

# TOWN OF ELMORE, VT

## Monthly Select Board Meeting

Meeting Minutes – prepared by G. Schwartz  
Status: Approved

**Meeting Date:** December 12, 2018

**Start Time:** 6:35 pm **Adjourn:** 9:00pm

**Meeting Attendees:** See attached sign in sheet

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### **A. Meeting Minutes Approval:**

1. The minutes of the November 14, 2018 Select Board Meeting were approved.

### **B. SPECIAL TOPICS:**

1. Preliminary Budget Review

**Notes:** Sharon Draper provided preliminary documentation to the Select Board for Review. A meeting will be setup in early January to begin the budget process.

### **C. ACTIVE ITEMS:**

1. **Discuss:** Reclassifying roads, including Class 4 to a legal trail

**Notes:** Robert Moore from the Lamoille County Planning Commission attended the meeting to discuss the pros and cons of changing classifications of certain roads in town from Class 4 to a legal trails. Attached to these minutes is a map from VTrans with some roads highlighted in yellow and a table showing the miles involved. Caroline to contact Bob Burley to see if he can assist in this process.

### **D. CONTINUING ACTIVE ITEMS: (Update status by principle owner)**

1. **UPDATE:** Road Commissioner's Report – Lacasse

**Notes:** The Road Commissioner stated that much of the past month has been spent plowing and sanding the town roads. Approximately 1/3 of the sand pile has been used so far this season.

2. **UPDATE:** Efficiency Vermont – Street light replacement program. DeVore

**Notes:** C. DeVore stated that Morrisville Power and Light is still backlogged and is scheduled to put us at the top of their list for 2019. This item will be removed from the agenda and moved to the action list.

## **TOWN OF ELMORE, VT**

### **Monthly Select Board Meeting**

3. **UPDATE:** Planning Commission – Schwartz

**Notes:** The Planning Commission met on November 29, 2018. Minutes of that meeting will be available on the Elmore Website. The topics that were discussed were as follows;

- Zoning and Subdivision Amendments with Seth Jensen (LCPC)
- Driveway and Road Standards
- Discuss Subdivision Section 4.2, specific prominent and scenic features.
- Finalized list of goals for Town Plan survey

4. **UPDATE:** Development Review Board – DeVore

**Notes:** The Development Review Board met on December 6, 2018. Minutes of this meeting are available on the Elmore Website.

The Select Board voted to approve the appointment of Michael Furst to the DRB.

5. **UPDATE:** Lake Association – Schwartz

**Notes:** G. Schwartz met with Peter Danforth of the Lamoille County Conservation District on November 21, 2018. The Elmore lake association has been working with Peter for several months in an effort to get grants to improve private roads within the Town of Elmore. A watershed assessment grant is the first step in achieving this goal as well as providing valuable information regarding the entire watershed. This grant will have a no cost match to the town of Elmore. The grant for the watershed assessment was submitted on December 10, 2018.

6. **UPDATE:** Elmore admittance to the State Park – Schwartz

The current proposal is to distribute one 10-visit punch card per household, available at the Town Clerk office upon request with verification of residency. Up to two Green Mountain Passports (lifetime day-use pass available to VT residents who are 62 years of age or older OR are veterans honorably discharged from active duty in the US armed services) can be substituted for the 10-punch card, per household. There is no expiration on the 10-visit punch card or the Green Mountain Passport, and both can be used at any Vermont State Park. Capping the amount of cards available was discussed and will probably be around 100.

G. Schwartz applied to RiseVT for a Grant for community partners who support the initiative to embrace healthy lifestyles. The Amplify Grant funds range up to \$1,500. It is expected that we will receive the maximum amount.

G. Schwartz to meet w/ Alison Link the Policy and Community Outreach Coordinator on 12/20/18

## **TOWN OF ELMORE, VT**

### **Monthly Select Board Meeting**

7. **Update** –Debris around the Elmore Fire Station- DeVore

**Notes:** C. DeVore spoke to Brent Hosking and he provided the following update;  
At the November Fire Department meeting the department discussed several options for the old Fire truck. Between now and the spring they will investigate those options, working toward a solution. Some 6 and 8 inch plastic pipe for dry hydrants should be dug out and organized. Brush needs to be cut back as it has grown in over the years.

8. **UPDATE:** Possible Purchase of an excavator – Lacasse

**Notes:** This item will be removed from the agenda and moved to the action list.

9. **UPDATE:** Look into what adding another road crew employee would look like. – Wills

**Notes:** This item will be removed from the agenda and moved to the action list.

10. **UPDATE:** Digital client services including email, server backups, document retention, disaster recovery, and equipment servicing. – Schwartz

a. Email Migration

**Notes:** Alario Tech is continuing to work towards migration of the email system.

b. Digital Records

**Notes:** A meeting was held on November 29, 2018. Sharon Draper, Kent Shaw, Dan Alario, one of the Town Auditors and G. Schwartz were in attendance. Our total investment to move forward is estimated to be under \$1,500.00. We can get as little or as much as we want to get out of the system. At a minimum it will take care of our retention requirements. If coded properly, we can get more out of the system. Alario is on hold regarding this issue, but is moving forward on all others. Sharon Draper raised her concerns about moving forward with this process.

11. **UPDATE:** Erosion Inventory / 5 year plan – Lacasse/Schwartz

**Notes:** A meeting was held on November 20, 2018 with Robert Moore, Michel Lacasse and G. Schwartz to discuss and develop the 5 year plan. This plan was presented to the Select Board and was approved with comments, to be submitted to the State by December 21, 2018. A copy of the preliminary report is attached to these minutes.

**TOWN OF ELMORE, VT**  
**Monthly Select Board Meeting**

**E. COMPLETED/INACTIVE ITEMS: (Update status)**

1. Review Action Item List

**Notes:** The action list was reviewed at this meeting

**E. NON AGENDA/OTHER ITEMS: (Time Available)**

1. Routine Administrative, Operations items and payment approvals.

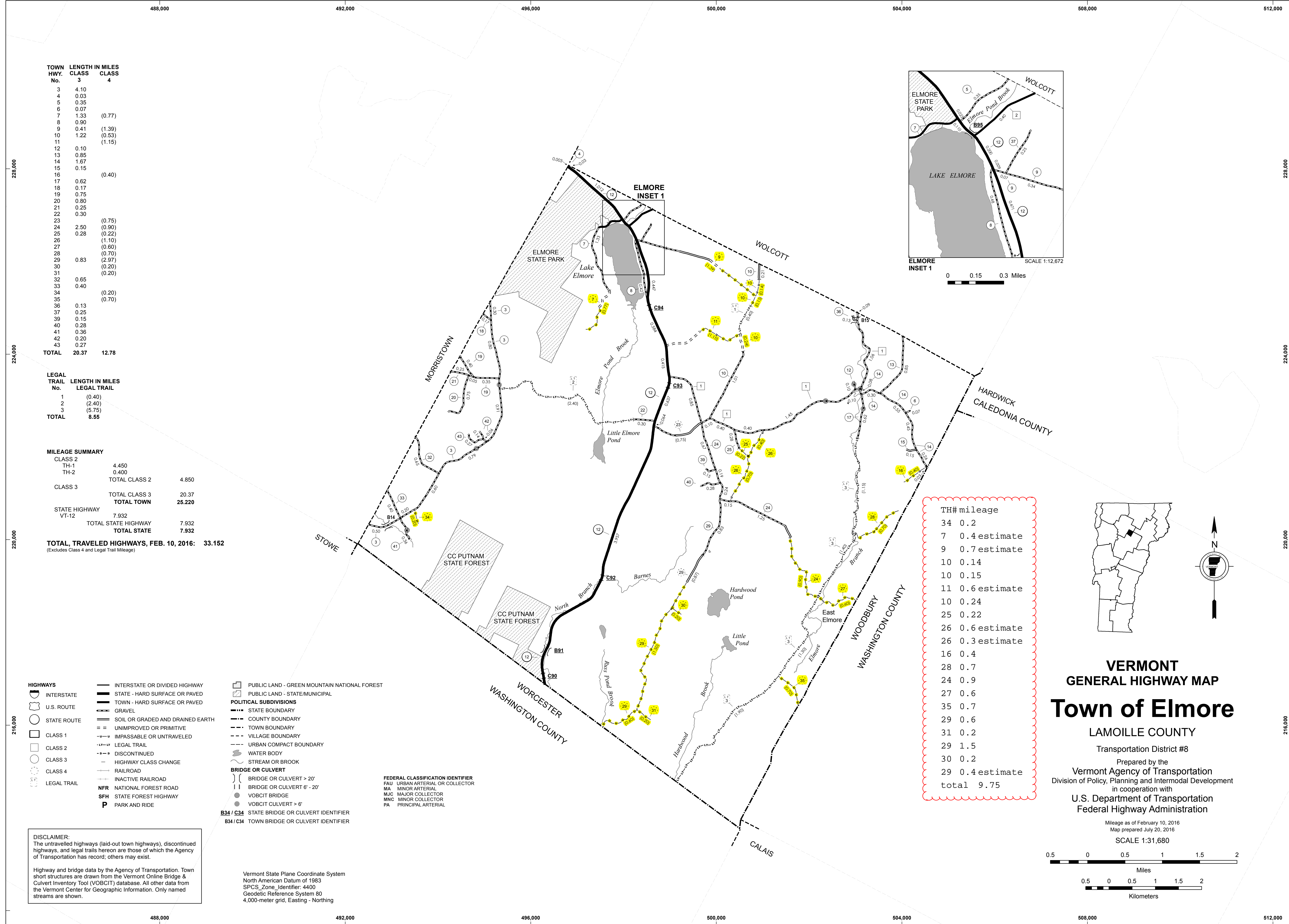
**F. EXECUTIVE OR DELIBERATIVE SESSION AS NEEDED**

The Select Board entered into Executive Session at 8:35 pm

No Minutes were taken during this session

The Executive Session ended at 9:00 pm



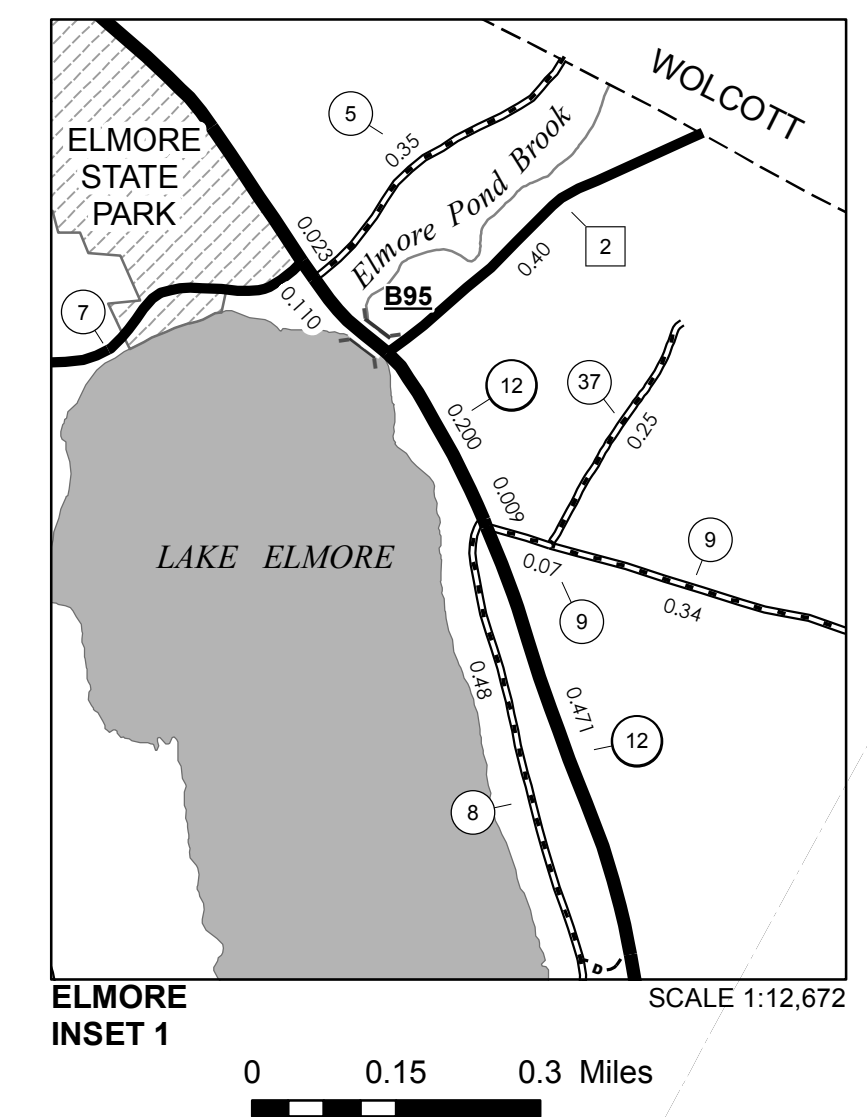


TOWN HWY. No.	LENGTH IN MILES CLASS 3	CLASS 4
3	4.10	
4	0.03	
5	0.35	
6	0.07	
7	1.33	(0.77)
8	0.90	
9	0.41	(1.39)
10	1.22	(0.53)
11		(1.15)
12	0.10	
13	0.85	
14	1.67	
15	0.15	
16		(0.40)
17	0.62	
18	0.17	
19	0.75	
20	0.80	
21	0.25	
22	0.30	
23		(0.75)
24	2.50	(0.90)
25	0.28	(0.22)
26		(1.10)
27		(0.60)
28		(0.70)
29	0.83	(2.97)
30		(0.20)
31		(0.20)
32	0.65	
33	0.40	
34		(0.20)
35		(0.70)
36	0.13	
37	0.25	
39	0.15	
40	0.28	
41	0.36	
42	0.20	
43	0.27	
<b>TOTAL</b>	<b>20.37</b>	<b>12.78</b>

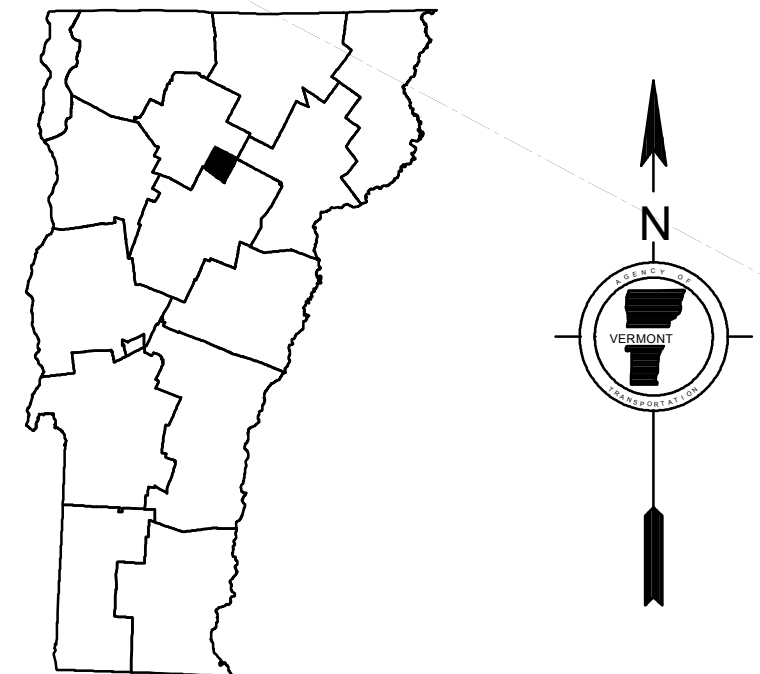
LEGAL TRAIL No.	LENGTH IN MILES LEGAL TRAIL
1	(0.40)
2	(2.40)
3	(5.75)
<b>TOTAL</b>	<b>8.55</b>

MILEAGE SUMMARY		
CLASS 2		
TH-1	4.450	
TH-2	0.400	
<b>TOTAL CLASS 2</b>		<b>4.850</b>
CLASS 3		
<b>TOTAL CLASS 3</b>		<b>20.37</b>
<b>TOTAL TOWN</b>		<b>25.220</b>
STATE HIGHWAY		
VT-12	7.932	
<b>TOTAL STATE HIGHWAY</b>		<b>7.932</b>
<b>TOTAL STATE</b>		<b>7.932</b>

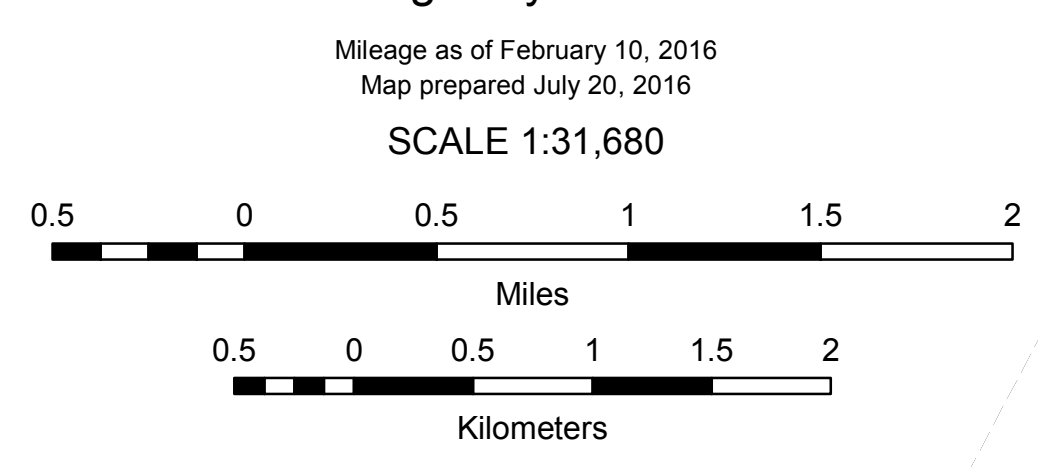
**TOTAL, TRAVELED HIGHWAYS, FEB. 10, 2016: 33.152**  
 (Excludes Class 4 and Legal Trail Mileage)



TH#	mileage
34	0.2
7	0.4 estimate
9	0.7 estimate
10	0.14
10	0.15
11	0.6 estimate
10	0.24
25	0.22
26	0.6 estimate
26	0.3 estimate
16	0.4
28	0.7
24	0.9
27	0.6
35	0.7
29	0.6
31	0.2
29	1.5
30	0.2
29	0.4 estimate
<b>total</b>	<b>9.75</b>



**VERMONT**  
**GENERAL HIGHWAY MAP**  
**Town of Elmore**  
 LAMOILLE COUNTY  
 Transportation District #8  
 Prepared by the  
 Vermont Agency of Transportation  
 Division of Policy, Planning and Intermodal Development  
 in cooperation with  
 U.S. Department of Transportation  
 Federal Highway Administration



- HIGHWAYS**
  - INTERSTATE
  - U.S. ROUTE
  - STATE ROUTE
  - CLASS 1
  - CLASS 2
  - CLASS 3
  - CLASS 4
  - LEGAL TRAIL
- INTERSTATE OR DIVIDED HIGHWAY
- STATE - HARD SURFACE OR PAVED
- TOWN - HARD SURFACE OR PAVED
- GRAVEL
- SOIL OR GRADED AND DRAINED EARTH
- UNIMPROVED OR PRIMITIVE
- IMPASSABLE OR UNTRAVELED
- LEGAL TRAIL
- DISCONTINUED
- HIGHWAY CLASS CHANGE
- RAILROAD
- INACTIVE RAILROAD
- NFR NATIONAL FOREST ROAD
- SFH STATE FOREST HIGHWAY
- P PARK AND RIDE

- PUBLIC LAND - GREEN MOUNTAIN NATIONAL FOREST
- PUBLIC LAND - STATE/MUNICIPAL
- POLITICAL SUBDIVISIONS**
  - STATE BOUNDARY
  - COUNTY BOUNDARY
  - TOWN BOUNDARY
  - VILLAGE BOUNDARY
  - URBAN COMPACT BOUNDARY
- WATER BODY
- STREAM OR BROOK
- BRIDGE OR CULVERT**
  - BRIDGE OR CULVERT > 20'
  - BRIDGE OR CULVERT 6' - 20'
  - VOBCIT BRIDGE
  - VOBCIT CULVERT > 6'
  - STATE BRIDGE OR CULVERT IDENTIFIER
  - TOWN BRIDGE OR CULVERT IDENTIFIER
- FEDERAL CLASSIFICATION IDENTIFIER**
  - FAU URBAN ARTERIAL OR COLLECTOR
  - MA MINOR ARTERIAL
  - MJC MAJOR COLLECTOR
  - MNC MINOR COLLECTOR
  - PA PRINCIPAL ARTERIAL

**DISCLAIMER:**  
 The untraveled highways (laid-out town highways), discontinued highways, and legal trails hereon are those of which the Agency of Transportation has record; others may exist.

Highway and bridge data by the Agency of Transportation. Town short structures are drawn from the Vermont Online Bridge & Culvert Inventory Tool (VOBCIT) database. All other data from the Vermont Center for Geographic Information. Only named streams are shown.

Vermont State Plane Coordinate System  
 North American Datum of 1983  
 SPCS\_Zone\_Identifier: 4400  
 Geodetic Reference System 80  
 4,000-meter grid, Easting - Northing



## ROAD EROSION INVENTORY, 2018

ELMORE, VERMONT

### Project Synopsis

Lamoille County Planning Commission (LCPC) conducted a road erosion inventory (REI) to evaluate “hydrologically-connected” road segments in the town of Elmore in 2018. This report describes the process, the observed conditions, and the Town priorities. It is important to note this report represents a snapshot in time, and is based on a combination of desktop geographic analysis by DEC of specific parameters, plus field observations made by LCPC staff. It is known that some site-specific conditions have changed since the field work was conducted.

The Road Erosion Inventory and Implementation Schedule (REI) is required for both grant funding and permit compliance. The purpose of the REI is to identify locations susceptible to road erosion. These are usually the places that require regular attention by town road crews to maintain safe travel or repeatedly fix erosion issues. Only hydrologically-connected road segments are assessed in the REI, plus segments identified by the Town as possibly hydrologically-connected and in need of field verification.

The Department of Environmental Conservation (DEC) identified hydrologically-connected municipal road segments (all surface types and all classes of roads) based on proximity to water. The hydrologically-connected roads were divided into approximately 100 meter segments (~328 feet) and assigned an identification number by DEC. All hydrologically-connected segments were inspected by LCPC staff and given a score of Fully Meets, Partially Meets, or Does Not Meet based on the MRGP guidance.

The Town of Elmore is just over 39 square miles of mountains and streams, with approximately 38 miles of public roads. As of June 2018, the Atlas identified 311 road segments as hydrologically-connected, or approximately 19.3 miles. Upon field inspections, 97 of the GIS-identified hydrologically-connected segments (approximately 6 miles) were determined incorrect in terms of connectivity status and/or spatial location and/or status as a municipal road. Thirteen (13) segments were identified to be in full compliance with the MRGP, or approximately 0.8 miles. Thirty-one (31) segments were identified as “unknown” in terms of compliance with the MRGP because those segments are not accessible for inspection; these roads are currently listed as Class 4 highways, but the Town is considering a change in classification to Legal Trails. For calculation purposes these segments are counted as “not connected” and are included in the 97 incorrect segments described above.

The resulting estimated quantity of hydrologically-connected, municipally owned, not fully compliant road segments in need of work over the 20 years of the MRGP jurisdiction is **201 segments, or approximately 12.5 miles.**

# Town of Elmore Road Erosion Inventory Report



*Prepared by:*

**Lamoille County Planning Commission**

PO Box 1637

52 Portland Street, Second Floor

Morrisville, Vermont 05661

**December 2018**



*Inventory and report funded by the Vermont Agency of Transportation 2018 Better Roads Program*



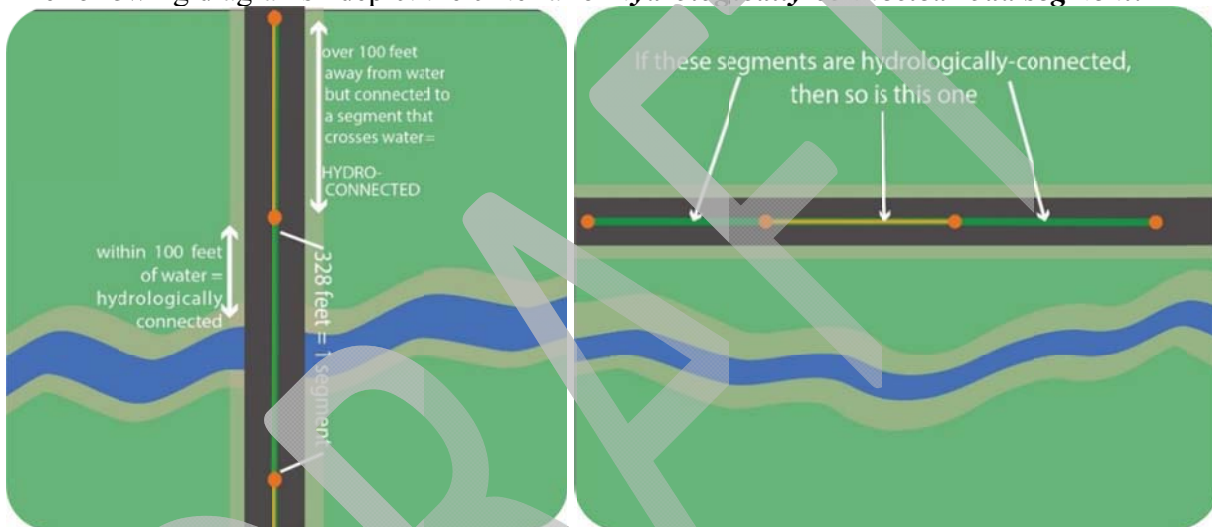
## Introduction

Lamoille County Planning Commission (LCPC) conducted a road erosion inventory (REI) to evaluate “hydrologically-connected” road segments in the town of Elmore in 2018. This report describes the process, the observed conditions, and the Town priorities.

Hydrologically-connected road segments are indicated by one or more of the following:

- Within 100 feet to water resources (streams, rivers, wetlands, lakes, ponds)
- Road segments that bisect a water resource
- Adjacent segments to connected segments (i.e. segment uphill of a connected segment)
- Catch basin outfall pipe at 500 feet or less from a water resource

The following diagrams\* depict the criteria for *hydrologically-connected road segment*:



\*Diagrams created by Two Rivers-Ottawaquechee Regional Commission staff

## Background

Many historic settlements and roads in Vermont are near water since these are generally the flattest parts of our State, and proximity to water was historically essential to economic vitality. Erosion has adverse effects on water resources. During rain events, road sediment sometimes is deposited directly into the water resources. In the context of this report, water resources are defined as perennial and intermittent streams, rivers, wetlands, lakes, and ponds. Road sediment in water resources contributes to a spectrum of ecological problems related to water pollution.

Solutions for road erosion concerns are taking shape in the form of state regulations and grants. Grants should support installation and maintenance of road Best Management Practices (BMPs), while regulations should establish minimum BMP requirements. The goal is to minimize road erosion caused by storm runoff and ensure the sediment that does erode is sufficiently filtered before reaching the water. In optimum circumstances surface water runoff should be prevented (or disconnected) from directly reaching water resources.

The Road Erosion Inventory and Implementation Schedule (REI) is required for both grant funding and permit compliance. The purpose of the REI is to identify locations susceptible to road erosion. These are usually the places that require regular attention by town road crews to maintain safe travel or repeatedly fix erosion issues. Only hydrologically-connected road segments are assessed in the REI, plus segments identified by the Town as possibly hydrologically-connected and in need of field verification.

The Department of Environmental Conservation (DEC) provides GIS data via the Agency of Natural Resources (ANR) Natural Resource Atlas (Atlas) identifying the hydrologically-connected road segments for each municipality. This REI reflects the criteria set by DEC's Municipal Roads General Permit (MRGP), which intends to be congruous with the Better Roads Manual provided by the Vermont Agency of Transportation (VTrans).

The MRGP is required by the Vermont Clean Water Act (Act 64), and the permit took effect July 31, 2018.

### **Road Erosion Inventory Methodology**

- The DEC identified hydrologically-connected municipal road segments (all surface types and all classes of roads) based on proximity to water
- The hydrologically-connected roads were divided into approximately 100 meter segments (~328 feet) and assigned a segment identification number by DEC
- All hydrologically-connected segments were inspected by LCPC staff and given a score of Fully Meets, Partially Meets, or Does Not Meet based on the MRGP guidance

LCPC staff inspected each ANR Atlas identified hydrologically-connected road segment during the 2018 field season, and collected data using an "iPad" brand portable tablet. ANR Atlas data was loaded onto the tablet in June 2018, and integrated into a field inventory application created with ESRI Arcgis Collector software. The roadway surface, shoulders, and ditches of each DEC-identified hydrologically-connected road segment were inspected for areas of erosion. Culverts were also examined for erosion issues related to transition areas between swales and streams, culvert head walls, stream channel, and stream bank stability. Stream culvert issues are exempt from the MRGP if in-stream work permits are required by any local, state or federal regulatory agency. Non-stream culvert issues and driveway culverts were noted if they were contributing to erosion issues. The geographic location and extent of each erosion area was recorded with the "Collector" software.

### **Town Report**

The Town of Elmore is just over 39 square miles of mountains and streams, with approximately 38 miles of public roads. As of June 2018, the Atlas identified 311 road segments as hydrologically-connected, or approximately 19.3 miles. Upon field inspections, 97 of the GIS-identified hydrologically-connected segments (approximately 6 miles) were determined incorrect in terms of connectivity status and/or spatial location and/or status as a municipal road. Thirteen (13) segments were identified to be in full compliance with the MRGP, or approximately 0.8 miles. Thirty-one (31) segments were identified as "unknown" in terms of compliance with the

MRGP because those segments are not accessible for inspection; these roads are currently listed as Class 4 highways, but the Town is considering a change in classification to Legal Trails. For calculation purposes these segments are counted as “not connected” and are included in the 97 incorrect segments described above. The resulting estimated quantity of hydrologically-connected, municipally owned, not fully compliant road segments in need of work over the 20 years of the MRGP jurisdiction is **201 segments, or approximately 12.5 miles.**

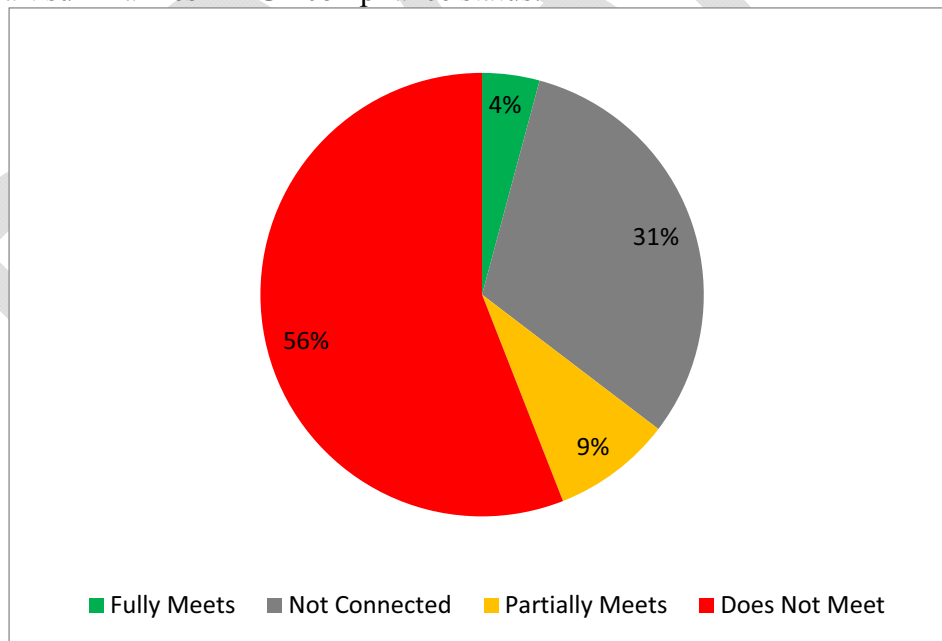
Maps and spreadsheets depicting the details of the REI is contained in Appendix A and B, respectively. Appendix C contains excerpts of typical BMP construction details from the Better Back Roads Manual. A significant portion of municipal roads are near water resources. It is not unexpected to find many roads flanked by a steep grade to one side and a water resource on the other. Combined with steep roads this creates extra challenges and emphasizes the importance of proper road drainage installation and maintenance.

Common causes for erosion issues are as follows:

- Inadequate infiltration and disconnection practices
- Unstable river and stream banks adjacent to roads
- Unstable swales or no swales where they are needed
- Lack of, or inadequate culverts or headwalls
- Inadequate compaction or cohesiveness of road surface material

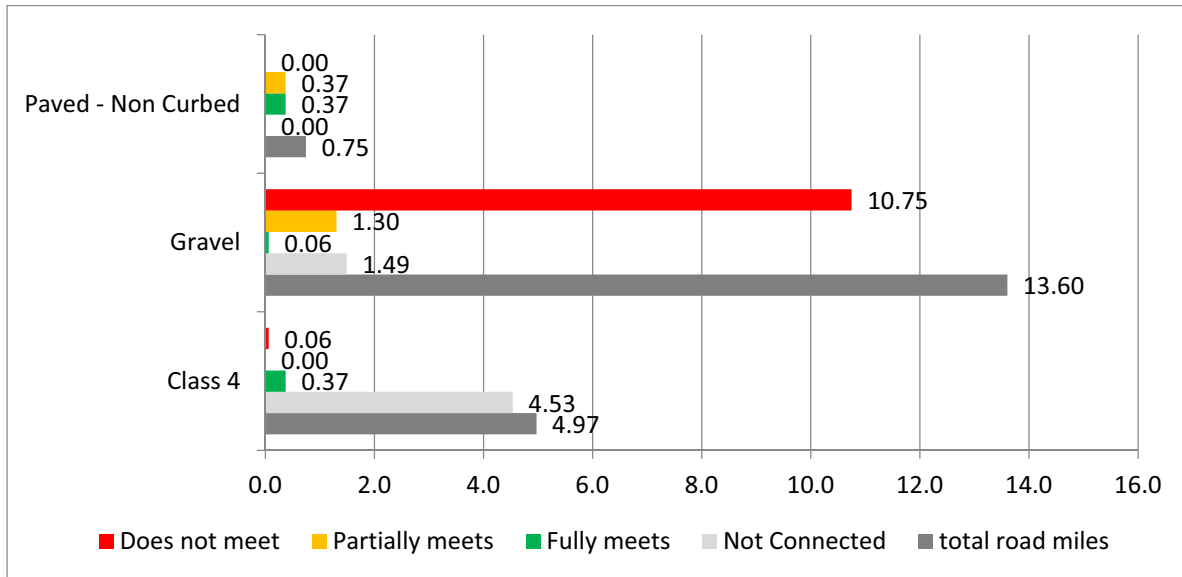
Results: Snapshot of Current Condition

This pie-chart summarizes MRGP compliance status:



- There are 214 hydrologically-connected road segments in Elmore, or 13.3 miles (including class 4 roads)
- Of these, 65% (201 segments) do not fully meet MRGP standards; which equals approximately 12.5 miles of road

The following bar chart depicts the scoring breakdown (fully meets, partially meets, does not meet) by road type for hydrologically-connected road miles within the town’s total road miles.



*Implementation Plan*

It is important to note this report represents a snapshot in time, and is based on a combination of desktop geographic analysis by DEC of specific parameters, plus field observations made by LCPC staff. It is known that some site-specific conditions have changed since the field work was conducted. The work conducted in this assessment was consistent with DEC training provided for Regional Planning Commission staff. The findings in this report are a clear indication of the likelihood of conditions that may be observed at any snapshot in time, at various locations around Town. This report is also useful in framing the caliber and order of magnitude of work which will be required under the Municipal Road General Permit, and therefore should be helpful in projecting general budgeting needs.

Thirty-four (34) segments have been identified by the Town as High Priority for implementation in the first five years of the MRGP, at an estimated cost of \$500,000. High Priority indicates a segment score of “partially” or “does not meet” at locations identified by the Town as a high priority, as shown in the following table. Some sites may be determined by Town Staff to need a fully engineered design, or a design created by the Town. However, most sites can be addressed by implementing typical BMPs found in the Better Back Roads Guidance Manual published by VTrans.

The Town priorities, project descriptions, schedule, and costs in the following table are subject to change.

**Town of Elmore  
2018 Road Erosion Inventory Report**

Road Name	Avg Road Grade	Segment ID #	Meets MRGP ?	Estimated Project Description	Est Project Cost	Est Time
ELMORE MOUNTAIN RD	5	95466	no	Replace 4 existing culverts of > 3ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$75,000	Year 1, 2019
	6	95467	no			
	4	95468	no			
OLD ICE HOUSE RD	3	144077	no	Replace existing stream culvert with new box culvert. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$200,000	Year 2, 2020
	2	144076	no			
ELMORE POND RD	3	20217.1	no	Replace multiple existing culverts of < 3ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$70,000	Year 3, 2021
	2	20223.1	no			
	3	20222.1	no			
	4	20221.1	no			
	4	20220.1	no			
	2	20218.1	no			
SYMONDS MILL RD	6	176025	no	Install stone ditches and small culverts on steep road. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$70,000	Year 4, 2022
	8	176024	no			
	4	176023	no			
	5	176022	no			
	1	176021	no			
	5	176017	no			
	4	176016	no			
	6	176015	no			
	4	176014	no			
	5	176013	no			
	4	176012	no			
	7	176011	no			
	8	176010	no			
	10	176009	no			
	2	176004	no			
	10	176003	no			
	8	176002	no			
8	176001	no				
10	176000	no				
7	175999	no				
EAST ELMORE RD	2	92573	no	Install stream bank stabilization practices at river-road conflict area. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$85,000	Year 5, 2023
	1	92574	no			
	1	92575	no			

From a review of the erosion sites, several common erosion scenarios were identified at various locations in Town. Typical designs for mitigating erosion issues are provided from the Better Back Roads Manual by LCPC in Appendix C. Town Staff met with LCPC on numerous occasions, both in the office and at example erosion locations, to review the results of the desktop analysis and subsequent field work conducted in 2018. Possible erosion management (i.e. treatment) options for implementation were also discussed, to be consistent with the Town's available resources. Specific techniques to be applied to each location, including estimates of materials, equipment, and personnel needs will be determined by the Town prior to implementation of corrective actions.

The erosion location maps, typical details, and database are provided to the Town in this report. The data will help the Town track erosion problem areas over time, and identify project locations and schedules. For the sites that require full engineering design to repair, the Town can use this information to help inform future decisions on hiring a design firm to address these areas as funding becomes available. The typical designs can also be used as supplementary documentation for future grant applications.

## **Conclusion**

While the existence of roads in proximity to water poses a risk for water quality, adequate road maintenance practices will reduce the rate of unmanaged runoff reaching our valuable natural resources. Recommended BMPs to improve current conditions are detailed in Appendix C and include measures such as grass and stone-lined drainage swales, sheet flow infiltration, disconnection practices, road crowning, improving culvert outlets and headwalls, and stabilizing exposed soil.

The Road Erosion Inventory for the Town of Elmore accomplished the following objectives: (1) an increased understanding of the scope of erosion concerns along municipal roads, (2) an inventory of hydrologically-connected road segments, and (3) five year work plan with cost estimates. The identification and prioritization of road erosion sites will help the Town budget for and implement the necessary repairs.

Road segments not identified in the ANR Atlas as hydrologically-connected, but are connected, were documented by LCPC staff. Additionally, there were segments identified in the ANR Atlas as hydrologically-connected but they are not connected. The REI should be updated every five years in accordance with the MRGP to document progress, impacts from specific weather events, and re-evaluation of the Town's priorities. Sites identified for a full engineering design should also be reviewed by the Town and prioritized for inclusion in Capital Budgets.

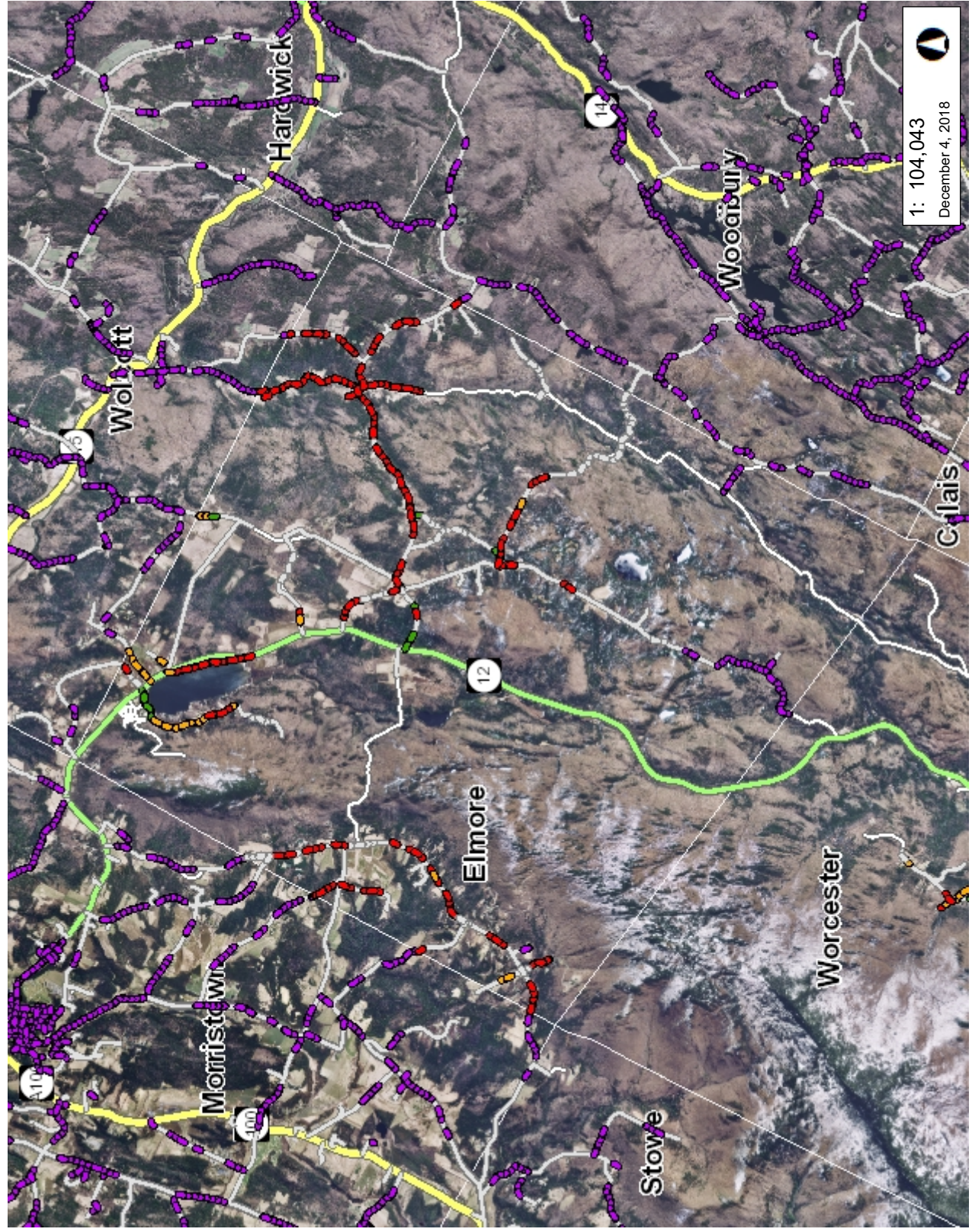
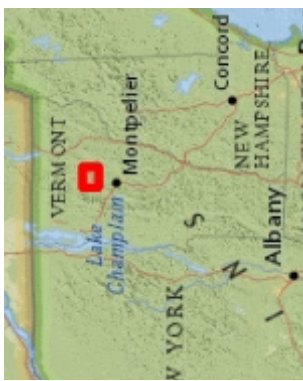
There are sections of Class 4 roads where erosion issues were documented. Town highway budgets are limited and more traveled roads usually receive higher priority by the voting public and taxpayers. Due to the MRGP requirements, LCPC will collaborate with the partners – Vermont Department of Environmental Conservation, Vermont Youth Conservation Corps, and involved Towns – to identify available funding sources and develop appropriate implementation measures for selected Class 4 roads in the future.



# Elmore Road Erosion Inventory

Vermont Agency of Natural Resources

vermont.gov



1: 104,043  
December 4, 2018

5,285.0 0 2,642.00 5,285.0 Meters  
1" = 8670 Ft. 1cm = 1040 Meters  
THIS MAP IS NOT TO BE USED FOR NAVIGATION  
© Vermont Agency of Natural Resources

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

**Road Erosion Scoring (MIRGP)**

- Fully Meets
- Partially Meets
- Does Not Meet
- Incomplete Data
- Not Connected

**Road Segment Priority (MRGF)**

- Very High
- High
- Moderate
- Low
- Incomplete Data

**Hydrologically Connected Road (MRGP)**

- Yes
- No

**Roads**

- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification S

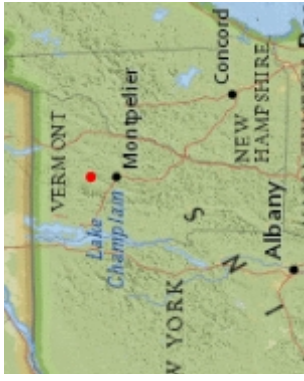
**Waterbody**

- Stream
- Town Boundary

### NOTES

Data collected by LCPC, map generated using VT ANR Atlas.

Appendix A



Segment #s 95466, 95467, 95468. Replace 4 existing culverts of > 3ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts. Year 1, estimated cost \$75,000



1: 7,315

December 6, 2018

**LEGEND**

- Road Erosion Scoring (MRGP)**
- Fully Meets
  - Partially Meets
  - Does Not Meet
  - Incomplete Data
  - Not Connected
- Hydrologically Connected Road (MRGP)**
- Yes
  - No
- Parcels (Standardized)**
- Roads**
- Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Waterbody**
- Stream
  - Parcels (Non-Standardized)
  - Town Boundary

**NOTES**

Map created using ANR's Natural Resources Atlas

Appendix A

**372.0** 0 186.00 372.0 Meters

1" = 610 Ft. 1cm = 73 Meters

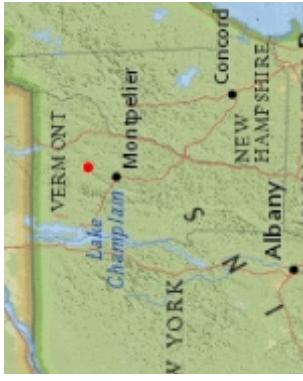
THIS MAP IS NOT TO BE USED FOR NAVIGATION

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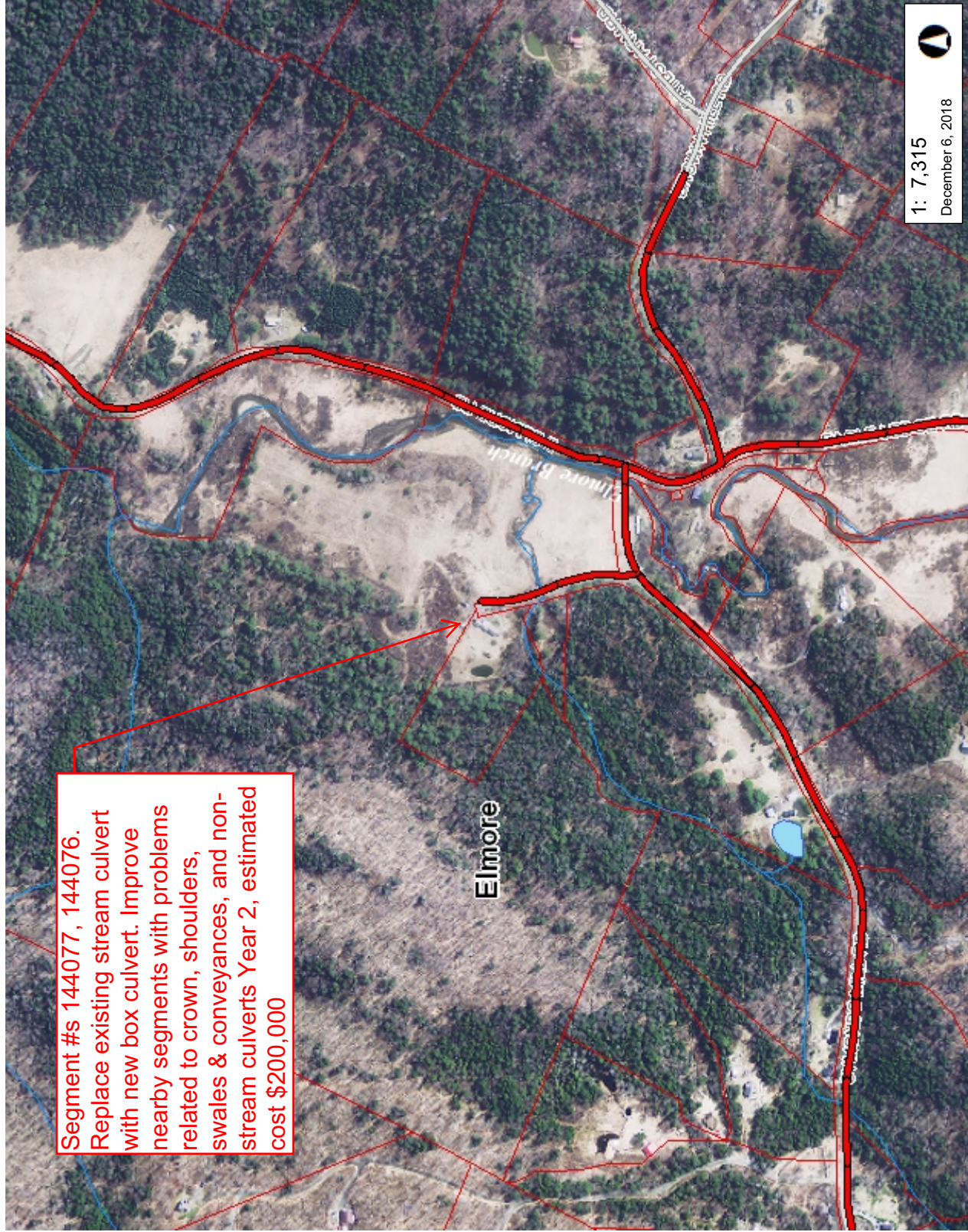
WGS\_1984\_Web\_Mercator\_Auxiliary\_Sphere

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Segment #s 144077, 144076.  
Replace existing stream culvert with new box culvert. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts Year 2, estimated cost \$200,000



1: 7,315  
December 6, 2018

**LEGEND**

**Road Erosion Scoring (MIRGP)**

- Fully Meets
- Partially Meets
- Does Not Meet
- Incomplete Data
- Not Connected

**Hydrologically Connected Roads (MRGP)**

- Yes
- No

**Parcels (Standardized)**

**Roads**

- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification S

**Waterbody**

- Stream

**Parcels (Non-Standardized)**

- Town Boundary

**NOTES**

Map created using ANR's Natural Resources Atlas

**Appendix A**

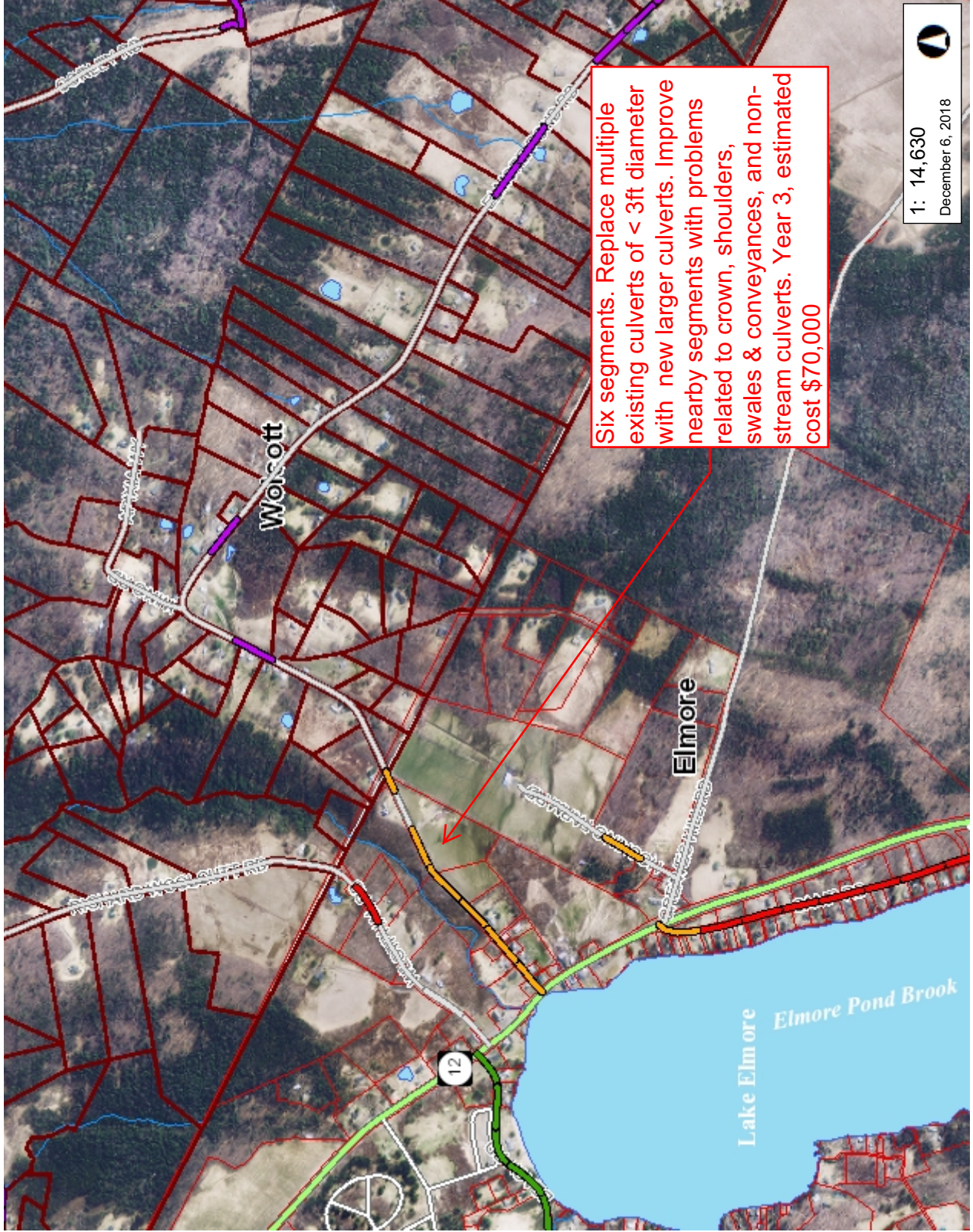
372.0 0 186.00 372.0 Meters

1" = 610 Ft. 1cm = 73 Meters

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1: 14,630  
December 6, 2018



**LEGEND**

- Road Erosion Scoring (MIRGP)**
- █ Fully Meets
  - █ Partially Meets
  - █ Does Not Meet
  - █ Incomplete Data
  - █ Not Connected
- Hydrologically Connected Roads (MRGP)**
- █ Yes
  - █ No
- Parcels (Standardized)**
- Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Waterbody**
- █ Waterbody
  - Stream
- Parcels (Non-Standardized)**
- Town Boundary

**NOTES**

Map created using ANR's Natural Resources Atlas

Appendix A

743.0 0 372.00 743.0 Meters

1" = 1219 Ft. 1cm = 146 Meters

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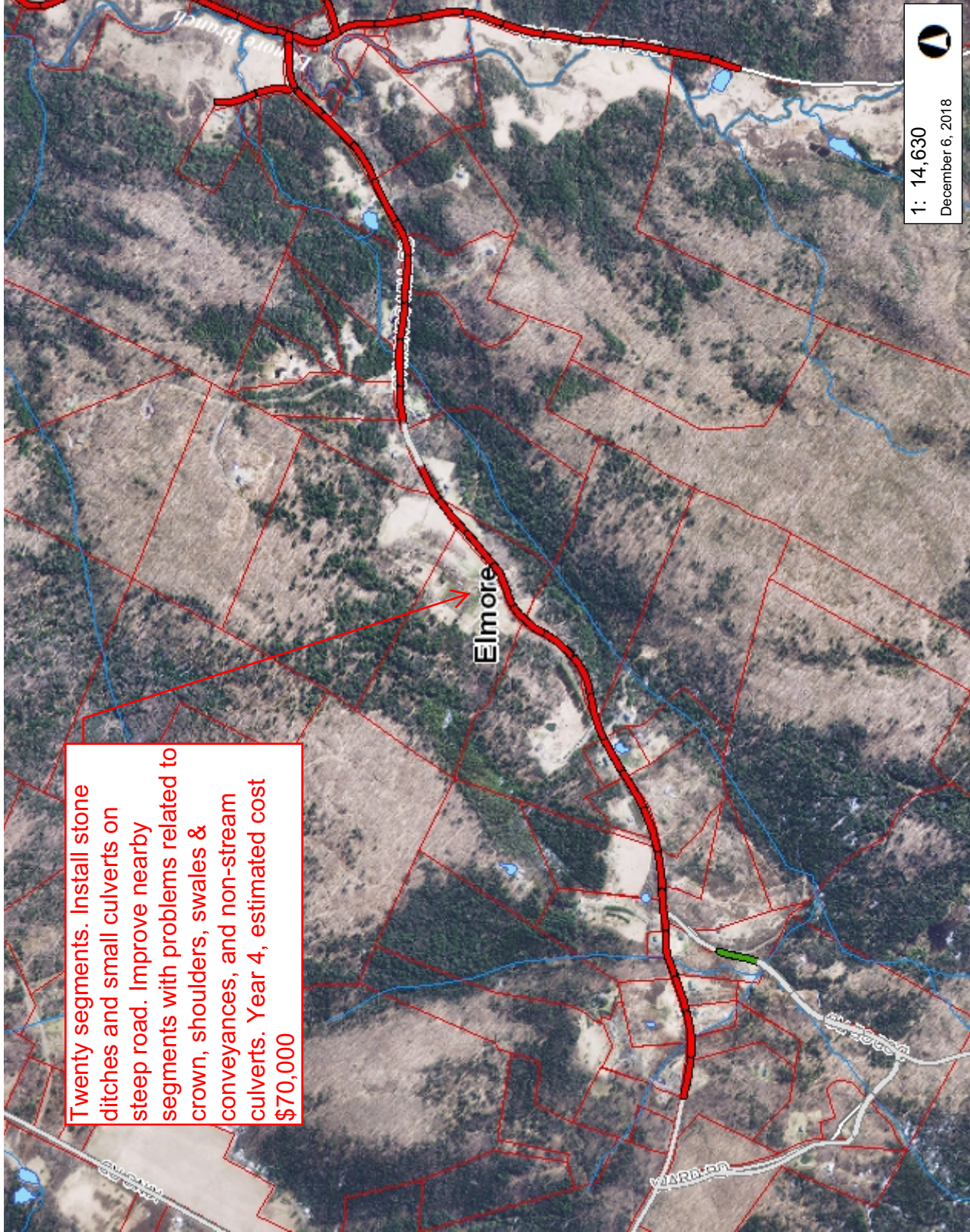
# Natural Resources Atlas

Vermont Agency of Natural Resources

vermont.gov



Twenty segments. Install stone ditches and small culverts on steep road. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts. Year 4, estimated cost \$70,000



1: 14,630  
December 6, 2018



### LEGEND

- Road Erosion Scoring (MRGP)**
  - Fully Meets
  - Partially Meets
  - Does Not Meet
  - Incomplete Data
  - Not Connected
- Hydrologically Connected Road (MRGP)**
  - Yes
  - No
- Parcels (Standardized)**
- Roads**
  - Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Waterbody**
- Stream**
- Parcels (Non-Standardized)**
- Town Boundary**

### NOTES

Map created using ANR's Natural Resources Atlas

Appendix A

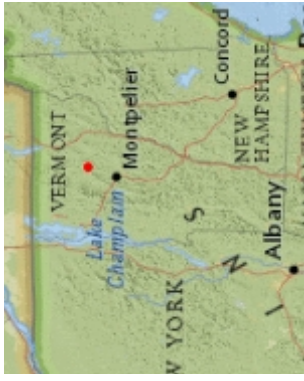
743.0 0 372.00 743.0 Meters

1" = 1219 Ft. 1cm = 146 Meters

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Segment #s 92573, 92574, 92575. Install stream bank stabilization practices at river-road conflict area. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts. Year 5, estimated cost \$85,000

1: 3,658  
December 6, 2018

### LEGEND

**Road Erosion Scoring (MRGP)**

- Fully Meets
- Partially Meets
- Does Not Meet
- Incomplete Data
- Not Connected

**Hydrologically Connected Road (MRGP)**

- Yes
- No

**Parcels (Standardized)**

**Roads**

- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification S

**Waterbody**

- Stream
- Parcels (Non-Standardized)
- Town Boundary

### NOTES

Map created using ANR's Natural Resources Atlas

Appendix A

186.0 0 93.00 186.0 Meters

1" = 305 Ft. 1cm = 37 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

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Elmore Road Erosion Inventory 5-Year Workplan and Budget Estimate

Road Name	Average Road Grade	Segment ID #	Crown Issue	Shoulder Issue	Swale Issue	Culvert Issue	Conveyance Area Issue	Meets MRGP?	Estimated Project Description	Estimated Project Cost	Estimated Timeline
ELMORE MOUNTAIN RD	5	95466	yes	yes		yes		no	Replace 4 existing culverts of > 3 ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$75,000	Year 1, 2019
	6	95467	yes	yes				no			
	4	95468	yes	yes		yes		no			
OLD ICE HOUSE RD	3	144077	yes	yes			yes	no	Replace existing stream culvert with new box culvert. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$200,000	Year 2, 2020
	2	144076	yes	yes	yes			no			
ELMORE POND RD	3	20217.1	n/a	n/a	yes			no	Replace multiple existing culverts of < 3 ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$70,000	Year 3, 2021
	2	20223.1	n/a	n/a	yes			no			
	3	20222.1	n/a	n/a	yes			no			
	4	20221.1	n/a	n/a	yes			no			
	4	20220.1	n/a	n/a	yes			no			
	2	20218.1	n/a	n/a	yes			no			
	6	176025	yes	yes				no			
	8	176024	yes	yes				no			
	4	176023	yes	yes				no			
	5	176022	yes	yes		yes		no			
SYMONDS MILL RD	1	176021	yes	yes				no	Install stone ditches and small culverts on steep road. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$70,000	Year 4, 2022
	5	176017	yes	yes				no			
	4	176016	yes	yes				no			
	6	176015	yes	yes				no			
	4	176014	yes	yes				no			
	5	176013	yes	yes				no			
	4	176012	yes	yes				no			
	7	176011	yes	yes				no			
	8	176010	yes	yes				no			
	10	176009	yes	yes				no			
	2	176004	yes	yes				no			
	10	176003	yes	yes				no			
	8	176002	yes	yes				no			
	8	176001	yes	yes				no			
	10	176000	yes	yes				no			
7	175999	yes	yes		yes		no				
EAST ELMORE RD	2	92573	yes	yes	yes			no	Install stream bank stabilization practices at river-road conflict area. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$85,000	Year 5, 2023
	1	92574	yes	yes	yes			no			
	1	92575	yes	yes				no			

34 Total Segments

Estimated Total Cost \$500,000

Appendix B

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
27234	COURCHAINNE FARM RD	9/14/2018	Initial Inventory	Gravel	5.000	F	F	F	F			Fully Meets
28742	CROSS RD	9/24/2018	Initial Inventory	Class 4	3.000							Fully Meets
28744	CROSS RD	9/24/2018	Initial Inventory	Class 4	6.000							Fully Meets
28745	CROSS RD	9/24/2018	Initial Inventory	Class 4	4.000							Fully Meets
28750	CROSS RD	9/14/2018	Initial Inventory	Class 4	4.000							Fully Meets
33323	DODGE RD	9/24/2018	Initial Inventory	Class 4	9.000							Fully Meets
33326	DODGE RD	9/24/2018	Initial Inventory	Class 4	3.000							Fully Meets
5990	BEACH RD	6/29/2018	Initial Inventory	Paved - Non Curbed	2.000			F	F			Fully Meets
5991	BEACH RD	6/29/2018	Initial Inventory	Paved - Non Curbed	1.000			F	F			Fully Meets
5992	BEACH RD	6/29/2018	Initial Inventory	Paved - Non Curbed	1.000			F	F			Fully Meets
5993	BEACH RD	6/29/2018	Initial Inventory	Paved - Non Curbed	1.000			F	F	F		Fully Meets
5994	BEACH RD	6/29/2018	Initial Inventory	Paved - Non Curbed	1.000			F	F			Fully Meets
5995	BEACH RD	6/29/2018	Initial Inventory	Paved - Non Curbed	2.000			F	F			Fully Meets
108771	HARDWOOD FLATS RD	9/24/2018	Initial Inventory	Class 4	4.000							Not Connected
108772	HARDWOOD FLATS RD	9/24/2018	Initial Inventory	Class 4	4.000							Not Connected
108802	HARDWOOD FLATS RD	6/29/2018	Initial Inventory	Gravel	4.000							Not Connected
121815	LACASSE RD	6/29/2018	Initial Inventory	Gravel	2.000							Not Connected
121819	LACASSE RD	6/29/2018	Initial Inventory	Gravel	8.000							Not Connected
127843	LOWER MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	5.000							Not Connected
137023	MOWRY RD	9/6/2018	Initial Inventory	Gravel	1.000							Not Connected
176008	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	11.000	D	D	F	F			Not Connected
176306	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176307	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176310	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176311	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176312	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176313	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176314	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176315	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
176316	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176317	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176318	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176319	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176320	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176321	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176322	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176323	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176324	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176325	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176326	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176327	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
176328	TALLMAN RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
178271	TH 11	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
178272	TH 11	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
178273	TH 11	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
178274	TH 11	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
178275	TH 11	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
180524	TH 28	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
180531	TH 28	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
180532	TH 28	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
180533	TH 28	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
194213	WARD RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
194214	WARD RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
196698	WESTPHAL RD	6/29/2018	Initial Inventory	Gravel	2.000							Not Connected
22341	CHURCHILL RD	9/6/2018	Initial Inventory	Gravel	4.000							Not Connected
28746	CROSS RD	6/29/2018	Initial Inventory	Gravel	1.000							Not Connected
33327	DODGE RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
33328	DODGE RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
33329	DODGE RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
33333	DODGE RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
33334	DODGE RD	9/24/2018	Initial Inventory	Class 4	99.000							Not Connected
6015	BEACH RD	9/14/2018	Initial Inventory	Class 4	4.000							Not Connected
6016	BEACH RD	9/14/2018	Initial Inventory	Class 4	3.000							Not Connected
6017	BEACH RD	9/14/2018	Initial Inventory	Class 4	4.000							Not Connected
7091	BEDELL BROOK RD	9/6/2018	Initial Inventory	Gravel	2.000							Not Connected
95452	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	3.000							Not Connected
95460	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	1.000							Not Connected
95473	ELMORE MOUNTAIN RD	9/6/2018	Initial Inventory	Gravel	1.000							Not Connected
95474	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000							Not Connected
95496	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	5.000							Not Connected
95497	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	5.000							Not Connected
95498	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	6.000							Not Connected
95499	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	6.000							Not Connected
95500	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000							Not Connected
95508	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	1.000							Not Connected
95509	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000							Not Connected
95514	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	4.000							Not Connected
95515	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	2.000							Not Connected
95516	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	3.000							Not Connected
101433	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	7.000	D	D	F	F			Does Not Meet
101434	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	F	D	P	F	Does Not Meet
101435	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	7.000	D	D	F	F		F	Does Not Meet
101436	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	5.000	D	D	F	F		F	Does Not Meet
108821	HARDWOOD FLATS RD	6/29/2018	Initial Inventory	Gravel	5.000	D	D	F	F	F		Does Not Meet
108822	HARDWOOD FLATS RD	6/29/2018	Initial Inventory	Gravel	8.000	D	D	F	F			Does Not Meet
108832	HARDWOOD FLATS RD	6/29/2018	Initial Inventory	Gravel	5.000	D	D	P	D			Does Not Meet
108833	HARDWOOD FLATS RD	6/29/2018	Initial Inventory	Gravel	5.000	D	D	F	F	F	F	Does Not Meet



Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
121813	LACASSE RD	6/29/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
121820	LACASSE RD	6/29/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
123858	LEAHY RD	9/6/2018	Initial Inventory	Gravel	5.000	P	D	F	D			Does Not Meet
123863	LEAHY RD	9/6/2018	Initial Inventory	Gravel	5.000	P	D	F	D	P		Does Not Meet
134356	MITCHELL LN	9/24/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
14362	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	6.000	D	D	P	F		P	Does Not Meet
14371	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	7.000	D	D	F	F			Does Not Meet
14372	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	5.000	D	D	F	F			Does Not Meet
14374	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	5.000	D	D	F	F			Does Not Meet
14378	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	6.000	D	D	F	F		P	Does Not Meet
14379	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	F	F		P	Does Not Meet
14380	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	D	F		P	Does Not Meet
175999	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	7.000	D	D	F	F		D	Does Not Meet
176001	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	F	F			Does Not Meet
176002	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	F	F	F		Does Not Meet
176010	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	F	F			Does Not Meet
176011	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	7.000	D	D	F	F			Does Not Meet
176013	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	5.000	D	D	F	F			Does Not Meet
176015	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
176017	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	5.000	D	D	F	F	F	F	Does Not Meet
176022	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	5.000	D	D	F	D			Does Not Meet
176024	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	8.000	D	D	F	F			Does Not Meet
176025	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
176304	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
176340	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	7.000	D	D	F	F			Does Not Meet
176341	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	5.000	D	D	F	D			Does Not Meet
176343	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	5.000	D	D	F	F			Does Not Meet
176347	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	7.000	D	D	F	F	F	F	Does Not Meet
178283	TH 11	6/29/2018	Initial Inventory	Gravel	8.000	D	D	F	F			Does Not Meet

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
6006	BEACH RD	6/29/2018	Initial Inventory	Gravel	5.000	P	P	P	F			Does Not Meet
6008	BEACH RD	6/29/2018	Initial Inventory	Gravel	5.000	P	P	P	F			Does Not Meet
6009	BEACH RD	6/29/2018	Initial Inventory	Gravel	5.000	P	P	P	F			Does Not Meet
7092	BEDELL BROOK RD	9/6/2018	Initial Inventory	Gravel	6.000	P	P	P	F			Does Not Meet
7093	BEDELL BROOK RD	9/6/2018	Initial Inventory	Gravel	6.000	P	P	P	F			Does Not Meet
7094	BEDELL BROOK RD	9/6/2018	Initial Inventory	Gravel	5.000	D	P	P	F			Does Not Meet
92578	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	5.000	P	D	F	F			Does Not Meet
92583	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	5.000	P	D	F	F			Does Not Meet
92584	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	5.000	P	D	F	F			Does Not Meet
93738	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	5.000	D	D	P	F			Does Not Meet
93743	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
93745	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	6.000	D	D	F	D			Does Not Meet
93880	EARL GRAY RD	9/6/2018	Initial Inventory	Gravel	6.000	P	D	F	F	F		Does Not Meet
93881	EARL GRAY RD	9/6/2018	Initial Inventory	Gravel	9.000	P	D	F	F			Does Not Meet
95466	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	5.000	D	D	F	F	P		Does Not Meet
95467	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
95478	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	8.000	D	D	F	D	F		Does Not Meet
95482	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	8.000	D	D	F	F			Does Not Meet
95484	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	8.000	D	P	P	D	P		Does Not Meet
95488	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	5.000	D	P	P	D	P		Does Not Meet
95492	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	8.000	D	D	P	D			Does Not Meet
95501	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	6.000	D	D	F	F			Does Not Meet
95502	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	7.000	D	D	P	D			Does Not Meet
95506	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	7.000	D	D	F	D			Does Not Meet
95507	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	7.000	D	D	F	F			Does Not Meet
114430	HOSKING FARM RD	6/29/2018	Initial Inventory	Gravel	3.000	D	F	F	F			Partially Meets
137027	MOWRY RD	9/6/2018	Initial Inventory	Gravel	1.000	D	F	P	F			Partially Meets
137028	MOWRY RD	9/6/2018	Initial Inventory	Gravel	1.000	D	F	P	F			Partially Meets
176339	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	4.000	D	P	F	F	F	F	Partially Meets

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
17755	CAMP RD	6/29/2018	Initial Inventory	Gravel	2.000	D	P	F	F			Partially Meets
20217.1	ELMORE POND RD	6/29/2018	Initial Inventory	Paved - Non Curbed	3.000			P	F			Partially Meets
20218.1	ELMORE POND RD	6/29/2018	Initial Inventory	Paved - Non Curbed	2.000			P	F			Partially Meets
20220.1	ELMORE POND RD	6/29/2018	Initial Inventory	Paved - Non Curbed	4.000			P	F			Partially Meets
20221.1	ELMORE POND RD	6/29/2018	Initial Inventory	Paved - Non Curbed	4.000			P	F			Partially Meets
20222.1	ELMORE POND RD	6/29/2018	Initial Inventory	Paved - Non Curbed	3.000			P	F			Partially Meets
20223.1	ELMORE POND RD	6/29/2018	Initial Inventory	Paved - Non Curbed	2.000			P	F			Partially Meets
27232	COURCHAIINE FARM RD	9/14/2018	Initial Inventory	Gravel	2.000	F	F	F	F		P	Partially Meets
27233	COURCHAIINE FARM RD	9/14/2018	Initial Inventory	Gravel	3.000	F	F	F	F		P	Partially Meets
5996	BEACH RD	6/29/2018	Initial Inventory	Gravel	4.000	P	P	F	F	F		Partially Meets
5998	BEACH RD	6/29/2018	Initial Inventory	Gravel	1.000	P	P	F	F	F		Partially Meets
5999	BEACH RD	6/29/2018	Initial Inventory	Gravel	1.000	P	P	F	F			Partially Meets
6000	BEACH RD	6/29/2018	Initial Inventory	Gravel	3.000	P	P	F	F		F	Partially Meets
6001	BEACH RD	6/29/2018	Initial Inventory	Gravel	4.000	P	P	F	F	F		Partially Meets
6002	BEACH RD	6/29/2018	Initial Inventory	Gravel	1.000	P	P	F	F	F		Partially Meets
6003	BEACH RD	6/29/2018	Initial Inventory	Gravel	2.000	P	P	F	F			Partially Meets
6004	BEACH RD	6/29/2018	Initial Inventory	Gravel	4.000	P	P	F	F	F		Partially Meets
6005	BEACH RD	6/29/2018	Initial Inventory	Gravel	4.000	P	P	F	F		F	Partially Meets
6010	BEACH RD	6/29/2018	Initial Inventory	Gravel	4.000	P	P	F	F		F	Partially Meets
92587	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	2.000	P	P	F	F			Partially Meets
101424	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
101427	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	3.000	D	D	F	F		F	Does Not Meet
101428	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	2.000	D	D	F	F		F	Does Not Meet
101429	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
101430	GATES FARM RD	7/2/2018	Initial Inventory	Gravel	3.000	D	D	F	F		D	Does Not Meet
108820	HARDWOOD FLATS RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
121814	LACASSE RD	6/29/2018	Initial Inventory	Gravel	4.000	D	D	F	D			Does Not Meet
121821	LACASSE RD	6/29/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
121822	LACASSE RD	6/29/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
121823	LACASSE RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
121824	LACASSE RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
123852	LEAHY RD	9/6/2018	Initial Inventory	Gravel	2.000	D	D	F	D			Does Not Meet
123859	LEAHY RD	9/6/2018	Initial Inventory	Gravel	1.000	D	D	F	F		P	Does Not Meet
123860	LEAHY RD	9/6/2018	Initial Inventory	Gravel	3.000	P	D	F	D			Does Not Meet
134357	MITCHELL LN	9/24/2018	Initial Inventory	Gravel	2.000	D	D	F	D			Does Not Meet
14363	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
14373	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F		F	Does Not Meet
144076	OLD ICEHOUSE RD	9/24/2018	Initial Inventory	Gravel	2.000	D	D	P	F			Does Not Meet
144077	OLD ICEHOUSE RD	9/24/2018	Initial Inventory	Gravel	3.000	D	D	F	D			Does Not Meet
175996	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
175997	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	1.000	D	D	D	F			Does Not Meet
175998	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
176004	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	2.000	D	D	F	F		F	Does Not Meet
176005	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
176012	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176014	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176016	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176018	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176019	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
176020	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	1.000	D	D	F	F		F	Does Not Meet
176021	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	1.000	D	D	F	F		F	Does Not Meet
176023	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176031	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
176032	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F		F	Does Not Meet
176033	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D		D			Does Not Meet
176034	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176333	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
176334	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet

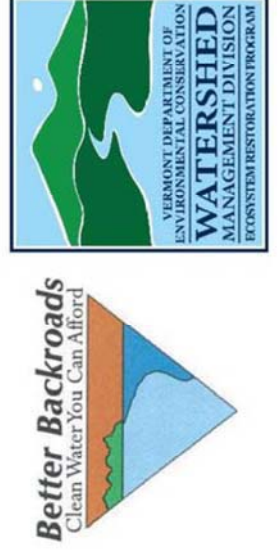
Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
176335	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	2.000	D	P	F	D	F		Does Not Meet
176342	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
176346	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
176348	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
176349	TALLMAN RD	6/29/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
17756	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
17757	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F				Does Not Meet
17758	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
17759	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F		Does Not Meet
17760	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F		Does Not Meet
17761	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
17762	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
17763	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
17764	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F		Does Not Meet
17765	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
17766	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F		Does Not Meet
17767	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F		Does Not Meet
17768	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F	F	Does Not Meet
17769	CAMP RD	6/29/2018	Initial Inventory	Gravel	1.000	D	D	F	F	F		Does Not Meet
196695	WESTPHAL RD	6/29/2018	Initial Inventory	Gravel	2.000	P	F	D	F			Does Not Meet
22340	CHURCHILL RD	9/6/2018	Initial Inventory	Gravel	2.000	D	D	F	F	P		Does Not Meet
28751	CROSS RD	9/14/2018	Initial Inventory	Class 4	2.000							Does Not Meet
6007	BEACH RD	6/29/2018	Initial Inventory	Gravel	3.000	P	P	P	F		F	Does Not Meet
7095	BEDELL BROOK RD	9/6/2018	Initial Inventory	Gravel	2.000	D	P	P	D	F		Does Not Meet
92572	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	1.000	P	D	F	F		P	Does Not Meet
92573	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	2.000	P	D	P	F			Does Not Meet
92574	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	1.000	P	D	P	F		P	Does Not Meet
92575	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	1.000	P	D	F	F			Does Not Meet
92576	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	1.000	P	D	F	F		F	Does Not Meet

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
92577	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	2.000	P	D	F	F			Does Not Meet
92579	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	3.000	P	D	F	F			Does Not Meet
92580	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	3.000	P	D	F	F			Does Not Meet
92581	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	4.000	P	D	F	F			Does Not Meet
92582	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	4.000	P	D	F	F	F		Does Not Meet
92585	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	4.000	P	D	F	F			Does Not Meet
92586	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	2.000	P	D	F	F			Does Not Meet
92588	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	4.000	P	D	F	F			Does Not Meet
92589	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	1.000	P	D	F	F			Does Not Meet
92590	E ELMORE RD	9/5/2018	Initial Inventory	Gravel	1.000	P	D	F	F		P	Does Not Meet
93739	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
93740	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
93741	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	1.000	D	D	F	F		P	Does Not Meet
93742	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	1.000	D	D	F	F		P	Does Not Meet
93744	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
93746	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
93747	EAGLE LEDGE RD	9/24/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
93879	EARL GRAY RD	9/6/2018	Initial Inventory	Gravel	3.000	P	D	F	D			Does Not Meet
95453	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	1.000	D	D	F	F			Does Not Meet
95454	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000	D	D	F	F		P	Does Not Meet
95455	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000	D	D	F	F		P	Does Not Meet
95456	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
95457	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	3.000	D	D	F	D			Does Not Meet
95468	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	4.000	D	D	F	F		P	Does Not Meet
95475	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000	D	D	F	F			Does Not Meet
95476	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	2.000	D	P	P	D		P	Does Not Meet
95477	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	3.000	D	D	P	F			Does Not Meet
95487	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	4.000	D	P	F	F	F	P	Does Not Meet
95489	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	3.000	D	P	P	D		P	Does Not Meet

Seg ID	Road Name	Date	Reason	Road Type	Slope	Crown	Berm / windrow	Drainage	Conveyance	Driveway Culvert	Drainage Culvert	Status
95505	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	3.000	D	D	F	F			Does Not Meet
95510	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	2.000	D	D	F	F	F		Does Not Meet
95511	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	3.000	D	D	F	F	F		Does Not Meet
95512	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	4.000	D	D	F	D			Does Not Meet
95513	ELMORE MOUNTAIN RD	9/14/2018	Initial Inventory	Gravel	4.000	D	D	F	F			Does Not Meet
178284	TH 11	6/29/2018	Initial Inventory	Gravel	7.000	D	F	F	F			Partially Meets
5997	BEACH RD	6/29/2018	Initial Inventory	Gravel	5.000	P	P	F	F			Partially Meets
95483	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	8.000	D	F	F	F			Partially Meets
14384	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	20.000	D	D	D	F			Does Not Meet
14385	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	20.000	D	D	D	F		D	Does Not Meet
14386	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	20.000	D	D	D	F		D	Does Not Meet
14387	BROWN HILL RD	7/2/2018	Initial Inventory	Gravel	20.000	D	F	D	F		D	Does Not Meet
176000	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	10.000	D	D	F	F			Does Not Meet
176003	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	10.000	D	D	F	F			Does Not Meet
176006	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	10.000	D	D	F	F			Does Not Meet
176007	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	12.000	D	D	F	F			Does Not Meet
176009	SYMONDS MILL RD	7/2/2018	Initial Inventory	Gravel	10.000	D	D	F	F	F		Does Not Meet
93882	EARL GRAY RD	9/6/2018	Initial Inventory	Gravel	12.000	P	D	F	F	P		Does Not Meet
95479	ELMORE MOUNTAIN RD	9/7/2018	Initial Inventory	Gravel	10.000	D	P	P	D			Does Not Meet

# Vermont Better Backroads – Road Erosion Inventory

## Erosion Solutions – Quick Reference Guide





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*Velocity Control Solutions*

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### ***Design Details from Others:***

*Ditch / Swale Erosion Control Solutions*

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*Level Spreader*

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*Stone Check Dam*

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*Culvert Header*

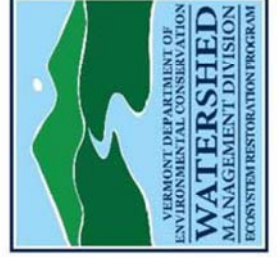
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*Culvert Discharge Stabilization*

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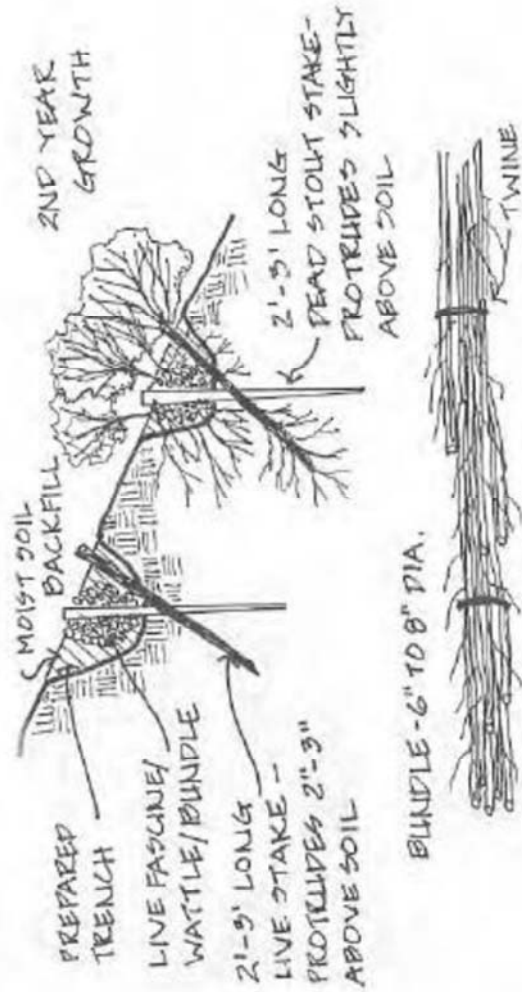
*Typical Road Crown – Cross Section*

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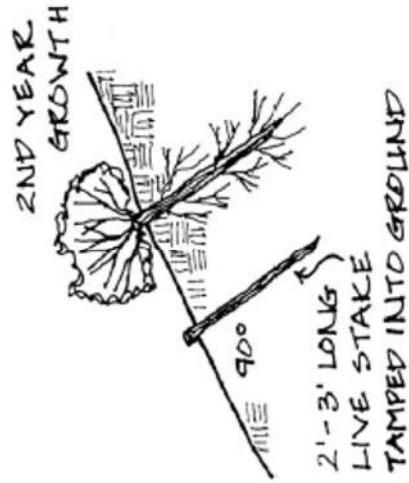


Bank Stabilization Solutions – Better Backroads Manual



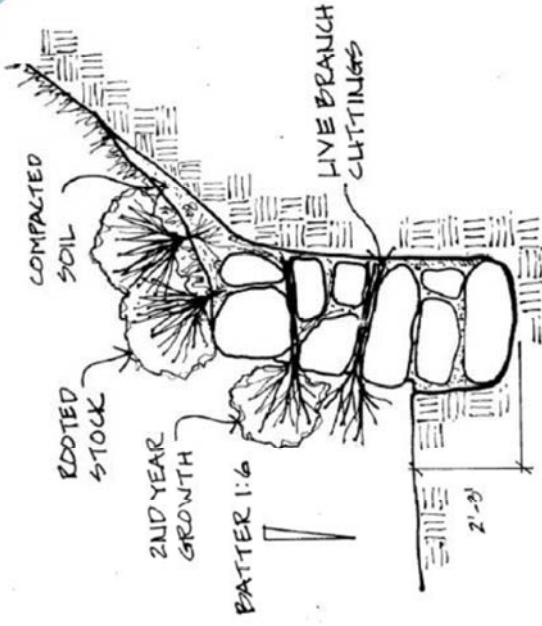
LIVE FASCINES/WATTLES/BUNDLES

(BBR Manual – pg. 35)



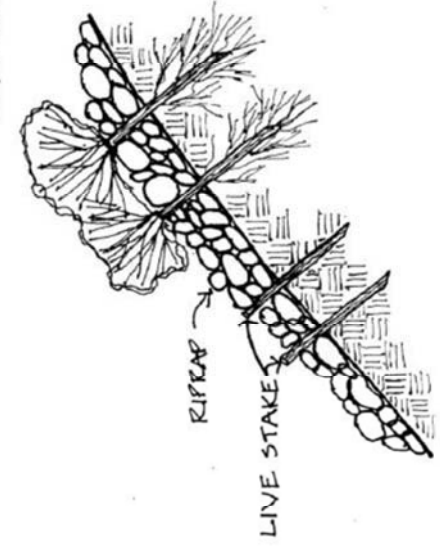
LIVE STAKES

(BBR Manual – pg. 36)



VEGETATED ROCK WALL  
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2ND YEAR GROWTH

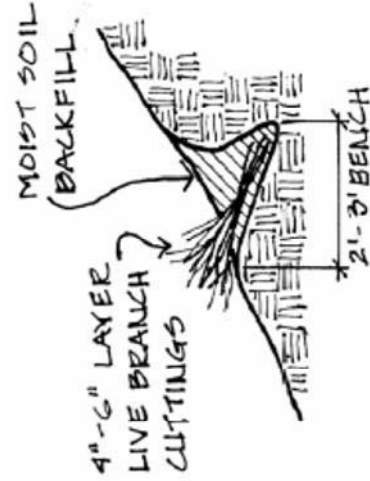


VEGETATED RIPRAP

(BBR Manual – pg. 45)

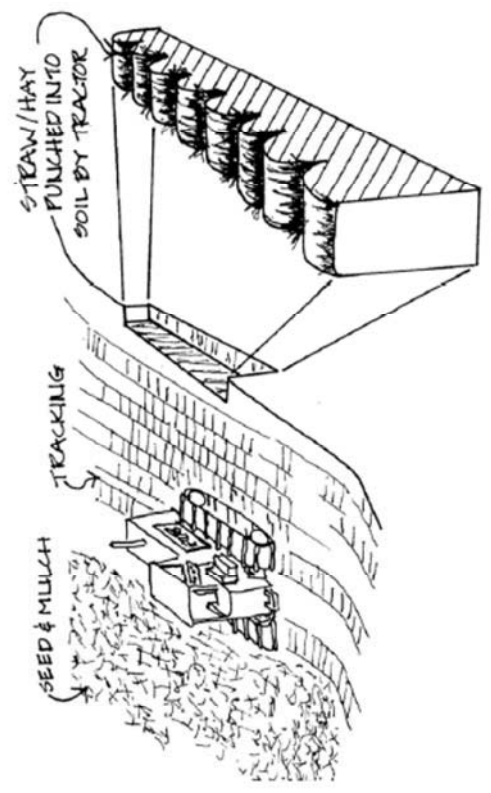
BRUSHLAYERING

(BBR Manual – pg. 36)

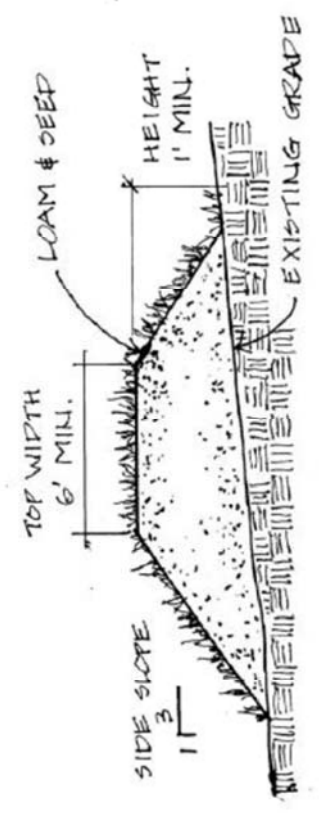
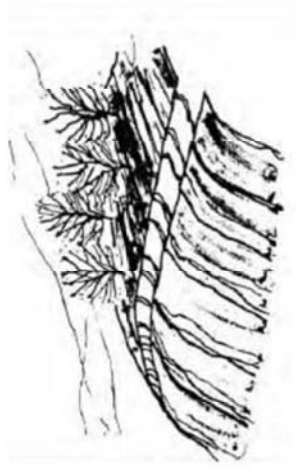




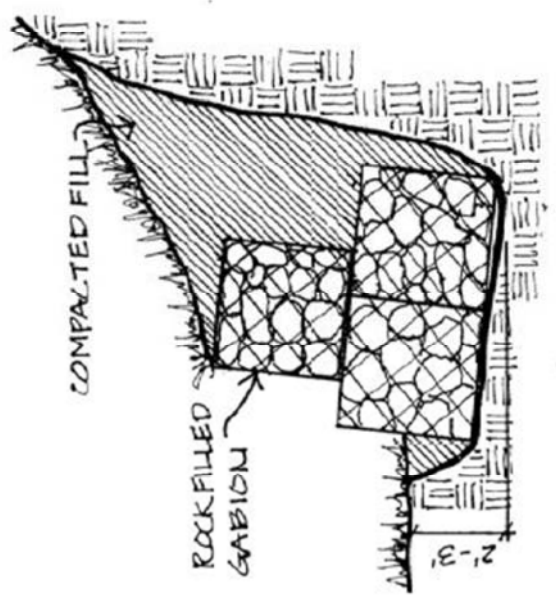
Bank Stabilization Solutions – Better Backroads Manual



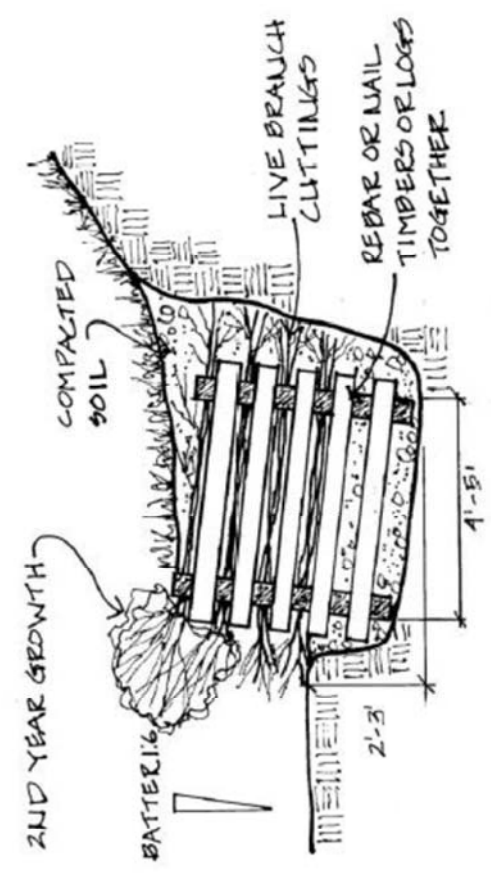
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## Bank Stabilization Solutions – Better Backroads Manual

### Grading Techniques:

Proper grading or regrading of slopes can often stabilize banks without the use of structures.

- Grading or regrading slopes to a maximum 2:1 slope will help to stabilize the bank.

### Terracing:

Benches can be constructed on slopes that are excessively steep and long to provide near level areas that intercept and divert water.

- Backslope terraces inwards toward the slope to intercept water and prevent erosion of terrace.

### Counterweight:

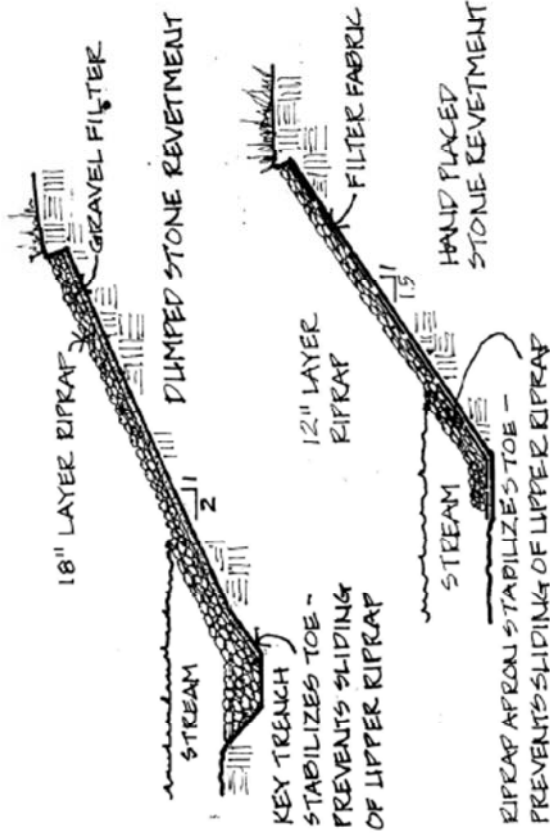
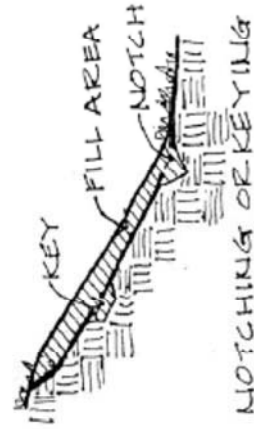
A one level bench and slope that can be added next to a steep falling bank to hold the bank up and prevent continued sliding.

### Cut and/or Fill:

The removal or addition of soil to the bank to create the desired 2:1 or flatter slope, often times removing less stable soils and replacing them in the process of regrading the slope.

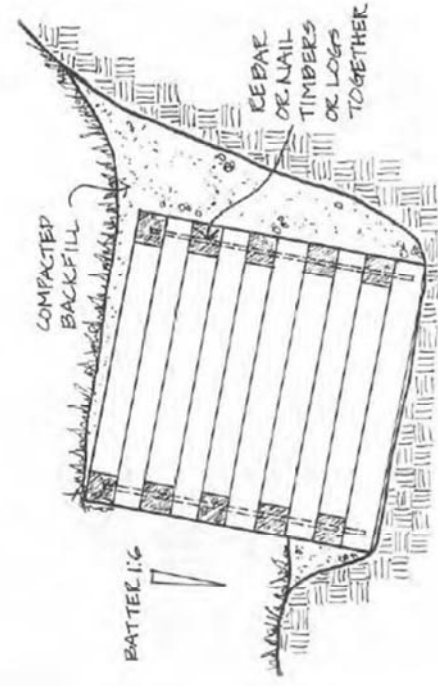
### Notching or Keying:

A "V" or trapezoid shaped cut made in the existing ground to help further stabilize the slope.



### RIPRAP REVETMENT

(BBR Manual – pg. 41)



LOG OR TIMBER CRIB

(BBR Manual – pg. 40)

(BBR Manual – pg. 38)



Culvert Solutions – Better Backroads Manual

Culvert length example calculation:

Using 18 inch (1.5 ft.) culvert with 1.5 ft. of cover and 28 ft. road + shoulder width.

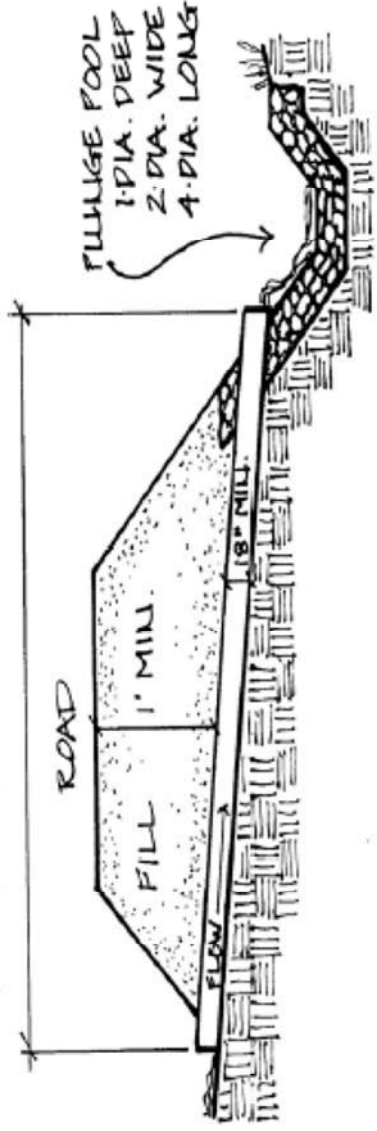
Step 1: Pipe length = 28 + 4 (1.5 + 1.5)

Step 3: Pipe length = 28 + 12

Step 2: Pipe length = 28 + 4 (3)

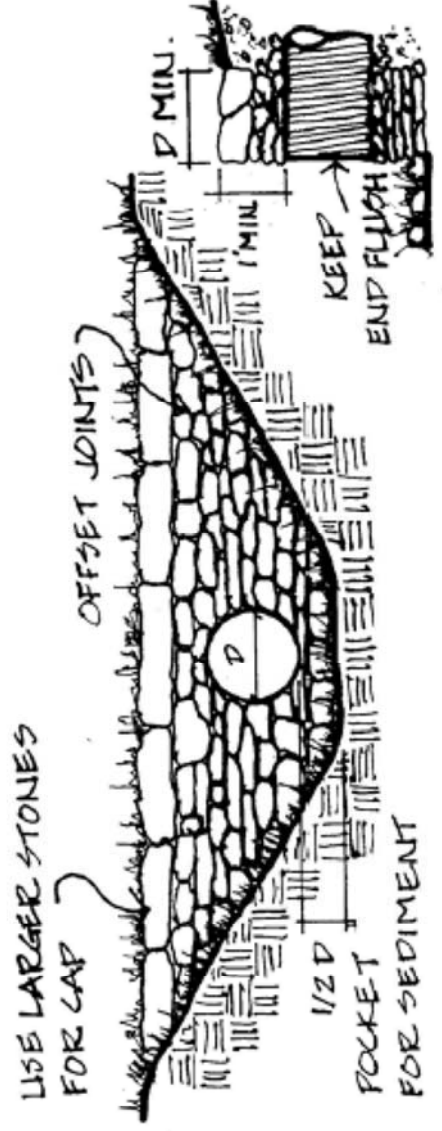
Step 4: Pipe length = 40

PIPE LENGTH = ROAD + SHOULDERS + 4 x (COVER + PIPE DIA.)



CULVERT PROFILE & CROSS SECTION

(BBR Manual – pg. 20)

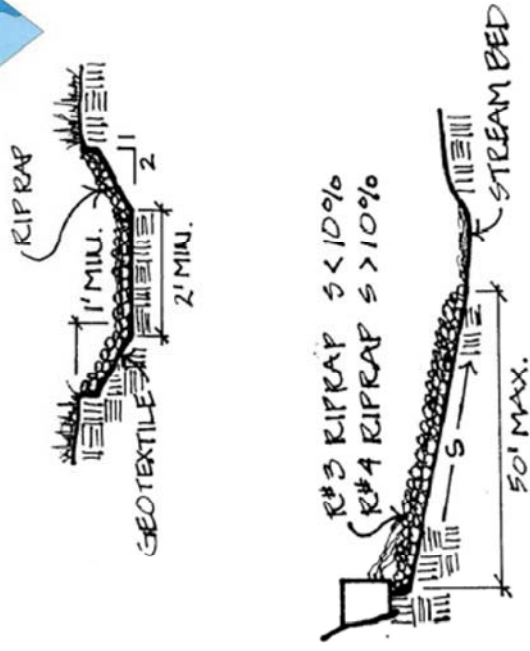


HEADER

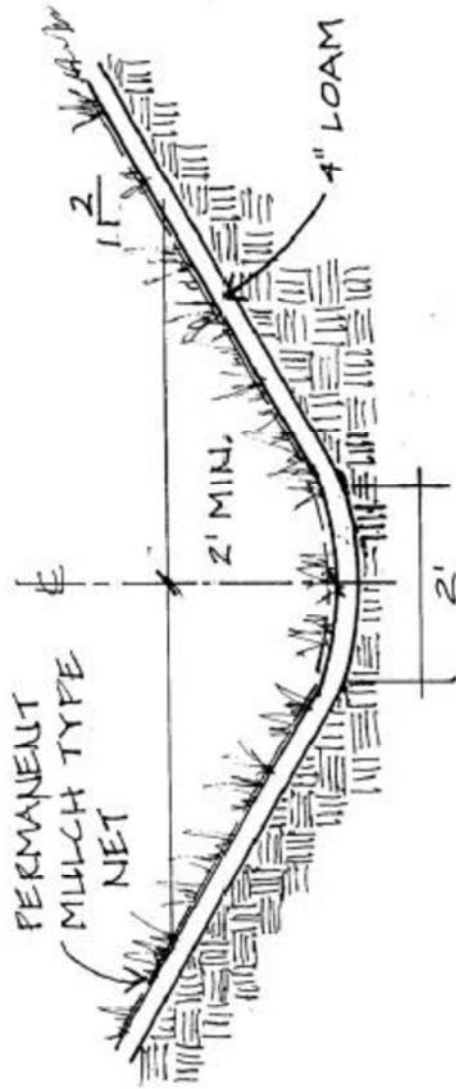
(BBR Manual – pg. 24)



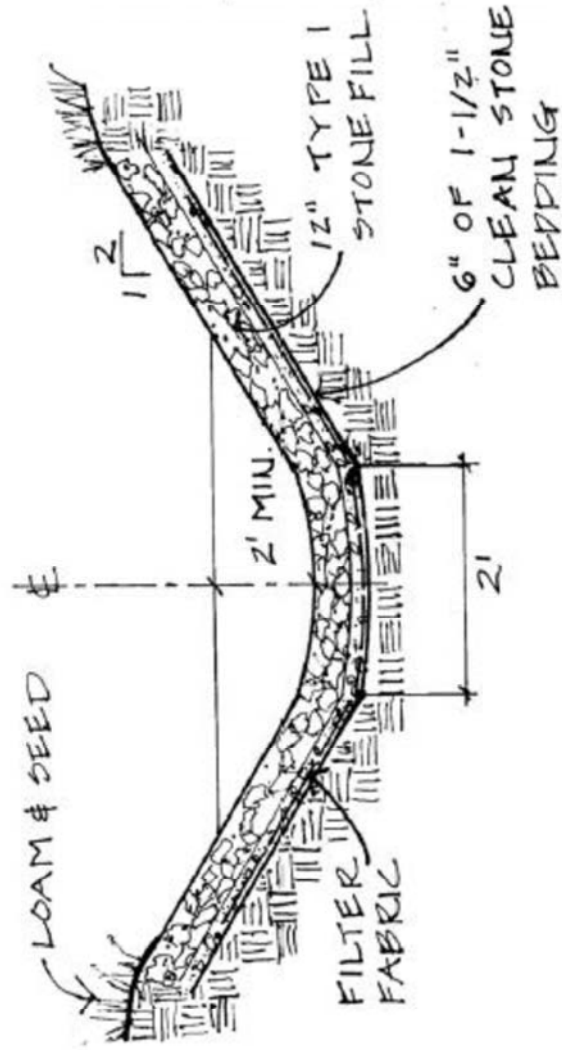
Ditch Stabilization Solutions – Better Backroads Manual



RIPRAP CONVEYANCE CHANNEL  
 (BBR Manual – pg. 30)



GRASS LINED DITCH  
 (BBR Manual – pg. 12)

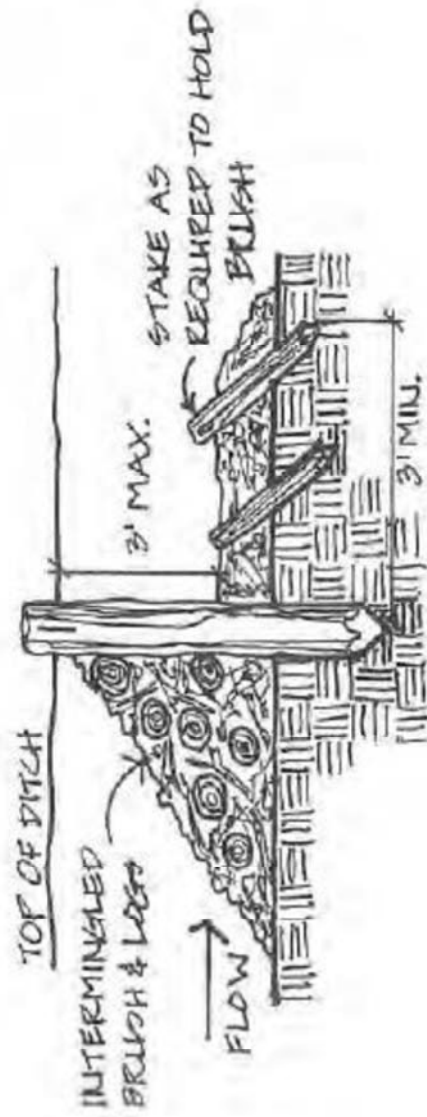
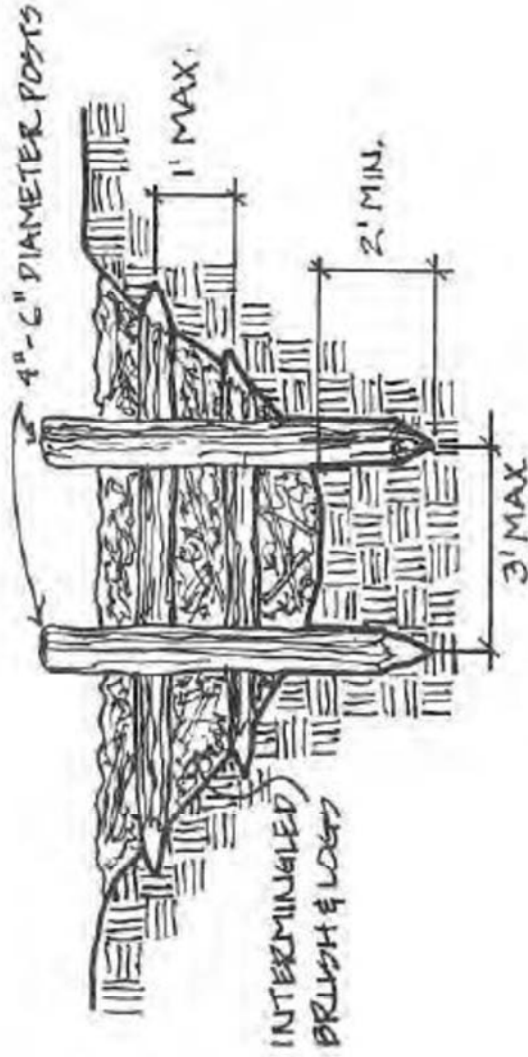


STONE LINED DITCH  
 (BBR Manual – pg. 13)

TABLE 1: DITCH LININGS

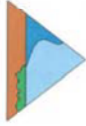
Channel Slope	Lining	Thickness
0-5%	grass	
5-10%	R#3 (2 - 6 inch) diameter rock	7.5"
> 10%	R#4 (3-12 inch) diameter rock	12"

(BBR Manual – pg. 14)

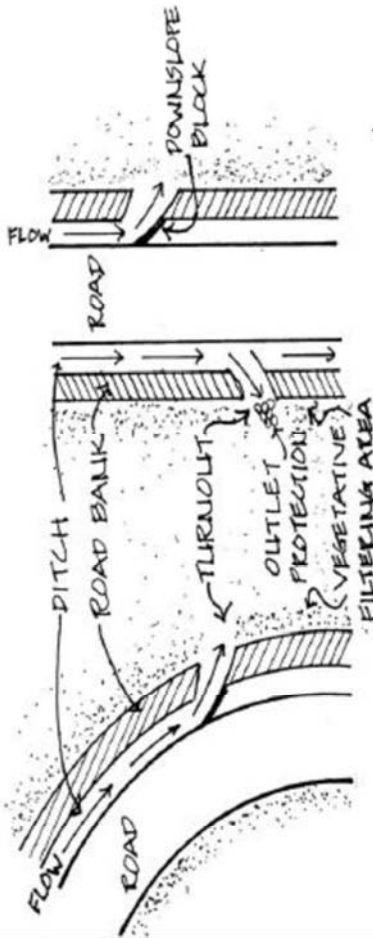


**LOG & BRUSH CHECK DAMS**

(BBR Manual – pg. 18)



Velocity Control Solutions – Better Backroads Manual

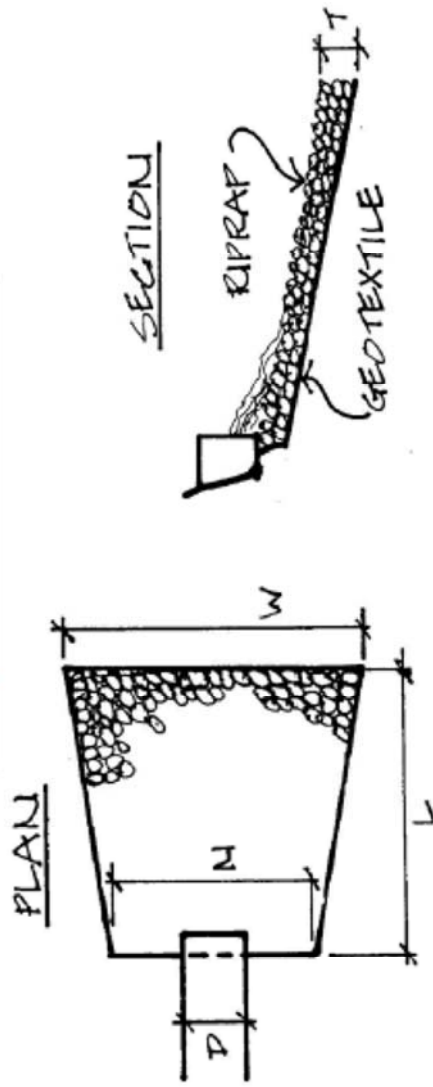


Rock Apron Specifications					
Culvert Diameter (D)	Riprap Size	T (in.)	N (ft.)	W (ft.)	L (ft.)
18 inches	(3-12 inch)	18	4.5	14.5	10.0
24 inches	(3-12 inch)	18	6.0	20.0	14.0

TURNOUTS

(BBR Manual – pg. 28)

D= diameter of culvert  
 T= depth of stone in apron  
 N= width of apron near culvert  
 W= width at downhill end of apron  
 L= length of apron

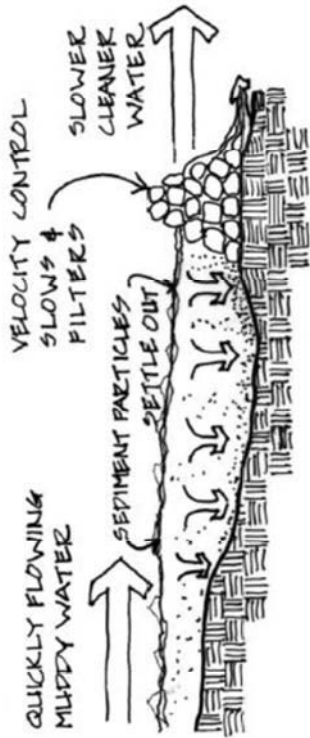


ROCK APRON  
 (BBR Manual – pg. 29)





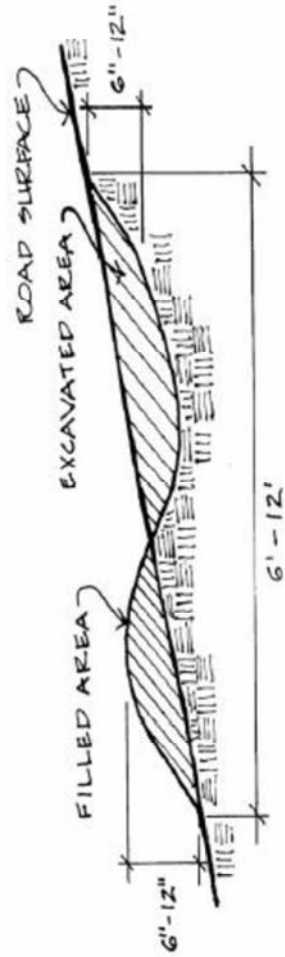
Velocity Control Solutions – Better Backroads Manual



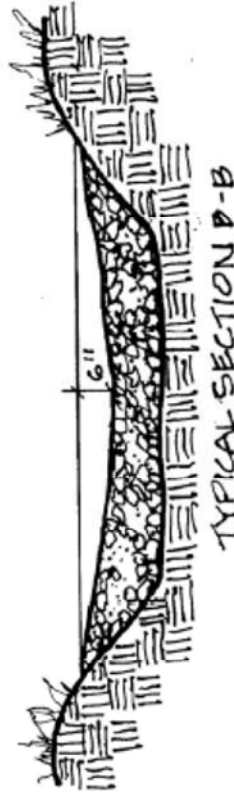
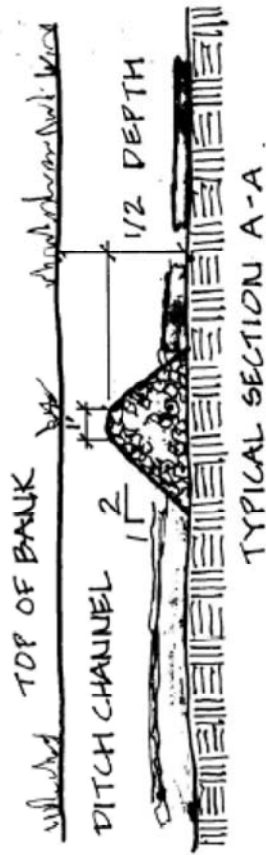
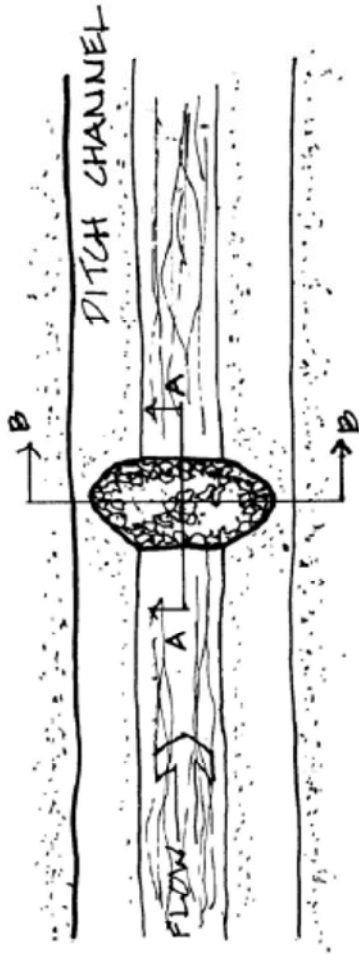
VELOCITY CONTROL  
 (BBR Manual – pg. 16)



LEVEL SPREADER  
 (BBR Manual – pg. 50)



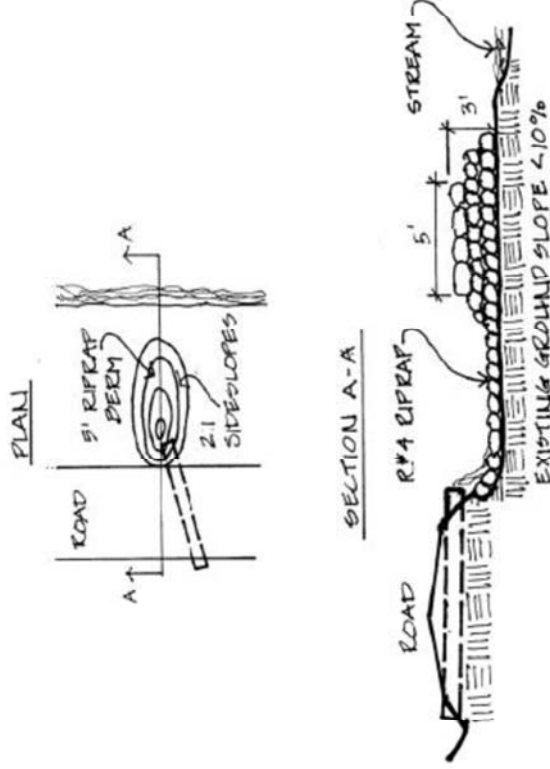
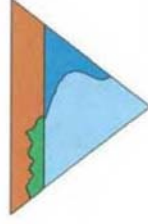
WATERBAR CROSS-SECTION  
 (BBR Manual – pg. 51)



STONE CHECK DAMS  
 (BBR Manual – pg. 17)

**Splash/Plunge Pools:**  
Riprap basin located at outlet of a culvert pipe.

- Used to remove sediments (by absorbing energy from flowing water and allowing sediments to settle out) from areas with concentrated flows and areas without adequate vegetative filter strips.
- Limited to areas with less than 10% slope.
- Consolidates sediment for easier removal.
- Reduces energy and velocity of flows by providing storage of runoff.
- Can allow for ground water recharge.
- Clean when pool area is one third filled with sediment.
- Locate the pool so that mechanized cleaning is possible.
- See pool capacity requirements chart on next page for sizing.

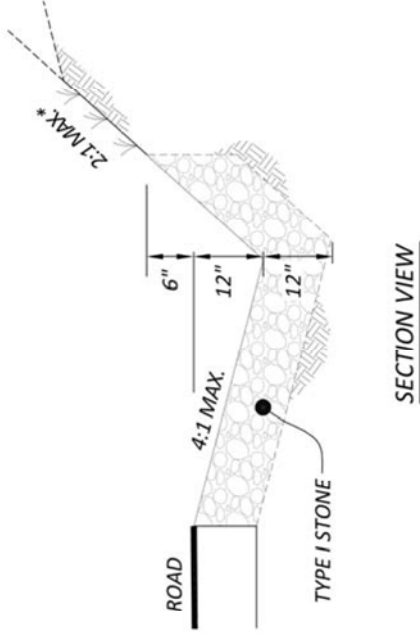


SPLASH/PLUNGE POOL

Distance Between Culverts (ft.)	Pool Capacity (cu. ft.)	
	Crowned road	Banked road
500	230	460
400	180	360
350	160	320
300	140	280
250	120	240
200	100	200

\* IF EXISTING SIDE SLOPES ARE STEEPER THAN 2:1, BUT STABLE, DO NOT REGRADE SLOPE. IF THERE IS INSUFFICIENT WIDTH FOR 2:1 SIDE SLOPES, USE A STEEPER SLOPE ON THE BACKSIDE OF THE SWALE, AWAY FROM THE ROAD, AND STABILIZE WITH NORTH AMERICAN GREEN S150 EROSION BLANKET (SEE DETAIL B).

IF STEE SLOPE IS SATURATED WITH GROUNDWATER, FACE WITH 2-4" DIA. CRUSHED STONE AT LEAST 6" DEEP.



SECTION VIEW

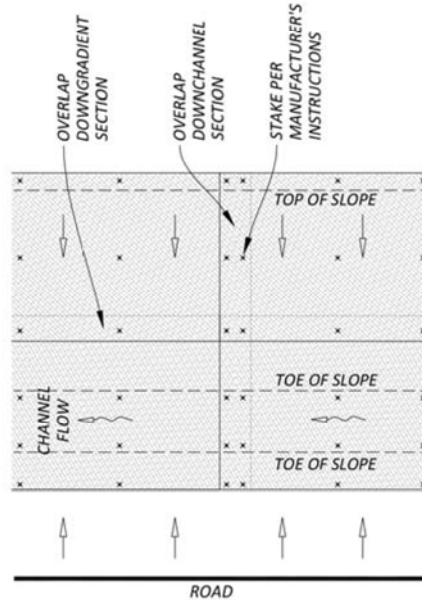
TYPE I STONE FILL (VAOT SEC. 706.04(A)) THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 4 INCHES.

## DETAIL A NARROW ROADSIDE SWALE STABILIZATION

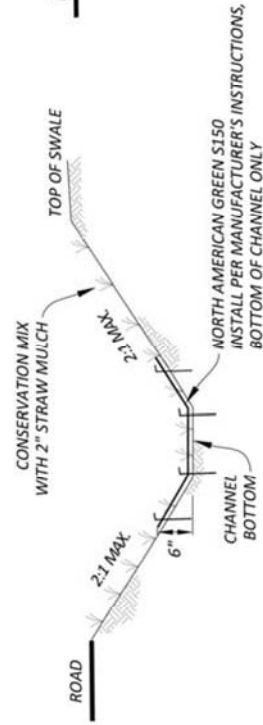
NTS

NOTE:  
USE DETAIL A WHEN STABILIZED ROADSIDE SWALE IS "SQUEEZED" BETWEEN ROAD AND STEEP SIDE SLOPE. INTENT IS THAT VEHICLES CAN RUN ONTO ADJACENT 4:1 SLOPE IN EMERGENCY.

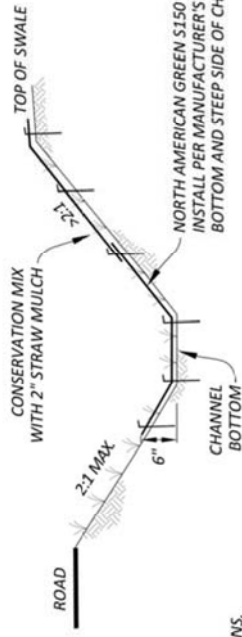
Details Produced By:



PLAN VIEW



SECTION VIEW WITHOUT STEEP BACK SLOPE



SECTION VIEW WITH STEEP BACK SLOPE

## DETAIL B VEGETATIVE CHANNEL STABILIZATION WITH AND WITHOUT EROSION BLANKET

NTS

NOTE:  
USE DETAIL B TO STABILIZE TYPICAL ROADSIDE SWALE. USE EROSION BLANKET ON STEEPER BACKSIDE SLOPES.

Details Produced By:





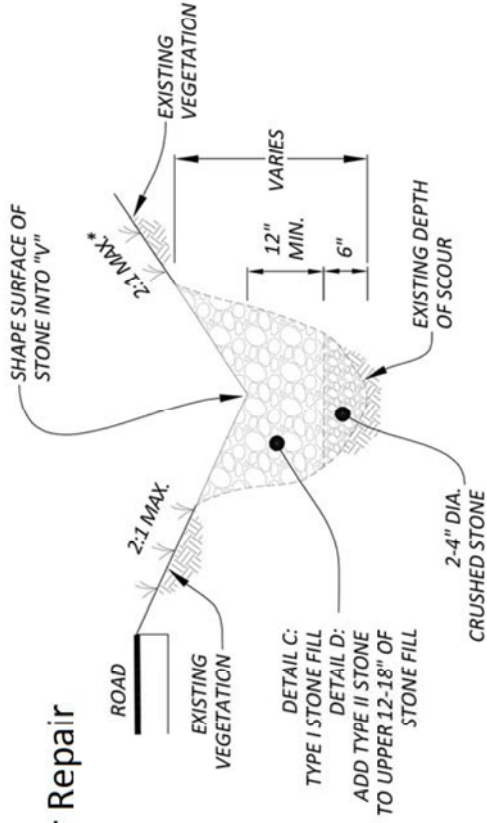
# VTrans Detail Name: Ditch Scour Repair

**TYPE I STONE FILL**  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 4 INCHES.

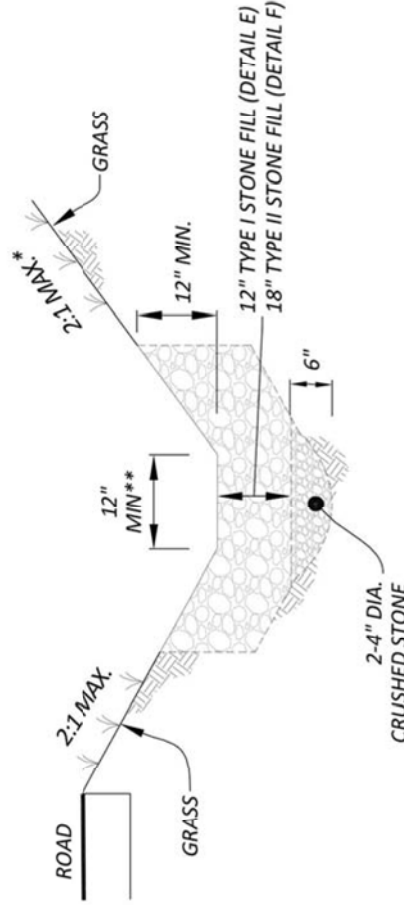
**TYPE II STONE FILL**  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 2 INCHES TO 36 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 12 INCHES.

**TYPE I STONE FILL**  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 4 INCHES.

**TYPE II STONE FILL**  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 2 INCHES TO 36 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 12 INCHES.



## DETAIL C/D SWALE SCOUR REPAIR



## DETAIL E/F STONE SWALE

NTS

NOTE:  
USE DETAIL E/F WHERE HIGHER FLOW VELOCITIES WILL ERODE GRASS SURFACE.

\* IF EXISTING SIDE SLOPES ARE STEEPER THAN 2:1, BUT STABLE, DO NOT REGRADE SLOPE. IF THERE IS INSUFFICIENT WIDTH FOR 2:1 SIDE SLOPES, USE A STEEPER SLOPE ON THE BACKSIDE OF THE SWALE, AWAY FROM THE ROAD, AND STABILIZE WITH NORTH AMERICAN GREEN S150 EROSION BLANKET (SEE DETAIL B).

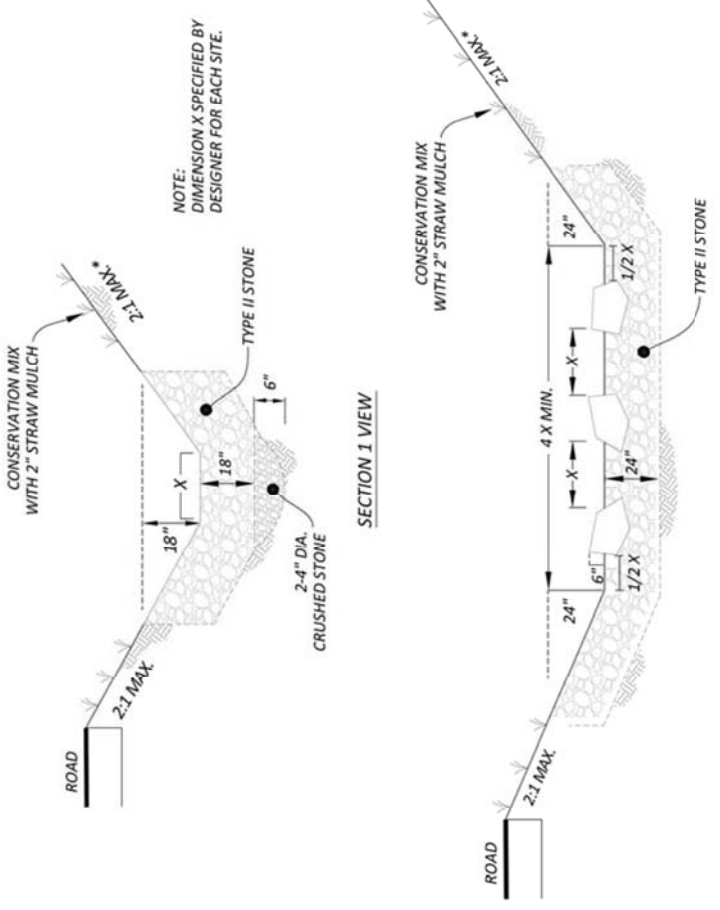
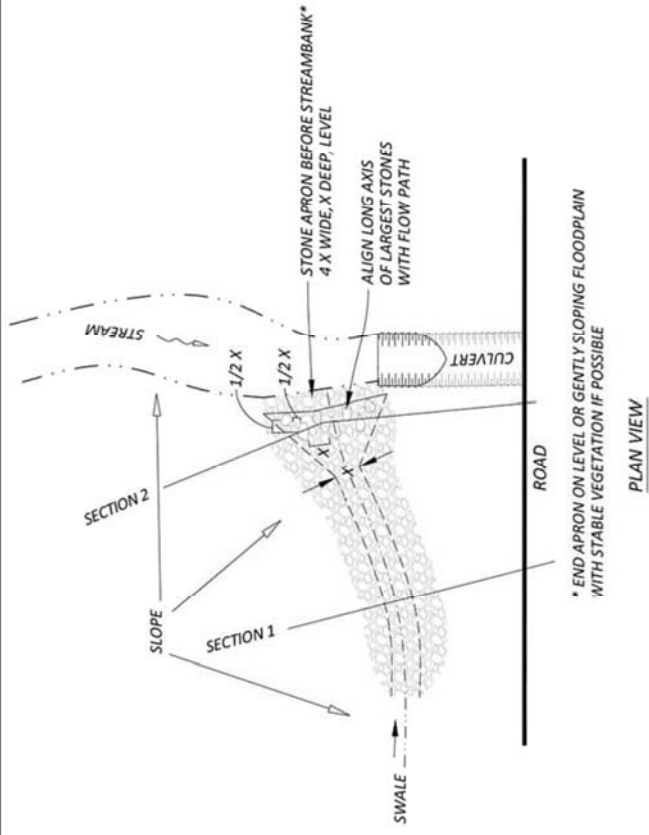
**NOTES:**

1. USE DETAIL C/D TO REPAIR EXISTING GRASS SWALES WITH ACTIVE CUTTING.
2. USE DETAIL C WITH ONLY TYPE I STONE FOR SWALES WITH SLOWER FLOW VELOCITIES.
3. USE DETAIL D WITH TYPE II STONE FOR SWALES WITH HIGHER FLOW VELOCITIES.

\* IF >2:1, INSTALL NORTH AMERICAN GREEN S150 PER MANUFACTURER'S INSTRUCTIONS, BOTTOM AND STEEP SIDE OF CHANNEL (SEE DETAIL B)

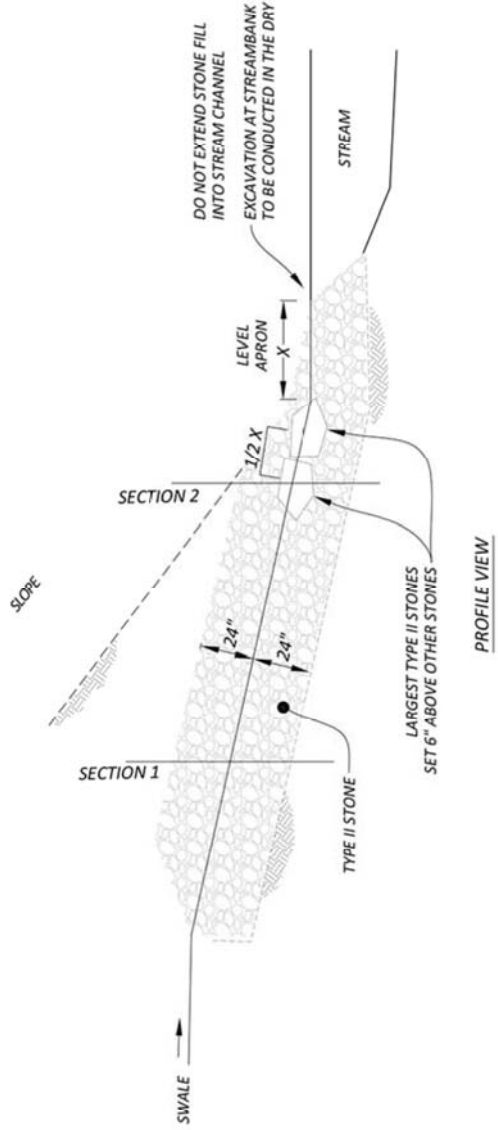
\*\* SHAPE STONE SURFACE AS "V" IF SPACE FOR SWALE IS TOO NARROW FOR FLAT SURFACE





\* IF EXISTING SIDE SLOPES ARE STEEPER THAN 2:1, BUT STABLE, DO NOT REGRADE SLOPE. IF THERE IS INSUFFICIENT WIDTH FOR 2:1 SIDE SLOPES, USE A STEEPER SLOPE ON THE BACKSIDE OF THE SWALE, AWAY FROM THE ROAD, AND STABILIZE WITH NORTH AMERICAN GREEN S150 EROSION BLANKET (SEE DETAIL B).

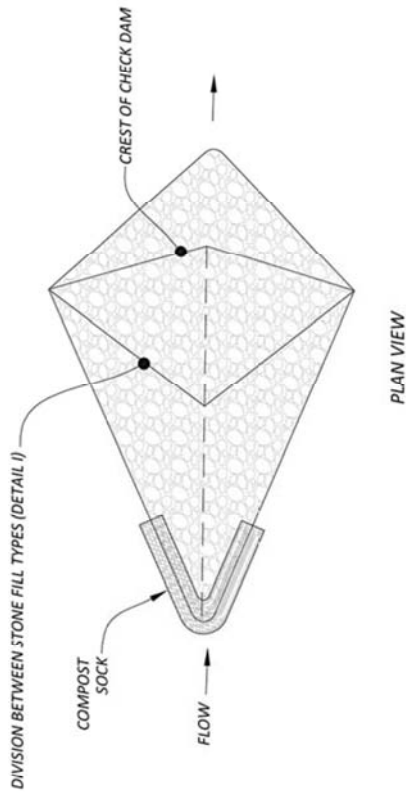
SECTION 2 VIEW



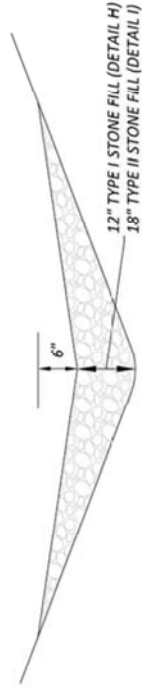
NOTE:  
USE DETAIL G ALONG STEEPER SWALES, TYPICALLY DISCHARGING TO STREAMS OR FLOODPLAINS. IF STREAMBANK IS UNSTABLE AND ERODING, CONDUCT MORE DETAILED ENGINEERING STUDY BEFORE USING DETAIL G.

DETAIL G  
STONE CHUTE AND SPREADER  
NTS

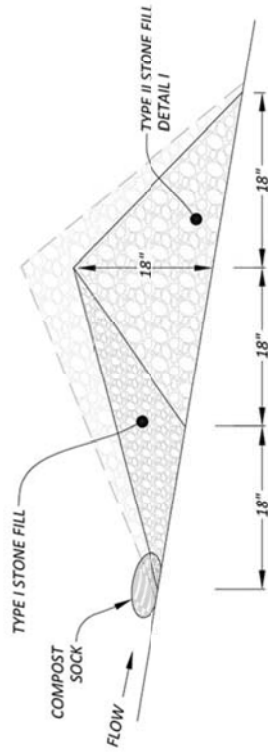
TYPE II STONE FILL  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 2 INCHES TO 36 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 12 INCHES.



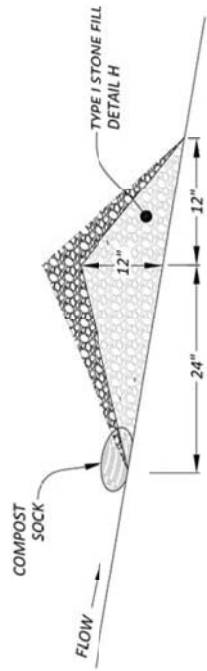
PLAN VIEW



SECTION VIEW



PROFILE VIEW - DETAIL I



PROFILE VIEW - DETAIL H

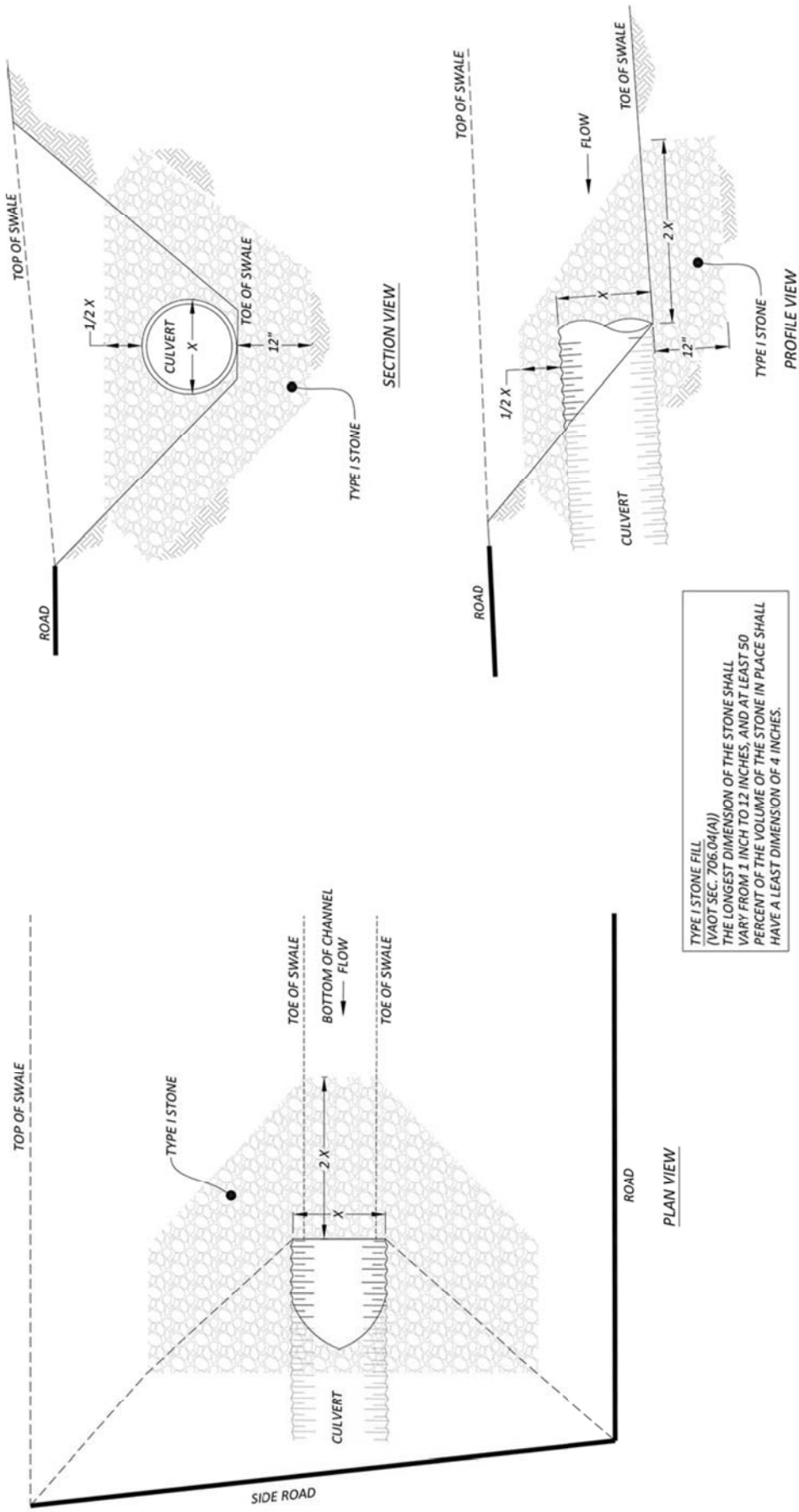
NOTE:  
SET SPACING OF CHECK DAMS TO ASSUME THAT  
ELEVATIONS OF THE CREST OF THE DOWNSTREAM  
DAM IS AT THE SAME ELEVATION OF THE TOE OF THE  
UPSTREAM DAM"

## DETAIL H/I STONE CHECK DAM

NTS

TYPE I STONE FILL  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL  
VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50  
PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL  
HAVE A LEAST DIMENSION OF 4 INCHES.

TYPE II STONE FILL  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY  
FROM 2 INCHES TO 36 INCHES, AND AT LEAST 50 PERCENT  
OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A  
LEAST DIMENSION OF 12 INCHES.

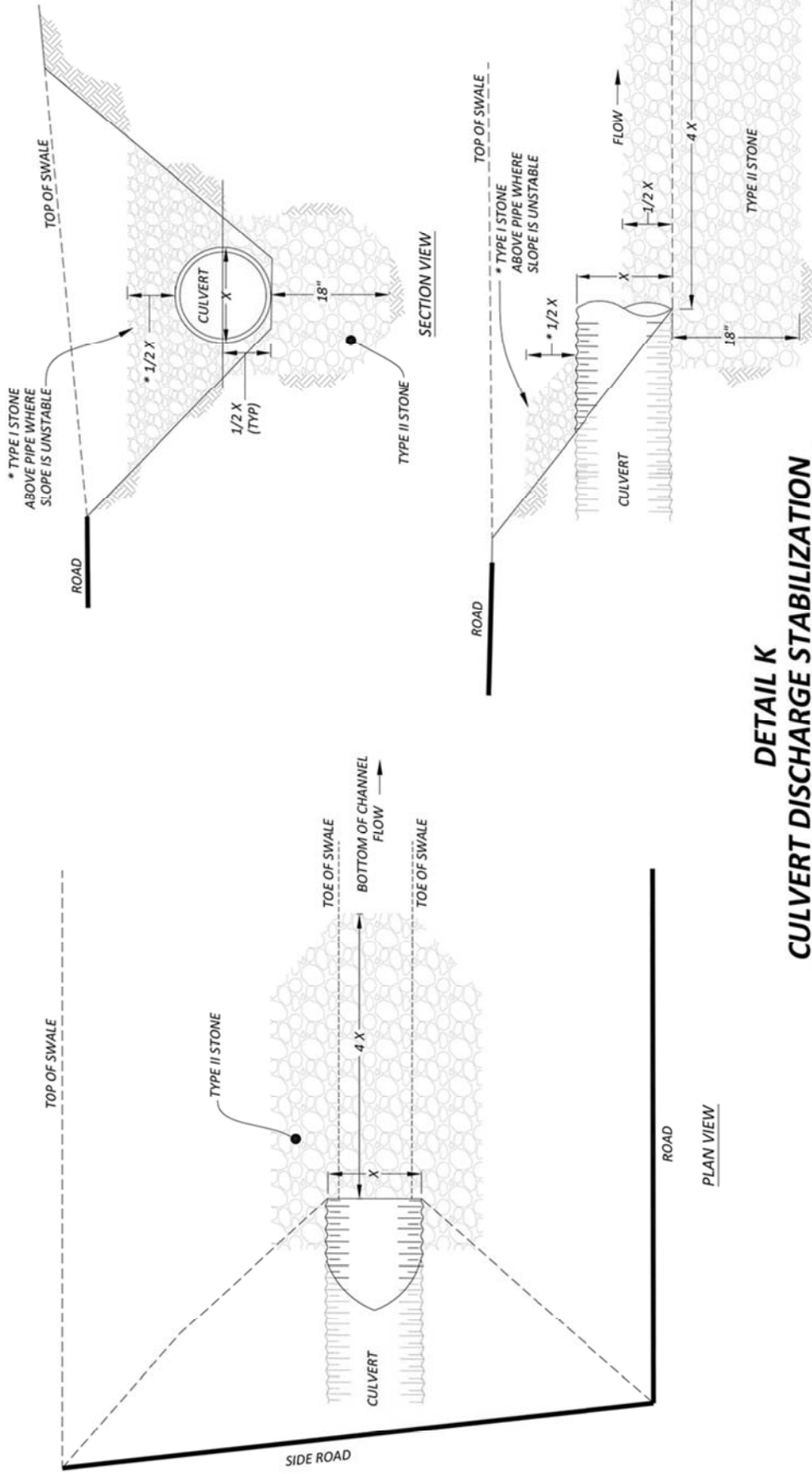


TYPE I STONE FILL  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL  
VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50  
PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL  
HAVE A LEAST DIMENSION OF 4 INCHES.

**DETAIL J**  
**CULVERT ENTRANCE STABILIZATION**

NTS

NOTE:  
USE DETAIL J IN LIEU OF CULVERT HEADWALL WHERE  
ENTERING FLOW IS SCOURING BOTTOM AND SIDES OF SWALE.



## DETAIL K CULVERT DISCHARGE STABILIZATION

NTS

NOTE:  
USE DETAIL K WHERE EXITING FLOW IS SCOURING BOTTOM  
OF DISCHARGE CHANNEL

**TYPE I STONE FILL**  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 1 INCH TO 12 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 4 INCHES.

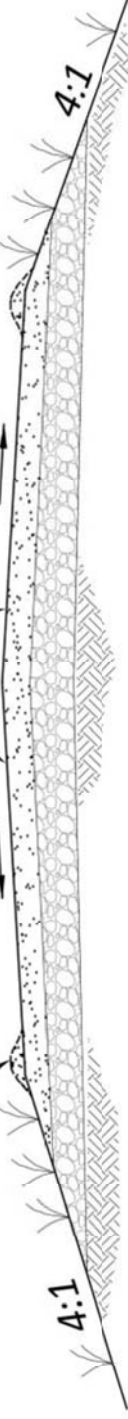
**TYPE II STONE FILL**  
(VAOT SEC. 706.04(A))  
THE LONGEST DIMENSION OF THE STONE SHALL VARY FROM 2 INCHES TO 36 INCHES, AND AT LEAST 50 PERCENT OF THE VOLUME OF THE STONE IN PLACE SHALL HAVE A LEAST DIMENSION OF 12 INCHES.

PROFILE VIEW



WINTER SAND BUILD-UP AND  
SAND FROM GRADER TO BE  
ELIMINATED BY SMOOTHING  
EDGE OF ROAD WITH GRADER BLADE

CROWN 1/2" TO 3/4"  
PER FOOT OF ROAD WIDTH



# DETAIL L TYPICAL ROAD CROWN SECTION

NTS

Details Produced By:



**Elmore Road Erosion Inventory 5-Year Workplan and Budget Estimate**

Road Name	Average Road Grade	Segment ID #	Crown Issue	Shoulder Issue	Swale Issue	Culvert Issue	Conveyance Area Issue	Meets MRGP?	Estimated Project Description	Estimated Project Cost	Estimated Timeline
ELMORE MOUNTAIN RD	5	95466	yes	yes		yes		no	Replace 4 existing culverts of > 3ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$75,000	Year 1, 2019
	6	95467	yes	yes				no			
	4	95468	yes	yes		yes		no			
OLD ICE HOUSE RD	3	144077	yes	yes			yes	no	Replace existing stream culvert with new box culvert. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$200,000	Year 2, 2020
	2	144076	yes	yes	yes			no			
ELMORE POND RD	3	20217.1	n/a	n/a	yes			no	Replace multiple existing culverts of < 3ft diameter with new larger culverts. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$70,000	Year 3, 2021
	2	20223.1	n/a	n/a	yes			no			
	3	20222.1	n/a	n/a	yes			no			
	4	20221.1	n/a	n/a	yes			no			
	4	20220.1	n/a	n/a	yes			no			
	2	20218.1	n/a	n/a	yes			no			
SYMONDS MILL RD	6	176025	yes	yes				no	Install stone ditches and small culverts on steep road. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$70,000	Year 4, 2022
	8	176024	yes	yes				no			
	4	176023	yes	yes				no			
	5	176022	yes	yes			yes	no			
	1	176021	yes	yes				no			
	5	176017	yes	yes				no			
	4	176016	yes	yes				no			
	6	176015	yes	yes				no			
	4	176014	yes	yes				no			
	5	176013	yes	yes				no			
	4	176012	yes	yes				no			
	7	176011	yes	yes				no			
	8	176010	yes	yes				no			
	10	176009	yes	yes				no			
	2	176004	yes	yes				no			
	10	176003	yes	yes				no			
	8	176002	yes	yes				no			
	8	176001	yes	yes				no			
10	176000	yes	yes				no				
7	175999	yes	yes		yes		no				
EAST ELMORE RD	2	92573	yes	yes	yes			no	Install stream bank stabilization practices at river-road conflict area. Improve nearby segments with problems related to crown, shoulders, swales & conveyances, and non-stream culverts	\$85,000	Year 5, 2023
	1	92574	yes	yes	yes	yes		no			
	1	92575	yes	yes				no			

34 Total Segments

Estimated Total Cost \$500,000

**Appendix B**