STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5315	1	63

REFERENCE: U-5315

PROJECT: 45429

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

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	57+00 - 85+00	4-5	9
-LPB-	10+00 - 22+11.35	4	10
-RPD-	10+00 - 30+42.73	4,7	11
-LPD-	10+00 - 23+54.20	4-6	12
-RPD-	10+00 - 31.02.03	5, 8	13
-Y1-	10+00 - 23+46.90	5-6	14

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	59+00 - 62+00	15-17
-L-	62+50 - 66+50	18-21
-LPB-	11+00 - 18+00	22-32
-RPD-	15+00 - 18+00	33-37
-LPD-	13+50 - 16+50	38-40
-RPD-	15+00 - 24+16	41-52

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *WAKE*

PROJECT DESCRIPTION *MORRISVILLE PARKWAY EXTENSION AND NC540 INTERCHANGE FROM SR 1625 (GREEN LEVEL CHURCH RD) TO NC 55*

INVENTORY

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

EVANS, T. E.

SDS

INVESTIGATED BY *EVANS, T. E.*

DRAWN BY *EVANS, T. E.*

CHECKED BY *HAMM, J. R.*

SUBMITTED BY *FALCON*

DATE *FEBRUARY 2015*

NORTH CAROLINA PROFESSIONAL SEAL 039779 ENGINEER JEREMY R. HAMM

2-2-15

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-5315	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

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

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI)		
PL — PLASTIC LIMIT		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:

BORING ELEVATIONS BASED ON .TIN FILES ELEVATION: FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLED
REF - REFUSAL (SOUNDING ROD)

DATE: 8-15-14

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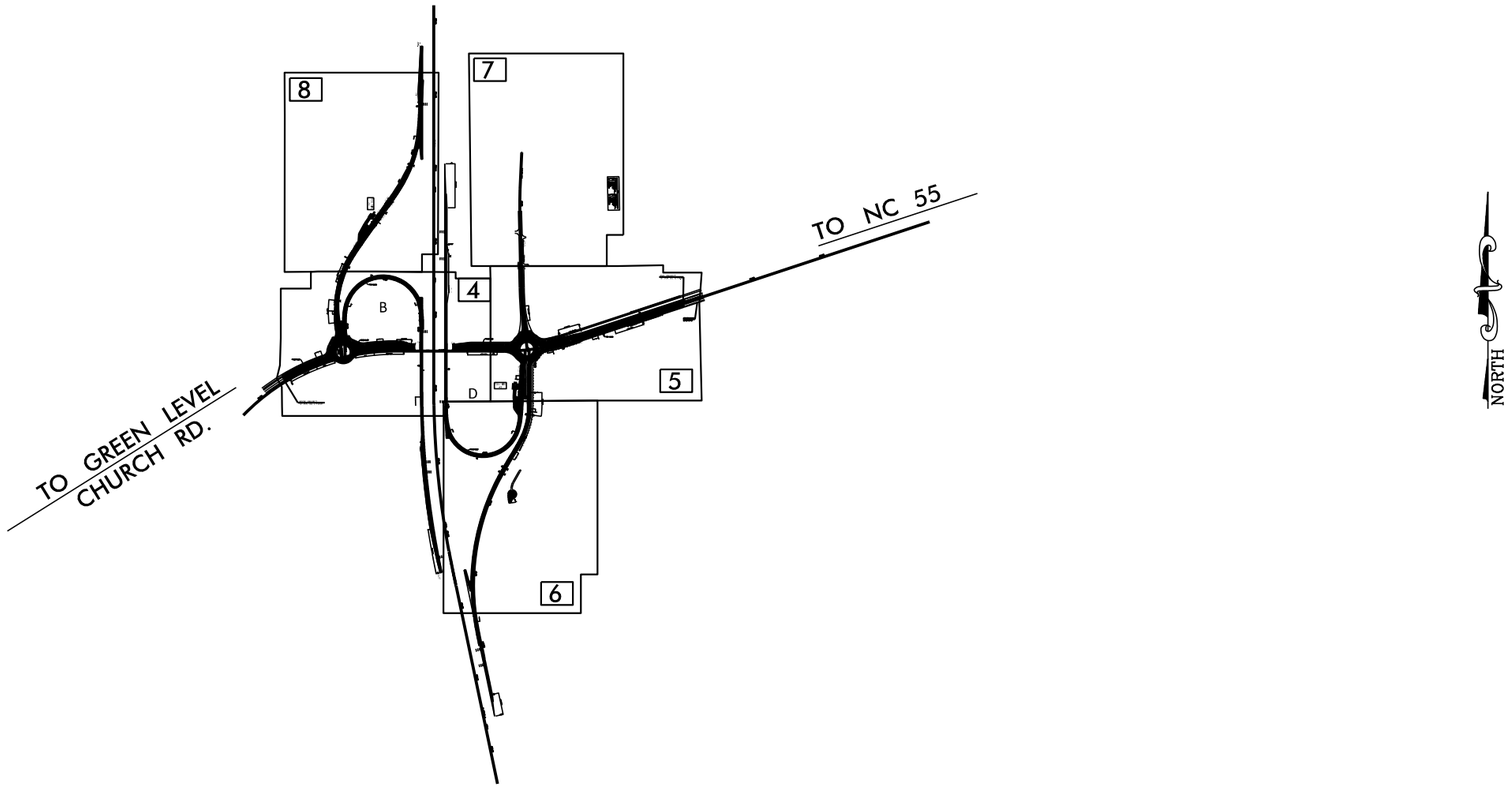
STATE PROJECT REFERENCE NO.	SHEET
45429.1.1(U-5315)	2A

MORRISVILLE PARKWAY

Project Limits - Morrisville Parkway Extension and NC 540 Interchange
from SR 1625 (Green Level Church Rd.) to NC 55

Project No. ST 1123/1220

Contact Information:
project.manager@townofcary.org
919.460.0000



Revisions	
Date	Description
.	.
.	.
.	.
.	.
.	.

Survey for this project was completed by Town of Cary professional land surveyors. Coordinate control based on the following:
Horizontal _____ Vertical _____

Drawn By : -
Designed By: -
Date: -

Project Engineer:
Engineer Name

Signature Date SEAL

Director of Transportation & Facilities
Laura L. Cove, P.E.

Signature Date SEAL

Internal Control Approval Authorizing Release By The Town of Cary
Transportation & Facilities Dept. (Check Indicating Type of Plan)

___ Final Drawings (No Marking)

Certification Optional:

___ Preliminary Drawings - Do Not Use For Construction
___ Progress Drawing - Do Not Use For Construction
___ Final Drawing - Not Released For Construction
___ Final Drawing - For Review Purposes Only
___ Not a Certified Document as to the Original Document but ONLY as to the Revisions

Roadway Subsurface Investigation Report - Inventory

Morrisville Parkway Extension and NC 540 Interchange
From SR 1625 (Green Level Church Rd) to NC 55
Town of Cary
Wake County, North Carolina
WBS: 45429.1.1 TIP: U-5315
Falcon Project No.: G14001.00

Prepared for:
RK&K
900 Ridgefield Drive, Suite 350
Raleigh, NC 27609

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

January 12, 2015

PREFACE

This roadway subsurface investigation was conducted between September 8th and September 16th, 2014 in general accordance with our Proposal to Provide Geotechnical Engineering Services, dated December 2, 2013 (Proposal No.: F2012-045R1). The recommendations provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of thirty-nine (39) Standard Penetration Test (SPT) borings were drilled for the new roadway alignments. All SPT borings were drilled using a CME-550X all-terrain-vehicle (ATV) mounted drill rig equipped with 2 ¼-inch inside diameter hollow-stem augers and an automatic hammer. Four (4) additional hand auger borings with rod soundings were performed where SPT borings were offset significantly from centerline to develop a comprehensive cross section of subsurface conditions. Representative soil samples, collected with a split-barrel sampler, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for additional laboratory testing for use in our geotechnical engineering analyses.

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

FALCON ENGINEERING, INC.

Report Prepared By:

Thomas E. Evans, PE
Geotechnical Engineer

Report Reviewed By:

Jeremy R. Hamm, PE
Geotechnical Engineering Manager

WBS: 45429.1.1
TIP: U-5315
COUNTY: Wake
DESCRIPTION: Morrisville Parkway Extension and NC 540 Interchange
From SR1625 (Green Level Church Rd) to NC 55
SUBJECT: Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of a portion of the Morrisville Parkway extension from the end of an existing section west of NC 540 near Westfalen Drive to NC 55 in western Wake County, North Carolina. The project has been divided into three sections, and the section which has been investigated for this report extends from station 57+00 to 82+55 -L- (-MPE3-). Beyond these limits on -L- (-MPE3-) design and investigation is the responsibility of others. The project also includes a new partial cloverleaf interchange with NC 540 and the corresponding alignments listed below for ramps and loops in two quadrants. In addition, Twyla Road (SR 3068) will be partially relocated along -Y1- in the same vicinity of the existing alignment to provide an intersection with Morrisville Parkway. All other alignments will consist of new location roadway constructed through what are currently heavily wooded, residential, and agricultural lands. A bridge structure and associated approach embankments have been previously constructed spanning NC 540 as part of the NC 540 construction. The bridge will carry the planned two lane section of -L- across NC 540 with a future matching structure planned to create duals as needed to facilitate a four lane section. The planned alignments cross a few small waterways which will be facilitated by pipe crossings. A reinforced concrete box culvert (RCBC) is planned near station 83+50 -L- beyond the limits of our investigation. An onsite detour -Y1DET- is also planned near -Y1-, for which no investigation was scoped. The following alignments, totaling approximately 10,612 feet (2.01 miles) were explicitly investigated.

Alignment	Station
-L- (Morrisville Parkway)	57+00.00 – 82+55.00
-Y1- (Twyla Road)	10+00.00 – 23+46.90
-LPB-	10+00.00 – 22+11.35
-RPB-	10+00.00 – 30+42.73
-LPD-	10+00.00 – 23+54.20
-RPD-	10+00.00 – 31+02.03

AREAS OF SPECIAL GEOTECHNICAL INTEREST

The following sections contain cohesive soils which have the potential to cause embankment or subgrade stability problems during construction:

Station
57+00 to 81+50, -L-
12+00 to 21+02.62, -LPB-
14+00 to 29+30.63, -RPB-
13+00 to 22+88.66, -LPD-
15+00 to 30+33.64, -RPD-
10+00 to 19+50.00, -Y1-

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

Station
61+00 to 66+00 -L-
73+00 to 83+00 -L-
12+00 to 15+00 -LPB-
13+00 to 16+00 -LPD-
22+00 to 23+00 -LPD-
15+00 to 24+00 -RPD-
29+00 to 31+00 -RPD-
11+00 to 13+00 -Y1-

Alluvial soils and natural waterways, seasonally high groundwater, perched water, and/or surficial water due to poor drainage was observed in the areas below. The potential for wet, soft or organic soils should be anticipated in these areas.

Station
72+55 - 72+82 -L-
74+95 - 75+21 -L-
82+55 -L- to beyond project limits

PHYSIOGRAPHY AND GEOLOGY

The project site is in the western portion of the Coastal Plain Physiographic Province of North Carolina. According to the ***Geologic Map of North Carolina*** (1985), the site is underlain by the Chatham Group, Undivided (TRc) of the Triassic Basin Formation in the Piedmont Physiographic Province. This unit is noted to consist of conglomerate, fanglomerate, sandstone and mudstone. Residual soils encountered indicate a geologic setting consistent with the published data.

Existing site topography is gently sloping with some steep slopes near creeks; typical of this area of the piedmont region. Predominantly wide and shallow drainage swales parallel existing roadway alignments, and carry roadway drainage toward various natural drainage features and creeks. Topography is relatively flat in agricultural areas within the project corridor.

Large cut slopes exist on the project corridor near NC 540 which the proposed ramps for the interchange will traverse. These slopes were observed at 3:1 (HV) or shallower and appeared to be stable within the vicinity of the proposed corridor. Some exposed weathered rock was observed along these cut slopes. Subsurface cross sections depict the top of weathered rock day lighting into the cut slopes where appropriate.

SOIL PROPERTIES

A variety of soils were encountered along the project, including existing roadway embankments, alluvial deposits, and Triassic residual soils, weathered rock, and intrusive crystalline rock.

Roadway Embankment soils were encountered at the ground surface or beneath existing pavements in and adjacent to existing roadways. These consist of 1.5 to 3 feet of dry to wet, very loose to medium dense, clayey and silty sand (A-2-4, A-2-6) and medium stiff to stiff, sandy clay and silt (A-4, A-6) with trace gravel.

Alluvial soils were encountered at the ground surface in a few locations. These soils were found at the ground surface and beneath embankment materials to depths of approximately 8.5 feet deep and consist of dry to wet, very loose to medium dense, silty sand and poorly-graded sand (A-2-4, A-1-b) with trace amounts of organic material.

Triassic Residual soils were encountered at the ground surface, or beneath roadway embankment and/or alluvial soils. These soils consist of dry to wet, loose to very dense, clayey and silty sand (A-2-6, A-2-4) and medium stiff to hard, fine sandy clay and silt and silty clays (A-4, A-6, A-7).

Weathered rock was encountered in many borings throughout the project area at depths of 0.5 feet to 21 feet, consisting of red-brown, tan, gray, blue, and purple, Triassic Siltstone and Triassic Sandstone. Some borings were terminated before encountering weathered rock, at depths of up to 25 feet. Many of the borings were terminated in weathered rock before non-crystalline rock was encountered. However, intrusive crystalline rock was encountered at two locations (along -Y1-, and near the roundabout where -LPD-, -RPD-, and -L- intersect). This material consisted of black, gray, and brown Intrusive Diabase, likely part of a dike formation, and was encountered at 14 to 20 feet below existing ground. The presence of other Diabase dikes or other formations within the project limits is also likely.

GROUNDWATER PROPERTIES

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

The project crosses small streams and tributaries as well as natural drainage ditches. Groundwater was observed at shallow depths near these streams and in low lying areas. In addition, perched and/or static groundwater was encountered in proposed cut areas and will likely be encountered during site excavation. Detailed groundwater measurements are included in the attached subsurface profiles and cross sections.

The ground surface between 72+55 and 72+82 -L-, was saturated with standing water in the area at the time of our investigation due to poor drainage. Perched water and/or shallow groundwater, flowing surface water, and saturated, soft soils are likely to be encountered in this area during construction.

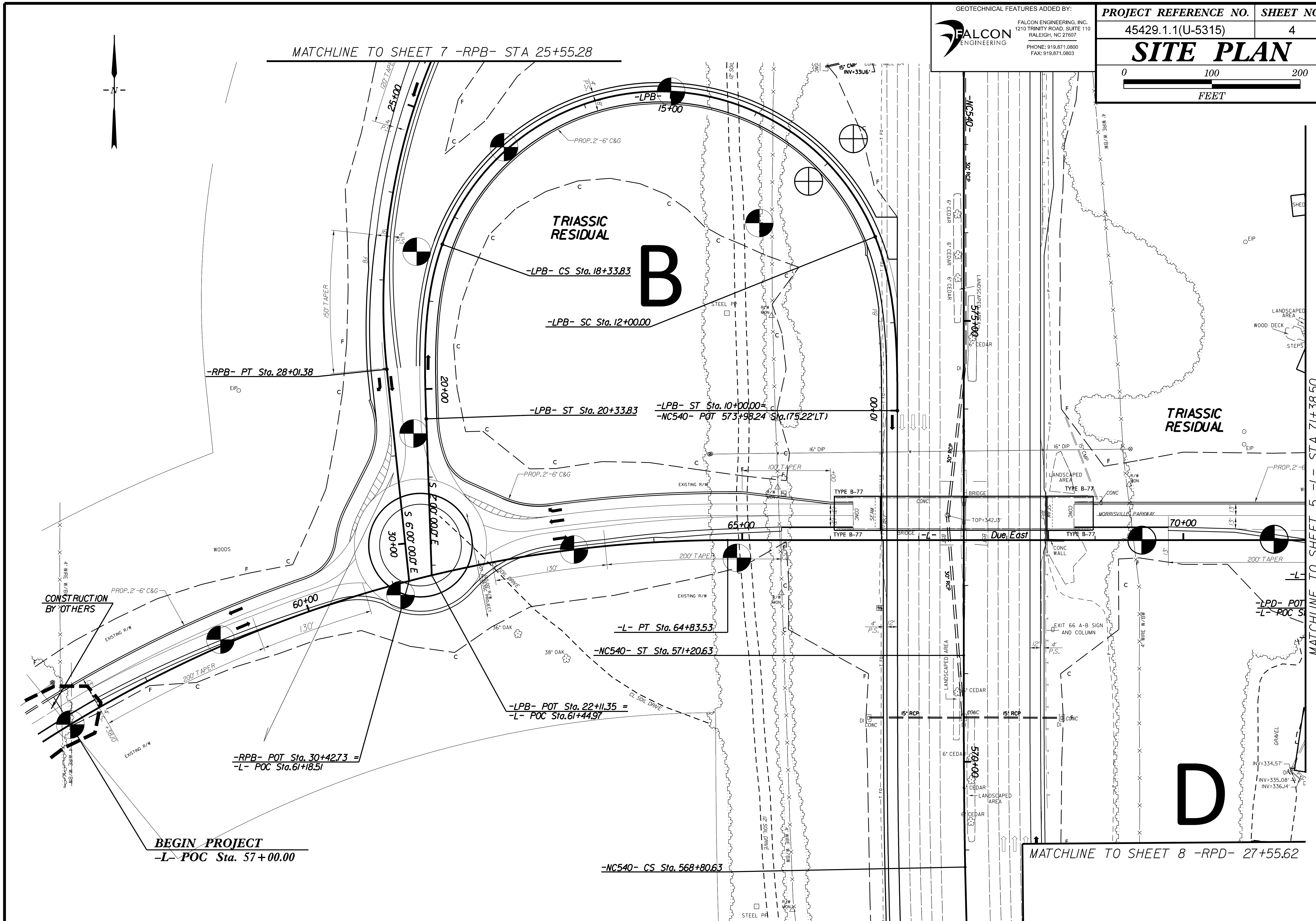
GEOTECHNICAL FEATURES ADDED BY:

FALCON ENGINEERING

FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

PROJECT REFERENCE NO.	SHEET NO.
45429.1.1(U-5315)	4

SITE PLAN


0 100 200
FEET
N
MATCHLINE TO SHEET 7 -RPB- STA 25+55.28
MATCHLINE TO SHEET 5 -L- STA 71+38.50
MATCHLINE TO SHEET 8 -RPD- 27+55.62
TRIASSIC RESIDUAL
B
TRIASSIC RESIDUAL
D
-LPB- CS Sta. 18+33.83
-LPB- SC Sta. 12+00.00
-RPB- PT Sta. 28+01.38
-LPB- ST Sta. 20+33.83
-LPB- ST Sta. 10+00.00=
-NC540- POT 573+98.24 Sta.(75.22'LT)
-L- PT Sta. 64+83.53
-NC540- ST Sta. 571+20.63
-LPB- POT Sta. 22+11.35 =
-L- POC Sta.61+44.97
-RPB- POT Sta. 30+42.73 =
-L- POC Sta.61+18.51
-NC540- CS Sta. 568+80.63
BEGIN PROJECT
-L- POC Sta. 57+00.00
CONSTRUCTION BY OTHERS
S 6°00'00.0" E
-L- Due East
-NC540-
MORRISVILLE PARKWAY
PROP. 2'-6" C&G
150' TAPER
200' TAPER
100' TAPER
130'
16" DIP
15" RCP
30" RCP
TYPE B-77
BRIDGE
EXIT 66 A-B SIGN AND COLUMN
LANDSCAPED AREA
WOODS
36" OAK
38" OAK
STEEL PP
EXISTING R/W
4' WIRE W/BW
12' SOIL DRIVE
25+00
15+00
20+00
10+00
30+00
60+00
65+00
70+00
575+00
570+00

GEOTECHNICAL FEATURES ADDED BY:

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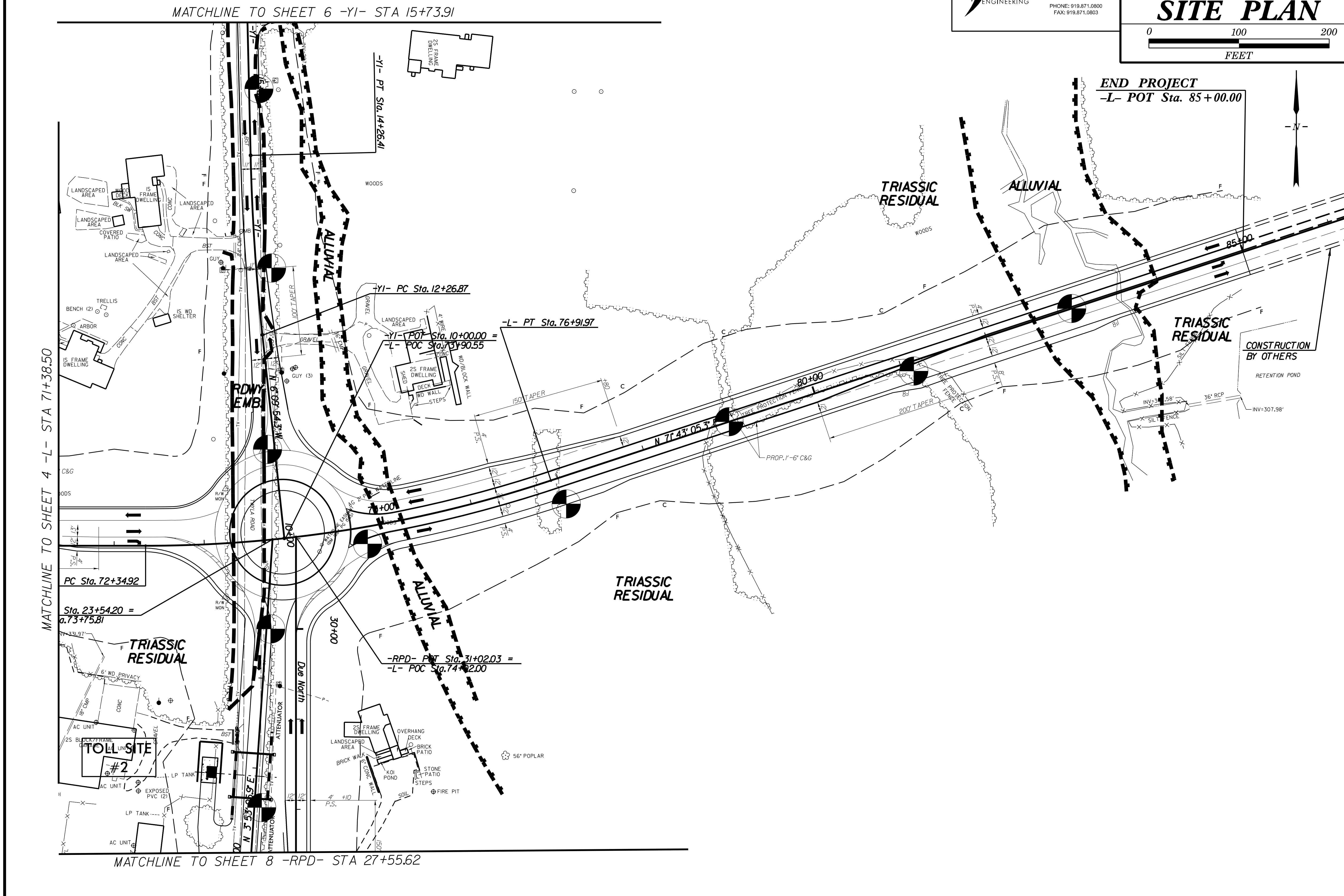
PROJECT REFERENCE NO.	SHEET NO.
45429.1.1(U-5315)	5

SITE PLAN



0 100 200
FEET
MATCHLINE TO SHEET 6 -YI- STA 15+73.91
MATCHLINE TO SHEET 4 -L- STA 71+38.50
MATCHLINE TO SHEET 8 -RPD- STA 27+55.62
END PROJECT
-L- POT Sta. 85+00.00
-YI- PT Sta. 14+26.41
-YI- PC Sta. 12+26.87
-YI- POT Sta. 10+00.00 =
-L- POC Sta. 73+90.55
-L- PT Sta. 76+91.97
PC Sta. 72+34.92
Sta. 23+54.20 =
a.73+75.81
-RPD- POT Sta. 31+02.03 =
-L- POC Sta. 74+02.00
N 71° 43' 05.3"
TRIASSIC RESIDUAL
ALLUVIAL
RDWY EMB
TOLL SITE #2
CONSTRUCTION BY OTHERS
RETENTION POND
Due North
WOODS
150' TAPER
200' TAPER
100' TAPER
80+00
85+00
30+00
LANDSCAPED AREA
1S FRAME DWELLING
2S FRAME DWELLING
COVERED PATIO
IS WD SHELTER
TRELLIS
BENCH (2)
ARBOR
GUY (3)
ATTENUATOR
LP TANK
AC UNIT
EXPOSED PVC (2)
OVERHANG DECK
BRICK PATIO
STONE PATIO
KOI POND
BRICK WALK
STEPS
FIRE PIT
56" POPLAR
6' WD PRIVACY
TREE PROTECTION FENCE
PROP. 1'-6" C&G
36" RCP
INV=307.98'
SILT FENCE

GEOTECHNICAL FEATURES ADDED BY:

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PROJECT REFERENCE NO.	SHEET NO.
45429.1.1(U-5315)	6

SITE PLAN

0 100 200

FEET

N

TRIASSIC RESIDUAL

-Y1- PT Sta. 20+98.08

-Y1- PC Sta. 19+54.07

-Y1- POT Sta. 23+46.90

END CONSTRUCTION
-Y1- POT Sta.19+50.00

MATCHLINE TO SHEET 5 -Y1- STA 15+73.91

RDWY EMB.

ALLUVIAL

N 2°55'15.6" E

N 28.6' W

20+00

-Y1-

TWYLA ROAD

GATE

4' WOOD SPLIT RAIL

3' WOOD SPLIT RAIL

WOODS

GRAVEL

BST

FES

15" RCP

18" RCP

42" RCP

30" RCP

INV=284.98'

INV=285.01'

INV=285.62'

INV=286.31'

INV=302.35'

INV=300.81'

INV=296.62'

INV=292.65'

INV=292.62'

GUY

GW

2S FRAME DWELLING

2S MD GARAGE

WELL

CONC

AC

DECK

GEOTECHNICAL FEATURES ADDED BY:

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FALCON ENGINEERING, INC.
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PROJECT REFERENCE NO.	SHEET NO.
45429.1.1(U-5315)	7

SITE PLAN

0 100 200
FEET

590+00
585+00
10+00
15+00
20+00
25+00
INV=309.20'
INV=309.13'
TOP=315.94'
INV=309.16'
30" RCP
Due North
INV=316.88'
INV=316.77'
TOP=323.07'
30" RCP
-NC540-
INV=320.57'
INV=319.43'
TOP=329.81'
I-540 60' BST
S 3°00'00.0"W
SENSOR
MILE 64.2
INV=308.73'
TOP=316.44'
INV=308.45'
RIPRAP
INV=303.41'
R/W MON
WOODS
12' SOIL DRIVE
STEEL PP
WIRE W/BW
-RPB- TS Sta. 12+11.93
-RPB- POT Sta. 10+00.00=
-NC540- POT Sta.590+99.12 (75.13'LT)
-RPB- SC Sta. 14+11.93
TRIASSIC RESIDUAL
-RPB- CS Sta. 17+08.18
-RPB- ST Sta. 19+08.18
TOLL SITE #1
S 35°18'38.2"W
-RPB- TS Sta. 22+07.25
-RPB- SC Sta. 23+57.25
TOP=334.71'
DRIVE
N

MATCHLINE TO SHEET 4 -RPB- STA 25+55.28

GEOTECHNICAL FEATURES ADDED BY:

FALCON ENGINEERING
FALCON ENGINEERING, INC.
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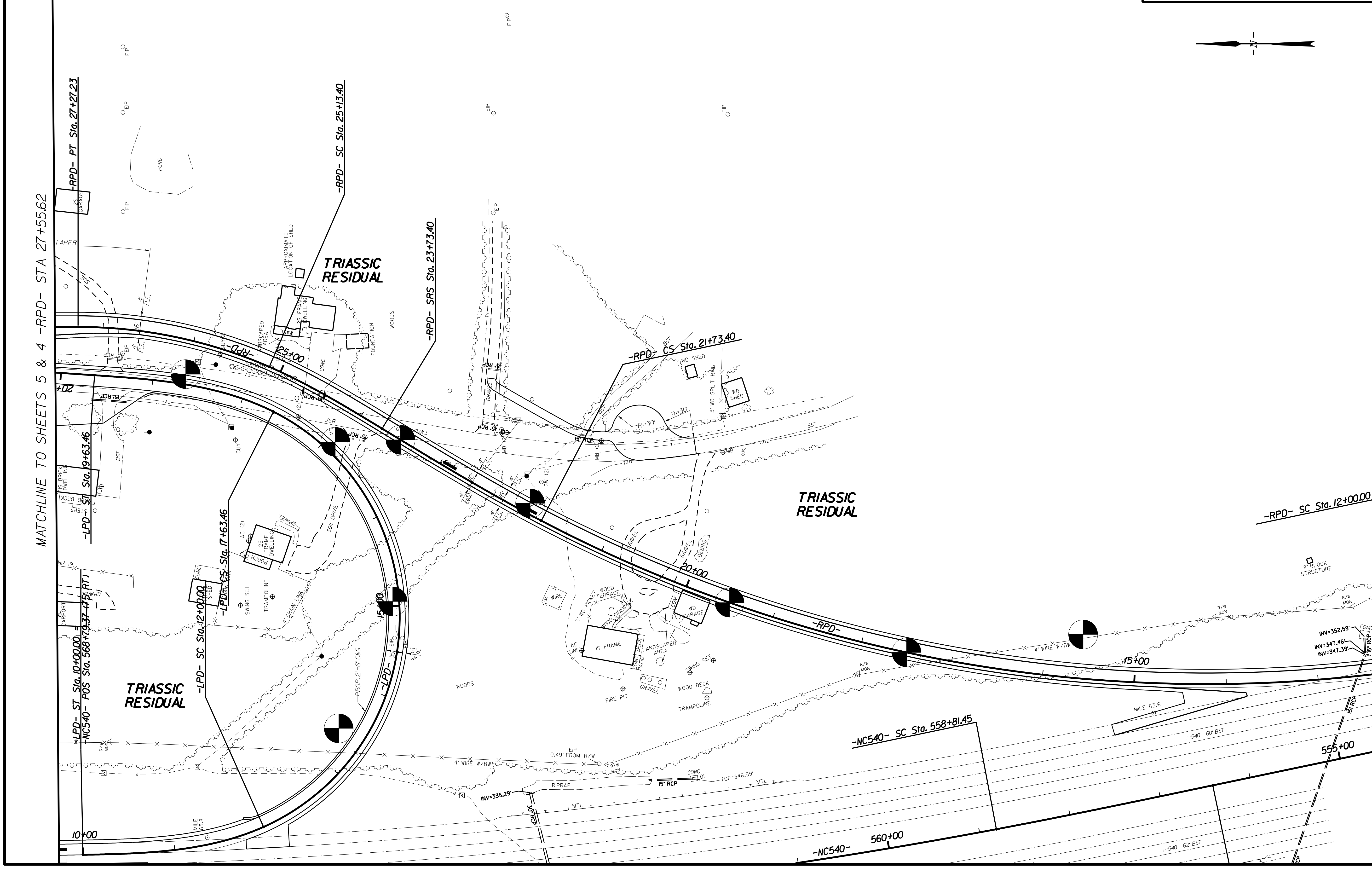
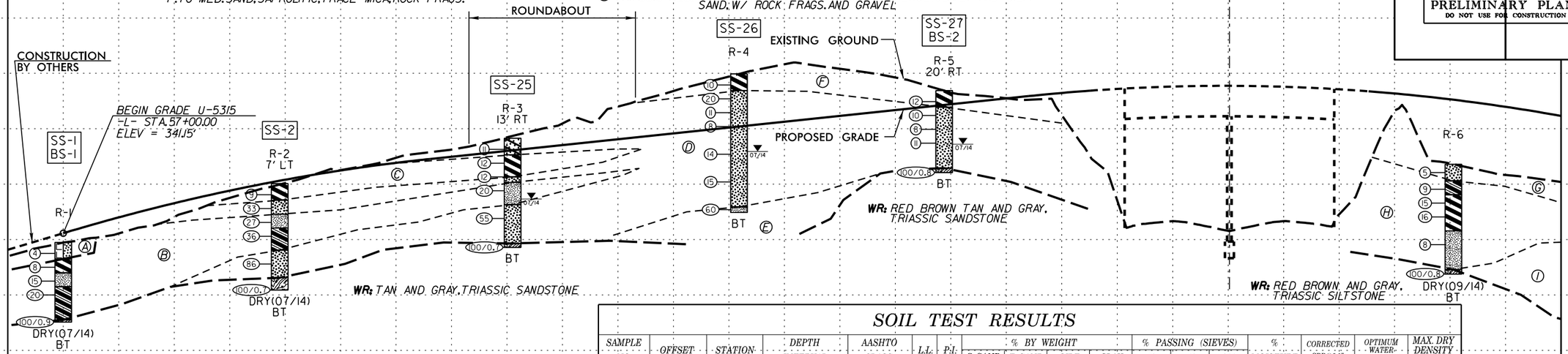
PHONE: 919.871.0800
FAX: 919.871.0803

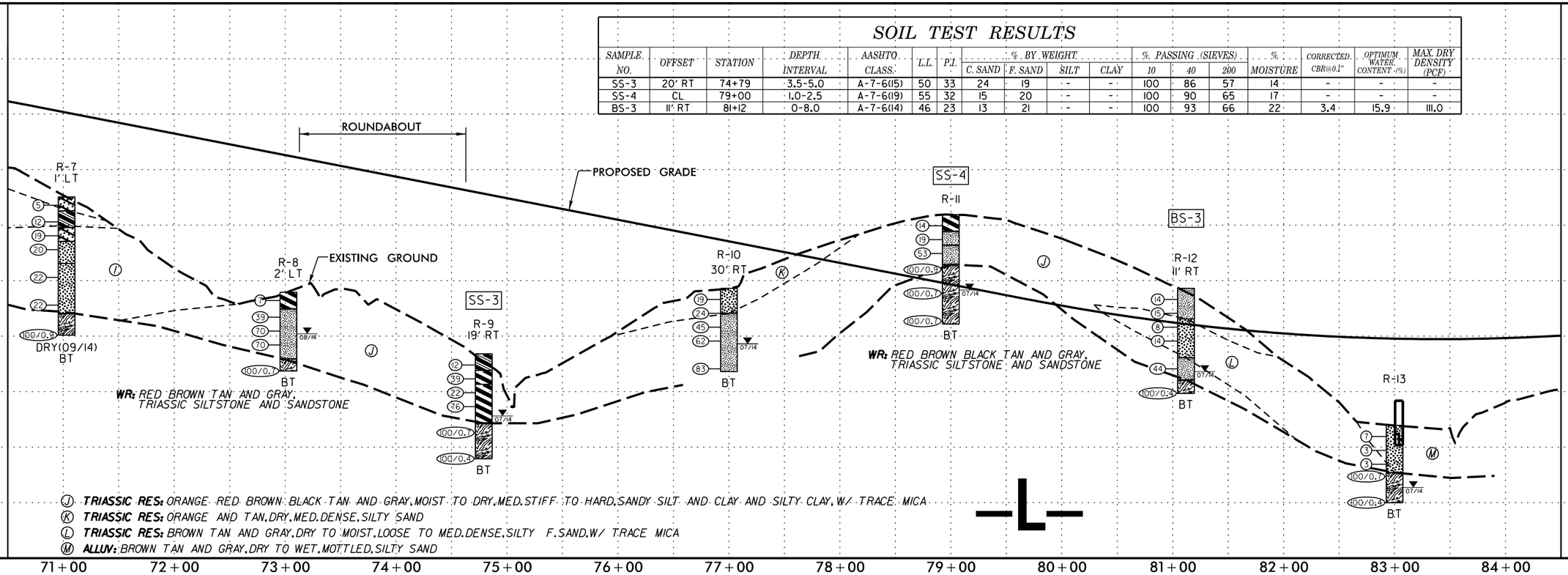
PROJECT REFERENCE NO.	SHEET NO.
45429.1.1(U-5315)	8

SITE PLAN

0 100 200 FEET


MATCHLINE TO SHEETS 5 & 4 -RPD- STA 27+55.62
-RPD- PT Sta. 27+27.23
-RPD- SC Sta. 25+13.40
-RPD- SRS Sta. 23+73.40
-RPD- CS Sta. 21+73.40
-RPD- SC Sta. 12+00.00
-LPD- ST Sta. 9+63.46
-LPD- CS Sta. 17+63.46
-LPD- SC Sta. 12+00.00
-LPD- ST Sta. 10+00.00
-NC540- POS Sta. 568+79.37 (75' RT)
-NC540- SC Sta. 558+81.45
TRIASSIC RESIDUAL
TRIASSIC RESIDUAL
TRIASSIC RESIDUAL
-RPD-
-LPD-
-NC540-
25+00
20+00
15+00
10+00
555+00
560+00
POND
WOODS
WD SHED
WD SHED
WD GARAGE
1S FRAME
2S FRAME DWELLING
8' BLOCK STRUCTURE
TRAMPOLINE
SWING SET
FIRE PIT
WOOD DECK
LANDSCAPED AREA
MILE 63.6
MILE 63.8
RIPRAP
15" RCP
INV=335.29'
INV=352.59'
INV=347.46'
INV=347.39'
TOP=346.59'
I-540 60' BST
I-540 62' BST
4' WIRE W/BW
EIP 0.49' FROM R/W





PROJECT REFERENCE NO.	SHEET NO.
U-5315	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-NC540-

Ⓐ **RDWY EMB:** BROWN AND TAN, DRY, SOFT, SILTY F. SAND

Ⓑ **TRIASSIC RES:** GRAY TAN RED AND BROWN, DRY TO MOIST, F. SANDY SILT AND CLAY, AND SILTY CLAY, W/ TRACE MICA

Ⓒ **TRIASSIC RES:** BROWN AND TAN, DRY, STIFF, SILTY CLAY, W/ ROOTS

Ⓓ **TRIASSIC RES:** RED BROWN GRAY AND TAN, DRY, LOOSE TO V. DENSE, SILTY AND CLAYEY F. TO MED. SAND, SAPROLITIC, TRACE MICA, ROCK FRAGS.

Ⓔ **TRIASSIC RES:** RED BROWN AND TAN, MOIST, V. DENSE, F. SANDY SILT, SAPROLITIC, TRACE MICA

Ⓕ **TRIASSIC RES:** BROWN AND TAN, MOIST, STIFF, SILTY CLAY, W/ ROOTS

Ⓖ **TRIASSIC RES:** GRAY AND TAN, WET, MED. STIFF, SILTY AND CLAYEY MED. SAND

Ⓗ **TRIASSIC RES:** TAN GRAY AND RED, MOIST TO WET, MOTTLED, SANDY CLAY AND SILT, AND SILTY CLAY

Ⓘ **TRIASSIC RES:** ORANGE GRAY AND TAN, MOIST, MED. DENSE, CLAYEY AND SILTY SAND, W/ ROCK FRAGS. AND GRAVEL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-1	CL	57+00	3.5-5.0	A-7-6(24)	55	28	2	18	-	-	100	99	80	28	-	-	-
SS-2	7' LT	58+95	8.5-10.0	A-6(14)	36	15	1	8	-	-	100	99	91	11	-	-	-
SS-25	13' RT	61+50	3.5-5.0	A-7-6(25)	56	29	9	10	-	-	100	94	81	23	-	-	-
SS-26	CL	63+09	1.0-2.5	A-7-6(34)	72	43	13	11	-	-	99	89	75	21	-	-	-
SS-27	CL	64+94	1.0-2.5	A-7-5(27)	87	56	35	8	-	-	98	69	55	X	-	-	-
BS-1	CL	57+00	0-5.0	A-7-6(24)	53	29	7	14	-	-	99	95	78	22	2.4	19.2	102.6
BS-2	20' RT	64+94	0-4.0	A-7-6(11)	57	35	41	12	-	-	98	65	46	18	6.2	13.8	115.2

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-3	20' RT	74+79	3.5-5.0	A-7-6(15)	50	33	24	19	-	-	100	86	57	14	-	-	-
SS-4	CL	79+00	1.0-2.5	A-7-6(19)	55	32	15	20	-	-	100	90	65	17	-	-	-
BS-3	11' RT	81+12	0-8.0	A-7-6(14)	46	23	13	21	-	-	100	93	66	22	3.4	15.9	111.0

Ⓙ **TRIASSIC RES:** ORANGE RED BROWN BLACK TAN AND GRAY, MOIST TO DRY, MED. STIFF TO HARD, SANDY SILT AND CLAY AND SILTY CLAY, W/ TRACE MICA

Ⓚ **TRIASSIC RES:** ORANGE AND TAN, DRY, MED. DENSE, SILTY SAND

Ⓛ **TRIASSIC RES:** BROWN TAN AND GRAY, DRY TO MOIST, LOOSE TO MED. DENSE, SILTY F. SAND, W/ TRACE MICA

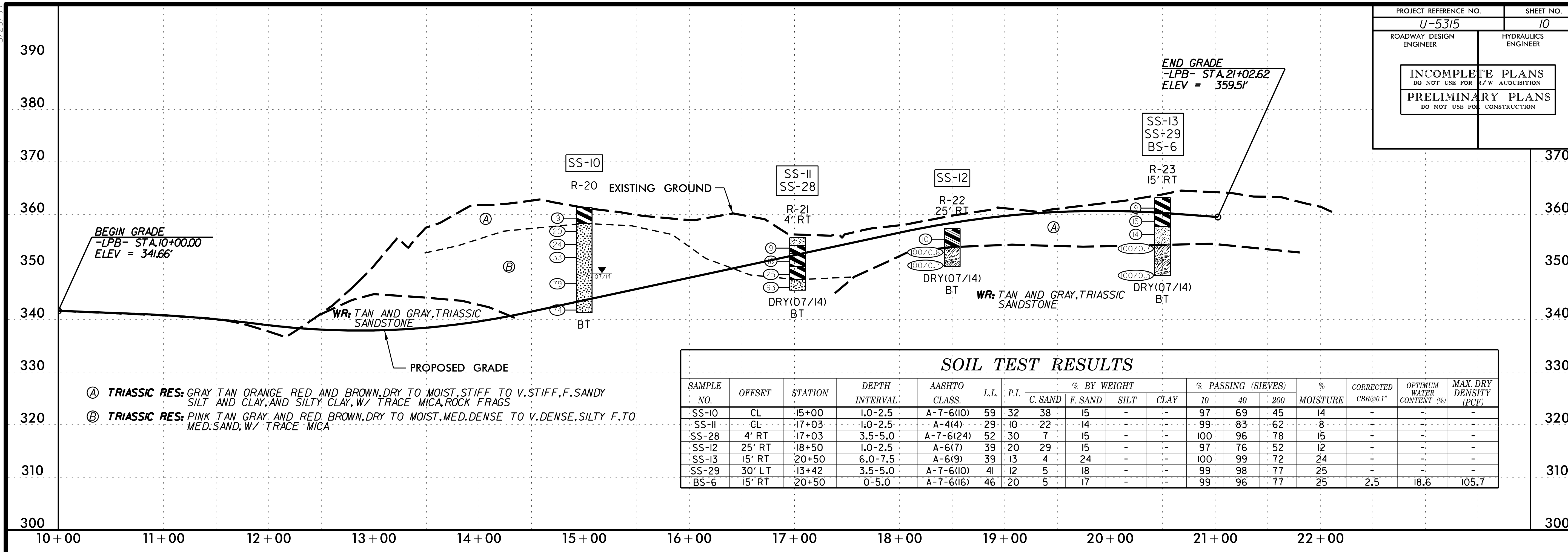
Ⓜ **ALLUV:** BROWN TAN AND GRAY, DRY TO WET, MOTTLED, SILTY SAND

-L-

PROJECT REFERENCE NO.	SHEET NO.
U-5315	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

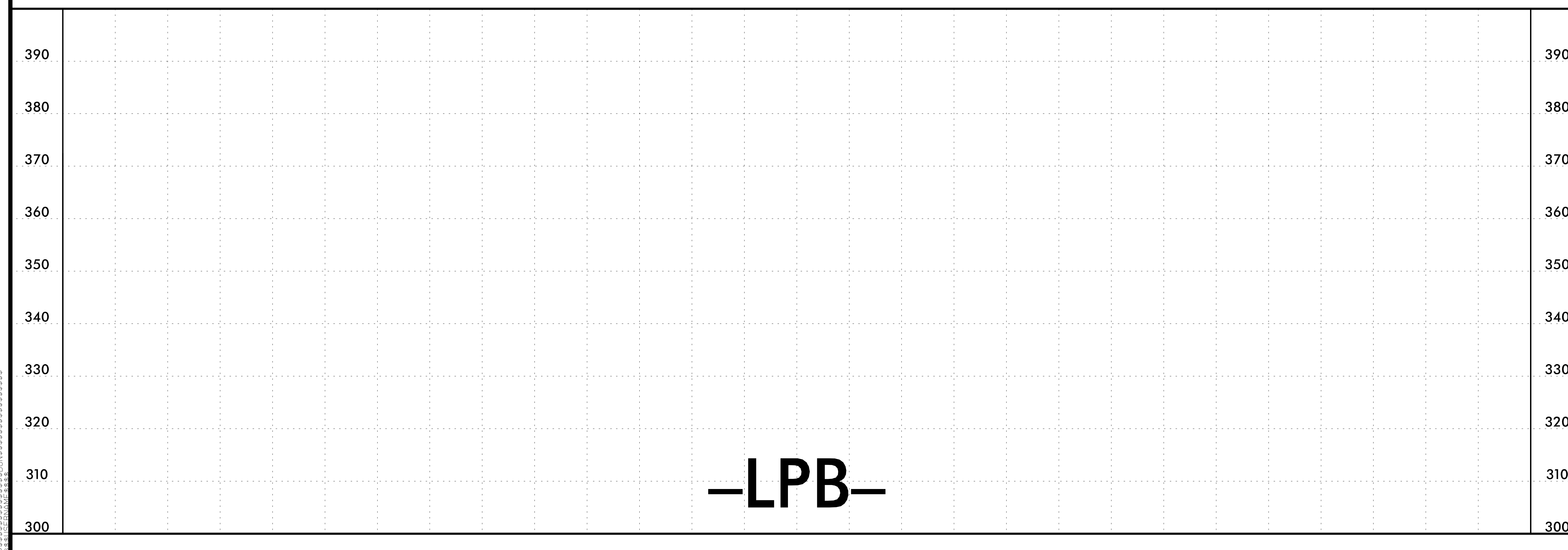
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

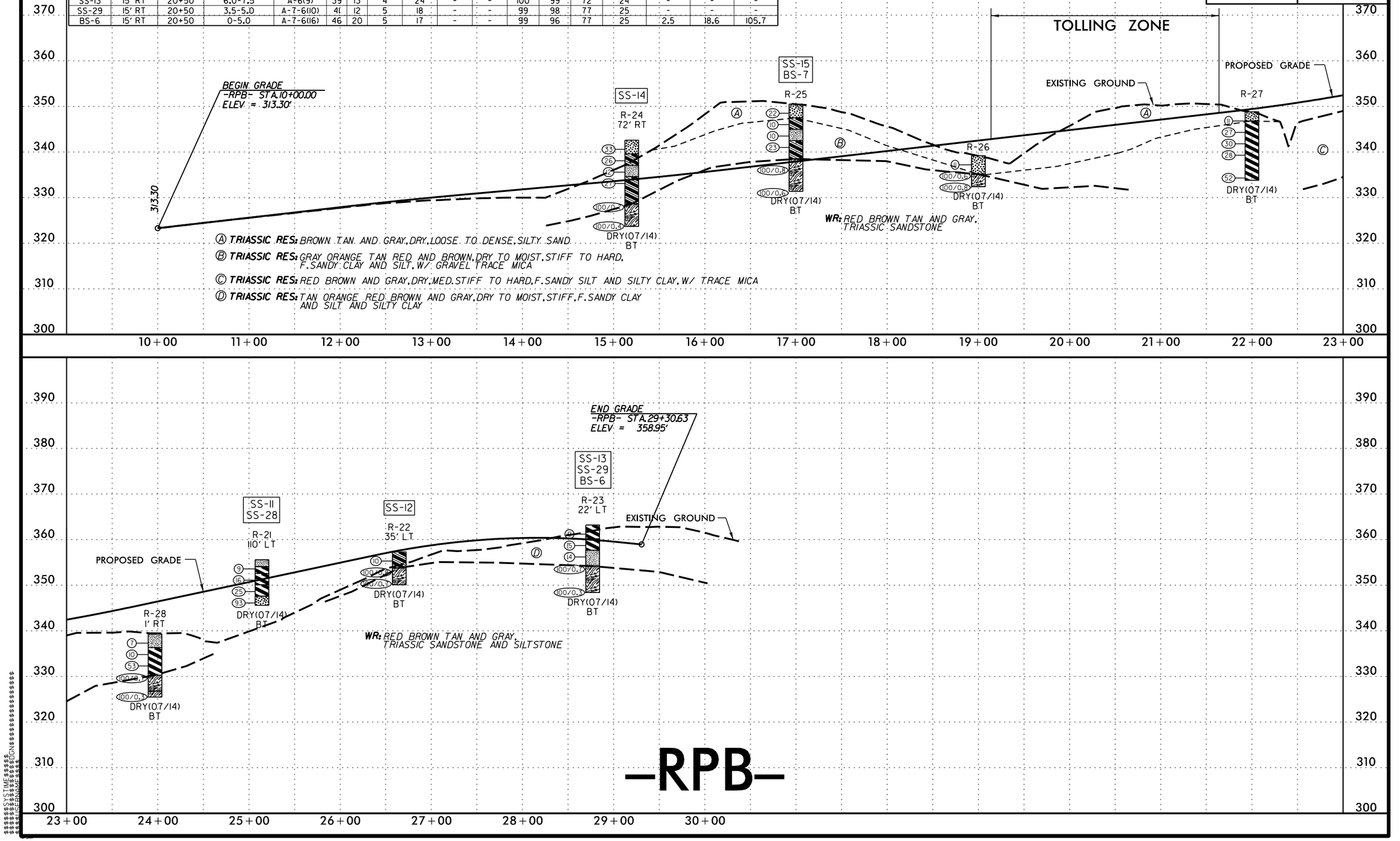


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT	CLAY	10	40	200				
SS-10	CL	15+00	1.0-2.5	A-7-6(10)	59	32	38	15	-	-	97	69	45	14	-	-	-
SS-11	CL	17+03	1.0-2.5	A-4(4)	29	10	22	14	-	-	99	83	62	8	-	-	-
SS-28	4' RT	17+03	3.5-5.0	A-7-6(24)	52	30	7	15	-	-	100	96	78	15	-	-	-
SS-12	25' RT	18+50	1.0-2.5	A-6(7)	39	20	29	15	-	-	97	76	52	12	-	-	-
SS-13	15' RT	20+50	6.0-7.5	A-6(9)	39	13	4	24	-	-	100	99	72	24	-	-	-
SS-29	30' LT	13+42	3.5-5.0	A-7-6(10)	41	12	5	18	-	-	99	98	77	25	-	-	-
BS-6	15' RT	20+50	0-5.0	A-7-6(16)	46	20	5	17	-	-	99	96	77	25	2.5	18.6	105.7



-LPB-



5/28/99

PROJECT REFERENCE NO.	SHEET NO.
U-5315	11

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	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-14	72' RT	15+20	8.5-10.0	A-6(8)	36	13	3	27	-	-	100	99	70	14	-	-	-
SS-15	CL	17+00	8.5-10.0	A-6(9)	36	13	2	22	-	-	100	99	76	16	-	-	-
BS-7	CL	17+00	0-10.0	A-7-6(17)	50	28	13	20	-	-	99	92	67	21	2.9	13.2	116.9
SS-11	4' RT	17+03	1.0-2.5	A-4(4)	29	10	22	14	-	-	99	83	62	8	-	-	-
SS-28	4' RT	17+03	3.5-5.0	A-7-6(24)	52	30	7	15	-	-	100	96	78	15	-	-	-
SS-12	25' RT	18+50	1.0-2.5	A-6(7)	39	20	29	15	-	-	97	76	52	12	-	-	-
SS-13	15' RT	20+50	6.0-7.5	A-6(9)	39	13	4	24	-	-	100	99	72	24	-	-	-
SS-29	15' RT	20+50	3.5-5.0	A-7-6(10)	41	12	5	18	-	-	99	98	77	25	-	-	-
BS-6	15' RT	20+50	0-5.0	A-7-6(16)	46	20	5	17	-	-	99	96	77	25	2.5	18.6	105.7

WR: RED BROWN TAN AND GRAY, TRIASSIC SANDSTONE

Ⓐ **TRIASSIC RES:** BROWN TAN AND GRAY, DRY, LOOSE TO DENSE, SILTY SAND

Ⓑ **TRIASSIC RES:** GRAY ORANGE TAN RED AND BROWN, DRY TO MOIST, STIFF TO HARD, F.SANDY CLAY AND SILT, W/ GRAVEL TRACE MICA

Ⓒ **TRIASSIC RES:** RED BROWN AND GRAY, DRY, MED.STIFF TO HARD, F.SANDY SILT AND SILTY CLAY, W/ TRACE MICA

Ⓓ **TRIASSIC RES:** TAN ORANGE RED BROWN AND GRAY, DRY TO MOIST, STIFF, F.SANDY CLAY AND SILT AND SILTY CLAY

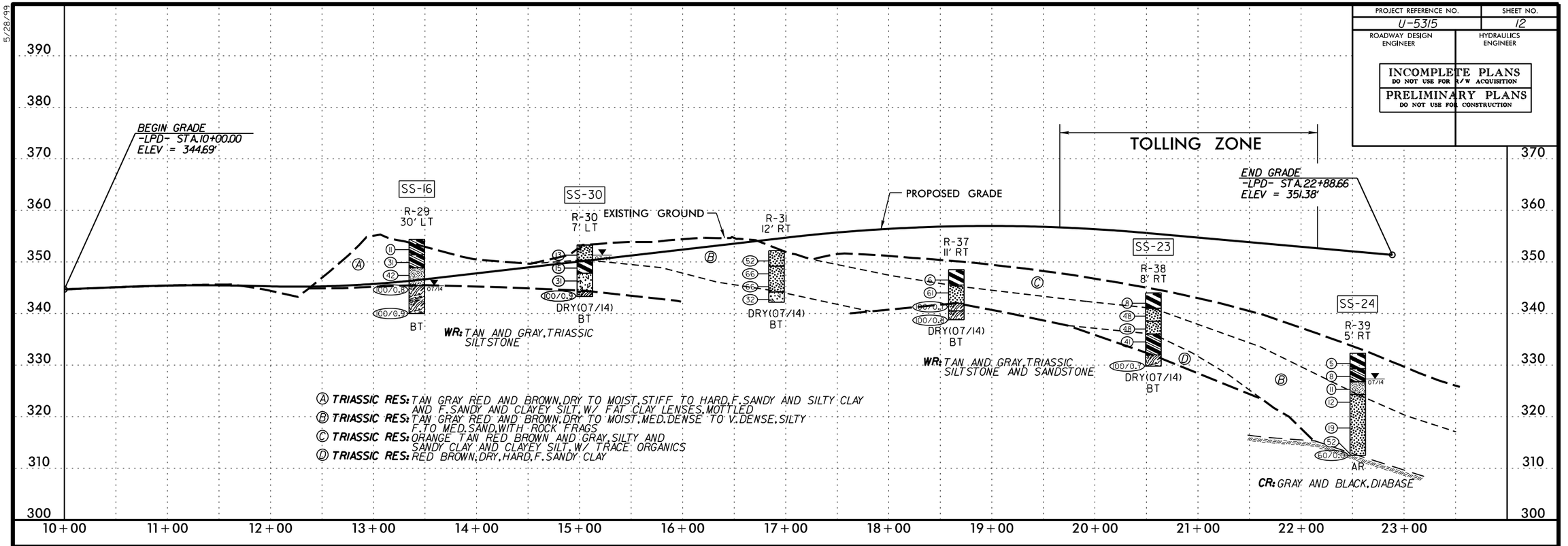
WR: RED BROWN TAN AND GRAY, TRIASSIC SANDSTONE AND SILTSTONE

-RPB-

PROJECT REFERENCE NO.	SHEET NO.
U-5315	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

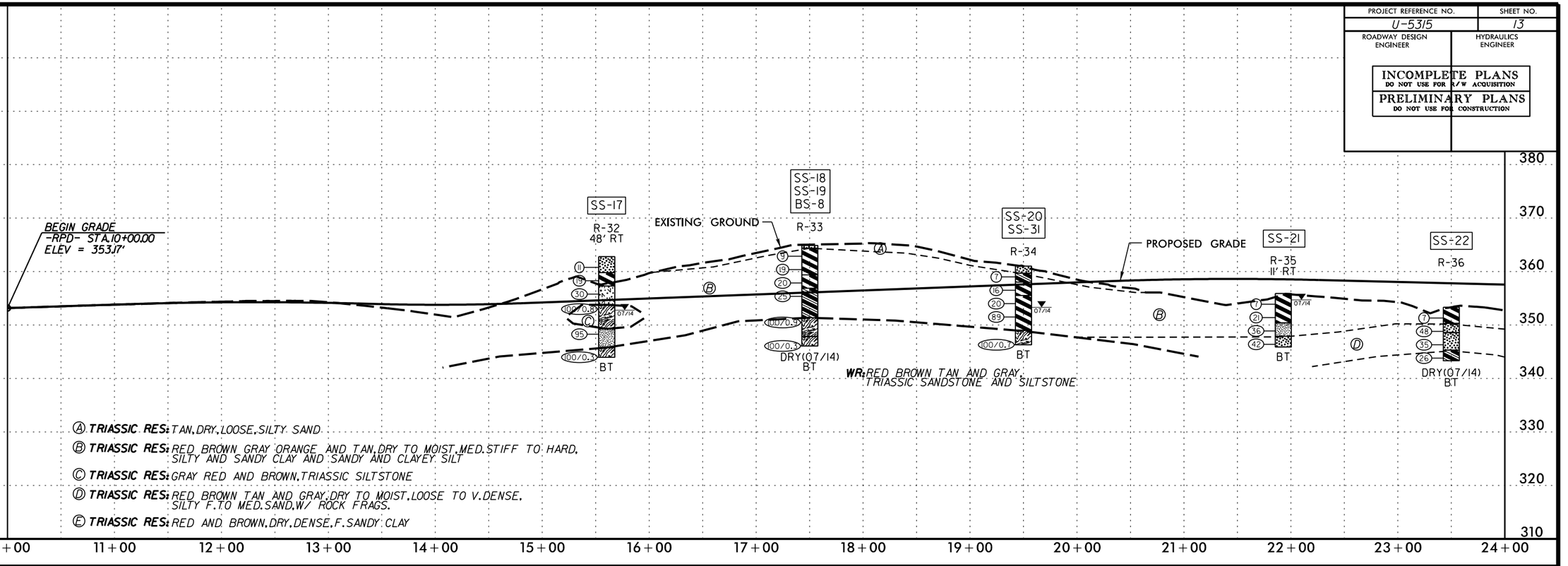
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

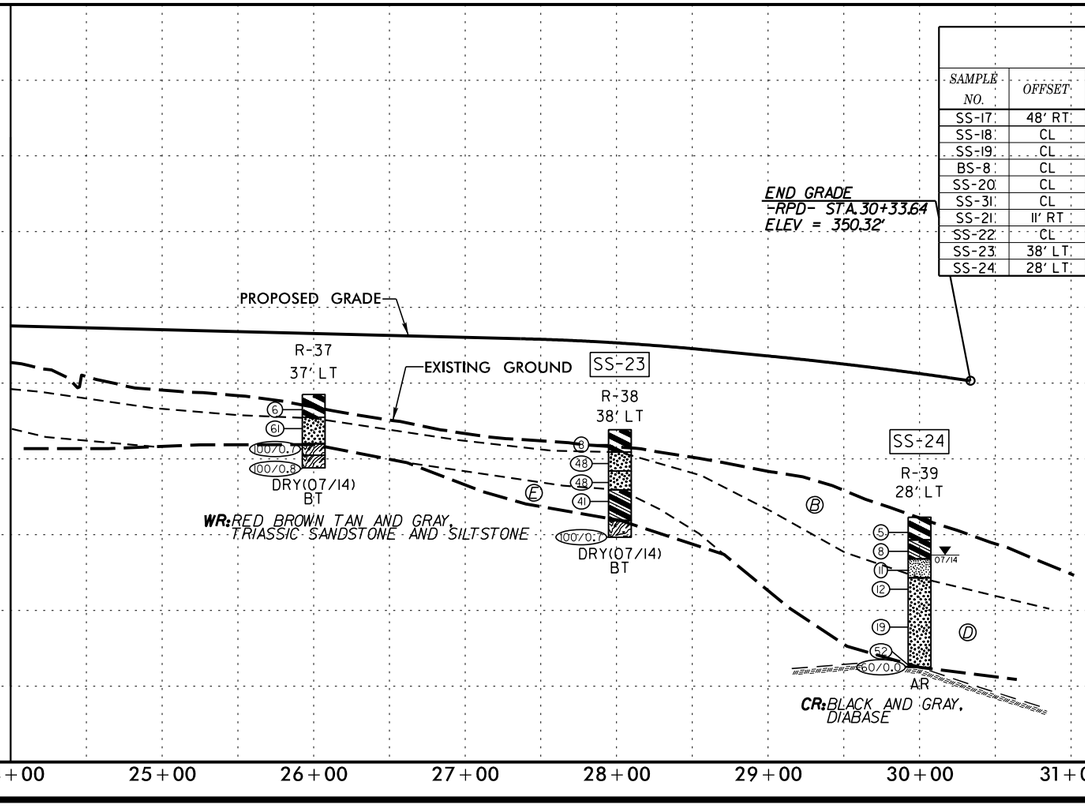


SOIL TEST RESULTS

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	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-16	CL	57+00	3.5-5.0	A-6(9)	34	13	2	18	-	-	100	99	80	10	-	-	-
SS-30	7' LT	58+95	8.5-10.0	A-7-6(39)	74	53	12	15	-	-	99	91	73	19	-	-	-
SS-23	13' RT	61+50	3.5-5.0	A-7-6(35)	75	49	13	17	-	-	100	93	70	25	-	-	-
SS-24	CL	63+09	1.0-2.5	A-7-5(76)	104	67	2	4	-	-	100	99	94	44	-	-	-

-LPD-





PROJECT REFERENCE NO.	SHEET NO.
U-5315	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Ⓐ **TRIASSIC RES:** TAN, DRY, LOOSE, SILTY SAND

Ⓑ **TRIASSIC RES:** RED BROWN GRAY ORANGE AND TAN, DRY TO MOIST, MED. STIFF TO HARD, SILTY AND SANDY CLAY AND SANDY AND CLAYEY SILT

Ⓒ **TRIASSIC RES:** GRAY RED AND BROWN, TRIASSIC SILTSTONE

Ⓓ **TRIASSIC RES:** RED BROWN TAN AND GRAY, DRY TO MOIST, LOOSE TO V.DENSE, SILTY F. TO MED. SAND, W/ ROCK FRAGS.

Ⓔ **TRIASSIC RES:** RED AND BROWN, DRY, DENSE, F. SANDY CLAY

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	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-17	48' RT	15+60	3.5-5.0	A-6(10)	35	13	6	18	-	-	100	96	76	12	-	-	-
SS-18	CL	17+50	3.5-5.0	A-7-6(62)	89	63	3	9	-	-	100	97	87	22	-	-	-
SS-19	CL	17+50	8.5-10.0	A-6(13)	39	20	5	21	-	-	100	98	74	11	-	-	-
BS-8	CL	17+50	0-8.0	A-7-6(35)	33	15	8	12	-	-	100	92	67	18	2.2	16.9	109.9
SS-20	CL	19+50	1.0-2.5	A-6(4)	33	15	30	18	-	-	99	77	51	7	-	-	-
SS-31	CL	19+50	3.5-5.0	A-7-6(33)	60	32	2	8	-	-	100	99	90	18	-	-	-
SS-21	11' RT	21+93	3.5-5.0	A-7-6(28)	51	29	1	10	-	-	100	100	89	19	-	-	-
SS-22	CL	23+50	1.0-2.5	A-7-5(34)	66	36	6	10	-	-	100	96	84	28	-	-	-
SS-23	38' LT	28+02	1.0-2.5	A-7-6(35)	75	49	13	17	-	-	100	93	70	25	-	-	-
SS-24	28' LT	30+00	1.0-2.5	A-7-5(76)	104	67	2	4	-	-	100	99	94	44	-	-	-

-RPD-

PROJECT REFERENCE NO.	SHEET NO.
U-5315	14

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	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT	CLAY	10	40	200				
SS-5	17' RT	13+00	6.0-7.5	A-7-6(34)	56	37	2	10	-	-	100	99	87	23	-	-	-
SS-6	11' RT	15+00	3.5-5.0	A-7-5(52)	88	48	4	7	-	-	100	99	89	55	-	-	-
SS-7	11' RT	17+00	3.5-5.0	A-7-6(14)	43	28	15	23	-	-	100	92	61	17	-	-	-
SS-8	11' RT	19+00	1.0-2.5	A-6(3)	30	11	28	21	-	-	99	80	51	21	-	-	-
BS-4	11' RT	19+00	0-5.0	A-6(4)	33	16	25	21	-	-	94	79	49	16	11.2	10.2	122.7

Ⓐ **RDWY EMB:** TAN, DRY, LOOSE, SILTY SAND

Ⓑ **RDWY EMB:** TAN AND GRAY, MOIST, LOOSE, CLAYEY SAND

Ⓒ **RDWY EMB:** DK. AND LT. GRAY, MOIST, MED. STIFF, SANDY CLAY, W/ TRACE ORGANICS

Ⓓ **TRIASSIC RES:** GRAY BLACK AND TAN, DRY TO MOIST, LOOSE TO DENSE, CLAYEY AND SILTY F. TO MED. SAND, W/ TRACE MICA

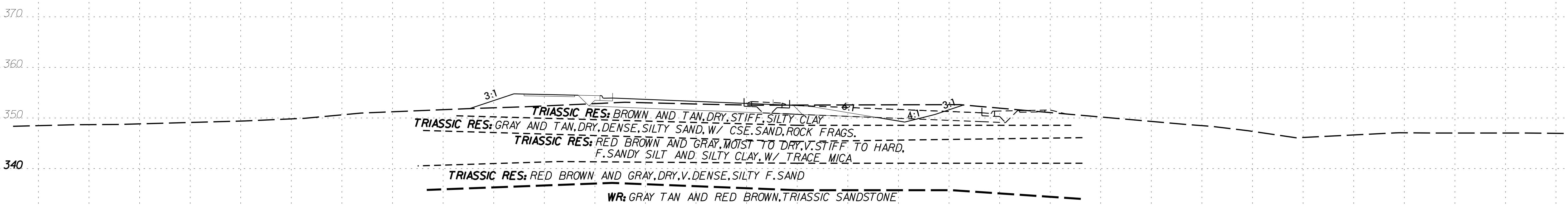
Ⓔ **TRIASSIC RES:** BROWN BLUE GRAY ORANGE AND TAN, DRY, MED. STIFF TO HARD, F. SANDY CLAY AND SILT AND SILTY CLAY, W/ TRACE MICA, TRACE TO LITTLE ORGANICS

Ⓕ **TRIASSIC RES:** BROWN TAN AND BLACK, WET, LOOSE, CLAYEY F. SAND AND POORLY -GRADED SAND, W/ GRAVEL

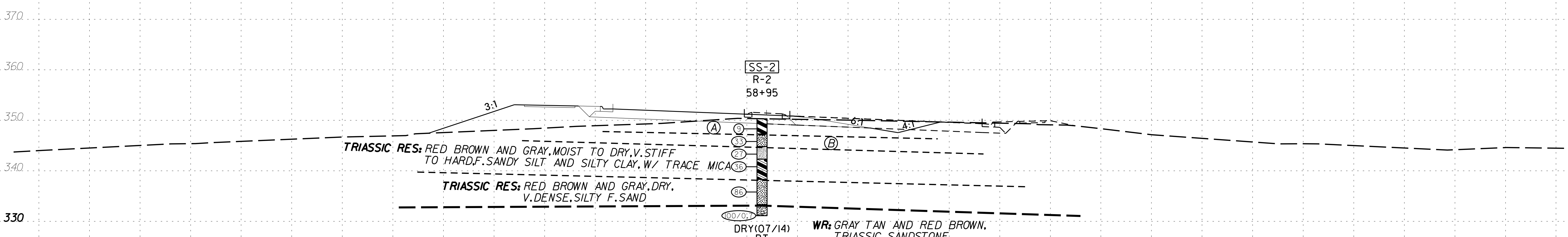
-Y1-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-2	7' LT	58+95	8.5-10.0	A-6(14)	36	15	1	8	91	100	99	91	11	-	-	-



59+50.00



Ⓐ **TRIASSIC RES:** BROWN AND TAN,DRY,STIFF,SILTY CLAY

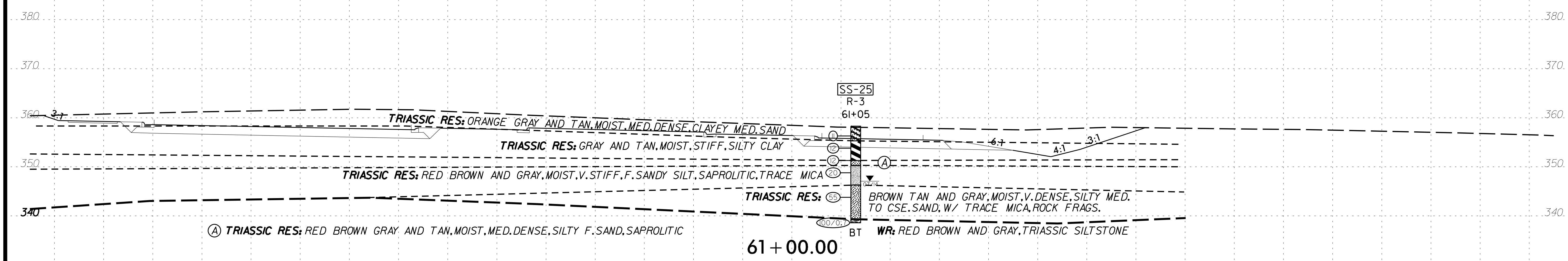
Ⓑ **TRIASSIC RES:** GRAY AND TAN,DRY,DENSE,SILTY SAND,W/ CSE.SAND,ROCK FRAGS.

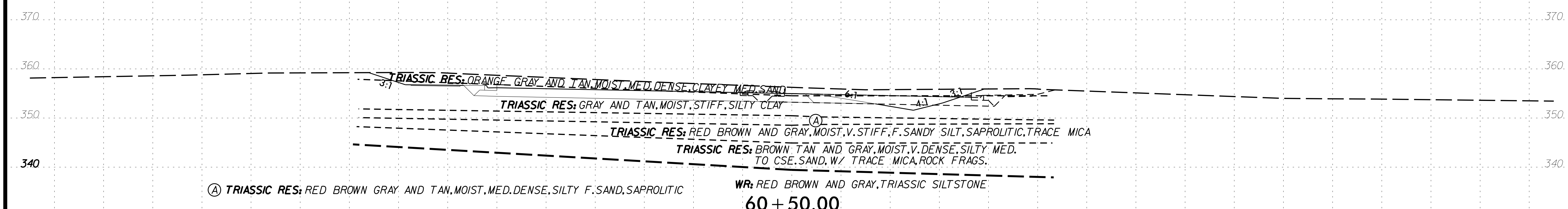
59+00.00

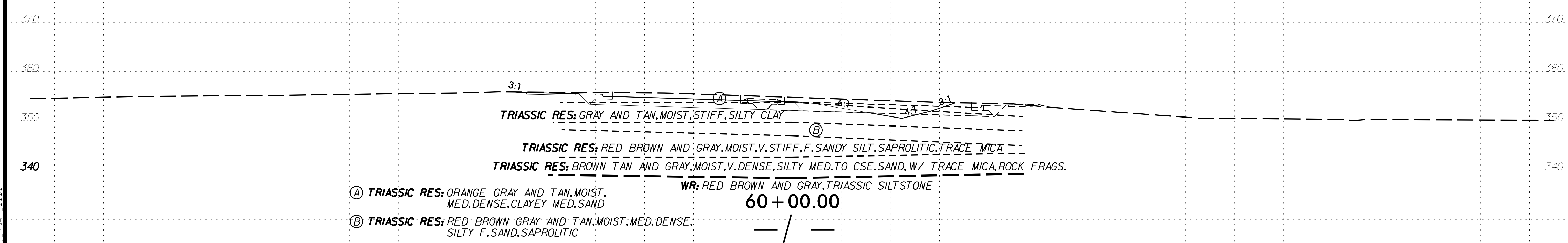
-L-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-25	13' RT	61+50	3.5-5.0	A-7-6(25)	56	29	9	10	81	100	94	81	23	-	-	-







8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	17

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

380 370 360 350 340 330

3:1 6:1 4:1 3:1

TRIASSIC RES: RED BROWN AND TAN,MOIST TO WET,MED.DENSE TO V.DENSE, SILTY AND CLAYEY SAND,W/ CLAY LAYERS,TRACE MICA,CSE.SAND

Ⓐ

Ⓑ

TRIASSIC RES: RED BROWN AND TAN,MOIST TO WET,MED.DENSE TO V.DENSE, SILTY AND CLAYEY SAND,W/ CLAY LAYERS,TRACE MICA,CSE.SAND

Ⓒ

WR: RED-BROWN AND GRAY,TRIASSIC SILTSTONE

Ⓐ **TRIASSIC RES:** GRAY AND TAN,MOIST,STIFF,SILTY CLAY

Ⓑ **TRIASSIC RES:** RED-BROWN AND GRAY,MOIST,V.STIFF TO HARD,F.SANDY SILT,SAPROLITIC,TRACE MICA

Ⓒ **TRIASSIC RES:** RED BROWN AND TAN,MOIST,HARD,F.SANDY SILT,SAPROLITIC,TRACE MICA

62+00.00

INTERSECTION –LPB– & –RPB– Ⓡ ROUNDABOUT SHEAR LINE

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

TRIASSIC RES: GRAY AND TAN,MOIST,STIFF,SILTY CLAY

Ⓐ

TRIASSIC RES: RED BROWN AND GRAY,MOIST,V.STIFF,F.SANDY SILT,SAPROLITIC,TRACE MICA

TRIASSIC RES: BROWN TAN AND GRAY,MOIST,V.DENSE,SILTY MED. TO CSE.SAND,W/ TRACE MICA,ROCK FRAGS.

WR: RED BROWN AND GRAY,TRIASSIC SILTSTONE

Ⓐ **TRIASSIC RES:** RED BROWN GRAY AND TAN,MOIST,MED.DENSE,SILTY F.SAND,SAPROLITIC

61+50.00

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

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-26	CL	63+09	1.0-2.5	A-7-6(34)	72	43	13	11	75	99	89	75	21	-	-	-

TRIASSIC RES: RED BROWN AND TAN, MOIST TO WET, MED. DENSE TO V. DENSE, SILTY AND CLAYEY SAND, W/ CLAY PIECES, TRACE MICA, CSE. SAND

TRIASSIC RES: RED BROWN AND TAN, MOIST, HARD, F. SANDY SILT, SAPROLITIC, TRACE MICA

Ⓐ **TRIASSIC RES:** BROWN AND TAN, MOIST, STIFF, SILTY CLAY, W/ ROOTS

63 + 00.00

TRIASSIC RES: RED BROWN AND TAN, MOIST TO WET, MED. DENSE TO V. DENSE, SILTY AND CLAYEY SAND, W/ CLAY LAYERS, TRACE MICA, CSE. SAND

TRIASSIC RES: RED BROWN AND TAN, MOIST, HARD, F. SANDY SILT, SAPROLITIC, TRACE MICA

Ⓐ **TRIASSIC RES:** BROWN AND TAN, MOIST, STIFF, SILTY CLAY, W/ ROOTS

62 + 50.00

—L—

PROJ. REFERENCE NO.	SHEET NO.
U-5315	19

64 + 00.00

63 + 50.00

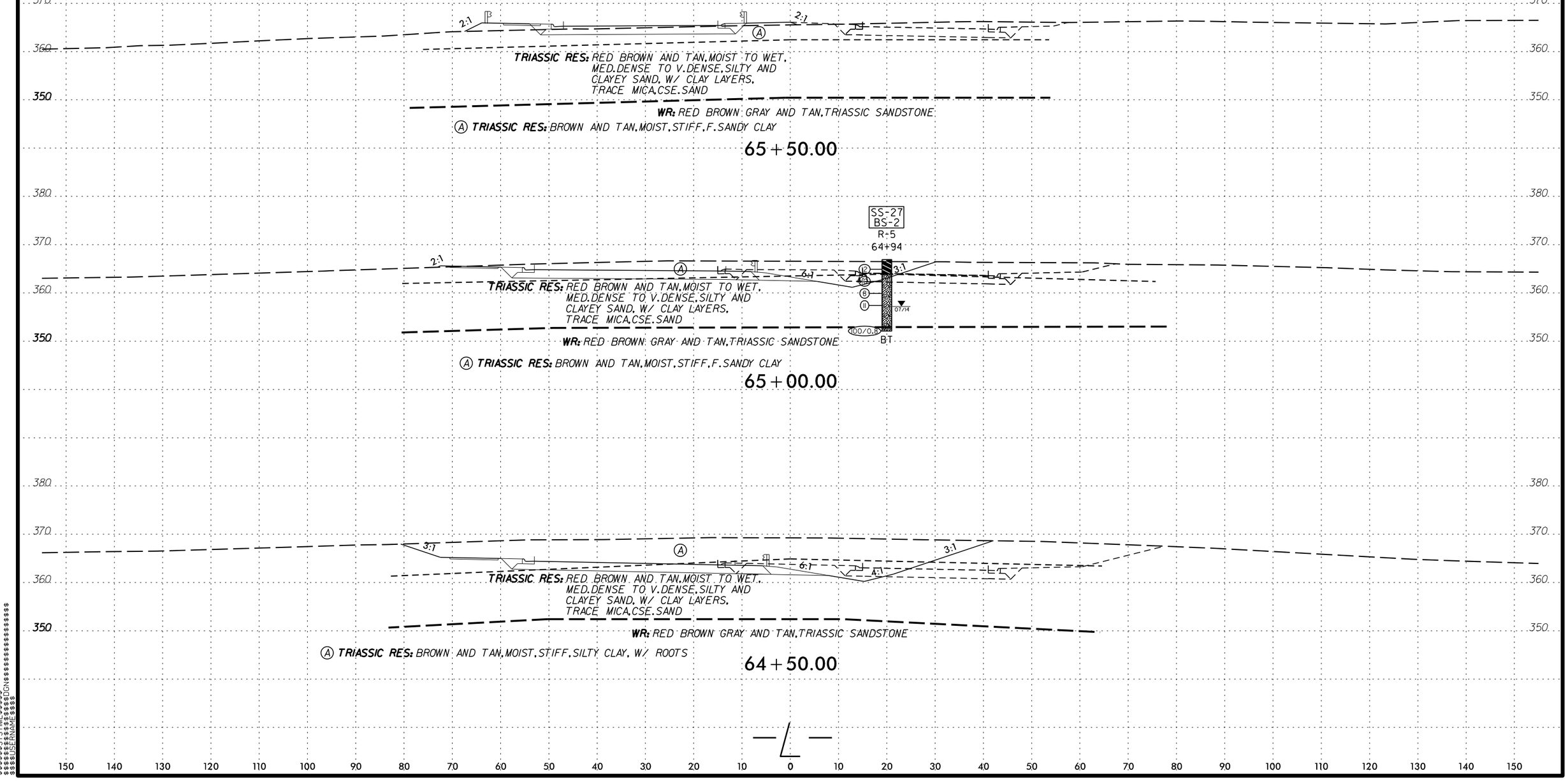
— L —

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	20

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-27	CL	64+94	1.0-2.5	A-7-5(27)	87	56	35	8	55	98	69	55	15	-	-	-
BS-2	20' RT	64+94	0-4.0	A-7-6(11)	57	35	41	12	46	98	65	46	18	6.2	13.8	115.2



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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	21

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

380 370 360 350 340 330 420 410 400 390 380 370 360 350 340 330

ROADWAY EMBANKMENT

TRIASSIC RES: RED BROWN AND TAN, MOIST TO WET, MED. DENSE TO V. DENSE, SILTY AND CLAYEY SAND, W/ CLAY LAYERS, TRACE MICA, CSE. SAND

66 + 50.00

2:1 3:1

ROADWAY EMBANKMENT

RES: RED BROWN AND TAN, MOIST TO WET, MED. DENSE TO V. DENSE, SILTY AND CLAYEY SAND, W/ FAT CLAY PIECES, TRACE MICA, CSE. SAND

WR: RED BROWN GRAY AND TAN, TRIASSIC SANDSTONE

66 + 00.00

—/—

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

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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	22

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

400
390
380
370
360
350
340
330

4:1

6:1

TRIASSIC RES: BROWN GRAY AND TAN MOIST, STIFF TO V.STIFF, F. SANDY SILT AND SILTY CLAY

WR: TAN BROWN AND GRAY, TRIASSIC SANDSTONE

11+00.00

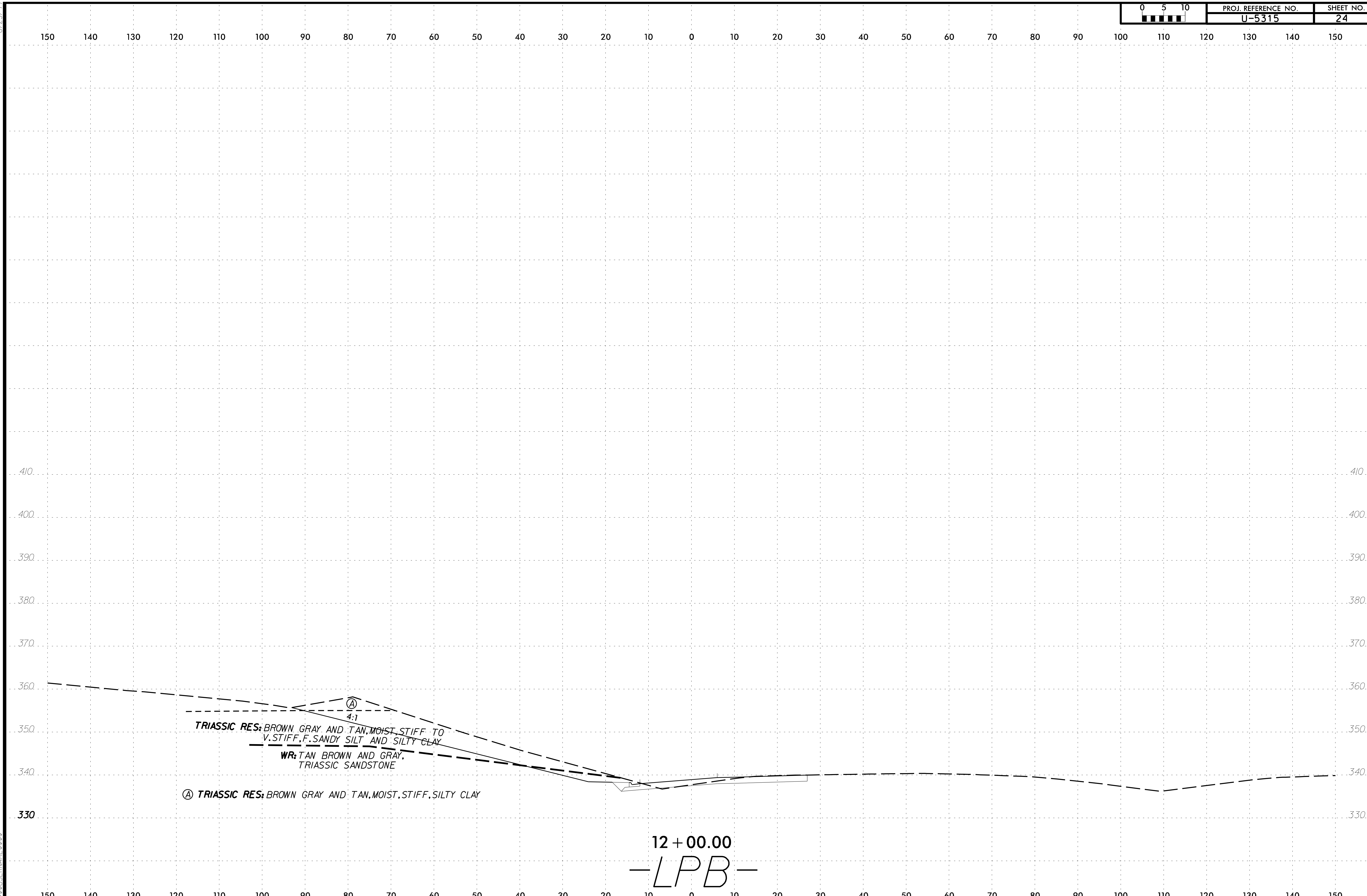
-LPB-

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

PROJ. REFERENCE NO.	SHEET NO.
U-5315	23

11+50.00

-LPB-



PROJ. REFERENCE NO.
U-5315
SHEET NO.
24
0 5 10
TRIASSIC RES: BROWN GRAY AND TAN, MOIST, STIFF TO V. STIFF, F. SANDY SILT AND SILTY CLAY
WR: TAN BROWN AND GRAY, TRIASSIC SANDSTONE
Ⓐ TRIASSIC RES: BROWN GRAY AND TAN, MOIST, STIFF, SILTY CLAY
4:1
12+00.00
-LPB-

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	25

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

420
410
400
390
380
370
360
350
340
330

4:1

6:1

Ⓐ **TRIASSIC RES:** TAN, DRY, MED. DENSE, SILTY SAND.

Ⓑ **TRIASSIC RES:** BROWN GRAY AND TAN, MOIST, STIFF, SILTY CLAY

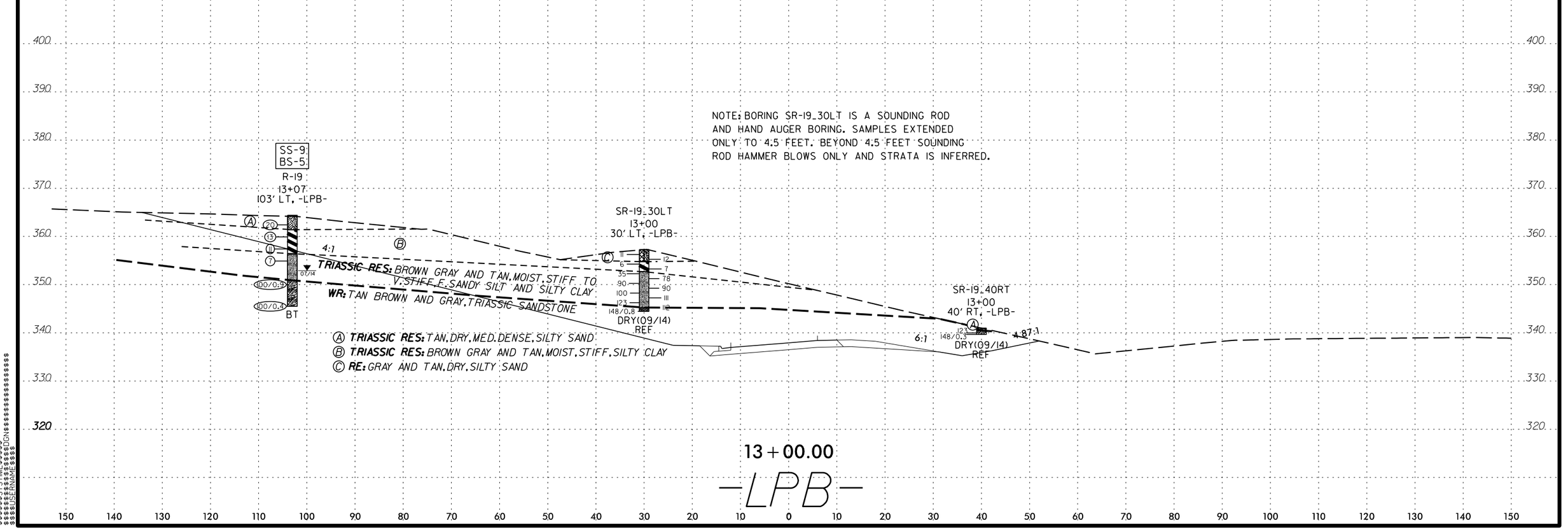
TRIASSIC RES: BROWN GRAY AND TAN, MOIST, STIFF TO V. STIFF, F. SANDY SILT AND SILTY CLAY

WR: TAN BROWN AND GRAY, TRIASSIC SANDSTONE

12 + 50.00

-LPB-

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



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-9	103' LT	13+07	6.0-7.5	A-7-6(30)	66	37	7	17	76	100	97	76	29	-	-	-
BS-5	103' LT	13+07	0-10.0	A-7-6(33)	69	42	10	16	75	100	94	75	26	3.3	17.1	107.9

NOTE: BORING SR-19_30LT IS A SOUNDING ROD AND HAND AUGER BORING. SAMPLES EXTENDED ONLY TO 4.5 FEET. BEYOND 4.5 FEET SOUNDING ROD HAMMER BLOWS ONLY AND STRATA IS INFERRED.

Ⓐ **TRIASSIC RES:** TAN, DRY, MED. DENSE, SILTY SAND
Ⓑ **TRIASSIC RES:** BROWN GRAY AND TAN, MOIST, STIFF, SILTY CLAY
Ⓒ **RE:** GRAY AND TAN, DRY, SILTY SAND

13+00.00
-LPB-

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	27

TRIASSIC RES: BROWN GRAY ORANGE AND TAN, MOIST, STIFF TO V. STIFF, F. SANDY SILT AND SILTY CLAY, W/ ROCK FRAGS.

WR: TAN BROWN AND GRAY, TRIASSIC SANDSTONE

Ⓐ **TRIASSIC RES:** TAN BROWN AND ORANGE, MOIST, STIFF TO V. STIFF, SILTY CLAY, W/ GRAVEL, ROCK FRAGS.

Ⓑ **TRIASSIC RES:** RED-BROWN PINK TAN BLACK AND GRAY, DRY TO WET, MED. DENSE TO V. DENSE, SILTY SAND, W/ TRACE MICA

13+50.00

-LPB-

8/23/99

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	28

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

390 380 370 360 350 340

TRIASSIC RES: BROWN GRAY ORANGE AND TAN, MOIST, STIFF TO V.STIFF, F. SANDY SILT AND SILTY CLAY, W/ ROCK FRAGS.

TRIASSIC RES: RED-BROWN PINK TAN BLACK AND GRAY, DRY TO WET, MED. DENSE TO V. DENSE, SILTY SAND, W/ TRACE MICA

4:1 6:1 4:1

14+50.00

400 390 380 370 360 350 340

TRIASSIC RES: BROWN GRAY ORANGE AND TAN, MOIST, STIFF TO V.STIFF, F. SANDY SILT AND SILTY CLAY, W/ ROCK FRAGS.

TRIASSIC RES: RED-BROWN PINK TAN BLACK AND GRAY, DRY TO WET, MED. DENSE TO V. DENSE, SILTY SAND, W/ TRACE MICA

WR: TAN BROWN AND GRAY, TRIASSIC SANDSTONE

4:1 6:1 4:1

14+00.00

—LPB—

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

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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	29

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

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-10	CL	15+00	1.0-2.5	A-7-6(10)	59	32	38	15	45	97	69	45	14	-	-	-

390 380 370 360 350

Ⓐ **TRIASSIC RES:** TAN BROWN AND ORANGE, MOIST, V.STIFF, SILTY CLAY, W/ GRAVEL, ROCK FRAGS.

TRIASSIC RES: PINK TAN BLACK AND GRAY, DRY TO WET, MED. DENSE TO V. DENSE, SILTY SAND, W/ TRACE MCIA

4:1 4:1 6:1

15+50.00

390 380 370 360 350

SS-10
R-20
19 20 24 33 79 74
07/14
BT

TRIASSIC RES: PINK TAN BLACK AND GRAY, DRY TO WET, MED. DENSE TO V. DENSE, SILTY SAND, W/ TRACE MCIA

Ⓐ **TRIASSIC RES:** TAN BROWN AND ORANGE, MOIST, V. STIFF, SILTY CLAY, W/ GRAVEL, ROCK FRAGS.

4:1 4:1 6:1

15+00.00

—LPB—

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

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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	30

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

400
390
380
370
360
350
340

4:1 **TRIASSIC RES:** TAN BROWN AND ORANGE,MOIST,V.STIFF,SILTY LAY,W/ GRAVEL,ROCK FRAGS. 4:1

6:1

TRIASSIC RES: PINK TAN BLACK AND GRAY,DRY TO WET,MED.DENSE TO V.DENSE,SILTY SAND,W/ TRACE MCIA

16+50.00

400
390
380
370
360
350

4:1 **TRIASSIC RES:** TAN BROWN AND ORANGE,MOIST,V.STIFF,SILTY CLAY,W/ GRAVEL,ROCK FRAGS.

TRIASSIC RES: PINK TAN BLACK AND GRAY,DRY TO WET,MED.DENSE TO V.DENSE, SILTY SAND,W/ TRACE MCIA

6:1

4:1

16+00.00

-LPB-

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

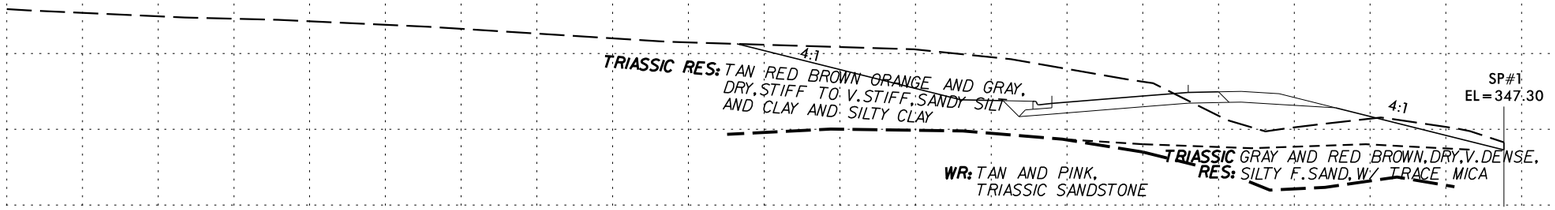
$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$$USERNAME$$$$

8/23/99

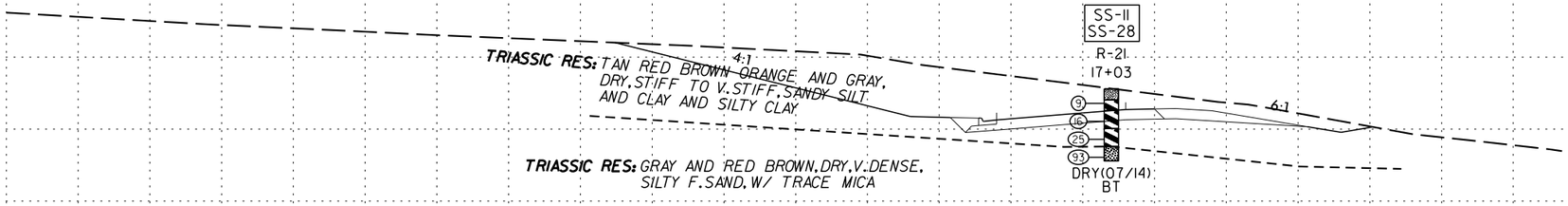
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	31

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-11	4' RT	17+03	1.0-2.5	A-4(4)	29	10	22	14	62	99	83	62	8	-	-	-
SS-28	4' RT	17+03	3.5-5.0	A-7-6(24)	52	30	7	15	78	100	96	78	15	-	-	-



17 + 50.00



17 + 00.00

-LPB-

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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	32

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

400
390
380
370
360
350

4:1

TRIASSIC RES: TAN ORANGE,MOIST,STIFF,F.SANDY CLAY

4:1

WR: TAN AND PINK,
TRIASSIC SANDSTONE

SP#2
EL=352.33

18+00.00

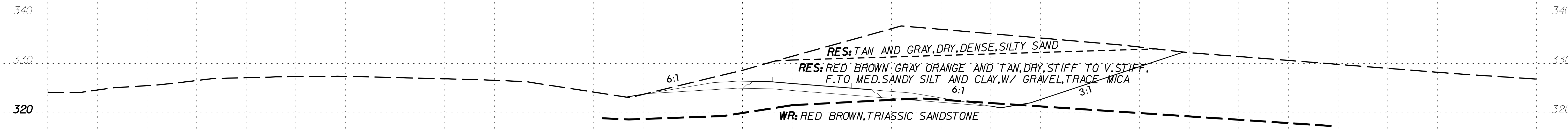
-LPB-

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

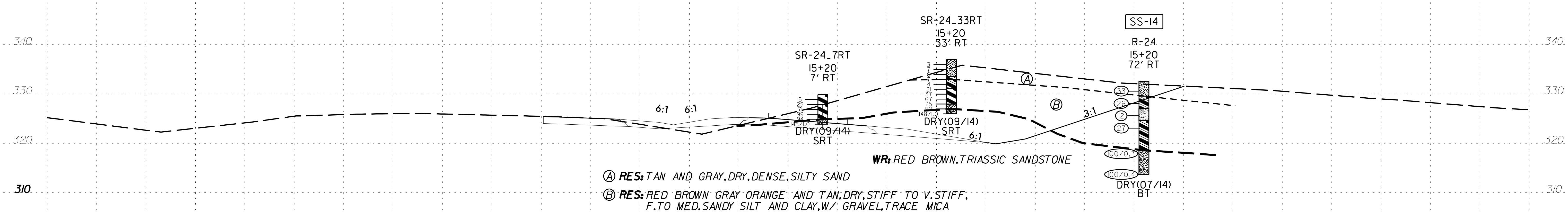
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-14	72' RT	15+20	8.5-10.0	A-6(8)	36	13	3	27	70	100	99	70	14	-	-	-



15+50.00



15+00.00

-RPB-

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	34

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

390 380 370 360 350 340 330 320 310

RES: GRAY AND TAN, DRY, MED. DENSE, SILTY SAND

Ⓐ **RES:** RED BROWN ORANGE GRAY AND TAN, MOIST, SANDY SILT AND CLAY, MOTTLED

WR: RED BROWN, TRIASSIC SANDSTONE

4:1 6:1 6:1 3:1

Ⓐ **TRIASSIC RES:** ORANGE GRAY AND TAN, MOIST, MOTTLED, STIFF, SANDY CLAY

16 + 50.00

RES: GRAY AND TAN, DRY, MED. DENSE, SILTY SAND

Ⓐ **RES:** RED BROWN ORANGE GRAY AND TAN, MOIST, SANDY SILT AND CLAY, MOTTLED

WR: RED BROWN, TRIASSIC SANDSTONE

6:1 6:1 6:1 3:1

Ⓐ **TRIASSIC RES:** ORANGE GRAY AND TAN, MOIST, MOTTLED, STIFF, SANDY CLAY

16 + 00.00

-RPB-

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

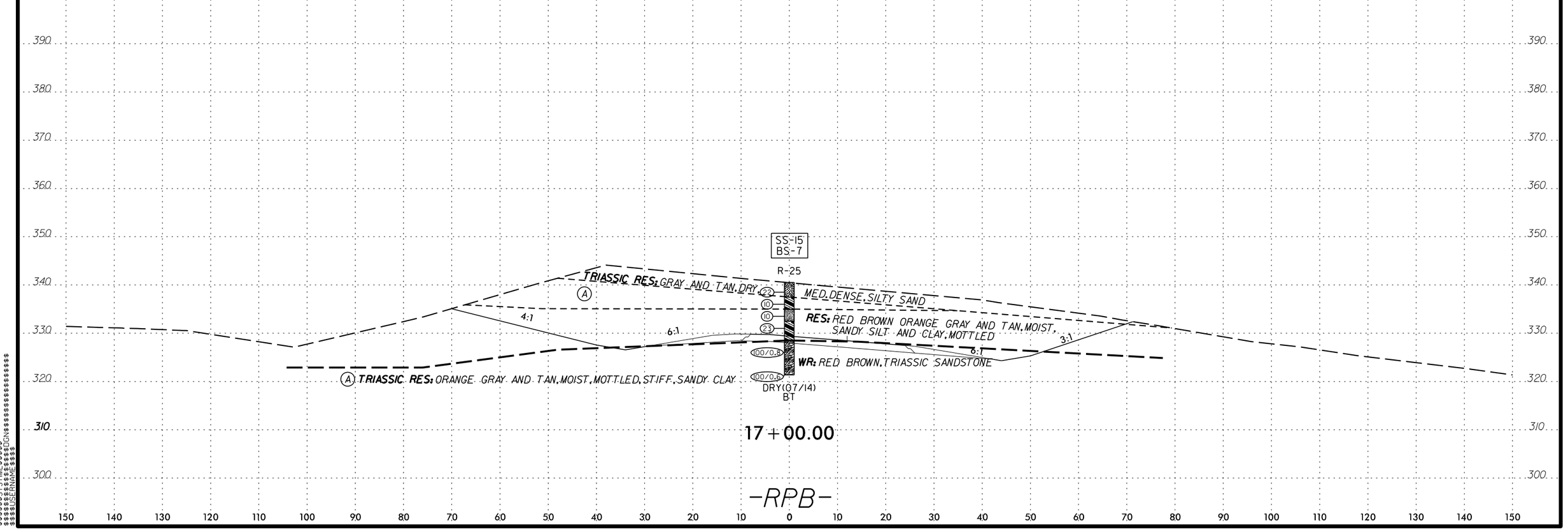
$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/99

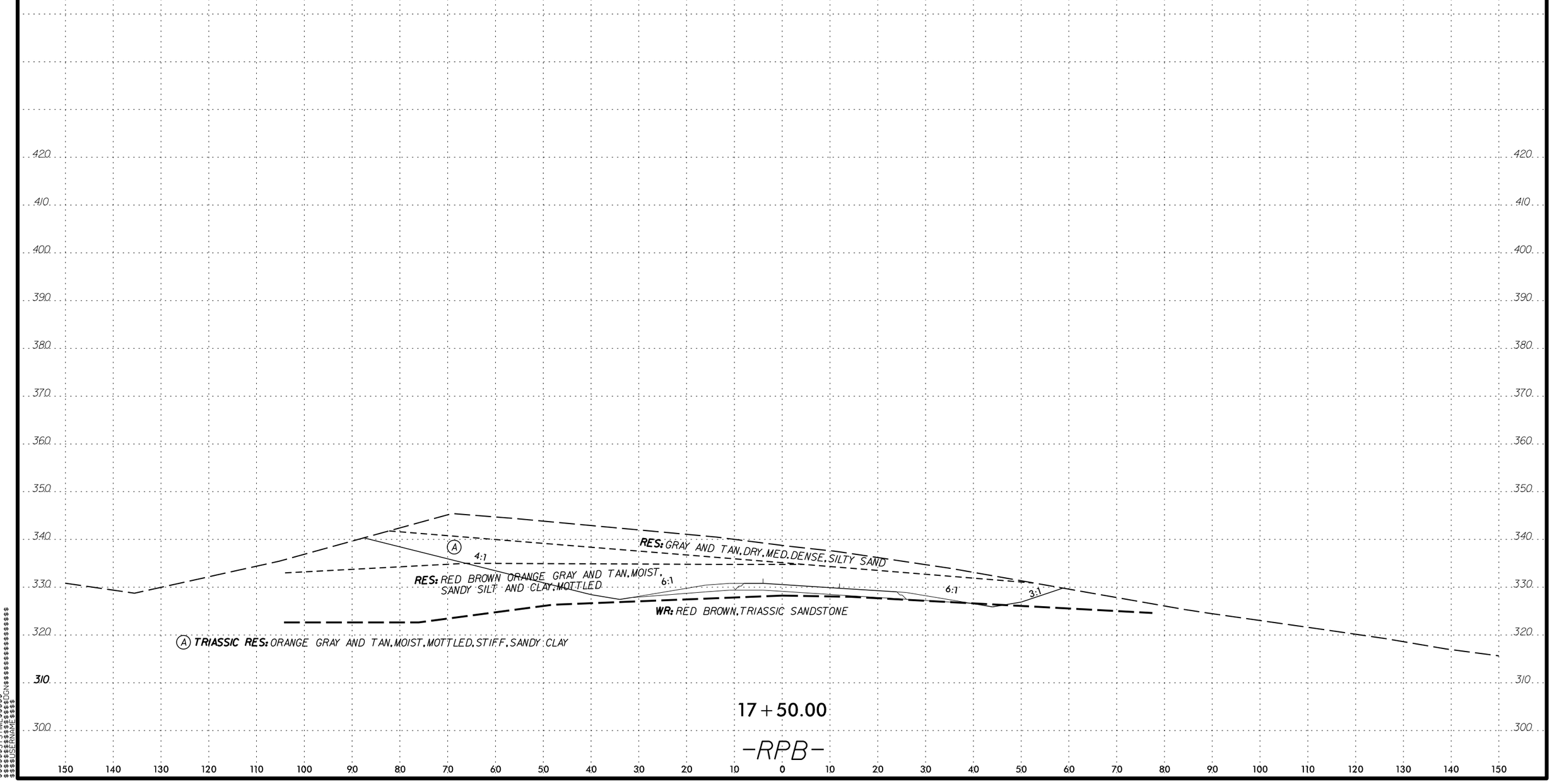
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	35

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-15	CL	17+00	8.5-10.0	A-6(9)	36	13	2	22	76	100	99	98	16	-	-	-
BS-7	CL	17+00	0-10.0	A-7-6(17)	50	28	13	20	67	99	92	67	21	2.9	13.2	116.9



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



PROJ. REFERENCE NO.	SHEET NO.
U-5315	36

17 + 50.00

-RPB-

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	37

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

420
410
400
390
380
370
360
350
340
330
320
310
300

4:1

RES: RED BROWN ORANGE GRAY AND TAN, MOIST, SANDY SILT AND CLAY, MOTTLED

6:1

RES: GRAY AND TAN, DRY, MED. DENSE, SILTY SAND

WR: RED BROWN, TRIASSIC SANDSTONE

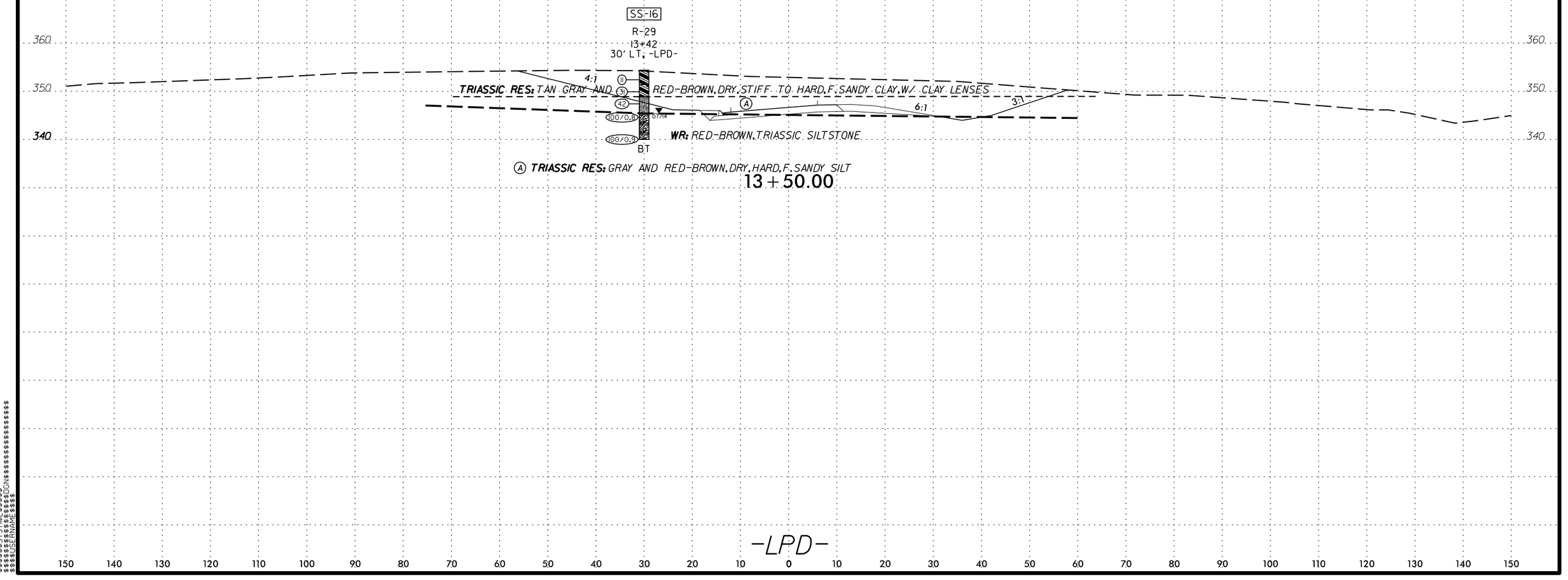
18+00.00

-RPB-

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

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-16	30' LT	13+42	3.5-5.0	A-6(9)	34	13	2	18	80	100	99	80	10	-	-	-



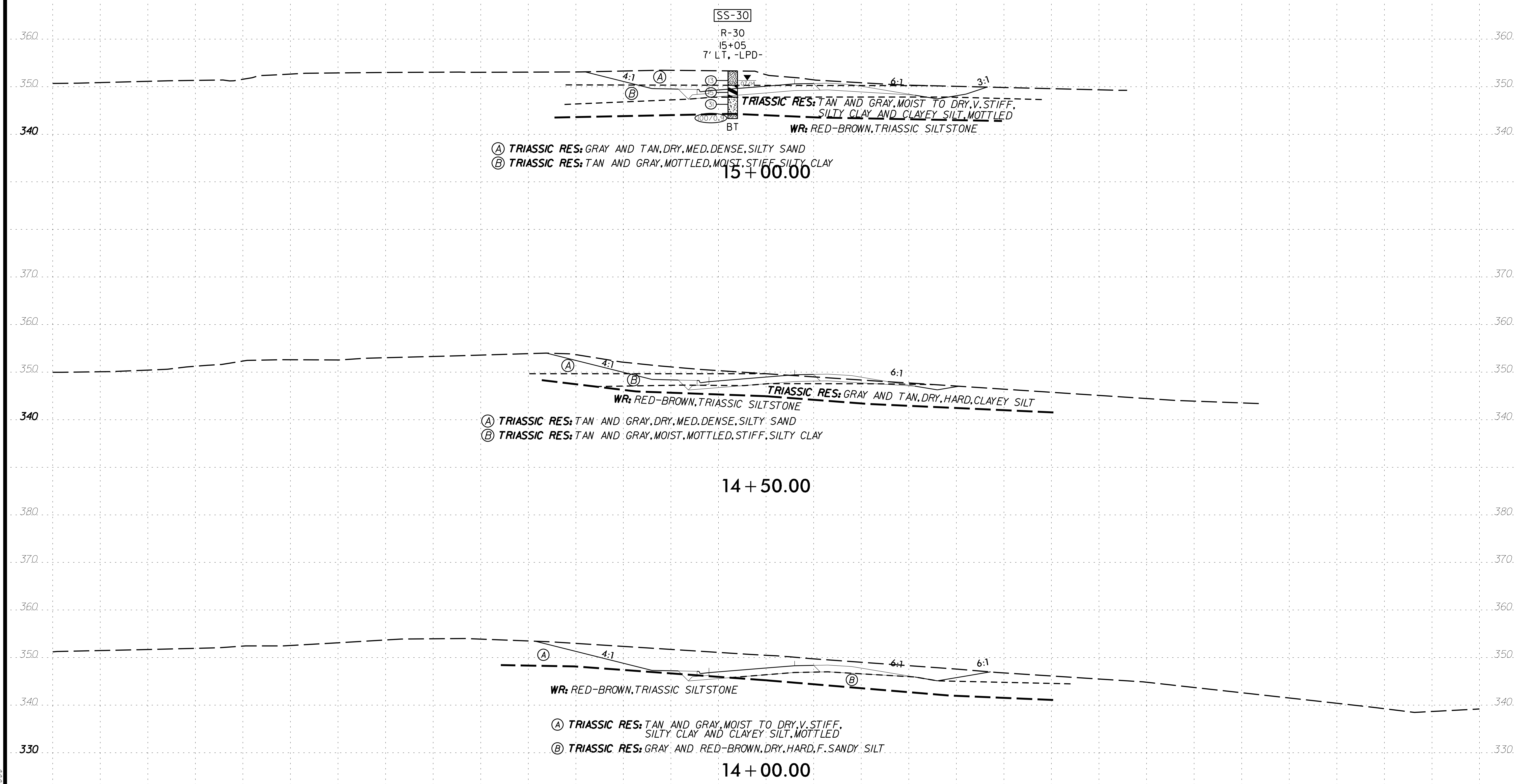
8/23/99

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

PROJ. REFERENCE NO.	SHEET NO.
U-5315	39

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-30	7' LT	15+05	3.5-5.0	A-7-6(39)	74	53	12	15	73	99	91	73	19	-	-	-

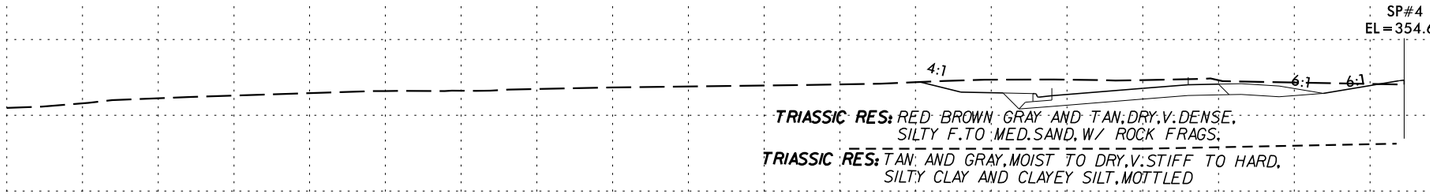


-LPD-

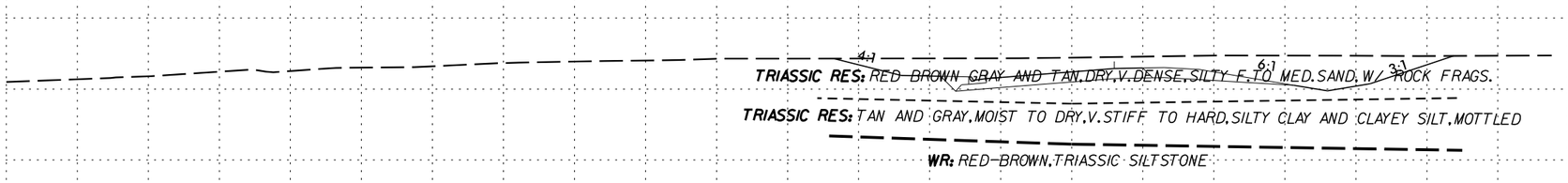
8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	40

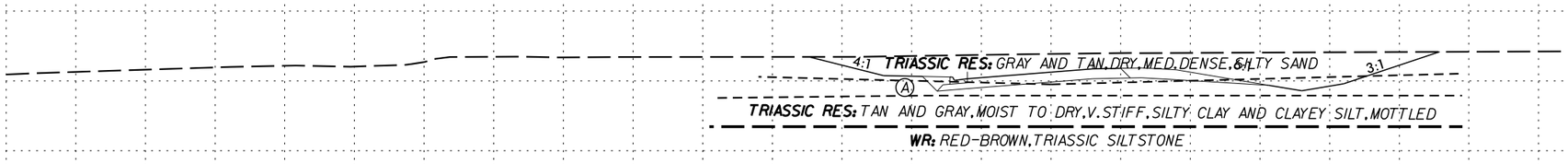
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



16+50.00



16+00.00



15+50.00

-LPD-

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

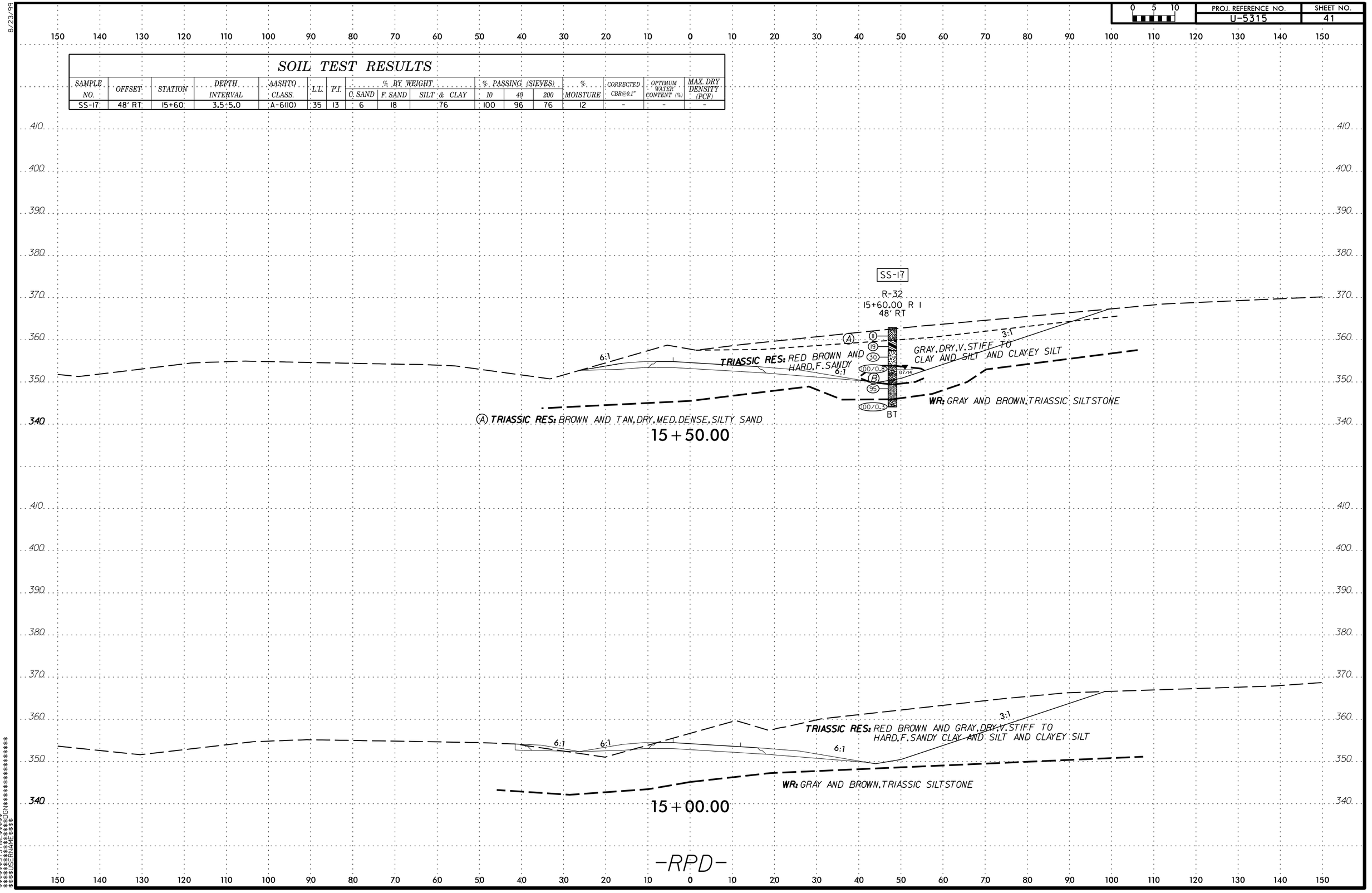
$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	41

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-17	48' RT	15+60	3.5-5.0	A-6(10)	35	13	6	18	76	100	96	76	12	-	-	-



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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	42

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

420
410
400
390
380
370
360
350
340

6:1
6:1
6:1
3:1

TRIASSIC RES: RED BROWN AND GRAY, DRY, V.STIFF TO HARD, F. SANDY CLAY AND SILT AND CLAYEY SILT

WR: GRAY AND BROWN, TRIASSIC SILTSTONE

16+00.00

-RPD-

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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	43

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

420
410
400
390
380
370
360
350
340

TRIASSIC RES: TAN,DRY,LOOSE,SILTY SAND

TRIASSIC RES: ORANGE TAN RED BROWN AND GRAY,MOIST,V.STIFF,F.SANDY AND SILTY CLAY.

4:1 6:1 6:1 3:1

TRIASSIC RES: ORANGE RED BROWN AND GRAY,DRY,V.STIFF TO HARD,F.SANDY CLAY AND SILT AND CLAYEY SILT

WR: GRAY AND BROWN,TRIASSIC SILTSTONE

16+50.00

-RPD-

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

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	44

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

420
410
400
390
380
370
360
350
340

4:1
6:1
6:1
3:1

TRIASSIC RES: ORANGE TAN GRAY AND BROWN, DRY TO MOIST, V. STIFF, SILTY CLAY

TRIASSIC RES: ORANGE TAN RED BROWN AND GRAY, MOIST, V. STIFF, F. SANDY AND SILTY CLAY.

WR: GRAY AND TAN, TRIASSIC SILTSTONE

Ⓐ **TRIASSIC RES:** TAN, DRY, LOOSE, SILTY SAND

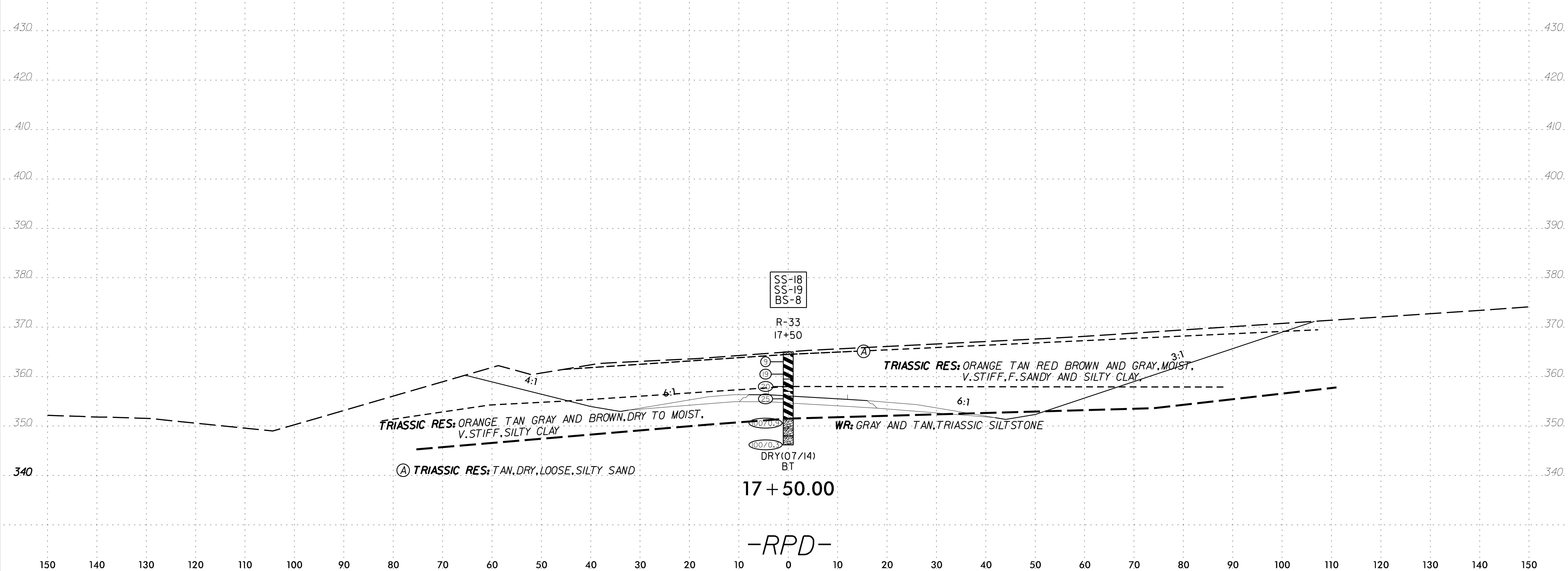
17+00.00

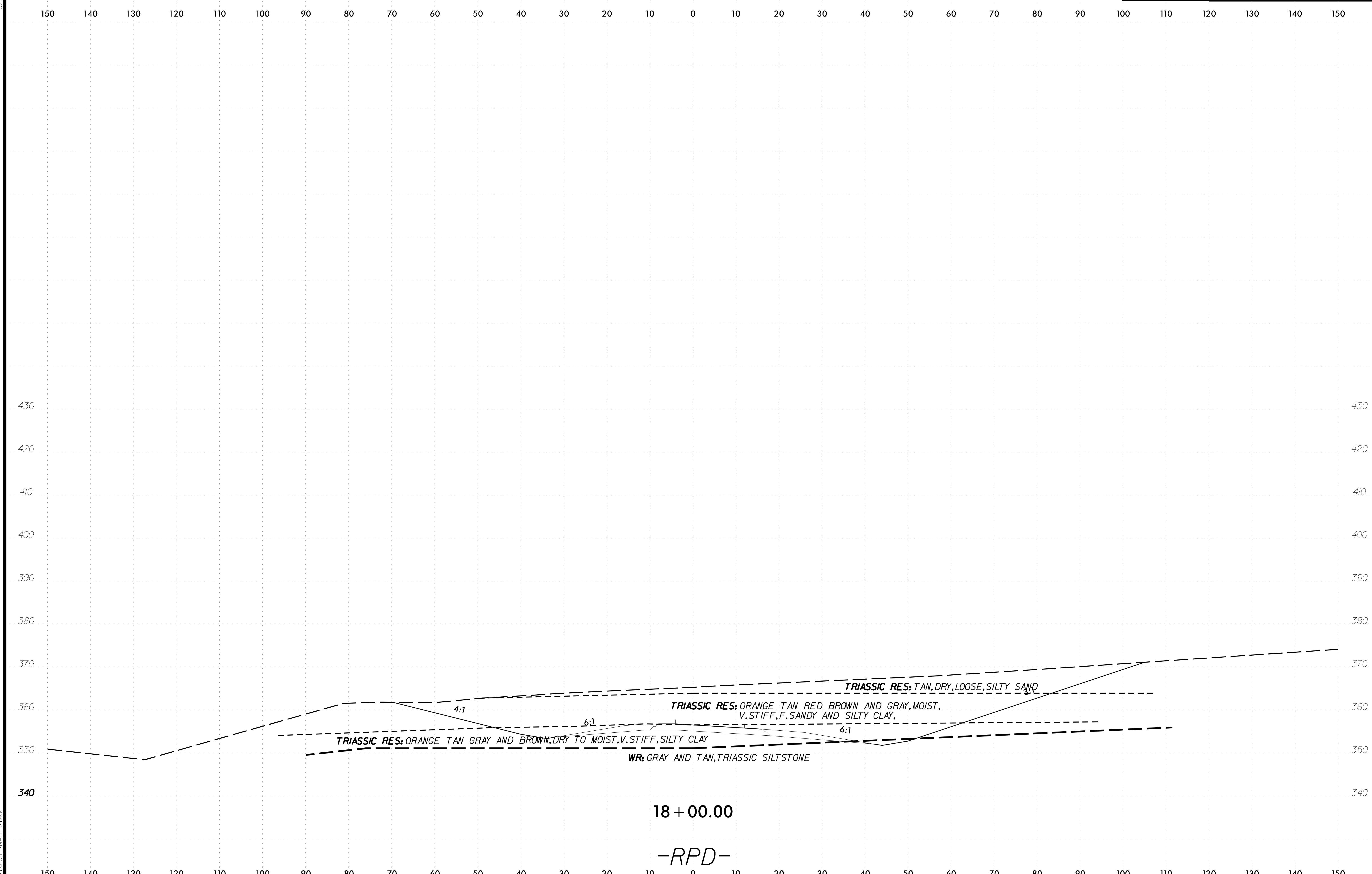
-RPD-

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

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-18	CL	17+50	3.5-5.0	A-7-6(62)	89	63	3	9	87	100	97	87	22	-	-	-
SS-19	CL	17+50	8.5-10.0	A-6(13)	39	20	5	21	74	100	98	74	11	-	-	-
BS-8	CL	17+50	0-8.0	A-7-6(35)	62	42	8	12	80	100	95	80	18	2.2	16.9	109.9




TRIASSIC RES: TAN, DRY, LOOSE, SILTY SAND
TRIASSIC RES: ORANGE TAN RED BROWN AND GRAY, MOIST, V.STIFF, F.SANDY AND SILTY CLAY.
TRIASSIC RES: ORANGE TAN GRAY AND BROWN, DRY TO MOIST, V.STIFF, SILTY CLAY
WR: GRAY AND TAN, TRIASSIC SILTSTONE
4:1
6:1
6:1
18 + 00.00
-RPD-

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	47

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

410 400 390 380 370 360 350

TRIASSIC RES: TAN, DRY, LOOSE, SILTY SAND

TRIASSIC RES: TAN BROWN AND ORANGE, MOIST, V. STIFF, SILTY CLAY

TRIASSIC RES: ORANGE TAN GRAY AND BROWN, DRY TO MOIST, HARD, F. SANDY AND SILTY CLAY

WR: GRAY AND TAN, TRIASSIC SILTSTONE

4:1 6:1 6:1 3:1

19 + 00.00

420 410 400 390 380 370 360 350 340

TRIASSIC RES: TAN, DRY, LOOSE, SILTY SAND

TRIASSIC RES: TAN RED BROWN AND ORANGE, DRY, V. STIFF TO HARD, SILTY CLAY AND F. SANDY SILT

TRIASSIC RES: ORANGE TAN GRAY AND BROWN, DRY TO MOIST, V. STIFF, SILTY CLAY

WR: GRAY AND TAN, TRIASSIC SILTSTONE

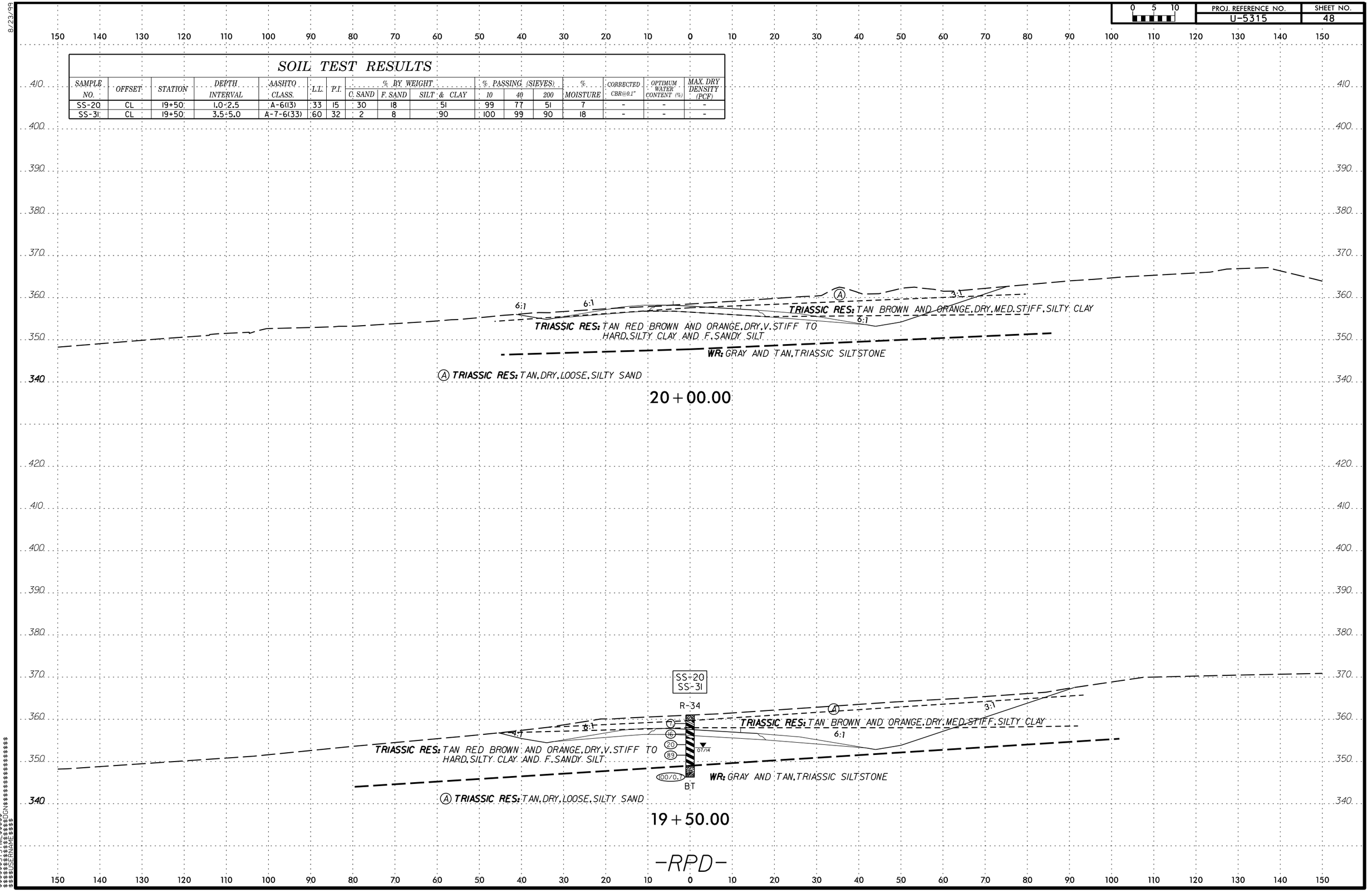
4:1 6:1 6:1 3:1

18 + 50.00

-RPD-

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

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



SOIL TEST RESULTS

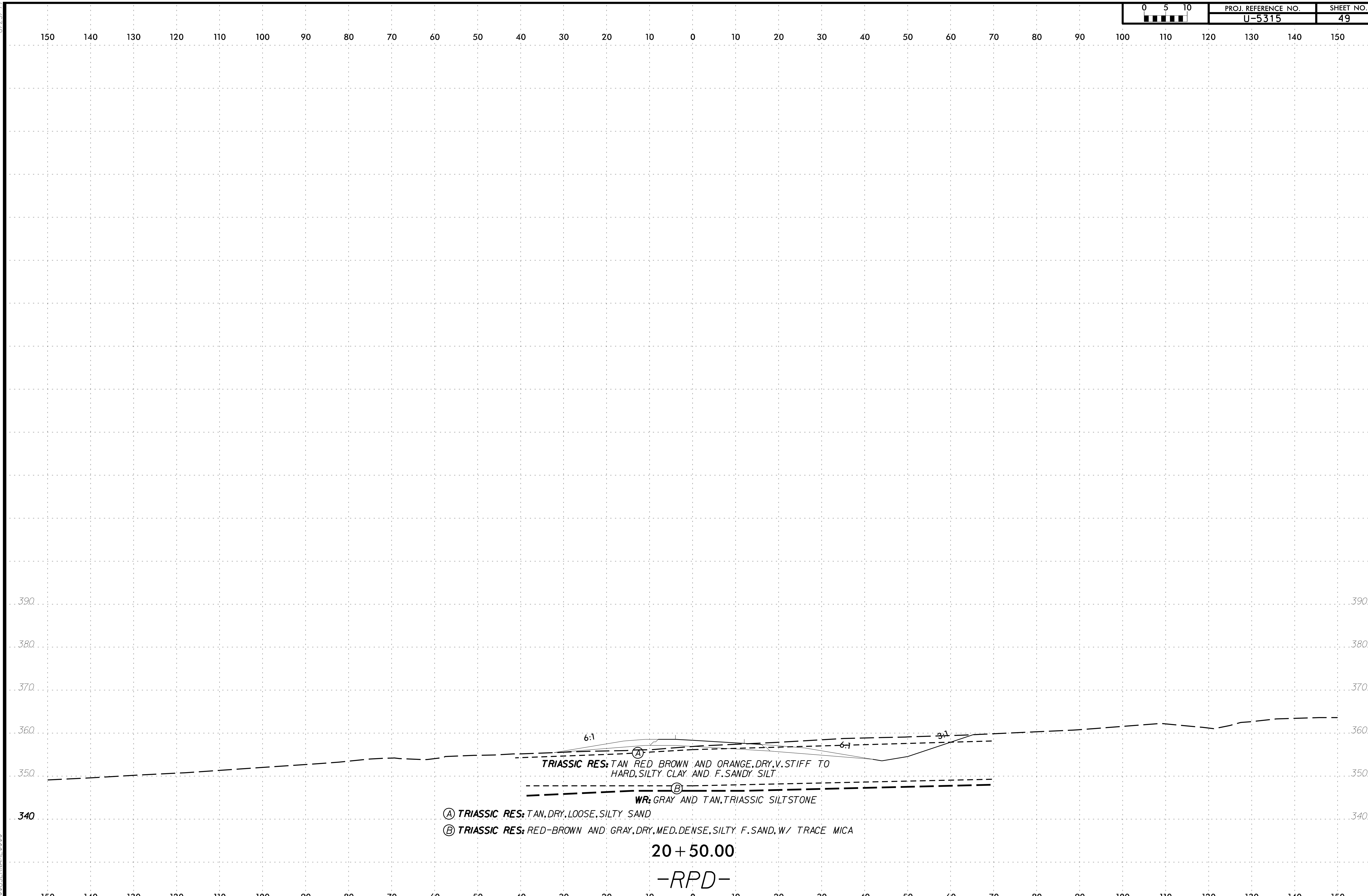
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-20	CL	19+50	1.0-2.5	A-6(13)	33	15	30	18	51	99	77	51	7	-	-	-
SS-31	CL	19+50	3.5-5.0	A-7-6(33)	60	32	2	8	90	100	99	90	18	-	-	-

20 + 00.00

19 + 50.00

-RPD-

PROJ. REFERENCE NO.	SHEET NO.
U-5315	49



8/23/99

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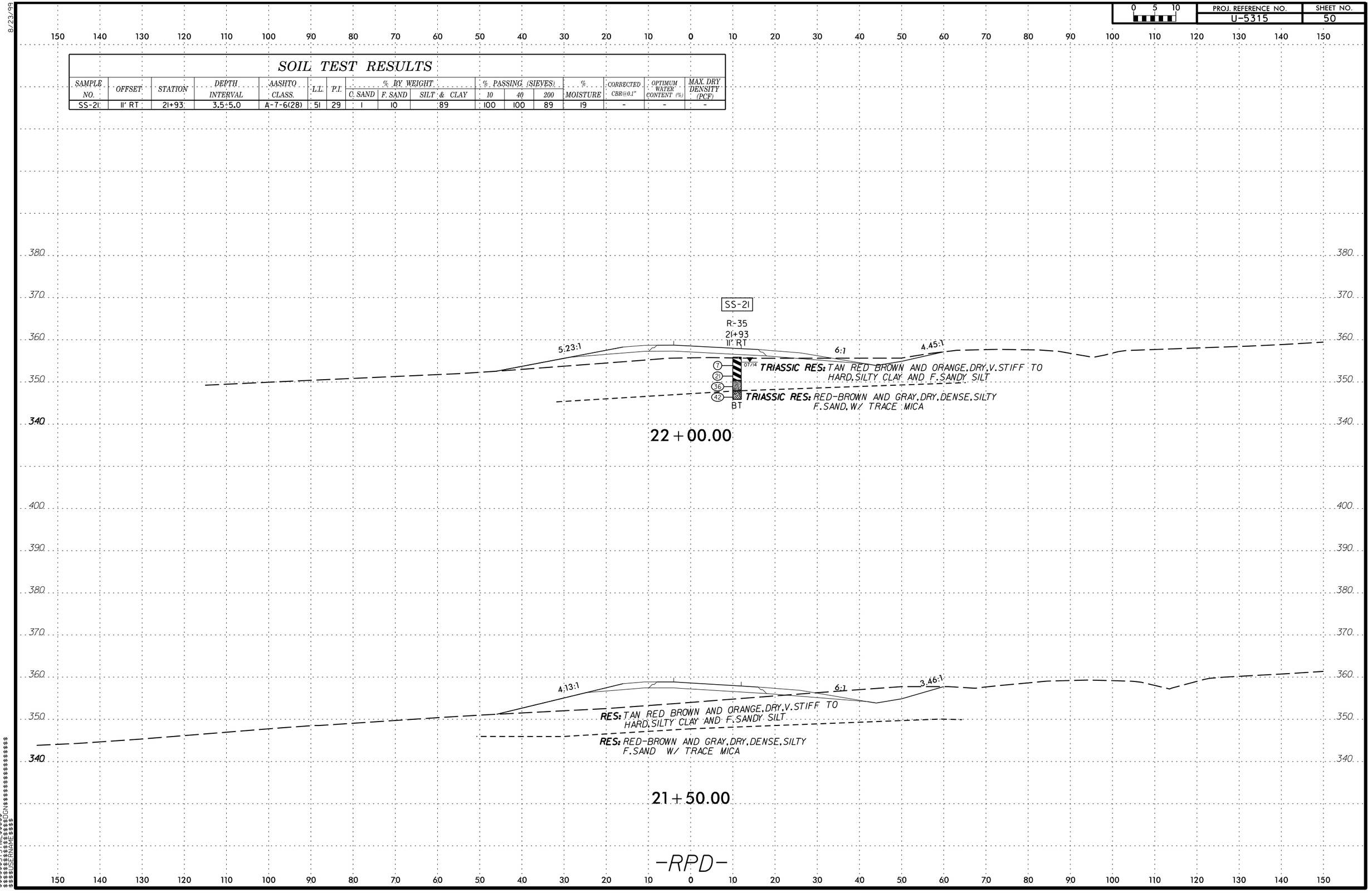


0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	50

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
							C. SAND	F. SAND	SILT & CLAY	10	40	200				
SS-21	11' RT	21+93	3.5-5.0	A-7-6(28)	51	29	1	10	89	100	100	89	19	-	-	-

22+00.00

21+50.00

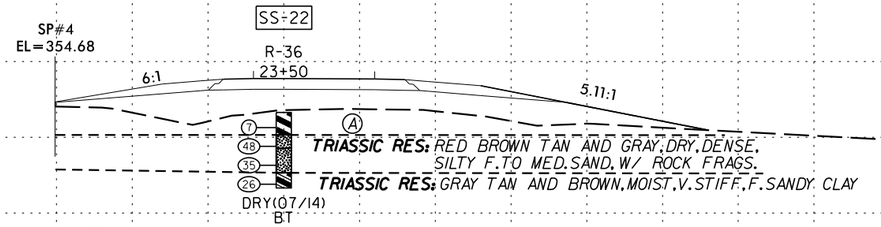
-RPD-

8/23/99

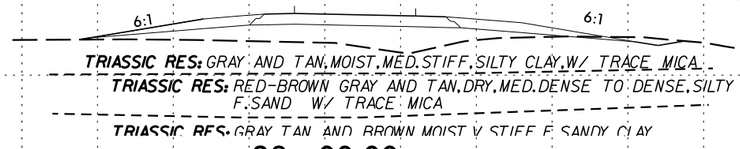
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	51

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT & CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	CORRECTED CBR@0.1"	OPTIMUM WATER CONTENT (%)	MAX. DRY DENSITY (PCF)
SS-22	CL	23+50	1.0-2.5	A-7-5(34)	66	36	6	10	84	100	96	84	28	-	-	-



23+60.00



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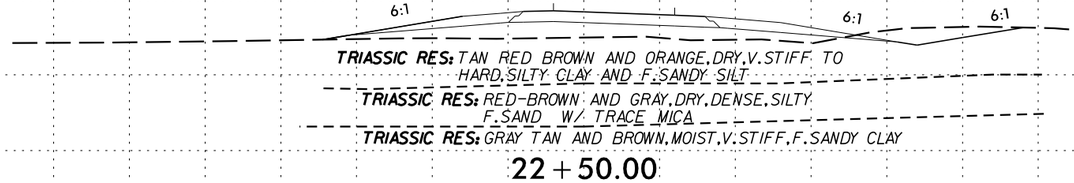
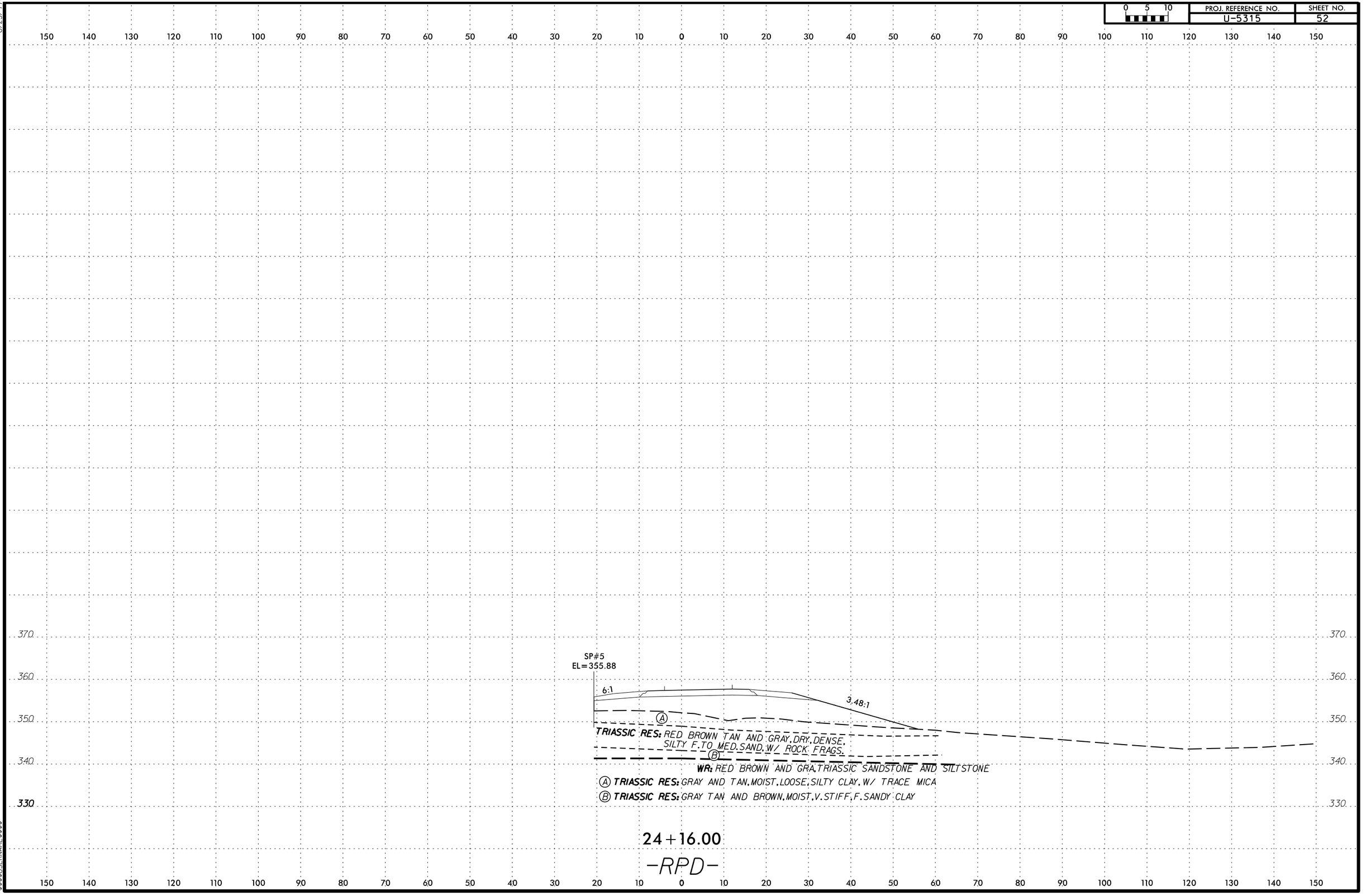


22+50.00

-RPD-

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

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5315	52



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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

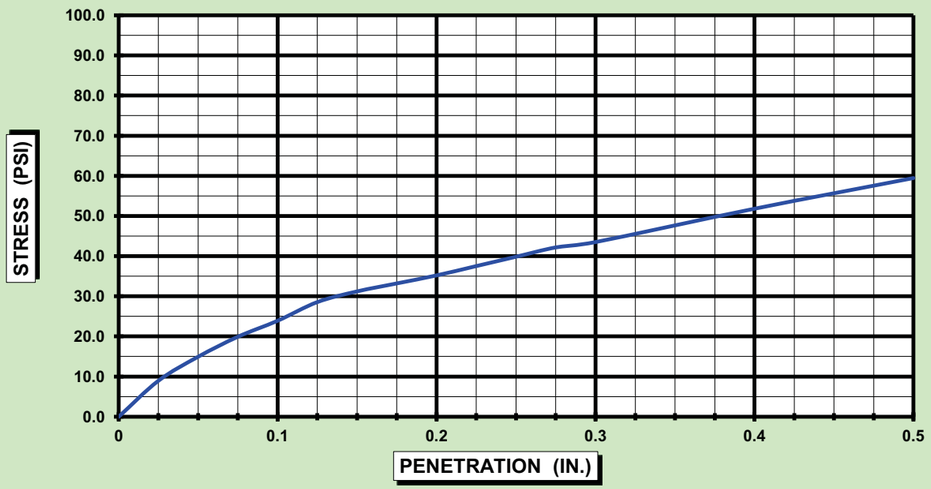
PROJECT #:	G14001.00	**DATE:**	8/22/2014
PROJECT NAME:	Morrisville Parkway Interchange		
BORING:	R-1	**SAMPLE:** BS-1	**DEPTH:** 0-5

SOIL DESCRIPTION: Brown FAT CLAY with SAND (A-7-6)

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	102.6 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	19.2%	LOAD CELL	2500LB
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	97.6 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	20.5%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	95.1%	SWELL	4.18%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	2.4	N/A
CBR VALUE AT .2"	2.3	N/A

STRESS-PENETRATION CURVE



LIQUID LIMIT	53	PLASTIC LIMIT	24	PLASTIC INDEX	29
Percent Passing #200 Sieve = 78.3%		Natural Moisture Content = 22.2%			

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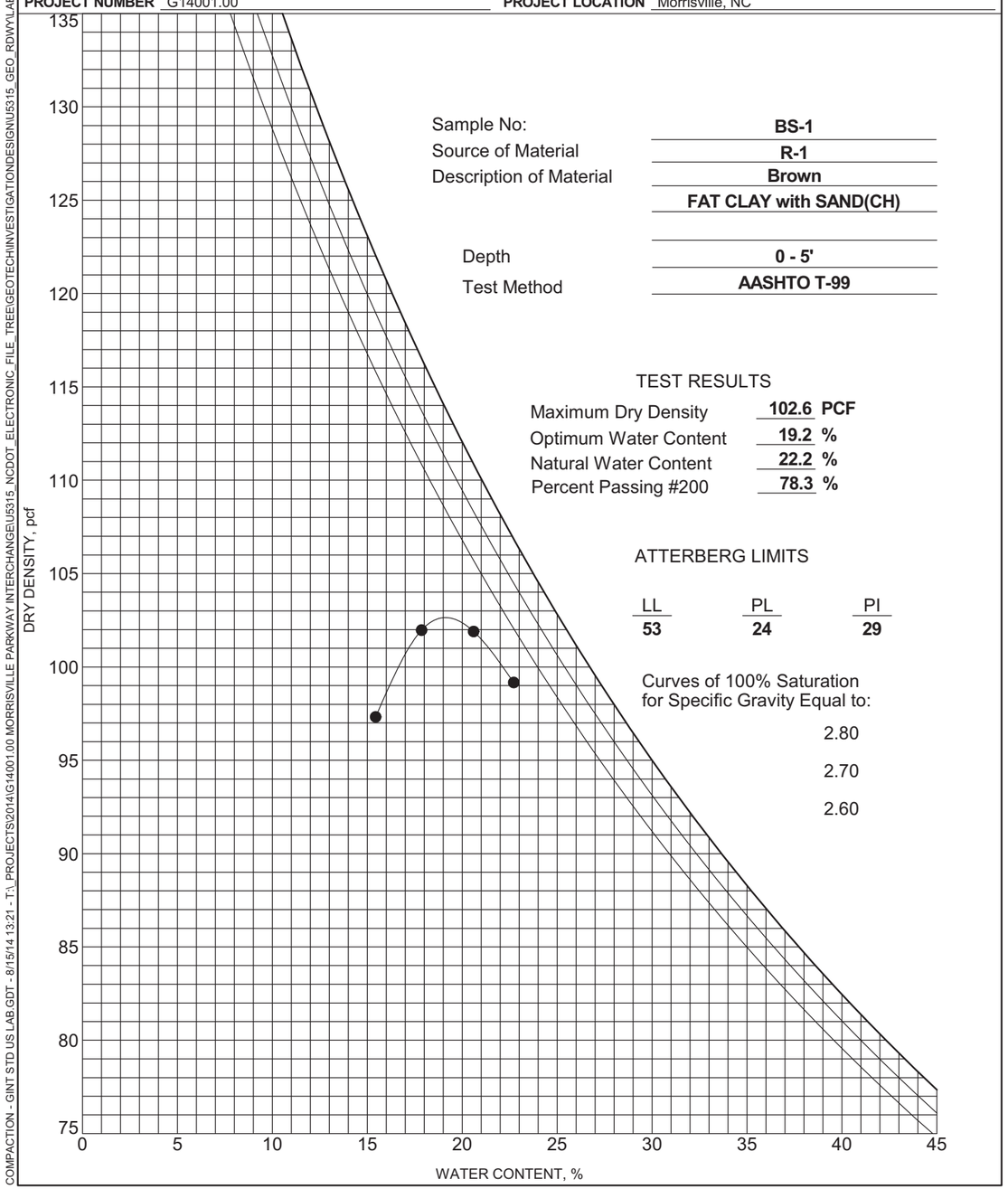
MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	BS-1
Source of Material	R-1
Description of Material	Brown FAT CLAY with SAND(CH)
Depth	0 - 5'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	102.6 PCF
Optimum Water Content	19.2 %
Natural Water Content	22.2 %
Percent Passing #200	78.3 %

ATTERBERG LIMITS

LL	PL	PI
53	24	29

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/15/14 13:21 - T:_PROJECTS\2014\G14001.00 MORRISVILLE PARKWAY INTERCHANGE\U5315_NCDOT_ELECTRONIC_FILE_TREE\GEOTECH\INVESTIGATION\DESIGN\U5315_GEO_RDWY\LABTESTS\G14001.00 GINT.GPJ

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

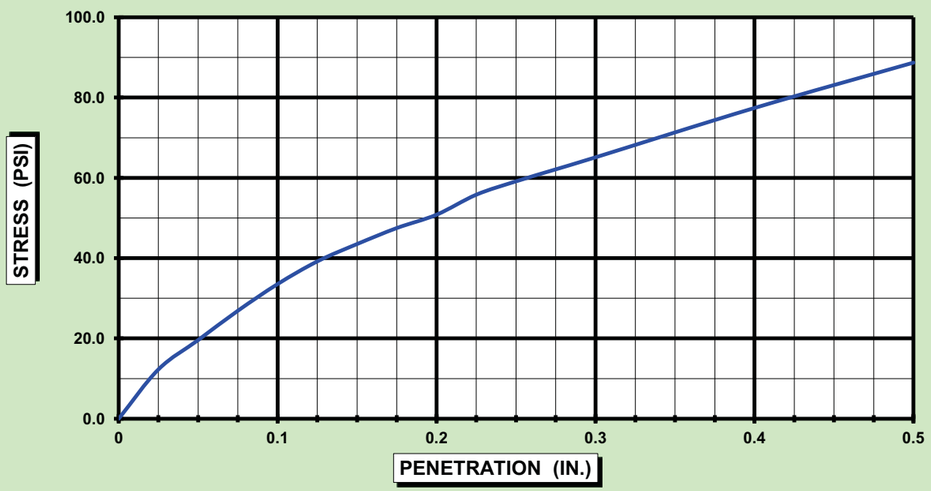
PROJECT #:	**G14001.00**	**DATE:**	**8/22/2014**
PROJECT NAME:	**Morrisville Parkway Interchange**		
BORING:	**R-12**	**SAMPLE:** **BS-3**	**DEPTH:** **0-8**

SOIL DESCRIPTION: Light Brown/Orange SANDY LEAN CLAY (A-7-6)

COMPACTION METHOD	**AASHTO T-99**	**SOAK**	**96 HRS.**
MAXIMUM DRY DENSITY	**111.0 PCF**	**STRAIN RATE**	**.05 IN / MIN.**
OPTIMUM MOISTURE CONTENT	**15.9%**	**LOAD CELL**	**2500LB**
TEST DATA		**SURCHARGE WEIGHT**	**10 lb.**
DRY DENSITY	**105.5 PCF**	**SURCHARGE PER SQUARE FOOT**	**51 lbs/sq.ft.**
MOISTURE CONTENT	**16.0%**	**FINAL MOISTURE CONTENT**	**N/A**
PERCENT COMPACTION	**95.0%**	**SWELL**	**3.07%**

	ACTUAL	CORRECTED
CBR VALUE AT .1"	**3.4**	**N/A**
CBR VALUE AT .2"	**3.4**	**N/A**

STRESS-PENETRATION CURVE



LIQUID LIMIT	**46**	**PLASTIC LIMIT**	**23**	**PLASTIC INDEX**	**23**
Percent Passing #200 Sieve = 66.1%		**Natural Moisture Content = 21.5%**			

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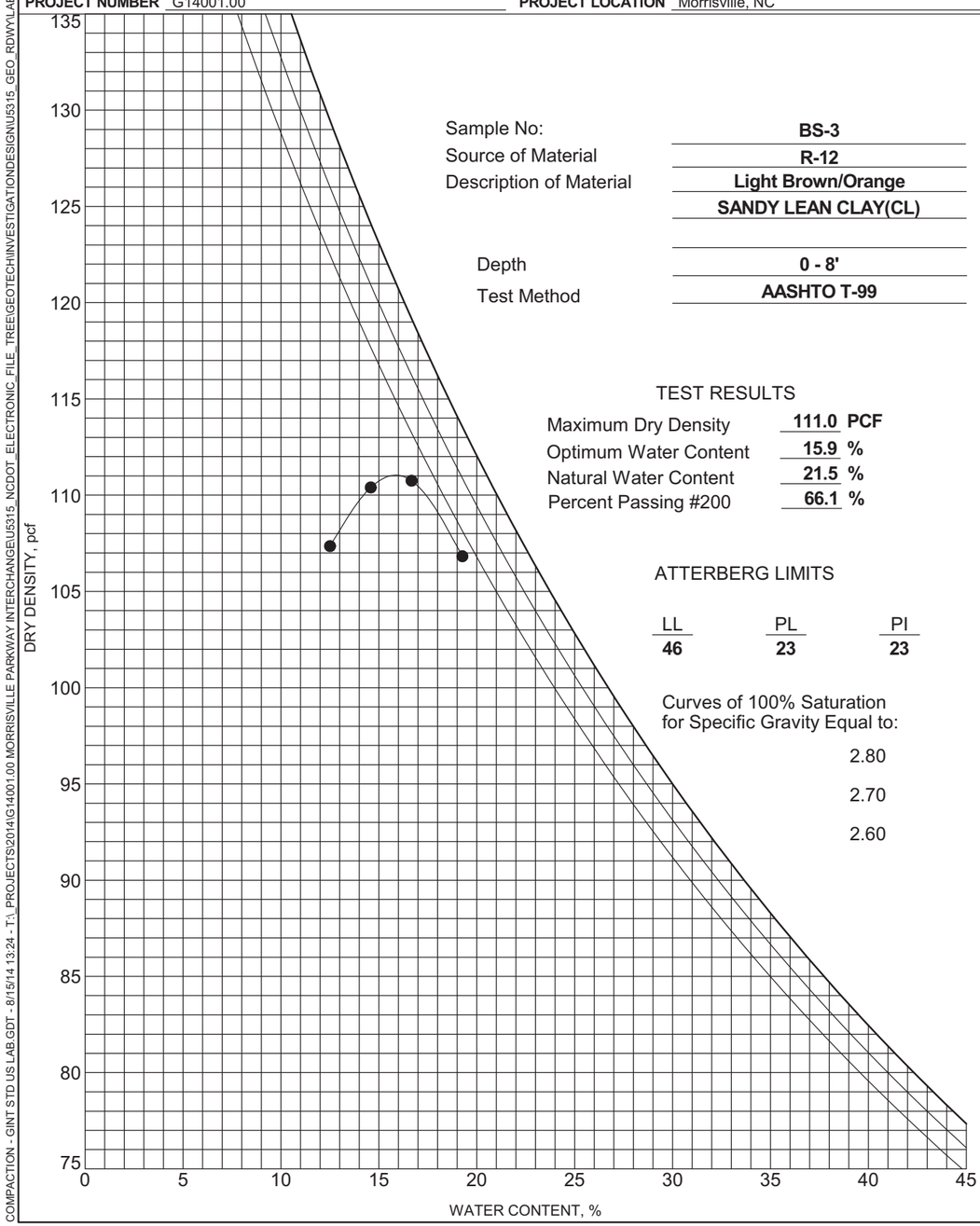
MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	**BS-3**
Source of Material	**R-12**
Description of Material	**Light Brown/Orange SANDY LEAN CLAY(CL)**
Depth	**0 - 8'**
Test Method	**AASHTO T-99**

TEST RESULTS

Maximum Dry Density	**111.0 PCF**
Optimum Water Content	**15.9 %**
Natural Water Content	**21.5 %**
Percent Passing #200	**66.1 %**

ATTERBERG LIMITS

LL	PL	PI
46	**23**	**23**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/15/14 13:24 - T:_PROJECTS\2014\G14001.00 MORRISVILLE PARKWAY INTERCHANGE\U5315_NCDOT_ELECTRONIC_FILE_TREE\GEOTECH\INVESTIGATION\DESIGN\U5315_GEO_RDWY\LABTESTS\G14001.00 GINT.GPJ

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

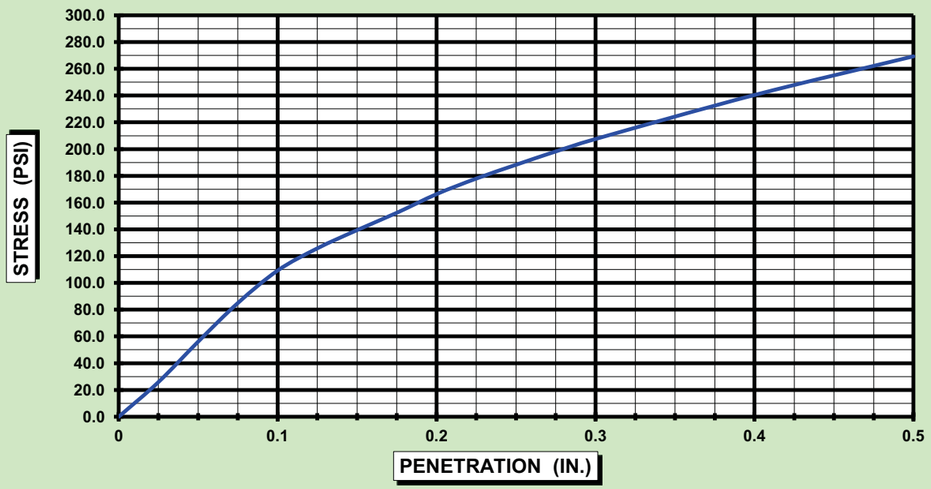
PROJECT #:	G14001.00	**DATE:**	8/22/2014
PROJECT NAME:	Morrisville Parkway Interchange		
BORING:	R-18	**SAMPLE:** BS-4	**DEPTH:** 0-5

SOIL DESCRIPTION: Light Brown/Gray CLAYEY SAND (A-6)

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	122.7 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	10.2%	LOAD CELL	2500LB
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	118.9 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	10.4%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	96.9%	SWELL	0.69%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	10.9	11.2
CBR VALUE AT .2"	11.1	11.2

STRESS-PENETRATION CURVE



LIQUID LIMIT	33	PLASTIC LIMIT	17	PLASTIC INDEX	16
Percent Passing #200 Sieve = 48.8%		Natural Moisture Content = 16.2%			

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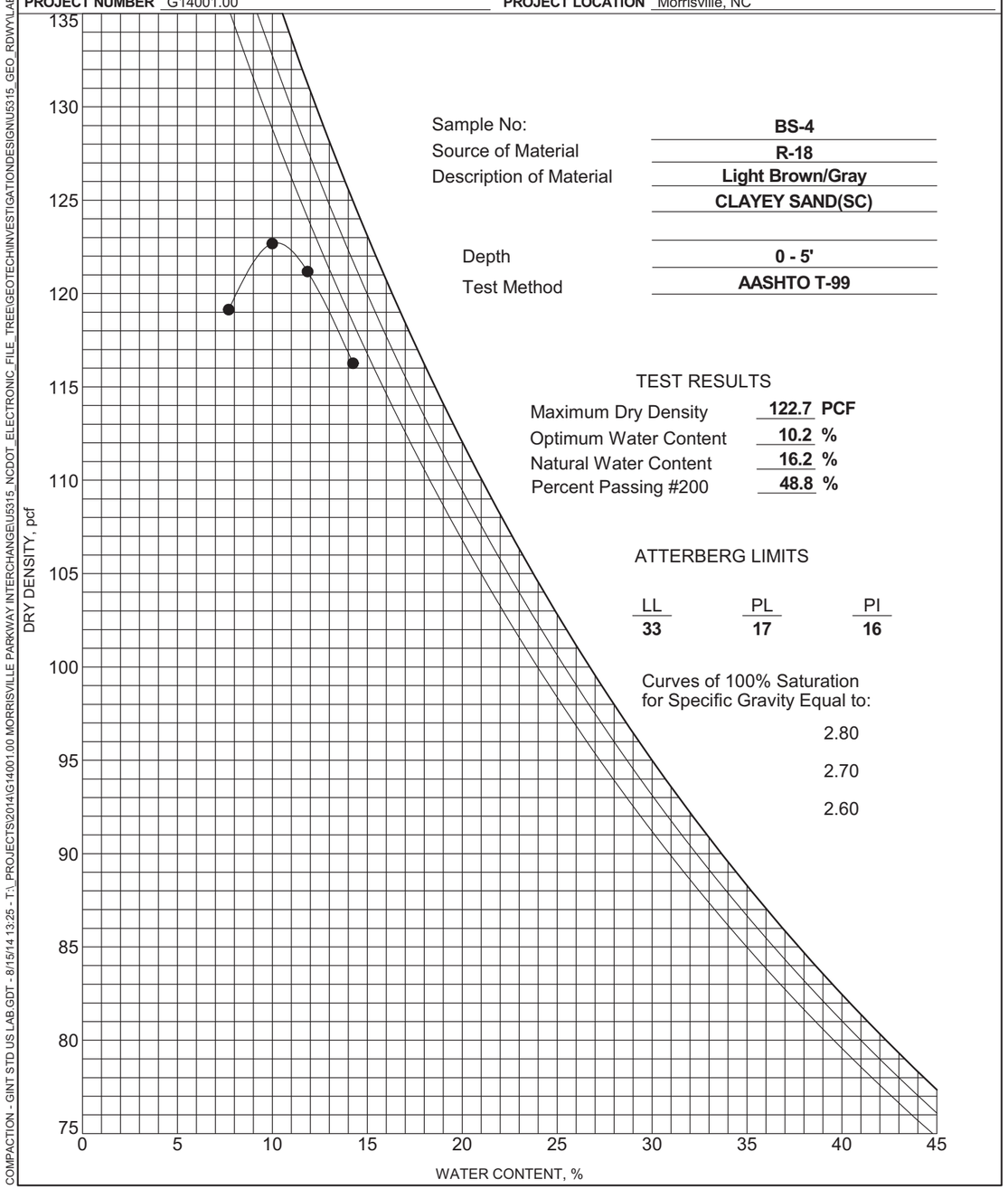
MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	BS-4
Source of Material	R-18
Description of Material	Light Brown/Gray CLAYEY SAND(SC)
Depth	0 - 5'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	122.7 PCF
Optimum Water Content	10.2 %
Natural Water Content	16.2 %
Percent Passing #200	48.8 %

ATTERBERG LIMITS

LL	PL	PI
33	17	16

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/15/14 13:25 - T:_PROJECTS\2014\G14001.00 MORRISVILLE PARKWAY INTERCHANGE\U5315_NCDOT_ELECTRONIC_FILE_TREE\GEOTECH\INVESTIGATION\DESIGN\U5315_GEO_RDWY\LABTESTS\G14001.00 GINT.GPJ

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

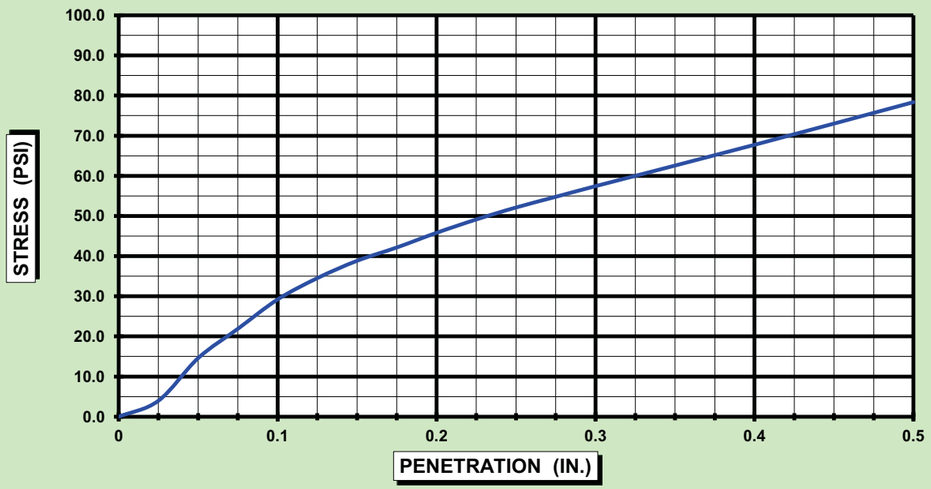
PROJECT #:	**G14001.00**	**DATE:**	**8/22/2014**
PROJECT NAME:	**Morrisville Parkway Interchange**		
BORING:	**R-19**	**SAMPLE:**	**BS-5**
DEPTH:	**0-10**		

SOIL DESCRIPTION: Orange/White FAT CLAY with SAND (A-7-6)

COMPACTION METHOD	**AASHTO T-99**	**SOAK**	**96 HRS.**
MAXIMUM DRY DENSITY	**107.9 PCF**	**STRAIN RATE**	**.05 IN / MIN.**
OPTIMUM MOISTURE CONTENT	**17.1%**	**LOAD CELL**	**2500LB**
TEST DATA		**SURCHARGE WEIGHT**	**10 lb.**
DRY DENSITY	**102.8 PCF**	**SURCHARGE PER SQUARE FOOT**	**51 lbs/sq.ft.**
MOISTURE CONTENT	**17.9%**	**FINAL MOISTURE CONTENT**	**N/A**
PERCENT COMPACTION	**95.3%**	**SWELL**	**3.09%**

	ACTUAL	CORRECTED
CBR VALUE AT .1"	**2.9**	**3.3**
CBR VALUE AT .2"	**3.1**	**3.2**

STRESS-PENETRATION CURVE



LIQUID LIMIT	**69**	**PLASTIC LIMIT**	**27**	**PLASTIC INDEX**	**42**
Percent Passing #200 Sieve = 74.5%		**Natural Moisture Content = 26.0%**			

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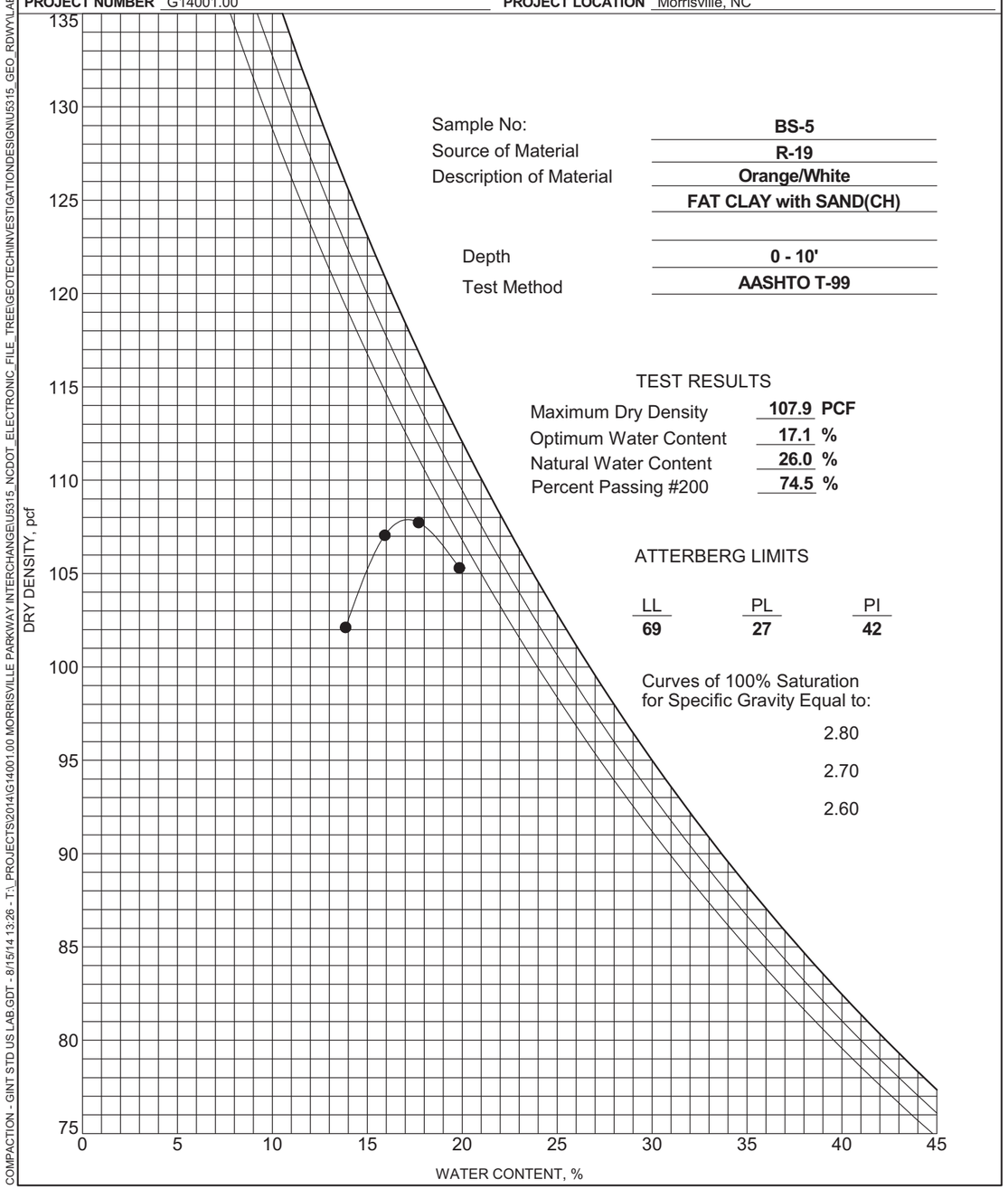
MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	**BS-5**
Source of Material	**R-19**
Description of Material	**Orange/White FAT CLAY with SAND(CH)**
Depth	**0 - 10'**
Test Method	**AASHTO T-99**

TEST RESULTS

Maximum Dry Density	**107.9 PCF**
Optimum Water Content	**17.1 %**
Natural Water Content	**26.0 %**
Percent Passing #200	**74.5 %**

ATTERBERG LIMITS

LL	PL	PI
69	**27**	**42**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/15/14 13:26 - T:_PROJECTS\2014\G14001.00 MORRISVILLE PARKWAY INTERCHANGE\EU5315_NCDOT_ELECTRONIC_FILE_TREE\GEOTECH\INVESTIGATION\DESIGN\U5315_GEO_RDWY\LABTESTS\G14001.00 GINT.GPJ

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

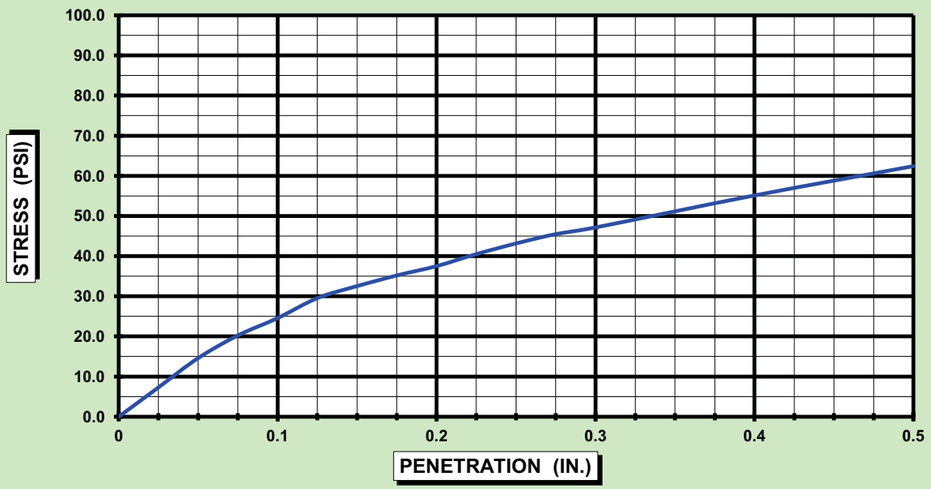
PROJECT #:	G14001.00	**DATE:**	8/22/2014
PROJECT NAME:	Morrisville Parkway Interchange		
BORING:	R-23	**SAMPLE:** BS-6	**DEPTH:** 0-5

SOIL DESCRIPTION: Brown/Light Orange LEAN CLAY with SAND (A-7-6)

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	105.7 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	18.6%	LOAD CELL	2500LB
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	102.4 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	18.6%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	96.9%	SWELL	3.89%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	2.5	N/A
CBR VALUE AT .2"	2.5	N/A

STRESS-PENETRATION CURVE



LIQUID LIMIT	46	PLASTIC LIMIT	26	PLASTIC INDEX	20
Percent Passing #200 Sieve = 77.3%		Natural Moisture Content = 25.0%			

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MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC

Sample No:	BS-6
Source of Material	R-23
Description of Material	Brown/Light Orange LEAN CLAY with SAND(CL)
Depth	0 - 5'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	105.7	PCF
Optimum Water Content	18.6	%
Natural Water Content	25.0	%
Percent Passing #200	77.3	%

ATTERBERG LIMITS

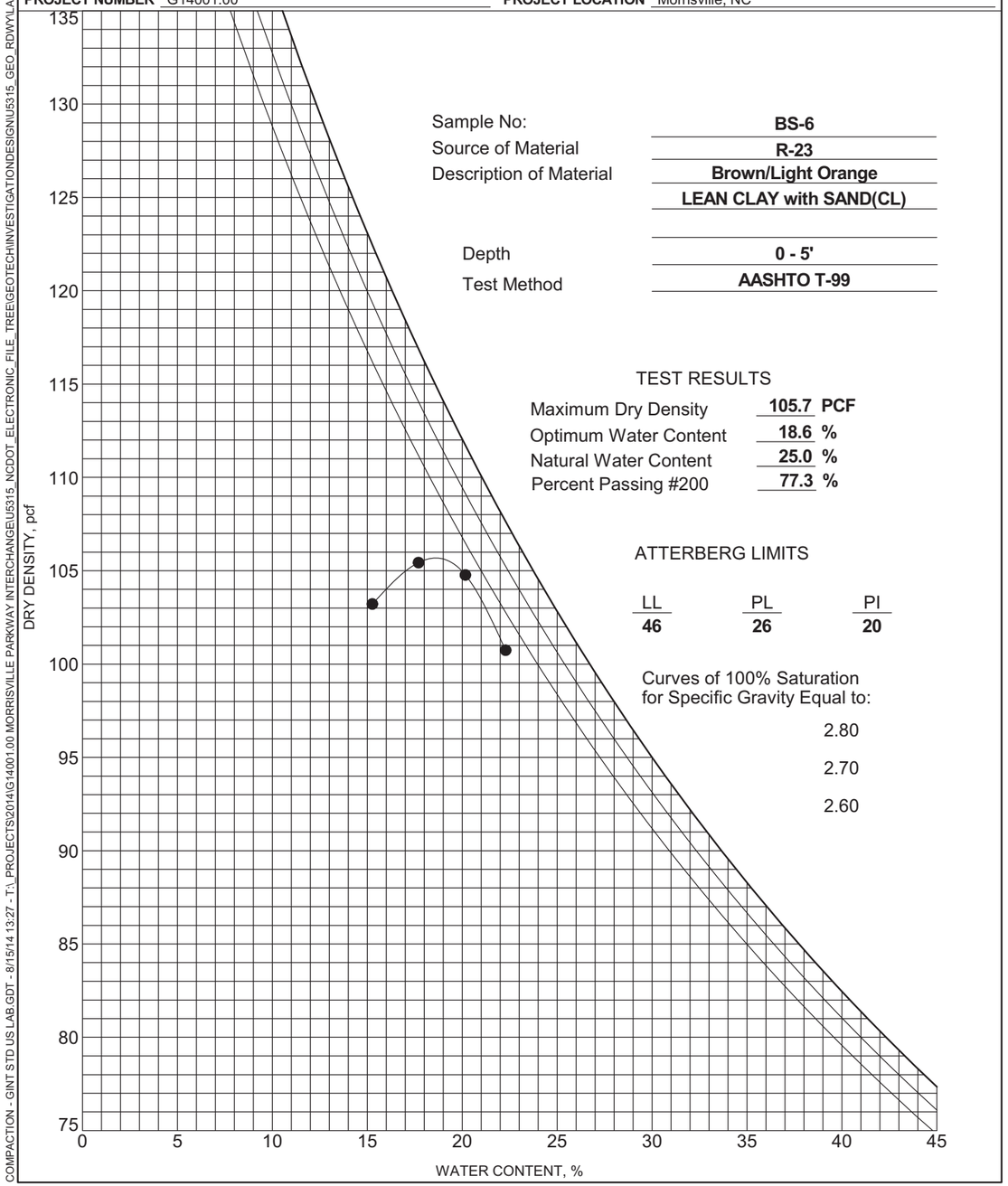
LL	PL	PI
46	26	20

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60



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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

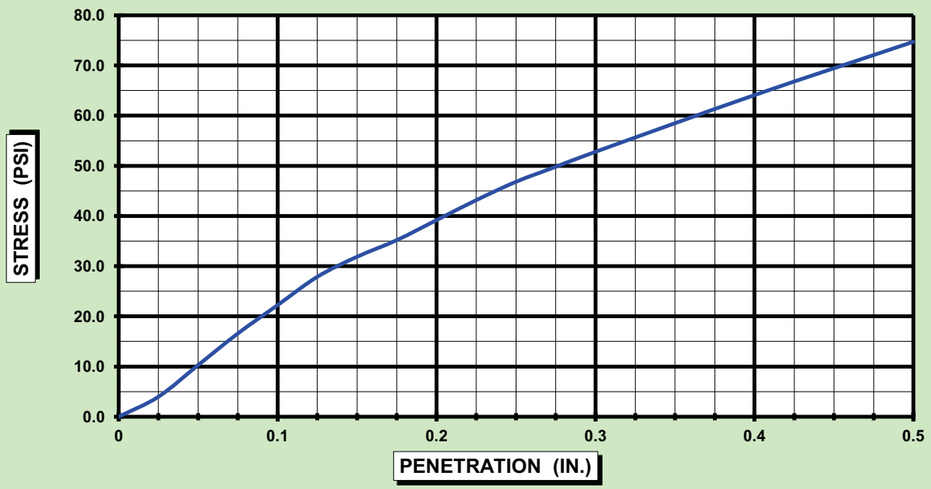
PROJECT #:	G14001.00	**DATE:**	8/22/2014
PROJECT NAME:	Morrisville Parkway Interchange		
BORING:	R-25	**SAMPLE:** BS-7	**DEPTH:** 0-10

SOIL DESCRIPTION: Brown/Tan SANDY FAT CLAY (A-7-6)

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	116.9 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	13.2%	LOAD CELL	2500LB
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	111.3 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	12.7%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	95.2%	SWELL	2.87%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	2.2	2.9
CBR VALUE AT .2"	2.6	2.7

STRESS-PENETRATION CURVE



LIQUID LIMIT	50	PLASTIC LIMIT	22	PLASTIC INDEX	28
Percent Passing #200 Sieve = 66.9%		Natural Moisture Content = 21.2%			

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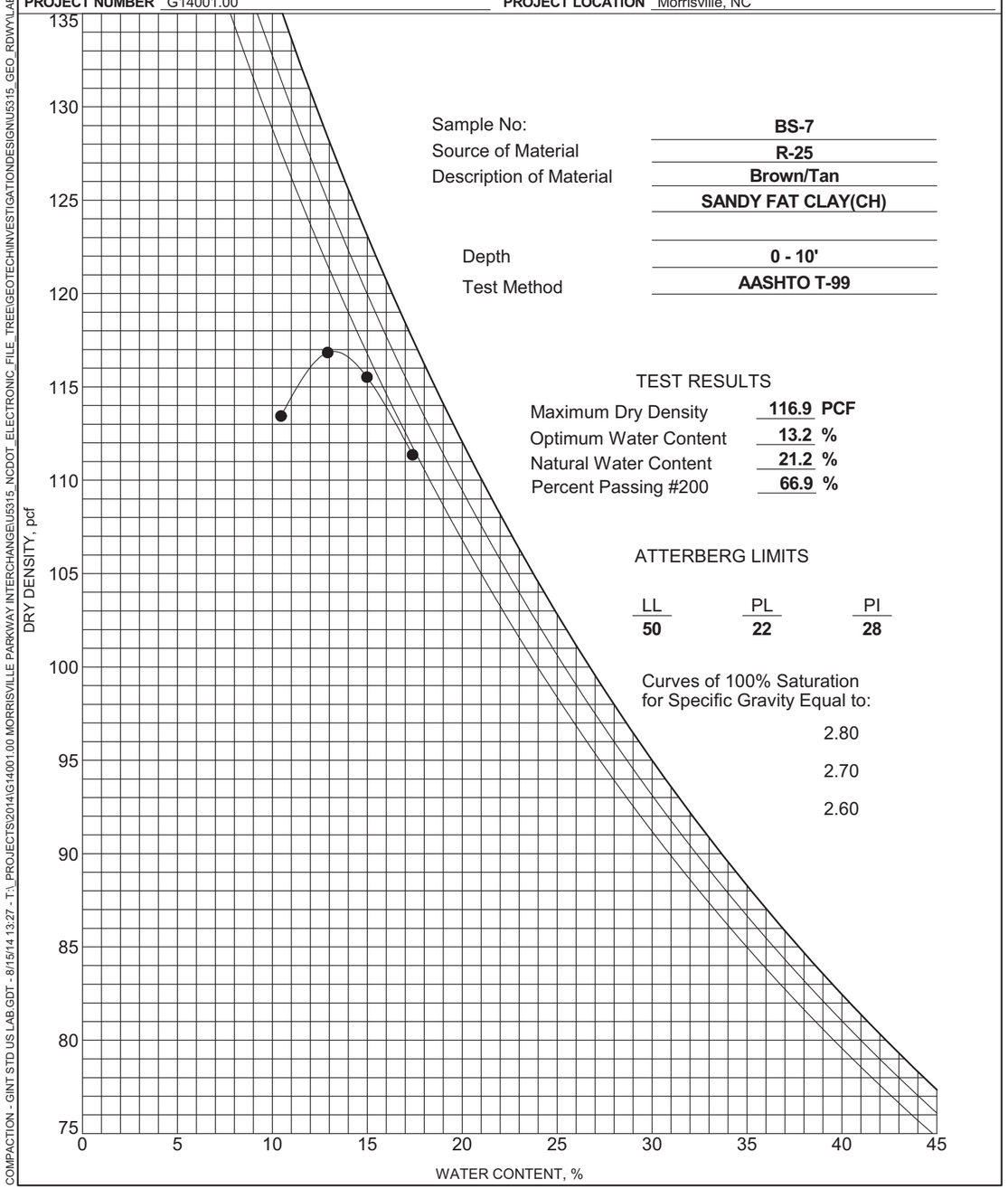
MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	BS-7
Source of Material	R-25
Description of Material	Brown/Tan SANDY FAT CLAY(CH)
Depth	0 - 10'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	116.9 PCF
Optimum Water Content	13.2 %
Natural Water Content	21.2 %
Percent Passing #200	66.9 %

ATTERBERG LIMITS

LL	PL	PI
50	22	28

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/15/14 13:27 - T:_PROJECTS\2014\G14001.00 MORRISVILLE PARKWAY INTERCHANGE\U5315_NCDOT_ELECTRONIC_FILE_TREE\GEOTECH\INVESTIGATION\DESIGN\U5315_GEO_RDWY\LABTESTS\G14001.00 GINT.GPJ

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

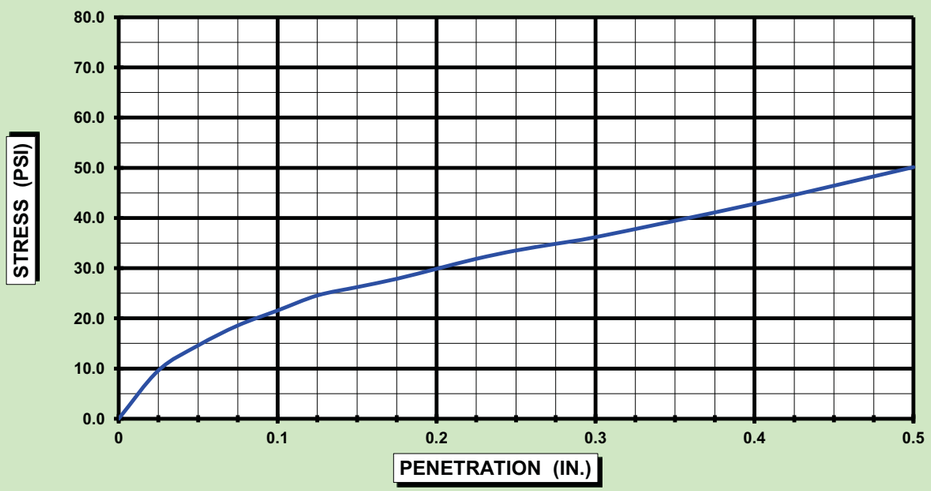
PROJECT #:	G14001.00	**DATE:**	8/22/2014
PROJECT NAME:	Morrisville Parkway Interchange		
BORING:	R-33	**SAMPLE:** BS-8	**DEPTH:** 0-8

SOIL DESCRIPTION: Brown/Tan SANDY FAT CLAY (A-7-6)

COMPACTION METHOD	AASHTO T-99	SOAK	96 HRS.
MAXIMUM DRY DENSITY	109.9 PCF	STRAIN RATE	.05 IN / MIN.
OPTIMUM MOISTURE CONTENT	16.9%	LOAD CELL	2500LB
TEST DATA		SURCHARGE WEIGHT	10 lb.
DRY DENSITY	106.5 PCF	SURCHARGE PER SQUARE FOOT	51 lbs/sq.ft.
MOISTURE CONTENT	16.7%	FINAL MOISTURE CONTENT	N/A
PERCENT COMPACTION	96.9%	SWELL	3.98%

	ACTUAL	CORRECTED
CBR VALUE AT .1"	2.2	N/A
CBR VALUE AT .2"	2.0	N/A

STRESS-PENETRATION CURVE



LIQUID LIMIT	62	PLASTIC LIMIT	20	PLASTIC INDEX	42
Percent Passing #200 Sieve = 80.0%		Natural Moisture Content = 17.5%			

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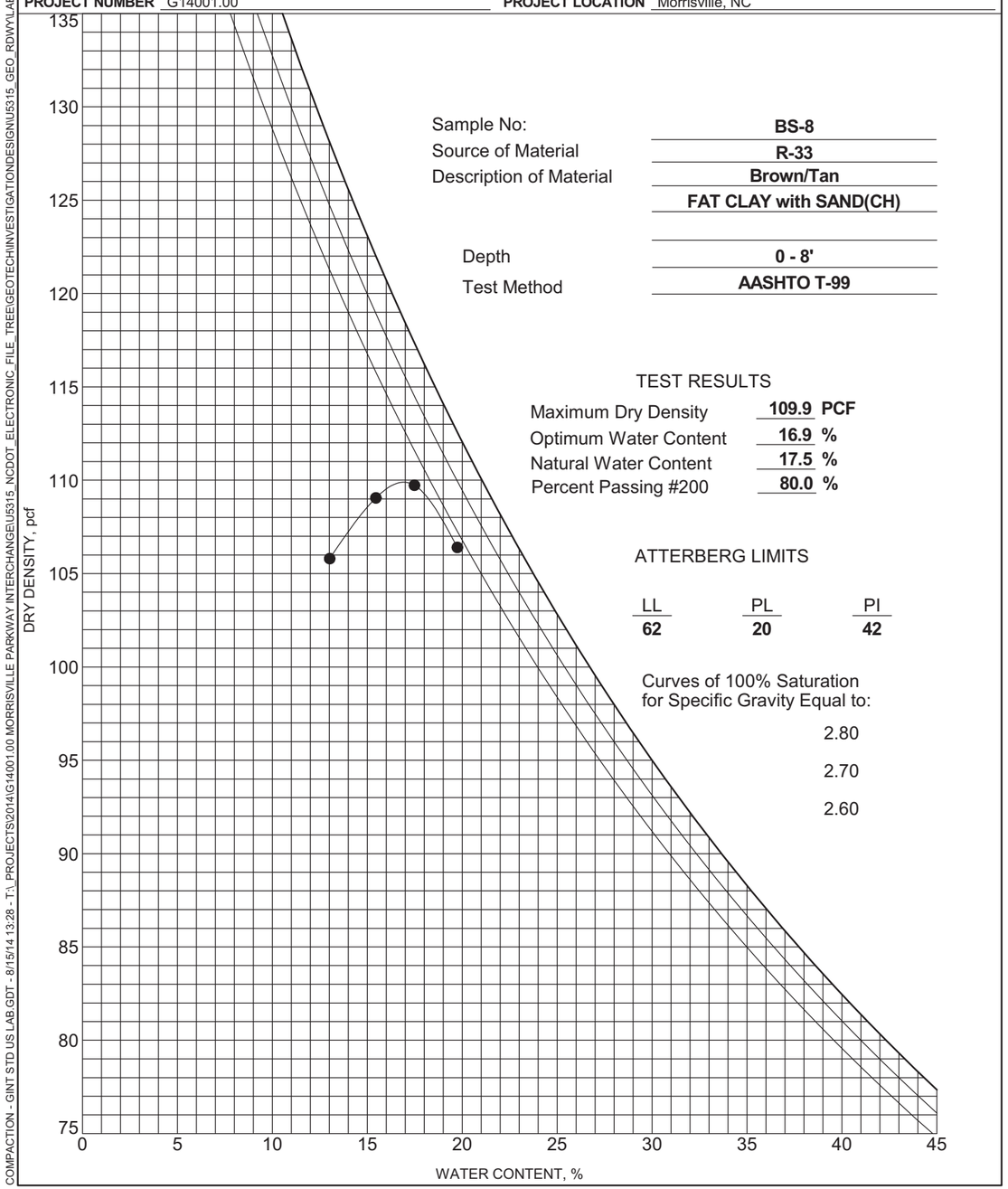
Fax: (919) 871-0803

MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	BS-8
Source of Material	R-33
Description of Material	Brown/Tan FAT CLAY with SAND(CH)
Depth	0 - 8'
Test Method	AASHTO T-99

TEST RESULTS

Maximum Dry Density	109.9 PCF
Optimum Water Content	16.9 %
Natural Water Content	17.5 %
Percent Passing #200	80.0 %

ATTERBERG LIMITS

LL	PL	PI
62	20	42

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION - GINT STD US LAB.GDT - 8/15/14 13:28 - T:_PROJECTS\2014\G14001.00 MORRISVILLE PARKWAY INTERCHANGE\EU5315_NCDOT_ELECTRONIC_FILE_TREE\GEOTECH\INVESTIGATION\DESIGN\U5315_GEO_RDWY\LABTESTS\G14001.00 GINT.GPJ

FALCON ENGINEERING

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

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL

AASHTO T-193 \ ASTM D-1883

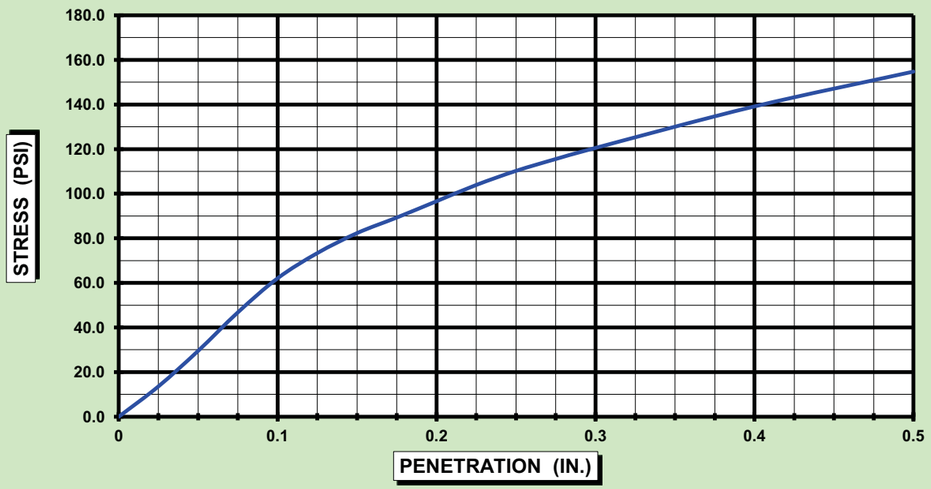
PROJECT #:	**G14001.00**	**DATE:**	**8/22/2014**
PROJECT NAME:	**Morrisville Parkway Interchange**		
BORING:	**R-5**	**SAMPLE:** **BS-2**	**DEPTH:** **0-4**

SOIL DESCRIPTION: Light Brown/Orange CLAYEY SAND (A-7-6)

COMPACTION METHOD	**AASHTO T-99**	**SOAK**	**96 HRS.**
MAXIMUM DRY DENSITY	**115.2 PCF**	**STRAIN RATE**	**.05 IN / MIN.**
OPTIMUM MOISTURE CONTENT	**13.8%**	**LOAD CELL**	**2500LB**
TEST DATA		**SURCHARGE WEIGHT**	**10 lb.**
DRY DENSITY	**110.0 PCF**	**SURCHARGE PER SQUARE FOOT**	**51 lbs/sq.ft.**
MOISTURE CONTENT	**13.8%**	**FINAL MOISTURE CONTENT**	**N/A**
PERCENT COMPACTION	**95.5%**	**SWELL**	**1.49%**

	ACTUAL	CORRECTED
CBR VALUE AT .1"	**6.2**	**6.7**
CBR VALUE AT .2"	**6.4**	**6.7**

STRESS-PENETRATION CURVE



LIQUID LIMIT	**57**	**PLASTIC LIMIT**	**22**	**PLASTIC INDEX**	**35**
Percent Passing #200 Sieve = 45.5%		**Natural Moisture Content = 18.0%**			

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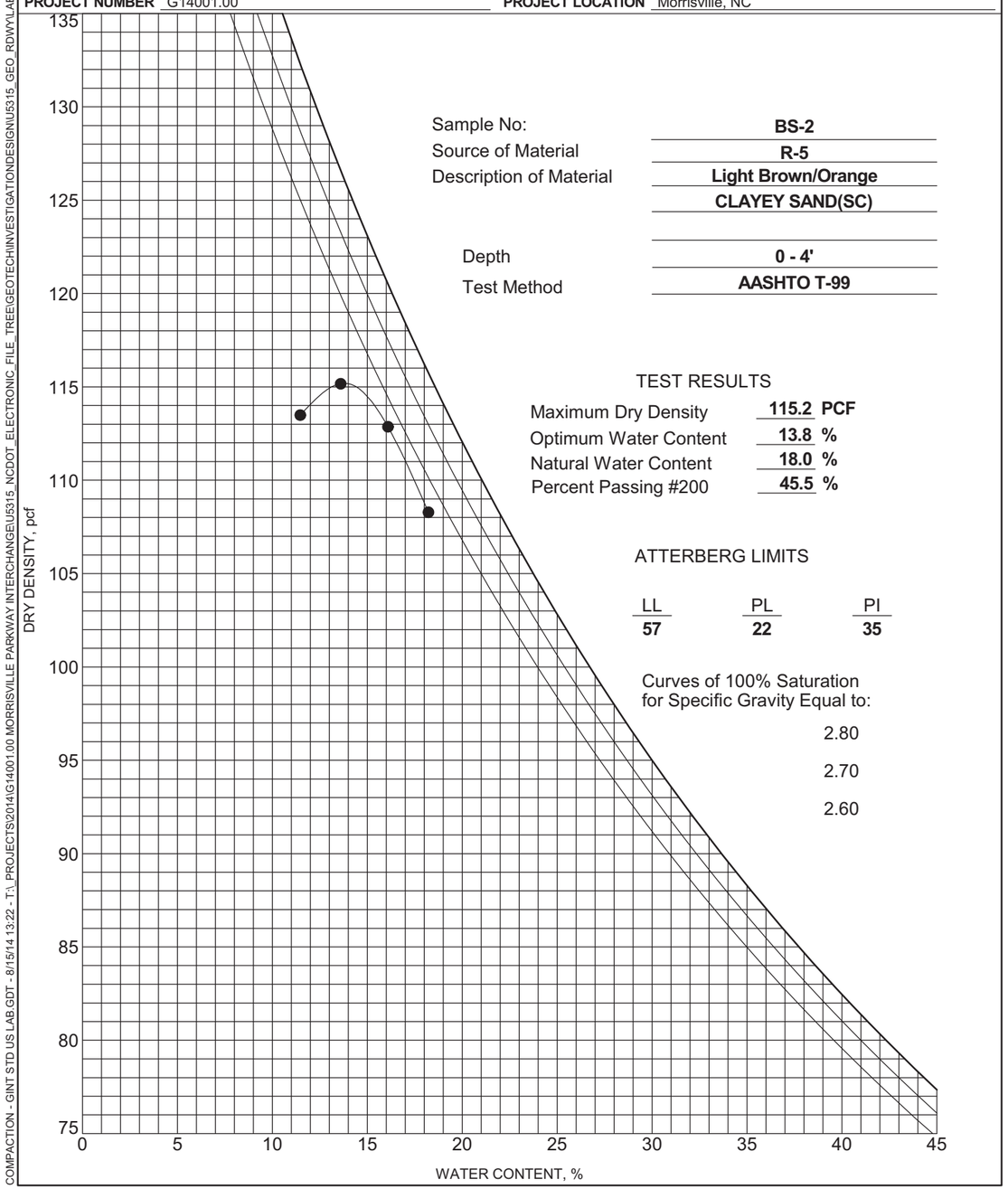
MOISTURE-DENSITY RELATIONSHIP

CLIENT RK & K **PROJECT NAME** Morrisville Parkway Interchange

PROJECT NUMBER G14001.00 **PROJECT LOCATION** Morrisville, NC



Sample No:	**BS-2**
Source of Material	**R-5**
Description of Material	**Light Brown/Orange CLAYEY SAND(SC)**
Depth	**0 - 4'**
Test Method	**AASHTO T-99**

TEST RESULTS

Maximum Dry Density	**115.2 PCF**
Optimum Water Content	**13.8 %**
Natural Water Content	**18.0 %**
Percent Passing #200	**45.5 %**

ATTERBERG LIMITS

LL	PL	PI
57	**22**	**35**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60