ID: B-3881

CONTRACT: C201921

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

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LINE	STATION	PLAN	PROFILE
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

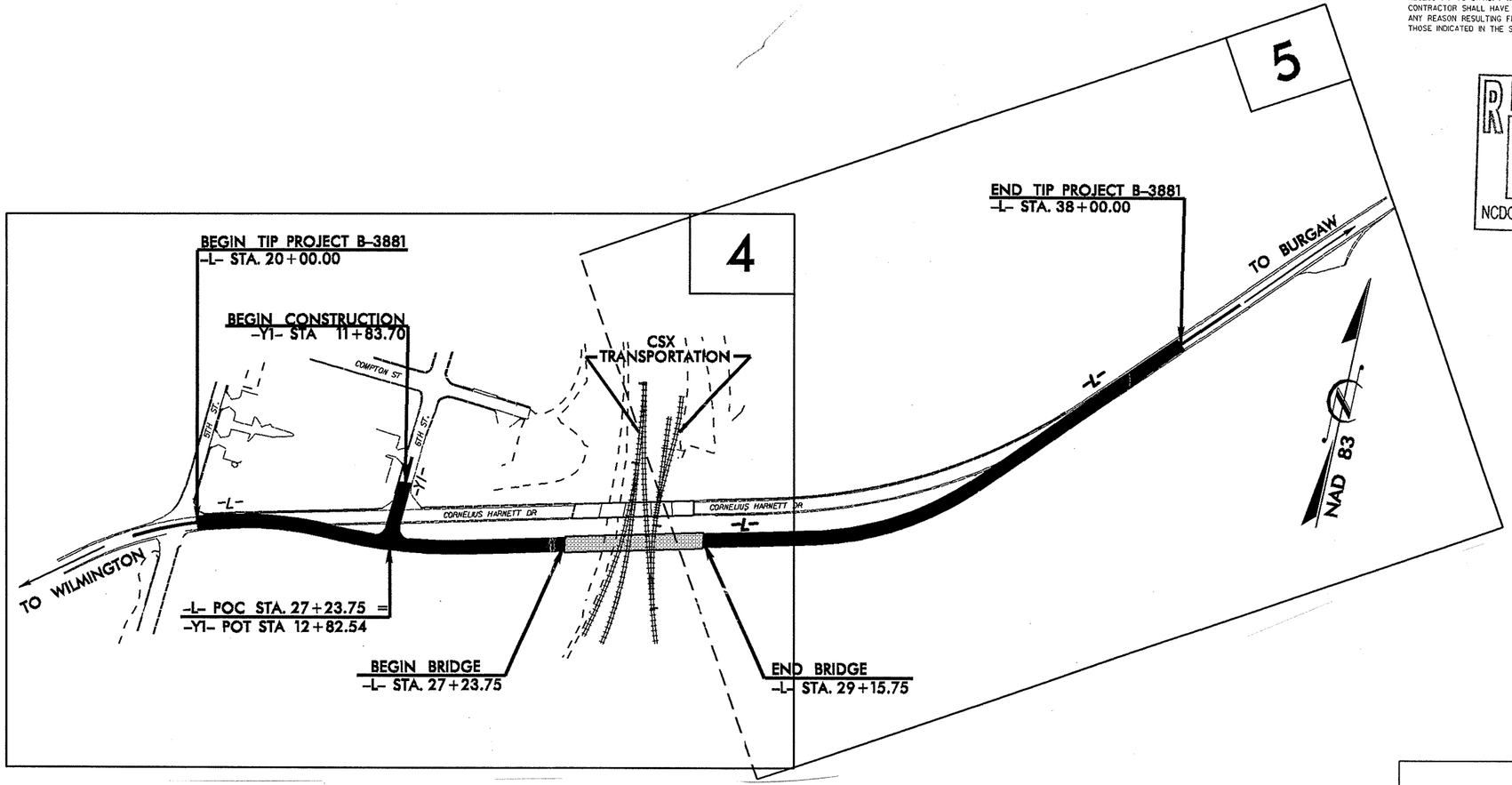
ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33323.1.1 (B-3881) F.A. PROJ. BRSTP-117 (9)

COUNTY NEW HANOVER

PROJECT DESCRIPTION BRIDGE NO. 26 ON CORNELIUS HARNETT DRIVE (OLD NC 133) OVER CSX TRANSPORTATION TRACKS

INVENTORY



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3881	1	7

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33323.1.1	BRSTP-117(9)	PE
33323.2.2	BRSTP-117(9)	RW,UTIL
33323.3.1	BRSTP-117(14)	CONST.

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.

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PERSONNEL

JNJ

KBQ

WNC

RES

INVESTIGATED BY JL STONE

CHECKED BY DN ARGENBRIGHT

SUBMITTED BY DN ARGENBRIGHT

DATE MAY, 2007

DRAWN BY: CP TURNER, JL STONE

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.
33323.1.1 (B-3881)	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		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 MN	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/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		
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 VST PMT — 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
- 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
- [X] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

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

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

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [X] 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:

ELEVATION: FT.

NOTES:

REVISED 02/23/06

09/06/06

TIP PROJECT: B-3881

CONTRACT:

10-APR-2007 12:09
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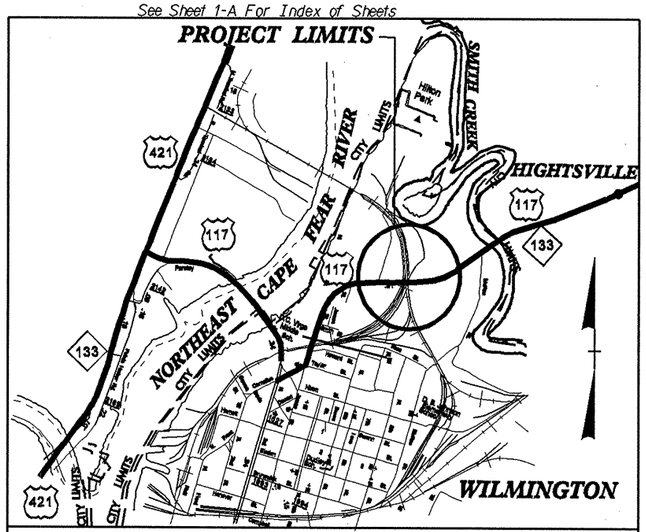
jistone AT GEO226153

See Sheet 1-A For Index of Sheets



VICINTIY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

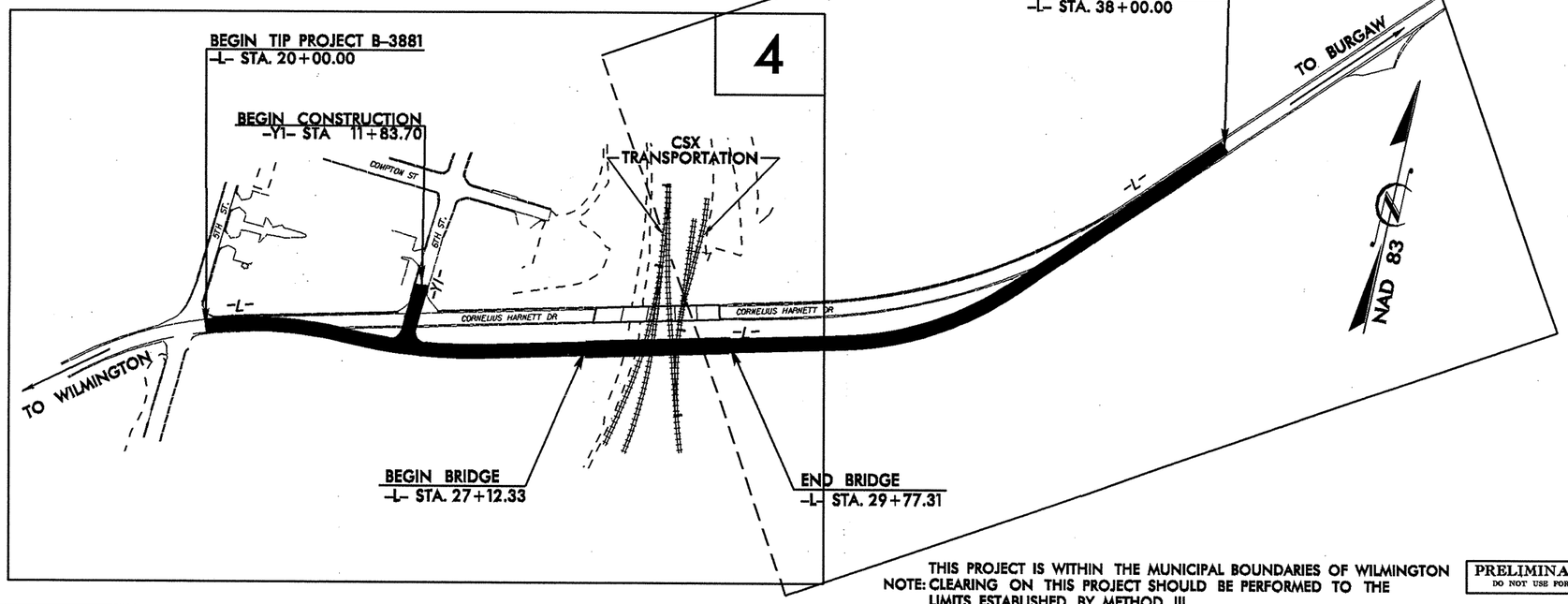
NEW HANOVER COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3881	2A	7

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
33323.1.1	BRSTP-117(9)	PE
33323.2.2	BRSTP-117(9)	R/W,UTIL

LOCATION: *BRIDGE 26 OVER CSX TRANSPORTATION TRACKS ON CORNELIUS HARNETT DRIVE (OLD NC 133)*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, STRUCTURE, SIGNING, AND PAVEMENT MARKINGS*



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF WILMINGTON
NOTE: CLEARING ON THIS PROJECT SHOULD BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 20600
ADT 2025 = 800
DHV = 30 %
D = 60 %
T = 5 % *
V = 40 MPH
* TTST 3% DUAL 2%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-3881 = 0.291 MILES
LENGTH STRUCTURE TIP PROJECT B-3881 = 0.050 MILES
TOTAL LENGTH OF TIP PROJECT B-3881 = 0.341 MILES

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: DECEMBER 16, 2005

LETTING DATE: DECEMBER 18,2007

JASON MOORE, PE
PROJECT ENGINEER

BRYAN KEY, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

April 16, 2007

STATE PROJECT: 33323.1.1 B-3881
F.A. PROJECT: BRSTP-117(9)
COUNTY: New Hanover
DESCRIPTION: Bridge No. 26 on Cornelius Harnett Drive (Old NC 133) over CSX Transportation Tracks

SUBJECT: Geotechnical Report – Inventory

Project Description

The proposed project is located within the city limits of Wilmington just south of the existing bridge site. Based on the current plans, proposed construction consists of relocating the bridge and associated roadway approaches approximately 60 feet south of its current location. The investigation of subsurface conditions was confined to areas of proposed construction.

The following line was investigated for this project:

Line	Station (±)
-L-	20+00 to 38+00
-Y1-	11+82 to 12+82

Areas of Special Geotechnical Interest

1) The following section was found to exhibit seasonal high ground water, or the potential for ground water related construction problems:

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-250-4088
FAX: 919-250-4237
WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

Line	Station (±)
-L-	24+00 to 34+00

2) The following section contains cohesive soils, which have the potential to pose embankment stability problems during construction.

Line	Station (±)
-L-	23+50 to 33+50

Physiography and Geology

The project is located in New Hanover County within the Coastal Plain Physiographic Province. Topography along the project is gently sloping with elevations ranging from 8± 36± feet above sea level.

Recent alluvial sediments underlain by Cretaceous sediments of the Peedee Formation characterize the geology of this area.

Ground Water

Ground water data was collected during August 2005 during which period the area experienced below normal precipitation conditions. Ground water was found at elevations ranging from 13 to 27 feet above sea level.

Soils

Soils encountered during this investigation are separated into alluvial soils, formational soils belonging to the Peedee Formation and roadway embankment.

Alluvial soils encountered are comprised of 6 to 16 or more feet of very loose to medium dense sand and silty sand (A-3, A-2-4) interlayered with 1 to 2 feet of soft sandy silt (A-4).

Soils belonging to the Cretaceous age Peedee Formation underlie the alluvial sediments at an elevation of 5 to 12 feet above sea level. The Peedee Formation in this area is comprised of 6 to 30 feet of medium stiff to hard sandy clay (A-6) and sandy clayey silt (A-4) with some dense silty sand (A-2-4) layers. These cohesive deposits are underlain by limestone at an elevation of -20± feet below sea level.

Roadway embankment soils consist of 2 to 6 or more feet of loose to medium dense sand and silty sand (A-3, A-2-4).

Prepared by,

Joseph L Stone, L.G.
Project Geologist

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT B-3881 COUNTY NEW HANOVER DATE 5/28/2008 COMPILED BY: TC CHECKED BY: JRH SHEET 3A/7 SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. 25%		ROCK	SUITABLE	UNSUIT.	TOTAL
L LT 20+00.00	23+50.00	234				234	162		162	203			31		31
Y1 LT 11+83.70	12+70.92	20				20	138		138	173	153				
Y1 RT 11+83.70	12+70.92	24				24	46		46	58	34				
SUBTOTAL		**278**				**278**	**346**		**346**	**434**	**187**		**31**		**31**
L RT 20+00.00	23+50.00	516				516	226		226	283			233		233
L RT 35+00.00	38+00.00	41				41	232		232	290	249				
SUBTOTAL		**557**				**557**	**458**		**458**	**573**	**249**		**233**		**233**
L CL 23+50.00	27+23.75	14				14	16148		16148	20185	20171				
L CL 29+15.75	35+00.00	66				66	26027		26027	32534	32468				
SUBTOTAL		**80**				**80**	**42175**		**42175**	**52719**	**52639**				
L LT 35+00.00	38+00.00	204				204	68		68	85			119		119
SUBTOTAL		**204**				**204**	**68**		**68**	**85**			**119**		**119**
TOTAL		**1119**				**1119**	**43047**		**43047**	**53811**	**53075**		**383**		**383**
WASTE IN LIEU OF BORROW											-383		-383		-383
PROJECT TOTAL		**1119**				**1119**	**43047**		**43047**	**53811**	**52692**		**0**		**0**
5% TO REPLACE TOPSOIL ON PIT											2635				
GRAND TOTAL		**1119**									**55327**				
SAY		**1175**									**55400**				
EST. DDE = 120 CY															
EST. UNDERCUT = 300CY															

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.

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-3881	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID NAD 83

-Y1-	L	L
PI Sta 11+59.46	PI Sta 18+63.60	PI Sta 23+98.37
Δ = 5° 41' 37.2" (LT)	Δ = 83° 51' 57.0" (RT)	Δ = 15° 29' 28.9" (LT)
D = 14° 19' 26.2"	D = 8° 04' 11.4"	D = 5° 50' 47.4"
L = 397.5'	L = 1,039.25'	L = 264.97'
T = 198.9'	T = 637.78'	T = 133.30'
R = 400.00'	R = 710.00'	R = 980.00'
SE = .04	SE = .04	SE = .04
V_D = 40 MPH	V_D = 40 MPH	V_D = 40 MPH

(1)

ADT 2005 / 2025
19000 / 400 — US 117/NC 133 — 19000 / 800

0 100 200
FEET

-Y1- POT Sta. 10+00.00

BEGIN PROJECT
-L- STA 20+00

-Y1- PC Sta. 11+39.57

-Y1- PT Sta. 11+79.32
BEGIN CONSTRUCTION
-Y1- PT STA 11+82.12

-L- PRC Sta. 22+65.07

-L- POC STA 23+86.36
-Y1- POT STA 12+82.54

-L- PT Sta. 25+30.04

-L- STA 28+53.26 OFFSET 25.47'

MATCH TO SHEET No.5 STA 31+00.00

BEGIN BRIDGE
-L- STA 27+12.33

END BRIDGE
-L- STA 29+77.31

TYPE III

-L-
N 65° 58' 02.3" E

BEGIN APPROACH SLAB
-L- STA 26+96.64

END APPROACH SLAB
-L- STA 29+93.09

SKETCH SHOWING BRIDGE/PAVEMENT RELATIONSHIP

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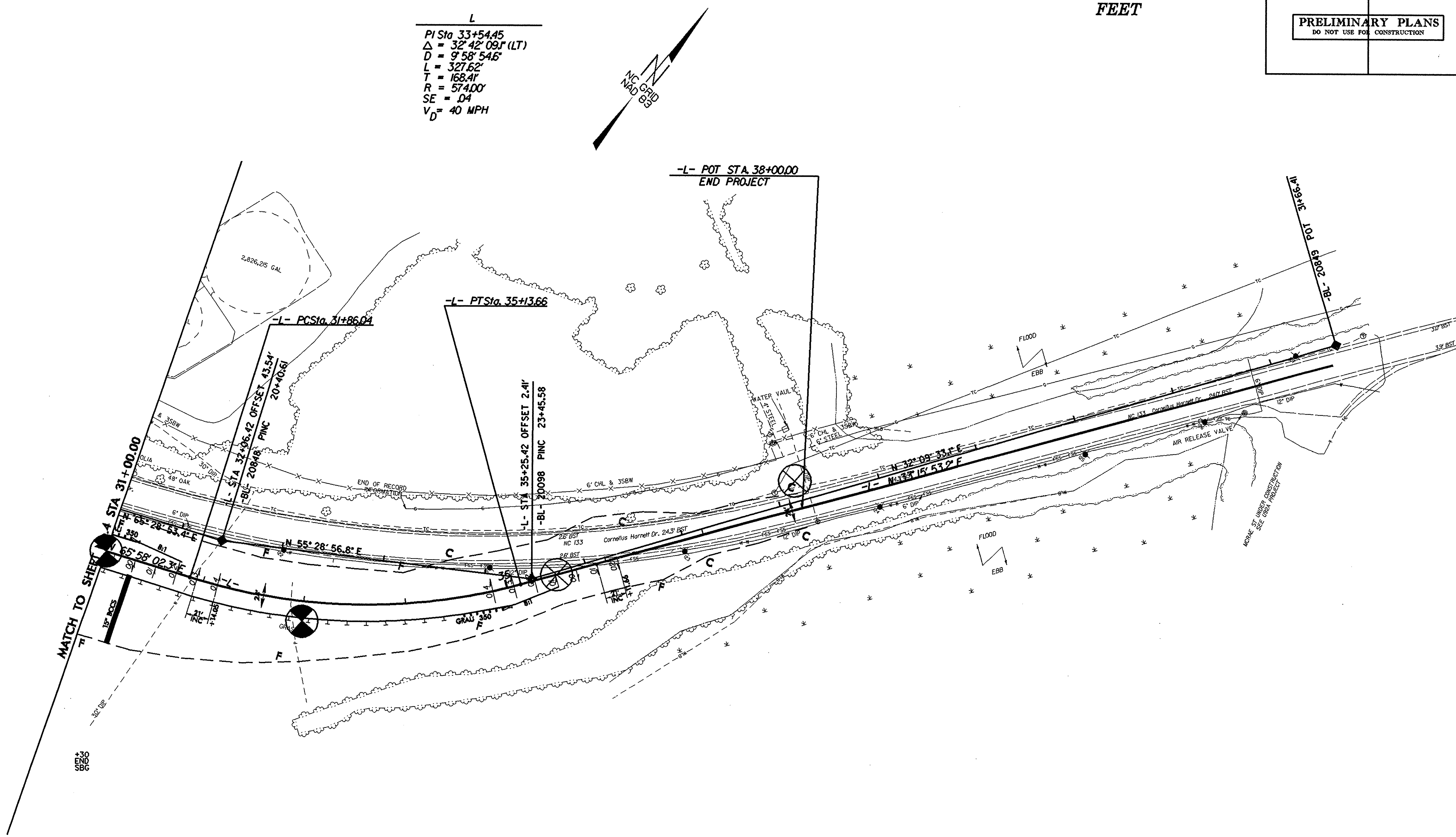
jlstone AT GEO226153

PROJECT REFERENCE NO.	SHEET NO.
B-3881	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

0 100 200
FEET

L
PI Sta 33+54.45
Δ = 32° 42' 09.1" (LT)
D = 9° 58' 54.6"
L = 327.62'
T = 168.41'
R = 574.00'
SE = .04
V_D = 40 MPH



NC GRID NAD 83
-L- POT STA. 38+00.00
END PROJECT
-L- PT Sta. 35+13.66
-L- PC Sta. 31+86.04
-L- STA 32+06.42 OFFSET 43.54'
-BL- 20848 PINC 20+40.61
-L- STA 35+25.42 OFFSET 2.41'
-BL- 20098 PINC 23+45.58
-BL- 20849 POT 31+66.41
-L- STA 31+00.00
MATCH TO SHEET
N 65° 28' 53.4" E
N 55° 28' 56.8" E
65° 58' 02.3" E
N 32° 09' 33.1" E
N 33° 15' 53.2" E
2,826,215 GAL
WATER VAULT
END OF RECORD INFORMATION
6' CHL & 3SBW
Cornelius Harrett Dr.
NC 133
AIR RELEASE VALVE
FLOOD
EBB
MCRAE ST. UNDER CONSTRUCTION SEE U92A PROJECT
+30
END
SBG

R/W Rev. - Added unconstructed platted streets and revised the guardrail design. BCK 8-1-06

8/17/99

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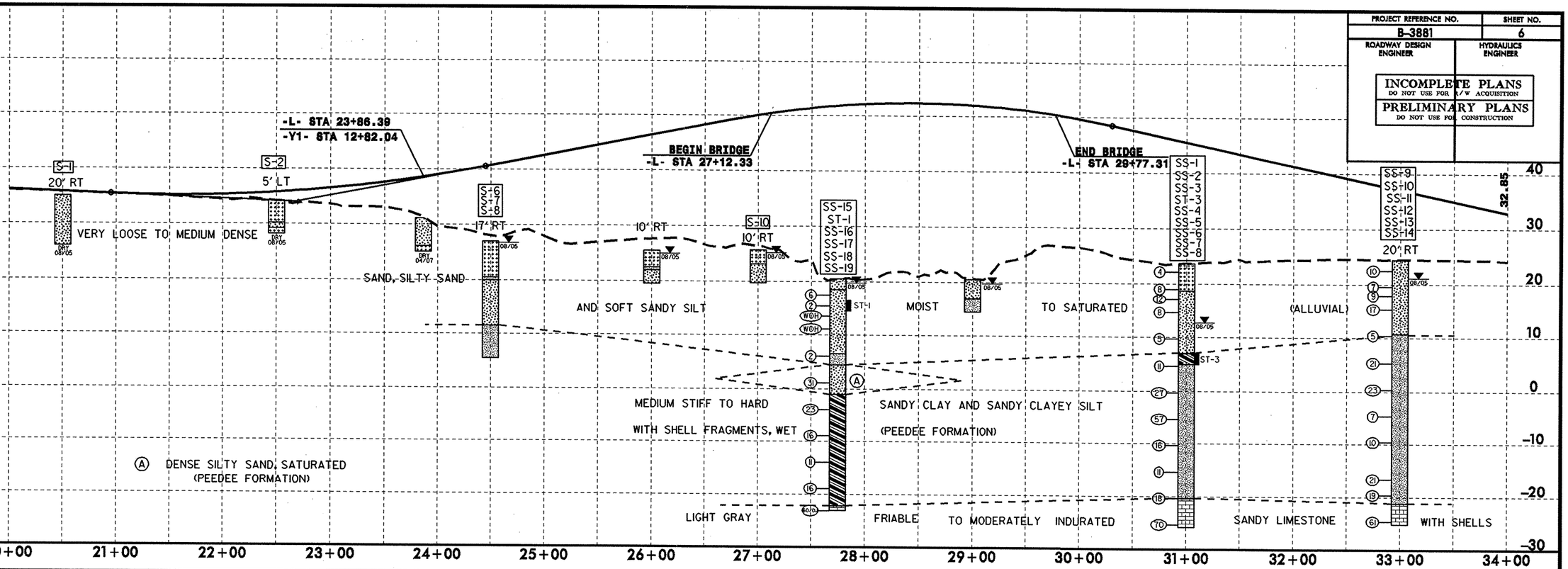
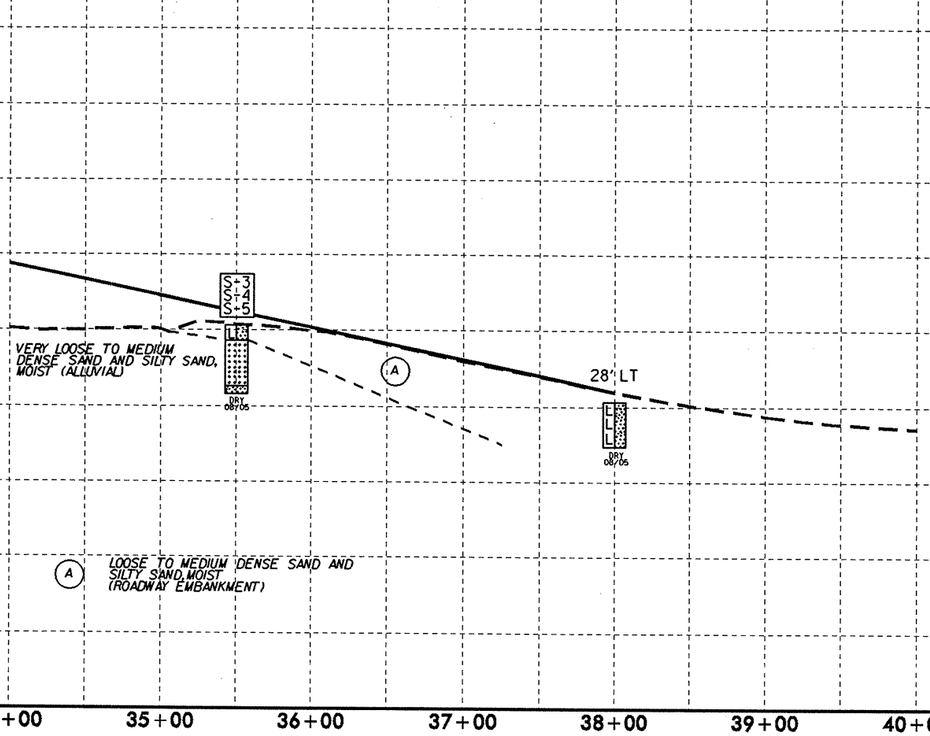
5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-3881	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-1	20' RT	20+50	1.0-2.0	A-2-4(0)	12	NP	45.9	40.9	6.8	6.4	100	89	13		
S-2	5' LT	22+50	4.0-5.0	A-2-4(0)	17	NP	63.1	34.1	1.4	1.4	100	84	13		
S-6	17' RT	24+50	1.0-2.5	A-3(0)	22	NP	95.0	4.5	0.5	0.0	100	88	1		
S-7	17' RT	24+50	7.0-15.5	A-2-4(0)	21	NP	22.0	67.5	2.5	8.1	100	94	12		
S-8	17' RT	24+50	15.5-21.5	A-4(1)	27	7	12.3	58.2	15.4	14.1	99	93	47		
S-10	10' RT	27+00	2.5-6.0	A-2-4(0)	20	NP	19.1	62.2	4.5	14.1	100	93	20		
SS-15	CL	27+75	1.0-1.5	A-2-4(0)	19	NP	42.0	37.9	8.0	12.1	87	16	16		
ST-1	CL	27+75	3.9-5.9	A-2-4(0)	19	NP	26.4	56.6	6.3	10.4	94	78	22		
SS-16	CL	27+75	13.9-14.9	A-4(0)	25	NP	14.3	35.3	37.9	12.5	95	87	49		
SS-17	CL	27+75	18.4-19.9	A-2-4(0)	28	7	63.2	17.9	0.3	18.6	85	53	11	14.8	
SS-18	CL	27+75	28.4-24.9	A-6(3)	34	13	7.1	44.2	24.1	24.6	94	91	47	18.0	
SS-19	CL	27+75	33.4-34.9	A-6(5)	38	15	3.8	43.4	20.1	32.7	95	94	51	18.1	
SS-1	CL	31+00	1.0-3.5	A-3(0)	17	NP	68.4	38.0	6.6	2.0	99	81	10		
SS-2	CL	31+00	3.7-5.2	A-3(0)	13	NP	42.4	54.2	3.4	0.0	99	83	4		
SS-3	CL	31+00	8.0-9.5	A-2-4(0)	23	2	25.7	49.2	7.2	18.1	98	66	27		
ST-3	CL	31+00	16.7-18.7	A-6(4)	33	15	17.1	33.2	28.3	21.5	97	87	61		
SS-4	CL	31+00	19.0-19.5	A-4(5)	31	6	7.0	36.4	40.5	16.1	98	91	60	11.9	
SS-5	CL	31+00	23.0-24.5	A-4(2)	29	8	6.4	56.3	19.2	18.1	91	88	49		
SS-6	CL	31+00	33.5-34.5	A-4(2)	35	7	5.8	46.6	17.5	30.1	87	85	46	17.3	
SS-7	CL	31+00	44.0-44.5	A-2-4(0)	29	9	16.9	44.9	14.1	24.1	76	71	32		
SS-8	CL	31+00	48.0-49.5	A-2-4(0)	16	NP	38.6	23.7	13.7	4.0	100	62	22		
SS-9	20' RT	33+00	5.6-7.1	A-2-4(0)	12	NP	40.0	41.1	8.9	10.0	99	83	20		
SS-10	20' RT	33+00	8.1-9.6	A-2-4(0)	18	NP	80.9	9.3	3.8	6.0	94	32	11		
SS-11	20' RT	33+00	18.1-19.6	A-4(5)	25	3	14.7	30.9	42.4	12.0	93	84	58	13.5	
SS-12	20' RT	33+00	23.1-24.6	A-4(1)	28	5	0.8	74.7	12.5	12.0	100	100	38		
SS-13	20' RT	33+00	28.1-29.6	A-4(2)	30	NP	3.0	65.1	15.8	16.1	100	99	47	19.5	
SS-14	20' RT	33+00	40.1-41.6	A-4(1)	28	8	6.4	55.6	26.0	12.0	94	92	39	15.6	
S-3	CL	35+50	2.0-6.0	A-3(0)	11	NP	62.3	37.5	3.3	6.4	100	83	10		
S-4	CL	35+50	6.0-8.0	A-3(0)	13	NP	55.9	39.7	0.0	4.4	87	54	4		
S-5	CL	35+50	8.0-9.0	A-2-4(0)	17	NP	76.4	12.0	1.3	10.4	98	53	11		

NOTE: SOIL CORRELATIONS ARE DRAWN BETWEEN BORINGS AT THE INDICATED OFFSETS.

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-3881	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

BEGIN GRADE
STA 11+83.70
EL = 34.88

END GRADE
STA 12+70.92
EL = 38.1248
(-L- STA 23+87.13)

40
30
20
10

15' LT

DRY 04/07

DRY 04/07

LOOSE TO MEDIUM DENSE SAND AND SILTY SAND,MOIST
(ALLUVIAL)

-Y1-

NOTE: SOIL CORRELATIONS ARE DRAWN BETWEEN BORINGS AT THE INDICATED OFFSETS.

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