

CONTRACT: 32575.1.2 ID: B-0682

# STATE OF NORTH CAROLINA

## DEPARTMENT OF TRANSPORTATION

### DIVISION OF HIGHWAYS

### GEOTECHNICAL UNIT

**CONTENTS:**

LINE	STATION	SHEET NO.
-L-	11+50 TO 32+42	4, 5, 9
-L-	55+39 TO 72+10	7, 8, 11
-DET-	10+00 TO 17+10	5, 13
-DET-	24+85 TO 29+05	6, 13
-YI-	13+50 TO 28+53	7, 8, 12

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-0682	1	13
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
32575.1.2	BRS-1813(1)	P.E.	
32575		RW & UTILITIES	
	BRZ-1813(3)	CONST	

**CAUTION NOTICE**

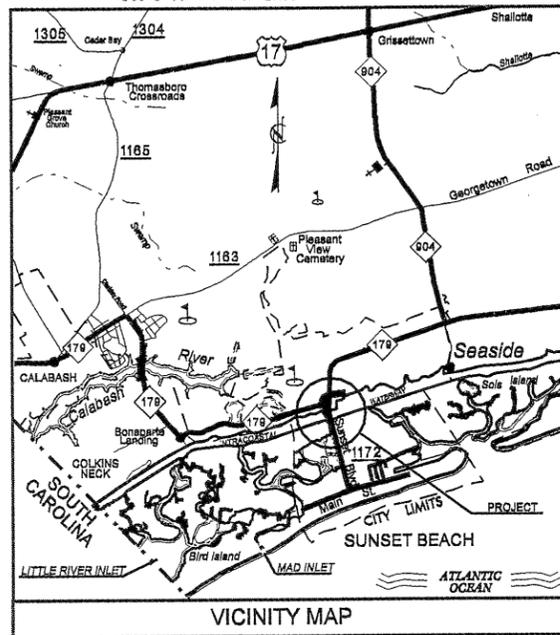
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING 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. 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.

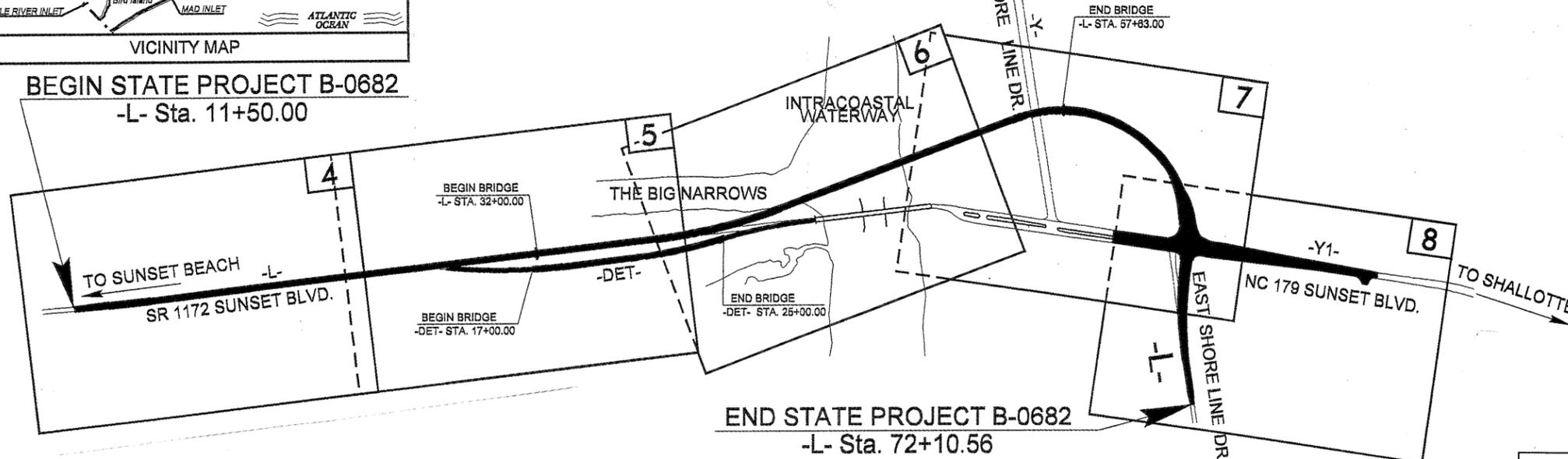
BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE ENGINEER 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 REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM INDICATED IN THE SUBSURFACE INFORMATION.

# SUBSURFACE INVESTIGATION

STATE PROJECT 8.2230101 I.D. NO. B-0682  
 F.A. PROJECT BRS-1813(1)  
 COUNTY BRUNSWICK  
 DESCRIPTION BRIDGE NO. 198 OVER THE INTRACOASTAL WATERWAY AND APPROACHES ON SR 1172 AT SUNSET BEACH  
 (INVENTORY)



BEGIN STATE PROJECT B-0682  
 -L- Sta. 11+50.00



END STATE PROJECT B-0682  
 -L- Sta. 72+10.56

THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS

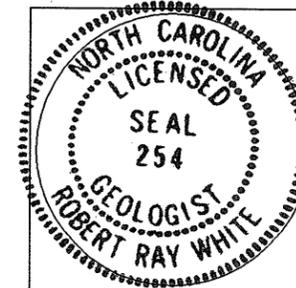
THIS PROJECT IS WITHIN THE LIMITS OF SUNSET BEACH

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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.

DRAWN BY: DRA

INVESTIGATED BY: FMW PERSONNEL: FMW  
 CHECKED BY: FMW FMW LWD  
 SUBMITTED BY: RRW RRW KBM  
 DATE: JULY, 2002 RES



SEAL  
 SIGNATURE  
Robert Ray White

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

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-0682	8.2230101	2	13

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																												
<p>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:</p> <p align="center"><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>		<p>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)</p> <p>GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p align="center"><b>ANGULARITY OF GRAINS</b></p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.</p>		<p>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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN 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.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>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.</p> <p>TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																												
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09/08/95

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**BRUNSWICK COUNTY**

LOCATION: BRIDGE NO. 198 OVER THE INTRACOASTAL WATERWAY AND APPROACHES ON SR 1172 AT SUNSET BEACH

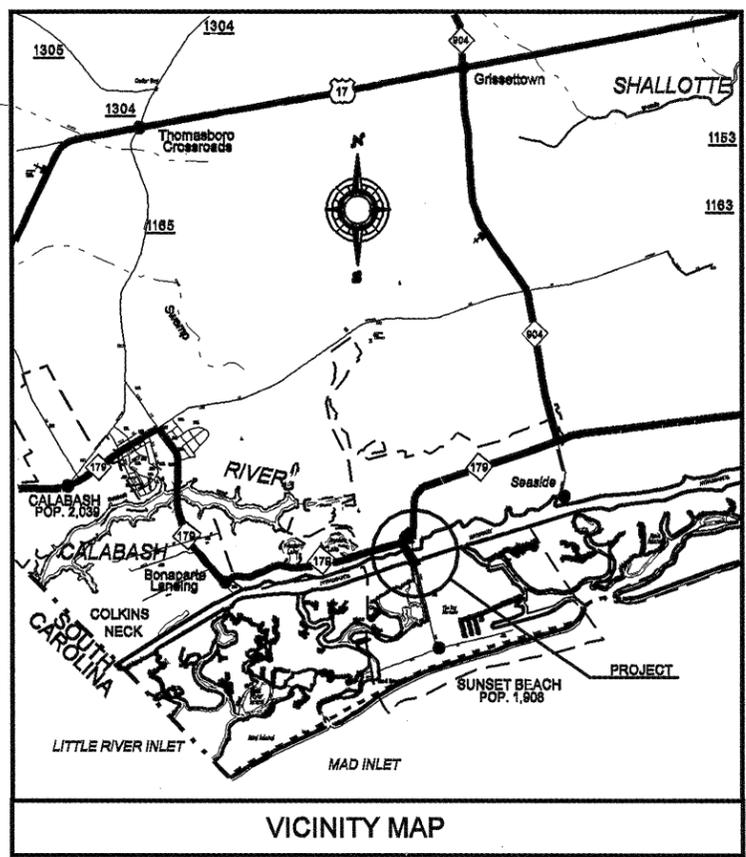
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-0682	3	13
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
8.2230101	BRS-1813(1)	PE	

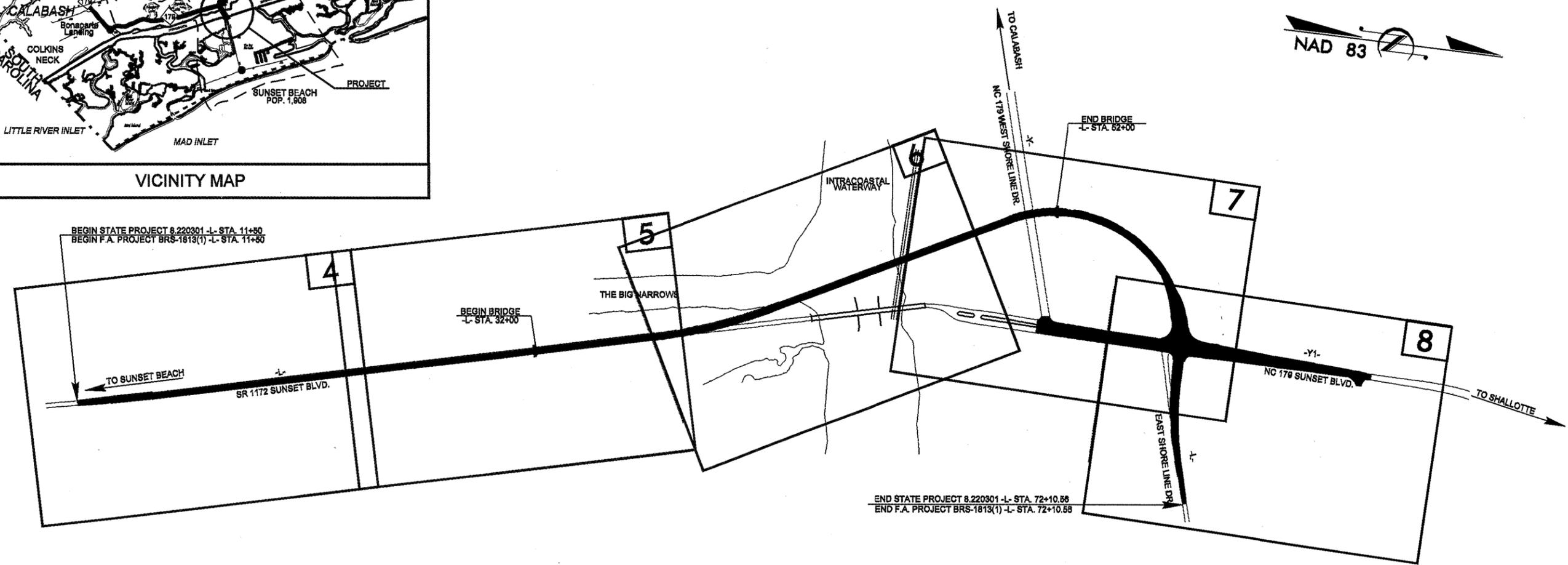


PROJECT: B-0682

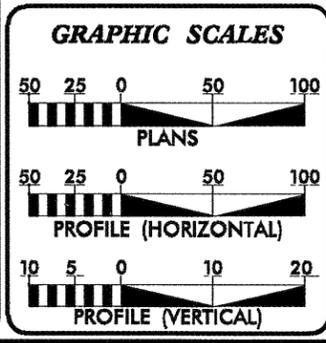
PROJECT: 8.2230101



VICINITY MAP



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



**DESIGN DATA**

ADT 2001 =	3800
ADT 2025 =	6800
DHV =	60 %
D =	12 %
T =	3 % *
V =	40 MPH
* TTST	1 %
DUAL	2 %

**PROJECT LENGTH**

LENGTH ROADWAY F.A. PROJECT BRS-1813(1) =	0.769 Mi.
LENGTH STRUCTURE F.A. PROJECT BRS-1813(1) =	0.379 Mi.
TOTAL LENGTH STATE PROJECT 8.2230101 =	1.148 Mi.

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

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MARCH 15, 2002

LETTING DATE: MARCH 16, 2004

**JIMMY GOODNIGHT, PE**  
PROJECT ENGINEER

**LEON OLIVER**  
PROJECT DESIGN ENGINEER

**HYDRAULICS ENGINEER**

\_\_\_\_\_  
SIGNATURE

\_\_\_\_\_  
ROADWAY DESIGN ENGINEER

\_\_\_\_\_  
SIGNATURE

**DIVISION OF HIGHWAYS**  
STATE OF NORTH CAROLINA

\_\_\_\_\_  
STATE DESIGN ENGINEER

**DEPARTMENT OF TRANSPORTATION**  
FEDERAL HIGHWAY ADMINISTRATION

\_\_\_\_\_  
APPROVED DIVISION ADMINISTRATOR

\_\_\_\_\_  
DATE



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

LYNDO TIPPETT  
SECRETARY

July 16, 2002

STATE PROJECT: 8.2230101 B-0682  
FEDERAL PROJECT: BRS-1813(1)  
COUNTY: Brunswick  
DESCRIPTION: Bridge No. 198 over the Intracoastal Waterway and Approaches on SR 1172 at Sunset Beach  
SUBJECT: Geotechnical Report - Inventory

Due to the lengthening of the proposed bridge, grade revisions and addition of a detour, the Inventory report submitted November of 1989 should be disregarded. Subsurface data utilized in this report includes borings made in 1986, 1989, and May of this year.

**Project Description**

The proposed project is located on SR 1172 at the existing bridge over the Intracoastal Waterway at Sunset Beach. The roadway portion of the project will primarily consist of constructing the approaches for the new bridge. The project will typically be constructed along and west of existing SR 1172 and NC 179. Some widening of the existing SR 1172 and NC 179 roadways is proposed. An on-site detour will be constructed along the east side of SR 1172. Based on the current plans, a detour bridge is proposed to span some of the wetland portions of the project. The southern terminus of the project is located on a tidal marsh adjacent to a narrow barrier island while the northern end will be located on the mainland. The investigation of subsurface conditions was confined to the corridor of proposed new construction.

The following base lines were investigated for this project:

<u>Line</u>	<u>Station</u>
-L-	11+50 to 32+42
-L-	55+39 to 72+10
-DET-	10+00 to 17+10
-DET-	24+85 to 29+05
-Y1-	13+50 to 28+53

**Areas of Special Geotechnical Interest**

1) The following sections contain clay soils which typically have high plasticity indices, 50 percent or more passing the 200 sieve, and/or high moisture contents which have the potential to cause settlement and/or stability problems:

<u>Line</u>	<u>Station(±)</u>
-L-	30+00 to 32+50
-L-	55+00 to 61+50

2) Typically, the entire project was found to exhibit a high water table, seasonal high ground water or the potential for ground water related construction problems. The only segment noted that ground water was 6 feet or more below the surface generally occurs between -L- stations 55+40± and 61+00±.

3) Relatively soft, slight to moderately organic deposits occur within the tidal marsh along the southern approach and detour.

**Physiography and Geology**

The project corridor is located in the Coastal Plain Physiographic Province and is underlain by Cretaceous to Recent sediments. Soils along the north approach will involve upland deposits. The south approach typically consists of tidal marsh deposits and existing roadway fill. Topography along the project is nearly flat to moderately sloping with elevations ranging from a low of -23± feet on the bottom of the Intracoastal Waterway to a high of 26± feet on the north approach. Natural ground elevation within the tidal marsh range from 1 to 2 feet above sea level.

**Ground Water**

Ground water data collected within the upland areas range from 2 to 13 feet in depth. Water levels in the tidal marsh areas were at or above the natural ground surface. However, the water levels of the Intracoastal Waterway and adjacent marsh areas are variable due to tidal fluctuations. During our investigation, water levels were noted to range from elevations of -1.5 to 3.8 feet above sea level.

**Soils**

Soils encountered during this investigation are separated into four major categories based on origin and published data. These categories are tidal marsh soils, upland soils, Peedee Formation deposits, and embankment soils.

Soils within the tidal marsh areas (south approach) and detour consist of up to 5 feet of loose to medium dense fine to coarse sand (A-3) underlain by 1 to 4 feet of very soft organic soils (clay

and fine sand). The organic soils typically exhibit fair to poor engineering properties. Vane Shear tests performed in the organic deposits range from 30 to 440 psf. Moisture contents of tested organic samples range from 100 to 200 percent and organic contents of 3 to 9 percent are typical. The organic deposits are generally underlain by loose to medium dense fine to coarse sand (A-2-4, A-3). Based on a deep SPT boring drilled at station 32+00, the granular deposits extend to an elevation of -16± feet. Soils between elevations of -16± and -29± feet consist of very soft sandy silty clay (A-7-6) and are underlain by Cretaceous sediments belonging to the Peedee Formation. The proposed alignment follows the existing SR 1172 roadway from station -L- station 11+50 to 38+00±. Approximately 3 to 6 feet of sandy (A-2-4, A-3) fill overlies the tidal marsh deposits along this segment. Also in the vicinity of -L- station 32+00, abandoned commercial development has resulted in 3 to 5 feet of sandy (A-3) embankment above natural ground.

Surficial soils along the upland area along the north approach (-L- and -Y1-) generally consist of very loose to medium dense sand (A-2-4, A-3). Based on several deep auger and SPT borings from -L- stations 55+00 to 61+00, these deposits extend down to an elevation of -1± feet. Soils between elevations of -1± and -14± consist of soft to medium stiff fine sandy silty clay (A-6, A-7-6). The clay deposits exhibit fair to poor engineering properties. Moisture contents of tested samples in this layer generally range from 65 to 84 percent. Vane Shear tests performed in the clay soils range from 1100 and 1500 psf. The Peedee Formation was noted below the cohesive soils near an elevation of -14 feet.

The Peedee Formation was encountered in deeper borings in the tidal marsh and upland segments at elevations of -29± and -14± feet, respectively. The boring made at -L- station 32+00 indicates that soils within the Peedee Formation in the tidal marsh (southern approach) consist of an indurated sandstone layer 0.3 feet thick at an elevation of -29± feet underlain by stiff to very stiff sandy silty clay (A-7-6). A deep boring on the upland side along the northern approach at -L- station 55+80 indicates soils of the Peedee Formation consists of 15± feet of medium dense silty sand (A-2-4, A-1-b) underlain by stiff to very stiff clay (A-6) with sandstone layers.

Embankments are man-made fills built during construction of existing roadways. Roadway embankment soils overlie the upland and tidal marsh soils along the entire width and length of the existing alignment. These embankment soils consist primarily of loose to medium dense fine to coarse sand (A-2-4, A-3) and have very good to excellent engineering properties.

**Undisturbed Samples**

Undisturbed (Shelby Tube) samples were taken at the following locations and submitted for Triaxial CU and Consolidation testing in August 1986:

<u>Sample No.</u>	<u>Station (-L-)</u>	<u>Depth (ft.)</u>
ST-2	57+55, -CL-	31.0 to 33.0
ST-3	55+80, -CL-	21.3 to 23.3
ST-4	55+80, -CL-	31.3 to 33.3

The following tubes were submitted for Triaxial CU and Consolidation testing in May 2002:

<u>Sample No.</u>	<u>Station (-L-)</u>	<u>Depth (ft.)</u>
ST-1	32+00, 30' LT	26.3-28.3
ST-2	32+00, 30' LT	31.3-33.3

Respectfully submitted,



Fred M. Wescott III, TEG-II

DNA:FMW

# EARTHWORK SUMMARIES

PROJECT B-0682

COUNTY Brunswick

DATE

2/1/2007

SHEET **3C**

Volumes in Cubic Yards

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. 25%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
<b>RD214549 SUMMARY No. 1</b>															
-L-	11+50.00	32+00.00	0				0	10,466		10,466	13,083	13,083			
-DET-	12+00.25	17+00.00	0				0	2,589		2,589	3,236	3,236			
	BRIDGE														
DET	25+11.54	29+05.02	40				40	904		904	1,130	1,090			
<b>SUMMARY No. 1 TOTAL</b>			40				40	13,959		13,959	17,449	17,409			
<b>SUMMARY No. 2</b>															
-L-	57+63.00	65+00.00	1,369				1,369	12,192		12,192	15,240	13,871			
-L-	65+47.00	72+10.56	1,732				1,732	384		384	480	0	1,252	0	1,252
-Y1-	16+65.00	23+53.55	2,499				2,499	694		694	868	0	1,631	0	1,631
<b>SUMMARY No. 2 TOTAL</b>			5,600				5,600	13,270		13,270	16,588	13,871	2,883		2,883
<b>SUMMARY No. 3</b>															
CAUSEWAY REMOVAL			8,016				8,016						8,016	0	8,016
DETOUR REMOVAL			2,813				2,813						2,813	0	2,813
<b>SUMMARY No. 3 TOTAL</b>			10,829				10,829						10,829	0	10,829
<b>SUMMARY No. 4</b>															
CARTWAY CONSTRUCTION			1,250				1,250				*SEE NOTE BELOW		1,250	0	1,250
<b>SUMMARY No. 4 TOTAL</b>			1,250				1,250						1,250	0	1,250
<b>SUMMARIES TOTAL</b>			<b>17,719</b>				<b>17,719</b>	<b>27,229</b>		<b>27,229</b>	<b>34,037</b>	<b>31,280</b>	<b>14,962</b>	<b>0</b>	<b>14,962</b>
<b>WASTE IN LIEU OF BORROW SHOULDER MATERIAL</b>								1,470		1,470	1,838	1,225			
<b>(+) 5% TO REPLACE SOIL IN BORROW PITS</b>												1,520			
<b>DEDUCTION FOR "DAM EMBANKMENT EARTHFILL"</b>								3,500		3,500	4,488	-4,488			
<b>GRAND TOTAL</b>			17,719									25,722	10,829		10,829
<b>SAY</b>			<b>18,000</b>									<b>26,000</b>			
<b>DAM EMBANKMENT EARTHFILL</b>								6,490		6,490	<b>SAY</b>	<b>8,150</b>			
<b>UNDERCUT</b>				<b>SAY</b>	<b>500</b>										

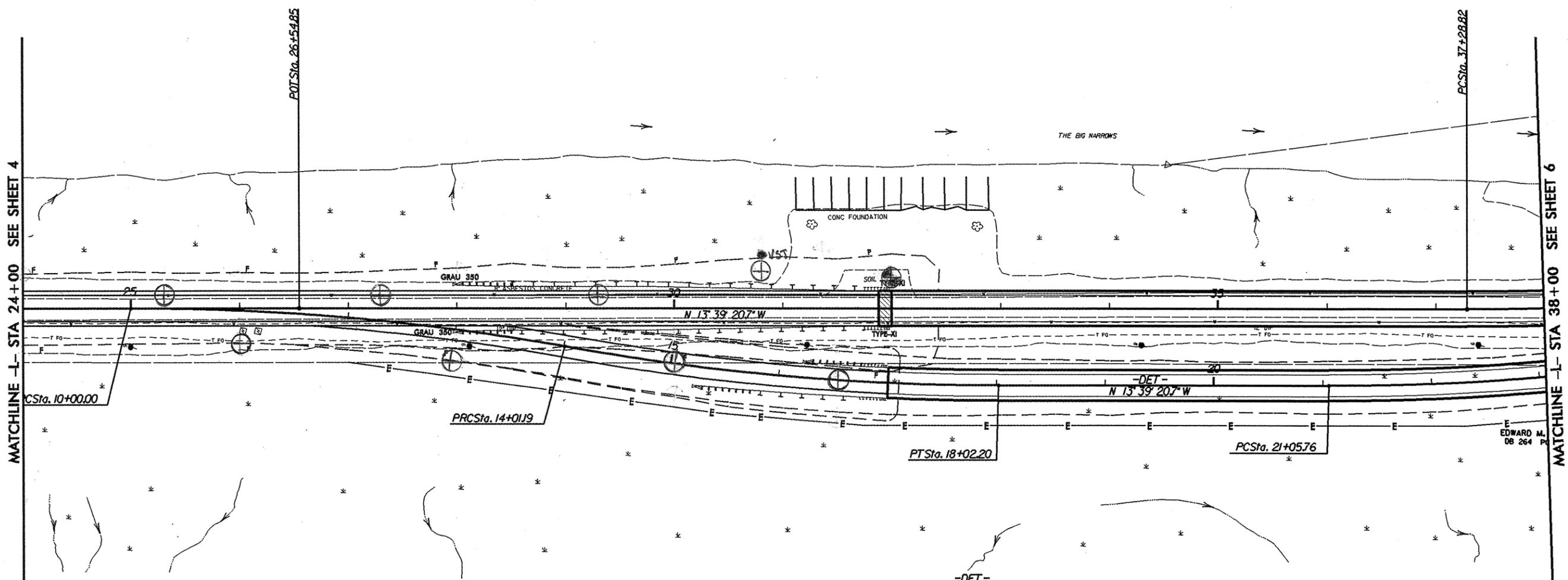
\*NOTE: EMB. Req'd. FOR DAM IS SPECIAL MATERIAL AND IS NOT INCLUDED IN BORROW TOTAL ( SEE SPECIAL PROVISIONS)



PROJECT REFERENCE NO. B-0682	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

8/17/98

REVISIONS



-DET-

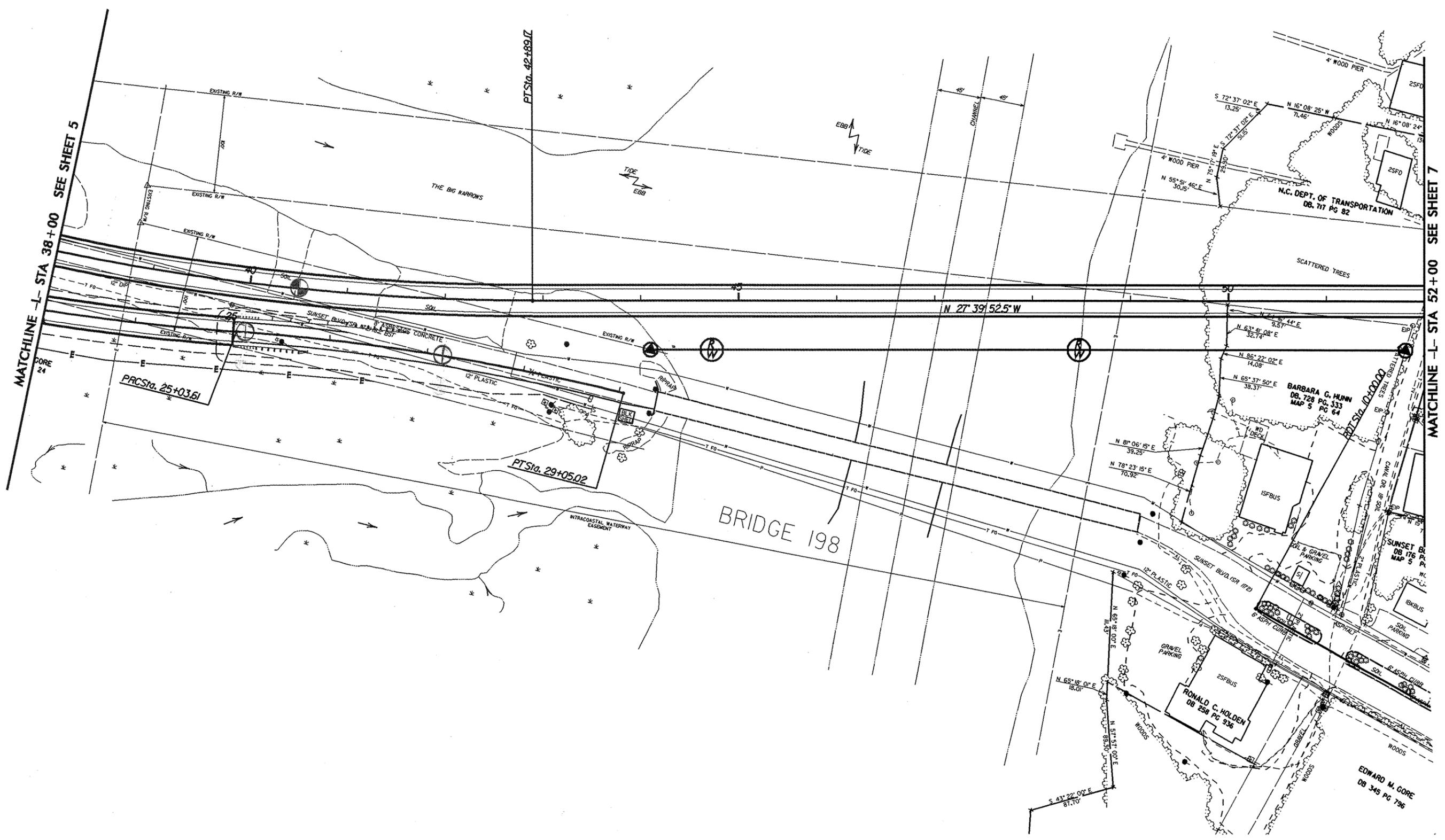
PI Sta 12+01.1	PI Sta 16+02.21	PI Sta 23+05.19	PI Sta 27+04.83
$\Delta = 10^\circ 01' 46.9''$ (RT)	$\Delta = 10^\circ 01' 31.1''$ (LT)	$\Delta = 9^\circ 56' 46.1''$ (LT)	$\Delta = 10^\circ 02' 06.8''$ (RT)
D = 2' 30" 00.0"	D = 2' 30" 00.0"	D = 2' 30" 00.0"	D = 2' 30" 00.0"
L = 401.19'	L = 401.01'	L = 397.85'	L = 401.41'
T = 201.11'	T = 201.02'	T = 199.42'	T = 201.22'
R = 2,291.83'	R = 2,291.83'	R = 2,291.83'	R = 2,291.83'

\*\*\*\*\*  
 DATE: 8/17/98  
 TIME: 10:00 AM  
 DRAWN BY: J. J. J.  
 CHECKED BY: J. J. J.  
 APPROVED BY: J. J. J.  
 \*\*\*\*\*

PROJECT REFERENCE NO. B-0682	SHEET NO. 6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

$\Delta = 14^{\circ}00'31.7"$  (LT)  
 $OD = 2^{\circ}30'00.0"$   
 $LT = 560.35'$   
 $TT = 281.58'$   
 $R = 2,291.83'$

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SYSTEMS DESIGN  
 8/17/99



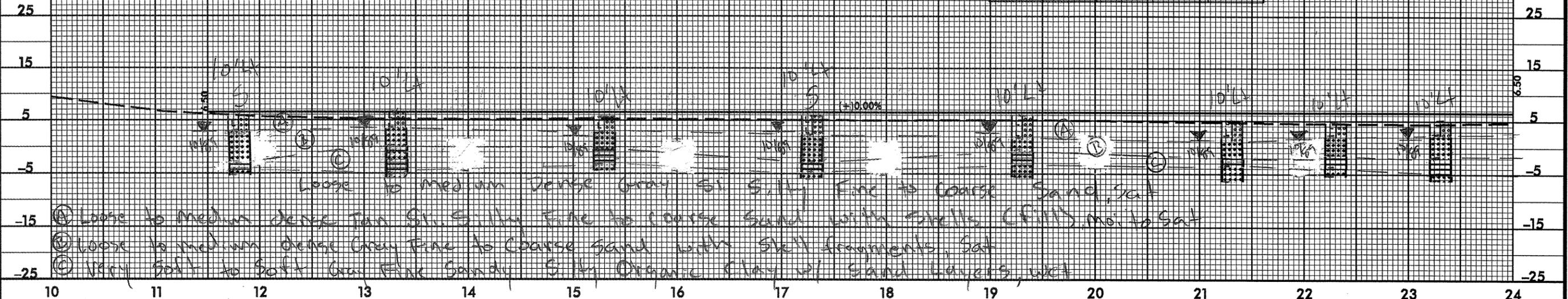


**Soil Sample Test Results**

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	ASTM CLASS		% BY WEIGHT					% PASSING (SIEVES)			% MOISTURE	% ORGANIC
				LL	PL	CLAY	SAND	SILT	CLAY	#10	#40	#200			
S-7	11+80	10' LT	1.0-3.0	A-3(0)	18	NP	9	89	0	2	97	94	3		
S-8	11+80	10' LT	3.0-9.0	A-3(0)	25	NP	16	79	1	4	81	75	5		
S-5	17+30	10' LT	1.0-3.5	A-3(0)	25	NP	16	80	0	4	98	94	5		
S-6	17+30	10' LT	3.5-8.5	A-3(0)	25	NP	14	87	0	2	97	96	3		
S-12	17+30	10' LT	8.5-10.5	A-2-3(0)	29	8	4	70	10	12	100	98	28	191.7	3.1

**VANE SHEAR TESTS**

STATION	OFFSET	DEPTH (ft)	SR (psf)
17+30	25' LT	2.0	295
17+30	25' LT	2.5	295
17+30	25' LT	3.0	177
17+30	25' LT	3.5	516
17+30	25' LT	4.0	192
17+30	25' LT	4.5	295
17+30	25' LT	5.0	550



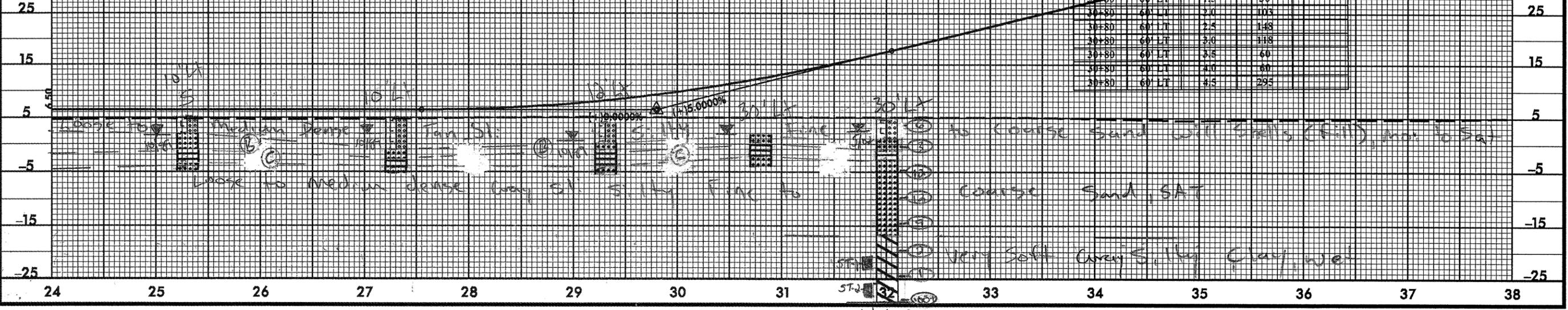
**Soil Sample Test Results**

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	ASTM CLASS		% BY WEIGHT					% PASSING (SIEVES)			% MOISTURE	% ORGANIC
				LL	PL	CLAY	SAND	SILT	CLAY	#10	#40	#200			
S-3	25+30	10' LT	1.0-3.0	A-3(0)	20	NP	10	80	0	4	88	82	5		
S-4	25+30	10' LT	3.0-6.0	A-3(0)	23	NP	10	85	0	4	85	81	4	11	
S-11	25+30	10' LT	6.0-8.5	A-7-6(20)	77	43	4	30	30	34	96	93	63	98.1	8.5
SS-3	32+00	30' LT	13.30-14.80	A-3(0)	22	NP	10.3	89.0	0.7	0.0	100	100	1		
SS-4	32+00	30' LT	23.30-24.80	A-7-6(15)	67	37	14.6	19.6	17.7	48.6	76	67	54	54.9	
SS-5	32+00	30' LT	34.30-34.00	A-3(4)	39	7	6.7	32.5	42.3	8.4	100	95	72		
SS-6	32+00	30' LT	38.30-39.80	A-7-6(20)	55	35	0.4	35.2	23.5	40.9	100	100	78	35.0	
SS-7	32+00	30' LT	48.30-49.80	A-7-6(16)	43	20	0.2	43.8	27.1	28.6	100	100	80		
SS-8	32+00	30' LT	58.30-59.80	A-7-6(20)	50	31	0.6	38.2	28.3	32.7	100	100	81	32.6	
SS-9	32+00	30' LT	68.30-69.80	A-7-6(30)	57	37	0.4	34.4	28.4	36.8	100	100	83	33.3	
SS-10	32+00	30' LT	5.00-6.50	A-7-4(0)	26	NP	7.0	73.1	11.5	3.3	100	100	27		

PI = 29+80.00  
 EL = 6.50'  
 VC = 440'  
 K = 90.0

**VANE SHEAR TESTS**

STATION	OFFSET	DEPTH (ft)	SR (psf)
30+80	30' LT	2.0	30
30+80	30' LT	2.5	43
30+80	30' LT	3.0	177
30+80	30' LT	3.5	118
30+80	30' LT	4.0	162
30+80	30' LT	4.5	443
30+80	60' LT	1.5	30
30+80	60' LT	2.0	105
30+80	60' LT	2.5	148
30+80	60' LT	3.0	118
30+80	60' LT	3.5	60
30+80	60' LT	4.0	60
30+80	60' LT	4.5	295



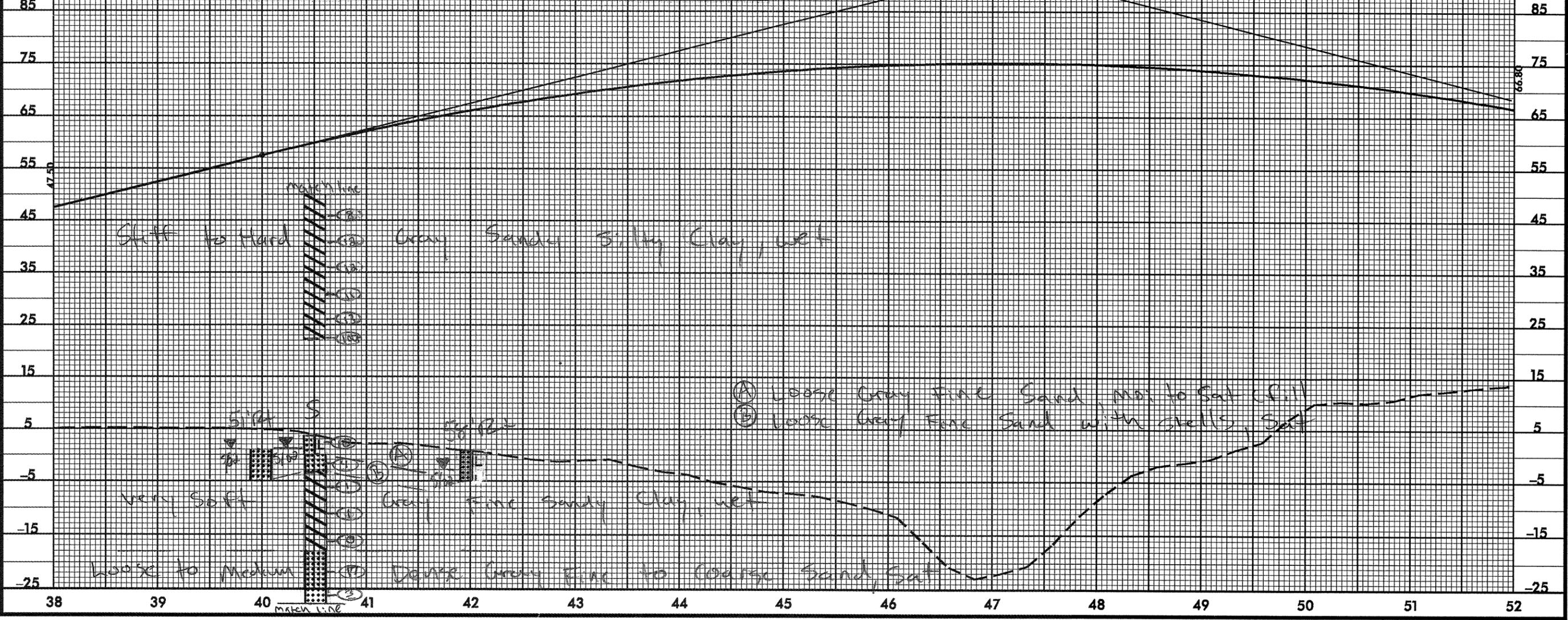
5/14/99

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**Soil Sample Test Results**

SAMPLE NO.	STATIONS	DEPTH	INTERVAL	CLASS	% BY WEIGHT				% PASSING SIEVES			MOISTURE	ORGANIC
					LI	PL	C SAND	F SAND	SILT	CLAY	#10		
SS-11	40+50	CL	4.00-5.00	A-3(0)	21	35	16.2	83.2	0.5	4.1	25	21	6
SS-12	40+50	CL	8.00-9.00	A-7-6(9)	49	38	6.5	48.7	15.3	29.5	100	98	48
SS-13	40+50	CL	18.00-19.00	A-7-6(4)	43	25	1.1	59.9	6.5	30.1	96	95	39
SS-14	40+50	CL	23.00-24.00	A-3(0)	16	39	22.4	76.0	0.6	1.0	100	97	2
SS-15	40+50	CL	33.00-34.00	A-7-6(19)	49	29	0.4	48.3	18.6	32.7	100	100	70
SS-16	40+50	CL	43.00-44.00	A-7-6(17)	46	27	5.1	44.2	24.1	23.6	100	98	70
SS-17	40+50	CL	53.00-54.00	A-7-6(28)	54	34	0.6	37.8	26.8	34.8	100	100	80

PL = 47+10.00  
 EL = 93.00'  
 VC = 1+420'  
 K = 142.0



Stiff to Hard Gray Sandy Silty Clay, wet

Very Soft

Loose to Medium Dense Gray Fine to Coarse Sand, Sat

- (A) Loose Gray Fine Sand, May to Sat, c/Bill
- (B) Loose Gray Fine Sand with shells, Sat

SYSTEM TIME: 5/14/99 10:58:58 AM  
 C:\PROJECTS\B-0682\DRAWING\SS-11.DWG  
 PLOT: 5/14/99 10:58:58 AM



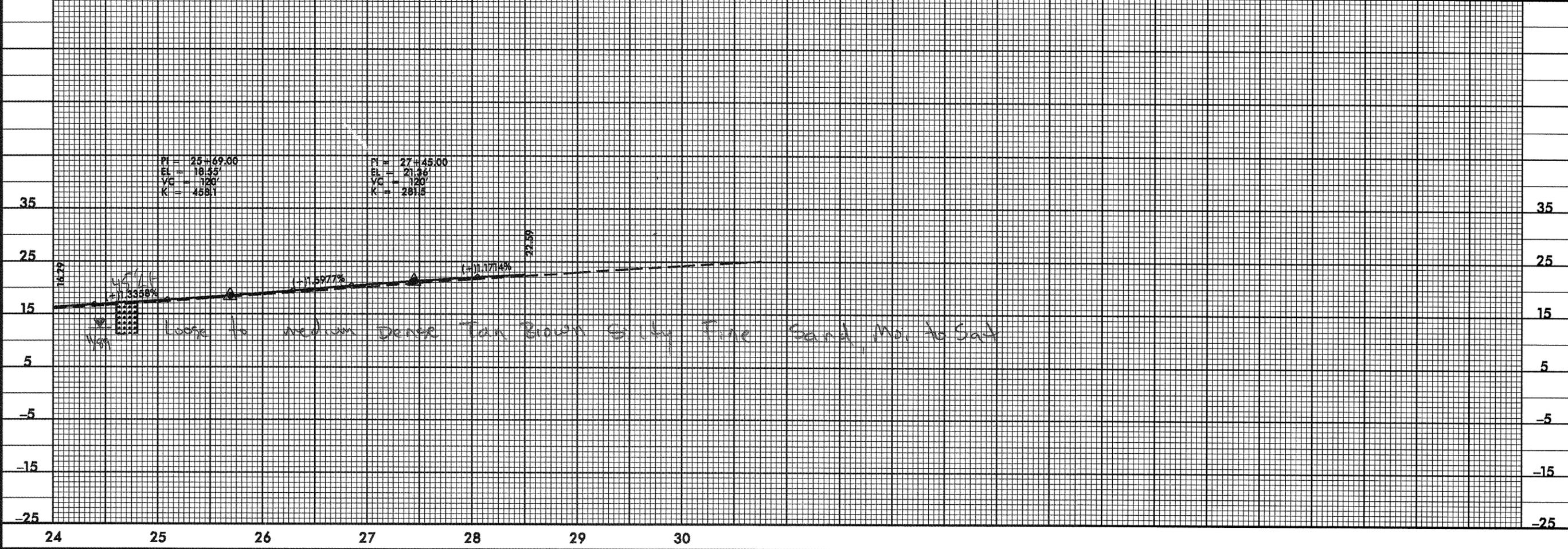
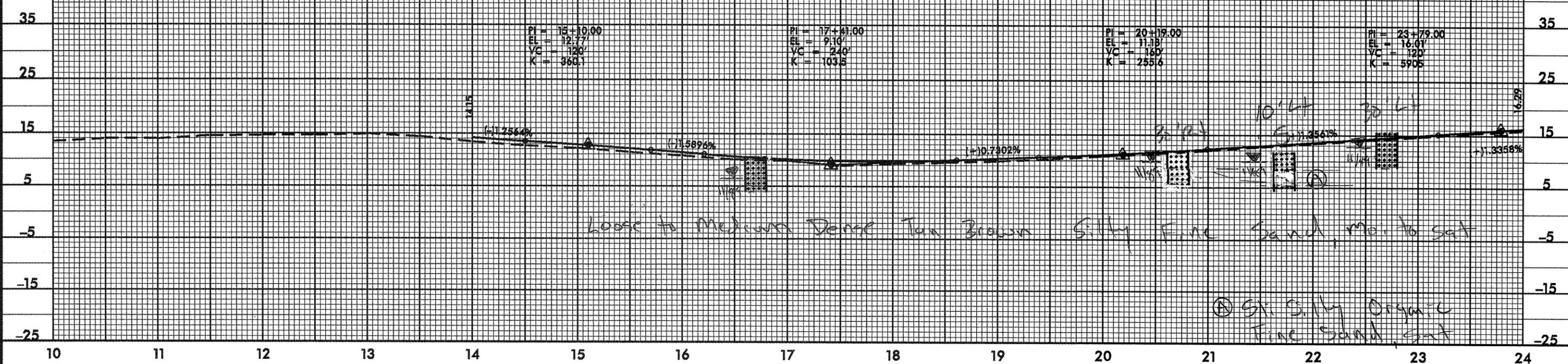
5/28/99

-Y1-

PROJECT REFERENCE NO. B-0682	SHEET NO. 12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	

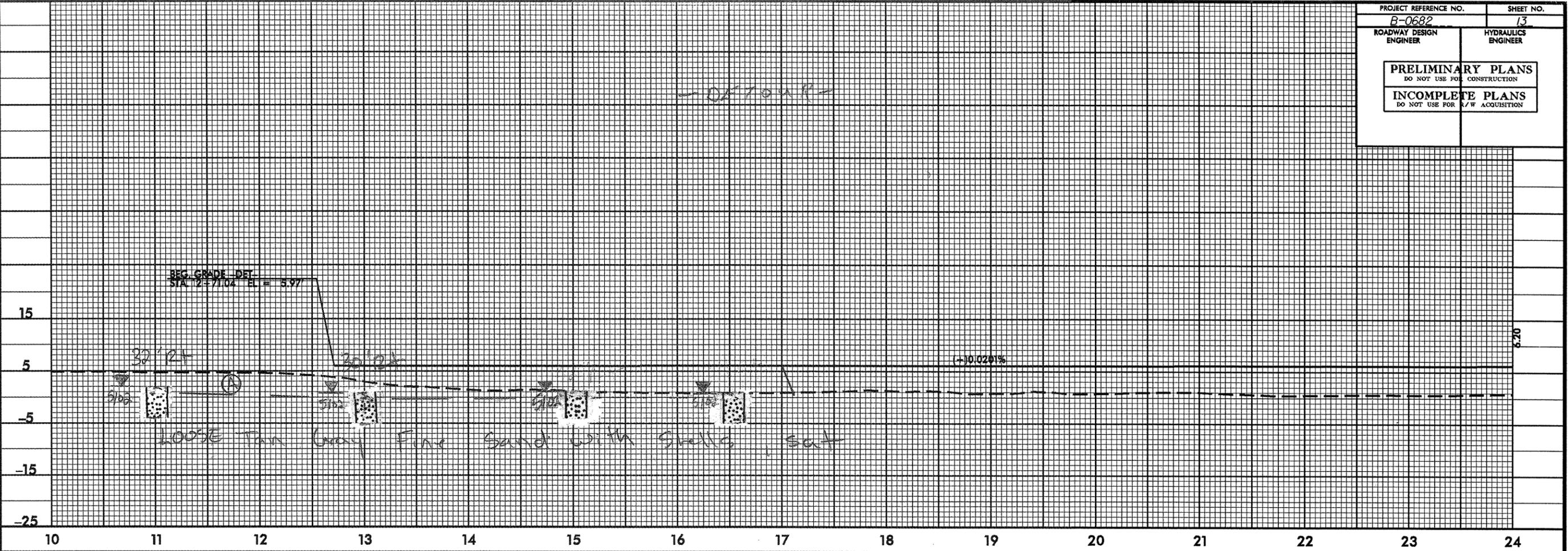
*Soil Sample Test Results*

SAMPLE NO.	SECTION	DEPTH	CLASS	% BY WEIGHT				% PASSING (SIEVES)			ORGANIC	
				CLAY	SILT	SAND	GRAVEL	#10	#40	#200		
S-9	21+70	10-17	A-3(0)	23	NP	10	83	7	100	77	6	
S-10	21+70	0-17	A-2.5(0)	45	NP	10	79	5	100	88	11	11.9

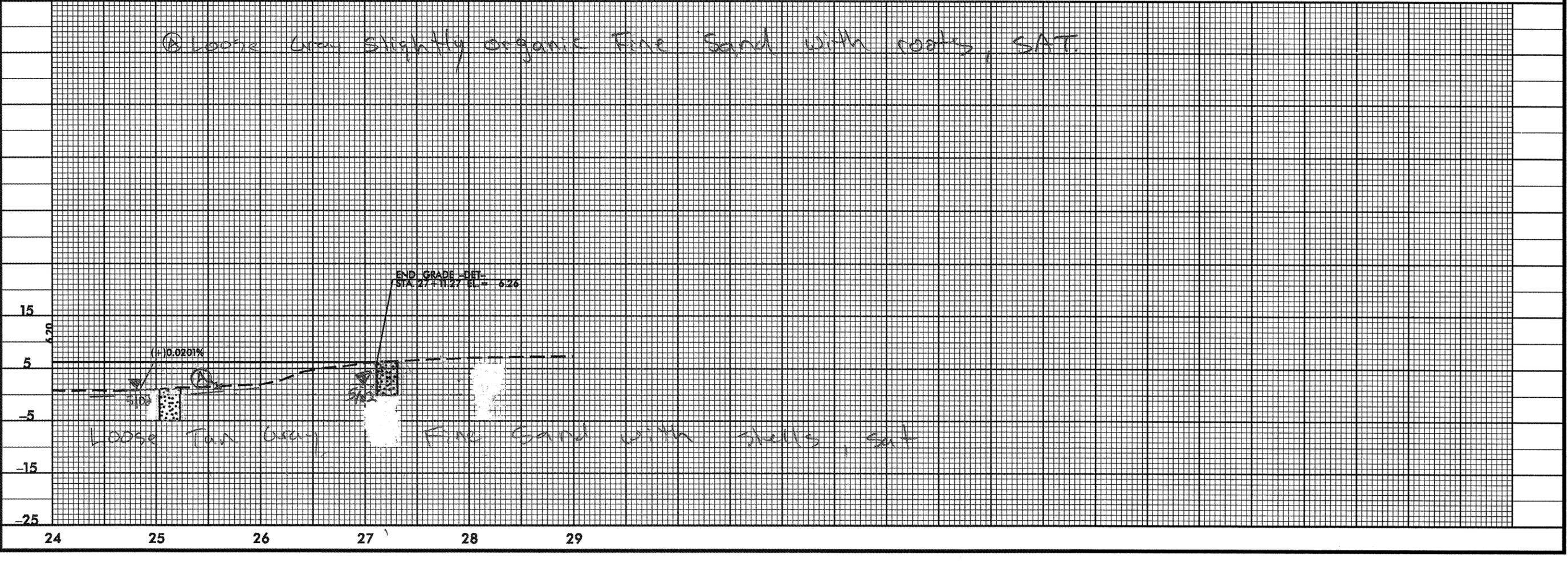


5/28/99

- OF 104 -



⊕ Loose Gray slightly organic Fine Sand with coals, SAT.



5/28/99

SYSTEMS