

November 11, 2019

MEMORANDUM TO: Lisa Gilchrist, PE  
Division Bridge Program Manager

FROM: Don Brown, P.E.  
Practice Leader, Geotechnical & Construction Services

STATE PROJECT: SF-910216  
TIP NO.: 17BP.5.R.79  
COUNTY: Wake  
DESCRIPTION: Bridge No. 216 on SR 2366 (Old Battle Bridge Road) over Buffalo 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 200 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 200 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. Undercut for Subgrade Stability  
Recommend a quantity of 200 cubic yards of undercut for subgrade stability 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.
- B. Aggregate Subgrade  
Recommend a quantity of 100 cubic yards of shallow undercut for subgrade stability 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.
- C. Geotextile for Soil Stabilization  
A quantity of 300 square yards of geotextile for soil stabilization should be included in the project contract as a contingency item for Item IIB.

Recommend an additional quantity of 200 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. Borrow Criteria  
Common borrow for embankment construction to subgrade shall meet the Piedmont and Western Area criteria outlined in Standard Specification, Article 1018-1(A).



# STEWART

STRONGER BY DESIGN

**B. 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 400 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.

**C. 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.

**D. Class IV Subgrade Stabilization Material**

Include 200 tons of Class IV material in the project contract as a contingency item for subgrade stabilization for Item IIB. This material shall meet the criteria is the Standard Specifications, Article 1016-3 Class IV

**IV. Miscellaneous**

**A. Reduction of Unclassified Excavation – Clearing and Grubbing**

Loss due to clearing and grubbing is estimated to be negligible.

**B. Reduction of Unclassified Excavation – Unsuitable Unclassified**

Based on the current roadway plans, unclassified excavation will be negligible.

Prepared by,



Donald W. Brown, Jr., P.E.  
Senior Geotechnical Engineer



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

Summary of Quantities

WBS Number: 17BP.5.R.79

County: Wake

Project Engineer: D. Brown, PE

TIP Number: SF-910216

Field Office: STEWART

Project Geologist: \_\_\_\_\_

Description: Bridge No. 216 on SR 2366 (Old Battle Bridge Road) over Buffalo 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	200	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Contingency	N/A	N/A	200	CY
<b>Total Quantity of Undercut Excavation =</b>							<b>400</b>	<b>CY</b>
0195000000-E	Select Granular Material	265 - Select Granular Material	III. B	Contingency	N/A	N/A	400	CY
<b>Total Quantity of Select Granular Material =</b>							<b>400</b>	<b>CY</b>
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Contingency	N/A	N/A	200	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. C	Contingency	N/A	N/A	500	SY
<b>Total Quantity of Geotextile for Soil Stabilization =</b>							<b>700</b>	<b>SY</b>
1099500000-E	Shallow Undercut	505 - Aggregate Subgrade	II. B	Contingency	N/A	N/A	100	CY
<b>Total Quantity of Shallow Undercut =</b>							<b>100</b>	<b>CY</b>
1099700000-E	Class IV Subgrade Stabilization	505 - Aggregate Subgrade	III. D	Contingency	N/A	N/A	200	TON
<b>Total Quantity of Class IV Subgrade Stabilization =</b>							<b>200</b>	<b>TON</b>

<b>These Items Only Impact Earthwork Totals</b>								
N/A	Shrinkage Factor	235 - Embankments	III. C	N/A	N/A	N/A	20	%