STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2536D	1	70

REFERENCE: R-2536D

PROJECT: 34450

SEE SHEET 3 FOR PROPOSED ALIGNMENT AT TIME OF INVESTIGATION

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY RANDOLPH

PROJECT DESCRIPTION R-2536D – ZOO CONNECTOR FROM EAST OF SR 2839 (STALEYS FARM RD) TO EXISTING NC 159 /ZOO ENTRANCE

INVENTORY

CONTENTS

LINE	STATION	PLAN	PROFILE	BORING LOGS
-Y9-	21+69 - 114+00	4 - 12	13 - 19	26 -60
-Y10-	81+00 - 94+30	9 & 11	20	61 - 63
-Y10A-	10+00 - 13+00	11	21	63
-NC159 RPA-	10+00 - 20+46	4 & 5	22	64 - 66
-NC159 SPUR-	10+00 - 26+81	4	23	67 - 68
-RAB-	10+00 - 13+45	4	25	26
-SERRD2-	10+00 - 19+10	12	24	69 - 70

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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

B. WORLEY, PG

B. SMITH, PG

L. GONZALEZ

R. THOMPSON

DS DD 9/23/2014

INVESTIGATED BY B. WORLEY, PG

DRAWN BY B. WORLEY & M. BRANDON

CHECKED BY D. DEWEY, PE

SUBMITTED BY Summit Design & Engineering Services, PLLC

DATE SEPTEMBER, 2014

SIGNATURE DATE

NORTH CAROLINA LICENSED SEAL 1926 GEOLOGIST BRADLEY D. WORLEY

DocuSigned by: Brad Worley CA8721209FCB478... 9/23/2014

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2536D	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											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
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
GRAIN SIZE 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 SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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 GPT 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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [x] CME-450
- [ ] _____

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] 6" HOLLOW AUGERS

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

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

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] 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: •SEE NOTE

ELEVATION: FEET

NOTES:

BORING ELEVATIONS DETERMINED USING TIN FILE (NCDOT_dem.tin)

FIAD = Filled In After Drilling

All borings near existing roadway were FIAD due to potential pedestrians.

All borings in existing cattle pastures were FIAD due at the property owner's request.

DATE: 8-15-14

TIP PROJECT: R-2536D

CONTRACT:

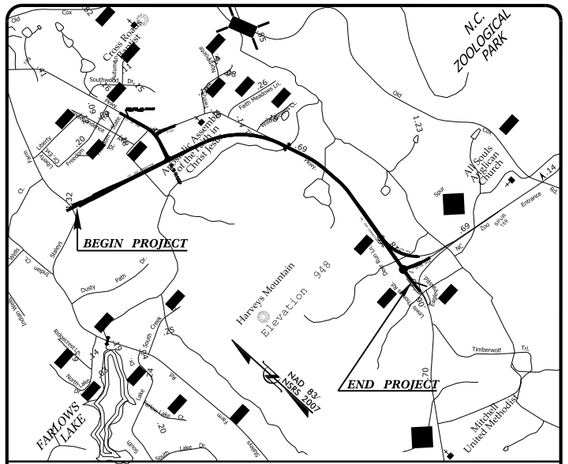
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2536D	3	70

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34450.1.1		

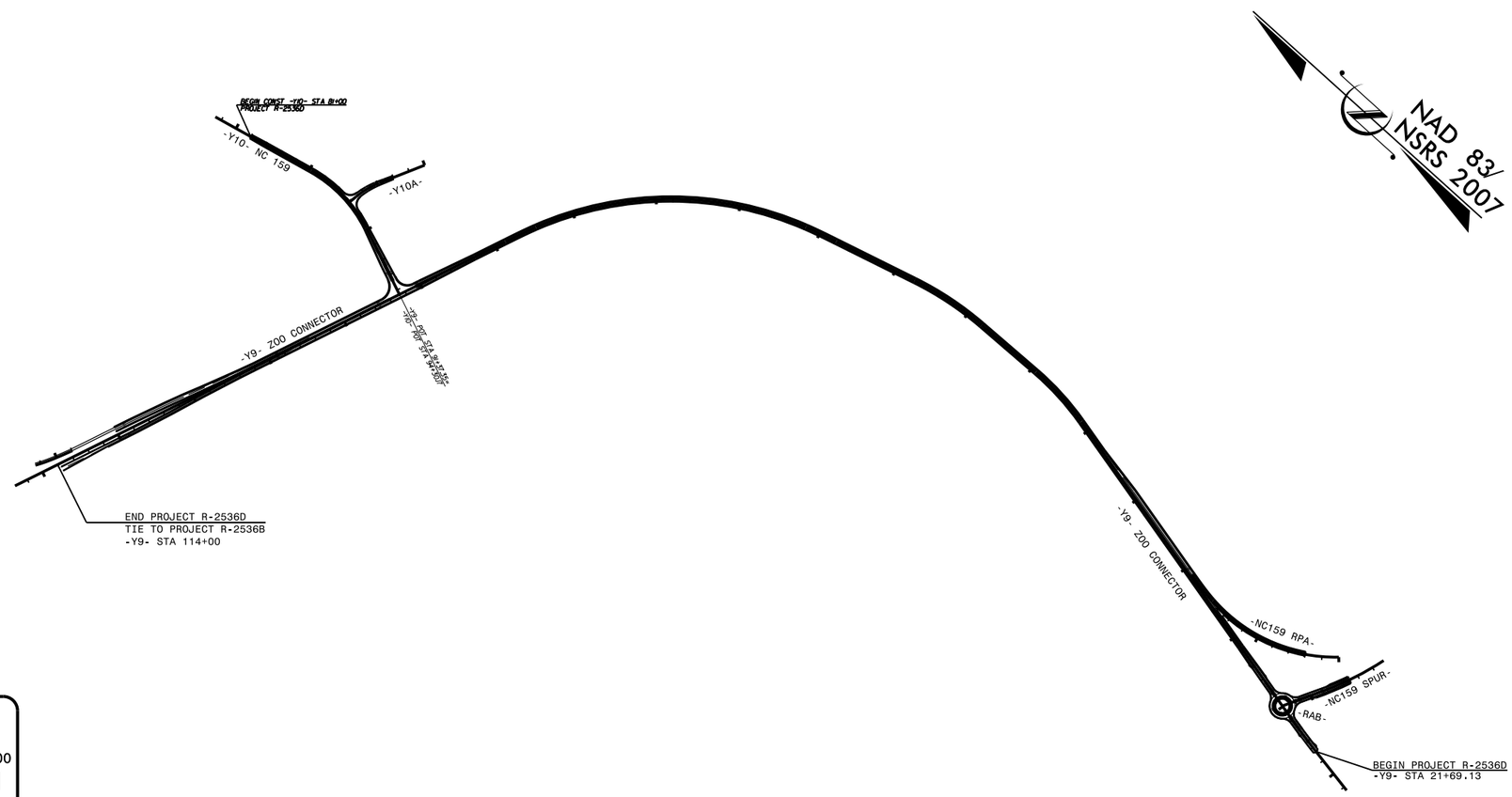
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

RANDOLPH COUNTY

LOCATION: ZOO CONNECTOR FROM EAST OF SR 2839 (STALEYS FARM ROAD) TO EXISTING NC 159/ZOO ENTRANCE



VICINITY MAP



INCOMPLETE PLANS
DO NOT USE FOR RW ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

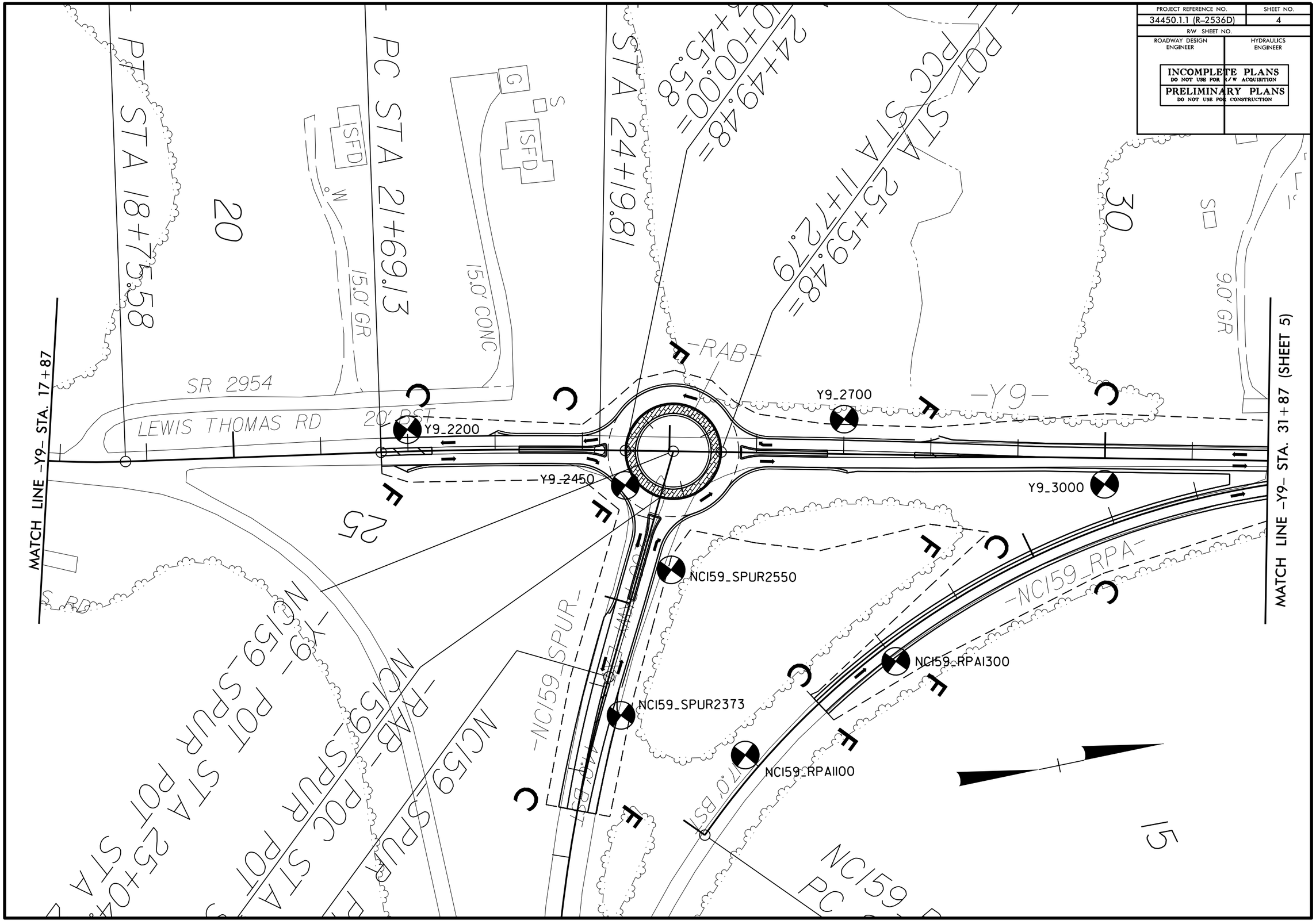
10 5 0 10 20
PROFILE (VERTICAL)

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

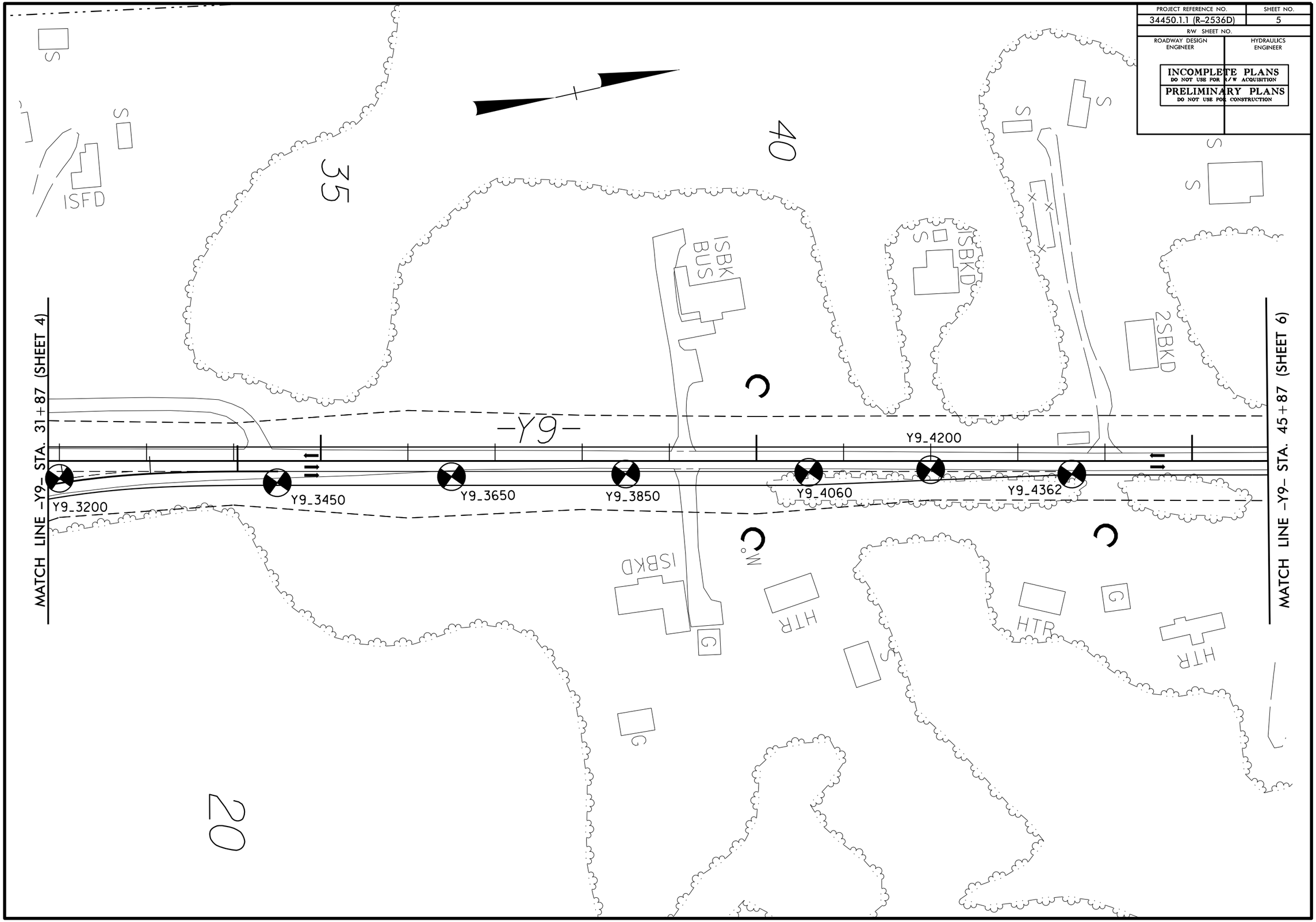
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

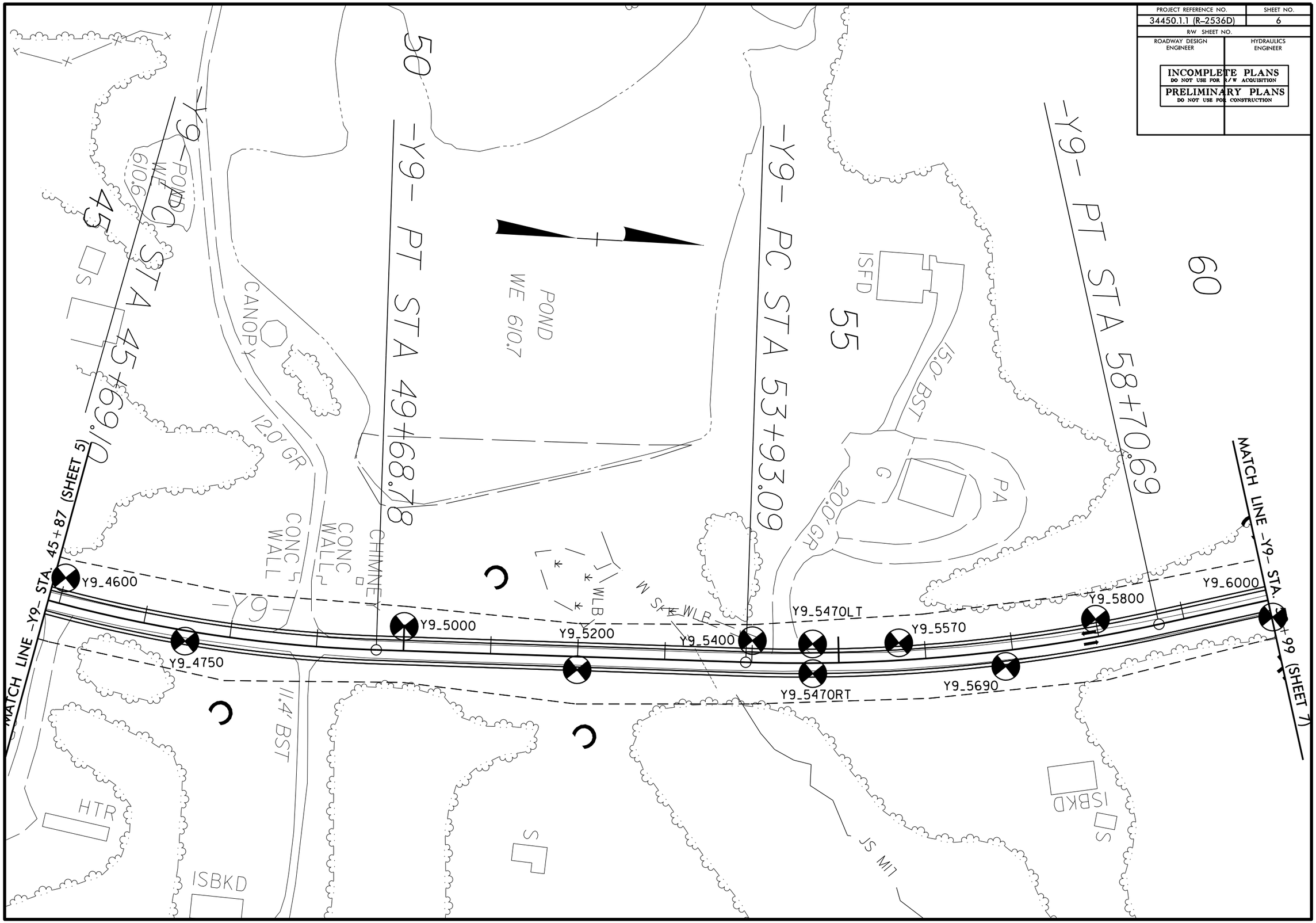
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

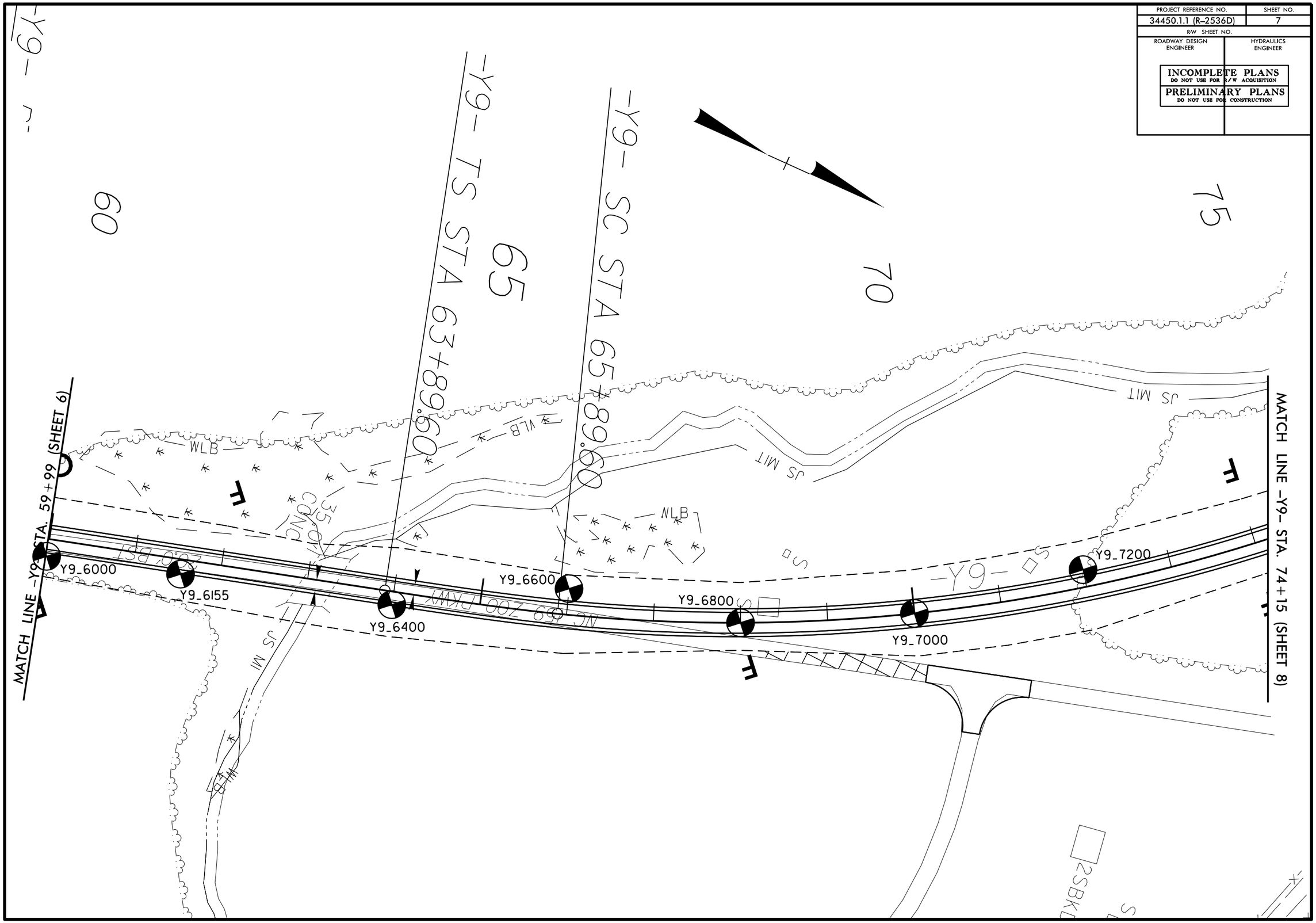
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

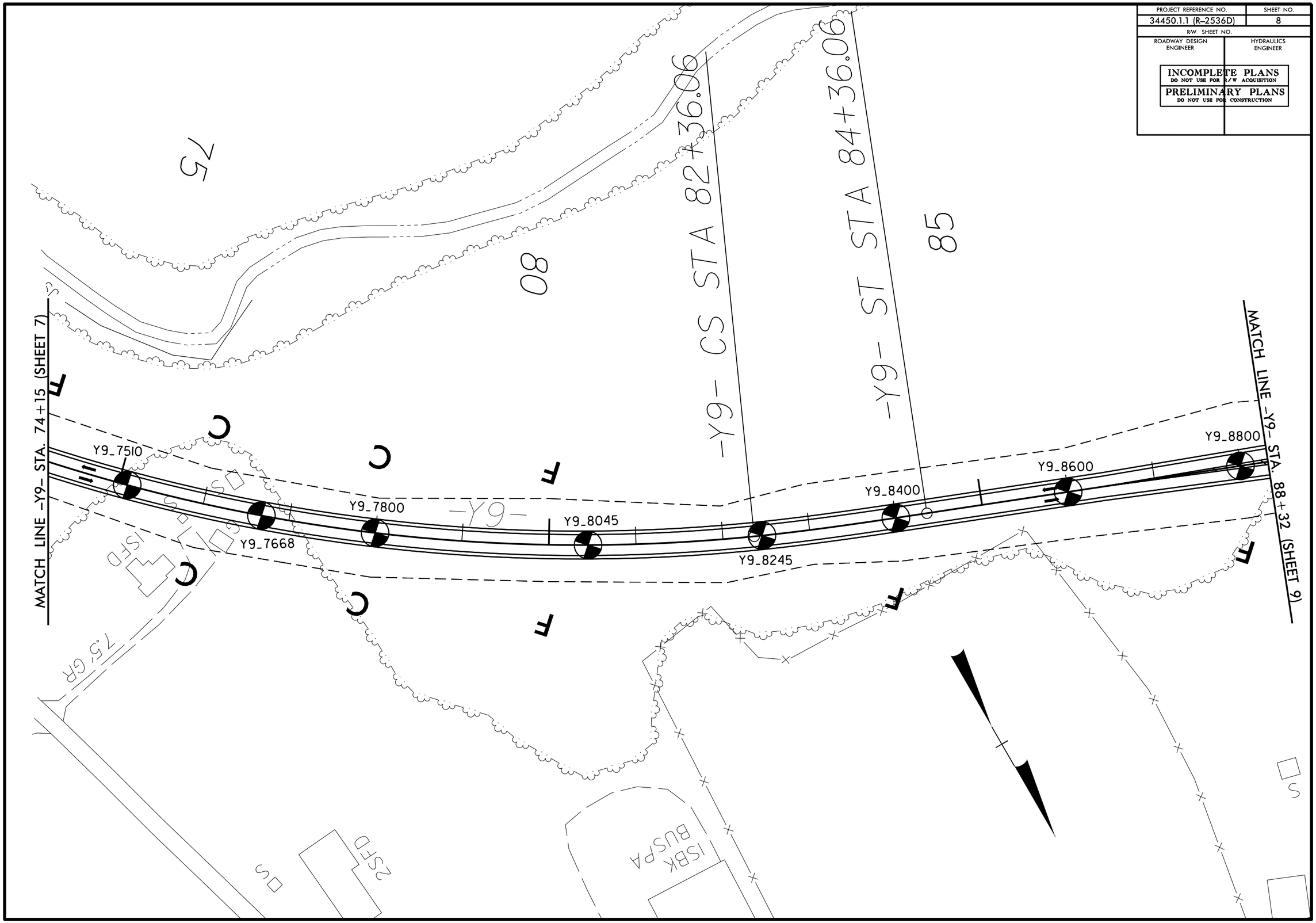
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

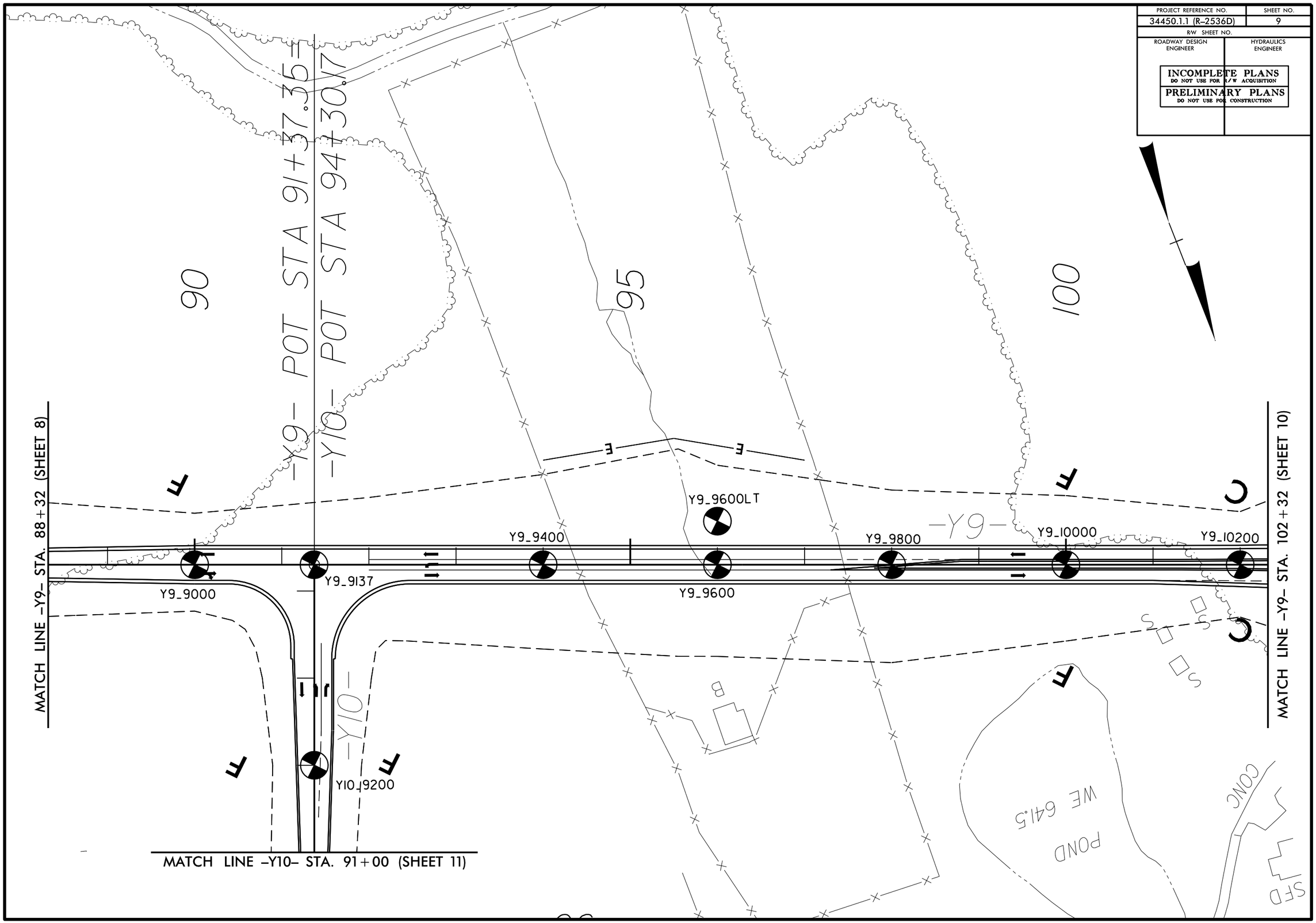
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

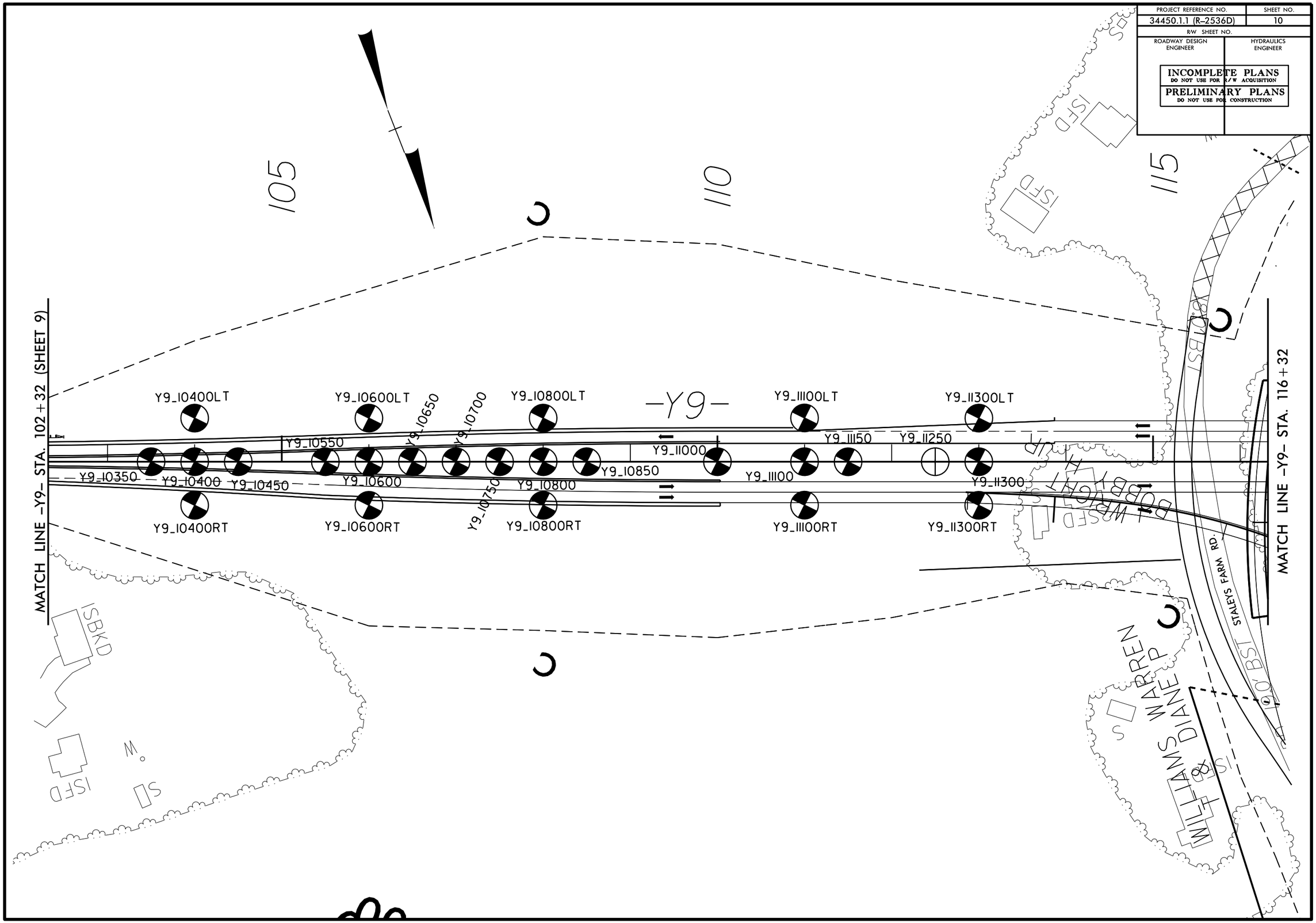
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

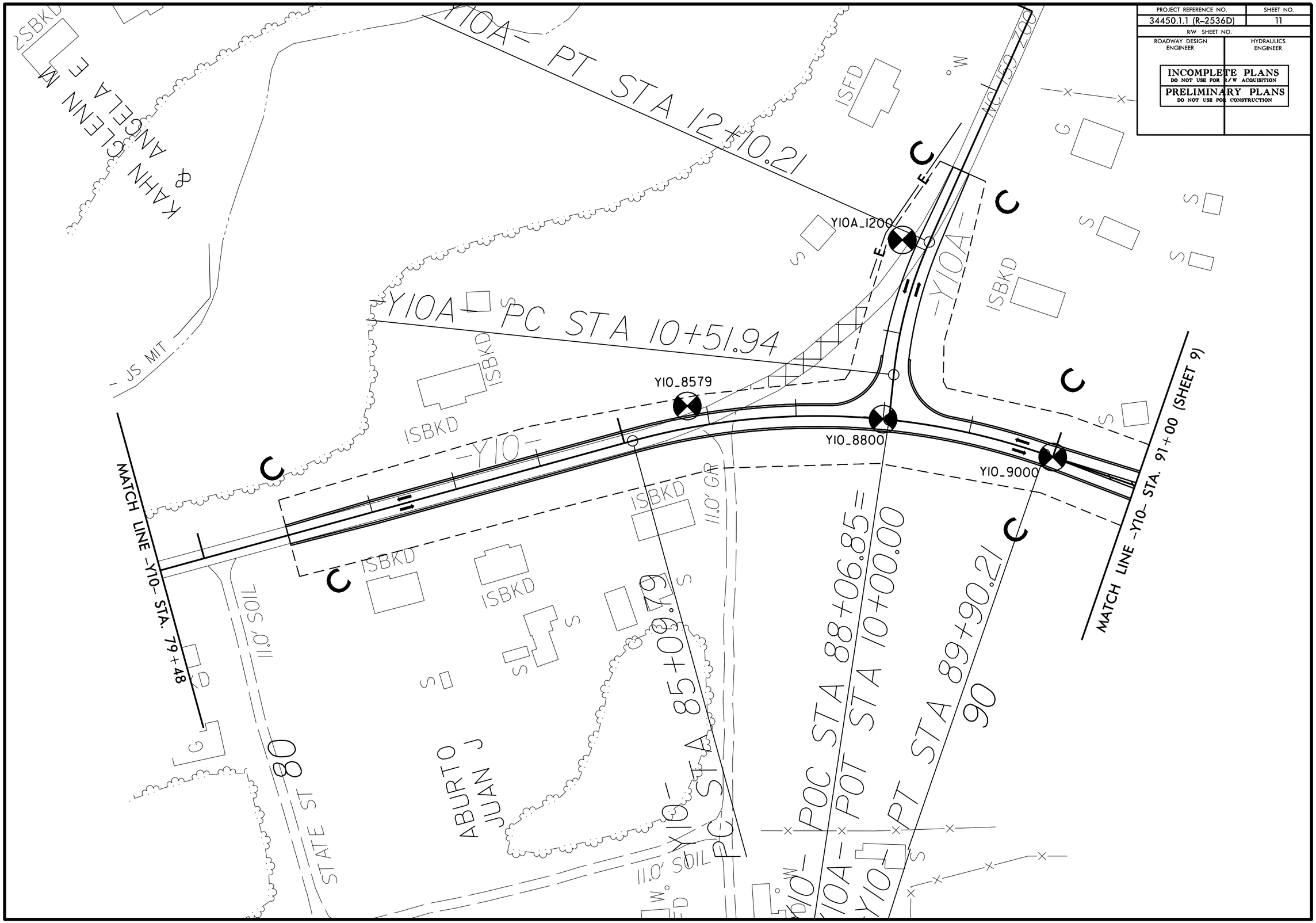
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

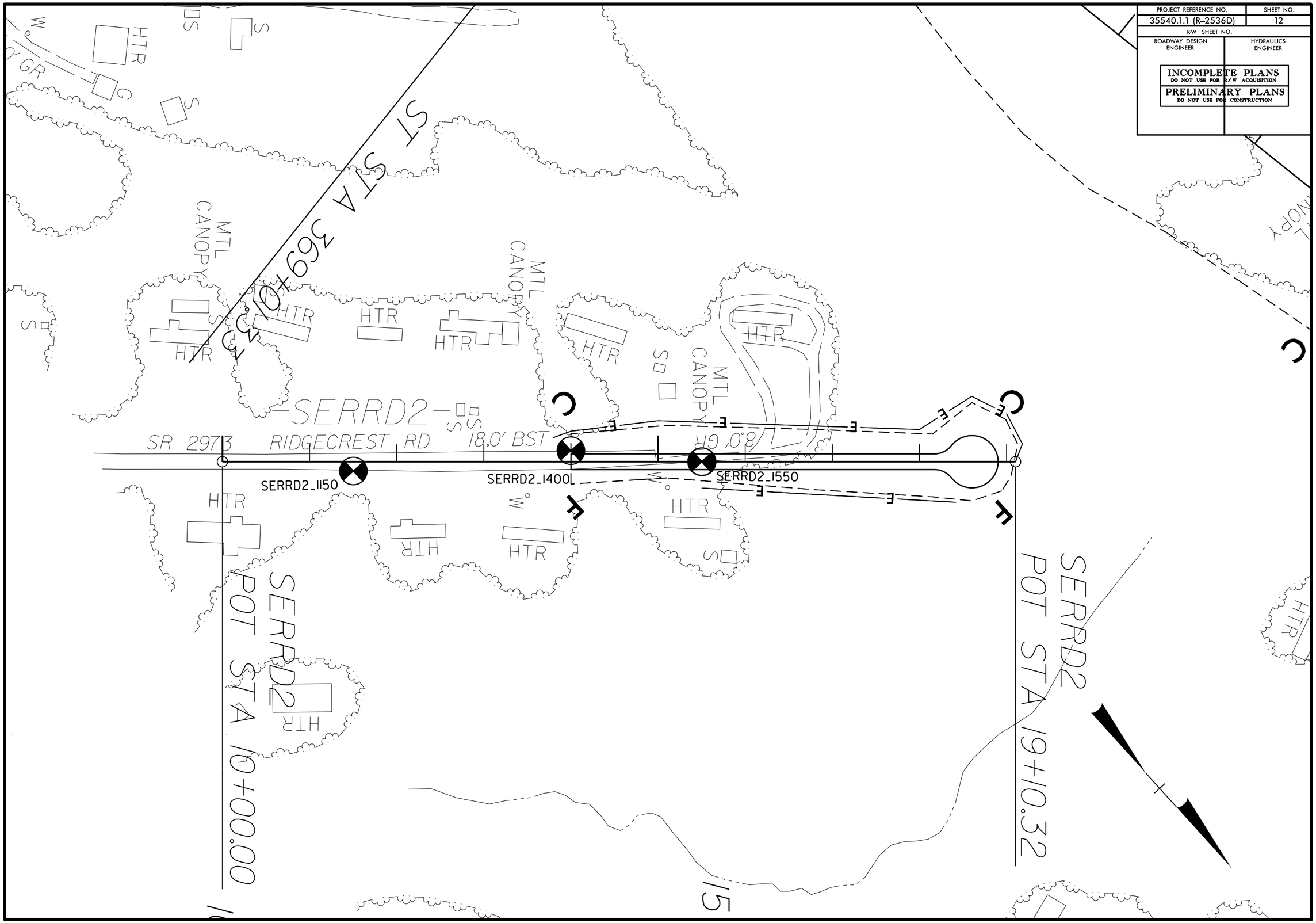
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
35540.1.1 (R-2536D)	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

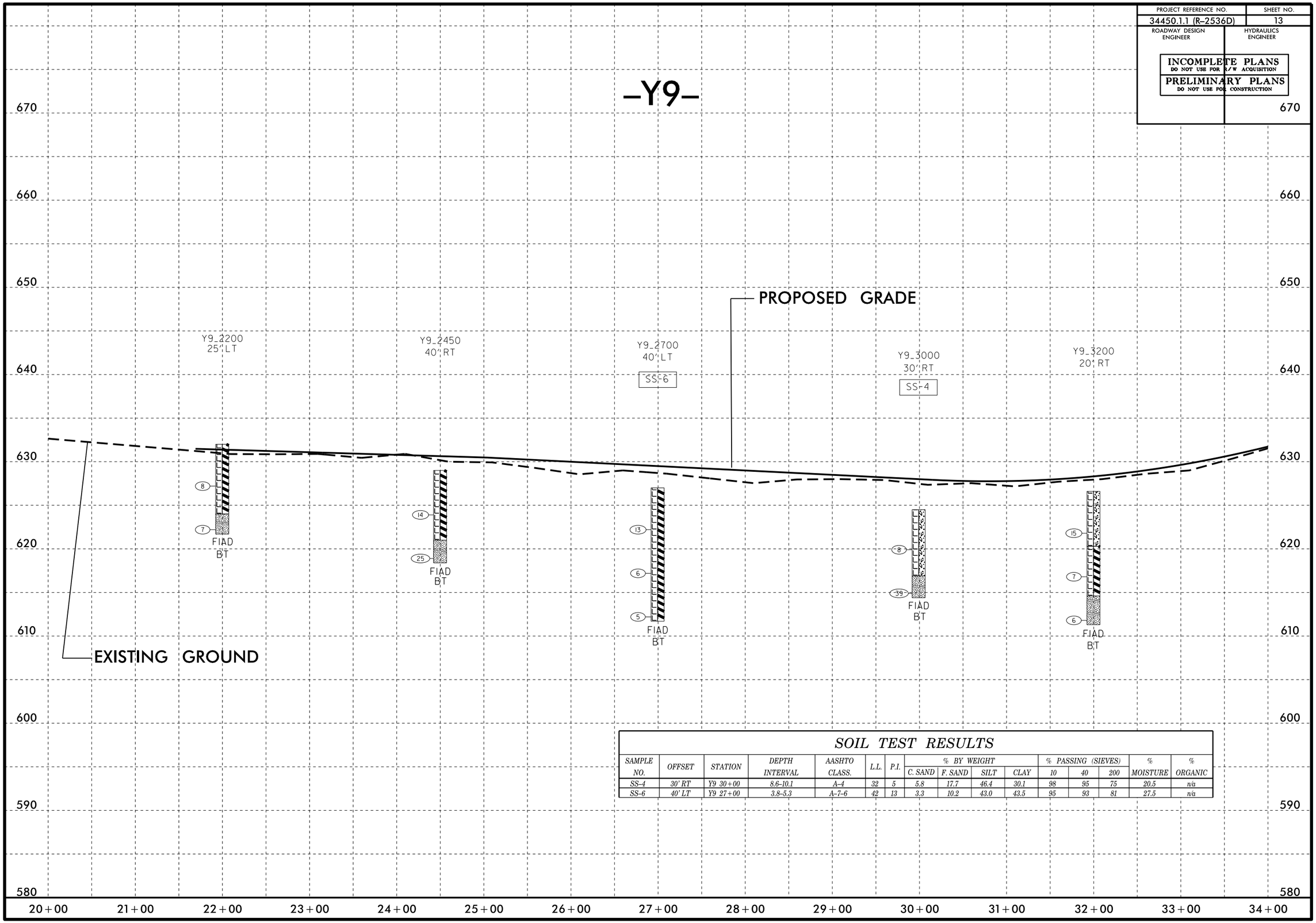
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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



SOIL TEST RESULTS

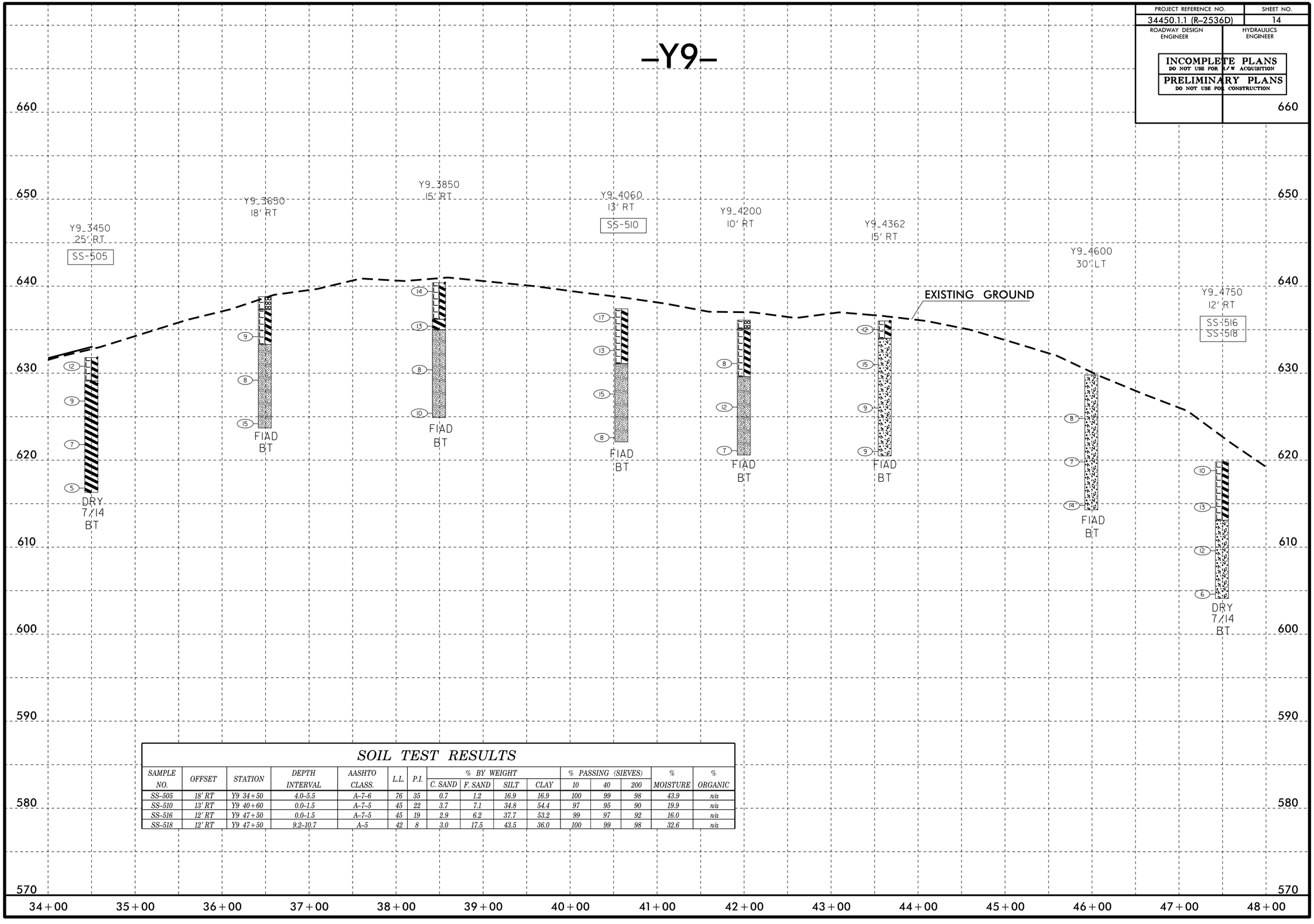
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	30' RT	Y9 30+00	8.6-10.1	A-4	32	5	5.8	17.7	46.4	30.1	98	95	75	20.5	n/a
SS-6	40' LT	Y9 27+00	3.8-5.3	A-7-6	42	13	3.3	10.2	43.0	43.5	95	93	81	27.5	n/a

PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y9-



SOIL TEST RESULTS

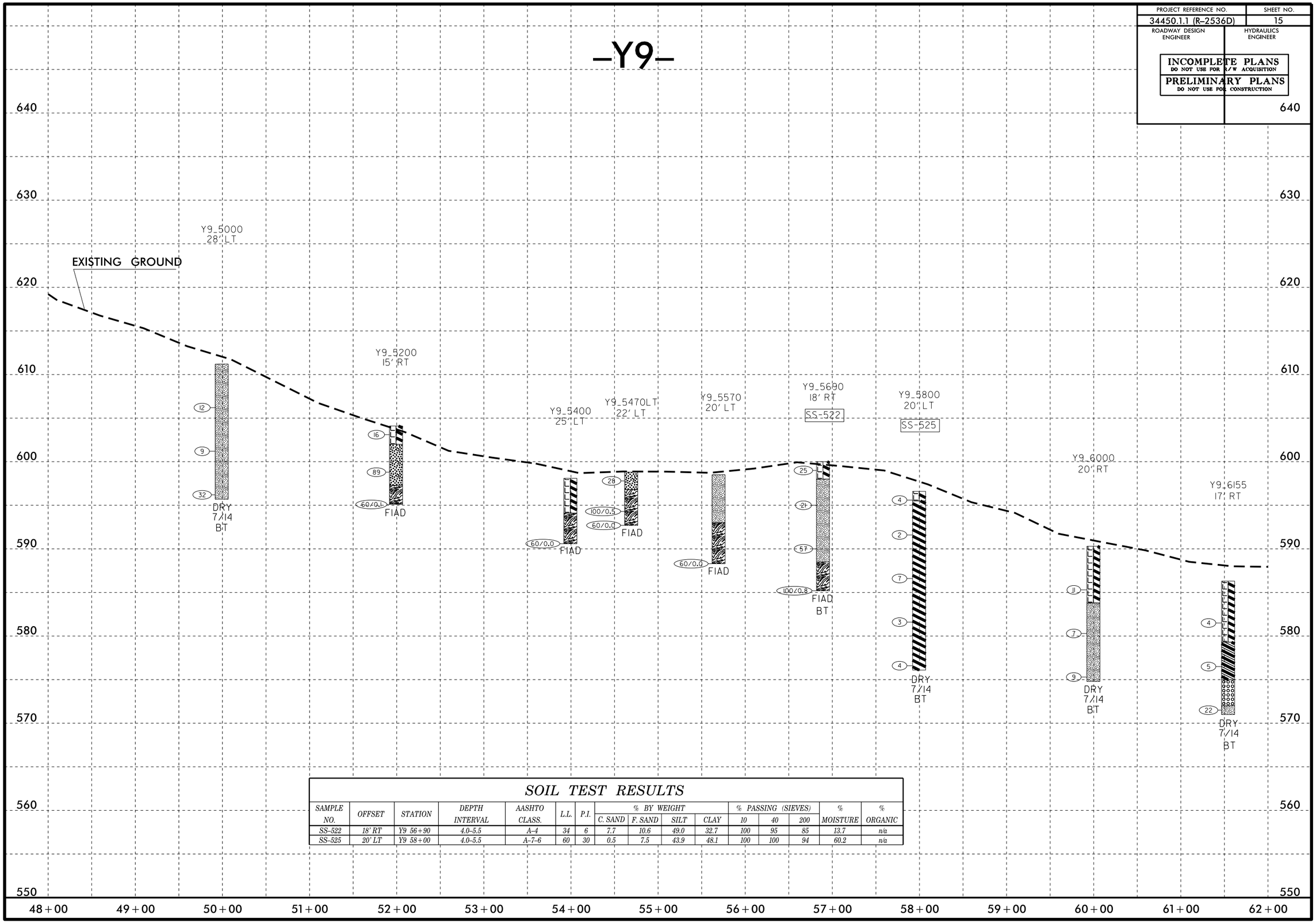
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-505	18' RT	Y9 34+50	4.0-5.5	A-7-6	76	35	0.7	1.2	16.9	16.9	100	99	98	43.9	n/a
SS-510	13' RT	Y9 40+60	0.0-1.5	A-7-5	45	22	3.7	7.1	34.8	54.4	97	95	90	19.9	n/a
SS-516	12' RT	Y9 47+50	0.0-1.5	A-7-5	45	19	2.9	6.2	37.7	53.2	99	97	92	16.0	n/a
SS-518	12' RT	Y9 47+50	9.2-10.7	A-5	42	8	3.0	17.5	43.5	36.0	100	99	98	32.6	n/a

PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y9-



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-522	18' RT	Y9 56+90	4.0-5.5	A-4	34	6	7.7	10.6	49.0	32.7	100	95	85	13.7	n/a
SS-525	20' LT	Y9 58+00	4.0-5.5	A-7-6	60	30	0.5	7.5	43.9	48.1	100	100	94	60.2	n/a

PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

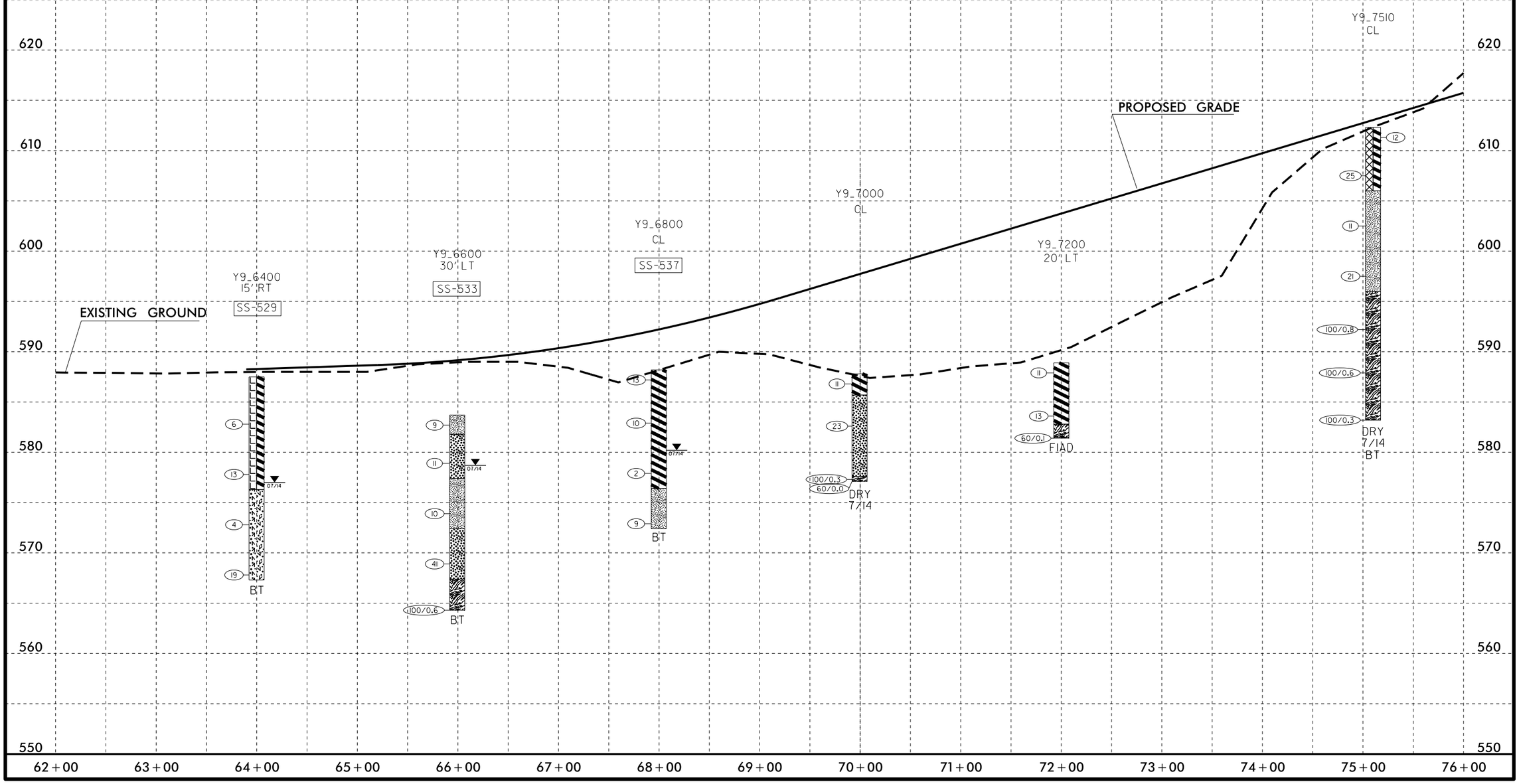
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y9-

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-529	15' RT	Y9 64+00	13.7-15.2	A-5	45	19	0.3	22.5	49.4	27.8	100	95	83	39.2	n/a
SS-533	30' LT	Y9 66+00	8.8-10.3	A-5	32	5	15.7	22.3	43.5	18.5	95	88	65	23.3	n/a
SS-537	CL	Y9 68+00	9.3-10.8	A-75	58	11	3.8	21.5	45.6	29.1	100	99	79	63.2	n/a



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

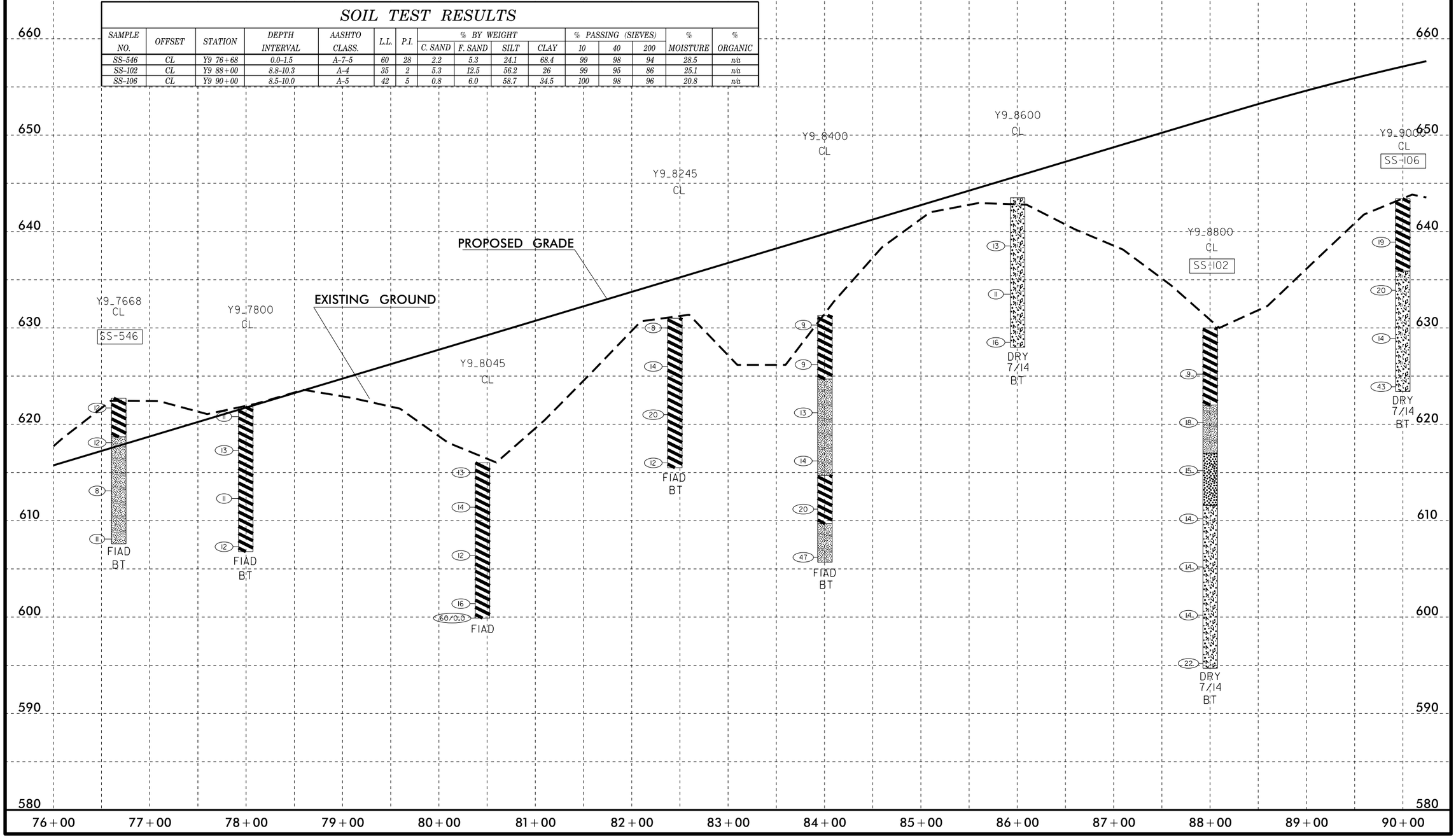
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-Y9-

SOIL TEST RESULTS

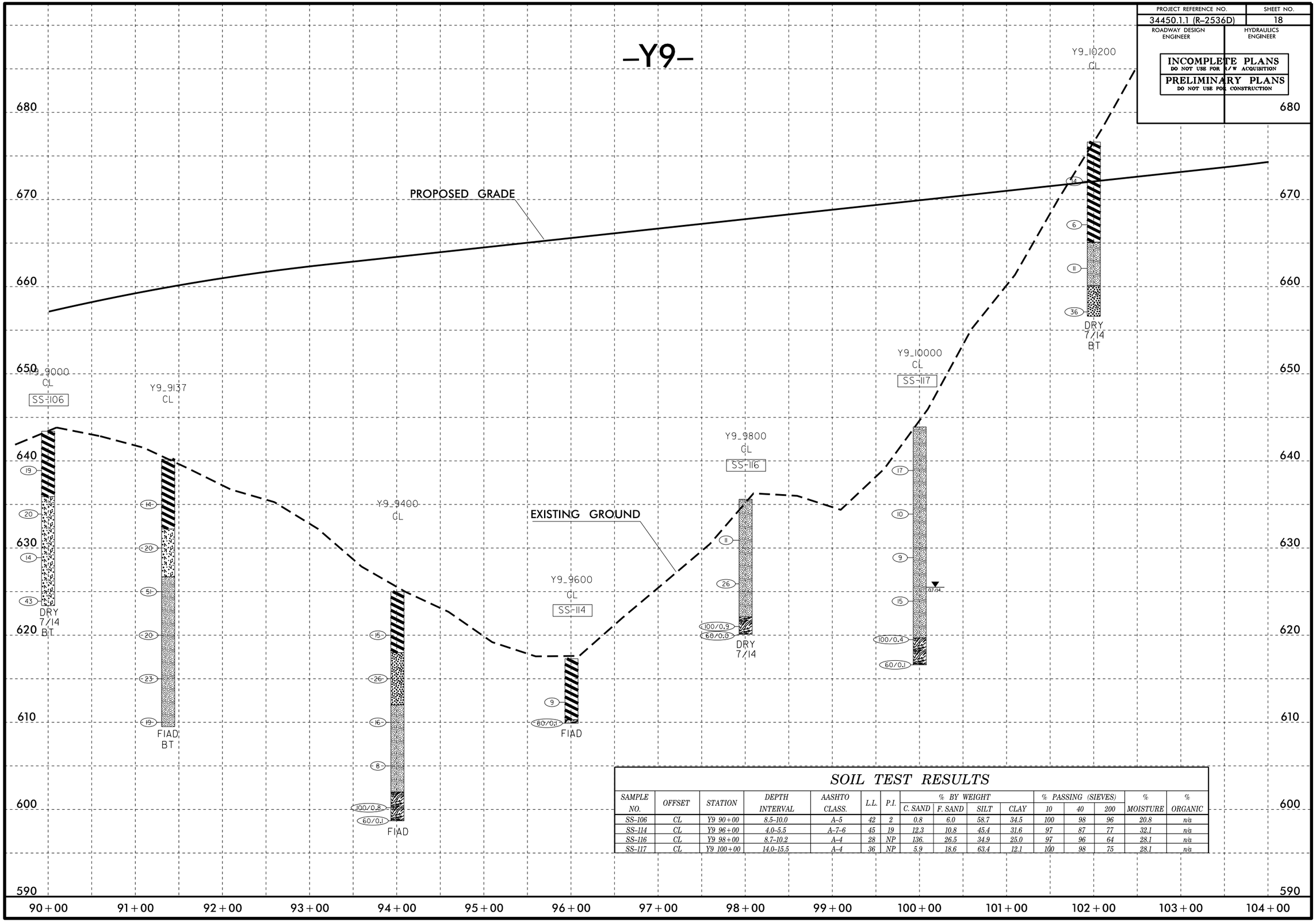
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-546	CL	Y9 76+68	0.0-1.5	A-7-5	60	28	2.2	5.3	24.1	68.4	99	98	94	28.5	n/a
SS-102	CL	Y9 88+00	8.8-10.3	A-4	35	2	5.3	12.5	56.2	26	99	95	86	25.1	n/a
SS-106	CL	Y9 90+00	8.5-10.0	A-5	42	5	0.8	6.0	58.7	34.5	100	98	96	20.8	n/a



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	18
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-106	CL	Y9 90+00	8.5-10.0	A-5	42	2	0.8	6.0	58.7	34.5	100	98	96	20.8	n/a
SS-114	CL	Y9 96+00	4.0-5.5	A-7-6	45	19	12.3	10.8	45.4	31.6	97	87	77	32.1	n/a
SS-116	CL	Y9 98+00	8.7-10.2	A-4	28	NP	136.	26.5	34.9	25.0	97	96	64	28.1	n/a
SS-117	CL	Y9 100+00	14.0-15.5	A-4	36	NP	5.9	18.6	63.4	12.1	100	98	75	28.1	n/a

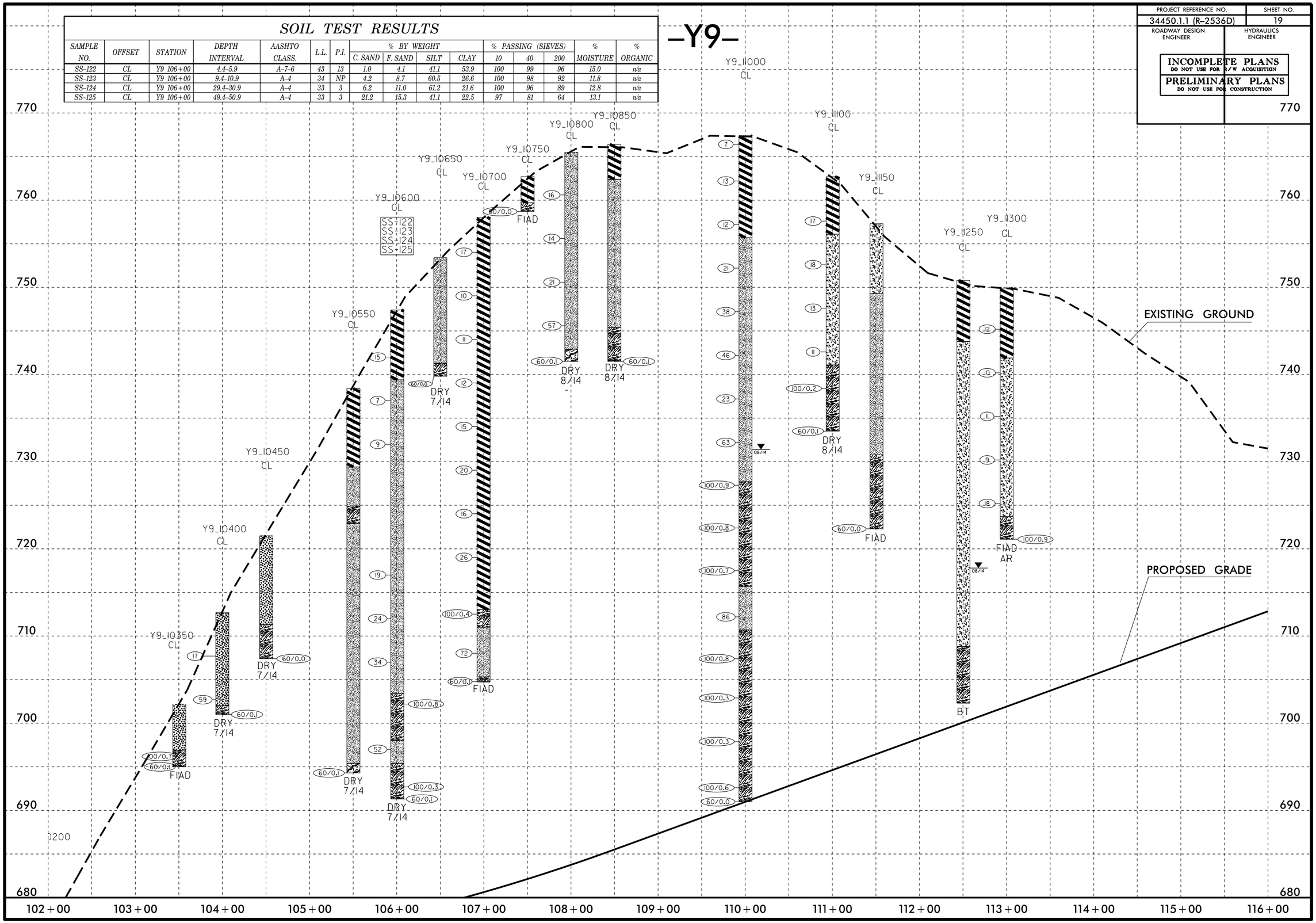
PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

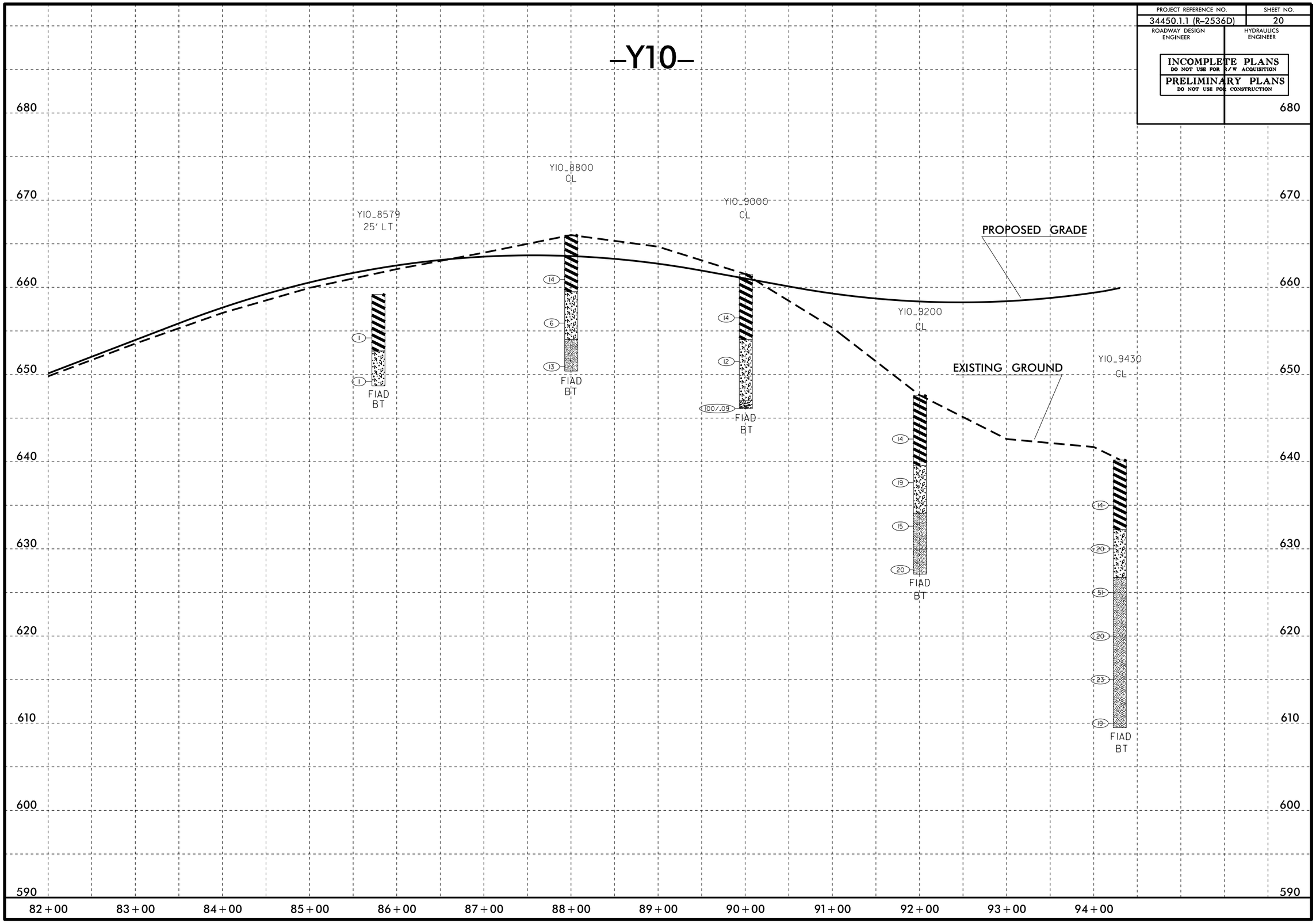
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-122	CL	Y9 106+00	4.4-5.9	A-7-6	43	13	1.0	4.1	41.1	53.9	100	99	96	15.0	n/a
SS-123	CL	Y9 106+00	9.4-10.9	A-4	34	NP	4.2	8.7	60.5	26.6	100	98	92	11.8	n/a
SS-124	CL	Y9 106+00	29.4-30.9	A-4	33	3	6.2	11.0	61.2	21.6	100	96	89	12.8	n/a
SS-125	CL	Y9 106+00	49.4-50.9	A-4	33	3	21.2	15.3	41.1	22.5	97	81	64	13.1	n/a



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

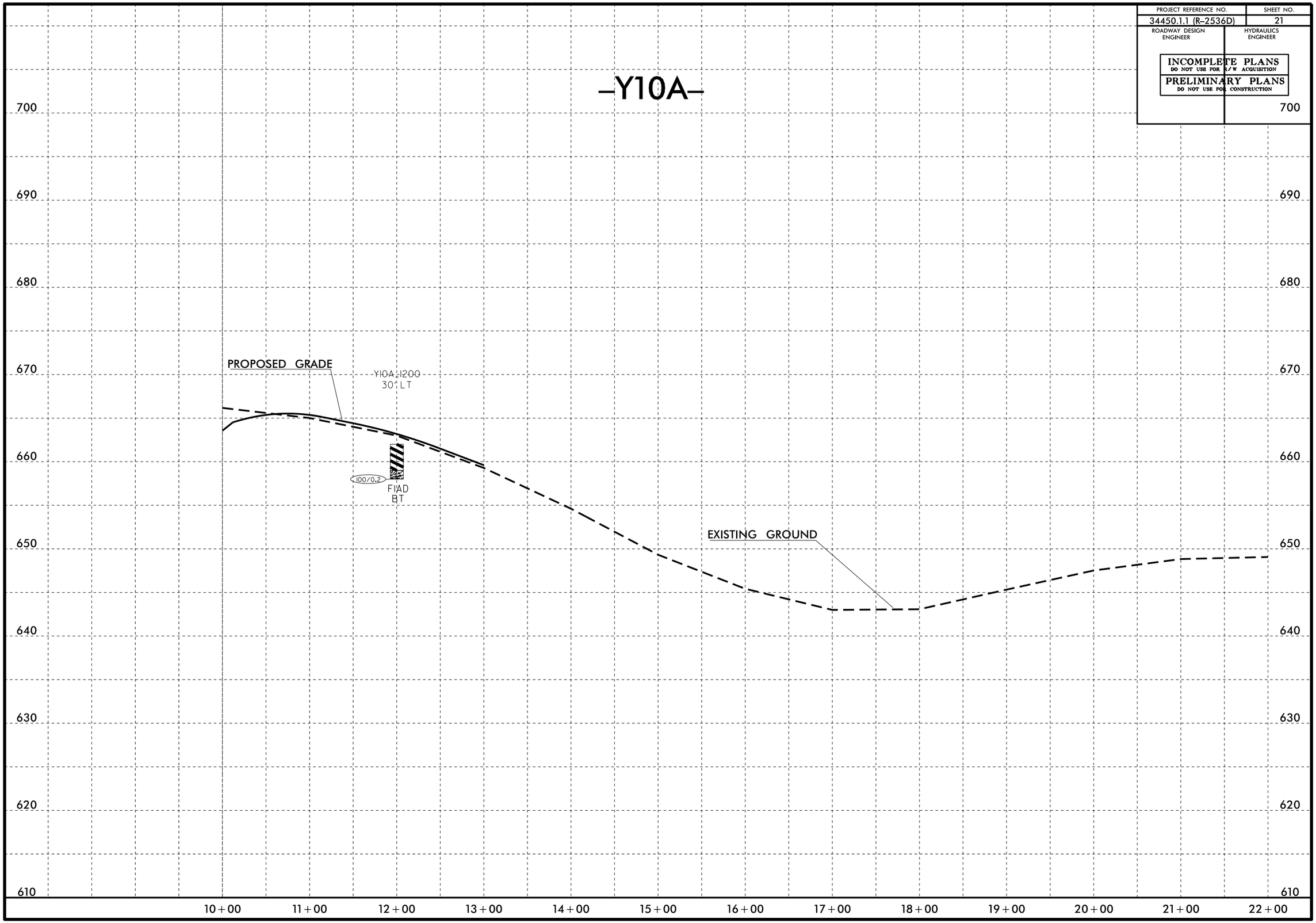
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

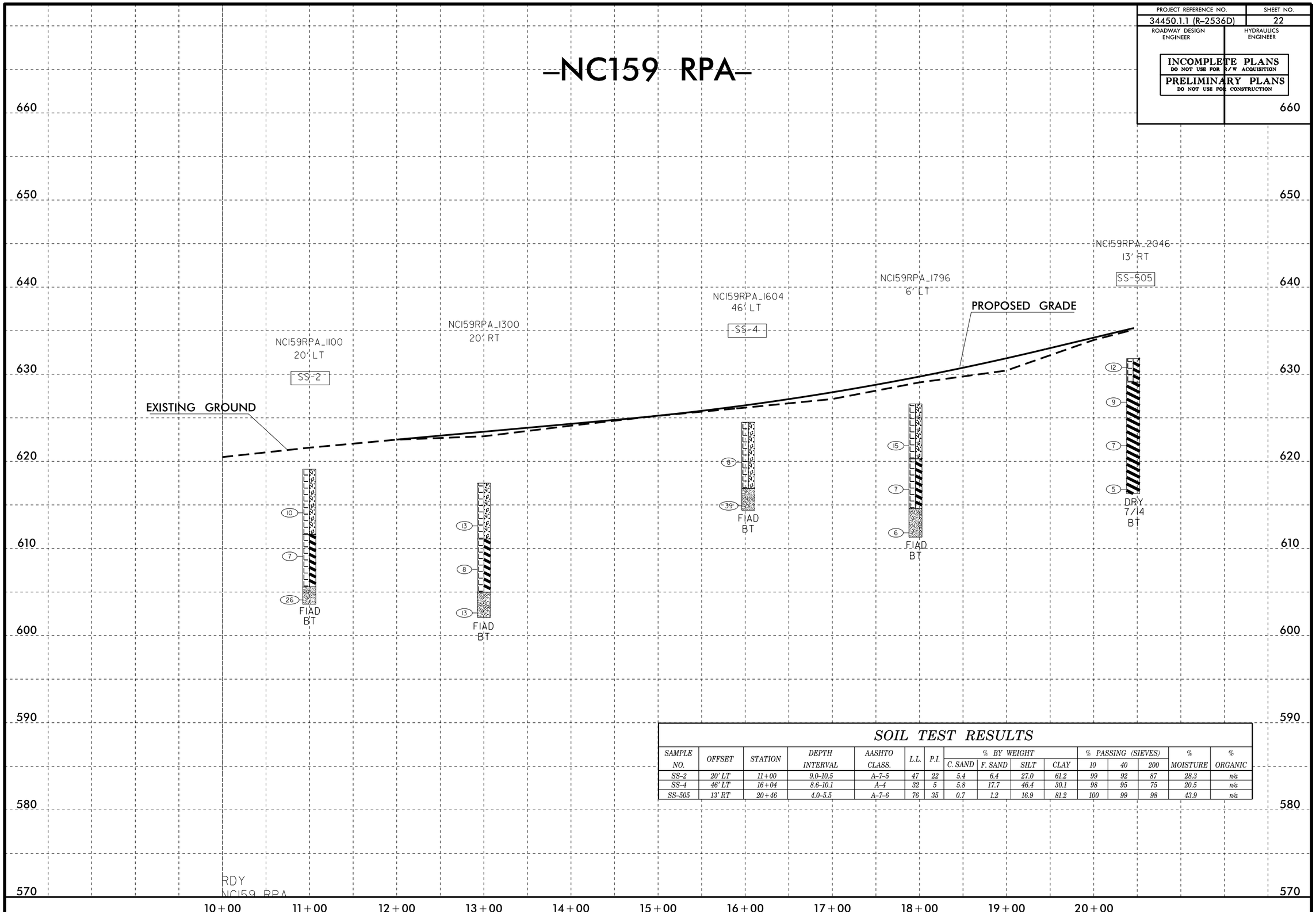
-Y10A-



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

-NC159 RPA-



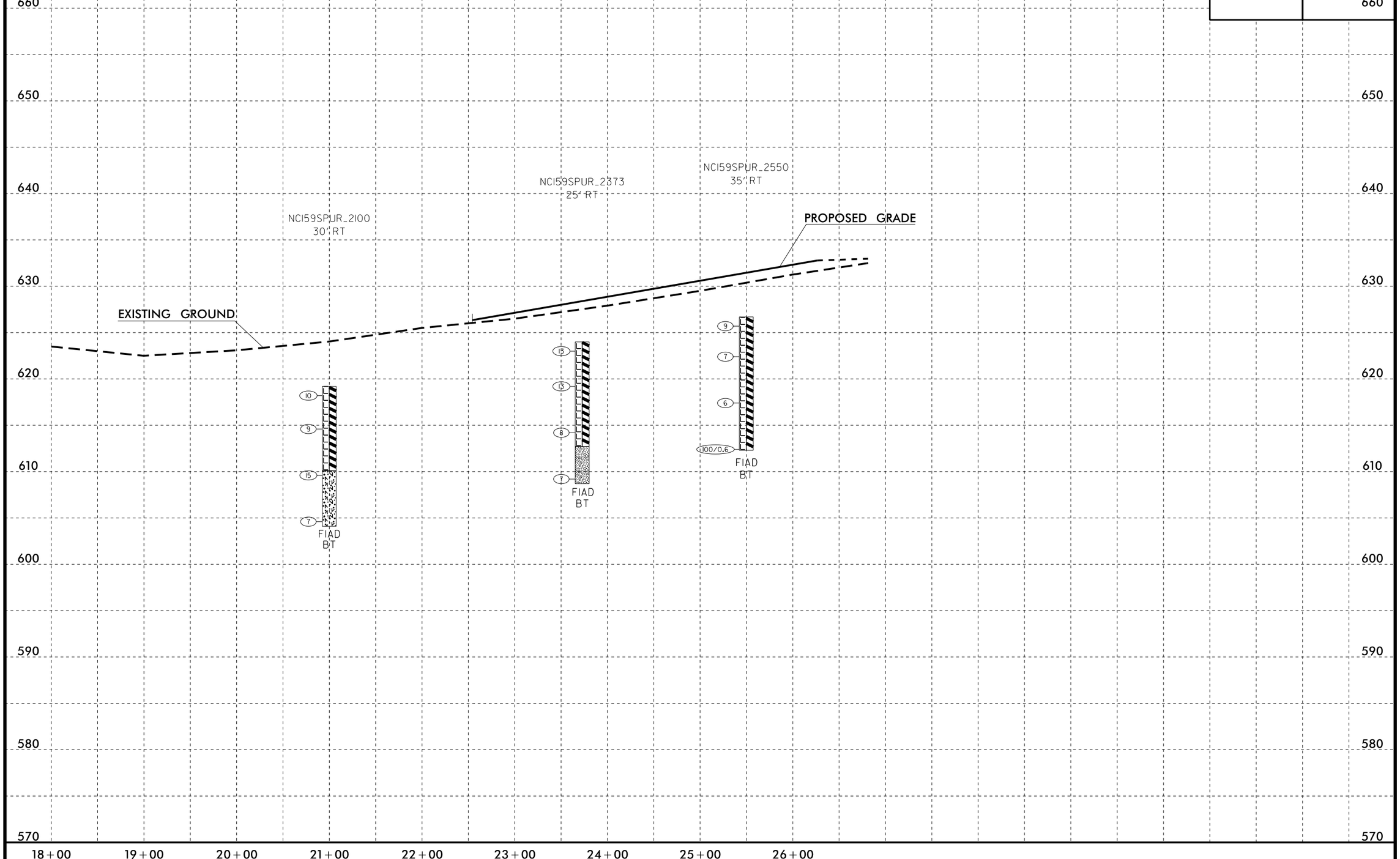
SOIL TEST RESULTS

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	20' LT	11+00	9.0-10.5	A-7-5	47	22	5.4	6.4	27.0	61.2	99	92	87	28.3	n/a
SS-4	46' LT	16+04	8.6-10.1	A-4	32	5	5.8	17.7	46.4	30.1	98	95	75	20.5	n/a
SS-505	13' RT	20+46	4.0-5.5	A-7-6	76	35	0.7	1.2	16.9	81.2	100	99	98	43.9	n/a

PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

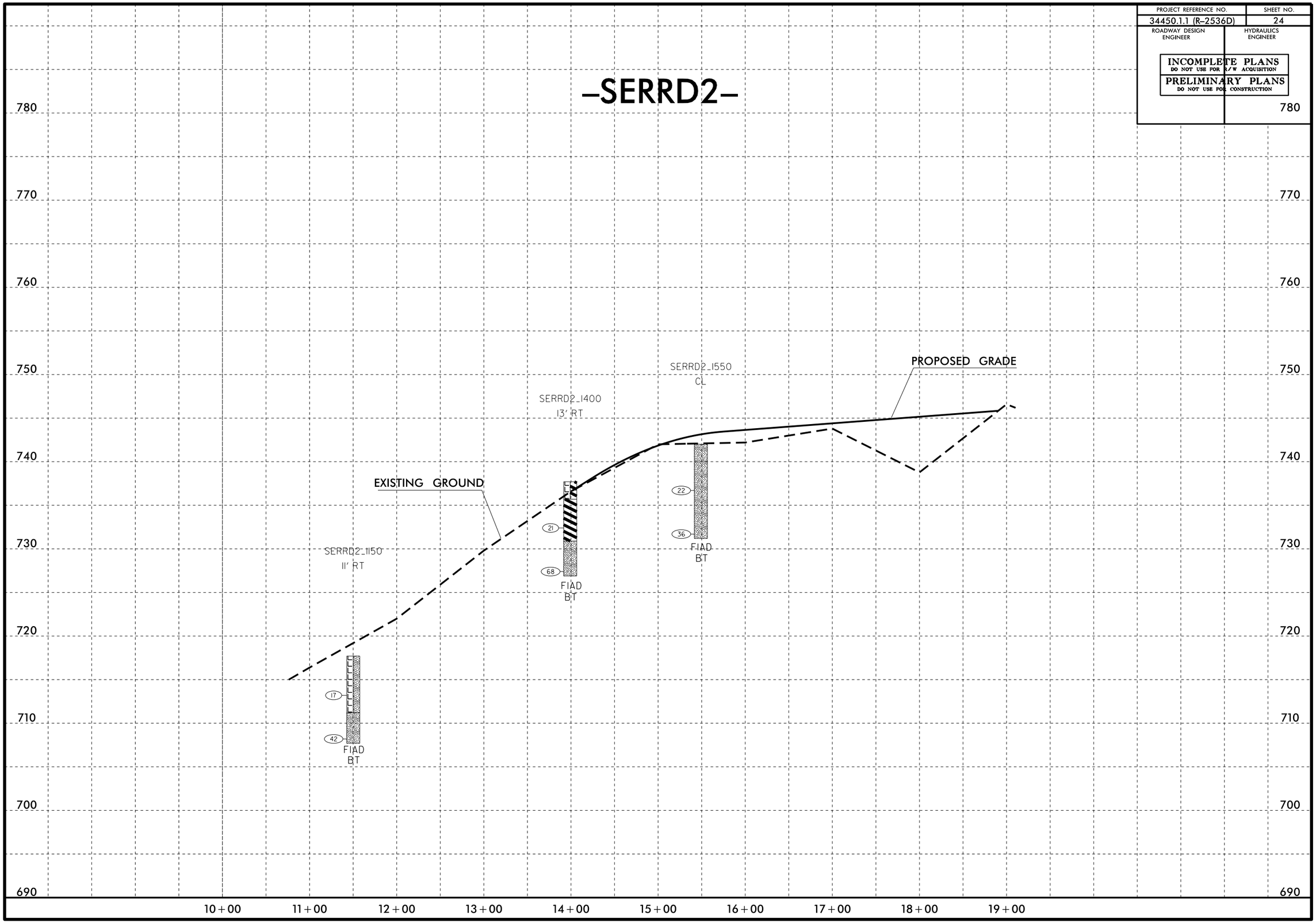
-NC159 SPUR-



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

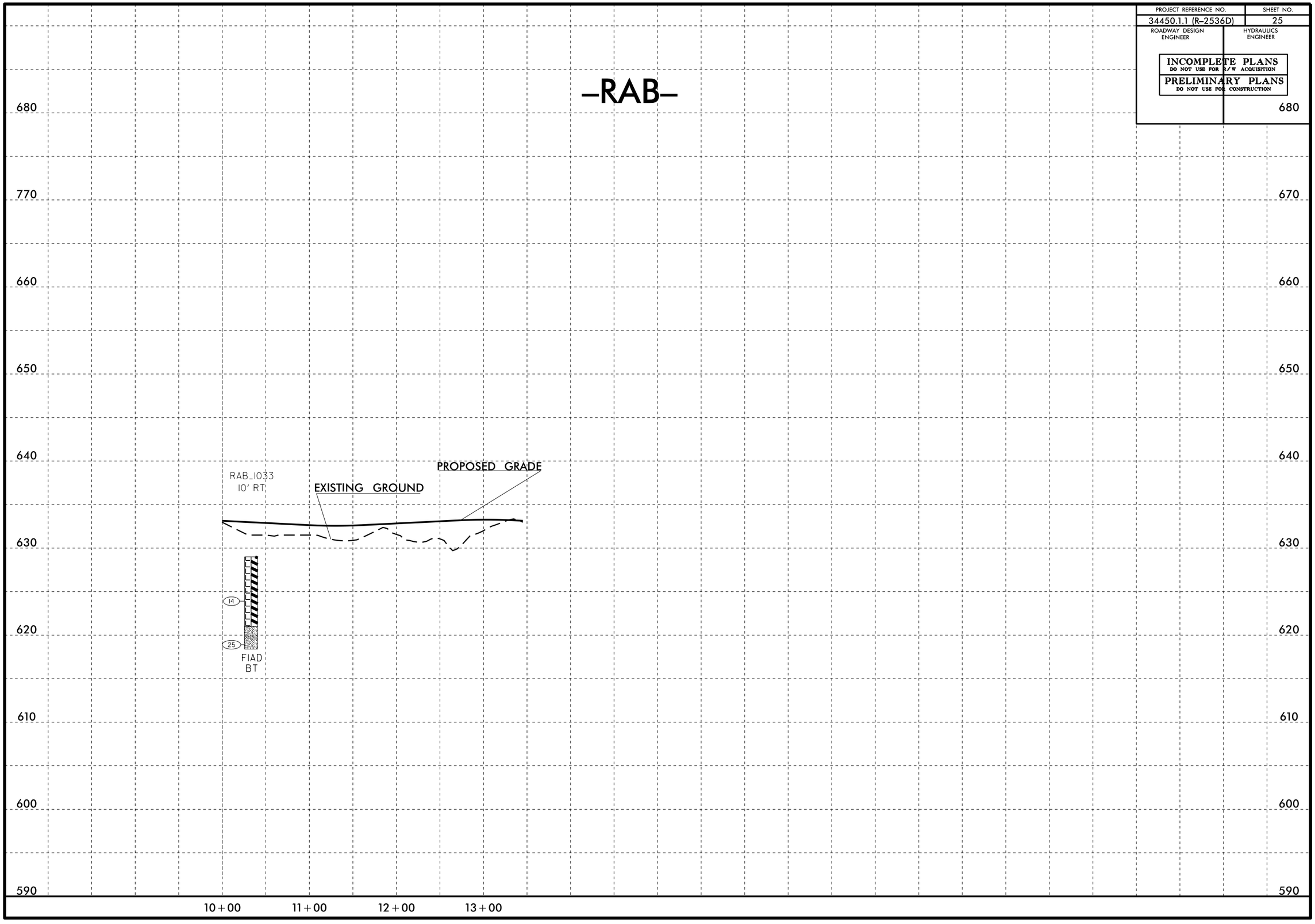
-SERRD2-



PROJECT REFERENCE NO.	SHEET NO.
34450.1.1 (R-2536D)	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

–RAB–



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_2200	**STATION** 22+00	**OFFSET** 25 ft LT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 632.0 ft	**TOTAL DEPTH** 10.3 ft	**NORTHING** 686,009	**EASTING** 1,767,326 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
635											
										632.0 GROUND SURFACE	0.0
630										**ROADWAY EMBANKMENT** orange-brown, silty CLAY (A-7-6)	
	628.2	3.8	2	4	4	8		D			
625										624.0	8.0
	623.2	8.8	2	3	4	7		D		**RESIDUAL** tan-brown, SILT (A-4) 621.7	10.3
										Boring Terminated at Elevation 621.7 ft in Residual (SILT)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_2450	**STATION** 24+50	**OFFSET** 40 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 629.0 ft	**TOTAL DEPTH** 10.6 ft	**NORTHING** 686,241	**EASTING** 1,767,439 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
630										629.0 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT orange-brown, silty CLAY (A-7-6)
625	624.9	4.1	4	6	8	14		D		
620	619.9	9.1	3	9	16	25		D		621.0 8.0 **RESIDUAL** red-brown, SILT (A-4) 618.4 10.6
										Boring Terminated at Elevation 618.4 ft in Residual (SILT)
										Equivalent to -RAB- 10+33, 10' RT

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_2700	**STATION** 27+00	**OFFSET** 40 ft LT	**ALIGNMENT** -Y9-
COLLAR ELEV. 627.0 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 686,502	**EASTING** 1,767,416
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
630											
										627.0 GROUND SURFACE	0.0
625										**ROADWAY EMBANKMENT** orange-brown, red-brown, and tan, silty CLAY (A-7-6)	
	623.2	3.8	2	5	8	13	SS-6	28%			
620											
	618.2	8.8	2	3	3	6		M			
615											
	613.2	13.8	1	2	3	5		M		611.7 Boring Terminated at Elevation 611.7 ft in Roadway Embankment Fill (silty CLAY)	15.3

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_3000	**STATION** 30+00	**OFFSET** 30 ft RT	**ALIGNMENT** -Y9-
COLLAR ELEV. 624.5 ft	**TOTAL DEPTH** 10.1 ft	**NORTHING** 686,779	**EASTING** 1,767,550
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
625										624.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT orange-tan, clayey SILT (A-5)	
620	620.9	3.6	1	3	5	8		D			
										616.9	7.6
615	615.9	8.6	6	13	26	39	SS-4	21%		**RESIDUAL** tan-gray, fine sandy SILT (A-4)	
										614.4 Boring Terminated at Elevation 614.4 ft in Residual (fine sandy SILT)	10.1

Harder drilling at 7.6 ft was interpreted as the top of Residual.
Equivalent to NC159RPA_1604.

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_3200	**STATION** 32+00	**OFFSET** 20 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 626.6 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 686,977	**EASTING** 1,767,584 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
630										626.6 GROUND SURFACE	0.0
625	622.8	3.8	2	6	9	15		M		**ROADWAY EMBANKMENT** orange-tan, clayey SILT (A-5)	
620	617.8	8.8	1	3	4	7		M		620.3 orange-brown and gray-tan, silty CLAY (A-7-5)	6.3
615	612.8	13.8	1	2	4	6		M		614.6 **RESIDUAL** tan-gray, SILT (A-4)	12.0
										611.3 Boring Terminated at Elevation 611.3 ft in Residual (SILT)	15.3

Equivalent to NC159RPA_1796

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_3450	**STATION** 34+50	**OFFSET** 25 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Caved
COLLAR ELEV. 631.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 687,220	**EASTING** 1,767,643 / **24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/10/14	**COMP. DATE** 07/10/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
635										
	631.8	0.0								631.8 GROUND SURFACE 0.0
630			4	5	7	12		D		**ROADWAY EMBANKMENT** red-brown, silty CLAY with little fine sand (A-7)
	627.8	4.0								629.1 2.7
625			2	4	5	9	SS-505	44%		**RESIDUAL** red-brown, orange-brown, tan-brown, and mottled black, saprolitic, silty CLAY (A-7-6)
	622.8	9.0								
620			3	3	4	7		W		
	617.8	14.0								
			2	3	2	5		Sat.		616.3 Boring Terminated at Elevation 616.3 ft in Residual (silty CLAY) 15.5

Equivalent to NC159RPA_2046

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

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BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_3650	**STATION** 36+50	**OFFSET** 18 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 638.8 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 687,416	**EASTING** 1,767,680	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/11/14	**COMP. DATE** 07/11/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
640										638.8 GROUND SURFACE	0.0
										637.3 **ROADWAY EMBANKMENT** gray, GRAVEL with some sand (A-1-a) red-orange, silty CLAY (A-7)	1.5
635	635.2	3.6	3	4	5	9		M		633.3 **RESIDUAL** light orange-brown to tan-brown, saprolitic, fine sandy SILT with little clay and trace MnO (A-4)	5.5
630	630.2	8.6	2	3	5	8		M			
625	625.2	13.6	6	7	8	15		M		623.7 Boring Terminated at Elevation 623.7 ft in Residual (fine sandy SILT)	15.1

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_3850	**STATION** 38+50	**OFFSET** 15 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 640.4 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 687,612	**EASTING** 1,767,721	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/11/14	**COMP. DATE** 07/11/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
645										
										640.4 GROUND SURFACE 0.0
640	640.4	0.0	4	6	8	14		D		**ROADWAY EMBANKMENT** red-orange and orange-brown, silty CLAY with trace gravel (A-7)
	636.4	4.0								636.2 4.2
635			3	5	8	13		M		635.0 **RESIDUAL** red-brown, silty CLAY with little fine sand (A-7) 5.4
	631.4	9.0								orange-brown and tan-brown, saprolitic, fine sandy SILT with little clay and MnO (A-4)
630			2	3	5	8		M		
	626.4	14.0								
625			4	4	6	10		M		624.9 Boring Terminated at Elevation 624.9 ft in Residual (fine sandy SILT) 15.5

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_4060	**STATION** 40+60	**OFFSET** 13 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 637.4 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 687,817	**EASTING** 1,767,765 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/11/14	**COMP. DATE** 07/11/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
640											
	637.4	0.0								637.4 GROUND SURFACE	0.0
			3	7	10	17	SS-510	20%		**ROADWAY EMBANKMENT** tan-brown and orange-brown, silty CLAY with trace sand and gravel (A-7-5)	
635											
	633.6	3.8									
			3	7	6	13		M			
630										631.1	6.3
	628.6	8.8								**RESIDUAL** red-orange and orange-brown, fine sandy SILT with little clay and trace MnO (A-4)	
			4	6	9	15		M			
625											
	623.6	13.8									
			3	4	4	8		M		622.1	15.3
										Boring Terminated at Elevation 622.1 ft in Residual (fine sandy SILT)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_4200	**STATION** 42+00	**OFFSET** 10 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 636.1 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 687,955	**EASTING** 1,767,793 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/11/14	**COMP. DATE** 07/11/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
640											
										636.1 GROUND SURFACE	0.0
635										635.1 **ROADWAY EMBANKMENT** dark gray, GRAVEL with some sand (A-1-a)	1.0
	632.1	4.0								red-brown and tan-brown, silty CLAY with little fine sand and trace organics (A-7)	
			3	4	4	8		M			
630										629.6	6.5
	627.1	9.0								**RESIDUAL** red-orange and tan-brown, fine sandy SILT with little clay (A-4)	
			3	5	7	12		M			
625											
	622.1	14.0									
			3	3	4	7		M		620.6	15.5
										Boring Terminated at Elevation 620.6 ft in Residual (fine sandy SILT)	

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_4362	**STATION** 43+62	**OFFSET** 15 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Caved
COLLAR ELEV. 636.0 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 688,112	**EASTING** 1,767,833	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/11/14	**COMP. DATE** 07/11/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
640											
	636.0	0.0								636.0 GROUND SURFACE	0.0
635			3	5	7	12		D		**ROADWAY EMBANKMENT** red-brown, silty CLAY (A-7)	
	634.0	2.0								**RESIDUAL** red-orange and orange-brown, saprolitic, clayey SILT with little sand (A-5)	
	632.0	4.0	3	7	8	15		M			
630											
	627.0	9.0	2	4	5	9		W			
625											
	622.0	14.0	3	4	5	9		W		620.5	15.5

Boring Terminated at Elevation 620.5 ft in Residual (clayey SILT)

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_4600	**STATION** 46+00	**OFFSET** 30 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 629.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 688,353	**EASTING** 1,767,841	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/11/14	**COMP. DATE** 07/11/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
630										629.8 GROUND SURFACE 0.0
	625.8	4.0	2	3	5	8		M		**RESIDUAL** red-orange, orange-brown, and tan-brown, saprolitic, clayey SILT with little sand (A-5)
625										
	620.8	9.0	2	3	4	7		M		
620										
	615.8	14.0	4	6	8	14		M		614.3 15.5
615										

Boring Terminated at Elevation 614.3 ft in Residual (clayey SILT)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_4750	**STATION** 47+50	**OFFSET** 12 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 619.8 ft	**TOTAL DEPTH** 15.7 ft	**NORTHING** 688,494	**EASTING** 1,767,905 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/14/14	**COMP. DATE** 07/14/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
620										
	619.8	0.0	4	5	5	10	SS-516	16%		619.8 GROUND SURFACE 0.0
615	615.6	4.2	9	6	7	13		D		**ROADWAY EMBANKMENT** red-brown and tan-brown, silty CLAY with trace sand and gravel (A-7-5)
610	610.6	9.2	3	5	7	12	SS-518	33%		613.1 6.7 **RESIDUAL** red-orange, orange-brown, and tan-brown, clayey SILT with little sand (A-5)
605	605.6	14.2	2	3	3	6		W		604.1 15.7 Boring Terminated at Elevation 604.1 ft in Residual (clayey SILT)

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_5000	**STATION** 50+00	**OFFSET** 28 ft LT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 611.2 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 688,744	**EASTING** 1,767,874 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/14/14	**COMP. DATE** 07/14/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
615										
										611.2 GROUND SURFACE 0.0
610										**RESIDUAL** orange-brown, tan-brown, and light gray, fine sandy SILT with little clay (A-4)
	607.2	4.0	2	5	7	12		M		
605										
	602.2	9.0	4	4	5	9		M		
600										
	597.2	14.0	8	10	22	32		M		595.7 15.5 Boring Terminated at Elevation 595.7 ft in Residual (fine sandy SILT)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_5200	**STATION** 52+00	**OFFSET** 15 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Caved
COLLAR ELEV. 604.1 ft	**TOTAL DEPTH** 9.0 ft	**NORTHING** 688,945	**EASTING** 1,767,913	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/14/14	**COMP. DATE** 07/14/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
605											
	604.1	0.0	5	7	9	16		D		604.1 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT tan-brown and red-brown, silty CLAY with trace sand and gravel (A-7-5) 602.0	2.1
600	599.8	4.3	6	23	66	89		D		**RESIDUAL** orange-brown and light gray, saprolitic, silty fine SAND with trace gravel sized rock fragments (A-2-4) 597.3	6.8
	595.2	8.9	60/0.1			60/0.1				**WEATHERED ROCK** (Felsic Metavolcanic) 595.2	8.9
										CRYSTALLINE ROCK (Felsic Metavolcanic) 595.1	9.0
										Boring Terminated at Elevation 595.1 ft in Crystalline Rock (Felsic Metavolcanic)	
										Auger refusal at 8.9 ft.	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_5400	**STATION** 54+00	**OFFSET** 25 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 598.1 ft	**TOTAL DEPTH** 7.5 ft	**NORTHING** 689,144	**EASTING** 1,767,868	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/14/14	**COMP. DATE** 07/14/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
600										
										598.1 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT red-brown and brown, medium stiff to stiff, silty CLAY with little fine sand and trace gravel (A-7) 594.1 4.0
595										**WEATHERED ROCK** (Felsic Metavolcanic) 590.6 7.5
	590.6	7.5	60/0.0			60/0.0				**CRYSTALLINE ROCK** (Felsic Metavolcanic)
										Boring Terminated at Elevation 590.6 ft on Crystalline Rock (Felsic Metavolcanic)
										(ROCK SOUNDING)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_5470LT	**STATION** 54+70	**OFFSET** 22 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Caved
COLLAR ELEV. 598.8 ft	**TOTAL DEPTH** 6.1 ft	**NORTHING** 689,213	**EASTING** 1,767,868	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/14/14	**COMP. DATE** 07/14/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
600											
	598.8	0.0								598.8 GROUND SURFACE	0.0
			10	18	10	28		D		**RESIDUAL** tan-brown, saprolitic, silty fine SAND with trace gravel sized rock fragments (A-2-4)	2.0
595	594.8	4.0	84	16/0.0		100/0.5				**WEATHERED ROCK** (Felsic Metavolcanic)	
	592.7	6.1	60/0.0			60/0.0				592.7 **CRYSTALLINE ROCK** (Felsic Metavolcanic) Boring Terminated at Elevation 592.7 ft on Crystalline Rock (Felsic Metavolcanic)	6.1

Auger refusal at 6.1 ft.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_5470RT	**STATION** 54+70	**OFFSET** 12 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 597.1 ft	**TOTAL DEPTH** 7.3 ft	**NORTHING** 689,216	**EASTING** 1,767,902	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/14/14	**COMP. DATE** 07/14/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
600										
										597.1 GROUND SURFACE 0.0
595										**ROADWAY EMBANKMENT** red-brown and brown, medium stiff to stiff, silty CLAY with trace fine sand and gravel (A-7)
										592.1 5.0
										590.6 **RESIDUAL** orange-brown and tan-brown, very stiff to hard, fine sandy SILT with little clay (A-4) 6.5
590	589.8	7.3	60/0.0			60/0.0				589.8 7.3 **WEATHERED ROCK** (Felsic Metavolcanic) **CRYSTALLINE ROCK** (Felsic Metavolcanic) Boring Terminated at Elevation 589.8 ft on Crystalline Rock (Felsic Metavolcanic)

(ROCK SOUNDING)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_5570	**STATION** 55+70	**OFFSET** 20 ft LT	**ALIGNMENT** -Y9-
COLLAR ELEV. 598.5 ft	**TOTAL DEPTH** 10.2 ft	**NORTHING** 689,312	**EASTING** 1,767,861
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/15/14	**COMP. DATE** 07/15/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
600											
										598.5 GROUND SURFACE	0.0
										RESIDUAL tan-brown and orange-brown, stiff to hard, fine sandy SILT with little clay (A-4)	
595											
										593.0	5.5
										WEATHERED ROCK (Felsic Metavolcanic)	
590											
	588.3	10.2	60/0.0			60/0.0				588.3	10.2
										CRYSTALLINE ROCK (Felsic Metavolcanic) Boring Terminated at Elevation 588.3 ft on Crystalline Rock (Felsic Metavolcanic)	
										(ROCK SOUNDING)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_5690	**STATION** 56+90	**OFFSET** 18 ft RT	**ALIGNMENT** -Y9-
COLLAR ELEV. 600.0 ft	**TOTAL DEPTH** 14.8 ft	**NORTHING** 689,436	**EASTING** 1,767,881
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/15/14	**COMP. DATE** 07/15/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
600										
	600.0	0.0	6	10	15	25		D		600.0 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT red-brown and tan-brown, silty CLAY with trace gravel (A-7-5)
	596.0	4.0								598.0 2.0
595			3	8	13	21	SS-522	14%		**RESIDUAL** orange-brown and tan-brown, saprolitic, fine sandy SILT with little clay and gravel sized rock fragments (A-4)
	591.0	9.0								
590			20	19	38	57		M		
	586.0	14.0								588.5 11.5
			30	70/0.3		100/0.8				**WEATHERED ROCK** (Felsic Metavolcanic)
										585.2 14.8
										Boring Terminated at Elevation 585.2 ft in Weathered Rock (Felsic Metavolcanic)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_5800	**STATION** 58+00	**OFFSET** 20 ft LT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 596.6 ft	**TOTAL DEPTH** 20.5 ft	**NORTHING** 689,536	**EASTING** 1,767,821 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/15/14	**COMP. DATE** 07/15/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
600											
	596.6	0.0								596.6 GROUND SURFACE	0.0
595			2	1	3	4		M		595.5 **ROADWAY EMBANKMENT** red-brown, silty CLAY with trace organics and gravel (A-7)	1.1
	592.6	4.0								**RESIDUAL** orange-brown and tan-brown, saprolitic, silty CLAY with trace MnO (A-7-6)	
590			3	1	1	2	SS-525	60%			
	587.6	9.0									
585			4	4	3	7		W			
	582.6	14.0									
580			WOH	1	2	3		Sat.			
	577.6	19.0									
			1	1	3	4		Sat.		576.1 Boring Terminated at Elevation 576.1 ft in Residual (silty CLAY)	20.5

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_6000	**STATION** 60+00	**OFFSET** 20 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 590.3 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 689,739	**EASTING** 1,767,807 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/15/14	**COMP. DATE** 07/15/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
595										
590										590.3 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT red-brown and orange-brown, silty CLAY with little fine sand, trace gravel and organics (A-7)
	586.3	4.0								
585			3	4	7	11		M		583.8 6.5
										RESIDUAL orange-brown, tan-brown, and gray, saprolitic, fine sandy SILT with little clay (A-4)
	581.3	9.0								
580			2	3	4	7		M		
	576.3	14.0								
575			2	4	5	9		W		574.8 15.5
										Boring Terminated at Elevation 574.8 ft in Residual (fine sandy SILT)
										Encountered small boulder in Roadway Embankment Fill at 6.5 feet.

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_6155	**STATION** 61+55	**OFFSET** 17 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 586.3 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 689,887	**EASTING** 1,767,762	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/15/14	**COMP. DATE** 07/15/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
590											
										586.3 GROUND SURFACE	0.0
585										**ROADWAY EMBANKMENT** red-brown, silty CLAY with little sand and gravel, trace asphalt chunks (A-7)	
	582.5	3.8	9	2	2	4		M			
580										579.3	7.0
	577.5	8.8	4	3	2	5		Sat.		**ALLUVIAL** gray to dark-gray, sandy CLAY with trace organics (A-6)	
575										575.0	11.3
	572.5	13.8	5	8	14	22		M		gray, fine to coarse SAND with some gravel (A-1-b) 572.0	14.3
										571.0 **RESIDUAL** light green-gray, saprolitic, fine sandy SILT with little clay (A-4)	15.3
										Boring Terminated at Elevation 571.0 ft in Residual (fine sandy SILT)	
										Alluvial/Residual contact observed in split spoon at 14.3 ft.	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_6400	**STATION** 64+00	**OFFSET** 15 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 587.5 ft	**TOTAL DEPTH** 20.2 ft	**NORTHING** 690,123	**EASTING** 1,767,694	**24 HR.** 10.5
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/15/14	**COMP. DATE** 07/15/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
590										
										587.5 GROUND SURFACE 0.0
585										**ROADWAY EMBANKMENT** red-brown, brown, and brown-gray, silty CLAY with little sand and trace gravel (A-7)
	583.8	3.7	3	4	2	6		M		
580	578.8	8.7	3	5	8	13		M		576.3 11.2
575	573.8	13.7	2	1	3	4	SS-529	39%		**RESIDUAL** brown-gray, brown, and tan-brown, saprolitic, clayey SILT with little fine sand (A-5)
570	568.8	18.7	3	3	16	19		W		567.3 20.2
										Boring Terminated at Elevation 567.3 ft in Residual (clayey SILT)
										Weathered Rock Seam 12.4-12.8 feet.

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_6600	**STATION** 66+00	**OFFSET** 30 ft LT	**ALIGNMENT** -Y9-	**0 HR.** 12.5
COLLAR ELEV. 583.7 ft	**TOTAL DEPTH** 19.4 ft	**NORTHING** 690,300	**EASTING** 1,767,593	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/16/14	**COMP. DATE** 07/16/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
585											
	583.7	0.0	2	4	5	9		M		583.7 GROUND SURFACE	0.0
580	579.9	3.8	3	6	5	11		W		**RESIDUAL** orange-brown and tan-brown, fine sandy SILT with little clay (A-4) 581.8	1.9
										orange-brown, tan-brown, and gray, saprolitic, silty SAND with little gravel sized rock fragments (A-2-4) 577.4	6.3
575	574.9	8.8	3	4	6	10	SS-533	23%		gray, saprolitic, sandy SILT with little clay (A-4) 572.4	11.3
570	569.9	13.8	9	9	32	41		M		gray and orange-brown, saprolitic, silty SAND (A-2-4) 567.4	16.3
565	564.9	18.8	88	12/0.1		100/0.6				**WEATHERED ROCK** (Felsic Metavolcanic) 564.3	19.4
										Boring Terminated at Elevation 564.3 ft in Weathered Rock (Felsic Metavolcanic)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_6800	**STATION** 68+00	**OFFSET** CL	**ALIGNMENT** -Y9-	**0 HR.** 8.2
COLLAR ELEV. 588.2 ft	**TOTAL DEPTH** 15.8 ft	**NORTHING** 690,496	**EASTING** 1,767,548	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/16/14	**COMP. DATE** 07/16/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
590										
	588.2	0.0	3	5	8	13		D		588.2 GROUND SURFACE 0.0
585	583.9	4.3	2	4	6	10		M		**RESIDUAL** red-brown, orange-brown, and brown, saprolitic, silty CLAY with little fine sand (A-7-5)
580	578.9	9.3	WOH	1	1	2	SS-537	63%		576.4 11.8
575	573.9	14.3	1	4	5	9		Sat.		brown, saprolitic, sandy SILT with little clay (A-4) 572.4 15.8
										Boring Terminated at Elevation 572.4 ft in Residual (sandy SILT)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_7000	**STATION** 70+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 587.8 ft	**TOTAL DEPTH** 10.7 ft	**NORTHING** 690,673	**EASTING** 1,767,456
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/16/14	**COMP. DATE** 07/16/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
590											
	587.8	0.0								587.8 GROUND SURFACE	0.0
			3	5	6	11		D		**RESIDUAL** orange-brown, silty CLAY with little fine sand (A-7)	
585										585.7	2.1
	583.6	4.2								red-brown, saprolitic, silty SAND with trace gravel sized rock fragments (A-2-4)	
			9	11	12	23		M			
580											
	578.6	9.2									
			10	11	100/0.3	100/0.3				577.6	10.2
	577.1	10.7	60/0.0			60/0.0				577.1 **WEATHERED ROCK** (Felsic Metavolcanic)	10.7
										CRYSTALLINE ROCK (Felsic Metavolcanic)	

Boring Terminated at Elevation 577.1 ft on Crystalline Rock (Felsic Metavolcanic)

Auger Refusal at 10.7 ft. Felsic Metavolcanic float boulders observed near boring location.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_7200	**STATION** 72+00	**OFFSET** 20 ft LT	**ALIGNMENT** -Y9-
COLLAR ELEV. 588.9 ft	**TOTAL DEPTH** 7.5 ft	**NORTHING** 690,829	**EASTING** 1,767,330
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/16/14	**COMP. DATE** 07/16/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Caved
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
590										
	588.9	0.0								588.9 GROUND SURFACE 0.0
			1	5	6	11		D		**RESIDUAL** brown and red-brown, silty CLAY with little fine sand (A-7)
585										
	584.6	4.3								
			5	5	8	13		D		582.8 6.1
	581.5	7.4								581.5 **WEATHERED ROCK** (Felsic Metavolcanic) 7.4
			60/0.1			60/0.1				581.4 7.5
										CRYSTALLINE ROCK (Felsic Metavolcanic)

Boring Terminated at Elevation 581.4 ft in Crysalline Rock (Felsic Metavolcanic)

Auger Refusal at 7.4 ft.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_7510	**STATION** 75+10	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 612.3 ft	**TOTAL DEPTH** 29.1 ft	**NORTHING** 691,076	**EASTING** 1,767,145
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/16/14	**COMP. DATE** 07/16/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 25 50 75 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
615										
	612.3	0.0								612.3 GROUND SURFACE 0.0
			3	5	7	12		D		**ARTIFICIAL FILL** red-brown, silty CLAY with little fine sand and gravel (A-7)
610	608.5	3.8	10	11	14	25		D		
605										606.0 6.3 **RESIDUAL** orange-brown, red-brown, and tan-brown, saprolitic, fine sandy SILT (A-4)
	603.5	8.8	5	5	6	11		M		
600										
	598.5	13.8	5	8	13	21		M		
595										596.0 16.3 **WEATHERED ROCK** (Felsic Metavolcanic)
	593.5	18.8	5	34	66/0.3	100/0.8				
590										
	588.5	23.8	70	30/0.1		100/0.6				
585										
	583.5	28.8	100/0.3			100/0.3				583.2 29.1

Boring Terminated at Elevation 583.2 ft in Weathered Rock (Felsic Metavolcanic)

Artificial fill is believed to be associated with house/lot construction.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_7668	**STATION** 76+68	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 622.7 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 691,184	**EASTING** 1,767,030
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/17/14	**COMP. DATE** 07/17/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 25 50 75 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
625										
	622.7	0.0								622.7 GROUND SURFACE 0.0
			3	5	7	12	SS-546	29%		**RESIDUAL** red-brown, silty CLAY with trace fine sand (A-7-5)
620	619.1	3.6	4	6	6	12		M		618.7 4.0 orange-brown, red-brown, and tan-brown, saprolitic, fine sandy SILT with little clay and trace MnO (A-4)
615	614.1	8.6	3	3	5	8		M		
610	609.1	13.6	4	4	7	11		M		607.6 15.1 Boring Terminated at Elevation 607.6 ft in Residual (fine sandy SILT)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_7800	**STATION** 78+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 621.8 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 691,266	**EASTING** 1,766,927
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/17/14	**COMP. DATE** 07/17/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
625											
	621.8	0.0								621.8 GROUND SURFACE	0.0
620			3	6	5	11		D		**RESIDUAL** red-brown, red-orange, and orange-brown, saprolitic, silty CLAY with little fine sand (A-7)	
	618.3	3.5	3	6	7	13		M			
615											
	613.3	8.5	3	5	6	11		M			
610											
	608.3	13.5	4	5	7	12		M		606.8	15.0

Boring Terminated at Elevation 606.8 ft in Residual (silty CLAY)

FIAD due to location in active cow pasture.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_8045	**STATION** 80+45	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 616.0 ft	**TOTAL DEPTH** 16.1 ft	**NORTHING** 691,401	**EASTING** 1,766,722
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/17/14	**COMP. DATE** 07/17/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
620										
	616.0	0.0								616.0 GROUND SURFACE 0.0
615			6	6	7	13		M		**RESIDUAL** red-brown and orange-brown, silty CLAY with little fine sand and trace gravel sized quartz fragments (A-7)
	612.4	3.6	4	6	8	14		M		
610										
	607.4	8.6	4	5	7	12		M		
605										
	602.4	13.6	3	5	11	16		M		
600	599.9	16.1	60/0.0			60/0.0				599.9 16.1

CRYSTALLINE ROCK
(Felsic Metavolcanic)
Boring Terminated at Elevation 599.9 ft on Crystalline Rock (Felsic Metavolcanic)

Very sharp Residual/Crystalline Rock contact, no Weathered Rock observed. Auger Refusal at 16.1 ft. Boring FIAD due to location in active cow pasture.

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_8245	**STATION** 82+45	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 631.0 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 691,491	**EASTING** 1,766,544
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/17/14	**COMP. DATE** 07/17/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
635											
	631.0	0.0								631.0 GROUND SURFACE	0.0
630			2	3	5	8		D		**RESIDUAL** orange-brown, red-brown, tan-brown, and gray, saprolitic, silty CLAY with little fine sand and trace MnO (A-7)	
	627.0	4.0									
625			4	7	7	14		M			
	622.0	9.0									
620			4	8	12	20		M			
	617.0	14.0									
			2	5	7	12		M		615.5 Boring Terminated at Elevation 615.5 ft in Residual (silty CLAY)	15.5

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_8400	**STATION** 84+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 631.3 ft	**TOTAL DEPTH** 25.6 ft	**NORTHING** 691,550	**EASTING** 1,766,400
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/18/14	**COMP. DATE** 07/18/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
635										
	631.3	0.0								631.3 GROUND SURFACE 0.0
630			2	4	5	9		D		**RESIDUAL** red-brown and orange-brown, silty CLAY with little fine sand (A-7)
	627.2	4.1								
625			2	4	5	9		M		624.7 6.6
	622.2	9.1								orange-brown and red-brown, saprolitic, fine sandy SILT with little clay and trace MnO (A-4)
620			3	5	8	13		M		
	617.2	14.1								
615			3	7	7	14		M		614.7 16.6
	612.2	19.1								tan-brown and light gray, saprolitic, silty CLAY with little fine sand (A-7)
610			6	9	11	20		M		609.7 21.6
	607.2	24.1								light gray, saprolitic, fine sandy SILT with little clay (A-4)
			3	21	26	47		M		605.7 25.6 Boring Terminated at Elevation 605.7 ft in Residual (fine sandy SILT)

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_8600	**STATION** 86+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 643.5 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 691,623	**EASTING** 1,766,214
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/23/14	**COMP. DATE** 07/23/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
645											
										643.5 GROUND SURFACE	0.0
640										**RESIDUAL** Orange-brown, saprolitic, clayey SILT (A-5)	
	639.5	4.0	3	6	7	13		D			
635	634.5	9.0	3	4	7	11		D			
630	629.5	14.0	7	7	9	16		D			
										628.0 Boring Terminated at Elevation 628.0 ft In Residual clayey SILT (A-5)	15.5

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_8800	**STATION** 88+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 630.0 ft	**TOTAL DEPTH** 35.3 ft	**NORTHING** 691,696	**EASTING** 1,766,028
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/23/14	**COMP. DATE** 07/23/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
630										630.0 GROUND SURFACE	0.0
										RESIDUAL orange-brown, silty CLAY (A-7-5)	
625	626.2	3.8	3	3	6	9		M			
										622.0 tan, sandy SILT (A-4)	8.0
620	621.2	8.8	3	7	11	18	SS-102	25%			
										617.0 gray-brown, saprolitic, silty SAND (A-2-4)	13.0
615	616.2	13.8	2	5	10	15		D			
										611.6 tan to gray-brown, saprolitic, SILT (A-5)	18.4
610	611.2	18.8	2	6	8	14		M			
605	606.2	23.8	2	5	9	14		M			
600	601.2	28.8	11	6	8	14		M			
595	596.2	33.8	2	5	17	22		M		594.7 Boring Terminated at Elevation 594.7 ft In Residual clayey SILT (A-5)	35.3

Driller indicates harder drilling at 25.9'

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_9000	**STATION** 90+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 643.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 691,769	**EASTING** 1,765,842
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/23/14	**COMP. DATE** 07/23/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
645											
										643.4 GROUND SURFACE	0.0
640	639.9	3.5	6	7	12	19		D		**RESIDUAL** red-brown, silty CLAY (A-5)	
635	634.9	8.5	6	9	11	20	SS-106	21%		635.9 red-brown, saprolitic, clayey SILT (A-5)	7.5
630	629.9	13.5	5	6	8	14		D			
625	624.9	18.5	7	25	18	43		D		623.4 Boring Terminated at Elevation 623.4 ft In Residual clayey SILT (A-5)	20.0

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_9137	**STATION** 91+37	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 640.2 ft	**TOTAL DEPTH** 30.7 ft	**NORTHING** 691,820	**EASTING** 1,765,714
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/23/14	**COMP. DATE** 07/23/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
645										
640										640.2 GROUND SURFACE 0.0
										RESIDUAL orange-brown, silty CLAY (A-7-5)
635	636.0	4.2	4	6	8	14		M		632.2 red-gray, clayey SILT (A-5) 8.0
630	631.0	9.2	6	8	12	20		D		
625	626.0	14.2	6	19	32	51		D		626.7 tan and gray-brown, f. sandy SILT (A-4) 13.5
620	621.0	19.2	6	8	12	20		D		
615	616.0	24.2	6	9	14	23		D		
610	611.0	29.2	2	8	11	19		D		609.5 Boring Terminated at Elevation 609.5 ft In Residual f. sandy SILT (A-4) 30.7

(Equivalent boring for -Y10- 94+30 CL)

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_9400	**STATION** 94+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 625.0 ft	**TOTAL DEPTH** 26.3 ft	**NORTHING** 691,916	**EASTING** 1,765,469
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/24/14	**COMP. DATE** 07/24/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
625										625.0 GROUND SURFACE 0.0
										RESIDUAL orange-brown, silty CLAY (A-7-5)
620	621.0	4.0	5	7	8	15		M		
										618.0 7.0 orange-brown, saprolitic, silty SAND (A-2-4)
615	616.0	9.0	4	14	12	26		D		
										612.0 13.0 tan-brown, saprolitic, f. sandy SILT (A-4)
610	611.0	14.0	3	7	9	16		D		
605	606.0	19.0	3	3	5	8		M		
										602.0 23.0 **WEATHERED ROCK** (meta-volcanic)
600	601.0	24.0	37	73/0.3		100/0.8				
	598.8	26.2	60/0.1			60/0.1				598.8 26.2 / 598.7 26.3 **CRYSTALLINE ROCK** (meta-volcanic)

Boring Terminated with Standard Penetration Test Refusal at Elevation 598.7 ft In Crystalline Rock (meta-volcanic)

Auger refusal at 26.2'

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_9600	**STATION** 96+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 617.3 ft	**TOTAL DEPTH** 7.4 ft	**NORTHING** 691,989	**EASTING** 1,765,283
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/25/14	**COMP. DATE** 07/25/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
620										617.3 GROUND SURFACE 0.0
										RESIDUAL brown, saprolitic, f. sandy, silty CLAY (A-7-6)
615	613.3	4.0	3	4	5	9	SS-114	32%		
610	610.0	7.3	60/0.1			60/0.1				610.3 7.0 / 609.9 7.4 **CRYSTALLINE ROCK** (meta-volcanic)

Boring Terminated with Standard Penetration Test Refusal at Elevation 609.9 ft In Crystalline Rock (meta-volcanic)

Harder drilling (grinding) at 7.0'

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_9600LT	**STATION** 96+00	**OFFSET** 50 ft LT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 616.1 ft	**TOTAL DEPTH** 7.5 ft	**NORTHING** 691,942	**EASTING** 1,765,265 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/25/14	**COMP. DATE** 07/25/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
620											
										616.1 GROUND SURFACE	0.0
615										**RESIDUAL** brown, saprolitic, f. sandy, silty CLAY (A-7-6)	
	612.1	4.0	3	7	8	15		M			
610										609.0	7.1
	608.7	7.4	60/0.1			60/0.1				608.6 **CRYSTALLINE ROCK** (meta-volcanic)	7.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 608.6 ft In Crystalline Rock (meta-volcanic)	
										Very hard drilling (griding) at 7.1'	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_9800	**STATION** 98+00	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 635.6 ft	**TOTAL DEPTH** 15.8 ft	**NORTHING** 692,062	**EASTING** 1,765,097 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/25/14	**COMP. DATE** 07/25/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
640										
										635.6 GROUND SURFACE 0.0
635										**RESIDUAL** tan-brown, saprolitic, f. sandy SILT (A-4)
	631.9	3.7	4	5	6	11		M		
630										
	626.9	8.7	6	12	14	26	SS-116	15%		
625										622.1 13.5
	621.9	13.7	20	55	45/0.4	100/0.9				**WEATHERED ROCK** (meta-volcanic)
620	619.8	15.8	60/0.0							620.1 15.5 **CRYSTALLINE ROCK** (meta-volcanic)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 619.8 ft In Crystalline Rock (meta-volcanic)
										Hard drilling (grinding) at 15.5'

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10000	**STATION** 100+00	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 643.9 ft	**TOTAL DEPTH** 27.3 ft	**NORTHING** 692,135	**EASTING** 1,764,911 / **24 HR.** 18.4
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/28/14	**COMP. DATE** 07/28/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
645										643.9 GROUND SURFACE	0.0
640	639.9	4.0	3	7	10	17		M		**RESIDUAL** red-brown, to tan and gray-brown, saprolitic, f. sandy SILT (A-4)	
635	634.9	9.0	4	4	6	10		M			
630	629.9	14.0	2	4	5	9	SS-117	28%			
625	624.9	19.0	2	6	9	15		M			
620	619.9	24.0	100/0.4			100/0.4				619.7 **WEATHERED ROCK** (meta-volcanic)	24.2
	616.7	27.2	60/0.1			60/0.1				616.7 **CRYSTALLINE ROCK** (meta-volcanic) 616.6	27.2 27.3

Boring Terminated with Standard Penetration Test Refusal at Elevation 616.6 ft In Crystalline Rock (meta-volcanic)

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10200	**STATION** 102+00	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 676.6 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 692,208	**EASTING** 1,764,725 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/28/14	**COMP. DATE** 07/28/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
680										676.6 GROUND SURFACE 0.0
675	673.1	3.5	3	4	10	14		M		**RESIDUAL** red-brown, f. sandy, silty CLAY (A-7-6)
670	668.1	8.5	2	2	4	6		M		
665	663.1	13.5	3	4	7	11		M		665.1 tan, f. sandy SILT (A-4) 11.5
660	658.1	18.5	6	11	25	36		M		660.1 tan-brown, silty f. SAND (A-2-4) 16.5
										656.6 20.0

Boring Terminated at Elevation 656.6 ft In Residual silty f. SAND (A-2-4)

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y9.GPJ NC_DOT.GDT 9/16/14

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10350	**STATION** 103+50	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 702.2 ft	**TOTAL DEPTH** 7.2 ft	**NORTHING** 692,263	**EASTING** 1,764,585
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/29/14	**COMP. DATE** 07/29/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
705											
										702.2 GROUND SURFACE	0.0
700										**RESIDUAL** tan to orange-brown, med. dense to dense, silty f. SAND (A-2-4) w/ CR cobbles	
	696.9	5.3								696.9	5.3
695	695.1	7.1	70	30/0.2		100/0.7				**WEATHERED ROCK** (meta-volcanic) 695.1	7.1
			60/0.1			60/0.1				695.0 **CRYSTALLINE ROCK** (meta-volcanic)	7.2

Boring Terminated with Standard Penetration Test Refusal at Elevation 695.0 ft In Crystalline Rock (meta-volcanic)

(ROCK SOUNDING)
Grinding (but progressing) at 5.3' (WR)
Auger refusal at 7.1'

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10400	**STATION** 104+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 712.7 ft	**TOTAL DEPTH** 11.7 ft	**NORTHING** 692,281	**EASTING** 1,764,539
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/28/14	**COMP. DATE** 07/28/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
715										
										712.7 GROUND SURFACE 0.0
710										**RESIDUAL** tan to orange, silty f. SAND (A-2-4)
	708.7	4.0	6	8	9	17		D		
705	703.7	9.0	14	27	32	59		D		702.0 10.7
	701.1	11.6	60/0.1			60/0.1				701.1 11.6 **WEATHERED ROCK** (meta-volcanic) 701.0 11.7 **CRYSTALLINE ROCK** (meta-volcanic)

Boring Terminated with Standard Penetration Test Refusal at Elevation 701.0 ft In Crystalline Rock (meta-volcanic)

Hard/slow drilling at 10.7' (WR)
Auger refusal at 11.6' (CR)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_10400LT	**STATION** 104+00	**OFFSET** 50 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 715.8 ft	**TOTAL DEPTH** 12.1 ft	**NORTHING** 692,234	**EASTING** 1,764,520	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/29/14	**COMP. DATE** 07/29/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
720											
										715.8 GROUND SURFACE	0.0
715										**RESIDUAL** tan-brown, med. dense to dense, silty f. SAND (A-2-4) w/ CR cobbles	
710										708.3	7.5
										WEATHERED ROCK (meta-volcancic) 705.6	10.2
705										**CRYSTALLINE ROCK** (meta-volcancic) 703.7	12.1
	703.8	12.0	60/0.1			60/0.1				Boring Terminated with Standard Penetration Test Refusal at Elevation 703.7 ft In Crystalline Rock (meta-volcanic)	
										(ROCK SOUNDING) Very slow drilling at 7.5' (WR) Grinding at 10.2' (CR)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_10400RT	**STATION** 104+00	**OFFSET** 50 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 707.6 ft	**TOTAL DEPTH** 5.3 ft	**NORTHING** 692,327	**EASTING** 1,764,557	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/29/14	**COMP. DATE** 07/29/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
710										
										707.6 GROUND SURFACE 0.0
705										**RESIDUAL** tan, med. dense, silty f. SAND (A-2-4) w/ CR cobbles
	702.4	5.2	60/0.0			60/0.0				702.4 5.2
										CRYSTALLINE ROCK (meta-volcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 702.3 ft On Crystalline Rock (meta-volcanic)
										(ROCK SOUNDING) Grinding/hard drilling at 5.2' (CR) Auger refusal at 5.3'

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10450	**STATION** 104+50	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 721.5 ft	**TOTAL DEPTH** 14.1 ft	**NORTHING** 692,299	**EASTING** 1,764,492 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/28/14	**COMP. DATE** 07/28/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
725										
										721.5 GROUND SURFACE 0.0
720										**RESIDUAL** tan-orange and gray-tan, med. dense to v. dense, silty f. SAND (A-2-4)
715										
										711.3 10.2
710										**WEATHERED ROCK** (meta-volcanic)
	707.4	14.1	60/0.0			60/0.0				707.4 14.1
										CRYSTALLINE ROCK (meta-volcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 707.4 ft In Crystalline Rock (meta-volcanic) (ROCK SOUNDING) Hard drilling at 10.2' (WR) Grinding at 14.1' (CR)

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10550	**STATION** 105+50	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 738.4 ft	**TOTAL DEPTH** 44.1 ft	**NORTHING** 692,336	**EASTING** 1,764,399 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/29/14	**COMP. DATE** 07/29/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
740										
										738.4 GROUND SURFACE 0.0
735										**RESIDUAL** orange-tan, v. stiff, moist to dry, silty CLAY (A-7-6)
730										
										729.4 9.0
										tan, v. stiff, dry, f. sandy SILT (A-4)
725										724.9 13.5
										WEATHERED ROCK (meta-volcanic)
										722.9 15.5
720										**RESIDUAL** tan-brown, v. stiff to hard, dry, f. sandy SILT (A-4)
715										
710										
705										
700										
695										695.4 43.0
	694.4	44.0	60/0.1			60/0.1				694.3 44.1
										CRYSTALLINE ROCK (meta-volcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 694.3 ft In Crystalline Rock (meta-volcanic) (ROCK SOUNDING) Hard drilling at 13.5' (WR) Softer drilling at 15.5' (RES) Grinding at 43.0' (CR)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10600	**STATION** 106+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 747.4 ft	**TOTAL DEPTH** 56.1 ft	**NORTHING** 692,354	**EASTING** 1,764,352
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/29/14	**COMP. DATE** 07/29/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
750											
										747.4 GROUND SURFACE	0.0
745										**RESIDUAL** orange-tan, silty CLAY (A-7-6)	
	743.0	4.4	6	7	8	15	SS-122	15%			
740										739.4 tan, saprolitic, f. sandy SILT (A-4)	8.0
	738.0	9.4	2	3	4	7	SS-123	12%			
735											
	733.0	14.4	2	4	5	9		D			
730											
725											
720											
	718.0	29.4	4	8	11	19	SS-124	13%			
715											
	713.0	34.4	6	10	14	24		D			
710											
	708.0	39.4	8	11	23	34		D			
705											
	703.0	44.4	9	22	78/0.3	100/0.8				703.4 **WEATHERED ROCK** (meta-volcanic)	44.0
700											
	698.0	49.4	54	29	23	52	SS-125	13%		698.0 **RESIDUAL** gray, saprolitic, f. sandy SILT (A-4)	49.4
695										695.4 **WEATHERED ROCK** (meta-volcanic)	52.0
	693.0	54.4	100/0.3			100/0.3					
	691.4	56.0	60/0.1			60/0.1				691.4 691.3 **CRYSTALLINE ROCK** (meta-volcanic)	56.0 56.1

Boring Terminated with Standard Penetration Test Refusal at Elevation 691.3 ft In Crystalline Rock (meta-volcanic)

(*Note: SPT drives at 19.4' and 24.4' not performed due to issue w/ SPT hammer. Driller helper was sent to get part and SPT resumed at 29.4')

Hard drilling/grinding at 52.0' (WR)
Auger refusal at 56.0'

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10600LT	**STATION** 106+00	**OFFSET** 50 ft LT	**ALIGNMENT** -Y9-
COLLAR ELEV. 749.3 ft	**TOTAL DEPTH** 43.6 ft	**NORTHING** 692,307	**EASTING** 1,764,334
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/30/14	**COMP. DATE** 07/30/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
750										749.3 GROUND SURFACE 0.0
745										**RESIDUAL** orange-brown, stiff, dry, silty CLAY (A-7-6)
740										738.3 tan, stiff to v. stiff, dry, f. sandy SILT (A-4) 11.0
735										
730										
725										
720										
715										
710										
	705.8	43.5	60/0.1			60/0.1				706.8 705.7 **CRYSTALLINE ROCK** (meta-volcanic) 42.5 43.6

Boring Terminated with Standard Penetration Test Refusal at Elevation 705.7 ft In Crystalline Rock (meta-volcanic)

(ROCK SOUNDING)
Hard drilling at 42.5' (CR)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_10600RT	**STATION** 106+00	**OFFSET** 50 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 743.8 ft	**TOTAL DEPTH** 18.8 ft	**NORTHING** 692,401	**EASTING** 1,764,371	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 08/12/14	**COMP. DATE** 08/12/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
745										743.8 GROUND SURFACE	0.0
740										**RESIDUAL** orange-brown, med. stiff to v. stiff, f. sandy SILT (A-4)	
735											
730											
725	725.0	18.8	60/0.0			60/0.0				725.3 / 725.0 **CRYSTALLINE ROCK** (meta-volcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 725.0 ft In Crystalline Rock (meta-volcanic) (ROCK SOUNDING) Harder at 18.5' (CR)	18.5 / 18.8

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_10650	**STATION** 106+50	**OFFSET** CL	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 753.4 ft	**TOTAL DEPTH** 13.6 ft	**NORTHING** 692,372	**EASTING** 1,764,306	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 08/12/14	**COMP. DATE** 08/12/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
755										753.4 GROUND SURFACE 0.0
750										**RESIDUAL** orange-brown, med. stiff, moist, f. sandy SILT (A-4)
745										
740	739.8	13.6	60/0.0			60/0.0				741.3 / 12.1 **WEATHERED ROCK** (meta-volcanic) 739.8 / 13.6 **CRYSTALLINE ROCK** (meta-volcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 739.8 ft On Crystalline Rock (meta-volcanic) (ROCK SOUNDING) Hard drilling at 12.1' (WR) Grinding at 13.6' (CR)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10700	**STATION** 107+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 758.0 ft	**TOTAL DEPTH** 53.3 ft	**NORTHING** 692,391	**EASTING** 1,764,259
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/27/14	**COMP. DATE** 08/27/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
760											
										758.0 GROUND SURFACE	0.0
755										**RESIDUAL** Red to orange-brown, saprolitic, silty CLAY (A-7-6)	
	754.0	4.0	5	7	10	17		M			
750											
	749.0	9.0	3	5	5	10		M			
745											
	744.0	14.0	4	5	6	11		M			
740											
	739.0	19.0	4	5	7	12		M			
735											
	734.0	24.0	4	6	9	15		M			
730											
	729.0	29.0	6	10	10	20		M			
725											
	724.0	34.0	6	8	8	16		M			
720											
	719.0	39.0	3	11	15	26		M			
715											
	714.0	44.0	8	18	100/0.4	100/0.4				713.0	45.0
										WEATHERED ROCK (felsic meta-volcanic)	
710										711.0	47.0
	709.0	49.0	19	28	44	72		M		**RESIDUAL** Orange-brown and light gray, saprolitic, f. sandy SILT (A-4) w/ little rock fragments	
705											
	704.8	53.2	60/0.1			60/0.1				705.3	52.7
										704.8	53.2
										WEATHERED ROCK (felsic meta-volcanic)	
										704.7	53.3
										CRYSTALLINE ROCK (felsic meta-volcanic)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 704.7 ft In Crystalline Rock (felsic meta-volcanic)	
										WR seam 11.6' - 12.5' Auger Refusal at 53.2'	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10750	**STATION** 107+50	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 762.7 ft	**TOTAL DEPTH** 4.0 ft	**NORTHING** 692,409	**EASTING** 1,764,213
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/14/14	**COMP. DATE** 08/14/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
765										
										762.7 GROUND SURFACE 0.0
760										**RESIDUAL** orange-brown, med. stiff to hard, moist, silty CLAY (A-7-6) 759.7 3.0
	758.7	4.0	60/0.0			60/0.0				758.7 4.0
										WEATHERED ROCK (meta-volcanic)
										CRYSTALLINE ROCK (meta-volcanic)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 758.7 ft On Crystalline Rock (felsic meta-volcanic)
										(ROCK SOUNDING) Auger refusal at 4.0'
										Numerous felsic metavolcanic boulders around boring. Boring was offset 3 times, all with refusal at approx. 4 ft.

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10800	**STATION** 108+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 765.5 ft	**TOTAL DEPTH** 24.0 ft	**NORTHING** 692,427	**EASTING** 1,764,166
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/12/14	**COMP. DATE** 08/12/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
770											
765										765.5 GROUND SURFACE	0.0
										RESIDUAL orange-tan to light gray, saprolitic, f. sandy SILT (A-4)	
760	761.6	3.9	5	8	8	16		D			
755	756.6	8.9	5	7	7	14		M			
750	751.6	13.9	7	8	13	21		D			
745	746.6	18.9	6	17	40	57		D			
	741.6	23.9	60/0.1			60/0.1				742.9	22.6
										741.5 **CRYSTALLINE ROCK** (meta-volcanic)	24.0
										Boring Terminated with Standard Penetration Test Refusal at Elevation 741.5 ft In Crystalline Rock (meta-volcanic)	
										Slow drilling (grinding) at 22.6' (CR)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10800LT	**STATION** 108+00	**OFFSET** 50 ft LT	**ALIGNMENT** -Y9-
COLLAR ELEV. 770.9 ft	**TOTAL DEPTH** 29.9 ft	**NORTHING** 692,381	**EASTING** 1,764,148
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/14/14	**COMP. DATE** 08/14/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft): 0 HR. Dry; 24 HR. Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
775										
770										770.9 GROUND SURFACE 0.0
										RESIDUAL orange-brown, med. stiff to v. stiff, moist, silty CLAY (A-7-6)
765										761.9 9.0
760										light to tan-brown, stiff to hard, moist, f. sandy SILT (A-4) w/ trace clay
755										
750										748.9 22.0
745										**WEATHERED ROCK** (meta-volcanic)
	741.0	29.9	60/0.0			60/0.0				741.0 29.9
										CRYSTALLINE ROCK (meta-volcanic)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 741.0 ft On Crystalline Rock (felsic meta-volcanic)
										(ROCK SOUNDING) Auger refusal at 29.9'

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10800RT	**STATION** 108+00	**OFFSET** 50 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 759.8 ft	**TOTAL DEPTH** 21.6 ft	**NORTHING** 692,474	**EASTING** 1,764,184 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/14/14	**COMP. DATE** 08/14/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
760										759.8 GROUND SURFACE	0.0
755										**RESIDUAL** orange-brown to brown, med. stiff to hard, moist, silty CLAY (A-7) w/ little sand	
750											
745										743.8 **WEATHERED ROCK** (felsic meta-volcanic)	16.0
740											
	738.3	21.5	60/0.1			60/0.1				738.3 / 738.2 **CRYSTALLINE ROCK** felsic meta-volcanic)	21.5 / 21.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 738.2 ft In Crystalline Rock (felsic meta-volcanic)	
										(ROCK SOUNDING) Auger refusal at 21.5'	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_10850	**STATION** 108+50	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 766.4 ft	**TOTAL DEPTH** 24.9 ft	**NORTHING** 692,445	**EASTING** 1,764,120 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/14/14	**COMP. DATE** 08/14/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										766.4 GROUND SURFACE 0.0
765										**RESIDUAL** red-brown, med. stiff to stiff, moist, silty CLAY (A-7)
										762.4 4.0
760										light-brown to tan-brown, med. stiff to hard, moist, f. sandy SILT (A-4) w/ little clay
755										
750										
745										745.4 21.0 **WEATHERED ROCK** (felsic meta-volcanic)
	741.6	24.8	60/0.1			60/0.1				741.6 / 741.5 24.8 / 24.9 **CRYSTALLINE ROCK** (felsic meta-volcanic)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 741.5 ft In Crystalline Rock (felsic meta-volcanic)
										(ROCK SOUNDING) Few residual BOULDERS at 0.0'-7.0' Auger refusal at 24.8'

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BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11000	**STATION** 110+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 767.4 ft	**TOTAL DEPTH** 76.4 ft	**NORTHING** 692,500	**EASTING** 1,763,980
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/15/14	**COMP. DATE** 08/15/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	36.0

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
770											
	767.4	0.0								767.4 GROUND SURFACE	0.0
765			1	3	4	7		M		**RESIDUAL** orange to red-brown, saprolitic, silty CLAY (A-7)	
	763.2	4.2									
760			3	6	7	13		M			
	758.2	9.2									
755			3	5	7	12		M		755.7 orange-brown and light gray, saprolitic, f. sandy SILT (A-4)	11.7
	753.2	14.2									
750			5	7	14	21		M			
	748.2	19.2									
745			7	13	25	38		M			
	743.2	24.2									
740			10	23	23	46		M			
	738.2	29.2									
735			7	11	12	23		M			
	733.2	34.2									
730			6	27	36	63					
	728.2	39.2								727.7 **WEATHERED ROCK** (felsic meta-volcanic)	39.7
725			13	36	64/0.4	100/0.9					
	723.2	44.2									
720			35	65/0.3		100/0.8					
	718.2	49.2									
715			47	53/0.2		100/0.7				715.7 **RESIDUAL** light gray and gray and white, saprolitic, f. sandy SILT (A-4) w/ little clay	51.7
	713.2	54.2									
710			62	46	40	86		M		710.7 **WEATHERED ROCK** (felsic meta-volcanic)	56.7
	708.2	59.2									
705			36	64/0.3		100/0.8					
	703.2	64.2									
700			100/0.3			100/0.3					
	698.2	69.2									
695			100/0.3			100/0.3					
	693.2	74.2									
	691.0	76.4	50	50/0.1		100/0.6				691.0 **CRYSTALLINE ROCK**	76.4
			60/0.0			60/0.0					

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11000	**STATION** 110+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 767.4 ft	**TOTAL DEPTH** 76.4 ft	**NORTHING** 692,500	**EASTING** 1,763,980
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/15/14	**COMP. DATE** 08/15/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	36.0

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
690						Match Line				
										(felsic meta-volcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 691.0 ft On Crystalline Rock (felsic meta-volcanic)
										Split barrel sampler saturated (outside) at 49.2'
										Auger refusal at 76.4'

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11100	**STATION** 111+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 762.7 ft	**TOTAL DEPTH** 29.2 ft	**NORTHING** 692,537	**EASTING** 1,763,887
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/21/14	**COMP. DATE** 08/21/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
762.7									GROUND SURFACE	0.0
758.6		4.1	4	7	10		M		**RESIDUAL** orange-brown and tan-brown, silty CLAY with little fine sand (A-7)	
756.1									gray and orange-brown, saprolitic, clayey SILT with little fine sand (A-5)	6.6
753.6		9.1	4	8	10		M			
748.6		14.1	4	5	8		M			
743.6		19.1	3	5	6		M			
741.1									**WEATHERED ROCK** (Felsic Metavolcanic)	21.6
738.6		24.1	100/0.2							
733.6		29.1	60/0.1							
733.5									**CRYSTALLINE ROCK** (Felsic Metavolcanic)	29.2

BLOWS PER FOOT: 0 25 50 75 100

Boring Terminated with Standard Penetration Test Refusal at Elevation 733.5 ft in Crystalline Rock (Felsic Metavolcanic)

Residual boulders observed at the surface and encountered during drilling 0.0 - 3.0 ft.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11100LT	**STATION** 111+00	**OFFSET** 50 ft LT	**ALIGNMENT** -Y9-
COLLAR ELEV. 761.8 ft	**TOTAL DEPTH** 41.7 ft	**NORTHING** 692,490	**EASTING** 1,763,869
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/21/14	**COMP. DATE** 08/21/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	Dry

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
761.8									GROUND SURFACE	0.0
									RESIDUAL red-orange, medium stiff to stiff, silty CLAY (A-7)	
755.8									light tan-brown and gray, stiff to hard, clayey SILT (A-5)	6.0
740.8									**WEATHERED ROCK** (Felsic Metavolcanic)	21.0
738.8									**RESIDUAL** light brown, very stiff to hard, fine sandy SILT (A-4)	23.0
728.8									**WEATHERED ROCK** (Felsic Metavolcanic)	33.0
720.1		41.7	60/0.0						**CRYSTALLINE ROCK** (Felsic Metavolcanic)	41.7

BLOWS PER FOOT: 0 25 50 75 100

Boring Terminated with Standard Penetration Test Refusal at Elevation 720.1 ft on Crystalline Rock (Felsic Metavolcanic)

(ROCK SOUNDING)
Auger Refusal at 41.7 ft.

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11100RT	**STATION** 111+00	**OFFSET** 50 ft RT	**ALIGNMENT** -Y9- / **0 HR.** Dry
COLLAR ELEV. 762.8 ft	**TOTAL DEPTH** 24.9 ft	**NORTHING** 692,583	**EASTING** 1,763,905 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/21/14	**COMP. DATE** 08/21/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
765											
										762.8 GROUND SURFACE	0.0
760										**RESIDUAL** red-orange, medium stiff to stiff, silty CLAY (A-7)	
755											
										751.8	11.0
750										brown, stiff to very stiff, fine sandy SILT (A-4)	
										746.8	16.0
745										brown-gray, medium stiff to very stiff, silty CLAY (A-7)	
										742.8	20.0
740										**WEATHERED ROCK** (Felsic Metavolcanic)	
	737.9	24.9	60/0.0			60/0.0				737.9	24.9
										CRYSTALLINE ROCK (Felsic Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 737.9 ft on Crystalline Rock (Felsic Metavolcanic) (ROCK SOUNDING) Auger Refusal at 24.9 ft.	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11150	**STATION** 111+50	**OFFSET** CL	**ALIGNMENT** -Y9- / **0 HR.** N/A
COLLAR ELEV. 757.3 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 692,555	**EASTING** 1,763,840 / **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/23/14	**COMP. DATE** 08/23/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
760										
										757.3 GROUND SURFACE 0.0
755										**RESIDUAL** red-orange, medium stiff to stiff, clayey SILT with little fine sand (A-5)
750										749.3 8.0
745										brown, stiff to hard, fine sandy SILT with little clay (A-4)
740										
735										
730										730.8 26.5 **WEATHERED ROCK** (Felsic Metavolcanic)
725										
	722.3	35.0	60/0.0			60/0.0				722.3 35.0 **CRYSTALLINE ROCK** (Felsic Metavolcanic) Boring Terminated with Standard Penetration Test Refusal at Elevation 722.3 ft on Crystalline Rock (Felsic Metavolcanic) (ROCK SOUNDING) Drive shaft sheared at connection to chain box during Auger Refusal at 35.0 ft.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11250	**STATION** 112+50	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 750.8 ft	**TOTAL DEPTH** 48.5 ft	**NORTHING** 692,591	**EASTING** 1,763,747
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/23/14	**COMP. DATE** 08/23/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	33.0

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
755											
750										750.8 GROUND SURFACE	0.0
										RESIDUAL red-brown, medium stiff to stiff, silty CLAY (A-7)	
745										743.8	7.0
										brown, stiff to hard, clayey SILT with little fine sand (A-5)	
740											
735											
730											
725											
720								▼			
715											
710										708.8	42.0
										WEATHERED ROCK (Felsic Metavolcanic)	
705										702.3	48.5
										Boring Terminated at Elevation 702.3 ft in Weathered Rock (Felsic Metavolcanic) (ROCK SOUNDING)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y9_11300	**STATION** 113+00	**OFFSET** CL	**ALIGNMENT** -Y9-
COLLAR ELEV. 749.9 ft	**TOTAL DEPTH** 28.8 ft	**NORTHING** 692,610	**EASTING** 1,763,701
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/21/14	**COMP. DATE** 08/22/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
750										749.9 GROUND SURFACE 0.0
	746.2	3.7	3	5	7	12		M		**RESIDUAL** red-orange, silty CLAY (A-7)
745										741.9 8.0
	741.2	8.7	3	5	5	10		M		light brown, brown-gray, and tan-brown, saprolitic, clayey SILT with little fine sand (A-5)
740										
	736.2	13.7	4	5	6	11		M		
735										
	731.2	18.7	3	4	5	9		M		
730										
	726.2	23.7	5	9	9	18		M		
725										723.7 26.2
	722.5	27.4	30	53	47/0.4	100/0.9				**WEATHERED ROCK** (Felsic Metavolcanic)
										721.1 28.8
										Boring Terminated by Auger Refusal at Elevation 721.1 ft in Weathered Rock (Felsic Metavolcanic)
										Auger Refusal at 27.4 ft. Even though SPT revealed only WR, Augers would not advance beyond 27.4 ft without serious risk of damage to drill rig. Spoon possibly driven down a fracture.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_11300LT	**STATION** 113+00	**OFFSET** 50 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 754.3 ft	**TOTAL DEPTH** 37.7 ft	**NORTHING** 692,563	**EASTING** 1,763,682	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 08/23/14	**COMP. DATE** 08/23/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
755										754.3 GROUND SURFACE	0.0
750										**RESIDUAL** red-brown, medium stiff to stiff, silty CLAY (A-7)	
										748.3	6.0
745										brown, medium stiff to hard, clayey SILT (A-5)	
740											
735											
730											
725											
720										719.3	35.0
	717.4	36.9	72	28/0.3		100/0.8				**WEATHERED ROCK** (Felsic Metavolcanic)	
										716.6	37.7

Boring Terminated by Auger Refusal at Elevation 716.6 ft in Weathered Rock (Felsic Metavolcanic)

(ROCK SOUNDING)
Auger Refusal at 36.9 ft. Auger was grinding and catching like it was hitting an irregular hard surface. While SPT revealed only WR, we could not advance the auger further without risking serious damage to drill rig.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance				**GROUND WTR (ft)**
BORING NO. Y9_11300RT	**STATION** 113+00	**OFFSET** 50 ft RT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 744.5 ft	**TOTAL DEPTH** 35.6 ft	**NORTHING** 692,656	**EASTING** 1,763,719	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 08/23/14	**COMP. DATE** 08/23/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
745										744.5 GROUND SURFACE 0.0
740										**RESIDUAL** red-brown, medium stiff to stiff, silty CLAY (A-7)
735										735.5 9.0 brown, medium stiff to hard, clayey SILT (A-5)
730										
725										
720										721.5 23.0 **WEATHERED ROCK** (Felsic Metavolcanic)
715										719.5 25.0 **RESIDUAL** brown, very stiff to hard, clayey SILT with little fine sand (A-5)
710										714.5 30.0 **WEATHERED ROCK** (Felsic Metavolcanic)
	709.0	35.5	60/0.1			60/0.1				709.0 35.5 708.9 35.6 **CRYSTALLINE ROCK** (Felsic Metavolcanic)

Boring Terminated with Standard Penetration Test Refusal at Elevation 708.9 ft in Crystalline Rock (Felsic Metavolcanic)

(ROCK SOUNDING)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y10_8579	**STATION** 85+79	**OFFSET** 25 ft LT	**ALIGNMENT** -Y10- / **0 HR.** Dry
COLLAR ELEV. 659.2 ft	**TOTAL DEPTH** 10.5 ft	**NORTHING** 692,637	**EASTING** 1,765,947 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/22/14	**COMP. DATE** 08/22/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
660										659.2 GROUND SURFACE	0.0
655	655.2	4.0	5	5	6	11		M		**RESIDUAL** red-brown, silty CLAY (A-7)	
										652.7 red-orange, saprolitic, clayey SILT (A-5)	6.5
650	650.2	9.0	3	5	6	11		M		648.7 Boring Terminated at Elevation 648.7 ft in Residual (clayey SILT)	10.5

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y10_8800	**STATION** 88+00	**OFFSET** CL	**ALIGNMENT** -Y10- / **0 HR.** Dry
COLLAR ELEV. 666.0 ft	**TOTAL DEPTH** 15.6 ft	**NORTHING** 692,413	**EASTING** 1,765,923 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/24/14	**COMP. DATE** 07/24/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
670										666.0 GROUND SURFACE 0.0
665	661.9	4.1	3	6	8	14		D		**RESIDUAL** orange-brown, silty CLAY (A-7-5)
										659.5 orange-tan, SILT (A-5) 6.5
660	656.9	9.1	2	2	4	6		D		
										654.0 tan, saprolitic, f. sandy SILT (A-4) 12.0
655	651.9	14.1	4	6	7	13		D		650.4 Boring Terminated at Elevation 650.4 ft In Residual sandy SILT (A-4) 15.6

NCDOT BORE DOUBLE R2536D_GEO_RDWY_GINT_Y10.GPJ NC_DOT.GDT 8/29/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y10_9000	**STATION** 90+00	**OFFSET** CL	**ALIGNMENT** -Y10-
COLLAR ELEV. 661.5 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 692,220	**EASTING** 1,765,871
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/24/14	**COMP. DATE** 07/24/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
665											
										661.5 GROUND SURFACE	0.0
660										**RESIDUAL** orange-brown, silty CLAY (A-7-5)	
	657.5	4.0	4	5	9	14		D			
655										654.0 orange-tan, SILT (A-5)	7.5
	652.5	9.0	3	4	8	12		D			
650											
	647.5	14.0	4	20	80/0.4	100/.09				647.0	14.5
										646.1 **WEATHERED ROCK** (meta-volcanic)	15.4
										Boring Terminated at Elevation 646.1 ft In Weathered Rock (meta-volcanic)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y10_9200	**STATION** 92+00	**OFFSET** CL	**ALIGNMENT** -Y10-
COLLAR ELEV. 647.6 ft	**TOTAL DEPTH** 20.5 ft	**NORTHING** 692,034	**EASTING** 1,765,798
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/24/14	**COMP. DATE** 07/24/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
650										
										647.6 GROUND SURFACE 0.0
645										**RESIDUAL** orange-brown, silty CLAY (A-7-5)
	643.6	4.0	4	6	8	14		D		
640										639.6 tan-orange, clayey SILT (A-5) 8.0
	638.6	9.0	5	8	11	19		D		
635										634.1 orange-tan, saprolitic, f. sandy SILT (A-4) 13.5
	633.6	14.0	3	6	9	15		D		
630										
	628.6	19.0	7	10	10	20		D		627.1 20.5
										Boring Terminated at Elevation 627.1 ft In Residual sandy SILT (A-4)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y10_9430	**STATION** 94+30	**OFFSET** CL	**ALIGNMENT** -Y10-
COLLAR ELEV. 640.2 ft	**TOTAL DEPTH** 30.7 ft	**NORTHING** 691,820	**EASTING** 1,765,714
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/23/14	**COMP. DATE** 07/23/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
645											
640										640.2 GROUND SURFACE	0.0
										RESIDUAL orange-brown, silty CLAY (A-7-5)	
635	636.0	4.2	4	6	8	14		M			
630	631.0	9.2	6	8	12	20		D		632.2 red-gray, clayey SILT (A-5)	8.0
625	626.0	14.2	6	19	32	51		D		626.7 tan and gray-brown, f. sandy SILT (A-4)	13.5
620	621.0	19.2	6	8	12	20		D			
615	616.0	24.2	6	9	14	23		D			
610	611.0	29.2	2	8	11	19		D		609.5	30.7

Boring Terminated at Elevation 609.5 ft In Residual f. sandy SILT (A-4)

(Equivalent boring for -Y9- 91+37 CL)

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. Y10A_1200	**STATION** 12+00	**OFFSET** 30 ft LT	**ALIGNMENT** -Y10A-
COLLAR ELEV. 662.0 ft	**TOTAL DEPTH** 4.0 ft	**NORTHING** 692,382	**EASTING** 1,766,127
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/22/14	**COMP. DATE** 08/22/14	**SURFACE WATER DEPTH** N/A

GROUND WTR (ft)	
0 HR.	Dry
24 HR.	FIAD

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
665										
660										662.0 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT red-brown, silty CLAY with little gravel and boulders (A-7)
	658.2	3.8	100/0.2			100/0.2				659.0 3.0 / 658.0 4.0
										WEATHERED ROCK (Felsic Metavolcanic)

Boring Terminated by Auger Refusal at Elevation 658.0 ft in Weathered Rock (Felsic Metavolcanic)

Boring offset due to utility conflicts.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. NC159RPA_1100	**STATION** 11+00	**OFFSET** 20 ft LT	**ALIGNMENT** -NC159RPA- / **0 HR.** Dry
COLLAR ELEV. 619.1 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 686,312	**EASTING** 1,767,770 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
620										619.1 GROUND SURFACE	0.0
615	615.1	4.0	3	4	6	10		D		**ROADWAY EMBANKMENT** orange-brown, clayey SILT (A-5)	
610	610.1	9.0	2	3	4	7	SS-2	28%		611.6 orange-brown and gray-brown, silty CLAY (A-7-5)	7.5
605	605.1	14.0	8	13	13	26		D		605.6 **RESIDUAL** gray, SILT (A-4)	13.5
										603.6 Boring Terminated at Elevation 603.6 ft in Residual (SILT)	15.5

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. NC159RPA_1300	**STATION** 13+00	**OFFSET** 20 ft RT	**ALIGNMENT** -NC159RPA- / **0 HR.** Dry
COLLAR ELEV. 617.5 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 686,504	**EASTING** 1,767,700 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
620										617.5 GROUND SURFACE 0.0
615	613.6	3.9	3	6	7	13		D		**ROADWAY EMBANKMENT** orange-brown, clayey SILT (A-5)
610	608.6	8.9	2	3	5	8		M		611.1 orange-brown, silty CLAY (A-7-5) 6.4
605	603.6	13.9	3	5	8	13		M		605.0 **RESIDUAL** gray, SILT (A-4) 12.5 602.1 Boring Terminated at Elevation 602.1 ft in Residual (SILT) 15.4

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. NC159RPA_1604	**STATION** 16+04	**OFFSET** 46 ft LT	**ALIGNMENT** -NC159RPA- / **0 HR.** Dry
COLLAR ELEV. 624.5 ft	**TOTAL DEPTH** 10.1 ft	**NORTHING** 686,779	**EASTING** 1,767,550 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
625										624.5 GROUND SURFACE	0.0
620	620.9	3.6	1	3	5	8		D		**ROADWAY EMBANKMENT** orange-tan, clayey SILT (A-5)	
										616.9	7.6
615	615.9	8.6	6	13	26	39	SS-4	21%		**RESIDUAL** tan-gray, fine sandy SILT (A-4)	
										614.4	10.1

Boring Terminated at Elevation 614.4 ft in Residual (fine sandy SILT)

(Equivalent to Y9_3000)

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Worley, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. NC159RPA_1796	**STATION** 17+96	**OFFSET** 6 ft LT	**ALIGNMENT** -NC159RPA- / **0 HR.** Dry
COLLAR ELEV. 626.6 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 686,977	**EASTING** 1,767,584 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/08/14	**COMP. DATE** 07/08/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
630										626.6 GROUND SURFACE 0.0
625	622.8	3.8	2	6	9	15		M		**ROADWAY EMBANKMENT** orange-tan, clayey SILT (A-5)
										620.3 6.3
620	617.8	8.8	1	3	4	7		M		orange-brown and gray-tan, silty CLAY (A-7-5)
										614.6 12.0
615	612.8	13.8	1	2	4	6		M		**RESIDUAL** tan-gray, SILT (A-4)
										611.3 15.3

Boring Terminated at Elevation 611.3 ft in Residual (SILT)

(Equivalent to Y9_3200)

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. NC159RPA_2046	**STATION** 20+46	**OFFSET** 13 ft RT	**ALIGNMENT** -NC159RPA-	**0 HR.** Caved
COLLAR ELEV. 631.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 687,220	**EASTING** 1,767,643	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/10/14	**COMP. DATE** 07/10/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
635											
	631.8	0.0								631.8 GROUND SURFACE	0.0
630			4	5	7	12		D		**ROADWAY EMBANKMENT** red-brown, silty CLAY with little fine sand (A-7)	
	627.8	4.0								629.1	2.7
			2	4	5	9	SS-505	44%		**RESIDUAL** red-brown, orange-brown, tan-brown, and mottled black, saprolitic, silty CLAY (A-7-6)	
625											
	622.8	9.0									
			3	3	4	7		W			
620											
	617.8	14.0									
			2	3	2	5		Sat.		616.3	15.5
										Boring Terminated at Elevation 616.3 ft in Residual (silty CLAY) (Equivalent to Y9_3450)	

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. NC159SPUR_2100	**STATION** 21+00	**OFFSET** 30 ft RT	**ALIGNMENT** -NC159SPUR-	**0 HR.** Dry
COLLAR ELEV. 619.2 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 686,087	**EASTING** 1,767,948	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/10/14	**COMP. DATE** 07/10/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
620	619.2	0.0	3	5	5	10		D		619.2 GROUND SURFACE	0.0
615	615.6	3.6	3	4	5	9		M		**ROADWAY EMBANKMENT** red-orange, red-brown, brown, and gray, silty CLAY with trace gravel (A-7)	
610	610.6	8.6	5	6	9	15		M		610.1 **RESIDUAL** red-brown and red-orange, saprolitic, clayey SILT with little fine sand (A-5)	9.1
605	605.6	13.6	2	3	4	7		W		604.1 Boring Terminated at Elevation 604.1 ft in Residual (clayey SILT)	15.1

Encountered boulder in Roadway Embankment Fill at 2.0 ft. Possible Weathered Rock Seam or Residual Boulder encountered around 12-13 ft.

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.	
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance				**GROUND WTR (ft)**
BORING NO. NC159SPUR_2373	**STATION** 23+73	**OFFSET** 25 ft RT	**ALIGNMENT** -NC159SPUR-	**0 HR.** Dry
COLLAR ELEV. 624.0 ft	**TOTAL DEPTH** 15.3 ft	**NORTHING** 686,182	**EASTING** 1,767,697	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez, L.	**START DATE** 07/10/14	**COMP. DATE** 07/10/14	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
625	624.0	0.0	3	4	9	13		D		624.0 GROUND SURFACE 0.0
620	620.2	3.8	3	6	7	13		M		**ROADWAY EMBANKMENT** red-orange, red-brown, and orange-brown, silty CLAY with little fine sand and trace gravel (A-7)
615	615.2	8.8	2	3	5	8		M		612.7 11.3 **RESIDUAL** orange-brown, saprolitic, fine sandy SILT with little clay (A-4)
610	610.2	13.8	4	3	4	7		M		608.7 15.3 Boring Terminated at Elevation 608.7 ft in Residual (fine sandy SILT)

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WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159/ Zoo Entrance			**GROUND WTR (ft)**
BORING NO. NC159SPUR_2550	**STATION** 25+50	**OFFSET** 35 ft RT	**ALIGNMENT** -NC159SPUR- **0 HR.** Dry
COLLAR ELEV. 626.7 ft	**TOTAL DEPTH** 14.4 ft	**NORTHING** 686,272	**EASTING** 1,767,545 **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 07/10/14	**COMP. DATE** 07/10/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
630											
	626.7	0.0								626.7 GROUND SURFACE	0.0
625			4	4	5	9		D		**ROADWAY EMBANKMENT** red-brown, brown, and gray, silty CLAY with little fine sand, trace gravel and boulders (A-7)	
	623.4	3.3	2	3	4	7		D			
620											
	618.4	8.3	3	3	3	6		M			
615											
	613.4	13.3	3	60	40/0.1	100/0.6				612.3	14.4

Boring Terminated at Elevation 612.3 ft in Roadway Embankment Fill (silty CLAY)

Impacted boulder buried in the Roadway Embankment Fill with SPT at 13.3 ft. This was not interpreted to be Weathered Rock.

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BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. SERRD2_1150	**STATION** 11+50	**OFFSET** 11 ft RT	**ALIGNMENT** -SERRD2- / **0 HR.** Caved
COLLAR ELEV. 717.7 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 690,616	**EASTING** 1,761,092 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/22/14	**COMP. DATE** 08/22/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
720											
										717.7 GROUND SURFACE	0.0
715	714.2	3.5	7	8	9	17		M		**ROADWAY EMBANKMENT** red-orange to red-brown, fine sandy SILT with little clay (A-4)	
										711.2	6.5
710	709.2	8.5	5	16	26	42		D		**RESIDUAL** orange-brown and red-brown, saprolitic, fine sandy SILT (A-4)	
										707.7	10.0
										Boring Terminated at Elevation 707.7 ft in Residual (fine sandy SILT)	

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. SERRD2_1400	**STATION** 14+00	**OFFSET** 13 ft LT	**ALIGNMENT** -SERRD2- / **0 HR.** Dry
COLLAR ELEV. 737.7 ft	**TOTAL DEPTH** 10.8 ft	**NORTHING** 690,865	**EASTING** 1,761,069 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/22/14	**COMP. DATE** 08/22/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
740										
										737.7 GROUND SURFACE 0.0
735	733.4	4.3	3	10	11	21		M		**ROADWAY EMBANKMENT** red-brown, silty CLAY with little gravel (A-7) 2.0
										RESIDUAL red-brown, saprolitic, silty CLAY (A-7)
										730.9 6.8
730	728.4	9.3	20	33	35	68		D		orange-brown and light tan-brown, saprolitic, fine sandy SILT with little gravel sized rock fragments (A-4)
										726.9 10.8
										Boring Terminated at Elevation 726.9 ft in Residual (fine sandy SILT)

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BORELOG REPORT

WBS 34450.1.1	**TIP** R-2536D	**COUNTY** RANDOLPH	**GEOLOGIST** Smith, B.
SITE DESCRIPTION Zoo Connector from east of SR 2839 (Staleys Farm Rd) to existing NC 159 / Zoo Entrance			**GROUND WTR (ft)**
BORING NO. SERRD2_1550	**STATION** 15+50	**OFFSET** CL	**ALIGNMENT** -SERRD2-	**0 HR.** Dry
COLLAR ELEV. 742.0 ft	**TOTAL DEPTH** 10.8 ft	**NORTHING** 691,015	**EASTING** 1,761,081	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 08/15/2013		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Gonzalez, L.	**START DATE** 08/22/14	**COMP. DATE** 08/22/14	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
745											
										742.0 GROUND SURFACE	0.0
740										**RESIDUAL** orange-brown, red-brown, and tan-brown, saprolitic, fine sandy SILT (A-4)	
	737.7	4.3	6	8	14	22		D			
735											
	732.7	9.3	20	16	20	36		D		731.2	10.8
										Boring Terminated at Elevation 731.2 ft in Residual (fine sandy SILT)	