

Bridge 9
VT Route 102 over
Nulhegan River

Town of Bloomfield, VT

July 24, 2023



ALTERNATIVES PRESENTATION MEETING

Bloomfield BF 0271(21)



Introductions

- Laura Stone – Vermont Agency of Transportation Scoping Engineer
- Judith Ehrlich – VTrans Historic Preservation Officer
- Megan Ooms – DuBois & King, Inc. Project Manager

Discussion Outline



**Project
Introduction**



**Existing
Conditions**



**Chosen
Alternative**



Impacts

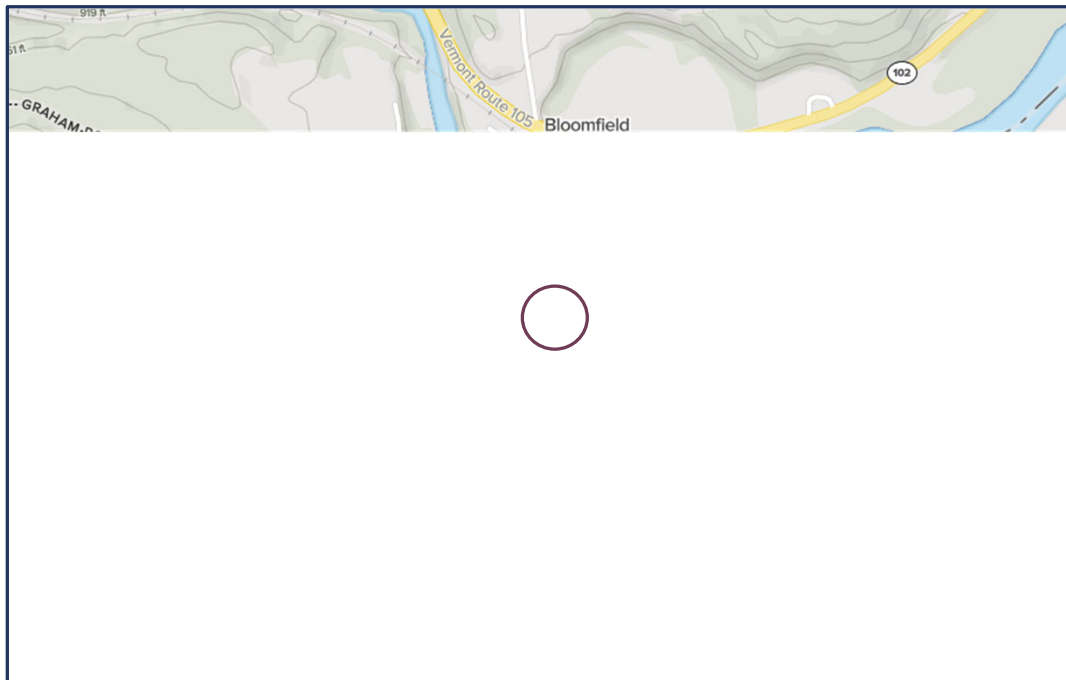


**Recommendation
&
Feedback**

Project Introduction

Why are we here?

Project Location



Bridge 9 - Bloomfield, VT
VT Route 102 over Nulhegan River



Purpose and Need

Purpose: The purpose of this project is to provide a safe crossing of the Nulhegan River for the traveling public, including pedestrians and bicyclists, and to address the current structural deficiencies and ongoing deterioration of the bridge.

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

- 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

Local Involvement: Operations Input

Survey distributed 2021 District 9 Maintenance

Primary Concerns:

- 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 may not be permitted, and a town road may need to be realigned as part of the project to meet railing and safety standards

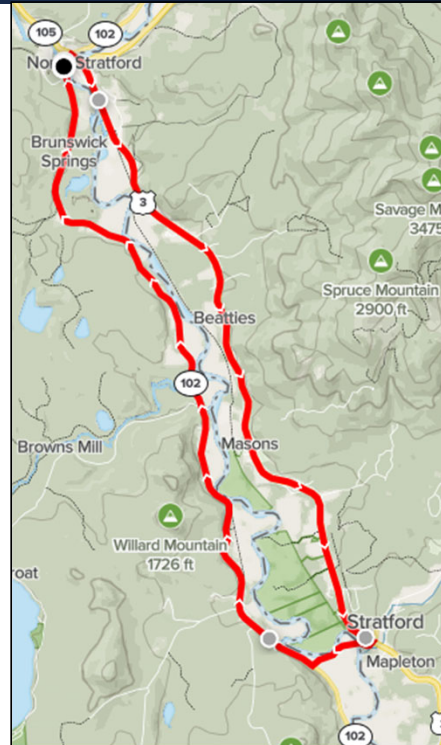


Local Involvement: Local Concerns Meeting

Meeting Held November 15, 2022

Concerns Presented at Meeting:

- Slowest parts of the year are mud season and post-hunting season,
 - Impact school bus routes
 - Falls outside of the allowable construction season
- Suggestions for an over-widened shoulder (10ft) that could be groomed and used by snowmobiles in the winter.
- New conventional bridge would better serve current traffic needs
 - 18-wheeler milk truck, school buses, farming equipment, and emergency vehicles.



Narrow Bridge: Pedestrian, Bicycle and Snowmobile conflict

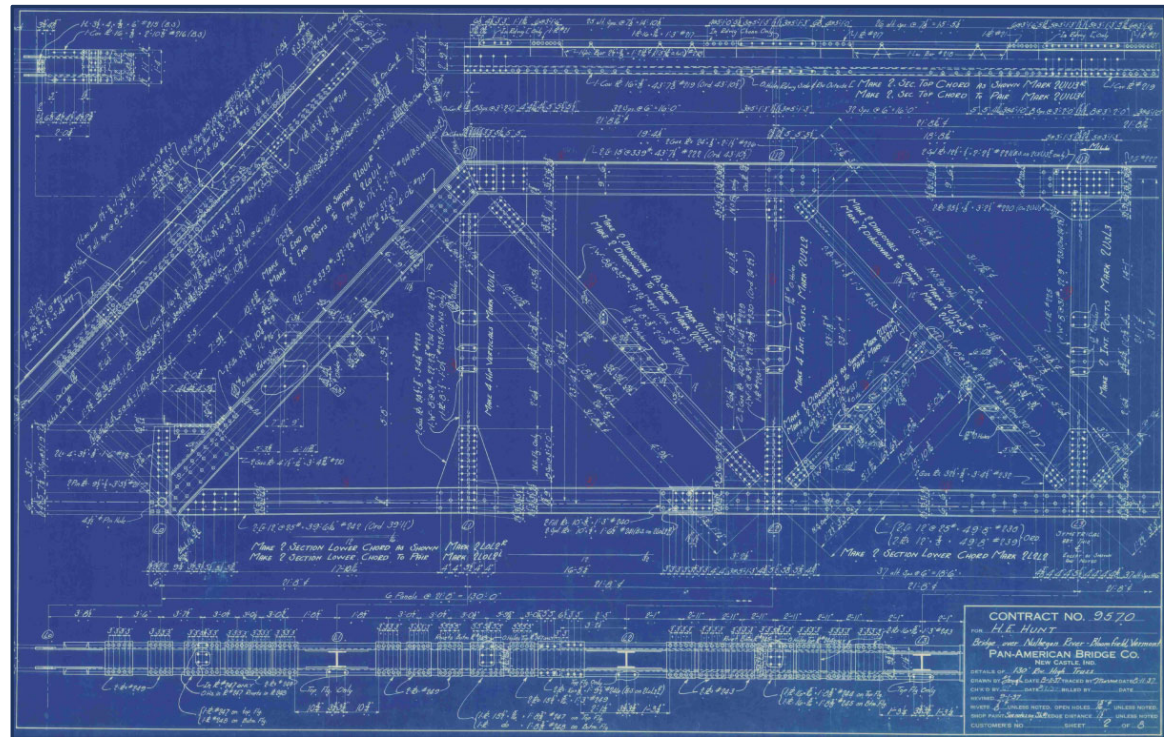
18 Mile Detour on already busy road that is Posted for 20 Tons with increased emergency response time

Existing Conditions

Where are we and what needs to be done?

Existing Bridge Information

- Constructed in 1937
- Steel Pratt thru Truss Type Bridge
- Span Length = 130'-0"
- Width (Truss to Truss) = 23'-0"
- Height of Truss = 23'-4"
- Original design load = H15 Trucks
- Substructures: Cast in Place Concrete Abutments
- Roadway width = 20'-0"



February 2021 Inspection Results

Component	Condition Rating	Description
Deck	5	Fair
Superstructure	4	Poor
Substructure	7	Good
Channel	8	Very Good

Component	Appraisal	Description
Railings	0	Does not meet current standard
Approach Guardrail	1	Meets current standards
Structure	4	Meets minimum tolerable criteria
Deck Geometry	4	Meets minimum tolerable criteria

Existing Conditions – Deck (below roadway)

- Cracks and Spalls present on bottom of deck
- Marked deterioration in bridge overhangs, particularly at rail post connections



Existing Conditions – Truss (above roadway)

- Primary and secondary members are all in relatively good condition above the deck level (other than paint condition)
- Evidence of prior repairs in good condition



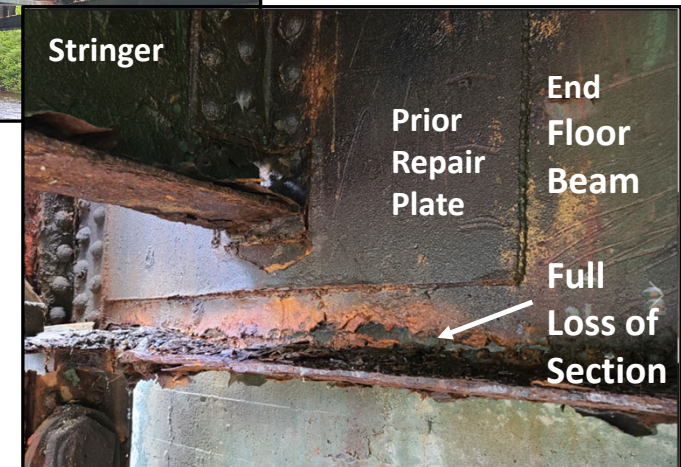
Existing Conditions – Truss (below roadway)

- Lower Chord Members Show regular regions of section loss at batten plates
- Full Truss needs to be cleaned and repainted to continue to protect the existing steel from corrosion
- Existing paint may be lead based



Existing Conditions – Floor System

- Severe Deterioration of All Components
- Replacement Required:
 - Stringers
 - Floor beams
 - Bracing of expansion end bay



Existing Conditions – Truss (Expansion Bearings)

- Severe Deterioration of Both Bearings at Expansion End Require Replacement
- Areas of complete loss of section in connecting plates and braces



Existing Conditions – Load Carrying Capacity

- Several members do not meet HL-93 loads.
- Several members in the floor system and gusset plates do not meet H20 loading
- Most gusset plates and floorbeams, as well as stringers in the end bay, do not meet H15 loading in their current condition
 - These members need to be replaced or strengthened as part of this project if the truss remains at this location
 - This is a significant effort

Historic Considerations: Category 1

*What requirements need to be met to justify replacement?
What mitigation efforts will be required?*

Cultural Resources

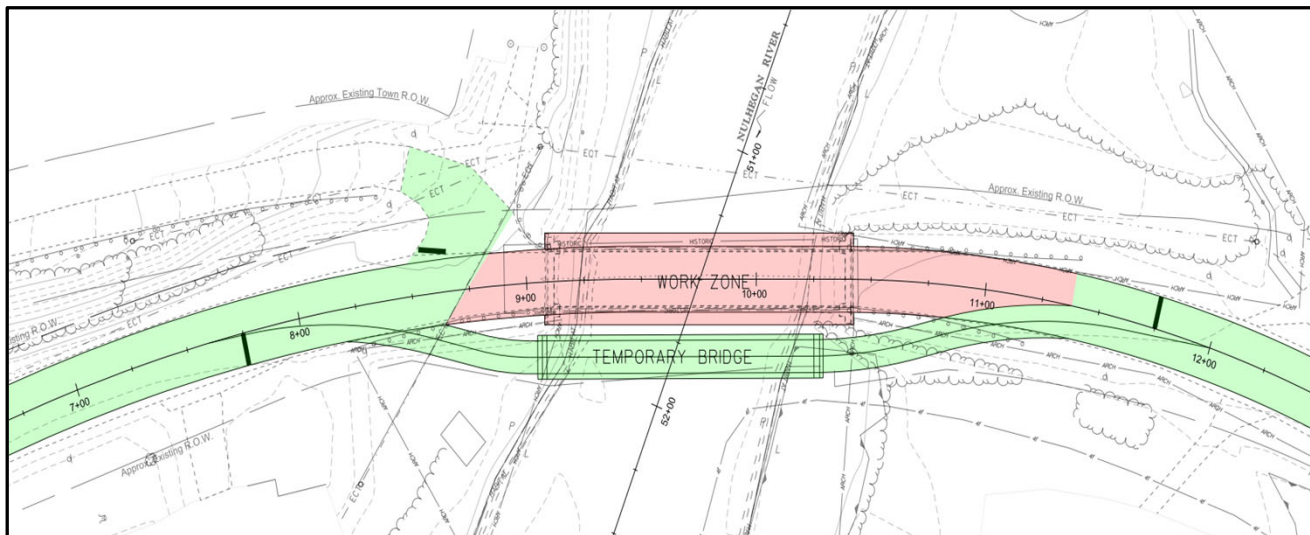
- Project Falls under Section 106 of the National Historic Preservation Act
- 4(f) Resources Involved/Impacted

Design Criteria & Considerations

- Structural Needs
- Community Needs
- Average Daily Traffic
 - 2025 = 480
 - 2045 = 530
- % Trucks
 - 2025 = 7.4
 - 2045 = 9.9
- Utilities
 - Aerial Electric & Communications
 - No Underground
- Historic & Cultural Resources

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

Maintenance of Traffic – Temporary Bridge



Downstream Temporary Bridge

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 using 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
Bridge Width	25'-0"	39'-0"	39'-0"
ROW Accommodations for Snowmobiles	None	10'-0"	10'-0"
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

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	\$5,000 ⁴
Total	\$4.1 Million	\$6.15 Million	\$7.55 Million
Risk Summary	Moderate	Lowest	Highest
Recommendation	Not Recommended Does not meet 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.

3) Right of Way acquisitions for options 2 and 3 would be temporary impacts.

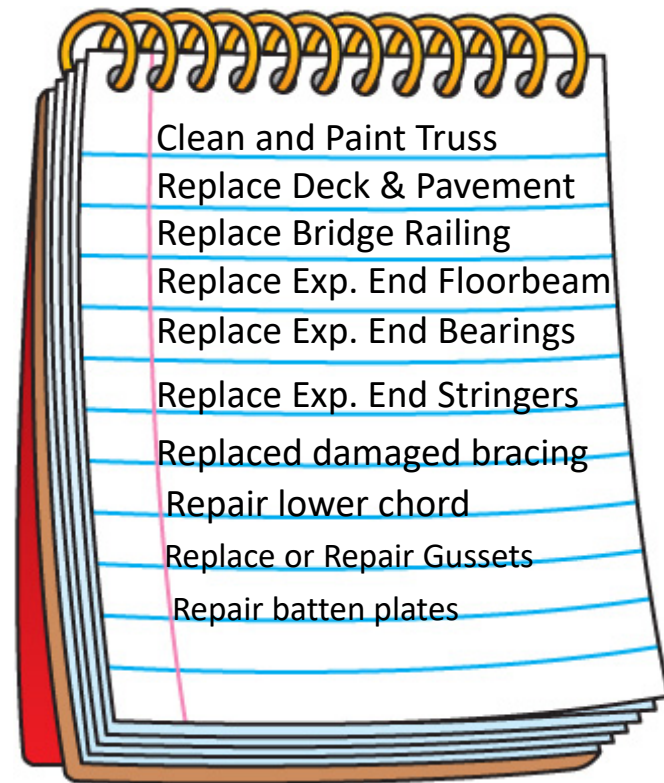
4) Right of Way Impacts for option 4 would be permanent impacts

Feasibility of Rehabilitation

Is it possible, even if not practical

Generally, yes, however...

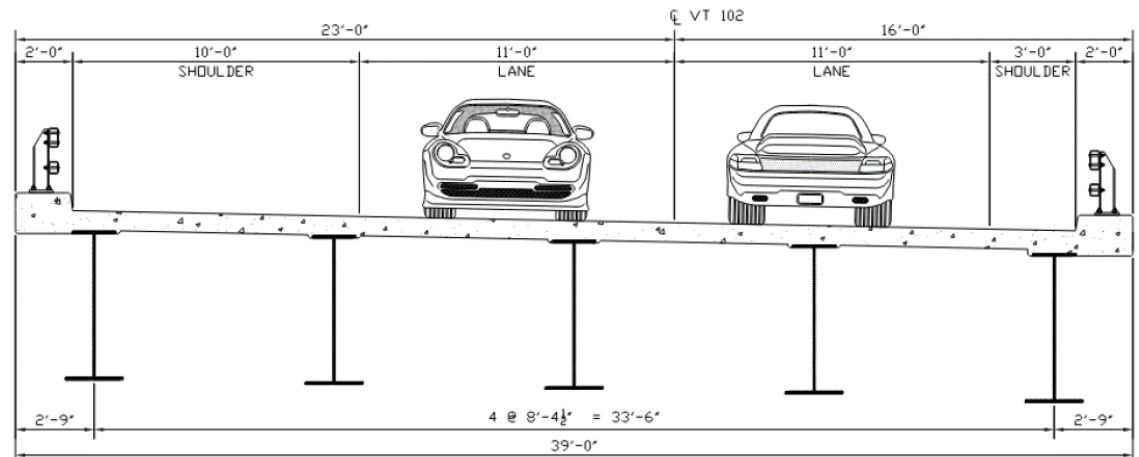
- Roadway width requirements will not be met
- High construction risk for unknowns and continued deterioration of structure
- No accommodations will be provided for snowmobiles



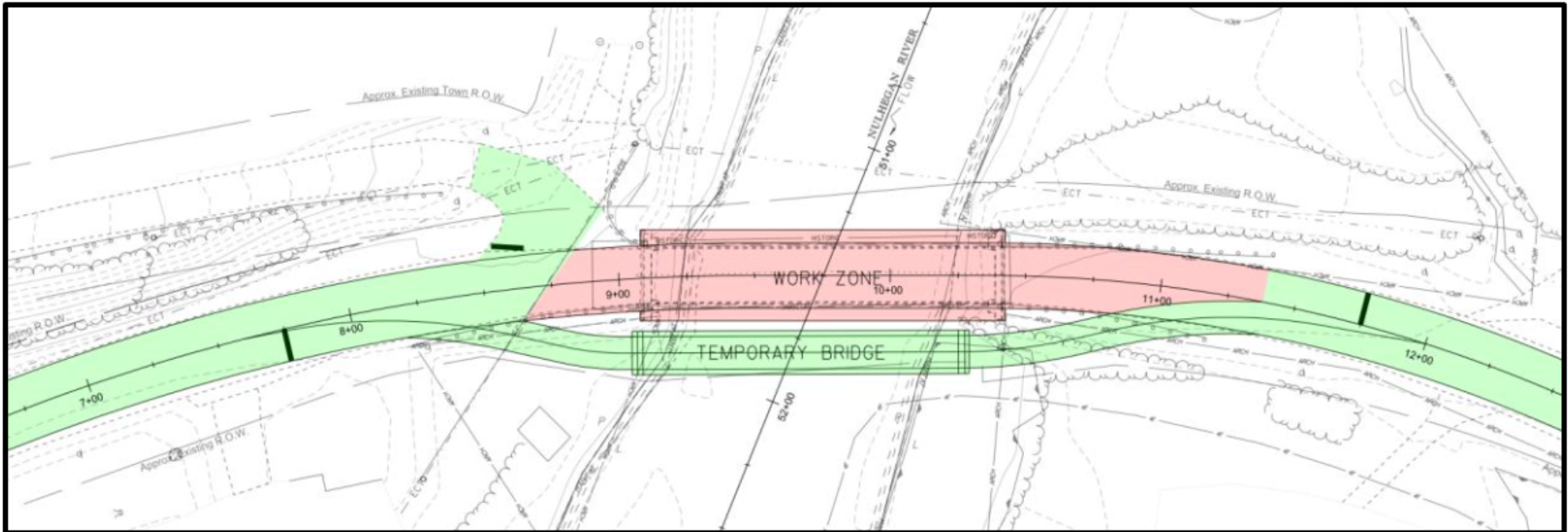
Recommend Alternative

Alternative 3 – Replace On Alignment

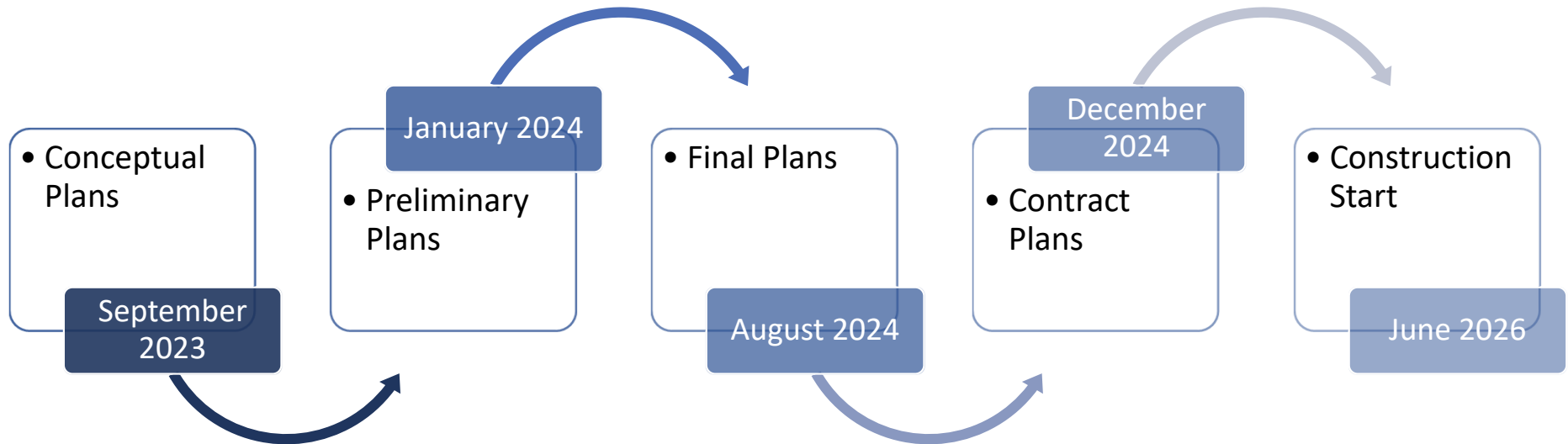
- Place Temporary Bridge on the downstream side of the truss
- Decrease impacts to the intersection and the trail access 4(f) resource area.
- Wider available Right-of-Way
- Allow for the replacement structure to be shifted slightly upstream as needed to address horizontal curve geometry.



Recommended Layout



Preliminary Project Schedule



Questions & Comments

Contact: Megan Ooms, P.E.

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For more information, Go to:

<https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/21B028>