STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Richmond BF 0284(28)

US ROUTE 2, BRIDGE 32 OVER SNIPE ISLAND BROOK

May 9, 2014

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I. Site Information

The bridge is located in a rural area along US Route 2, beginning approximately 40 feet east of the junction with TH-12 (Snipe Ireland Road). 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
Bridge Type	Concrete Tee Beam
Bridge Span	21 feet
Year Built	1929
Ownership	State of Vermont

Need

The following is a list of the deficiencies of Richmond Bridge 32 and US 2 in this location.

1. The deck is in poor condition, rated (4), and the superstructure and substructure are rated (5), fair. There are concerns with full depth holes occurring in the near future. The bridge is considered as structurally deficient overall.

2. The existing bridge does not have adequate hydraulic capacity.

3. Scour was observed near the bridge by the Hydraulics staff.

4. The shoulder width and banking geometry is substandard.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2016 and 2036.

TRAFFIC DATA	2016	2036
ADT	3,500	3,700
DHV	410	430
ADTT	310	510
%T	1.8	2.8
%D	63	63

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on an ADT > 2000 and a design speed of 50 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	11'/3' (28')	11'/3' (28')	
Bridge Lane and Shoulder Widths	VSS Table 5.3	11'/2.8' (27.6')	11'/4' (30')[1]	Substandard
Clear Zone Distance	VSS Table 5.5	None Known within the project	20' fill / 12' cut 1:3, 14' cut 1:4	
Banking	VSS Section 5.13	+/-1-3% (Some adverse slopes exist)	6% (max) at side road	Substandard
Speed	VSS Section 5.3	50 mph (Posted)	50 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R=6000' , Bridge located on curve	R=6000 ft. for a 2% bank across entire section.	
Vertical Grade	VSS Table 5.6	Bridge located on a 0.507% grade	6% (max) for level terrain	
K Values for Vertical Curves	VSS Table 5.1	Bridge near sag. K = 446	110 crest / 90 sag	
Vertical Clearance Issues	VSS Section 5.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	1668 ft. on adjacent curve to the west	400'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	2.8 ft.	4' Shoulder[1]	Substandard
Bridge Railing	Structures Manual Section 13	Fascia Mounted	TL-3	Substandard
Hydraulics	VTrans Hydraulics Section	Passes $Q_{2.33}$ storm event with 1.7 ft. freeboard	Pass Q_{50} storm event with 1.0' of freeboard	Substandard
Structural Capacity	SM, Ch. 3.4.1	Structurally Deficient	Design Live Load: HL-93	Substandard

[1] 1 ft. has been added to shoulders on bridge to accommodate shared use with bicycles

Inspection Report Summary

Deck Rating	4 Poor
Superstructure Rating	5 Fair
Substructure Rating	5 Fair
Channel Rating	5 Fair

07/19/2011 – Bridge deck is rated as poor due to localized heavy deterioration in beam bays 3 and 4. Localized full depth holes through the deck are possible. ~MJ/DK

06/26/09 this structure is in fair to poor condition. The deck could have full depth holes any place, any time; especially in bay 3. The tee beams have lots of spalling and some section loss in the exposed rebar. The upstream wing of abutment 1 is spalled almost completely through as well as abutment 2's downstream wing. DCP

Hydraulics

From preliminary hydraulics report:

"The existing bridge does not meet the hydraulic standard. The bridge only passes the $Q_{2.33}$ storm (with 1.7 ft. of freeboard). The standard requires a minimum of 1 foot of freeboard for the Q_{50} discharge for state routes."

The existing skew is 20 degrees. The Preliminary Hydraulics Report indicates that the bank full width (BFW) is approximately 15 ft. based on actual field conditions and 27 ft. according to the Vermont ANR BFW Equation. The report assumes the 15 ft. width as the BFW for this project and states that the bridge currently spans the BFW. The existing low beam elevation has been established to be 315.5 ft. Two options were considered that span the BFW and meet the hydraulic standard:

- A 19.7 ft. span normal to the stream (29 ft. normal to the roadway), with no stone fill, vertical face abutments, low beam elevation of 317.7, which is 2.2 ft. higher than the current elevation.
- A 42 ft. span normal to the stream (52 ft. span normal to the roadway), with stone fill in front of the abutments, low beam elevation of 317.6, which is 2.1 ft. higher than the current elevation.

Both options reviewed in the Preliminary Hydraulics Report will meet the BFW. Both also come with the recommendation that a western guide bank be created, and the eastern bank widened. The report indicates that scour and abutment spalling has been caused by poor flow conditions at the bridge.

Utilities

Underground: There is a conduit attached to the north side of the bridge, which is believed to be Fairpoint cable. This will need to be relocated, at least temporarily, to accomplish the project. There are also a couple of culverts visible near the bridge. These will likely be relocated/reconstructed as part of the project. No other buried utilities are known.

Aerial: There are overhead electric and communication utility lines passing by the project on the downstream side. Some of these utility lines cross the road just west of the project to serve TH-12. It is expected that relocation of aerial lines will be required for this project

Right Of Way

The existing 3 rod Right of Way is shown on the Layout sheet.

Resources

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

Biological:
Any impacts to Snipe Island Brook below ordinary high water will need to be avoided and minimized and reported to the Vermont Agency of Natural Resources and to the US Army Corps of Engineers for permitting purposes. Additional field work will be required if wetland areas cannot be avoided.

Wetlands

There are wetlands within the immediate area of the project that could be impacted by any of the alternatives developed. They are mostly emergent wetlands which are all Class II wetlands. They are shown on a map contained in the appendix.

Wildlife Habitat

Good wildlife habitat is believed to exist on both sides of US Route 2, with existing opportunities to cross. The Snipe Island Brook supports a variety of aquatic organisms. Timing restrictions for in-stream work will be likely.

Rare, Threatened and Endangered Species

There are no federal or state mapped threatened or endangered plants or animals within the project corridor and no impacts are anticipated.

Agricultural

There are "Statewide B" agricultural soils within the project area. Minimal permanent impacts are expected.

Archaeological:
Archaeological sensitivity was identified within all four quadrants of the project area. These areas can be seen in the appendix.

Historic:
This bridge is not historic, and there are no adjacent historic resources.

Hazardous Materials:
There are no known hazardous materials in the project area.

Stormwater:
There are no stormwater concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation has created an 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 early. 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: Temporary Bridge

If a temporary bridge is chosen for traffic maintenance, a two lane bridge is recommended. Traffic volume at this site is projected to be at an ADT of 3500 and a DHV of 410. The current rule of thumb for the capacity of a one lane bridge with alternating traffic is an ADT of 4250 and a DHV of 580, with stop bars 470 ft. apart. However, the rule of thumb is approximate, and the traffic volume would be close to the cutoff for a single lane. Considering level of service versus the expense of temporary traffic signals, and expecting that impacts would be similar for a one lane or a two lane, a two lane bridge would be chosen. A temporary bridge would require additional temporary Right of Way acquisition.

Both upstream and downstream locations were reviewed. On the north side of US Route 2 (upstream), there is a Class II wetland on the NW quadrant, and archaeologically sensitive areas on both the NW and NE quadrants of the site. A temporary bridge would impact these sensitive areas. The west approach to the temporary bridge would intersect TH-12, Snipe Ireland Road and require some realignment for the construction duration. A temporary bridge on the south side of US Route 2 (downstream) would likely not impact archaeological areas, as they are mapped far enough away from the roadway. A small area of wetland, less than approximately 800 SF, would be impacted. Due to the proximity and the angle of TH-12, Snipe Ireland Road, adjustments to the town highway would be required to access the temporary bridge or US Route 2.

Temporary Bridge Layout Sheets can be seen in the appendix.

Advantages: Traffic flow would be maintained through the project corridor during construction.

Disadvantages: This option would require the acquisition of additional temporary rights, and would be relatively high in cost. A temporary bridge would have adverse impacts to resources if placed upstream of the bridge. There would be some delays and disruption to traffic, with the speed limit reduced. Also, a downstream temporary bridge would require overhead utilities to be moved more than they would just to accommodate work on the bridge.

Option 2: Phased Construction

Phased construction is the maintenance of one lane of two-way 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 resources and adjacent property owners.

With traffic volumes at this site projected to be 3500 ADT and 410 DHV for the expected construction year, it does not seem that closing one lane of traffic and maintaining only one alternating lane of traffic would provide an acceptable level of service for the construction period. There are width constraints as well on the existing bridge, making it impossible to phase traffic without shifting the alignment of the bridge, or widening the bridge beyond that required by the standards to allow traffic to be maintained on the new structure during the second phase of construction.

The time required to develop a phased construction project is the same as that required to develop a project which is not phased. However, the time required to complete a phased construction project increases because some of the construction tasks have to be performed multiple times. This increase in the length of construction along with the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases causes the construction costs for phased construction to be larger than construction which is not phased. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space. Phased construction is usually considered when the benefits include reduced impacts to resources and decreased costs and development time by not requiring the purchase of additional Right of Way. For this project, Right of Way will still be required, and resources and neighboring properties will still be affected if phasing is used.

Since the advantages do not seem to outweigh the negative aspects of phasing, it will not be considered further for this project.

Option 3: Off-Site Detour

This option would close the bridge and reroute traffic to an off-site detour. Utilizing State Routes, the detour could be on I-89, between the Richmond and Waterbury exits. A traveler going between Waterbury and Richmond would use Interstate 89 and would find the distance similar to the US 2 distance, about 15.5 miles. The end-to-end distance around the State signed detour would be approximately 31 miles.

There is essentially one local bypass route that avoids the construction site if US 2 is closed to through traffic. Local bypass routes are not signed, or official, detour routes and are not necessarily appropriate for all traffic that needs to detour around a site. Because local bypass routes are comprised of public roads that circumvent the road closure in a shorter distance than the official detour, they may see an increase in traffic from passenger cars as locals use them during the closure.

Safety is a major consideration during the development and construction of a project. Not only the safety of the travelling public and construction workers affected by the construction activities, but also the ability of fire and rescue personnel to reach all areas of a town during construction.

Thus, any bypass routes are evaluated to determine if they may be used by service vehicles and first responders to respond to emergencies during a road closure.

The possible local bypass route for this project is via Bridge St. (TH-1) in Richmond and Cochran Road (TH-3). Bridge St. and Cochran Road are also FAS routes. Bridge 8 on Cochran Road over the Huntington River is posted for 12 tons, but it is not expected that the bypass would be appropriate for truck traffic. The through route on US 2, between the Bridge St./US 2 intersection and the Cochran Road/US 2 intersection is approximately 3.5 miles. The bypass route between those same intersections is approximately 4.25 miles, an increase of 0.75 miles. The end to end distance via the bypass route would be 7.75 miles. This route is paved. A map of the detour route and possible local bypass route which could see an increase in traffic can be found in the appendix.

The Richmond Fire Department is located in the village area of the Town, approximately 2.0 miles west of the project site. The Bolton Fire Department is located approximately 0.3 miles west of the intersection of US 2 and TH-3, Bolton Valley Access Road. This location is about 3.75 miles east of the project location. If the bridge were to be closed for an off-site detour, the distance around the bypass for the Richmond Fire responders or Rescue would be about 5.6 miles. Coordination should occur so that coverage can be maintained if the bridge is closed.

Advantages: Utilizing an off-site detour would eliminate the need to use a temporary bridge or to phase construction to maintain traffic. This would decrease the cost and amount of time required to construct a project in this location. The impacts and amount of temporary rights required to construct a project in this location would also be reduced for this option. The safety of both construction workers and the travelling public will be improved by removing traffic from the construction site. Impacts to neighboring property owners and to the wetlands and archaeologically sensitive areas would be minimized with this option.

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

III. Alternatives Discussion

Bridge 32 is structurally deficient with a deck rating of (4). The existing channel configuration is inefficient and has the potential to damage the bridge, roadway, and surrounding property. The bridge does not meet the hydraulic standard and the bridge deck is too narrow. Minor horizontal geometry deficiencies exist. The alternatives presented here are based on improvement of the condition of the bridge and channel.

No Action

This alternative leaves the bridge in its current condition. A good rule of thumb for the “No Action” alternative is to determine whether the existing bridge can stay in place without any work being performed on it during the next 10 years. Given the poor rating on the deck, this bridge will require work within the next 10 years. From the standpoint of safety, economics, and convenience, this alternative is not recommended and will not be considered further.

Rehabilitation

Although there are several issues associated with this stretch of US 2, the deck is most in need of attention. The first consideration of a rehabilitation alternative would be to rectify the deck issues. There are two types of rehabilitation options available for a tee-beam bridge: Superstructure patching and Superstructure replacement.

Superstructure Patching

The existing deck is rated (4), poor. The superstructure, referring to the concrete beams, is rated (5), fair, but is deteriorating and a downgrade to a (4) rating should be expected. The existing substructure is rated (5) and based on pictures and field observation, it seems reasonable to assume that the existing substructure can safely carry anticipated traffic loads for another 20-30 years. Superstructure Patching would include removal of loose and deteriorating concrete, cleaning reinforcing steel, application of patching material to cracks and areas of section loss (deck, superstructure, and substructure), and paving on the bridge and for a short distance off each end. It would be reasonable to also consider replacement of the existing bridge and approach rail, since the existing fascia mounted rail is substandard. Since the existing channel alignment encourages erosion and scour, channel protection should be included. Some characteristics of Superstructure Patching are as follows:

- Patching tends to accelerate the deterioration of the existing concrete that is in contact with the patching material, and thus offers an additional service life of only 10 years or less.
- The attachment of new rail to the old, deteriorating deck would be challenging.
- Much of the work would take place underneath the bridge with efforts required to avoid contamination of the river.
- This alternative leaves several substandard conditions in place, including substandard lane and shoulder widths, hydraulic capacity, and roadway banking.
- Although the substructure is rated (5), there is cracking that may be indicative of movement.
- After approximately 10 years, major work would be required, possibly including bridge replacement.

Disadvantages seem to outweigh the benefits to this short-term fix. Superstructure Patching alone is not considered further.

Superstructure Replacement

This alternative would include superstructure replacement and some substructure repair. Since the existing T-beams are integral with the deck, replacement of the deck only is not feasible. Included in the Superstructure Replacement are: deck and superstructure replacement, new bridge and approach rail, abutment crack and surface defect repair, and added protection of the channel banks in the area of the bridge. The characteristics of a Superstructure Replacement are as follows:

- The rail to rail width on the bridge deck is narrower than the standard by 2.4 ft. In placing a new superstructure on the existing substructure, the standard lane and shoulder width can be improved and possibly brought up to standard by increasing the deck overhang.
- Substandard horizontal approach roadway geometry and banking could possibly be improved by adjusting the bridge seats.
- Hydraulic capacity does not get corrected by this alternative.
- Placing a new superstructure on an existing substructure makes economic sense if the substructures are in good condition. However, the existing substructure is 85 years old and only in fair condition. It is assumed that this option could add approximately 20-30 years to the remaining service life of this bridge, at which point, the entire structure would need to be replaced. It does not make economic sense to replace the deck and superstructure while leaving an 85 year old substructure in fair condition, which will need to be replaced in under 30 years.

Due to the disadvantages of this alternative, it has not been considered any further.

Alternative 1: New Structure, 27 ft. span

For a new structure, a 3-sided rigid frame was considered. Improvements to the alignment of the channel were also considered. Variables include:

a. Roadway Width

The current rail to rail width is 27.6 feet. This does not meet the minimum standard of 30 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 30 foot width bridge, rail to rail, will be proposed.

b. Span and Skew

The existing bridge is 25 ft. long with a 20 degree skew. A clear span of 19.7 ft. normal to the river is needed to meet the hydraulic standard. At 20 degrees of skew, a 22 ft. interior span satisfies that requirement. Using an assumed wall thickness for the rigid frame of 2 ft, the total roadway span of the frame would be approximately 27 ft., measuring to the outside faces of the vertical walls. Improvements to the channel should be made by filling in any scour holes, improving the western guide bank and widening the eastern bank as recommended in the Preliminary Hydraulics Report. Skew would remain at 20 degrees.

c. Horizontal Alignment

The existing roadway and bridge are on a horizontal curve with a radius of 6000 ft. The shape of the existing roadway cross section is generally a normal-crown shape, with cross slope varying between approximately 0% and 3.3%. A new bridge would be built on the current horizontal alignment, with revisions to portions of the approach roadway banking to meet the standard for a 6000 ft. curve at 50 mph. That would provide a constant bank across the roadway section of approximately 2% at the bridge and within the project limits.

d. Vertical Alignment

Although the existing vertical alignment is satisfactory geometrically, it does not meet the hydraulic standard. The preliminary hydraulics report indicates that the recommended low beam elevation for this bridge configuration is 317.7 ft. Thus, it is proposed that elevation 317.7 ft. be provided with a new bridge with a 27 ft. span. If this alternative is chosen, the roadway would be raised approximately 1.5 ft. to meet this requirement. This modification would require extending the length of project to allow matching back in to existing conditions at the project approaches. Some work on Snipe Ireland Road would be required to match the new vertical alignment.

e. Structure Type

Due to the span and height of the waterway requirements, it was assumed that it is probably not possible to find a large enough precast 4-sided box culvert for this project. Therefore, a 3-sided rigid frame was considered, with precast footings and walls placed 6 ft. below the bottom of the stream bed for support of the frame.

f. Substructure Type

There is no visible bedrock in the location of the project. Available information on nearby water wells indicates that bedrock depth varies between 15 ft. and 115 ft. and the site may be underlain by sand and gravel, with localized areas of silt and clay. A 3-sided rigid frame should be placed on concrete footings and walls. The footings should be a minimum of 6 ft. below the bottom of the stream bed to provide stability and scour protection. Subsurface information should be obtained to verify the in-situ conditions.

g. Maintenance of Traffic

Either a temporary bridge or an off-site detour would be appropriate measures for traffic control at this site. In either case, access to and from Snipe Ireland Road (TH-12) would need to be maintained.

Alternative 2: New Structure, 50 ft. span

This alternative calls for the replacement of the entire bridge, including deck, railing, superstructure and substructure. Improvements to the alignment of the channel were also considered. The various considerations under this option include:

a. Bridge Width

The current rail to rail width is 27.6 feet. This does not meet the minimum standard of 30 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 30 foot width bridge, rail to rail, will be proposed.

b. Bridge Length and Skew

This alternative would consist of a typical integral abutment installation. A roadway span of 50 ft. at a skew of 20 degrees would provide a clear span normal to the river that exceeds the 42 ft.

required by the preliminary hydraulics report (the roadway span is defined as bearing-to-bearing, assumed to be at the centerline of 3 ft. abutments). An important consideration for Alternative 2 is that a longer span would require the relocation of Snipe Ireland Road to the west, which would have impacts on sensitive resources northwest of the bridge.

c. Horizontal Alignment

The existing roadway and bridge are on a horizontal curve with a radius of 6000 ft. The shape of the existing roadway cross section is generally a normal-crown shape, with cross slope varying between approximately 0% and 3.3%. If a bridge replacement project is chosen, the new bridge would be built on the current horizontal alignment, with revisions to the banking to meet the standard for a 6000 ft. curve at 50 mph. That would provide a constant bank across the roadway section of approximately 2% at the bridge and within the project limits.

d. Channel Alignment

Snipe Island Brook is poorly aligned, resulting in erosion of the stream banks, scour, and possible deterioration of the existing concrete elements of the bridge. Looking at the existing conditions plan, it is easy to see that the channel alignment of the stream seriously deviates from what could be a nice, nearly straight path across US 2. Under flood conditions, serious damage to the stream banks and to the bridge would be possible. One possible course of action considered was to realign the channel so that it is a nearly straight line from upstream to downstream of the bridge. This would require the relocation of TH-12 Snipe Ireland Road to the west. However, in consideration of Alternative 2, it is felt that fully straightening the brook would push TH-12 too far to the west, causing additional impacts to natural resources and requiring more Right Of Way. Relocating TH-12 would also result in difficult geometric challenges to achieve a safe and standard intersection with US Route 2. Therefore, a compromise would be proposed that corrects some of the worst meanders of the brook and protects the banks, but doesn't push the road so far as to create more adverse impacts to resources. This can be seen in the drawings in the appendix.

e. Vertical Alignment

The existing bridge and vertical alignment do not meet the hydraulic standard. If this alternative is chosen, the recommended low beam elevation would be 317.6 ft. The proposed low beam elevation would be 317.6 ft, which would require the roadway to be raised approximately 2.4 ft. to meet the hydraulic standard. This modification would require extending the length of project to allow matching back in to existing conditions at the project approaches.

f. Superstructure Type

A prefabricated structure will be the preferred choice to minimize construction time. The bridge types that are most commonly used in Vermont for the span being considered in this alternative are Prefabricated Bridge Units (PBUs) and NEXT beams. NEXT beams would be recommended for this alternative since a few inches of superstructure depth can be saved compared to the PBUs. Since the radius of the roadway curve is so large, it is expected that the bridge elements could be straight, with slightly varying deck overhangs. The superstructure depth is an important consideration in meeting the hydraulic standard, and either superstructure type would be appropriate.

g. Substructure Type

Integral abutment substructures would be the preferred substructure type. There is no visible bedrock in the location of the project. Available information on nearby water wells indicates that bedrock depth varies between 15 ft. and 115 ft. and the site may be underlain by sand and gravel, with localized areas of silt and clay. For the purposes of this report, it is assumed that piles can be installed. This type of substructure would provide the best scour protection. Subsurface information should be obtained to verify the in-situ conditions.

h. Maintenance of Traffic

Either a temporary bridge or an off-site detour would be appropriate measures for traffic control. Access to and from Snipe Ireland Road would need to be maintained during construction.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, there are three viable alternatives:

- Alternative 1a: New 27 ft. Structure with Traffic Maintained on Offsite Detour.
- Alternative 1b: New 27 ft. Structure with Traffic Maintained on Temporary Bridge.
- Alternative 2a: New 50 ft. Structure with Traffic Maintained on an Offsite Detour.
- Alternative 2b: New 50 ft. Structure with Traffic Maintained on Temporary Bridge.

V. Cost Matrix[1]

Richmond BF 0284(28)		Do Nothing	Alt 1a	Alt 1b	Alt 2a	Alt 2b
			Complete Replacement			
			27 ft. Span	27 ft. Span	50 ft. Span	50 ft. Span
			Offsite Detour	Temporary Bridge	Offsite Detour	Temporary Bridge
COST	Bridge Cost	$0	$430,000	$430,000	$524,000	$524,000
	Removal of Structure	$0	$34,000	$34,000	$34,000	$34,000
	Roadway	$0	$345,000	$345,000	$416,000	$416,000
	Maintenance of Traffic	$0	$30,000	$155,000	$30,000	$155,000
	Construction Costs	$0	$839,000	$964,000	$1,004,000	$1,129,000
	Construction Engineering + Contingencies	$0	$243,000	$280,000	$291,000	$327,000
	Total Construction Costs w CEC	**$0**	**$1,082,000**	**$1,244,000**	**$1,295,000**	**$1,456,000**
	Preliminary Engineering[2]	**$0**	**$251,000**	**$289,000**	**$301,000**	**$339,000**
	Right of Way	**$0**	**$63,000**	**$96,000**	**$75,000**	**$113,000**
	Total Project Costs	$0	$1,396,000	$1,629,000	$1,671,000	$1,908,000
SCHEDULING	Project Development Duration[3]	NA	4 years	4 years	4 years	4 years
	Construction Duration	NA	6 months	18 months	6 months	18 months
	Closure Duration (If Applicable)	NA	4 weeks	NA	4 weeks	NA
ENGINEERING	Typical Section - Roadway (feet)	28'	28'	28'	28'	28’
	Typical Section - Bridge (feet)	2.8-11-11-2.8	4-11-11-4	4-11-11-4	4-11-11-4	4-11-11-4
	Geometric Design Criteria	No Change	Meets Standard	Meets Standard	Meets Standard	Meets Standard
	Traffic Safety	No Change	Improved	Improved	Improved	Improved
	Alignment Change	No	Vertical Only	Vertical Only	Vertical Only	Vertical Only
	Bicycle Access	No Change	Improved	Improved	Improved	Improved
	Hydraulic Performance	No Change	Meets Standard	Meets Standard	Meets Standard	Meets Standard
	Pedestrian Access	No Change	Improved	Improved	Improved	Improved
	Utility	No Change	Relocation	Relocation	Relocation	Relocation
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes
	Road Closure	No	Yes	No	Yes	No
	Design Life	<10 years	80 years	80 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] Project Development Durations are staring from the end of the Project Definition Phase.

VI. Conclusion

We recommend **Alternative 1a**; complete bridge replacement with a 27 ft. span while maintaining traffic on an offsite detour. The new structure would be 3-sided rigid frame.

Structure:

The shorter structure was chosen because there seems to be minimal advantage to the longer alternative, and some adverse impacts are avoided. With Alternative 1a, all standards, including hydraulics, are met within the project limits. The intersection of US 2 and Snipe Ireland Road does not have to be relocated. It is proposed that the river's flow characteristics be improved as shown on the drawings included in the Appendix.

Traffic Control:

The recommended method of traffic control is to close the bridge for four weeks, and maintain traffic on an offsite detour. For a through traveler, the detour for this project would add a negligible amount, since the Interstate could be used as a detour. The end-to-end distance is approximately 31 miles. There is a local bypass route which would most likely be used by local traffic. This route adds 0.75 miles to the through route, and has an end-to-end distance of 7.75 miles. Current bicycle use is occasional, according to feedback received from the Town (see appendix). It is expected that during a closure, bicyclists would either choose to avoid this route or use the local bypass, as it is not much longer than the normal route for through users. Pedestrian users are infrequent. No specific accommodations for pedestrians are planned.

The option to close the road will have smaller impacts to adjacent properties compared to the temporary bridge option. Additionally the option to close the road is the least expensive and the safest option.

The general procedure used when roads are closed in a community is to provide the affected towns the opportunity to determine the best time for the closure. The traditional window for closures within which the towns are able to choose is between June 1 and September 1. This provides a high probability for success because of the long days, favorable weather, low water, and fewer restrictions for in-stream work. Within that allowable period, the community can balance the impacts to schools and businesses and any other community events. This process has worked well at providing a high rate of success to allow the construction to be completed within the closure period as well as providing the best outcomes for the towns based on their schedule and needs. It is anticipated that this same process will be utilized for this project.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archaeology Memo
- Historic Memo
- Resource ID Completion Memo
- Local Response and Input
- Detour Route
- Local Bypass Route
- Plans
    - Existing Conditions
    - Proposed Conditions
        - Typical Sections
        - Layout
        - Profile
        - Temporary Bridge Layouts

Bridge 32 Looking West

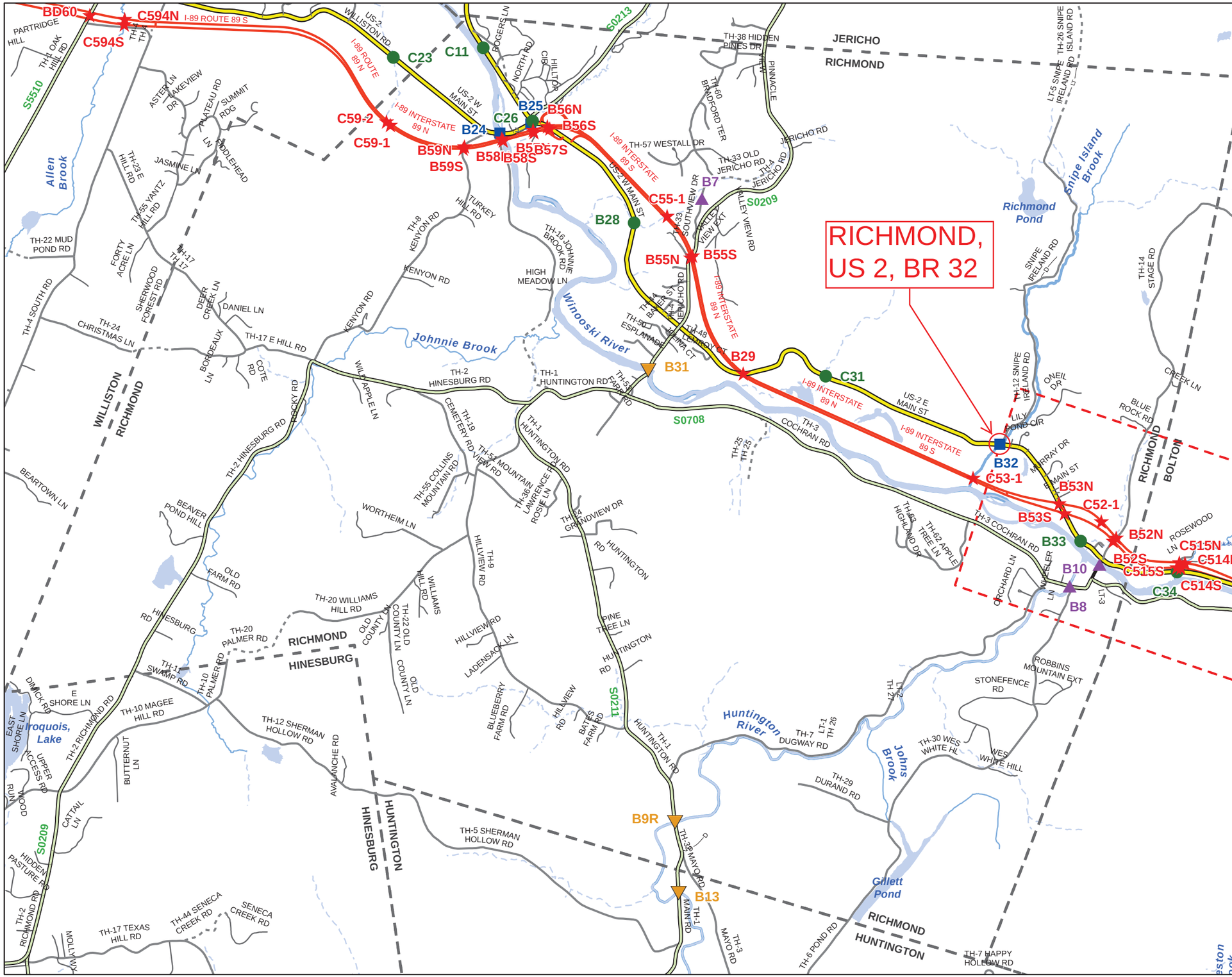
Bridge 32 Looking East

Snipe Island Brook Looking Downstream

Snipe Island Brook Looking Upstream

Abutment Deterioration

Superstructure Deterioration


RICHMOND, US 2, BR 32
JERICHO
RICHMOND
WILLISTON
HINESBURG
HUNTINGTON
BOLTON
Winooski River
Johnnie Brook
Allen Brook
Snipe Island Brook
Richmond Pond
Huntington River
Johns Brook
Gillett Pond
Iroquois, Lake
BD60
C594N
C594S
C59-2
C59-1
B59N
B59S
B58N
B58S
B57S
B56N
B56S
B55N
B55S
C55-1
B29
B28
B31
B24
B25
C26
C23
C11
C31
B32
C53-1
B53N
B53S
C52-1
B52N
B52S
C515N
C515S
C514N
C514S
B33
B10
B8
C34
B7
B9R
B13
Scale 1:40,106
N
INTERSTATE
STATE LONG
STATE SHORT
TOWN LONG
FAS/FAU
FAS/FAU HWY
INTERSTATE
STATE HIGHWAY
CLASS 1
CLASS 2
CLASS 3
CLASS 4
LEGAL TRAIL
PRIVATE
DISCONTINUED
DISTRICT
POLITICAL BOUNDARY
NAMED RIVERS-STREAMS
UNNAMED RIVERS-STREAMS
Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011
RICHMOND
CHITTENDEN COUNTY
DISTRICT # 5

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for RICHMOND **bridge no.:** 00032 **District:** 5

Located on: US 00002 ML **over** SNIPE ISLAND BROOK **approximately** 4.2 MI E JCT VT 117 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 5 FAIR

Substructure Rating: 5 FAIR

Channel Rating: 5 FAIR

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200284003204112

Federal Sufficiency Rating: 064

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1929 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 00

ADT: 003200 **% Truck ADT:** 06

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0021

Structure Length (ft): 000025

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 27.6

Deck Width Out-to-Out (ft): 29.4

Appr. Roadway Width (ft): 028

Skew: 20

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 T BEAM

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

Kind of Material and/or Design: 1 CONCRETE

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Deck Geometry: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 5 OCCASIONAL OVERTOPPING OF BRIDGE & ROADWAY WITH SIGNIFICANT TRAFFIC DELAYS

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

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: 072011 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

*07/19/2011 - * Bridge deck is rated as poor due to localized heavy deterioration in beam bays 3 and 4. Localized full depth holes through the deck are possible. ~ MJ/DK*

06/26/09 This structure is in poor to fair condition. The deck could have full dept holes any place, any time; especially in bay3. The tee beams have lots of spalling and some section loss in the exposed rebar. The upstream wing of abutment 1 is spalled almost completely through, as well as abutment 2's down stream wing. DCP

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Ryan Lizewski, Hydraulics Project Engineer (VHB)
via Nick Wark, VTrans Hydraulic Engineer

DATE: September 3, 2013

SUBJECT: RICHMOND – BF0284(28), US2 BR32 over SNIPE ISLAND BROOK

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

Existing Bridge Information

The site is located on US 2 in the Town of Richmond, approximately 2,000 feet upstream of the confluence with the Winooski River. There are no record plans available. The original date of construction for the original bridge appears to be 1929 based on the Structure Inspection, Inventory. It is a single span concrete T-beam structure. The existing abutments are concrete. Other properties of the bridge include:

Number of Lanes	2	
Number of Spans	1	
Bridge Skew Angle[2,3]	20	deg
Abutment Skew Angle	0	deg
Width: Out to Out[1]	29.4	ft
Width: Out to Out[2]	31.3	ft
Approach Width[1]	28	ft
Span[1]	21	ft
Span[2]	19.7	ft
Superstructure Depth	2.8	ft
Low Chord Elevation	315.5	ft (NAVD)
Opening Height	6.1	ft

1 – normal to roadway
2 – normal to river
3 – upstream and downstream skew angles vary

The existing bridge does not meet the hydraulic standard. The bridge only passes the $Q_{2.33}$ storm (with 1.7 feet of freeboard). The standard requires a minimum of 1 foot of freeboard for the Q_{50} discharge for state routes.

Recommendations

The bridge replacement option selection criteria should at a minimum meet the hydraulic standard and to the extent practicable provide a bridge opening that does not restrict the bank full width, nor provide an unrealistic widening of the existing channel, or create any worse backwater flooding conditions than the existing conditions. The Vermont Agency of Natural Resources (VANR) Bank Full Width (BFW) Equation estimates the BFW of Snipe Island Brook to be approximately 27.0 feet, but the estimated BFW width within the study reach area is approximately 15 feet based on actual field conditions. The existing bridge currently spans the BFW, the current span is approximately 19 (normal to river) feet between the abutments at the waterline.

It has been assumed that if the existing bridge is replaced, a replacement structure will be located in the existing roadway alignment having the same basic surface geometry based on the site constraints.

- The first option analyzed maintains the existing 21 foot clear span with skewed abutments (19.7 feet normal to the stream channel, vertical abutments and no stone fill above the existing ground) and raises the low chord and roadway profile as shown in Figure 1. The low chord elevation must be raised approximately 2.2 feet to an elevation 317.7 feet to meet the hydraulic standard. Raising the bridge deck elevation will require adjustments to the roadway approaches including Snipe Ireland Road which intersects US 2 at the bridge location. This bridge option spans the BWF of 15 feet. The model predicts the 100-year water surface to be the same or lower than existing conditions for this option.

- A second option which spans the BFW with skewed integral abutments assuming a stone fill 1.5(h):1(v) slope would require a bridge having a minimum single 44.6 foot clear span (42 feet normal to the stream channel) as shown in Figure 2. The low chord elevation would need to be raised approximately 2.1 feet to an elevation 317.6 to meet the hydraulic standard. This option would require moving each abutment approximately 11.8 feet away from the river and regrading the channel in the vicinity of the bridge. The model predicts an increase of 0.2 feet in the 100-year water surface elevation in the vicinity of the bridge; however, within 10 feet of the bridge water surface elevations return to or are below existing for this option.

Bridge abutments orientated perpendicular to the roadway will require a span approximately 10.9 feet longer than the skewed abutment bridge options previously presented, without modifications to the channel alignment.

Based on the site survey and actual field conditions, it appears the bridge centerline is shifted approximately 26-feet from the natural Snipe Island Brook centerline. This likely contributes to the observed scour and spalling of the upstream abutment as well as the erosion to upstream banks. Shifting the bridge span over the natural stream centerline will reduce this type of damage; however, existing site constraints including the intersection of Snipe Ireland Road and Route 2 may prevent moving the bridge. If the bridge span is kept over the current stream alignment, it is our recommendation to create a western guide bank and widen the eastern bank, immediately upstream of the bridge, to reduce the potential for damage to the abutments and surrounding banks.

As noted above, scour was not reviewed during the preliminary design. However based on the velocities from the analyses, it is anticipated that a minimum of Type III Stone Fill will be necessary for armoring the abutments and disturbed channel banks near the replacement structure. Stone fill sizing will be verified during final hydraulic design.

<u>Temporary Bridge</u>
As part of this analysis we did not size a temporary bridge. If a temporary bridge is determined to be necessary let us know and we will work with you to size one.

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

cc: Hydraulics Project File via NJW
Hydraulics Chrono File

FIGURE 1

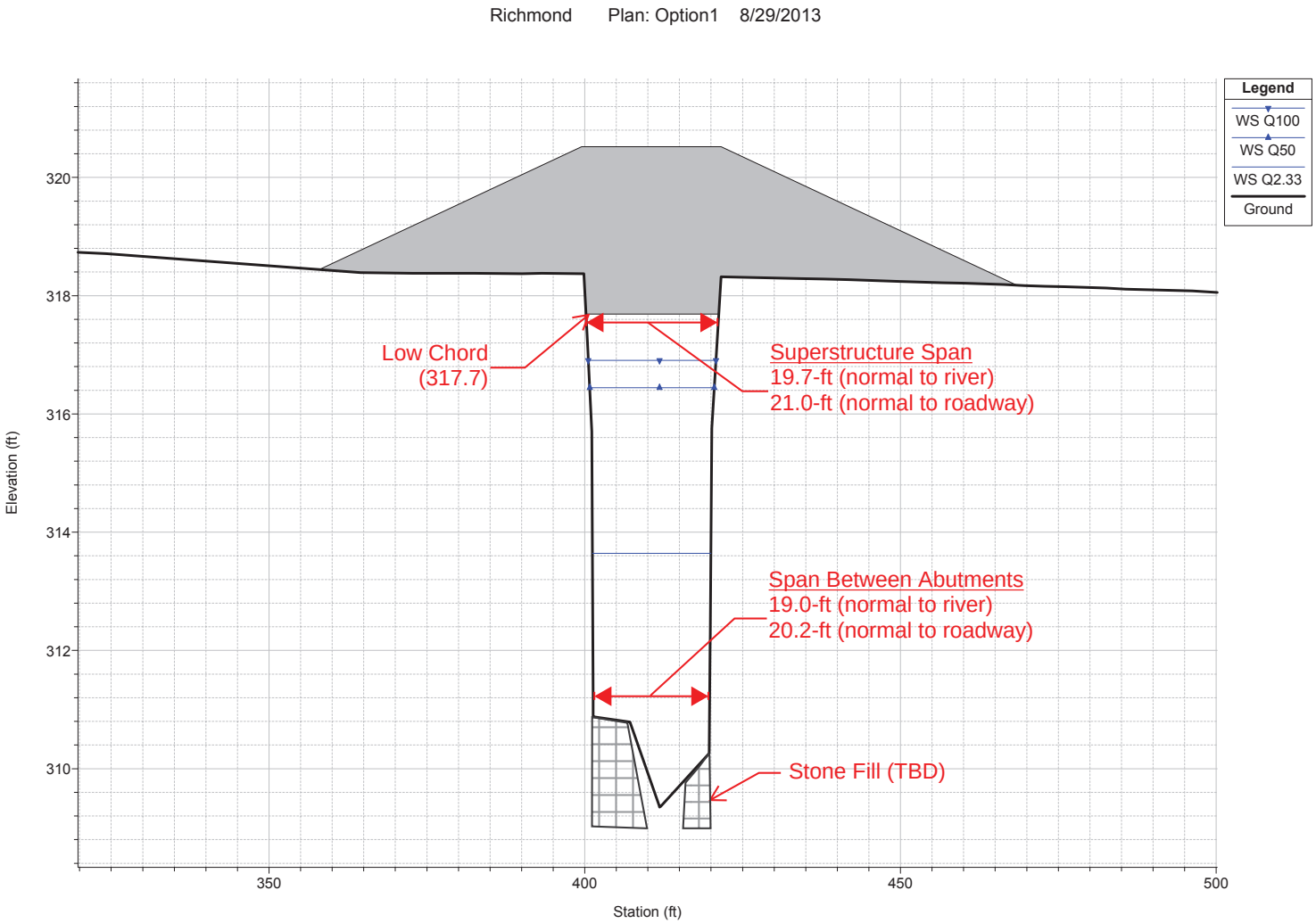
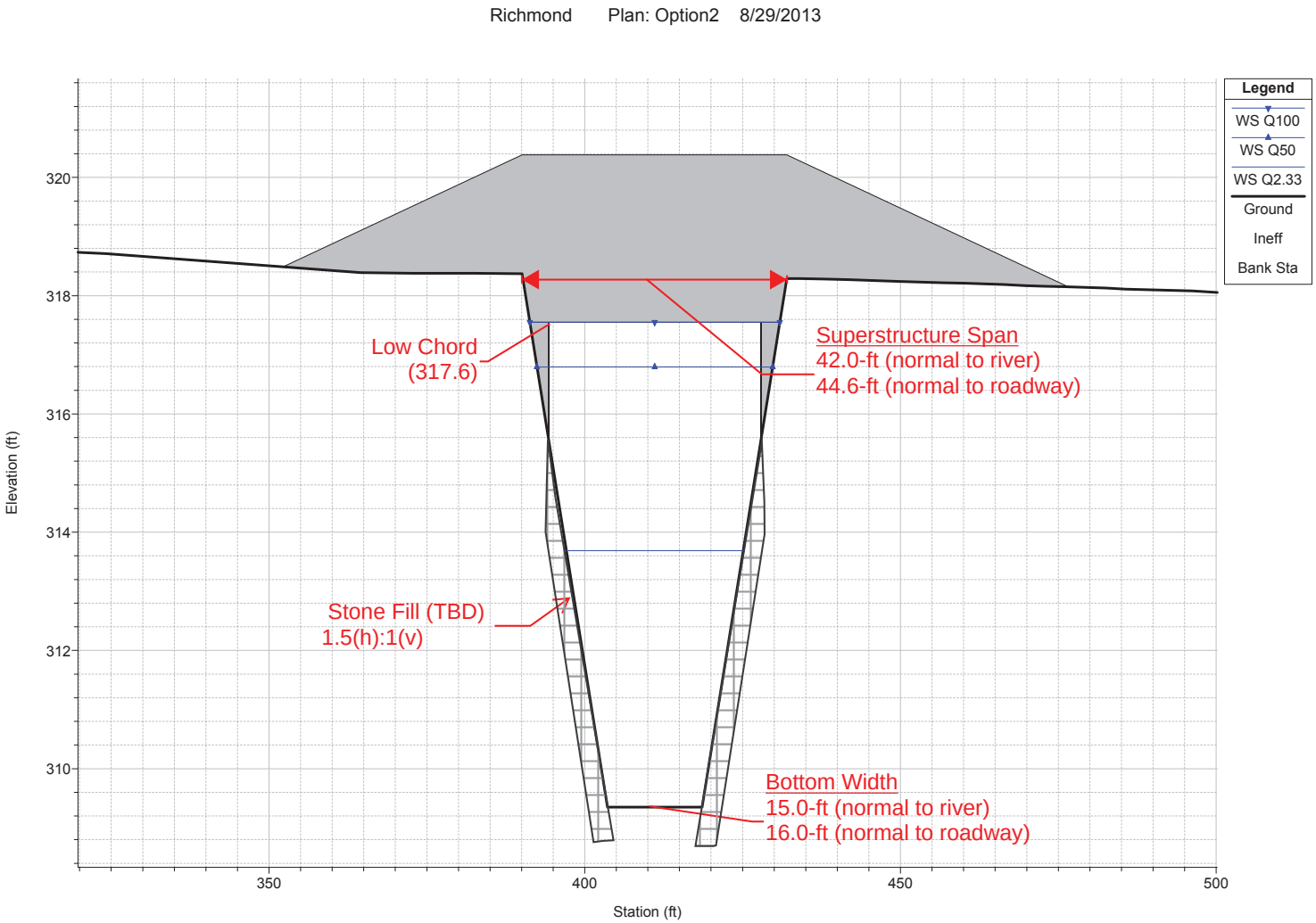

Richmond Plan: Option1 8/29/2013
Legend
WS Q100
WS Q50
WS Q2.33
Ground
Low Chord
(317.7)
Superstructure Span
19.7-ft (normal to river)
21.0-ft (normal to roadway)
Span Between Abutments
19.0-ft (normal to river)
20.2-ft (normal to roadway)
Stone Fill (TBD)
Elevation (ft)
320
318
316
314
312
310
350
400
450
500
Station (ft)

FIGURE 2


Richmond Plan: Option2 8/29/2013
Legend
WS Q100
WS Q50
WS Q2.33
Ground
Ineff
Bank Sta
Low Chord
(317.6)
Superstructure Span
42.0-ft (normal to river)
44.6-ft (normal to roadway)
Stone Fill (TBD)
1.5(h):1(v)
Bottom Width
15.0-ft (normal to river)
16.0-ft (normal to roadway)
Elevation (ft)
Station (ft)
320
318
316
314
312
310
350
400
450
500

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

TDE CCB

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

Date: July 26, 2013

Subject: Richmond BF0284 (28) 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. 32 on U.S.-2 which crosses over Snipe Island Brook in Richmond, Vermont. Figures 1 and 2 show the bridge as viewed from the west and east.

Figure 1 View of Bridge No. 32 looking west.

Figure 2 View of Bridge No. 32 looking east.

This review included observations made during a site visit, 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 site visit was performed on July 16, 2013 for the purposes of assessing topographic and geologic conditions that may impact the design and/or construction of the proposed bridge. Observations were also made of existing utility locations and logistical site access conditions. The topography is relatively flat lying downstream of the bridge as Snipe Island Brook discharges from highlands north of the bridge to the Winooski River Valley. The brook bottom appeared to have a sandy bottom with the presence of gravel and cobble sized material. Overhead cable, telephone and power lines are present along the southern side of U.S.-2 and the eastern side of Snipe Island Road. Access for drilling borings appears favorable.

No boring log data were found in the Soils & Foundations project database or in-house historical boring log records.

No record plans from original construction of the current bridge were found in the VTrans as-built plans digital print room.

Drilling logs from private drinking water wells in the area of a project can be helpful in anticipating what may be encountered in the subsurface. The Agency of Natural Resources Private Well Locator interactive map was reviewed for these purposes.

Six water wells are present within approximately a ¼-mile radius from the subject project location. Based on lithologies reported on the driller logs, the subsurface in the area of the subject bridge is underlain by sand and gravel deposits. One log indicated the presence of hardpan. Depth to bedrock varies from 15 feet below ground surface (BGS) north of the subject bridge to 115-feet BGS east of the bridge. Figure 3 depicts the reported lithologies encountered in these nearby water wells. It should be noted that these logs were developed and provided by the well drilling companies whose employees may have had little to no training in identifying soil and rock.

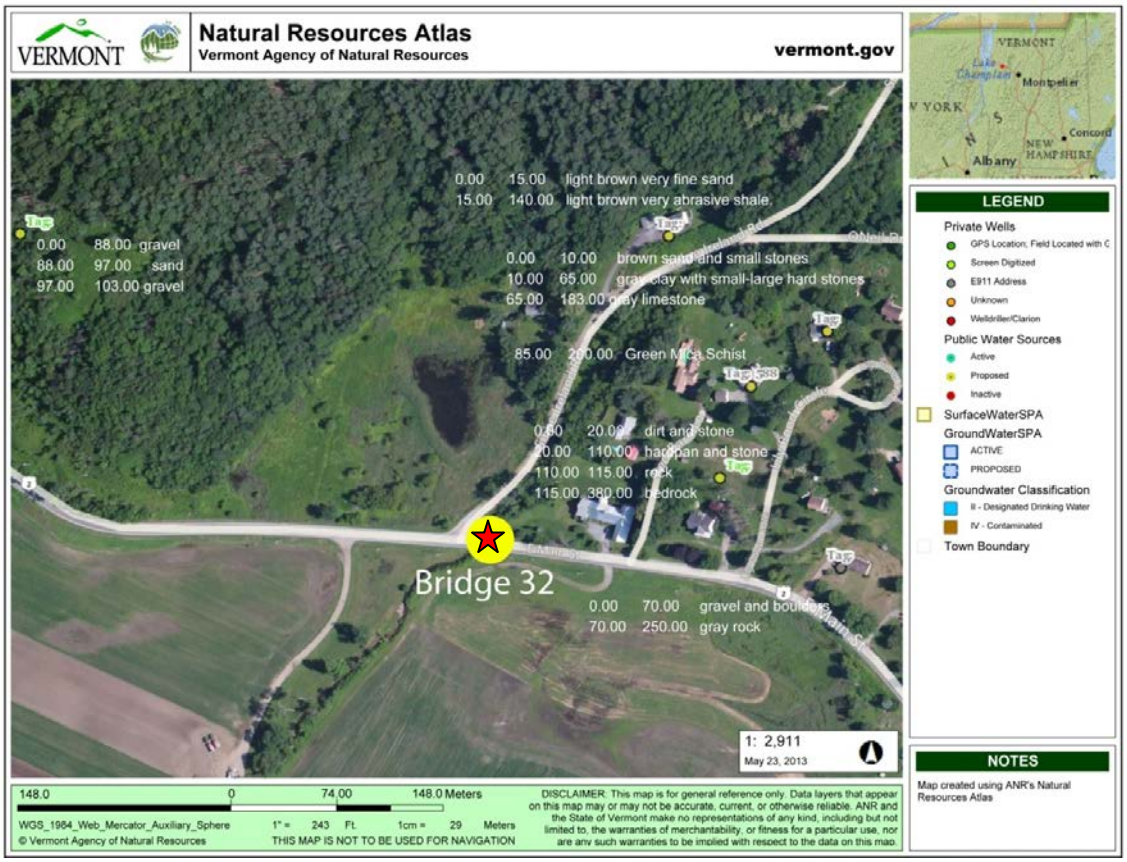


Figure 3 Private water wells in the vicinity of Bridge 32, U.S.-2 Richmond.

Surficial mapping conducted for the 1970 Surficial Geologic Map of Vermont indicates that the subject area is underlain by recent alluvium (AL), well sorted sand (LS) and localized fluvial gravel (FG) and lacustrine silt, silty clays and clay (STC). A copy of a portion of the 15-minute quadrangle map used in the compilation of the Surficial Geologic Map of Vermont is presented as Figure 4.

Figure 4 Surficial Geologic Map of Project Area.

According to the 2011 bedrock map of Vermont, the project area overlies bedrock consisting of Pinnacle Formation rocks described as "Gray- to light-brownish-gray-weathering, massive to bedded muscovite-biotite-chlorite metawacke, conglomerate, and blue-quartz pebbly phyllite, wacke and feldspathic quartzite".

USDA Natural Resources Conservation soil survey records indicate that surficial soils in the area of the bridge consist of Limerick silt loam (Le). Figure 5 presents a depiction of soil types in the vicinity of the subject bridge.

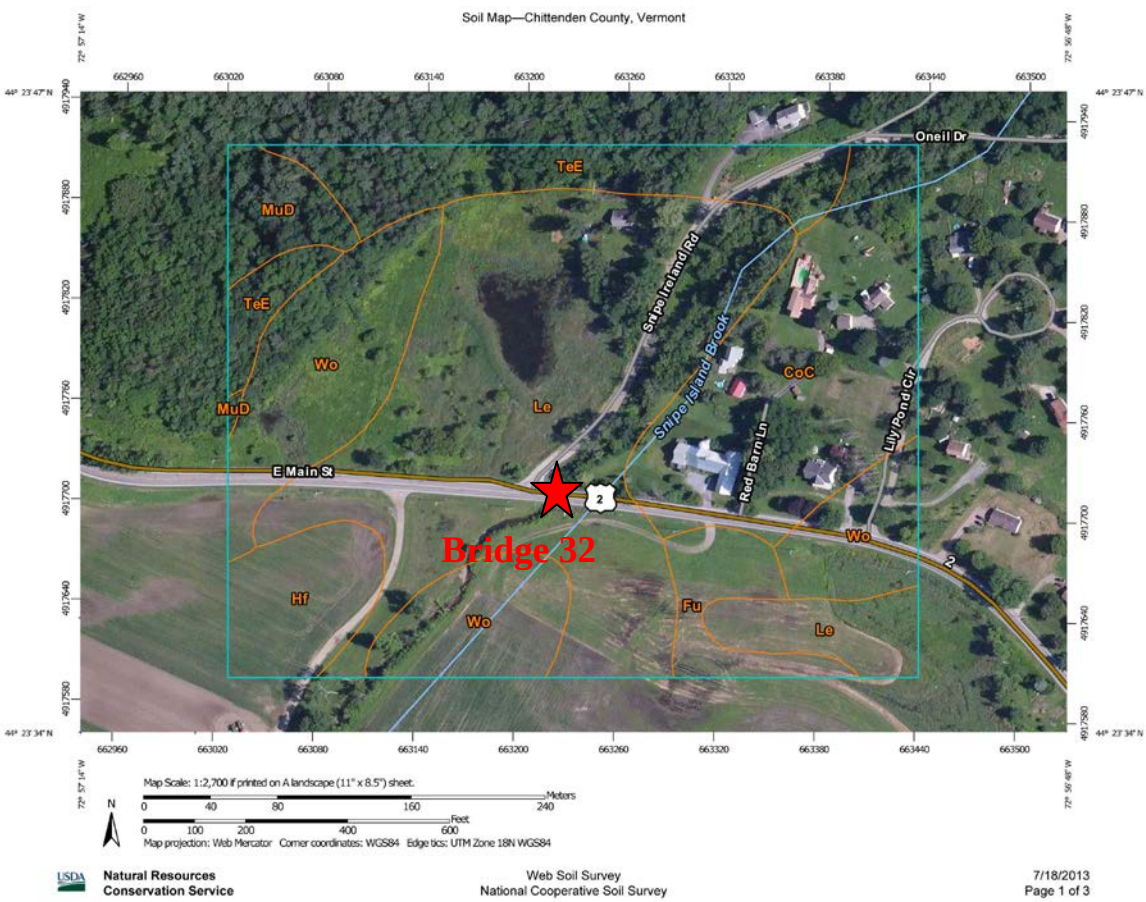


Figure 5 NRCS Map Showing Soil Types in the Vicinity of Bridge 32.

As a result of our preliminary investigation, we anticipate the following possible foundation options:

- Reinforced concrete abutments on spread footings
- Pile supported abutments

We recommend drilling two borings at opposite corners of the proposed bridge in order to more fully assess the subsurface conditions at the site including, but not limited to, the soil properties, ground water conditions and depth to and condition of bedrock.

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

c: WEA/Read File
CCB/Project File

VERMONT

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

[phone] 802-828-3979
[fax] 802-828-2334
[ttd] 800-253-0191

Agency of Transportation

To: Jeff Ramsey, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 5/15/2013

Subject: Richmond BF 0284(28) - Natural Resource ID

I have completed my natural resource ID for the above referenced project. My evaluation has included the following resources: wetlands, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed all existing mapped information and completed a field visit. I have evaluated 100 feet of the approaches and 50 feet upstream and downstream.

Wetlands/Watercourses
There are wetlands within the immediate area of the project. The wetlands are mostly emergent wetlands which are all Class II wetlands. Wetlands at this site all exhibited signs of hydric soils, wetland vegetation and hydrology indicators at the time of the visit. Primary functions and values of the wetlands at this project site would be flood storage and erosion control. Location information was collected and is available and it is in the geo-database ready for "dgn" creation.

The Snipe Island Brook flows through the project area. Any impacts below ordinary high water to this watercourse will need to be avoided and minimized and reported to the ANR and US Corps of Engineers (COE) for permitting purposes. Additional field work will be required if wetland areas cannot be avoided.

Wildlife Habitat
According to VT Fish and Wildlife linkage rating "4", good wildlife habitat exists on both sides of US 2 within this corridor. As this is a bridge project opportunities to cross will exist.

The Snipe Island Brook supports a variety of aquatic organisms. Timing restrictions for in-stream work will be likely.

Rare, Threatened and Endangered Species (R/T/E)
According to the VT Fish and Wildlife Natural Heritage Database there are no federal or state listed mapped threatened or endangered plants or animals within the project corridor, therefore, no impacts are anticipated.

Agricultural Soils
Soils within the project area are mapped as Limerick silt loam, which are considered Statewide (B) in the VT NRCS Vermont Important Farmland Rating.

1:1,530

Richmond BF 0284 (28)

N

5.1

5.2

Project Location

Deer Wintering Areas

Endangered Species - In House Backup

Vermont Wetlands (VSWI)

WetlandResourceID

Map created by Glenn Gingras, PDD-Environmental Section on 5\15\13.

bing™

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VERMONT

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

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

Agency of Transportation

To: Jeff Ramsey, Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer

Date: May 15, 2013

Subject: Richmond BF 0284(28)

This project consists of a proposed bridge replacement but no further detail is provided at this time. We have been asked to identify resource areas within a 200 foot radius of the existing bridge.
A field visit was conducted on 5-8-13 for the above bridge project. Archaeological sensitivity was identified within all four quadrants of the project area. These sensitive areas are logged into the geodatabase.

Please feel free to contact me if you have any questions.

Thank you,
Jen Russell
VTrans Archaeology Officer

Cc:
Chris Williams, Project Manager
Karen Spooner, Environmental Section

VTrans Working to Get You There
Vermont Agency of Transportation

Richmond BF 0284(28)
Arch Resource ID

0 0.005 0.01 0.02 0.03 0.04
Miles

1:2,096

N

Map created by J. Russell
PDD-Environmental Section
on 5-16-13

Ramsey, Jeff

From: O'Shea, Kaitlin
Sent: Wednesday, April 24, 2013 12:23 PM
To: Ramsey, Jeff
Cc: Newman, Scott; Williams, Chris
Subject: Re: RICHMOND BF 0284 (28) Resource ID request

Hi Jeff,

Richmond Bridge 32 is not historic, and there are no adjacent historic resources.

Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Environmental Section
Vermont Agency of Transportation
802-828-3962

On Apr 15, 2013, at 9:18, "Ramsey, Jeff" <Jeff.Ramsey@state.vt.us> wrote:

> Hi all y'all!
>
> The PM would like resources identified for this project.
>
> **From**: Jeff Ramsey, Environmental Specialist
> **Date**: April 15, 2013
> **Project**: RICHMOND BF 0284 (28)
> **PIN**: 13C070 **EA**: 0284028 100
>
> **Project Manager**: Chris Williams
> **Link to Photos**: Z:\Projects-Engineering\RichmondBF0284()13c070\Structures\Pictures
>
> The PM would like resources identified for this project.
>
> If there aren't any resources present, please feel free to issue a Resource Clearance for the CE as well.
>
> Folder Link:
> Z:\Projects-Engineering\RichmondBF0284()13c070\Environmental
>
> If you have any questions or need additional information please let me know.
> Thanks,
> Jeff
>
> **Jeff Ramsey**
> Environmental Specialist - North Region

Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
(802) 828-1278
jeff.ramsey@state.vt.us

VTrans Environmental Section Website

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Jeff Ramsey, Environmental Specialist
DATE: May 20, 2013
PIN: 13C070

Project: RICHMOND BF 0284(28)

ENVIRONMENTAL RESOURCES:

Wetlands:	X	Yes		No	
Historic/Historic District:		Yes	X	No	
Archaeological Site:	X	Yes		No	all four quadrants
4(f) Property:		Yes	X	No	
6(f) Property:		Yes	X	No	
Agricultural Land:	X	Yes		No	Statewide (b)
Fish & Wildlife Habitat:	X	Yes		No	Snipe Island Brook
Endangered Species:		Yes	X	No	
Hazardous Waste:		Yes	X	No	
Stormwater:		Yes	X	No	
USDA-Forest Service Lands:		Yes	X	No	
Wildlife Habitat Connectivity:	X	Yes		No	According to VT Fish and Wildlife linkage rating "4", good wildlife habitat exists on both sides of US 2 within this corridor. As this is a bridge project opportunities to cross will exist.
Scenic Highway/ Byway:		Yes	X	No	
Act 250 Permits:		Yes	X	No	

If you have any questions or need additional information please let me know.
Thanks,
Jeff

cc:
Project File

TOWN OF RICHMOND

RICHMOND TOWN CENTER
203 Bridge Street, P.O. Box 285
Richmond, Vermont 05477

June 27, 2013

Christopher P. Williams, P.E.
Agency of Transportation
One National Life Drive
Montpelier, VT 05633-5001

RE: Local and Regional Input Questionnaire
RICHMOND BF 0284(28) US 2, Bridge 32 over SNIPE ISLAND BROOK

Dear Mr. Williams:

This letter serves as Richmond's formal response to the request for local input on the proposed bridge project over the Snipe Island Brook. If you have any kind of a timeframe for this project, please let me know.

Community Considerations:

1) Richmond holds an annual July 4th parade and fireworks celebration which closes some roads temporarily for the day and brings in a few thousand people. The GMAA typically holds a 5k run on Cochran Road the third Saturday in August, which closes the road for about two hours. We also hold a farmers market in the village each Friday during the Summer which draws people but doesn't significantly affect traffic. Route 2 is used significantly by commuter traffic from Richmond and other towns.
2) Typically after the end of school the morning and evening traffic is somewhat less, and, of course, during the Summer when school is not in session.
3) Our fire, rescue and police are headquartered at different locations in Richmond village, about 1.5 miles from this project. All would need to detour to Cochran Road to reach the eastern part of the town during this project, which would add up to three miles of travel.
4) We have Richmond Elementary and Camels Hump Middle School on School Street, just off of Jericho Road in the central part of town (in the village). They have a typical school schedule of late August through early June.
5) School buses use this route, and it is a significantly traveled road for traffic going through Richmond. I am not aware that any public transit buses use Route 2 but they might.
6) The VYCC or the Pratt family (P&P Septic) may experience limited access to their fields unless they do a four-mile detour.

7) The VYCC is the only significant public facility (it is a private nonprofit that has public access) that is near this project.
8) Cochran Road and Bridge Street will bear the burden of Route 2 traffic. Currently Cochran Road is used by those who want to avoid the village and Route 2, as well as residents.
9) Other than emergency services coping with detours I do not think that any specific municipal operation would be impacted.
10) Richmond uses the Burlington Free Press, the Times Inkl newspapers, the Richmond Front Porch Forum and MMCTV Channel 15 (airs on Comcast). Television is covered by the usual local stations. Many people listen to Vermont Public Radio.
11) We have a Richmond Economic Development Committee headed by Selectboard member Amy Lord: alord@comcast.net

Design Considerations

1) I am not aware that the alignment creates any problems. There are some sight issues related to vegetation when exiting Snipe Ireland Road.
2) We are not aware of any issues with the width.
3) The current level of bicycle and pedestrian use is occasional. A typical bicyclist on Route 2 is an experienced cyclist used to adverse conditions. Pedestrians are infrequent.
4) There is no sidewalk or wide shoulder, but a wider shoulder may improve pedestrian and bicyclist access.
5) There is not a great need at the moment, however, in the future there may be a need.
6) I feel that usual bicycle traffic would probably detour, although, irregular cyclists or hikers may be unaware of the project and wind up at the site, objecting to a four mile detour.
7) Probably should not be painted red.
8) I am unaware of any safety concerns.
9) This area will flood in an Irene-type event, however, I believe that this bridge was above the water then.
10) I am unaware of any hazardous materials site nearby.
11) There is an older home to the east of this project but I am unsure of its significance.
12)

Land Use & Public Transit

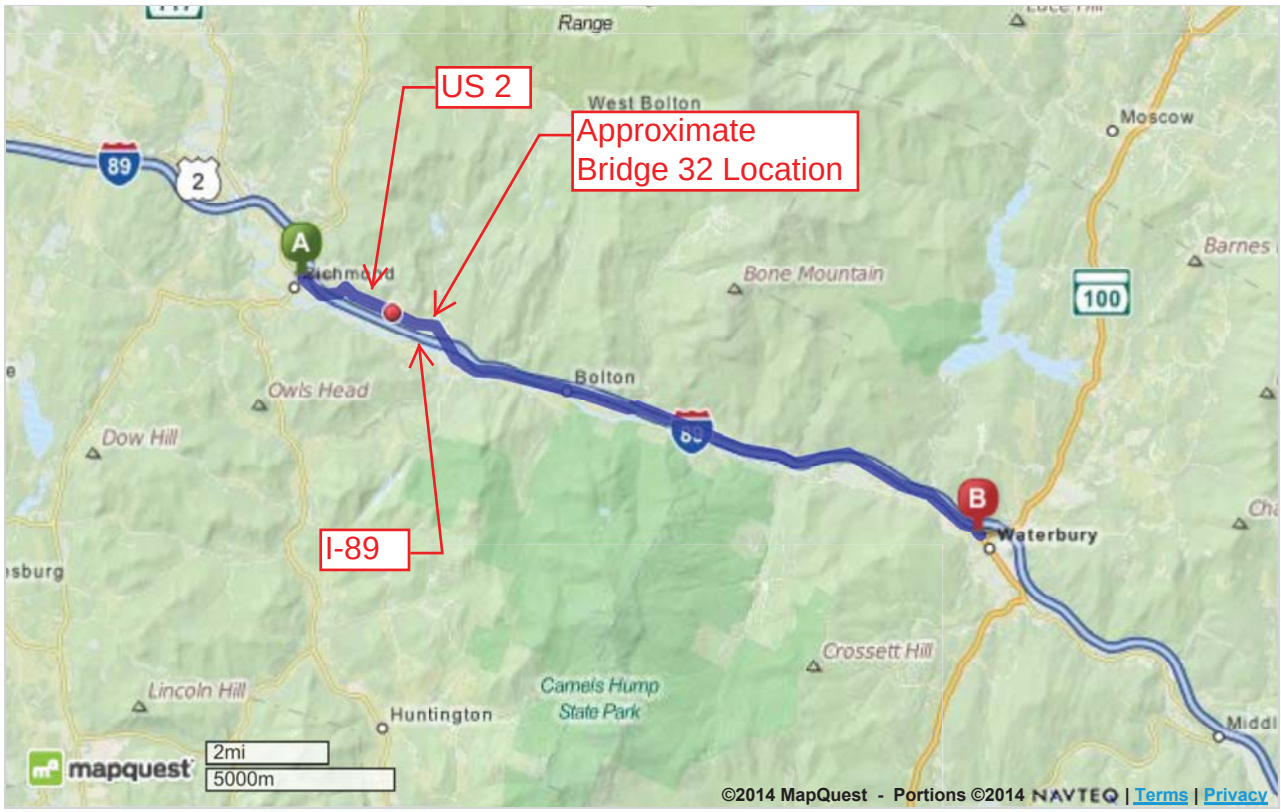
1) Neither our Town Plan nor our municipal land use regulations reference this bridge. As an improvement of an existing public infrastructure I believe it is exempt from our local review.
2) Included
3) I am not aware of any significant development proposals in this area. Most of the land is in the flood zone.
4) I am not aware of any expansion of public transit for Route 2 east of the village.

I hope that you find this helpful, but if you have any questions for me, I can be reached at 434-5170.

Sincerely,

Geoffrey Urbanik
Town Manager

Cc: Peter Gosselin, Richmond Highway
Alan Buck, Chief, Richmond Police
Tom Levesque, Chief, Richmond Fire
Michael Chiarella, Richmond Rescue
Michelle Boomhower, CCRPC



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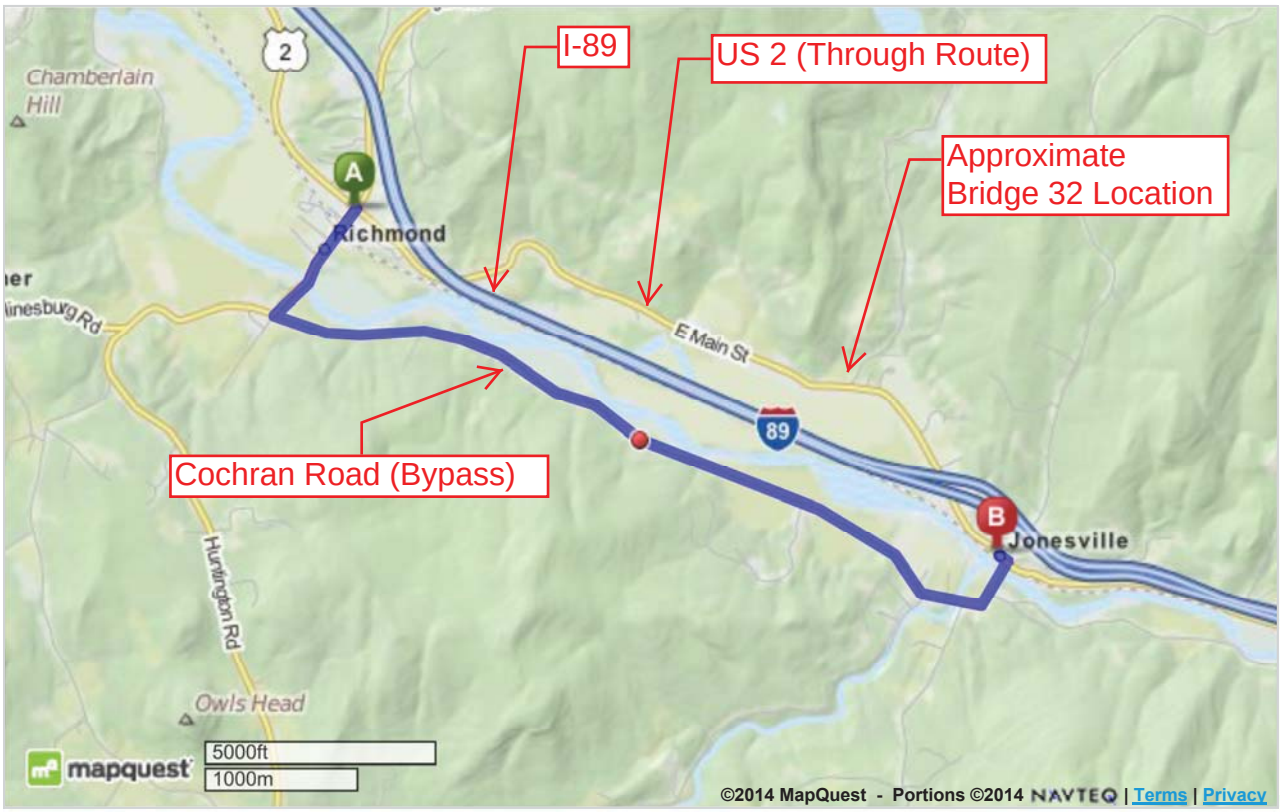
STATE DETOUR - I-89 Richmond Exit 11 to Waterbury Exit 10.

A-B on Through Route:	15.5 miles
A-B on Detour Route:	15.5 miles
Added Miles:	0 miles
End to End Distance:	31 miles



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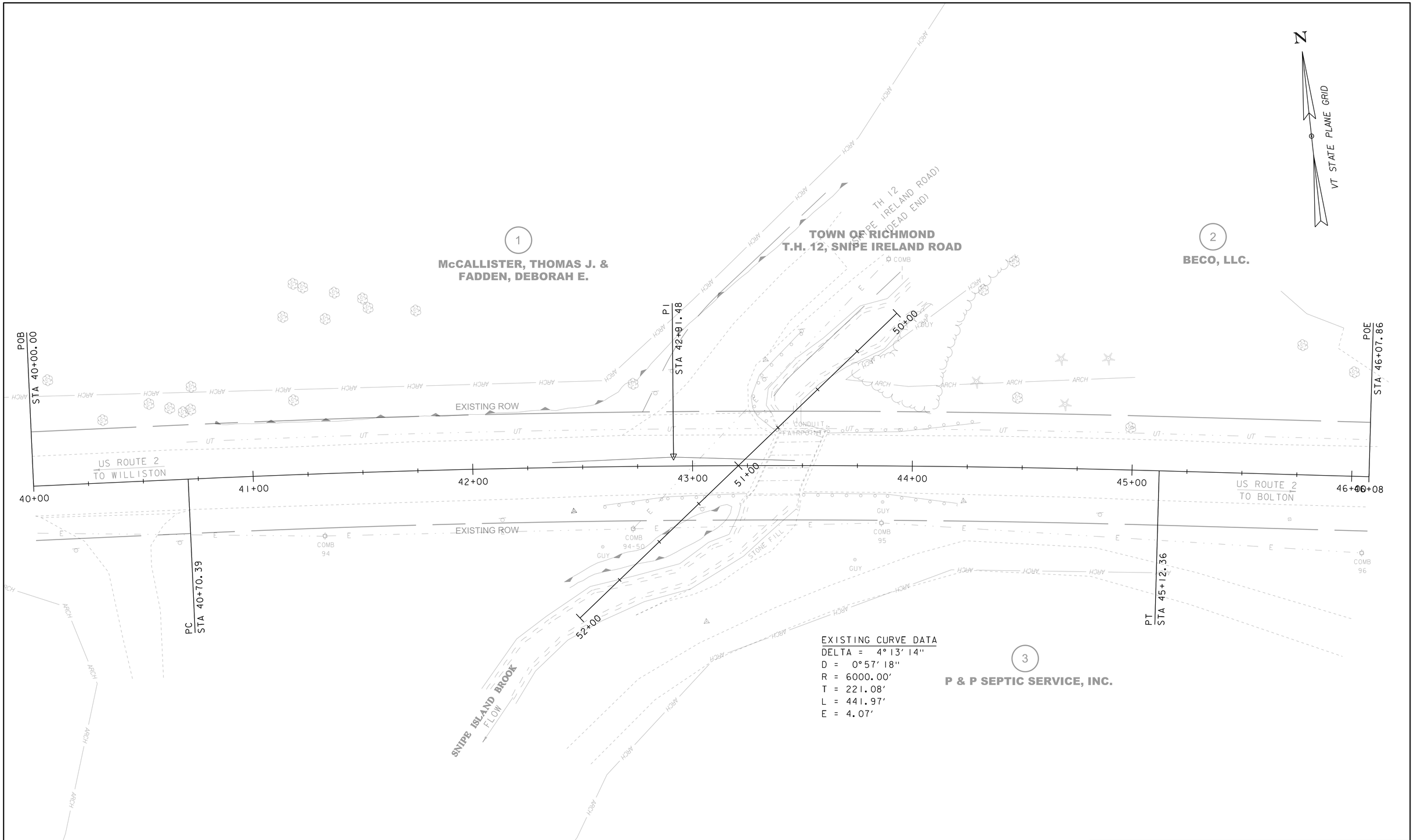
LOCAL BYPASS ROUTE - Bridge St. Richmond to US 2 in Jonesville

A-B on Through Route (US 2):	3.5 miles
A-B on Bypass Route (Cochran Rd.):	4.25 miles
Added Miles:	0.75 miles
End to End Distance:	7.75 miles

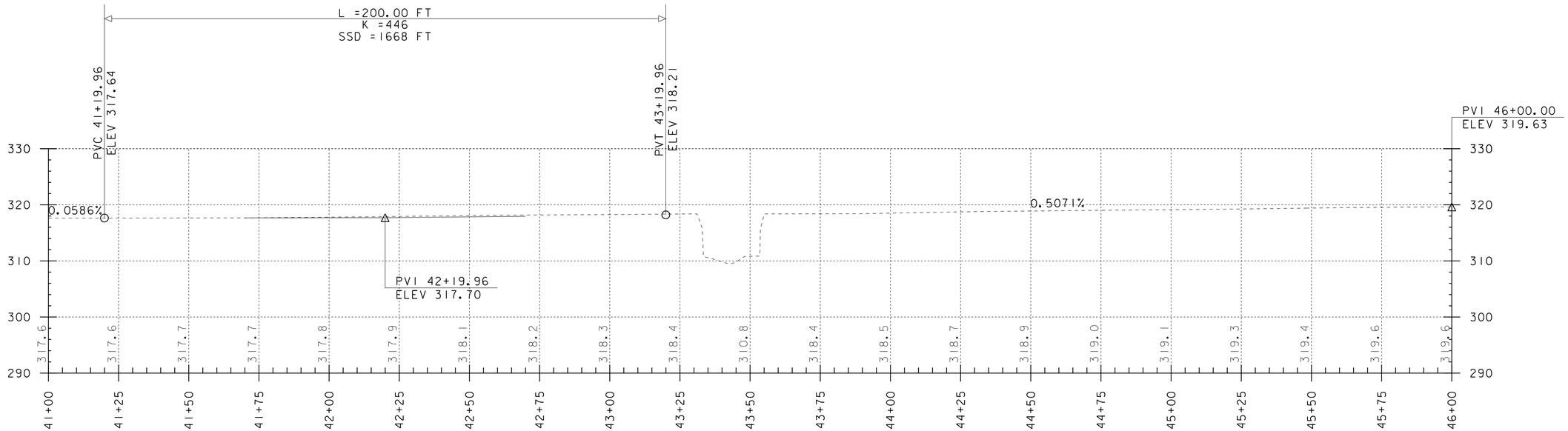


EXISTING CURVE DATA
DELTA = 4°13′14″
D = 0°57′18″
R = 6000.00′
T = 221.08′
L = 441.97′
E = 4.07′

EXISTING CONDITIONS

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284(28)	
FILE NAME: 13c070/sl3c070border.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET	SHEET 1 OF 16



US ROUTE 2 PROFILE

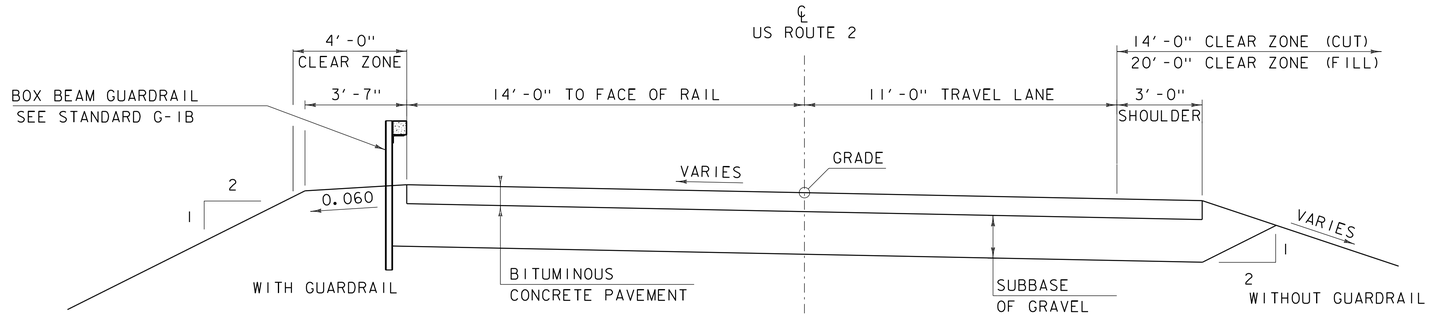
SCALE: HORIZONTAL 1" = 20'-0"
VERTICAL 1" = 10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

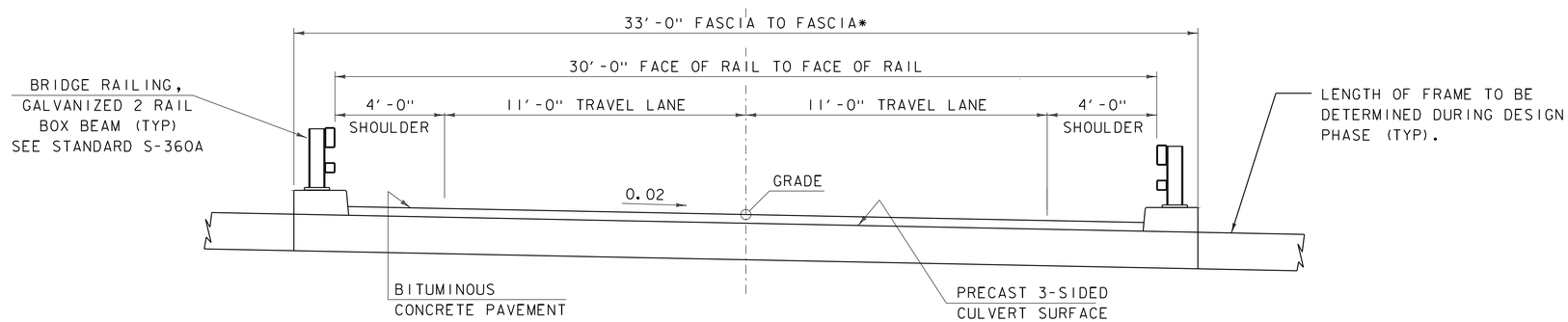
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284(28)	
FILE NAME: 13c070/13c070profile.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 2 OF 16



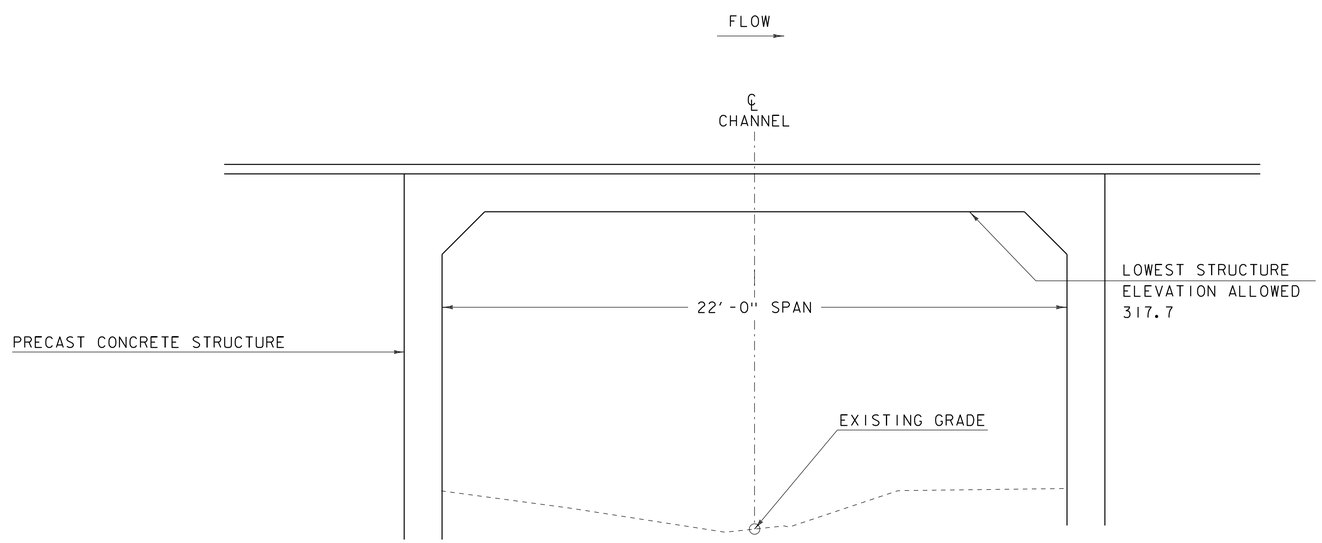
PROPOSED FAS 0284 TYPICAL SECTION

SCALE 3/8" = 1'-0"



ALTERNATIVE 1 PROPOSED FRAME TYPICAL SECTION*

SCALE 3/8" = 1'-0"



ALTERNATIVE 1 PRECAST 3-SIDED FRAME PROFILE

SCALE 3/8" = 1'-0"

* TOP SLAB AND WALLS OF FRAME ARE NOT YET DESIGNED. A TOP SLAB THICKNESS OF 16" HAS BEEN ASSUMED.

MATERIAL TOLERANCES

(IF USED ON PROJECT)

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

PROJECT NAME: RICHMOND
PROJECT NUMBER: BF 0284(28)

FILE NAME: 13c070\sl3c070typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ----------
ALT 1TYPICAL SECTIONS

PLOT DATE: 17-APR-2014
DRAWN BY: O.M.DARISSE
CHECKED BY: ------
SHEET 3 OF 16

N

VT STATE PLANE GRID

TH 12
(SNIPE IRELAND ROAD)

BEGIN BRIDGE
STA 13+25.00

POB
STA 10+00.00

BEGIN APPROACH
STA 10+50.00

BEGIN PROJECT
STA 12+25.00

PI
STA 12+91.48

50+00

END PROJECT
STA 14+50.00

END APPROACH
STA 16+00.00

POE
STA 16+07.86

EXISTING ROW

US ROUTE 2
TO WILLISTON

20°

51+00

10+00

11+00

12+00

13+00

14+00

15+00

US ROUTE 2
TO BOLTON

16+00

16+08

EXISTING ROW

LIMITS OF
POTENTIAL IMPACTS

PC
STA 10+70.39

52+00

END BRIDGE
STA 13+52.00

PT
STA 15+12.36

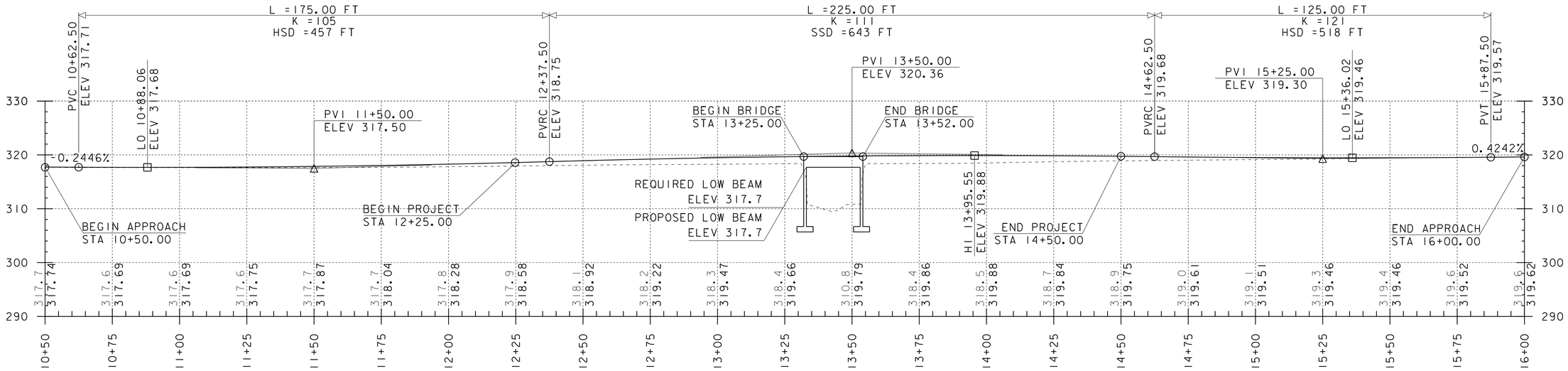
SNIPE ISLAND BROOK
FLOW

CURVE (1)
DELTA = 4° 13' 14"
D = 0° 57' 18"
R = 6000.00'
T = 221.08'
L = 441.97'
E = 4.07'

ALTERNATIVE 1 LAYOUT

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

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284 (28)	
FILE NAME: 13c070/s13c070border.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY:	CHECKED BY: ------
ALTERNATIVE 1LAYOUT	SHEET 4 OF 16



ALTERNATIVE 1 PROFILE

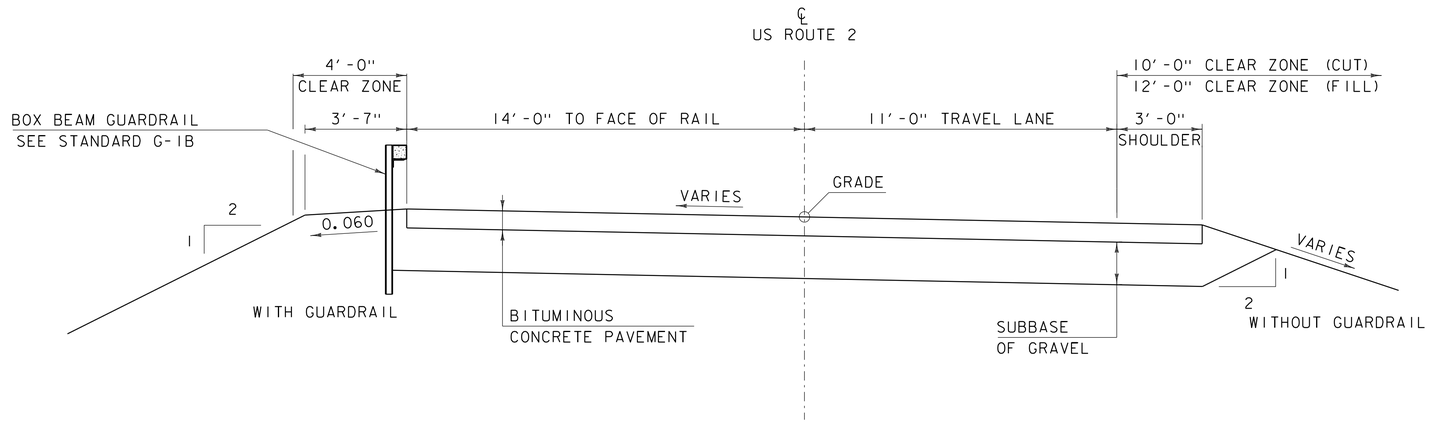
SCALE: HORIZONTAL 1" = 20'-0"
VERTICAL 1" = 10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

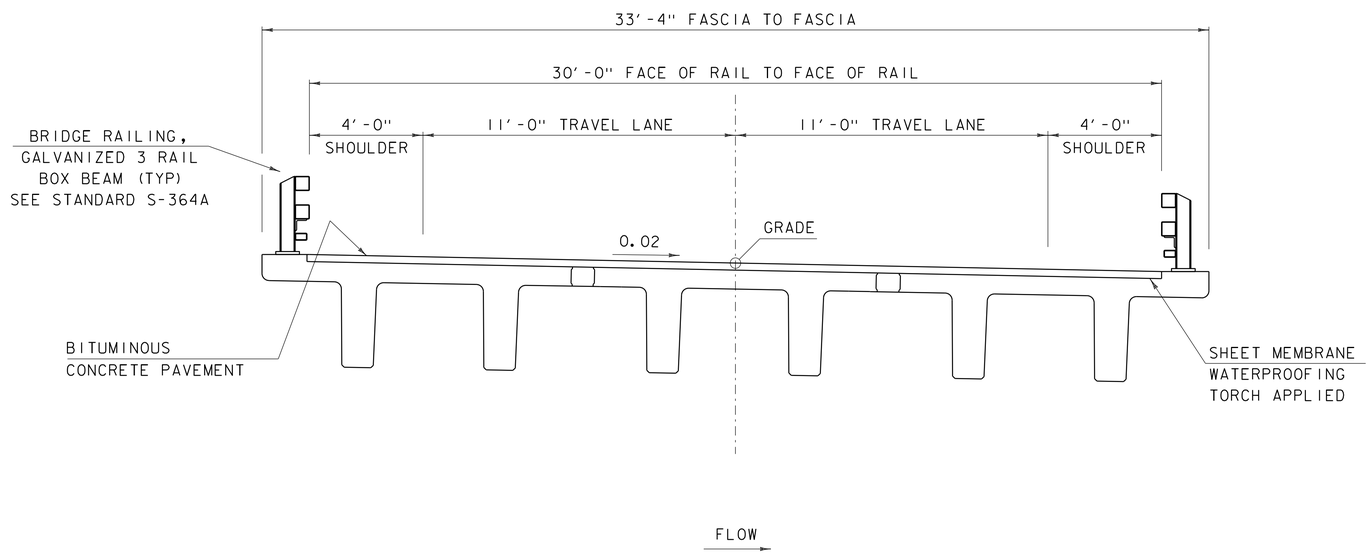
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284(28)	
FILE NAME: 13c070/13c070profile.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 5 OF 16



PROPOSED FAS 0284 TYPICAL SECTION

SCALE 3/8" = 1'-0"



ALTERNATIVE 2 - TYPICAL BRIDGE SECTION

SCALE 3/8" = 1'-0"

NOTE: NEXT-D BEAMS SHOWN FOR EXAMPLE,
SUPERSTRUCTURE NOT YET DESIGNED

MATERIAL TOLERANCES

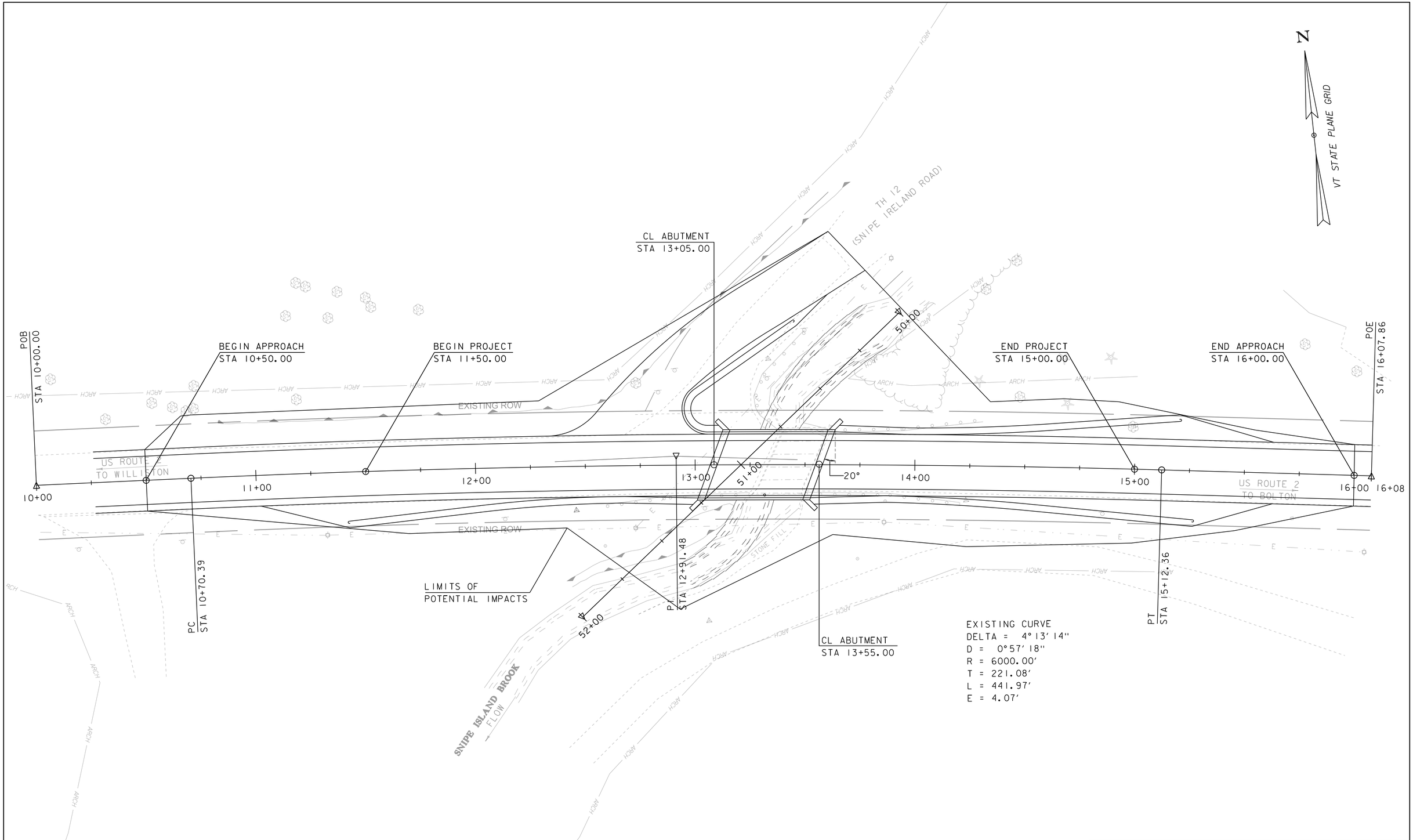
(IF USED ON PROJECT)

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

PROJECT NAME: RICHMOND
PROJECT NUMBER: BF 0284(28)

FILE NAME: 13c070\sl3c070typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ----------
ALT 2 TYPICAL SECTIONS

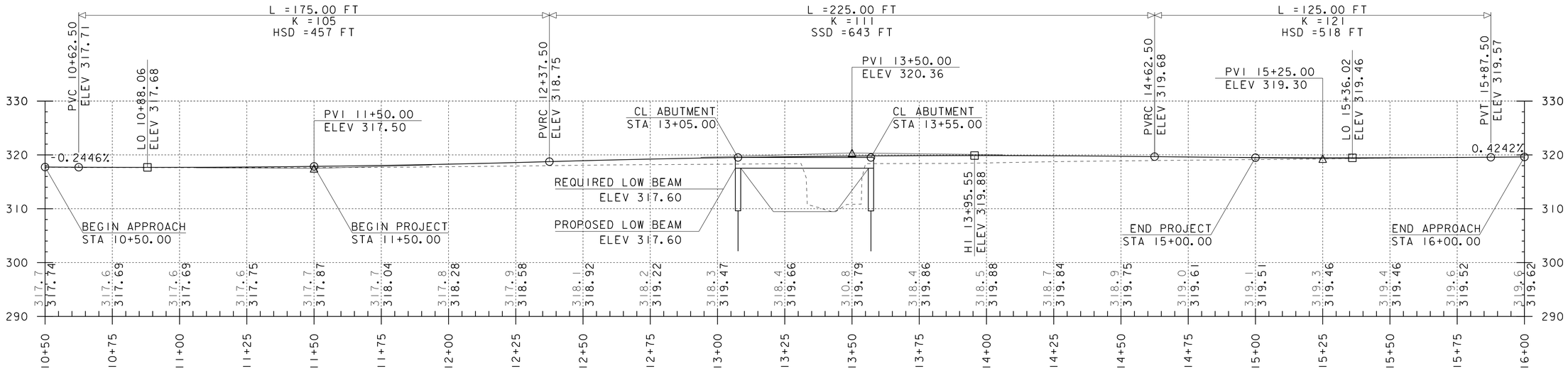
PLOT DATE: 17-APR-2014
DRAWN BY: O.M.DARISSE
CHECKED BY: ------
SHEET 6 OF 16



ALTERNATIVE 2 LAYOUT

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

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284 (28)	
FILE NAME: 13c070/sl3c070border.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY: ------	CHECKED BY: ------
ALTERNATIVE 2 LAYOUT	SHEET 7 OF 16



ALTERNATIVE 2 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: RICHMOND	
PROJECT NUMBER: BF 0284(28)	
FILE NAME: 13c070/13c070profile.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 8 OF 16

N

VT STATE PLANE GRID

TH 12
(SNIPE IRELAND ROAD)

PC
STA 20+00.00

PRC
STA 20+78.00

PI
STA 21+19.92

PI
STA 22+52.46

LIMITS OF
POTENTIAL IMPACTS

PT
STA 23+71.00

EXISTING ROW

US ROUTE 2
TO WILLISTON

US ROUTE 2
TO BOLTON

40+00
41+00
42+00
43+00
44+00
45+00
46+00
46+08
20+00
21+00
22+00
23+00
23+71
50+00
51+00
52+00

PI
STA 20+39.79

PT
STA 21+60.00

PC
STA 22+10.00

PRC
STA 22+93.00

PI
STA 23+32.79

STONE FILL

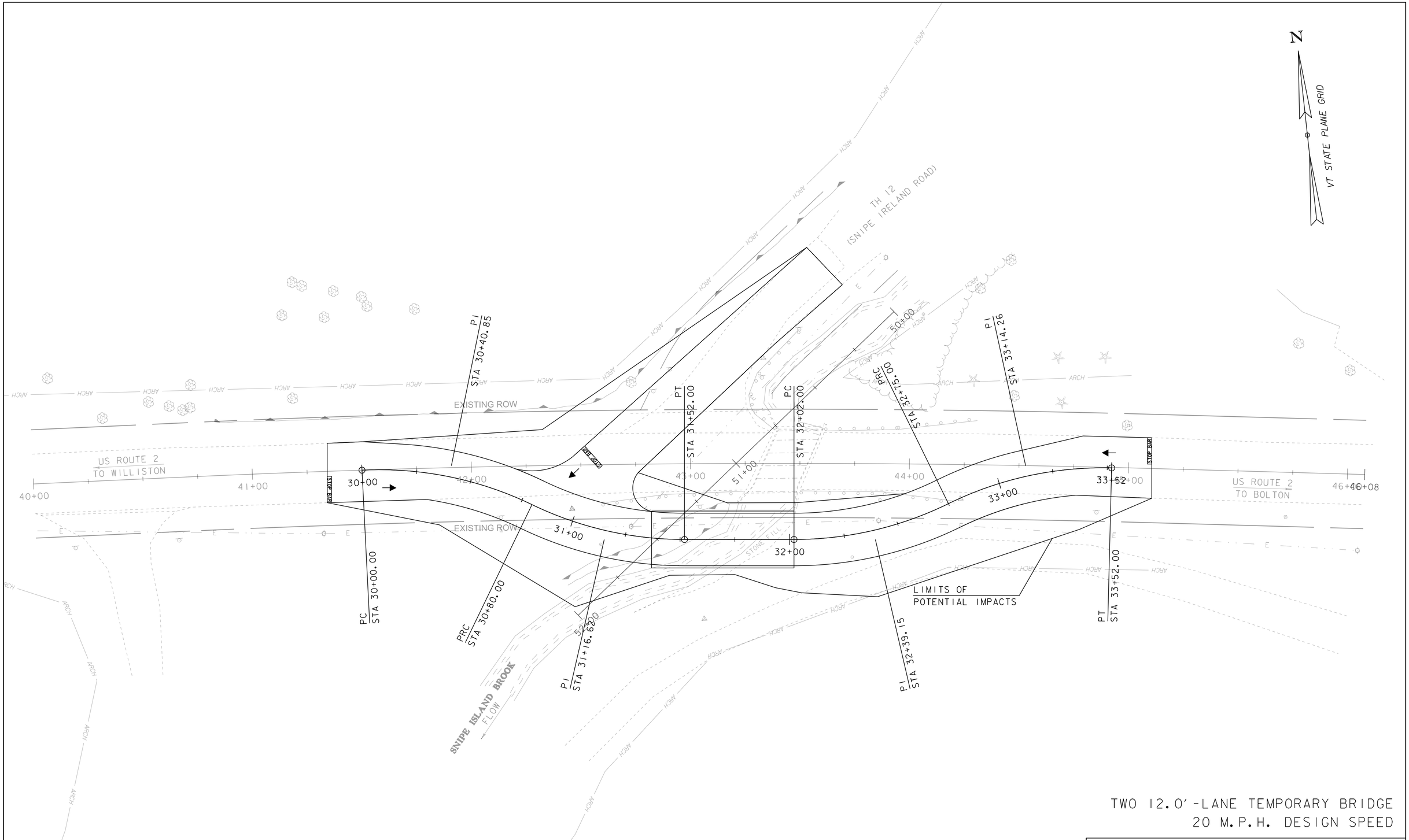
SNIPE ISLAND BROOK
FLOW

UPSTREAM TEMPORARY BRIDGE LAYOUT

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

TWO 12.0'-LANE TEMPORARY BRIDGE
20 M.P.H. DESIGN SPEED

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284 (28)	
FILE NAME: 13c070/sl3c070border.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY: ------	CHECKED BY: ------
UPSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 9 OF 16



DOWNSTREAM TEMPORARY BRIDGE LAYOUT

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

TWO 12.0'-LANE TEMPORARY BRIDGE
20 M.P.H. DESIGN SPEED

PROJECT NAME: RICHMOND	
PROJECT NUMBER: BF 0284 (28)	
FILE NAME: 13c070/sl3c070border.dgn	PLOT DATE: 17-APR-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY: ------	CHECKED BY: ------
DOWNSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 10 OF 16