REV. 09-12-19

Project TIP No.: I-5972
County: Johnston
Project Engineer: Mike Merritt, PE
Division Contact: Russell Broadwell, PE

DIVISION DESIGN RALEIGH LET CHECKLIST

Project plans, prepared by Division personnel or private engineering firms, to be let to contract through the State Contract Officer shall perform functions as follows:

1. ✓ Make sure plans are prepared in accordance with the "Review List for Final Construction Plans". https://connect.ncdot.gov/resources/Specifications/2012RevisionsRoadwayDrawings/2018%20Review%20List%20for%20Final%20Construction%20Plans%20--%20FINAL.pdf

2. ✓ Any environmental concerns should be resolved through coordination with the Project Development and Environmental Analysis Branch **prior** to plan completion. Make sure all necessary permits have been applied for and approved.

3. ✓ All TIP projects will need to be set up on Sharepoint prior to submitting the plans to *Contract Standards and Development.* If there is not already a set of folders set up for the project on project store, send an email to the help desk *(dothelp@ncdot.gov)* and ask for a project store to be set up for this TIP.

4. ✓ Geotechnical recommendations, retaining wall designs, and any subsurface investigations should be coordinated through the regional office of the Geotechnical Engineering Unit prior to turning in the project plans to *Contract Standards and Development*. All geotechnical recommendations should be incorporated into the project design, and if applicable, subsurface plans should be submitted with the project plans.

5.✓Traffic management plans should be coordinated with the *Work Zone Traffic Control* Section and turned in with the project plans.

6.✓Utility plans should be coordinated with the *Utilities Unit* prior to turning in the project plans to *Contract Standards and Development*. Any utility construction (UC) and/or utility by others (UO) plans should be turned in with the project plans.

7.✓Coordinate with the *Roadside Environmental Unit,* prior to turning in the project plans to *Contract Standards and Development. A*ll erosion control information (plans, special provisions, estimates, etc.) should be submitted with the project plans.

8.✓Coordinate all pavement designs with *Pavement Management* prior to turning in the project plans to *Contract Standards and Development*. Final pavement designs prepared by *Pavement Management* will be sealed by the Pavement Design Engineer. Any pavement design not coordinated with *Pavement Management* will need to be sealed by Division personnel or the PEF firm.

9.✓Pavement Marking and Signing Plans should be coordinated with the *Signing and Delineation Section* and turned in with the project plans.

10.✓Signal plans should be coordinated with the *Signal Design Section* prior to turning in the project plans to *Contract Standards and Development.*

11.✓Structure plans should be coordinated with the *Structure Management Unit* early in the design process. All structure plans (bridges, culverts, walls, etc.) should be submitted to the *Structure Management Unit* at the same time the roadway plans are submitted to *Contract Standards and Development*.

12.NA Submit project files (bound file and loose file) in accordance with section 13-1 in part II, chapter 13 of the Roadway Design Manual.

13.✓Estimates should be in the proper format and include all pay items necessary to let the project. A .csv file or pay items entered into there surfacing program (.est file) should be submitted for all projects prepared by Division personnel. A .csv file should be submitted if the plans are prepared by a private engineering firm.

14.✓Once the plans have been reviewed and approved by a Plan Review Engineer, electronically signed and sealed PDFs of the final plans will need to be placed in the applicable TIP folders on project store. Individual PDF files of each plan sheet are required. Please follow the "Final Plan Submittal Changes" policy from the Roadway Design Unit. See link below.
https://connect.ncdot.gov/site/preconstruction/Pages/Best%20Practices.aspx?Order=61

Some problem areas on plans that may warrant a second look by the designer are:

1.Y Are thru lane tapers long enough to satisfy the design speed of the facility?

2.Y Is the proposed construction properly tied to the survey line?

3.✓Use the "calculation of quantities" sheets found on the *Contract Standards and Development* web page. Submit copies of all applicable calculation sheets with the project plans.
https://connect.ncdot.gov/resources/Specifications/Pages/Contracts-Resources.aspx

4.Y Are summaries included in the plans for drainage, earth work, pavement removal and guardrail?

5.Y Are Geotechnical Summary tables needed?
https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Geotech%20Summary%20Tables.pdf

6.__Y__If the project has a pay item for “Grading Lump Sum,” does it fit within the guidelines specified in section 11-7 in part I of the Roadway Design Manual.

7.__✓__Has all special construction been covered by any needed special provisions, special details, and pay items? The provisions and details shall be sealed by a Professional Engineer. Special details prepared by the Plans and Standards Section of *Contract Standards and Development* shall be sealed by the Standards Squad Leader.

8.__✓__Please provide a list of contacts of all NCDOT unit personnel that have reviewed and approved individual project plans.

9.__NA__Are there any Design Exceptions? See Design Exception Preparation Guidelines.
https://connect.ncdot.gov/projects/Roadway/RoadwayDesignAdministrativeDocuments/Design%20Exception%20Guidelines.pdf

10.__N__Has a Pre-Let or Combined Field Inspection been scheduled? Please have the Division Construction Engineer fill out the Combined or Pre-Let Field Inspection questions (Combined for Bridge Replacement Projects and Pre-Let for all other TIP projects). The questions can be found in the Roadway Design Resources web site under “Forms, Guidelines, Manual” and “Resource Type: Forms”.
https://connect.ncdot.gov/projects/Roadway/Pages/Guidelines--Standards.aspx

11.__Y__Have you obtained Right of Way authorization and has all Right of Way been acquired?

If you have any questions regarding this checklist, please contact Joel S. Howerton, PE at (919) 707-6950 or jhowerton@ncdot.gov

DocuSigned by:
Matthew V. Springer
BC60F6E8B584403...
1/3/2019

EXTRUDED THERMOPLASTIC PAVEMENT MARKING THICKNESS:
(03-19-19)

Revise the *2018 Standard Specifications* as follows:

Page 12-6, Subarticle 1205-4(A)(1) General, lines 5-8, delete the second sentence and replace with the following:

Use application equipment that provides multiple width settings ranging from 4 inches to 12 inches and multiple thickness settings to achieve a minimum pavement marking thickness of 0.090 inch above the surface of the pavement.

Page 12-7, Table 1205-3, THICKNESS REQUIREMENTS FOR THERMOPLASTIC, replace with the following:

TABLE 1205-3
MINIMUM THICKNESS REQUIREMENTS FOR THERMOPLASTIC

Thickness	Location
240 mils	In-lane and shoulder-transverse pavement markings (rumble strips). May be placed in 2 passes.
90 mils	Center lines, skip lines, transverse bands, mini-skip lines, characters, bike lane symbols, crosswalk lines, edge lines, gore lines, diagonals, and arrow symbols

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Roy Cooper
Governor

J.R. "Joey" Hopkins
Secretary

MEMO TO: Russell Broadwell, PE

FROM: Andrew D. Wargo, PhD, PE DocuSigned by: Andrew Wargo 2D2C959DCBCA49E... 10/06/2023

SUBJECT: Revised Final Pavement Design
I-5972, 44989.1.1
US 70 Bus & I-95 Interchange
Johnston County, Division 4

DATE: October 6, 2023

The revised pavement designs for the above project are as follows:

Line	Surface	Intermed.	Base	ABC	CTABC	Stab.
Y1 US-70 BUS	3.0" S9.5C	4.0" I19.0C	4.0" B25.0C	-	-	No
Y1 Ramps	3.0" S9.5C	3.0" I19.0C**	4.0" B25.0C	-	-	No
Y2 & Y3 (Mallard Rd.)	3.0" S9.5B	-	4.0" B25.0C	-	-	No
I-95	3.0" S9.5D	4.0" I19.0C	10.5" B25.0C	-	-	No
Y1 Ramps (Temp - 2 Years)	3.0" S9.5C	-	4.0" B25.0C	-	-	No

*For I-95, remove the existing shoulders in areas were widening will occur or where the existing shoulder location will be used for accel/decel lanes, and replace with the design listed in the table above.

For I-95, mill the existing pavement 2.25" and replace with 3.0" S9.5D, and 0.75" of OGFC (to match surface type of the surrounding area.)

**4.0" I19.0C may be used in order to facilitate the construction of shoulder berm gutter.

In areas with existing curb and gutter to remain in place, mill existing pavement 1.5" and replace with half the surface thickness listed in the table above

On Y1, in areas without existing curb and gutter, overlay the existing pavement to remain in place with 1.5" of S9.5C.

If any additional information is needed, please contact Andrew D. Wargo, Ph.D., PE, Pavement Design/Analysis at 919-329-4017

CSM/adw

Mailing Address:	*Telephone: (919) 329-4000*	*Location:*
NC DEPARTMENT OF TRANSPORTATION	*Fax: (919) 733-8742*	1801 BLUE RIDGE ROAD
MATERIALS AND TESTS UNIT	*Customer Service: 1-877-368-4968*	RALEIGH, NC 27607
1563 MAIL SERVICE CENTER		
RALEIGH, NC 27699-1563	*Website: www.ncdot.gov*	

Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT: I-5972 COUNTY: Johnston DATE: 7/7/2023 COMPILED BY: Anton Gneushev

CHAIN	STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
			TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. (+)25%		ROCK	SUITABLE	UNSUIT.	TOTAL
SUMMARY 1																
-L- LT	28+00.00	58+00.00	2,289			40	2,249	2,477		2,477	3,096	847			40	40
-L- LT	58+00.00	77+11.40	2,709			1,120	1,589	1,051		1,051	1,314			275	1,120	1,395
-Y1-	21+70.00	36+75.00	1,082			680	402	33,879		33,879	42,349	41,947			680	680
-RPB-	12+00.00	26+50.00	2,483			1,000	1,483	15,011		15,011	18,764	17,281			1,000	1,000
-RPC-	10+00.00	24+50.00	915			650	265	15,863		15,863	19,829	19,564			650	650
SUBTOTAL			9,478			3,490	5,988	68,281		68,281	85,351	79,639		275	3,490	3,765
SUMMARY 2																
-L- RT	33+50.00	63+50.00	3,473			570	2,903	2,064		2,064	2,580			323	570	893
-L- RT	63+50.00	82+00.00	2,598			990	1,608	1,272		1,272	1,590			18	990	1,008
-Y1-	38+04.00	56+50.00	3,148				3,148	31,579		31,579	39,474	36,326				
-RPA-	14+00.00	21+50.00	837			80	757	4,434		4,434	5,543	4,786			80	80
-RPD-	10+00.00	30+50.00	5,784			310	5,474	3,523		3,523	4,404			1,070	310	1,380
SUBTOTAL			15,840			1,950	13,890	42,872		42,872	53,590	41,111		1,411	1,950	3,361
SUMMARY 3																
-Y2-	10+50.00	33+50.00	7,683		2,169	2,160	5,523	13,060		13,060	16,325	10,802			4,329	4,329
SUBTOTAL			7,683		2,169	2,160	5,523	13,060		13,060	16,325	10,802			4,329	4,329
SUMMARY 4																
-TEMPRPB-	11+00.00	17+50.00	138				138	10,585		10,585	13,231	13,093				
-TEMPRPC-	11+50.00	22+00.00	128				128	15,294		15,294	19,118	18,990				
-TEMPRPC-REMOVE	12+00.00	16+00.00	90				90							90		
SUBTOTAL			356				266	25,879		25,879	32,349	32,083				
SHEET TOTALS			33,357		2,169	7,600	25,667	150,092		150,092	187,615	163,635		1,777	9,769	11,456

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

Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT: I-5972 COUNTY: Johnston DATE: 7/7/2023 COMPILED BY: Anton Gneushev

CUMULATIVE TOTALS	EXCAVATION					EMBANKMENT				BORROW	WASTE			
	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. (+)25%		ROCK	SUITABLE	UNSUIT.	TOTAL
SHEET 1 SUMMARY	33,357		2,169	7,600	25,667	150,092		150,092	187,615	163,635		1,777	9,769	11,456
SHEET TOTALS	33,357		2,169	7,600	25,667	150,092		150,092	187,615	163,635		1,777	9,769	11,456
MATERIAL FOR SHOULDER CONSTRUCTION						8,537		8,537	10,671					
GRADE POINT UNDERCUT CONTINGENCY			150			150		150	188	188			150	150
CONTINGENCY UNDERCUT FOR SUBGRADE			500											
ADDITIONAL UNDERCUT CONTINGENCY			500											
EARTH WASTE IN LIEU OF BORROW										-1,777		-1,777		-1,777
PROJECT TOTAL	33,357		3,319	7,600	25,667	158,779		158,779	198,474	162,046			9,919	9,829
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT										8,102				
GRAND TOTAL	33,357									170,148				
SAY	33,360									170,150				
DRAINAGE DITCH EXCAVATION	6,790													
SHALLOW UNDERCUT	10,300													
*UNCLASSIFIED EXCAVATION - ACCEPTABLE BUT NOT TO BE USED IN THE TOP 3' OF EMBANKMENT OR BACKFILL (5,100 CY) SEE LOCATIONS BELOW														
-L- 43+75 - 45+75 (150 CY)														
-Y1- 47+25 - 54+00 (1950 CY)														
-RPB- 15+25 - 18+75 (630 CY)														
-RPC- 16+75 - 20+75 (420 CY)														
-RPD- 13+00 - 18+50 (930 CY)														
-RPD- 24+75 - 29+60 (960 CY)														

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

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			ROADWAY				
0000100000-N	M	800	Mobilization	1	LS		$ -
0000400000-N	M	801	Construction Surveying	1	LS		$ -
0000720000-N	M	SP	Field Office	1	LS		$ -
0001000000-E	G	200	Clearing & Grubbing (16 ACRE)	1	LS		$ -
0008000000-E	G	200	Supplementary Clearing & Grubbing	2	ACR		$ -
0022000000-E	G	225	Unclassified Excavation	33,360	CY		$ -
0036000000-E	G	225	Undercut Excavation	3,200	CY		$ -
0106000000-E	G	230	Borrow Excavation	170,150	CY		$ -
0134000000-E	D	240	Drainage Ditch Excavation	6,790	CY		$ -
0156000000-E	G	250	Removal of Existing Asphalt Pavement	25,090	SY		$ -
0192000000-N	G	260	Proof Rolling	10.0	HR		$ -
0195000000-E	G	265	Select Granular Material	14,300.0	CY		$ -
0196000000-E	G	270	Geotextile for Soil Stabilization	50,300.0	SY		$ -
0199000000-E	G	SP	Temporary Shoring	4,400.0	SF		$ -
0222000000-E	G	SP	Geotextile for Rock Embankment, Type I	2,500.0	SY		$ -
1011000000-N	P	500	Fine Grading (68,150 sy)	1	LS		$ -
1077000000-E	P	SP	#57 Stone	1,300	TON		$ -
1099500000-E	G	505	Shallow Undercut	10,300	CY		$ -
1099700000-E	G	505	Class IV Subgrade Stabilization	22,600	TON		$ -
1297000000-E	P	607	Milling Asphalt Pavement, 2.25" Depth	29,930	SY		$ -
1330000000-E	P	607	Incidental Milling	1,250	SY		$ -
1489000000-E	P	610	Asphalt Conc. Base Course, Type B25.0C	30,330	TON		$ -
1503000000-E	P	610	Asphalt Conc. Intermediate Course, Type I19.0C	15,850	TON		$ -
1523000000-E	P	610	Asphalt Conc. Surface Course, Type S9.5C	9,990	TON		$ -
1524200000-E	P	610	Asphalt Conc. Surface Course, Type S9.5D	9,060	TON		$ -
1575000000-E	P	620	Asphalt Binder for Plant Mix	2,725	TON		$ -
1577000000-E	P	620	Polymer Modified Asphalt Binder for Plant Mix	645	TON		$ -
1662000000-E	P	650	Open-Graded Asphalt Friction Course, Type FC-1 Modified	1,880	TON		$ -
1693000000-E	P	654	Asphalt Plant Mix, Pavement Repair	220	TON		$ -
2549000000-E	P	846	2' - 6" Concrete Curb and Gutter	2,760	LF		$ -
2556000000-E	P	846	Shoulder Berm Gutter	35	LF		$ -
2591000000-E	P	848	4" Concrete Sidewalk	1,020	SY		$ -
2605000000-E	P	848	Concrete Curb Ramps	11	EA		$ -
2655000000-E	P	852	5" Monolithic Concrete Islands (Keyed In)	1,580	SY		$ -
3030000000-E	GR	862	Steel Beam Guardrail	1,300	LF		$ -
3195000000-N	GR	862	Guardrail End Units, Type AT-1	2	EA		$ -
3210000000-N	GR	862	Guardrail End Units, Type CAT-1	1	EA		$ -
3215000000-N	GR	862	Guardrail End Units, Type III	4	EA		$ -
3287000000-N	GR	862	Guardrail End Units, Type TL-3	5	EA		$ -
3317000000-N	GR	SP	Guardrail End Units, Type B-77	4	EA		$ -
3503000000-E	F	866	Woven Wire Fence, 47" Fabric	2,890	LF		$ -
3509000000-E	F	866	4" Timber Fence Posts, 7'-6" Long	174	EA		$ -
3515000000-E	F	866	5" Timber Fence Posts, 8'-0" Long	60	EA		$ -
			DRAINAGE				
0318000000-E	D	300	Foundation Conditioning Material, Minor Structures	410	TON		$ -
0320000000-E	D	300	Foundation Conditioning Geotextile	1,290	SY		$ -
0343000000-E	D	310	15" Side Drain Pipe	268	LF		$ -
0366000000-E	D	310	15" RC Pipe Culverts, Class III	812	LF		$ -
0372000000-E	D	310	18" RC Pipe Culverts, Class III	264	LF		$ -
0378000000-E	D	310	24" RC Pipe Culverts, Class III	312	LF		$ -
0384000000-E	D	310	30" RC Pipe Culverts, Class III	296	LF		$ -

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
0448300000-E	D	310	18" RC Pipe Culverts, Class IV	904	LF		$ -
0448400000-E	D	310	24" RC Pipe Culverts, Class IV	256	LF		$ -
0448700000-E	D	310	42" RC Pipe Culverts, Class IV	100	LF		$ -
0582000000-E	D	310	15" Corrugated Steel Pipe	632	LF		$ -
0973100000-E	D	330	30" Welded Steel Pipe, 0.5" Thick, Grade B In Soil	96	LF		$ -
0973300000-E	D	330	30" Welded Steel Pipe, 0.5" Thick, Grade B Not In Soil	96	LF		$ -
0973100000-E	D	330	36" Welded Steel Pipe, 0.5" Thick, Grade B In Soil	96	LF		$ -
0973300000-E	D	330	36" Welded Steel Pipe, 0.5" Thick, Grade B Not In Soil	96	LF		$ -
0973100000-E	D	330	42" Welded Steel Pipe, 0.625" Thick, Grade B In Soil	126	LF		$ -
0973300000-E	D	330	42" Welded Steel Pipe, 0.625" Thick, Grade B Not In Soil	126	LF		$ -
0973100000-E	D	330	54" Welded Steel Pipe, 0.75" Thick, Grade B In Soil	514	LF		$ -
0973300000-E	D	330	54" Welded Steel Pipe, 0.75" Thick, Grade B Not In Soil	514	LF		$ -
0995000000-E	D	340	Pipe Removal	1,566.0	LF		$ -
1220000000-E	G	545	Incidental Stone Base	500.0	TON		$ -
2022000000-E	D	815	Subdrain Excavation	4,980.0	CY		$ -
2026000000-E	D	815	Goetextile for Subsurface Drains	14,800.0	SY		$ -
2036000000-E	D	815	Subdrain Coarse Aggregate	2,490.0	CY		$ -
2044000000-E	D	815	6" Perforated Subdrain Pipe	14,800.0	LF		$ -
2070000000-N	D	815	Subdrain Pipe Outlet	30.0	EA		$ -
2077000000-E	D	815	6" Outlet Pipe	180.0	LF		$ -
2209000000-E	D	838	Endwalls	15.5	CY		$ -
2220000000-E	D	838	Reinforced Endwalls	29.2	CY		$ -
2264000000-E	D	840	Pipe Plugs	2.1	CY		$ -
2275000000-E	D	SP	Flowable Fill	166.0	CY		$ -
2286000000-N	D	840	Masonry Drainage Structures	31	EA		$ -
2297000000-E	D	840	Masonry Drainage Structures	5.1	CY		$ -
2308000000-E	D	840	Masonry Drainage Structures	13.6	LF		$ -
2374000000-N	D	840	Frame with Grate & Hood, STD 840.03, Type E	1	EA		$ -
2374000000-N	D	840	Frame with Grate & Hood, STD 840.03, Type F	7	EA		$ -
2374000000-N	D	840	Frame with Grate & Hood, STD 840.03, Type G	6	EA		$ -
2364000000-N	D	840	Frame with Two Grates, STD 840.16	2	EA		$ -
2365000000-N	D	840	Frame with Two Grates, STD 840.22	7	EA		$ -
2366000000-N	D	840	Frame with Two Grates, STD 840.24	2	EA		$ -
2396000000-N	D	840	Frame with Cover, STD 840.54	5	EA		$ -
2407000000-N	D	840	Steel Frame with Two Grates, STD 840.37	2	EA		$ -
2451000000-N	D	852	Concrete Transitional Section For Drop Inlet	2	EA		$ -
2800000000-N	D	858	Adjust Catch Basin	2	EA		$ -
2815000000-N	D	858	Adjust Drop Inlets	1	EA		$ -
3628000000-E	D	876	Rip Rap, Class I	520	TON		$ -
3635000000-E	D	876	Rip Rap, Class II	2,400	TON		$ -
3642000000-E	D	876	Rip Rap, Class A	700	TON		$ -
3649000000-E	D	876	Rip Rap, Class B	160	TON		$ -
3656000000-E	D	876	Geotextile for Drainage	2,825	SY		$ -
2253000000-E	D	840	Pipe Collars	0.4	CY		$ -
0335850000-E	D	305	15" Drainage Pipe Elbows	12	EA		$ -
			SIGNING				
4048000000-E	S	902	Reinforced Concrete Sign Foundation	11	CY		$ -
4054000000-E	S	902	Plain Concrete Sign Foundation	2	CY		$ -
4057000000-E	S	SP	Overhead Footing	24	CY		$ -
4060000000-E	S	903	Supports, Breakaway Steel Beam	14,397	LB		$ -
4072000000-E	S	903	Supports, 3 LB Steel U-Channel	1,113	LF		$ -
4082100000-N	S	906	Supports, Overhead Sign Structure @ -RPB- Sta. 23+00	1	LS		$ -
4096000000-N	S	904	Sign Erection, Type D	2	EA		$ -
4102000000-N	S	904	Sign Erection, Type E	43	EA		$ -

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
4108000000-N	S	904	Sign Erection, Type F	10	EA		$ -
4110000000-N	S	904	Sign Erection, Type A (Ground Mounted)	15	EA		$ -
4110000000-N	S	904	Sign Erection, Type B (Ground Mounted)	6	EA		$ -
4114000000-N	S	904	Sign Erection, Milemarkers	4	EA		$ -
4116100000-N	S	904	Sign Erection, Relocate Sign Type A (Ground Mounted)	8	EA		$ -
4116100000-N	S	904	Sign Erection, Relocate Sign Type D (Ground Mounted)	1	EA		$ -
4116100000-N	S	904	Sign Erection, Relocate Sign Type E (Ground Mounted)	5	EA		$ -
4138000000-N	S	907	Disposal of Support, Steel Beam	8	EA		$ -
4149000000-N	S	907	Disposal of Sign System, Overhead	1	EA		$ -
4152000000-N	S	907	Disposal of Sign System, Steel Beam	8	EA		$ -
4155000000-N	S	907	Disposal of Sign System, U-Channel	91	EA		$ -
4158000000-N	S	907	Disposal of Sign System, Wood	1	EA		$ -
4186000000-N	S	907	Disposal of Support, U-Channel	6	EA		$ -
			TRAFFIC CONTROL				
4400000000-E	Y	1110	Stationary Work Zone Signs	184.00	SF		$ -
4402000000-E	Y	SP	High Visibility Stationary Signs	606.00	SF		$ -
4405000000-E	Y	1110	Portable Work Zone Signs	311.00	SF		$ -
4407000000-E	Y	SP	High Visibility Portable Signs	586.00	SF		$ -
4410000000-E	Y	1110	Barricade Mounted Work Zone Signs	76.00	SF		$ -
4415000000-N	Y	1115	Flashing Arrow Board	4.00	EA		$ -
4420000000-N	Y	1120	Portable Changeable Message Sign	4.00	EA		$ -
4423000000-N	Y	SP	Work Zone Digital Speed Limit Sign	6.00	EA		$ -
4424000000-N	Y	SP	Work Zone Presence Lighting	22.00	EA		$ -
4430000000-N	Y	1130	Drums	50.00	EA		$ -
4432000000-N	Y	SP	High Visibility Drums	165.00	EA		$ -
4434000000-N	Y	SP	Sequential Flashing Warning Lights	24.00	EA		$ -
4445000000-E	Y	1145	Barricades (Type III)	280.00	LF		$ -
4447000000-E	Y	SP	Pedestrian Channelization Devices	32.00	LF		$ -
4455000000-N	Y	1150	Flagger (By Day)	600.00	DAY		$ -
4480000000-N	Y	1165	TMA	2.00	EA		$ -
4510000000-N	Y	1190	Law Enforcement	520.00	HR		$ -
4516000000-N	Y	1180	Skinny Drum	19.00	EA		$ -
4520000000-N	Y	1266	Tubular Markers (Fixed)	30.00	EA		$ -
4650000000-N	Y	1251	Temporary Raise Pavement Markers	1,641.00	EA		$ -
4770000000-N	Y	1251	Cold Applied Plastic (4") Type 4	1,080.00	EA		$ -
4810000000-E	PM	1205	Paint (4")	107,763.00	LF		$ -
4820000000-E	PM	1205	Paint (8")	6,199.00	LF		$ -
4835000000-E	PM	1205	Paint (24")	1,628.00	LF		$ -
4840000000-N	PM	1205	Paint Marking Characters	64.00	EA		$ -
4845000000-N	PM	1205	Paint Marking Symbols	338.00	EA		$ -
4847500000-E	PM	SP	Work Zone Performance Pavement Marking Lines (6")	87,377.00	LF		$ -
4847600000-E	PM	SP	Work Zone Performance Pavement Marking Lines (12")	7,871.00	LF		$ -
4850000000-E	PM	1205	Removal of Pavement Marking Lines (4")	28,560.00	LF		$ -
4855000000-E	PM	1205	Removal of Pavement Marking Lines (6")	58,629.00	LF		$ -
4860000000-E	PM	1205	Removal of Pavement Marking Lines (8")	1,102.00	LF		$ -
4865000000-E	PM	1205	Removal of Pavement Marking Lines (12")	4,280.00	LF		$ -
4870000000-E	PM	1205	Removal of Pavement Marking Lines (24")	234.00	LF		$ -
4875000000-N	PM	1205	Removal of Pavement Marking Symbols	56.00	EA		$ -
			PAVEMENT MARKINGS				
4685000000-E	PM	1205	Thermoplastic Pavement Marking Lines (4", 90 MILS)	13,100	LF		$ -
4688000000-E	PM	1205	Thermoplastic Pavement Marking Lines (6", 90 MILS)	49,239	LF		$ -
4695000000-E	PM	1205	Thermoplastic Pavement Marking Lines (8", 90 MILS)	278	LF		$ -

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
4700000000-E	PM	1205	Thermoplastic Pavement Marking Lines (12", 90 MILS)	2,753	LF		$ -
4709000000-E	PM	1205	Thermoplastic Pavement Marking Lines (24", 90 MILS)	298	LF		$ -
4720000000-E	PM	1205	Thermoplastic Pavement Marking Character (90 MILS)	16	EA		$ -
4725000000-E	PM	1205	Thermoplastic Pavement Marking Symbol (90 MILS)	95	EA		$ -
4775000000-E	PM	1205	Cold Applied Plastic Pavement Marking Lines, Type ** (6")	1,024	LF		$ -
4900000000-N	PM	1251	Permanent Raised Pavement Markers	7	EA		$ -
4905100000-N	PM	1253	Snowplowable Pavement Markers	572	EA		$ -
			EROSION CONTROL				
6000000000-E	L	1605	Temporary Silt Fence	74,525	LF		$ -
6006000000-E	L	1610	Erosion Control Stone, Class A	500	TON		$ -
6009000000-E	L	1610	Erosion Control Stone, Class B	1,855	TON		$ -
6012000000-E	L	1610	Sediment Control Stone	575	TON		$ -
6015000000-E	L	1615	Temporary Mulching	117.5	ACR		$ -
6018000000-E	L	1620	Seed for Temporary Seeding	4,500	LB		$ -
6021000000-E	L	1620	Fertilizer for Temporary Seeding	23.5	TON		$ -
6024000000-E	L	1622	Temporary Slope Drains	1,960	LF		$ -
6029000000-E	L	SP	Safety Fence	4,680	LF		$ -
6030000000-E	L	1630	Silt Excavation	14,950	CY		$ -
6036000000-E	L	1631	Matting for Erosion Control	56,335	SY		$ -
6037000000-E	L	SP	Coir Fiber Mat	255	SY		$ -
6042000000-E	L	1632	1/4" Hardware Cloth	285	LF		$ -
6043000000-E	L	SP	Low Permeability Geotextile	330	SY		$ -
6069000000-E	L	1638	Stilling Basins	96	CY		$ -
6071012000-E	L	SP	Coir Fiber Wattle	3,600	LF		$ -
6071020000-E	L	SP	Polyacrylamide (PAM)	3,400	LB		$ -
6071030000-E	L	1640	Coir Fiber Baffle	3,160	LF		$ -
6071050000-E	L	SP	Skimmer - (1-1/2")	14	EA		$ -
6071050000-E	L	SP	Skimmer - (2")	3	EA		$ -
6084000000-E	L	1660	Seeding and Mulching	69	ACR		$ -
6087000000-E	L	1660	Mowing	81	ACR		$ -
6090000000-E	L	1661	Seed for Repair Seeding	1,200	LB		$ -
6093000000-E	L	1661	Fertilizer for Repair Seeding	3.5	TON		$ -
6096000000-E	L	1662	Seed for Supplemental Seeding	1,700	LB		$ -
6108000000-E	L	1665	Fertilizer Topdressing	50.5	TON		$ -
6111000000-E	L	SP	Impervious Dike	40	LF		$ -
6114500000-N	L	1667	Specialized Hand Mowing	10	MHR		$ -
6117000000-N	L	1675	Response for Erosion Control	150	EA		$ -
6120000000-E	L	SP	Culvert Diversion Channel	338	CY		$ -
6123000000-E	L	1670	Reforestation	0.10	ACR		$ -
6117500000-N	L	SP	Concrete Washout Structure	8	EA		$ -
6114800000-N	L	SP	Manual Litter Removal	45	MHR		$ -
6114900000-E	L	SP	Litter Disposal	2	TON		$ -
			SIGNALS				
7060000000-E	Z	1705	Signal Cable	3,370	LF		$ -
7120000000-E	Z	1705	Vehicle Signal Head (12", 3 Section)	18	EA		$ -
7132000000-E	Z	1705	Vehicle Signal Head (12", 4 Section)	5	EA		$ -
7252000000-E	Z	1710	Messenger Cable (1/4")	600	LF		$ -
7264000000-E	Z	1710	Messenger Cable (3/8")	1,450	LF		$ -
7279000000-E	Z	1715	Tracer Wire	1,530	LF		$ -
7300000000-E	Z	1715	Unpaved Trenching (1 Conduit, 2 Inch)	1,205	LF		$ -
7300000000-E	Z	1715	Unpaved Trenching (2 Conduit, 2 Inch)	300	LF		$ -
7301000000-E	Z	1715	Directional Drill (1 Conduit, 2 Inch)	610	LF		$ -

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
7301000000-E	Z	1715	Directional Drill (2 Conduit, 2 Inch)	230	LF		$ -
7312000000-N	Z	1716	Junction Box (Special Over-Sized, Heavy Duty 36"x24"x24")	2	EA		$ -
7324000000-N	Z	1716	Junction Box (Standard Size)	8	EA		$ -
7348000000-N	Z	1716	Junction Box (Over-Sized, Heavy Duty)	7	EA		$ -
7360000000-N	Z	1720	Wood Pole	5	EA		$ -
7372000000-N	Z	1721	Guy Assembly	13	EA		$ -
7420000000-E	Z	1722	2" Riser with Weatherhead	2	EA		$ -
7444000000-E	Z	1725	Inductive Loop Sawcut	1,760	LF		$ -
7456000000-E	Z	1726	Lead-In Cable (14-2)	3,200	LF		$ -
7481000000-N	Z	SP	Site Survey	1	EA		$ -
7481240000-N	Z	SP	Camera Without Internal Loop Emulator Processing Unit	3	EA		$ -
7481260000-N	Z	SP	External Loop Emulator Processing Unit	1	EA		$ -
7481280000-N	Z	SP	Relocate Camera Sensor Unit	6	EA		$ -
7516000000-E	Z	1730	Communicaions Cable (24 Fiber)	3,450	LF		$ -
7528000000-E	Z	1730	Drop Cable (12 Fiber)	920	LF		$ -
7540000000-N	Z	1731	Splice Enclosure	2	EA		$ -
7541000000-N	Z	1731	Modify Splice Enclosure	3	EA		$ -
7552000000-N	Z	1731	Interconnect Center	3	EA		$ -
7566000000-N	Z	1733	Delineator Marker	16	EA		$ -
7575160000-E	Z	1734	Remove Existing Communications Cable	645	LF		$ -
7576000000-N	Z	SP	Metal Strain Signal Pole	8	EA		$ -
7613000000-N	Z	SP	Soil Test	8	EA		$ -
7614100000-E	Z	SP	Drilled Pier Foundation	64	CY		$ -
7636000000-N	Z	1745	Sign for Signals	7	EA		$ -
7684000000-N	Z	1750	Signal Cabinet Foundation	2	EA		$ -
7696000000-N	Z	1751	Controller with Cabinet (Type 2070LX, Base Mounted)	2	EA		$ -
7744000000-N	Z	1751	Detector Card (Type 170)	10	EA		$ -
7901000000-N	Z	1753	Cabinet Base Extender	2	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (Protective Coating for Strain Pole (Black))	8	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (Ethernet Edge Switch)	2	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (Digital CCTV Camera Assembly)	1	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (Field Equipment Cabinet)	1	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (CCTV Wood Pole)	1	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (Meter Base/Disconnect Combination Panel	1	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (Equipment Cabinet Disconnect)	1	EA		$ -
7980000000-N	Z	SP	Generic Signal Item (5/8"X10' Grounding Electrode)	3	EA		$ -
7990000000-N	Z	SP	Generic Signal Item (3-Wire Copper Feeder Conductors)	600	LF		$ -
7990000000-N	Z	SP	Generic Signal Item (#4 Solid Bare Grounding Conductor)	30	LF		$ -
			UTILITIES				
5325600000-E	U	1510	6" Water line	61	LF		$ -
5325800000-E	U	1510	8" Water line	2,169	LF		$ -
5326200000-E	U	1510	12" Water line	2,123	LF		$ -
5326600000-E	U	1510	16" Water line	349	LF		$ -
5540000000-E	U	1515	6" Valve	3	EA		$ -
5546000000-E	U	1515	8" Valve	4	EA		$ -
5558000000-E	U	1515	12" Valve	2	EA		$ -
5571600000-E	U	1515	6" Tapping Sleeve and Valve	1	EA		$ -
5571800000-E	U	1515	8" Tapping Sleeve and Valve	2	EA		$ -
5643100000-E	U	1515	3/4" water meter	1	EA		$ -
5648000000-N	U	1515	Relocated Water meter	4	EA		$ -
5649000000-N	U	1515	Reconnect Water Meter	2	EA		$ -
5666000000-N	U	1515	Fire Hydrant	4	EA		$ -
5673000000-E	U	1515	Fire Hydrant Leg	46	LF		$ -
5686000000-E	U	1515	2" Water Service Line	360	LF		$ -

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
5686500000-E	U	1515	Water Service Line	176	LF		$ -
5768000000-N	U	1510	Sanitary Sewer Clean out	2	EA		$ -
5768500000-N	U	1520	6" Sewer Service Line	54	LF		$ -
5769000000-N	U	1520	Ductile Iron Sewer Pipe Fittings	25	LB		$ -
5775000000-E	U	1525	4' Dia Utility Manhole	1	EA		$ -
5798000000-E	U	1530	Abandon 2" Utility Pipe	363	LF		$ -
5800000000-E	U	1530	Abandon 6" Utility Pipe	112	LF		$ -
5801000000-E	U	1530	Abandon 8" Utility Pipe	1,064	LF		$ -
5815000000-N	U	1530	Remove Water Meter	1	EA		$ -
5815500000-N	U	1530	Remove Fire Hydrant	2	EA		$ -
5816000000-N	U	1530	Abandon Utility Manhole	1	EA		$ -
5835700000-E	U	1540	16" Encasement Pipe	553	LF		$ -
5836000000-E	U	1540	24" Encasement Pipe	127	LF		$ -
2830000000-N	D	858	Adjustment of Manhole	2	EA		$ -
2845000000-N	D	858	Adjustment of Meter Box or Valve Box	1	EA		$ -
5329000000-E	U	1510	Ductie Iron Water Pipe Fittings	4,980	LB		$ -
5872500000-E	U	1550	Bore and Jack 16"	553	LF		$ -
5872500000-E	U	1550	Bore and Jack 24"	127	LF		$ -
5872600000-E	U	1550	Directional Drilling of 16"	349	LF		$ -
			STRUCTURES				
	B		-Y1- Bridge Sta. 35+83.00 to 38+04.00 (89.1' wide x 221' long)	19,687	SF		$ -
8035000000-N	B	40	Removal of Existing Structure at Station 36+93.50 -Y1-	1	LS		$ -
8065000000-N	B	SP	Asbestos Assessment	1	LS		$ -
8091000000-N	B	410	Foundation Excavation for Bent 1 at Station 36+93.50 -Y1-	1	LS		$ -
8112730000-N	B	450	PDA Testing	1	EA		$ -
8147000000-E	B	420	Reinforced Concrete Deck Slab	19,441	SF		$ -
8161000000-E	B	420	Grooving Bridge Floors	20,634	SF		$ -
8182000000-E	B	420	Class A Concrete (Bridge)	452.5	CY		$ -
8210000000-N	B	SP	Bridge Approach Slabs (2 @ 87.17' wide x 25' long)	4,358	SF		$ -
8217000000-E	B	425	Reinforcing Steel (Bridge)	65,182	LB		$ -
8238000000-E	B	425	Spiral Column Reinforcing (Bridge)	2,613	LB		$ -
8265000000-E	B	430	54" Prestressed Concrete Girders	2,366.38	LF		$ -
8328200000-E	B	450	Pile Driving Equipment Setup for HP 12x53 Steel Piles	78	EA		$ -
8364000000-E	B	450	HP 12x53 Steel Piles	3,645	LF		$ -
8391000000-N	B	450	Steel Pile Points	15	EA		$ -
8475000000-E	B	460	Two Bar Metal Rail	420.89	LF		$ -
8517000000-E	B	460	1'-2" x 2'-6" Concrete Parapet	225.74	LF		$ -
8517000000-E	B	460	1'-2" x 3'-2 3/4" Concrete Parapet	218.24	LF		$ -
8531000000-E	B	462	4" Slope Protection	89	SY		$ -
8657000000-N	B	430	Elastomeric Bearings	1	LS		$ -
8699000000-N	B	SP	Strip Seals	1	LS		$ -
	C	SP	RCBC 2 @ 8.0' x 5.0'	66	LF		$ -
8126000000-N	C	414	Culvert Excavation, Sta. 17+30.70 -Y2-	1	LS		$ -
8133000000-E	C	414	Foundation Conditioning Material, Box Culvert	102	TON		$ -
8196000000-E	C	420	Class A Concrete (Culvert)	145.6	CY		$ -
8245000000-E	C	425	Reinforcing Steel (Culvert)	19,835	LB		$ -
8801000000-E	W	SP	MSE Retaining Wall No. 1	5,933	SF		$ -
8801000000-E	W	SP	MSE Retaining Wall No. 2	5,209	SF		$ -
			Misc. & Mob (10% Strs&Util)				$ -
			Misc. & Mob (25% Roadway)				$ -

Lgth 0.667 Miles

Contract Cost …….. …….. …….. $ -
E. & C. 15% …….. …….. …….. $ -

North Carolina Department of Transportation
Preliminary Estimate

TIP No. **I-5972** | **Final Plans** | County: **Johnson**
Route: US 70
From:
Typical Section: 4-Lane Median Divided

CONSTR. COST
$0

Prepared By: RK&K Engineers 7/10/23
Requested By:
Priced By:

Line Item	Des	Sec No.	Description	Quantity	Unit	Price	Amount
			Construction Cost …….. …….. ……..			**$**	**-**

PROJECT TIP NO. I-5972
COUNTY JOHNSON COUNTY
PROJECT ENGINEER RUSSELL BROADWELL
PROJ. DESIGN ENGINEER _____

EFF. 01-15-18
REV. 10-02-17

REVIEW LIST FOR FINAL CONSTRUCTION PLANS
LET UNDER THE 2018 SPECIFICATIONS

CLICK THE RIGHT BOX TO APPLY "CHECK MARK" WHEN COMPLETED APPLICABLE ITEMS ON THIS REVIEW LIST. USE THE DROPDOWN ARROW TO PLACE "N/A" BY NON-APPLICABLE ITEMS.

TITLE SHEET

(1) ✓ LOCATION OF PROJECT IS COMPLETE AND ACCURATE
(2) ✓ COUNTY IS SHOWN
(3) ✓ TYPE OF WORK INCLUDES ALL ITEMS SHOWN ON CURRENT TENTATIVE LETTING LIST
(4) ✓ GRAPHIC SCALES ARE SHOWN FOR PLAN AND PROFILE SHEETS
(5) ✓ DESIGN DATA IS SHOWN
(6) ✓ CONTROL OF ACCESS NOTE SHOWN (FULL OR PARTIAL)
(7) N/A SHOW ANY ADDITIONAL "CONVENTIONAL SYMBOLS" ON SHEET 1B
(8) _____ VICINITY MAP INCLUDES THE FOLLOWING:
- (A) ✓ CITY AND CITY LIMITS
- (B) ✓ INTERSTATE, U.S. AND STATE ROUTES
- (C) ✓ NORTH ARROW
- (D) ✓ BEGINNING AND END OF PROJECT
- (E) ✓ TITLE BLOCK
- (F) N/A OFFSITE DETOURS

(9) _____ PROJECT LAYOUT ON NUMBERED SUPERIMPOSED SHEETS INCLUDES THE FOLLOWING:
- (A) ✓ PROJECT ALIGNMENT FOR ALL PROPOSED CONSTRUCTION, (-L- LINES, -Y- LINES, SERVICE ROADS, DETOURS, ETC)
- (B) ✓ EXISTING ROADS AND STREETS AFFECTED BY CONSTRUCTION BUT NOT A PART OF THE PROJECT
- (C) ✓ ROUTE NUMBERS, SURVEY LINE NUMBERS, STREET NAMES, ETC.
- (D) ✓ SYMBOLS FOR PROPOSED BRIDGES AND CULVERTS 20'/6 m AND OVER WITH BEGINNING AND ENDING STATIONS
- (E) N/A STREAMS AND RIVERS
- (F) N/A RAILROADS
- (G) ✓ CITY LIMITS
- (H) N/A STATE AND COUNTY LIMITS
- (I) ✓ BEGINNING AND ENDING STATIONS FOR EACH PROJECT
- (J) ✓ BEGIN AND END CONSTRUCTION OUTSIDE PROJECT LIMITS
- (K) ✓ DESTINATION POINTS AT BEGINNING AND ENDING OF PROJECT
- (L) ✓ NORTH ARROW

(10) ____ PROJECT NUMBER INFORMATION INCLUDES THE FOLLOWING:
- (A) ✓ PROJECT CONTRACT NUMBER AND T.I.P. NUMBER ON LEFT END OF SHEET
- (B) ✓ P.E., R/W, UTILITY AND CONSTRUCTION F.A. PROJECT NUMBERS IN PROJECT IDENTIFICATION BLOCK (TOP RIGHT CORNER)
- (C) ✓ P.E., R/W, UTILITY AND CONSTRUCTION WBS ELEMENTS IN PROJECT IDENTIFICATION BLOCK (TOP RIGHT CORNER)

(11) ✓ LENGTH OF PROJECT CORRECT (LENGTH SHOWN FOR ROADWAY, STRUCTURE AND TOTAL PROJECT)
(12) ✓ SHOWN PLANS PREPARED BY: RK & K
(13) ✓ MONTH, DAY AND YEAR OF R/W AND LETTING SHOWN
(14) N/A AREAS NOT PART OF PROJECT NOTED
(15) ✓ REMOVE CLEARING METHOD NOTE
(16) ✓ REMOVE NOTE FOR MUNICIPAL BOUNDARIES

INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARDS

(1) ✓ SUBMIT 8 ½" x 11" WORK SHEETS TO PLAN REVIEW (AFTER REVIEW RETURN WORKSHEETS AND COMPLETED SHEET 1-A TO PLAN REVIEW)

TYPICAL SECTIONS

(1) ✓ PAVEMENT SCHEDULE CORRESPONDS WITH PAVEMENT DESIGN LETTER
(2) ✓ PAVEMENT COMPOSITIONS LABELED TO CORRESPOND WITH PAVEMENT SCHEDULE
(3) ✓ DIMENSIONS SHOWN ON PAVEMENT, SUBGRADES, STABILIZATION, SHOULDERS, DITCHES, SLOPES, CENTERLINE TO CENTERLINE, MEDIANS, SIDEWALKS, UTILITY STRIPS, CURB & GUTTER, ETC.
(4) ✓ SLOPES SHOWN ON PAVEMENT, FLEXIBLE PAVEMENT EDGE, SHOULDERS, SUBGRADE, DITCHES, HINGE POINT GRADING, CUTS AND FILLS, RUMBLE STRIPS
(5) ✓ STATION TO STATION SHOWN WITH CORRECT LINE REFERENCE
(6) ✓ STATIONS ARE BROKEN FOR BRIDGES AND EQUALITIES
(7) ✓ GRADING LIMIT LINES SHOWN
(8) ✓ GRADE POINT SHOWN ON EACH TYPICAL SECTION
(9) N/A INFORMATION RELATED TO FUTURE CONSTRUCTION SHOWN
(10) ✓ VARIABLE LIMITS SHOWN
(11) ✓ NECESSARY NOTES OF EXPLANATION SHOWN
(12) NO TEMPORARY PAVEMENT REQUIRES A TEMPORARY PAVEMENT DESIGN FROM THE PAVEMENT MANAGEMENT UNIT AND A TYPICAL SECTION

DETAILS (WHERE APPLIED)

(1) N/A INTERSECTIONS AND ISLANDS
(2) N/A LAYOUT OF SYMBOLS FOR TYPES OF CONCRETE PAVEMENT (THROUGH LANES, RAMPS AND MISCELLANEOUS)
(3) N/A RIP RAP NOT SHOWN BY STANDARDS
(4) N/A TEMPORARY SHORING

(5) N/A BENCH SLOPES
(6) N/A ROCK PLATING
(7) N/A SPECIAL DRAINAGE STRUCTURE OR ENDWALLS
(8) ✓ SPECIAL DITCHES
(9) N/A GUARDRAIL NOT COVERED BY STANDARDS
(10) N/A ASPHALT WEARING SURFACE ON CORED SLAB AND BOX BEAM BRIDGES

PLAN SHEETS

(1) ✓ BEGINNING AND ENDING STATIONS ARE SHOWN ON FIRST AND LAST PLAN SHEET TO AGREE WITH TITLE SHEET AND TYPICAL SECTIONS
(2) ✓ EXISTING PAVEMENT WIDTH AND TYPE IS SHOWN
(3) ✓ GRADE LINES AND DESIGN CORRECT
(4) THE FOLLOWING ARE SHOWN ON EACH PLAN AND/OR PROFILE SHEET:
- (A) ✓ NORTH ARROW
- (B) ✓ BEARINGS
- (C) ✓ CURVE DATA WITH SUPERELEVATION AND RUNOFF
- (D) ✓ CONSTRUCTION LIMITS, BERM DITCHES AND LATERAL DITCHES
- (E) ✓ PROPERTY OWNERS, PROPERTY LINES AND PARCEL NUMBERS
- (F) ✓ R/W, EASEMENT, CONTROL OF ACCESS BREAKS BY STATION AND DISTANCE
- (G) ✓ AREAS TO REMAIN UNDISTURBED WITHIN THE RIGHT-OF-WAY ARE CLEARLY MARKED
- (H) ✓ FENCE AND TYPE
- (I) ✓ STREETS, ROADS AND DRIVEWAYS
- (J) * ONSITE DETOURS (SEPERATE DETAIL SHEETS)
- (K) ✓ DISPOSITION OF OLD ROADS IF PROJECT IS A RELOCATION
- (L) ✓ DIMENSIONS OF PAVEMENT AND SHOULDERS IN RELATION TO PROPOSED BRIDGE WIDTH (SKETCH)
- (M) ✓ PROPOSED PAVEMENT AND RIGHT-OF-WAY WIDTHS AT THE BEGINNING AND END OF EACH SHEET
- (N) ✓ SHOW LANE LINES AT INTERSECTIONS, TAPERS, AUXILIARY LANES, ETC.
- (O) ✓ -Y- LINES WITH BEGINNING AND ENDING CONSTRUCTION STATIONS AND STATION TIES WITH MAIN LINE
- (P) ✓ TRAFFIC DATA FOR INTERSECTIONS
- (Q) ✓ LIMITS OF PAVED SHOULDERS AT INTERSECTIONS
- (R) N/A NOTE WHERE SIGHT DISTANCE GRADING IS REQUIRED
- (S) N/A BORROW AND/OR WASTE AREAS IF FURNISHED BY DOT
- (T) ✓ REMOVAL OF EXISTING PIPES
- (U) ✓ PIPES TO BE PLUGGED
- (V) ✓ CROSS REFERENCE NOTES CORRECT
- (W) ✓ SYMBOL DENOTING PAVEMENT REMOVAL LOCATIONS
- (X) ✓ BEGINNING AND END STATION FOR BRIDGES AND CULVERTS
- (Y) UNDERCUT EXCAVATION ON PROFILE
- (Z) ✓ STRUCTURAL SHEET NUMBERS, IF COMBINED BID
- (AA) ✓ HYDRAULIC DATA (DRAINAGE AREA, FREQUENCY, ETC.)

(BB) ✓ FALSE SUMP DETAIL [IF NOT SHOWN ON DITCH DETAILS SHEET (2D-SERIES)]
(CC) ✓ BENCH MARKS (PROFILES AND/OR SURVEY CONTROL SHEETS)
(DD) ____ LABEL QUANTITIES AT EACH LOCATION AS FOLLOWS:
1. ✓ RIP RAP
2. ✓ DRAINAGE DITCH EXCAVATION
3. ✓ GEOTEXTILE FOR DRAINAGE
(EE) ✓ DRAINAGE
(FF) ✓ REMOVE BASELINE AND BASELINE STATIONS
(GG) ✓ ENSURE BASELINE DATA IS SHOWN WITH POINT SYMBOL AND POINT NUMBER
(HH) ✓ LABEL WELLS TO BE SEALED AND ABANDONED.

INTERCHANGE SHEETS

(1) ✓ INTERCHANGE SHEETS PROPERLY MATCHED WITH ADJACENT PLAN SHEET WITH NO OVERLAPPING COVERAGE, IF POSSIBLE
(2) ✓ STRUCTURES CHECKED FOR VERTICAL AND HORIZONTAL CLEARANCES
(3) ✓ THE FOLLOWING INFORMATION SHOWN ON THE INTERCHANGE DETAILS AND PROFILES:
(A) ✓ TRAFFIC DATA
(B) ✓ BAR SCALE
(C) ✓ ADDITIONAL ITEMS AS LISTED UNDER PLAN SHEETS
(4) N/A CONTOUR GRADING DETAIL SHOWN, IF REQUESTED BY THE DIVISION
(5) N/A CROSS-SECTION LAYOUT DETAIL/SHEAR POINT DIAGRAM(NOT ALWAYS REQUIRED FOR DIAMOND INTERCHANGE)

INTERSECTION SHEETS

THE INFORMATION SHOWN ON THE INTERSECTION DETAILS SHALL BE RESTRICTED TO DESIGN DATA ONLY. THE FOLLOWING SHALL BE SHOWN:
(1) N/A SHOW INFORMATION FOR CONSTRUCTING THREE CENTERED CURVES
(2) N/A ISLAND DETAILS
(3) N/A LEGEND FOR ISLANDS, SIDEWALKS, CURB RAMPS
(4) N/A ALIGNMENT
(5) N/A LANE MARKINGS
(6) N/A BAR SCALE
(7) N/A PROPOSED EDGES OF PAVEMENT
(8) N/A NORTH ARROWS
(9) N/A SUPERELEVATION RATES
(10) N/A PAVED SHOULDER WIDTHS
(11) N/A SUFFICIENT DIMENSIONS AND TIE POINTS FOR FIELD LOCATION

CROSS-SECTIONS

(1) ✓ SHOW EXISTING GROUND LINE, STATIONS AND ELEVATIONS
(2) ✓ TEMPLATES SHOWING LABELED CUT AND FILL SLOPES, GUARDRAIL WIDENING, DITCHES, CHANNEL CHANGES, ETC.
(3) ✓ GEOLOGY REPORT REVIEWED TO ASSURE CONFORMITY WITH PLANS

(4) ✓ UNDERCUT EXCAVATION AND/ OR SHALLOW UNDERCUT SYMBOL IS SHOWN
(5) N/A NOTE ON CROSS-SECTION SUMMARY SHEET SHOULD INDICATE WHETHER OR NOT THE EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT
(6) ✓ EARTHWORK COMPUTATION SHEETS COMPLETE
(7) ✓ CROSS-SECTIONS CHECKED TO ASSURE ADEQUATE SIGHT DISTANCES AT BRIDGES AND INTERSECTIONS
(8) ✓ NOTE SHOWN ON CROSS-SECTION SUMMARY SHEET
(9) ✓ SCALE SHOWN ON EACH SHEET

GUARDRAIL DESIGN

(1) ✓ GUARDRAIL SHOWN FOR BRIDGE PIERS, CULVERTS, LARGE PIPE, SIGN SUPPORTS AND OTHER FIXED OBJECTS
(2) ✓ GUARDRAIL SHOWN FOR PONDS, RIVERS AND OTHER WATER RELATED HAZARDS
(3) ✓ GUARDRAIL SHOWN ON PLANS
(4) ✓ GUARDRAIL SHOWN ON THE GUARDRAIL SUMMARY SHEET
(5) N/A SPECIAL DETAILS SHOWN AS REQUIRED
(6) ✓ ENSURE THAT THE STRUCTURE GUARDRAIL ANCHOR SHOWN ON THE PLANS ATTACHES TO THE BRIDGE BARRIER

SUMMARY OF QUANTITIES

(1) ✓ COMPUTATION SHEET TOTALS FOR EACH PAY ITEM CHECKED AGAINST ESTIMATE
(2) ✓ SUMMARY SHEETS INITIALED BY PERSON WHO WORKED AND CHECKED SUMMARIES
(3) ✓ REFERENCE PAVEMENT STRUCTURE VOLUME (WHEN APPLICABLE) BELOW EARTHWORK SUMMARY
(4) ✓ EARTHWORK SUMMARY (SHOW NOTE RELATED TO GEO-TECH DATA)
(5) ✓ DRAINAGE SUMMARY
(6) ✓ GUARDRAIL SUMMARY
(7) N/A SHOULDER DRAIN SUMMARY
(8) ✓ PAVEMENT REMOVAL SUMMARY
(9) N/A FENCE SUMMARY (URBAN PROJECTS)
(10) ✓ GEOTECHNICAL SUMMARIES (SHEET 3G-1)
(11) _____ MISCELLANEOUS SUMMARIES AS NECESSARY

ESTIMATES * TO BE COMPLETED AFTER NCDOT 90% PLAN REVIEW

(1) * ESTIMATE MADE FOR EACH WBS ELEMENT, FEDERAL PROJECT NUMBER, AND OTHER PARTS AS NECESSARY
(2) * FINAL TRNS*PORT ESTIMATE CHECKED AGAINST THE QUANTITY CALCULATIONS
(3) * DESCRIPTION NUMBER, SECTION NUMBER AND ITEM DESCRIPTION CHECKED AGAINST PAY ITEM LIST
(4) * FORCE ACCOUNT ITEMS INCORPORATED INTO THE ESTIMATE ON F.A. PROJECTS
(5) * TRNS*PORT ESTIMATE PLACED IN THE PROJECT FILE
(6) * PROJECT LENGTH SHOWN ON ESTIMATE AGREES WITH TITLE SHEET

(7) * (ROADWAY'S LENGTH ONLY) COST BASED ESTIMATE QUANTITY BREAKDOWN SUMMARY SHEET COMPLETED

(8) * INCLUDE ON ROADWAY ESTIMATE ANY STRUCTURE REMOVAL PAY ITEMS NOT INCLUDED ON THE STRUCTURE ESTIMATE

GENERAL

(1) ✓ CHECK SUBSURFACE PLANS WITH GRADE LINE AND EARTHWORK BALANCE SHEET AGAINST FINAL ROADWAY PLANS

(2) ✓ ALL FILE FOLDERS IDENTIFIED BY CONSTRUCTION WBS ELEMENT, T.I.P. NUMBER, CONTRACT NUMBER AND COUNTY

(3) ✓ ALL QUANTITY CALCULATION SHEETS IDENTIFIED BY THE T.I.P. NUMBER. SHOW CONSTRUCTION WBS ELEMENT AND SIGNATURE ON SHEET NO. 1

(4) ✓ EXCAVATION QUANTITIES AT CULVERTS HAVE BEEN COORDINATED WITH STRUCTURE MANAGEMENT

(5) ✓ REMOVE "PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION" NOTE FROM ALL SHEETS

(6) N/A DESIGN EXCEPTION REQUESTED, APPROVED, AND NOTED ON PLANS

(7) ✓ RIGHT-OF-WAY REVISION NOTES REMOVED FROM THE PLANS

(8) ✓ T.I.P. NUMBER IS SHOWN ON ALL SHEETS

(9) ✓ COORDINATE FINAL PLANS WITH PLANNING & ENVIRONMENTAL AND HYDRAULICS UNIT TO ENSURE COMPLIANCE WITH PERMIT

(10) N/A UTILITY ITEMS ARE INCLUDED

(11) ✓ LANDSCAPE AND EROSION CONTROL ITEMS ARE INCLUDED

(12) ✓ SIGNING AND SIGNALIZATION ITEMS ARE INCLUDED

(13) ✓ TRAFFIC CONTROL PLAN ITEMS ARE INCLUDED

(14) N/A SHOW RIGHT-OF-WAY PLAN SHEET NUMBER IN THE MARGIN ABOVE THE TITLE BLOCK IF DIFFERENT FROM CONSTRUCTION SHEET NUMBERS (EXAMPLE: R/W 12)

(15) * COMPLETE CHECKLIST FOR COORDINATION OF ROADWAY AND STRUCTURE PLANS (CIRCLE TYPE OF APPROACH FILL SPECIFIED IN STRUCTURE PLANS ITEM #8)

(16) * PLACE IMAGE OF PROFESSIONAL ENGINEER SEAL (MULTIPLE SEALS MAY BE REQUIRED ON A SINGLE SHEET) WITH ENGINEER'S NAME AND LICENSE NUMBER. ELECTRONIC SIGNATURES ARE NOT REQUIRED AT THE INITIAL TURN-IN TO PLAN REVIEW.

(17) N/A HAS PAVEMENT MANAGEMENT REVIEWED PLANS FOR SHOULDER DRAIN LOCATIONS?

(18) * SUBMIT FULL SIZE CROSS-SECTION SHEET IF 30 SHEETS OR LESS. SUBMIT LEDGER CROSS-SECTION SHEETS IF 31 SHEETS OR MORE.

(19) * ENSURE PLANS INCLUDE ANY "ENVIRONMENTAL COMMITMENTS".

(20) * ALL INDIVIDUAL PDF SHEETS MUST BE SCALED 34" WIDE X 22" HIGH.

(21) * BIND PLANS WITH BINDER CLIPS. NO SCREWS, PLEASE.

(22) * PROJECT FILE CONTAINS CORRESPONDENCE RELATED TO STANDARD SPECIFICATIONS SECTIONS 210 OR 215.

(23) ✓ INCLUDE PARCEL INDEX SHEET (FOR PROJECTS WITH 2 OR MORE PLAN SHEETS AS 3P-1.

* TO BE COMPLETED AFTER NCDOT 90% PLAN REVIEW

(24) ✱ INCLUDE BRIDGE "FOUNDATION RECOMMENDATIONS" IN THE BOUND FILE.

(25) ✱ RETAINING OR SOUND BARRIER WALLS PLANS INCLUDED AS SPECIFIED BY MR. ART MCMILLIAN, P.E. (PER MEMO 7-29-05)

(26) ✱ REFER TO THE ROADWAY DESIGN MANUAL, PART II, CHAPTER 13, SECTION 13-1 FOR PROJECT FILE CONTENT.

(27) ✱ AT THE TIME FINAL PLANS ARE SUBMITTED TO THE PLAN REVIEW SECTION, SEND A PDF OF THE TRANSPORT ESTIMATE FOR EACH OF THE DESIGN UNITS TO THE DIVISION CONSTRUCTION ENGINEER.

(28) ✱ AT THE TIME FINAL PLANS ARE SUBMITTED TO THE PLANS CHECKING UNIT, NOTIFY LOCATION & SURVEYS (L & S) CENTRAL OFFICE THAT PLANS ARE COMPLETE OF THE CURRENT DIRECTORY OF THE ELECTRONIC DESIGN PLANS (EMAIL TO UNIT HEAD IS SUFFICIENT).

(29) ✱ ONCE THE BALANCE SHEET HAS BEEN CHECKED BY THE PLANS AND STANDARDS MANAGEMENT SECTION, PLACE AN ELECTRONIC COPY (EXCEL FORMAT REQUIRED) OF THE EARTHWORK BALANCE SHEET IN THE "PRELETSTAGE\TIP#\ROADWAY\EARTHWORK BALANCE SHEET" FOLDER.

(30) ✱ GEOTECHNICAL STANDARD DRAWINGS AND PROVISIONS ARE CURRENT. FOR STANDARD DRAWINGS, COMPARE DRAWING DATE TO EFFECTIVE LET DATE SHOWN HERE:
https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx
FOR STANDARD PROVISIONS, COMPARE PROVISION DATE TO EFFECTIVE LET DATE SHOWN HERE
https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Provisions_Notes.aspx

(31) ✱ HAVE YOU COORDINATED THE "GEOTECHNICAL SUMMARY TABLES" WITH THE GEOTECHNICAL ENGINEERING UNIT? (PER GEOTECH. AUGUST 28, 2012 MEMO)

(32) ✱ SEND A PDF OF YOUR PLANS TO PAVEMENT MANAGEMENT AND TO THE HYDRAULICS UNIT FOR REVIEW BEFORE SEALING THEIR PLANS

SPECIAL PROVISIONS

(1) ✱ (SPECIAL PROVISIONS WRITTEN FOR ALL PAY ITEMS AND CONTRACT IMPLEMENTATION ITEMS NOT COVERED BY THE CURRENT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES", PROJECT PROVISIONS OR STANDARD SPECIAL PROVISIONS.

PLANS PREPARED BY: RK&K - ANDREW HEFNER 6/8/21

CALCULATION OF QUANTITIES

PROJECT TIP NUMBER: I-5972

CONSTRUCTION WBS NUMBER: 44989.1.1

COUNTY: JOHNSTON

FEDERAL AID NUMBER: NHP-0095(045)

TOTAL LENGTH [USE EXACT THREE (3) FIGURES BEYOND DECIMAL]

STA.	21+60.000	**TO STA.**	56+50.000	=	3490.000	**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**

TOTAL LENGTH * = 3,490.000 **LIN. FT. / 5,280 =** 0.661 **MILES**

STRUCTURE LENGTHS

STA.	35+83.000	**TO STA.**	38+04.000	=	221.000	**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**
STA.		**TO STA.**		=		**LIN. FT.**

LENGTH OF STRUCTURES * = 221.000 **LIN. FT. / 5,280 =** 0.042 **MILES**

ROADWAY LENGTH (LESS STRUCTURES) = 0.619 **MILES**

NOTE: USED _____ **LANE FOR LENGTH**

*** LENGTH SHOWN TO THREE (3) DECIMAL PLACES USING NORMAL ROUNDING.**

Computed by: Erin Seals
(Please Print Name)

Checked by: Andrew Hefler
(Please Print Name)

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: E. SEALS 7/5/23
CHECKED BY: ash 7/7/23 **SECTION: 200**

CLEARING AND GRUBBING

* Calculate Acreage for Tree Areas Only

LINE	STATION	STATION	LOCATION	AREA FROM CADD OR LENGTH	WIDTH	SQUARE FEET
-Y1-	44+28	45+36	LT	2,475.93		2,475.93
	45+12	45+36	LT	175.87		175.87
	45+53	45+74	LT	106.38		106.38
	46+71	47+45	LT	2,206.66		2,206.66
	47+43	48+50	LT	1,822.20		1,822.20
	49+54	50+21	LT	1,122.58		1,122.58
	29+15	29+60	RT	519.05		519.05
	46+79	47+62	RT	3,929.95		3,929.95
-RPA-	10+52	19+36	LT	22,840.24		22,840.24
-RPB-	12+44	13+05	RT	783.11		783.11
	13+34	15+33	RT	1,006.31		1,006.31
	15+41	15+94	RT	178.46		178.46
	16+21	21+33	RT	9,540.68		9,540.68
-RPC-	15+58	18+52	LT	6,677.84		6,677.84
-Y2-	16+86	21+79	CL	35,272.27		35,272.27
-L-	28+00	44+00	LT	37,561.61		37,561.61
INTERCHANGE		A		87,806.71		87,806.71
		B		135,690.39		135,690.39
		C		138,469.26		138,469.26
		D		208,460.52		208,460.52
		Total Sq. Feet =			**Total Sq. Feet**	696,646.02
		43560 Sq. Feet/ACRE			**Acres***	15.99
					SAY	**16.00**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/5/23
CHECKED BY: ash 7/7/23 **SECTION: 200 OR 226**

SUPPLEMENTARY CLEARING AND GRUBBING

CLEARING AND GRUBBING	=	SUPPLEMENTARY CLEARING AND GRUBBING
0 THRU 10 ACRES	=	1 ACRES
11 THRU 25 ACRES	=	2 ACRES
26 THRU 50 ACRES	=	3 ACRES
51 THRU 80 ACRES	=	4 ACRES
80 ACRES OR MORE	=	5 ACRES

ACRES SUPPLEMENTARY CLEARING AND GRUBBING **2 ACRES**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: RK&K GEOTECHNICAL UNIT
CHECKED BY: EBS 7/10/23 **SECTION: 225**

UNDERCUT EXCAVATION

LINE	STATION	STATION	LOCATION	LENGTH	CUBIC YARDS
UNDERCUT CONTINGENCY I.B					500
UNDERCUT CONTINGENCY II.A					500
UNDERCUT VARIES PER GEOTECH RECS					2,800
UNDERCUT CONTINGENCY II.F					150
			TOTAL		3950.00

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 1/23/19
CHECKED BY: MJA 2/12/19 **SECTION: 240**

DRAINAGE DITCH EXCAVATION

LINE	SIDE	STATION	STATION	VOLUME CY^3
-L-	LT	30+50	33+50	67.00
-L-	RT	35+00	40+79	393.00
-L-	LT	50+50	54+50	50.00
-L-	RT	54+00		101.00
-L-	LT	58+00	61+00	506.00
-L-	LT	61+00	63+50	479.00
-RPA-	RT	19+00	21+50	330.00
-RPA-	LT	20+75		55.00
-RPC-	LT	15+00	18+50	358.00
-RPC-	LT	18+50	21+50	253.00
-RPC-	LT	21+50	24+50	23.00
-RPC-	RT	17+10		22.00
-RPD-	RT	15+50		66.00
-RPD-	RT	27+50	29+50	30.00
-RPD-	RT	29+50		201.00
-Y1-	LT	28+00	31+50	2,626.00
-Y1-	RT	32+00	35+00	80.00
-Y1-	LT	32+50	36+00	631.00
-Y1-	LT	39+00	42+00	145.00
-Y1-	LT	44+50	46+50	184.00
-Y1-	RT	44+50	45+50	190.00
			TOTAL	6,790.00
			SAY	**6790**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ash 7/8/23 **SECTION: 250**

REMOVAL OF EXISTING ASPHALT PAVEMENT

(FILL IN THE BLANK FOR 'ASPHALT' OR 'CONCRETE'PAVEMENT)

LINE	STATION	STATION	LOCATION	LENGTH OR AREA	WIDTH	SQUARE YARDS
L LT	27+95	38+75	LT	6990.94		776.77
L LT	41+97	66+56	LT	25185.32		2798.37
L LT	69+79	77+11	LT	4137.38		459.71
L LT	54+37	58+96	RT	3879.15		431.02
L RT	33+39	40+79	RT	4909.14		545.46
L RT	44+20	68+83	RT	25017.00		2779.67
L RT	68+85	82+41	RT	7570.93		841.21
L RT	54+37	58+96	LT	4352.31		483.59
Y1	31+63	35+81	CL	12139.28		1348.81
Y1	38+07	40+00	CL	5479.19		608.80
RPA	10+00	19+56	CL	20844.13		2316.01
RPB	10+00	23+35	CL	35358.39		3928.71
RPC	10+00	18+65	CL	22001.10		2444.57
RPD	10+00	30+07	CL	40956.27		4550.70
	27+88	30+95	CL	6276.64		697.40
	30+66	31+09	CL	655.93		72.88
					TOTAL	25,083.68
					SAY	**25,090**

PROJECT NO.: **I-5972** **SHEET 1 OF 1**
COMPUTED BY: **MJA**
CHECKED BY: **REM** **SECTION: 260**

PROOF ROLLING

(3 HRS. PER 24' WIDTH PER MILE)

LINE	BEG. STA.	END STA.	*WIDTH	HOURS PER MILE	MILES	HRS.
RPA	12+61.00	22+13.61	16.00	2.00	0.18	0.36
RPB	13+22.00	16+64.82	16.00	2.00	0.06	0.13
RPB	16+64.82	18+20.81	20.00	2.50	0.03	0.07
RPB	18+20.81	18+77.97	24.00	3.00	0.01	0.03
RPB	18+77.97	20+27.70	30.00	3.75	0.03	0.11
RPB	20+27.70	27+11.52	36.00	4.50	0.13	0.58
RPC	13+21.00	25+15.55	16.00	2.00	0.23	0.45
RPD	13+41.00	25+19.51	16.00	2.00	0.22	0.45
RPD	25+19.51	26+77.47	20.00	2.50	0.03	0.07
RPD	26+77.47	27+53.69	24.00	3.00	0.01	0.04
RPD	27+53.69	28+99.31	30.00	3.75	0.03	0.10
RPD	28+99.31	30+87.84	36.00	4.50	0.04	0.16
					TOTAL	2.57
					SAY	**10**

***SEE DESIGN MANUAL, PART I, 11-1A**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: RK&K, GEOTECHNICAL UNIT
CHECKED BY: ash 7/7/23 **SECTION: 265**

SELECT GRANULAR MATERIAL

LINE	STATION	STATION	LOCATION	LENGTH	CUBIC YARDS
PER LETTER FROM GEOTECH DATED NOVEMBER 8, 2021					
			Contingency		3,000.00
			Varies		11,300.00
			TOTAL		14300.00

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: GEOTECHNICAL RECOMMENDATIONS, RK&K
CHECKED BY: ash 7/7/23 **SECTION: 270**
REVISED BY:

GEOTEXTILE FOR SOIL STABILIZATION

LINE	BEG. STA.	END STA.	LOCATION	LENGTH	AREA FROM CADD OR WIDTH	SQUARE YARDS
	Geotech					
Contingency						2,000.00
Varies I.C						11,300.00
Varies II.C						33,900.00
Contingency II.C						2,000.00
	Erosion Control					
						1,100.00
					GRAND TOTAL	**50,300.00**

TEMPORARY SHORING TABLE							
SHORING I.D.	BEGIN/OFFSET		END/OFFSET		ESTIMATED AVERAGE HEIGHT (ft)	ESTIMATED MAXIMUM HEIGHT (ft)	SHORING QTY (ft^2)
1	-Y1- STA 35+23±	1.5' RT	-Y1- STA 36+15±	1.5' RT	11.3	20	1040
2	-Y1- STA 37+67±	1.5' RT	-Y1- STA 38+34±	1.5' RT	10.8	20	724
3	-Y1- STA 35+13±	3' RT	-Y1- STA 35+90±	2' RT	15	21	1155
4	-Y1- STA 37+92±	3.5' RT	-Y1- STA 38+39±	3.5' RT	12	21	564
5	-L- STA 56+02±	13.7' LT	-L- STA 56+77±	14.6' LT	6.1	6.1	458
6	-L- STA 56+02±	9.3' RT	-L- STA 56+77±	8.3' RT	6.1	6.1	458
						Total:	**4397**
						Say:	**4400**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: RK&K, GEOTECHNICAL UNIT
CHECKED BY: ash 7/7/23 **SECTION: SP**

GEOTEXTILE FOR ROCK EMBANKMENTS, TYPE II

LINE	BEG. STA.	END STA.	LOCATION	LENGTH	AVERAGE WIDTH	SQUARE YARDS
PER GEOTECHNICAL REPORT, November 8, 2021						
Y1	37+75	41+55	RT			2500.00
					TOTAL	2500

PROJECT NO.: **I-5972** **SHEET 1 OF 1**
COMPUTED BY: **EBS 1/24/19**
CHECKED BY: **MJA 2/12/19** **SECTION: 500**

FINE GRADING

NOTE: THE WIDTH IS MEASURED FROM EOP +1 FOOT TO EOP +1 FOOT

LINE	STATION	STATION	LOCATION	LENGTH	AREA FROM CADD OR WIDTH	SQUARE FEET
-L-	27+94.89	43+06.30	LT		34,117.53	34,117.53
-L-	33+39.01	45+70.47	RT		28,399.65	28,399.65
-L-	43+06.30	52+31.26	LT		9,373.09	9,373.09
-L-	45+70.47	53+01.47	RT		8,278.23	8,278.23
-L-	52+31.26	60+18.58	LT		26,142.66	26,142.66
-L-	53+01.48	61+28.03	RT		27,670.43	27,670.43
-L-	60+18.58	65+07.38	LT		5,119.46	5,119.46
-L-	61+28.03	67+60.65	RT		6,802.10	6,802.10
-L-	65+07.41	77+11.40	LT		27,057.54	27,057.54
-L-	67+60.65	82+40.82	RT		33,242.51	33,242.51
-Y1-	21+69.44	36+27.17	LT		18,109.98	18,109.98
-Y1-	21+69.44	35+98.19	RT		35,732.03	35,732.03
-Y1-	38+16.08	44+40.02	LT		8,951.58	8,951.58
-Y1-	37+65.81	42+47.55	RT		15,646.69	15,646.69
-Y1-	44+04.19	56+54.83	RT		23,594.82	23,594.82
-Y1-	44+61.31	48+08.93	LT		2,610.66	2,610.66
-Y1-	49+32.33	56+55.53	LT		3,845.58	3,845.58
-Y2-	10+00.00	33+51.74	BT		94,724.55	94,724.55
-RPA-	13+73.63	22+00.00	BT		23,072.96	23,072.96
-RPB-	13+96.34	26+91.55	BT		53,967.20	53,967.20
-RPC-	14+36.37	25+14.28	BT		29,545.41	29,545.41
-RPD-	14+08.22	31+02.75	BT		51,911.51	51,911.51
-TEMPRPB-	10+70.00	17+62.41			19,290.34	19,290.34
-TEMPRPC-	11+95.36	22+42.28			26,105.54	26,105.54
					TOTAL IN FT^2	613,312.04
					TOTAL IN YD^2	68,145.78
					SAY	**68,150.00**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: GEOTECHNICAL UNIT, RK&K
CHECKED BY: ash 7/7/23 **SECTION: SP**
REVISED BY:

#57 STONE

LINE	STATION	STATION	LOCATION	LENGTH OR AREA	HEIGHT	WIDTH	NO. PIERS	PIER VOLUME	TONS
			PER GEOTECH REPORT, NOVEMBER 8, 2021						
YI	37+55.00	41+55.00	RT	N/A	N/A	N/A	N/A	N/A	1300.00
						TOTAL			1,300.00
						SAY			**1,300**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: RK&K Geotechnical Unit
CHECKED BY: EBS 7/10/23 **SECTION: 505**

SHALLOW UNDERCUT

LINE	STATION	STATION	LOCATION	LENGTH	CUBIC YARDS
Per NCDOT, Geotech.recommendations Letter Dated: November 8, 2021					
	Contingency				500.00
	Varies				9,800.00
			TOTAL		10300.00

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: GEOTECHNICAL UNIT, RK&K
CHECKED BY: AG 3/6/2020 EBS 3/11/2020 **SECTION: 505**

CLASS IV SUBGRADE STABILIZATION

LINE	STATION	STATION	LOCATION	LENGTH	TON
PER GEOTECHNICAL REPORT, November 8, 2021					
	Contingency				1,000.00
	Varies				21,600.00
			TOTAL		22600.00

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 10/11/21
CHECKED BY: ash 7/10/23 **SECTION: 607**

INCIDENTAL MILLING

LINE	STATION	STATION	WIDTH	CAD AREA SQ. FT.
L	27+95	28+45	28.00	1,400
L	33+39	33+89	28.00	1,400
L	76+61	77+11	28.00	1,400
L	81+91	82+41	28.00	1,400
Y1	21+70	22+20	57.00	317
Y1	56+00	56+50	36.00	200
Y3	13+50	14+00	20.00	111
			TOTAL:	6,228
			TOTAL (SY)	692
			SAY	**700**

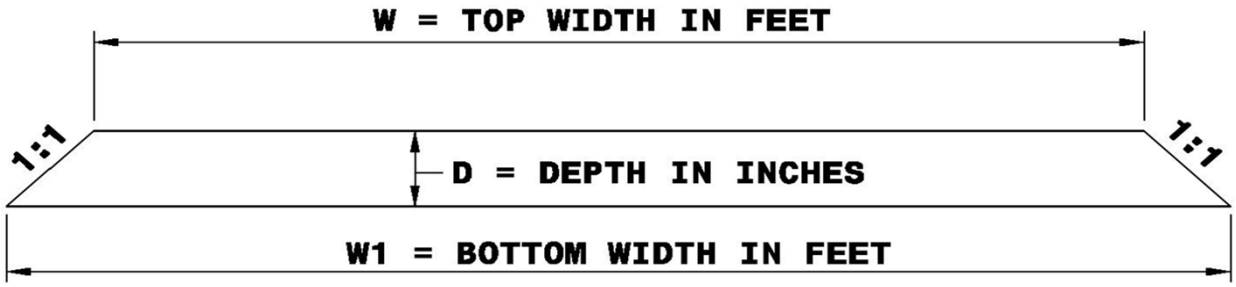
PROJECT NO.:	**I-5972**		**SHEET 1 OF 1**
COMPUTED BY:	**EBS 10/11/21**		
CHECKED BY:	**ash 7/10/23**		**SECTION: 607**

MILLING ASPHALT PAVEMENT, 2.25" DEPTH

LINE	STATION	STATION	WIDTH	CAD AREA SQ. FT.
L	28+45	76+61	28.00	134,863
L	33+89	81+91	28.00	134,451
			TOTAL:	269,314
			TOTAL (SY)	29,924
			SAY	**29,930**

PROJECT NO.: I-5972 **SHEET 1 OF 2**
COMPUTED BY: EBS 10/13/2021
CHECKED BY: **SECTION: 610**

ASPHALT CONCRETE BASE COURSE
TYPE B25.0C



CALCULATE:

LENGTH X ((W+W1)/2) X D X 114# / YD^2 / IN = _____ TONS

9 FT^2 / YD^2 X 2000# / TON

NOTE: IF USING AREA, NO LENGTH OR W1 FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG STA.	END STA.	LENGTH	AREA / W	W1	DEPTH	TONS
-L- (LT)	27+95	30+95	300.06	5264.195		10.5	350.07
-L- (LT)	30+95	38+75	779.94	22.646	23.521	10.5	1197.25
-L- (RT)	33+39	36+89	350.19	6387.61		10.5	424.78
-L- (RT)	36+89	40+79	389.82	22.646	23.521	10.5	598.40
-L- (LT)	38+75	43+04	429.05	13620.003		10.5	905.73
-L- (RT)	40+79	45+70	491.54	15103.225		10.5	1004.36
-L- (LT)	43+04	52+31	927.49	10.646	11.521	10.5	683.61
-L- (RT)	45+70	53+01	731.08	10.646	11.521	10.5	538.84
-L- (LT)	52+31	54+30	198.59	5301.187		10.5	352.53
-L- (RT)	53+01	55+00	198.52	5301.654		10.5	352.56
-L- (LT)	54+30	58+20	390.00	38.146	39.021	10.5	1000.67
-L- (RT)	55+00	59+00	400.00	38.146	39.021	10.5	1026.32
-L- (LT)	58+20	60+19	198.58	5303.23		10.5	352.66
-L- (RT)	59+00	60+99	198.53	5299.556		10.5	352.42
-L- (LT)	60+19	65+07	488.87	10.646	11.521	10.5	360.32
-L- (RT)	60+99	67+88	689.82	10.646	11.521	10.5	508.44
-L- (LT)	65+07	69+79	471.55	14250.799		10.5	947.68
-L- (RT)	67+88	71+61	372.47	11915.330		10.5	792.37
-L- (LT)	69+79	73+61	382.38	22.646	23.521	10.5	586.97
						SUBTOTAL	12335.98

PROJECT NO.: I-5972 **SHEET 2 OF 2**
COMPUTED BY: EBS 10/13/2021
CHECKED BY: ash 7/7/23 **SECTION: 610**

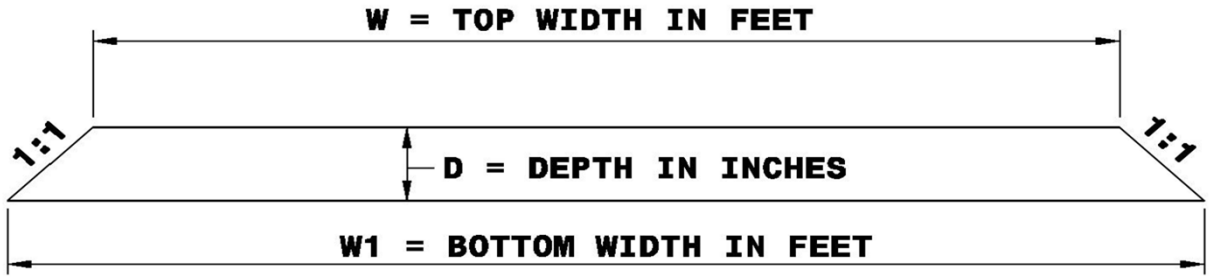
ASPHALT CONCRETE BASE COURSE
TYPE B25.0C
(CONTINUED)

NOTE: IF USING AREA, NO LENGTH OR W1 FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG STA.	END STA.	LENGTH	AREA / W	W1	DEPTH	TONS
-L- (RT)	71+61	79+41	780.03	22.646	23.521	10.5	1197.39
-L- (LT)	73+61	77+11	350.40	6156.803		10.5	409.43
-L- (RT)	79+41	82+41	299.79	5301.268		10.5	352.53
-RPA-	13+73	21+98	825.29	26392.12		4	668.60
-RPB-	13+90	27+09	1319.40	59695.61		4	1512.29
-RPC-	14+29	24+85	1055.20	33480.31		4	848.17
-RPD-	13+99	30+75	1676.09	58092.47		4	1471.68
-Y1- RT	21+70	29+61	791.00	8553.261		4	216.68
-Y1- RT	30+09	35+65	556.37	22807.3		4	577.78
-Y1- LT	30+49	36+27	578.43	6454.16		4	163.51
-Y1- RT	37+67	42+46	479.37	15564.13		4	394.29
-Y1- RT	44+04	56+55	1250.48	23400.49		4	592.81
-Y1- LT	38+17	44+30	612.66	7496.952		4	189.92
-Y1- LT	44+60	48+00	339.87	2594.722		4	65.73
-Y1- LT	49+32	56+55	723.08	3511.57		4	88.96
-Y2-	10+10	33+53	2342.34	91988.74		4	2330.38
-Y3-	23+31	23+92	61.00	997.3685		4	25.27
-TEMPRPB-	10+70	17+62	6+92	18879.14		4	478.27
-TEMPRPC-	10+00	22+42	12+42	25437.31		4	644.41
-Y1- WEDGE							5765.20
						TOTAL	30329.28
						SAY	30330.00

PROJECT NO.: I-5972 **SHEET 1 OF 2**
COMPUTED BY: J. NIEWODOWSKI (01/22/2019)
CHECKED BY: **SECTION: 610**

ASPHALT CONCRETE INTERMEDIATE COURSE TYPE I19.0C



CALCULATE:

LENGTH X ((W+W1)/2) X D X 114# / YD^2 / IN = _____ TONS

9 FT^2 / YD^2 X 2000# / TON

NOTE: IF USING AREA, NO LENGTH OR W1 FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG. STA.	END STA.	LENGTH	AREA / W	W1	DEPTH	TONS
-L- (LT)	27+95	30+95	300.1	5026.485		4	127.34
-L- (LT)	30+95	38+75	779.9	22.3125	22.646	4	444.16
-L- (RT)	33+39	36+89	350.2	6110.265		4	154.79
-L- (RT)	36+89	40+79	389.8	22.3125	22.646	4	221.99
-L- (LT)	38+75	43+04	429.1	13278.76		4	336.40
-L- (RT)	40+79	45+70	491.5	14397.96		4	364.75
-L- (LT)	43+04	52+31	927.5	10.3125	10.646	4	246.22
-L- (RT)	45+70	53+01	731.1	10.3125	10.646	4	194.08
-L- (LT)	52+31	54+30	198.6	5142.066		4	130.27
-L- (RT)	53+01	55+00	198.5	5141.825		4	130.26
-L- (LT)	54+30	58+20	390.0	37.8125	38.146	4	375.24
-L- (RT)	55+00	59+00	400.0	37.8125	38.146	4	384.85
-L- (LT)	58+20	60+19	198.6	5143.357		4	130.30
-L- (RT)	59+00	60+99	198.5	5139.729		4	130.21
-L- (LT)	60+19	65+07	488.9	10.3125	10.646	4	129.78
-L- (RT)	60+99	67+88	689.8	10.3125	10.646	4	183.13
-L- (LT)	65+07	69+79	471.6	9169.62		4	232.30
-L- (RT)	67+88	71+61	372.5	11618.64		4	294.34
-L- (LT)	69+79	73+61	382.4	22.3125	22.646	4	217.75
						SUBTOTAL	4428.16

PROJECT NO.: **I-5972** **SHEET 1 OF 2**
COMPUTED BY: J. NIEWODOWSKI (01/22/2019)
CHECKED BY: **SECTION: 610**

ASPHALT CONCRETE INTERMEDIATE COURSE TYPE I19.0C

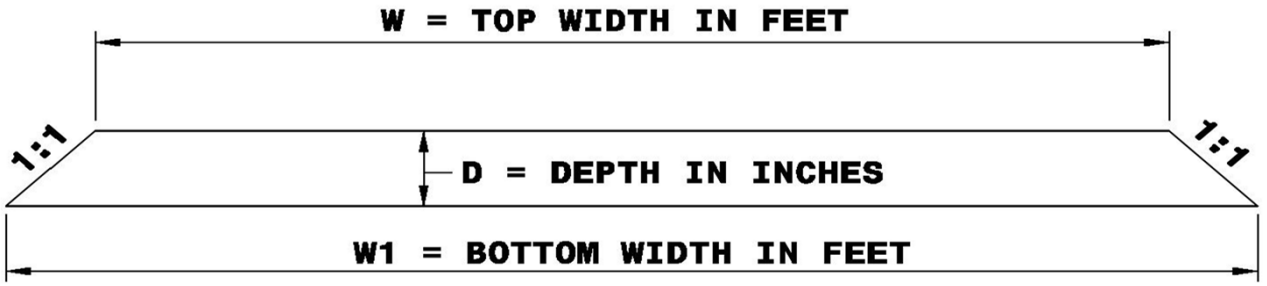
(CONTINUED)

NOTE: IF USING AREA, NO LENGTH OR W1 FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG. STA.	END STA.	LENGTH	AREA / W	W1	DEPTH	TONS
-L- (RT)	71+61	79+41	780.2	22.3125	22.646	4	444.31
-L- (LT)	73+61	77+11	350.0	5879.448		4	148.95
-L- (RT)	79+41	82+41	299.8	5063.621		4	128.28
-RPA-	13+73	21+98	825.29	26208.82		3	497.97
-RPB-	13+90	27+09	1319.40	59402.56		3	1128.65
-RPC-	14+29	24+85	1055.20	33245.94		3	631.67
-RPD-	13+99	30+75	1676.09	60381.29		3	1147.24
-Y1- RT	21+70	29+61	791.00	8377.572		4	212.23
-Y1- RT	30+09	35+65	556.37	22683.72		4	574.65
-Y1- LT	30+49	36+27	578.43	6325.684		4	160.25
-Y1- RT	37+67	42+46	479.37	15457.65		4	391.59
-Y1- RT	44+04	56+55	1250.48	23122.75		4	585.78
-Y1- LT	38+17	44+30	612.66	7360.874		4	186.48
-Y1- LT	44+60	48+00	339.87	2519.233		4	63.82
-Y1- LT	49+32	56+55	723.08	3350.966		4	84.89
-Y2-	10+10	33+59		92853.49		3	1764.22
-Y1- WEDGE							3269.60
						TOTAL	15848.74
						SAY	15850.00

PROJECT NO.: I-5872 **SHEET 1 OF 1**
COMPUTED BY: EBS 1/25/19
CHECKED BY: **SECTION: 610**

ASPHALT CONCRETE SURFACE COURSE
TYPE S9.5C



CALCULATE:

LENGTH X ((W+W1)/2) X D X 112# / YD^2 / IN = _____ TONS

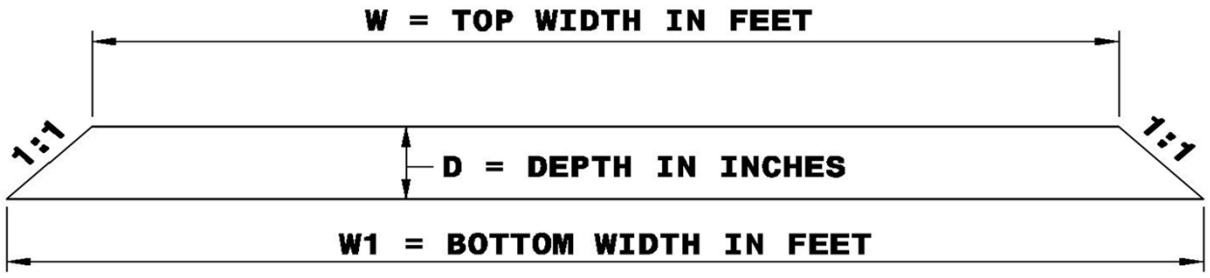
9 FT^2 / YD^2 X 2000# / TON

NOTE: IF USING AREA, NO LENGTH OR W1 FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG. STA.	END STA.	LENGTH	AREA / W	W1	DEPTH	TONS
-RPA-	13+73	21+98	825.3	26105.66		3	487.31
-RPB-	13+90	27+09	1319.4	59237.63		3	1105.77
-RPC-	14+29	24+85	1055.2	33114.04		3	618.13
-RPD-	13+99	30+75	1676.1	60171.78		3	1123.21
-Y1-	21+70	36+17	1447.1	72654.6		1.5	678.11
-Y1-	37+67	56+55	1888.1	76385.91		1.5	712.94
-Y1- RT	21+70	29+61	791.0	8201.882		3	153.10
-Y1- RT	30+09	35+65	556.4	22560.15		3	421.12
-Y1- LT	30+49	36+27	578.4	6197.208		3	115.68
-Y1- RT	37+67	42+46	479.4	15351.18		3	286.56
-Y1- RT	44+04	56+55	1250.5	22845		3	426.44
-Y1- LT	38+17	44+30	612.7	7224.795		3	134.86
-Y1- LT	44+60	48+00	339.9	2443.744		3	45.62
-Y1- LT	49+32	56+55	723.1	3190.362		3	59.55
-Y2-	10+10	33+59	2348.9	91443.67		1.5	853.47
-Y3-	13+50	23+92	1041.8	21806.25		1.5	203.53
-TEMPRPB-	10+70	17+62	692.4	18347.21		3	342.48
-TEMPRPC-	10+00	22+42	1242.3	28111.6		3	524.75
-Y1- WEDGE							1689.08
						TOTAL	9981.71
						SAY	9990.00

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: J. NIEWODOWSKI (01/22/2019)
CHECKED BY: **SECTION: 610**

ASPHALT CONCRETE SURFACE COURSE
TYPE S9.5D



CALCULATE:

LENGTH X ((W+W1)/2) X D X 112# / YD^2 / IN = 9060.00 TONS

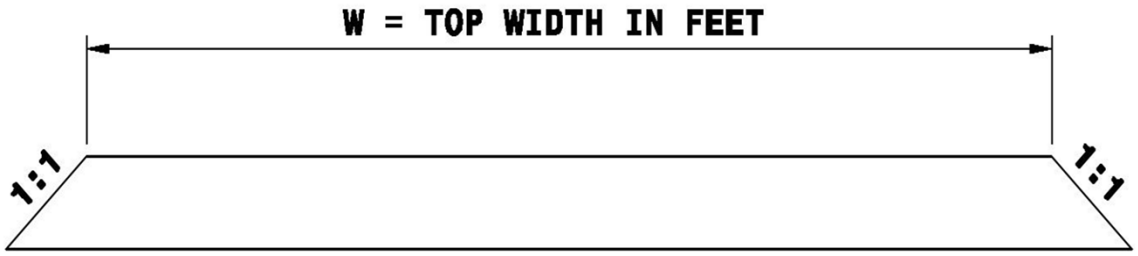
9 FT^2 / YD^2 X 2000# / TON

NOTE: IF USING AREA, NO LENGTH OR W1 FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG. STA.	END STA.	LENGTH	AREA / W	W1	DEPTH	TONS
-L- (LT)	27+95	30+95	300.1	13495.716		3	251.92
-L- (LT)	30+95	38+75	779.9	50.125	50.625	3	733.41
-L- (RT)	33+39	36+89	350.2	15902.679		3	296.85
-L- (RT)	36+89	40+79	389.8	50.125	50.625	3	366.56
-L- (LT)	38+75	52+31	1356.5	61109.010		3	1140.70
-L- (RT)	40+79	53+01	1222.6	56707.133		3	1058.53
-L- (LT)	52+31	54+30	198.6	10697.503		3	199.69
-L- (RT)	53+01	55+00	198.5	10696.141		3	199.66
-L- (LT)	54+30	55+77	147.1	65.625	66.125	3	180.92
-L- (RT)	55+00	55+77	77.1	65.625	66.125	3	94.84
-L- (LT)	55+77	57+58	180.8	70.125	70.625	3	237.45
-L- (RT)	55+77	57+58	180.8	70.125	70.625	3	237.45
-L- (LT)	57+58	58+20	62.1	65.625	66.125	3	76.39
-L- (RT)	57+58	59+00	142.1	65.625	66.125	3	174.76
-L- (LT)	58+20	60+19	198.6	10699.257		3	199.72
-L- (RT)	59+00	60+99	198.5	10694.248		3	199.63
-L- (LT)	60+19	69+79	960.4	45960.498		3	857.93
-L- (RT)	60+99	71+61	1062.3	48672.326		3	908.55
-L- (LT)	69+79	73+61	382.4	50.125	50.625	3	359.56
-L- (RT)	71+61	79+41	780.2	50.125	50.625	3	733.66
-L- (LT)	73+61	77+11	350.0	15672.424		3	292.55
-L- (RT)	79+41	82+41	299.8	13451.074		3	251.09
						TOTAL	9051.82
						SAY	9060.00

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: J. NIEWODOWSKI (01/22/2019)
CHECKED BY: R Myers **SECTION: 650**

OPEN-GRADED ASPHALT FRICTION COURSE TYPE FC-1



CALCULATE:

LENGTH X WIDTH x 70# / YD^2 = **1880.00** **TONS**

9FT^2 / YD^2 X 2000# / TON

NOTE: IF USING AREA NO LENGTH FIGURE IS NEEDED IN COMPUTATION.

LINE	BEG. STA.	END STA.	LENGTH	W	AREA	AREA1	DEPTH	TONS
-L- (LT)	27+95	30+95	300.1		13308.00	13345.508	0.75	51.8
-L- (LT)	30+95	38+75	779.9	50.00		50.125	0.75	151.9
-L- (RT)	33+39	36+89	350.2		15727.00	15770.774	0.75	61.3
-L- (RT)	36+89	40+79	389.8	50.00		50.125	0.75	75.9
-L- (LT)	38+75	52+31	1356.5		60401.26	60570.830	0.75	235.2
-L- (RT)	40+79	53+01	1222.6		56064.63	56217.458	0.75	218.3
-L- (LT)	52+31	54+30	198.6		10598.00	10622.823	0.75	41.3
-L- (RT)	53+01	55+00	198.5		10596.00	10620.815	0.75	41.3
-L- (LT)	54+30	55+77	147.1	65.50		65.625	0.75	37.5
-L- (RT)	55+00	55+77	77.1	65.50		65.625	0.75	19.7
-L- (LT)	55+77	57+58	180.8	70.00		70.125	0.75	49.3
-L- (RT)	55+77	57+58	180.8	70.00		70.125	0.75	49.3
-L- (LT)	57+58	58+20	62.1	65.50		65.625	0.75	15.8
-L- (RT)	57+58	59+00	142.1	65.50		65.625	0.75	36.2
-L- (LT)	58+20	60+19	198.6		10600.00	10624.823	0.75	41.3
-L- (RT)	59+00	60+99	198.5		10595.00	10619.816	0.75	41.3
-L- (LT)	60+19	69+79	960.4		45448.74	45568.790	0.75	177.0
-L- (RT)	60+99	71+61	1062.3		48115.51	48248.299	0.75	187.4
-L- (LT)	69+79	73+61	382.4	50.00		50.125	0.75	74.4
-L- (RT)	71+61	79+41	780.2	50.00		50.125	0.75	151.9
-L- (LT)	73+61	77+11	350.0		15497.00	15540.752	0.75	60.4
-L- (RT)	79+41	82+41	299.8		13339.00	13376.474	0.75	52.0
				TOTAL				1870.1
				SAY				**1880.00**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ASH 7/7/23 **SECTION: 620**

ASPHALT BINDER
FOR PLANT MIX

GRADE PG 64-22

SA-1		TONS	X	0.068	=		TONS
S4.75A		TONS	X	0.070	=		TONS
S9.5B		TONS	X	0.065	=		TONS
S9.5C	9,990	TONS	X	0.059	=	589.41	TONS
I19.0C	15,850	TONS	X	0.048	=	760.80	TONS
B25.0C	30,330	TONS	X	0.045	=	1,364.85	TONS
PADC, TYPE P-57		TONS	X	0.030	=		TONS
PADC, TYPE P-78M		TONS	X	0.030	=		TONS
PATCHING EXISTING PAVEMENT	220	TONS	X	0.048	=	10.56	TONS

SUBTOTAL TONS ASPHALT BINDER FOR PLANT MIX, GRADE PG 64-22	=	2,725.62	TONS

TOTAL TONS ASPHALT BINDER FOR PLANT MIX	=	2,725.62	TONS
	SAY	2,730	TONS

PROJECT NO.: **SHEET OF**
COMPUTED BY:
CHECKED BY: **SECTION: 620**

POLYMER MODIFIED ASPHALT BINDER FOR PLANT MIX

GRADE PG 76-22

TYPE S9.5D	**9,060**	**TONS**	**X**	**0.058**	**=**	**525.48**	**TONS**
OGAFC, TYPE FC-1 MOD	**1,880**	**TONS**	**X**	**0.062**	**=**	**116.56**	**TONS**
PATCHING EXISTING PAVEMENT		**TONS**	**X**	**0.048**	**=**		**TONS**

SUBTOTAL TONS POLYMER MODIFED ASPHALT BINDER FOR PLANT MIX, GRADE PG 76-22 = 642.04 TONS

GRADE PG 70-28

ULTRA-THIN BONDED WEARING COURSE		**TONS**	**X**	**0.050**	**=**		**TONS**

SUBTOTAL TONS POLYMER MODIFED ASPHALT BINDER FOR PLANT MIX, GRADE PG 70-28 = TONS

TOTAL TONS POLYMER MODIFIED ASPHALT BINDER FOR PLANT MIX = 642.04 TONS
SAY 645 TONS

7/26/2023

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/6/23
CHECKED BY: ash 7/7/23 **SECTION: 654**

ASPHALT PAVEMENT REPAIR

LINE	STATION (Str #)	LENGTH OF PIPE UNDER PAVEMENT (FT)	PIPE SIZE (IN)	WIDTH* (FT)	AREA (SY)	RATE (Lbs/SY/in)	WEIGHT (Lbs)
Y1	28+00	35.00	24.0	8.5	33.06	114	41,452
Y1	28+00	60.00	30.0	9.1	60.56	114	75,937
Y1	29+50	100.00	15.0	7.6	84.26	114	105,656
					TOTAL (LB)		223,044.80
					TOTAL (TON)		**112**
					Per CFI Questions		**100**
					SAY		**220.00**

*See STD. Drawing No. 654.01

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/6/23
CHECKED BY: ash 7/10/23 **SECTION: 655**

RUMBLE STRIPS

LINE	STATION	STATION	SIDE	GROSS LENGTH	DEDUCTIONS		NET LENGTH
					DRIVES	OTHERS	
L LT	27+94.92	77+11.40	LT	4,916			4,916
L RT	33+39.04	82+40.82	RT	4,902			4,902
						TOTAL	9,818
						SAY	**9,820**

MULLC

COMPUTED BY: *EBS* **DATE:** *1/22/19*

CHECKED BY: *MJA* **DATE:** *2/12/19*

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

GUARDRAIL SUMMARY

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL
W = TOTAL WIDTH OF FLARE FROM BEGIN

G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

ALN.	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL WIDTH	FLARE LENGTH		W		ANCHORS					REMOVE EXISTING GR	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPR. END	TRAIL. END			APPROACH END	TRAILING END	APPR. END	TRAIL. END	B-77	TYPE-III	CAT-1	GREU TL-3	AT-1		
-Y1-	30+48.01	35+80.87	RT																	532.86	
-Y1-	30+92.93	36+01.44	LT																	508.51	
-Y1-	33+41.43	35+51.70	RT	210.27				33+41.34	11.5		50		1			1		1			
-Y1-	37+72.72	42+01.46	RT	428.74			37+71.49		11.5			50		1		1		1			
-Y1-	35+20.83	36+16.48	LT	95.65			36+13.51		10	13		50		1		1		1			
-Y1-	38+07.00	42+04.72	RT																	397.7	
-Y1-	38+36.27	40+43.33	LT	207.06				38+36.27	10	13	50		1			1		1			
-Y1-	38+28.65	43+35.59	LT																	506.9	
-L-	54+91.63	56+00.00	CL	108.37			54+91.63		12	15					1						
-L-	54+91.63	56+00.00	CL	108.37				56+00.00	12	15					1						
-L-	54+50.94	57+02.56	RT																	251.6	
	54+91.63	58+43.37	CL																	703.5	
-L-	56+74.82	57+93.58	LT																	118.8	
-L-	57+35.00	58+43.37	CL	108.37			57+35.00		12	15					1						
-L-	57+35.00	58+43.37	CL	108.37				58+43.37	12	15					1						
-RPB-	23+51.17	24+54.97	RT																	103.8	
-RPB-	23+88.51	24+36.36	RT																	47.8	
-RPD-	26+97.16	29+69.63	RT	274.25			28+00.00	29+46.96	13	16	50		1				1	1			
-Y3-	23+91.75	23+91.75	CL	50.00			23+91.75												2		
			SUBTOTAL:	1,699.45	0.00										4	4	1	5	2	3171.54	
			ANCHOR UNIT DEDUCTIONS:																		
			B-77 4 @ 22.875' Each	-91.50																	
			TYPE-III 4 @ 18.75' Each	-75.00																	
			GREU TL-3 5 @ 50' Each	-250.00																	
			CAT-1 1 @ 6.25' Each	-6.25																	
			AT-1 2 @ 6.25' Each	-12.50																	
			LESS GUARDRAIL DEDUCTIONS:	1,264.20	0.00																
			PROJECT TOTAL:	1,264.20	0.00															3171.5	
			SAY:	**1,300.0**	**0.0**										**4**	**4**	**1**	**5**	**2**	**3180.0**	
			(10 ADDITIONAL GUARDRAIL POSTS)																		

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: J. NIEWODOWSKI (01/22/2019)
CHECKED BY: E. SEALS 1/23/19 **SECTION: 866**
REVISED BY: EBS 7/6/23 **RECHECKED BY: ash 7/7/23**

WOVEN WIRE FENCE, 47" FABRIC

$$E = \left[\frac{A - (8B + 16C + 16D)}{14}\right] - \left(\frac{B + C + D}{2}\right) \qquad F = (2B + 3C + 3D)$$

STATION TO STATION	LT. OR RT.	A FABRIC L.F.	B END BRACE	C CORNER BRACE	D LINE BRACE	E 4" POSTS	F 5" POSTS
-RPB- 17+87 TO 23+51	RT.	606	2		1	40	7
-RPC- 14+60 TO 16+20	LT	156	2			9	4
-RPD- 13+35 TO 16+30	RT.	338.00	1	5		15	17
-RPD- 16+30 TO 21+42	RT.	564.00		1	1	37	6
-RPD- 21+75 TO 30+42	RT.	1,010.00		6	1	61	21
-Y1- 44+40 TO 46+50	RT.	209.00	1	1		12	5
TOTAL		2,883.00				173	60
SAY		**2,890**				**174**	**60**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: DIVISION
CHECKED BY: E. SEALS 7/6/23 **SECTION: 545**

INCIDENTAL STONE BASE

(FURNISHED BY DIVISION)

Per Combined or Pre-Let Field Inspection Questions dated: March 28, 2022

SAY = 500 **TONS**

PROJECT NO. : I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/10/23
CHECKED BY: ASH 7/10/23 **SECTION: 300**

FOUNDATION CONDITIONING MATERIAL MINOR STRUCTURES

3844	**LIN. FT**	**X**	**0.106**	**=**	407.46	**TONS**
				SAY	410	**TONS**

FOUNDATION CONDITIONING GEOTEXTILE

3844	**LIN. FT**	**X**	**6 FT / 18**	**=**	1281.33	**SY**
				SAY	1290	**SY**

PROJECT NO.: I-5972

SHEET 1 OF 1
SECTION: 815

SUBSURFACE DRAINS

SUBDRAIN EXCAVATION (USE 6' DEPTH FOR PROOF ROLLING AND 4' DEPTH ELSEWHERE)	**4972.8**	**YD^3**
GEOTEXTILE FOR SUBSURFACE DRAINS ……...…..…...…....…	**14800**	**YD^2**
SUBDRAIN COARSE AGGREGATE (USE 3' DEPTH) ……..……..…	**2486.4**	**YD^3**
6" PERFORATED SUBDRAIN PIPE ……..…....…..……..……	**14800**	**LIN. FT.**
6" OUTLET PIPE (6 LINEAR FT. PER PIPE OUTLET) …..…..…....…	**180**	**LIN. FT.**
SUBDRAIN PIPE OUTLET (USE 1 PER 500' OF PIPE) ……...…	**30**	**EACH**

EXCAVATION 14800 **LIN. FT. x** 6 **DEPTH x 0.056 =** **4972.8** **YD^3**

AGGREGATE 14800 **LIN. FT. x** 3' **DEPTH x 0.056 =** **2486.4** **YD^3**

NOTE: USE 6" SUBDRAIN PIPE UNLESS ANOTHER SIZE IS SPECIFICALLY RECOMMENDED BY THE GEOTECHNICAL UNIT.

Calculated by : AG 3/6/2020
Checked by : EBS 3/11/2020

PROJECT NO.: I-5972 **SHEET 1 OF 4**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ash 7/10/23 **SECTION: 876**

PLAIN RIP RAP, CLASS I

(AT PIPE OUTLETS - CLASS I RIP RAP)

LINE	STATION	PIPE SIZE (in)	PIPE WITH DITCH (Y OR N)	TONS
L	45+95.01 LT	42	Y	20
L	61+00.00 RT	54	Y	66
Y1	41+82.72 RT	54	Y	66
Y1	41+94.90 RT	15	Y	3
RPD	15+51.04 RT	42	Y	40
RPD	29+49.45 RT	54	Y	66
Y1	38+24 TO 40+30 RT (TOE PROTECTION)			68
Y1	37+40 TO 41+54 RT (UNDER FILL)			133
Y2	17+25 (CHANNEL IMPROVEMENTS)			55
			TOTAL	517
			SAY	**520**

PROJECT NO.: I-5972 **SHEET 2 OF 4**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ash 7/10/23 **SECTION: 876**

PLAIN RIP RAP, CLASS II

(WITH OR WITHOUT FILTER FABRIC)

LINE	STATION	LOCATION	DITCH (Y/N)	PIPE DIAMETER	TONS
PER GEOTECHNICAL REPORT, November 8, 2021					
Y1	37+55 TO 41+55	RT	N/A	N/A	2400
				TOTAL	2400
				SAY	**2400**

PROJECT NO.: I-5972 **SHEET 3 OF 4**
COMPUTED BY: GEOTECHNICAL UNIT, RK&K
CHECKED BY: EBS 7/7/23 **SECTION: 876**

PLAIN RIP RAP, CLASS A

(WITH OR WITHOUT FILTER FABRIC)

LINE	STATION	LOCATION	DITCH (Y/N)	PIPE DIAMETER	TONS
PER GEOTECHNICAL REPORT, November 8, 2021					
Y1	37+55 TO 41+55	RT	N/A	N/A	700
				TOTAL	700
				SAY	**700**

PROJECT NO.: I-5972 **SHEET 4 OF 4**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ash 7/10/23 **SECTION: 876**

PLAIN RIP RAP, CLASS B

(WITH OR WITHOUT FILTER FABRIC)

LINE	STATION	LOCATION	DITCH (Y/N)	PIPE DIAMETER	TONS
L	35+25.25 RT		Y	15	2
L	54+00.00 RT		Y	36	2
Y1	21+89.45 LT		N	18	3
Y1	28+50.10 LT		Y	30	2
Y1	29+39.99 LT		Y	15	2
Y1	34+42.32 RT		Y	15	4
Y1	35+87.98 LT		Y	15	1
Y1	38+05.00 RT		N	15	1
Y1	39+57.18 LT		Y	15	2
Y1	44+50.00 RT		Y	30	8
Y2	11+00.79 RT		Y	18	3
Y2	33+00.39 RT		Y	24	5
RPB	16+43.26 LT		Y	30	16
RPB	25+65.71 LT		Y	30	8
RPC	24+36.71 RT		Y	15	4
Y1	44+50 TO 45+00 (TOE PROTECTION)				32
Y2	20+20 TP 21+50 (TOE PROTECTION)				63
				TOTAL	158
				SAY	**160**

PROJECT NO.: I-5972 **SHEET 1 OF 2**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ash 7/7/23 **SECTION: 876**

GEOTEXTILE FOR DRAINAGE

(CLASS B RIP RAP)

LINE	STATION	PIPE SIZE (in)	PIPE WITH DITCH (Y OR N)	SQUARE YARDS
L	35+25.25 RT	15	Y	5
L	54+00.00 RT	36	Y	28
Y1	21+89.45 LT	18	N	10
Y1	28+50.10 LT	30	Y	7
Y1	29+39.99 LT	15	Y	7
Y1	34+42.32 RT	15	Y	7
Y1	35+87.98 LT	15	Y	5
Y1	38+05.00 RT	15	N	5
Y1	39+57.18 LT	15	Y	7
Y1	44+50.00 RT	30	Y	21
Y2	11+00.79 RT	18	Y	10
Y2	33+00.39 RT	24	Y	14
RPB	16+43.26 LT	30	Y	42
RPB	25+65.71 LT	30	Y	21
RPC	24+36.71 RT	15	Y	15
Y1	44+50 TO 45+00 (TOE PROTECTION)			70
Y2	20+20 TP 21+50 (TOE PROTECTION)			141
			SUBTOTAL	415

PROJECT NO.: I-5972 **SHEET 2 OF 2**
COMPUTED BY: EBS 7/7/23
CHECKED BY: ash 7/7/23 **SECTION: 876**

GEOTEXTILE FOR DRAINAGE

(CLASS I RIP RAP)

LINE	STATION	PIPE SIZE (in)	PIPE WITH DITCH (Y OR N)	SQUARE YARDS
L	45+95.01 LT	42	Y	39
L	61+00.00 RT	54	Y	124
Y1	41+82.72 RT	54	Y	124
Y1	41+94.90 RT	15	Y	7
RPD	15+51.04 RT	42	Y	78
RPD	29+49.45 RT	54	Y	124
Y1	38+24 TO 40+30 (TOE PROTECTION)			145
Y1	37+40 TO 41+54 (UNDER FILL)			188
Y2	17+25 (CHANNEL IMPROVEMENTS)			80
	EROSION CONTROL			1500
			SUBTOTAL	2409
			SHEET1	415
			GRAND TOTAL	2824
			SAY	**2825**

PROJECT NO.: I-5972 SHEET 1 OF 1
COMPUTED BY: EBS 1/22/19
CHECKED BY:REM 2/12/19 SECT. 846

2' 6" CONCRETE CURB AND GUTTER

LINE	STATION	STATION	SIDE	LENGTH
-Y1-	21+69.430	27+05.350	LT	552.7
-Y1-	27+65.440	28+28.000	LT	70.5
-Y1-	21+69.370	24+98.000	RT	339.2
-Y1-	25+36.420	26+03.420	RT	109.4
-Y1-	26+38.230	26+91.480	RT	82.4
-Y1-	27+23.380	28+36.290	RT	130.3
-Y1-	28+67.880	31+47.080	RT	361.4
-Y1-	31+75.650	35+65.340	RT	414.4
-Y1-	37+66.560	42+73.530	RT	538.9
-Y1-	47+77.760	47+97.740	RT	32.0
-Y1-	48+17.710	48+37.530	RT	32.0
-Y1-	51+34.790	51+54.530	RT	45.1
-Y1-	51+78.250	51+97.850	RT	42.5
			TOTAL	2,750.8
			SAY	**2,760**

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 7/6/23
CHECKED BY: ash 7/7/23 **SECTION: 846**

SHOULDER BERM GUTTER

LOCATION	SIDE	BEG. STA.	END STA.	LENGTH
Y1	LT	35+75.00	35+91.00	16.0
Y1	LT	38+59.53	38+78.03	18.5
			TOTAL	34.5
			SAY	**35**

PROJECT NO.: I-5972 **SHEET OF**
COMPUTED BY: EBS 1/22/19
CHECKED BY: REM 2/12/19 **SECTION: 848**

4" CONCRETE SIDEWALK

LINE	STATION	STATION	LOCATION	LENGTH	WIDTH	SQUARE YARDS
-Y1-	21+70.00	24+89.00	RT	319	5	177.22
-Y1-	25+46.00	26+01.00	RT	55	5	30.56
-Y1-	26+44.00	26+89.00	RT	45	5	25.00
-Y1-	27+25.00	28+28.00	RT	103	5	57.22
-Y1-	28+73.00	31+12.00	RT	239	5	132.78
-Y1-	31+93.00	42+67.00	RT	1074	5	596.67
					TOTAL	1019.44
					SAY	**1020**

PROJECT NO.: I-5972
COMPUTED BY: EBS 1/22/19
CHECKED BY: REM 2/12/19

SHEET OF

SECTION: 848

CONCRETE CURB RAMP

LINE	STATION	LOCATION	NO. OF RAMPS
-Y1-	24+89	RT	1
-Y1-	25+46	RT	1
-Y1-	26+01	RT	1
-Y1-	26+44	RT	1
-Y1-	26+89	RT	1
-Y1-	27+25	RT	1
-Y1-	28+28	RT	1
-Y1-	28+73	RT	1
-Y1-	31+12	RT	1
-Y1-	31+93	RT	1
-Y1-	42+67	RT	1
Column Total			11

LINE	STATION	LOCATION	NO. OF RAMPS
Column Total			
Total			11
Say			11

PROJECT NO.: I-5972 **SHEET 1 OF 1**
COMPUTED BY: EBS 1/22/19
CHECKED BY: MJA 2/12/19 **SECTION: 852**

5" MONOLITHIC ISLANDS (KEYED IN)

LINE	STATION TO STATION	SQUARE FEET
-Y1-	27+99.77 - 31+62.55	3672.46
-Y1-	27+32.89 - 31+82.82	1937.40
-Y1-	32+70.69 - 42+00.00	3713.75
	43+50.00 - 47+77.16	4850.77
	Column Total	14174.38

LINE	STATION TO STATION	SQUARE FEET
	Column Total	
	TOTAL IN SQUARE YARDS	1,574.93
	SAY	**1,580**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5972	1	88

REFERENCE: I-5972

PROJECT: 44989

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	35+50 - 46+00	4 - 11
-L-	49+50 - 82+00	11 - 32
-RPA-[1]	10+29 - 13+63	24 - 26
-RPB-[1]	10+29 - 13+82	22 - 25
-RPC-[1]	10+25 - 14+27	6 - 9
-RPD-[1]	10+21 - 13+74	7 - 10
-Y1-	22+00 - 30+50	33 - 38
-Y1-	32+50 - 37+00	39 - 46
-Y1-	45+00 - 54+50	46 - 53
-Y2-	10+50 - 33+00	54 - 67
-RPA-	14+00 - 17+50	68 - 70
-RPB-	14+50 - 22+00	71 - 75
-RPC-	14+50 - 15+50	76
-RPC-	16+50 - 21+00	77 - 80
-RPD-	15+00 - 21+00	81 - 84
-RPD-	24+50 - 30+00	84 - 88

1 - These cross sections are subsets of -L- cross sections.

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY ***JOHNSTON***

PROJECT DESCRIPTION ***I-95 AND US-70 BUSINESS, (E. MARKET STREET), EXIT 95 INTERCHANGE FROM OUTLET CENTER DRIVE TO WEST OF YELVERTON GROVE ROAD***

RECOMMENDATIONS

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) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

P. CARY

J. MIZE

S&ME PERSONNEL

INVESTIGATED BY ***RK&K, LLP***

DRAWN BY ***M. METRY***

CHECKED BY ***M. SWEITZER***

SUBMITTED BY ***RK&K, LLP***

DATE ***OCTOBER 2021***

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NORTH CAROLINA PROFESSIONAL SEAL 024955 ENGINEER MARGARET M. SWEITZER

10/19/2021

DocuSigned by:
Margaret M. Sweitzer
4AC688A0680C453...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5972	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] DEIDRICH D-50
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK:

ELEVATION: FEET

NOTES:

ABBREVIATIONS:
F.I.A.D. - FILLED IMMEDIATELY AFTER DRILLING

ROADWAY BORING ELEVATIONS DETERMINED FROM PROVIDED .TIN FILES

BRIDGE AND RETAINING WALL BORING ELEVATIONS DETERMINED USING SURVEY-GRADE GPS UNIT

▥: CLASS IV SUBGRADE STABILIZATION

DATE: 8-15-14

09/08/99

TIP PROJECT: I-5972

CONTRACT: C203991

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5972	3	88

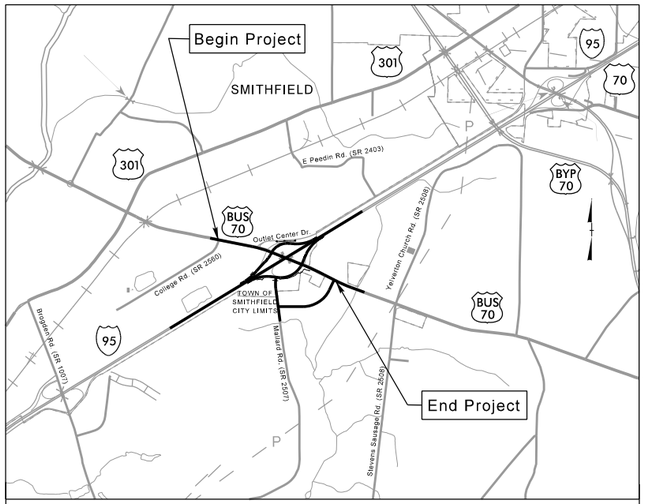
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
44989.1.1	NHP-0095(045)	PE
44989.2.1	NHP-0095(045)	R/W, UTILITIES
44989.3.1	NHP-0095(045)	CONST.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

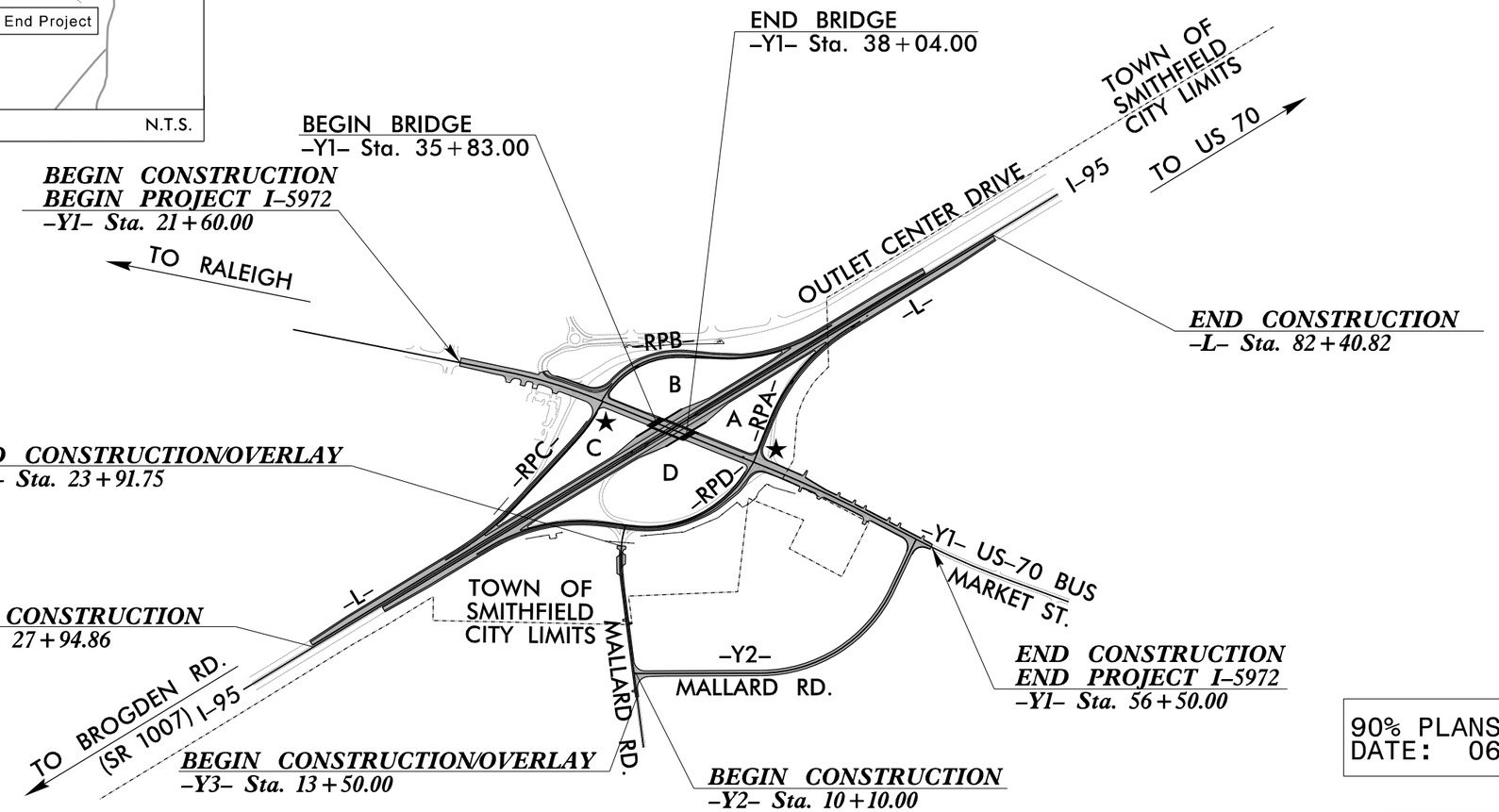
JOHNSTON COUNTY

LOCATION: I-95 AND US-70 BUSINESS, (E. MARKET STREET), EXIT 95 INTERCHANGE FROM OUTLET CENTER DR. TO WEST OF YELVERTON GROVE RD.

TYPE OF WORK: GRADING, DRAINAGE, PAVING, BRIDGE, SIGNING AND SIGNALS



VICINITY MAP N.T.S.



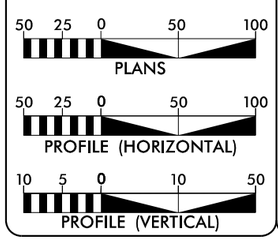
90% PLANS SUBMITTAL
DATE: 06/08/21

NOTE:
1. THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

★ - *PROPOSED SIGNALS*

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES



DESIGN DATA

ADT 2017 = 13,600
ADT 2040 = 17,600
K = 8 %
D = 55 %
T = 4 % *
V = 50 MPH

* (TTST 1% + DUALS 3%)

FUNC. CLASS = MINOR ARTERIAL

PROJECT LENGTH

* LENGTH OF ROADWAY PROJECT I-5972.....0.619 mi
LENGTH OF STRUCTURE PROJECT I-5972.....0.042 mi
TOTAL LENGTH OF PROJECT I-5972.....0.661 mi

* BASED ON -Y1-

PREPARED IN THE OFFICE OF:
RK&K
FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:
December 14, 2021

B. KEITH SKINNER, P.E.
PROJECT ENGINEER

MICHAEL T. MERRITT, P.E.
PROJECT DESIGN ENGINEER

NCDOT CONTACT: RUSSELL BROADWELL, P.E.
DIVISION 4 PROJECT ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

9/28/2021
R:\GeoTech\InvestigationDesign\CADD_GEOTECH\PlanProf\Title sheet and Legend\I5972_GEO_recs_tsh_003.dgn
FKeys

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	4

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

170 160 150 140

6:1

5.78:1

04/21

ROADWAY EMBANKMENT Brown, loose to medium dense, clayey coarse SAND, moist to wet

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet

36+50.00

(A) ROADWAY EMBANKMENT Brown, loose to medium dense, clayey coarse SAND, moist to wet

(B) Black, medium stiff to stiff, sandy silty CLAY, wet

6:1

5.78:1

04/21

UNDIVIDED COASTAL PLAIN Black, medium stiff to stiff, sandy silty highly plastic CLAY, wet

36+00.00

BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 35+75

(A) ROADWAY EMBANKMENT Orange, soft to stiff, sandy CLAY, moist

(B) Gray, medium stiff to stiff, clayey sandy SILT, moist

6:1

4:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

35+50.00

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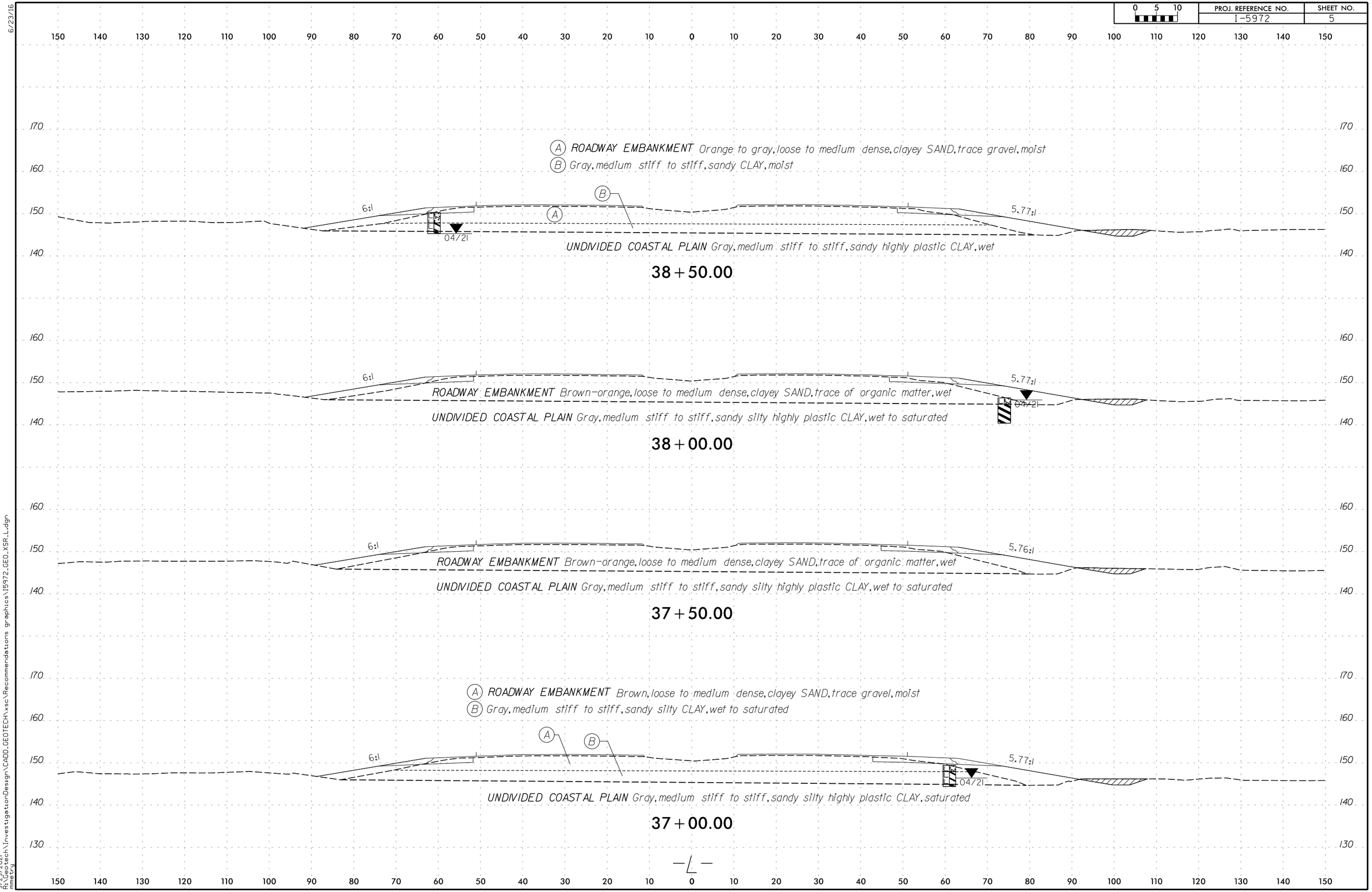
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	5



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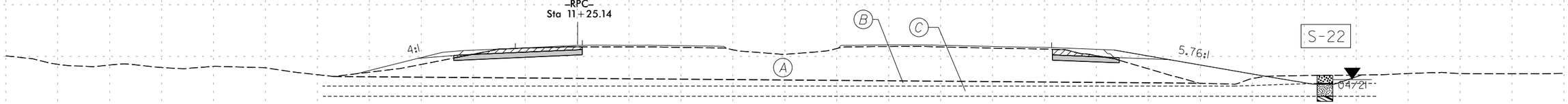
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	6

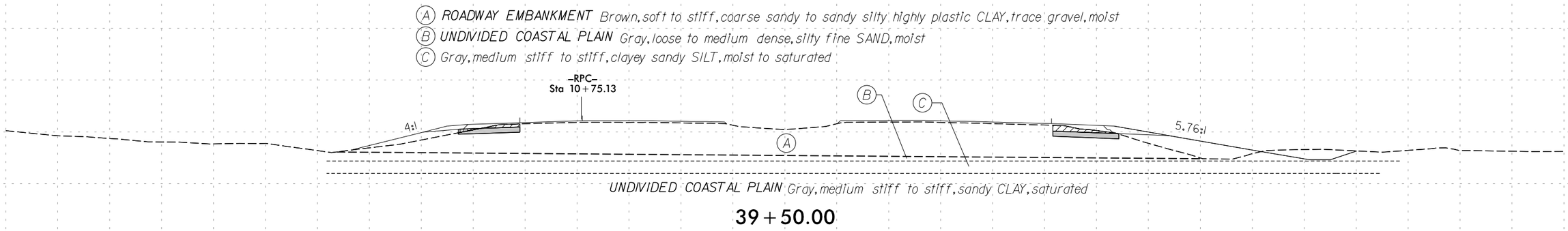
END CLASS IV SUBGRADE STABILIZATION -RPC- STA. 11+50

SOIL TEST RESULTS

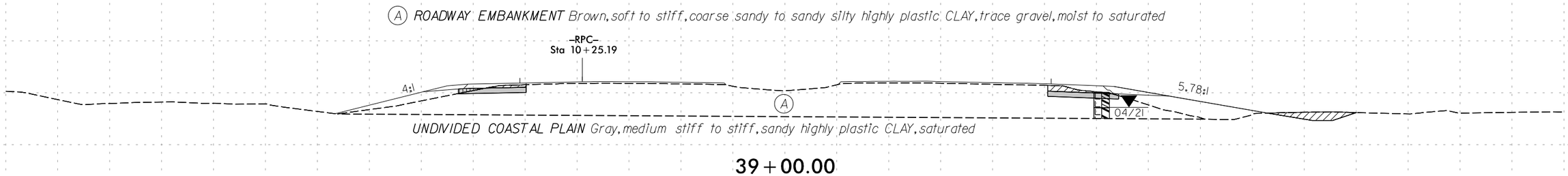
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-22	40+00	104' RT	2.0-2.5	A-4	20	6	23	34	18	25	100	88	48	21.7	-



40+00.00



39+50.00



39+00.00

BEGIN CLASS IV SUBGRADE STABILIZATION -RPC- STA. 10+00
BEGIN SHALLOW UNDERCUT EXCAVATION -L STA. 38+75
BEGIN SHALLOW UNDERCUT EXCAVATION -RPC- STA. 10+00
BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPC- STA. 10+00

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	7

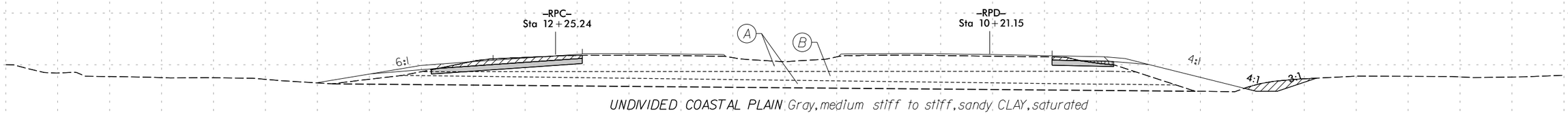
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

180 170 160 150 140 130 120

END CLASS IV SUBGRADE STABILIZATION -RPD- STA. 10+50

(A) *ROADWAY EMBANKMENT* Orange-brown to gray-black, soft to stiff, coarse sandy highly plastic CLAY, moist to saturated

(B) Gray-black, loose, silty clayey SAND, moist



41+00.00

BEGIN SHALLOW UNDERCUT EXCAVATION -RPD- STA. 10+00
BEGIN CLASS IV SUBGRADE STABILIZATION -RPD- STA. 10+00
BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPD- STA. 10+00

200 190 180 170 160 150 140 130

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 40+75
END SHALLOW UNDERCUT EXCAVATION -L- STA. 40+75

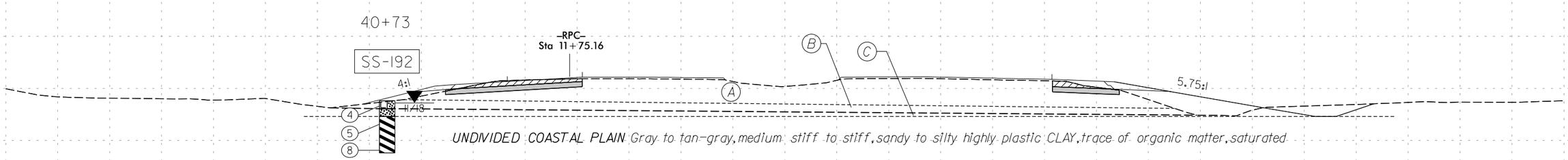
SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-192	40+73	77' LT	3.5-5.0	A-7-6 (31)	52	34	5	15	44	36	100	98	86.6	34.2	-

(A) *ROADWAY EMBANKMENT* Brown, soft to stiff, coarse sandy to sandy silty highly plastic CLAY, trace gravel, moist

(B) Gray to tan, loose, silty fine to coarse SAND, moist

(C) *UNDIVIDED COASTAL PLAIN* Tan, loose, silty fine to coarse SAND, moist



40+50.00

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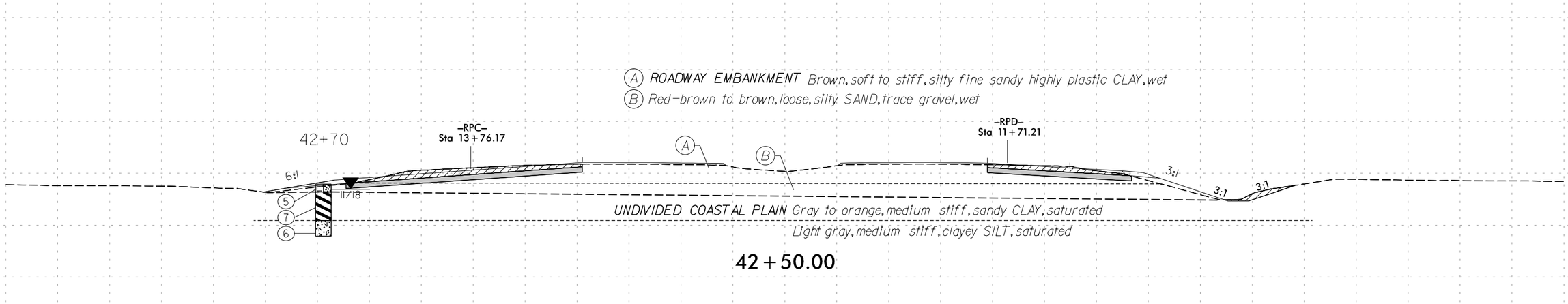
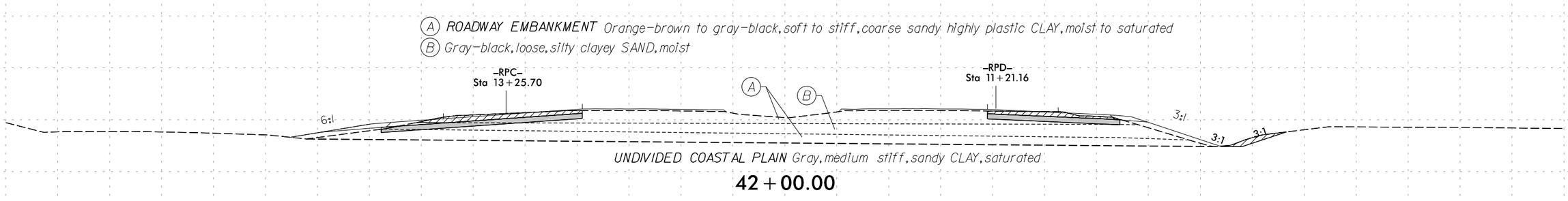
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	8





END CLASS IV SUBGRADE STABILIZATION -RPC- STA. 13+00

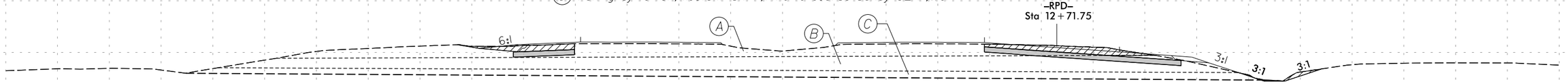
BEGIN CLASS IV SUBGRADE STABILIZATION -RPC- STA. 12+50

41+50.00

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	9

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPD- STA. 13+00
END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 43+75
END SHALLOW UNDERCUT EXCAVATION -RPD- STA. 13+00
END SHALLOW UNDERCUT EXCAVATION -L- STA. 43+75

(A) *ROADWAY EMBANKMENT* Brown, soft to stiff, silty fine sandy highly plastic CLAY, wet
(B) Red-brown to brown, loose, silty to silty clayey SAND, trace gravel, wet
(C) Tan-gray to tan, medium stiff, fine to coarse sandy CLAY, wet

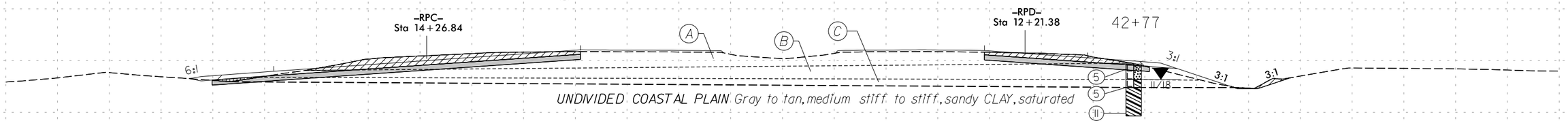


43+50.00

BEGIN SHALLOW UNDERCUT EXCAVATION -L STA. 43+25
BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 43+25

UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE FOR -RPC- CONTINUES ON SHEET 76
SHALLOW UNDERCUT EXCAVATION FOR -RPC- CONTINUES ON SHEET 76
END CLASS IV SUBGRADE STABILIZATION -RPC- STA. 14+50

(A) *ROADWAY EMBANKMENT* Brown, soft to stiff, silty fine sandy highly plastic CLAY, wet
(B) Red-brown to brown, loose, silty to silty clayey SAND, trace gravel, wet
(C) Tan-gray to tan, medium stiff, fine to coarse sandy CLAY, wet

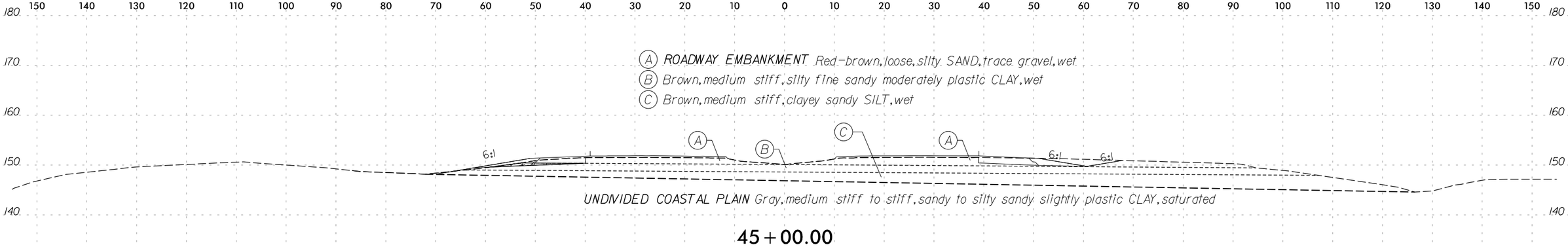


43+00.00

BEGIN CLASS IV SUBGRADE STABILIZATION -RPC- STA. 14+00

—L—

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	10

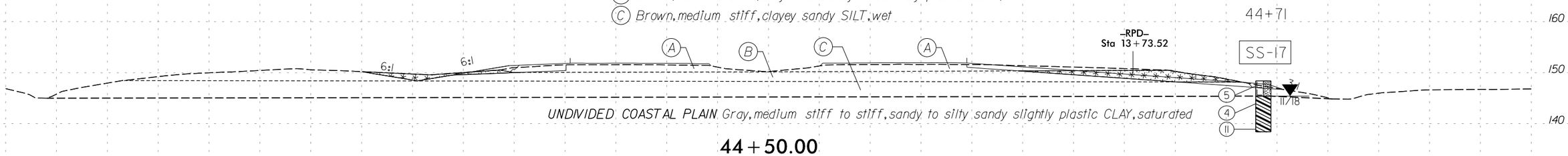


45+00.00

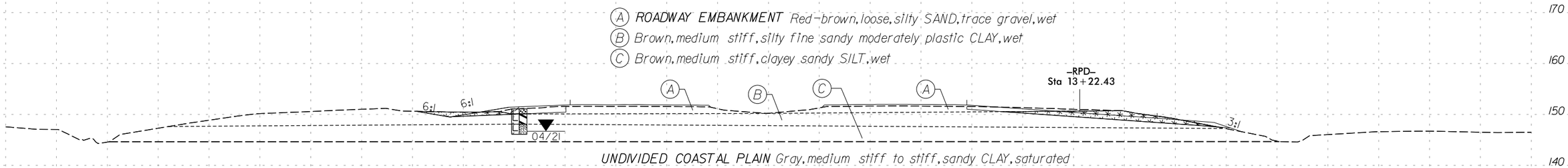
UNCLASSIFIED EXCAVATION - ACCEPTABLE FOR -RPD- CONTINUES ON SHEET 8I

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-17	44+71	97' RT	3.5-5.0	A-6 (6)	27	12	7	26	38	29	99	95	73	19.1	-



44+50.00



44+00.00

BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE -L- STA. 43+75
BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPD- STA. 13+00

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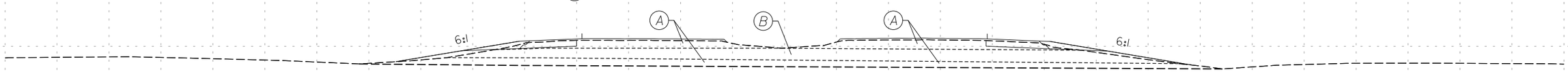
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	11

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

170
160
150
140

Ⓐ *ROADWAY EMBANKMENT* Orange to gray, loose to medium dense, silty to clayey coarse SAND, lenses of clay, wet
Ⓑ Brown-orange, medium stiff to stiff, silty CLAY, wet

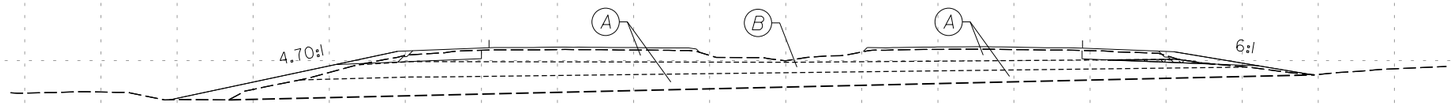


UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

49+50.00

170
160
150
140

Ⓐ *ROADWAY EMBANKMENT* Orange to gray, loose, silty to clayey coarse SAND, lenses of clay, wet
Ⓑ Brown-orange, medium stiff, silty CLAY, wet



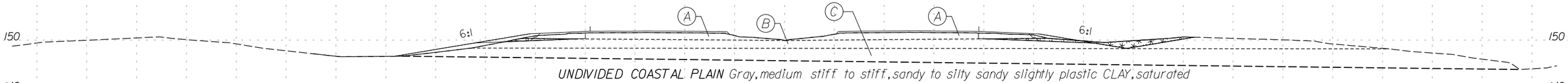
UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

46+00.00

180
170
160
150
140
130

END UNCLASSIFIED EXCAVATION - ACCEPTABLE -L- STA. 45+75

Ⓐ *ROADWAY EMBANKMENT* Red-brown, loose, silty SAND, trace gravel, wet
Ⓑ Brown, medium stiff, silty fine sandy moderately plastic CLAY, wet
Ⓒ Brown, medium stiff, clayey sandy SILT, wet



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, sandy to silty sandy slightly plastic CLAY, saturated

45+50.00

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

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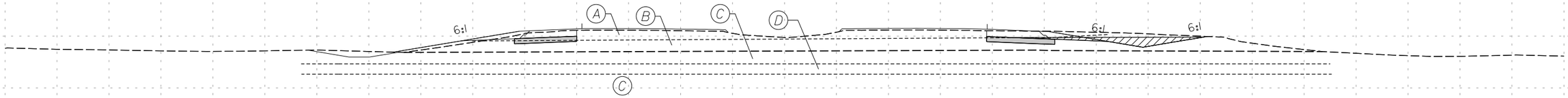
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	12

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

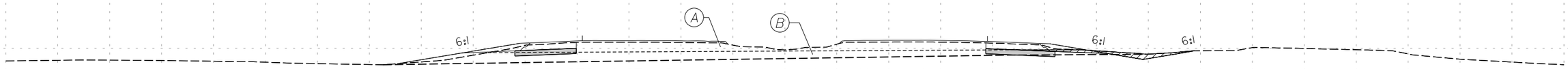
180 170 160 150 140

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



51+00.00

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet



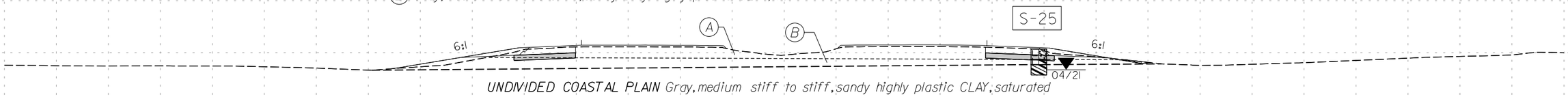
UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, sandy highly plastic CLAY, saturated

50+50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-25	50+00	49' RT	2.0-2.5	A-7-6	46	28	7	18	29	46	100	97	80.6	21.3	-

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, sandy highly plastic CLAY, saturated

50+00.00

BEGIN SHALLOW UNDERCUT EXCAVATION -L- STA. 49+75
BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 49+75

—L—

180 170 160 150 140 130 120

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

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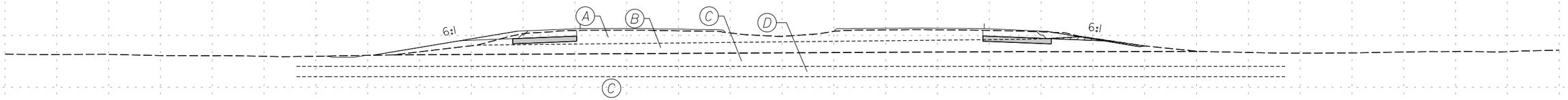
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	13

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

180 170 160 150 140

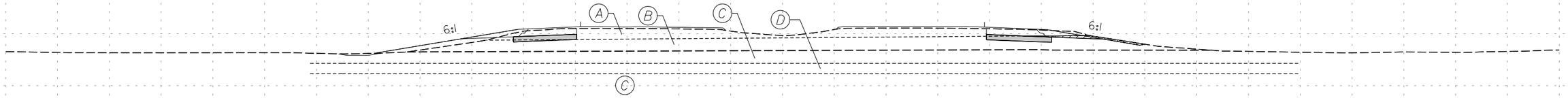
(A) ROADWAY EMBANKMENT Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) UNDIVIDED COASTAL PLAIN Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



52 + 50.00

180 170 160 150 140 130

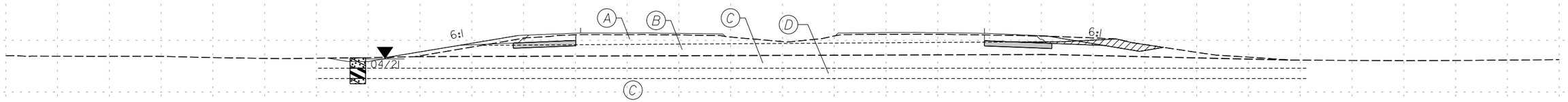
(A) ROADWAY EMBANKMENT Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) UNDIVIDED COASTAL PLAIN Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



52 + 00.00

170 160 150 140 130

(A) ROADWAY EMBANKMENT Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) UNDIVIDED COASTAL PLAIN Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



51 + 50.00

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

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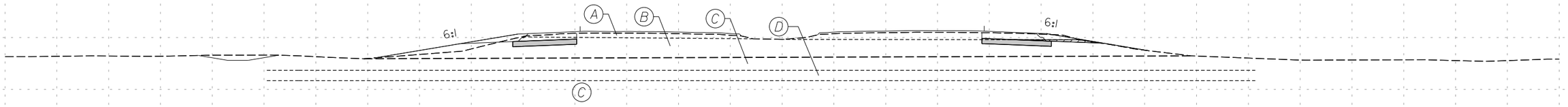
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	14

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

190 180 170 160 150 140

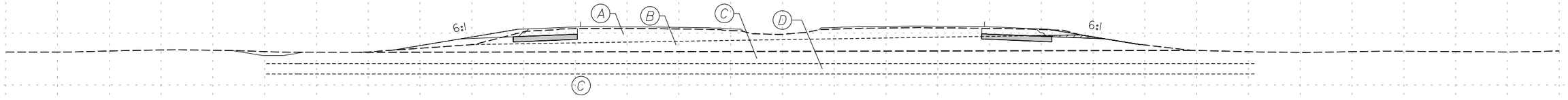
END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 54+25

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



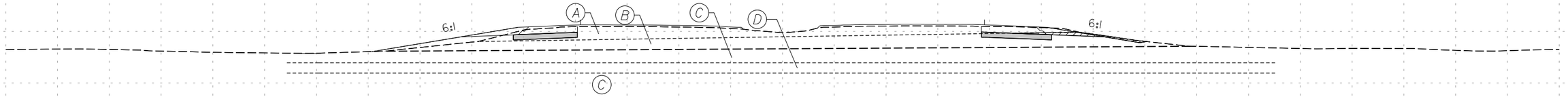
54+00.00

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



53+50.00

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



53+00.00

—L—

130

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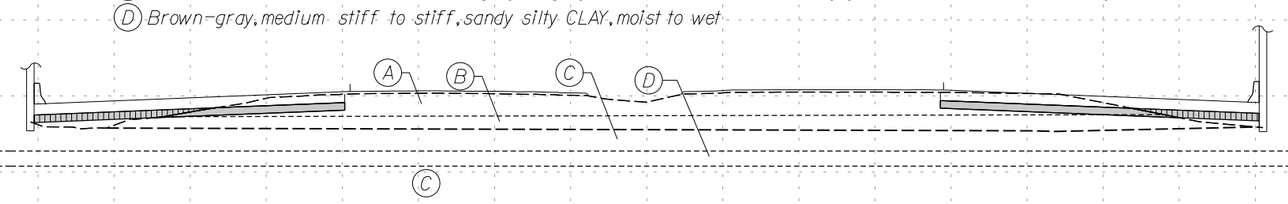
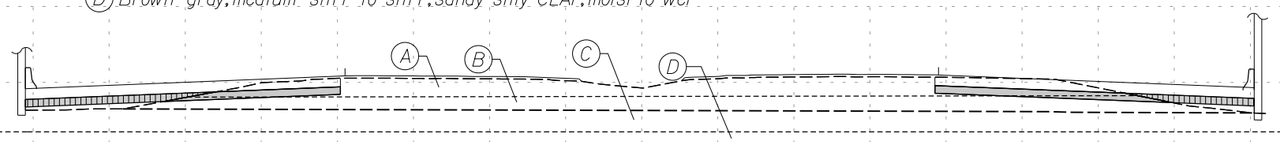
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	15

Ⓐ ROADWAY EMBANKMENT Red-brown, loose to medium dense, clayey coarse SAND, moist
Ⓑ Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
Ⓒ UNDIVIDED COASTAL PLAIN Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
Ⓓ Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



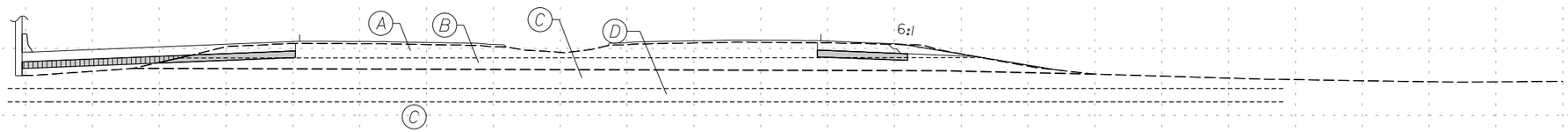
55 + 50.00

Ⓐ ROADWAY EMBANKMENT Red-brown, loose to medium dense, clayey coarse SAND, moist
Ⓑ Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
Ⓒ UNDIVIDED COASTAL PLAIN Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
Ⓓ Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



55 + 00.00

Ⓐ ROADWAY EMBANKMENT Red-brown, loose to medium dense, clayey coarse SAND, moist
Ⓑ Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
Ⓒ UNDIVIDED COASTAL PLAIN Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
Ⓓ Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



54 + 50.00

BEGIN CLASS IV SUBGRADE STABILIZATION -L- STA. 54+25

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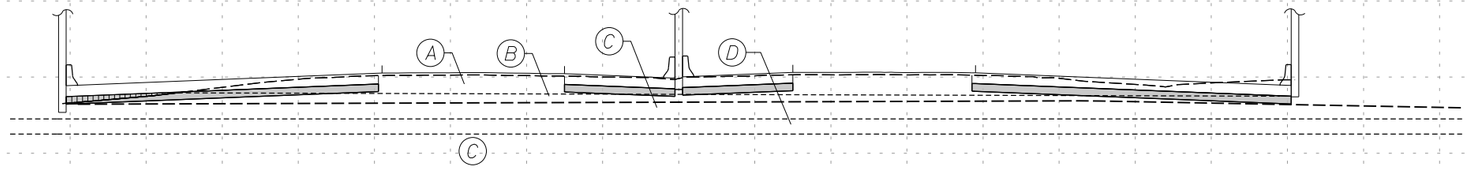
mmercy

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	16

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

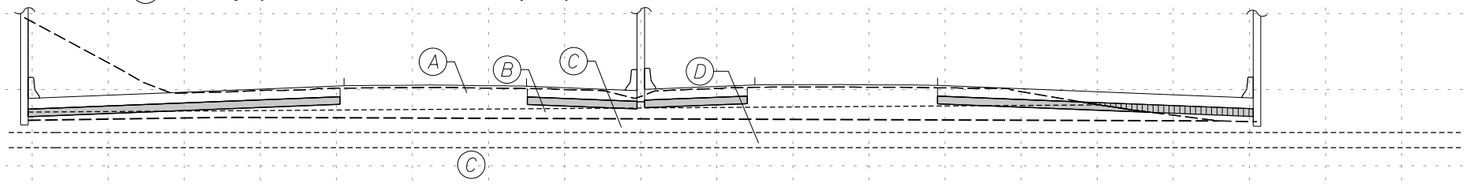
180 170 160 150 140 130

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



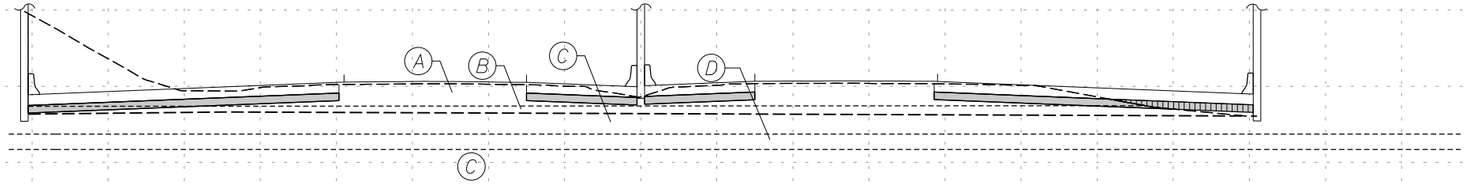
57+00.00

(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



56+50.00

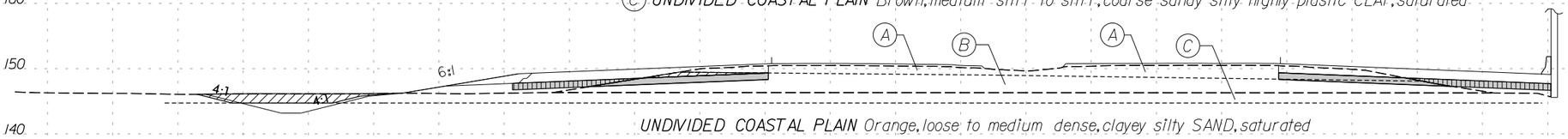
(A) *ROADWAY EMBANKMENT* Red-brown, loose to medium dense, clayey coarse SAND, moist
(B) Gray, medium stiff to stiff, sandy silty highly plastic CLAY, wet
(C) *UNDIVIDED COASTAL PLAIN* Brown-gray to gray, loose to medium dense, clayey coarse SAND, lenses of clay, moist to saturated
(D) Brown-gray, medium stiff to stiff, sandy silty CLAY, moist to wet



56+00.00

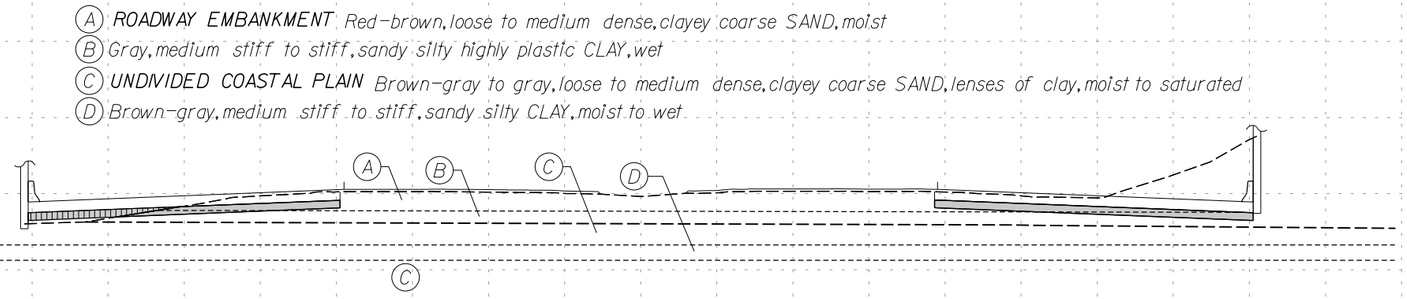
—L—

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	17

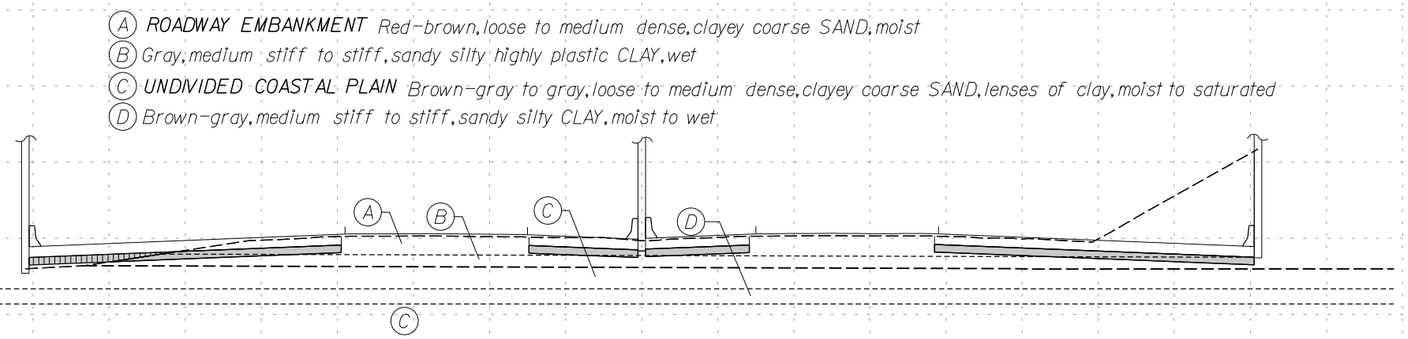


58+50.00

BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 58+25



58+00.00



57+50.00

—L—

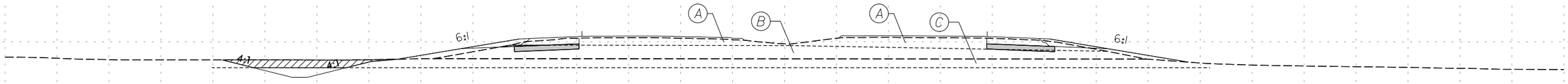
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	18

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

180 170 160 150 140 130

(A) *ROADWAY EMBANKMENT* Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) *UNDIVIDED COASTAL PLAIN* Brown, medium stiff to stiff, coarse sandy silty highly plastic CLAY, saturated

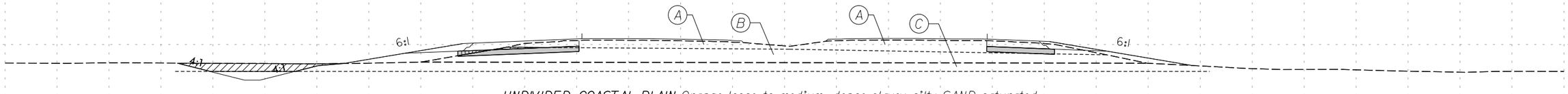


UNDIVIDED COASTAL PLAIN Orange, loose to medium dense, clayey silty SAND, saturated

60+00.00

END CLASS IV SUBGRADE STABILIZATION -L- STA. 59+75

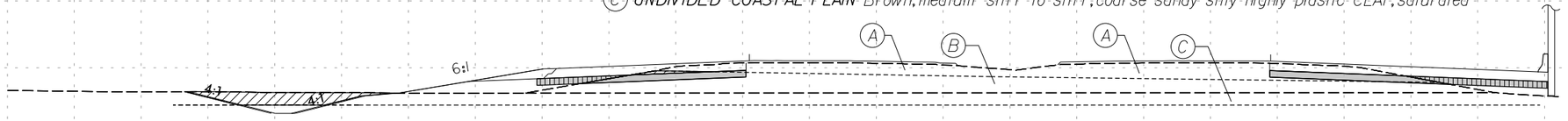
(A) *ROADWAY EMBANKMENT* Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) *UNDIVIDED COASTAL PLAIN* Brown, medium stiff to stiff, coarse sandy silty highly plastic CLAY, saturated



UNDIVIDED COASTAL PLAIN Orange, loose to medium dense, clayey silty SAND, saturated

59+50.00

(A) *ROADWAY EMBANKMENT* Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) *UNDIVIDED COASTAL PLAIN* Brown, medium stiff to stiff, coarse sandy silty highly plastic CLAY, saturated



UNDIVIDED COASTAL PLAIN Orange, loose to medium dense, clayey silty SAND, saturated

59+00.00

—L—

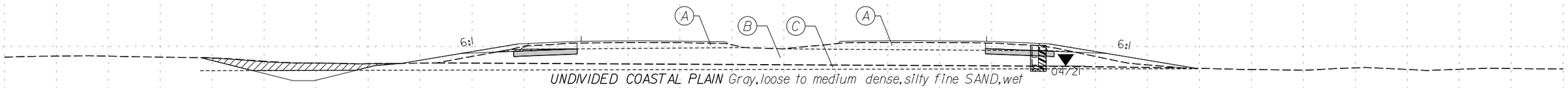
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	19

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

180 170 160 150 140

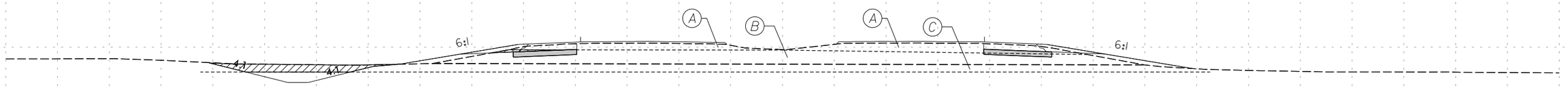
(A) ROADWAY EMBANKMENT Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, silty fine sandy highly plastic CLAY, lenses of sand, wet



UNDIVIDED COASTAL PLAIN Gray, loose to medium dense, silty fine SAND, wet

61+50.00

(A) ROADWAY EMBANKMENT Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) UNDIVIDED COASTAL PLAIN Brown, medium stiff to stiff, coarse sandy silty highly plastic CLAY, saturated



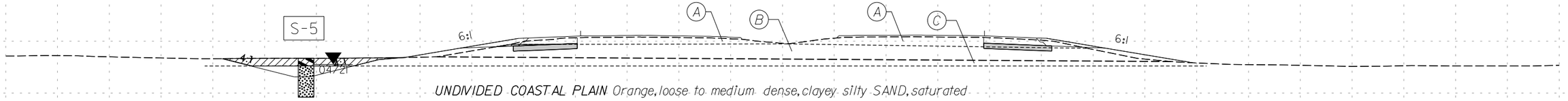
UNDIVIDED COASTAL PLAIN Orange, loose to medium dense, clayey silty SAND, saturated

61+00.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-5	60+50	92' LT	0.5-1.0	A-7-6	60	33	38	14	5	43	100	69	49.5	31.5	-

(A) ROADWAY EMBANKMENT Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) UNDIVIDED COASTAL PLAIN Brown, medium stiff to stiff, coarse sandy silty highly plastic CLAY, saturated



UNDIVIDED COASTAL PLAIN Orange, loose to medium dense, clayey silty SAND, saturated

60+50.00

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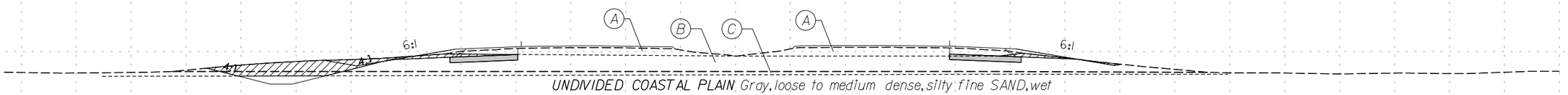
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	20

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

180 170 160 150 140

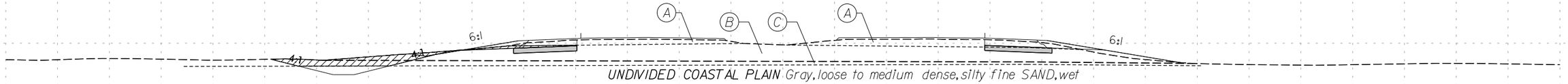
(A) *ROADWAY EMBANKMENT* Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) *UNDIVIDED COASTAL PLAIN* Gray, medium stiff to stiff, silty fine sandy highly plastic CLAY, lenses of sand, wet



UNDIVIDED COASTAL PLAIN Gray, loose to medium dense, silty fine SAND, wet

63 + 00.00

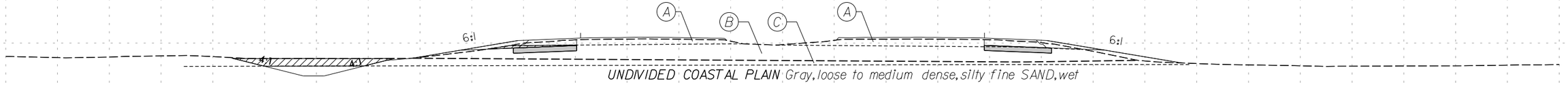
(A) *ROADWAY EMBANKMENT* Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) *UNDIVIDED COASTAL PLAIN* Gray, medium stiff to stiff, silty fine sandy highly plastic CLAY, lenses of sand, wet



UNDIVIDED COASTAL PLAIN Gray, loose to medium dense, silty fine SAND, wet

62 + 50.00

(A) *ROADWAY EMBANKMENT* Brown to gray, loose to medium dense, silty to silty clayey fine SAND, moist to wet
(B) Brown to gray, medium stiff to stiff, sandy to silty sandy highly plastic CLAY, trace of organic matter, lenses of sand, moist to wet
(C) *UNDIVIDED COASTAL PLAIN* Gray, medium stiff to stiff, silty fine sandy highly plastic CLAY, lenses of sand, wet



UNDIVIDED COASTAL PLAIN Gray, loose to medium dense, silty fine SAND, wet

62 + 00.00

170 160 150 140 130

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

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mmsley

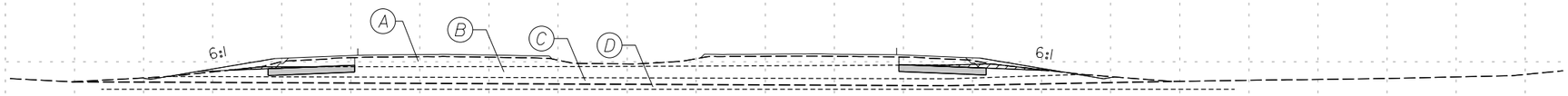
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	21

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

180 170 160 150 140 130

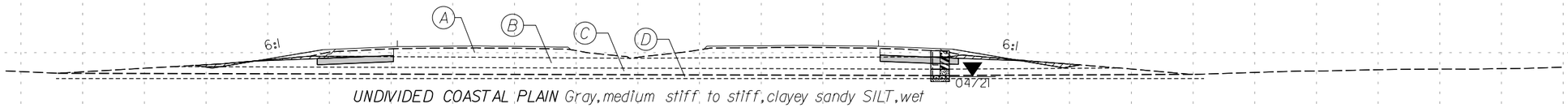
(A) *ROADWAY EMBANKMENT* Brown-orange, loose to medium dense, clayey SAND, trace gravel, moist
(B) Brown-orange, medium stiff to stiff, sandy highly plastic CLAY, trace gravel, moist to wet
(C) Gray-orange, medium stiff to stiff, clayey sandy SILT, wet
(D) *UNDIVIDED COASTAL PLAIN* Gray, loose to medium dense, silty fine SAND, trace of organic matter, wet



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, wet

64 + 50.00

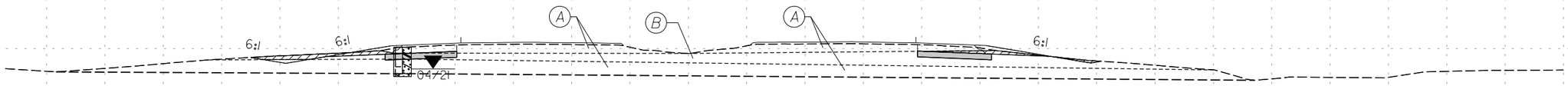
(A) *ROADWAY EMBANKMENT* Brown-orange, loose to medium dense, clayey SAND, trace gravel, moist
(B) Brown-orange, medium stiff to stiff, sandy highly plastic CLAY, trace gravel, moist to wet
(C) Gray-orange, medium stiff to stiff, clayey sandy SILT, wet
(D) *UNDIVIDED COASTAL PLAIN* Gray, loose to medium dense, silty fine SAND, trace of organic matter, wet



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, wet

64 + 00.00

(A) *ROADWAY EMBANKMENT* Orange-brown to brown, loose to medium dense, clayey SAND, lenses of clay, moist to wet
(B) Brown, medium stiff to stiff, sandy highly plastic CLAY, wet



UNDIVIDED COASTAL PLAIN Brown, loose to medium dense, clayey SAND, lenses of clay, wet

63 + 50.00

9/29/2021
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mmosby

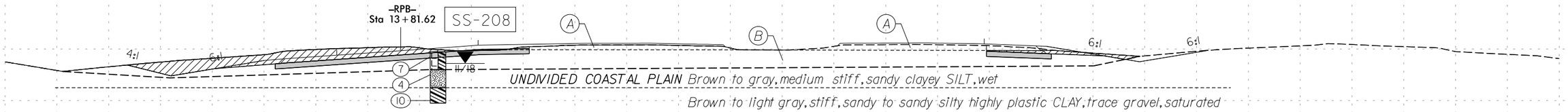
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	22

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-208	65+79	66' LT	3.5-5.0	A-4 (2)	23	6	10	26	40	24	98	92	71.6	18.3	-

65+79

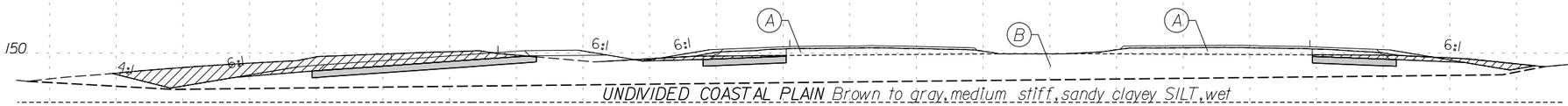
(A) ROADWAY EMBANKMENT Brown, loose to medium dense, silty SAND, moist
(B) Brown to brown-orange, medium stiff, sandy to sandy silty highly plastic CLAY, trace gravel, moist to wet



UNDIVIDED COASTAL PLAIN Brown to gray, medium stiff, sandy clayey SILT, wet
Brown to light gray, stiff, sandy to sandy silty highly plastic CLAY, trace gravel, saturated

66+00.00

(A) ROADWAY EMBANKMENT Brown, loose to medium dense, silty SAND, moist
(B) Brown to brown-orange, medium stiff, sandy to sandy silty highly plastic CLAY, trace gravel, moist to wet

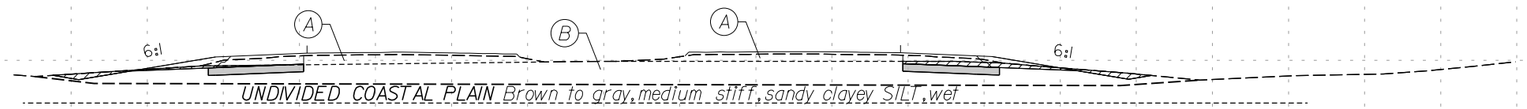


UNDIVIDED COASTAL PLAIN Brown to gray, medium stiff, sandy clayey SILT, wet
Brown to light gray, stiff, sandy to sandy silty highly plastic CLAY, trace gravel, saturated

UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE FOR -RPB- CONTINUES ON SHEET 7I
SHALLOW UNDERCUT EXCAVATION FOR -RPB- CONTINUES ON SHEET 7I

65+50.00

(A) ROADWAY EMBANKMENT Brown, loose to medium dense, silty SAND, moist
(B) Brown to brown-orange, medium stiff, sandy to sandy silty highly plastic CLAY, trace gravel, moist to wet



UNDIVIDED COASTAL PLAIN Brown to gray, medium stiff, sandy clayey SILT, wet
Brown to light gray, stiff, sandy to sandy silty highly plastic CLAY, trace gravel, saturated

65+00.00

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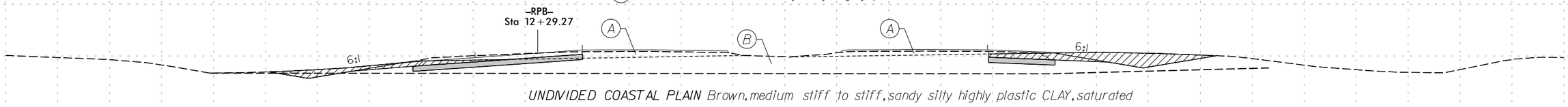
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	23

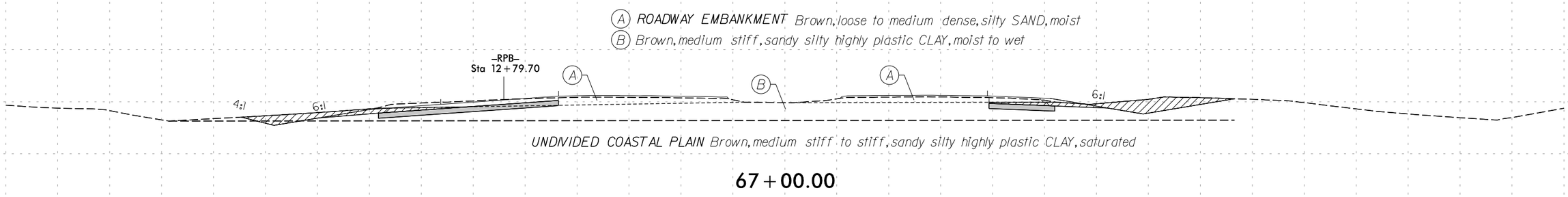
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

190 180 170 160 150 140

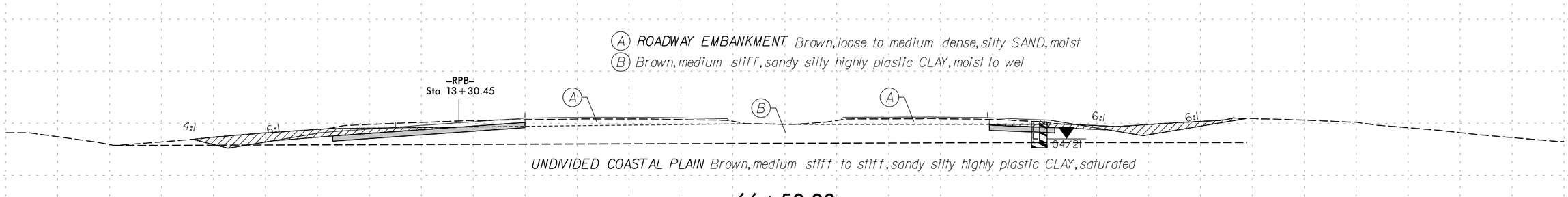
BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPB- STA. 12+00
END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 67+75
END SHALLOW UNDERCUT EXCAVATION -L- STA. 67+75



67+50.00



67+00.00



66+50.00

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170 160 150 140 130

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

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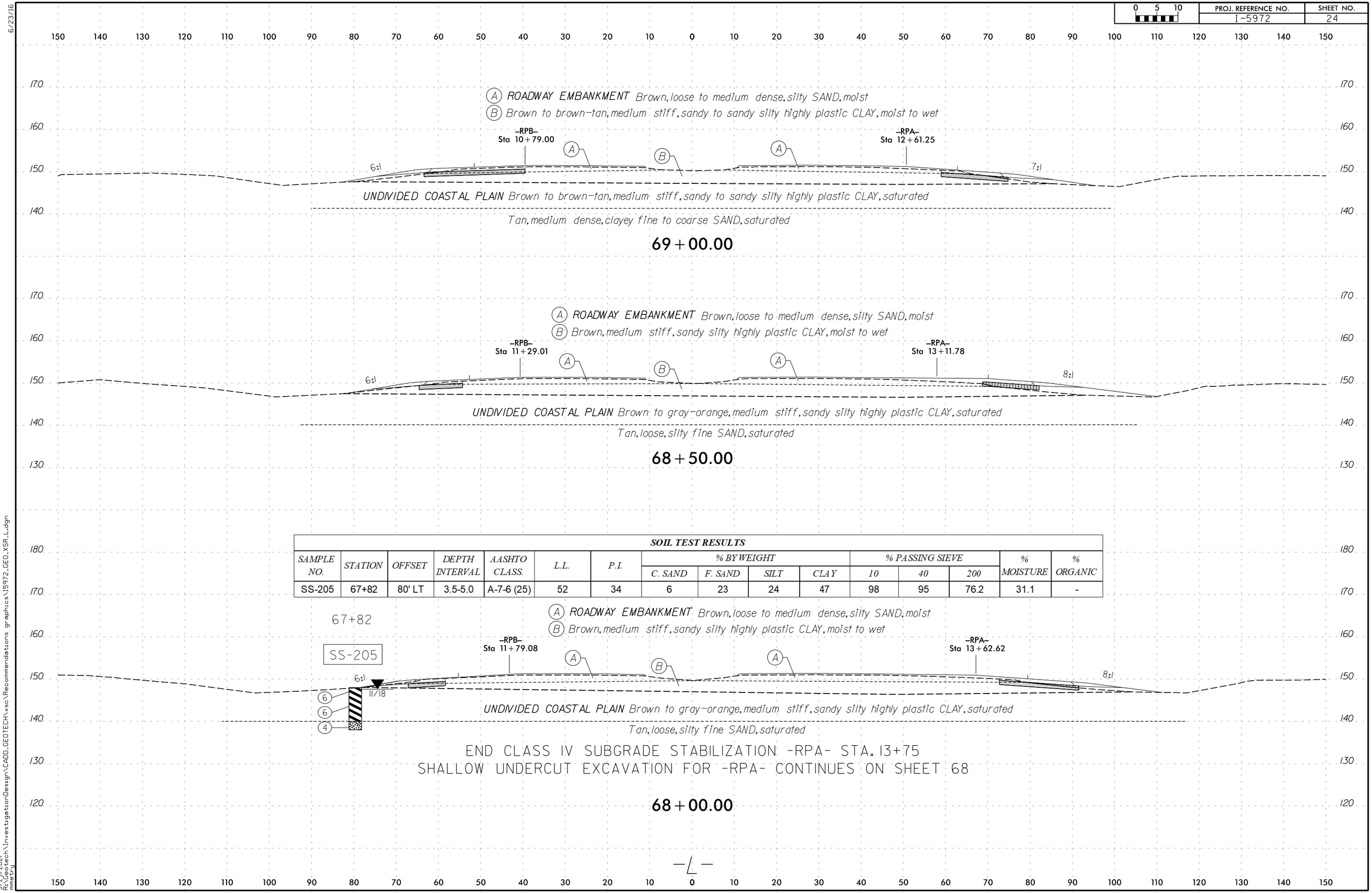
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	24



SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-205	67+82	80' LT	3.5-5.0	A-7-6 (25)	52	34	6	23	24	47	98	95	76.2	31.1	-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	25

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

170 160 150 140

(A) *ROADWAY EMBANKMENT* *Brown, loose to medium dense, clayey SAND, trace gravel, moist*

–RPA–
Sta 11+10.83

6:1 5:1

A

UNDIVIDED COASTAL PLAIN *Gray, medium stiff to stiff, clayey sandy SILT, moist to wet*

70+50.00

170 160 150 140

(A) *ROADWAY EMBANKMENT* *Brown, loose to medium dense, silty SAND, moist*

(B) *Brown to brown-tan, medium stiff, sandy to sandy silty highly plastic CLAY, moist to wet*

–RPA–
Sta 11+60.86

A B A

6:1 6:1

UNDIVIDED COASTAL PLAIN *Brown to brown-tan, medium stiff, sandy to sandy silty highly plastic CLAY, saturated*

Tan, medium dense, clayey fine to coarse SAND, saturated

140 130 120

70+00.00

BEGIN SHALLOW UNDERCUT EXCAVATION -L- STA. 69+75

180 170 160 150 140

BEGIN CLASS IV SUBGRADE STABILIZATION -RPA- STA. 11+75
BEGIN CLASS IV SUBGRADE STABILIZATION -RPB- STA. 10+00
BEGIN SHALLOW UNDERCUT EXCAVATION -RPB- STA. 10+00

(A) *ROADWAY EMBANKMENT* *Brown, loose to medium dense, silty SAND, moist*

(B) *Brown to brown-tan, medium stiff, sandy to sandy silty highly plastic CLAY, moist to wet*

–RPB–
Sta 10+28.99

–RPA–
Sta 12+10.98

69+63

A B A

6:1 7:1

6
6
18

11/18

UNDIVIDED COASTAL PLAIN *Brown to brown-tan, medium stiff, sandy to sandy silty highly plastic CLAY, saturated*

Tan, medium dense, clayey fine to coarse SAND, saturated

END CLASS IV SUBGRADE STABILIZATION -RPB- STA. 10+50

69+50.00

130 120

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

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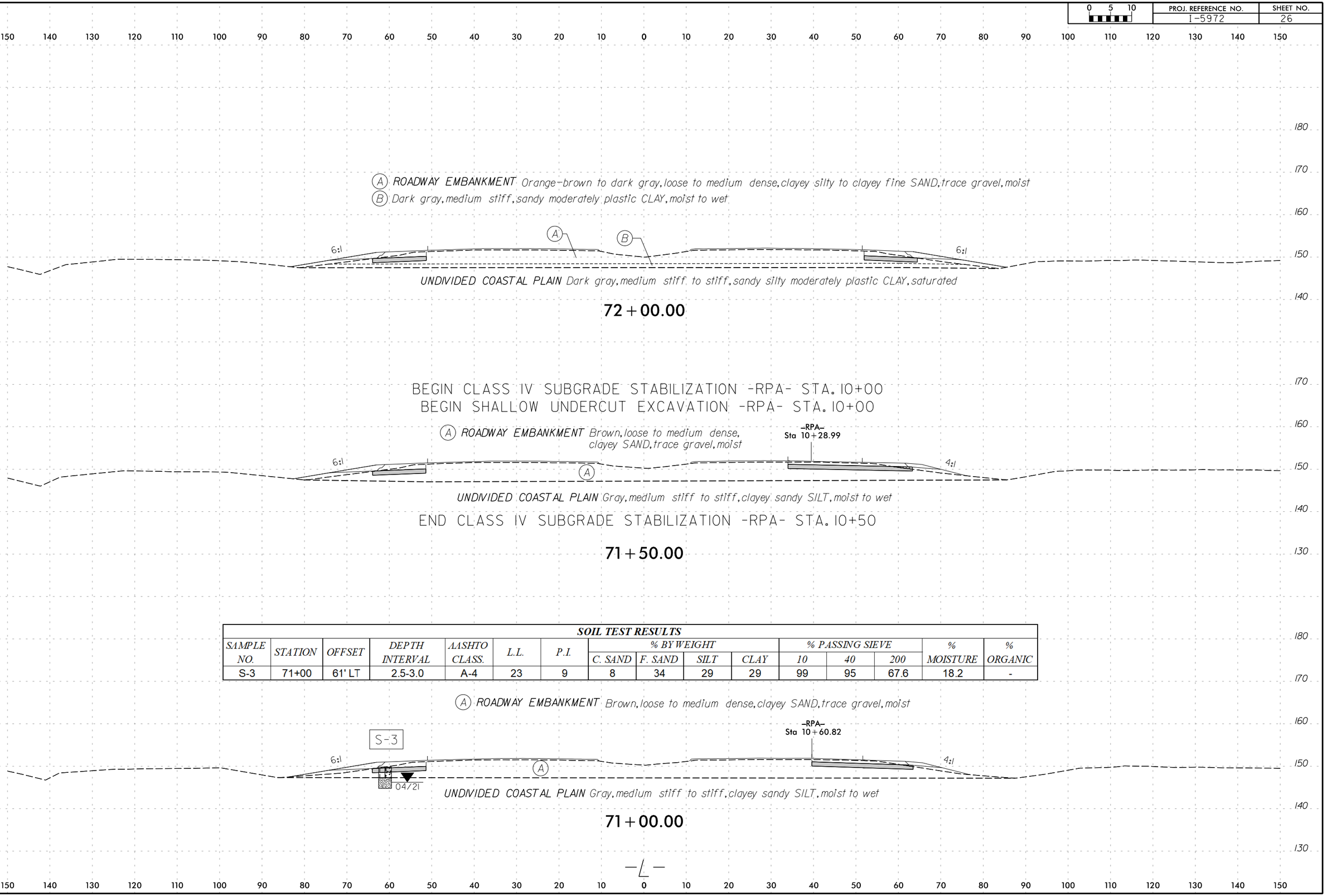
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	26



SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-3	71+00	61' LT	2.5-3.0	A-4	23	9	8	34	29	29	99	95	67.6	18.2	-

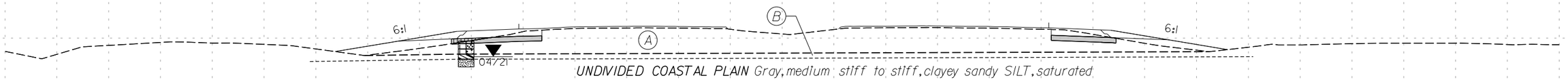
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	27

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

170
160
150
140

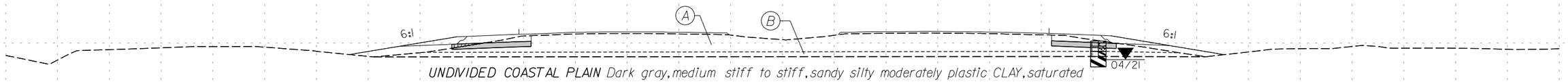
(A) *ROADWAY EMBANKMENT* Dark brown to gray, loose to medium dense, silty to clayey SAND, trace of organic matter, moist
(B) *UNDIVIDED COASTAL PLAIN* Gray, medium stiff, sandy moderately plastic CLAY, moist



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

73+50.00

(A) *ROADWAY EMBANKMENT* Orange-brown to dark gray, loose to medium dense, clayey silty to clayey fine SAND, trace gravel, moist
(B) Dark gray, medium stiff, sandy moderately plastic CLAY, moist to wet

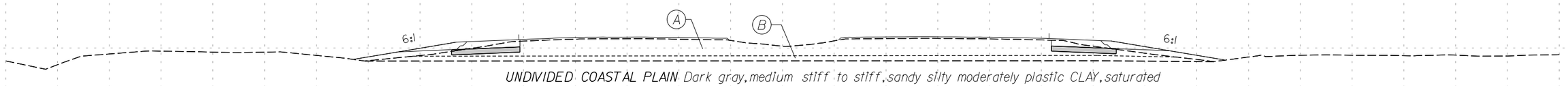


UNDIVIDED COASTAL PLAIN Dark gray, medium stiff to stiff, sandy silty moderately plastic CLAY, saturated

73+00.00

BEGIN CLASS IV SUBGRADE STABILIZATION -L- STA. 72+75

(A) *ROADWAY EMBANKMENT* Orange-brown to dark gray, loose to medium dense, clayey silty to clayey fine SAND, trace gravel, moist
(B) Dark gray, medium stiff, sandy moderately plastic CLAY, moist to wet



UNDIVIDED COASTAL PLAIN Dark gray, medium stiff to stiff, sandy silty moderately plastic CLAY, saturated

72+50.00

—L—

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

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mmccoy

6/23/16

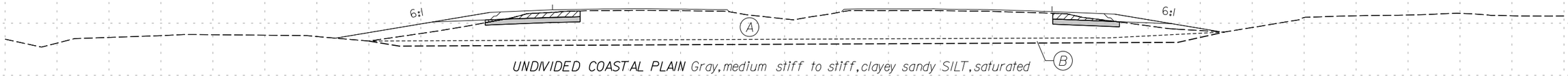
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	28

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

170 160 150 140

END CLASS IV SUBGRADE STABILIZATION -L- STA. 75+75

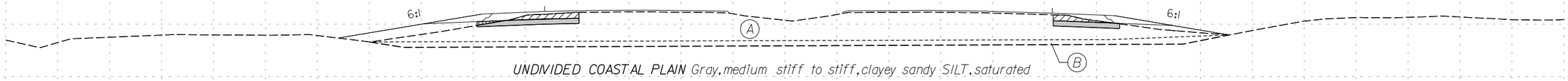
(A) *ROADWAY EMBANKMENT* Brown, medium stiff, sandy to sandy silty moderately plastic CLAY, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

75+50.00

(A) *ROADWAY EMBANKMENT* Brown, medium stiff, sandy to sandy silty moderately plastic CLAY, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

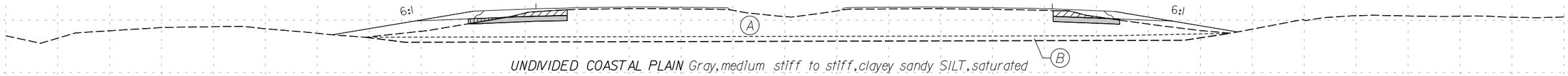


UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

75+00.00

160 150 140 130

(A) *ROADWAY EMBANKMENT* Brown, medium stiff, sandy to sandy silty moderately plastic CLAY, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet



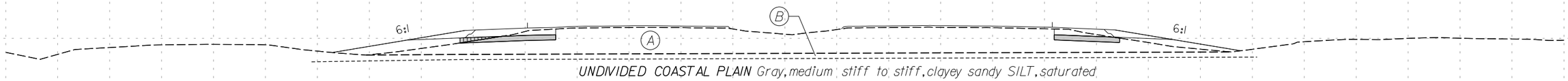
UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

74+50.00

BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 74+25

170 160 150 140 130

(A) *ROADWAY EMBANKMENT* Dark brown to gray, loose to medium dense, silty to clayey SAND, trace of organic matter, moist
(B) *UNDIVIDED COASTAL PLAIN* Gray, medium stiff, sandy moderately plastic CLAY, moist



UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

74+00.00

—L—

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

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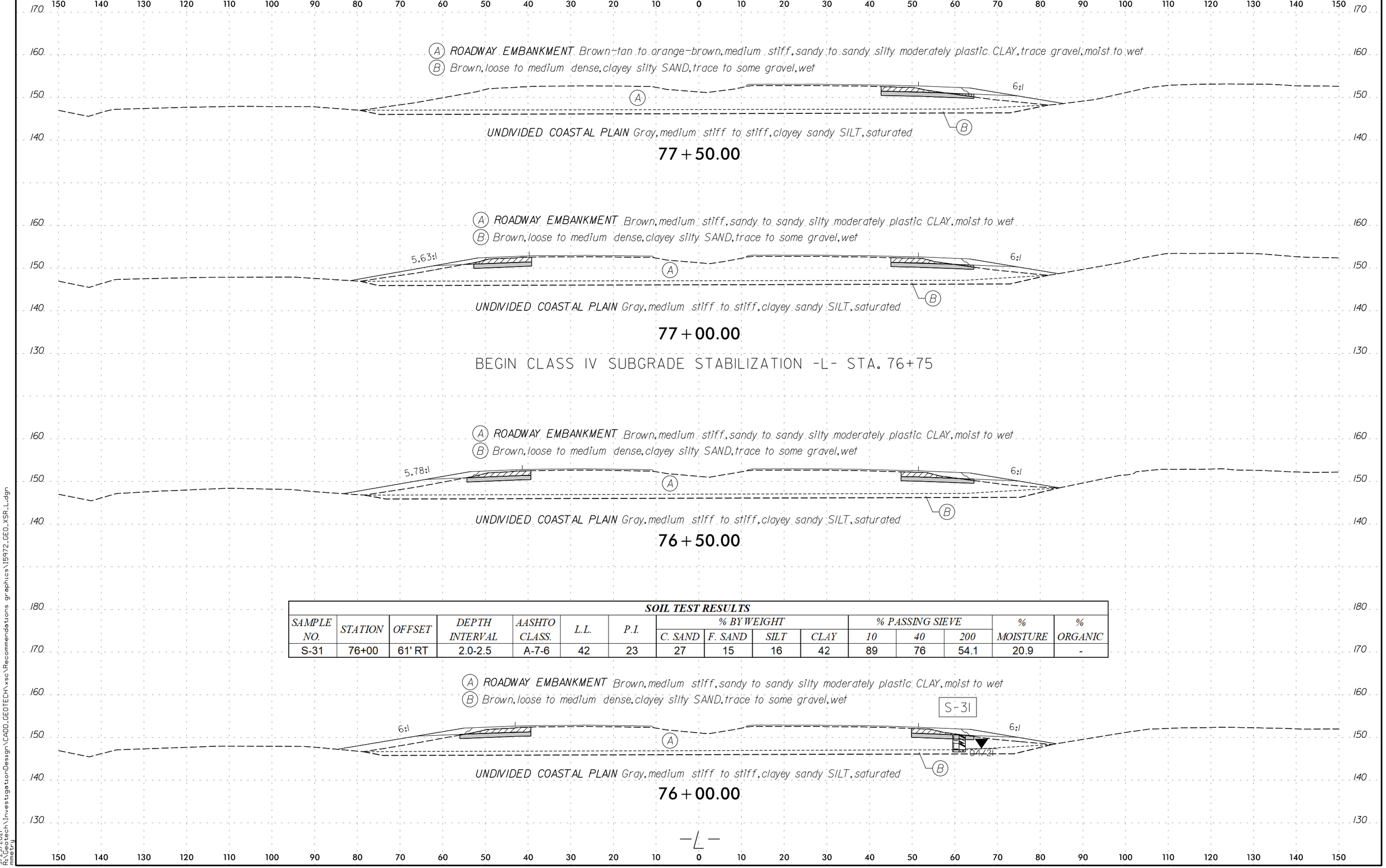
mmeyer

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	29



SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-31	76+00	61' RT	2.0-2.5	A-7-6	42	23	27	15	16	42	89	76	54.1	20.9	-

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	30

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

170 160 150 140

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

6:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

79+50.00

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

6:1

04/21

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

79+00.00

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

6:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

78+50.00

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

6:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

78+00.00

160 150 140 130

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

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	31

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

170
160
150
140

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

5.09:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

81+50.00

160
150
140
130

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

5.53:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

81+00.00

END CLASS IV SUBGRADE STABILIZATION -L- STA. 80+75

160
150
140
130

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

6:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

80+50.00

160
150
140
130

(A) *ROADWAY EMBANKMENT* Brown-tan to orange-brown, medium stiff, sandy to sandy silty moderately plastic CLAY, trace gravel, moist to wet
(B) Brown, loose to medium dense, clayey silty SAND, trace to some gravel, wet

6:1

UNDIVIDED COASTAL PLAIN Gray, medium stiff to stiff, clayey sandy SILT, saturated

80+00.00

—L—

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

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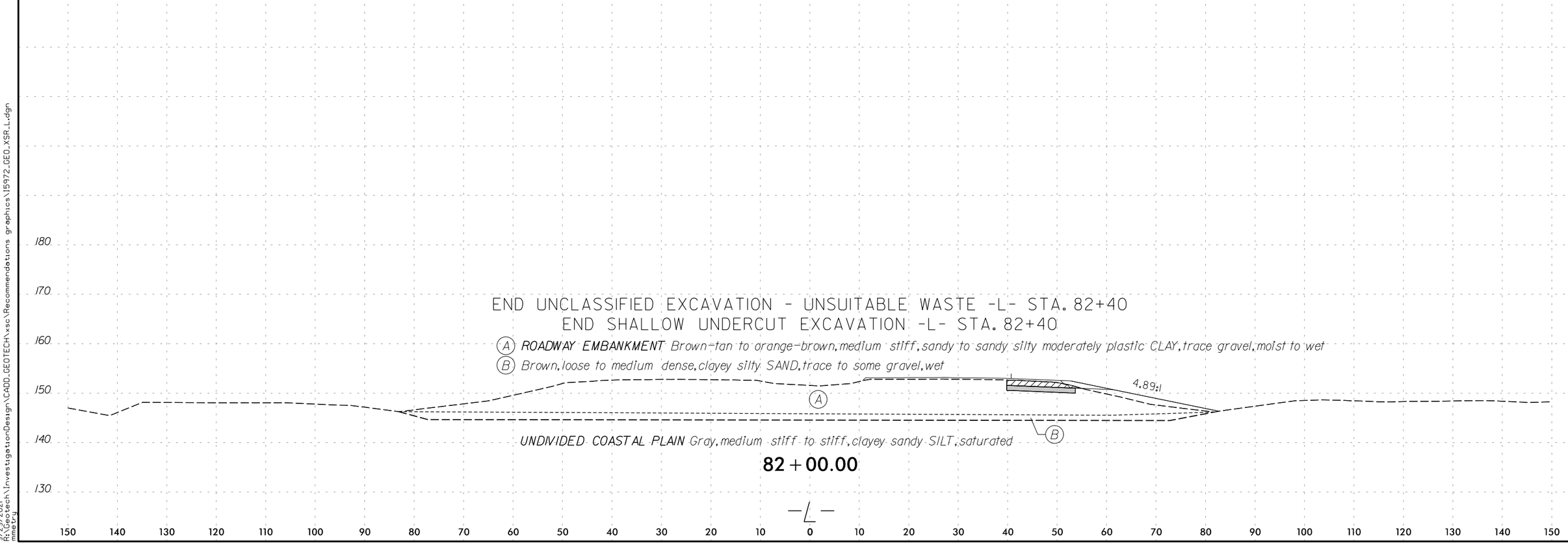
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	32

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -L- STA. 82+40

END SHALLOW UNDERCUT EXCAVATION -L- STA. 82+40



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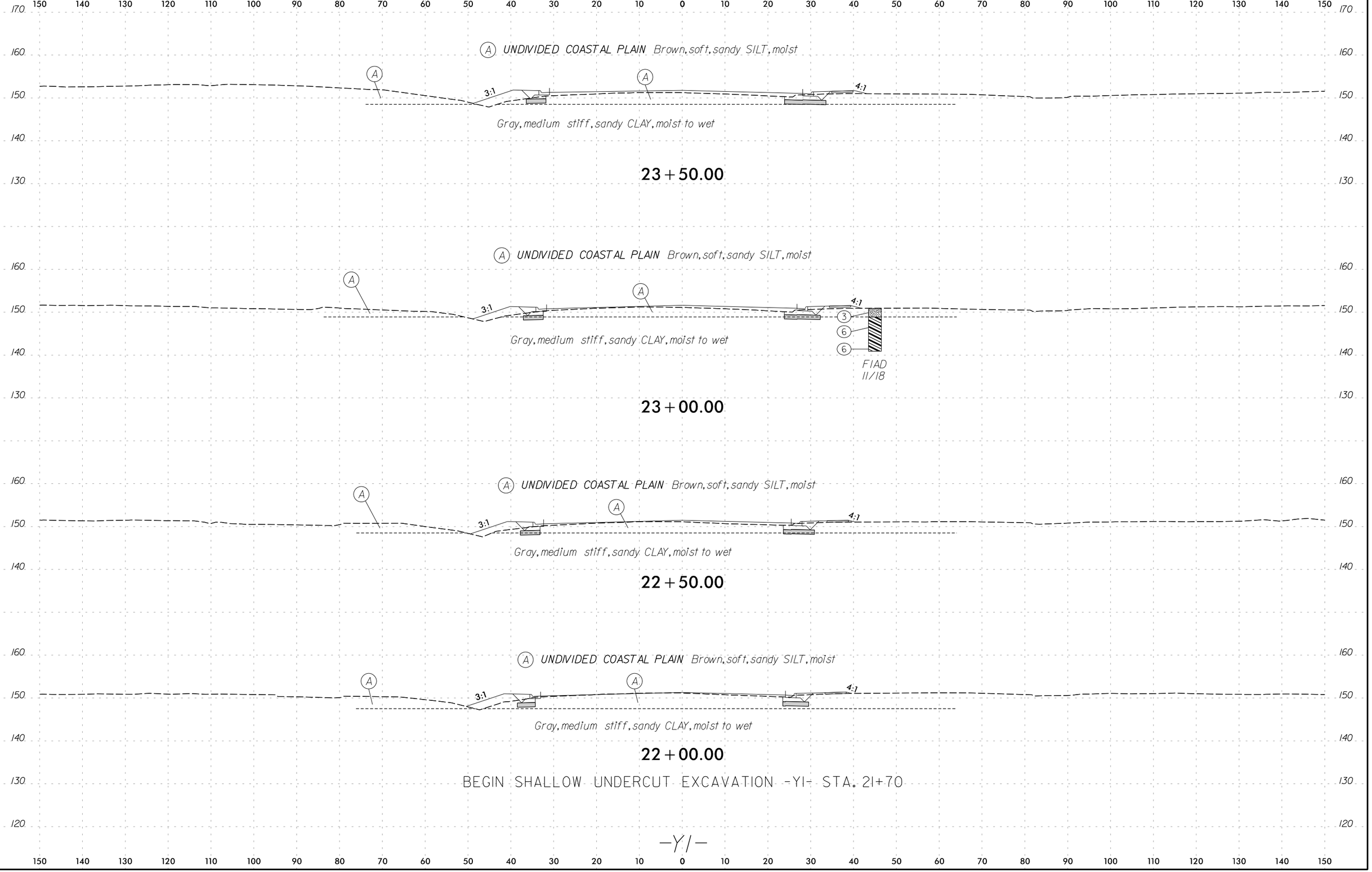
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	33



6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	34

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

170 160 150 140

3:1 4:1

UNDIVIDED COASTAL PLAIN Brown-tan to brown-orange, stiff to very stiff, silty sandy slightly plastic CLAY, moist

Tan, medium dense, clayey silty coarse SAND, moist

25+50.00

160 150 140

3:1 4:1

UNDIVIDED COASTAL PLAIN Brown-tan to brown-orange, stiff to very stiff, silty sandy slightly plastic CLAY, moist

Tan, medium dense, clayey silty coarse SAND, moist

25+00.00

160 150 140 130

3:1 4:1

UNDIVIDED COASTAL PLAIN Brown-tan to brown-orange, stiff to very stiff, silty sandy slightly plastic CLAY, moist

Tan, medium dense, clayey silty coarse SAND, moist

24+50.00

160 150 140 130 120

(A) UNDIVIDED COASTAL PLAIN Brown, soft, sandy SILT, moist

(A) (A) 3:1 4:1

Gray, medium stiff, sandy CLAY, moist to wet

24+00.00

BEGIN CLASS IV SUBGRADE STABILIZATION -YI- STA. 23+75

-Y/-

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

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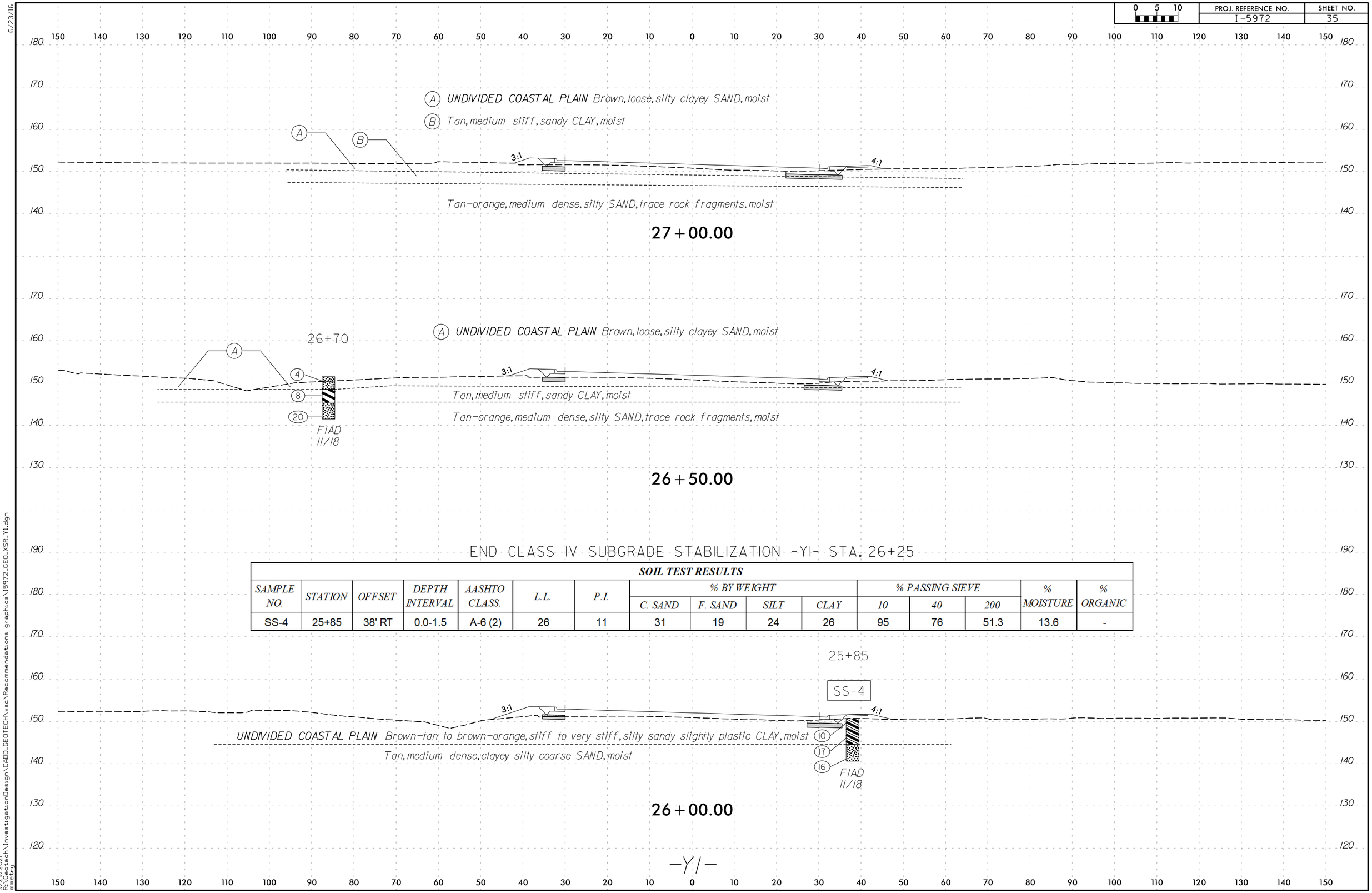
mmccoy

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	35



END CLASS IV SUBGRADE STABILIZATION -YI- STA. 26+25

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-4	25+85	38' RT	0.0-1.5	A-6 (2)	26	11	31	19	24	26	95	76	51.3	13.6	-

-YI-

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mingsley

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	36

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

180 170 160 150 140 130

Ⓐ ROADWAY EMBANKMENT Brown, loose, silty clayey SAND, moist

4:1 4:1 4:1

UNDIVIDED COASTAL PLAIN Tan-orange, medium stiff, sandy slightly plastic CLAY, wet

Tan-orange, medium dense, silty coarse SAND, trace rock fragments, moist

28+50.00

160 150 140 130

4:1 4:1

Tan-orange, medium stiff, sandy slightly plastic CLAY, wet

Tan-orange, medium dense, silty coarse SAND, trace rock fragments, moist

28+00.00

160 150 140 130

3:1 4:1

Tan-orange, medium stiff, sandy slightly plastic CLAY, wet

Tan-orange, medium dense, silty coarse SAND, trace rock fragments, moist

27+50.00

120

—Y1—

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

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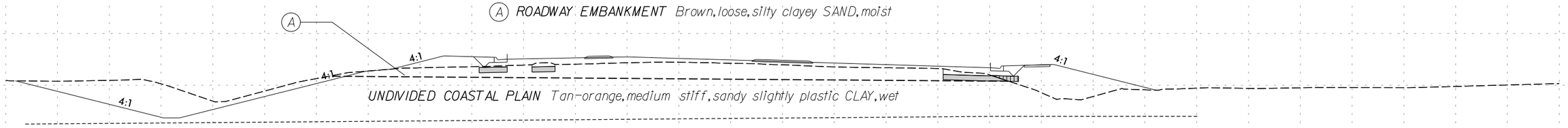
mmsley

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	37

END CLASS IV SUBGRADE STABILIZATION -YI- STA. 29+75



(A) *ROADWAY EMBANKMENT* Brown, loose, silty clayey SAND, moist

UNDIVIDED COASTAL PLAIN Tan-orange, medium stiff, sandy slightly plastic CLAY, wet

Tan-orange, medium dense, silty coarse SAND, trace rock fragments, moist

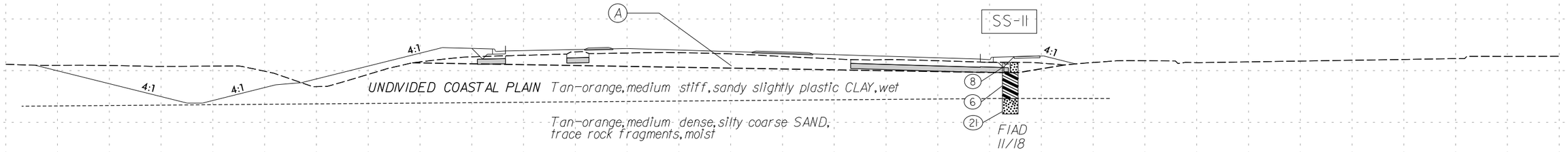
29+50.00

BEGIN CLASS IV SUBGRADE STABILIZATION -YI- STA. 29+25

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-11	29+00	44' RT	3.5-5.0	A-6 (8)	36	14	21	13	21	45	99	85	69.2	20.9	-

(A) *ROADWAY EMBANKMENT* Brown, loose, silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Tan-orange, medium stiff, sandy slightly plastic CLAY, wet

Tan-orange, medium dense, silty coarse SAND, trace rock fragments, moist

29+00.00

-YI-

9/29/2021
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mmeyer

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	38

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

190
180
170
160
150
140
130
120
110

Ⓐ *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

4:1 4:1 4:1 4:1 4:1

UNDIVIDED COASTAL PLAIN Brown to orange, loose, clayey SAND, moist

Gray, medium stiff to stiff, coarse sandy CLAY and silty CLAY, some wood fragments, saturated

RESIDUAL Gray, medium dense, silty fine SAND, saturated

30+50.00

END SHALLOW UNDERCUT EXCAVATION -YI- STA. 30+25

4:1 4:1 4:1 4:1 4:1

UNDIVIDED COASTAL PLAIN Tan-orange, medium stiff, sandy slightly plastic CLAY, wet

Tan-orange, medium dense, silty coarse SAND, trace rock fragments, moist

30+00.00

-YI-

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

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mlevy

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	39

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

180 170 160 150 140

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

ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

04/21

UNDIVIDED COASTAL PLAIN Gray to orange, medium stiff, sandy to sandy silty slightly to highly plastic CLAY, lenses of sand, saturated

Gray, medium dense, silty SAND, trace clay, saturated

33+50.00

170 160 150 140

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

ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

UNDIVIDED COASTAL PLAIN Gray to orange, medium stiff, sandy to sandy silty slightly to highly plastic CLAY, lenses of sand, saturated

Gray, medium dense, silty SAND, trace clay, saturated

33+00.00

BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -YI- STA. 32+75

170 160 150 140 130 120 110

INTERSECTION -RPB- @ -YI- SHEAR LINE

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

ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

UNDIVIDED COASTAL PLAIN Brown to orange, loose, clayey SAND, moist

Gray, medium stiff to stiff, coarse sandy CLAY and silty CLAY, some wood fragments, saturated

RESIDUAL Gray, medium dense, silty fine SAND, saturated

32+50.00

-YI-

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

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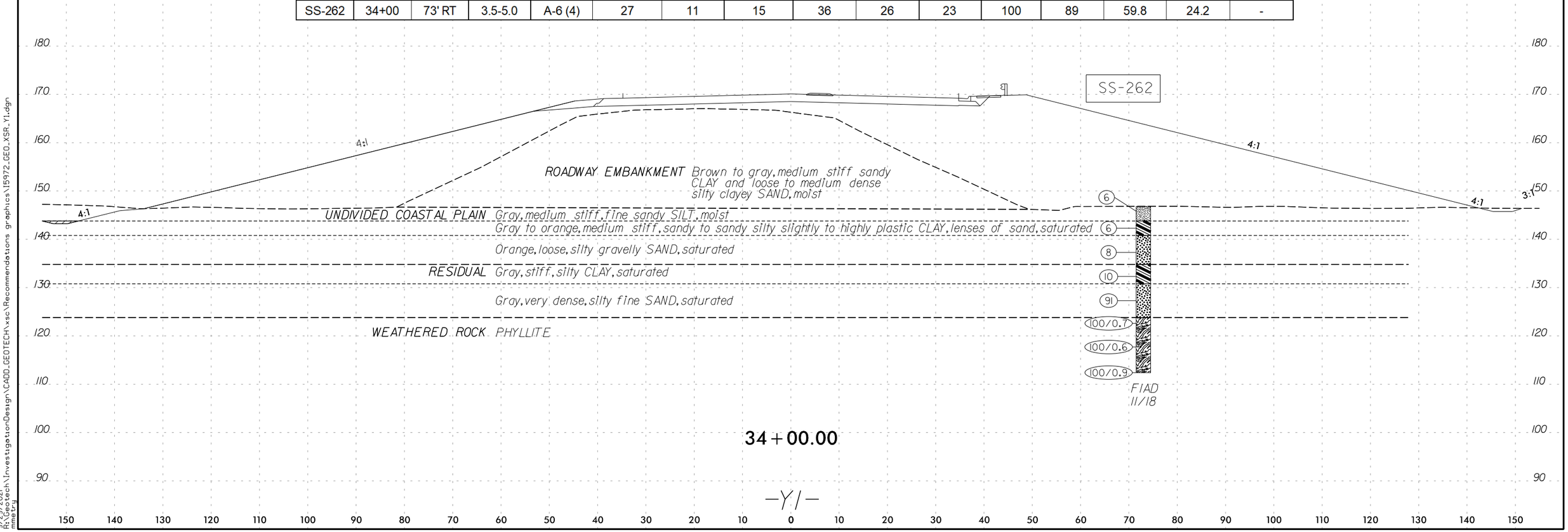
mmetz

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	40

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-262	34+00	73' RT	3.5-5.0	A-6 (4)	27	11	15	36	26	23	100	89	59.8	24.2	-



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mmsley

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	41

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

180
170
160
150
140
130
120
110

4:1
4:1
4:1
EX

ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

UNDIVIDED COASTAL PLAIN Gray to orange, medium stiff, sandy to silty sandy slightly to highly plastic CLAY, lenses of sand, saturated

Orange, loose to medium dense, silty to clayey silty coarse SAND, saturated

RESIDUAL Orange, stiff, fine sandy CLAY, saturated

Green to gray, medium dense, silty fine SAND, saturated

WEATHERED ROCK PHYLLITE

34+50.00

-Y1- ℄

160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

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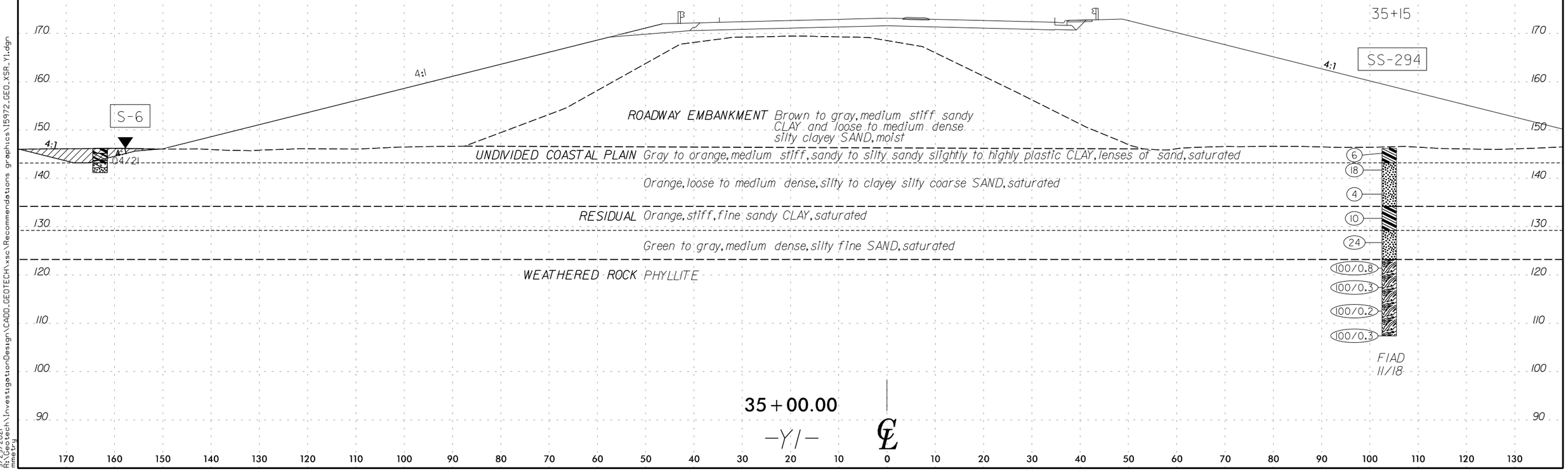
mmsley

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	42

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-294	35+15	104' RT	0.0-1.5	A-6 (3)	26	11	25	28	25	22	100	82	54.1	17.8	-
S-6	35+00	163' LT	0.5-1.0	A-7-6	50	26	41	16	8	35	98	66	43.6	28.4	-



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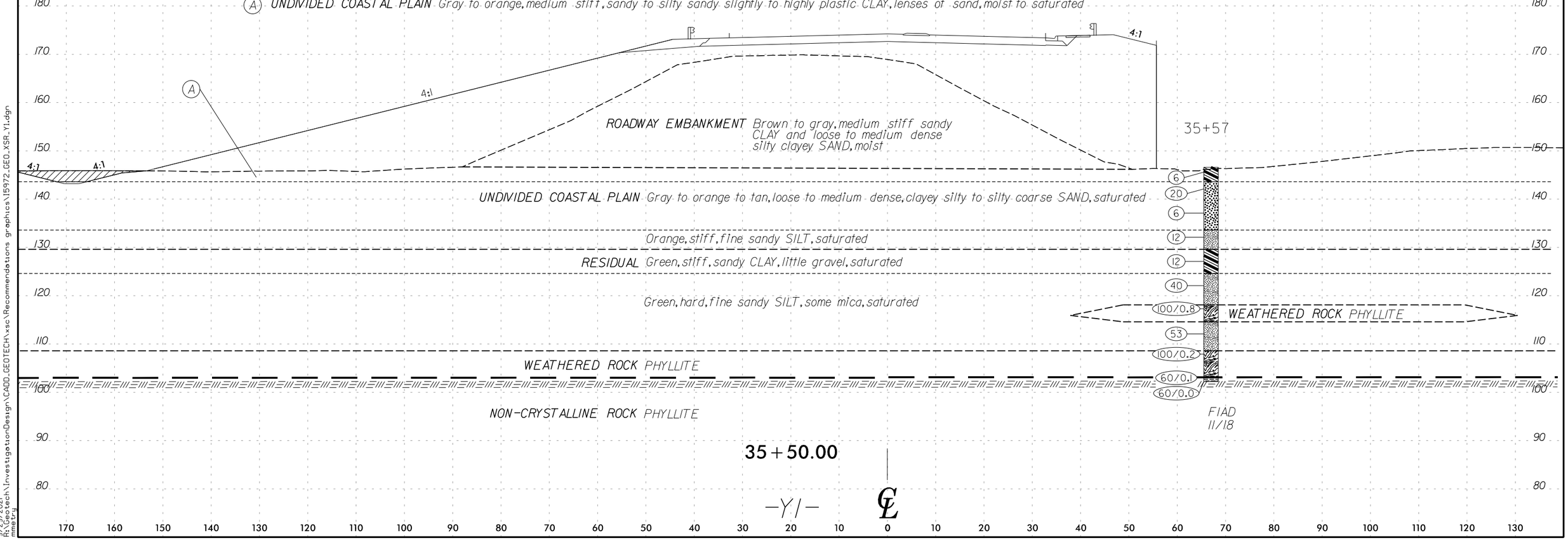
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	43

170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130

190
180

(A) *UNDIVIDED COASTAL PLAIN* Gray to orange, medium stiff, sandy to silty sandy slightly to highly plastic CLAY, lenses of sand, moist to saturated



170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130

190
180
170
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120
110
100
90
80

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mmeyer
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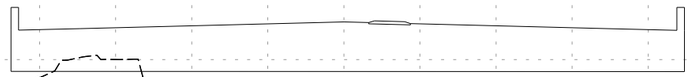
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	44

170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130

190
180
170
160
150
140
130
120
110
100
90
80



ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

4:1 4:1

UNDIVIDED COASTAL PLAIN Gray to orange, medium stiff, sandy to silty sandy slightly to highly plastic CLAY, lenses of sand, moist to saturated

Gray to orange to tan, loose to medium dense, clayey silty to silty coarse SAND, saturated

Orange, stiff, fine sandy SILT, saturated

RESIDUAL Green, stiff, sandy CLAY, little gravel, saturated

Green, hard, fine sandy SILT, some mica, saturated

WEATHERED ROCK PHYLLITE

WEATHERED ROCK PHYLLITE

NON-CRYSTALLINE ROCK PHYLLITE

36+00.00

-Y1-

℄

170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130

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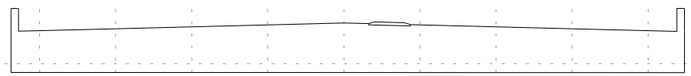
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	45

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -YI- STA. 36+75



4:1

UNDIVIDED COASTAL PLAIN Gray to orange, medium stiff, sandy to silty sandy slightly to highly plastic CLAY, lenses of sand, moist to saturated

Gray to orange to tan, loose to medium dense, clayey silty to silty coarse SAND, saturated

Orange, stiff, fine sandy SILT, saturated

RESIDUAL Green, stiff, sandy CLAY, little gravel, saturated

Green, hard, fine sandy SILT, some mica, saturated

WEATHERED ROCK PHYLLITE

WEATHERED ROCK PHYLLITE

NON-CRYSTALLINE ROCK PHYLLITE

36+50.00

-YI-

℄

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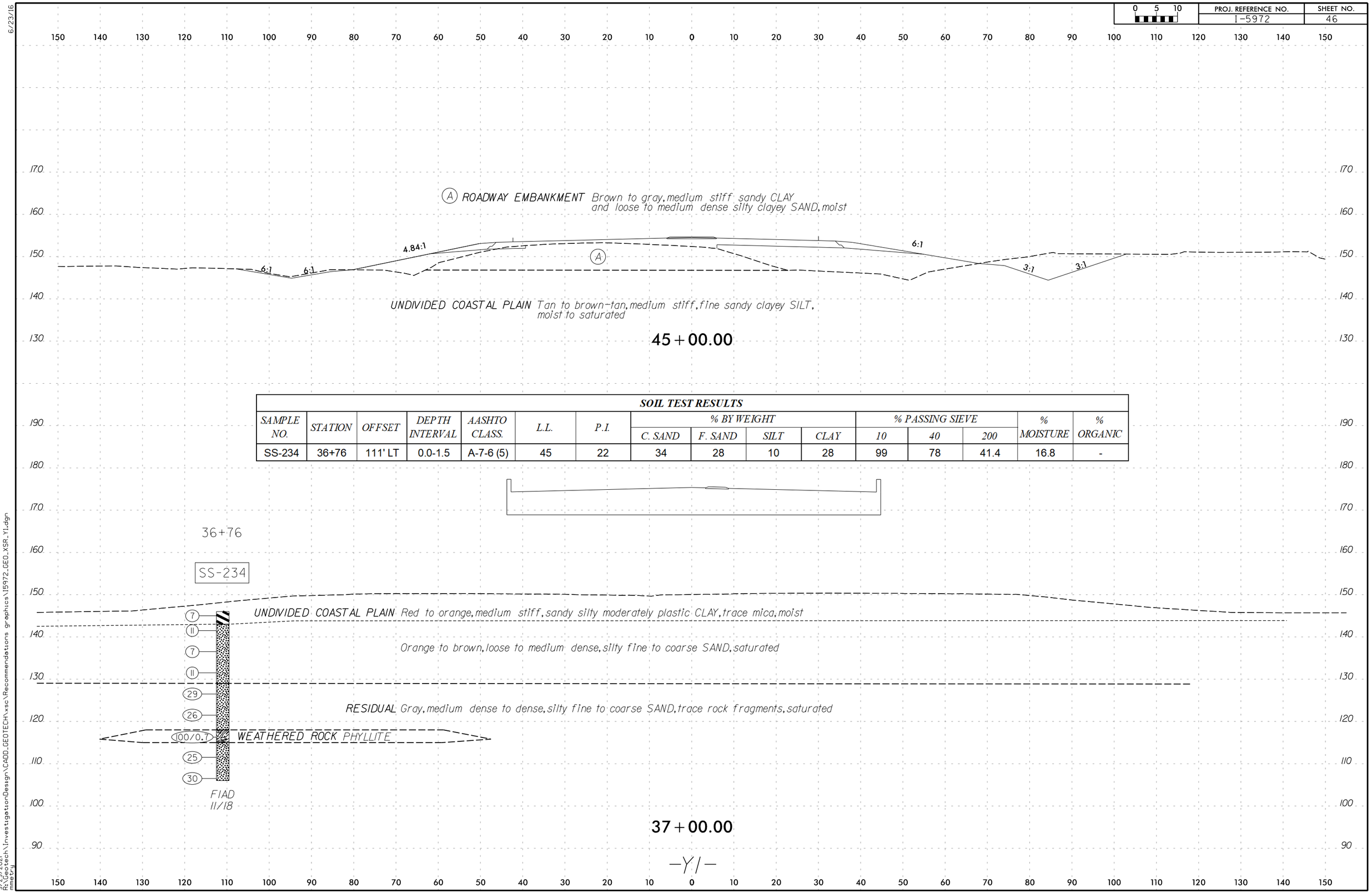
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	46



SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-234	36+76	111' LT	0.0-1.5	A-7-6 (5)	45	22	34	28	10	28	99	78	41.4	16.8	-

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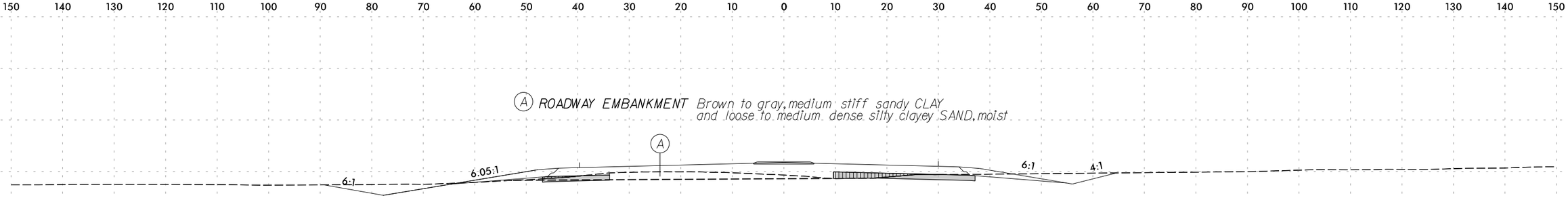
mmccoy

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	47

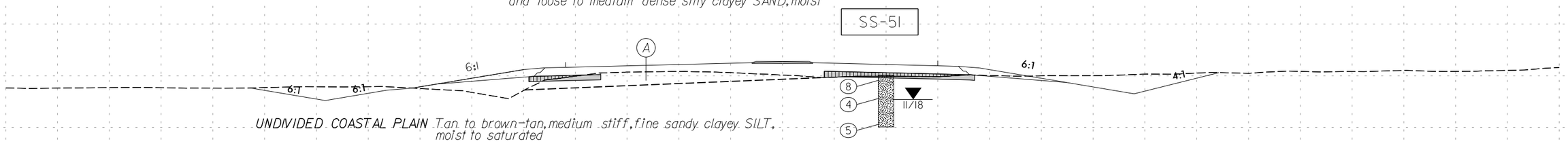


46 + 50.00

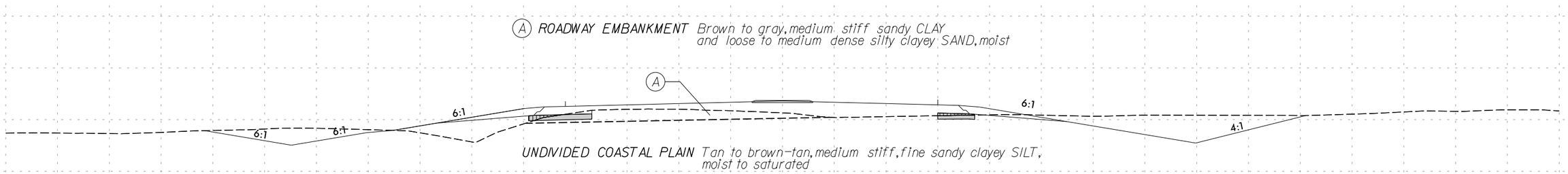
SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-51	45+85	20' RT	3.5-5.0	A-4 (3)	25	10	19	30	26	25	99	89	55.6	12.2	-

45+85



46 + 00.00



45 + 50.00

BEGIN CLASS IV SUBGRADE STABILIZATION -YI- STA. 45+25

BEGIN SHALLOW UNDERCUT EXCAVATION -YI- STA. 45+25

-Y I-

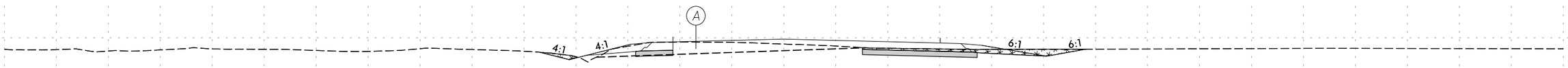
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	48

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

170 160 150 140 130

Ⓐ *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

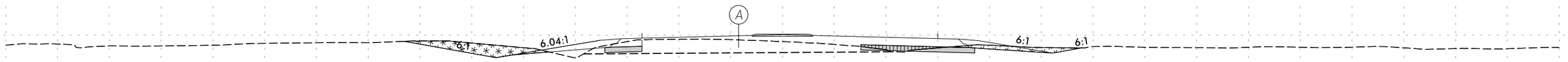


UNDIVIDED COASTAL PLAIN Tan to gray to gray-orange, medium stiff to stiff, silty sandy moderately plastic CLAY, wet to saturated

48+00.00

END CLASS IV SUBGRADE STABILIZATION -YI- STA. 47+75

Ⓐ *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

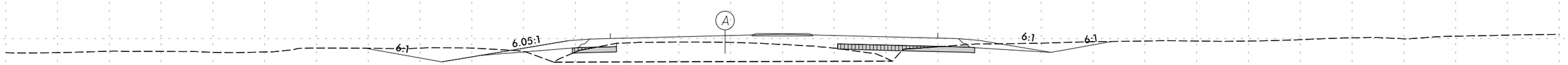


UNDIVIDED COASTAL PLAIN Tan to gray to gray-orange, medium stiff to stiff, silty sandy moderately plastic CLAY, wet to saturated

47+50.00

BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE -YI- STA. 47+25

Ⓐ *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Tan to brown-tan, medium stiff, fine sandy clayey SILT, moist to saturated

47+00.00

-YI-

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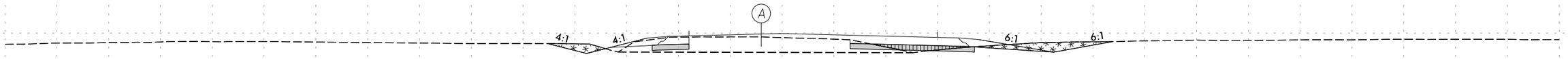
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	49

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

170 160 150 140 130

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Tan to gray to gray-orange, medium stiff to stiff, silty sandy moderately plastic CLAY, wet to saturated

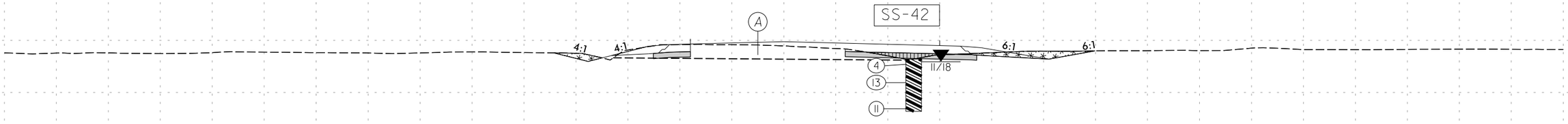
49+00.00

190 180 170 160 150 140 130 120 110 100

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-42	48+50	25' RT	3.5-5.0	A-6 (15)	38	20	9	18	41	32	100	95	78.4	24	-

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Tan to gray to gray-orange, medium stiff to stiff, silty sandy moderately plastic CLAY, wet to saturated

48+50.00

BEGIN CLASS IV SUBGRADE STABILIZATION -YI- STA. 48+25

-Y/-

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

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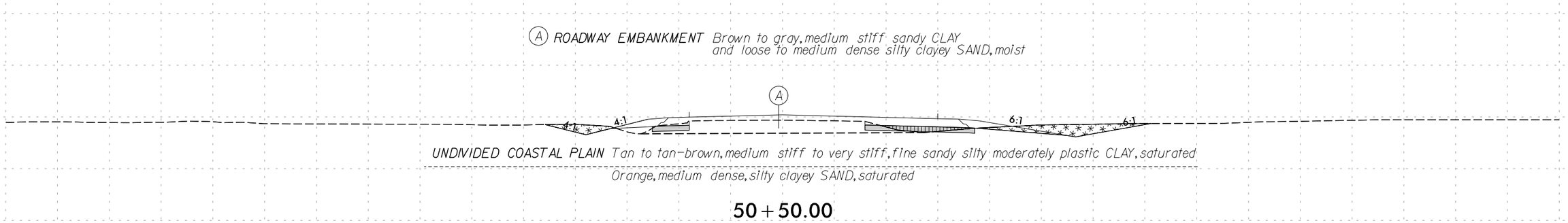
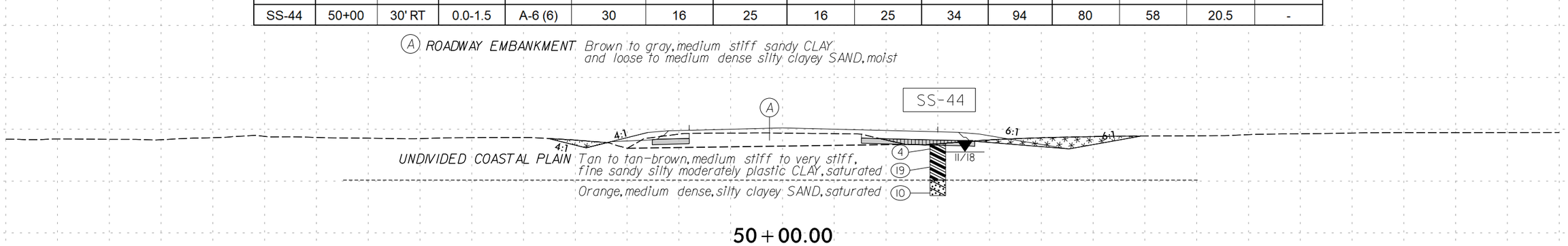
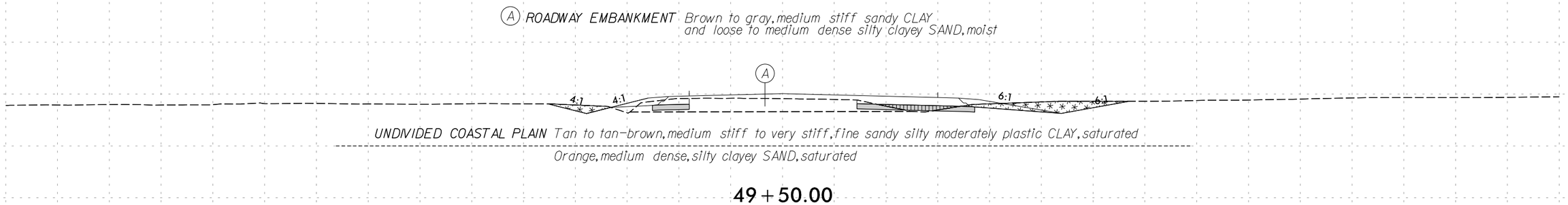
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	50



SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-44	50+00	30' RT	0.0-1.5	A-6 (6)	30	16	25	16	25	34	94	80	58	20.5	-





—Y/—

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	51

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

170
160
150
140
130

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

6:1 6:1 6:1 6:1

UNDIVIDED COASTAL PLAIN Tan to tan-orange-gray, soft to medium stiff, sandy CLAY, moist to saturated

52 + 00.00

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

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

UNDIVIDED COASTAL PLAIN Tan to tan-brown, medium stiff to very stiff, fine sandy silty moderately plastic CLAY, saturated

Orange, medium dense, silty clayey SAND, saturated

51 + 50.00

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

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

UNDIVIDED COASTAL PLAIN Tan to tan-brown, medium stiff to very stiff, fine sandy silty moderately plastic CLAY, saturated

Orange, medium dense, silty clayey SAND, saturated

51 + 00.00

-Y/-

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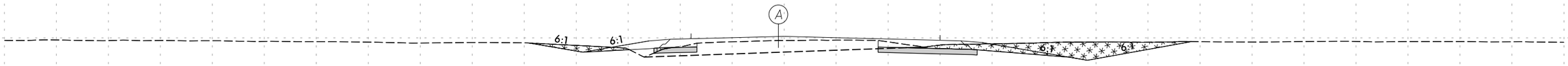
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	52

END CLASS IV SUBGRADE STABILIZATION -YI- STA.53+75

(A) *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

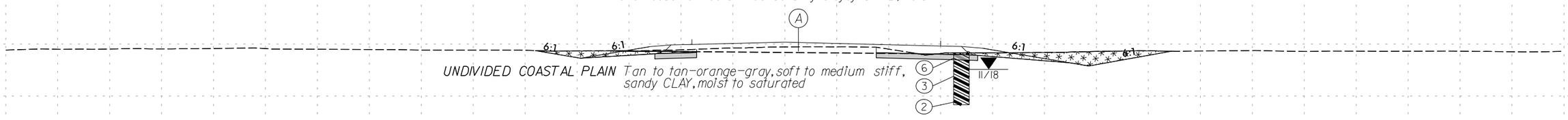


UNDIVIDED COASTAL PLAIN Tan to tan-orange-gray, soft to medium stiff, sandy CLAY, moist to saturated

53+50.00

BEGIN CLASS IV SUBGRADE STABILIZATION -YI- STA. 53+25

(A) *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

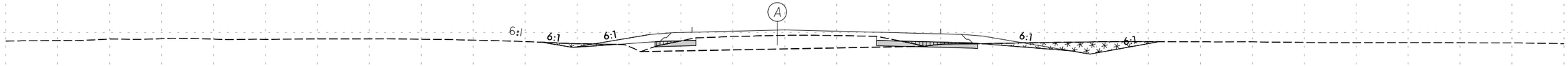


UNDIVIDED COASTAL PLAIN Tan to tan-orange-gray, soft to medium stiff, sandy CLAY, moist to saturated

53+00.00

END CLASS IV SUBGRADE STABILIZATION -YI- STA.52+75

(A) *ROADWAY EMBANKMENT* Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Tan to tan-orange-gray, soft to medium stiff, sandy CLAY, moist to saturated

52+50.00

-Y/-

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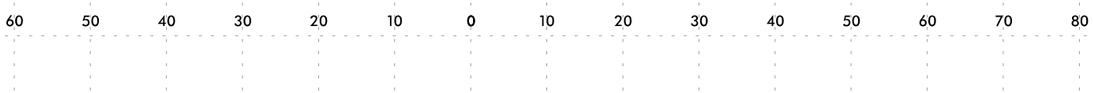
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	53

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

170
160
150
140
130

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist

Ⓑ UNDIVIDED COASTAL PLAIN Tan, soft, clayey SILT, moist



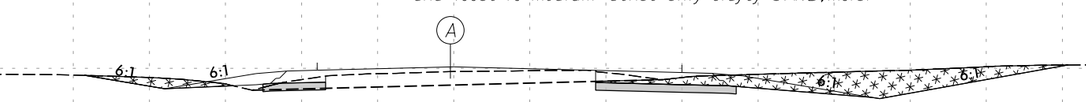
UNDIVIDED COASTAL PLAIN Tan-orange-gray, very stiff, sandy CLAY, moist

Gray, medium dense, clayey fine to coarse SAND, moist

54+50.00

END UNCLASSIFIED EXCAVATION - ACCEPTABLE -YI- STA. 54+25
END SHALLOW UNDERCUT EXCAVATION -YI- STA. 54+25

Ⓐ ROADWAY EMBANKMENT Brown to gray, medium stiff sandy CLAY and loose to medium dense silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Tan to tan-orange-gray, soft to medium stiff, sandy CLAY, moist to saturated

54+00.00

—Y1—

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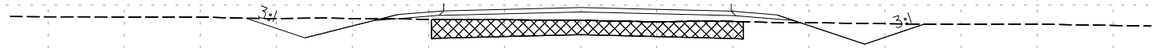
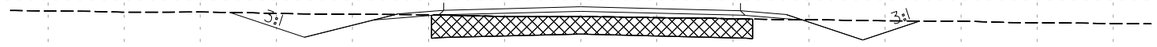
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	54



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, clayey SILT, moist

Tan-orange, loose, silty clayey SAND, saturated

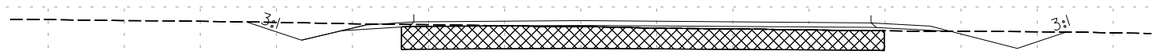
11+50.00



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, clayey SILT, moist

Tan-orange, loose, silty clayey SAND, saturated

11+00.00



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, clayey SILT, moist

Tan-orange, loose, silty clayey SAND, saturated

10+50.00

BEGIN SUBGRADE UNDERCUT -Y2- STA. 10+10

-Y2-

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	55

UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, fine sandy clayey SILT, moist

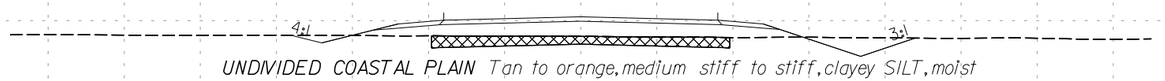
Tan-gray, medium dense, clayey silty SAND, saturated

13 + 50.00

UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, clayey SILT, moist

Tan-orange, loose, silty clayey SAND, saturated

13 + 00.00



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, clayey SILT, moist

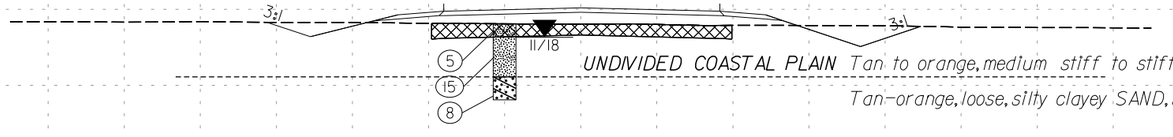
Tan-orange, loose, silty clayey SAND, saturated

12 + 50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-150	12+00	10' LT	0.0-1.5	A-4 (1)	21	7	18	33	25	24	99	90	55	14.8	-

SS-150



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, clayey SILT, moist

Tan-orange, loose, silty clayey SAND, saturated

12 + 00.00

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	56

UNDIVIDED COASTAL PLAIN Tan to orange, soft to very stiff, fine sandy clayey SILT, moist

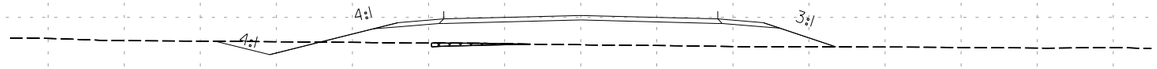
Tan, medium dense, silty clayey coarse SAND, saturated

15+50.00

UNDIVIDED COASTAL PLAIN Tan to orange, soft to very stiff, fine sandy clayey SILT, moist

Tan, medium dense, silty clayey coarse SAND, saturated

15+00.00



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, fine sandy clayey SILT, moist

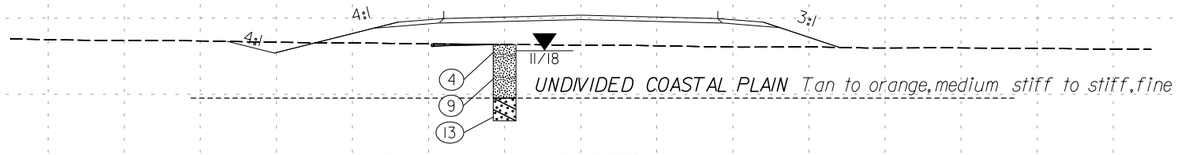
Tan-gray, medium dense, clayey silty SAND, saturated

14+50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-153	14+00	10' RT	0.0-1.5	A-4 (3)	24	9	19	29	31	21	99	84	60.6	11.4	-

SS-153



UNDIVIDED COASTAL PLAIN Tan to orange, medium stiff to stiff, fine sandy clayey SILT, moist

Tan-gray, medium dense, clayey silty SAND, saturated

14+00.00

-Y2-

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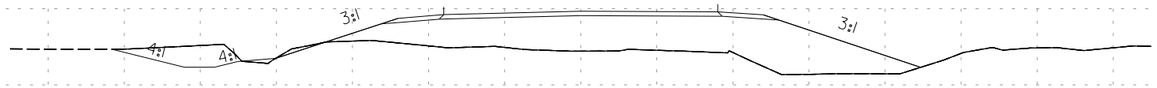
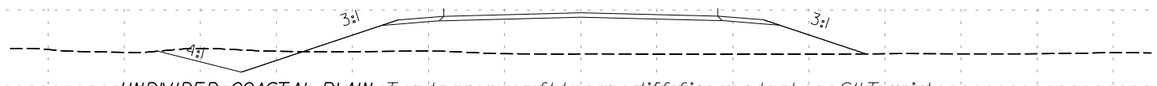
mmesa

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	57



UNDIVIDED COASTAL PLAIN Brown to orange, soft to stiff, sandy clayey SILT, moist

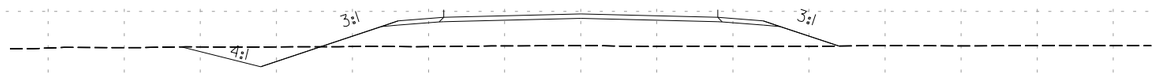
17+50.00



UNDIVIDED COASTAL PLAIN Tan to orange, soft to very stiff, fine sandy clayey SILT, moist

Tan, medium dense, silty clayey coarse SAND, saturated

17+00.00



UNDIVIDED COASTAL PLAIN Tan to orange, soft to very stiff, fine sandy clayey SILT, moist

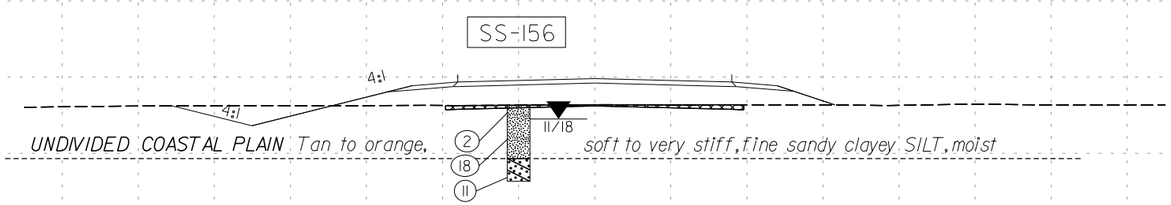
Tan, medium dense, silty clayey coarse SAND, saturated

16+50.00

END SUBGRADE UNDERCUT -Y2- STA. 16+25

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-156	16+00	10' LT	0.0-1.5	A-4 (1)	22	7	17	39	22	22	100	89	51.2	14.8	-



UNDIVIDED COASTAL PLAIN Tan to orange, soft to very stiff, fine sandy clayey SILT, moist

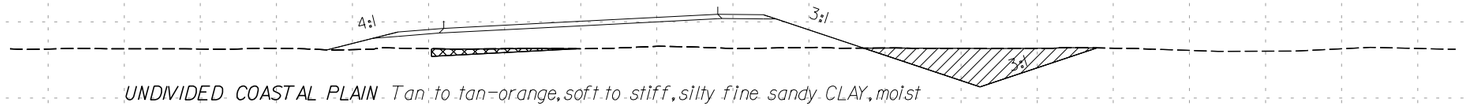
Tan, medium dense, silty clayey coarse SAND, saturated

16+00.00

-Y2-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	58

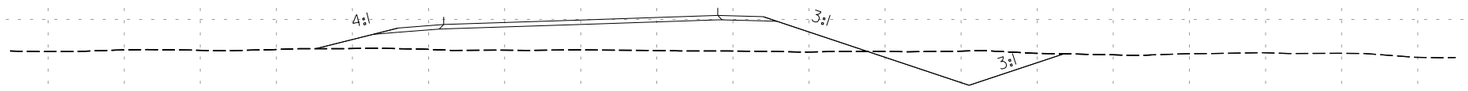


UNDIVIDED COASTAL PLAIN Tan to tan-orange, soft to stiff, silty fine sandy CLAY, moist

Gray, medium stiff, sandy SILT, wet

19+00.00

BEGIN SUBGRADE UNDERCUT -Y2- STA. 18+75
BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -Y2- STA. 18+75

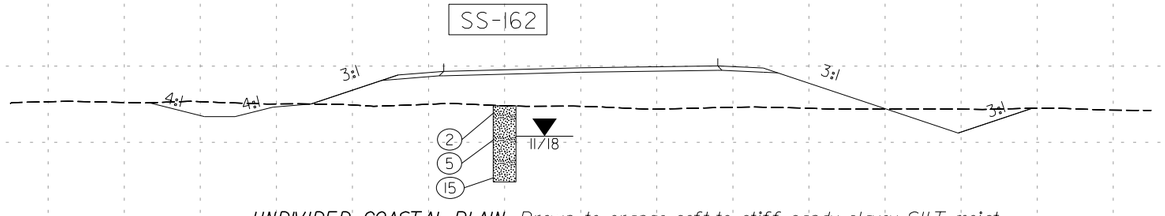


UNDIVIDED COASTAL PLAIN Brown to orange, soft to stiff, sandy clayey SILT, moist

18+50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-162	18+00	10' LT	0.0-1.5	A-4 (0)	17	2	34	25	29	12	100	76	46.7	16.6	-



UNDIVIDED COASTAL PLAIN Brown to orange, soft to stiff, sandy clayey SILT, moist

18+00.00

-Y2-

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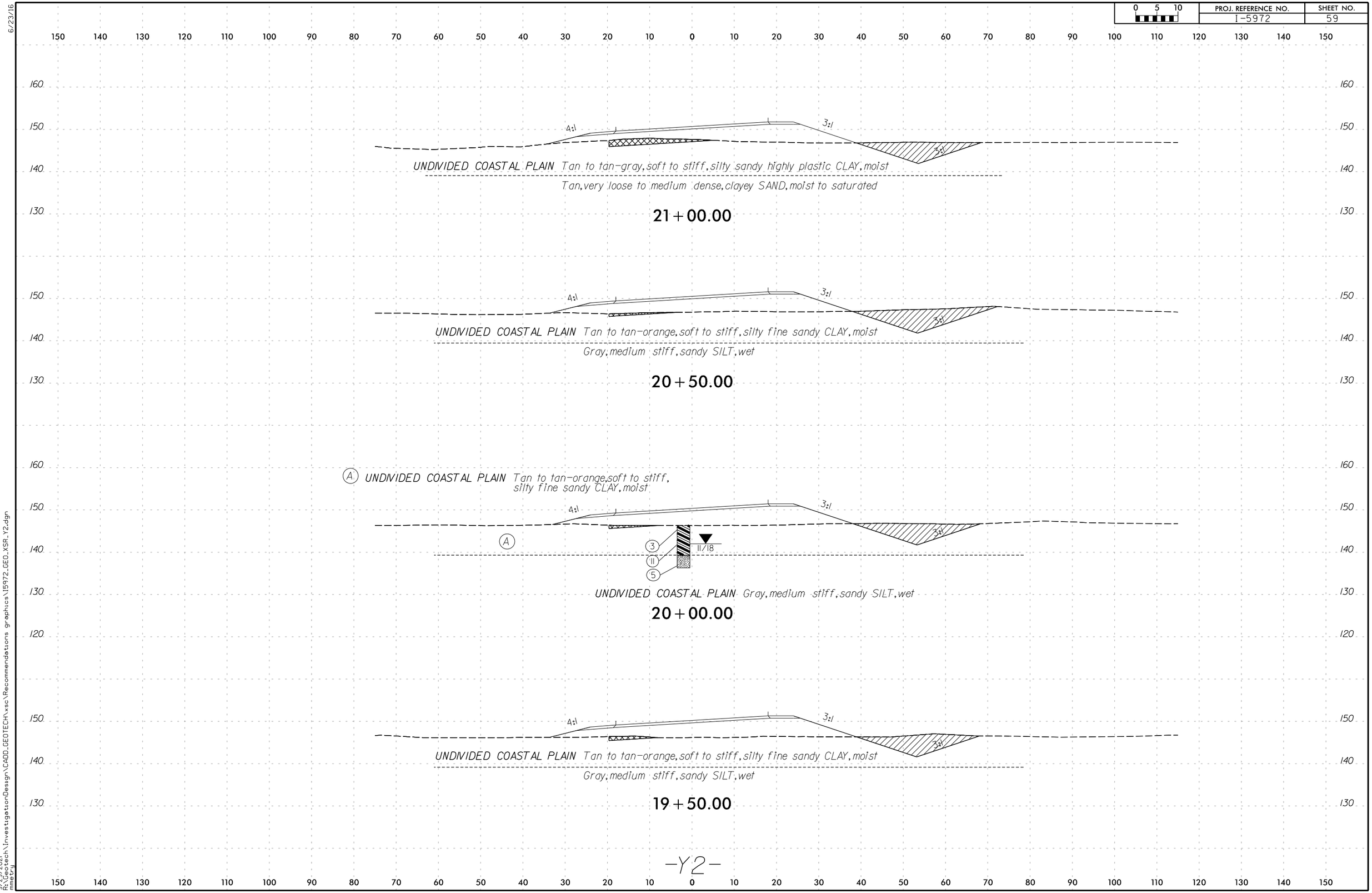
mmoya

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	59



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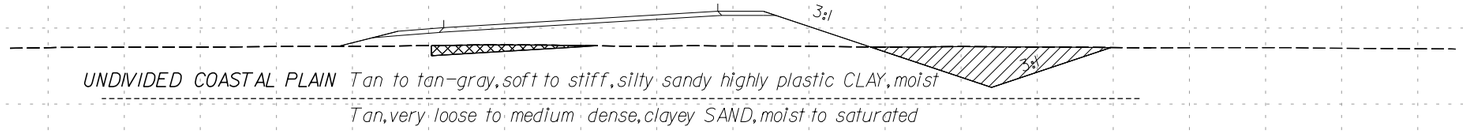
mmsley

6/23/16

PROJ. REFERENCE NO.	SHEET NO.
I-5972	60



UNDIVIDED COASTAL PLAIN Tan to tan-gray, soft to stiff, silty sandy highly plastic CLAY, moist

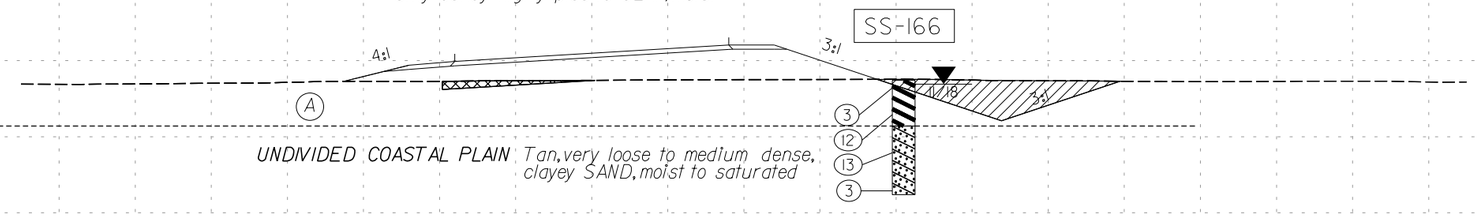
Tan, very loose to medium dense, clayey SAND, moist to saturated

22 + 50.00

SOIL TEST RESULTS

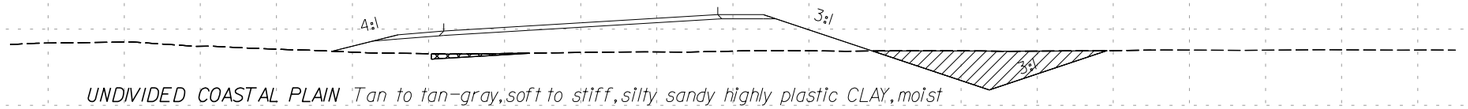
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-166	22+00	41' RT	3.5-5.0	A-7-6 (14)	46	30	24	20	21	35	99	89	59.4	19.8	-

Ⓐ UNDIVIDED COASTAL PLAIN Tan to tan-gray, soft to stiff, silty sandy highly plastic CLAY, moist



UNDIVIDED COASTAL PLAIN Tan, very loose to medium dense, clayey SAND, moist to saturated

22 + 00.00



UNDIVIDED COASTAL PLAIN Tan to tan-gray, soft to stiff, silty sandy highly plastic CLAY, moist

Tan, very loose to medium dense, clayey SAND, moist to saturated

21 + 50.00

-Y2-

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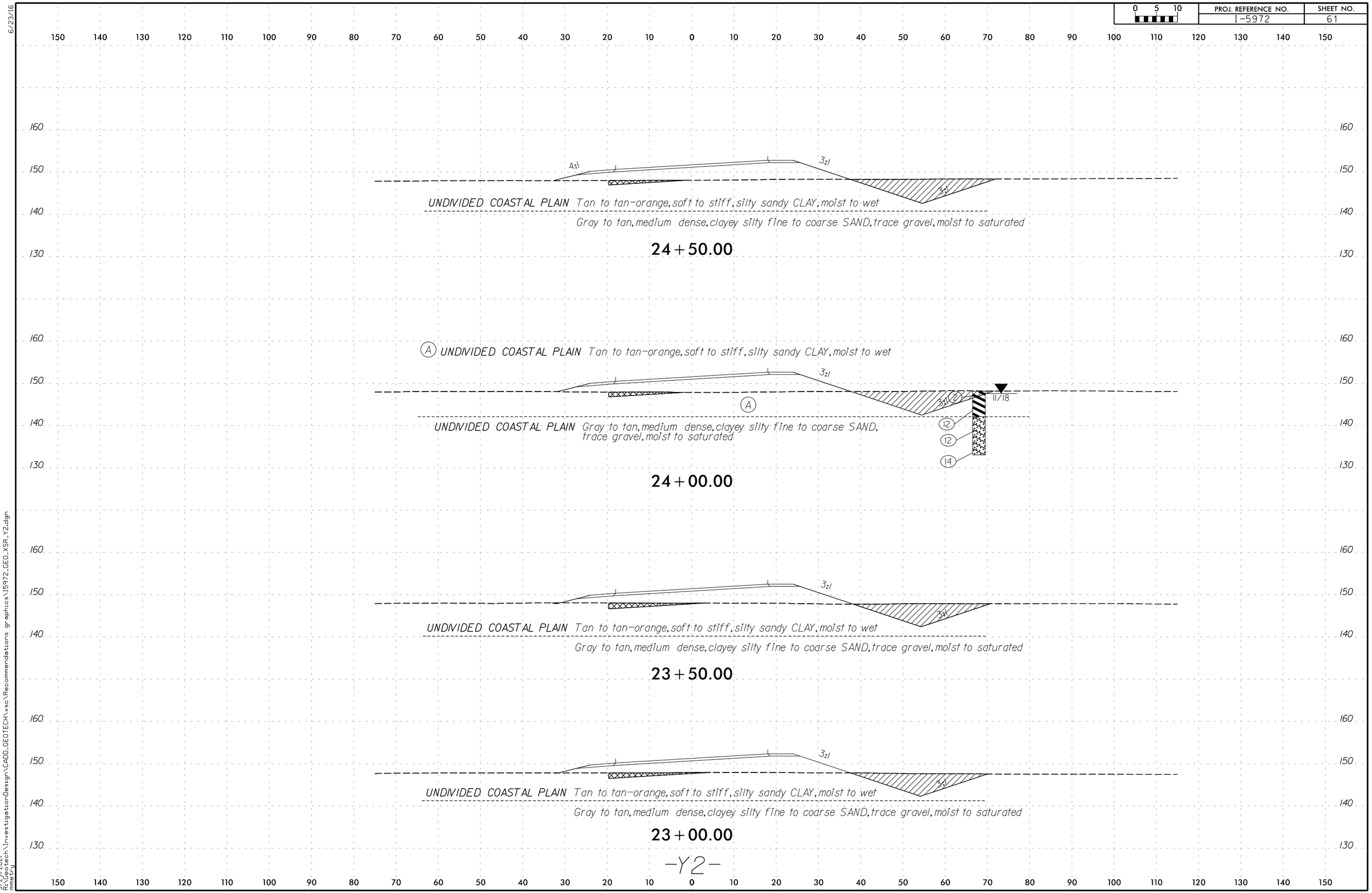
mmesa

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	61



-Y2-

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mmccoy

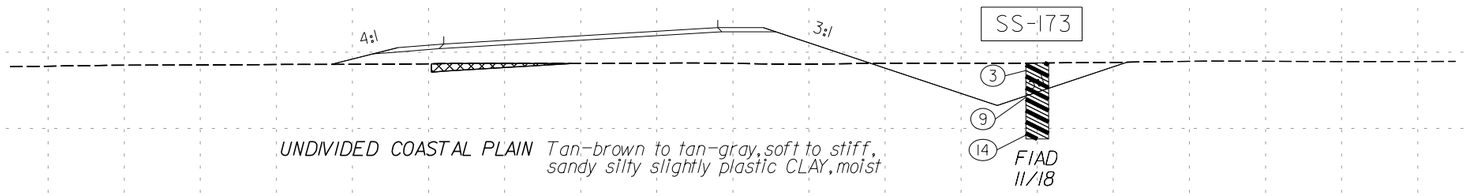
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	62

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

190 180 170 160 150 140 130

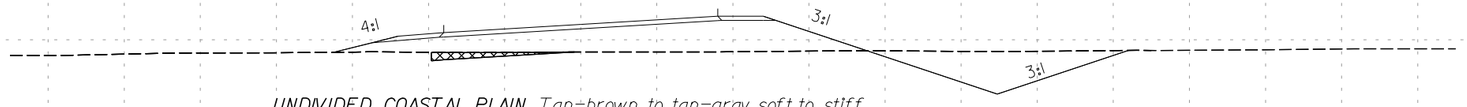
SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-173	26+00	60' RT	0.0-1.5	A-6 (4)	27	13	25	20	27	28	99	87	58.3	23.3	-



UNDIVIDED COASTAL PLAIN *Tan-brown to tan-gray, soft to stiff, sandy silty slightly plastic CLAY, moist*

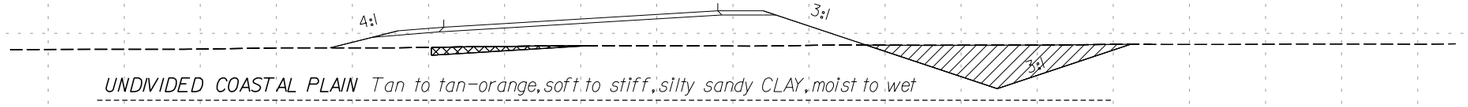
26+00.00



UNDIVIDED COASTAL PLAIN *Tan-brown to tan-gray, soft to stiff, sandy silty slightly plastic CLAY, moist*

25+50.00

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -Y2- STA. 25+25



UNDIVIDED COASTAL PLAIN *Tan to tan-orange, soft to stiff, silty sandy CLAY, moist to wet*

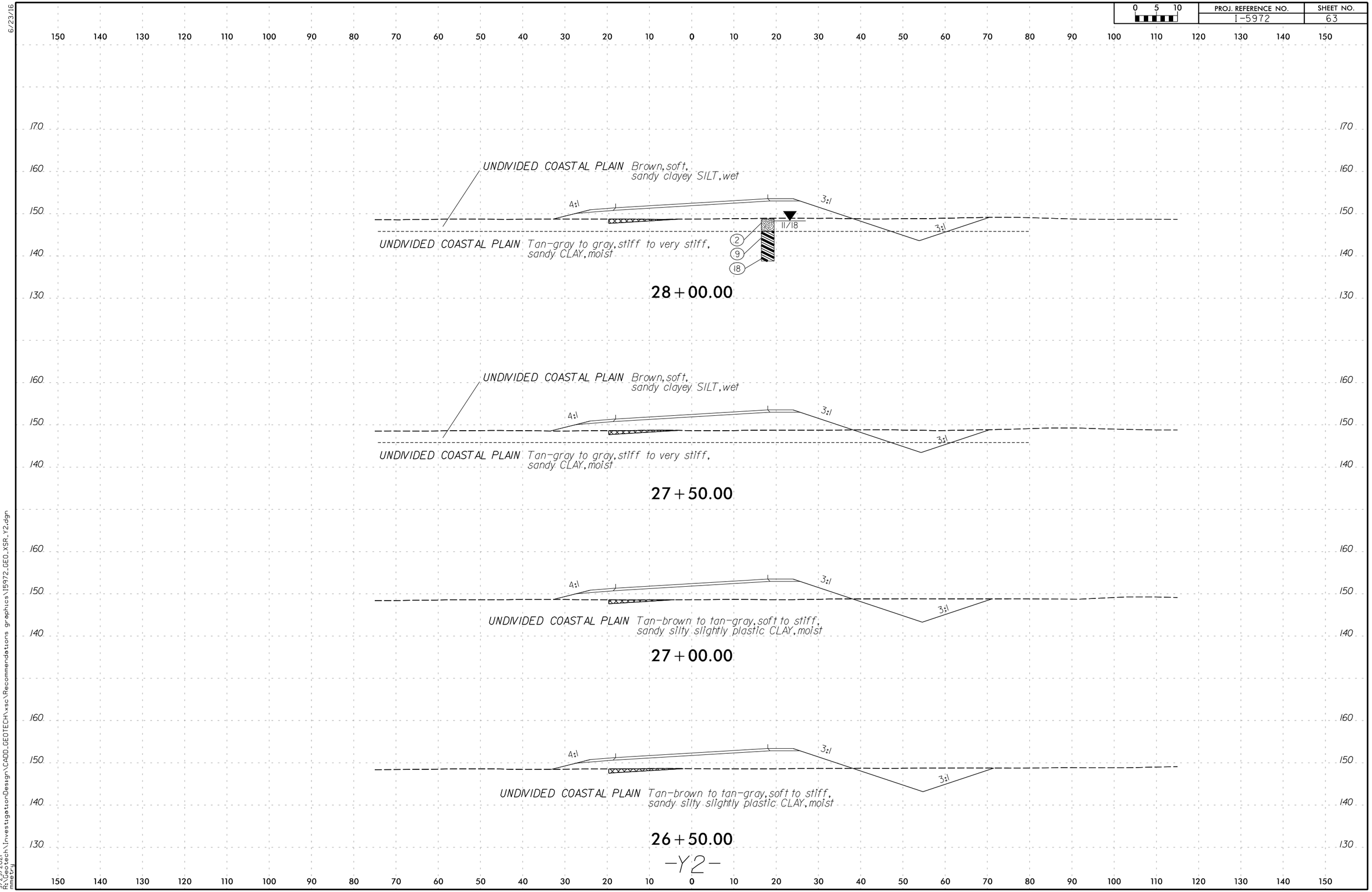
Gray to tan, medium dense, clayey silty fine to coarse SAND, trace gravel, moist to saturated

25+00.00

-Y2-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	63



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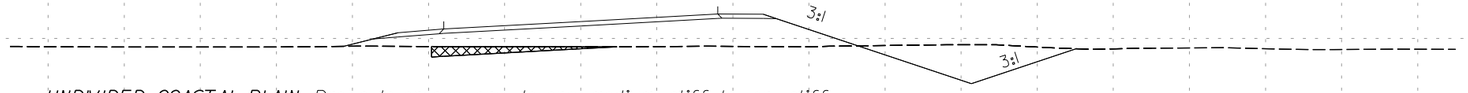
mlerch

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	64

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

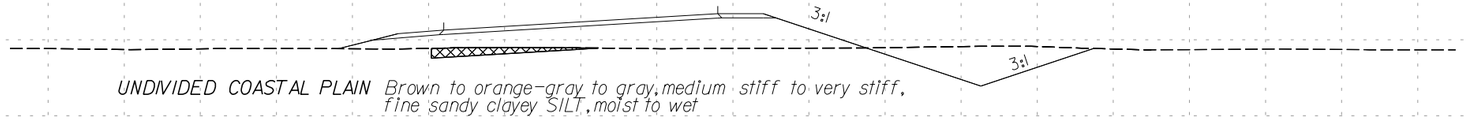
170
160
150
140



UNDIVIDED COASTAL PLAIN Brown to orange-gray to gray, medium stiff to very stiff, fine sandy clayey SILT, moist to wet

29+50.00

160
150
140
130

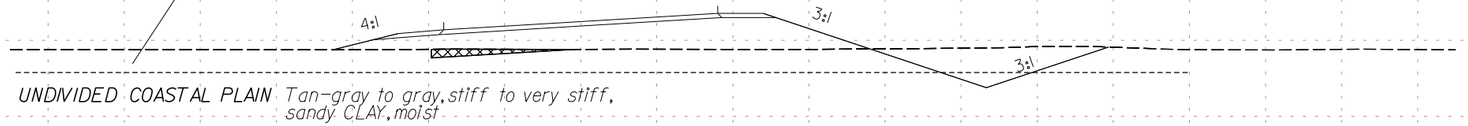


UNDIVIDED COASTAL PLAIN Brown to orange-gray to gray, medium stiff to very stiff, fine sandy clayey SILT, moist to wet

29+00.00

160
150
140
130

UNDIVIDED COASTAL PLAIN Brown, soft, sandy clayey SILT, wet



UNDIVIDED COASTAL PLAIN Tan-gray to gray, stiff to very stiff, sandy CLAY, moist

28+50.00

-Y2-

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

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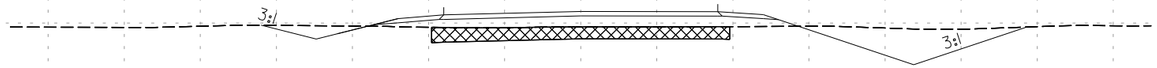
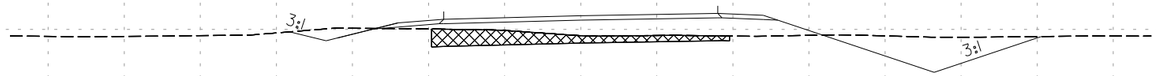
mmeyer

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	65



UNDIVIDED COASTAL PLAIN Brown to orange-gray to gray, medium stiff to very stiff, fine sandy clayey SILT, moist to wet

31+00.00

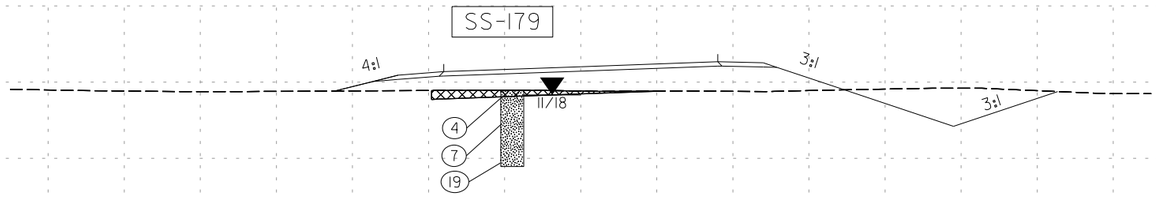


UNDIVIDED COASTAL PLAIN Brown to orange-gray to gray, medium stiff to very stiff, fine sandy clayey SILT, moist to wet

30+50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-179	30+00	9' LT	0.0-1.5	A-4 (2)	23	9	27	19	24	30	93	82	53.5	10.7	-

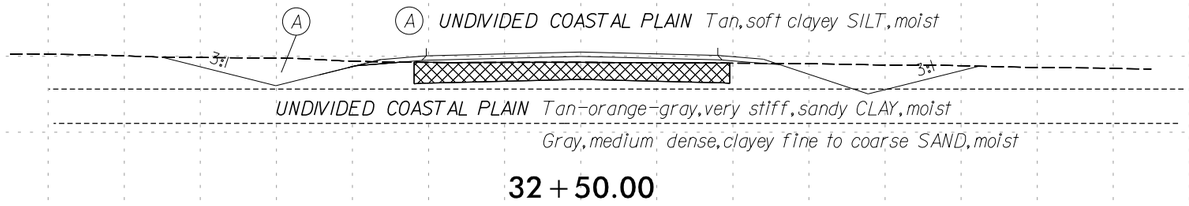


UNDIVIDED COASTAL PLAIN Brown to orange-gray to gray, medium stiff to very stiff, fine sandy clayey SILT, moist to wet

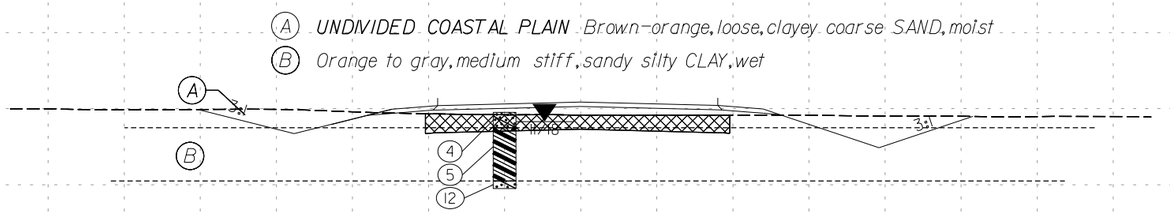
30+00.00

-Y2-

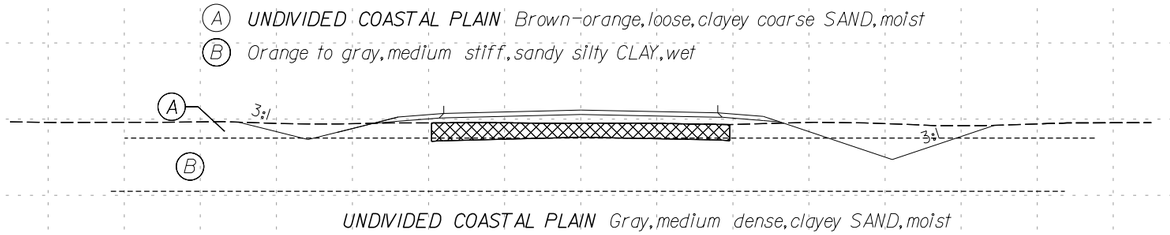
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	66



32 + 50.00



32 + 00.00



31 + 50.00

-Y2-

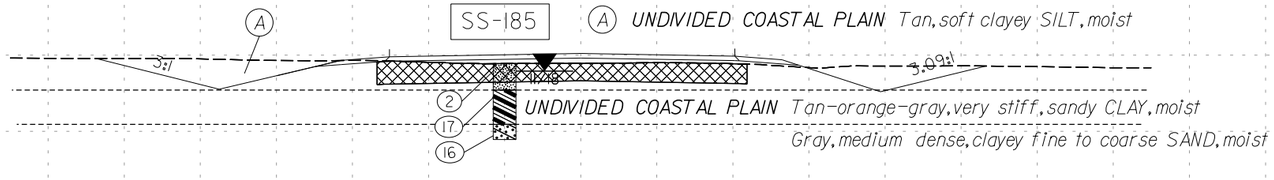
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	67

END SUBGRADE UNDERCUT -Y2- STA. 33+25

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-185	33+00	10' LT	0.0-1.5	A-4 (1)	20	8	29	23	24	24	92	79	48.9	16.2	-



33+00.00

-Y2-

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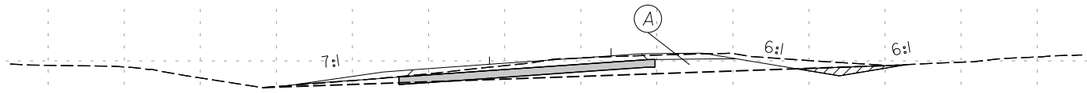
mmesa

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	68

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPA- STA. 15+25

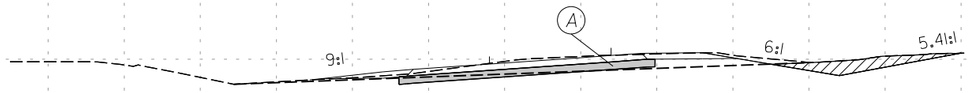
(A) *ROADWAY EMBANKMENT* Brown-tan to brown-gray, stiff, sandy SILT to sandy CLAY, moist



UNDIVIDED COASTAL PLAIN Brown-tan to tan-gray to tan-orange, medium stiff to very stiff, sandy moderately plastic CLAY, moist to wet

15+00.00

(A) *ROADWAY EMBANKMENT* Brown-tan to brown-gray, stiff, sandy SILT to sandy CLAY, moist



UNDIVIDED COASTAL PLAIN Brown-tan to tan-gray to tan-orange, medium stiff to very stiff, sandy moderately plastic CLAY, moist to wet

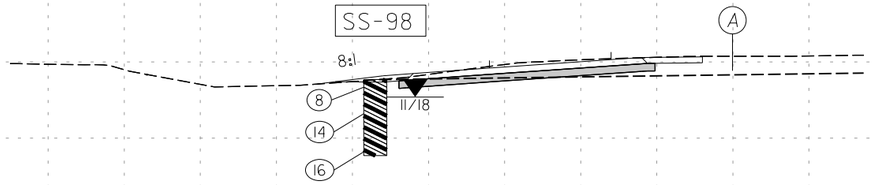
14+50.00

BEGIN UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPA- STA. 14+25

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-98	14+00	27' LT	0.0-1.5	A-6 (10)	39	21	19	25	21	35	99	88	61.4	23.6	-

(A) *ROADWAY EMBANKMENT* Brown-tan to brown-gray, stiff, sandy SILT to sandy CLAY, moist



UNDIVIDED COASTAL PLAIN Brown-tan to tan-gray to tan-orange, medium stiff to very stiff, sandy moderately plastic CLAY, moist to wet

SHALLOW UNDERCUT EXCAVATION FOR -RPA- CONTINUES FROM SHEET 24

14+00.00

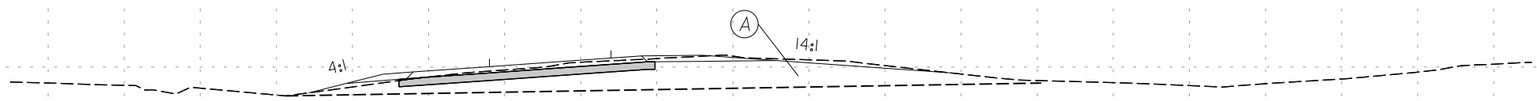
-RPA-

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	69

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

170 160 150 140 130

Ⓐ ***ROADWAY EMBANKMENT*** *Brown-tan, stiff, sandy CLAY, moist*



UNDIVIDED COASTAL PLAIN Tan-gray to gray, stiff, silty moderately plastic CLAY, wet

16 + 50.00

180 170

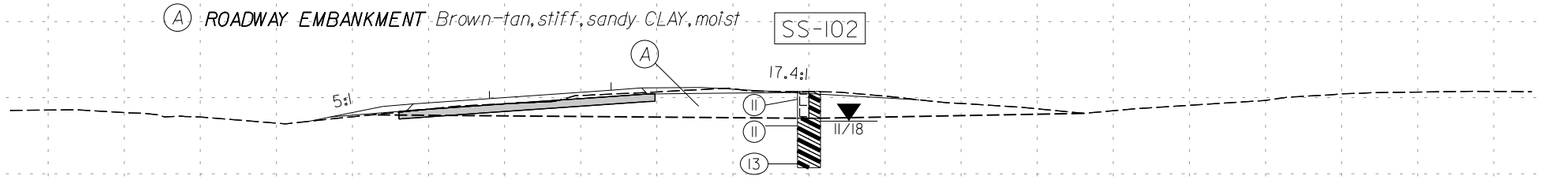
SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-102	16+00	30' RT	3.5-5.0	A-6 (6)	37	20	31	23	16	30	95	78	48.9	22.6	-

180 170

160 150 140 130

Ⓐ ***ROADWAY EMBANKMENT*** *Brown-tan, stiff, sandy CLAY, moist* SS-102

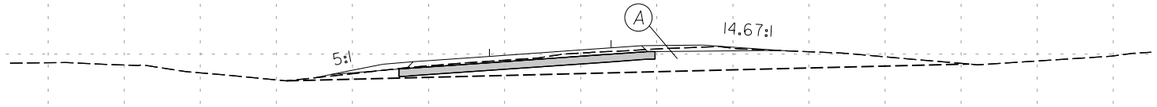


UNDIVIDED COASTAL PLAIN Tan-gray to gray, stiff, silty moderately plastic CLAY, wet

16 + 00.00

160 150 140 130

Ⓐ ***ROADWAY EMBANKMENT*** *Brown-tan, stiff, sandy CLAY, moist*



UNDIVIDED COASTAL PLAIN Tan-gray to gray, stiff, silty moderately plastic CLAY, wet

15 + 50.00

-RPA-

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

6/23/16

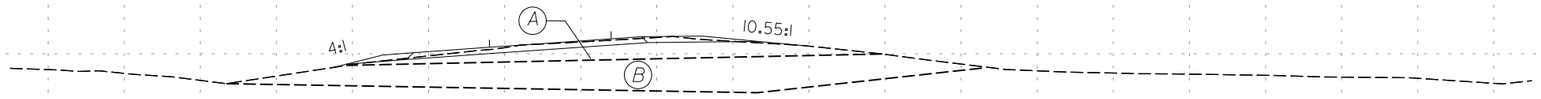
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	70

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

180 170 160 150 140 130

Ⓐ *ROADWAY EMBANKMENT* Brown-gray, stiff, sandy SILT, moist

Ⓑ Tan-brown, stiff, sandy CLAY, moist

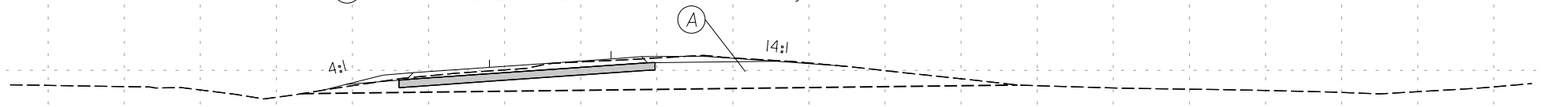


UNDIVIDED COASTAL PLAIN Gray, medium stiff, silty CLAY, wet

17+50.00

END SHALLOW UNDERCUT EXCAVATION -RPA- STA. 17+25

Ⓐ *ROADWAY EMBANKMENT* Brown-tan, stiff, sandy CLAY, moist



UNDIVIDED COASTAL PLAIN Tan-gray to gray, stiff, silty moderately plastic CLAY, wet

17+00.00

-RPA-

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

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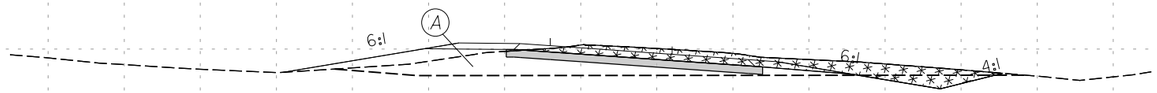
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	71

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

170 160 150 140 130

(A) *ROADWAY EMBANKMENT* Brown, medium stiff, silty CLAY, moist



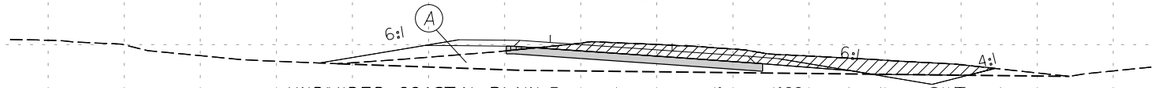
UNDIVIDED COASTAL PLAIN Gray-orange, very soft to stiff, silty moderately plastic CLAY, saturated

15+50.00

BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPB- STA. 15+25

END CLASS IV SUBGRADE STABILIZATION -RPB- STA. 15+25
END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPB- STA. 15+25

(A) *ROADWAY EMBANKMENT* Brown to brown-orange, medium stiff, sandy to sandy silty highly plastic CLAY, trace gravel, moist to wet



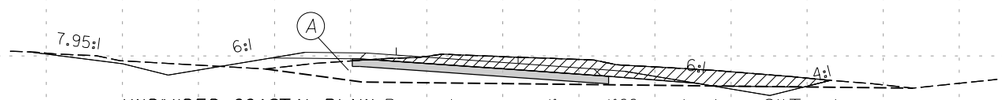
UNDIVIDED COASTAL PLAIN Brown to gray, medium stiff, sandy clayey SILT, wet

Brown to light gray, stiff, sandy to sandy silty highly plastic CLAY, trace gravel, saturated

15+00.00

BEGIN CLASS IV SUBGRADE STABILIZATION -RPB- STA. 14+75

(A) *ROADWAY EMBANKMENT* Brown to brown-orange, medium stiff, sandy to sandy silty highly plastic CLAY, trace gravel, moist to wet



UNDIVIDED COASTAL PLAIN Brown to gray, medium stiff, sandy clayey SILT, wet

Brown to light gray, stiff, sandy to sandy silty highly plastic CLAY, trace gravel, saturated

SHALLOW UNDERCUT EXCAVATION FOR -RPB- CONTINUES FROM SHEET 22
UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE FOR -RPB- CONTINUES FROM SHEET 22

14+50.00

-RPB-

120 110

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

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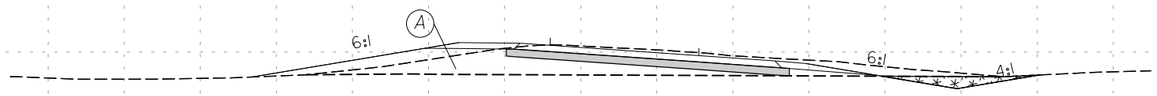
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	72

Ⓐ *ROADWAY EMBANKMENT* Tan, stiff, clayey fine sandy SILT, moist

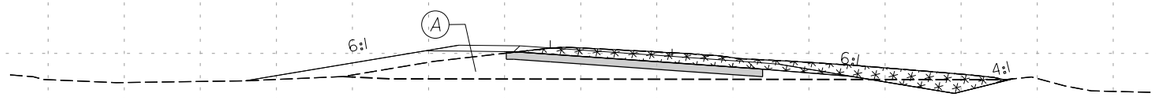


UNDIVIDED COASTAL PLAIN Tan-orange-gray, stiff, silty moderately plastic CLAY, moist

Gray, loose, silty fine to coarse SAND, moist

17+00.00

Ⓐ *ROADWAY EMBANKMENT* Brown, medium stiff, silty CLAY, moist



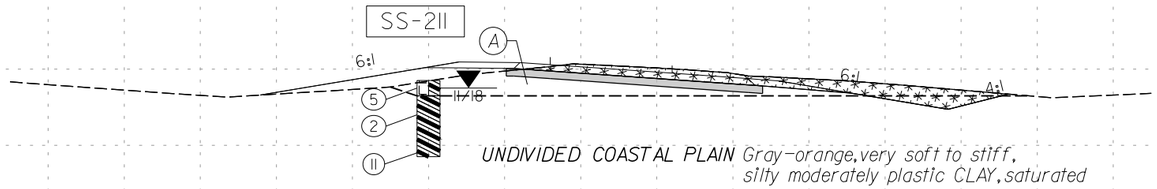
UNDIVIDED COASTAL PLAIN Gray-orange, very soft to stiff, silty moderately plastic CLAY, saturated

16+50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-211	16+00	20' LT	3.5-5.0	A-6 (15)	40	19	3	27	31	39	100	99	79	27.2	-

Ⓐ *ROADWAY EMBANKMENT* Brown, medium stiff, silty CLAY, moist



UNDIVIDED COASTAL PLAIN Gray-orange, very soft to stiff, silty moderately plastic CLAY, saturated

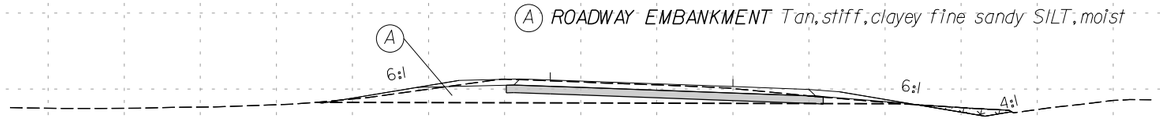
16+00.00

-RPB-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	73

END UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPB- STA. 18+75



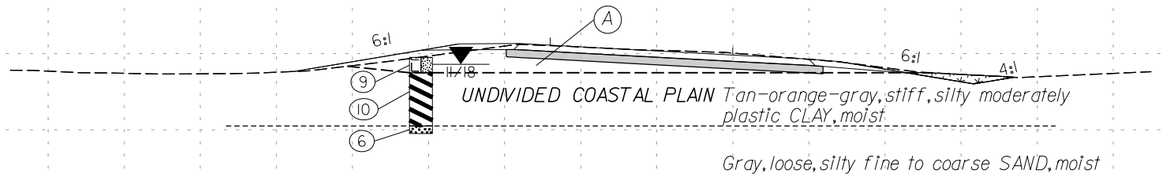
(A) *ROADWAY EMBANKMENT Tan, stiff, clayey fine sandy SILT, moist*

UNDIVIDED COASTAL PLAIN Tan-orange-gray, stiff, silty moderately plastic CLAY, moist

Gray, loose, silty fine to coarse SAND, moist

18+50.00

(A) *ROADWAY EMBANKMENT Tan, stiff, clayey fine sandy SILT, moist*

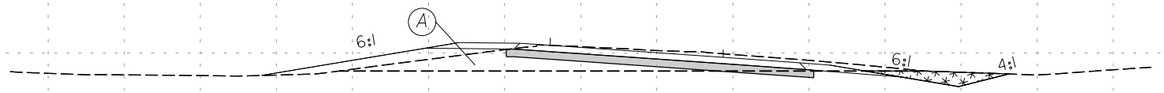


UNDIVIDED COASTAL PLAIN Tan-orange-gray, stiff, silty moderately plastic CLAY, moist

Gray, loose, silty fine to coarse SAND, moist

18+00.00

(A) *ROADWAY EMBANKMENT Tan, stiff, clayey fine sandy SILT, moist*



UNDIVIDED COASTAL PLAIN Tan-orange-gray, stiff, silty moderately plastic CLAY, moist

Gray, loose, silty fine to coarse SAND, moist

17+50.00

-RPB-

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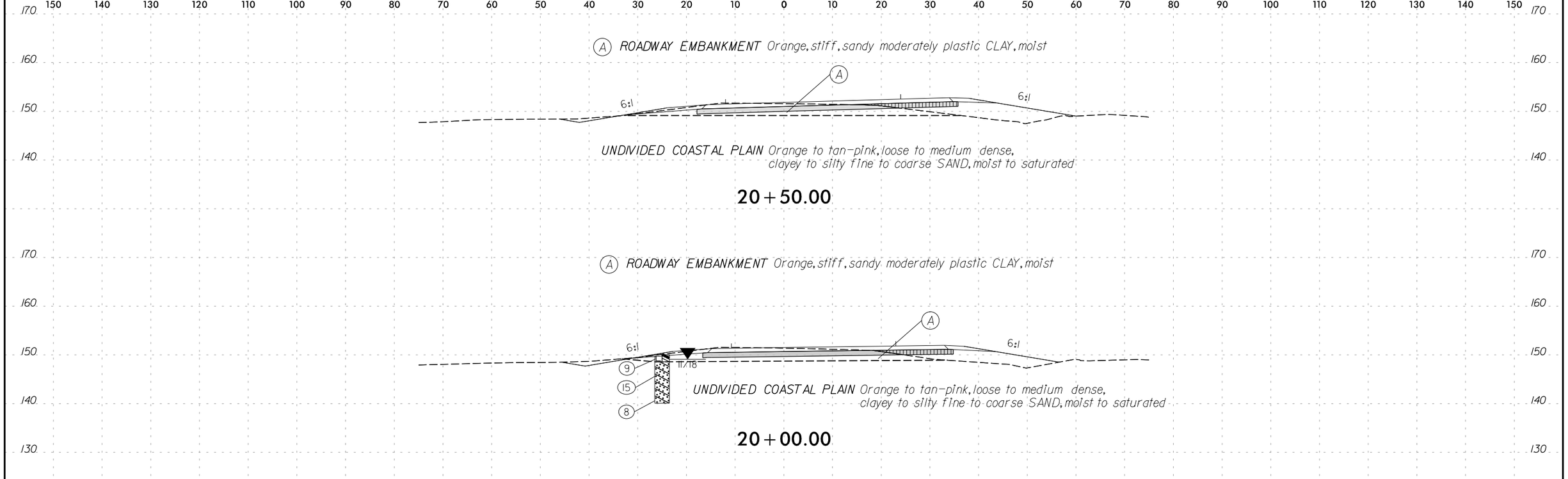
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	74



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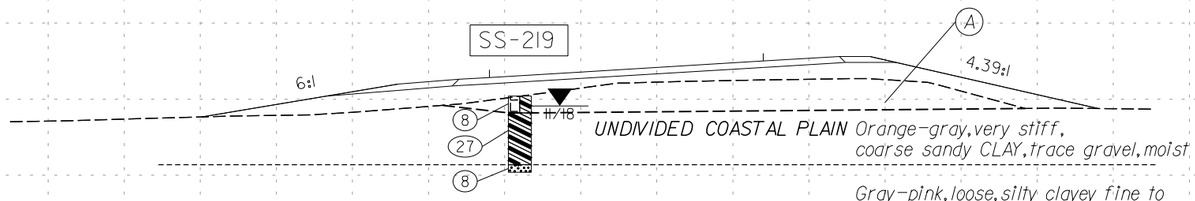
SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-219	22+00	8' LT	0.0-1.5	A-6 (6)	35	16	24	21	23	32	93	76	56.4	15.3	-

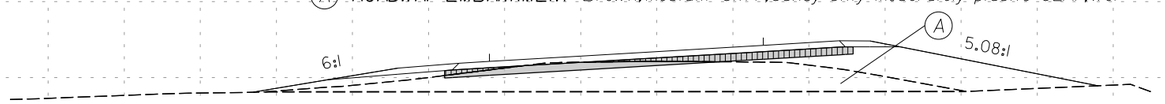
(A) *ROADWAY EMBANKMENT Brown, medium stiff, sandy silty moderately plastic CLAY, wet*



22+00.00

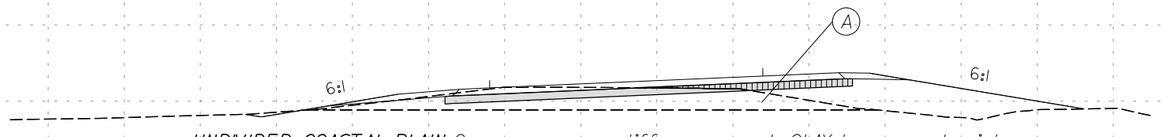
END CLASS IV SUBGRADE STABILIZATION -RPB- STA. 21+75
END SHALLOW UNDERCUT EXCAVATION -RPB- STA. 21+75

(A) *ROADWAY EMBANKMENT Brown, medium stiff, sandy silty moderately plastic CLAY, wet*



21+50.00

(A) *ROADWAY EMBANKMENT Brown, medium stiff, sandy silty moderately plastic CLAY, wet*



21+00.00

-RPB-

6/23/16

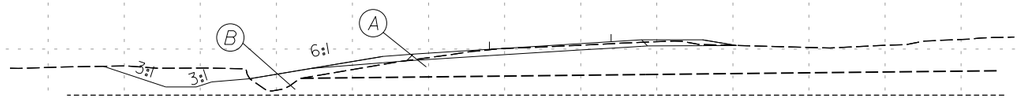
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	76

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

170 160 150 140

(A) *ROADWAY EMBANKMENT* Brown to gray, medium dense, clayey SAND, moist

(B) *UNDIVIDED COASTAL PLAIN* Brown to gray, stiff, sandy SILT, moist



UNDIVIDED COASTAL PLAIN Tan-gray, medium stiff, silty CLAY, moist

15+50.00

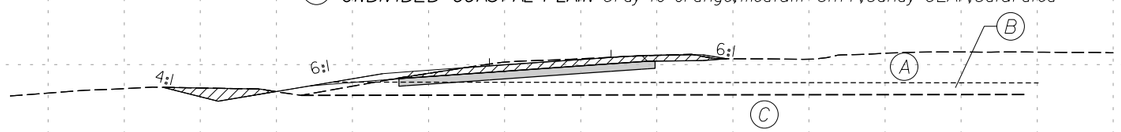
180 170 160

END UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE -RPC- STA.15+25
END SHALLOW UNDERCUT EXCAVATION -RPC- STA. 15+25

(A) *ROADWAY EMBANKMENT* Brown, silty fine sandy highly plastic CLAY, wet

(B) Red-brown to brown, loose, silty SAND, trace gravel, wet

(C) *UNDIVIDED COASTAL PLAIN* Gray to orange, medium stiff, sandy CLAY, saturated



UNDIVIDED COASTAL PLAIN Light gray, medium stiff, clayey SILT, saturated

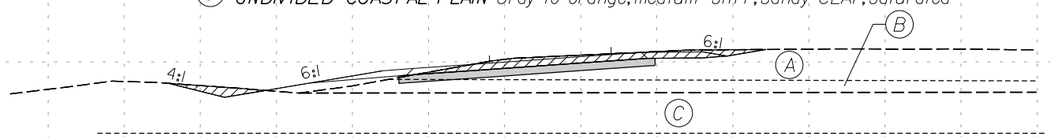
15+00.00

170 160 150 140

(A) *ROADWAY EMBANKMENT* Brown, silty fine sandy highly plastic CLAY, wet

(B) Red-brown to brown, loose, silty SAND, trace gravel, wet

(C) *UNDIVIDED COASTAL PLAIN* Gray to orange, medium stiff, sandy CLAY, saturated



UNDIVIDED COASTAL PLAIN Light gray, medium stiff, clayey SILT, saturated

SHALLOW UNDERCUT EXCAVATION FOR -RPC- CONTINUES FROM SHEET 9
UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE FOR -RPC- CONTINUES FROM SHEET 9

14+50.00

130 120 110

-RPC-

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

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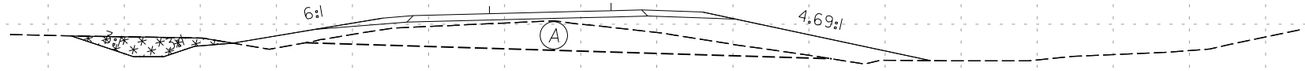
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	77

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

170
160
150
140

Ⓐ *ROADWAY EMBANKMENT* Brown-gray, stiff, silty moderately plastic CLAY, moist

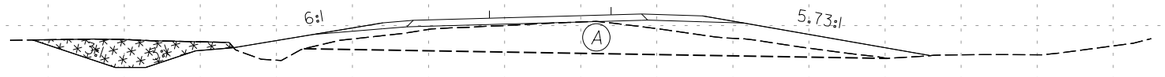


UNDIVIDED COASTAL PLAIN Tan-gray, stiff, silty moderately plastic CLAY, wet

17 + 50.00

Ⓐ *ROADWAY EMBANKMENT* Brown-gray, stiff, silty moderately plastic CLAY, moist

160
150
140
130



UNDIVIDED COASTAL PLAIN Tan-gray, stiff, silty moderately plastic CLAY, wet

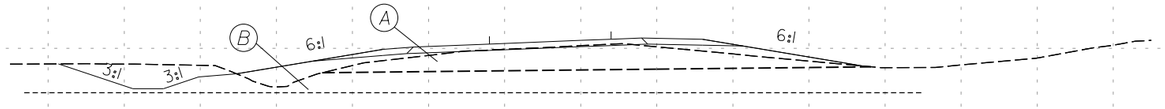
17 + 00.00

BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPC- STA. 16+75

120

Ⓐ *ROADWAY EMBANKMENT* Brown to gray, medium dense, clayey SAND, moist
Ⓑ *UNDIVIDED COASTAL PLAIN* Brown to gray, stiff, sandy SILT, moist

160
150
140
130



UNDIVIDED COASTAL PLAIN Tan-gray, medium stiff, silty CLAY, moist

16 + 50.00

-RPC-

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

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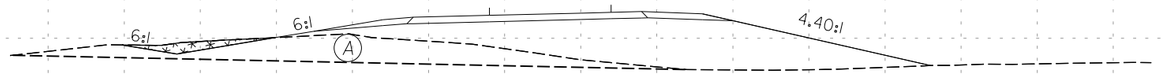
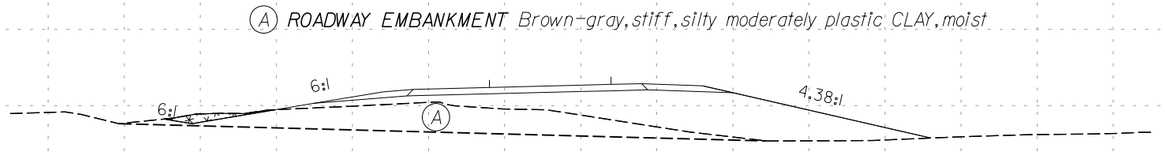
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	78



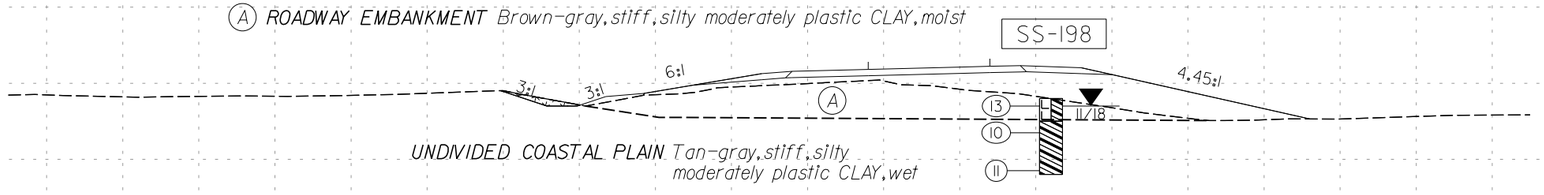
19 + 00.00



18 + 50.00

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-198	18+00	12' RT	3.5-5.0	A-6 (14)	36	17	3	22	42	33	100	99	84.1	17.7	-



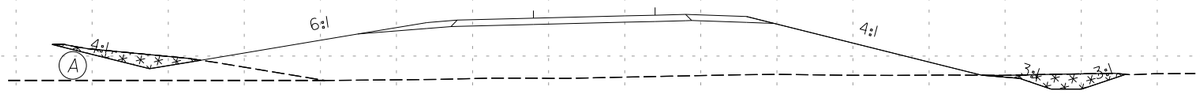
18 + 00.00

-RPC-

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	79

END UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPC- STA. 20+75

(A) *ROADWAY EMBANKMENT* Brown-gray, stiff silty moderately plastic CLAY, moist

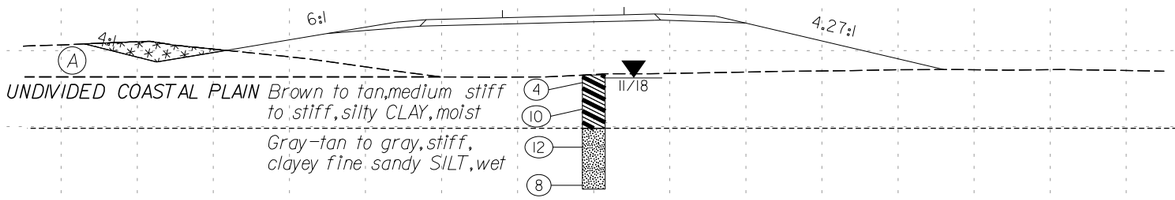


UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty CLAY, moist

Gray-tan to gray, stiff, clayey fine sandy SILT, wet

20+50.00

(A) *ROADWAY EMBANKMENT* Brown-gray, stiff silty moderately plastic CLAY, moist

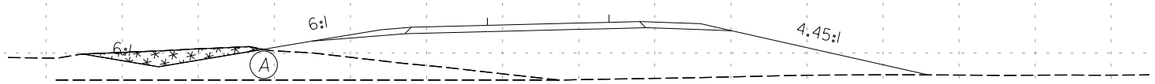


UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty CLAY, moist

Gray-tan to gray, stiff, clayey fine sandy SILT, wet

20+00.00

(A) *ROADWAY EMBANKMENT* Brown-gray, stiff silty moderately plastic CLAY, moist



UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty CLAY, moist

Gray-tan to gray, stiff, clayey fine sandy SILT, wet

19+50.00

-RPC-

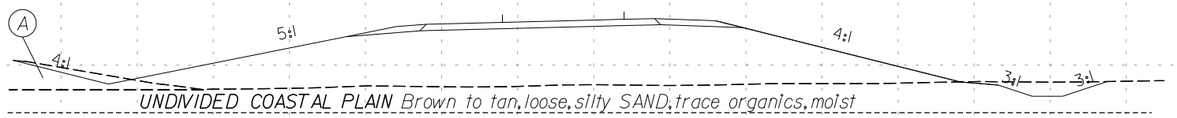
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	80

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

170 160 150 140 130 120

Ⓐ *ROADWAY EMBANKMENT Brown-gray, loose to medium dense clayey SAND, moist*



UNDIVIDED COASTAL PLAIN Brown to tan, loose, silty SAND, trace organics, moist

Brown to orange to gray, medium stiff, sandy slightly plastic CLAY, saturated

Gray to orange, very loose to medium dense, silty clayey SAND, saturated

Gray, medium stiff, fine sandy SILT, saturated

21+00.00

-RPC-

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

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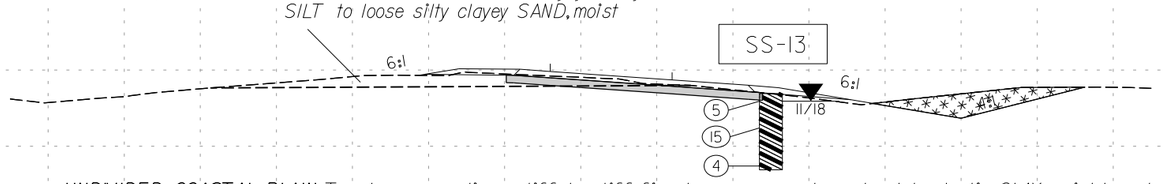
SOIL TEST RESULTS

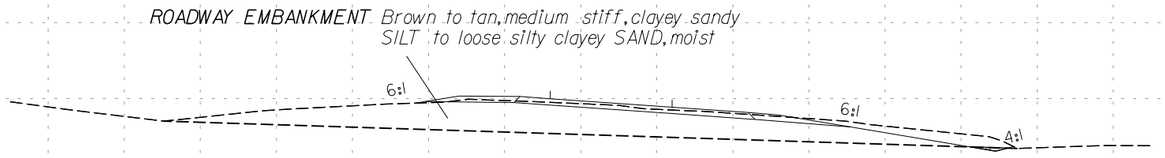
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-13	16+00	25' RT	0.0-1.5	A-6 (5)	37	20	37	22	16	25	99	71	44.6	14.5	-



UNDIVIDED COASTAL PLAIN Tan to gray, medium stiff to stiff, fine to coarse sandy moderately plastic CLAY, moist to saturated

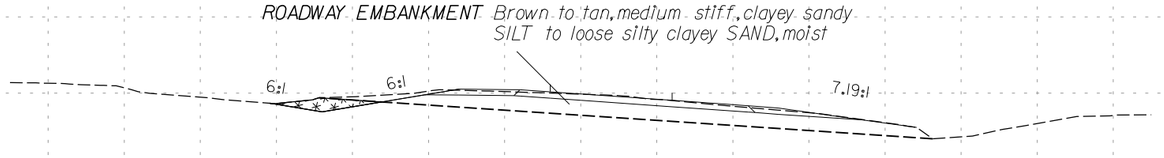
16+00.00

BEGIN SHALLOW UNDERCUT EXCAVATION STA. 15+75



UNDIVIDED COASTAL PLAIN Tan to gray, medium stiff to stiff, fine to coarse sandy moderately plastic CLAY, moist to saturated

15+50.00



UNDIVIDED COASTAL PLAIN Tan to gray, medium stiff to stiff, fine to coarse sandy moderately plastic CLAY, moist to saturated

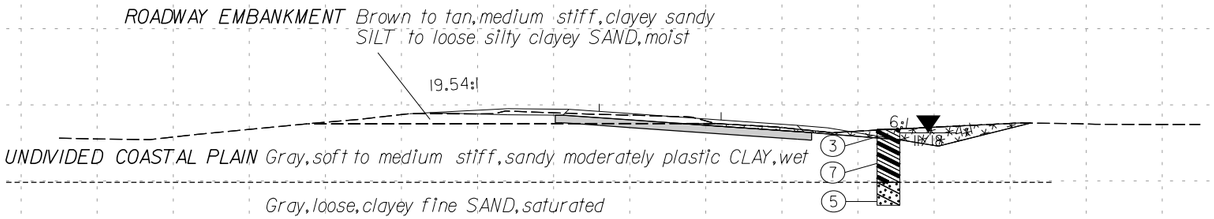
UNCLASSIFIED EXCAVATION - ACCEPTABLE FOR -RPD- CONTINUES FROM SHEET 10

15+00.00

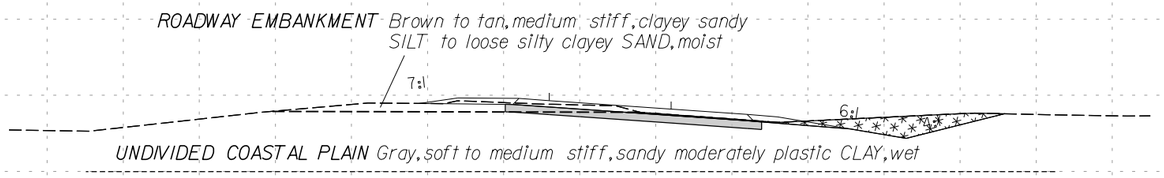
-RPD-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	82

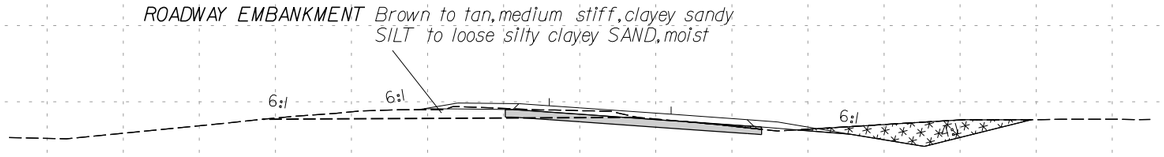


18+00.00

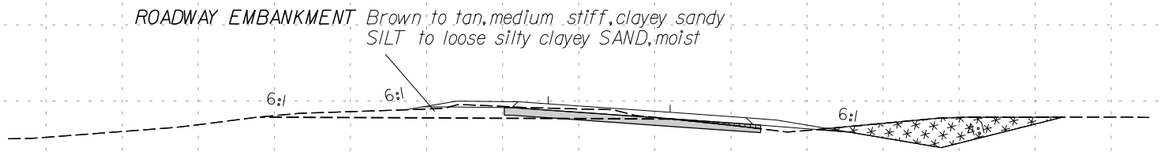


17+50.00

END CLASS IV SUBGRADE STABILIZATION -RPD- STA. 17+25



17+00.00



16+50.00

BEGIN CLASS IV SUBGRADE STABILIZATION -RPD- STA. 16+25

-RPD-

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	83

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

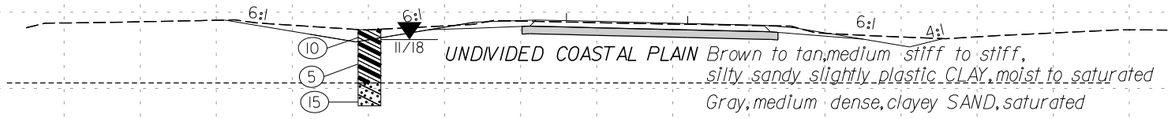
190 180 170 160 150 140

SOIL TEST RESULTS

SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-26	19+40	30' LT	3.5-5.0	A-6 (3)	27	13	30	23	21	26	100	87	50.8	19.6	-

19+40

SS-26



UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty sandy slightly plastic CLAY, moist to saturated

Gray, medium dense, clayey SAND, saturated

19+50.00

ROADWAY EMBANKMENT Brown to tan, medium stiff, clayey sandy SILT to loose silty clayey SAND, moist

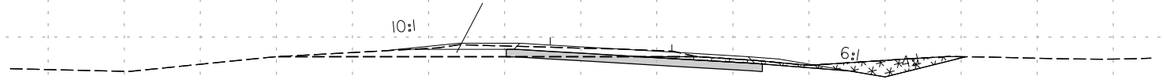
UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty sandy slightly plastic CLAY, moist to saturated

Gray, medium dense, clayey SAND, saturated

19+00.00

END UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPD- STA. 18+75

ROADWAY EMBANKMENT Brown to tan, medium stiff, clayey sandy SILT to loose silty clayey SAND, moist



UNDIVIDED COASTAL PLAIN Gray, soft to medium stiff, sandy moderately plastic CLAY, wet

Gray, loose, clayey fine SAND, saturated

18+50.00

-RPD-

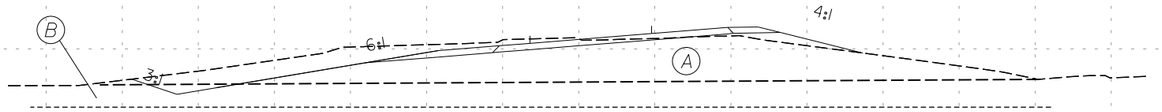
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	84

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

170 160 150 140 130

(A) *ROADWAY EMBANKMENT* Brown, medium stiff, sandy clayey SILT, moist

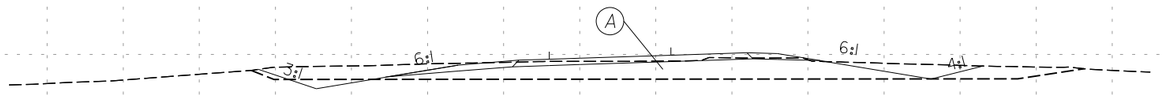
(B) *UNDIVIDED COASTAL PLAIN* Tan-gray, soft, sandy clayey SILT, wet



UNDIVIDED COASTAL PLAIN Tan-gray, medium dense, clayey SAND, saturated

24+50.00

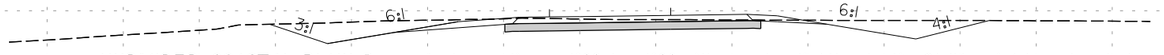
(A) *ROADWAY EMBANKMENT* Tan-orange, medium stiff, sandy clayey SILT, wet



UNDIVIDED COASTAL PLAIN Tan-gray to gray, loose to medium dense, silty SAND, saturated

21+00.00

END SHALLOW UNDERCUT EXCAVATION STA. 20+75



UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty sandy slightly plastic CLAY, moist to saturated

UNDIVIDED COASTAL PLAIN: Gray, medium dense, clayey SAND, saturated

20+50.00

UNDIVIDED COASTAL PLAIN Brown to tan, medium stiff to stiff, silty sandy slightly plastic CLAY, moist to saturated

Gray, medium dense, clayey SAND, saturated

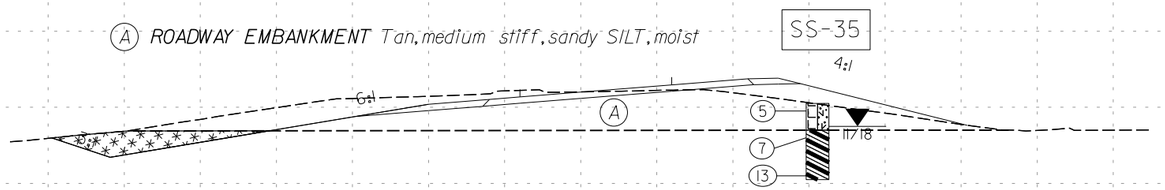
20+00.00

-RPD-

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	85

SOIL TEST RESULTS

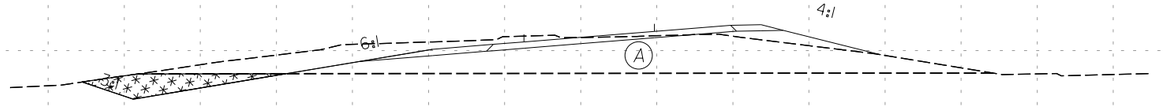
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVE			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-35	26+00	31' RT	3.5-5.0	A-6 (4)	36	18	34	25	17	24	100	80	45.7	18.9	-



(A) *ROADWAY EMBANKMENT Tan, medium stiff, sandy SILT, moist*

UNDIVIDED COASTAL PLAIN Tan to tan-gray, medium stiff to stiff, sandy moderately plastic CLAY, wet to saturated

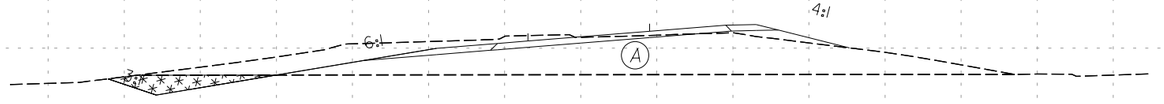
26+00.00



(A) *ROADWAY EMBANKMENT Tan, medium stiff, sandy SILT, moist*

UNDIVIDED COASTAL PLAIN Tan to tan-gray, medium stiff to stiff, sandy moderately plastic CLAY, wet to saturated

25+50.00



(A) *ROADWAY EMBANKMENT Tan, medium stiff, sandy SILT, moist*

UNDIVIDED COASTAL PLAIN Tan to tan-gray, medium stiff to stiff, sandy moderately plastic CLAY, wet to saturated

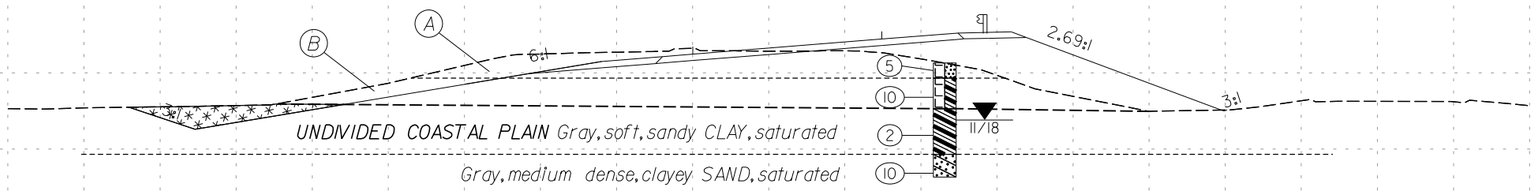
25+00.00

BEGIN UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPD- STA. 24+75

-RPD-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	86



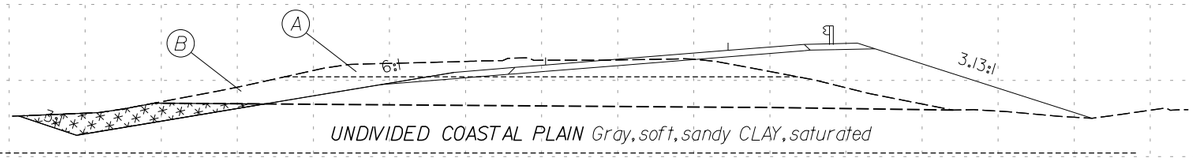
(A) *ROADWAY EMBANKMENT* Brown, loose, silty SAND, moist

(B) Brown, stiff, sandy CLAY, moist

UNDIVIDED COASTAL PLAIN Gray, soft, sandy CLAY, saturated

Gray, medium dense, clayey SAND, saturated

28+00.00



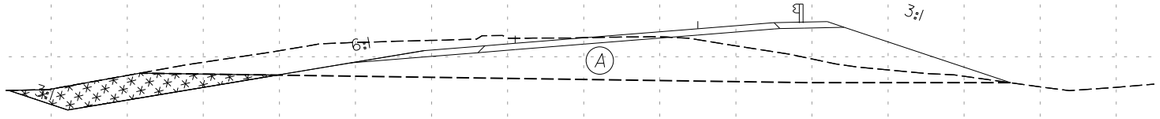
(A) *ROADWAY EMBANKMENT* Brown, loose, silty SAND, moist

(B) Brown, stiff, sandy CLAY, moist

UNDIVIDED COASTAL PLAIN Gray, soft, sandy CLAY, saturated

Gray, medium dense, clayey SAND, saturated

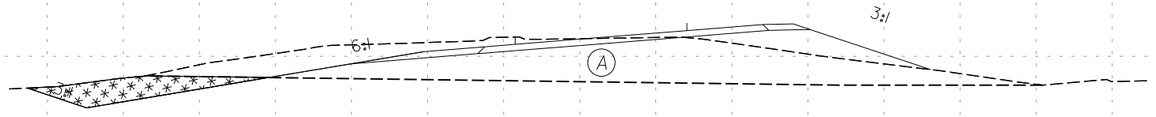
27+50.00



(A) *ROADWAY EMBANKMENT* Tan, medium stiff, sandy SILT, moist

UNDIVIDED COASTAL PLAIN Tan to tan-gray, medium stiff to stiff, sandy moderately plastic CLAY, wet to saturated

27+00.00



(A) *ROADWAY EMBANKMENT* Tan, medium stiff, sandy SILT, moist

UNDIVIDED COASTAL PLAIN Tan to tan-gray, medium stiff to stiff, sandy moderately plastic CLAY, wet to saturated

26+50.00

-RPD-

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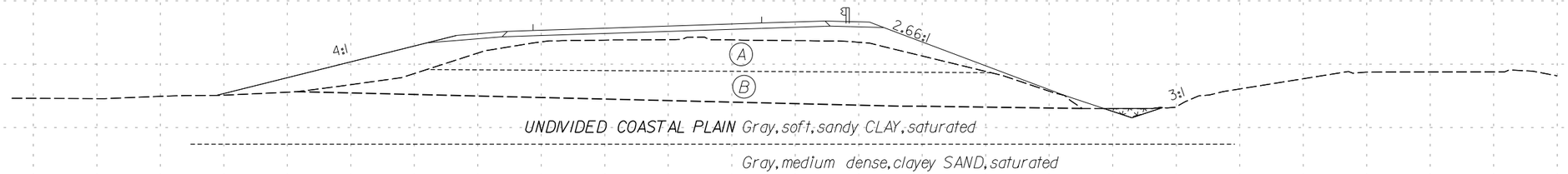
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	87

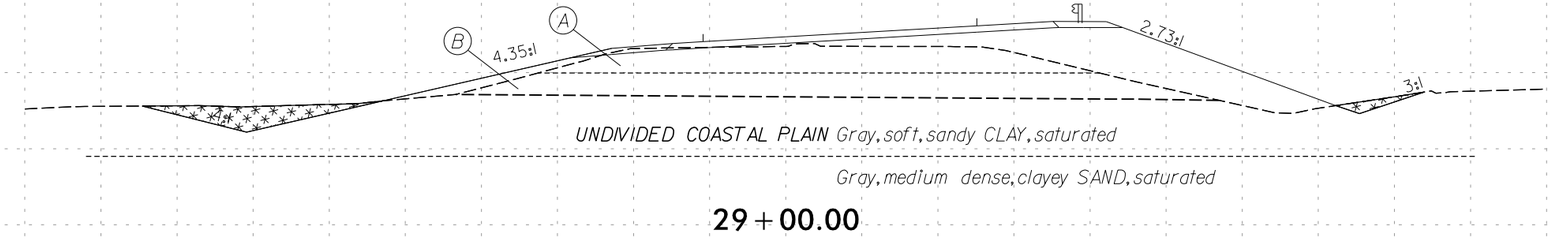
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

180 170 160 150 140 130

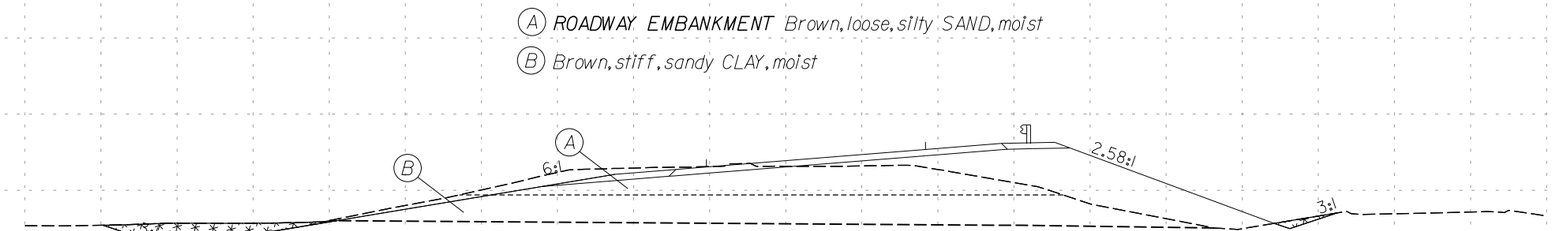
END UNCLASSIFIED EXCAVATION - ACCEPTABLE -RPD- STA. 29+60



29+50.00



29+00.00



28+50.00

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	I-5972	88

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

180 170 160 150 140 130

(A) ROADWAY EMBANKMENT Brown, loose, silty SAND, moist

(B) Brown, stiff, sandy CLAY, moist

4:1

5.03:1

A

B

UNDIVIDED COASTAL PLAIN Gray, soft, sandy CLAY, saturated

Gray, medium dense, clayey SAND, saturated

30+00.00

-RPD-

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

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November 8, 2021

Memorandum to: Russell Broadwell, PE
Project Engineer – Division 4
509 Ward Blvd.
PO Box 3165
Wilson, NC 27895

From: Margaret M. Sweitzer, PE
Senior Project Engineer, Geotechnical

WBS Number: 44989.1.1
TIP Number: I-5972
County: Johnston
Description: I-95 and US-70 Business, (E. Market Street), Exit 95 Interchange from Outlet Center Drive to West of Yelverton Grove Road

Subject: **Geotechnical Report – Roadway Design and Construction Recommendations**

RK&K has completed the subsurface investigation for this project and submits the following recommendations. These recommendations are based on soil borings performed by RK&K, laboratory testing of select soil samples, and roadway plans. This report includes recommendations for the following alignments:

Line	Stations (±)
-L-	27+95 – 82+41
-Y1-	21+70 – 56+50
-Y2-	10+10 – 33+59
-RPA-	10+00 – 22+12
-RPB-	10+00 – 27+09
-RPC-	10+00 – 25+11
-RPD-	10+00 – 30+86

I. SLOPE/ EMBANKMENT STABILITY AND SETTLEMENT

A. Slope Design

It is recommended that all fill and cut slopes be constructed at a ratio of 3:1 (H:V) or flatter as shown on the roadway plans.

Long term settlement due to embankment construction is not anticipated to be significant. Settlement monitoring is not recommended.

It is recommended that embankment preparation and benching be in accordance with Section 235-3(A) of the Standard Specifications where embankment fill will be placed on existing slopes steeper than 4:1 (H:V).

B. Undercut for Embankment Stability

Soils unsuitable for embankment construction should be undercut. Backfill all embankment undercut areas with Select Granular Material, Class II or III. Unsuitable material should be wasted or used in landscape areas.

Any soft or loose alluvial soils encountered within the limits of proposed embankments should be undercut to firm material or to a minimum depth of 3 feet. Backfill to replace undercut material should be Select Material, Class II or III, on top of Geotextile for Soil Stabilization, Type 4.

A contingency quantity of 500 cubic yards of undercut for embankment stability is recommended to be used at the discretion of the Engineer.

C. Geotextile for Soil Stabilization

Geotextile for Soil Stabilization may be needed to establish a working platform for embankment construction due to soft/wet soils in the following areas:

Line	Station	Offset
-L-	33+40 – 45+00	RT
-Y1-	34+30 – 35+30	RT
-Y2-	16+25 – 18+75	LT & RT
-RPA-	19+50 – 22+00	LT & RT

Recommend 11,300 square yards of Geotextile for Soil Stabilization to be used in with section IC. A contingency quantity of 2,000 square yards of Geotextile for Soil Stabilization is recommended to be included in the contract. Geotextile for Soil Stabilization should be Type 4 in accordance with Section 1056 of the Standard Specifications.

D. Rock Embankment

Rock embankment is recommended for the following location where embankments will be constructed in wetlands with standing water:

Line	Stations (±)	Offset
-Y1-	37+75 – 41+55	RT

Class 2 Rip Rap shall be used for rock embankments. Rock embankments are recommended to be installed 2 foot above the existing ground or water level whichever is higher. Recommend 2,400 tons of Rip Rap Class 2, 700 tons of Rip Rap Class A, 1,300 tons of #57 stone, and 2,500 square yards of Geotextile for Rock Embankment. The Rock Embankment Special Provision should be included in the contract.

II. SUBGRADE STABILITY

A. Undercut for Subgrade Stability

Cohesive soils with plasticity indices (PI) greater than 20, greater than 50 percent passing the No. 200 sieve, and soft or wet soils should be undercut. The depth of undercut should be to 3 feet below subgrade or to suitable soils, whichever is less. Unsuitable material should be wasted or used in landscape areas. Backfill all subgrade stability undercut areas with Select Granular Material, Class II or III.

Recommend 2,800 cubic yards of undercut for subgrade stability be used in the following areas. The recommended areas are shown with a double hatching on the included cross section sheets:

Line	Station	Offset
-Y2-	10+10 – 13+25	LT & RT
-Y2-	13+25 – 14+75	LT
-Y2-	14+75 – 16+25	LT & RT
-Y2-	18+75 – 20+75	LT
-Y2-	20+75 – 23+75	LT & RT
-Y2-	23+75 – 28+75	LT
-Y2-	28+75 – 33+25	LT & RT

A contingency quantity of 500 cubic yards of undercut for subgrade stability is recommended to be used at the discretion of the Engineer. It is recommended that Geotextile for Soil Stabilization be placed in the base of undercut sections. Geotextile for Soil Stabilization should be Type 4 in accordance with Section 1056 of the Standard Specifications.

B. Aggregate Subgrade

Aggregate Subgrade is recommended where highly plastic soils exist within 3 feet below subgrade and full depth undercut cannot be performed due to the close proximity of traffic and/or utilities. Aggregate Subgrade should be constructed in accordance with Section 505 of the Standard Specifications. The aggregate subgrade should be extended 1 foot outside the edge of the proposed pavement.

i. **Shallow Undercut**: Shallow undercut is recommended to a depth of 12 inches below subgrade. Recommend 9,800 cubic yards of Shallow Undercut to be used in the following areas. Undercut materials with PI>20 should be wasted or used in landscape areas at the discretion of the Engineer. Undercut materials with 15<PI≤20 may be used in fill sections below a depth of 3 feet from subgrade at the discretion of the Engineer. The recommended shallow undercut areas are shown with a shaded pattern on the included cross section sheets.

Line	Stations (±)	Offset
-L-	38+75 – 40+75	RT
-L-	43+25 – 43+75	LT

Line	Stations (±)	Offset
-L-	49+75 – 65+75	LT & RT
-L-	65+75 – 67+75	RT
-L-	69+75 – 71+75	LT
-L-	71+75 – 77+25	LT & RT
-L-	77+25 – 82+40	RT
-Y1-	21+70 – 24+75	LT & RT
-Y1-	24+75 – 25+75	RT
-Y1-	25+75 – 30+25	LT & RT
-Y1-	45+25 – 54+25	LT & RT
-RPA-	10+00 – 11+50	LT & RT
-RPA-	11+50 – 14+00	LT
-RPA-	14+00 – 17+25	LT & RT
-RPB-	10+00 – 12+00	RT
-RPB-	12+00 – 21+25	LT & RT
-RPB-	21+25 – 21+75	LT
-RPC-	10+00 – 11+00	LT
-RPC-	11+00 – 15+25	LT & RT
-RPD-	10+00 – 13+00	RT
-RPD-	15+75 – 20+75	LT & RT

A contingency quantity of 500 cubic yards of Shallow Undercut is recommended to be used at the discretion of the Engineer. Backfill to replace shallow undercut material should be Select Material, Class IV, on top of Geotextile for Soil Stabilization, Type 4.

ii. **Class IV Aggregate Subgrade Stabilization:** In the following areas, the distance between the proposed subgrade and existing ground is between 6 to 12 inches. Therefore, a combination of Shallow Undercut and Class IV Subgrade Stabilization is recommended. The recommended Class IV Aggregate Subgrade Stabilization areas are shown with a shaded vertical hatch pattern on the included cross section sheets.

Line	Stations (±)	Offset
-L-	54+25 – 54+75	LT
-L-	54+75 – 55+75	LT & RT
-L-	55+75 – 56+75	RT
-L-	56+75 – 58+25	LT
-L-	58+25 – 59+25	LT & RT
-L-	59+25 – 59+75	LT
-L-	72+75 – 75+75	LT
-L-	76+75 – 80+75	RT
-Y1-	23+75 – 24+75	LT
-Y1-	24+75 – 25+75*	LT
-Y1-	25+75 – 26+25	LT
-Y1-	29+25 – 29+75	RT

Line	Stations (±)	Offset
-Y1-	45+25 – 47+25	LT & RT
-Y1-	47+25 – 47+75	RT
-Y1-	48+25 – 51+75	RT
-Y1-	51+75 – 52+75	LT & RT
-Y1-	53+25 – 53+75	LT
-RPA-	10+00 – 10+50	LT
-RPA-	11+75 – 13+75	LT
-RPB-	10+00 – 10+50	RT
-RPB-	14+75 – 15+25	LT
-RPB-	19+25 – 21+75	RT
-RPC-	10+00 – 11+50	LT
-RPC-	12+50 – 13+00	LT & RT
-RPC-	14+00 – 14+50	LT
-RPD-	10+00 – 10+50	RT
-RPD-	16+25 – 17+25	RT

*In these areas, Aggregate Subgrade is recommended, but the undercut is not required because proposed subgrade is more than 1 foot above the existing ground. Therefore, Class IV Aggregate Subgrade Stabilization is recommended.

C. Geotextile for Soil Stabilization

Recommend 33,900 square yards of Geotextile for Soil Stabilization to be used with Items II.A and II.B. A contingency quantity of 2,000 square yards of Geotextile for Soil Stabilization is recommended to be used with contingency Items II.A and II.B, respectively.

D. Special Ditches

Recommend special ditches a minimum of 6-ft below the proposed subgrade, or as deep as outfall will allow, at the following locations. The recommended special ditch locations are all connected to outfall. Existing terrain prevents any further lowering of grade for the addition of deeper ditches.

Line	Stations (±)	Offset
-RPA-	10+00 – 15+50	LT
-RPA-	15+50 – 17+00	LT & RT
-RPB-	10+00 – 15+50	RT
-RPB-	15+50 – 23+50	LT & RT
-RPC-	10+00 – 15+50	LT
-RPC-	15+50 – 19+50	LT & RT
-RPD-	10+00 – 15+50	RT
-RPD-	15+50 – 27+00	LT & RT

It is recommended that the hydraulic engineer evaluate the extension of ditches to outfall.

E. Subsurface Drainage

Groundwater was encountered within 6-ft of the proposed subgrade in the following areas. Recommend 13,800 linear feet of 6-inch perforated subdrain pipe per Roadway Standard Drawing 815.02 – Subsurface Drain.

Line	Stations (±)	Offset
-L-	27+95 – 33+40	LT
-L-	34+50 – 77+12	LT & RT
-L-	77+12 – 82+41	RT
-Y1-	21+70 – 30+25	RT
-Y1-	45+25 – 56+50	RT
-Y2-	10+10 – 17+00	LT
-Y2-	22+00 – 33+60	LT

A contingency quantity of 1,000 linear feet of 6-inch perforated subdrain pipe is recommended. Subsurface drains should be installed at the discretion of the Engineer in any other areas where shallow groundwater is encountered during construction.

F. Grade Point Undercut

A contingency quantity of 150 cubic yards of grade point undercut is recommended to be used at the discretion of the Engineer.

III. BORROW SPECIFICATIONS

A. Borrow Criteria

Common borrow for embankment construction shall meet the borrow criteria outlined in Section 1018-2 (B) of the Standard Specifications.

B. Shrinkage Factor

A shrinkage factor of 25 percent is recommended for calculation of earthwork on this project.

C. Select Granular Material

Select Granular Material for backfill over Geotextile for Soil Stabilization shall be Select Material, Class II or III. Select Granular Material for backfill in water shall be Select Material, Class III. The Select Granular Material should be placed to a height of 3 feet above Geotextile for Soil Stabilization and/or water level whichever is higher.

Recommend 11,300 cubic yards of Select Granular Material, Class II or III, to be used with items I.C and II.A. A contingency quantity of 3,000 cubic yards of Select Granular Material, Class II or III, to be used with contingency items in I.B, I.C, and II.A is recommended.

D. Class IV Subgrade Stabilization

Recommend 21,600 tons of Class IV Subgrade Stabilization to be used with Item II.B. A contingency quantity of 1,000 tons of Class IV Subgrade Stabilization Material to be used with contingency item II.B.

IV. MISCELLANEOUS

A. Reduction of Unclassified Excavation – Clearing and Grubbing

No significant loss of unclassified excavation is anticipated due to clearing and grubbing.

B. Reduction of Unclassified Excavation - Unsuitable Waste

Soils within shallow cut and ditch excavations with plasticity indices (PI) greater than 20 were encountered in the following areas. These materials should be wasted. These areas are represented on the cross sections by a single hatch pattern.

Line	Station	Offset
-L-	35+75 – 40+75	RT
-L-	43+25 – 43+75	LT
-L-	49+75 – 54+25	RT
-L-	58+25 – 62+75	LT
-L-	62+75 – 65+75	LT & RT
-L-	65+75 – 67+75	RT
-L-	74+25 – 77+25	LT & RT
-L-	77+25 – 82+40	RT
-Y1-	32+75 – 36+75	LT
-Y2-	18+75 – 25+25	RT
-RPA-	14+25 – 15+25	RT
-RPB-	12+00 – 13+50	RT
-RPB-	13+50 – 15+25	LT & RT
-RPC-	10+00 – 11+00	LT
-RPC-	11+00 – 15+25	LT & RT
-RPD-	10+00 – 11+00	RT
-RPD-	11+00 – 13+00	LT & RT

The estimated quantity of unsuitable unclassified excavation is 7,600 cubic yards.

C. Acceptable Unclassified Excavation

Soils within excavations with plasticity indices (PI) between 16 and 20 were encountered in the following areas. These soils are acceptable for use as borrow material but should not be placed within the top 3 feet of the embankment or backfill in accordance with Section 1018-2 of the Standard Specifications.

Line	Station	Offset
-L-	43+75 – 45+25	LT
-L-	45+25 – 45+75	LT & RT
-Y1-	47+25 – 54+25	LT & RT
-RPB-	15+25 – 16+75	LT & RT
-RPB-	16+75 – 18+75	RT
-RPC-	16+75 – 20+25	LT
-RPC-	20+25 – 20+75	LT & RT

Line	Station	Offset
-RPD-	13+00 – 14+00	LT & RT
-RPD-	14+00 – 15+25	LT
-RPD-	15+25 – 18+75	RT
-RPD-	24+75 – 28+25	LT
-RPD-	28+25 – 29+25	LT & RT
-RPD-	29+25 – 29+60	RT

These areas are represented on the cross sections by an asterisk hatch pattern. The estimated quantity of acceptable unclassified excavation is 5,100 cubic yards.

D. Culverts

One reinforced concrete box culvert (RCBC) is proposed along the project corridor. The proposed culvert location and recommendations are as follows:

-Y2- STA. 17+35.5 – Double 8'x5' RCBC

The following notes should be included on the culvert plans:

Excavate 1-ft below culvert bearing elevation and replace with foundation conditioning material (Select Material, Class VI).

Undercut any soft/loose alluvial soils that may be encountered beneath the bottom of the foundation conditioning material. Backfill undercut area with foundation conditioning material.

E. Ponds

Ponds were not observed during the subsurface investigation within the footprint of the project. If ponds were encountered in the vicinity of the project, silt studies should be completed at the Contractor's discretion.

F. Water Wells

The following water well was found within the proposed slope stake limits on the project:

Line	Station	Offset
-Y1-	47+59	LT

Other water wells may be encountered during construction due to the presence of dwellings and businesses near the footprint of the project. Water wells, listed above and any others encountered during construction, should be sealed in accordance with Section 205 of the Standard Specifications.

Prepared by,

DocuSigned by:
Margaret M. Sweitzer
4AC688A0680C4F3...
11/8/2021

Margaret M. Sweitzer, P.E.
Senior Project Engineer, Geotechnical
Registered, North Carolina 024955

DocuSigned by:
Max Metry
B8F28C84BD234E4...
11/8/2021

Max Metry, EIT
Geotechnical Professional

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
Summary of Quantities

WBS Number: 44989.1.1 County: Johnston Project Engineer: M. Metry
TIP Number: I-5972 Field Office: Raleigh Project Geologist: P. Cary
Description: I-95 and US-70 Business, (E. Market Street), Exit 95 Interchange from Outlet Center Drive to West of Yelverton Grove Road

Pay Item No.	Pay Item/ Quantity Adjustment	Spec Book Section No. or Special Provision (SP) Reference	Report Section	Alignment	Begin Station	End Station	Quantity	Units / %
0036000000-E	Undercut Excavation	225 - Roadway Excavation	I. B	Contingency	N/A	N/A	500	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Contingency	N/A	N/A	500	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Varies	N/A	N/A	2,800	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. F	Contingency	N/A	N/A	150	CY
						Total Quantity of Undercut Excavation =	**3,950**	**CY**
0195000000-E	Select Granular Material	265 - Select Granular Material	III. C	Varies	N/A	N/A	11,300	CY
0195000000-E	Select Granular Material	265 - Select Granular Material	III. C	Contingency	N/A	N/A	3,000	CY
						Total Quantity of Select Granular Material =	**14,300**	**CY**
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Contingency	N/A	N/A	2,000	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Varies	N/A	N/A	11,300	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	Varies	N/A	N/A	33,900	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	Contingency	N/A	N/A	2,000	SY
						Total Quantity of Geotextile for Soil Stabilization =	**49,200**	**SY**
0222000000-E	Geotextile for Rock Embankments	SP - Rock Embankments	I. D	Varies	N/A	N/A	2,500	SY
						Total Quantity of Geotextile for Rock Embankments =	**2,500**	**SY**
1077000000-E	#57 Stone	SP - Rock Embankments	I. D	Varies	N/A	N/A	1,300	TON
						Total Quantity of #57 Stone =	**1,300**	**TON**
1099500000-E	Shallow Undercut	505 - Aggregate Subgrade	II. B	Varies	N/A	N/A	9,800	CY
1099500000-E	Shallow Undercut	505 - Aggregate Subgrade	II. B	Contingency	N/A	N/A	500	CY
						Total Quantity of Shallow Undercut =	**10,300**	**CY**
1099700000-E	Class IV Subgrade Stabilization	505 - Aggregate Subgrade	III. D	Varies	N/A	N/A	21,600	TON
1099700000-E	Class IV Subgrade Stabilization	505 - Aggregate Subgrade	III. D	Contingency	N/A	N/A	1,000	TON
						Total Quantity of Class IV Subgrade Stabilization =	**22,600**	**TON**
2044000000-E	6" Perforated Subdrain Pipe	815 - Subsurface Drainage	II. E	Varies	N/A	N/A	13,800	LF
2044000000-E	6" Perforated Subdrain Pipe	815 - Subsurface Drainage	II. E	Contingency	N/A	N/A	1,000	LF
						Total Quantity of 6" Perforated Subdrain Pipe =	**14,800**	**LF**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
Summary of Quantities

WBS Number: 44989.1.1 County: Johnston Project Engineer: M. Metry
TIP Number: I-5972 Field Office: Raleigh Project Geologist: P. Cary
Description: I-95 and US-70 Business, (E. Market Street), Exit 95 Interchange from Outlet Center Drive to West of Yelverton Grove Road

Pay Item No.	Pay Item/ Quantity Adjustment	Spec Book Section No. or Special Provision (SP) Reference	Report Section	Alignment	Begin Station	End Station	Quantity	Units / %
3635000000-E	Rip Rap, Class 2	SP - Rock Embankments	I. D	Varies	N/A	N/A	2,400	TON
						Total Quantity of Rip Rap, Class 2 =	**2,400**	**TON**
3642000000-E	Rip Rap, Class A	SP - Rock Embankments	I. D	Varies	N/A	N/A	700	TON
						Total Quantity of Rip Rap, Class A =	**700**	**TON**
N/A	Unclassified Excavation - Acceptable, but not to be used in top 3 ft of embankment or backfill	225 - Roadway Excavation	IV. C	Varies	N/A	N/A	5,100	CY
						Total Quantity of Unclassified Excavation - Acceptable, but not to be used in top 3 ft of embankment or backfill =	**5,100**	**CY**

These Items Only Impact Earthwork Totals								
N/A	Shrinkage Factor	235 - Embankments	III. B	N/A	N/A	N/A	25	%
N/A	Unclassified Excavation - Unsuitable Waste	225 - Roadway Excavation	IV. B	N/A	N/A	N/A	7,600	CY

COMPUTED BY: MM	DATE: 7/26/2021
CHECKED BY: MS	DATE: 7/26/2021

(5-15-18)

PROJECT NO.	SHEET NO.
I-5972	3G-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF SUBSURFACE DRAINAGE

LINE	Station	Station	Location LT/RT/CL	Drain Type* UD/BD/SD	LF
-L-	27+95	33+40	LT	SD	600
-L-	34+50	77+12	LT& RT	SD	8,650
-L-	77+12	82+41	RT	SD	550
-Y1-	21+70	30+25	RT	SD	900
-Y1-	45+25	56+50	RT	SD	1,150
-Y2-	10+10	17+00	LT	SD	750
-Y2-	22+00	33+60	LT	SD	1,200
CONTINGENCY					1,000
				TOTAL LF:	14,800

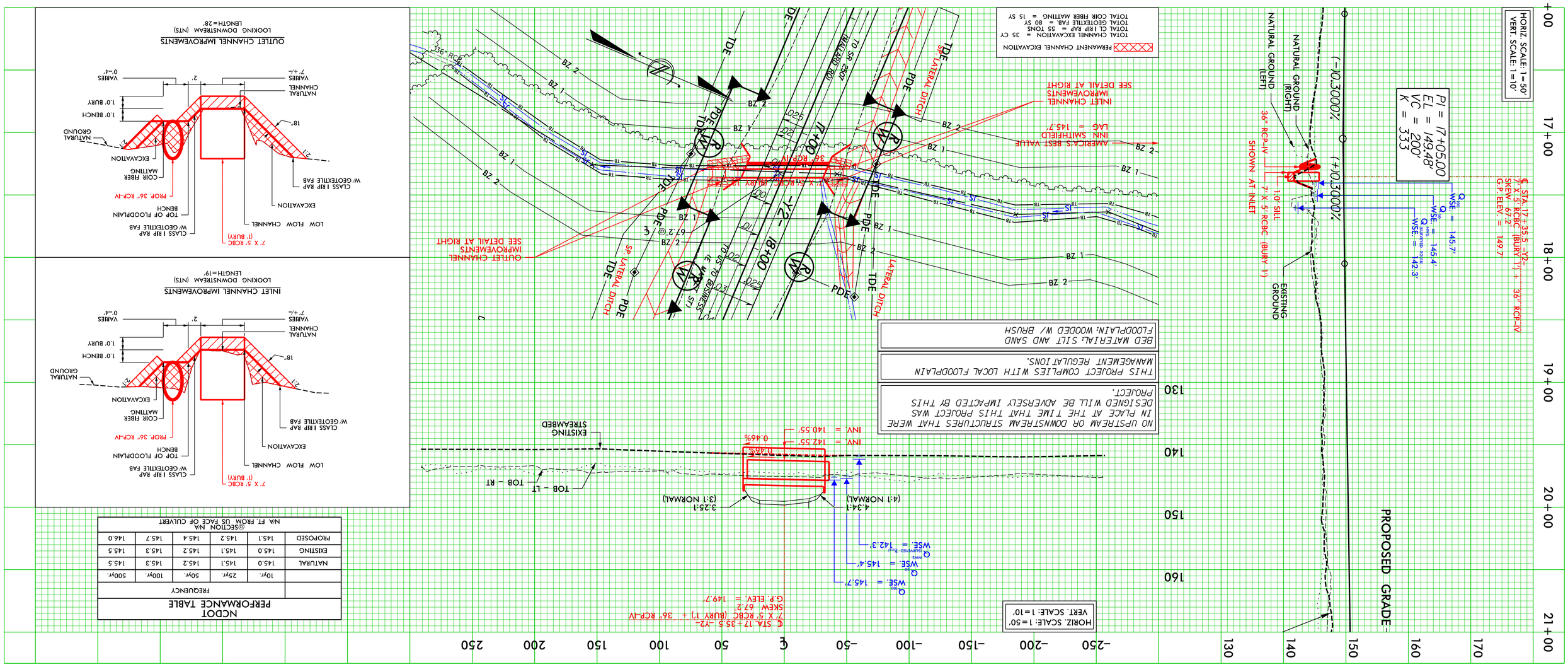
*UD = Underdrain
*BD = Blind Drain

*SD = Subsurface Drain

SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	Station	Station	Aggregate Type* ASU(1/2)/ AST	Aggregate Thickness INCHES [8" for ASU(2)]	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Soil Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization TONS
-L-	38+75	40+75	ASU1	12	150	290	450		
-L-	43+25	43+75	ASU1	12	40	80	120		
-L-	49+75	67+75	ASU1	12	2,620	5,920	9,330		
-L-	69+75	82+40	ASU1	12	1,140	2,560	4,020		
-Y1-	21+70	30+25	ASU1	12	620	1,320	2,070		
-Y1-	45+25	54+25	ASU1	12	760	2,270	3,480		
-RPA-	10+00	17+25	ASU1	12	1,160	2,370	3,740		
-RPB-	10+00	21+75	ASU1	12	1,600	3,390	5,340		
-RPC-	10+00	15+25	ASU1	12	700	1,390	2,190		
-RPD-	10+00	13+00	ASU1	12	320	630	990		
-RPD-	15+75	20+75	ASU1	12	690	1,380	2,170		
CONTINGENCY			ASU1	12	500	1,000	1,500		
			TOTAL CY/TONS/SY:		10,300	22,600**	35,400**	0	0

*ASU(1/2) = Aggregate Subgrade (Type 1 or 2)
*AST = Aggregate Stabilization
**Total tons of "Class IV Subgrade Stabilization" and total square yards of "Geotextile for Soil Stabilization" are only the estimated quantities for ASU(1/2)/AST and may only represent a portion of the subgrade stabilization and geotextile quantities shown in the Item Sheets of the Proposal.



ADDITIONAL INFORMATION AND COMPUTATIONS

HYDROLOGY ..... DRAINAGE AREA = 150 ACRES (0.23 SQ. MILES)

44% IMPERVIOUS (BASED SMITHFIELD AND JOHNSTON COUNTY ZONING MAPS.)

HEC-HMS v4.3 MODEL ..... USE

U_{10} = 183 cfs ..... 180 cfs

U_{25} = 201 cfs ..... 200 cfs

U_{50} = 235 cfs ..... 230 cfs

U_{100} = 258 cfs ..... 260 cfs

U_{500} = 310 cfs ..... 310 cfs

EXISTING CHANNEL DESCRIPTION .....

U/S OF PROPOSED CROSSING: 7' WIDE AND 3.6' DEEP CHANNEL, 13.1' WIDE FROM TOB TO TOB, WITH 0.8:1 BANK SLOPES.

D/S OF PROPOSED CROSSING: 7' WIDE AND 3.0' DEEP CHANNEL, 10.4' WIDE FROM TOB TO TOB, WITH 0.6:1 BANK SLOPES.

BED MATERIAL: SILT AND SAND

FLOODPLAIN: WOODED W/ MEDIUM UNDERBRUSH AT STREAM, SOME AGRICULTURAL FIELDS FURTHER AWAY.

OUTLET SHEAR STRESS CALCULATION (10-yr) .....

SHEAR STRESS = UNIT WEIGHT OF WATER x DEPTH x CHANNEL SLOPE

SHEAR STRESS = 62.4 lb/ft x 3.8 ft x 0.0038 ft/ft = 0.90 lb/ft

SITE DATA

Drainage Area 150 ACRES (0.23 SQ. MILES) Source USGS STREAM STATS / QUAD MAP - FOUR OAKS NE

River Basin NEUSE RIVER Character REGION 1: PIEDMONT (URBAN)

Stream Classification (Such as Trout, High Quality Water, etc.) C, NSW

Data on Existing Structure N/A

Total Waterway Opening N/A s.f. Waterway Opening Below 100yr. WS EL. N/A s.f.

Debris Potential: Low ☐ Moderate ☒ High ☐

Data on Structures Up and Down Stream UPSTREAM: N/A;

DOWNSTREAM: CONFLUENCE WITH POLECAT BRANCH

Gage Station No. N/A Period of Records N/A yrs.

Max. Discharge N/A c.f.s Date N/A Frequency N/A

Historical Flood Information:

Date - Elev. - ft. Est. Freq. - yr. Source N/A Period of Knowledge N/A yrs.

Date - Elev. - ft. Est. Freq. - yr. Source N/A Period of Knowledge N/A yrs.

Allowable HW Elev. 145.7 (100-YR BELOW AMERICA'S SMITHFIELD BEST VALUE INN LAG) ft. Normal Water Surface Elev. 142.3 ft.

Manning's n : Left O.B. 0.15 (TREES/BRUSH) Channel 0.035 (STRAIGHT/FULL) Right O.B. 0.05 (AG. FIELDS) Obtained From FIELD (9/2018)

Flood Study / Status PANEL 2602; NOT IN FLOOD STUDY (EFF. FIS REPORT-1/5/2007 PRELIM. FIS REPORT-3/31/2015) Floodway Established? N/A

Flood Study 100 yr. Discharge N/A c.f.s.; WS Elev.: Floodway N/A ft. Without Floodway N/A ft. @River Station N/A

DESIGN DATA

Hydrological Method HEC-HMS 4.3 (I5972_UTPolecatBranch_SR2507.hms)

Hydraulic Design Method HY8 7.5 (I5972_UTPolecatBranch_SR2507.hy8)

Design Tailwater : Q_{10} 3.8 ft.; Q_{25} 3.9 ft.; Q_{50} 4.0 ft.; Q_{100} 4.1 ft.; Q_{500} 4.2 ft.

INV. IN EL. = 140.7, INV. OUT EL. = 140.4

SIZE & TYPE: (1) - 7' X 5' RCBC (BURY 1') + (1) - 36" RCP-IV @ INLET OF CULVERT.

FREQUENCY	Q (cfs)	Inlet Control HW/D	Inlet Control H.W.	Inlet Control WSEL	Outlet Control H.W.	Outlet Control WSEL	Remarks
10 YR	180	0.66	2.3	143.7	3.7	145.1	
25 YR	200	0.71	2.5	143.9	3.9	145.3	
50 YR	230	0.77	2.7	144.1	4.0	145.4	
100 YR	260	0.83	2.9	144.3	4.3	145.7	
500 YR	310	0.91	3.2	144.6	4.6	146.0	

Is a Floodway Revision Required? NO Total Proposed Waterway Opening 35 s.f.

Outlet Velocity (V_{10}) 3.4 f.p.s. Natural Channel Velocity (V_{10}) 1.8 f.p.s.

Required Outlet Protection CLASS I RIP RAP W/GEOTEXTILE FABRIC

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station N/A - US FACE OF CULVERT

Design: Discharge 200 c.f.s. Frequency 25 yr. Elev. 145.2 ft.

Base Flood: Discharge 260 c.f.s. Frequency 100 yr. Elev. 145.7 ft.

Overtopping: Discharge 632 c.f.s. Frequency 500+ yr. Elev. 149.2 ft.

* OVERTOPPING ELEVATION IS 149.64' ON SAG AT -L- STA. 17+05

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, N. C.

I.D. No. I-5972 Project No. 44989.1.1 Proj. Station STA. 17+35.5 -Y2-

County JOHNSTON Stream UNNAMED TRIBUTARY TO POLECAT BRANCH Stru. No. N/A

On Highway SR 2507 (MALLARD RD) Between SR 2507 (MALLARD RD) and US 70 BUSINESS

Recommended Structure (1) - 7' X 5' RCBC (BURY 1') + (1) - 36" RCP-IV WITH CONCRETE HEADWALLS AND WING WALLS

Recommended Width of Roadway 36' SHOULDER PT TO SHOULDER PT Skew 67.2°

Recommended Location is ~~(Up, At, Down) Stream from Existing Crossing.~~ NEW LOCATION

Latitude 35.49944° Longitude -78.31959°

Statewide Tier ☒ Regional Tier ☐ Sub-Regional Tier ☐

Bench Mark is BM #8, ON -Y3- STA. 7+84.7, 31.6' RT, NAIL IN 29" PINE

N , E Elev. 216.42' ft. Datum: NAVD 88

Temporary Crossing NOT REQUIRED: NEW LOCATION

RK&K ENGINEERS, LLP
900 RIDGEFIELD DRIVE, STE. 350
RALEIGH, NC 27609, LICENSE NO- F-0112

Designed by: COREY CAVALIER, PE

Assisted by: CHRIS PIPER

Project Engineer : COREY CAVALIER, PE

Reviewed by:

Date

NORTH CAROLINA PROFESSIONAL SEAL 30018 ENGINEER COREY A. CAVALIER
DocuSigned by: Corey Cavalier
3/8/2019

Stream UT POLECAT BRANCH Struc. Inv. No. N/A I.D. No. I-5972 Project No. 44989.1.1 PDF File 50 0000 2019 I5972 UT POLECAT BRANCH SR2507.PDF

TRAFFIC CONTROL SECTION
ENGINEER'S ESTIMATE FORM
2018 STANDARD SPECIFICATIONS

TIP No.: I-5972 English

WBS No

NC Project No:

FA-Project No:

County:

Description:

Date of Estimate: 1/31/2022

Estimate Prepared By: K. BISBY

Estimate Reviewed By:

Estimate Type:

- ☐ Scoping
- ☐ Letting List Verification
- ☐ Preliminary
- ☐ Final

THIS SECTION FOR COST ESTIMATE USE

Scoping Cost

Traffic Control Devices:

Pavement Markings:

Pavement Markers:

Delineation:

ITEM NO.			ITEM DESCRIPTION	QUANTITY	UNIT
GRP CODE	DESC. NO.	SEC NO.			
PM	4685000000-E	1205	THERMOPLASTIC (4", 90 MILS)	13100	LF
PM	4688000000-E	1205	THERMOPLASTIC (6", 90 MILS)	49239	LF
PM	4695000000-E	1205	THERMOPLASTIC (8", 90 MILS)	278	LF
PM	4700000000-E	1205	THERMOPLASTIC (12", 90 MILS)	2753	LF
PM	4720000000-E	1205	THERMOPLASTIC PAVEMENT MARKING CHARACTER (90 MILS	16	EA
PM	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOLS (90 MILS)	95	EA
PM	4775000000-E	1205	COLD APPLIED PLASTIC (6") (III)	1024	LF
PM	4891000000-E	1205	GENERIC PAVEMENT MARKING ITEM (1205)	298	LF
PM	4900000000-N	1251	PERMANENT RAISED PAVEMENT MARKERS	7	EA
PM	4905000000-N	1253	SNOWPLOWABLE RAISED PAVEMENT MARKERS	572	EA

8601 Six Forks Rd., Forum 1 Suite 700 | Raleigh, NC 27615 | P 919.878.9560 | T 888.521.4455 | www.rkk.com

November 12, 2021

Memorandum to: Russell Broadwell, PE
Project Engineer – Division 4
509 Ward Blvd.
PO Box 3165
Wilson, NC 27895

From: Gregory K Goins, PE
Manager, Geotechnical

WBS Number: 44989.1.1
TIP Number: I-5972
County: Johnston
Description: I-95 and US-70 Business, (E. Market Street), Exit 95 Interchange from Outlet Center Drive to West of Yelverton Grove Road

Subject: **Temporary Shoring Recommendations – Revision 1**

For the referenced project, the following locations have temporary shoring proposed:

Table 1: Temporary Shoring Locations

Shoring Location No.	Begin Station & Offset	End Station & Offset	Estimated Average Height (ft)	Estimated Maximum Height (ft)	Shoring Location, Type, Traffic Control Plan
1	-Y1- STA 35+57± 1.5 ft RT	-Y1- STA 36+25± 1.5 ft RT	11.3	20.0	Roadway Embankment Construction (Cut, TC Phase I, Step 2 and 3, TMP-6)
2	-Y1 STA 37+53± 1.5 ft RT	-Y1- STA 38+23± 1.5 ft RT	10.8	20.0	Roadway Embankment Construction (Cut, TC Phase I, Step 2 and 3, TMP-6)
3	-Y1 - STA 35+25± 3.0 ft RT	-Y1- STA 35+90± 2.0 ft RT	15.0	21.0	Roadway Embankment Construction (Fill, TC Phase I, Step 2 and 3, TMP-6)

Shoring Location No.	Begin Station & Offset	End Station & Offset	Estimated Average Height (ft)	Estimated Maximum Height (ft)	Shoring Location, Type, Traffic Control Plan
4	-Y1- STA 37+92± 3.5 ft RT	-Y1- STA 38+23± 3.5 ft RT	12.0	21.0	Roadway Embankment Construction (Fill, TC Phase I, Step 2 and 3, TMP-6)
5	-L- STA 56+02± 13.7 ft LT	-L- STA 56+77± 14.6 ft LT	6.1	6.1	Roadway Construction (Cut, TC Phase I, Step 2 and 3, TMP-6)
6	-L- STA 56+02± 9.3 ft RT	-L- STA 56+77± 8.3 ft RT	6.1	6.1	Roadway Construction (Cut, TC Phase I, Step 2 and 3, TMP-6)

The following notes on plans are recommended for the proposed shoring locations:

Shoring Location No. 1:

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -Y1- STA 35+57±, 1.5 FT RT TO STATION -Y1- STA 36+25±, 1.5 FT RT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEITGHT (γ): 120 PCF
FRICTION ANGLE (ϕ): 30 DEGREES
COHESION (c): 0 PSF
GROUNDWATER ELEVATION: VARIES, ASSUMED ELEVATION ±146.7 FT

AT THE CONTRACTOR'S OPTION AND AS APPLICABLE, USE STANDARD TEMPORARY SHORING FOR THE TEMPORARY SHORING FROM -Y1- STA 35+57±,

1.5 FT RT TO STATION -Y1- STA 36+25±, 1.5 FT RT. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION -Y1- STA 35+57±, 1.5 FT RT TO STATION -Y1- STA 36+25±, 1.5 FT RT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. THE SUBSURFACE INFORMATION THAT IS AVAILABLE CAN BE FOUND IN THE ROADWAY SUBSURFACE INVENTORY REPORT.

DRIVEN PILING FOR TEMPORARY SHORING FROM -Y1- STA 35+57±, 1.5 FT RT TO STATION -Y1- STA 36+25±, 1.5 FT RT, MAY NOT PENETRATE BELOW ELEVATION 116.5 FT DUE TO VERY DENSE OR HARD SOIL, BOULDERS OR WEATHERED ROCK.

DO NOT USE A TEMPORARY WALL FOR TEMPORARY SHORING FROM STATION -Y1- STA 35+57±, 1.5 FT RT TO STATION -Y1- STA 36+25±, 1.5 FT RT.

Shoring Location No. 2:

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -Y1- STA 37+53±, 1.5 FT RT TO STATION -Y1- STA 38+23±, 1.5 FT RT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEITGHT (γ): 120 PCF
FRICTION ANGLE (ϕ): 30 DEGREES
COHESION (c): 0 PSF
GROUNDWATER ELEVATION: VARIES, ASSUMED ELEVATION ±145.0 FT

AT THE CONTRACTOR'S OPTION AND AS APPLICABLE, USE STANDARD TEMPORARY SHORING FOR THE TEMPORARY SHORING FROM STATION -Y1- STA 37+53±, 1.5 FT RT TO STATION -Y1- STA 38+23±, 1.5 FT RT. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION -Y1- STA 37+53±, 1.5 FT RT TO STATION -Y1- STA 38+23±, 1.5 FT RT. THE INFORMATION PROVIDED FOR TEMPORARY

SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. THE SUBSURFACE INFORMATION THAT IS AVAILABLE CAN BE FOUND IN THE ROADWAY SUBSURFACE INVENTORY REPORT.

DRIVEN PILING FOR TEMPORARY SHORING FROM -Y1- STA 37+53±, 1.5 FT RT TO STATION -Y1- STA 38+23±, 1.5 FT RT, MAY NOT PENETRATE BELOW ELEVATION 114.8 FT DUE TO VERY DENSE OR HARD SOIL, BOULDERS OR WEATHERED OR HARD ROCK.

DO NOT USE A TEMPORARY WALL FOR TEMPORARY SHORING FROM STATION -Y1- STA 37+53±, 1.5 FT RT TO STATION -Y1- STA 38+23±, 1.5 FT RT.

Shoring Location No. 3:

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -Y1- STA 35+25±, 3 FT RT TO STATION -Y1- STA 35+90±, 2 FT RT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEITGHT (γ): 120 PCF
FRICTION ANGLE (ϕ): 30 DEGREES
COHESION (c): 0 PSF
GROUNDWATER ELEVATION: VARIES, ASSUMED ELEVATION ±146.7 FT

AT THE CONTRACTOR'S OPTION, USE A STANDARD TEMPORARY WALL FOR THE TEMPORARY SHORING FROM STATION -Y1- STA 35+25±, 3 FT RT TO STATION -Y1- STA 35+90±, 2 FT RT. SEE STANDARD DRAWING NO. 1801.02 FOR STANDARD TEMPORARY WALLS.

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION -Y1- STA 35+25±, 3 FT RT TO STATION -Y1- STA 35+90±, 2 FT RT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. THE SUBSURFACE INFORMATION THAT IS AVAILABLE CAN BE FOUND IN THE ROADWAY SUBSURFACE INVENTORY REPORT.

DO NOT USE CANTILEVER, BRACED OR ANCHORED SHORING FOR TEMPORARY SHORING FROM STATION -Y1- STA 35+25±, 3 FT RT TO STATION -Y1- STA 35+90±, 2 FT RT.

Shoring Location No. 4:

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -Y1- STA 37+92±, 3.5 FT RT TO STATION -Y1- STA 38+23±, 3.5 FT RT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEITGHT (γ): 120 PCF
FRICTION ANGLE (ϕ): 30 DEGREES
COHESION (c): 0 PSF
GROUNDWATER ELEVATION: VARIES, ASSUMED ELEVATION ±145.0 FT.

AT THE CONTRACTOR'S OPTION, USE A STANDARD TEMPORARY WALL FOR THE TEMPORARY SHORING FROM STATION -Y1- STA 37+92±, 3.5 FT RT TO STATION -Y1- STA 38+23±, 3.5 FT RT. SEE STANDARD DRAWING NO. 1801.02 FOR STANDARD TEMPORARY WALLS.

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION -Y1- STA 37+92±, 3.5 FT RT TO STATION -Y1- STA 38+23±, 3.5 FT RT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. THE SUBSURFACE INFORMATION THAT IS AVAILABLE CAN BE FOUND IN THE ROADWAY SUBSURFACE INVENTORY REPORT.

DO NOT USE CANTILEVER, BRACED OR ANCHORED SHORING FOR TEMPORARY SHORING FROM STATION -Y1- STA 37+92±, 3.5 FT RT TO STATION -Y1- STA 38+23±, 3.5 FT RT.

Shoring Location No. 5:

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -L- STA 56+02±, 13.7 FT LT TO STATION -L- STA 56+77±, 14.6 FT LT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEITGHT (γ): 120 PCF
FRICTION ANGLE (ϕ): 30 DEGREES
COHESION (c): 0 PSF
GROUNDWATER ELEVATION: VARIES, ASSUMED ELEVATION RANGE BETWEEN ±145.0 - ±146.7 FT.

AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING FOR THE TEMPORARY SHORING FROM STATION -L- STA 56+02±, 13.7 FT LT TO STATION -L- STA 56+77±, 14.6 FT LT. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION - L- STA 56+02±, 13.7 FT LT TO STATION -L- STA 56+77±, 14.6 FT LT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. THE SUBSURFACE INFORMATION THAT IS AVAILABLE CAN BE FOUND IN THE ROADWAY SUBSURFACE INVENTORY REPORT.

DO NOT USE A TEMPORARY WALL FOR TEMPORARY SHORING FROM STATION - L- STA 56+02±, 13.7 FT LT TO STATION -L- STA 56+77±, 14.6 FT LT.

IT MAY BE PREFFERED TO USE A TEMPORARY SOIL NAIL WALL FOR TEMPORARY SHORING FROM STATION - L- STA 56+02±, 13.7 FT LT TO STATION -L- STA 56+77±, 14.6 FT LT. FOR TEMPORARY SOIL NAIL WALLS, SEE TEMPORARY SOIL NAIL WALLS PROVISION.

Shoring Location No. 6:

FOR TEMPORARY SHORING AND POSITIVE PROTECTION FOR TEMPORARY SHORING, SEE PLANS AND TEMPORARY SHORING PROVISION.

BEFORE BEGINNING TEMPORARY SHORING DESIGN OR CONSTRUCTION, SURVEY EXISTING GROUND ELEVATIONS IN THE VICINITY OF SHORING LOCATIONS TO DETERMINE ACTUAL SHORING HEIGHTS.

DESIGN TEMPORARY SHORING FROM STATION -L- STA 56+02±, 9.3 FT RT TO STATION -L- STA 56+77±, 8.3 FT RT, FOR THE FOLLOWING ASSUMED SOIL PARAMETERS AND GROUNDWATER ELEVATION:

UNIT WEITGHT (γ): 120 PCF
FRICTION ANGLE (ϕ): 30 DEGREES
COHESION (c): 0 PSF
GROUNDWATER ELEVATION: VARIES, ASSUMED ELEVATION RANGE BETWEEN ±145.0 - ±146.7 FT.

AT THE CONTRACTOR'S OPTION, USE STANDARD TEMPORARY SHORING FOR THE TEMPORARY SHORING FROM STATION -L- STA 56+02±, 9.3 FT RT TO STATION -L- STA 56+77±, 8.3 FT RT. SEE STANDARD DRAWING NO. 1801.01 FOR STANDARD TEMPORARY SHORING.

LIMITED SUBSURFACE INFORMATION IS AVAILABLE IN THE VICINITY OF TEMPORARY SHORING FROM STATION -L- STA 56+02±, 9.3 FT RT TO STATION -L- STA 56+77±, 8.3 FT RT. THE INFORMATION PROVIDED FOR TEMPORARY SHORING DESIGN WAS ASSUMED AND MAY NOT BE APPLICABLE TO THE ACTUAL SITE CONDITIONS ENCOUNTERED DURING CONSTRUCTION. THE SUBSURFACE INFORMATION THAT IS AVAILABLE CAN BE FOUND IN THE ROADWAY SUBSURFACE INVENTORY REPORT.

DO NOT USE A TEMPORARY WALL FOR TEMPORARY SHORING FROM STATION -L- STA 56+02±, 9.3 FT RT TO STATION -L- STA 56+77±, 8.3 FT RT.

IT MAY BE PREFFERED TO USE A TEMPORARY SOIL NAIL WALL FOR TEMPORARY SHORING FROM STATION -L- STA 56+02±, 9.3 FT RT TO STATION -L- STA 56+77±, 8.3 FT RT. FOR TEMPORARY SOIL NAIL WALLS, SEE TEMPORARY SOIL NAIL WALLS PROVISION.

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ATTACHMENTS:
-Standard Shoring Provision
-Temporary Shoring Provision
-Temporary Soil Nail Provision

STANDARD AND SPECIAL PROVISION

STANDARD SHORING: **(1-16-18)**

Description

Standard shoring includes standard temporary shoring and standard temporary mechanically stabilized earth (MSE) walls. At the Contractor's option, use standard shoring as noted in the plans or as directed. When using standard shoring, a temporary shoring design submittal is not required. Construct standard shoring based on actual elevations and shoring dimensions in accordance with the contract and Geotechnical Standard Detail No. 1801.01 or 1801.02.

Define "standard temporary shoring" as cantilever shoring that meets the standard temporary shoring detail (Geotechnical Standard Detail No. 1801.01). Define "standard temporary wall" as a temporary MSE wall with geotextile or geogrid reinforcement that meets the standard temporary wall detail (Geotechnical Standard Detail No. 1801.02). Define "standard temporary geotextile wall" as a standard temporary wall with geotextile reinforcement and "standard temporary geogrid wall" as a standard temporary wall with geogrid reinforcement.

Provide positive protection for standard shoring at locations shown in the plans and as directed. See *Temporary Shoring* provision for positive protection types and definitions.

Materials

Refer to the *Standard Specifications*.

Item	Section
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Neat Cement Grout, Type 1	1003
Portland Cement Concrete, Class A	1000
Select Materials	1016
Steel Beam Guardrail Materials	862-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Welded Wire Reinforcement	1070-3

Provide Type 6 material certifications for shoring materials. Use Class IV select material for temporary guardrail. Use Class A concrete that meets Article 450-2 of the *Standard Specifications* or grout for drilled-in piles.

Based on actual shoring height, positive protection, groundwater elevation, slope or surcharge case and traffic impact at each standard temporary shoring location, use sheet piles with the minimum required section modulus or H-piles with the sizes shown in Geotechnical Standard Detail No. 1801.01. Use untreated timber with a thickness of at least 3" and a bending stress of at least 1,000 psi for timber lagging.

(A) Shoring Backfill

Use Class II, Type 1, Class III, Class V or Class VI select material or material that meets AASHTO M 145 for soil classification A-2-4 with a maximum PI of 6 for shoring backfill except do not use the following:

(1) A-2-4 soil for backfill around culverts,

(2) A-2-4 soil in the reinforced zone of standard temporary walls with a back slope and

(3) Class VI select material in the reinforced zone of standard temporary geotextile walls.

(B) Standard Temporary Walls

Use welded wire reinforcement for welded wire facing, struts and wires with the dimensions and minimum wire sizes shown in Geotechnical Standard Detail No. 1801.02. Provide Type 2 geotextile for separation and retention geotextiles. Do not use more than 4 different reinforcement strengths for each standard temporary wall.

(1) Geotextile Reinforcement

Provide Type 5 geotextile for geotextile reinforcement with a mass per unit area of at least 8 oz/sy in accordance with ASTM D5261. Based on actual wall height, groundwater elevation, slope or surcharge case and shoring backfill to be used in the reinforced zone at each standard temporary geotextile wall location, provide geotextiles with ultimate tensile strengths as shown in Geotechnical Standard Detail No. 1801.02.

(2) Geogrid Reinforcement

Use geogrids with a roll width of at least 4 ft and an "approved" or "approved for provisional use" status code. The list of approved geogrids is available from: connect.ncdot.gov/resources/Materials/Pages/Materials-Manual-by-Material.aspx

Based on actual wall height, groundwater elevation, slope or surcharge case and shoring backfill to be used in the reinforced zone at each standard temporary geogrid wall location, provide geogrids for geogrid reinforcement with short-term design strengths as shown in Geotechnical Standard Detail No. 1801.02. Geogrids are typically approved for ultimate tensile strengths in the machine direction (MD) and cross-machine direction (CD) or short-term design strengths for a 3-year design life in the MD based on material type. Define material type from the website above for shoring backfill as follows:

Material Type	Shoring Backfill
Borrow	A-2-4 Soil
Fine Aggregate	Class II, Type 1 or Class III Select Material
Coarse Aggregate	Class V or VI Select Material

If the website does not list a short-term design strength for an approved geogrid, use a short-term design strength equal to the ultimate tensile strength divided by 3.5 for the geogrid reinforcement.

Preconstruction Requirements

(A) Concrete Barrier

Define "clear distance" behind concrete barrier as the horizontal distance between the barrier and edge of pavement. The minimum required clear distance for concrete barrier is shown in the plans. At the Contractor's option or if the minimum required clear

distance is not available, set concrete barrier next to and up against traffic side of standard shoring except for barrier above standard temporary walls. Concrete barrier with the minimum required clear distance is required above standard temporary walls.

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and standard shoring. At the Contractor's option or if clear distance for standard temporary shoring is less than 4 ft, attach guardrail to traffic side of shoring as shown in the plans. Place ABC in clear distance and around guardrail posts instead of pavement. Do not use temporary guardrail above standard temporary walls.

(C) Standard Shoring Selection Forms

Before beginning standard shoring construction, survey existing ground elevations in the vicinity of standard shoring locations to determine actual shoring or wall heights (H). Submit a standard shoring selection form for each location at least 7 days before starting standard shoring construction. Standard shoring selection forms are available from: connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx

Construction Methods

Construct standard shoring in accordance with the *Temporary Shoring* provision.

(A) Standard Temporary Shoring Installation

Based on actual shoring height, positive protection, groundwater elevation, slope or surcharge case and traffic impact at each standard temporary shoring location, install piles with the minimum required embedment and extension for each shoring section in accordance with Geotechnical Standard Detail No. 1801.01. For concrete barrier above and next to standard temporary shoring and temporary guardrail above and attached to standard temporary shoring, use "surcharge case with traffic impact" in accordance with Geotechnical Standard Detail No. 1801.01. Otherwise, use "slope or surcharge case with no traffic impact" in accordance with Geotechnical Standard Detail No. 1801.01. If refusal is reached before driven piles attain the minimum required embedment, use drilled-in H-piles with timber lagging for standard temporary shoring.

(B) Standard Temporary Walls Installation

Based on actual wall height, groundwater elevation, slope or surcharge case, geotextile or geogrid reinforcement and shoring backfill in the reinforced zone at each standard temporary wall location, construct walls with the minimum required reinforcement length and number of reinforcement layers for each wall section in accordance with Geotechnical Standard Detail No. 1801.02. For standard temporary walls with pile foundations in the reinforced zone, drive piles through reinforcement after constructing temporary walls.

For standard temporary walls with interior angles less than 90°, wrap geosynthetics at acute corners as directed by the Engineer. Place geosynthetics as shown in Geotechnical Standard Detail No. 1801.02. Place separation geotextiles between shoring backfill and backfill, natural ground or culverts along the sides of the reinforced zone perpendicular to the wall face. For Class V or VI select material in the reinforced zone, place separation geotextiles between shoring backfill and backfill or natural ground on top of and at the

back of the reinforced zone.

Measurement and Payment

Standard shoring will be measured and paid in accordance with the *Temporary Shoring* provision.

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TEMPORARY SHORING:

(2-20-07) (Rev. 10-19-21) SP11 R02

Description

Temporary shoring includes cantilever, braced and anchored shoring and temporary mechanically stabilized earth (MSE) walls. Temporary shoring does not include trench boxes. At the Contractor's option, use any type of temporary shoring unless noted otherwise in the plans or as directed. Design and construct temporary shoring based on actual elevations and shoring dimensions in accordance with the contract and accepted submittals. Construct temporary shoring at locations shown in the plans and as directed. Temporary shoring is required to maintain traffic when a 2:1 (H:V) slope from the top of an embankment or bottom of an excavation will intersect the existing ground line less than 5 feet from the edge of pavement of an open travelway. This provision does not apply to pipe, inlet or utility installation unless noted otherwise in the plans.

Positive protection includes concrete barrier and temporary guardrail. Provide positive protection for temporary shoring at locations shown in the plans and as directed. Positive protection is required if temporary shoring is located in the clear zone in accordance with the *AASHTO Roadside Design Guide.*

(A) Cantilever and Braced Shoring

Cantilever shoring consists of steel sheet piles or H-piles with timber lagging. Braced shoring consists of sheet piles or H-piles with timber lagging and bracing such as beams, plates, walers, struts, rakers, etc. Define "piles" as sheet piles or H-piles.

(B) Anchored Shoring

Anchored shoring consists of sheet piles with walers or H-piles with timber lagging anchored with ground or helical anchors. Driven anchors may be accepted at the discretion of the Engineer. A ground anchor consists of a grouted steel bar or multi-strand tendon with an anchorage. A helical anchor consists of a lead section with a central steel shaft and at least one helix steel plate followed by extensions with only central shafts (no helixes) and an anchorage. Anchorages consist of steel bearing plates with washers and hex nuts for bars or steel wedge plates and wedges for strands. Use a prequalified Anchored Wall Contractor to install ground anchors. Define "anchors" as ground, helical or driven anchors.

(C) Temporary MSE Walls

Temporary MSE walls include temporary geosynthetic and wire walls. Define "temporary wall" as a temporary MSE wall and "Temporary Wall Vendor" as the vendor supplying the temporary MSE wall. Define "reinforcement" as geotextile, geogrid, geostrip, welded wire grid or metallic strip reinforcement.

Temporary geosynthetic walls consist of geotextiles or geogrids wrapped behind welded wire facing or geostrips connected to welded wire facing. Define "temporary geotextile

wall" as a temporary geosynthetic wall with geotextile reinforcement, "temporary geogrid wall" as a temporary geosynthetic wall with geogrid reinforcement and "temporary geostrip wall" as a temporary geosynthetic wall with geostrip reinforcement.

Temporary wire walls consist of welded wire grid or metallic strip reinforcement connected to welded wire facing. Define "Wire Wall Vendor" as the vendor supplying the temporary wire wall.

(D) Embedment

Define "embedment" for cantilever, braced and anchored shoring as the pile depth below the grade in front of shoring. Define "embedment" for temporary walls as the wall embedment below the grade at the wall face.

(E) Positive Protection

Define "unanchored or anchored portable concrete barrier" as portable concrete barrier (PCB) that meets 2018 Roadway Standard Drawing No. 1170.01. Define "concrete barrier" as unanchored or anchored PCB or an approved equal. Define "temporary guardrail" as temporary steel beam guardrail that meets 2018 Roadway Standard Drawing No. 862.02.

Materials

Refer to the *2018 Standard Specifications*.

Item	**Section**
Concrete Barrier Materials	1170-2
Flowable Fill, Excavatable	1000-6
Geosynthetics	1056
Grout, Type 1	1003
Portland Cement	1024-1
Portland Cement Concrete	1000
Select Materials	1016
Steel Beam Guardrail Materials	862-2
Steel Plates	1072-2
Steel Sheet Piles and H-Piles	1084
Untreated Timber	1082-2
Water	1024-4
Welded Wire Reinforcement	1070-3

Provide Type 6 material certifications for shoring materials in accordance with Article 106-3 of the *2018 Standard Specifications*. Use Class IV select material for temporary guardrail and Class A concrete that meets Article 450-2 of the *2018 Standard Specifications* or Type 1 grout for drilled-in piles. Provide untreated timber with a thickness of at least 3 inches and a bending stress of at least 1,000 pounds per square inch for timber lagging. Provide steel bracing that meets ASTM

A36.

(A) Shoring Backfill

Use Class II, Type 1, Class III, Class V or Class VI select material or material that meets AASHTO M 145 for soil classification A-2-4 with a maximum PI of 6 for shoring backfill except do not use A-2-4 soil for backfill around culverts.

(B) Anchors

Store anchor materials on blocking a minimum of 12 inches above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store anchor materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

(1) Ground Anchors

Use high-strength deformed steel bars that meet AASHTO M 275 or seven-wire strands that meet ASTM A886 or Article 1070-5 of the *2018 Standard Specifications*. Splice bars in accordance with Article 1070-9 of the *2018 Standard Specifications*. Do not splice strands. Use bondbreakers, spacers and centralizers that meet Article 6.3.5 of the *AASHTO LRFD Bridge Construction Specifications*.

Use neat cement grout that only contains cement and water with a water cement ratio of 0.4 to 0.5 which is approximately 5.5 gallons of water per 94 pounds of Portland cement. Provide grout with a compressive strength at 3 and 28 days of at least 1,500 and 4,000 psi, respectively.

(2) Helical Anchors

Use helical anchors with an ICC Evaluation Service, Inc. (ICC-ES) report. Provide couplers, thread bar adapters and bolts recommended by the Anchor Manufacturer to connect helical anchors together and to piles.

(3) Anchorages

Provide steel plates for bearing plates and steel washers, hex nuts, wedge plates and wedges recommended by the Anchor Manufacturer.

(C) Temporary Walls

(1) Welded Wire Facing

Use welded wire reinforcement for welded wire facing, struts and wires. For temporary wire walls, provide welded wire facing supplied by the Wire Wall

Vendor or a manufacturer approved or licensed by the vendor. For temporary wire walls with separate reinforcement and facing components, provide connectors (e.g., bars, clamps, plates, etc.) and fasteners (e.g., bolts, nuts, washers, etc.) required by the Wire Wall Vendor.

(2) Geotextiles

Provide Type 2 geotextile for separation and retention geotextiles. Provide Type 5 geotextile for geotextile reinforcement with ultimate tensile strengths in accordance with the accepted submittals.

(3) Geogrid and Geostrip Reinforcement

Use geogrids with a roll width of at least 4 feet. Use geogrids for geogrid reinforcement and geostrips for geostrip reinforcement with an "approved" status code in accordance with the NCDOT Geosynthetic Reinforcement Evaluation Program. The list of approved geogrids and geostrips is available from: connect.ncdot.gov/resources/Geological/Pages/Products.aspx

Provide geogrids and geostrips with design strengths in accordance with the accepted submittals. Geogrids and geostrips are approved for short-term design strengths (3-year design life) in the machine direction (MD) and cross-machine direction (CD) based on material type. Define material type from the website above for shoring backfill as follows:

Material Type	Shoring Backfill
Borrow	A-2-4 Soil
Fine Aggregate	Class II, Type 1 or Class III Select Material
Coarse Aggregate	Class V or VI Select Material

(4) Welded Wire Grid and Metallic Strip Reinforcement

Provide welded wire grid and metallic strip reinforcement supplied by the Wire Wall Vendor or a manufacturer approved or licensed by the vendor. Use welded wire grid reinforcement ("mesh", "mats" and "ladders") that meet Article 1070-3 of the *2018 Standard Specifications* and metallic strip reinforcement ("straps") that meet ASTM A572 or A1011.

Preconstruction Requirements

(A) Concrete Barrier

Define "clear distance" behind concrete barrier as the horizontal distance between the barrier and edge of pavement. The minimum required clear distance for concrete barrier is shown in the plans. At the Contractor's option or if the minimum required clear distance is not available, set concrete barrier next to and up against traffic side of temporary shoring

except for barrier above temporary walls. Concrete barrier with the minimum required clear distance is required above temporary walls.

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and temporary shoring. At the Contractor's option or if clear distance for cantilever, braced and anchored shoring is less than 4 feet, attach guardrail to traffic side of shoring as shown in the plans. Place ABC in clear distance and around guardrail posts instead of pavement. Do not use temporary guardrail above temporary walls.

(C) Temporary Shoring Designs

Before beginning temporary shoring design, survey existing ground elevations in the vicinity of shoring locations to determine actual design heights (H). Submit PDF files of working drawings and design calculations for temporary shoring designs in accordance with Article 105-2 of the *2018 Standard Specifications*. Submit working drawings showing plan views, shoring profiles, typical sections and details of temporary shoring design and construction sequence. Do not begin shoring construction until a design submittal is accepted.

Have cantilever and braced shoring designed, detailed and sealed by an engineer licensed in the state of North Carolina. Use a prequalified Anchored Wall Design Consultant to design anchored shoring. Provide anchored shoring designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for an Anchored Wall Design Consultant. Include details in anchored shoring working drawings of anchor locations and lock-off loads, unit grout/ground bond strengths for ground anchors or minimum installation torque and torsional strength rating for helical anchors and if necessary, obstructions extending through shoring or interfering with anchors. Include details in the anchored shoring construction sequence of pile and anchor installation, excavation and anchor testing.

Provide temporary wall designs sealed by a Design Engineer licensed in the state of North Carolina and employed or contracted by the Temporary Wall Vendor. Include details in temporary wall working drawings of geotextile and reinforcement types, locations and directions and obstructions extending through walls or interfering with reinforcement.

(1) Soil Parameters

Design temporary shoring for the assumed soil parameters and groundwater or flood elevations shown in the plans. Assume the following soil parameters for shoring backfill:

(a) Unit weight (γ) = 120 pcf,

(b)

Friction Angle (ϕ)	**Shoring Backfill**

30°	A-2-4 Soil
34°	Class II, Type 1 or Class III Select Material
38°	Class V or VI Select Material

(c) Cohesion (c) = 0 psf.

(2) Traffic Surcharge

Design temporary shoring for a traffic surcharge of 250 pounds per square foot if traffic will be above and within H of shoring. This traffic surcharge does not apply to construction traffic. Design temporary shoring for any construction surcharge if construction traffic will be above and within H of shoring. Design temporary shoring for a traffic (live load) surcharge in accordance with Article 11.5.6 of the *AASHTO LRFD Bridge Design Specifications*.

(3) Cantilever, Braced and Anchored Shoring Designs

Use shoring backfill for fill sections and voids between cantilever, braced and anchored shoring and the critical failure surface. Use concrete or Type 1 grout for embedded portions of drilled-in H-piles. Do not use drilled-in sheet piles.

Define "top of shoring" for cantilever, braced and anchored shoring as where the grade intersects the back of sheet piles or H-piles and timber lagging. Design cantilever, braced and anchored shoring for a traffic impact load of 2,000 pounds per foot applied 18 inches above top of shoring if concrete barrier is above and next to shoring or temporary guardrail is above and attached to shoring. Extend cantilever, braced and anchored shoring at least 32 inches above top of shoring if shoring is designed for traffic impact. Otherwise, extend shoring at least 6 inches above top of shoring.

Design cantilever, braced and anchored shoring for a maximum deflection of 3 inches if the horizontal distance to the closest edge of pavement or structure is less than H. Otherwise, design shoring for a maximum deflection of 6 inches. Design cantilever and braced shoring in accordance with the plans and *AASHTO Guide Design Specifications for Bridge Temporary Works*.

Design anchored shoring in accordance with the plans and Article 11.9 of the *AASHTO LRFD Bridge Design Specifications*. Use a resistance factor of 0.80 for tensile resistance of anchors with bars, strands or shafts. Extend the unbonded length for ground anchors and the shallowest helix for helical anchors at least 5 feet behind the critical failure surface. Do not extend anchors beyond right-of-way or easement limits. If existing or future obstructions such as foundations, guardrail posts, pavements, pipes, inlets or utilities will interfere with anchors, maintain a clearance of at least 6 inches between obstructions and anchors.

(4) Temporary Wall Designs

Use shoring backfill in the reinforced zone of temporary walls. Separation geotextiles are required between shoring backfill and backfill, natural ground or culverts along the sides of the reinforced zone perpendicular to the wall face. For Class V or VI select material in the reinforced zone, separation geotextiles are also required between shoring backfill and backfill or natural ground on top of and at the back of the reinforced zone.

Design temporary walls in accordance with the plans and Article 11.10 of the *AASHTO LRFD Bridge Design Specifications*. Embed temporary walls at least 18 inches except for walls on structures or rock as determined by the Engineer. Use a uniform reinforcement length throughout the wall height of at least 0.7H or 6 feet, whichever is longer. Extend the reinforced zone at least 6 inches beyond end of reinforcement. Do not locate the reinforced zone outside right-of-way or easement limits.

Use the simplified method for determining maximum reinforcement loads in accordance with the AASHTO LRFD specifications. For geotextile reinforcement, use geotextile properties approved by the Department or default values in accordance with the AASHTO LRFD specifications. For geogrid and geostrip reinforcement, use approved geosynthetic reinforcement properties available from the website shown elsewhere in this provision. Use geosynthetic properties for the direction reinforcement will be installed, a 3-year design life and shoring backfill to be used in the reinforced zone.

Do not use more than 4 different reinforcement strengths for each temporary geosynthetic wall. Design temporary geotextile walls for a reinforcement coverage ratio (R_c) of 1.0. For temporary geogrid walls with an R_c of less than 1.0, use a maximum horizontal clearance between geogrids of 3 feet and stagger reinforcement so geogrids are centered over gaps in the reinforcement layer below.

For temporary geosynthetic walls, use “L” shaped welded wire facing with 18 to 24 inch long legs. Locate geosynthetic reinforcement so reinforcement layers are at the same level as the horizontal legs of welded wire facing. Use vertical reinforcement spacing equal to facing height. Wrap geotextile or geogrid reinforcement behind welded wire facing and extend reinforcement at least 3 feet back behind facing into shoring backfill. Attach geostrip reinforcement to welded wire facing with a connection approved by the Department.

For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing with a connection approved by the Department. For temporary geogrid, geostrip and wire walls, retain shoring backfill at welded wire facing with retention geotextiles and extend geotextiles at least 3 feet back behind facing into backfill.

(D) Preconstruction Meeting

The Engineer may require a shoring preconstruction meeting to discuss the construction, inspection and testing of the temporary shoring. If required and if this meeting occurs before all shoring submittals have been accepted, additional preconstruction meetings may be required before beginning construction of temporary shoring without accepted submittals. The Resident, District or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and Shoring Contractor Superintendent will attend preconstruction meetings.

Construction Methods

Control drainage during construction in the vicinity of shoring. Direct run off away from shoring and shoring backfill. Contain and maintain backfill and protect material from erosion.

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the *2018 Standard Specifications* and 2018 Roadway Standard Drawing No. 1170.01. Use temporary guardrail in accordance with Section 862 of the *2018 Standard Specifications* and 2018 Roadway Standard Drawing Nos. 862.01, 862.02 and 862.03.

(A) Tolerances

Construct shoring with the following tolerances:

(1) Horizontal wires of welded wire facing are level in all directions,

(2) Shoring location is within 6 inches of horizontal and vertical alignment shown in the accepted submittals, and

(3) Shoring plumbness (batter) is not negative and within 2 degrees of vertical.

(B) Cantilever, Braced and Anchored Shoring Installation

If overexcavation behind cantilever, braced or anchored shoring is shown in the accepted submittals, excavate before installing piles. Otherwise, install piles before excavating for shoring. Install cantilever, braced or anchored shoring in accordance with the construction sequence shown in the accepted submittals. Remove piles and if applicable, timber lagging when shoring is no longer needed.

(1) Pile Installation

Install piles with the minimum required embedment and extension in accordance with Subarticles 450-3(D) and 450-3(E) of the *2018 Standard Specifications* except that a pile driving equipment data form is not required. Piles may be installed with a vibratory hammer as approved by the Engineer.

Do not splice sheet piles. Use pile excavation to install drilled-in H-piles. After filling holes with concrete or Type 1 grout to the elevations shown in the accepted submittals, remove any fluids and fill remaining portions of holes with flowable fill. Cure concrete or grout at least 7 days before excavating.

Notify the Engineer if refusal is reached before pile excavation or driven piles attain the minimum required embedment. When this occurs, a revised design submittal may be required.

(2) Excavation

Excavate in front of piles from the top down in accordance with the accepted submittals. For H-piles with timber lagging and braced and anchored shoring, excavate in staged horizontal lifts with a maximum height of 5 feet. Remove flowable fill and material in between H-piles as needed to install timber lagging. Position lagging with at least 3 inches of contact in the horizontal direction between the lagging and pile flanges. Do not excavate the next lift until timber lagging for the current lift is installed and if applicable, bracing and anchors for the current lift are accepted. Backfill behind cantilever, braced or anchored shoring with shoring backfill.

(3) Anchor Installation

If applicable, install foundations located behind anchored shoring before installing anchors. Fabricate and install ground anchors in accordance with the accepted submittals, Articles 6.4 and 6.5 of the *AASHTO LRFD Bridge Construction Specifications* and the following unless otherwise approved:

(a) Materials in accordance with this provision are required instead of materials conforming to Articles 6.4 and 6.5.3 of the AASHTO LRFD Specifications,

(b) Encapsulation-protected ground anchors in accordance with Article 6.4.1.2 of the AASHTO LRFD specifications are not required, and

(c) Corrosion protection for unbonded lengths of ground anchors and anchorage covers are not required.

(d) Mix and place neat cement grout in accordance with Subarticles 1003-5, 1003-6 and 1003-7 of the *2018 Standard Specifications*. Measure grout temperature, density and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute/American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

Install helical anchors in accordance with the accepted submittals and Anchor Manufacturer's instructions. Measure torque during installation and do not exceed the torsional strength rating of the helical anchor. Attain the minimum required installation torque and penetration before terminating anchor installation. When replacing a helical anchor, embed last helix of the replacement anchor at least 3 helix plate diameters past the location of the first helix of the previous anchor.

(4) Anchor Testing

Proof test and lock-off anchors in accordance with the accepted submittals and Article 6.5.5 of the *AASHTO LRFD Bridge Construction Specifications* except for the acceptance criteria in Article 6.5.5.5. For the AASHTO LRFD specifications, "ground anchor" refers to a ground or helical anchor and "tendon" refers to a bar, strand or shaft.

(a) Anchor Acceptance

Anchor acceptance is based in part on the following criteria.

(i) For ground and helical anchors, total movement is less than 0.04 inches between the 1 and 10 minute readings or less than 0.08 inches between the 6 and 60 minute readings.
(ii) For ground anchors, total movement at maximum test load exceeds 80% of the theoretical elastic elongation of the unbonded length.

(b) Anchor Test Results

Submit PDF files of anchor test records including movement versus load plots for each load increment within 24 hours of completing each row of anchors. The Engineer will review the test records to determine if the anchors are acceptable.

If the Engineer determines an anchor is unacceptable, revise the anchor design or installation methods. Submit a revised anchored shoring design for acceptance and provide an acceptable anchor with the revised design or installation methods. If required, replace the anchor or provide additional anchors with the revised design or installation methods.

(C) Temporary Wall Installation

Excavate as necessary for temporary walls in accordance with the plans and accepted submittals. If applicable, install foundations located in the reinforced zone before placing shoring backfill or reinforcement unless otherwise approved. Notify the Engineer when foundation excavation is complete. Do not place shoring backfill or reinforcement until excavation dimensions and foundation material are approved.

Erect welded wire facing so the wall position is as shown in the plans and accepted submittals. Set welded wire facing adjacent to each other in the horizontal and vertical direction to completely cover the wall face with facing. Stagger welded wire facing to create a running bond by centering facing over joints in the row below.

Attach geostrip reinforcement to welded wire facing and wrap geotextile reinforcement and retention geotextiles behind welded wire facing as shown in the plans and accepted submittals. Cover geotextiles with at least 3" of shoring backfill. Overlap adjacent geotextile reinforcement and retention and separation geotextiles at least 18 inches with seams oriented perpendicular to the wall face. Hold geotextiles in place with wire staples or anchor pins as needed.

Place reinforcement within 3 inches of locations shown in the plans and accepted submittals. Before placing shoring backfill, pull geosynthetic reinforcement taut so it is in tension and free of kinks, folds, wrinkles or creases. Install reinforcement with the direction shown in the plans and accepted submittals. For temporary wire walls with separate reinforcement and facing components, attach welded wire grid or metallic strip reinforcement to welded wire facing as shown in the accepted submittals. Do not splice or overlap reinforcement so seams are parallel to the wall face. Contact the Engineer when unanticipated existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with reinforcement.

Place shoring backfill in the reinforced zone in 8 to 10 inch thick lifts. Compact A-2-4 soil and Class II, Type 1 and Class III select material in accordance with Subarticle 235-3(C) of the *2018 Standard Specifications*. Use only hand operated compaction equipment to compact backfill within 3 feet of welded wire facing. At a distance greater than 3 feet, compact shoring backfill with at least 4 passes of an 8 to 10 ton vibratory roller in a direction parallel to the wall face. Smooth wheeled or rubber tired rollers are also acceptable for compacting backfill. Do not use sheepsfoot, grid rollers or other types of compaction equipment with feet. Do not displace or damage reinforcement when placing and compacting shoring backfill. End dumping directly on geosynthetics is not permitted. Do not operate heavy equipment on reinforcement until it is covered with at least 8 inches of shoring backfill. Replace any damaged reinforcement to the satisfaction of the Engineer.

Backfill for temporary walls outside the reinforced zone in accordance with Article 410-8 of the *2018 Standard Specifications*. Bench temporary walls into the sides of excavations where applicable. For temporary geosynthetic walls with top of wall within 5 feet of finished grade, remove top facing and incorporate top reinforcement layer into fill when placing fill in front of wall. Temporary walls remain in place permanently unless otherwise required.

Measurement and Payment

Temporary Shoring will be measured and paid in square feet. Temporary walls will be measured as the square feet of exposed wall face area. Cantilever, braced or anchored shoring will be measured as the square feet of exposed shoring face area with the shoring height equal to the

difference between the top and bottom of shoring elevations. Define "top of shoring" as where the grade intersects the back of sheet piles or H-piles and timber lagging. Define "bottom of shoring" as where the grade intersects front of sheet piles or H-piles and timber lagging. No measurement will be made for any embedment, shoring extension above top of shoring or pavement thickness above temporary walls.

The contract unit price for *Temporary Shoring* will be full compensation for providing shoring designs, submittals and materials, excavating, backfilling, hauling and removing excavated materials and supplying all labor, tools, equipment and incidentals necessary to construct temporary shoring.

No payment will be made for temporary shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience. No value engineering proposals will be accepted based solely on revising or eliminating shoring locations shown in the plans or estimated quantities shown in the bid item sheets as a result of actual field measurements or site conditions.

PCB will be measured and paid in accordance with Section 1170 of the *2018 Standard Specifications*. No additional payment will be made for anchoring PCB for temporary shoring. Costs for anchoring PCB will be incidental to temporary shoring.

Temporary guardrail will be measured and paid for in accordance with Section 862 of the *2018 Standard Specifications*.

Payment will be made under:

Pay Item	**Pay Unit**
Temporary Shoring	Square Foot

DocuSigned by:
Gregory Goins
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1/31/2022

TEMPORARY SOIL NAIL WALLS: **(1-16-18)**

Description

Construct temporary soil nail walls consisting of soil nails spaced at a regular pattern and connected to a reinforced shotcrete face. A soil nail consists of a steel bar grouted in a drilled hole inclined at an angle below horizontal. At the Contractor's option, use temporary soil nail walls instead of temporary shoring for full cut sections. Design and construct temporary soil nail walls based on actual elevations and wall dimensions in accordance with the contract and accepted submittals. Use a prequalified Anchored Wall Contractor to construct temporary soil nail walls. Define "soil nail wall" as a tempporary soil nail wall and "Soil Nail Wall Contractor" as the Anchored Wall Contractor installing soil nails and applying shotcrete. Define "nail" as a soil nail.

Provide positive protection for soil nail walls at locations shown in the plans and as directed. See *Temporary Shoring* provision for positive protection types and definitions.

Materials

Refer to Division 10 of the *Standard Specifications*.

Item	Section
Geocomposites	1056
Neat Cement Grout, Type 2	1003
Reinforcing Steel	1070
Shotcrete	1002
Select Material, Class IV	1016
Steel Plates	1072-2

Use Class IV select material for temporary guardrail. Provide soil nails consisting of grouted steel bars and nail head assemblies. Use deformed steel bars that meet AASHTO M 275 or M 31, Grade 60 or 75. Splice bars in accordance with Article 1070-9 of the *Standard Specifications*.

Fabricate centralizers from schedule 40 PVC plastic pipe or tube, steel or other material not detrimental to steel bars (no wood). Size centralizers to position bars within 1" of drill hole centers and allow tremies to be inserted to ends of holes. Use centralizers that do not interfere with grout placement or flow around bars.

Provide nail head assemblies consisting of nuts, washers and bearing plates. Use steel plates for bearing plates and steel washers and hex nuts recommended by the Soil Nail Manufacturer.

Provide Type 6 material certifications for soil nail materials in accordance with Article 106-3 of the *Standard Specifications*. Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store soil nail wall materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

Preconstruction Requirements

(A) Concrete Barrier

Define "clear distance" behind concrete barrier as the horizontal distance between the barrier and edge of pavement. The minimum required clear distance for concrete barrier is shown in the plans. At the Contractor's option or if the minimum required clear distance

is not available, set concrete barrier next to and up against traffic side of soil nail walls except for barrier above walls. Concrete barrier with the minimum required clear distance is required above soil nail walls.

(B) Temporary Guardrail

Define "clear distance" behind temporary guardrail as the horizontal distance between guardrail posts and soil nail walls. At the Contractor's option or if clear distance for soil nail walls is less than 4 ft, use temporary guardrail with 8 ft posts and a clear distance of at least 2.5 ft. Place ABC in clear distance and around guardrail posts instead of pavement.

(C) Soil Nail Wall Designs

Before beginning soil nail wall design, survey existing ground elevations in the vicinity of wall locations to determine actual design heights (H). Use a prequalified Anchored Wall Design Consultant to design soil nail walls. Provide designs sealed by a Design Engineer approved as a Geotechnical Engineer (key person) for the Anchored Wall Design Consultant.

Submit PDF files of working drawings and design calculations for soil nail wall designs in accordance with Article 105-2 of the *Standard Specifications*. Submit working drawings showing plan views, wall profiles, typical sections and details of soil nail wall design and construction sequence. Include details in working drawings of soil nail locations, unit grout/ground bond strengths, shotcrete reinforcement and if necessary, obstructions extending through walls or interfering with nails. Include details in construction sequence of excavation, grouting, installing reinforcement, nail testing and shotcreting with mix designs and shotcrete nozzleman certifications. Do not begin soil nail wall construction until a design submittal is accepted.

Design soil nail walls in accordance with the plans and allowable stress design method in the *FHWA Geotechnical Engineering Circular No. 7 "Soil Nail Walls"* (Publication No. FHWA-IF-03-017) unless otherwise required.

Design soil nails that meet the following unless otherwise approved:

(1) Horizontal and vertical spacing of at least 3 ft,

(2) Inclination of at least 12° below horizontal and

(3) Diameter of 4" to 10".

Do not extend nails beyond right-of-way or easement limits. If existing or future obstructions such as foundations, pavements, pipes, inlets or utilities will interfere with nails, maintain a clearance of at least 6" between obstructions and nails.

Design soil nail walls for a traffic surcharge of 250 psf if traffic will be above and within H of walls. This traffic surcharge does not apply to construction traffic. Design soil nail walls for any construction surcharge if construction traffic will be above and within H of walls. For temporary guardrail with 8 ft posts above soil nail walls, analyze walls for a horizontal load of 300 lb/ft of wall.

Place geocomposite drain strips with a horizontal spacing of no more than 10 ft and center strips between adjacent nails. Attach drain strips to excavation faces. Use shotcrete at least 4" thick and reinforce shotcrete with #4 waler bars around nail heads. Two waler bars

(one on each side of nail head) in the horizontal and vertical directions are required for a total of 4 bars per nail.

(D) Preconstruction Meeting

Before starting soil nail wall construction, hold a preconstruction meeting to discuss the construction, inspection and testing of the soil nail walls. If this meeting occurs before all soil nail wall submittals have been accepted, additional preconstruction meetings may be required before beginning construction of soil nail walls without accepted submittals. The Resident, District or Bridge Maintenance Engineer, Area Construction Engineer, Geotechnical Operations Engineer, Contractor and Soil Nail Wall Contractor Superintendent will attend preconstruction meetings.

(E) Preconstruction Meeting

Before beginning wall construction, provide preconstruction test panels in accordance with Subarticle 1002-3(D) of the *Standard Specifications*.

Construction Methods

Control drainage during construction in the vicinity of soil nail walls. Direct run off away from soil nail walls and areas above and behind walls.

Install foundations located behind soil nail walls before beginning wall construction. Do not excavate behind soil nail walls. If overexcavation occurs, repair walls with an approved method and a revised soil nail wall design may be required.

Install positive protection in accordance with the contract and accepted submittals. Use PCB in accordance with Section 1170 of the *Standard Specifications* and Roadway Standard Drawing No. 1170.01. Use temporary guardrail in accordance with Section 862 of the *Standard Specifications* and Roadway Standard Drawing No. 862.01, 862.02 and 862.03.

(A) Excavation

Excavate for soil nail walls from the top down in accordance with the accepted submittals. Excavate in staged horizontal lifts with no negative batter (excavation face leaning forward). Excavate lifts in accordance with the following:

(1) Heights not to exceed vertical nail spacing,

(2) Bottom of lifts no more than 3 ft below nail locations for current lift and

(3) Horizontal and vertical alignment within 6" of location shown in the accepted submittals.

Remove any cobbles, boulders, rubble or debris that will protrude more than 2" into the required shotcrete thickness. Rocky ground such as colluvium, boulder fills and weathered rock may be difficult to excavate without leaving voids.

Apply shotcrete to excavation faces within 24 hours of excavating each lift unless otherwise approved. Shotcreting may be delayed if it can be demonstrated that delays will not adversely affect excavation stability. If excavation faces will be exposed for more than 24 hours, use polyethylene sheets anchored at top and bottom of lifts to protect excavation faces from changes in moisture content.

If an excavation becomes unstable at any time, suspend soil nail wall construction and

temporarily stabilize the excavation by immediately placing an earth berm up against the unstable excavation face. When this occurs, repair walls with an approved method and a revised soil nail wall design may be required.

Do not excavate the next lift until nail installations and testing and shotcrete application for the current lift are accepted and grout and shotcrete for the current lift have cured at least 3 days and 1 day, respectively.

(B) Soil Nails

Drill and grout nails the same day and do not leave drill holes open overnight. Control drilling and grouting to prevent excessive ground movements, damaging structures and pavements or fracturing rock and soil formations. If ground heave or subsidence occurs, suspend soil nail wall construction and take corrective action to minimize movement. If property damage occurs, make repairs with an approved method and a revised soil nail wall design may be required.

(1) Drilling

Use drill rigs of the sizes necessary to install soil nails and with sufficient capacity to drill through whatever materials are encountered. Drill straight and clean holes with the dimensions and inclination shown in the accepted submittals. Drill holes within 6" of locations and 2° of inclination shown in the accepted submittals unless otherwise approved.

Stabilize drill holes with temporary casings if unstable, caving or sloughing material is anticipated or encountered. Do not use drilling fluids to stabilize drill holes or remove cuttings.

(2) Steel Bars

Center steel bars in drill holes with centralizers. Securely attach centralizers along bars at no more than 8 ft centers. Attach uppermost and lowermost centralizers 18" from excavation faces and ends of holes.

Do not insert steel bars into drill holes until hole locations, dimensions, inclination and cleanliness are approved. Do not vibrate, drive or otherwise force bars into holes. If a steel bar cannot be completely and easily inserted into a drill hole, remove the bar and clean or redrill the hole.

(3) Grouting

Remove oil, rust inhibitors, residual drilling fluids and similar foreign materials from holding tanks/hoppers, stirring devices, pumps, lines, tremie pipes and any other equipment in contact with grout before use. Measure grout temperature, density and flow during grouting with at least the same frequency grout cubes are made for compressive strength. Perform density and flow field tests in the presence of the Engineer in accordance with American National Standards Institute/American Petroleum Institute Recommended Practice 13B-1 (Section 4, Mud Balance) and ASTM C939 (Flow Cone), respectively.

Inject grout at the lowest point of drill holes through tremies, e.g., grout tubes, casings, hollow-stem augers or drill rods, in one continuous operation. Fill drill

holes progressively from ends of holes to excavation faces and withdraw tremies at a slow even rate as holes are filled to prevent voids in grout. Extend tremies into grout at least 5 ft at all times except when grout is initially placed in holes.

Provide grout free of segregation, intrusions, contamination, structural damage or inadequate consolidation (honeycombing). Cold joints in grout are not allowed except for test nails. Remove any temporary casings as grout is placed and record grout volume for each drill hole.

(4) Nail Heads

Install nail head assemblies after shotcreting. Before shotcrete reaches initial set, seat bearing plates and tighten nuts so plates contact shotcrete uniformly. If uniform contact is not possible, install nail head assemblies on mortar pads so nail heads are evenly loaded.

(C) Drain Strips

Install geocomposite drain strips as shown in the accepted submittals. Before installing shotcrete reinforcement, place drain strips with the geotextile side against excavation faces. For highly irregular faces and at the discretion of the Engineer, drain strips may be placed after shotcreting over weep holes through the shotcrete. Hold drain strips in place with anchor pins so strips are in continuous contact with surfaces to which they are attached and allow for full flow the entire height of soil nail walls. Discontinuous drain strips are not allowed. If splices are needed, overlap drain strips at least 12" so flow is not impeded. Cut off excess drain strip length and expose strip ends below shotcrete when soil nail wall construction is complete.

(D) Shotcrete

Clean ungrouted zones of drill holes and excavation faces of loose materials, mud, rebound and other foreign material. Moisten surfaces to receive shotcrete. Install shotcrete reinforcement in accordance with the contract and accepted submittals. Secure reinforcing steel so shooting does not displace or vibrate reinforcement. Install approved thickness gauges on 5 ft centers in the horizontal and vertical directions to measure shotcrete thickness.

Apply shotcrete in accordance with the contract, accepted submittals and Subarticle 1002-3(F) of the *Standard Specifications*. Use approved shotcrete nozzlemen who made satisfactory preconstruction test panels to apply shotcrete. Direct shotcrete at right angles to excavation faces except when shooting around reinforcing steel. Rotate nozzle steadily in small circular patterns and apply shotcrete from bottom of lifts up.

Make shotcrete surfaces uniform and free of sloughing or sagging. Completely fill ungrouted zones of drill holes and any other voids with shotcrete. Taper construction joints to a thin edge over a horizontal distance of at least the shotcrete thickness. Wet joint surfaces before shooting adjacent sections.

Repair surface defects as soon as possible after shooting. Remove any shotcrete which lacks uniformity, exhibits segregation, honeycombing or lamination or contains any voids or sand pockets and replace with fresh shotcrete to the satisfaction of the Engineer. Protect shotcrete from freezing and rain until shotcrete reaches initial set.

(E) Construction Records

Provide 2 copies of soil nail wall construction records within 24 hours of completing each lift. Include the following in construction records:

(1) Names of Soil Nail Wall Contractor, Superintendent, Nozzleman, Drill Rig Operator, Project Manager and Design Engineer;

(2) Wall description, county, Department's contract, TIP and WBS element number;

(3) Wall station and number and lift location, dimensions, elevations and description;

(4) Nail locations, dimensions and inclinations, bar types, sizes and grades and temporary casing information;

(5) Date and time drilling begins and ends, steel bars are inserted into drill holes, grout and shotcrete are mixed and arrives on-site and grout placement and shotcrete application begins and ends;

(6) Grout volume, temperature, flow and density records;

(7) Ground and surface water conditions and elevations if applicable;

(8) Weather conditions including air temperature at time of grout placement and shotcrete application; and

(9) All other pertinent details related to soil nail wall construction.

After completing each soil nail wall or stage of a wall, provide a PDF file of all corresponding construction records.

Nail Testing

"Proof tests" are performed on nails incorporated into walls, i.e., production nails. Define "test nail" as a nail tested with a proof test. Proof tests are typically required for at least one nail per nail row per soil nail wall or at least 5% of production nails, whichever is greater. More or less test nails may be required depending on subsurface conditions encountered. The Engineer will determine the number and locations of proof tests required. Do not test nails until grout and shotcrete attain the required 3 day compressive strength.

(A) Test Equipment

Use the following equipment to test nails:

(1) Two dial gauges with rigid supports,

(2) Hydraulic jack and pressure gauge and

(3) Jacking block or reaction frame.

Provide dial gauges with enough range and precision to measure the maximum test nail movement to 0.001". Use pressure gauges graduated in 100 psi increments or less. Submit identification numbers and calibration records for load cells, jacks and pressure gauges with the soil nail wall design. Calibrate each jack and pressure gauge as a unit.

Align test equipment to uniformly and evenly load test nails. Use a jacking block or reaction frame that does not damage or contact shotcrete within 3 ft of nail heads. Place dial gauges opposite each other on either side of test nails and align gauges within 5° of

bar inclinations. Set up test equipment so resetting or repositioning equipment during nail testing is not needed.

(B) Test Nails

Test nails include both unbonded and bond lengths. Grout only bond lengths before nail testing. Provide unbonded and bond lengths of at least 3 ft and 10 ft, respectively.

Steel bars for production nails may be overstressed under higher test nail loads. If necessary, use larger size or higher grade bars with more capacity for test nails instead of shortening bond lengths to less than the minimum required.

(C) Proof Tests

Determine maximum bond length (L_B) using the following:

$$L_B \leq (C_{RT} \times A_t \times f_y) / (Q_{ALL} \times 1.5)$$

Where,
L_B = bond length (ft),
C_{RT} = reduction coefficient, 0.9 for Grade 60 and 75 bars or 0.8 for Grade 150 bars,
A_t = bar area (in^2),
f_y = bar yield stress (ksi) and
Q_{ALL} = allowable unit grout/ground bond strength (kips/ft).

Determine design test load (DTL) based on as-built bond length and allowable unit grout/ground bond strength using the following:

$$DTL = L_B \times Q_{ALL}$$

Where,
DTL = design test load (kips).

Perform proof tests by incrementally loading nails to failure or a load of 150% of DTL based on the following schedule:

Load	Hold Time
AL*	Until movement stabilizes
0.25 DTL	Until movement stabilizes
0.50 DTL	Until movement stabilizes
0.75 DTL	Until movement stabilizes
1.00 DTL	Until movement stabilizes
1.25 DTL	Until movement stabilizes
1.50 DTL	10 or 60 minutes (creep test)
AL*	1 minute

* Alignment load (AL) is the minimum load needed to align test equipment and should not exceed 0.05 DTL.

Reset dial gauges to zero after applying alignment load. Record test nail movement at each load increment and monitor test nails for creep at the 1.5 DTL load increment. Measure and record movement during creep test at 1, 2, 3, 5, 6 and 10 minutes. If test nail movement between 1 and 10 minutes is greater than 0.04", maintain the 1.5 DTL load increment for

an additional 50 minutes and record movement at 20, 30, 50 and 60 minutes. Repump jack as needed to maintain load during hold times.

(D) Test Nail Acceptance

Submit 2 copies of test nail records including load versus movement and time versus creep movement plots within 24 hours of completing each proof test. The Engineer will review the test nail records to determine if test nails are acceptable. Test nail acceptance is based in part on the following criteria.

(1) Total movement during creep test is less than 0.04" between the 1 and 10 minute readings or less than 0.08" between the 6 and 60 minute readings and creep rate is linear or decreasing throughout hold time.

(2) Total movement at maximum load exceeds 80% of the theoretical elastic elongation of the unbonded length.

(3) Pullout failure does not occur at or before the 1.5 DTL load increment. Define "pullout failure" as the inability to increase load while movement continues. Record pullout failure load as part of test nail data.

Maintain stability of unbonded lengths for subsequent grouting. If a test nail is accepted but the unbonded length cannot be satisfactorily grouted, do not incorporate the test nail into the soil nail wall and add another production nail to replace the test nail.

If the Engineer determines a test nail is unacceptable, either perform additional proof tests on adjacent production nails or revise the soil nail design or installation methods for the production nails represented by the unacceptable test nail as determined by the Engineer. Submit a revised soil nail wall design for acceptance, provide an acceptable test nail with the revised design or installation methods and install additional production nails for the nails represented by the unacceptable test nail.

After completing nail testing for each soil nail wall or stage of a wall, provide a PDF file of all corresponding test nail records.

Measurement and Payment

Temporary soil nail walls will be measured and paid in square feet. Temporary soil nail walls will be paid for at the contract unit price for *Temporary Shoring*. Temporary soil nail walls will be measured as the square feet of exposed wall face area. No measurement will be made for any embedment or pavement thickness above soil nail walls.

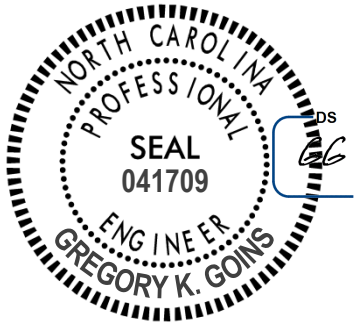
The contract unit price for *Temporary Shoring* will be full compensation for providing soil nail wall designs, submittals, labor, tools, equipment and soil nail wall materials, excavating, hauling and removing excavated materials, installing and testing soil nails, grouting, shotcreting and supplying drain strips and any incidentals necessary to construct soil nail walls. No additional payment will be made and no extension of completion date or time will be allowed for repairing property damage, overexcavations or unstable excavations, unacceptable test nails or thicker shotcrete.

No payment will be made for temporary shoring not shown in the plans or required by the Engineer including shoring for OSHA reasons or the Contractor's convenience. No value engineering proposals will be accepted based solely on revising or eliminating shoring locations shown in the

plans or estimated quantities shown in the bid item sheets as a result of actual field measurements or site conditions.

PCB will be measured and paid in accordance with Section 1170 of the *Standard Specifications*. No additional payment will be made for anchoring PCB for soil nail walls. Costs for anchoring PCB will be incidental to soil nail walls.

Temporary guardrail will be measured and paid for in accordance with Section 862 of the *Standard Specifications*.



DocuSigned by:
Gregory Goins
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1/31/2022

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

May 20, 2022

Town of Smithfield
Attention: Ted Credle, P.E. Director of Utilities
230 Hospital Road
Smithfield, North Carolina 27577

Re: Engineering Plans and Special Provisions Approval
Distribution Relocation
I-5972 I-95 and US-70 Business
Town of Smithfield
Water System No.: NC0351010, Johnston County
Serial No.: 22-00334

Dear Applicant:

Enclosed please find one copy of the "Application for Approval..." together with one copy of the referenced engineering plans and project special provisions bearing the Division of Water Resources stamp of approval for the referenced project. These engineering plans and project special provisions are approved under Division of Water Resources Serial Number 22-00334, dated May 20, 2022.

Engineering plans and project special provisions prepared by Bryan Badey, P.E., call for the installation of approximately 350 feet of 16-inch water main, 2,120 feet of 12-inch water main, 2,170 feet of 8-inch water main, 60 feet of 6-inch water main, fire hydrants, valves, and associated appurtenances to replace and relocate existing water mains along Mallard Drive extending south from US-70 Business to US-70 Business from Outlet Center Drive to west of Yelverton Grove Road in the Town of Smithfield, Johnston County. The proposed 8-inch water mains along US-70 Business will connect to existing 8-inch water main along US-70 Business at both ends. The proposed 12-inch water main along Mallard Drive will connect to an existing 8-inch water main along US 70-Business. Construction of this project must be in accordance with NCDOT's standard specifications, in addition to the project special provisions.

Please note that in accordance with 15A NCAC 18C .0309(a), no construction, alteration, or expansion of a water system shall be placed into service or made available for human consumption until the Public Water Supply Section has issued Final Approval. Final Approval will be issued and mailed to the applicant upon receipt of both an Engineer's Certification and an Applicant's Certification submitted in accordance with 15A NCAC 18C .0303 (a) and (c).

These plans and project special provisions in the foregoing application are approved insofar as the protection of public health is concerned as provided in the rules, standards and criteria adopted under the authority of Chapter 130A-317 of the General Statutes. This approval does not constitute a warranty of the design, construction, or future operation of the water system.

One copy of the "Application for Approval..." and a copy of the plans and project special provisions with a seal of approval from the department are enclosed. One copy of the documents in a digital format (CD) is being forwarded to our Raleigh Regional Office. The second CD is being retained in our office.

If the Public Water Supply Section can be of further service, please call (919) 707-9100.

Sincerely,

FOR

Robert W. Midgette, P.E.
Chief, Public Water Supply Section

RWM/AKS

Enclosures: Approval Document

cc: Shawn Guyer, P.E., Raleigh Regional Office
Johnston County Health Department
RK&K

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
RICHARD E. ROGERS, JR.
Director

NORTH CAROLINA
Environmental Quality

May 20, 2022

TOWN OF SMITHFIELD
ATTN: TED CREDLE, PE
230 HOSPITAL RD
SMITHFIELD, NC 27577

Re: **Authorization to Construct (This is not a Final Approval)**
Issue Date: May 20, 2022
NCDOT I-5972 I-95 & US-70 BUSINESS
Serial No.: 22-00334 Water System No.: NC0351010
Johnston County

Dear Applicant:

This letter is to confirm that a complete Engineer's Report and a Water System Management Plan have been received, and that engineering plans and specifications have been approved by the Department for **NCDOT I-5972 I-95 & US-70 BUSINESS, Serial No.: 22-00334.**

The "Authorization to Construct" is valid for 36 months from the issue date. Authorization to construct may be extended if the Rules Governing Public Water Supplies and site conditions have not changed (see Rule .0305). The "Authorization to Construct" and the engineering plans and specifications approval letter shall be posted at the primary entrance of the job site before and during construction.

Upon completion of the construction or modification, **and prior to placing the new construction or modification into service,** the applicant must submit an Engineer's Certification and Applicant's Certification to the Public Water Supply Section.

- **Engineer's Certification:** in accordance with Rule .0303 (a), the applicant shall submit a certification statement signed and sealed by a registered professional engineer stating that construction was completed in accordance with approved engineering plans and specifications, including any provisions stipulated in the Department's engineering plan and specification approval letter.
- **Applicant's Certification:** in accordance with Rule .0303 (c), the applicant shall submit a signed certification statement indicating that the requirements for an Operation and Maintenance Plan and Emergency Management Plan have been satisfied in accordance with Rule .0307 (d) and (e) and that the system has a certified operator in accordance with Rule .1300. The "Applicant's Certification" form is available at http://www.ncwater.org/ (click on Public Water Supply Section, Plan Review, Plan Review Forms).

Certifications can be sent by mail, fax (919-715-4374), or attachment to an e-mail message to **PWSSection.PlanReview@ncdenr.gov.**

If this "Authorization to Construct" is for a new public water system, the owner must submit a completed **application for an Operating Permit** and the appropriate fee. For a copy of the application for an Operating Permit please call (919) 707-9085.

Once the certifications and permit application and fee (if applicable) are received and determined adequate, the Department will issue a Final Approval letter to the applicant. In accordance with Rule .0309 (a), **no portion of this project shall be placed into service until the Department has issued Final Approval.**

Please contact us at (919) 707-9100 if you have any questions or need additional information.

Sincerely,

RW Midgette

Robert W. Midgette, P.E.
Chief, Public Water Supply Section

cc: SHAWN GUYER, P.E., Regional Engineer
RK&K

North Carolina Department of Environmental Quality
Division of Water Resources

Authorization to Construct

Project Applicant:	**TOWN OF SMITHFIELD**
Public Water System Name and Water System No.:	**SMITHFIELD, TOWN OF** **NC0351010**
Project Name:	**NCDOT I-5972 I-95 & US-70 BUSINESS**
Serial No.:	**22-00334**
Issue Date:	**May 20, 2022**
Expiration Date:	36 Months after Issue Date

In accordance with NCAC 18C .0305, this Authorization to Construct must be posted at the primary entrance to the job site during construction.

DocuSigned by:
Matthew V. Springer
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1/3/2019

SNOWPLOWABLE PAVEMENT MARKERS:
(03-19-19)

Revise the *2018 Standard Specifications* as follows:

Pages 10-177 and 10-178, Subarticle 1086-3 SNOWPLOWABLE PAVEMENT MARKERS, delete items (A), (B) and (C)(1) and replace with the following:

(A) General

Use snowplowable pavement markers evaluated by NTPEP. The snowplowable pavement marker shall consist of a housing with one or more glass or plastic face lens type reflective lenses to provide the required color designation. Shape the housing to deflect a snowplow blade upward in both directions without being damaged. Plastic lens faces shall use an abrasion resistant coating.

Use recycled snowplowable pavement markers that meet all the requirements of new snowplowable pavement markers except Subarticle 1086-3(B)(1). Recycled snowplowable pavement markers with minimal variation in dimensions are acceptable only when the reflector fits in the housing of the recycled snowplowable pavement marker as originally designed.

(B) Housings

(1) Dimensions

The dimension, slope and minimum area of reflecting surface shall conform to dimensions as shown in the plans. The minimum area of each reflecting surface shall be 1.44 sq.in.

(2) Materials

Use snowplowable pavement markers that are on the NCDOT Approved Products List.

(3) Surface

The surface of the housing shall be free of scale, dirt, rust, oil, grease or any other contaminant which might reduce its bond to the epoxy adhesive.

(4) Identification

Mark the housing with the manufacturer's name and model number of marker.

(C) Reflectors

(1) General

Laminate the reflector to an elastomeric pad and attach with adhesive to the housing. The thickness of the elastomeric pad shall be 0.04".

Pages 12-14, Subarticle 1250-3(C) Removal of Existing Pavement Markers, lines 19-29, delete and replace with the following:

Remove the existing raised pavement markers or the snowplowable pavement markers including the housings, before overlaying an existing roadway with pavement. Repair the pavement by filling holes as directed by the Engineer.

When traffic patterns are changed in work zones due to construction or reconstruction, remove all raised pavement markers or snowplowable markers including housings that conflict with the new traffic pattern before switching traffic to the new traffic pattern. Lens removal in lieu of total housing removal is not an acceptable practice for snowplowable markers.

Properly dispose of the removed pavement markers. No direct payment will be made for removal or disposal of existing pavement markers or repair of pavement, as such work will be incidental to other items in the contract.

Pages 12-16 and 12-17, Subarticle 1253-3 CONSTRUCTION METHODS, delete items (A), (B) and (C) and replace with the following:

(A) General

Bond marker housings to the pavement with epoxy adhesive. Mechanically mix and dispense epoxy adhesives as required by the manufacturer's specifications. Place the markers immediately after the adhesive has been mixed and dispensed.

Install snowplowable pavement marker housings into slots sawcut into the pavement. Make slots in the pavement to exactly duplicate the shape of the housing of the snowplowable pavement markers.

Promptly remove all debris resulting from the saw cutting operation from the pavement surface. Install the marker housings within 7 calendar days after saw cutting slots in the pavement. Remove and dispose of loose material from the slots by brushing, blow cleaning or vacuuming. Dry the slots before applying the epoxy adhesive. Fill the cleaned slots totally with epoxy adhesive flush with the surface of the existing pavement. Install snowplowable pavement markers according to the manufacturer’s recommendations.

Protect the snowplowable pavement markers until the epoxy has initially cured and is track free.

(B) Reflector Replacement

In the event that a reflector is damaged, replace the damaged reflector by using adhesives and methods recommended by the manufacturer of the markers and approved by the Engineer. This work is considered incidental if damage occurs during the initial installation of the marker housings and maintenance of initial snowplowable markers specified in this section. This work will be paid for under the pay item for the type of reflector replacement if the damage occurred after the initial installation of the snowplowable pavement marker.

Missing housings shall be replaced. Broken housings shall be removed and replaced. In both cases the slot for the housings shall be properly prepared prior to installing the new housing. Removal of broken housings and preparation of slots will be considered incidental to the work of replacing housings.

(C) Recycled Snowplowable Pavement Marker Housings

Use properly refurbished snowplowable pavement marker housings as approved by the Engineer such that approved new reflectors can be installed inside the housings.

DocuSigned by:
Matthew V. Springer
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1/3/2019

THERMOPLASTIC PAVEMENT MARKING MATERIAL – COLOR TESTING:
(03-19-19)

Revise the *2018 Standard Specifications* as follows:

Pages 10-183 and 10-184, Subarticle 1087-7(D)(1)(b) Yellow, lines 9-11, delete and replace with the following:

Obtain Color Values Y,x,y per ASTM E1349 using C/2° illuminant/observer.
Results shall be Y ≥ 45%, and x,y shall fall within PR#1 chart chromaticity limits.