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

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	12+40 TO 40+00	4-5	6-8
-Y1-	10+00 TO 11+30	4	-
-Y2-	10+00 TO 12+05	5	9
-Y3-	10+00 TO 11+30	5	9
-Y4-	10+00 TO 11+25	5	-

CROSS SECTIONS	STATION	SHEET
-L-	12+50 TO 13+50	10
-L-	16+50 TO 20+50	11-13
-L-	28+50 TO 40+00	14-18

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

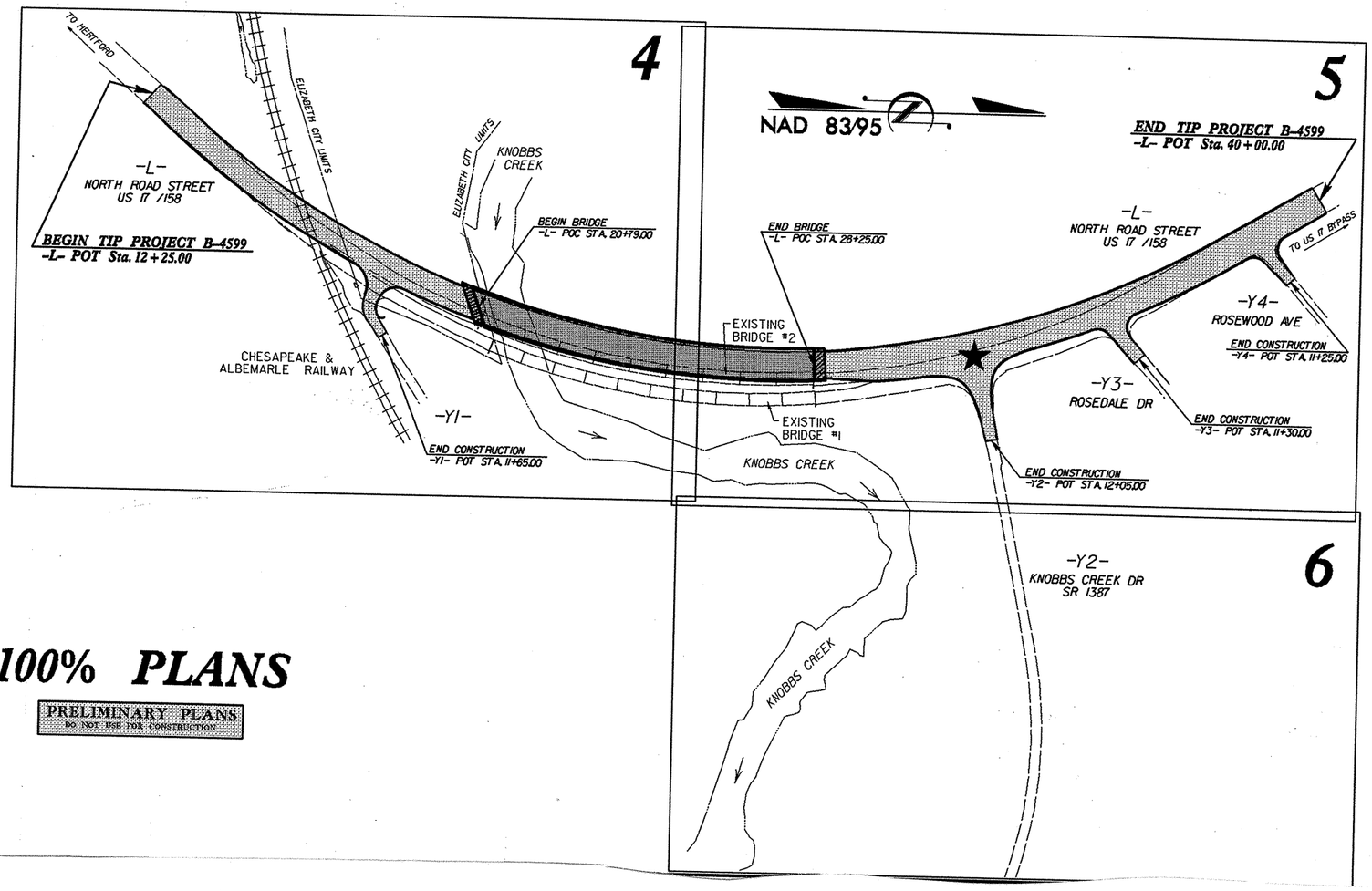
ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33791.1.1 (B-4599) F.A. PROJ. BRSTP-17(41)

COUNTY PASQUOTANK COUNTY

PROJECT DESCRIPTION BRIDGES NOS. 1 & 2 OVER KNOBBS CREEK ON US 17 / US 158

RECOMMENDATIONS



100% PLANS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33791.1.1 (B-4599)	1	18

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33791.1.1	BRSTP-17(41)	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 FELD 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

CMW

JRS

RES

JME

S&ME PERSONNEL

INVESTIGATED BY T.C. BOTTOMS

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE JANUARY 2012

NORTH CAROLINA PROFESSIONAL SEAL 32171 ENGINEER JINYOUNG PARK 1-30-12

NORTH CAROLINA LICENSED SEAL 2240 GEOLOGIST THEER C. BOTTOMS 1/30/12

DRAWN BY: C.R. SUMNER, C.M. WRIKE

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.

ID: B-4599

CONTRACT: C202823

PROJECT REFERENCE NO.	SHEET NO.
B-4599	2 OF 18

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-4, A-5	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6	A-3	A-6, A-7	
SYMBOL														
% PASSING #10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
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
- 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-45B
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 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
- [X] 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 NO. 5 RR SPIKE IN BASE OF 20" MAPLE AT -L- STA. 19+63
44' RT
ELEVATION: 35.70 FT.

NOTES:

VST = VANE SHEAR TEST

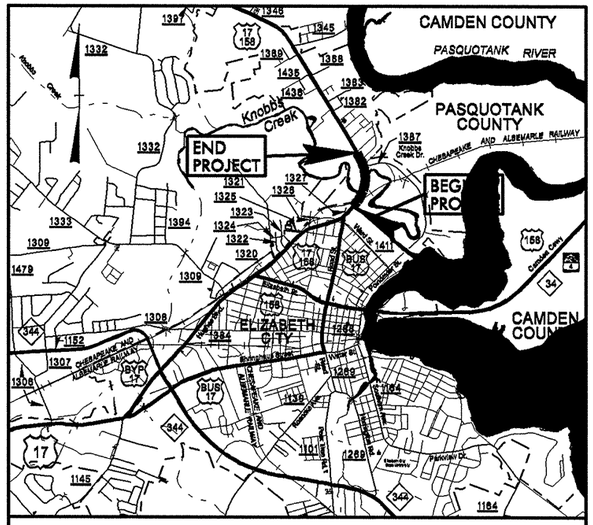
APPROXIMATE LIMITS OF ORGANIC MATERIAL

09/08/99

TIP PROJECT: B-4599

CONTRACT: _____

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



VICINITY MAP (N.T.S.)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PASQUOTANK COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4599	3	18

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33791.1.1	BRSTP-17(41)	PE

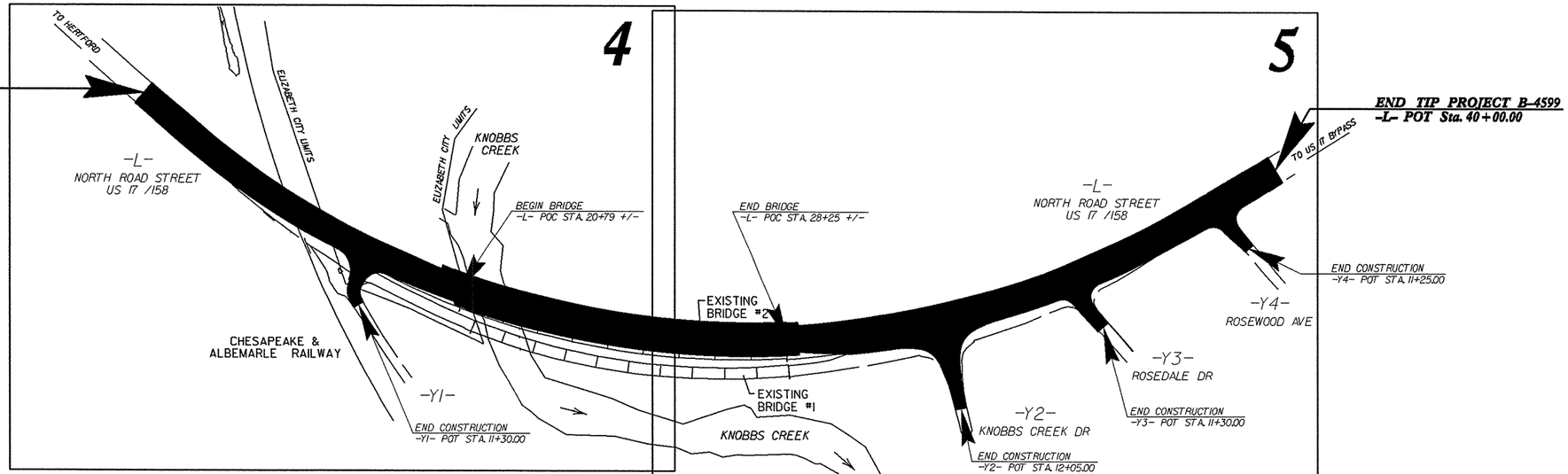
LOCATION: *BRIDGES NOS. 1 & 2 OVER KNOBBS CREEK ON US 17 / US 158.*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, CURB & GUTTER & STRUCTURE.*

25% REVISED

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

NAD 83/95



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF ELIZABETH CITY.

NCDOT CONTACT:

MR. DOUG TAYLOR, PE - ENGINEERING COORDINATION - PROJECT ENGINEER - ROADWAY DESIGN UNIT

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2011 = 40,700
ADT 2031 = 58,500
DHV = 10 %
D = 60 %
T = 7 % *
V = 50 MPH
* (TTST 4% + DUAL 3%)
FUNC. CLASS = URBAN PRINCIPAL ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4459	=	*0.382 mile*
LENGTH STRUCTURE TIP PROJECT B-4459	=	*0.141 mile*
TOTAL LENGTH TIP PROJECT B-4459	=	*0.523 mile*

Prepared For:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610
By:
MA ENGINEERING CONSULTANTS, INC.
598 EAST CHATHAM STREET, SUITE 137
CARY, NORTH CAROLINA 27511
(919) 297-0220

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: FEBRUARY 19, 2010

LETTING DATE: FEBRUARY 15, 2011

ROBERT W. PORTER, JR. PE
PROJECT ENGINEER

KEVIN S. HUTCHENS
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.*

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sdturner AT GE025461

Approximate quantities only. Clearing and grubbing, unclassified excavation, fine grading, removal of existing pavement, and breaking of existing asphalt pavement will be paid for at the contract lump sum price for "GRADING".

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

3A

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.

PROJECT: B-4599 33971.3.1 COUNTY: Pasquotank DATE: 02/21/2012 COMPUTED BY: RWP SHEET: 1 OF 1

STATION to STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
	TOTAL UNCLASS.	ROCK	TOTAL UNDERCUT	UNSUITABLE EARTH	SUITABLE EARTH	TOTAL	ROCK	EARTH	EARTH +30%		ROCK	SUITABLE	UNSUITABLE	TOTAL
PHASE 1														
-L- LT. 12+25.00 TO 20+79.00 (BEGIN BRIDGE)	146				146	1515		1515	1970	1824				
-L- LT. 16+60+/- TO 19+25+/-			2239			2239		2239	2911	2911			2239	2239
-L- LT. 28+25.00 (END BRIDGE) TO 40+00.00	853				853	1763		1763	2292	1439				
-L- LT. 35+25 TO 40+00			411			411		411	534	534			411	411
TOTAL (PHASE 1)	**999**		**2650**		**999**	**5928**		**5928**	**7707**	**6708**			**2650**	**2650**
PHASE 2														
-L- CL-RT. 19+00.00 TO 20+79.00 (BEGIN BRIDGE)						504		504	655	655				
-L- CL-RT. 28+25.00 (END BRIDGE) TO 33+50.00						872		872	1134	1134				
TOTAL (PHASE 2)						**1376**		**1376**	**1789**	**1789**				
PHASE 3														
-L- RT. 12+25.00 TO 20+79.00 (BEGIN BRIDGE)	18				18	917		917	1192	1174				
-L- RT. 12+60+/- TO 13+30+/-			241			241		241	313	313			241	241
-Y1- 10+50.00 TO 11+65.00	38				38	25		25	33			5		5
-L- RT. 28+25.00 (END BRIDGE) TO 40+00.00	11				11	923		923	1200	1189				
-Y2- 10+75.00 TO 12+05.00	6				6	146		146	190	184				
-Y3- 10+50.00 TO 11+30.00	52				52	21		21	27			25		25
-Y4- 10+50.00 TO 11+25.00	18				18	19		19	25	7				
SUBTOTAL (PHASE 3)	143		241		143	2292		2292	2980	2867		30	241	271
WASTE TO REPLACE BORROW										-30		-30		-30
TOTAL (PHASE 3)	**143**		**241**		**143**	**2292**		**2292**	**2980**	**2837**			**241**	**241**
TOTAL (ALL PHASES)	**1142**		**2891**		**1142**	**9596**		**9596**	**12476**	**11334**			**2891**	**2891**
EST. LOSS DUE TO CLEARING & GRUBBING*	N/A				N/A					N/A				
ADDITIONAL UNDERCUT (CONTINGENCY)			1000			1000		1000	1300	1300			1000	1000
USE SELECT GRANULAR MATERIAL, CLASS III IN LIEU OF BACKFILL FOR UNDERCUT						-3891		-3891	-5058	-5058				
PROJECT TOTAL	**1142**		**3891**		**1142**	**6705**		**6705**	**8718**	**7576**			**3891**	**3891**
ESTIMATED 5% TO REPLACE TOPSOIL ON BORROW PIT										379				
GRAND TOTALS (CUBIC YARDS)	**1,142**		**3,891**		**1,142**	**6,705**		**6,705**	**8,718**	**7,955**			**3,891**	**3,891**
SAY (CUBIC YARDS)	**1,200**		**3,900**							**8,000**				

SELECT GRANULAR MATERIAL (CLASS III) = 5,400 CY (3,700 CY BACKFILL FOR UNDERCUT + 1,700 CY CONTINGENCY PER 'GEOTECHNICAL REPORT - DESIGN AND CONSTRUCTION RECOMMENDATIONS' LETTER DATED JANUARY 31, 2012)

ESTIMATED GEOTEXTILE FOR SOIL STABILIZATION = 1,600 SY (900 SY FOR UNDERCUT AREAS + 700 SY CONTINGENCY PER 'GEOTECHNICAL REPORT - DESIGN AND CONSTRUCTION RECOMMENDATIONS' LETTER DATED JANUARY 31, 2012)

* NO SIGNIFICANT LOSS OF UNCLASSIFIED EXCAVATION IS ANTICIPATED DUE TO CLEARING AND GRUBBING (PER 'GEOTECHNICAL REPORT - DESIGN AND CONSTRUCTION RECOMMENDATIONS' LETTER DATED JANUARY 31, 2012)

REVISIONS

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-4599	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

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

-L-
PI Sta 27+60.68
Δ = 72° 33' 14.9" (LT)
D = 2° 57' 12.2"
L = 2,456.64'
T = 1,423.88'
R = 1,940.00'
RO = 140' (PC)
SE = 0.035 ft/ft
V = 50 mph

-Y1-
PI Sta 10+99.76
Δ = 57° 21' 41.3" (LT)
D = 114° 35' 29.6"
L = 50.06'
T = 27.35'
R = 50.00'

NAD 83/95

SEE SHEETS 6 & 7 FOR -L- PROFILE
SEE SHEET 7 FOR -Y1- PROFILE

BEGIN TIP PROJECT B-4599
-L- POT, Sta. 12+40.00

-L- POT Sta. 10+00.00

-L- PC Sta. 13+36.80

-Y1- PC Sta. 10+72.40

-Y1- PT Sta. 11+22.46

END CONSTRUCTION
-Y1- POT STA. 11+30.00

-Y1- POT Sta. 12+16.29

-L- POC Sta. 18+61.51
-Y1- POT Sta. 10+00.00

BEGIN APPROACH SLAB
-L- POC STA. 20+54 +/-

BEGIN BRIDGE
-L- POC STA. 20+79 +/-

MATCHLINE -L- STA. 25+50.00
SEE SHEET 5

PC ENTERPRISE LLC
DB 743 PG 521

M.C. BREWER & MARK F. SWIMME
DB 802 PG 534

DORIS B. SAWYER
DB 580 PG 318

LI-SCI TECK INC
DB 861 PG 497

VEPCO
DB 547 PG 169

ELIZABETH CITY BRICK CO
DB 202 PG 102

CITY OF ELIZABETH CITY
DB 282 PG 183

W.W. OWENS & SONS MOVING & STORAGE
DB 449 PG 24
DB 497 PG 476
MB 12 PG 32

GLENN D. & LINDA SPEIGHT
DB 606 PG 424

DOUBLE O THREE ENTERPRISE

JIM WALTER HOMES
DB 666 PG 691

VEPCO
DB 347 PG 169

MENEFEE PROPERTIES, L.P.
DB 686 PG 364
DB 575 PG 505

CHESAPEAKE & ALBEMARLE RAILWAY

KNOBBS CREEK

APPROXIMATE LIMITS OF ORGANIC MATERIAL

175' LANE WIDTH TRANSITIONS

BRIDGE STAGING LINE
15' RT. OF -L- CENTERLINE

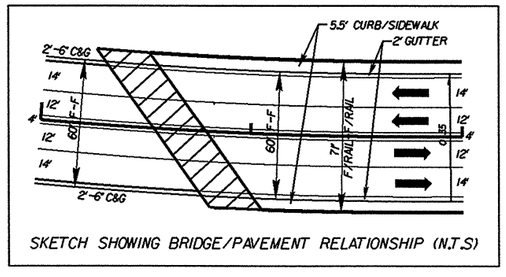
HIGH WATER MARK 3.07'
HURRICANE FLOYD 1999

BM #10

END 2'-6" C&G #65
BEGIN 2'-6" C&G #20
USE 2' PAVED SHOULDER IN LIEU OF C&G

END 2'-6" C&G #65
BEGIN 2'-6" C&G #45
USE 2' PAVED SHOULDER IN LIEU OF C&G

SKETCH SHOWING BRIDGE/PAVEMENT RELATIONSHIP (N.T.S.)



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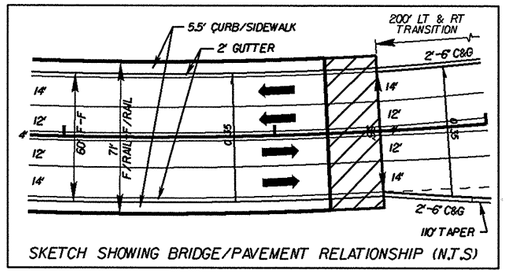
PROJECT REFERENCE NO.	SHEET NO.
B-4599	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS 8/17/99



SKETCH SHOWING BRIDGE/PAVEMENT RELATIONSHIP (N.T.S)

NAD 83/95

-L-	-Y2-
PI Sta 27+60.68	PI Sta 10+65.38
Δ = 72° 33' 14.9" (LT)	Δ = 19° 52' 39.9" (LT)
D = 2° 57' 12.2"	D = 31° 49' 51.6"
L = 2,456.64'	L = 62.45'
T = 1,423.88'	T = 31.54'
R = 1,940.00'	R = 180.00'
RO = 157.5' (PT)	
SE = 0.035 ft/ft	
V = 50 mph	

-L- POT Sta. 38+34.63
-Y4- POT Sta. 10+00.00

ALBEMARLE MEDICAL CENTER
DB 578 PG 1
MB 17 PG 24

END TIP PROJECT B-4599
-L- POT Sta. 40+00.00
-L- POT Sta. 40+32.45

-L- POT Sta. 37+93.44

TWIFORD FUNERAL HOME
DB 500 PG 681

ROEBUCK PROPERTIES
DB 789 PG 598

JIM WALTER HOMES
DB 666 PG 691

-L- POC Sta. 34+84.57
-Y3- POT Sta. 10+00.00

-L- POC Sta. 31+74.74
-Y2- POT Sta. 10+00.00

END BRIDGE
-L- POC STA. 28+25 +/-

END APPROACH SLAB
-L- POC STA. 28+50 +/-

BRIDGE STAGING LINE
15' RT OF -L- CENTERLINE

MATCHLINE -L- STA. 25+50.00
SEE SHEET 4

APPROXIMATE LIMITS OF ORGANIC MATERIAL

200' LT & RT TRANSITION

100' LT & RT TAPER

APPROX. LOCATION

NORTH ROAD STREET
US 17 BYPASS
TO USIT BYPASS

-Y3- RC
Sta. 10+35.84

-Y3- PT
Sta. 10+98.29

-Y4- POT Sta. 11+25.00

-Y3- POT Sta. 13+00.00

-Y2- POT Sta. 13+00.00

END CONSTRUCTION
-Y4- POT STA. 11+25.00

END CONSTRUCTION
-Y3- POT STA. 11+30.00

END CONSTRUCTION
-Y2- POT STA. 12+05.00

MENEFEE PROPERTIES, L.P.
DB 686 PG 364
DB 575 PG 505

AMBROSE SIGNS, INC.
DB 651 PG 720
MB 25 PG 29

CITY OF ELIZABETH CITY
DB 505 PG 43
DB 501 PG 299

J. MARSHALL WHITE
MB 17 PG 177

HAROLD W. WILLS ET UX
DB 537 PG 65
MB 17 PG 177

WILLIAM E. WATERS
DB 486
PG 432

RANDY L. HOBBS
DB 953 PG 638

EVELYN B. HOBBS
DB 355 PG 455

DORIS SAWYER
DB 42 PG 252
DB 34 PG 98

GERALDINE SAUNDERS
DB 586 PG 506

KNOBBS CREEK

KNOBBS CREEK DR

ROSEANNE DR

SHIRLEY DR

- UPGRADE EXISTING SIGNAL

SEE SHEETS 6 & 7 FOR -L- PROFILE
SEE SHEET 7 FOR -Y2-, -Y3-, & -Y4- PROFILES

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INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/14/99

-L-

US 17 / 158 (NORTH ROAD ST.)

VANE SHEAR TESTS

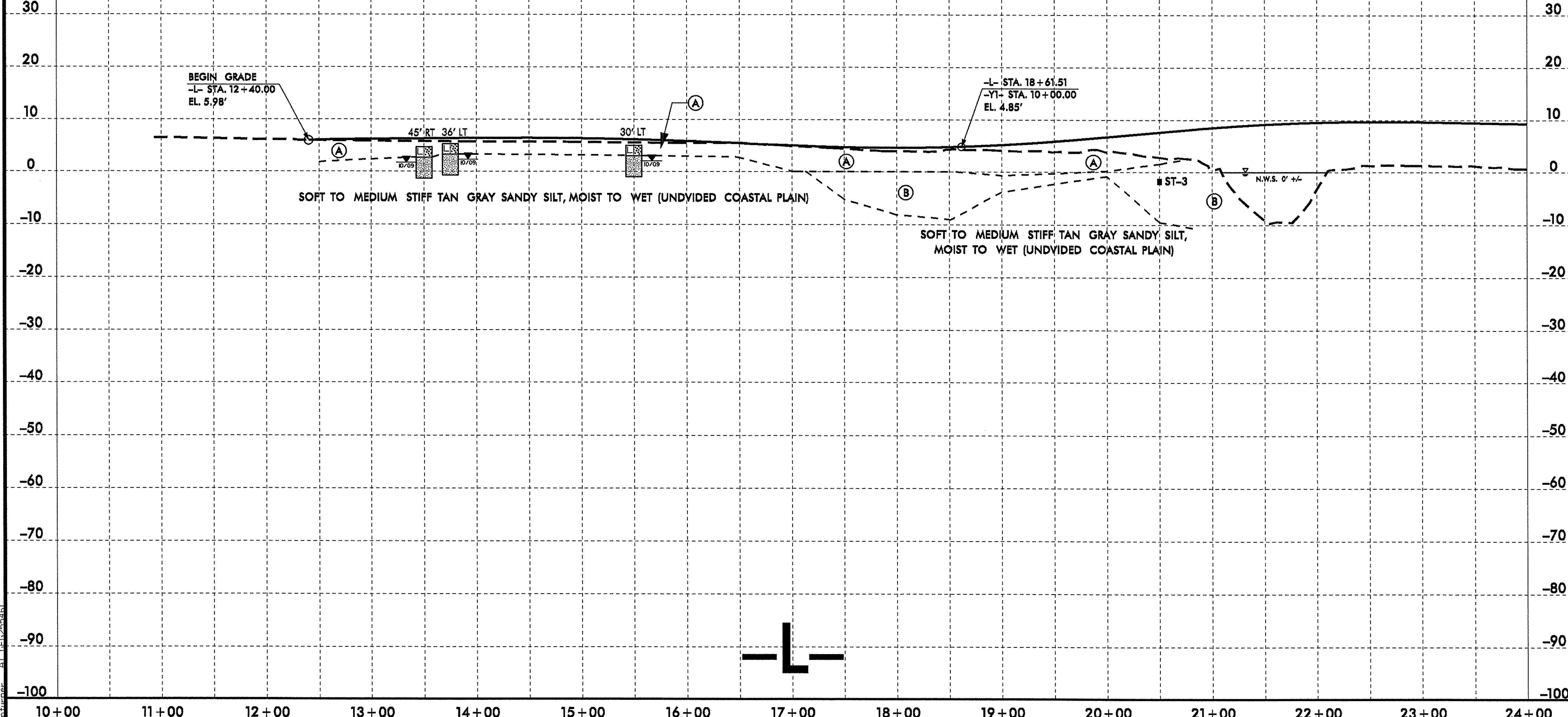
STATION	OFFSET	DEPTH	S (psf)
17+00	55' LT	0.0	271.44
17+00	55' LT	0.5	292.32
17+00	55' LT	1.0	208.80
17+00	55' LT	1.5	167.04
17+00	55' LT	2.0	334.08
17+00	55' LT	2.5	563.76
17+00	55' LT	3.0	167.04
17+00	55' LT	3.5	208.80
17+00	55' LT	4.0	187.92
17+00	55' LT	4.5	375.84
17+00	55' LT	5.0	313.20
17+00	55' LT	5.5	375.84
17+00	55' LT	6.0	709.92
17+00	55' LT	6.5	501.12
17+00	55' LT	7.0	1002.24
17+00	55' LT	7.5	876.96
17+00	55' LT	8.0	1106.64
17+00	55' LT	8.5	1148.40
17+00	55' LT	9.0	793.44
17+00	55' LT	9.5	1106.64
17+00	55' LT	10.0	793.44
17+00	55' LT	10.5	835.20
17+00	55' LT	11.0	772.56
18+00	21' LT	1.0	271.44
18+00	21' LT	2.0	292.32
18+00	21' LT	3.0	208.80
18+00	21' LT	4.0	167.04
18+00	21' LT	5.0	334.08
18+00	21' LT	6.0	563.76
20+50	10' LT	1.0	1739
20+50	10' LT	2.0	2312
20+50	10' LT	3.0	2405
20+50	10' LT	4.0	1739
20+50	10' LT	5.0	2016.5
20+50	10' LT	6.0	MAX

SHELBY TUBE 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
ST-1	49 LT	17+00	0.00-2.00	A-2-5(0)	68	NP	38.8	43.3	9.7	8.2	95	82	19	125.66	22.5
ST-2	20 LT	18+00	1.00-3.00	A-2-6(1)	31	15	49.8	22.3	5.7	22.2	96	69	28	75.93	2.2
ST-3	10 LT	20+50	4.00-5.00	A-4(3)	33	3	8.5	31.2	46.2	14.1	99	95	81	143.87	9.3

(A) LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

(B) SOFT BROWN MUCK AND SANDY SILT WITH LITTLE ORGANIC MATERIAL, WET (ALLUVIAL)



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5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-4599	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

VANE SHEAR TESTS

STATION	OFFSET	DEPTH	S (psf)
29+00	10' LT	1.0	1868.5
29+00	10' LT	2.0	1905.5
29+00	10' LT	3.0	962
29+00	16' LT	4.0	1184
29+00	10' LT	5.0	962
29+00	10' LT	6.0	1789
29+00	10' LT	7.0	2072

-L-
US 17 / 158
(NORTH ROAD ST.)

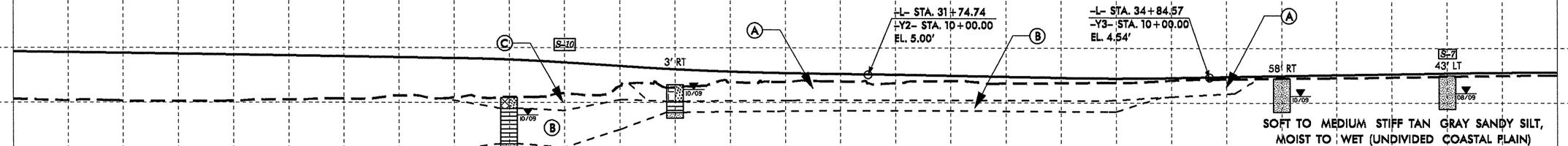
SOIL TEST RESULTS

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-7	43 LT	37+00	0.0-6.0	A-4(0)	22	2	7.5	49.0	29.4	14.1	94	92	67	-	-
S-10	10 LT	29+00	6.00-7.00	-	-	-	-	-	-	-	-	-	-	116.3	21.8

Ⓐ LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)

Ⓑ SOFT TO STIFF BROWN MUCK AND SANDY SILT WITH LITTLE ORGANIC MATERIAL, WET (ALLUVIAL)

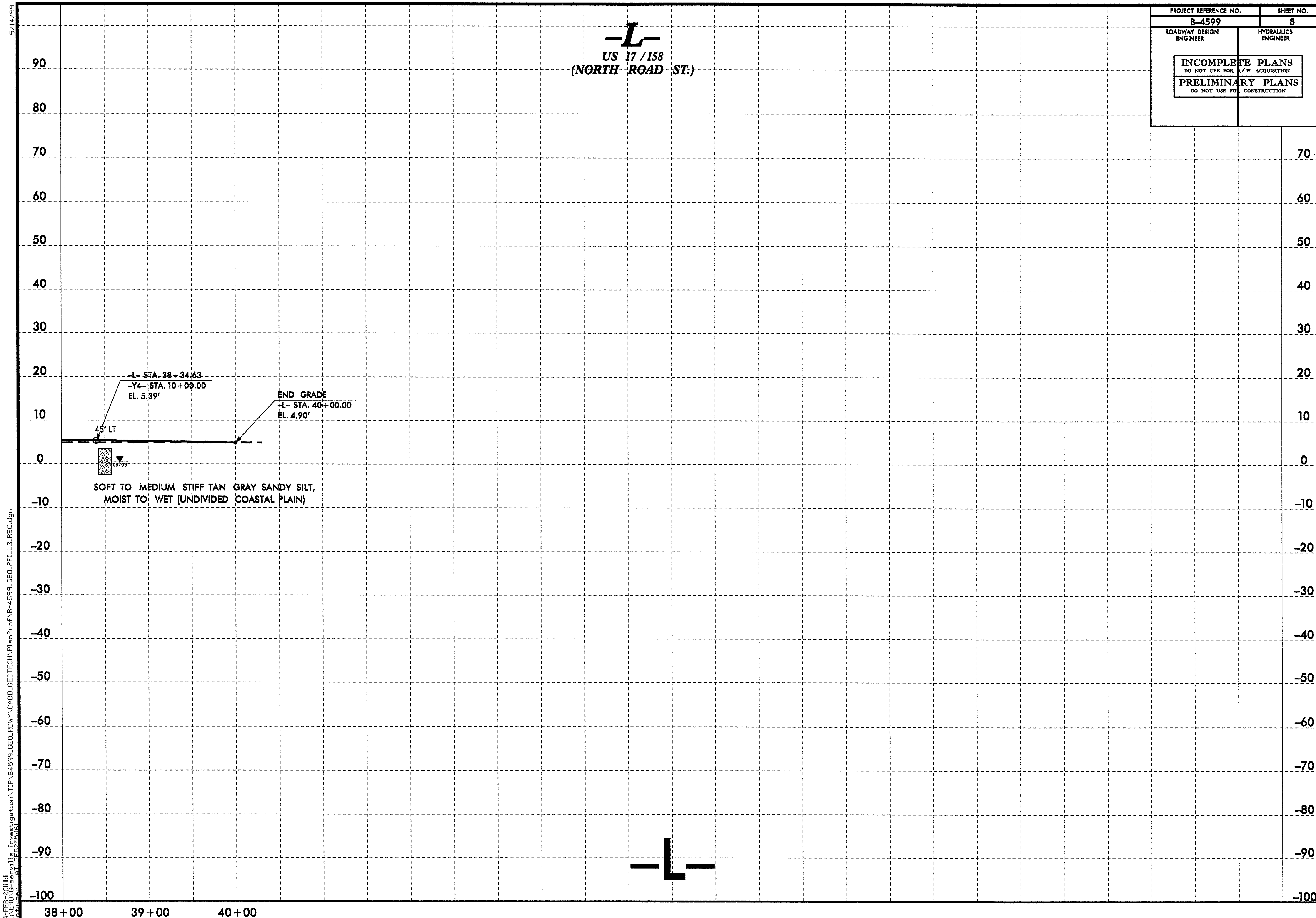
Ⓒ LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)



90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100

24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00 38+00

-L-



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PROJECT REFERENCE NO.	SHEET NO.
B-4599	9

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

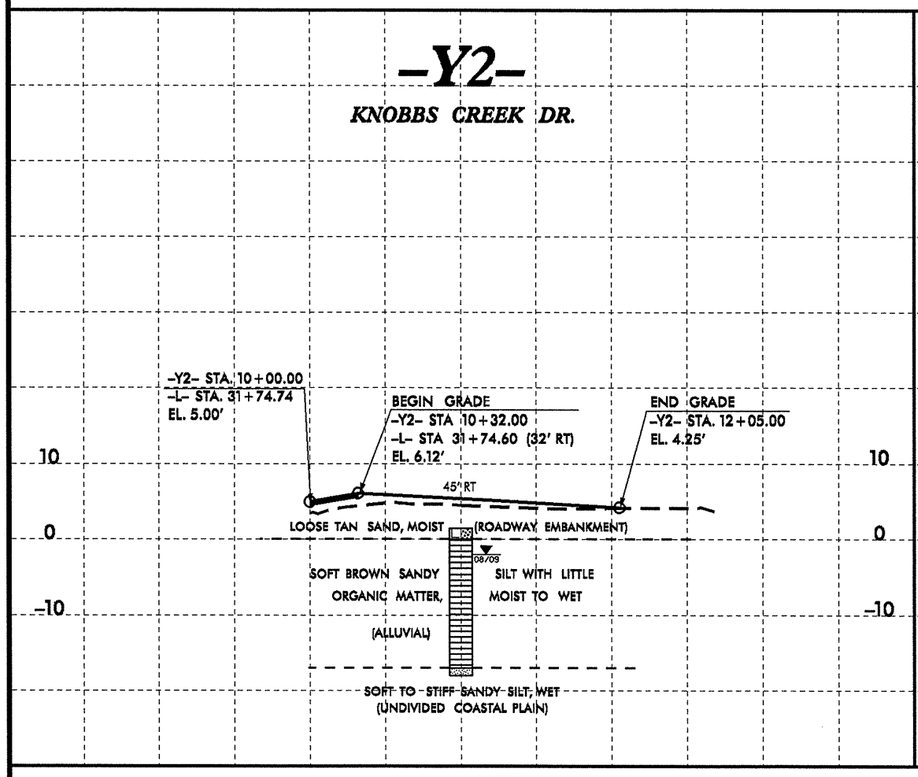
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

–Y2–

KNOBBS CREEK DR.

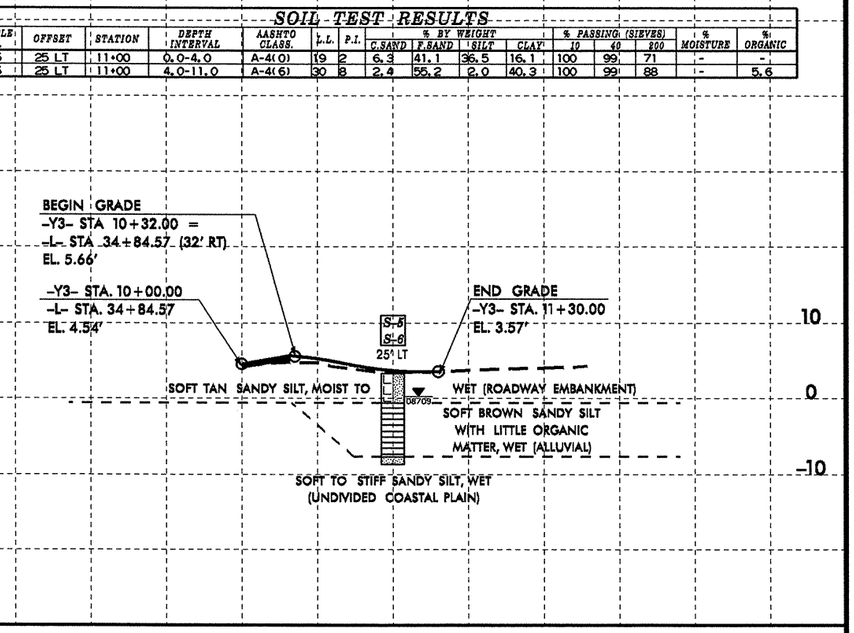


–Y3–

ROSEDALE DR.

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-5	25 LT	11+00	0.0-4.0	A-4(0)	19	2	6.3	41.1	36.5	16.1	100	99	71	-	-
S-6	25 LT	11+00	4.0-11.0	A-4(6)	30	8	2.4	55.2	2.0	40.3	100	99	88	-	5.6



8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10 0

LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF TAN GRAY CLAYEY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

10/09

13+50.00

20 10 0

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-4	55 RT	13+00	0.0-3.5	A-5(11)	105	NP	24.6	11.3	44.0	20.2	95	76	65	219.8	36.8

END UNDERCUT –L– STA. 13+30.00 +/–

10 0

LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)

S-4

SOFT TO MEDIUM STIFF TAN GRAY CLAYEY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

08/09

SOFT BROWN MUCK, MOIST TO WET (ALLUVIAL)

BEGIN UNDERCUT –L– STA. 12+60.00 +/–

13+00.00

10 0

LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF TAN GRAY CLAYEY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

10/09

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)

UNDERCUT EXCAVATION

12+50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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jonick
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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	11

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

VANE SHEAR TESTS

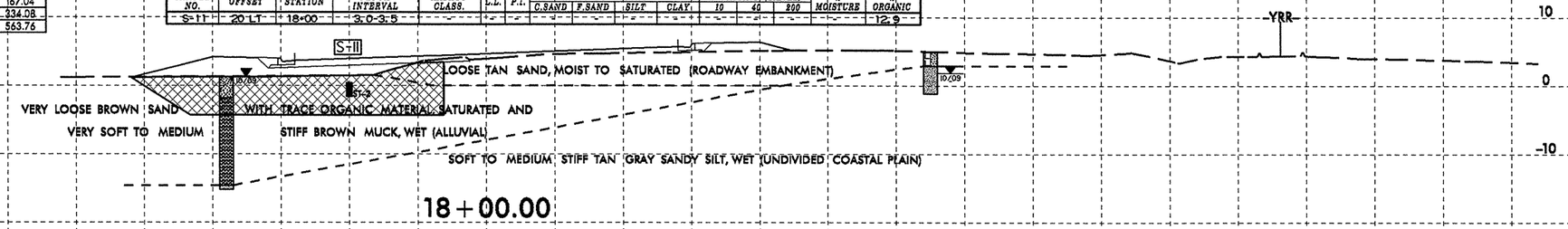
STATION	OFFSET	DEPTH	S (psf)
18+00	21' LT	1.0	271.44
18+00	21' LT	2.0	292.32
18+00	21' LT	3.0	208.80
18+00	21' LT	4.0	167.04
18+00	21' LT	5.0	334.08
18+00	21' LT	6.0	563.76

SHELBY TUBE RESULTS

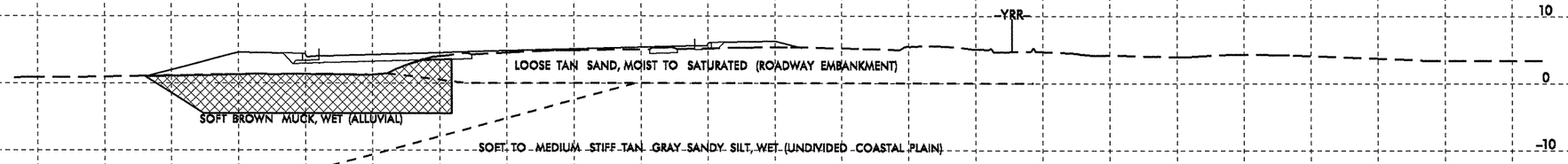
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
ST-2	20 LT	18+00	1.0-3.0	A-2-6(1)	31	15	49.8	22.3	5.7	22.2	96	69	28	75.93	2.2

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-11	20 LT	18+00	3.0-3.5	-	-	-	-	-	-	-	-	-	-	-	12.9



18+00.00



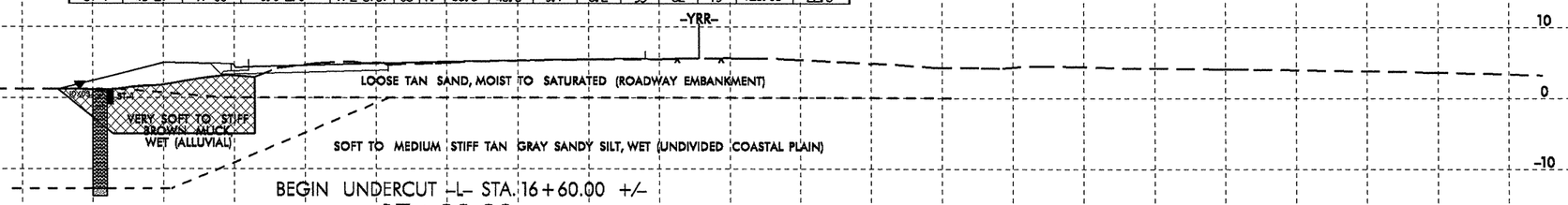
17+50.00

VANE SHEAR TESTS

STATION	OFFSET	DEPTH	S (psf)
17+00	55' LT	0.0	271.44
17+00	55' LT	0.5	292.32
17+00	55' LT	1.0	208.80
17+00	55' LT	1.5	167.04
17+00	55' LT	2.0	334.08
17+00	55' LT	2.5	563.76
17+00	55' LT	3.0	167.04
17+00	55' LT	3.5	208.80
17+00	55' LT	4.0	187.92
17+00	55' LT	4.5	375.84
17+00	55' LT	5.0	313.20
17+00	55' LT	5.5	375.84
17+00	55' LT	6.0	709.92
17+00	55' LT	6.5	501.12
17+00	55' LT	7.0	1002.24
17+00	55' LT	7.5	876.96
17+00	55' LT	8.0	1106.64
17+00	55' LT	8.5	1148.40
17+00	55' LT	9.0	793.44
17+00	55' LT	9.5	1106.64
17+00	55' LT	10.0	793.44
17+00	55' LT	10.5	835.20
17+00	55' LT	11.0	772.56

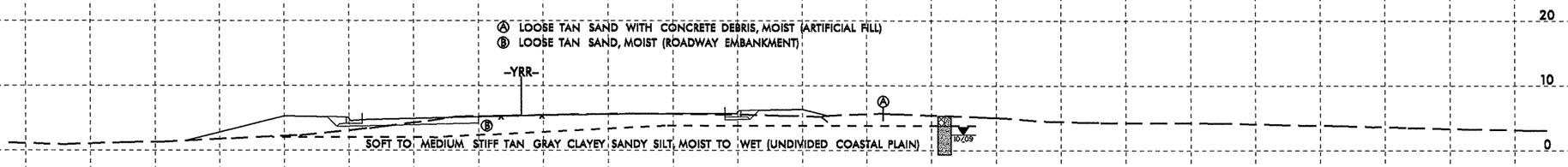
SHELBY TUBE RESULTS

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
ST-1	49 LT	17+00	0.0-2.0	A-2-5(0)	68	NP	38.8	43.9	9.7	8.2	95	82	19	125.66	22.5



BEGIN UNDERCUT -L- STA. 16+60.00 +/-

17+00.00



UNDERCUT EXCAVATION

16+50.00

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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	12

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10
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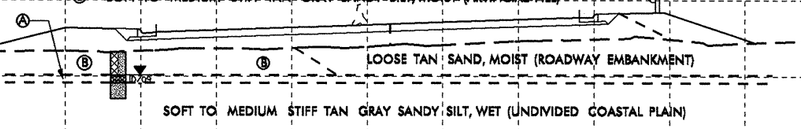
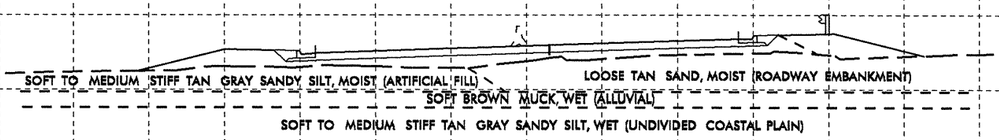
Ⓐ SOFT BROWN MUCK, WET (ALLUVIAL)
Ⓑ SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST (ARTIFICIAL FILL)



20+00.00

10
0



19+50.00

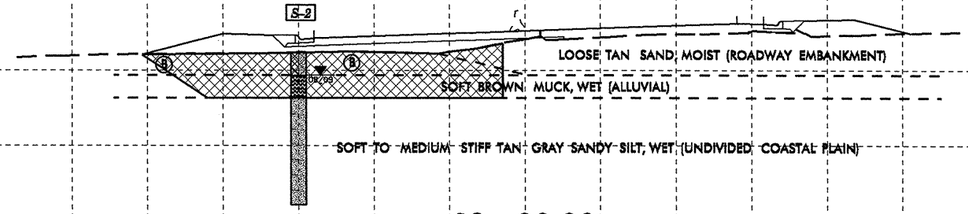
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	% BY WEIGHT F.SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-2	30 LT	19+00	2.0-6.0	A-5(2)	77	NP	25.4	34.7	27.8	12.1	98	81	48	-	27.5

20
10
0
-10

Ⓑ SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST (ARTIFICIAL FILL)

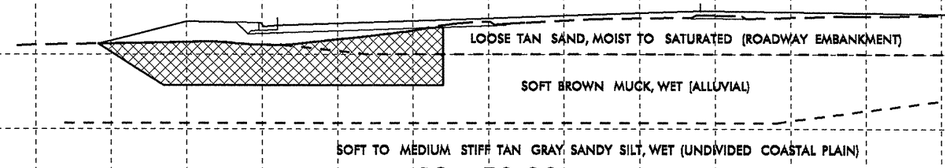
END UNDERCUT -L- STA. 19+25.00 +/-



19+00.00

10
0
-10

-Y1-



18+50.00

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UNDERCUT EXCAVATION

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	13

VANE SHEAR TESTS

STATION	OFFSET	DEPTH	S (psf)
20+50	10' LT	1.0	1739
20+50	10' LT	2.0	2312
20+50	10' LT	3.0	2405
20+88	10' LT	4.0	1799
20+50	10' LT	5.0	2016.5
20+50	10' LT	6.0	MAX

SHELBY TUBE RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	% BY WEIGHT F.SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
ST-3	10' LT	20+50	4.0-5.0	A-4(8)	33	3	8.5	31.2	46.2	14.1	99	95	81	143.87	9.3

Ⓐ LOOSE TAN SAND WITH CONCRETE DEBRIS, MOIST (ROADWAY EMBANKMENT)

Ⓑ SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST (ARTIFICIAL FILL)

ST-3

SOFT TO STIFF BROWN MUCK AND SANDY SILT WITH LITTLE ORGANIC MATERIAL, WET (ALLUVIAL)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

20+50.00

-L-

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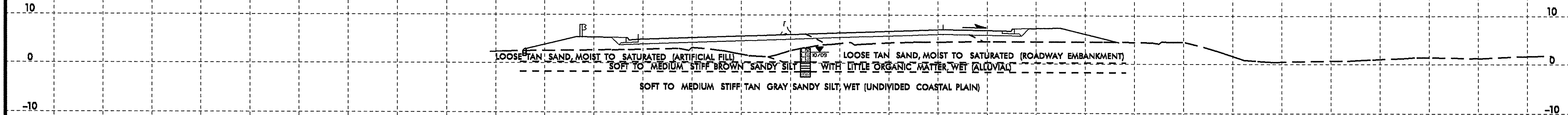
B-4599	14



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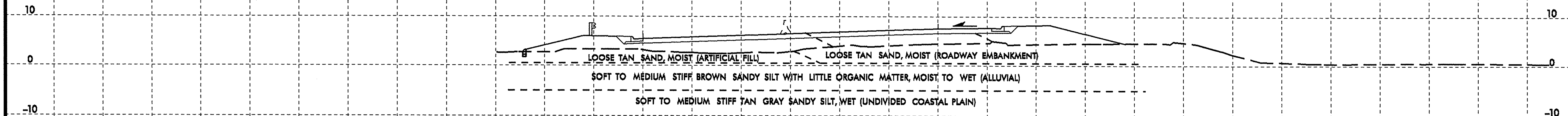


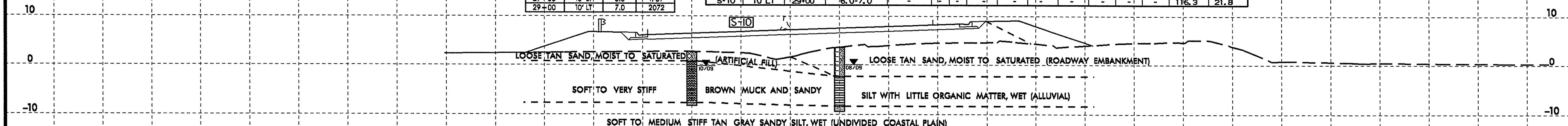
29+50.00

VANE SHEAR TESTS

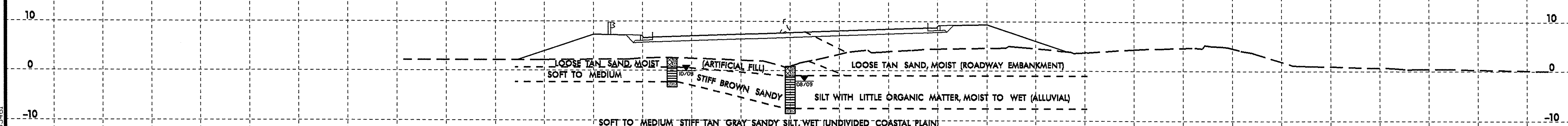
STATION	OFFSET	DEPTH	S (psf)
29+00	10' LT	1.0	1868.5
29+00	10' LT	2.0	1905.5
29+00	10' LT	3.0	962
29+00	10' LT	4.0	1184
29+00	10' LT	5.0	962
29+00	10' LT	6.0	1739
29+00	10' LT	7.0	2072

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	D.L.	P.I.	% BY WEIGHT C.SAND	% BY WEIGHT F.SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
S-10	10 LT	29+00	6.0-7.0	-	-	-	-	-	-	-	-	-	-	116.3	21.8



29+00.00



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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	15

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10 / 0

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)
SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

32+50.00

10 / 0 / -10

-Y2-

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)
SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

32+00.00

10 / 0

-Y2-

Ⓐ LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)
SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

31+50.00

10 / 0

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)
SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

31+00.00

10 / 0

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)
SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

30+50.00

-L-

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	16

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10 / 0 / -10

-Y3-

Ⓐ LOOSE TAN SAND, MOIST (ARTIFICIAL FILL)

LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

SOFT TAN SANDY SILT, MOIST TO WET (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

35+00.00

Ⓐ LOOSE TAN SAND, MOIST (ARTIFICIAL FILL)

LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, MOIST TO WET (ALLUVIAL)

34+50.00

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)

LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

34+00.00

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)

LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

33+50.00

LOOSE TAN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)

LOOSE TAN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)

SOFT TO MEDIUM STIFF BROWN SANDY SILT WITH LITTLE ORGANIC MATTER, WET (ALLUVIAL)

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

33+00.00

-L-

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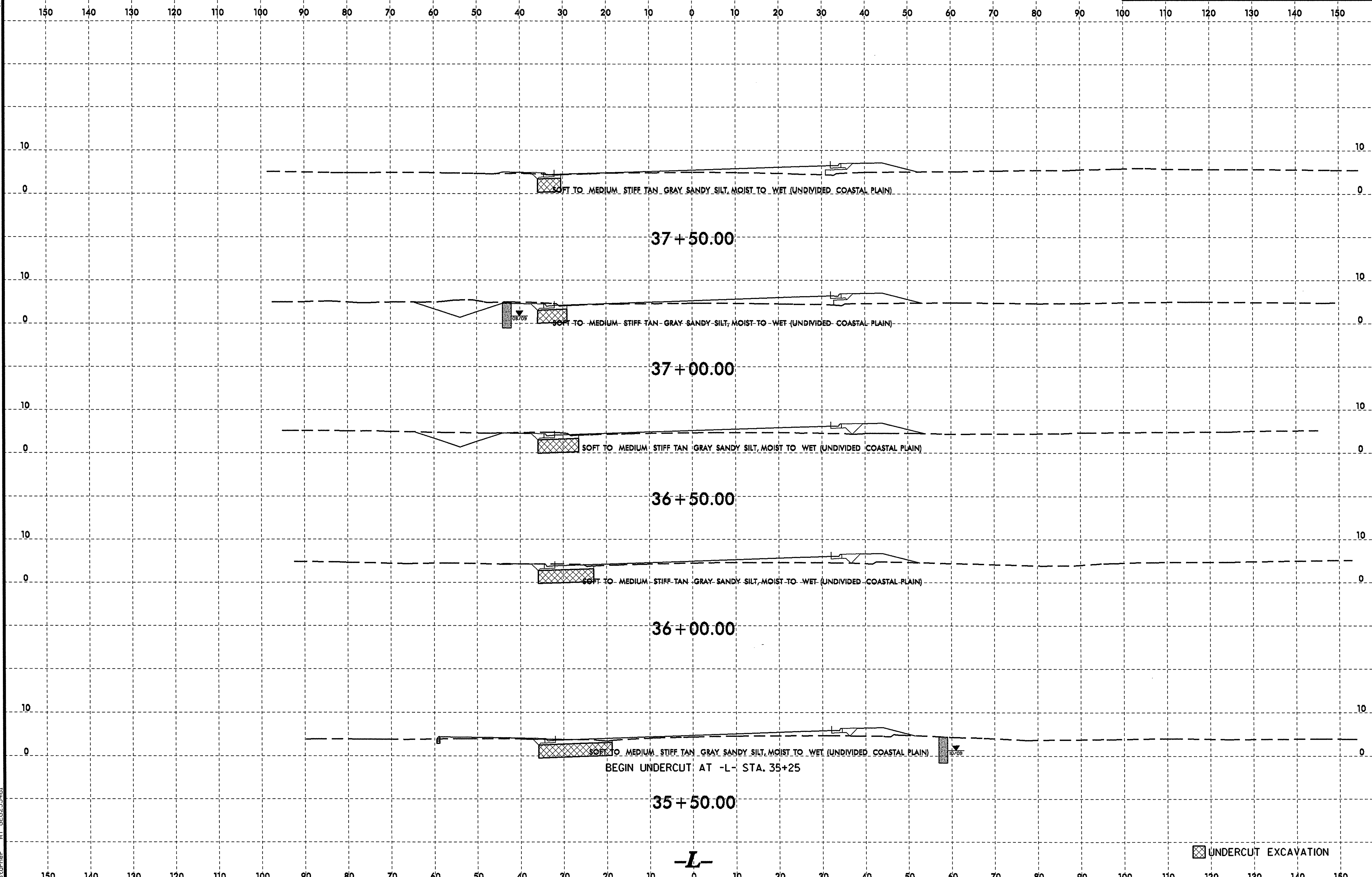
PROJ. REFERENCE NO.	SHEET NO.
B-4599	17



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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4599	18

END UNDERCUT AT -L- STA. 40+00

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

40+00.00

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

39+50.00

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

39+00.00

-Y4-

08/09

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

38+50.00

SOFT TO MEDIUM STIFF TAN GRAY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

38+00.00

-L-

UNDERCUT EXCAVATION

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