STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Bennington BF 1000(20)

Town Highway 2, Bridge 6 over the Walloomsac River

September 10, 2019

I. Contents

I. Site Information

The bridge is located on Town Highway 2 (VT Route 9/Main Street) in the Town of Bennington Urban Compact, approximately 0.5 miles east of the intersection of Town Highway 2 (VT Route 9/Main Street) with Town Highway 1 (US Route 7/North Street/South Street). Town Highway 2 (VT Route 9) is classified as a Class 1 Town Highway through the project area. 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	Principal Arterial, National Highway System, Urban (Class 1 TH)
Bridge Type	Reinforced Concrete T-Beam
Bridge Span	46 feet
Existing Skew	30 degrees
Year Built	1923
Ownership	Town of Bennington
County	Bennington
Maintenance District	1

Need

The following is a list of the deficiencies of Bennington Bridge 6 and Town Highway 2 (VT Route 9) in this location.

1. The substructures and superstructures are in fair condition with a rating of 5. There is significant deterioration of the concrete and seats with spalling and voids developing.

2. Settlement cracks are apparent in Abutment 2.

3. There are drainage features on the bridge that are leaking and saturating concrete members, accelerating deterioration.

4. The bridge does not meet the minimum hydraulic requirements and is located within a flood insurance study area.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2018 and 2038.

TRAFFIC DATA	2018	2038
AADT	8,800	9,800
DHV	930	1,000
ADTT	330	550
%T	3.1	4.6
%D	57	57

Design Criteria

The design standards for this bridge project are the Vermont State Standards (VSS), dated October 22, 1997. Minimum standards are based on a DHV>400 and a design speed of 30 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 3.6	12'/8' (40')	11'/8' (38')	
Bridge Lane and Shoulder Widths	VSS Section 3.6	12'/8' (40')	12'/8' (40')[1]	
Clear Zone Distance	VSS Table 3.4		16' Fill 14' Cut	
Banking	VSS Section 3.13	NC	Banking not required on urban streets	
Speed	VSS Section 3.3	30 mph	30 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	No curve over bridge, 1,500' radius curve on eastern approach	Banking not required on urban streets	
Vertical Grade	VSS Table 3.6	Bridge located on crest vertical curve between slopes of 2.54% and 0.23%.	9% (max) for rolling terrain in urban settings	
K Values for Vertical Curves	VSS Table 3.1	K=65 (crest) on bridge, K=60 (sag) on east approach	30 crest / 40 sag	
Vertical Clearance	VSS Section 3.8	None noted	16'-3" (min)	
Stopping Sight Distance	VSS Table 3.1	>500', both approaches	200'	
Bicycle/Pedestrian Criteria	VSS Table 3.8	8 ft. shoulder	4' shoulder	
Bridge Railing	Structures Manual Section 13	Reinforced Concrete Rail	TL-2	
Hydraulics	VTrans Hydraulics Section/Manual	Passes Q50 storm event with (-) 4 feet of freeboard	Pass Q_{50} storm event with 1' of freeboard	Substandard
Structural Capacity	SM, Ch. 3.4	Significant deterioration	Design Live Load: HL-93	Substandard

Inspection Report Summary

Deck Rating	6 Satisfactory
Superstructure Rating	5 Fair
Substructure Rating	5 Fair
Channel Rating	6 Satisfactory

From the Structure Inspection, Inventory, and Appraisal Sheet:

5/30/2017 – Concrete repairs are needed throughout. The abutments continue to spall out around the drain openings and along the footings. Voids have developed due to spalling along the stemwall ends and the wingwalls. Scattered settlement cracks in abutment 2 that stem from the drainage openings have ¼" +/- of separation. The spalling around beam 10 at abutment 2 has narrowed the bridge seat and penetrated into the beam end. Drainage in the deck also affects beam 10 with continued saturation and spalling that penetrates beyond the second layer of reinforcing. ~JW/SP

[1] Footnote b in Table 3.6 of the VSS requires the addition of 2' to the shoulder width in guard rail areas on principal arterials where the DHV is over 400 vph.

6/9/2015 – Extensive concrete repairs are needed throughout. The abutments continue to spall out around the openings of the old drainage pipes and there are large voids with cracking along the wingwalls. There are scattered full height vertical settlement cracks in abutment 2. The bridge seat area under beam 10 at abutment 2 has become a concern. This is due to continued spalling and saturation that penetrates down through the bridge seat and up from the drainage opening below. The area continues to "neck" down and could eventually lead to a failure in the bridge seat. The old weep tubes continue to saturate and cause spalling in the beams below. ~JWW/JDM

6/13/2013 – Structure is in fair condition. The footing areas along both abutments should be repaired to prevent any possible undermining or continued spalling. ~JWW/JDM

Hydraulics

The structure is hydraulically inadequate. All flows up to and including Q_{10} pass under the bridge. At the design storm, Q_{50}, the roadway is overtopped with approximately (-)4' of freeboard. Hydraulic standards require a minimum of 1 foot of freeboard for the Q_{50} discharge for this roadway.

The existing 46-foot span bridge is skewed 30 degrees, which provides a clear span of 37 feet perpendicular to flow. This does not meet the minimum Bank Full Width (BFW) of 40-feet.

Due to site constraints, it is unlikely that a new bridge could be raised or lengthened significantly. It is recommended that a more efficient beam type is chosen to improve hydraulics, and that the hydraulic capacity is not reduced any further from the existing condition.

Utilities

The following is summarized from the Utilities Completion Memo and sketch that can be found in Appendix L:

Aerial Facilities:

- There are major, existing aerial facilities adjacent to the sidewalk along the northern side of Vermont Route 9 which extend along the northern side of the bridge; this existing line crosses from the northern to the southern side of Vermont Route 9 just to the west of the bridge. The facilities in this run include a 3 Phase Electric Line, a municipally owned fire alarm cable (no longer active) and 5 communication cables.

- There are existing aerial facilities which cross over Vermont Route 9 approximately 50 feet from the east end of the bridge and extend out Beech Street; these aerial facilities include a 3 Phase Electric line and 3 communication cables.

- There are existing aerial facilities which cross over Vermont Route 9 approximately 50 feet from the west end of the bridge and extend out Morgan Street; these aerial facilities include a Single-Phase Electric line and 1 communication cable.

- There are numerous private service connections (electric and telephone) located within the project area.

Underground Facilities:

- There is a series of telephone manholes located in the Vermont Route 9 roadway a few feet from the northern curb line; located with this manhole system are 3 active cables (900/400/300 pair. There is an existing telephone manhole within 25-feet (+/-) of either end of the existing bridge.

- Between these telephone manholes there appears to be 2 underground conduits (containing these 3 cables) which are attached to the underside of the existing bridge, under the westbound travel lane.

Municipal Sewer Main:

- The Town of Bennington has an 8-inch Clay Sewer Main (1940's vintage) located in the westbound lane a few feet north of the Vermont Route 9 centerline; the path of this sewer main is identifiable from the sewer manholes.
    - The sewer main located under Vermont Route 9 is buried under the stream bed and the existing bridge in alignment with the existing sewer manholes.

- There are 8-inch Clay Sewer Mains which intercept the Vermont. Route 9 main not far from the ends of the bridge and extend up Morgan Street and Beech Street.

Municipal Water Main:

- The Town of Bennington has a 10-inch Cast Iron main (1929 Vintage) located under the eastbound travel lane of Vermont Route 9.
    - The water main is attached to the underside of the existing bridge, under the Vermont Route 9 eastbound travel lane.

- There are water mains which intercept the Vermont Route 9 water main not far from the ends of the existing bridge and extend up Morgan and Beech Streets. The water main under Morgan Street has a 6-inch diameter and the water main under Beech Street has a 10-inch diameter.

Funding Participation:

Since this portion of Vermont Route 9 is a Class I Town Highway, any work which involves relocation of the municipal water or sewer mains is an eligible participating project cost, including the design of the relocations by the Town's selected Engineering firm.

Right of Way

There is an existing 4-rod Right-of-Way (ROW) centered on VT Route 9 which is shown on the Layout sheet. Additional Right-of-Way will be required for all alternatives.

Resources

Biological:

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

Wetlands/Watercourses

The project spans the Walloomsac River.

There are no wetlands present within the potential project area.

Wildlife Habitat

While there is a well shaded riparian buffer along the river banks north and south of the bridge, there is limited wildlife habitat in the project area. Movement of terrestrial wildlife would be over short distances at best.

This stretch of the Walloomsac river is well shaded and flows are relatively unobstructed by the bridges that span the river. This project should have limited impacts to the river. If shade trees need to be cut for the project, a planting plan should be developed to ensure that trees will reestablish in this area.

Rare, Threatened and Endangered Species

The only listed species in the area is the federally threatened northern long-eared bat. No impacts are anticipated with this project. The bridge does not provide good habitat features at this time and it is unlikely that use will occur before the project is constructed.

Agricultural

The project area is listed as Copake gravelly fine sandy loam. This is a prime agricultural soil. No impacts are likely.

Archaeological:

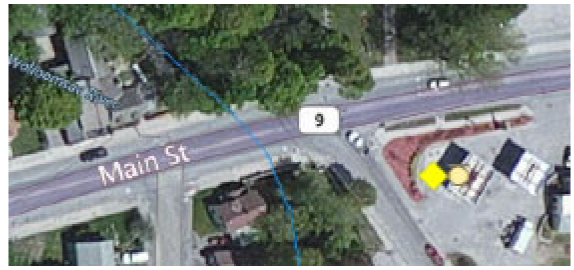
Of the four project quadrants, only the northeast section is undisturbed. Two of the remaining quadrants contain structures, and the final section contains a concrete culvert and rip rap. The sensitive northeast quadrant has been mapped and added to the archaeology geodatabase for inclusion in future project plans. The sensitivity is based on environmental factors and presence of a historic structure dating to the 18th century. Generally front yards are not considered archaeologically sensitive, but in this case the early date and direct connection to the Samuel Safford Mill raises the potential significance to a level that would require future research. See the Archaeological Resource ID in Appendix H for additional information.

Historic:

There are two historic resources identified as eligible for inclusion in the National Register of Historic Places (NRHP): Bridge No. 6 and the former Safford-Morgan House at 722 Main Street. Both historic resources are considered Section 4(f) property types. See the Historic Resource ID in Appendix I for additional information.

Hazardous Materials:

The Mobil Gas Station located southeast of the project is a hazardous waste site. There are also underground storage tanks associated with this site.



Stormwater:

There are no stormwater concerns for this project.

II. Safety

There are 2 High Crash Location (HCL) Intersections from the 2012-2016 formal HCL report located along VT Route 9 through the Village area. The closest HCL Intersection is the intersection of VT Route 9, Union Street and Pleasant Street, which is located 600 feet west of the bridge. The HCL Intersections are summarized in the following table:

Intersection	MM	# of crashes	# of fatalities	# of injuries
VT Route 9, Depot St., and Washington St.	4.260 – 4.280	17	0	2
VT Route 9, Union St., and Pleasant St.	4.810 – 4.830	20	0	8

These HCL's are located outside of the project limits. However, the VTrans Traffic Safety Engineer should evaluate potential impacts to these intersections during construction.

III. Maintenance of Traffic

The Vermont Agency of Transportation developed an Accelerated Bridge Program in 2012, which focuses on expedited delivery of construction plans, permitting, and Right-of-Way, as well as accelerated 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 accelerated construction techniques and incentives to encourage contractors to complete projects early. The Agency will consider the closure option on projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements and systems for new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Bridge 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 1 Town Highway, it would be the responsibility of the State of Vermont to choose the preferred detour route, and to sign it according to the MUTCD.

There are several routes that could serve as an appropriate detour for passenger cars at this site. The shortest route has an end-to-end distance of 0.6 miles and adds approximately 0.05 miles to travel distance. The passenger car detour route is as follows:

> State Signed Passenger Car Detour Route: VT Route 9, to Safford Street, Coolidge Street, and Bradford Street back to VT Route 9 (0.6 mi end-to-end)

There are several routes that could serve as an appropriate detour for passenger cars at this site. However, many bypass routes around the bridge are not appropriate for trucks due to geometric constraints and the high volume of traffic on VT Route 9. The passenger car route specified above is not appropriate for trucks due to geometric constraints. Therefore, a separate truck route would be recommended. The regional truck route has an end-to-end distance of 5.4 miles and adds approximately 2.7 miles to travel distance. The truck detour route is as follows:

> State Signed Truck Detour Route: VT Route 9, to US Route 7, and VT Route 279, back to VT Route 9 (5.4 mi end-to-end)

Since there is a sidewalk on the existing bridge, a pedestrian detour is necessary. The above passenger car route does not have sidewalks for the entire length and as such would not be recommended for pedestrians. The pedestrian detour route is as follows:

> State Signed Pedestrian Detour Route: VT Route 9, to Safford Street, Gage Street, and Bradford Street back to VT Route 9 (0.8 mi end-to-end)

A map of these detour routes can be found in Appendix M.

Advantages: This option would eliminate the need for phasing construction, which would significantly decrease cost and time of construction. Also, this option would not have impacts to historic resources adjacent to the bridge. This option reduces the time and cost of the project both at the development stage and construction. The Town of Bennington would reduce their local share by 50% for choosing to close the bridge during construction per ACT 153.

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

Option 2: Phased Construction

Phased construction is the maintenance of 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.

While the time required to develop a phased construction project would remain the same, the time required to complete a phased construction project increases because some of the construction tasks have to be performed multiple times. In addition to the increased design and construction costs mentioned above, the costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. 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 ROW.

Due to the high volume of traffic at this site, two lanes would have to be provided for the duration of each phase if all traffic is expected to go through the project site. Additionally, since there is a sidewalk on the existing structure, pedestrian traffic should be maintained as well. In order to accommodate these requirements, four phases would be necessary for a fully phased project. This is not desirable; it would result in a longer, more expensive, and less safe construction project, as pedestrians, passenger vehicles, and construction equipment would all be present in these tight site constraints.

A safer approach at the project site is to partially phase. There are two options available:

1. Pedestrians and traffic travelling eastbound would be maintained over the bridge while it is constructed in phases, and traffic travelling westbound on VT Route 9 would be detoured.

2. Two-way traffic would be maintained over the bridge while it is constructed in phases, and pedestrians would be detoured.

The detour recommended for westbound traffic and for pedestrians is listed above in Option 1.

Option 3: Temporary Bridge

This is a very small site to attempt to fit in a temporary bridge, and there are constraints on both sides. There are buildings located on both the upstream and downstream sides of Bridge 6, which are within 10 feet from the roadway on both sides. It would be impossible to construct a temporary bridge without the removal of at least one building. Additionally, there is a historic property located in the northwest quadrant, which should be avoided.

Significant additional costs would be incurred to use a temporary bridge, including the cost of the bridge itself, installation and removal, demolition of historic properties, restoration of the disturbed area, and the time and money associated with the temporary Right-of-Way. Additional permit review would be triggered by the impacts to historic properties.

A two-way temporary bridge would be appropriate based on the daily traffic volumes. However, since placement of a bridge is not feasible due to the above reasons, it will not be considered further in this report.

IV. Alternatives Discussion

Bridge 6 is not considered structurally deficient; however, the existing T-beams are only in fair condition and continue to deteriorate, with large areas of delaminations on the T-beams and continually saturated areas on the deck soffit. Additionally, the hydraulic opening is substandard.

No Action

This alternative would involve leaving the bridge in its current condition. The superstructure and substructure are only in fair condition, so something will have to be done to improve this bridge in the near future. Although the bridge is not in imminent danger of collapse, it will eventually be posted for lower traffic loads. In the interest of safety to the traveling public, the No Action alternative is not recommended.

Superstructure Repair

While there are some substandard features associated with this stretch of VT Route 9, the superstructure is the item that will require work within the next 10 years. Thus, the primary goal of a rehabilitation option will be to rectify the superstructure issues. Minor repairs would also be recommended for the substructures. There are two types of superstructure rehabilitation options available for concrete structures: concrete patching and superstructure replacement.

Superstructure Patching

Patching involves removing the deteriorated and loose concrete from the structure. Then forms are constructed such that a thin layer of new concrete can be placed to replace this removed concrete. There are several disadvantages with this method of rehabilitation in this situation. The first is that most of the patching is overhead; this requires the work to take place in difficult circumstances, where the work is taking place in the river. The concrete must be removed without spoiling the river and the new concrete must be placed from underneath the bridge. Second, having newer non-chloride laced concrete adjacent to the existing concrete usually exacerbates the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 15 years with the addition of sacrificial anodes into the patched structure.

Superstructure Replacement

This alternative would involve removing the existing superstructure in its entirety and placing new shallower tee beams back on the existing abutments. The advantage to performing a complete superstructure replacement over patching in this situation is that the lifespan of all new concrete would be much greater than patching and hydraulics could be slightly improved. Additionally, there would be repairs as follows:

- The existing bridge seats would be cut down and new bridge seats would be poured to accommodate the new superstructure.

- The existing historic concrete rail would be replaced in its entirety with a railing that meets the section 106 and section 4(f) permitting requirements for historic resources.

- There are several drainage inlets within the project limits that should be replaced during a superstructure replacement project.

- There are several utility conduits that run through the backwall of the existing structure. These conduits will be affected by a superstructure replacement project since they are located at the superstructure elevation. Care should be taken working around these conduits.

- Minor work to the substructures and wingwalls would be required to match back into the new substructure. Each of the wingwalls would need to be sawcut and removed down to the bridge seat elevation and recast after the new superstructure is placed. Additionally, some concrete repair and patching would be required for the existing substructures.

- Stone fill should not be placed in front of the abutments for protection; the bridge does not meet hydraulic standards and it is important not to reduce the waterway opening

The existing substructure is in fair condition, and it is reasonable to assume that it can safely carry anticipated traffic loads for an additional 30 years. The existing lane widths and shoulders on the bridge are 12 feet wide and 8 feet wide respectively, which meets the minimum standard as set forth in the Vermont State Standards. In addition to the existing lane and shoulder widths, there is a 9-foot wide sidewalk on either side of VT Route 9 throughout the project area. It is proposed that this typical section is maintained for this alternative.

Advantages: This alternative would address the structural issues of the existing bridge, with minimum upfront costs. This option would have minimal impacts to adjacent properties and resources.

Disadvantages: The existing bridge is inadequate hydraulically, which this option does not improve. Additionally, a new superstructure would have a design life that exceeds the remaining life of the existing foundations.

Maintenance of Traffic: The only possible options for traffic control at this site are an offsite detour, or partially phased construction.

Full Bridge Replacement On-Alignment

The remaining substandard criteria at this site that cannot be easily rectified with a rehabilitation project is the substandard hydraulics. In order to meet the hydraulic standards, the bridge and roadway would need to be raised several feet. Due to the close proximity of buildings to the bridge, it is not feasible to raise the roadway and sidewalks. Additionally, raising the roadway would also cause a worse flooding scenario of these buildings. By maintaining the existing alignment, impacts to resources and adjacent properties will be minimized.

Due to the constraints at the project site discussed above, only the current horizontal and vertical alignments will be considered. This alternative would replace the existing bridge with a new superstructure as well as a new substructure at the existing location. The new bridge would have a 100-year design life. The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

a. *Bridge Width*

The existing bridge has 12-foot wide lane widths and 8-foot wide shoulders; this meets the minimum standard of 12-feet and 8-feet respectively. In addition to the existing lane and shoulder widths, there is a 9-foot wide sidewalk on each side of VT Route 9 throughout the project area. It is proposed that this typical section is maintained for this alternative. This will result in a bridge that is 60’ wide out-to-out with concrete combination bridge railing.

b. Bridge Length and Skew

The existing bridge is 48 feet long with a 30-degree skew. This provides a clear span normal to the channel of approximately 37 feet. Due to constraints on both ends of the bridge, lengthening the bridge significantly or eliminating the skew is not prudent. Vertical abutments with a bridge span of approximately 50 feet with a skew of 30 degrees will be recommended in order to match the existing site conditions.

c. Superstructure Type

A precast structure will be the preferred choice, due to decreased construction time. The possible 50' span length bridge types that are most commonly used in Vermont, are solid slabs, steel and composite concrete deck, and NEXT beams. The superstructure should have a maximum depth of 32 inches in order to match or improve the existing low beam elevation for hydraulics. Either a solid slab or NEXT Beams would meet the criteria. The superstructure type with the shallowest profile should be chosen for this option, to provide for a larger hydraulic capacity as the superstructure depth is critical for improving hydraulic conditions.

d. Substructure Type

There is no visible bedrock in the location of the project. Available information from nearby borings suggests that either shallow bedrock or sandy/silty soils could be encountered at this site. Borings should be taken at the project site, to determine if the subsurface conditions at this location. Possible foundation options here are pile caps on a single row of H-Piles or reinforced concrete abutments on spread footings.

e. Maintenance of Traffic:

The only possible option for traffic control at this site is an offsite detour.

V. Alternatives Summary

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

Alternative 1: Superstructure Patching with Traffic Maintained with Off-Peak Short-Term Lane Closures
Alternative 2a: Superstructure Replacement with Traffic Maintained on Off-Site Detour
Alternative 2b: Superstructure Replacement with 2-Way Vehicular Traffic Maintained with Phased Construction and an Offsite Pedestrian Detour
Alternative 2c: Superstructure Replacement with Pedestrian and 1-Way Eastbound Vehicular Traffic Maintained with Phased Construction and an Offsite Detour for Westbound Traffic
Alternative 3: Full Bridge Replacement with Traffic Maintained on Off-Site Detour

VI. Cost Matrix[2]

Bennington BF 1000(20)		Do Nothing	Alt 1	Alt 2a	Alt 2b	Alt 2c	Alt 3
			Superstructure Patching	Superstructure Replacement			Full Bridge Replacement
			Short Term Lane Closures	Offsite Detour	2-Way Traffic Maintained by Phasing w/ Offsite Pedestrian Detour	Pedestrian and 1-Way Eastbound Vehicular Traffic Maintained by Phasing w/ Offsite Detour for Westbound Vehicular Traffic	Offsite Detour
COST	Bridge Cost	$0	256,200	808,500	1,010,700	1,010,700	1,608,400
	Removal of Structure	$0	0	119,040	136,896	136,896	223,200
	Roadway	$0	61,000	234,000	366,000	366,000	295,000
	Maintenance of Traffic	$0	29,040	115,300	296,600	346,600	115,300
	Construction Costs	$0	346,240	1,276,840	1,810,196	1,860,196	2,241,900
	Construction Engineering & Contingencies	$0	103,872	191,526	271,529	279,029	515,637
	Total Construction Costs w CEC	$0	450,112	1,468,366	2,081,725	2,139,225	2,757,537
	Preliminary Engineering[3]	$0	103,872	255,368	362,039	372,039	336,285
	Right of Way	$0	15,000	30,000	30,000	30,000	45,000
	Total Project Costs	**$0**	**568,984**	**1,753,734**	**2,473,765**	**2,541,265**	3,138,822
	Annualized Costs	$0	37,932	58,458	82,459	84,709	31,388
TOWN SHARE			28,449	43,843	123,688	127,063	156,941
TOWN %			5%	2.5%	5%	5%	5%
SCHEDULEING	Project Development Duration[4]		4 years	4 years	4 years	4 years	4 years
	Construction Duration		2 months	3 months	9 months	9 months	6 months
	Closure Duration (If Applicable)		N/A	30 days	N/A	N/A	60 days
ENGINEERING	Typical Section - Roadway (feet)	40	40	40	40	40	40
	Typical Section - Bridge (feet)	40	40	40	40	40	40
	Geometric Design Criteria	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No Change	No Change	No Change	No Change	No Change	No Change
	Bicycle Access	No Change	No Change	No Change	No Change	No Change	No Change
	Pedestrian Access	No Change	No Change	No Change	No Change	No Change	No Change
	Hydraulics	No Change	Substandard Hydraulics and BFW	Substandard Hydraulics and BFW	Substandard Hydraulics and BFW	Substandard Hydraulics and BFW	Substandard Hydraulics
	Utilities	No Change	No Change	Relocation - Aerial and Buried	Relocation - Aerial and Buried	Relocation - Aerial and Buried	Relocation - Aerial and Buried
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes	Yes
	Road Closure	N/A	No	Yes	No	No	Yes
	Design Life	<10 years	15	30	30	30	100

[2] Costs are estimates only, used for comparison purposes.
[3] Preliminary Engineering costs are estimated starting from the end of the Project Definition Phase.
[4] Project Development Durations are starting from the end of the Project Definition Phase.

VII. Conclusion

We recommend **Alternative 3**; a full bridge replacement while maintaining traffic on an offsite detour.

Structure:
The annualized cost for a full bridge replacement is less expensive than the rehabilitation options. Additionally, with a new structure, the bridge span can be slightly lengthened to meet the minimum Bank Full Width requirement. This structure will remain hydraulically inadequate, however.

The new bridge can be precast or cast-in-place and will have a span of approximately 50-feet. In order to match or improve the existing hydraulic condition, the superstructure type with the shallowest profile should be selected. In-situ soil conditions will need to be determined before selecting a substructure type, as shallow bedrock may be present.

The new structure should provide a 40-foot paved typical to match the existing roadway width. Additionally, 9-foot wide sidewalks on each side of the bridge are recommended to match the existing conditions.

The new bridge will be designed to a 100-year design life.

Traffic Control:
The recommended method of traffic control is to close the bridge for 60 days and maintain traffic on an offsite detour. The detour for this project location would add approximately 0.05 miles to the through route and have an end-to-end distance of 0.6 miles. This detour is not appropriate for large trucks, and as such a separate detour route for trucks is recommended. A separate pedestrian route onto Gage street would also be signed.

The Average Daily Traffic volume on VT Route 9 through the project area is 8,800 veh/day, which is considered relatively high. The option to close the road is the least expensive and the safest option compared to phasing.

Additionally, by closing the bridge to traffic during construction, and not constructing a temporary bridge structure, the local share is reduced by 50% per VT Legislation Act 153 of 2012.

Utilities:
Overhead and underground utilities will need to be relocated; coordination should take place early in the design phase.

VIII. Appendices

- A: Site Pictures
- B: Town Map
- C: Bridge Inspection Report
- D: Preliminary Hydraulics Report
- E: Preliminary Geotechnical Information
- F: Resource ID Completion Memo
- G: Natural Resources Memo
- H: Archaeology Memo
- I: Historic Memo
- J: Local Response and Input
- K: Operations Response and Input
- L: Utility ID and Field Sketch
- M: Detour Routes
- N: Crash Data
- O: Plans

A: Site Pictures

Picture 1: Looking West Over Bridge

Picture 2: Looking East Over Bridge

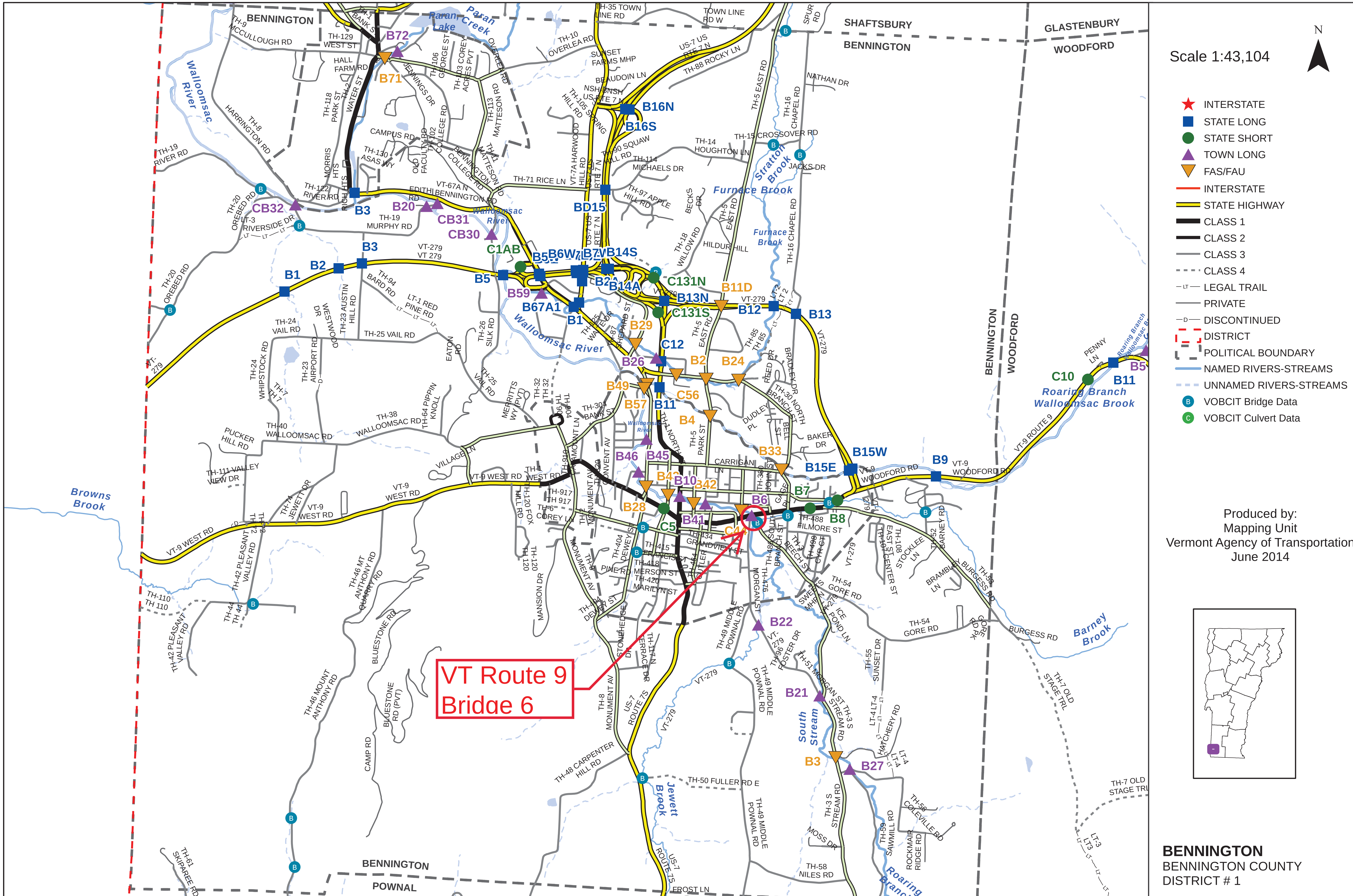
Picture 3: Looking at Upstream Fascia

Picture 4: Abutment Scour and Deterioration

Picture 5: Beam and Abutment Deterioration

Picture 6: T-Beam Deterioration and Utilities

B: Town Map


VT Route 9
Bridge 6
Scale 1:43,104
N
INTERSTATE
STATE LONG
STATE SHORT
TOWN LONG
FAS/FAU
INTERSTATE
STATE HIGHWAY
CLASS 1
CLASS 2
CLASS 3
CLASS 4
LEGAL TRAIL
PRIVATE
DISCONTINUED
DISTRICT
POLITICAL BOUNDARY
NAMED RIVERS-STREAMS
UNNAMED RIVERS-STREAMS
VOBCIT Bridge Data
VOBCIT Culvert Data
Produced by:
Mapping Unit
Vermont Agency of Transportation
June 2014
BENNINGTON
BENNINGTON COUNTY
DISTRICT # 1
SHAFTSBURY
GLASTENBURY
WOODFORD
POWNAL
Walloomsac River
Roaring Branch Walloomsac Brook
Furnace Brook
South Stream
Jewett Brook
Barney Brook
Browns Brook
Paran Lake
Paran Creek

C: Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for BENNINGTON | bridge no.: 00006 | District: 1

Located on: VT 00009 ML over WALLOOMSAC RIVER approximately 0.6 MI E JCT US 7 | Owner: 04 CITY-OWNED

CONDITION

Deck Rating: 6 SATISFACTORY

Superstructure Rating: 5 FAIR

Substructure Rating: 5 FAIR

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200010000602022

Federal Sufficiency Rating: 059.4

Deficiency Status of Structure: ND

AGE and SERVICE

Year Built: 1923 Year Reconstructed: 0000

Service On: 5 HIGHWAY-PEDESTRIAN

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 21

ADT: 012300 % Truck ADT: 07

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0046

Structure Length (ft): 000048

Lt Curb/Sidewalk Width (ft): 9.4

Rt Curb/Sidewalk Width (ft): 9.4

Bridge Rdwy Width Curb-to-Curb (ft): 60

Deck Width Out-to-Out (ft): 62

Appr. Roadway Width (ft): 055

Skew: 30

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: CONC T-BM/ENC STL BM

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: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Deck Geometry: 9 SUPERIOR TO DESIRABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 7 SLIGHT CHANCE OF OVERTOPPING BRIDGE & ROADWAY

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 1 LOAD FACTOR (LF)

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: 052017 Insp. Freq. (months) 24 X-Ref. BrNum:

INSPECTION SUMMARY and NEEDS

5/30/2017 Concrete repairs are needed throughout. The abutments continue to spall out around the drain openings and along the footings. Voids have developed due to spalling along the stemwall ends and the wingwalls. Scattered settlement cracks in abutment 2 that stem from the drainage openings have 1/4"+/- of separation. The spalling around beam 10 at abutment 2 has narrowed the bridge seat and penetrated into the beam end. Drainage in the deck also affects beam 10 with continued saturation and spalling that penetrates beyond the second layer of reinforcing. JW/SP

6/9/2015 Extensive concrete repairs are needed throughout. The abutments continue to spall out around the openings of the old drainage pipes and there are large voids with cracking along the wingwalls. There are scattered full height vertical settlement cracks in abutment 2. The bridge seat area under beam 10 at abutment 2 has become a concern. This is due to continued spalling and saturation that penetrates down through the bridge seat and up from the drainage opening below. This area continues to "neck" down and could eventually lead to a failure in the bridge seat. The old weep tubes continue to saturate and cause spalling in the beams below. JWW/JDM

6/13/2013 Structure is in fair condition. The footing areas along both abutments should be repaired to prevent any possible undermining or continued spalling. JWW/JDM

D: Preliminary Hydraulics Report

BENNINGTON, BF-1000(20), TH-2 BR6
over the South Stream/Walloomsac River
Preliminary Hydraulics by M. Briones, March 2019
PIN # 12j606

PROJECT HISTORY and BACKGROUND

VTrans has requested a preliminary hydraulic analysis for Town Bridge No. 6 located on Town Highway No. 2 (Main St also Route 9) which is directly east of the intersection with Morgan St and approximately 0.5 miles east of the intersection of U.S. Highway 7 and Vermont State Highway 9. The following analysis evaluated the existing crossing and one proposed alternative.

Record plans are available for the bridge from August 28, 1923 and survey is available from May 24th, 2017. According to the survey, the bridge is a single span. The existing abutments are concrete. Below is the relevant bridge information for the existing crossing:

Number of Lanes	2	
Number of Spans	1	
Bridge Skew Angle	22	deg
Abutment Skew Angle	22	deg
Width: Out to Out	50	ft
Approach Width	59	ft
Structure Span	40	ft
Span Perpendicular to flow	37	
Superstructure Depth	3.1-3.3	ft
Low Chord Elevation	727	ft (NAVD88)
Opening Height	5.2	ft

South Stream (also known as Walloomsac River) drains to the Roaring Branch Walloomsac Brook approximately 1.7 miles northwest of the bridge. The Vermont Watershed Management Program's Bankfull Width (BFW) Equation estimates the BFW for South Stream at the bridge crossing to be approximately 59 feet based on the contributing watershed, but the estimated BFW within the study reach area is approximately 40 feet based on field observations and the results of the modeled 2-year storm event. The current clear span is approximately 37 feet between the abutments and does not fully span the BFW.

There is a National Flood Insurance Program (NFIP) Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM) for Bennington County available with an effective date of December 2, 2015. The study reach is in a Zone AE and has Base Flood Elevations (BFEs) determined, FIRMette attached. The stream has defined stream banks within this study reach. The subject crossing is located within a FEMA designated Floodway with a width of 115 feet, immediately upstream of the bridge. To comply with NFIP regulations, work performed within the Floodway should not result in an increase in flood profiles.

The roadway is classified as a 'Principal Arterial' and the minimum design frequency is the 2% annual exceedance probability (AEP) flood (50-year flood), according to The Vermont Agency of Transportation Hydraulic Manual, adopted May 28, 2015 (VTrans Manual). The design event for this bridge is the Q_{50} flow and the regulatory event is the Q_{100} flow. The project was recently surveyed using English units with a NAVD 88 vertical datum.

HYDROLOGY

As part of the hydrologic analysis for Bridge No. 2 over the South Stream, we evaluated two methodologies for estimating peak flows for the design floods. Following VTrans Manual guidance, VHB evaluated peak flows estimated from the following two sources:

- USGS StreamStats regression equations for estimation of flood discharges at selected annual exceedance probability for South Stream described in the attached StreamStats report dated January 14, 2019, published by USGS and provided by VTrans.
- Federal Emergency Management Agency (FEMA) Effective Flood Insurance Study (FIS) for Bennington County, dated December 2, 2015, providing estimated flows, base flood water surface elevations, and a stream profile for the regulatory event, Q_{100}.

The peak flows estimated using the USGS StreamStats regression equations were substantially lower than the peak flows provided in the Effective NFIP FIS for Bennington County. As discussed with the VTrans Hydraulic group, StreamStats peak flows were used for this analysis along with the FEMA FIS base flood discharge to analyze the regulatory event, Q_{100}.

Drainage Area = 30.0 square miles

	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}	$Q_{100(NFIP)}$
STUDY VALUES (CFS)	800	1,230	1,560	2,040	2,440	2,870	3,488

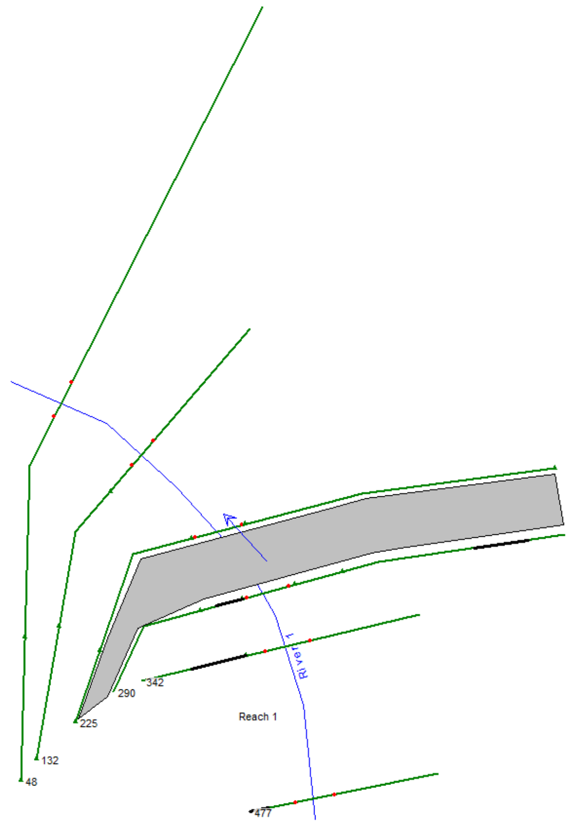
HYDRAULICS

Model Setup: HEC-RAS version 5.0.6 was used for the hydraulic analysis. Channel section information required in HEC-RAS was taken using the HEC-RAS Mapper from the field survey. The field survey data covering the main channel and adjacent floodplain was supplemented with a 2017 7-meter Hydroflattened DEM dataset for the State of Vermont from the Vermont Center for Geographic Information (VGCI) where the cross sections needed to be extended to represent the full floodplain width. A channel alignment was created using RAS Mapper along the approximate centerline of the channel with the stationing going from downstream to upstream. Channel geometry was estimated by interpolating channel slope using DEM data and burning a channel into the sections where the survey data was missing at the upstream and downstream limits of the model. Station 0+00 begins at the downstream end of the project survey and runs to station 4+29 at the upstream limits of the project survey. Using RAS Mapper geometry tools the following were developed:

- Left Bank
- Left Overbank
- Right Bank
- Right Overbank
- Channel Cross Sections.
- Ineffective Areas

The left and right bank linestrings were developed to represent the approximate location of the top of the channel banks. The left and right overbank linestrings were developed to represent the approximate center of mass of the overbank flow. Cross section linestrings were developed along that channel centerline, from left to right facing downstream. Cross section locations were chosen to represent conditions upstream and downstream of the bridge, and channel sections beyond the bridge were drawn perpendicular to flow. The existing bridge as well as the abutments are skewed to the channel by 22º. Cross sections bounding the bridge were drawn parallel to the road (stations 2+90 and 2+25) and a 22º skew angle was assigned within HEC-RAS

The combined surface was exported from ArcGIS into RAS Mapper. RAS Mapper was then used to draw the model geometry which included left and right bank and over bank lines, as well as channel cross sections. Based on the bridge location and the channel geometry, the following sections were chosen:



HEC-RAS Station	Additional Information
477	Upstream Limits of Study – 221' ± TH-2 BR6
342	Survey Cross Section
290	Immediately Upstream of Existing Bridge
255.5	Center (±) of Bridge No. 6
225	Immediately Downstream of Existing Bridge
132	Survey Cross Section
48	Downstream Limits of Study – 208'± TH-2 BR6

Downstream and Upstream Boundary Conditions:
The downstream boundary condition was determined using a rating curve based on FEMA FIS flows and elevations. VHB chose to use a rating curve to account for the backwater affects from the downstream Safford Street crossing.

Roughness: VHB estimated the roughness factors (Manning's N value) for the existing stream conditions based on visual inspection. The streambed appears to consist of gravel and small cobbles based on field and photographic observation of the area. VHB estimated the roughness coefficient for the channel to be 0.040, representing mountain streams, with no in-channel vegetation, steep banks and bottom consisting of gravels, cobbles and few boulders. A roughness coefficient of 0.1 was set for a portion of the cross section extending approximately 125 feet river right from the top of bank to account for trees, brush and few structures in the overbank. VHB estimated the roughness coefficients for the developed floodplain overbanks to be 0.3, representing developed areas which would significantly impede but not fully obstruct overbank flow.

Channel Roughness: 0.040
Trees and Brush: 0.08 to 0.10
Asphalt: 0.016
Developed Overbank: 0.3

Contraction/Expansion Coefficients: VHB set the contraction and expansion coefficients to 0.1 and 0.3 respectively for all sections, with the exception of cross sections immediately upstream and downstream of each bridge. VHB set contraction and expansion coefficients for the two cross section immediately upstream and the one cross section immediately downstream of each bridge to be 0.2 and 0.4 respectively.

Ineffective Flow Area: Ineffective flow areas were assigned to portions of the model cross sections. Ineffective flow areas were assigned to areas that would flood but provide no active conveyance. Areas immediately upstream and downstream of the bridge abutment/roadway were designated as permanent ineffective flow areas which never allow conveyance but do allow storage. On the east side of the South Stream (river left) there is a slight mound which will become ineffective flow once the roadway is overtopped at elevation 731.0 feet. Non-permanent ineffective flow areas were defined in this area, which allow conveyance once the bank is overtopped.

Blocked Obstructions:
Blocked obstructions were incorporated into the model to represent buildings directly on the banks of the stream that would obstruct flow in the overbanks.

Scenarios: A total of 2 model scenarios were investigated, including:

- Existing Conditions
- Proposed Conditions – Alternative 1

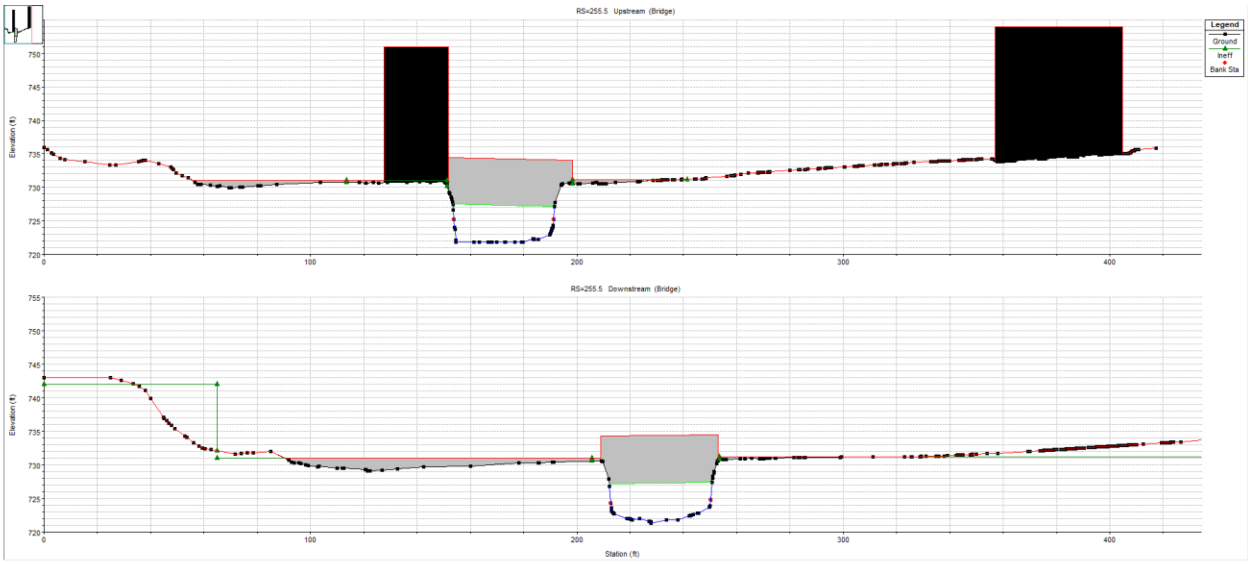
For each of the scenarios investigated, model runs were performed for the Q_5, Q_{10}, Q_{25}, Q_{50}, Q_{100}, and $Q_{NFIP(100)}$ event conditions.

The following sections describe each of these scenarios in more detail including a table summarizing the inputs and results, followed by a discussion of our recommendations.

<u>EXISTING BRIDGE:</u>
The existing bridge conditions were modeled using the recent field survey and information from field observations. The center of the TH2 BR6 Bridge along the channel alignment is at approximately HEC-RAS River Station 255.5. The field survey was used to determine the top of deck and low chord elevations. The outside bridge width (out to out) is approximately 50 feet wide with an approximate deck thickness of 3.1-3.3 feet.

HEC-RAS defaults to using the cross-sections immediately upstream and downstream of the bridge for the bridge's internal cross-sections. Additional internal cross-sections were cut using RAS Mapper to replace the default internal sections. This allows for a more accurate representation of actual conditions since channel bottom elevations are better represented and the abutments are built into the project DTM as shown in the screen shot below.

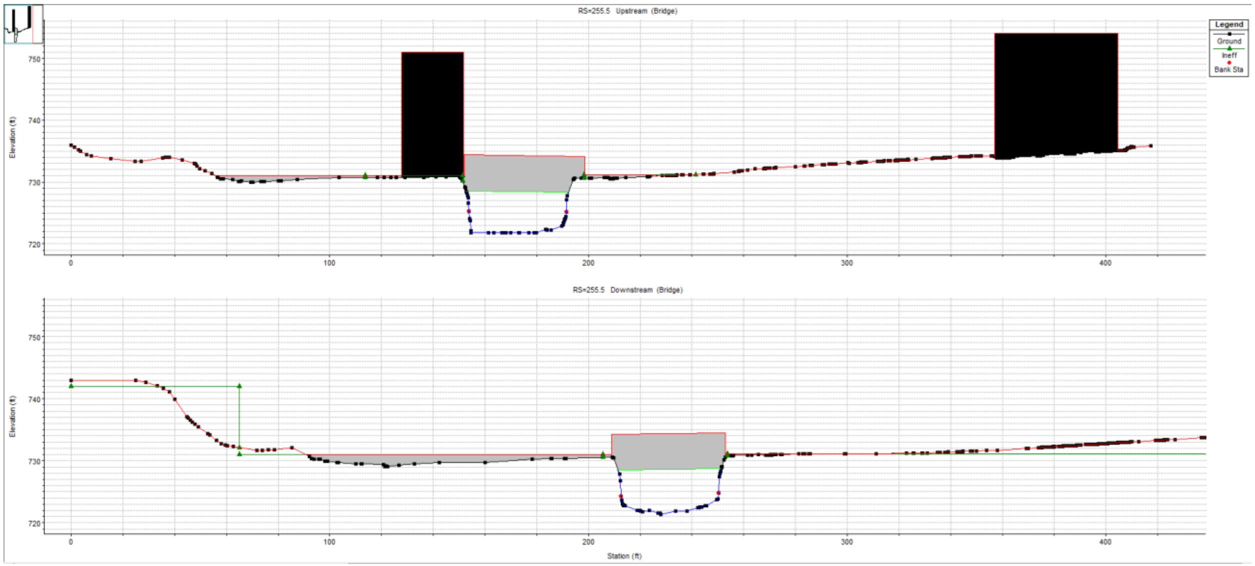
The existing bridge does not meet the VTrans hydraulic requirement to pass the Q_{50} flow with 1.0 foot of freeboard. The model predicts that for Q_{50} that the bridge is overtopped, with water surface elevation at 731.3-feet and -4.3-feet of freeboard. The existing bridge has a clear span of 37 feet and does not span the measured BFW of 40 feet.



PROPOSED BRIDGE: ALTERNATIVE 1
REDUCED SUPERSTRUCTURE DEPTH

This replacement bridge alternative is located on the same roadway alignment as the Existing Bridge with the center of the bridge at approximately River Station 255.5. Due to existing buildings and retaining walls which form the stream banks upstream and downstream of the bridge, widening the bridge profile was not seen as a feasible option. Additionally, building and driveway entrances along the approach roadway constrain the roadway profile from increasing, limiting a substantial increase in low chord elevation. For this reason, VTrans recommended a proposed bridge with a reduced superstructure depth to improve the hydraulic performance of the bridge. This option would maintain a single span bridge but decrease the superstructure depth from a depth of approximately 3.1-3.3 feet to 2-feet to improve conveyance of South Stream during large storm events. The proposed abutments remain in the same location as the existing abutments with a clear span length of 37 feet. All input parameters for this Proposed Conditions model were the same as the Existing Conditions model (i.e. contraction/expansion coefficients, Manning's n, etc.).

While the low chord of the bridge is raised to 728.7 feet, the hydraulic design requirements of passing the Q50 flow with 1.0 foot of freeboard are still not met but yields improved results. The water surface elevation for Q50 is reduced from 731.3-feet to 730.5 feet with -2.2-feet of freeboard and no is longer predicted to flood the roadway. This alternative does not span the BFW of 40 feet but, as mentioned previously, nearby obstructions limit the widening of the bridge profile.


RS=255.5 Upstream (Bridge)
Legend
Ground
Ineff
Bank Sta
Elevation (ft)
750
740
730
720
0
100
200
300
400
RS=255.5 Downstream (Bridge)
Elevation (ft)
750
740
730
720
0
100
200
300
400
Station (ft)

PROPOSED ALTERNATIVES SUMMARY

The following table summarizes the scenarios investigated and the design event (Q_{50}) model results.

Design Event (Q_{50}) Hydraulic Results Summary

Scenario	**Existing**	**Option 1**
Spans	1	1
Lanes	2	2
Clear Span	37	37
Width	50	50
Stone Fill	Type IV	Type IV
Low Chord (feet)	727	728.3
Hydraulic Opening (SF)	198.3	241.7
Low Flow Modeling Approach	Energy	Energy
High Flow Modeling Approach	Pressure	Pressure
WSE (feet)		
132	727.46	727.46
225	728.89	728.89
255.5 BR DS	731.29	730.48
255.5 BR US	731.29	730.48
290	731.29	730.48
342	731.36	730.57
Channel Velocity (feet/sec)		
132	11.57	11.57
225	8.85	8.85
255.5 BR DS	11.29	9.97
255.5 BR US	11.1	10.02
290	6.73	7.41
342	6.89	7.65
Freeboard (ft)		
132	-0.5	0.8
225	-1.9	-0.6
255.5 BR DS	-4.3	-2.2
255.5 BR US	-4.3	-2.2
290	-4.3	-2.2
342	-4.4	-2.3

Freeboard is in reference to WSE to the height of the low chord of the bridge
All Elevations based on NAVD88

The regulatory base flood event was evaluated for South Stream based on the NFIP 100-year flood discharge. As shown in the table below, it was determined that the proposed condition will not increase base flood elevations of South Stream.

Regulatory Event (Q100) Water Surface Elevations (feet)

Scenario	Existing	Alternative 1
132	728.8	728.8
225	729.9	729.9
255.5 BR DS	732.3	731.7
255.5 BR US	732.5	731.7
290	732.5	731.7
342	732.4	731.8

All Elevations based on NAVD88

Based on the model results, the existing bridge does not meet the hydraulic standard; with an existing low chord elevation of 727 feet, the model predicts -4.3 feet of freeboard for the Q_{50} event. The existing bridge does not span the bankfull width estimate of 40 feet between abutments.

Alternative 1 maintains an existing single span of 37 feet normal to flow and a bridge width of approximately 50 feet. The low chord elevation may be as low as 728.3 but does not meet the design requirements of having 1 foot of freeboard during the Q_{50} event. It does, however, eliminate flooding in the road for the Q_{50} event. Alternative 1 also does not fully span the bankfull width of 40 feet between abutments.

Model results for Alternative 1 predicts a 0.8-foot decrease in flood profile for the cross section upstream of the bridge (Sta. 290) during the Q50 flow. Immediately downstream of the bridge (Sta. 225) the water surface elevation is reduced by 0.8 feet for the Q50 flow. There are no increases in flood profile from the existing to proposed condition and therefore there is no adverse flood risk impacts to adjacent roadways or abutters.

Summary of HEC-RAS Model Runs created for Preliminary Design:
Flow Conditions used: 20% (5 Yr), 10% (10 Yr), 4% (25 Yr), 2% (50 Yr), 1% (100 Yr), 1% NFIP (100 Yr)

- Existing Conditions
- Proposed Conditions – Alternative 1 – Decreased Superstructure Depth

Proposal Constraints:
The existing bridge is located within a FEMA designated Floodway, and as a result, any proposed work must result in no increases in flood profiles. VTrans will need to provide documentation that the proposed bridge will result in a "No Rise" in water surface elevations.

Scour:
Scour will be calculated with final hydraulics.

Stone Fill:
Based on existing channel conditions, it is anticipated that a minimum Type III Stone Fill will be required to armor the abutment and channel banks based on the modeling velocities.

Temporary Bridge:
VHB did not evaluate the necessity for a temporary bridge during construction.

CADD Data Files:
x12j606sv.dgn, x12j606.dtm

E: Preliminary Geotechnical Information

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Jennifer Fitch, P.E., Structures Project Manager

From: Alan Therrien, Geotechnical Engineer, via Callie Ewald, P.E., Geotechnical Engineering Manger

Date: December 19, 2016

Subject: Bennington BF 1000(20) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge No. 6 on Vermont Route 9 (Main St.) over the Walloomsac River in the town of Bennington, VT. Bridge No. 6 is located approximately 0.6 miles east of the intersection Vermont Route 9 and US Route 7. The subject project consists of replacing or rehabilitating the existing single span bridge. This review included the examination of as-built record plans, historical in-house bridge boring files, water well logs and hazardous site information on-file at the Agency of Natural Resources, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps, and observations made during a site visit.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

There were no record plans, foundation, or soil information available for this project

The Geotechnical Engineering Section maintains a GIS based historical record of subsurface investigations, which contains electronic records for the majority of borings completed in the past 10 years. An exploration of this database revealed 3 nearby projects within a 1.5-mile radius. Boring logs for these projects indicated boulders, cobbles, silt, sand, and gravel mixtures with bedrock encountered at depths as shallow as 8 feet and deeper than 141.5 feet.

2.2 Water Well Logs

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, these logs can be used to determine general characteristics of the soil strata in the area. The soil description given on the logs is done in the field, by unknown personnel, and as such, should only be used as an approximation. Figure 1 contains the subject project as well as surrounding well locations found using the ANR Natural Resources Atlas. Five water wells within an approximate 2,700-foot radius of the project were used to get an estimate of the depth to bedrock likely to be encountered for Bridge No. 6 and are highlighted below with red boxes.

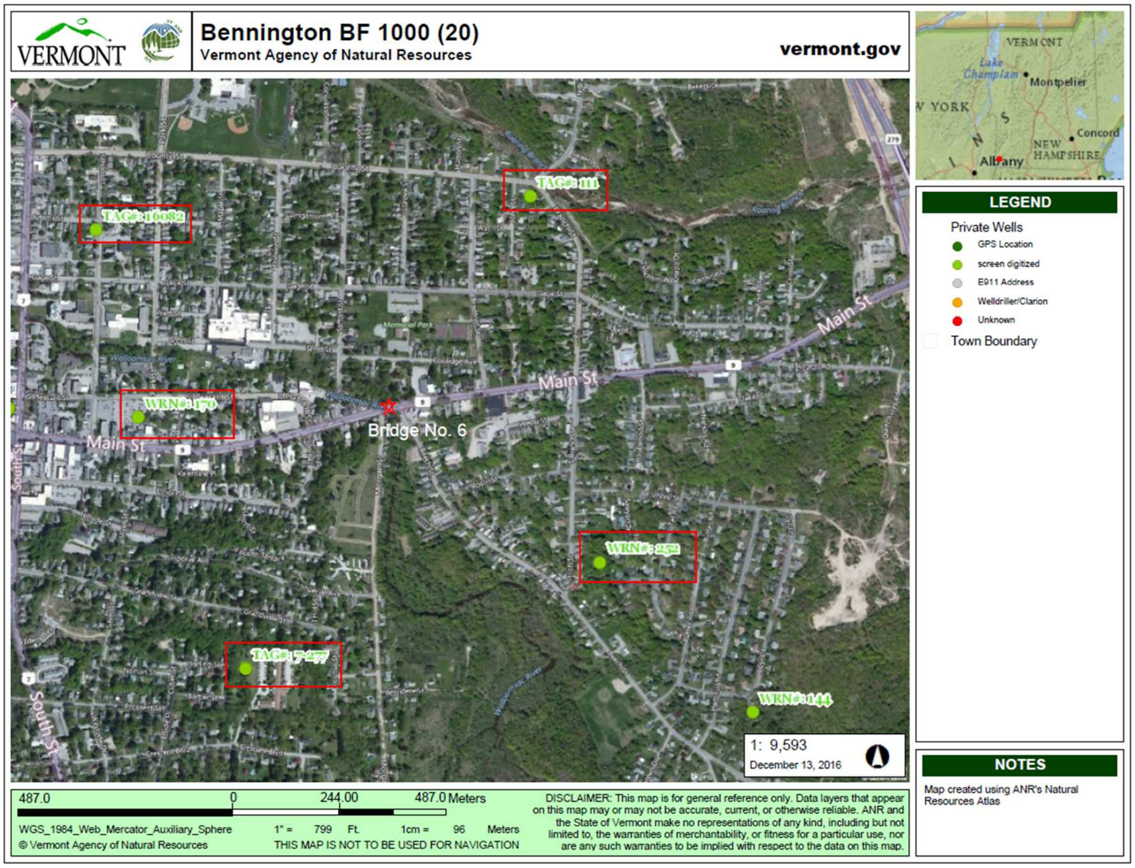


Figure 1. Highlighted Well Locations Near Subject Project

Table 1 lists the well sites used in gathering the surrounding information. Wells are listed with the distance from the bridge project, depth to bedrock, and overburden material encountered.

Table 1. Depths to Bedrock of Surrounding Wells

Well ID	Approx. Distance From Project (feet)	Approx. Depth to Bedrock (feet)	Overburden Material
170	1,975	35	Sand, Clay, Gravel
111	1,980	10	Unknown
252	2,025	21	Sand and Coarse Gravel
7-277	2,330	7	Unknown
16082	2,700	110	Unknown

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Natural Resource Atlas also maps the location and information of known hazardous waste sites and underground storage tanks. The location of this project does include a hazardous waste site/underground storage tank approximately 110 feet from the project. "Mincers Mini Mart" is located at 735 E Main St and has an underground storage tank for use by the attached gas station.

2.4 USDA Soil Survey

The United States Department of Agriculture Natural Resources Conservation Service maintains an online surficial geology map of the United States. According to the Web Soil Survey, the stratum directly underlying the project site consists of well drained Copake gravelly fine sandy loam with 0 to 3 percent slopes and a depth to bedrock of more than 80 inches and depth to groundwater of more than 80 inches.

2.5 Geologic Maps of Vermont

Mapping conducted in 1970 for the Surficial Geologic map of Vermont shows that the project area consists of outwash.

According to the 2011 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project site is underlain with Dolostone and Phyllite.

3.0 BRIDGE INSPECTION

An inspection of the bridge was done in June of 2015 by the Bridge Management and Inspection Unit. The inspection team gave the substructure of this bridge an overall rating of Fair (5). This inspection recommended extensive concrete repairs throughout the bridge, including the abutments and wingwalls due to spalling, voids, and cracks. An example of this damage can be seen in Figure 2.

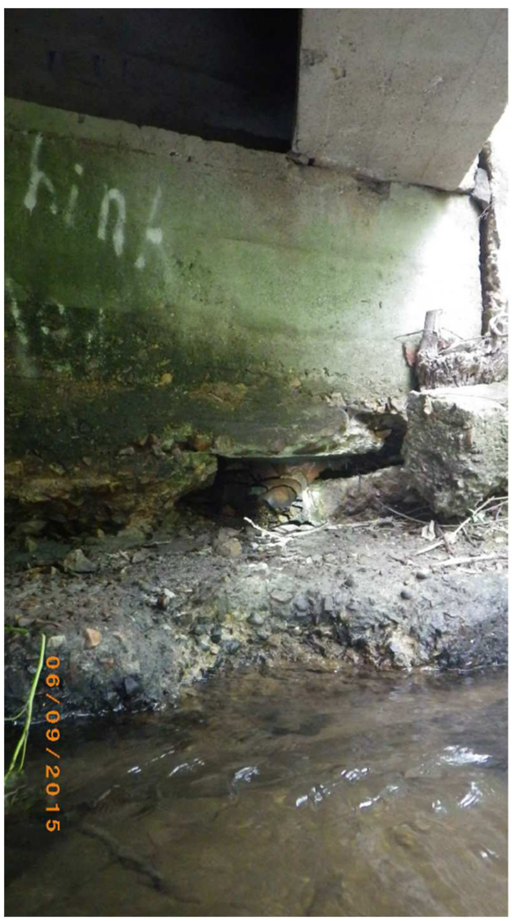


Figure 2: Damage to Abutment on East Side of Bridge

4.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on December 2, 2016 to determine possible obstructions inhibiting boring operations and to make any other pertinent observations about the project. This visit revealed structures in close proximity to the bridge, including a building foundation in contact with one of the wingwalls on the west side of the bridge, as seen in Figure 3. Overhead powerlines cross Route 9 above the bridge on the east side, and run parallel to the bridge on the north side. The utility lines/poles can be seen in Figure 4 and Figure 5. There was no visible bedrock in the stream, but there were many boulders and cobbles visible throughout the stream and stream bank which can be seen in Figure 6.

Figure 3: Structure Foundation in Contact with Bridge

Figure 4: Utility Lines Above and Parallel to Bridge

Figure 5: Looking East Over the Bridge

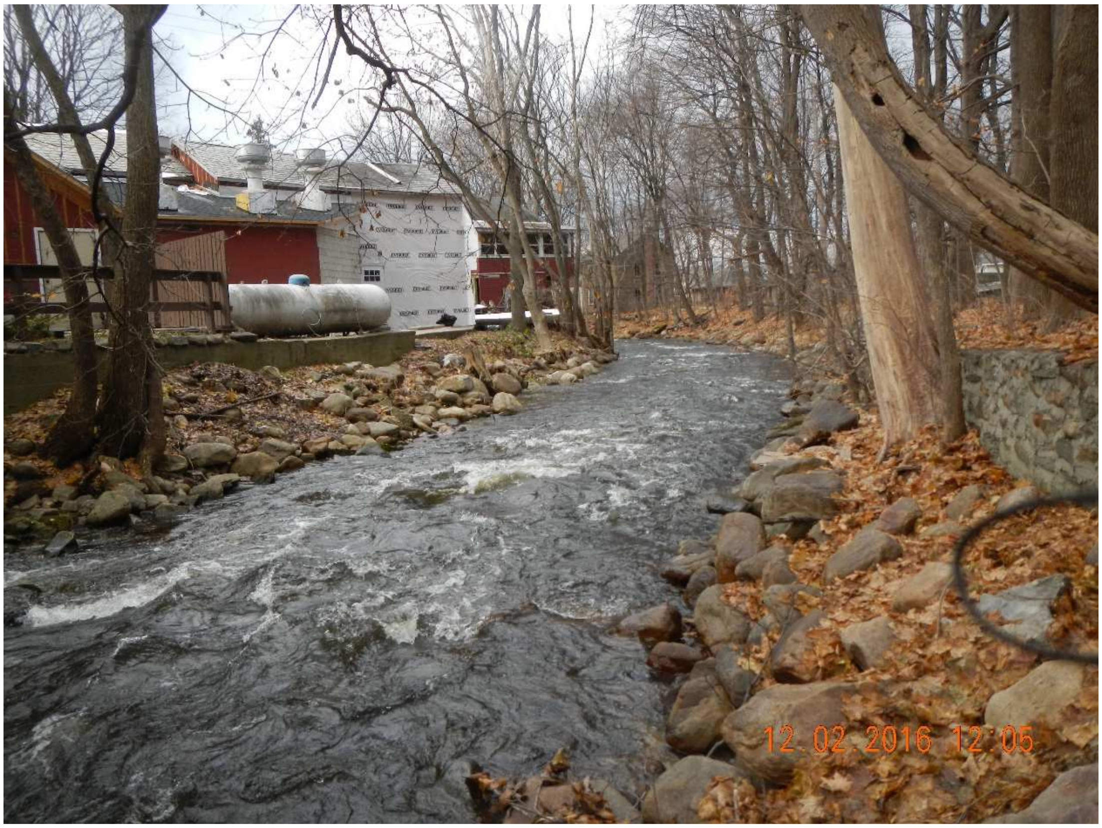


Figure 6: Boulders and Cobbles in Stream

5.0 RECOMMENDATIONS

If a full bridge replacement option is chosen as the preferred alternative, we recommend the following foundation options:

- Reinforced concrete abutments on spread footings supported on soil or bedrock
- Integral abutments supported on a single row of H-piles

We recommend a minimum of two borings be taken with one located at each abutment at opposite corners in order to more fully assess the subsurface conditions at the site including, but not limited to, the soil properties, groundwater conditions, and depth to bedrock (if applicable). If shallow bedrock is encountered during drilling operations, additional borings will likely be required to profile the bedrock elevation across the footprint of the proposed structure.

6.0 CONCLUSION

When a design alternative has been chosen, the Geotechnical Engineering Section can assist in determining a subsurface investigation that efficiently gathers adequate information for the alternative chosen.

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-2561.

cc: Read File/DJH
Project File/CEE
AJT

Z:\Highways\CMB\GeotechEngineering\Projects\Bennington BF 1000(20)\REPORTS\Bennington BF 1000(20) Preliminary Geotechnical Information

F: Resource ID Completion Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Nicholas Wark, Project Manager
FROM: Julie Ann Held, Environmental Specialist, SW Region (802)828-3963
DATE: May 8, 2017
Project: **Bennington BF 1000(20)**

ENVIRONMENTAL RESOURCES:

Archaeological Site: _X_ Yes ____ No See Archaeological Resource ID Memo Issued: 03/20/2017. The undisturbed northeast quadrant is sensitive and has been mapped for inclusion in future project plans. The direct connection to the Samuel Safford Mill raises the potential significance in this quadrant to a level that would require future research.

Historic/Historic District: _X_ Yes ____ No See Historic Resource ID Memo Issued: 05/08/2017. Bridge No. 6 and the former Safford-Morgan House at 722 Main Street are both eligible for inclusion in the National Register of Historic Places. See memo for more information.

4(f) Property: _X_ Yes ____ No Both resources are considered Section 4(f) property types. Depending on the scope of work, a 4(f) review may be required.

Wetlands: ____ Yes _X_ No See Natural Resource ID Memo Issued: 03/23/2017

Agricultural Land: _X_ Yes ____ No The project area is listed as Copake gravelly fine sandy loam. This is a prime agricultural soil. No impacts are likely.

Fish & Wildlife Habitat: _X_ Yes ____ No A well shaded riparian buffer is located along the river banks north and south of the bridge. If shade trees need to be cut for the project, a planting plan should be developed to ensure that trees will reestablish in this area.

Wildlife Habitat Connectivity: ____ Yes _X_ No

Endangered Species: _X_ Yes ____ No Northern long-eared bat, but impacts are not anticipated.

Invasive Species: ____ Yes _X_ No ANR Atlas Mapped 11/23/2016

Stormwater: ____ Yes _X_ No ANR Atlas Mapped 05/08/2017

Landscaping: ____ Yes _X_ No

6(f) Property: ____ Yes _X_ No

Hazardous Waste: _X_ Yes ____ No Per the ANR Atlas on 11/23/2016 a hazardous waste site and an underground storage tank is located in the SE quadrant of the project area owned by a Mobil station. Avoidance is recommended.

Contaminated Soils: ____ Yes _X_ No ANR Atlas mapped on 11/23/2016

USDA-Forest Service Lands: ____ Yes _X_ No ANR Atlas mapped on 11/23/2016

Scenic Highway/Byway: _X_ Yes ____ No The project area is located along the Molly Stark Trail. Consideration to the byway's historic and tourism values is recommended.

Act 250 Permits: ____ Yes _X_ No ANR Atlas mapped on 11/23/2016

FEMA Floodplains: _X_ Yes ____ No

Flood Hazard Area/
River Corridor: _X_ Yes ____ No The Walloomsac River is located in the project area. The project area is located in a Type AE flood hazard area. Depending on the scope of work a FHARC permit may be required.

US Coast Guard: ____ Yes _X_ No

Lakes and Ponds: ____ Yes _X_ No

Environmental Justice: ____ Yes _X_ No

303D List/ Class A Water/ Outstanding Resource Water	____ Yes _X_ No	____________
Source Protection Area:	____ Yes _X_ No	____________
Public Water Sources/ Private Wells:	____ Yes _X_ No	____________
Other:	____ Yes _X_ No	____________

cc:
Project File

G: Natural Resources Memo

VERMONT

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
vtrans.vermont.gov

Agency of Transportation

[phone] 802-279-2562
[fax] 802-279-2562
[ttd] 800-253-0191

To: Julie Ann Held, VTrans Environmental Specialist

From: James Brady, VTrans Environmental Biologist

Date: March 29, 2017

Subject: Bennington BF 1000 (20) - Natural Resource ID

I have completed my natural resource report for the above referenced project. My evaluation has included wetlands, wildlife habitat, agricultural soils and rare, threatened and endangered species.

Project Bennington BF 1000 (20) is located on Main Street at Bridge 6 in the town of Bennington. A site visit was conducted on March 23, 2017.

Wetlands/Watercourses
The project spans the Walloomsac River.

There are no wetlands present within the potential project area.

Wildlife Habitat
While there is a well shaded riparian buffer along the river banks north and south of the bridge, there is limited wildlife habitat in the project area. Movement of terrestrial wildlife would be over short distances at best.

This stretch of the Walloomsac river is well shaded and flows are relatively unobstructed by the bridges that span the river. This project should have limited impacts to the river. If shade trees need to be cut for the project, a planting plan should be developed to ensure that trees will reestablish in this area.

Rare, Threatened and Endangered Species
The only listed species in the area is the federally threatened northern long-eared bat. No impacts are anticipated with this project. The bridge does not provide good habitat features at this time and it is unlikely that use will occur before the project is constructed.

Agricultural Soils:
The project area is listed as Copake gravelly fine sandy loam. This is a prime agricultural soil. No impacts are likely.

VERMONT

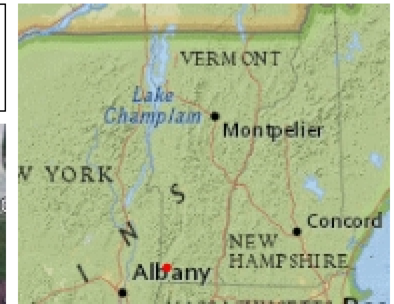
AE Flood Hazard Area

Vermont Agency of Natural Resources

vermont.gov

1: 1,329

November 23, 2016



LEGEND

Flood Hazard Areas (Only FEN

- AE (1-percent annual chance flood
- A (1-percent annual chance floodpl
- AO (1-percent annual chance zone feet)
- 0.2-percent annual chance flood ha

Brownfields

Stream

Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

68.0 0 34.00 68.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 111 Ft. 1cm = 13 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

H: Archaeology Memo

Brennan Gauthier
VTrans Archaeologist
Vermont Agency of Transportation
Project Delivery Bureau
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-279-1460
Brennan.Gauthier@Vermont.gov

To: Julie Ann Held, Environmental Specialist
From: Brennan Gauthier, VTrans Archaeologist
Date: 3/20/2017
Subject: Bennington BO 1000(20) Bridge 6, VT Route 9 Resource ID

Julie Ann,

I have completed my background review and field inspection for the proposed Bridge 6 rehab/replacement project located along at MM 4.955 on VT Route 9 in Bennington, Bennington County, VT. The bridge received a rating of FAIR during a bridge inspection in 2015 and indicated extensive spalling and deterioration to the abutments. Although currently unscoped, I've assumed a worst-case-scenario APE to incorporate all potential plan alternatives. A field visit was conducted on March 10th and was adequate to assess archaeological site potential in the project area; the area was snow free and without vegetative cover.

History of Bridge 6

Originally drafted by Vermont Highway Department engineer George Reed in August of 1923, the final iteration of Bridge 6 was pared down and simplified by reinforced concrete engineer Jasper O. Draffin. Completed at a cost of $12,078.39 in January of 1924, Bridge 6 is a 42 by 69 foot reinforced concrete T-beam structure tied into poured concrete abutments. The structure was designed to provide automobile, pedestrian and electric trolley traffic and is thus substantially wider than typical concrete bridges of the early 1920s.

Bennington Historic Background

The Town of Bennington was originally chartered in 1749 to New Hampshire Governor Benning Wentworth, who named the town after his mother's maiden name. Although permanent settlement was still decades away, the township was divided into 64 separate lots, with two being set aside for public space. The additional 60 were divided amongst Wentworth's political supporters and supplicants, many of whom had traveled through the area during scouting excursions in the French and Indian War. One such military officer, Captain Samuel Robinson of Hardwick, MA, mistakenly traveled up the Walloomsac instead of the Hoosick River in search of forts in Williamstown, MA. This accidental expedition marked the beginning of Euroamerican settlement of the town starting in 1761. Robinson, with twenty or thirty other families from the Hardwick area arrived in town in June of 1761 and quickly began improving and clearing the land.

These early settlers, upon purchase of rights from the original New Hampshire grantees, became the town proprietors; the first proprietors meeting took place on February 11th, 1762 and focused on the creation of a meetinghouse. Additionally, this town meeting set aside five acres of land to Samuel Robinson and Deacon Joseph Safford with the privilege within the said five acres to build a corn-mill and sawmill along the Walloomsac. These infrastructural improvements were funded by the town proprietors in hopes of providing local farmers the ability to grind grain instead of importing it from northern Massachusetts settlements. Self-sustainability was slow to come, but the mills erected by Robinson and Safford in the general area near Bridge #6 were the first in Vermont; an important first step in permanent settlement.

With the creation of the mills came a demand for improvements to the roads and included the erection of a bridge upon the current footprint of Bridge #9. Although the date of the first construction is currently unknown, it was likely built at some point in the 1770s following the rapid expansion of the village immediately before the American Revolution. The location of the mills became an important focal point of town, and is best summed up in the 1889 History of the Town of Bennington:

Thought built by the two men named, they became the Samuel Safford Mills by the settlers, in referring to them as the eastern terminus of the road from Bennington Center, and for a century was thus termed, and until the mills were abandoned for such purposes.

Additionally, the erection of a timber crib dam to the south of the bridge created a large pond known locally as Safford's Pond, and later as Benton's Pond. The original colloquialism of *Safford's Mills* and *Safford's Bridge* soon fell out of favor with locals, and the bridge was eventually known simply as *Cooper's Bridge* in homage to the Coopers Mills located slightly to the east. These mills were home to the Cooper Manufacturing Company (VT-BE-0145), a giant in the spring knitting needle industry that eventually focused on the production of knitting needles and underwear. Originally established in 1859 in Thompsonville, Connecticut, the firm moved to Bennington following the American Civil War. A complex of factory buildings and warehouses stood in the area until the mid 20th century when they were completely demolished upon disillusion of the company. The only existing structures related to the factory are a series of worker homes further down Beech Street.

Archaeological Sensitivity

Of the four project quadrants, only the northeast section is undisturbed. Two of the remaining quadrants contain structures, and the final section contains a concrete culvert and rip rap. The sensitive northeast quadrant has been mapped and added to the archaeology geodatabase for inclusion in future project plans. The sensitivity is based on environmental factors and presence of a historic structure dating to the 18th century. Generally front yards are not considered archaeologically sensitive, but in this case the early date and direct connection to the Samuel Safford Mill raises the potential significance to a level that would require future research.

Feel free to reach out with any questions or concerns that may arise as part of this project.

Sincerely,

Brennan

Brennan

Images and Illustrations

Figure 1: Bridge Location and VT-BE-0145

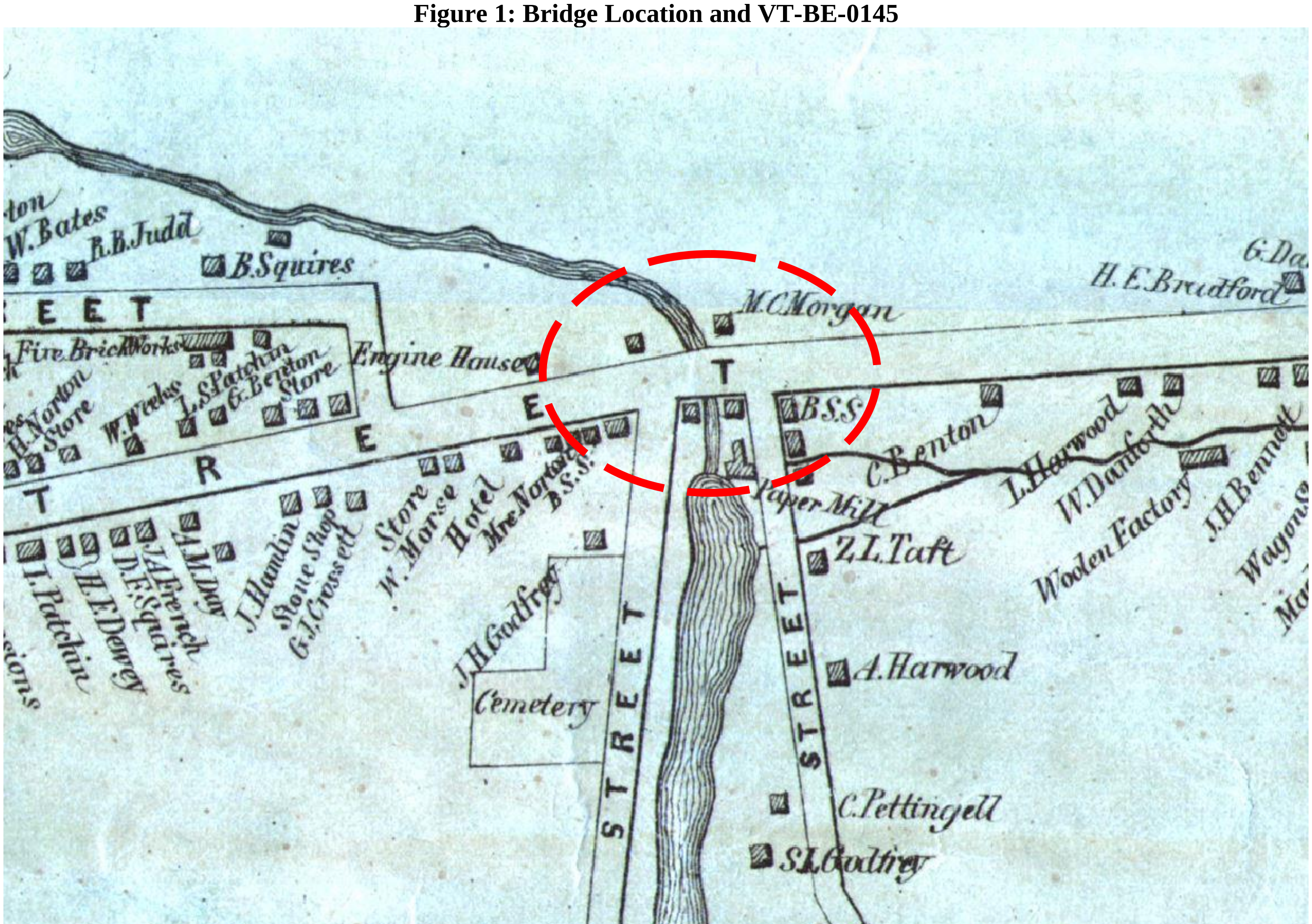


Figure 2: Ca. 1870 Map

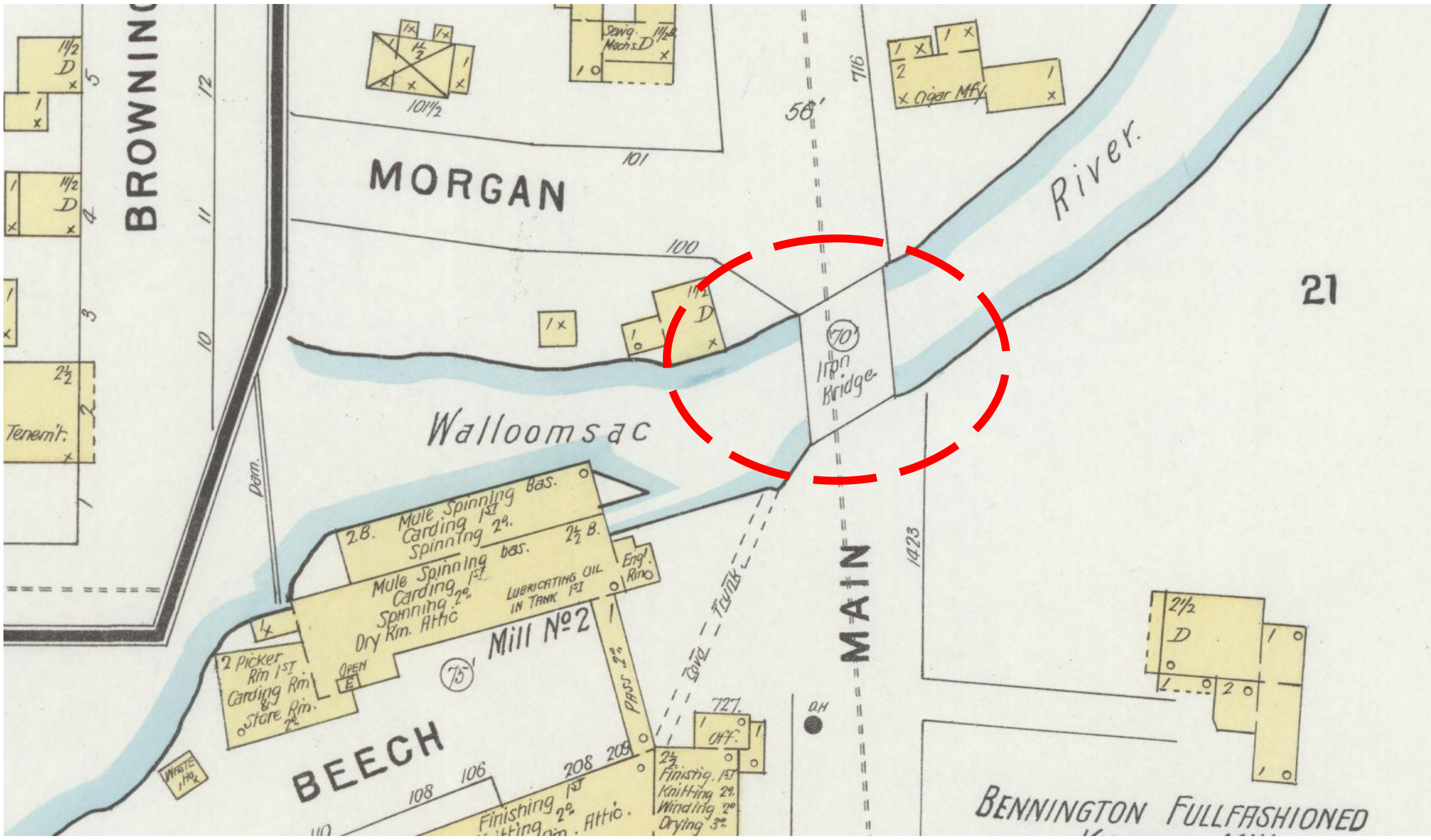


Figure 3: Ca. 1890 Fire Insurance Map


Figure 4: Bridge 6 in 1936

Figure 5: Bridge Ca. 1900 (*Photo courtesy of the Bennington Museum)*

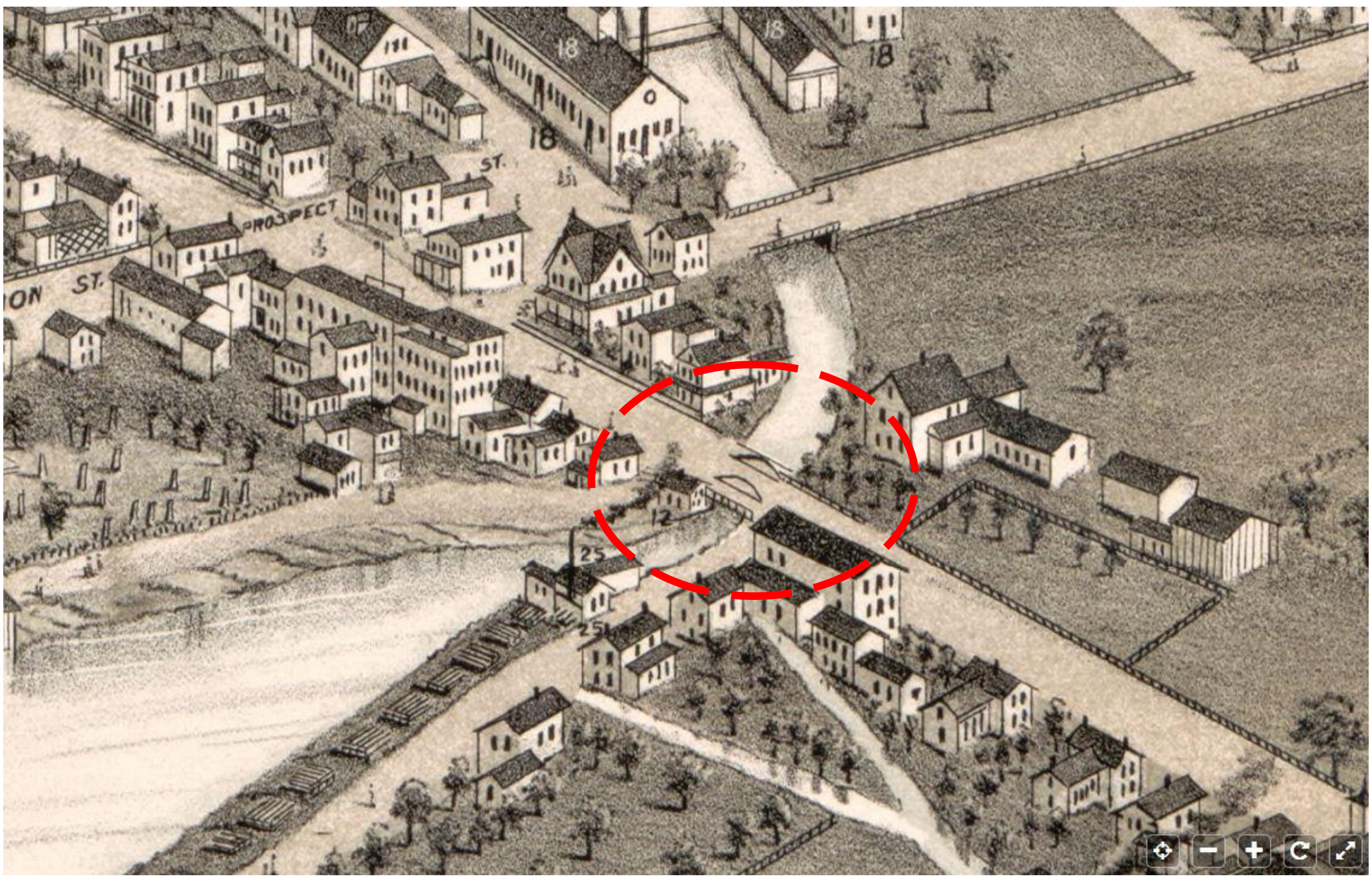


Figure 6: Bridge Ca. 1877

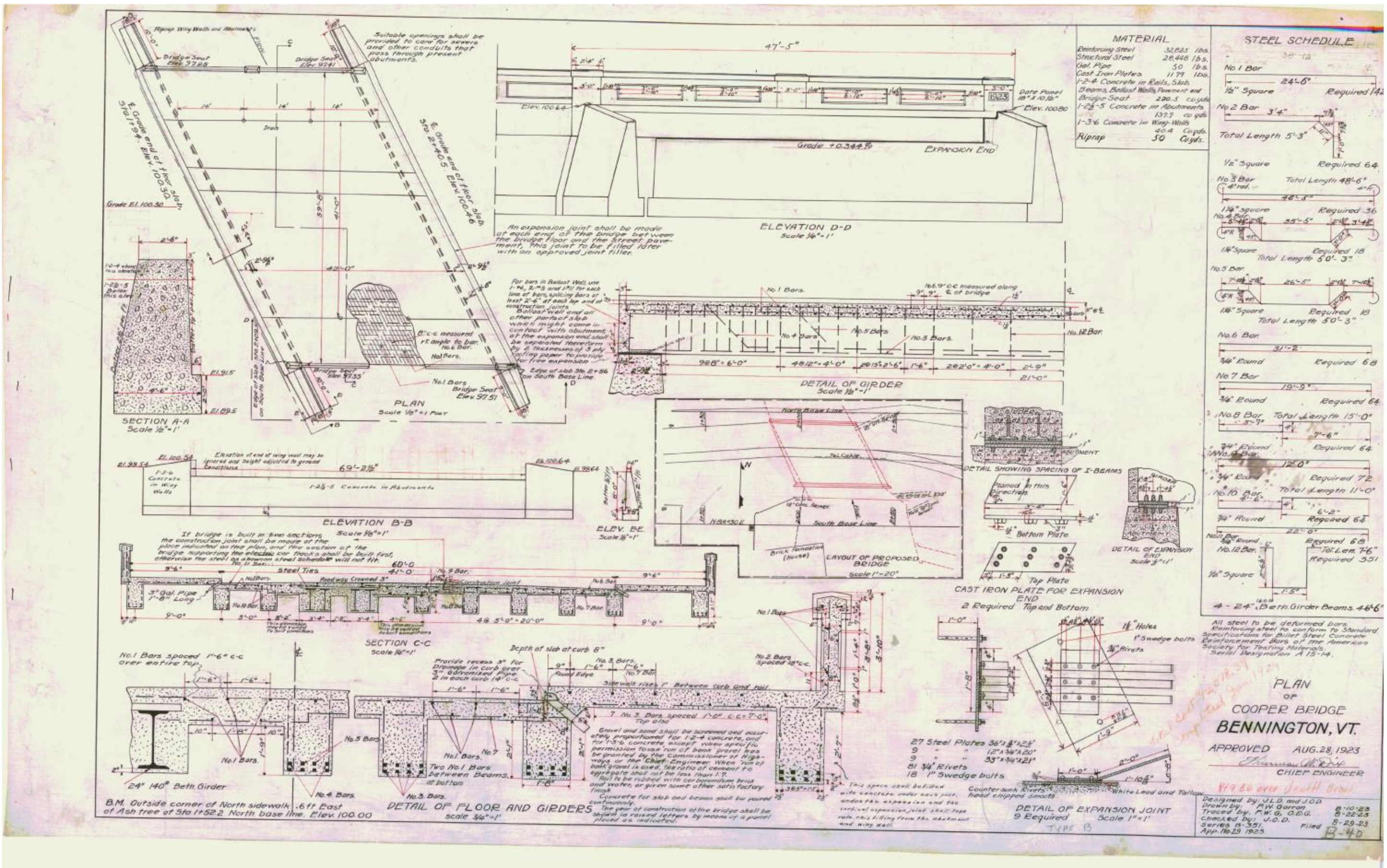


Figure 7: Original 1920s Bridge Plans

Figure 8: Bridge APE

Figure 9: NE Quad Arch Sensitivity

Figure 10: Cooper Needles (*Photo courtesy of the Bennington Museum*)

I: Historic Memo

Kyle Obenauer
Historic Preservation Specialist

Vermont Agency of Transportation

Project Delivery Bureau - Environmental Section
One National Life Drive
Montpelier, VT 05633-5001

kyle.obenauer@vermont.gov
(802) 279-7040
www.vtrans.vermont.gov

Historic Preservation Resource Identification Memo

To: Julie Ann Held, VTrans Environmental Specialist
Via: Judith Ehrlich, VTrans Historic Preservation Officer
Cc: Brennan Gauthier, VTrans Archaeologist
Karen Spooner, VTrans Administrative Assistant
Date: May 8, 2017

Subject: Bennington BF 1000(20)

Julie Ann,

I have completed a resource identification (ID) for this project, which could include the rehabilitation or replacement of Bridge No. 6 at mile marker 4.955 on Vermont Route 9 (Main Street) in Bennington, Bennington County, Vermont.

Within a likely project Area of Potential Effect (APE), two historic resources were identified as eligible for inclusion in the National Register of Historic Places (NRHP): Bridge No. 6 and the former Safford-Morgan House at 722 Main Street (Figure 1). Both historic resources have been mapped in ArcGIS and are considered Section 4(f) property types.

Bridge No. 6 is a simple, early example of a standardized, short-span, reinforced concrete automobile bridge that spans approximately, 48 feet over the Walloomsac River (Figures 2-3). Constructed in 1923, federally-funded work at Bridge No. 6 would most likely be reviewed under Section 106 of the National Historic Preservation Act and Section 4(f) of the Department of Transportation Act, among other state and federal legislation. Under 23 CFR 774.13(a), if a Department of Transportation project results in a No Adverse Effect Section 106 determination, possible through rehabilitation of Bridge No. 6 rather than replacement, that project may be exempt from Section 4(f) review. To help avoid adverse impacts to Bridge No. 6, rehabilitation should be performed using the *Secretary of the Interior's Standards for Rehabilitation* as guidance, included at Appendix A.

Any work on the parcel historically associated with the former Safford-Morgan House at 722 Main Street (Vermont Route 9), including tree removal, would likely be considered an effect subject to the cultural resource reviews noted, above (Figure 4).

Perhaps constructed by Samuel Robinson, son of Deacon Joseph Safford, around 1775-1780, the former Safford-Morgan House is likely one of the oldest extant buildings in Bennington; however, its present, somewhat eclectic architectural appearance reflects renovations made by the Morgan family in the 1870s. William and Fanny Morgan became the dominant developers of the residential northeastern part of Bennington village during the last quarter of the 19th and first quarter of the 20th centuries. The present Memorial Park around Morgan Spring is the last vestige of open land from their former holdings.

Figure 1. Historic Resources within a Possible Project APE for Rehabilitation of Bridge No. 6

Figure 2. Bridge No. 6 Beam and Rail

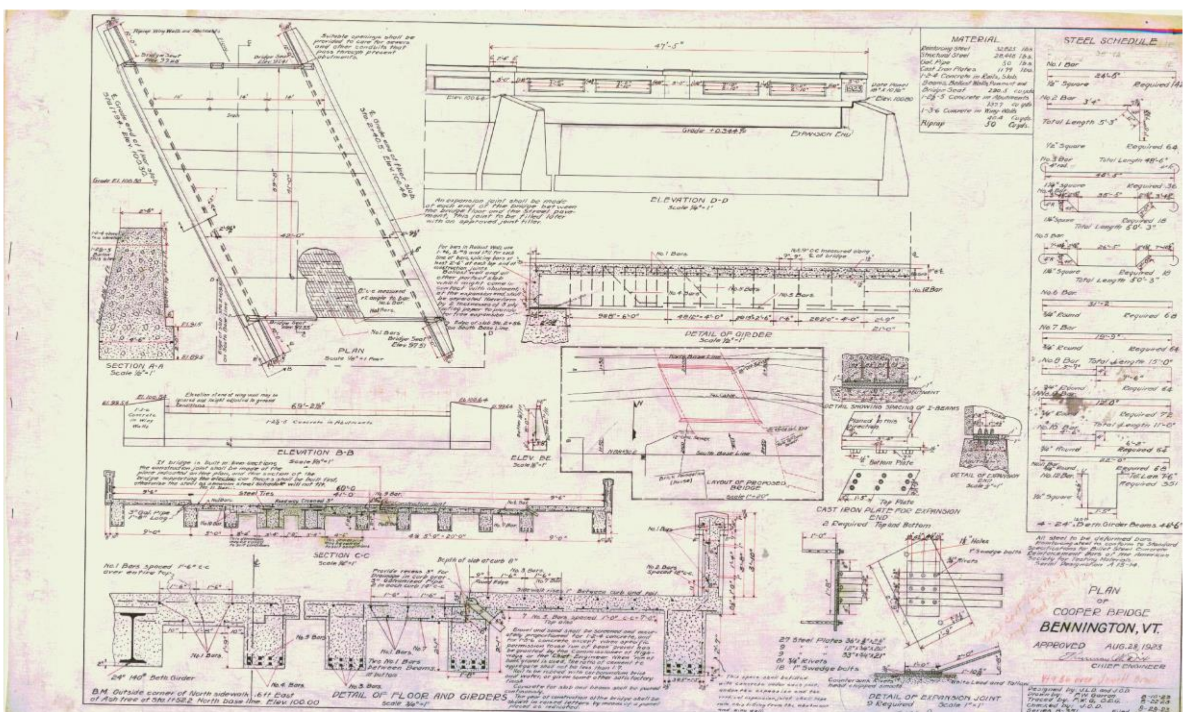


Figure 3. 1923 Plans for Bridge No. 6 (Cooper Bridge)

Figure 4. Former Safford-Morgan House at 722 Main Street (Vermont Route 9). Note Mature Trees and Bridge No. 6 at the Background's Left Corner.

Appendix A – *Secretary of the Interior's Standards for Rehabilitation*

Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Standards for Rehabilitation

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces, and spatial relationships.
2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces, and spatial relationships that characterize a property will be avoided.
3. Each property will be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.
4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.
5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.
6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.
7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.
8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

J: Local Response and Input

This project, BF 1000(20), focuses on bridge 6 on VT Route 9 in Bennington, Vermont. The bridge is deteriorating and is in need of either a major maintenance action or replacement. Potential options being considered for this project include repairs to the existing structure, or a new structure built on the existing alignment. It is possible that VTrans will recommend a road closure and detour traffic away from the project site for the duration of the work.

Community Considerations

1. Are there regularly 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 annual bike races, festivals, parades, cultural events, weekly farmers market, concerts, etc. that could be impacted? If yes, please provide approximate date, location and event organizers' contact info.
   Mayfest, a downtown event, last weekend in May
   Bennington Battle Day parade and State Firefighters convention, August 16 weekend
   Fallapolooza, a downtown event, mid-October
   Fall Foliage season, Mid-September to mid-October

2. Is there a "slow season" or period of time from May through October where traffic is less or no events are scheduled?

   June and July

3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response routes that might be affected by the closure of the bridge, one-way traffic, or lane closures and provide contact information (names, address, email addresses, and phone numbers.

   All municipal garages, Police and Village Fire are located in the western part of the community as is the Rescue Squad. Bennington Rural Fire District has one of its facilities on Beech Street, but detours are available. All contacts through the Town offices: Stuart Hurd, Town Manager

4. Are there businesses (including agricultural operations and industrial parks) or delivery services (fuel or goods) that would be adversely impacted either by a detour or due to work zone proximity? Yes, retail and retail service businesses.

5. Are there important public buildings (town hall, community center, senior center, library) or community facilities (recreational fields, town green, etc.) close to the project? No.

6. What other municipal operations could be adversely affected by a road/bridge closure or detour? Water /sewer lines may run beneath the bridge. Water and sewer infrastructure run under the river. Any trenching or digging in the river could adversely affect this.

7. Are there any town highways that might be adversely impacted by traffic bypassing the construction on other local roads? Please indicate which roads may be affected and their condition (paved/unpaved, narrow, weight-limited bridges, etc), including those that may be or go into other towns. Detour roads available: Safford, Gage, and Bradford, all are paved and sufficient in width and turning radius. To the south of Route 9, Branch Street can carrying south bound traffic, but west bound traffic would use the other alternative.

8. Is there a local business association, chamber of commerce, regional development corporation, or other downtown group that we should be working with? If known, please provide name, organization, email, and phone number. We have both a Chamber of Commerce and a local downtown advocacy organization, the Better Bennington Corp. We can communicate with both.

9. Are there any public transit services or stops that use the bridge or transit routes in the vicinity that may be affected if they become the detour route? The Green Mountain Express in Bennington and the Moover in Wilmington use this route, but the detour streets can handle them.

Schools

1. Where are the schools in your community and what are their schedules? There are no schools in this vicinity. Bus routes would have to be altered. Schedule late August to mid-June

2. Is this project on specific routes that school buses or students use to walk to and from school? Yes

3. Are there recreational facilities associated with the schools nearby (other than at the school)? The Bennington Recreation Center is on Gage Street. It hosts summer programs for youths.

Pedestrians and Bicyclists

1. What is the current level of bicycle and pedestrian use on the bridge? I would rate it as normal.

2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use? Perhaps. See comments on pedestrian and bicycle use.

3. Does the community feel there is a need for a sidewalk or bike lane on the bridge? It would be a consideration. Sidewalk on both sides and adequate shoulder width to accommodate bicyclists would be preferable.

4. Is pedestrian and bicycle traffic heavy enough that it should be accommodated during construction? Yes.

5. Does the Town have plans to construct either pedestrian or bicycle facilities leading up to the bridge? Please provide any planning documents demonstrating this (scoping study, master plan, corridor study, town or regional plan). Not at this time.

6. 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? It is a “village” location. Pedestrian and bicycle use is already there.

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? No.

2. Are there any concerns with the width of the existing bridge? No, provided it can accommodate pedestrian and bicycle uses.

3. Are there any special aesthetic considerations we should be aware of? The bridge has historic concrete railings, an attractive feature.

4. Does the location have a history of flooding? If yes, please explain. No. However, it is in the FEMA identified floodplain.

5. Are there any known Hazardous Material Sites near the project site? Not that are known.

6. Are there any known historic, archeological and/or other environmental resource issues near the project site? Not that are known.

7. Are there any utilities (water, sewer, communications, power) attached to the existing bridge? Please provide any available documentation. There is a 10" municipal water line attached to the bridge between the I-beams. See photos.

8. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc. near the project that should be considered? No.

9. Are there any other issues that are important for us to understand and consider? The water main in this location is one of primary service. Relocating it on a temporary basis will be important.

.

<u>Land Use & Zoning</u>

1. Please provide a copy of your existing and future land use map or zoning map, if applicable. It is attached.

2. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so, please explain. No.

3. Is there any planned expansion of public transit or intercity transit service in the project area? Please provide the name and contact information for the relevant public transit provider.
   Green Mountain Community Network
   215 Pleasant St
   Bennington VT 05201 Ms. Donna Baker, Exec Director

Communications

1. Please identify any local communication outlets that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Facebook, Front Page Forum, etc. Also include any unconventional means such as local low-power FM.
   WBTN 1370 AM radio
   Bennington Banner, local newspaper
   CAT TV, peg access TV
   Town Of Bennington website

2. Other than people/organizations already referenced in this questionnaire, are there any others who should be kept in the loop as the project moves forward? All nearby adjoining properties should be kept in the loop. The former Peppermills Restaurant is undergoing renovations under new ownership. It will most likely be impacted by complete closure due to its proximity to the bridge.

K: Operations Response and Input

Bridge Scoping Project BF 1000(20)
Operations Input Questionnaire

The Structures Section has begun the scoping process for Bennington BF 1000(20), VT Route 9, Bridge 6, over the Walloomsac River. This is a concrete T-beam bridge constructed in 1923. The Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the deck as 7 (good), the superstructure as 5 (fair), and the substructure as 5 (fair). We are interested in hearing your thoughts regarding the items listed below. Leave it blank if you don't wish to comment on a particular item.

1. Your thoughts on the general condition of this bridge and the general maintenance effort required to keep it in service.
   The maintenance of this bridge is the responsibility of the Town.

2. Any comments on the geometry of the bridge (curve, sag, banking, sight distance)?
   The Geometry doesn't seem to be a problem. There is an intersection directly east of the bridge.

3. Do you feel the posted speed limit is appropriate?
   Yes.

4. Is the width adequate for snow plowing?
   This is a Class 1 Highway and the town plows this section.

5. Are the joints salvageable or would you recommend replacement?
   Unknown, but with other apparent deterioration, would presume they need replacement also.

6. Are the railings constantly in need of repair or replacement? What type of railing works best for your district?
   That is a town decision.

7. Are you aware of any unpermitted driveways within the likely project limits? We frequently encounter driveways that prevent us from meeting railing standards and then discover them to be illegal.
   Town jurisdiction.

8. Are you aware of abutting property owners that are likely to need special attention during the planning and construction phases? These could be people with disabilities, elderly, or simply folks who feel they have been unfairly treated in the past.
   Unknown.

9. Do you find that extra effort is required to keep the slopes and river banks around the bridge in a stable condition? Is there frequent flood damage that demands repair?
   Unknown.

10. Does this bridge seem to pick up an unusual amount of debris from the waterway?
    Unknown.

11. Do you think a closure with off-site detour and accelerated construction would be appropriate? With this being a class 1 town highway, what should we consider for a detour route, assuming that we use State route for State projects and any route for Town projects?
    State/truck detour would include US 7, VT 279 and VT9
    Town Detour could use Safford St., Gage St. or County St. and Branch St. where it meets VT 9 at a signalized intersection. Other town roads are residential

12. Please describe any larger projects that you have completed that may not be reflected on the attached Appraisal sheet, such as deck patches, paving patches, railing replacement with new type, steel coating, etc.
    None. Town jurisdiction.

13. There is a sidewalk on this bridge, how effective are the Town's efforts to keep it snow and ice free?
    Both sides have sidewalk and they are addressed during snow and ice events. The town is pretty responsive in their efforts.

14. Are there any drainage issues that we should address on this project?
    Unknown.

15. Are you aware of any complaints that the public has about issues that we can address on this project?
    Unknown.

16. Anything else?
    ?

L: Utility ID and Field Sketch

AOT - HWY PROJ STR Shared

From: Wheeler, Lawrence
Sent: Wednesday, January 4, 2017 8:17 AM
To: Fitch, Jennifer; Griffin, Jonathan; Beard, Daniel
Cc: Corbett, Shaun; Rutter, Melissa
Subject: Bennington BF 1000(20) - VT Route 9 (Class I TH - TH #2) - BR #6 - Identification of existing utilities
Attachments: bennington utility sketch_0001.pdf

I have completed my investigation of the existing utility locations/ownership within the vicinity of the above referenced project.

Aerial Facilities:

- There are major, existing aerial facilities adjacent to the sidewalk along the northern side of Vt. Route 9 which extend along the northern side of the bridge; this existing line crosses from the northern to the southern side of Vt. Route 9 just to the west of the bridge. The facilities in this ''run'' include a 3 Phase Electric Line, a municipally owned fire alarm cable (no longer active) and 5 communication cables.

  - ✓ Aerial 3 Phase Electric Line – Green Mountain Power
  - ✓ Aerial Fire Alarm Cable (Inactive) – Town of Bennington
  - ✓ Aerial Communication Cables – Vermont Telephone Company (VTEL), Comcast, Sovernet, Level 3 and FairPoint

- There are existing aerial facilities which cross over Vt. Route 9 approximately 50' from the east end of the bridge and extend out Beech Street; these aerial facilities include a 3 Phase Electric line and 3 communication cables.

- There are existing aerial facilities which cross over Vt. Route 9 approximately 50' from the west end of the bridge and extend out Morgan Street; these aerial facilities include a Single Phase Electric line and 1 communication cable.

- Additional information –

  - ✓ There are numerous private service connections (electric and telephone) located within the project area.
  - ✓ The poles located west of the bridge are owned by Green Mountain Power
  - ✓ The poles located east of the bridge belong to FairPoint.

Underground Facilities:

- There is a series of telephone manholes located in the Vt. Route 9 roadway a few feet from the northern curb line; located with this manhole system are 3 active cables (900/400/300 pair); these manholes and cables are all owned by FairPoint. There is an existing telephone manhole within 25' (+/-) of either end of the existing bridge.

- Between these telephone manholes there appears to be 2 underground conduits (containing these 3 cables) which are attached to the underside of the existing bridge, under the westbound travel lane. I should state that on the day of my field visit the water in the river was very high and I was not able to get under the bridge. Much of this information comes from bridge inspection photos. At some point I will meet on site with FairPoint to confirm what's actually there.

Municipal Sewer Main:

- The Town of Bennington has an 8'' Clay Sewer Main (1940's vintage) located in the westbound lane a few feet north of the Vt. Route 9 centerline; the path of this sewer main is identifiable from the sewer manholes.

- The sewer main located in Vt. Route is buried under the stream bed and the existing bridge in alignment with the existing sewer manholes; there are no ''as-built'' plans for this sewer main but the Public Works Department does have some ''basic mapping''; I have requested a copy of this. If necessary we can get depths of this main by pulling the sewer manhole covers.

- There are 8'' Clay Sewer Mains which intercept the Vt. Route 9 main not far from the ends of the bridge and extend up Morgan Street and Beech Street. If necessary we can get depths of these mains by pulling the sewer manhole covers.

Municipal Water Main:

- The Town of Bennington has a 10'' Cast Iron main (1929 Vintage) located under the eastbound travel lane of Vt. Route 9; there are no ''as-built'' plans for this water main but the Public Works Department will be providing me with a ''basic mapping plan''.

- The water main is attached to the underside of the existing bridge, under the Vt. Route 9 eastbound travel lane.

- There are water mains which intercept the Vt. Route 9 water main not far from the ends of the existing bridge and extend up Morgan and Beech Streets. The water main in Morgan is 6'' and the water main in Beech is 10''.

General Note:

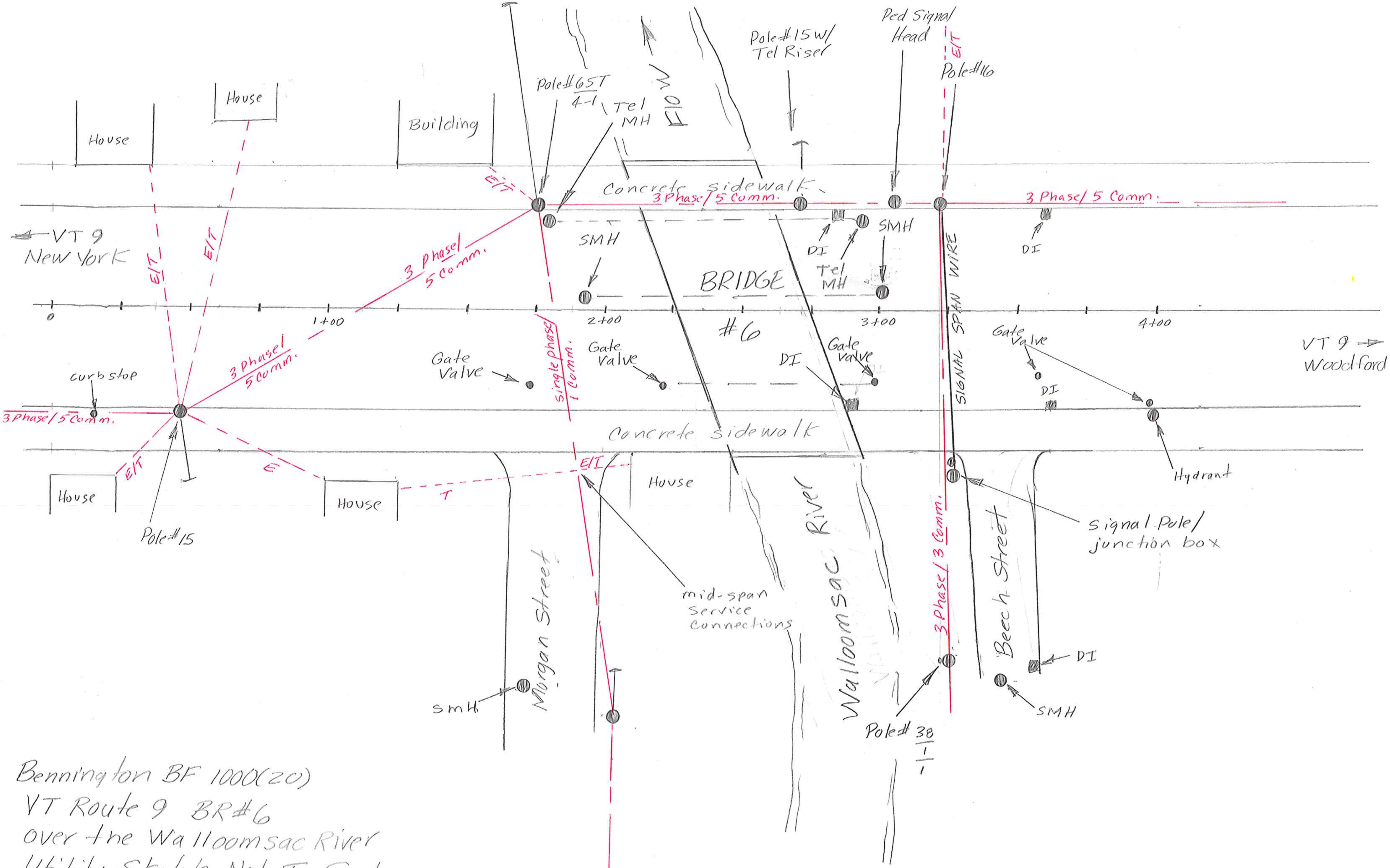
- This portion of Vt. Route 9 is Class I Town Highway (TH #2); any work which involves relocation of the municipal water or sewer mains is an eligible participating project cost, including the design of the relocations by the Town's selected Engineering firm.

If you have questions, concerns or comments, or believe that additional information is necessary, please feel free to contact me.

Lawrence Wheeler
Utilities and Permits Unit
Structures Section
One National Life Drive
Montpelier, VT 05633-5001

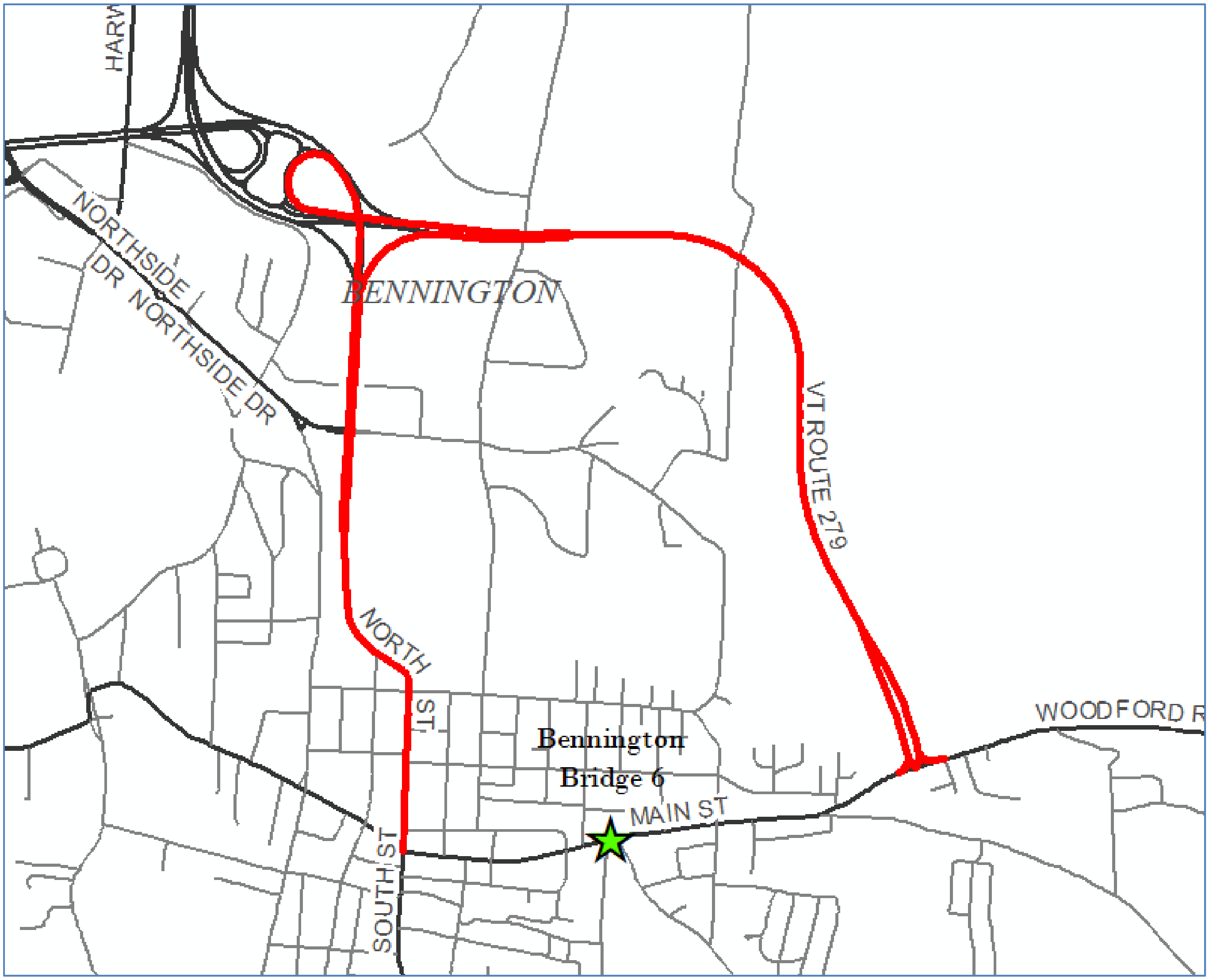
lawrence.wheeler@partner.vermont.gov
lwheeler@gpinet.com

(802) 279-1607



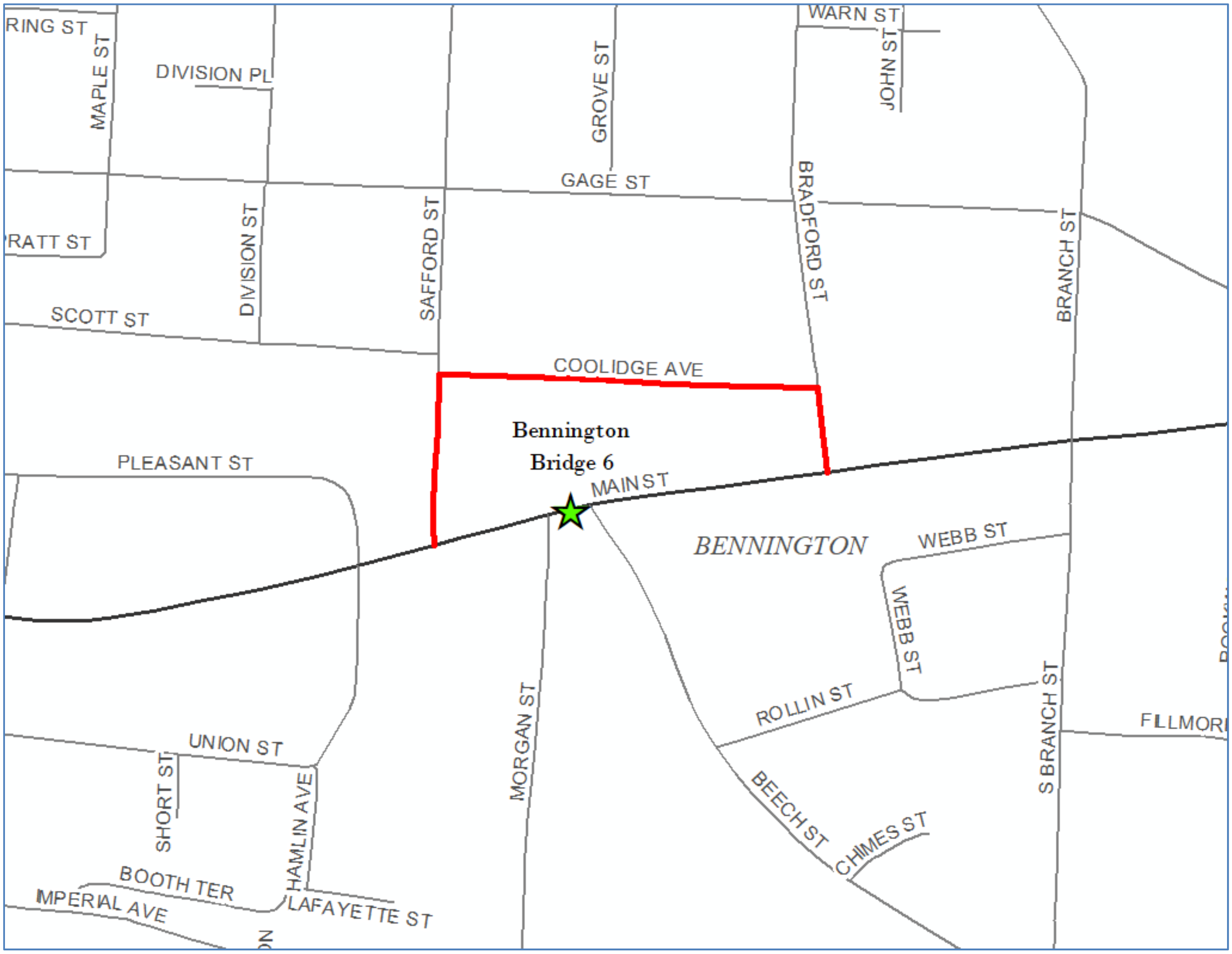
Bennington BF 1000(20)
VT Route 9 BR#6
over the Walloomsac River
Utility Sketch Not To Scale

M: Detour Routes



State Signed Truck Detour Route: VT Route 9, to US Route 7, and VT Route 279, back to VT Route 9

Through Route: 1.35 Miles
Detour Route: 4.05 Miles
Added Distance: 2.7 Miles
End-to-End Distance: 5.4 Miles



State Signed Passenger Car Detour Route: VT Route 9, to Safford Street, Coolidge Street, and Bradford Street back to VT Route 9

Through Route: 0.25 Miles
Detour Route: 0.35 Miles
Added Distance: 0.1 Miles
End-to-End Distance: 0.6 Miles

Pedestrian Detour Route: VT Route 9, to Safford Street, Gage Street, and Bradford Street back to VT Route 9

Through Route: 0.25 Miles
Detour Route: 0.55 Miles
Added Distance: 0.3 Miles
End-to-End Distance: 0.8 Miles

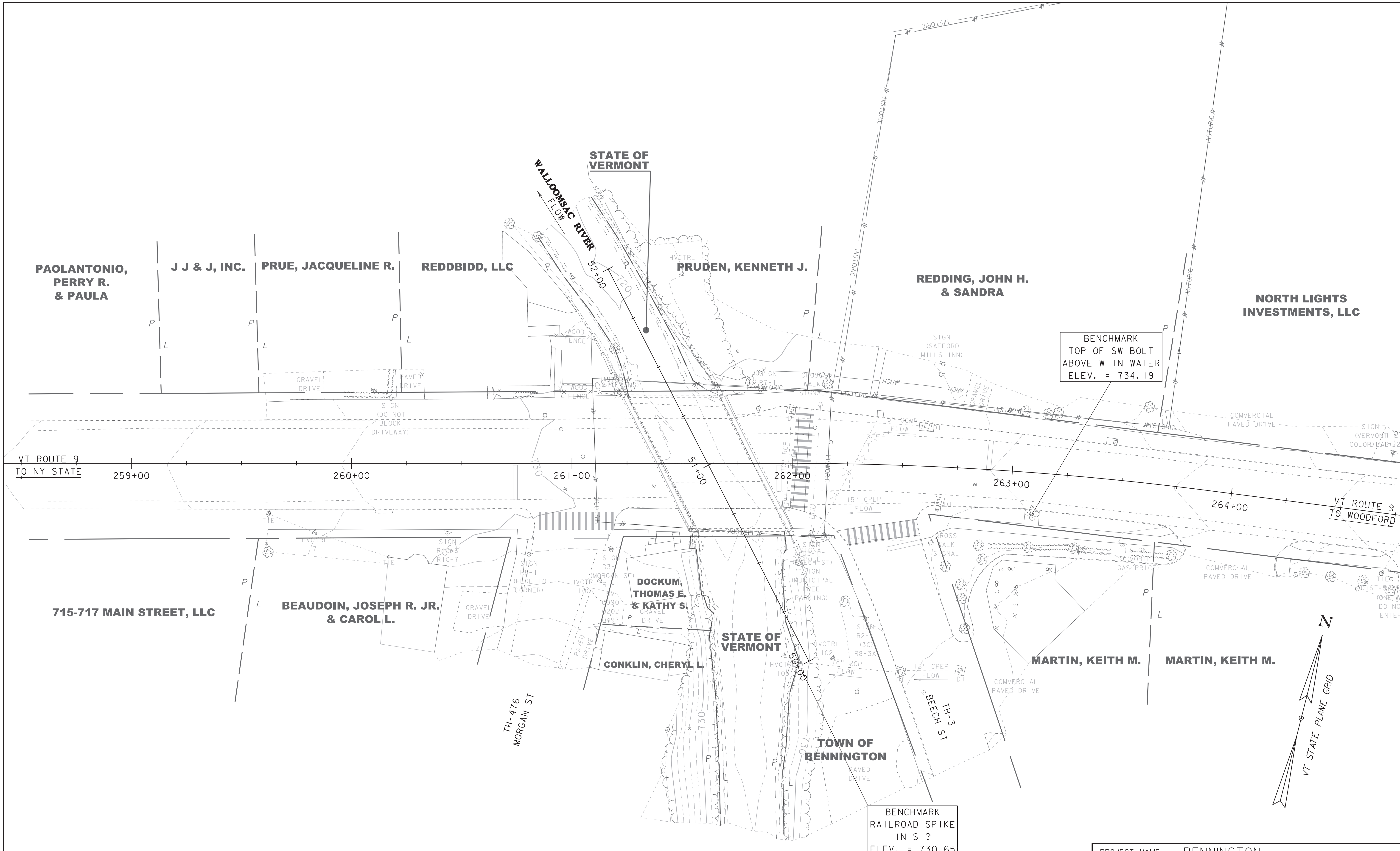
N: Crash Data

Formal Statewide Intersections - Route Log Order /2 - Statewide

Years: 2012 - 2016

H.C.L No.	/3.	Route	System	Town	Mileage	AADT	Years	Crashes	Fatalities	Injuries	PDO Crashes	Critical Rate	Actual Rate	Ratio Actual/Critical	SMS Severity Index
	34	US-5, VT-10A, I-91	Major Collector (r)	Norwich	0.990 - 1.060	10,950	5	24	0	8	19	0.790	1.201	1.521	$38,446
	101	US-7, VT-7A, TOWN HWY. NO. 28 (KOCHER DR.), BENNINGTON	Principal Arterial (u)/Minor Arterial (u)	Bennington	4.100 - 4.200	22,540	5	56	0	14	45	1.293	1.361	1.053	$31,205
	108	US-7, VT-103, TOWN ROAD 0019	Principal Arterial (r)	Clarendon	3.250 - 3.380	11,535	5	15	0	6	12	0.705	0.713	1.011	$44,440
#	84	US-7, WEST RUTLAND-RUTLAND (BR US-4), <T0000>	Principal Arterial (u)	Rutland City	1.270 - 1.290	27,850	5	48	0	18	33	0.836	0.944	1.130	$40,956
#	76	US-7, <0189>, SWIFT ST., SOUTH BURLINGTON	Principal Arterial (u)/Urban Collector (u)	South Burlington/Burlington	1.720 - 0.010	38,650	5	60	0	1	59	0.731	0.851	1.163	$12,587
#	14	US-7, MAIN ST., BURLINGTON, US-2	Principal Arterial (u)	Burlington	2.110 - 2.130	21,400	5	65	0	9	58	0.871	1.664	1.910	$22,337
#	47	US-7, PEARL ST., BURLINGTON	Principal Arterial (u)/Minor Arterial (u)	Burlington	2.420 - 2.440	16,780	5	57	0	13	47	1.350	1.861	1.379	$29,502
#	64	US-7, BURLINGTON (ALTERNATE US-7)	Principal Arterial (u)	Burlington	3.050 - 3.070	12,235	5	27	0	5	23	0.962	1.209	1.256	$26,015
#	7	US-7, W. ALLEN ST., WINOOSKI CITY, VT-15, E. CANAL ST., WINOOS, W. CENTER ST., WINOO, <T0000>	Principal Arterial (u)/Minor Arterial (u)	Winooski City	0.040 - 0.230	29,630	5	163	0	14	150	1.246	3.014	2.419	$18,000
#	39	US-7, E SPRING ST., WINOOSKI CITY, W SPRING ST., WINOOSKI CITY	Principal Arterial (u)/Urban Collector (u)	Winooski City	0.430 - 0.450	17,340	5	38	0	13	29	0.832	1.201	1.444	$38,900
	111	US-7, VT-2A	Principal Arterial (u)/Minor Arterial (u)	Colchester	3.580 - 3.650	14,700	5	37	0	8	32	1.378	1.379	1.001	$28,908
	30	US-7, VT-207	Major Collector (r)	St. Albans Town	2.290 - 2.310	8,950	5	21	0	12	13	0.824	1.286	1.559	$57,567
	102	VT-7A	Minor Arterial (u)	Bennington	0.100 - 0.120	13,350	5	20	0	2	18	0.781	0.821	1.051	$19,020
	94	VT-7A, RICE LN., BENNINGTON, <T0000>	Minor Arterial (u)/Urban Collector (u)	Bennington	1.700 - 1.720	5,900	5	12	0	13	4	1.028	1.114	1.084	$99,642
#	105	VT-9, DEPOT ST., BENNINGTON, WASHINGTON ST., BENNINGTON	Principal Arterial (u)/Urban Collector (u)	Bennington	4.260 - 4.280	9,650	5	17	0	2	15	0.931	0.965	1.036	$20,382
#	70	VT-9, UNION ST., BENNINGTON, PLEASANT ST., BENNINGTON	Principal Arterial (u)/Urban Collector (u)	Bennington	4.810 - 4.830	9,540	5	20	0	8	14	0.934	1.149	1.230	$43,310
	21	VT-9, VT-8	Principal Arterial (r)/Major Collector (r)	Searsburg	1.720 - 1.920	3,439	5	11	0	0	11	1.029	1.753	1.703	$11,300
	79	VT-9, VT-100, TOWN ROAD 0033	Principal Arterial (r)/Minor Arterial (r)	Wilmington	2.990 - 3.050	7,926	5	16	0	1	15	0.962	1.106	1.150	$16,125
	89	VT-10A, I-91	Major Collector (r)	Norwich	0.170 - 0.250	12,950	5	20	0	3	18	0.763	0.846	1.109	$23,445
	69	VT-11, VT-30	Minor Arterial (r)	Winhall	3.030 - 3.230	6,926	5	12	0	0	12	0.766	0.949	1.240	$11,300
	74	VT-11, VT-100, TOWN ROAD 0059	Minor Arterial (r)	Londonderry	1.880 - 1.960	5,810	5	10	0	2	8	0.798	0.943	1.181	$26,740
#	45	VT-11, VT-106	Minor Arterial (r)/Major Collector (r)	Springfield	3.950 - 4.030	12,350	5	32	0	2	30	1.021	1.420	1.391	$16,125

O: Plans

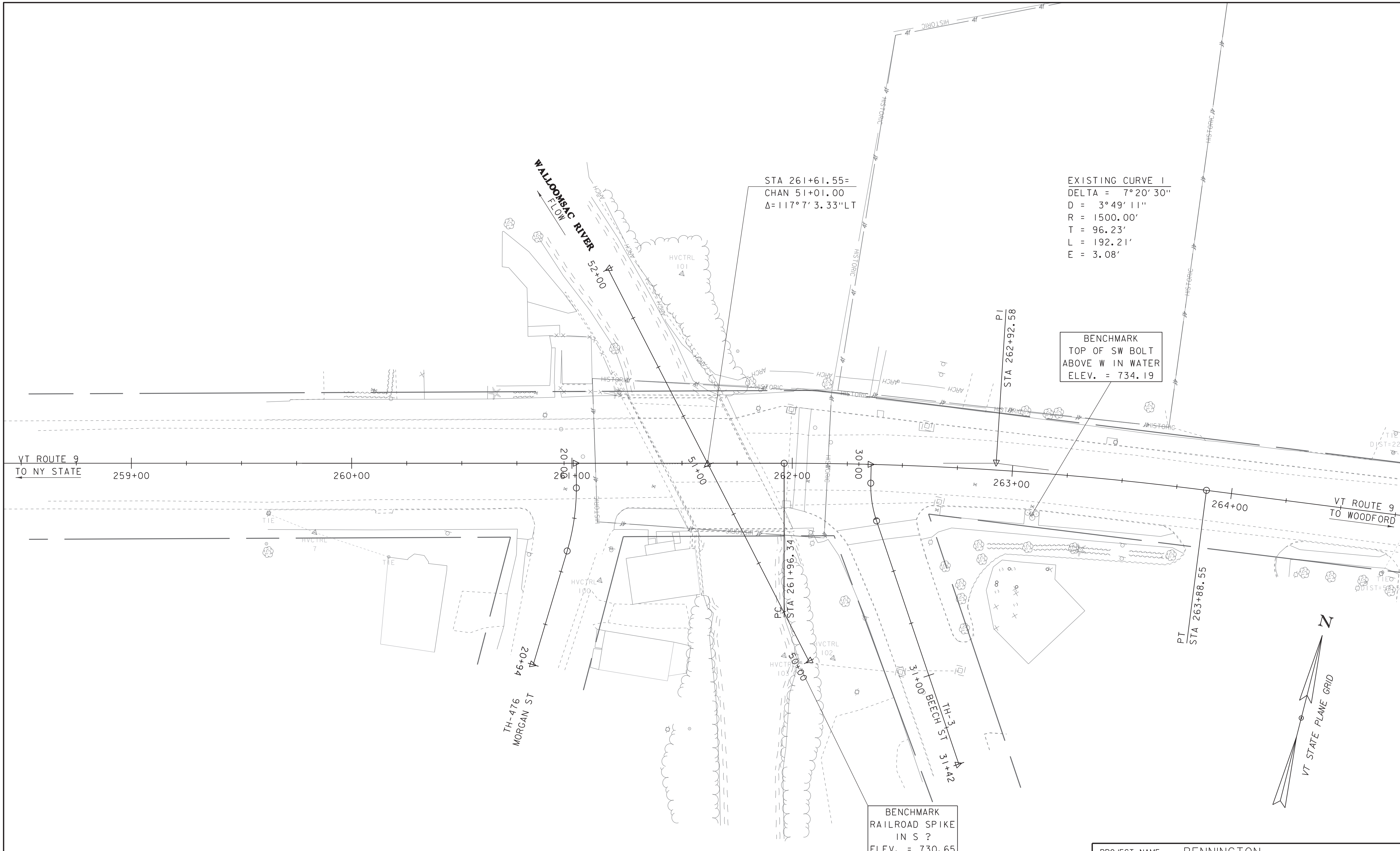


EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46' SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

RESOURCE SITE PLAN

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

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606/sl2j606border.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
RESOURCE SITE PLAN	SHEET 1 OF 15



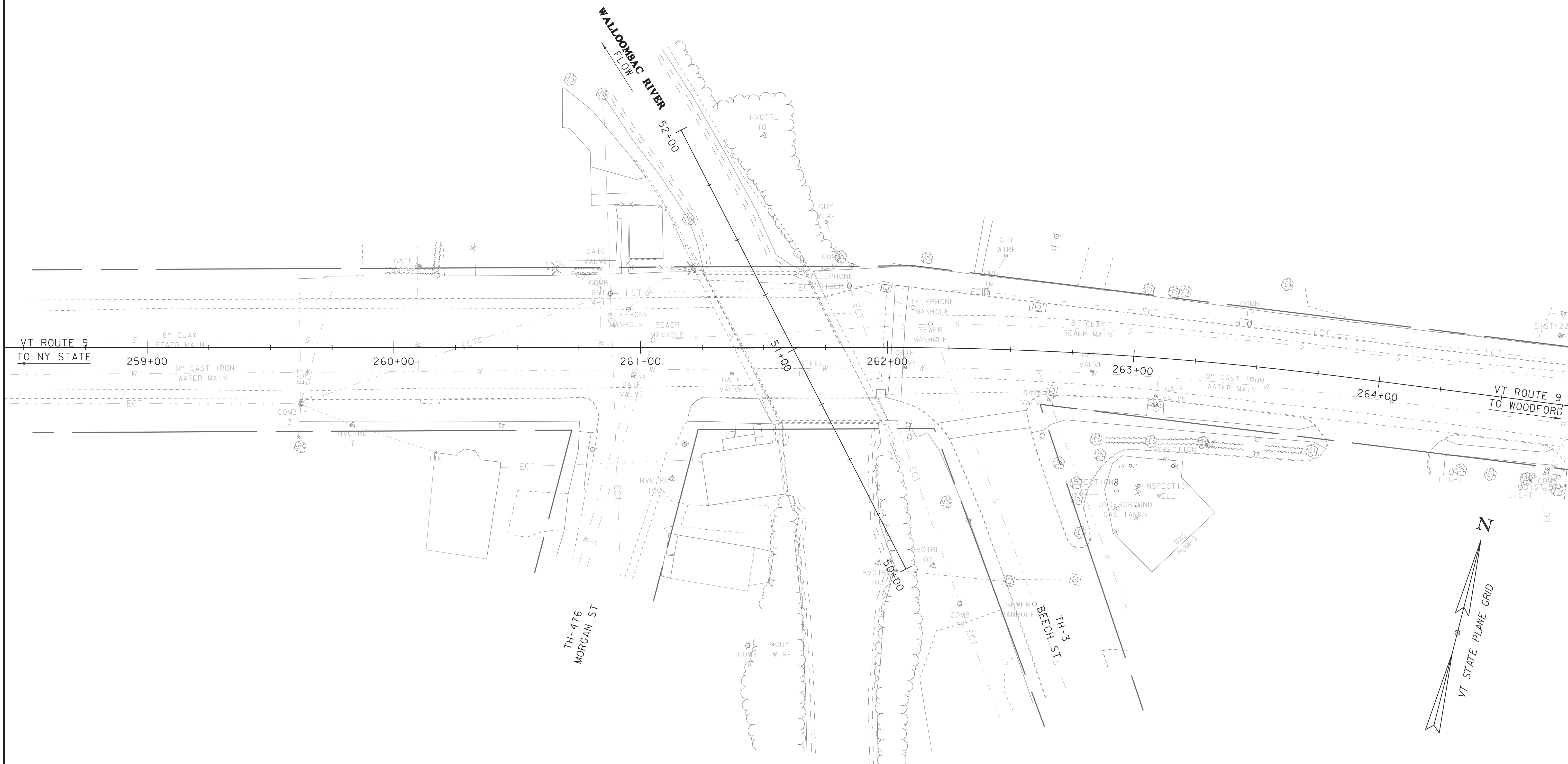
EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46′ SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

ALIGNMENT LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME:	BENNINGTON
PROJECT NUMBER:	BF 1000(20)

FILE NAME: 12j606/s12j606border.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
ALIGNMENT LAYOUT SHEET	SHEET 2 OF 15

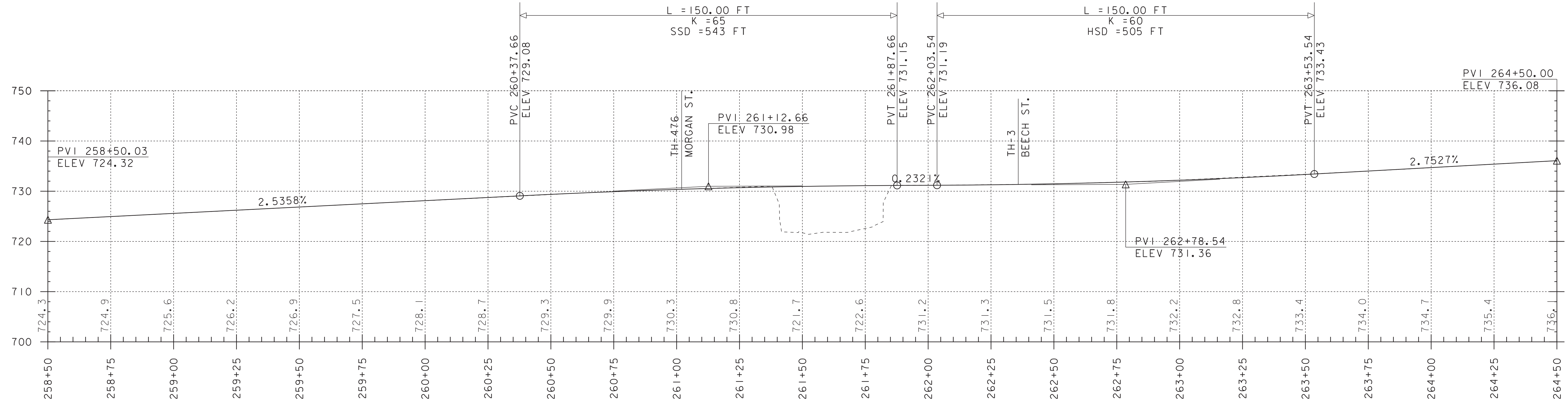


EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46' SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

EXISTING UTILITY LAYOUT

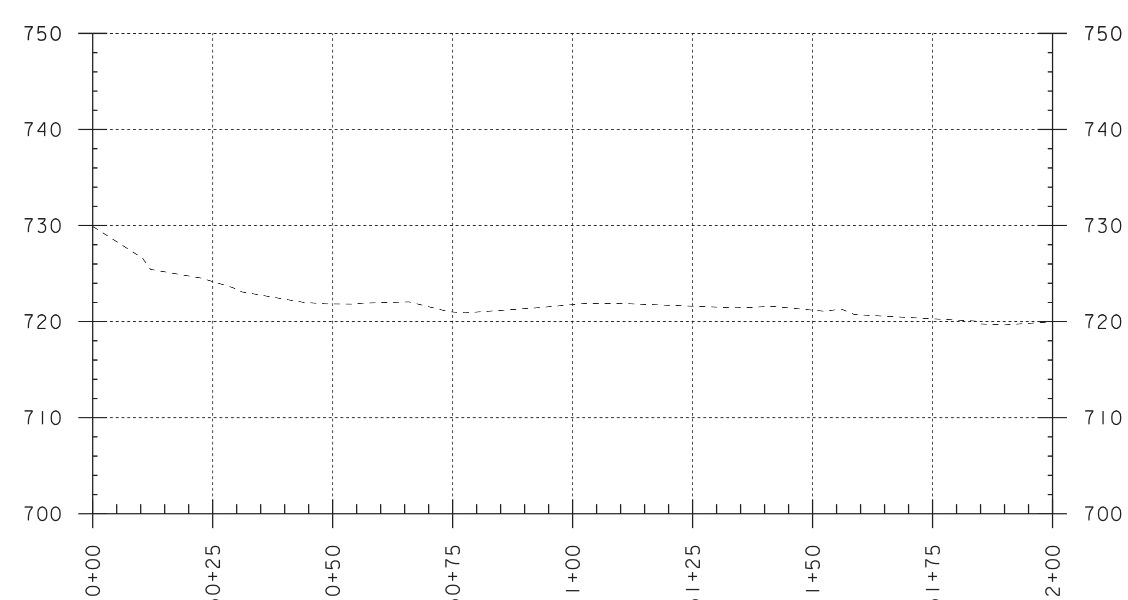
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606/sl2j606border.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING UTILITY LAYOUT SHEET	SHEET 3 OF 15



VT ROUTE 9 PROFILE

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



WALLOOMSAC RIVER PROFILE

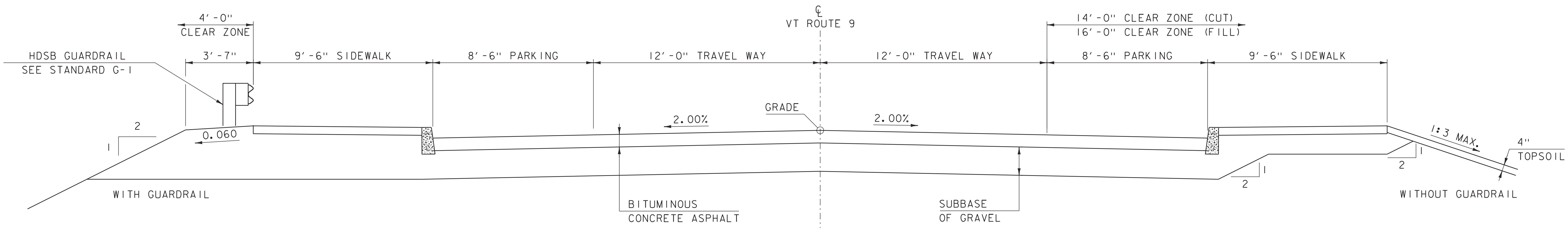
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

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

PROJECT NAME: BENNINGTON
PROJECT NUMBER: BF 1000(20)

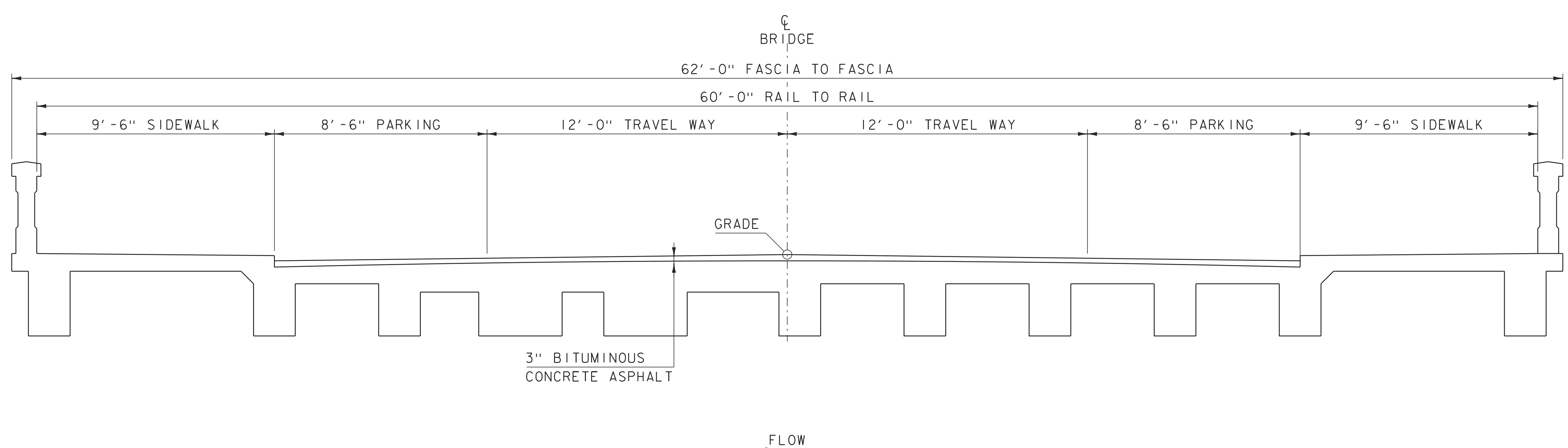
FILE NAME: 12j606/s12j606profile.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
PROFILE SHEET

PLOT DATE: 11-MAR-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 4 OF 15



VT ROUTE 9 TYPICAL SECTION

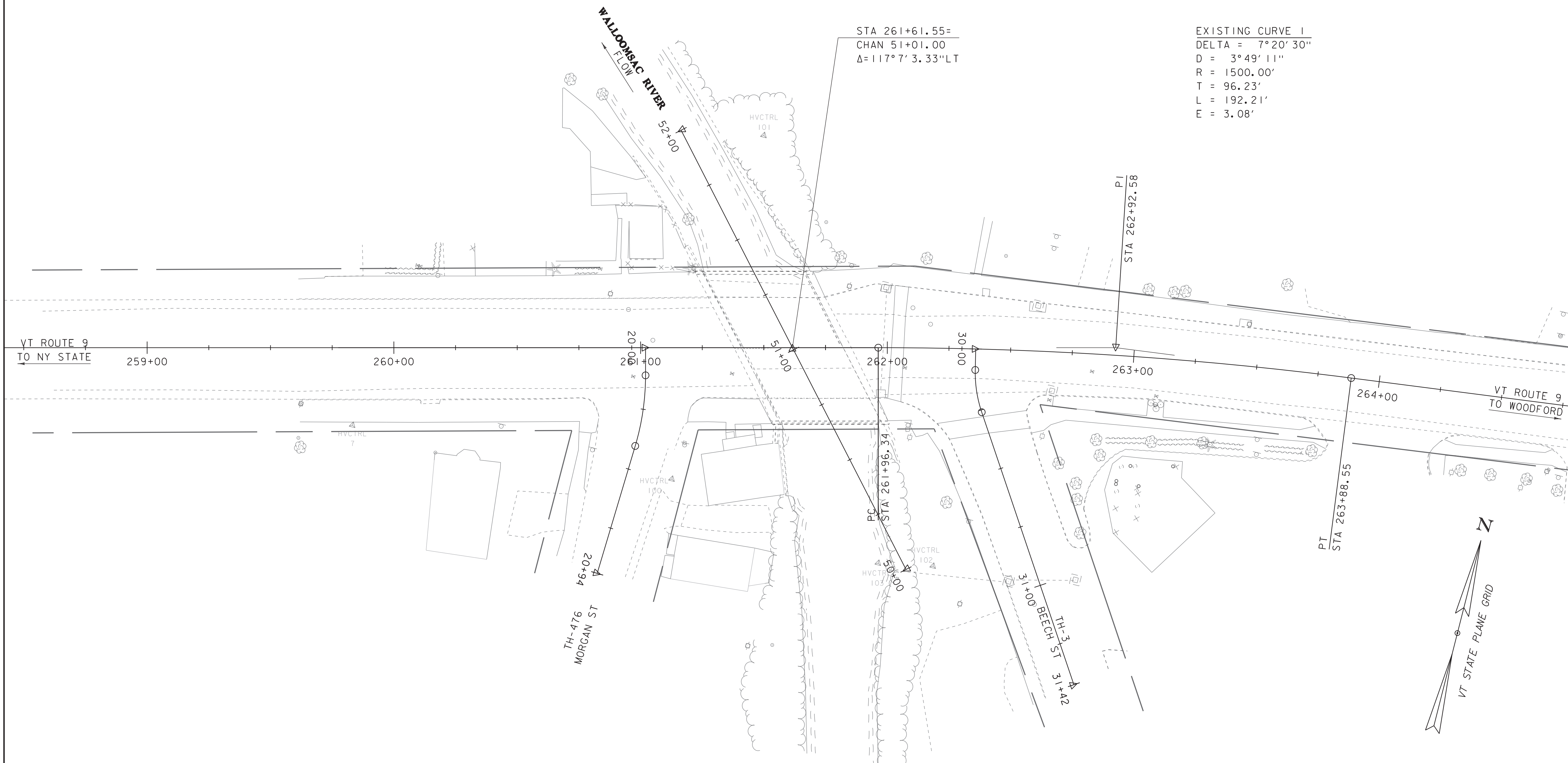
SCALE 3/8" = 1'-0"



EXISTING BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606\s12j606Typ.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING TYPICAL SECTIONS	SHEET 5 OF 15

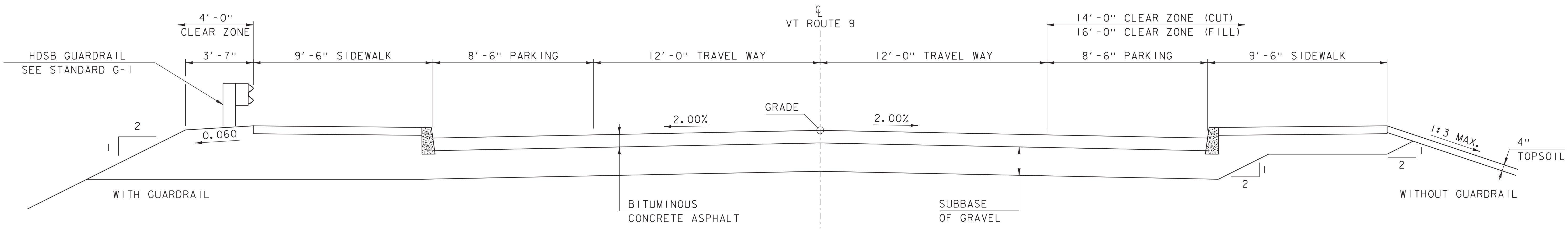


EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46′ SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

SUPERSTRUCTURE PATCHING LAYOUT

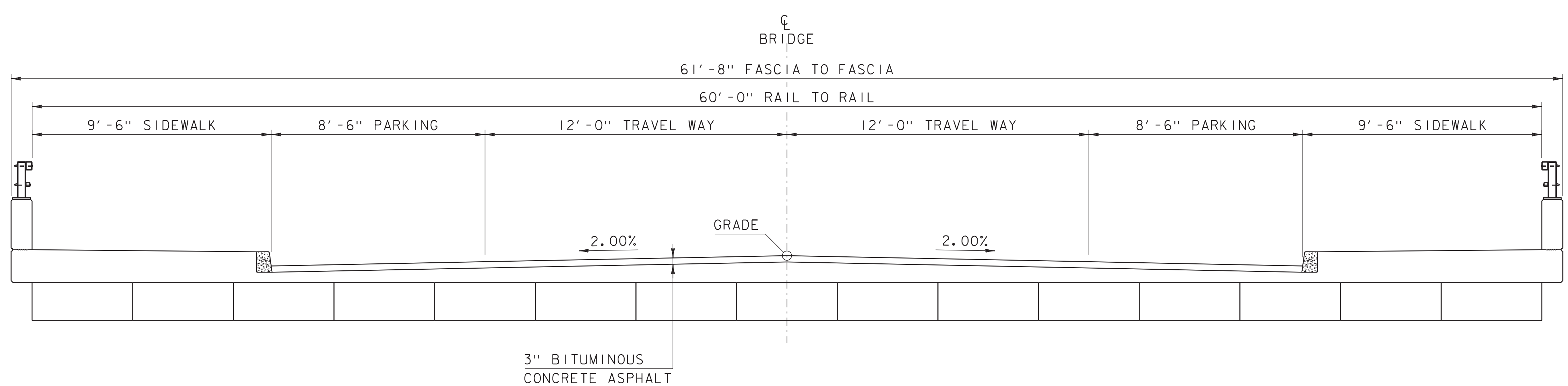
SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606/sl2j606border.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
SUPERSTRUCTURE PATCHING LAYOUT SHEET	SHEET 6 OF 15



PROPOSED VT ROUTE 9 TYPICAL SECTION

SCALE ⅜" = 1'-0"



FLOW

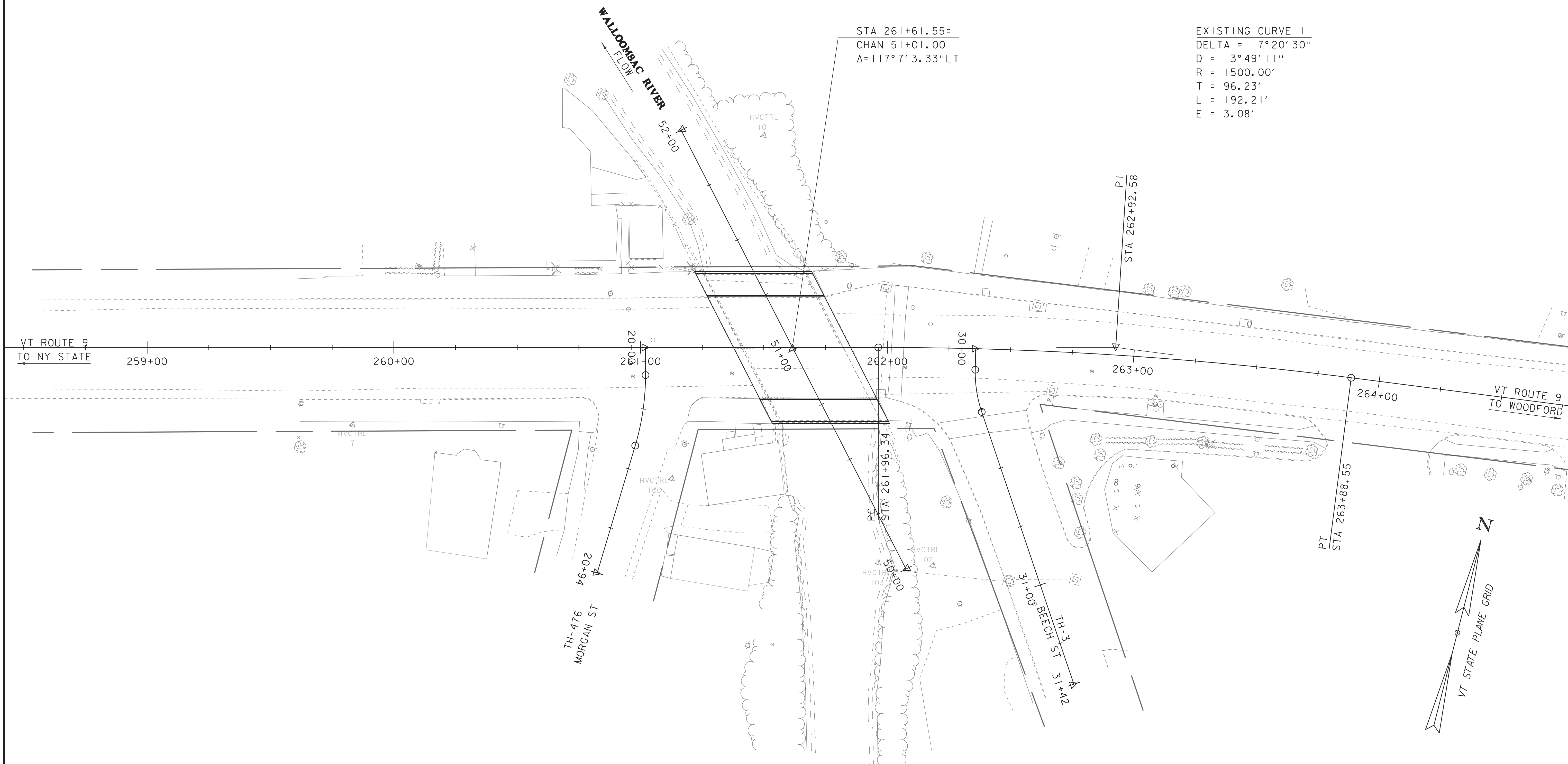
PROPOSED BRIDGE TYPICAL SECTION

SCALE ⅜" = 1'-0"

SOLID SLABS SHOWN FOR EXAMPLE

PROJECT NAME: BENNINGTON
PROJECT NUMBER: BF 1000(20)

FILE NAME: 12j606\s12j606Typ.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
PROPOSED TYPICAL SECTIONS
PLOT DATE: 11-MAR-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 7 OF 15



EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46' SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

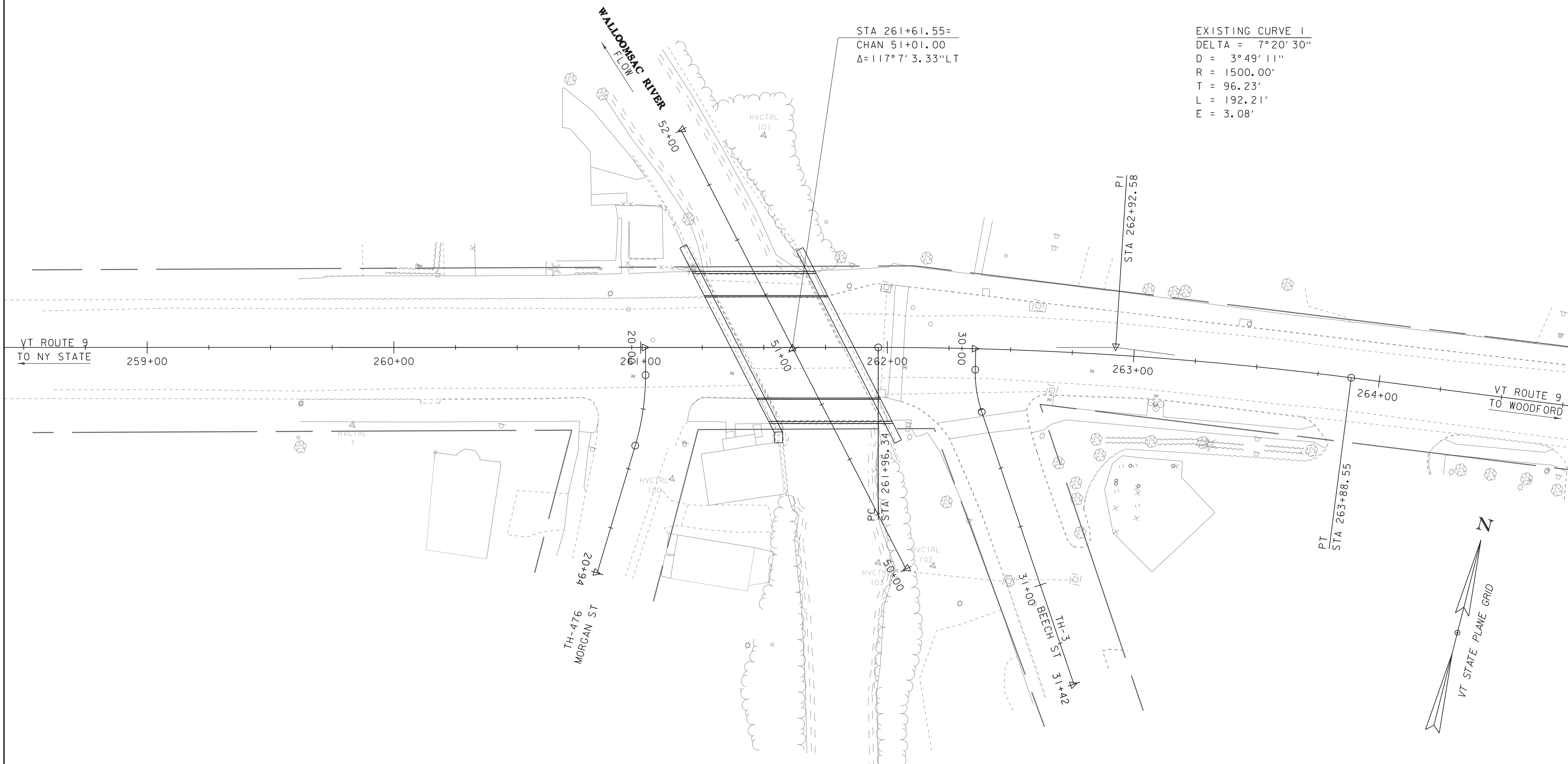
SUPERSTRUCTURE REPLACEMENT LAYOUT

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

PROJECT NAME: BENNINGTON
PROJECT NUMBER: BF 1000(20)

FILE NAME: 12j606/s12j606border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
SUPERSTRUCTURE REPLACEMENT LAYOUT SHEET

PLOT DATE: 11-MAR-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 8 OF 15



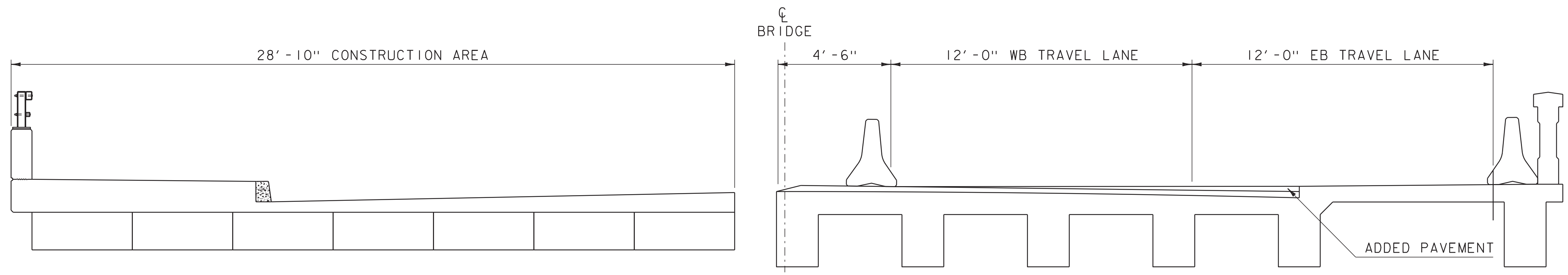
EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46′ SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

BRIDGE REPLACEMENT LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME:	BENNINGTON
PROJECT NUMBER:	BF 1000(20)

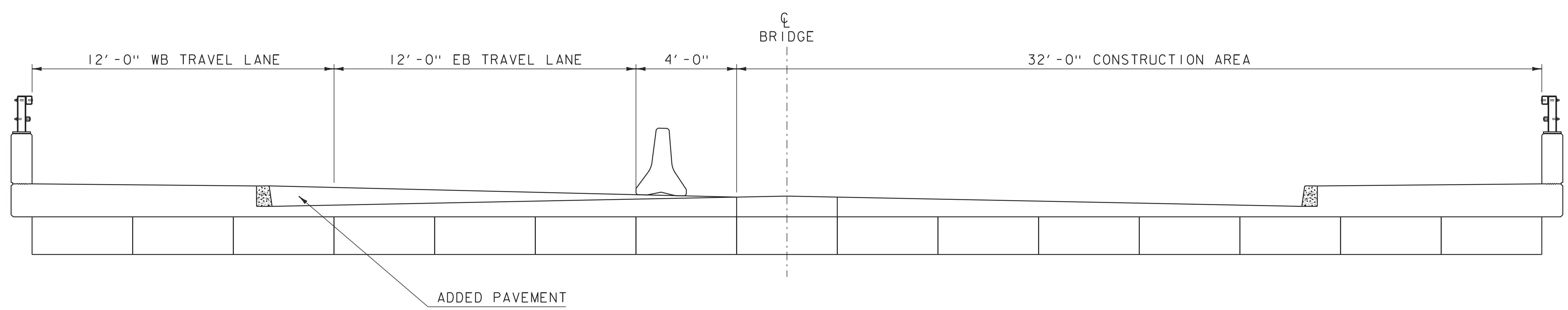
FILE NAME: 12j606/s12j606border.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BRIDGE REPLACMENT LAYOUT SHEET	SHEET 9 OF 15



FLOW

PHASE 1 TYPICAL SECTION

SCALE 3/8" = 1'-0"



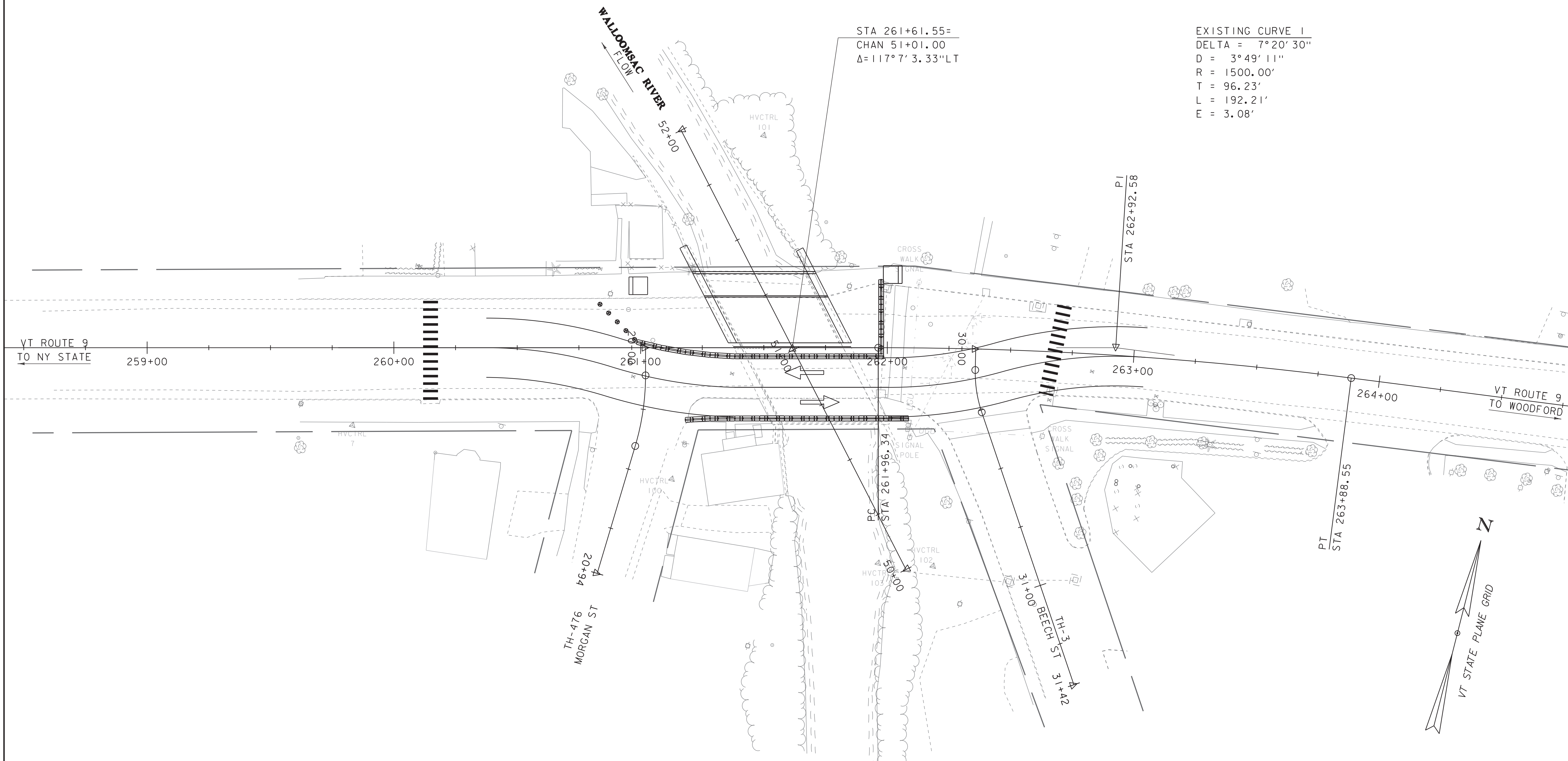
FLOW

PHASE 2 TYPICAL SECTION

SCALE 3/8" = 1'-0"

FINAL PAVEMENT TO BE PLACED AFTER PHASE 2

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606\s12j606phasing.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
TWO LANE PHASING TYPICAL SECTIONS	SHEET 10 OF 15

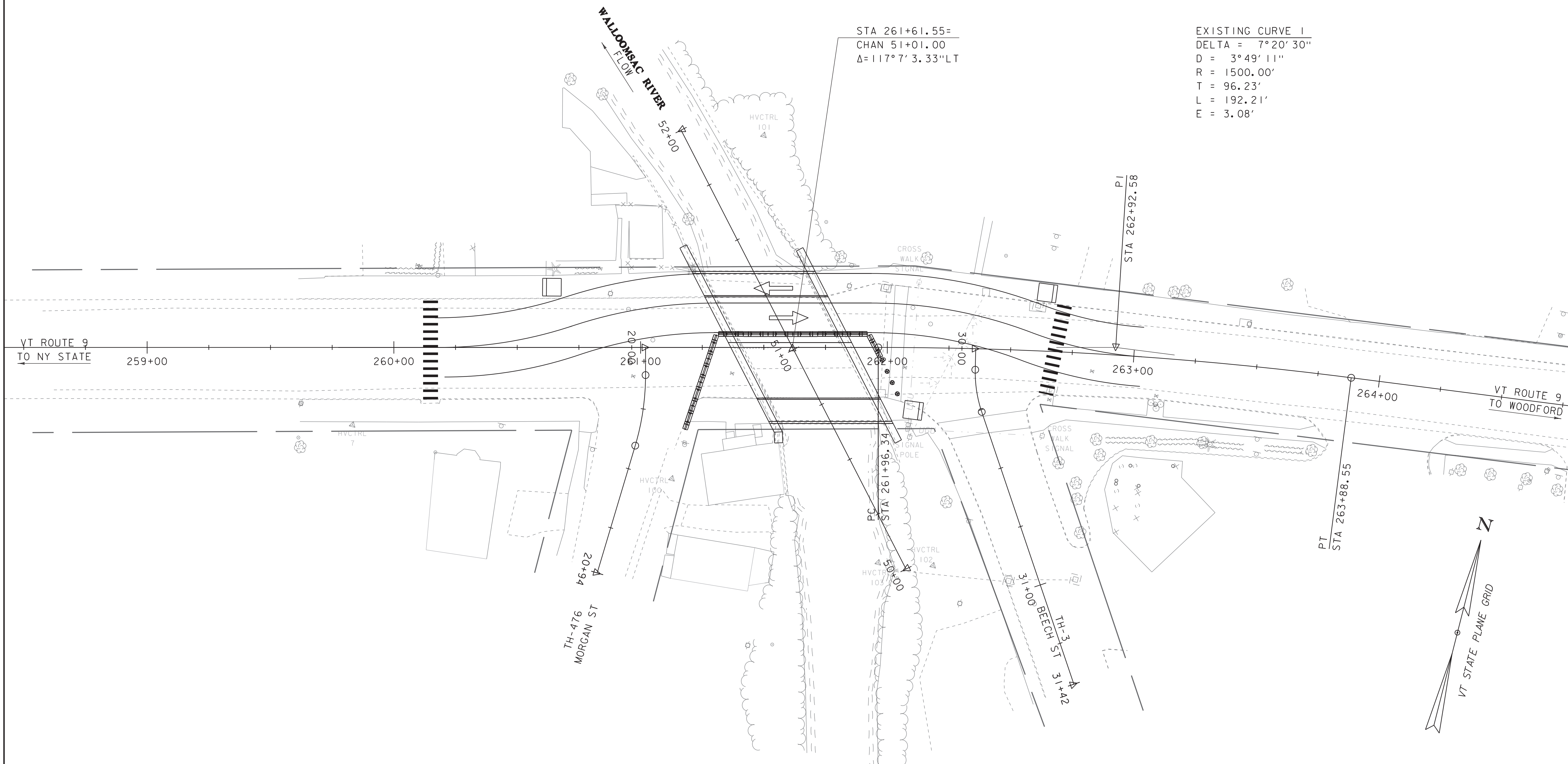


EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46' SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

TWO LANE TRAFFIC PHASE 1 LAYOUT

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

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606/s12j606TCborder.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
TWO LANE TRAFFIC PHASE 1 LAYOUT SHEET	SHEET 11 OF 15



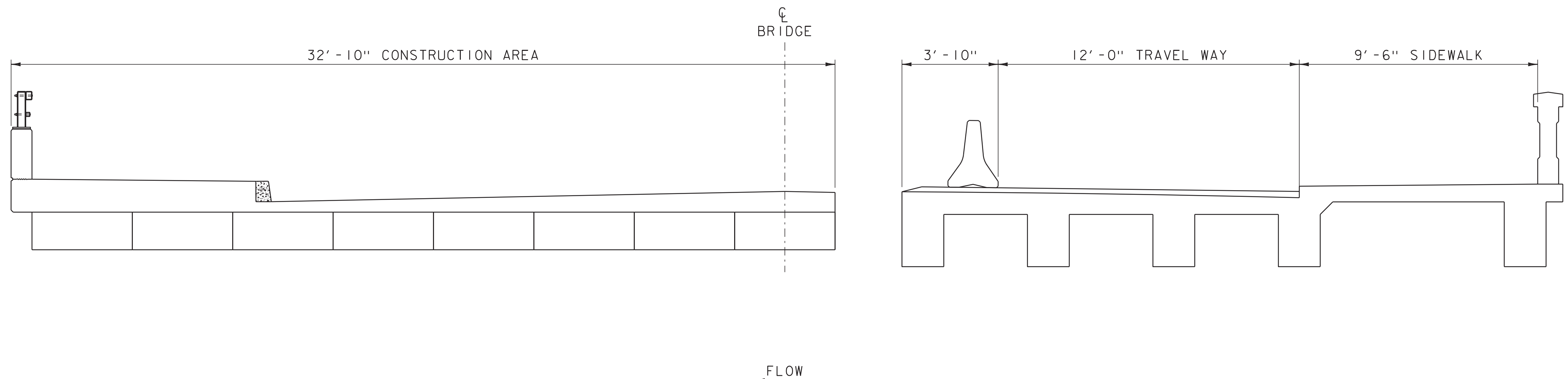
EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46′ SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

TWO LANE TRAFFIC PHASE 2 LAYOUT

SCALE 1" = 20′-0"

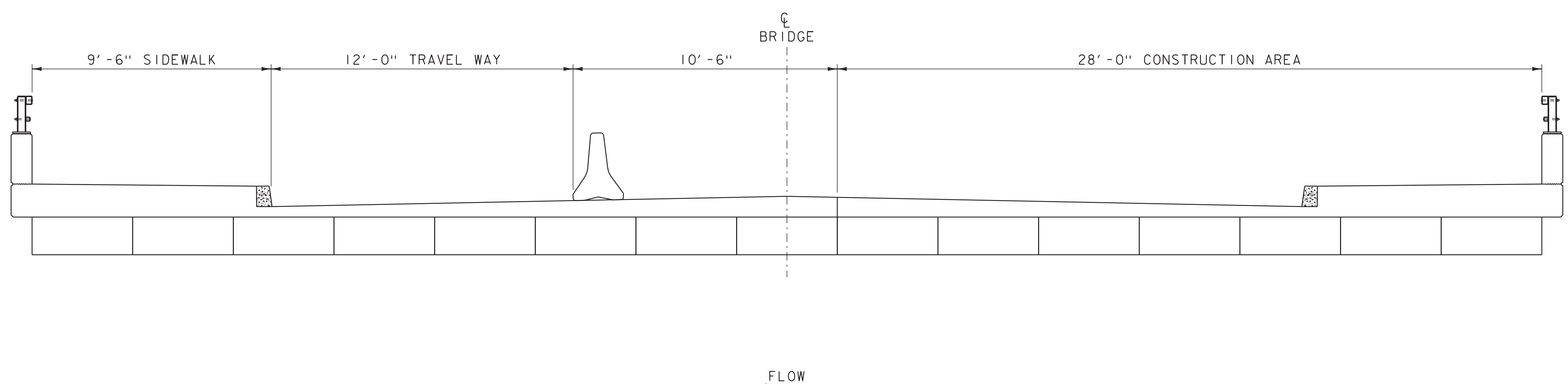
20 0 20

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606/s12j606TCborder.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
TWO LANE TRAFFIC PHASE 2 LAYOUT SHEET	SHEET 12 OF 15



PHASE 1 TYPICAL SECTION

SCALE 3/8" = 1'-0"

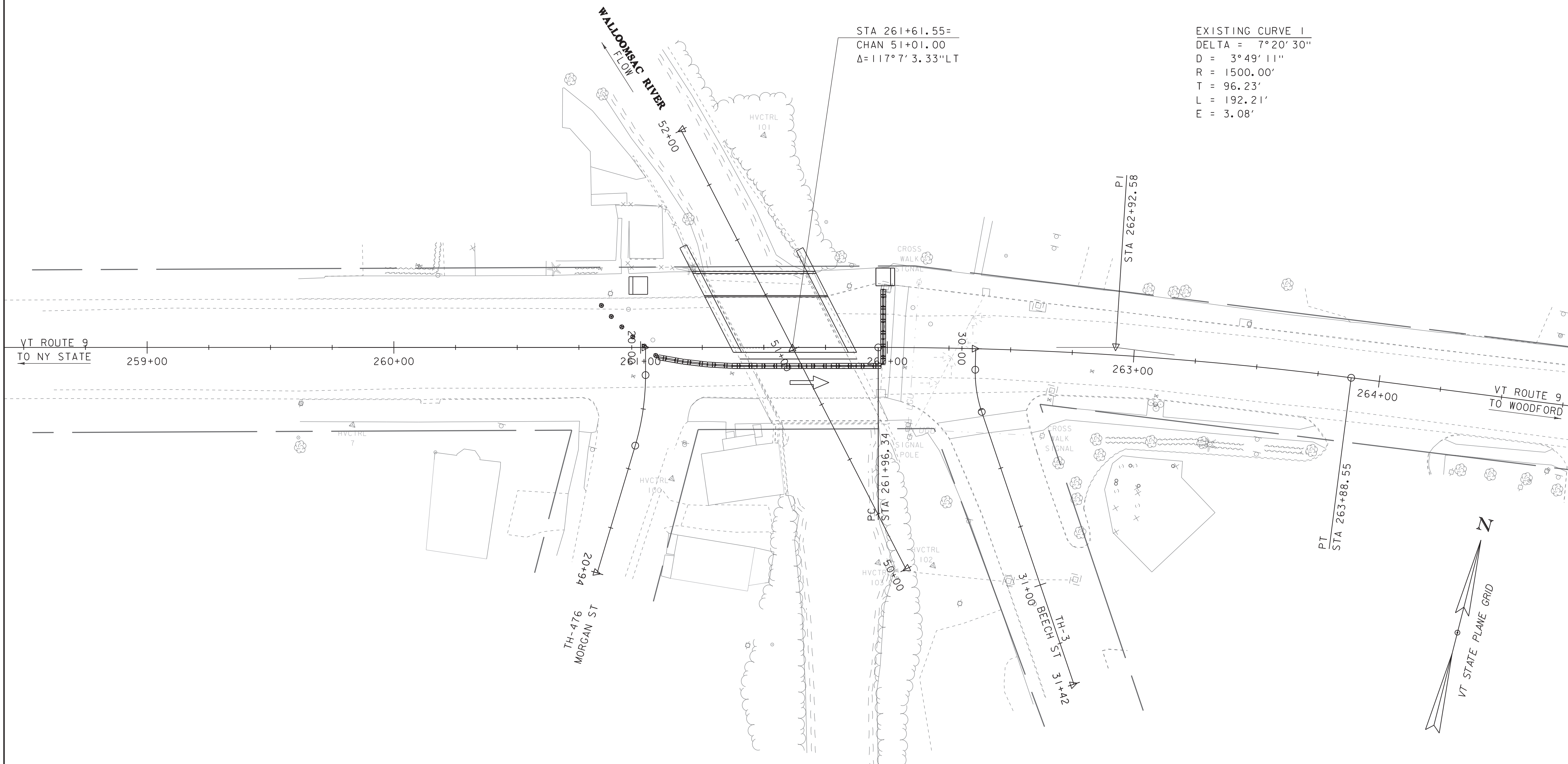


PHASE 2 TYPICAL SECTION

SCALE 3/8" = 1'-0"

PAVEMENT TO BE PLACED AFTER PHASE 2

PROJECT NAME: BENNINGTON	
PROJECT NUMBER: BF 1000(20)	
FILE NAME: 12j606\sl2j606phasing.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
SINGLE LANE PHASING TYPICAL SECTIONS	SHEET 13 OF 15



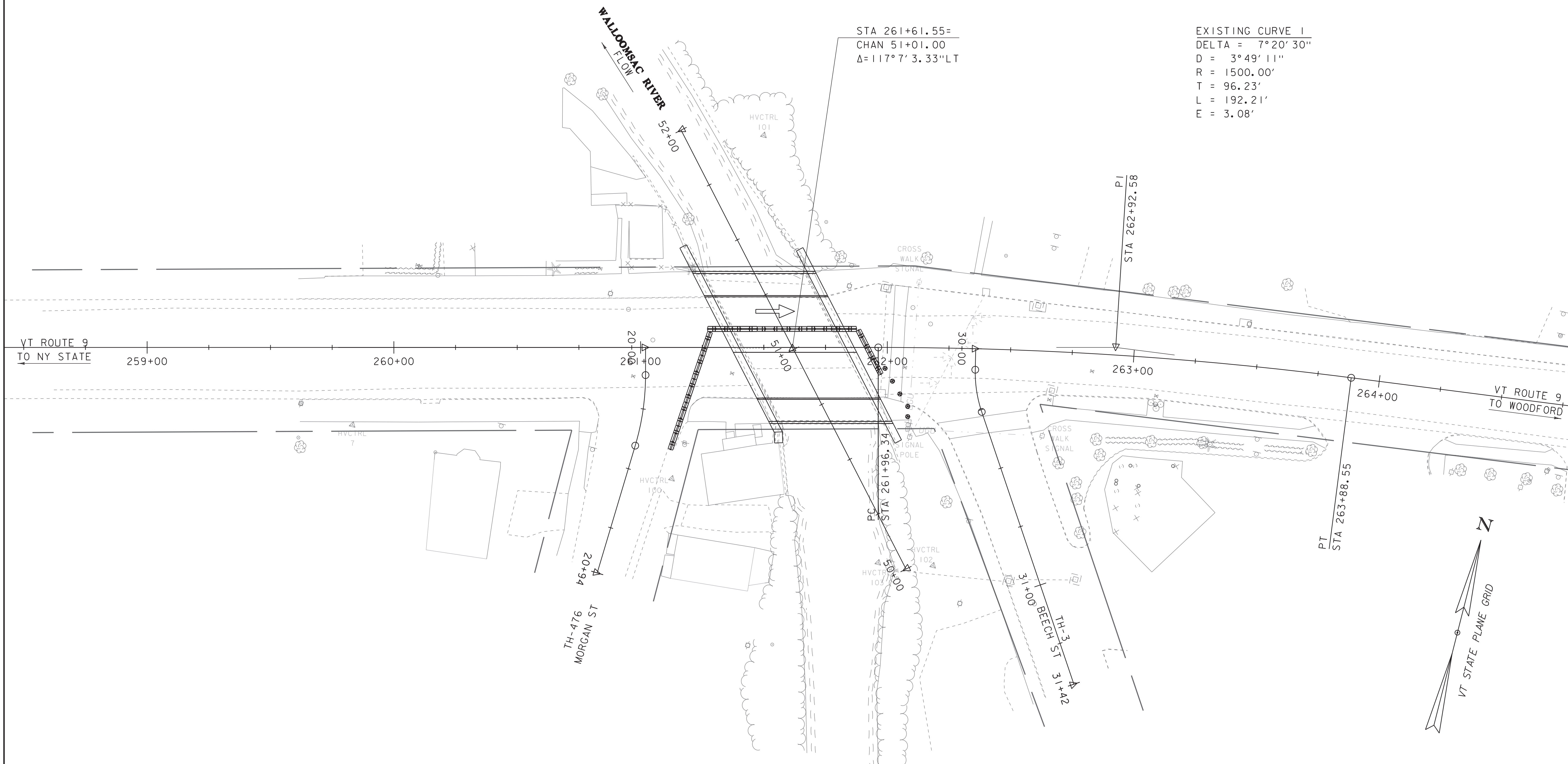
EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46′ SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

ONE-WAY PHASE 1 LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME:	BENNINGTON
PROJECT NUMBER:	BF 1000(20)

FILE NAME: 12j606/s12j606TCborder.dgn	PLOT DATE: 11-MAR-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ONW-WAY PHASE 1 LAYOUT SHEET	SHEET 14 OF 15



EXISTING BRIDGE INFO
BUILT 1923, SINGLE 46′ SPAN
CONCRETE T-BEAM/
ENCASED STEEL BEAM
CIP CONCRETE DECK

ONE-WAY PHASE 2 LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: BENNINGTON
PROJECT NUMBER: BF 1000(20)

FILE NAME: 12j606/s12j606TCborder.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: ------
ONE-WAY PHASE 2 LAYOUT SHEET

PLOT DATE: 11-MAR-2019
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 15 OF 15