STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR
Newfane BF 0106(6)

FAS ROUTE 106 (Town Highway 2), BRIDGE 12 OVER THE ROCK RIVER

February 23, 2015

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I. Site Information

Bridge 12 is a locally owned bridge located in a historic district on Depot Road (Town Highway 2/FAS Route 106) 1.9 miles west with its junction with VT Route 30. The reinforced concrete arch bridge was the first of its kind constructed in Vermont and is listed on the Reinforced Concrete Arch Preservation Plan as a bridge of exceptional historical significance. The bridge is located at a T-intersection with Dover Road and Grimes Hill Road and is used as a one lane, alternating direction bridge. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Major Collector (Class 2)
Bridge Type	Reinforced Concrete Closed Spandrel Elliptical Arch
Bridge Length	100 feet (76.5 foot span)
Year Built	1908
Ownership	Town of Newfane

Need

Bridge 12 carries Depot Road across the Rock River. The following is a list of deficiencies of Bridge 12 and Depot Road in this location:

1. The original arch is in poor condition. The spandrel walls have failed and falling concrete from the delaminated walls poses a risk to swimmers below. There is map cracking throughout the arch ring, which is leaking. The foundation has map cracking and efflorescence throughout with major delaminations.

2. The existing vertical alignment through the project location does not meet the current standard.

3. The lane and shoulder widths of the bridge and approaches are too narrow for the traffic volume, design speed and roadway classification.

4. The existing bridge railing has failed.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2017 and 2037.

TRAFFIC DATA	2017	2037
AADT	1,500	1,600
DHV	170	180
ADTT	65	110
%T	3.9	6.0
%D	70	70

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997 and The AASHTO Green Book, dated 2010. Minimum standards are based on an ADT of 1600, a DHV of 180, and a design speed of 15 mph for a Rural Collector.

Design Speed: Depot Road is posted for 25 mph, however there is stop condition at the bridge, and will therefore be designed for a lower speed. The reduction in design speed will not require a design exception as per the Vermont State Standards.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	9'/2' (22')	10'/3' (26')	Substandard
Bridge Lane and Shoulder Widths	VSS Section 5.7	3.8'-10'-3.8' one-way (17.6')	10'/3' (26')	Substandard
Clear Zone Distance	VSS Table 5.5		14' fill / 12' cut	
Banking	VSS Section 5.13	Varies	8% (max)	
Speed	VSS Section 5.3 VSS Section 5.10	25 mph (Posted)	15 mph (Design) 10 mph (Design Radius)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 250', 1000' (Westbound Approach), R = ∞ (Bridge)	R_{min} = 250 @ e=4.0%	Through interpolation, a radius of 250' will meet standard with a 4% bank
Vertical Grade	VSS Table 5.6	4.4399% max	10% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 5.1	K_{sag} = 19 (Bridge), K_{crest} = 21 (Westbound Approach)	20 crest / 30 sag	Substandard
Vertical Clearance	VSS Section 5.8	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	219'	150'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	3.8' shoulder	3' Shoulder	
Bridge Railing	Structures Design Manual Section 13	Failed Concrete Parapet	TL-2	Substandard
Hydraulics	VTrans Hydraulics Section	Passes Q_{50} storm event with over 15' of freeboard, Bank Full Width = 76.5'	Pass Q_{50} storm event with 1.0' of freeboard Bank Full Width = 76'	
Structural Capacity	SM, Ch. 3.4.1	Structurally Deficient	Design Live Load: HL-93	Substandard

Inspection Report Summary

Culvert Rating	4 Poor
Channel Rating	8 Very Good

05/05/2014 – Structure is in poor condition and should be considered for rehab or replacement in the near future. This is a local swimming hole so the spalling and delaminations should be removed so people are not in danger of falling debris. ~FRE/TJB

05/06/2013 – Structure should be considered for rehab in the near future. However this area is a local swimming hole and loose concrete on the fascias and the soffit area should be removed so people are not in danger of falling concrete. Concrete rails should be cleaned and patched. ~FRE/DAK

07/11/2012 – Rail along the top of the structure should be repaired. Large delaminations on the downstream side on the abutment 1 side should be removed and repaired. ~FRE/SJH

03/25/2010 – The main portion of the arch vault maintains carrying capacity, however, the outer portions of the arch ring have been compromised by heavy deterioration of the original concrete and subsequent section loss. The spandrel walls which retain roadway fill material are dependent on the ring of the outer arch for support. The gunnite shroud has no practical repair solution. The arch built at the turn of the century should either be replaced or perhaps bypassed with a new structure. ~MJ/MK

Hydraulics

The existing bridge currently passes a 50 year storm event with over 15 feet of freeboard. This meets the hydraulic standard of passing the 50 year storm event (Q_{50}) with one foot of freeboard below the low beam elevation of the bridge. Additionally, the existing structure spans both the measured and calculated bankfull width and the abutments are well aligned with the channel. It is recommended that any new structure maintain the existing clearspan, with vertical abutments and no stone fill. The low beam (haunches of an arch) can be lowered to elevation 501' while still meeting the hydraulic standards and having no impact to the Q100 water surface elevation.

Utilities

The existing utilities are shown on the Existing Conditions Layout Sheet, and are as follows:

Municipal Utilities

- There are no municipal water or sewer facilities within the project area.

Public Utilities

Underground:

- On existing Pole #61/45/25T/6/1624/45 near the end of bridge in the Depot Road/Grimes Hill Road intersection there is an attached sign indicating the presence of buried cable. FairPoint has indicated that this is no longer a working buried cable and that it has been abandoned in place. The location of this abandoned cable is unknown.

- At the base of existing Pole #61/44/44 (at the south end of BR #12) there is an electric meter pedestal. From this pedestal there is underground electric cable to the garage directly across from where Sunset Lake Road intersects with Depot Road.

- At Pole #164-47/6106/2 on the north side of Grimes Hill Road, both telephone cables come down the pole on risers and proceed underground to the east, along the north side of Grimes Hill Road. There is a FairPoint substation a short distance up Grimes Hill road on this same side.

Aerial:

- There are aerial electric utility lines (3 phase) which approach the project area along the south side of Town Highway 2 (Dover Road); these electric lines cross Depot Road at the north end of the bridge to Pole # 61/45/25T/6/1624/45 (in the Depot Road/Grimes Hill Road intersection). These electric lines are owned by Green Mountain Power (GMP)

- From Pole # 61/45/25T/6/1624/45 the 3 phase electric line turns southeast along Depot Road just off the east edge of the bridge. Electric lines (Single Phase) also extend up and along Grimes Hill Road. These lines are also owned by GMP.

- There are aerial service lines crossing Depot Road, not far from the south end of the bridge.

- There are two aerial communication cables which follow the exact same path as the electric lines. These cables are owned by FairPoint and Southern Vermont Cable Company.

It is anticipated that overhead utilities will not have to be relocated for construction.

Right Of Way

The existing Right-of-Way is plotted on the Existing Conditions Layout Sheet. There is a three rod Right-of-Way centered on Town Highway 2, Town Highway 5, and Town Highway 42. All alternatives considered in this report, with the exception of "Do Nothing", will require additional Right-of-Way.

Resources

The environmental resources present at this project are shown on the Existing Conditions Layout Sheet, and are as follows:

Biological:

Wetlands/Watercourses

There are no wetlands present in the immediate vicinity of the bridge.

Agricultural Soils

There are no prime agricultural soils located in the vicinity of the bridge.

Floodplains

The Rock River is confined within a steep sided, high gradient stream bed in this location and thus, there is no floodplain associated with this watercourse in the vicinity of the project.

Fisheries

The Rock River is a cold-water stream and in-stream construction activities (permanent or temporary) will be subjected to in-stream timing restrictions. In addition, erosion prevention and sedimentation controls will be the best line of defense against unnecessary impacts.

Species of Special Concern

There are no species of special concern near this project.

Permits and Construction

Although the Rock River is not a *Navigable Waterway* or *Essential Fish Habitat*, in-stream work (including temporary work) will require both a Stream Alteration Permit and 401 Water Quality Certificate from the ANR, and a Section 404 General Permit from the Corps. The existing arch appears to be more than adequate for this crossing and has many ecological benefits over a structure with a pier in the river. A new arch, clear-span, or a project which widens the existing

structure will all be readily permittable. If a temporary bridge is required for this project, a clear-span of the channel (above OHW) immediately adjacent to the existing structure (either side) will be the simplest to permit.

Hazardous Materials:
According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, the garage located in the eastern downstream quadrant is a hazardous waste site. Additionally, there are two underground storage tanks located downstream from the bridge. Impacts to hazardous waste sites should be avoided. See the appendix for a map showing the locations of hazardous waste sites in the project area.

Historic
Bridge 12 is a historic bridge of particular significance. It is a 76' closed spandrel elliptical concrete arch that carries Town Highway 2 across the Rock River. It was constructed in 1908 by the Brattleboro contracting firm, Crosby and Parker. Bridge 12 is included in the Reinforced Concrete Arch Preservation Plan under Category 1, meaning the preferred method of treatment is preservation.

The bridge is the gateway to the Williamsville Village Historic District, which continues west on Dover Road. There is a pull off area and stone wall adjacent to the bridge, on the NW quadrant. These areas are included in the historic district.

The project will require a Section 4(f) bridge programmatic evaluation and potentially others, depending on the impacts to nearby properties.

Archeological:
A field visit was conducted on 5/14/2014 in order to assess archaeological sensitivity in the immediate area of potential effect (APE) around Bridge 12 on Dover and Depot Roads over Rock River in Newfane, Windham County, VT. A generalized radius of 200 feet around both bridge approaches was implemented as a baseline APE. Two quadrants of historic archaeological sensitivity were identified during field review and are shown on the Existing Conditions Layout Sheet.

The NW quadrant appears to contain remnants of a pre-1850s structure that appears on the 1856 Walling Map. This structure was owned by William H. Williams (1776-1866), the namesake of the Village of Williamsville. The SW quadrant was once occupied by a mill and may contain belowground archaeological evidence of industrial activity in the area. No visible remnants of the mill complex were visible during the field inspection.

A series of current and historic images as well as a pair of historic maps showing the industrial and residential density of the project area in the middle-to-late 1800s can be found in the Appendix. Also of interest may be a ca. 1900 photo showing the elaborate cribbing that was needed to construct the reinforced concrete structure we see today.

Since the archaeological remains in the project area are not above ground, they should be marked out prior to construction so they can be avoided.

Stormwater:
There are no stormwater concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation reviews each new project to determine suitability for the Accelerated Bridge Program, which focuses on faster delivery of construction plans, permitting, and Right of Way, as well as faster construction of projects in the field. One practice that will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with faster construction techniques and incentives to contractors to complete projects sooner. The Agency will consider the closure option on most projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Construction should provide enhanced safety for the workers and the travelling public while maintaining project quality. The following options have been considered:

Option 1: Off-Site Detour

This option would close the bridge and reroute traffic onto an offsite detour. Since the bridge is located on a class 2 Town Highway, it would be the responsibility of the Town of Newfane to choose the preferred detour route, and to sign it.

There are a couple possible routes that could be appropriate for a detour at this site. The shortest of which is 4.5 miles end-to-end and adds approximately 0.5 miles to travel distance. This detour route is as follows:

1. Depot Road, to Grimes Hill Road, to VT Route 30, back to Depot Road (4.5 mi end-to-end)

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. This option would not require the need to obtain rights from adjacent property owners for a temporary bridge. Also, this option would have minimal impacts to property owners, hazardous waste sites, or archaeological resources adjacent to the bridge. This option reduces the time and cost of the project both at the development stage and construction. This is the safest traffic control option since the traveling public is removed from the construction site.

Disadvantages: Traffic flow would not be maintained through the project site during construction.

Option 2: Phased Construction

Phased construction is the maintenance of one way alternating traffic on the existing bridge while building one lane at a time of the proposed structure. This allows keeping the road open during construction, while having minimal impacts to adjacent property owners and environmental resources.

Due to horizontal constraints, this option is not being considered. In order to keep one lane open to traffic, approximately 12 feet of the existing bridge width needs to remain for Phase 1. The existing bridge is 17.5 feet wide, which does not provide enough of a working width to make this method advantageous. In some circumstances, phased construction can be accomplished with a shift in alignment. Due to the type and condition of the existing bridge, this is not recommended. Additionally, this option would increase the design and construction costs.

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed on either the upstream or downstream side of the existing bridge. A downstream temporary bridge would have temporary impacts to the gravel drive located before the bridge, and would potentially affect the hazardous waste site located on the downstream side of Town Highway 2. An upstream bridge would have impacts to archeologically sensitive areas, and would require an archeological assessment. Both an upstream and downstream temporary bridge would require additional rights from adjacent property owners.

A one-way temporary bridge would be required based on the daily traffic volumes. The Town of Newfane has indicated that they wish to pursue an off-site detour for traffic control during construction. As such, neither a cost estimate or plan layout has been provided for this method of traffic control in this report.

III. Alternatives Discussion

No Action

This alternative is not recommended. The bridge is in poor condition and will continue to deteriorate. Additionally, it poses a danger to the public who use the bridge area as a swimming hole, since there is a risk of falling concrete. The bridge is considered structurally deficient and will eventually be posted for lower traffic loads or even closed if no action is taken to repair or replace this bridge in the near future. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Alternative 1: Arch Rehabilitation

An arch rehabilitation would include repairs to the outer portions of the arch ring, repairs or possibly replacement of the foundations, and replacement of the spandrel walls.

- There is a significant map cracking all throughout the soffit area of the existing arch ring; this can be seen in the site pictures found in the appendix. This type of cracking is a characteristic of Alkali Silica Reaction (ASR), which is possibly the cause of deterioration of the ring. Water is leaking through this cracking as evident by water staining on the ring. Because of the rapid deterioration typical of ASR and a structure rating of Poor, a design life of 25 years should be assumed for this option.

- The foundation has map cracking and efflorescence throughout. Additionally it has areas with major delaminations and fully exposed rebar. The foundation concrete would need to be removed and patched with the appropriate level of concrete repair. When replacing concrete of this age with new concrete, it is required that the old concrete is removed down to “sound concrete”. It is possible that sound concrete will not be encountered, and if this is the case, then the entire foundation would need replacement.

- The existing spandrel walls have failed and would need to be entirely removed and replaced with new spandrel walls, as they are beyond rehabilitation. Any new spandrel walls will likely be thicker and heavier than existing since they will need to function as retaining walls

as well as be subject to the bridge railing loads. It is recommended that a lightweight concrete be used for any new spandrel walls in order to minimize the moment at the connection with the arch ring and minimize forces that would be exerted on the original ring.

The existing bridge has is a one-way alternating bridge with one 10 foot travel lane with 3.8 foot shoulders on each side. It is proposed that the new bridge would maintain the existing width to have one 10 foot travel lane with four foot shoulders. This would result in a one-way alternating bridge with a stop condition for the western approach. Widening the existing structure to allow for two-way traffic according to the current standards was discussed with the town, and it was decided that a one-way bridge would be maintained regardless of the scope chosen. If a wider bridge were desired, it would create design complications to cast a portion of a new arch ring and then attach it to the existing ring. Additionally, from a historic standpoint it would be more difficult to have a wider bridge permitted for Section 4(f) and Section 106 requirements. Based on the roadway classification, one way bridges are not specified in the standards, and a design exception will be required for this condition.

There would be difficulties in predicting the loading capacity of a rehabilitated bridge since there are no record plans that indicate the amount of reinforcing in the original arch. This also creates an issue in design of the replacement spandrel walls, since it is unknown what moment the arch ring can handle from the weight of the new walls.

In order to reduce construction time, the spandrel walls may be precast. The geometry and fascia pattern of the new walls should be similar to the existing historic walls.

Advantages: This alternative would address the structural deficiencies of the existing bridge, with minimum disruption to the historic value of this bridge. This option would have minimal impacts to adjacent properties and archeological resources. This option meets hydraulic standards.

Disadvantages: There are many difficulties with rehabilitating the existing reinforced concrete arch as described above. It is possible that the only bridge element that can be kept is the arch ring which is over 100 years old and deteriorating. It would be difficult to load rate the bridge due to a lack of record plans. The original arch ring was designed for much lower vehicle loads than are used today, and the additional weight of new spandrel walls and bridge railing will reduce the loading capacity even further.

Maintenance of Traffic: The Town of Newfane has expressed desire to maintain traffic utilizing an offsite detour.

Alternative 2a: Full Bridge Replacement – New Reinforced Concrete Arch On-Alignment

This alternative would replace the existing reinforced concrete arch with a new reinforced concrete arch as well as a new substructure with similar proportions and characteristics at the existing location. The various considerations under this option include: alignment, the bridge width and length, skew, superstructure type and substructure type.

a. Alignment

The existing horizontal alignment meets current minimum standards. Town Highway 2 currently intersects Town Highway 5 at a 73 degree angle. This meets the minimum of 60 degrees as set forth by the AASHTO Green Book. The most desirable two road intersection angle is 90 degrees,

however, it was discussed with the town, and decided that any new structure will be placed back on the existing horizontal alignment in order to minimize impacts and project costs

The existing vertical alignment does not meet the current minimum standards. By slightly modifying the banking on Dover Road/Grimes Hill Road, and raising the grade over the bridge approximately 11 inches, the vertical alignment can be brought up to standard. See the Plans in the appendix for the proposed banking and vertical profiles. The Town of Newfane expressed interest in raising depot road to result in a crest vertical curve to help with drainage over the bridge. This is not possible without significantly extending the project limits. Instead, it is recommended that drainage be taken into account when selecting bridge design details and when selecting railing details.

b. Bridge Width

The current rail to rail width is 17.6'; this does not meet the minimum standard of 26 feet. The existing bridge has is a one-way alternating bridge with one 10 foot travel lane with 3.8 foot shoulders on each side. It is proposed that the new bridge would maintain the existing width to have one 10 foot travel lane with four foot shoulders. This would result in a one-way alternating bridge with a stop condition for the western approach. Widening the existing structure to allow for two-way traffic according to the current standards was discussed with the town, and it was decided that a one-way bridge would be maintained regardless of the scope chosen. Additionally, by maintaining the existing width, the historic character of the original bridge can be maintained. An 18 foot width (rail to rail) bridge will be proposed.

c. Bridge Length and Skew

The existing arch has a span of 76.5 feet and no skew. If a new arch were constructed, a 76.5 foot span would be proposed in order to match the characteristics of the existing historic bridge, and to uphold the historic character. The natural channel is perpendicular to the bridge. Therefore it is proposed that any new bridge have no skew to match the existing site conditions.

d. Superstructure Type

This option would provide a new reinforced concrete arch similar to existing historic arch. The original arch is elliptical with a major axis length of 76.5 feet and a minor axis length of 31.0 feet. It is proposed that any new structure match these dimensions for mitigation.

e. Substructure Type

Both foundations currently lie directly on bedrock. As such, utilizing the same span bridge as existing, a new bridge in the same location would most likely also be founded directly on bedrock. Borings should be taken at the foundation locations to verify the bedrock properties. In order to reduce construction time, precast components may be used where possible.

Maintenance of Traffic: The Town of Newfane has expressed desire to maintain traffic utilizing an offsite detour.

Alternative 2b: Full Bridge Replacement – New Bridge with Concrete Arch Façade On-Alignment

This alternative would replace the existing reinforced concrete arch with a new bridge. A concrete arch façade with similar proportions and characteristics of the existing Arch would be attached to the fascias of the new bridge and a non-functioning arch ring would be placed under the beams to give the new bridge the appearance of an arch at the existing location. The various considerations under this option include: alignment, the bridge width and length, skew, superstructure type and substructure type.

a. Alignment

The existing horizontal alignment meets current minimum standards. Town Highway 2 currently intersects Town Highway 5 at a 73 degree angle. This meets the minimum of 60 degrees as set forth by the AASHTO Green Book. The most desirable two road intersection angle is 90 degrees, however, it was discussed with the town, and decided that any new structure will be placed back on the existing horizontal alignment in order to minimize impacts and project costs

The existing vertical alignment does not meet the current minimum standards. By slightly modifying the banking on Dover Road/Grimes Hill Road, and raising the grade over the bridge approximately 11 inches, the vertical alignment can be brought up to standard. See the Plans in the appendix for the proposed banking and vertical profiles. The Town of Newfane expressed interest in raising depot road to result in a crest vertical curve to help with drainage over the bridge. This is not possible without significantly extending the project limits. Instead, it is recommended that drainage be taken into account when selecting bridge design details and when selecting railing details.

b. Bridge Width

The current rail to rail width is 17.6'; this does not meet the minimum standard of 26 feet. The existing bridge has is a one-way alternating bridge with one 10 foot travel lane with 3.8 foot shoulders on each side. It is proposed that the new bridge would maintain the existing width to have one 10 foot travel lane with four foot shoulders. This would result in a one-way alternating bridge with a stop condition for the western approach. Widening the existing structure to allow for two-way traffic according to the current standards was discussed with the town, and it was decided that a one-way bridge would be maintained regardless of the scope chosen. Additionally, by maintaining the existing width, the historic character of the original bridge can be maintained. An 18 foot width (rail to rail) bridge will be proposed.

c. Bridge Length and Skew

The existing arch has a span of 76.5 feet and no skew. For a bridge to span a faux arch of this size, a bridge span of approximately 100 feet would be necessary. The natural channel is perpendicular to the bridge. Therefore it is proposed that any new bridge have no skew to match the existing site conditions.

d. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. Since traffic will be detoured, accelerated bridge construction techniques are appropriate in order to reduce the length of disruption to traffic. The most economical 100' span length bridge type that is most commonly used in Vermont, is a steel and composite concrete deck (Precast Bridge Units). This option would also provide a new concrete arch façade with similar characteristics to the existing historic arch.

e. Substructure Type

Both foundations currently lie directly on bedrock. As such, utilizing the same span arch as existing, a new faux arch ring would most likely also be founded directly on bedrock. Additionally, since a new bridge would be located high above ordinary high water, and located behind the faux arch ring, it could be founded on a simple slab. Borings should be taken at the foundation locations to verify the bedrock properties. In order to reduce construction time, precast components may be used where possible.

Maintenance of Traffic: The Town of Newfane has expressed desire to maintain traffic utilizing an offsite detour.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and Town input there are two viable alternatives:

Alternative 1: Arch Rehabilitation with Traffic Maintained on Off-Site Detour

Alternative 2a: Full Bridge Replacement On-Alignment with New Functioning Reinforced Concrete Closed Spandrel Elliptical Arch and Traffic Maintained on Off-Site Detour

Alternative 2b: Full Bridge Replacement On-Alignment with New Precast Bridge with a Concrete Arch Facade and Traffic Maintained on Off-Site Detour

V. Cost Matrix[1]

Newfane BF 0106(6)		Do Nothing	Alt 1	Alt 2	
			Rehabilitation of Existing Reinforced Concrete Arch	a. Bridge Replacement with New Functioning Reinforced Concrete Closed Spandrel Elliptical Arch	b. Bridge Replacement with New Precast Bridge and Concrete Arch Facade
			Offsite Detour	Offsite Detour	Offsite Detour
COST	Bridge Cost	$0	$398,000	$748,000	$1,306,000
	Removal of Structure	$0	$83,000	$171,000	$171,000
	Roadway	$0	$250,000	$350,000	$350,000
	Maintenance of Traffic	$0	$51,000	$72,000	$72,000
	Construction Costs	$0	$782,000	$1,341,000	$1,899,000
	Construction Engineering + Contingencies	$0	$235,000	$470,000	$570,000
	Total Construction Costs w CEC	**$0**	**$1,016,600**	**$1,743,300**	**$2,468,700**
	Preliminary Engineering[2]	**$0**	**$273,700**	**$335,250**	**$379,800**
	Right of Way	**$0**	**$54,740**	**$54,740**	**$54,740**
	Total Project Costs	$0	$1,345,040	$2,133,290	$2,903,240
	Town Share	$0	$0[3]	$106,665 (5%)	$145,162 (5%)
	Annualized Costs	$0	$53,900	$26,700	$36,300
SCHEDULING	Project Development Duration[4]		5 years	5 years	5 years
	Construction Duration		8 months	8 months	8 months
	Closure Duration (If Applicable)		Approximately 12 weeks	Approximately 20 weeks	Approximately 16 weeks
ENGINEERING	Typical Section - Roadway (feet)	26'	26'	26'	26'
	Typical Section - Bridge (feet)	3.8-10-3.8	4-10-4	4-10-4	4-10-4
	Geometric Design Criteria	Substandard width and vertical curve	Substandard width	Substandard width	Substandard width
	Traffic Safety	No Change	Reduced Load Capacity	Improved	Improved
	Alignment Change	No	Slight Vertical Rise	Slight Vertical Rise	Slight Vertical Rise
	Bicycle Access	No Change	No Change	No Change	No Change
	Hydraulic Performance	Meets Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	Pedestrian Access	No Change	No Change	No Change	No Change
	Utility	No Change	Relocation	Relocation	Relocation
OTHER	ROW Acquisition	No	Yes	Yes	Yes
	Road Closure	No	Yes	Yes	Yes
	Design Life	<10 years	25 Years	80 years	80 years

[1] Costs are estimates only, used for comparison purposes.
[2] Preliminary Engineering costs are estimated starting from the end of the Project Definition Phase.
[3] No local share as per 19 V.S.A § 309a. (http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=19&Chapter=003&Section=00309a).
[4] Project Development Durations are starting from the end of the Project Definition Phase.

VI. Conclusion

We recommend **Alternative 2**; a full bridge replacement on-alignment while maintaining traffic on an offsite detour.

Structure:
The existing arch is listed on the Reinforced Concrete Arch Preservation Plan as a bridge of exceptional historical significance, and should be preserved as a first choice. However, the existing structure is rated as poor, and repairs to the existing arch would be so extensive that a full structure replacement is warranted. The spandrel walls have failed and would need full replacement. Additionally, the foundation concrete is in an unknown condition and it is possible that the entire foundation would need replacement. The only component of the original arch that could be retained is the arch ring itself. The map cracking throughout the existing arch ring is indicative of Alkali-Silica Reaction, which results in rapid deterioration. Any new concrete would have a reduced design life since deterioration would be sped up from the reaction with old concrete. Because of all these reasons, a rehabilitation project would be costly while having a reduced loading capacity and design life, and as such, a full replacement is recommended.

The new structure will result in a brand new 80 year bridge, with minimal future maintenance requirements. While alternative 1 is less expensive upfront, it only has a design life of 25 years, making the annualized cost more. In order to obtain the necessary Section 4(f) and Section 106 historic permitting requirements for this alternative, the new structure would need to match the existing arch characteristics.

The new structure can either be a functioning reinforced concrete arch similar to the original structure, or a prefabricated steel beam bridge with a concrete arch façade to mimic the original structure. With either option, the structure will have the appearance of a closed spandrel elliptical arch, similar to the existing in dimensions, with a major axis length of 76.5 and a minor axis length of 31.0 feet. This clearspan meets the hydraulic standard of passing the Q_{50} storm event with at least 1.0' of freeboard, and meets bank full width requirements. The lines and concrete details of the original spandrel walls shall be replicated as close as possible. Additionally, all dimensions and proportions of the original arch should be maintained where possible.

In order to facilitate rapid construction of the new bridge, the bridge/arch components can be prefabricated.

Traffic Maintenance:
The recommended method of traffic control is to close the bridge, and maintain traffic on an offsite detour. The most appropriate detour for this project location would add approximately 0.5 miles to the through route, and have an end-to-end distance of 4.5 miles.

This option will have smaller impacts to adjacent properties and surrounding environmental resources and will not require additional Right-of-Way acquisition for a temporary bridge. The ADT on Town Highway 2 is 1500, which is considered relatively low. Additionally, there are several reasonable detour routes that could be signed by the Town of Newfane. Therefore, it is reasonable to close the road and reroute traffic while the new bridge is being constructed. By not providing a temporary bridge, the project cost is significantly reduced. Additionally the option to close the road is the safest option.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archeology Memo
- Historic Memo
- Hazardous Sites Map
- Local Input
- Detour
- Plans
    - Existing Conditions
    - Proposed Typical Sections
    - Proposed Layout and Profile
    - Historical Elevation Sheet

Looking East on Depot Road over Bridge 12

Looking West on Depot Road over Bridge 12

Delamination and Spalling of foundation.
Exposed rebar and efflorescence on arch ring.

Delamination/separation of spandrel wall

Looking South from Grimes Hill Road onto Dover Road.

Looking North from Dover Road onto Grimes Hill Road.

Failing Bridge Railing. Note exposed Rebar.

Scale 1:44,082

N

- INTERSTATE
- STATE LONG
- STATE SHORT
- TOWN LONG
- FAS/FAU
- FAS/FAU HWY
- INTERSTATE
- STATE HIGHWAY
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LT — LEGAL TRAIL
- PRIVATE
- D — DISCONTINUED
- DISTRICT
- POLITICAL BOUNDARY
- NAMED RIVERS-STREAMS
- UNNAMED RIVERS-STREAMS

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011

NEWFANE
WINDHAM COUNTY
DISTRICT # 2

NEWFANE BR 12
BF 0106(6)

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for NEWFANE **bridge no.:** 00012 **District:** 2

Located on: TR 02 FAS 106 **over** ROCK RIVER **approximately** 1.9 MI W JCT. VT.30 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: N NOT APPLICABLE

Superstructure Rating: N NOT APPLICABLE

Substructure Rating: N NOT APPLICABLE

Channel Rating: 8 VERY GOOD

Culvert Rating: 4 POOR

Federal Str. Number: 200106001213122

Federal Sufficiency Rating: 043

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1900 **Year Reconstructed:** 1934

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 29

ADT: 001310 **% Truck ADT:** 06

Year of ADT: 1995

GEOMETRIC DATA

Length of Maximum Span (ft): 0076

Structure Length (ft): 000100

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 17.6

Deck Width Out-to-Out (ft): 21

Appr. Roadway Width (ft): 022

Skew: 00

Bridge Median: 0 NO MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: CONCRETE ARCH

Number of Approach Spans: 0000 **Number of Main Spans:** 001

Kind of Material and/or Design: 1 CONCRETE

Deck Structure Type: N NOT APPLICABLE

Type of Wearing Surface: N NOT APPLICABLE

Type of Membrane N NOT APPLICABLE

Deck Protection: N NOT APPLICABLE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA

Deck Geometry: N NOT APPLICABLE

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 8 SLIGHT CHANCE OF OVERTOPPING ROADWAY

Approach Roadway Alignment: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 0 NO RATING ANALYSIS PERFORMED

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 052014 **Insp. Freq. (months)** 12 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

5/5/2014 Structure is in poor condition and should be considered for rehab or replacement in the near future. This is a local swimming hole so the spalling and delams should be removed so people are not in danger of falling debris. ~FRE/TJB

5/6/2013 Structure should be considered for rehab in the near future. However this area is a local swimming hole and loose concrete on the fascias and the soffit area should be removed so people are not in danger of falling concrete. Concrete rails should be cleaned and patched. ~FRE/DAK

7/11/2012 Rail along the top of the structure should be repaired. Large delams on the downstream side on the abutment #1 side should be removed and repaired. ~FRE/SJH

*03/25/2010 - * The main portion of the arch vault maintains carrying capacity, however, the outer portions of the arch ring have been compromised by heavy deterioration of the original concrete and subsequent section loss. The spandrel walls which retain roadway fill material are dependent on the ring of the outer arch for support. The gunnite shroud has no practical repair solution. The arch built at the turn of the century should either be replaced or perhaps bypassed with a new structure. ~ MJ/MK*

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Project Manager

FROM: Nick Wark, P.E., Hydraulics Engineer

DATE: July 22, 2014

SUBJECT: Newfane BF 0106(6) – Preliminary Hydraulics

Existing Structure

The existing structure is a concrete arch built in 1900. The abutments are founded on exposed ledge. The span is approximately 76' measured at the base of the abutments. The abutments are slightly and irregularly battered. The max clear span is approximately 78' measure just below the haunches. The span length along the centerline and the effective span length measured perpendicular to the channel are the same.

The existing bridge is hydraulically adequate. Q50 water surface elevation is 496.5' and Q100 is 497.5'. The peak of the arch is at 517.05' so there is over 20' of freeboard to this point at the Q50 design storm, which applies to major collectors.

The existing structure spans both the measured and calculated bankfull width. The abutments are well aligned with the channel.

Recommendations

The new structure should be as long as the existing (78'). Due to the ledge, this recommendation is based on vertical abutments with no stone fill. If stone fill is needed in front of the abutment the bridge will need to be significantly longer and ledge may need to be removed so the channel cross section is not constricted. Contact us if this is a viable alternative and we will work with you to develop the required span length and stone fill limits for this type of structure.

Low beam (including haunches of an arch) can be lowered to elevation 501' while still meeting the hydraulic standards and having no impact to the Q100 water surface elevation. It may be possible to go slightly lower than this but we will need specific information on the arch/bridge geometry. Contact us if you would like an exact low beam elevation for a specific design.

If required, it is acceptable to replace this structure with the exact same arch geometry and abutment batter as the existing structure meets hydraulic standards.

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

NJW

cc: Hydraulics Project File
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

From: Thomas D. Eliassen, Transportation Geologist via Christopher C. Benda, Soils and Foundations Engineer

Date: February 10, 2014

Subject: Newfane BF0106 (6) Preliminary Geotechnical Information Report

In an effort to assist the Structures Section with their bridge type study, the Soils and Foundations Unit within the Materials and Research Section has completed a review of available geological data near Bridge No. 12 on Depot Road which crosses over the Rock River in Newfane, Vermont. Figure 1 shows the subject bridge during a 2013 bridge inspection.

Figure 1 Photograph of Bridge 12. Photograph was taken during 2013 bridge inspection.

The bridge is a concrete arch type whose abutments rest directly on bedrock. The river channel at this location is floored by bedrock with recent alluvium deposits ranging from sand to boulder in size.

Normally, a review would include the examination of historical in-house bridge boring files, as-built record plans, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps and water well logs on-file at the Agency of Natural Resources. A review of record plans from original construction of the current bridge were reviewed which confirmed that the bridge abutments rest directly on bedrock (Figure 2). Considering bedrock is exposed at the surface within the footprint of this bridge, a review of water well logs and USDA Natural Resources Conservation soil survey records was not necessary.

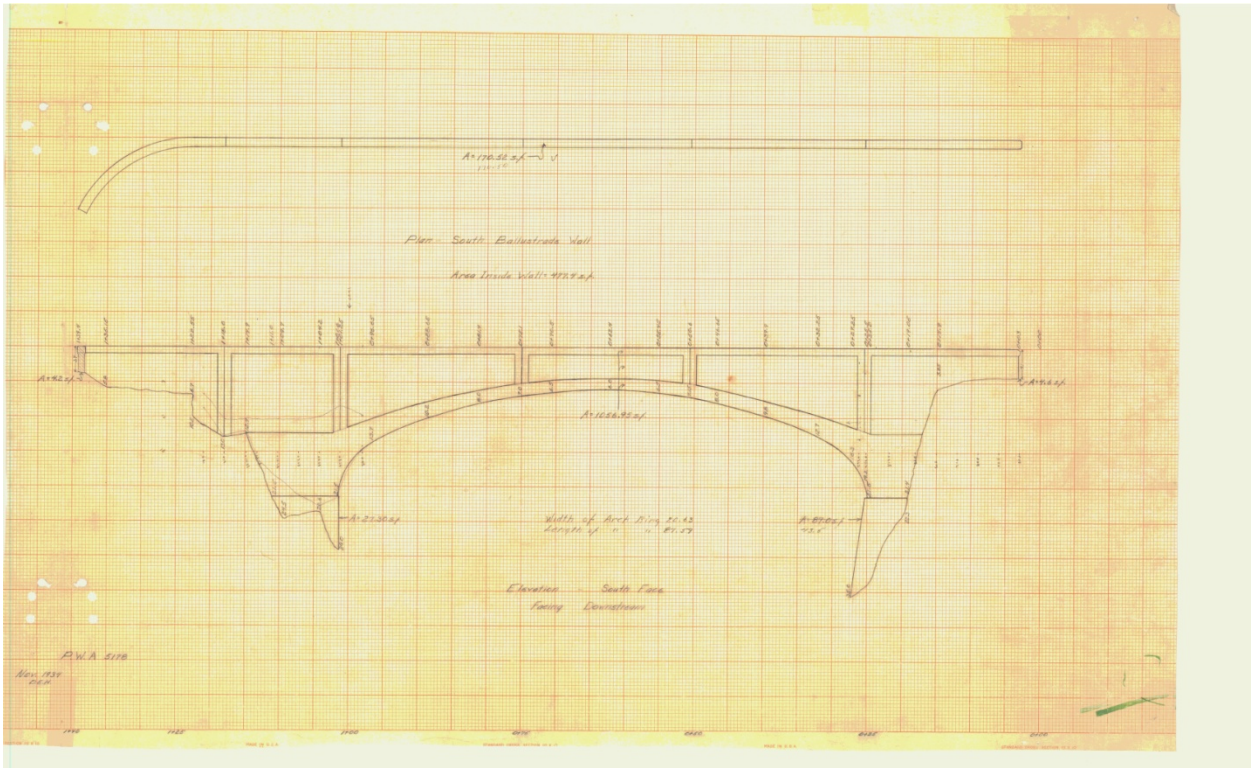


Figure 2 Plan sheet from 1934 original bridge construction.

According to the 2011 bedrock map of Vermont, the project area overlies bedrock consisting of "Dark-gray to black, poorly layered, porphyritic and nonporphyritic ilmenite-epidote-chlorite-plagioclase-hornblende amphibolite" of the North River Igneous Suite of rocks. Foliation in the rock dips steeply in a southeasterly direction and the rock is cut by jointing which dip at low angles toward the southeast. Figure 2 shows the rock at the southeasterly abutment of the existing bridge.

Figure 3 Bedrock exposed at southeastern abutment. Photograph was taken during site visit on January 31, 2013.

During our site visit performed on January 31, 2014, we observed that bedrock is exposed along in the river channel and both sides of riverbanks and it appears that both abutments are founded on bedrock (see Figure 3). Toppling failures of slabs of rock were noted adjacent to the southeastern abutment although these loose slabs do not appear to be adversely affecting the stability of the existing abutment.

Thin soil cover overlies bedrock at the top of each of the river banks. According to surficial geologic mapping conducted for the 1970 Vermont State Surficial Map, these soils are made up of glacial granular Kame deposits.

Prior to the development of project plans, we recommend that a thorough geologic assessment of the bedrock on this project be performed. This assessment would include an evaluation of the quality of the rock as well as other critical design parameters such as orientation and condition of any jointing or other discontinuities which may have an impact on the design of the bridge footings. Due to the present winter conditions that would make this investigation inaccessible and potentially dangerous, we recommend that this work be performed in the late spring after the snow and ice have melted and the level of the river receded.

Based on the limited information gathered during this investigation, possible foundation options for a bridge replacement include the following:

- Reinforced concrete abutment on spread footings
- Precast arch on spread footings

It is recommended that a minimum of two borings be drilled to a depth sufficient to penetrate 10 feet into sound bedrock behind the existing abutments in order to assess the subsurface conditions and engineering parameters of the rock. If variable conditions are encountered, additional borings should be advanced to establish a more detailed bedrock profile.

If you have any questions, please feel free to contact us at 828-6916.

c: WEA/Read File
CCB/Project File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: Lee Goldstein, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: January 3, 2014

SUBJECT: **NEWFANE B_F 0106 (6)**
Natural Resources Identification
FAS 106, Br. 12 over Rock River

Wetlands
There are no wetlands are not present in the immediate vicinity of the bridge.

Agricultural Soils
There are no prime agricultural soils located in the vicinity of the bridge.

Floodplains
The Rock River is confined within a steep sided, high gradient stream bed in this location and thus, there is no floodplain associated with this watercourse in the vicinity of the project.

Fisheries
The Rock River is a cold-water stream and in-stream construction activities (permanent or temporary) will be subjected to in-stream timing restrictions. In addition, erosion prevention and sedimentation controls will be the best line of defense against unnecessary impacts.

Species of Special Concern
There are no species of special concern near this project.

Permits & Construction
Although the Rock River is not a *Navigable Waterway* or *Essential Fish Habitat*, in-stream work (including temporary work) will require both a Stream Alteration Permit and 401 Water Quality Certificate from the ANR, and a Section 404 General Permit from the Corps. The existing arch appears to be more than adequate for this crossing and has many ecological benefits over a structure with a pier in the river. A new arch, clear-span, or a project which widens the existing structure will all be readily permittable. If a temporary bridge is required for this project, a clear-span of the channel (above OHW) immediately adjacent to the existing structure (either side) will be the simplest to permit.

Should you have any questions about this, please call me at 828-3963.

VERMONT

Jeannine Russell
VTrans Archaeology Officer
State of Vermont
Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

Agency of Transportation

[phone] 802-828-3981
[fax] 802-828-2334
[ttd] 800-253-0191

To: Lee Goldstein, VTrans Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer
via Brennan Gauthier, VTrans Archaeologist

Date: 5/19/2014

Subject: Newfane BF 0106(6) – Archaeological Resource ID

Lee,

A field visit was conducted on 5/14/2014 in order to assess archaeological sensitivity in the immediate APE around Bridge 12 on Dover and Depot Roads over Rock River in Newfane, Windham County, VT. A generalized radius of 200 feet around both bridge approaches was implemented as a baseline APE. The project has yet to be scoped, so an assessment was completed encompassing multiple alternatives. Two quadrant of historic archaeological sensitivity was identified during field review and mapped into the archaeology geodatabase for inclusion in future plans.

The NW quadrant appears to contain remnants of a pre-1850s structure that appears on the 1856 Walling Map. This structure was owned by William H. Williams (1776-1866), the namesake of the Village of Williamsville. The SW quadrant was once occupied by a mill and may contain belowground archaeological evidence of industrial activity in the area. No visible remnants of the mill complex were visible during the field inspection. Both areas have been added to the archaeology geodatabase.

I've attached a series of current and historic images as well as a pair of historic maps showing the industrial and residential density of the project area in the middle-to-late 1800s. Also of interest may be a ca. 1900 photo showing the elaborate cribbing that was needed to construct the reinforced concrete structure we see today. Please feel free to contact me with any questions or concerns that may arise as part of this project.

Sincerely,

Brennan

Brennan Gauthier
VTrans Archaeologist
Vermont Agency of Transportation
Project Delivery Bureau
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-3965
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation

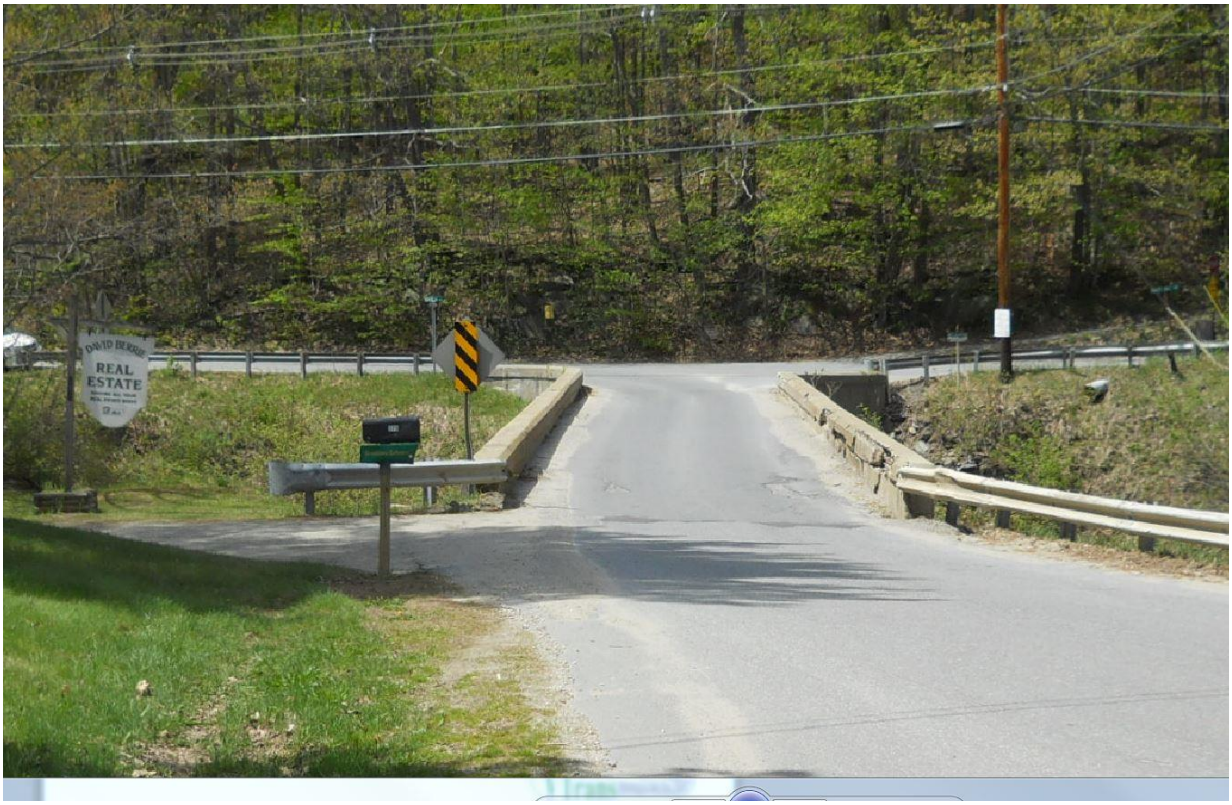


Figure 1: May 14th, 2014 Photo

Figure 2: Ca. 1915 Photo
Porter C. Thayer

Figure 3: Ca. 1900 Bridge Construction Photo
Porter E. Thayer

Figure 4: 1850s Walling Map

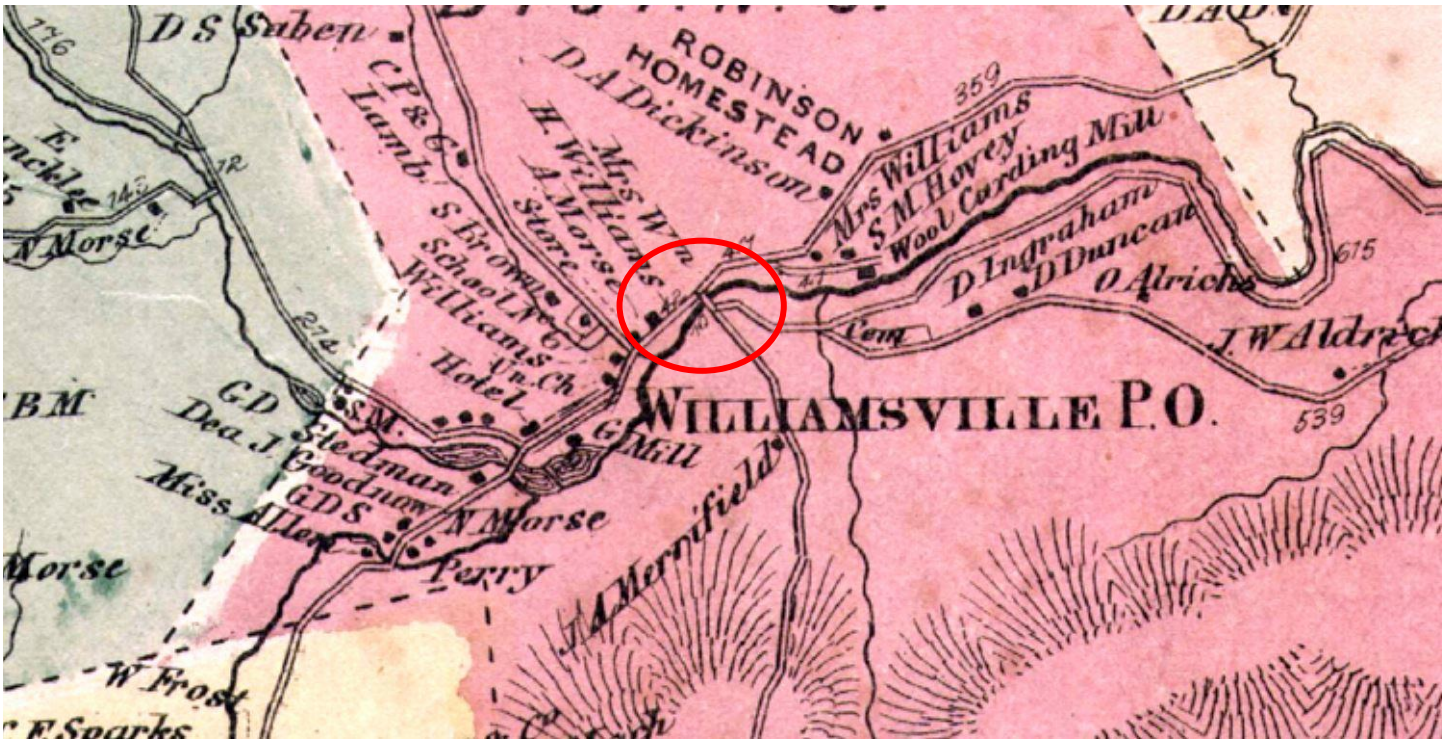


Figure 5: 1860s Beers Map

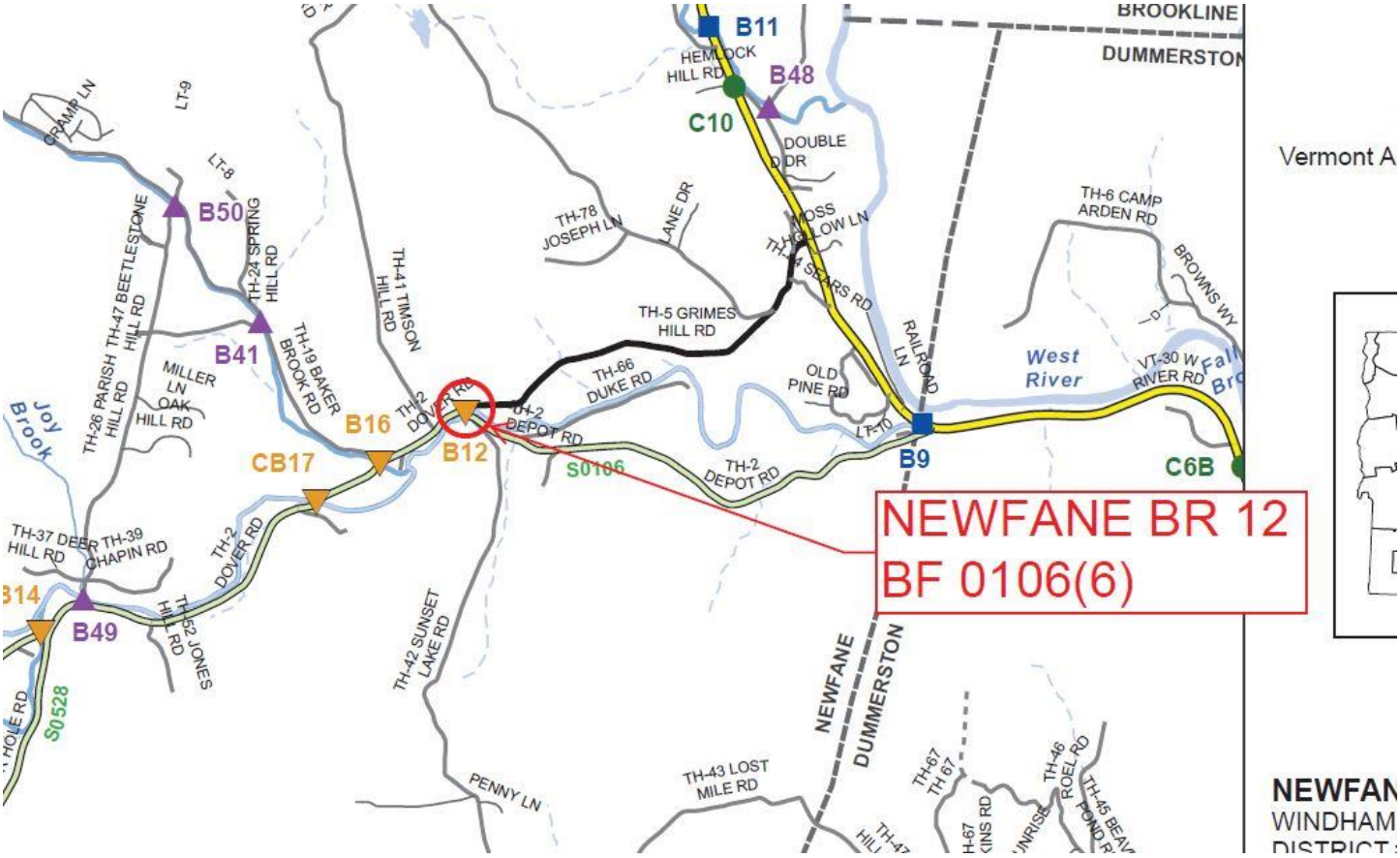
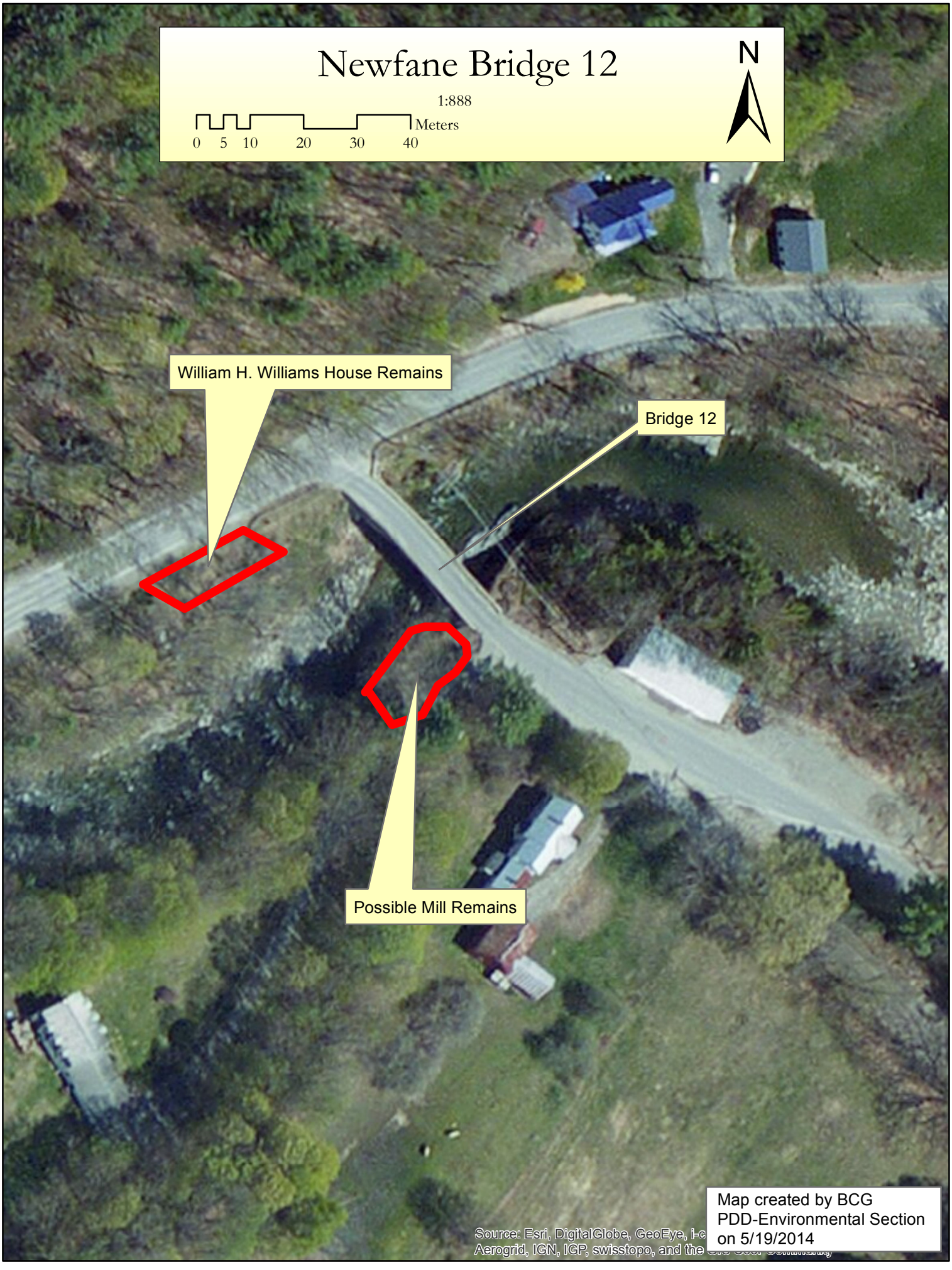


Figure 6: 2014 Map


Newfane Bridge 12
1:888
Meters
0 5 10 20 30 40
N
William H. Williams House Remains
Bridge 12
Possible Mill Remains
Map created by BCG
PDD-Environmental Section
on 5/19/2014
Source: Esri, DigitalGlobe, GeoEye, i-c
Aerogrid, IGN, IGP, swisstopo, and the

Stone, Laura

From: O'Shea, Kaitlin
Sent: Monday, February 10, 2014 1:53 PM
To: Goldstein, Lee
Cc: Newman, Scott; Williams, Chris
Subject: Newfane BF 0106(6) Historic Resource ID

Hi Lee,

I have completed the historic resource ID for Newfane BF 0106(6).

Bridge 12 is a historic bridge of particular significance. It is a 76' closed spandrel elliptical concrete arch that carries Town Highway 2 across the Rock River. It was constructed in 1908 by the Brattleboro contracting firm, Crosby and Parker. Bridge 12 is included in the Reinforced Concrete Arch Preservation Plan under Category 1, meaning the preferred method of treatment is preservation.

The bridge is the gateway to the Williamsville Village Historic District, which continues west on Dover Road. There is a pull off area and stone wall adjacent to the bridge, on the NW quadrant. These areas are included in the historic district.

The project will require a Section 4(f) bridge programmatic evaluation and potentially others, depending on the impacts to nearby properties.

The historic resources have been mapped on Arcmap.

Let me know if you have any questions.

Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

802-828-3962
Kaitlin.O'Shea@state.vt.us

Hazardous Waste Sites

Local & Regional Input Questionnaire

Project Name: Bridge 12 **Project Number: Newfane BF0106(6) FAS 0106**

Community Considerations

1. Are there any scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include: a bike race, festivals, cultural events, farmers market, concerts, etc. that could be impacted? If yes, please provide date, location and event organizers' contact info.

   In or around July, the Rock River Artists' Tour is held, which is a tour around Williamsville/South Newfane. At the end of August, there is generally a Rock River Revival parade in Williamsville.

2. Is there a "slow season" or period of time from May through October where traffic is less?

   No.

3. Please describe the location of emergency responders (fire, police, ambulance) and emergency response routes.

   S. Newfane/Williamsville Fire Department is approximately 1/4 mile from the project site, on the Williamsville side. NewBrook Fire Department is on Route 30 in Newfane. Access can be via Grimes Hill Road.

4. Where are the schools in your community and what are their schedules?

   Newfane Elementary School is located on Route 30 in Newfane. They are open from approximately 9/1 - 6/18. There is a private child care facility on Timson Hill in Williamsville. They are open year round.

5. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling? Please explain.

   There is nothing that is likely to lead to significant levels of walking or bicycling.

6. Are there any businesses (including agricultural operations) that would be adversely impacted either by a detour or due to work zone proximity?

   There are currently no business that would be adversely impacted by the a detour.

7. Are there any important public buildings (town hall or community center) or community facilities (recreational fields or library) in close proximity to the proposed project?

   The former highway garage (still used for storage of highway equipment) is adjacent to the project site. The Williamsville Hall is located approximately 1/4 mile from the project location on Dover Road.

8. Are there any town highways that might be adversely impacted by traffic bypassing the construction on another local road?

   There is a potential for Sunset Lake Road and Depot Road to be adversely affected by this.

9. Are there any other municipal operations that could be adversely impacted if the bridge is closed during construction? If yes, please explain.

   There are no other municipal operations that will be adversely impacted due to closure.

10. Please identify any local communication channels that are available—e.g. weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM.

    Brattleboro Reformer - local daily newspaper
    WTSA 96.7 - local radio station
    WKVT 92.7 - local radio station
    BCTV - public access television
    www.frontporchforum.com

11. Is there a local business association, chamber of commerce or other downtown group that we should be working with?

    There are no additional local groups that need to be worked with.

Design Considerations

1. Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of?

   One lane bridge at a T intersection.

2. Are there any concerns with the width of the existing bridge?

   One lane bridge.

3. What is the current level of bicycle and pedestrian use on the bridge?

   Low level of bicycle and pedestrian use on current bridge.

4. If a sidewalk or wide shoulder is present on the existing bridge, should the new structure have one? Are there existing bicycle and/or pedestrian facilities on the approaches to the bridge?

   There is no sidewalk or wide shoulder on the present bridge. There are no existing bike/pedestrian facilities on the approaches.

5. Does the Town have plans to construct either bicycle or pedestrian facilities leading up to the bridge? Please provide a copy of the planning document that demonstrates this (e.g. scoping study, master plan, corridor study) Please explain and provide documentation.

   There are no current plans to construct bike or pedestrian facilities leading up to the bridge.

6. Does the bridge provide an important link in the town or statewide bicycle or pedestrian network such that you feel that bicycle and pedestrian traffic should be accommodated during construction?

   The bridge does not currently provide a link to any bike or pedestrian network.

7. Are there any special aesthetic considerations we should be aware of?

   There are no special aesthetic considerations at this time.

8. Are there any traffic, pedestrian or bicycle safety concerns associated with the current bridge? If yes, please explain.

   One lane bridge at a T intersection.

9. Does the location have a history of flooding? If yes, please explain.

   There is no history of flooding at this location.

10. Are you aware of any nearby Hazardous Material Sites?

    We are not aware of any nearby Hazardous Material sites.

11. Are you aware of any historic, archeological and/or other environmental resource issues?

    We are not aware of any historic, archeological and/or environmental resource issues.

12. Are there any other comments you feel are important for us to consider that we have not mentioned yet?

    This site is located on a Federal Connector highway. Also, please note that emergency personnel will need to almost double response time for any emergencies on the Depot Road/Sunset Lake Road side of the bridge.

Land Use & Public Transit Considerations – to be filled out by the municipality or RPC.

1. Does your municipal land use plan reference the bridge in question? If so please provide a copy of the applicable section or sections of the plan.

   The current Zoning Bylaw does not specifically reference the bridge in question.

2. Please provide a copy of your existing and future land use map, if applicable.

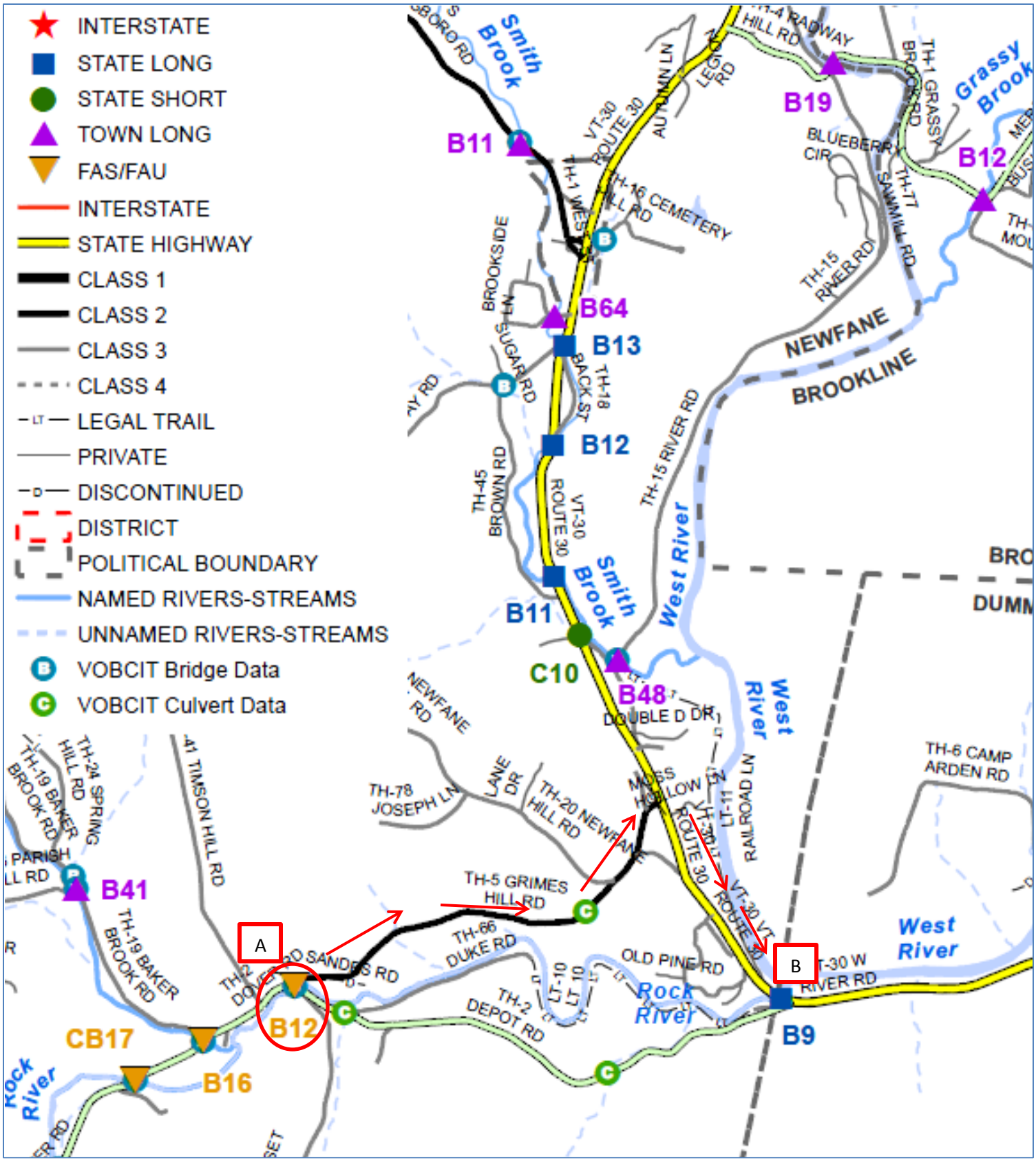
   N/A

3. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so please explain.

   There are no current existing, pending or planned development proposals that would impact future transportation patterns near the bridge.

4. Is there any planned expansion of public transit service in the project area? If not known please contact your Regional Public Transit Provider.

   There is currently no planned expansion of public transit services in the project area.



Detour Route

Depot Road (TH 2/FAS 106), to Grimes Hill Road, to VT Route 30, back to Depot Road

A – B Through Route: 2.0 Miles
A – B Detour Route: 2.5 Miles
Added Miles: 0.5 Miles
End-End Distance: 4.5 Miles

EXISTING BRIDGE INFORMATION
100' CONCRETE ARCH
BUILT 1900, RECONSTRUCTED 1934
21' FASCIA TO FASCIA

TH-5 EXISTING CURVE 1
DELTA = 23°25'28"
D = 12°43'57"
R = 450.00'
T = 93.29'
L = 183.98'
E = 9.57'

TH-2 EXISTING CURVE 1
DELTA = 18°48'02"
D = 22°55'06"
R = 250.00'
T = 41.39'
L = 82.03'
E = 3.40'

TH-2 EXISTING CURVE 2
DELTA = 5°32'45"
D = 5°43'46"
R = 1000.00'
T = 48.44'
L = 96.79'
E = 1.17'

PI STA 31+67.20
PT STA 32+57.89
PC STA 30+73.91
PC STA 41+47.49
PT STA 42+29.53
PI STA 43+36.84
POE STA 44+67.11
PC STA 42+88.40
PI STA 41+88.88
POB STA 38+00.00
PI STA 38+00.00

TH-5 (GRIMES HILL ROAD) TO VT ROUTE 30
TH-2 (DEPOT ROAD) TO VT ROUTE 30
TH-2 (DOVER ROAD) TO DOVER
TH-42 (SUNSET LAKE ROAD)

ROCK RIVER FLOW

TOWN OF NEWFANE

REDDEN, DAVID D. & ARIEL

SANDES, ROGER & MARY

HASKINS, STEPHEN C.

GOLDENHILL, ROBERT

BERRIE, DAVID S. & CYNTHIA

YOUNG, ROBERT & GROOM, SASKIA

BENCHMARK
RAIL ROAD SPIKE
IN LEDGE
ELEV= 527.49

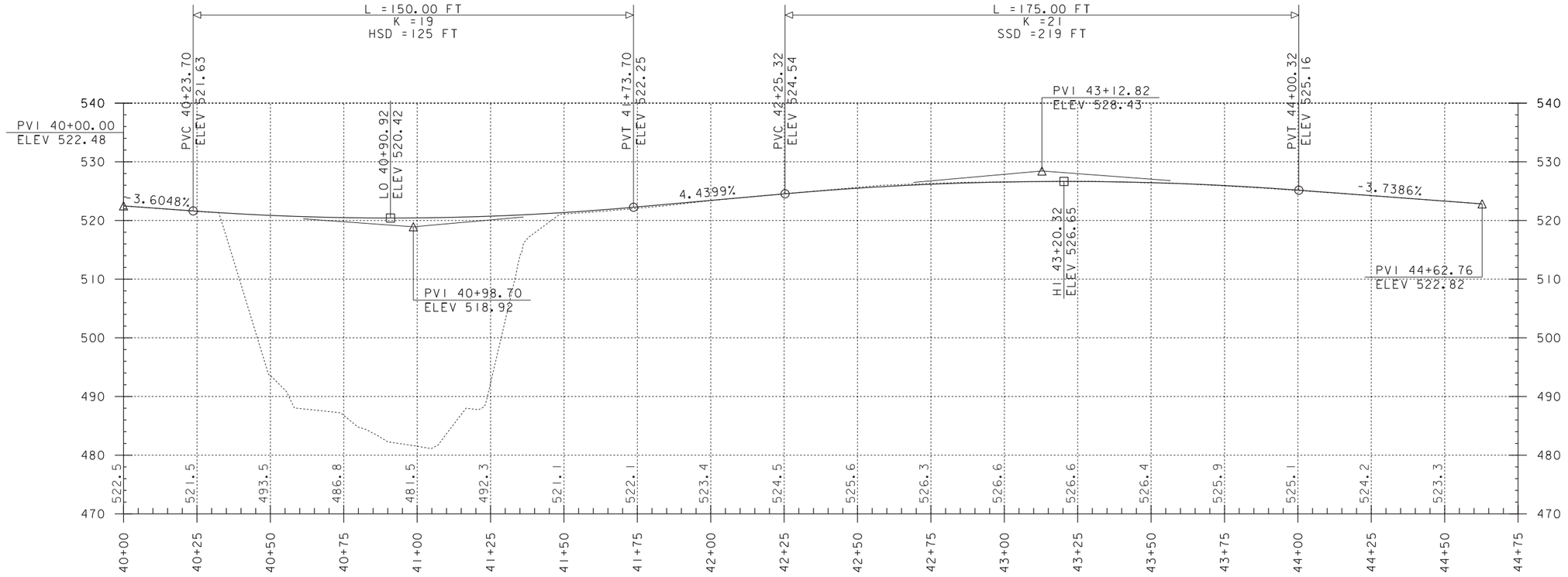
USGS BENCHMARK
15 REM 1942
ELEV= 521.01

VT STATE PLANE GRID

EXISTING CONDITIONS

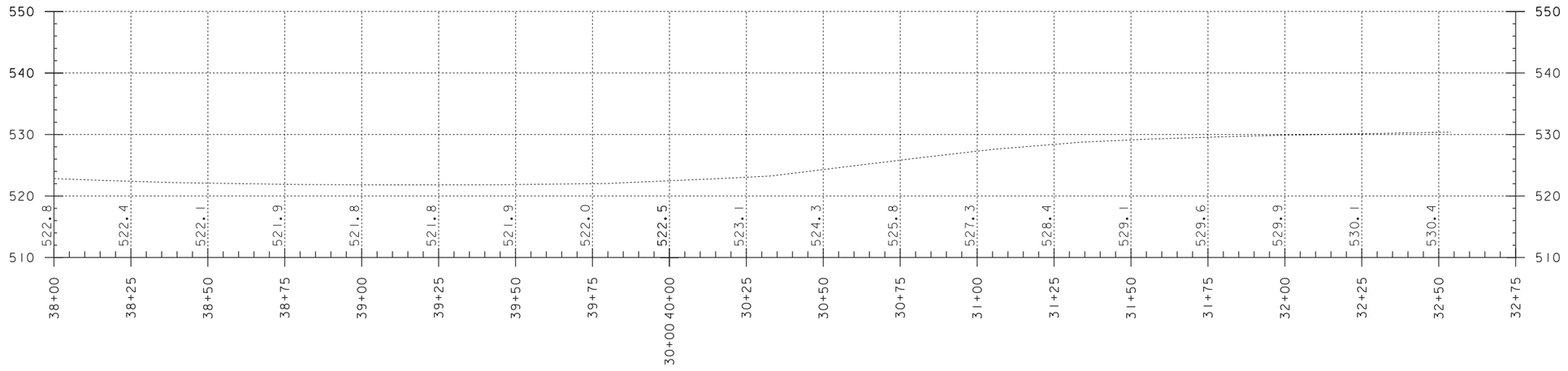
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	NEWFANE
PROJECT NUMBER:	BF 0106(6)
FILE NAME:	13j306/sl3j306border.dgn
PROJECT LEADER:	C.P.WILLIAMS
DESIGNED BY:	------
EXISTING CONDITIONS	
PLOT DATE:	15-SEP-2014
DRAWN BY:	D.D.BEARD
CHECKED BY:	------
SHEET	1 OF 6



TH-2 (DEPOT ROAD) EXISTING PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



TH-2 (DEPOT ROAD) & TH-5 (GRIMES HILL ROAD) PROFILE

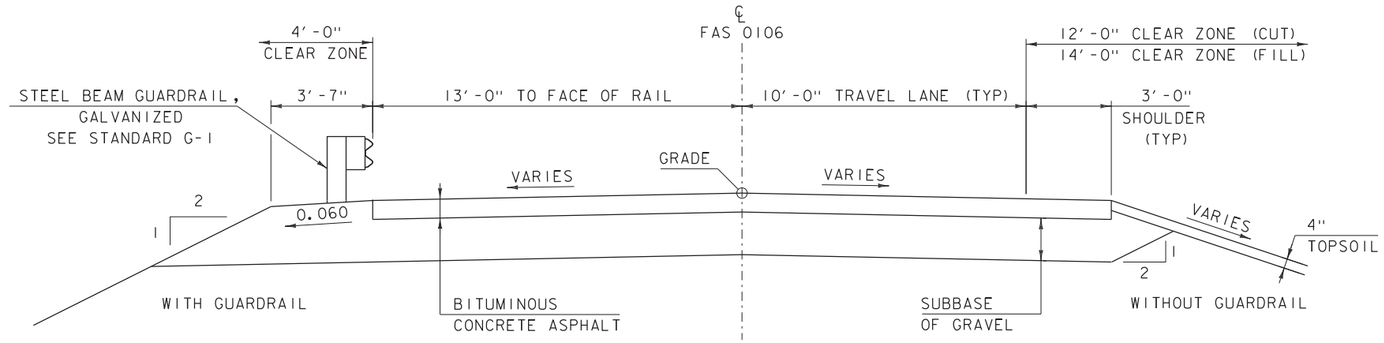
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: NEWFANE
PROJECT NUMBER: BF 0106(6)

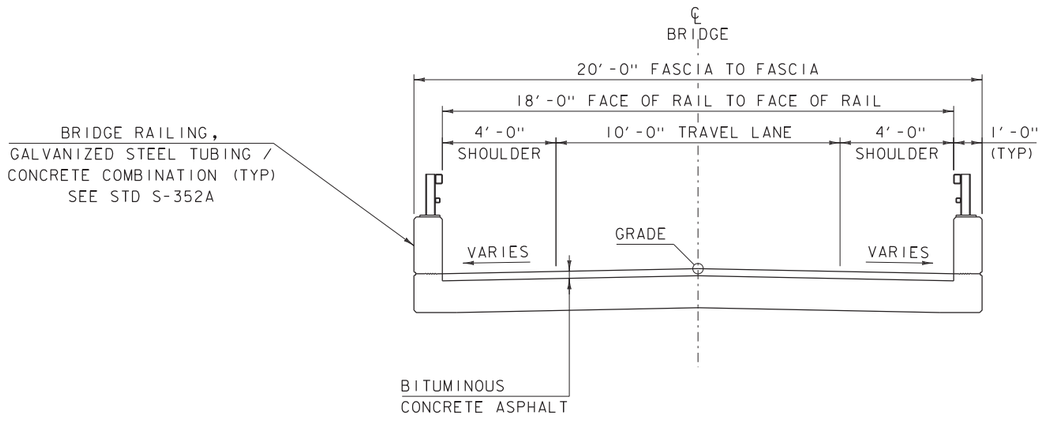
FILE NAME: 13j306/sl3j306profile.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
PROFILE SHEET

PLOT DATE: 15-SEP-2014
DRAWN BY: D.D.BEARD
CHECKED BY: ------



PROPOSED FAS 0106 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: NEWFANE
PROJECT NUMBER: BF 0106(6)

FILE NAME: 13j306\sl3j306typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 15-SEP-2014
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 3 OF 6

EXISTING BRIDGE INFORMATION
100' CONCRETE ARCH
BUILT 1900, RECONSTRUCTED 1934
21' FASCIA TO FASCIA

TH-5 EXISTING CURVE 1
DELTA = 23°25'28"
D = 12°43'57"
R = 450.00'
T = 93.29'
L = 183.98'
E = 9.57'

TH-2 EXISTING CURVE 1
DELTA = 18°48'02"
D = 22°55'06"
R = 250.00'
T = 41.39'
L = 82.03'
E = 3.40'

TH-2 EXISTING CURVE 2
DELTA = 5°32'45"
D = 5°43'46"
R = 1000.00'
T = 48.44'
L = 96.79'
E = 1.17'

PI STA 31+67.20
PT STA 32+51.89
POE STA 44+67.11
PI STA 43+36.84
PT STA 42+29.53
PC STA 41+47.49
PC STA 30+73.91
PI STA 41+88.88
PC STA 42+88.40
PT STA 43+85.20
PI STA 38+00.00
POB STA 38+[illegible]

END APPROACH
STA 31+00.00

END PROJECT
STA 30+50.00

END APPROACH
STA 43+00.00

END PROJECT
STA 42+50.00

BENCHMARK
RAIL ROAD SPIKE
IN LEDGE
ELEV= 527.49

BEGIN APPROACH
BEGIN PROJECT
STA 40+00.00

BEGIN PROJECT
STA 39+75.00

BEGIN APPROACH
STA 39+25.00

USGS BENCHMARK
15 REM 1942
ELEV= 521.01

CONCEPTUAL
CONSTRUCTION LIMITS

TH-5 (GRIMES HILL ROAD)
TO VT ROUTE 30

TH-2 (DEPOT ROAD)
TO VT ROUTE 30

TH-42
(SUNSET LAKE ROAD)

TH-2 (DOVER ROAD)
TO DOVER

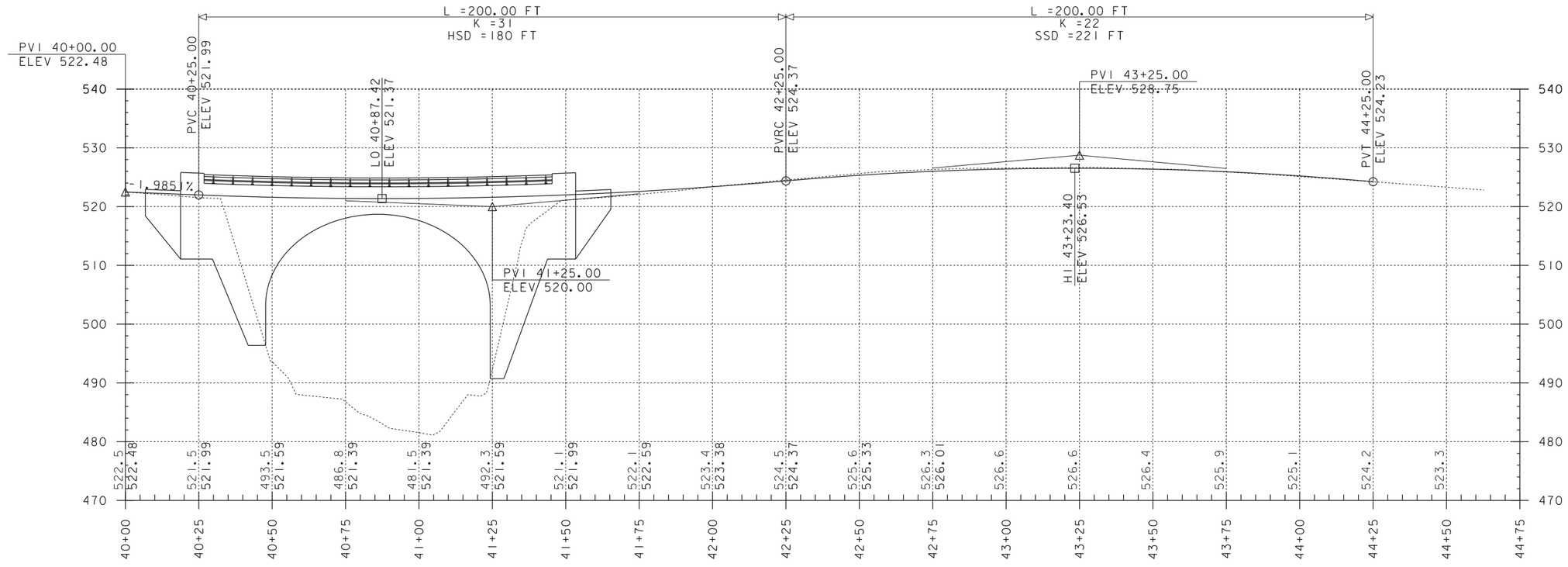
ROCK RIVER
FLOW

30+00 40+00 41+00 42+00 43+00 44+00 44+67
31+00 32+00 39+00 50+00 52+00

VT STATE PLANE GRID N

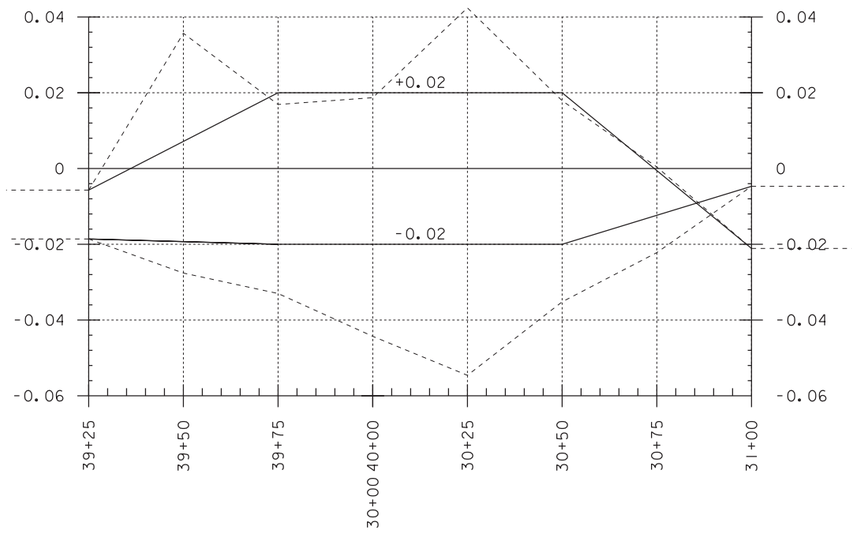
PROPOSED LAYOUT
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	NEWFANE
PROJECT NUMBER:	BF 0106(6)
FILE NAME:	13j306/sl3j306border.dgn
PROJECT LEADER:	C.P.WILLIAMS
DESIGNED BY:	L.J.STONE
	PROPOSED LAYOUT
PLOT DATE:	15-SEP-2014
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	4 OF 6



TH-2 (DEPOT ROAD) PROPOSED PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



TH-2 (DEPOT ROAD) & TH-5 (GRIMES HILL ROAD) PROPOSED BANKING

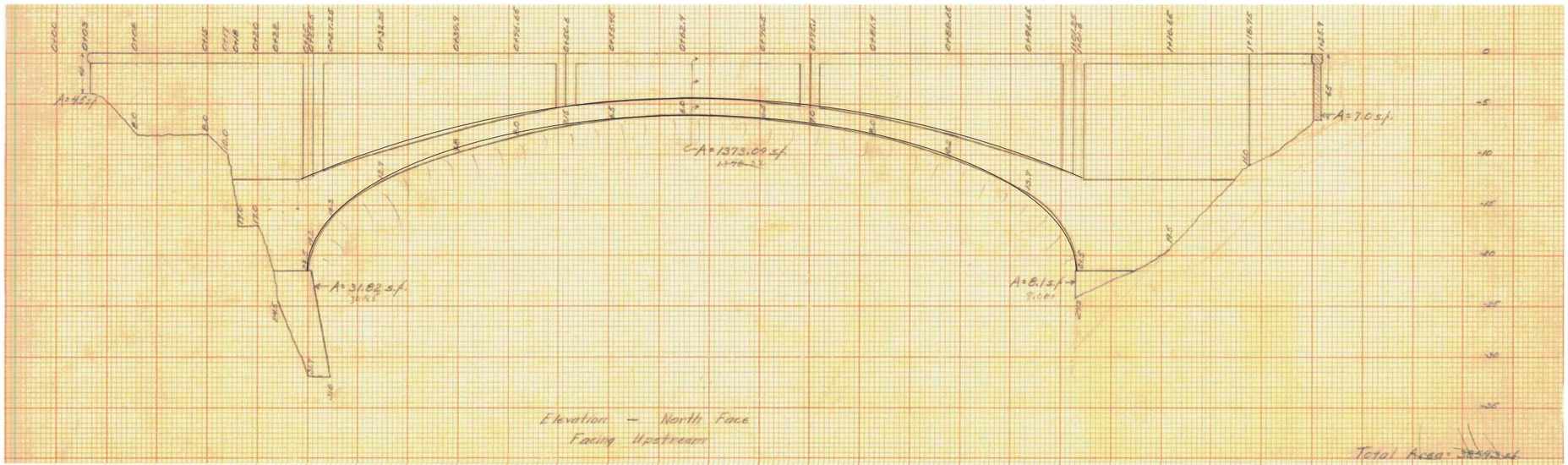
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: NEWFANE
PROJECT NUMBER: BF 0106(6)

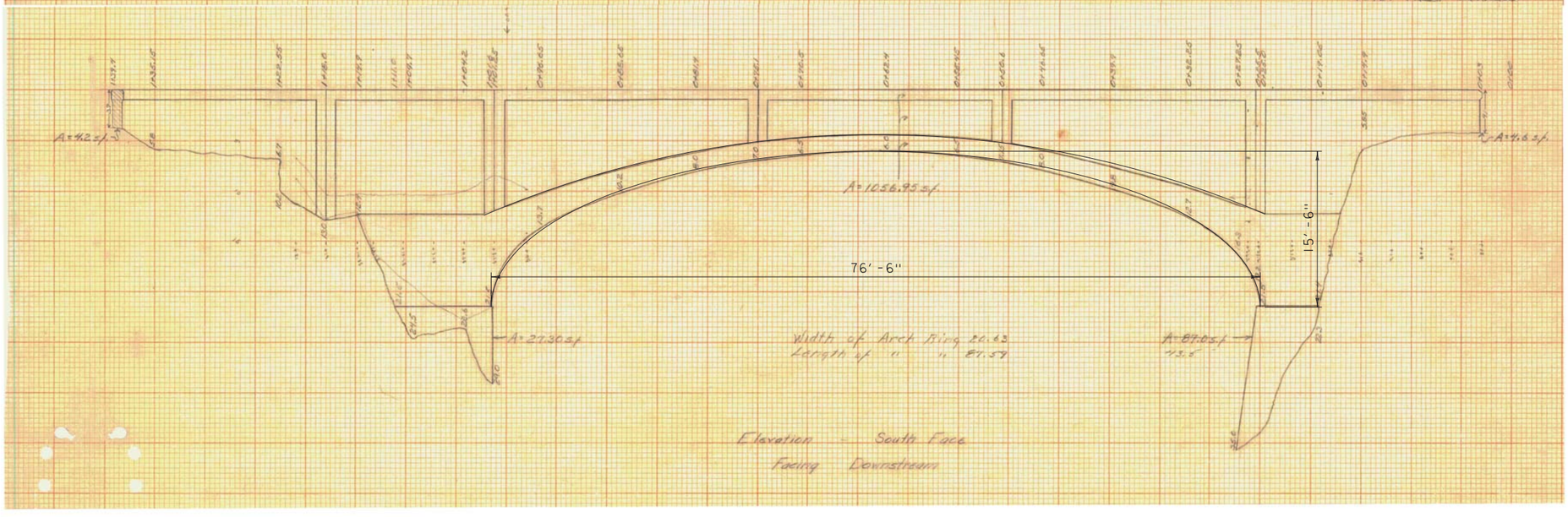
FILE NAME: I3j306/sI3j306profile.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
PROPOSED PROFILE SHEET

PLOT DATE: 15-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 5 OF 6



Elevation — North Face
Facing Upstream

Total Area=



Elevation — South Face
Facing Downstream

PROJECT NAME:	NEWFANE
PROJECT NUMBER:	BF 0106(6)
FILE NAME: 13j306/sl3j306plan.dgn	PLOT DATE: 15-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
HISTORICAL ELEVATION SHEET	SHEET 6 OF 6