



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

August 5, 2014

MEMORANDUM TO: Wally Bowman, P.E.
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.55 (SF-720142)
FEDERAL PROJECT: N/A
COUNTY: Person

DESCRIPTION: Bridge No. 142 on SR 1547 over Mayo Creek between SR 1554
and SR 1551

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 (3) 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

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

FOUNDATION RECOMMENDATIONS

PROJECT 17BP.5.R.55

DESCRIPTION Bridge No. 142 on SR 1547

T.I.P. NO. SF-720142

over Mayo Creek between SR 1554 and SR 1551

COUNTY Person

STATION 15+64.00 -L-



	INITIALS	DATE
DESIGN	NAA	8/5/2014
CHECK	CAK	8/6/14
APPROVAL	KJK	8/6/14

CAK 4/2/15

Revised NAA 4/2/2015

BENT NO.	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	15+29.00 -L-	Cap on HP 12 x 53 Steel Piles	85 Tons/Pile	Bottom of Cap Elevation = 461.5 ft. ± Estimated Pile Length = 10 ft. ± Number of Piles = 7
END BENT 2	15+99.00 -L-	Cap on HP 12 x 53 Steel Piles	85 Tons/Pile	Bottom of Cap Elevation = 461.8 ft. ± Estimated Pile Length = 10 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 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 85 TONS PER PILE.
3. ~~DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 145 TONS PER PILE.~~ Remove
4. PILE EXCAVATION IS REQUIRED TO INSTALL PILES AT END BENT NO. 1 AND END BENT NO. 2. EXCAVATE HOLES AT PILE LOCATIONS TO ELEVATIONS 451.5 FT AND 451.8 FT, RESPECTIVELY. FOR PILE EXCAVATION, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
5. CONCRETE OR GROUT IS REQUIRED TO FILL HOLES FOR PILE EXCAVATION AT END BENT NO. 1 AND END BENT NO. 2.

SPECIAL NOTES ON PLANS

6. DO NOT DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 AFTER PLACING PILES IN HOLES. VERIFY PILES ARE SEATED ON HARD ROCK BEFORE FILLING WITH CONCRETE OR GROUT. Add

7. Install piles at End Bent NO.1 and End Bent NO.2 to the required tip elevations and with penetration of at least 3 feet into rock.

FOUNDATION RECOMMENDATION COMMENTS

1. 1.5:1 (H:V) SLOPES FOR END BENTS WITH SLOPE PROTECTION TO BERM ARE OK.
2. VERTICAL PILES SHOULD BE USED AT END BENT NO. 1 AND END BENT NO. 2.
3. NO WAITING PERIOD IS REQUIRED BEFORE BEGINNING ANY WORK FOR END BENT CONSTRUCTION AFTER COMPLETION OF THE EMBANKMENT AT EACH END BENT.
4. BRIDGE APPROACH FILL DETAILS SHOULD BE USED AT BOTH END BENTS. SEE STANDARD DRAWING NO. 422.11 "BRIDGE APPROACH FILLS" PER NCDOT 2012 ROADWAY STANDARD DRAWINGS.

Designed by: NAA

Date: 8-5-2014

Checked by: *CAK*

Date: *8/6/14*

Revised by: NAA

4/2/2015

CAK

4/2/15

PILE PAY ITEMS

(Revised 8/15/12)

Rev. 4/2/15

WBS ELEMENT 17BP.5.R.55

TIP NO. SF-720142

COUNTY Person

STATION 15+64.00 -L-

DATE 8/5/2014

DESIGNED BY NAA NAA

CHECKED BY CAK CAK

DESCRIPTION Bridge No. 142 on SR 1547 over Mayo Creek
Between SR 1554 and SR 1551

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	2	
NUMBER OF PILES PER END BENT	7	

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	✗				50	20	X
End Bent #2	✗				47	23	
TOTALS			0	0	97	43	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.

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

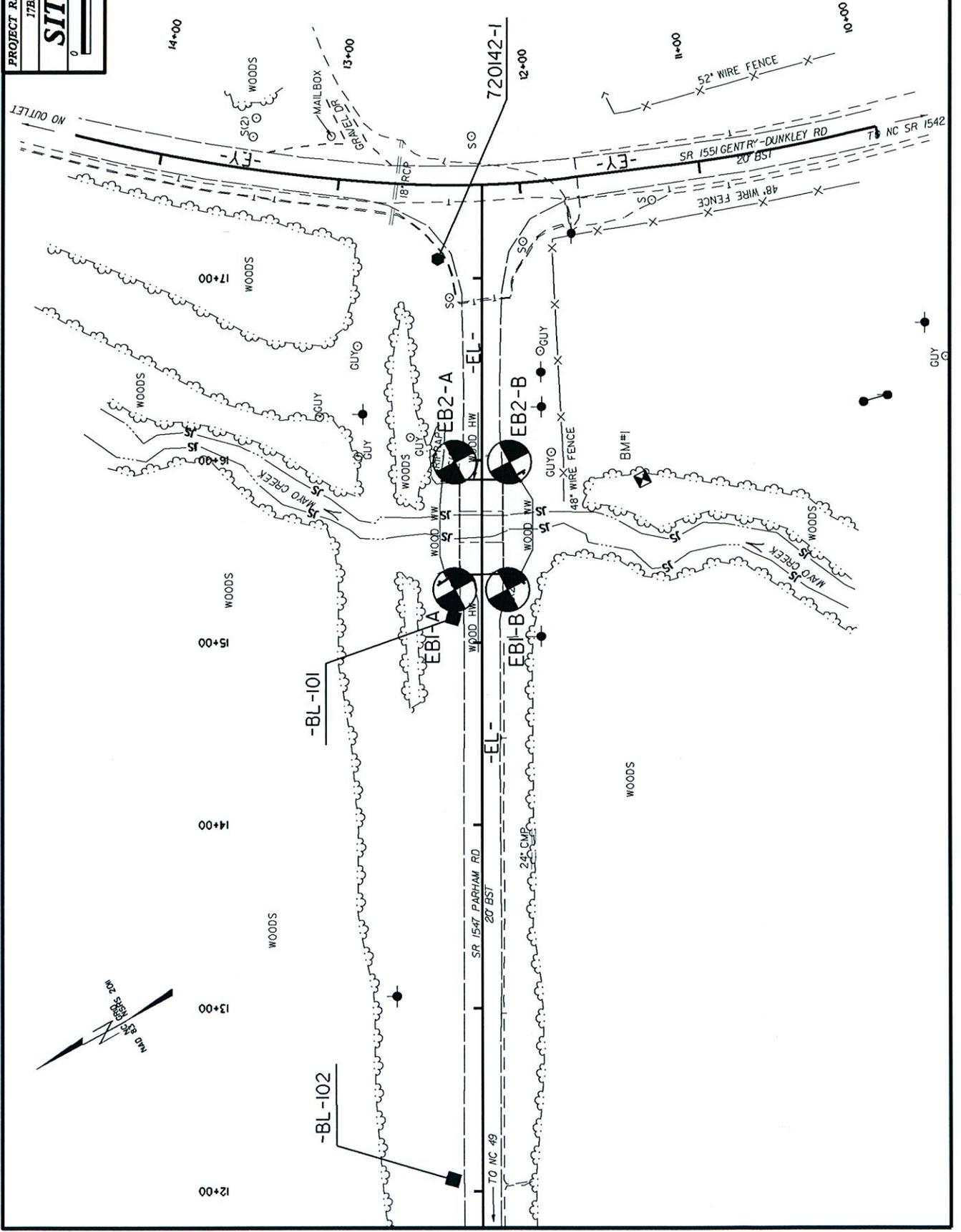
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

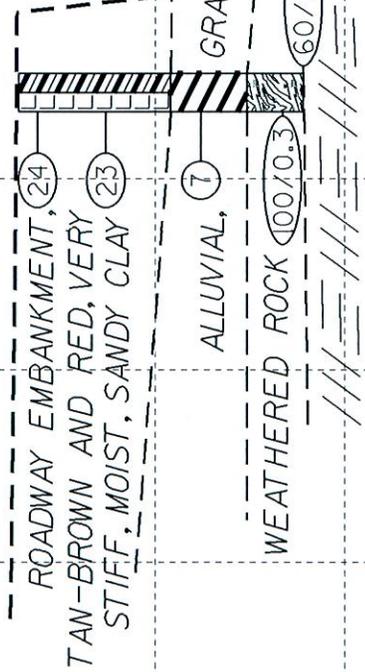
ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 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:</p>		<p>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 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 (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.</p>	
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.	
WEATHERING			
FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.		
VERY SLIGHT (V SL.)	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 (SL.)	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.		
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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.		
SOFT	CAN BE GROOVED 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.		
FRACTURE SPACING		BEDDING	
TERM	SPACING	TERM	THICKNESS
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET
		THINLY LAMINATED	< 0.008 FEET
INDURATION			
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.		
		BENCH MARK: BL-101, -L- Sta. 15+35.5, Offset - 15.8' Lt	
		ELEVATION: 467.1 FT.	
NOTES:			

PROJECT REFERENCE NO. SHEET
17BP-S.R.55 3

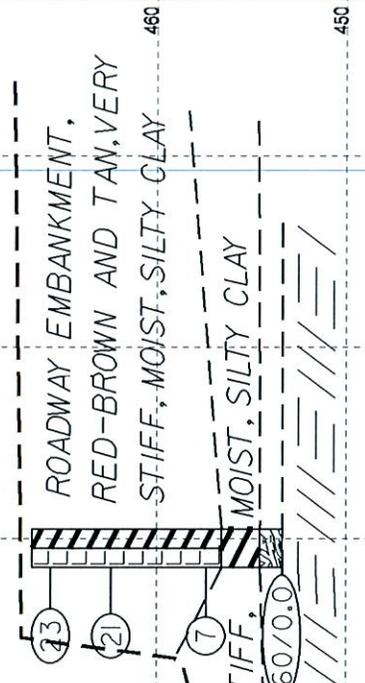
SITE PLAN



EB1-A
15+29
15' LT



EB2-A
15+99
15' LT



480 470 460 450 440 430 420 410

NOTE: GROUNDLINE TAKEN FROM ROADWAY PFL FILE DATED 6/13/14

+80 +20 +60 +80 +16+00 +20 +40 +40

480

480

470

470

460

460

450

450

440

440

430

420

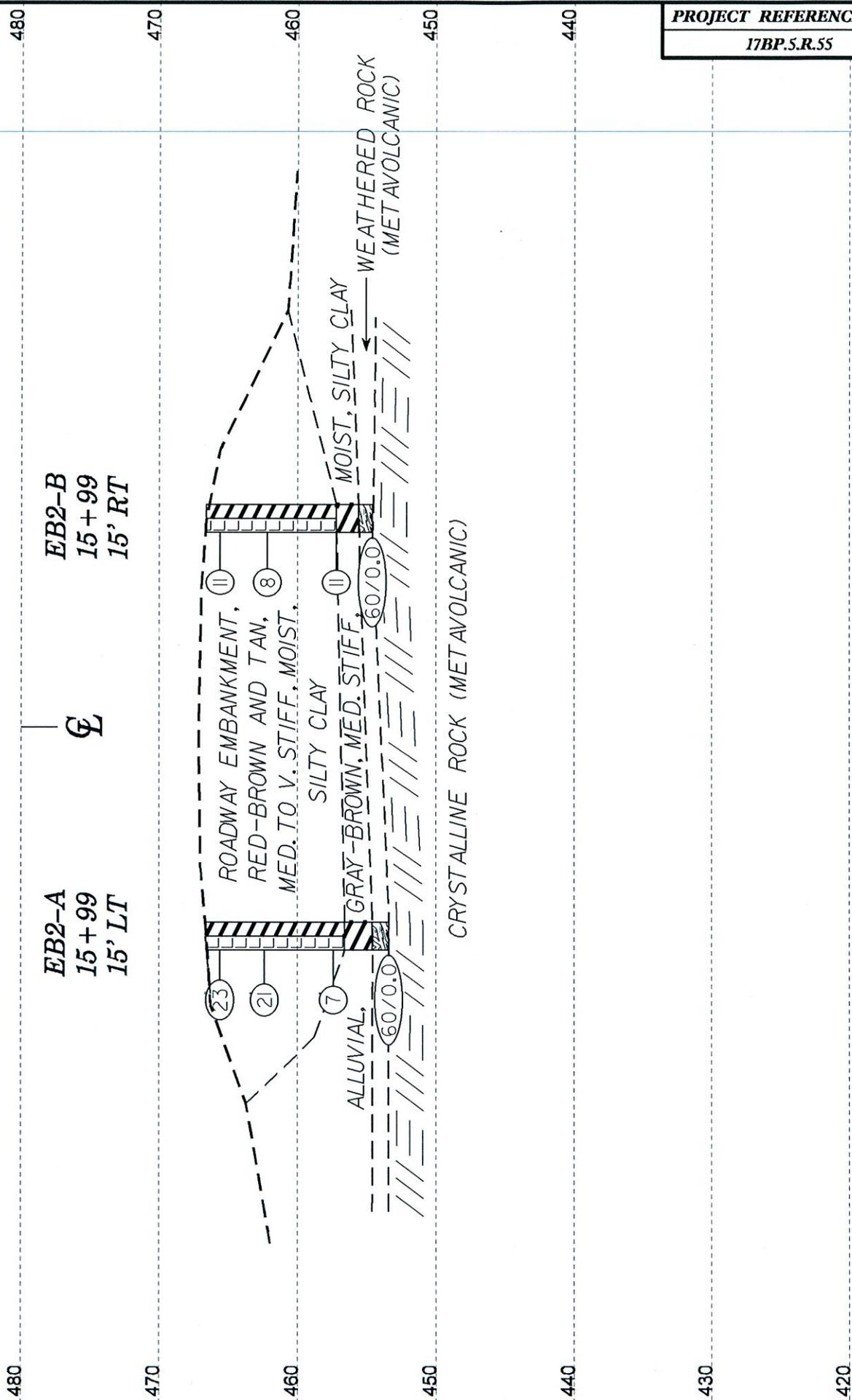
EB1-B
15+29
14' RT

EB1-A
15+29
15' LT



VE = 1:1

CROSS SECTION THROUGH END BENT 1



VE = 1:1

CROSS SECTION THROUGH END BENT 2



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 17BP.5.R.55	TIP SF-720142	COUNTY PERSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 142 ON -L- (SR 1547) OVER MAYO CREEK			GROUND WTR (ft)
BORING NO. EB1-A	STATION 15+29	OFFSET 15 ft LT	ALIGNMENT -L-
COLLAR ELEV. 467.2 ft	TOTAL DEPTH 15.0 ft	NORTHING 968,435	EASTING 2,033,969
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 07/07/14	COMP. DATE 07/07/14	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	100					ELEV. (ft)
470															
	467.2	0.0												467.2	0.0
465			17	13	11										
	463.6	3.6													
460			10	11	12										
	458.6	8.6													
455			5	4	3										
	453.6	13.6													
	452.2	15.0	100/0.3											452.2	15.0
			60/0.0												

NCDOT BORE SINGLE 720142_GEO_BH.GPJ NC_DOT.GDT 7/15/14



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 17BP.5.R.55	TIP SF-720142	COUNTY PERSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 142 ON -L- (SR 1547) OVER MAYO CREEK			GROUND WTR (ft)
BORING NO. EB1-B	STATION 15+29	OFFSET 14 ft RT	ALIGNMENT -L-
COLLAR ELEV. 467.0 ft	TOTAL DEPTH 13.7 ft	NORTHING 968,409	EASTING 2,033,955
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 07/08/14	COMP. DATE 07/08/14	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	100					
470															
	467.0	0.0												GROUND SURFACE	0.0
465			20	11	12								M	ROADWAY EMBANKMENT	
	463.4	3.6											M	TAN-BROWN AND RED, SANDY CLAY	
460			11	10	10										
	458.4	8.6											M		
455			5	6	5										
	456.5													ALLUVIAL	10.5
	454.3														12.7
	453.4													GRAY-BROWN, SILTY CLAY	13.6
	453.3													WEATHERED ROCK	13.7
														(METAVOLCANIC)	
														CRYSTALLINE ROCK	
														(METAVOLCANIC)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 453.3 ft IN CRYSTALLINE ROCK (METAVOLCANIC)	

NCDOT BORE SINGLE 720142_GEO_BH.GPJ NC_DOT_GDT 7/15/14



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 17BP.5.R.55	TIP SF-720142	COUNTY PERSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION BRIDGE NO. 142 ON -L- (SR 1547) OVER MAYO CREEK			GROUND WTR (ft)
BORING NO. EB2-A	STATION 15+99	OFFSET 15 ft LT	ALIGNMENT -L-
COLLAR ELEV. 466.6 ft	TOTAL DEPTH 13.2 ft	NORTHING 968,402	EASTING 2,034,031
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 07/08/14	COMP. DATE 07/08/14	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	100					ELEV. (ft)
470															
	466.6	0.0												466.6	0.0
465	463.4	3.2	12	13	10										
	463.4	3.2	13	10	11										
460	458.4	8.2	3	4	3										
	458.4	8.2	3	4	3										
455	453.4	13.2	60/0.0											453.4	13.2

NCDOT BORE SINGLE 720142_GEO_BH.GPJ NC_DOT.GDT 7/15/14

BRIDGE NO. 142 ON -L- (SR 1547) OVER MAYO CREEK





STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

August 6, 2014

MEMORANDUM TO: Wally Bowman, 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.55
FEDERAL PROJECT: N/A
COUNTY: Person
DESCRIPTION: Bridge No. 142 on SR 1547 (Parham Rd.) over Mayo Creek

SUBJECT: Geotechnical Report - Design and Construction Recommendations

The Geotechnical Engineering Unit has completed a limited subsurface investigation for this project and presents the following recommendations. No subsurface plans, profiles, or cross section will be provided.

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.

C. Geotextile for Soil Stabilization

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

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-707-6850
FAX: 919-250-4237

CONNECT.NCDOT.GOV/RESOURCES/GEOLOGICAL

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

II. Subgrade Stability

A. Subgrade Undercut

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

B. Geotextile for Soil Stabilization

An additional quantity of 100 square yards of geotextile for soil stabilization should be included in the project contract as a contingency item for areas of subgrade undercut.

III. Borrow Specifications

A. Select Granular Material

Recommend that a quantity of 200 cubic yards of Select Granular Material be included in the contract as a contingency item, to be used at the discretion of the Engineer. Select Granular Material for embankment/backfill for geotextile for soil stabilization or backfill in water shall meet the criteria outlined in Standard Specifications, Article 1016-3 Class II or III. The backfill material should be placed to a height of three (3) feet above fabric for soil stabilization or water level.

B. Shrinkage Factor

A shrinkage factor of 20% 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.

Prepared by,



Nadia Al-Dhalimy, PE
Geotechnical Operations Engineer

JLP/CAK/NAA/jlp

Prepared by,



Jaime Love Pedro, LG
Project Geological Engineer



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
 Summary of Quantities

WBS No.: 17BP.5.R.55 County: Person Project Engineer: N. A. Al-Dhalimv
 TIP No.: SF-720142 Field Office: Raleigh Project Geologist: J. L. Pedro
 Description: Bridge No. 142 on -L- (SR 1547) over Mayo 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 =							200	CY
0195000000-E	Select Granular Material	265 - Select Granular Material	III. A	Contingency	N/A	N/A	200	CY
Total Quantity of Select Granular Material =							200	CY
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	SY

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
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

July 16, 2014

STATE PROJECT: 17BP.5.R.55
FEDERAL PROJECT: N/A
COUNTY: Person

DESCRIPTION: Bridge No. 142 on SR 1547 (Parham Road) over Mayo 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. 142 on SR 1547 (Parham Rd.) over Mayo Creek with a single-span structure. The total length of the roadway portion of the project is 0.08 miles. The proposed grade will be raised slightly compared to the existing grade. A geotechnical investigation was conducted during July of 2014. Selected locations along -L- between Station 13+20 and Station 17+41 were investigated. Representative soil samples were collected for visual classification in the field.

Physiography & Geology

The project is located approximately 5 miles east of the town of Roxboro in the gently rolling terrain of the Piedmont Physiographic Province of North Carolina. Geologically, the site is characterized by sands and silts associated with the metavolcanic rock of the Carolina Slate Belt.

Soil Properties

Soils encountered at the site include: roadway embankment, alluvial, and residual soils. Roadway embankment soils consist of soft to medium stiff, sandy and silty clay (A-6, A-7-6). Alluvial soils consist of soft, silty clay (A-7) and loose, coarse sand (A-1-b) with some gravel. These soils are present in the creek bed in the vicinity of the bridge. Residual soils consist of stiff to hard, sandy silt and clay (A-4, A-6). Residual soils are derived from weathering of the underlying weathered and crystalline rock.

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LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Rock Properties

Crystalline rock is approximately 12.0 to 15.0 feet below the ground surface and consists of brown to green-gray, moderately weathered to fresh, metavolcanic rock.

Groundwater

The groundwater level is anticipated to be at elevations similar to Mayo Creek. Seasonal fluctuations in the water table can be expected.

Respectfully submitted,



Jaime Love Pedro, LG
Project Geological Engineer

JLP/NTR/jlp