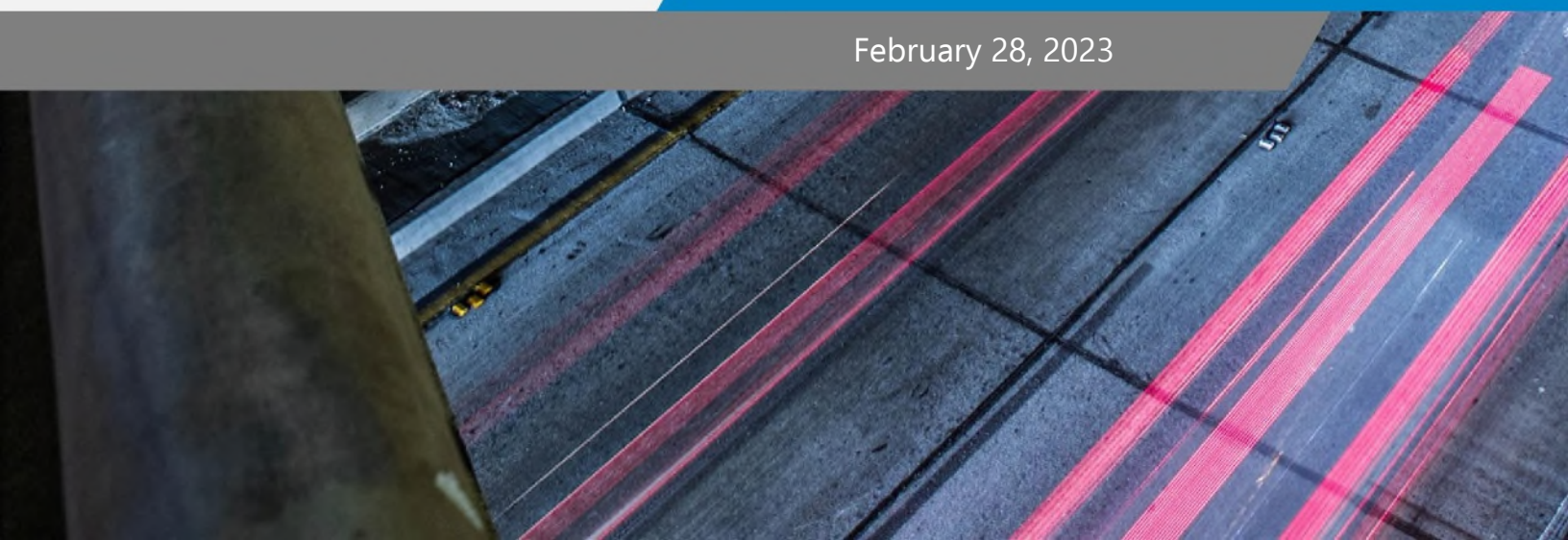
CAROLINAS GEOTECHNICAL GROUP

Structure Foundation Recommendations, Rev. 1

Prepared for:
TGS Engineers, Inc.
201 West Marion Street, Suite 200
Shelby, North Carolina 28150

February 28, 2023



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February 28, 2023

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

WBS ELEMENT:	50347.1.1
T.I.P. NO.:	HB-0007
I.D. NO.:	SF-770299
COUNTY:	Robeson
DESCRIPTION:	Bridge No. 299 on SR 1529 (Mt. Olive Church Road) over Saddletree Swamp

SUBJECT: Structure Foundation Recommendations, REV. 1

Dear Mr. Terry:

Carolinas Geotechnical Group, PLLC (CG2) has completed the Structure Foundation Recommendations for the proposed replacement of Bridge No. 770299 on SR 1529 (Mt. Olive Church Road) over Saddletree Swamp in Robeson County, North Carolina. The revised Structure Foundation Recommendations are attached. The 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:
D. Matthew Brewer
386129C0A4C1462...
D. Matthew Brewer, P.E.
Senior Project Engineer

DocuSigned by:
8AD703B2A8484F4...
Robert E. Kral, P.E.
Senior Project Engineer

NORTH CAROLINA PROFESSIONAL SEAL 042642 ENGINEER ROBERT E. KRAL

ATTACHMENTS:

Foundation Recommendation Sheet(s)
Foundation Recommendations Notes on Plans Sheet(s)
Foundation Recommendations Comments Sheet(s)
Geotechnical Foundation Tables

FOUNDATION RECOMMENDATIONS

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

PROJECT	50347.1.1	DESCRIPTION	Bridge No. 299 on SR 1529
TIP NO.	HB-0007		(Mt Olive Church Road) over Saddletree Swamp
COUNTY	Robeson		
STATION	18+30.50 -L-		

	INITIALS	DATE
DESIGN	REK	2/28/23
CHECK	DMB	2/28/23

P.E. SEAL

SIGNATURE

	BENT STATION	FOUNDATION TYPE	FACTORED RESISTANCE	ADDITIONAL INFORMATION
END BENT 1	18+01.88 -L-	4'-0" Cap on HP 12 x 53 Steel H-Piles	71 Tons/Pile	Bottom of Cap Elev. = 128.20 ft Average Estimated Pile Length = 55 ft Number of Plumb Piles/Cap = 7 Pile Spacing = 6"-0"
END BENT 2	18+59.13 -L-	4'-0" Cap on HP 12 x 53 Steel H-Piles	71 Tons/Pile	Bottom of Cap Elev. = 128.10 ft Average Estimated Pile Length = 60 ft Number of Piles/Cap = 7 Pile Spacing = 6"-0"

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

FOUNDATION RECOMMENDATIONS NOTES ON PLANS

1. FOR PILES, SEE PILES PROVISION AND SECTION 450 OF THE STANDARD SPECIFICATIONS.

Bridge No. 299 on SR 1529 (Mt Olive Church Road) over Saddletree Swamp Robeson County

FOUNDATION RECOMMENDATIONS COMMENTS

1. THE STANDARD HAMMER, A DELMAG D19-32, IS SUFFICIENT TO DRIVE PILES TO THE REQUIRED DRIVING RESISTANCE AT BOTH END BENTS.

2. USE TYPE II MODIFIED BRIDGE APPROACH FILL (STANDARD DRAWING 422.02) AT END BENT 1 AND END BENT 2.

3. 1.5:1 (H:V) OR FLATTER SLOPE AT BOTH END BENTS IS OK WITH RIP RAP SLOPE PROTECTION.

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 PILE CUTOFF ELEVATION TO THE ANTICIPATED TIP ELEVATION, ROUNDED UP TO THE NEAREST 5 FEET.

SUMMARY OF PILE INFORMATION/INSTALLATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Factored Resistance per Pile TONS	Pile Cut-Off (Top of Pile) Elevation FT	Estimated Pile Lenth per Pile FT	Scour Critical Elevation FT	Driven Piles			Predrilling for Piles*			Drilled-In Piles		
					Min Pile Tip (Tip No Higher Than) Elev FT	Required Driving Resistance (RDR)** per Pile TONS	Total Pile Redrives Quantity EACH	Predrilling Length per Pile Lin FT	Predrilling Elevation (Elev Not To Predrill Below) FT	Maximum Predrilling Dia INCHES	Pile Excavation (Bottom of Hole) Elev FT	Pile Exc Not In Soil per Pile Lin FT	Pile Exc In Soil per Pile Lin FT
End Bent 1, Piles 1-7	71	130.20	55			120							
End Bent 2, Piles 1-7	71	130.10	60			120							

*Predrilling for Piles is required for end bents/bents with a predrilling length and at the Contractor's option for end bents/bents with predrilling information but no predrilling length.

$$^{**}RDR = \frac{Factored\ Resistance + Factored\ Downdrag\ Load + Factored\ Dead\ Load}{Dynamic\ Resistance\ Factor} + Nominal\ Downdrag\ Resistance + \frac{Nominal\ Scour\ Resistance}{Scour\ Resistance\ Factor}$$

SUMMARY OF PDA/PILE ORDER LENGTHS

(Blank entries indicate item is not applicable to structure)

Pile Driving Analyzer (PDA)				Pile Order Lengths	
End Bent/ Bent No	PDA Testing Required? YES or MAYBE	PDA Test Pile Length FT	Total PDA Testing Quantity EACH	End Bent/ Bent No(s)	Pile Order Length Basis* EST or PDA
End Bent 1	MAYBE	60	1		
End Bent 2	MAYBE	65			

*EST = Pile order lengths from estimated pile lengths; PDA = Pile order lengths based on PDA testing. For groups of end bents/bents with pile order lengths based on PDA testing, the first end bent/bent no. listed for each group is the representative end bent/bent with the PDA.

PILE DESIGN INFORMATION

(Blank entries indicate item is not applicable to structure)

End Bent/ Bent No, Pile(s) #-# (e.g., "Bent 1, Piles 1-5")	Factored Axial Load per Pile TONS	Factored Downdrag Load per Pile TONS	Factored Dead Load* per Pile TONS	Dynamic Resistance Factor	Nominal Downdrag Resistance per Pile TONS	Nominal Scour Resistance per Pile TONS	Scour Resistance Factor (Default = 1.00)
End Bent 1, Piles 1-7	71			0.60			1.00
End Bent 2, Piles 1-7	71			0.60			1.00

*Factored Dead Load is factored weight of pile above the ground line.

PROJECT NO. 50347.1.1

ROBESON COUNTY

STATION: 18+30.50 -L-

NOTES:

1. The Pile Foundation Tables are based on the bridge substructure design and foundation recommendations sealed by a North Carolina Professional Engineer (Robert E. Kral, P.E. No. 042642) on 02-28-2023.
2. Total Pile Driving Equipment Setup quantity (not shown in Pile Foundation Tables) equals the number of driven piles, i.e., the number of piles with a Required Driving Resistance.
3. The Engineer will determine the need for PDA Testing when PDAs may be required.
4. For Piles, See Piles Provision and Section 450 of the Standard Specifications.

NORTH CAROLINA PROFESSIONAL SEAL PE # ENGINEER PE SEAL NAME

SIGNATURE DATE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

PILE FOUNDATION TABLES

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

NO.	BY:	DATE:	NO.	BY:	DATE:
1			3		
2			4		

SHEET NO.

TOTAL SHEETS