



Vermont Better Roads Grant Program Application

CATEGORY A: ROAD INVENTORY AND CAPITAL BUDGET PLANNING PROJECT

Town/Organization: Town of Rochester

Project Name: Engineering Design for Culvert Replacement

Inventory Type: Town wide Watershed (please list): White River

Describe how the grant funds will be spent and attach a project budget:

Rochester will contract with an engineering firm to scope out and design the replacement of two adjacent culverts which are identified as high priority for replacement in two assessment reports, by Two Rivers-Ottawaquechee RC and the White River Partnership. Because the two culverts are located very close together with very similar hydraulic features, we hope to achieve a savings by having both designs done together. We are requesting funding for one of these culverts. E

How do you plan to meet the required 20% match on this grant?:

Funds for the required match will come from a town budget set-aside.

Requested Grant Amount (\$8,000 max): \$ 8,000.00

Estimated Total Project Cost (including 20% local match): \$ 12,000.00

Estimated Completion Date: 03/31/2017

Please check this box if you would like to contract your project through your RPC

REQUIRED ATTACHMENTS: a) Project budget b) Appropriate supporting documents.

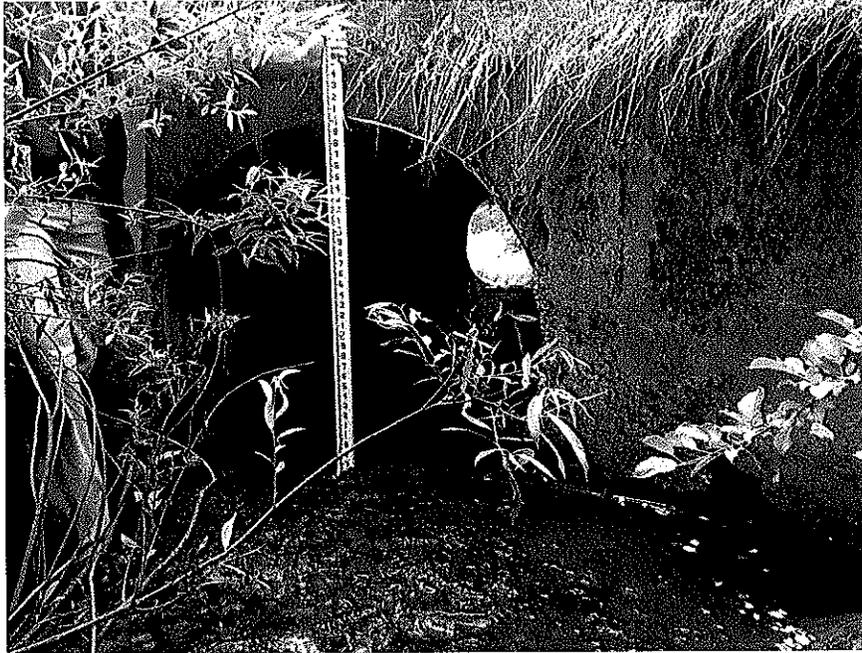
By signing this application I certify that all the information provided is accurate to the best of my knowledge. We will comply with all the requirements of the grant including making our books available for audit if required.

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

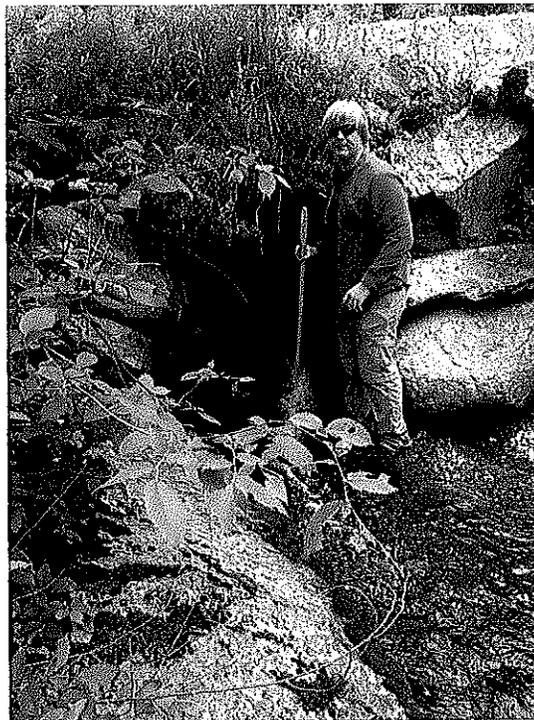
Name: *Joan Hinkley*

Title: Selectboard Chair

Town of Rochester
Culvert Replacement Project – Scoping and Engineering Design



Cushman Rd. culvert inlet



Cushman Rd. culvert outlet



Upstream of Mt. Cushman culvert, showing large sediment wedge that's formed above the culvert



Middle Hollow Rd. culvert inlet



Middle Hollow Rd. culvert outlet

HYDRAULICS UNIT

TO: Chris Bump, District Project Manager, District 4
Michael Blakslee, Technician, District 4

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

DATE: 19 August 2013

SUBJECT: Rochester TH 2 – Middle Hollow Road – over unnamed brook
GPS coordinates: N 43.8798° W 72.7818°

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 open meadow. The total contributing drainage area is about 1.1 sq. mi. There is an overall length of 7620 feet from the divide to the site, with a 1240 foot drop in elevation, giving an average overall channel slope of 16.2%. The stream slope at the site was estimated to be about 2 – 3%. 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	80
Q10	180
Q25	225 - Town Highway Design Flow
Q50	275
Q100	320 - Check flow

Existing Conditions

The existing structure is a 4' diameter CPEP that provides 12.6 sq. ft. of waterway area. The pipe looks like it was crushed a little in the middle during installation. The roadway was overtopped during a storm. This brook moves quite a bit of sediment. There is a 2' drop at the outlet.

Our calculations show the existing structure is not adequate hydraulically. Headwater to depth ratios exceed the allowable values and water overtops the roadway below the design Q25. The existing structure constricts the channel width, resulting in scour at the outlet and increased potential for ice and debris blockage.

Recommendations

In sizing a new structure we attempt to select structures that meet the hydraulic standards, fit the natural channel width, the roadway grade and other site conditions. We measured a channel width of approximately 12' – 17' during our site visit. It was difficult to get an exact channel width measurement due to the flood damage. The Agency of Natural Resources VT Regional Hydraulic Geometry Curve gives a bank full width of 14' for this size drainage area. Those curves are only based on drainage area and do not consider other factors, such as storage, stream slope or other site specific conditions. They may not be valid for this drainage area. 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. Based on our calculations and the information available, we recommend any of the following structures as a replacement at this site:

1. A concrete box with a 14' wide by 7' high inside opening, with 12" high bed retention sills (baffles) in
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the bottom. The box invert should be buried 24", so the top of the sills will be buried 12" and not be visible. That will result in a 14' wide by 5' high waterway opening above streambed, providing 70-sq. ft. of waterway area. 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. Sills should be cast in a V shape with a 10:1 lateral slope, to create a low flow channel in the center if the bed material in the structure is washed out. The spaces between sills should be filled with stone graded to match the natural stream bed material. This structure will result in a headwater depth at Q25 = 3.4' and at Q100 = 4.3', with no roadway overtopping up to Q100.

2. Any similar structure with a minimum clear span of 14' and at least 70 sq. ft. of waterway area, that fits the site conditions, could be considered. Any structure should have bed retention sills and a buried invert as described above.

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.

The Agency of Natural Resources (ANR), Corps of Engineers, or other permitting agency may have additional concerns regarding replacement of this structure, or any channel work. The River Management Engineer should be contacted with respect to those concerns, before a replacement structure is ordered. If ANR requires the invert of the structure to be buried deeper than specified above, the size of the structure will have to be larger to provide the required waterway area.

Please keep in mind 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 the replacement of this structure should take into consideration matching the natural channel conditions, the roadway grade, environmental concerns, safety, and other requirements of the site.

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

LGR

cc: Patrick Ross, A.N.R. River Management Engineer
Hydraulics Project File via NJW
Hydraulics Chrono File

April 6, 2016

Mr. Doon Hinderyckx
Town of Rochester
PO Box 238
Rochester, VT 05767

Dear Doon:

I am pleased to provide a letter of support for the Town of Rochester's application submission for a Category A Better Back Roads grant for engineering studies for Mt. Cushman culvert #1 and Middle Hollow Rd culvert #3. During our 2015 culvert inventory with the Town, we identified these sites as a high priority projects (#3 and #4) for erosion/water quality control with eventual upgrades to sizes. This will help improve the resiliency of both gravel roads and reduce the erosion damage each year.

Please contact me if you have any questions.

Sincerely,



Rita Seto, AICP
Senior Planner

128 King Farm Rd.
Woodstock, VT 05091
802-457-3188
trorc.org

William B. Emmons, III, Chair
Peter G. Gregory, AICP, Executive Director



April 14, 2016

Joan Allen, Selectboard Assistant
Town of Rochester
PO Box 238
Rochester, VT 05767

Dear Joan,

I am writing on behalf of the White River Partnership (WRP) to support the Town of Rochester's application to the VTrans Better Roads Program, Category A for a culvert replacement design project. The WRP is pleased to be a technical assistance partner on this proposed project.

The WRP identified the proposed project location as a priority in a recent report to the Town of Rochester. In 2015 the WRP assessed all of the stream-crossing culverts in Rochester using the *Vermont Agency of Natural Resources Bridge and Culvert Assessment* protocol, then analyzed the data using two "rapid screening tools" – one to determine vulnerability to flood damages and one to determine impacts to fish passage. The proposed culvert is less than 50% of bankfull width, which makes it extremely vulnerable to flooding – this finding is supported by on-the-ground evidence that the culvert is routinely bypassed by high waters, resulting in costly road repairs. The proposed culvert is also a barrier to fish passage.

We have worked closely with the Town of Rochester since Tropical Storm Irene to implement 9 culvert replacement designs and 6 culvert replacement implementation projects that improve flood resilience and fish passage in high-priority locations. Together we have raised over \$650,000 to ensure project completion, and will leverage those dollars to implement the replacement project once the design is in-hand. For these reasons, we are confident that Rochester will put this grant to good use.

Sincerely,

A handwritten signature in cursive script, appearing to read "Mary Russ".

Mary Russ
Executive Director