CONTRACT: C201550 ID: R-2245

NOTE: SEE SHEET 1A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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LINE	STATION	PLAN	PROFILE	XSECTS
-L-	10+00 TO 248+66.02	4 - 21	27 - 35	37 - 61
-Y7-	10+00 TO 28+00	21 - 23	36	
ACC1	10+00 TO 37+73.52	9, 25		
ACC2	10+00 TO 32+43.33	9, 24		
ACC3	10+00 TO 27+00	17, 26		

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

ROADWAY SUBSURFACE INVESTIGATION

STATE PROJ. 34407.1.1 I.D. R-2245 F.A. PROJ. STP-1105 (6)

COUNTY BRUNSWICK

PROJECT DESCRIPTION NEW ROUTE FROM SR 1104 (BEACH DR.) TO NC 211 (2ND BRIDGE TO OAK ISLAND)

INVENTORY-REVISED

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2245	1	

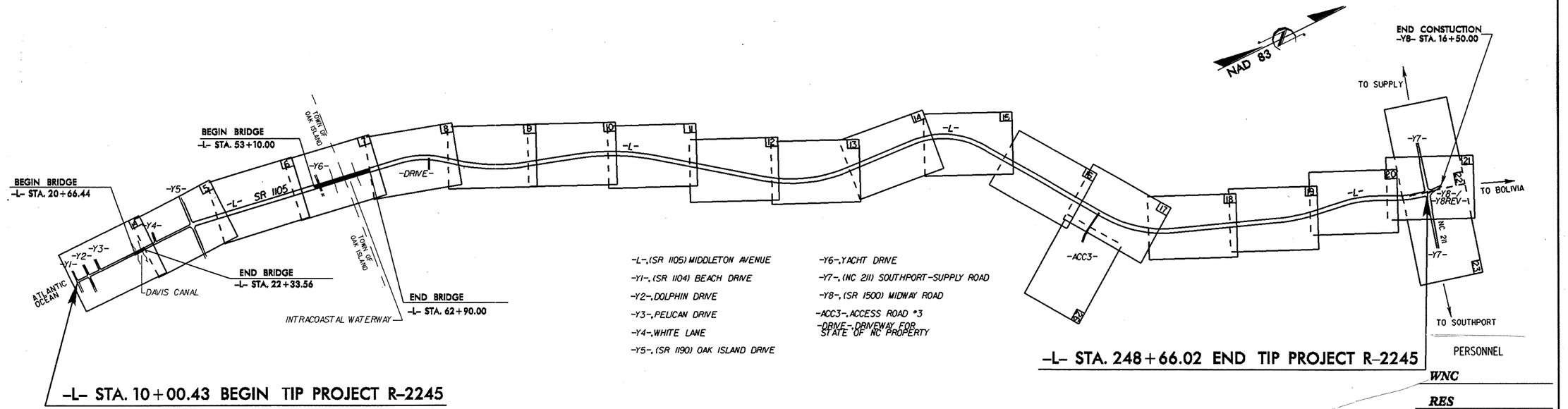
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34407.1.1	STP-1105(6)	P.E.
34407.3.1	STP-1105(7)	R/W & UTIL.
34407.2.3	STP-1105(17)	CONST.

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.



ACCESS IS NOT CONTROLLED FROM OCEAN BEACH DRIVE TO 735' SOUTH OF YACHT DRIVE.
ACCESS CONTROL IS LIMITED TO POINTS AS SHOWN ON THE PLANS FROM 735' SOUTH OF YACHT DRIVE TO NC 211.

WNC

RES

JLS

INVESTIGATED BY F. M. WESCOTT

CHECKED BY D. N. ARGENBRIGHT

SUBMITTED BY D. N. ARGENBRIGHT

DATE JULY, 2006

NORTH CAROLINA LICENSED SEAL 1050 GEOLOGIST D. N. ARGENBRIGHT

7-7-06

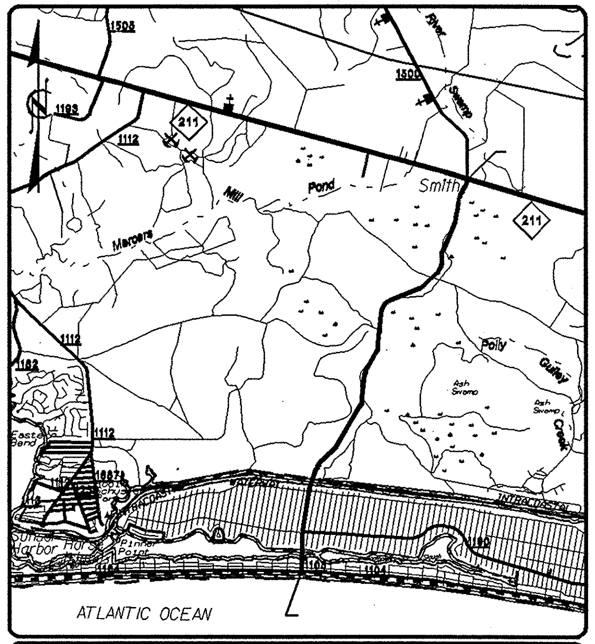
DRAWN BY: W. D. FIELDS

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

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

TIP PROJECT: R-2245

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

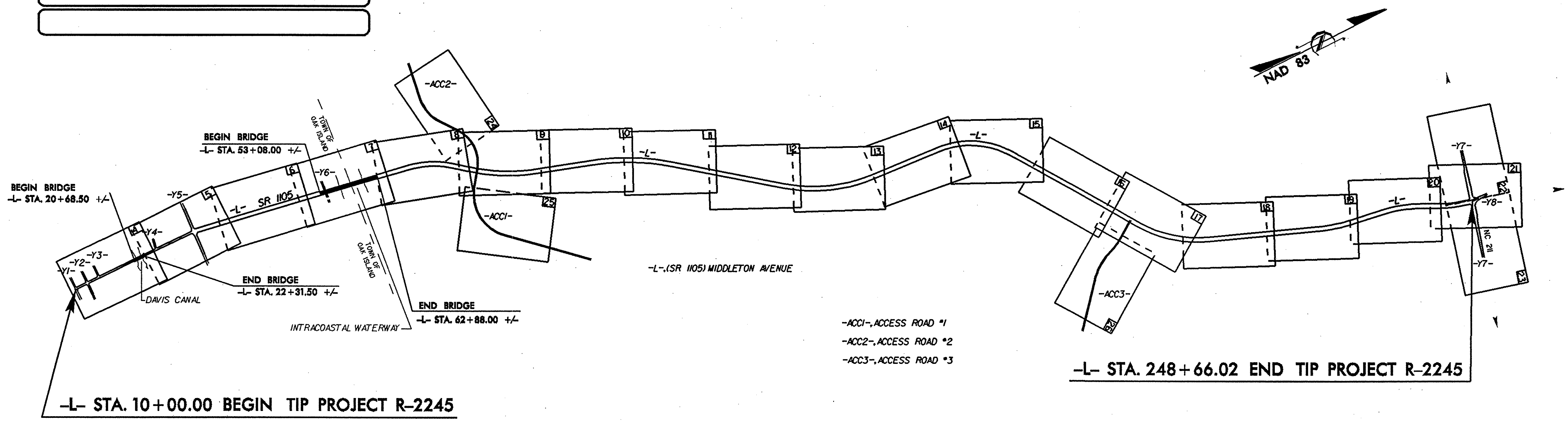
BRUNSWICK COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2245	1A	61

STATE PROJ.NO.	F.A.PROJ.NO.	DESCRIPTION
34407.1.1	STP-1105(6)	P.E.
34407.3.1	STP-1105(7)	R/W & UTIL.

LOCATION: NEW ROUTE FROM SR 1104 (OCEAN BEACH DRIVE) TO NC 211 (SECOND BRIDGE TO OAK ISLAND)

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



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF OAK ISLAND.
THIS PROJECT HAS UNCONTROLLED ACCESS FROM OCEAN BEACH DRIVE TO 835' SOUTH OF YACHT DRIVE.
THIS PROJECT HAS LIMITED CONTROLLED ACCESS WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS FROM 835' SOUTH OF YACHT DRIVE TO NC 211.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 11600
ADT 2025 = 27400
DHV = 8 %
D = 55 %
T = 3 % *
V = 40-60 MPH
* TTST 1% + DUAL 2%
FUNC CLASS = RURAL COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2245 = MI

LENGTH STRUCTURES TIP PROJECT R-2245 = MI

TOTAL LENGTH OF TIP PROJECT R-2245 = 4.520 MI

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 29, 2005

LETTING DATE: AUGUST 15, 2006

GLENN W. MUMFORD, PE
PROJECT ENGINEER

LISA W. SHAPIRO, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

CONTRACT:

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
R-2245	34407.1.1	2	61

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10	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			
LIQUID LIMIT	6 MX		N.P.	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
PLASTIC INDEX				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 A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS	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 SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
w - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] OTHER CME-45B
- [ ] OTHER_____

ADVANCING TOOLS:
- [X] CLAY BITS
- [X] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE_____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK:

ELEVATION:

NOTES:

APPROX. LIMITS OF ORGANIC SOILS

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 19, 2006

STATE PROJECT: 34407.1.1 R-2245
F. A. PROJECT: STP-1105(6)
COUNTY: Brunswick
DESCRIPTION: New Route from SR 1104 (Beach DR.) to NC 211 (2nd Bridge to Oak Isalnd)

SUBJECT: Geotechnical Report – Inventory-Revised

This report supercedes the Roadway Investigation report dated December 7, 2005.

Project Description

The project consists of widening the existing Middleton Ave. and adding a four lane divided facility along a new location connecting to NC 211. The project begins at Ocean Beach Drive and proceeds northeast toward the Intracoastal Waterway. The new location begins just south of the Intracoastal Waterway and continues in the northeasterly direction cross-country to where it ties in with existing NC 211. The geotechnical investigation of subsurface conditions was confined to the corridor of proposed new construction.

The following base line were investigated for this project:

Line	Station(±)
-L-	10+00 to 248+66
-Y7-	10+00 to 28+00

Areas of Special Geotechnical Interest

1) The following sections contain cohesive soils which have the potential to cause embankment stability and/or long term settlement problems:

MAILING ADDRESS:
EASTERN REGIONAL OFFICE
GEOTECHNICAL ENGINEERING UNIT
1570 MAIL SERVICE CENTER
RALEIGH NC 27699-1570

TELEPHONE: 919-662-4710
FAX: 919-662-3095

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
3301 JONES SAUSAGE RD., SUITE 100
GARNER, NC 27529-9489

Line	Station (±)
-L-	235+70 to 242+75
-L-	244+20 to 246+75
-Y7-	10+00 to 20+90

2) The following section contain relatively soft organic soils which have the potential for subgrade problems during construction:

Line	Station(±)
-L-	77+70 to 80+65
-L-	94+00 to 96+00
-L-	108+49 to 110+30
-L-	160+30 to 161+90
-L-	174+20 to 178+10
-L-	200+01 to 216+05

3) The following intervals were found to exhibit a high water table, seasonal high ground water or the potential for ground water related construction problems:

Line	Station(±)
-L-	76+00 to 248+66
-Y7-	10+00 to 28+00

Physiography, Geology and Ground Water

The project is located in the Coastal Plain Physiographic Province. Topography at the site is nearly flat to gentle sloping. Elevations at the site range from -15± feet along the channel bed of the Intracoastal Waterway bed to 23± feet along the existing SR 1105 roadway. Elevations along the proposed new location range from 20± to 60± feet.

The geology of the project consist of Recent age coastal plain sediments overlying marine to marginal marine sediments of the Pliocene age Waccamaw Formation and Tertiary age limestone and sandstone of the Castle Hayne Formation. The project is drained by the Intracoastal Waterway and Big Davis Canal, which flow into the Atlantic Ocean. A thick, 12± to 25± foot layer of sandy spoil dredged from the Intracoastal Waterway is located north of the waterway.

Ground water data was collected primarily from March 2005 to April 2005 during above average rainfall conditions. Typically, ground water levels were measured at depths of 2± to 20± feet below the natural ground surface in nearly level areas and at the surface within the

Carolina Bay areas. Ground water levels should fall 3± feet or more during dry summer conditions.

Soils

Soils occurring along the project are derived from marine and fluvial sediments deposited in the geologic past. Based on origin and occurrence, soils encountered during this investigation are separated into four major categories. The categories are surficial soils, coastal plain soils, organic deposits and artificial fill.

Surficial soils are found in the top 3 to 6 feet of the soil profile. Typically, they consist of very loose to medium dense sand (A-2-4, A-3). The granular material generally exhibits good to excellent engineering properties.

The coastal plain soils generally underlie the surficial soils at depths up to 20± feet. These deposits typically consist medium dense to dense sand (A-2-4, A-3). Very soft to medium stiff sandy silty clay (A-6, A-7-6) was encountered under the surficial soils from -L- stations 235+70± to 242+65± and 244+20± to 246+75± and under the roadway embankment along -Y7- from stations 10+00± to 20+90±. Moisture content of tested cohesive samples ranged from 32 to 35 percent. An undisturbed Shelby Tube was taken in the cohesive deposits at -L- Station 241+00, CL and submitted for Triaxial Cu and Consolidation testing. The granular soils typically exhibit good to excellent engineering properties. However, the cohesive soils generally have poor engineering properties due to a very soft consistency, relatively high moisture contents, medium to high plasticity indices and 50 percent or more passing the 200 sieve. These soils have the potential to cause subgrade stability problems or embankment stability/settlement problems.

Organic deposits were found in areas along the project where the alignment crossed Carolina bays. Soils within the bays consisted of very soft to soft muck. Organic content of tested samples ranged from 8 to 29 percent. Moisture content of a tested organic sample was 91 percent. These soils have poor engineering properties and have the potential to cause subgrade stability problems or embankment stability/settlement problems.

Artificial fill is derived from dredging the Intracoastal Waterway. This material ranges from 12± to 25± feet thick and is predominantly loose sand. These soils are found up to 1100± feet north of the Intracoastal Waterway.

Culvert at -Y7- Station 23+98

Based on the Culvert Survey and Hydraulic Design Report dated November 7, 2005, a single 10'x 8' RCBC is proposed for -Y7- over a River Swamp at station 23+98. Hand auger borings performed at the proposed culvert site shows up to 3 feet of loose to medium dense sandy roadway embankment (A-2-4) underlain by loose to medium dense sand (A-2-4) at the site. Ground water was measured at an elevation of 43± feet.

Prepared by:

Fred M Wescott III
Project Geological Engineer

EARTHWORK BALANCE SHEET

PROJECT R-2245 COUNTY BRUNSWICK COMPUTED BY: TLW 01/07 CHECKED BY: EMM 01/07 SHEET 1 OF 3 3B

STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EARTH EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	UNDERCUT EMB.	EMB. +25 %	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
-L- LT.																
10+12.45	16+00.00	170	0	0	0	170	15	0	15	0	19	0	0	151	0	151
-L- RT.																
10+12.45	16+00.00	158	0	0	0	158	2	0	2	0	2	0	0	156	0	156
-Y1-																
10+00.00	13+00.00	109	0	0	0	109	0	0	0	0	0	0	0	109	0	109
-Y2-																
11+00.00	12+80.00	51	0	0	0	51	0	0	0	0	0	0	0	51	0	51
-Y3-																
11+00.00	11+98.26	19	0	0	0	19	0	0	0	0	0	0	0	19	0	19
-L-																
16+00.00	20+66.44 BEGIN BRIDGE	152	0	0	0	152	2,871	0	2,871	0	3,589	3,437	0	0	0	0
SUBTOTAL:		659	0	0	0	659	2,888	0	2,888	0	3,610	3,437	0	486	0	486
-L-																
22+33.56 END BRIDGE	23+00.00	15	0	0	0	15	161	0	161	0	201	186	0	0	0	0
-L- LT.																
23+00.00	32+00.00	82	0	0	0	82	22	0	22	0	27	0	0	55	0	55
-L- RT.																
22+50.00	32+00.00	397	0	0	0	397	132	0	132	0	165	0	0	232	0	232
-L-																
32+00.00	53+10.00 BEGIN BRIDGE	934	0	0	0	934	93,707	0	93,707	0	117,134	116,200	0	0	0	0
-Y4-																
10+50.000	11+63.54	26	0	0	0	26	0	0	0	0	0	0	0	26	0	26

"EARTHWORK QUANTITIES ARE CACULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT."

PROJECT R-2245 COUNTY BRUNSWICK COMPUTED BY: TLW 01/07 CHECKED BY: EMM 01/07 SHEET 2 OF 3 3C

STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EARTH EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	UNDERCUT EMB.	EMB. + 25 %	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
-Y5-																
11+20.000	17+21.27	88	0	0	0	88	117	0	117	0	146	58	0	0	0	0
SUBTOTAL:		1,542	0	0	0	1,542	94,139	0	94,139	0	117,673	116,444	0	313	0	313
-L-																
62+90.00 END BRIDGE	93+00.00	363	0	1,365	0	363	86,718	0	85,353	1,365	108,398	108,035	0	0	1,365	1,365
-DRIVE-																
10+32.75	12+00.00	0	0	0	0	0	981	0	981	0	1,226	1,226	0	0	0	0
SUBTOTAL:		363	0	1,365	0	363	87,699	0	86,334	1,365	109,624	109,261	0	0	1,365	1,365
-L-																
93+00.00	123+00.00	0	0	1,775	0	0	52,495	0	50,720	1,775	65,619	65,619	0	0	1,775	1,775
SUBTOTAL:		0	0	1,775	0	0	52,495	0	50,720	1,775	65,619	65,619	0	0	1,775	1,775
-L-																
123+00.00	153+00.00	0	0	0	0	0	54,338	0	54,338	0	67,923	67,923	0	0	0	0
SUBTOTAL:		0	0	0	0	0	54,338	0	54,338	0	67,923	67,923	0	0	0	0
-L-																
153+00.00	183+00.00	0	0	6,910	0	0	80,202	0	73,292	6,910	100,253	100,253	0	0	6,910	6,910
SUBTOTAL:		0	0	6,910	0	0	80,202	0	73,292	6,910	100,253	100,253	0	0	6,910	6,910
-L-																
183+00.00	213+00.00	0	0	27,160	0	0	88,562	0	61,402	27,160	110,703	110,703	0	0	27,160	27,160
-ACC3-																
10+32.84	14+16.57	0	0	0	0	0	6,165	0	6,165	0	7,706	7,706	0	0	0	0
SUBTOTAL:		0	0	27,160	0	0	94,727	0	67,567	27,160	118,409	118,409	0	0	27,160	27,160

"EARTHWORK QUANTITIES ARE CACULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT."

PROJECT R-2245 COUNTY BRUNSWICK COMPUTED BY: TLW 01/07 CHECKED BY: EMM 01/07 SHEET 3 OF 3 3D

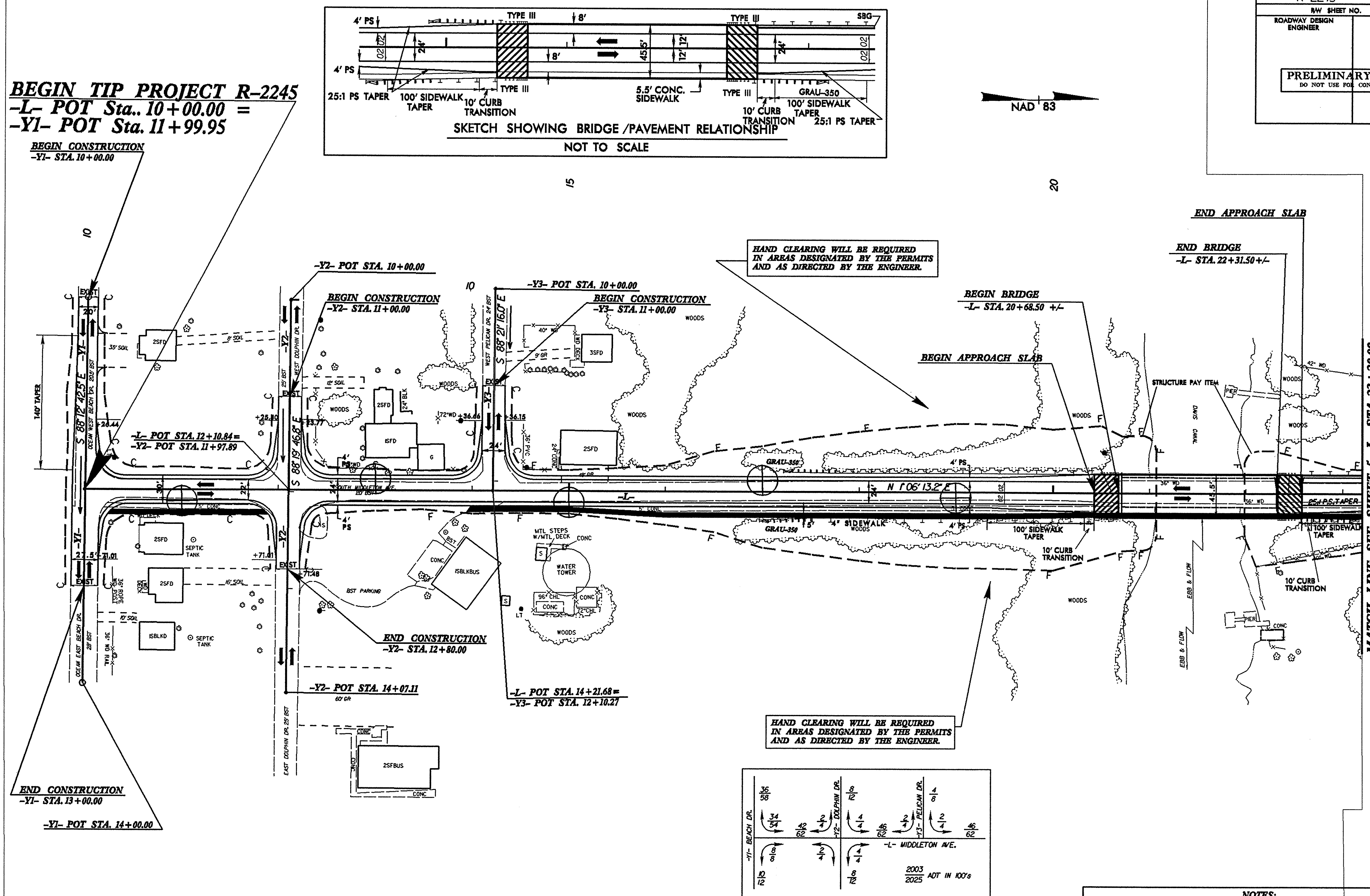
STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EARTH EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	UNDERCUT EMB.	EMB. +25 %	BORROW	ROCK WASTE	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
-L-																
213+00.00	248+47.46	398	0	4,967	0	398	74,718	0	69,751	4,967	93,397	92,999	0	0	4,967	4,967
SUBTOTAL:		398	0	4,967	0	398	74,718	0	69,751	4,967	93,397	92,999	0	0	4,967	4,967
-Y7DET-																
19+00.00	27+50.00	502	0	0	0	502	1,451	0	1,451	0	1,814	1,312	0	0	0	0
-Y7-																
10+00.00	28+00.00	1,486	0	0	0	1,486	1,640	0	1,640	0	2,050	564	0	0	0	0
-Y8-																
11+92.29	16+50.000	409	0	0	0	409	223	0	223	0	279	0	0	130	0	130
-Y8REV-																
10+24.08	11+89.61	54	0	0	0	54	237	0	237	0	296	242	0	0	0	0
SUBTOTAL:		2,451	0	0	0	2,451	3,551	0	3,551	0	4,439	2,118	0	130	0	130
PROJECT SUBTOTAL:		5,413	0	42,177	0	5,413	544,757	0	502,580	42,177	680,949	676,463	0	929	42,177	43,106
WASTE IN LIEU OF BORROW												-929		-929		-929
ADDITIONAL UNDERCUT		0	0	1,000	0	0	1,000	0	0	1,000	1,250	1,250	0	0	1,000	1,000
LOSS DUE TO CLEARING & GRUBBING		-800				-800						800				
ESTIMATED SHOULDER MATERIAL							11,800		11,800		14,750	14,750				
PROJECT TOTAL:		4,613	0	43,177	0	4,613	557,557	0	514,380	43,177	696,949	692,334	0	0	43,177	43,177
SELECT MATERIAL IN LIEU OF BORROW												-53,971				
ESTIMATED 5% TO REPLACE TOPSOIL IN BORROW PIT												31,918				
GRAND TOTAL:		4,613	0	43,177	0	4,613	557,557	0	514,380	43,177	696,949	670,281	0	0	43,177	43,177
SAY:		4,700										670,500				

DDE = 5,293 cu. yds.

"EARTHWORK QUANTITIES ARE CACULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT."

PROJECT REFERENCE NO.	SHEET NO.
R-2245	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NOTES:

1) FOR -L- PROFILE SEE SHEET 27.
2) FOR -Y1-, -Y2- AND -Y3- PROFILES SEE SHEET 36.
3) FOR STRUCTURE PLANS SEE SHEETS S- TO S-.
4) DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.
5) ~~PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.~~
6) -Y- LINE RADII ARE 30' UNLESS OTHERWISE NOTED.
7) FOR CURB TRANSITION SEE SHEET 2-.

REVISIONS

8/17/99

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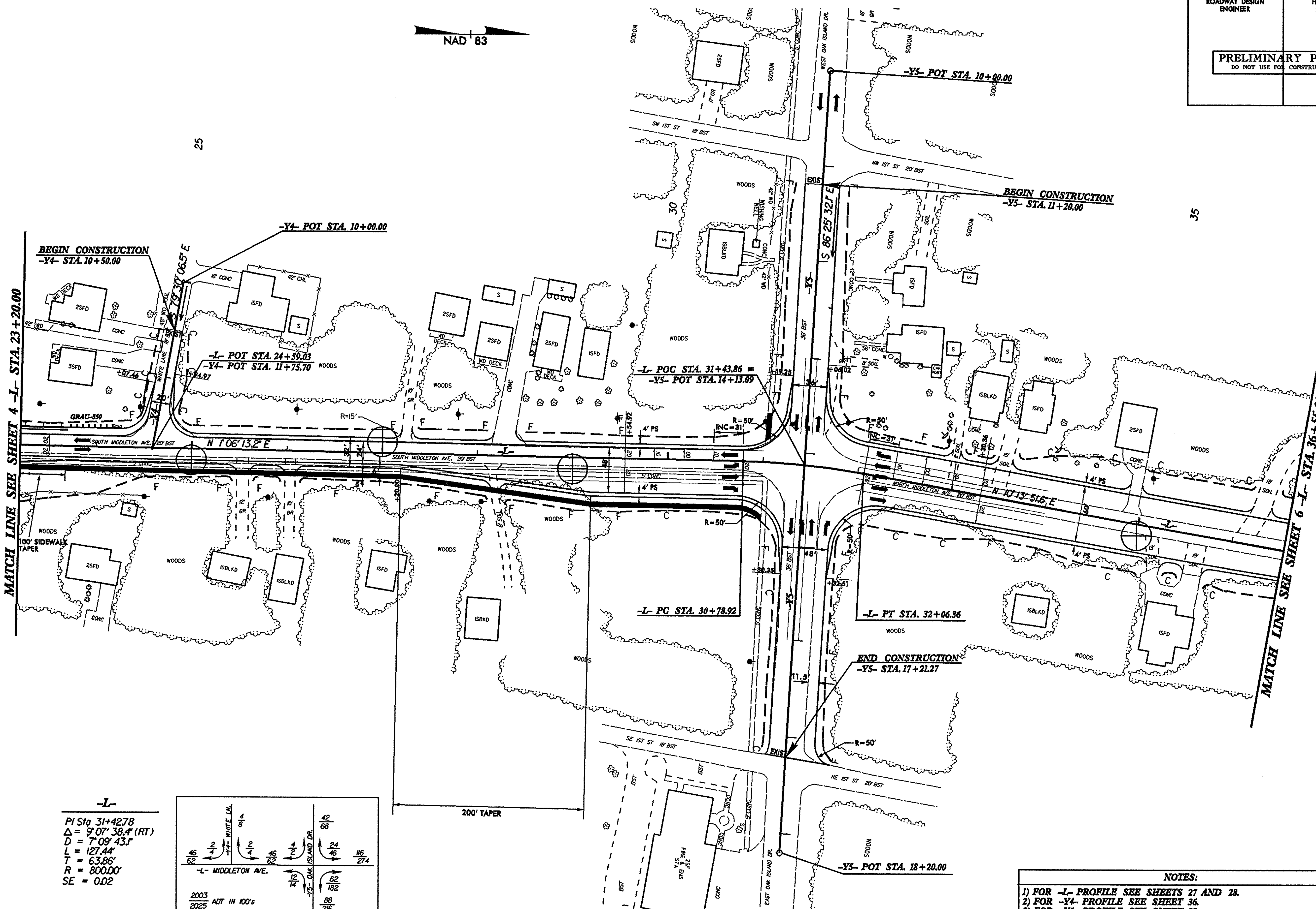
PROJECT REFERENCE NO.	SHEET NO.
R-2245	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-

PI Sta 31+42.78
Δ = 9° 07' 38.4" (RT)
D = 7° 09' 43.1"
L = 127.44'
T = 63.86'
R = 800.00'
SE = 0.02

2003 / 2025 ADT IN 100's

NOTES:

1) FOR -L- PROFILE SEE SHEETS 27 AND 28.
2) FOR -Y4- PROFILE SEE SHEET 36.
3) FOR -Y5- PROFILE SEE SHEET 37.
4) DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.
5) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
6) -Y- LINE RADII ARE 30' UNLESS OTHERWISE NOTED.

REVISIONS

8/17/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2245	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

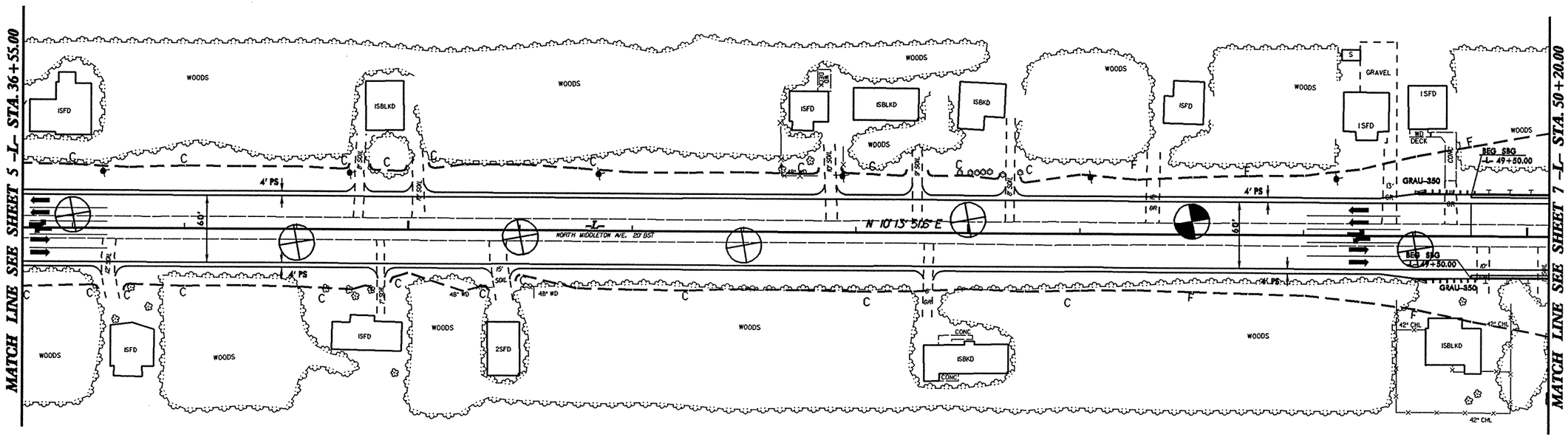
NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NAD 83

40 45 50

MATCH LINE SEE SHEET 5 -L- STA. 36+55.00

MATCH LINE SEE SHEET 7 -L- STA. 50+20.00



NOTES:

1) FOR -L- PROFILE SEE SHEET 28.
2) DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.
3) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.

REVISIONS 8/17/99

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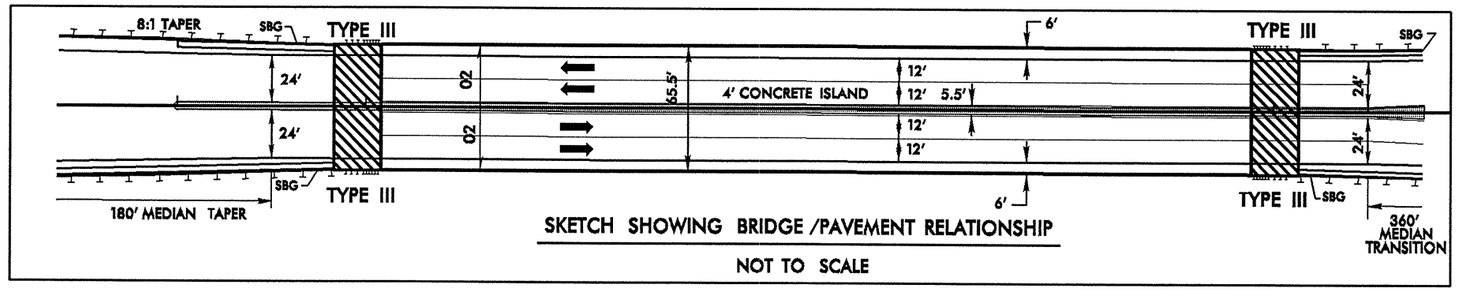
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
R-2245	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SKETCH SHOWING BRIDGE /PAVEMENT RELATIONSHIP

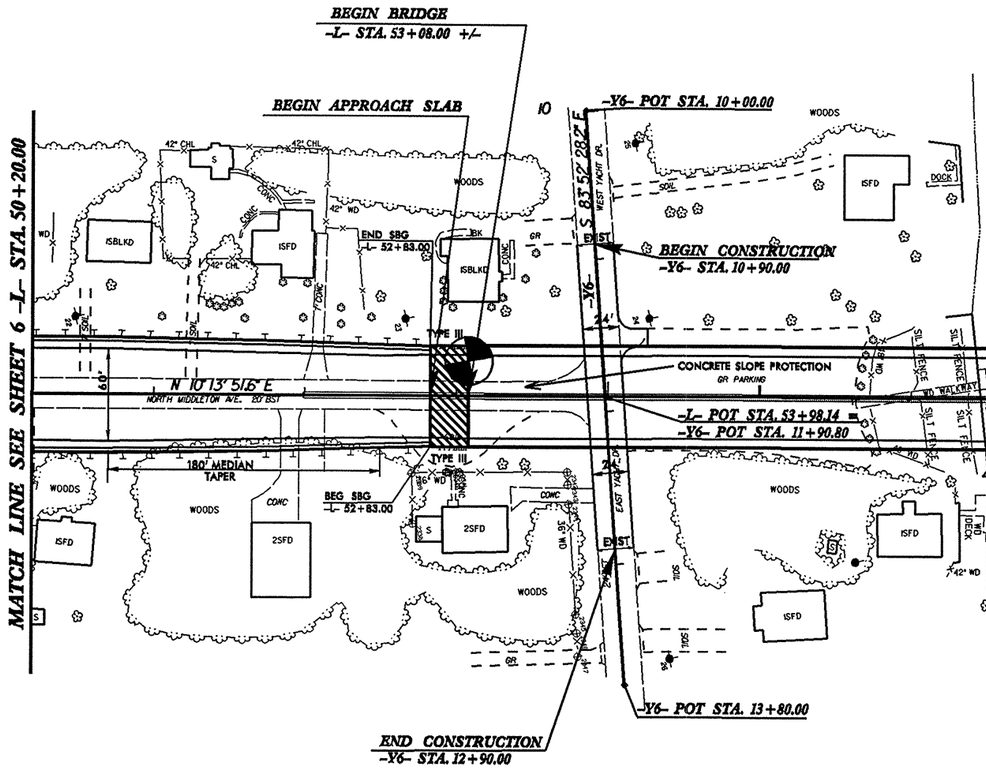
NOT TO SCALE

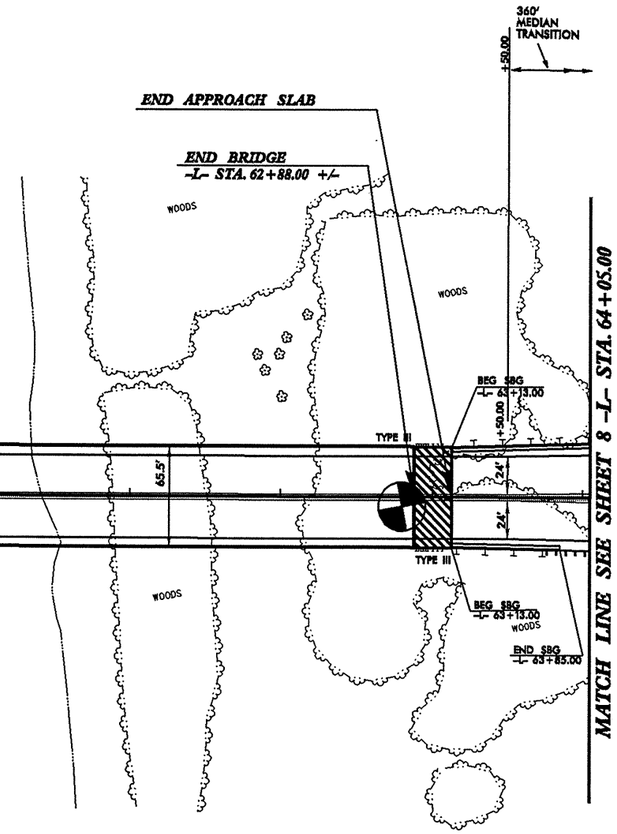
NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

55

60

NAD 83





NOTES:

1) FOR -L- PROFILE SEE SHEETS 28 AND 29.
2) FOR -Y6- PROFILE SEE SHEET 37.
3) FOR STRUCTURE PLANS SEE SHEETS S- TO S-.
4) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.

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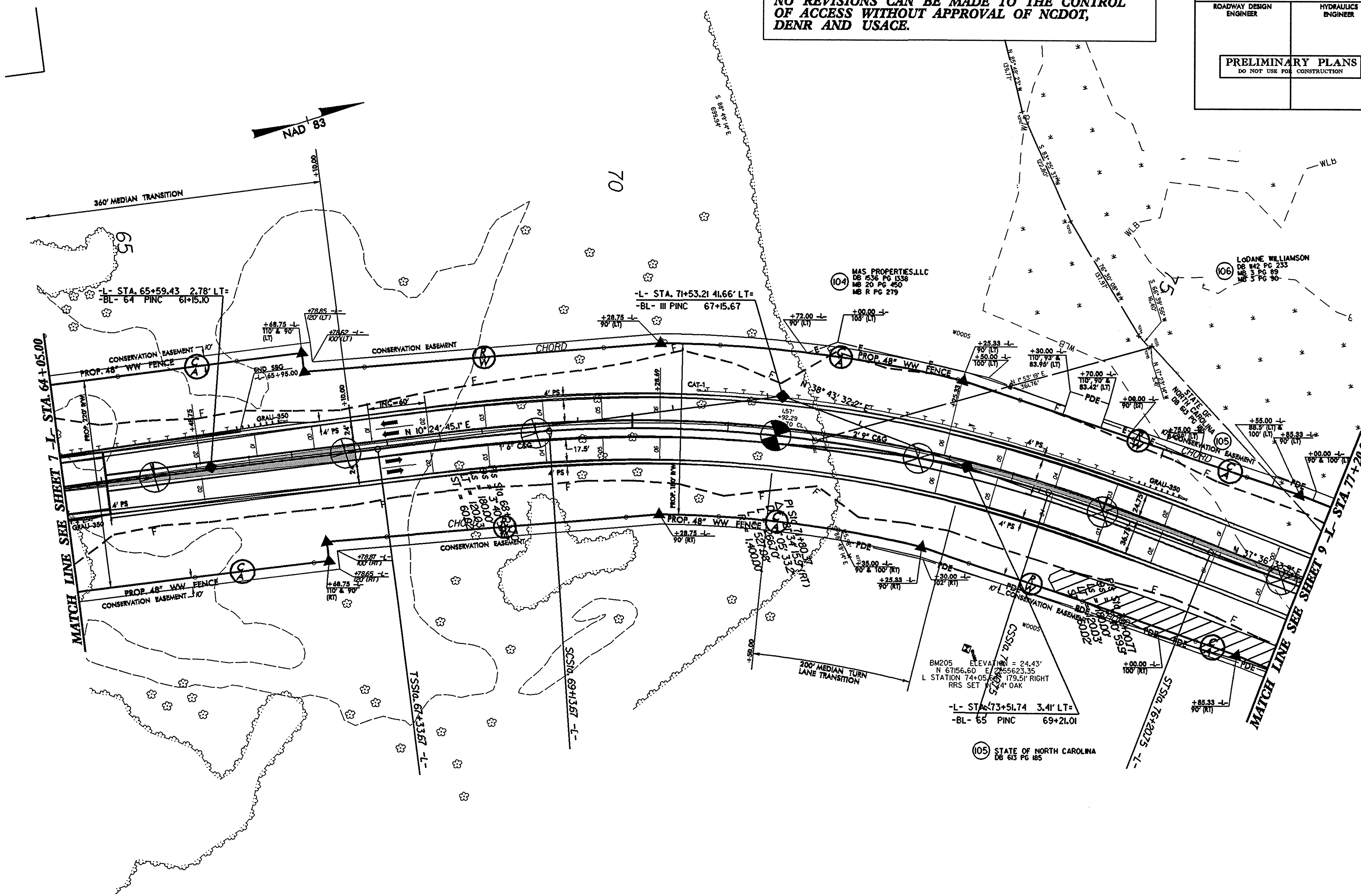
PROJECT REFERENCE NO.	SHEET NO.
R-2245	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.



REVISIONS

8/17/99

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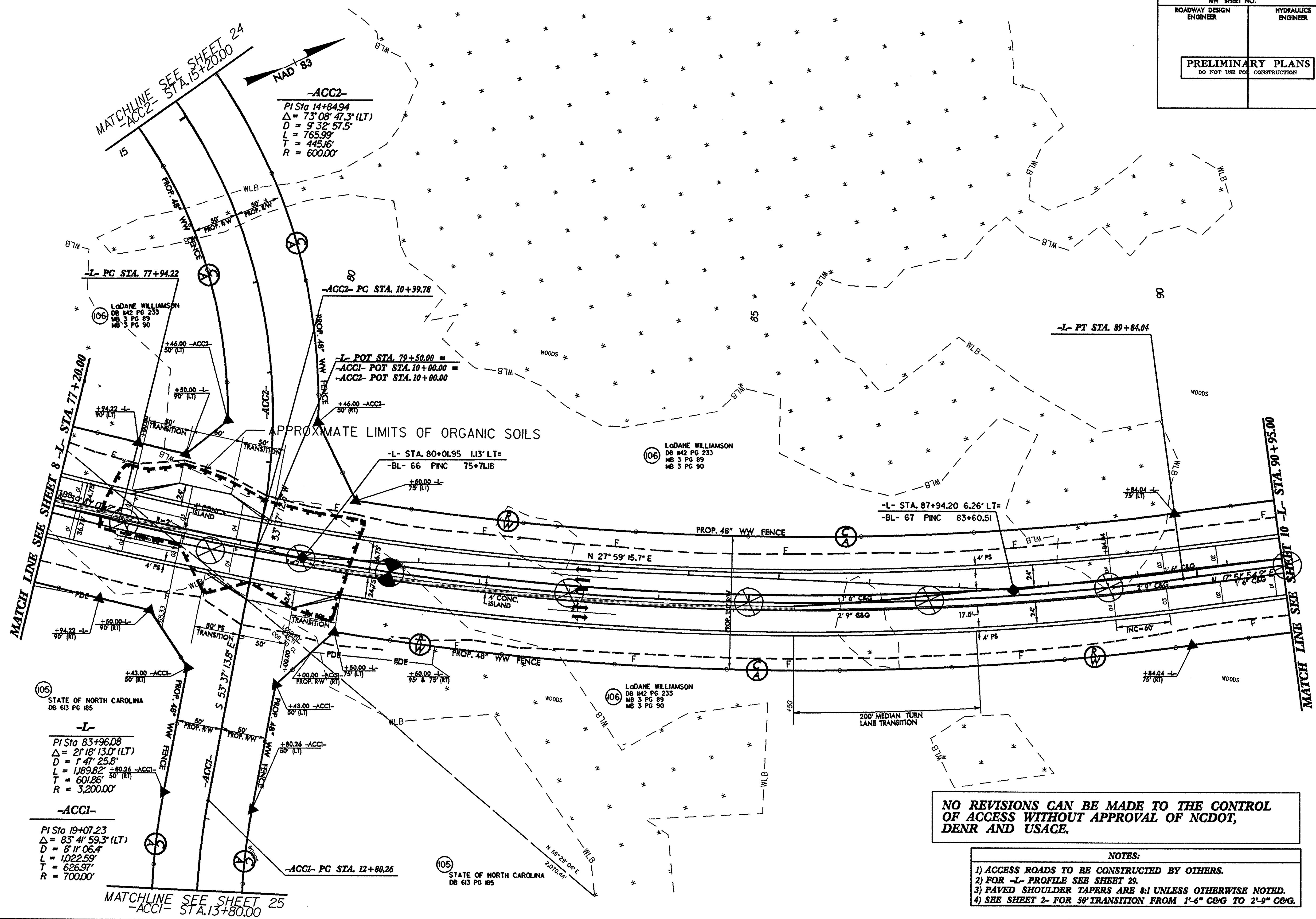
NOTES:

1) FOR -L- PROFILE SEE SHEET 29.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

PROJECT REFERENCE NO.	SHEET NO.
R-2245	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) ACCESS ROADS TO BE CONSTRUCTED BY OTHERS.
2) FOR -L- PROFILE SEE SHEET 29.
3) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
4) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

REVISIONS

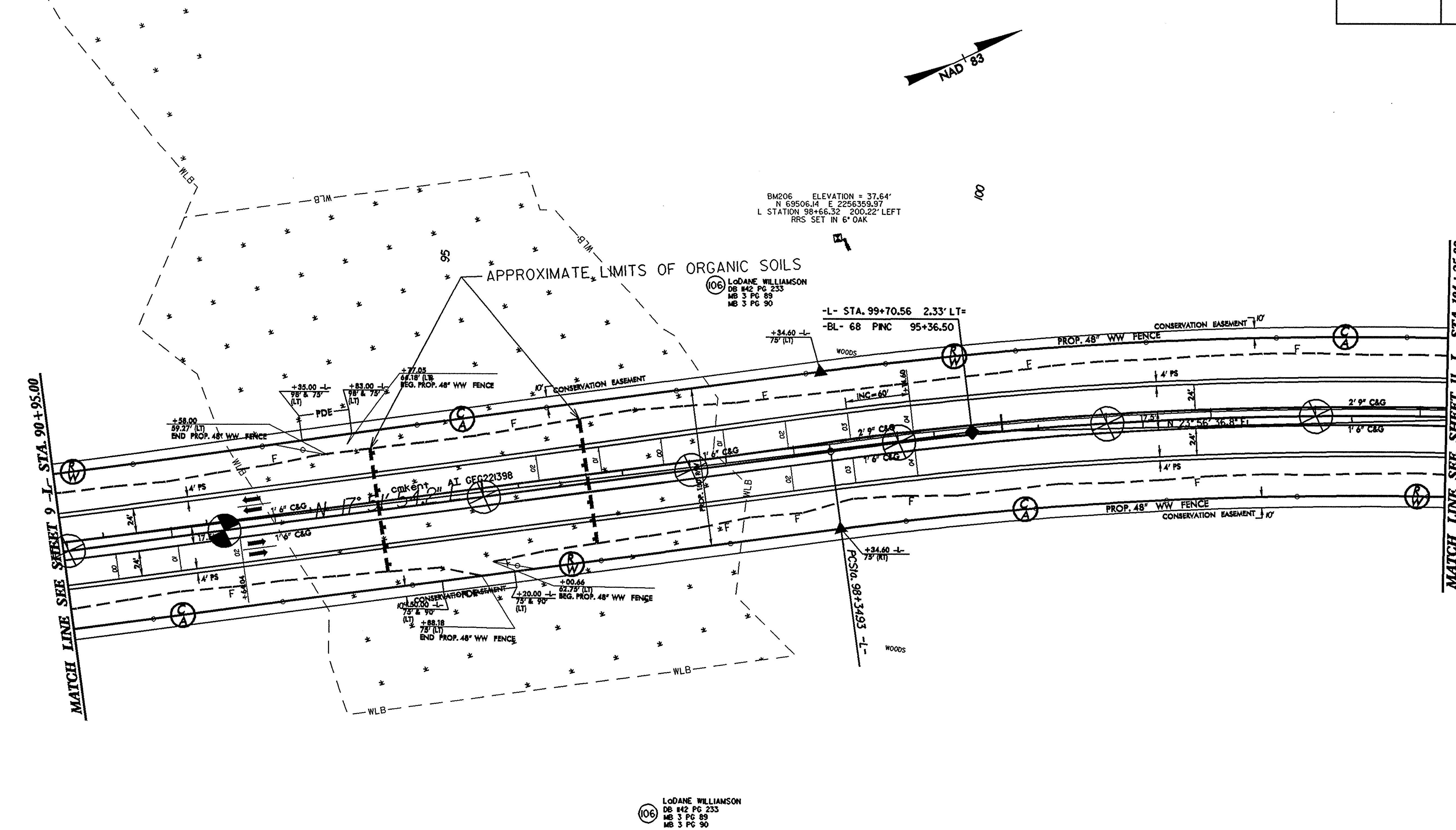
8/17/99

19-JUL-2006 11:31
U:\Projects\ERO\Greenville Investigation\TIP\r2245_GEO_RDWY\CADD_GEOTECH\PlanProf\r2245_geo_psh09.dgn

PROJECT REFERENCE NO.	SHEET NO.
R-2245	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.



LoDANE WILLIAMSON
DB 842 PG 233
MB 3 PG 89
MB 3 PG 90

REVISIONS

8/17/99

NOTES:

1) FOR -L- PROFILE SEE SHEETS 29 AND 30.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

19-JUL-2006 11:31
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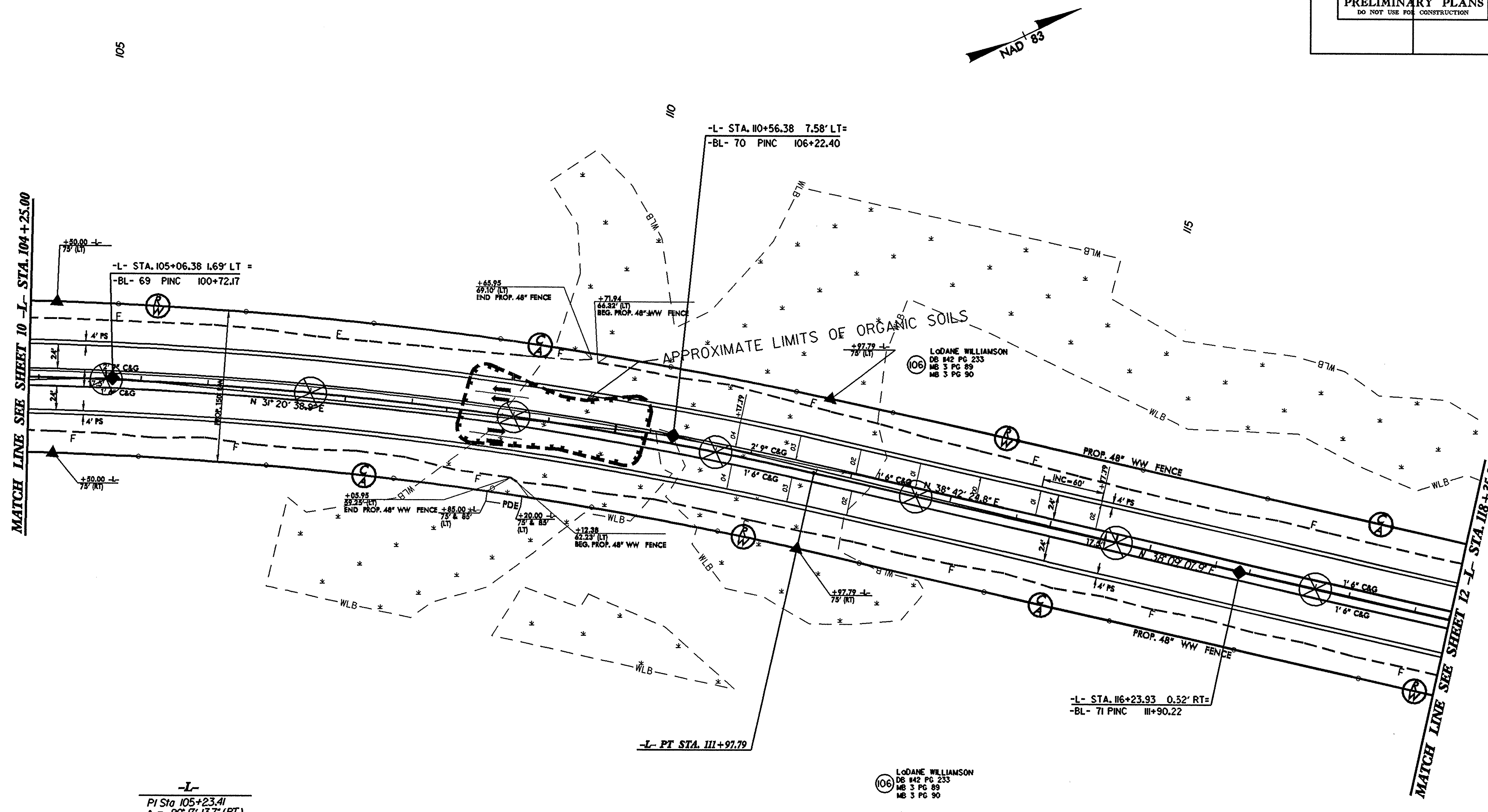
cmkent AT GEC221398

PROJECT REFERENCE NO.	SHEET NO.
R-2245	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-
PI Sta 105+23.41
Δ = 20° 17' 13.7" (RT)
D = 1° 29' 17.5"
L = 1,363.20'
T = 688.81'
R = 3,850.00'
S.E. = 0.04

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEET 30.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

REVISIONS

8/17/99

19-JUL-2006 11:32
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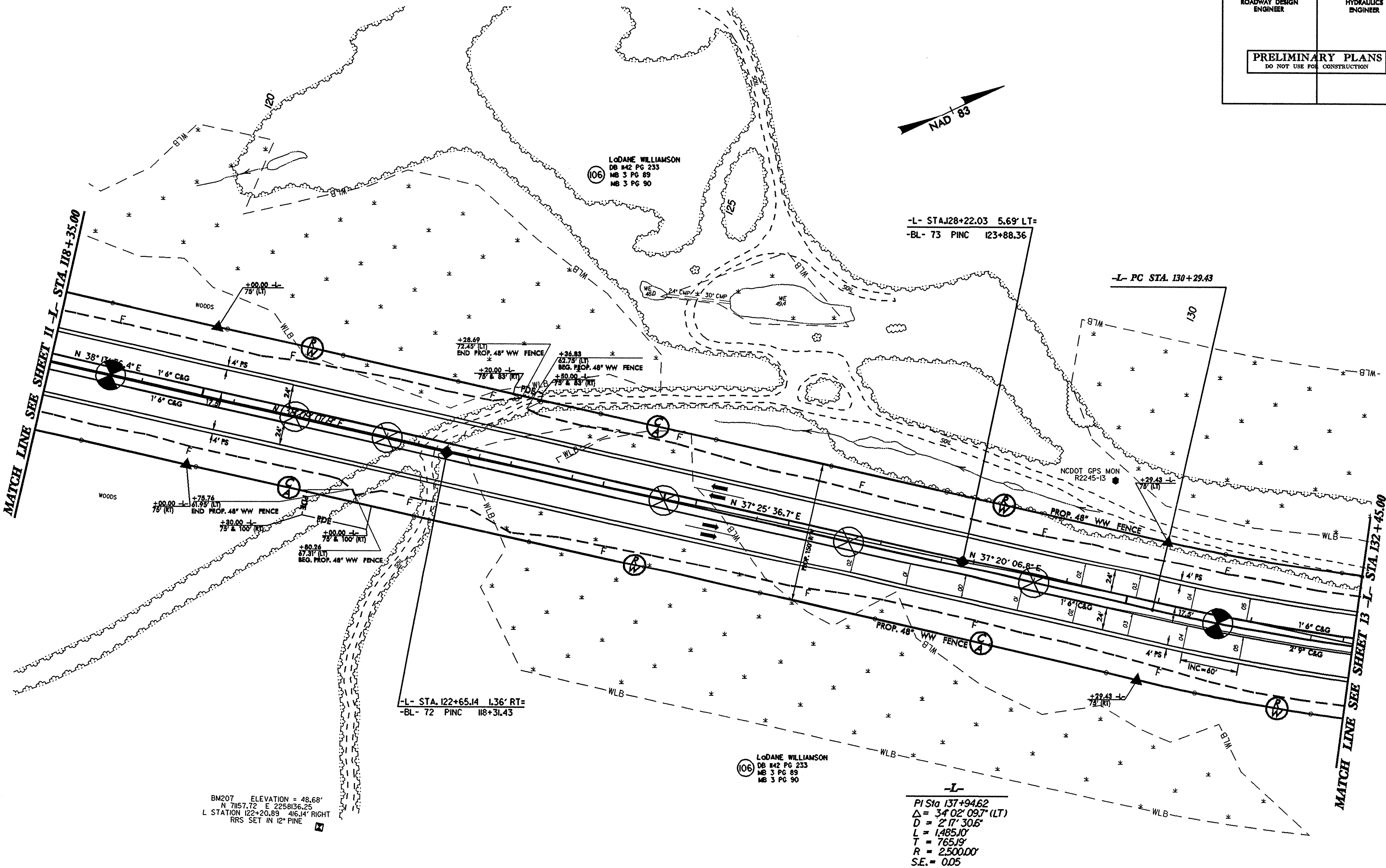
PROJECT REFERENCE NO.	SHEET NO.
R-2245	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEETS 30 AND 31.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

REVISIONS

8/17/99

19-JUL-2006 11:32
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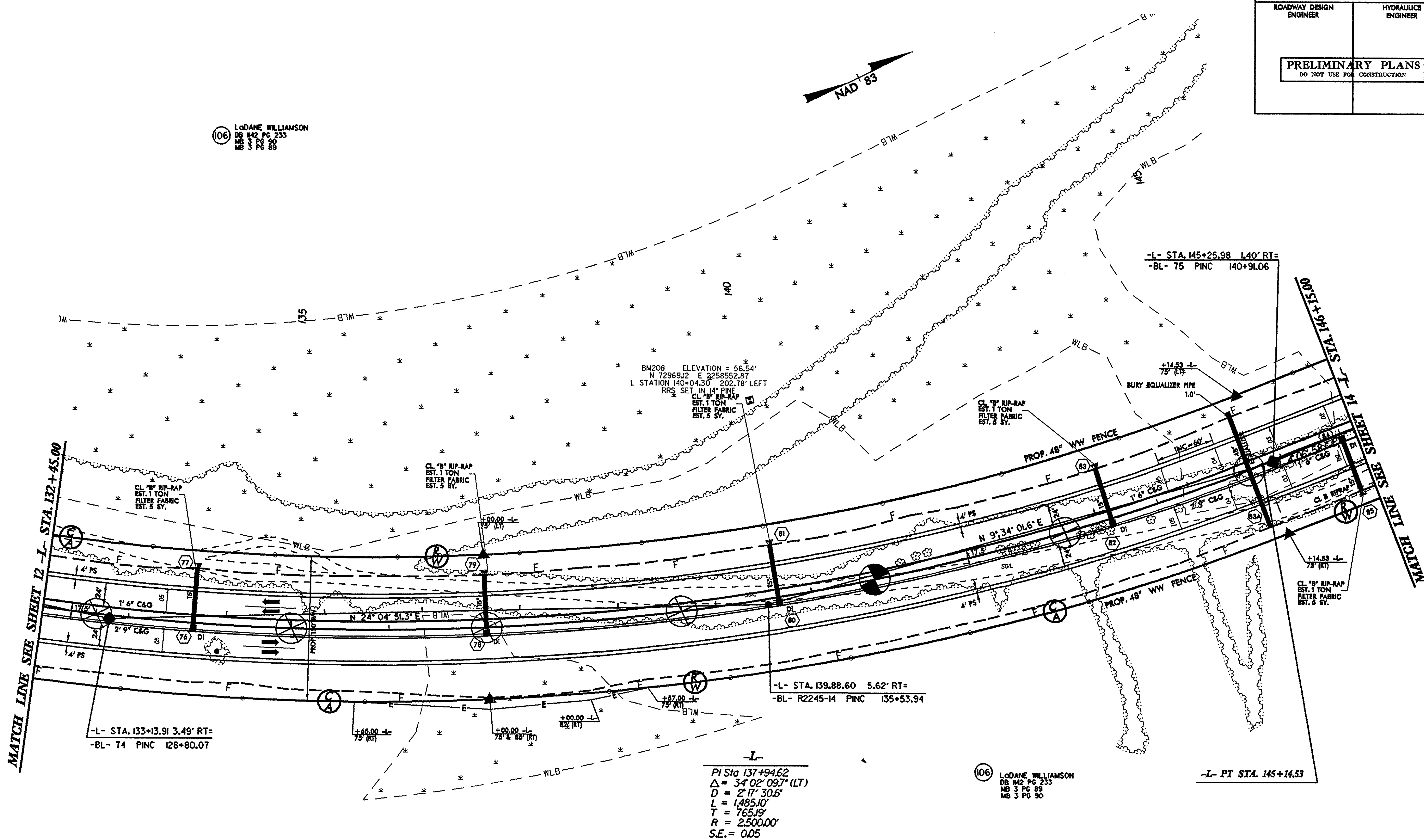
PROJECT REFERENCE NO.	SHEET NO.
R-2245	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEET 31.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

REVISIONS

8/17/99

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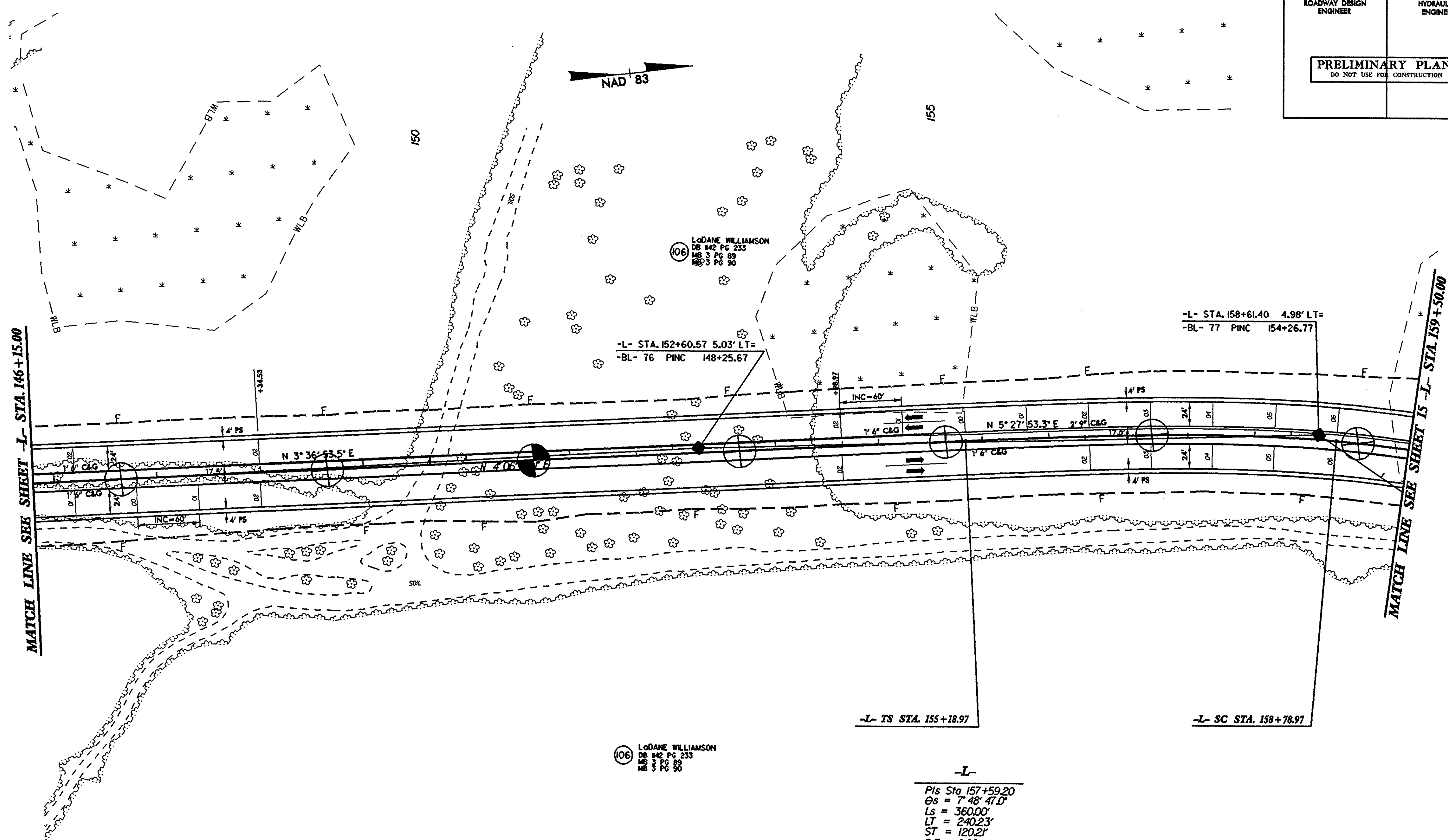
PROJECT REFERENCE NO.	SHEET NO.
R-2245	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEETS 31 AND 32.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

19-JUL-2006 11:32
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PROJECT REFERENCE NO.	SHEET NO.
R-2245	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

BM209 ELEVATION = 58.64'
N 75639.12 E 2259092.03
L STATION 166+33.71 297.26' LEFT
RRS SET IN 6" PINE

NAD 83

APPROXIMATE LIMITS OF ORGANIC SOILS

LaDANE WILLIAMSON
(106) DB 842 PG 233
MB 3 PG 89
MB 3 PG 90

-L- STA. 165+70.54 31.09' LT=
-BL- 79 PINC 161+52.88

MATCH LINE SEE SHEET 14 -L- STA. 159+50.00

-L- STA. 160+99.38 99.93' RT=
-BL- 78 PINC 156+78.57

-L- STA. 173+75.88 6.07' LT=
-BL- 80 PINC 169+62.64

-L- CS STA. 167+22.27

-L- ST STA. 170+82.27

MATCH LINE SEE SHEET 16 -L- STA. 173+90.00

-L-

PI Sta 163+15.57	PIs Sta 168+42.48
Δ = 36° 36' 14.6" (RT)	Θs = 7° 48' 47.0"
D = 4° 20' 26.5"	Ls = 360.00'
L = 843.30'	LT = 240.23'
T = 436.60'	ST = 120.21'
R = 1,320.00'	
S.E. = 0.06	

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEET 32.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

09-JUL-2006 11:32
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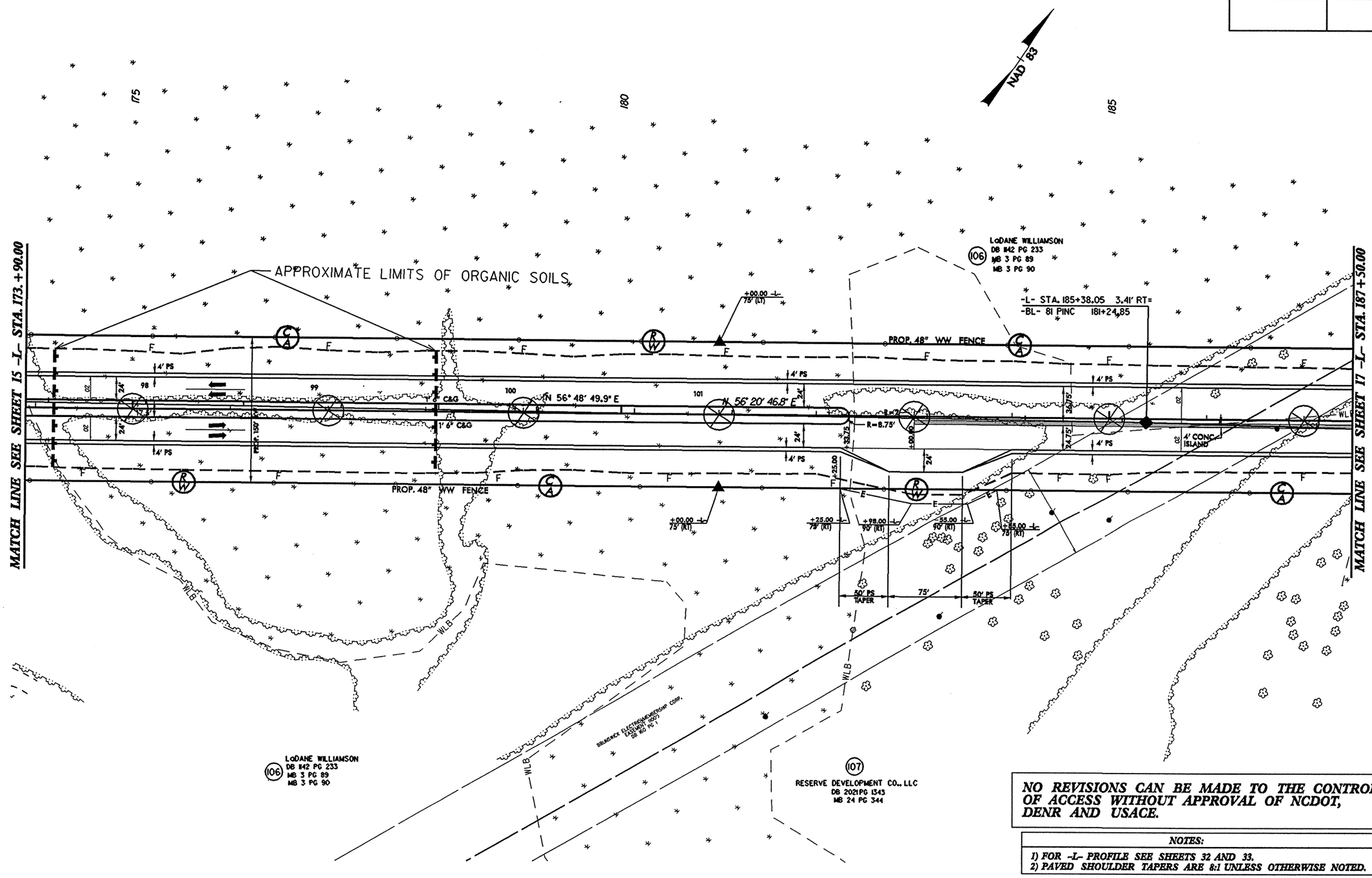
mmenk

PROJECT REFERENCE NO.	SHEET NO.
R-2245	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
8/17/99



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEETS 32 AND 33.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.

19-JUL-2006 11:32
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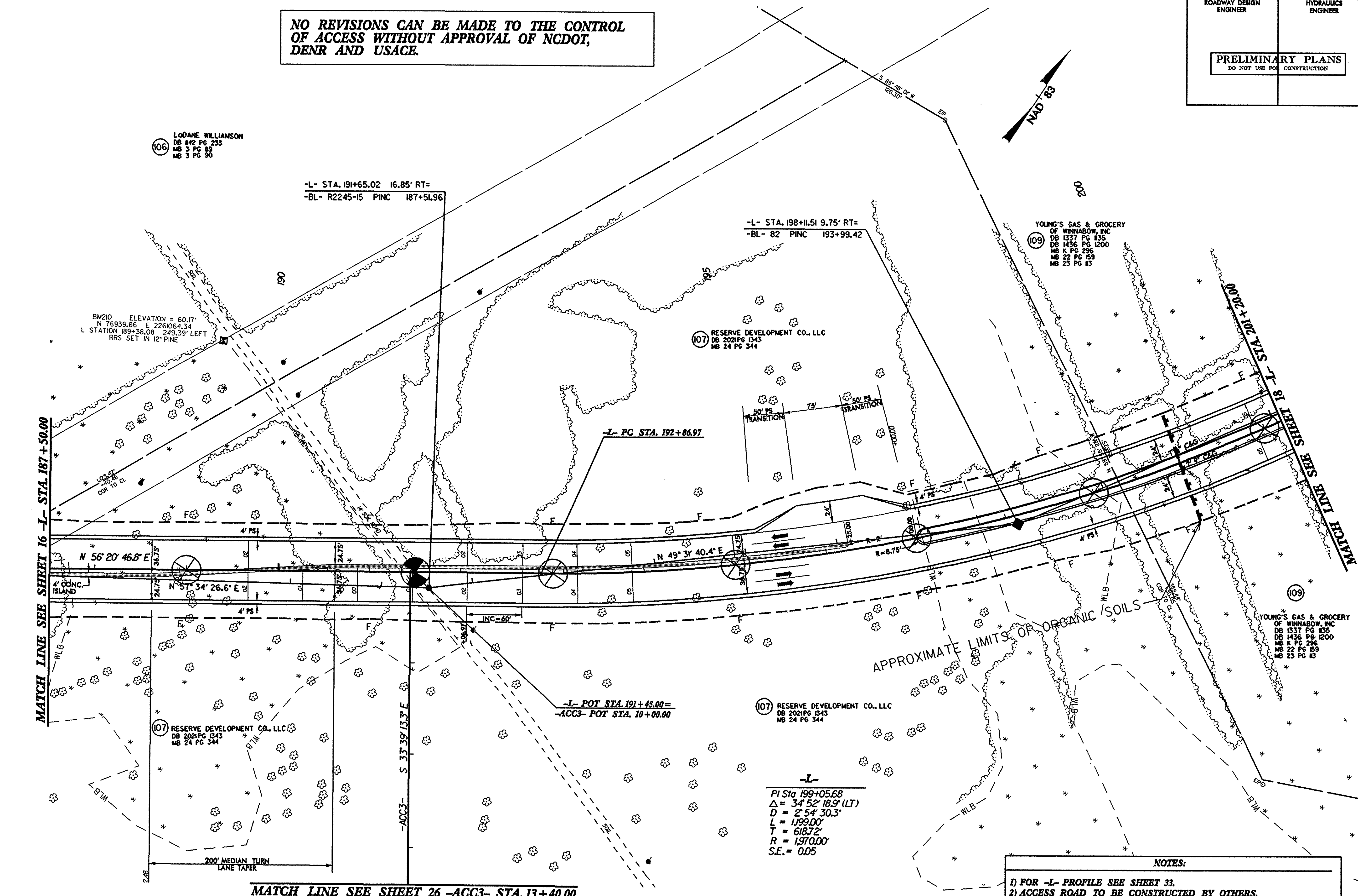
cmcent AT GEO221938

PROJECT REFERENCE NO.	SHEET NO.
R-2245	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.



NOTES:

1) FOR -L- PROFILE SEE SHEET 33.
2) ACCESS ROAD TO BE CONSTRUCTED BY OTHERS.
3) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
4) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

REVISIONS

8/17/99

19-JUL-2006 11:32
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PROJECT REFERENCE NO.	SHEET NO.
R-2245	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NAD 83

-L- PT STA. 204+85.97

-L-
PI Sta 199+05.68
Δ = 34° 52' 18.9" (LT)
D = 2° 54' 30.3"
L = 1199.00'
T = 618.72'
R = 1970.00'
S.E. = 0.05

YOUNG'S GAS & GROCERY OF WINNABOW, INC
(109) DB 1337 PG 1135
DB 1436 PG 1200
MB K PG 296
MB 22 PG 159
MB 23 PG 113

RESERVE DEVELOPMENT CO., LLC
(107) DB 2021PG 1343
MB 24 PG 344

APPROXIMATE LIMITS OF ORGANIC SOILS

MATCH LINE SEE SHEET 17 -L- STA. 201+20.00

MATCH LINE SEE SHEET 19 -L- STA. 215+00.00

NOTES:
1) FOR -L- PROFILE SEE SHEETS 33 AND 34.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

REVISIONS
8/17/99

19-JUL-2006 11:32
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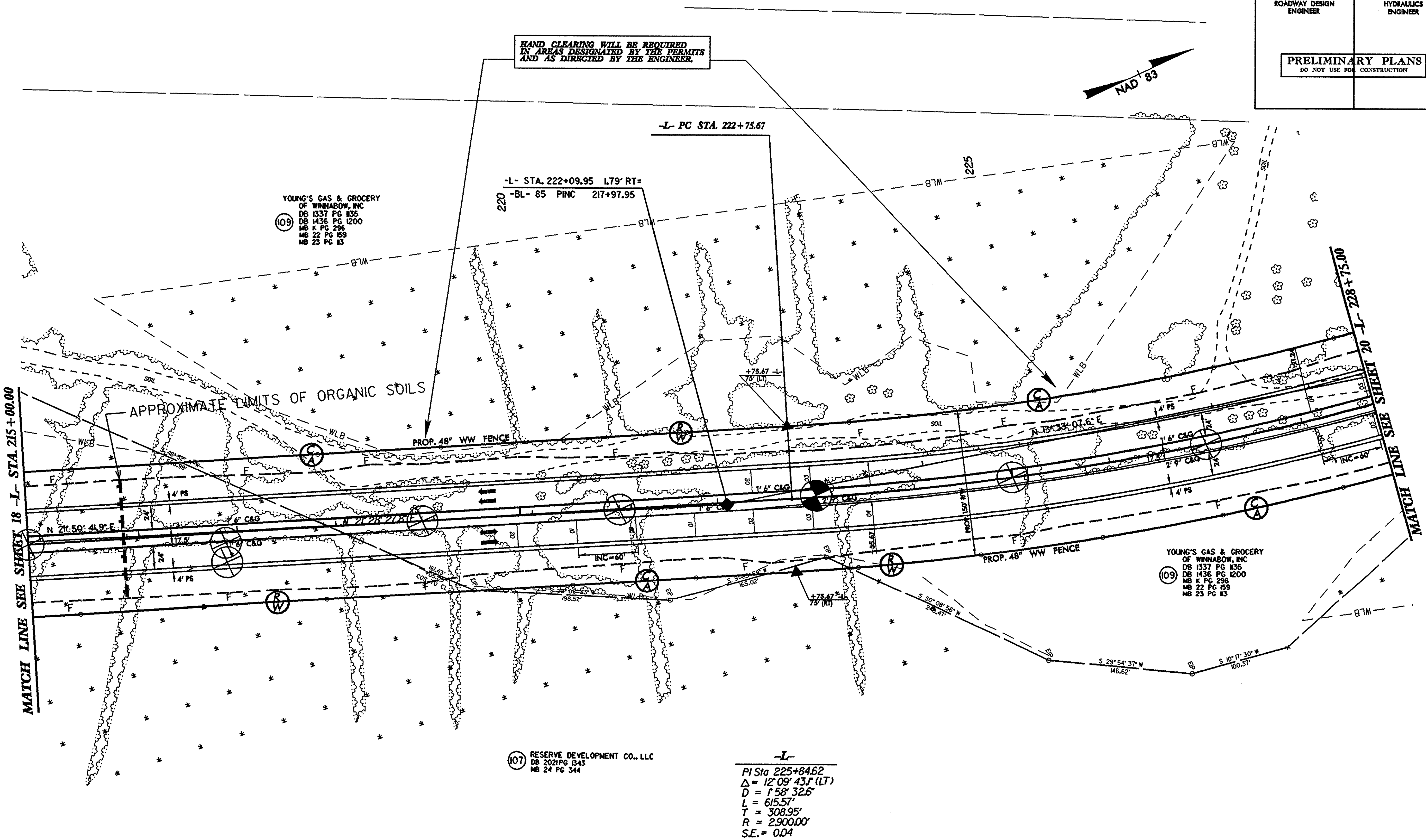
omkent
ATT00221338

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2245	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEET 34.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

19-JUL-2006 11:32
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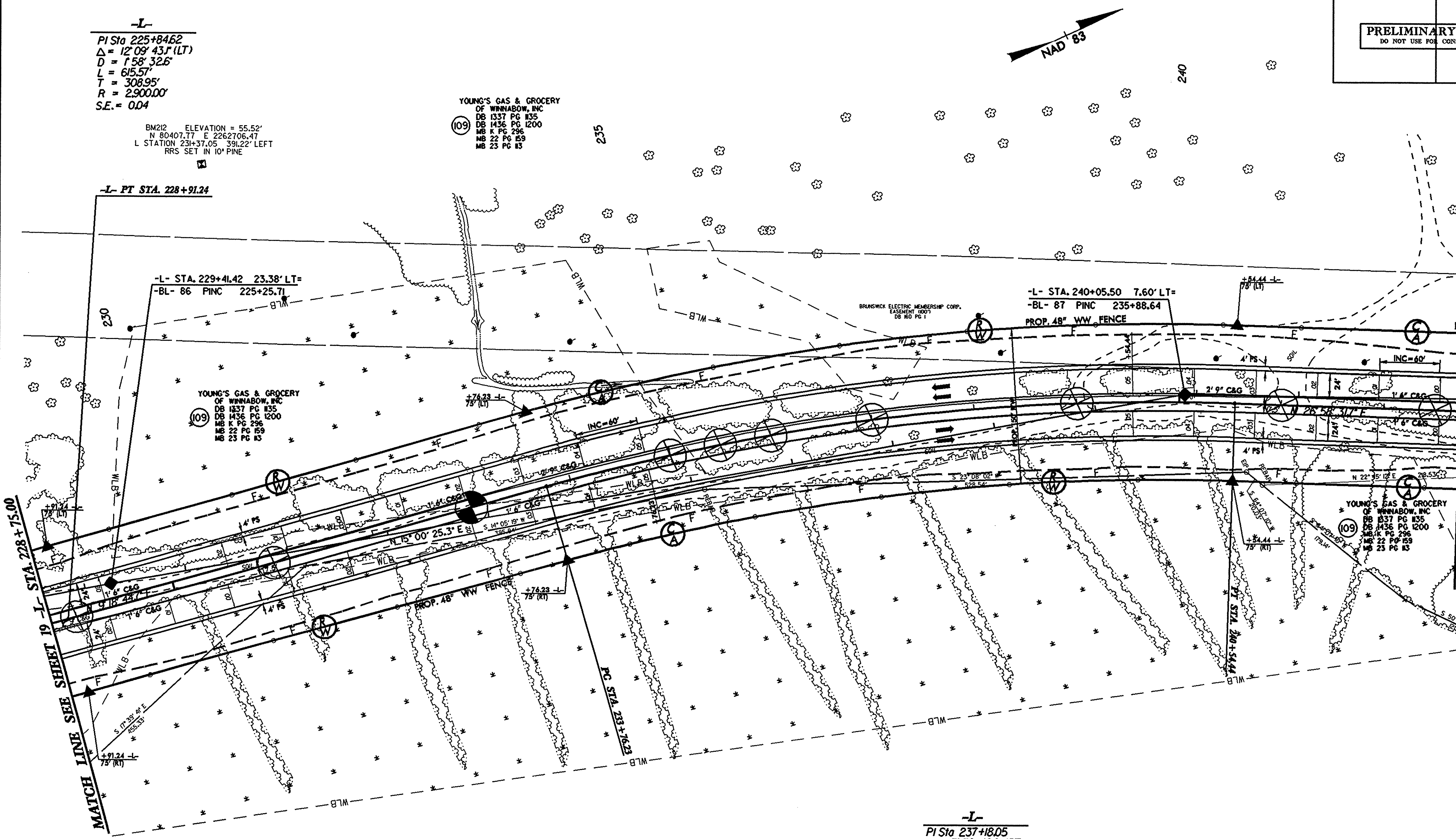
cmkent AT GEO221398

PROJECT REFERENCE NO.	SHEET NO.
R-2245	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

8/17/99



NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTES:

1) FOR -L- PROFILE SEE SHEETS 34 AND 35.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) SEE SHEET 2- FOR 50' TRANSITION FROM 1'-6" C&G TO 2'-9" C&G.

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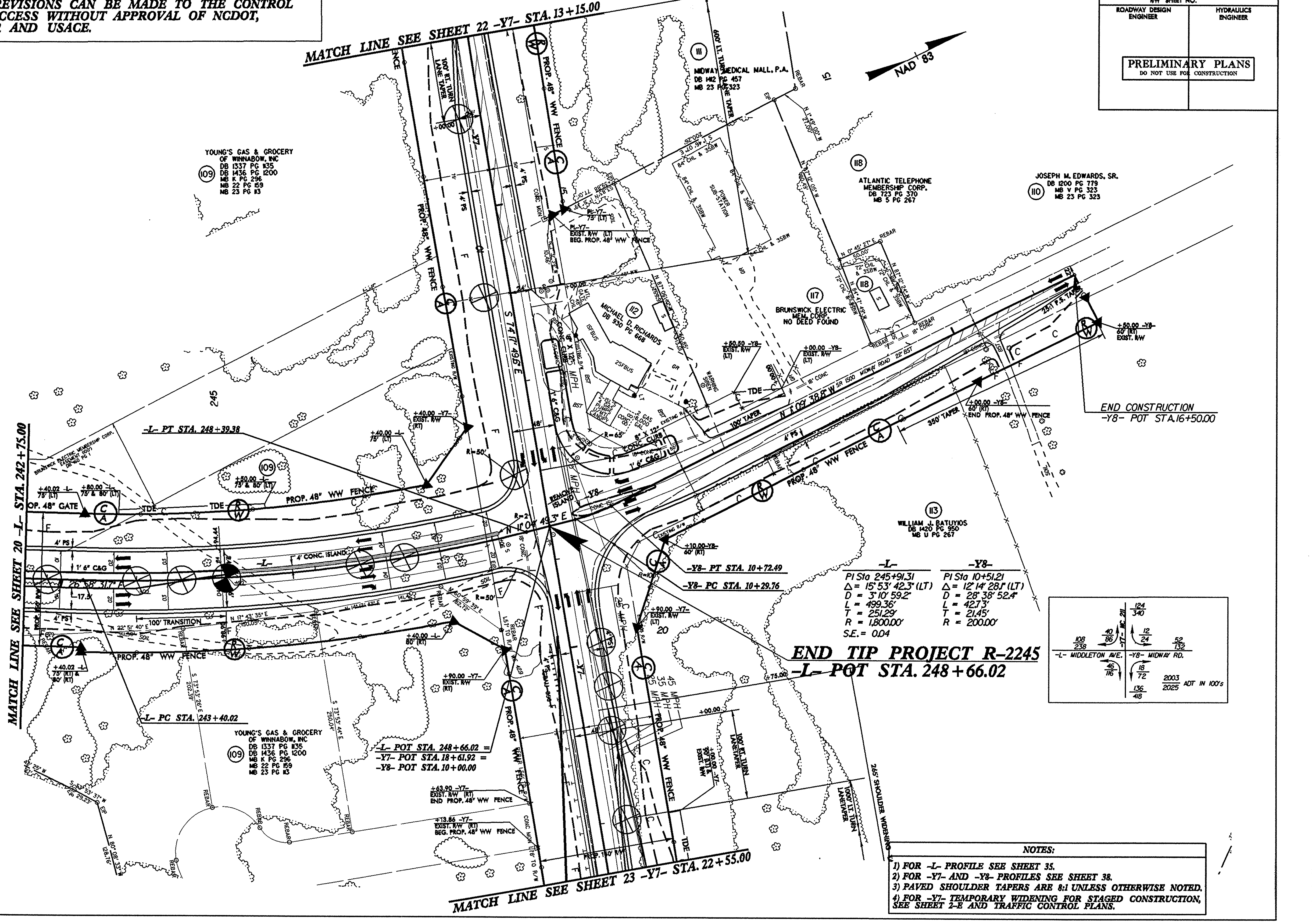
PROJECT REFERENCE NO.	SHEET NO.
R-2245	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

REVISIONS



-L-	-Y8-
PI Sta 245+91.31	PI Sta 10+51.21
Δ = 15°53' 42.3" (LT)	Δ = 12°14' 28.1" (LT)
D = 3°10' 59.2"	D = 28°38' 52.4"
L = 499.36'	L = 42.73'
T = 251.29'	T = 21.45'
R = 1,800.00'	R = 200.00'
S.E. = 0.04	

NOTES:

1) FOR -L- PROFILE SEE SHEET 35.
2) FOR -Y7- AND -Y8- PROFILES SEE SHEET 38.
3) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
4) FOR -Y7- TEMPORARY WIDENING FOR STAGED CONSTRUCTION, SEE SHEET 2-E AND TRAFFIC CONTROL PLANS.

8/17/99
19-JUL-2006 11:32
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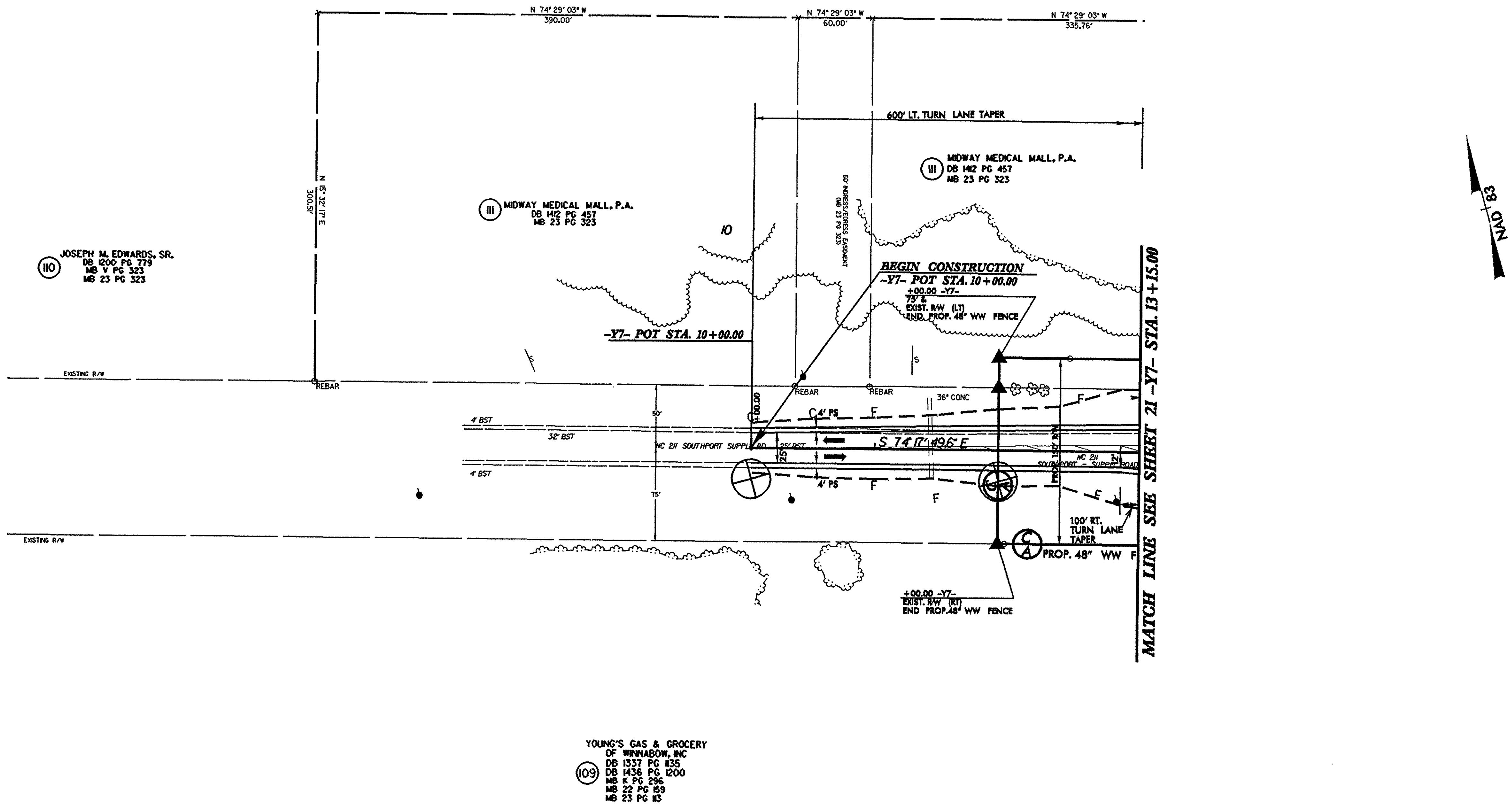
PROJECT REFERENCE NO.	SHEET NO.
R-2245	22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS



NOTES:

1) FOR -Y7- PROFILE SEE SHEET 38.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.

8/17/99

19-JUL-2006 11:32
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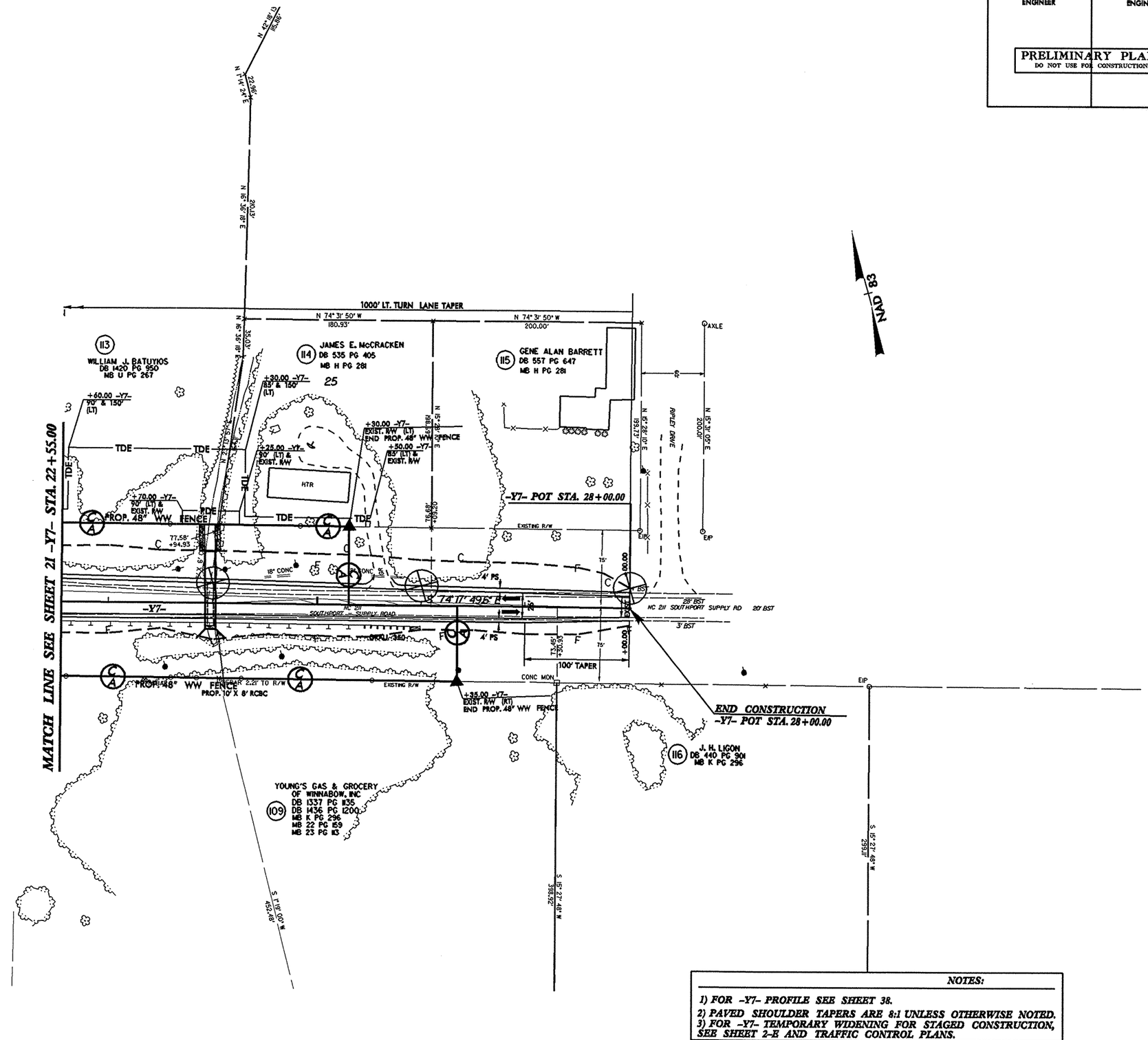
PROJECT REFERENCE NO.	SHEET NO.
R-2245	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 8/17/99



NOTES:

1) FOR -Y7- PROFILE SEE SHEET 38.
2) PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.
3) FOR -Y7- TEMPORARY WIDENING FOR STAGED CONSTRUCTION, SEE SHEET 2-E AND TRAFFIC CONTROL PLANS.

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smkant AT GEO221338

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2245	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

-ACC2- POT Sta. 32+43.33

MATCH LINE SHEET 24 -ACC2- STA. 29+50.00

NAD 83

30

NAD 83

-ACC2-
PI Sta 14+84.94
Δ = 73° 08' 47.3" (LT)
D = 9° 32' 57.5"
L = 765.99'
T = 445.16'
R = 600.00'

MATCHLINE SEE SHEET 9
-ACC2- STA.15+20.00

MATCH LINE SHEET 24 -ACC2- STA. 29+50.00

-ACC2- PT STA. 26+07.93

-ACC2-
PI Sta 23+84.67
Δ = 45° 07' 33.3" (RT)
D = 9° 32' 57.5"
L = 472.56'
T = 249.30'
R = 600.00'

-ACC2- PC STA. 21+35.37

S 5° 13' 59" W

-ACC2- PT STA. 18+05.77

N 81° 38' 26.7" W

-ACC2-

28

25

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

NOTE:
1) ACCESS ROAD TO BE CONSTRUCTED BY OTHERS.

19-JUL-2006 11:33
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cmken AT GEO21338

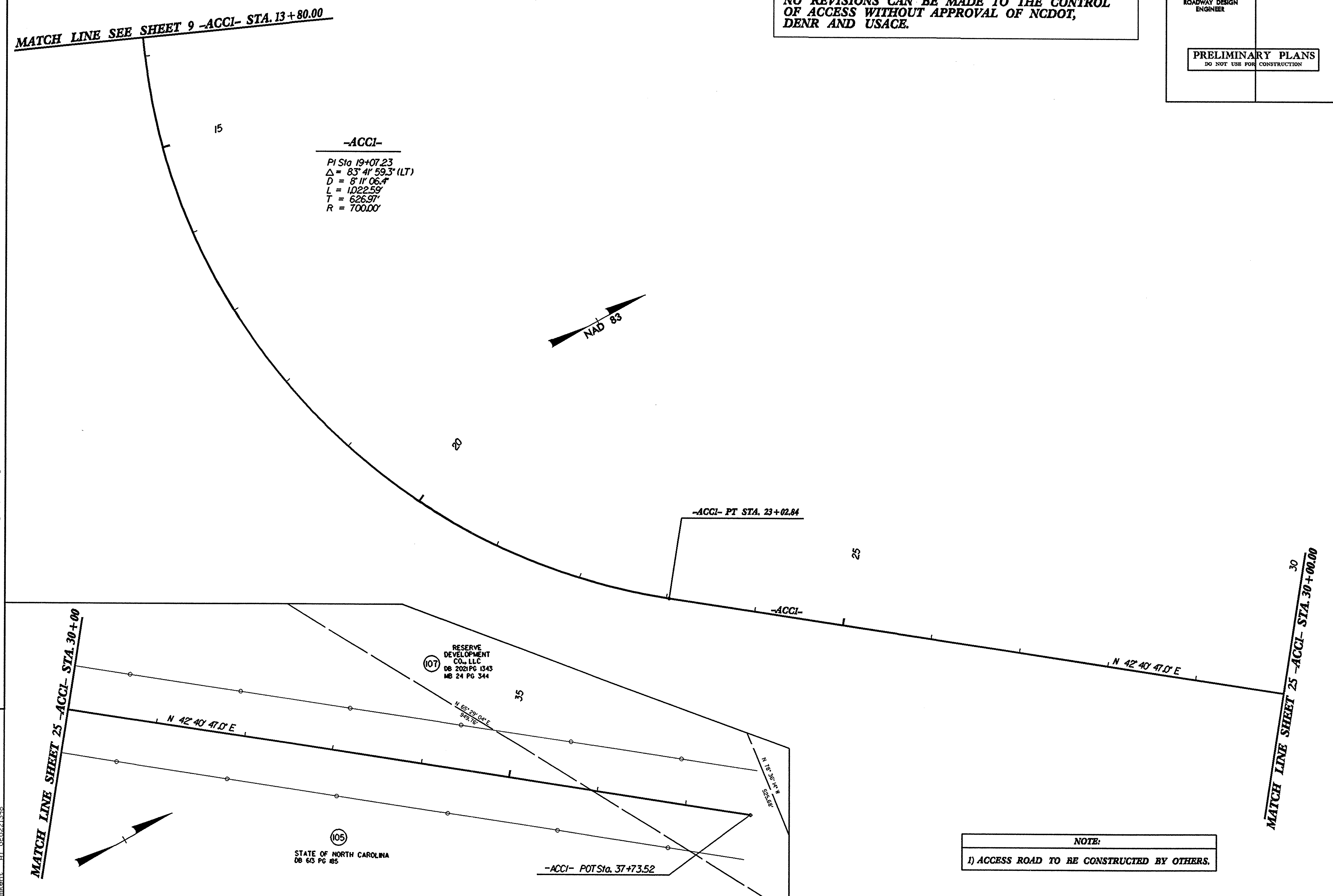
PROJECT REFERENCE NO.	SHEET NO.
R-2245	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

REVISIONS

8/17/99



NOTE:

1) ACCESS ROAD TO BE CONSTRUCTED BY OTHERS.

19-JUL-2006 11:33
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PROJECT REFERENCE NO.	SHEET NO.
R-2245	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS
8/17/99

NAD 83

-ACC3-
PI Sta 14+55.42
Δ = 12° 16' 30.9" (RT)
D = 5° 43' 46.5"
L = 214.24'
T = 107.53'
R = 1,000.00'

-ACC3-
PI Sta 19+18.73
Δ = 28° 01' 19.4" (LT)
D = 5° 43' 46.5"
L = 489.08'
T = 249.53'
R = 1,000.00'

15 20 25

-ACC3- PC STA. 13+47.89

-ACC3- PT STA. 15+62.13

-ACC3- PC STA. 16+69.20

-ACC3- PT STA. 21+58.27

-ACC3- POT STA. 21+00.00

S 21° 22' 42.4" E

-ACC3-

S 49° 24' 01.8" E

MATCH LINE SEE SHEET 17 -ACC3- STA. 13+40.00

NOTE:
1) ACCESS ROAD TO BE CONSTRUCTED BY OTHERS.

NO REVISIONS CAN BE MADE TO THE CONTROL OF ACCESS WITHOUT APPROVAL OF NCDOT, DENR AND USACE.

94

19-JUL-2006 11:33
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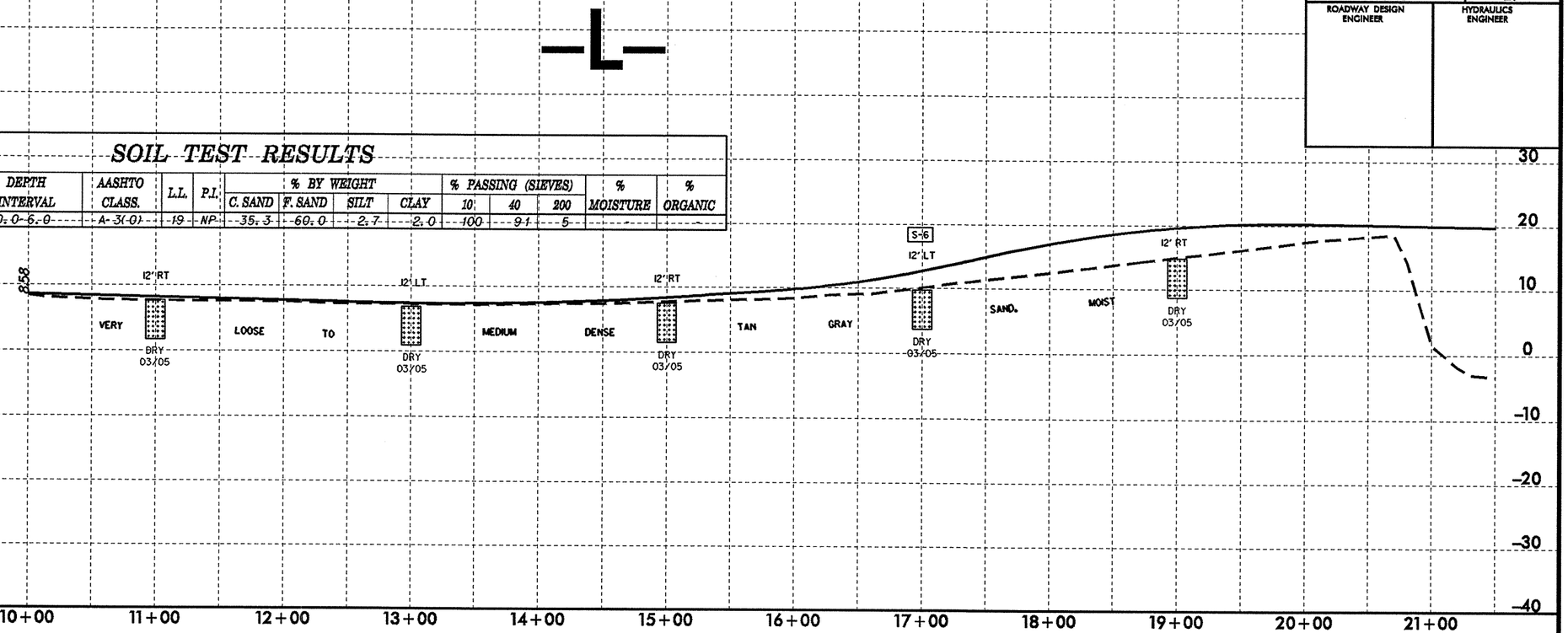
cmkent AT GEO21338

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2245	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

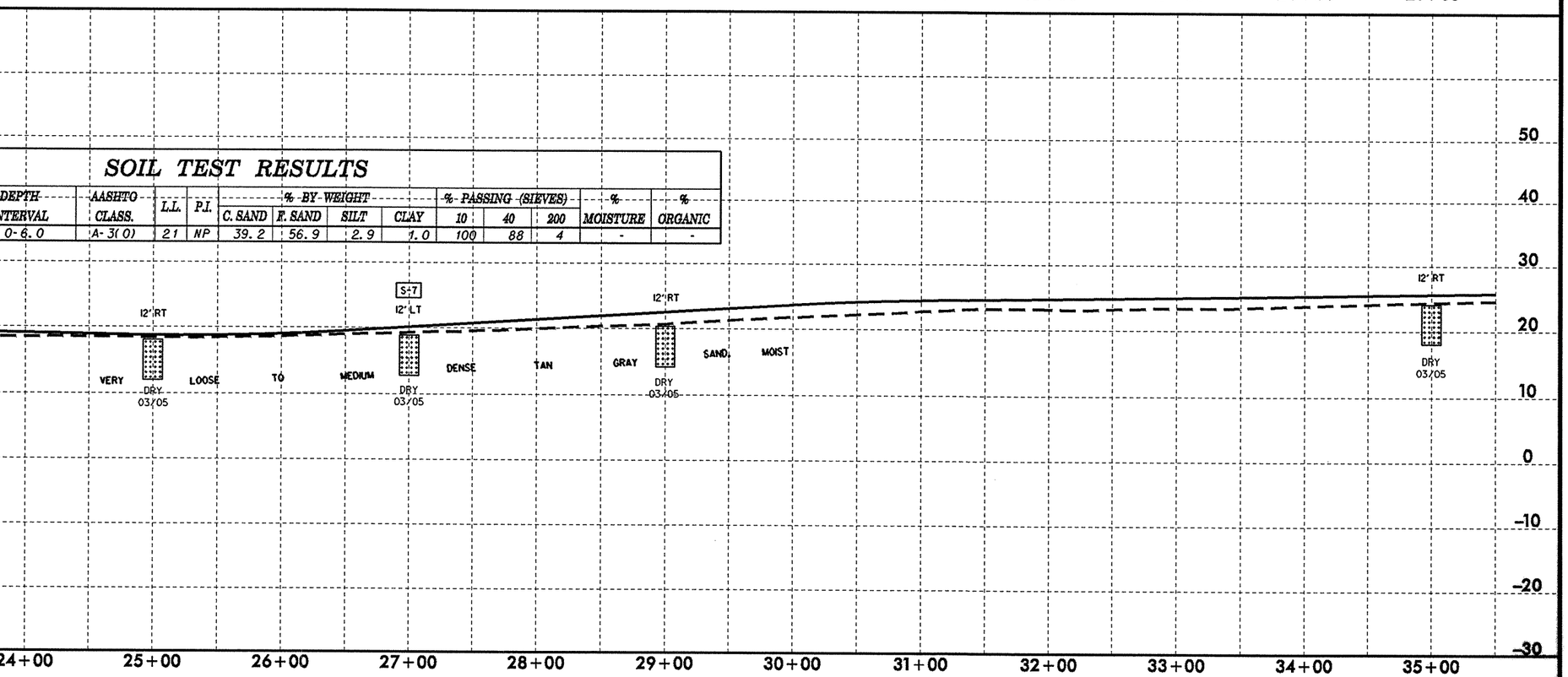
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-6	12 LT	17+00	0.0-6.0	A-3(0)	19	NP	35.3	60.0	2.7	2.0	100	91	5	-	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-7	12 LT	27+00	0.0-6.0	A-3(0)	21	NP	39.2	56.9	2.9	1.0	100	88	4	-	-

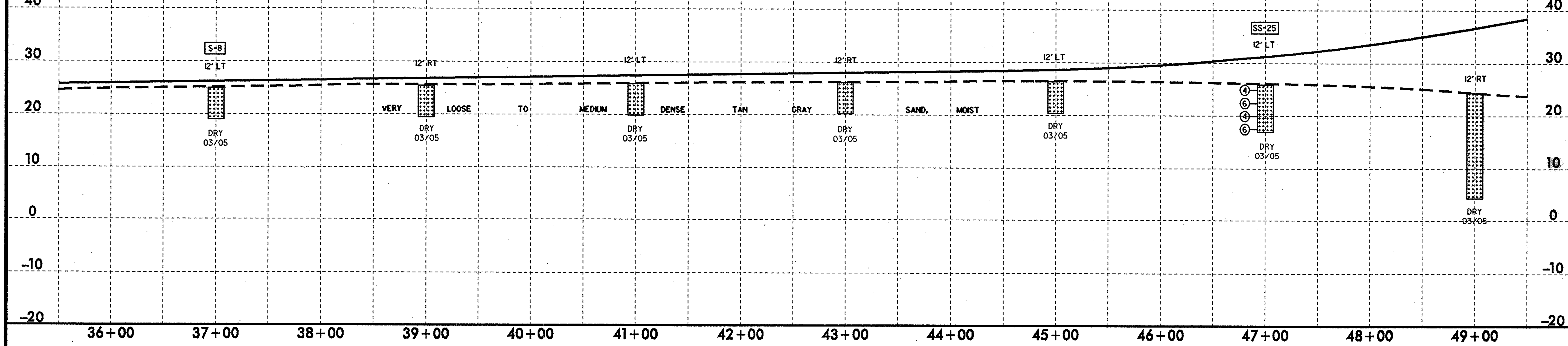


PROJECT REFERENCE NO.	SHEET NO.
R-2245	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-

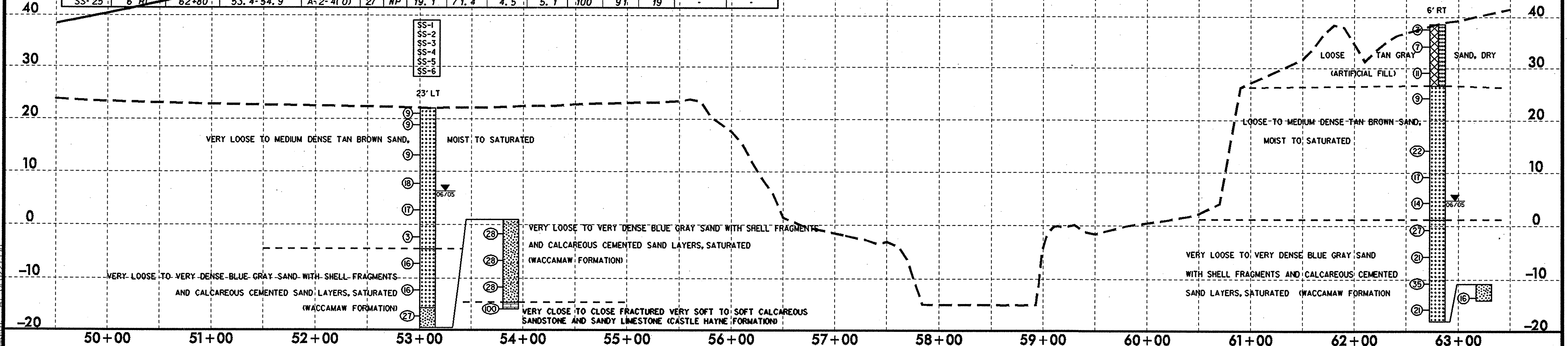
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-8	12 LT	37+00	0.0-6.0	A-3(0)	22	NP	33.5	62.8	3.6	0.0	100	92	4	-	-
SS-25	12 LT	47+00	2.5-4.0	A-3(0)	23	NP	31.5	66.6	1.9	0.0	100	95	2	-	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-1	23 LT	53+08	2.1-3.6	A-3(0)	23	NP	56.1	42.9	1.0	0.0	100	78	1	-	-
SS-2	23 LT	53+08	13.3-14.8	A-3(0)	23	NP	26.3	73.3	0.4	0.0	100	95	1	-	-
SS-3	23 LT	53+08	23.2-24.8	A-3(0)	19	NP	34.9	64.5	0.6	0.0	100	87	1	-	-
SS-4	23 LT	53+08	28.3-29.8	A-3(0)	31	NP	28.9	63.1	1.9	6.1	97	79	10	-	-
SS-5	23 LT	53+08	38.3-39.8	A-2-4(0)	27	NP	18.4	72.9	2.6	6.1	100	93	13	-	-
SS-6	23 LT	53+08	48.1-49.6	A-2-4(0)	19	NP	53.9	29.5	10.5	6.1	96	76	18	-	-
SS-20	6 RT	62+80	3.5-5.0	A-3(0)	22	NP	48.1	51.7	0.2	0.0	100	79	1	-	-
SS-21	6 RT	62+80	13.4-14.9	A-3(0)	25	NP	24.4	73.1	2.4	0.0	100	96	3	-	-
SS-22	6 RT	62+80	23.4-24.9	A-3(0)	21	NP	19.5	79.7	0.8	0.0	100	98	1	-	-
SS-23	6 RT	62+80	33.4-34.9	A-3(0)	22	NP	26.7	69.9	1.4	2.0	100	91	4	-	-
SS-24	6 RT	62+80	38.4-39.9	A-3(0)	30	NP	42.1	53.8	0.1	4.1	96	67	5	-	-
SS-25	6 RT	62+80	53.4-54.9	A-2-4(0)	27	NP	19.1	71.4	4.5	5.1	100	91	19	-	-



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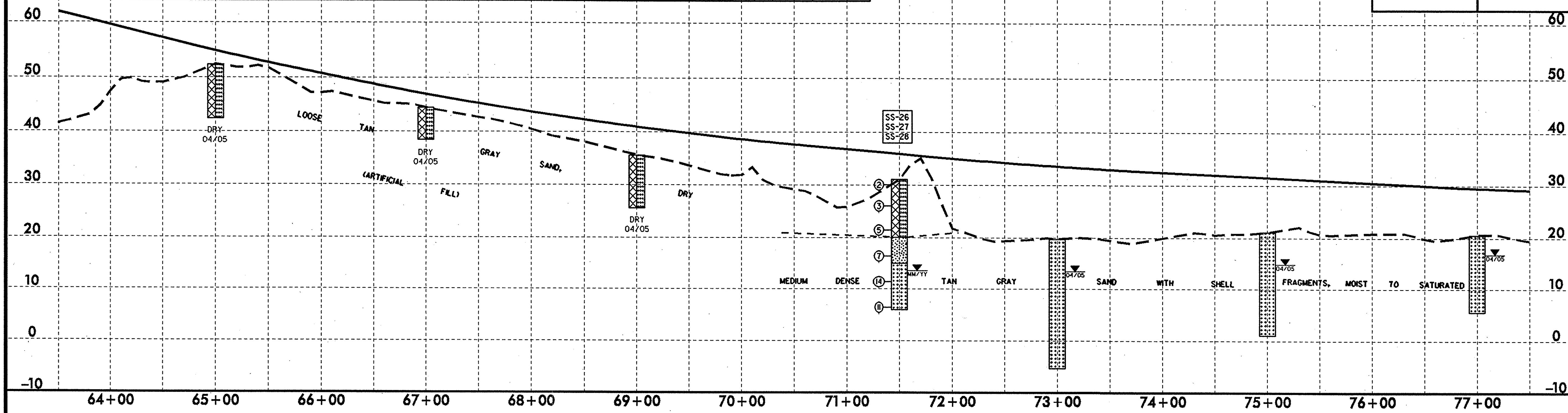
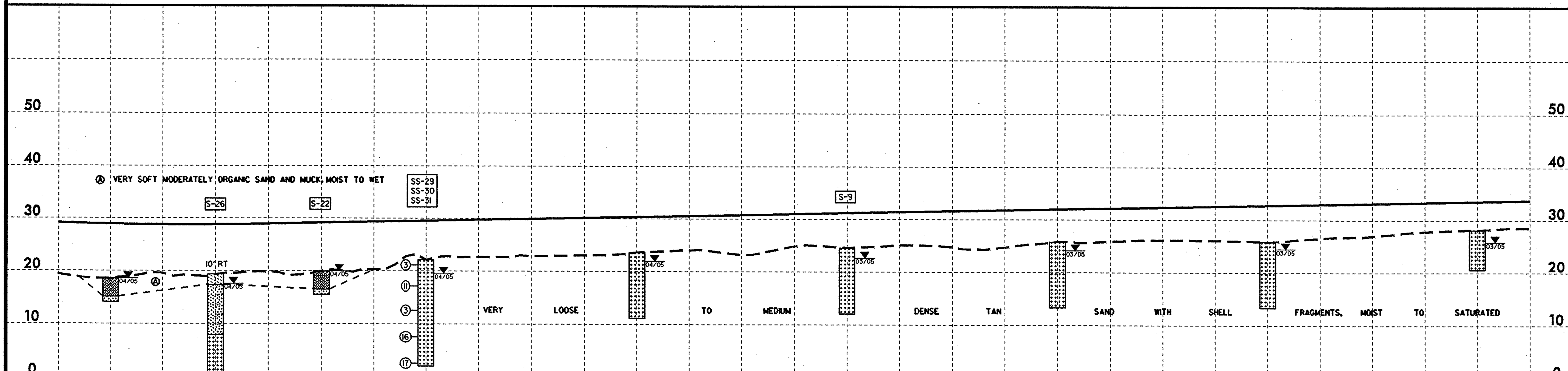
PROJECT REFERENCE NO.	SHEET NO.
R-2245	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-26	CL	71+50	4.0-5.5	A-3(0)	24	NP	14.3	81.6	2.0	2.0	100	98	5	-	-
SS-27	CL	71+50	13.6-15.1	A-2-4(0)	29	NP	3.6	74.0	11.3	11.0	99	99	28	-	-
SS-28	CL	71+50	18.6-20.1	A-3(0)	22	NP	18.7	78.2	1.1	2.0	100	98	3	-	-





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
S-26	10 RT	79+00	1.0-2.0	A-2-4(0)	38	NP	15.5	71.6	11.0	2.0	100	97	14	-	8.3
S-22	CL	80+00	0.0-3.5	A-2-5(0)	56	NP	13.6	71.4	11.9	3.0	99	96	15	90.8	13.9
SS-29	CL	81+00	0.0-1.5	A-3(0)	24	NP	20.5	77.8	1.7	0.0	100	97	2	-	-
SS-30	CL	81+00	8.6-10.1	A-3(0)	22	NP	24.1	73.7	1.2	1.0	100	94	2	-	-
SS-31	CL	81+00	13.6-15.1	A-3(0)	26	NP	37.3	59.2	3.5	0.0	95	71	4	-	-
S-9	CL	85+00	0.0-12.5	A-3(0)	26	NP	15.9	82.2	1.8	0.0	100	98	2	-	-

-10 -20 -30

78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00 88+00 89+00 90+00 91+00

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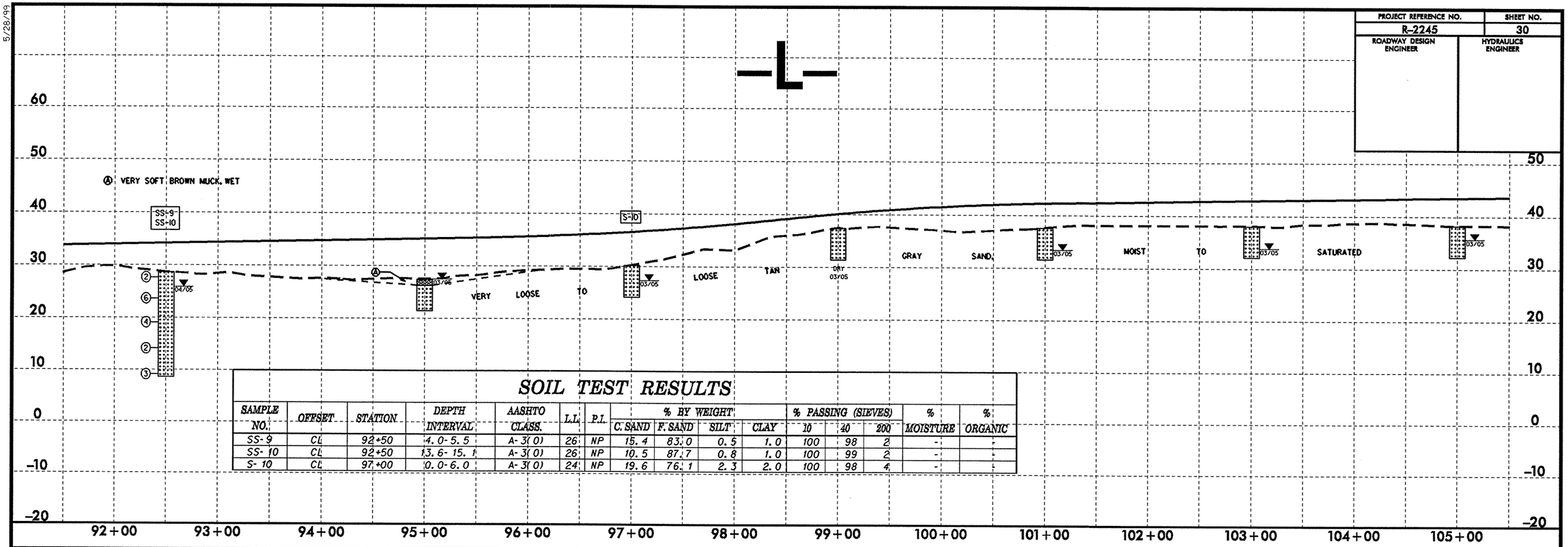
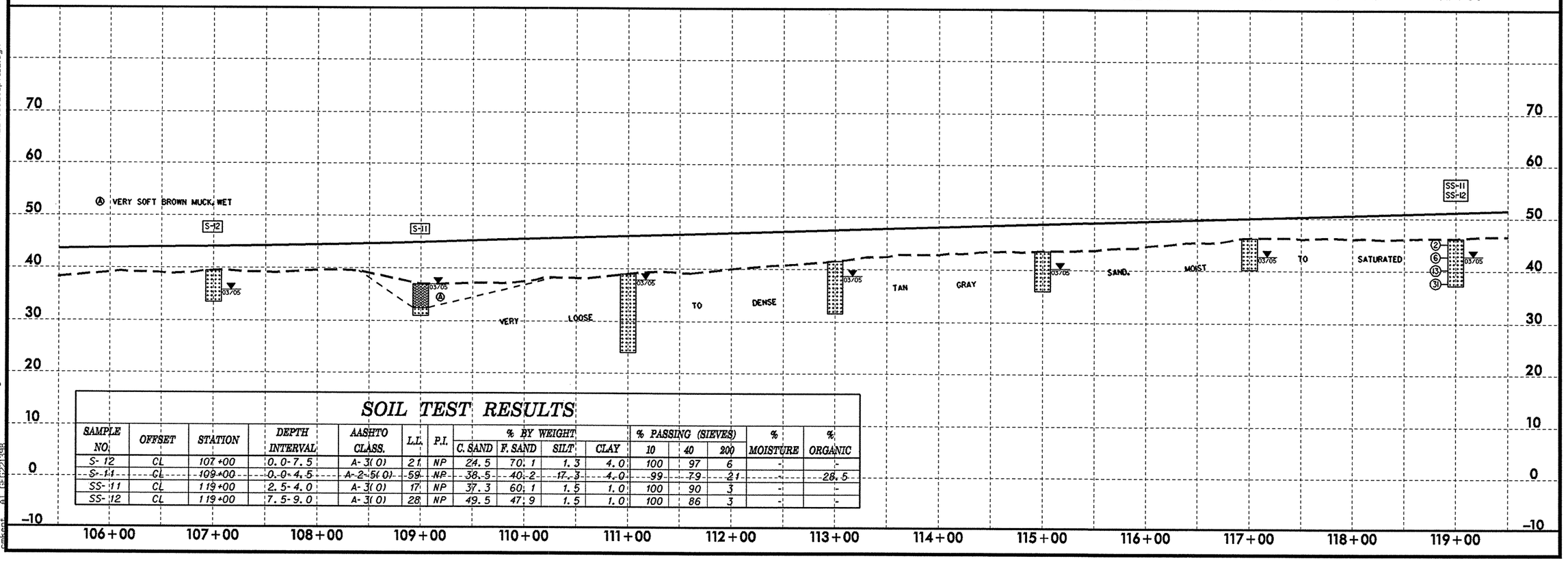
PROJECT REFERENCE NO.	SHEET NO.
R-2245	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-9	CL	92+50	4.0-5.5	A-3(0)	26	NP	15.4	83.0	0.5	1.0	100	98	2	-	-
SS-10	CL	92+50	13.6-15.1	A-3(0)	26	NP	10.5	87.7	0.8	1.0	100	99	2	-	-
S-10	CL	97+00	0.0-6.0	A-3(0)	24	NP	19.6	76.1	2.3	2.0	100	98	4	-	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-12	CL	107+00	0.0-7.5	A-3(0)	21	NP	24.5	70.1	1.3	4.0	100	97	6	-	-
S-11	CL	109+00	0.0-4.5	A-2-5(0)	59	NP	38.5	40.2	17.3	4.0	99	79	21	-	28.5
SS-11	CL	119+00	2.5-4.0	A-3(0)	17	NP	37.3	60.1	1.5	1.0	100	90	3	-	-
SS-12	CL	119+00	7.5-9.0	A-3(0)	28	NP	49.5	47.9	1.5	1.0	100	86	3	-	-

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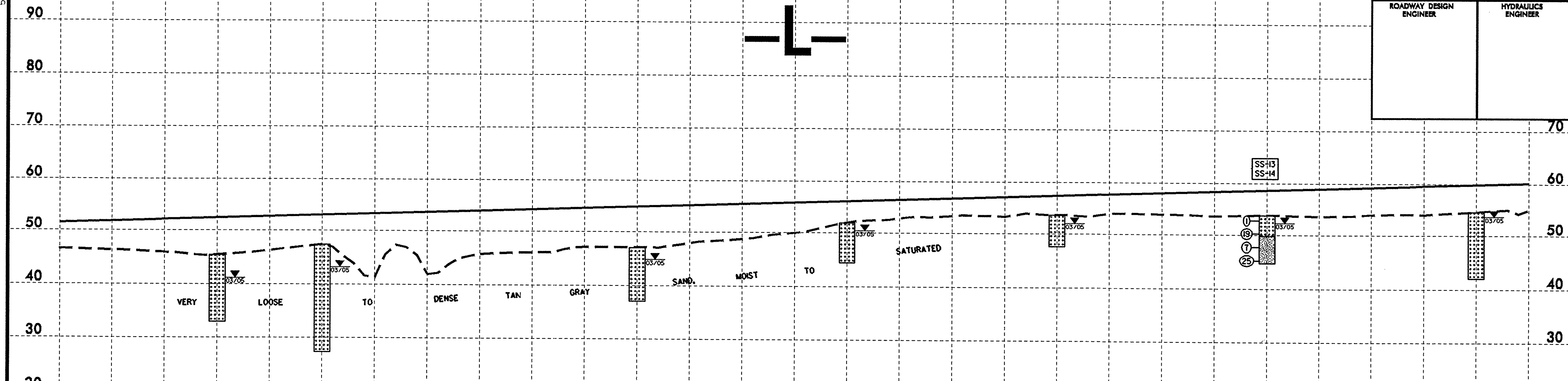
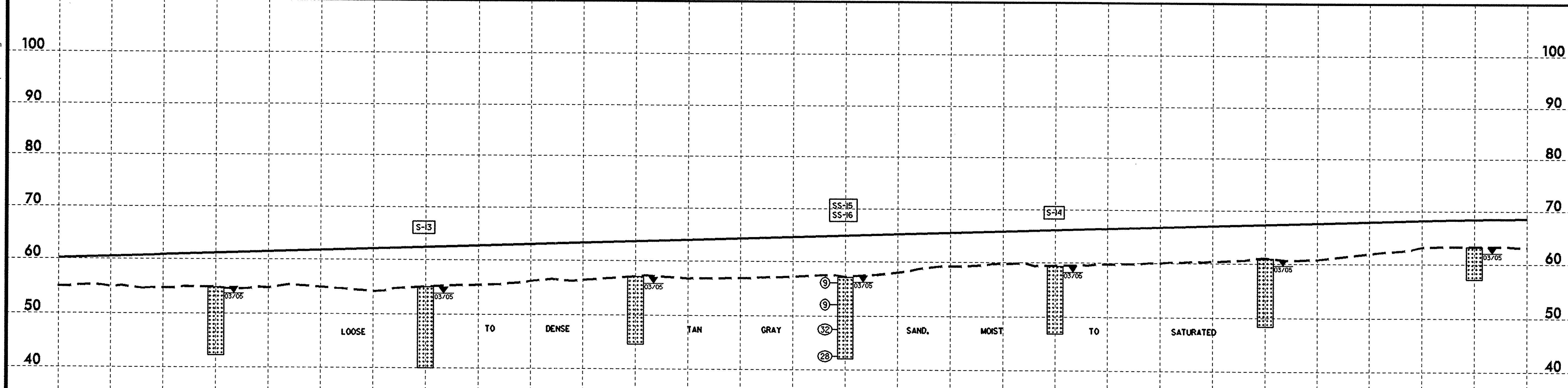
PROJECT REFERENCE NO.	SHEET NO.
R-2245	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

-L-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-13	CL	131+00	0.0-1.5	A-3(0)	22	NP	64.1	35.5	0.4	0.0	100	82	1	-	-
SS-14	CL	131+00	5.0-6.5	A-4(0)	23	NP	32.4	16.6	51.0	0.0	100	91	51	-	-



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
S-13	CL	137+00	0.0-15.0	A-3(0)	21	NP	56.8	39.6	1.6	2.0	100	84	4	-	-
SS-16	CL	141+00	13.6-15.1	A-3(0)	24	NP	52.0	46.6	1.4	0.0	100	93	2	-	-
SS-15	CL	141+00	4.0-6.5	A-3(0)	25	NP	73.8	24.5	0.7	1.0	100	73	2	-	-
S-14	CL	143+00	0.0-12.5	A-3(0)	18	NP	63.5	33.4	1.1	2.0	100	78	3	-	-

PROJECT REFERENCE NO.	SHEET NO.
R-2245	32
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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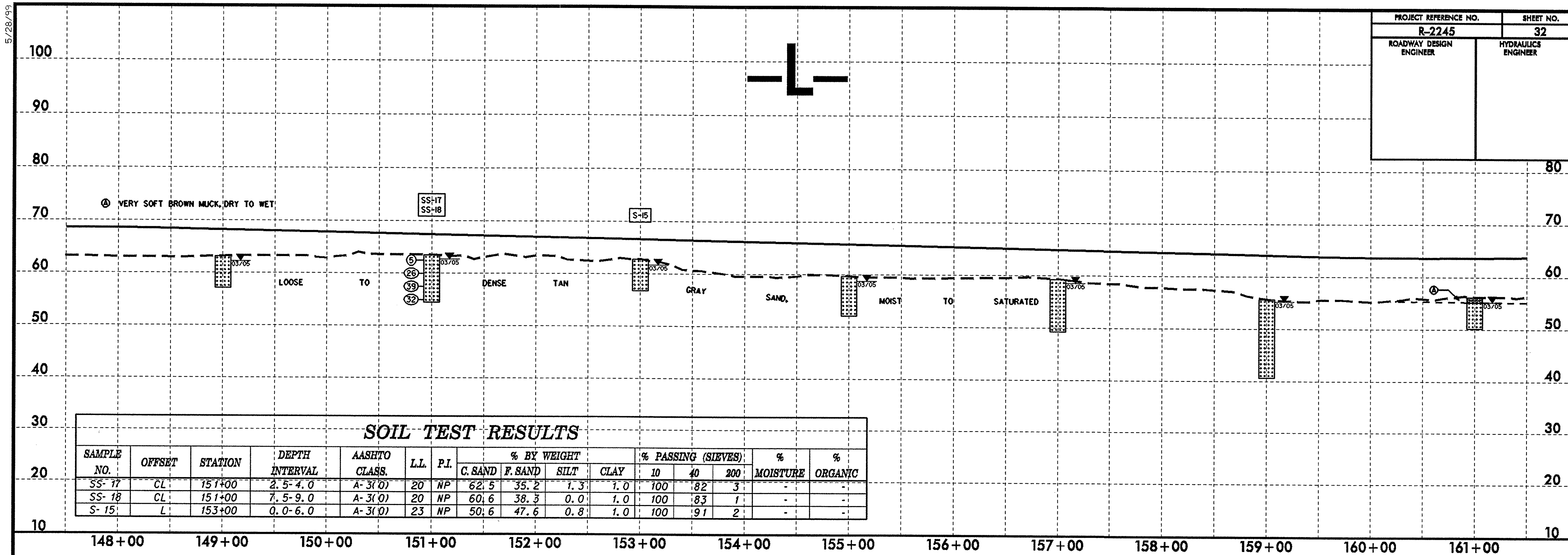
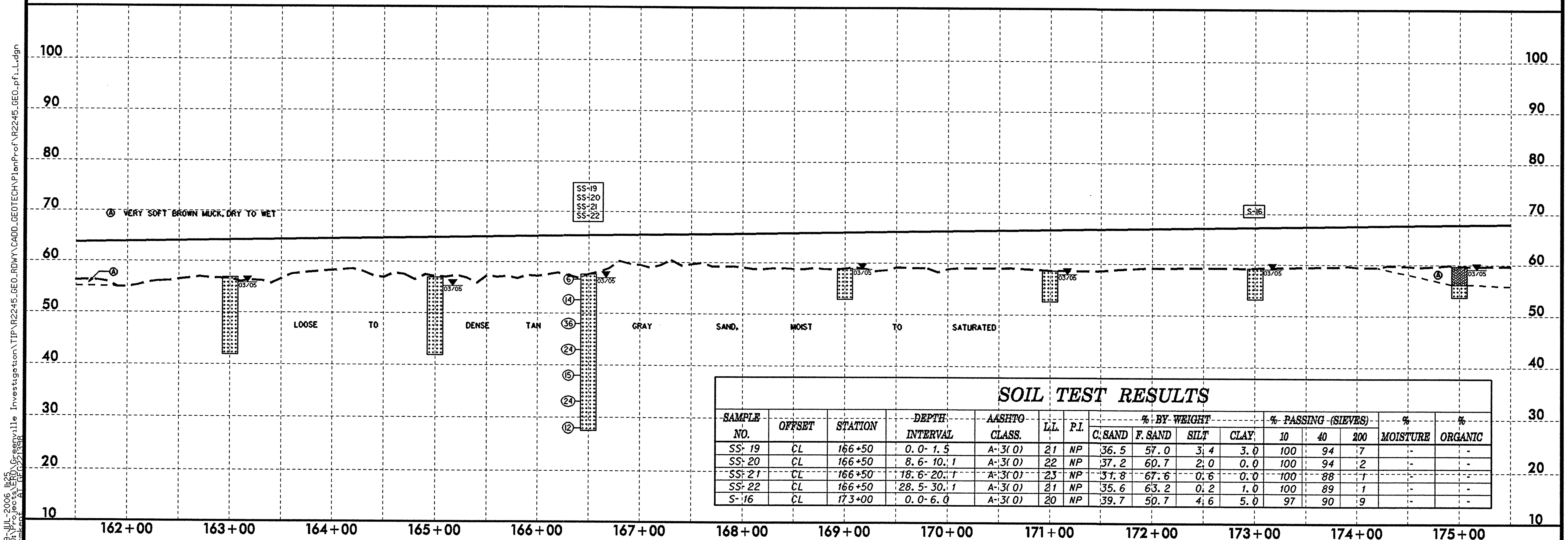


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS- 17	CL	151+00	2.5-4.0	A-3(0)	20	NP	62.5	35.2	1.3	1.0	100	82	3	-	-
SS- 18	CL	151+00	7.5-9.0	A-3(0)	20	NP	60.6	38.3	0.0	1.0	100	83	1	-	-
S- 15	L	153+00	0.0-6.0	A-3(0)	23	NP	50.6	47.6	0.8	1.0	100	91	2	-	-



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- 19	CL	166+50	0.0- 1.5	A-3(0)	21	NP	36.5	57.0	3.4	3.0	100	94	7	-	-
SS- 20	CL	166+50	8.6- 10.1	A-3(0)	22	NP	37.2	60.7	2.0	0.0	100	94	2	-	-
SS- 21	CL	166+50	18.6- 20.1	A-3(0)	23	NP	31.8	67.6	0.6	0.0	100	88	1	-	-
SS- 22	CL	166+50	28.5- 30.1	A-3(0)	21	NP	35.6	63.2	0.2	1.0	100	89	1	-	-
S- 16	CL	173+00	0.0-6.0	A-3(0)	20	NP	39.7	50.7	4.6	5.0	97	90	9	-	-

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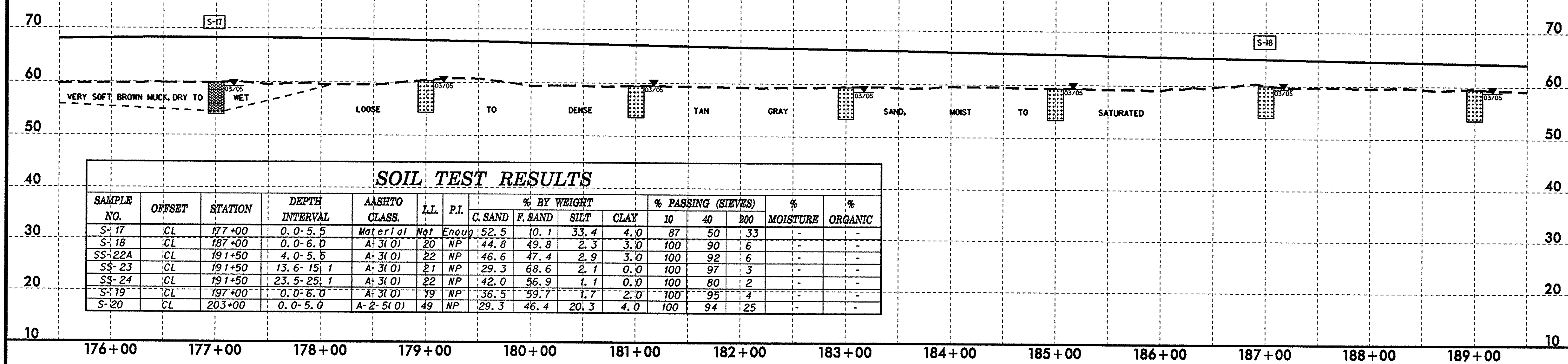
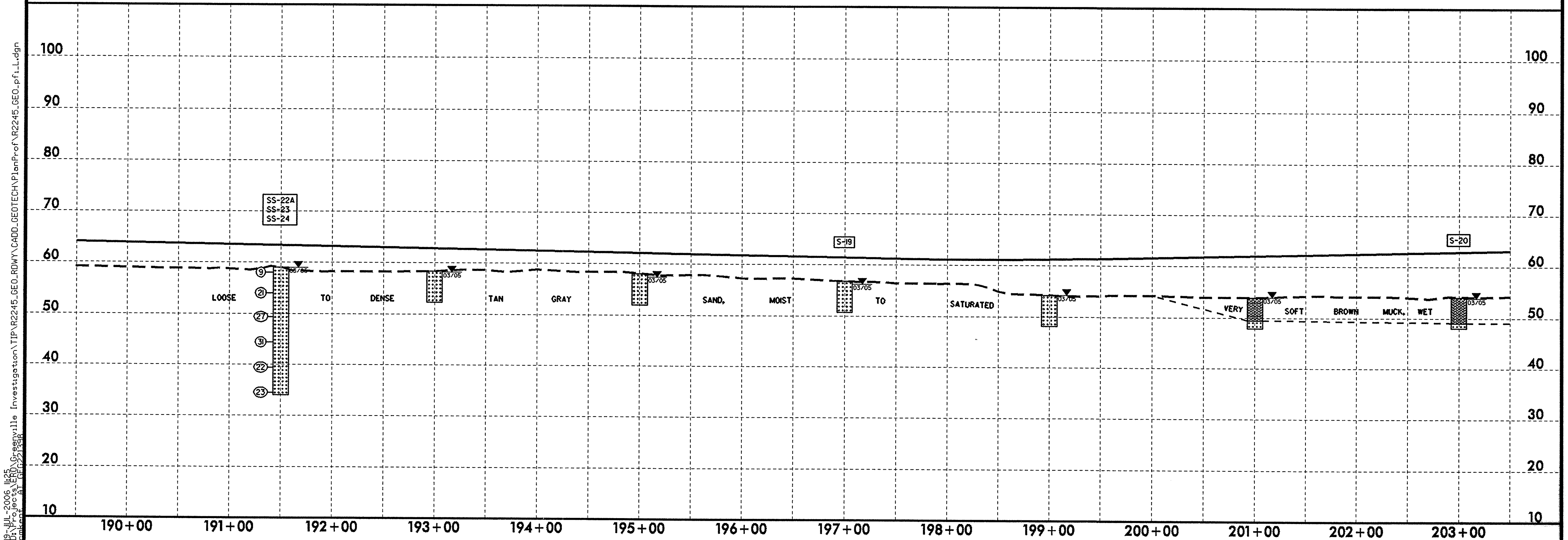


SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-17	CL	177+00	0.0-5.5	Material	Not	Enoug	52.5	10.1	33.4	4.0	87	50	33	-	-
S-18	CL	187+00	0.0-6.0	A-3(0)	20	NP	44.8	49.8	2.3	3.0	100	90	6	-	-
SS-22A	CL	191+50	4.0-5.5	A-3(0)	22	NP	46.6	47.4	2.9	3.0	100	92	6	-	-
SS-23	CL	191+50	13.6-15.1	A-3(0)	21	NP	29.3	68.6	2.1	0.0	100	97	3	-	-
SS-24	CL	191+50	23.5-25.1	A-3(0)	22	NP	42.0	56.9	1.1	0.0	100	80	2	-	-
S-19	CL	197+00	0.0-6.0	A-3(0)	19	NP	36.5	59.7	1.7	2.0	100	95	4	-	-
S-20	CL	203+00	0.0-5.0	A-2-5(0)	49	NP	29.3	46.4	20.3	4.0	100	94	25	-	-



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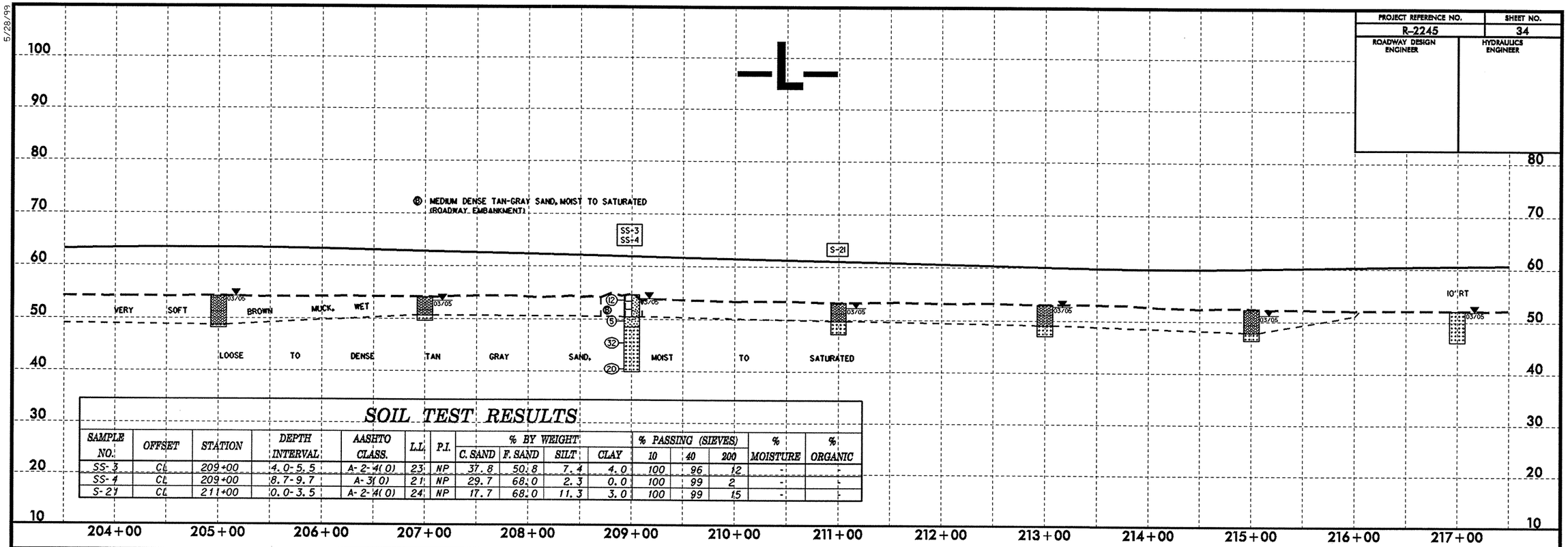
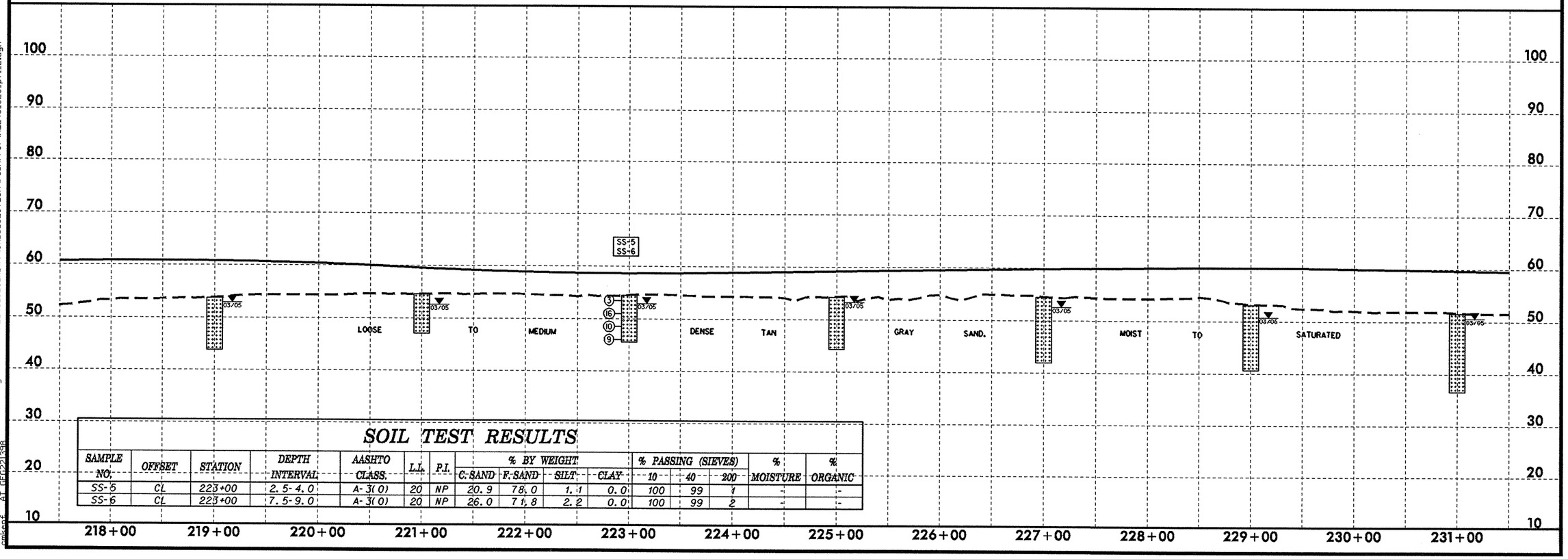
PROJECT REFERENCE NO.	SHEET NO.
R-2245	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



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-3	CL	209+00	4.0-5.5	A-2-4(0)	23	NP	37.8	50.8	7.4	4.0	100	96	12	-	-
SS-4	CL	209+00	8.7-9.7	A-3(0)	21	NP	29.7	68.0	2.3	0.0	100	99	2	-	-
S-21	CL	211+00	0.0-3.5	A-2-4(0)	24	NP	17.7	68.0	11.3	3.0	100	99	15	-	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-5	CL	223+00	2.5-4.0	A-3(0)	20	NP	20.9	78.0	1.1	0.0	100	99	1	-	-
SS-6	CL	223+00	7.5-9.0	A-3(0)	20	NP	26.0	71.8	2.2	0.0	100	99	2	-	-

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PROJECT REFERENCE NO.	SHEET NO.
R-2245	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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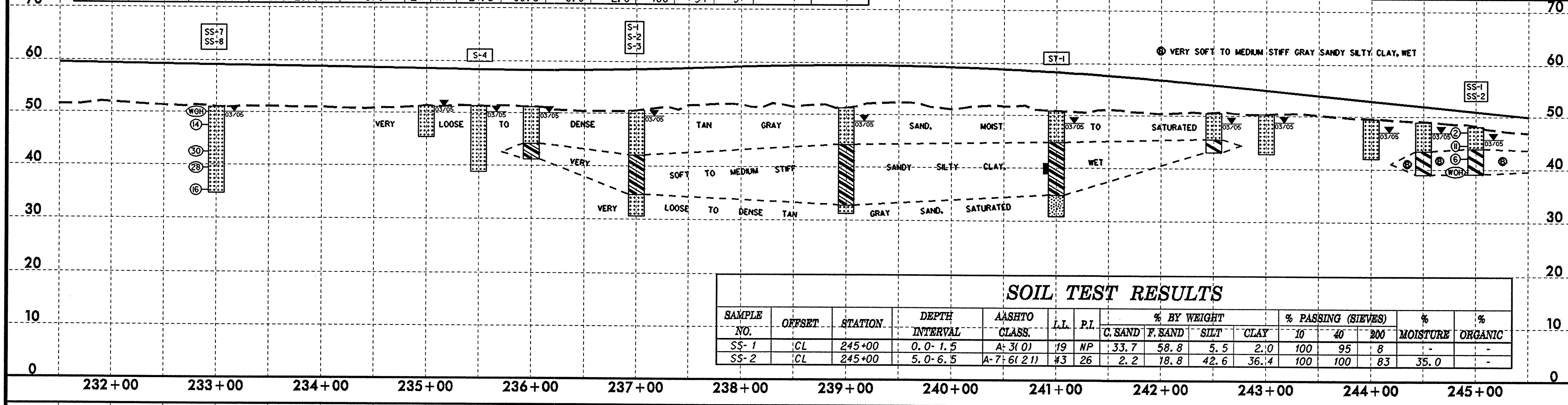
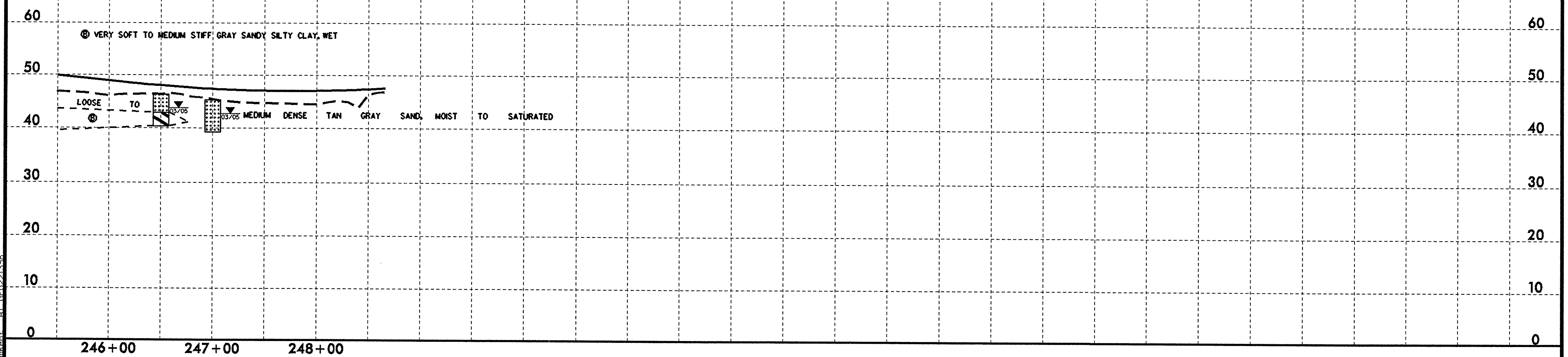
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% [redacted]	% [redacted]
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-7	CL	233+00	2.5-4.0	A-3(0)	22	NP	33.2	59.6	5.2	2.0	100	98	8	[redacted]	-
SS-8	CL	233+00	10.6-12.1	A-3(0)	23	NP	39.9	57.9	2.2	0.0	100	92	2	-	-
S-4	CL	235+50	0.0-12.5	A-3(0)	20	NP	26.5	69.0	2.5	2.0	100	98	5	-	-
S-1	CL	237+00	0.0-8.5	A-3(0)	17	NP	25.2	64.9	5.9	4.0	100	98	10	-	-
S-2	CL	237+00	8.5-16.0	A-6(13)	37	22	7.1	25.9	32.7	34.3	100	97	71	-	-
S-3	CL	237+00	16.0-20.0	A-3(0)	24	NP	21.3	69.8	6.9	2.0	100	94	9	-	-



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	CL	245+00	0.0-1.5	A-3(0)	19	NP	33.7	58.8	5.5	2.0	100	95	8	-	-
SS-2	CL	245+00	5.0-6.5	A-7-6(21)	43	26	2.2	18.8	42.6	36.4	100	100	83	35.0	-



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PROJECT REFERENCE NO.	SHEET NO.
R-2245	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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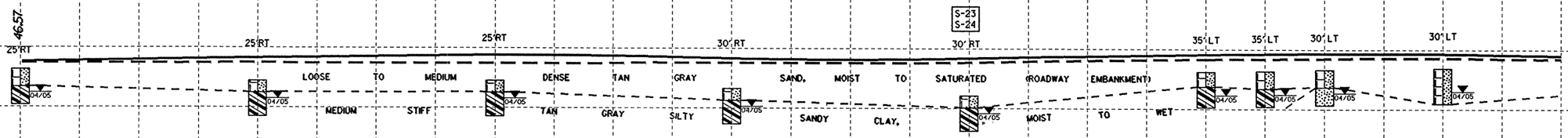
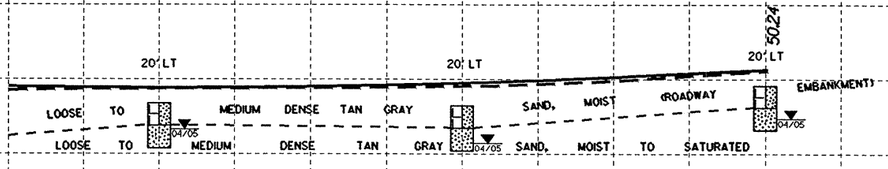


SOIL TEST RESULTS

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
S-23	30' RT	18+00	0.0-7.0	A-2-4(0)	20	NP	25.5	58.4	8.1	8.0	98	90	17	-	-
S-24	30' RT	18+00	2.0-6.0	A-6(7)	30	17	8.8	33.1	28.0	30.1	100	98	60	32.3	-



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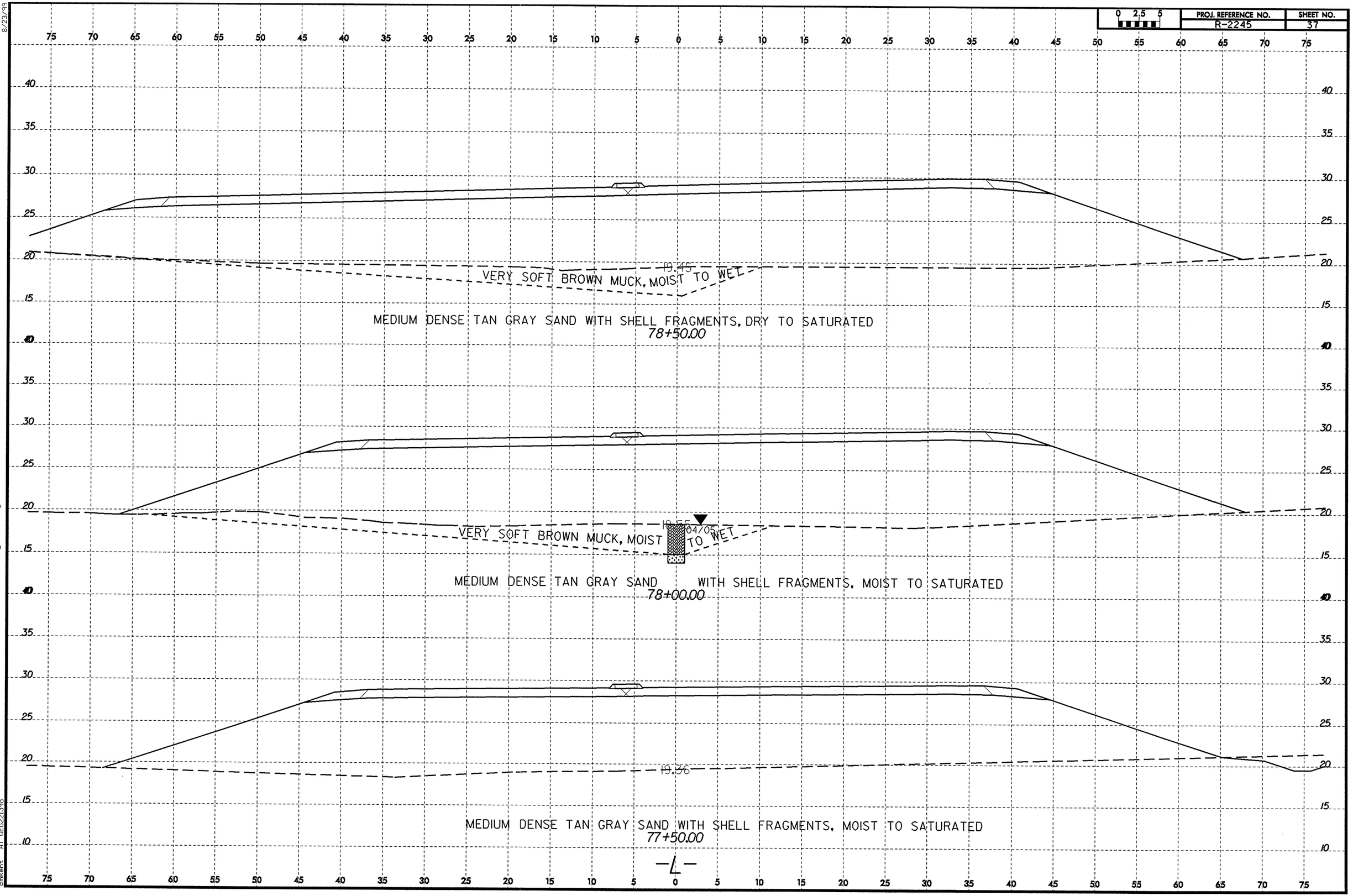
	R-2245	37



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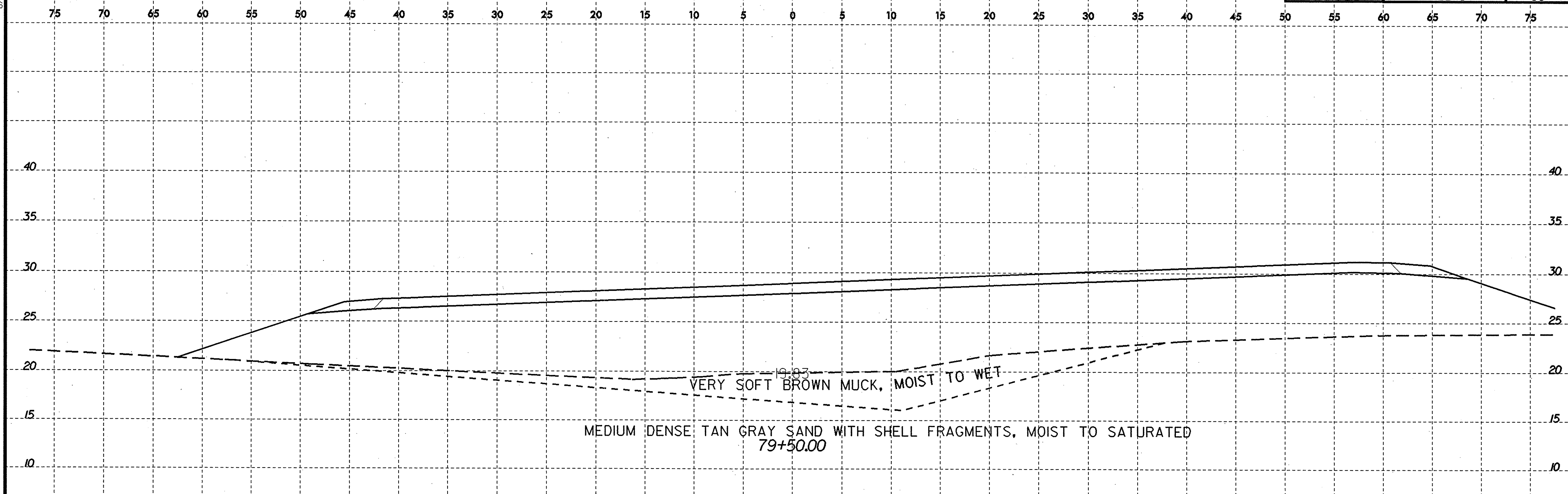
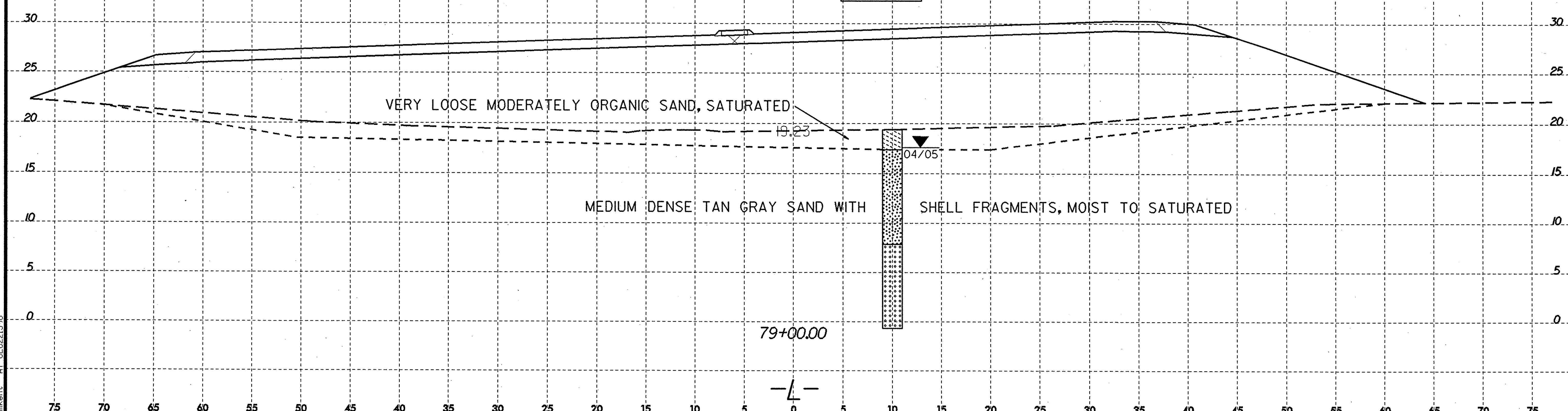
PROJ. REFERENCE NO.	SHEET NO.
R-2245	38



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	% BY WEIGHT F. SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
S-26	10 RT	79+00	1.0-2.0	A-2-4(0)	38	NP	15.5	71.6	11.0	2.0	100	97	14	-	8.3

S-26



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cmkent AT GEO221348

8/23/99

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	39

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

40 35 30 25 20 15 10

VERY SOFT BROWN MUCK, MOIST TO WET

2021

MEDIUM DENSE TAN GRAY SAND WITH SHELL FRAGMENTS, MOIST TO SATURATED

80+50.00

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
S-22	CL	80+00	0.0-3.5	A-2-5(0)	56	NP	13.6	71.4	11.9	3.0	99	96	15	90.8	13.9

S-22

10.00

04/05

VERY SOFT BROWN MUCK, MOIST TO WET

MEDIUM DENSE TAN GRAY SAND WITH SHELL FRAGMENTS, MOIST TO SATURATED

80+00.00

-4-

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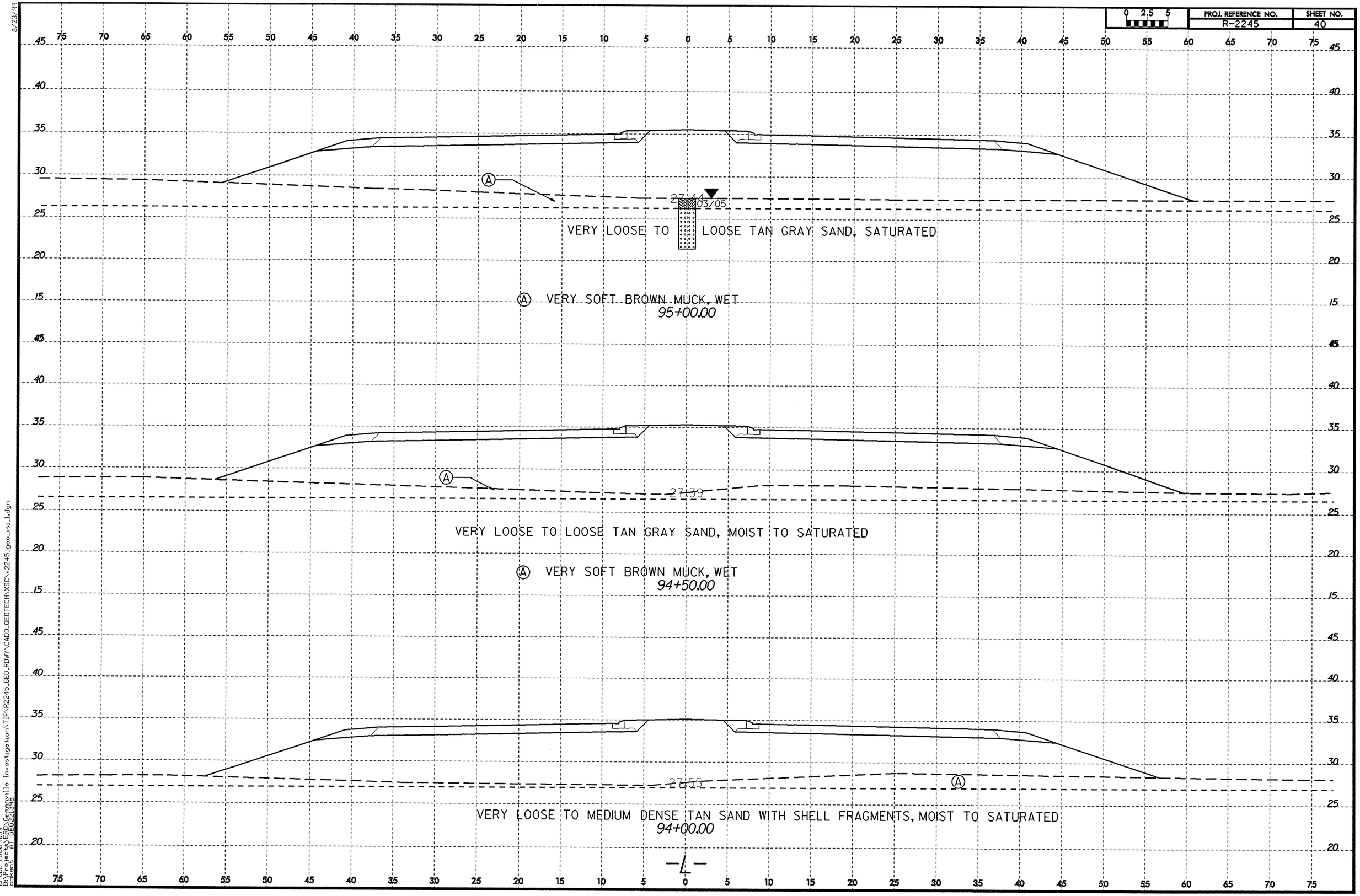
8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	40



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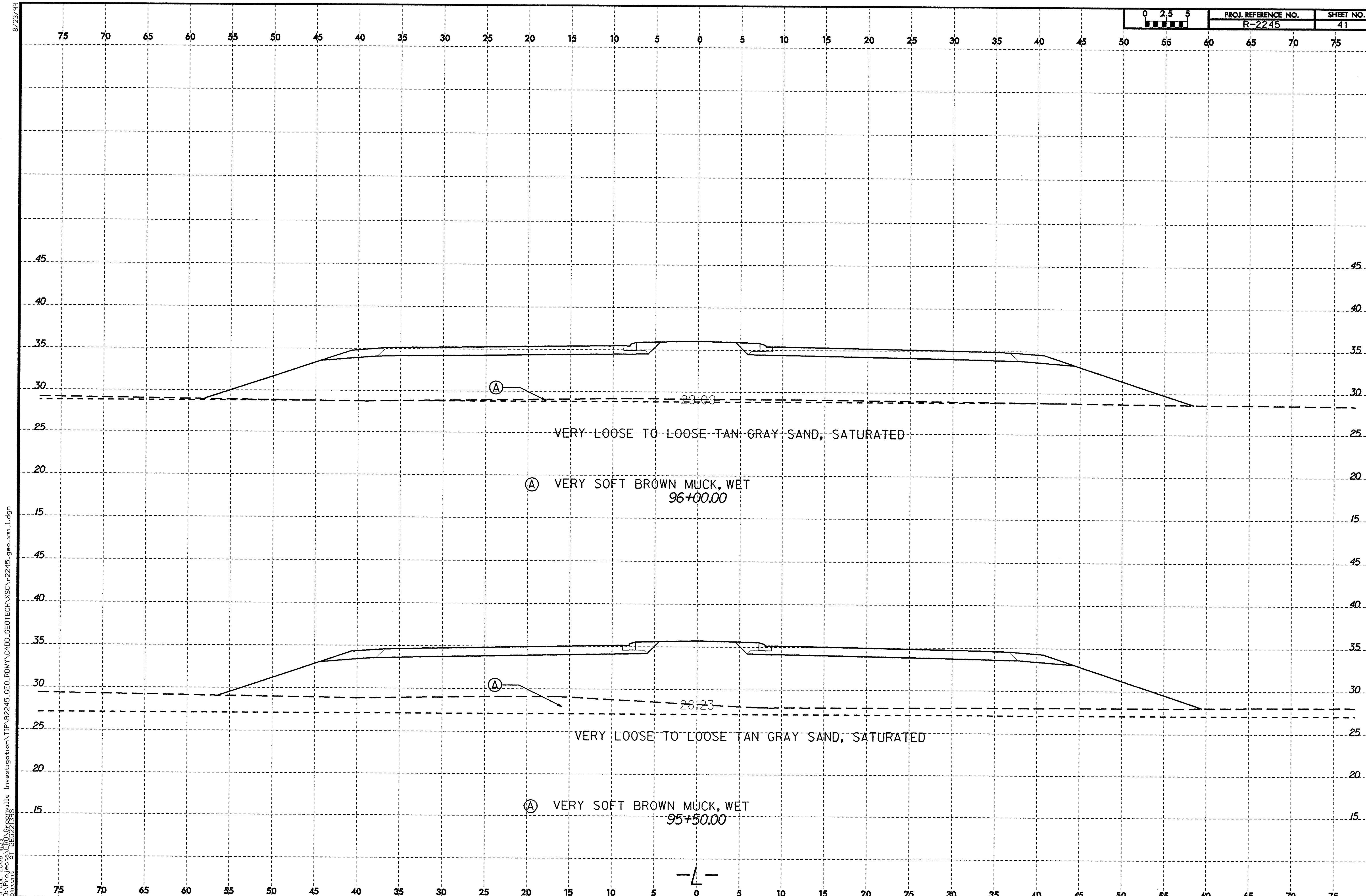
PROJ. REFERENCE NO.	SHEET NO.
R-2245	41



8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	42

37.0

VERY SOFT BROWN MUCK, WET

VERY LOOSE TO DENSE TAN GRAY SAND, MOIST TO SATURATED

109+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-11	CL	109+00	0.0-4.5	A-2-5(0)	59	NP	38.5	40.2	17.3	4.0	99	79	21	-	28.5

S-11

37.0

03/05

VERY SOFT BROWN MUCK, WET

VERY LOOSE TO DENSE TAN GRAY SAND, MOIST TO SATURATED

109+00.00

VERY SOFT BROWN MUCK, WET

39.00

VERY LOOSE TO DENSE TAN GRAY SAND, MOIST TO SATURATED

108+50.00

-L-

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cmkent AI 0E0221398

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	43

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

55 50 45 40 35 30

38.14

VERY LOOSE TO DENSE TAN GRAY SAND, MOIST TO SATURATED

110+50.00

55 50 45 40 35 30

37.63

VERY SOFT BROWN MUCK, WET

VERY LOOSE TO DENSE TAN GRAY SAND, MOIST TO SATURATED

110+00.00

-L-

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

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cmkent AT GEO22398

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	44

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

75
70
65
60
55
50
45

55.77

LOOSE TO DENSE TAN GRAY SAND, DRY TO SATURATED

160+50.00

75
70
65
60
55
50
45

55.10

LOOSE TO DENSE TAN GRAY SAND, DRY TO SATURATED

160+00.00

-L-

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

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cmkent AT GEO22348

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	45

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

75
70
65
60
55
50
45
40

56.21

LOOSE TO DENSE TAN GRAY SAND, DRY TO SATURATED

161+50.00

68

Ⓐ 56.20
03/05

LOOSE TO DENSE TAN GRAY SAND, DRY TO SATURATED

Ⓐ VERY SOFT BROWN MUCK, DRY TO WET

161+00.00

—L—

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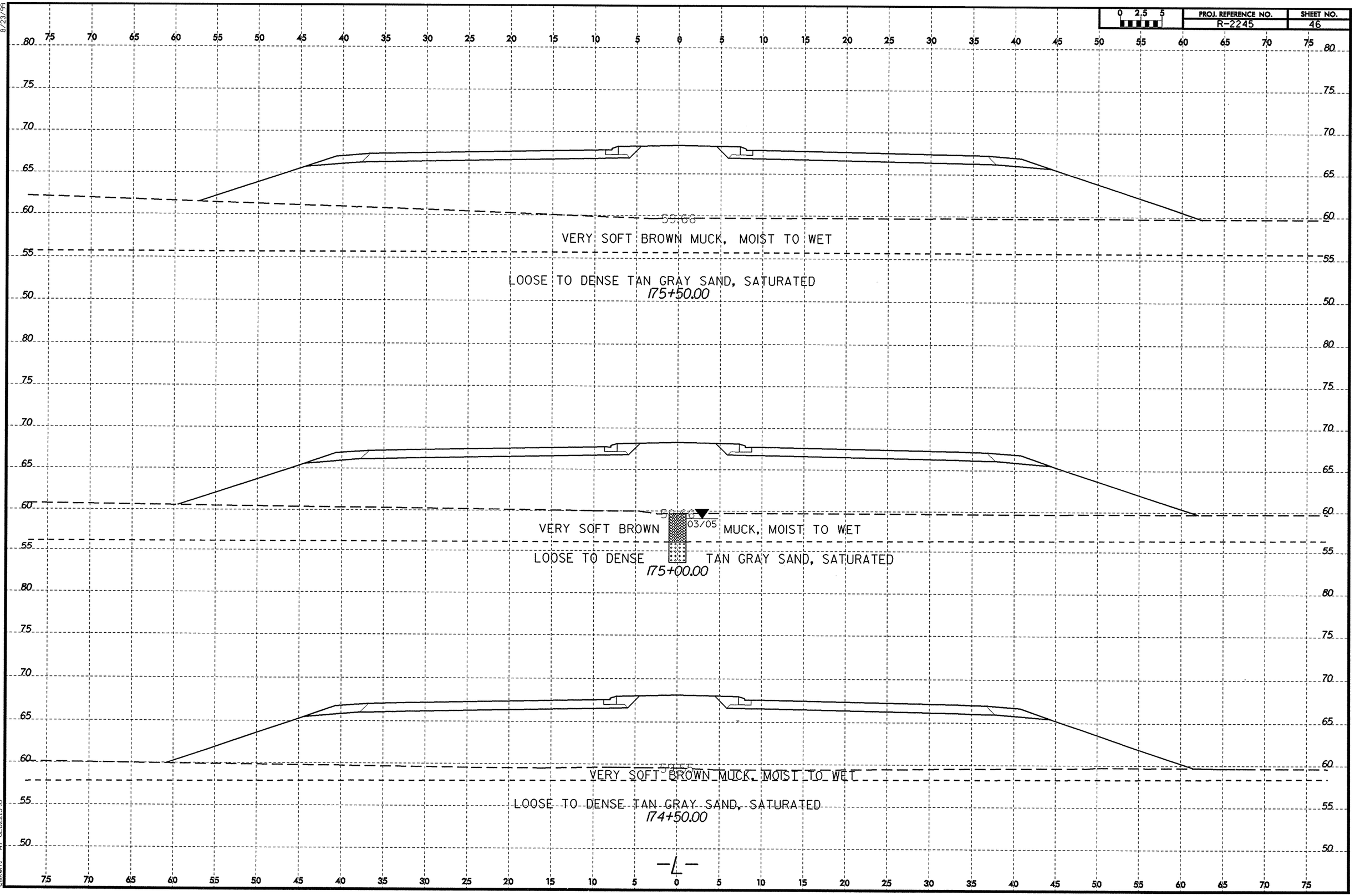
cmkent AT GEO22138

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	46



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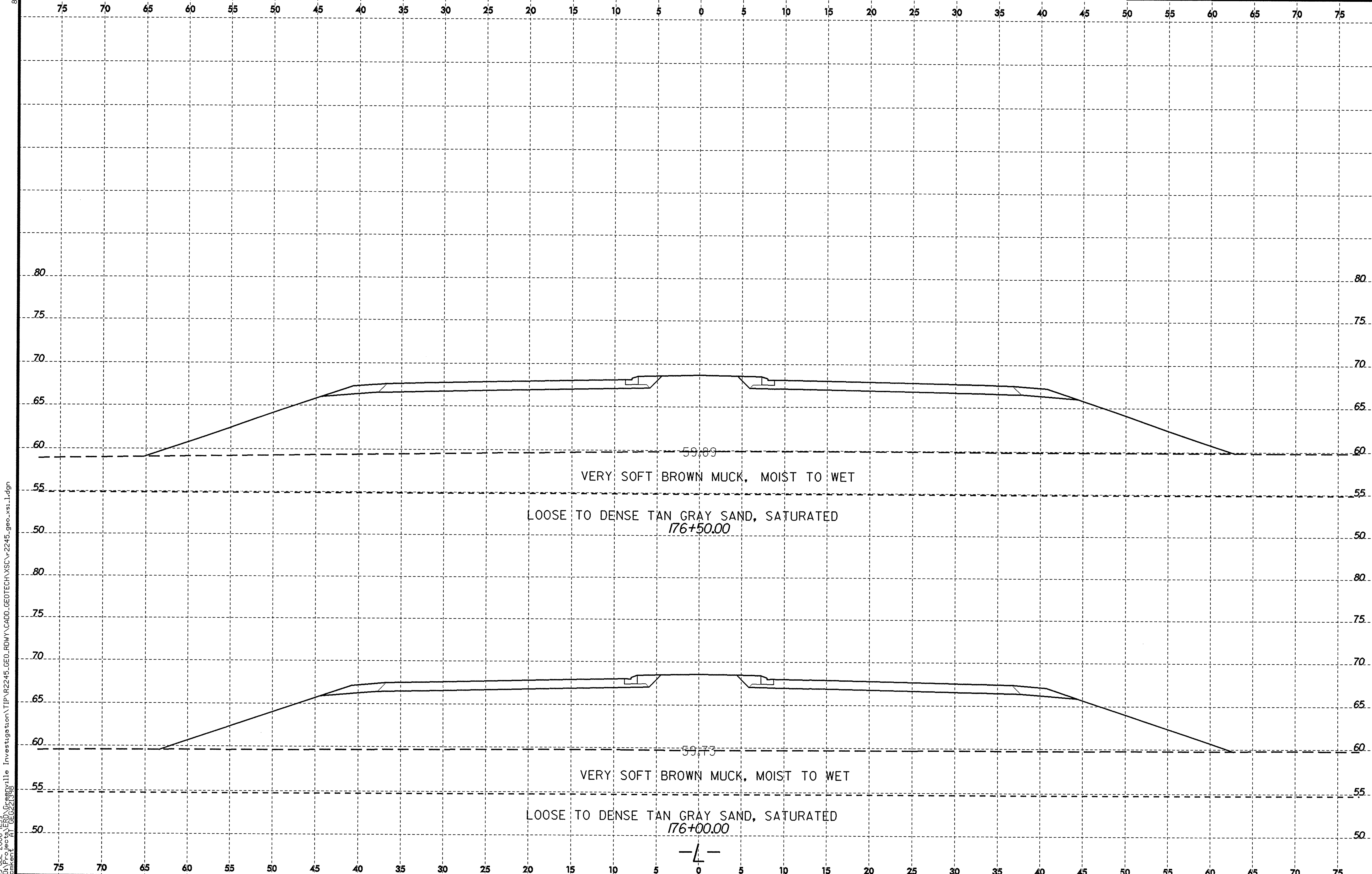
PROJ. REFERENCE NO.	SHEET NO.
R-2245	47



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cmkent AT GEG21898

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	48

VERY SOFT BROWN MUCK, MOIST TO WET

59.52

LOOSE TO DENSE TAN GRAY SAND, SATURATED

178+00.00

59.55

VERY SOFT BROWN MUCK, MOIST TO WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

177+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PI	% BY WEIGHT C-SAND	F-SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-17	CL	177+00	0.0-5.5	Material Not Enoug			52.5	10.1	33.4	4.0	87	50	33	-	-

S-17

59.89

03/05

VERY SOFT BROWN MUCK, MOIST TO WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

177+00.00

—L—

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cmkent GEO221398

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	49

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

75 70 65 60 55 50 45

53.85
03/05

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

201+00.00

53.07

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

200+50.00

54.14

LOOSE TO DENSE TAN GRAY SAND, DRY TO SATURATED

200+00.00

—L—

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

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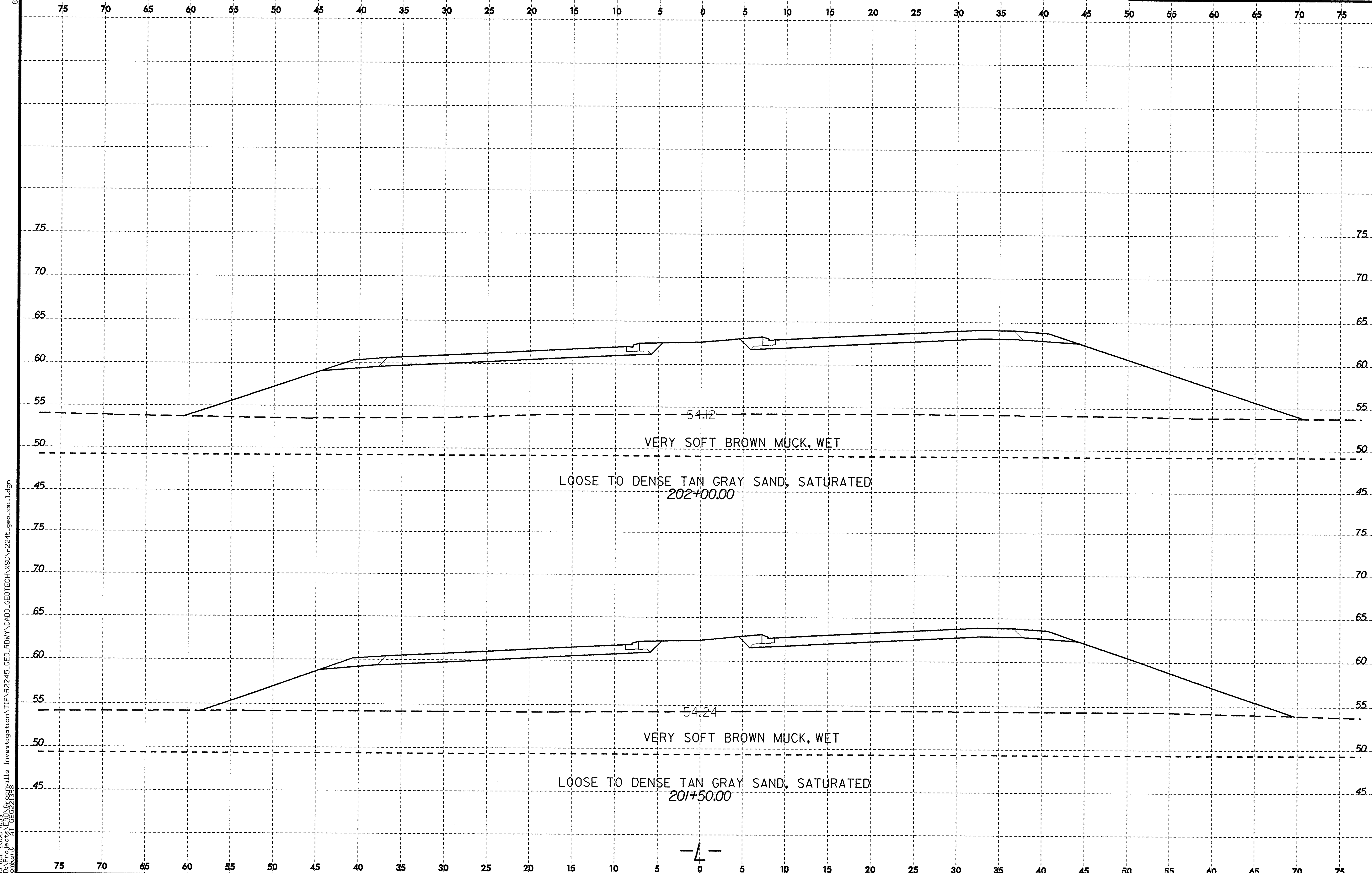
PROJ. REFERENCE NO.	SHEET NO.
R-2245	50



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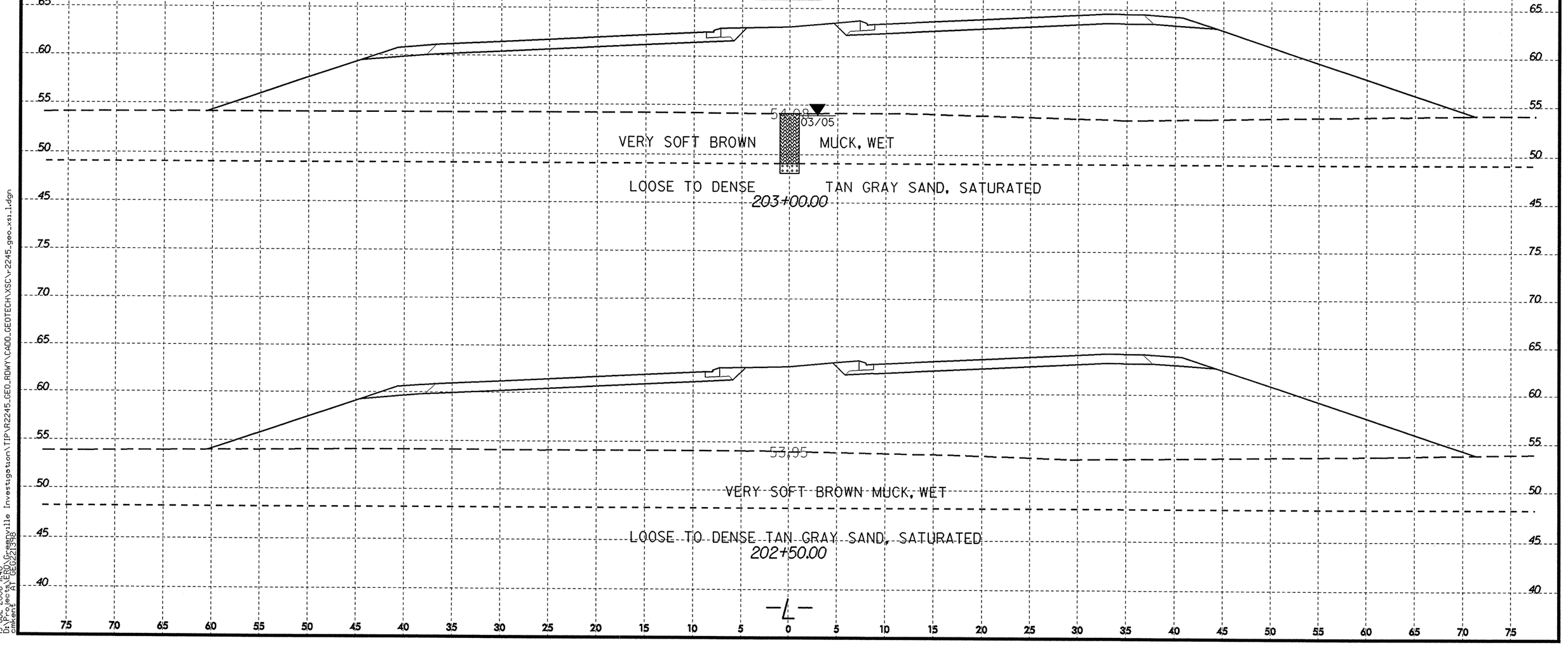
cmkent AT GEO221398

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	51

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-20	CL	203+00	0.0-5.0	A-2-5(0)	49	NP	29.3	46.4	20.3	4.0	100	94	25	-	-



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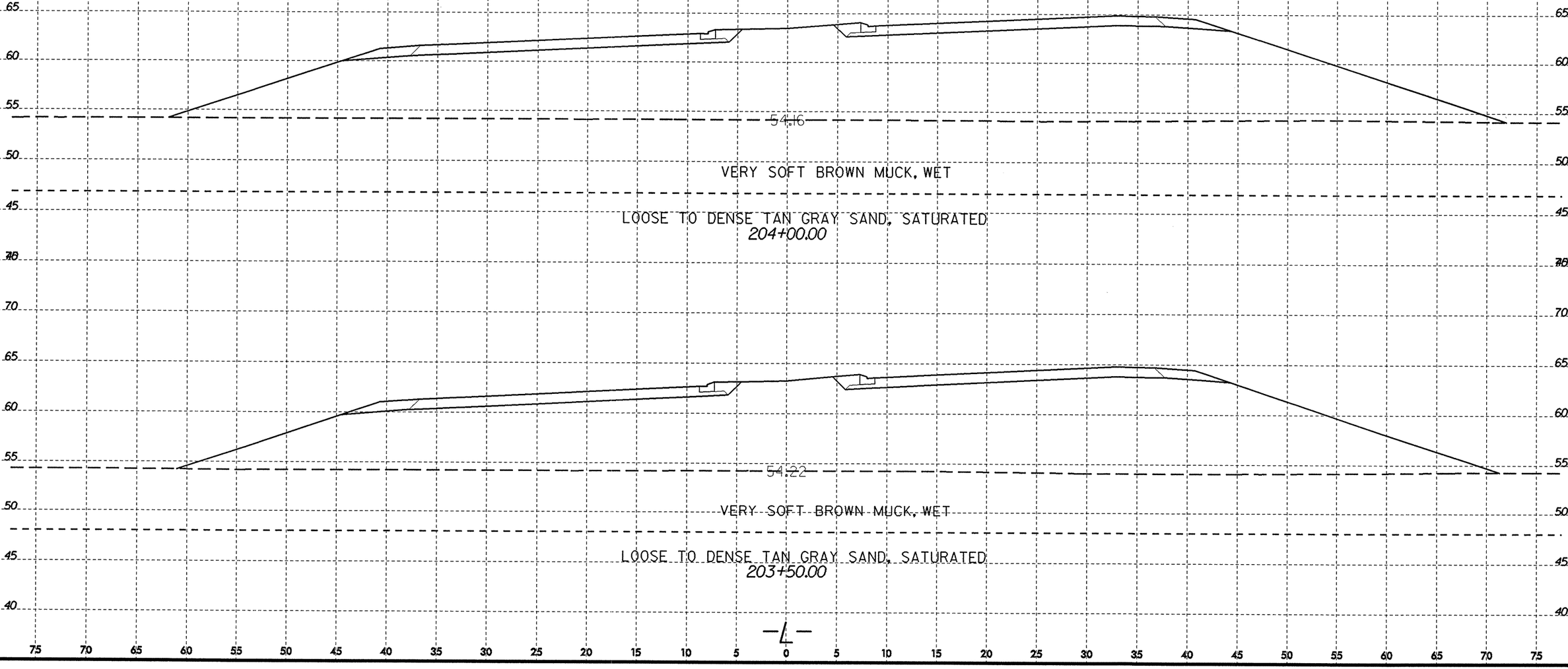
8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	52

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

75
70
65
60
55
50
45
40



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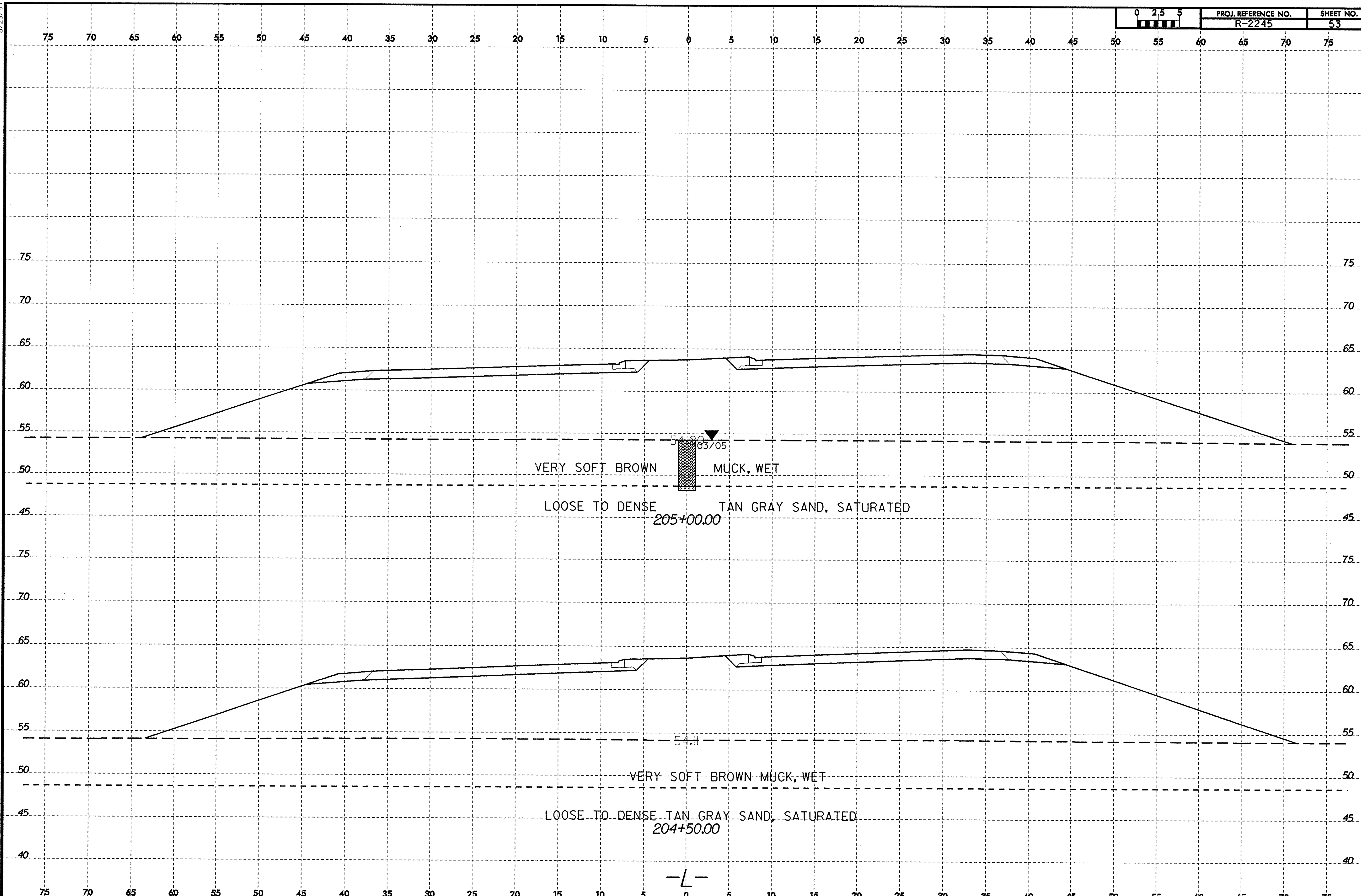
PROJ. REFERENCE NO.	SHEET NO.
R-2245	53



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cmkent AT GEG221398

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	54

54.16

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

206+00.00

54.10

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

205+50.00

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-2245	55

0 2.5 5

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

75
70
65
60
55
50
45
40

54.12
03/05

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

207+00.00

54.14

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

206+50.00

-L-

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cmkent AT GEO221348

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	56

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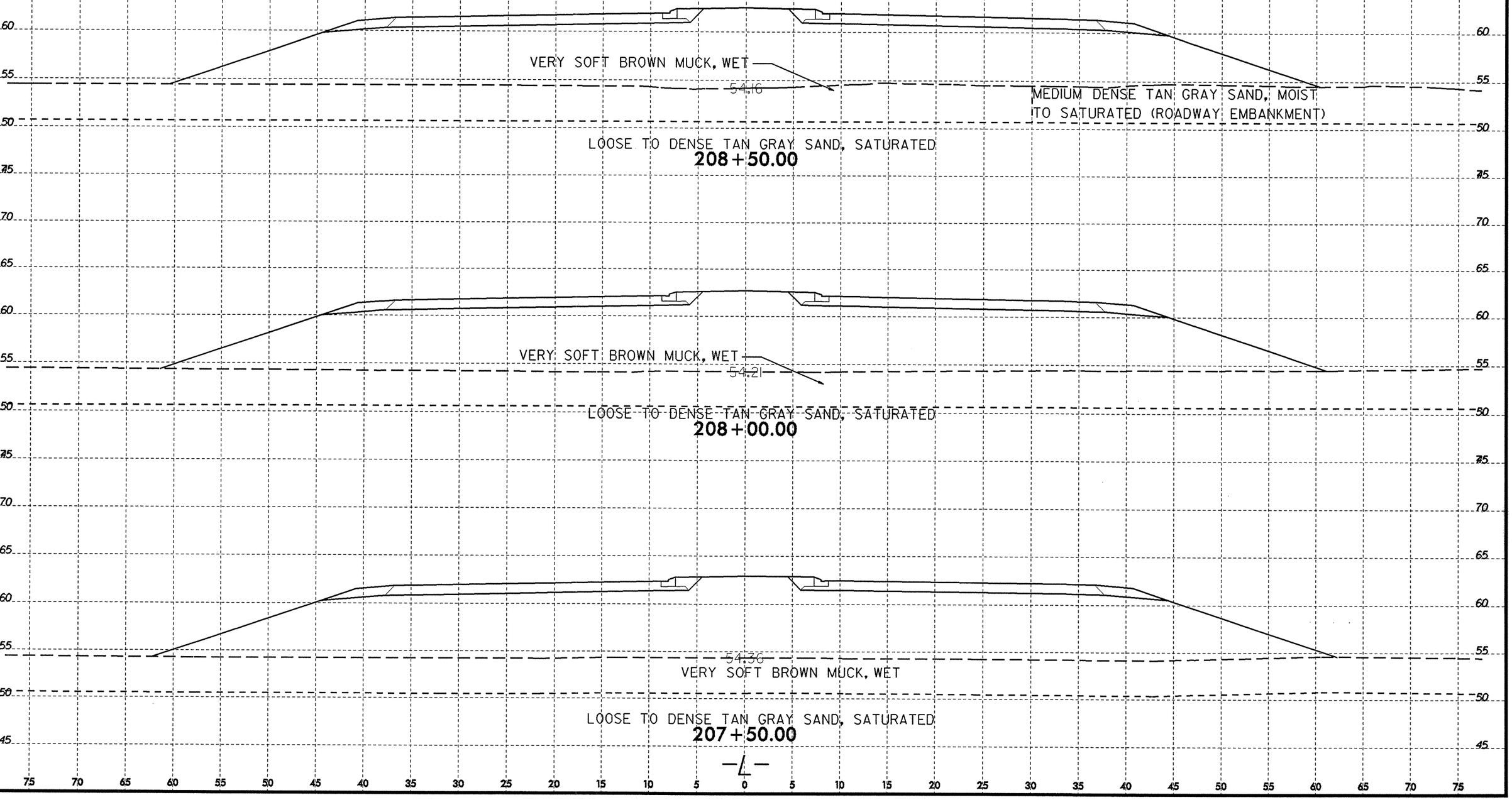

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8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	57

TO SATURATED (ROADWAY EMBANKMENT)
MEDIUM DENSE TAN GRAY SAND, MOIST

VERY SOFT BROWN MUCK, WET

53.64

LOOSE TO DENSE TAN GRAY SAND, SATURATED
209+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3	CL	209+00	4.0-5.5	A-2-4(0)	23	NP	37.8	50.8	7.4	4.0	100	96	12	-	-
SS-4	CL	209+00	8.7-9.7	A-3(0)	21	NP	29.7	68.0	2.3	0.0	100	99	2	-	-

SS-3
SS-4

VERY SOFT BROWN MUCK, WET

MEDIUM DENSE TAN GRAY SAND, MOIST
(ROADWAY EMBANKMENT)

VERY SOFT BROWN MUCK, WET

TO SATURATED

LOOSE TO DENSE TAN GRAY SAND, SATURATED

(12) (5) (32) (20)

03/05

209+00.00

—L—

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cmkent AT GEO221398

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-2245	58

0 2.5 5

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
S-21	CL	211+00	0.0-3.5	A-2-4(0)	24	NP	17.7	68.0	11.3	3.0	100	99	15	-	-

S-21

53.32

03/05

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

211+00.00

53.40

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

210+50.00

VERY SOFT BROWN MUCK, WET

53.41

LOOSE TO DENSE TAN GRAY SAND, SATURATED

210+00.00

-L-

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emkent AT GEO221398

0 2.5 5

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

53.16

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

212+50.00

53.15

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

212+00.00

53.29

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

211+50.00

-L-

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	60

52.65

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

214+00.00

53.00

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

213+50.00

57.08

03/05

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

213+00.00

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	61

52.25

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

215+50.00

52.35

03/05

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

215+00.00

52.34

VERY SOFT BROWN MUCK, WET

LOOSE TO DENSE TAN GRAY SAND, SATURATED

214+50.00

-L-

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8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	62

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

70
65
60
55
50
45

52.06

LOOSE TO DENSE TAN GRAY SAND, SATURATED
216+50.00

70
65
60
55
50
45

VERY SOFT BROWN MUCK, WET

52.08

LOOSE TO DENSE TAN GRAY SAND, SATURATED
216+00.00

-L-

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

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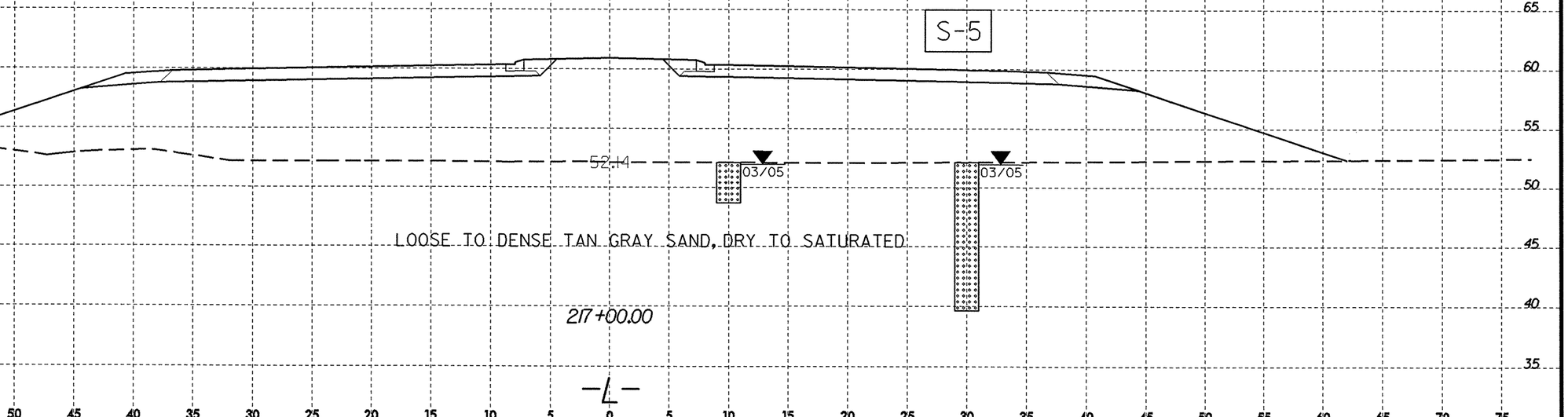
cmkent A1 GEO221398

8/23/99

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	63

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-5	CL	217+00	0.0-12.5	A-3(0)	24	NP	20.1	75.3	2.6	2.0	100	99	5	-	-



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cmkent AT GEO22198

ID: R-2245

CONTRACT: C201550

NOTE: SEE SHEET 1A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34407.1.1 I.D. NO. R-2245 F.A. PROJ. STP-1105 (7)

COUNTY BRUNSWICK

PROJECT DESCRIPTION NEW ROUTE FROM SR-1104 (BEACH DR.) TO NC 211 (2ND BRIDGE TO OAK ISLAND)

INVENTORY-ADDENDUM

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2245	1	

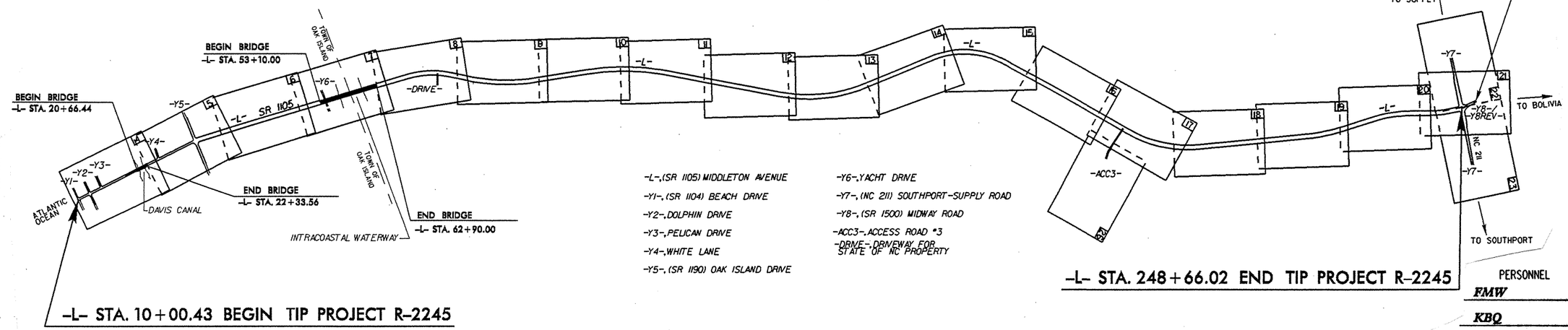
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
34407.1.1	STP-1105(6)	P.E.
34407.3.1	STP-1105(7)	R/W & UTIL.
34407.2.3	STP-1105(17)	CONST.

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.



-L-, (SR 1105) MIDDLETON AVENUE
-Y1-, (SR 1104) BEACH DRIVE
-Y2-, DOLPHIN DRIVE
-Y3-, PELICAN DRIVE
-Y4-, WHITE LANE
-Y5-, (SR 1190) OAK ISLAND DRIVE
-Y6-, YACHT DRIVE
-Y7-, (NC 211) SOUTHPORT-SUPPLY ROAD
-Y8-, (SR 1500) MIDWAY ROAD
-ACC3-, ACCESS ROAD #3
-DRIVE-, DRIVEWAY FOR STATE OF NC PROPERTY

ACCESS IS NOT CONTROLLED FROM OCEAN BEACH DRIVE TO 735' SOUTH OF YACHT DRIVE.
ACCESS CONTROL IS LIMITED TO POINTS AS SHOWN ON THE PLANS FROM 735' SOUTH OF YACHT DRIVE TO NC 211.

PERSONNEL
FMW
KBQ
WNC
RES

INVESTIGATED BY F. M. WESCOTT III
CHECKED BY D. N. ARGENBRIGHT
SUBMITTED BY D. N. ARGENBRIGHT
DATE APRIL 2006

NORTH CAROLINA LICENSED SEAL 1050 GEOLOGIST D. N. ARGENBRIGHT 4/27/06

DRAWN BY: C. M. KENT

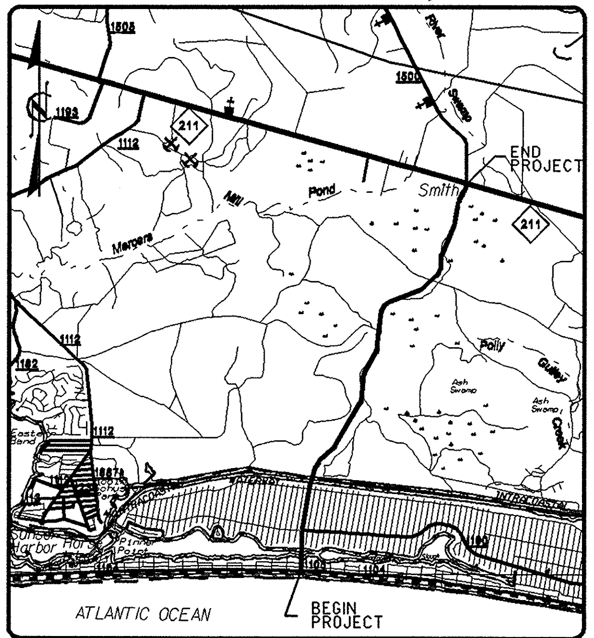
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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

CONTRACT:

TIP PROJECT: R-2245

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

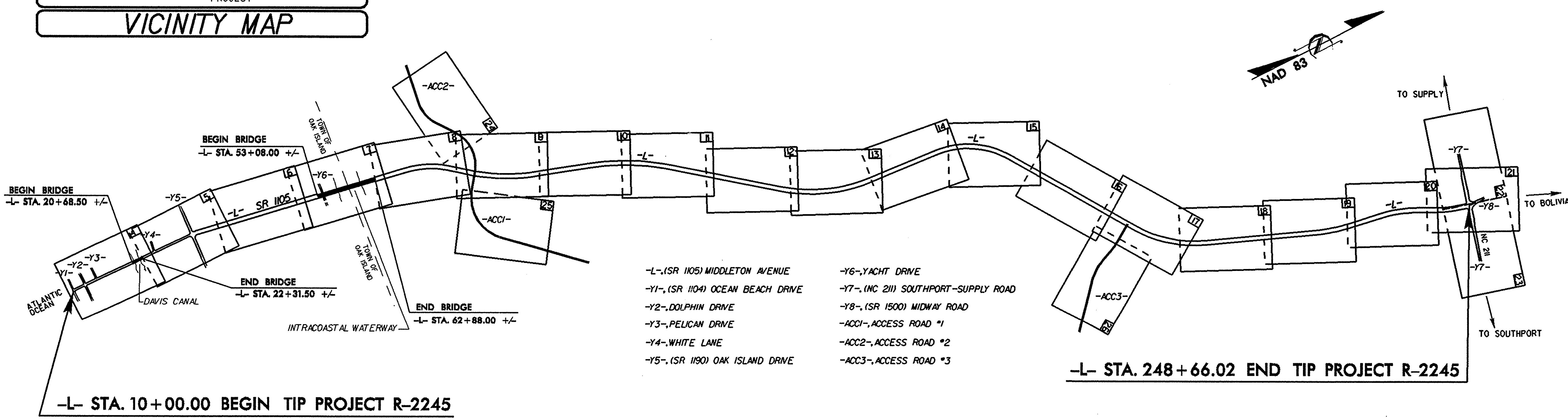
BRUNSWICK COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2245	1A	8

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34407.1.1	STP-1105(6)	P.E.

LOCATION: NEW ROUTE FROM SR 1104 (OCEAN BEACH DRIVE) TO NC 211 (SECOND BRIDGE TO OAK ISLAND)

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



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF OAK ISLAND.
ACCESS IS NOT CONTROLLED FROM OCEAN BEACH DRIVE TO 835' SOUTH OF YACHT DRIVE.
ACCESS CONTROL IS LIMITED TO POINTS AS SHOWN ON THE PLANS FROM 835' SOUTH OF YACHT DRIVE TO NC 211.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 11600
ADT 2025 = 27400
DHV = 8 %
D = 55 %
T = 3 % *
V = 40-60 MPH
* TTST 1% + DUAL 2%
FUNC CLASS = RURAL COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2245 = MI

LENGTH STRUCTURES TIP PROJECT R-2245 = MI

TOTAL LENGTH OF TIP PROJECT R-2245 = 4.520 MI

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 29, 2005

LETTING DATE: AUGUST 15, 2006

GLENN W. MUMFORD, PE
PROJECT ENGINEER

LISA W. SHAPIRO, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

PROJECT REFERENCE NO.	SHEET NO.
R-2245	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1			A-3	A-2			A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b			A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX			NP	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
PLASTIC INDEX					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 A 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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, 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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

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

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE 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 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS 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, 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:

ELEVATION: FT.

NOTES:

REVISED 02/23/06

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

April 27, 2006

STATE PROJECT: 34407.1.1 R-2245
F. A. PROJECT: STP-1105(7)
COUNTY: Brunswick
DESCRIPTION: New Route from SR 1104 (Beach Dr.) to NC 211 (2nd Bridge to Oak Island)

SUBJECT: Geotechnical Report – Addendum to Inventory

The Geotechnical Unit has reviewed the grade revisions along this project and submits the following comments:

The subsurface data and information submitted in the inventory report dated December 5, 2005 accurately depicts the soils present along the existing alignment. Additional borings for reenforced slopes were done from -L- Stations 16+50 to 20+50 to further support the orginal data. Cross sections containing this information are submitted in this report.

Respectfully submitted,

Fred M. Wescott III
Project Geological Engineer

NWW/FMW

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

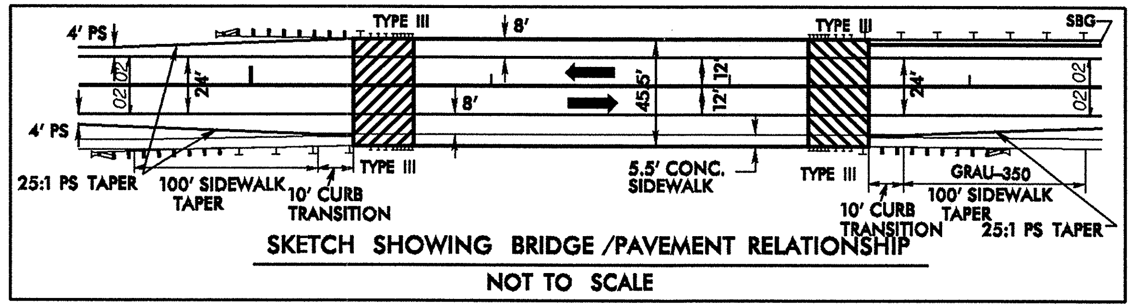
TELEPHONE: 919-250-4088
FAX: 919-250-4237

WEBSITE: WWW.DOH.DOT.STATE.NC.US

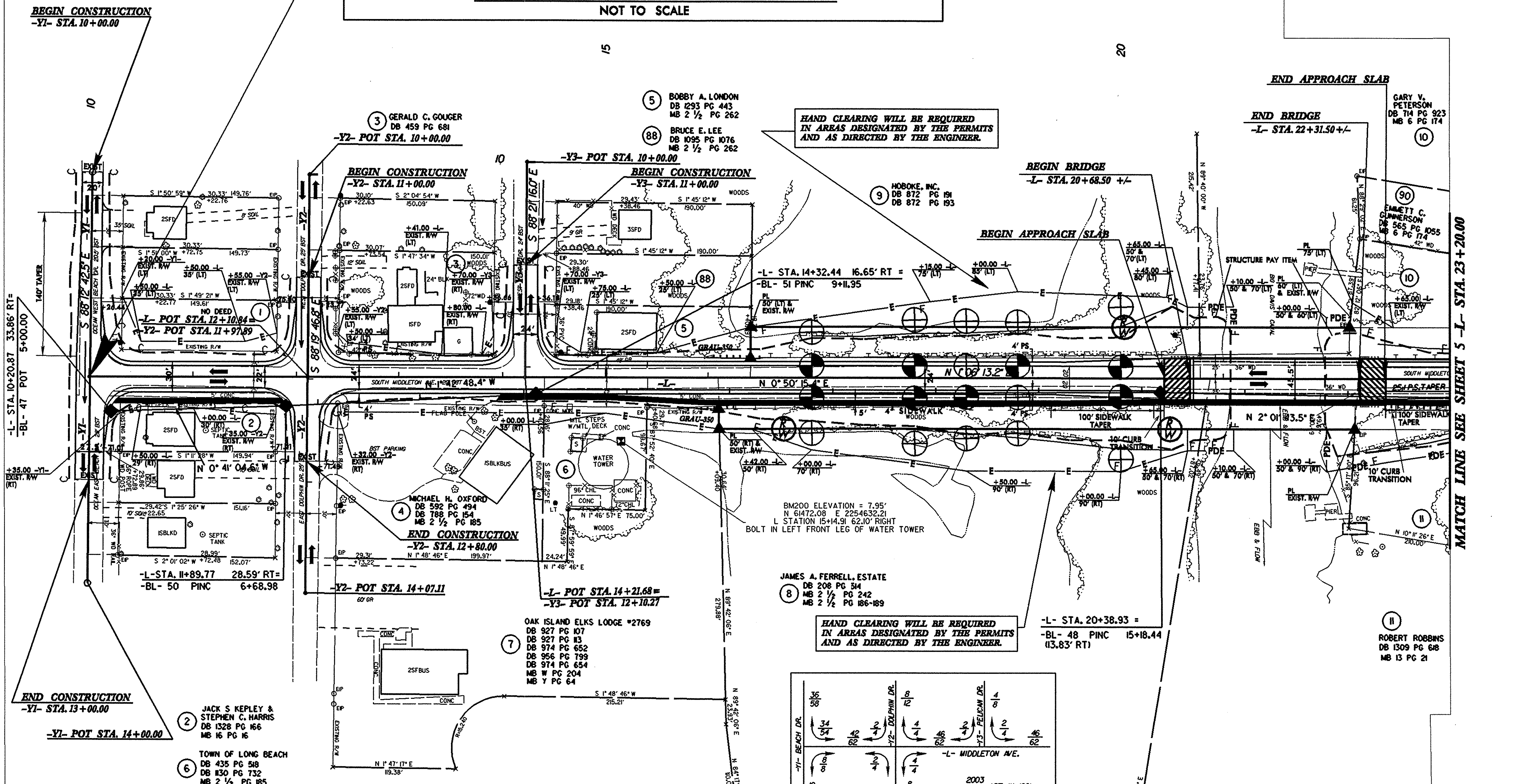
LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

PROJECT REFERENCE NO.	SHEET NO.
R-2245	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



BEGIN TIP PROJECT R-2245
-L- POT Sta.. 10+00.00 =
-Y1- POT Sta. 11+99.95



BEGIN CONSTRUCTION
-Y1- STA. 10+00.00
GERALD C. GOUGER
DB 459 PG 681
-Y2- POT STA. 10+00.00
BEGIN CONSTRUCTION
-Y2- STA. 11+00.00
-Y3- POT STA. 10+00.00
BEGIN CONSTRUCTION
-Y3- STA. 11+00.00
BOBBY A. LONDON
DB 1293 PG 443
MB 2 1/2 PG 262
BRUCE E. LEE
DB 1095 PG 1076
MB 2 1/2 PG 262
HAND CLEARING WILL BE REQUIRED IN AREAS DESIGNATED BY THE PERMITS AND AS DIRECTED BY THE ENGINEER.
HOBOKE, INC.
DB 872 PG 191
DB 872 PG 193
BEGIN BRIDGE
-L- STA. 20+68.50 +/-
BEGIN APPROACH SLAB
END APPROACH SLAB
END BRIDGE
-L- STA. 22+31.50+/-
GARY V. PETERSON
DB 714 PG 923
MB 6 PG 174
EMMETT C. GUNNERSON
DB 565 PG 1055
MB 6 PG 174
MATCH LINE SEE SHEET 5 -L- STA. 23+20.00
-L- STA. 14+32.44 16.65' RT =
-BL- 51 PINC 9+11.95
-L- STA. 10+20.87 33.86' RT=
-BL- 47 POT 5+00.00
140' TAPER
-L- POT STA. 12+10.84=
-Y2- POT STA. 11+97.89
NO DEED
SOUTH MIDDLETON AVE.
N 0° 50' 15.4" E
N 2° 01' 13.5" E
N 0° 41' 04.6" W
STRUCTURE PAY ITEM
WATER TOWER
MICHAEL H. OXFORD
DB 592 PG 494
DB 788 PG 154
MB 2 1/2 PG 185
END CONSTRUCTION
-Y2- STA. 12+80.00
BM200 ELEVATION = 7.95'
N 61472.08 E 2254632.21
L STATION 15+14.91 62.10' RIGHT
BOLT IN LEFT FRONT LEG OF WATER TOWER
-L-STA. 11+89.77 28.59' RT=
-BL- 50 PINC 6+68.98
-Y2- POT STA. 14+07.11
-L- POT STA. 14+21.68=
-Y3- POT STA. 12+10.27
JAMES A. FERRELL, ESTATE
DB 208 PG 514
MB 2 1/2 PG 242
MB 2 1/2 PG 186-189
-L- STA. 20+38.93 =
-BL- 48 PINC 15+18.44
(13.83' RT)
OAK ISLAND ELKS LODGE #2769
DB 927 PG 107
DB 927 PG 113
DB 974 PG 652
DB 956 PG 799
DB 974 PG 654
MB W PG 204
MB Y PG 64
ROBERT ROBBINS
DB 1309 PG 618
MB 13 PG 21
END CONSTRUCTION
-Y1- STA. 13+00.00
-Y1- POT STA. 14+00.00
JACK S KEPLEY &
STEPHEN C. HARRIS
DB 1328 PG 166
MB 16 PG 16
TOWN OF LONG BEACH
DB 435 PG 518
DB 1130 PG 732
MB 2 1/2 PG 185
MB W PG 304
-Y1- BEACH DR.
-Y2- DOLPHIN DR.
-Y3- PELICAN DR.
-L- MIDDLETON AVE.
2003/2025 ADT IN 100's

NOTES:

1) FOR -L- PROFILE SEE SHEET 27.
2) FOR -Y1-, -Y2- AND -Y3- PROFILES SEE SHEET 36.
3) FOR STRUCTURE PLANS SEE SHEETS S- TO S-.
4) DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.
5) ~~PAVED SHOULDER TAPERS ARE 8:1 UNLESS OTHERWISE NOTED.~~
6) -Y- LINE RADII ARE 30' UNLESS OTHERWISE NOTED.
7) FOR CURB TRANSITION SEE SHEET 2-.

REVISIONS

8/17/99

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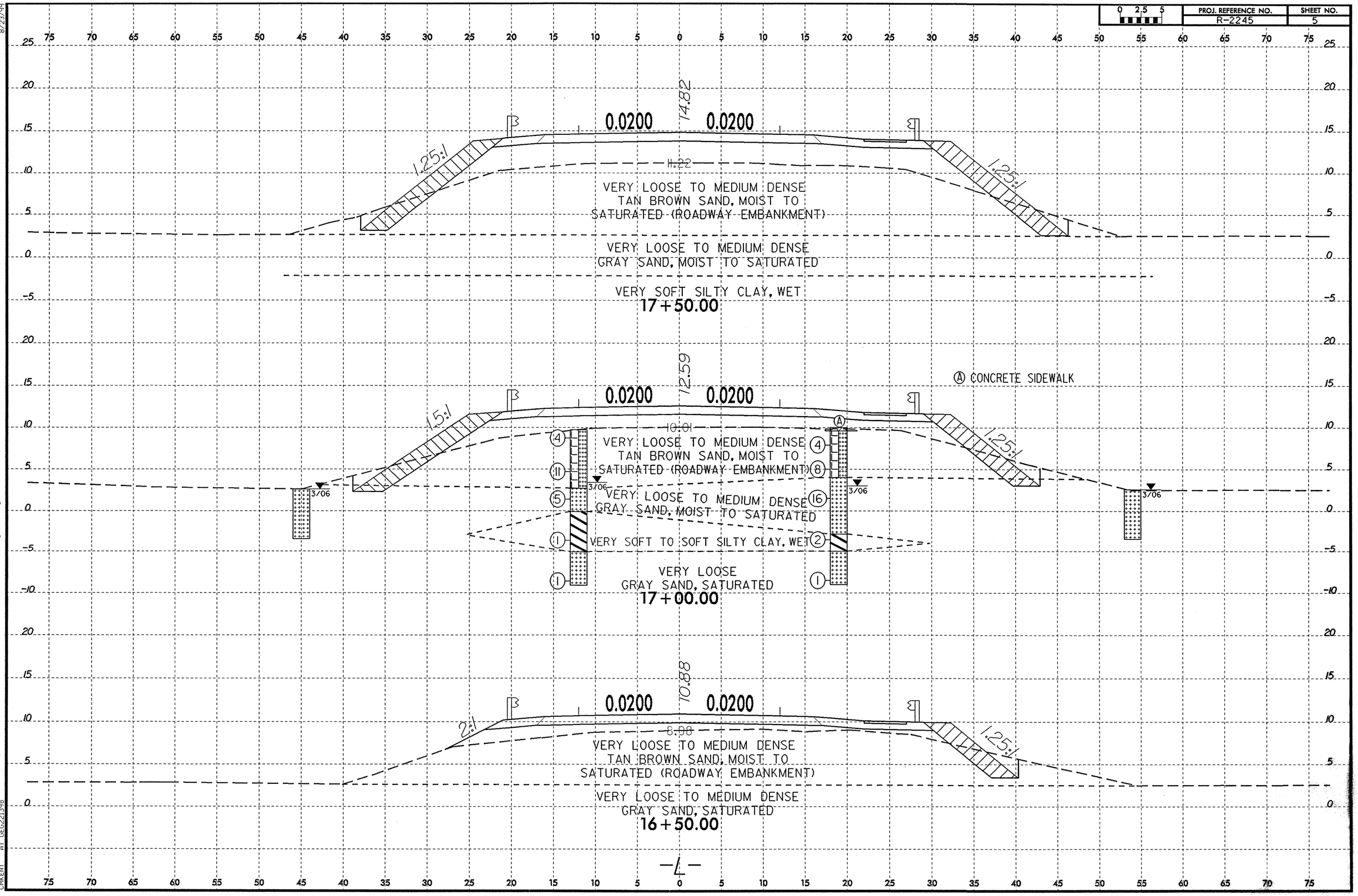

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	R-2245	6

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25 20 15 10 5 0 -5

18.52

0.0200 0.0200

1.25:1

1.25:1

13.56

VERY LOOSE TO MEDIUM DENSE
TAN BROWN SAND, MOIST TO
SATURATED (ROADWAY EMBANKMENT)

VERY LOOSE GRAY SAND,
MOIST TO SATURATED

VERY SOFT SILTY CLAY, WET

3/06 3/06 3/22 3/06

18+50.00

16.93

0.0200 0.0200

1.25:1

1.25:1

12.37

(6) (17) (11) VERY LOOSE TO MEDIUM DENSE
TAN BROWN SAND, MOIST TO
SATURATED (ROADWAY EMBANKMENT) (3) (10) (6)

3/06 3/06 3/06

SOFT SILTY CLAY, WET

(3) VERY LOOSE
GRAY SAND, MOIST TO SATURATED (4)

(WOH) VERY SOFT SILTY CLAY, WET (1)

18+00.00

Ⓐ CONCRETE SIDEWALK

-L-

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0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	7

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

30 25 20 15 10 5 0

0.0200 20.17 0.0200

1.25:1 1.25:1

10.02

VERY LOOSE TO MEDIUM DENSE
TAN BROWN SAND, MOIST TO
SATURATED (ROADWAY EMBANKMENT)

VERY LOOSE TO MEDIUM DENSE
GRAY SAND, SATURATED

19+50.00

0.0200 19.67 0.0200

1.25:1 1.25:1

Ⓐ CONCRETE SIDEWALK

14.83

(4) (25) (14) (7) (3)

(3) (9) (7) (24) (7)

3/06 3/06 3/06 3/06

VERY LOOSE TO MEDIUM DENSE
TAN BROWN SAND, MOIST TO
SATURATED (ROADWAY EMBANKMENT)

VERY LOOSE TO MEDIUM DENSE
GRAY SAND, SATURATED

19+00.00

-5

-4-

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0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-2245	8

70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

30 25 20 15 10 5 0

20.08

0.0200 0.0200

18.18

2:1

2.5:1

LOOSE TO MEDIUM DENSE
TAN BROWN SAND, MOIST TO
SATURATED (ROADWAY EMBANKMENT)

MEDIUM DENSE
GRAY SAND, MOIST TO SATURATED

20+50.00

20.23

0.0200 0.0200

17.31

1.5:1

1.5:1

(5) (5) (21) (16) (26)

3/06

LOOSE TO MEDIUM DENSE
TAN BROWN SAND, MOIST TO
SATURATED (ROADWAY EMBANKMENT)

(A) (7) (5) (10) (18) (15)

3/06

3/06

3/06

(B)

MEDIUM DENSE
GRAY SAND, SATURATED

(A) CONCRETE SIDEWALK
(B) VERY SOFT SILTY CLAY, WET

20+00.00

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