

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33727.1.1 (B-4490)	1	10

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 33727.1.1 (B-4490) F.A. PROJ. BRNHS-0024(24)

COUNTY CUMBERLAND

PROJECT DESCRIPTION BRIDGE NO. 116 OVER CSX RR, NORFOLK SOUTHERN RR, & HILLSBORO ST. ON NC 24-210

SITE DESCRIPTION BRIDGE ON -L- OVER CSX RR & HILLSBORO ST. @ -L- STA. 29+57

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. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

PERSONNEL
S&ME, INC.

J.R. SWARTLEY

O.B. OTI

H.R. CONLEY

J.R. MATULA

INVESTIGATED BY J.R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE JUNE 2014

PROJECT: 33727.1.1 ID: B-4490

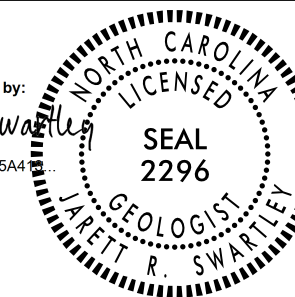
DRAWN BY: T.T. WALKER, J.R. SWARTLEY

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

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

4/2/2015

DocuSigned by:
Jarett Swartley
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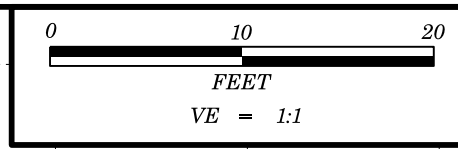
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 33727.1(I)(B-4490)	SHEET NO. 2
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SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS			
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>		WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED). GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL. THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP)  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		ROCK HARDNESS			
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> 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.		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		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 GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROUDED 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 FINGER NAIL.	
CONSISTENCY OR DENSENESS		GROUND WATER		MISCELLANEOUS SYMBOLS		ROCK HARDNESS			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/F ²)		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES		TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD			
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053		AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL - CLAY MOD. - MODERATELY UN - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC DRY - DRY UNIT WEIGHT CSE - COARSE ORG. - ORGANIC SAMPLE ABBREVIATIONS DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST S - BULK DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC S - SPLIT SPOON e - VOID RATIO SD. - SAND, SANDY SL. - SILT, SILTY ST - SHELBY TUBE F - FINE SLI. - SLIGHTLY TCR - TRICONE REFUSAL RS - ROCK FOSS. - FOSSILIFEROUS W - MOISTURE CONTENT RT - RECOMPACTED TRIAXIAL FRAC. - FRACTURED, FRACTURES HI. - HIGHLY V - VERY CBR - CALIFORNIA BEARING RATIO		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> CLAY BITS <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> BK-51 <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> CME-45C <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> -N <input type="checkbox"/> CME-550 <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> -H <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> HAND TOOLS: <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> HAND AUGER <input type="checkbox"/> CORE BIT <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET			
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		BEDDING		INDURATION			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> CLAY BITS <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> BK-51 <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> CME-45C <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> -N <input type="checkbox"/> CME-550 <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> -H <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> HAND TOOLS: <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> HAND AUGER <input type="checkbox"/> CORE BIT <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.			
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> CLAY BITS <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> BK-51 <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> CME-45C <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> -N <input type="checkbox"/> CME-550 <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> -H <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> HAND TOOLS: <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> HAND AUGER <input type="checkbox"/> CORE BIT <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION			
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> CLAY BITS <input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> BK-51 <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> CME-45C <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> -N <input type="checkbox"/> CME-550 <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> -H <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> HAND TOOLS: <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> HAND AUGER <input type="checkbox"/> CORE BIT <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					

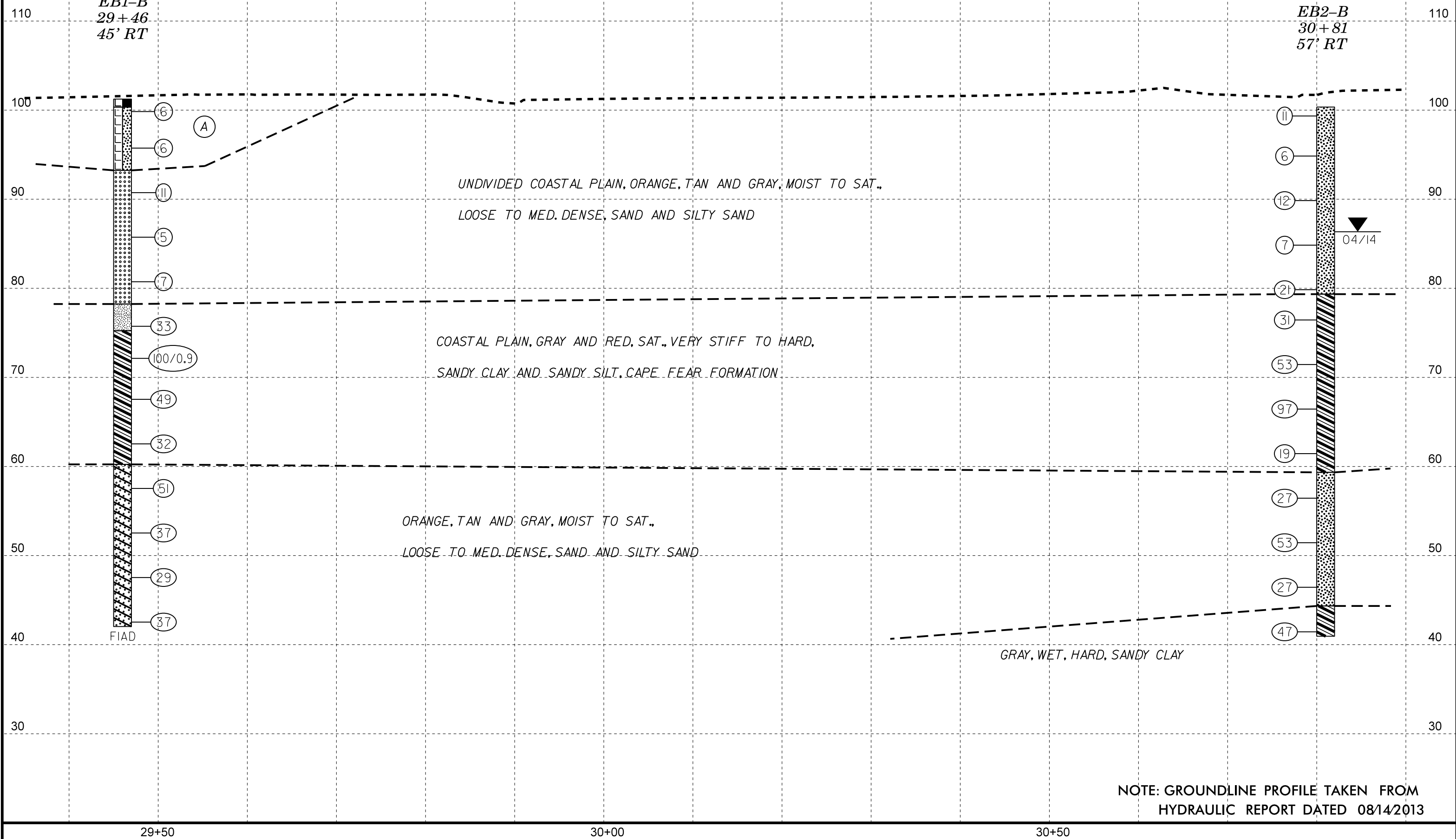


PROJECT REFERENCE NO.	SHEET
33727.1.1 (B-4490)	4
PROFILE ALONG RIGHT SIDE PROJECTED ON -L- GROUNDLINE	

(A) ROADWAY EMBANKMENT, ORANGE, MOIST, LOOSE, SILTY SAND

EB1-B
29+46
45' RT

EB2-B
30+81
57' RT

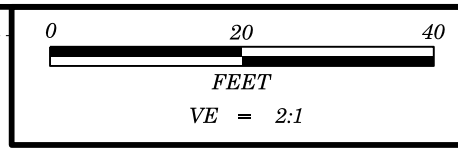


NOTE: GROUNDLINE PROFILE TAKEN FROM
HYDRAULIC REPORT DATED 08/14/2013

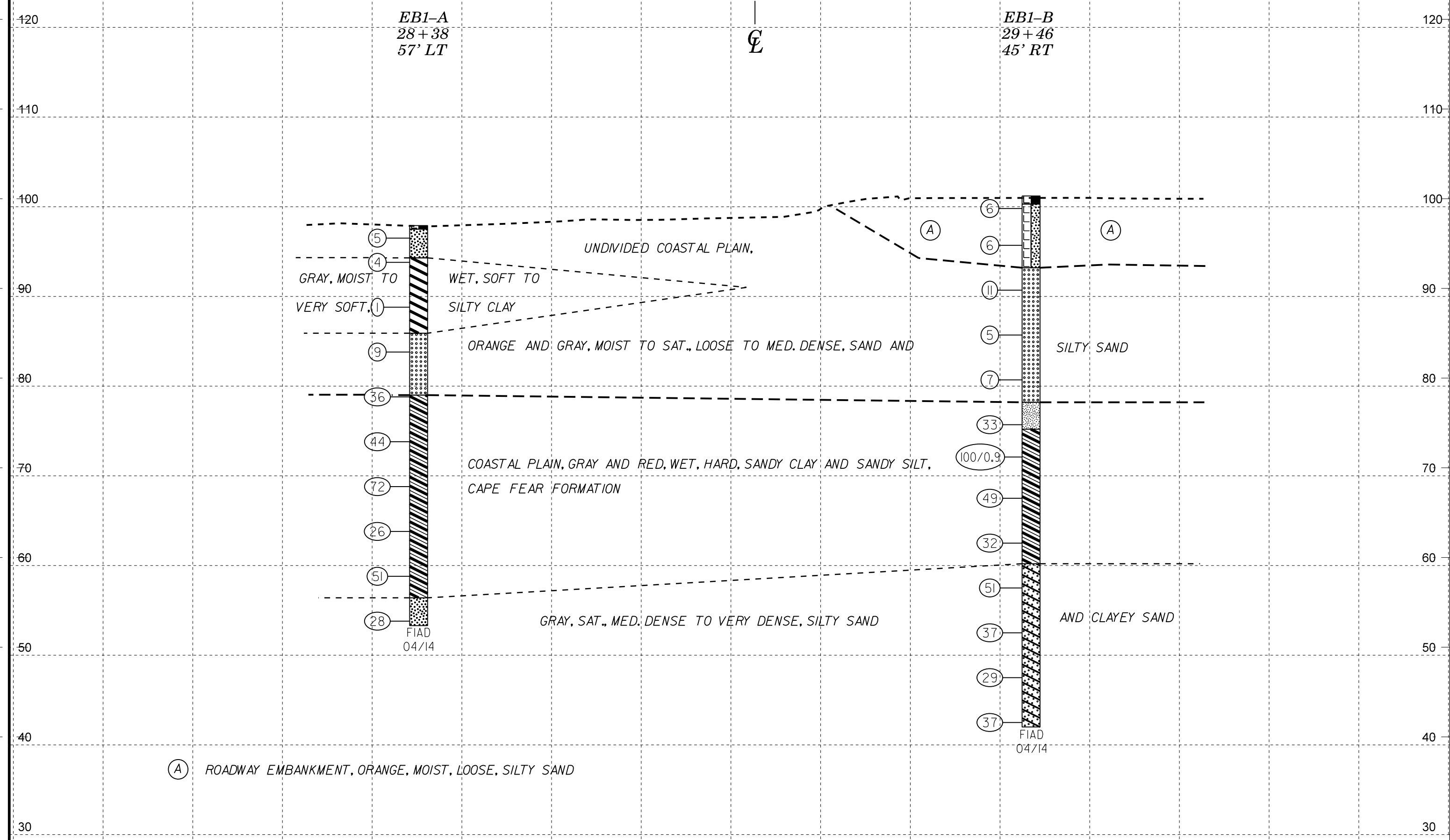
29+50

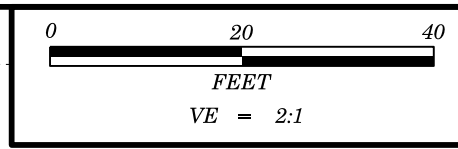
30+00

30+50



PROJECT REFERENCE NO.	SHEET
36596.1.2 (B-4490)	5
CROSS SECTION THROUGH END BENT 1	



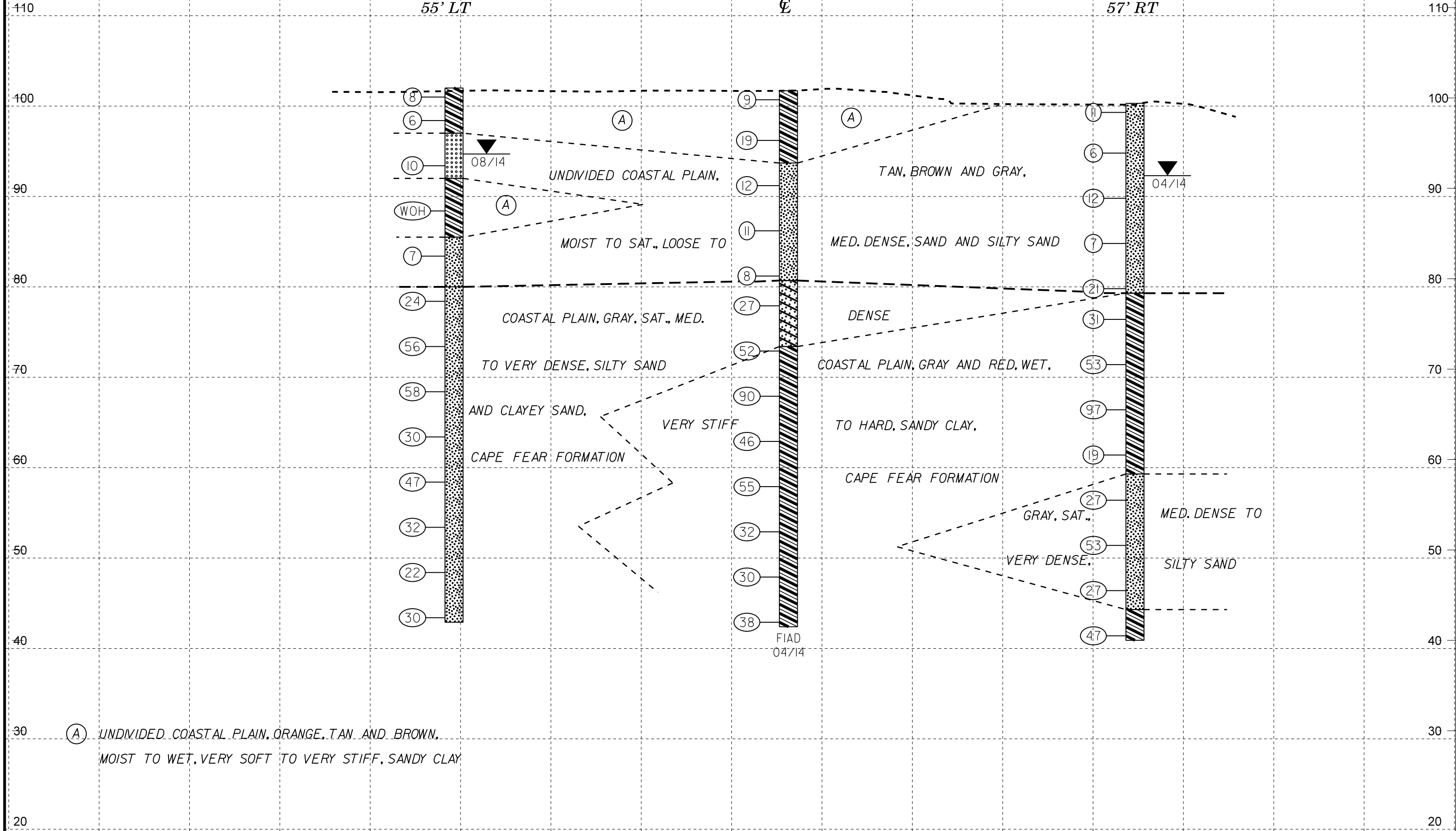


PROJECT REFERENCE NO.	SHEET
36596.1.2 (B-4490)	6
CROSS SECTION THROUGH END BENT 2	

EB2-A
30+20
55' LT

EB2-C
30+46
℄

EB2-B
30+81
57' RT



- 8
- 6
- 10
- WOH
- 7
- 24
- 56
- 58
- 30
- 47
- 32
- 22
- 30

- 9
- 19
- 12
- 11
- 8
- 27
- 52
- 90
- 46
- 55
- 32
- 30
- 38

- 11
- 6
- 12
- 7
- 21
- 31
- 53
- 97
- 19
- 27
- 53
- 27
- 47

UNDIVIDED COASTAL PLAIN,
MOIST TO SAT., LOOSE TO
COASTAL PLAIN, GRAY, SAT., MED.
TO VERY DENSE, SILTY SAND
AND CLAYEY SAND,
CAPE FEAR FORMATION

TAN, BROWN AND GRAY,
MED. DENSE, SAND AND SILTY SAND
DENSE
COASTAL PLAIN, GRAY AND RED, WET,
TO HARD, SANDY CLAY,
CAPE FEAR FORMATION

GRAY, SAT.,
VERY DENSE,
MED. DENSE TO
SILTY SAND

08/14

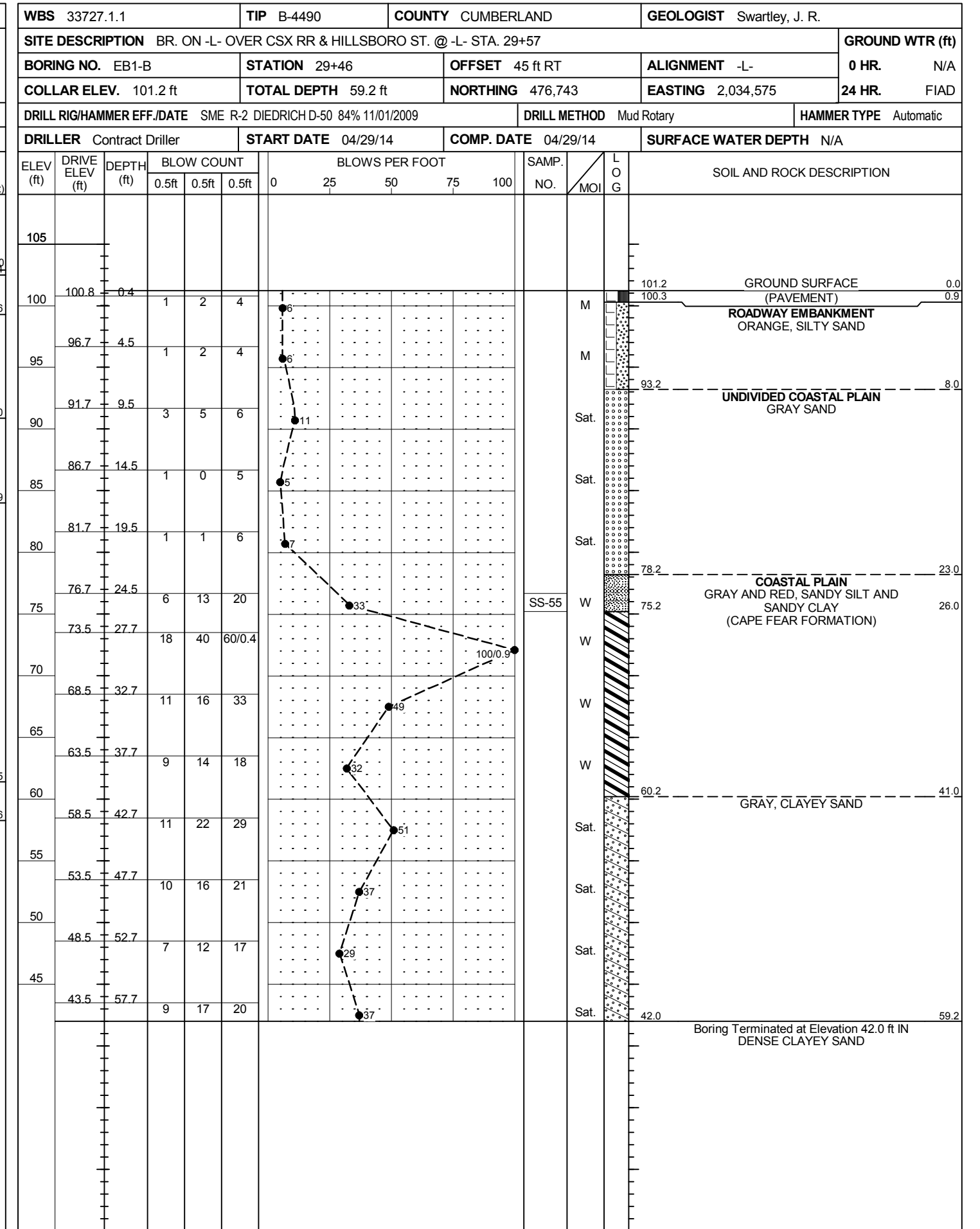
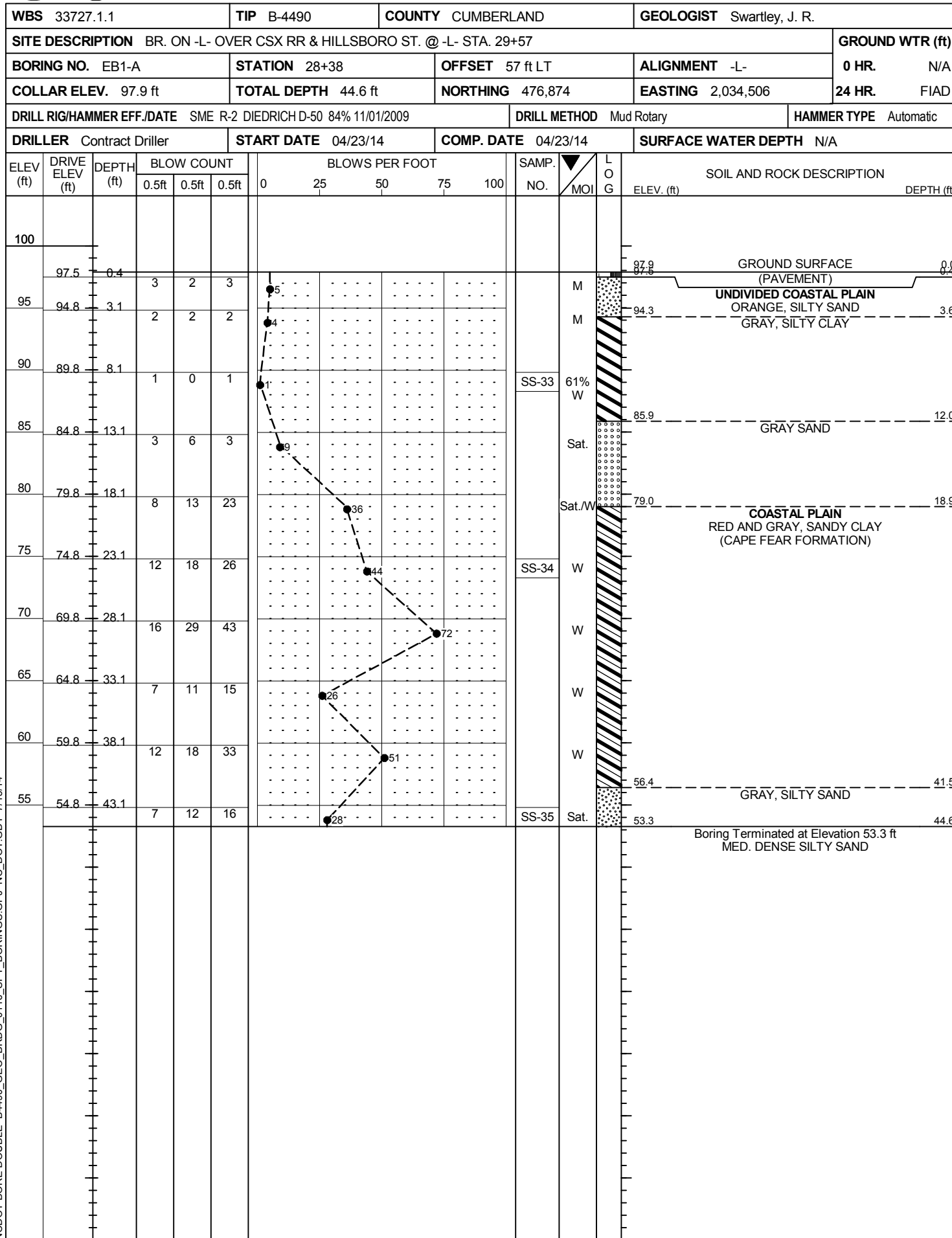
04/14

FIAD
04/14



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT



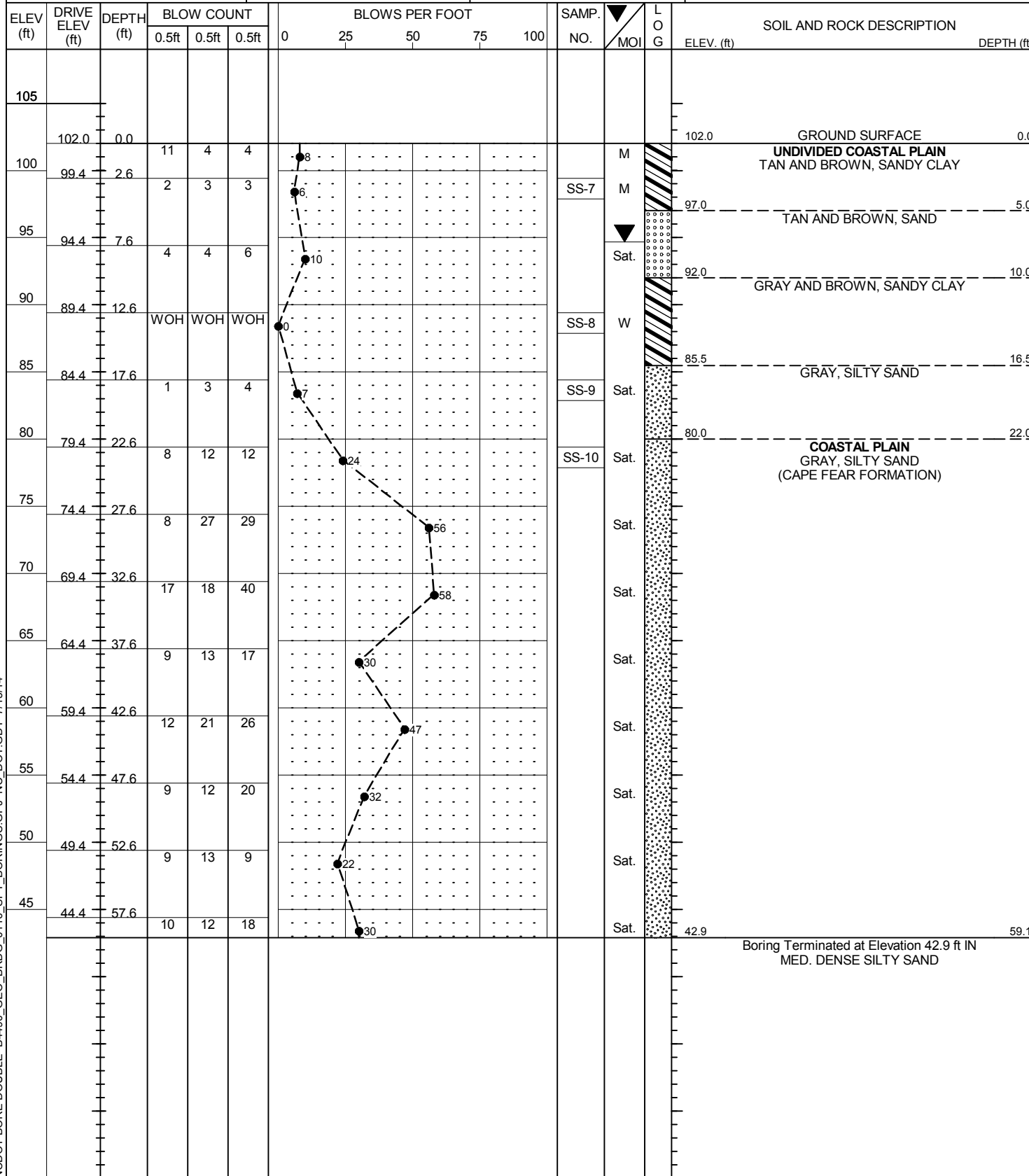
NCDOT BORE DOUBLE B4490_GEO_BRDG_0116_SPT_BORINGS.GPJ NC_DOT.GDT 7/15/14



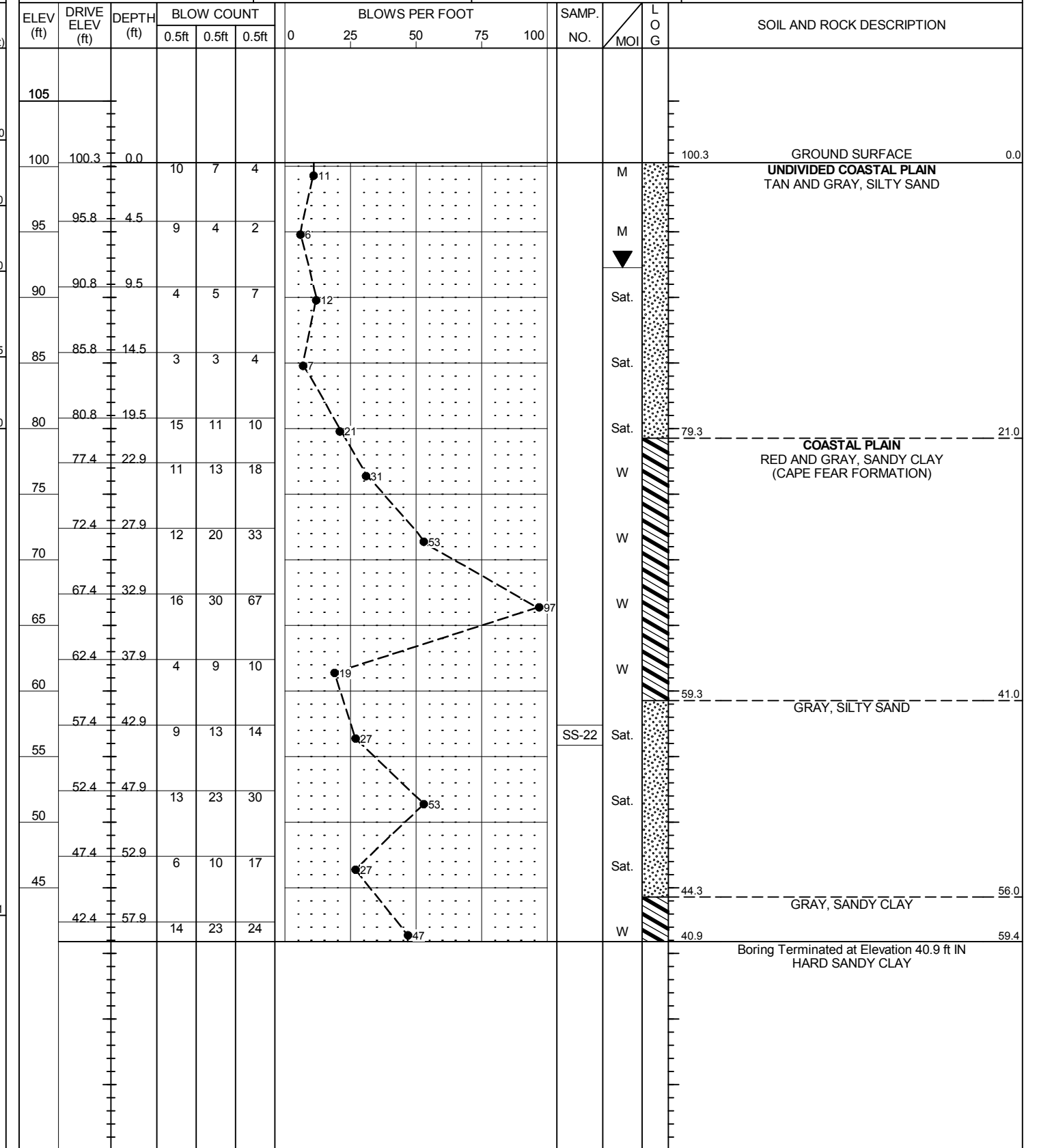
NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 33727.1.1	TIP B-4490	COUNTY CUMBERLAND	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BR. ON -L- OVER CSX RR & HILLSBORO ST. @ -L- STA. 29+57			GROUND WTR (ft)
BORING NO. EB2-A	STATION 30+20	OFFSET 55 ft LT	ALIGNMENT -L-
COLLAR ELEV. 102.0 ft	TOTAL DEPTH 59.1 ft	NORTHING 476,813	EASTING 2,034,677
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Conley, H. R.	START DATE 08/14/13	COMP. DATE 08/15/14	SURFACE WATER DEPTH N/A



WBS 33727.1.1	TIP B-4490	COUNTY CUMBERLAND	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BR. ON -L- OVER CSX RR & HILLSBORO ST. @ -L- STA. 29+57			GROUND WTR (ft)
BORING NO. EB2-B	STATION 30+81	OFFSET 57 ft RT	ALIGNMENT -L-
COLLAR ELEV. 100.3 ft	TOTAL DEPTH 59.4 ft	NORTHING 476,688	EASTING 2,034,699
DRILL RIG/HAMMER EFF./DATE SME R-2 DIETRICH D-50 84% 11/01/2009		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 04/17/14	COMP. DATE 04/17/14	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B4490_GEO_BRDG_0116_SPT_BORINGS.GPJ NC_DOT.GDT 7/15/14

WBS 33727.1.1		TIP B-4490		COUNTY CUMBERLAND		GEOLOGIST Swartley, J. R.								
SITE DESCRIPTION BR. ON -L- OVER CSX RR & HILLSBORO ST. @ -L- STA. 29+57							GROUND WTR (ft)							
BORING NO. EB2-C		STATION 30+46		OFFSET CL		ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEV. 101.7 ft		TOTAL DEPTH 59.3 ft		NORTHING 476,753		EASTING 2,034,684		24 HR. FIAD						
DRILL RIG/HAMMER EFF./DATE SME R-2 DIEDRICH D-50 84% 11/01/2009						DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER Contract Driller		START DATE 04/21/14		COMP. DATE 04/21/14		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
105														
	101.7	0.0												101.7 GROUND SURFACE 0.0
100			5	5	4	9						M		UNDIVIDED COASTAL PLAIN ORANGE AND TAN, SANDY CLAY
	97.2	4.5										M		
95			12	9	10	19						M		
	92.2	9.5										M		93.7 TAN, SILTY SAND 8.0
90			4	5	7	12						M		
	87.2	14.5										Sat.		
85			2	2	9	11						Sat.		
	82.2	19.5										Sat.		
80			4	3	5	8						Sat.		80.7 COASTAL PLAIN GRAY, CLAYEY SAND (CAPE FEAR FORMATION) 21.0
	78.9	22.8										Sat.		
75			10	12	15	27						SS-23 Sat.		
	73.9	27.8										Sat./W		73.4 RED AND GRAY, SANDY CLAY 28.3
70			18	23	29	52						W		
	68.9	32.8										W		
65			16	32	58	90						W		
	63.9	37.8										SS-24 W		
60			12	18	28	46						W		
	58.9	42.8										SS-25 W		
55			12	22	33	55						W		
	53.9	47.8										W		
50			9	13	19	32						W		
	48.9	52.8										W		
45			10	12	18	30						W		
	43.9	57.8										W		
			11	15	23	38						W		42.4 Boring Terminated at Elevation 42.4 ft IN HARD SANDY CLAY 59.3

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	10	40	200		
SS-33	57LT	28+38	8.1-9.6	A-7-5(35)	66	29	3.1	3.1	16.6	77.3	100	98	95	61.1	-
SS-34	57LT	28+38	23.1-24.6	A-6(4)	35	13	22.8	34.2	32.9	10.2	100	86	50	-	-
SS-35	57LT	28+38	43.1-44.6	A-2-4(0)	31	10	48.6	31.1	16.2	4.1	100	74	26	-	-

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	10	40	200		
SS-55	45RT	29+46	24.5-26.0	A-4(1)	36	9	26.9	36.2	28.8	8.1	99	84	44	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	10	40	200		
SS-7	55LT	30+20	2.6-4.1	A-6(5)	32	16	31.1	18.2	16.3	34.4	97	75	52	-	-
SS-8	55LT	30+20	12.6-14.1	A-6(7)	31	16	7.5	37.0	15.1	40.4	100	97	62	-	-
SS-9	55LT	30+20	17.6-19.1	A-2-4(0)	23	NP	5.9	75.0	9.0	10.1	100	100	26	-	-
SS-10	55LT	30+20	22.6-24.1	A-2-4(0)	37	NP	62.7	16.7	12.5	8.1	97	54	23	-	-

EB2-C

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	10	40	200		
SS-23	CL	30+46	22.8-24.3	A-2-6(0)	38	16	57.6	22.4	16.0	4.1	96	58	23	-	-
SS-24	CL	30+46	37.8-39.3	A-6(1)	37	13	31.5	37.6	22.7	8.1	100	85	36	-	-
SS-25	CL	30+46	42.8-44.3	A-6(1)	36	12	37.4	30.3	22.1	10.2	99	77	37	-	-

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SEVES)			% MOISTURE	% ORGANIC
							C SAND	F SAND	SILT	CLAY	10	40	200		
SS-22	57RT	30+81	42.9-44.1	A-2-4(0)	28	8	43.4	30.8	16.8	9.0	99	76	29	-	-