Culvert Placement on Navigable Waterways

This worksheet should be completed and accompany all application materials for a Waterway Crossings General Permit.

Will the proposed project affect the navigational use of the waterbody? Yes ☐ No ☐

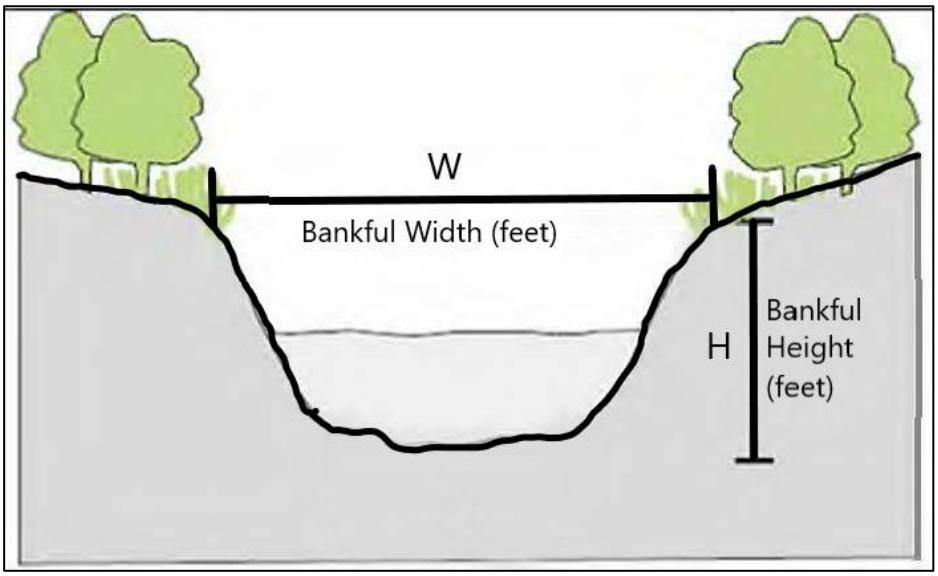
If "Yes", the following portage will be provided (describe portage): _____

_____

_____

Calculate Required Culvert Area

To be eligible for a general permit without a professionally engineered culvert design, the required culvert area may be up to 20 square feet. To be eligible for a general permit with a professionally engineered culvert design, the required culvert area may be up to 40 square feet.



To determine the required culvert area, measurements shall be made of the channel width of the stream in feet at the bankfull width (W), and the maximum bankfull height in feet above the stream bottom (H) (see diagram). These measurements shall be made at each of 3 locations or transects along the stream: the location of the newly proposed culvert crossing; 100 feet upstream from the crossing; and 100 feet downstream from the crossing. Where there is an existing crossing being replaced, measurements at the site of the crossing may not be representative due to impacts related to the existing crossing. In such instances two measurements shall be taken, upstream and downstream of the crossing location. Measurements shall be taken to ensure that the locations where measurements are made are representative of the stream overall. The individual measurements of W and H shall be averaged to derive the final W and H values. The required culvert area is then calculated with the following equation:

Required Culvert Area (square feet) = H x W

To find the area of any round culvert, use the following equation:

Round Culvert Area (square feet) = R x R x 3.14

R (radius in feet) = Culvert diameter (inches) / 24

*Example culvert area required for a stream with a culvert area calculation (H*W) of 8.5 square feet:

8.5 square feet = R x R x 3.14
2.7 square feet = R x R
1.6 feet = R
R = 19.7 inches
Culvert diameter =39.4 inches
Culvert size = 42 inches

Round culvert diameters and corresponding culvert area	
Culvert diameter (inches)	Culvert area (square feet)
18	1.80
24	3.10
30	4.90
36	7.10
42	9.60
48	12.60
54	15.90
60	19.60
66	23.80

Pipe arch culvert diameters and corresponding culvert area		
Pipe width or span (inches)	Pipe height or rise (inches)	Culvert area (square feet)
43	27	6.4
50	31	8.7
58	36	11.4
65	40	14.3
72	44	17.6
73	55	22.0
85	54	25.3
81	59	26
87	63	31
95	67	35
103	71	40

Calculate Required Culvert Length

To determine the length of any culvert, use the following equation:

Length of Culvert (L) = W + 4H + 2

W = Width of road top
H = Height of culvert + average depth of road fill
H is multiplied by 4 as a constant for the side slope angle (2 x 2:1)
2 is added as a constant for 1 foot of pipe extension beyond fill

Example culvert length calculation.

Length of culvert needed for 10’ road top, 24” (2”) diameter pipe, 1’ average road fill depth, 2:1 side slopes, 1’ pipe extension beyond fill:

L = 10’ road top + 4(2’ culvert + 1’ fill) + 2’ extension
L = 10 + 4(2+1) + 2
L = 10 + 4x2 + 4x1 + 2
L = 10 + 8 +4 + 2
L = 24 feet