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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BB	1	84

REFERENCE: U-2519BB

PROJECT: 34817

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

CROSS SECTIONS

APPENDICES

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *CUMBERLAND*

PROJECT DESCRIPTION *FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1140 (STRICKLAND BRIDGE RD) TO SOUTH OF US 401*

INVENTORY

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. 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.

PERSONNEL

HUNSBERGER, W. S.

HOGLEN, J. R.

TRIGON EXP.

INVESTIGATED BY *WSH*

DRAWN BY *WSH*

CHECKED BY *HAMM, J. R.*

SUBMITTED BY *FALCON*

DATE *MAY 2016*

NORTH CAROLINA PROFESSIONAL SEAL 36283 ENGINEER W. SCOTT HUNSBERGER

DocuSigned by:
W. Scott Hunsberger
EA39AB9EDF5845A...
6/21/2016
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR 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
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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 LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 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
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	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.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES 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 WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 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 WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

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:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. 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, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD 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 FOOT
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 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, SUCH 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:
BORING ELEVATIONS COLLECTED USING "u2519b_ls_tin.tin"
DATED 03/01/2016 ELEVATION: FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING
LT. - LIGHT
DK. - DARK
UCP - UNDIVIDED COASTAL PLAIN

DATE: 8-15-14

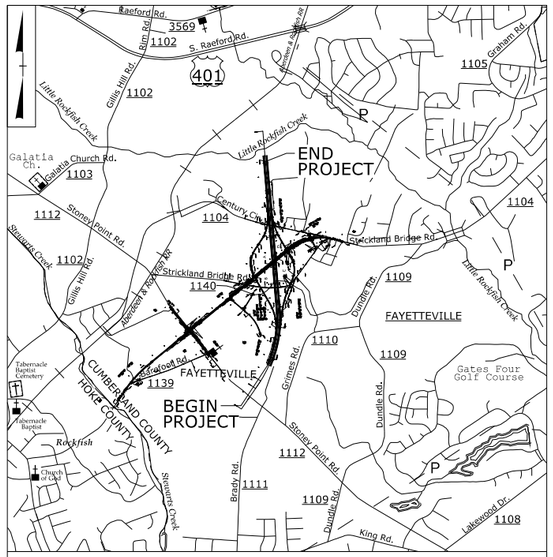
09/08/99

TIP PROJECT: U-2519BB

CONTRACT: _____

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

See Sheet 1 For Index of Sheets



VICINITY MAP

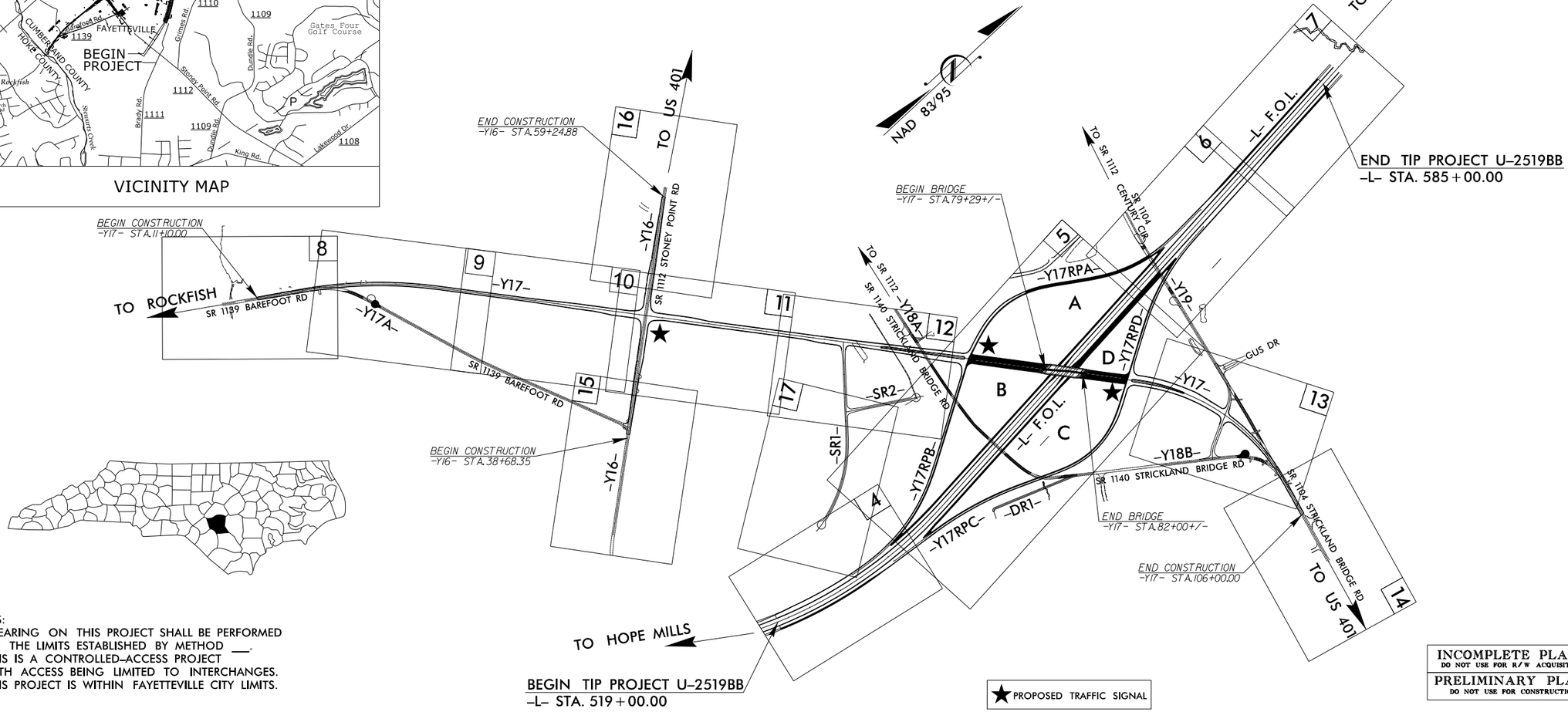
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BB	3	84
STATE WBS NO.	F.A. PROJ. NO.	DESCRIPTION	
34817.1.FR8	NHF-0100(25)	PE	

CUMBERLAND COUNTY

LOCATION: FAYETTEVILLE OUTER LOOP (F.O.L.) FROM SOUTH OF SR 1104 (STRICKLAND BRIDGE ROAD) TO SOUTH OF US 401

TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURE, & SIGNALS



NOTES:
1. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ___.
2. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.
3. THIS PROJECT IS WITHIN FAYETTEVILLE CITY LIMITS.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2018 = 37,400
ADT 2038 = 46,800
K = 8 %
D = 55 %
T = 12 % *
V = 70 MPH
* 4% TTST + 8% DUAL

FUNC CLASS = INTERSTATE
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-2519BB	=	1.250 MILES
LENGTH STRUCTURES TIP PROJECT U-2519BB	=	0.000 MILES
TOTAL LENGTH TIP PROJECT U-2519BB	=	1.250 MILES

Prepared in the Office of:
Mulkey Engineers & Consultants
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 18, 2016

LETTING DATE:
SEPTEMBER 18, 2018

JOHNNY BANKS
MULKEY E & C PROJECT MANAGER

STEVE BROWDE, PE
MULKEY E & C PROJECT DESIGN ENGINEER

NCDOT CONTACT: REKHA PATEL, PE
ROADWAY DESIGN – PROJECT ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

Roadway Subsurface Investigation Report - Inventory

Fayetteville Outer Loop From South of SR 1140 (Strickland Bridge Rd.)
to South of US 401
Cumberland County, North Carolina
WBS: 34817.1.FR8 TIP: U-2519BB
Falcon Project No.: G15058.00

Prepared for:
NCDOT Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, NC 27699-1589

Submitted by:
Falcon Engineering, Inc.
1210 Trinity Road, Suite 110
Raleigh, North Carolina 27607
(919) 871-0800
www.falconengineers.com

May 11, 2016

WBS:	34817.1.FR8
TIP:	U-2519BB
Project ID:	26617
COUNTY:	Cumberland
DESCRIPTION:	Fayetteville Outer Loop from South of SR 1140 (Strickland Bridge Rd.) to South of US 401
SUBJECT:	Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of 6.1 miles of proposed new roadway, realignment and widening in Cumberland County, North Carolina. A new 1.25 mile of the Fayetteville Outer Loop will be constructed from Strickland Bridge Road to south of US 401 including a full diamond interchange at the Strickland Bridge Road grade separation. Strickland Bridge Road will be realigned from Century Circle to Barefoot Road. Stoney Point Road will be widened between Barefoot Road and the new alignment of Strickland Bridge Road. Additional -Y- lines and small drives are also included at various locations.

Included in this project is a bridge structure on alignment -Y17- over alignment -L- from station 79+29 to 82+00, -Y17-. The bridge structure was investigated as a part of this roadway investigation and end bent borings are presented herein. However, the Structure Subsurface Investigation and Foundation Recommendations will be completed at a later date under a separate cover.

The investigation was conducted between January 4, 2016 and February 25, 2016 in general accordance with our Proposal to Provide Geotechnical Engineering Services, dated December 8, 2015. The recommendations provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of eighty-one (81) borings (both Standard Penetration Test (SPT) and Hand Auger borings were drilled for the proposed roadway alignments. All SPT borings were drilled using a CME-55 ATV drill rig equipped with 2 ¼-inch inside diameter hollow-stem augers and an automatic hammer. Seven (7) additional hand auger borings were performed along minor drives and service roads due to access restrictions. Representative soil samples, collected with a split-barrel sampler or hand auger, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for standard proctor compaction and California Bearing Ratio testing.

The following alignments, totaling approximately 6.1 miles were explicitly investigated.

Alignment	Station (ft)
-L- (Fayetteville Outer Loop)	519+10.00—585+00.00
-Y16- (Stoney Point Rd)	38+68.35—59+24.88
-Y17- (Strickland Bridge Rd)	11+10.00—106+00.00
-Y17RPA-	10+00.00—34+37.00
-Y17RPB-	10+00.00—31+23.54
-Y17RPC-	10+00.00—36+07.93
-Y17RPD-	10+00.00—24+44.52
-Y19-	28+00.00—36+71.95
-DR1-	10+00.00—18+50.15
-SR1-	10+31.00—16+47.00
-SR2-	10+10.14—16+47.00

AREAS OF SPECIAL GEOTECHNICAL INTEREST

I. The following locations contain highly plastic soils with plasticity indices (PI) greater than 25 within 3 feet of proposed subgrade elevations:

Station (ft)	Alignment
561+00	-L-
50+00	-Y16-
34+00	-Y17-
25+04	-Y17RPA-
22+00	-Y17RPD-

II. The following locations contain very soft to soft/very loose soils with an N-value less than 4 near the ground surface:

Station (ft)	Alignment
28+00	-Y17RPA-
15+50 to 24+50	-Y17RPB-
21+00	-Y17RPC-
28+00 to 30+00	-Y17RPC-
55+00	-Y17-
16+00	-SR2-

III. The following locations contain organic soils near the ground surface:

Station (ft)	Alignment
15+60	-DR1-
16+00	-SR2-

IV. Shallow ground water was measured within the following areas and may cause groundwater related stability problems during construction:

Station (ft)	Alignment
519+00 to 583+50	-L-
36+50 to 96+00	-Y17-
25+00 to 32+00	-Y17RPA-
15+50 to 29+00	-Y17RPB-
13+00 to 25+00	-Y17RPC-
17+50 to23+00	-Y17RPD-

V. Alluvial soils were encountered at the following locations. The potential for wet, soft or organic soils should be anticipated at these locations:

Station (ft)	Alignment
545+06	-L-
566+94	-L-
15+60	-DR1-

Isolated alluvial soils are likely to exist elsewhere on the site elsewhere between borings in proximity to natural waterways.

VI. Artificial fill was encountered at the following location associated with an apparent dumping site on a private property. Various debris was noted at the ground surface in this vicinity and may extend into the subsurface:

Station (ft)	Alignment
555+00	-L-

PHYSIOGRAPHY AND GEOLOGY

The project site is in the Coastal Plain Physiographic Province of North Carolina. According to the ***Geologic Map of North Carolina*** (1985), the majority of the site is underlain by one major geologic unit in the Coastal Plain Physiographic Provence. A second major geologic unit in the Coastal Plain Physiographic Provence was encountered at the northern portion of the project site. The primary unit is Middendorf Formation (**Km**) of the Cretaceous Period. In the north, the corridor transitions to Cape Fear Formation (**Kc**) of the Cretaceous Period.

The Middendorf Formation is noted to consist of sand, sandstone, and mudstone with clay balls and iron-cemented concretions common. The beds are laterally discontinuous, with cross-bedding common. The Cape Fear Formation is noted to consist of sandstone and sandy mudstone characterized by indurated, graded and laterally continuous bedding, blocky clay, faint cross-bedding, with feldspar and mica common.

Existing site topography is generally flat with some steep slopes near creeks; typical of this area of the Coastal Plain. Drainage swales parallel existing roadway alignments, and carry roadway drainage toward various natural drainage features and creeks. Drainage ditches for agricultural use were encountered in existing agricultural fields. Topography is relatively flat in agricultural areas within the project corridor. Much of the alignment is bordered by residential and commercial properties.

SOIL PROPERTIES

A variety of soils were encountered along the project, including existing roadway embankments, artificial fills not associated with roadway construction, alluvial deposits, undivided coastal plain deposits, and coastal plain formation deposits. Areas where soils at the ground surface are of a unique geologic origin (i.e. not coastal plain soils) are approximately delineated on the boring location plans based on subsurface conditions encountered in nearby borings, and various topographical, vegetative, or other visual surface features.

Roadway Embankment soils were encountered at the ground surface beneath and adjacent to existing roadways. These consist of 3 to 5 feet of moist to wet, loose, silty sand (A-2-4).

Artificial Fill soils were encountered at one location associated with an apparent dumping site on a private property. The soils encountered consist of moist to wet, loose, silty sand (A-2-4). Various debris was noted at the ground surface in this vicinity and may extend into the subsurface.

Alluvial soils were encountered at the ground surface near the historic floodplains of natural waterways. These soils extended to depths of up to approximately 4 feet and consist of wet to saturated, very loose, silty sand (A-2-4) and wet, soft sandy silt (A-4) with trace to little amounts of organic material.

Coastal plain soils were encountered at the ground surface, or beneath fills, roadway embankments, or alluvial deposits extending to the maximum depths explored. These soils consist of dry to saturated, very loose to very dense, clayey and silty sand (A-2-6, A-2-7,A-2-4) and very soft to hard, sandy clay and silt, clayey silt and silty clays (A-4, A-6, A-7). Coastal plain soils encountered include undivided deposits, Middendorf Formation, and Cape Fear Formation deposits.

Topsoil and rootmat was encountered in grassy, brushy, and wooded areas ranging in thickness from 0.1 to 1.0 feet, and typically on the order of 0.4 to 0.7 feet.

Cultivated soils were in agricultural lands ranging in thickness from 0.3 to 1.2 feet, and typically on the order of 0.8 feet. These soils consist of wet, silty sand (A-2-4) with organic staining and some vegetative matter from recent crops.

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in some cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential areas were backfilled immediately after completion due to safety considerations.

The project crosses small streams and tributaries as well as agricultural and roadway drainage ditches. Groundwater was observed at shallow depths near these streams and in low lying areas. In addition, many of the deeper ditches on site had standing water in them, and some low lying areas were inundated with water throughout the investigation. Detailed groundwater measurements are included in the attached subsurface profiles and cross sections, and noted areas of shallow groundwater are included in the Areas of Special Geotechnical Interest earlier in this report.

ADDITIONAL LABORATORY TESTING

The following bulk samples were obtained:

Sample	Location	Depth (ft)	Test
BS-1	15+49, 6'LT, -Y17RPD-	1 – 8.0	California Bearing Ratio, Standard Proctor
BS-2	15+63, 2'RT, -Y17RPA-	1 – 8.0	California Bearing Ratio, Standard Proctor
BS-3	564+00, CL, -L-	1 – 8.0	California Bearing Ratio, Standard Proctor
BS-4	48+95, 5' LT, -Y17-	1 – 6.0	California Bearing Ratio, Standard Proctor
BS-5	31+00, CL, -Y17-	1 – 7.0	California Bearing Ratio, Standard Proctor
BS-6	576+00, CL, -L-	1 – 9.0	California Bearing Ratio, Standard Proctor

Classification test results for bulk samples are included in the subsurface profiles and cross sections and Standard Proctor and California Bearing Ratio (CBR) data is attached in the Appendix.

CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

Report Prepared By:

W. Scott Hunsberger, PE
Geotechnical Engineer

Report Reviewed By:

Jeremy R. Hamm, PE
Geotechnical Engineering Manager

8/17/99

REVISIONS

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WWW.MULKEYINC.COM
NC License No. C-1021

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	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

-L-

PIs Sta 510+25.55
θs = 2° 14′ 59.4″
Ls = 300.00′
LT = 200.02′
ST = 100.01′

PI Sta 523+30.69
Δ = 35° 01′ 11.1″ (LT)
D = 1° 29′ 59.6″
L = 2,334.82′
T = 1,205.17′
R = 3,820.00′
Vd = 70 MPH
SUPER = 6%

PIs Sta 535+60.37
θs = 2° 14′ 59.4″
Ls = 300.00′
LT = 200.02′
ST = 100.01′

-Y17RPB-

PIs Sta 11+82.77
θs = 2° 26′ 11.1″
θs = 5° 59′ 34.0″
Ls = 320.00′
LT = 182.77′
ST = 137.78′

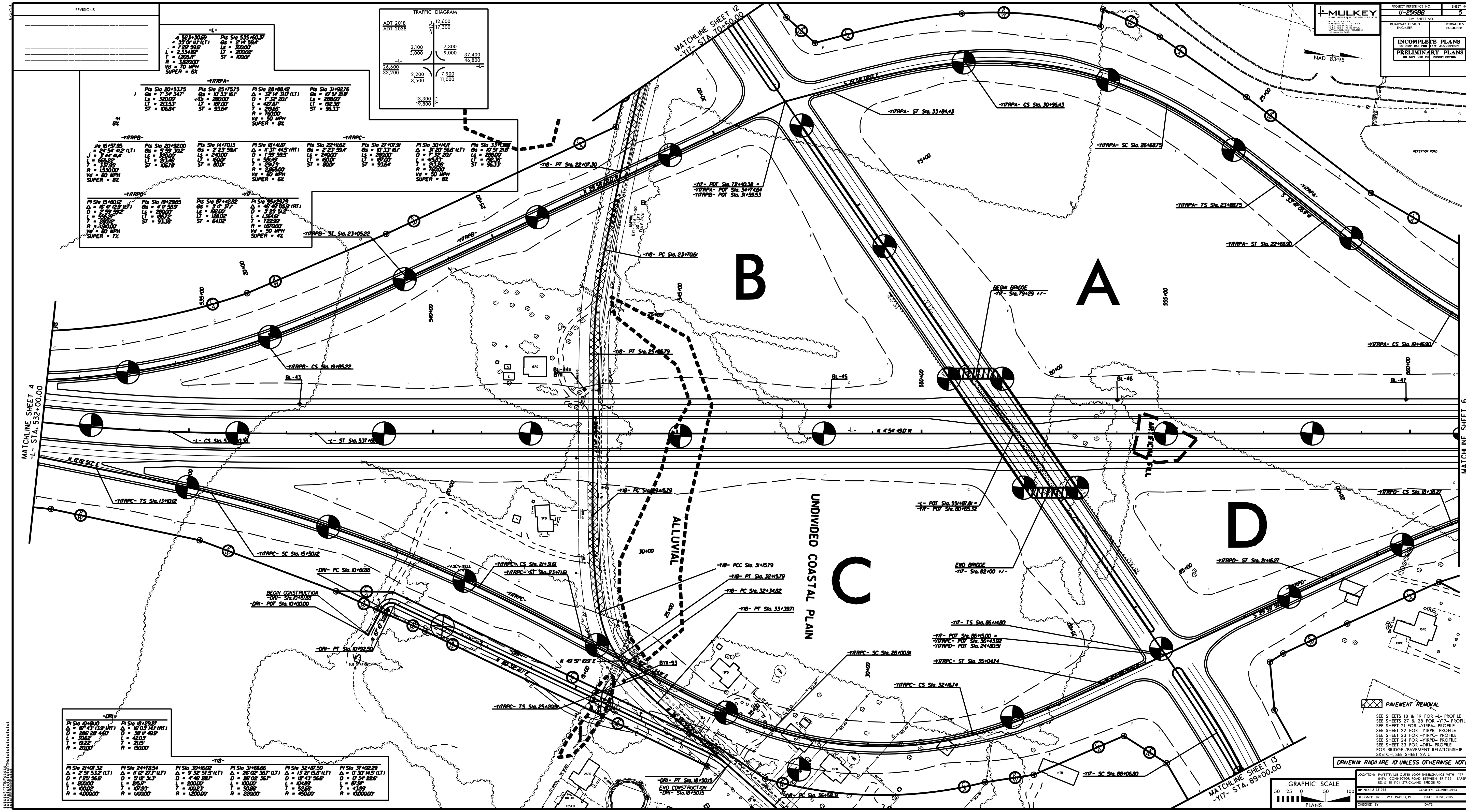
PI Sta 16+57.95
Δ = 24° 54′ 41.2″ (LT)
D = 3° 44′ 41.4″
L = 665.22′
T = 337.95′
R = 1,530.00′
Vd = 60 MPH
SUPER = 8%

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "BREEZE" WITH NAD 83/95 STATE PLANE GRID COORDINATES OF:
NORTHING: 455,401.488 (FT) EASTING: 2,024,426.703 (FT)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS 0.999880000
THE N.C. LAMBERT GRID BEARING & LOCALIZED HORIZONTAL GROUND DISTANCE FROM "BREEZE" TO -L- STATION 520+00.00 IS
S88°57′34.8″W 35,172.187′
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES.
VERTICAL DATUM USED IS NAVD 88.

SEE SHEET 18 FOR -L- PROFILE
SEE SHEET 22 FOR -Y17RPB- PROFILE
SEE SHEET 23 FOR -Y17RPC- PROFILE

DRIVEWAY RADII ARE 10′ UNLESS OTHERWISE NOTED



REVISIONS
TRAFFIC DIAGRAM
MULKEY
INCOMPLETE PLANS
PRELIMINARY PLANS
NAD 83/95
MATCHLINE SHEET 12 -Y17- STA. 70+50.00
MATCHLINE SHEET 4 -L- STA. 532+00.00
MATCHLINE SHEET 6 -L- STA. 561+00.00
MATCHLINE SHEET 13 -Y17- STA. 89+00.00
A
B
C
D
ALLUVIAL
UNDIVIDED COASTAL PLAIN
BEGIN BRIDGE
END BRIDGE
BEGIN CONSTRUCTION
END CONSTRUCTION
PAVEMENT REMOVAL
SEE SHEETS 18 & 19 FOR -L- PROFILE
SEE SHEETS 27 & 28 FOR -Y17- PROFILE
SEE SHEET 21 FOR -Y1RPA- PROFILE
SEE SHEET 22 FOR -Y1RPB- PROFILE
SEE SHEET 23 FOR -Y1RPC- PROFILE
SEE SHEET 24 FOR -Y1RPD- PROFILE
SEE SHEET 33 FOR -DR1- PROFILE
FOR BRIDGE /PAVEMENT RELATIONSHIP SKETCH, SEE SHEET 2A-5
DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED
GRAPHIC SCALE
50 25 0 50 100
PLANS

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	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

NAD 83/95

8/17/99

REVISIONS

MATCHLINE SHEET 5
-L- STA. 561+00.00

MATCHLINE SHEET 7
-L- STA. 575+00.00

UNDIVIDED COASTAL PLAIN

ALLUVIAL FLOODPLAIN

ROADWAY EMBANKMENT

-Y19- PC 13+60.57

BEGIN CONSTRUCTION
-Y19- Sta. 15+00.00

END CONSTRUCTION
-Y19- Sta. 15+96.41

-Y19- PT 16+19.83

-Y19- PC 17+76.78

-Y19- PT 19+57.40

BEGIN CONSTRUCTION
-Y19- Sta. 21+20.33

-Y19- PC 21+49.53

-Y19- PT 22+42.89

END CONSTRUCTION
-Y19- Sta. 22+25.90

BY12-98

BL-48
BY12

BL-49

BL-50

BL-51

-Y17RPA- SC Sta. 15+00.33

-Y17RPA- TS Sta. 11+80.33

-Y17RPA- POT Sta. 10+00.00 =
-L- POT Sta. 570+00.00
59.0' LT
Δ = 2° 18' 00"

-Y17RPD- SC Sta. 12+80.00

-Y17RPD- ST Sta. 10+00.00 =
-L- POT Sta. 569+06.16
59.0' RT

BM#189
BL- STA 256+89
235 RIGHT
ELEV 210.81'

S 7° 53' 08.7" E

S 17° 35' 58.0" E

S 78° 53' 34.9" E

S 78° 21' 29.2" E

N 4° 54' 49.0" W

S 2° 36' 49.0" E

-Y17RPA-

Pls Sta 13+93.85	Pl Sta 17+26.18
Θs = 7° 34' 34.7"	Δ = 21° 08' 46.5" (RT)
Ls = 320.00'	D = 4° 44' 06.7"
LT = 213.53'	L = 446.58'
ST = 106.84'	T = 225.86'
	R = 1,210.00'
	Vd = 60 MPH
	SUPER = 8%

-Y17RPD-

Pls Sta 11+86.72	Pl Sta 15+60.12
Θs = 4° 11' 58.9"	Δ = 16° 41' 12.9" (LT)
Ls = 280.00'	D = 2° 59' 59.2"
LT = 186.72'	L = 556.27'
ST = 93.38'	T = 280.12'
	R = 1,910.00'
	Vd = 60 MPH
	SUPER = 7%

-Y19-

Pl Sta 14+90.24	Pl Sta 18+67.09	Pl Sta 21+96.21
Δ = 3° 42' 49.3" (LT)	Δ = 1° 17' 36.9" (LT)	Δ = 0° 32' 05.7" (RT)
D = 1° 25' 56.6"	D = 0° 42' 58.3"	D = 0° 34' 22.6"
L = 259.26'	L = 180.62'	L = 93.36'
T = 129.68'	T = 90.31'	T = 46.68'
R = 4,000.00'	R = 8,000.00'	R = 10,000.00'

PAVEMENT REMOVAL

SEE SHEETS 19 & 20 FOR -L- PROFILE
SEE SHEET 21 FOR -Y1RPA- PROFILE
SEE SHEET 24 FOR -Y1RPD- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	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

SEE SHEET 20 FOR -L- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

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

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	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

-Y17-
PIs Sta 15+19.42
θs = 0° 40' 29.8"
Ls = 90.00'
LT = 60.00'
ST = 30.00'

SEE SHEET 25 FOR -Y17- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

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

-Y17-		
PIs Sta 15+19.42	PI Sta 20+90.55	PIs Sta 26+54.53
Θs = 0° 40' 29.8"	Δ = 16° 07' 31.8" (RT)	Θs = 0° 40' 29.8"
Ls = 90.00'	D = 1° 29' 59.6"	Ls = 90.00'
LT = 60.00'	L = 1,075.11'	LT = 60.00'
ST = 30.00'	T = 541.13'	ST = 30.00'
	R = 3,820.00'	
	Vd = 50 MPH	
	SUPER = 3%	

-Y17A-		
PIs Sta 17+77.48	PI Sta 29+52.74	
Θs = 11° 56' 11.8"	Δ = 4° 53' 05.6" (LT)	
Ls = 250.00'	D = 0° 57' 17.7"	
LT = 167.05'	L = 511.55'	
ST = 83.68'	T = 255.93'	
	R = 6,000.00'	

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NC License No C-0701

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	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

REVISIONS
8/17/99

NAD 83/95

UNDIVIDED COASTAL PLAIN

-Y17- CS Sta. 26+24.53

-Y17- ST Sta. 27+14.53

-Y17- SC Sta. 15+49.42

-Y17A- CS Sta. 16+93.80

-Y17A- ST Sta. 19+43.80

BEGIN CONSTRUCTION
-Y17A- Sta.18+68.82

END CONSTRUCTION
-Y17A- Sta.19+70.51

BY9-88

BY9-87

N 50° 36' 18.3" E

N 71° 42' 23.5" E

SR 1139 BARETOOT RD

MATCHLINE SHEET 8
-Y17- STA. 15+00.00

MATCHLINE SHEET 10
-Y17- STA. 28+50.00

PAVEMENT REMOVAL

SEE SHEETS 25 & 26 FOR -Y17- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$ISCREATED$$$$

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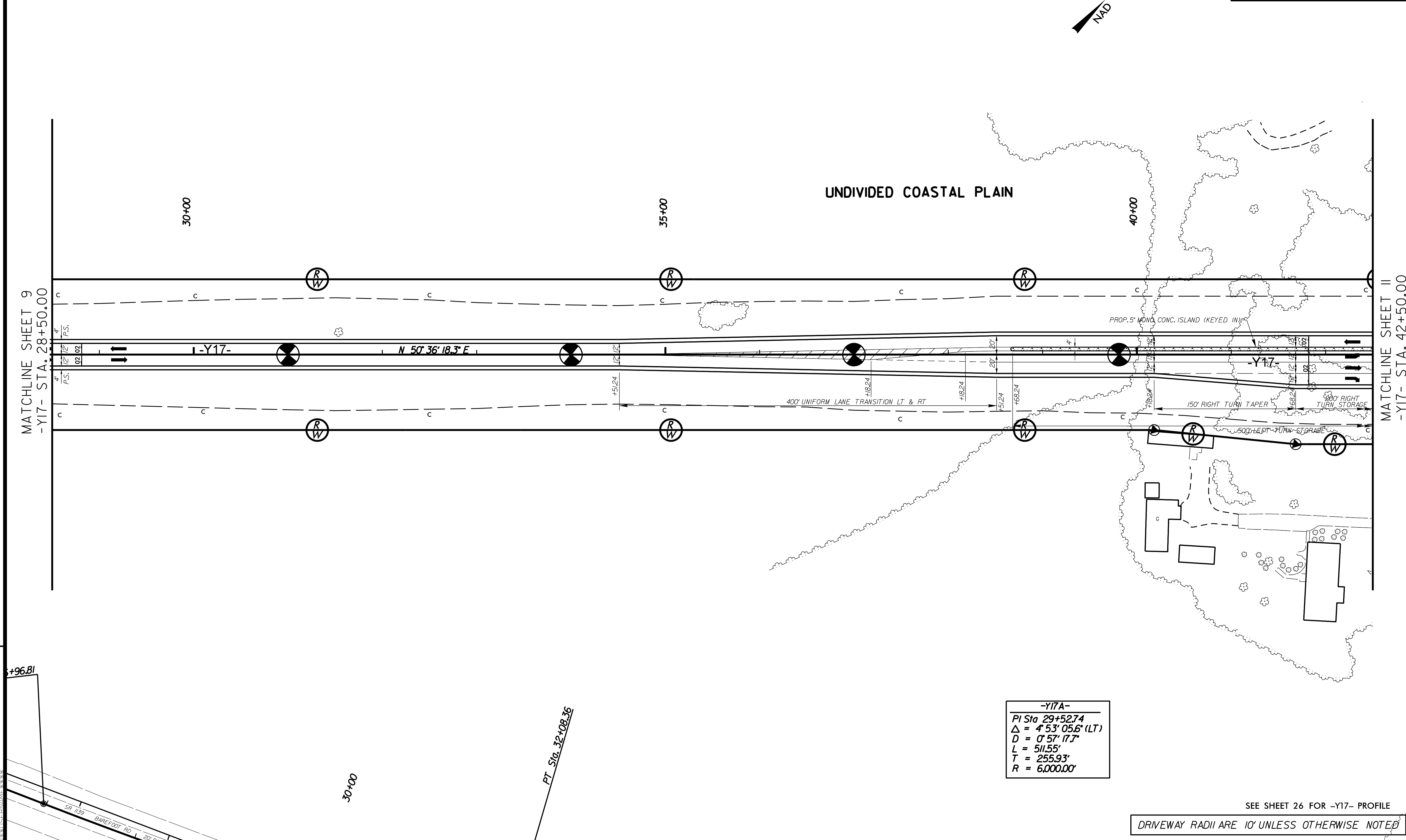
PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/99



-Y17A-
PI Sta 29+52.74
Δ = 4° 53' 05.6" (LT)
D = 0° 57' 17.7"
L = 511.55'
T = 255.93'
R = 6,000.00'

SEE SHEET 26 FOR -Y17- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

8/17/99

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	11
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

NAD 83/95

MATCHLINE SHEET 16
-Y16- STA. 52+00.00

MATCHLINE SHEET 10
-Y17- STA. 42+50.00

MATCHLINE SHEET 12
-Y17- STA. 56+50.00

ISFD

-Y16- POT Sta. 48+97.04 =
-Y17- POT Sta. 44+56.41

50+00

45+00

55+00

-Y17-

N 50° 36' 18.3" E

ROADWAY EMBANKMENT

BY8-79

10' CONC

-Y16-

N 38° 35' 49.4" W

72' CHL

45+00

UNDIVIDED COASTAL PLAIN

NURSERY

GREENHOUSES

STONEY POINT RD
-Y16-

MATCHLINE SHEET 15
-Y16- STA. 42+50.00

TRAFFIC DIAGRAM

ADT 2018
ADT 2038

9,300
12,800

1,900
2,900

3,500
4,900

12,600
17,300

-Y17-

8,200
11,700

2,900
4,300

5,700
7,900

12,500
17,200

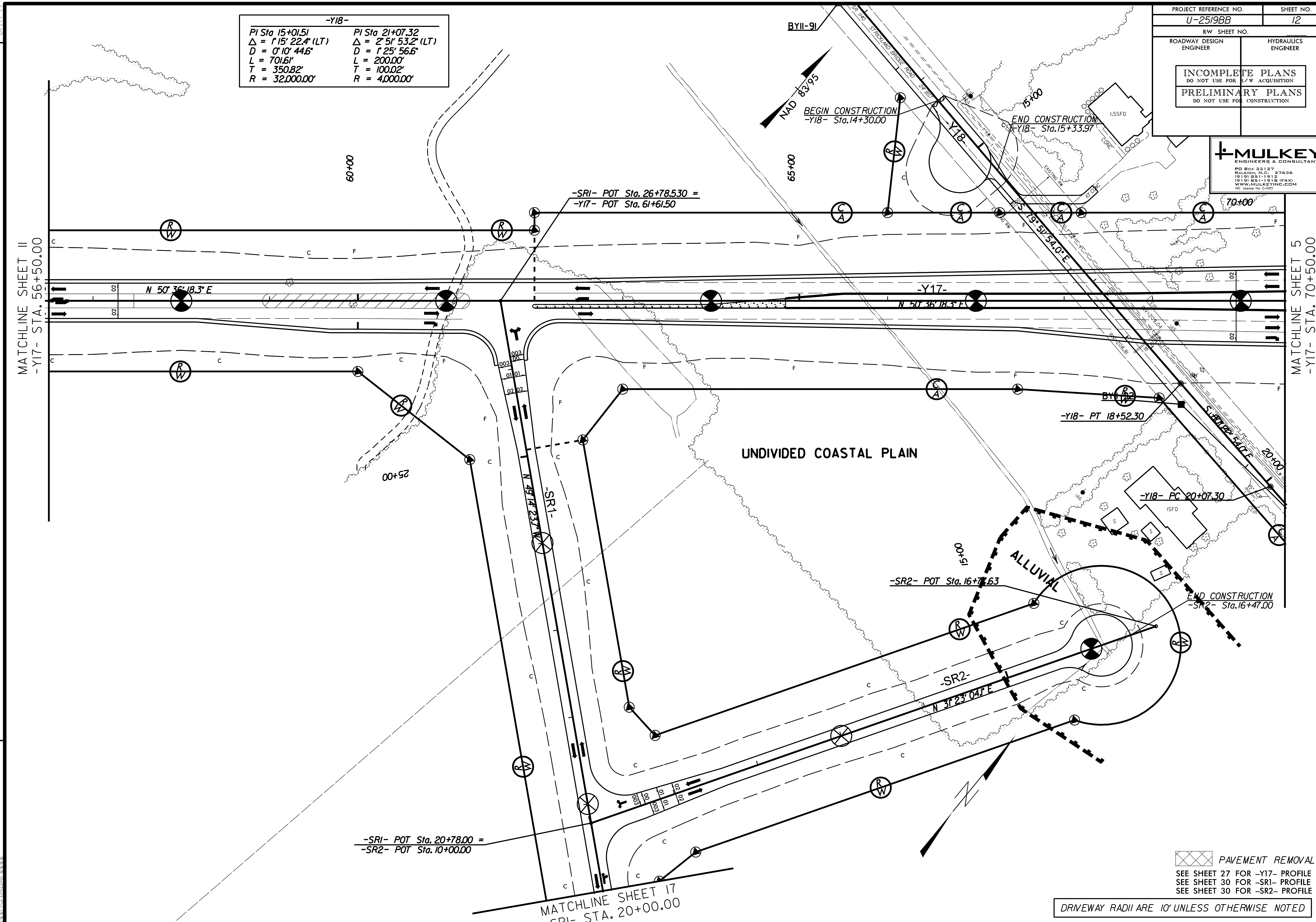
STONEY POINT RD
-Y16-

-Y17-

SEE SHEETS 24 & 25 FOR -Y16- PROFILE
SEE SHEETS 26 & 27 FOR -Y17- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

$$$$CKTIME$$$$
$$$$SIGN$$$$
$$$$USERNAME$$$$


PROJECT REFERENCE NO. U-2519BB
SHEET NO. 12
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
MULKEY ENGINEERS & CONSULTANTS
PO Box 33127
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(919) 851-1918 (FAX)
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BYII-91
NAD 83/95
BEGIN CONSTRUCTION
-YI8- Sta.14+30.00
END CONSTRUCTION
-YI8- Sta.15+33.97
-Y18-
15+00
60+00
65+00
70+00
-SRI- POT Sta. 26+78.530 =
-YI7- POT Sta. 61+61.50
N 50° 36' 18.3" E
-Y17-
S 79° 51' 54.0" E
MATCHLINE SHEET II
-YI7- STA. 56+50.00
MATCHLINE SHEET 5
-YI7- STA. 70+50.00
-YI8- PT 18+52.30
UNDIVIDED COASTAL PLAIN
25+00
-SR1-
N 49° 14' 23.7" W
-YI8- PC 20+07.30
20+00
ALLUVIAL
-SR2- POT Sta. 16+71.63
END CONSTRUCTION
-SR2- Sta.16+47.00
-SR2-
N 31° 23' 04.1" E
-SRI- POT Sta. 20+78.00 =
-SR2- POT Sta. 10+00.00
MATCHLINE SHEET I7
-SRI- STA. 20+00.00
PAVEMENT REMOVAL
SEE SHEET 27 FOR -YI7- PROFILE
SEE SHEET 30 FOR -SRI- PROFILE
SEE SHEET 30 FOR -SR2- PROFILE
DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED
REVISIONS
8/17/99

-YI8-

PI Sta 15+01.51	PI Sta 21+07.32
Δ = 1° 15' 22.4" (LT)	Δ = 2° 51' 53.2" (LT)
D = 0° 10' 44.6"	D = 1° 25' 56.6"
L = 701.61'	L = 200.00'
T = 350.82'	T = 100.02'
R = 32,000.00'	R = 4,000.00'

8/17/99

REVISIONS

-Y17-
PI Sta 95+29.79
Δ = 46° 49' 05.9" (RT)
D = 3° 25' 51.2"
L = 1,364.61'
T = 722.99'
R = 1,670.00'
Vd = 50 MPH
SUPER = 4%

PIs Sta 102+35.43
θs = 3° 17' 37.1"
Ls = 192.00'
LT = 128.02'
ST = 64.02'

-Y18B-
PIs Sta 50+18.42
θs = 33° 12' 53.8"
Ls = 400.00'
LT = 271.52'
ST = 137.75'

PI Sta 51+94.07
Δ = 15° 34' 21.1" (RT)
D = 16° 36' 26.9"
L = 93.77'
T = 47.17'
R = 345.00'

-Y19-
PI Sta 30+93.33
Δ = 51° 34' 20.0" (RT)
D = 22° 02' 12.6"
L = 234.03'
T = 125.61'
R = 260.00'
Vd = 35 MPH
SUPER = 6%

PI Sta 36+11.90
Δ = 28° 06' 05.2" (LT)
D = 22° 55' 05.9"
L = 122.62'
T = 62.57'
R = 250.00'

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	13
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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NAD 83/95

LREMC SUBSTATION

BEGIN CONSTRUCTION
-Y19- Sta. 28+00.00

-Y19- PC Sta. 29+67.72

BY12-99

-Y19- PT Sta. 32+01.74

-Y17- POC Sta. 95+11.52 =
-Y19- POT Sta. 32+78.31

MATCHLINE SHEET 5
-Y17- STA. 89+00.00

UNDIVIDED COASTAL PLAIN

-Y19- PC=35+49.33

-Y19- POC Sta. 36+71.95 =
-Y18- POT Sta. 46+99.48

BY11-95

BY11-276 = GPS 76R
32' OF 24" STEEL CASING

END CONSTRUCTION
-Y18- Sta. 50+11.34

-Y18- SC Sta. 51+46.90

-Y18- CS Sta. 52+40.67

-Y17- CS Sta. 101+71.41

BEGIN CONSTRUCTION
-Y18- Sta. 49+10.00

-Y18- TS Sta. 47+46.90

AQUA AMERICA WELL (AATUR)

MATCHLINE SHEET 14
-Y17- STA. 103+50.00

TRAFFIC DIAGRAM

	-Y19-	
ADT 2018 / ADT 2038	1,100 / 1,400	
-Y17-	1,000 / 1,300	100 / 100
13,300 / 19,800	2,200 / 2,700	100 / 100 — -Y17- 10,300 / 16,000
	2,300 / 2,800 — -Y19-	

PAVEMENT REMOVAL

SEE SHEET 28 FOR -Y17- PROFILE
SEE SHEET 29 FOR -Y19- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y17-
PIs Sta 102+35.43
Θs = 3° 17' 37.5"
Ls = 192.00'
LT = 128.02'
ST = 64.02'

SEE SHEET 28 FOR -Y17- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

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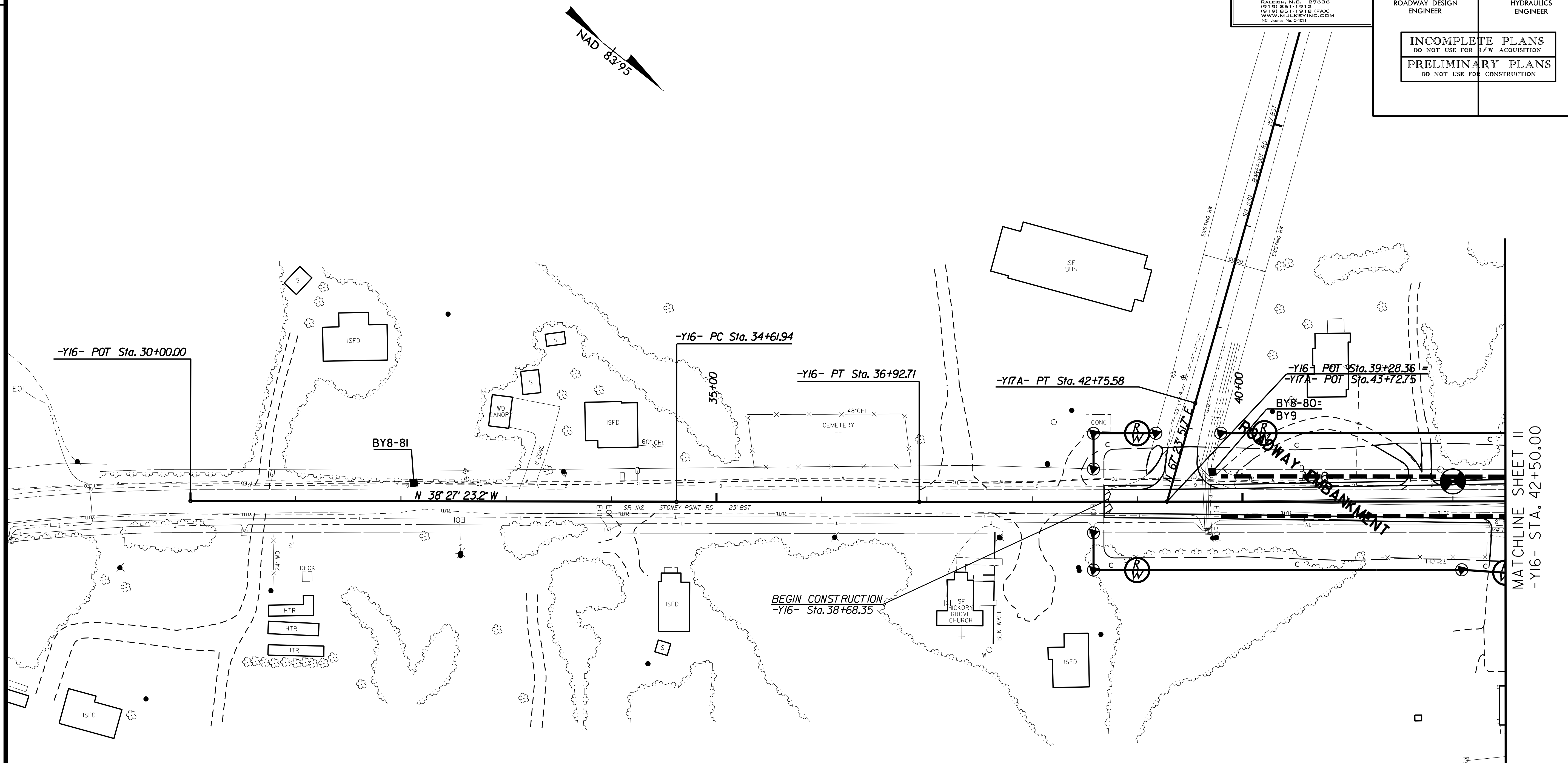
PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

REVISIONS

8/17/99



-Y16-	-Y17A-
PI Sta 35+77.33	PI Sta 40+24.23
Δ = 0° 07' 56.0" (LT)	Δ = 0° 34' 33.8" (RT)
D = 0° 03' 26.3"	D = 0° 06' 52.5"
L = 230.76'	L = 502.71'
T = 115.38'	T = 251.36'
R = 100,000.00'	R = 50,000.00'

SEE SHEET 24 FOR -Y16- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

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

8/17/99

REVISIONS

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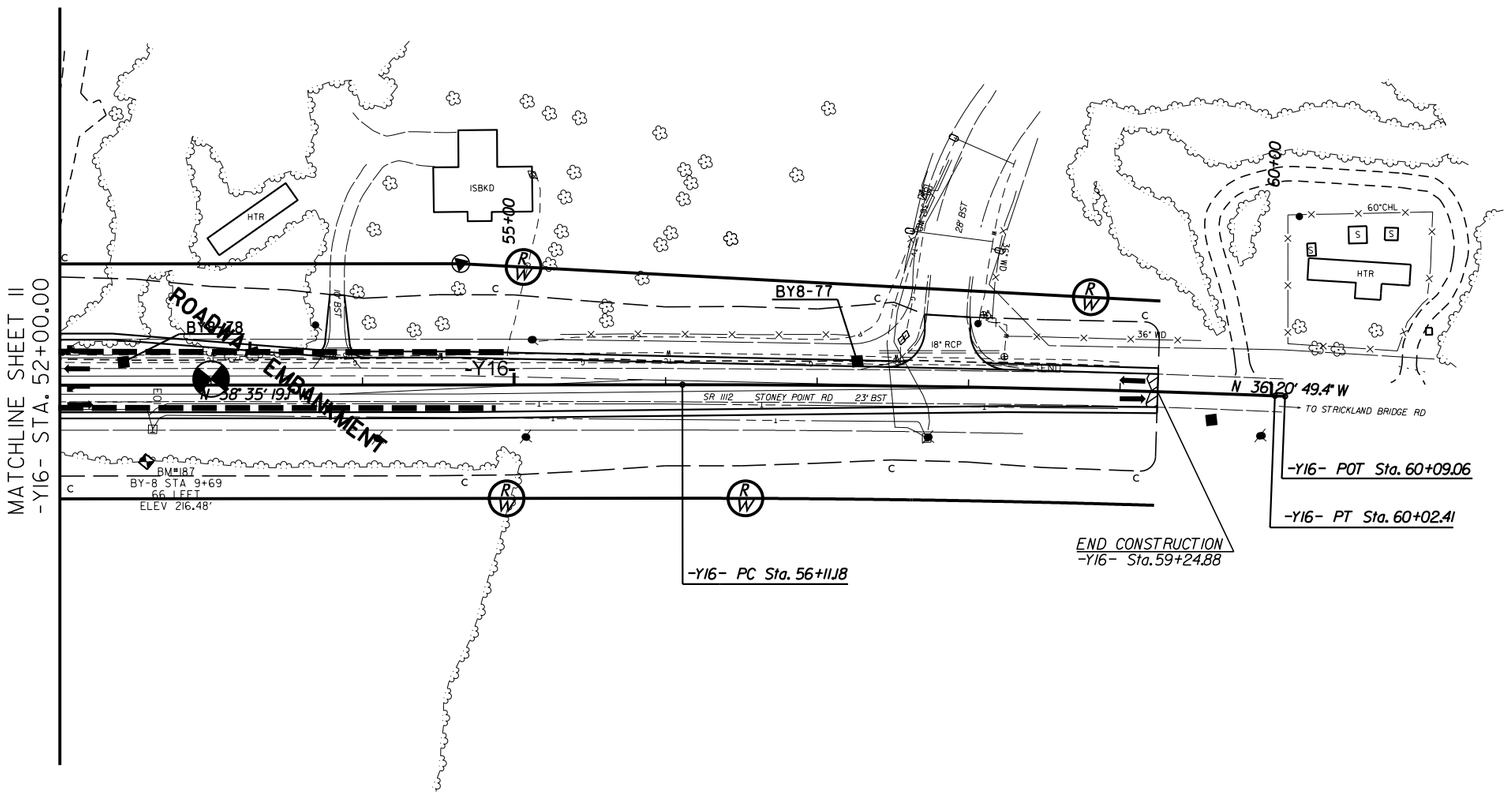
PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y16-
PI Sta 58+06.82
Δ = 2° 14′ 29.7″ (RT)
D = 0° 34′ 22.6″
L = 391.23′
T = 195.64′
R = 10,000.00′

NAD 83/95



SEE SHEET 25 FOR -Y16- PROFILE

DRIVEWAY RADII ARE 10′ UNLESS OTHERWISE NOTED

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

8/17/99

REVISIONS

-SR1-
PI Sta 14+45.78
Δ = 40° 34' 21.5" (LT)
D = 4° 45' 03.2"
L = 854.00'
T = 445.78'
R = 1,206.00'
Vd = 40 MPH
SUPER = 4%

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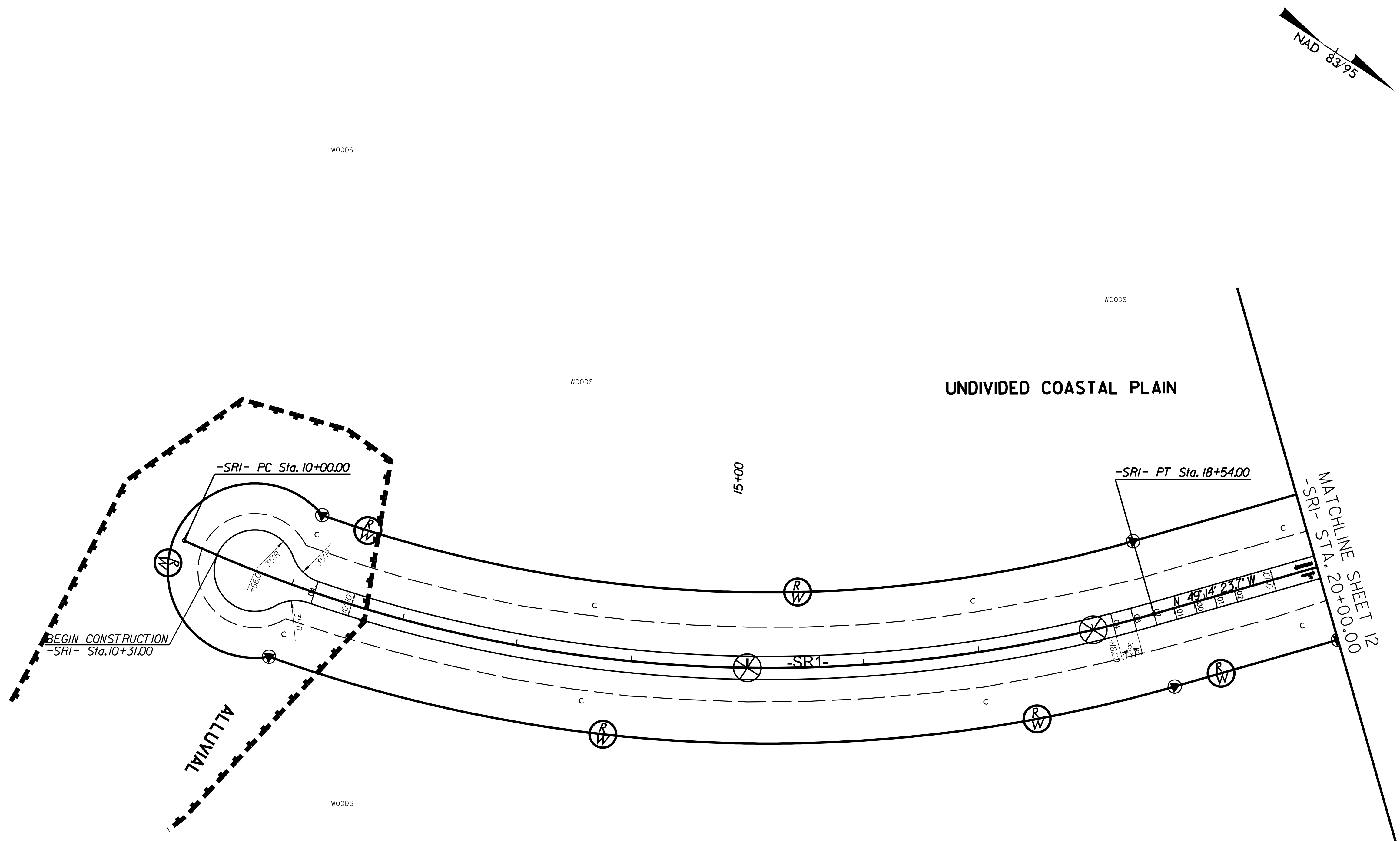
PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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



SEE SHEET 29 FOR -SR1- PROFILE

DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

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

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

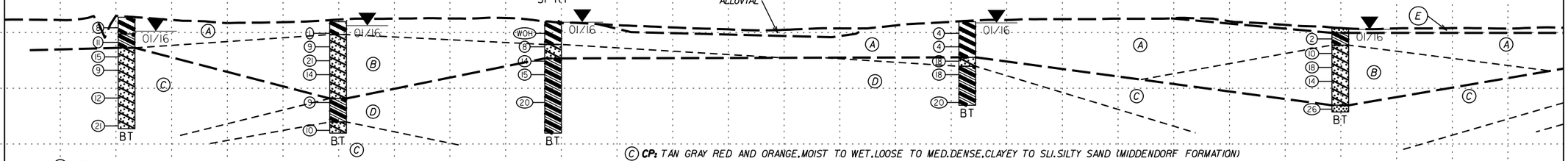
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-

BEGIN TIP PROJECT U-2519BB
END TIP PROJECT U-2519BA
-L- STA.519+00.00
ELEV.= 222.74

31' RT

ALLUVIAL



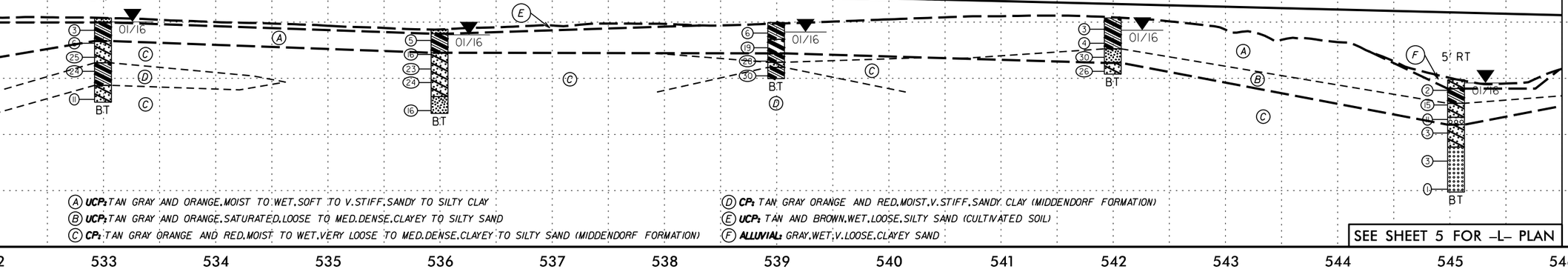
SEE SHEET 4 FOR -L- PLAN

-L-

BM# 188
-L- STA.544+30.44
472.85' LT.
ELEV.211.91

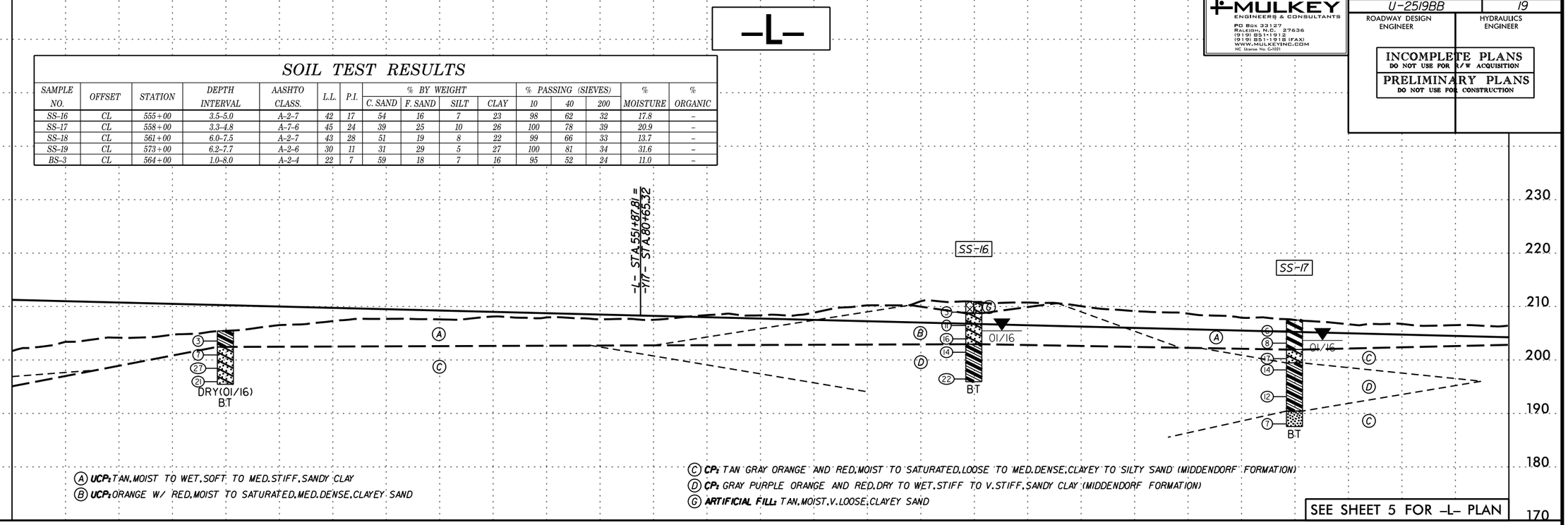
4' LT, -L-

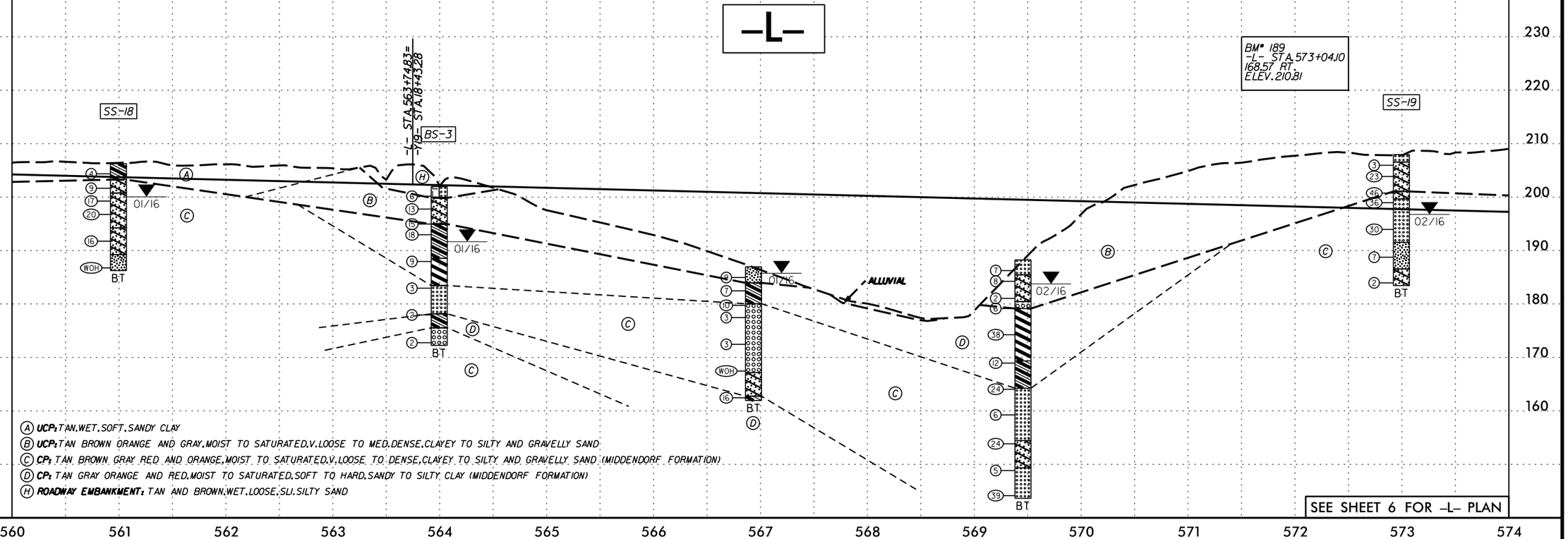
5' RT



SEE SHEET 5 FOR -L- PLAN

$$$$SYSTEM$$$$ $$$$USERNAME$$$$ $$$$DGN$$$$





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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	19

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-16	CL	555+00	3.5-5.0	A-2-7	42	17	54	16	7	23	98	62	32	17.8	-
SS-17	CL	558+00	3.3-4.8	A-7-6	45	24	39	25	10	26	100	78	39	20.9	-
SS-18	CL	561+00	6.0-7.5	A-2-7	43	28	51	19	8	22	99	66	33	13.7	-
SS-19	CL	573+00	6.2-7.7	A-2-6	30	11	31	29	5	27	100	81	34	31.6	-
BS-3	CL	564+00	1.0-8.0	A-2-4	22	7	59	18	7	16	95	52	24	11.0	-

-L-

Ⓐ **UCP:** TAN,MOIST TO WET,SOFT TO MED.STIFF,SANDY CLAY
Ⓑ **UCP:** ORANGE W/ RED,MOIST TO SATURATED,MED.DENSE,CLAYEY SAND
Ⓒ **CP:** TAN GRAY ORANGE AND RED,MOIST TO SATURATED,LOOSE TO MED.DENSE,CLAYEY TO SILTY SAND (MIDDENDORF FORMATION)
Ⓓ **CP:** GRAY PURPLE ORANGE AND RED,DRY TO WET,STIFF TO V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)
Ⓖ **ARTIFICIAL FILL:** TAN,MOIST,V.LOOSE,CLAYEY SAND

SEE SHEET 5 FOR -L- PLAN

-L-

Ⓐ **UCP:** TAN,WET,SOFT,SANDY CLAY
Ⓑ **UCP:** TAN BROWN ORANGE AND GRAY,MOIST TO SATURATED,V.LOOSE TO MED.DENSE,CLAYEY TO SILTY AND GRAVELLY SAND
Ⓒ **CP:** TAN BROWN GRAY RED AND ORANGE,MOIST TO SATURATED,V.LOOSE TO DENSE,CLAYEY TO SILTY AND GRAVELLY SAND (MIDDENDORF FORMATION)
Ⓓ **CP:** TAN GRAY ORANGE AND RED,MOIST TO SATURATED,SOFT TO HARD,SANDY TO SILTY CLAY (MIDDENDORF FORMATION)
Ⓗ **ROADWAY EMBANKMENT:** TAN AND BROWN,WET,LOOSE,SLI.SILTY SAND

SEE SHEET 6 FOR -L- PLAN

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	20

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/28/99

-L-

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
BS-6	CL	576+00	1.0-9.0	A-2-4	18	0	71	18	4	7	98	62	12	19.9	-
SS-20	CL	579+00	13.0-14.5	A-2-4	22	0	11	77	4	8	100	95	12	41.9	-
SS-21	CL	582+00	8.5-10	A-1-b	19	0	68	19	3	10	95	49	14	14.8	-

Ⓑ **UCP:** TAN BROWN ORANGE PINK AND RED.MOIST TO WET.V.LOOSE TO MED.DENSE.CLAYEY TO SILTY SAND

Ⓒ **CP:** TAN PINK ORANGE AND GRAY.MOIST TO SATURATED.V.LOOSE TO V.DENSE.CLAYEY TO SILTY SAND AND SILTY COARSE SAND (MIDDENDORF FORMATION)

Ⓓ **CP:** TAN GRAY AND ORANGE.DRY TO SATURATED.SOFT TO HARD.SILTY CLAY (MIDDENDORF FORMATION)

Ⓖ **CP:** TAN GRAY AND ORANGE.DRY TO MOIST.STIFF TO V.STIFF.SANDY TO SILTY CLAY (CAPE FEAR FORMATION)

Ⓘ **CP:** TAN GRAY AND ORANGE.WET TO SATURATED.V.LOOSE TO V.DENSE.CLAYEY TO SILTY SAND (CAPE FEAR FORMATION)

SEE SHEETS 6 & 7 FOR -L- PLAN

-L-

SEE SHEET 7 FOR -L- PLAN

SEE SHEET 7 FOR -L- PLAN

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ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

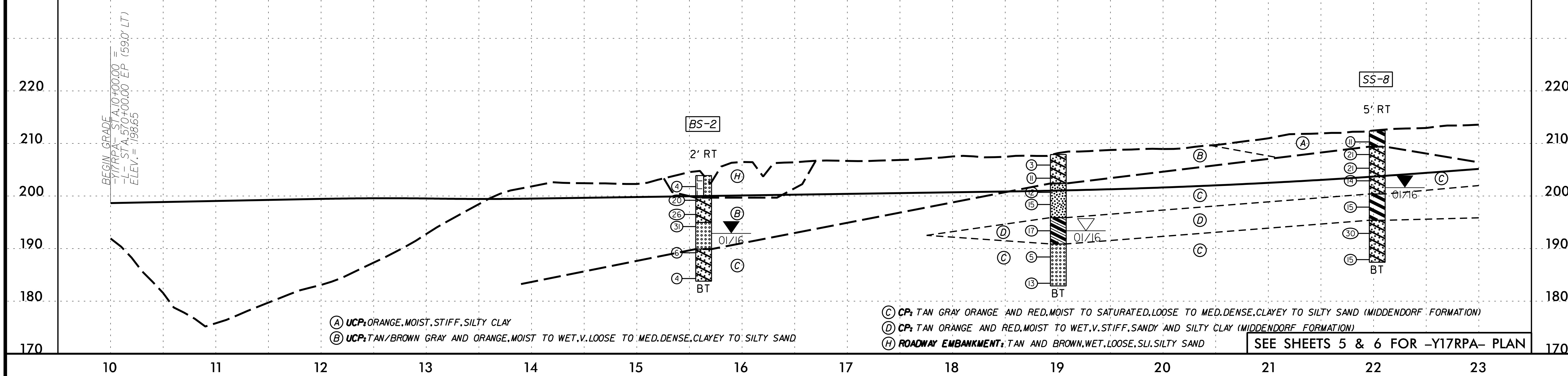
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/28/99

–Y17RPA–

SOIL TEST RESULTS

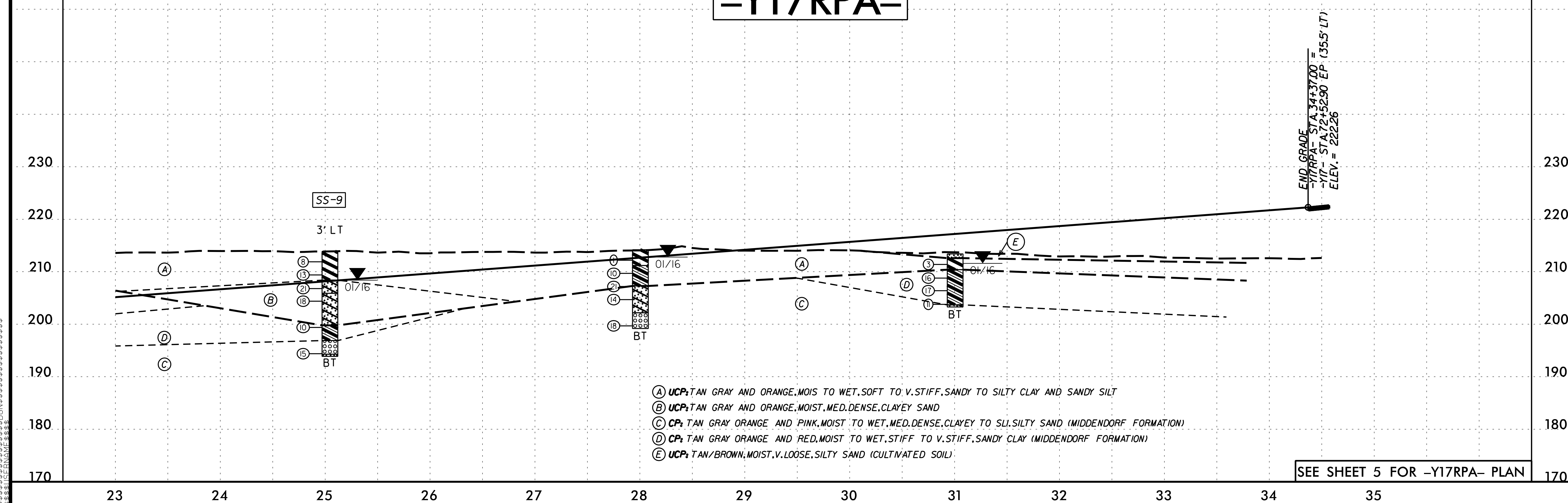
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
BS-2	2' RT	15+63	1.0-8.0	A-2-4	20	3	57	24	6	13	98	65	21	12.6	–
SS-8	5' RT	22+03	13.5-15.0	A-7-6	42	23	29	29	13	29	100	83	47	15.5	–
SS-9	3' LT	25+04	6.1-7.6	A-2-7	45	26	47	20	6	27	99	69	35	17.8	–



(A) UCP: ORANGE, MOIST, STIFF, SILTY CLAY
(B) UCP: TAN/BROWN GRAY AND ORANGE, MOIST TO WET, V.LOOSE TO MED.DENSE, CLAYEY TO SILTY SAND
(C) CP: TAN GRAY ORANGE AND RED, MOIST TO SATURATED, LOOSE TO MED.DENSE, CLAYEY TO SILTY SAND (MIDDENDORF FORMATION)
(D) CP: TAN ORANGE AND RED, MOIST TO WET, V.STIFF, SANDY AND SILTY CLAY (MIDDENDORF FORMATION)
(H) ROADWAY EMBANKMENT: TAN AND BROWN, WET, LOOSE, SLI. SILTY SAND

SEE SHEETS 5 & 6 FOR –Y17RPA– PLAN

–Y17RPA–



(A) UCP: TAN GRAY AND ORANGE, MOIS TO WET, SOFT TO V.STIFF, SANDY TO SILTY CLAY AND SANDY SILT
(B) UCP: TAN GRAY AND ORANGE, MOIST, MED.DENSE, CLAYEY SAND
(C) CP: TAN GRAY ORANGE AND PINK, MOIST TO WET, MED.DENSE, CLAYEY TO SLI.SILTY SAND (MIDDENDORF FORMATION)
(D) CP: TAN GRAY ORANGE AND RED, MOIST TO WET, STIFF TO V.STIFF, SANDY CLAY (MIDDENDORF FORMATION)
(E) UCP: TAN/BROWN, MOIST, V.LOOSE, SILTY SAND (CULTIVATED SOIL)

SEE SHEET 5 FOR –Y17RPA– PLAN

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

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

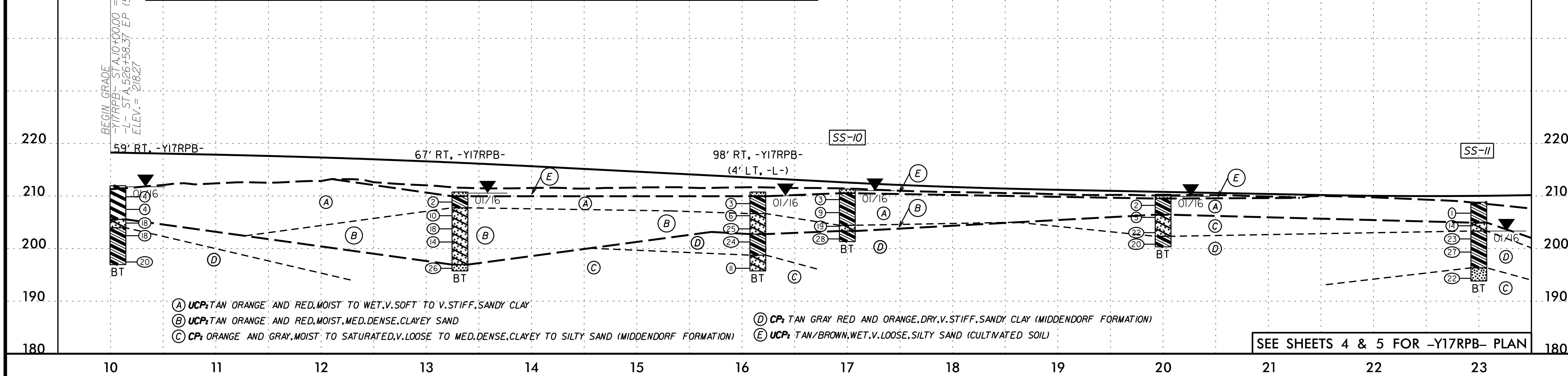
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION

–Y17RPB–

SOIL TEST RESULTS

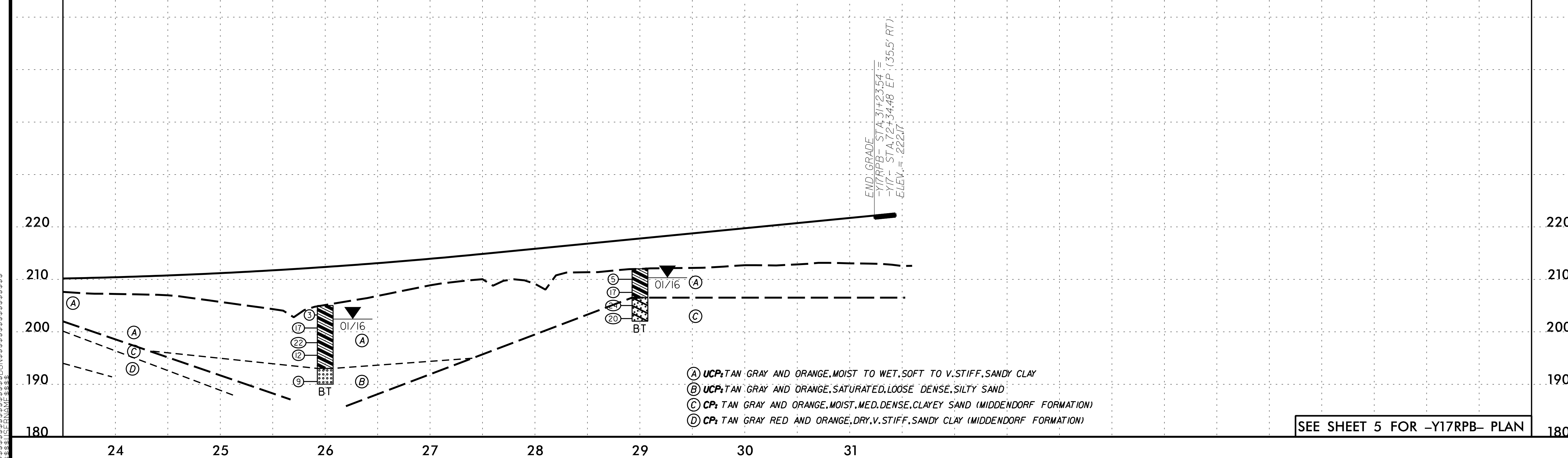
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	CL	17+00	1.0-2.5	A-6	39	21	34	23	15	28	100	79	47	23.6	–
SS-11	CL	23+00	1.1-2.6	A-6	27	13	32	28	29	11	100	81	45	19.8	–



BEGIN GRADE
-Y17RPB- STA.10+00.00 =
-L- STA.526+58.37 EP (59.0' LT)
ELEV.= 218.27
59' RT. -Y17RPB-
67' RT. -Y17RPB-
98' RT. -Y17RPB-
(4' LT. -L-)
SS-10
SS-11
01/16
BT
220
210
200
190
180
10
11
12
13
14
15
16
17
18
19
20
21
22
23
(A) UCP: TAN ORANGE AND RED. MOIST TO WET. V. SOFT TO V. STIFF. SANDY CLAY
(B) UCP: TAN ORANGE AND RED. MOIST. MED. DENSE. CLAYEY SAND
(C) CP: ORANGE AND GRAY. MOIST TO SATURATED. V. LOOSE TO MED. DENSE. CLAYEY TO SILTY SAND (MIDDENDORF FORMATION)
(D) CP: TAN GRAY RED AND ORANGE. DRY. V. STIFF. SANDY CLAY (MIDDENDORF FORMATION)
(E) UCP: TAN/BROWN. WET. V. LOOSE. SILTY SAND (CULTIVATED SOIL)

SEE SHEETS 4 & 5 FOR –Y17RPB– PLAN

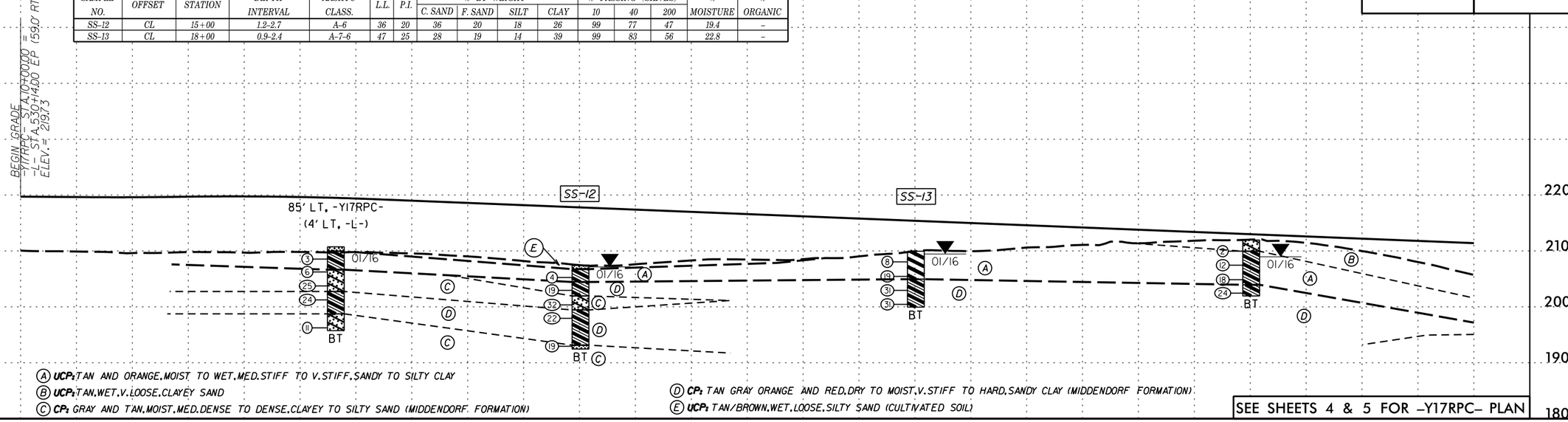
–Y17RPB–

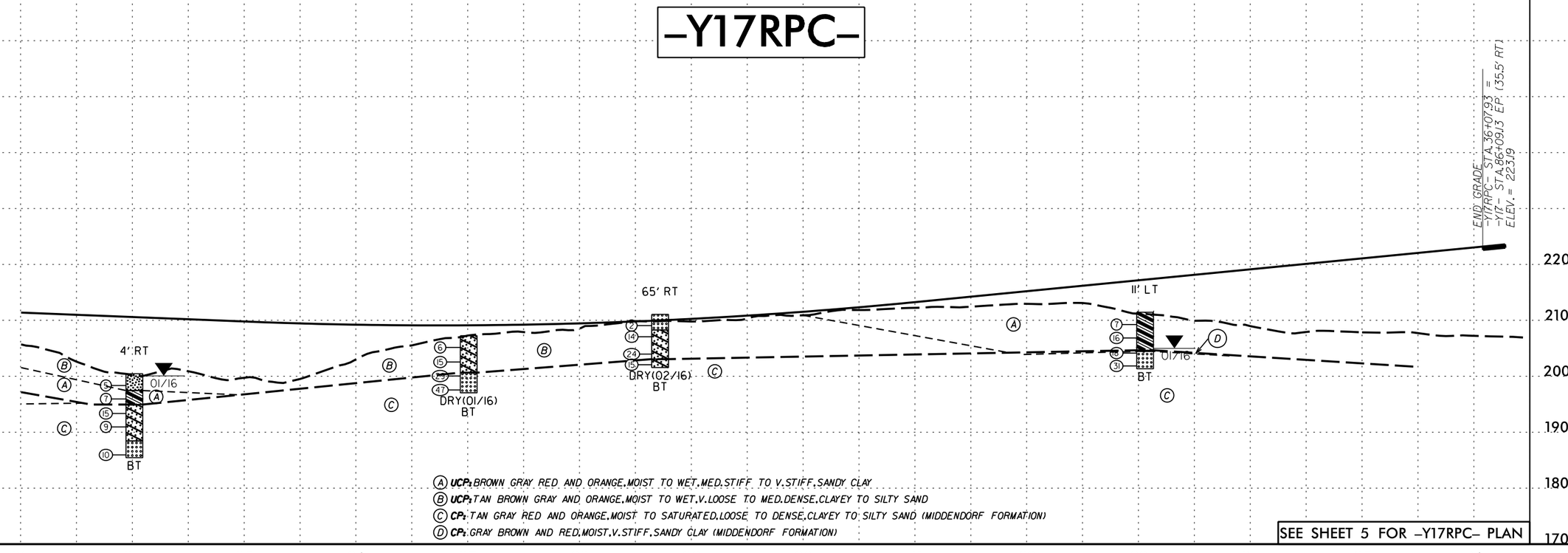


END GRADE
-Y17RPB- STA.31+23.54 =
-Y17- STA.72+34.48 EP (35.5' RT)
ELEV.= 222.17
01/16
BT
220
210
200
190
180
24
25
26
27
28
29
30
31
(A) UCP: TAN GRAY AND ORANGE. MOIST TO WET. SOFT TO V. STIFF. SANDY CLAY
(B) UCP: TAN GRAY AND ORANGE. SATURATED. LOOSE DENSE. SILTY SAND
(C) CP: TAN GRAY AND ORANGE. MOIST. MED. DENSE. CLAYEY SAND (MIDDENDORF FORMATION)
(D) CP: TAN GRAY RED AND ORANGE. DRY. V. STIFF. SANDY CLAY (MIDDENDORF FORMATION)

SEE SHEET 5 FOR –Y17RPB– PLAN

5/28/99





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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	23

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y17RPC-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-12	CL	15+00	1.2-2.7	A-6	36	20	36	20	18	26	99	77	47	19.4	-
SS-13	CL	18+00	0.9-2.4	A-7-6	47	25	28	19	14	39	99	83	56	22.8	-

Ⓐ **UCP:** TAN AND ORANGE,MOIST TO WET,MED.STIFF TO V.STIFF,SANDY TO SILTY CLAY
Ⓑ **UCP:** TAN,WET,V.LOOSE,CLAYEY SAND
Ⓒ **CP:** GRAY AND TAN,MOIST,MED.DENSE TO DENSE,CLAYEY TO SILTY SAND (MIDDENDORF FORMATION)
Ⓓ **CP:** TAN GRAY ORANGE AND RED,DRY TO MOIST,V.STIFF TO HARD,SANDY CLAY (MIDDENDORF FORMATION)
Ⓔ **UCP:** TAN/BROWN,WET,LOOSE,SILTY SAND (CULTIVATED SOIL)

SEE SHEETS 4 & 5 FOR -Y17RPC- PLAN

-Y17RPC-

Ⓐ **UCP:** BROWN GRAY RED AND ORANGE,MOIST TO WET,MED.STIFF TO V.STIFF,SANDY CLAY
Ⓑ **UCP:** TAN BROWN GRAY AND ORANGE,MOIST TO WET,V.LOOSE TO MED.DENSE,CLAYEY TO SILTY SAND
Ⓒ **CP:** TAN GRAY RED AND ORANGE,MOIST TO SATURATED,LOOSE TO DENSE,CLAYEY TO SILTY SAND (MIDDENDORF FORMATION)
Ⓓ **CP:** GRAY BROWN AND RED,MOIST,V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

SEE SHEET 5 FOR -Y17RPC- PLAN

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

5/28/99

–Y17RPD–

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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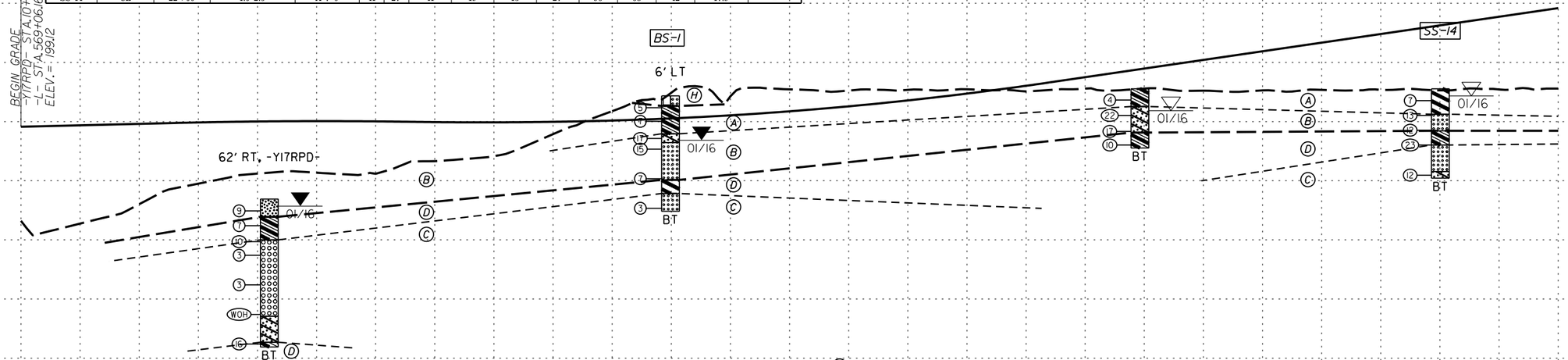
SOIL TEST RESULTS

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	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
BS-1	6' LT	15+49	1.0-8.0	A-6	30	15	34	33	10	23	99	80	37	15.2	–
SS-14	CL	22+00	1.0-2.5	A-7-6	41	27	41	19	13	27	96	68	42	17.9	–

BEGIN GRADE
–Y17RPD– STA.10+00.00 =
–L– STA.569+06.16 EP (59.0' RT)
ELEV. = 199.12



(A) **UCP:** TAN AND BROWN, MOIST TO WET, MED. STIFF, SANDY TO SILTY CLAY
(B) **UCP:** TAN GRAY AND ORANGE, MOIST TO SATURATED, LOOSE TO MED. DENSE, CLAYEY TO SILTY SAND
(C) **CP:** TAN GRAY RED AND ORANGE, MOIST TO SATURATED, V. LOOSE TO MED. DENSE, CLAYEY TO SILTY SAND (MIDDENDORF FORMATION)
(D) **CP:** TAN GRAY AND ORANGE, MOIST TO WET, MED. STIFF TO STIFF, SANDY TO SILTY CLAY (MIDDENDORF FORMATION)
(H) **ROADWAY EMBANKMENT:** BROWN, WET, LOOSE, SLI. SILTY SAND

SEE SHEETS 5 & 6 FOR –Y17RPD– PLAN

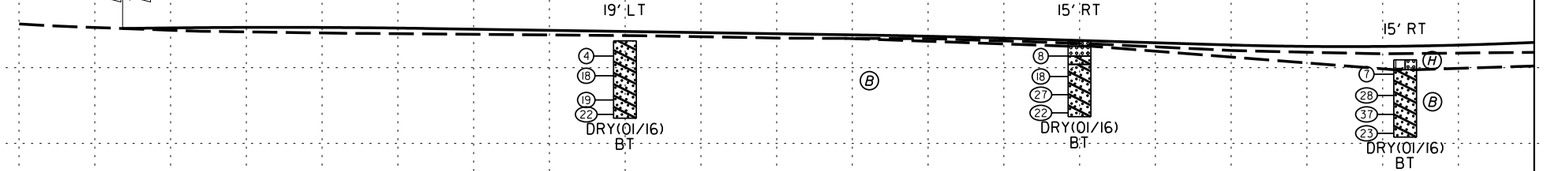
–Y17RPD–

END GRADE
–Y17RPD– STA.24+44.52 =
–Y17– STA.186+20.87 EP (35.5' LT)
ELEV. = 223.40

SEE SHEET 5 FOR –Y17RPD– PLAN

–Y16–

BEGIN GRADE
–Y16– STA.38+68.34
ELEV. = 215.17



(B) **UCP:** TAN BROWN AND GRAY, DRY TO WET, V. LOOSE TO DENSE, CLAYEY SAND
(H) **ROADWAY EMBANKMENT:** BROWN, MOIST, LOOSE, SLI. SILTY SAND

SEE SHEETS 11 & 15 FOR –Y16– PLAN

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	25

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

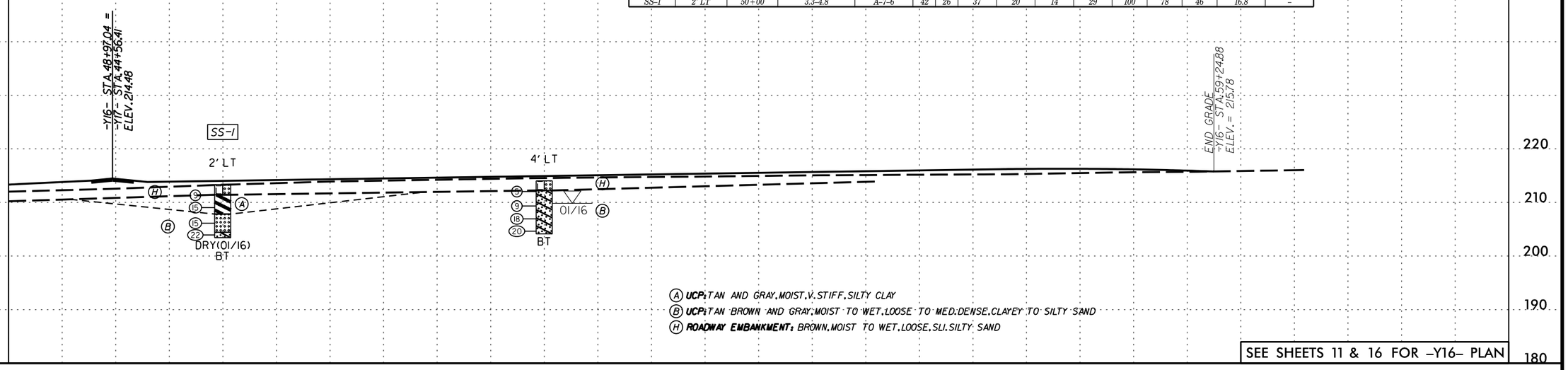
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y16-

BM* 187
-Y16- STA.52+57.28
50.56 RT.
ELEV.216.48

SOIL TEST RESULTS

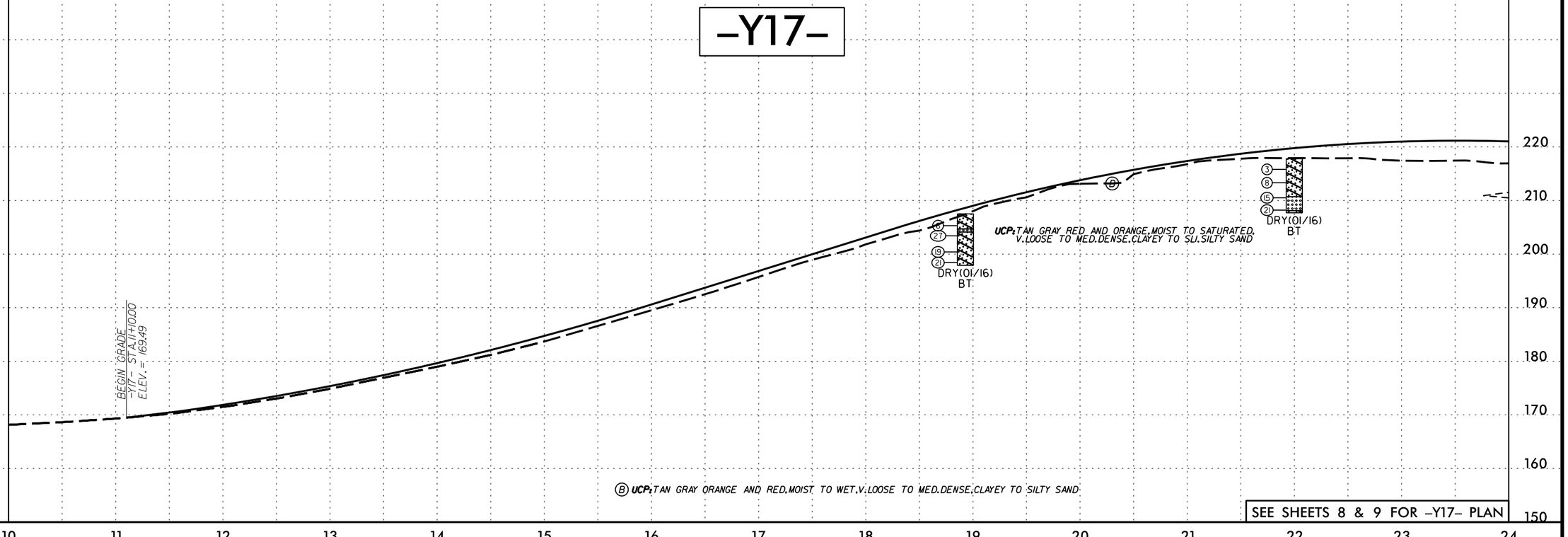
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	2' LT	50+00	3.3-4.8	A-7-6	42	26	37	20	14	29	100	78	46	16.8	-



Ⓐ **UCP:** TAN AND GRAY,MOIST,V.STIFF,SILTY CLAY
Ⓑ **UCP:** TAN BROWN AND GRAY,MOIST TO WET,LOOSE TO MED.DENSE,CLAYEY TO SILTY SAND
Ⓗ **ROADWAY EMBANKMENT:** BROWN,MOIST TO WET,LOOSE,SLI.SILTY SAND

SEE SHEETS 11 & 16 FOR -Y16- PLAN

-Y17-



UCP: TAN GRAY RED AND ORANGE,MOIST TO SATURATED,
V.LOOSE TO MED.DENSE,CLAYEY TO SLI.SILTY SAND

Ⓑ **UCP:** TAN GRAY ORANGE AND RED,MOIST TO WET,V.LOOSE TO MED.DENSE,CLAYEY TO SILTY SAND

SEE SHEETS 8 & 9 FOR -Y17- PLAN

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

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

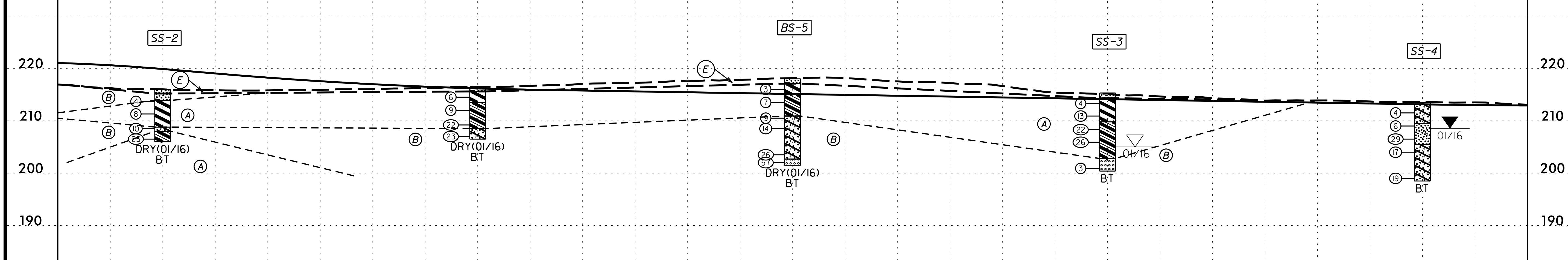
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y17-

SOIL TEST RESULTS

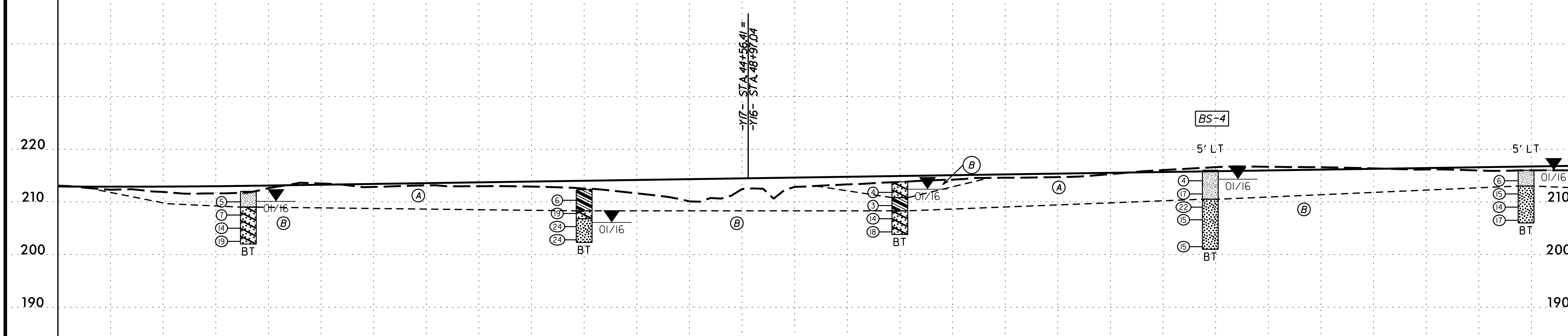
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	CL	25+00	3.7-5.2	A-7-6	42	24	36	24	8	32	100	79	43	19.4	-
SS-3	CL	34+00	3.4-4.9	A-7-6	50	32	40	21	9	30	100	76	42	17.7	-
SS-4	CL	37+00	3.5-5.0	A-2-6	34	17	49	21	7	23	100	71	32	13.3	-
BS-5	CL	31+00	1.0-7.0	A-6	35	20	42	23	10	25	100	76	38	13.0	-
BS-4	5' LT	48+95	1.0-6.0	A-2-6	39	21	45	23	9	23	99	72	35	17.9	-



(A) UCP: TAN GRAY ORANGE AND RED, DRY TO WET, SOFT TO MED. STIFF, SANDY AND SILTY CLAY
(B) UCP: TAN GRAY ORANGE AND RED, DRY TO WET, V. LOOSE TO V. DENSE, CLAYEY TO SILTY SAND
(E) UCP: TAN AND ORANGE, MOIST TO WET, V. LOOSE TO LOOSE, SILTY SAND (CULTIVATED SOIL)

SEE SHEETS 9 & 10 FOR -Y17- PLAN

-Y17-



(A) UCP: TAN GRAY AND BROWN, MOIST TO WET, SOFT TO MED. STIFF, SANDY SILT TO SANDY CLAY
(B) UCP: GRAY TAN PINK AND RED, MOIST TO WET, V. LOOSE TO MED. DENSE, CLAYEY TO SILTY SAND

SEE SHEETS 10 & 11 FOR -Y17- PLAN

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

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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

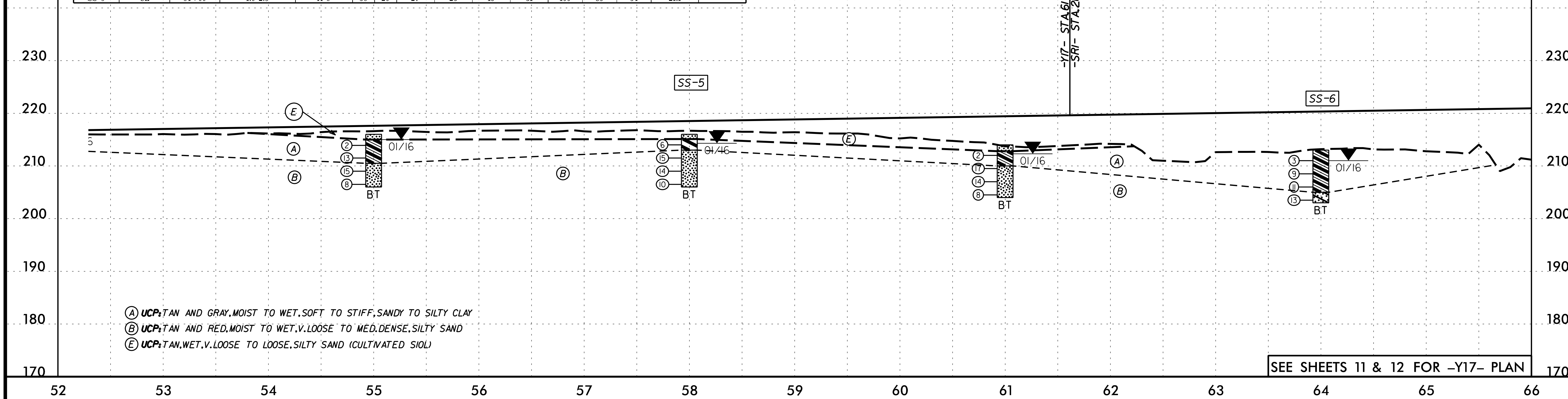
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

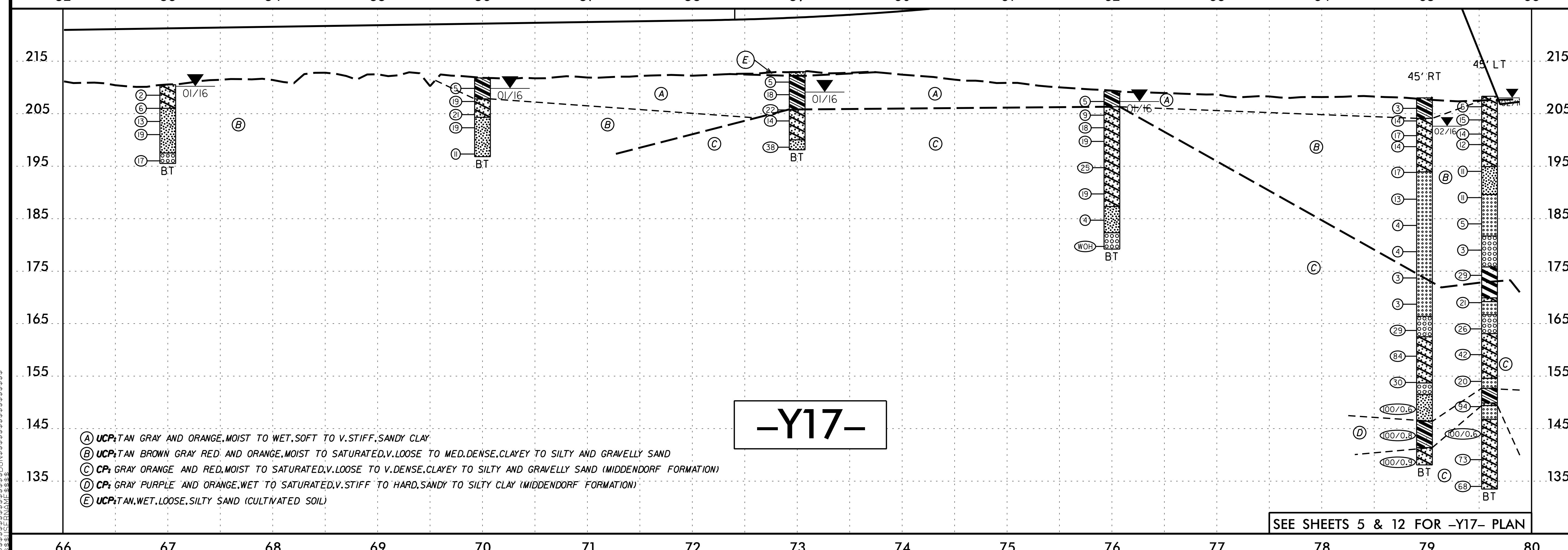
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y17-

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
SS-5	CL	58+00	1.0-2.5	A-7-6	44	19	32	19	15	34	99	80	52	22.2	-
SS-6	CL	64+00	1.0-2.5	A-6	36	20	27	23	19	31	100	85	54	21.1	-



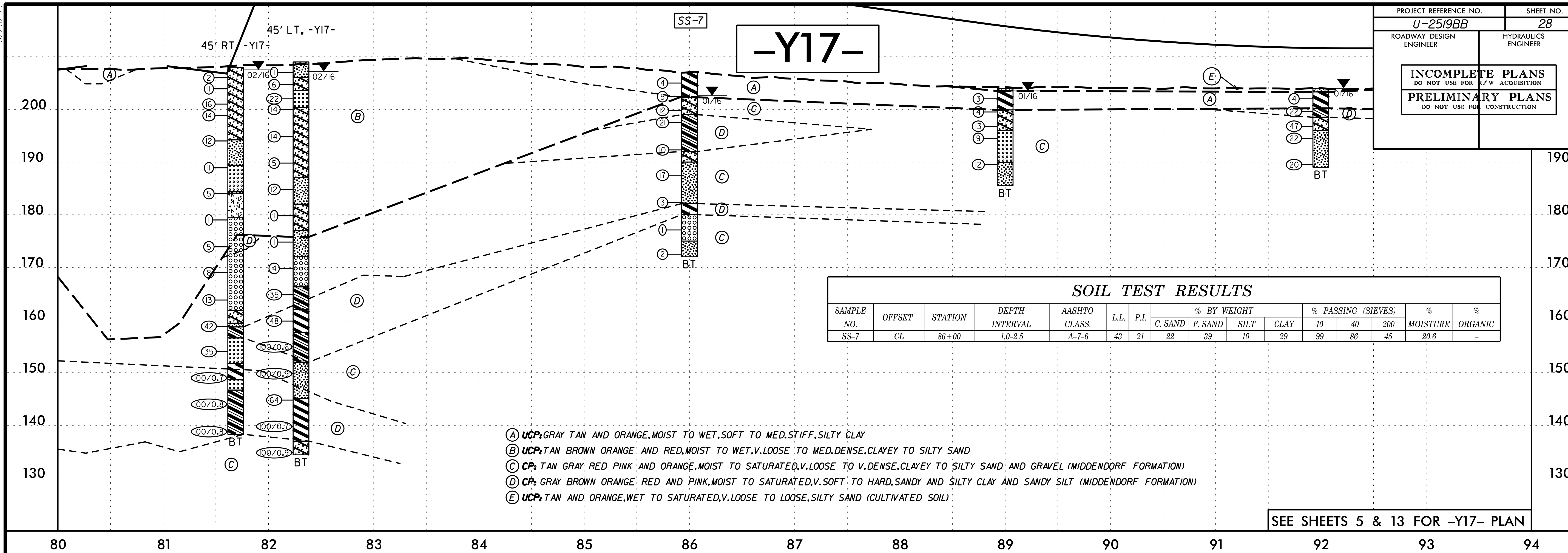


PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y17-



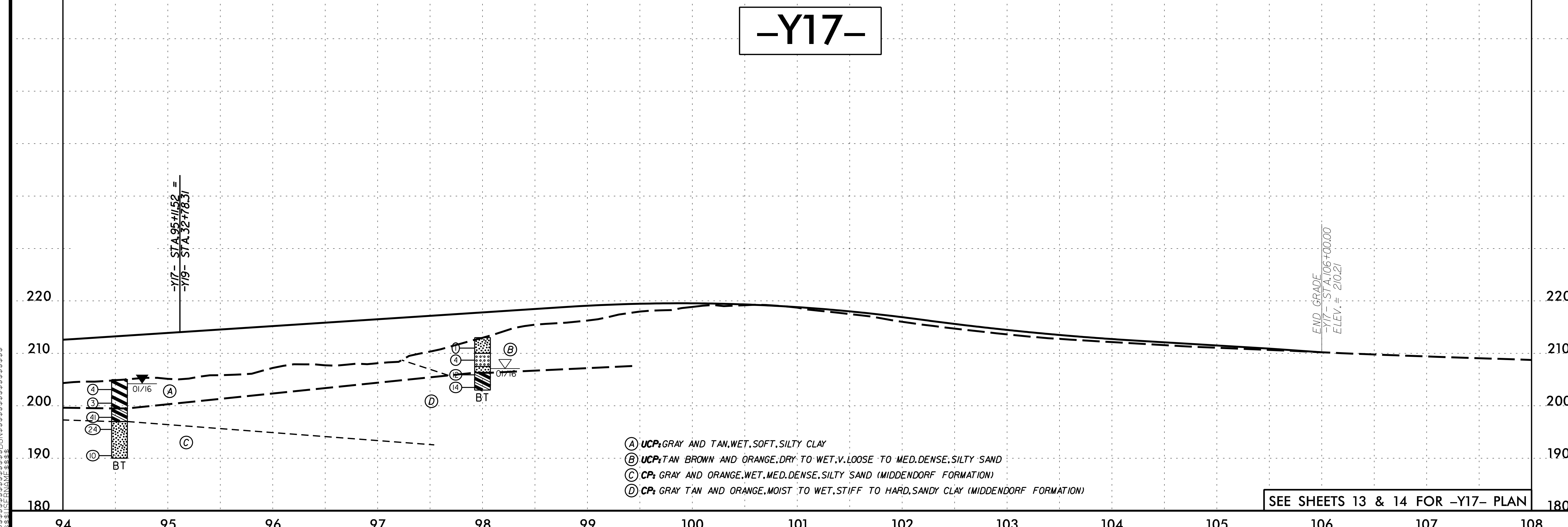
SOIL TEST RESULTS

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	% PASSING (SIEVES): 40	% PASSING (SIEVES): 200	% MOISTURE	% ORGANIC
SS-7	CL	86+00	1.0-2.5	A-7-6	43	21	22	39	10	29	99	86	45	20.6	-

(A) **UCP:** GRAY TAN AND ORANGE, MOIST TO WET, SOFT TO MED. STIFF, SILTY CLAY
(B) **UCP:** TAN BROWN ORANGE AND RED, MOIST TO WET, V. LOOSE TO MED. DENSE, CLAYEY TO SILTY SAND
(C) **CP:** TAN GRAY RED PINK AND ORANGE, MOIST TO SATURATED, V. LOOSE TO V. DENSE, CLAYEY TO SILTY SAND AND GRAVEL (MIDDENDORF FORMATION)
(D) **CP:** GRAY BROWN ORANGE RED AND PINK, MOIST TO SATURATED, V. SOFT TO HARD, SANDY AND SILTY CLAY AND SANDY SILT (MIDDENDORF FORMATION)
(E) **UCP:** TAN AND ORANGE, WET TO SATURATED, V. LOOSE TO LOOSE, SILTY SAND (CULTIVATED SOIL)

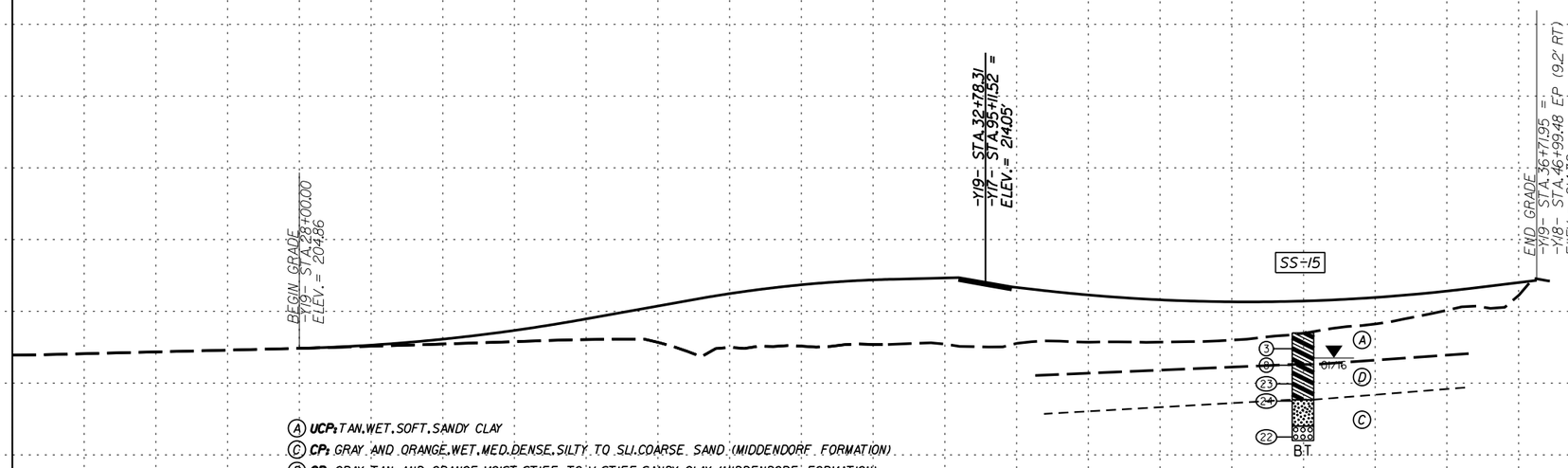
SEE SHEETS 5 & 13 FOR -Y17- PLAN

-Y17-



(A) **UCP:** GRAY AND TAN, WET, SOFT, SILTY CLAY
(B) **UCP:** TAN BROWN AND ORANGE, DRY TO WET, V. LOOSE TO MED. DENSE, SILTY SAND
(C) **CP:** GRAY AND ORANGE, WET, MED. DENSE, SILTY SAND (MIDDENDORF FORMATION)
(D) **CP:** GRAY TAN AND ORANGE, MOIST TO WET, STIFF TO HARD, SANDY CLAY (MIDDENDORF FORMATION)

SEE SHEETS 13 & 14 FOR -Y17- PLAN



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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	29

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y19-

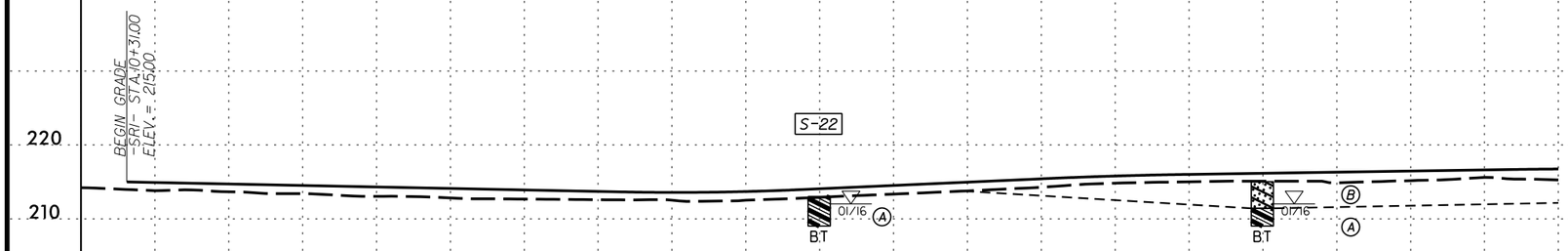
SOIL TEST RESULTS

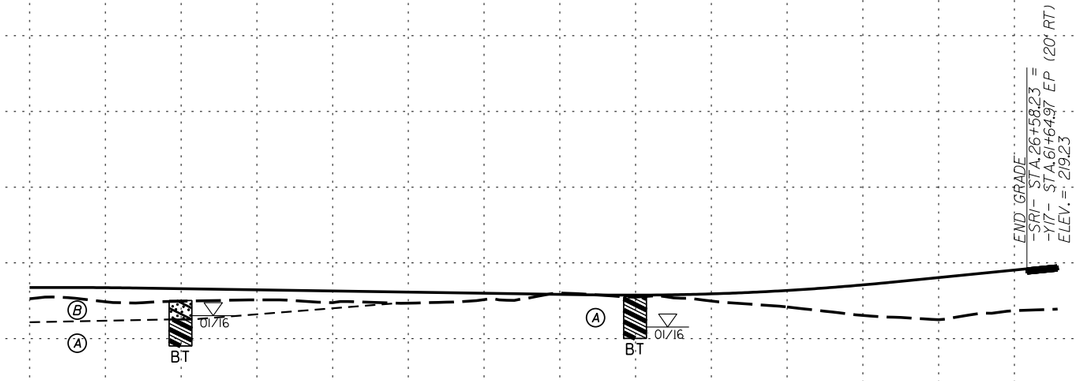
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-15	CL	35+00	1.2-2.7	A-6	30	15	20	39	15	26	99	88	48	19.0	-

Ⓐ **UCP:** TAN,WET,SOFT,SANDY CLAY
Ⓒ **CP:** GRAY AND ORANGE,WET,MED.DENSE,SILTY TO SLI.COARSE SAND (MIDDENDORF FORMATION)
Ⓓ **CP:** GRAY TAN AND ORANGE,MOIST,STIFF TO V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

SEE SHEET 13 FOR -Y19- PLAN

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





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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	30

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/28/99

–SR1–

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-22	CL	21+00	0.0-1.0	A-6	24	11	35	24	18	23	100	79	45	20.9	1.9

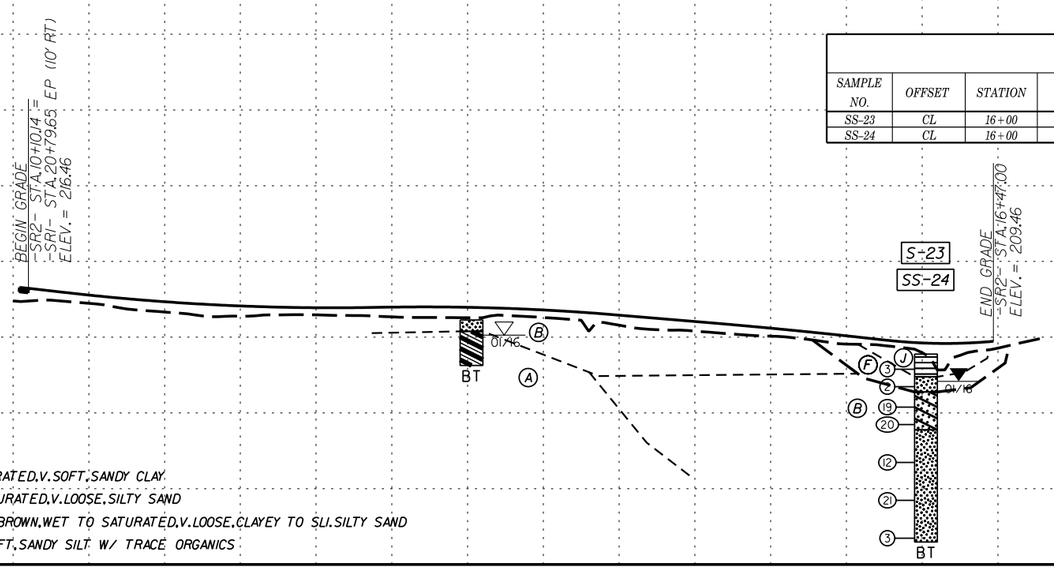
Ⓐ **UCP:** TAN GRAY RED AND ORANGE, WET TO SATURATED, SOFT, SANDY CLAY
Ⓑ **UCP:** TAN AND GRAY, WET TO SATURATED, VERY LOOSE, CLAYEY SAND

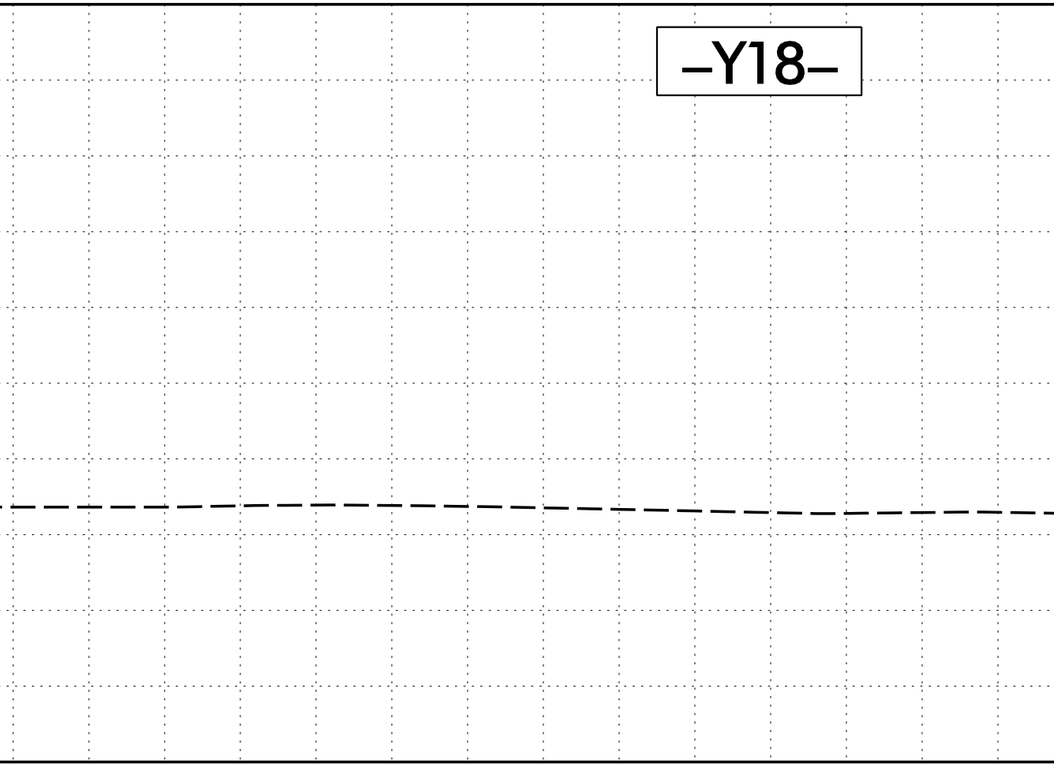
SEE SHEET 17 FOR -SR1- PLAN

–SR1–

Ⓐ **UCP:** TAN, SATURATED, V. SOFT, SANDY CLAY
Ⓑ **UCP:** TAN AND ORANGE, WET, V. LOOSE, CLAYEY SAND

SEE SHEET 12 FOR -SR1- PLAN





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PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	31

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-SR2-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-23	CL	16+00	0.0-1.0	A-4	26	8	25	27	28	20	100	87	51	20.1	3.9
SS-24	CL	16+00	1.0-2.5	A-4	22	6	23	36	24	17	100	91	46	24.2	3.2

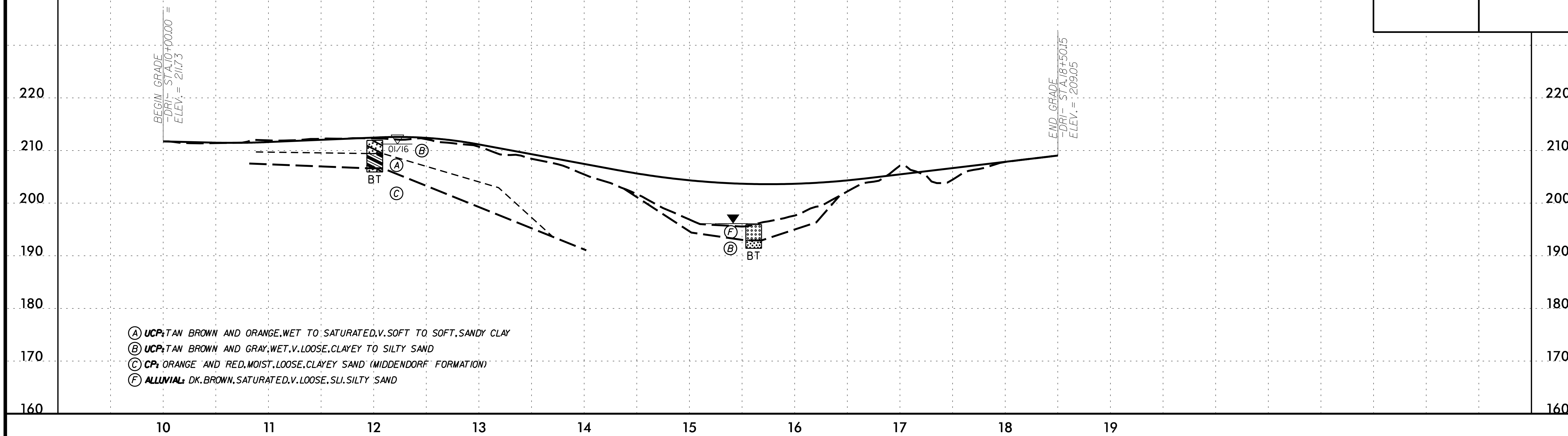
Ⓐ **UCP:** TAN AND GRAY, SATURATED, V. SOFT, SANDY CLAY
Ⓑ **UCP:** TAN AND BROWN, SATURATED, V. LOOSE, SILTY SAND
Ⓕ **ALLUVIAL:** DK. GRAY TO DK. BROWN, WET TO SATURATED, V. LOOSE, CLAYEY TO SLI. SILTY SAND
Ⓙ **ALLUVIAL:** DK. GRAY, WET, SOFT, SANDY SILT W/ TRACE ORGANICS

SEE SHEET 12 FOR -SR2- PLAN

-Y18-

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

-DR1-



(A) **UCP:** TAN BROWN AND ORANGE,WET TO SATURATED,V.SOFT TO SOFT,SANDY CLAY
(B) **UCP:** TAN BROWN AND GRAY,WET,V.LOOSE,CLAYEY TO SILTY SAND
(C) **CP:** ORANGE AND RED,MOIST,LOOSE,CLAYEY SAND (MIDDENDORF FORMATION)
(F) **ALLUVIAL:** DK.BROWN,SATURATED,V.LOOSE,SLI.SILTY SAND

MULKEY ENGINEERS & CONSULTANTS
PO Box 33127
Raleigh, N.C. 27636
(919) 851-1912
(919) 851-1918 (FAX)
WWW.MULKEYINC.COM
NC License No. C-1021

PROJECT REFERENCE NO.	SHEET NO.
U-2519BB	32

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

5/28/99

$$$$$$$$SYSTIME$$$$$
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$$$$USERNAME$$$$

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	33

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

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-18	CL	561+00	6.0-7.5	A-2-7	43	28	51	19	8	22	99	66	33	13.7	-

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	35

210
200
190
180
170
220
210
200
190

UCP: TAN AND ORANGE, MOIST, MED. DENSE, CLAYEY SAND

COASTAL PLAIN: RED ORANGE AND GRAY, MOIST TO WET, STIFF TO V. STIFF, SANDY AND SILTY CLAY (MIDDENDORF FORMATION)

COASTAL PLAIN: ORANGE TAN AND GRAY, SATURATED, V. LOOSE, SILTY AND CLAYEY SAND

COASTAL PLAIN: ORANGE AND GRAY, SATURATED, SOFT, SANDY CLAY

COASTAL PLAIN: BROWN AND ORANGE, SATURATED, V. LOOSE, SILTY SAND

563+00.00

UCP: TAN, WET, SOFT, SANDY CLAY

COASTAL PLAIN: TAN AND GRAY, MOIST TO WET, MED. DENSE, HIGHLY PLASTIC CLAYEY SAND (MIDDENDORF FORMATION)

COASTAL PLAIN: ORANGE TAN AND GRAY, MOIST, V. LOOSE TO MED. DENSE, SILTY SAND

562+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

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

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	36

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

225 220 215 210 205 200 195

UCP: ORANGE AND TAN,WET,MED.STIFF,SILTY CLAY

UCP: ORANGE AND TAN,MOIST,V.STIFF,SANDY CLAY

UCP: ORANGE TAN AND GRAY,DRY,MED.DENSE,CLAYEY SAND

27 + 00.00

220 215 210 205 200

UCP: ORANGE AND TAN,WET,MED.STIFF,SILTY CLAY

UCP: ORANGE AND TAN,MOIST,V.STIFF,SANDY CLAY

UCP: ORANGE TAN AND GRAY,DRY,MED.DENSE,CLAYEY SAND

26 + 50.00

220 215 210 205 200

UCP: TAN,MOIST,LOOSE,SILTY SAND

UCP: ORANGE,MOIST,STIFF,SILTY CLAY

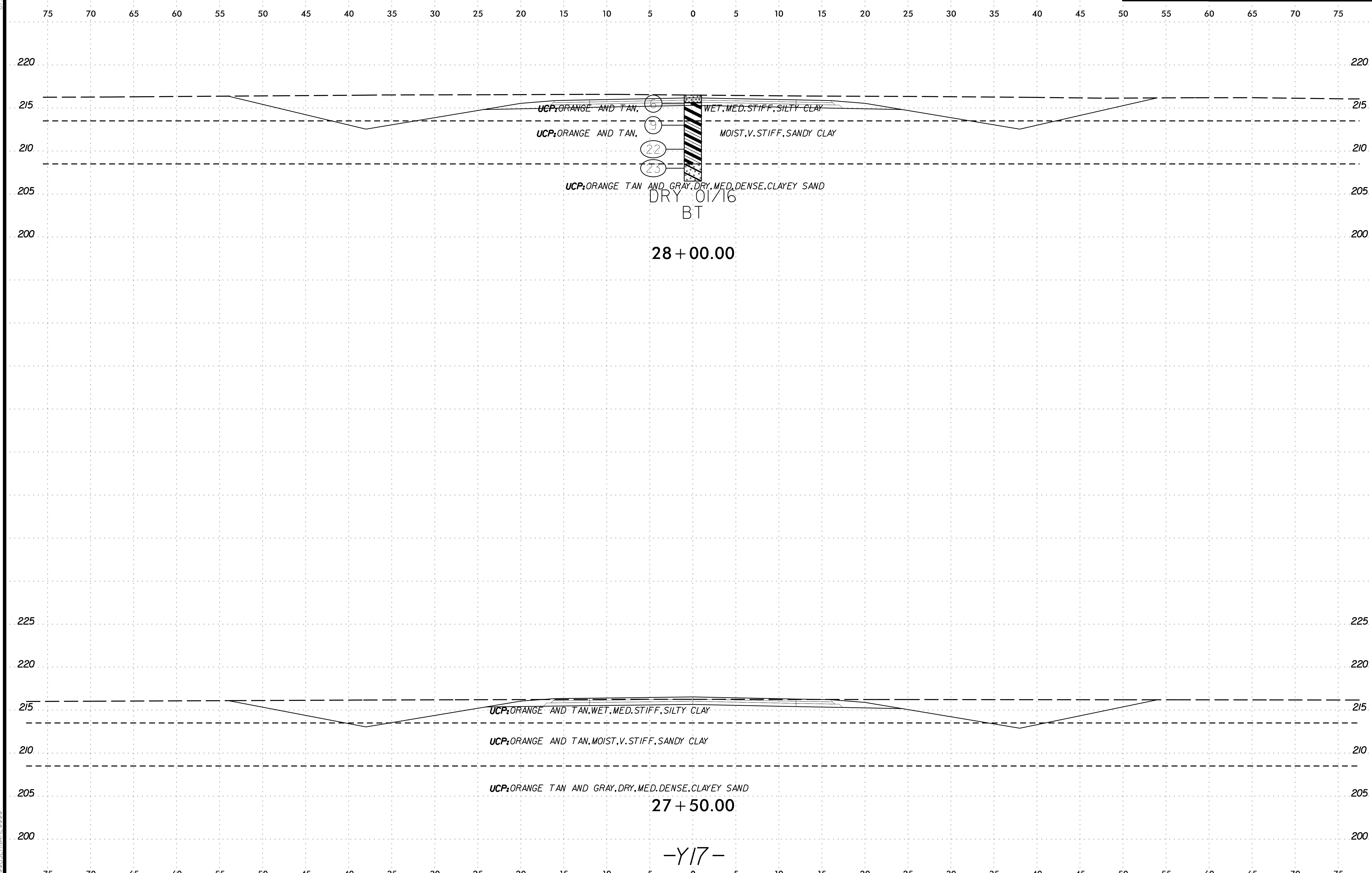
UCP: ORANGE AND RED,MOIST,MED.DENSE,CLAYEY SAND

UCP: ORANGE RED AND GRAY,MOIST,V.STIFF,SANDY CLAY

26 + 00.00

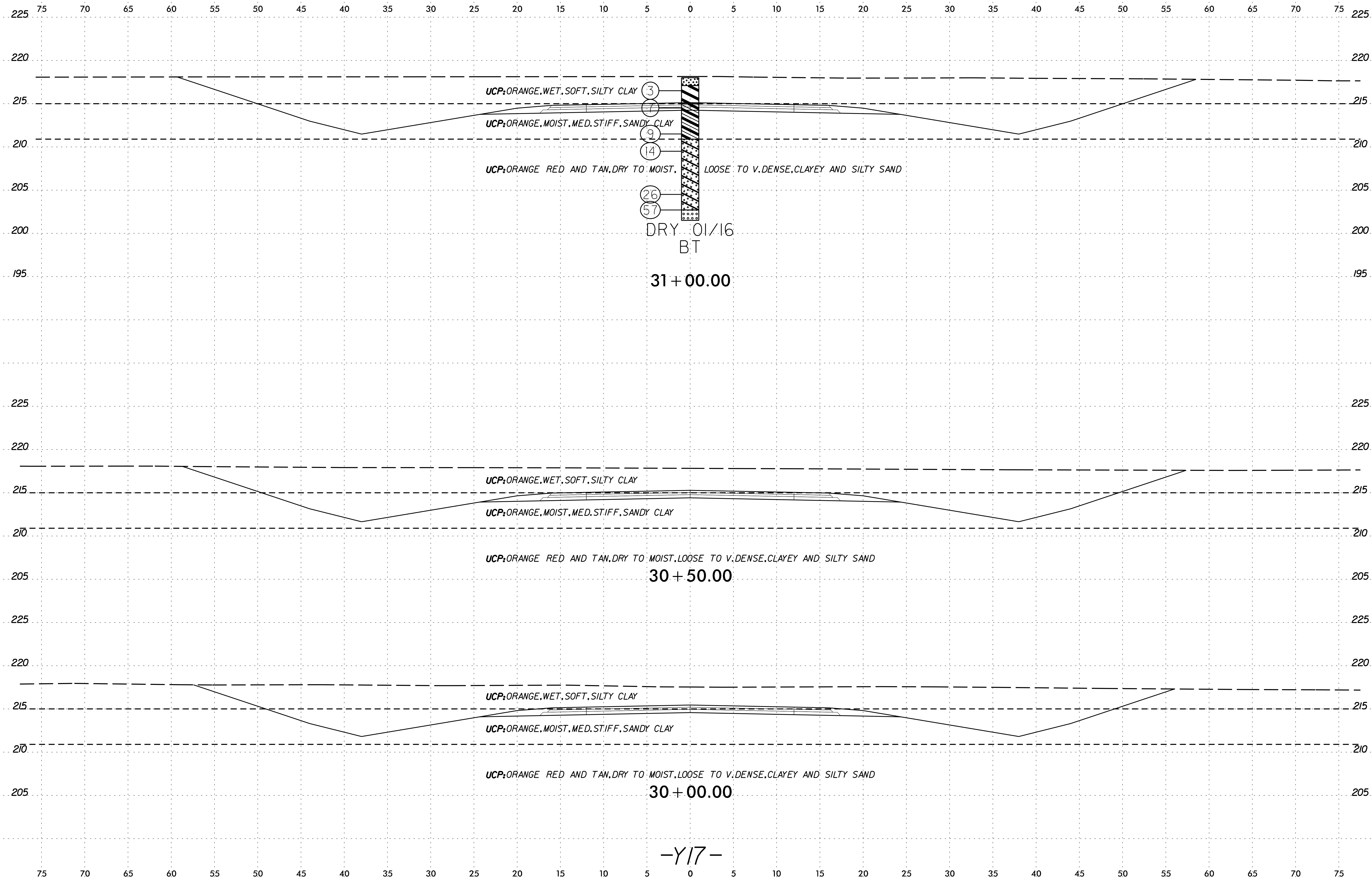
$$$$SYSTIME$$$$
$$$$SHEETNAME$$$$
$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	37



PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	38

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	39



8/23/99

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

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	40

0 2.5 5

32 + 50.00

32 + 00.00

31 + 50.00

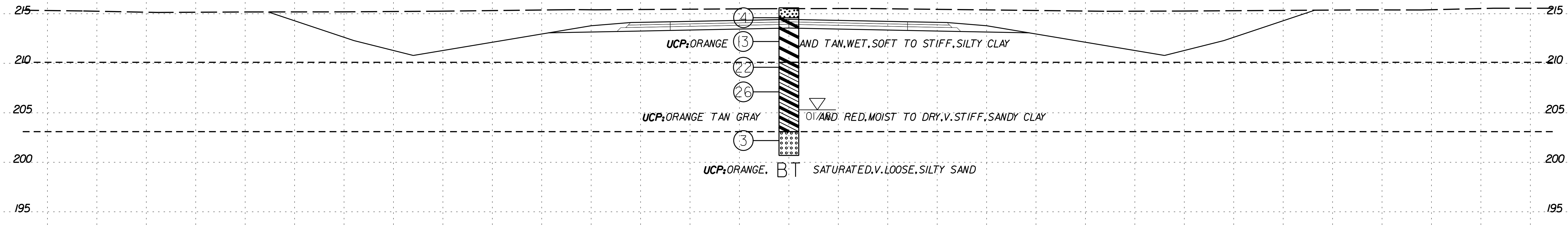
–Y17–

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

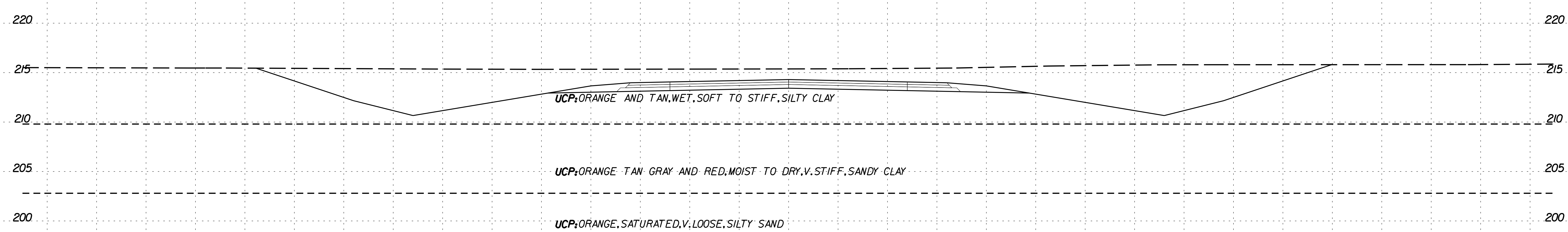
SS-3

SOIL TEST RESULTS

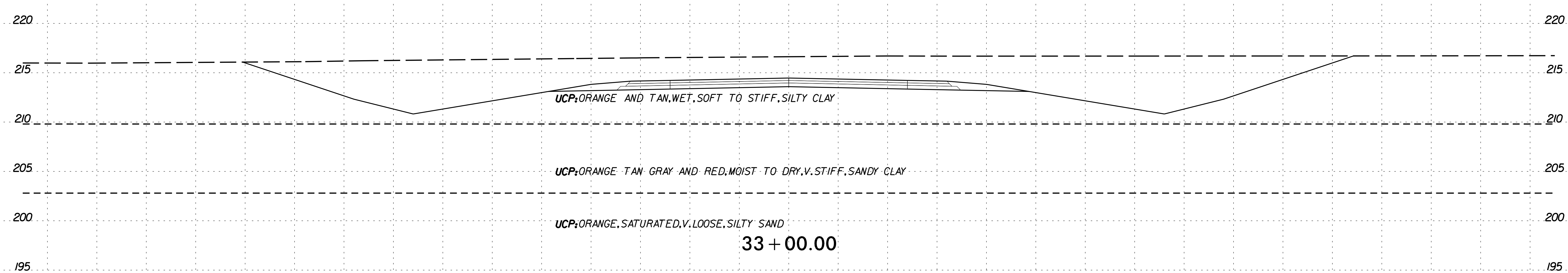
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-3	CL	34+00	3.4-4.9	A-7-6	50	32	40	21	9	30	100	76	42	17.7	-



34 + 00.00



33 + 50.00



33 + 00.00

-Y17-

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	42

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

245 240 235 230 225 220 215 210 205 200 195

UCP: ORANGE AND TAN, WET, SOFT TO STIFF, SILTY CLAY

UCP: ORANGE TAN GRAY AND RED, MOIST TO DRY, V. STIFF, SANDY CLAY

UCP: ORANGE, SATURATED, V. LOOSE, SILTY SAND

35 + 00.00

220 215 210 205 200 195

UCP: ORANGE AND TAN, WET, SOFT TO STIFF, SILTY CLAY

UCP: ORANGE TAN GRAY AND RED, MOIST TO DRY, V. STIFF, SANDY CLAY

UCP: ORANGE, SATURATED, V. LOOSE, SILTY SAND

34 + 50.00

-Y17-

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

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	43

0 2.5 5

8/23/99

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

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	44

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

220
215
210
205
200
195
190
185

UCP: ORANGE AND TAN,MOIST TO WET,STIFF,SILTY CLAY

UCP: TAN ORANGE AND GRAY,MOIST,MED.DENSE,HIGHLY PLASTIC CLAYEY SAND

UCP: ORANGE AND GRAY,MOIST,MED.DENSE,CLAYEY SAND

CP: TAN AND GRAY,WET,STIFF,SANDY CLAY (MIDDENDORF FORMATION)

CP: TAN AND GRAY,WET,MED.DENSE,CLAYEY AND SILTY SAND

23+50.00

UCP: ORANGE,MOIST,V.STIFF,SILTY CLAY

CP: ORANGE AND RED,MOIST,MED.DENSE,CLAYEY SAND (MIDDENDORF FORMATION)

CP: TAN ORANGE AND RED,MOIST,V.STIFF,SILTY CLAY

CP: TAN AND GRAY,MOIST TO WET,MED.DENSE,SLI.CLAYEY SAND

23+00.00

-Y17RPA-

$$$$SYSTIME$$$$
$$$$SHEETDGN$$$$
$$$$USERNAME$$$$

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	45

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

220
215
210
205
200
195
190

UCP: ORANGE AND TAN,MOIST TO WET,STIFF,SILTY CLAY

UCP: TAN ORANGE AND GRAY,MOIST,MED.DENSE,HIGHLY PLASTIC CLAYEY SAND

UCP: ORANGE AND GRAY,MOIST,MED.DENSE,CLAYEY SAND

CP: TAN AND GRAY,WET,STIFF,SANDY CLAY (MIDDENDORF FORMATION)

CP: TAN AND GRAY,WET,MED.DENSE,CLAYEY AND SILTY SAND

24+50.00

220
215
210
205
200
195
190

UCP: ORANGE AND TAN,MOIST TO WET,STIFF,SILTY CLAY

UCP: TAN ORANGE AND GRAY,MOIST,MED.DENSE,HIGHLY PLASTIC CLAYEY SAND

UCP: ORANGE AND GRAY,MOIST,MED.DENSE,CLAYEY SAND

CP: TAN AND GRAY,WET,STIFF,SANDY CLAY (MIDDENDORF FORMATION)

CP: TAN AND GRAY,WET,MED.DENSE,CLAYEY AND SILTY SAND

24+00.00

-Y17RPA-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$SCALEDON$$$$
$$$$USERNAME$$$$

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	46

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
SS-9	3' LT	25+04	6.1-7.6	A-2-7	45	26	47	20	6	27	99	69	35	17.8	-

SS-9

25+04

8

13

21

18

10

15

BT

01/16

UCP: ORANGE AND TAN, MOIST TO WET, STIFF, SILTY CLAY

UCP: TAN ORANGE AND GRAY, MOIST, MED. DENSE, HIGHLY PLASTIC CLAYEY SAND

UCP: ORANGE AND GRAY, MOIST, MED. DENSE, CLAYEY SAND

CP: TAN AND GRAY, WET, STIFF, SANDY CLAY (MIDDENDORF FORMATION)

CP: TAN AND GRAY, WET, MED. DENSE, CLAYEY AND SILTY SAND

220 215 210 205 200 195 190 185 180 175 170 165 160 155 150 145 140

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

25+00.00

-YI7RPA-

7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 .5 0 .5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5

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

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	47

8/23/99

-Y17RPA-

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

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	48

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

220
215
210
205
200

UCP: TAN,WET,V.SOFT,HIGHLY PLASTIC SILTY CLAY

UCP: TAN AND GRAY,MOIST TO WET,STIFF TO V.STIFF,SANDY CLAY

CP: TAN ORANGE AND GRAY,MOIST TO WET,MED.DENSE,CLAYEY AND SILTY SAND (MIDDENDORF FORMATION)

27+50.00

220
215
210
205
200

UCP: TAN,WET,V.SOFT,HIGHLY PLASTIC SILTY CLAY

UCP: TAN AND GRAY,MOIST TO WET,STIFF TO V.STIFF,SANDY CLAY

CP: TAN ORANGE AND GRAY,MOIST TO WET,MED.DENSE,CLAYEY AND SILTY SAND (MIDDENDORF FORMATION)

27+00.00

-Y17RPA-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$SCREEN$$$$
$$$$USERNAME$$$$

0 2.5 5
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
215
210
205
200
195
190
185
180
175
170
165
160
155
150
145
140
135
130
125
UCP: TAN,WET,V.SOFT,HIGHLY PLASTIC SILTY CLAY
UCP: TAN AND GRAY,MOIST TO WET,STIFF TO V.STIFF,SANDY CLAY
CP: TAN ORANGE AND GRAY,MOIST TO WET,MED.DENSE,CLAYEY AND SILTY SAND (MIDDENDORF FORMATION)
1
10
21
14
18
01/16
BT
28+00.00
-Y17RPA-

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	50

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

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	51

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

225 220 215 210 205 200 195

UCP: TAN,MOIST,SILTY SAND (CULTIVATED SOIL)

UCP: TAN AND ORANGE,MOIST,SOFT,HIGHLY PLASTIC SILTY CLAY

CP: ORANGE RED AND GRAY,MOIST,V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

CP: TAN ORANGE AND GRAY,MOIST,MED.DENSE,CLAYEY SAND

30+50.00

225 220 215 210 205 200 195

UCP: TAN,MOIST,SILTY SAND (CULTIVATED SOIL)

UCP: TAN AND ORANGE,MOIST,SOFT,HIGHLY PLASTIC SILTY CLAY

CP: ORANGE RED AND GRAY,MOIST,V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

CP: TAN ORANGE AND GRAY,MOIST,MED.DENSE,CLAYEY SAND

30+00.00

-Y17RPA-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

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$$$$DESIGN$$$$
$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	52

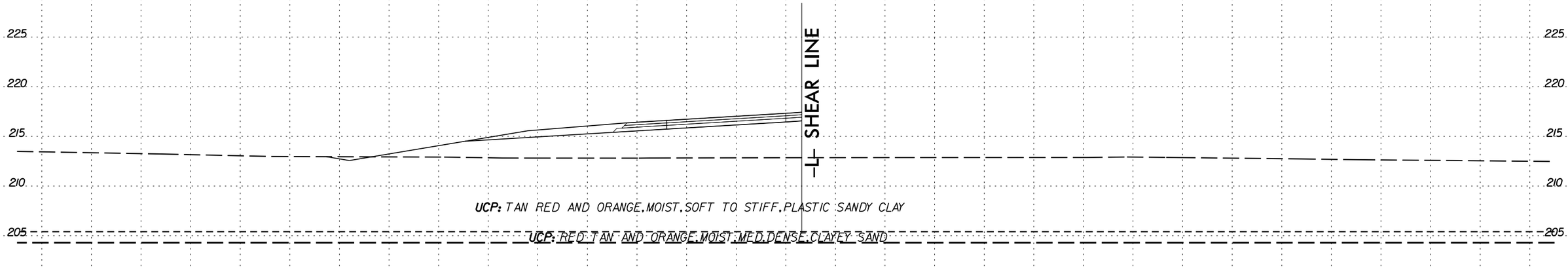
8/23/99

8/23/99

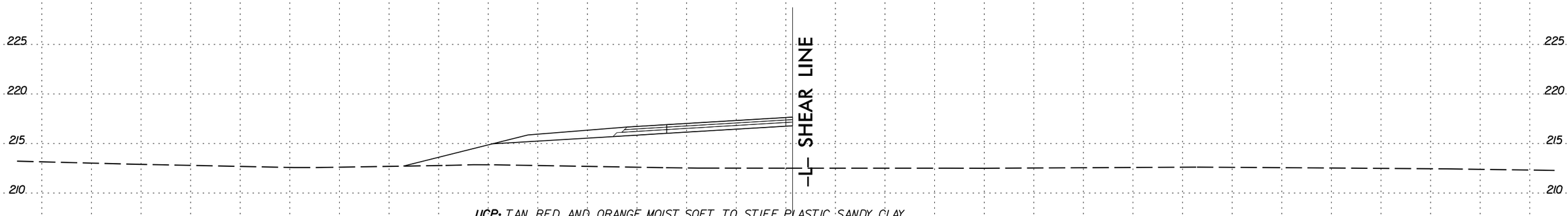
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	53

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

230 225 220 215 210 205 200 195



12 + 00.00



11 + 50.00

-Y17RPB-

$$$$SYSTIME$$$$
$$$$SAVEDON$$$$
$$$$USERNAME$$$$

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	54

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

230 225 220 215 210 205 200 195

SHEAR LINE

UCP: TAN, MOIST, SILTY SAND (CULTIVATED SOIL)

UCP: TAN RED AND ORANGE, MOIST, SOFT TO STIFF, PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE, MOIST, MED. DENSE, CLAYEY SAND

CP: ORANGE RED AND GRAY, DRY, V. STIFF, SANDY CLAY (MIDDENDORF FORMATION)

13 + 00.00

SHEAR LINE

UCP: TAN RED AND ORANGE, MOIST, SOFT TO STIFF, PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE, MOIST, MED. DENSE, CLAYEY SAND

CP: ORANGE RED AND GRAY, DRY, V. STIFF, SANDY CLAY (MIDDENDORF FORMATION)

12 + 50.00

-Y17RPB-

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

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	55

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

230 225 220 215 210 205 200

UCP: TAN, MOIST, SILTY SAND (CULTIVATED SOIL)

UCP: TAN RED AND ORANGE, MOIST, SOFT TO STIFF, PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE, MOIST, MED DENSE, CLAYEY SAND

CP: ORANGE RED AND GRAY, DRY, V. STIFF, SANDY CLAY (MIDDENDORF FORMATION)

SHEAR LINE

14 + 00.00

230 225 220 215 210 205 200

UCP: TAN, MOIST, SILTY SAND (CULTIVATED SOIL)

UCP: TAN RED AND ORANGE, MOIST, SOFT TO STIFF, PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE, MOIST, MED DENSE, CLAYEY SAND

CP: ORANGE RED AND GRAY, DRY, V. STIFF, SANDY CLAY (MIDDENDORF FORMATION)

SHEAR LINE

13 + 50.00

195

-Y17RPB-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

$$$$SYSTIME$$$$
$$$$SMFILE$$$$
$$$$USERNAME$$$$

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	56

-Y17RPB-

8/22/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	57

16+00.00

15+50.00

-Y17RPB-

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	58

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

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	59

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	CL	17+00	1.0-2.5	A-6	39	21	34	23	15	28	100	79	47	23.6	-

17+00.00

-Y17RPB-

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	60

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

215 210 205 200

UCP: TAN RED AND ORANGE,MOIST,SOFT TO STIFF,PLASTIC SANDY CLAY

CP: ORANGE AND GRAY,MOIST,LOOSE TO MED.DENSE,CLAYEY SAND (MIDDENDORF FORMATION)

CP: ORANGE RED AND GRAY,DRY,V.STIFF,SANDY CLAY

19 + 00.00

215 210 205 200

UCP: TAN,MOIST,SILTY SAND (CULTIVATED SOIL)

UCP: TAN RED AND ORANGE,MOIST,SOFT TO STIFF,PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE,MOIST,MED.DENSE,CLAYEY SAND

CP: ORANGE RED AND GRAY,DRY,V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

18 + 50.00

215 210 205 200

UCP: TAN,MOIST,SILTY SAND (CULTIVATED SOIL)

UCP: TAN RED AND ORANGE,MOIST,SOFT TO STIFF,PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE,MOIST,MED.DENSE,CLAYEY SAND

CP: ORANGE RED AND GRAY,DRY,V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

18 + 00.00

215 210 205 200

UCP: TAN,MOIST,SILTY SAND (CULTIVATED SOIL)

UCP: TAN RED AND ORANGE,MOIST,SOFT TO STIFF,PLASTIC SANDY CLAY

UCP: RED TAN AND ORANGE,MOIST,MED.DENSE,CLAYEY SAND

CP: ORANGE RED AND GRAY,DRY,V.STIFF,SANDY CLAY (MIDDENDORF FORMATION)

17 + 50.00

195

-Y17RPB-

$$$$SYSTIME$$$$
$$$$SDON$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$$$$PRNAME$$$$
$$$$USERNAME$$$$

0 2.5 5
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75
215
210
205
200
195
UCP: TAN RED AND ORANGE, MOIST, SOFT TO STIFF, PLASTIC SANDY CLAY
CP: ORANGE AND GRAY, MOIST, LOOSE TO MED. DENSE, CLAYEY SAND (MIDDENDORF FORMATION)
CP: ORANGE RED AND GRAY, DRY, V. STIFF, SANDY CLAY
19 + 50.00
-Y17RPB-

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	62

8/22/99

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

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	63

8/23/99

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	64

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

215
210
205
200
195
190

UCP: TAN, MOIST, SOFT, SANDY CLAY

CP: ORANGE AND GRAY, MOIST, MED. DENSE, CLAYEY SAND (MIDDENDORF FORMATION)

CP: ORANGE TAN AND GRAY, DRY, V. STIFF, SANDY CLAY

CP: LT. GRAY, SATURATED, MED. DENSE, SILTY SAND

22 + 00.00

-Y17RPB-

$$$$USERNAME$$$$ $$$$SYSTIME$$$$

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	65

14+50.00

14+00.00

-Y17RPD-

15+00.00

-Y17RPD-

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	67

15+49

ROADWAY EMBANKMENT: BROWN, WET, LOOSE, SILTY SAND

UCP: TAN AND BROWN, MOIST TO WET, MED. STIFF, SANDY CLAY

5
7
17
15

01/16

UCP: TAN GRAY AND ORANGE, MOIST TO SATURATED, MED. DENSE, CLAYEY AND SILTY SAND

7

COASTAL PLAIN: ORANGE AND GRAY, MOIST, MED. STIFF, SILTY CLAY (MIDDENDORF FORMATION)

COASTAL PLAIN: ORANGE AND GRAY, SATURATED, V. LOOSE, SLITY SAND

3

BT

15+50.00

-Y17RPD-

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

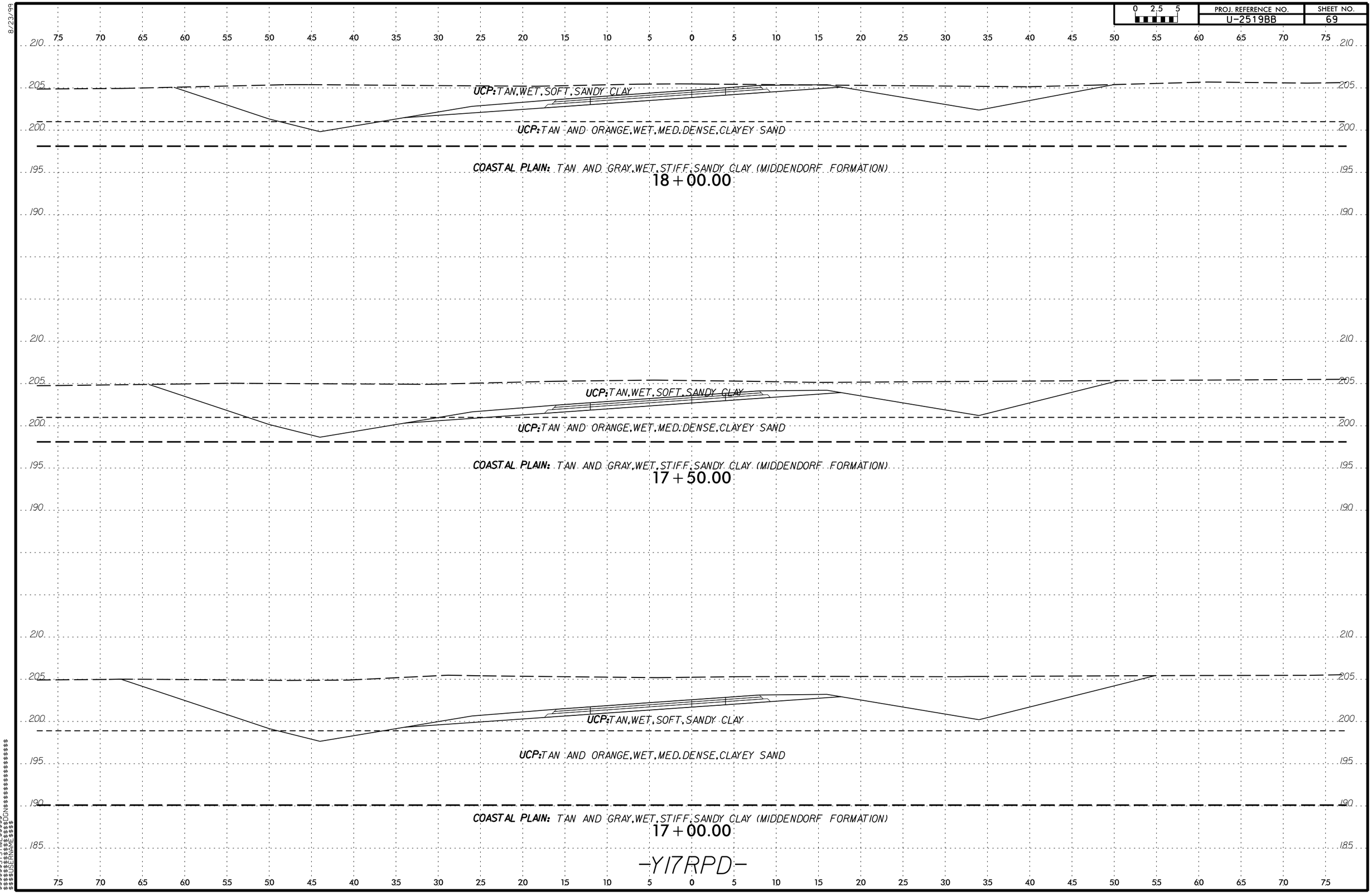
8/23/99

16 + 50.00

16 + 00.00

-Y17RPD-

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



PROJ. REFERENCE NO.	SHEET NO.
U-2519BB	69

18 + 00.00

17 + 50.00

17 + 00.00

-Y17RPD-

8/23/99

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

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	70

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	71

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

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2519BB	72

8/23/99

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

PROJECT REFERENCE NO.	SHEET NO.
U–2519BB	73

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX A
LABORATORY RESULTS

REFERENCE: U–2519BB

PROJECT: 34817

INITIALS DATE

Falcon Engineering, Inc. **1210 Trinity Road, Suite 110, Raleigh, NC 27607**

LABORATORY TEST RESULTS

FAYETTEVILLE OUTER LOOP FROM SOUTH OF SR 1140 (STRICKLAND BRIDGE RD) TO SOUTH OF US 401
CUMBERLAND COUNTY, NORTH CAROLINA
Project: 34817.1.FR8 (U-2519BB)
Falcon Engineering Project No.: G15058.00

SAMPLE			DEPTH	AASHTO	ATTERBERG LIMITS		% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	STATION	OFFSET	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANICS
SS-1	50+00 -Y16-	2' LT	3.3-4.8	A-7-6	42	26	37	20	14	29	100	78	46	16.8	-
SS-2	25+00 -Y17-	CL	3.7-5.2	A-7-6	42	24	36	24	8	32	100	79	43	19.4	-
SS-3	34+00 -Y17-	CL	3.4-4.9	A-7-6	50	32	40	21	9	30	100	76	42	17.7	-
SS-4	37+00 -Y17-	CL	3.5-5.0	A-2-6	34	17	49	21	7	23	100	71	32	13.3	-
SS-5	58+00 -Y17-	CL	1.0-2.5	A-7-6	44	19	32	19	15	34	99	80	52	22.2	-
SS-6	64+00 -Y17-	CL	1.0-2.5	A-6	36	20	27	23	19	31	100	85	54	21.1	-
SS-7	86+00 -Y17-	CL	1.0-2.5	A-7-6	43	21	22	39	10	29	99	86	45	20.6	-
SS-8	22+03 -Y17RPA-	5' RT	13.5-15.0	A-7-6	42	23	29	29	13	29	100	83	47	15.5	-
SS-9	25+04 -Y17RPA-	3' LT	6.1-7.6	A-2-7	45	26	47	20	6	27	99	69	35	17.8	-
SS-10	17+00 -Y17RPB-	CL	1.0-2.5	A-6	39	21	34	23	15	28	100	79	47	23.6	-
SS-11	23+00 -Y17RPB-	CL	1.1-2.6	A-6	27	13	32	28	29	11	100	81	45	19.8	-
SS-12	15+00 -Y17RPC-	CL	1.2-2.7	A-6	36	20	36	20	18	26	99	77	47	19.4	-
SS-13	18+00 -Y17RPC-	CL	0.9-2.4	A-7-6	47	25	28	19	14	39	99	83	56	22.8	-
SS-14	22+00 -Y17RPD-	CL	1.0-2.5	A-7-6	41	27	41	19	13	27	96	68	42	17.9	-
SS-15	35+00 -Y19-	CL	1.2-2.7	A-6	30	15	20	39	15	26	99	88	48	19.0	-
SS-16	555+00 -L-	CL	3.5-5.0	A-2-7	42	17	54	16	7	23	98	62	32	17.8	-
SS-17	558+00 -L-	CL	3.3-4.8	A-7-6	45	24	39	25	10	26	100	78	39	20.9	-
SS-18	561+00 -L-	CL	6.0-7.5	A-2-7	43	28	51	19	8	22	99	66	33	13.7	-
SS-19	573+00 -L-	CL	6.2-7.7	A-2-6	30	11	39	29	5	27	100	81	34	31.6	-
SS-20	579+00 -L-	CL	13.0-14.5	A-2-4	22	0	11	77	4	8	100	95	12	41.9	-
SS-21	582+00 -L-	CL	8.5-10	A-1-b	19	0	68	19	3	10	95	49	14	14.8	-
SS-22	21+00 -SR1-	CL	0.0-1.0	A-6	24	11	35	24	18	23	100	79	45	20.9	1.9
SS-23	16+00 -SR2-	CL	0.0-1.0	A-4	26	8	25	27	28	20	100	87	51	20.1	3.9
SS-24	16+00 -SR2-	CL	1.0-2.5	A-4	22	6	23	36	24	17	100	91	46	24.2	3.2
BS-1	15+49 -Y17RPD-	6' LT	1.0-8.0	A-6	30	15	34	33	10	23	99	80	37	15.2	-
BS-2	15+63 -Y17RPA-	2' RT	1.0-8.0	A-2-4	20	3	57	24	6	13	98	65	21	12.6	-
BS-3	564+00 -L-	CL	1.0-8.0	A-2-4	22	7	59	18	7	16	95	52	24	11.0	-
BS-4	48+95 -Y17-	5' LT	1.0-6.0	A-2-6	39	21	45	23	9	23	99	72	35	17.9	-
BS-5	31+00 -Y17-	CL	1.0-7.0	A-6	35	20	42	23	10	25	100	76	38	13.0	-
BS-6	576+00 -L-	CL	1.0-9.0	A-2-4	18	0	71	18	4	7	98	62	12	19.9	-

Signature: **NCDOT No.:** 123-01-0509

Notes: LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index = LL - PL
* Classification based only on field classification

Falcon Engineering, Inc.
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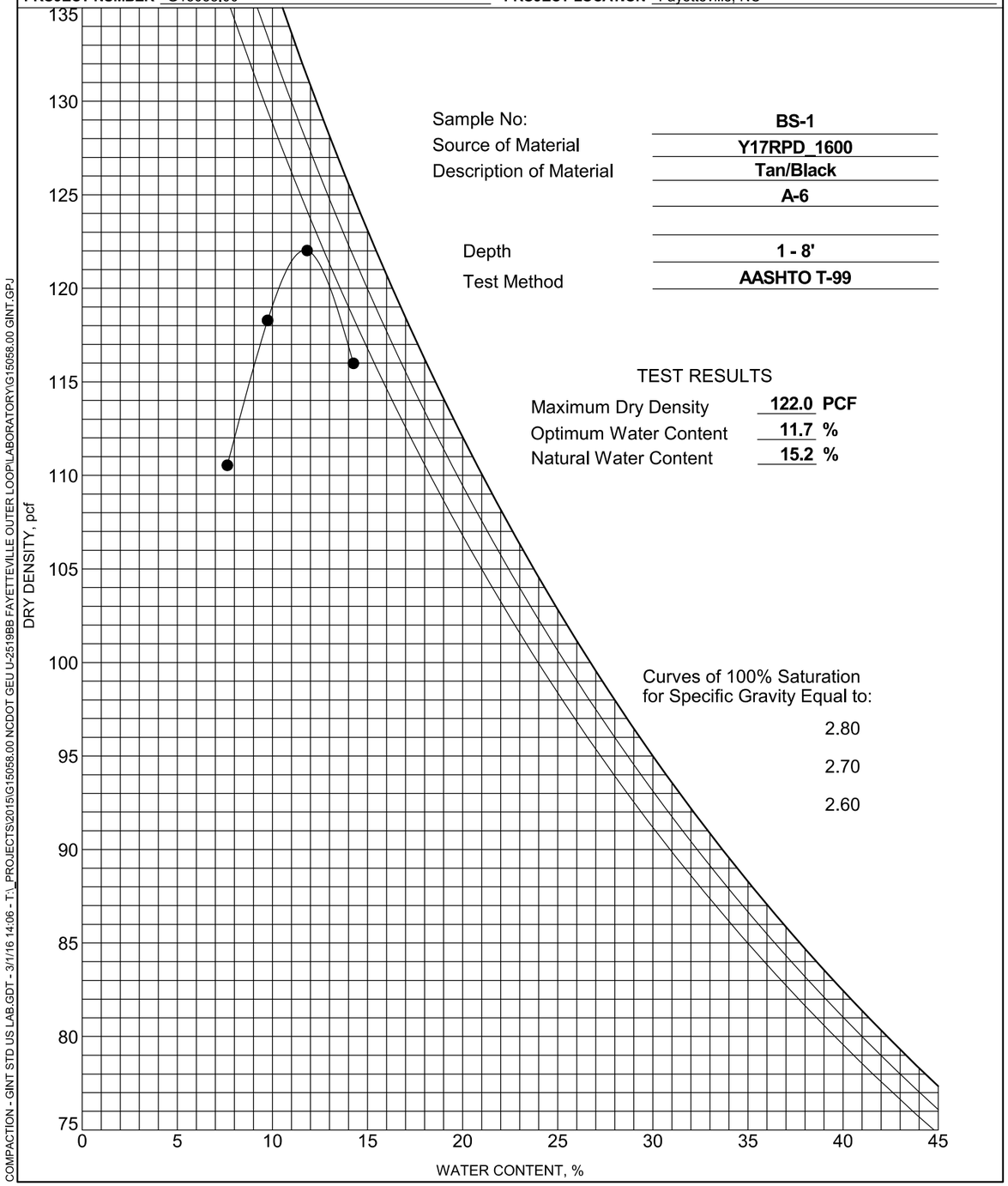
Fax: (919) 871-0803

MOISTURE-DENSITY RELATIONSHIP

CLIENT NCDOT **PROJECT NAME** Fayetteville Outer Loop

PROJECT NUMBER G15058.00 **PROJECT LOCATION** Fayetteville, NC



Sample No:	BS-1
Source of Material	Y17RPD_1600
Description of Material	Tan/Black
	A-6
Depth	1 - 8'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	122.0	PCF
Optimum Water Content	11.7	%
Natural Water Content	15.2	%

COMPACTION - GINT STD US LAB.GDT - 3/1/16 14:06 - T:_PROJECTS\2015\G15058.00 NCDOT GEU U-2519BB FAYETTEVILLE OUTER LOOP\LABORATORY\G15058.00 GINT.GPJ

FALCON ENGINEERING 1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

PROJECT #: G15058.00 **DATE:** 3/8/2016

PROJECT NAME: Fayetteville Outer Loop

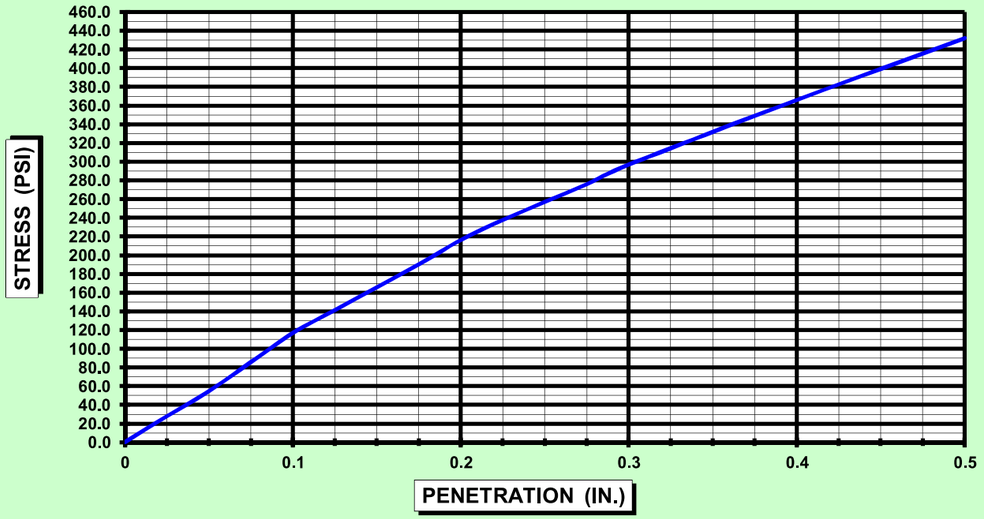
BORING: Y17RPD_1600 **SAMPLE:** BS-1 **DEPTH:** 1.0-8.0

SOIL DESCRIPTION: Tan/Black A-6

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	122.0 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	11.7%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	120.2 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	11.8%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.5%	SWELL	0.07%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	11.7	12.9
CBR VALUE AT .2"	14.4	15.0

STRESS-PENETRATION CURVE



LIQUID LIMIT	30	PLASTIC LIMIT	15	PLASTIC INDEX	15
Percent Passing #200 Sieve = 37.0%		Natural Moisture Content = 15.2%			

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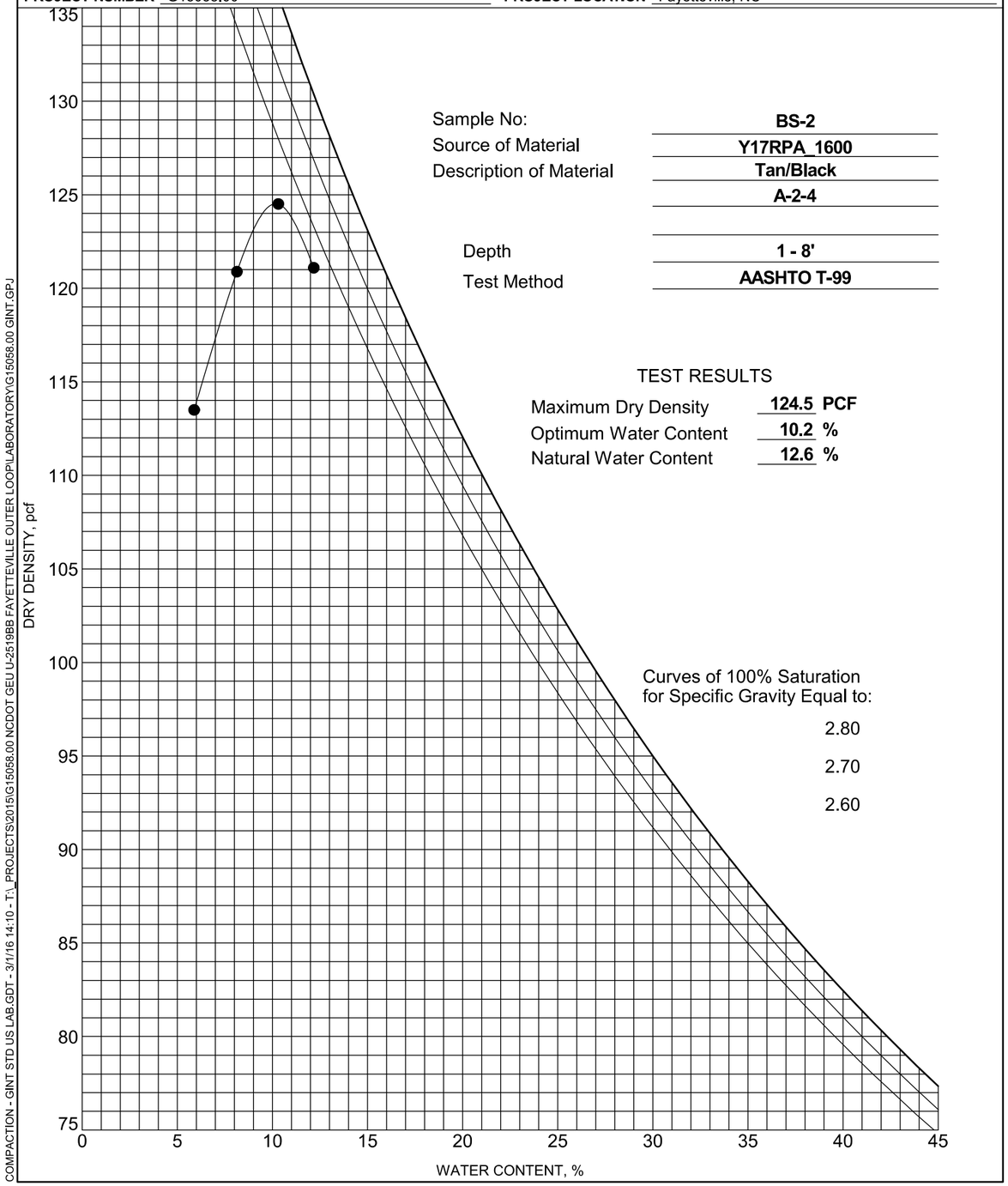
MOISTURE-DENSITY RELATIONSHIP

CLIENT NCDOT **PROJECT NAME** Fayetteville Outer Loop

PROJECT NUMBER G15058.00 **PROJECT LOCATION** Fayetteville, NC



Sample No:	BS-2
Source of Material	Y17RPA_1600
Description of Material	Tan/Black A-2-4
Depth	1 - 8'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	124.5	PCF
Optimum Water Content	10.2	%
Natural Water Content	12.6	%

FALCON ENGINEERING 1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

PROJECT #: G15058.00 **DATE:** 3/8/2016

PROJECT NAME: Fayetteville Outer Loop

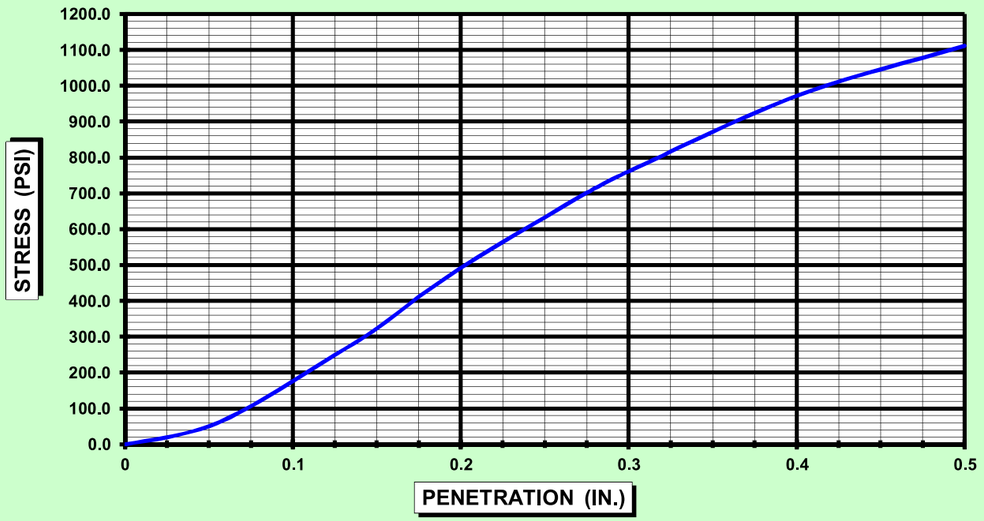
BORING: Y17RPA_1600 **SAMPLE:** BS-2 **DEPTH:** 1.0-8.0

SOIL DESCRIPTION: Tan/Black A-2-4

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	124.5 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	10.2%	LOAD CELL	6000lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	122.9 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	10.3%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.7%	SWELL	-0.07%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	17.6	28.0
CBR VALUE AT .2"	32.8	39.3

STRESS-PENETRATION CURVE



LIQUID LIMIT	20	PLASTIC LIMIT	17	PLASTIC INDEX	3
Percent Passing #200 Sieve = 21.2%		Natural Moisture Content = 12.6%			

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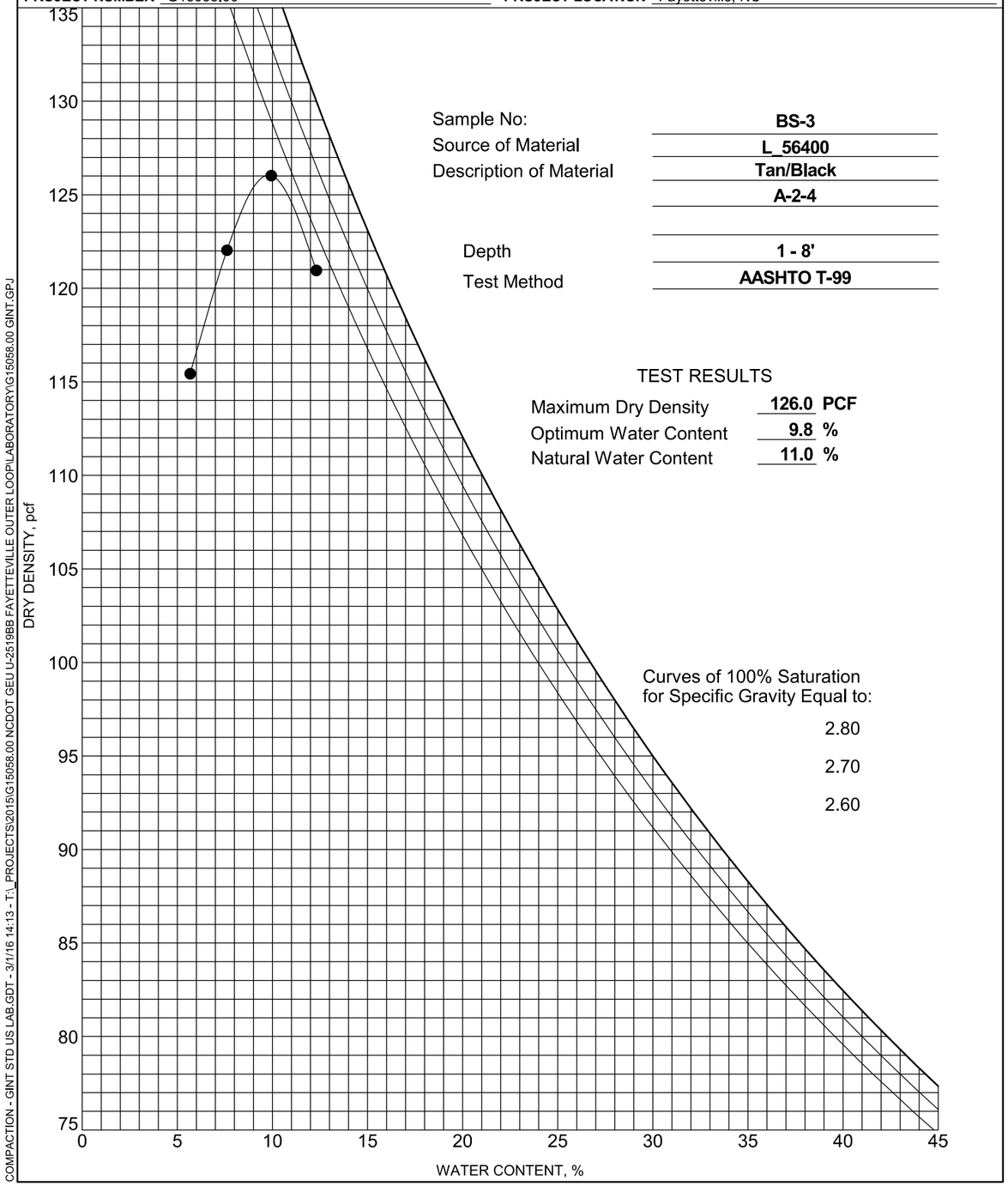
MOISTURE-DENSITY RELATIONSHIP

CLIENT NCDOT **PROJECT NAME** Fayetteville Outer Loop

PROJECT NUMBER G15058.00 **PROJECT LOCATION** Fayetteville, NC



Sample No:	BS-3
Source of Material	L_56400
Description of Material	Tan/Black A-2-4
Depth	1 - 8'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	126.0	PCF
Optimum Water Content	9.8	%
Natural Water Content	11.0	%

FALCON ENGINEERING 1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

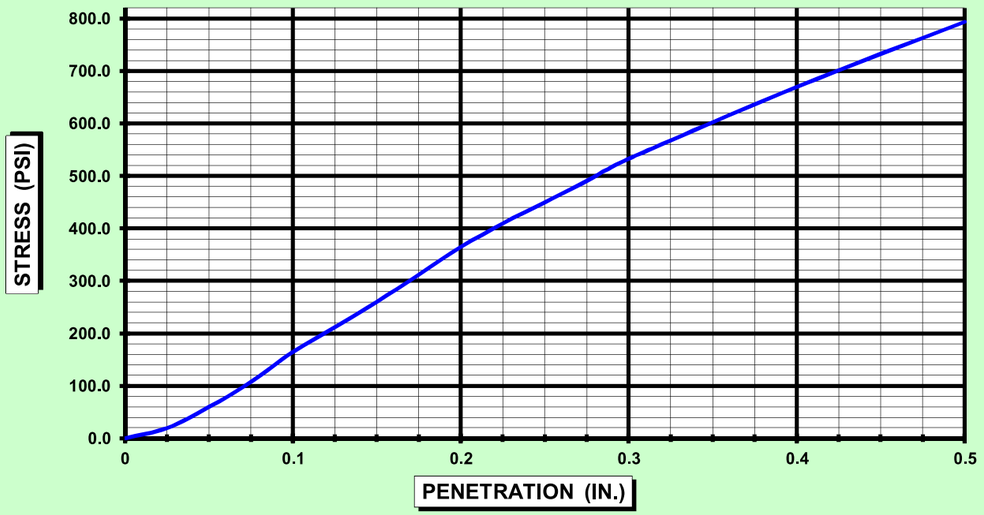
AASHTO T-193 \ ASTM D-1883

PROJECT #:	G15058.00	DATE:	3/8/2016
PROJECT NAME:	Fayetteville Outer Loop		
BORING:	L_56400	SAMPLE: BS-3	DEPTH: 1.0-8.0
SOIL DESCRIPTION:	Tan/Black A-2-4		

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	126.0 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	9.8%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	123.5 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	10.1%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.0%	SWELL	-0.04%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	16.5	21.5
CBR VALUE AT .2"	24.3	27.0

STRESS-PENETRATION CURVE



LIQUID LIMIT	22	PLASTIC LIMIT	15	PLASTIC INDEX	7
Percent Passing #200 Sieve = 24.0%		Natural Moisture Content = 11.0%			

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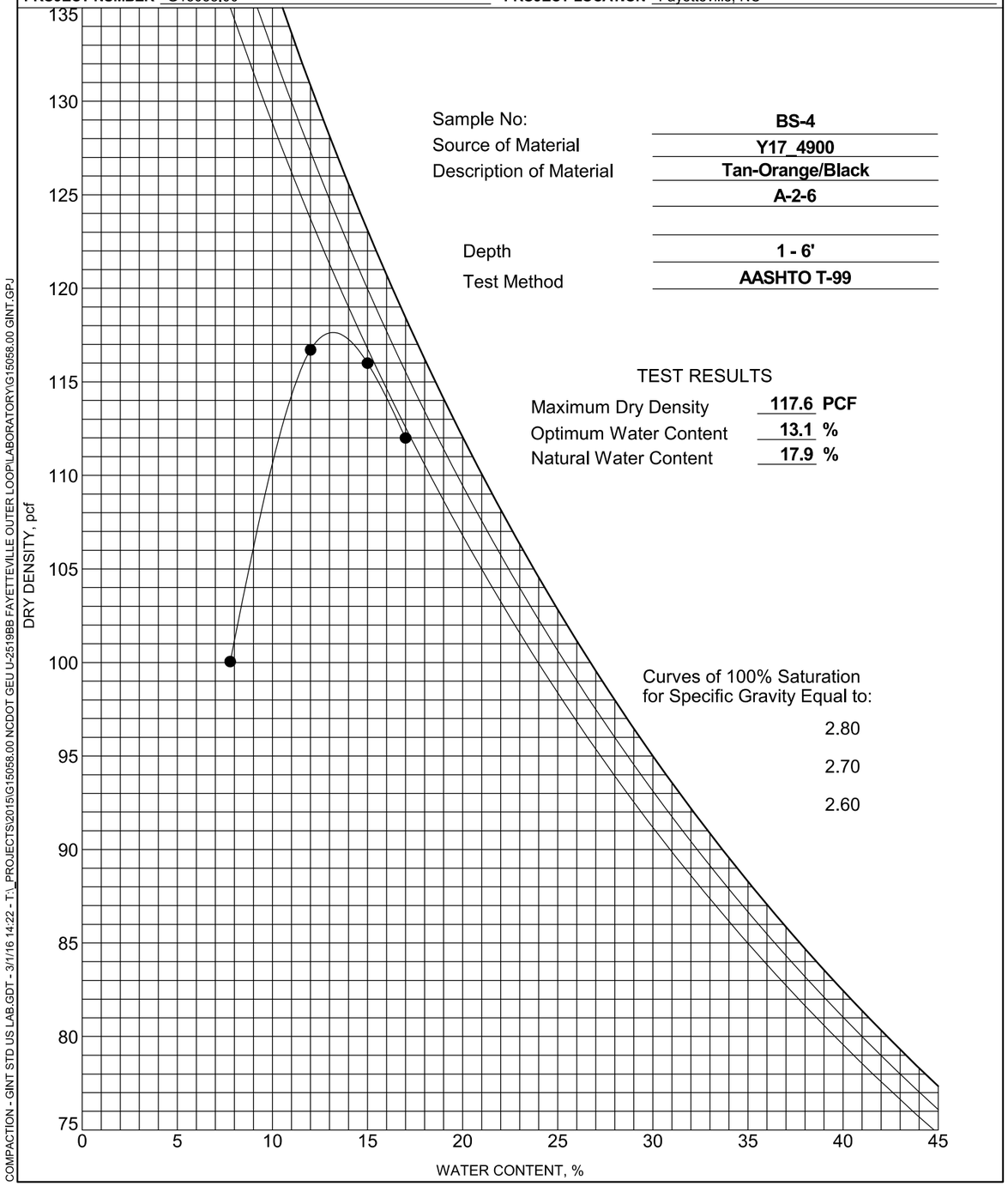
MOISTURE-DENSITY RELATIONSHIP

CLIENT NCDOT **PROJECT NAME** Fayetteville Outer Loop

PROJECT NUMBER G15058.00 **PROJECT LOCATION** Fayetteville, NC



Sample No:	BS-4
Source of Material	Y17_4900
Description of Material	Tan-Orange/Black A-2-6
Depth	1 - 6'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	117.6	PCF
Optimum Water Content	13.1	%
Natural Water Content	17.9	%

FALCON ENGINEERING 1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

PROJECT #: G15058.00 **DATE:** 3/8/2016

PROJECT NAME: Fayetteville Outer Loop

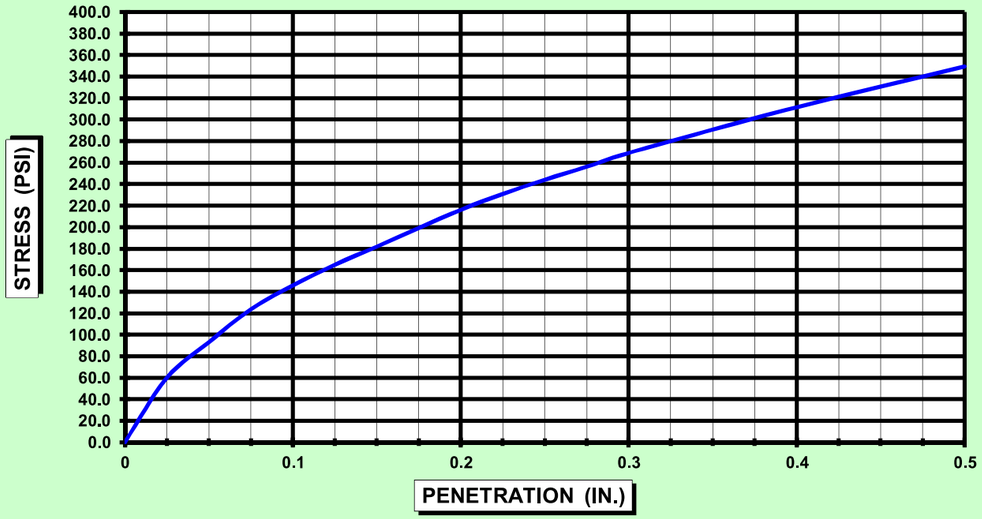
BORING: Y17_4900 **SAMPLE:** BS-4 **DEPTH:** 1.0-6.0

SOIL DESCRIPTION: Tan-Orange/Black A-2-6

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	117.6 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	13.1%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	115.4 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	13.4%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.1%	SWELL	0.11%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	14.6	N/A
CBR VALUE AT .2"	14.4	N/A

STRESS-PENETRATION CURVE



LIQUID LIMIT	39	PLASTIC LIMIT	18	PLASTIC INDEX	21
Percent Passing #200 Sieve = 35.0%		Natural Moisture Content = 17.9%			

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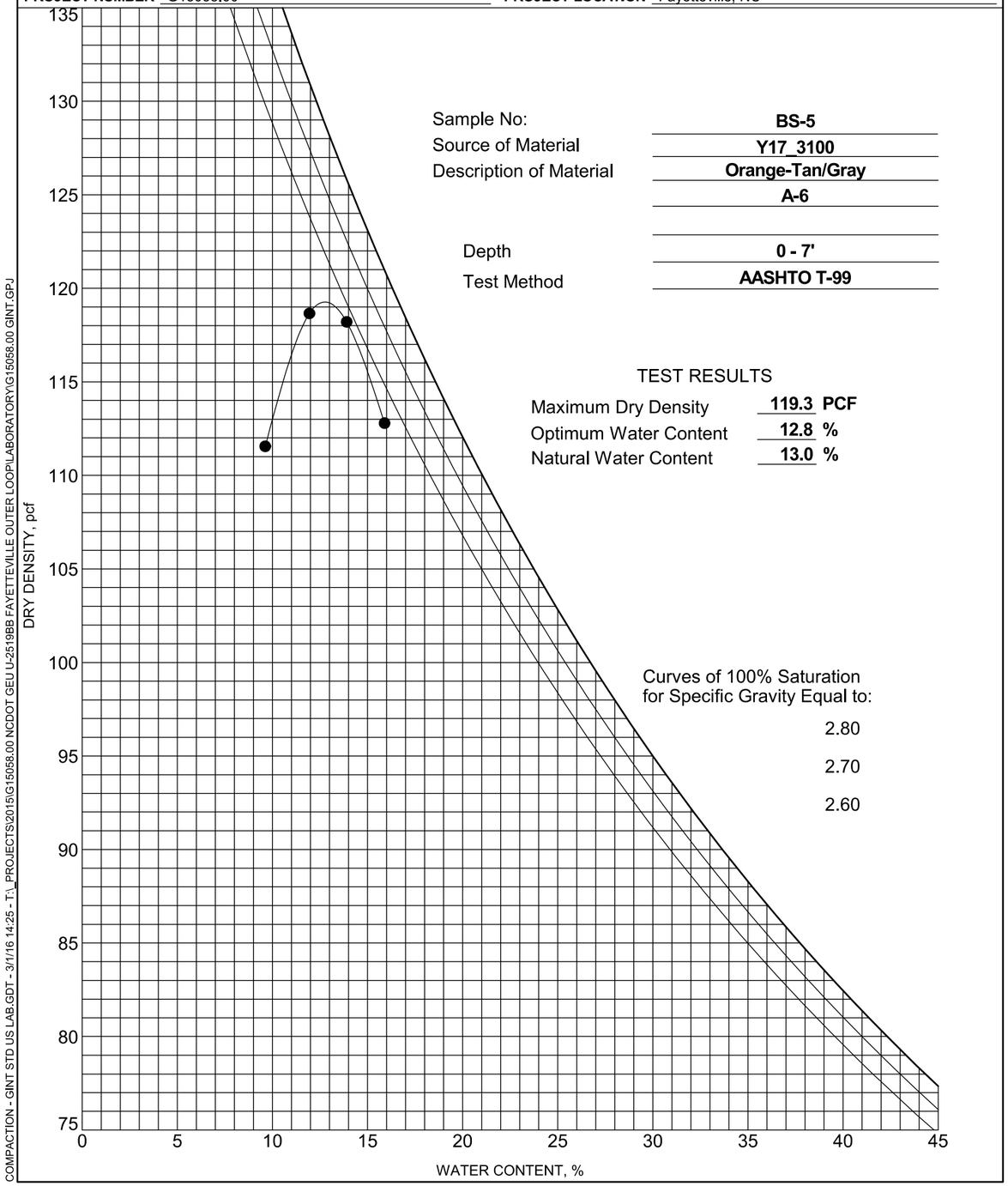
MOISTURE-DENSITY RELATIONSHIP

CLIENT NCDOT **PROJECT NAME** Fayetteville Outer Loop

PROJECT NUMBER G15058.00 **PROJECT LOCATION** Fayetteville, NC



Sample No:	BS-5
Source of Material	Y17_3100
Description of Material	Orange-Tan/Gray
	A-6
Depth	0 - 7'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	119.3	PCF
Optimum Water Content	12.8	%
Natural Water Content	13.0	%

FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

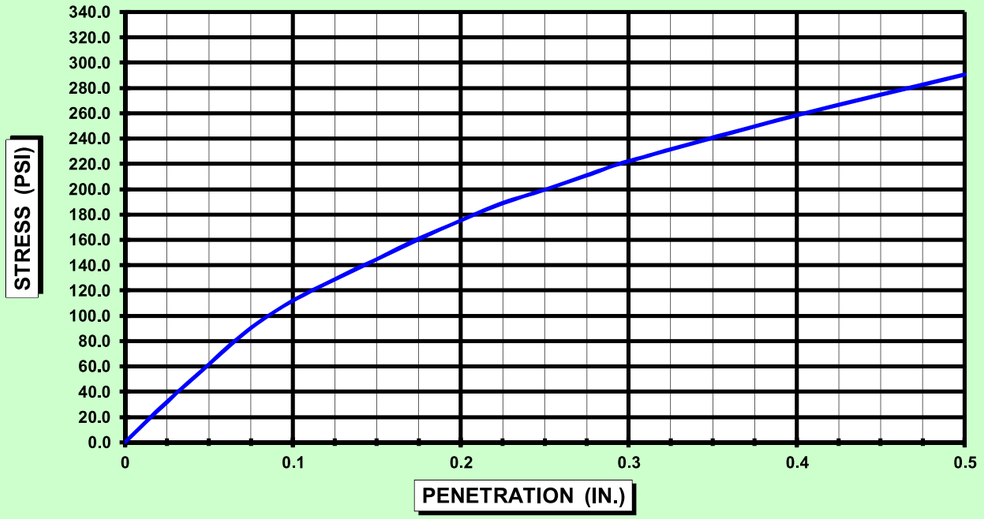
AASHTO T-193 \ ASTM D-1883

PROJECT #:	G15058.00	DATE:	3/8/2016
PROJECT NAME:	Fayetteville Outer Loop		
BORING:	Y17_3100	SAMPLE: BS-5	DEPTH: 0-7.0
SOIL DESCRIPTION:	Orange-Tan/Gray A-6		

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	119.3 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	12.8%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	117.7 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	12.9%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.7%	SWELL	0.02%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	11.2	N/A
CBR VALUE AT .2"	11.7	N/A

STRESS-PENETRATION CURVE



LIQUID LIMIT	35	PLASTIC LIMIT	15	PLASTIC INDEX	20
Percent Passing #200 Sieve = 37.7%		Natural Moisture Content = 13.0%			

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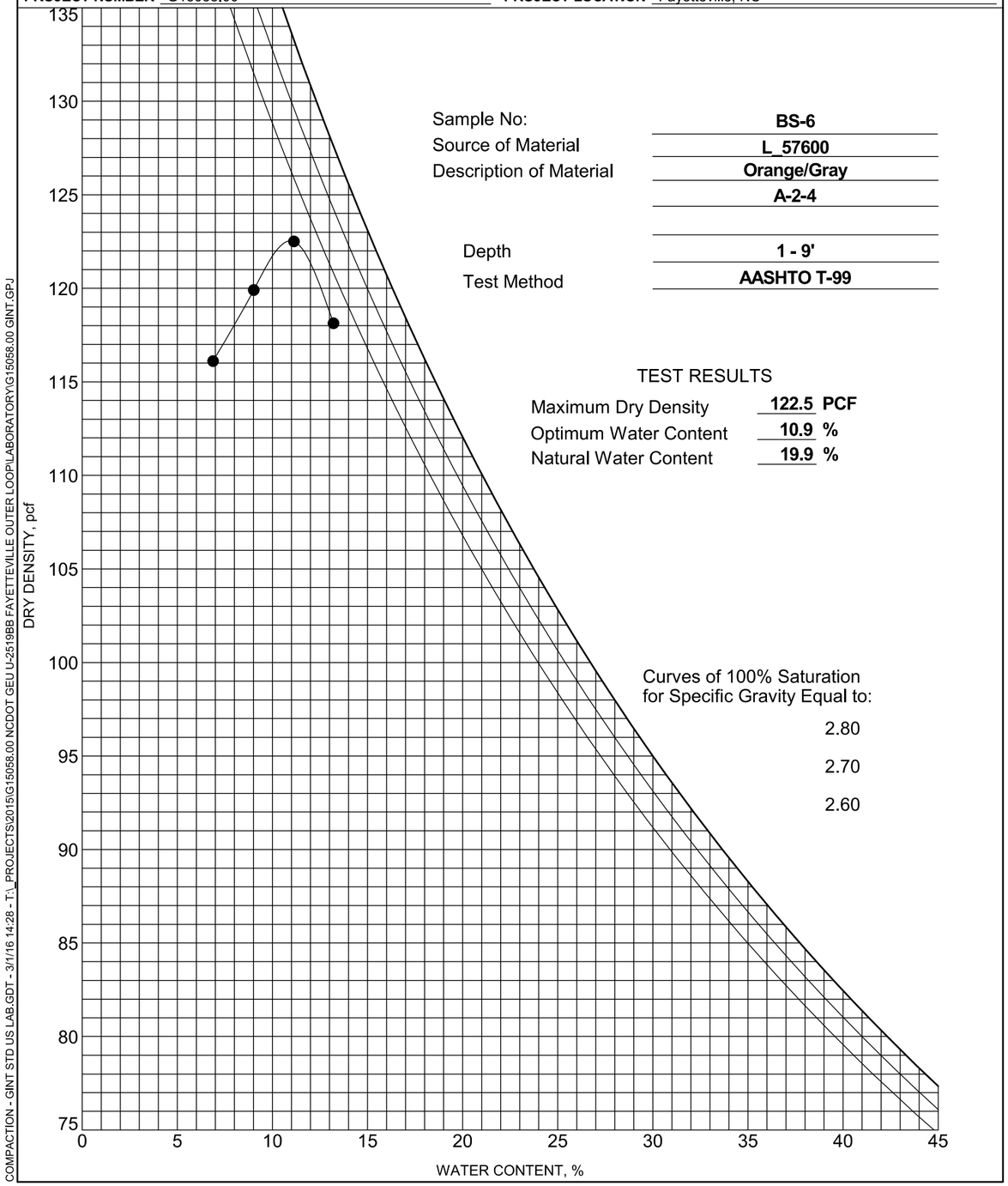
MOISTURE-DENSITY RELATIONSHIP

CLIENT NCDOT **PROJECT NAME** Fayetteville Outer Loop

PROJECT NUMBER G15058.00 **PROJECT LOCATION** Fayetteville, NC



Sample No:	BS-6
Source of Material	L_57600
Description of Material	Orange/Gray A-2-4
Depth	1 - 9'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	122.5	PCF
Optimum Water Content	10.9	%
Natural Water Content	19.9	%

FALCON ENGINEERING

1210 TRINITY RD., SUITE 110, RALEIGH, NC 27607

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

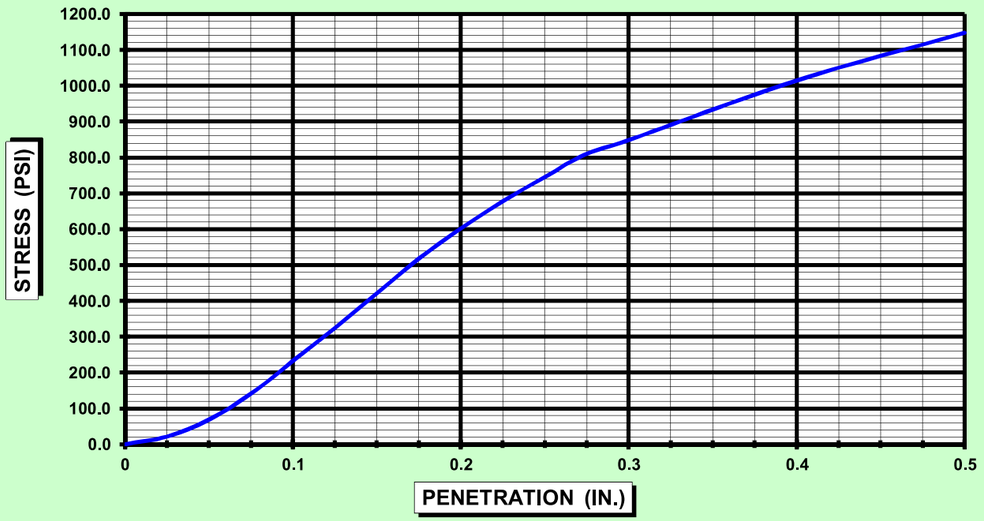
AASHTO T-193 \ ASTM D-1883

PROJECT #:	G15058.00	DATE:	3/8/2016
PROJECT NAME:	Fayetteville Outer Loop		
BORING:	L_57600	SAMPLE: BS-6	DEPTH: 1.0-9.0
SOIL DESCRIPTION:	Orange/Gray A-2-4		

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	122.5 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	10.9%	LOAD CELL	2500lb
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	120.7 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	11.0%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	98.5%	SWELL	-0.11%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	23.2	36.0
CBR VALUE AT .2"	40.1	43.0

STRESS-PENETRATION CURVE



LIQUID LIMIT	18	PLASTIC LIMIT	NP	PLASTIC INDEX	NP
Percent Passing #200 Sieve = 12.1%		Natural Moisture Content = 19.9%			