

WIN: 23625.00
 Town: Hodgdon
 Route No. US1
 Asset ID: 2492
 Lat: 46.04671 Long: -67.8556

Project Name: Maduskeag
 Stream Name: Maduskeag Stream
 Bridge Name: N/A
 Analysis by: csh / meg
 Date: 10/19/2018

Peak Flow Calculations by USGS Regression Equations (Hodgkins, 1999 & Lombard/Hodgkins, 2015)

Enter data in blue cells only!

ver. 2018 Jul 09

	km ²	mi ²	ac
A	7.85	3.03	1939.2
W	1.22	0.5	301.7
P _c	590390	5100877	
County	Aroostook S		
pptA	39.0		
SG	0.00		
A (km ²)	7.85		
W (%)	15.56		

Enter data in [mi²]

Watershed Area *DRNAREA*
 Wetlands area (by NWI)

watershed centroid (E, N; UTM 19N; meters)
 choose county from drop-down menu
 mean annual precipitation (inches; by look-up)
 sand & gravel aquifer as decimal fraction of watershed A

Conf Lvl 0.67

NWI Wetlands % *STORNWI*

Worksheet prepared by:

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References:

Hodgkins, G.A., 1999.
 Estimating the magnitude of peak flows for streams
 in Maine for selected recurrence intervals

Watershed Characteristics for Monthly & Daily Flows

HGA	0
SLOPE	5.07
DIST	118.00
WATER	0
EAVG	589.5
EMAX	861.3

mean basin percentage of hydrological soil group A
 mean basin slope (%)
 distance from the coast (mi)
 percent of drainage basin land cover classified as open water
 mean basin elevation (ft)
 maximum basin elevation (ft)

Ret Pd	Peak Flow Estimate		
T (yr)	Lower	Q _T (m ³ /s)	Upper
1.1		1.29	
2		2.59	
5		4.02	
10		4.98	
25		6.53	
50		7.50	
100		8.78	
500		11.66	

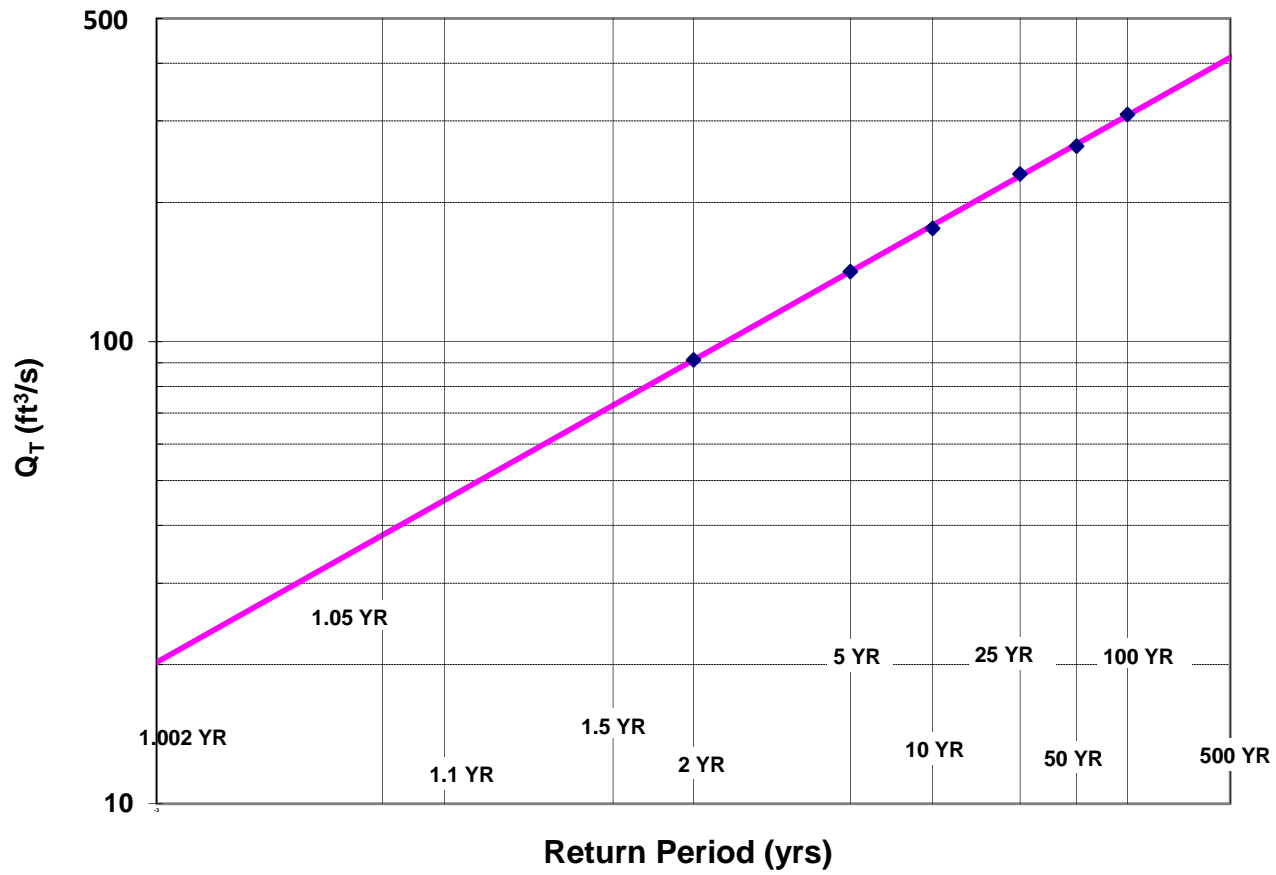
Q _T (ft ³ /s)
45.4
91.3
141.8
175.9
230.5
264.9
310.1
411.5

WRIR 99-4008, USGS Augusta, ME

Lombard, P.J. & G.A. Hodgkins, 2015.
 Peak flow regression equations for small, ungaged streams in
 Maine - Comparing map-based to field-based variables
 SIR 2015-4059, USGS, Augusta, ME

$$Q_T = b \times A^a \times 10^{-wW}$$

Log-Normal Probability Plot



WIN:	23625.00
Town:	Hodgdon
Route No.	US1
Asset ID:	2492
Lat:	46.04671
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Stream Name:	Maduskeag Stream
Bridge Name:	N/A
Analysis by:	csH / meg
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DO NOT ENTER ANY DATA ON THIS PAGE; EVERYTHING IS CALCULATED

MAINE MONTHLY MEDIAN FLOWS and HYDRAULIC GEOMETRY BY USGS REGRESSION EQUATIONS (2004, 2013, 2015)

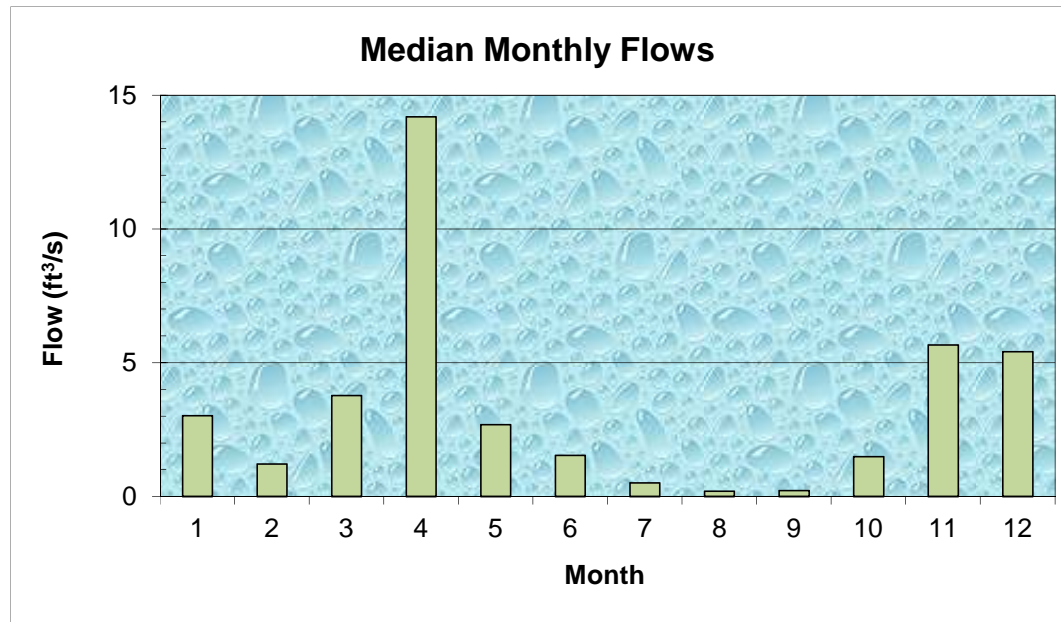
Value	Variable	Explanation
3.03	A	Area (mi ²)
590390	P _c	Watershed centroid (E,N; UTM; Zone 19; meters)
117.11	DIST	Distance from Coastal reference line (mi)
39.0	pptA	Mean Annual Precipitation (inches)
0.00	SG	Sand & Gravel Aquifer (decimal fraction of watershed area)

Month	Q _{median} (ft ³ /s)	(m ³ /s)
Jan	3.03	0.0857
Feb	1.22	0.0345
Mar	3.78	0.1072
Apr	14.19	0.4022
May	2.69	0.0761
Jun	1.54	0.0437
Jul	0.51	0.0143
Aug	0.20	0.0055
Sep	0.22	0.0062
Oct	1.49	0.0422
Nov	5.66	0.1604
Dec	5.42	0.1536

Q _{bf}	16.6
ann avg	7.0
ann med	2.8
Q _{1.002}	20.2
Q _{1.01}	27.0
Q _{1.05}	38.1
Q _{bf}	59.0

assume v = 4ft/s

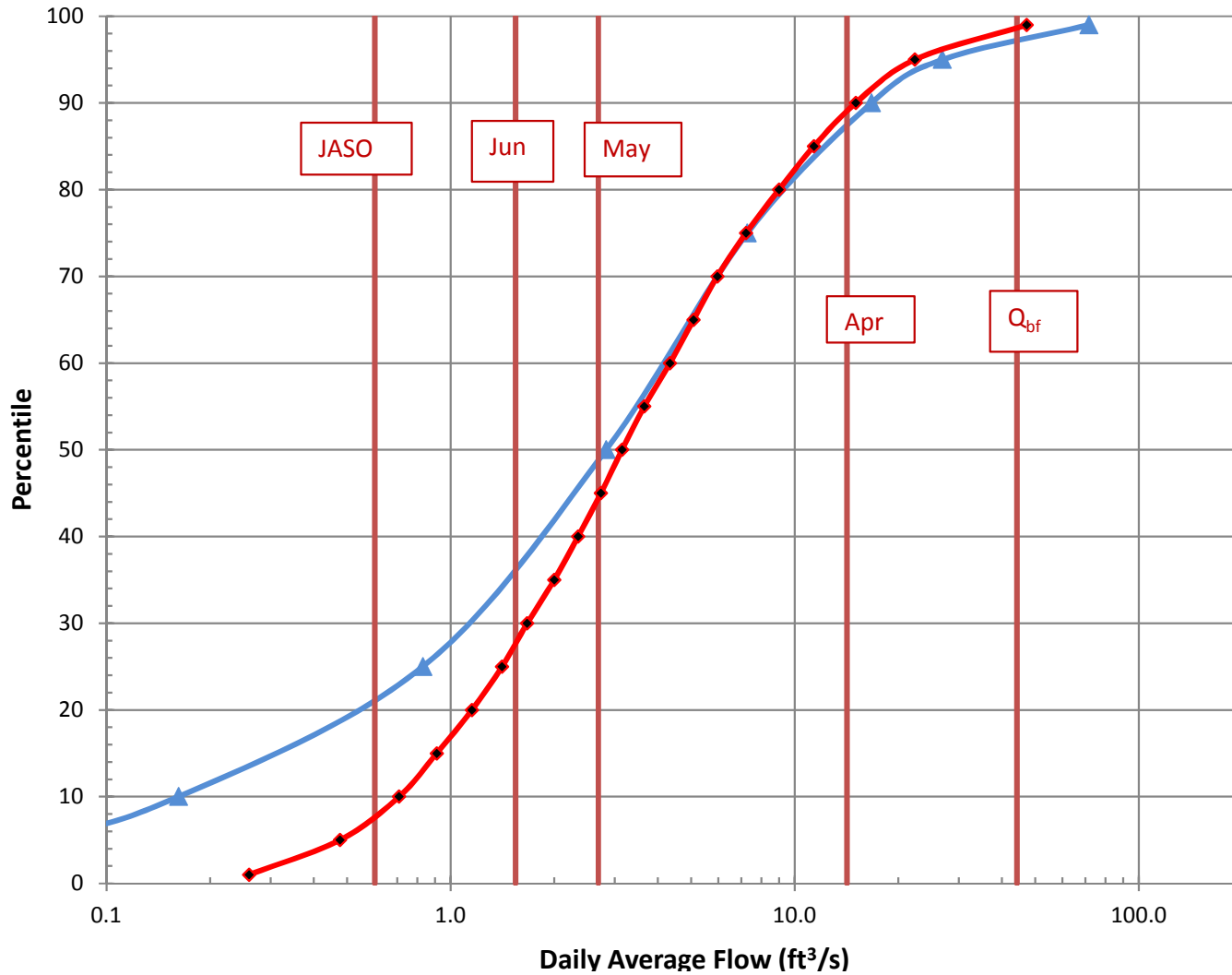
W _{bf}	17.0	estimated bankfull width (ft)
d _{bf}	0.9	estimated bankfull depth (ft)
A _{bf}	11.8	estimated bankfull flow area (ft ²)



References

- Dudley, R.W., 2013. FY2013 Progress Report - Phase 1 ..., USFWS QRP Project
- Dudley, R.W., 2004. Estimating Monthly Streamflows ... , SIR 2004-5026
- Dudley, R.W., 2015. Regression Equations for Monthly and Annual Mean..., USGS SIF

Daily Average Flow Distribution



Daily Avg Flow Dist

A_{ws} = (mi²) 3.0

Q (ft³/s)

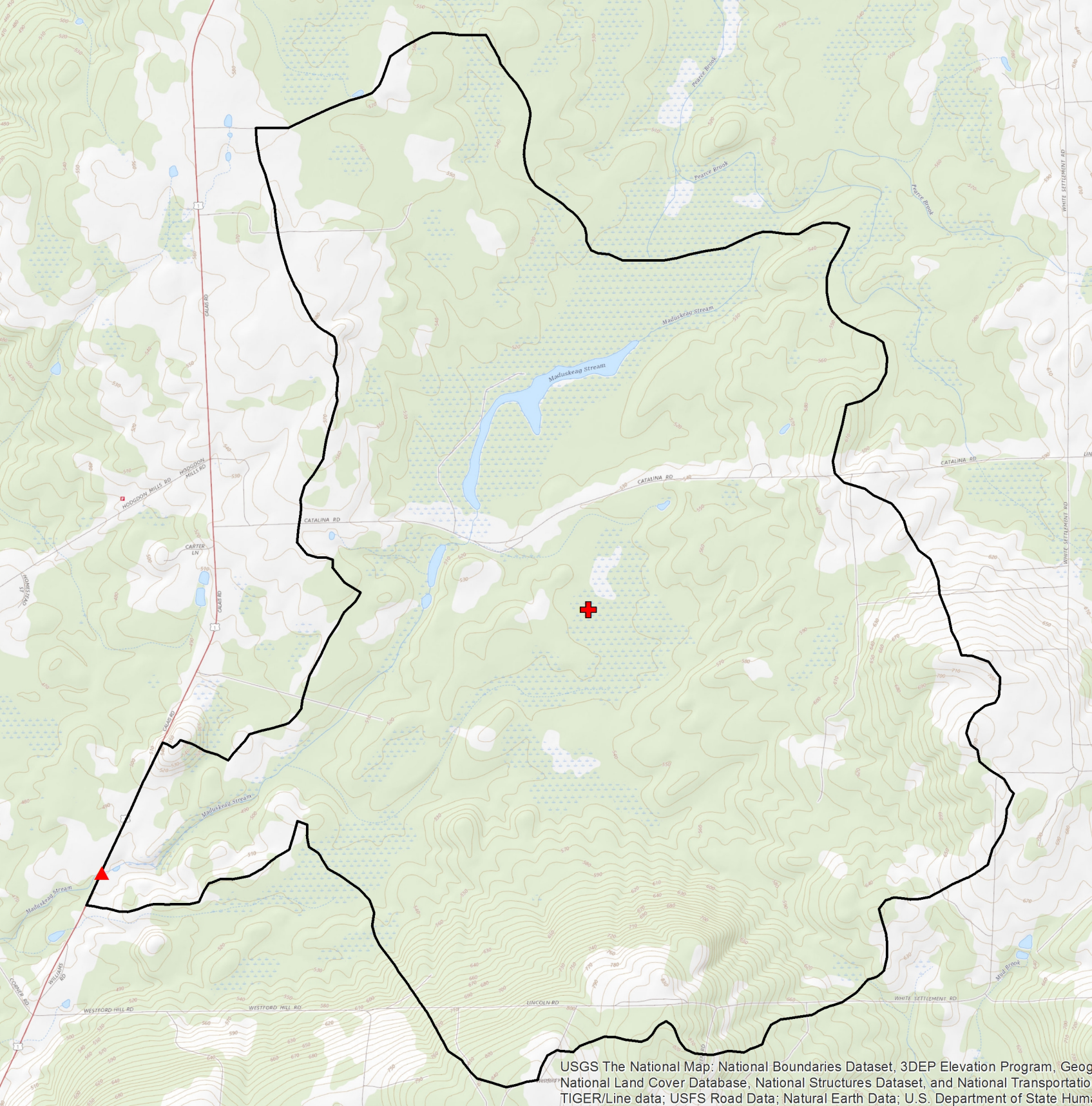
Pctl	Median	84 th pctl
1	0.26	0.46
5	0.48	0.77
10	0.71	1.07
15	0.91	1.33
20	1.15	1.61
25	1.41	1.89
30	1.67	2.15
35	2.00	2.46
40	2.35	2.83
45	2.73	3.20
50	3.15	3.78
55	3.66	4.40
60	4.34	5.16
65	5.08	6.01
70	5.96	7.02
75	7.22	8.44
80	9.01	10.07
85	11.36	12.91
90	15.05	17.33
95	22.34	26.96
99	47.24	62.19

Q_{bf} 16.6

Q_{1.002} 20.2

Q_{1.1} 45.4

Q₂ 91.3



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geo National Land Cover Database, National Structures Dataset, and National Transportation TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State

HY-8 Analysis Results

Culvert Summary Table - Slab Bridge

Culvert Crossing: Existing Bridge

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
Q1.1	45.40	45.40	474.79	1.24	1.79	7-H2c	NA	0.81	0.81	1.61	5.10	3.68
Q10	175.90	175.90	476.82	3.07	3.82	7-H2c	NA	2.00	2.00	2.84	8.01	5.74
Q25	230.50	230.50	477.48	3.67	4.48	7-H2c	NA	2.39	2.39	3.21	8.77	6.24
Q50	264.90	264.90	477.87	4.03	4.87	7-H2c	NA	2.62	2.62	3.42	9.19	6.51
Q100	310.10	310.10	478.35	4.49	5.35	7-H2c	NA	2.91	2.91	3.67	9.68	6.82
Q500	411.50	411.50	479.36	5.43	6.36	7-H2c	NA	3.52	3.52	4.18	10.64	7.43

HY-8 Analysis Results

Culvert Summary Table - Box Culvert

Culvert Crossing: Proposed Bridge

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth(ft)	Outlet Control Depth(ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
Q1.1	45.40	45.40	475.32	1.17	1.32	3-M2t	1.13	0.69	0.91	1.61	3.55	3.68
Q10	175.90	175.90	477.11	2.89	3.11	3-M2t	2.57	1.70	2.14	2.84	5.88	5.74
Q25	230.50	230.50	477.70	3.45	3.70	3-M2t	3.03	2.03	2.51	3.21	6.57	6.24
Q50	264.90	264.90	478.04	3.78	4.04	3-M2t	3.30	2.23	2.72	3.42	6.96	6.51
Q100	310.10	310.10	478.47	4.19	4.47	3-M2t	3.64	2.48	2.97	3.67	7.45	6.82
Q500	411.50	411.50	479.35	5.04	5.35	3-M2t	4.32	2.99	3.48	4.18	8.45	7.43