



Made By: MVC Date: 12/23/2024

Chk'd By: Date:

CRS: HOL-179-3.89

PID: 111085

Element: Temporary AccessFill Calculations

Sheet 1 of 2

Calculations for determining Temporary Access Fill (TAF) culvert system

**Given:**

OHWL: 924.7 (plans)

Top of TAF: 925.7

Maximum mean monthly flow: 61.8 cfs

Month: March

Minimum flow to be maintained: 123.6 cfs (2x highest monthly average (March) from SteamStats (See Table 1)

Maximum pipe size for TAF: 24" CMP or 2" CMP

Inputs from CDSS

Qmax: 14.38 cfs

Qfull: 13.37 cfs

Design flow: 12.36 cfs

Manning (n) for CMP: 0.022 (See Table 2)

Pipe Slope: 0.01 ft/ft

Max. Stream Opening: 29 ft

**Process Calculations**

123.6 cfs / 13.37 = 9.24, Use: 10 pipes. 123.6 cfs / 10 = 12.36 cfs; Produces 14.38 cfs (Max.) & 13.37 cfs (Full)

Qmax: 14.38 x 10 = 143.8 > 123.6 cfs

PASS

Qfull: 13.37 x 10 = 133.7 > 123.6 cfs

PASS

Pipe Width: (2 CMP x 10 pipes (each)) + (9 spa. x 0.5 ft. clearance) = 24.5 ft < 29 ft

PASS

OHWL Flow rate  $Q = (1.486/n)A(A/P)^{(2/3)}XS^{(1/2)}$

n (weighted): 0.045

n(Channel): 0.03

n(bank): 0.08

A (x-sect area): 92.88 sq ft

P (wetted perimeter): 41.07 ft

Depth (y): 2.7 ft

S (slope): 0.0039

Base Width: 29 ft

Bank Slope: 2 :1

Thalweg Elev: 922

$Q = (1.486 / 0.045)(92.88 / 41.07)^{(2 / 3)} \times 0.0039^{(1 / 2)} = 330.01 \text{ cfs}$



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Figure 1 – Culvert Hydraulic Tool Results for 24" CMP (From CDSS)

RESULTS	
Normal Depth (ft.)	1.52
Critical Depth (ft.)	1.26
Q max (cfs)	14.38
Q full (cfs)	13.37

Table 1 – StreamStats Monthly Average Flows

Statistic	Value	Unit	SE	ASEp
January Mean Flow	45.6	ft <sup>3</sup> /s	16.6	16.6
February Mean Flow	52.3	ft <sup>3</sup> /s	11.9	11.9
March Mean Flow	61.8	ft <sup>3</sup> /s	14	14
April Mean Flow	54.2	ft <sup>3</sup> /s	11.2	11.2
May Mean Flow	34.6	ft <sup>3</sup> /s	19.5	19.5
June Mean Flow	23.5	ft <sup>3</sup> /s	27	27
July Mean Flow	14.7	ft <sup>3</sup> /s	28.2	28.2

Table 2 – Manning Values

Manning's n Coefficients for Open Channel Flow	The fluid mechanics calculations website
Manning n values compiled from the references listed under <a href="#">Discussion and References</a> as well as the references at the bottom of this page. Manning n has no units.	
To: <a href="#">LMNO Engineering Home Page (more calculations)</a>	
<a href="#">Circular Culverts using Manning Equation</a> <a href="#">Culvert Design using Inlet and Outlet Control</a>	
<a href="#">Trapezoidal Channels</a> <a href="#">Rectangular Channels</a>	
<a href="#">Manning Equation Calculator</a> <a href="#">Unit Conversions</a>	

Material	Manning n	Material	Manning n
<i>Natural Streams</i>		<i>Excavated Earth Channels</i>	
Clean and Straight	0.030	Clean	0.022
Major Rivers	0.035	Gravelly	0.025
Sluggish with Deep Pools	0.040	Weedy	0.030
		Stony, Cobbles	0.035
<i>Metals</i>		<i>Floodplains</i>	
Brass	0.011	Pasture, Farmland	0.035
Cast Iron	0.013	Light Brush	0.050
Smooth Steel	0.012	Heavy Brush	0.075
Corrugated Metal	0.022	Trees	0.15