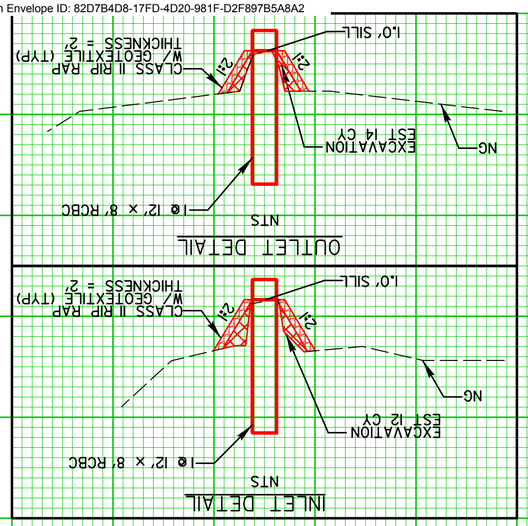
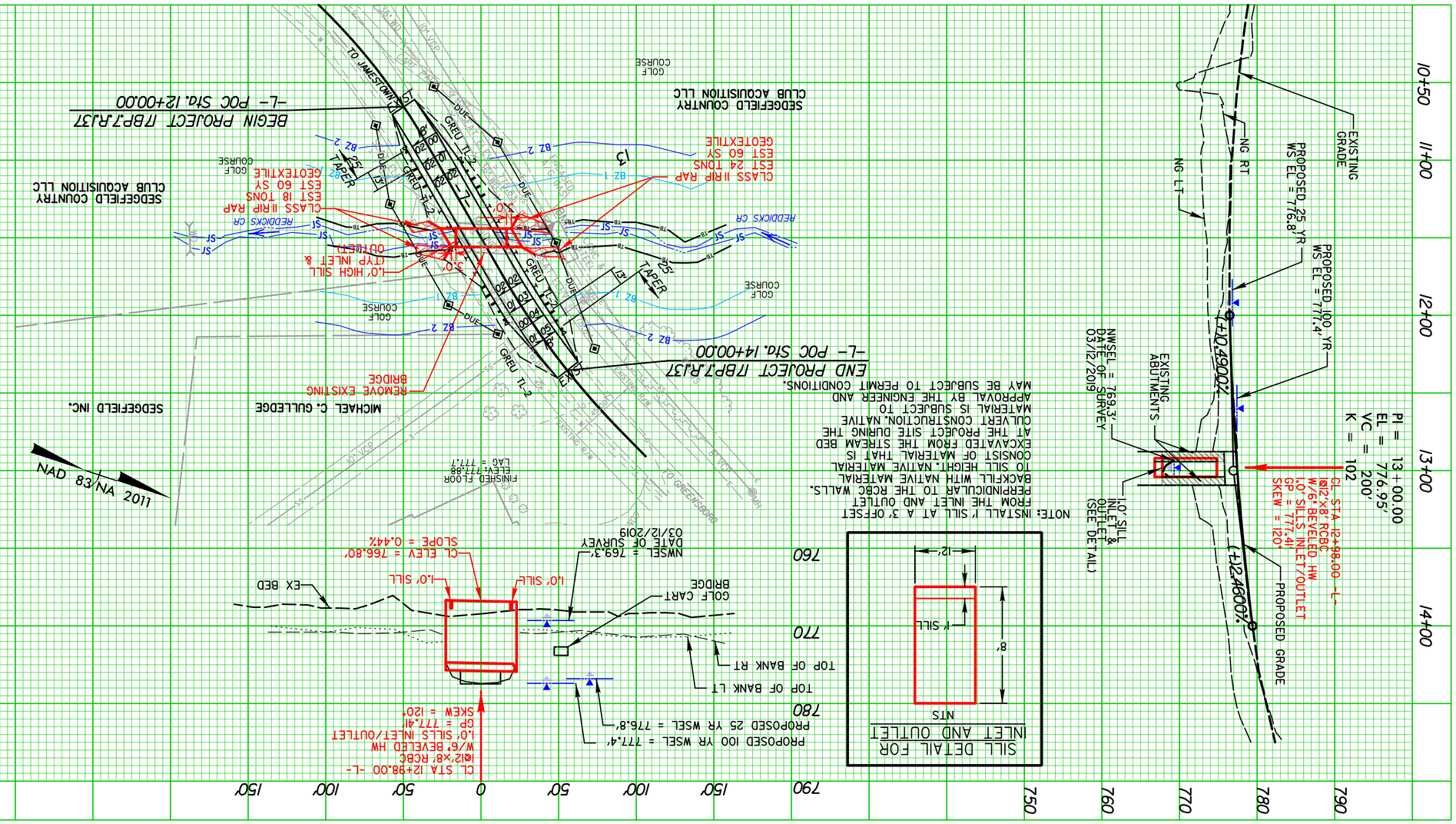


FEMA PERFORMANCE TABLE	
	100yr.
DUPLICATE EFFECTIVE	777.6' @ RS 40536
CORRECTED EFFECTIVE	777.6'
REVISED	777.4'

10.4 FT. FROM US FACE OF CULVERT

NCDOT PERFORMANCE TABLE @SECTION 40528					
	FREQUENCY				
	10yr.	25yr.	50yr.	100yr.	500yr.
NATURAL	774.9'	775.7'	776.1'	776.4'	777.2'
EXISTING	776.9'	777.1'	777.3'	777.6'	777.9'
PROPOSED	775.6'	776.8'	777.1'	777.4'	777.8'

10.4 FT. FROM US FACE OF CULVERT



ADDITIONAL INFORMATION AND COMPUTATIONS

USGS SIR 2014-5030
URBAN – REGION 1 DRAINAGE AREA: 1.0 SQ. MI. IA%=20%

$10MI^2 < 3MI^2$

SAY

$U_2 = 163(1.0)^{0.7089}(10)^{0.0133*20} = 300$ cfs — 300 cfs
$U_5 = 284(1.0)^{0.7351}(10)^{0.0096*20} = 442$ cfs — 440 cfs — FEMA
$U_{10} = 381(1.0)^{0.7536}(10)^{0.0076*20} = 540$ cfs — 550 cfs — 434 cfs
$U_{25} = 518(1.0)^{0.7752}(10)^{0.0063*20} = 662$ cfs — 650 cfs — 637 cfs
$U_{50} = 632(1.0)^{0.7903}(10)^{0.0037*20} = 749$ cfs — 750 cfs — 757 cfs
$U_{100} = 753(1.0)^{0.8038}(10)^{0.0024*20} = 841$ cfs — 850 cfs — 880 cfs
$U_{500} = 1045(1.0)^{0.8160} = 1040$ cfs — 1000 cfs — 1245 cfs

USGS URBAN 2014 EQUATIONS USED FOR DESIGN
FEMA DISCHARGES USED FOR COMPLIANCE AND 100 YEAR DESIGN

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

THE CHANNEL IS STABLE AND THE BED MATERIAL IS COMPOSED OF GRAVEL, SAND, AND SILT.

SITE DATA

Drainage Area 1.0 SQ. MI. Source USGS QUAD: GUILFORD STREAM STATS

River Basin CAPE FEAR Character RESIDENTIAL/URBAN - REGION 1

Stream Classification (Such as Trout, High Quality Water, etc.) WS IV.•

Data on Existing Structure 1@21.6' TIMBER DECK ON TIMBER JOIST. ABUTMENTS: RUBBLE MASONRY W/TIMBER SEATS

Total Waterway Opening 72.7 s.f. Waterway Opening Below 100yr. WS EL. 72.7 s.f.
Debris Potential: Low ☒ Moderate ☐ High ☐ WEIR FLOW: 127.5 sf

Data on Structures Up and Down Stream US - 400439 - 1@18'-5" TIMBER DECK ON TIMBER ABUTMENT: RUBBLE MASONRY W/TIMBER CAPS. DS - 400404 - 1@23'-0" TIMBER DECK ON I-BEAMS, ABUTMENT: RUBBLE MASONRY W/STEEL CAPS.

Gage Station No. NONE Period of Records N/A yrs.

Max. Discharge N/A c.f.s Date N/A Frequency N/A

Historical Flood Information:

NEVER OVER BRIDGE
Date ..... Elev. 774.9 ft. Est. Freq. ~10YR yr. Source CHAD CROMER GOLF COURSE SUPERINTENDENT Period of Knowledge 24 yrs.

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

Allowable HW Elev. MAINTAIN OR IMPROVE 100 YR EL ft. Normal Water Surface Elev. 769.3 ft.

Manning's n : Left O.B. 0.07-0.105 Channel 0.045 Right O.B. 0.08 Obtained From FIELD RECON FEMA

Flood Study /Status PRE-PRELIMINARY DETAILED STUDY, FIRM 7832 Floodway Established? YES

Flood Study 100 yr. Discharge 880 c.f.s.; WS Elev.: With Floodway 778.3 ft. Without Floodway 777.6 ft. @River Station 40536

DESIGN DATA

Hydrological Method FEMA DISCHARGES

Hydraulic Design Method HEC-RAS 4.1.0

Design Tailwater : Q_{10} 7.0 ft.; Q_{25} 9.0 ft.; Q_{50} 9.2 ft.; Q_{100} 9.4 ft.; Q_{500} 9.7 ft.

INV. IN EL. = 766.9', INV. OUT EL. = 766.7', BED INV IN EL. = 767.9, BED INV OUT EL. = 767.7
SIZE & TYPE: 12'X8' RCBC @STATION 40528, APPROX. 10.4' 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	550	0.9	6.2	774.1	7.7	775.6	OUTLET CONTROL
25 YR	650	1.0	7.0	774.9	8.9	776.8	OUTLET CONTROL
100 YR	*880	1.2	8.5	776.4	9.5	777.4	OUTLET CONTROL
500 YR	1000	1.3	9.3	777.2	9.9	777.8	OUTLET CONTROL

Is a Floodway Revision Required? NO, MOA TYPE 2a Total Proposed Waterway Opening 84 s.f.
MAX DECREASE 0.2' @ RS 40528 AND 40534

Outlet Velocity (V_{10}) 6.6 f.p.s. Natural Channel Velocity (V_{10}) 4.5 f.p.s.

Required Outlet Protection CLASS II RIP RAP ON BANKS ONLY

INFORMATION TO BE SHOWN ON PLANS

WS EL. Taken @ River Station 40528

Design: Discharge 650 c.f.s. Frequency 25 yr. Elev. 776.8 ft.

Base Flood: Discharge 880 c.f.s. Frequency 100 yr. Elev. 777.4 ft.

Overtopping: Discharge 625 c.f.s. Frequency ~25 YR yr. Elev. 776.5 ft.
OT @ 12+00 +/- -L- AT EOP

DETAILED STUDY
CAPE FEAR

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

WJC

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

I.D. No. SF-400402 Project No. I7BP.7.R.137 Proj. Station 12+98.00 -L-

County GUILFORD Stream REDDICKS CREEK (FEMA: REGISTERS CREEK) Stru. No. 0402

On Highway SR 1376 (MECKLENBURG RD.) Between SR 1378 (FORSYTH DR.) and SR 1372 (ALAMANCE RD.)

Recommended Structure 12'X8' RCBC W/6' BEVELED HEADWALL, BURIED 1.0' W/1.0' SILLS IN INLET AND OUTLET

Recommended Width of Roadway 32' SP TO SP Skew 120°

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

Latitude 36.00976 Longitude -79.88312

Statewide Tier ☐ Regional Tier ☐ Sub-Regional Tier ☒

Bench Mark is BM#1 - CHISLED SQUARE IN SE BENT OF GOLF CART BRIDGE 41' LT OF -L- STA 13+13.1 N 823638 E 1738774 Elev. 773.15 ft. Datum: NAVD 88

Temporary Crossing IS NOT REQUIRED - OFF SITE DETOUR

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

Designed by: MIRANDA SALZLER, PE
Assisted by: BRANDON BARHAM, PE
Project Engineer : MIRANDA SALZLER, PE
Reviewed by: WDC 6/4/21
Date 05/21/2021

Digitally signed by Miranda Salzler
Date: 2021.06.07 08:13:48 -04'00'

NORTH CAROLINA PROFESSIONAL SEAL 033180 ENGINEER MIRANDA LOUISE SALZLER

6/21/2021

SF400402_2021_400402_REDDICKSCREEK_I7BP.7.R.137.PDF File_SR1376.PDF
Stream REDDICKS CREEK Strus. Inv. No. 0402 I.D. No. SF-400402 Project No. I7BP.7.R.137 (FEMA: REGISTERS CREEK)