

# Stream Crossings: Guidelines and Best Management Practices

The following recommendations are to assist in designing, installing, and replacing stream crossing structures in small streams, with the goal of protecting stream continuity. Pre-installation stream conditions should be retained to the maximum extent possible. Structures should be designed and installed so that the natural stream flow and bottom substrate are mimicked throughout the crossing and so that the structure does not constrict or fragment the stream. Additional engineering design may be necessary to ensure structural integrity and appropriate hydraulic capacity.

## Types of Crossings:

Bridges and open bottom box culverts are the preferred crossing method. Other methods, in descending order of preference, include open-bottom arch culverts (typically installed on concrete footings), box culverts (typically pre-cast concrete), arch or elliptical/squash culverts (metal, concrete, or plastic), and circular culverts (metal, concrete, or plastic).

## Location:

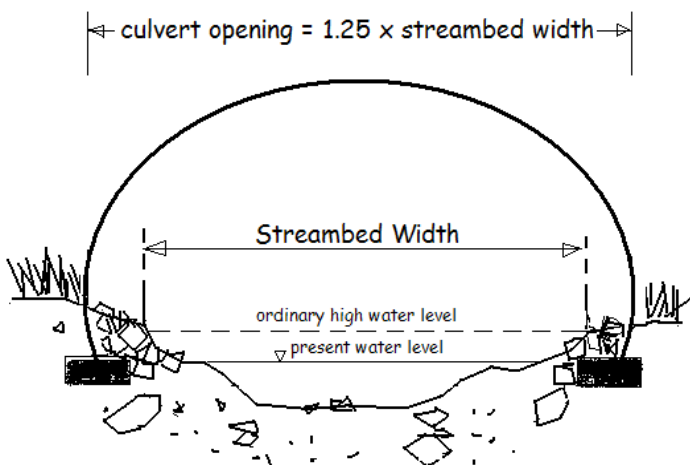
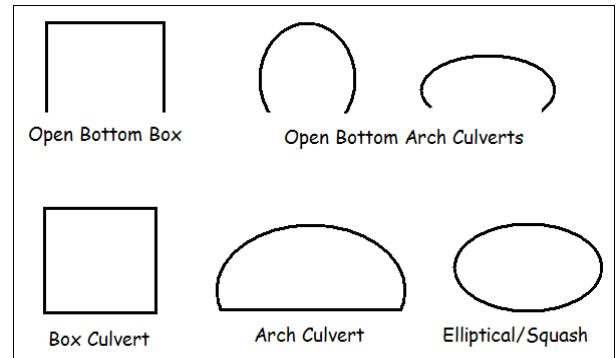
The structure should be located within a stretch of watercourse where the channel is straight, unobstructed, and well defined. When selecting a crossing location, choose a straight, flat area where the streambed/bank characteristics can be easily retained or replicated and erosion potential can be minimized. Areas where wetlands exist along the stream should be avoided when possible.

## Length and Side Slopes:

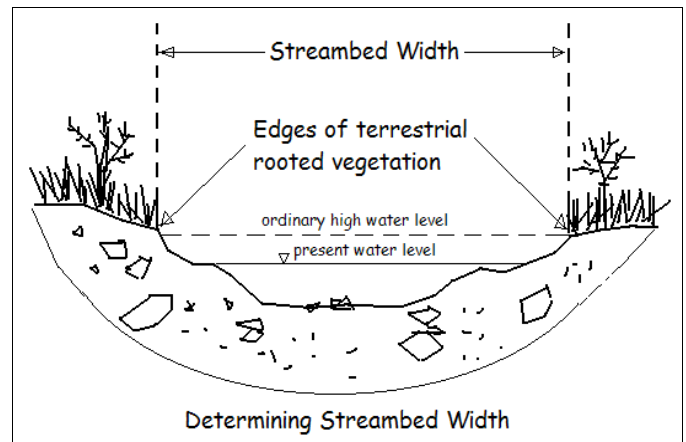
Road and shoulder widths should be the minimum necessary for the crossing and side slopes should be as steep as possible without compromising stability to minimize the length of the culvert. Note: A side slope grade of 2:1 is typically the steepest grade that can be vegetated.

## Capacity/Size:

The width of the structure should be 1.25 times the normal width of the streambed. The overall culvert capacity should be able to accommodate expected high flows.



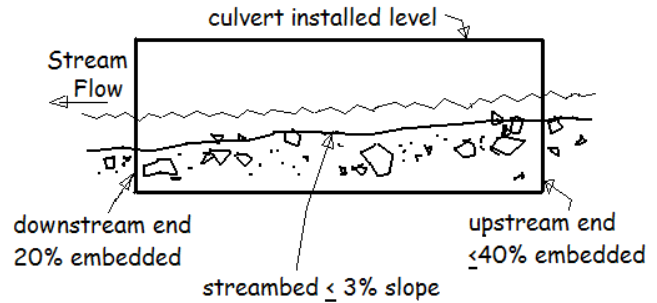
Correctly installed open-bottom arch culvert with footings



### **Installation:**

For “closed-bottom” culverts, the streambed slope must be less than 3% (3 foot vertical rise in 100 feet of channel length), and the culvert installed level with at least 20% of the vertical rise embedded at the downstream invert.

Culvert installation should take place “in the dry”, to facilitate construction and reduce downstream impacts from turbidity and sedimentation. This may require piping or pumping the stream flow around the work area and the use of cofferdams. The duration of dewatering should be kept to a minimum and flows immediately downstream of the worksite should equal flows immediately upstream of the worksite.



### **Erosion Control:**

If necessary, flared ends and/or rip rap should be used to prevent scouring around the inlet and outlet of the culvert. High flows can erode the soil surrounding the inlet and the soil underneath the outlet of a culvert. Both instances can cause culvert undermining and can adversely affect the structural integrity of the road crossing.

Appropriate erosion and sediment controls, including silt fencing and/or straw bales, should be installed parallel to the stream to prevent downstream impacts and should be depicted on project plans.

Disturbance of the streambed and banks should be limited to that necessary to place the culvert. Affected bank and bed areas should be restored to pre-project conditions following installation of the culvert and the banks should be planted with native vegetation, consistent with that which existed prior to the culvert installation. Seeded banks should be covered with mulch to accelerate plant growth.

### **Timing:**

To protect fish spawning, timing restrictions may be imposed for all instream work as well as any adjacent work that may result in suspension of sediment in a stream. In general, instream work should occur during low flow conditions, typically between June and September, to minimize impacts to fisheries and water quality. For additional information on timing restrictions, please contact the regional DEC office for the county in which the project is located.

### **Maintenance:**

It is recommended that stream crossing structures be maintained at least once annually, preferably before high spring flows. Typical maintenance includes checking for structural deficiencies such as undermining and debris buildup.

### **DEC Permits**

Permits are required for streams classified as C(T) or higher quality (ECL Article 15-0501), navigable bodies of water (ECL Article 15-0505), and DEC regulated wetlands (ECL Article 24). For additional information, please contact the regional DEC office for the county in which the project is located or visit our website at <http://www.dec.ny.gov/permits/6042.html>.

### **Permits May Also Be Required From Other Agencies, such as**

U.S. Army Corps of Engineers  
Adirondack Park Agency