Bloomfield BF 0271(21)

Bridge #9

Vermont 102 over the Nulhegan River

Scoping Study

April 2023

Prepared For: VERMONT AGENCY OF TRANSPORTATION

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28 North Main Street

Randolph, Vermont 05060

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1 Site Information

1.1 Project Location and Classifications

Bridge 9 is a state-owned bridge carrying Vermont 102 over the Nulhegan River in Bloomfield, Vermont (see Figure 1-1). The bridge is a single span historic steel Pratt thru truss built in 1937. The bridge site in Bloomfield is just south of the junction of Vermont 102 and Vermont 105. VT 102 parallels US Route 3 in New Hampshire on the other side of the Connecticut River. This route provides a North-South Route along the easternmost edge of the state from Canaan at the Canadian Border to US Route 2 in Guildhall, Vermont, serving as a critical link for these rural communities. The existing conditions were gathered through site visits, inspection and rating reports, record plans, local concerns meeting, and traffic records.

The classifications for this bridge and roadway are as follows:

Roadway Classification	5 – Major Collector
Bridge Type	Steel Pratt thru Truss
Bridge Length / Span	134’-0” / 130’-0”
Feature Spanned	Nulhegan River
Year Built	1937
County	Essex
Federal Aid	On Federal Aid System – Non NHS
Ownership	State of Vermont
Maintenance	District 9

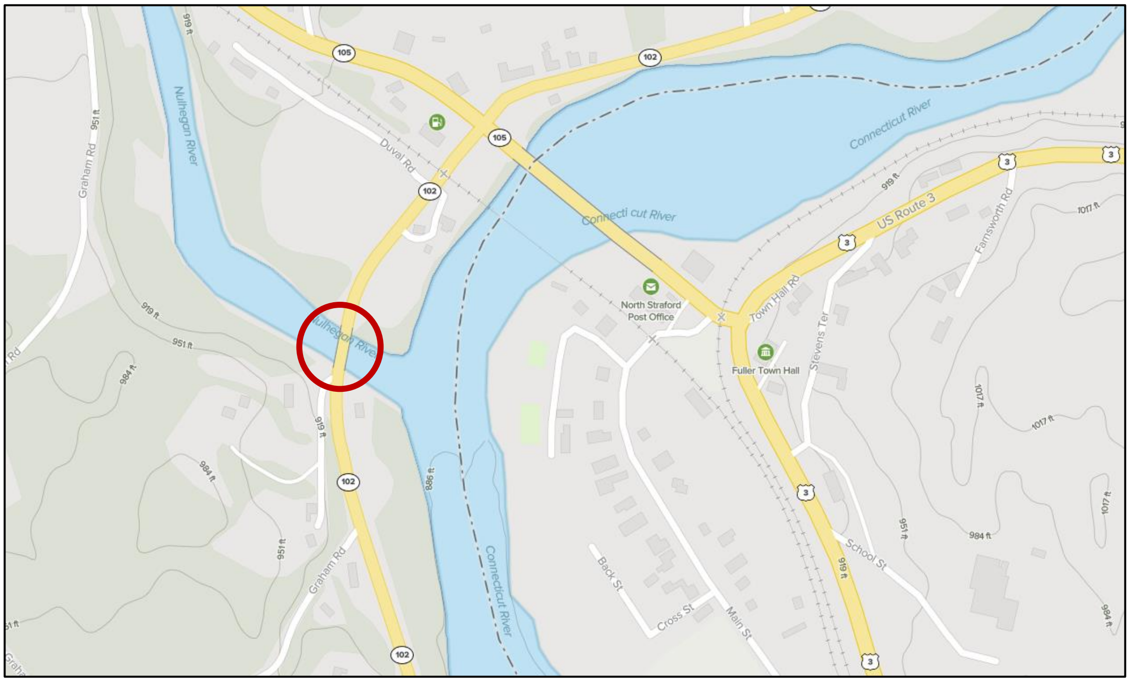


Figure 1-1: Site Location

1.2 Design Criteria

The design standards for this bridge project are the Vermont State Design Standards (VSS), dated October 22, 1997, AASHTO's Policy on Geometric Design of Highways and Streets, 6th Edition, and the VTrans Structures Design Manual (SDM) 2010. Minimum standards referenced below are based on an ADT between 400-750 vehicles per day and a design speed of 50 mph for a Rural Major Collector.

Table 1-1: Design Criteria

Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	12' lane / 2' shoulders (28' total)	10' lane / 2' shoulder (24' total)	Approach width tapers to meet bridge rail. Approach widths outside taper are adequate
Bridge Lane and Shoulder Widths	VSS Table 5.4 & SDM 2.1.3	20' total	20' for rehab / 24' otherwise	Provisions allow for a minimum width of 20' if rehabbing a historic structure
Vertical Clearance	VSS Section 5.8	No freeboard at 2% or 1% AEP.	1' over Q50 Flood	Substandard Clearance. Bankfull width is met.
Clear Zone Distance	VSS Table 5.5	-	12' Fill / 8' Cut	Recommend Steel post approach rail
Superelevation	VSS Section 5.13	Normal Crown	6%	No concerns
Speed	VSS Section 5.3	50 mph	25-50mph	No concern
Vertical Grade	VSS Table 5.6	0.1%	6%	No concerns
Maximum K Value for Vertical Curves	VSS Table 5.1	63 Crest	110 Crest / 90 Sag	No concerns
Stopping Sight Distance	VSS Table 5.1	1255'	400'	No concerns
Bicycle / Pedestrian Criteria	VSS Table 5.8	No shoulder	2' paved shoulder	Shoulders should be added to the new structure
Bridge Railing	SDM Ch. 13	Original pipe and channel attached to truss	TL-2	Substandard
Structural Capacity	SDM Ch. 3.4.1 & VSS Table 5.4	H15	HL-93 (new)	Built in exception for existing structures

Approximately 500 feet north of the bridge, VT 102 traverses underneath the St. Lawrence and Atlantic Railroad (SL&A) tracks. This is a narrow underpass with a posted 12'-6" clearance. Any geometric improvements at the bridge site will not alleviate the condition at the underpass.

The southern bridge abutment is adjacent to the intersection with Patnaude Road (TH-12), which rises sharply uphill immediately after the intersection and turns approximately parallel with VT 102. Site distance at this intersection is required to meet a minimum of 550 feet, in accordance with VSS Table 5.2.

1.3 Existing Conditions and Inspection Summary

The condition ratings provided below are from the most recent inspection performed by VTrans in February 2021:

Deck Condition	5	(Fair)
Superstructure	4	(Poor)
Substructure	7	(Good)
Channel	8	(Very Good)

The following is a summary of the VTrans recent inspection history for Bridge 9:

> *07/01/2020 - Request made to add support below southern truss ends until more adequate shoring can be installed. Bridge crew has added oak blocking below lower chord ends and pinned to seat. ~ MJ/JO*
>
> *04/23/2020 - Bridge steel superstructure is in poor condition with holes through the bottom cord in several locations, the end post have large holes where the rail was attacked, Main concern at this time is the gusset plates at abutment 1 are rusted with upstream inside broken off and 90% of the downstream inside gusset rusted through. The bridge should have some shoring done to help with the weak gusset plates at abutment 1 and full replacement of the bridge planned as the rate of corrosion will compromise the load capacity soon. ~ JS/AC*
>
> *07/16/2019 - The truss has localized areas of heavy corrosion, with the most concerning section loss along the upper chord end posts interior channels and the southwest interior vertical gusset plate, which is cracked completely thru, separating half the truss connection from bearing support. The superstructure has now been lowered to a poor condition based on this gusset failure. The end posts need strengthening and the southwest truss corner needs some repair/shoring measures. Depending on timeline for upgrading plans for the bridge, should also consider adding shoring below the south end floorbeam, as well as its attached intermediate stringer ends, since corrosion is accelerating; especially, if a project is not expedited within the next few years. ~ MJ/MK*
>
> *7/26/2017 - Structure is in fair condition random holes found along bottom chord between portal legs and 2nd vertical in along web at each corner with some past repairs. Bottom inner flange abutment 1 upstream has heavy section loss for approx. first 3'. Few small holes found along web of vertical and diagonals. Holes also noted in portal leg. Portal has past impact damage. Couple of the x bracing angle clips cracked through and upstream abutment 1 rusted off. Deck soffit has numerous moderate to larger size delams. Structure should be programed for extensive recon or replacement. MJK AC*
>
> *7/7/2015 - Grease paint on the floor beams and stringers is still in good condition. The outside channel in the bottom chord on abutment #2 downstream side should be repaired. Tie plates on the bottom chord should be replaced. All steel above the bottom chord should be cleaned and painted soon. ~FRE/TJB*

> *7/16/2013 - Floor beams and stringers have been greased painted. Structure should be cleaned and painted in the near future. Some of the tie plates on the bottom chord have rusted through and some have cracks these plates will need replacement in the near future. Bottom chord has been repaired in the past on abutment #1 downstream side. ~ FRE/SJH*
>
> *7/11/2011 - This structure was rehabbed and is in satisfactory condition .There is some prying in the bottom chord at midspan and some holes behind the bridge guardrail in the end posts in the webs in places and in abutment1 web on the right side at abutment 1. The deck is in satisfactory condition with some cracking and delams in places. ~ DCP/FRE*
>
> *07-13-2009 - Overall condition is satisfactory to good condition. Deck soffit has areas of deterioration. Steel superstructure has localized section loss. The upper truss members should be painted. ~ DCP*

The site was visited by Rich Tetreault (PE, VT), Rebekah Gaudreau (PE, VT), and Cameron Bellisle of Dubois & King on June 10, 2022. The inspection consisted of visual inspection of various components of the bridge including the top chord and web members, gussets, deck, rail, and abutments as well as the surrounding site to record existing conditions and observe any notable deterioration. No material or load testing was performed. The results of the inspection are noted in the following subsections of section 1.3. These observations and the results of the subsequent load rating were used to inform the alternatives analysis presented within this document.

1.3.1 Trusses

Bridge 9 in Bloomfield consists of two steel single span Pratt Trusses with lateral cross bracing, end portals, and floor beam and stringer floor system. The truss top chord consists of a riveted built up section of two channels with a cover plate along the top and lacing bars on the bottom. The truss verticals and diagonals consist of 8” wide flange rolled shapes. The lower chord consists of built up double channels with batten plates top and bottom. Members are connected by two gusset plates at each node.

Both trusses are in generally good condition above the deck level. Both the primary and secondary systems need to be cleaned and painted, as failure of the coating system is evident on most members. The existing coating system may contain lead based paint, and cleaning activities will likely require lead abatement. Upper chord gusset plates are relatively thin at 3/8” thickness, but do not show signs of distress. Section losses in both the primary and secondary systems above deck level are localized and generally do not exceed 1/16” of loss, with occasional areas of loss up to 1/8” in thickness. See Figure 1-4.

Web plate repairs are present on the end posts at the deck and railing level. These repairs appear to be in good condition, as shown in Figure 1-2.

The portions of the web members at and below deck level as well as the bottom chord show more advanced deterioration, with regions of 100% section loss at most batten plate locations on the lower chord. The lower chord gusset plates at the expansion knuckle of the truss are severely deteriorated, with the inner plate on the upstream side severed for the full height, with large areas of full section loss on the downstream side.

Figure 1-2: Typical Repair of End Post
(Top Left)

Figure 1-3: Typical Condition of Top Chord
(Bottom Left)

Figure 1-4: Typical Condition of Primary and Secondary Systems Above Deck Level
(Top Right)

Figure 1-5: Typical Deterioration in the Bottom Chord

1.3.2 Floor System

The floor system consists of 2 steel 18”x50WF exterior stringers and 2 21”x59WF interior stringers per bay, with rolled steel 30”x116 WF floor beams at 21’-8” on center. The end floor beams are smaller at 27”x98WF. The lower lateral bracing consists of X bracing with L 3.5”x3.5”x 5/16” single angles supported at midlength, as depicted in Figure 1-6. The lower floor and lateral systems are generally in good condition with the exception of the expansion end bay which is in poor condition (See Figure 1-7). The end floor beam shows evidence of prior plate repairs on the downstream exterior stringer to floorbeam connection on the expansion end, with an approximately 3’ long segment of 100% section loss between the web and bottom flange of the floor beam. The lateral bracing at the upstream end connection is fully severed (See Figure 1-8).

Figure 1-6: Typical Floor System Condition

Figure 1-7: Expansion End Floor Beam Condition

1.3.3 Bearings

All four truss bearings are cast steel bearings with 4" diameter ASTM A-7-34 steel pins and 4-1.5" diameter straight anchor rods. The fixed shoes at the north end of the bridge are in good condition. Expansion is accommodated by rocker bearings at the south end of the bridge, with an additional two anchors in 3.5" slotted holes for expansion capacity. These bearings show severe deterioration and require replacement, as shown in Figure 1-8.

All bearing locations have been temporarily supported by bolster blocks inboard of the pins on new concrete pads supporting the lower chord near at the edge of the gusset. Bolster blocks supports have been poured directly in front of the original bearing seat. The concrete supports and steel bolsters are in good condition as shown in Figure 1-9. Though this temporary solution is not showing signs of distress, it does change the load path of the end post member and the forces in the knuckle plates.

Figure 1-8: Severe Deterioration of End Bearings, Plates, and Connections

Figure 1-9: South Abutment and Bolsters

1.3.4 Deck, Curb, and Rail

The deck consists of reinforced concrete with an assumed thickness of 10" based on existing plans for a 20' wide roadway. At the time of construction, the concrete was considered class A concrete and the deformed steel bars are designated A15-14. Design curb heights measured 9" from the top of deck surface to top of curb. The curb is shallow with a reveal of approximately 4", indicating a potential for 5" of pavement on the bridge in its current condition, and is spalled in places as shown in Figure 1-10.

Figure 1-10: Spall in Curb

The underside of the deck exhibits numerous cracks, spalls, and areas of minor efflorescence. Rust staining is also visible in places, indicating active corrosion of reinforcement. A typical bay is shown in Figure 1-12, with a more severe spall shown in Figure 1-13. The most significant deterioration tends to occur at the rail post connections on the deck overhang, as shown in Figure 1-11, where large spalls cracking, and efflorescence is visible at the rail post connection. The connection is made by 2 metal studs embedded horizontally in the deck. The embedment is not known, though there is clear evidence of water intrusion.

Figure 1-12: Typical Underside of Deck

Figure 1-13: Spall in Underside of Deck

Figure 1-11: Deck Deterioration in Overhang

The original railing is still present on the bridge and is attached to the diagonal and vertical members, as well as to posts connected to the bottom chord. The railing consists of a built up section of a 6” channel and two angles to create the low rail and a 2 ½” steel tube top rail. The support posts are built up members consisting of back to back L2x2x5/16” angles with fill and connector plates. The railing is substandard for this class of roadway. The railing and its connections can be seen in Figure 1-14.

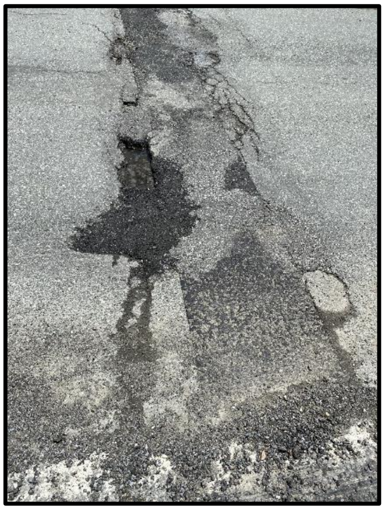
Figure 1-14: Aerial View of Roadway, Curb, and Railing

1.3.5 Joints and Pavement

The southbound lane travel surface exhibits rutting and stripping of the pavement due to snowmobile use, as seen in Figure 1-14 above. Pavement is otherwise in fair condition with a few small potholes in the travel surface. The joint at the expansion end is an asphaltic pavement joint that shows measurable deterioration, cracking, and loss of pavement, as shown in Figure 1-16. This allows salt penetration through the pavement layer, which corresponds to the substantial deterioration observed below the deck at this location.

Figure 1-16: South End Expansion Joint (Right)

Figure 1-15: Small Pothole in Travel Way (Below)



1.3.6 Abutments

The abutments consist of cast in place concrete seats and backwalls, which are in generally good condition with debris present on the bearing seats and few signs of aging. No concerns regarding the abutment integrity were noted.

Figure 1-17 shows the typical condition of the abutments, with some staining and minor cracking, with no major spalls in the support areas.

As noted in section 1.3.3, concrete bolsters have been poured directly in front of the existing abutments as a temporary support mitigation measure at each truss support location. These blocks are in good condition and do not show signs of distress.

Figure 1-17: North Abutment and End Framing in Good Condition

The original bridge plans indicate the abutments are shallow gravity abutments with a 7’-6” wide footing. Given the condition of the abutments, it is assumed that this site has favorable soil conditions for bearing.

1.3.7 Approaches

Both approaches to the bridge are paved and with steel post highway guardrail present at all four corners. The alignment through the bridge is tangent, however circular curves are present on both approaches just prior to / after the bridge structure, creating a broken back curve condition with restricted site distances.

The southerly approach intersects with Patnaude Road just prior to the bridge, with the parking area (4(f) resource) for the canoe trail located at the intersection as shown in Figure 1-18. As such, the approach rail in the southwest quadrant turns abruptly at the bridge connection and wraps around to the small parking area.

Figure 1-18: Southerly Approach and Intersection with Patnaude Road

In the winter months, the canoe trail is a corridor trail on the VAST (Vermont Association of Snow Travelers) network, and snowmobiles traverse the bridge to access the gas station at the intersection of VT 102 and VT 105.

The northerly approach is relatively flat as shown in Figure 1-19, with a small pull off parking area that could potentially be used as a lay down area during construction. The SL&A underpass on the northern approach raises a potential construction risk for equipment access to the site. If equipment is not able to be brought in from the North, it will need to access the site from the south side. There are no logical lay down areas on the south end, and locating a crane on the south side without closing Patnaude Road is a logistical hurdle. The SL&A line extends southerly through New Hampshire and down into Maine, connecting to Pan Am Railways to Portland, Maine and points south into Boston. Shipment of steel from Casco Bay may need to be considered as a nontraditional delivery method if site access from the south is inadequate for construction and shipping heights cannot meet the 12’-6” clearance requirement.

Figure 1-19: Northerly Approach

1.4 Traffic

A traffic study of the project area was completed by the Agency in March 2021 with the following estimated traffic data:

Table 1-2: Traffic Data

Component	2025	2045
AADT	480	530
DHV	90	100
ADTT	40	60
% Trucks	7.4	9.9
Directional Distribution	58	58
Flexible ESAL	325,000 (2025-2045)	699,000 (2025-2065)

No crash data at mile marker 0.17 (Bridge 9) was recorded in the 2019 crash summary for years 2014 to 2018. Furthermore, no crashes were noted during the public concerns meeting held in November 2022.

1.5 Hydraulics

A hydraulics memo has been prepared by Christian Boisvert of the VTrans hydraulics unit dated February 10, 2022. The hydraulic study included the existing structure as well as a proposed structure assuming a 123’-0” span single span bridge with sloping stone fill and an adequate low chord elevation. The structure is located within a FEMA Special Flood Hazard Area (Zone AE) without Base Flood Elevations. Given that that VT-102 is a major collector, the design storm flow is 2% Annual Exceedance Probability (AEP) (Q50). Preliminary analysis indicates that the substructures are not in a scour critical region. Impacts in or along the river will require a Title 19 consult.

Additional results of the memo are summarized below.

Table 1-3: Hydraulic Information

Parameter	Existing Span	Proposed Span
Hydraulic Clear Span	123 ft	123 ft
Low Chord Elevation	895.5 ft	897.4 ft
Overtopping Storm	Q100 (200’ upstream)	Q100 (200’ upstream)
Freeboard at Q50	None	1.07 ft
Freeboard at Q100	None	0.09 ft
100 yr scour depth	0 ft	0 ft

1.6 Utilities

There are no known underground or municipal utilities within the project area. Aerial utilities run along the west side of the crossing (upstream side of the bridge) and are owned and operated by Vermont Electric Cooperative, FirstLight Fiber, and Consolidated Communication.

1.7 Right of Way

Vermont right of way varies in width within the project area. Temporary ROW takings will be required if a temporary bridge is utilized, regardless of which side of the existing structure the temporary bridge is placed. Right of way takings will not be required for truss rehabilitation or replacement on alignment alternatives, but permanent takings will be required if the off alignment replacement alternative is selected. Right of way is highlighted on the site plan shown below in Figure 1-20.

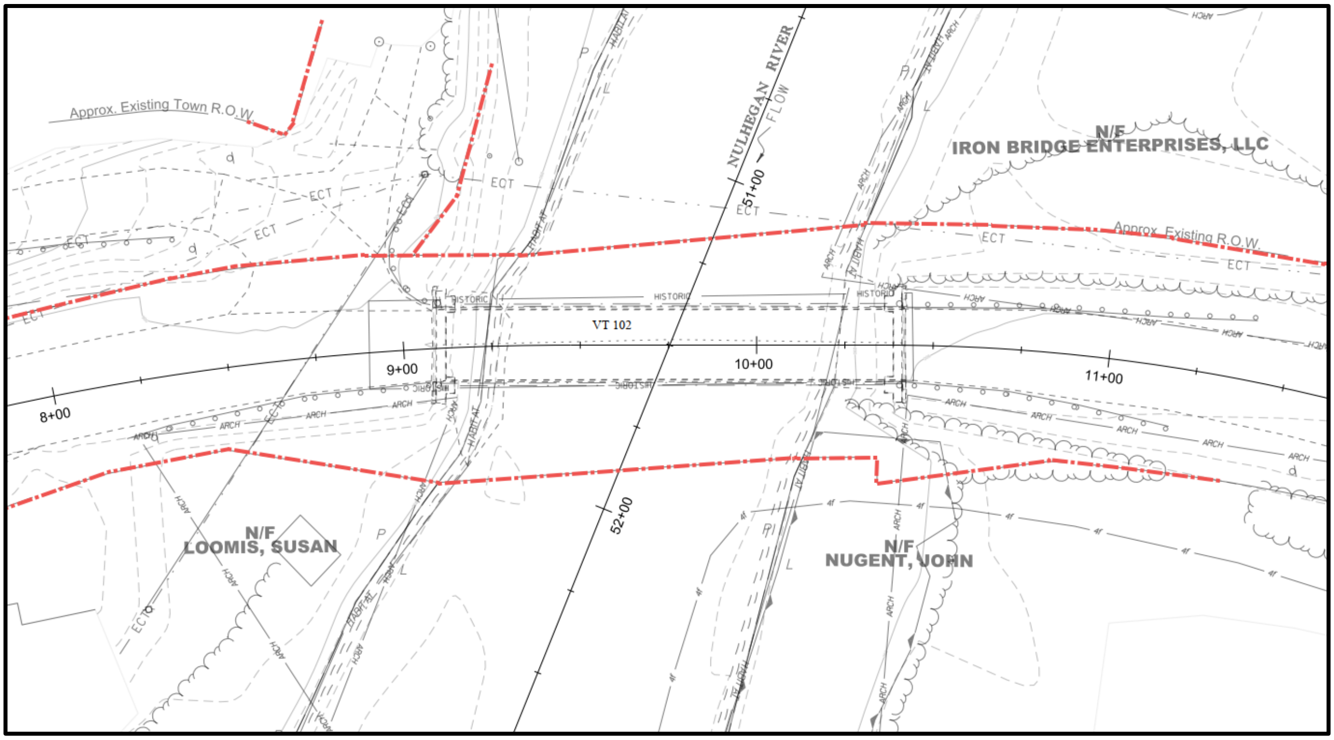


Figure 1-20: Existing Right of Way

1.8 Resources

The following sections are intended to convey summaries related to notable resources in the area. Full memos and reports used as source data for these summaries are available in the appendices. No hazardous waste sites were noted in the project area as of March 15, 2021. The Hazard Waste Urban Soils Map for this site area is located in Appendix A, Resource Maps and Memos.

1.8.1 Historic

An architectural resource identification survey was completed by WSP USA for VTrans in May 2021. During the investigations, two properties older than 45 years were noted, one of which is the bridge itself. The other is a public recreation area, the Northern Forest Canoe Trail Access and Parking Lot. The bridge is listed in the Vermont State Register of Historic Places and is eligible for listing on the National Register. As a historic resource, Bridge 9 is also a Section 4(f) resource. The Northern Forest Canoe Trail Access and Parking Lot is also considered a Section 4(f) resource.

The town of Bloomfield was chartered in 1762 as Minehead, and changed to Bloomfield in 1830. Settlement was concentrated at the confluence of the Connecticut and Nulhegan rivers. The Grand Trunk Railroad was constructed along the south side of the village by 1853. The village was home to the Baldwin Lumber mill, a starch factory, and a blacksmith shop, four sawmills, and two schoolhouses. Many of the former logging and agricultural areas are now temperate forests. The earliest map of Essex County is dated 1859, showing fairly dense settlement with the area of potential effect (APE) of this project. Vermont Route 102 was established in the 1930's, with the truss bridge built in 1937. The WSP investigations concluded that an intensive survey may be warranted should project activities expand beyond the existing footprint of the bridge. Any solutions resulting in alterations to the current historic bridge structure must be done in coordination with the Vermont Division for Historic Preservation.

The full report is available in Appendix B, Architectural Resource Identification Survey.

1.8.2 Archaeological

The VTrans environmental group looks for pre-historic and historic resources that could designate an area as archaeologically sensitive. An archaeological resource assessment (ARA) was completed by WSP USA in July 2021. The results of this study determined that potentially significant archaeological resources may be present on all 4 quadrants of the project area. Whenever there are areas of archaeological sensitivity, any type of ground disturbance raises concern. While the area directly around the bridge has been disturbed from the original construction of the bridge, the results from a field inspection in combination with background research has shown the project area to contain three areas of archaeological concern. This is the result of the proximity of the historic site and several areas of flat, potentially undisturbed land surrounding the bridge. Placement of a temporary bridge would require additional archaeological studies to clear the area of sensitivity. Anywhere there would be ground disturbance, preliminary test borings will be taken for archaeological evaluation; this is a phase 1 archaeological study. A phase 1 archaeology study is scheduled to be conducted in the summer of 2023 to determine any potential impacts or additional requirements for the project.

The full archaeological report is available in Appendix C, Archaeological Resource Assessment.

1.8.3 Biological

Soils in the project area are hydrologic soil group A, which are well draining. Sheet flow through vegetation should be encouraged with the design.

The project site is not within a designated groundwater public water supply source protection area, and is not located within a storm water impaired watershed. An operational storm water permit will likely only be required if the area of disturbance exceeds 1 acre.

A natural resource evaluation was completed by Bear Creek Environmental in the spring of 2021 in a 3.2 acre area surrounding the bridge site.

- Two wetlands areas were noted within the study area on the eastern side of VT Route 102. A small palustrine emergent (PEM) wetland is present in the north-east corner of the study area and is a class III wetland. The second location is north of the river and is classified as Class II due to adjacent surface waters. This wetland is categorized as Palustrine Forested (PFO) and measured approximately 0.14 acres in the study region. Impacts to Class II wetlands and their 50-foot buffer zones should be avoided whenever possible.

- No rare, threatened, or endangered species were observed in the botanical survey.
- A US Fish and Wildlife Service biologist was consulted for the reported occurrence of the Dwarf Wedgemussel. She noted the occurrence is old (1949) and therefore a mussel survey is likely not required.
- Bat habitat and presence was not included in the Bear Creek Environmental study.

The full evaluation is located in Appendix D, Natural Resource Assessment.

2 Purpose and Need

The following ***purpose and need statement*** summarizes what the project is intending to accomplish.

Purpose: The purpose of this project is to provide a safe crossing of the Nulhegan River for the traveling public while addressing the current structural and geometric deficiencies of the structure and approaches for maintenance operations, as well as addressing the ongoing deterioration of the bridge.

Need: Recognizing the importance of this crossing with respect to the local community, including businesses, abutters, and snowmobile traffic, the following needs have been identified:

Structural Needs:

- The bridge width does not meet current standards.
- The railing does not meet current standards.
- The bridge deck and railing attachments are in poor condition and need to be replaced.
- The paint system has failed.
- Multiple members have deteriorated to the point of requiring repair or replacement, including all steel members and bearings at the expansion end, the full length of the lower chord, and most gusset plates.
- The load rating does not show adequate capacity for truck traffic.

Community Needs:

Based on the local concerns meeting and operations survey (see Section 4), the following community needs have been identified:

- The bridge width is too narrow for effective maintenance operations.
- The bridge width is too narrow and poses a safety concern for multimodal users.
- Bridge closure would be a detriment to the community.

3 Load Rating Results

Load ratings provide a snapshot of the live load carrying capacity of various components of a bridge at the current time, as compare to when they were originally designed. The load rating was performed following Load and Resistance Factor Rating Methodology in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Manual for Bridge Evaluation, 3rd Edition, with 2019 Interim Revisions. A yield strength of 33ksi and ultimate strength of 66ksi for all structural steel components was assumed based on a year of construction of 1937. The original design load on the structure was two H15 vehicles. The load rating was completed for HL-93 loading, as well as the H20 and H15 trucks, in order to provide a baseline in the rating results compared to the original intent. All structural members were rated for the maximum of the single lane and two lane cases with appropriate multiple presence factors, distribution factors, and dynamic load allowances applied. The controlling live load force effects were computed for the truss by loading the appropriate bays based on influence lines to achieve the maximum effect. MathCAD was utilized to calculate section properties, capacities, and load rating values.

The truss analysis was completed in MIDAS. Given that the truss is doubly symmetric, the model was completed for a 2D single truss only. Load rating calculations were performed for each member considering their as-built condition, and members with field measured losses were then adjusted to account for the reduction in capacity. The results of the load rating are shown in Table 3-1, and tell the story that the truss and floor systems were designed for H15 loading. Looking at H20 results, the rating is governed by the gusset plates. This is logical considering that modern gusset plate evaluation guidance was developed following the I35-W bridge collapse in 2007, and did not officially become part of AASHTO LRFD design guidelines until 2014.

Table 3-1: As Inspected Load Rating Results

Component		HL-93 Loading		H20 Loading		H15 Loading	
		Inventory	Operating	Inventory	Operating	Inventory	Operating
Stringers	Exterior	***0.58***	***0.75***	***0.83***	1.08	1.11	1.43
	Interior	***0.73***	***0.95***	1.05	1.36	1.40	1.81
	Exterior – Expansion Bay	***0.45***	***0.59***	***0.65***	***0.85***	***0.87***	1.13
	Interior – Expansion Bay	***0.58***	***0.75***	***0.83***	1.08	1.11	1.44
Floor Beams	Fixed End	***0.52***	***0.68***	***0.76***	***0.99***	1.02	1.32
	Expansion End	***0.49***	***0.63***	***0.71***	***0.92***	***0.95***	1.23
	Intermediate	***0.45***	***0.59***	***0.74***	***0.96***	***0.98***	1.28
End Posts	L0-U1	1.06	1.37	2.74	3.55	3.67	4.78
Top Chord	U1–U2	1.12	1.46	2.87	3.71	3.82	4.95
	U2-U3	***0.87***	1.13	2.25	2.91	3.01	3.90
Lower Chord	L0-L2	*The as-inspected values including section loss are in the final stages of the QC process and will be included in the final report.*					
	L1-L2						
	L2-L3						
Diagonals	U1-L2	***0.74***	***0.96***	1.42	1.84	1.90	2.46
	L2-M2	*Zero-Force Member / No Rating Required*					

	U2-M2	1.30	1.68	2.26	2.93	3.02	3.91
	M2-L3	1.31	1.69	2.27	2.94	3.03	3.93
Verticals	L1-U1	1.06	1.37	1.77	2.29	2.39	3.10
	L2-U2	1.02	1.32	2.13	2.76	2.80	3.63
	L3-U3	*Zero-Force Member / No Rating Required*					
Gusset Plates	L0 (Fixed End)	***0.56***	***0.73***	1.18	1.53	1.58	2.27
	L0 (Expansion End)	***0***	***0***	***0***	***0***	***0***	***0***
	L1	3.52	4.57	4.84	6.28	6.45	8.37
	L2	***0.87***	1.13	1.65	2.13	2.19	2.84
	L3	1.04	1.34	1.80	2.33	2.40	3.11
	U1	***0.25***	***0.33***	***0.49***	***0.64***	***0.66***	***0.85***
	U2	***0.90***	1.17	1.57	2.04	2.10	2.72
	U3	***0.21***	***0.28***	***0.45***	***0.58***	***0.60***	***0.78***

Deterioration will continue to progress and the load ratings will continue to decrease over time if corrosion is not mitigated.

4 Local Involvement

4.1 Operations Input

An operations survey was distributed in 2021 district 9 maintenance to assess known issues with the structure. The full results of this survey can be found in Appendix F, Community Input. The key takeaway's are as follows:

- The bridge will require light and heavy maintenance work in the near future to remain in service
- The bridge is too narrow, and has to be treated as a one-way bridge for plowing operations.
- A residential driveway is located approximately 160' south of the bridge and may not be permitted, and a town road is located immediately south of the bridge that may need to be realigned as part of the project to meet railing and safety standards.

4.2 Local Concerns Meeting

A local concerns meeting was held on November 14, 2022 in the town of Bloomfield. The following safety issues and community concerns regarding the project were expressed:

- The select board expressed a safety issue regarding the narrow bridge width, particularly for unfamiliar drivers, pedestrians, bicycles, and snowmobiles.
- Local business owners expressed concern regarding the duration and timing of the bridge closure during construction, as the detour at this site has an end to end distance of 18 miles.

    - Owners of the Debanville's General Store and Café stated that they suffered tremendously during the pandemic, and noted that summer is their busiest season and a road closure at that time would be detrimental to their business.
    - The Town and business owners indicated the slowest parts of the year and preferred closure times are mud season and post-hunting season, which would have an impact to school bus routes and falls outside of the allowable construction season.
    - Concern was expressed about increased emergency response times if the bridge is closed.
- Residents expressed concern regarding the detour route that was shown along Route 3 in New Hampshire. The Janice Peaslee Bridge in Maidstone is posted for 20Tons and is a one lane structure, and that detoured traffic would need to drive further down into Guildhall, extending the detour length. Additionally it was noted that US Route 3 is already very busy.
- Concern was expressed regarding the roadway geometry. The select board noted that the curve on the bridge approach together with the width issue creates a safety issue, and suggested re-aligning the bridge towards the New Hampshire side to assist with sight distance issues.
- Participants expressed concern about the snowmobile use on the bridge, as the state VAST trail in this area requires snowmobiles to traverse the bridge to continue on the trail. Suggestions included an over-widened shoulder (10ft) that could be groomed and used by snowmobiles in the winter.
- The community members felt a new conventional structure would better serve the trucks that currently use the bridge, including the 18-wheeler milk truck, school buses, farming equipment, and emergency vehicles.
- An abutter to the project area expressed concern about permanent and temporary impacts to their property

5 Maintenance of Traffic

The Vermont Agency of Transportation reviews each new project to determine suitability for the Accelerated Bridge Program, which focuses on faster delivery of construction plans, permitting, and Right-of-Way, as well as faster construction of projects in the field. One practice that substantially increases the speed of construction is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intent is to minimize the closure period through faster construction techniques and incentives to contractors to complete projects sooner. The Agency considers the closure option on all projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will expedites construction schedules. This can apply to decks, superstructures, and substructures. VTrans Accelerated Bridge Construction Program has demonstrated that accelerated construction often provides enhanced safety for the workers and the traveling public by removing traffic from the immediate vicinity of the construction zone while maintaining project quality.

The duration of each of the traffic maintenance alternatives will be dependent on the result of the historic investigations and any potential adaptive reuse provisions of the truss. If adaptive reuse is required, then careful disassembly of the truss will be required and the overall disassembly and construction of a new structure will likely require two construction seasons. If adaptive reuse is not required, then demolition and construction of a new bridge may be completed in a single season without traffic flow interruptions during the winter months.

5.1 Traffic Option 1 – Off Site Detour

This option would close the bridge completely and utilize Route 3 in New Hampshire as the North – South link in the region. The detour for passenger vehicles and light trucks utilizes Lamoureux Road in Maidstone as the crossing of the Connecticut River linking US 3 and VT 102, for a detour length of 18 miles, and is shown in Figure 5-2. The bridge at this location is a single lane truss bridge posted at 20 Tons. Trucks and all loads > 20 Tons would detour through Guildhall, for a total of 32.5 miles, as shown in Figure 5-1. These detours will both require coordination with multiple towns and the State of New Hampshire for installation and maintenance of detour route signs. Emergency service coordination with the towns of Brunswick and Maidstone is recommended for points south of the bridge site should the detour option be selected.

Advantages: This option would eliminate the need for a temporary vehicular bridge, which would significantly decrease cost and time of construction for the project. This option would reduce temporary right of way, environmental, and potential archaeological and 4f impacts, as it minimizes impacts to adjacent properties and undisturbed soils. Detour routes are also the safest traffic control option with respect to construction, as the traveling public is removed from the construction site.

Disadvantages: The detour route is very long. No pedestrian or bicycle access would be provided across the river. School busing would be substantially impacted if closures extend into the school season, and emergency response times would be substantially impacted, particularly if the town of Brunswick is unable to assist for a given call.

VT102 south of the bridge down to the Maidstone Town Line is maintained out of the District 9 Bloomfield Garage north of the village of Bloomfield. Full closure and detours during winter months would have a major impact on operations.

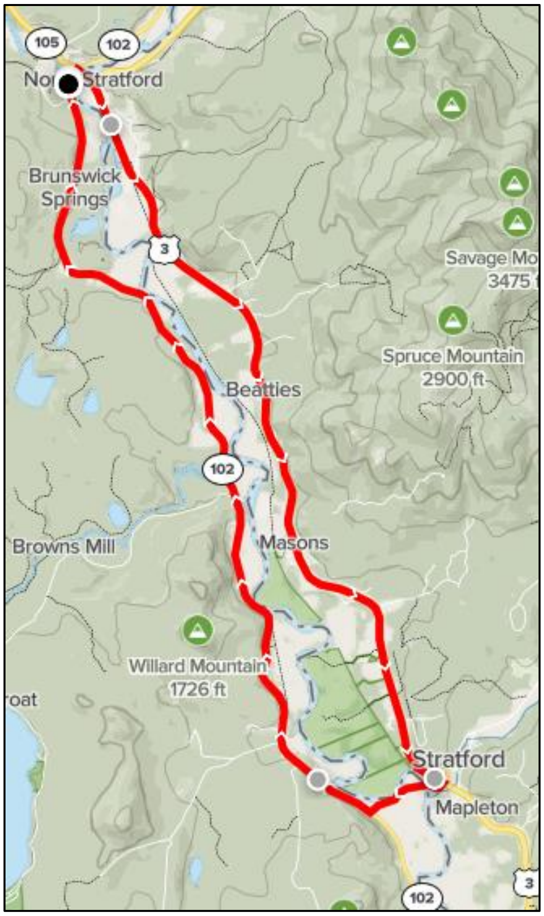


Figure 5-2: Vehicular Detour Route

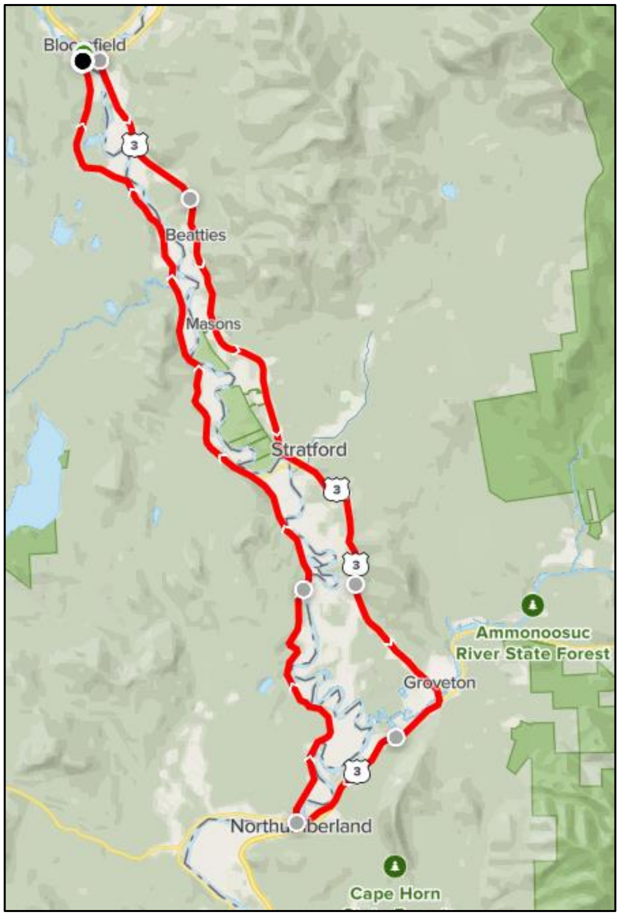


Figure 5-1: Truck Detour Route

5.2 Traffic Option 2 – Temporary Bridge

A temporary roadway bridge would include the construction of small concrete abutments and a temporary superstructure. The temporary bridge would be a single lane bridge with alternating one way traffic, and could be located on either side of the structure. A two way temporary bridge would substantially increase temporary impacts and is not warranted for the traffic volumes seen at this location. Load postings may be necessary on the existing structure prior to construction of the temporary bridge.

Advantages: A temporary bridge will maintain traffic flow through the construction site and eliminate the lengthy detour.

Disadvantages: A temporary bridge will add to the overall cost of the project, and will result in temporary right of way impacts, intersection impacts, and/or temporary wetlands impacts.

Given the length of the detour for this project area, the cost of a temporary bridge is warranted. Three locations have been considered as shown in the options below.

5.2.1 Upstream Temporary Bridge

This alternative consists of building a temporary bridge upstream of the current structure prior to closing the truss. Locating the bridge on the upstream side will substantially impact the parking area for the trail and the intersection with Patnaude Road. The intersection poses a substantial challenge given the grade of Patnaude road, and may not produce a geometrically favorable driving condition for motorists. A 3-way stop condition with a 25mph speed limit may be required at this intersection. Advisory speed plaques attached to parent warning signs may allow for the elimination of reduced speeds. If reduced speeds are required than additional approvals may be required for proper enforcement. Additionally, potential support of slopes at the southern end of the intersection may be required to direct traffic west of the work zone. Trail parking would be closed for the duration of construction. Relocating utilities is required for this alternative.

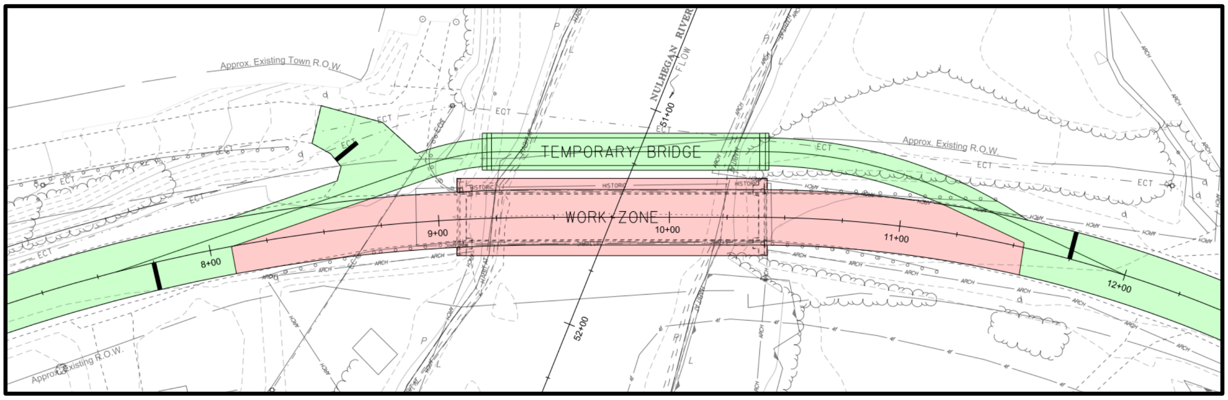


Figure 5-3: Upstream Temporary Bridge

5.2.2 Downstream Temporary Bridge

The available right of way on the downstream side is wider, however additional temporary wetlands impacts would be realized if that option was chosen. Temporary right of way takings would be required for slopework for both properties on the east side of the crossing, as the elevation drop from the roadway to the river's edge is about 10 feet. Placing the bridge on the downstream side significantly improves the roadway geometry at the intersection and may allow for trail parking. This should be investigated further in the design phases for safety purposes.

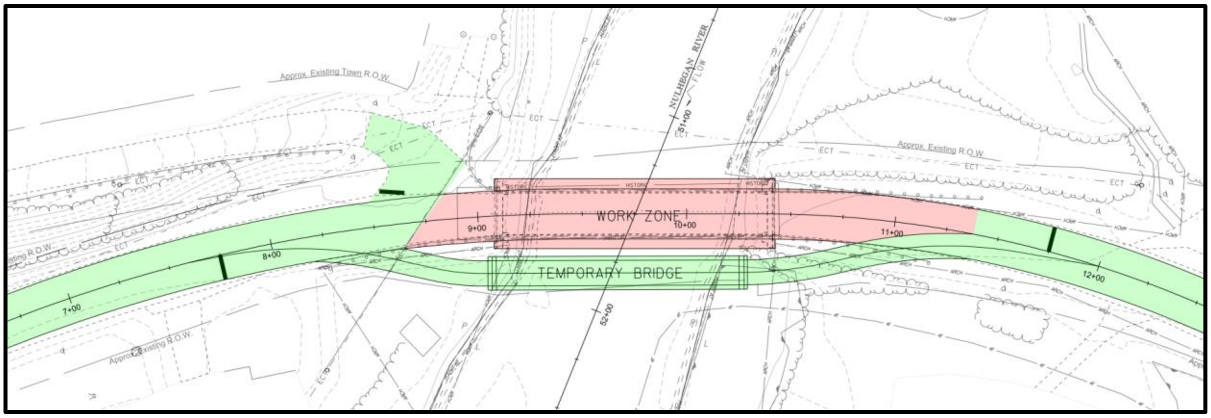


Figure 5-4: Downstream Temporary Bridge

5.2.3 Temporary Bridge on Existing Truss Bridge Abutments

This alternative would require a short duration road closure to remove the existing truss bridge and install the temporary bridge on the downstream end of the existing abutments. This alternative decreases impacts to adjacent privately owned properties and utilizes a small portion of the existing structure to reduce earthworks. This option would require the replacement bridge to be built off alignment, and can be explored during design phases if an off alignment bridge option is selected.

Advantages: This option reduces earthworks and temporary supports by utilizing existing bridge abutments, and maintains one way traffic on its approximate existing alignment during construction, increasing the safety to the traveling public with a familiar route through the work zone.

Disadvantages: Forces the replacement structure to be constructed off alignment, increasing permanent impacts.

6 Alternative Analysis

6.1 No Action (Alternative 1)

This alternative would leave the existing structure in place without any major repairs. This is not a viable alternative, as the deterioration in the end bay has progressed enough that bridge posting and ultimate closure would occur over the next several years. This is in direct opposition to the purpose and need at this project area. Therefore this option is not included in the assessment matrices, and a cost estimate is not provided since there are no direct costs for this alternative.

6.2 Rehabilitate Existing Truss Bridge (Alternative 2)

This alternative leaves the existing historic structure in place with its current width, with bearing replacement and end bay floor system replacement at the expansion end, repairs of the bottom chord and gusset plates, as well as rivet replacement with high strength bolts in gusset connections, and a deck replacement. This alternative will allow the existing structure to remain, but would not solve the narrow width issues expressed as a community need at the local concerns meeting. This alternative also would require the existing bridge to be cleaned and painted, with the expectation that the existing paint is lead based paint requiring appropriate mitigation procedures.

The rehabilitated structure would be designed to safely carry the HS20 vehicle. Full HL-93 level repairs are not recommended as this would result in excessive repair requirements, and the traffic volumes and geometry of the bridge do not realistically result in a condition where the bridge would ever be loaded with full lane load and trucks in both lanes simultaneously.

This alternative produces the lowest permanent impacts in all categories, however temporary impacts will still be realized as a temporary bridge will be required while repairs are being completed.

6.3 Widen and Strengthen Existing Truss Bridge (Alternative 2b)

Given the historic status of this crossing, widening of the existing bridge should be considered. Widening can take two forms, both of which would require substantial strengthening of the trusses to accommodate:

1) Cantilever a path to the outside of one of the trusses for snowmobile use.
2) Widen the interior opening by moving the truss outward and replacing all secondary members and the floor system.

Both of these alternatives are impractical given the current condition of the existing trusses. Substantial additional costs would be realized for either approach for steel framing and truss strengthening upgrades to the structure. A cantilevered path, while requiring less framing to achieve, would not solve the narrow width issues for maintenance / snow removal. Widening the truss would require completely replacing all floorbeams, top struts, portal frames, top and bottom lateral bracing members, and an additional stringer, as well as strengthening of the truss. For these reasons this alternative is not developed further, and will not be included in the comparison matrices.

6.4 Full Replacement on Alignment (Alternative 3)

This alternative consists of removing the existing structure and building a new structure in approximately the same footprint as the existing bridge. The footprint will be increased to capture the required additional width to bring the crossing up to current standards, but is not anticipated to exceed the right-of-way boundaries. The proposed structure is recommended to be single span steel composite plate girder bridge spanning approximately 135’-0”. Small shifts in the alignment are recommended to improve the existing broken back curve alignment.

The proposed cross section for both this alternative and alternative 4 is shown below in Table 3-1, which shows the addition of a 10’ wide shoulder to allow for snowmobile grooming equipment in the winter to allow passage of snowmobiles outside of the travel way width. Alternative asphalt mixes may be utilized to accommodate the heavy wear caused by snowmobile skis and studded tracks.

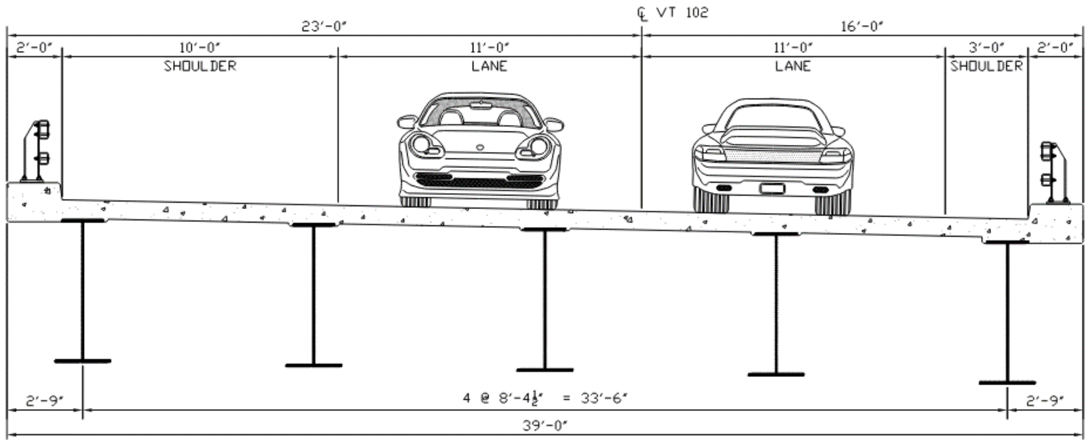


Figure 6-1 - Proposed Cross Section

6.5 Full Replacement off Alignment (Alternative 4)

This alternative consists of building the permanent replacement bridge off alignment from the existing structure, utilizing the existing truss bridge to limit closure windows. While this alternative may provide the option of convenience to the traveling public, the presence of the intersection with Patnaude Road and its steep rise away from the intersection would result in substantial approach work, intersection reconfiguration, and a profile rise on Route 102.

In order to limit these impacts a curved structure with a fairly tight radius (approximately 500 feet) would be required, complicating the design, increasing the required span length to maintain bankfull width requirements, and increasing the overall cost of the structure. Utility coordination would also be substantial for this alternative, as the current utilities running along the upstream side of VT102 would require substantial reconfiguration.

Moving the replacement structure to the downstream side of the existing bridge would require taking the entirety of the residence at the southeast corner of the project area, and is assumed to be a non-viable alternative.

6.6 Alternatives Matrix

Given the structure condition and the purpose and need statement for this project area, the no action alternative (1) and the widening alternative (2b) are omitted from the comparison tables as they are considered non-viable options.

Table 6-1: Risk Assessment Matrix

Item \ Alternative:	2 Rehabilitate Truss	3 Replace On Alignment	4 Replace Off Alignment
Meets Purpose & Need?	No	Yes	Yes
Traffic Impacts	High	High	Very High (Potential closures)
Traffic Maintenance	Temporary Bridge	Temporary Bridge	Temporary Bridge with detour during approach / intersection work
Environmental Impacts	Lead Paint Removal, Temporary Bridge Impacts	Temporary Bridge Impacts & Wider final bridge footprint	Temporary Bridge Impacts and permanent final bridge impacts
Historic Impacts	Minimal Impacts (Repairs Visible)	Adverse Effect (Truss Removed)	Adverse Effect (Truss Removed)
ROW Risk	Low	Low	Extreme
Construction Duration	1 Construction Season	1 Construction Season	Two Construction Seasons (1 for bridge, 1 for approaches)
Construction Risk	Very High	Low	Moderate
Roadway Approach Impacts	Low	Low	High

Table 6-2: Cost and Selection Matrix

Item \ Alternative:	**2** **Rehabilitate Truss**	**3** **Replace On Alignment**	**4** **Replace Off Alignment**
Meets Purpose & Need?	No	Yes	Yes
Bridge Cost	\$3.5 Million [1]	\$5.5 Million	\$6.5 Million
Roadway Cost	\$55,000	\$100,000	\$750,000
Traffic Control	*\$75,000 (temporary signals, signage, message boards)*		
Temporary Bridge and Related Items	*\$500,000*	*\$500,000*	*\$300,000* [2]
ROW Cost	\$3,000 [3]	\$3,000 [3]	\$5000 [4]
Total	\$4.1 Million	\$6.15 Million	\$7.55 Million
Risk Summary	Moderate	Lowest	Highest
Recommendation	***Not Recommended*** *Does not meet the purpose and need for the project area*	**Recommended**	***Not Recommended*** *High risk level for ROW, Environmental Impacts, and Roadway Impacts*

**Notes:*

1) Bridge costs reported are capital costs. Life cycle costs for the truss bridge will be measurably higher than replacement options given the need to maintain, clean, paint, and strengthen the truss as it continues to deteriorate over time.

2) If geometrically feasible, the off alignment structure may be able to utilize the existing crossing as opposed to a temporary bridge. If not feasible, savings may be realized by placing a temporary bridge on the eastern side of the existing truss bridge abutments, decreasing the overall cost of the temporary crossing.

2) Right of Way acquisitions for options 1 and 2 would be temporary impacts.

3) Right of Way Impacts for option 3 would be permanent impacts

7 Conclusions and Recommendations

The recommended solution at this site is to remove the existing trusses and replace the bridge with a new conventional steel girder bridge. Rehabilitation of the trusses would preserve the historic structure, however no rehabilitation scenario will present a practical solution that meets the purpose and need of this project, which focuses on providing a safe and maintainable bridge width. The off alignment solution will result in substantial cost increases and schedule disruptions to the general public in order to complete substantial modifications to the bridge approaches, and may not be geometrically feasible to meet the requirements of the intersection with Patnaude Road.

The temporary bridge is recommended to be placed on the downstream side of the truss to decrease impacts to the intersection and the trail access 4(f) resource area. This location will utilize the wider available right of way, and will also allow for the replacement structure to be shifted slightly upstream as needed to address horizontal curve geometry.

APPENDIX

A

Resource Maps and Memos

A.1 – Preliminary Hydraulics

A.2 – Traffic Memo

A.3 – Crash Report

A.4 – Hazardous Site Map

A.5 – Stormwater Resource ID

A.6 – River Corridor Map

A.7 – Utility Report

State of Vermont
Structures and Hydraulics Section
Barre City Place
219 North Main Street, Barre, VT 05641
vtrans.vermont.gov

[phone] 802-595-6493

Agency of Transportation

TO: Laura Stone, Structures, Scoping Engineer

CC: Nick Wark, Hydraulics Engineer

FROM: Christian Boisvert, Hydraulics Project Engineer

DATE: February 10, 2022

SUBJECT: Bloomfield BF 0271(27), pin#21B028
Bloomfield, VT-102, Br9, Nulhegan River
Coordinates: 44.751463, -71.633520

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

No site visit was performed as a part of this study. However, the hydraulics unit met with ANR to discuss bankfull width (BFW) requirements for this site. In an email on 11/5/21, ANR indicated a minimum span of 110-feet should be used to span BFW. ANR also mentioned that if a replacement bridge is designed to be skewed then the span will need to be increased accordingly.

Bridge 9 is located within a FEMA Special Flood Hazard Area (SFHA) Zone AE without Base Flood Elevations.

VT-102 is a major collector. Therefore, Design Storm Flow is 2% AEP (Q50).

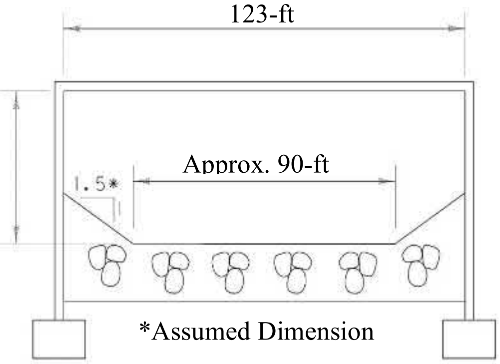
The following was analyzed:

Existing Conditions: Single Span Steel Through Truss

- 123-foot hydraulic clear span with a low chord elevation of 895.5 feet
- There is no freeboard at the 2% and 1% AEPs.
- Some roadway overtopping occurs approximately 200 feet north of the structure at the 1% design AEP.
- The existing structure does not meet current standards of the VTrans Hydraulic Manual. However, it does meet state stream equilibrium standards for bankfull width.

Proposed Bridge Replacement: Single Span Bridge

- Maintain the existing 123-foot hydraulic clear span with sloping stone fill
- A minimum required low beam elevation of 897.4 feet
- There is approximately 1.05 feet of freeboard at the 2% AEP and 0.09 feet of freeboard at the 1% AEP.
- Roadway overtopping still occurs as described in the existing conditions above due to a low point in the road.



- Does not increase the 100-year base flood elevations
- Assumes no changes to the existing structure alignment/skew

Stone Fill, Type III should be used for bank armoring and to protect any disturbed channel banks or roadway slopes. A final scour countermeasure design will be performed during final design.

Using a D50 of 150 mm, a preliminary scour analysis indicated no contraction scour at the design and check scour events. Pressure flow conditions may occur at the 0.5% AEP (check scour event), however a scour depth of ‘zero’ feet of scour was determined for this condition. For preliminary design assume that the bottom of footing elevation is 6-ft below the streambed or founded on ledge. A final scour analysis will be performed during the final design phase.

Other similar sized structures could be considered for this site. If another alternative is considered, coordinate with the Hydraulics Unit to perform additionally analyses.

Please contact us with any questions, or to check substructure configuration scenarios.

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

HIGHWAY DIVISION
TRAFFIC RESEARCH

TO: Daniel Beard, Structures Technician

FROM: Maureen Carr**,** Traffic Analysis Engineer
Colin Philbrook, Traffic Analysis Technician

DATE: March 16, 2021

RE: Bloomfield BF 0271(27)
VT 102- MM 0.1740 (BR #9)

As requested on March 3, 2021, please find complete estimated traffic data on the above project in the town of Bloomfield. The data for the years 2025, 2045 and 2065 is included in the table below.

If you have any questions, or if further information is needed, please call at 522-4089.

TRAFFIC DATA	2025	2045	2065
AADT	480	530	~
DHV	90	100	~
ADTT	40	60	~
%T	7.4	9.9	~
%D	58	58	~
FLEXIBLE ESAL	~	**2025 ~ 2045** 325,000	**2025 ~ 2065** 699,000

CC: Data Analysis Files

Vermont Agency of Transportation

Bridge 9 is located at MM 0.17

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

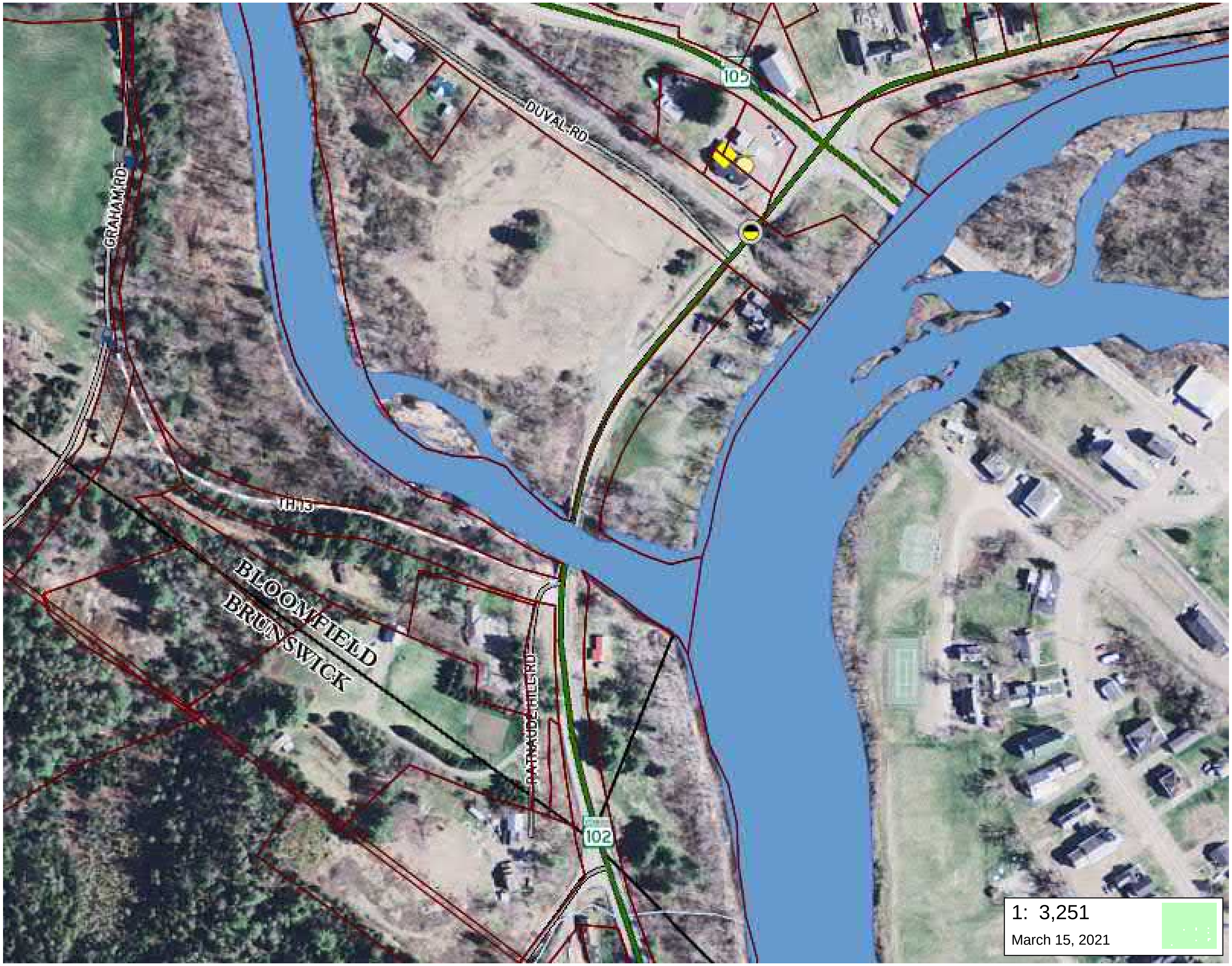
*	Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
	VTVSP0800/15B203776	Maidstone	0.50	11/01/2015	11:39	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0800/14B202407	Maidstone	1.15	07/26/2014	22:00	Clear	No improper driving	Single Vehicle Crash	0	0	0	S	SH
	VTVSP0800/16B204086	Maidstone	2.02	10/21/2016	05:47	Cloudy	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	SH State Owned
	VT0050000/17EXC0291	Maidstone	3.00	09/08/2017	12:00	Cloudy	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	SH State Owned
	VT0050000/18EXC0265	Maidstone	3.02	08/06/2018	14:37	Clear	Driving too fast for conditions	Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^- -	1	0	0	S	SH State Owned
	VTVSP0800/17A503764	Maidstone	3.04	09/16/2017	13:10	Clear	Failure to keep in proper lane, No improper driving	Head On	2	1	0	S, N	SH State Owned
	VTVSP0800/15B204005	Maidstone	3.24	11/17/2015	18:50	Clear	Inattention	Single Vehicle Crash	1	0	0	S	SH
	VT0050000/14EXC0246	Maidstone	3.36	08/11/2014	12:00	Clear	No improper driving	Single Vehicle Crash	1	0	0	S	SH
	VTVSP0800/16B201830	Maidstone	5.12	05/27/2016	23:42	Clear	Fatigued, asleep, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	SH State Owned
	VTVSP0800/15B202300	Maidstone	5.13	07/12/2015	23:59	Rain	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, No improper driving	Single Vehicle Crash	1	0	0	N	SH
	VT0050000/14EXC0121	Brunswick	2.96	05/07/2014	17:34	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	0	1	0	N	SH
	VT0050000/0314	Brunswick	4.04	10/10/2017	12:50	Clear	Exceeded authorized speed limit, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	0	N	SH State Owned
	VTVSP0800/14B202817	Brunswick	6.74	08/29/2014	17:59	Clear	Not Distracted	Single Vehicle Crash	2	0	0	S	SH
	VTVSP0800/18A501303	Bloomfield	0.39	04/11/2018	17:26	Clear	Failed to yield right of way, Exceeded authorized speed limit	Single Vehicle Crash	1	0	0	E	SH State Owned
	VTVSP0800/17A502664	Bloomfield	0.50	07/02/2017	18:45	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Angle Broadside -->v--	3	0	0	N, S	SH State Owned
	VTVSP0800/14B200956	Bloomfield	3.00	03/27/2014	11:15	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	1	0	0	W, S	SH
	VTVSP0800/14B200388	Bloomfield	4.83	02/02/2014	03:45	Clear	Fatigued, asleep	Single Vehicle Crash	0	0	0	N	SH
	VT0050000/18EXC0205	Bloomfield	5.04	06/26/2018	09:30	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Head On	0	0	0	N	SH State Owned
	VTVSP0800/15B203319	Lemington	2.71	09/28/2015	12:15	Clear	Driving too fast for conditions	Single Vehicle Crash	0	1	0	N	SH
	VTVSP0800/16B201264	Lemington	6.86	04/16/2016	00:00	Clear	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	S	SH State Owned

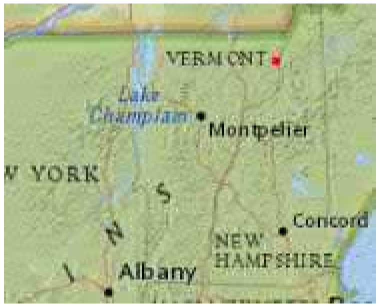
**Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.*

Hazard Waste Urban Soils Map

Vermont Agency of Natural Resources

vermont.gov





LEGEND

Landfills

- ▨ OPERATING
- ▨ CLOSED

Land Use Restrictions

- ▨ Class IV GW Reclass
- ▨ Class VI GW Reclass
- ▨ Deed Restriction
- ▨ Easement
- ▨ Land Record Notice
- ■ Other

- ▨ Hazardous Site
- ▨ Hazardous Waste Generators
- ▨ Brownfields
- ▨ Salvage Yard
- ▨ Aboveground Storage Tank
- ▨ Underground Storage Tank (w
- ● Dry Cleaner
- ▨ Parcels (standardized)
- ▨ River Area
- ▨ VTRANS State and Town Lonç
- ▨ VTRANS State Short Structure
- ▨ Town Bridge
- ▨ Town Culvert

Roads

- ▨ Interstate
- ▨ US Highway; 1
- ■ State Highway
- Town Highway (Class 1)

1: 3,251

March 15, 2021

NOTES

Map created using ANR's Natural Resources Atlas

165.0 0 82.00 165.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

1" = 271 Ft. 1cm = 33 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

VERMONT

State of Vermont
Environmental Section
219 North Main Street
Barre, Vermont 05641
Vtrans.vermont.gov

Agency of Transportation

[phone] 802-595-9143

To: Julie Ann Held, VTrans Environmental Specialist
From: Jon Armstrong, Stormwater Management Engineer
Date: July 9, 2021
Subject: Bloomfield BF 0271(27) Stormwater Resource ID Review

Project Description: I have reviewed the project area for stormwater related regulatory and water quality concerns. This project involves Br.9 (currently an old metal truss bridge) on VT102 over the Nulhegan River in the town of Bloomfield. The scope of the project has not yet been determined, but likely involves repair/ rehabilitation of the structure.

My evaluation has included the review of existing imagery and mapping (ANR Natural Resource Atlas, VTrans Operational Stormwater Permits, Google maps) to capture existing stormwater features and existing drainage.

Regulatory Considerations
It is not anticipated that an Operational Stormwater permit will be likely required for this project unless substantial roadway work is involved. However, should construction earth disturbance push the area of disturbance above 1 acre, that would trigger the need for a construction SW permit and also require the project to follow the TS4 "Gap" procedure and incorporate feasible post construction treatment measures. There are no existing stormwater permits near the site area. No formal stormwater treatment is located within the ROW.

The following are not noteworthy stormwater regulatory concerns at this time.

> This project site is not within a designated groundwater public water supply source protection area. The project site is not located within a stormwater impaired (303(d) list) watershed.

Existing Drainage
The project area largely consists of sheet flow off the paved roadway over the road embankment into vegetated areas without clearly defined concentrated drainage swales.

Design Considerations
To the extent feasible, sheet flow through vegetation should be encouraged with the design. Soils in the project area are shown as hydrologic soil group A, which are generally well suited for infiltration practices.

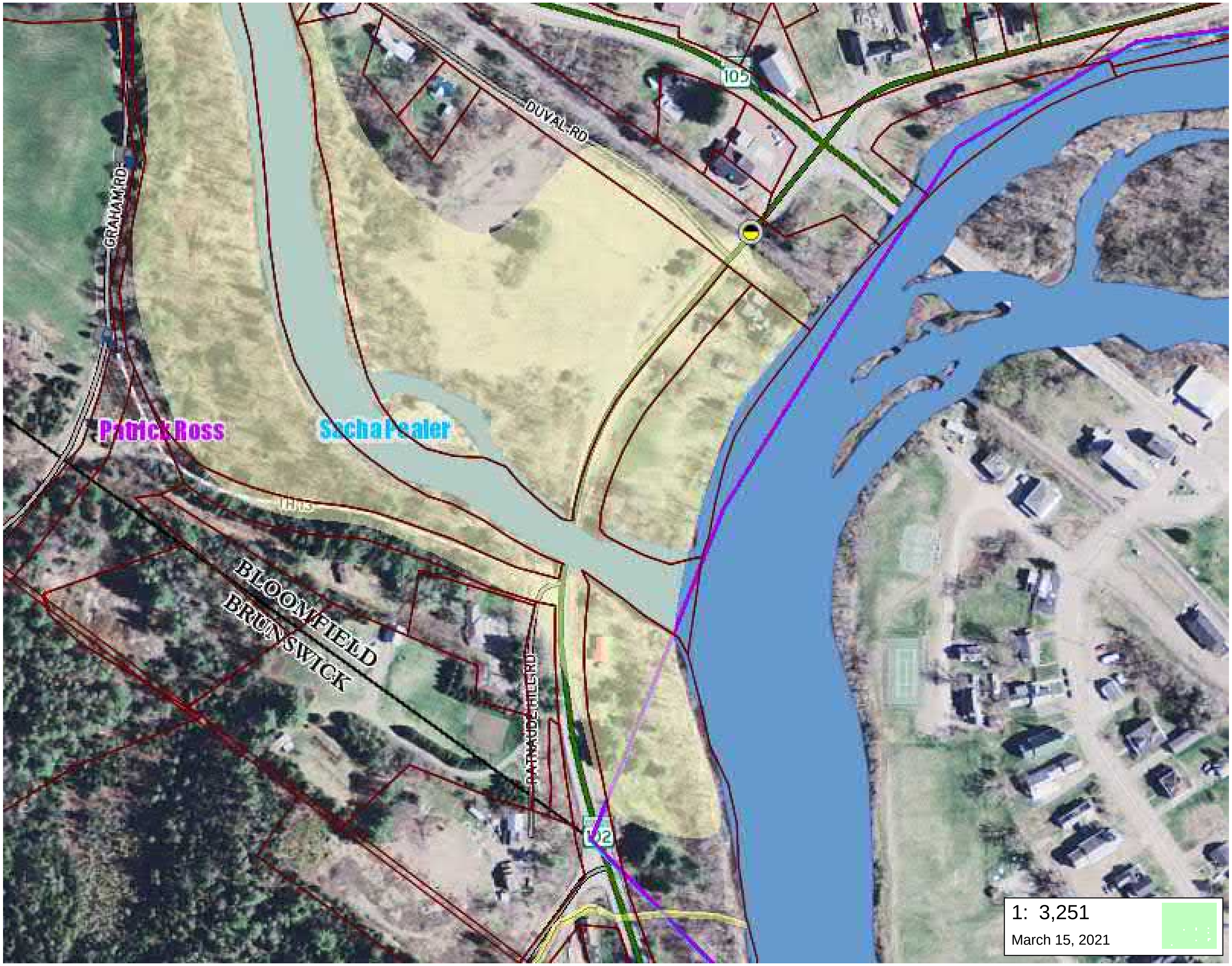
Bloomfield BF 0271(27)

Br9 on VT102

Floodplains River Corridor Map

Vermont Agency of Natural Resources

vermont.gov



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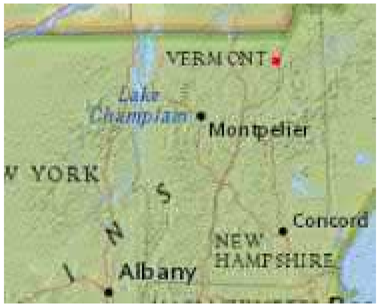

LEGEND

- ■ DFIRM X-Sections
- ■ DFIRM - Letter of Map Revisio
- ■ DFIRM Panels
- ■ DFIRM Floodways
- Flood Hazard Areas (Only FEM
  - ■ AE (1-percent annual chance flood
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- ■ River Corridors (Aug 27, 2019)
- ■ .5 - 2 sqmi.
- ■ .25-.5 sqmi.
- ■ River Management Engineer D
- ■ Floodplain Manager Regions
- ■ Parcels (standardized)
- ■ River Area
- ■ VTRANS State and Town Long
- ■ VTRANS State Short Structure
- ■ Town Bridge
- ■ Town Culvert
- Roads
  - ■ Interstate
  - ■ US Highway; 1
  - ■ State Highway
  - ■ Town Highway (Class 1)
  - ■ Town Highway (Class 2,3)
  - ■ Town Highway (Class 4)

165.0 0 82.00 165.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

1" = 271 Ft. 1cm = 33 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

NOTES

Map created using ANR's Natural Resources Atlas

Bloomfield BF 0271(27)
Existing Utilities within Project Limits Report
Bridge Number 9, VT Route 102, Bloomfield

AERIAL

Vermont Electric Cooperative
FirstLight Fiber
Consolidated Communication

UNDERGROUND

No known underground utilities within the project area

MUNICIPAL

No known municipal utilities within the project area

APPENDIX

B

Architectural Resource Identification Survey

VERMONT

Vermont Agency of Transportation
Project Delivery Bureau - Environmental Section
219 North Main Street
Barre, VT 05641

To: Lee Goldstein, Environmental Specialist

From: Judith Williams Ehrlich, VTrans Historic Preservation Officer

Date: July 9, 2021

Subject: Historic Resource Identification for Bloomfield BF 0271(27)

I have completed a resource identification (ID) for Bloomfield BF 0271(27). At this time, the project is expected to include repairs to the existing Bridge No. 9, but the full scope of the project has not been determined.

This Resource Identification effort is being undertaken to provide information to the VTrans designers working on a proposed improvement project. Toward that end, VTrans Cultural Resources staff have identified potential resources within a broad preliminary Area of Potential Effect to ensure the designers are aware of all cultural resources that could possibly be affected by a project. Once the project is defined at the Conceptual Design phase, Cultural Resources staff will be able to determine a formal Area of Potential Effect for purposes of Section 106 and 22 VSA § 14.

I requested WSP USA Inc. complete a Resource Identification of Bridge No. 9 on Vermont Route 102 in Bloomfield. The consultant recommended that the bridge is historic, and I concur with this recommendation. The bridge is already listed on the Vermont State Register of Historic Places and is eligible for listing on the National Register. As a historic resource, Bridge 9 is also considered a Section 4(f) resource.

WSP also identified a second 4(f) resource in the project area: the Northern Forest Canoe Trail Access and Parking Lot.

Please see the report titled, "Architectural Resource Identification Survey Bloomfield Bridge No. 9, VT 102, BF 0271(27)" and dated June 11, 2021.

Architectural Resource Identification Survey
Bloomfield Bridge No. 9, VT Route 102
BF 0271(27)

Bloomfield, Essex County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

May 26, 2021

ARCHITECTURAL RESOURCE IDENTIFICATION SURVEY
BLOOMFIELD BRIDGE NO. 9, VT ROUTE 102
BF 0271(27)

Bloomfield, Essex County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

Camilla McDonald and Amber Courselle

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

May 26, 2021

Abstract

On behalf of the Vermont Agency of Transportation (VTrans), Montpelier, WSP USA Inc. (WSP) of Troy, New York, completed a historic architectural resource identification survey and effects assessment for the proposed improvements to Bloomfield Bridge No. 9, VT Route 102, Essex County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to take into account the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The area of potential effect (APE) for the survey extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches.

The goal of the survey was to identify (1) historic architectural resources (properties) in the APE previously listed in the Vermont State Register of Historic Places/National Register of Historic Places (SRHP/NRHP) (the criteria for both are identical), and (2) previously unsurveyed historic architectural resources in the APE that may be eligible for listing in the SRHP/NRHP. The survey also evaluated the potential effects of the project on viewsheds associated with any properties listed in or eligible for the SRHP/NRHP. As the project is still in the planning stages and may take several years to be implemented, WSP identified properties that meet the 45-year age mark for NRHP evaluation. The investigation included background research and fieldwork. Fieldwork took place in April 2021. The historic architectural investigations were undertaken in accordance with Act 250 (Title 10 of Vermont Statutes Annotated [VSA], Chapter 151); and Title 30, VSA Chapter 5, Section 248 (Public Service Board's Certificate of Public Good).

WSP identified two properties in the APE older than 45 years. One has been previously surveyed, the subject property, Bloomfield Bridge No. 9, which is listed in the SRHP/NRHP. The other property is a Section 4(f) resource, a public recreation area, the Northern Forest Canoe Trail Access and Parking Lot. It is WSP's opinion that the previously listed Bloomfield Bridge No. 9 should remain listed in the SRHP/NRHP.

It is WSP's opinion is that an intensive survey is not warranted at this time, as the project activities will be confined to the project right-of-way and will not alter the setting of any historic properties. Should project activities be expanded to include new sidewalks, increased road width, or improved intersections, an intensive survey may be warranted to identify all issues that may arise and to establish mitigation efforts that can be put in place to ensure the protection of the resources. This will allow VTrans to consider historic resources in planning the improvements to Bridge No. 9 and VT Route 102. As Bridge No. 9 is listed in the SRHP/NRHP, and any alterations will likely require further consultation with Vermont Division for Historic Preservation.

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I. Introduction

A. Project Description

On behalf of the Vermont Agency of Transportation (VTrans), Montpelier, WSP USA Inc. (WSP), of Troy, New York, completed a historic architectural resource identification survey and effects assessment for the proposed improvements to Bloomfield Bridge No. 9, VT Route 102, Essex County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to take into account the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge.

The project is located along VT 102 in the Town of Bloomfield, Essex County (Figure 1). The area of potential effect (APE) for the architectural survey and effects assessment extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches (Figure 2).

B. Objectives

The goal of the survey was to identify (1) historic architectural resources (properties) in the APE previously listed in the Vermont State Register of Historic Places/National Register of Historic Places (SRHP/NRHP) (the criteria for both are identical), and (2) previously unsurveyed historic architectural resources in the APE that may be eligible for listing in the SRHP/NRHP. The survey also evaluated the potential effects of the project on viewsheds associated with any historic resources listed in or eligible for the SRHP/NRHP. The investigation included background research and fieldwork. Fieldwork took place in April 2021.

Determinations of eligibility for the NRHP followed the guidelines and criteria established by the National Park Service (36 CFR 60.4). In 2001 the Vermont Division for Historic Preservation (VDHP) changed the Vermont SRHP criteria to be identical to the NRHP criteria, and all resources then listed in the Vermont SRHP were deemed eligible for the NRHP, creating a single class of historic properties and thereby streamlining the historic preservation permitting process in Vermont. As the project is still in the planning stages and may take several years to be implemented, WSP identified properties that meet the 45-year age mark for evaluation for the NRHP. The historic architectural investigations were undertaken in accordance with Act 250 (Title 10 of Vermont Statutes Annotated [VSA], Chapter 151); and Title 30 VSA Chapter 5, Section 248 (Public Service Board’s Certificate of Public Good), and followed VTrans (2000) guidelines.

This report contains six chapters. Following the introduction in Chapter I, Chapter II describes the survey’s methodology. Chapter III provides the historic context for the project vicinity. Chapter IV describes the survey results, and the conclusions appear in Chapter V. Chapter VI contains the references cited.

This investigation was conducted under the direction and supervision of WSP Senior Vice President Hope Luhman, PhD. Director of Historic Preservation Steven Bedford, PhD supervised the QA/QC process. WSP Historic Preservation Manager Camilla McDonald and Architectural Historian Amber Courselle conducted the research, and Ms. Courselle conducted the fieldwork. Ms. McDonald and Ms. Courselle wrote the report. Principal Draftsperson Jacqueline L. Horsford prepared the graphics, and Principal Editor Anne Moiseev edited the report.

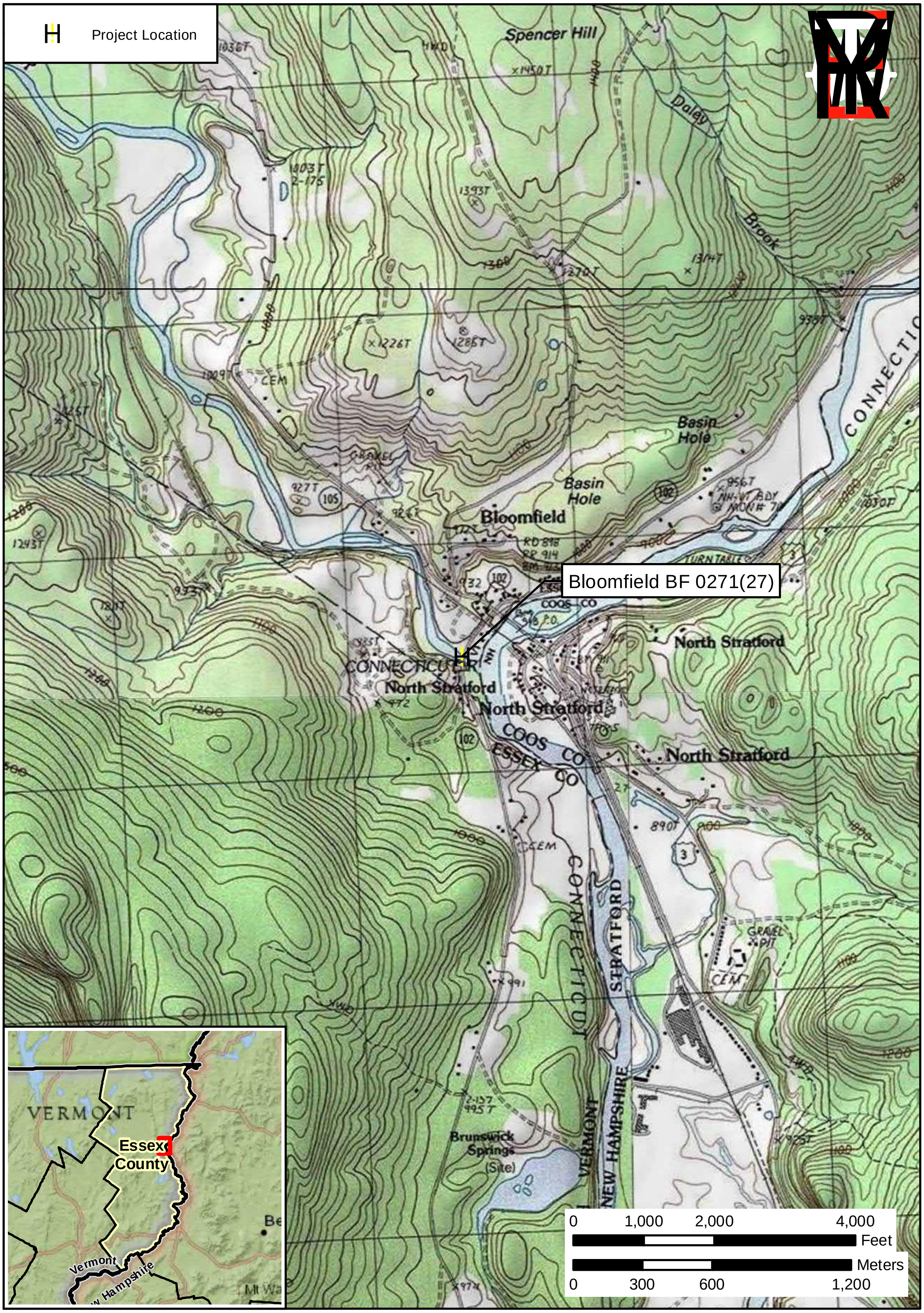

FIGURE 1: Location of Project BF 0271(27) (ESRI USA Topo Maps 2019)

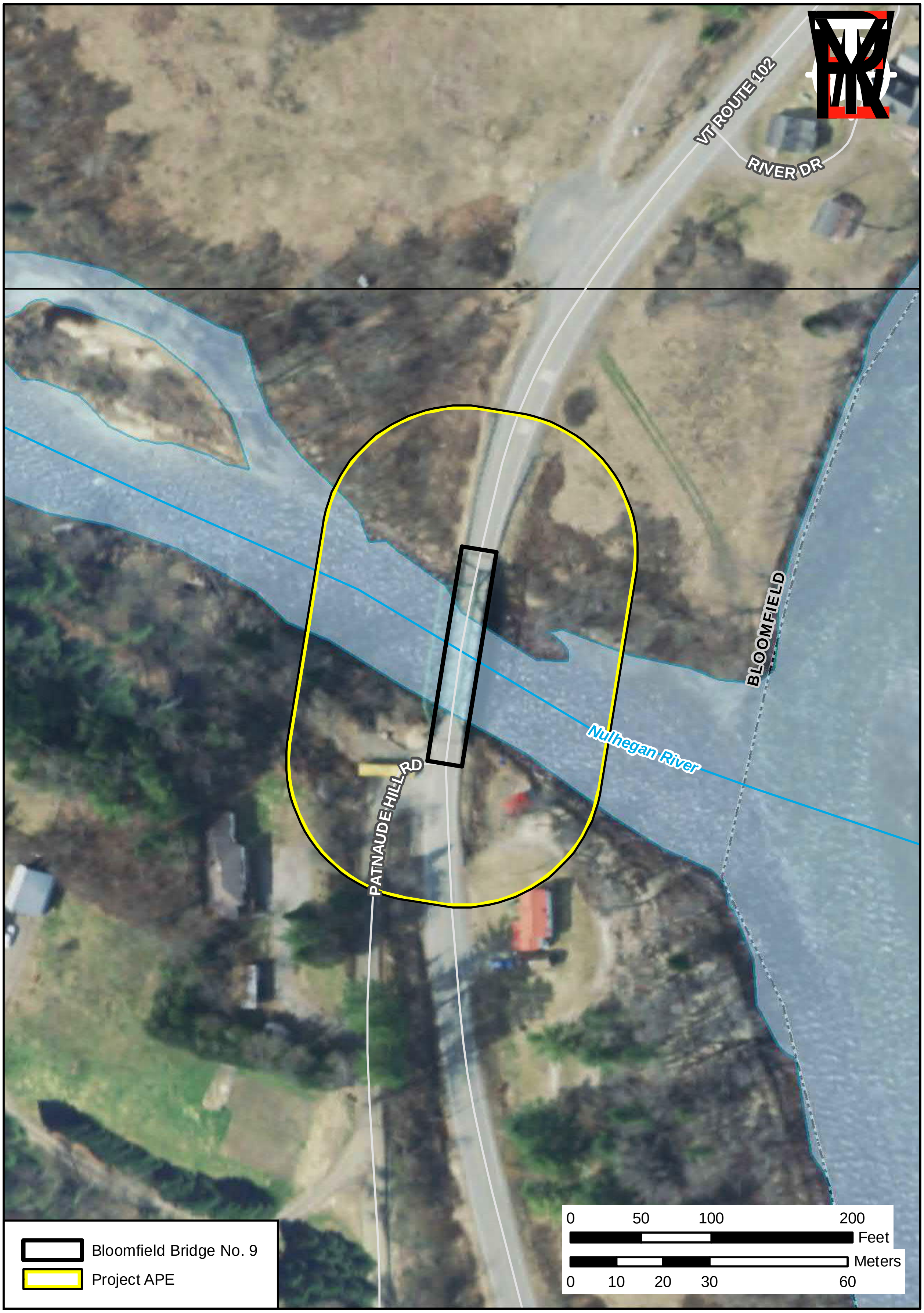

FIGURE 2: Project APE (VCGI 2018)

II. Methodology

WSP's primary task in the architectural resource identification survey and effects assessment was to identify historic architectural resources (properties) in the APE listed in or eligible for listing in the SRHP/NRHP. WSP reviewed site files at the VDHP, identifying documented resources in the APE that are already either listed in or eligible for listing. Location information on the identified properties was mapped, and nomination forms and eligibility determination data were copied for comparison against current conditions during the field survey. Available historic context data on the development of the community in the APE were gathered from VDHP files and other sources to assist in the evaluation of additional historic resources identified during the field survey.

During fieldwork WSP staff checked the current status of the historic properties identified during the site file check and previously unsurveyed properties that meet the 45-year age mark. WSP and collected information on each property's architectural and historical integrity and eligibility for continued listing in the NRHP. Each resource in the APE was documented through digital photographs and narrative field notes. Some properties were not visible from the public right-of-way, and those properties were examined through historical and current aerial photographs to determine their age. Results of the background research and field survey were analyzed to determine the NRHP eligibility of the identified architectural resource.

According to the NRHP criteria for evaluation, properties may be eligible for the NRHP if:

A. they are associated with events that have made a significant contribution to the broad patterns of our history; or

B. they are associated with the lives of significant persons in our past; or

C. they embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. they have yielded, or may be likely to yield, information important in history or prehistory (National Park Service 2002:7).

WSP's assessments of eligibility were further guided by the *Multiple Property Documentation for Agricultural Resources in Vermont* (VDHP 1991), which establishes standards of integrity for listing agricultural resources in Vermont in the SRHP/NRHP.

WSP also identified an adjacent property, Northern Forest Canoe Trail Access and Parking Lot, that is subject to Section 4(f) of the U.S. Department of Transportation Act of 1966, which stipulates that Department of Transportation (DOT) agencies may not approve the use of public recreation areas and NRHP-listed historic sites for federal DOT funded projects unless there is no feasible and prudent alternative and the action includes all possible mitigation of potential harm to the property. Construction at the bridge site, which is immediately adjacent to the parcel, may impact this 4(f) property.

III. Historic Context

A. Historical Overview of Northern Vermont

The first Euro-Americans to venture into the region that would become Vermont were trappers and hunters in the eighteenth century. Access to much of this area was impeded by mountains, and colonization was slow because the political situation was unsettled. Recurring hostilities between the British and French authorities initially inhibited settlers from making Vermont their home; however, even before the final surrender of the French to the British at Quebec in 1760, applications for land grants were being made by many parties.

The colony of Connecticut made the first land grants within what is now Vermont in the early eighteenth century, after Massachusetts, which had erroneously granted its own citizens 436 square kilometers (172 square miles) within the borders of Connecticut, transferred these land grants (the “equivalent lands”) to Connecticut. Connecticut immediately sold these lands to people from both Connecticut and Massachusetts, who in turn sold the land to prospective settlers at a profit. After the final resolution of the Massachusetts-New Hampshire territorial disputes in 1740, these lands became New Hampshire territory. Nevertheless, most of the region’s settlers continued to come from Connecticut and Massachusetts (Tosi 1948:48-49). European settlement was slow in all parts of today’s Vermont until 1761, when Benning Wentworth, governor of New Hampshire, claimed the lands for New Hampshire and began establishing illegal land grants. These territories became the State of Vermont in 1791.

Prior to 1830, subsistence farming was the dominant economic activity. The earliest economic activity outside the household was the sale of potash and lumber obtained from land clearing. Potash, owing to its high market value and use in the production of glass, became the only inspected product in Vermont at that time (Elliott 1977:18). Small manufacturers, including gristmills and sawmills, sprang up throughout the region to process locally grown materials. Distilleries (using rye and corn) and starch factories (using potatoes) also developed. Taverns and general stores opened to cater to the local populace in nearly every town. By 1830 the region’s agricultural economy was concentrated on the cultivation of potatoes and grains, some of which was shipped to Eastern and Southern markets. Wheat was initially an important crop, so much so that it was used as money by the earliest settlers. As transportation increased to wider markets, farmers focused more on a smaller number of specialized products.

Apple growing in particular became an important part of the Vermont economy. John McIntosh, born in 1776, eventually began selling his apple seedlings to settlers, and the McIntosh apple became the dominant apple in Vermont because of its acclimation to cool nights and warm, sunny days. In 1899 Vermont boasted 1,675,131 apple trees and produced 1,176,822 bushels of apples. Commercial apple production in Vermont continued into the twentieth century but declined owing to the lack of modernized facilities. The introduction of the automobile boosted apple production again; in 1955 Vermont produced over 1,100,000 bushels, and in the 1980s roughly 79 commercial growers on 3,500 bearing acres of land produced roughly 1.25 million bushels annually (VDHP 1990).

By the late eighteenth century some industry had begun to develop in Vermont. Lumbering in the oak forests brought much-needed money into the state and also cleared land for farming (Stratton 1980:250). Large fallen trees were ideal for making masts for ships and were usually shipped to Quebec. Production of hats was also an early trade, which used local wool and beaver hides from trappers. Other early businesses included blacksmithing, brick making, and dyeing.

The developing livestock industry rapidly took over in Vermont as both cattle and horses thrived on the local grasslands and climate (Bearse 1968; Tosi 1948:58-59; VDHP 1990). During the early nineteenth century the Spanish Merino sheep, an outstanding wool producer easily adapted to rugged terrain and climate, arrived in Vermont. The self-sufficiency of the Vermont farmers diminished considerably as many turned to sheep farming for an alternative source of income almost to the complete exclusion of other agricultural products. The improved machinery and larger wool mills that were introduced around 1830 permitted Vermont farmers to produce more wool, and 33 wool factories were built in Vermont during that period. In addition to wool, raw cotton was imported into Vermont mills for processing (Meeks 1986; Tosi 1948:62).

Although some textile production occurred in fulling and cleansing mills, and later also carding mills, the production of textiles remained a household activity until about 1820. After about 1820 factories took over the production of textiles, and the number of fulling and carding mills increased by 200 percent (from 136 to 273) and 275 percent (from 87 to 234), respectively. By 1830 the home manufacture of textiles was almost non-existent. Since a typical textile mill required the labor of about nine or so workers, the mills typically sprang up where the workers lived. In many cases the wool factories were an outgrowth of earlier textile mills as the mills became suppliers for developing wool factories (Meeks 1986; Steponaitis 1975:43-50).

The breeding of wool sheep reached its peak in Vermont in the early 1840s, but by the end of the decade, the industry had begun to decline, partly the result of lower protective tariffs on imported wool and partly the result of competition from the West with its larger pastures, less costly grain, and better transportation following the opening of the Ohio and Pennsylvania canal systems (Tosi 1948:59-60; VDHP 1989b). The number of wool factories in Vermont decreased from 97 in the mid-1840s to 89 a decade later. In addition, the number of textile concerns in Vermont began to drop as the industry consolidated into fewer, larger firms using more efficient machinery and located along more traveled transportation routes. The number of mills fell from a peak of over 400 in the 1820s to only 75 in the early 1850s. The sheep industry revived briefly in the 1860s and immediately afterward, as the Civil War prompted a greater demand and higher prices for wool products because of the low availability of Southern cotton as well as the imposition of higher tariffs (Steponaitis 1975:60-67).

With the initial decline of the sheep and wool industry in the late 1840s, many farmers returned to breeding cattle, although not before mutton sheep slowly infiltrated many farms formerly devoted to wool-bearing sheep (VDHP 1989a:2). Dairy farming in Vermont and elsewhere in New England had been introduced by the 1840s (Barron 1980; Russell 1982). Dairying proved to be a protection against the fluctuating price of wool and allowed farmers to take advantage of expanding urban markets to the south. The introduction of dairy breeds to replace beef cattle was a slow and intermittent process. Barron (1980) believes that one reason farmers in Vermont were slow to switch from wool to dairy was problems with labor. The young of Vermont were moving out West and to the big cities, depopulating the countryside during the second half of the nineteenth century (discussed further below). Because sheep farming was far less labor-intensive, it remained a more efficient use of resources during this period even as prices for wool dropped. Dairy farming, on the other hand, was becoming more labor-intensive, and Barron (1980:333) estimates that because of technological changes, the labor demand for cows grew by 68 percent per cow between 1850 and 1910. As a result, since the available pool of labor was declining after the mid-nineteenth century, farmers were hesitant to make the switch from wool to dairy even though the wool market was unstable. It was not until the market for wool completely collapsed at the end of the century that the switch from sheep to cows became complete.

Up until the 1850s, only private dairying took place. As the industry became more widespread, cheese factories, and later creameries, were built to service entire dairying communities. The three staple crops for the mid-nineteenth century Vermont farmer became wool, butter, and maple sugar, and dairy farming dominated the agriculture of eastern Vermont after the Civil War (Bremer 1929:587; Tosi 1948:63). Butter and cheese were manufactured in centrally located factories, although up until 1900 almost 40 percent of manufactured dairy products were produced privately in the home for sale to a private clientele. The number of dairy cows in some Vermont counties reached a peak in 1900. By the close of the nineteenth century, however, the Vermont dairy farmer faced direct competition from the dairy industries of Ohio and Wisconsin, for whom the transport of perishable goods did not pose as great an obstacle after development of the railroads connected these states with the East. Dairying declined slowly until 1920, then rose sharply until 1930 (Tosi 1948:62-64). By the end of the twentieth century, however, the need for expensive equipment had put many small hill-country farmers out of business (VDHP 1989a).

The wool industry in Vermont changed in the late nineteenth century with the emergence of large town-based manufacturing firms (those employing more than 100 employees) in places such as Bennington, Winooski, Rutland, Johnson, and Fair Haven. Vermont still enjoyed prominence in the manufacture of wool and knit goods during the 1880s; however, the state's industry declined steadily through the first half of the twentieth century despite a brief rise during the World War II years (Steponaitis 1975:118; VDHP 1991:10-11). Mills gradually closed after the end of the nineteenth century as they became unable to compete with mills and factories in the South (Barron 1980:326).

The population decline during the second half of the nineteenth century produced one of the greatest historical effects on the landscape. As the United States expanded, new opportunities arose and young people moved to the West. Many of the Vermont's rural youth left for jobs in the growing big cities, although Barron (1980) describes contemporary writing of abandoned farms as "hyperbole," writing that agriculture in New England did not collapse after the Civil War but only experienced stagnation. He points out that throughout Vermont two-thirds of male household heads remained farmers/farm laborers throughout the second half of the nineteenth century, 90 percent of farms were family-owned, and two-thirds of the land remained agricultural land. In short, the number, size, and location of farms throughout Vermont remained stable. In addition, the output of wool, butter, and maple sugar from these farms remained constant into the late 1890s. The number of tradesmen also remained constant, although a number of mills and factories were replaced because they could not compete with those in the South (Barron 1980:326). Vermont farmers may have been able to survive the slow attrition of labor throughout the second half of the nineteenth century, but the lack of available labor ultimately prevented them from adapting to more economically advantageous forms of farming.

B. Town of Bloomfield

The Town of Bloomfield is located in the north half of Essex County, in the northeast portion of the state almost 70 miles northeast of Montpelier. The land that comprises Essex County was formally a component of New Hampshire, and in 1770 it was also claimed by New York (Benton 1886). Between 1777 and 1799, the land that eventually became Essex County had been included in Cumberland, Orange, and Caledonia counties in Vermont as smaller counties were planned following the organization of the Vermont Republic. Essex County was officially organized in 1800, following the formal establishment of the state in 1791 (Benton 1886).

The Town of Bloomfield was chartered in 1762 as Minehead, named for a town in England. The name was changed to Bloomfield by the Vermont legislature in 1830. Settlement in the Town of Bloomfield was concentrated in the east half along the rivers. The Village of Bloomfield grew slowly, with a population of only 150 by 1830; settlement was concentrated at the confluence of the Connecticut and Nulhegan rivers, perhaps because the Village of North Stafford was directly across the Connecticut River in New Hampshire. The Grand Trunk Railroad had been constructed along the south side of the Village of Bloomfield by 1853, and the Baldwin Lumber mill was the principal employer (Hemenway 1867:951). The village also contained a starch factory and blacksmith shop, and the town was home to four additional sawmills and two schoolhouses (Walling 1859). By the late nineteenth century the east half of the township appears to have reached its current extent of settlement. At that time the township had a school, two stores, a boarding house, an ox and horse stable, and a lumber mill and sawmill with a dam and mill race (Beers 1878) (Figure 3).

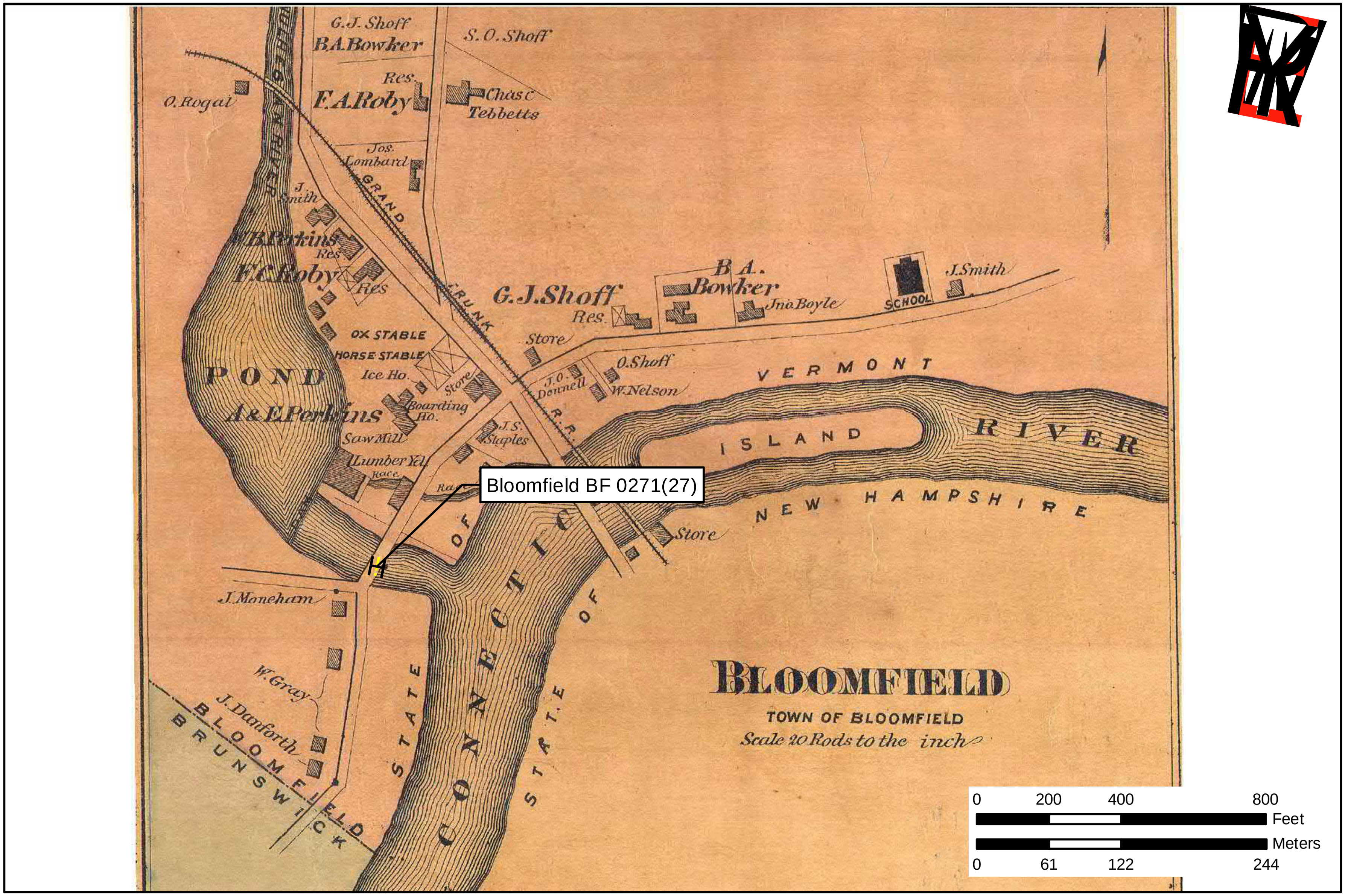

FIGURE 3: Map of Bloomfield, 1878 (Beers 1878)

The lumber mill in Bloomfield burned in 1885 and was rebuilt in 1892 under the ownership of George Van Dyke, renowned owner of the Connecticut River Lumber Company. The mill closed in 1904, which directly affected the village: from 1890 to 1920, the population declined 46 percent (Mardorf and Martin 2009:II.7). Logging operations on the river and logging camps drew seasonal workers to the region throughout the mid-nineteenth century. In 1929 lumber camps were scattered throughout the town, many located along the East Branch of the Nulhegan River (Mardorf and Martin 2009:II.9). Development such as a sugar barrel mill in neighboring North Stratford, New Hampshire, also provided an economic boost to the region (Mardorf and Martin 2009:II.8).

Today, much of the former logging and agricultural areas have reverted back to temperate forests. Bloomfield is home to approximately 221 residents, with most living in the Village of Bloomfield (United States Census Bureau 2010).

IV. Survey Results

The APE for the architectural survey and effects assessment extends 30.5 meters (100 feet) from either side of Bridge No. 9, on VT 102. The APE consists of a small village setting.

The APE contains two properties, both of which are older than 45 years (Figure 4; Table 1). The previously surveyed Bloomfield Bridge No. 9 over VT Route 102 (the subject property) is listed in the SRHP/NRHP. The Northern Forest Canoe Trail Access and Parking Lot, a Section 4(f) resource, had not been previously surveyed.

Photographs of the resources follow the individual resource listings.

TABLE 1: PREVIOUSLY AND NEWLY IDENTIFIED HISTORIC ARCHITECTURAL RESOURCES IN APE

ID No. (Figure 4)	NRHP ELIGIBILITY	NAME	ADDRESS
Bloomfield-1	Listed, SRHP and NRHP	Bridge No. 9 (Bloomfield-Nulhegan River VT Route 102 Bridge)	VT Route 102, Bloomfield
Bloomfield-2	N/A; Section 4(f) resource	Northern Forest Canoe Trail Access and Parking Lot	VT Route 102, Bloomfield

A. Vermont SRHP/NRHP-Listed Properties

1. Bloomfield-1

Bloomfield Bridge No. 9, VT Route 102; constructed 1937 (Plates 1-3)
Listed, NRHP (NRHP No. 91001605, listed 11.14.1991)
Listed, SRHP

Bridge No. 9 is a single-span riveted steel Platt through-truss bridge, measuring 134 feet long. The two-lane bridge carries VT Route 102 over the Nulhegan River in the Village of Bloomfield. The connections on the truss are hydraulically riveted and most of the structural elements are rolled I-beams, which are both characteristics of standard bridge construction and design in Vermont after the flood of 1927. The bridge floor system features four I-beam stringers and poured concrete abutments.

The bridge was rehabilitated in 2011, presumably to address deterioration in areas of the deck soffit and localized section loss of the steel superstructure. Today, the bridge is in poor condition with holes in the bottom chord and end posts as well as considerable deterioration of gusset plates at the abutments (VTrans 2020). Despite the bridge’s condition, it retains its significance as a significant example of the standard truss bridge type used in the post-1927 era of bridge building in Vermont. It is WSP’s opinion that the bridge retains a sufficient level of integrity to remain listed in the SRHP/NRHP under NRHP Criteria A and C.

B. Section 4(f) Resources

1. Bloomfield-2

Northern Forest Canoe Trail Access and Parking Lot (Plates 4 and 5)

A canoe launch and parking lot for the Northern Forest Canoe Trail are located on the parcel adjacent to the northwest corner of the bridge. The approximately 16-acre parcel extends along the north shoreline of the Nulhegan River and the west side of VT Route 102 to Duval Road. A parking lot and trail sign are located approximately 180 feet north of the bridge. The parcel appears to be publicly owned (VCGI 2021).

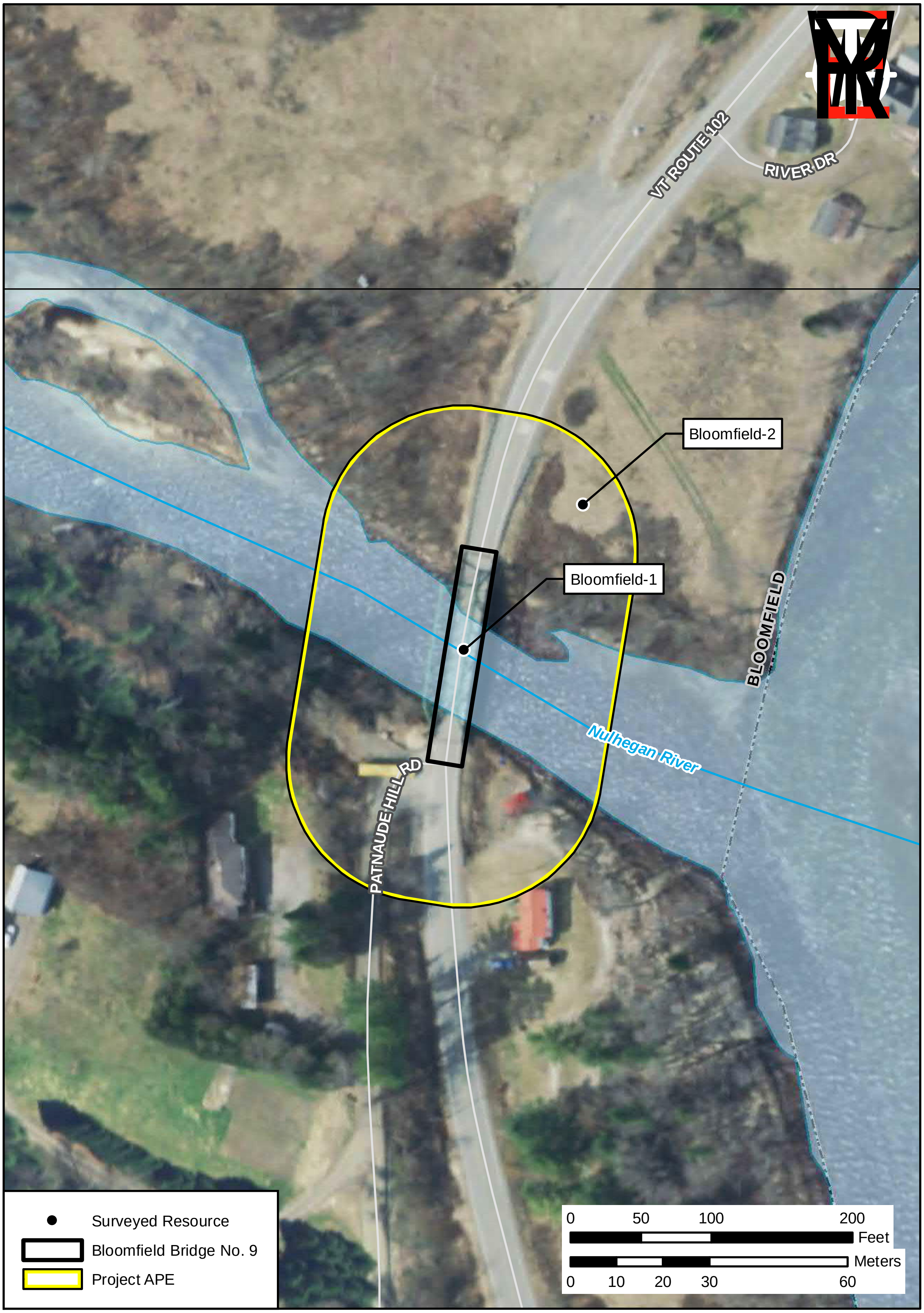

FIGURE 4: Location of Surveyed Resources in APE (VCGI 2018)

PLATE 1: Bloomfield Bridge No. 9, Facing Northeast

PLATE 2: Bloomfield Bridge No. 9, Facing Southwest

PLATE 3: Bloomfield Bridge No. 9, Facing South

PLATE 4: Northern Forest Canoe Trail Access and Parking Lot, Facing Southeast

PLATE 5: Northern Forest Canoe Trail Access and Parking Lot, Facing South

V. Conclusions

On behalf of VTrans, WSP completed a historic architectural resource identification survey and effects assessment for the proposed improvements to Bloomfield Bridge No. 9, VT Route 102, Essex County. WSP conducted this survey and resource assessment to take into account the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The APE for the survey extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches (see Figure 2).

The goal of the survey was to identify (1) historic architectural resources (properties) in the APE previously listed in the SRHP/NRHP (the criteria for both are identical), and (2) previously unsurveyed historic architectural resources in the APE that may be eligible for listing in the SRHPNRHP. The survey also evaluated the potential effects of the project on viewsheds associated with any resources listed in or eligible for the SRHP/NRHP. As the project is still in the planning stages and may take several years to be implemented, WSP identified properties that meet the 45-year age mark for NRHP evaluation. The investigation included background research and fieldwork. Fieldwork took place in April 2021.

WSP identified one previously surveyed property in the APE that is older than 45 years, the subject property, Bridge No. 9. The bridge is listed in the SRHP/NRHP, and it is WSP’s opinion that the bridge should remain listed. One public recreation area, a Section 4(f) resource, is also located in the APE.

It is WSP’s opinion is that an intensive survey is not warranted at this time, as the project activities will be confined to the project right-of-way and will not alter the setting of any historic properties. Should project activities be expanded to include new sidewalks, increased road width, or improved intersections, an intensive survey may be warranted to identify all issues that may arise and to establish mitigation efforts that can be put in place to ensure the protection of resources. This will allow VTrans to consider historic resources in planning the improvements to Bridge No. 9 and VT Route 102. As the subject property, Bridge No. 9, is listed in the NRHP/SRHP, any alterations will likely require further consultation with the VDHP.

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APPENDIX

C

Archaeological Resource Assessment

Archaeological Resource Assessment Bloomfield Bridge No. 9, VT Route 102 BF-0271(27)

Town of Bloomfield, Essex County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

July 16, 2021

ARCHAEOLOGICAL RESOURCE ASSESSMENT
BLOOMFIELD BRIDGE NO. 9, VT ROUTE 102
BF-0271(27)

Town of Bloomfield, Essex County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

Jessica Vavrasek and Marlis Muschal

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

July 16, 2021

Abstract

On behalf of the Vermont Agency of Transportation (VTrans), WSP USA Inc. (WSP) of Troy, New York, completed an archaeological resource assessment (ARA) for the proposed improvements to Bloomfield Bridge No. 9, VT Route 102, Essex County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to consider the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The archaeological area of potential effect (APE) extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches.

The goal of the ARA was to survey the entire APE to determine if any archaeologically sensitive areas are present. The ARA consisted of background research as well as field inspection, which was conducted on April 8, 2021. The ARA determined the project APE's sensitivity for archaeological resources based on the potential for intact subsurface soils, the APE's relationship to nearby known archaeological sites and historical structures, and other criteria, including soils, topography, and proximity to water. WSP used the Vermont Division for Historic Preservation's *Environmental Predictive Model for Locating Precontact Archaeological Sites* and the Vermont Online Resource Center to inform its assessment.

Background research identified one previously recorded historic archaeological site, Site VT-ES-0028, approximately 60 meters (197 feet) northwest of the APE. No other sites have been previously recorded within 1.6 kilometers (1 mile) of the APE. Site VT-ES-0028, also known as the Nulhegan Lumber Co., was the headquarters for the Connecticut Valley Lumber Company and operated until the twentieth century. Historical maps depict nineteenth- and twentieth-century Euro-American settlement in the vicinity. No precontact or historic sites were identified during the ARA. Because of the proximity of the historic site and several areas of flat, potentially undisturbed land surrounding the bridge, three areas of the APE have been deemed potentially archaeologically sensitive.

It is WSP's opinion that any future development carried out within the APE may have impacts on potentially significant archaeological resources. Additional archaeological investigation of the APE may be necessary if the construction of a temporary bridge or a staging yard is proposed in any of the three potentially sensitive areas; in addition, should project activities be expanded and the APE changed, further investigation may be warranted in those areas.

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I. Introduction

A. Project Description

On behalf of the Vermont Agency of Transportation (VTrans), WSP USA Inc. (WSP) of Troy, New York, completed an archaeological resource assessment (ARA) for the proposed improvements to Bloomfield Bridge No. 9, VT Route 102, Essex County (Figure 1). The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to consider the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The archaeological area of potential effect (APE) extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches (Figure 2).

B. Scope of Services

The goal of the ARA was to survey the entire APE to determine if any archaeologically sensitive areas are present. This will allow VTrans maximum flexibility in avoiding sites that are eligible for the National Register of Historic Places (NRHP). For the ARA, WSP conducted background research and a field inspection, and evaluated the location using the Vermont Department of Historic Preservation (VDHP) *Environmental Predictive Model for Locating Precontact Archaeological Sites* (VDHP 2015) (see Appendix A), the Vermont Online Resource Center (ORC) map tool (VDHP 2021), historical maps, and local histories (see Chapter IV.A).

All archaeological investigations were conducted in accordance with guidelines established by VTrans and the Programmatic Agreement (PA) among VTrans, the Federal Highway Administration, the VDHP, and the Advisory Council on Historic Preservation, which guides the administration and review process of archaeological projects. That PA and the accompanying *Manual of Standards and Guidelines* (VTrans 2000) provide the framework for the conduct of archaeological investigations for VTrans projects.

All cultural resource services were performed using the professional guidelines and standards in *Procedures for the Protection of Historic and Cultural Properties* (36 CFR 800) and *Procedures for Determining Site Eligibility for the National Register of Historic Places* (36 CFR 60 and 63). This investigation also conformed to the Secretary of the Interior’s Standards for Archaeology and Historic Preservation (48 *Federal Register* 44716) (United States Department of the Interior 1983), and *Guidelines for Conducting Archaeology in Vermont* (VDHP 2002). The cultural resource specialists who performed this work satisfy the Secretary of the Interior’s Professional Qualifications standards as specified in 36 CFR 66.3(6)(2).

This report has been organized into six chapters. After the introduction in Chapter I, Chapter II describes the environmental setting of the APE. Chapter III discusses the cultural context for the APE, briefly outlining the 11,000-year history of the region and summarizing previous archaeological investigations in the vicinity. Chapter IV presents the methods and results of the ARA, and Chapter V contains the conclusions. Chapter VI lists the references cited. Appendix A provides the Environmental Predictive Model Checklists.

This investigation was conducted under the direction and supervision of WSP Senior Vice President Hope Luhman, PhD (Register of Professional Archaeologists [RPA 10505]). WSP Historic Preservation Manager Camilla McDonald served as the project manager. Archaeologist Jessica Vavrasek, PhD (RPA 989768) conducted the field inspection. Dr. Vavrasek completed the background research and wrote the report with assistance from WSP Archaeologist Marlis Muschal (RPA 34344474). Principal Draftsperson Jacqueline L. Horsford prepared the graphics. Principal Editor Anne Moiseev supervised the editing and production of the report.

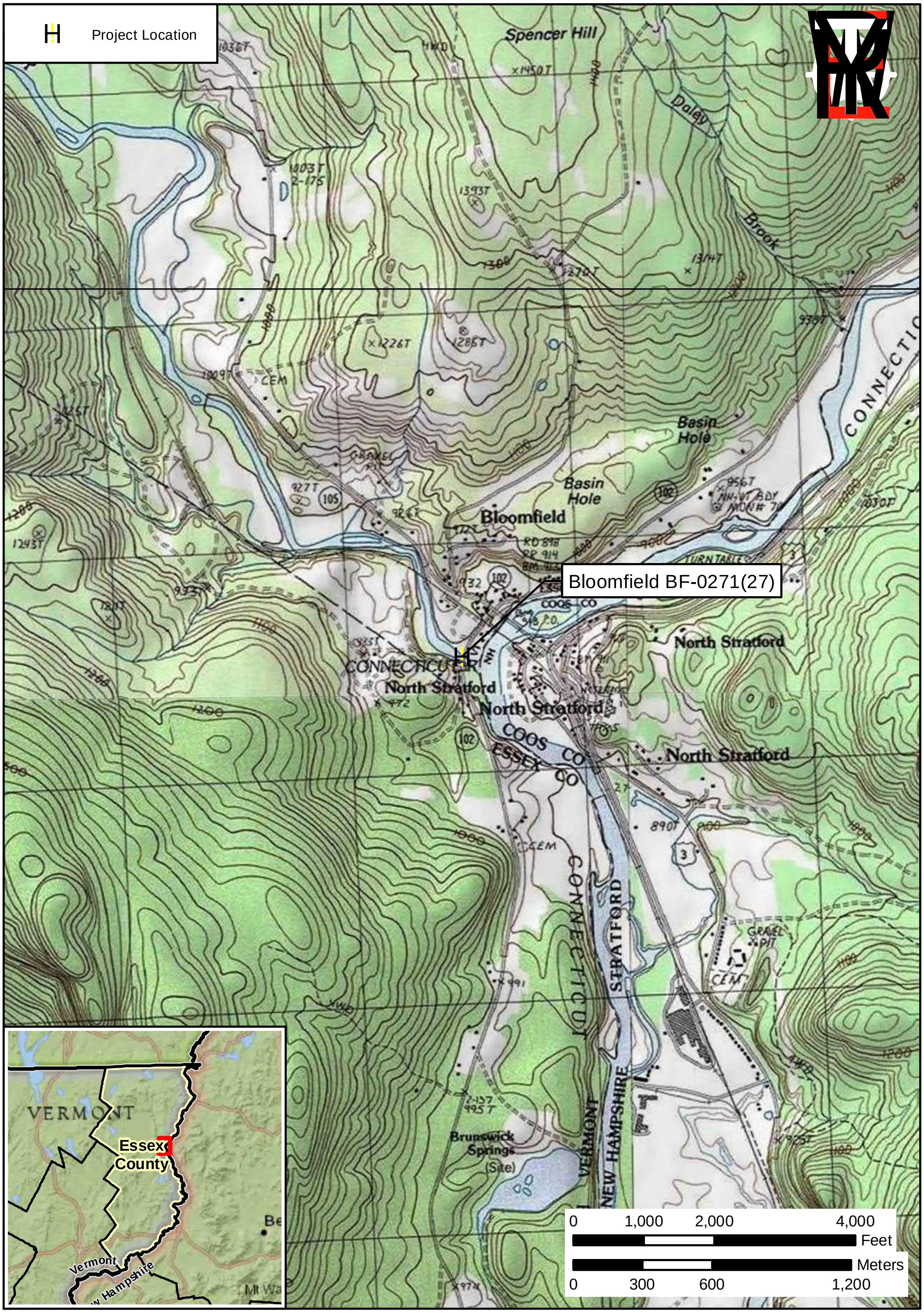

FIGURE 1: Location of Project BF 0271(27) (ESRI USA Topo Maps 2019)

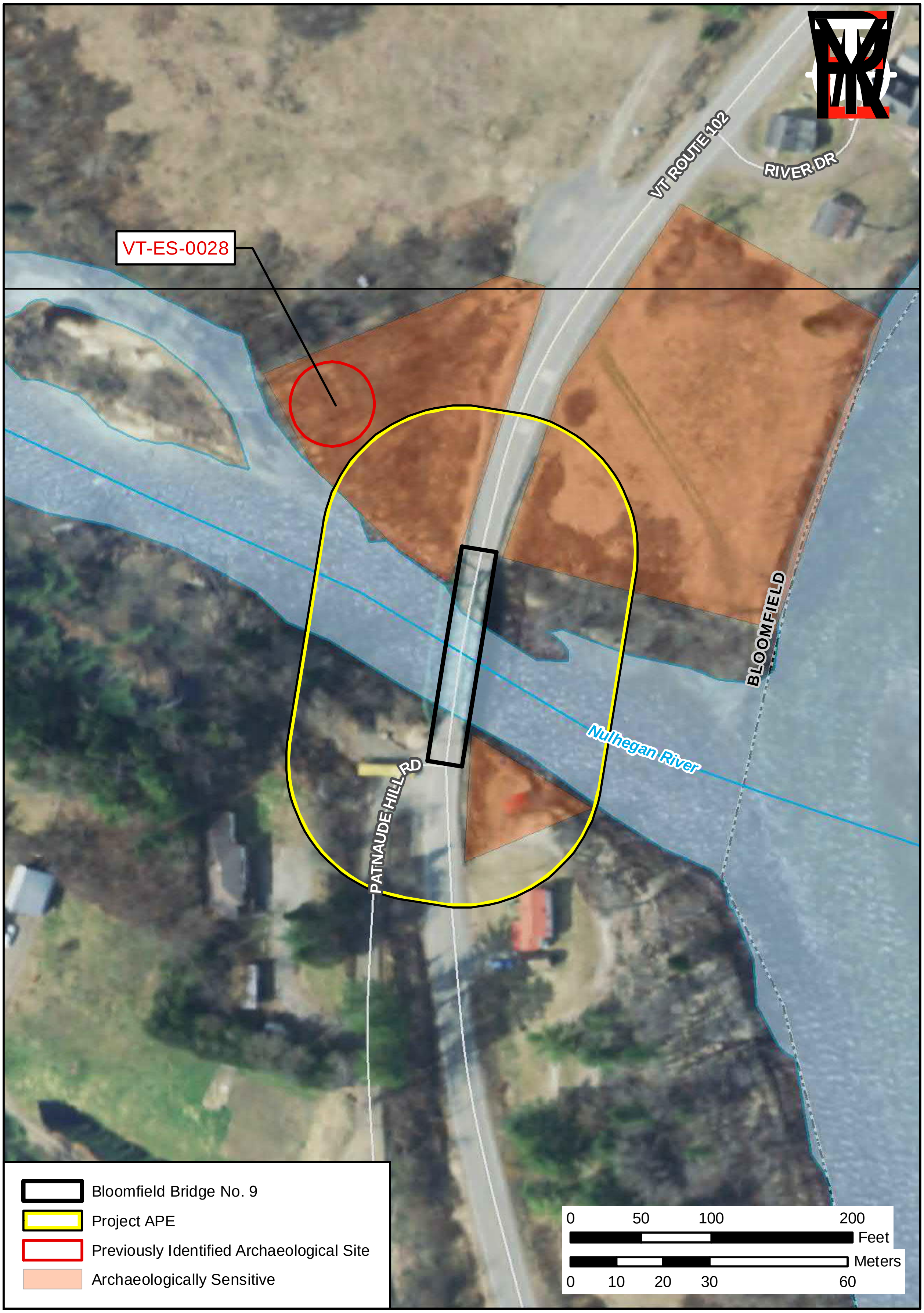

FIGURE 2: Project APE (VCGI 2019)

II. Environmental Setting

A. General Setting

The APE is located along VT 102 in the Town of Bloomfield (see Figure 2), in the Bronson Hill physiographic region of northwestern Vermont. The region is characterized by 300- to 400-million-year-old mudstone deposits. As part of the Connecticut Valley-Gaspé Basin, the area includes limestones, sand, and shales that originated in highlands to the west (Doolan 1996). The APE is located in the Gile Mountain Formation, and micaceous quartzite is common throughout the area (Ratcliffe et al. 2011).

Situated in the Nulhegan River Basin, the region includes very soft, eroded granite (Vermont Fish & Wildlife Department 2014). The landscape includes low, open mountain terrain with relatively broad river valleys and numerous wetlands (Griffith et al. 2009). The APE is located immediately above the confluence of the Nulhegan and Connecticut rivers, near the boundary of the Nulhegan and Mohawk River-Connecticut River watersheds (United States Geological Survey [USGS] 2018). Located in the Northeastern Highlands of Vermont, the APE is part of one of the coldest regions in Vermont. Soils are not well suited to agriculture, and forested land cover is common. Human habitation is relatively low, and recreation, timber production, and wildlife habitat are the major land uses (Griffith et al. 2009; Vermont Fish & Wildlife Department 2014).

The landscape in the APE includes the Nulhegan riverbanks, abutted by residential plots and partially forested land.

B. Soils in the APE

The APE contains two general soil types (Figure 3; Table 1). Colton-Duxbury complex consists of very deep, well to excessively drained soils formed in glaciofluvial deposits. Colton soils are found on terraces, kames, eskers, and outwash plains, and Duxbury soils are found in valley train, outwash plain, esker, kame,

TABLE 1: SOILS IN PROJECT APE

SERIES NAME	SOIL HORIZON	DEPTH	COLOR	TEXTURE, INCLUSIONS	SLOPE	DRAINAGE	LANDFORM
Colton soils (32B, 32E)	Ap	0-18 cm (0-7 in)	Gr Brn	Gvl Lo Sa	32B (3-8%) 32E (25-60%)	Excessively Well Drained	Terraces, kames, eskers and outwash plains
	E	18-20 cm (7-9 in)	Pink Gr	Gvl Lo Sa			
	Bhs	20-28 cm (9-11 in)	Dr Rd Br	Gvl Lo Sa			
	Bs	28-41 cm (11-16 in)	Rd Brn	Gvl Lo Sa			
	BC	41-56 cm (16-22 in)	Yl Brn	Vr Gvl Sa			
	C	56-183 cm (22-72 in)	Pa Brn	Gvl Sa			
Duxbury soils (32B, 32E)	Oe	0-2.5 cm (0-1 in)		Plant material	32B (3-8%) 32E (25-60%)	Well Drained	Valley trains, outwash plains, eskers, kames, and terraces
	E	2.5-15 cm (1-6 in)	Brn	Gr Sa Lo			
	Bhs	15-20 cm (6-9 in)	Vr Dusky Rd	Si Lo			
	Bs	20-43 cm (9-17 in)	Dk Rd Brn	Gr Sa Lo			
	BC	43-66 cm (17-26 in)	Dk Yl Brn	Gr Sa Lo			
	2C	66-165 cm (26-65 in)	Gy & Pale Brn	Vr Gvl Sa			
Podunk fine sandy loam (31A)	Ap	0-25 cm (0-10 in)	Dk Yl Brn	Fi Sa Lo	31A (0-3%)	Moderately Well Drained	Floodplains
	Bw1	25-46 cm (10-18 in)	Ol Brn	Fi Sa Lo			
	Bw2	46-76 cm (18-30 in)	Ol Brn	Fi Sa Lo			
	C	76-165 cm (30-65 in)	Ol Gy	Lo Sa			

KEY: Shade: Lt – Light, Dk – Dark, V – Very, St – Strong
Color: Brn – Brown, Blk – Black, Gry – Gray, GBrn – Grayish Brown, StrBrn – Strong Brown, RBrn – Reddish Brown, YBrn – Yellowish Brown, OlBrn – Olive Brown, Wh – White, Ol – Olive, PlBrn-Pale Brown, Brn Yl-Brownish Yellow, YRd-Yellowish Red
Soils: Cl – Clay, Lo – Loam, Si – Silt, Sa – Sand
Other: / - Mottled, Grl – Gravel, Cbs – Cobbles, Pbs – Pebbles, Rts – Roots, C – Coarse, Ch - Channery, F – Fine, V-Very, E- Extremely, Dec OM – Decomposed organic matter, S- Stratified
USDA-NRCS 2019

and terrace settings. Podunk fine sandy loam is formed in recent alluvium on floodplains and consists of very deep, moderately well drained soils (United States Department of Agriculture-Natural Resources Conservation Service [USDA-NRCS] 2019).

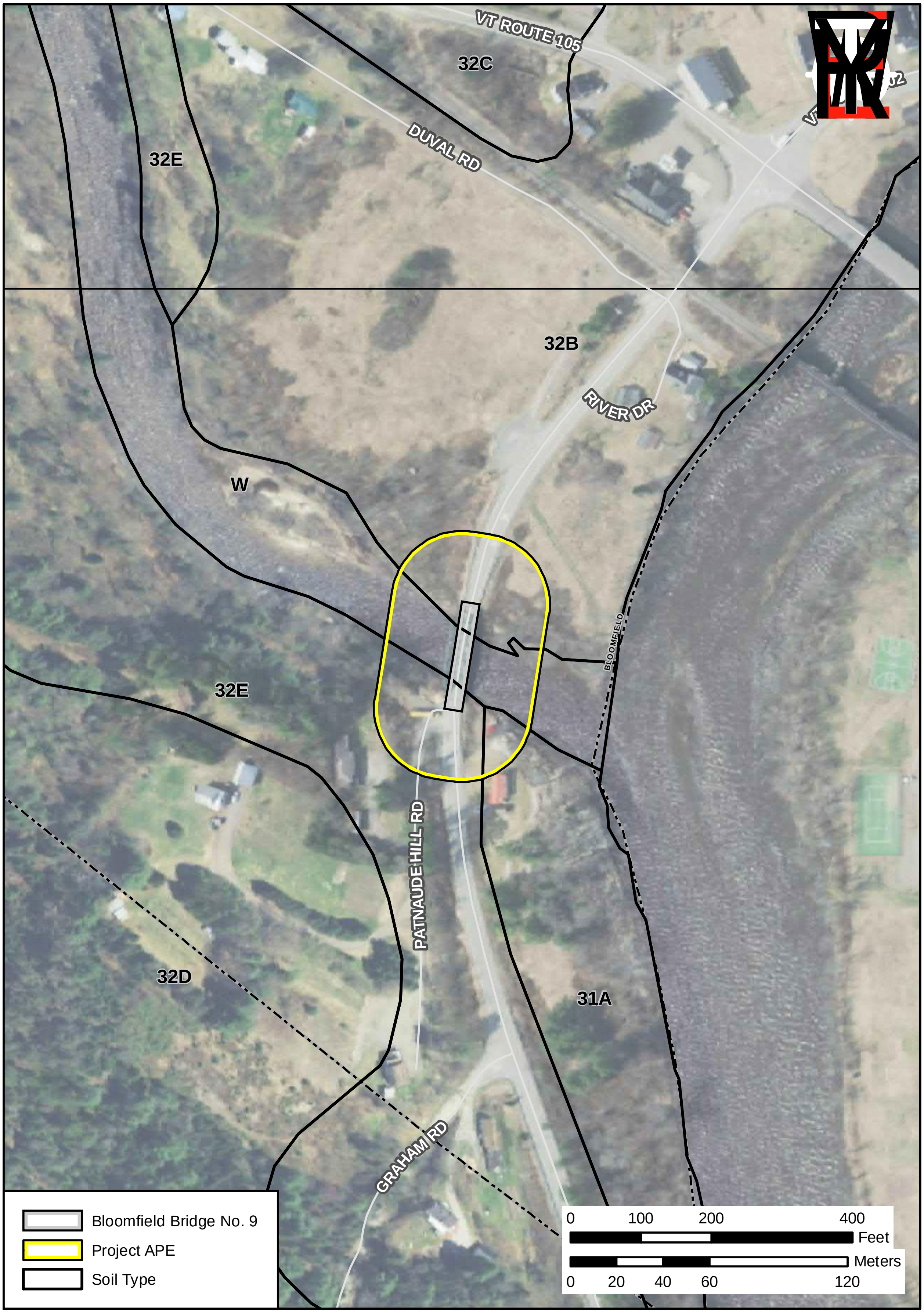

FIGURE 3: Soils in Project APE (USDA-NRCS 2019; VCGI 2019)

C. Environmental History of Vermont

Paleoecologists have constructed the environmental history of Vermont from a variety of sources, including pollen cores, sedimentation histories, and faunal collections. The ruggedness of Vermont and the pronounced differences in elevation across its landscape have resulted in regional contrasts in vegetation, creating a “patchy” landscape. Today it is possible to find tundra at a few thousand feet on the highest peaks of the Green Mountains in contrast to the deciduous and coniferous vegetation in lowlands to the east and west (Thomas 1991).

Before 13,500 years before present (BP), most of present-day Vermont was covered with glacial ice. Within a thousand years the glaciers had moved north of the St. Lawrence lowland, and in their wake grew a landscape of moss, lichens, and stunted shrubs. A frigid arctic climate prevailed, leaving the ground frozen for most of year. By about 12,000 BP most of Vermont was within an herb-to-spruce zone, with higher elevations following suit about 500 to 1,000 years later. Fauna during that period likely included wooly mammoth, mastodon, moose, elk, caribou, and musk ox, as well as smaller arctic animals such as ptarmigan, arctic shrews, and lemmings. By 11,000 BP a subarctic climate dominated the region. Before the end of the eleventh millennium BP, the Champlain Sea had drained. This sea once covered an area about twice the size of present-day Vermont and may have provided Vermont’s earliest human settlers with many resources.

With the close of the Pleistocene, an open park-like woodland of largely spruce, fir, and birch moved into Vermont’s lowlands, and into the mountains by the following millennium. Evidence exists of larch and alder in wet lowlands and beech, oak, ash, and maple in the better drained bottomland and low hills of the Champlain and Connecticut valleys. These changes led to growth in the populations of many animals that today live in Vermont, including moose, beaver, lynx, porcupine, snowshoe rabbit, spruce grouse, mice, voles, and other animals that likely came in from the south.

Pollen cores indicate a sharp increase by 9000 BP in the amount of white pine, hemlock, oak, poplar, elm, ash, sweet gale, and ferns throughout Vermont. Pine pollen takes up 50 percent of pollen diagrams for that period. The presence of pine-dominated forests indicates a warming trend, and thin alluvial beds on floodplains from the period suggest low precipitation (Thomas and Dillon 1983). Pollen cores illustrate a drop in the rates of various pine pollen and a rise in the amount of oak, beech, birch, sugar maple, elm, and ash pollen within a thousand years, indicating the beginning of a Temperate Oak Forest (Thomas 1991:2-4).

Different strands of evidence from the Upper Midwest and the Northeast reveal that between 7500 and 5300 BP, precipitation was higher than today, and the climate was fairly warm. Evidence of rapid sedimentation and increased channel migration along the Missisquoi River between 6500 and 5400 BP indicates a higher level of rainfall. Other evidence of a wetter environment includes high rates of hemlock and beech pollen deposition, as well as beech, cedar, maple, and hemlock logs found along the Missisquoi floodplain and dating to that time period (Brakenridge 1988; COHMAP Members 1988; Thomas and Dillon 1983).

After 6500 BP the mixed deciduous-coniferous forest in the lowlands of eastern and western Vermont provided good habitat for deer, bear, wolf, raccoon, otter, fox, gray squirrel, wild turkey, and passenger pigeon. In the higher, mountainous elevations of central Vermont, spruce-fir-northern hardwood forests were home to moose, elk, and possibly small herds of woodland caribou (Thomas 1991:2-10).

After 5000 BP hemlock steeply declined and oak and hickory increased (Whitehead and Bentley 1963), possibly indicating the onset of drier conditions. Other evidence of drier conditions includes the entrenchment and infrequent river flooding in the upper Midwest (Thompson and Bettis 1982), a lack of substantial alluvial deposits along floodplains of the Missisquoi River (Brakenridge 1988; Thomas and

Dillon 1983), and an apparent drop in the water table of Shelburne Pond in the Champlain Lowlands of Vermont (Carr et al. 1977). The climate was probably between 2 and 4 degrees centigrade warmer than today (Dincauze 1989). Chestnut appeared after about 2000 BP. Oak continues to dominate in Vermont's forests today.

Temperatures likely became cooler after about 2800 BP, and precipitation increased until about AD 270. These changes led to greater quantities of spruce and fir at higher elevations and a general increase in pine in the lowlands (Bernabo and Webb 1977; Whitehead and Bentley 1963). Warmer temperatures then returned during the first millennium AD, with a rise in precipitation after about AD 750 (Swain 1978). After AD 1050 drought conditions and higher temperatures prevailed. Evidence of lower water tables, a decrease in stream flow and frequency, and the duration of flooding demonstrate that the period between AD 1000 and 1200 may have been the warmest in Vermont in over 2,000 years. After AD 1550 cooler and moister conditions came with the beginning of the so-called "Little Ice Age" (Thomas 1991:2-9), extending into the mid-nineteenth century.

III. Cultural Context

A. Precontact Background

1. Paleoindian Period (11,000 to 10,000 BP)

The earliest known archaeological remains in Vermont date to the Paleoindian period. These sites were created by small groups of hunter-gatherers who colonized the recently deglaciated sections of the state and the surrounding region sometime before the eleventh millennium BP. Data on the specific nature of Paleoindian adaptations in Vermont remain limited. Although sites of this time period have been found in the state (Loring 1980; Ritchie 1953), none have been subject to excavation. Nevertheless, some aspects of Paleoindian adaptations can be inferred by reference to investigated Paleoindian sites in the neighboring areas of New York State, New England, and the Canadian Maritimes (e.g., Deller and Ellis 1992; Ellis and Deller 2000; Ellis and Lothrop 1989; Lothrop 1989; Meltzer 1984; Stork 1997, 2004).

Assemblages from these sites indicate three consistent attributes of Paleoindian technology that were probably also true for groups in Vermont. First, in addition to fluted points, the stone technologies of these groups consisted of a flake-based toolkit with general categories of wide- and narrow-bit unifacial tools, unifacial gravers, utilized flakes, bipolar artifacts, and large bifaces. Second, people during the Paleoindian period in the Northeast probably preferred bedrock lithic sources as opposed to secondary cobble, and lithic procurement strategy may have been driven, in part, by the design requirements of their transported stone toolkits. Finally, locations of raw material sources for Paleoindian stone toolkits are often many kilometers distant from the sites where these tools are recovered. These distances indicate that people in the Northeast traveled far to collect stone for toolmaking, either during their seasonal movements or as part of trips made specifically to gather new supplies of lithic materials (Seeman 1994).

Disagreement exists over whether people at the end of the Pleistocene in the Northeast were specialists following herds of caribou, or generalists living off a diverse environment, collecting and hunting a wide range of resources (Dincauze and Curran 1983; Pelletier and Robinson 2005). More than likely, the reality varied over time and across space, and was a question not of specialist versus generalist but rather of degree and scale (Thomas 1991:3-7). As specialists, people likely gathered in larger, multifamily settlements at key times of year along strategic intercept points to hunt caribou. These larger aggregations then split up into smaller groups and moved widely across the landscape. As generalists, the people of the Paleoindian period may have moved in small family-sized groups, mapping their movements to the availability of resources.

Archaeologists know of substantial Paleoindian sites south of the present APE in the Connecticut River valley, including the Whipple Site just off the Ashuelot River in New Hampshire (Curran 1984), the DEDIC Site on the Connecticut River in Deerfield, Massachusetts (Chilton et al. 2005), and the Turner’s Falls Site on the Connecticut River in Turner’s Falls, Massachusetts (Binzen 2005). In northwestern Vermont Loring (1980) documented the recovery of fluted points on and below Champlain Sea beach deposits from adjacent interior lowlands and from higher-elevation settings in the western foothills of the Green Mountains. Several sites in northwestern Vermont with evidence of Paleoindian occupations have been found in the Champlain Basin (Robinson et al. 2017).

2. Archaic Period (10,000 to 3000 BP)

Archaeologists call the period beginning 10,000 years ago following the end of the Pleistocene and the beginning of the Holocene, the Archaic period. They further subdivide the Archaic into at least three subperiods, the Early (10,000 to 7500 BP), Middle (7500 to 6000 BP), and Late Archaic (6000 to 3000 BP). These subperiods are largely demarcated by changes in projectile point styles.

Earlier archaeologists generalized the environment of the early Holocene (Early and Middle Archaic) in the Northeast as closed woodlands dominated by conifers (Dincauze and Mulholland 1977; Fitting 1968; Ritchie 1980). Since a low carrying capacity characterizes such an environment, they hypothesized that there was a low population until about 6,000 years ago, which resulted in low site density for the period. More recently, archaeologists have questioned this understanding. Nicholas (1991a, 1991b, 1998) cites evidence that the landscape in the early Holocene was far more diverse, supporting a broader resource base than that characterized by a closed conifer forest environment. According to Nicholas's "glacial lake basin mosaic model" (Nicholas 1991a, 1991b, 1998), people took advantage of a highly productive ecosystem that contained a complex system of lakes, ponds, and wetlands. Robinson and Petersen (1993) cite the problems encountered with trying to attach changing demographics to known frequencies of temporally diagnostic projectile points. Since earlier archaeologists did not find many sites with temporally diagnostic points in early Holocene contexts, they assumed that the region was fairly uninhabited. Robinson and Petersen (1993), however, write that the lithic technology recovered from known early Holocene components is typically very expedient, resulting in the production of few temporally diagnostic formal artifacts such as projectile points. Rather, assemblages from these sites consist mostly of flake assemblages, and therefore many of the components dating to this time period have likely gone unrecognized. Furthermore, it is possible that many sites from the Early and Middle Archaic now lie deep beneath river floodplains (Thomas 1991:5-1).

In southern Vermont the transition to the Early Archaic was contemporaneous with the continued warming trend in the early Holocene and the replacement of spruce and fir by pine as the dominant tree species (Carr et al. 1977) (see Chapter II.C). The combination of environmental and technological changes during the transition to the Early Archaic may indicate an increase in the importance of plant foods and shifts in the exploitation of certain terrestrial fauna, such as the hunting of deer rather than caribou. As opposed to Paleoindian use of high-quality cherts brought long distances before discard, evidence from early Holocene sites indicates a switch to the use of local chert, quartzite, and quartz during the Early Archaic. The change is likely the result of people living in far more restricted areas than their Paleoindian ancestors as well as a lack of widespread external contacts (Thomas 1991:5-6). Archaeologists have long thought that people remained within these territories, spending portions of the year in larger base camps and then moving to smaller, more task-specific camps in the surrounding area (Snow 1980:171).

The number of known sites and diagnostic artifact types and projectile points dating to the Late Archaic (6000 to 3000 BP) is far greater throughout the Northeast and Vermont than for any of the preceding periods. There is also evidence of the development of mortuary ceremonialism. Archaeologists have traditionally characterized the Late Archaic in the Northeast and Vermont into three basic traditions based on these numerous changing artifact types. The Laurentian tradition is thought to date to between about 5600 and 4400 BP and is known from sites in western Vermont as well as elsewhere throughout the Northeast, including New York, southern Ontario, southern Quebec, and northern New England. The Narrow Point tradition follows the Laurentian and dates roughly between 4400 and 3600 BP. Archaeologists have found artifacts associated with this tradition up and down the East Coast from as far south as North Carolina and as far north as the Upper St. Lawrence River. The Susquehanna tradition is later, dating to between about 3800 and 1800 BP. Traits associated with this tradition are thought to have moved north from the Southeastern Piedmont to as far north as Maine and the Upper St. Lawrence.

These traditions differ from each other based largely on changing artifact traits; however, Dean Snow (1980) and others (e.g., Braun and Braun 1994) geographically split the Northeast during the Late Archaic into three very general sections. They base these divisions on broad generalizations about adaptations to major regional environments. The Maritime Archaic lay in the coastal regions of northern New England

and the Canadian Maritimes and is defined as an adaptation based on the resources of the ocean. The Lake Forest Archaic stretched from the Eastern Great Lakes across northern New England. Snow (1980) believes the people of the Lake Forest Archaic lived around the many lakes and rivers found in the region. The Mast Forest Archaic ran from the coastal plains of southern New England into the oak forests of the interior. Here people are thought to have made use of the abundant nut-bearing deciduous trees in the region. Although these models are useful in a very general sense, they are also problematic because they are so general and mask much of the potential for variation across the Northeast.

Our understanding of the lives people led in the Northeast is largely shaped by where the vast majority of archaeologists have worked along the great rivers of the region, including the Connecticut, the Hudson, and the Merrimack. Thousands of years ago people migrated to these rivers each spring to take advantage of the abundant annual migrations of anadromous fish. Each spring around April these fish swam far up the rivers and their tributaries to spawn until stopped by falls. They created a plentiful food resource for people at the leanest time of year when the winter stocks were empty. These large groups likely stayed together throughout much of the warm-weather months, splintering off periodically to hunt, gather different food, and collect other needed resources. There is ample archaeological evidence along the floodplains of large rivers in much of the Northeast of these large gatherings at so-called “base camps.” With the onset of the cold weather, people are thought to have splintered into smaller groups, likely extended families, and moved inland away from the rivers. This pattern of small groups of hunter-gatherers aggregating during the spring and then splintering in the fall has been defined as the “central-based wandering pattern” (Ritchie and Funk 1973:340). There is ample archaeological evidence along the floodplains of large rivers in much of the Northeast of large gatherings at so-called “base camps.” These large groups likely stayed together throughout much of the warm-weather months, splintering off periodically to hunt, gather different food, and collect other needed resources. With the onset of the cold weather, people are thought to have splintered into smaller groups, likely extended families, and moved inland away from the rivers. This pattern of small groups of hunter-gatherers aggregating during the spring and then splintering in the fall has been defined as the “central-based wandering pattern” (Ritchie and Funk 1973:340).

The problem with applying these interpretations to eastern Vermont is the lack of anadromous fish coming up the Connecticut River beyond Bellows Falls. Ohl (1994:55) comments on the lack of known sites dating to the Middle Archaic north of the falls, although sites dating to this period are known south of the falls up the West River and Ashuelot River in New Hampshire. Site VT-WD-0003 lies just south of the confluence of the West and Connecticut rivers and may have been the location of a large, warm-weather group aggregation. Elsewhere in eastern Vermont, however, since the major impetus for large gatherings appears to have been absent north of Bellows Falls, the lives people lived in this region were likely very different from elsewhere in the Northeast.

3. Woodland Period (3000 BP to AD 1600)

The Woodland period is marked by the introduction of ceramic technology about 3,000 years ago. This new technology allowed the production of containers that could withstand cooking with direct heat. This new capability likely affected nutrition and therefore population dynamics. Ceramics also enhanced the capability to store food, which by offsetting seasonal changes in the availability of different foods made it possible for people to become more sedentary. Despite the possibilities presented by this new technology, there is little evidence of any profound changes in life across Vermont. In addition, the elaborate ceremonialism represented by the rich grave-good assemblages found at Early Woodland (3000 to 2000 BP) and Middle Woodland (2000 to 1000 BP) sites, such as Swanton, Boucher, East Creek, and Bennett (Loring 1985; Thomas 1991:9-9), indicate continuity with the burial ceremonialism of the Late Archaic.

There is little archaeological evidence of the Early Woodland in eastern Vermont, and much of what we know about the Early to Middle Woodland comes from sites located in the Connecticut Valley. Two notable sites are the Canaan Site (VT-ES-2) in Canaan, Vermont, and the Skitchewaug Site (VT-WN-41) in southeastern Vermont (Bolian and Gengras 1994; Heckenberger et al. 1992). Middle Woodland sites in western Vermont, such as the Winooski (Power et al. 1980) and McNeil Generating Station sites (Thomas 1980), illustrate the use of areas along the lower reaches of rivers flowing into Lake Champlain. These sites indicate the presence of large gatherings of people who fished, harvested nuts, and hunted.

At Middle Woodland sites like Winooski and McNeil, lithic artifacts are mostly made of non-local cherts. By the Late Woodland (AD 1000 to 1600), however, people were using local cherts, perhaps suggesting changes in and an end to the long-distance trade and political relationships that had existed during the Middle and perhaps Early Woodland periods (Haviland and Power 1982:132-133; Thomas 1991:9-9). The ceramics at Winooski are “related to ceramics from the Lake Forest Middle Woodland ‘cultural complex’ of the Great Lakes-St. Lawrence drainage” (Petersen and Power 1983:142), whereas later ceramic assemblages “seem more clearly related to other local assemblages within the Lake Champlain drainage basin” (Petersen and Power 1983:143). Ceramics recovered from the Canaan and Skitchewaug sites are consistent with contemporaneous types found elsewhere in Vermont.

Throughout the Northeast the Late Woodland period is associated with the introduction of horticulture, particularly the importation of domesticated maize; however, it is more than likely that maize did not appear in New England until after about AD 1300 (Chilton 2006), several centuries after the Iroquois to the west had adopted it. In New York maize became a key component in the development of large permanent villages. Although maize was adopted throughout New England, there is little evidence of the development of large sedentary villages based on maize horticulture (c.f., Petersen and Cowie 2002). Rather, archaeological evidence indicates that people remained mobile hunter-gatherers who only used maize as a dietary supplement. These people therefore become what Elizabeth Chilton (2002) has called mobile farmers because although they planted, they did not become sedentary farmers like the Iroquois.

4. Contact Period (ca. AD 1600 to 1750)

At the time of European contact in the seventeenth century, the descendants of Late Woodland groups inhabiting the Connecticut Valley of Vermont included the Western Abenaki. By that time sedentary village life was a major aspect of their adaptation. The Western Abenaki were organized into several major bands or organizations, each occupying its own village site. Subsistence strategies alternated between the village setting, where crops were grown and surplus foodstuffs stored, and periodic dispersion into smaller groups that traveled to other locations, primarily to hunt (Haviland and Power 1982).

The coming of Europeans to New England in the seventeenth century brought immense and catastrophic changes to the Native peoples of the region—changes that we are only beginning to understand today. The Native inhabitants of Vermont, the Abenaki, experienced severe population loss to European diseases. Their traditional lifeways were forever changed by Europeans who took their lands, refugee populations of American Indians who moved in from elsewhere in New England, and involvement in European wars and European demand for trade goods, such as beaver pelts. The Abenaki, who call their homeland Ndakinna, meaning “our land,” received tribal recognition from the State of Vermont in 2006. They are still seeking federal recognition and are referred to as the St. Francis/Sokoki Band of the Abenaki Nation of Missisquoi (Abenaki Nation 2010). Today, the St. Francis/Sokoki Band of the Abenaki Nation of Missisquoi live in northwestern Vermont (Abenaki Nation 2010).

B. Historical Overview

1. Historic Context for Northern Vermont

The first Euro-Americans to venture into the region that would become Vermont were trappers and hunters in the eighteenth century. Access to much of this area was impeded by mountains, and colonization was slow because the political situation was unsettled. Recurring hostilities between the British and French authorities initially inhibited settlers from making Vermont their home; however, even before the final surrender of the French to the British at Quebec in 1760, applications for land grants were being made by many parties.

The colony of Connecticut made the first land grants within what is now Vermont in the early eighteenth century, after Massachusetts, which had erroneously granted its own citizens 436 square kilometers (172 square miles) within the borders of Connecticut, transferred these land grants (the "equivalent lands") to Connecticut. Connecticut immediately sold these lands to people from both Connecticut and Massachusetts, who in turn sold the land to prospective settlers at a profit. After the final resolution of the Massachusetts-New Hampshire territorial disputes in 1740, these lands became New Hampshire territory. Nevertheless, most of the region's settlers continued to come from Connecticut and Massachusetts (Tosi 1948:48-49). European settlement was slow in all parts of today's Vermont until 1761, when Benning Wentworth, governor of New Hampshire, claimed the lands for New Hampshire and began establishing illegal land grants. These territories became the State of Vermont in 1791.

Prior to 1830, subsistence farming was the dominant economic activity. The earliest economic activity outside the household was the sale of potash and lumber obtained from land clearing. Potash, owing to its high market value and use in the production of glass, became the only inspected product in Vermont at that time (Elliott 1977:18). Small manufacturers, including gristmills and sawmills, sprang up throughout the region to process locally grown materials. Distilleries (using rye and corn) and starch factories (using potatoes) also developed. Taverns and general stores opened to cater to the local populace in nearly every town. By 1830 the region's agricultural economy was concentrated on the cultivation of potatoes and grains, some of which was shipped to Eastern and Southern markets. Wheat was initially an important crop, so much so that it was used as money by the earliest settlers. As transportation increased to wider markets, farmers focused more on a smaller number of specialized products.

Apple growing became an important part of the Vermont economy. John McIntosh, born in 1776, eventually began selling his apple seedlings to settlers, and the McIntosh apple became the dominant apple in Vermont because of its acclimation to cool nights and warm, sunny days. In 1899 Vermont boasted 1,675,131 apple trees and produced 1,176,822 bushels of apples. Commercial apple production in Vermont continued into the twentieth century but declined owing to the lack of modernized facilities. The introduction of the automobile boosted apple production again; in 1955 Vermont produced over 1,100,000 bushels, and in the 1980s roughly 79 commercial growers on 3,500 bearing acres of land produced roughly 1.25 million bushels annually (VDHP 1990).

By the late eighteenth century some industry had begun to develop in Vermont. Lumbering in the oak forests brought much-needed money into the state and also cleared land for farming (Stratton 1980:250). Large fallen trees were ideal for making masts for ships and were usually shipped to Quebec. Production of hats was also an early trade, which used local wool and beaver hides from trappers. Other early businesses included blacksmithing, brick making, and dyeing.

The developing livestock industry rapidly took over in Vermont as both cattle and horses thrived on the local grasslands and climate (Bearse 1968; Tosi 1948:58-59; VDHP 1990). During the early nineteenth century the Spanish Merino sheep, an outstanding wool producer easily adapted to rugged terrain and climate, arrived in Vermont. The self-sufficiency of the Vermont farmers diminished considerably as many turned to sheep farming for an alternative source of income almost to the complete exclusion of other agricultural products. The improved machinery and larger wool mills that were introduced around 1830 permitted Vermont farmers to produce more wool, and 33 wool factories were built in Vermont during that period. In addition to wool, raw cotton was imported into Vermont mills for processing (Meeks 1986; Tosi 1948:62).

Although some textile production occurred in fulling and cleansing mills, and later also carding mills, the production of textiles remained a household activity until about 1820. After about 1820 factories took over the production of textiles, and the number of fulling and carding mills increased by 200 percent (from 136 to 273) and 275 percent (from 87 to 234), respectively. By 1830 the home manufacture of textiles was almost non-existent. Since a typical textile mill required the labor of about nine or so workers, the mills typically sprang up where the workers lived. In many cases the wool factories were an outgrowth of earlier textile mills as the mills became suppliers for developing wool factories (Meeks 1986; Steponaitis 1975:43-50).

The breeding of wool sheep reached its peak in Vermont in the early 1840s, but by the end of the decade, the industry had begun to decline, partly the result of lower protective tariffs on imported wool and partly the result of competition from the West with its larger pastures, less costly grain, and better transportation following the opening of the Ohio and Pennsylvania canal systems (Tosi 1948:59-60; VDHP 1989b). The number of wool factories in Vermont decreased from 97 in the mid-1840s to 89 a decade later. In addition, the number of textile concerns in Vermont began to drop as the industry consolidated into fewer, larger firms using more efficient machinery and located along more traveled transportation routes. The number of mills fell from a peak of over 400 in the 1820s to only 75 in the early 1850s. The sheep industry revived briefly in the 1860s and immediately afterward, as the Civil War prompted a greater demand and higher prices for wool products because of the low availability of Southern cotton as well as the imposition of higher tariffs (Steponaitis 1975:60-67).

With the initial decline of the sheep and wool industry in the late 1840s, many farmers returned to breeding cattle, although not before mutton sheep slowly infiltrated many farms formerly devoted to wool-bearing sheep (VDHP 1989a:2). Dairy farming in Vermont and elsewhere in New England had been introduced by the 1840s (Barron 1980; Russell 1982). Dairying proved to be a protection against the fluctuating price of wool and allowed farmers to take advantage of expanding urban markets to the south. The introduction of dairy breeds to replace beef cattle was a slow and intermittent process. Barron (1980) believes that one reason farmers in Vermont were slow to switch from wool to dairy was problems with labor. The young of Vermont were moving out West and to the big cities, depopulating the countryside during the second half of the nineteenth century (discussed further below). Because sheep farming was far less labor-intensive, it remained a more efficient use of resources during this period even as prices for wool dropped. Dairy farming, on the other hand, was becoming more labor-intensive, and Barron (1980:333) estimates that because of technological changes, the labor demand for cows grew by 68 percent per cow between 1850 and 1910. As a result, since the available pool of labor was declining after the mid-nineteenth century, farmers were hesitant to make the switch from wool to dairy even though the wool market was unstable. It was not until the market for wool completely collapsed at the end of the century that the switch from sheep to cows became complete.

Up until the 1850s, only private dairying took place. As the industry became more widespread, cheese factories, and later creameries, were built to service entire dairying communities. The three staple crops for the mid-nineteenth century Vermont farmer became wool, butter, and maple sugar, and dairy farming dominated the agriculture of eastern Vermont after the Civil War (Bremer 1929:587; Tosi 1948:63). Butter and cheese were manufactured in centrally located factories, although up until 1900 almost 40 percent of manufactured dairy products were produced privately in the home for sale to a private clientele. The number of dairy cows in some Vermont counties reached a peak in 1900. By the close of the nineteenth century, however, the Vermont dairy farmer faced direct competition from the dairy industries of Ohio and Wisconsin, for whom the transport of perishable goods did not pose as great an obstacle after development of the railroads connected these states with the East. Dairying declined slowly until 1920, then rose sharply until 1930 (Tosi 1948:62-64). By the end of the twentieth century, however, the need for expensive equipment had put many small hill-country farmers out of business (VDHP 1989a).

The wool industry in Vermont changed in the late nineteenth century with the emergence of large town-based manufacturing firms (those employing more than 100 employees) in places such as Bennington, Winooski, Rutland, Johnson, and Fair Haven. Vermont still enjoyed prominence in the manufacture of wool and knit goods during the 1880s; however, the state's industry declined steadily through the first half of the twentieth century despite a brief rise during the World War II years (Steponaitis 1975:118; VDHP 1991:10-11). Mills gradually closed after the end of the nineteenth century as they became unable to compete with mills and factories in the South (Barron 1980:326).

The population decline during the second half of the nineteenth century produced one of the greatest historical effects on the landscape. As the United States expanded, new opportunities arose and young people moved to the West. Many of the Vermont's rural youth left for jobs in the growing big cities, although Barron (1980) describes contemporary writing of abandoned farms as "hyperbole," writing that agriculture in New England did not collapse after the Civil War but only experienced stagnation. He points out that throughout Vermont two-thirds of male household heads remained farmers/farm laborers throughout the second half of the nineteenth century, 90 percent of farms were family-owned, and two-thirds of the land remained agricultural land. In short, the number, size, and location of farms throughout Vermont remained stable. In addition, the output of wool, butter, and maple sugar from these farms remained constant into the late 1890s. The number of tradesmen also remained constant, although a number of mills and factories were replaced because they could not compete with those in the South (Barron 1980:326). Vermont farmers may have been able to survive the slow attrition of labor throughout the second half of the nineteenth century, but the lack of available labor ultimately prevented them from adapting to more economically advantageous forms of farming.

2. Historic Context for Essex County

a. County Formation

The Town of Bloomfield is in the north half of Essex County, in the northeast portion of the state almost 70 miles northeast of Montpelier. The land that comprises Essex County was formally a component of New Hampshire, and in 1770 it was also claimed by New York (Benton 1886). Between 1777 and 1799, the land that eventually became Essex County had been included in Cumberland, Orange, and Caledonia counties in Vermont as smaller counties were planned following the organization of the Vermont Republic. Essex County was officially organized in 1800, following the formal establishment of the state in 1791 (Benton 1886).

b. Town of Bloomfield

The Town of Bloomfield was chartered in 1762 as Minehead, named for a town in England. The name was changed to Bloomfield by the Vermont legislature in 1830. Settlement in the Town of Bloomfield was concentrated in the east half along the rivers. The Village of Bloomfield grew slowly, with a population of only 150 by 1830; settlement was concentrated at the confluence of the Connecticut and Nulhegan rivers, perhaps because the Village of North Stafford was directly across the Connecticut River in New Hampshire. The Grand Trunk Railroad had been constructed along the south side of the Village of Bloomfield by 1853, and the Baldwin Lumber mill was the principal employer (Hemenway 1867:951). The village also contained a starch factory and blacksmith shop, and the town was home to four sawmills and two schoolhouses (Walling 1859). By the late nineteenth century the east half of the township appears to have reached its current extent of settlement. At that time the township had a school, two stores, a boarding house, an ox and horse stable, and a lumber mill and sawmill with a dam and mill race (Beers 1878) (Figure 4).

The lumber mill in Bloomfield burned in 1885 and was rebuilt in 1892 under the ownership of George Van Dyke, locally well-known owner of the Connecticut River Lumber Company. In 1904 the mill was closed, which directly impacted the village with a population decline of 46 percent from 1890 to 1920 (Mardorf & Martin 2009:II.7). Logging operations on the river and logging camps drew seasonal workers to the region throughout the mid-nineteenth century. In 1929 lumber camps were scattered throughout the township, many located along the East Branch of the Nulhegan River (Mardorf and Martin 2009:II.9). Development such as a sugar barrel mill in neighboring North Stratford, New Hampshire, also provided an economic boost to the region (Mardorf and Martin 2009:II.8).

Today, much of the former logging and agricultural areas have reverted to temperate forests. Bloomfield is home to approximately 221 residents with most living in Bloomfield village (United States Census Bureau 2010).

C. Historical Map Review

The earliest map of Essex County dates to 1859 (Walling 1859) (Figure 5). The map shows fairly dense settlement in the vicinity of the APE. In addition to private properties, a sawmill and a starch factory are located nearby. The Atlantic and St. Lawrence Railroad passes north of the APE, and a toll bridge is near the confluence of the Nulhegan and Connecticut rivers. A road runs along the right (west) bank of the Connecticut River, likely the precursor to VT Route 102. Another road runs northwest-southeast along the left (north) bank of the Nulhegan River.

The Beers (1878) atlas of Essex County shows a decrease in the density of properties in the vicinity of the APE (see Figure 4). Most properties are north of the Nulhegan River along the Atlantic and St. Lawrence Railroad. Using a geo-rectified version of Beers (1878) map in the VDHP (2021) map tool, it appears that the APE is located along the road that would become VT Route 102.

Topographic maps from 1929 and 1936 show that the vicinity of the APE remained relatively densely populated, with most properties located along the railroad and nearby roads. VT Route 102 was established by the 1930s, and the railroad was renamed the Lumber Railroad. Little change to the APE vicinity is evident from topographic maps dating from the 1940s to 1980s. Similarly, historical aerial imagery from 1955 and 1956 shows little significant development in the vicinity of the APE (Nationwide Environmental Title Research [NETR] 2021).

D. Previous Cultural Resource Management Projects and Known Sites

1. Previous Cultural Resource Management Studies in Vicinity of APE

WSP’s background research included examination of the VDHP’s ORC files to identify known sites and the results of previously conducted cultural resource management surveys in the vicinity. No cultural resource surveys have been conducted within 1.6 kilometers (1 mile) of the APE.

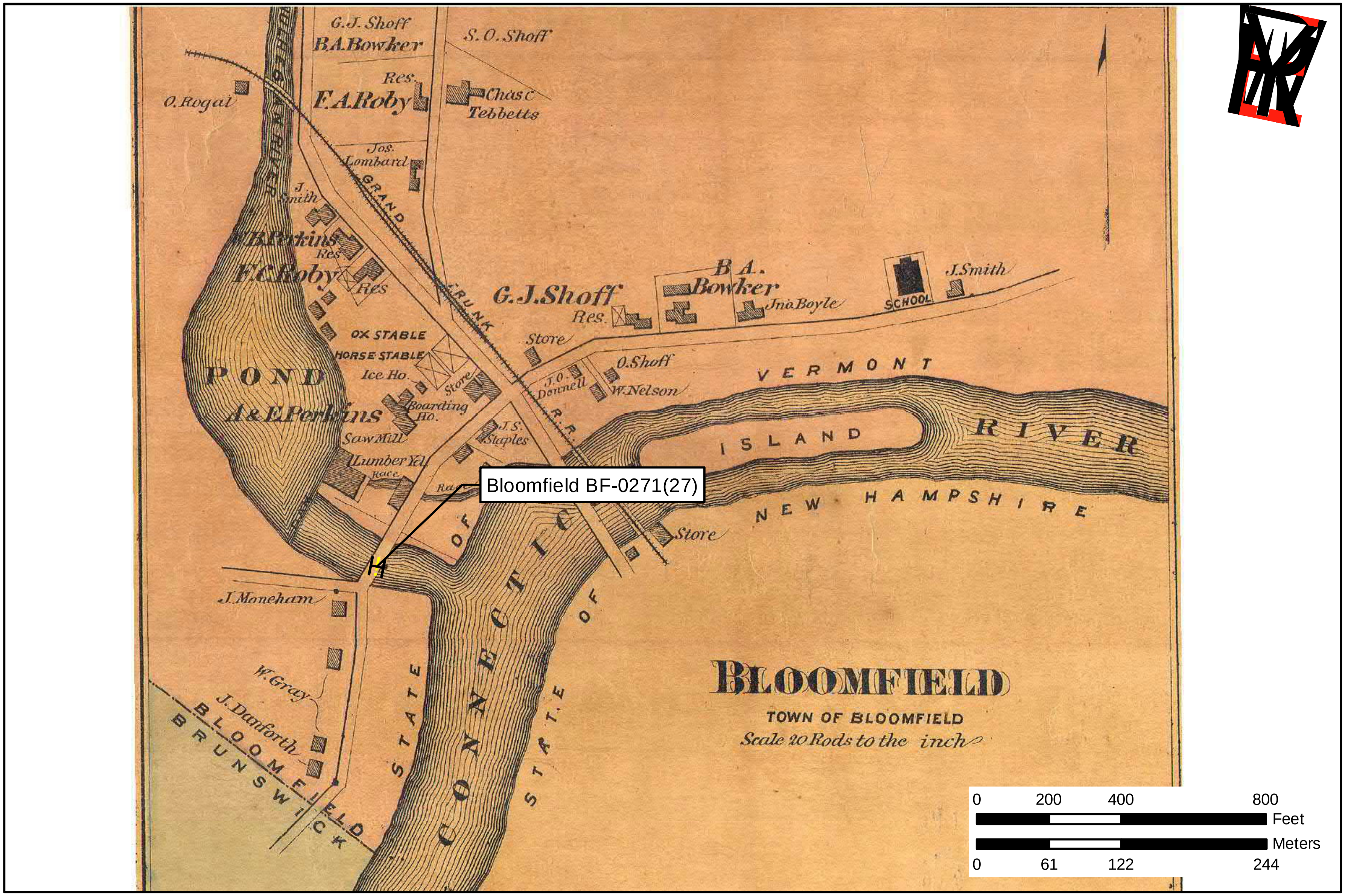

FIGURE 4: Map of Bloomfield, 1878 (Beers 1878)

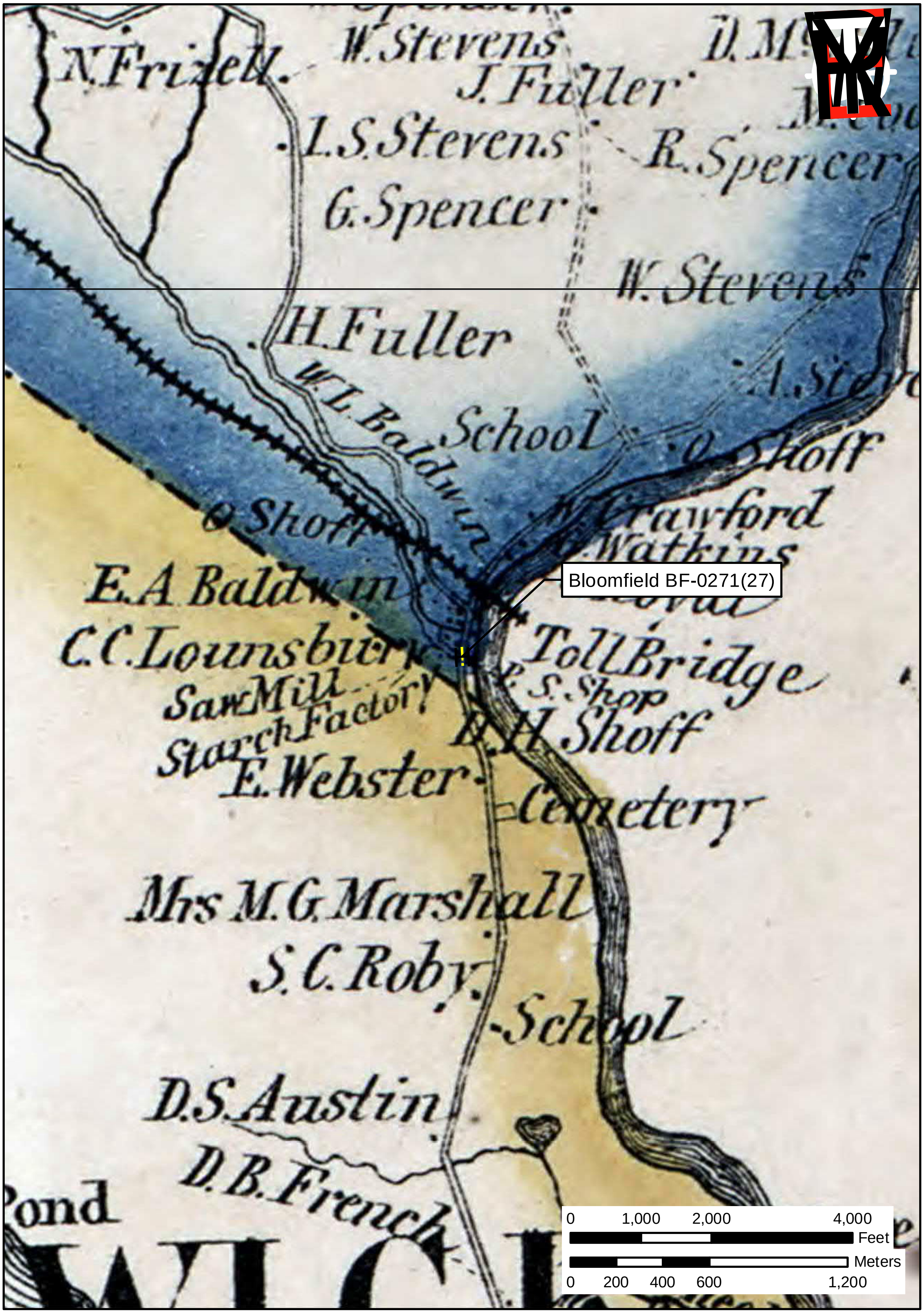

FIGURE 5: Project APE in 1859 (Walling 1859)

2. Precontact Archaeological Sites in Vicinity of APE

No precontact archaeological sites have been previously recorded within 1.6 kilometers (1 mile) of the APE. The closest archaeological site, VT-ES-0003, is located 2.3 kilometers (1.4 miles) to the south and consists of a Native American healing ground.

3. Historic Archaeological Sites in Vicinity of APE

One historic archaeological site, Site VT-ES-0028, has been previously recorded approximately 60 meters (197 feet) northwest of the APE (Table 2). No other sites have been previously recorded within 1.6 kilometers (1 mile) of the APE. Site VT-ES-0028, also known as the Nulhegan Lumber Co., is a water-powered sawmill dated to the 1840s that was expanded into a wood manufacturing mill in the 1850s. The site was the headquarters for the Connecticut Valley Lumber Company, managed by George Van Dyke. Van Dyke closed the mill in Bloomfield in 1904.

TABLE 2: KNOWN ARCHAEOLOGICAL SITES WITHIN 1.6 KILOMETERS (1 MILE) OF APE

SITE No.	LOCATION	PERIOD(S)	RESULTS
VT-ES-0028	Left bank of Nulhegan River, west of confluence with Connecticut River	Historic	Water-powered sawmill and wood manufacturing mill

IV. Archaeological Assessment

A. Methods

WSP's goal for the ARA was to assess and survey the entire APE to identify archaeologically sensitive areas. This will allow VTrans maximum flexibility in avoiding sites that are eligible for the NRHP. To derive this assessment, WSP conducted background research, field inspection, and analysis of the APE using the *Environmental Predictive Model for Locating Precontact Archaeological Sites* (VDHP 2015).

1. Background Research

The background research included use of the Vermont ORC map tool (VDHP 2021), a review of site files from sites located within 1.6 kilometers (1 miles) of the APE, reports from projects conducted within the Town of Bloomfield, historical maps, and local histories.

2. Determination of Archaeologically Sensitive Areas

WSP's archaeological assessment followed several stages. WSP first reviewed the APE using the VDHP ORC online map tool (2021) and the *Environmental Predictive Model for Locating Precontact Archaeological Sites* (VDHP 2015; see Appendix A) to identify the distribution of key environmental criteria possibly affecting the location of precontact archaeological sites. The environmental criteria listed in these two predictive tools are summarized below.

Proximity to a:

- Permanent Stream/River
- Waterbody
- Wetlands
- Stream/Waterbody Confluence
- Head of Drainage
- Stream Confluence
- Waterfalls

The presence of:
- Glacial Lake Shore Line
- Glacial Outwash and Kame Terrace
- Floodplain Soils
- Level Terrain
- Significantly Sloped Terrain

For the seven criteria defined by proximity, the radius of proximity defined as significant is typically 180 meters (590 feet). The value attached to proximity was refined according to the Environmental Predictive Model, with a higher significance and greater score given to areas within 90 meters (295 feet) of a particular environmental criterion, versus a lower significance and half the score given to locations between 90 and 180 meters (295 and 590 feet) of the same criterion. The other five criteria are based on presence/absence (i.e., presence on level terrain versus presence on significantly sloped terrain) and not on varying levels of proximity. The Environmental Predictive Model attaches scores to each of these criteria as well as other criteria, including the presence of burials and known archaeological sites.

WSP determined sensitivity for the possibility of historic archaeological sites through an analysis of historical maps (see Figures 4 and 5) of the APE as well as regional histories. These historical maps are useful sources of information about old roads as well as the location of historic-era structures and other features. WSP also researched the VDHP site and report files available through the ORC as well as in-house resources to identify known sites and the results of previously conducted cultural resource management surveys surrounding the project, as described in Chapter III. Familiarity with known sites is useful both for understanding where sites might be located and for interpreting what is found and assessing its potential significance.

WSP consulted the Historic Front Yards study (Louis Berger 2005) to provide a context for identification of archaeological sensitivity in areas of historic building-road space. That study provides a guideline for assessing archaeological sensitivity and making recommendations for additional work. This includes identification of historic building-road spaces, eliminating historic building-road spaces that have been obviously and significantly disturbed, evaluating the archaeological sensitivity of each historic building-road space, and determining the setting and context of the space. The space and context setting variables are summarized below.

- Space Setting
  - Age of adjoining road compared to the adjoining historic building.
  - Historical function of the building or building complex adjoining space and type of associated below-grade infrastructure to support the functions of the associated building.
  - Overall general historical setting of the space.
  - Distance of the historic building from the road and evidence of changing distance since the building was originally erected.
  - Known previous buildings erected nearby or in the location of the historic building.
  - Historical orientation of the historic building relative to the space.
  - Historical functions of the historic building-road space.
  - Evidence of archaeological features or deposits.

- Context Setting
  - Ability to pose research issues that might be investigated on the property where the historic building-road space is located, based on documentary research and field reconnaissance.
  - Presence of pertinent historical themes or associations that the property might illustrate.
  - The potential for the historic building-road space to contribute substantively to the possible overall significance of the property.

B. Results

1. Field Inspection

The results from the field inspection, in combination with the background research, indicate that the APE contains three areas of archaeological concern, as a result of the proximity of the historic site and several areas of flat, potentially undisturbed land surrounding the bridge (see Figure 2). The area immediately surrounding the bridge was built up during the construction of the original bridge (Plate 1), however, and therefore any modifications to this area will only impact soils that were already modified in the past. In addition, large stones were brought in during the construction of the abutments, creating more artificial ground cover and more ground disturbance (Plates 2 and 3). Even if these stones were removed to make way for a new bridge abutment system, it would have little to no impact on any potentially intact cultural layers.

PLATE 1: East Portion of APE Showing Buildup of Roadway Leading to Bridge, View East

PLATE 2: Stones Brought in to Construct Eastern Abutment, View East

PLATE 3: Stone Brought in to Construct Western Abutment, View West

If the APE were to be widened to accommodate a much larger bridge or to install a temporary bridge to either side of the original, a survey may be required to assess its proximity to the identified historic site (VT-ES-0028) located near the APE, as well as to evaluate the potential for encountering intact cultural deposits south of the bridge.

2. Analysis

The VDHP (2015) predictive model for precontact archaeological sites relies mainly on ecological variables, including distance to water, particular types of landforms, and slope, as well as possible archival or oral traditions and the known presence of sites and burials. Scoring according to this model is not meant to be taken rigidly, but rather as a guide to review possible environmental variables. The primary environmental variable related to precontact sites that applies to the APE is water sources. Elevated landforms are located too far from water sources to yield cumulative scores of 32 on the predictive model. The previous bridge and road construction operations have also resulted in surface and limited subsurface disturbances, that when combined with a lack of suitable intact landforms such as alluvial or outwash deposits, results in a negative score. Given the lack of positive environmental factors, the existing disturbance, and the generally low-density distribution of precontact sites in the vicinity, the APE is considered to have a low to very low sensitivity for precontact archaeological resources. Based on the predictive model, no portion of the APE scored 32 or higher, with a minimum score of 32 required to indicate archaeological sensitivity.

Application of criteria in Louis Berger’s (2005) Historic Front Yards study showed that there is a low historic archaeological sensitivity in the APE. Although historical maps of the area depicted some historical activities in the general area of the APE, none fell within the APE of the bridge itself. In addition, the roadway leading up to the bridge shows evidence of having been repaved several times since its installation, causing changes to the historic road space of the APE. However, because of the proximity of the historic site and several areas of flat potentially undisturbed land surrounding the bridge, three areas have been deemed potentially archaeologically sensitive.

V. Conclusions

On behalf of VTrans, WSP completed an ARA for the proposed improvements to Bloomfield Bridge No. 9, VT 102, Essex County, Vermont. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to consider the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The APE extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches. The goal of the survey was to survey the entire APE to determine if archaeologically sensitive areas are present. The survey included background research, field inspection conducted on April 8, 2021, and application of the predictive model.

No previously recorded precontact or historic archaeological sites lie within the APE. One historic site (VT-ES-0028) lies within 1.6 kilometers (1 mile) of the APE. No identified precontact sites lie within 1.6 kilometers (1 mile) of the APE. No other archaeological sites were identified during the ARA. Because of the proximity of the historic site and several areas of flat potentially undisturbed land surrounding the bridge, three areas have been deemed potentially archaeologically sensitive.

It is WSP's opinion that any future development carried out within the APE may have impacts on potentially significant archaeological resources. Additional archaeological investigation of the APE may be necessary if the construction of a temporary bridge or a staging yard is proposed in any of the three potentially sensitive areas (see Figure 2); in addition, should project activities be expanded and the APE changed, further investigation may be warranted in those areas.

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APPENDIX A: Environmental Predictive Model Checklist

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name VTrans TO7 HRM Rich-Bolt **County** Essex **Town** Bloomfield
DHP No. **Map No.** **Staff Init.** JV **Date** 4/9/2021

Additional Information Bloomfield BF 0271(27)

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or	0- 90 m	12	12
Permanent Stream (measured from top of bank)	90- 180 m	6	
2) Distance to Intermittent Stream	0- 90 m	8	
	90-180 m	4	
3) Confluence of River/River or River/Stream	0-90 m	12	12
	90 –180 m	6	
4) Confluence of Intermittent Streams	0 – 90 m	8	
	90 – 180 m	4	
5) Falls or Rapids	0 – 90 m	8	
	90 – 180 m	4	
6) Head of Draw	0 – 90 m	8	
	90 – 180 m	4	
7) Major Floodplain/Alluvial Terrace		32	
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m	12	
	90 -180 m	6	
11) Confluence of River or Stream	0-90 m	12	
	90 –180 m	6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland	0- 90 m	12	
(wetland > one acre in size)	90 -180 m	6	
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	

17) Marine/Lake Delta Complex**		12	
18) Champlain Sea or Glacial Lake Shore Line**		32	
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	
20) ☐ Natural Travel Corridor ☐ Sole or important access to another drainage ☐ Drainage divide		12	
21) Existing or Relict Spring	0 – 90 m 90 – 180 m	8 4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	
23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	
25) High Recorded Site Density		32	
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	-32
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	-32

**** refer to 1970 Surficial Geological Map of Vermont**

Total Score: -40

Other Comments :

Area immediately surrounding the bridge has been disturbed. There is a possible floodplain to the south of the bridge but this looks highly disturbed as well.

0- 31 = Archeologically Non- Sensitive
32+ = Archeologically Sensitive

APPENDIX

D Natural Resource Assessment

Natural Resource Evaluation

Vermont Agency of Transportation
Bloomfield BF 0271 (27)
Vermont Route 102
Bloomfield, Vermont

July 1, 2021

Prepared for:
Vermont Agency of Transportation
219 North Main Street
Barre, VT 05641

Prepared by:
Bear Creek Environmental, LLC
Natural Resource Services Team
131 Elm Street, Suite 1
Montpelier, VT 05602

Table of Contents

1.0 EXECUTIVE SUMMARY

- During spring 2021, the Bear Creek Environmental (BCE) Natural Resource Services Team conducted a natural resource assessment of a 3.2 acre area surrounding a bridge on Vermont Route 102 in Bloomfield for the Vermont Agency of Transportation (VTrans).

- The BCE team conducted mapping exercises to identify pertinent natural resources within and surrounding the study area. In addition to these desktop analyses, the team also conducted field surveys to evaluate wetlands and botanical resources.

- Bear Creek Environmental delineated two wetlands within the study area on the eastern side of VT Route 102. A site visit with District Wetland Ecologist, Shannon Morrison, was completed on June 30, 2021 to confirm the wetland boundary. A functional evaluation was prepared for the wetland complex following procedures set forth by the State of Vermont Wetlands Program. Impacts to Class II wetlands and their 50-foot buffer zones should be avoided whenever possible in accordance with the Vermont Wetland Rules.

- Rare, threatened, and endangered species occurrence reports were reviewed for the project site. Two plant species (satiny willow and Oakes hawthorn) and one animal species (Dwarf Wedgemussel) have reported occurrences near the project site. A botanical survey was performed and no RTE species were observed at the site. A biologist with the US Fish and Wildlife Service was consulted for guidance regarding the rare mussel. She noted that because the occurrence is so old (1949) a mussel survey of the Nulhegan River would likely not be required.

- The project area was not evaluated for RTE bat presence nor was potential habitat quantified; however, it is possible that the Little Brown Bat (state-endangered) and/or Northern Long-eared Bat (state-endangered, federally threatened) could be found in the vicinity of the project. Limited observations of the bridge were made and peeling paint combined with openings and crevices within the bridge beams may provide potential roosting habitat. It is recommended a formal bat survey be conducted of the bridge and any potential roost trees.

2.0 BACKGROUND

The Bear Creek Environmental Natural Resource Services Team was retained by the Vermont Agency of Transportation (VTrans) to evaluate wetland and wildlife resources in the vicinity of a bridge that crosses the Nulhegan River on Vermont Route 102 in Bloomfield. The project is currently at a scoping level. The site is located approximately 0.1 miles south of the intersection with Vermont Route VT Route 105 at mile marker 0.18 on VT-102 in Bloomfield. An area roughly 3.2 acres in size adjacent to the bridge was evaluated for the presence of wetlands. The location of the study area is shown on a map on page 1 of the Attachment.

Vermont Route 102 is classified by VTrans as a Major Collector roadway. This classification is based on the function of the roadway and the proximity of other nearby roadways. Major Collectors gather traffic from local roads and connect them to the Arterial network (USDOT, 2013). Route 102 runs roughly 44 miles north-south from Guildhall to Canaan.

Assessment work included remote sensing analysis to evaluate resources at and in the vicinity of the project site. The results of this analysis are portrayed on a map on page 2 of the Attachment. A desktop analysis of wildlife connectivity was performed, in addition to a field wetland delineation and botanical survey.

3.0 WETLANDS

The Vermont Significant Wetlands Inventory (VSWI) dataset provides a statewide tool for identifying wetlands through geospatial analysis. This dataset indicates the presence of significant wetlands within 180 feet of the western side of the study area. On June 1, 2021, Alex Marcucci and Mary Nealon of Bear Creek Environmental visited the site to delineate jurisdictional wetlands and to perform a functional evaluation of the wetlands. The delineation was performed in accordance with the methods described in the manual prepared by the US Army Corps of Engineers dated 2012 and titled "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region". The locations of wetlands were documented in the field using a submeter GPS unit, and functional evaluations were performed. Wetlands were delineated through field observations of soils, vegetation, and hydrology.

Two small wetlands were identified within the study area boundary (page 3 of Attachment). The size of the wetland A, located in the north-east corner of the study area is approximately 0.03 acres; however, the wetland continues east of the study area boundary, where mapping did not occur. Wetland A is a Class III wetland, per the District Wetland Ecologist, Shannon Morrison. Wetland B is located north of the Nulhegan River, and is classified as Class II due to its adjacency to surface waters. The size of wetland B is approximately 0.14 acres within the study area. Wetland B continues to the east of the study area boundary, where mapping did not take place. A site visit with Shannon Morrison to confirm the delineation occurred on June 30, 2021.

Class II wetlands are protected under the Vermont Wetland Rules. As such, impacts to Class II wetlands and their 50-foot buffer zones should be avoided whenever possible, in accordance with the rules. If impacts cannot be avoided, they should be minimized. Mitigation may be required for unavoidable wetland impacts to replace impacted functions and values (VANR, 2018).

The wetlands were identified using the codes of wetland cover types in the United States Fish and Wildlife Service document titled Classification of Wetlands and Deepwater Habitats of the

United States 2nd Edition (1.4MB PDF), 2013, by Cowardin, Lewis M. et al. (FGDC, 2013). In the Cowardin system, wetlands are categorized first by landscape position (tidal, riverine, lacustrine, and palustrine), followed by cover type (cover types described below), and then by hydrologic regime (ranging from saturated or temporarily-flooded to permanently flooded).

The wetlands at the project site are palustrine. Palustrine wetlands are defined using the system as nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. Wetland A was identified as being Palustrine Emergent (PEM), which is defined as wetlands in which emergent plants are the tallest life form with at least 30% areal coverage. Wetland B was categorized as Palustrine Forested (PFO). PFO is defined as wetlands in which trees, woody plants that are at least 6 m or 20 ft tall, are dominant (at least 30% areal coverage).

Wetland A

Wetland A exhibited the following secondary indicators for hydrology: geomorphic position and FAC-neutral test. Vegetation was dominated by giant goldenrod and also included common moneywort, white meadowsweet, and purple loosestrife (Figure 1).

Figure 1. Wetland A (6/1/21)

Wetland B

Wetland B is a silver maple-sensitive fern floodplain forest with hydrology indicators of water-stained leaves, geomorphic position, and FAC-neutral test. The tree layer was dominated by silver maple, with American elm and boxelder also present. The shrub layer was comprised of speckled alder. Herbaceous vegetation included sensitive fern, giant goldenrod, jack-in-the-pulpit, and jewelweed (Figure 2).

Figure 2. Wetland B (6/1/21)

The wetland complex was found to have the following functions and values: flood water and storm runoff, surface and groundwater protection, fish habitat, wildlife habitat, recreational value and economic benefits, open space and aesthetics, and erosion control through binding and stabilizing the soil. Data forms and the functional evaluation for the wetlands are provided on pages 4 through 26 of the Attachment.

4.0 BOTANICAL RESOURCES

A site visit was conducted by botanist, Elizabeth McLane on May 28, 2021 to investigate the presence of two rare plant species that have occurrence records in the Vermont Heritage Inventory in the vicinity of the Bloomfield BF 0271(27) study area. The first species of interest is *Salix pellita* (satiny willow), which has been documented to occur on the west bank of the Connecticut River near the confluence of the Nulhegan River. The second species, *Crataegus oaksiana* (Oakes' Hawthorn) has an element occurrence report at a location about 0.8 miles from the study area. No rare plants were noted at the Bloomfield BF 0271(27) project site during the May 2021 survey. In addition, no rare or significant Natural Communities were noted at this site. A memorandum summarizing the botanical findings is provided on page 27 of the Attachment.

5.0 WILDLIFE RESOURCES

A remote sensing review of wildlife resources was performed by Bear Creek Environmental for the Route 102 study site. The study involved a review of historic occurrences of rare, threatened, and endangered (RTE) animal species in the vicinity of the project site, as well as an assessment of wildlife connectivity.

Freshwater Mussels

Alasmidonta heterodon (Dwarf Wedgemussel), a rare (S1 state rank) freshwater mussel, is the only rare animal species have been documented within the vicinity of the project site according to the Vermont Natural Heritage database. The presence of this species in the Connecticut River near the confluence of the Nulhegan River dates back to 1949.

Susi von Oettigen, Endangered Species Biologist with the New England Field Office of the United States Fish and Wildlife Service, was contacted for a determination of whether a mussel survey of the Nulhegan River, immediately upstream of the confluence with the Connecticut, would be required if instream work for the bridge project were needed. In an email dated June 15, 2021 (refer to pages 28 and 29 of the Attachment), Ms. Von Oettigen replied that the documented occurrences of Dwarf Wedgemussel in that area is quite old. Only *Lynx canadensis* (Canada Lynx) and *Myotis septentrionalis* (Northern Long-eared Bat) come up in the IPaC (Information for Planning and Consultation) as listed as rare, threatened and endangered (RTE) species on the U.S. Fish & Wildlife Service web page that could be potentially impacted by the Bloomfield bridge project (https://ecos.fws.gov/ipac/location/2CJEEOZTCNBXDOJW24QJQGIVRY/resources#endangered-species, accessed June 16, 2021). Both Canada Lynx and Northern Long-eared Bat are listed as federally threatened.

Bats

The project area was not evaluated for RTE bat presence nor was potential habitat quantified; however, it is possible that the Little Brown Bat (state-endangered) and/or Northern Long-eared Bat (state-endangered, federally threatened) could be found in the vicinity of the project. BCE scientists examined the bridge for features that may provide potential bat roosting habitat. Photographs taken of the bridge indicate there are crevices due to peeling paint and locations in the bridge that could provide habitat for bats (e.g. I-beams that are hollowed out). Photographs of the bridge are provided on page 30 of the Attachment. BCE also noted the presence of a handful of standing dead and dying trees within the study area that could also provide potential roosting habitat. It is recommended that a bat survey be conducted of the bridge and potential roost trees, as the project moves forward to a design stage.

Wildlife Habitat

The Vermont Conservation Design database on the Vermont Agency of Natural Resources BioFinder Mapping Tool was reviewed to assess landscape scale wildlife habitat. The results of this review are presented on page 31 of the Attachment. The stream crossing location is ranked as highest priority for the following categories: surface water and riparian areas, riparian and wildlife connectivity, and physical landscape diversity. Additionally, forested lands adjacent to the site on the west side of VT-102 have been identified as a highest priority interior forest block, connectivity block, and highest priority for physical landscape diversity.

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Geospatial and remote sensing data sources include:

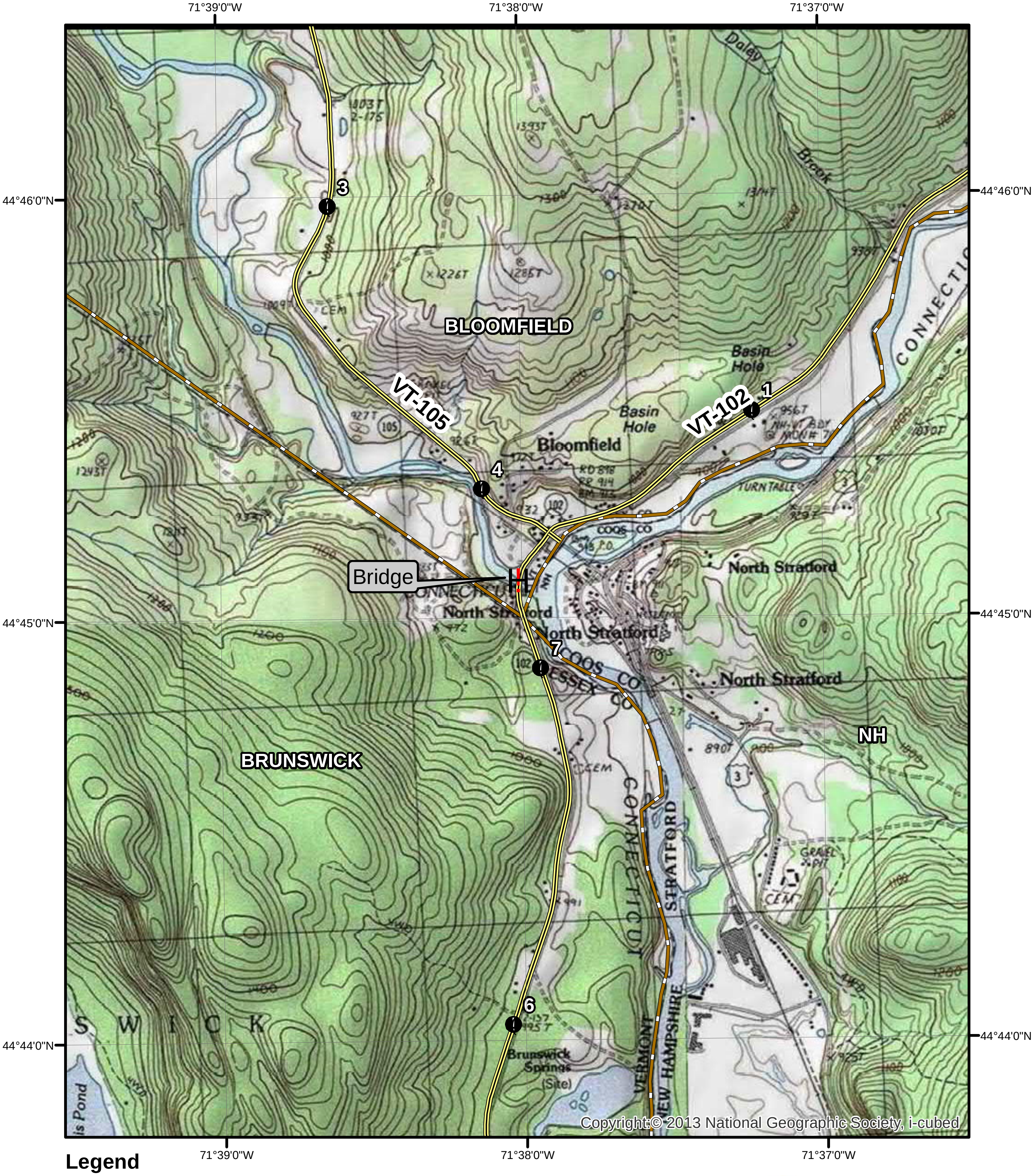
Vermont Agency of Natural Resources (VANR). 2021. BioFinder Mapping Tool. Available at: https://anrmaps.vermont.gov/websites/BioFinder/

Vermont Agency of Natural Resources (VANR). 2021. Natural Resources Atlas. Available at: http://anrmaps.vermont.gov/websites/anra5/

Vermont Center for Geographic Information (VCGI). Data available at: http://gis.vtanr.opendata.arcgis.com/

Attachment

Project Location Map for Bloomfield BF 0271(27)
Vermont Route 102
Bloomfield, Vermont



Legend

- ● Mile Marker
- Major Road
- Town Boundary

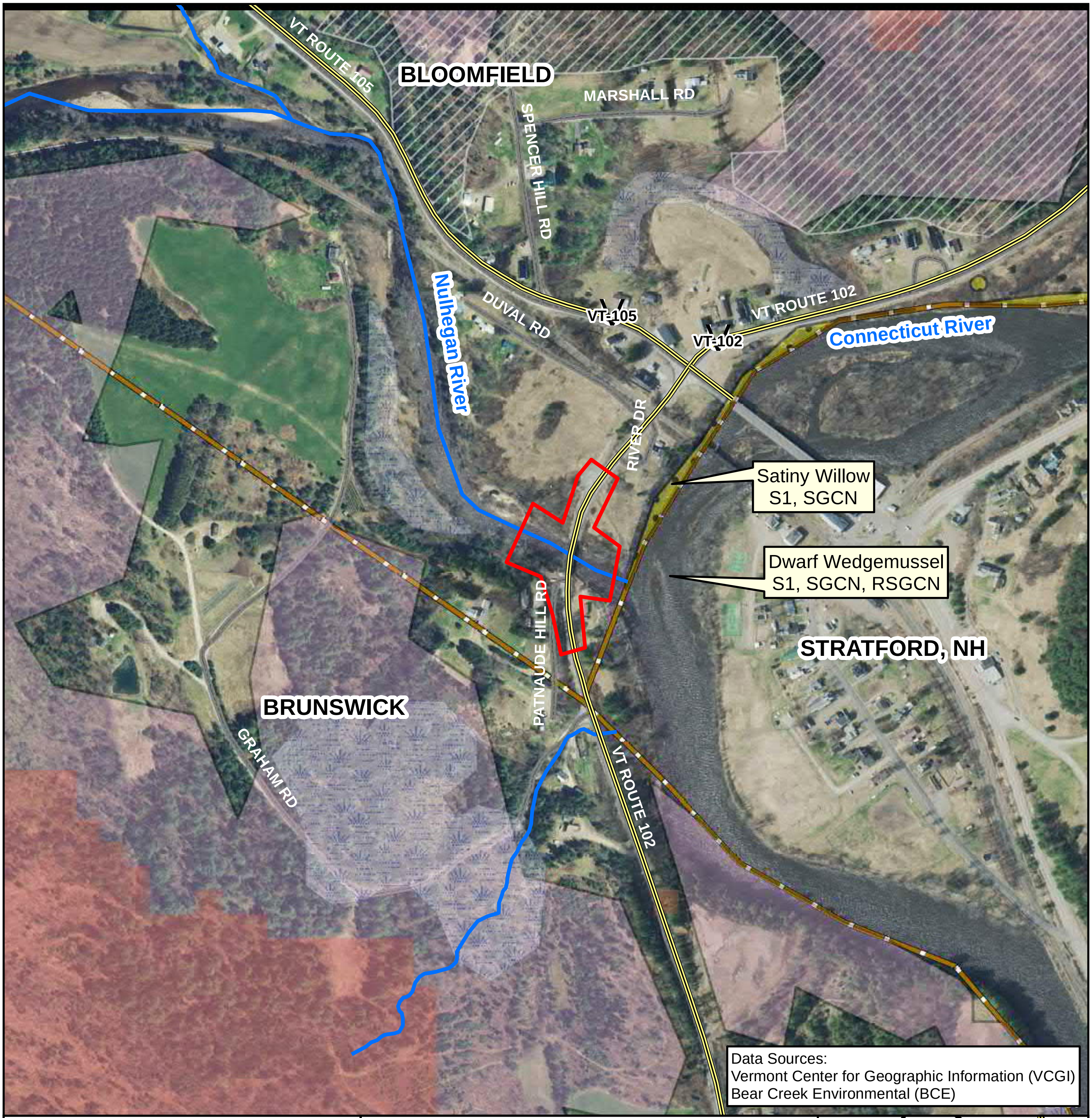
0 1,000 2,000 Feet

1 inch = 2,000 feet

Data sources include:
Vermont Center for Geographic Information (VCGI)

Map composed on June 18, 2021.

Bear Creek Environmental



Data Sources:
Vermont Center for Geographic Information (VCGI)
Bear Creek Environmental (BCE)

Resource Map - Ecological

Vermont Agency of Transportation
Bloomfield BF 0271(27)
Vermont Route 102
Bloomfield, VT
Essex County

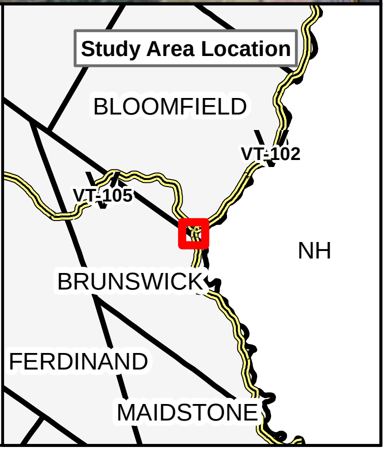
Bear Creek Environmental

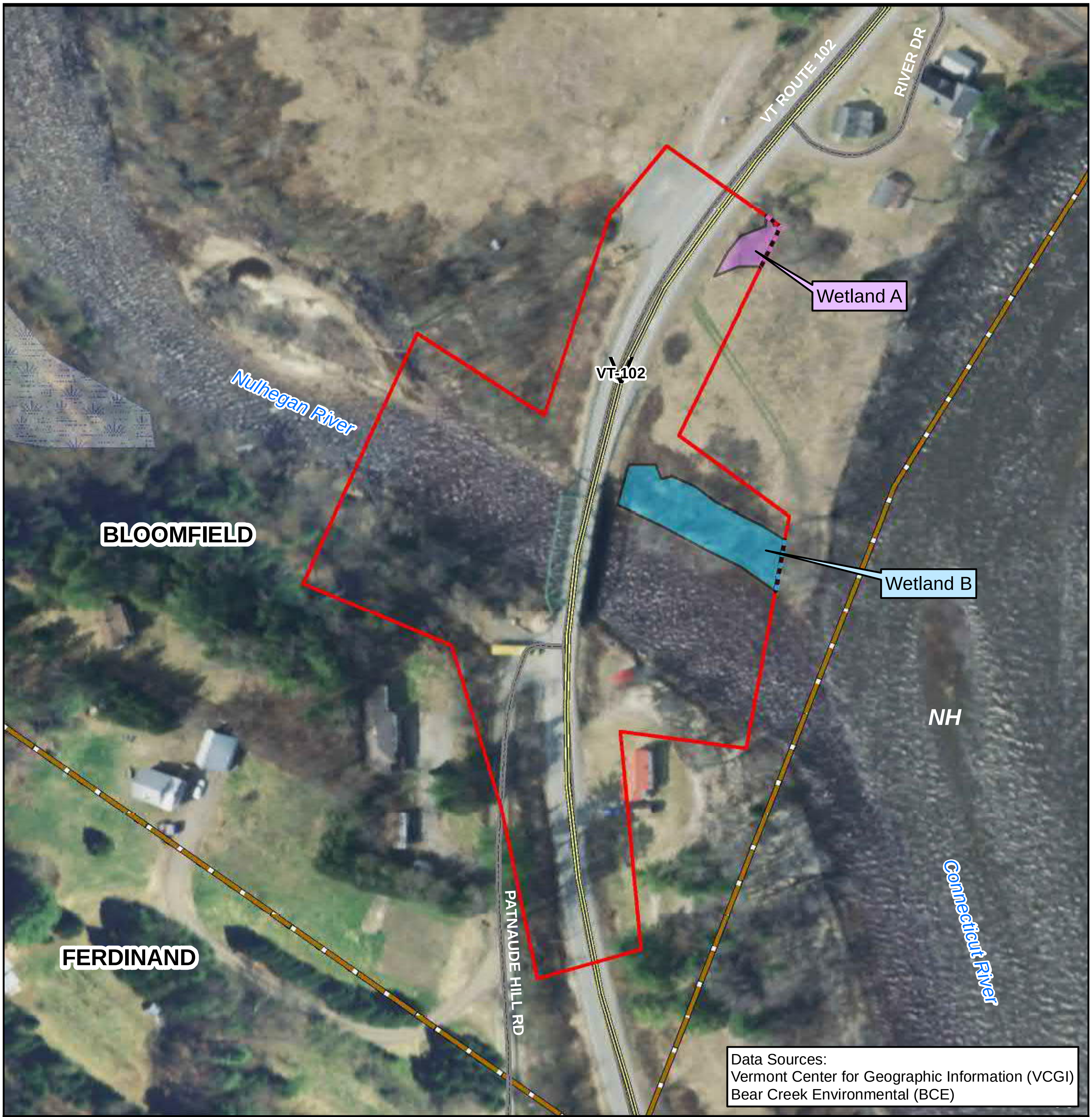
Legend

- Study Area
- VHD Stream
- Deer Wintering Area
- RTE Species
- Core Habitat
- Vermont Sig. Wetland Inventory
- Habitat Block
- Major Road
- Road
- Town Boundary

0 125 250 500 Feet

Map composed May 7, 2021.





Data Sources:
Vermont Center for Geographic Information (VCGI)
Bear Creek Environmental (BCE)

Resource Map - Field Delineated Wetlands

Vermont Agency of Transportation
Bloomfield BF 0271(27)
Vermont Route 102
Bloomfield, VT
Essex County

Bear Creek Environmental

Legend

🟥 Study Area

Field Delineated Wetland

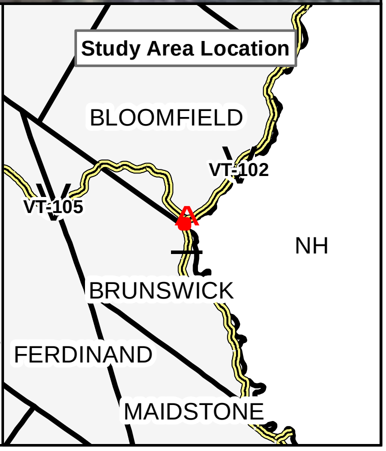
- Class II
- Class III

- Major Road
- Vermont Sig. Wetland Inventory
- Road
- Town Boundary

0 37.5 75 150 Feet

A wetland delineation was performed in accordance with the methods described in the manual prepared by the US Army Corps of Engineers dated 2012 and titled "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region". Wetland delineation performed on 6/1/21. Wetland delineation was confirmed by Shannon Morrison, District Ecologist with the VT Wetlands Program at a site visit on June 30, 2021. Field delineated wetlands continue beyond the study area boundary, but mapping only occurred within the study area. Wetlands that extend farther are shown with an open boundary (dotted line). Map composed 6/14/21, updated 7/1/21.

Study Area Location



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: VTrans Bloomfield BF 0271(27) City/County: Bloomfield/Essex Sampling Date: 6/1/21

Applicant/Owner: Vtrans State: VT Sampling Point: A wet

Investigator(s): Alex Marcucci, Mary Nealon Section, Township, Range: ____

Landform (hillside, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR or MLRA): LRR R Lat: 44.752171 Long: -71.632940 Datum: WGS 1984

Soil Map Unit Name: ____ NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____

Hydric Soil Present? Yes X No ____

Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? Yes ____ No X Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: A wet

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Herb Stratum (Plot size: 5)			
1. *Solidago gigantea*	70	Yes	FACW
2. *Achillea millefolium*	10	No	FACU
3. *Lysimachia nummularia*	10	No	FACW
4. *Oxalis dillenii*	5	No	FACU
5. *Ranunculus caricetorum*	5	No	FAC
6. *Spiraea alba*	5	No	FACW
7. *Lythrum salicaria*	5	No	OBL
8.			
9.			
10.			
11.			
12.			
	110	=Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	85	x 2 =	170
FAC species	5	x 3 =	15
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	110	(A)	250 (B)

Prevalence Index = B/A = 2.27

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: A wet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 3/1	100					Loamy/Clayey	slightly sandy

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7)
- Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- High Chroma Sands (S11) (**LRR K, L)**
- Loamy Mucky Mineral (F1) (**LRR K, L**)
- Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- Coast Prairie Redox (A16) (**LRR K, L, R**)
- 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- Polyvalue Below Surface (S8) (**LRR K, L**)
- Thin Dark Surface (S9) (**LRR K, L**)
- Iron-Manganese Masses (F12) (**LRR K, L, R**)
- Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: rock?

Depth (inches): 11

Hydric Soil Present? **Yes** X **No**

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: VTrans Bloomfield BF 0271(27) City/County: Bloomfield/Essex Sampling Date: 6/1/21
Applicant/Owner: Vtrans State: VT Sampling Point: Aup
Investigator(s): Alex Marcucci, Mary Nealon Section, Township, Range: ____
Landform (hillside, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR or MLRA): LRR R Lat: 44.752059 Long: -71.633020 Datum: WGS 1984
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X
If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? Yes ____ No X Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Aup

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		

Herb Stratum (Plot size: 5)			
1. *Grass unidentified*	95	Yes	
2. *Galium mollugo*	5	No	FACU
3. *Taraxacum officinale*	5	No	FACU
4. *Glechoma hederacea*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	110 =Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	15 (A)		60 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Aup

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3	100						

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)

___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ High Chroma Sands (S11) (**LRR K, L)**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: rock?

Depth (inches): 8

Hydric Soil Present? Yes ___ **No** X

Remarks:
This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: VTrans Bloomfield BF 0271(27) City/County: Bloomfield/Essex Sampling Date: 6/1/21

Applicant/Owner: Vtrans State: VT Sampling Point: Bwet

Investigator(s): Alex Marcucci, Mary Nealon Section, Township, Range: ___

Landform (hillside, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR or MLRA): LRR R Lat: 44.751589 Long: -71.633164 Datum: WGS 1984

Soil Map Unit Name: ___ NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are “Normal Circumstances” present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___

Hydric Soil Present? Yes X No ___

Wetland Hydrology Present? Yes X No ___

Is the Sampled Area within a Wetland? Yes X **No** ___

If yes, optional Wetland Site ID: ___

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? Yes ___ No X Depth (inches): ___
(includes capillary fringe)

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: Bwet

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharinum*	20	Yes	FACW
2. *Ulmus americana*	5	No	FACW
3. *Acer negundo*	5	No	FAC
4.			
5.			
6.			
7.			
	30	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus incana*	10	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	60	Yes	FACW
2. *Solidago gigantea*	10	No	FACW
3. *Arisaema triphyllum*	5	No	FAC
4. *Rubus pubescens*	5	No	FACW
5. *Impatiens capensis*	5	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	85	=Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	115	x 2 =	230
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	125	(A)	260 (B)

Prevalence Index = B/A = 2.08

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Bwet

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/2	100					Loamy/Clayey	
18-24+	10YR 3/1	90					Loamy/Clayey	Mn conc - black <5%, fine sand 5%

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)

___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ High Chroma Sands (S11) (**LRR K, L)**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? **Yes** X **No** ____

Remarks:
This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: VTrans Bloomfield BF 0271(27) City/County: Bloomfield/Essex Sampling Date: 6/1/21
Applicant/Owner: Vtrans State: VT Sampling Point: B up
Investigator(s): Alex Marcucci, Mary Nealon Section, Township, Range: ____
Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR or MLRA): LRR R Lat: 44.751711 Long: -71.633085 Datum: WGS 1984
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X
If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? Yes ____ No ____ Depth (inches): ____
Water Table Present? Yes ____ No ____ Depth (inches): ____
Saturation Present? Yes ____ No ____ Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: B up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Malus*	5	Yes	
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	

Sapling/Shrub Stratum (Plot size: 15)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus tremuloides*	10	Yes	FACU
2. *Cornus alba*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	15	=Total Cover	

Herb Stratum (Plot size: 5)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Solidago gigantea*	50	Yes	FACW
2. *Solidago flexicaulis*	10	No	FACU
3. *Aegopodium podagraria*	5	No	FAC
4. *Solidago rugosa*	5	No	FAC
5. *Taraxacum officinale*	5	No	FACU
6. *Fragaria vesca*	5	No	UPL
7. *Galium mollugo*	5	No	FACU
8. *Rubus idaeus*	5	No	FACU
9.			
10.			
11.			
12.			
	90	=Total Cover	

Woody Vine Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	55	x 2 =	110	
FAC species	10	x 3 =	30	
FACU species	35	x 4 =	140	
UPL species	5	x 5 =	25	
Column Totals:	105	(A)	305	(B)

Prevalence Index = B/A = 2.90

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: B up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12+	10YR 3/3	100						

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2] Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)

___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ High Chroma Sands (S11) (**LRR K, L)**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

VERMONT WETLAND EVALUATION FORM

Project Name: Bloomfield BF0271(27)   Project #:

Date: June 1, 2021   Investigator: Alex Marcucci and Mary Nealon

SUMMARY OF FUNCTIONAL EVALUATION:
Each function gets a score of 0= not present; L = Low; P = Present; or H = High.

1. Water Storage for Flood Water and Storm Runoff	H
2. Surface & Ground Water Protection	H
3. Fish Habitat	P
4. Wildlife Habitat	H
5. Exemplary Wetland Natural Community	0
6. Rare, Threatened, and Endangered Species Habitat	0
7. Education and Research in Natural Sciences	0
8. Recreational Value and Economic Benefits	P
9. Open Space and Aesthetics	P
10. Erosion Control through Binding and Stabilizing the Soil	H

Note:

- ***When to use this form:*** This is a field form to help you compile data needed to evaluate the 10 possible functions and values of a wetland as described in the Vermont Wetland Rules. All information in this form is replicated in the applications for both wetland determinations and wetland permits.
- ***Both a desktop review and field examination*** should be employed to accurately determine surrounding land use, hydrology, hydroperiod, vegetation, position in the landscape, and physical attributes.
- ***The entire wetland or wetland complex*** in question must be evaluated to determine the level of function in all ten (10) categories for accurate classification. A wetland complex can be defined as a series of interconnected wetland types.
- ***The surrounding upland and outflow area*** of the wetland should be examined to determine land use, development, nearby natural resources, and hydrology. The surrounding land use, previous development, and cumulative impacts may play a role in the current function of the wetland. For best results please read all descriptions prior to scoring activity.
- ***Evaluation***: The first portion in each section determines whether the wetland does or does not provide the function. If none of the conditions listed in the first section are met, proceed

to the next section. If any of these conditions are met, determine if the wetland provides this function at a higher or lower level based on the information listed in the subsequent sections.

- ***Presumptions:*** Please note that many wetlands are already presumed to be significant under the Vermont Wetland Rules. A wetland is presumed to be significant if:
    - The wetland is mapped on the VSWI map
    - The wetland is contiguous to a VSWI mapped wetland
    - The wetland meets the presumptions of significance under Section 4.6
    - The wetland has a preliminary determination that it is Class II

1. Water Storage for Flood Water and Storm Runoff

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☒ Constricted outlet or no outlet and an unconstricted inlet.
- ☒ Physical space for floodwater expansion and dense, persistent, emergent vegetation or dense woody vegetation that slows down flood waters or stormwater runoff during peak flows and facilitates water removal by evaporation and transpiration.
- ☒ If a stream is present, its course is sinuous and there is sufficient woody vegetation to intercept surface flows in the portion of the wetland that floods.
- ☒ Physical evidence of seasonal flooding or ponding such as water stained leaves, water marks on trees, drift rows, debris deposits, or standing water.
- ☐ Hydrologic or hydraulic study indicates wetland attenuates flooding.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level:

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ Significant flood storage capacity upstream of the wetland, and the wetland in question provides this function at a negligible level in comparison to upstream storage (unless the upstream storage is temporary such as a beaver impoundment).
- ☐ Wetland is contiguous to a major lake or pond that provides storage benefits independently of the wetland.
- ☐ Wetland's storage capacity is created primarily by recent beaver dams or other temporary structures.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.

☒ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ History of downstream flood damage to public or private property.
- ☒ Any of the following conditions present downstream of the wetland, but upstream of a major lake or pond, could be impacted by a loss or reduction of the water storage function.
  - ☐ 1. Developed public or private property.
  - ☒ 2. Stream banks susceptible to scouring and erosion.
  - ☒ 3. Important habitat for aquatic life.
- ☒ The wetland is large in size and naturally vegetated.

☐ Any of the following conditions present upstream of the wetland may indicate a large volume of runoff may reach the wetland.

- ☐ 1. A large amount of impervious surface in urbanized areas.
- ☐ 2. Relatively impervious soils.
- ☐ 3. Steep slopes in the adjacent areas.

2. Surface and Ground Water Protection

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☒ Constricted or no outlets.
- ☒ Low water velocity through dense, persistent vegetation.
- ☒ Hydroperiod permanently flooded or saturated.
- ☒ Wetlands in depositional environments with persistent vegetation wider than 20 feet.
- ☒ Wetlands with persistent vegetation comprising a defined delta, island, bar or peninsula.
- ☐ Presence of seeps or springs.
- ☒ Wetland contains a high amount of microtopography that helps slow and filter surface water.
- ☐ Position in the landscape indicates the wetland is a headwaters area.
- ☒ Wetland is adjacent to surface waters.
- ☐ Wetland recharges a drinking water source.
- ☐ Water sampling indicates removal of pollutants or nutrients.
- ☐ Water sampling indicates retention of sediments or organic matter.
- ☐ Fine mineral soils and alkalinity not low.
- ☐ The wetland provides an obvious filter between surface water or ground water and land uses that may contribute point or nonpoint sources of sediments, toxic substances or nutrients to the wetland, such as: steep erodible slopes; row crops; dumps; areas of pesticide, herbicide or fertilizer application; feed lots; parking lots or heavily traveled road; and septic systems.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ Presence of dead forest or shrub areas in sufficient amounts to result in diminished nutrient uptake.

- ☐ Presence of ditches or channels that confine water and restrict contact of water with vegetation.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.
- ☐ Current use in the wetland results in disturbance that compromises this function.

☒ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The wetland is adjacent to a well head or source protection area, and provides ground water recharge.
- ☐ The wetland provides flows to Class A surface waters.
- ☐ The wetland contributes to the protection or improvement of water quality of any impaired waters.
- ☒ The wetland is large in size and naturally vegetated.

3. Fish Habitat

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☒ Contains woody vegetation that overhangs the banks of a stream or river and provides any of the following: shading that controls summer water temperature; cover including refuges created by overhanging branches or undercut banks; source of terrestrial insects as fish food; or streambank stability.
- ☒ Provides spawning, nursery, feeding or cover habitat for fish (documented or professionally judged). Common habitat includes deep marsh and shallow marsh associates with lakes and streams, and seasonally flooded wetlands associated with streams and rivers.
- ☐ Documented or professionally judged spawning habitat for northern pike.
- ☒ Provides cold spring discharge that lowers the temperature of receiving waters and creates summer habitat for salmonoid species.
- ☐ The wetland is located along a tributary that does not support fish, but contributes to a larger body of water that does support fish. The tributary supports downstream fish by providing cooler water, and food sources.

4. Wildlife Habitat

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Provides resting, feeding staging or roosting habitat to support waterfowl migration, and feeding habitat for wading birds. Good habitats for these species include open water wetlands.
- ☒ Habitat to support one or more breeding pairs or broods of waterfowl including all species of ducks, geese, and swans. Good habitats for these species include open water habitats adjacent shallow marsh, deep marsh, shrub wetland, forested wetland, or naturally vegetated buffer zone.
- ☒ Provides a nest site, a buffer for a nest site or feeding habitat for wading birds including but not limited to: great blue heron, black-crowned night heron, green-backed heron, cattle egret, or snowy egret. Good habitats for these species include open water or deep marsh adjacent to forested wetlands, or standing dead trees.
- ☒ Supports or has the habitat to support one or more breeding pairs of any migratory bird that requires wetland habitat for breeding, nesting, rearing of young, feeding, staging roosting, or migration, including: Virginia rail, common snipe, marsh wren, American bittern, northern water thrush, northern harrier, spruce grouse, Cerulean warbler, and common loon.
- ☐ Supports winter habitat for white-tailed deer. Good habitats for these species include softwood swamps. Evidence of use includes deer browsing, bark stripping, worn trails, or pellet piles.
- ☐ Provides important feeding habitat for black bear, bobcat, or moose based on an assessment of use. Good habitat for these types of species includes wetlands located in a forested mosaic.
- ☒ Has the habitat to support muskrat, otter or mink. Good habitats for these species include deep marshes, wetlands adjacent to bodies of water including lakes, ponds, rivers and streams.
- ☐ Supports an active beaver dam, one or more lodges, or evidence of use in two or more consecutive years by an adult beaver population.
- ☐ Provides the following habitats that support the reproduction of Uncommon Vermont amphibian species including:
    - ☐ 1. Wood Frog, Jefferson Salamander, Blue-spotted Salamander, or Spotted Salamander. Breeding habitat for these species includes vernal pools and small ponds.
    - ☐ 2. Northern Dusky Salamander and the Spring Salamander. Habitat for these species includes headwater seeps, springs, and streams.
    - ☐ 3. The Four-toed salamander; Fowler’s Toad; Western or Boreal Chorus frog, or other amphibians found in Vermont of similar significance.

- ☐ Supports or has the habitat to support significant populations of Vermont amphibian species including, but not limited to Pickerel Frog, Northern Leopard Frog, Mink Frog, and others found in Vermont of similar significance. Good habitat for these types of species includes large marsh systems with open water components.
- ☒ Supports or has the habitat to support populations of uncommon Vermont reptile species including: Wood Turtle, Northern Map Turtle, Eastern Musk Turtle, Spotted Turtle, Spiny Softshell, Eastern Ribbonsnake, Northern Watersnake, and others found in Vermont of similar significance.
- ☒ Supports or has the habitat to support significant populations of Vermont reptile species, including Smooth Greensnake, DeKay's Brownsnake, or other more common wetland-associated species.
- ☒ Meets four or more of the following conditions indicative of wildlife habitat diversity:
  - ☐ 1. Three or more wetland vegetation classes (greater than 1/2 acre) present including but not limited to: open water contiguous to, but not necessarily part of, the wetland, deep marsh, shallow marsh, shrub swamp, forested swamp, fen, or bog;
  - ☒ 2. The dominant vegetation class is one of the following types: deep marsh, shallow marsh, shrub swamp or, forested swamp;
  - ☒ 3. Located adjacent to a lake, pond, river or stream;
  - ☒ 4. Fifty percent or more of surrounding habitat type is one or more of the following: forest, agricultural land, old field or open land;
  - ☐ 5. Emergent or woody vegetation occupies 26 to 75 percent of wetland, the rest is open water;
  - ☒ 6. One of the following:
    - ☐ i. hydrologically connected to other wetlands of different dominant classes or open water within 1 mile;
    - ☒ ii. hydrologically connected to other wetlands of same dominant class within 1/2 mile;
    - ☐ iii. within 1/4 mile of other wetlands of different dominant classes or open water, but not hydrologically connected;
- ☐ Wetland or wetland complex is owned in whole or in part by state or federal government and managed for wildlife and habitat conservation; and
- ☐ Contains evidence that it is used by wetland dependent wildlife species.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ The wetland is small in size for its type and does not represent fugitive habitat in developed areas (vernal pools and seeps are generally small in size, so this does not apply).

- ☐ The surrounding land use is densely developed enough to limit use by wildlife species (with the exception of wetlands with open water habitat). Can be negated by evidence of use.
- ☐ The current use in the wetland results in frequent cutting, mowing or other disturbance.
- ☐ The wetland hydrology and character is at a drier end of the scale and does not support wetland dependent species.

☒ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☒ The wetland complex is large in size and high in quality.
- ☒ The habitat has the potential to support several species based on the assessment above.
- ☒ Wetland is associated with an important wildlife corridor.
- ☐ The wetland has been identified by ANR-F&W as important habitat.

5. Exemplary Wetland Natural Community

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Wetlands that are identified as high quality examples of Vermont’s natural community types recognized by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department, including rare types such as dwarf shrub bogs, rich fens, alpine peatlands, red maple-black gum swamps and the more common types including deep bulrush marshes, cattail marshes, northern white cedar swamps, spruce-fir-tamarack swamps, and red maple-black ash seepage swamps are automatically significant for this function.

The wetland is also likely to be significant if any of the following conditions are met:

- ☐ Is an example of a wetland natural community type that has been identified and mapped by, or meets the ranking and mapping standards of, the Natural Heritage Information Project of the Vermont Fish and Wildlife Department.
- ☐ Contains ecological features that contribute to Vermont’s natural heritage, including, but not limited to:
  - ☐ Deep peat accumulation reflecting a long history of wetland formation;
  - ☐ Forested wetlands displaying very old trees and other old growth characteristics;
  - ☐ A wetland natural community that is at the edge of the normal range for that type;

☐ A wetland mosaic containing examples of several to many wetland community types; or

☐ A large wetland complex with examples of several wetland community types.

6. Rare, Threatened, and Endangered Species Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Wetlands that contain one or more species on the federal or state threatened or endangered lists, as well as species that are rare in Vermont, are automatically significant for this function.

The wetland is also likely to be significant if any of the following apply:

☐ There is creditable documentation that the wetland provides important habitat for any species on the federal or state threatened or endangered species lists;

☐ There is creditable documentation that threatened or endangered species have been present in past 10 years;

☐ There is creditable documentation that the wetland provides important habitat for any species listed as rare in Vermont (S1 or S2 ranks), state historic (SH rank), or rare to uncommon globally (G1, G2, or G3 ranks) by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department;

☐ There is creditable documentation that the wetland provides habitat for multiple uncommon species of plants or animals (S3 rank).

List name of species and ranking:

7. Education and Research in Natural Sciences

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

☐ Owned by or leased to a public entity dedicated to education or research.

☐ History of use for education or research.

☐ Has one or more characteristics making it valuable for education or research.

8. Recreational Value and Economic Benefits

☒ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

- ☒ Used for, or contributes to, recreational activities.
- ☐ Provides economic benefits.
- ☒ Provides important habitat for fish or wildlife which can be fished, hunted or trapped under applicable state law.
- ☐ Used for harvesting of wild foods.

Comments:

9. Open Space and Aesthetics

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☒ Can be readily observed by the public; and
  - ☐ Possesses special or unique aesthetic qualities; or
  - ☒ Has prominence as a distinct feature in the surrounding landscape;
- ☐ Has been identified as important open space in a municipal, regional or state plan.

10. Erosion Control through Binding and Stabilizing the Soil

☒ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☒ Erosive forces such as wave or current energy are present and any of the following are present as well:
  - ☒ Dense, persistent vegetation along a shoreline or stream bank that reduces an adjacent erosive force.
  - ☒ Good interspersion of persistent emergent vegetation and water along course of water flow.
  - ☒ Studies show that wetlands of similar size, vegetation type, and hydrology are important for erosion control.

What type of erosive forces are present?

☐ Lake fetch and waves

☒ High current velocities

☐ Water level influenced by upstream impoundment

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

☐ The stream is artificially channelized and/or lacks vegetation that contributes to controlling the erosive force.

☒ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

☒ The stream contains high sinuosity.

☐ Has been identified through fluvial geomorphic assessment to be important in maintaining the natural condition of the stream or river corridor.

Elisabeth McLane, Ecological Consulting.
22 Blue Moon Road
South Strafford, VT 05070
802 765-4745, tii.mclane0123@gmail.com

TO: Mary Nealon, Bear Creek Environmental; VTRANS
FROM: Elisabeth McLane RE: Project Name: Bloomfield – BF 0271 (27). Vermont Route 102: Bridge.
DATE: June 17, 2021

A site visit for this VRANS-designated area that is located at the bridge on Route 102 just south of the intersection between Routes 102 and 105 in Bloomfield, Vermont took place on May 28th, 2021. The area surveyed included both sides of the road, approximately 300 feet along the road both north and south of the bridge. Closer to the bridge, the strip widens to include river bank up and downstream for approximately 200 ft upstream, and 100 feet downstream (to the edge of the Connecticut River). This visit was designed to determine if Rare, Threatened, or Endangered (RTE) plants or natural communities are present within the site boundaries.

The area was surveyed on this date to determine the presence of any RTE plants, with particular attention being paid to the possible presence of two locally mapped RTE species: *Salix pellita* (Satiny Willow), and *Crataegus oaksiana (*Oakes' Hawthorn*)*. Satiny willow has a reported occurrence in the Vermont Natural Heritage Inventory close to the project site on the Connecticut River, and has a State Rank of S1 (very rare). There is an element occurrence report for Oakes' Hawthorn, which is about 0.8 mile south of the project site. *Crataegus oaksiana* has a state ranking of S1S2 (very rare to rare).

No RTE plants were noted at the Bloomfield BF 0271(27) project site during the May 2021 survey.

The project area includes stream edge as well as road side. The stream edge here is dominated by a mix of cobble and sand shore, with riprap found only under the bridge. The setting here appears relatively natural (except where riprap is present). The Natural Community type includes a mix of River Sand or Gravel Shore and River Cobble Shore. The vegetation along this shore is dominated by red-osier dogwood, speckled alder, and several willow species including: *S. bebbiana*, *S. discolor*, *S. sericea*, and *S. eriocephala*. Herbaceous plants include barren strawberry, flat-topped aster, meadowsweet, and dewberry. Several examples of a particular willow needed to be examined very closely, as they potentially resembled *S. pellita*, but based on flower structure (and including consultations with additional Vermont botanists), were determined to be especially-silky specimens of *S. sericea*, a locally-common willow species. No Crataegus species were noted at the site.

Much of the road-side area is maintained lawn. In un-maintained areas the vegetation is frequently dominated by invasive shrubs (honeysuckle, primarily). Invasive goutweed was also noted. Staghorn sumac and black ash were found as patches within this vegetated strip and silver maple is a scattered overstory tree.

Botanical Findings – No RTE plants were noted at this stie.

Natural Community Findings: No rare or significant Natural Communities were noted at this site. Invasive plants pose a threat to native plants at this site.

From: vonOettingen, Susi
To: Alex@BearCreekEnvironmental.com
Cc: mary@bearcreekenvironmental.com
Subject: Re: [EXTERNAL] VTrans bridge project & RTE mussels
Date: Tuesday, June 15, 2021 2:59:46 PM

Good afternoon,

Thanks for sending me the information re: this project. I checked my records and the documented occurrences are quite old. I'm not sure where you got that information from, but if you go through our Information, Planning and Consultation website for a species list, the mussel should not come up.

The only species that might come up are the northern long-eared bat and the lynx. I don't think lynx is present, and you can fill in the determination key and get a verification letter for the bat.

Susi

****

Susi von Oettingen
New Telephone Number: 603-748-8357 (mobile)
Endangered Species Biologist
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301

Teleworking indefinitely

From: Alex Marcucci <Alex@BearCreekEnvironmental.com>
Sent: Tuesday, June 15, 2021 12:17 PM
To: vonOettingen, Susi <susi_vonoettingen@fws.gov>
Cc: mary@bearcreekenvironmental.com <mary@bearcreekenvironmental.com>
Subject: [EXTERNAL] VTrans bridge project & RTE mussels

Ms. von Oettingen,

I hope you are doing well. I am emailing about a VTrans project that Bear Creek Environmental is involved with. The project is a scoping phase bridge project up in Bloomfield on the Nulhegan River immediately upstream of the confluence with the Connecticut River. There are documented occurrences of the Dwarf Wedgemussel (S1) within the reach of the Connecticut that the Nulhegan flows into. I have attached an ecological resource map that BCE prepared for the site to this email. My question for you is as follows: if instream work for the bridge project were needed, would a mussel survey of the Nulhegan be required?

If you are not the correct person to ask this question to, please let me know who I should contact. I appreciate any information you can provide.

Thanks so much,
Alex

Alexandra Marcucci
Environmental Scientist/GIS Specialist
Certified Floodplain Manager

Bear Creek Environmental

131 Elm Street, Suite 1
Montpelier, VT 05602
Phone: 802-223-5140
Email: Alex@BearCreekEnvironmental.com
Website: http://www.bearcreekenvironmental.com

Bloomfield BF0271 (27) – Bridge over Nulhegan River on VT Route 102
Photos taken on June 1, 2021


Figure 1. Route 102 Bridge (looking downstream)

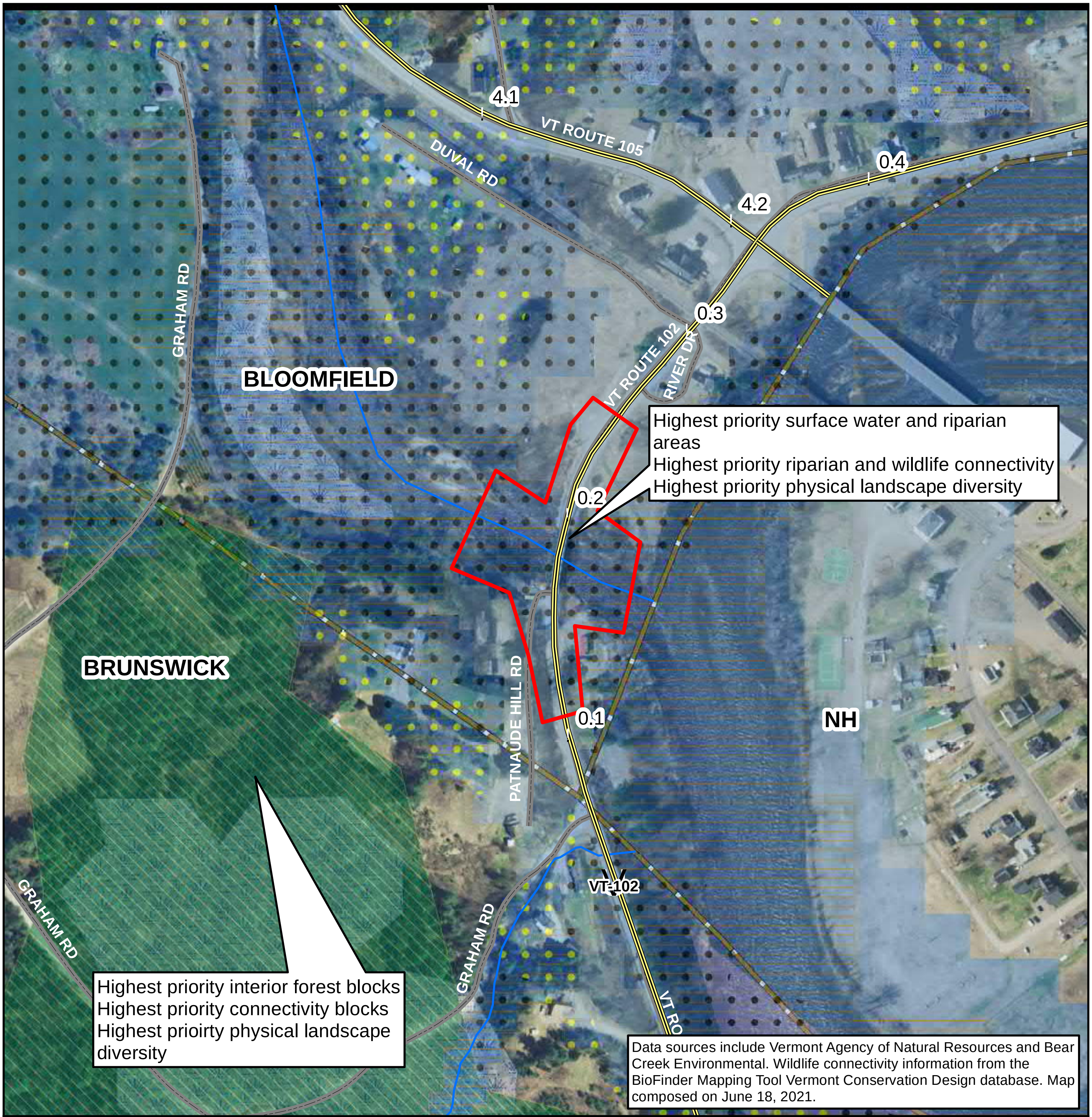

Figure 2. Route 102 Bridge (looking downstream)


Figure 3. Crevices in Route 102 Bridge


Figure 4. Peeling paint in Route 102 Bridge


Figure 5. Peeling paint and Crevices in Route 102 Bridge


Figure 6. Peeling paint and crevices in Route 102 Bridge



Highest priority surface water and riparian areas
Highest priority riparian and wildlife connectivity
Highest priority physical landscape diversity

Highest priority interior forest blocks
Highest priority connectivity blocks
Highest prioirty physical landscape diversity

Data sources include Vermont Agency of Natural Resources and Bear Creek Environmental. Wildlife connectivity information from the BioFinder Mapping Tool Vermont Conservation Design database. Map composed on June 18, 2021.

Resource Map - Wildlife Connectivity

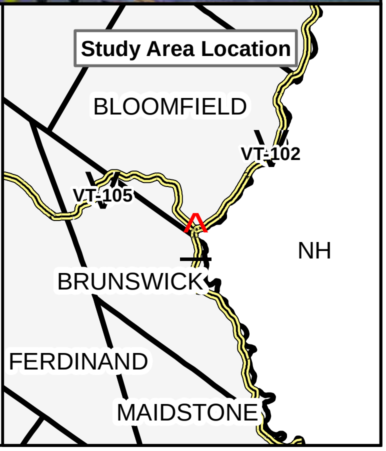
Vermont Agency of Transportation
Bloomfield BF0271(27)
Vermont Route 102
Bloomfield, VT
Essex County

Bear Creek Environmental

Legend

- 🟥 Study Area
- Mile Marker - Tenths
- Major Road
- Road
- VHD Stream
- Highest Priority Physical Landscape Diversity - Representative
- Highest Priority Physical Landscape Diversity - Responsibility
- ▨ Highest Priority Connectivity Blocks
- ▨ Connectivity Blocks - Priority
- ▨ Highest Priority Wildlife Connectivity
- 🟦 Highest Priority Surface Water and Riparian
- 🟦 Priority Surface Water and Riparian
- 🟩 Highest Priority Interior Forest Blocks - Highest Priority
- ▨ Priority Interior Forest Blocks
- VT Sig. Wetland Inventory
- Town Boundary

0 75 150 300 Feet



APPENDIX

E Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for : BLOOMFIELD
Bridge No.: 00009
District: 9
Located on: VT 00102 over NULHEGAN RIVER
approximately 0.2 MI S JCT. VT.105
Owner: STATE-OWNED

CONDITION

Deck Rating: 5 FAIR
Superstructure Rating: 4 POOR
Substructure Rating: 7 GOOD
Channel Rating: 8 VERY GOOD
Culvert Rating: N NOT APPLICABLE
Federal Str. Number: 200271000905032
Federal Sufficiency Rating: 53.6
Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1937
Year Reconstructed: 0000
Service On: 1 HIGHWAY
Service Under: 5 WATERWAY
Lanes On the Structure: 02
Lanes Under the Structure: 00
Bypass, Detour Length (miles): 01
ADT: 000470
% Truck ADT: 06
Year of ADT: 2018

GEOMETRIC DATA

Length of Maximum Span (ft): 0130
Structure Length (ft): 000134
Lt Curb/Sidewalk Width (ft): 0
Rt Curb/Sidewalk Width (ft): 0.6
Bridge Rdwy Width Curb-to-Curb (ft): 24.4
Deck Width Out-to-Out (ft): 25
Appr. Roadway Width (ft): 025
Skew: 00
Bridge Median: 0 NO MEDIAN
Min Vertical Clr Over (ft): 14 FT 11 IN
Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD
Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: STEEL THRU TRUSS
Number of Approach Spans: 0000
Number of Main Spans: 001
Kind of Material and/or Design: 3 STEEL
Deck Structure Type: 1 CONCRETE CIP
Type of Wearing Surface: 6 BITUMINOUS
Type of Membrane: 2 PREFORMED FABRIC
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: 1 MEETS CURRENT STANDARD
Approach Guardrail Ends: 1 MEETS CURRENT STANDARD
Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA
Deck Geometry: 4 MEETS MINIMUM TOLERABLE CRITERIA
Underclearances Vertical and Horizontal: N NOT APPLICABLE
Waterway Adequacy: 7 SLIGHT CHANCE OF OVERTOPPING BRIDGE & ROADWAY
Approach Roadway Alignment: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA
Scour Critical Bridges: 7 CORRECTIVE COUNTERMEASURES IN PLACE

DESIGN VEHICLE, RATING and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS(AS)
Posting Status: D OPEN, TEMPORARY SHORING
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

X-Ref. Route:
Insp. Date: 042020
Insp. Freq. (months): 12
X-Ref. BrNum:

INSPECTION SUMMARY and NEEDS

07/01/2020 - Request made to add support below southern truss ends until more adequent shoring can be installed. Bridge crew has added oak blocking below lower chord ends and pinned to seat. ~ MJ/JO

04/23/2020 - Bridge steel superstructure is in poor condition with holes through the bottom cord in several locations, the end post have large holes where the rail was attacked, Main concern at this time is the gusset plates at abutment 1 are rusted with upstream inside broken off and 90% of the downstream inside gusset rusted through. The bridge should have some shoring done to help with the weak gusset plates at abutment 1 and full replacement of the bridge planned as the rate of corrosion will compromise the load capacity soon. JS/AC

07/16/2019 - The truss has localized areas of heavy corrosion, with the most concerning section loss along the upper chord end posts interior channels and the southwest interior vertical gusset plate, which is cracked completely thru, separating half the truss connection from bearing support. The superstructure has now been lowered to a poor condition based on this gusset failure. The end posts need strengthening and the southwest truss corner needs some repair/shoring measures. Depending on timeline for upgrading plans for the bridge, should also consider adding shoring below the south end floorbeam, as well as its attached intermediate stringer ends, since corrosion is accelerating; especially, if a project is not expedited within the next few years. ~ MJ/MK

7/26/2017 Structure is in fair condition random holes found along bottom chord between portal legs and 2nd vertical in along web at each corner with some past repairs. Bottom inner flange abutment 1 upstream has heavy section loss for approx. first 3'. Few small holes found along web of vertical and diagonals. Holes also noted in portal leg. Portal has past impact damage. Couple of the x bracing angle clips cracked through and upstream abutment 1 rusted off. Deck soffit has numerous moderate to larger size delams. Structure should be programed for extensive recon or replacement. MJK AC

7/7/2015 Grease paint on the floor beams and stringers is still in good condition. The outside channel in the bottom chord on abutment #2 downstream side should be repaired. Tie plates on the bottom chord should be replaced. All steel above the bottom chord should be cleaned and painted soon. ~FRE/TJB

7/16/2013 Floor beams and stringers have been greased painted. Structure should be cleaned and painted in the near future. Some of the tie plates on the bottom chord have rusted through and some have cracks these plates will need replacement in the near future. Bottom chord has been repaired in the past on abutment #1 downstream side. ~FRE/SJH

7/11/2011 This structure was rehabbed and is in satisfactory condition .There is some prying in the bottom chord at midspan and some holes behind the bridge guardrail in the end posts in the webs in places and in abutment1 web on the right side at abutment 1. The deck is in satisfactory condition with some cracking and delams in places. ~DCP/FRE

07-13-2009 - Overall condition is satisfactory to good condition. Deck soffit has areas of deterioration. Steel superstructure has localized section loss. The upper truss members should be painted.- DCP

APPENDIX

F

Community Input

Bridge Scoping Project BF 0271(27)
Operations Input Questionnaire

The Structures Section has begun the scoping process for BF 0271(27), VT Route 102, Bridge 9, over the Nulhegan River. This is a steel thru truss bridge constructed in 1937. The Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the deck as 5 (fair), the superstructure as 4 (poor), and the substructure as 7 (good). 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. What are your thoughts on the general condition of this culvert and the general maintenance effort required to keep it in service?
   Bridge should most definitely be replaced for many reasons at this point. Further light and heavy maintenance work will be inevitable in the near future to keep this bridge in service.

2. What are your comments on the current geometry and alignment of the road overt the culvert (curve, sag, banking, sight distance)?
   Bridge is in a curve

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

4. Is the current roadway width adequate for winter maintenance including snow plowing?
   Current bridge is too narrow. Plow truck has to treat this bridge as a one-way while plowing. Most cars even treat the bridge as a one-way.

5. Are the railings constantly in need of repair or replacement? What type of railing works best for your district?
   W-Beam guardrail is the most common rail we deal with in the district and always have materials on-hand to make repairs

6. Are you aware of any unpermitted driveways within close proximity to the culvert? We frequently encounter driveways that prevent us from meeting railing and safety standards.
   There is a residential driveway 160' south of the bridge that doesn't appear to have a permit and there is a town road immediately south of the bridge that may need to be re-aligned

7. 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.
   I am unaware of any abutters that will require any special attention, other than typical during the construction of a new structure

8. Do you find that extra effort is required to keep the slopes and river banks around the culvert in a stable condition? Is there frequent flood damage that requires repair?
   No

9. Does this culvert seem to catch an unusual amount of debris from the waterway?
   No

10. Are you familiar with traffic volumes in the area of this project?
    Very low traffic volume

11. Do you think a closure with off-site detour and accelerated construction would be appropriate? Do you have any opinion about a possible detour route, assuming that we use State route for State projects and any route for Town projects? Are there locations on a potential detour that are already congested that we should consider avoiding?
    Detour route would be Rt 3. From the bridge would have to go all the way to Guildhall to cross over to Rt 3. Total detour around would be 30+ miles

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.
    The bridge crew installed shoring under the end floor beam after a Critical Bridge inspection finding, then a contractor came in and repaired an area of the top chord that was pointed out in the same Bridge inspection finding and installed a little shoring in front of the bearing.

13. Are there any drainage issues that we should address on this project?
    No

14. Are you aware of any complaints that the public has about issues that we can address on this project?
    No

15. Is there anything else we should be aware of?
    Currently, other than the structural issues, the biggest problem maintenance has is with the width

Becky Gaudreau <bgaudreau@dubois-king.com>

BLOOMFIELD BF 0271(27) 21B028 - Bridge 9 on VT Route 102 over Nulhegan River - Local Concerns Meeting Follow-up

Stone, Laura <Laura.Stone@vermont.gov> Thu, Nov 17, 2022 at 4:19 PM
To: "BowenJr, Ray" <townofbloomfieldvt@gmail.com>
Cc: mooms <mooms@dubois-king.com>, Becky Gaudreau <bgaudreau@dubois-king.com>, rtetreault <rtetreault@dubois-king.com>, "Ehrlich, Judith" <Judith.Ehrlich@vermont.gov>, "Booth, Michael" <Michael.Booth@vermont.gov>, "Cota, Carolyn" <Carolyn.Cota@vermont.gov>, "lin-m@juno.com" <lin-m@juno.com>, dmorton <dmorton@nvda.net>, "DeMent, Jacqueline" <Jacqueline.DeMent@vermont.gov>, "anancynancy@aol.com" <anancynancy@aol.com>, Jim Mazzonna <debanvilles@gmail.com>, "McCarthy, JB" <JB.McCarthy@vermont.gov>

Good afternoon,

Thank you for helping us schedule the Local Concerns Meeting to discuss the scope for the upcoming Bridge 9 project over the Nulheagan River. As discussed at the meeting, the intent was to gather additional community considerations needed to make our recommendation, as rehabilitation of the bridge (regardless of its condition) can only be eliminated from consideration if the repaired bridge can't meet the "Purpose and Need Statement" for the project. Overall, I felt the selectboard was in favor of a wider bridge, stating that the current configuration is a public safety issue, especially for unfamiliar drivers, pedestrians, bicycles and snowmobiles. As discussed, the current bridge has a roadway width of 20-feet, which is substandard by 8 feet. While the historic integrity of the bridge holds a great importance, the width considerations and safety of the traveling public is always most imperative and will be evaluated during the scoping process.

Identifying the purpose and need will be a crucial step in making the right recommendation, and obtaining the necessary Section 4(f) and 106 permits for historic mitigation. Once we have drafted up the revised Purpose and Need statement including the community needs, we will send it to the Town for review and comment.

Summary of Local Concerns Discussion:

- *Bridge Closure During Construction:* There was a question about how long the bridge would be closed during construction if a closure is chosen. As discussed, we anticipate that the project would require a construction season closure. There are certain Accelerated Bridge techniques that could be utilized to reduce that timeframe, such as utilizing precast elements. While we may be able to shave some time off of the potential closure period, this will likely still be at a bare minimum 30+ day closure due to the magnitude of the project and complexities with disassembling the truss along with construction of new foundations. The shortest route around utilizes US Route 3 into New Hampshire and has an end-to-end distance of 18.0 miles. Since Route 3 parallels VT Route 102, there would be minimal impact to through route traffic. However locals traveling from one end of the bridge to the other would have a relatively long distance around. Several concerns were bought up at the meeting about the detour route shown. Participants expressed concern that Janice Peaslee Bridge in Maidstone is posted for 20T and is a one lane structure and indicated that detoured traffic would need to drive further down into Guildhall. Additionally, US Route 3 is very busy already and may not be appropriate for use of a detour. This will be investigated during the scoping process. There were concerns brought up about construction timing and any potential detour. The Town and business owners indicated that the slowest part of the year and preferable closure window would be mud season and after hunting season, which would have an impact to school bus routes and would fall outside of the allowable construction season. During the meeting, concern was also expressed about increased response times for emergency vehicles and impacts to local business.

- *Business impacts:* The owners of the Debanville's General Store & Café were present at the meeting and expressed concerns about business impacts due to a potential detour. They stated that their business suffered tremendously due to the pandemic. Summer (construction season) is their busiest season, and closing the road at that time would be detrimental to their business. They also stated that an 18 mile detour for an extended period of time would be excruciating for the general traveling public.

- *Rehabilitation/Replacement Options:* As explained above, in order to be eligible for federal funds, the rehabilitation option must be considered first. Many meeting participants felt that a rehabilitation project would not meet the needs of the Town and that a full bridge replacement with a new conventional bridge is warranted. The Town stated that they would like a bridge that will meet their needs for height, width, and loading. As discussed, from a structural standpoint, the truss is in satisfactory condition above the deck and in its as-built condition has adequate capacity. All steel members below the deck, including the bottom chord of the truss is in poor condition, and would require replacement to get the Truss back up to the H20 design loading. During the meeting, participants expressed many concerns related to the geometry and alignment of the bridge. The selectboard stated that the curve on the bridge approach along with the substandard width creates a safety issue, especially for drivers who are not familiar with the configuration. There is a high percentage of out of state plates and unfamiliar users noted during the summertime. It was suggested that re-aligning the bridge towards the New Hampshire side would help with sight distance issues and widening the bridge would help tremendously with safety concerns. Meeting attendees felt that a Truss is no longer practical in this location as the truss does not allow large trucks through due to height restrictions. Additionally there is farmland surrounding the bridge, and it is difficult to get farming equipment across to the other side. The selectboard mentioned that a local farmer, Dean Hook, has farmland on both sides of the bridge and access to his land on the other side is an issue. As discussed, if the truss came out, the new bridge would not be required to be a truss. The community members felt a new conventional structure would better serve the trucks that currently use the bridge, including the 18-wheeler milk truck, school busses, farming equipment, and emergency vehicles.

- *Snowmobile/Multi-use Accommodations:* Meeting participants expressed concern over the bridge not being wide enough for snowmobiles use. Currently, the State VAST trail comes up to the bridge, and snowmobiles need to cross over the bridge to continue to the other side. This creates extra wear on the bridge from the snowmobiles who are driving directly on the pavement. Lin Mixer, an active member of the snowmobile community asked what the snowmobile access across the bridge will look like after the project, and suggested that a design similar to the Rogers Rangers bridge at the New Hampshire/Vermont Town line along US Route 2 would be preferable. The Roger Rangers bridge featured an extra wide (10-foot wide) sidewalk that could be groomed and used by snowmobilers in the winter. As discussed, a minimum 8 to 10-foot width is needed for the snow grooming equipment. Meeting participants stressed that a multi-use bridge would be preferable to accommodate the frequent pedestrian and bicycle use as well as the VAST trail users

- *Archaeological Sensitivity:* As discussed, the VTrans environmental group looks for pre-historic and historic resources that could designate an area as archaeologically sensitive. Whenever there are areas of archaeological sensitivity, we are concerned about any type of ground disturbance. While the area directly around the bridge has been disturbed, from the construction of the bridge, the results from a field inspection in combination with background research, has found the project area to contain three areas of archaeological concern, as a result of the proximity of the historic site and several areas of flat, potentially undisturbed land surrounding the bridge. Placement of a temporary bridge would require additional archaeological studies to clear the area of sensitivity. Anywhere there would be ground disturbance, preliminary test borings will be taken for archaeological evaluation; this is a phase 1 archaeological study. We will plan on conducting a phase 1 archaeology study next summer to get the process moving and the area cleared for any potential impacts from the project.

- Temporary Bridge Option: The Business owners and selectboard participants at the meeting felt that a temporary bridge is warranted at this location due to the long distance of the detour. It was speculated that the State owned ROW is wider on the Connecticut River side and it may be preferable to place a temporary bridge on that side of the road.

- *Property Owner Concerns:* As discussed, Nancy Loomis reached out prior to the meeting to express concern about the impacts this project will have on her property. She is concerned about any permanent encroachments onto her property as well as potential temporary impacts from placement of a temporary bridge on her side of the road. Regardless of the placement of a temporary bridge, project clean up and reestablishment of turf would be included in the contract, and the surrounding properties would be brought back to the original state after the project is completed.

- *Hydraulic Capacity:* There was brief discussion about the current hydraulic adequacy of the bridge. It was mentioned that Ice jams hit the bottom of the existing bridge on occasion and that the bridge has only flooded once, in 1978. The VTrans hydraulics section has analyzed the bridge and has found that it does not meet the minimum hydraulic standards. As such, the superstructure type and vertical alignment of the roadway will be brought into consideration in developing alternatives.

- *Construction Year:* As discussed at the meeting, the project is currently in the budget for construction in the summer of 2026. It is possible this could move a year due to budget, Right-of-Way, utility relocation or permitting delays. We do not anticipate the schedule deviating more than a year.

The presentation from Monday night has been uploaded to our VTrans projects page: https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/21B028. All future plans and presentations will also be posted to the projects page.

Once we obtain Managements approval of the scope, which is a necessary step for federal funding, we will reach out to the Town for an another meeting that will go over the alternatives in greater detail and discuss our selected alternative. We expect to be reaching out to you again in the next 6 months to distribute our final scoping report and set up a Meeting. Please feel free to contact Rich or I with any other questions or comments prior to then. We really enjoyed meeting with everyone and are looking forward to working with the Town of Bloomfield on this project.

Best Regards,

Laura

Laura J. Stone, P.E. (She/Her) | Scoping Engineer/AOT Project Manager

Project Delivery Bureau | Structures Section | Project Initiation and Innovation

Highway Division

Vermont Agency of Transportation

Barre City Place | 219 North Main Street | Barre, VT 05641

802-917-4996 phone | laura.stone@vermont.gov

http://vtrans.vermont.gov/highway/structures-hydraulics/project-initiation-and-innovation

It’s time to “button up” your homes for winter and the State of Vermont and the Button Up Vermont campaign have many resources available. To help prepare for and get through the home heating season, you can find information, financial resources, tips and more at vermont.gov/ButtonUpVT.

From: Stone, Laura
Sent: Wednesday, October 26, 2022 11:46 AM
To: Townof Bloomfield <townofbloomfieldvt@gmail.com>
Cc: mooms <mooms@dubois-king.com>; Becky Gaudreau <bgaudreau@dubois-king.com>; rtetreault <rtetreault@dubois-king.com>; Ehrlich, Judith <Judith.Ehrlich@vermont.gov>; Booth, Michael <Michael.Booth@vermont.gov>; Cota, Carolyn <Carolyn.Cota@vermont.gov>; lin-m@juno.com
Subject: BLOOMFIELD BF 0271(27) 21B028 - Bridge 9 on VT Route 102 over Nulhegan River - Local Concerns Meeting

Good morning Raymond,

The Vermont Agency of Transportation along with Dubois & King, Inc. is evaluating alternatives for the scoping effort for Bridge 9 over Nulhegan River located along VT Route 102 in the Town of Bloomfield. We would like to ensure that we are considering all of the potentially feasible and practical solutions for this bridge project and that our current purpose and need statement is consistent with local concerns and issues so that the best possible solution can be identified. We would also like to discuss how this purpose and need will affect our recommended alternative in regards to the Section 106 review and 4(f) evaluation for permitting. I would like to schedule a Local Concerns Meeting to gather input from stakeholders, including selectboard members and property owners. During this meeting we can discuss the existing conditions of the bridge, site constraints, and options that should be considered in the scoping report.

If possible, we would like to hold the meeting during a regularly scheduled Selectboard Meeting. The Local Concerns Meeting will likely take about 30 minutes comprised of a 20 minute presentation and 10 minute question and comment period. Planning and development, public works, the Selectboard, Property Owners, and anyone else you think may have an interest should be represented at the meeting. At this time, we prefer to hold public meetings remotely, but are able to meet in person as well.

-

Please let me know at your earliest convenience to arrange a time and date for the Local Concerns Meeting. We would like to schedule the meeting at least 30 days out to allow for adequate notification to affected property owners and other stakeholders.

Best Regards,

Laura J. Stone, P.E.

Laura J. Stone, P.E. (She/Her) | Scoping Engineer/AOT Project Manager

Project Delivery Bureau | Structures Section | Project Initiation and Innovation

Highway Division

Vermont Agency of Transportation

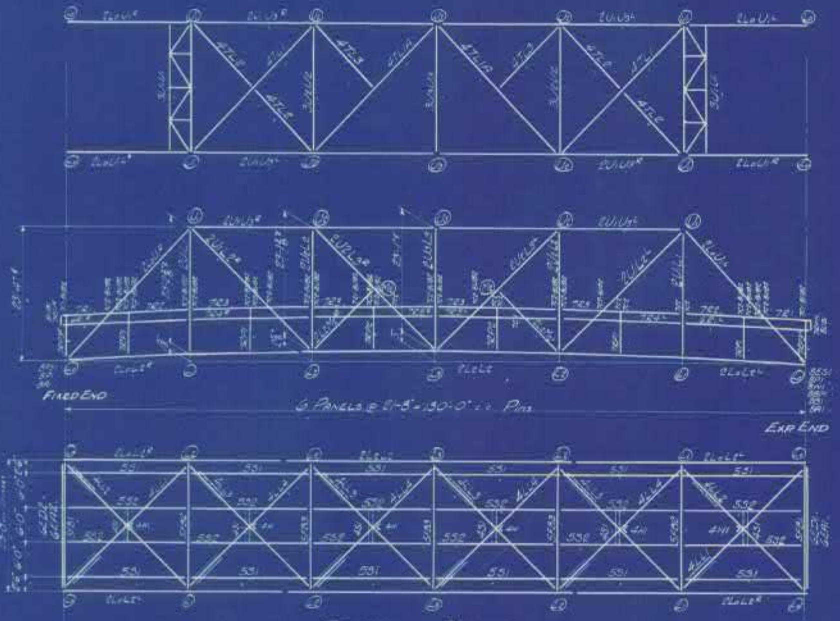
Barre City Place | 219 North Main Street | Barre, VT 05641

802-917-4996 phone | laura.stone@vermont.gov

http://vtrans.vermont.gov/highway/structures-hydraulics/project-initiation-and-innovation

APPENDIX

G Existing Plans



ERECTION DIAGRAM

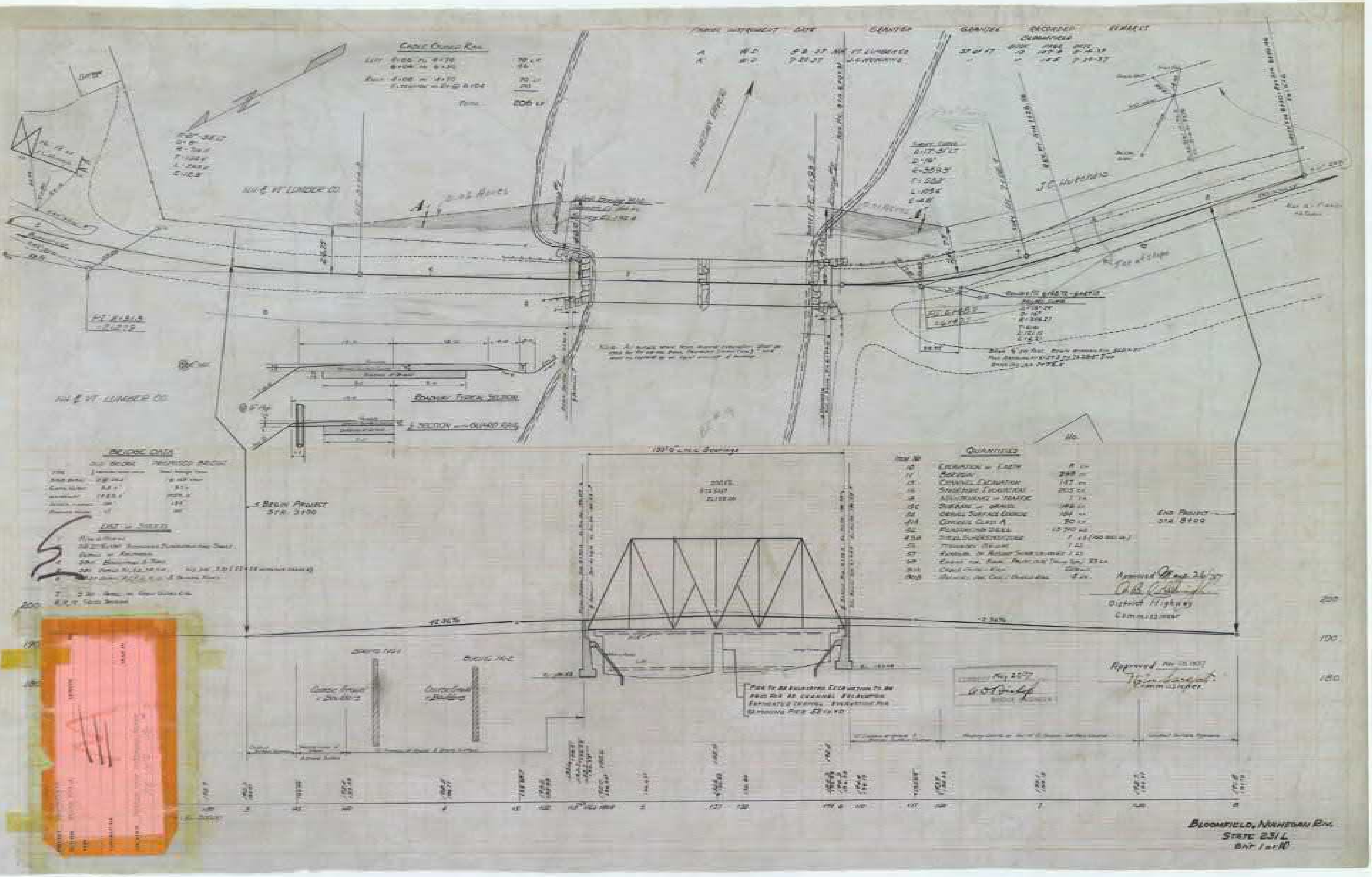
ANCHOR SETTING PLAN

GENERAL PAINTING NOTES:-

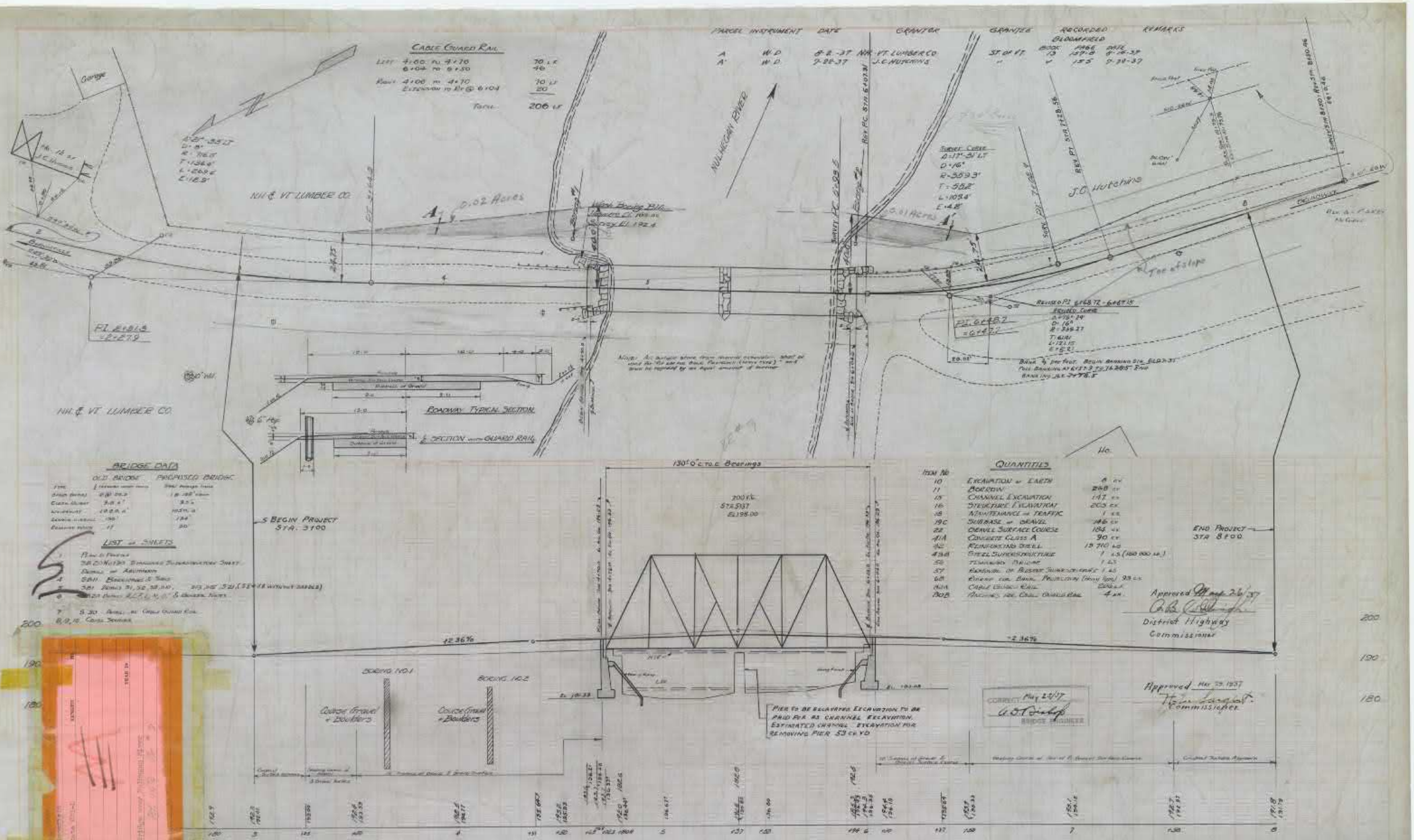
Shop paint to be approved Red Lead & Oil
Shop contact surfaces of steel shall be painted

CAMBER BLOCKING DIAGRAM

CONTRACT NO. 9570
FOR H.E. HUNT
BLOOMFIELD - NULHEGAN RIVER VERMONT
PAN-AMERICAN BRIDGE CO.
NEW CASTLE IND.
DETAILS OF ERECTION DIAGRAM
DRAWN BY DATE TRACED BY DATE
CH'K'D BY DATE BILLED BY DATE
REVISED 9-2-37
RIVETS UNLESS NOTED. OPEN HOLES UNLESS NOTED
SHOP PAINT EDGE DISTANCE UNLESS NOTED
CUSTOMER'S NO. SHEET 1 OF 8



Cable Guard Rail
Total 206 L.F.
Parcel Instrument Date Grantor Grantee Recorded Remarks
Bloomfield
Book Page Date
A W.D. N.H. & VT. Lumber Co.
J.C. Hutchins
N.H. & VT. Lumber Co.
J.C. Hutchins
Nulhegan River
Roadway Typical Section
Section with Guard Rail
N.H. & VT. Lumber Co.
Bridge Data
Old Bridge
Proposed Bridge
List of Sheets
Begin Project Sta. 3+00
150'-0" C. to C. Bearings
Quantities
Item No.
10 Excavation of Earth
11 Borrow
13 Channel Excavation
15 Structure Excavation
18 Maintenance of Traffic
Subbase of Gravel
Gravel Surface Course
Concrete Class A
Reinforcing Steel
Steel Superstructure
Removal of Present Superstructure
Cable Guard Rail
End Project Sta. 8+00
Approved Aug. 26/37
District Highway Commissioner
+2.36%
-2.36%
Boring No. 1
Boring No. 2
Coarse Gravel & Boulders
Pier to be removed
Bridge Engineer
Approved
Commissioner
200
190
180
Bloomfield, Nulhegan Riv.
State 231 L
Sht 1 of 10



CABLE GUARD RAIL

LEFT	4+00 to 4+70	70 L.F.
	6+04 to 6+50	46
RIGHT	4+00 to 4+70	70 L.F.
	EXTENSION TO RT @ 6+04	20
	TOTAL	206 L.F.

PARCEL	INSTRUMENT	DATE	GRANTOR	GRANTEE	RECORDED BLOOMFIELD BOOK	PAGE	DATE	REMARKS
A	W.D.	8-2-37	NH. VT. LUMBER CO.	ST. OF VT.	13	157-8	8-14-37	
A'	W.D.	9-28-37	J.C. HUTCHINS	"	"	155	9-28-37	

NOTE: All surplus stone from channel excavation shall be used for "Rip Rap for Bank Protection (Heavy Type)" and shall be replaced by an equal amount of borrow.

BRIDGE DATA

	OLD BRIDGE	PROPOSED BRIDGE
Type	[illegible]	Steel through truss
Span	2 @ 65.2	1 @ 130' c. to c.
Clear Height	9.0.4'	9.5'
Roadway	19.8.9.4'	[illegible]
Length	130'	134'
Roadway width	17	20'

LIST OF SHEETS

1 Plan & Profile
2 S.B. 20 No. 130 Standard Superstructure Sheet
3 Details of Abutments
4 S.B.11 Bearings & Shoes
5 S.B.1 Details S1, S2, S8, S10, S13, S16, S21 (S2 + S8 without saddle)
6 S.B.29 Details [illegible] & General Notes
7 S.30 Details of Cable Guard Rail
8, 9, 10 Cross Sections

QUANTITIES

ITEM NO.		
10	EXCAVATION of EARTH	8 CY
11	BORROW	248 CY
15	CHANNEL EXCAVATION	147 CY
16	STRUCTURE EXCAVATION	203 CY
18	MAINTENANCE of TRAFFIC	1 LS
19C	SUBBASE of GRAVEL	146 CY
22	GRAVEL SURFACE COURSE	184 CY
41A	CONCRETE CLASS A	90 CY
42	REINFORCING STEEL	13 710 LB
43B	STEEL SUPERSTRUCTURE	1 LS (180 000 LB.)
56	TEMPORARY BRIDGE	1 LS
57	REMOVAL OF PRESENT SUPERSTRUCTURE	1 LS
68	RIPRAP FOR BANK PROTECTION (Heavy Type)	93 CY
80A	CABLE GUARD RAIL	206 L.F.
80B	ANCHORS FOR CABLE GUARD RAIL	4 EA.

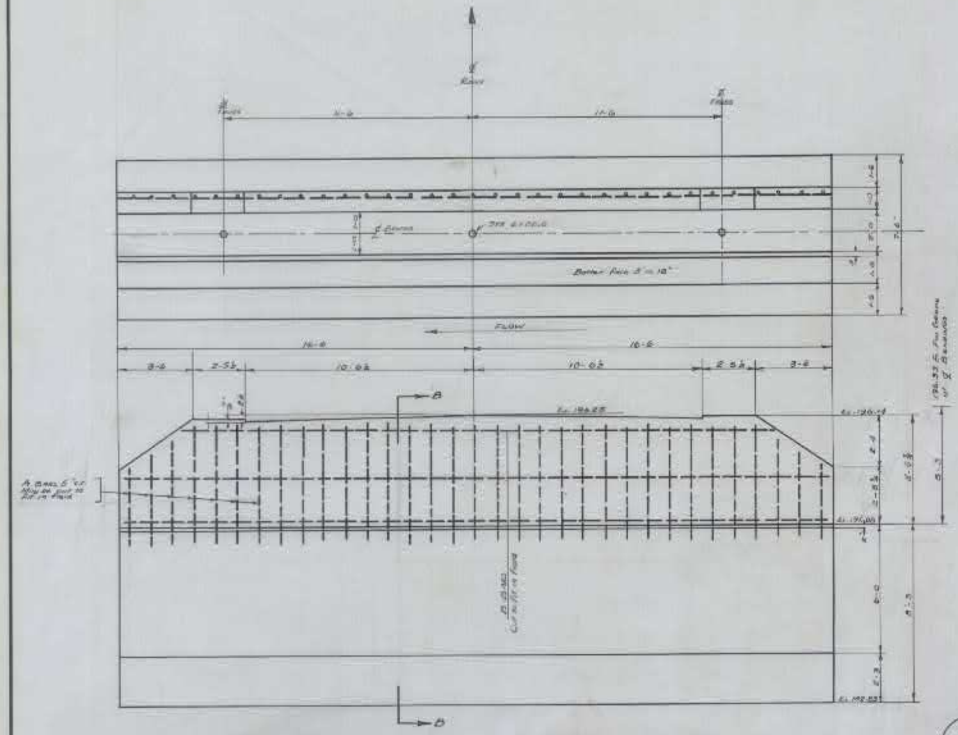
Approved May 26/37
A.B. [illegible]
District Highway Commissioner

PIER TO BE REMOVED. EXCAVATION TO BE PAID FOR AS CHANNEL EXCAVATION. ESTIMATED CHANNEL EXCAVATION FOR REMOVING PIER 53 CU. YD

CORRECT May 28/37
A.O. Bishop
BRIDGE ENGINEER

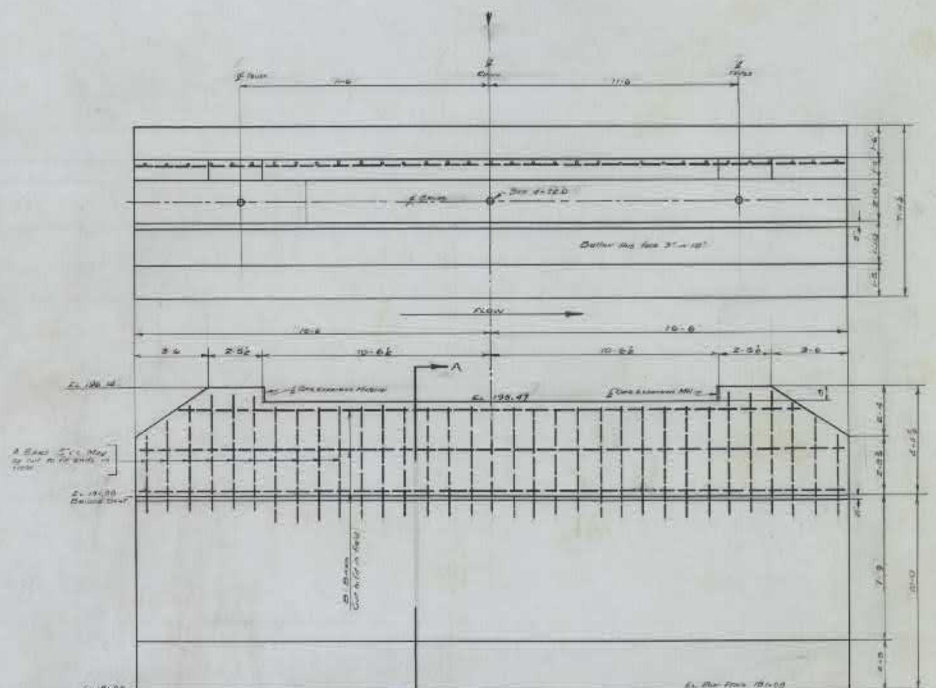
Approved May 29 1937
[illegible]
Commissioner

BLOOMFIELD, NULHEGAN RIV.
STATE 231 L
SHT 1 OF 10

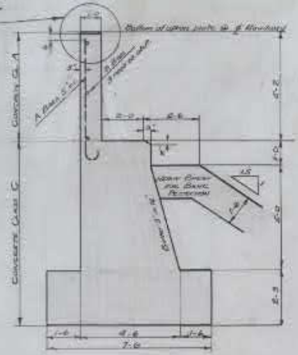


PLAN & FRONT ELEVATION OF ABUT No 2

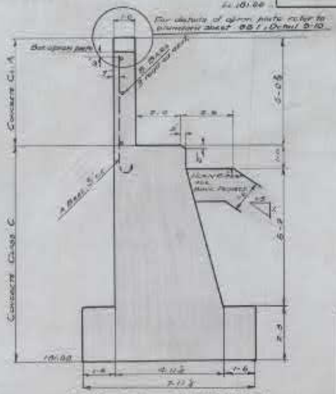
For details of Anchor Plate of ballast wall refer to standard sheet 881, Detail 5-9



PLAN & FRONT ELEVATION OF ABUTMENT No. 1



SEC. B-B. ABUT. No. 2



SEC. A-A. ABUT. No. 1

REINFORCING STEEL FOR ONE ABUT.
(2 REQUIRED)

MK	REQ'D	SIZE	TOTAL L'GTH	SHAPE
A	80	½" ⌀	6-4	5-6, R=2
B	3	½" ⌀	32-6	Straight

Dimensions & Elevations as revised on this sheet to have precedence over original figures

Revised 7-9-37

94 A bars added and change from 12" to 15" spacing in ballast wall. (298# added)
Revised 7-17-36

ABUTMENT DETAILS
BLOOMFIELD – NULHEGAN RIVER

Scale ½" = 1'-0

ESTIMATED QUANTITIES

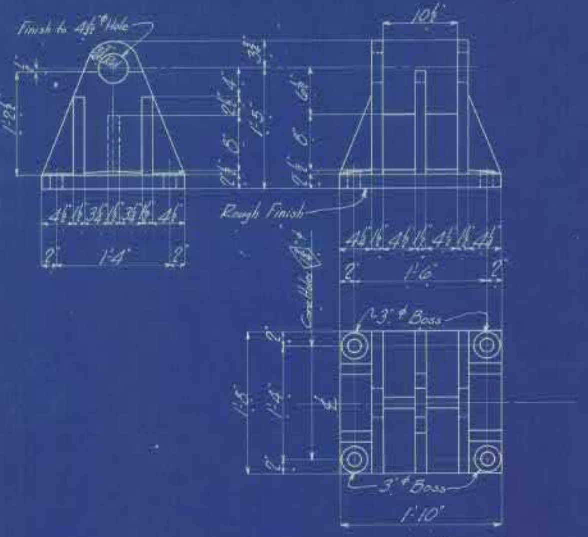
Item No.		Abutment 1	Abutment 2
#5	Channel Excavation	39.	93.
16	Structure Excavation	111.	94.
41A	Concrete Class A	4.1	3.6
41C	Concrete Class C	59.3	48.3
42	Reinforcing Steel	404.	404.
68	Rubble for Bank Protection	58	41.

Surveyed by
Designed by GW
Drawn by GW
Traced by CHK 5.J.00
Checked by H/C
Series/Shelf No. 23/L Filed
Sheet 3 of 10 Sheets

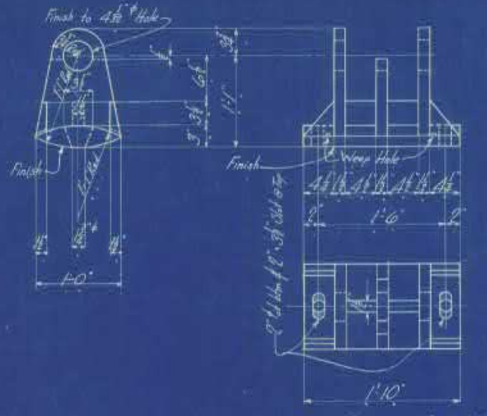
CAST STEEL BLOOMFIELD, VERMONT CONTR. # 9570

SPECIFICATIONS:-

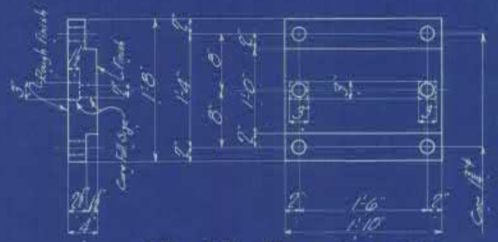
Cast Steel shall conform to the Specifications of the American Association of State Highway Officials dated 1935.
No test coupons required.
Furnish Quadruplicate copies of test reports.



MAKE 2 FIXED SHOES MARK 8FS1
Material:- Cast Steel (Annealed)

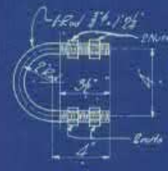


MAKE 2 EXPANSION SHOES MARK 8ES1
Material:- Cast Steel (Annealed)

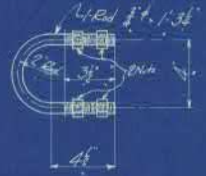


MAKE 2 BED PLATES MARK 8BP1
Material:- Cast Steel (Annealed)

PAN AMERICAN BRIDGE CO. NEWCASTLE, IND.



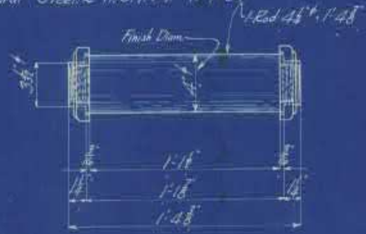
MAKE 4 U-BOLTS MARK 8UB1



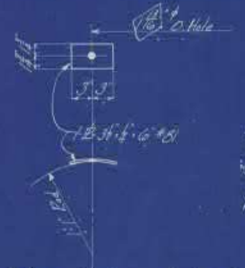
MAKE 68 U-BOLTS MARK 8UB2

PIN BLOOMFIELD, VERMONT CONTR. #9570

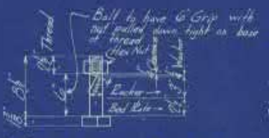
Structural Steel:- A.S.T.M. A-7-34



MAKE 4 PINS MARK 8P1

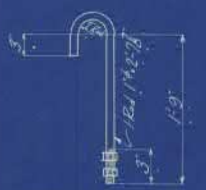


MAKE 4 WASHERS MARK 8W1



MAKE 4 BOLTS MARK 8B1

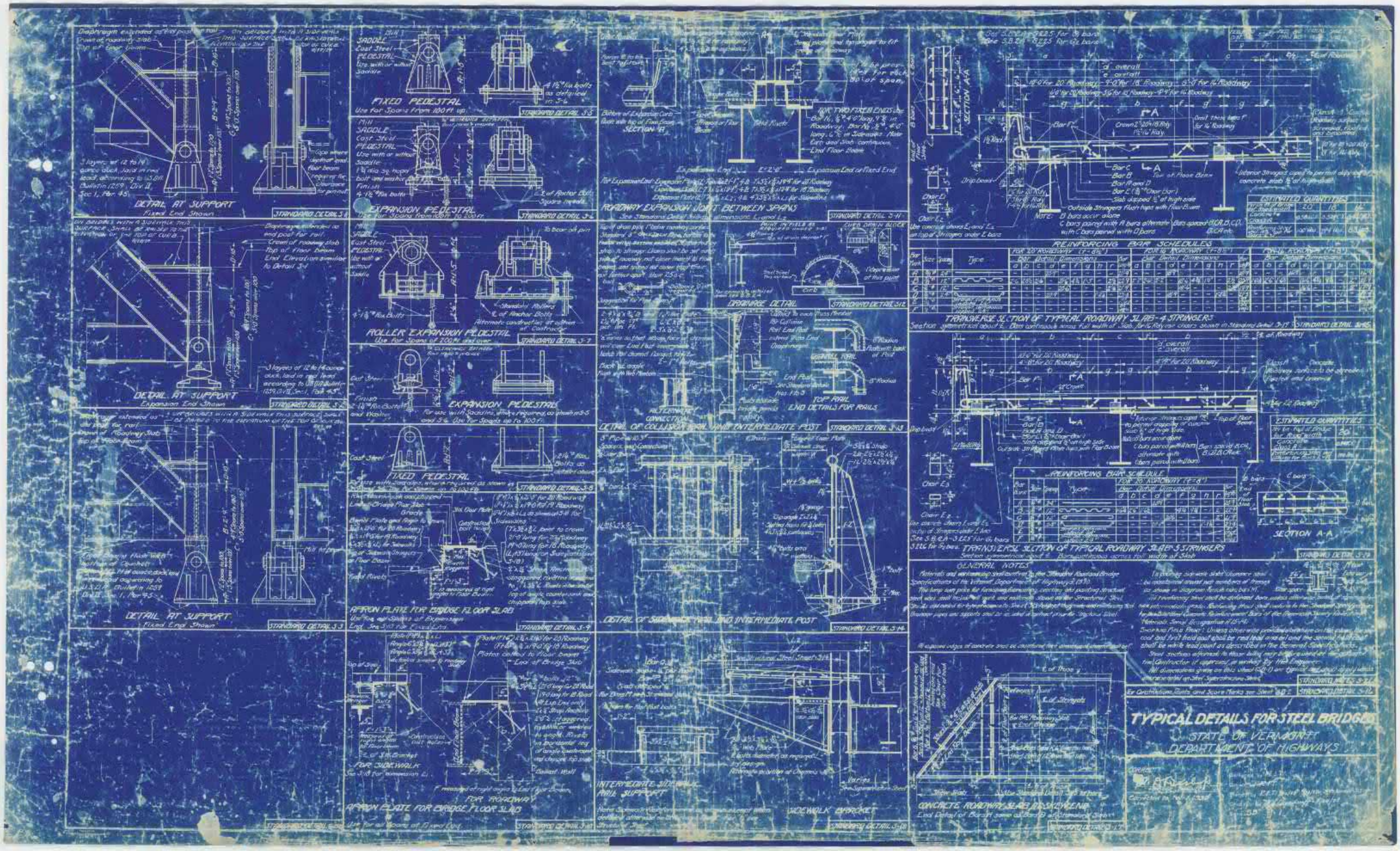
MAKE 16 ANCHORS MARK 8A1



MAKE 24 HOOK BOLTS MARK 8HB1
(to Int. Rail Posts)

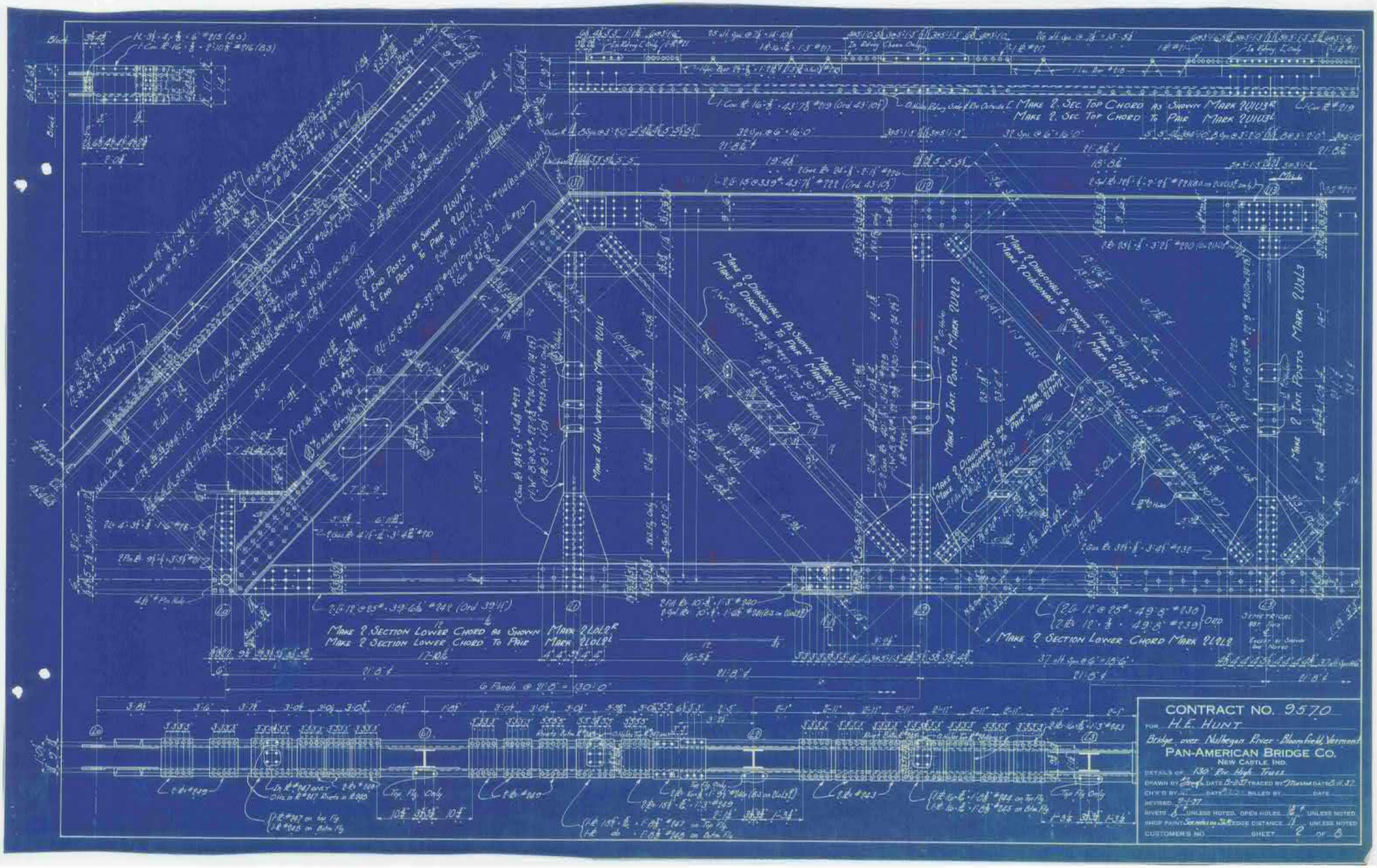
Covers for Brg. Areas
12 Pcs. 12 to 14 oz. Duck 1'-8" × 1'-10"
[Ordered 1 Pc. 24" × 24'-0" to be shipped direct]

CONTRACT NO. 9570
FOR H.E. HUNT
Bridge over Nulhegan River - Bloomfield, Vermont
PAN-AMERICAN BRIDGE CO.
NEW CASTLE, IND.
DETAILS OF 130' Pin High Truss
DRAWN BY [illegible] DATE 8-12-37 TRACED BY [illegible] DATE 8-18-37
CH'K'D BY [illegible] DATE [illegible] BILLED BY ____ DATE ____
REVISED 9-2-37
RIVETS ____ UNLESS NOTED. OPEN HOLES ____ UNLESS NOTED.
SHOP PAINT [illegible] EDGE DISTANCE ____ UNLESS NOTED
CUSTOMER'S NO. ____ SHEET 8 OF 8



TYPICAL DETAILS FOR STEEL BRIDGES

STATE OF VERMONT
DEPARTMENT OF HIGHWAYS



CONTRACT NO. 9570

FOR H.E. HUNT

Bridge over Nulhegan River - Bloomfield, Vermont

PAN-AMERICAN BRIDGE CO.

NEW CASTLE, IND.

DETAILS OF 130' Pony High Truss

DRAWN BY [illegible] DATE 8-2-37 TRACED BY [illegible] DATE 8-11-37

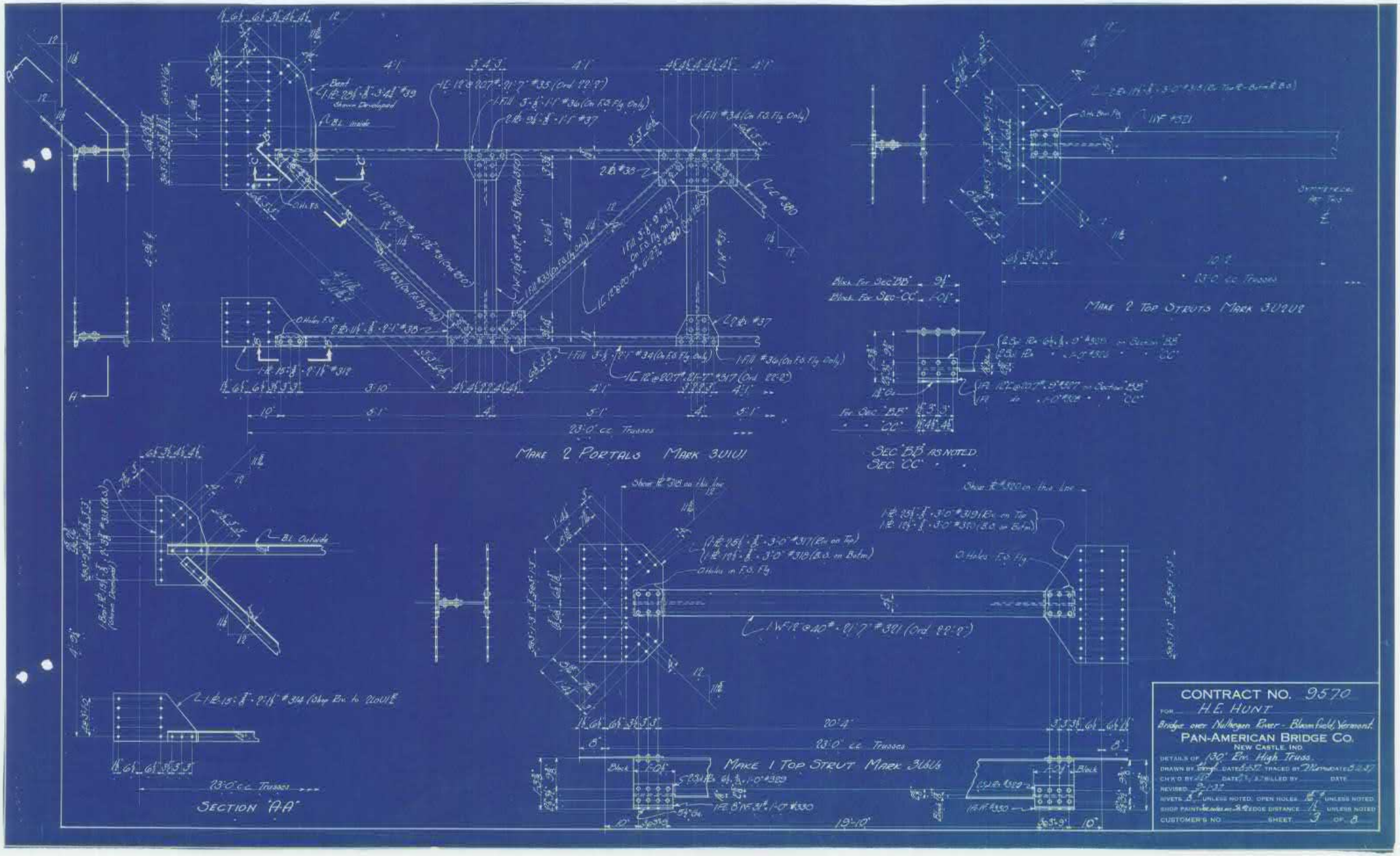
CH'K'D BY [illegible] DATE [illegible] BILLED BY DATE

REVISED 9-1-37

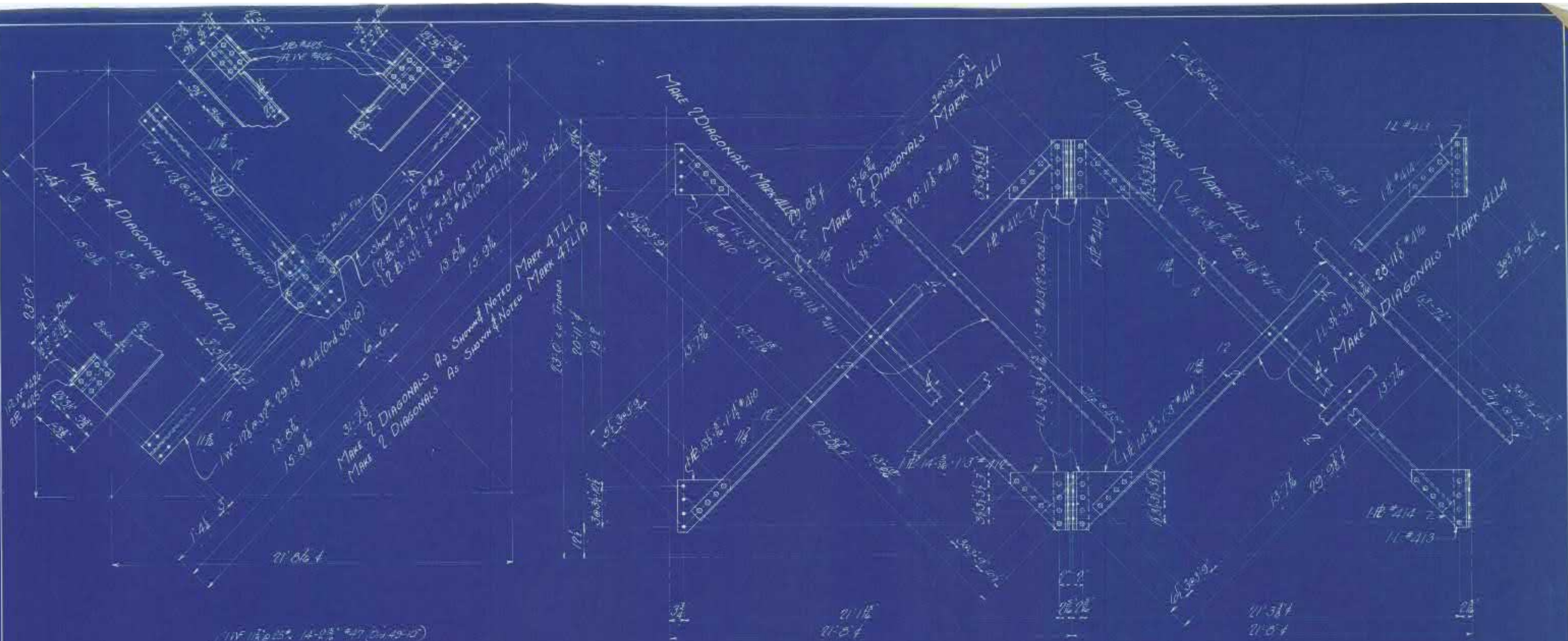
RIVETS 3/4" UNLESS NOTED. OPEN HOLES 13/16" UNLESS NOTED

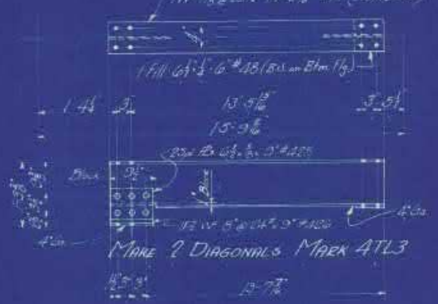
SHOP PAINT [illegible] EDGE DISTANCE 1 1/4" UNLESS NOTED

CUSTOMER'S NO SHEET 2 OF 8

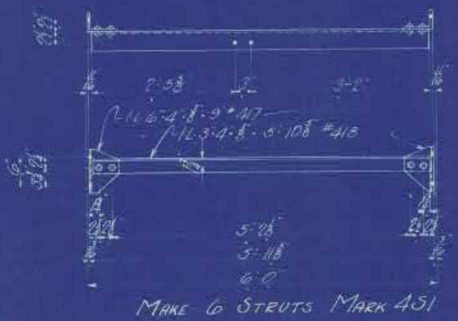


CONTRACT NO. 9570
FOR H.E. HUNT
Bridge over Nulhegan River - Bloomfield, Vermont.
PAN-AMERICAN BRIDGE CO.
NEW CASTLE, IND.
DETAILS OF 130' Riv. High Truss.
DRAWN BY DATED TRACED BY DATED
CH'K'D BY DATE BILLED BY DATE
REVISED 9-1-37
RIVETS ⅞" UNLESS NOTED. OPEN HOLES 15/16" UNLESS NOTED
SHOP PAINT EDGE DISTANCE 1½" UNLESS NOTED
CUSTOMER'S NO. SHEET 3 OF 8

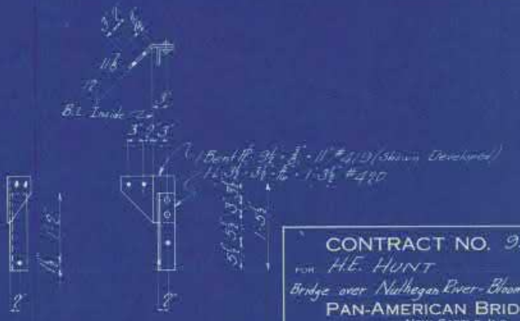




Make 2 Diagonals Mark 4TL3



Make 6 Struts Mark 4S1



Make 6 Hangers Mark 4H1

CONTRACT NO. 9570

FOR H.E. HUNT

Bridge over Nulhegan River - Bloomfield, Vermont

PAN-AMERICAN BRIDGE CO.

NEW CASTLE, IND

DETAILS OF 130' Riv. High Truss

DRAWN BY [illegible] DATE 5-12-37 TRACED BY [illegible] DATE 5-12-37

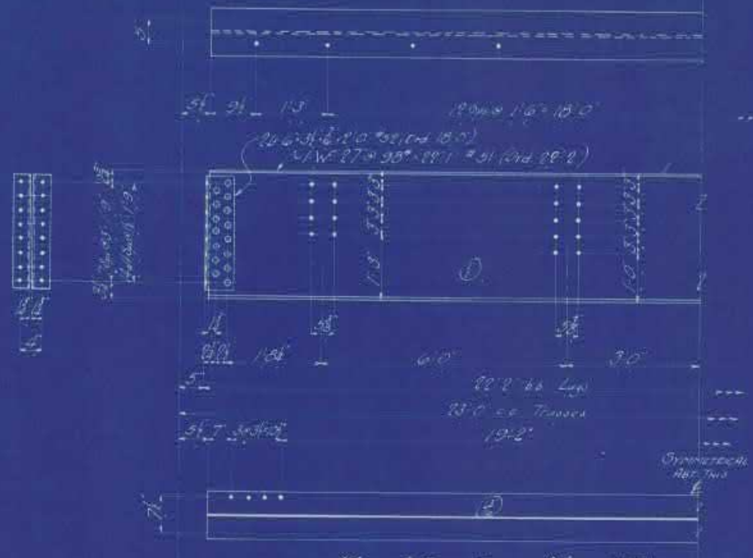
CH'K'D BY DATE BILLED BY DATE

REVISED 2-2-37

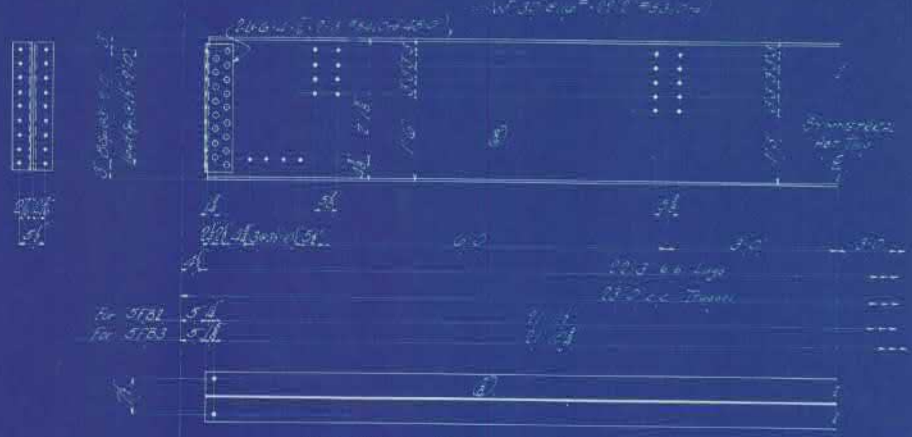
RIVETS 3/4 UNLESS NOTED. OPEN HOLES 13/16 UNLESS NOTED

SHOP PAINT [illegible] EDGE DISTANCE 1 1/2 UNLESS NOTED

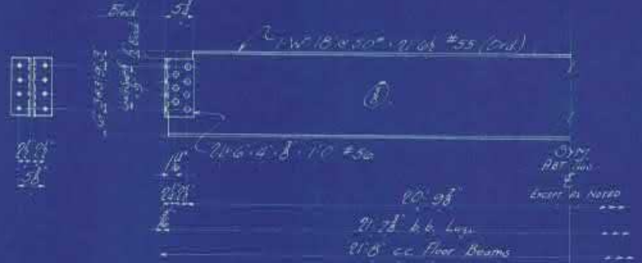
CUSTOMER'S NO SHEET 4 OF 5



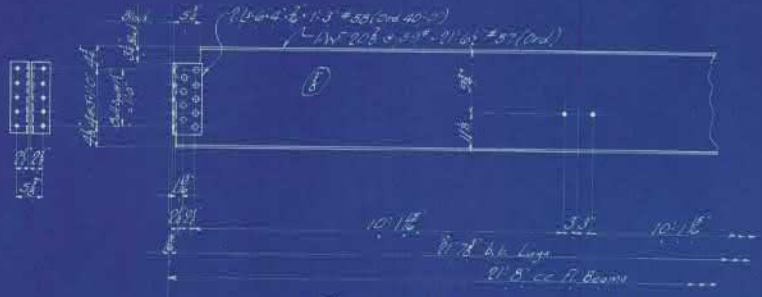
Make 2 Floor Beams Mark 5FB1



Make 2 Floor Beams as Shown & Noted Mark 5FB2
Make 3 Floor Beams as Shown & Noted Mark 5FB3

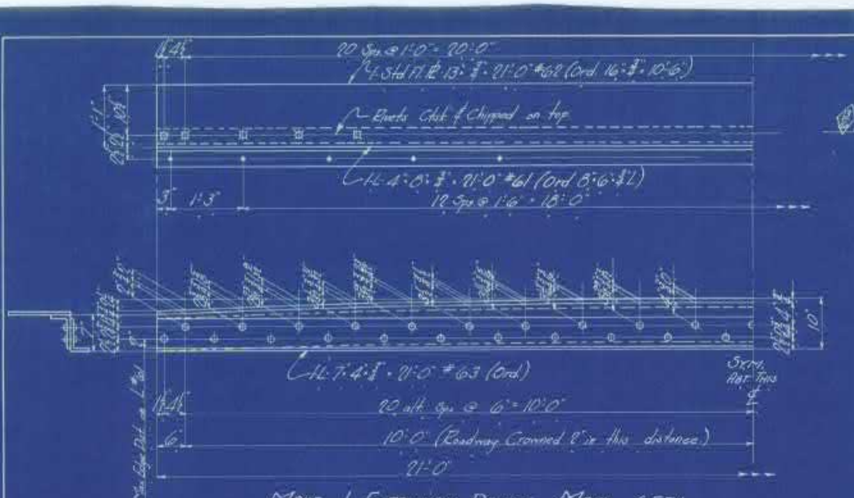


Make 12 Stringers Mark 5S1

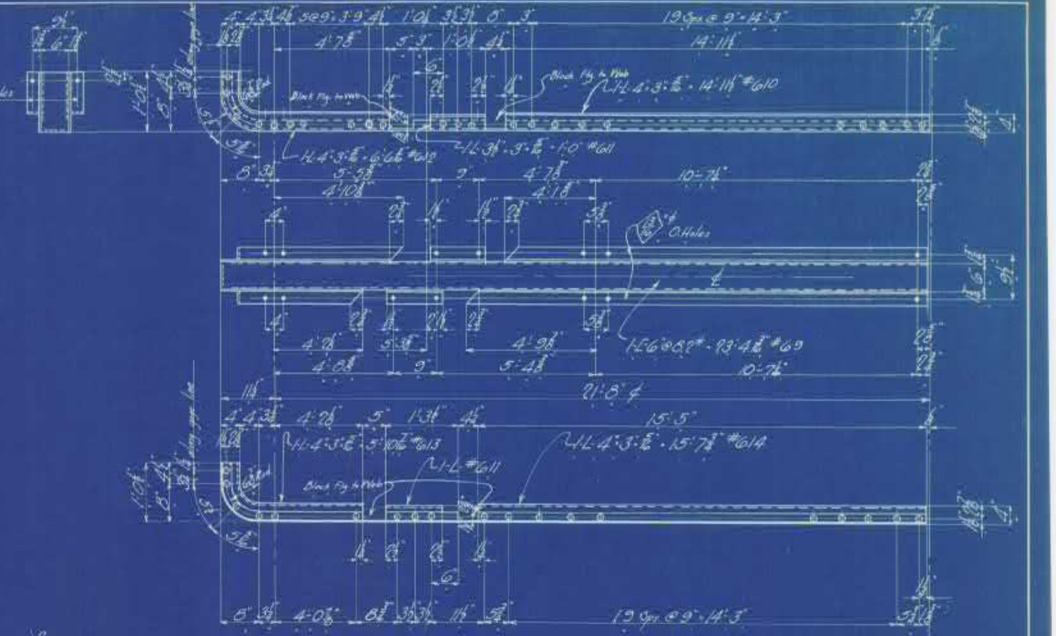


Make 12 Stringers Mark 5S2

CONTRACT NO. 9570
FOR H.E. HUNT
Bridge over Nulhegan River - Bloomfield, Vermont
PAN-AMERICAN BRIDGE CO.
NEW CASTLE IND.
DETAILS OF 130' Riv. High Truss
DRAWN BY DATE TRACED BY DATE 5.1.37
CH'K'D BY DATE BILLED BY DATE
REVISED
RIVETS ⅞" UNLESS NOTED. OPEN HOLES UNLESS NOTED.
SHOP PAINT EDGE DISTANCE UNLESS NOTED
CUSTOMER'S NO. SHEET 5 OF 8



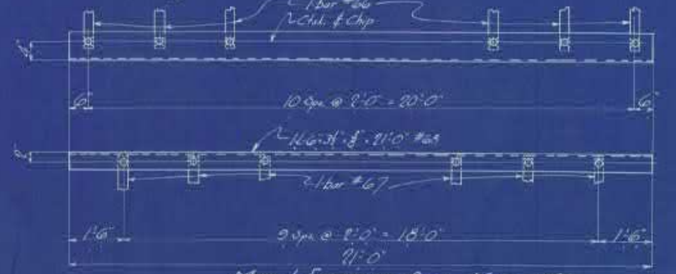
MAKE 1 EXPANSION DEVICE MARK 6ED1



MAKE 2 SEC. RAIL AS SHOWN MARK 6R1R
MAKE 2 SEC. RAIL TO PAIR MARK 6R1L
[11/16" ⌀ O. Holes & 5/8" ⌀ Riv. (Unless Noted)]

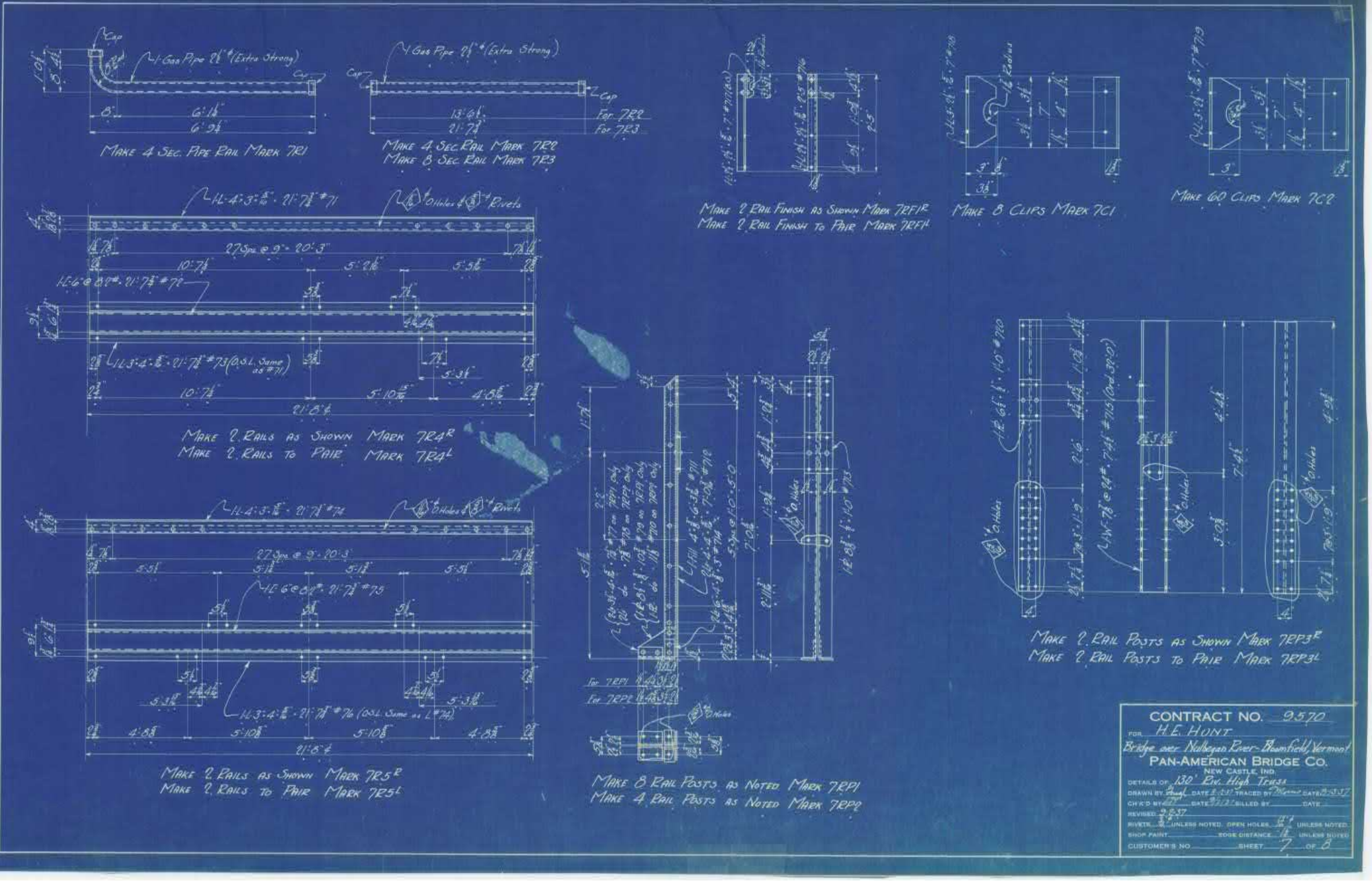
MAKE 1 EXPANSION ANGLE MARK 6EA1
3/4" ⌀ Riv. & 13/16" ⌀ O. Holes

MAKE 1 EXPANSION DEVICE MARK 6ED2



MAKE 1 EXPANSION ANGLE MARK 6EA2
3/4" ⌀ Riv. & 13/16" ⌀ O. Holes

CONTRACT NO. 9570
FOR H. E. HUNT
Bridge over Nulhegan River - Bloomfield, Vermont
PAN-AMERICAN BRIDGE CO.
NEW CASTLE, IND.
DETAILS OF 130' Riv. High Truss
DRAWN BY [illegible] DATE 8-2-37 TRACED BY [illegible] DATE 8-12-37
CH'K'D BY [illegible] DATE [illegible] BILLED BY DATE
REVISED 9-2-37
RIVETS 3/4" UNLESS NOTED. OPEN HOLES 13/16" UNLESS NOTED
SHOP PAINT [illegible] EDGE DISTANCE 1 1/8" UNLESS NOTED
CUSTOMER'S NO. SHEET 6 OF 8



MAKE 4 SEC. PIPE RAIL MARK 7R1

MAKE 4 SEC. RAIL MARK 7R2
MAKE 8 SEC. RAIL MARK 7R3

MAKE 2 RAIL FINISH AS SHOWN MARK 7RF1^R
MAKE 2 RAIL FINISH TO PAIR MARK 7RF1^L

MAKE 8 CLIPS MARK 7C1

MAKE 60 CLIPS MARK 7C2

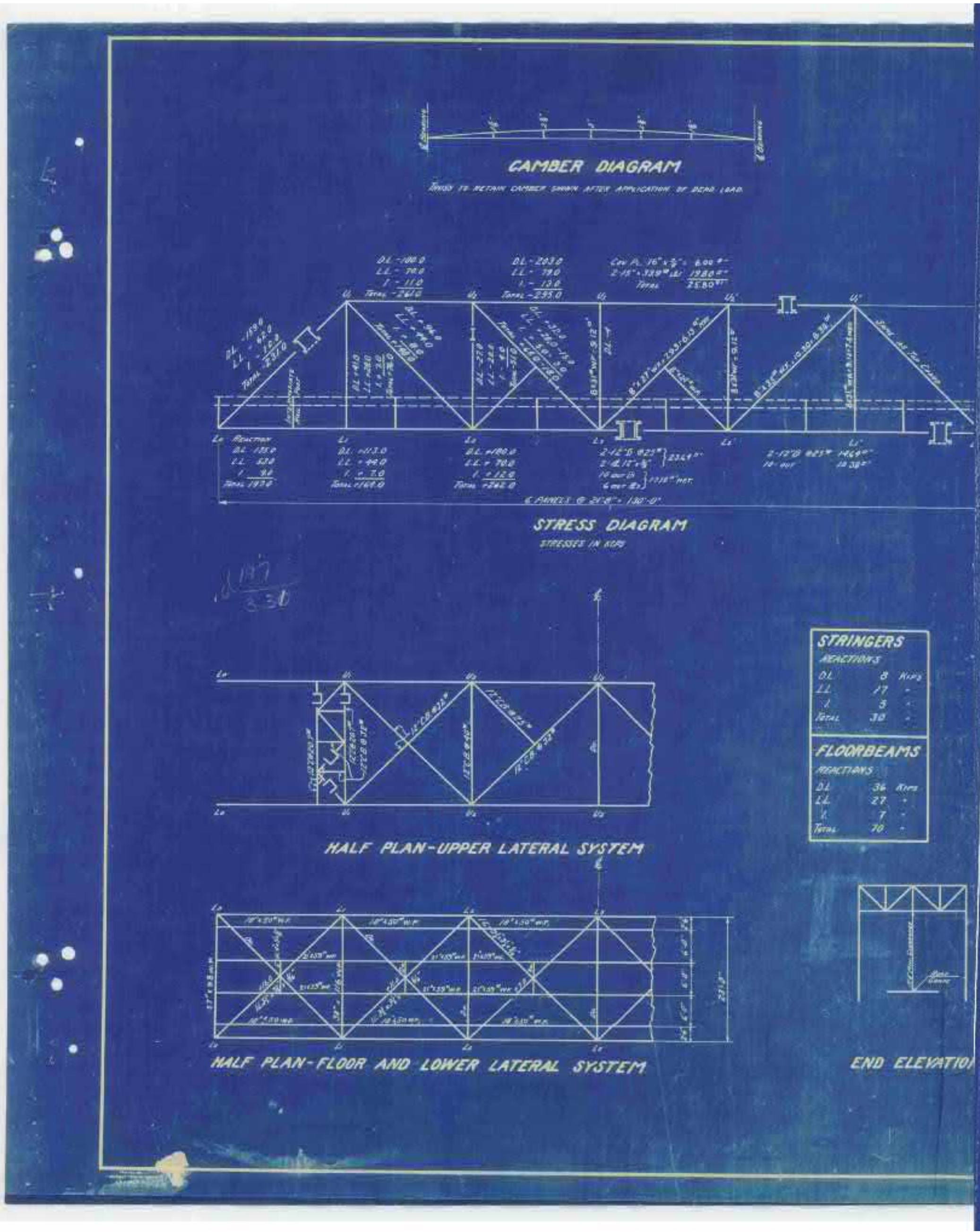
MAKE 2 RAILS AS SHOWN MARK 7R4^R
MAKE 2 RAILS TO PAIR MARK 7R4^L

MAKE 2 RAIL POSTS AS SHOWN MARK 7RP3^R
MAKE 2 RAIL POSTS TO PAIR MARK 7RP3^L

MAKE 2 RAILS AS SHOWN MARK 7R5^R
MAKE 2 RAILS TO PAIR MARK 7R5^L

MAKE 8 RAIL POSTS AS NOTED MARK 7RP1
MAKE 4 RAIL POSTS AS NOTED MARK 7RP2

CONTRACT NO. 9570
FOR H.E. HUNT
Bridge over Nulhegan River - Bloomfield, Vermont
PAN-AMERICAN BRIDGE CO.
NEW CASTLE, IND.
DETAILS OF 130' Riv. High Truss
DRAWN BY Hough DATE 8-23-37 TRACED BY Monroe DATE 8-31-37
CH'K'D BY DATE BILLED BY DATE
REVISED 9-8-37
RIVETS ¾" UNLESS NOTED. OPEN HOLES 13/16"ϕ UNLESS NOTED
SHOP PAINT EDGE DISTANCE 1½" UNLESS NOTED
CUSTOMER'S NO. SHEET 7 OF 8



STRINGERS

REACTIONS

D.L.	8	KIPS
L.L.	17	-
I.	5	-
TOTAL	30	-

FLOORBEAMS

REACTIONS

D.L.	36	KIPS
L.L.	27	-
I.	7	-
TOTAL	70	-

APPENDIX

H Concept Plans

DuBois & King inc.

EXISTING CONDITIONS PLAN

SCALE: 1"=20'

20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME: BLOOMFIELD
PROJECT NUMBER: BF 0271(27)

FILE NAME: 62800IALTS.dgn
PROJECT LEADER: M. OOMS
DESIGNED BY: R.GAUDREAU
EXISTING CONDITIONS PLAN

PLOT DATE: 12/7/2022
DRAWN BY: K. KITTREDGE
CHECKED BY: M. OOMS
SHEET 1 OF 7

ALTERNATIVE 2 - BRIDGE REHABILITATION

SCALE: 1"=20'
20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME:	BLOOMFIELD
PROJECT NUMBER:	BF 0271(27)

FILE NAME: 628001ALTS.dgn	PLOT DATE: 12/7/2022
PROJECT LEADER: M. OOMS	DRAWN BY: K. KITTREDGE
DESIGNED BY: R.GAUDREAU	CHECKED BY: M. OOMS
ALTERNATIVE 2 REHABILITATION	SHEET 2 OF 7

ALTERNATIVE 3 - ON ALIGNMENT BRIDGE REPLACEMENT

STEEL BEAM SLAB BRIDGE WITH NEW SUBSTRUCTURE

SCALE: 1"=20'

20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME: BLOOMFIELD	
PROJECT NUMBER: BF 027I(27)	
FILE NAME: 628001ALTS.dgn	PLOT DATE: 12/7/2022
PROJECT LEADER: M. OOMS	DRAWN BY: K. KITTREDGE
DESIGNED BY: K. KITTREDGE	CHECKED BY: R. GAUDREAU
ALTERNATIVE 3 - ON ALIGN. REPLACEMENT	SHEET 3 OF 7

ALTERNATIVE 4 - OFF ALIGNEMNT BRIDGE REPLACEMENT

STEEL BEAM SLAB BRIDGE WITH NEW SUBSTRUCTURE

SCALE: 1"=20'

20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME: BLOOMFIELD
PROJECT NUMBER: BF 0271(27)

FILE NAME: 628001ALTS.dgn
PROJECT LEADER: M. OOMS
DESIGNED BY: K. KITTREDGE
ALTERNATIVE 4 - OFF ALIGN. REPLACEMENT

PLOT DATE: 12/7/2022
DRAWN BY: K. KITTREDGE
CHECKED BY: R. GAUDREAU
SHEET 4 OF 7

TEMPORARY BRIDGE LOCATION PLAN - ALTERNATIVE I

SCALE: 1"=20'

20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME:	BLOOMFIELD
PROJECT NUMBER:	BF 0271(27)

FILE NAME: 628001ALTS.dgn	PLOT DATE: 12/7/2022
PROJECT LEADER: M. OOMS	DRAWN BY: K. KITTREDGE
DESIGNED BY: R.GAUDREAU	CHECKED BY: M. OOMS
TEMPORARY BRIDGE LOCATION PLAN - ALT I	SHEET 5 OF 7

TEMPORARY BRIDGE LOCATION PLAN - ALTERNATIVE 2

SCALE: 1"=20'

20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME: BLOOMFIELD
PROJECT NUMBER: BF 0271(27)

FILE NAME: 628001ALTS.dgn
PROJECT LEADER: M. OOMS
DESIGNED BY: R.GAUDREAU
TEMPORARY BRIDGE LOCATION PLAN - ALT 2

PLOT DATE: 12/7/2022
DRAWN BY: K. KITTREDGE
CHECKED BY: M. OOMS
SHEET 6 OF 7

TEMPORARY BRIDGE LOCATION PLAN - ALTERNATIVE 3

SCALE: 1"=20'
20 0 20

EXISTING BRIDGE INFORMATION
BUILT 1937, 130' SPAN
SINGLE SPAN STEEL THRU TRUSS

PROJECT NAME: BLOOMFIELD
PROJECT NUMBER: BF 0271(27)

FILE NAME: 628001ALTS.dgn
PROJECT LEADER: M. OOMS
DESIGNED BY: K. KITTREDGE
TEMPORARY BRIDGE LOCATION PLAN - ALT 3

PLOT DATE: 12/7/2022
DRAWN BY: K. KITTREDGE
CHECKED BY: R. GAUDREAU
SHEET 7 OF 7