



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION


PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

January 12, 2015

MEMORANDUM TO: Joey Hopkins, P.E.
Division 5 Engineer

ATTENTION: Lisa B. Gilchrist, E.I.
Division Bridge Program Manager

FROM: Kyung (K. J.) Kim, Ph.D., P.E. 
Eastern Regional Geotechnical Manager

STATE PROJECT: 17BP.5.R.53 (BMU-380062)
COUNTY: Granville
DESCRIPTION: Bridge No. 62 on SR 1004 (Butner Rd.) over Knap of Reeds Creek

SUBJECT: Geotechnical Report - Design and Construction Recommendations

I. Slope/Embankment Stability

A. Slope Design

Recommend that all slopes be constructed at a ratio of 2:1 (H:V) or flatter.

B. Undercut

A quantity of 100 cubic yards of undercut for embankment stability should be included in the project contract as a contingency item to be used at the discretion of the Engineer.

C. Geotextile for Soil Stabilization

A quantity of 100 square yards of geotextile for soil stabilization should be included in the project contract as a contingency item to be used at the discretion of the Engineer.

II. Subgrade Stability

A. Subgrade Undercut

Recommend a quantity of 100 cubic yards of subgrade undercut be included in the project contract as a contingency item for areas of unsuitable subgrade soil to be used at the discretion of the Engineer.

MAILING ADDRESS:
EASTERN REGIONAL OFFICE
GEOTECHNICAL ENGINEERING UNIT
1570 MAIL SERVICE CENTER
RALEIGH NC 27699-1570

TELEPHONE: 919-662-4710
FAX: 919-662-3095

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
3301 JONES SAUSAGE RD., SUITE 100
GARNER, NC 27529-9489

B. Geotextile for Soil Stabilization

Recommend a quantity of 100 square yards of geotextile for soil stabilization be included in the project contract as a contingency item to be used at the discretion of the Engineer.

III. Borrow Specifications

A. Select Granular Material

Select Granular Material for embankment construction on geotextile for soil stabilization shall meet the criteria outlined in Standard Specification, Article 1016-3 Class II or Class III. Include 200 cubic yards of this material in the project contract as a contingency item. The backfill material should be placed on geotextile for soil stabilization to a height not less than three (3) feet above geotextile for soil stabilization.

B. Shrinkage Factor

A shrinkage factor of 20 percent is recommended in the calculation of all earthwork quantities. This is to compensate for loss of soils due to erosion, clearing and grubbing of fill areas, and an increase in embankment quantities required due to consolidation of underlying soils and other factors.

IV. Miscellaneous

A. Reduction of Unclassified Excavation – Clearing and Grubbing

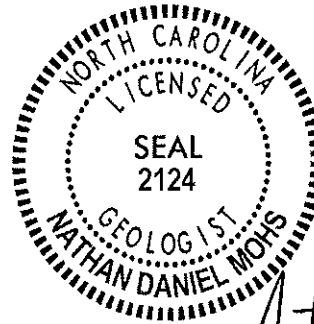
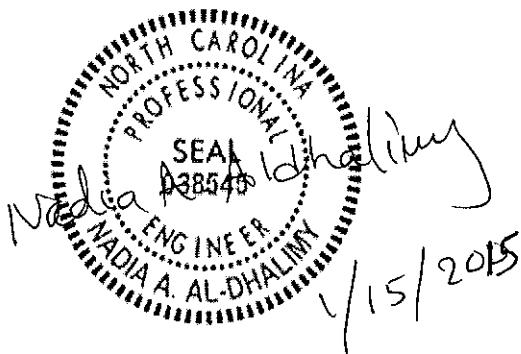
No significant loss of unclassified excavation is anticipated due to clearing and grubbing.

B. Reduction of Unclassified Excavation – Unsuitable Unclassified

Unclassified excavation will be derived from cut slope, ditch, and abutment embankment excavation. It is anticipated that 100 percent of unclassified excavation is suitable for embankment construction.

Prepared by,

Prepared by,



Nadia Al-Dhalimy, P.E.
Geotechnical Operations Engineer

Nathan Mohs, L.G.
Transportation Engineering Geologist

JLP/CAK/NAA/NDM



**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL ENGINEERING UNIT**

Summary of Quantities

WBS Number: 17BP.5.R.53 County: Granville Project Engineer: NAA
 TIP Number: BMU-380062 Field Office: Raleigh Project Geologist: NDM
 Description: Bridge No. 62 on SR 1004 (Butner Rd.) over Knap of Reeds Creek

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	100	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Contingency	N/A	N/A	100	CY
Total Quantity of Undercut Excavation =								
0195000000-E	Select Granular Material	265 - Select Granular Material	III. A	Contingency	N/A	N/A	200	CY
Total Quantity of Select Granular Material =								
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Contingency	N/A	N/A	100	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. B	Contingency	N/A	N/A	100	SY
Total Quantity of Geotextile for Soil Stabilization =								
200								
These Items Only Impact Earthwork Totals								
N/A	Shrinkage Factor	235 - Embankments	III. B	N/A	N/A	N/A	20	%



STATE OF NORTH CAROLINA
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January 12, 2015

STATE PROJECT: 17BP.5.R.53 (BMU-380062)
COUNTY: Granville
DESCRIPTION: Bridge No. 62 on SR 1004 (Butner Rd.) over Knap of Reeds
Creek
SUBJECT: Geotechnical Report – Inventory

The Geotechnical Engineering Unit has completed a subsurface investigation for this project and presents the following inventory. No plans, profiles, or cross-sections will be submitted for this roadway project.

Project Description

The project consists of the replacement of Bridge No. 62 on SR 1004 (Butner Rd.) over Knap of Reeds Creek. The total length of the roadway portion of the project is 0.2 miles. Bore logs from the bridge subsurface investigation in December 2014 were referenced for this project.

Physiography & Geology

The project is located in gently rolling terrain of southern Granville County. Knap of Reeds Creek is part of the Neuse River Basin. Geologically the site is characterized by sands and clays associated with weathered sedimentary rock of the Durham Triassic Basin.

Soil Properties

Soils encountered at the site are roadway embankment, alluvial, and Triassic residual soils. Roadway embankment soils consist of soft to medium stiff, sandy and silty clay (A-6, A-7). This material varies in depth up to 9.6 feet at the bridge approaches. Alluvial soils deposited by Knap of Reeds Creek consist primarily of very loose, silty to fine sand (A-2-4, A-3). Triassic residual soils consist of moist, loose to medium dense, coarse sand (A-1) with gravel and some cobbles encountered on the End Bent 2 side of the bridge.

Groundwater

Groundwater is not expected to cause any problems during construction.

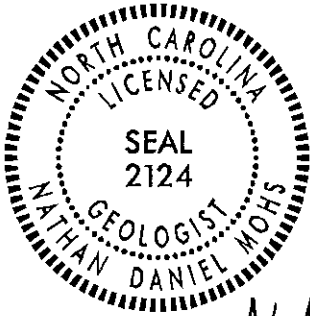
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LOCATION:
3301 JONES SAUSAGE RD., SUITE 100
GARNER, NC 27529-9489

Prepared by,



Nathan Mohs 1/15/15

Nathan Mohs, L.G.
Project Geological Engineer

JLP/NTR/NDM



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Division 5 Engineer

ATTENTION: Lisa B. Gilchrist, E.I.
Division Bridge Program Manager

FROM: Kyung (K. J.) Kim, Ph.D., P.E. *KJK*
Eastern Regional Geotechnical Manager

STATE PROJECT: 17BP.5.R.53 (BMU-380062)
FEDERAL PROJECT: N/A
COUNTY: Granville

DESCRIPTION: Bridge No. 62 on SR 1004 (Butner Road) over Knap of Reeds
Creek between SR 1120 and SR 1121

SUBJECT: Bridge Foundation Recommendations

The Geotechnical Engineering Unit has completed the subsurface investigation and has prepared the foundation design recommendations for the above structure and presents the following project data:

- Bridge Inventory (12) pages
- Foundation Design Recommendations (5) pages
- Design Calculations () pages
- Special Provisions () pages

Please call Nadia Al-Dhalimy, P.E. or Chris Kreider, P.E. at (919) 662-4710 if there are any questions concerning this memorandum.

KJK/CAK/NAA

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GEOTECHNICAL ENGINEERING UNIT
1570 MAIL SERVICE CENTER
RALEIGH NC 27699-1570

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LOCATION:
3301 JONES SAUSAGE RD., SUITE 100
GARNER, NC 27529-9489

FOUNDATION RECOMMENDATIONS

PROJECT 17BP.5.R.53

DESCRIPTION Bridge No. 62 on SR 1004

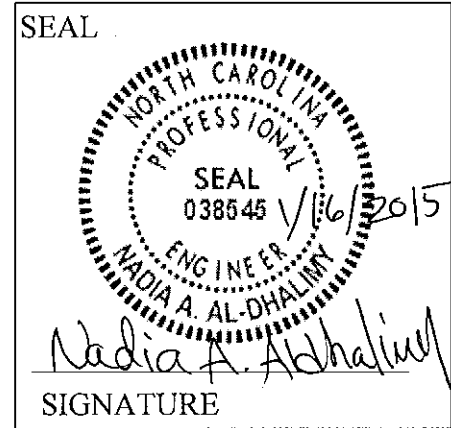
T.I.P. NO. BMU-380062

over Knap of Reeds Creek between SR 1120 and

COUNTY Granville

SR 1121

STATION 15+65.00 -L-



	INITIALS	DATE
DESIGN	NAA	1/12/2015
CHECK	CAK	1/16/15
APPROVAL	KJL	1/16/15

BENT NO.	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	14+96.25 -L-	Cap on HP 12 x 53 Steel Piles	55 Tons/Pile	Bottom of Cap Elevation = 278.1 ft. ± Estimated Pile Length = 15 ft. ± Number of Piles = 7
BENT 1	15+22.44 -L-	42 in. Diameter Drilled Piers	360 Tons/Pier	Bottom of Cap Elevation = 280.6 ft. ± Estimated Drilled Pier Top El. = 271.6 ft. ± Point of Fixity Elevation = 261 ft. ± Tip Elevation No Higher Than = 254 ft. Number of Piers = 3
BENT 2	15+92.56 -L-	42 in. Diameter Drilled Piers	425 Tons/Pier	Bottom of Cap Elevation = 280.8 ft. ± Estimated Drilled Pier Top El. = 271.1 ft. ± Point of Fixity Elevation = 256 ft. ± Tip Elevation No Higher Than = 247 ft. Number of Piers = 3
END BENT 2	16+33.75 -L-	Cap on HP 12 x 53 Steel Piles	65 Tons/Pile	Bottom of Cap Elevation = 278.5 ft. ± Estimated Pile Length = 15 ft. ± Number of Piles = 7

COMMENTS & NOTES (See Following Page)

FOUNDATION RECOMMENDATION NOTES ON PLANS

1. FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 55 TONS PER PILE.
3. DRIVE PILES AT END BENT NO. 1 TO A REQUIRED DRIVING RESISTANCE OF 95 TONS PER PILE.
4. PILES AT END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.
5. DRIVE PILES AT END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 110 TONS PER PILE.
6. STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 1 AND END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
7. FOR DRILLED PIERS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
8. DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 360 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 55 TSF.
9. DRILLED PIERS AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 425 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 55 TSF.
10. PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 1. IF REQUIRED, DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 265 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. THE ENGINEER WILL DETERMINE THE NEED FOR PERMANENT CASINGS.
11. PERMANENT STEEL CASINGS ARE REQUIRED FOR DRILLED PIERS AT BENT NO. 2. DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 262 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
12. INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 254 FT AND WITH THE REQUIRED TIP RESISTANCE.
13. INSTALL DRILLED PIERS AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 247 FT AND WITH THE REQUIRED TIP RESISTANCE.
14. DRILLED PIER EXCAVATIONS AT BENT NO. 1 AND BENT NO. 2 WILL EXTEND INTO MATERIALS THAT DETERIORATE WHEN EXPOSED TO THE AIR AND WATER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE AND PLACE CONCRETE IMMEDIATELY AFTER THE EXCAVATION IS COMPLETED.

Designed by: NAA

Date: 1/12/2015

Checked by: CAR Date: 1/16/15

15. THE SCOUR CRITICAL ELEVATION AT BENT NO. 1 IS ELEVATION 264.5 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
16. THE SCOUR CRITICAL ELEVATION AT BENT NO. 2 IS ELEVATION 260 FEET. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
17. SPT MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SPT. FOR SPT TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
18. CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO.1 AND BENT NO. 2. FOR CSL TESTING, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.
19. SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

SPECIAL NOTE ON PLANS

20. IF THE DRILLED PIER HOLE LEFT OPEN MORE THAN 24 HOURS AFTER COMPLETION OF EXCAVATION TO THE TIP ELEVATION, THE HOLE MUST BE OVERREAMED.

FOUNDATION RECOMMENDATION COMMENTS

1. 1.5:1 (H:V) SLOPES FOR END BENTS WITH SLOPE PROTECTION TO BERM ARE OK.
2. NO WAITING PERIOD IS REQUIRED BEFORE BEGINNING ANY WORK FOR END BENT CONSTRUCTION AFTER COMPLETION OF THE EMBANKMENT AT EACH END BENT.
3. USE REINFORCED BRIDGE APPROACH FILL DETAILS AT BOTH END BENTS.
4. DESIGN SCOUR ELEVATIONS AT BENT NO. 1 IS 266.4 FEET.
5. DESIGN SCOUR ELEVATIONS AT BENT NO. 2 IS 262.0 FEET.

Designed by: NAA

Date: 1/12/2015

Checked by: *CAH* Date: *1/16/15*

DRILLED PIER PAY ITEMS
(For LRFD Projects - Revised 8/15/12)

WBS ELEMENT 17BP.5.R.53 DATE 1/12/2015
 TIP NO. BMU-380062 DESIGNED BY NAA
 COUNTY Granville CHECKED BY CAK
 STATION 15+65.00 -L-
 DESCRIPTION Bridge No. 62 on SR 1004 over Knap of Reeds Creek
Between SR 1120 and SR 1121

NUMBER OF BENTS WITH DRILLED PIERS 2
 NUMBER OF DRILLED PIERS PER BENT 3
 NUMBER OF END BENTS WITH DRILLED PIERS _____
 NUMBER OF DRILLED PIERS PER END BENT _____

Bent # or End Bent #	DRILLED PIER PAY ITEM QUANTITIES				
	Permanent Steel Casing For 42" Dia. Drilled Pier (yes/no/maybe)	42" Dia. * Drilled Piers Not In Soil (per linear ft)	SID Inspections (per each)	SPT Testing (per each)	CSL Testing (per each)
Bent # 1	maybe				
Bent # 2	yes				
TOTALS		0	2	2	2

Notes:
 Blanks or "no" represent quantity of zero.



If drilled piers not in soil are required, calculate quantity of "42" Dia. Drilled Piers in Soil" as the difference between the total drilled pier length and the "42" Dia. Drilled Piers Not in Soil" from the table above. If there is none or zero quantity for drilled piers not in soil in the table above, calculate quantity of "42" Dia. Drilled Piers" as the total drilled pier length and do not use the "42" Dia. Drilled Piers in Soil" pay item.

If permanent steel casing is or may be required, calculate quantity of "Permanent Steel Casing for 42" Dia. Drilled Pier" as the difference between the ground line or top of drilled pier elevation, whichever is higher, and the elevation the permanent casing can not extend below from the foundation recommendations.

If "SID Inspections", "SPT Testing" or "CSL Testing" may be required, show quantities of these pay items on the plans as totals only. If "SID Inspections", "SPT Testing" or "CSL Testing" is required, show quantities of these pay items on the plans for each bent or end bent.

The number of CSL tubes required per drilled pier is equal to one tube per foot of design pier diameter with at least 4 tubes per pier. Calculate the length of each CSL tube as the total drilled pier length plus 1.5 ft.

PILE PAY ITEMS

(Revised 8/15/12)

WBS ELEMENT 17BP.5.R.53

TIP NO. BMU-380062

COUNTY Granville

STATION 15+65.00 -L-

DATE 1/12/2015

DESIGNED BY NAA

CHECKED BY AK

DESCRIPTION Bridge No. 62 on SR 1004 over Knap of Reeds Creek
Between SR 1120 and SR 1121

NUMBER OF BENTS WITH PILES _____	}	Only required for "Predrilling for Piles" & "Pile Excavation" pay items
NUMBER OF PILES PER BENT _____		
NUMBER OF END BENTS WITH PILES _____		
NUMBER OF PILES PER END BENT _____		

Bent # or End Bent #	PILE PAY ITEM QUANTITIES						PDA Testing (per each)
	Steel Pile Points (yes/no)	Pipe Pile Plates (yes/no/maybe)	Predrilling For Piles (per linear ft)	Pile Redrives (per each)	Pile Excavation (per linear ft)		
					In Soil	Not In Soil	
End Bent #1	yes						X
End Bent #2	yes						
TOTALS			0	0	0	0	0

Notes:

Blanks or "no" represent quantity of zero.

If steel pile points are required, calculate quantity of "Steel Pile Points" as equal to the number of steel piles.

If pipe pile plates are or may be required, calculate the quantity of "Pipe Pile Plates" as equal to the number of pipe piles.

Show quantity of "PDA Testing" on the plans as total only.

If quantity of "PDA Testing" is 3 or less, reference "Pile Driving Criteria" provision in PDA notes on plans and include "Pile Driving Criteria" provision in the contract.

PROJECT: 17BP.5.R.53 REFERENCE: 380062

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5, 6	CROSS SECTION
7-II	BORE LOGS & CORE REPORTS
12	CORE PHOTOGRAPH

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRANVILLE
 PROJECT DESCRIPTION BRIDGE NO. 62 ON SR 1004
(BUTNER RD.) OVER KNAP OF REEDS CREEK

SITE DESCRIPTION _____

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.5.R.53	1	12

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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

N.D. MOHS

O.B. OTI

D.G. PINTER

J.R. SWARTLEY

N.T. ROBERSON

INVESTIGATED BY N.D. MOHS

DRAWN BY W.D. FIELDS

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE JANUARY 2015

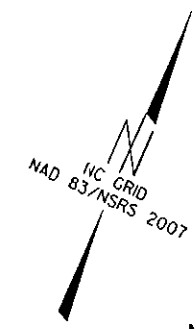


Nate Mohs 1/15/15
 SIGNATURE DATE

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS			
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 (ASTM D 1586, ASTM D 5958). 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, <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. 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.				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 60 BLOWS PER FOOT 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: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.				ALUVIUM (ALUV.) - 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 DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROQ) - 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 IN 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 60 BLOWS. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: 38-0062-2, N: 875,692.1510 E: 2,066,937.6440 ELEVATION: 285.41 FEET			
SOIL LEGEND AND AASHTO CLASSIFICATION				ANGULARITY OF GRAINS				WEATHERING							
GENERAL CLASS. GRANULAR MATERIALS (< 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS				THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUND, OR ROUNDED.				WEATHERED ROCK (WR)							
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				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.				CRYSTALLINE ROCK (CR)							
SYMBOL				MINERALOGICAL COMPOSITION				NON-CRYSTALLINE ROCK (NCR)							
% PASSING #10, #40, #200				COMPRESSIBILITY				COASTAL PLAIN SEDIMENTARY ROCK (CP)							
MATERIAL PASSING #40 LL, PI				PERCENTAGE OF MATERIAL				FRESH							
GROUP INDEX				GROUND WATER				VERY SLIGHT (V SL.)							
USUAL TYPES OF MAJOR MATERIALS				MISCELLANEOUS SYMBOLS				SLIGHT (SL.)							
GENERAL INDEX AS SUBGRADE				RECOMMENDATION SYMBOLS				MODERATE (MOD.)							
CONSISTENCY OR DENSENESS				ABBREVIATIONS				MODERATELY SEVERE (MOD. SEV.)							
PRIMARY SOIL TYPE				EQUIPMENT USED ON SUBJECT PROJECT				SEVERE (SEV.)							
TEXTURE OR GRAIN SIZE								VERY SEVERE (V SEV.)							
U.S. STD. SIEVE SIZE								COMPLETE							
BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CS. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.)								ROCK HARDNESS							
GRAIN SIZE								VERY HARD							
SOIL MOISTURE - CORRELATION OF TERMS								HARD							
PLASTICITY								MODERATELY HARD							
COLOR								MEDIUM HARD							
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.								SOFT							
								VERY SOFT							
								EXTREMELY INDURATED							

PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.53	3
SITE PLAN	



STATE OF NORTH CAROLINA
NO DEED REFERENCE
FOUND

-L- PC Sta. 12+89.80

15+00

KNAP OF REEDS CREEK

STATE OF NORTH CAROLINA
NO DEED REFERENCE
FOUND

END PROJECT
-L- POT Sta. 18+00.00

WOODS

WOODS

EB1-A B1-A B2A EB2-A

-LT

SR 1004 (BUTNER RD.)

EB1-B B1-B B2-B EB2-B

38-0062-2

WV

EB1 BRIDGE RAIL

EB2 BRIDGE RAIL

GRAVEL

STATE OF NORTH CAROLINA
NO DEED REFERENCE
FOUND

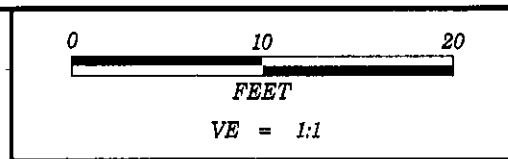
STATE OF NORTH CAROLINA
NO DEED REFERENCE
FOUND

WOODS

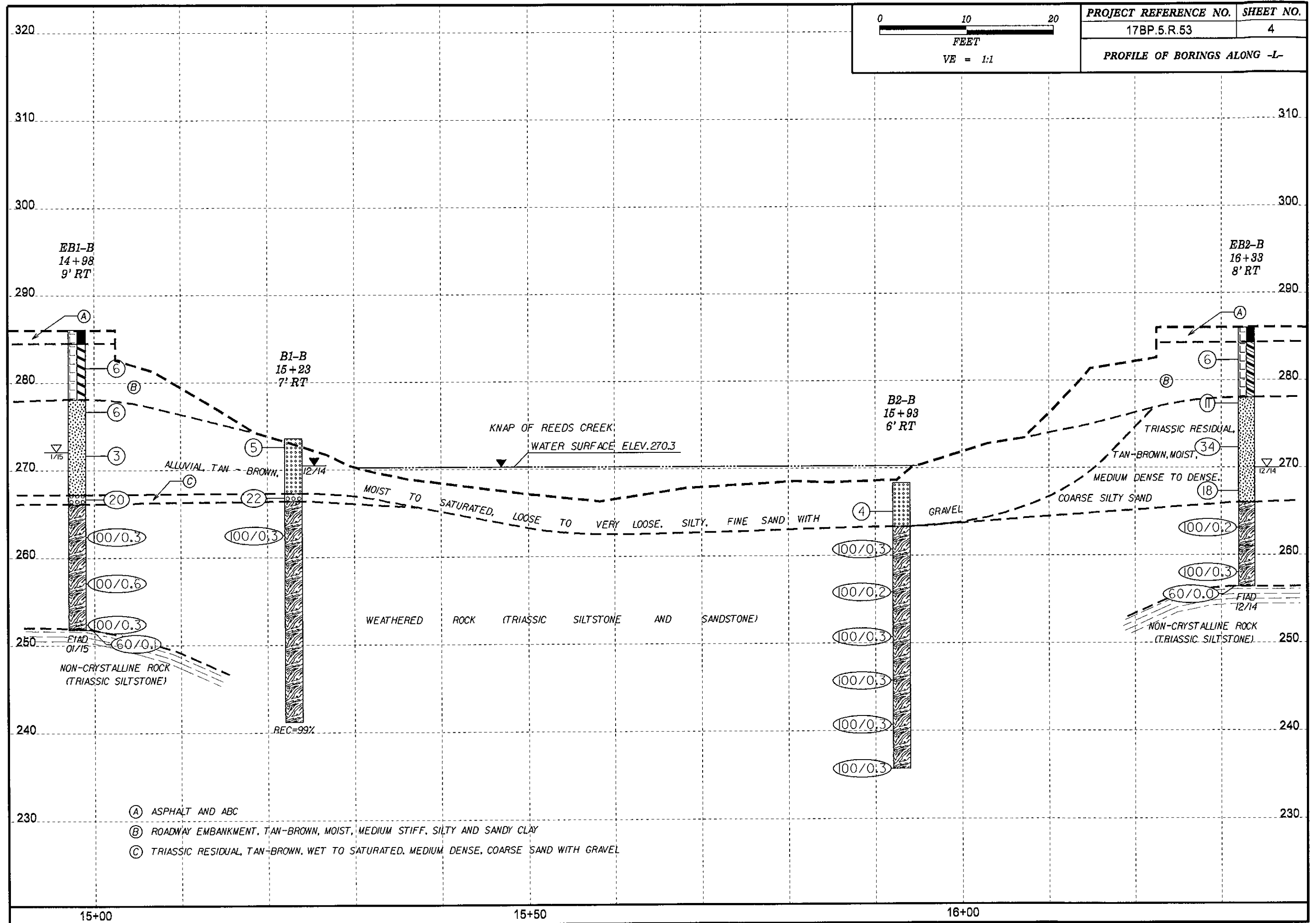
BARBED WIRE

WOODS

SKIEW=90°



PROJECT REFERENCE NO.	SHEET NO.
17BP.5.R.53	4
PROFILE OF BORINGS ALONG -L-	



EB1-B
14+98
9' RT

B1-B
15+23
7' RT

B2-B
15+93
6' RT

EB2-B
16+33
8' RT

KNAP OF REEDS CREEK
WATER SURFACE ELEV. 270.3

ALLUVIAL TAN-BROWN

TRIASSIC RESIDUAL
TAN-BROWN, MOIST,
MEDIUM DENSE TO DENSE,
COARSE SILTY SAND

MOIST TO SATURATED, LOOSE TO VERY LOOSE, SILTY, FINE SAND WITH GRAVEL

WEATHERED ROCK (TRIASSIC SILTSTONE AND SANDSTONE)

NON-CRYSTALLINE ROCK (TRIASSIC SILTSTONE)

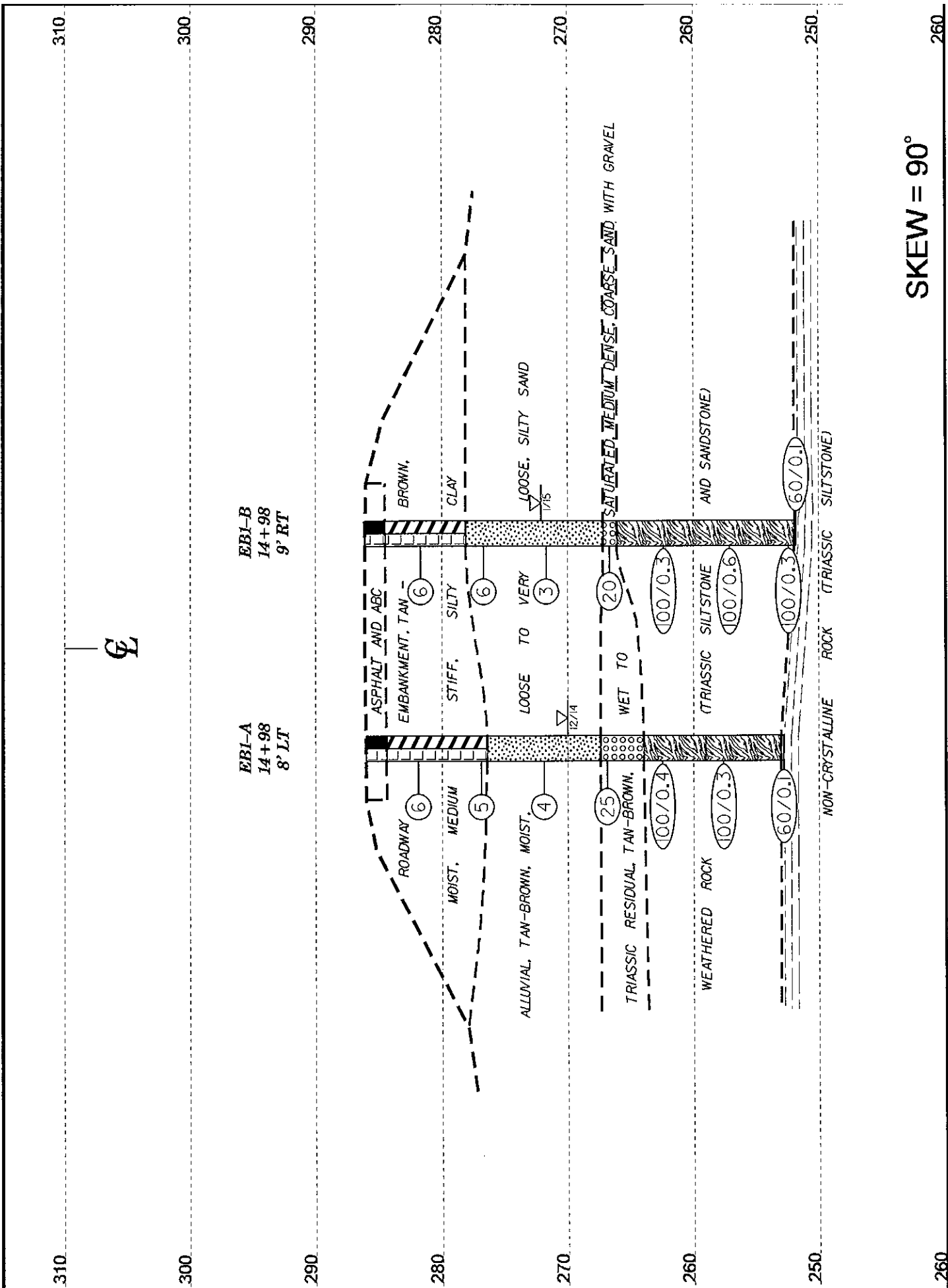
NON-CRYSTALLINE ROCK (TRIASSIC SILTSTONE)

- (A) ASPHALT AND ABC
- (B) ROADWAY EMBANKMENT, TAN-BROWN, MOIST, MEDIUM STIFF, SILTY AND SANDY CLAY
- (C) TRIASSIC RESIDUAL, TAN-BROWN, WET TO SATURATED, MEDIUM DENSE, COARSE SAND WITH GRAVEL

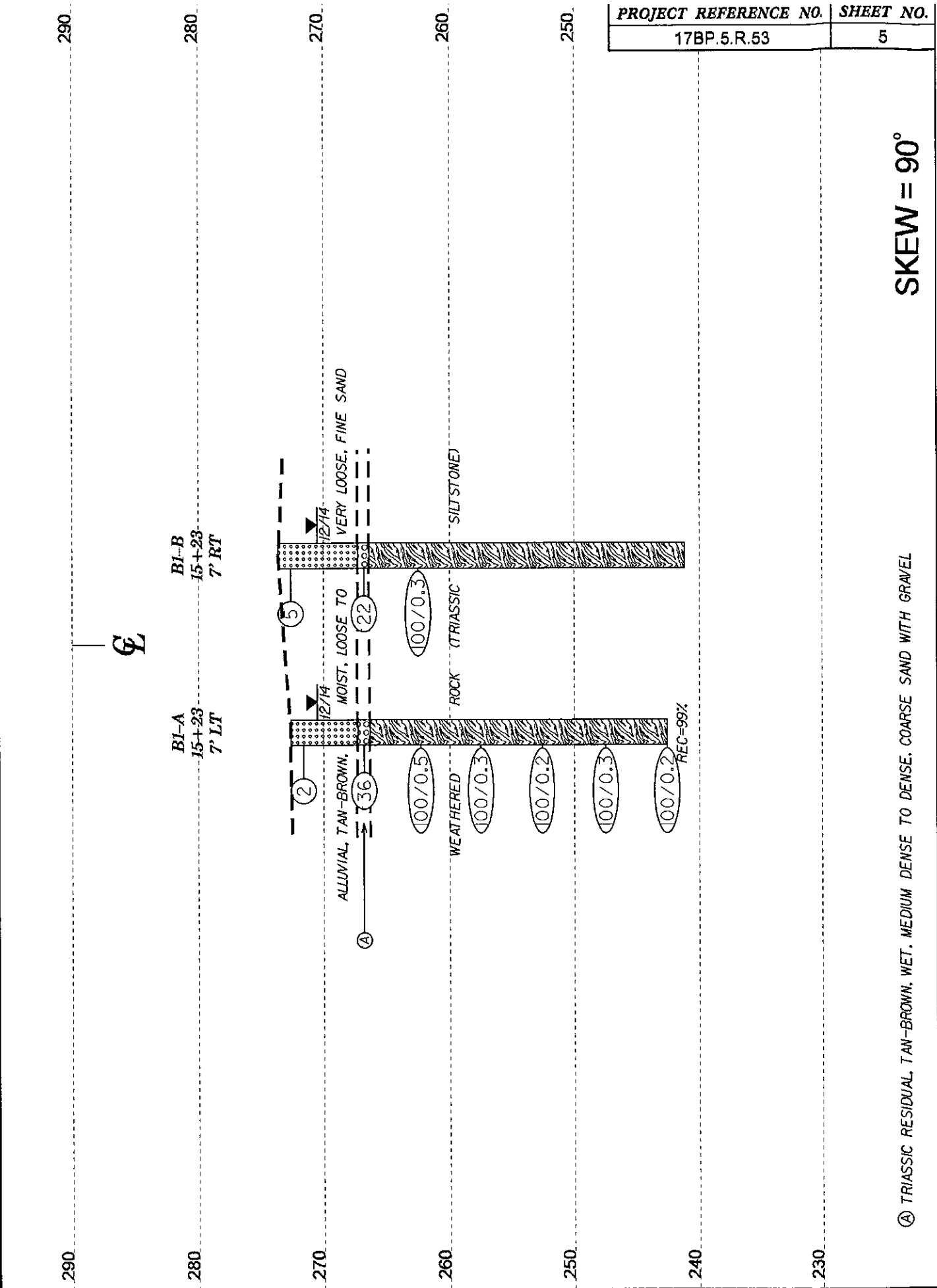
15+00

15+50

16+00

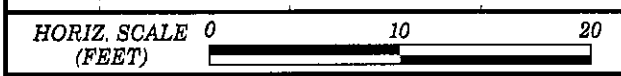
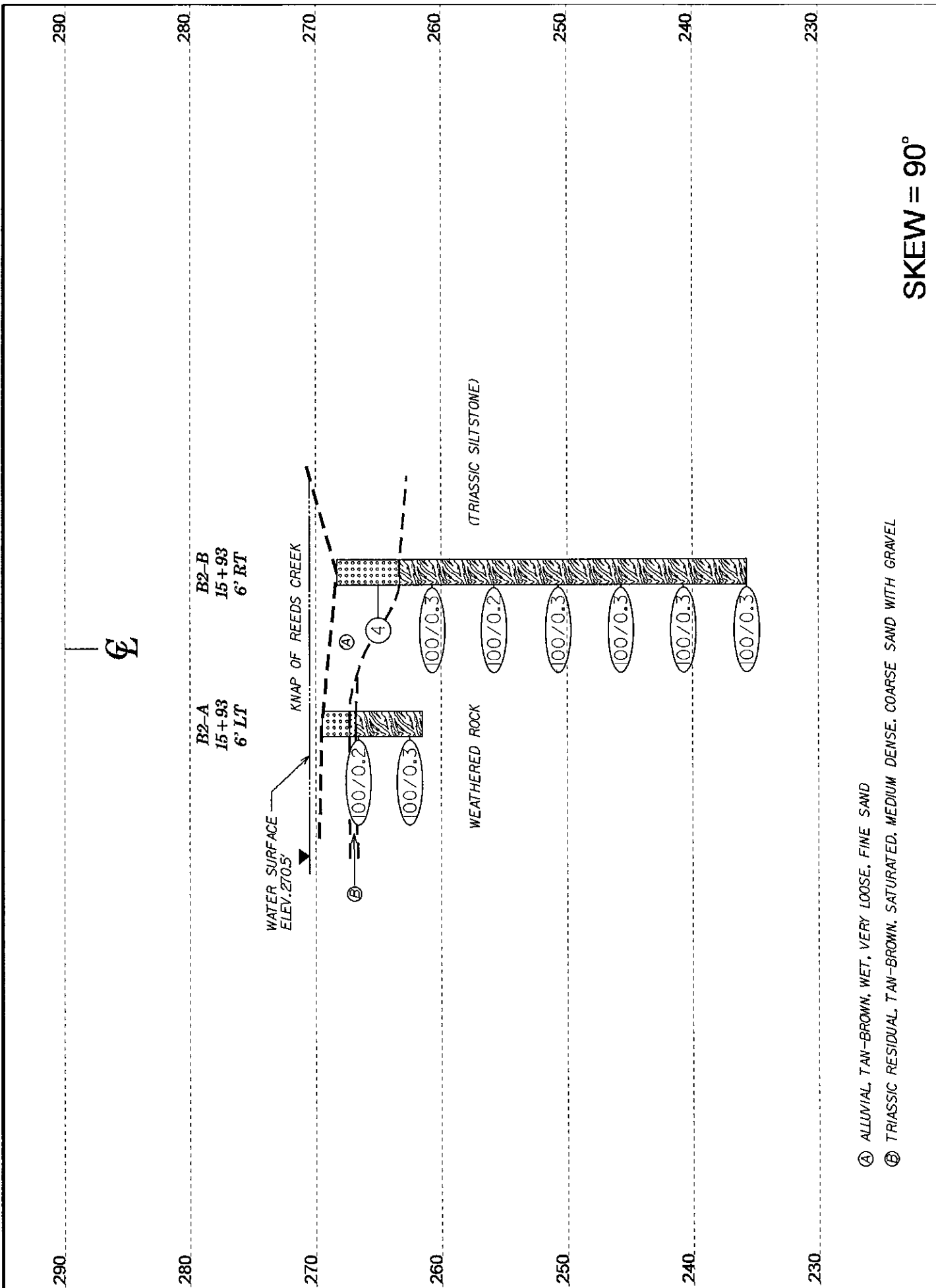


SKIEW = 90°

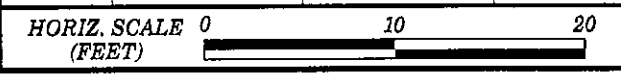
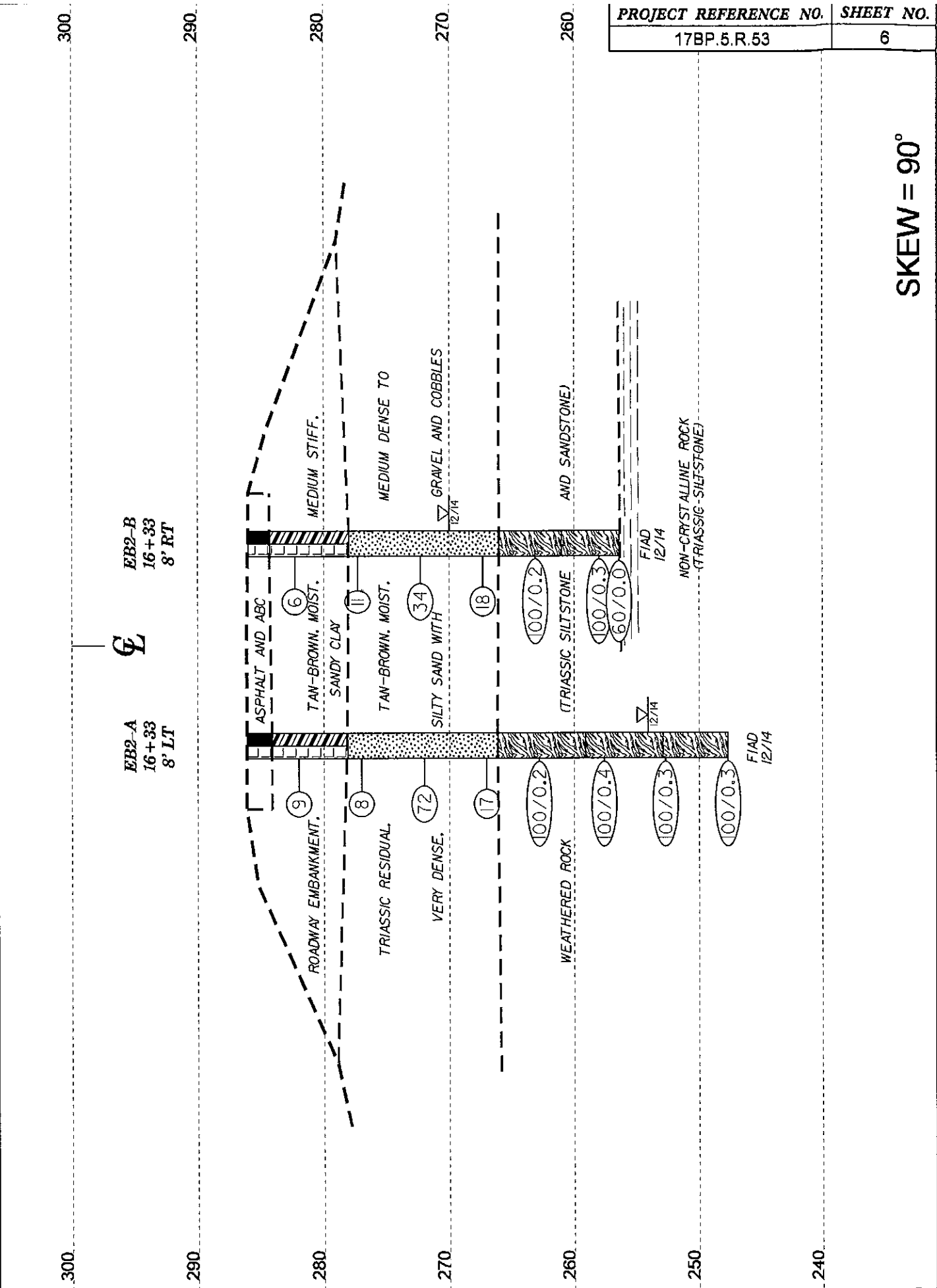


SKIEW = 90°

Ⓐ TRIASSIC RESIDUAL, TAN-BROWN, WET, MEDIUM DENSE TO DENSE, COARSE SAND WITH GRAVEL



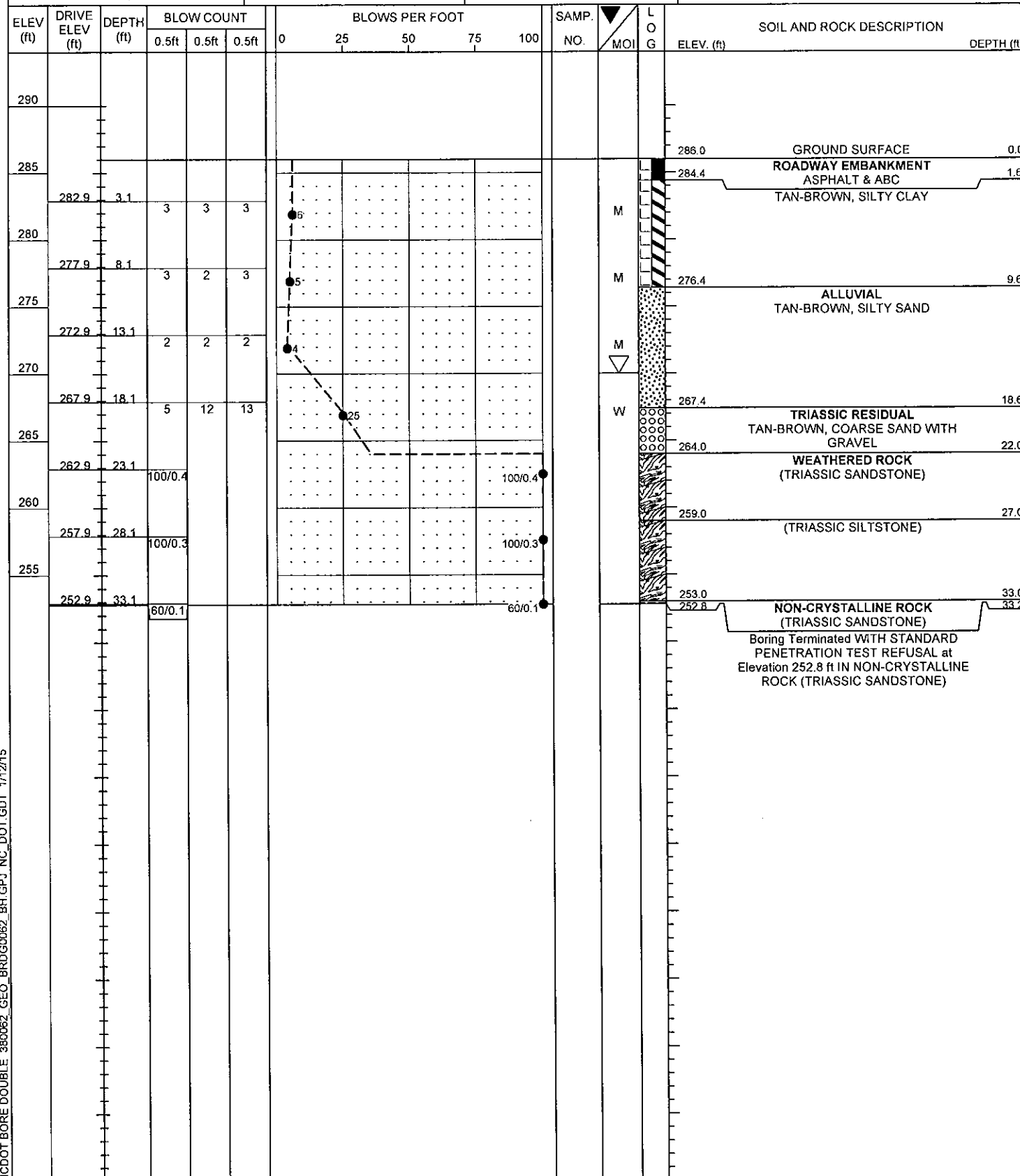
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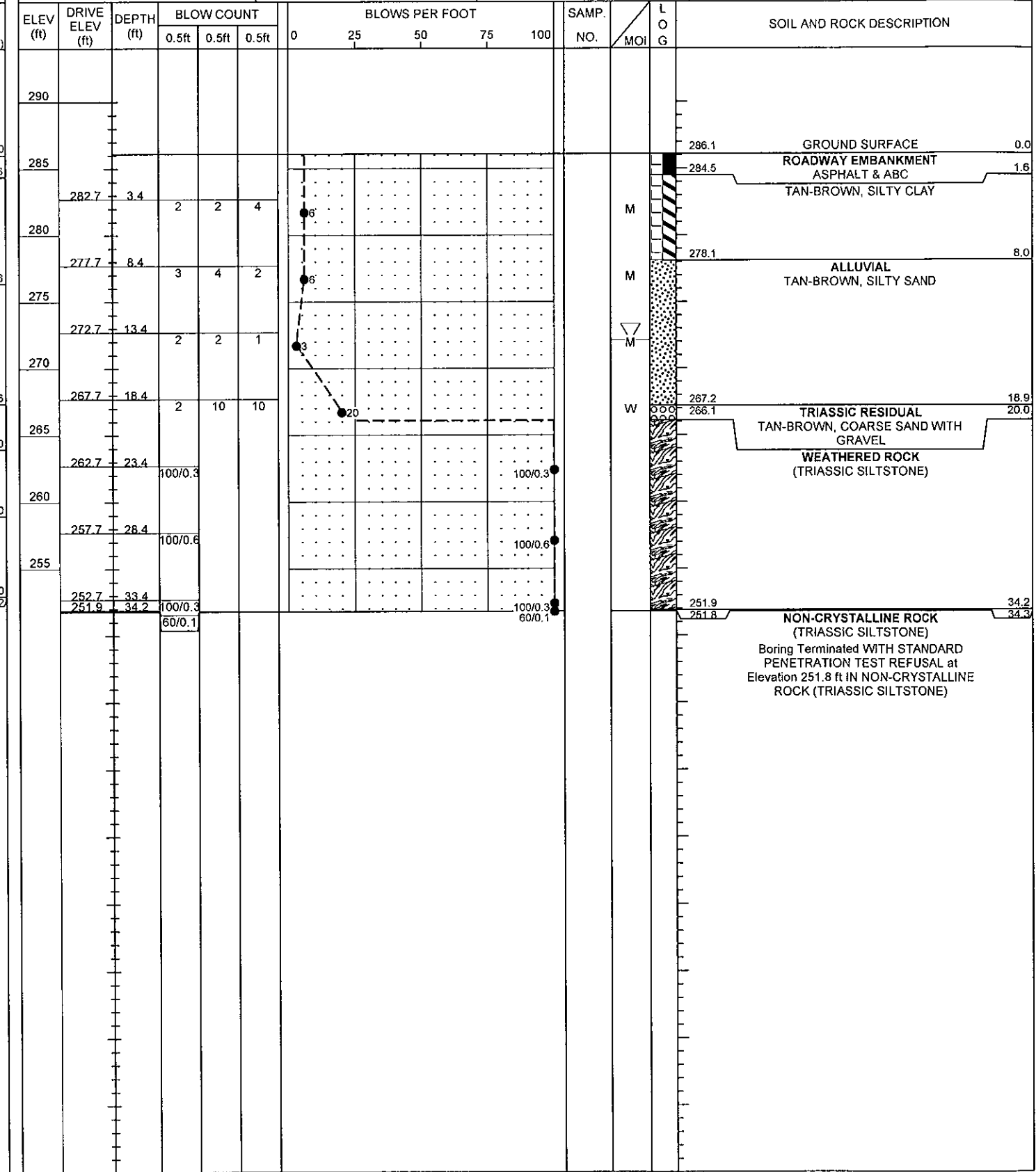
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NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.5.R.53	TIP BMU-380062	COUNTY GRANVILLE	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 14+98	OFFSET 8 ft LT	ALIGNMENT -L-
COLLAR ELEV. 286.0 ft	TOTAL DEPTH 33.2 ft	NORTHING 875,641	EASTING 2,066,766
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 12/12/14	COMP. DATE 12/12/14	SURFACE WATER DEPTH N/A



WBS 17BP.5.R.53	TIP BMU-380062	COUNTY GRANVILLE	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+98	OFFSET 9 ft RT	ALIGNMENT -L-
COLLAR ELEV. 286.1 ft	TOTAL DEPTH 34.3 ft	NORTHING 875,625	EASTING 2,066,773
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 01/05/15	COMP. DATE 01/05/15	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE 380062 GEO_BROG0062_BH.GPJ NC_DOT.GDT 1/12/15

WBS 17BP.5.R.53		TIP BMU-380062		COUNTY GRANVILLE		GEOLOGIST Oti, O. B.								
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK							GROUND WTR (ft)							
BORING NO. B1-A		STATION 15+23		OFFSET 7 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 272.6 ft		TOTAL DEPTH 30.0 ft		NORTHING 875,650		EASTING 2,066,790								
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011						DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic						
DRILLER Pinter, D. G.		START DATE 12/30/14		COMP. DATE 12/30/14		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				
275														
	272.6	0.0	1	1	1	2								272.6 GROUND SURFACE 0.0
270	267.8	4.8	5	12	24	36								267.3 ALLUVIAL TAN-BROWN, FINE SAND 5.3
265	262.8	9.8	100/0.5											266.3 RESIDUAL TAN-BROWN, COARSE SAND WITH GRAVEL 6.3
260	257.8	14.8	100/0.3											WEATHERED ROCK (TRIASSIC SILTSTONE)
255	252.8	19.8	100/0.2											
250	247.8	24.8	100/0.3											
245	242.8	29.8	100/0.2											242.6 Boring Terminated at Elevation 242.6 ft IN WEATHERED ROCK (TRIASSIC SILTSTONE) 30.0



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 17BP.5.R.53		TIP BMU-380062		COUNTY GRANVILLE		GEOLOGIST Swartley, J. R.							
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK						GROUND WTR (ft)							
BORING NO. B1-B		STATION 15+23		OFFSET 7 ft RT		ALIGNMENT -L-							
COLLAR ELEV. 273.6 ft		TOTAL DEPTH 32.4 ft		NORTHING 875,637		EASTING 2,066,795							
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic							
DRILLER Pinter, D. G.		START DATE 12/31/14		COMP. DATE 12/31/14		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
275	273.6	0.0										GROUND SURFACE	0.0
270			WOH	1	4						M	ALLUVIAL BROWN, FINE SAND	
265	267.8	5.8		5	10	12					Sat.	RESIDUAL BROWN AND GRAY, COARSE SAND WITH GRAVEL	6.3
260	262.8	10.8		100/0.3								WEATHERED ROCK (TRIASSIC SILTSTONE)	7.2
255													
250													
245													
Boring Terminated at Elevation 241.2 ft IN WEATHERED ROCK (TRIASSIC SILTSTONE)													32.4

NCDOT BORE DOUBLE 380062_GEO_BRDG0062_BH.GPJ NC_DOT.GDT 1/7/15



CORE BORING REPORT

WBS 17BP.5.R.53		TIP BMU-380062		COUNTY GRANVILLE		GEOLOGIST Swartley, J. R.					
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK						GROUND WTR (ft)					
BORING NO. B1-B		STATION 15+23		OFFSET 7 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 273.6 ft		TOTAL DEPTH 32.4 ft		NORTHING 875,637		EASTING 2,066,795					
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER Pinter, D. G.		START DATE 12/31/14		COMP. DATE 12/31/14		SURFACE WATER DEPTH N/A					
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)	REC. (%)	ROD (%)			
262.5	261.2	11.1	1.3	0:30/0.3 3:00/1.0	(1.2)	N/A				Begin Coring @ 11.1 ft	
260			5.0	2:21/1.0 1:43/1.0 1:22/1.0 1:57/1.0 2:30/1.0	92% (5.0)	N/A				WEATHERED ROCK (TRIASSIC SILTSTONE) REC=99% (continued)	
255	256.2	17.4	5.0	2:20/1.0 1:20/1.0 1:07/1.0 1:26/1.0 1:00/1.0	(5.0)	N/A					
250	251.2	22.4	5.0	1:48/1.0 1:03/1.0 1:11/1.0 1:43/1.0 1:35/1.0	100%	N/A					
245	246.2	27.4	5.0	2:20/1.0 2:00/1.0 1:45/1.0 1:51/1.0 2:10/1.0	(5.0)	N/A					
Boring Terminated at Elevation 241.2 ft IN WEATHERED ROCK (TRIASSIC SILTSTONE)											32.4

NCDOT BORE DOUBLE 380062_GEO_BRDG0062_BH.GPJ NC_DOT.GDT 1/7/15



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.5.R.53	TIP BMU-380062	COUNTY GRANVILLE	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK			GROUND WTR (ft)
BORING NO. B2-A	STATION 15+93	OFFSET 6 ft LT	ALIGNMENT -L-
COLLAR ELEV. 269.5 ft	TOTAL DEPTH 8.0 ft	NORTHING 875,678	EASTING 2,066,854
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 12/18/14	COMP. DATE 12/18/14	SURFACE WATER DEPTH 0.6ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
270															
265	267.8	1.7	WOH	14	100/0.2										
	262.8	6.7			100/0.3										

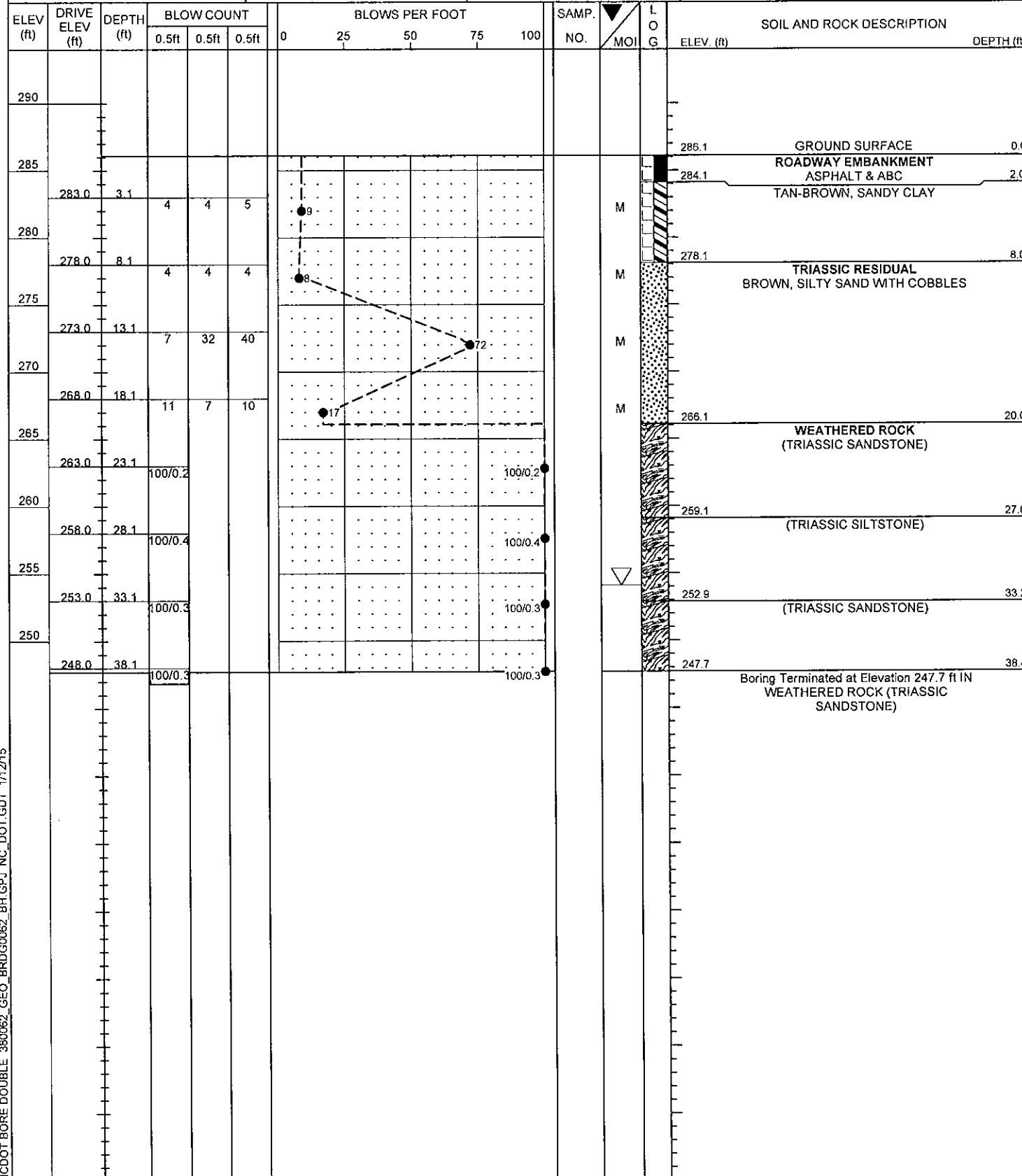
WBS 17BP.5.R.53	TIP BMU-380062	COUNTY GRANVILLE	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK			GROUND WTR (ft)
BORING NO. B2-B	STATION 15+93	OFFSET 6 ft RT	ALIGNMENT -L-
COLLAR ELEV. 268.3 ft	TOTAL DEPTH 32.6 ft	NORTHING 875,667	EASTING 2,066,859
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 12/16/14	COMP. DATE 12/17/14	SURFACE WATER DEPTH 1.2ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
270															
265	266.0	2.3		3	2	2									
	261.0	7.3				100/0.3									
	256.0	12.3				100/0.2									
	251.0	17.3				100/0.3									
	246.0	22.3				100/0.3									
	241.0	27.3				100/0.3									
	236.0	32.3				100/0.3									

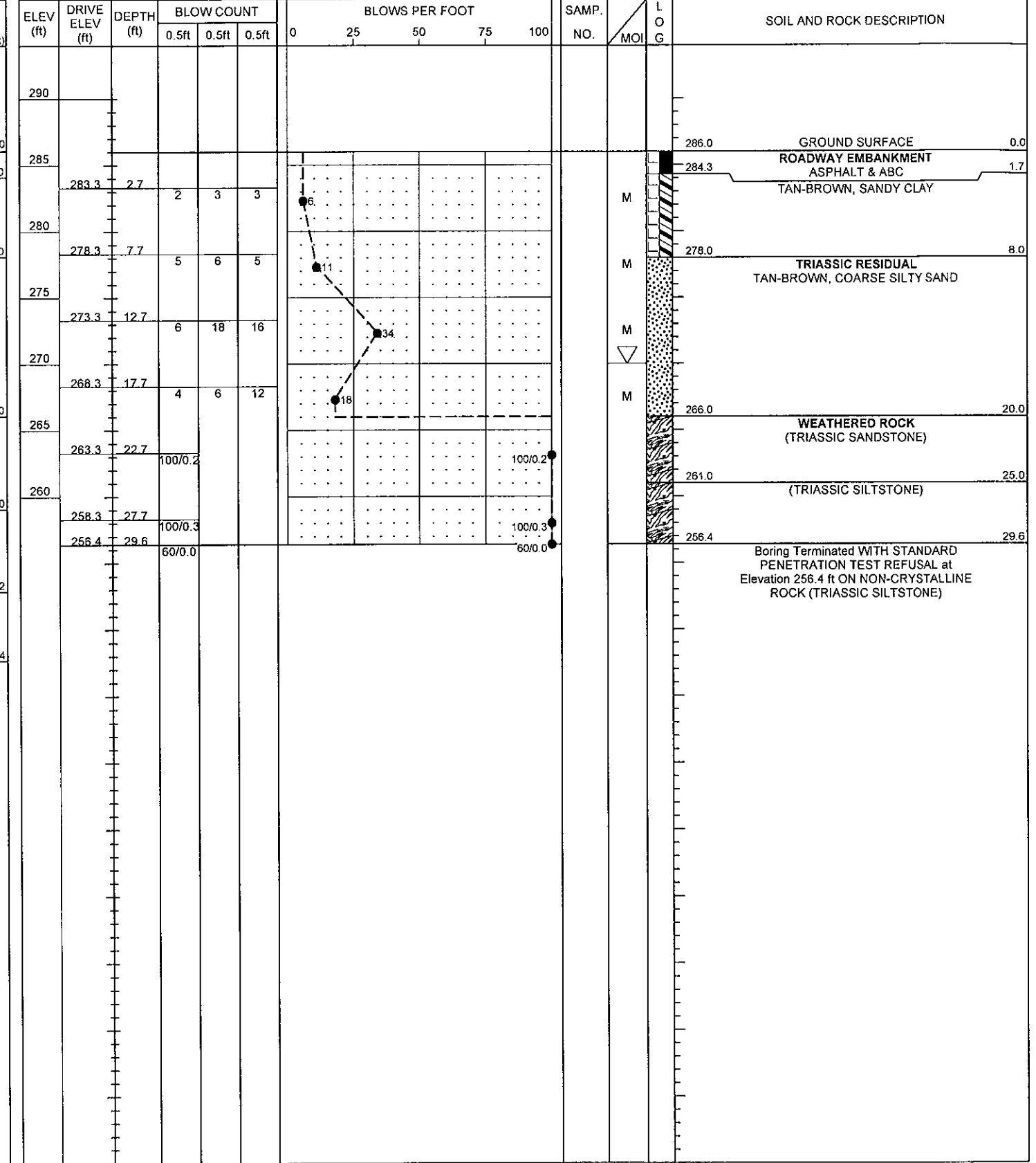
NCDOT BORE DOUBLE 380062_GEO_BRD0062_BH.GPJ_NC_DOT_GDT_17/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.5.R.53	TIP BMU-380062	COUNTY GRANVILLE	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 16+33	OFFSET 8 ft LT	ALIGNMENT -L-
COLLAR ELEV. 286.1 ft	TOTAL DEPTH 38.4 ft	NORTHING 875,696	EASTING 2,066,889
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 12/11/14	COMP. DATE 12/11/14	SURFACE WATER DEPTH N/A



WBS 17BP.5.R.53	TIP BMU-380062	COUNTY GRANVILLE	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 62 ON SR 1004 (BUTNER RD.) OVER KNAP OF REEDS CREEK			GROUND WTR (ft)
BORING NO. EB2-B	STATION 16+33	OFFSET 8 ft RT	ALIGNMENT -L-
COLLAR ELEV. 286.0 ft	TOTAL DEPTH 29.6 ft	NORTHING 875,682	EASTING 2,066,896
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 12/15/14	COMP. DATE 12/15/14	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE 380062 GEO BRD0062 BH.GPJ NC.DOT.GDT 1/12/15

CORE PHOTOGRAPHS

B1-B
BOXES 1 - 3: 11.1 - 32.4 FEET

