



# FY17 Vermont Better Roads Grant Application

Please complete this page ONCE and return with your Grant Category Application(s)

Town/Organization: Town of Cambridge Contact Person(s): Bill Morey

Address: P.O. Box 127, Jeffersomville, Vt. 05464

Email: bill.ctg@myfairpoint.com Phone: (802) 644 - 8843

DUNS #: 604444479 Fiscal Year End Month (MM): 12

Accounting System:  Automated  Manual  Combination

Please use the suggested documentation checklist below to ensure that all of the relevant items regarding your application have been included.

- Grant application cover sheet (Only submit one)
- Grant application form (One per category/project)
- Itemized Cost estimate for labor, equipment, and materials (see enclosed Cost Estimate Worksheet). If applicable, please break down funding by source (i.e. different grant sources)
- Project Location Map (please show location of affected water)
- Sketch of proposed erosion control measures or other management practices, including distances in feet
  - Also show approximate location of town/other right-of-way and/or property lines
- Photo(s) of the project area
- Letters of Support (RPC, VTrans District Technical Staff, ANR Rivers and Streams Engineers, etc.)
- If Category C River/Road Conflict or Category D River/Stream Structure or Culvert, you must attach ANR/ACOE consultation



# Vermont Better Roads Grant Program Application

Please complete one application per category and/or project you are applying for. You may make copies of the application for multiple applications per category and/or multiple categories.

Please check the Category you are applying for:

- B. Correction of a Road Related Erosion Problem and/or Stormwater Mitigation Retrofit for both gravel and paved roads
- C. Correction of a Stream Bank or Slope Related Problem
- D. Structure/culvert upgrades

Town/Organization: Town of Cambridge

Project Name: Junction Hill Rd. Culvert - Safford

Road Name: Junction Hill Rd. TH #: 25 Structure # (if applicable): \_\_\_\_\_

Road Type: Unpaved Uncurbed  
Class 3

Watershed: Lamoille River

Please provide a thorough description of the problem (ex. Roadway has steep slope with no ditch which is causing roadway erosion):

The existing culvert is in a deteriorated condition, and does not meet the stream "State Stream Equilibrium Standards," causing severe stream bank erosion and scour especially downstream.

Description of Project and how you plan to complete the work (ex. Stone line 500' of ditch by reshaping ditch and stone lining, working from the top of the project down to the bottom):

Replace the existing structure with a buried invert Pipe Arch Structure, with headwalls.

Expected Effects (+ & -) on water quality (ex. Erosion will be eliminated by placing the stone ditch):

With a correctly sized structure and proper end treatment, erosion should be reduced significantly or eliminated.



Distance from end of project to nearest water (stream, lake, or stormwater system that outlets directly to water). 0-50'

Progress to Date:

None other than planning and obtaining a VTrans Hydraulic Study.

Is there an emergency reason this project must be completed quickly? If yes, please explain:

No emergency now, however should be completed in the near future.

Has this project been identified through a municipal road inventory, capital budget plan, tactical basin plan, culvert inventory, or other management plan? If yes, please list which.

Yes: \_\_\_\_\_

No

Please list any professionals you may have contacted for assistance with this project (ANR River Management Engineer, Army Corps of Engineers, VTrans District Technical staff, Basin Planner etc.):  
VTrans Hydraulic Study completed. Chris Brunell - VTDEC has been contacted to review.

Is the project located in the town "Right of Way?" Yes, No, Both (if "Both" please explain further).

Both

Will the town road crew complete this work? Yes, No, Some (if "some" please explain further).

Yes, with the help of specialized equipment required.



Describe how the grant funds will be spent and/or attach a project budget:  
See Attached Sheet

How do you plan to meet the required 20% match on this grant?:  
Cash and/or town Labor & Equipment

Requested Grant Amount (\$20,000 max Category B, \$40,000 max Categories C & D): \$ 40,000.00  
Estimated Total Project Cost (including 20% local match): \$ 78,379.84  
Estimated Completion Date: 10/30/2016

REQUIRED ATTACHMENTS:

- Itemized Cost Estimate (labor, equipment, materials)  
(For assistance, call Better Backroads at 802-828-4585)
- Project Location Map  
(Please show location of affected water; 1:12,000 USGS map, if possible)
- Sketch of proposed erosion control measures, including:
  - Distances (ft.)
  - Estimate of waste & borrow quantities
  - Approx. location of town/other right-of-way and/or property lines
- Photo(s) of the project area.
- Agreement for Entry and/or Deed of Easement (if project is outside Town ROW).
- If project involves stream or river/road conflict, include documentation of consultation with a River Management Engineer.
- Other appropriate supporting documents.

By signing this application I certify that all the information provided is accurate to the best of my knowledge. We will comply with all the requirements of the grant including making our books available for audit if required.

SIGNATURE OF APPLICANT: (Must be Town Administrator/Manager or Select Board Chair)

Name: Dan W. Lewis Title: Selectman



Maps

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION  
**HYDRAULICS UNIT**

**TO:** Jim Cota, District 8 Project Manager  
Bill Morey, Cambridge Town

**FROM:** Leslie Russell, P.E., Hydraulics Project Supervisor

**DATE:** 27 May 2015

**SUBJECT:** Cambridge TH 25 – just south of Mansfield View Drive – unnamed brook  
Junction Hill Road  
GPS coordinates: N 44 38.182° W 72 48.689°

We have completed our hydraulic study for the above referenced site, and offer the following information for your use:

**Hydrology**

This site has a hilly to mountainous drainage basin. It is a mixture of forest and fields. The total contributing drainage area is about 0.7 sq. mi. There is an overall length of 11,200 feet from the divide to the site, with a 1550 foot drop in elevation, giving an average overall channel slope of 13.8%. The stream slope at the site was estimated to be about 5 - 6%. Using several hydrologic methods, we selected the following design flow rates:

<u>Recurrence Interval in Years</u>	<u>Flow Rate in Cubic Feet per Second (CFS)</u>
Q2.33	50
Q10	100
Q25	140 - Local Town Highway Design Flow
Q50	160
Q100	190 - Check flow

**Channel Morphology**

The channel is moderate gradient. There is likely little coarse sediment transport at the site. Field measurements of bankfull width varied from 4' to 5' upstream to 5' to 7' downstream. The Vermont Hydraulic Geometry Relationships anticipate a bankfull width of 11' for stream channels in equilibrium at this watershed size. Those curves may not be valid for this size drainage area. The upstream bankfull width may be affected by the lawns that encroach upon the channel. There is some indications of active horizontal instability downstream.

**Existing Conditions**

The existing structure is a corrugated metal pipe or arch that measures approximately 66" wide by 51" high. It provides a waterway opening of about 19.3 sq. ft.

Our calculations, field observations and measurements indicate the existing structure does not meet the current standards of the VTrans Hydraulic Manual nor does the existing structure meet state stream equilibrium standards for bankfull width (span length). The existing structure constricts the channel width, resulting in an increased potential for debris blockage and scour downstream. Headwater to depth ratios exceed allowable values established in the current VTrans Hydraulics Manual. Water overtops the road below the design Q25.

**Replacement Recommendations**

In sizing a new structure we attempt to select structures that meet both the current VTrans hydraulic standards, state environmental standards with regard to span length and opening height, and allow for roadway grade and other site constraints.

The low height from the stream bed to the road limits the replacement options to a box structure, as the roadway would have to be raised substantially for a pipe. Raising the road that much would create a dam that could increase flooding of the upstream property, so that is not recommended.

Based on the above considerations and the information available, we recommend any of the following structures as a replacement at this site:

1. A concrete box with an 8' wide by 6' high inside opening. The box invert should be buried 2'. That will result in an 8' wide by 4' high waterway opening above streambed, providing 32 sq. ft. of waterway area. Bed retention sills should be added in the bottom. Sills should be 12" high across the full width of the box. So the top of the sills will be buried 12" and not be visible. Sills should be spaced no more than 8'-0" apart throughout the structure with one sill placed at the inlet and one at the outlet. The box should be filled up to the stream bed level with stone graded to match the natural stream bed material that will keep flow above the surface. This structure will result in a headwater depth at Q25 = 3.4' and at Q100 = 4.4'.
2. Any similar structure with a minimum clear span of 8' and at least 32-sq. ft. of waterway area, that fits the site conditions, could be considered. Any structure with a closed bottom should have bed retention sills and a buried invert as described above.

Prior to any further action toward implementation of any of the above recommendations, structure size and type must be confirmed, and may be modified, by the VT ANR River Management Engineer to ensure compliance with state environmental standards for stream crossing structures.

Other regulatory authorities including the US Army Corps of Engineers may have additional concerns or requirements regarding replacement of this structure.

#### **General Comments**

If a new box is installed, we recommend it have full headwalls at the inlet and outlet. The headwalls should extend at least four feet below the channel bottom, or to ledge, to act as cutoff walls and prevent undermining.

It is always desirable for a new structure of this size to have flared wingwalls at the inlet and outlet, to smoothly transition flow through the structure, and to protect the structure and roadway approaches from erosion. The wingwalls should match into the channel banks. Any new structure should be properly aligned with the channel, and constructed on a grade that matches the channel. A new structure should span the natural channel width.

Stone Fill, Type III should be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet, up to a height of at least one-foot above the top of the opening. The stone fill should not constrict the channel or structure opening.

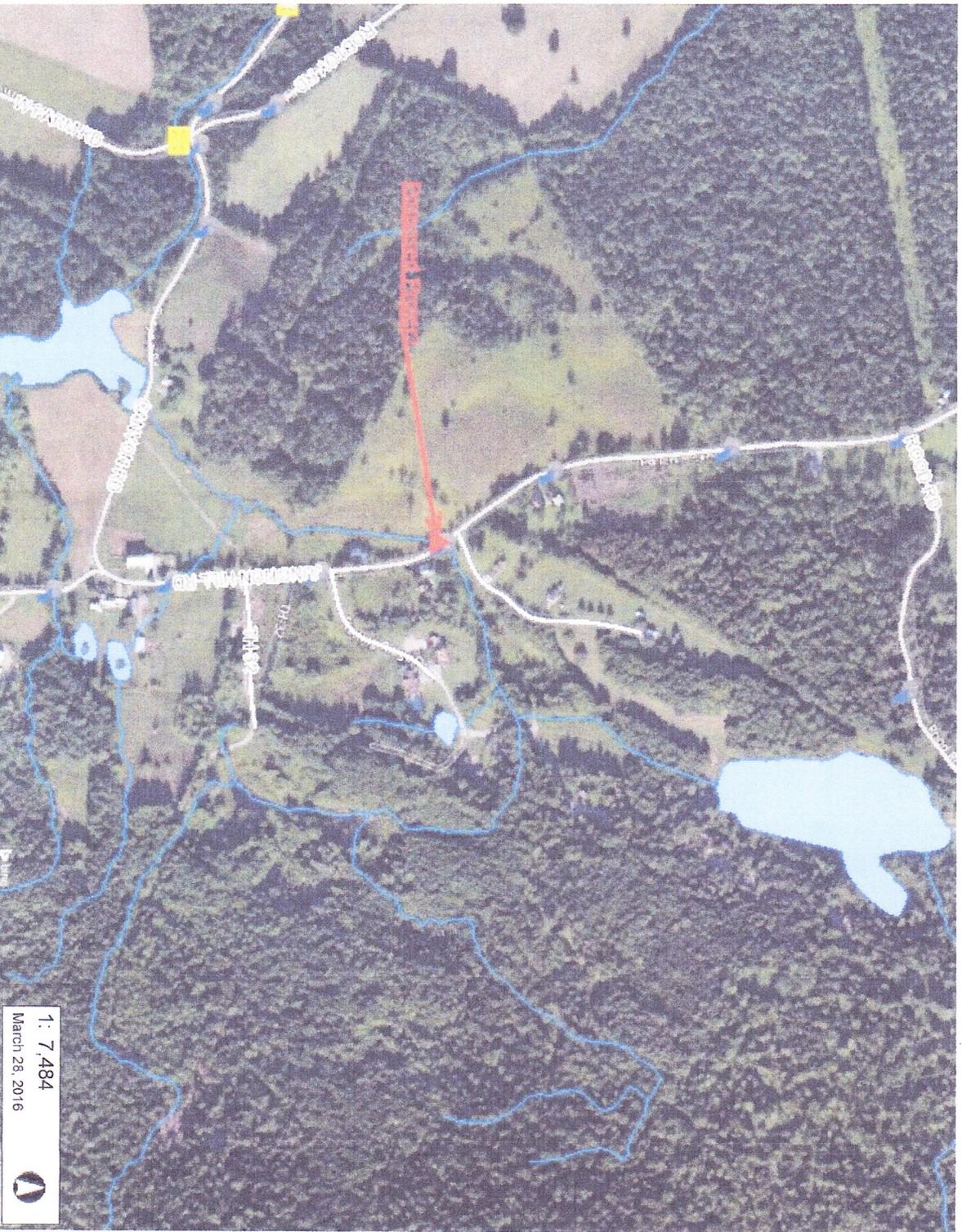
Please note that while a site visit was made, these recommendations were made without the benefit of a survey and are based on limited information. The final decision regarding replacement of this structure must comply with state regulatory standards, and should take into consideration matching natural channel conditions, roadway grade, environmental concerns, safety, and other requirements.

Please contact us if you have any questions or if we may be of further assistance.

LGR

cc: Chris Brunelle, A.N.R. River Management Engineer  
Hydraulics Project File via NJW





1: 7,484  
March 28, 2016



380.0 0 190.00 380.0 Meters  
WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere  
© Vermont Agency of Natural Resources  
1" = 624 Ft 1cm = 75 Meters  
THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.



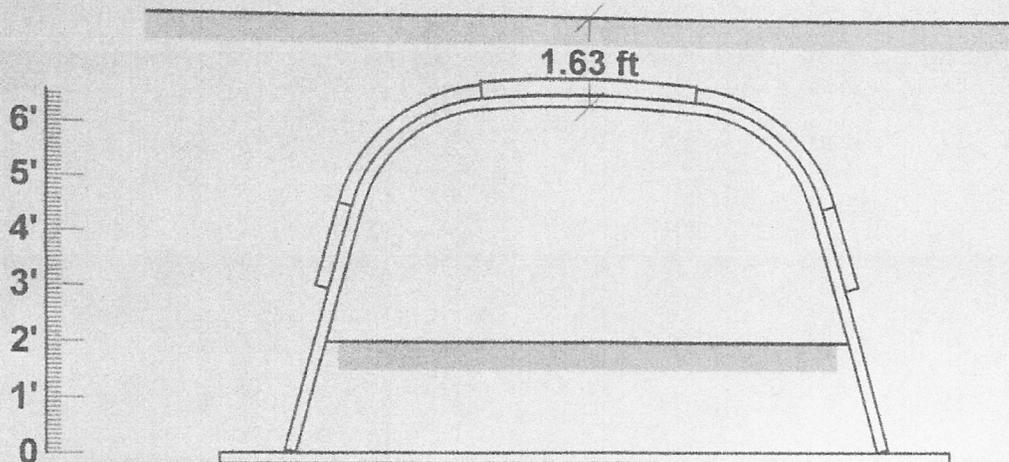
### LEGEND

- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Roads
  - Principal Arterial
  - Minor Arterial
  - Rural Major Collector
  - Rural Minor Collector
  - Urban Collector
  - Local
  - Not part of the Functional Classification
- Waterbody
- Stream
- Town Boundary

### NOTES

Map created using ANR's Natural Resources Atlas

# Junction Hill Road- Town Highway 25 Cambridge, VT



## 24N Aluminum Box Culvert

(Structure Number 6)

10'-10" Span x 6'-4" Rise

End Area = 35.8 ft<sup>2</sup>

Bottom Span = 10'-10 1/2"

Side angle = 15.25°

Arc	"N"	Radius
Crown	5	297 1/2"
Haunch	4	30"
Side	5.500	Flat

Type IV Crown Ribs

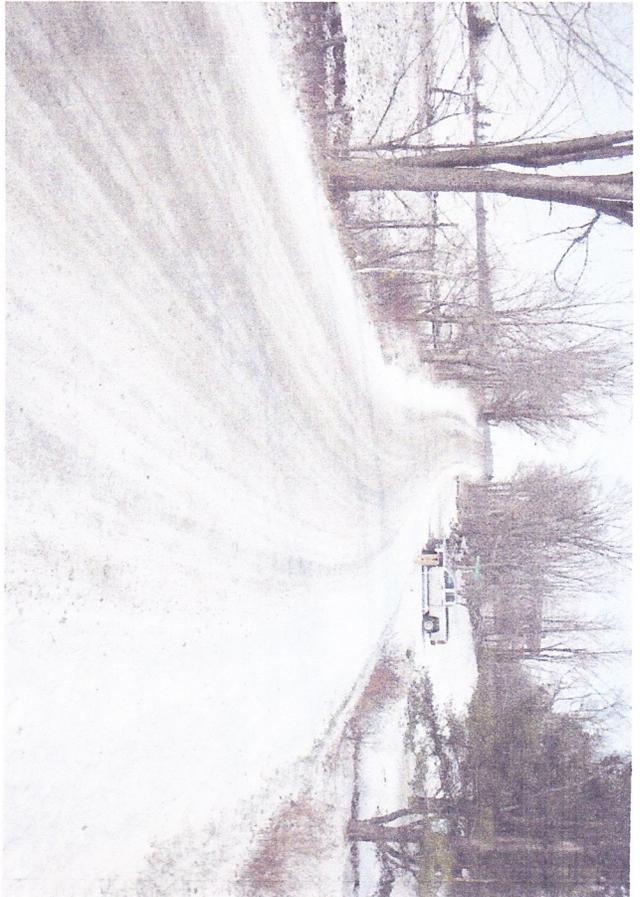
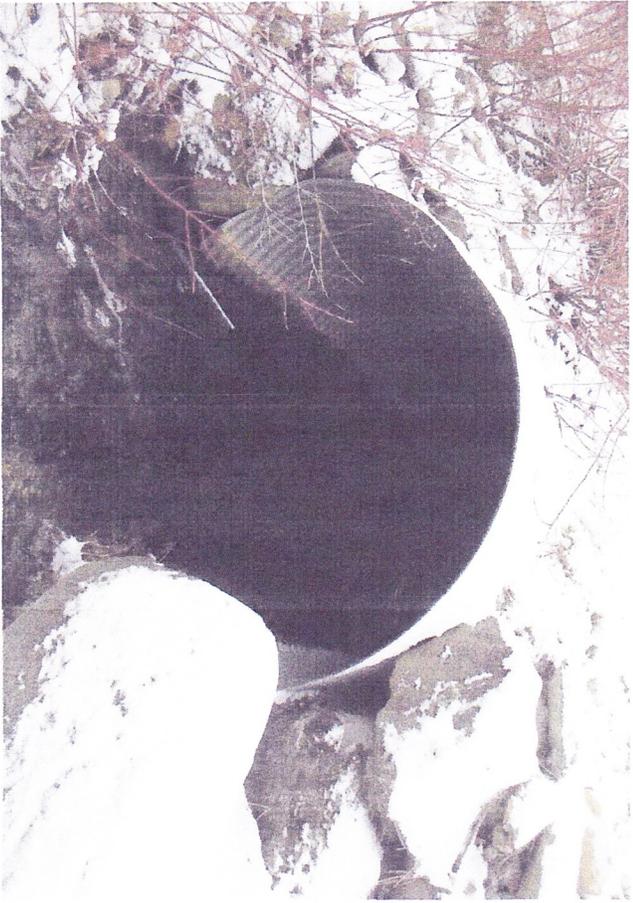
Type II Haunch Ribs



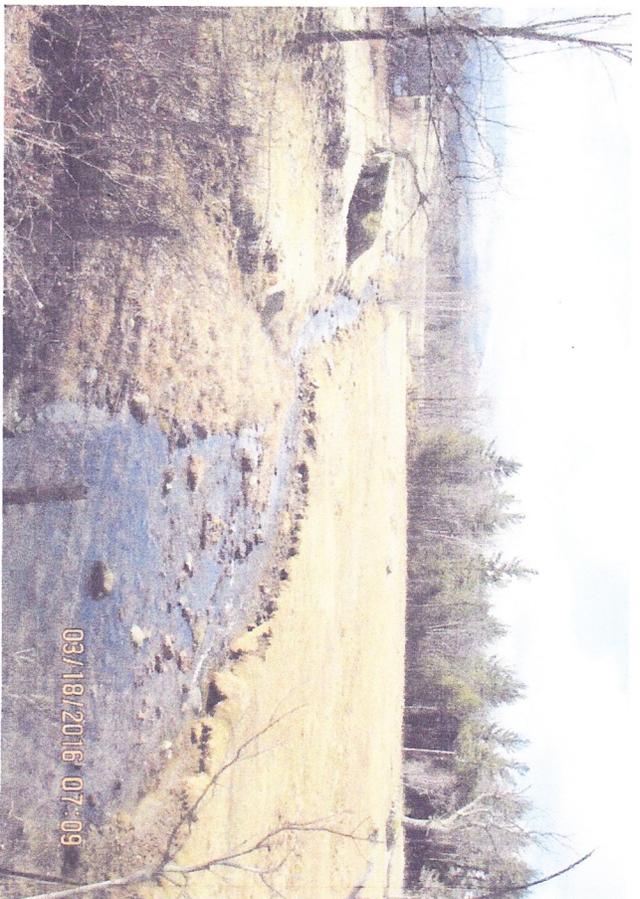
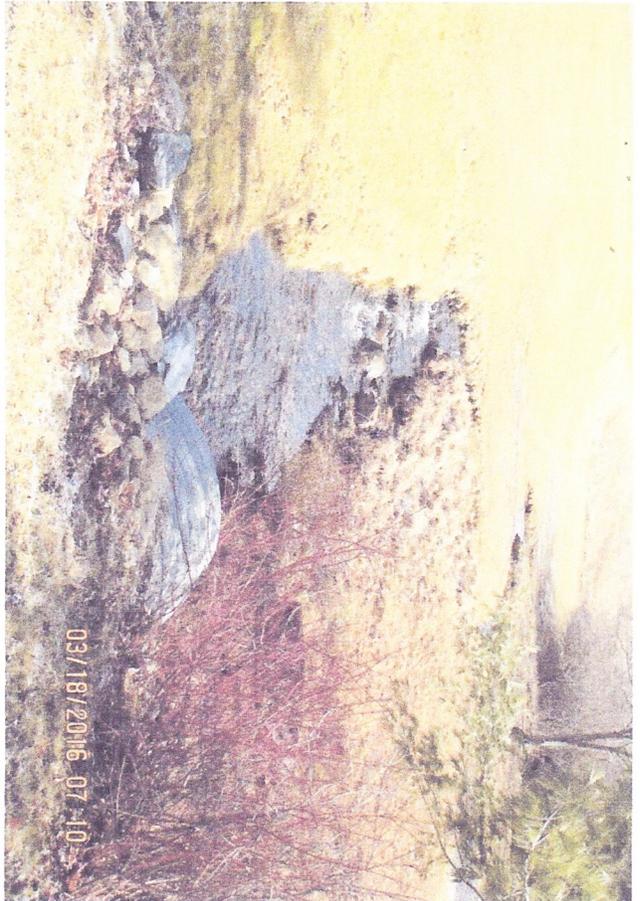
*Not for final design or construction purposes*







Ambridge - Brownsville Hill Rd - 7/105



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**Bill Morey**

**From:** Brunelle, Chris <Chris.Brunelle@vermont.gov>  
**Sent:** Wednesday, April 13, 2016 11:29 AM  
**To:** Bill Morey  
**Subject:** RE: Jct Hill Replacement Culvert

Bill,  
I support this approach, it meets our equilibrium and connectivity standards.

Sincerely,



**Christopher Brunelle, River Management Engineer**  
RIVERS PROGRAM

111 West Street, Essex Jct., VT 05452  
Cell/text: 802-777-5328  
Email: [chris.brunelle@vermont.gov](mailto:chris.brunelle@vermont.gov)  
homepage: [www.watershedmanagement.gov](http://www.watershedmanagement.gov)  
Flood ready: [www.floodready.vermont.gov](http://www.floodready.vermont.gov)

**From:** Bill Morey [mailto:bill.ctg@myfairpoint.net]  
**Sent:** Wednesday, April 06, 2016 9:07 AM  
**To:** Brunelle, Chris <Chris.Brunelle@vermont.gov>  
**Subject:** Jct Hill Replacement Culvert

Morning Chris,

I've sent along an attachment of the culvert that we would like to install over this waterway on Jct. Hill road. This would be a Better Backroad Grant Project and of course they would like a letter of support. I would greatly appreciate a letter if this structure is OK by you. The reason for this is the road is too low to support the size culvert needed and the Town doesn't want to pay for a box culvert. This seems to be the next better fit. I also included some pictures of the site. The Hydraulic study for Cliff Reynolds road is included. We plan to use the same structure on that site next year maybe.

Thank you,  
Bill Morey