

Town of Canaan
Canaan Flood Mitigation Rail Trail Trestle
Canaan, New Hampshire
Rail Trestle Assessment Report
Photo Page 1 of 8



Photo 1: Looking at upstream side of Upper Trestle (U.T).

Town of Canaan
Canaan Flood Mitigation Rail Trail Trestle
Canaan, New Hampshire
Rail Trestle Assessment Report
Photo Page 2 of 8



Photo 3: View of rotten pile beneath U.T.

Town of Canaan
Canaan Flood Mitigation Rail Trail Trestle
Canaan, New Hampshire
Rail Trestle Assessment Report
Photo Page 3 of 8



Photo 5: Looking at charred deck beams of U.T.



Photo 6: Looking at deck planking on U.T.



Photo 8: View of debris around piles of U.T.

HEB Project #2017-086
Photos taken by JCR 06/12/18

Town of Canaan
Canaan Flood Mitigation Rail Trail Trestle
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Rail Trestle Assessment Report
Photo Page 4 of 8



Photo 7: View of downstream side of U.T.

Figure 5 shows a portion of the site plan for this infrastructure improvement.

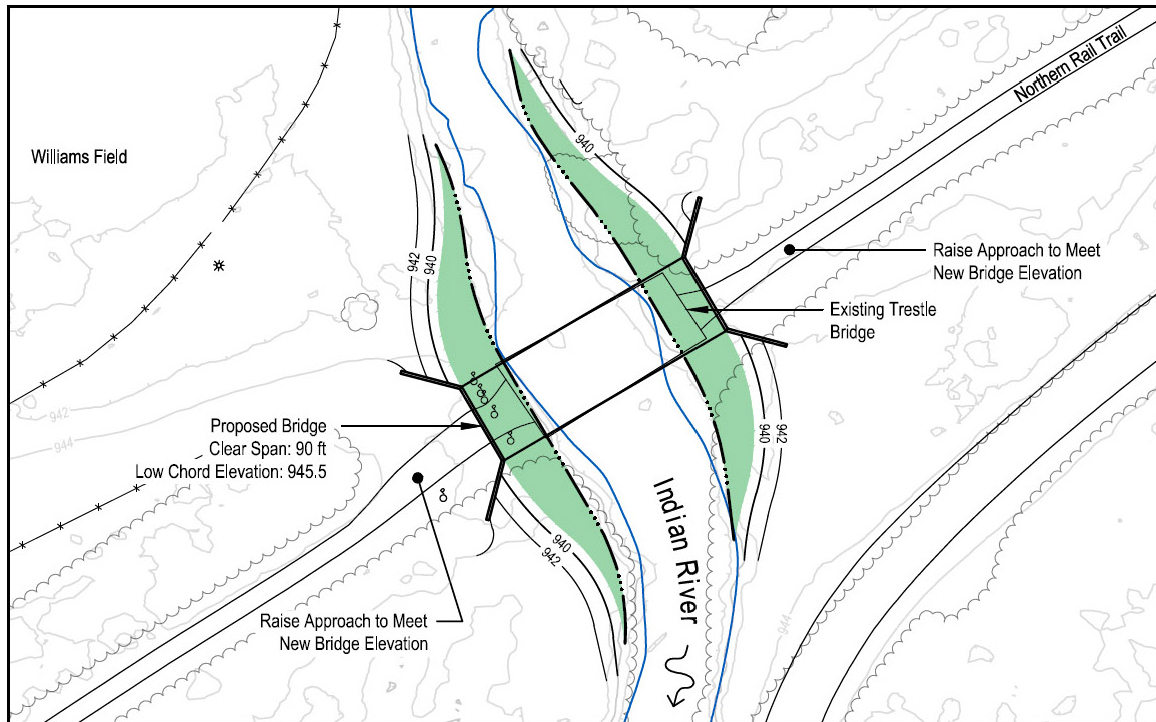


Figure 5 – Conceptual site plan for 90-foot clear span bridge at the upstream Rail Trail crossing

To maximize the waterway opening area the superstructure was assumed to be supported on vertical abutments. Figure 6 shows a cross-section view of the proposed stream crossing inlet from the perspective of looking downstream.

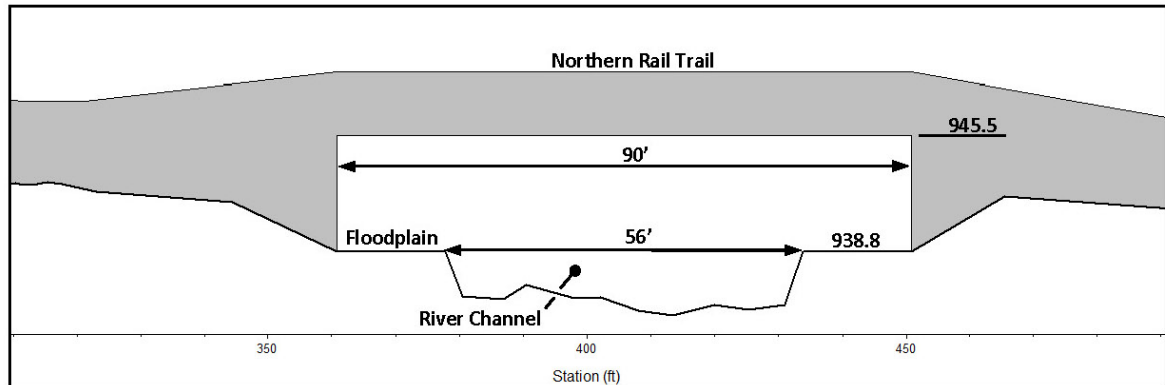


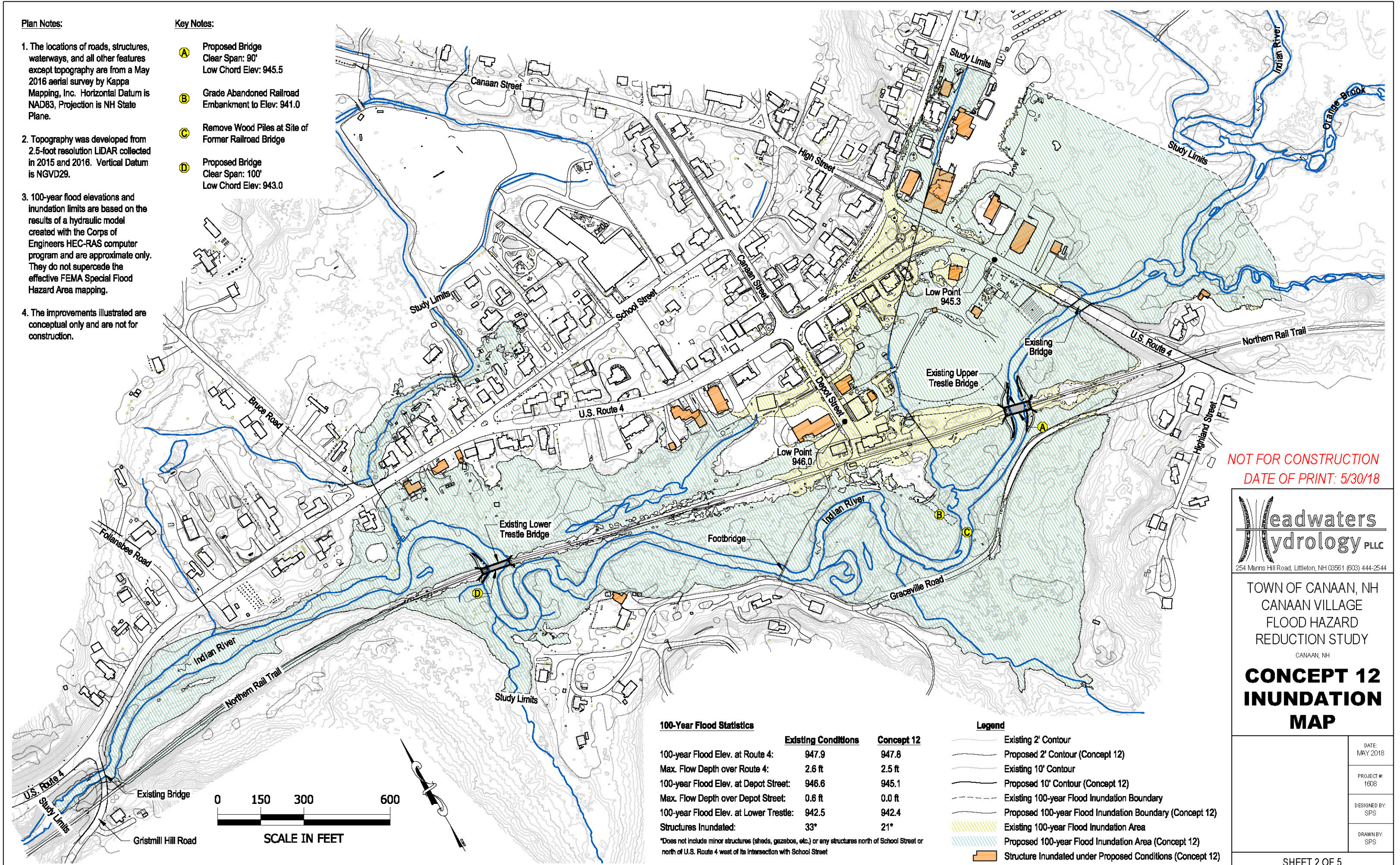
Figure 6 – Cross-section at inlet of proposed 90-foot clear span bridge at the upstream Rail Trail Crossing

Plan Notes:

- The locations of roads, structures, waterways, and all other features except topography are from a May 2016 aerial survey by Kappa Mapping, Inc. Horizontal Datum is NAD83, Projection is NH State Plane.
- Topography was developed from 2.5-foot resolution LIDAR collected in 2015 and 2016. Vertical Datum is NGVD29.
- 100-year flood elevations and inundation limits are based on the results of a hydraulic model created with the Corps of Engineers HEC-RAS computer program and are approximate only. They do not supercede the effective FEMA Special Flood Hazard Area mapping.
- The improvements illustrated are conceptual only and are not for construction.

Key Notes:

- A** Proposed Bridge
Clear Span: 90'
Low Chord Elev: 945.5
- B** Grade Abandoned Railroad
Embankment to Elev: 941.0
- C** Remove Wood Piles at Site of
Former Railroad Bridge
- D** Proposed Bridge
Clear Span: 100'
Low Chord Elev: 943.0



NOT FOR CONSTRUCTION
DATE OF PRINT: 5/30/18

Headwaters Hydrology PLLC
254 Manns Hill Road, Littleton, NH 03561 (603) 444-2544

TOWN OF CANAAN, NH
CANAAN VILLAGE
FLOOD HAZARD
REDUCTION STUDY
CANAAN, NH

**CONCEPT 12
INUNDATION
MAP**

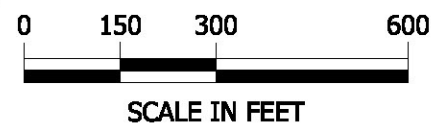
100-Year Flood Statistics

	Existing Conditions	Concept 12
100-year Flood Elev. at Route 4:	947.9	947.8
Max. Flow Depth over Route 4:	2.6 ft	2.5 ft
100-year Flood Elev. at Depot Street:	946.6	945.1
Max. Flow Depth over Depot Street:	0.8 ft	0.0 ft
100-year Flood Elev. at Lower Trestle:	942.5	942.4
Structures Inundated:	33*	21*

*Does not include minor structures (sheds, gazebos, etc.) or any structures north of School Street or north of U.S. Route 4 west of its intersection with School Street

Legend

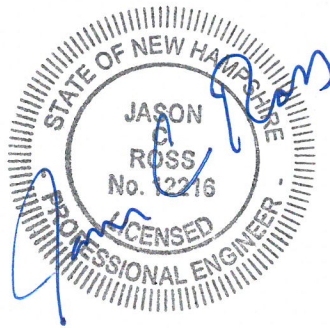
- Existing 2' Contour
- Proposed 2' Contour (Concept 12)
- Existing 10' Contour
- Proposed 10' Contour (Concept 12)
- Existing 100-year Flood Inundation Boundary
- Proposed 100-year Flood Inundation Boundary (Concept 12)
- Existing 100-year Flood Inundation Area
- Proposed 100-year Flood Inundation Area (Concept 12)
- Structure Inundated under Proposed Conditions (Concept 12)



BRIDGE ASSESSMENT REPORT
CANAAN FLOOD HAZARD MITIGATION PROJECT
RAIL TRAIL TRESTLE ASSESSMENT
CANAAN, NEW HAMPSHIRE

Prepared for:
Town of Canaan

July 25, 2018



Prepared by:
HEB Engineers, Inc.

Project #2017-086

July 25, 2018

Michael Samson, Town Administrator
Town of Canaan
PO Box 38
Canaan, NH 03741

**Re: Canaan Flood Hazard Mitigation Project –Rail Trail Trestle Assessment
HEB Project #2017-086**

Dear Mike,

This Bridge Assessment Letter Report has been prepared by HEB Engineers, Inc. (HEB) to address the concerns about the structural integrity of the two existing trestle bridges on the Northern Rail Trail in the vicinity of Canaan Village. On June 12, 2018, I visited the site with Jonathan MacDougall, PE, to observe and assess the condition of the existing bridge structures. Presented in this Letter Report are my field observations and recommendations. This work was performed in accordance with our Contract Amendment #1 dated March 13, 2018 and signed on March 20, 2018.

Field Observations:

There are two timber trestle bridges on the Northern Rail Trail that cross over the Indian River in the vicinity of Canaan Village. The trail and bridges were once part of the Boston and Maine Railroad system and the ages of the structures are unknown. The eastern bridge, also known as Upper Trestle Bridge, is approximately 70 feet long and 32 feet wide (see Photo 1 in Appendix A). The bridge has stone abutments at the ends and timber bents spaced approximately 11 feet, 6 inches on-center along the length of the bridge. The western bridge, also known as Lower Trestle Bridge, is approximately 88 feet long and 18 feet wide, with a 12-foot, 10-inch curb-to-curb spacing and a 5-foot wide pedestrian walkway on the northern side of the structure (see Photo 2). The bridge has stone abutments at the ends and timber bents spaced approximately 12 feet, 6 inches on-center along the length of the bridge.

The bridge elements were assessed as follows:

Upper Trestle Bridge:

- The 12- to 14-inch diameter, 6- to 8-foot tall, creosote treated, timber piles are spaced 2- to 3 feet on center. The piles were probed and sounded with a hammer. Many of the piles were found to be rotten and hollow, where the creosote treatment had not penetrated, especially at the base of the piles where they are constantly exposed to water. Some of the upstream piles were observed to be broken (see Photo 3). The upper portion of several piles was observed to have minor surface char from a fire.
- The 12-inch x 14-inch, creosote treated, timber bent caps were observed to be in satisfactory condition with some minor surface deterioration and shrinkage cracks and checks. Several of the timbers were observed to have minor surface char from a fire (see Photo 4).
- The 6-foot tall stone abutments appeared to be in satisfactory condition but do not span the entire width of the bridge. It appears that the bridge was widened and additional timbers were used to support the new structure. There was no significant scour observed at the toe of the stones.
- The 8-inch x 16-inch, creosote treated, timber floor beams are spaced 8-inches on-center and span approximately 11 feet between bents (see Photo 5). The beams were observed to be in satisfactory condition with some minor surface deterioration, shrinkage cracks, and checks. Many of the downstream beams were observed to have minor surface char from a fire.
- The 3-inch thick bridge deck consists of creosote treated, timber planks with no additional wearing surface. The deck is in poor condition with some advanced section loss, wear, and broken planks (see Photo 6).

- The 8-inch x 8-inch timber curb is in fair condition with minor section loss and cracking. The bridge railing is missing from the structure. There are charred remains of railing posts attached to the side of the downstream deck beam and curb along with a utility conduit, believed to be fiber optic cable (see Photo 7).
- The waterway opening does not appear to be adequate for the Indian River at this location. A significant amount of debris was observed to be caught on the upstream side of the timber bents which can restrict the flow and cause scour (see Photo 8). The channel appears to have migrated to the western side of the opening and could eventually compromise the western abutment.

Lower Trestle Bridge:

- The 12- to 14-inch diameter, 6- to 8-foot tall, creosote treated, timber piles are spaced approximately 3 feet on center. The piles were probed and sounded with a hammer. A few of the piles were found to have some rot and cracks. One of the upstream piles was observed to be broken and hollow (see Photo 9).
- The 12-inch x 14-inch, creosote treated, timber bent caps were observed to be in satisfactory condition with some minor surface deterioration and shrinkage cracks and checks (see Photo 10).
- The 6-foot tall stone abutments appeared to be in satisfactory condition. There was no significant scour observed at the toe of the stones (see Photo 11).
- The 8-inch x 16-inch, creosote treated, timber floor beams are spaced 8 inches on-center and span approximately 12 feet between bents. The beams were observed to be in satisfactory condition with some minor surface deterioration and shrinkage cracks and checks (see Photo 12).
- The timber deck consists of creosote treated, 3-inch thick planks with a gravel wearing surface. The bottom of the deck appears to be in satisfactory condition, however the top of the deck could not be observed due to the gravel.
- The 8-inch x 8-inch timber curb and 42-inch tall railing were observed to be in fair condition with minor section loss and cracking, however they are not securely fastened to the bridge structure below and have large openings (see Photo 13).
- The deck and railings of the pedestrian walkway on the downstream (northern) side of the bridge are in critical condition and are failing in several locations (see Photo 14).
- The waterway opening does not appear to be adequate for the Indian River at this location. There was a significant amount of debris caught on the upstream side of the timber bents which can restrict the flow and cause scour (see Photo 15).

Conclusions & Recommendations:

The superstructure of the Upper Trestle Bridge is in fair condition. All primary structural elements are sound but there is some minor section loss and cracking. The substructure is in poor to serious condition. There has been a significant amount of deterioration and section loss in many of the timber piles that support the bridge. Local failures could be possible during high water events or if the bridge is heavily loaded. Vehicular traffic on the bridge should be prohibited, and the bridge should be closely monitored for additional deterioration and movement until corrective action can be taken.

There is no practical way to repair or replace the rotten timber piles without removing the entire bridge superstructure. Additionally, the close spacing of the timber bents collect debris and restrict flow in the stream. Because of these things, we recommend replacing the entire bridge structure.

The superstructure of the Lower Trestle Bridge is also in fair condition. All primary structural elements are sound but there is some minor section loss and cracking. The deck and railings of the sidewalk are in critical condition and should be closed or removed until corrective action can be taken. The substructure is in fair to poor condition. There has been some deterioration and section loss in several of the timber piles that support the bridge.

We recommend the following:

- Perform additional testing on all of the piles to determine the extent of the deterioration. Repair these damaged piles as necessary.
- Monitor the piles for additional deterioration and scour.
- Routinely remove debris that is caught on the timber bents.
- Remove the gravel wearing surface from the bridge deck so that the condition of the deck can be properly assessed. Consider installing a new timber wearing surface instead of the gravel.
- Remove the pedestrian walkway from the northern side of the bridge.
- Install/replace the bridge railings with a secure system.

Disclaimer:

The opinions and recommendations contained in this report are based on a "walk-through" field assessment performed as part of this work. Only limited calculations were performed to determine if certain structural members are in compliance with adopted codes and only limited physical testing was performed. This report does not address any other part of the structure other than those mentioned, nor does it provide any warranty, either express or implied.

Please do not hesitate to contact us if you have any questions or need any additional information.

Sincerely,
HEB Engineers, Inc.



Jason C. Ross, PE
Senior Structural Engineer

Attachment A – Photo Pages

Copy: File
 Town of Canaan

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HEB Engineers, Inc. • www.hebengineers.com

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Maine: Office (207) 803-8265 • PO Box 343 • 103 Main Street • Suite 6 • Bridgton, ME 04009

Date:	January 3, 2018	Time:	10:00AM – 11:45AM	Project #:	2017-086
Project Description:	Canaan Flood Mitigation				
Meeting Location:	7 Hazen Drive, Concord, NH				
Prepared by:	Christopher R. Fournier, PE				<i>Page 1 of 3</i>

Attended By:

- Councilor Joe Kenney - District 1
- Mike Samson, Town Administrator - Town of Canaan
- Shelley Winters, Administrator - Bureau of Rail and Transit, NHDOT
- Larry Keniston, Intermodal Facilities Engineer - Bureau of Rail and Transit, NHDOT
- Bob Landry, Administrator - Bureau of Bridge Design, NHDOT
- Nick Goulas, Chief of the Existing Bridge Section - Bureau of Bridge Design, NHDOT
- Nancy Mayville, Civil Engineer - Bureau of Planning and Community Assistance, NHDOT
- Chris Turgeon, Assistant District Engineer - District 2, NHDOT
- Chris Gamache, Chief, Bureau of Trails - Division of Parks and Recreation, NHDNCR
- Jennifer Gilbert, Senior Planner - Municipal and Regional Assistance, NHOSI
- Gino Infascelli, Public Works Supervisor - Wetlands Bureau, NHDES
- Paul Hatch, Field Representative (for Canaan) - NH-HSEM
- Heather Dunkerley, Senior Field Representative (for NHDOT) - NH-HSEM
- Ken Warren - Friends of the Northern Rail Trail in Grafton County (FNRT-Grafton)
- Stephen and Patrice Rasche - Friends of the Northern Rail Trail in Merrimack County (FNRT-Merrimack)
- Nadine Miller - Preservation Project Reviewer, NHDHR
- Craig Rennie – Inland Wetland Supervisor - Land Resources Management, NHDES
- Sean Sweeney - Headwaters Hydrology
- Christopher R. Fournier - HEB Engineers
- Ryan McMullen - HEB Engineers

Items discussed:

- Chris Fournier (HEB) opened the meeting and introduced Mike Samson (Canaan) to give a summary of the historic flooding issues in Canaan.
- Mike Samson presented photos of the Canaan flooding from Hurricane Irene, the storm on October 30th, 2017 and other photos from historic flooding. Mike reviewed the properties affected as well as practical observations and efforts during recent storm events.
- Sean Sweeney (Headwaters) presented the hydraulic study. The methods used to create hydraulic models were presented as well as possible mitigation options. Patrice Rasche (FNRT-Merrimack) asked if the mitigation options were mutually exclusive or if they could be combined. Sean responded that various mitigation options were combined into ten concepts. A few of these concepts were presented as well as estimated costs for the concepts.
- Chris Fournier (HEB) moderated questions and the following discussion:
- Nick Goulas (NHDOT) asked where the backup water came from with the opening from Route 4 still having freeboard during flood events. Sean Sweeney answered that tail water from the rail trail strongly impacted Route 4 and the storage volume in the valley was insignificant after a certain point. Bob asked if there was a backup coming from upstream. Mike Samson (Canaan) responded that there was additional water coming through the town from the North adding to the backup.

- Nancy Mayville (NHDOT) asked what would happen if Route 4 were raised. Sean Sweeney answered that the flood level is higher than the Route 4 highway profile. If Route 4 is raised, it would be like raising a dam and there is a certain amount of give and take with that.
- Chris Turgeon (NHDOT) asked about the possibility of making the spillway along the entire corridor of the rail trail. Sean Sweeney answered that the upstream spillway was as wide as it could be without affecting existing structures and that the downstream spillway presented was as wide as it can be, constricted by the valley wall. Chris asked about extending the spillway to Depot Street. Sean Sweeney responded that the greatest area of concern is the upstream area of the rail trail corridor.
- Nadine Miller (NHDHR) asked what would happen after a flooding event to the rail trail in regards to cleanup and if it was the State's responsibility to respond or someone else's.
- Mike Samson (Canaan) stated that Canaan is committed to move forward with the project and has managed the cleanup of the area after storm events in the past and can do so moving forward.
- Mike Samson (Canaan) asked about the rail corridor in Grafton that was modified seemingly out of compliance with rail requirements, and if there was a provision that allows for this. Larry Keniston (NHDOT) stated that the situation in Grafton was a unique situation and similar modifications are unsatisfactory moving forward.
- Mike Samson (Canaan) asked if there are any other possible mitigation options so that the flooded buildings do not have to be permanently abandoned. Paul Hatch (NH-HSEM) suggested that the culvert options, rather than spillways, seemed to mitigate flooding without changing the rail corridor profile.
- Mike Samson (Canaan) stated that there is a certain amount of cost that Canaan cannot absorb in regards to the project, but the economic activity in the village is important. Sean Sweeney (Headwaters) added that the box culverts do not provide as much hydraulic capacity for the dollar spent that the spillways do. Mike inquired about the cost of a clear span bridge compared to a series of box culverts. Sean was unsure of this due to the lack of knowledge of site conditions such as geotechnical information.
- Patrice Rasche (FNRT-Merrimack) stated that the FNRT prefer the culvert option to the spillway option.
- Mike Samson (Canaan) stated the importance of the economic vitality of the rail trail. Chris Fournier (HEB) introduced that the project could be eligible for FEMA Flood Mitigation Assistance (FMA), Pre-Disaster Mitigation (PDM) or the Hazard Mitigation Grant Program (HMGP).
- Shelley Winters (NHDOT) stated that mitigation alternatives need to accommodate future rail restoration. If the integrity of the corridor is not maintained, the federal funds previously used to construct the rail trail would have to be refunded. Also, the effects of the mitigation work on the next town downriver, as well as the corridor downriver, would have to be examined. Mike Samson (Canaan) asked if culverts under the corridor would need to be designed for trains and stated the Canaan owns 8 miles downriver. Larry Keniston (NHDOT) replied that the relevant parties need to be aware of who would pay for an upgrade to railroad loadings if the culverts were not designed for that during the project.
- Shelley Winters (NHDOT) stated that there has been erosion downriver that has been routinely fixed and raised concerns that this could worsen if water is getting downriver quicker as a result of this project. Sean Sweeney (Headwaters) stated that this was out of the scope of the original study but believed that, due to the distance down river, this would not have a significant effect. Sean said that this could be looked at in a new analysis.
- Bob Landry (NHDOT) asked which buildings would still be inundated after the proposed mitigation. Mike Samson pointed this out on a map from the presentation. Sean Sweeney (Headwaters) brought up the relative degree of inundation and that buildings could be flood proofed with the improvements. Mike stated economic importance of Depot Street and Route 4, as well as the flooded buildings.
- Chris Gamache (NHDNCR) stated that the concepts that would most likely be met with support would be concepts 2 and 4, and that it was possible to get culverts load rated.
- Shelley Winters (NHDOT) asked if the cost of relocating the fiber optic cable that is buried in the rail trail corridor was accounted for in the cost estimated. Sean Sweeney (Headwaters) said that he spoke with AT&T and his impression was that the relocation of the cable was feasible and AT&T was willing to work with the town. Nancy Mayville (NHDOT) asked if this would be done at AT&T's expense but this was not the case.

- Stephen Patrice (FNRT-Merrimack) asked how often the spillways would be overtopped. Sean Sweeney (Headwaters) responded that this would likely occur every 5 to 10 years and debris removal would be the primary maintenance associated with this.
- Mike Samson (Canaan) commented that the rail is used for emergency egress when Route 4 is flooded. He stated Route 4 is detoured to the south of the village through several local roads.
- Chris Fournier (HEB) suggested that NHDOT may want to raise Route 4 as a part of this project so that it isn't flooded regularly.
- Nadine Miller (NHDHR) suggested that coordination with the Division of Historic Resources should be done as early as possible via a Request for Project Review (RPR).
- Patrice Rasche (FNRT-Merrimack) asked who paid for the studies. Mike Samson answered that the Town of Canaan paid for the study. Patrice also asked if there was State funding available. Chris Fournier (HEB) answered that FEMA funding is intended to be the primary funder with approximately a 75% cost share. Chris also stated that the properties owned by the State would have to be applied for FEMA funding by the State. Patrice asked what the odds are of funding coming through and if the State could fund the project. Paul Hatch said that FMA hasn't typically been used for infrastructure projects in NH. Chris stated that the project does not fit in any of the State funded programs and this would have to be explored further with the State.
- Ken Warren (FNRT-Grafton) stated that at a previous meeting, concerns with debris in the river were raised and if that was a concern with this project and questioned if annual cleaning of the river is required. Sean Sweeney (Headwaters) responded that the existing wooden bents for the railroad trestle increases debris but not enough to replace the trestles. Also, debris comes from further upriver so mitigation would have to chase upriver to remedy the debris issue. Mike Samson (Canaan) added that the Town currently removes debris, as does the highway department and fire department.
- Nancy Mayville (NHDOT) stated that the project is complicated and intertwined between various departments and organizations. If federal money is used, it can't diminish previous federal highway investments on improvements. Coordination within the NHDOT will have to take place. Nancy asked what the next steps are. Chris Fournier (HEB) answered that everyone should digest what was discussed during the meeting and questions and comments should be sent to himself. Chris will coordinate with the Town of Canaan on how to proceed. Chris stated that it is important to figure out who the lead agency and owner of the project is in order to understand who needs to apply for FEMA funding.
- Bob Landry (NHDOT) asked if it makes sense to split up the project and believes that there is a higher likelihood of the bridge getting done if the other sections are already completed. Nick Goulas (NHDOT) stated that the existing bridge is 75 years old but in good shape. A new culvert next to the bridge would create complications for future replacement. However, increasing the span of the bridge is possible when the time comes to replace the bridge. Sean Sweeney (Headwaters) stated that the recent bridge inspection report has the bridge in good condition and Sean wasn't comfortable exploring altering an existing bridge in good condition to add to the opening in the study.
- Nick Goulas (NHDOT) raised concerns about trying to steer water in the flood plain back toward the Indian River. Nick asked if a levee would be cheaper. Sean Sweeney (Headwaters) answered that the issue with levees is that water flooding the town from upriver, which is coming down NH Route 118, would get trapped on the wrong side of the levee.
- Nancy Mayville (NHDOT) asked about the last inspection of the existing railroad trestles and said that TAP funding could be used to increase the span of the trestles if they needed to be replaced. Sean Sweeney (Headwaters) responded that the railroad bridge spans were at least the width of the river, and a new bridge with a longer span would not add much additional waterway opening. Shelley Winters (NHDOT) responded that the Bureau of Rail and Transit was responsible for the inspections of the trestles.
- Chris Turgeon (NHDOT) asked if permitting costs were considered in the cost estimates. Sean Sweeney (Headwaters) confirmed that they were.
- Chris Fournier (HEB) concluded the meeting and stated that follow up communication should be expected.



UVLSRPC Regional Plan 2015

Chapter 3

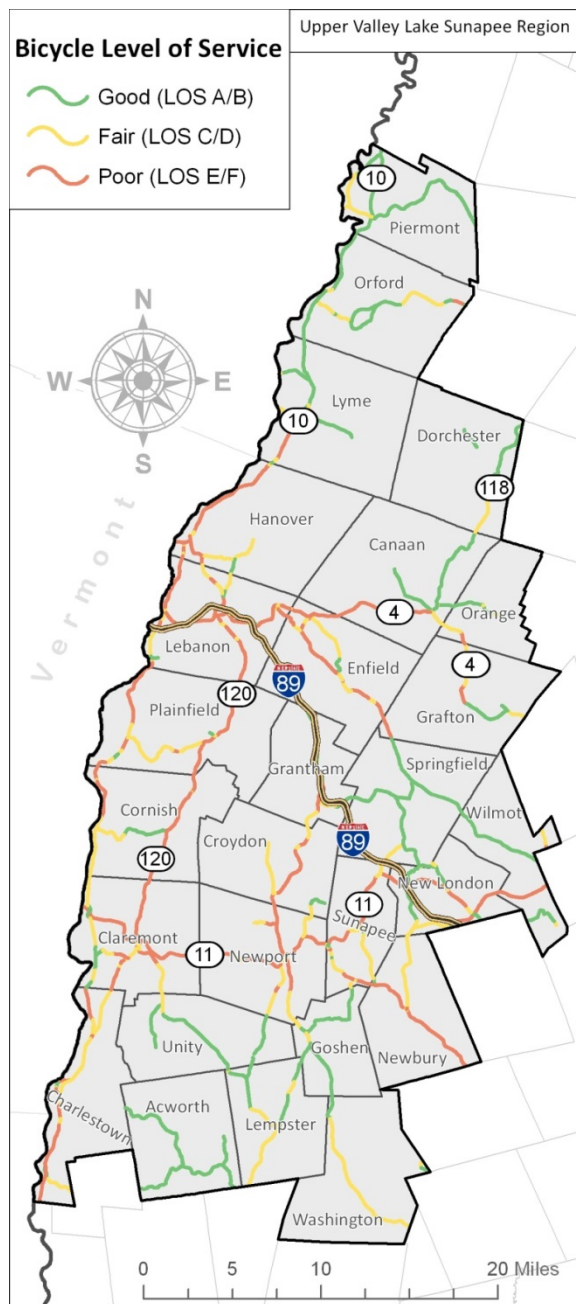
Transportation

3.5 BICYCLE AND PEDESTRIAN TRANSPORTATION IN THE REGION

Vision

A safe bicycle transportation network connects all the communities in the region and every community center can be accessed by a safe and appropriate pedestrian transportation network.

Existing Conditions



Bicycle Travel in the UVLSRPC Region

To analyze bicycle travel on the region's road network, the Commission conducted a Bicycle Level of Service analysis for all state and urban compact roads in the region.

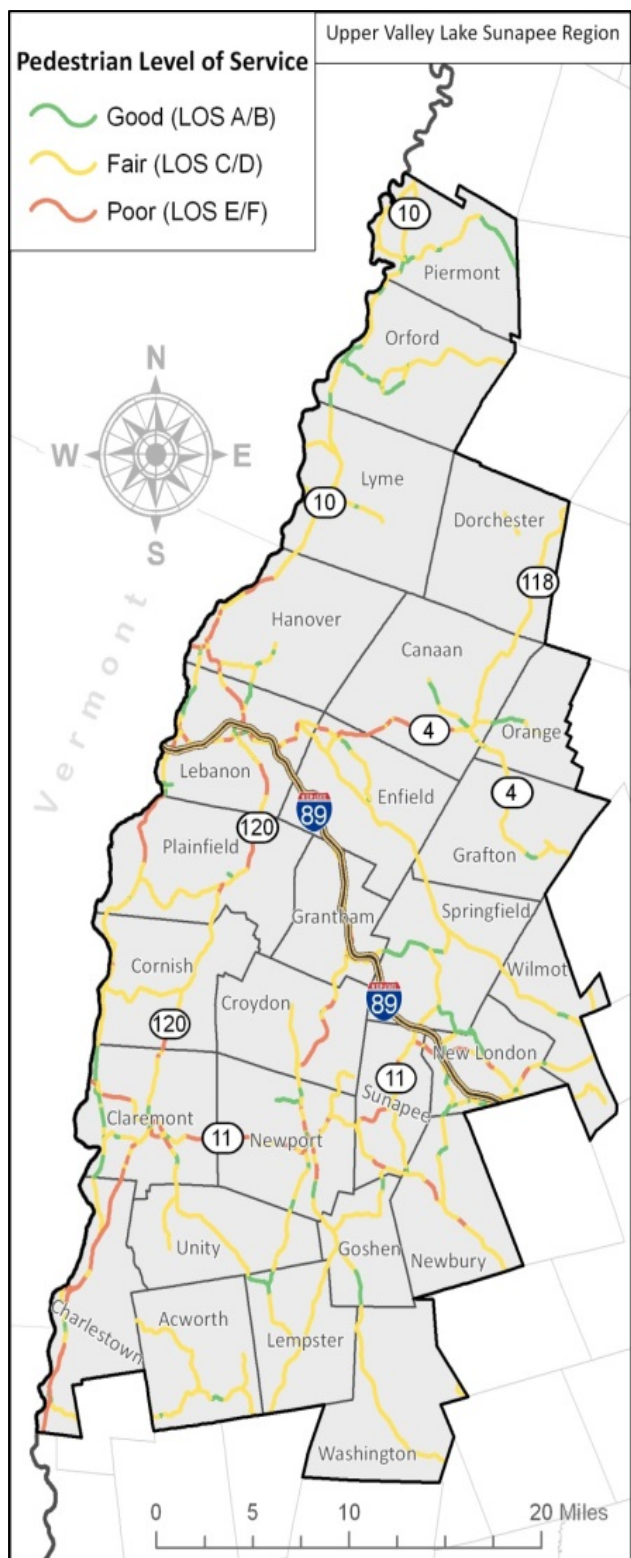
Bicycle Level of Service is a quantitative measure of a roadway's suitability for bicycle traffic. Whereas a roadway's Operational Level of Service is a measure of traveler delay, the Bicycle Level of Service quantifies a cyclist's perceived safety traveling on a roadway.

The National Cooperative Highway Research Program (NCHRP Report 616) has published a methodology for conducting Bicycle Level of Service analysis. The analysis involves a mathematical model that considers vehicle speed, proportion of heavy vehicles, pavement condition, lane width, on-street parking, shoulder width, and traffic volume.

The NCHRP methodology is only used for on-road facilities, not trails or other multi-use off-road paths.

What does this map show?

This map displays Bicycle Level of Service information for state highways in the UVLSRPC region according to the methodology presented in National Cooperative Highway Research Report 616. Level of Service is represented as a letter score, with A and B representing good bicycling conditions, C and D representing fair bicycling conditions, and E and F representing poor bicycling conditions.



Pedestrian Travel in the UVLSRPC Region

To analyze pedestrian travel on the region's road network, the Commission conducted a Pedestrian Level of Service analysis for all state and urban compact roads in the region.

Pedestrian Level of Service is a quantitative measure of a roadway's suitability for pedestrian traffic. Whereas a roadway's Operational Level of Service is a measure of traveler delay, the Pedestrian Level of Service quantifies a pedestrian's perceived safety while walking.

The National Cooperative Highway Research Program (NCHRP Report 616) has published a methodology for conducting Pedestrian Level of Service analysis. The analysis involves a mathematical model that considers traffic volume, shoulder width, on-street parking, sidewalk presence, sidewalk width, and vehicle speed.

The NCHRP methodology is only used for on-road facilities, not trails or other multi-use off-road paths.

What does this map show?

This map displays Pedestrian Level of Service information for state highways in the UVLSRPC region according to the methodology presented in National Cooperative Highway Research Report 616. Level of Service is represented as a letter score, with A and B representing good walking conditions, C and D representing fair walking conditions, and E and F representing poor walking conditions.

Implementation Strategies

State and federal funding sources for local bicycle and pedestrian transportation are very limited. Former standalone funding programs including the Transportation Enhancement Program (TE), Recreational Trails Program (RTP), and Safe Routes to School Program (SRTS) have been consolidated into a single program called the Transportation Alternatives Program (TAP).

At current funding levels, the State of New Hampshire receives approximately \$7.5 million in Transportation Alternatives Program funding each biennium. Of that \$7.5 million, approximately one-third of it is set aside for Recreational Trail projects administered by the NH Department of Resources and Economic Development. Another portion of the funding is set aside, per federal formula guidelines, to be used exclusively within the Nashua Region. After those set asides, each of the nine regions of the state will likely see one TAP-funded bicycle or pedestrian infrastructure improvement project every two years. Thus, the TAP program, while very popular amongst communities, will remain ultra-competitive and an unreliable source of funding for local projects.

Bicycle and pedestrian improvement projects are also potentially eligible for federal Highway Safety Improvement Program

funding, provided that the project location has a history of fatal or severe injury crashes involving bicyclists or pedestrians. Road Safety Audits should be conducted at all locations within the region that have had a fatality involving a bicyclist or pedestrian as a precursor to potential Highway Safety Improvement Program funding.

While the federal Congestion Mitigation and Air Quality Program (CMAQ) can potentially fund bicycle and pedestrian improvement projects, communities in the UVLSRPC region are not currently eligible for that funding because the region remains in attainment of federally-established air quality thresholds.

In the future, developing and improving the region's bicycle and pedestrian transportation infrastructure network will require strong local funding commitments. Projects that are funded through local public-private partnerships will have a higher probability for success. Two recent examples of successful public-private partnerships in the region include the Mascoma River Greenway in Lebanon and the new Riverwalk pedestrian bridge in Sunapee (which was entirely funded through private donations). Additionally, local Planning Boards should ensure through the site plan and/or subdivision review process that developers construct appropriate bicycle and pedestrian infrastructure to connect their developments to the state or local network.



UVLSRPC Regional Plan 2015

Chapter 6

Historic, Cultural and Recreational Resources

Rail Trails

Several railroad rights-of-way have been converted to trails. The non-profit Friends of the Northern Rail Trail in Grafton and Merrimack Counties has successfully converted into a rail trail all but the easternmost two miles of the Northern Rail Line between Concord and Lebanon. It is New Hampshire's longest rail trail and is on right-of-way purchased by the State. Efforts are underway by the City of Lebanon and the non-profit Mascoma River Greenway to extend this rail trail from downtown Lebanon to West Lebanon and eventually across the river to White River Junction.

A rail trail which runs along the Sugar River between Claremont and Newport, and which crosses now-rate railway covered bridges, has become popular.

The future rails-to-trails movement will bear watching following a Supreme Court ruling handed down on March 10, 2014.

These old railway rights-of-way offer precious opportunities since it would take a great deal of time, money and effort to consolidate rights-of-way such as these ever again. As the number and extent of rail trails continue to increase and as these rail trails become connected into large regional networks, their potential for recreation, health, and tourism will grow into even greater significance and value.

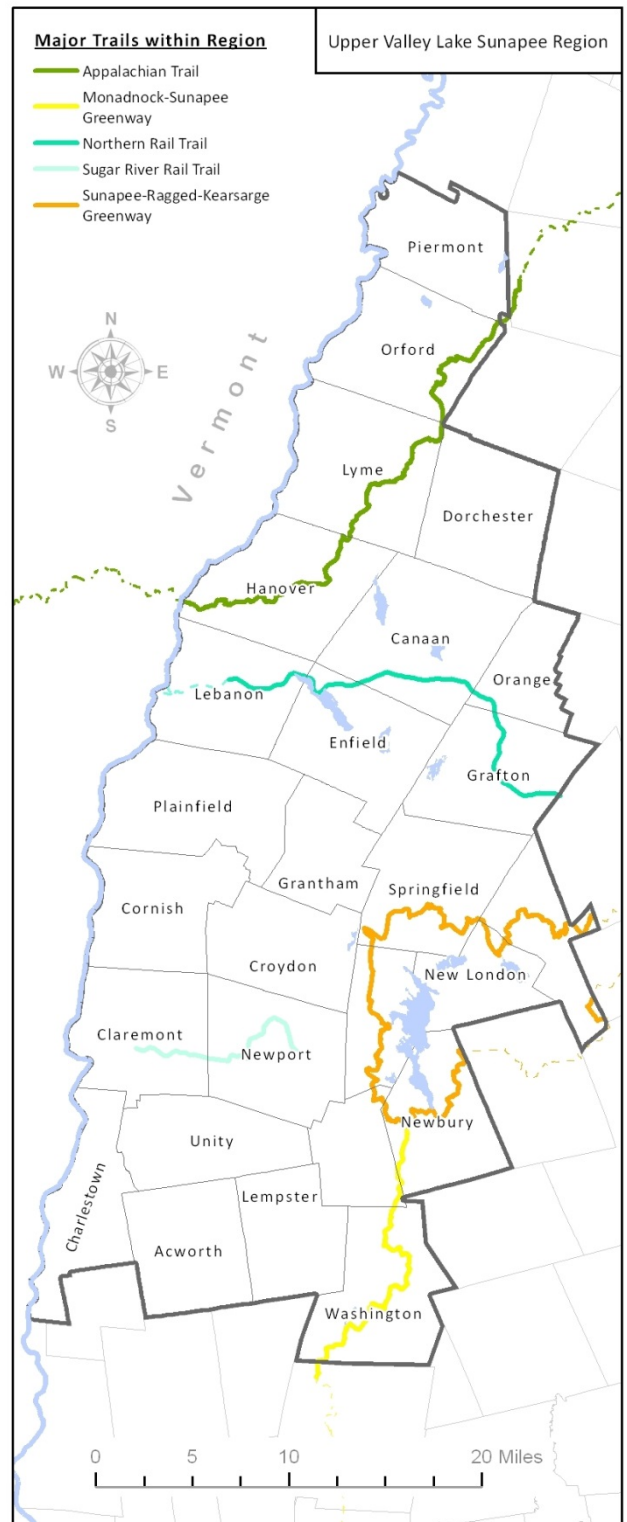


Figure 6.4.1- Key Regional Trails

Mascoma River Corridor Management Plan

Phase 1: Identifying Priority Issues in the Mascoma River Watershed

Adopted December 19, 2012

Prepared by:

Mascoma River Local
Advisory Committee



With assistance from:
Upper Valley Lake Sunapee Regional Planning Commission

Funding for this project was provided by a Water Quality Planning Grant from the NH Department of Environmental Services with Clean Water Act 604(b) funds from the US Environmental Protection Agency.



This plan is also available online at: <http://mascomariver.wordpress.com>

The Mascoma River Watershed: A Community Resource



The Mascoma River is an outstanding community resource for the City of Lebanon and Towns of Enfield and Canaan. The river connects the hearts of the three communities, flowing through villages and downtown areas before entering the Connecticut River in West Lebanon. The river acts as an important component of the region's economy, providing clean, safe drinking water for the City of Lebanon, and also sufficient water to power hydroelectric stations and support industrial uses. The Mascoma River, Mascoma Lake and the watershed are valued for their scenic beauty and wildlife habitat as well as the year-round recreation they provide.

To learn more about the resources of the Mascoma River, please refer to Appendix A: Nomination of the Mascoma River from Canaan Center to West Lebanon.

The Mascoma River Local Advisory Committee

In recognition of the Mascoma River as a vital community asset and the local support for its nomination, the New Hampshire Legislature designated the Mascoma River from Canaan Center to West Lebanon as a Protected River under the State Rivers Management and Protection Program (RSA 483) in 2010.

The Mascoma River Local Advisory Committee (Mascoma LAC), composed of residents of Lebanon, Enfield, and Canaan, is authorized by State law to advise on the management and protection of the Mascoma River. The Mascoma LAC receives no dedicated funding from the State, instead seeking funding from grants and local sources such as Mascoma River Watershed Council, Rotary Clubs, Lions Club, and other local philanthropic organizations.

The Mascoma River Corridor Management Plan

Under RSA 483, the Mascoma LAC is charged with developing and implementing a River Corridor Management Plan so that the outstanding qualities of the river may be better managed and protected now and in the future. ***The Mascoma River Corridor Management Plan's purpose is: to guide the Mascoma LAC and its community partners as they take action to protect the unique and valuable resources of the Mascoma River.***

The Mascoma LAC worked with Upper Valley Lake Sunapee Regional Planning Commission to survey municipal officials, waterfront landowners, and watershed residents about the most important resources and most pressing threats to the river and its watershed.

The Mascoma LAC used the survey responses (Appendix B) to develop goals for management and protection of the river and its watershed. For each goal, they studied the work already underway, and then brainstormed what action steps the Mascoma LAC can take to address these goals and how they can support the ongoing work of community partners.

Goal 1: Protect the quality and adequate supply of drinking water for the City of Lebanon.

Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • The City of Lebanon is proposing zoning amendments to improve riverbank and wetland protection. • The City Water Department is engaged in ongoing monitoring of the water supply. • The City Water Department recently completed a Source Water Protection planning project. • Lebanon and Enfield sponsor regional household hazardous waste and unwanted medicine collections; Lebanon, Enfield and Canaan participate in drug take-back days through Drug Enforcement Agency. 	<ul style="list-style-type: none"> • Act as a coordinating body for water-related organizations in watershed. <ul style="list-style-type: none"> ○ Develop a website to access water data for the watershed. • Partner with the City and NH DES to educate watershed residents about drinking water protection. • Provide outreach to homeowners and homeowners’ associations about the special status and protections for the Mascoma River through RSA 483 and other relevant state and federal laws.

Goal 2: Identify causes of water quality problems in Mascoma Lake and take action to improve water quality.

Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • In partnership with DES, the watershed’s lake associations and a river-monitoring group are engaged in a robust volunteer water quality monitoring program for the Mascoma watershed. • Cyanobacteria blooms in Mascoma Lake and Goose Pond are tracked by DES and UNH and have been publicized through local media outlets. 	<ul style="list-style-type: none"> • Support and participate in continued volunteer water quality monitoring. • Support studies to identify causes of cyanobacteria blooms and other water quality problems. • Support sharing of current water quality data within the watershed with DES, lake associations, and municipalities.

Goal 3: Ensure adequate water flows and water levels for the Mascoma’s many users.

Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • NH DES regulates withdrawals from the Mascoma River for drinking water, industry, and hydropower. • Mascoma Lake’s level is managed for recreation and to ensure sufficient water supply for the City of Lebanon. Mascoma Lake and other lakes in the watershed are drawn down in the fall to mitigate risk of ice damage and spring flooding. 	<ul style="list-style-type: none"> • Support a study of water quantity to identify potential conflicts that could arise due to changing precipitation patterns or changes in water withdrawals.

Goal 4: Improve public access to the Mascoma River and Mascoma Lake for recreation.

Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • The City of Lebanon is working to extend the Mascoma River Greenway along the rail corridor from downtown Lebanon to West Lebanon. This would connect to the Northern Rail Trail, which is a popular community, state and regional recreation resource. • The Lebanon Rotary Club has been developing community parks along the Mascoma River, called the String of Pearls project. This includes Baker’s Crossing and Riverside Park. • The Town of Enfield has been in discussion with NH DOT about a waterfront parcel that may be suitable for park development. 	<ul style="list-style-type: none"> • Work with partners to promote the Mascoma River as a recreational corridor and identify potential access points or viewpoints that connect the Greenway, Rail Trail or parks to the river. • Participate in the planning of waterfront parks and access points to promote environmentally-sensitive construction and design.

Goal 5: Prevent the spread of aquatic, wetland and terrestrial invasive species.

Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • Mascoma Lake Association has an active volunteer scuba diving group that removes and manages Eurasian water milfoil in Mascoma Lake. • Mascoma Lake Association, Goose Pond Lake Association, Canaan Street Lake Association, Crystal Lake Association and Friends of Grafton Pond are involved in the DES Weed Watchers program for early detection and NH Lakes Association’s Lake Host program for prevention. • Volunteers affiliated with the Volunteer River Assessment Program monitor the Mascoma River for invasive species on an informal basis. • Grass-roots volunteer efforts are underway in Lebanon to control garlic mustard, knotweed and other terrestrial invasive species. 	<ul style="list-style-type: none"> • Serve as a clearinghouse for information on invasive species populations in the watershed. • Promote the expansion of the NH Lakes Association’s Lake Host program to all lakes in the watershed. • Partner with the NH Rivers Council’s River Runners program to expand invasive species monitoring in the Mascoma River. • Promote the construction of information/bulletin boards at river access points. • Survey existing water access sites to determine if invasive species information is posted. If not, then add this information at access sites.

Goal 6: Protect the scenic quality of the Mascoma River watershed.	
Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • Ongoing conservation of public and private lands protects scenic views and vistas in the watershed. • The Town of Enfield is developing zoning amendments that would improve aesthetics for commercial development along Route 4. 	<ul style="list-style-type: none"> • Support land conservation efforts within the watershed. • Support protection of riparian buffers <ul style="list-style-type: none"> ○ Support local efforts in watershed towns to adopt riparian buffer provisions into local regulations. ○ Host a homeowner’s workshop for the DES Shoreland Program. • Encourage Planning Boards to include questions about the scenic quality of the watershed in Master Plan surveys.

Goal 7: Ensure that septic systems are properly maintained.	
Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • Mascoma LAC hosted an educational workshop for homeowners on septic system maintenance in 2012. 	<ul style="list-style-type: none"> • Identify methods to educate homeowners, real estate agents, lake associations, homeowners’ associations and planning boards on septic system maintenance. • Host an annual educational workshop on septic system maintenance.

Goal 8: Prevent stormwater runoff from carrying pollutants into the river system.	
Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • Existing state and local regulations provide some provisions for on-site treatment of stormwater. • The Town of Enfield is developing zoning amendments that would improve stormwater infiltration for development along Route 4. • NH Lakes Association’s Lake Conservation Corps partners with lake associations to construct stormwater management features; a statewide training program called Soak Up the Rain is being developed. 	<ul style="list-style-type: none"> • Identify methods to educate homeowners about buffer zones, Best Management Practices and existing Shoreland regulations. • Host a homeowners’ workshop with the DES Shoreland Program. • In cooperation with NH Lakes Association’s Lake Conservation Corps, work with lake associations and volunteer property owners to facilitate demonstration projects on lakefront properties.

Goal 9: Reduce road salt runoff into the river system.	
Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • Town roads near Goose Pond have been designated as low-salt areas. • UNH Technology Transfer Center provides training on winter road maintenance and road salting methods, including a Green SnowPro certification course. 	<ul style="list-style-type: none"> • Keep towns informed of best practices and options for road salt application and salt storage. • Investigate how salt application on state highways might be reduced. • Partner with the DES to identify and recommend Best Management Practices (BMPs) that could be implemented throughout the watershed.

Goal 10: Avoid over-development and protect open space.	
Current Work toward Achieving Goal	Action Items for Mascoma LAC
<ul style="list-style-type: none"> • Ongoing conservation of public and private lands protects open space in the watershed. 	<ul style="list-style-type: none"> • Raise awareness of the Mascoma River as a community asset. • Encourage Planning Boards to include questions about the Mascoma River and watershed in Master Plan surveys. • Promote education for landowners about conservation easements. • Refer to local zoning regulations when reviewing state permit applications. • Comment on local site plans and subdivisions when river/watershed may be impacted. • Keep riverfront municipalities informed about amendments to local zoning/regulations that improve protection for the river/watershed.

Plan Implementation and Update

The Mascoma River LAC will use this plan to guide their work and will review goals and action items on an annual basis. While many different organizations have been working in the Mascoma River watershed for decades, this plan is the first to include both the newly-designated river and the entire watershed. To monitor the Mascoma LAC's progress and offer your comments and ideas, please visit the Mascoma LAC's website at <http://mascomariver.wordpress.com>.

- Adopted December 19, 2012 by the members of the Mascoma River LAC -
 Lebanon: Shawn Donovan, Earl Jette and Don MacMeekin
 Enfield: Kurt Gotthardt and Tim Taylor
 Canaan: Bill Chabot, John Carr and Chuck Townsend

Canaan

Hazard Mitigation

Plan

Update 2017



This Plan integrates the following:

- **Hazard Mitigation Plan Update (FEMA)**
- **Community Wildfire Protection Plan (DRED)**

July 26, 2017
Final Adopted Plan for Final Approval

**Prepared for the Town of Canaan and NH Homeland Security &
Emergency Management**

By
The Canaan Planning Team

With assistance from Mapping and Planning Solutions

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Table 2.1 - Town Statistics		
<i>Wastewater Treatment Plant</i>	Yes	
<i>Electric Supplier</i>	NH Electric Coop; Liberty Utilities	
<i>Natural Gas Supplier</i>	None	
<i>Cellular Telephone Access</i>	Limited	
<i>High Speed Internet</i>	Limited	
<i>Telephone Company</i>	Fairpoint	
Transportation		
<i>Primary Evacuation Routes</i>	US Route 4 & NH Route 118	
<i>Secondary Evacuation Routes</i>	Canaan Street, Grafton Turnpike Road, Goose Pond Road & Potato Road (access from Ball Park, Grist Mill Hill & South Roads); Northern Rail Trail (possible evacuation)	
<i>Nearest Interstate</i>	I-89, Exit 17, 10 miles	
<i>Nearest Commercial Airport(s)</i>	Lebanon Municipal (18 miles) Manchester-Boston Regional (80 miles) Burlington International (95 miles)	
<i>Public Transportation</i>	Advance Transit; Grafton County Senior Citizens Council	
<i>Railroad</i>	No	
Education & Childcare		
<i>Elementary School</i>	Grades PK-4 - Canaan Elementary School	
<i>Middle School</i>	Grades 5-8 - Indian River School	
<i>High School</i>	Grades 9-12 - Mascoma Valley Regional High School	
<i>Private/Parochial</i>	Grades 6-9 - Cardigan Mountain School	
<i>School Administrative Unit</i>	SAU 62	
<i>Licensed Childcare Facilities</i>	4 facilities, 35 capacity	
Conserved Land as a Percent of Land in the Community <i>(GIS Analysis)</i>		
	Square Miles	Percent of Town Land
<i>Approximate Square Miles (including water 1.8 sq/ml)</i>	55.12	100.00%
<i>Approximate Total Un-Conserved Land</i>	50.99	92.51%
<i>Approximate Total Conserved Land (%)</i>	4.13	7.49%
<i>Approximate Federal Owned land (%)</i>	0.00	0.00%
<i>Approximate State Owned Land (%)</i>	0.68	1.24%
<i>Approximate Municipal/County Land (%)</i>	0.68	1.23%
<i>Approximate Private Land (%)</i>	2.77	5.03%
Fire Statistics <i>(NH Forests & Lands (DRED) Fire Statistics Report 2015 & the Town of Canaan)</i>		
<i>Wildfire Fire Calls (2015)</i>	None of significance in Canaan; responded to a 55 acres (Hartford, VT); 137 acres (Norwich, VT); 274 acres (Ossipee, NH)	
<i>Grafton County Fire Statistics (2015)</i>	17 fires; 22.6 acres	
<i>State Forest Fires FY (2015)</i>	134 fires; 661 acres	
<p><i>Information found in Table 2.1, unless otherwise noted, was derived from the Economic & Labor Market Information Bureau, NH Employment Security, August 2016. Community Response Received 7/25/2016; http://www.nhes.nh.gov/elmi/products/cp/profiles-pdf/canaan.pdf and from the Town of Canaan. .</i></p>		

Mitigation Action Items #18 (Stormwater Maintenance Plan) calls for the development of a stormwater maintenance program that will address both ditching and the condition of culverts in Town in order to mitigate flooding issues. In addition, several other action items address culverts and roads in Canaan that need improvements. Mitigation Action Items #15 addresses Canaan Village Flooding and Action Item #27 addresses Potato Road improvements.

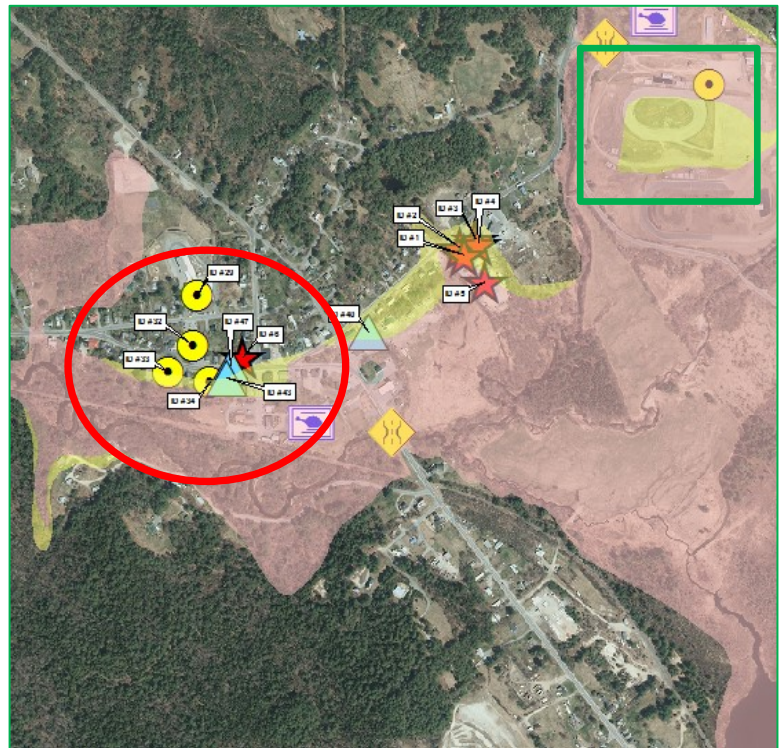
The cost of road erosion is difficult to calculate and it cannot be based on the assessed value of structures in Canaan. The expected loss value would be primarily on the economic impact on Community, the loss of accessibility and the time and cost of road repair which could be in the millions.

FLOODING - RIVERINE & 100-YEAR FLOODING EVENTS

Flooding is often associated with tropical storms, heavy rains and rapid snowmelt in the spring. Based on the Grafton County Floodplain Map, Canaan has a relatively large floodplain which follows along the banks of the Indian and Mascoma Rivers. Although not encompassing the entire town, the areas within the floodplain pose a serious problem for the Community.

As stated previously, there are five major areas of Canaan that experience flooding: parts of West Canaan, Potato Road; Canaan Village, sections of Route 118 and sections of Route 4. The most significant of these areas is Canaan Village (red circle) as shown in the aerial imagery below and on Map 3. Many of Canaan’s key resources and much of the critical infrastructure is located within the 100-year (pink) and the 200-year (yellow) floodplains. In fact, 22 CIKR throughout the Town were found to be in the flood zone and it is expected that many other structures are also susceptible.

The Canaan Motor Club, LLC, (green square) has recently invested in a two million dollar facility, to offer track racing to enthusiasts. The 1.3 mile long track sits within the 200-year floodplain, but does not usually flood. The CMC track is expected to bring increased revenue to Canaan and to be the driving force for new development. Town officials are hoping that through mitigation, Canaan Village can be protected from future flooding events. Mitigation Action Item #16 addresses flooding in Canaan Village and proposes three possible solutions for this reoccurring flooding.



Potential Mitigation Action Item	Affected Location	Type of Activity	Total	S	T	A	P	L	E	E
Action Item #15: Do an engineering and hydrology study to determine the best way to flood proof the Village Center; consider possible mitigation strategies such as 1) river redirection and the removal of impediments to the flow of water, 2) buying super sacks (sand) to serve as a temporary dike and 3) flood proofing buildings; explore these three solutions to address inevitable and reoccurring flooding in the Village Center. (F1, F5 & F13)	Canaan Village	Prevention Property Protection Structural Projects	14	3	2	2	2	3	1	1
				<i>Technical: Engineering requirements Administrative: Staff time Political: Local people disagree about how though handle the problem; there are varying opinions Economic: Budget constraints Environmental: DES permitting and involvement; Army Corp may also be needed</i>						
Action Item #16: Obtain funding through both local funds and grants to participate in a regional hazmat team. (Table 7.1)	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection	18	3	3	3	2	2	2	3
				<i>Political: Board of Selectmen may not want to do this Legal: Will need to explore legal and insurance costs Economic: Will cost funds annually; may not be approved</i>						
Action Item #17: Obtain dam plans for Canaan Street Lake Dam and Cummins Pond Dam plan. (F7) (Table 6.1)	Canaan Street Lake Dam & Cummins Pond Dam	Prevention Emergency Service Protection Property Protection Natural Resource Protection	15	3	2	1	1	2	3	3
				<i>Technical: Dams are both private; town has no say Administrative: Staff time Political: Lack of control and responsibility; not owned by town Legal: Lack of control and responsibility; not owned by town</i>						
Action Item #18: Develop a stormwater maintenance plan to ensure continuity of maintenance and to help reduce the impact of natural hazards, particularly flooding; include an inventory of culverts, drains, etc. along with a record of size, type and expected length of service; use the new Pubworks software. (F5 & F13) (Tables 6.1 & 7.1)	Town Wide	Prevention Emergency Service Protection Property Protection Natural Resource Protection	21	3	3	3	3	3	3	3
				<i>No apparent difficulties with this Action Item</i>						
Action Item #19: Obtain funding and add fire repeater systems to fire and highway vehicles to improve communications and help eliminate dead spots in Town; explore the possibility of a tower repeater. (Tables 6.1 & 7.1)	Town Wide & Town Vehicles	Prevention Emergency Service Protection	19	3	3	3	3	3	1	3
				<i>Economic: Budget constraints</i>						
Action Item #20: Install a permanent generator at the Canaan Elementary School so that this critical facility can be used as the Primary Shelter at the time of a natural disaster. (MU 13) (Tables 6.1 & 7.1)	Canaan Elementary School	Prevention Emergency Service Protection Property Protection	20	3	3	3	3	3	2	3
				<i>Economic: Budget constraints</i>						

Canaan Master Plan



September 29, 2006

Revises prior master plan certified on February 27, 1997

Section V Economic Policies and Recommendations

- (1) Create a prosperous and esthetically pleasing Village area.
- (2) Inventory available industrial sites and designate suitable areas for future industrial development.
- (3) Encourage commercial cluster development that will reduce curb cuts.
- (4) Adopt a sign ordinance to help preserve nighttime dark skies and to maintain a scenic rural environment.
- (5) Upgrade street lighting to achieve energy efficiency.
- (6) Educate homeowners in energy efficient, properly shaded, exterior lighting.
- (7) Encourage agriculture and forestry.
- (8) Encourage home businesses, which are already a strong sector of local economy.
- (9) Encourage "bed and breakfast" lodging facilities.
- (10) **Support the Northern Rail Trail and other recreational trails.**
- (11) Protect Canaan's natural, scenic and historical resources.
- (12) Encourage electric power distributors to upgrade the capacity of power lines serving Canaan
- (13) Work with communications providers to make broadband technology and cell-phone access more widely available in Town.
- (14) Ensure adequate setbacks between roads and building/parking lots to allow for future road widening projects.
- (15) Encourage adult education and job-training programs to enable local residents to upgrade their skill levels and adapt to changing conditions.
- (16) Study the need for a cell-tower ordinance.
- (17) Consider incentives for increasing commercial investment.

Section VII Transportation Policies and Recommendations

- (1) Ensure a cost-effective transportation system that will meet, to the maximum extent possible, the mobility needs of local residents and will provide for the safe, efficient movement of goods and people within and through Canaan.
- (2) Require the developer/subdivider to improve off-site roads as a condition for subdivision approval, if proposed subdivisions may have an adverse effect on off-site roads. Even if the new road in a subdivision meets the town's specifications, the other roads in the area may not be adequate to accommodate the increased traffic resulting from the development. In this case the developer/subdivider should pay his proportion of the cost to up-grade these off-site roads.
- (3) Maintain an inventory of Town roads and develop a road maintenance plan. Incorporate road maintenance and improvement in the CIP process.
- (4) Require adequate setbacks. It is recommended that the town require a 50-foot right-of-way for all roads to allow for road maintenance (plowing, drainage, etc.) and road improvements (widening, straightening curves, improving drainage, etc.). An adequate setback is also needed for buildings, fences, etc. which would obstruct the vision of motorists and bicyclists.
- (5) Encourage and support Advance Transit. The implementation of public bus service has had a very positive, impact upon the town, improving the mobility of commuters to employment centers and providing the only mode of transportation for many elderly persons. Free fare transportation on Advance Transit buses is valuable to retired persons and to students going into Lebanon after school, as well as to commuters.
- (6) Implement improvements that will improve pedestrian and bicycle travel. Such improvements include the construction or widening of sidewalks, trees and other plantings, benches, curb ramps, crosswalks, signals and signs, etc. which will make walking safer and more convenient. Bicycle-related improvements include bike racks, road shoulder improvements and signage and bike routes.
- (7) Encourage commercial cluster development that will reduce curb cuts.