COMPUTATIONS FOR TEMP. PIPE @ DETOUR

USE 54" CMP @ INVERT EL. = 28.0

FROM TEMP. BRIDGE COMPS:

UPSTR. W.S. EL. = 34.5
DOWNSTR. W.S. EL. = 34.1 $\Delta h = .4$

OUTLET IS SUBMERGED - PIPE IS IN OUTLET CONTROL

SOLVE FOR Q_2

$n = 0.27$ $K_e = .9$ (projecting) $L = 65'$

$$Q = VA = \left[\frac{(\Delta h)(2g)}{1 + K_e + \frac{29n^2L}{R^{1.33}}}\right]^{1/2} \cdot \left(\pi \frac{D^2}{4}\right)$$

$$Q = \left[\frac{0.4(2)(32.2)}{1 + .9 + \frac{29(.027)^2(65)}{(1.125)^{1.33}}}\right]^{1/2} \left(\pi \frac{(4.5)^2}{4}\right) = \underline{46.0 \text{ cfs}}$$

NEGLECT 46 cfs FOR BRIDGE DESIGN.



COMPUTATIONS

FLOWRATES ARE FROM GAGE DATA
GAGE IS USGS GAGE # 02109500 - WACCAMAW RIVER @ FREELAND, NC
APPROXIMATELY 6 MILES DOWNSTREAM OF PROJECT.
DRAINAGE AREAS = 520 Mi.^{2} @ PROJECT
680 Mi.^{2} @ GAGE

FLOWRATES @ GAGE : Q_{25} = 9527 cfs
Q_{100} = 12513 cfs

FLOWRATES @ PROJECT:

$Q_{25} = 9527 \left(\frac{520}{680}\right)^{.506} = 8318$ cfs SAY 8300 cfs

$Q_{100} = 12519 \left(\frac{520}{680}\right)^{.470} = 11036$ cfs SAY 11000 cfs

NOTE : THESE FLOWRATES ARE FOR THE ENTIRE FLOODPLAIN & CONVEYED BY TWO STRUCTURES - A BRIDGE @ WACCAMAW RIVER & THIS PIPE CULVERT @ THE WACCAMAW RIVER OVERFLOW

FLOWRATE DISTRIBUTION :

	RIVER BRIDGE	OVERFLOW PIPE
Q_{25} =	8000 cfs	300 cfs
Q_{100} =	10620 cfs	380 cfs

TAILWATER COMPUTATIONS - CULVERT TAILWATER IS THE W.S. EL. @ THE DOWNSTREAM EMBANKMENT WHICH IS THE SAME AS FOR THE BRIDGE. INV. EL. = 28.0 (CONSTANT)

FROM BRIDGE COMPS - UPSTREAM EL = 36.56 ∴ HW = 8.56
Δh = .24 H = .24 (Q_{25})
DOWNSTREAM EL = 36.32 TW = 8.32

Δh = TOTAL DIFFERENCE IN W.S. EL FROM UPSTREAM TO DOWNSTREAM - SEE BRIDGE COMPS - $\Delta h_{BRIDGE} = H_{PIPES}$

UPSTREAM EL = 37.82 ∴ HW = 9.82
Δh = 0.42 H = 0.42 (Q_{100})
DOWNSTREAM EL = 37.40 TW = 9.40

B-1144
186' ℄

H.K

HYDROGRAPHIC DEPARTMENT
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, NORTH CAROLINA

Sheet No. 1 of 1

P-28

CULVERT SURVEY & HYDRAULIC DESIGN REPORT

8.2430101 ; COLUMBUS County; Station 51+00 ; Skew 117°±
on S.R. 1928 between N.C. 130 and S.R. 1930
Route
on WACCAMAW RIVER OVERFLOW Bed Material SILT
orary Crossing 13 required. New location 80' UPSTREAM from pres. crossing.
nt Structure 15 to be removed. Description 4 SPAN BRIDGE - 1@35'-3", 2@35'-0", 1@35'-6"
mark N.C. GEODETIC MONUMENT #W226 LOCATED IN FRONT STEPS OF SCHOOL ON N.C. 130 IN OLD DOCK, N.C. ELEV. 45.974 MSL

21.0000 1995 B1144 STA_5100 WACCAMAW R SR 1928
WO_8243010_PDF

8.2430101

Hydraulic Design Information

Drainage Area 520 Mi.^{2} *; Character DENSLY WOODED SWAMP; Obtained From USGS TOPO
Hydraulic Contour ____; Curve Q= ____ cfs; Correction Factor(s) ____
Design Q 300 ** cfs; Frequency 25 yrs; Estimate of Future Culture UNCHANGED
Natural Highwater 8.41 ft; Allowable Headwater 9.82** ft; Tailwater 8.32 ** ft.

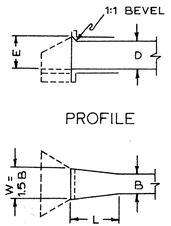
* ENTIRE DRAINAGE AREA FOR 2 STRUCTURES

COMPUTATIONS ** SEE COMPUTATIONS

Size & Type	ke	Inlet Control HW/D	Inlet Control H.W.	Outlet Control dc	Outlet Control dc+D/2	Outlet Control ho	Outlet Control H	Outlet Control LSo	H.W.	Remarks
3@72" RCP	0.2	0.63	3.8	2.7	4.35	8.32	0.24	0	8.56	Q25
3@72" RCP	0.2	0.72	4.3	3.0	4.5	9.40	0.42	0	9.82	Q100
TEMP 54" CMP	0.9	0.67	3.0	2.0	3.25	6.1	0.4	0	6.5	Q2

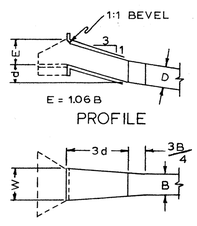
(H.W.ic—H.W.oc) ÷ H.W.oc = 3.8 − 8.56 ÷ 8.56 = −0.56 ; If more than 0.10 proceed to design special inlet. See instructions for "Design of Sloped & Tapered Inlets." Show computations on back, inlet dimensions below.

TAPERED INLET



B =
D =
E =
W =
L =

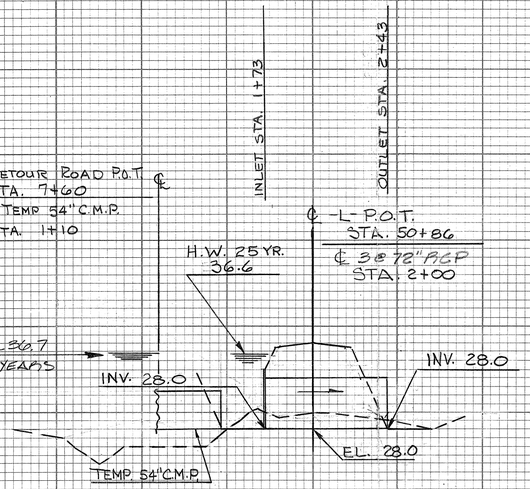
SLOPE-TAPERED INLET



B =
D =
E =
d =
W =

Information on Plans: Design Discharge 300 C.F.S. Frequency 25 yrs; Elev. 36.6
100 yr. Discharge 380 C.F.S. Elev. 37.8
Survey by BLUMMEL, KLEPPER & MOLL Date 4/26/85 Computations by C.L.F. Date 7/2/85
Assistants W.A. BLANCHARD, INC. Checked by W.R.B Date

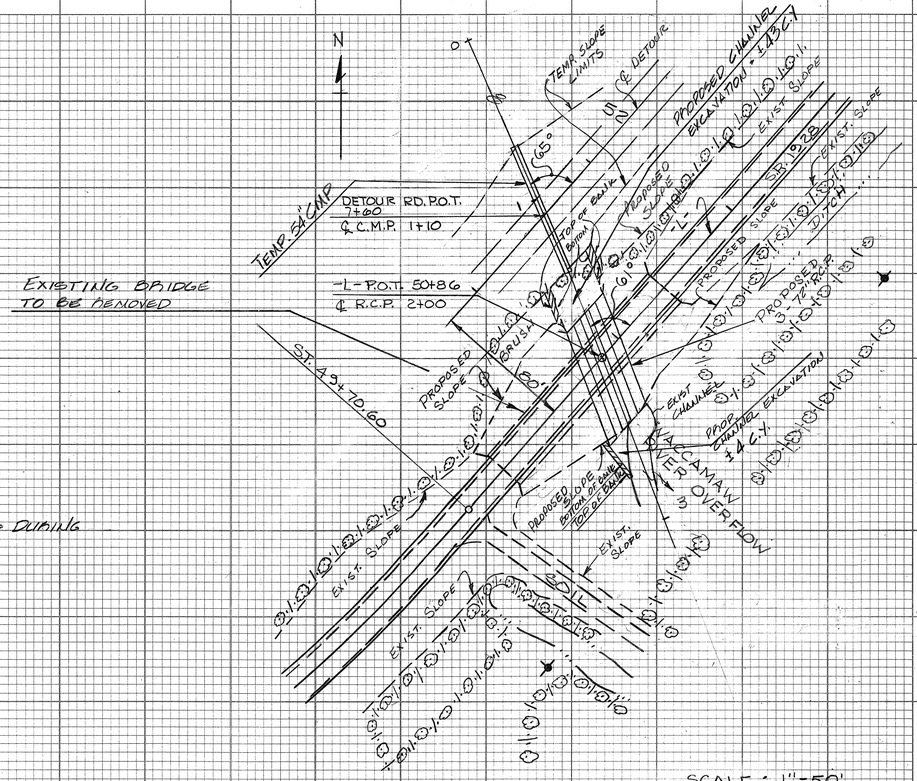
Waccamaw River Overflow



SCALE: VERT - 1"=10'
HORZ - 1"=50'

OVERFLOW ONLY OPERATES DURING PERIODS OF HIGH WATER.

EXISTING BRIDGE TO BE REMOVED



SCALE : 1"=50'