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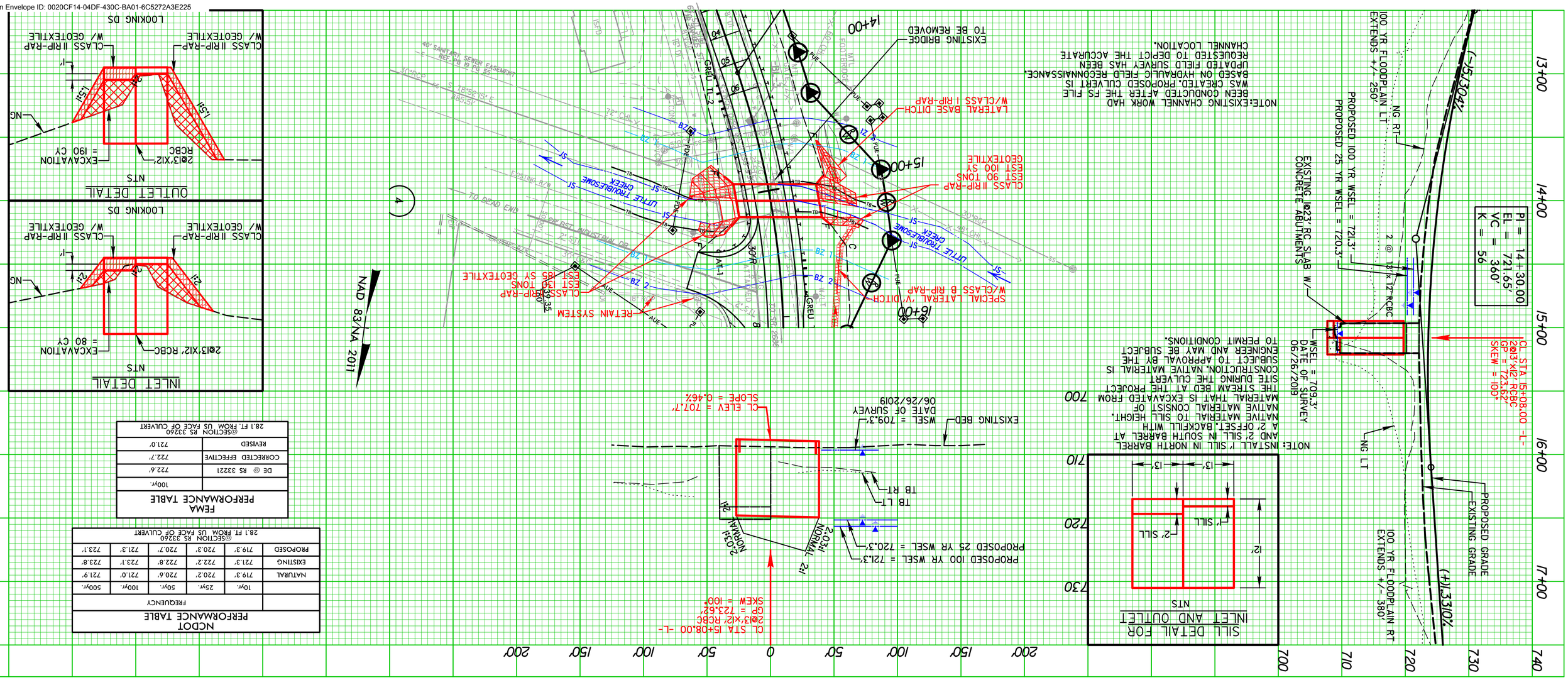

FEMA PERFORMANCE TABLE

	100yr.
DE @ RS 33221	722.6'
CORRECTED EFFECTIVE	722.7'
REVISED	721.0'

28.1 FT. FROM US FACE OF CULVERT

NCDOT PERFORMANCE TABLE

@SECTION RS 33260

28.1 FT. FROM US FACE OF CULVERT

	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	719.3'	720.2'	720.6'	721.0'	721.9'
EXISTING	721.3'	722.2'	722.8'	723.1'	723.8'
PROPOSED	719.3'	720.3'	720.7'	721.3'	723.1'

ADDITIONAL INFORMATION AND COMPUTATIONS

HYDROLOGY

DRAINAGE AREA = 3.7 SQ. MI. - REGION I — STREAM STATS 2006 = 17.57% 30% IMP USED FOR FUTURE CONDITIONS.

USGS SIR 2014-5030
URBAN - REGION 1
$3.0MI^2 \leq 436MI^2$

	SAY	FEMA
$U_{10} = 484(3.7)^{0.5539}(10)^{0.0060*30} = 1510$ CFS	1500 CFS	1140 CFS
$U_{25} = 657(3.7)^{0.5470}(10)^{0.0046*30} = 1850$ CFS	1900 CFS	1610 CFS
$U_{50} = 794(3.7)^{0.5428}(10)^{0.0037*30} = 2090$ CFS	2100 CFS	1840 CFS
$U_{100} = 941(3.7)^{0.5386}(10)^{0.0028*30} = 2310$ CFS	2300 CFS	2060 CFS
$U_{500} = 1319(3.7)^{0.5305}(10)^{0.0011*30} = 2850$ CFS	2900 CFS	2670 CFS

FEMA 100 YR DISCHARGE USED FOR NCFMP COMPLIANCE ONLY

USGS EQUATIONS USED FOR DESIGN

DESIGN FOLLOWS SUB-REGIONAL TIER GUIDELINES

NO UPSTREAM OR DOWNSTREAM STRUCTURES THAT WERE IN PLACE AT THE TIME THAT THIS PROJECT WAS DESIGNED WILL BE ADVERSELY IMPACTED BY THE PROPOSED STRUCTURE.

SITE DATA

Drainage Area 3.7 SQ. MI. Source USGS STREAM STATS

River Basin CAPE FEAR Character RURAL - REGION I

Stream Classification (Such as Trout, High Quality Water, etc.) WS-V, NSW

Data on Existing Structure 1@23'0" RC SLAB W/ MASS CONRETE ABUTMENTS.

Total Waterway Opening 198 s.f. Waterway Opening Below 100yr. WS EL. 252 s.f.

Debris Potential: Low ☐ Moderate ☒ High ☐ *WEIR AREA = 54 SF

Data on Structures Up and Down Stream US: SR 2686 - 780283 - 42' (1@17'7", 1@23'11") RC DECK ON I-BEAMS. DS: NC 87 - 780302 - 255' (1@85'8.2", 1@83'8.63", 1@85'7.2) RC DECK ON PPC GIRDERS.

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 NEVER OVER ROAD Elev. ft. Est. Freq. yr. Source BILL BROWN LOCAL RESIDENT Period of Knowledge 12 yrs.

Date N/A Elev. N/A ft. Est. Freq. N/A yr. Source N/A Period of Knowledge N/A yrs.

Allowable HW Elev. MAINTAIN OR IMPROVE EXISTING LEVEL OF SERVICE ft. Normal Water Surface Elev. 709.3 ft.

Manning's n : Left O.B. 0.05-0.08 Channel 0.05 Right O.B. 0.05-0.14 Obtained From FIS/FIELD RECON

Flood Study /Status REDELINEATED EFF: 07/2007 REV: 01/02/2009 Floodway Established? YES

Flood Study 100 yr. Discharge 2060 c.f.s.; WS Elev.: With Floodway 723.3 ft. Without Floodway 722.6 ft. @River Station 33221

DESIGN DATA

Hydrological Method USGS URBAN REGRESSION - REGION I

Hydraulic Design Method HEC RAS - V 5.0.6

Design Tailwater : Q_{10} 9.6 ft.; Q_{25} 10.4 ft.; Q_{50} 10.8 ft.; Q_{100} 11.1 ft.; Q_{500} 11.9 ft.

INV. IN EL. = 707.9', INV. OUT EL. = 707.6'

SIZE & TYPE: 2@13'x12' RCBC @STATION RS 33260, APPROX. 28.1' UPSTREAM OF CULVERT.

FREQUENCY	Q (cfs)	Inlet Control HW/D	Inlet Control H.W.	Inlet Control WSEL	Outlet Control H.W.	Outlet Control WSEL	Remarks
10 YR	1500	0.6	7.3	716.2	10.4	719.3	OUTLET CONTROL
25 YR	1900	0.8	8.5	717.4	11.4	720.3	OUTLET CONTROL
50 YR	2100	0.8	9.1	718.0	11.8	720.7	OUTLET CONTROL
100 YR	2300	0.9	9.7	718.6	12.4	721.3	OUTLET CONTROL
500 YR	2900	1.0	11.3	720.2	14.2	723.1	OUTLET CONTROL

NO; MEETS MOA TYPE 2b - MAX DECREASE OF

Is a Floodway Revision Required? 1.7' @ RS 33260. Total Proposed Waterway Opening 273 s.f.

Outlet Velocity (V_{10}) 7.4 f.p.s. Natural Channel Velocity (V_{10}) 7.6 f.p.s.

Required Outlet Protection CLASS II RIP-RAP ON BANKS ONLY

INFORMATION TO BE SHOWN ON PLANS

WS Elev. Taken @ River Station 33260

Design: Discharge 1900 c.f.s. Frequency 25 yr. Elev. 720.3 ft.

Base Flood: Discharge 2300 c.f.s. Frequency 100 yr. Elev. 721.3 ft.

Overtopping: Discharge 3670 c.f.s. Frequency 500+ yr. Elev. *724.5 ft.

*OVERTOPPING @ SAG STA 15+35.85 -L-

REDELINEATED STUDY

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

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

DS GL

I.D. No. SF-780280 Project No. 17BP.7.R.141 Proj. Station 15+08.00

County ROCKINGHAM Stream LITTLE TROUBLESOME CREEK Stru. No. 0280

On Highway SR 2670 (S. SCALES ST.) Between SR 2686 (RICHARDSON DR.) and NC 87/US BUS 29 (WILLIAM F. SIMPSON HWY./ FREEWAY DR.)

Recommended Structure 2@13'x12' RCBC W/ BEVELED HW W/ 1.0' SILL IN NORTH BARREL AND 2.0' SILL IN SOUTH BARREL

Recommended Width of Roadway 36' SP TO SP Skew 100°

Recommended Location is (Up, At, Down) Stream from Existing Crossing. AT EXISTING

Latitude 36.3312 Longitude -79.66549

Statewide Tier ☐ Regional Tier ☐ Sub-Regional Tier ☒

Bench Mark is BM*1: RR SPIKE IN 18" POPLAR TREE, 51' RT of -L- STA 10+00

NORTHING: 939605, EASTING: 1804201 Elev. 743.57' ft. Datum: NAVD 88

Temporary Crossing STAGED CONSTRUCTION

LITTLE TROUBLESOME CREEK Stream — Struc. Inv. No. 0280 I.D. No. SF-780280 Project No. 17BP.7.R.141 PDF File: LITTLETROUBLESOMECREEK-SR2670_HSR.PDF — 780280_2019_SF780280

Designed by: VHB Engineering NC, P.C. (C-3705) 940 Main Campus Drive, Suite 500 Raleigh, NC 27606

Assisted by: JBH, DGL

Project Engineer : REID ROBOL, PE

Reviewed by: DocuSigned by: Erik Seiler 914DF6C33CF245D...

Date

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043870 REID B. ROBOL

12/2022