

HYDROLOGY REPORT

Meadow Brook Bridge carries Jones Woods Road over Deer Meadow Brook in the town of Newcastle, Maine. A hydrology report for the Deer Meadow Brook watershed was developed. Peak flow estimates were calculated using the 1999 & 2015 United States Geological Survey Agency (USGS) full regression equation (see Appendix C). The summary of the site hydrology is located in the table below.

SUMMARY		
Drainage Area	5.56	mi ²
Q1.1	75	ft ³ /s
Q10	320	ft ³ /s
Q50	480	ft ³ /s
Q100	555	ft ³ /s
Q500	740	ft ³ /s

Reported by: Brewer, Erin

Date: May 9, 2023

Note: All elevations based on North American Vertical Datum (NAVD) of 1988.

HYDRAULIC SUMMARY

The hydraulic analysis was completed using the U.S. Army Corps of Engineers' HEC-RAS program, version 5.0.7. HEC-RAS supports one-dimensional, steady flow, water surface profile calculations. The existing bridge and a 22 foot span box culvert were analyzed. Cross-sections were taken from survey data gathered for this project.

In the BDG, for a culvert-type structure the headwater to depth ratio (HW/D) should be approximately equal to or less than 0.9. The 22 foot span length chosen was controlled by the HCD.

Below is a list of parameters used in each of the hydraulic models.

Existing Bridge

- Single Span with no piers
- Span: 10'
- Deck Width: 28.5'
- Skew: 0 degrees
- Low Chord: EL 94.70

Precast Concrete Box Culvert

- Single Span
- Span: 22'
- Rise: 8' with 2' of special fill
- Hydraulic Opening: 6' in height
- Culvert Length: 65' 8"
- Skew: 10°
- Low Chord: EL 93.02

See the Hydraulic Report for more information (Appendix C).

SUMMARY

		Existing Structure	Recommended Structure
		10' Span Concrete Slab	22' Span Precast Box Culvert
Total Area of Waterway Opening	ft ²	67	132
Headwater elevation @ Q _{1.1}	ft	91.24	91.24
Headwater elevation @ Q ₁₀	ft	91.81	91.91
Headwater elevation @ Q ₂₅	ft	91.77	91.94
Headwater elevation @ Q ₅₀	ft	92.14	91.86
Headwater elevation @ Q ₁₀₀	ft	92.57	91.84
Headwater elevation @ Q ₅₀₀	ft	93.54	92.43
Freeboard @ Q ₅₀	ft	2.56	1.16
Freeboard @ Q ₁₀₀	ft	2.13	1.18
Flood Of Record (February 1976)			
Outlet Velocity @ Q _{1.1}	ft/s	1.67	0.80
Outlet Velocity @ Q ₁₀	ft/s	6.24	2.86
Outlet Velocity @ Q ₂₅	ft/s	7.96	3.54
Outlet Velocity @ Q ₅₀	ft/s	9.40	4.06
Outlet Velocity @ Q ₁₀₀	ft/s	11.15	4.60
Outlet Velocity @ Q ₅₀₀	ft/s	13.35	5.91

Reported by: Brewer, Erin
Date: May 20, 2024

Note: All elevations based on North American Vertical Datum (NAVD) of 1988.