REFERENCE: W-5706C

PROJECT: 44852

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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-L-	17+20 - 20+50, 21+50	7 - 10
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-Y1-	17+50, 19+00	12
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *BLADEN*

PROJECT DESCRIPTION *ROUNDABOUT AT INTERSECTION OF NC 41 AND NC 410*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W-5706C	1	19

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.

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DATE *DECEMBER 2018*

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SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
W-5706C	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- 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] DIEDRICH D-50 (TER373)
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 2¼" HOLLOW STEM AUGER

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: N/A - TOP OF BORING ELEVATIONS ESTIMATED USING PROVIDED PROJECT TIN FILE (w5706c_fs_tin.tin) DATED: 12/04/2018
ELEVATION: FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

09/08/99

TIP PROJECT: W-5706C

CONTRACT:

20-DEC-2018 10:23
N:\Projects\2018\70185070\W5706C\W5706C_GEO_RDWY_NC41-410\CADD_GEOTECH\PlanProf\W-5706C_RDY_TSH_01.dgn
wdfields AT WXE-70023347

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W-5706C	3	19

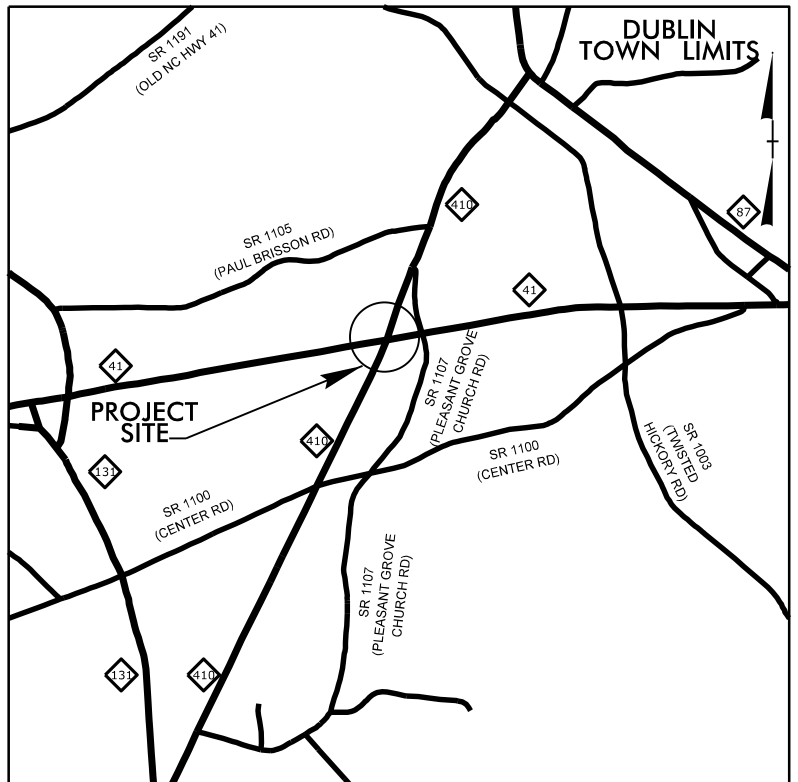
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
44852.1.3	HSIP-0041(110)	PE
44852.2.3	HSIP-0041(110)	ROW
44852.3.3	HSIP-0041(110)	CONST

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BLADEN COUNTY

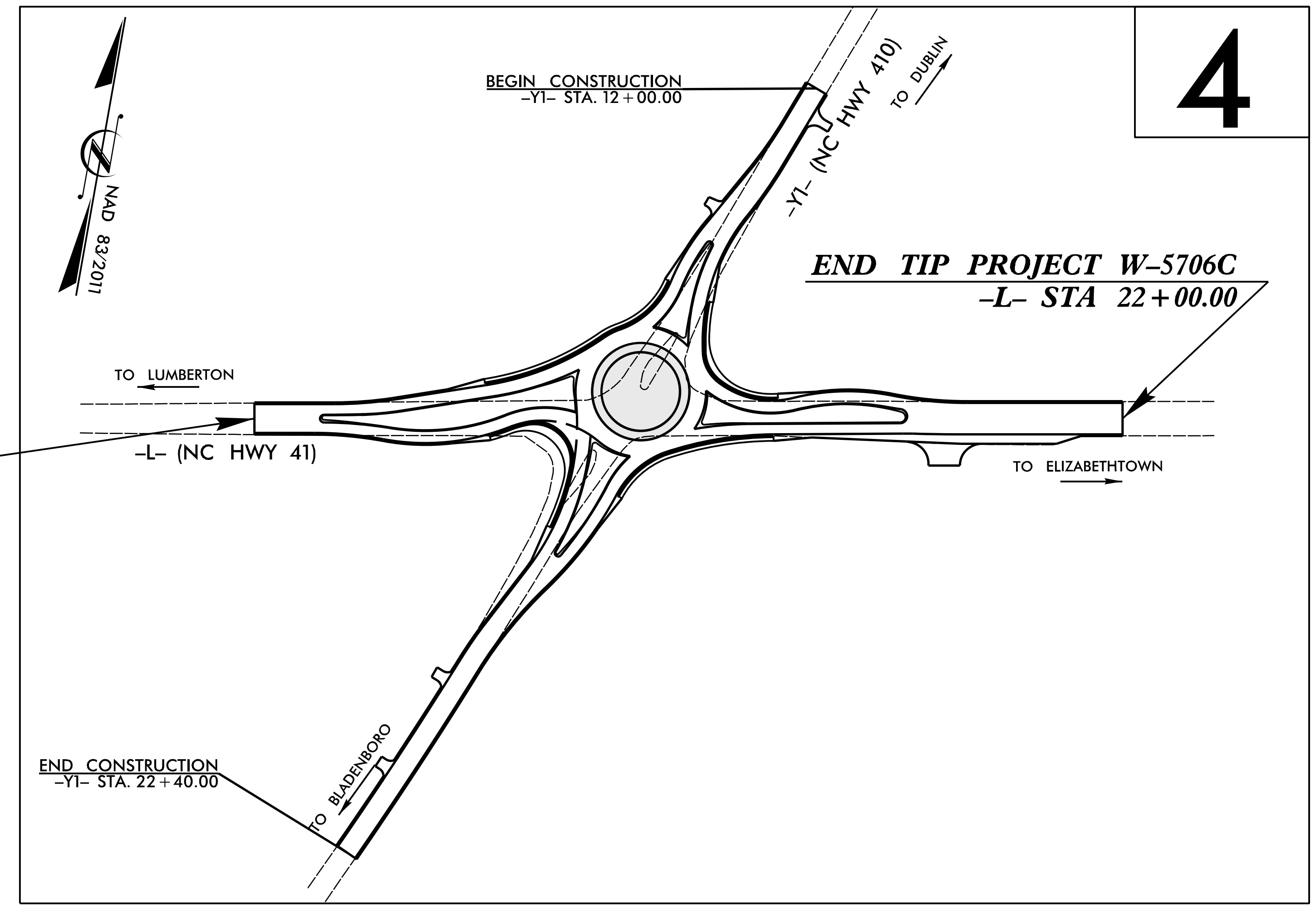
LOCATION: ROUNDABOUT AT INTERSECTION OF NC 41 AND NC 410

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING, AND PAVEMENT MARKING



VICINITY MAP

REVISED ROW SUBMITTAL – APRIL 10, 2018



BEGIN TIP PROJECT W-5706C
-L- STA 12+00.00

END TIP PROJECT W-5706C
-L- STA 22+00.00

THIS PROJECT IS NOT LOCATED WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF DUBLIN

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

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2016 = 4,900
V = 50 MPH
DHV = 10%
D = 65%
T = 4% *
* TTST = 1% DUAL = 3%

FUNC CLASS =
RURAL MINOR COLLECTOR
STATEWIDE TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT W-5706C = 0.189 MILES

TOTAL LENGTH OF TIP PROJECT W-5706C = 0.189 MILES

Prepared for the North Carolina Department of Transportation in the office of:

PLANS PREPARED BY: PARSONS
5540 Centerview Drive, Suite 217
Raleigh NC 27606
Bus: 919-854-1345 Fax: 919-851-2103
NC LICENSE NO. F-0246
FOR NORTH CAROLINA DEPT. OF TRANSPORTATION

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
ENG FIRM LICENSE NO. C-890

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 30, 2018

LETTING DATE:
APRIL 17, 2019

DAVID L. WILVER, PE
PROJECT ENGINEER

J. MATTHEW PICKENS, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Date: December 2018
WBS Number: 44852.1.3
TIP Number: W-5706C
County: Bladen
Description: NC 41 & NC 410 Intersection Improvements

Subject: Roadway Geotechnical Report - Inventory

Project Description

The project is located east of Elizabethtown, North Carolina, at the intersection of NC 41 (-L-) and NC 410 (-Y1-) in Bladen County. The project consists of the addition of raised medians and some minor widening at the intersection, construction of a roundabout and an overlay across all lanes for a flat finished surface. The length of the TIP project NC 41 (-L-) is 0.189 miles and intersects NC 410 (-Y1-) with a roundabout (-RAB-). The project corridor is in an urban setting with residential developments. A gas station and a Community College are close to the work area.

The geotechnical subsurface investigation was performed in November 2018. The site was investigated with eight (8) hand auger borings and eight (8) standard penetration test (SPT) borings. The hand auger borings were advanced to depths of 4.5 to 6 feet beneath the ground surface. Hand auger borings B-2, B-3, and B-9 were terminated at depths of 4.5 and 5 feet due to saturated, non-cohesive soils collapsing in the borehole. The SPT borings were advanced using a D-50 Diedrich track mounted rotary drill rig equipped with a recently calibrated automatic hammer. The SPT borings were advanced with hollow stem augers to depths of 10 feet beneath the ground surface. A pavement design investigation was also performed at the site consisting of the extraction of pavement cores, performing dual-mass dynamic cone penetrometer (DCP) testing and advancing solid stem augers into the subgrade soil to a depth of approximately 6 feet. Four (4) of the SPT borings were advanced below the dual-mass dynamic cone penetrometer (DCP) testing between 6 to 10 feet below the ground surface. The results of the pavement design investigation are provided in a separate report. Representative soil samples were collected in the field for visual classification and selected samples were submitted for laboratory analysis by Terracon's soil testing laboratory. Laboratory testing was performed in accordance with the AASHTO Soil Classification System.

The following alignment was investigated by soil testing and visual reconnaissance:

Alignment	Stations (±)
-L-	12+00 to 22+00
-Y1-	12+00 to 22+40
-RAB-	10+00 to 13+58

Physiography and Geology

The site is located within the Coastal Plain Physiographic and Geologic Province of North Carolina in Bladen County. The Coastal Plain Province is characterized by subdued topographic features. The existing elevations along the investigated corridor range from approximately 140 feet to the west,142 feet to the south and 147 feet to the east. In general, the topography at this site is generally flat with some gentle slopes.

The Inner Coastal Plain Physiographic Province consists of a wedge of unconsolidated sands, silt, marl, and other clays interbedded with occasional limestone strata, which rests on crystalline basement rocks.

Based on previous mapping (N.C. Geologic Map 1985) and our knowledge of the local geology, the site falls within the Cretaceous Age Black Creek Formation. However, based on our site visit and subsurface conditions encountered, the near surface soils appear to be recent Undivided Coastal Plain deposits of sands, typical of Undivided Coastal Plain soils. This type of deposition has resulted in a relatively consistent subsurface profile along the project alignment. The Undivided Coastal Plain deposits underlie the sands that make up the roadway embankment material. These near surface soils overlie the Black Creek Formation. The Black Creek Formation soils are described as gray to black lignitic clay with thin beds and laminae of fine-grained sands, micaceous sand and thick lenses of cross-bedded sands. The clays of this Formation are typically dark due to carbonaceous material, with sands being light yellow in color but can have a greenish tint due to ferrous oxide and small amounts of glauconite.

Soil Properties

Soils encountered during this investigation are separated into two categories based on their origin. The soils encountered consist of roadway embankment fill and Undivided Coastal Plain deposited soils.

Roadway embankment soils were encountered at the following approximate locations:

Alignment	Stations (±)
-L-	12+00 to 17+75
-L-	20+30 to 22+00
-Y1-	12+00 to 13+80
-Y1-	15+00 to 22+40

Roadway embankment fill was encountered up to a maximum depth of about 2 feet and was over laid by asphalt ranging from 0.7 feet to 1 foot in thickness. The roadway embankment soils consist of loose to medium dense, moist to wet, silty fine sand (A-2-4).

Undivided Coastal Plain deposits are present at the surface along the shoulders and beneath the roadway embankment. The Undivided Coastal Plain soils can be generalized as alternating layers of clayey and silty sands. The near surface Undivided Coastal Plain sands along the alignment, generally consist of very loose to dense, moist to saturated, silty and clayey fine sand (A-2-4 and A-2-6). Some of the clayey sands were moderately plastic and exhibited plasticity indices of 16 percent with 26 percent passing the #200 sieve. Slightly plastic to non-plastic, non-cohesive soils were encountered at or near the existing ground surface on a majority of the project.

Groundwater

In general, groundwater and surface water run off along the project flows Southwest to the Lumber River which flows into the Little Pee River. Groundwater was encountered during drilling and sampling along the alignments investigated at depths as shallow as 0.3 feet to greater than 4.8 feet beneath the ground surface. At the time of our investigation water was observed standing in the shoulder ditches at some locations.

The depth of groundwater, beneath the ground surface, will fluctuate with seasonal precipitation and may occur at higher levels at other times of the year above less permeable clayey soils.

Areas of Special Geotechnical Interest

1) Plastic Soils - Moderately plastic soils with plastic indices (PI) of 16 or greater were encountered at the following locations:

Alignment	Stations (±)
-L-	17+35 to 20+25

A discussion of these plastic soils is located above in the section titled “Soil Properties”.

BULK SAMPLES

The following bulk samples were taken for tests to determine the engineering properties of the soil.

Sample No.	Location	Depth (ft.)	Test
S-1	14+00 -L- 55’ RT	1.0-5.0	Proctor and CBR
S-3	14+00 -Y1- 37’ LT	1.0-2.5	Proctor and CBR

UNDISTRUBED SAMPLES

No “Shelby” tube samples were taken.

Closing

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service. Please contact us at your convenience.

Sincerely,
Terracon Consultants, Inc.

NORTH CAROLINA PROFESSIONAL SEAL 14155 ENGINEER ABNER F. RIGGS, JR.

Abner F. Riggs, Jr., PE
Senior Geotechnical Engineer

Andrew Nash

Andrew A. Nash, PE
Geotechnical Department Manager

PROJECT REFERENCE NO.	SHEET NO.
W-5706C	4

0 50 100 200
FEET

-Y1- POT Sta. 12+00.00
BEGIN CONSTRUCTION

ROADWAY EMBANKMENT

WADE & ROSELLA PAIT

STEVE & SUZANNE RUMBLEY

RONALD & CHARLENE GOODEN

-Y1- POT Sta. 15+48.10=
-RAB- POC Sta. 11+16.65

B-4
14+00 -Y1-
37' LT

-L- POT Sta. 17+02.32=
-RAB- POC Sta. 11+94.47

-L- POT Sta. 22+00.00
END TIP PROJECT W-5706C

-L- POT Sta. 23+05.3

RUFUS W. GARNER

B-3
10+65 -RAB-
57' LT

15+00 -L-

UNDIVIDED COASTAL PLAIN

B-2
14+50 -L-
50' LT

-L- POT Sta. 12+00.00
BEGIN TIP PROJECT W-5706C

B-5
11+58 -RAB-
41' LT

15+00 -Y1-

20+00 -L-

UNDIVIDED COASTAL PLAIN

B-6
19+50 -L-
33' LT

C-1
12+25 -L-
11' LT

ROADWAY EMBANKMENT

TO NC HWY 131

NC HWY 41

SR 1005

C-2
15+00 -L-
14' RT

ROADWAY EMBANKMENT

C-4
21+75 -L-
13' RT

TO CROMARTIE RD (SR 1155)

-L- POT Sta. 10+00.00

B-1
14+00 -L-
55' RT

B-8
17+50 -L-
53' RT

B-7
19+50 -L-
37' RT

UNDIVIDED COASTAL PLAIN

UNDIVIDED COASTAL PLAIN

BEGIN -RAB- POC STA. 10+00
END -RAB- POC STA. 13+58.14

B-9
17+60 -Y1-
7' LT

24" CONC C&G

MTL CANOPY

SOHAM OF NC, LLC
PB B156 PG 1561

MTL CANOPY

ISBKBUS

ATM

EARTH PETROLEUM IV, INC
PB B156 PG 1561

MANLEY & CAROL BRISSON

RONALD W. HUGGINS
PB B52 PG 514

UNDIVIDED COASTAL PLAIN

B-10
19+00 -Y1-
30' LT

C-6
20+00 -Y1-
7' RT

20+00 -Y1-

B-11
20+75 -Y1-
30' RT

RONNIE & WANDA SKINNER
PB A81 PG 813

B-12
21+25 -Y1-
34' LT

-Y1- POC Sta. 22+40.00
END CONSTRUCTION

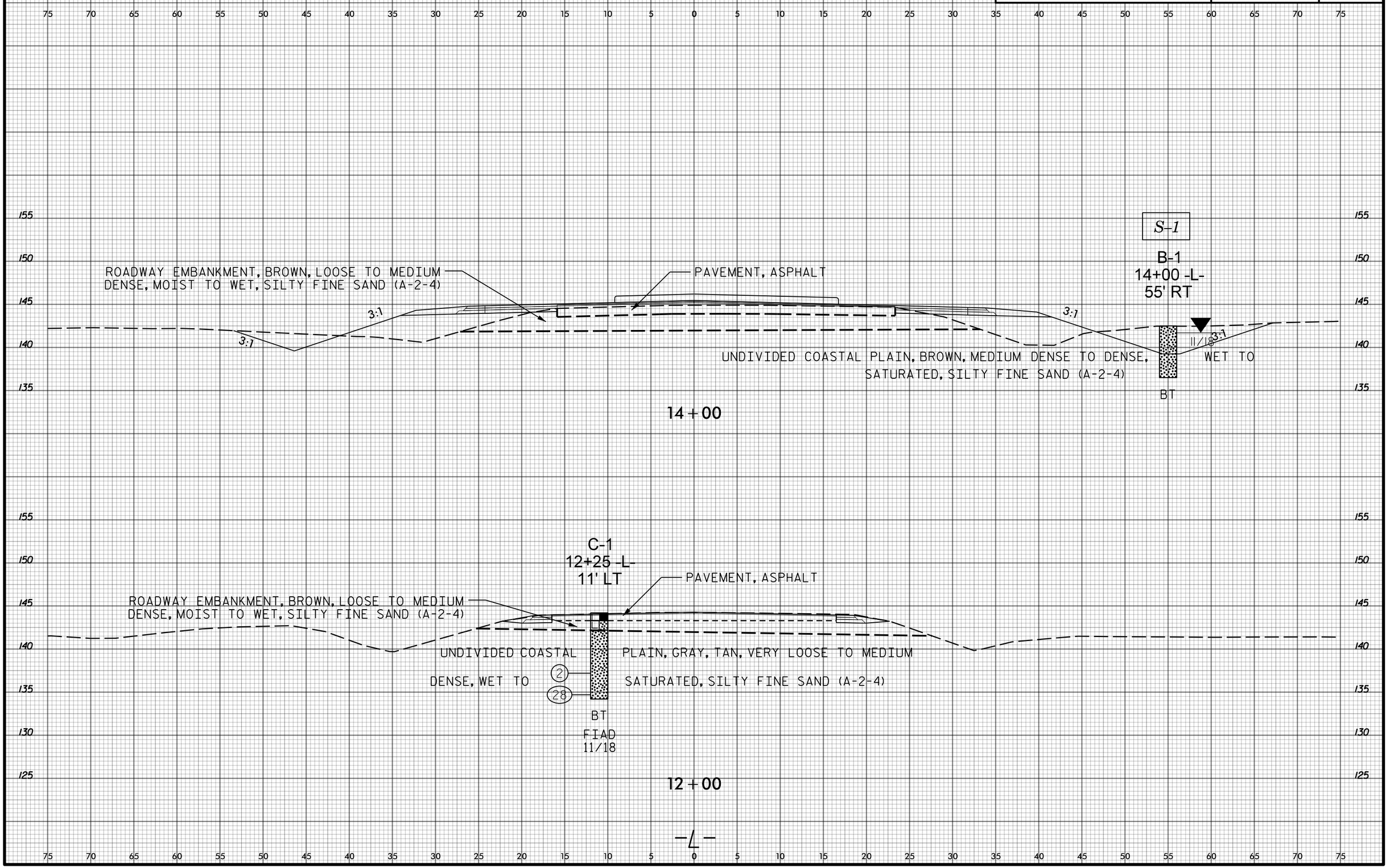
NC HWY 40

TO BLADENBORO

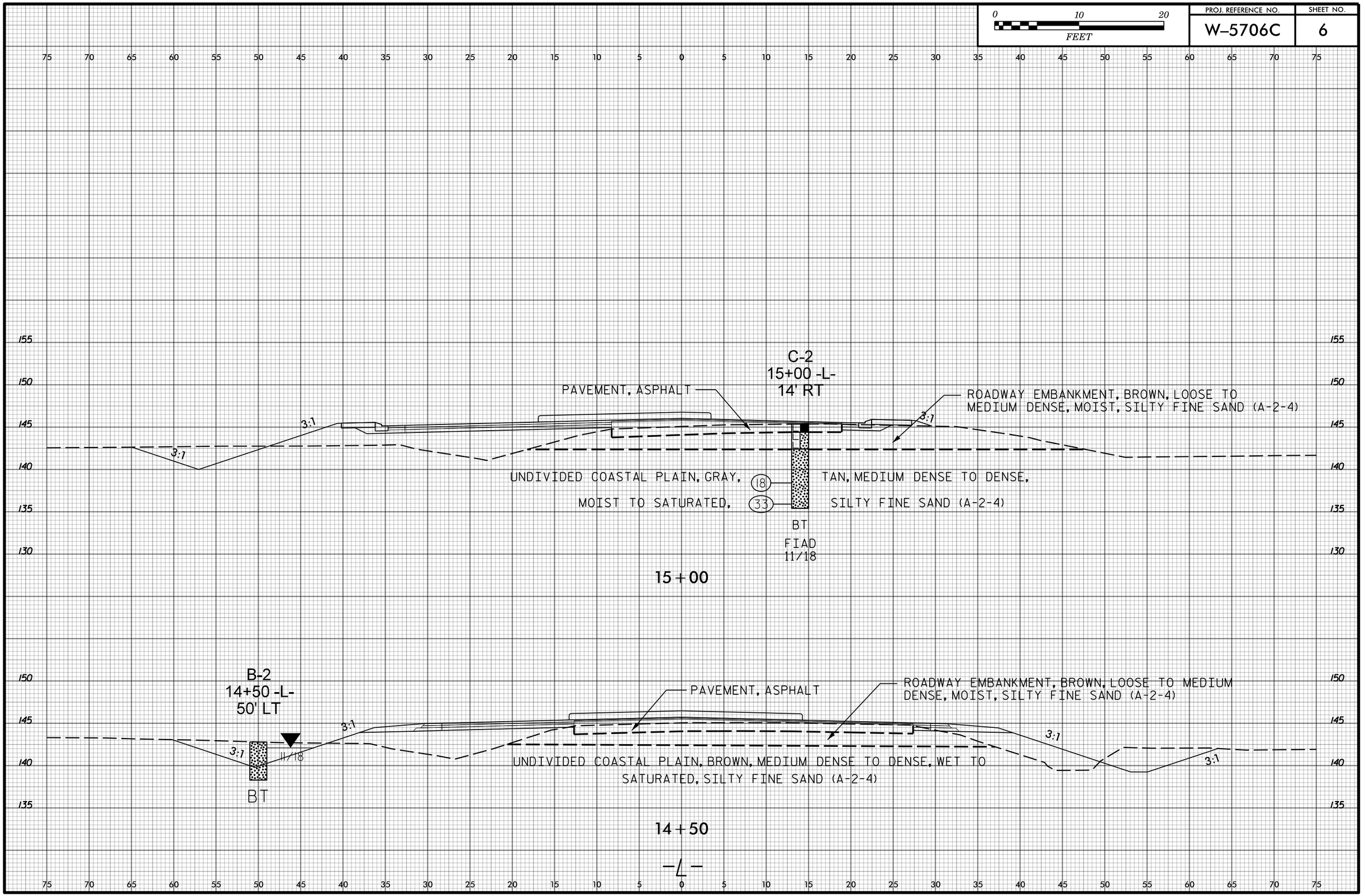
IRIS P. CASHWELL

PROJ. REFERENCE NO.	SHEET NO.
W–5706C	5

0 10 20
FEET



0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W–5706C	6



0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W–5706C	7

SS–1

B-5
17+24 -L-
59' LT

PAVEMENT, ASPHALT

3:1

3:1

3:1

UNDIVIDED	7	11/18 COASTAL PLAIN, TAN, ORANGE, VERY LOOSE TO LOOSE, WET TO SATURATED, SILTY FINE SAND (A-2-4)
ORANGE, TAN,	15	GRAY, MEDIUM DENSE, WET TO SATURATED, CLAYEY FINE SAND (A-2-6)
ORANGE, TAN,	3	VERY LOOSE, SATURATED, SILTY FINE SAND (A-2-4)

BT

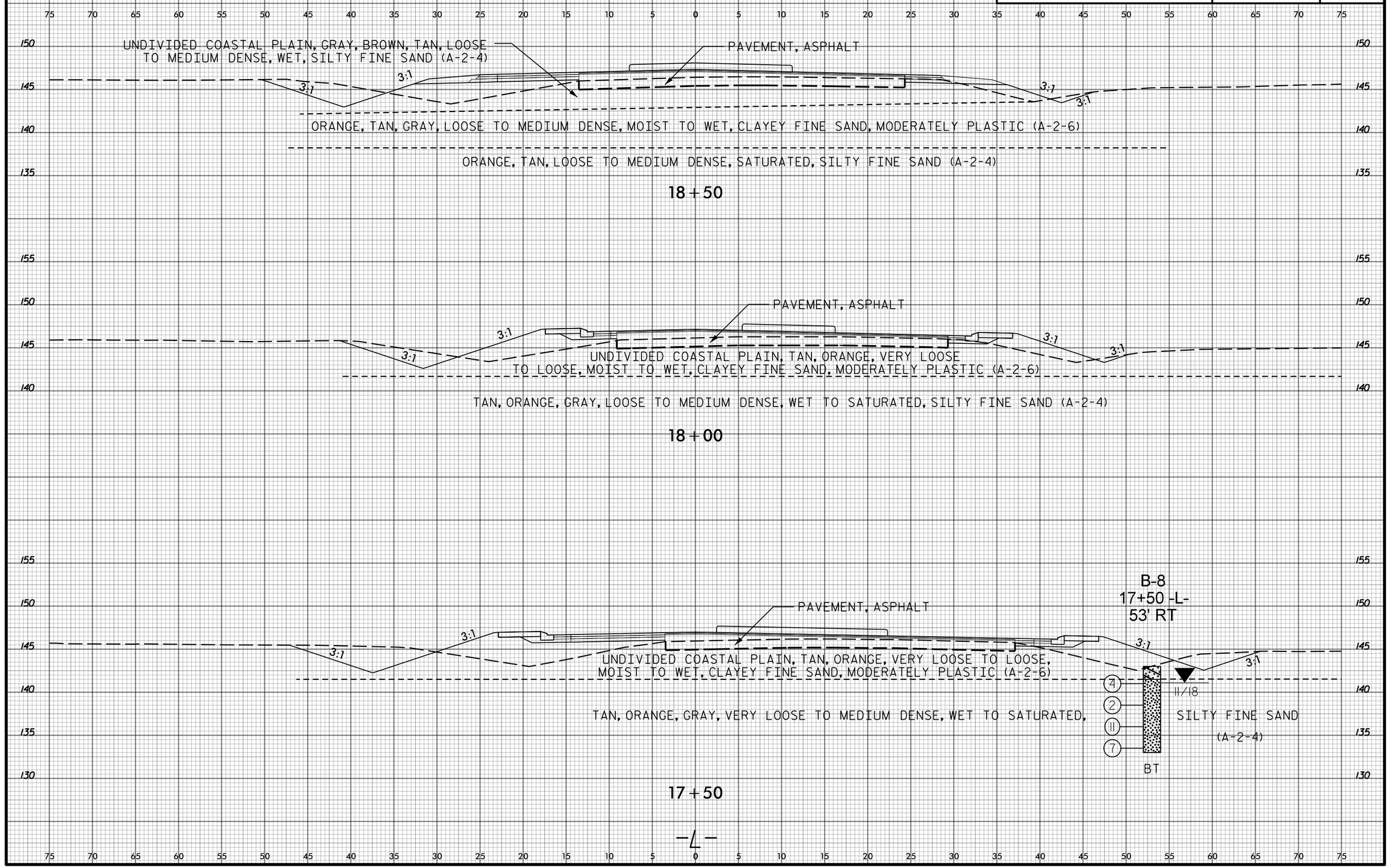
17+20

155 150 145 140 135

85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

–L–

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W-5706C	8



PROJ. REFERENCE NO.	SHEET NO.
W-5706C	9

0 10 20 FEET

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

150 145 140 135

UNDIVIDED COASTAL PLAIN, GRAY, BROWN, TAN, LOOSE TO MEDIUM DENSE, WET, SILTY FINE SAND (A-2-4)

PAVEMENT, ASPHALT

3:1

ORANGE, TAN, GRAY, LOOSE TO MEDIUM DENSE, MOIST TO WET, CLAYEY FINE SAND, MODERATELY PLASTIC (A-2-6)

ORANGE, TAN, LOOSE TO MEDIUM DENSE, SATURATED, SILTY FINE SAND (A-2-4)

20+00

160 155 150 145 140 135

SS-2

B-6
19+50 -L-
33' LT

B-7
19+50 -L-
37' RT

PAVEMENT, ASPHALT

3:1

UNDIVIDED COASTAL PLAIN, GRAY, BROWN, TAN, LOOSE TO MEDIUM DENSE, WET, SILTY FINE SAND (A-2-4)

ORANGE, TAN, GRAY, LOOSE TO MEDIUM DENSE, MOIST TO WET, CLAYEY FINE SAND, MODERATELY PLASTIC (A-2-6)

ORANGE, TAN, LOOSE TO MEDIUM DENSE, SATURATED, SILTY FINE SAND (A-2-4)

11/18

BT

4 7 5 4

11/18

BT

19+50

150 145 140 135

UNDIVIDED COASTAL PLAIN, GRAY, BROWN, TAN, LOOSE TO MEDIUM DENSE, WET, SILTY FINE SAND (A-2-4)

PAVEMENT, ASPHALT

3:1

ORANGE, TAN, GRAY, LOOSE TO MEDIUM DENSE, MOIST TO WET, CLAYEY FINE SAND, MODERATELY PLASTIC (A-2-6)

ORANGE, TAN, LOOSE TO MEDIUM DENSE, SATURATED, SILTY FINE SAND (A-2-4)

19+00

—L—

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

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W-5706C	10

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

165 160 155 150 145 140 135

C-4
21+75 -L-
13' RT

PAVEMENT, ASPHALT

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

3:1

UNDIVIDED COASTAL PLAIN, TAN, GRAY, ORANGE, RED, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

16

21

BT

21+50

155 150 145 140

PAVEMENT, ASPHALT

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

3:1

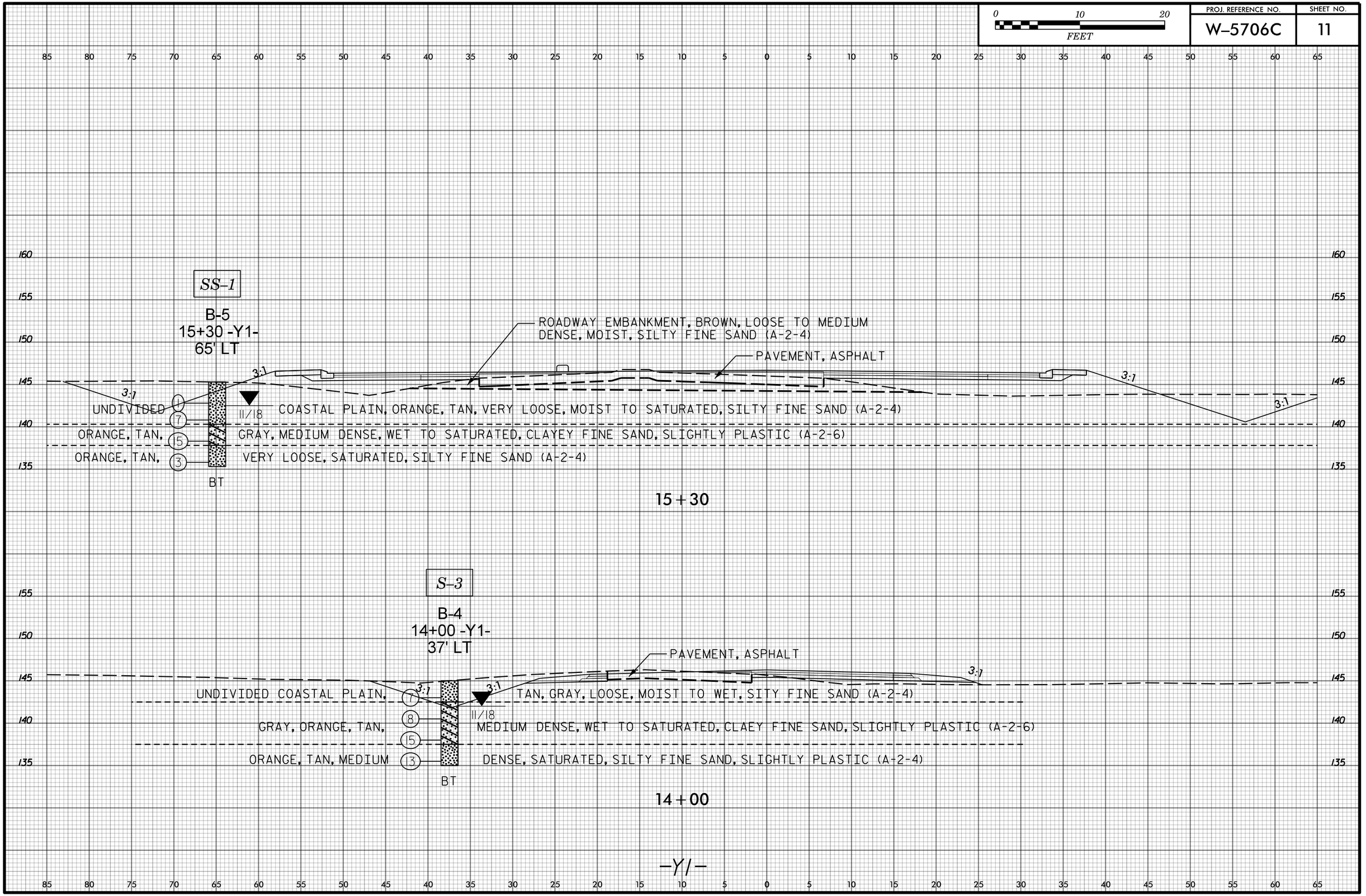
UNDIVIDED COASTAL PLAIN, TAN, GRAY, ORANGE, RED, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

20+50

-L-

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

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W-5706C	11



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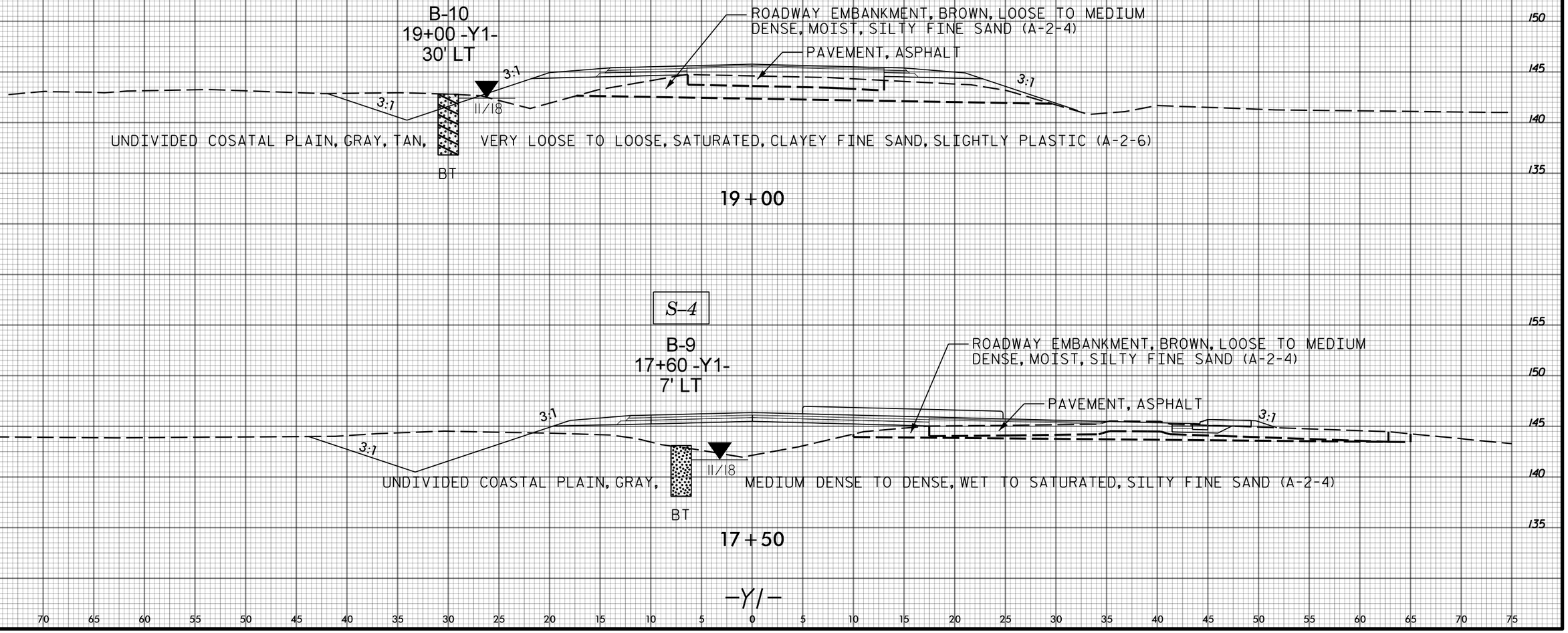
	W-5706C	12



0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W-5706C	13

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

155 150 145 140 135

B-11
20+75 -Y1-
30' RT

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

PAVEMENT, ASPHALT

UNDIVIDED COASTAL PLAIN, GRAY, LOOSE, MOIST TO WET, SILTY FINE SAND (A-2-4)

3:1 3:1 3:1 3:1

UNDIVIDED COASTAL PLAIN,
ORANGE, GRAY, TAN, LOOSE TO MEDIUM DENSE, WET TO SATURATED, CLAYEY FINE SAND, SLIGHTLY PLASTIC (A-2-6)

11/18

BT

20+50

C-6
20+00 -Y1-
7' RT

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

PAVEMENT, ASPHALT

3:1 3:1 3:1 3:1

UNDIVIDED COASTAL PLAIN,
LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, TAN, GRAY, PINK, SILTY FINE SAND (A-2-4)

20
29

BT

20+00

-Y1-

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

0 10 20
FEET

PROJ. REFERENCE NO.	SHEET NO.
W–5706C	14

S–5

B-12
21+25 -Y1-
34' LT

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

PAVEMENT, ASPHALT

3:1

3:1

3:1

3:1

11/18

UNDIVIDED COASTAL PLAIN, GRAY, LOOSE TO MEDIUM DENSE, WET TO SATURATED, CLAYEY FINE SAND, SLIGHTLY PLASTIC (A-2-6)

BT

21+50

–Y1–

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	W–5706C	15

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

160 155 150 145 140 135

SS–1

B-5
11+58 -RAB-
41' LT –Y1– INTERSECTION

11/18

UNDIVIDED (1) (7) COASTAL PLAIN, TAN, ORANGE, VERY LOOSE TO LOOSE, WET TO SATURATED, SILTY FINE SAND (A-2-4)

ORANGE, TAN, (15) GRAY, MEDIUM DENSE, WET TO SATURATED, CLAYEY FINE SAND (A-2-6)

ORANGE, TAN, (3) VERY LOOSE, WET TO SATURATED, SILTY FINE SAND (A-2-4)

BT

11+50

S–2

B-3
10+65 -RAB-
57' LT

ROADWAY EMBANKMENT, BROWN, LOOSE TO MEDIUM DENSE, MOIST, SILTY FINE SAND (A-2-4)

3:1

11/18

UNDIVIDED DENSE, BT

COASTAL PLAIN, TAN, ORANGE, MEDIUM DENSE TO WET TO SATURATED, SILTY FINE SAND (A-2-4)

10+75

–RAB–

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	W–5706C	16	19

REFERENCE: W–5706C

PROJECT: 44852.1.3

APPENDIX A

LABORATORY TESTING SUMMARY
CBR /PROCTOR RESULTS

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 44852.1.3 **TIP:** W-5706C **COUNTY:** BLADEN

DESCRIPTION: ROUNDABOUT AT INTERSECTION OF NC 41 AND NC 410

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200		
S-1	-L-	14+00	55 RT	1.0 - 5.0	A-2-4 (0)	22	NP	11.4	73.6	6.7	8.3	0	100	98	16	--	--
S-2	-RAB-	10+65	57 LT	3.0 - 4.0	A-2-4 (0)	18	NP	16.3	71.4	0.6	11.7	0	100	96	13	--	--
S-3	-Y1-	14+00	37 LT	1.0 - 2.5	A-2-4 (0)	19	2	15.5	62.9	1.6	20.0	0	100	95	22	--	--
S-4	-Y1-	17+60	7 LT	4.0 - 5.0	A-2-4 (0)	18	NP	11.0	73.2	1.6	14.2	0	100	97	16	--	--
S-5	-Y1-	21+25	34 LT	2.0 - 3.0	A-2-6 (0)	22	11	11.5	54.0	8.1	26.4	0	100	97	35	--	--
SS-1	-Y1-	15+30	65 LT	1.0 - 2.5	A-2-4 (0)	25	9	11.8	59.7	3.1	25.4	0	100	97	29	--	--
SS-2	-L-	19+50	37 RT	3.5 - 5.0	A-2-6 (0)	33	16	18.0	56.1	1.7	24.2	0	100	96	26	--	--

NP - NON-PLASTIC

Stephanie H. Huffman

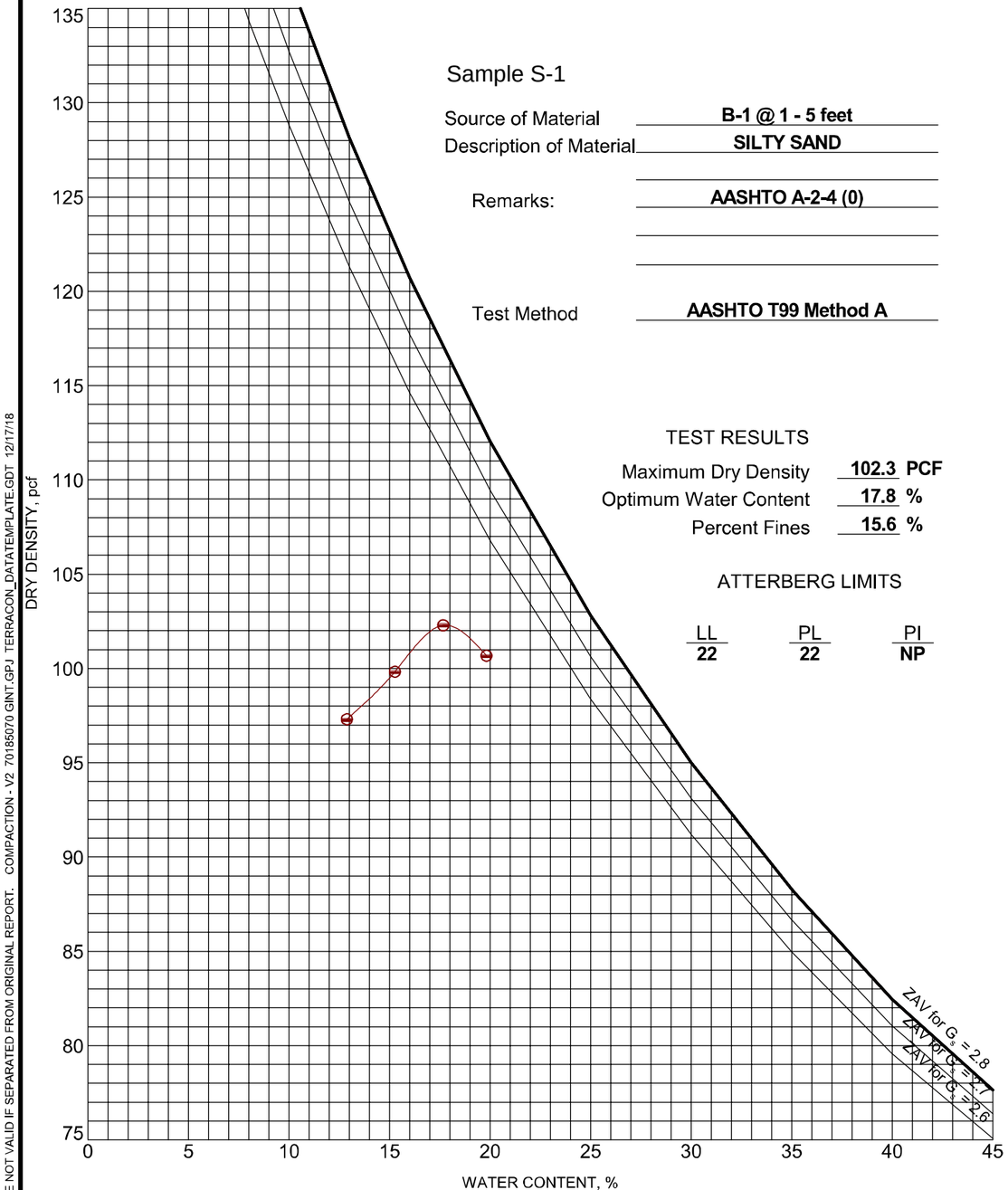
Certified Lab Technician Signature

114-01-1203

Certification Number

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



PROJECT: W-5706C - NC 41 and NC 410	Terracon 2401 Brentwood Rd, Ste 107 Raleigh, NC	PROJECT NUMBER: 70185070	
SITE: NC 41 and NC 410 Elizabethtown, North Carolina		CLIENT: Parsons Raleigh, North Carolina	
		EXHIBIT: B-1	

REPORT FOR CALIFORNIA BEARING RATIO

Service Date: 12/05/18
Report Date: 12/17/18

Terracon
2401 Brentwood Road, Suite 107
Raleigh, NC 27604
919-873-2211

Client
Parsons
Attn: David Wilver
5540 Centerview Drive
Suite 217
Raleigh, North Carolina 27606

Project
W-5706C - NC 41 & NC 410
NC 41 and NC 410
Elizabethtown, North Carolina
Project No. 70185070

SAMPLE INFORMATION

Sample Number:	S-1	Proctor Method:	AASHTO T99 - Method A
Boring Number:	B-1	Maximum Dry Density (pcf):	102.3
Sample Location:	Bulk Sample	Optimum Moisture:	17.8
Depth:	1-5'	Liquid Limit:	22
Material Description:	AASHTO A-2-4 (0)	Plasticity Index:	NP

CBR TEST DATA

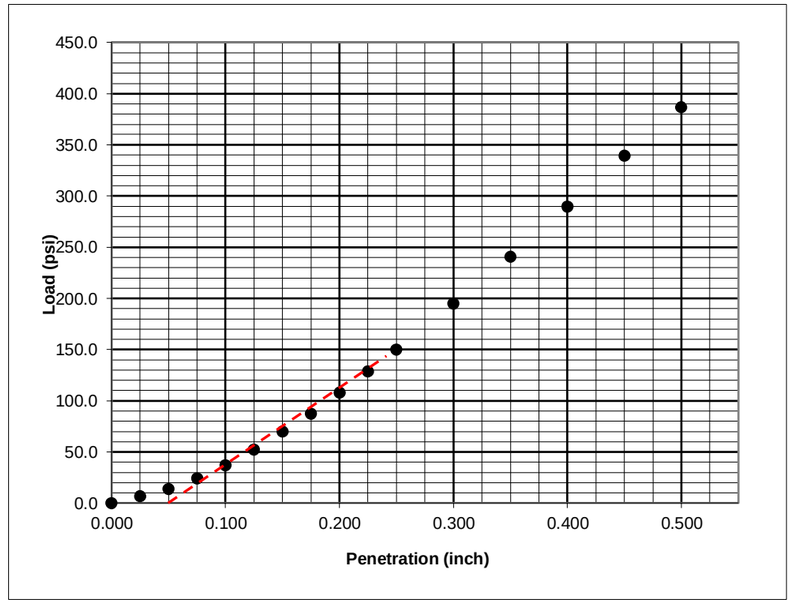
CBR Value at 0.100 inch	**7.5**
CBR Value at 0.200 inch	**10.0**
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	-0.1

DENSITY DATA

Dry Density Before Soaking (pcf)	101.3
Compaction of Proctor (%)	99.0

MOISTURE DATA

Before Compaction (%)	19.1
After Compaction (%)	18.8
Top 1" After Soaking (%)	20.3
Average After Soaking (%)	19.5



Comments:

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Huffman
Reported To: Abner (Buddy) Riggs
Contractor:

Report Distribution

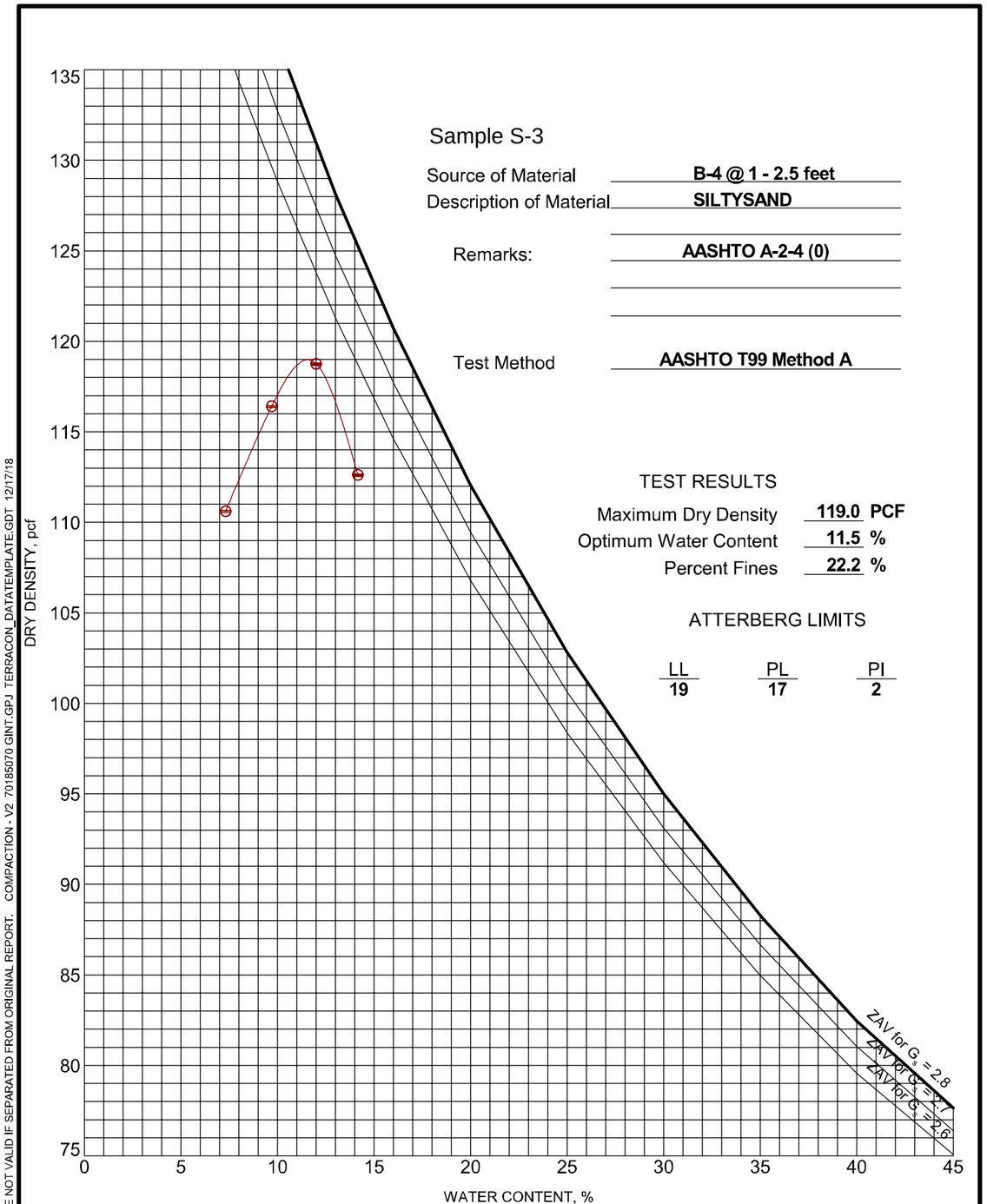
Reviewed by:
Abner F. Riggs, Jr.
Geotechnical Project Manager

Test Methods: ASTM D1883

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



PROJECT: W-5706C - NC 41 and NC 410	Terracon 2401 Brentwood Rd, Ste 107 Raleigh, NC	PROJECT NUMBER: 70185070	
SITE: NC 41 and NC 410 Elizabethtown, North Carolina		CLIENT: Parsons Raleigh, North Carolina	
		EXHIBIT: B-1	

REPORT FOR CALIFORNIA BEARING RATIO

Service Date: 12/05/18
Report Date: 12/17/18

Terracon
2401 Brentwood Road, Suite 107
Raleigh, NC 27604
919-873-2211

Client
Parsons
Attn: David Wilver
5540 Centerview Drive
Suite 217
Raleigh, North Carolina 27606

Project
W-5706C - NC 41 & NC 410
NC 41 and NC 410
Elizabethtown, North Carolina

Project No. 70185070

SAMPLE INFORMATION

Sample Number:	S-3	Proctor Method:	AASHTO T99 - Method A
Boring Number:	B-4	Maximum Dry Density (pcf):	119.0
Sample Location:	Bulk Sample	Optimum Moisture:	11.5
Depth:	1.0-2.5'	Liquid Limit:	19
Material Description:	AASHTO A-2-4 (0)	Plasticity Index:	2

CBR TEST DATA

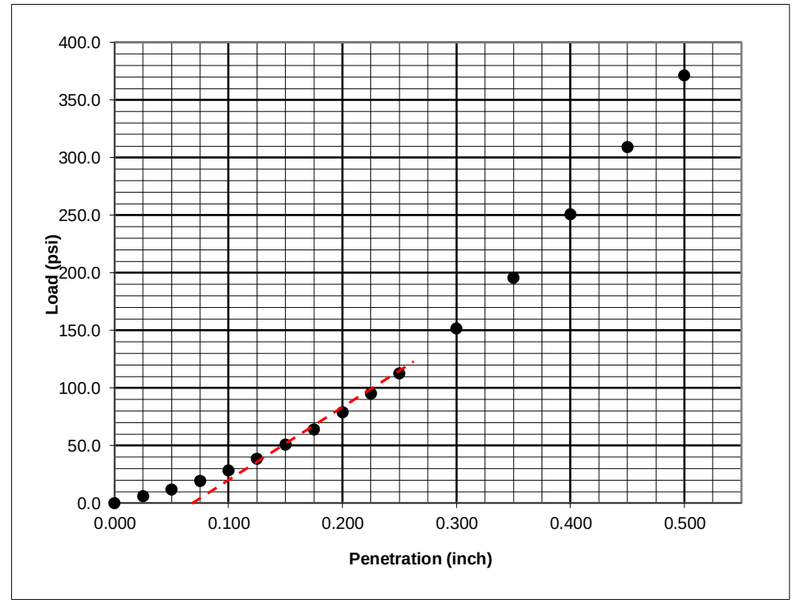
CBR Value at 0.100 inch	**6.5**
CBR Value at 0.200 inch	**8.5**
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	-0.1

DENSITY DATA

Dry Density Before Soaking (pcf)	116.9
Compaction of Proctor (%)	98.2

MOISTURE DATA

Before Compaction (%)	12.7
After Compaction (%)	12.4
Top 1" After Soaking (%)	12.9
Average After Soaking (%)	12.8



Comments:

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Stephanie Huffman
Reported To: Abner (Buddy) Riggs
Contractor:

Report Distribution

Reviewed by:
Abner F. Riggs, Jr.
Geotechnical Project Manager

Test Methods: ASTM D1883

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