Castleton STP CULV(123)
Regional Concerns Meeting
VT ROUTE 4A, BRIDGE 9 OVER UNNAMED BROOK

March 25, 2024

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Introductions

Adam Goudreau, P.E.

VTrans Design Project Manager

Laura Stone, P.E.

VTrans Scoping Project Manager

Stephen Coley, P.E.

VTrans Lead Design Engineer

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Purpose of Meeting

- Provide an understanding of our approach to the project
- Provide an overview of project constraints
- Discuss our selected alternative
- Provide an opportunity to ask questions and voice concerns

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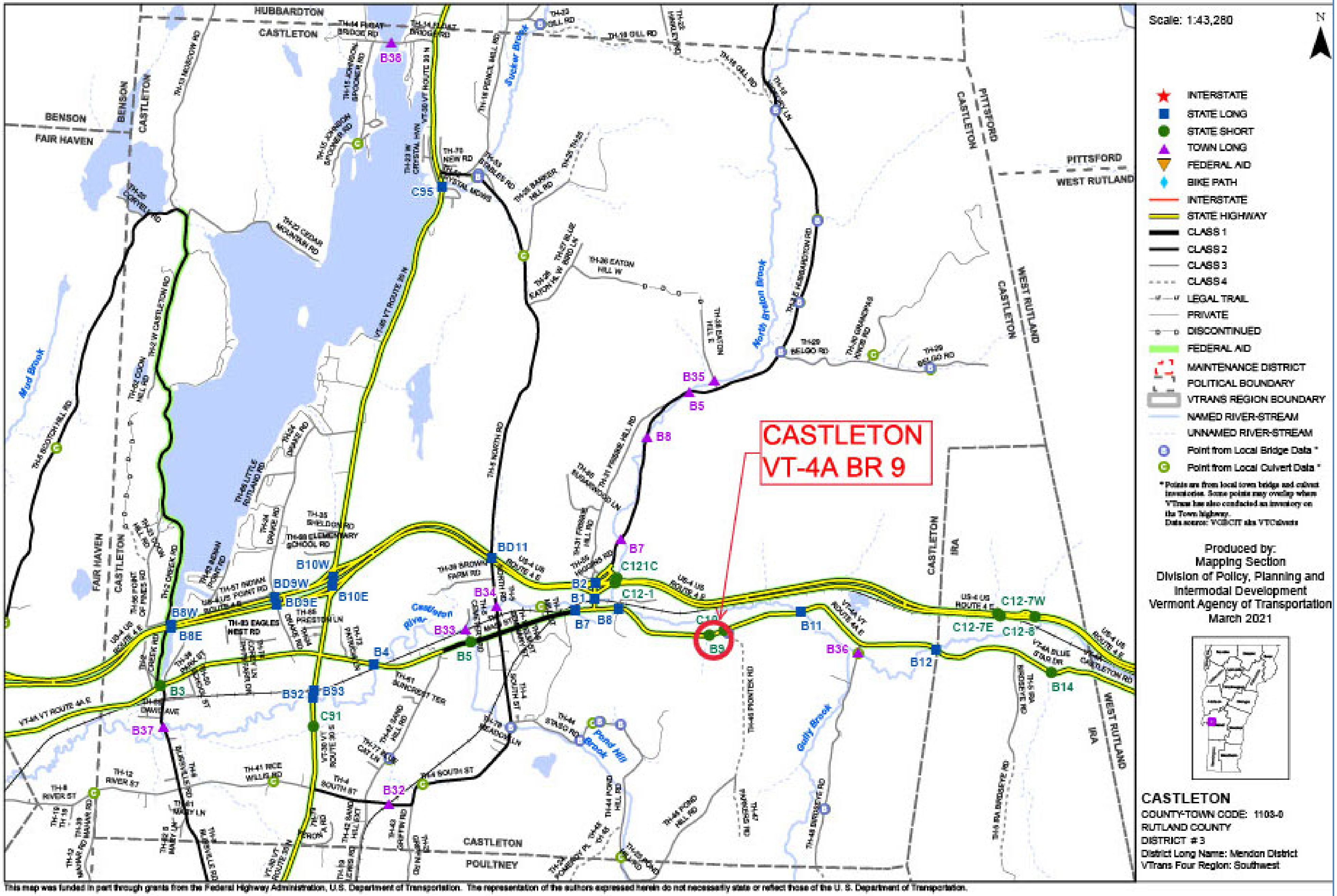
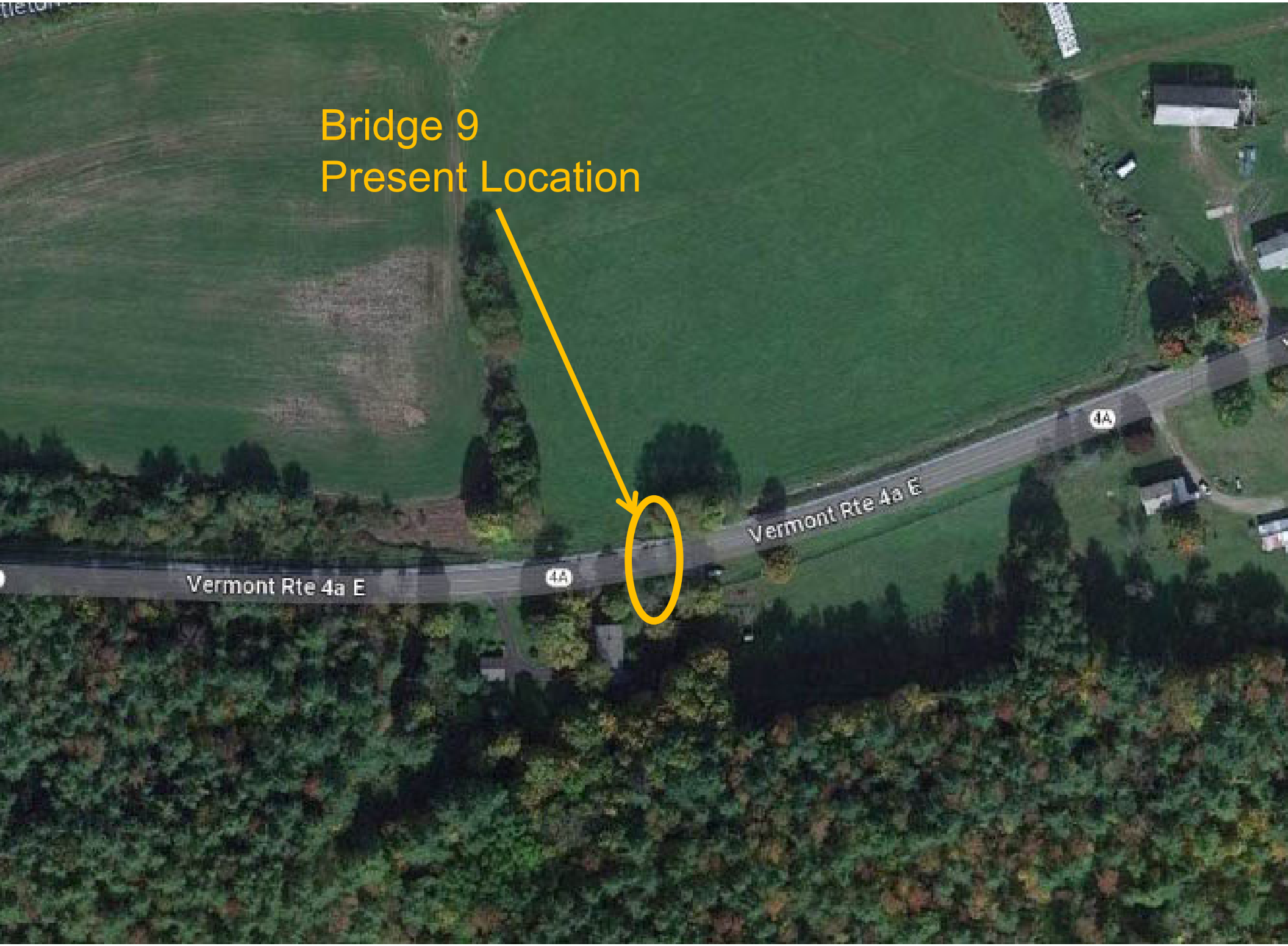


Location Map


Bridge 9
Present Location
Vermont Rte 4a E
4A
Vermont Rte 4a E
4A

Meeting Overview

- VTrans Project Development Process
- Project Overview
  - Existing Conditions
  - Alternatives Considered
  - Selected Alternative
- Maintenance of Traffic
- Schedule
- Summary
- Questions

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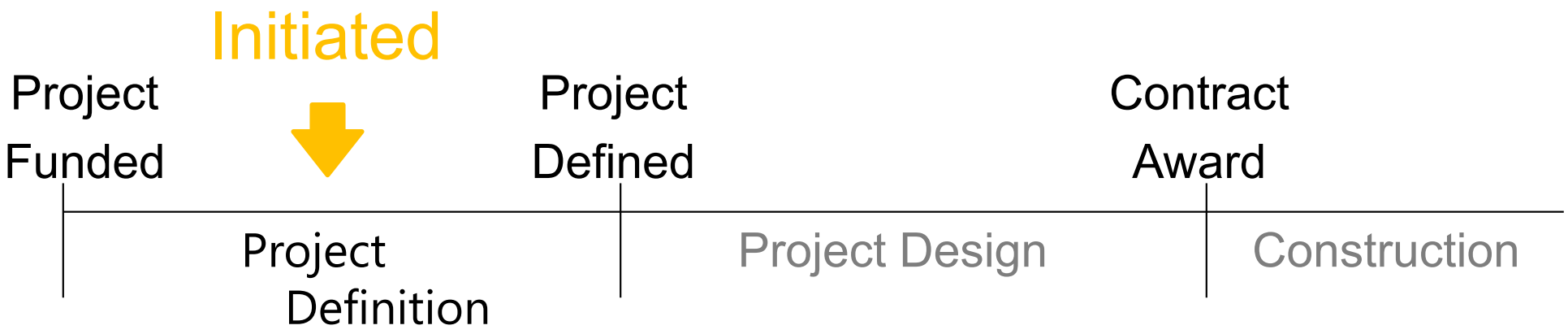
VTrans Project Development Process



- Identify resources & constraints
- Evaluate alternatives
- Public participation
- Build Consensus

- Quantify areas of impact
- Environmental permits
- Develop plans, estimate and specifications
- Right-of-Way process if necessary

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Looking West

Existing Conditions – Bridge #9

- Roadway Classification – Rural Major Collector
- Bridge Type – Reinforced Concrete Box
- Ownership – State of Vermont
- Constructed in 1927

Looking East

Existing Utilities – Bridge #9

- Aerial utilities, owned by Green Mountain Power (Three & Single Phase), Comcast, Consolidated Communications, and FirstLight Fiber.
- It is anticipated that overhead utilities will need to be relocated for replacement of the culvert.

Existing Site Deficiencies – Bridge #9

- The culvert is in poor condition. There are delaminations and cracks throughout the culvert.
- The existing culvert does not meet the calculated or measured bank full width.
- The existing culvert does not meet the headwater depth for the design or check storm. During the check storm, the roadway is calculated to be overtopped.
- The stream is intermittent, flashy, and laden with sediment.
- The stream channel has curves at the inlet and outlet, these cause slowing of the stream and deposition of sediment within and downstream of the culvert. This deposition reduces the carrying capacity of the culvert, increasing the frequency of overtopping.
- The shoulder width over the culvert does not meet the minimum standards.

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Existing Conditions - Bridge #9

- Culvert Rating 4 (Poor)
- Channel Rating 6 (Satisfactory)

Looking at Outlet

Existing Conditions - Bridge #9

Looking Downstream (Northeast)

Existing Conditions - Bridge #9

Looking Upstream (South)

Existing Conditions - Bridge #9

Inlet

Existing Conditions - Bridge #9

Existing Conditions - Bridge #9

Existing Conditions - Bridge #9

Existing Conditions - Bridge #9

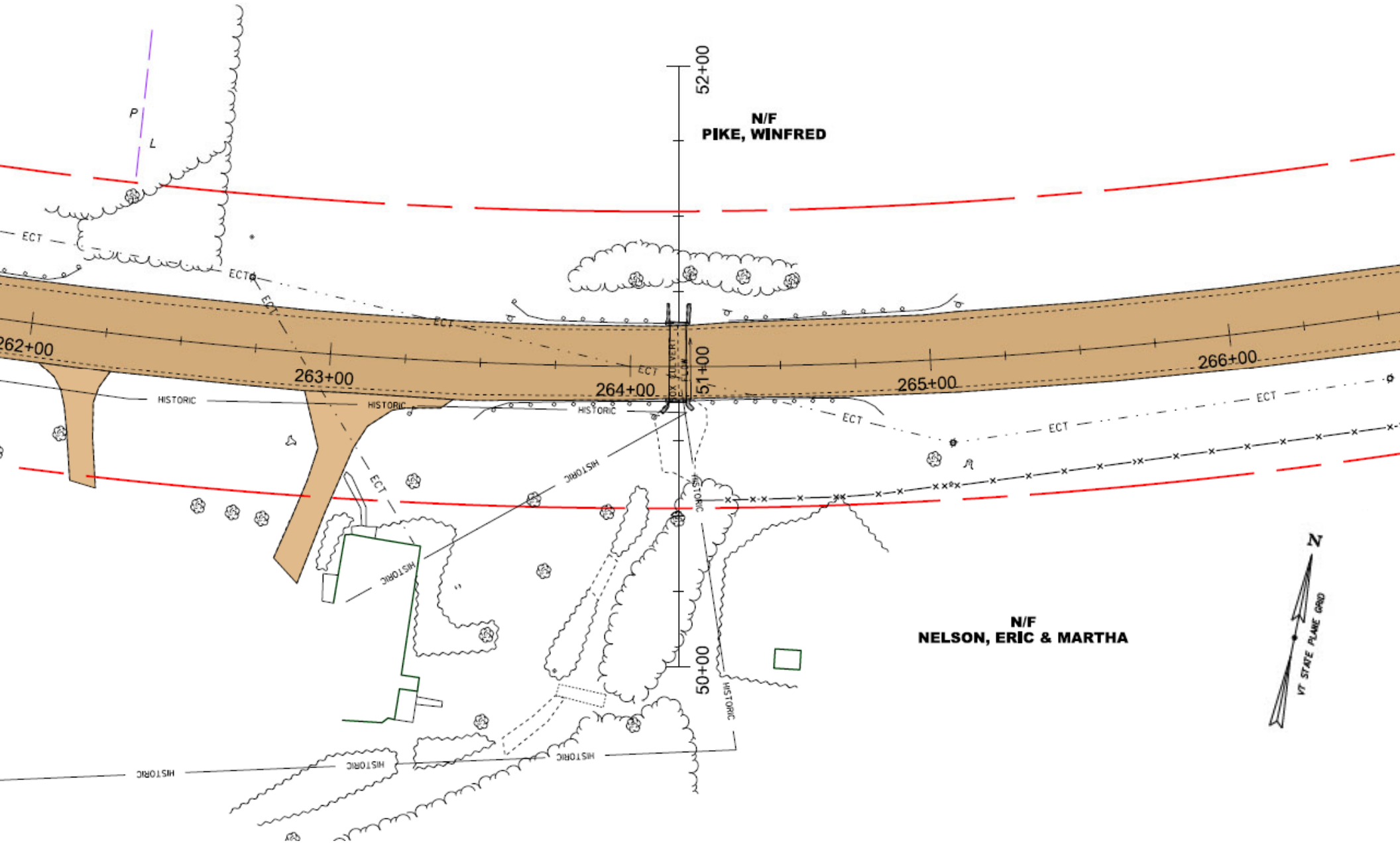
Existing Conditions - Bridge #9

Existing Resources – Bridge #9

- Project area is within the Northern Long Eared Bat's (NLEB's) habitat range.
- Wildlife Habitat – Resource identification has found that the existing structure is undersized and does not facilitate terrestrial connectivity, but there is a natural barrier within 100' of the structure.
- Archaeological – The field to the north of the existing structure is deemed archeologically sensitive.
- Historic – Bridge 9 is not historic, but the structure to the southwest is a National Register eligible house listed in the Vermont State Register.
- The soil in the area is considered Prime Agricultural soil.

- Vermont Route 4A is a moderate use bicycle corridor.
- Marble Valley Regional Transit District has a public transit route (Fair Haven route) with 4-5 round trips per day, that uses Vermont Route 4A through the project area.

Existing Conditions



Design Criteria and Considerations

- Average Daily Traffic
  - 2,150 vehicles per day
- Design Hourly Volume
  - 250 vehicles per hour
- % Trucks
  - 5.1%
- Design Speed
  - 50 MPH

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Alternatives Considered – Bridge #9

- No Action
  - Additional maintenance required within 10 years
- Full Bridge Replacement–Concrete Box Culvert-On Alignment
  - Meets all hydraulic standards if no sedimentation.
    - 8′ minimum span, 5′-3″ rise.
  - Meets horizontal geometric standards
    - 4-11-11-4 Roadway Typical.
    - 6% maximum banking.
  - 75-year design life
- Full Bridge Replacement–Concrete Box Culvert-Off Alignment
  - Meets all hydraulic standards
    - 8′ minimum span, 5′-0″ rise.
  - Meets horizontal geometric standards
    - 4-11-11-4 Roadway Typical.
    - 6% maximum banking.
  - 75-year design life

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Selected Alternative - Bridge #9

- Replace the existing culvert with a new precast concrete box off alignment
  - 8-foot minimum span box
  - New channel alignment as recommended by hydraulics reduces sediment deposition
  - Minimum hydraulic standard and bank full width conditions will be met
  - 4′/11′/11′/4′ roadway typical meets minimum standard width
  - Headwalls that extend four feet below the channel bottom to prevent undermining

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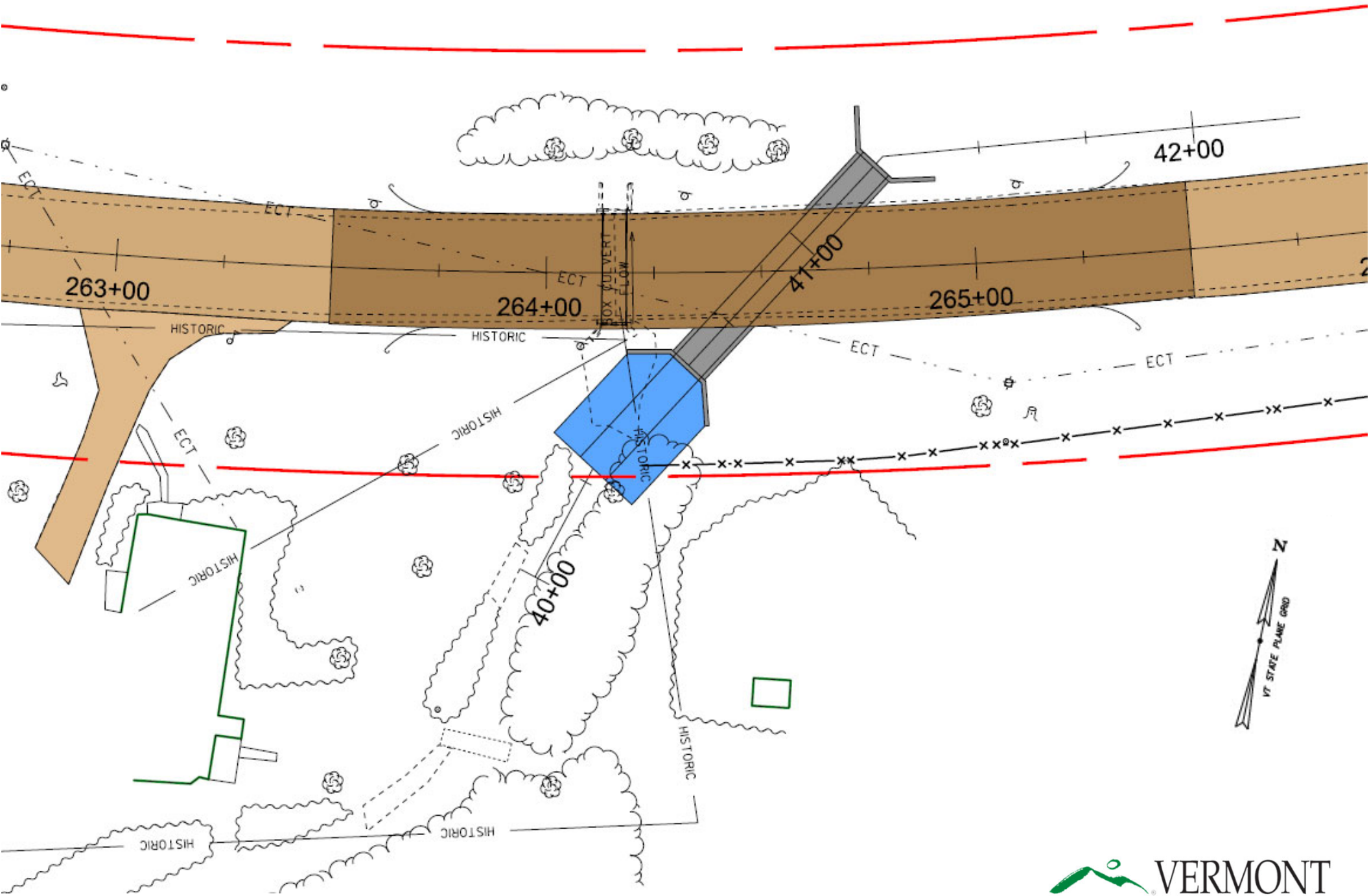
Precast Box Off Alignment - Layout



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Maintenance of Traffic Options Considered

- **Offsite Detour** – This option would close the bridge and reroute traffic onto an official, signed State detour.

- **Phased Construction** – Involves maintenance of traffic over the existing culvert while building one half at a time of the proposed structure. This allows the road to stay open during construction, but with reduced lane widths and a long construction season.

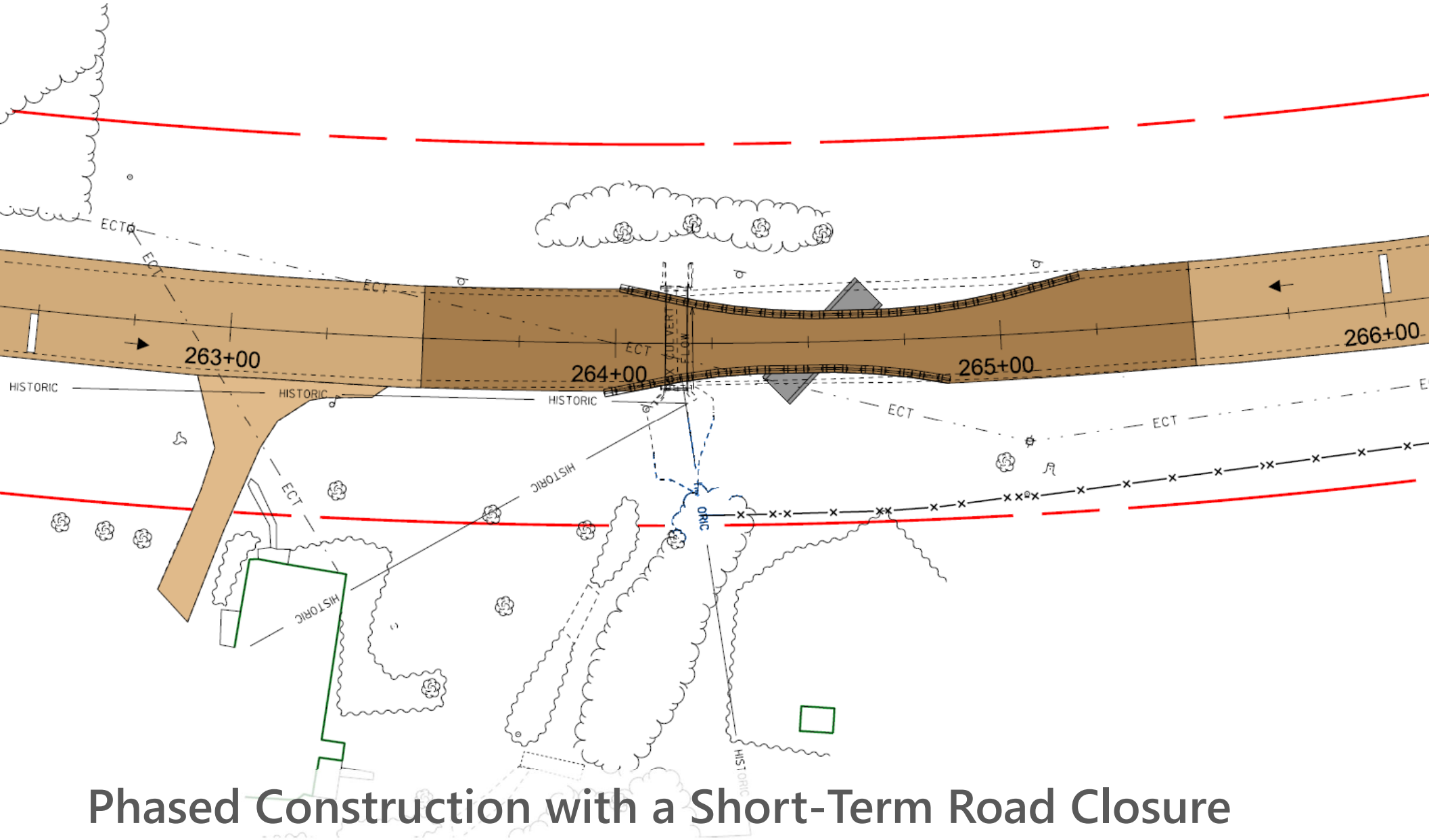
- **Temporary Bridge** - A temporary bridge on either side would have limits outside the existing Right-of-Way. A temporary bridge would have impacts to utilities and environmental and cultural resources.

Selected Method of Traffic Maintenance

Phased Construction with a Short-Term Road Closure

- 1 Phase with one-lane alternating traffic with Traffic Signal

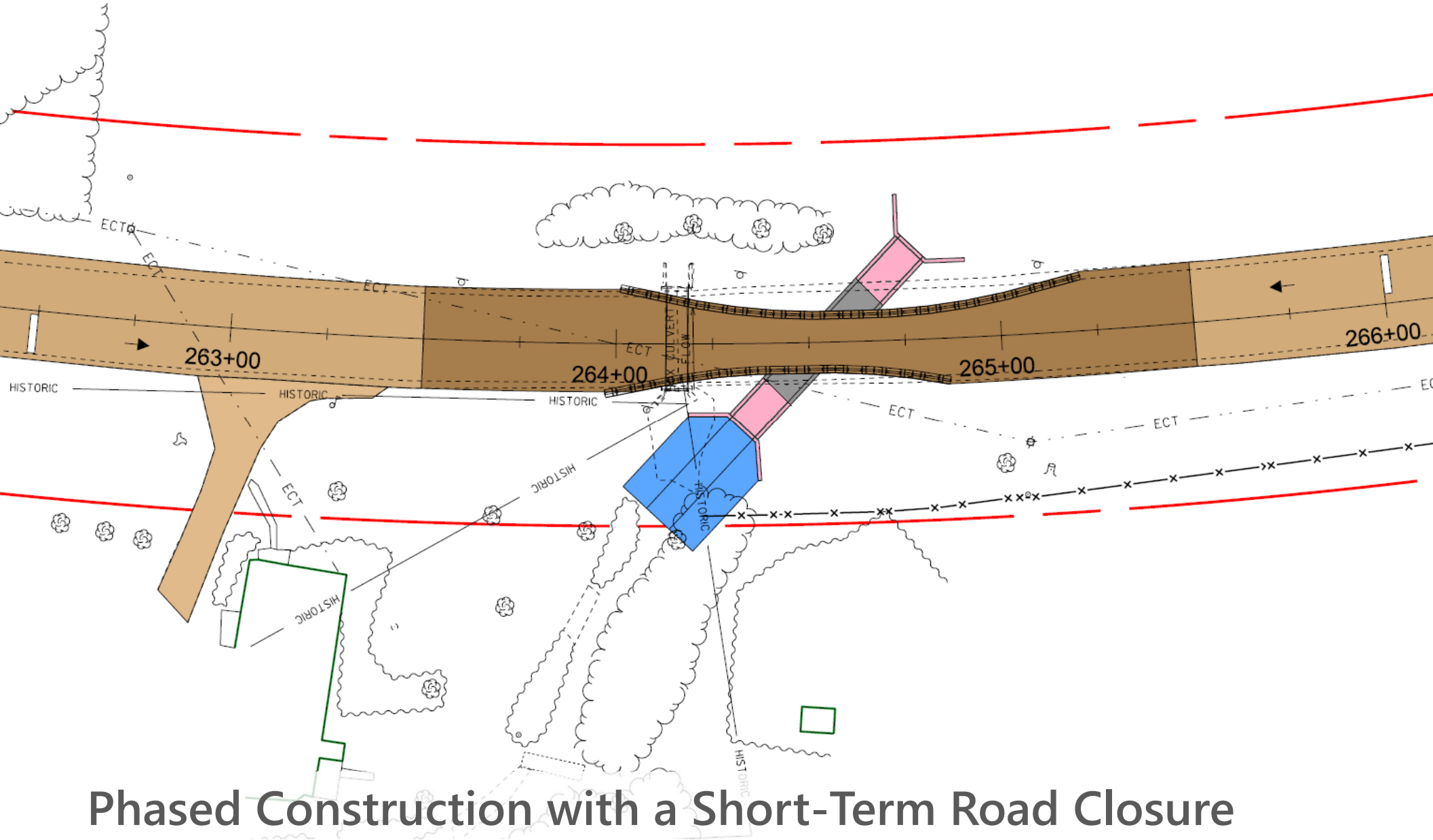
Phased Construction Layout 1



Phased Construction with a Short-Term Road Closure

- Middle section of the new structure to be installed during a weekend bridge closure

Phased Construction Layout 2



Phased Construction with a Short-Term Road Closure

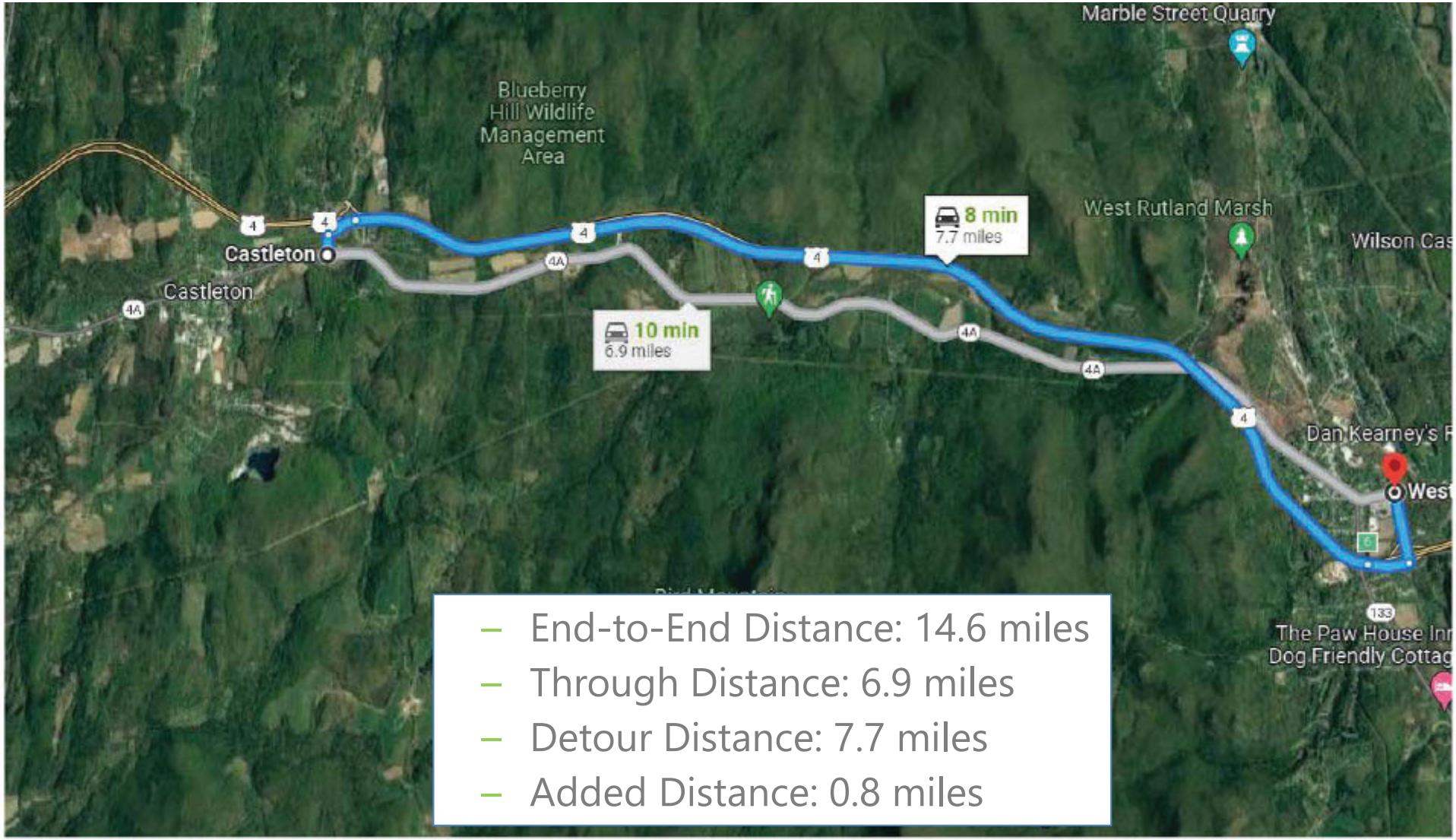
- Remainder of structure to be constructed while one-lane alternating traffic is maintained over the middle portion.

Road Closure

- Detour chosen and signed by State
- Weekend Closure Duration
- Shortest Detour Route is 14.6 miles end-to-end

Traffic Control – Detour Route

- **Regional Detour Route:** US Route 4, From exit 5 to exit 6



Preliminary Project Schedule

- Construction Start – Spring/Summer 2027
  - Total Cost Estimate: $1,300,000

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Project Summary - Bridge #9

- Replace the existing culvert with a new 8-foot span precast concrete box. Traffic will be maintained with a combination of a weekend closure and phased construction.
  - Recommended traffic control is a weekend closure to install sufficient culvert to maintain a single lane of traffic, and then a signalized single lane road to complete the remaining installation. A second short closure may be needed to remove the existing culvert. Then final roadwork can be completed through single lane closures.
  - Meets minimum hydraulic standard and bank full width.
  - The new box will be constructed on an improved alignment for hydraulics to prevent sediment buildup in the structure.
  - 4’/11’/11’/4’ roadway typical to meet the minimum standard roadway width
  - Design life of new structure is 75 years

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For more information:

- https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/23B028

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Questions and Comments

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