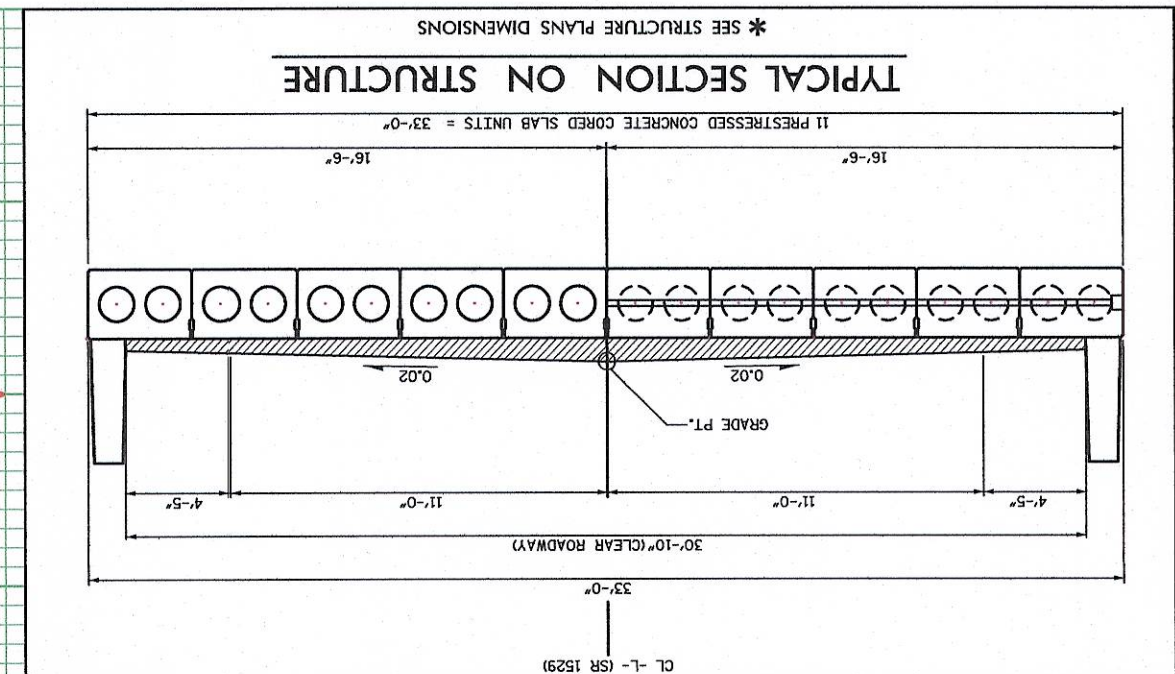
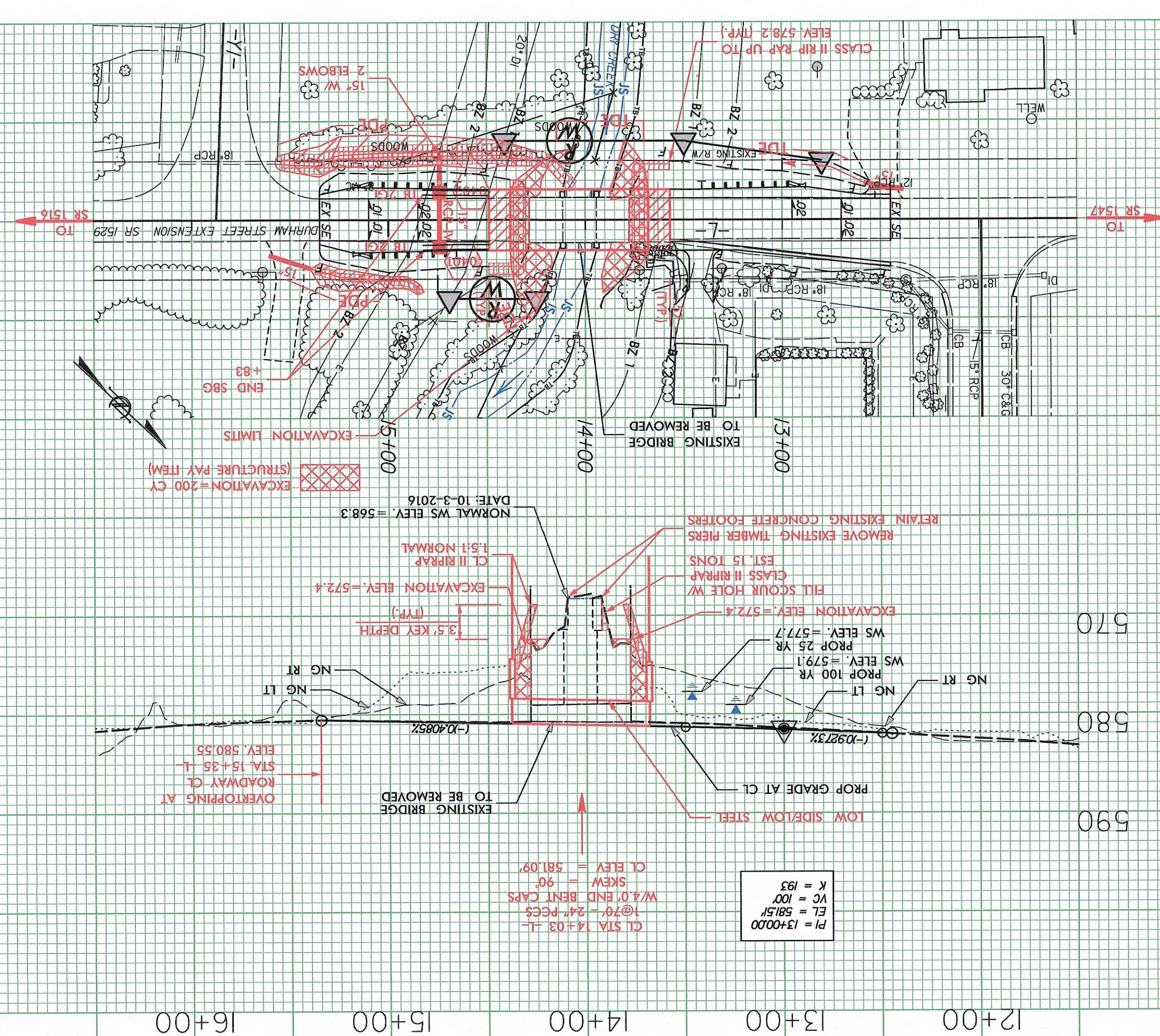




NO DECK DRAINS REQUIRED	
SPREAD = 4.0 FT. SHOULDER WIDTH = 4.4 FT. CROSS SLOPE = 0.02 H/H LONGITUDINAL SLOPE = 0.004 H/H 0.14 CFS C = 0.9 I = 4.0 IN⁴/FT D/A = 0.04 AC SPREAD ANALYSIS	
DUPLICATE EFFECTIVE @ SECTION 5148	
17.4 FT. FROM US FACE OF BRIDGE @SECTION 5072	
REVISIED	579.1
CORRECTED EFFECTIVE	579.7
DUPLICATE EFFECTIVE	579.8
100Yr.	
PERFORMANCE TABLE	
FEMA	
17.4 FT. FROM US FACE OF BRIDGE @SECTION 5072	
PROPOSED	576.5
EXISTING	577.0
NATURAL	577.4
10Yr.	50Yr.
50Yr.	100Yr.
579.1	
579.5	
580.6	
FREQUENCY	
NC DOT	
PERFORMANCE TABLE	

WS EL. Taken @ River Station 5072				
Design:	Discharge	1,760	c.f.s.	Frequency 25 yr. Elev. 577.7 ft.
Base Flood:	Discharge	2,270	c.f.s.	Frequency 100 yr. Elev. 579.1 ft.
Overtopping:	Discharge	3,050	c.f.s.	Frequency 500 yr. Elev. 580.6 ft.

*OT OCCURS AT ROADWAY STA. 15+35 ROADWAY CENTERLINE

USGS URBAN REGRESSION EQUATIONS FROM SCIENTIFIC INVESTIGATIONS REPORT 2014-5030.....

IMPERVIOUS AREA % = 20.0 (FUTURE IMPERVIOUS FROM ZONING DATA)

USGS DISCHARGES				PRELIMINARY FEMA FIS DISCHARGE	PRELIMINARY FEMA FLOODWAY DISCHARGE
REGION	1, 3.0 SQ. MI. ≤ DA ≤ 436 SQ. MI.	SAY			
Q 10 =	484 (3.27) ^{0.5539} 10 ^{0.00646*20.0}	= 1,230 CFS	1,200 CFS	1,210 CFS	—
Q 25 =	657 (3.27) ^{0.5470} 10 ^{0.00466*20.0}	= 1,552 CFS	1,600 CFS	1,760 CFS	—
Q 50 =	794 (3.27) ^{0.5428} 10 ^{0.0037*20.0}	= 1,791 CFS	1,800 CFS	2,020 CFS	—
Q 100 =	941 (3.27) ^{0.5386} 10 ^{0.00287*20.0}	= 2,026 CFS	2,000 CFS	2,270 CFS	2,270 CFS
Q 500 =	1319 (3.27) ^{0.5305} 10 ^{0.0011*20.0}	= 2,601 CFS	2,600 CFS	3,050 CFS	—

AFTER COMPARISON, THE PRELIMINARY FEMA FIS DISCHARGES SHOULD BE USED FOR DESIGN.
THE FEMA 100-YR DISCHARGE WILL BE USED FOR MOA COMPLIANCE.

LIVE-BED 100-YR CONTRACTION SCOUR (CHANNEL).

$$Y_{S_{\text{OUT}}} = Y_1 \cdot [(Q_2 / Q_1)^{6/7} \cdot (W_1 / W_2)^{K_1}] \cdot Y_0 = Y_0 = \text{ASSUMED} \cdot D_{50} = 2.4 \text{ mm}$$

1. NO UPSTREAM OR DOWNSTREAM STRUCTURES CURRENTLY WITHIN THE FLOODPLAIN AT THE TIME THIS PROJECT WAS DESIGNED WILL BE ADVERSELY AFFECTED BY THE PROPOSED BRIDGE.
2. CHANNEL IS STABLE AND BED MATERIAL IS COMPOSED OF GRAVEL, SAND AND SILT. DEBRIS POTENTIAL IS LOW.
3. SUB-REGIONAL TIER DESIGN GUIDELINES APPLY TO THIS PROJECT.

Drainage Area 3.27 SQ. MI. Source USGS QUAD MAP
 CAPE FEAR
 River Basin (JORDAN LAKE WATERSHED) Character LOW RESIDENTIAL, COMMERCIAL, INDUSTRIAL
 Stream Classification (Such as Trout, High Quality Water, etc.) WS-Y, NSW
 Data on Existing Structure @1@7'8", 1@17'0", 1@17'8" TIMBER DECK ON TIMBER JOISTS, OVERALL LENGTH = 52.3'
 ...END, & INT. BTS, TIMBER CAPS, POSTS & CONC. SILLS, TIMBER BULKHEADS... Total Waterway Opening 375 s.f.
 Waterway Opening Below 100yr. WS EL. 375 s.f.
 Debris Potential: Low ..X.. Moderate High
 Data on Structures Up and Down Stream UPSTREAM: NC .87. (OSPIPEE RD) 8' x 7' RCBC
 DOWNSTREAM: NO .COMPARABLE STRUCTURES DOWNSTREAM

Design Control Elev. MATCH_QR_REDUCE_CORRECTED EFFECTIVE 100 YR EL=579.7'

Gage Station No.N/A..... Period of RecordsN/A.....yrs.

Max. DischargeN/A..... c.f.s. DateN/A..... FrequencyN/A.....

Historical Flood Information:

HURRICANE FRAN

Date 1996. Elev. 577.7 ft. Est. Freq. 25-yr. Source DELORIS McFARLING, RESIDENT. Period of Knowledge 36 yrs.

Date 10/2016 Elev. 573.5 ft. Est. Freq. 10-yr. Source HIGH WATER MARK. Period of Knowledge — yrs.

Date Elev.ft. Est. Freq.yr. Source Period of Knowledgeyrs.

Historical Scour Info. : GeneralNQNE.....ft. ContractionNQNE.....ft. LocalNQNE.....ft.

Channel Slope0.005.....ft/ft SourceFIELD SURVEY..... Normal Water Surface Elev.568.3.....ft.

Manning's n: Left O.B.0.15.....Channel0.05..... Right O.B.0.15..... SourceFIELD SURVEY.....

FEMA DETAILED STUDY - ZONE AE

Flood Study /StatusPANEL #: 8856.EFFECTIVE DATE: 9/6/06..... Floodway Established?YES.....

With

Flood Study 100yr. Discharge2,270.....c.f.s. WS Elev.: Floodway579.4.....ft. Floodway579.4.....ft.

@ River Station 5068

Hydrological Method.....USGS. URBAN. REGRESSION. EQUATIONS. COMPARED. WITH. FEMA. FIS. DISCHARGES.....						
Hydraulic Design Method.....HEC-RAS. 4.1.0. (B5346. DRY CREEK. SR1529).....						
Floods Evaluated:		Freq. (yr.)	Q (c.f.s)	Elev. (ft.)	Backwater (ft.)	Bridge Opening Velocity (f.p.s)
River Station 5072	DESIGN	10.....	1,210.....	576.5.....	0.4.....	4.5.....
		25.....	1,760.....	577.7.....	0.4.....	5.0.....
		50.....	2,020.....	578.3.....	0.4.....	4.5.....
		100.....	2,270.....	579.1.....	0.7.....	5.0.....
		500.....	3,050.....	580.6.....	0.8.....	6.7.....

Waterway Opening Provided Below: Design W.S. Elev.367' s.f., 100yr W.S. Elev.456' s.f., Total456' s.f.,
Average Channel Velocity (Design)4.2 f.p.s. Average Overbank Velocity (Design)1.1 f.p.s.
(RS 5148) (RS 5148)
Computed Scour : GeneralNONE ft. Contraction0.0 ft. LocalNONE ft.
Is a Floodway Revision Required?NO. MOA TYPE 2B (0.6 MAX. DECREASE @ STATION .5072)

FEMA FLOOD ZONE AE
(PRELIMINARY DETAILED STUDY,
DATE: FEBRUARY 21, 2014)

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

I.D. No. B-5346 Project No. A6060.1.1 Proj. Station 14+03.1
County ALAMANCE Bridge Over DRY CREEK Bridge Inv. No. 3
SR 1529 SR 1666 SR 1803
On Highway(DURHAM ST. EXTENSION) Between (LITTLE JOHN LN.) and (DURHAM MEADOWS DR.)
Recommended Structure 1 @ .70'-.24" PRESTRESSED CONCRETE CORED SLAB W/4.0" END BENT CAPS
Recommended Width of Roadway 30'-10" FACE-FACE 33'0" OUT-OUT Skew 90°
Recommended Location is (Up/At/Down) Stream from Existing Crossing.
Statewide Tier ☐ Regional Tier ☐ Sub-Regional Tier ☒
Bench Mark is BM1-BL STA 18+68.00, 142' RIGHT, RR SPIKE IN BASE OF 20" BEECH TREE
Elev. 576.85 ft. Datum: NAVD 88
Temporary Crossing IS NOT REQUIRED - TRAFFIC MAINTAINED VIA OFF-SITE DETOUR



Designed by: E. M. LEONHART
Assisted by: R. L. HOWARD, B. T. SMITH
Project Engineer: W. HENRY WELLS, JR., P.E.
Reviewed by: *[Signature]* 2/14/2017

Date _____

SUNGATE DESIGN GROUP, P.A.
915 JONES FRANKLIN RD.
DAN FOSTER, NORTH CAROLINA

