

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	K-3800	1	33
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38748.1.1	NHS-0017(32)	PE	
38748.2.1	NHS-0017(32)	ROW, UTIL	
38748.3.FS1	NHS-0017(32)	CONST	

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	10+00 TO 29+75	5	6-7
-Y1-	10+47 TO 22+45	5	8
-Y2-	10+00 TO 19+62	5	9
-US17-	196+47 TO 203+56	4-5	10

CROSS SECTIONS

CROSS SECTIONS	STATION	SHEET
-L-	10+50 TO 21+50	11-16
-L-	23+00 TO 24+50	17-18
-L-	26+00 TO 29+37	18-21
-Y1-	11+51 TO 22+00	22-26
-Y2-	10+50 TO 16+50	27-30
-Y2-	18+50	30
-US17-	197+00 TO 203+00	31-33

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38748.1.1 (K-3800) F.A. PROJ. NHS-17(32)
COUNTY BEAUFORT
PROJECT DESCRIPTION PROPOSED REST AREA ALONG US 17 WASHINGTON BYPASS

INVENTORY

CAUTION NOTICE

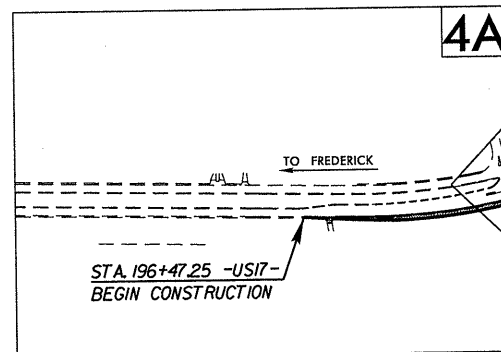
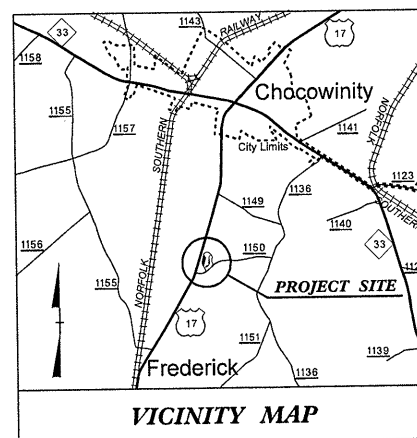
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING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

ID: K-3800

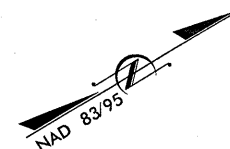
CONTRACT: C203304



STA. 10+00.00 -L-
BEGIN TIP PROJECT K-3800
STA. 10+47.13 -Y1-
BEGIN CONSTRUCTION

STA. 22+45.48 -Y1-
END CONSTRUCTION

STA. 29+75.16 -L-
END TIP PROJECT K-3800

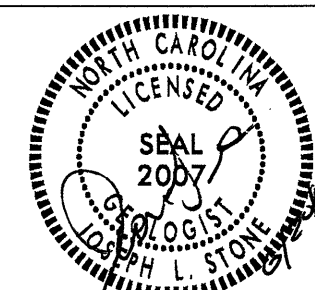


This project contains 1 INFILTRATION BASIN. Refer to it as well as to this Subsurface Investigation.

PERSONNEL

CMW
RES
JME

INVESTIGATED BY J.L. STONE
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE JUNE 2012



DRAWN BY: C.R. SUMNER, J.L. STONE

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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. K-3800	SHEET NO. 2 OF 33
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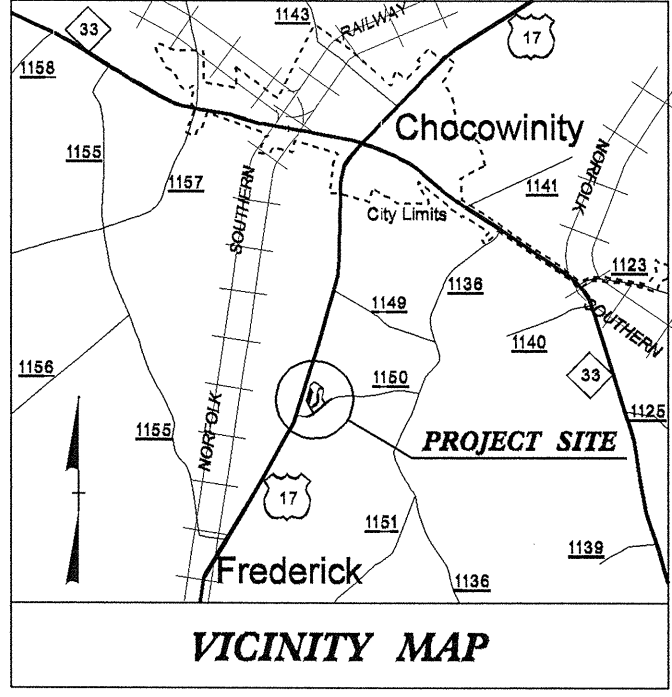
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO T208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE ASHTO 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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		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.		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:		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 DISLOGGED 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 (SCRC) - 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.	
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING			
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)			
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		COMPRESSIONIBILITY SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.			
SYMBOL		ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SILT - CLAY 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			
% PASSING # 10 # 40 # 200		GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		FRESH VERY SLIGHT (V SL.) SLIGHT (SL.) MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE			
LIQUID LIMIT PLASTIC INDEX		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 DIP & DIP DIRECTION OF ROCK STRUCTURES		ROCK HARDNESS VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT			
GROUP INDEX		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		TEST BORING W/ CORE AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD			
USUAL TYPES OF MAJOR MATERIALS		EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B- BK-51 CME-45B CME-550 PORTABLE HOIST		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE * STEEL TEETH TRICONE * TUNG-CARB. CORE BIT		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	
GEN. RATINGS AS A SUBGRADE		EQUIPMENT USED ON SUBJECT PROJECT (CONT.) HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		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		BENCH MARK: ELEVATION: FT. NOTES:	
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GRV.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)		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.			
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		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.			

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TIP PROJECT: K-3800

CONTRACT:

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



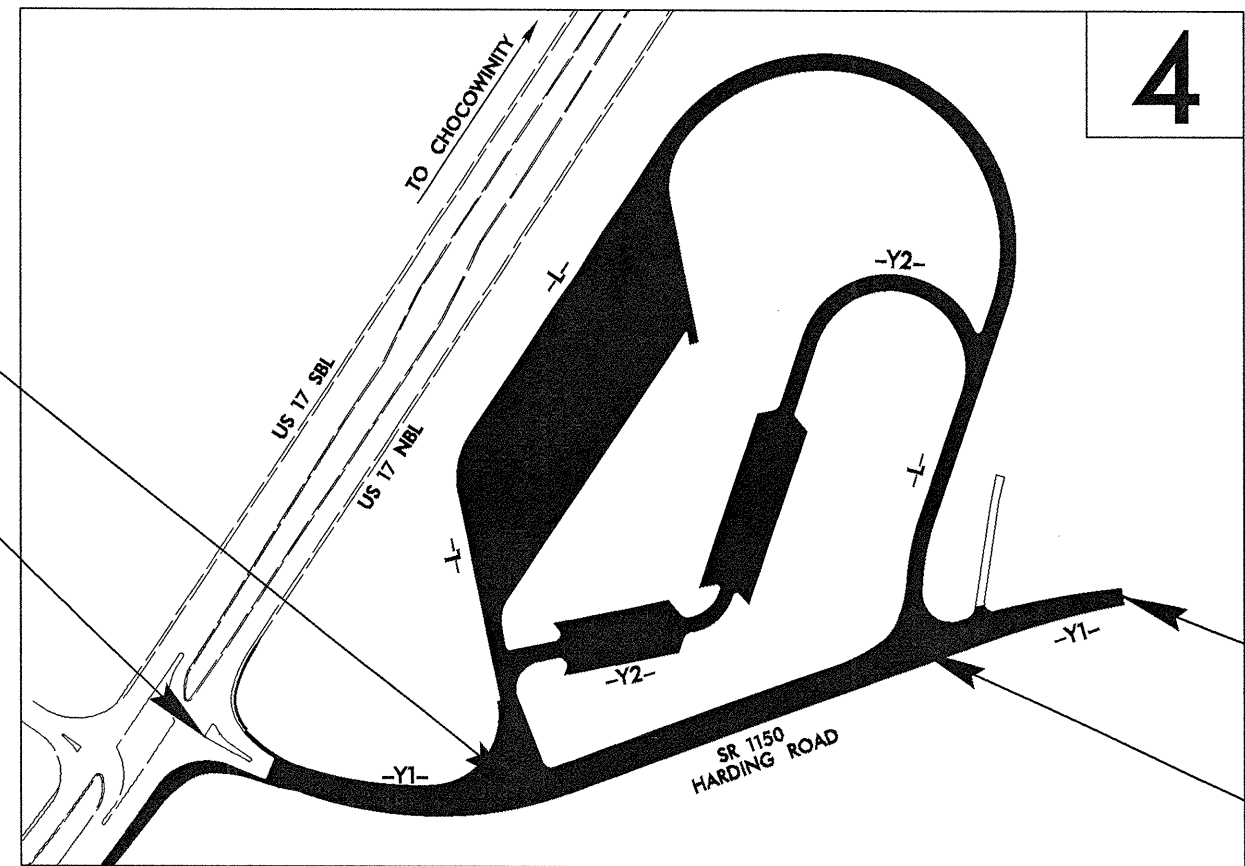
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BEAUFORT COUNTY

LOCATION: US 17 REST AREA

TYPE OF WORK: GRADING, PAVING, DRAINAGE, LIGHTING, REST AREA AND FACILITIES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	K-3800	2A	33
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
38748.1.1	NHS-17(32)	PE	



STA. 10+00.00 -L-
BEGIN TIP PROJECT K-3800

STA. 10+47.13 -Y1-
BEGIN CONSTRUCTION

STA. 22+45.48 -Y1-
END CONSTRUCTION

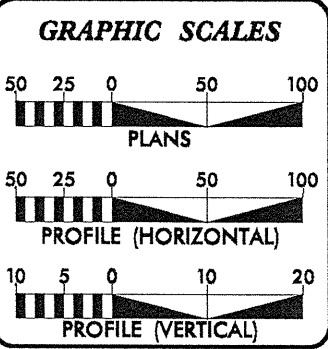
STA. 29+75.16 -L-
END TIP PROJECT K-3800

THIS IS A PARTIAL CONTROL OF ACCESS PROJECT WITH ACCESS BEING LIMITED TO THE POINTS AS SHOWN ON THE PLANS.

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

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

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



DESIGN DATA

ADT 2011	=	107
ADT 2031	=	169
DHV	=	15 %
D	=	N/A %
T	=	6 %
V	=	20 MPH

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT K-3800	=	0.374 MILES
TOTAL LENGTH TIP PROJECT K-3800	=	0.374 MILES

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 20, 2009

LETTING DATE:
AUGUST 20, 2013

BRENDA MOORE, P.E.
PROJECT ENGINEER

THAD F. DUNCAN, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.

SIGNATURE: _____

ROADWAY DESIGN ENGINEER

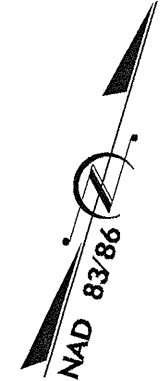
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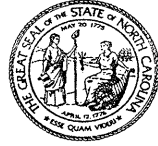
SIGNATURE: _____

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER

P.E.





STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

June 21, 2012

STATE PROJECT: 38748.1.1 (K-3800)
F.A. PROJECT: NHS-17(32)
COUNTY: Beaufort
DESCRIPTION: Proposed Rest Area along US 17 Washington Bypass
SUBJECT: Geotechnical Report – Inventory

Project Description

The proposed project area is located in Beaufort County, approximately 2 miles south of Chocowinity at the intersection of US 17 and SR 1150 (Harding Road). This geotechnical investigation was confined to areas of proposed construction

Fieldwork for this project was conducted in July 2009. Standard Penetration Test borings and solid stem auger borings were advanced with a CME 45-B drill machine with a automatic hammer. Hand auger borings were also completed. Representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

The following alignments, totaling 0.37 miles were investigated. Subsurface profiles and selected cross sections of these alignments are included in this report.

<u>Line</u>	<u>Station(±)</u>
-L-	10+00 to 29+75
-Y1-	10+47 to 22+45
-Y2-	10+00 to 19+62
-US17-	196+47 to 203+56

Areas of Special Geotechnical Interest

- 1) The entire project area contains cohesive soils which have the potential to cause embankment stability and/or long term settlement problems.
- 2) The following section was found to exhibit seasonal high ground water:

<u>Line</u>	<u>Station (±)</u>
-L-	21+00 to 23+50

Physiography and Geology

The project is located in the Coastal Plain Physiographic Province. Topography along the project is flat to gradually sloping. Natural ground elevations range from 34± feet above sea level to 44± feet above sea level.

Surficial soils in this area have been classified and undivided coastal plain sediments.

Ground Water

Ground water data was collected during July 2009, during which period the area experienced normal precipitation conditions. Ground water elevations were found to be from 27± feet above sea level to 39± feet above sea level.

Soils

Soils encountered during this investigation are separated into 2 categories: roadway embankment soils, and undivided coastal plain soils.

Undivided coastal plain soils consist of 2± feet to 6± feet of soft to medium stiff sandy silt clayey sandy silt and sandy clayey silt (A-4) with 3± feet to 11± feet of soft to very stiff sandy clay (A-6, A-7-6). These cohesive units are typically underlain by loose sand and clayey sand (A-2-4). Samples collected within the cohesive soils returned moisture contents ranging from 21% to 25% percent.

Roadway embankment soils are comprised of 2.0± feet of loose tan sand (A-2-4).

Prepared By,

Joseph L. Stone, L.G.
Project Geological Engineer

PROJECT: K-3800

COUNTY: Beaufort

Volumes in Cubic Yards

DATE: 6/18/2013

COMPILED BY: AJFOSTER

SHEET 1 OF 1 SHEETS

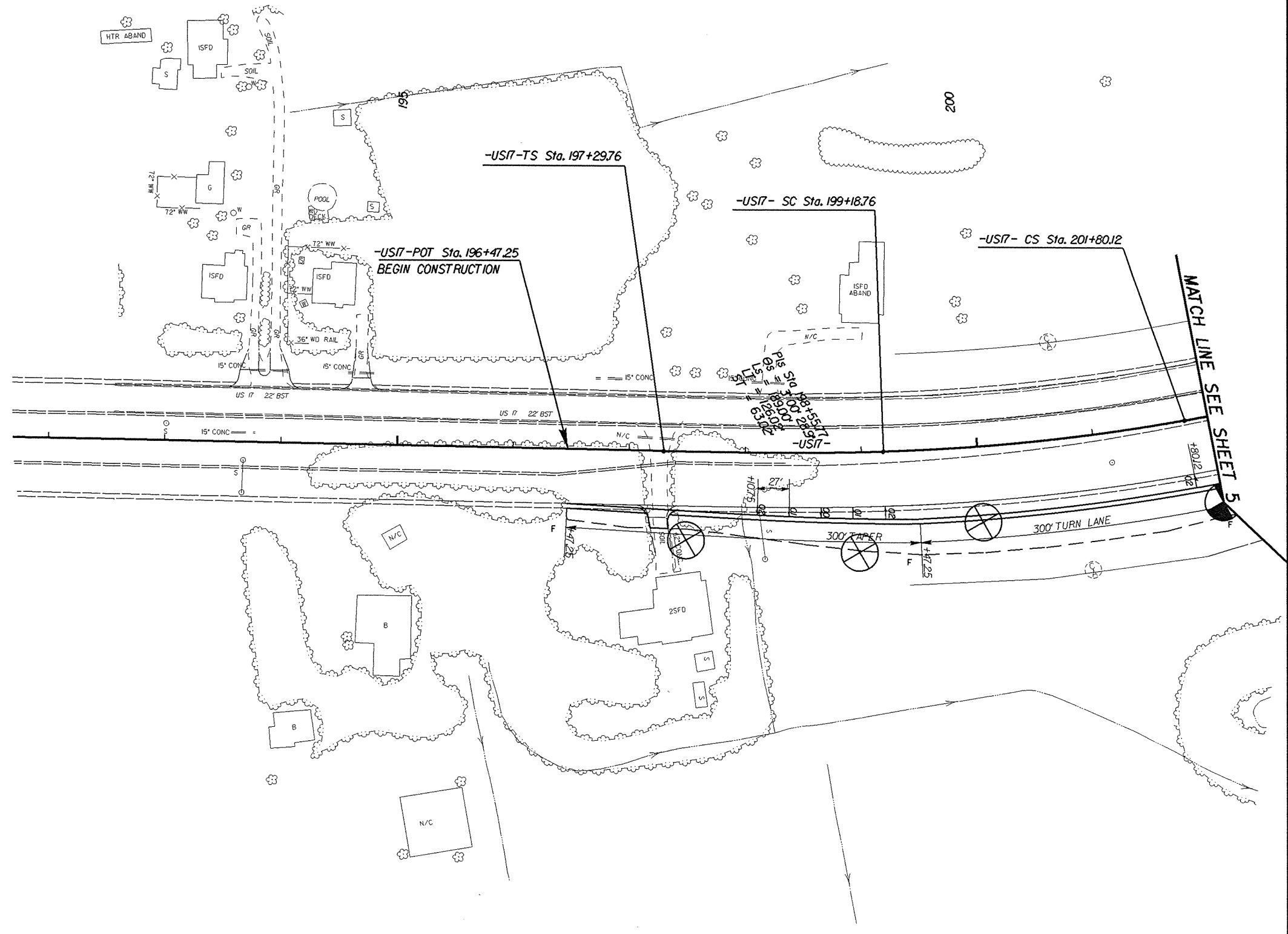
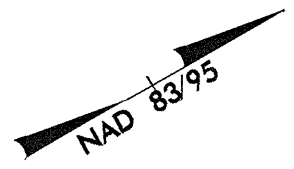
STATION	STATION	EXCAVATION				EMBANKMENT				BORROW	WASTE				
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH		EMBANK. +30%	ROCK	SUITABLE	UNSUIT.	TOTAL
-L- 10+18.02	-L- 29+56.53	605		5,929	133	472	25,274		25,274	32,856	32,384			6,062	6,062
	SUBTOTAL	605		5,929	133	472	25,274		25,274	32,856	32,384			6,062	6,062
-Y1- 10+47.13	-Y1- 22+45.48	2,726		1,772	1,539	1,187	2,957		2,957	3,844	2,657			3,311	3,311
	SUBTOTAL	2,726		1,772	1,539	1,187	2,957		2,957	3,844	2,657			3,311	3,311
-Y2-10+14.00	-Y2-19+06.72	29		2,687	29		6,982		6,982	9,077	9,077			2,716	2,716
	SUBTOTAL	29		2,687	29		6,982		6,982	9,077	9,077			2,716	2,716
-US17- 196+47.25	-US17- 202+47.25	347		799	347		1,100		1,100	1,430	1,430			1,146	1,146
	SUBTOTAL	347		799	347		1,100		1,100	1,430	1,430			1,146	1,146
TOTAL		3,707		11,187	2,048	1,659	36,313		36,313	47,207	45,548			13,235	13,235
MATERIAL FOR SHOULDER CONSTRUCTION							900		900	1,170	1,170				
BORROW FOR BUILDING AREA							6,100		6,100	7,930	7,930				
ADDITIONAL UNDERCUT				2,200										2,200	2,200
SELECT GRANULAR MATERIAL IN LIEU OF BORROW										-27,700	-27,700			200	200
ADDITIONAL UNSUITABLE		200			200										
PROJECT TOTAL		3,907		13,387	2,248	1,659	43,313		43,313	28,607	26,948			15,635	15,635
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT											1,347				
GRAND TOTAL		3,907		13,387	2,248	1,659	43,313		43,313	28,607	28,295			15,635	15,635
SAY		4,000		14,315							28,400				
DDE = 1846 CUBIC YARDS															

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

PROJECT REFERENCE NO. K-3800	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-US17-

PIs Sta 198+55.77	PI Sta 200+49.67
$\theta_s = 3^\circ 00' 28.9"$	$\Delta = 8' 19' 10.0"$ (LT)
$L_s = 189.00'$	$D = 3' 10' 59.2"$
$LT = 126.02'$	$L = 261.36'$
$ST = 63.02'$	$T = 130.91'$
	$R = 1,800.00'$
	SE= SEE PLANS

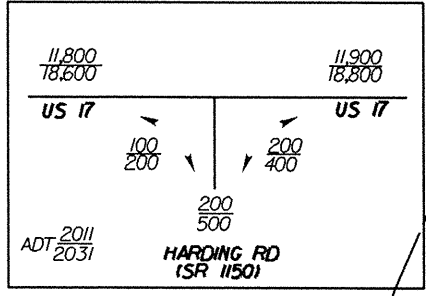
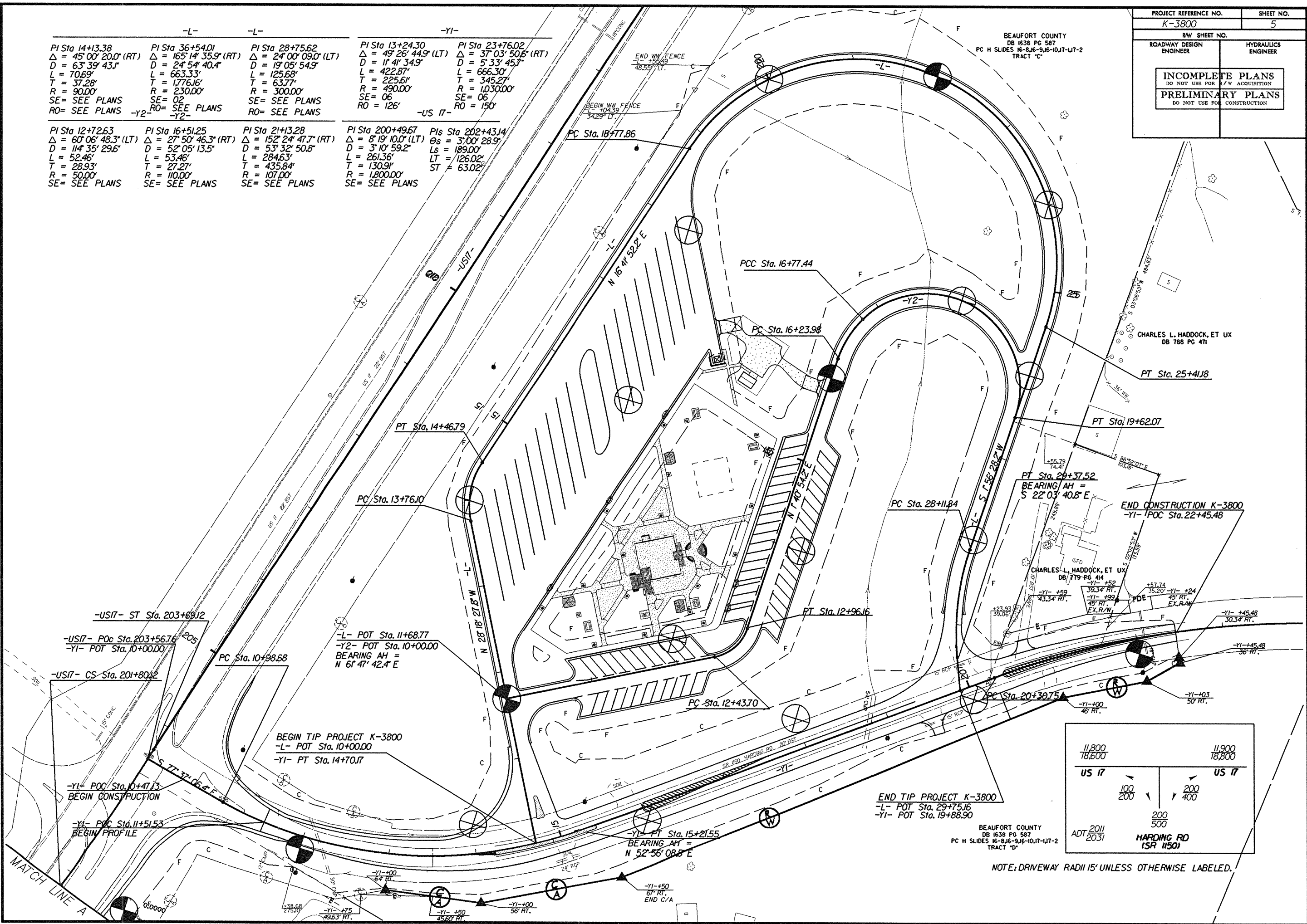


MATCH LINE SEE SHEET 5

PROJECT REFERENCE NO. K-3800	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR S/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

<p>-L-</p> <p>PI Sta 14+13.38 Δ = 45° 00' 20.0" (RT) D = 63° 39' 43.1" L = 70.69' T = 37.28' R = 90.00' SE = SEE PLANS RO = SEE PLANS</p>	<p>-L-</p> <p>PI Sta 36+54.01 Δ = 165° 14' 35.9" (RT) D = 24° 54' 40.4" L = 663.33' T = 1776.16' R = 230.00' SE = 02 RO = SEE PLANS</p>	<p>-L-</p> <p>PI Sta 28+75.62 Δ = 24° 00' 09.0" (LT) D = 19° 05' 54.9" L = 125.68' T = 63.77' R = 300.00' SE = SEE PLANS RO = SEE PLANS</p>	<p>-Y1-</p> <p>PI Sta 13+24.30 Δ = 49° 26' 44.9" (LT) D = 11° 41' 34.9" L = 422.87' T = 225.61' R = 490.00' SE = 06 RO = 126'</p>	<p>-Y1-</p> <p>PI Sta 23+76.02 Δ = 37° 03' 50.6" (RT) D = 5° 33' 45.7" L = 666.30' T = 345.27' R = 1030.00' SE = 06 RO = 150'</p>
<p>-L-</p> <p>PI Sta 12+72.63 Δ = 60° 06' 48.3" (LT) D = 114° 35' 29.6" L = 52.46' T = 28.93' R = 50.00' SE = SEE PLANS</p>	<p>-L-</p> <p>PI Sta 16+51.25 Δ = 27° 50' 46.3" (RT) D = 52° 05' 13.5" L = 53.46' T = 27.27' R = 110.00' SE = SEE PLANS</p>	<p>-L-</p> <p>PI Sta 21+13.28 Δ = 152° 24' 47.7" (RT) D = 53° 32' 50.8" L = 284.63' T = 435.84' R = 107.00' SE = SEE PLANS</p>	<p>-Y1-</p> <p>PI Sta 200+49.67 Δ = 8° 19' 10.0" (LT) D = 3° 10' 59.2" L = 261.36' T = 130.91' R = 1800.00' SE = SEE PLANS</p>	<p>-US 17-</p> <p>PIs Sta 202+43.14 Δs = 3° 00' 28.9" Ls = 189.00' LT = 126.02' ST = 63.02'</p>

BEAUFORT COUNTY
DB 1638 PG 587
PC H SLIDES 16-8J6-9J6-10J7-U7-2
TRACT "C"



NOTE: DRIVEWAY RADII 15' UNLESS OTHERWISE LABELED.

BEAUFORT COUNTY
DB 1638 PG 587
PC H SLIDES 16-8J6-9J6-10J7-U7-2
TRACT "D"

END TIP PROJECT K-3800
-L- POT Sta. 29+75.16
-Y1- POT Sta. 19+88.90

-L- POT Sta. 11+68.77
-Y2- POT Sta. 10+00.00
BEARING AH =
N 61° 47' 42.4" E

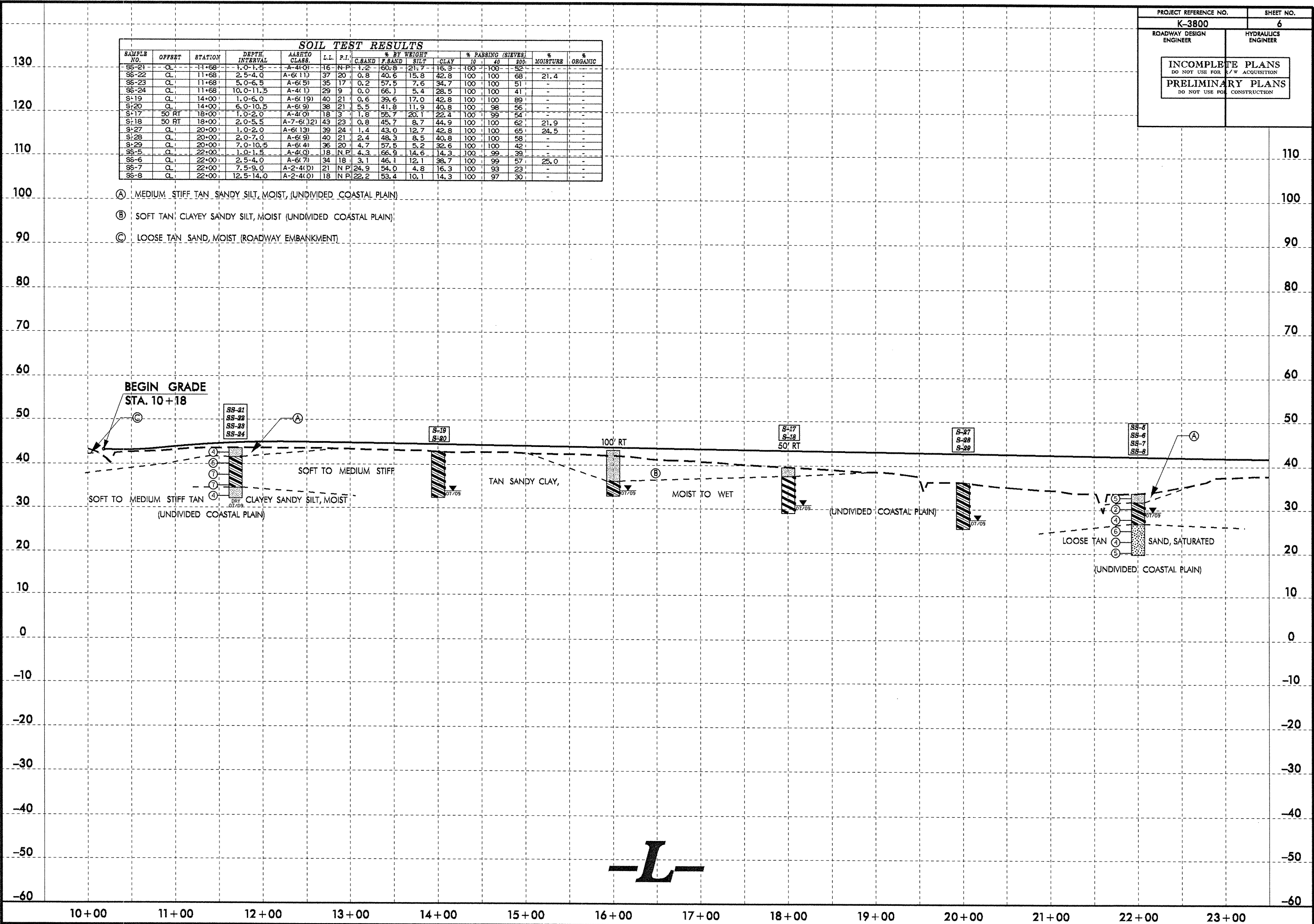
-Y1- POC Sta. 10+47.13
BEGIN CONSTRUCTION

-Y1- POC Sta. 11+51.53
BEGIN PROFILE

MATCH LINE A

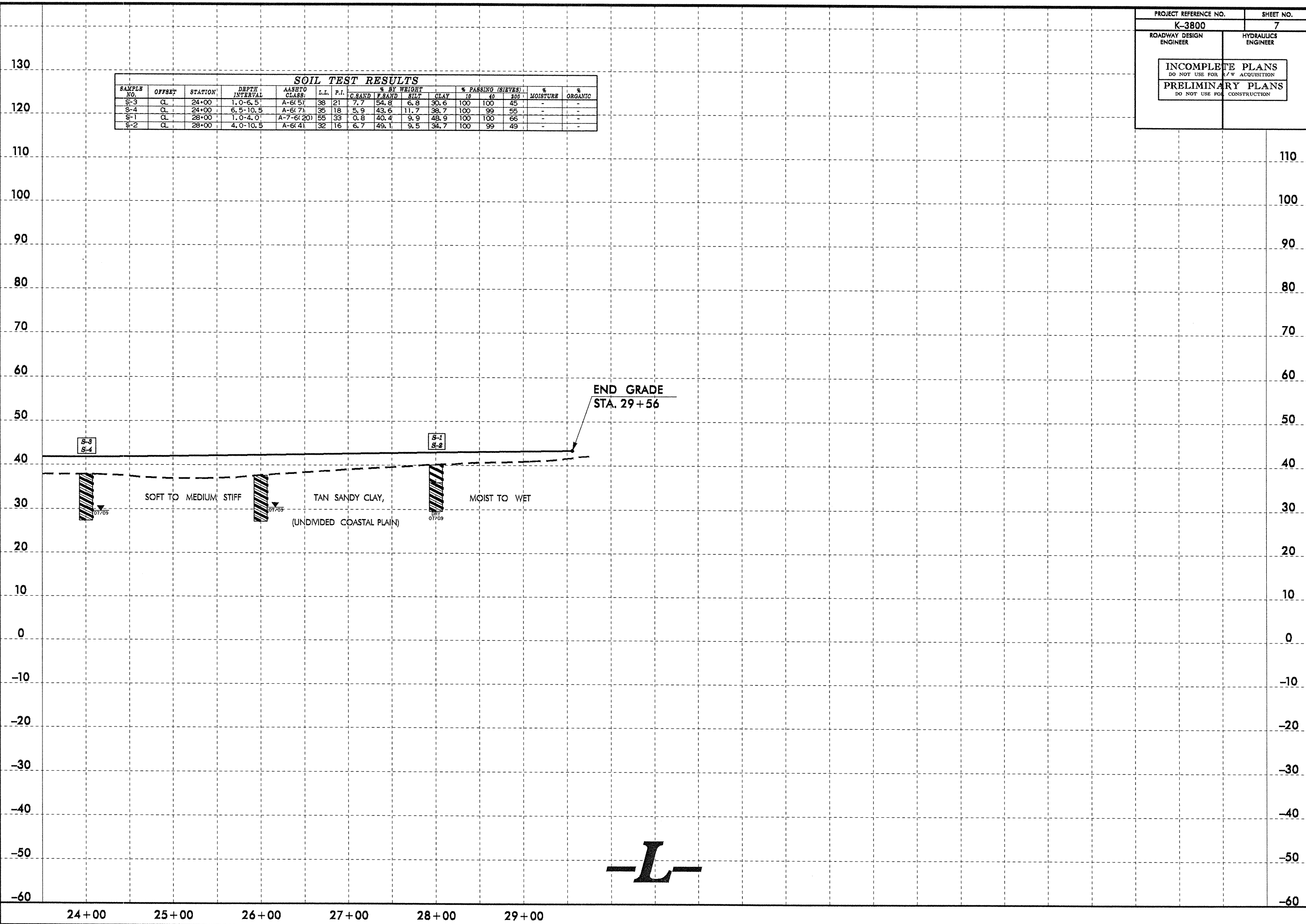
SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40		
SS-21	CL	11+68	1.0-1.5	A-4(0)	16	N.P.	1.2	60.8	21.7	16.3	100	100	52	-
SS-22	CL	11+68	2.5-4.0	A-6(11)	37	20	0.8	40.6	15.8	42.8	100	100	68	21.4
SS-23	CL	11+68	5.0-6.5	A-6(5)	35	17	0.2	57.5	7.6	34.7	100	100	51	-
SS-24	CL	11+68	10.0-11.5	A-6(1)	29	9	0.0	66.1	5.4	28.5	100	100	41	-
S-19	CL	14+00	1.0-6.0	A-6(19)	40	21	0.6	39.6	17.0	42.8	100	100	89	-
S-20	CL	14+00	6.0-10.5	A-6(9)	38	21	5.5	41.8	11.9	40.8	100	98	56	-
S-17	SO RT	18+00	1.0-2.0	A-4(0)	18	3	1.8	55.7	20.1	22.4	100	99	54	-
S-18	SO RT	18+00	2.0-5.5	A-7-6(12)	43	23	0.8	45.7	8.7	44.9	100	100	62	21.9
S-27	CL	20+00	1.0-2.0	A-6(13)	39	24	1.4	43.0	12.7	42.8	100	100	65	24.5
S-28	CL	20+00	2.0-7.0	A-6(9)	40	21	2.4	48.3	8.5	40.8	100	100	58	-
S-29	CL	20+00	7.0-10.5	A-6(4)	36	20	4.7	57.5	5.2	32.6	100	100	42	-
SS-5	CL	22+00	1.0-1.5	A-4(0)	18	N.P.	4.3	66.9	14.6	14.3	100	99	39	-
SS-6	CL	22+00	2.5-4.0	A-6(7)	34	18	3.1	46.1	12.1	38.7	100	99	57	25.0
SS-7	CL	22+00	7.5-9.0	A-2-4(0)	21	N.P.	24.9	54.0	4.8	16.3	100	93	23	-
SS-8	CL	22+00	12.5-14.0	A-2-4(0)	18	N.P.	22.2	53.4	10.1	14.3	100	97	30	-

- (A) MEDIUM STIFF TAN SANDY SILT, MOIST, (UNDIVIDED COASTAL PLAIN)
- (B) SOFT TAN, CLAYEY SANDY SILT, MOIST (UNDIVIDED COASTAL PLAIN)
- (C) LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)



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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-3	CL	24+00	1.0-6.5'	A-6(5)	38	21	7.7	54.8	6.8	30.6	100	100	45	-	-
S-4	CL	24+00	6.5-10.5'	A-6(7)	35	18	5.9	43.6	11.7	38.7	100	99	55	-	-
S-1	CL	28+00	1.0-4.0'	A-7-6(20)	55	33	0.8	40.4	9.9	48.9	100	100	66	-	-
S-2	CL	28+00	4.0-10.5'	A-6(4)	32	16	6.7	49.1	9.5	34.7	100	99	49	-	-



-L-

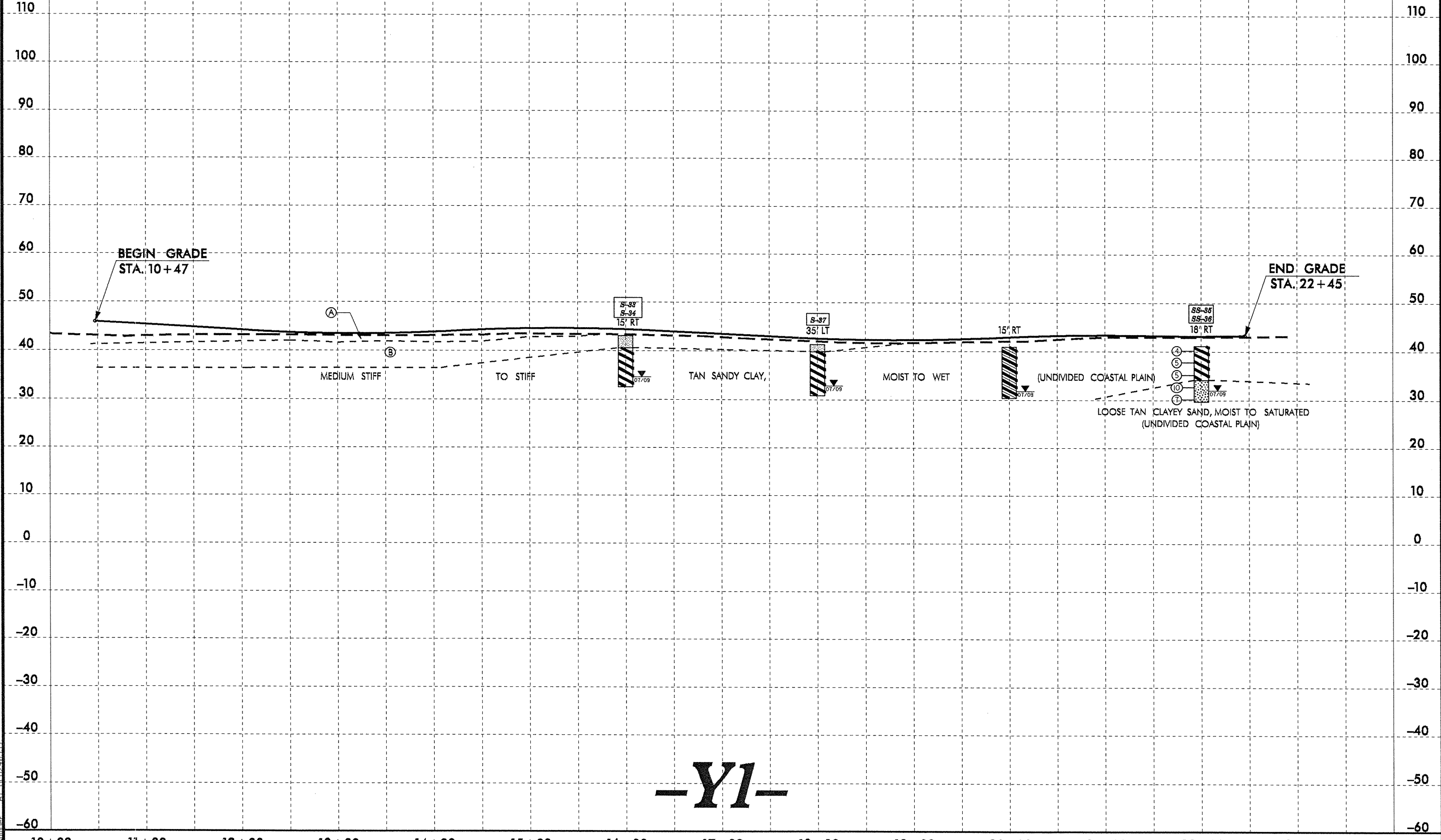
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PROJECT REFERENCE NO.		SHEET NO.	
K-3800		8	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION		PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	ASTRO CLASS	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)		% MOISTURE	% ORGANIC
							G.BAND	F.BAND	SILT	CLAY	#20	#100		
S-33	15 RT	16+00	1.0-2.5	A-4(0)	19	4	18.8	42.8	16.0	22.4	96	86	45	-
S-34	15 RT	16+00	2.5-10.5	A-7-G(22)	52	34	3.1	35.7	12.3	48.9	99	97	69	-
S-37	35 LT	18+00	1.5-10.5	A-7-G(31)	64	41	0.8	33.4	10.4	55.4	100	100	74	-
SS-35	18 RT	22+00	1.0-1.5	A-7-G(20)	48	27	0.4	34.7	16.0	48.9	100	100	75	-
SS-36	18 RT	22+00	7.5-9.0	A-2-H(0)	29	8	6.3	65.6	1.5	26.5	100	100	30	-

- (A) LOOSE TAN SAND, MOIST (ROADWAY EMBANKMENT)
- (B) MEDIUM STIFF TO VERY STIFF TAN CLAYEY SANDY AND SANDY CLAYEY SILT, MOIST (UNDIVIDED COASTAL PLAIN)

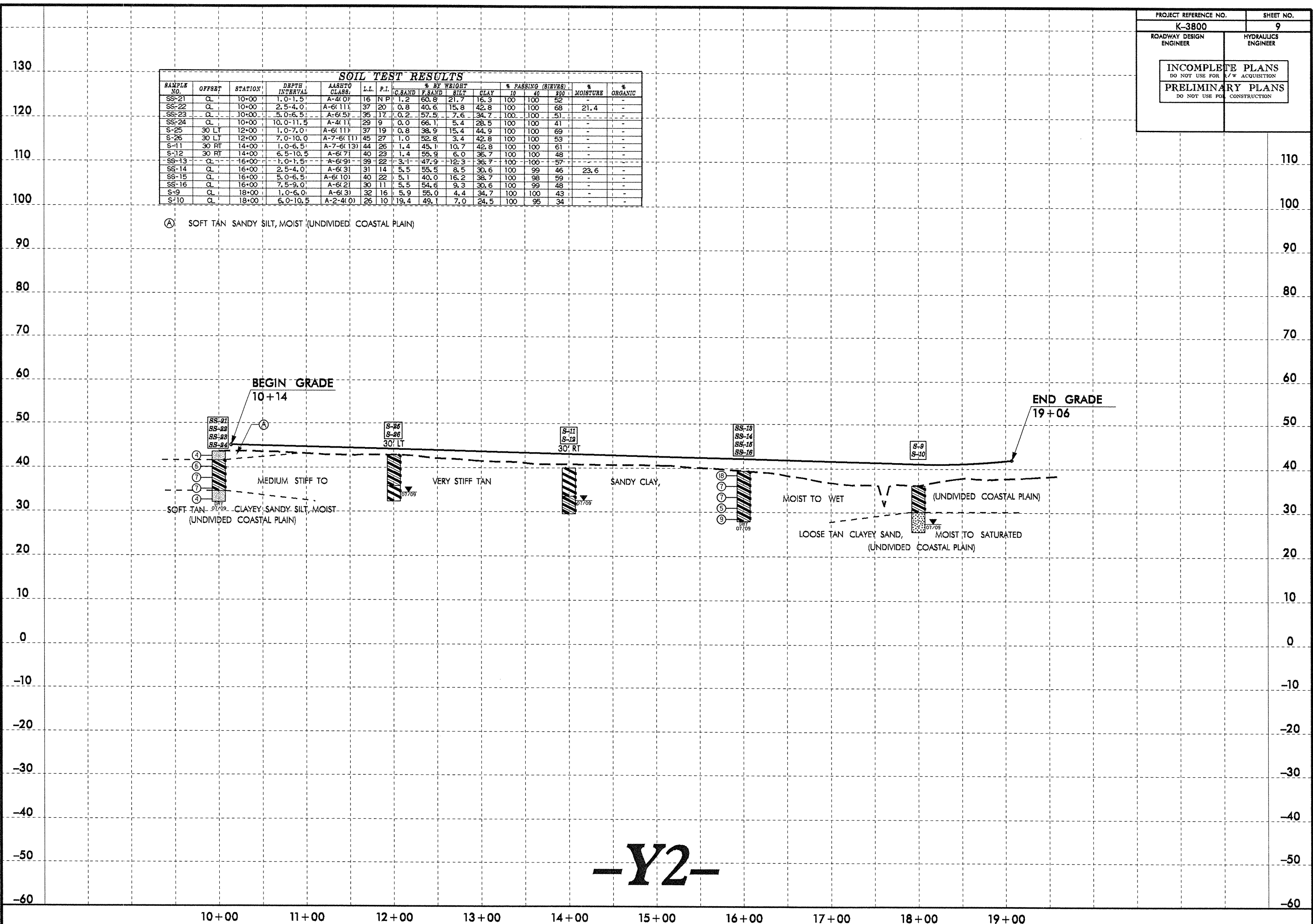


-Y1-

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SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIZES)			% MOISTURE	% ORGANIC
							G. SAND	F. SAND	SILT	#10	#40	#200		
SS-21	CL	10+00	1.0-1.5	A-4(0)	16	NP	1.2	60.8	21.7	16.3	100	100	52	-
SS-22	CL	10+00	2.5-4.0	A-6(11)	37	20	0.8	40.6	15.8	42.8	100	100	68	21.4
SS-23	CL	10+00	5.0-6.5	A-6(5)	36	17	0.2	57.5	7.6	34.7	100	100	51	-
SS-24	CL	10+00	10.0-11.5	A-4(1)	29	9	0.0	66.1	5.4	28.5	100	100	41	-
S-25	30 LT	12+00	1.0-7.0	A-6(11)	37	19	0.8	38.9	15.4	44.9	100	100	69	-
S-26	30 LT	12+00	7.0-10.0	A-7-6(11)	45	27	1.0	52.8	3.4	42.8	100	100	53	-
S-11	30 RT	14+00	1.0-6.5	A-7-6(13)	44	26	1.4	45.1	10.7	42.8	100	100	61	-
S-12	30 RT	14+00	6.5-10.5	A-6(7)	40	23	1.4	55.9	6.0	38.7	100	100	48	-
SS-13	CL	16+00	1.0-1.5	A-6(9)	39	22	3.1	47.9	12.3	36.7	100	100	57	-
SS-14	CL	16+00	2.5-4.0	A-6(3)	31	14	5.5	55.5	8.5	30.6	100	99	46	23.6
SS-15	CL	16+00	5.0-6.5	A-6(10)	40	22	5.1	40.0	16.2	38.7	100	98	59	-
SS-16	CL	16+00	7.5-9.0	A-6(2)	30	11	5.5	54.6	9.3	30.6	100	99	48	-
S-9	CL	18+00	1.0-6.0	A-6(3)	32	16	5.9	55.0	4.4	34.7	100	100	43	-
S-10	CL	18+00	6.0-10.5	A-2-4(0)	26	10	19.4	49.1	7.0	24.5	100	95	34	-

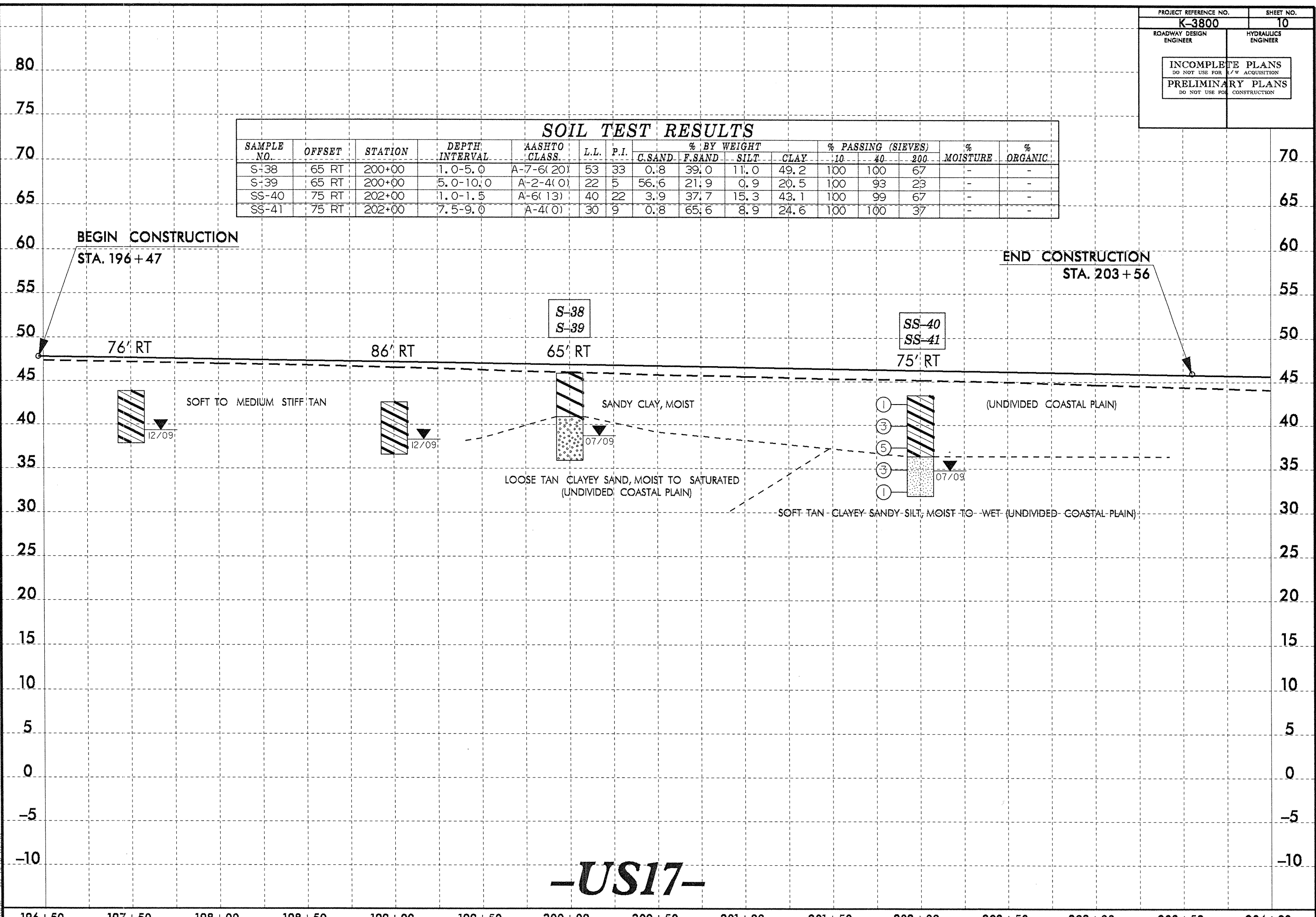
(A) SOFT TAN SANDY SILT, MOIST (UNDIVIDED COASTAL PLAIN)



-Y2-

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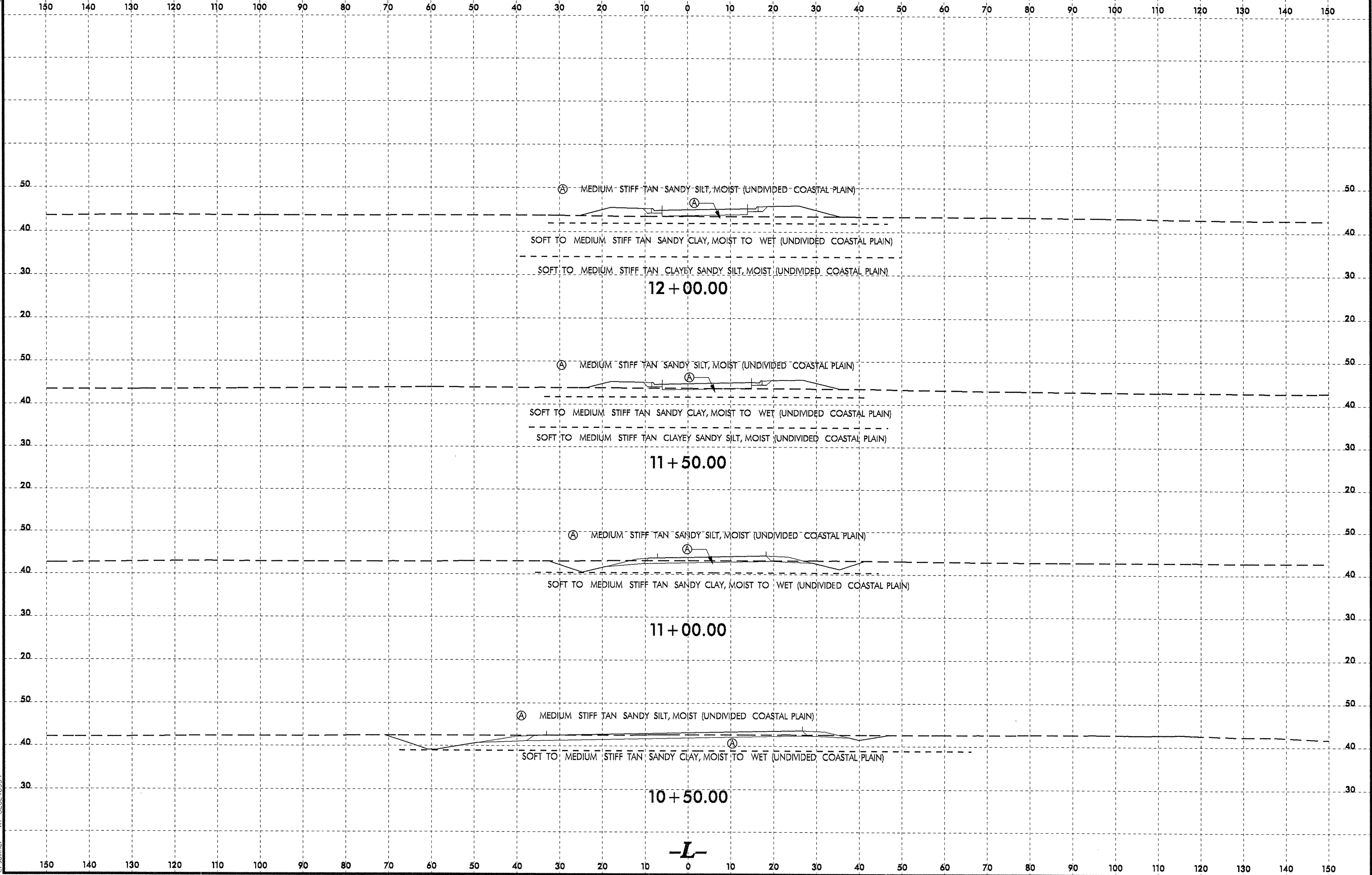
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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-38	65 RT	200+00	1.0-5.0	A-7-6(20)	53	33	0.8	39.0	11.0	49.2	100	100	67	-	-
S-39	65 RT	200+00	5.0-10.0	A-2-4(0)	22	5	56.6	21.9	0.9	20.5	100	93	23	-	-
SS-40	75 RT	202+00	1.0-1.5	A-6(13)	40	22	3.9	37.7	15.3	43.1	100	99	67	-	-
SS-41	75 RT	202+00	7.5-9.0	A-4(0)	30	9	0.8	65.6	8.9	24.6	100	100	37	-	-



-US17-

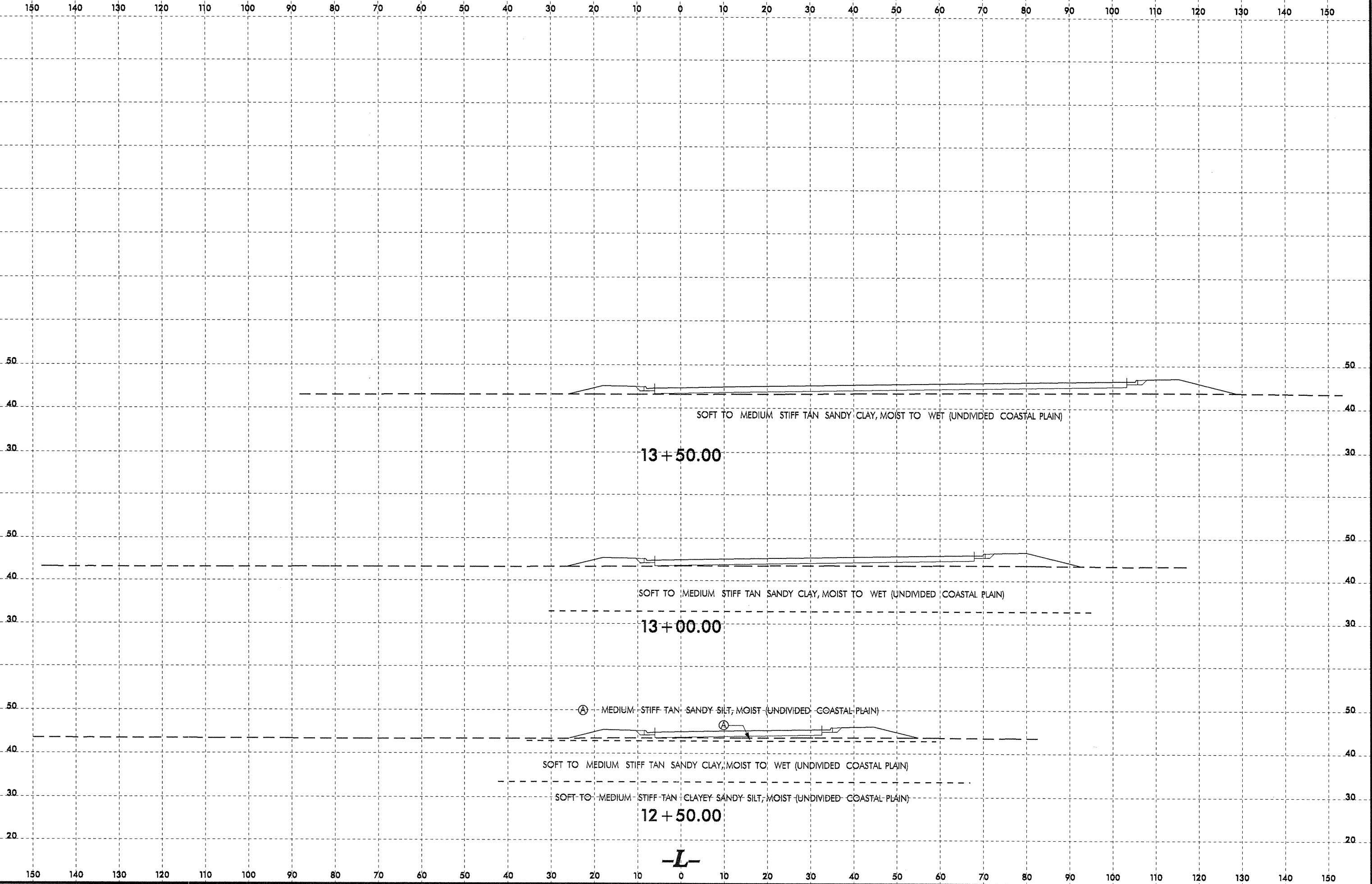
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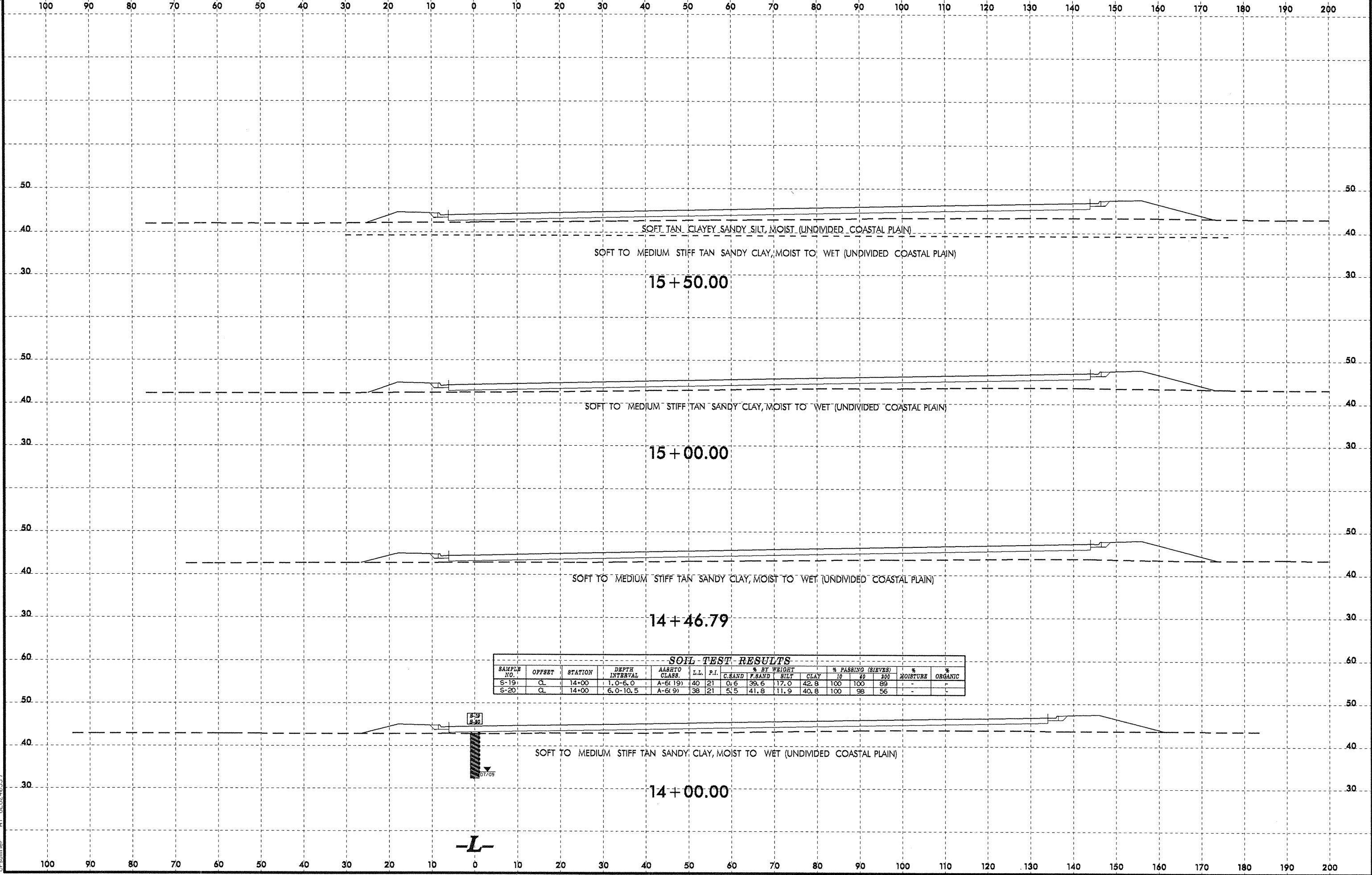
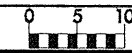
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8/23/09



SOFT TAN CLAYEY SANDY SILT, MOIST (UNDIVIDED COASTAL PLAIN)
 SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

15 + 50.00

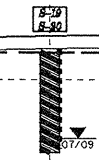
SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

15 + 00.00

SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

14 + 46.79

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-19	CL	14+00	1.0'-6.0'	A-(6-19)	40	21	0.6	39.6	17.0	42.8	100	100	89	-	-
S-20	CL	14+00	6.0'-10.5'	A-(6-9)	38	21	5.5	41.8	11.9	40.8	100	98	56	-	-



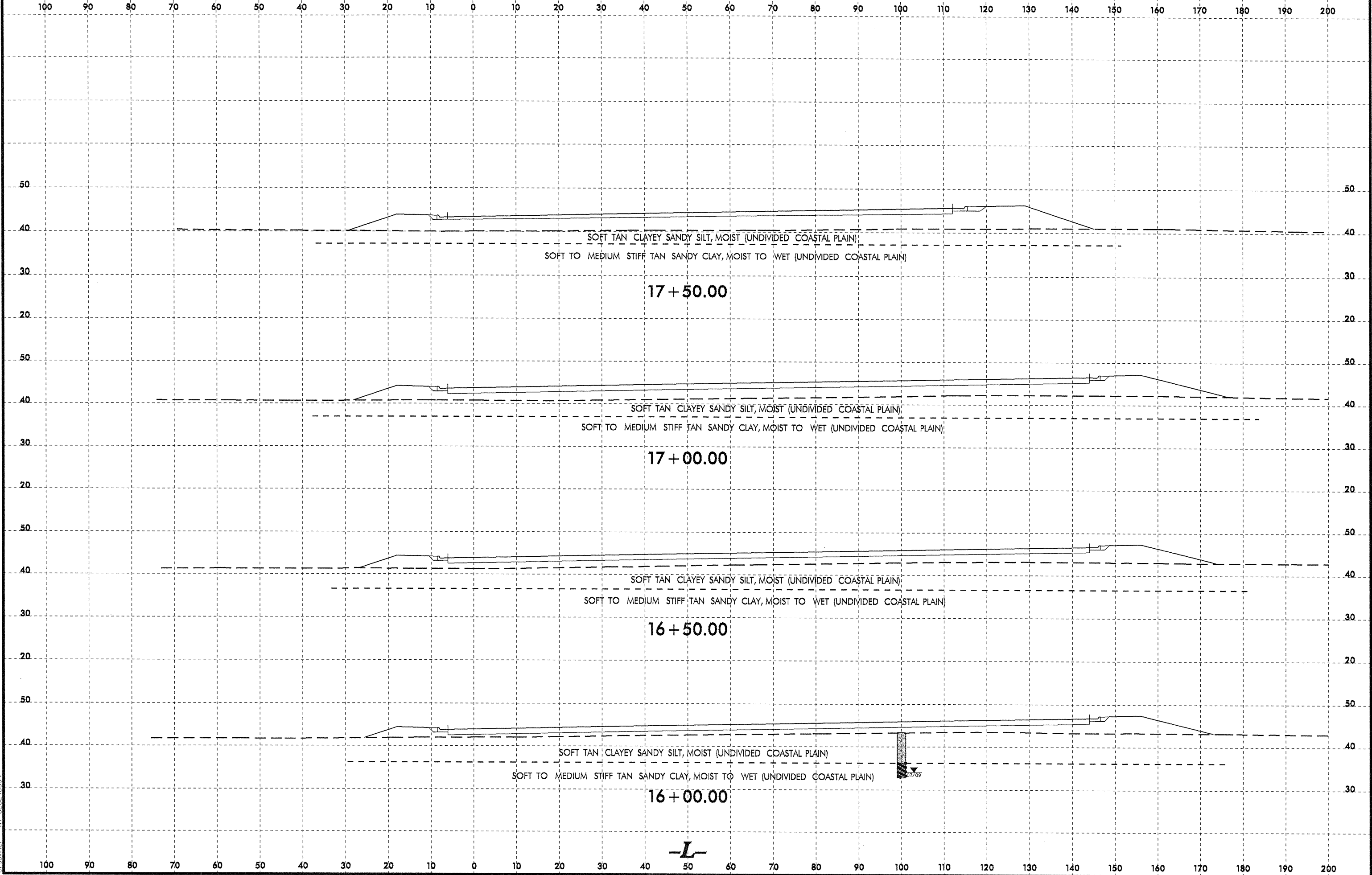
SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

14 + 00.00

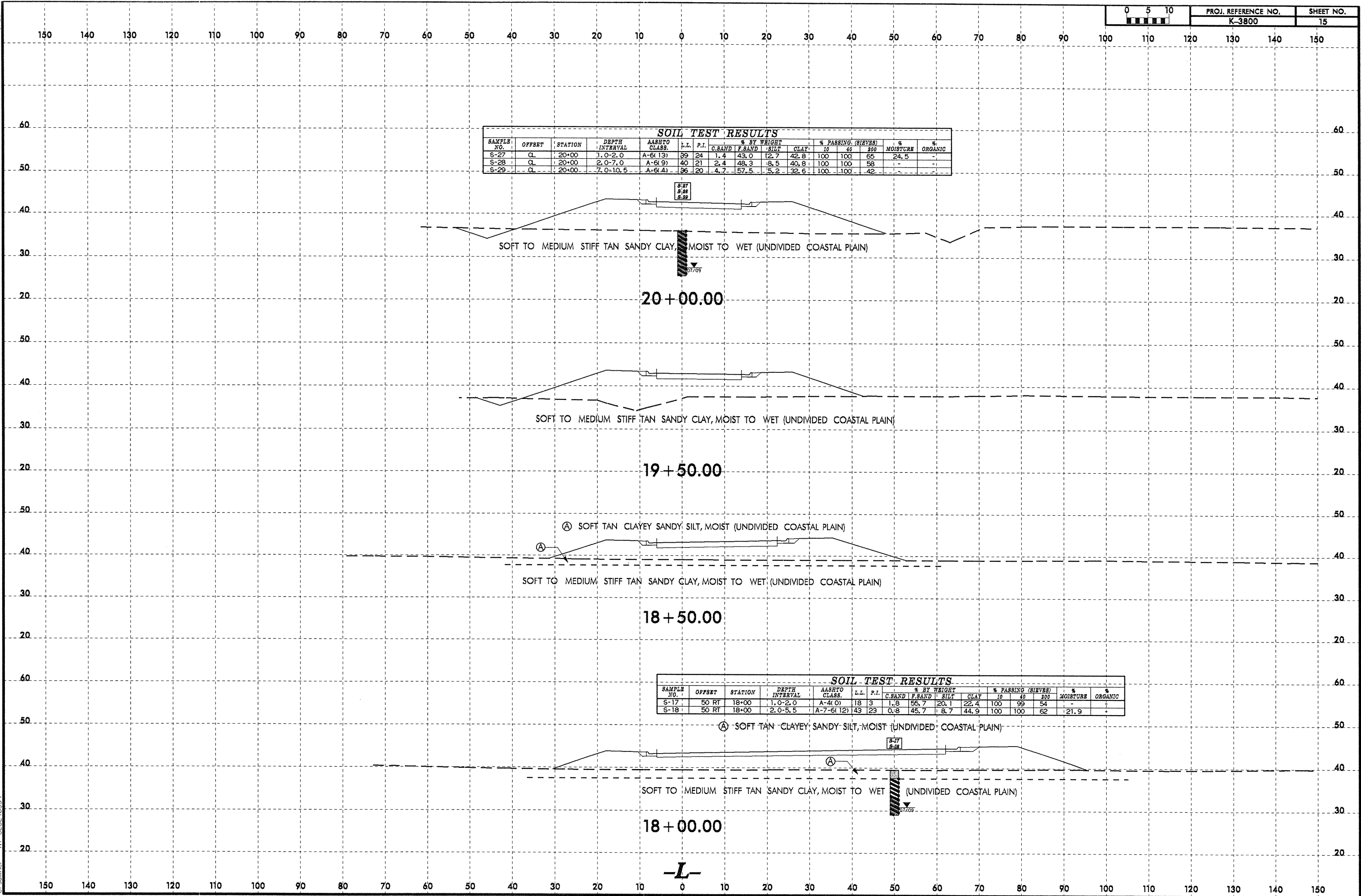
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SOIL TEST RESULTS

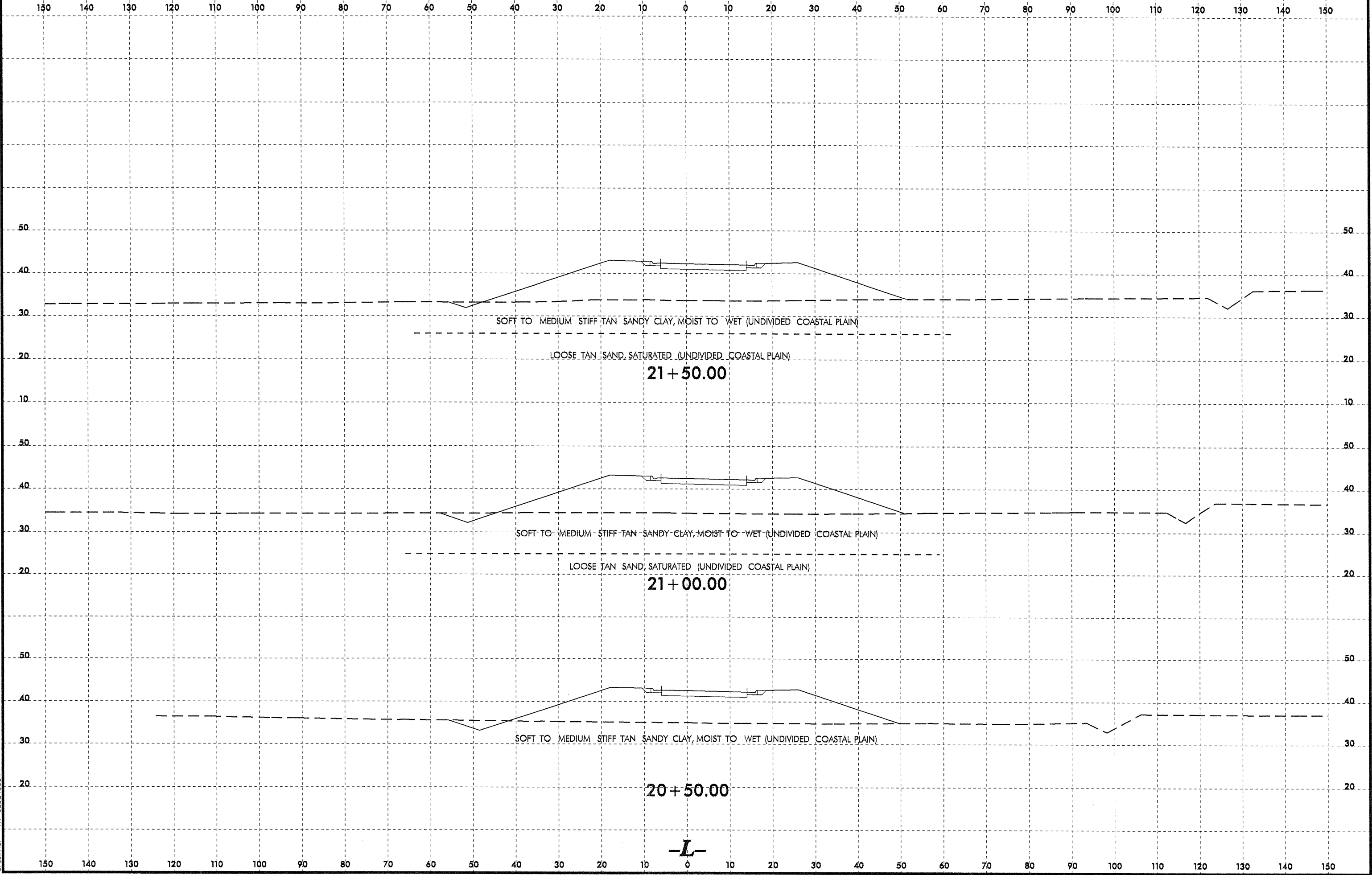
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C.SAND	F.SAND	SILT	10	40	200			
S-27	CL	20+00	1.0-2.0	A-6(13)	99	24	1.4	43.0	12.7	42.8	100	100	65	24.5	-
S-28	CL	20+00	2.0-7.0	A-6(9)	40	21	2.4	48.3	8.5	40.8	100	100	58	-	-
S-29	CL	20+00	7.0-10.5	A-6(4)	96	20	4.7	57.5	5.2	32.6	100	100	42	-	-

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	10	40	200			
S-17	50 RT	18+00	1.0-2.0	A-4(0)	18	3	1.8	55.7	20.1	22.4	100	99	54	-	-
S-18	50 RT	18+00	2.0-5.5	A-7(612)	43	23	0.8	45.7	8.7	44.9	100	100	62	21.9	-

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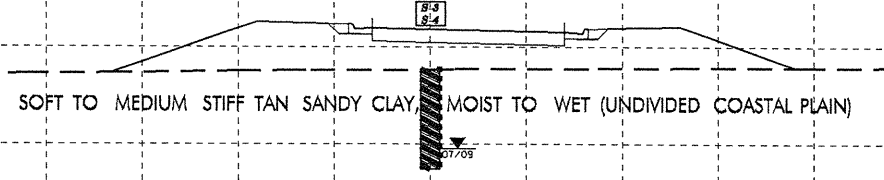
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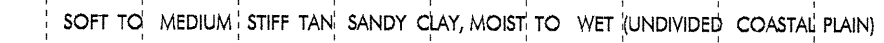
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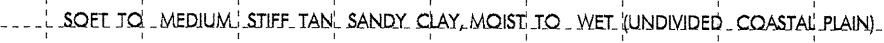
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							C SAND	F SAND	CLAY	#10	#40	#200		
Sr-3	CL	24+00	1.0-6.5	A-6(5)	38	21	7.7	54.8	6.8	30.6	100	100	45	-
Sr-4	CL	24+00	6.5-10.5	A-6(7)	35	18	5.9	43.6	11.7	38.7	100	99	55	-



24 + 00.00



23 + 50.00



LOOSE TAN SAND, SATURATED (UNDIVIDED COASTAL PLAIN)

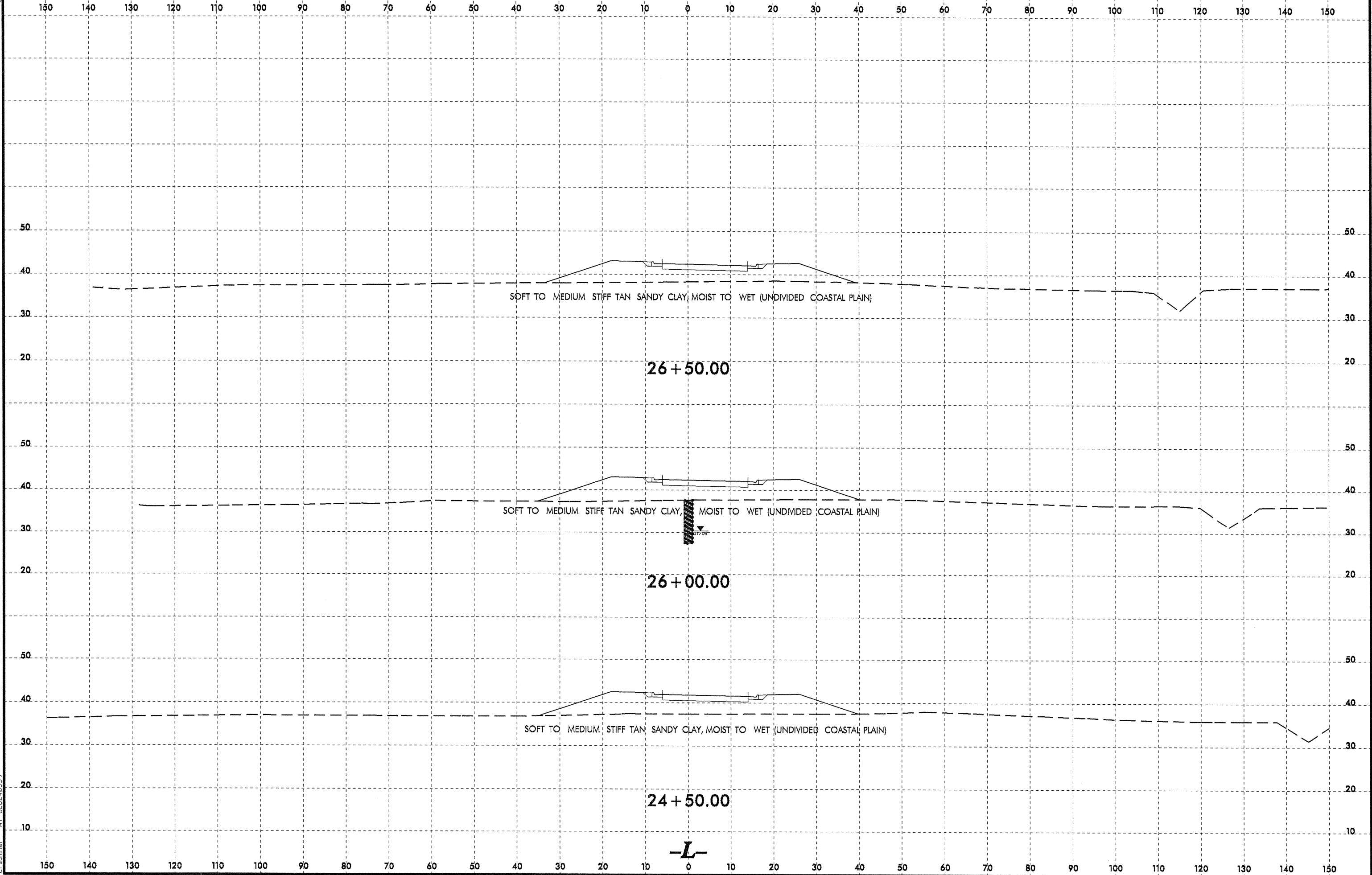
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8/23/96

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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-1	Q	28+00	1.0-4.0	A-7-1(20)	55	33	0.8	40.4	9.9	48.9	100	100	66	-	-
S-2	Q	28+00	4.0-10.5	A-6(4)	32	16	6.7	49.1	9.5	34.7	100	99	49	-	-

S-1
S-2

SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

28+00.00

SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

27+50.00

SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

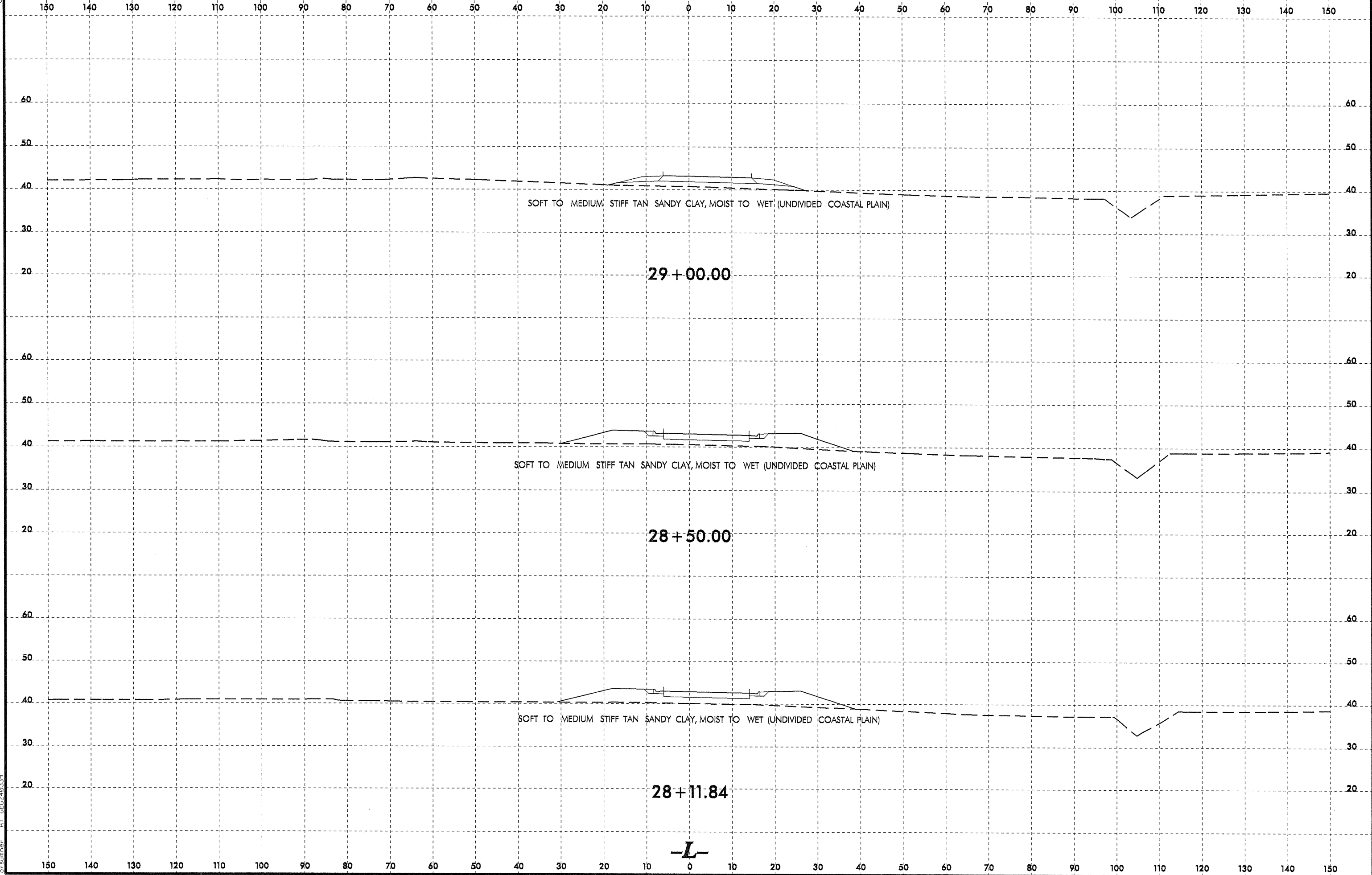
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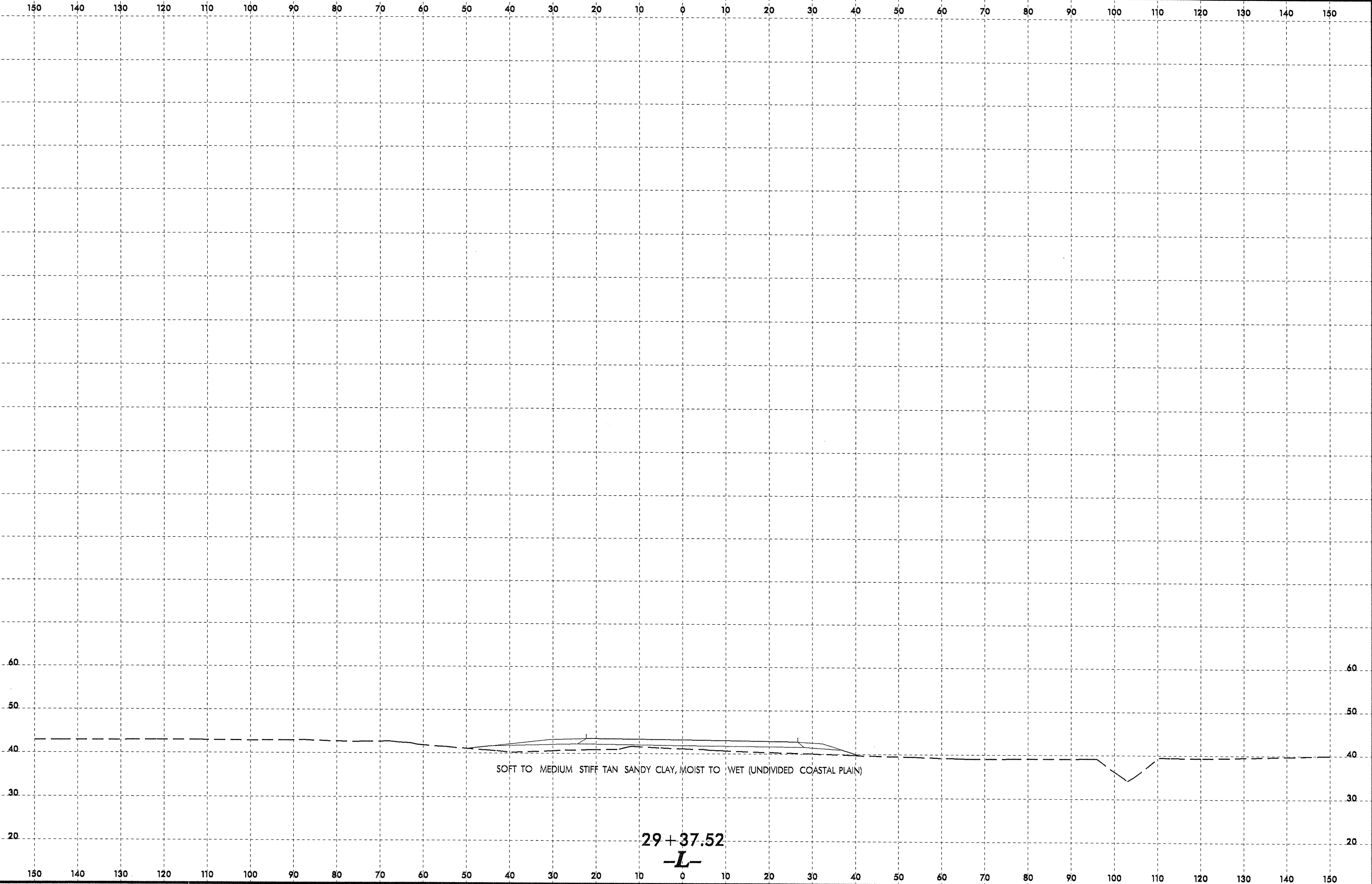
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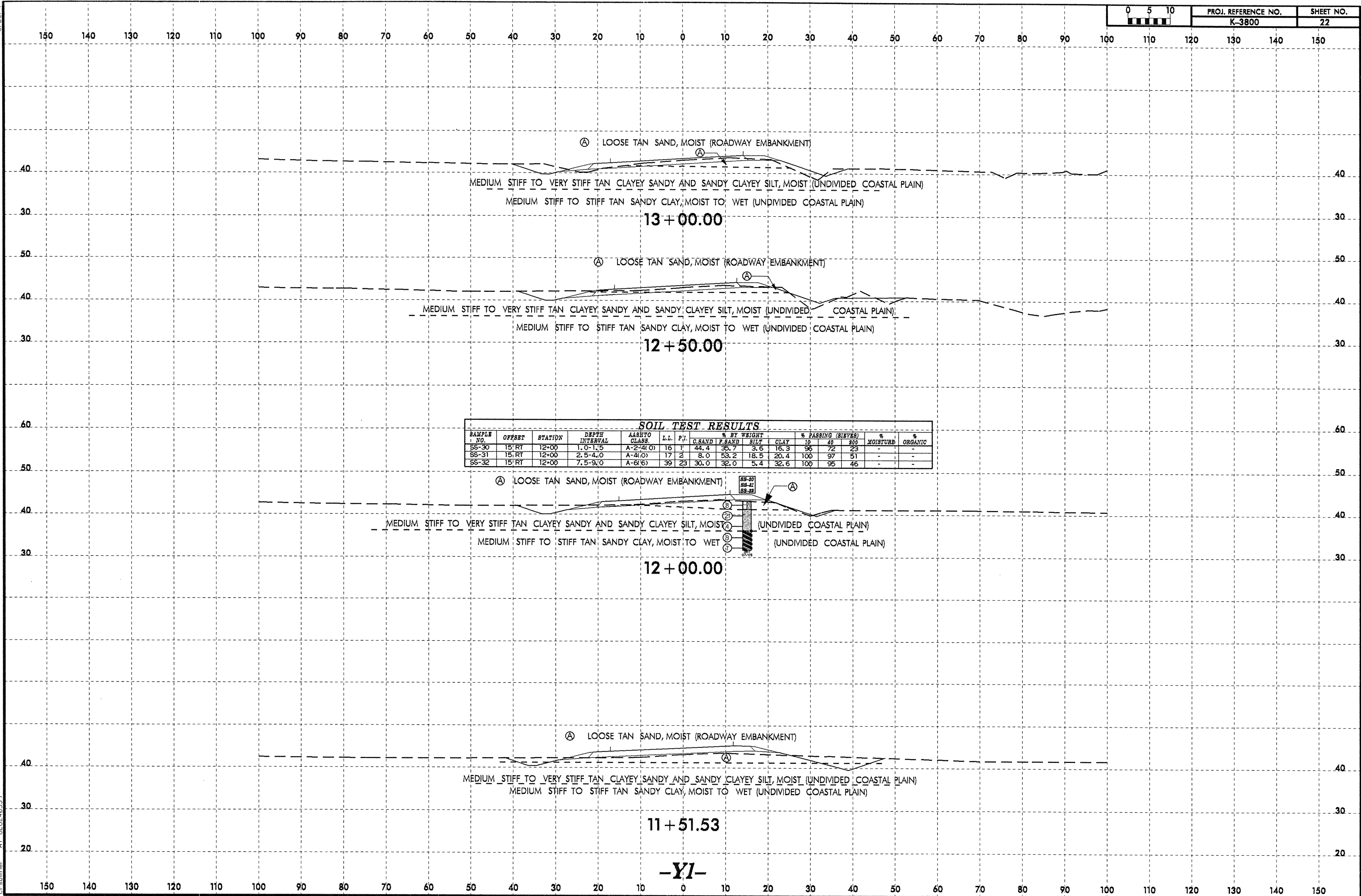


B/23/91

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
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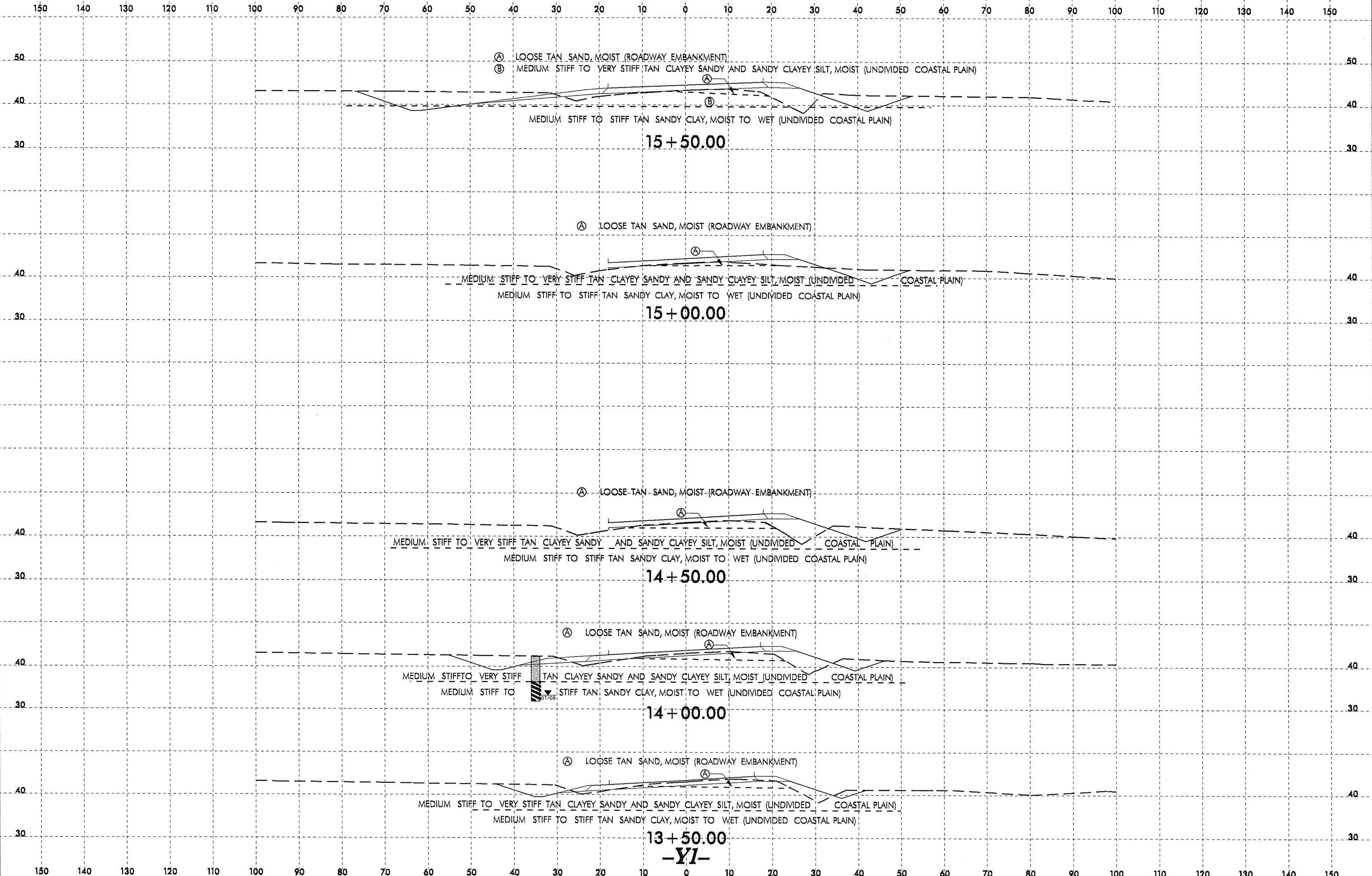
SOIL TEST RESULTS

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							G.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-30	15' RT	12+00	1.0-1.5	A-2(4) (0)	16	1	44.4	35.7	3.6	16.3	96	72	23	-	-
SS-31	15' RT	12+00	2.5-4.0	A-4(1) (0)	17	2	8.0	53.2	18.5	20.4	100	97	51	-	-
SS-32	15' RT	12+00	7.5-9.0	A-6(6)	39	23	30.0	32.0	5.4	32.6	100	95	46	-	-

8/23/09
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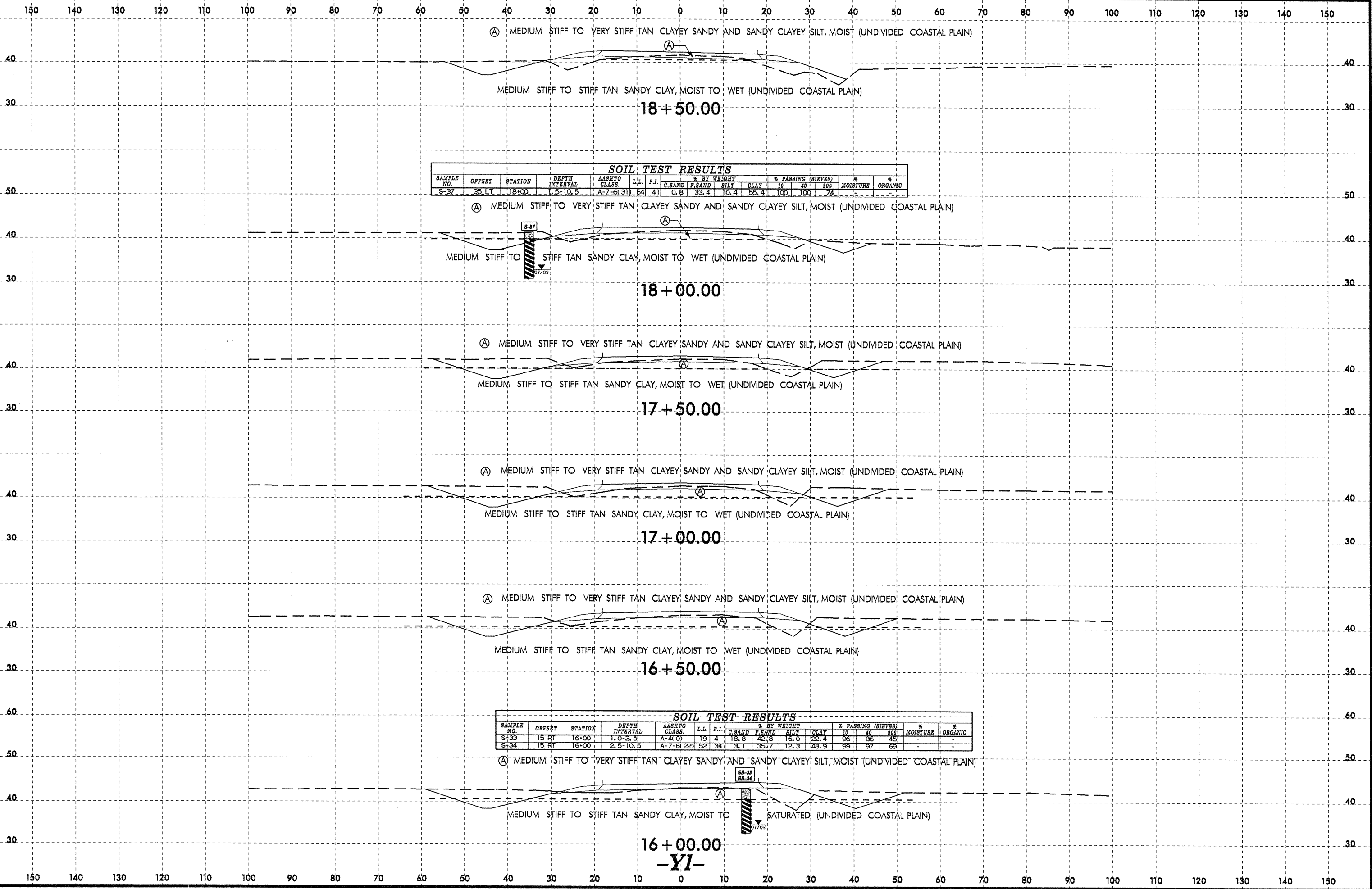
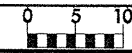
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 10/23/99

8/23/00



SOIL TEST RESULTS

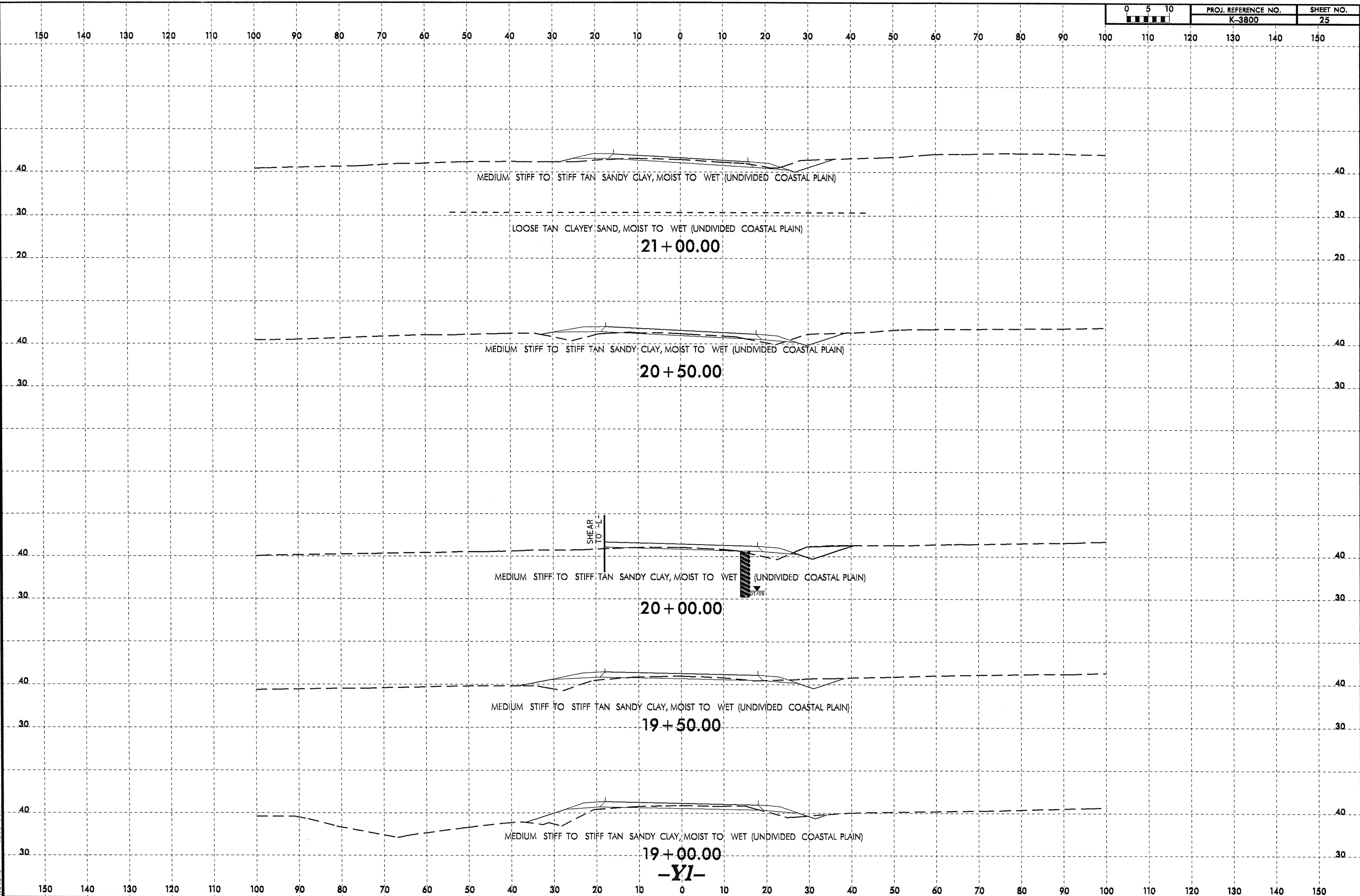
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							G.SAND	F.SAND	SILT	CLAY	10	40	200		
S-37	35 LT	18+00	1.5-10.5	A-7-6(3)	64	41	0.8	33.4	10.4	56.4	100	100	74	-	-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							G.SAND	F.SAND	SILT	CLAY	10	40	200		
S-33	15 RT	16+00	1.0-2.5	A-4(0)	19	4	18.8	42.8	15.0	22.4	96	85	45	-	-
S-34	15 RT	16+00	2.5-10.5	A-7-6(22)	52	34	3.1	35.7	12.3	48.9	99	97	69	-	-

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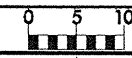
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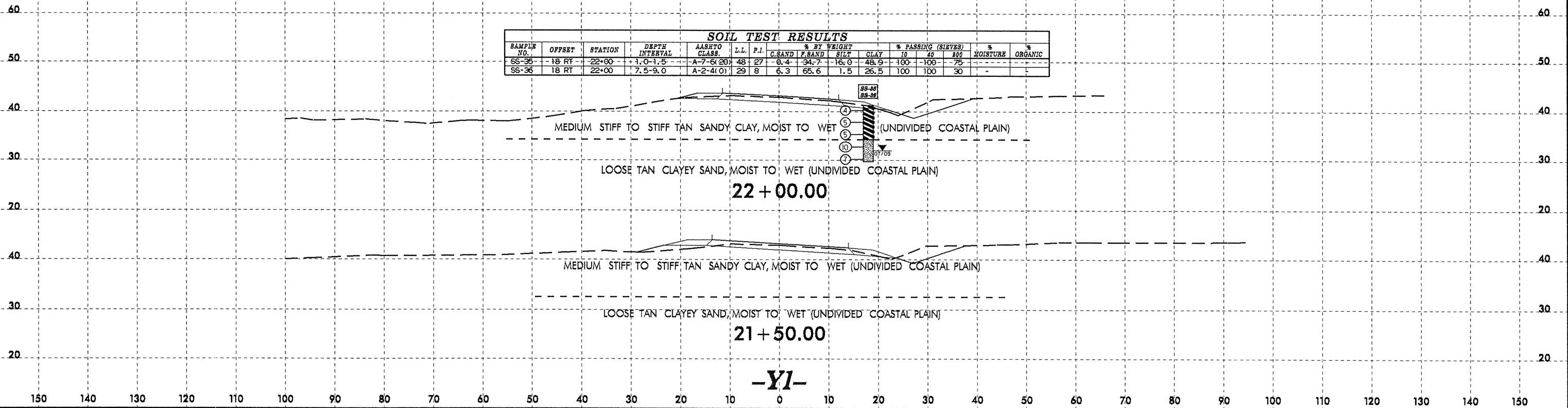
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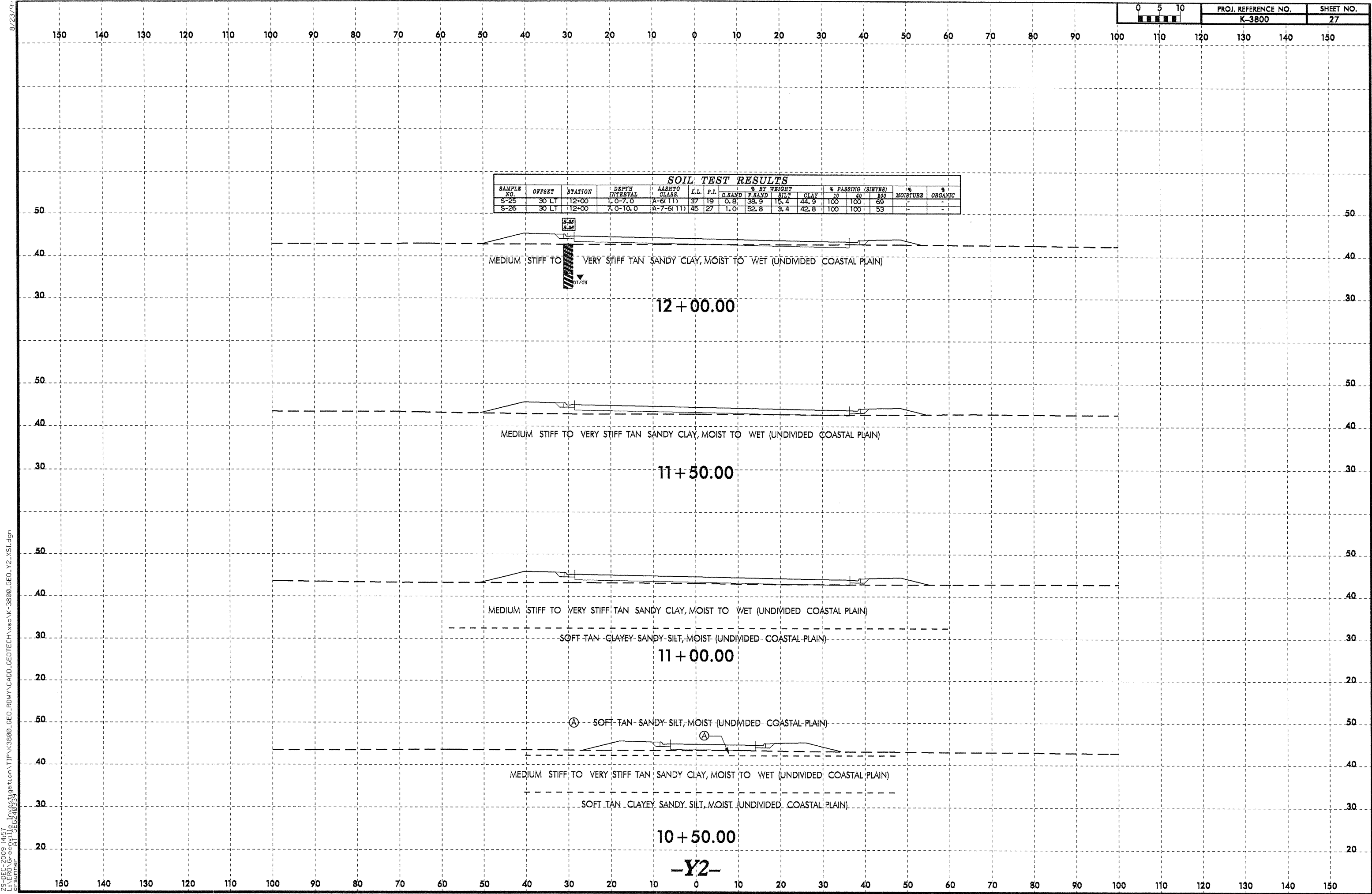
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-35	18 RT	22+00	1.0-1.5	A-7-6(20)	48	27	0.4	94.7	16.0	48.9	100	100	75	-	-
SS-36	18 RT	22+00	7.5-9.0	A-2-4(0)	29	8	6.3	65.6	1.5	26.5	100	100	30	-	-



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 rdwy
 Consumer



SOIL TEST RESULTS															
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							G. SAND	F. SAND	SILT	CLAY	10	40	200		
S-25	30 LT	12+00	1.0-7.0	A-6(11)	37	19	0.8	38.9	15.4	44.9	100	100	69	-	-
S-26	30 LT	12+00	7.0-10.0	A-7(6(11))	45	27	1.0	52.8	3.4	42.8	100	100	53	-	-



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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
S-11	30 FT	14+00	1.0-6.5	A-7(6)S	44	26	1.4	45.1	10.7	42.8	100	100	61	-	-
S-12	30 FT	14+00	6.5-10.5	A-6(7)	40	23	1.4	55.9	6.0	36.7	100	100	48	-	-

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

14 + 00.00

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

13 + 50.00

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

12 + 96.16

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

12 + 43.70

-Y2-

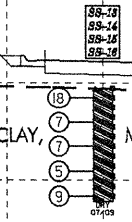
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	#10	#40	#200			
SS-13	CL	16+00	1.0-1.5	A-6(9)	39	22	3.1	47.9	12.9	36.7	100	100	57	-	-
SS-14	CL	16+00	2.5-4.0	A-6(3)	31	14	5.5	55.5	8.5	30.6	100	99	46	23.6	-
SS-15	CL	16+00	5.0-6.5	A-6(10)	40	22	5.1	40.0	16.2	38.7	100	98	59	-	-
SS-16	CL	16+00	7.5-9.0	A-6(2)	30	11	5.5	54.6	9.9	30.6	100	99	48	-	-



MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

16 + 00.00

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

15 + 50.00

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

15 + 00.00

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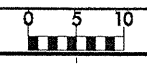
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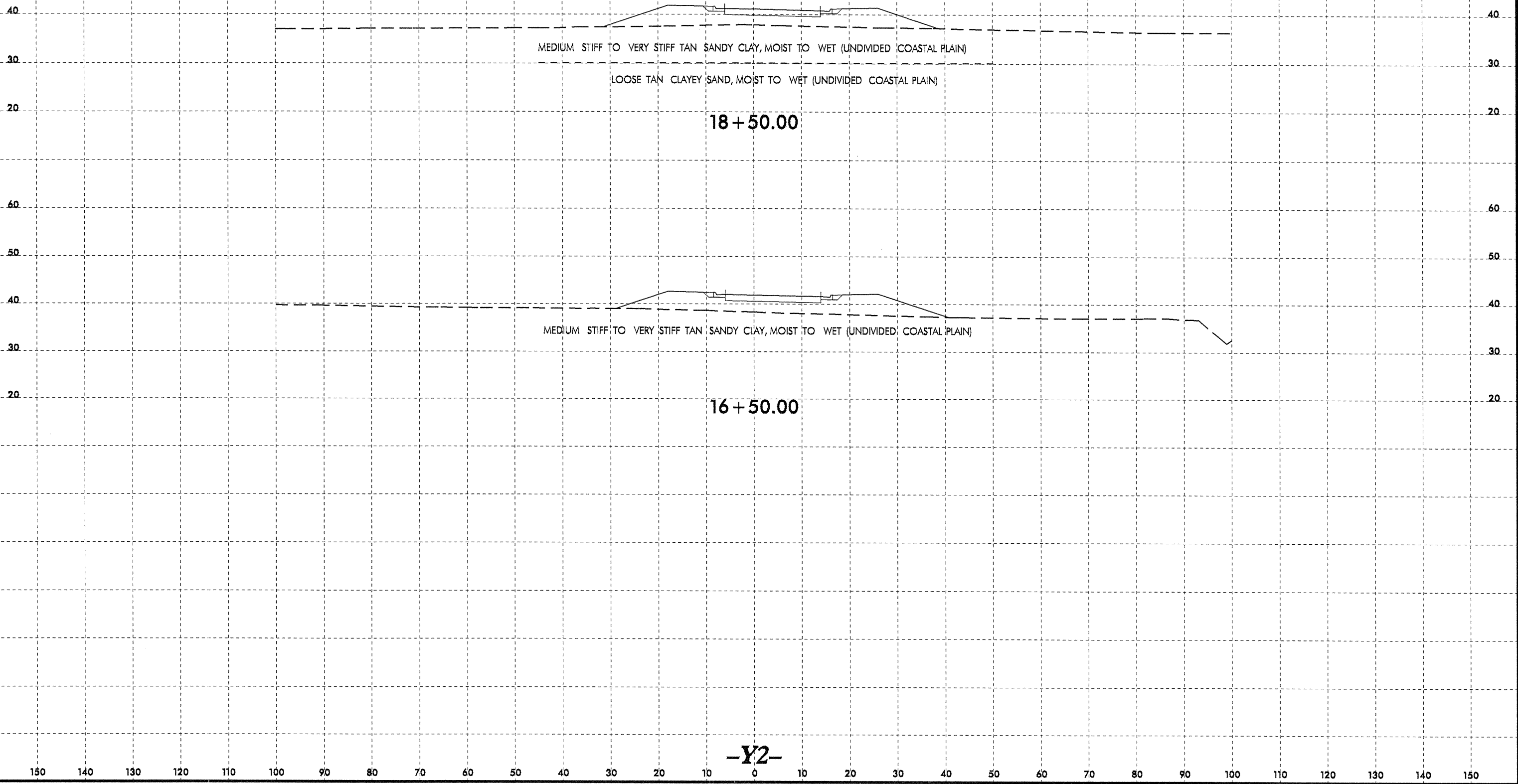
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PROJ. REFERENCE NO. K-3800	SHEET NO. 30
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MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

LOOSE TAN CLAYEY SAND, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

18 + 50.00

MEDIUM STIFF TO VERY STIFF TAN SANDY CLAY, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

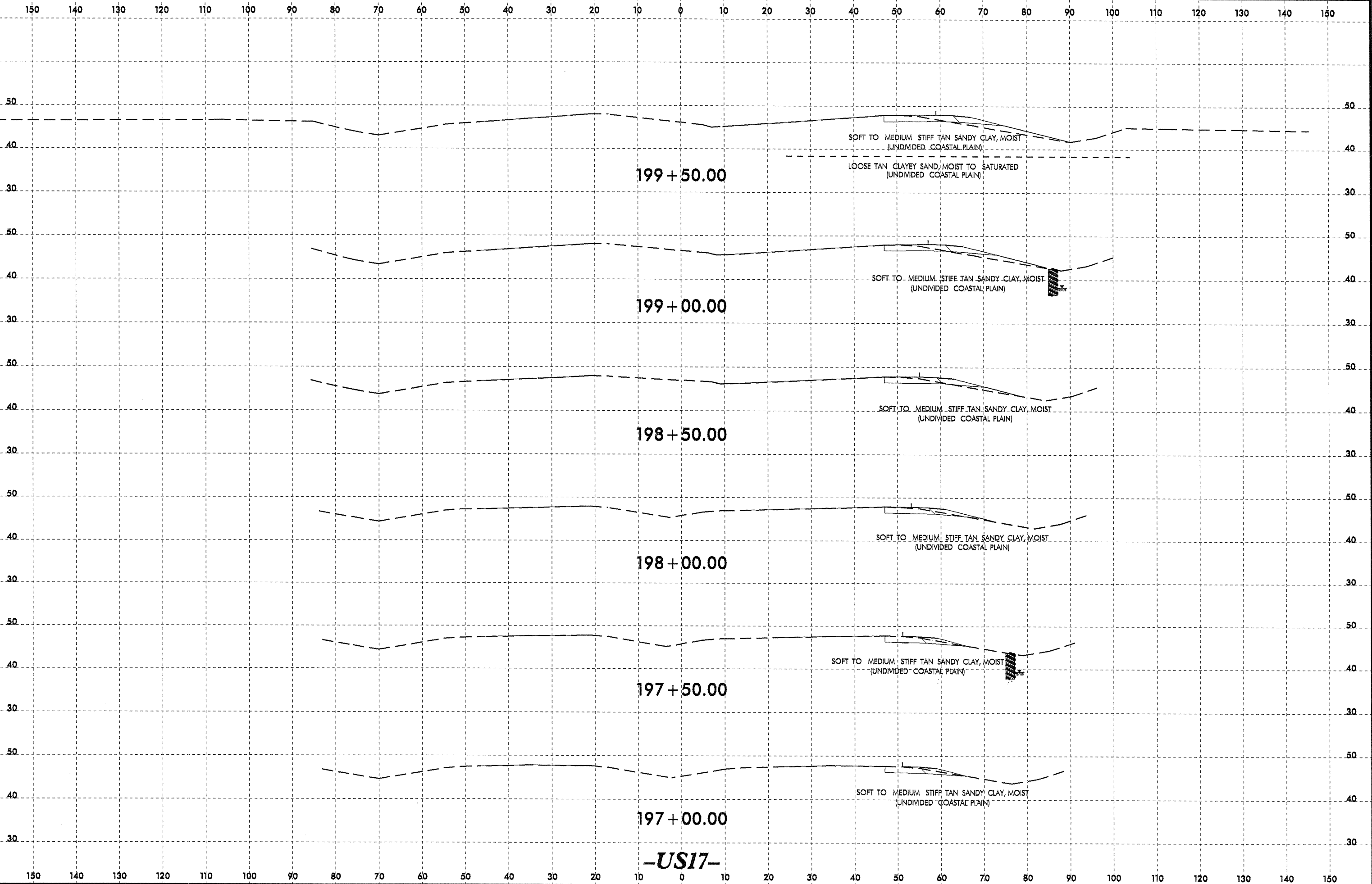
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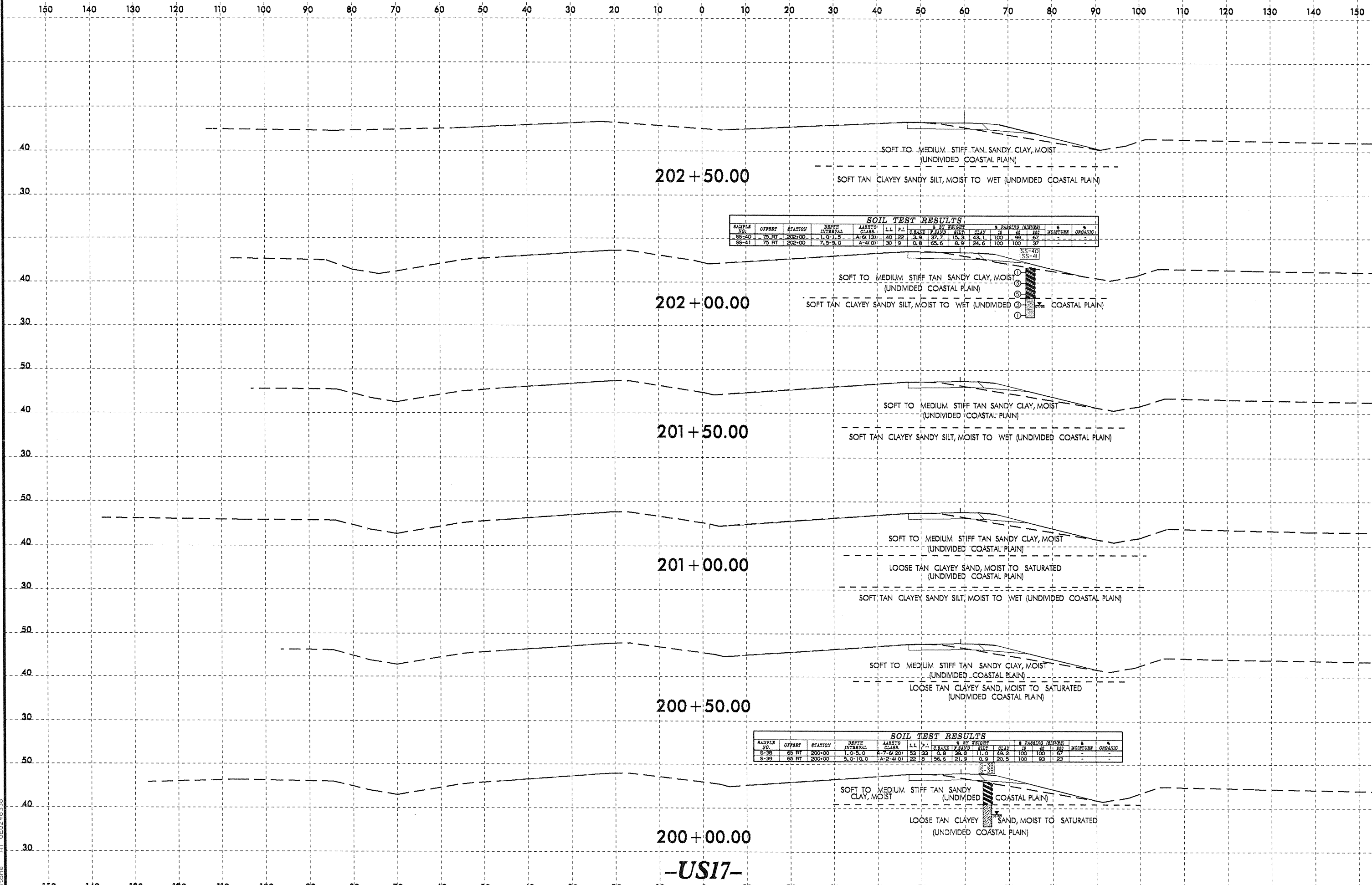
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8/23/99



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVE)			MOISTURE	ORGANIC	
							C.SAND	F.SAND	CLAY	#10	#40	#200			
SS-40	75 RT	202+00	1.0-1.5	A-6(13)	40	22	3.9	37.7	15.3	43.1	100	99	67	-	-
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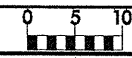
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			% PASSING (SIEVE)			MOISTURE	ORGANIC	
							C.SAND	F.SAND	CLAY	#10	#40	#200			
S-38	65 RT	200+00	1.0-5.0	A-7-6(20)	53	33	0.8	96.0	11.0	49.2	100	100	67	-	-
S-39	65 RT	200+00	5.0-10.0	A-2-4(0)	22	3	166.6	21.9	0.9	20.5	100	99	23	-	-

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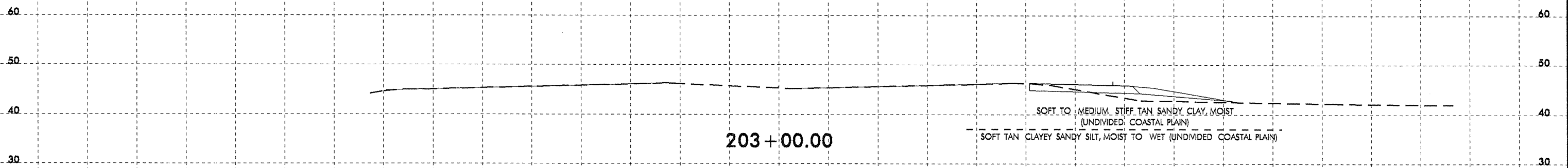
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8/23/94



PROJ. REFERENCE NO.	SHEET NO.
K-3800	33

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203 + 00.00

-US17-

SOFT TO MEDIUM STIFF TAN SANDY CLAY, MOIST
(UNDIVIDED COASTAL PLAIN)

SOFT TAN CLAYEY SANDY SILT, MOIST TO WET (UNDIVIDED COASTAL PLAIN)

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PROJECT: 38748.1.1 ID: K-3800

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	38748.1.1	1	12

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

**INFILTRATION BASIN
SUBSURFACE INVESTIGATION**

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3-4	GEOTECHNICAL REPORT
5	BORING LOCATION PLAN
6-7	CONSTANT HEAD PERMEAMETER TEST RESULTS
8-9	HAND AUGER SOIL PROFILE DESCRIPTIONS
10-12	LABORATORY TEST REPORT SUMMARY AND GRAIN SIZE CURVES

PROJ. REFERENCE NO. 38748.1.1 (K-3800) F.A. PROJ. NHS-17(32)
COUNTY BEAUFORT
PROJECT DESCRIPTION HAZARDOUS SPILL AND BMP SITES FOR
US 17 REST AREA, WASHINGTON BYPASS, OFF SR 1150

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.

PERSONNEL
J. WITHERSPOON

D. ATKINSON

M. LEAR

R. RAHIE

INVESTIGATED BY MACTEC

CHECKED BY S. CRISCENZO

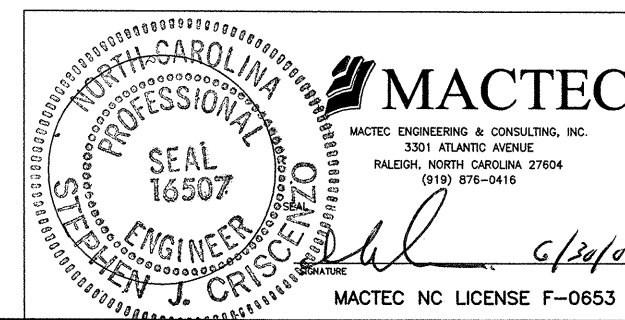
SUBMITTED BY MACTEC

DATE JUNE 25, 2009

DRAWN BY: R. RAHIE

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.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 38748.1.1
 SHEET NO. 2

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS			
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, ANGLARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRN, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>				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 ANGLARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				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 YIELD 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.				ALLUVIUM (ALLOUV.) - 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: BY6-56, 7+19.39 (SET BY NCDOT PERS.) ELEVATION: 43.12 FT.			
SOIL LEGEND AND AASHTO CLASSIFICATION				MINERALOGICAL COMPOSITION				COMPRESSIONIBILITY				PERCENTAGE OF MATERIAL			
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50				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			
CONSISTENCY OR DENSITY				GROUND WATER				MISCELLANEOUS SYMBOLS				ROCK HARDNESS			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT REFUSAL TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL				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 PIECES 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.			
TEXTURE OR GRAIN SIZE				ABBREVIATIONS				EQUIPMENT USED ON SUBJECT PROJECT				FRACTURE SPACING			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053				AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST F - VOID RATIO f - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICA MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL				DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6' CONTINUOUS FLIGHT AUGER 8' HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST				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			
SOIL MOISTURE - CORRELATION OF TERMS				ROCK BEDDING				INDURATION							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION				FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS SATURATED (SAT.) USUALLY LIQUID; VERY WET. USUALLY FROM BELOW THE GROUND WATER TABLE WET (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE MOIST (M) SOLID; AT OR NEAR OPTIMUM MOISTURE DRY (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE				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				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.			
PLASTICITY				COLOR											
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY				DESCRPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.											

NCDOT PROJECT NO.: 38748.1.1
TIP NO.: K-3800
FEDERAL AID NO.: NHS-17(32)
COUNTY: BEAUFORT
DESCRIPTION: Hazardous Spill and BMP Sites for US 17 Rest Area, Washington Bypass, off SR 1150
SUBJECT: Constant Head Permeameter Testing

Project Description

The purpose of this subsurface investigation was to evaluate four locations, identified by the NCDOT, at the project site for potential Hazardous Spill and BMP Sites for a proposed Rest Area on US 17/Washington Bypass, off SR 1150. Our understanding of this project comes from conversations with NCDOT Geotechnical Engineering Unit personnel; and from documents and drawings provided by the Geotechnical Engineering Unit including a Request for Proposal dated May 29, 2009 and electronic files on the NCDOT ftp site.

The project study area is located in western Beaufort County approximately 1.5 miles south of Chocowinity, North Carolina, near the intersection of US 17 and Harding Road (SR 1150). The site is currently an agriculture field. The field was planted in soybeans the morning prior to the field efforts.

Methodology

MACTEC conducted a subsurface investigation to determine depth to seasonal high water table (SHWT), apparent water table (if present), and *in-situ* saturated hydraulic conductivity. A MACTEC soil scientist advanced four hand auger borings to depths of 6.0 feet below ground surface (BGS). Representative soil samples were collected at approximately 1-foot intervals or where significant changes in soil texture were observed. The soil samples were described in the field and placed in sealed containers for transportation to and testing in MACTEC's laboratory. Infiltration testing with a constant head permeameter was conducted adjacent to the hand-auger boring locations. The infiltration tests were conducted at approximately 1.0-1.5 feet BGS, as specified by the NCDOT, and in general accordance with ASTM D 5216 procedures.

MACTEC identified the boring/test locations in the field utilizing non-survey grade sub-meter Global Positioning System (GPS) using northing/easting coordinates provided by NCDOT. GPS (horizontal) and conventional level surveys (vertical) were performed to obtain northing, easting, and ground surface elevations of the test/boring locations. The boring locations are shown on the Boring Location Plan (Drawing 1) and listed on the following table.

Table 1. Hand Auger and Permeameter Test Locations

Location	Northing	Easting	Elevation (ft)	Alignment, Station, Offset
Site 1 (HA-1)	639,164	2,563,803	37.8	-Y2- Sta. 16+50, ±90' LT
Site 2 (HA-2)	639,430	2,563,708	35.0	-L- Sta. 20+25, ±75' LT
Site 3 (HA-3)	639,411	2,563,989	37.1	-L- Sta. 22+50, ±60 LT
Site 4 (HA-4)	638,644	2,563,863	42.4	-Y1- Sta. 17+50, ±75 LT

Representative soil samples were tested to determine the soil index properties and to verify field classification. Four soil samples from the site (S-1 to S-4) were tested for grain size distribution (including hydrometer) and AASHTO classification. Laboratory testing was performed in accordance with applicable ASTM/AASHTO/NCDOT specifications. The results of the laboratory testing are included with this report.

Physiography and Geology

The site is a relatively flat, low lying, agricultural field located within the Carolina Coastal Plain Physiographic Province, in western Beaufort County, NC. The mostly marine sediments of the Carolina Coastal Plain were deposited during depositional cycles caused by fluctuating sea-levels and form a wedge of sediments that gradually thickens to the east. The 1985 Geologic Map of North Carolina, compiled by the N.C. Geological Survey, indicates that sediments of the Yorktown Formation are at or near the ground surface at the project location.

Soils encountered in the four hand-auger borings consisted of a surficial topsoil layer consisting of olive brown, silt (A-4) and silty sand (A-2-4), which extended from the ground surface to approximately 1.5 feet below the ground surface. Coastal Plain deposits belonging to the Yorktown Formation were encountered below the topsoil layer and consisted of yellowish brown to brownish gray, sandy clay (A-6/A-7-6) and extended to boring termination depths.

Infiltration Rates

Infiltration rates were measured at four locations at the project site. K_{sat} measurements were conducted with a Guelph Permeameter (GP). Test locations evaluated were HA1- through HA-4. The K_{sat} measurements were conducted in the unsaturated material above the apparent water table (if observed) on June 11, 2009. These measurements were conducted at soil depths ranging from 12 inches to 20 inches BGS. The measurement locations were areas that may be potentially used for hazardous spill and BMP sites. A detailed soil profile description was completed at each test location and is included with this report.

The *in-situ* K_{sat} values were calculated based on field measurements using the Glover Equation. K_{sat} measurements for the test at Site 3 were 0.184 inches/hour (in/hr) or 2.75 gallons per day per square-foot (gpd/ft²). Infiltration was not observed at Sites 1, 2, and 4 within two hours of commencing the infiltration tests. The soils present at the test depths at these locations generally included very heavy clay textures. These soils were beyond the capability of the GP to measure the K_{sat} . Table 2 summarizes the *in-situ* K_{sat} measurements for each location and includes: location; depth and horizon; hydraulic conductivity test method used; and conductivity measurement at each location.

Table 2. In-situ Saturated Hydraulic Conductivity Measurements

Site Number	Depth/Horizon (inches BGS)	Method	Result	
			gpd/ft ²	in/hr
1 (HA-1)	17/Bt	<i>In-Situ</i> (GP)	NIO	NIO
2 (HA-2)	18/Bt	<i>In-Situ</i> (GP)	NIO	NIO
3 (HA-3)	13/B	<i>In-Situ</i> (GP)	2.75	0.184
4 (HA-4)	17/Bt	<i>In-Situ</i> (GP)	NIO	NIO

Note: NIO = No Infiltration Observed

Groundwater

The hand-auger borings were terminated at 72 inches BGS. An apparent water table was observed at approximately 48 inches BGS in boring HA-2. Apparent water tables were not observed in the other three borings. SHWT depths were estimated based on soil characteristics through identification of low chroma redoximorphic features (mottles). The low chroma mottles suggest past conditions of saturation and reducing soil conditions. Evidence of a SHWT was observed at depths ranging from 18 to 34 inches BGS as indicated in Table 3.

Table 3. SHWT Estimates on June 11, 2009.

Site Number	Elevation of Ground Surface (feet)	SHWT Depth (inches BGS)	Apparent Water Table Depth (inches BGS)
HA-1	37.8	20	>72
HA-2	35.0	30	48
HA-3	37.1	34	>72
HA-4	42.4	18	>72

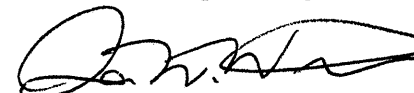
Closure

MACTEC provided these services in accordance with our Proposal No. 09-RAIL-186 dated June 5, 2009. Our services were performed under the Terms of the Agreement made and entered into on August 20, 2008 by and between the NCDOT and MACTEC.


We are available to discuss our findings with you and to provide additional studies or services necessary to complete the project. We appreciate the opportunity to assist you on this project and look forward to serving as your geotechnical consultant on future projects.

Very truly yours,

MACTEC Engineering and Consulting, Inc.

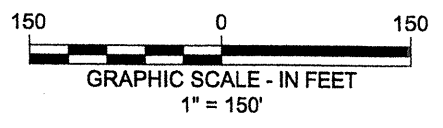
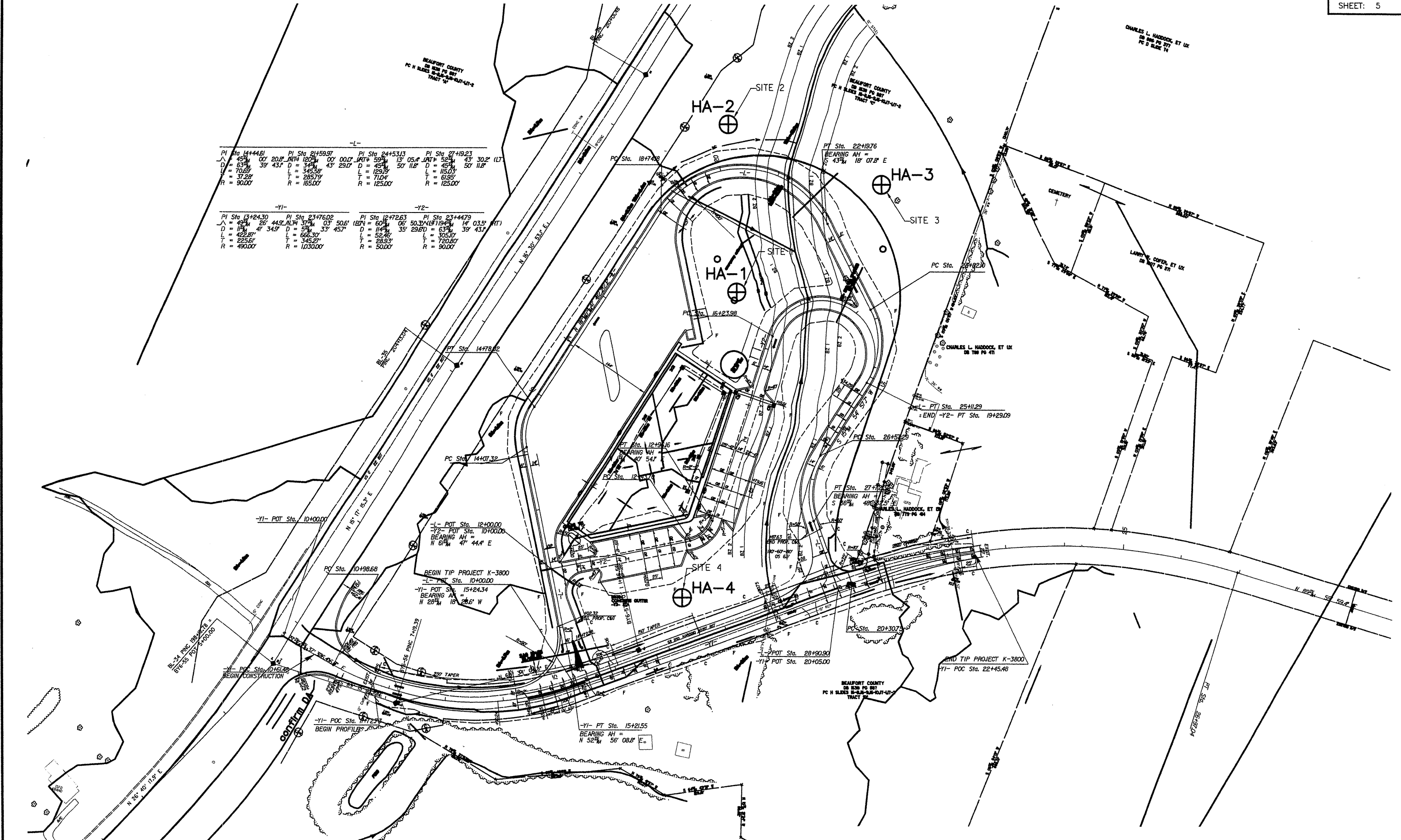

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-L-			
PI Sta 14+44.61	PI Sta 21+59.97	PI Sta 24+53.13	PI Sta 27+19.23
Δ = 45° 00' 20.8"	Δ = 120° 00' 00.0"	Δ = 59° 13' 05.4"	Δ = 52° 43' 30.2"
D = 63.74	D = 34.44	D = 45.44	D = 45.44
L = 70.69	L = 345.58	L = 129.19	L = 115.03
T = 37.28	T = 285.79	T = 71.04	T = 61.95
R = 90.00	R = 165.00	R = 125.00	R = 125.00

-Y1-		-Y2-	
PI Sta 13+24.30	PI Sta 23+76.02	PI Sta 12+72.63	PI Sta 23+44.79
Δ = 17° 41' 34.9"	Δ = 51° 33' 50.6"	Δ = 60° 06' 50.3"	Δ = 14° 03.5"
D = 174.41	D = 666.30	D = 114.41	D = 63.74
L = 422.97	L = 345.27	L = 52.46	L = 305.10
T = 225.61	T = 1030.00	T = 28.93	T = 720.00
R = 490.00	R = 1030.00	R = 50.00	R = 90.00



BORING LOCATION PLAN
 HAZARDOUS SPILL AND BMP SITES FOR US 17
 REST AREA, WASHINGTON BYPASS, OFF SR 1150
 NCDOT PROJECT NO. 38748.1.1 (K-3800)
 F.A. No. NHS-17(32)
 BEAUFORT COUNTY, NORTH CAROLINA

MACTEC ENGINEERING AND CONSULTING, INC. RALEIGH, NORTH CAROLINA			
REVISIONS	DRAWN:	R.R.	DATE: 06/25/09
	DFT CHECK:	M.B.L.	JOB: 6468-09-2441
	ENG CHECK:	S.J.C.	DWG: 1

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: US 17/Washington Bypass Rest Area

Job Number: 38748.1.1 (K-3800)

Location ID: HA-1 (Site 1)

Date: 06/11/09

Field Personnel: D. Atkinson

Well Hole Depth, (inches): 17

Field Notes:

Combined Reservoirs X, (cm²): 35.22 Horizon: Bt1

Inner Reservoir Y, (cm²): 2.15 SHWT: 20" BGS

Reservoir Constant: 2.15 cm²

Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H₁) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0	2:04:00	0.0	18.0	0.0	
1	4:10:00	126.0	18.0	0.0	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

2nd set of readings with height of water in well (H₂) set at 10 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings R_{1-bar} = R_{1-bar} / 60 = cm/sec

For the second set of readings R_{2-bar} = R_{2-bar} / 60 = cm/sec

$$K_{fs} = [(0.0041) * (\text{Res. Const}) * (R_{2\text{-bar}})] - [(0.0054) * (\text{Res. Const}) * (R_{1\text{-bar}})] \quad \text{cm/sec}$$

where,

K_{fs} = field saturated hydraulic conductivity

Calculated K _{fs} :	
K _{fs} =	cm/sec
K _{fs} =	in/hr

Prepared By: [Signature]
Checked By: [Signature]

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: US 17/Washington Bypass Rest Area

Job Number: 38748.1.1 (K-3800)

Location ID: HA-2 (Site 2)

Date: 06/11/09

Field Personnel: D. Atkinson

Well Hole Depth, (inches): 18

Field Notes:

Combined Reservoirs X, (cm²): 35.22 Horizon: Bt1

Inner Reservoir Y, (cm²): 2.15 SHWT: 30" BGS

Reservoir Constant: 2.15 cm²

Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H₁) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0	2:45:00	0.0	21.4	0.0	
1	5:05:00	140.0	21.4	0.0	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings R_{1-bar} = R_{1-bar} / 60 = cm/sec

For the second set of readings R_{2-bar} = R_{2-bar} / 60 = cm/sec

$$K_{fs} = [(0.0041) * (\text{Res. Const}) * (R_{2\text{-bar}})] - [(0.0054) * (\text{Res. Const}) * (R_{1\text{-bar}})] \quad \text{cm/sec}$$

where,

K_{fs} = field saturated hydraulic conductivity

Calculated K _{fs} :	
K _{fs} =	cm/sec
K _{fs} =	in/hr

2nd set of readings with height of water in well (H₂) set at 10 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

Prepared By: [Signature]
Checked By: [Signature]

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: US 17/Washington Bypass Rest Area

Job Number: 38748.1.1 (K-3800)

Location ID: HA-3 (Site 3)

Date: 06/11/09

Field Personnel: D. Atkinson

Well Hole Depth, (inches): 13

Field Notes:

Combined Reservoirs X, (cm²): 35.22 Horizon: B

Inner Reservoir Y, (cm²): 2.15 SHWT: 34" BGS

Reservoir Constant: 35.22 cm²

Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H₁) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0	12:33:00	0.0	10.0	0.0	
1	12:35:00	2.0	10.2	0.2	
2	12:36:00	1.0	10.2	0.0	
3	12:38:00	2.0	10.5	0.3	
4	12:40:00	2.0	11.0	0.5	
5	12:42:00	2.0	11.3	0.3	
6	12:44:00	2.0	11.6	0.3	
7	12:46:00	2.0	11.9	0.3	
8	12:48:00	2.0	12.2	0.3	
9	12:50:00	2.0	12.5	0.3	0.15
10	12:52:00	2.0	12.8	0.3	0.15
11	12:54:00	2.0	13.1	0.3	0.15
12				R1-bar	0.15
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings R_{1-bar} = R_{1-bar} / 60 = 2.5E-03 cm/sec

For the second set of readings R_{2-bar} = R_{2-bar} / 60 = 4.2E-03 cm/sec

$$K_{fs} = [(0.0041)(\text{Res. Const})(R_{2\text{-bar}})] - [(0.0054)(\text{Res. Const})(R_{1\text{-bar}})] \quad \text{cm/sec}$$

where,

K_{fs} = field saturated hydraulic conductivity

Calculated K_{fs}:		
K _{fs} =	1.3E-04	cm/sec
K _{fs} =	0.184	in/hr

Prepared By: *[Signature]*
Checked By: *[Signature]*

2nd set of readings with height of water in well (H₂) set at 10 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0	12:58:00	0.0	16.6	0.0	
1	1:02:00	4.0	16.9	0.3	
2	1:04:00	2.0	17.5	0.6	
3	1:06:00	2.0	18.0	0.5	
4	1:08:00	2.0	18.5	0.5	
5	1:10:00	2.0	19.0	0.5	
6	1:12:00	2.0	19.5	0.5	
7	1:14:00	2.0	20.0	0.5	
8	1:16:00	2.0	20.5	0.5	
9	1:18:00	2.0	21.0	0.5	0.25
10	1:20:00	2.0	21.5	0.5	0.25
11	1:22:00	2.0	22.0	0.5	0.25
12				R2-bar	0.25
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

Guelph Permeameter Field Data Sheet

Standard Procedure for Permeameter Readings and Calculations

Job Name: US 17/Washington Bypass Rest Area

Job Number: 38748.1.1 (K-3800)

Location ID: HA-4 (Site 4)

Date: 06/11/09

Field Personnel: D. Atkinson

Well Hole Depth, (inches): 17

Field Notes:

Combined Reservoirs X, (cm²): 35.22 Horizon: Bt1

Inner Reservoir Y, (cm²): 2.15 SHWT: 18" BGS

Reservoir Constant: 2.15 cm²

Note: In standardized procedure the radius of the well hole is always 3.0 cm.

1st set of readings with height of water in well (H₁) set at 5 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0	11:14:00	0.0	8.2	0.0	
1	1:30:00	136.0	8.2	0.0	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

For the first set of readings R_{1-bar} = R_{1-bar} / 60 = cm/sec

For the second set of readings R_{2-bar} = R_{2-bar} / 60 = cm/sec

$$K_{fs} = [(0.0041)(\text{Res. Const})(R_{2\text{-bar}})] - [(0.0054)(\text{Res. Const})(R_{1\text{-bar}})] \quad \text{cm/sec}$$

where,

K_{fs} = field saturated hydraulic conductivity

Calculated K_{fs}:		
K _{fs} =		cm/sec
K _{fs} =		in/hr

2nd set of readings with height of water in well (H₂) set at 10 cm.

Reading Number	Time	Time Interval, (min)	Water Level in Reservoir, (cm)	Water Level Change, (cm)	Rate of Water Level Change, R ₁ , (cm/min)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

Prepared By: *[Signature]*
Checked By: *[Signature]*

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT Site/Boring Location #: HA-1 (Site 1)
 Project Name: US 17/Washington Bypass Rest Area Vegetation: Grain stubble
 Project Number: 38748.1.1 (K-3800) Seasonal High Water Table: 20 inches
 Date: 11 June 2009 Apparent Water Table: >72 inches
 Location: East of US 17, North of SR 1150 Slope: 2-4%
 County: Beaufort State: North Carolina Boring Termination Depth: 72 inches
 Northing: 639,164 Us ft Easting: 2,563,803 Us ft
 Elevation: 37.8 ft

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence (moist)	Notes
A	0-7	2.5Y 5/4		FSL	1mgr	friable	
Bt1	7-20	2.5Y 5/6		CL	1fsbk	friable	
Bt2	20-28	10YR 5/6	10YR 5/2	C	1fsbk	firm	
			7.5YR 5/8				
Bt3	28-42	10YR 5/4	10YR 5/1	C	1msbk	firm	
			5YR 4/6				
Btg	42-48	2.5Y 6/1	10YR 5/4	SC	1msbk	firm	
Cg	48-72+	2.5Y 6/2	7.5YR 5/8	SCL	massive	firm	
			5YR 5/6				

Notes: Sample S-1 at 0.0'-0.6' Light olive brown clayey, sandy, SILT (A-4) (0)

Soil Textures: FSL = Fine sandy loam; CL – Clay loam; SCL = Sandy Clay Loam; C = Clay; SC = Sandy Clay

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, medium, subangular;
 1msbk = weak, medium subangular

Prepared By: *[Signature]*
 Checked By: *[Signature]*

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT Site/Boring Location #: HA-2 (Site 2)
 Project Name: US 17/Washington Bypass Rest Area Vegetation: Grain stubble
 Project Number: 38748.1.1 (K-3800) Seasonal High Water Table: 30 inches
 Date: 11 June 2009 Apparent Water Table: 48 inches
 Location: East of US 17, North of SR 1150 Slope: 2-4%
 County: Beaufort State: North Carolina Boring Termination Depth: 72 inches
 Northing: 639,430 US ft Easting: 2,563,708 US ft
 Elevation: 35.0 ft

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence	Notes
A	0-7	2.5Y 4/3		SL	1mgr	friable	
E	7-11	2.5Y 5/4		LFS	1mgr	friable	
Bt1	11-30	2.5Y 5/6		CL	1fsbk	friable	
Bt2	30-48	2.5Y 6/6	2.5Y 6/1	SCL	1msbk	friable	
			10YR 5/8				
Cg	48-72+	2.5Y 6/1	10YR 5/8	SCL	massive	friable	
			5YR 5/8				

Notes: Saturation and apparent water table observed at 48 inches BGS

Soil Textures: FSL = Fine sandy loam; LFS = Loamy fine sand; CL – Clay loam; SCL = Sandy Clay Loam

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, medium, subangular;
 1msbk = weak, medium subangular

Prepared By: *[Signature]*
 Checked By: *[Signature]*

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT

Project Name: US 17/Washington Bypass Rest Area

Project Number: 38748.1.1 (K-3800)

Date: 11 June 2009

Location: East of US 17, North of SR 1150

County: Beaufort State: North Carolina

Northing: 639,411 US ft Easting: 2,563,989 US ft

Elevation: 37.1 ft

Site/Boring Location #: HA-3 (Site 3)

Vegetation: Grain stubble

Seasonal High Water Table: 34 inches

Apparent Water Table: >72 inches

Slope: 2-4%

Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence	Notes
A	0-8	2.5Y 4/3		FSL	1mgr	friable	
B	8-20	2.5Y 6/4		FSL	1mgr	friable	
		2.5Y 6/6					
Bt1	20-34	2.5Y 5/6		SCL	1fsbk	friable	
Bt2	34-48	10YR 5/4	10YR 5/1	SCL	1fsbk	friable	
			10YR 5/6				
Cg	48-72+	10YR 6/2	2.5Y 5/4	SL	massive	friable	
			5YR 5/6				

Notes: Sample S-2 at 0.7'-1.7' Light yellowish brown silty SAND (A-2-4) (0); Sample S-3 at 4.0'-6.0' Light yellowish brown, sandy CLAY (A-6) (2)

Soil Textures: FSL = Fine sandy loam; SL = Sandy loam; CL = Clay loam; SCL = Sandy Clay Loam

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, medium, subangular; 1msbk = weak, medium subangular

Prepared By: JRM

Checked By: NKR

MACTEC Engineering and Consulting, Inc.

Soil Profile Description

Client: NCDOT

Project Name: US 17/Washington Bypass Rest Area

Project Number: 38748.1.1 (K-3800)

Date: 11 June 2009

Location: East of US 17; North of SR 1150

County: Beaufort State: North Carolina

Northing: 638,644 US ft Easting: 2,563,863 US ft

Elevation: 42.4 ft

Site/Boring Location #: HA-4 (Site 4)

Vegetation: Grain stubble

Seasonal High Water Table: 18 inches

Apparent Water Table: >72 inches

Slope: 2-4%

Boring Termination Depth: 72 inches

Horizon	Depth (in)	Matrix Color	Mottle(s) Color	Texture	Structure	Consistence	Notes
A	0-8	2.5Y 4/3		FSL	1mgr	friable	
Bt1	8-18	2.5Y 5/4		CL	1msbk	friable	
Bt2	18-28	2.5Y 5/4	10YR 5/2	C	1msbk	Firm	
			10YR 5/8				
			5YR 5/8				
Bt3	28-40	10YR 5/6	10YR 6/1	SC	1msbk	firm	
			2.5YR 4/6				
Btg1	40-64	2.5Y 6/1	10YR 5/4	SC	1msbk	Firm	
			2.5YR 4/6				
Btg2	64-72+	2.5y 6/1	10YR 5/6	SC	1msbk	firm	
			2.5Y 4/6				

Notes: Sample S-4 at 0.7'-3.3' Light olive brown clayey, sandy CLAY (A-7-6) (24)

Soil Textures: FSL = Fine sandy loam; CL = Clay loam; C = Clay; SC = Sandy Clay

Soil Structure: 1mgr = weak, medium, granular; 1fsbk = weak, medium, subangular; 1msbk = weak, medium subangular

Prepared By: JRM

Checked By: NKR



MACTEC ENGINEERING AND CONSULTING, INC.
3301 ATLANTIC AVENUE
RALEIGH, NORTH CAROLINA 27604

N.C.D.O.T./AASHTO CLASSIFICATIONS

REPORT ON SAMPLES OF: SOILS FOR QUALITY

MACTEC PROJECT NAME/ NUMBER: US 17/Washington Bypass Rest Area (6468-09-2441)

NCDOT PROJ. NO.: 38748.1.1 (K-3800)

COUNTY: BEAUFORT

OWNER: N.C.D.O.T.

DATE SAMPLED: June 11, 2009

RECEIVED: 6/12/2009

REPORTED BY: MACTEC

SAMPLED FROM: HA-1, HA-3, HA-4

SUBMITTED BY: MACTEC ENGINEERING AND CONSULTING, INC.

1992 STANDARD SPECIFICATIONS

TEST RESULTS

Lab Sample No.		S-1	S-2	S-3	S-4		
Retained No. 4 Sieve (%)		0.0	0.0	0.0	0.0		
Passing No. 10 Sieve (%)		99.9	100.0	100.0	100.0		
Passing No. 40 Sieve (%)		98.8	99.2	97.4	99.8		
Passing No. 200 Sieve (%)		39.4	23.1	40.3	73.9		

MINUS 2.00mm FRACTION

SOIL MORTAR - 100%							
Coarse Sand (%)		3.2	7.0	8.3	0.5		
Fine Sand (%)		62.6	78.0	55.7	28.2		
Silt (%)		14.3	9.1	5.7	15.2		
Clay (%)		19.9	5.9	30.3	56.1		

Moisture Content (%)		38.9	ND	18.7	24.8		
Liquid Limit, L.L.		21	NV	29	52		
Plasticity Index, P.I.		7	NP	14	33		
AASHTO Classification		A-4 (0)	A-2-4 (0)	A-6 (2)	A-7-6 (24)		
Organic Content (%)		ND	ND	ND	ND		

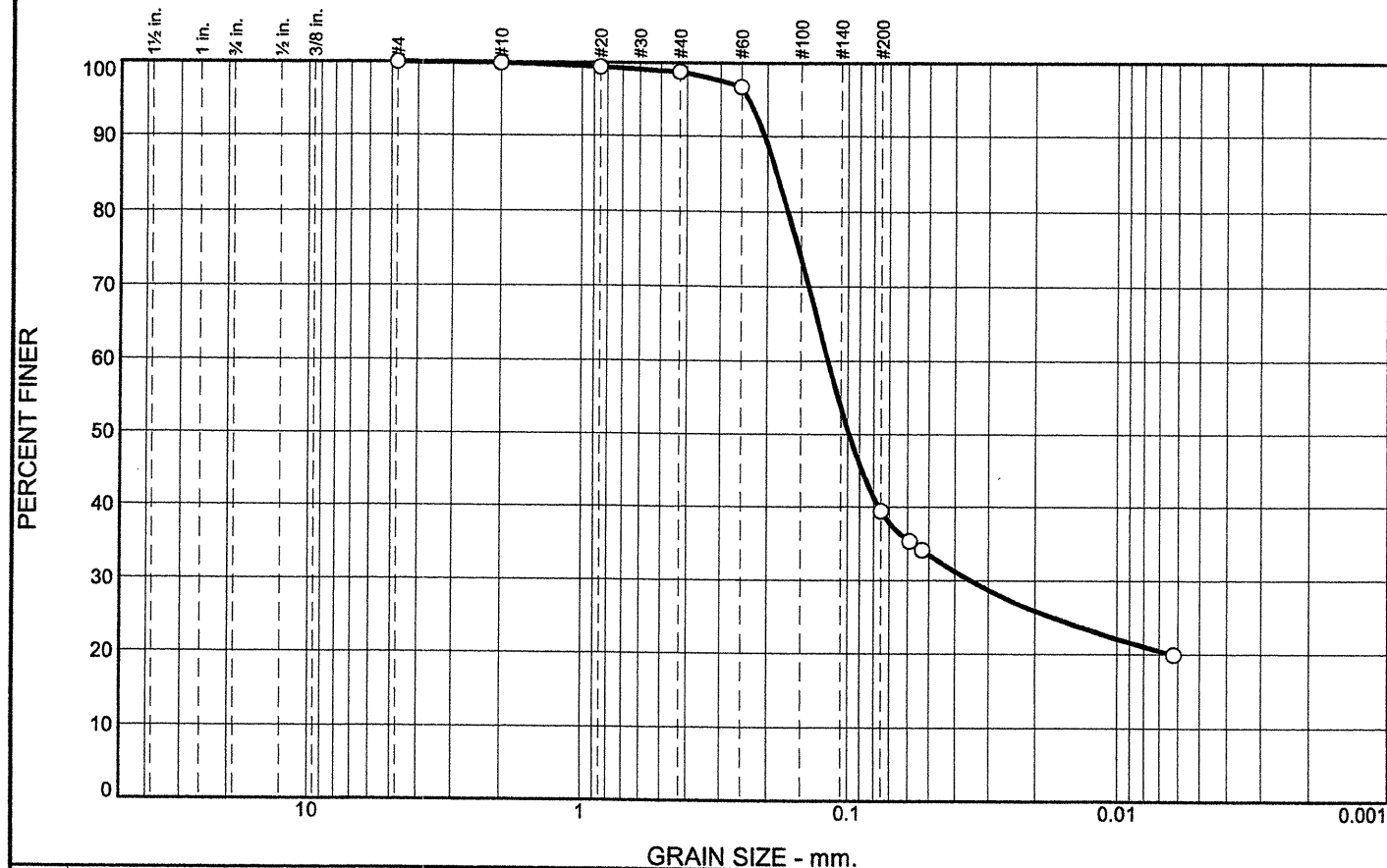
Boring No.		HA-1	HA-3	HA-3	HA-4		
Station		16+50	20+25	22+50	17+50		
Offset		+/- 90 LT	+/- 75 LT	+/- 60 LT	+/- 75 LT		
Alignment		-Y2-	-L-	-L-	-Y1-		
Depth (FT)	From	0.0	0.7	4.0	0.7		
	to	0.6	1.7	6.0	3.3		

REMARKS: ND=Not Determined, NP=Non-Plastic, NV=No Value

Tested By Chana Savanapridi; Cert. No. 104-04-0504

Signature

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.1	59.4	39.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#20	99.4		
#40	98.8		
#60	96.7		
#200	39.4		
#270	34.2		

Material Description
Olive Brown Clayey Sandy SILT

Atterberg Limits
PL= 14 LL= 21 PI= 7

Coefficients
D₈₅= 0.1838 D₆₀= 0.1184 D₅₀= 0.0984
D₃₀= 0.0347 D₁₅= D₁₀=
C_u= C_c=

Classification
USCS= SC-SM AASHTO= A-4(0)

Remarks

* (no specification provided)

Source of Sample: HA-1 Depth: 0.0-0.6'
Sample Number: S-1

Date: 6/22/09

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Raleigh, North Carolina

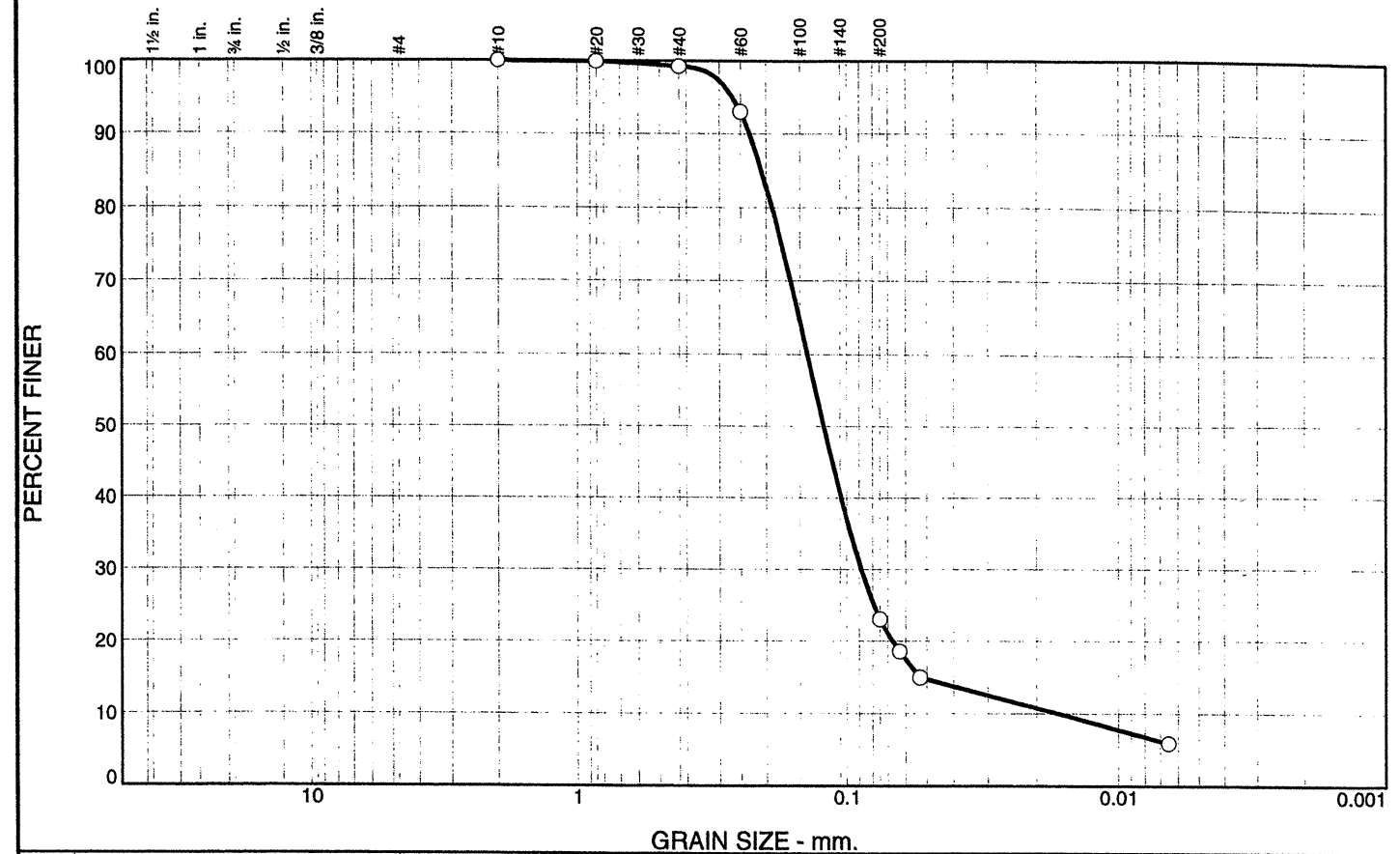
Client: NCDOT #38748.1.1 (K-3800)
Project: NCDOT US 17 Rest Area Permeameter Testing
Project No: 6468092441

Figure NA

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report

SHEET 11



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.8	76.1	23.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.2		
#60	93.0		
#200	23.1		
#270	15.0		

Material Description
Light Yellowish Brown Silty SAND

Atterberg Limits
PL= NP LL= NV PI= NP

Coefficients
D₉₀= 0.2313 D₈₅= 0.2082 D₆₀= 0.1408
D₅₀= 0.1220 D₃₀= 0.0882 D₁₅= 0.0528
D₁₀= 0.0167 C_u= 8.45 C_c= 3.32

Classification
USCS= SM AASHTO= A-2-4(0)

Remarks

* (no specification provided)

Source of Sample: HA-3 Depth: 0.7-1.7'
Sample Number: S-2

Date: 6/22/09

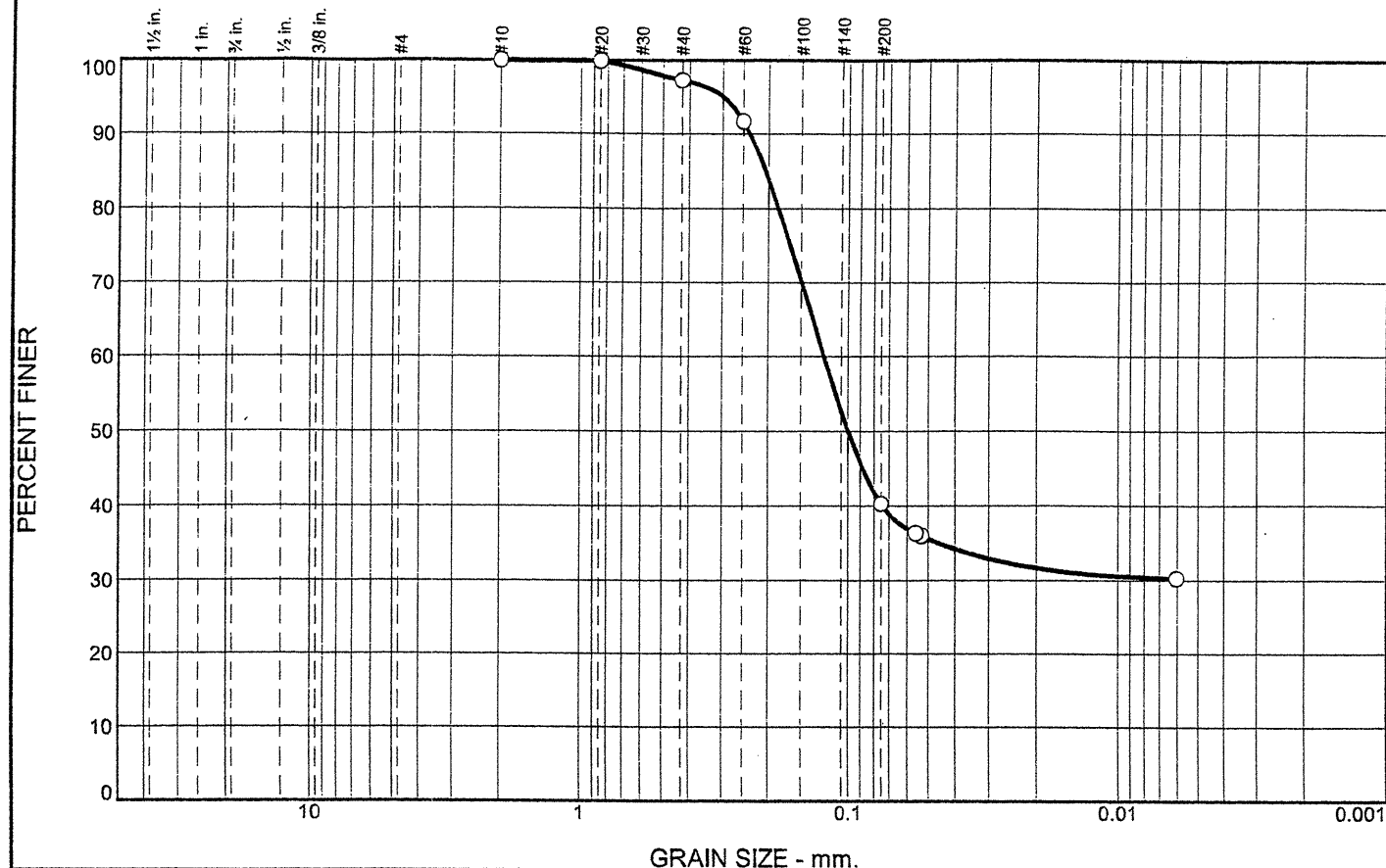
MACTEC Engineering and Consulting, Inc.
Raleigh, North Carolina

Client: NCDOT #38748.1.1 (K-3800)
Project: NCDOT US 17 Rest Area Permeameter Testing
Project No: 6468092441

Figure NA

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.6	57.1	40.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	97.4		
#60	91.7		
#200	40.3		
#270	36.0		

Material Description
Light Yellowish Brown Sandy CLAY

Atterberg Limits
PL= 15 LL= 29 PI= 14

Coefficients
D₈₅= 0.2051 D₆₀= 0.1228 D₅₀= 0.0995
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification
USCS= SC AASHTO= A-6(2)

Remarks

* (no specification provided)

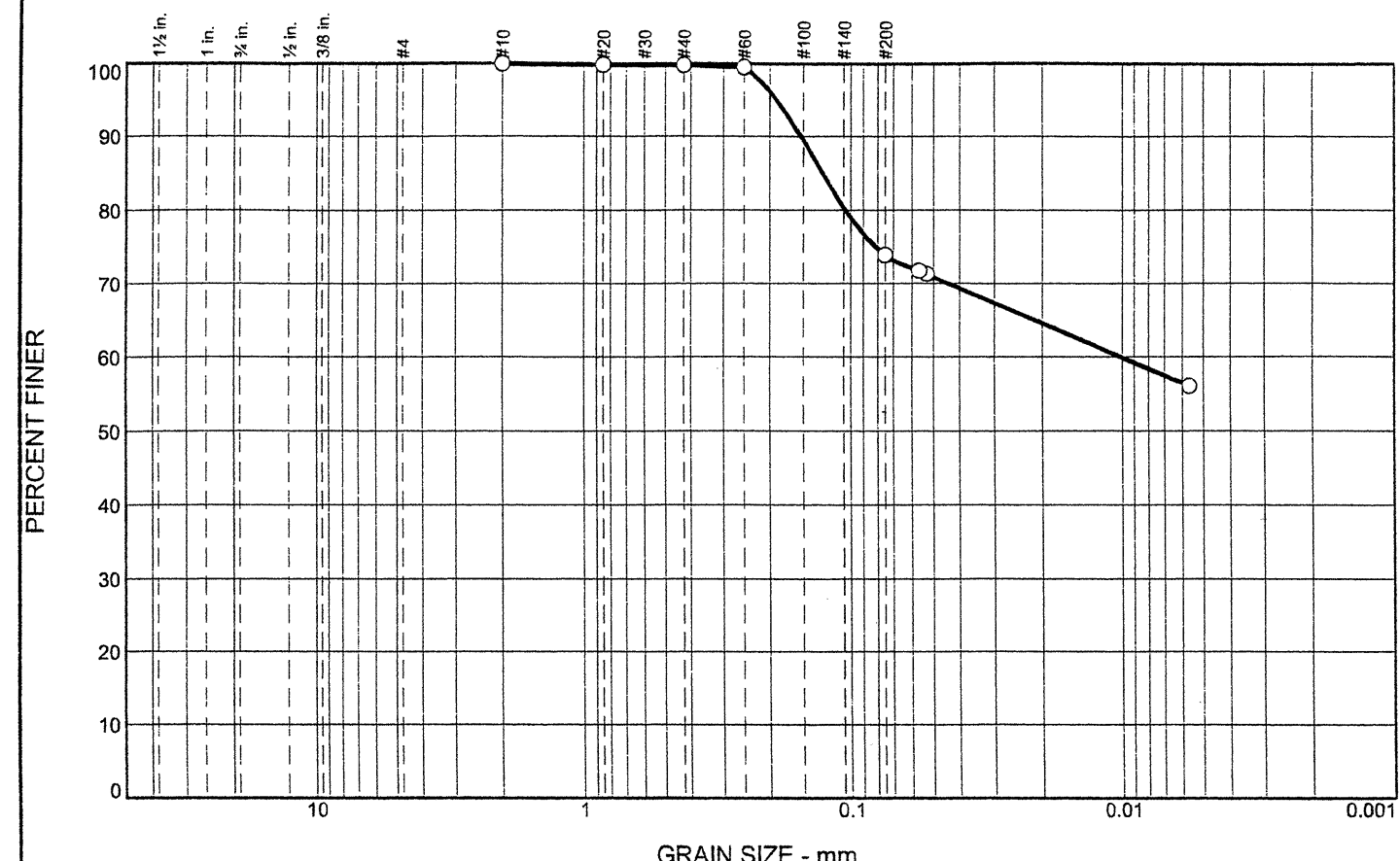
Source of Sample: HA-3 Depth: 4.0-6.0'
Sample Number: S-3

Date: 6/22/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	Client: NCDOT #38748.1.1 (K-3800) Project: NCDOT US 17 Rest Area Permeameter Testing Project No: 6468092441	Figure NA
--------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------	-----------

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	25.9	73.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.8		
#60	99.5		
#200	73.9		
#270	71.3		

Material Description
Olive Yellow Sandy CLAY

Atterberg Limits
PL= 19 LL= 52 PI= 33

Coefficients
D₈₅= 0.1267 D₆₀= 0.0101 D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification
USCS= CH AASHTO= A-7-6(24)

Remarks
Specific Gravity is assumed

* (no specification provided)

Source of Sample: HA-4 Depth: 0.7-3.3'
Sample Number: S-4

Date: 6/22/09

MACTEC Engineering and Consulting, Inc. Raleigh, North Carolina	Client: NCDOT #38748.1.1 (K-3800) Project: NCDOT US 17 Rest Area Permeameter Testing Project No: 6468092441	Figure NA
--------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------	-----------

Tested By: CS (Cert# 104-04-0504) Checked By: MDC (Lab Manager)