

# Culvert Sizing for Flood Resilience and Wildlife Passage



# Project Objectives



- Identify undersized culverts to look at flood resiliency, including channel constriction.
- Identify areas with potential Habitat Fragmentation issues.
- Inform municipalities of information collected and how it can be used for future culvert replacements.

# Watersheds



- **Summer 2013- Sawkill Watershed**
  - Town and Village of Red Hook, Towns of Milan and Rhinebeck
  - 129 culverts inventoried.
- **Summer 2014 - Punch Brook Watershed**
  - Town of North East
  - 10 crossings and 10 culverts inventoried.
- **Summer 2014- Shekomeko Watershed**
  - Towns of Pine Plains, Stanford, Amenia, and North East
  - 64 crossings and 73 culverts inventoried.

# Data Collection



- Aerials reviewed in office to determine road/driveway crossings prior to field work.
- Check each roadway for crossings
- Data sheets were filled out at each crossing, with separate data sheets for the culverts. If there were multiple culverts, data sheets were filled out separately for each one.
- Photos taken at each culvert to show inlet and outlet of culvert, and upstream and downstream of the culvert.

3/15/13

Data Checked

**Field Data Form: Road-Stream Crossing Inventory**

Coordinator:

Stream/River:

Road:

Flow Condition:

Town:

Date observed in field:

Observer:

Location:

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**Road/Railway Characteristics**

Road surface:

Road type:

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**Crossing/Stream Characteristics** *(during generally low-flow conditions)*

Crossing type:

Condition of crossing:

Does the stream at the crossing support fish?

Is the stream flowing?

Crossing span:

Tailwater Scour pool:

Crossing alignment matches stream?

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Image files must be jpg or gif format and send them zipped. Paste the file names of images associated with the crossing using ^ as a separator. For example enter: joybrook\_inlet.jpg^joybrook\_outlet.gif

**GPS Coordinates** (decimal degrees): Lat.

Lng.

(same coordinates as the culvert form(s) at this crossing)

**Culvert/Bridge Cell Characteristics:****(Use a separate pdf form with identical GPS coordinates for multiple culverts in a crossing)**

Structure embedded:

Structure substrate:

Internal features:

Physical barriers to fish and wildlife passage:

Describe any barriers:

Is there a clear line of sight through the structure?

Does the structure provide dry passage suitable for use by terrestrial wildlife?

If yes, what is the maximum structure height in the portion that offers dry passage?

Feet

Comments

**For the following questions use as a reference a portion of the natural stream channel that is outside the influence of the crossing structure and not otherwise altered.**

Water depth matches stream?

Water velocity matches stream?

Structure slope matches stream?

Length of stream through structure: \_\_\_\_\_ Feet

Inlet structure type (from above):

Inlet dimensions: A	B	C	D	Submerged	Clogged/Collapsed
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Inlet water depth (max depth inside the structure at the inlet) inches:	Measured	Estimated
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Inlet drop (enter '0' if none) inches (integer):	Measured	Estimated
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Outlet structure type (from above):

Outlet dimensions A	B	C	D	Submerged	Clogged/Collapsed
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Outlet water depth (max depth inside the structure at the outlet) inches (integer):	Measured	Estimated
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Outlet Drop

a. Culvert bottom to water surface - enter '0' (i.e. zero), or if present enter inches (integer)	Measured	Estimated
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b. Culvert bottom to stream bed - enter '0' (i.e. zero), or if present enter inches (integer)	Measured	Estimated
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c. With an outlet drop, check one:

Armored streambed at outlet?

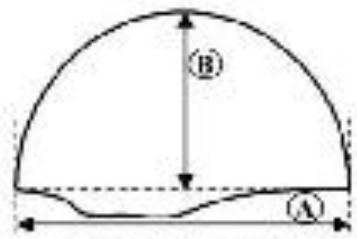
**Structure Hydrologic Capacity**

Vertical Distance from bottom of structure at inlet to road: \_\_\_\_\_ (ft.) Structure material (inlet):

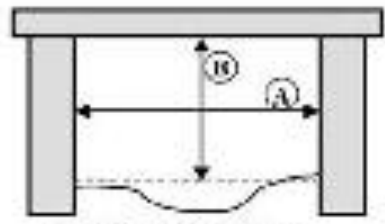
Structure slope(avg of 3 readings): \_\_\_\_\_ degrees Inlet type:

**GPS coordinates** (decimal degrees): Lat.  
(same coordinates as the crossing form )

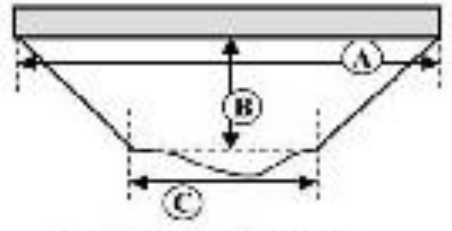
Lng.



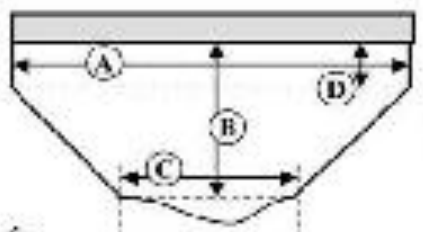
1. Open Bottom Arch



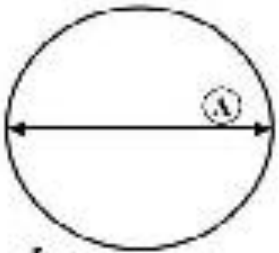
2. Bridge with Abutments



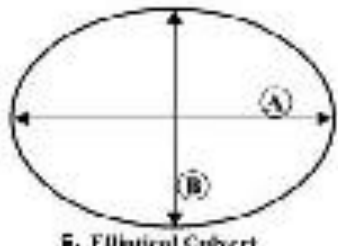
3. Bridge with Side Slopes



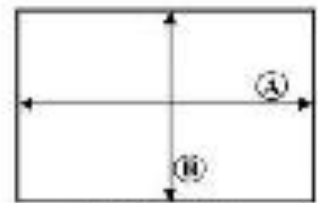
4. Bridge w/ Side Slopes & Abutments



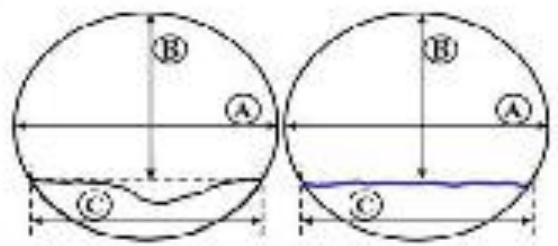
5. Round Culvert



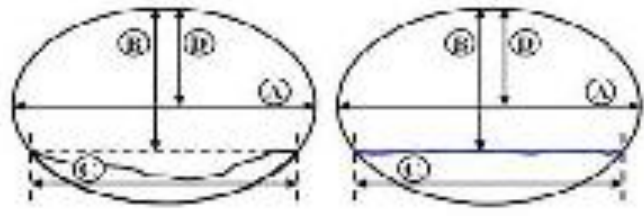
6. Elliptical Culvert



7. Box Culvert



8. Round Culvert Embedded or with Persistent Water



9. Elliptical Culvert Embedded or with Persistent Water



14:50 23-06-2014





14:36 24-06-2014

# After the Field Work



- Review database and Cornell modeling to look at culvert right sizing
- Presentation to all municipalities involved
- Online tool will be made available to municipalities.
- Data collected is added into the database for the River and Stream Continuity Project



Example of Shekomeko Watershed Culvert Location Map in ArcMap.

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