



**CAROLINAS
GEOTECHNICAL
GROUP**

Structure Foundation Recommendations

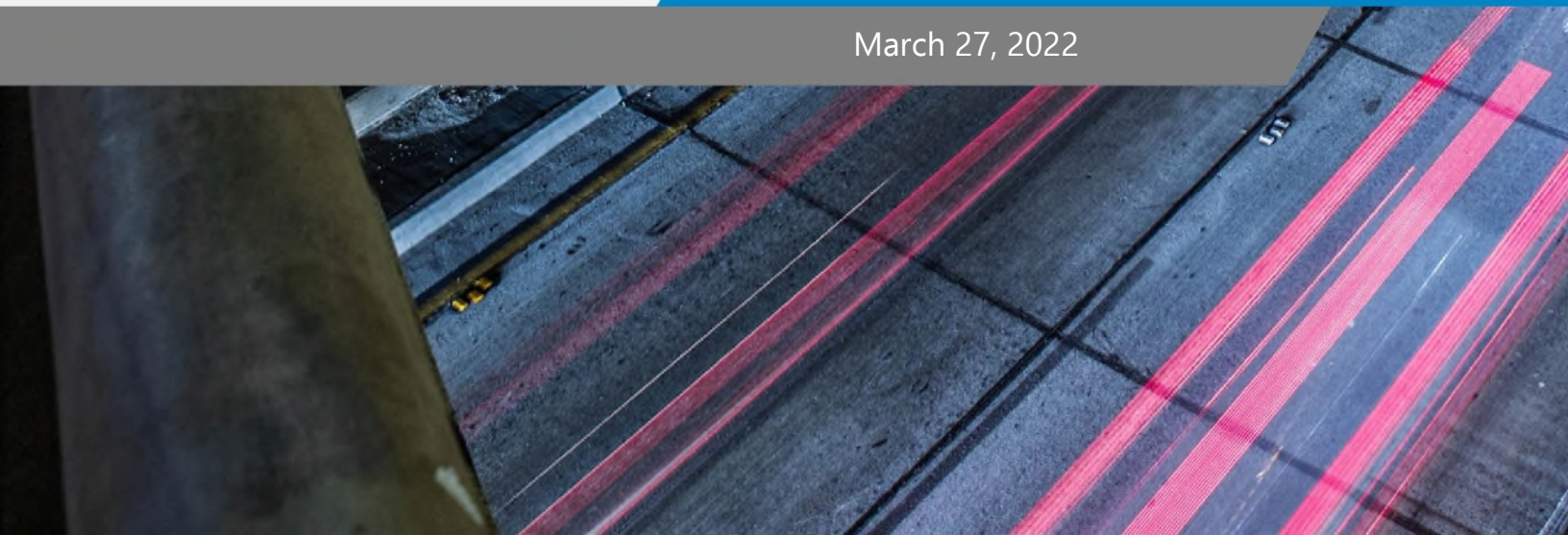
Prepared for:

TGS Engineers, Inc.

201 West Marion Street, Suite 200

Shelby, North Carolina 28150

March 27, 2022





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March 27, 2022

Mr. Jimmy L. Terry, P.E.
TGS Engineers, Inc.
201 West Marion Street, Suite 200
Shelby, North Carolina 28150

WBS ELEMENT: BP6.R002
T.I.P. NO.: SF-770200
I.D. NO.: 770200
COUNTY: Robeson
DESCRIPTION: Bridge No. 200 on SR 1550 (Lowe Road) over Bear Swap

SUBJECT: Structure Foundation Recommendations – Rev. 1

Dear Mr. Terry:

Carolinas Geotechnical Group, PLLC (CG2) has completed the revised Structure Foundation Recommendations for the proposed replacement of Bridge No. 770200 on SR 1550 (Lowe Road) over Bear Swamp in Robeson County, North Carolina. The revised supporting calculations will be submitted under separate cover.

CG2 is pleased to have the opportunity to provide these services to you and looks forward to working with you on your project. If you have questions concerning the content of this letter, or if CG2 can be of further service, please contact CG2 at (980) 339-8684.

Sincerely,
Carolinas Geotechnical Group, PLLC

DocuSigned by:

Robert E Kral

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Robert E. Kral, P.E.
Senior Project Engineer

DocuSigned by:

D. Matthew Brewer

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D. Matthew Brewer, P.E.
Senior Project Engineer



Structure Foundation Recommendations – Rev. 1

Bridge No. 200 on SR 1550 (Lowe Road) over Bear Swamp

Robeson County, North Carolina

ATTACHMENTS:

Foundation Recommendations Sheet(s)

Foundation Recommendations Notes on Plans Sheet(s)

Foundation Recommendations Comments Sheet(s)

Pile Pay Items Sheet(s)

FOUNDATION RECOMMENDATIONS

Prepared for NCDOT by: Carolinas Geotechnical Group, PLLC (CG2)

PROJECT BP6.R002

TIP NO. SF-770200

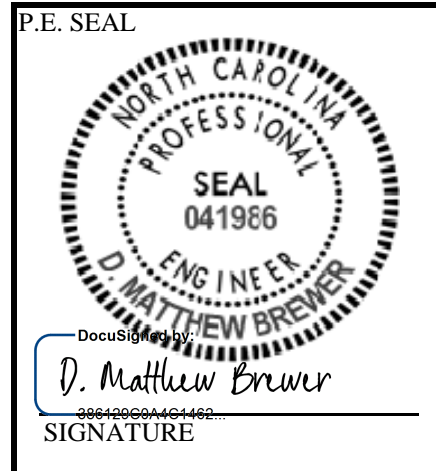
COUNTY Robeson

STATION 14+73.00 -L-

DESCRIPTION Bridge No. 200 on SR 1550

(Lowe Road) over Bear Swamp

	INITIALS	DATE
DESIGN	DMB	3/27/22
CHECK	REK	3/27/22



	BENT STATION	FOUNDATION TYPE	FACTORED RESISTANCE	ADDITIONAL INFORMATION
END BENT 1	14+19.31 -L-	2'-6" Cap on HP 12 x 53 Steel H-Piles	67 Tons/Pile	Bottom of Cap Elev. = 133.73 ft Average Estimated Pile Length = 45 ft Number of Plumb Piles/Cap = 7 Pile Spacing = 6'-0"
BENT 1	14+70.50 -L-	4'-0" Cap on 18" x 0.5" Galvanized Steel Open Ended Pipe Piles	118 Tons/Pile	Bottom of Cap Elev. = 133.30 ft Average Estimated Pile Length = 65 ft Number of Plumb Piles/Cap = 7 Pile Spacing = 5'-3" Tip Elevation No Higher Than = 91.0 ft
END BENT 2	15+26.69 -L-	2'-6" Cap on HP 12 x 53 Steel H-Piles	71 Tons/Pile	Bottom of Cap Elev. = 133.62 ft Average Estimated Pile Length = 50 ft Number of Piles/Cap = 7 Pile Spacing = 6'-0" Tip Elevation No Higher Than = 107.0 ft

(SEE NOTES ON PLANS AND COMMENTS ON FOLLOWING PAGES.)

FOUNDATION RECOMMENDATIONS NOTES ON PLANS

1. FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
2. PILES AT END BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 67 TONS PER PILE.
3. DRIVE PILES AT END BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 115 TONS PER PILE.
4. PILES AT END BENT 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 71 TONS PER PILE.
5. DRIVE PILES AT END BENT 2 TO A REQUIRED DRIVING RESISTANCE OF 125 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE DUE TO SCOUR.
6. INSTALL PILES AT END BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 107 FEET.
7. PILES AT BENT 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 118 TONS PER PILE.
8. DRIVE PILES AT BENT 1 TO A REQUIRED DRIVING RESISTANCE OF 205 TONS PER PILE. THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE DUE TO SCOUR.
9. INSTALL PILES AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 91 FEET.
10. THE SCOUR CRITICAL ELEVATION FOR END BENT 2 IS ELEVATION 133.6 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
11. THE SCOUR CRITICAL ELEVATION FOR BENT 1 IS ELEVATION 110 FT. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
12. TESTING PILES WITH THE PDA DURING DRIVING, RESTRIKING, OR REDRIVING, MAY BE REQUIRED. THE ENGINEER WILL DETERMINE THE NEED FOR PDA TESTING. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.

FOUNDATION RECOMMENDATIONS COMMENTS

1. A DELMAG D19-32 OR SIMILAR HAMMER SHOULD BE SUFFICIENT TO DRIVE PILES AT END BENT 1, BENT 1, AND END BENT 2.
2. TYPE II - MODIFIED BRIDGE APPROACH FILLS ARE REQUIRED AT EACH END BENT.
3. 2:1 (H:V) END SLOPES WITH RIP RAP PROTECTION ARE RECOMMENDED AS SHOWN ON THE APPROVED BSR.
4. NO WAITING PERIOD IS REQUIRED AT EITHER END BENT PRIOR TO CONSTRUCTION.
5. PDA MAY BE REQUIRED TO MONITOR DRIVING STRESSES.
6. AVERAGE PILE LENGTHS ARE BASED ON PLUMB PILES FROM THE BOTTOM OF CAP ELEVATION WITH CAP EMBEDMENT TO THE ANTICIPATED TIP ELEVATION, ROUNDED UP TO THE NEAREST 5 FEET.
7. THE BSR INDICATES THE 100-YR THEORETICAL SCOUR ELEVATION AT BENT 1 IS 109.4 FEET. BASED ON THE SUBSURFACE CONDITIONS AT BENT 1, WE RECOMMEND A GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (GASE) OF 113.0 FEET BE USED FOR THE DESIGN.
8. THE DSE MEMO INDICATES ABUTMENT SCOUR AT END BENT 2. THE GASE SCOUR ENVELOPE INTERCEPTS AT THE BOTTOM OF THE END BENT 2 CAP. THE AXIAL AND LATERAL DESIGN FOR END BENT 2 IS BASED ON AN ASSUMPTION OF 5 FEET OF ABUTMENT SCOUR.

PILE PAY ITEMS

(Revised 8/11/15)

WBS ELEMENT	BP6.R002	DATE	3/27/2022
I.D. NO.	SF-770200	DESIGNED BY	DMB
COUNTY	Robeson	CHECKED BY	REK
STATION	14+73.00 -L-		
DESCRIPTION Bridge No. 200 on SR 1550 (Lowe Road) over Bear Swamp			

NUMBER OF BENTS WITH PILES	0	}	Only required for "Predrilling for Piles" & "Pile Excavation" Pay Items
NUMBER OF PILES PER BENT	0		
NUMBER OF END BENTS WITH PILES	0		
NUMBER OF PILES PER END BENT	0		

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	No	n/a	0	4	0	0	<div></div>
Bent 1	No	no	0	4	0	0	
End Bent 2	No	n/a	0	4	0	0	
TOTALS				12			1

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.