

SPREAD ANALYSIS
6' SCUPERS ON 12' CENTERS
DA=0.006, OC=4.0, hfr=0.9
C=1.0
Q=0.25
LONGITUDINAL SLOPE=0.0001 f/h
CROSS SLOPE=0.025 f/h
SHOULDER WIDTH=8'
SPREAD=4.6'
DECK DRAINS REQUIRED
6' SCUPERS ON 12' CENTERS
88' SPANS = 7 SCUPERS LT & RT
100' SPANS = 8 SCUPERS LT & RT
120' SPANS = 9 SCUPERS LT & RT

BM4
N=951267
E=2902922
ELEV=5.03'
RR SPIKE IN PP

PI = 22+10.00
K = 600
VC = 120'
EL = 18.15'
PI = 20+40.00

PI = 20+40.00
K = 600
VC = 120'
EL = 18.15'
PI = 22+10.00

INFORMATION TO BE SHOWN ON PLANS **

WS EL Taken @ River Station 8

Design:	Discharge	N/A	c.f.s.	Frequency	N/A	yr.	Elev.	N/A	ft.
Base Flood:	Discharge	34.0	c.f.s.	Frequency	100	yr.	Elev.	2.63	ft.
Overtopping:	Discharge	N/A	c.f.s.	Frequency	500+	yr.	Elev.	17.14	ft.

ADDITIONAL INFORMATION AND COMPUTATIONS

•• HYDRAULIC MODELLING/SCOUR CALCULATIONS PROVIDED BY MOFFATT AND NICHOL

TOTAL SCOUR			TOTAL SCOUR			TOTAL SCOUR		
BENT NUMBER/STATION	TOTAL SCOUR (FEET)		BENT NUMBER/STATION	TOTAL SCOUR (FEET)		BENT NUMBER/STATION	TOTAL SCOUR (FEET)	
	100 yr.	500 yr.		100 yr.	500 yr.		100 yr.	500 yr.
BENT 9 STA 31+00	0.00	0.89	BENT 31 STA 53	0.22	0.95	BENT 51 STA 73+00	0.24	0.96
BENT 10 STA 32+00	0.00	0.93	BENT 32 STA 54+00	0.22	0.95	BENT 52 STA 74+00	0.24	0.96
BENT 11 STA 33+00	0.15	0.94	BENT 33 STA 55+00	0.23	0.95	BENT 53 STA 75+00	0.24	0.96
BENT 12 STA 34+00	0.19	0.94	BENT 34 STA 56+00	0.23	0.95	BENT 54 STA 76+00	0.25	0.97
BENT 13 STA 35+00	0.20	0.94	BENT 35 STA 57+00	0.23	0.95	BENT 55 STA 77+00	0.25	0.97
BENT 14 STA 36+00	0.20	0.94	BENT 36 STA 58+00	0.23	0.96	BENT 56 STA 78+00	0.25	0.97
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BENT 16 STA 38+00	0.21	0.95	BENT 38 STA 60+00	0.23	0.96	BENT 58 STA 80+00	0.25	0.97
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BENT 28 STA 50+00	0.22	0.95	BENT 50 STA 72+00	0.24	0.96	BENT 70 STA 92+00	0.24	0.96
BENT 29 STA 51+00	0.22	0.95				BENT 71 STA 93+00	0.23	0.95
BENT 30 STA 52+00	0.22	0.95				BENT 72 STA 94+00	0.00	0.93

LEVEL III WAVE STUDY DATA FOR COASTAL BRIDGE

UNITS	100 YR	50 YR	10 YR	
DEPTH-AVE. CURRENT SPEED	FT/SEC	2.4	1.8	0.0
WIND SPEED	MI/HR	5.7	5.5	0.8
WATER SURFACE ELEVATION	FT MSL	5.4	5.0	0.5
	FT NAVD	6.1	5.7	0.7
WAVE CREST ELEVATION	FT MSL	5.8	5.7	0.4
	FT NAVD	6.5	6.0	0.4
SIGNIFICANT WAVE HEIGHT	FT	0.3	0.3	0.0

SITE DATA

Drainage Area N/A (INDETERMINATE) Source USGS QUAD MAP
 River Basin PASQUOTANK Character COASTAL SWAMP
 Stream Classification (Such as Trout, High Quality Water, etc.) SW
 Data on Existing Structure N/A (NEW LOCATION)
 Total Waterway Opening N/A s.f.
 Waterway Opening Below 100yr WS EL N/A s.f.
 Debris Potential: Low x Moderate High
 Data on Structures Up and Down Stream N/A (NOT COMPARABLE)

Design Control Elev. N/A ft.
 Gage Station No. N/A Period of Records N/A yrs.
 Max. Discharge N/A c.f.s. Date N/A Frequency N/A
 Historical Flood Information:
 Date Elev. ft. Est. Freq. yr. Source Period of Knowledge yrs.
 Date Elev. ft. Est. Freq. yr. Source Period of Knowledge yrs.
 Date Elev. ft. Est. Freq. yr. Source Period of Knowledge yrs.
 Historical Scour Info.: General N/A ft. Contraction N/A ft. Local N/A ft.
 Channel Slope N/A f/ft Source N/A Normal Water Surface Elev. N/A ft.
 Manning's n: Left O.B. Channel Right O.B. Source
 Flood Study /Status FEMA ZONE AE (EL 4) (COASTAL STORM SURGE) Floodway Established? NO
 With Floodway Without Floodway
 Flood Study 100yr. Discharge N/A c.f.s. WS Elev.: Floodway N/A ft. Without Floodway N/A ft.

DESIGN DATA

Hydrological Method N/A
 Hydraulic Design Method N/A (HEC-RAS BY MOFFATT AND NICHOL)
 Floods Evaluated:

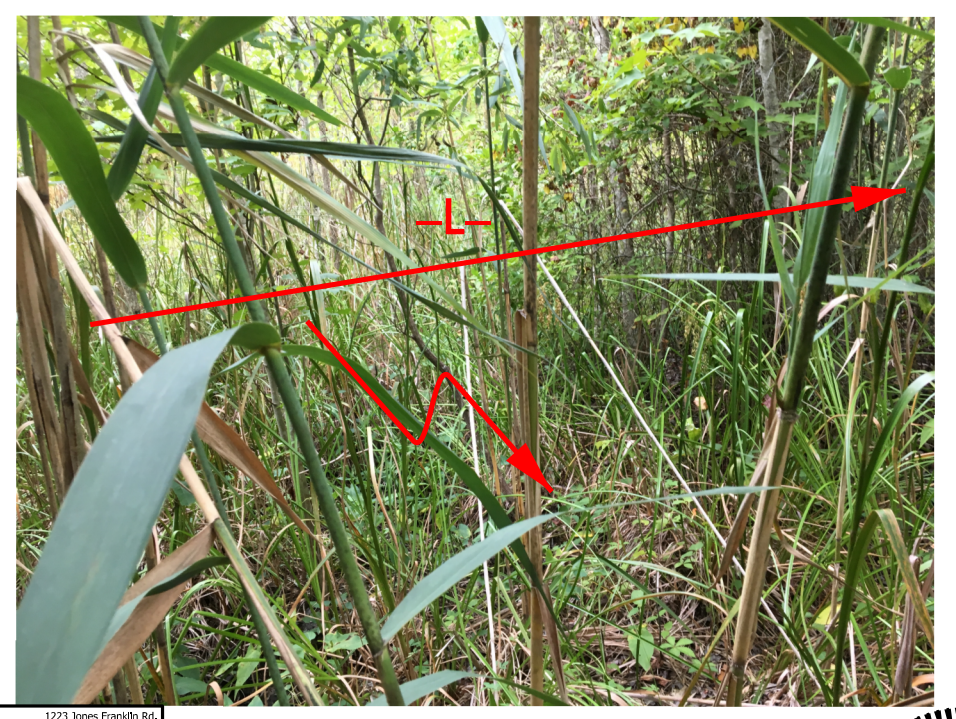
Freq. (yr.)	Q (c.f.s.)	Elev. (ft.)	Backwater (ft.)	Bridge Opening Velocity (f.p.s.)
100	34.0	2.63	-0.06'	0.01
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A

 @ River Station 8
 Waterway Opening Provided Below Design W.S. Elev. N/A s.f., 100yr W.S. Elev. 4905 s.f., Total 382,399s.f.
 Average Channel Velocity (Design) 0.01 f.p.s. Average Overbank Velocity (Design) N/A f.p.s.
 Computed Scour: General SEE BACK COVER SEE BACK COVER SEE BACK COVER
 Is a Floodway Revision Required? NO

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

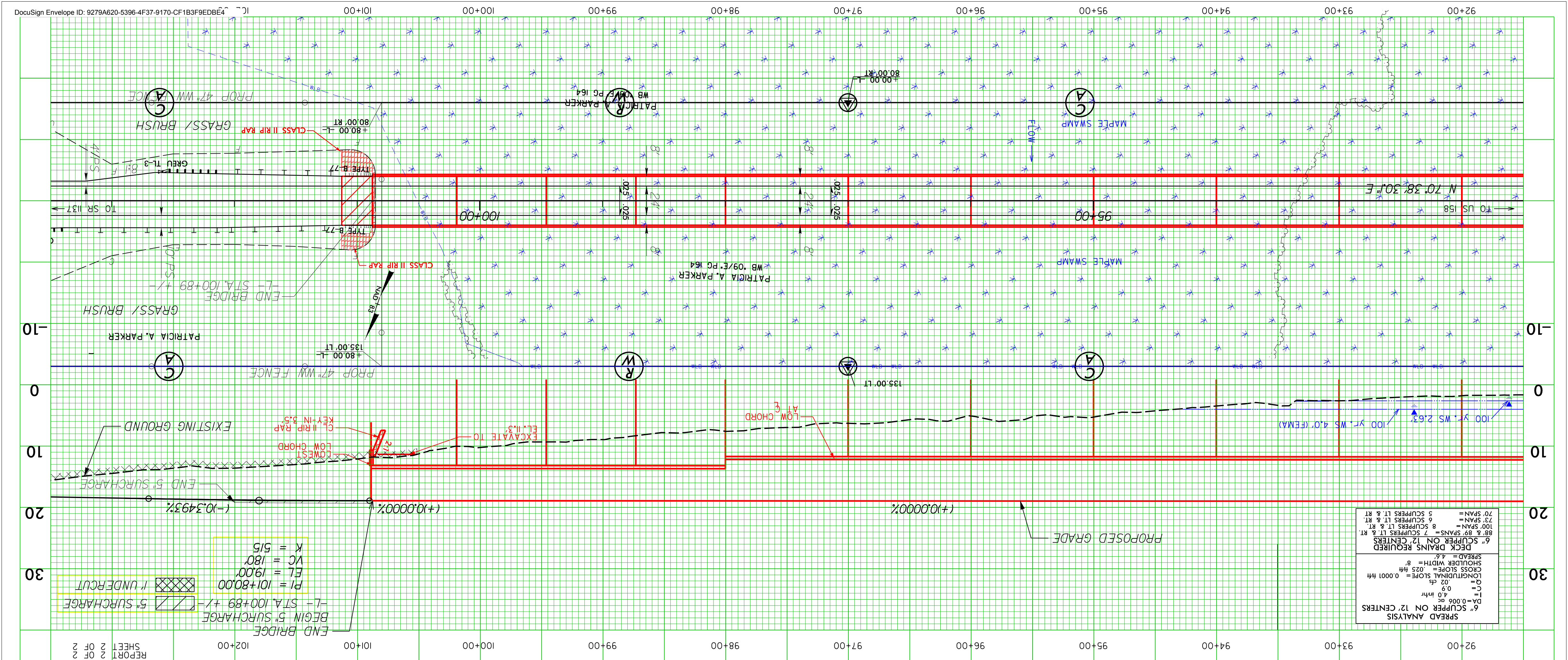
N. C. DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 HYDRAULICS UNIT
 RALEIGH, N. C.

REPORT 1 OF 2
 SHEET 1 OF 2
 I.D. No. R-2576 Project No. 34470.LTAI Proj. Station 61+67 -L-
 County CURRITUCK Bridge Over MAPLE SWAMP Bridge Inv. No.
 On Highway Between US 158 and NC 12
 Recommended Structure @ 88' SPAN 54" MBT, 3 @ 89' SPAN 54" MBT, 7 @ 100' SPANS, 72" MBT, 3 @ 73' SPAN 54" MBT, @ 70" SPAN 54" MBT
 4'0" Cap. at End Bent, 1, 2'6" Cap. at End Bent, 2 w/ Sloping Abutments.
 Recommended Width of Roadway 40' TO 122' CLEAR ROADWAY Skew 90°
 Recommended Location is (Up, At, Down) Stream from Existing Crossing NEW LOCATION
 Latitude 36.32916 Longitude -75.92470
 Statewide Tier Regional Tier Sub-Regional Tier
 Bench Mark is BM 4 - RR SPIKE IN PP 121' RIGHT OF STATION 29+41 -L-
 N951267, E2902922 Elev. 5.03 ft. Datum: NAVD 88
 Temporary Crossing NOT REQUIRED (NEW LOCATION)



1223 Sweet Fork Rd.
 Raleigh, NC 27609
 Phone: 919.851.1017
 Fax: 919.851.1018
 www.moffattandnichol.com

Designed by: MAX PRICE, P.E.
 Assisted by:
 Project Engineer: J. L. LINDSEY, P.E.
 Reviewed by: Roy D. Lovingsgood 08/22/2023
 MODELING AND SCOUR COMPS DRAFT & DECK DRAINAGE ONLY



SPREAD ANALYSIS
 6" SCUPER ON 12' CENTERS
 SLOPE = 0.020
 LONGITUDINAL SLOPE = 0.0001 TH
 CROSS SLOPE = 0.025 TH
 SHOULDER WIDTH = 8'
 SPREAD = 8' 0"
 DECK DRAINS REQUIRED
 6" SCUPER ON 12' CENTERS
 88' & 89' SPANS = 7 SCUPERS LT & RT
 100' SPANS = 9 SCUPERS LT & RT
 73' SPAN = 6 SCUPERS LT & RT
 70' SPAN = 5 SCUPERS LT & RT

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 8
 Design: Discharge N/A c.f.s. Frequency N/A yr. Elev. N/A ft.
 Base Flood: Discharge 34.0 c.f.s. Frequency 100 yr. Elev. 2.63 ft.
 Overtopping: Discharge N/A c.f.s. Frequency 500 yr. Elev. 7.14 ft.

ADDITIONAL INFORMATION AND COMPUTATIONS

TOTAL SCOUR			TOTAL SCOUR			TOTAL SCOUR		
BENT NUMBER / STATION	100 yr.	500 yr.	BENT NUMBER / STATION	100 yr.	500 yr.	BENT NUMBER / STATION	100 yr.	500 yr.
BENT 9 STA 31+00	0.00	0.89	BENT 31 STA 53	0.22	0.95	BENT 51 STA 73+00	0.24	0.96
BENT 10 STA 32+00	0.00	0.93	BENT 32 STA 54+00	0.22	0.95	BENT 52 STA 74+00	0.24	0.96
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BENT 30 STA 52+00	0.22	0.95				BENT 72 STA 94+00	0.00	0.93

LEVEL JJI WAVE STUDY DATA FOR COASTAL BRIDGE FOR COMPARISON ONLY

	UNITS	100 YR	50 YR	10 YR
DEPTH-AVE CURRENT SPEED	FT/SEC	2.4	1.8	0.0
WIND SPEED	M/HR			
WATER SURFACE ELEVATION	FT MSL	5.7	5.5	0.8
	FT NAVD	6.4	6.2	0.5
WAVE CREST ELEVATION	FT MSL	6.1	6.0	0.7
	FT NAVD	5.8	5.7	0.4
SIGNIFICANT WAVE HEIGHT	FT	0.3	0.3	0.0

SITE DATA

Drainage Area N/A (INDETERMINATE) Source USGS QUAD MAP
 River Basin PASQUOTANK Character COASTAL SWAMP
 Stream Classification (Such as Trout, High Quality Water, etc.) SW
 Data on Existing Structure N/A (NEW LOCATION)
 Debris Potential: Low x Moderate High
 Data on Structures Up and Down Stream N/A (NOT COMPARABLE)
 Design Control Elev. N/A ft.
 Gage Station No. N/A Period of Records N/A yrs.
 Max. Discharge N/A c.f.s. Date N/A Frequency N/A
 Historical Flood Information:
 Date Elev. ft. Est. Freq. yr. Source Period of Knowledge yrs.
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 Channel Slope N/A f/ft Source N/A Normal Water Surface Elev. N/A ft.
 Manning's n: Left O.B. Channel Right O.B. Source
 Flood Study / Status FEMA ZONE AE (EL 4) (COASTAL STORM SURGE) Floodway Established? NO
 With Floodway Without Floodway N/A N/A ft.
 Flood Study 100yr. Discharge N/A c.f.s. WS Elev.: Floodway N/A ft. Without Floodway N/A ft.

DESIGN DATA

Hydrological Method N/A
 Hydraulic Design Method HEC-RAS BY MOFFATT AND NICHOL
 Floods Evaluated: Freq. Q Elev. Backwater Bridge Opening Velocity
 @ River Station 8
 100 yr. 34.0 (c.f.s.) 2.63 (ft.) -0.06 (ft.) 0.01 (f.p.s.)
 N/A N/A N/A N/A N/A
 N/A N/A N/A N/A N/A
 N/A N/A N/A N/A N/A
 N/A N/A N/A N/A N/A
 Waterway Opening Provided Below Design W.S. Elev. N/A s.f. 100yr W.S. Elev. 4905 s.f. Total 382,393 f.
 Average Channel Velocity (Design) 0.01 f.p.s. Average Overbank Velocity (Design) N/A f.p.s.
 Computed Scour: General SEE BACK COVER SEE BACK COVER SEE BACK COVER
 Is a Floodway Revision Required? NO

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT
 N. C. DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 HYDRAULICS UNIT
 RALEIGH, N. C.

REPORT 1 OF 2
 SHEET 2 OF 2
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 4'0" Cap. at End Bent. 1. 2'6" Cap. at End Bent. 2 w/ Spill Through Abutments.
 Recommended Width of Roadway 40' TO 122' CLEAR ROADWAY Skew 90°
 Recommended Location is (Up, At, Down) Stream from Existing Crossing NEW LOCATION
 Latitude 36.32916 Longitude -75.92470
 Statewide Tier Regional Tier Sub-Regional Tier
 Bench Mark is BM 4 - RR SPIKE IN PP 121' RIGHT OF STATION 29+41 -L-
 Elev. 5.03 ft. Datum: NAVD 88
 Temporary Crossing NOT REQUIRED (NEW LOCATION)



DESIGNED BY: MAX PRICE, P.E.
 ASSISTED BY:
 PROJECT ENGINEER: J. L. LINDSEY, P.E.
 REVIEWED BY: Ray D. Loringood 08/22/2023
 04588B7F58224FE

MODELING AND SCOUR COMPS DRAFT & DECK DRAINAGE ONLY