Vermont Low-Slope Culvert Design
- Maximum channel slope: 1.0%
- Culvert at slope of natural channel.
- Maximum Culvert Length: 50 feet
- Suitable only where culvert does not excessively constrict the active floodplain.

Culvert Rise (diameter of round culvert or equivalent for other shapes)

Culvert width at bed elevation at least 125% of natural channel bankfull width

Culvert countersink 20 to 40% of culvert rise throughout

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_==Reports_and_Documents"
Note:
Step-pool channel for stream simulation within culvert or profile control. Pool segments are located outside of culvert.

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents

TREATMENTS FOR AQUATIC ORGANISM PASSAGE
STEP POOL CHANNEL WITH POOL SEGMENTS

Vermont Department of Fish And Wildlife 2009
**PROFILE VIEW**

- **Natural steps**
- **Scour pool expected to develop**
- **Optional Bed retention sill no more than half the bed depth. Space to anchor steps or similar spacing in other channel types.**
- **Alluvial bed material mix**

**PLAN VIEW**

- **Natural steps**
- **Constructed steps. Spacing and design simulate natural steps.**

For details, see *Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009* available at [http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents](http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents)

**TREATMENTS FOR AQUATIC ORGANISM PASSAGE**

**STEP-POOL STREAM SIMULATION**

Vermont Department of Fish And Wildlife 2009
Note:
Chute and pool sequence for profile control.

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents

TREATMENTS FOR AQUATIC ORGANISM PASSAGE
CHUTE AND POOL SEQUENCE

Vermont Department of Fish And Wildlife 2009
The Cascade is a complex series of steps at low flow and a rough cascade at higher flows. Boulders are in scattered pattern. Most boulders contact each other.

Rocks Greater Than Lift Thickness

Protrude No More Than 1/3 of Rock Height

Construction of Cascade Channel Lifts

Note: Cascade channel for stream simulation within culvert or profile control.

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents

TREATMENTS FOR AQUATIC ORGANISM PASSAGE
CASCADE CHANNEL

Vermont Department of Fish And Wildlife 2009
Note: Boulder weirs for profile control.

ARCH BOULDER WEIR

Apex angle 90–120 Degrees.

Low Flow Notch

Weir Keyed into banks

Existing ground

STRAIGHT BOULDER WEIR

FLOW

Each Header rock bears on Footer rock

Header Rock

Footer Rock

BOULDER WEIR ELEVATION

PROFILE

TREATMENTS FOR AQUATIC ORGANISM PASSAGE

BOULDER WEIR

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm?libbase_=Reports_and_Documents*

Vermont Department of Fish And Wildlife 2009

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For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents"
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TREATMENTS FOR AQUATIC ORGANISM PASSAGE
LOG WEIR WITH LOG CRIB BALLAST

Vermont Department of Fish And Wildlife 2009
For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents

LOW FLOW NOTCH DETAILS

* Notch width so notch flows full at low flow.”

TREATMENTS FOR AQUATIC ORGANISM PASSAGE
LOG WEIR

Vermont Department of Fish And Wildlife 2009
NOTE:
Design dimensions D, L, and Z2 control roughness and minimum depth. See design guidelines for details.

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm/libbase_=Reports_and_Documents
For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents"

**NOTE:**
1. All steel to be galvanized after fabrication.
2. Due to possible deformation of pipe, confirm actual shape of each baffle in field before fabrication.

TREATMENTS FOR AQUATIC ORGANISM PASSAGE
EXPANSION RING CULVERT BAFFLE 1/2

Vermont Department of Fish And Wildlife 2009 041909
3/8" Round Threaded 6" on each end. Bend to Radius of pipe. Slide through washer into 1 1/2" round pipe.

Double nut

Heavy steel washer welded to top of pipe

Thread type: Course

1 1/2" round Schedule 40 steel pipe.

3/16" Thick steel plate welded all around to end of 1 1/2" round pipe.

Fillet weld all around

3/8" Rod bent to the radius of pipe. Welded to the 1 1/2" round pipe.

For details, see Guidelines for the Design of Stream/Road Crossings for Passage of Aquatic Organisms in Vermont, 2009 available at http://www.vtfishandwildlife.com/library.cfm libbase_=Reports_and_Documents"