CONTRACT: 200851 ID: U-4439

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4439	1	15
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
8.1862201	STPNHS-17(39)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

STATE PROJECT 35032.1.1 I.D. NO. U-4439

F.A. PROJECT STPNHS-17(39)

COUNTY ONSLOW

DESCRIPTION CURTIS ROAD FROM US 17 TO "A" STREET ON BOARD THE USMC BASE-NEW RIVER AIR STATION (INVENTORY)

CONTENTS:

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

INVESTIGATED BY: FMW PERSONNEL: FMW, SSB, KBM, MBO, ELD

CHECKED BY: FMW

SUBMITTED BY: RRW

DATE: FEBRUARY, 2004

DRAWN BY: FMW

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

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

NORTH CAROLINA LICENSED SEAL 254 GEOLOGIST ROBERT RAY WHITE

SEAL

Rob Ray White

SIGNATURE

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-4439	8.1262201	2	15

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		N.P.	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 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 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	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	2.0	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
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTICITY	6-15	SLIGHT
PLASTICITY	16-25	MEDIUM
HIGHLY PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, 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 ARE 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 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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 SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- 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 - CBR 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
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- ■ MOBILE B-47
- ☐ BK-51
- ☐ CME-45B
- ☐ CME-550
- ☐ PORTABLE HOIST
- ☐ OTHER _____
- ☐ OTHER _____

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

HAMMER TYPE:
- ☐ AUTOMATIC ☐ MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 FOLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
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 ROCKS 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 GEOLOGISTS 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 GEOLOGISTS 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 GEOLOGISTS 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 WHICH 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 IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS WHICH 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 (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 B.P.F.) 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 LESS THAN 0.1 FOOT PENETRATION WITH 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 (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

ELEVATION:

NOTES:

REVISED 09/15/00

09/08/9-

U-4439

PROJECT 8.1262201

See Sheet 1-A For Index of Sheets

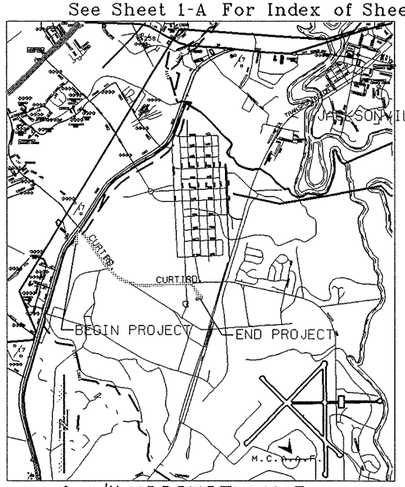
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ONSLOW COUNTY

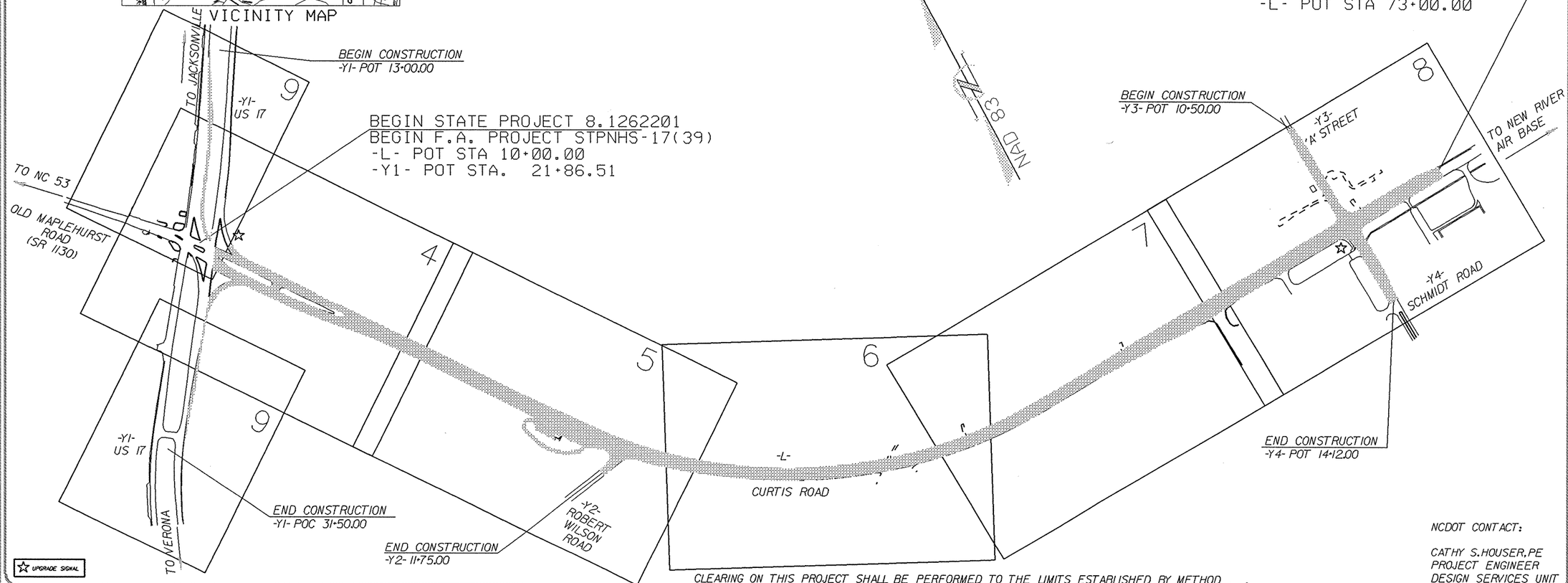
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4439	3	15
STATE PROJ.NO.	F.A. PROJ.NO.	DESCRIPTION	
8.1262201	STPNHS-17(39)	PE	

LOCATION: CURTIS ROAD FROM US 17 TO "A" STREET ON BOARD THE USMC BASE - NEW RIVER AIR STATION

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNALS, AND SIGNING



VICINITY MAP



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ___.

NCDOT CONTACT:

CATHY S.HOUSER,PE
PROJECT ENGINEER
DESIGN SERVICES UNIT

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 2004 = 19,700
ADT 2024 = 28,000
DHV = 11 %
D = 70 %
T = 5 % *
V = 40 MPH

* TTST 2 %DUAL 3 %

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT STPNHS-17(39) = 1.193 +/- MI

TOTAL LENGTH STATE PROJECT 8.1262201 = 1.193 +/- MI

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: SEPTEMBER 16, 2003

LETTING DATE: MAY 5, 2004

Prepared for:
DIVISION OF HIGHWAYS
1000 BIRCH RIDGE DR., NC, 27610
Prepared by:
MA ENGINEERING CONSULTANTS, INC.
598 E. CHATHAM STREET, SUITE 137
CARY, NORTH CAROLINA 27511
(919) 297-0220

R.W. PORTER JR., PE
PROJECT ENGINEER

D.M. WAINWRIGHT, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

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

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

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT
SECRETARY

February 5, 2004

STATE PROJECT: 8.1262201 U-4439
FEDERAL PROJECT: STPNHS-17(39)
COUNTY: Onslow
DESCRIPTION: Curtis Road from US 17 to "A" Street on board the USMC Base-New River Air Station

SUBJECT: Geotechnical Report - Inventory

Project Description

The proposed project is located on Curtis Road from US 17 to "A" Street on board the USMC Base-New River Air Station in Jacksonville. Based on the current plans, the existing three lane roadway will be widen to four lanes to accommodate traffic. Some minor widening will also be done along the existing -Y- lines. Also a new parking lot and service roads will be constructed near the existing guardhouse at a new location. The investigation of subsurface conditions was confined to the corridor of proposed new construction.

The following base lines were investigated for this project:

Line	Station±
-L-	10+00 to 73+00
-SBL1-	10+16 to 20+39
-SBL2-	26+14 to 32+73
-Y1-	13+00 to 31+50
-Y2-	10+00 to 11+75
-Y3-	10+50 to 15+60
-Y4-	10+00 to 14+12
-Y5-	10+00 to 18+80
-Y6-	30+00 to 35+67
-Y7-	40+00 to 50+60
-Y8-	50+00 to 51+23

Areas of Special Geotechnical Interest

1) The following sections contain cohesive soils which have the potential for subgrade problems during construction:

Line	Station (±)
-Y5-	12+25 to 18+25
-Y6-	30+50 to 34+90
-Y7-	40+75 to 48+25
-Y8-	50+10 to 50+88

2) The entire project was found to exhibit high water levels, seasonal high ground water or the potential for ground water related construction problems.

Physiography, Geology and Ground Water

The project corridor is located in the Coastal Plain Physiographic Province and is primarily underlain by Recent to Pleistocene upland sediments. Topography along the project is flat to gently sloping with elevations generally ranging between 22 and 32 feet above sea level. No significant floodplain or drainage areas were noted on this project.

Surface drainage is poor throughout the proposed corridor due to the relatively flat terrain. Ground water data was collected primarily in May and December 2003 during average rainfall conditions. During our investigation, the water table was generally within 3 to 5 feet of the natural ground surface.

Soils

Soils along the majority of the upland areas of the project primarily consist of up to 9 feet of loose to medium dense fine to coarse sand (A-2-4, A-3). Thin (2.5± feet) soft to medium stiff sandy silt (A-4) and sandy silty clay (A-6, A-7-6) layers were encountered throughout the surficial deposits. The soils generally exhibit fair to excellent engineering properties.

A 900 foot wooded area from -L- stations 21+00 to 30+00 was also included in this investigation where a parking lot and service roads (-Y5-, -Y6-, -Y7-, -Y8-) will be located. Soils along this area typically consist of 1 to 6 feet of loose to medium dense fine to coarse sand (A-2-4) underlain by medium stiff to hard sandy silty clay (A-6, A-7-6). The clay soils have a low to high plasticity index (7 to 38) and moisture contents ranging between 34 to 38 percent.

Vane Shear Tests performed in the cohesive soils typically range between 585 to 4000+ psf. Soils encountered beneath the cohesive deposits consist of loose to medium dense fine to coarse sand (A-1-b, A-2-4, A-3). Due to the relatively poor engineering characteristics of the clay soils within this area, undercutting of the soils will probably be required to assist stabilizing portions of the roadway.

Embankments are man-made fills built during construction of existing roadways. Roadway embankment soils overlie the upland soils along the entire width and length of the existing (-L- and -Y-) alignments. The existing embankment soils are typically 1 to 4 feet thick and consist of loose to medium dense fine to coarse sand (A-2-4, A-3) and have very good to excellent engineering properties.

Respectfully submitted,

Fred M Wescott III
Project Engineering Geologist

FMW

PROJECT: 35032.3.2 U-4439A&B COUNTY: ONSLOW DATE: February 2, 2005 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 + 25%		ROCK	SUITABLE	UNSUITABLE	TOTAL
LEFT SIDE EARTHWORK:														
-L- 11+50 to 40+00	650			195	455	3037		3037	3796	3341			195	195
-L- 40+00 to 68+00	661			198	463	3752		3752	4690	4227			198	198
-L- 68+000 to 73+00	877			263	614	731		731	914	300			263	263
-Y1- 13+00 to 21+71	239			72	167	788		788	985	818			72	72
-Y3- 10+50 to 15+00	509			153	356	396		396	495	139			153	153
LEFT SIDE TOTAL EARTHWORK (cu.yd.)	**2936**			**881**	**2055**	**8704**		**8704**	**10880**	**8825**			**881**	**881**
RIGHT SIDE EARTHWORK:														
-L- 11+50 to 40+00	913			274	639	2426		2426	3033	2394			274	274
-L- 40+00 to 68+00	153			46	107	357		357	446	339			46	46
-L- 68+000 to 73+00	139			42	97	129		129	161	64			42	42
-Y1- 24+26 to 31+50	89			27	62	852		852	1065	1003			27	27
-Y2- 10+50 to 11+75	4			1	3	26		26	33	30			1	1
-Y4- 10+50 to 14+12	231			69	162	34		34	43	0		119	69	188
RIGHT SIDE TOTAL EARTHWORK (cu.yd.)	**1529**			**459**	**1070**	**3824**		**3824**	**4781**	**3830**		**119**	**459**	**578**
MEDIAN EARTHWORK:														
-L- 11+08 to 17+45	91			27	64	162		162	203	139			27	27
MEDIAN TOTAL EARTHWORK (cu.yd.)	**91**			**27**	**64**	**162**		**162**	**203**	**139**			**27**	**27**
TOTAL (LEFT + RIGHT)	**4556**			**1367**	**3189**	**12690**		**12690**	**15864**	**12794**		**119**	**1367**	**1486**
WASTE TO REPLACE BORROW										-119		-119		-119
SELECT MATERIAL TO REPLACE BORROW										-200				
PROJECT TOTAL	**4556**			**1367**	**3189**	**12690**		**12690**	**15864**	**12475**		**0**	**1367**	**1367**
ESTIMATE 5% TO REPLACE TOPSOIL ON BORROW PIT										624				
GRAND TOTAL (CUBIC YARDS)	**4556**									**13099**				
SAY (CUBIC YARDS)	**4600**									**13100**				

ESTIMATED UNDERCUT* 200 CUBIC YARDS

ESTIMATED SELECT MATERIAL* 200 CUBIC YARDS (CLASS II AND/OR III FOR USE WITH FABRIC FOR SOIL STABILIZATION)

**(ESTIMATE 70% OF UNCLASSIFIED EXCAVATION AS SUITABLE*)

* (AS PER "GEOTECHNICAL REPORT - DESIGN AND CONSTRUCTION RECOMMENDATIONS" LETTER DATED MARCH 3, 2004)

PROJECT REFERENCE NO.	SHEET NO.
U-4439	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

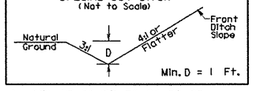
MA Engineering CONSULTANTS, INC.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

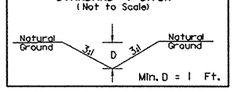
DATUM DESCRIPTION

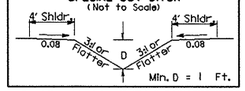
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "U4439-3"
WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF
NORTHING: 361,494.264(ft) EASTING: 2,458,286.934(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999918173
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "U4439-3" TO -L- STATION 10+00.00 IS
S 39° 05' 49.2" W 1,076.756 FEET
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

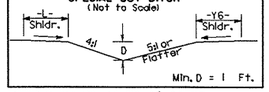
-SBU-

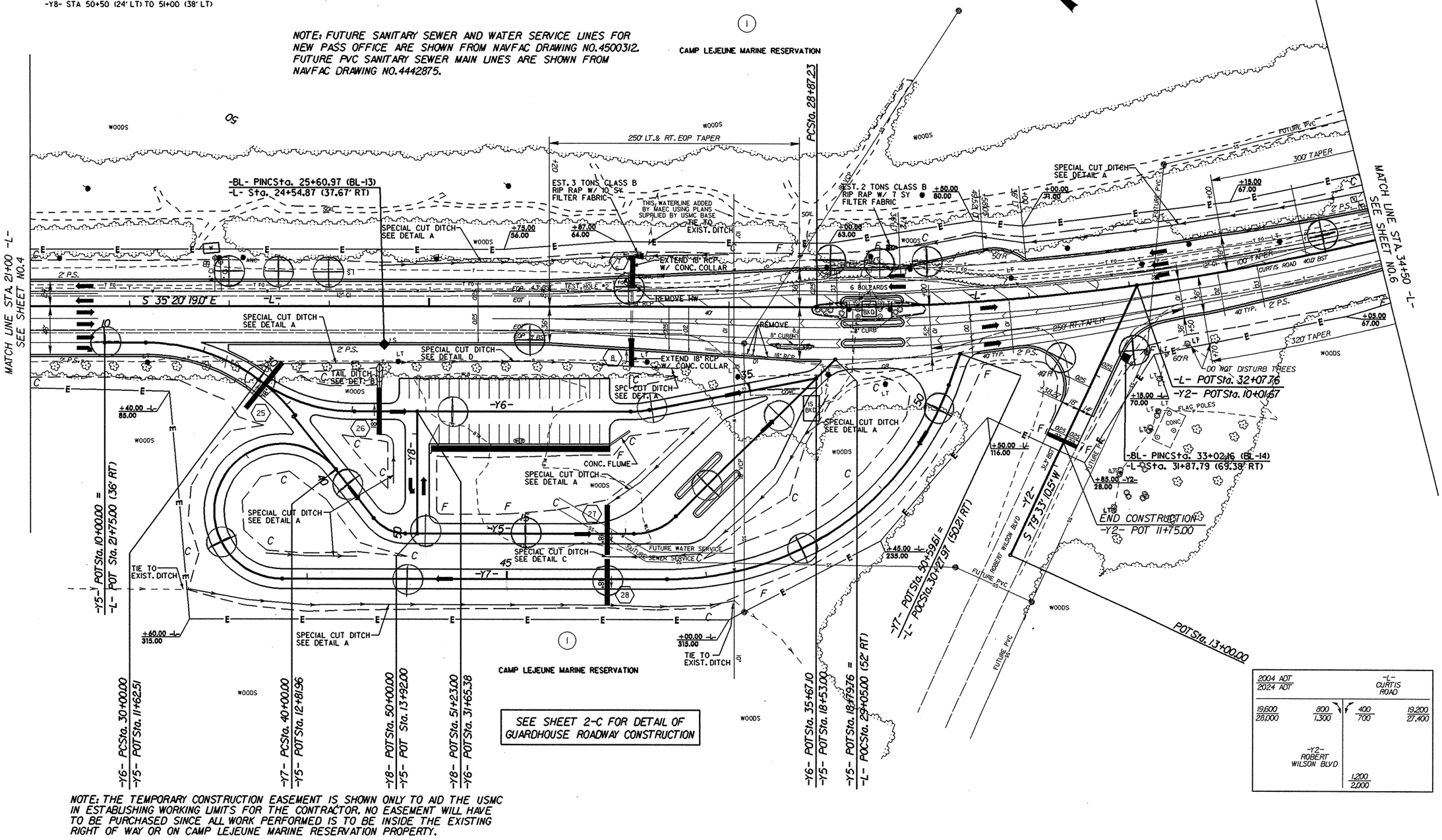
PI Sta 15+47.50	PI Sta 19+09.17
Δ = 6° 39' 47.8" (LT)	Δ = 6° 39' 47.8" (RT)
D = 2° 32' 47.3"	D = 2° 32' 47.3"
L = 261.67'	L = 261.67'
T = 130.98'	T = 130.98'
R = 2,250.00'	R = 2,250.00'
RO = 75'	RO = 75'
SE = NC	SE = NC











8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4439	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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- STA 23+50 RT TO 24+70 RT
-L- STA 26+80 RT TO 27+50 RT
-L- STA 24+50 LT TO 28+00 LT
-L- STA 29+70 LT TO 50+00 LT
-Y5- STA 15+81.47 LT TO 17+50 LT
-Y5- STA 16+50 RT TO 18+50 RT
-Y5- STA 15+81.47 LT TO 17+50 LT
-Y7- STA 42+16 (53' RT) TO 47+22 RT
-Y7- STA 42+50 LT TO 43+50 LT
-Y8- STA 50+50 (24' LT) TO 51+00 (38' LT)

-L- STA 24+50 (81' RT TO 56' RT)

-Y7- STA 46+00 LT TO 47+00 LT

-L- STA 24+70 RT TO 26+80 RT

SEE SHEET NO. 10 FOR -L- PROFILE.
SEE SHEET NO. 13 FOR -Y2- PROFILE.
SEE SHEET NO. 14 FOR -Y5- AND -Y6- PROFILES.
SEE SHEET NO. 15 FOR -Y7- AND -Y8- PROFILES.

-L-
PI Sta 31+85.55
Δ = 14° 46' 51.8" (LT)
D = 2° 29' 28.3"
L = 593.33'
T = 298.32'
R = 2,299.93'
RO = 120'
SE = 0.03 ft/ft

NOTE: FUTURE SANITARY SEWER AND WATER SERVICE LINES FOR NEW PASS OFFICE ARE SHOWN FROM NAVFAC DRAWING NO. 4500312. FUTURE PVC SANITARY SEWER MAIN LINES ARE SHOWN FROM NAVFAC DRAWING NO. 4442875.

SEE SHEET 2-C FOR DETAIL OF GUARDHOUSE ROADWAY CONSTRUCTION

NOTE: THE TEMPORARY CONSTRUCTION EASEMENT IS SHOWN ONLY TO AID THE USMC IN ESTABLISHING WORKING LIMITS FOR THE CONTRACTOR. NO EASEMENT WILL HAVE TO BE PURCHASED SINCE ALL WORK PERFORMED IS TO BE INSIDE THE EXISTING RIGHT OF WAY OR ON CAMP LEJEUNE MARINE RESERVATION PROPERTY.

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/17/99

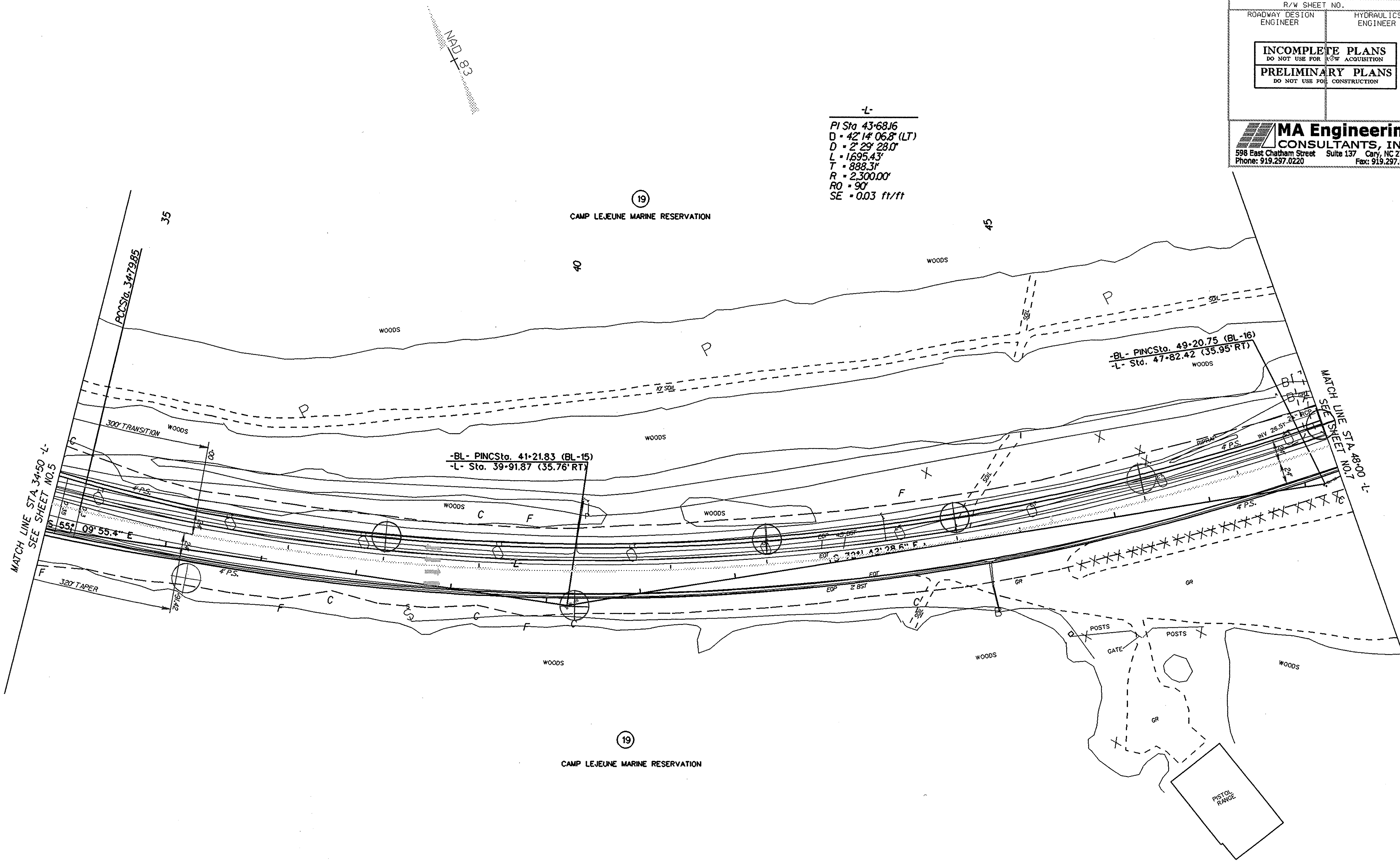
PROJECT REFERENCE NO.	SHEET NO.
U-4439	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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

REVISIONS


NAD 83
-L-
PI Sta 43+68.16
Δ = 42° 14' 06.8" (LT)
D = 2° 29' 28.0"
L = 1,695.43'
T = 888.31'
R = 2,300.00'
RO = 90'
SE = 0.03 ft/ft
19
CAMP LEJEUNE MARINE RESERVATION
35
40
45
WOODS
PCCSta. 34+79.85
-BL- PINCSta. 49+20.75 (BL-16)
-L- Sta. 47+82.42 (35.95' RT)
-BL- PINCSta. 41+21.83 (BL-15)
-L- Sta. 39+91.87 (35.76' RT)
MATCH LINE STA. 34+50 -L-
SEE SHEET NO. 5
MATCH LINE STA. 48+00 -L-
SEE SHEET NO. 7
300' TRANSITION
320' TAPER
S 55° 09' 55.4" E
4' P.S.
POSTS
GATE
GR
PISTOL RANGE
19
CAMP LEJEUNE MARINE RESERVATION

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$$

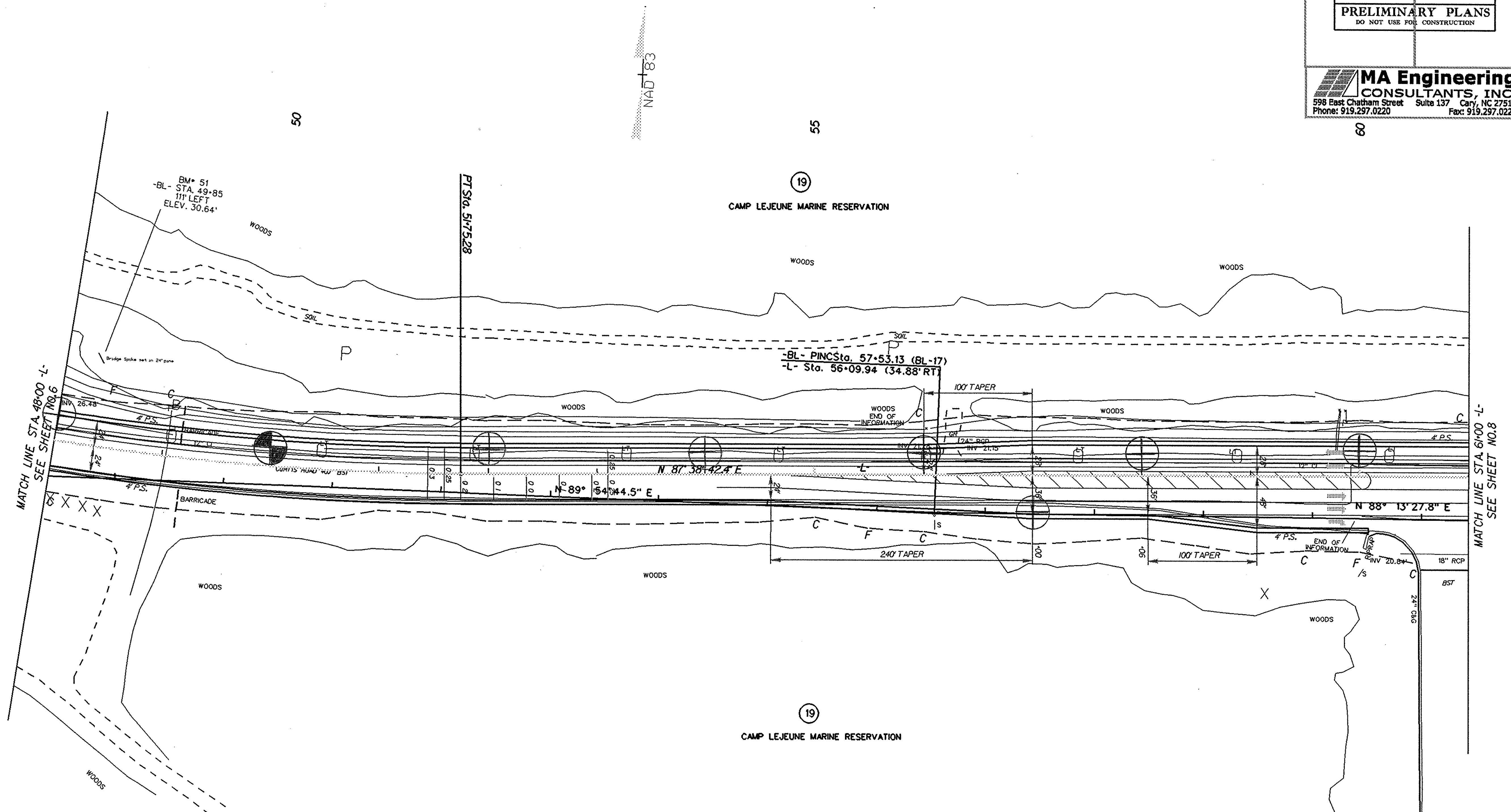
PROJECT REFERENCE NO.	SHEET NO.
U-4439	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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



8/17/9?
$$$$$$SYSTIME$$$$$$
$$$$$$DGN$$$$$$
$$$$USERNAME$$$$

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4439	8

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-4439	9
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

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REVISIONS

8/17/99

MATCH LINE STA. 26+50 -Y1-
SEE SHEET NO.4

NAD 83

(19) CAMP LEJEUNE MARINE RESERVATION

-Y1-
Pi Sta 30+75.35
Fs = 3°15'00.0"
Ls = 200.00'
LT = 133.36'
ST = 66.69'

(15) DANIEL G. KAMIN
PLUM POINTE LLC.
DB 1600 PG 808
MB 30 PG 177

(16) TRUSTEES OF MAPLE HURST PRIMITIVE BAPTIST CHURCH
DB 228 PG 640

(17) ACEY FRANKLIN TAYLOR
DB 440 PG 359

(18) PHILLIP R. PIERCE and wife LOIS C. PIERCE
DB 692 PG 259
MB 4 PG 13

S 37° 06' 29.9" W
S 37° 38' 59.7" W

-Y1-
TSSta. 29+42.00
SCSta. 31+42.00
PTSta. 35+00.00

BEGIN CONSTRUCTION
-Y1- POC 31+50.00

-Y1-
PI Sta 33+21.62
D = 11°38'06.6" (LT)
D = 3°15'00.0"
L = 358.00
T = 179.62'
R = 1762.95'

-BY- POTSta. 29+22.63 (BY-101)
-Y1- Sta. 32+55.35 (13.31' LT)

S 22° 45' 53.2" W

S 48° 20' 58" E 222.35'

MATCH LINE STA. 18+00 -Y1-
SEE SHEET NO.4

-BY- POTSta. 5+00.00 (BY-100)

POTSta. 10+00.00

(13) ANNE L. ARAGONA
DB 1583 PG 615

(12) BEN ARAGONA
DB 1822 PG 900

(11) GRACE LOCKLEAR GRANT
DB 745 PG 496

(10) GIRISH PATEL and wife SUDHA PATEL
DB 1807 PG 743

(9) CASHION AND LENNING, INC.
DB 1533 PG 1009

(4) JOE LEE WENSIL DB 1281 PG 636
and wife BEEDIE RUTH WENSIL MB 29 PG 82

S 32° 20' 38.9" W
S 32° 43' 18.9" W

BEGIN CONSTRUCTION
-Y1- POT 13+00.00

(19) CAMP LEJEUNE MARINE RESERVATION

-Y1-
PI Sta 18+21.56
D = 5°18'20.8" (RT)
D = 1°00'00.0"
L = 530.58'
T = 265.48'
R = 5729.58'

PCSta 15+56.08

MATCH LINE STA. 18+00 -Y1-
SEE SHEET NO.4

$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$$$$$$$$$$$$$$$CELL$$$$$$$$$$$$$$$$$$
$$$$$$USERNAME$$$$$

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

PROJECT REFERENCE NO. U-4439 | SHEET NO. 10

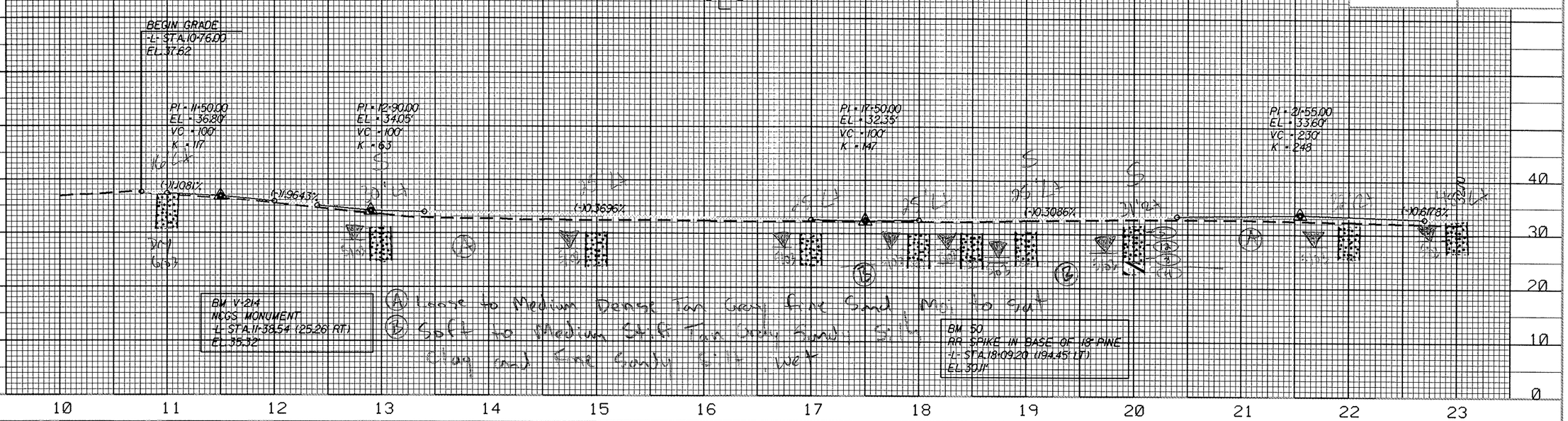
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

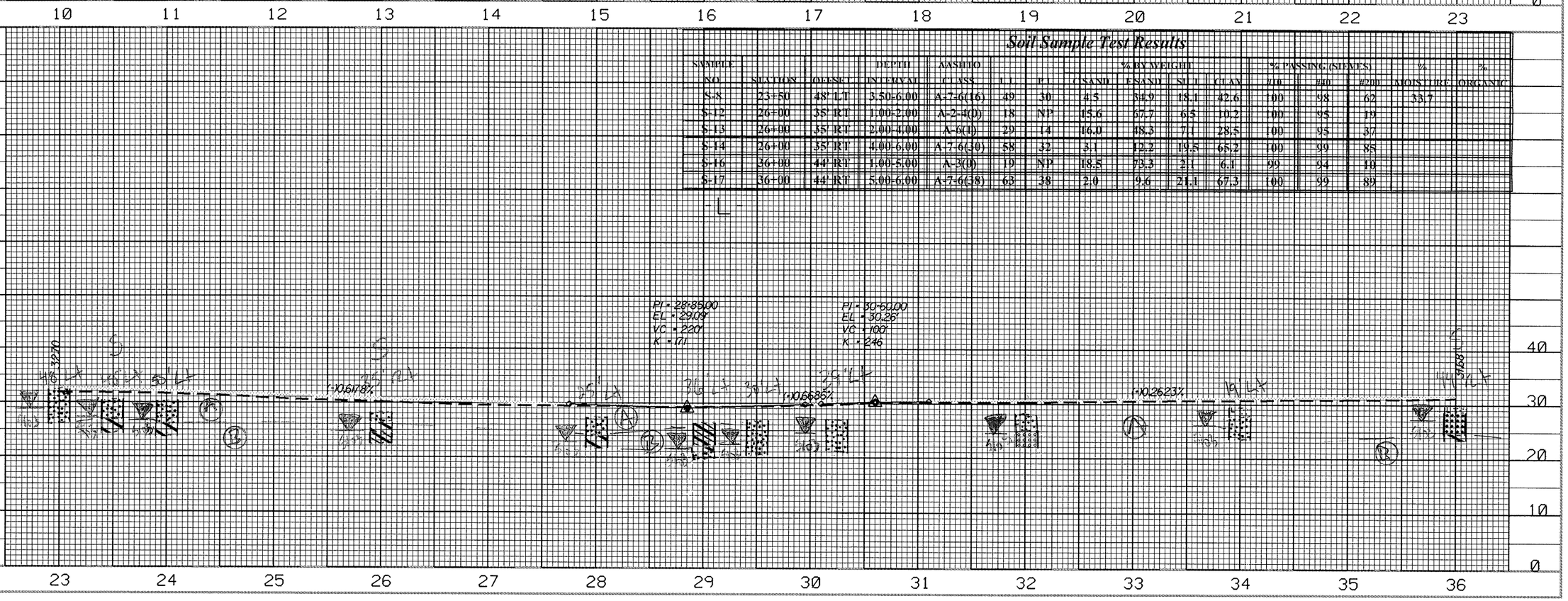
Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	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
S-11	13+00	30' LT	1.00-6.00	A-2-4(0)	18	NP	15.6	67.7	6.5	10.2	100	96	12		
S-9	19+00	25' LT	1.00-6.00	A-2-4(0)	19	NP	19.3	62.7	8.9	9.2	100	94	25		
SS-1	20+00	31' RT	1.00-1.50	A-2-4(0)	19	NP	16.1	66.1	7.6	10.2	99	94	22		
SS-2	20+00	31' RT	5.00-6.50	A-2-4(0)	19	NP	9.9	68.3	10.6	11.2	100	98	32		
SS-3	20+00	31' RT	7.50-9.00	A-7-6(19)	48	21	1.6	19.6	23.8	55.0	100	99	82		



Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	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
S-8	23+50	48' LT	3.50-6.00	A-7-6(16)	49	30	4.5	34.9	18.1	42.6	100	98	62	33.7	
S-12	26+00	35' RT	1.00-2.00	A-2-4(0)	18	NP	15.6	67.7	6.5	10.2	100	95	19		
S-13	26+00	35' RT	2.00-4.00	A-6(1)	29	14	16.0	48.3	7.1	28.5	100	95	37		
S-14	26+00	35' RT	4.00-6.00	A-7-6(30)	58	32	3.1	12.2	19.8	65.2	100	99	85		
S-16	36+00	44' RT	1.00-5.00	A-3(0)	19	NP	18.5	73.3	2.1	6.1	99	94	10		
S-17	36+00	44' RT	5.00-6.00	A-7-6(38)	63	38	2.0	9.6	21.1	67.3	100	99	89		



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598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

PROJECT REFERENCE NO.	SHEET NO.
U-4439	11

ROADWAY DESIGN ENGINEER

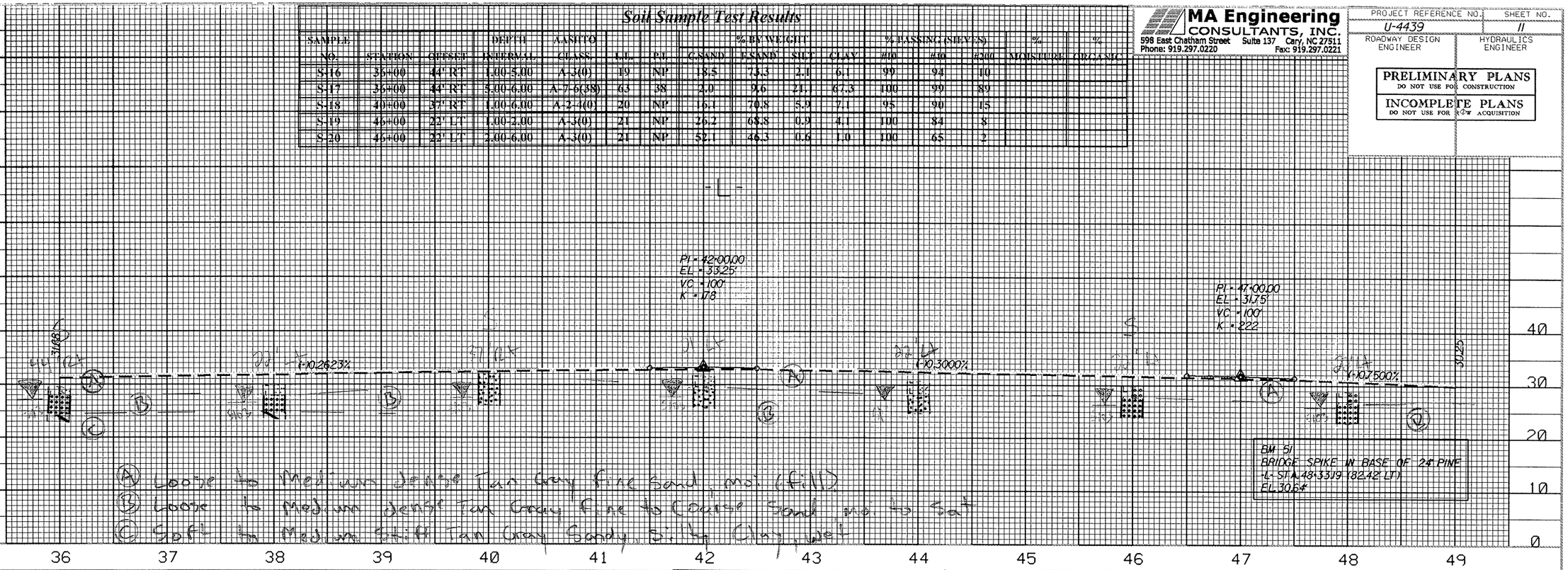
HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

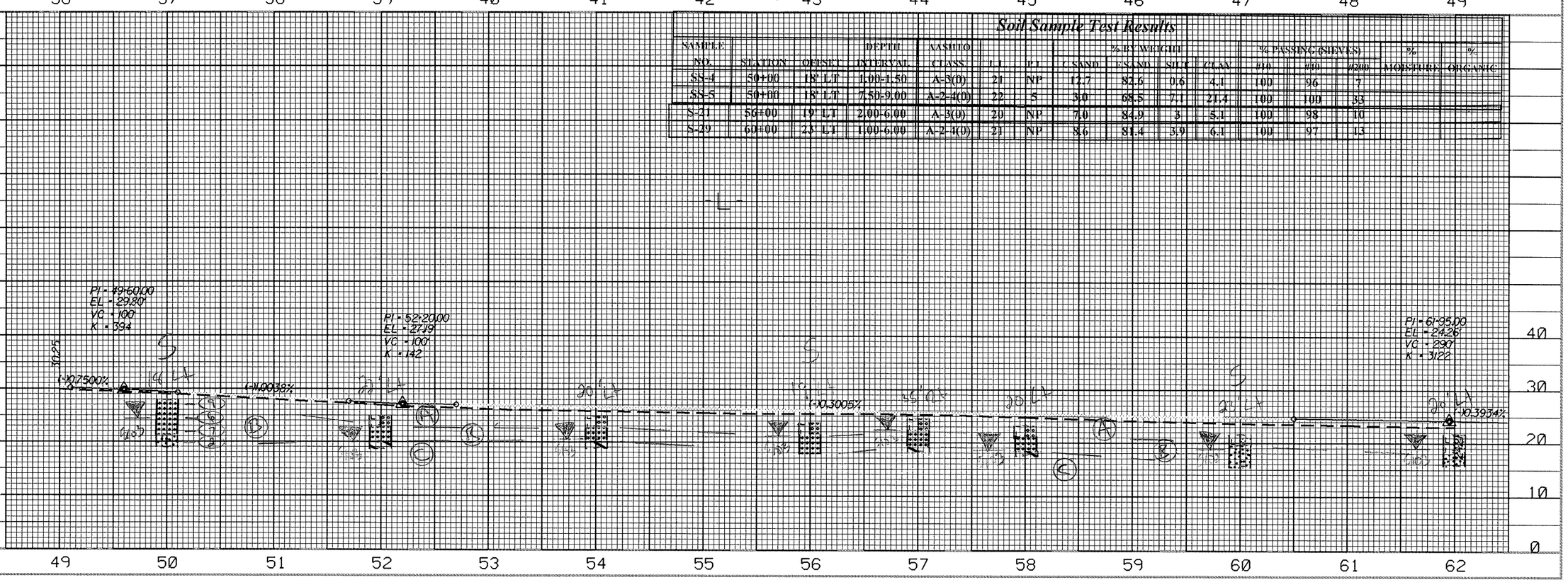
Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-16	35+00	44' RT	1.00-5.00	A-3(0)	19	NP	18.5	73.3	2.1	6.1	99	94	10		
S-17	35+00	44' RT	5.00-6.00	A-7-6(38)	63	38	2.0	9.6	21.1	67.3	100	99	89		
S-18	40+00	37' RT	1.00-6.00	A-2-4(0)	20	NP	16.1	70.8	5.9	7.1	95	90	15		
S-19	46+00	22' LT	1.00-2.00	A-3(0)	21	NP	26.2	68.8	0.9	4.1	100	84	8		
S-20	46+00	22' LT	2.00-6.00	A-3(0)	21	NP	52.1	46.3	0.6	1.0	100	65	2		



Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
SS-4	50+00	18' LT	1.00-1.50	A-3(0)	21	NP	12.7	82.6	0.6	4.1	100	96	7		
SS-5	50+00	18' LT	7.50-9.00	A-2-4(0)	22	5	3.0	68.5	7.1	21.4	100	100	33		
S-21	56+00	19' LT	2.00-6.00	A-3(0)	20	NP	7.0	84.9	3	5.1	100	98	10		
S-29	60+00	23' LT	1.00-6.00	A-2-4(0)	21	NP	8.6	81.4	3.9	6.1	100	97	13		



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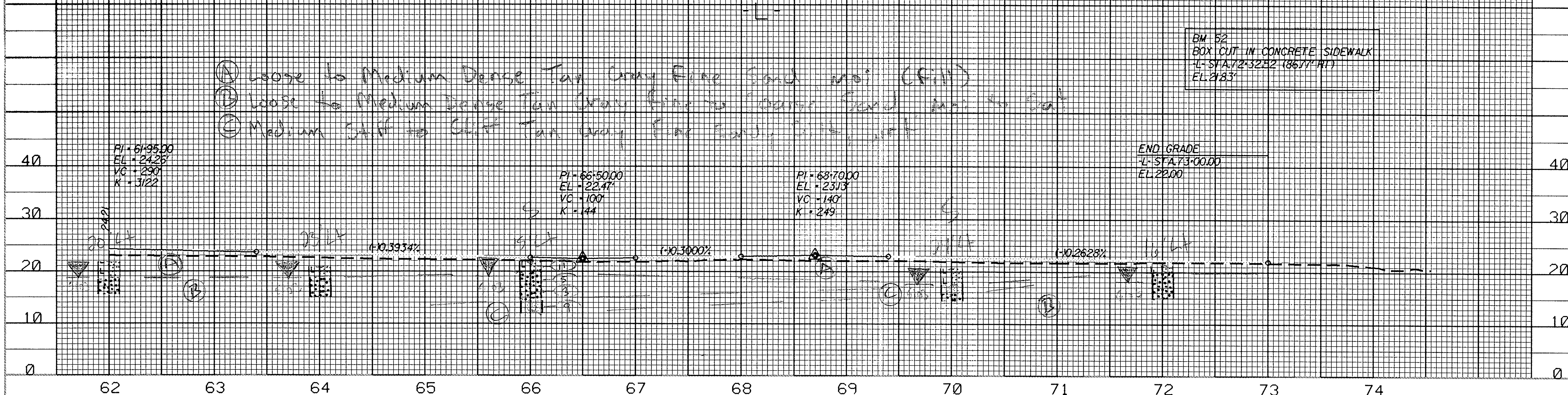
PROJECT REFERENCE NO.	SHEET NO.
U-4439	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

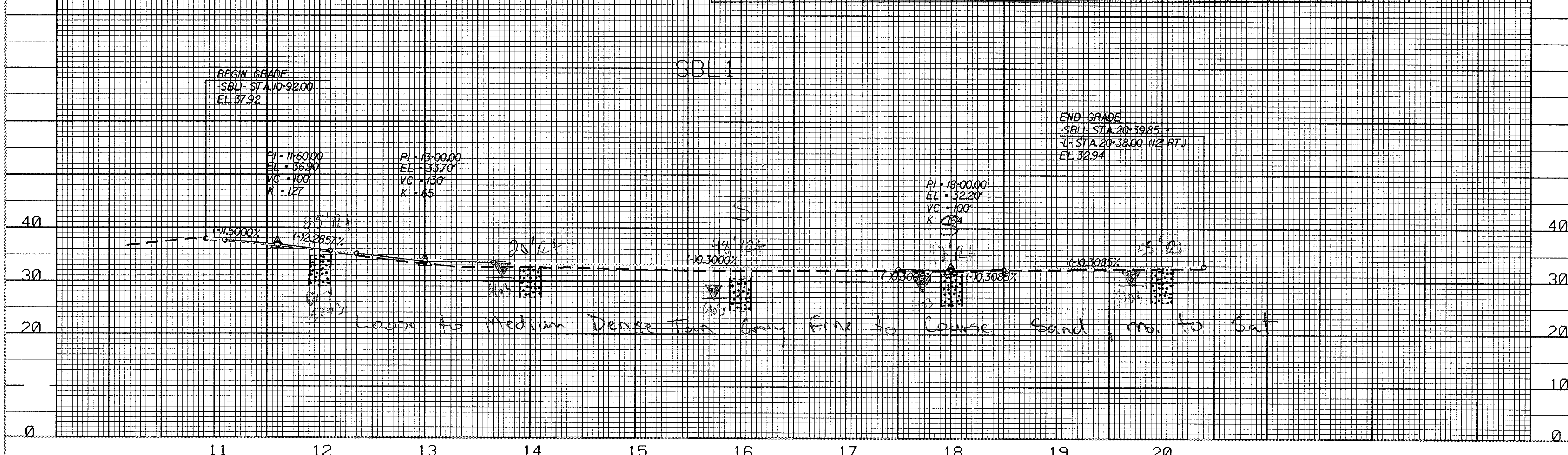
Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
SS-6	66+00	15' LT	1.00-1.50	A-2-4(0)	20	NP	12.1	79	1.7	7.1	98	94	12		
SS-7	66+00	15' LT	7.50-9.00	A-4(0)	24	8	4.9	60.9	9.8	24.5	100	99	42		
S-27	70+00	24' LT	3.50-5.00	A-2-4(0)	19	NP	14.3	75.4	3.2	7.1	97	93	12		
S-28	70+00	24' LT	3.50-5.00	A-4(2)	25	7	0.8	52.4	16.2	30.6	100	100	58		



Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	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	16+00	48' LT	1.00-3.50	A-2-4(0)	23	NP	20.1	60.4	9.3	10.1	100	94	23		6.8
S-6	18+00	12' LT	4.00-6.00	A-2-4(0)	19	NP	7.3	76.7	7.9	8.1	100	98	23		



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PROJECT REFERENCE NO.	SHEET NO.
U-4439	13

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

-SBL2-

BEGIN GRADE
-SBL2- STA. 26+14.11 •
-L- STA. 26+14.11
EL. 30.76

PI = 27+60.00
EL = 29.87'
VC = 120'
K = 136

PI = 29+50.00
EL = 30.39'
VC = 100'
K = 501

PI = 31+00.00
EL = 31.10'
VC = 100'
K = 112

PI = 32+10.00
EL = 30.64'
VC = 100'
K = 146

END GRADE
-SBL2- STA. 32+73.76 •
-L- STA. 32+71.42
EL. 30.81

(-)0.6100%
(-)0.2737%
(-)0.4733%
(-)0.4182%
(-)0.2657%

50' LT
53' LT

A Very Loose to Medium Dense Tan Clayey Fine Sand Moist to Wet

B Soft to Medium Stiff Tan Clayey Sandy Silts Moist to Wet

-Y2-

BEGIN GRADE
-Y2- STA. 10+43.27
-SBL2- STA. 31+86.35 (36.00' RT.) EOP
EL. 31.06'

-Y2- STA. 10+00.00
-SBL2- STA. 32+10.37
EL. 30.73'

PI = 10+95.00
EL = 29.17'
VC = 90'
K = 31

END GRADE
-Y2- STA. 11+75.00
EL. 28.57'

(-)0.7627%
(-)0.5536%
(-)0.7500%

Very Loose to Medium Dense Tan Clayey Fine Sand Moist

Soil Sample Test Results

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS	LL	PI	% BY WEIGHT C SAND	F SAND	SILT	CLAY	% PASSING (SIEVES) #10	#40	#200	% MOISTURE	% ORGANIC
S-20	12+00	18' LT	1.00-4.00	A-2-4(0)	19	NP	14.1	75.2	4.6	6.1	98	94	13		
S-24	13+00	21' LT	1.00-2.50	A-4(1)	26	7	3.5	57.1	17.9	22.4	99	98	46		
S-25	13+00	21' LT	2.50-6.00	A-2-4(0)	19	3	6.4	65.7	8.5	19.4	98	96	31		

-Y3-

BEGIN GRADE
-Y3- STA. 10+50.00
EL. 22.22

PI = 11+70.00
EL = 22.58'
VC = 100'
K = 166

PI = 12+95.00
EL = 22.20'
VC = 90'
K = 148

PI = 13+90.00
EL = 22.49'
VC = 100'
K = 146

PI = 14+85.00
EL = 22.13'
VC = 90'
K = 117

END GRADE
-Y3- STA. 15+36.00
-L- STA. 68+03.15 (24.00' LT.) EOP
EL. 22.33

-Y3- STA. 15+60.00
-L- STA. 68+03.16
EL. 22.23

(-)0.3000%
(-)0.3040%
(-)0.3053%
(-)0.3789%
(-)0.3922%
(-)1.2500%

Very Loose to Medium Dense Tan Clayey Fine Sand Moist to Wet

-Y4-

A Soft to Medium Stiff Tan Clayey Fine Sandy Silts Moist to Wet

BEGIN GRADE
-Y4- STA. 10+36.00
-L- STA. 68+09.65 (36.00' RT.) EOP
EL. 22.05'

-Y4- STA. 10+00.00
-L- STA. 68+09.54
EL. 22.95

PI = 11+40.00
EL = 22.79
VC = 100'
K = 89

END GRADE
-Y4- STA. 14+12.00
EL. 21.66

(-)2.5000%
(+)0.7115%
(-)0.3454%

Very Loose to Medium Dense Tan Clayey Fine Sand Moist to Wet

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PROJECT REFERENCE NO.	SHEET NO.
U-4439	14

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
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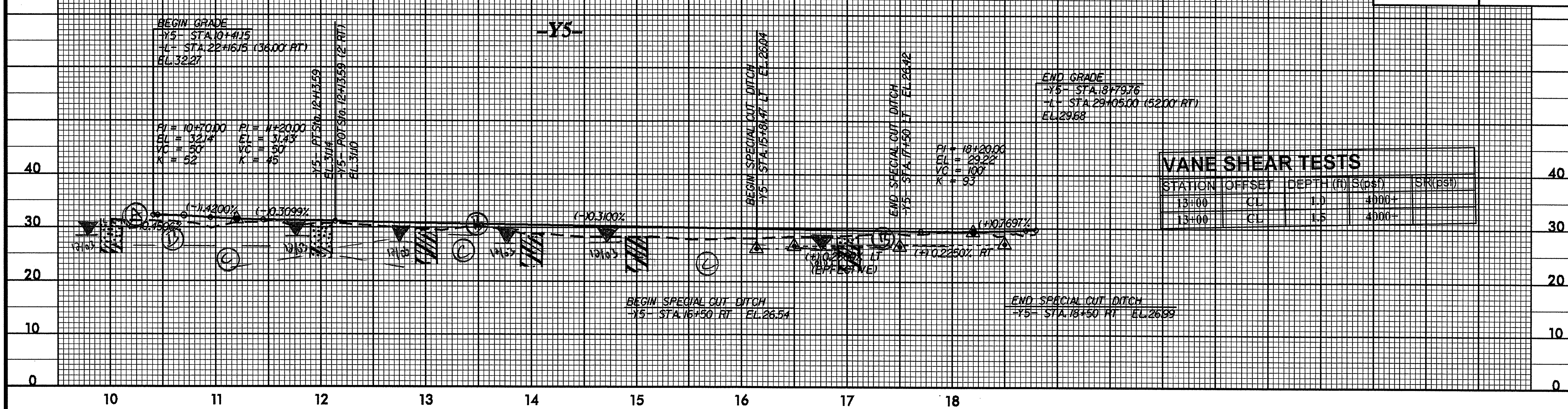
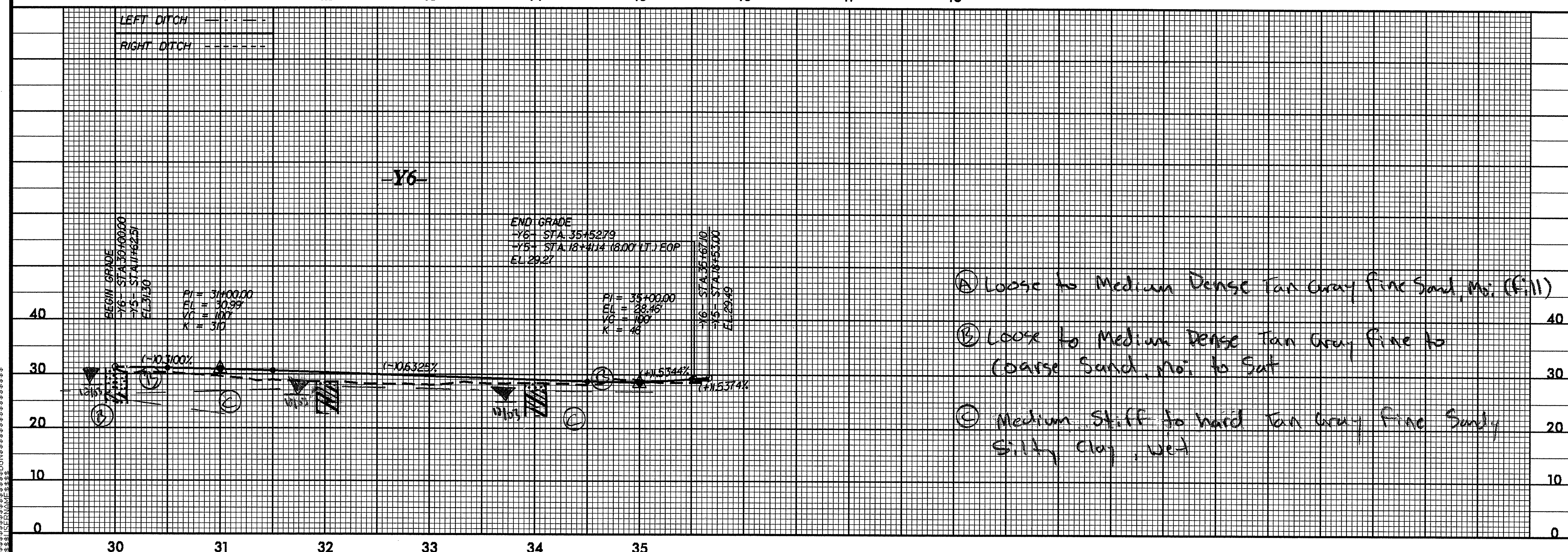
5/28/99


-Y5-
BEGIN GRADE
-Y5- STA.10+41.15
-L- STA.22+16.15 (36.00' RT)
EL.32.27
PI = 10+70.00
EL = 32.41
VC = 50
K = 52
PI = 11+20.00
EL = 31.43
VC = 30
K = 45
-Y5- PT STA. 12+13.59
EL.31.14
-Y5- POT STA. 12+13.59 (2' RT)
EL.31.10
(-)1.4200%
(-)0.3099%
(-)0.3100%
BEGIN SPECIAL CUT DITCH
-Y5- STA.15+81.47 LT EL.26.04
END SPECIAL CUT DITCH
-Y5- STA.17+50 LT EL.26.42
PI = 18+20.00
EL = 29.22
VC = 100
K = 93
(+)0.7697%
(+)0.2250% RT
(EFFECTIVE)
END GRADE
-Y5- STA.18+79.76
-L- STA.29+05.00 (52.00' RT)
EL.29.68
BEGIN SPECIAL CUT DITCH
-Y5- STA.16+50 RT EL.26.54
END SPECIAL CUT DITCH
-Y5- STA.18+50 RT EL.26.99
40
30
20
10
0
10
11
12
13
14
15
16
17
18

VANE SHEAR TESTS

STATION	OFFSET	DEPTH (ft)	S(psf)	SR(psf)
13+00	CL	1.0	4000+	
13+00	CL	1.5	4000+	


LEFT DITCH
RIGHT DITCH
-Y6-
BEGIN GRADE
-Y6- STA.30+00.00
-Y5- STA.11+62.51
EL.31.30
PI = 31+00.00
EL = 30.99
VC = 100
K = 310
(-)0.3100%
(-)0.6325%
END GRADE
-Y6- STA.35+52.79
-Y5- STA.18+41.14 (8.00' LT.) EOP
EL.29.21
PI = 35+00.00
EL = 28.46
VC = 100
K = 46
-Y6- STA.35+67.10
-Y5- STA.18+53.00
EL.29.49
(+)1.5344%
(+)1.5374%
40
30
20
10
0
30
31
32
33
34
35

Ⓐ Loose to Medium Dense Tan Gray Fine Sand, Moi. (Fill)

Ⓑ Loose to Medium Dense Tan Gray Fine to Coarse Sand, Moi. to Sat

Ⓒ Medium Stiff to Hard Tan Gray Fine Sandy Silty Clay, wet

$$$$SYSTIME$$$$
$$$$DGN$$$$
$$$$USERNAME$$$$

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PROJECT REFERENCE NO.	SHEET NO.
U-4439	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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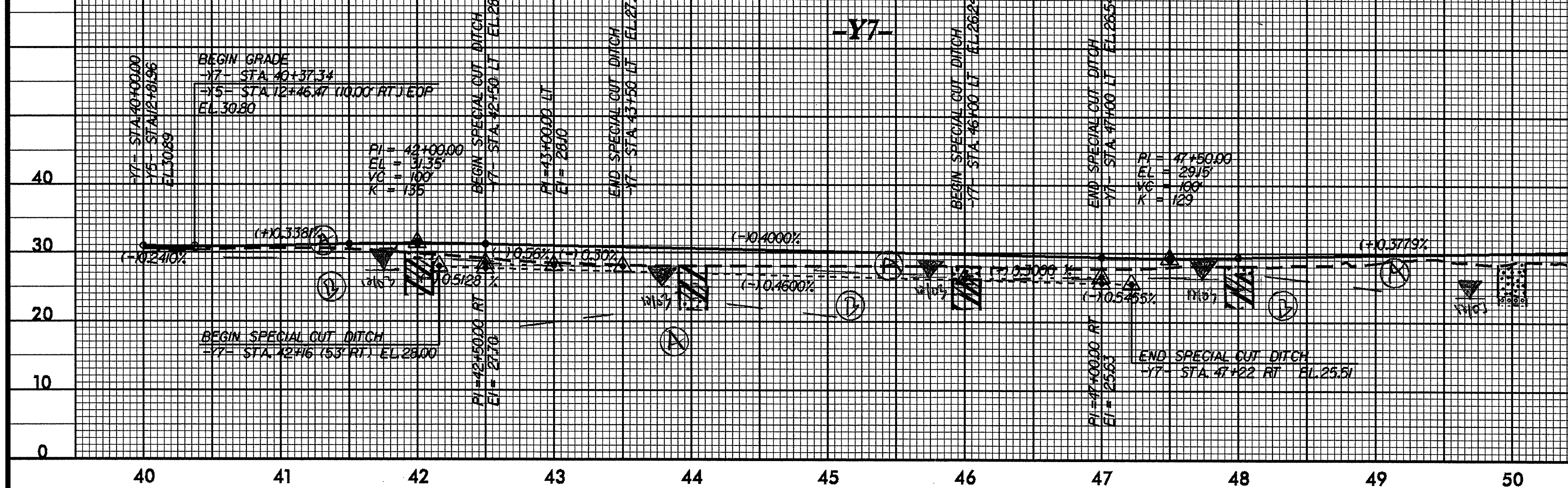
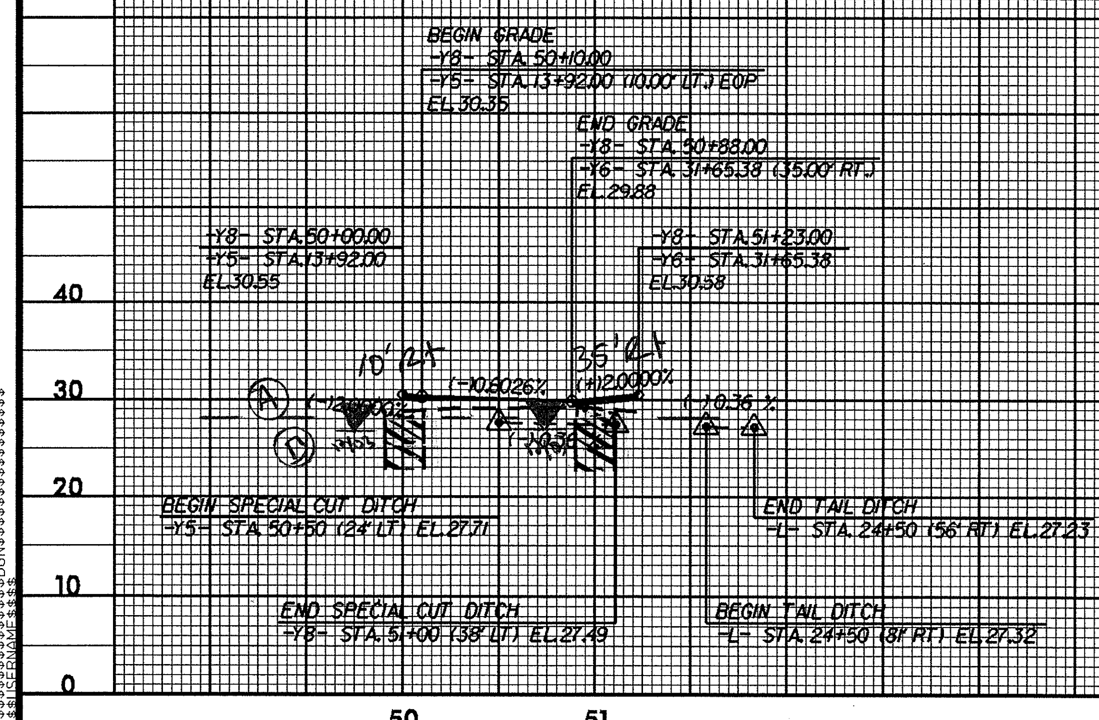


VANE SHEAR TESTS

STATION	OFFSET	DEPTH (ft)	S(psf)	SR(psf)
45+00	CL	1.0	585	
45+00	CL	1.5	960	
45+00	CL	2.0	4000+	
45+00	CL	2.5	4000+	

LEFT DITCH
RIGHT DITCH



(A) Loose to Medium Dense Tan Gray Fine to Coarse Sand, Moi. to Sat.

(B) Medium Stiff to Hard Tan Gray Fine Sandy Silty Clay, wet

5/28/99