- 33+66.97	77				77	134		134	168	91				
	SUBTOTAL	77				77	134		134	168	91				
-L- 19+55.00	-L- 24+59.88	46				46	2,237		2,237	2,796	2,750				
	SUBTOTAL	46				46	2,237		2,237	2,796	2,750				
-L- 27+34.88	-L- 32+35.00	19				19	6,840		6,840	8,550	8,531				
	SUBTOTAL	19				19	6,840		6,840	8,550	8,531				
-XL- 13+39.67	-XL- 15+30.88	138				138	54		54	68			70		70
-XL- 31+32.15	-XL- 33+66.97	168				168	62		62	77			91		91
	SUBTOTAL	306				306	116		116	145			161		161
	SUBTOTAL														
	SHEET TOTAL	516				516	9,437		9,437	11,797	11,442		161		161

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

3C

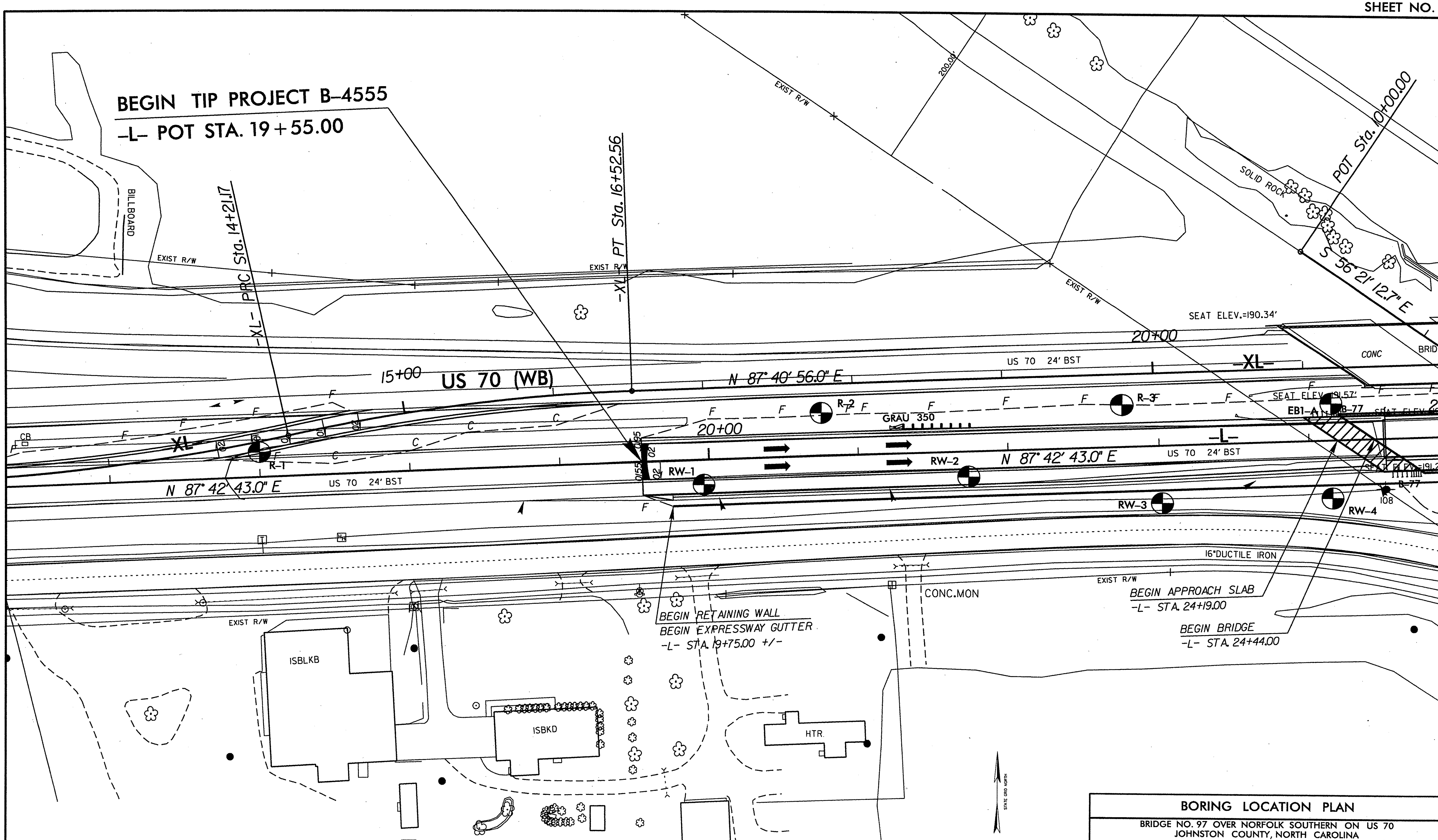
Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT: B-4555 COUNTY: Johnston DATE: 12-Mar COMPILED BY: STV-RALPH WHITEHEAD SHEET 2 OF 2 SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +25%		ROCK	SUITABLE	UNSUIT.	TOTAL
	TOTAL FROM SHEET 1	516				516	9437		9437	11797	11442		161		161
	TOTAL FROM SHEET 2														
	TOTAL FROM SHEET 3														
	TOTAL FROM SHEET 4														
	TOTAL FROM SHEET 5														
TOTAL		516				516	9,437		9,437	11,797	11,442		161		161
MATERIAL FOR SHOULDER CONSTRUCTION							225		225	281	281				
LOSS DUE TO CLEARING & GRUBBING															
ADDITIONAL UNDERCUT															
ROCK WASTE TO REPLACE BORROW															
ADJUST FOR ROCK WASTE															
WASTE IN LIEU OF BORROW															
PROJECT TOTAL		516				516	9,662		9,662	12,078	11,723		161		161
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT											586				
GRAND TOTAL		516				516	9,662		9,662	12,078	12,309		161		161
SAY		520									12,400				

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.



NOTES:

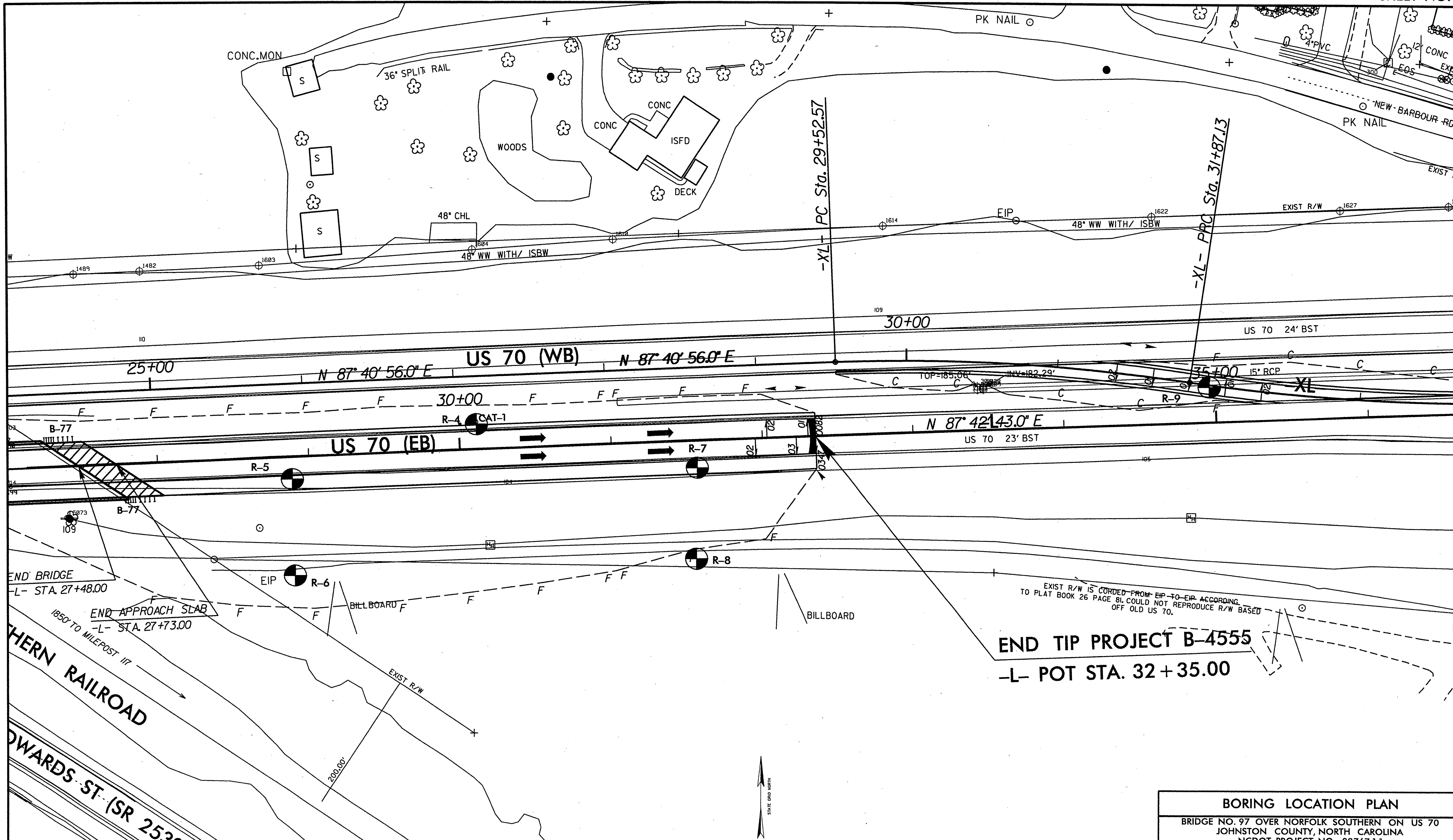
PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE, 2009.

BORING LOCATION PLAN

BRIDGE NO. 97 OVER NORFOLK SOUTHERN ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
NCDOT PROJECT NO.: 33767.1.1
TIP NO.: B-4555
SHEET 1 OF 2

FALCON ENGINEERING

FALCON ENGINEERING, INC.
2376 ROWLAND RD.
RALEIGH, NC 27615
PHONE: 919.871.0800
FAX: 919.871.0803



NOTES:

PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE, 2009.

BORING LOCATION PLAN

BRIDGE NO. 97 OVER NORFOLK SOUTHERN ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
NCDOT PROJECT NO.: 33767.1.1
TIP NO.: B-4555
SHEET 2 OF 2

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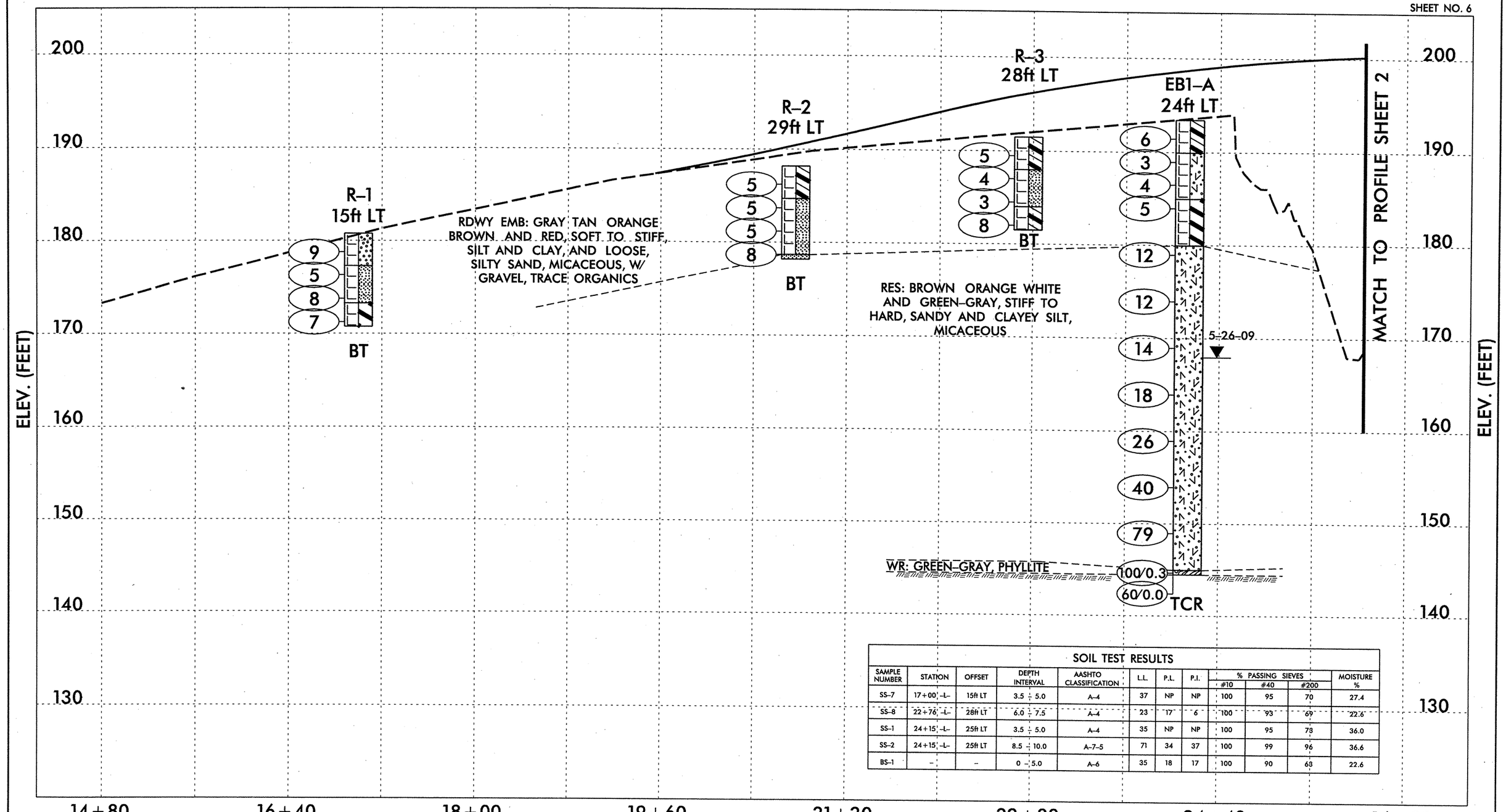


SOIL TEST RESULTS

SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES #10	% PASSING SIEVES #40	% PASSING SIEVES #200	MOISTURE %
SS–7	17+00 –L–	15ft LT	3.5 – 5.0	A–4	37	NP	NP	100	95	70	27.4
SS–8	22+76 –L–	28ft LT	6.0 – 7.5	A–4	23	17	6	100	93	69	22.6
SS–1	24+15 –L–	25ft LT	3.5 – 5.0	A–4	35	NP	NP	100	95	73	36.0
SS–2	24+15 –L–	25ft LT	8.5 – 10.0	A–7–5	71	34	37	100	99	96	36.6
BS–1	–	–	0 – 5.0	A–6	35	18	17	100	90	63	22.6

NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009
- INFERRED LITHOLOGIC BOUNDARIES ARE DRAWN THROUGH BORINGS AND PROJECTED ONTO THE PROFILE

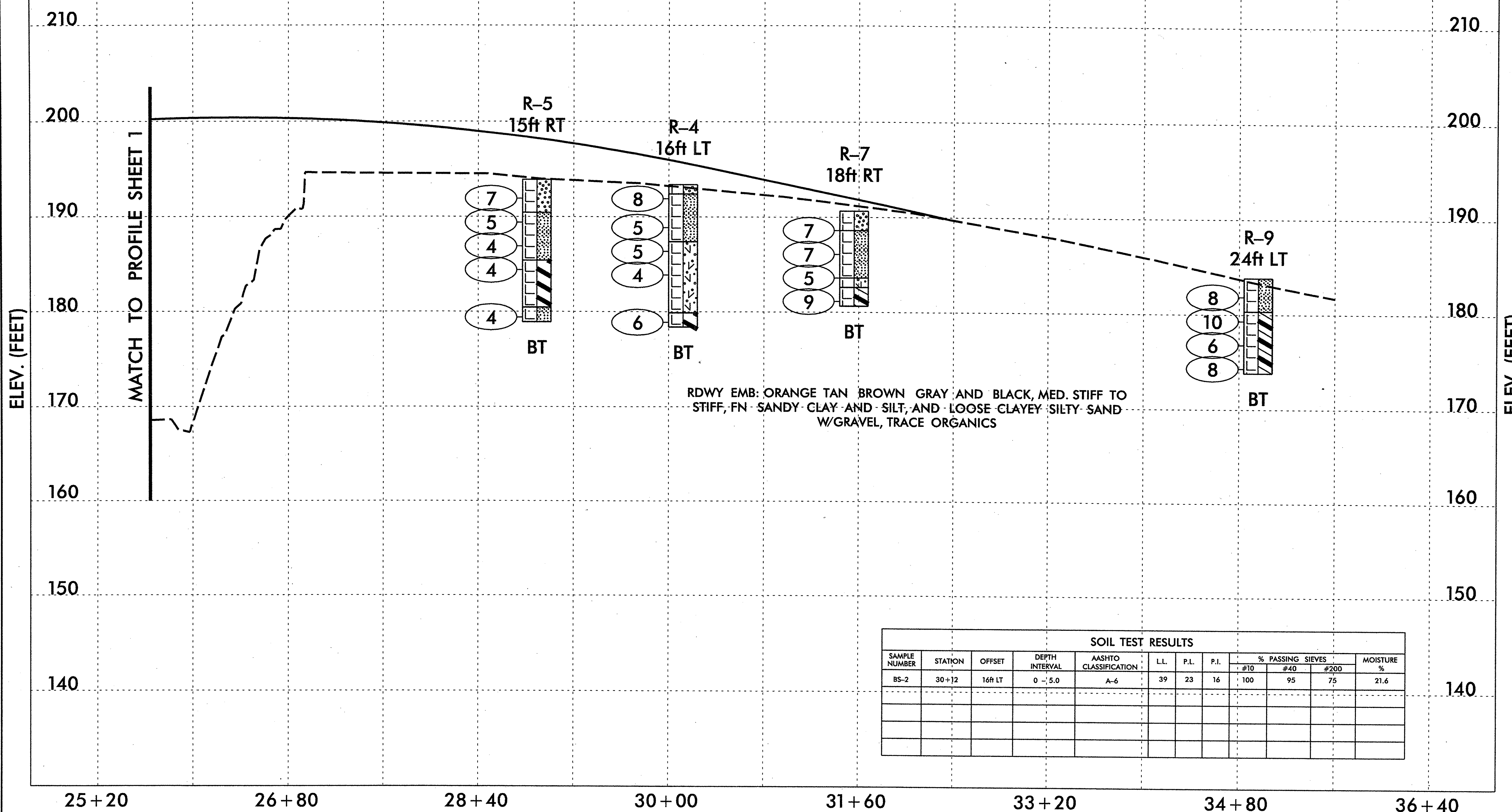
VERTICAL SCALE 0 10 20

HORIZONTAL SCALE 0 80 160

ROADWAY PROFILE ALONG –L–

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B–4555
SHEET 1 OF 2

FALCON ENGINEERING
FALCON ENGINEERING, INC.
2124 HOWLAND RD.
RALEIGH, NC 27615



SOIL TEST RESULTS

SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES			MOISTURE %
								#10	#40	#200	
BS–2	30+12	16ft LT	0 – 5.0	A–6	39	23	16	100	95	75	21.6

NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009
- INFERRED LITHOLOGIC BOUNDARIES ARE DRAWN THROUGH BORINGS AND PROJECTED ONTO THE PROFILE

VERTICAL SCALE 0 10 20

HORIZONTAL SCALE 0 80 160

PROFILE ALONG –L– ROADWAY

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B–4555
SHEET 2 OF 2

FALCON ENGINEERING, INC.
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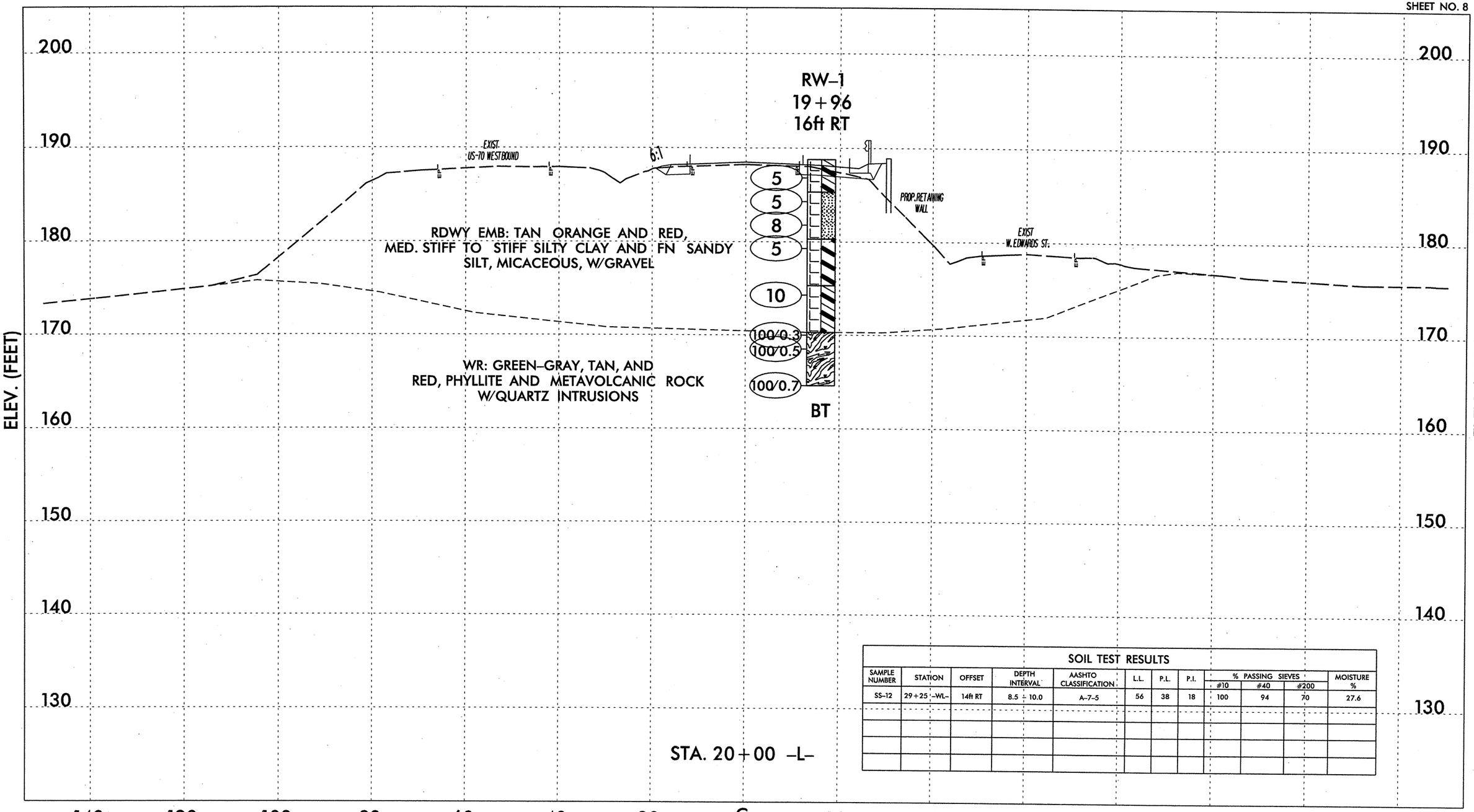

STA. 20+00 –L–

SOIL TEST RESULTS

SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES			MOISTURE %
								#10	#40	#200	
SS–12	29+25 –WL–	14ft RT	8.5 – 10.0	A–7–5	56	38	18	100	94	70	27.6

VERTICAL SCALE
0 10 20

HORIZONTAL SCALE
0 20 40

NOTES:
- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009

SUBSURFACE CROSS SECTION STA. 20+00 –L–

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B–4555
SHEET 2 OF 10

FALCON ENGINEERING
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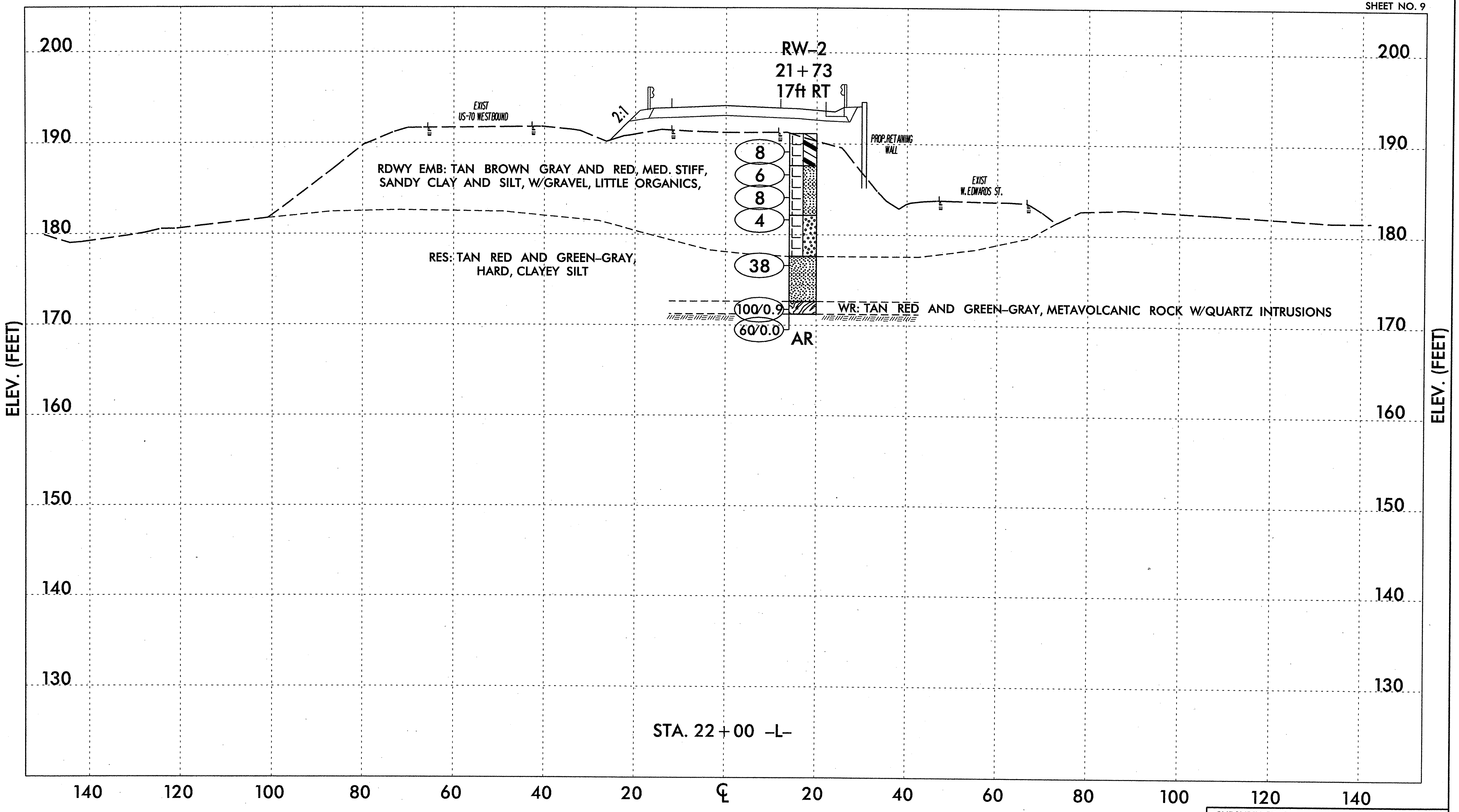
FAX: 919.851.0800



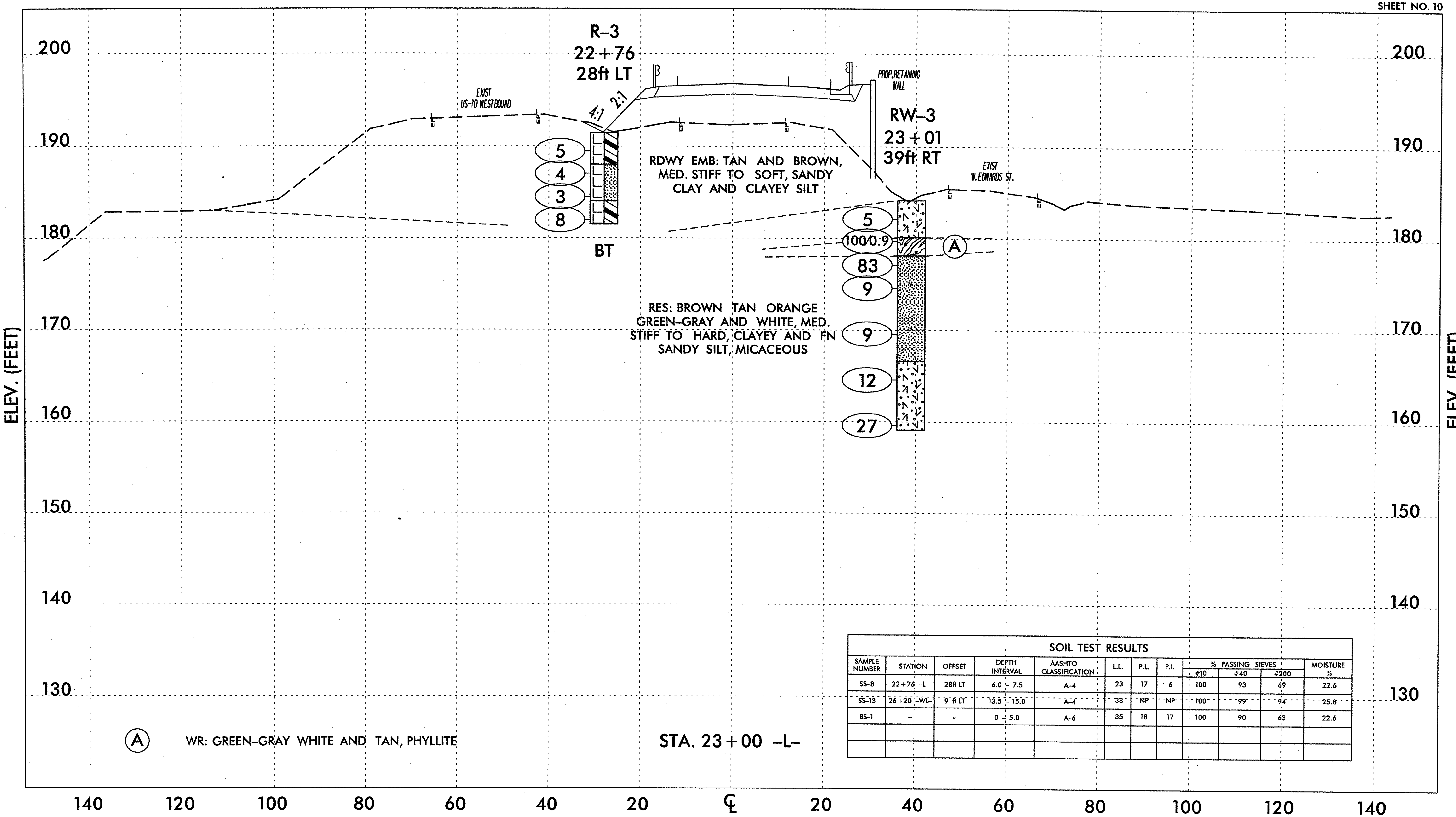
NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009

SUBSURFACE CROSS SECTION STA. 22+00 -L-

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B-4555
SHEET 4 OF 10

FALCON ENGINEERING



SOIL TEST RESULTS											
SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES			MOISTURE %
								#10	#40	#200	
SS–8	22+76 –L–	28ft LT	6.0 – 7.5	A–4	23	17	6	100	93	69	22.6
SS–13	26+20 –WL–	9 ft LT	13.5 – 15.0	A–4	38	NP	NP	100	99	94	25.8
BS–1	–	–	0 – 5.0	A–6	35	18	17	100	90	63	22.6

(A) WR: GREEN–GRAY WHITE AND TAN, PHYLLITE

STA. 23+00 –L–

VERTICAL SCALE 0 10 20

HORIZONTAL SCALE 0 20 40

SUBSURFACE CROSS SECTION STA. 23+00 –L–

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B–4555
SHEET 5 OF 10

FALCON ENGINEERING
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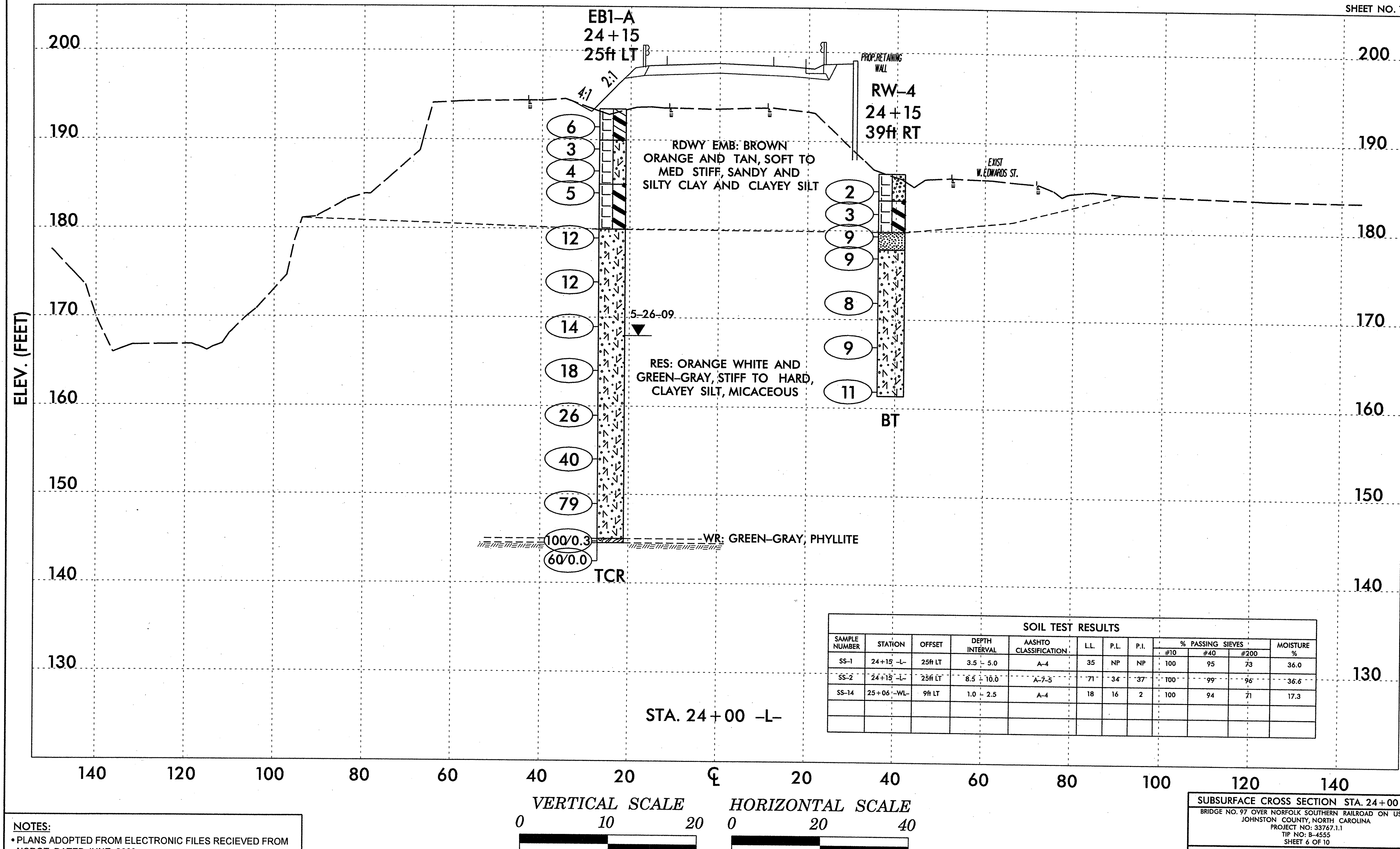
NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009



SOIL TEST RESULTS

SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES			MOISTURE %
								#10	#40	#200	
SS–1	24+15 –L–	25ft LT	3.5 – 5.0	A–4	35	NP	NP	100	95	73	36.0
SS–2	24+15 –L–	25ft LT	8.5 – 10.0	A–7–5	71	34	37	100	99	96	36.6
SS–14	25+06 –WL–	9ft LT	1.0 – 2.5	A–4	18	16	2	100	94	71	17.3

NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009

SUBSURFACE CROSS SECTION STA. 24+00 –L–

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B–4555
SHEET 6 OF 10

FALCON ENGINEERING
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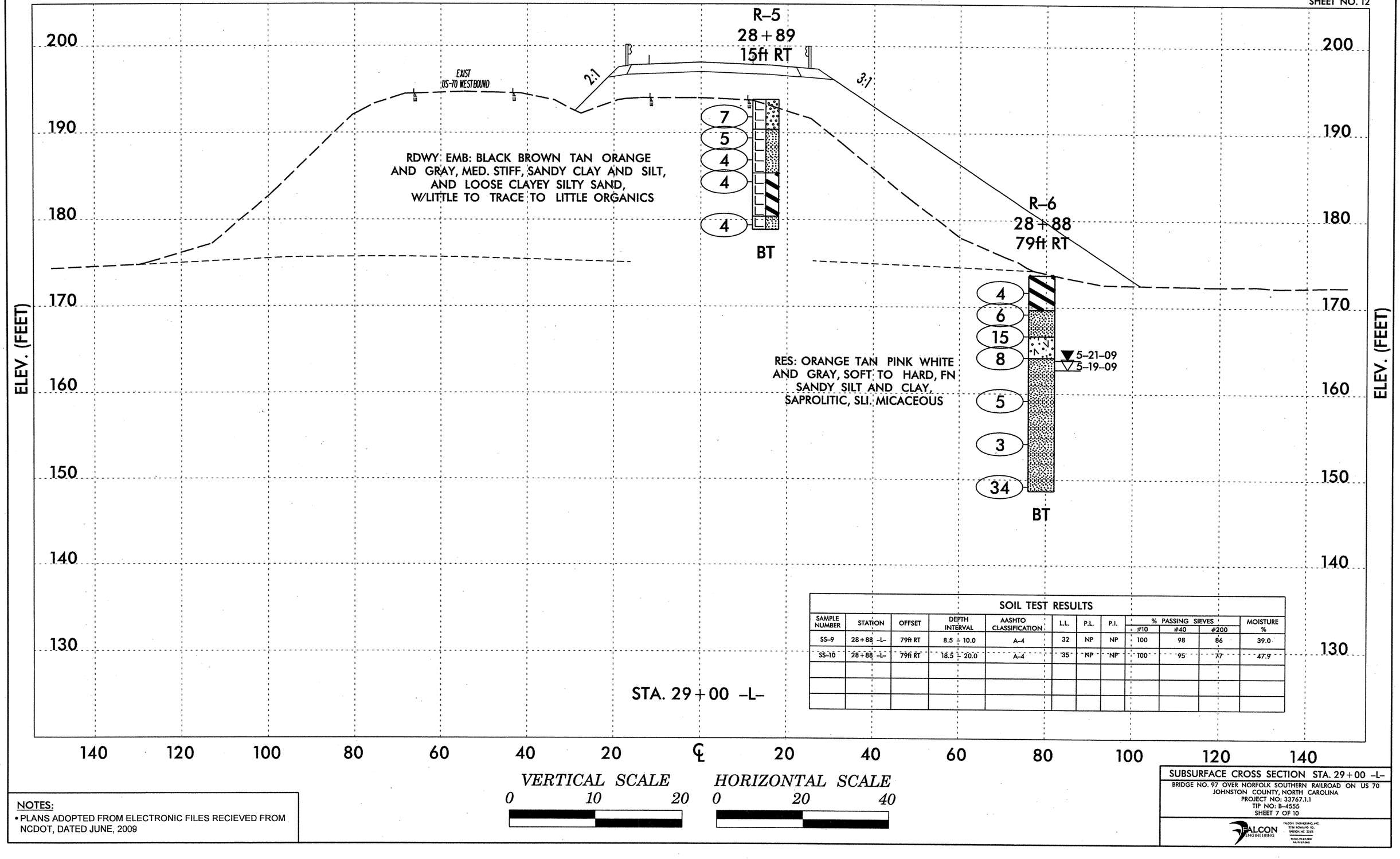
RALEIGH, NC 27615



SOIL TEST RESULTS

SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES			MOISTURE %
								#10	#40	#200	
SS–9	28 + 88 –L–	79ft RT	8.5 – 10.0	A–4	32	NP	NP	100	98	86	39.0
SS–10	28 + 88 –L–	79ft RT	18.5 – 20.0	A–4	35	NP	NP	100	95	77	47.9

NOTES:
- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009

SUBSURFACE CROSS SECTION STA. 29 + 00 –L–

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B–4555
SHEET 7 OF 10

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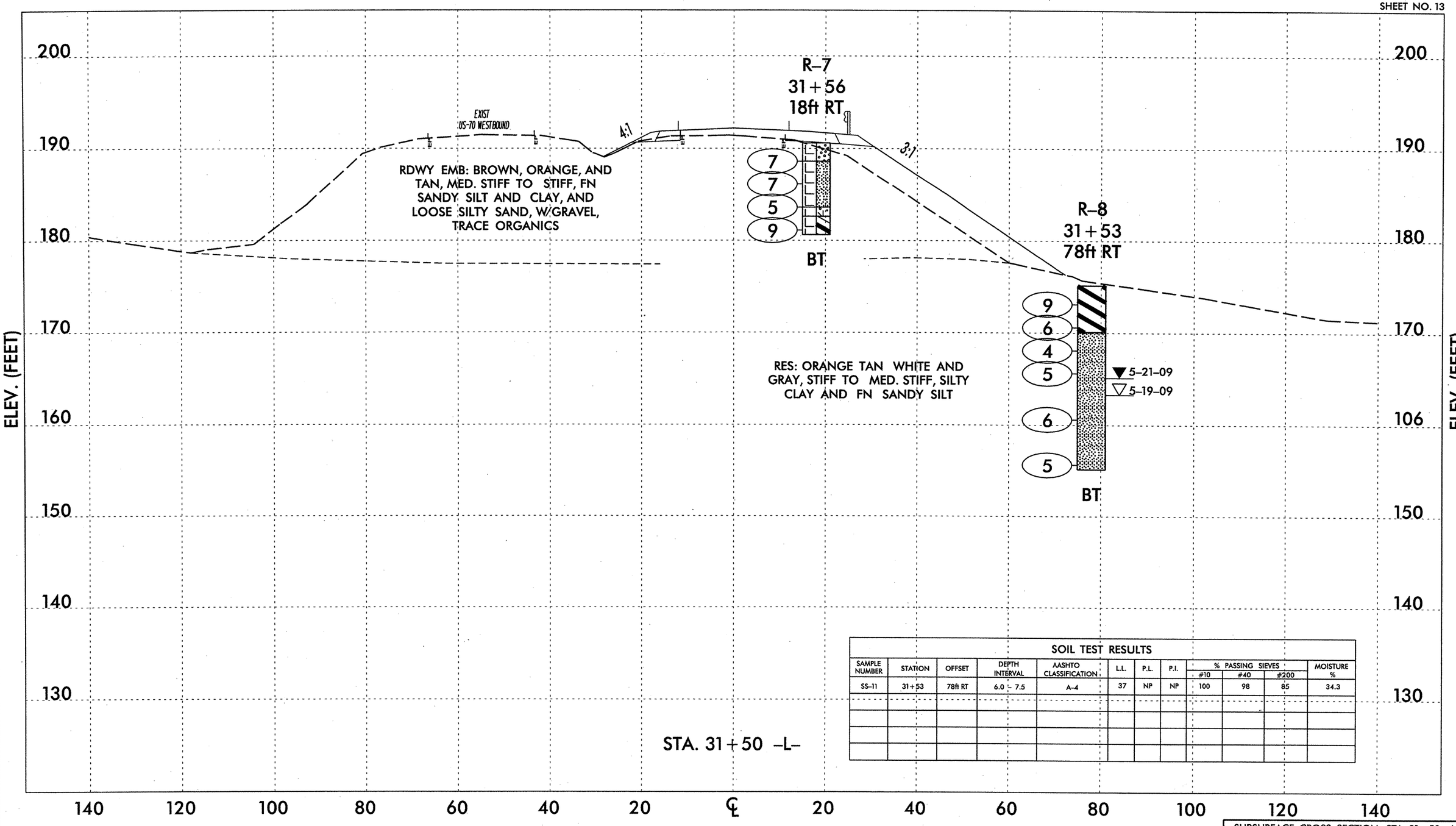


SOIL TEST RESULTS

SAMPLE NUMBER	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASSIFICATION	L.L.	P.L.	P.I.	% PASSING SIEVES			MOISTURE %
								#10	#40	#200	
SS–11	31+53	78ft RT	6.0 – 7.5	A–4	37	NP	NP	100	98	85	34.3

VERTICAL SCALE 0 10 20

HORIZONTAL SCALE 0 20 40

NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECIEVED FROM NCDOT, DATED JUNE, 2009

SUBSURFACE CROSS SECTION STA. 31+50 –L–

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO: 33767.1.1
TIP NO: B-4555
SHEET 9 OF 10

FALCON ENGINEERING
FALCON ENGINEERING, INC
3726 ROWLAND RD.
RALEIGH, NC 27610

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70

JOHNSTON COUNTY, NC

NCDOT Project No.: 33767.1.1, T.I.P. No. B-4555

TABLE 2: SUMMARY OF STANDARD PROCTOR AND CBR TEST RESULTS

BORING DESIGNATION	SAMPLE	DEPTH (FT.)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT	NATURAL MOISTURE CONTENT	PERCENT COMPACTION	CBR VALUE Corrected at 0.1 inch	PERCENT SWELL
R-2 ~ R-3	BS-1	0 - 5.0	113.1	16.1%	22.6%	95%	4.8	< 1%
R-4	BS-2	0 - 5.0	116.0	13.8%	21.6%	95%	8.6	< 1%

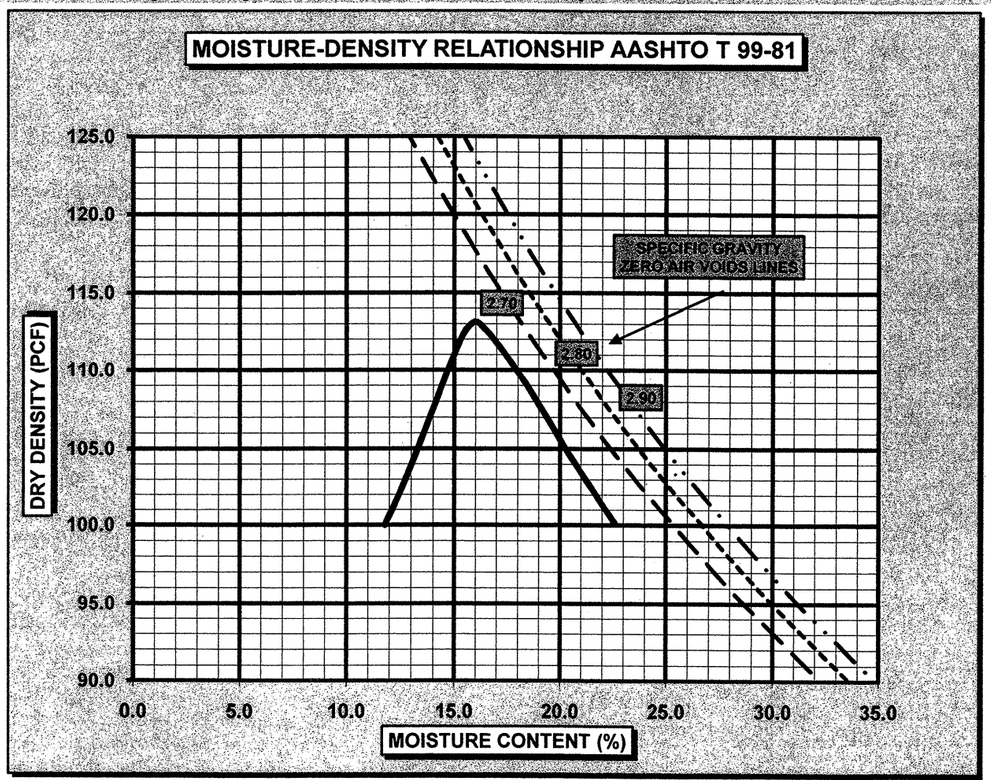
SIGNATURE

NCDOT NO. 105-03-0803

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA

LOCATION: R2, R3
SAMPLE NO.: BS-1
DEPTH: 0~5'
SAMPLE DESCRIPTION: TAN, SANDY, SILTY , CLAY (A-6)

Maximum Dry Density = 113.1 PCF Optimum Moisture Content = 16.1%



Sample Date : 6/2/09
Natural Moisture Content = 22.6
Percent Passing #200 Sieve : 62
Liquid Limit = 35
Plastic Limit = 18
Plastic Index = 17

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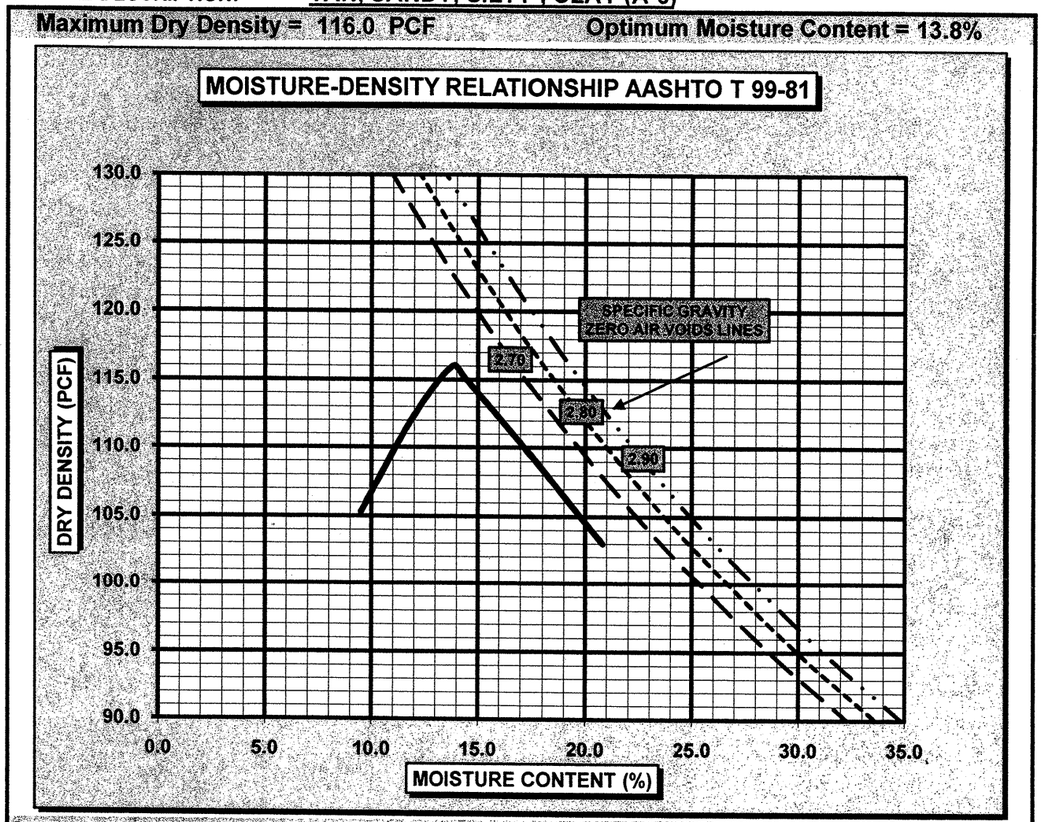
BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA

LOCATION: R4
SAMPLE NO.: BS-2
DEPTH: 0~5'
SAMPLE DESCRIPTION: TAN, SANDY, SILTY , CLAY (A-6)

Maximum Dry Density = 116.0 PCF Optimum Moisture Content = 13.8%



Sample Date : 6/2/09
Natural Moisture Content = 21.6
Percent Passing #200 Sieve : 65
Liquid Limit = 39
Plastic Limit = 23
Plastic Index = 16

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