STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5711	1	27

REFERENCE: R-5711

PROJECT: 50207

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	22+40 TO 38+75	4 TO 5	7
-Y1-	14+85 TO 15+48.09	6	9
-Y2-	13+45 TO 26+50	6	8
-Y2-	26+50 TO 29+20.41	4	8
-Y3-	10+00 TO 16+50	4	8
-Y4-	17+50 TO 20+42.67	4	9

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	27+50 TO 38+75	10 TO 19

APPENDICES

TITLE	SHEETS
SUMMARY OF LAB TEST DATA	20
CBR AND PROCTOR DATA	21 TO 25

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *IREDELL*

PROJECT DESCRIPTION *INTERSECTION IMPROVEMENTS AT US 21 AND SR 1312 (FLOWER HOUSE LOOP)/ SR 2375 (HOUSTON RD)*

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

M. L. HARTMAN

M. R. NORWOOD

T. D. NUSS

INVESTIGATED BY *M. L. HARTMAN*

DRAWN BY *M. L. HARTMAN*

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SUBMITTED BY *R. E. KRAL*

DATE *AUGUST 2018*

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RALEIGH, NC 27616
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NORTH CAROLINA PROFESSIONAL SEAL 042642 ENGINEER ROBERT E. KRAL

DocuSigned by:
Robert E Kral
8F44867067294AF...

08/09/2018

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-5711	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	50 MX													
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40														
LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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
- 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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-750
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3 1/4" HOLLOW AUGERS

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: ELEVATIONS TAKEN FROM TIN FILE "r5711_ls_tin.tin", DATED 01/26/2018

ELEVATION: N/A FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

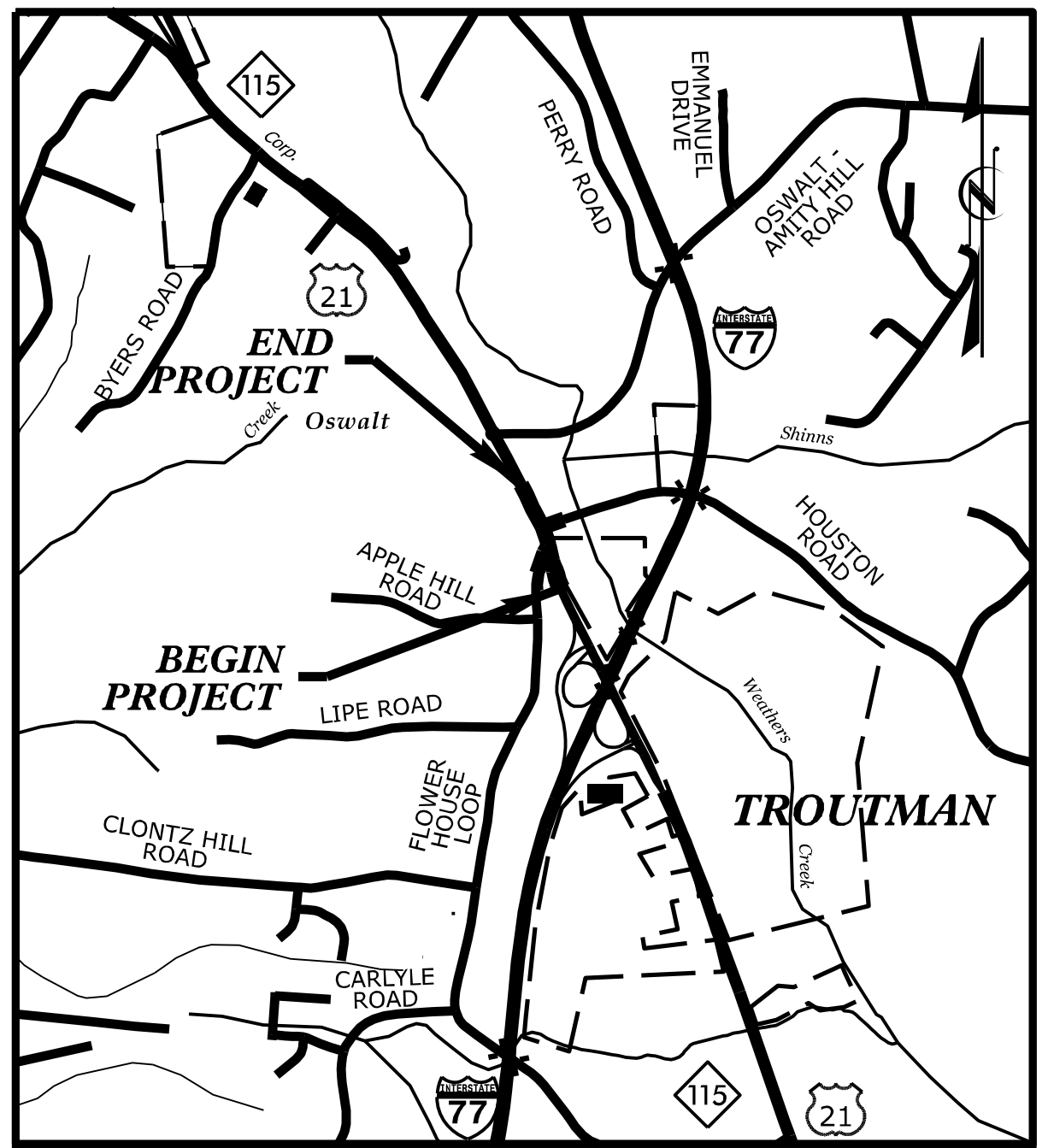
DATE: 8-15-14

05/30/17

TIP PROJECT: R-5711

CONTRACT:

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols
See 1C Sheet Series For Survey Control



VICINITY MAP

NOT TO SCALE

RW PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

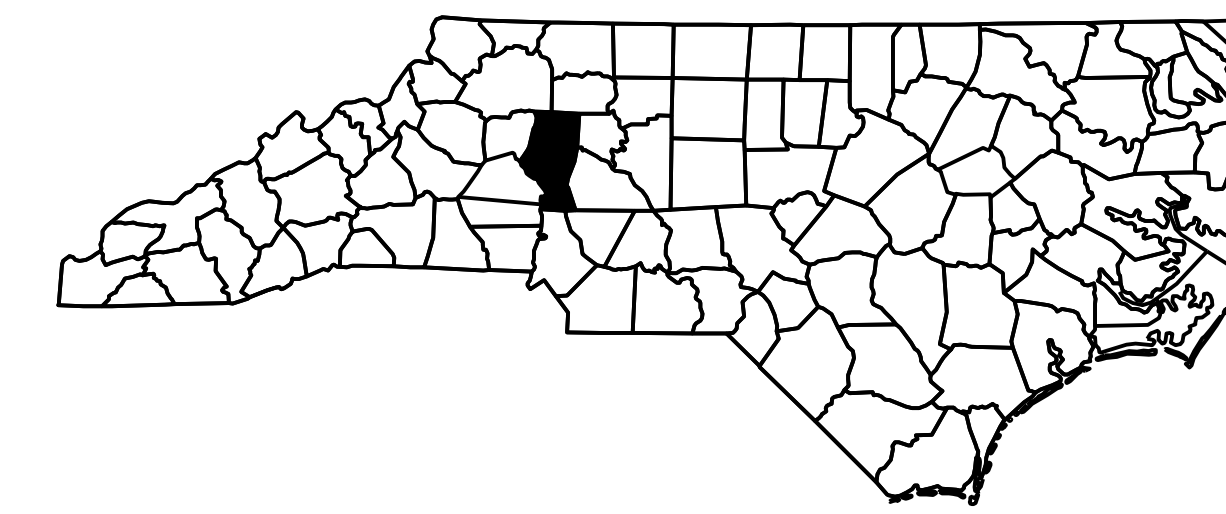
IREDELL COUNTY

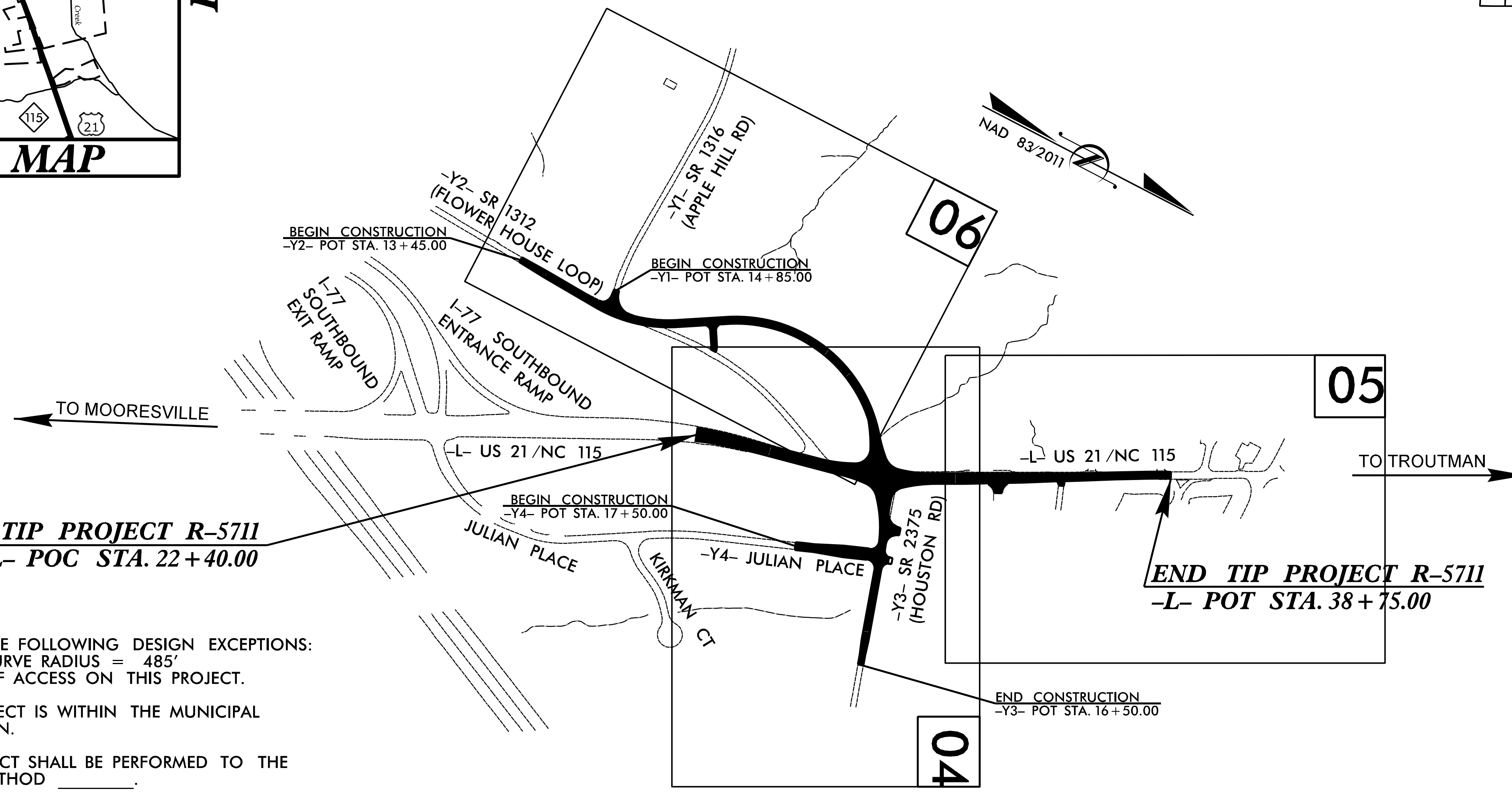
LOCATION: INTERSECTION IMPROVEMENTS AT US 21 AND SR 1312 (FLOWER HOUSE LOOP)/ SR 2375 (HOUSTON ROAD)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5711	3	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
50207.1.1		PE
50207.2.1		R/W





THIS PROJECT REQUIRES THE FOLLOWING DESIGN EXCEPTIONS:
MIN. HORIZONTAL CURVE RADIUS = 485′
THERE IS NO CONTROL OF ACCESS ON THIS PROJECT.

A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF TROUTMAN.

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 2019 = 15500
ADT 2040 = 19000
K = 7 %
D = 50 %
T = 17 % *
V = 50 MPH
(* TTST = 9% DUAL 8%)
FUNC CLASS =
MINOR ARTERIAL
REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5711 .... 0.310 mi

TOTAL LENGTH OF TIP PROJECT R-5711 .... 0.310 mi

PLANS PREPARED BY:

DRMP
ENGINEERS SURVEYORS PLANNERS SCIENTISTS

DRMP, INC.
5950 FAIRVIEW ROAD, SUITE 320
CHARLOTTE, NORTH CAROLINA 28210
(704) 332-2289
NC LICENSE NO. C-2213

FOR DIVISION OF HIGHWAYS

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 30, 2018

LETTING DATE:
JUNE 25, 2019

CHRISTOPHER K. HAIRE, PE
PROJECT ENGINEER

MICHAEL D. HAGE, PE
PROJECT DESIGN ENGINEER

NCDOT CONTACT:
BRYAN K. SOWELL, PE
DIVISION 12 PROJECT ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

$$DATE$$ $$TIME$$
$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

August 8, 2018

STATE PROJECT: 50207.1.1 (R-5711)
FEDERAL PROJECT: N/A
COUNTY: Iredell
DESCRIPTION: Intersection improvements at US 21 and SR 1312 (Flower House Loop)/SR 2375 (Houston Road)

SUBJECT: Geotechnical Report – Inventory

Project Description

This project consists of re-aligning the intersections of US 21 (-L-) with Flower House Loop (-Y2-) and Houston Road (-Y3-) in Troutman, North Carolina to a single, signalized intersection. The project begins approximately one-quarter mile north of Interstate 77, and extends north for approximately 0.31 miles. The type of work being performed consists of grading, paving, drainage, and signals. Proposed alignment -Y2- will be partially built on new location to align with the existing US 21/Houston Road intersection.

Field work was conducted in June of 2018 by S&ME, Inc. Standard Penetration Tests and hand-augers were performed at selected locations along the project. A CME-750 ATV-mounted drill machine with an automatic hammer was used to perform the SPT borings.

The following alignments were investigated. Subsurface profiles of the following alignments are included in this report.

Line	Station
-L-	22+17 to 38+75
-Y2-	13+45 to 29+20.41
-Y3-	10+22.52 to 16+50
-Y4-	17+50 to 20+30.64

Areas of Special Geotechnical Interest

1) The following borehole locations encountered soft, cohesive soils which have the potential to cause embankment stability and/or long-term settlement problems:

Line	Station
-L-	25+50
-Y4-	18+00

2) Highly Plastic Soils: Highly plastic soils (PI >25) were encountered on the project at the following borehole locations:

Line	Station	Offset
-L-	28+00	56’ RT
-L-	34+00	45’ RT
-Y2-	27+66	12’ RT
-Y3-	11+00	40’ RT
-Y4-	18+00	30’ RT

3) Highly Micaceous Soils: Soils with a high mica content were encountered on the project at the following borehole locations:

Line	Station	Offset
-L-	25+50	40’ LT
-Y2-	17+50	50’ RT
-Y2-	20+50	CL
-Y2-	26+00	20’ RT
-Y2-	27+66	12’ RT

4) Artificial Fill: One area of artificial fill occurs at the following approximate location:

Line	Station	Offset
-L-	29+42 to 32+71	19’ to 274’ RT

Physiography and Geology

The project corridor is located within the Piedmont Physiographic Province in Troutman, NC. Topography along the project is flat to moderately sloping. Natural ground elevations range from 910± to 959± feet above sea level. The project corridor is mostly rural commercial with some residential buildings.

Surficial soils in this area are generally classified as residual sediments. These sediments are weathered from the underlying parent rock, fine-grained Biotite Gneiss of the Charlotte Belt, and are Cambrian and Late Proterozoic in age.

Soil and Rock Properties

Soils encountered during this investigation are separated into four categories: Artificial Fill soils, Residual soils, Weathered Rock, and Crystalline Rock.

Artificial Fill soils encountered during this investigation consist of medium stiff, red and brown silty clay (A-7-5 or A-7-6). These soils were likely sourced from a nearby location, as they are similar to other soils found in the area during this investigation.

Residual soils encountered during this investigation consist of loose to dense, tan, brown, and gray silty sand (A-2-4), loose to medium-dense, gray clayey sand (A-2-6), medium-stiff to very stiff, tan and brown sandy silt (A-4), and very soft to very stiff, red, orange, tan, and brown silty clay (A-7-5 and A-7-6).

Weathered rock and crystalline rock were encountered at one location on the project, on -Y2- at station 27+66. Weathered rock was encountered at an elevation of 910.1 feet, and crystalline rock was encountered at an elevation of 885.6 feet.

Surface Water

An unnamed creek flows due northwest across the proposed realignment of Flower House Loop (-Y2-) at station 28+21. A second unnamed creek flows due south underneath Houston Road (-Y3-) at station 14+27.

Groundwater

Groundwater measurements were taken from each boring location at the time of drilling, and again on the morning of June 8, 2018. All borings were dry at the time of drilling, with the exception of boring Y2_2766. Groundwater was encountered at 11.1 feet below the ground surface at this location at the time of drilling. During 24-hour groundwater measurements, groundwater was encountered on the -Y3- and -Y4- alignments, at depths ranging from 3.6 to 7.7 feet below the ground surface.

Respectfully Submitted,

Matthew Hartman, G.I.T.
Staff Professional

PROJECT REFERENCE NO.	SHEET NO.
R-5711	04

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

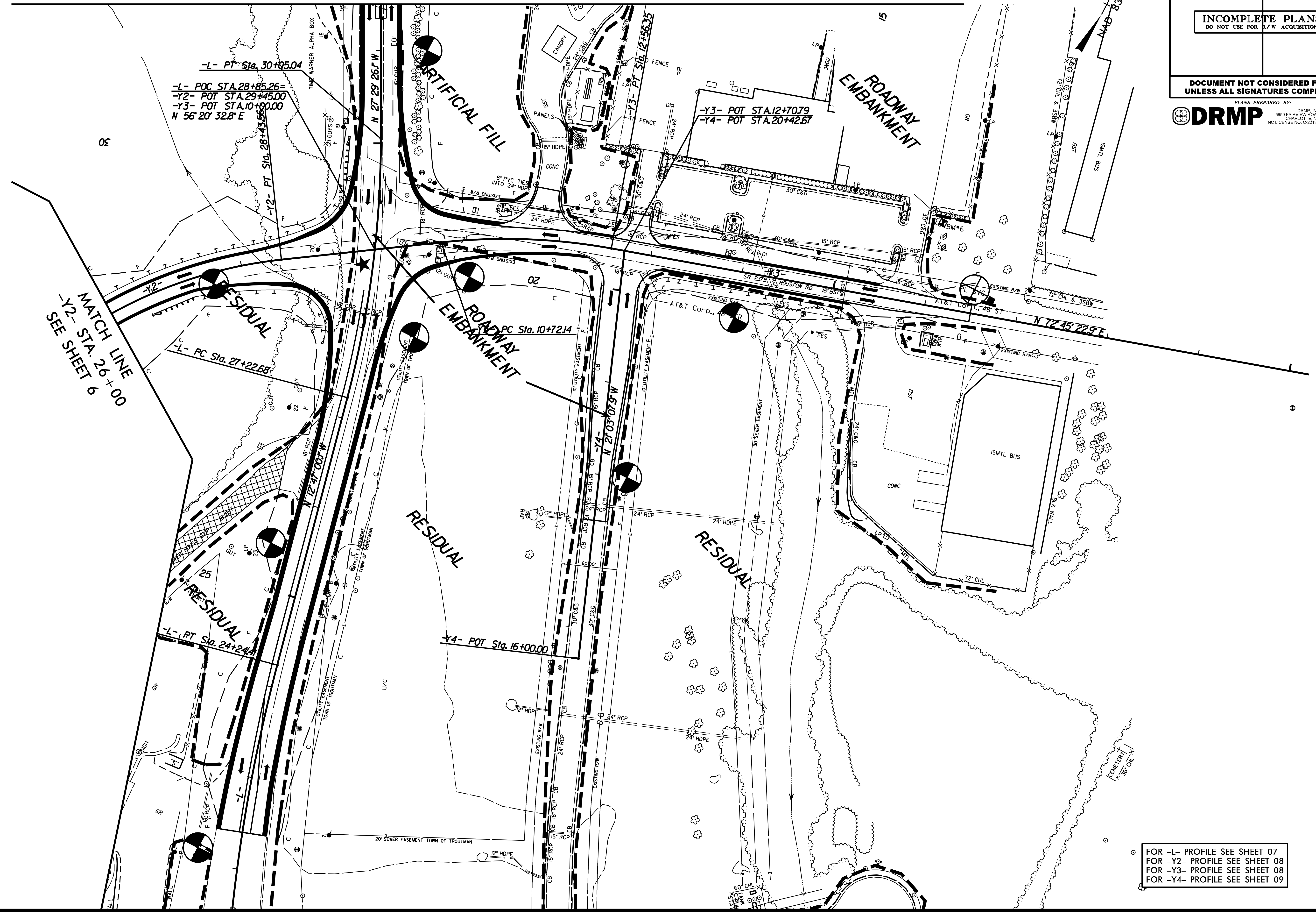
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PLANS PREPARED BY:

DRMP

DRMP, INC.
5950 FAIRVIEW ROAD, SUITE 320
CHARLOTTE, NC 28210
NC LICENSE NO. C-2213 (704) 332-2289

MATCH LINE –L– STA. 31+50 SEE SHEET 5



FOR –L– PROFILE SEE SHEET 07
FOR –Y2– PROFILE SEE SHEET 08
FOR –Y3– PROFILE SEE SHEET 08
FOR –Y4– PROFILE SEE SHEET 09

REVISIONS

8/17/99

$$DATE$$ $$TIME$$
$$$$USERNAME$$$$ $$$$DGN$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-5711	05

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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FOR -L- PROFILE SEE SHEET 07

REVISIONS

8/17/99

$$DATE$$ $$TIME$$
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$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-5711	06
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

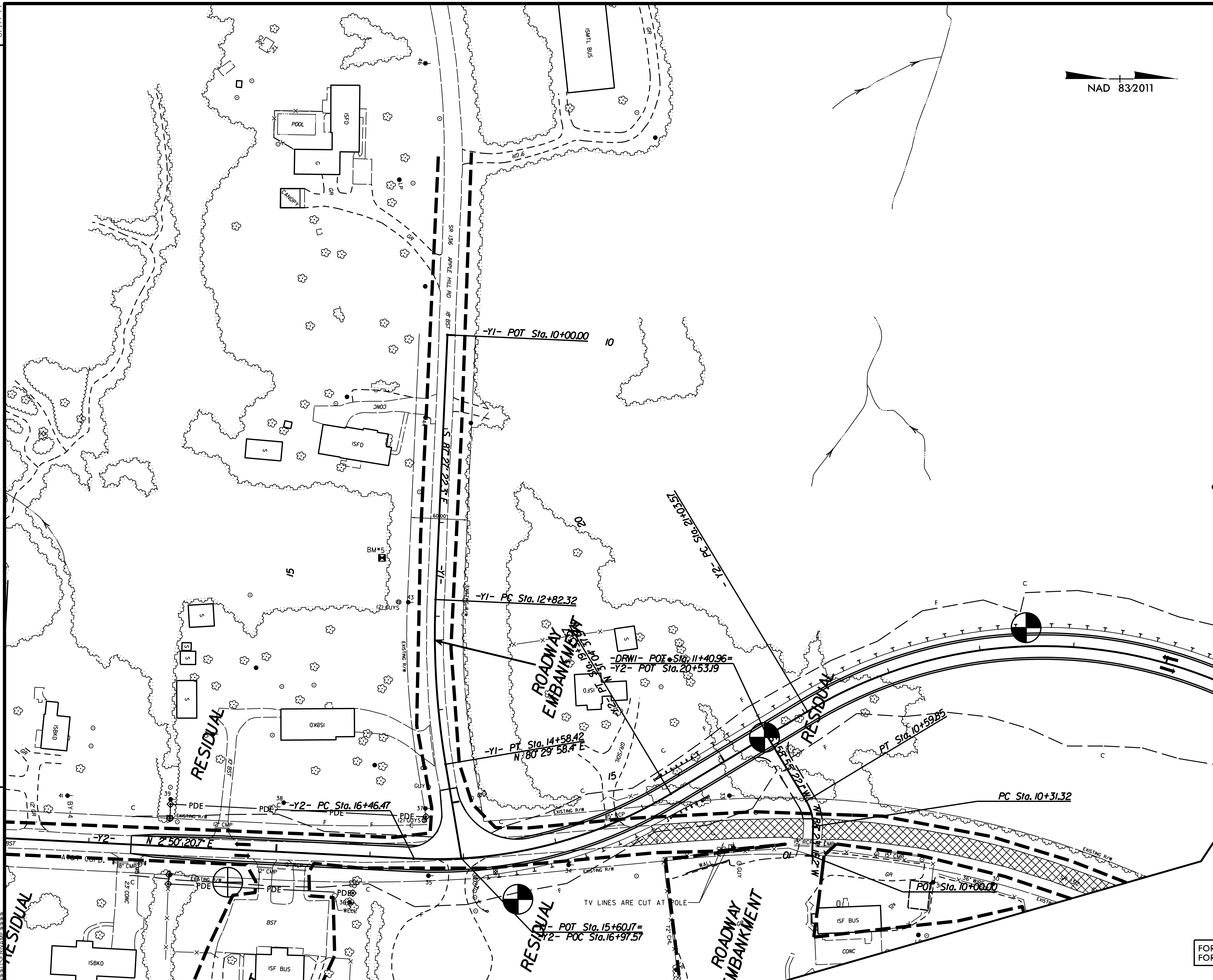
INCOMPLETE PLANS
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CHARLOTTE, NC 28210
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FOR -Y1- PROFILE SEE SHEET 09
FOR -Y2- PROFILE SEE SHEET 08

$$DATE$$ $$TIME$$ $$USERNAME$$ $$DGN$$

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PROJECT REFERENCE NO.	SHEET NO.
R-5711	07

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

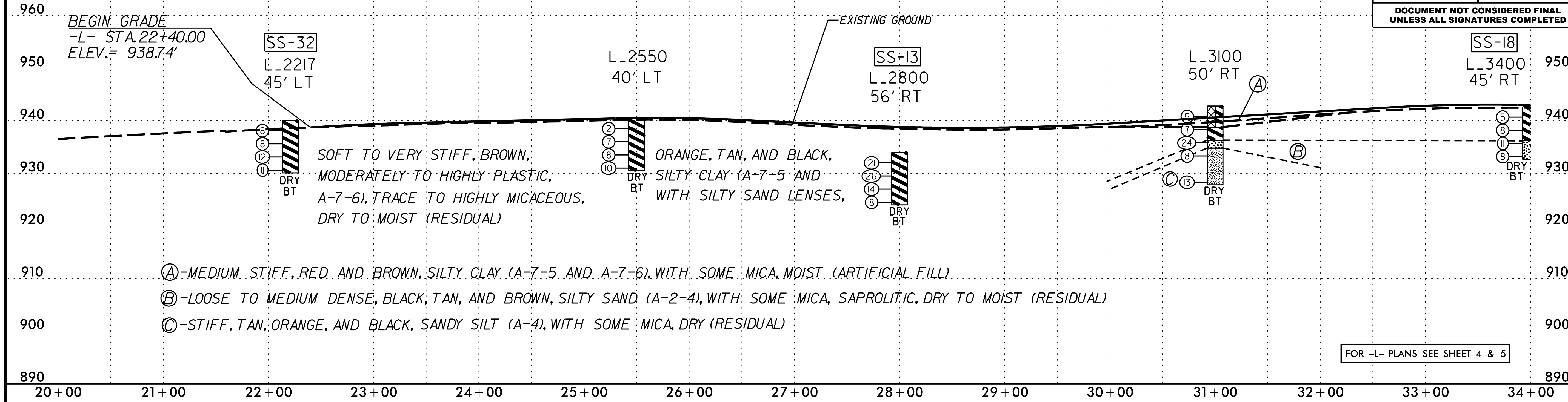
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5/28/99

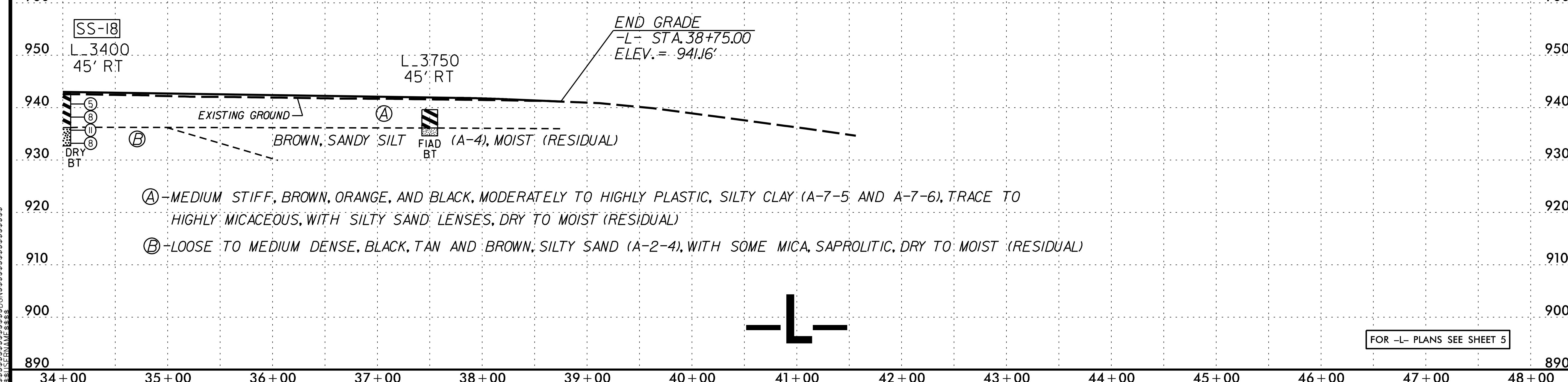
SOIL TEST RESULTS

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-32	45' LT	22+17	6.0' - 7.5'	A-7-5	62	21	5	42	18	35	100	98	61.1	39.7	-
SS-13	56' RT	28+00	1.0' - 2.5'	A-7-6	59	30	10	31	6	53	99	94	62.7	22.5	-
SS-18	45' RT	34+00	3.5' - 5.0'	A-7-5	78	40	5	19	8	68	97	94	76.5	35.2	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-18	45' RT	34+00	3.5' - 5.0'	A-7-5	78	40	5	19	8	68	97	94	76.5	35.2	-



$$DATE$$ $$TIME$$ $$DGN$$ $$USERNAME$$

5/28/99

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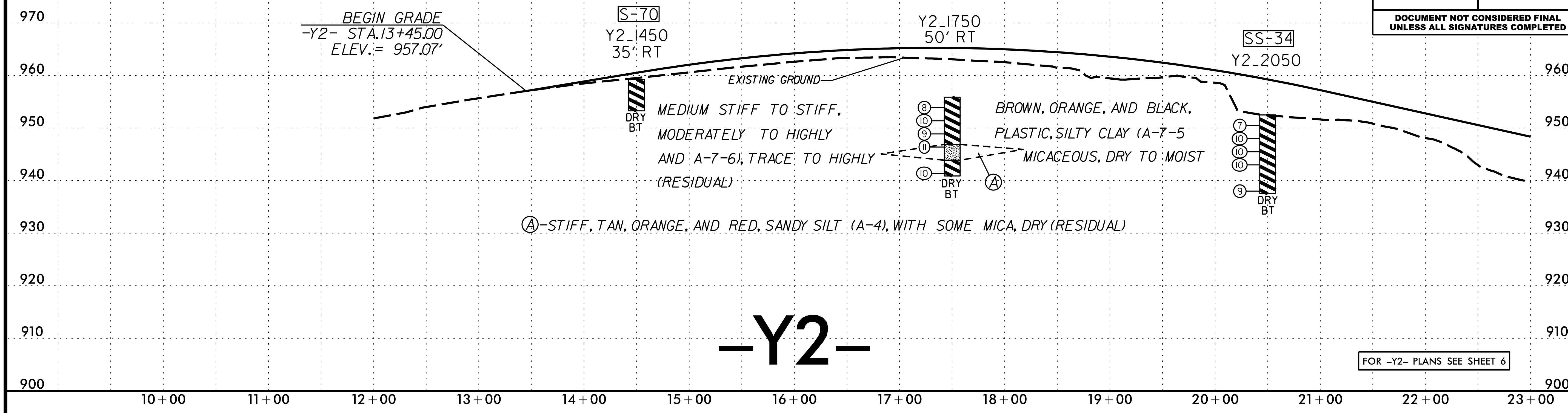
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R-5711	08
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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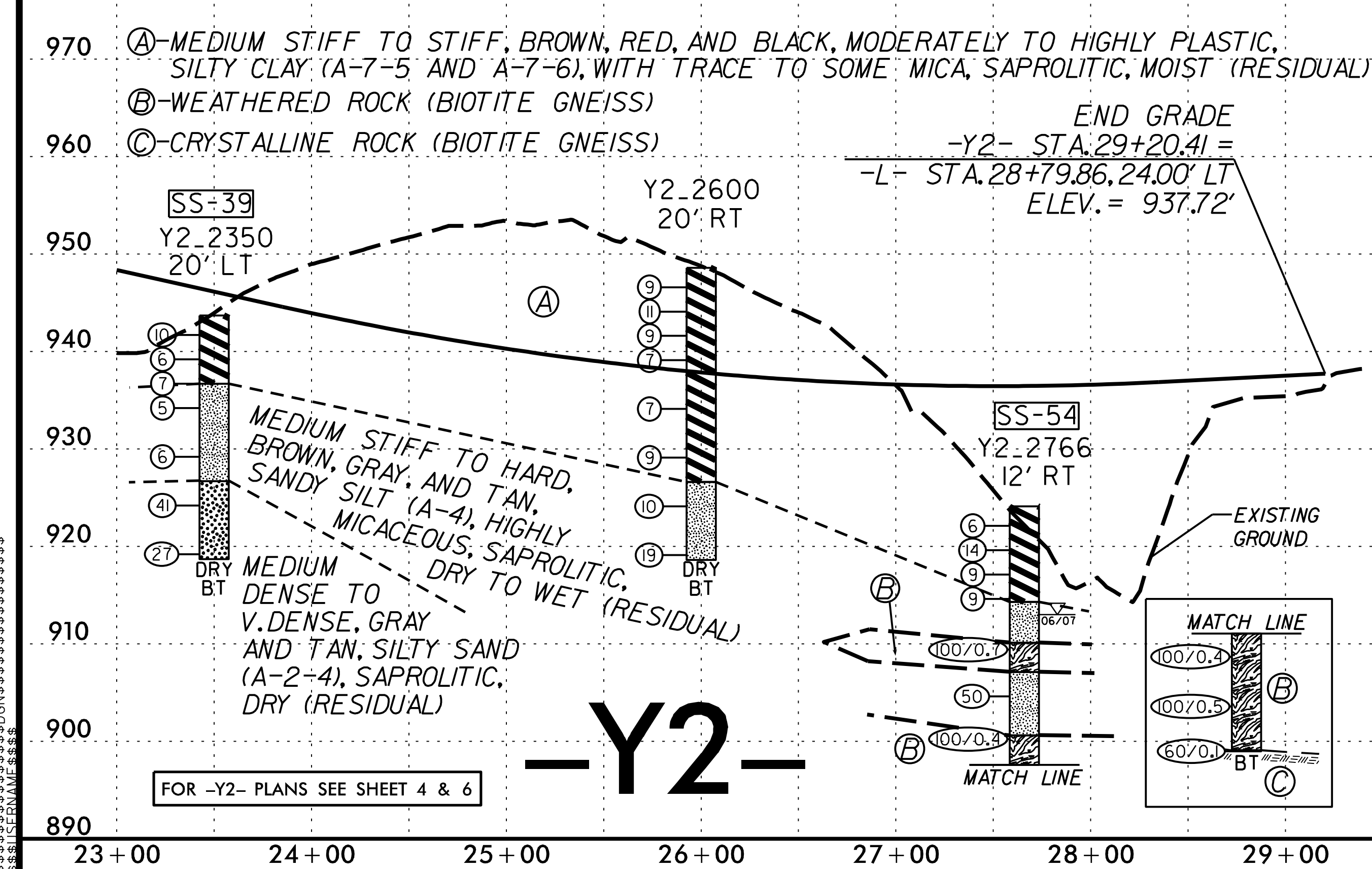
SOIL TEST RESULTS

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		
S-70	35' RT	14+50	5.0' - 5.5'	A-7-5	46	16	3	47	15	35	100	99	58.5	26.6	-
SS-34	CL	20+50	1.0' - 2.5'	A-7-5	48	17	14	43	19	24	98	89	51.7	26.0	-



SOIL TEST RESULTS

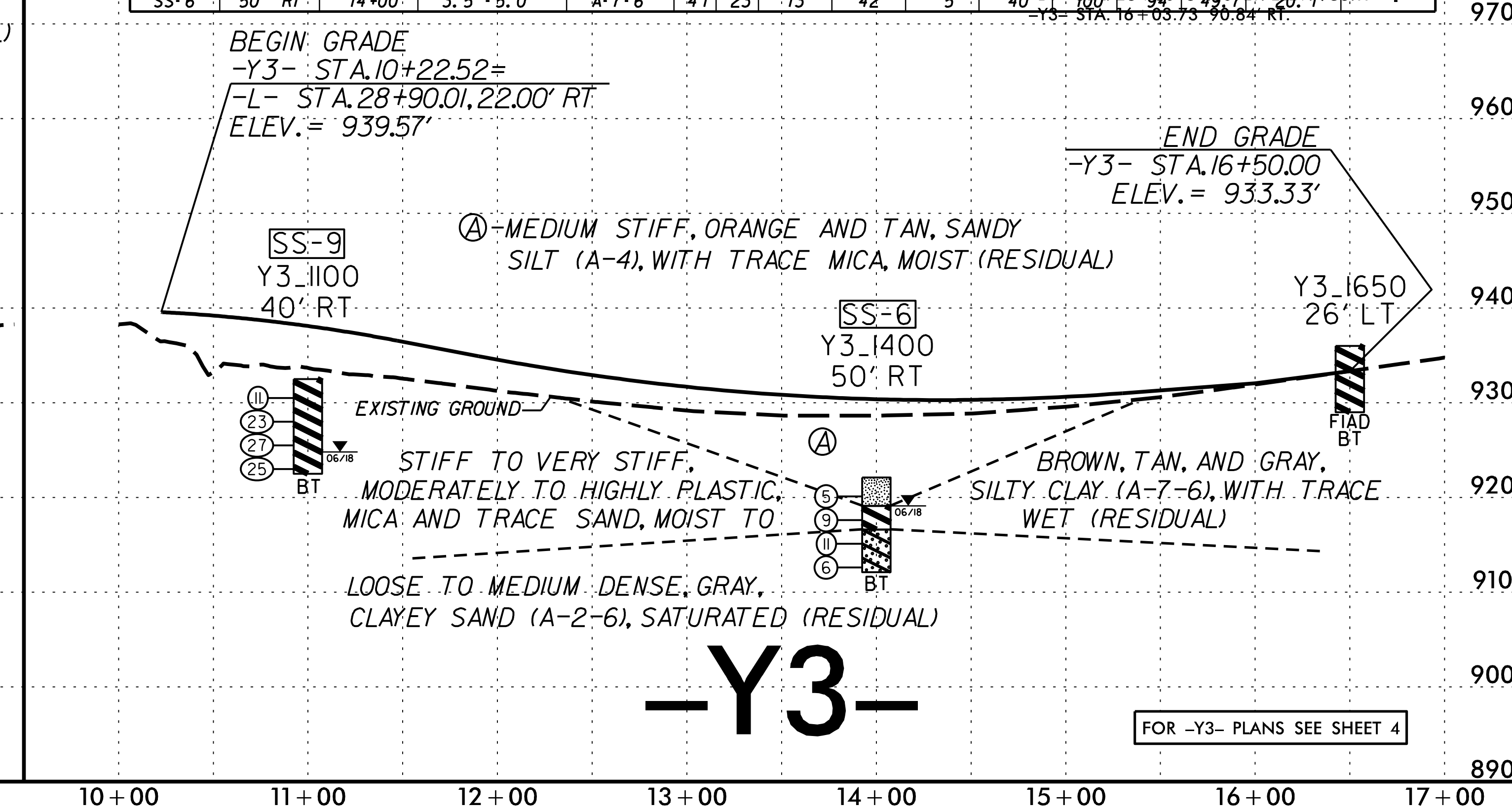
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-39	20' LT	23+50	1.0' - 2.5'	A-7-5	55	24	7	43	8	42	100	99	58.4	29.8	-
SS-54	12' RT	27+66	1.0' - 2.5'	A-7-6	52	27	11	30	10	49	100	94	63.5	19.8	-



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-9	40' RT	11+00	1.0' - 2.5'	A-7-6	64	37	7	20	3	70	100	98	75.6	23.2	-
SS-6	50' RT	14+00	3.5' - 5.0'	A-7-6	41	23	13	42	5	40	100	99	49.7	20.1	-

BM #6 BENCH SPIKE IN 12" MAPLE.
-BY- STA. 26+60 64.00' LT. ELEV. 936.11'
-Y3- STA. 16+03.73 90.84' RT.



$$$DATE$$$ $$$TIME$$$ $$$DGN$$$ $$$USERNAME$$$

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DRMP, INC.
5950 FAIRVIEW ROAD, SUITE 320
CHARLOTTE, NC 28210
NC LICENSE NO. C-2213 (704) 332-2289

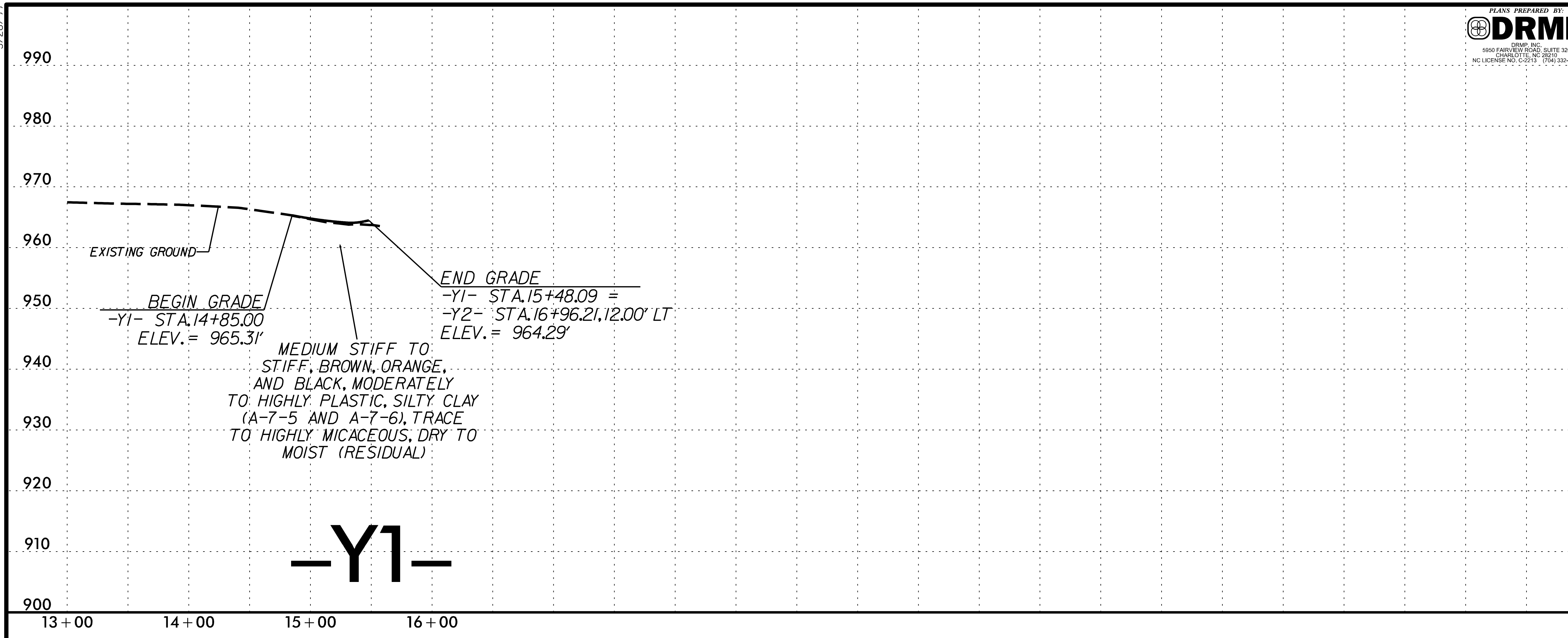
PROJECT REFERENCE NO.	SHEET NO.
R-5711	09

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

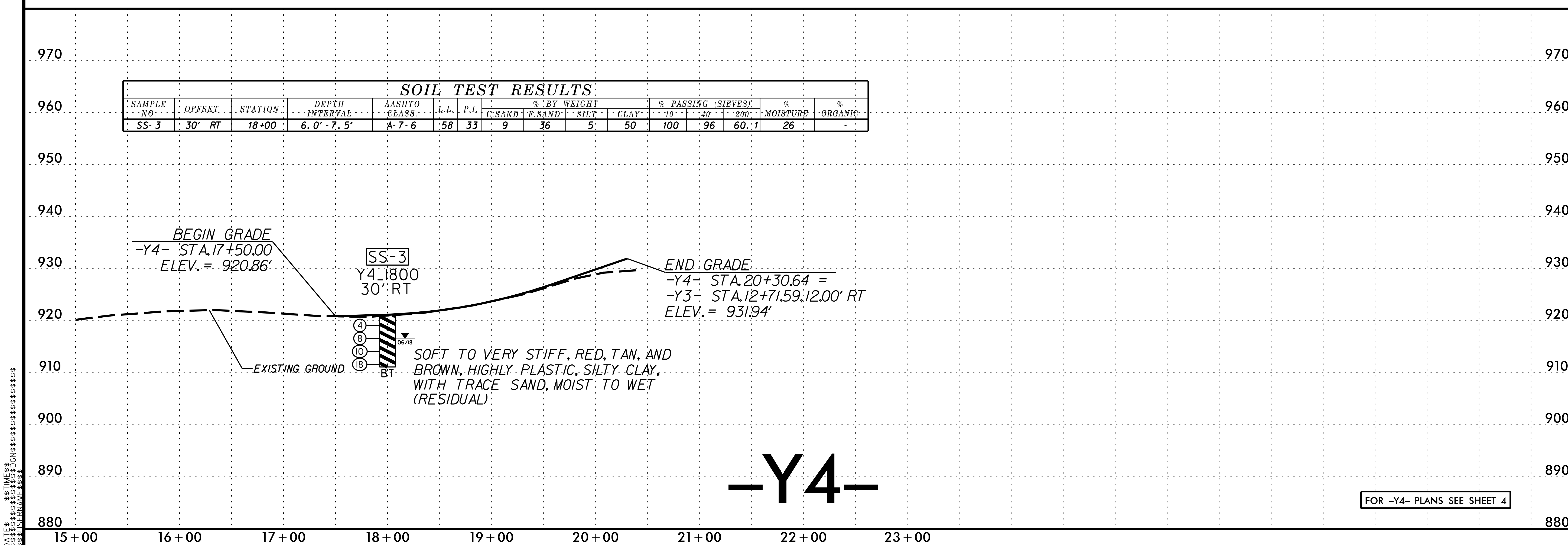
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SOIL TEST RESULTS

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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3	30' RT	18+00	6.0'-7.5'	A-7-6	58	33	9	36	5	50	100	96	60.1	26	-

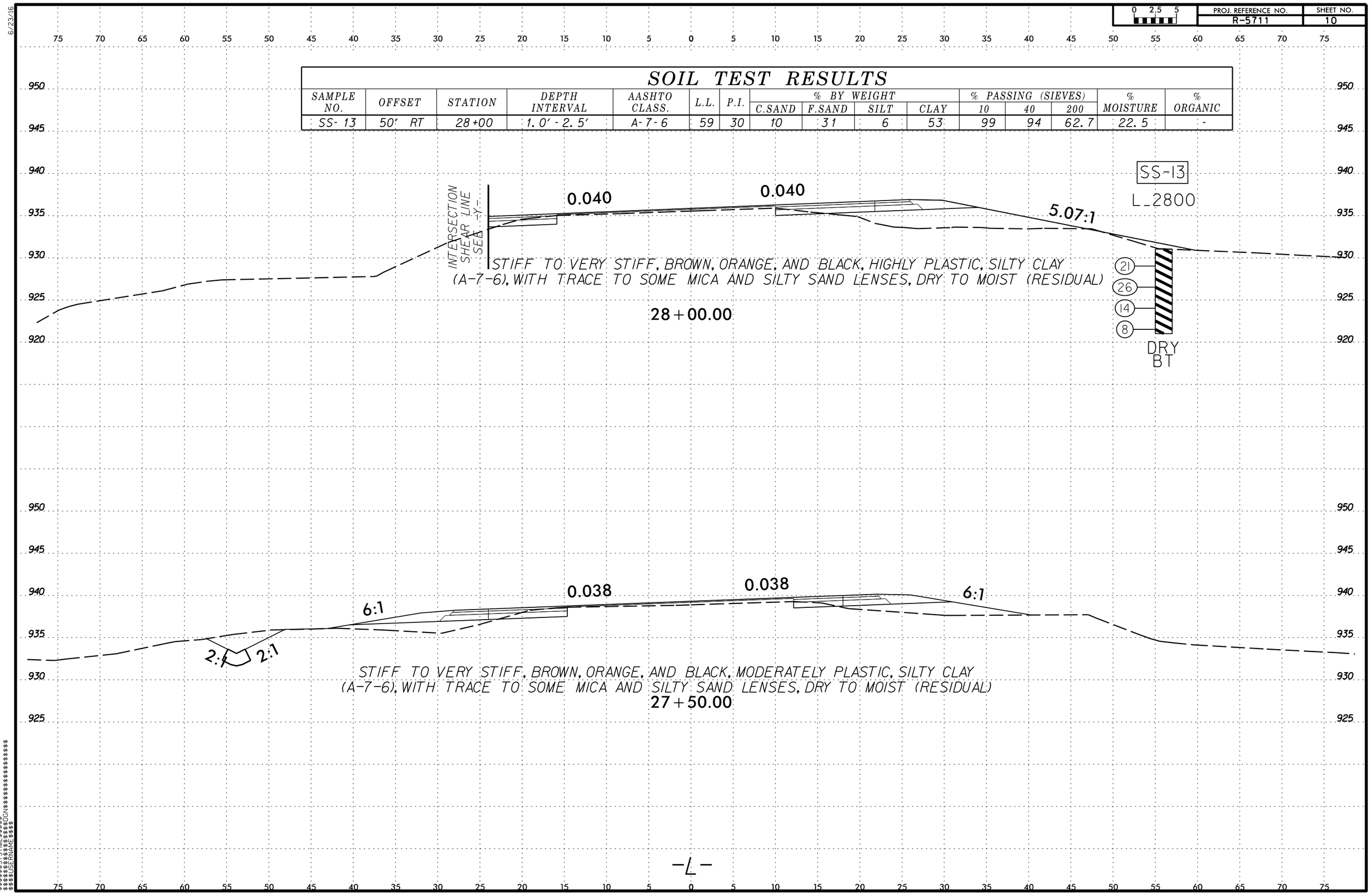


6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5711	10

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- 13	50' RT	28+00	1.0' - 2.5'	A-7-6	59	30	10	31	6	53	99	94	62.7	22.5	-



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

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5711	11

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945 940 935 930 925 920

INTERSECTION SHEAR LINE SEE -Y-

0.040

0.040

INTERSECTION SHEAR LINE SEE -YX-

STIFF TO VERY STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-6), WITH TRACE TO SOME MICA AND SILTY SAND LENSES, DRY TO MOIST (RESIDUAL)

29+00.00

945 940 935 930 925 920

INTERSECTION SHEAR LINE SEE -Y-

0.040

0.040

INTERSECTION SHEAR LINE SEE -YX-

STIFF TO VERY STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-6), WITH TRACE TO SOME MICA AND SILTY SAND LENSES, DRY TO MOIST (RESIDUAL)

28+50.00

-L-

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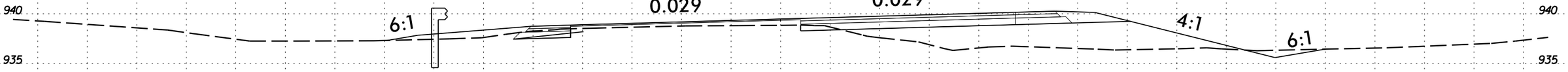
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6/23/16

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	R-5711	12

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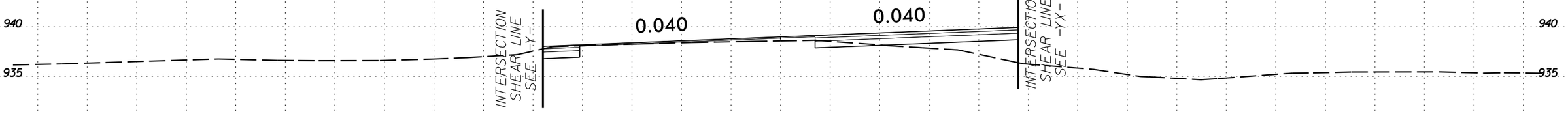
955 950 945 940 935 930



STIFF TO VERY STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-6),
WITH TRACE TO SOME MICA AND SILTY SAND LENSES, DRY TO MOIST (RESIDUAL)

30+00.00

945 940 935 930 925



STIFF TO VERY STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-6),
WITH TRACE TO SOME MICA AND SILTY SAND LENSES, DRY TO MOIST (RESIDUAL)

29+50.00

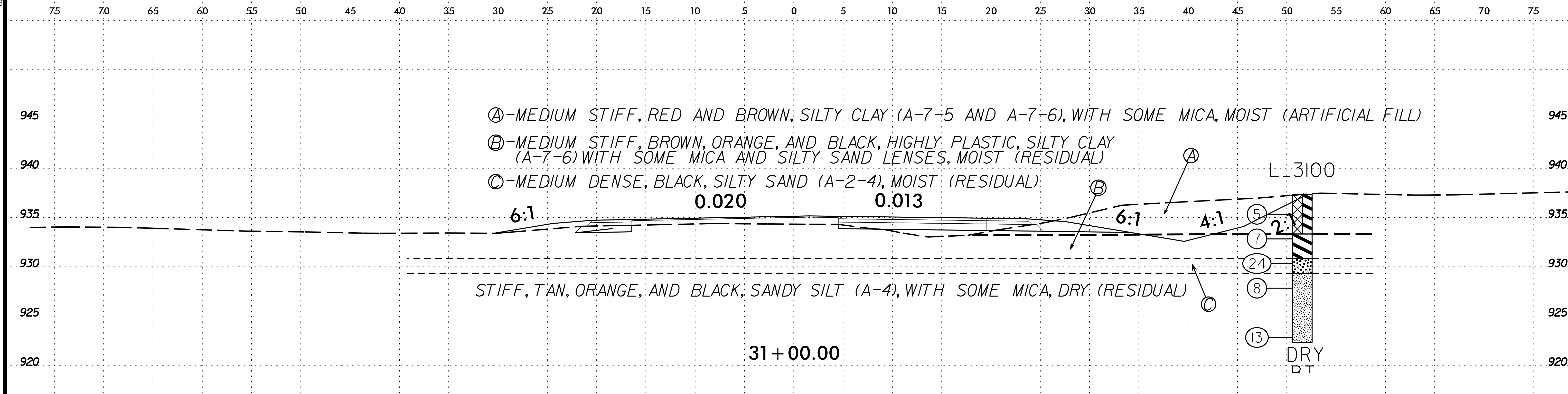
-L-

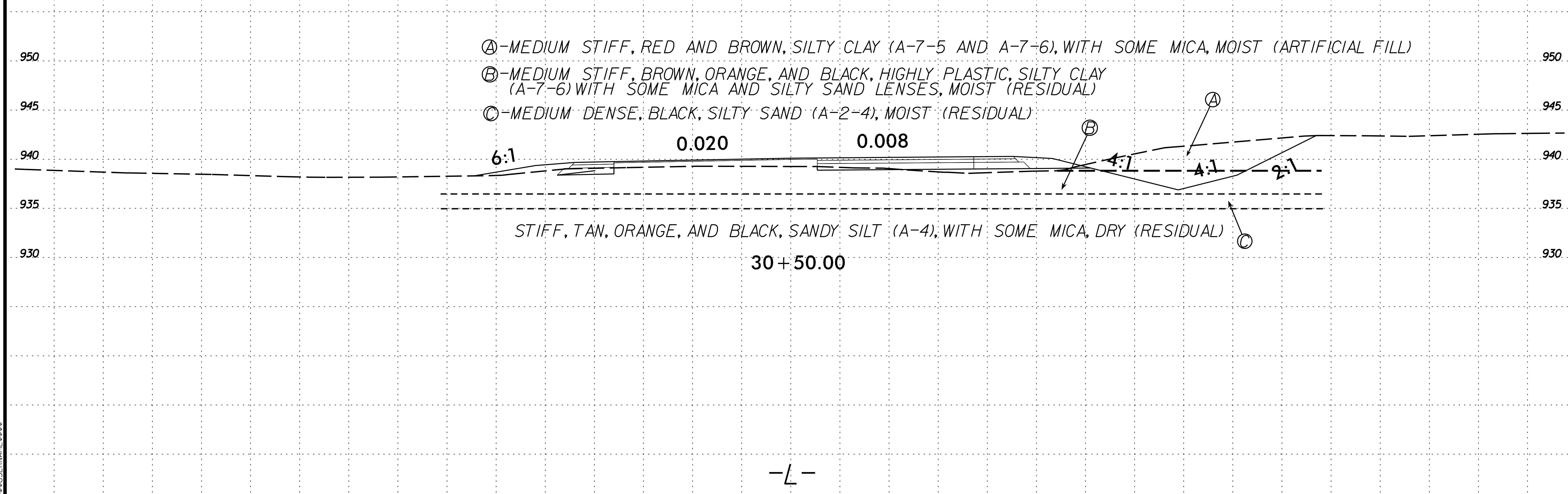
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$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5711	13





-L-

$$$$$SYSTIME$$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
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6/23/16

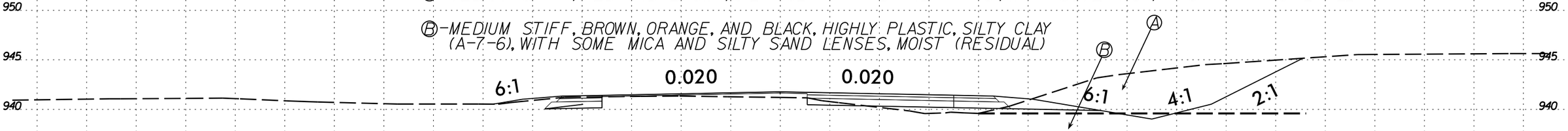
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	R-5711	14

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Ⓐ-MEDIUM STIFF, RED AND BROWN, SILTY CLAY (A-7-5 AND A-7-6), WITH SOME MICA, MOIST (ARTIFICIAL FILL)

Ⓑ-MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-6), WITH SOME MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

950 945 940 935 930 925



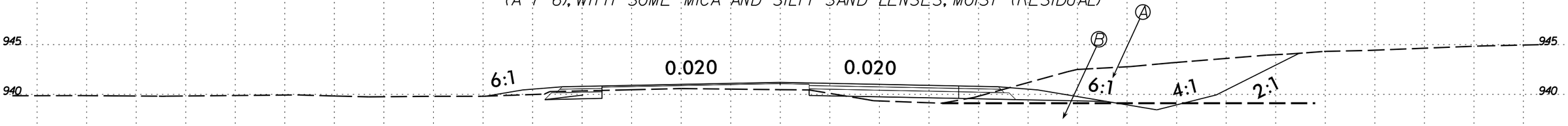
MEDIUM DENSE, BLACK, SILTY SAND (A-2-4), MOIST (RESIDUAL)

STIFF, TAN, ORANGE, AND BLACK, SANDY SILT (A-4), WITH SOME MICA, DRY (RESIDUAL)

32+00.00

Ⓐ-MEDIUM STIFF, RED AND BROWN, SILTY CLAY (A-7-5 AND A-7-6), WITH SOME MICA, MOIST (ARTIFICIAL FILL)

Ⓑ-MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-6), WITH SOME MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)



MEDIUM DENSE, BLACK, SILTY SAND (A-2-4), MOIST (RESIDUAL)

STIFF, TAN, ORANGE, AND BLACK, SANDY SILT (A-4), WITH SOME MICA, DRY (RESIDUAL)

31+50.00

-L-

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

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5711	15

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

950 945 940 935 930

6:1 0.020 0.020 6:1 6:1

MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH LITTLE MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

LOOSE TO MEDIUM DENSE, TAN AND BROWN, SILTY SAND (A-2-4), WITH SOME MICA, SAPROLITIC, DRY TO MOIST (RESIDUAL)

33+50.00

950 945 940 935 930

6:1 0.020 0.020 6:1 4.96:1

MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH LITTLE MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

LOOSE TO MEDIUM DENSE, TAN AND BROWN, SILTY SAND (A-2-4), WITH SOME MICA, SAPROLITIC, DRY TO MOIST (RESIDUAL)

33+00.00

950 945 940 935 930

6:1 0.020 0.020 6:1 6:1

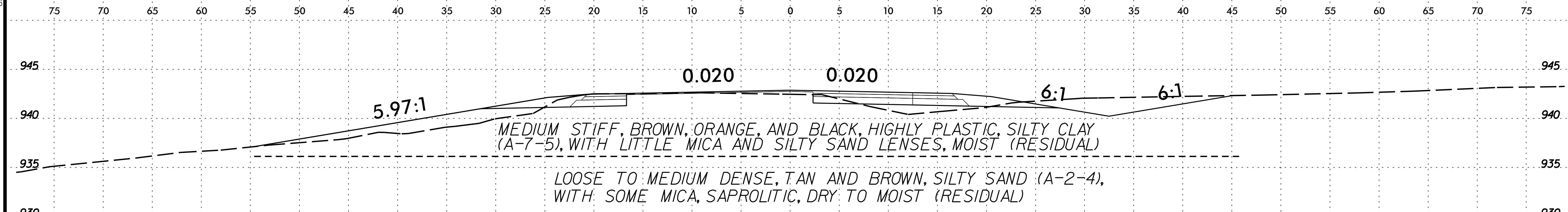
MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH LITTLE MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

LOOSE TO MEDIUM DENSE, TAN AND BROWN, SILTY SAND (A-2-4), WITH SOME MICA, SAPROLITIC, DRY TO MOIST (RESIDUAL)

32+50.00

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

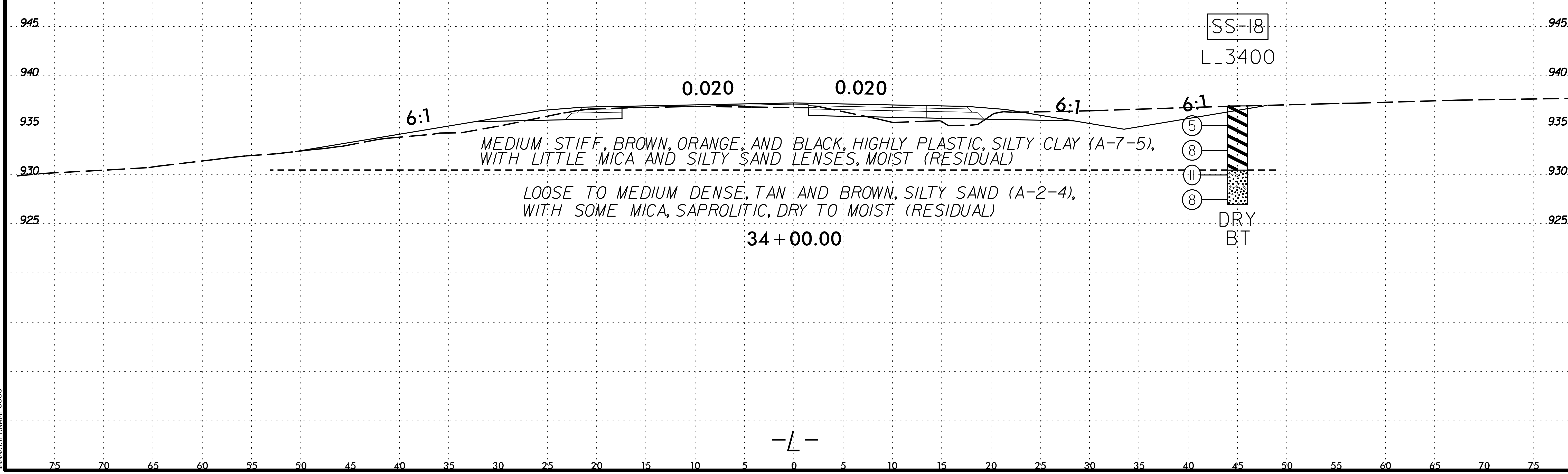
75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



34+50.00

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	45′ RT	34+00	3. 5′ - 5. 0′	A-7-5	78	40	5	19	8	68	97	94	76. 5	35. 2	-



34+00.00

-L-

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

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5711	17

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

945 940 935 930 925

6:1 0.020 0.020 6:1 6:1

MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY, (A-7-5), WITH LITTLE MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

BROWN, SANDY SILT (A-4), MOIST (RESIDUAL)

LOOSE TO MEDIUM DENSE, TAN AND BROWN, SILTY SAND (A-2-4), WITH SOME MICA, SAPROLITIC, DRY TO MOIST (RESIDUAL)

36+00.00

945 940 935 930 925

6:1 0.020 0.020 6:1 6:1

MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH LITTLE MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

BROWN, SANDY SILT (A-4), MOIST (RESIDUAL)

LOOSE TO MEDIUM DENSE, TAN AND BROWN, SILTY SAND (A-2-4), WITH SOME MICA, SAPROLITIC, DRY TO MOIST (RESIDUAL)

35+50.00

950 945 940 935 930 925

6:1 0.020 0.020 6:1 5.48:1

MEDIUM STIFF, BROWN, ORANGE, AND BLACK, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH LITTLE MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

LOOSE TO MEDIUM DENSE, TAN AND BROWN, SILTY SAND (A-2-4), WITH SOME MICA, SAPROLITIC, DRY TO MOIST (RESIDUAL)

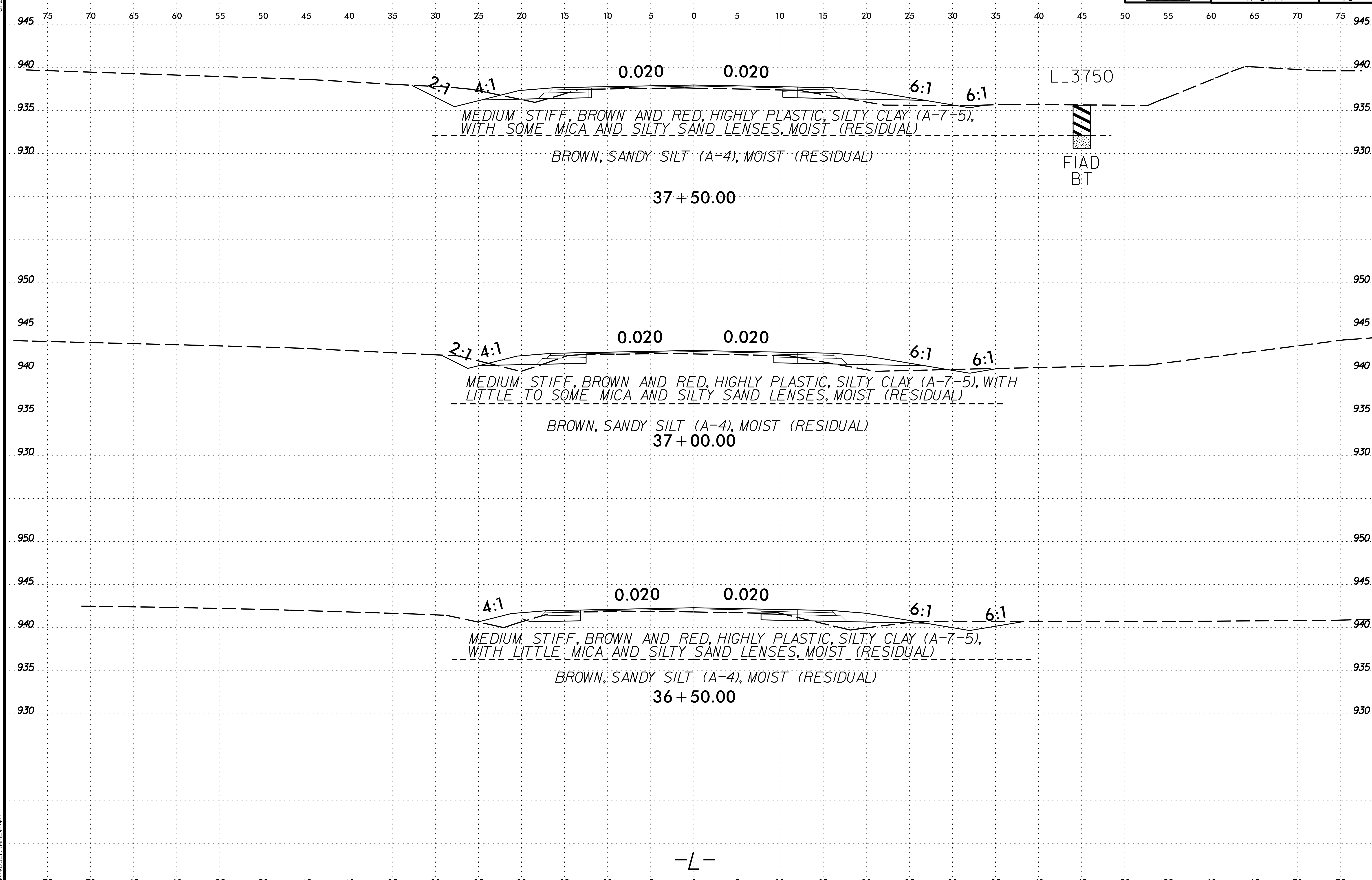
35+00.00

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

PROJ. REFERENCE NO.	SHEET NO.
R-5711	18



6/23/16
$$$$$SYSTIME$$$$$
$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5711	19

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

955 950 945 940 935 930

0.015 0.014

MEDIUM STIFF, BROWN AND RED, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH SOME MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

BROWN, SANDY SILT (A-4), MOIST (RESIDUAL)

38+75.00

945 940 935 930

0.020 0.020

6:1

MEDIUM STIFF, BROWN AND RED, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH SOME MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

BROWN, SANDY SILT (A-4), MOIST (RESIDUAL)

38+50.00

945 940 935 930

2:1 4:1 0.020 0.020 6:1

MEDIUM STIFF, BROWN AND RED, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH SOME MICA AND SILTY SAND LENSES, MOIST (RESIDUAL)

BROWN, SANDY SILT (A-4), MOIST (RESIDUAL)

38+00.00

-L-

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

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

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-18-013			Date Report	7/3/2018
State Project No.:	50207.1.1	County:	Iredell	Date Tested	6/22 - 6/30/18
Federal ID No.:	N/A	TIP No.:	R-5711		
Project Name:	Intersection Improvements at US 21 and SR 1312 (Flower House Loop)/SR 2375 (Houston Road)				
Client Name:	DRMP		Client Address: 5950 Fairview Rd, Charlotte, NC 28210		

Sample No.	Station #:	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Organic Content %	Moist. %
							10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay					
SS-3	18+00	30'RT	Y4	6.0-7.5	A-7-6	(18)	100	96	91	60.1	55.5	9	36	5	50	58	25	33	ND	26.0
SS-6	14+00	50'RT	Y3	3.5-6.0	A-7-6	(8)	100	94	87	49.7	44.6	13	42	5	40	41	18	23	ND	20.1
SS-9	11+00	40'RT	Y3	1.0-2.5	A-7-6	(29)	100	96	93	75.6	72.8	7	20	3	70	64	27	37	ND	23.2
SS-13	28+00	56'RT	L	1.0-2.5	A-7-6	(18)	99	94	89	62.7	58.1	10	31	6	53	59	29	30	ND	22.5
SS-18	34+00	45'RT	L	3.5-5.0	A-7-5	(35)	97	94	92	76.5	73.4	5	19	8	68	78	38	40	ND	35.2
SS-32	22+17	45'LT	L	6.0-7.5	A-7-5	(13)	100	98	95	61.1	53.3	5	42	18	35	62	41	21	ND	39.7
SS-34	20+50	CL	Y2	1.0-2.5	A-7-5	(7)	98	89	84	51.7	42.2	14	43	19	24	48	31	17	ND	26.0
SS-39	23+50	20'LT	Y2	1.0-2.5	A-7-5	(13)	100	99	93	58.4	50.2	7	43	8	42	55	31	24	ND	29.8
SS-54	27+66	12'RT	Y2	1.0-2.5	A-7-6	(16)	100	94	89	63.5	59.1	11	30	10	49	52	25	27	ND	19.8
S-70	14+50	35'RT	Y2	5.0-5.5	A-7-5	(8)	100	99	97	58.5	50.0	3	47	15	35	46	30	16	ND	26.6

References / Comments / Deviations: ND=Not Detemined.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET		104-01-0703	Rob Kral, P.E.	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

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SUMMARY OF LABORATORY TEST DATA

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project No.:	6235-18-013	S&ME Project Name: R-5711		Date Report:	7/5/2018
State Project No.:	50207.1.1	County:	Iredell	Date Tested:	6/22 - 7/2/18
Federal ID No.:	N/A	TIP No.:	R-5711		
Client Name:	DRMP	Client Address:	5950 Fairview Rd, Charlotte, NC 28210		

Boring No.	Sample No.	Station #:	Offset	Alignment	Sample Depth (ft)	AASHTO Soil Description	AASTHO T-99		AASHTO T-193 CBR #1		AASHTO T-193 CBR #2	
							MDD (pcf)	OPT (%)	0.1"	0.2"	0.1"	0.2"
L_3400	CBR-1	34+00	45' RT	L	N/A	Red-Brown Coarse to Fine Sandy Silty CLAY	90.0	27	5.1	5.0	ND	ND
L_2550	CBR-2	25+50	40' LT	L	N/A	Red-Brown Coarse to Fine Sandy Silty CLAY	92.0	26.4	4.7	4.6	ND	ND
Y3_1650	CBR-3	16+50	26' LT	Y3	N/A	Tan-Brown Coarse to Fine Sandy Silty CLAY	86.9	31.0	5.3	4.8	ND	ND
Y2_1450	CBR-4	14+50	35' RT	Y2	N/A	Red-Brown Coarse to Fine Sandy Silty CLAY	93.3	22.8	58.0	5.6	ND	ND

References / Comments / Deviations: ND=Not Detemined.

AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

AASHTO T 193: The California Bearing Ratio AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET		104-01-0703	Robert Kral, P.E.	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

Form No. TR-D1883-T193-3
Revision No. 2
Revision Date: 08/11/17

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T 193

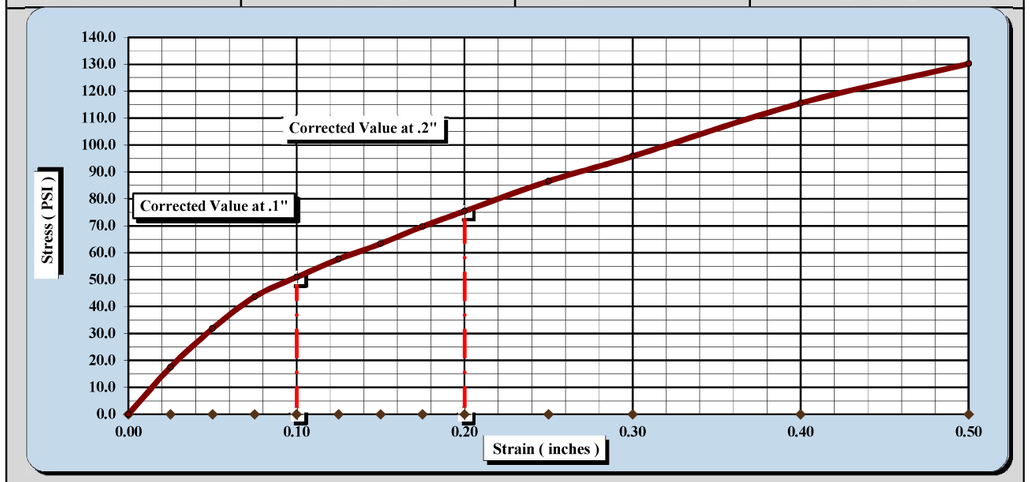
S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	6235-18-013	Report Date:	6/30/2018
Project Name:	R-5711	Test Date(s)	6/22 - 6/30/18
Client Name:	DRMP		
Client Address:	5950 Fairview Rd, Charlotte, NC 28210		
Boring #:	L_3400	Sample #: CBR-1	Sample Date: 6/6/18
Station #:	34+00 Alignment: -L-	Offset: 45' RT	Depth (ft): N/A
Sample Description:	Red-Brown Coarse to Fine Sandy Silty CLAY		

AASHTO T99 *Method A* Maximum Dry Density: 90.0 PCF Optimum Moisture Content: 27.0%

Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 5.1	CBR at 0.2 in. 5.0	CBR at 0.1 in. 5.1	CBR at 0.2 in. 5.0



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	88.4
Initial Dry Density (PCF)	90.2	Average Final Moisture Content	30.7%
Moisture Content of the Compacted Specimen	27.1%	Moisture Content (top 1" after soaking)	33.3%
Percent Compaction	100.2%	Percent Swell	2.2%

Soak Time: 96 hrs. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9
Liquid Limit ND Plastic Index ND

Notes/Deviations/References: ND=Not Determined.
Test specimen compacted to 100% at optimum moisture.

Mal Krajan, ET		Laboratory Manager	7/2/2018
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

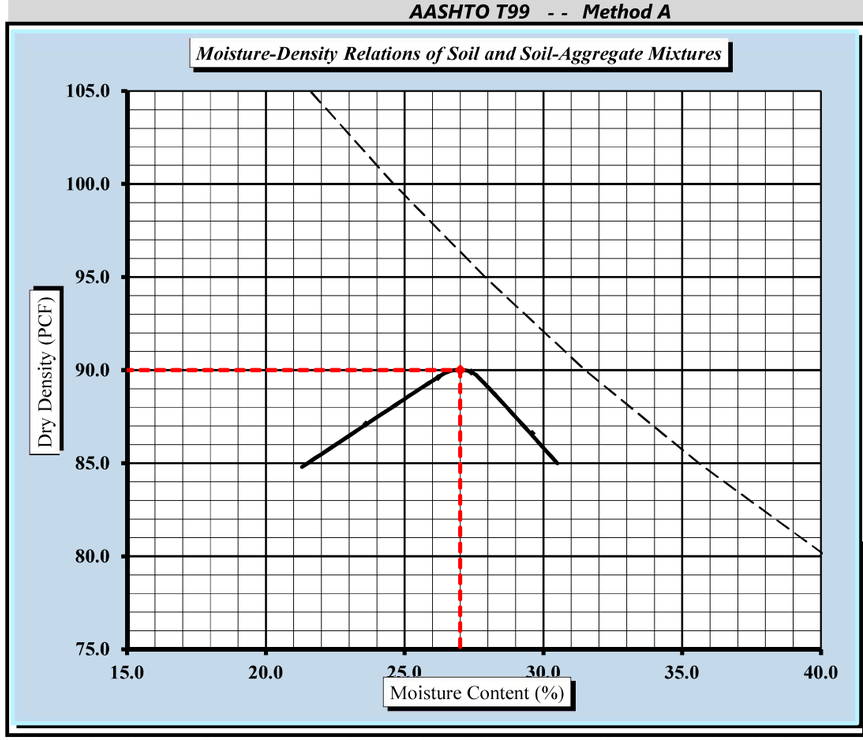
MOISTURE - DENSITY REPORT

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

S&ME Project #:	6235-18-013			Report Date:	6/25/18
Project Name:	R-5711			Test Date(s):	6/20 - 6/25/18
Client Name:	DRMP				
Client Address:	5950 Fairview Rd, Charlotte, NC 28210				
Boring #:	L-3400	Sample #:	CBR-1	Sample Date:	6/6/2018
Station #:	34+00 Alignment: -L-	Offset:	45' RT	Depth:	N/A
Sample Description:	Red-Brown Coarse to Fine Sandy Silty CLAY				

Maximum Dry Density 90.0 PCF. Optimum Moisture Content 27.0%

AASHTO T99 - - Method A



Soil Properties	
Natural Moisture Content	ND
Assumed Specific Gravity	2.650
Liquid Limit	ND
Plastic Limit	ND
Plastic Index	ND
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	ND
#40	ND
#60	ND
#200	ND
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET		Laboratory Manager	6/25/2018
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D1883-T193-3
Revision No. 2
Revision Date: 08/11/17

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T 193

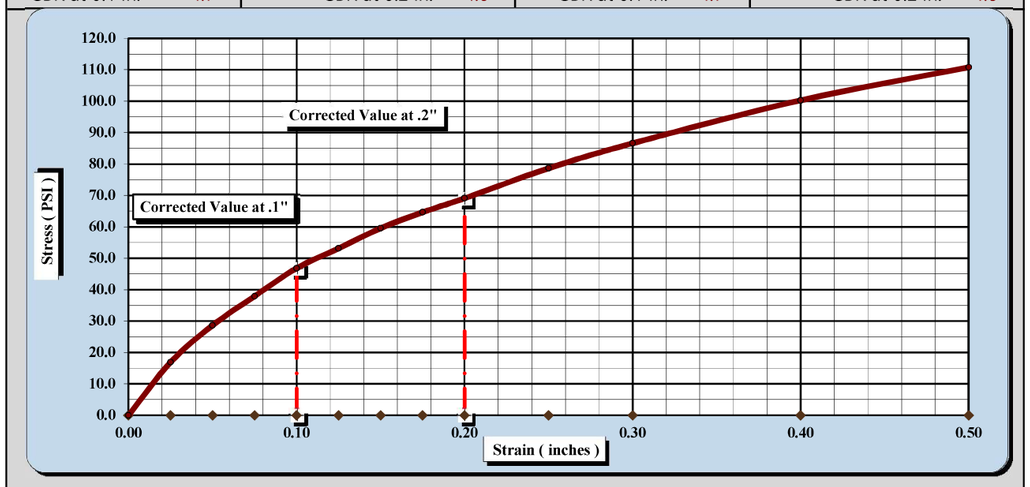
S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	6235-18-013	Report Date:	6/30/2018
Project Name:	R-5711	Test Date(s)	6/22 - 6/30/18
Client Name:	DRMP		
Client Address:	5950 Fairview Rd, Charlotte, NC 28210		
Boring #:	L_2550	Sample #: CBR-2	Sample Date: 6/6/18
Station #:	25+50 Alignment: -L-	Offset: 40' LT	Depth (ft): N/A
Sample Description:	Red-Brown Coarse to Fine Sandy Silty CLAY		

AASHTO T99 *Method A* Maximum Dry Density: 92.0 PCF Optimum Moisture Content: 26.4%

Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 4.7	CBR at 0.2 in. 4.6	CBR at 0.1 in. 4.7	CBR at 0.2 in. 4.6



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	89.4
Initial Dry Density (PCF)	91.9	Average Final Moisture Content	30.0%
Moisture Content of the Compacted Specimen	26.4%	Moisture Content (top 1" after soaking)	30.6%
Percent Compaction	99.9%	Percent Swell	2.9%

Soak Time: 96 hrs. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9

Liquid Limit ND Plastic Index ND

Notes/Deviations/References: ND=Not Determined.

Test specimen compacted to 100% at optimum moisture.

Mal Krajan, ET		Laboratory Manager	7/2/2018
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

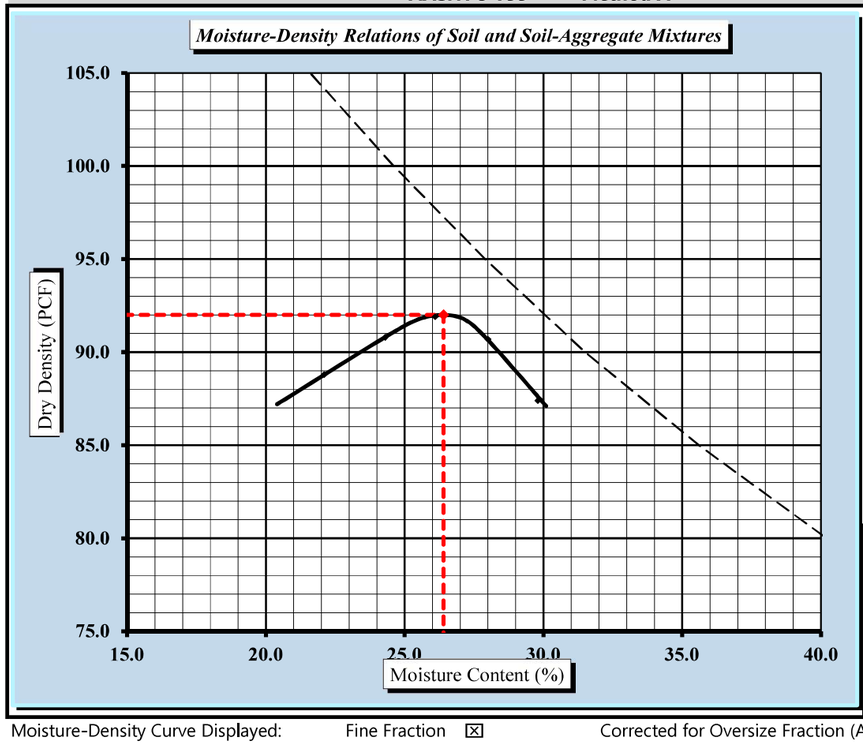
MOISTURE - DENSITY REPORT

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

S&ME Project #:	6235-18-013			Report Date:	6/25/18
Project Name:	R-5711			Test Date(s):	6/20 - 6/25/18
Client Name:	DRMP				
Client Address:	5950 Fairview Rd, Charlotte, NC 28210				
Boring #:	L_2550	Sample #:	CBR-2	Sample Date:	6/6/2018
Station #:	25+00 Alignment: -L-	Offset:	40' LT	Depth:	N/A
Sample Description:	Red-Brown Coarse to Fine Sandy Silty CLAY				

Maximum Dry Density 92.0 PCF. Optimum Moisture Content 26.4%

AASHTO T99 - - Method A



Soil Properties	
Natural Moisture Content	ND
Assumed Specific Gravity	2.650
Liquid Limit	ND
Plastic Limit	ND
Plastic Index	ND
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	ND
#40	ND
#60	ND
#200	ND
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET		Laboratory Manager	6/25/2018
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D1883-T193-3
Revision No. 2
Revision Date: 08/11/17

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T 193

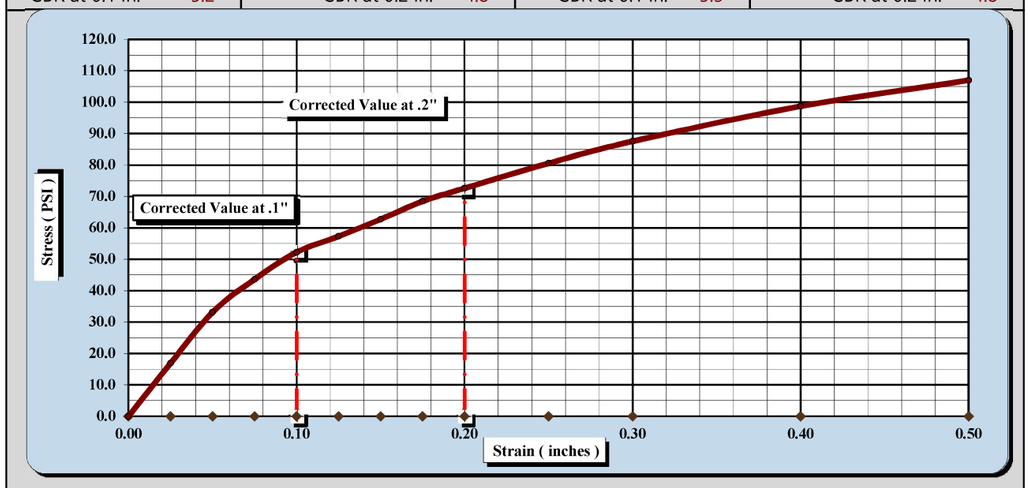
S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	6235-18-013	Report Date:	6/30/2018
Project Name:	R-5711	Test Date(s)	6/22 - 6/30/18
Client Name:	DRMP		
Client Address:	5950 Fairview Rd, Charlotte, NC, 28210		
Boring #:	Y3_1650	Sample #: CBR-3	Sample Date: 6/7/18
Station #:	16+50 Alignment: -L-	Offset: 26' LT	Depth (ft): N/A
Sample Description:	Tan-Brown Coarse to Fine Sandy Silty CLAY		

AASHTO T99 *Method A* Maximum Dry Density: 86.9 PCF Optimum Moisture Content: 31.0%

Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 5.2	CBR at 0.2 in. 4.8	CBR at 0.1 in. 5.3	CBR at 0.2 in. 4.8



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	85.1
Initial Dry Density (PCF)	87.4	Average Final Moisture Content	33.3%
Moisture Content of the Compacted Specimen	31.3%	Moisture Content (top 1" after soaking)	35.2%
Percent Compaction	100.5%	Percent Swell	2.9%

Soak Time: 96 hrs. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9
Liquid Limit ND Plastic Index ND

Notes/Deviations/References: ND=Not Determined.
Test specimen compacted to 100% at optimum moisture.

Mal Krajan, ET		Laboratory Manager	7/2/2018
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

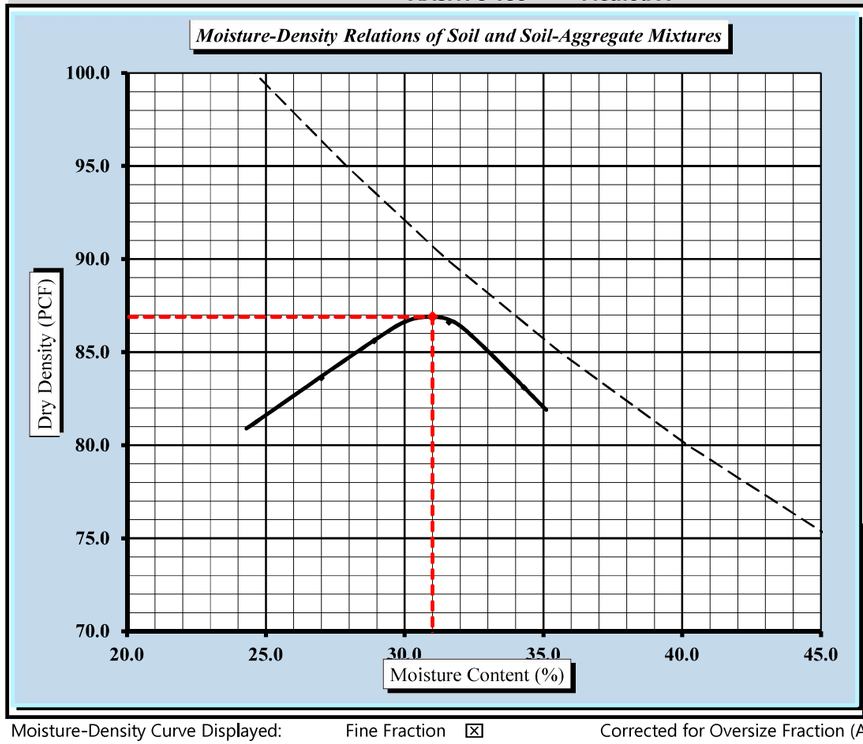
Quality Assurance

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

S&ME Project #:	6235-18-013			Report Date:	6/25/18
Project Name:	R-5711			Test Date(s):	6/20 - 6/25/18
Client Name:	DRMP				
Client Address:	5950 Fairview Rd, Charlotte, NC, 28210				
Boring #:	Y3_1650	Sample #:	CBR-3	Sample Date:	6/7/2018
Station #:	16+50 Alignment: -L-	Offset:	26' LT	Depth:	N/A
Sample Description:	Tan-Brown Coarse to Fine Sandy Silty CLAY				

Maximum Dry Density 86.9 PCF. Optimum Moisture Content 31.0%

AASHTO T99 - - Method A



Soil Properties	
Natural Moisture Content	ND
Assumed Specific Gravity	2.650
Liquid Limit	ND
Plastic Limit	ND
Plastic Index	ND
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	ND
#40	ND
#60	ND
#200	ND
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:
AASHTO T265: Laboratory Determination of Moisture Content of Soils
AASHTO T 99: Moisture-Density Relations of Soil Using a 5.5 Lb. Rammer and a 12" Drop

Mal Krajan, ET		Laboratory Manager	6/25/2018
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D1883-T193-3
Revision No. 2
Revision Date: 08/11/17

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T 193

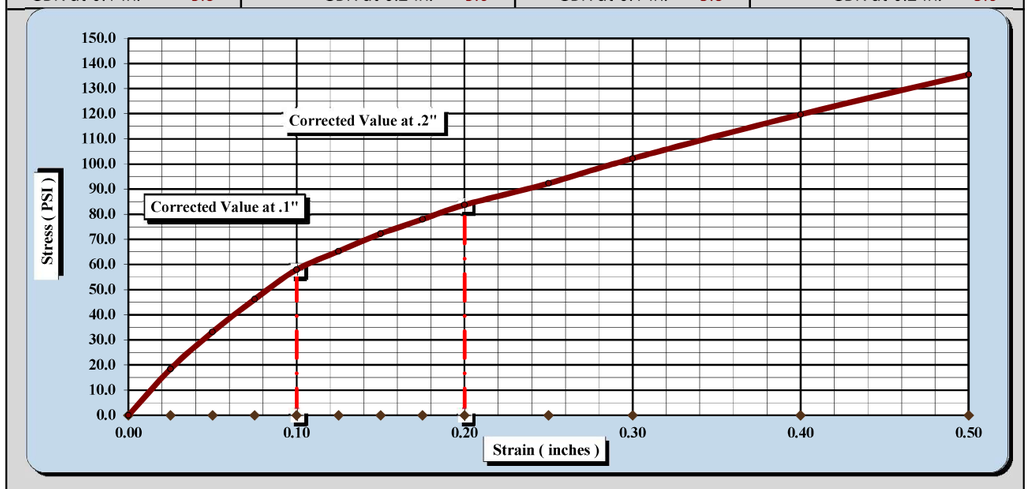
S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

Project #:	6235-18-013	Report Date:	6/30/2018
Project Name:	R-5711	Test Date(s)	6/22 - 6/30/18
Client Name:	DRMP		
Client Address:	5950 Fairview Rd, Charlotte, NC 28210		
Boring #:	Y2_1450	Sample #: CBR-4	Sample Date: 6/7/18
Station #:	14+50	Offset: 35' RT	Depth (ft): N/A
Sample Description:	Red-Brown Coarse to Fine Sandy Silty CLAY		

AASHTO T99 *Method A* Maximum Dry Density: 93.3 PCF Optimum Moisture Content: 22.8%

Compaction Test performed on grading complying with CBR spec. % Retained on the 3/4" sieve: 0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in. 5.8	CBR at 0.2 in. 5.6	CBR at 0.1 in. 5.8	CBR at 0.2 in. 5.6



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with AASHTO T 193, Section 5.1.1

Before Soaking		*After Soaking*	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	91.3
Initial Dry Density (PCF)	93.3	Average Final Moisture Content	28.4%
Moisture Content of the Compacted Specimen	22.5%	Moisture Content (top 1" after soaking)	30.4%
Percent Compaction	100.0%	Percent Swell	2.4%

Soak Time: 96 hrs. Surcharge Weight 10.0 Surcharge Wt. per sq. Ft. 50.9
Liquid Limit ND Plastic Index ND

Notes/Deviations/References: ND=Not Determined.
Test specimen compacted to 100% at optimum moisture.

Mal Krajan, ET — *Technical Responsibility* | *Signature* | Laboratory Manager — *Position* | 7/2/2018 — *Date*

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Form No. TR-D698-2
Revision No. : 1
Revision Date: 07/25/17

MOISTURE - DENSITY REPORT

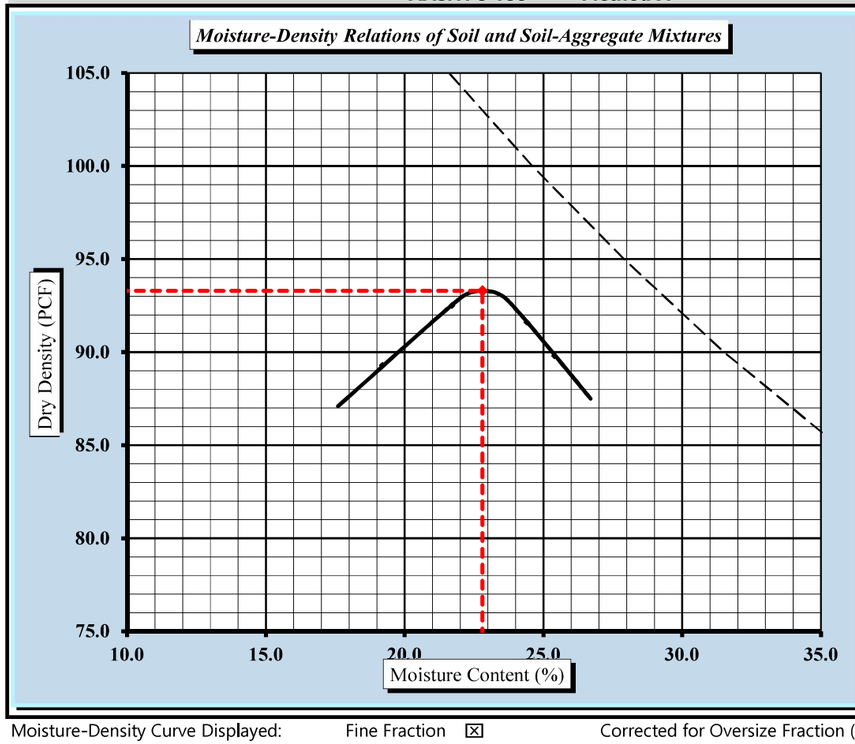
Quality Assurance

S&ME, Inc. Raleigh: 3201 Spring Forest Road, Raleigh, NC 27616

S&ME Project #:	6235-18-013			Report Date:	6/25/18
Project Name:	R-5711			Test Date(s):	6/20 - 6/25/18
Client Name:	DRMP				
Client Address:	5950 Fairview Rd, Charlotte, NC 28210				
Boring #:	Y2_1450	Sample #:	CBR-4	Sample Date:	6/7/2018
Station #:	14+50	Offset:	35' RT	Depth:	N/A
Sample Description:	Red-Brown Coarse to Fine Sandy Silty CLAY				

Maximum Dry Density 93.3 PCF. Optimum Moisture Content 22.8%

AASHTO T99 - - Method A



Soil Properties	
Natural Moisture Content	ND
Assumed Specific Gravity	2.650
Liquid Limit	ND
Plastic Limit	ND
Plastic Index	ND
% Passing	
3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	ND
#40	ND
#60	ND
#200	ND
Oversize Fraction	
Bulk Gravity	
% Moisture	
% Oversize	
MDD	
Opt. MC	

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☐ Manual Rammer ☒ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:
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Mal Krajan, ET — *Technical Responsibility* | *Signature* | Laboratory Manager — *Position* | 6/25/2018 — *Date*

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