STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Montgomery STP DECK(40)

VT ROUTE 118, BRIDGE 19 OVER TROUT RIVER

February 22, 2016

Table of Contents

I. Site Information

Bridge 19 is a State owned bridge located on VT Route 118 in the town of Montgomery. The bridge is located near the intersection of Comstock Bridge Road and VT Route 118, approximately 2.7 miles north of the junction with VT Route 242. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Major Collector (State Highway)
Bridge Type	Three Span Rolled Beam
Bridge Length	177 feet
Year Built	1953
Ownership	State Owned

Need

Bridge 19 carries VT Route 118 across Trout River. The following is a list of deficiencies of Bridge 31:

1. The deck is rated a 4 'poor' and has significant section loss at the fasciae.

2. The bridge seats will require some repair as well as resetting the bearings.

Traffic

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

	VT 118	
TRAFFIC DATA	2016	2036
AADT	2500	2600
DHV	330	350
ADTT	140	220
%T	4.3	6.3
%D	56	56

Design Criteria

The design standards for this roadway are indicated below; however given this is a maintenance project some improvements to meet current design standards will be impractical.

1. AASHTO. *A Policy on Geometric Design of Highways and Streets.* Association of State Highway and Transportation Officials, Washington, DC, 2011. (The Green Book)

2. AASHTO. *Roadside Design Guide.* Association of State Highway and Transportation Officials, Washington, DC, 2011.

Minimum standards are based on commentary from the Vermont State Design Standards for Lane and Shoulder widths for Urban Collectors.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Bridge Lane and Shoulder Widths	Green Book Chapter 8.2	3'-12'-12'-3'	3'-11'-11'-3'	Exceeds Standard
Speed		50 mph (Posted)	50 mph (Design)	
Bicycle/Pedestrian Criteria			3' Shoulder	
Bridge Railing	Structures Design Manual Section 13		TL-3	

Inspection Report Summary

Deck Rating 4 Poor
Superstructure Rating 7 Good
Substructure Rating 6 Satisfactory

8/27/2014 12 month inspection of poor deck. No significant changes since the last inspection. Beam bays 2 and 3 have the most progressive deterioration in spans 1 and 2. Hot spots for full depth failure is in beam bay #3 (just left of centerline heading northward) in span #2. Bridge would benefit greatly from reconstruction with a continuous new deck. ~ MJ/JS

8/28/2013 – The deck is now rated as poor and has the potential for full depth holes to form along beam bays 2 and 3. Bridge is a good candidate for reconstruction with a: new continuous deck, bridge rail upgrade, channel diaphragms addition at beam ends; along with pier seat patching and beam painting. ~ MJ/JS

10/27/2011 – Bridge would benefit greatly from a reconstruction project with deck replacement and joint elimination such as was done to bridge (21), just northward. All joints, save a plug at each end, should be eliminated with a continuous deck pour and the bridge rail upgraded with NETC type. ~ MJ/DK

Utilities
The existing utilities are as follows:

Municipal Utilities

- N/A

Public Utilities

- N/A

Aerial:

- There are aerial electric and telephone facilities which run along VT 118 owned by Vermont Electric, Comcast, and Fairpoint. The

Right Of Way
The existing Right-of-Way is plotted on the Layout Sheet. No Right-of-Way acquisition will be necessary.

Historic:

Bridge 19 is a historic structure. As requested for historic preservation, the new rail will feature a historic bridge rail that matches the character of existing site conditions.

II. Alternatives Discussion

This project was identified by the Asset Management Program along with 9 other structures as a candidate for the 2016/2017 Bridge Deck Replacement Program. The objective of the program was to identify structures to apply a cost-effective treatment at the proper time to preserve and extend the useful life of the bridge. Preventative maintenance provides the biggest benefit for the smallest level of investment. By either repairing or replacing the bridge deck, the service life of the superstructure and substructure can be maximized by protecting them from exposure to the elements that have caused the deck to deteriorate to its current condition. Therefore, the alternatives analysis was limited to the bridge deck exclusively. Any project that was determined to need major repairs to either the superstructure or substructure, or required a temporary bridge were removed from the Bridge Deck Replacement Program and will go through the standard development process.

Alternative 1: No Action

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

Alternative 2: Deck Patching

The existing deck is rated a 4 ("poor"). The superstructure, referring to the rolled steel beams, is rated a 7 ("good"), and the existing substructure is rated a 6 ("satisfactory"). Deck patching would include removal of loose and deteriorating concrete, cleaning and possibly supplementing reinforcing steel, application of patching material to cracks and areas of section loss, and paving on the bridge and for a short distance on each approach to the bridge. The Bridge Inspection Report (attached) indicates that the existing bridge and approach rail does not meet current safety standards. It would be reasonable to consider replacement of the existing bridge and approach rail to provide a bridge and approach rail that meets the current standard. Some characteristics of deck patching are as follows:

- Patching tends to accelerate the deterioration of the existing concrete that is in contact with the patching material, and thus offers a widely variable service life often 10 years or less.
- Much of the work would take place underneath the bridge with efforts required to avoid contamination of the river.
- In approximately 10 years, the condition of the bridge would be similar to its current condition and major work would be required again.

Disadvantages seem to outweigh the benefits to this short-term fix. Deck patching alone will not be considered further.

Alternative 3: Deck Replacement

This alternative would involve removing the existing deck in its entirety and placing a new deck on the existing steel beams. The new deck will be a "Link Slab" which is continuous and eliminate the need for bridge joints over the piers increasing the longevity of the bridge components below. A concrete/metal combination bridge railing was selected to meet historic requirements that matches both the character of the existing bridge, as well as the current design standards for the posted speed limit.

The existing substructure is in satisfactory condition, and it is reasonable to assume that it can safely carry anticipated traffic loads for an additional 40 years. The failed expansion joints at the piers have exposed the tops of the pier caps/bridge seats to high concentrations of deicing compounds (chlorides) that have caused some deterioration. Thus the bridge seats will require minor repairs to counteract the damage caused by the failed joints.

Advantages: This alternative would address the structural deficiencies of the existing bridge by providing a new deck and removing expansion joints from the bridge keeping leaky joints from deteriorating the bridge seats, abutments, bearings, and steel girders in the future. It would also make the new deck composite and increase the load carrying capacity of this structure. This option would have minimal impacts to adjacent properties and resources.

Maintenance of Traffic: Traffic could be maintained on an offsite detour or with phased construction. It generally does not make economic sense to construct a temporary bridge for a rehabilitation project.

Given this is a maintenance project meeting all of the current design standards may not be possible. However, the scope of the project will be to improve the bridge as much as possible given the site constraints.

III. Maintenance of Traffic

The Vermont Agency of Transportation review 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 will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize closure period with faster construction techniques and incentives to contractors to complete projects sooner. The Agency will consider the closure potion on most projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Construction should provide enhanced safety for the workers and the travelling public while maintaining project quality. The following options have been considered.

Option 1: Off-Site Detour

Montgomery Bridge 19:
This option would close the bridge and reroute traffic onto an offsite detour. Since the bridge is located on a State Highway, the State will design and manage a detour route and traffic control

plan. The State will coordinate with emergency services to develop a plan for the closure period. The shortest available state detour is as follows:

- From the Intersection of VT 118 and Comstock Bridge Rd drive east towards VT 105. At the intersection of VT 118 and VT 105 turn right. Follow VT 105 into the Village of Richford. Turn Right at Troy Street (VT 105) and continue following VT 105 west until the intersection of VT 105 and VT 101. Turn Right and follow VT 101 approximately 1 mile, turn Right onto VT 242 and follow for approximately 12 miles. At the end of VT 242 is an intersection with VT 118. The end to end distance is 42 miles resulting in 1 hour of drive time.

A potential local bypass route is as follows:

- Comstock Bridge Rd parallels VT 118. The entrance to Comstock Bridge road is at the end of the bridge. The end to end distance is 0.6 miles with an estimated drive time of 2 minutes. Comstock Bridge Rd has a one lane Covered Bridge that has both height and weight restrictions that would limit the size and type of traffic that can be accommodated along this route.

Advantages: The costs associated with signing the detour are much lower than the construction costs associated with other maintenance of traffic options. By detouring traffic away from construction activities, it creates a safer working environment for the construction workers. By not constructing the structure in phases, there will be no vibrations or deflections from adjacent traffic to affect the quality of the closure pours joining the phases. By not requiring the construction and removal of temporary approaches, temporary bridges and temporary crossovers, the length of construction can be reduced over those other options. This is the safest traffic control option since the traveling public is removed from the construction site.

Disadvantages: Traffic will not be maintained along the existing corridor for a limited portion of construction. Through traffic will see an increase in travel times during the closure period given the long detour.

Option 2: Phasing

Phased construction is the maintenance of one way alternating traffic on the existing bridge while building one lane at a time of the proposed structure. This allows the road to stay open to traffic during construction with regular construction related delays, while having minimal impacts to adjacent property and environmental resources.

Based on the traffic volumes, it is reasonable to close one lane of traffic, and maintain one lane of alternating one-way traffic with a traffic signal.

Advantages: Traffic would be maintained along the existing corridor during construction.

Disadvantages: While the time and cost required to construct a phased project may be less than that required to construct a project with a temporary bridge, the time required to construct a phased construction project is still longer than a project constructed without phasing, because some of the construction tasks have to be performed multiple times and cannot be performed concurrently. The cost of construction also increases over un-phased work because of this increase in the length of time, the additional inconvenience of working around traffic, and the effort involved in coordinating the joints between the phases. Once again, while the corridor will be open to traffic during construction, traffic will still be delayed and disrupted by the reduction

in the number of lanes and by construction vehicles and equipment entering and exiting the site. The construction workers and equipment will still be in close proximity to vehicular traffic increasing the probability of accidents.

Maintenance of Traffic Conclusion

Montgomery Bridge 19:
The detour for this location is 42 miles and takes approximately 1 hour to drive end to end. Given the length of the detour and the time required to commute around the bridge, phasing is the preferred alternative. Fortunately traffic volumes at bridge 19 are low enough to make phasing a viable alternative and the projected delays are far less than the time required to detour. During construction special considerations will need to be made for Comstock Bridge Rd as the contractor will be working in close proximity to the intersection in order to install the bridge approach slab. Traffic will need to be controlled at the intersection of Comstock Bridge Rd and VT Route 118 such that any traffic entering or exiting doesn't interfere with construction or the alternating one-way traffic on VT 118. It would be recommended that the Town of Montgomery consider closing the end of Comstock Bridge Rd closest to the Bridge on VT 118 and forcing local traffic to enter and exit at the other intersection of Comstock Bridge Rd and VT 118. This would also prevent excessive traffic, overweight, and over height trucks from attempting to utilize Comstock Bridge Rd rather than wait for the alternating one-way signal thus protecting the covered bridge from unnecessary damage.

IV. Cost Matrix[1]

Montgomery B19 VT 118		Alt 1 Do Nothing	Alt 3 Deck Replacement
COST	Bridge Cost	$0	$414,000
	Removal of Structure	$0	$125,000
	Roadway	$0	$256,000
	Maintenance of Traffic	$0	$95,000
	Construction Costs	$0	$890,000
	Construction Engineering + Contingencies	$0	$267,000
	Total Construction Costs w CEC	**$0**	**$1,157,000**
	Preliminary Engineering[2]	**$0**	**$100,000**
	Right of Way	**$0**	**$0**
	Total Project Costs	$0	$1,257,000
	Annualized Costs	$0	$0
TOWN SHARE	Towns total Share		
SCHEDULING	Project Development Duration[3]		1 years
	Construction Duration		1 years
	Closure Duration (If Applicable)		N/A
ENGINEERING	Typical Section –		
	Typical Section –		
	Typical Section – Bridge (feet)	3’-14’-14’-3’ (34’)	6’-11’-11’-6’ (34)
	Geometric Design Criteria	No Change	No Change
	Traffic Safety	No Change	No Change
	Alignment Change	No Change	No Change
	Bicycle Access	No Change	No Change
	Vertical Clearance	No Change	No Change
	Pedestrian Access	No Change	No Change
	Utility	No Change	No Change
OTHER	ROW Acquisition	No	No
	Road Closure	No	No
	Design Life	<5 years	40 years

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

V. Conclusion

Alternative 3 is recommended; to replace the existing deck using phased construction.

Structure:
This alternative includes replacing the deck with a cast in place continuous concrete deck using phased construction. This is a conventional construction method with a longitudinal joint in the center of the bridge. By making the slab continuous the expansion joints on the bridge are relocated to the ends of the structure which reduces the amount of maintenance necessary for this structure in the future. The new bridge railing will be a concrete and metal combination railing matching the historic character of the existing bridge while meeting current design standards and crash testing requirements.

Traffic Maintenance:
The State of Vermont will include provisions in the contract that require the contractor to create a traffic control plan which shows the phases, signage, and signal timings for the alternating one-way traffic.

VI. Appendices

Site Pictures

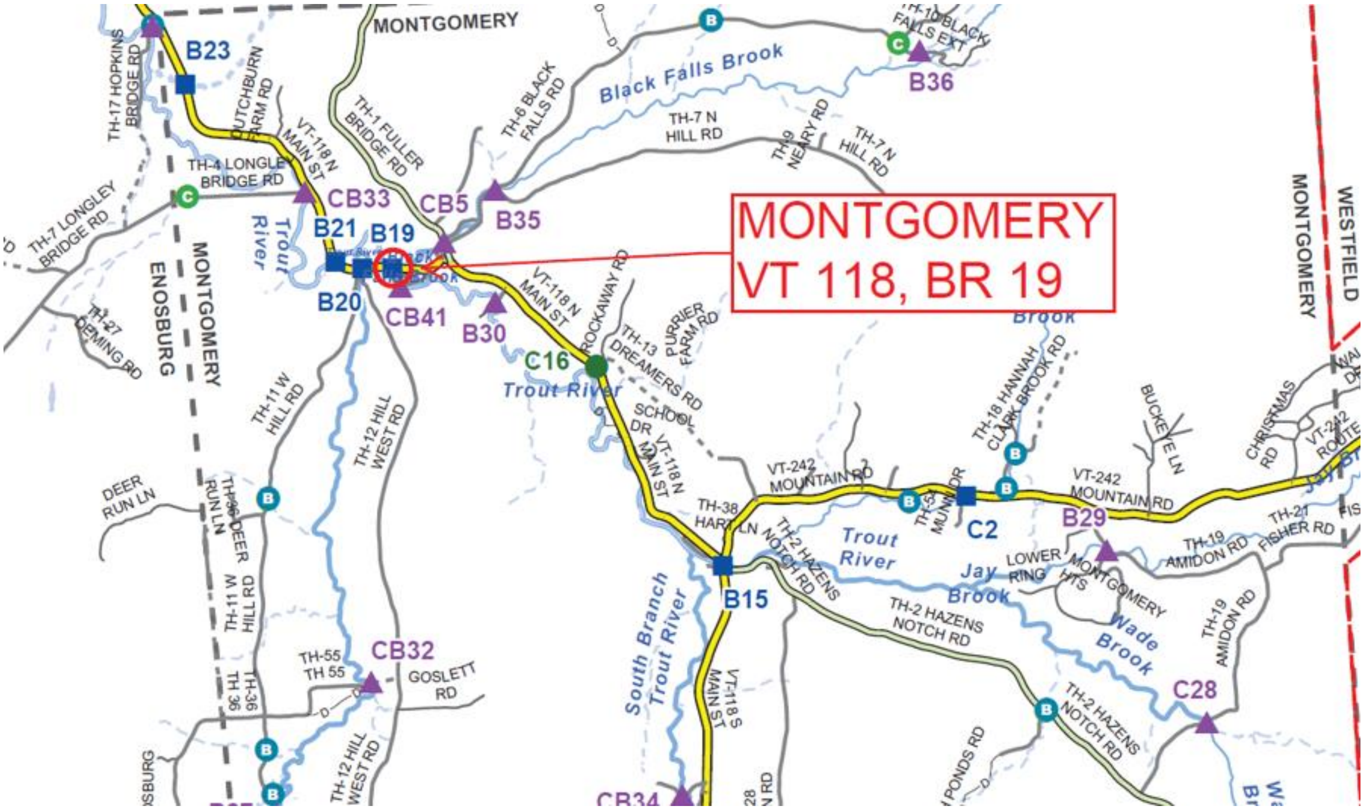

08/27/2014


08/27/2014


08/27/2014


08/27/2014

Town Map


MONTGOMERY
VT 118, BR 19
MONTGOMERY
B23
B21
B19
B20
CB33
CB5
B35
CB41
B30
C16
B36
Black Falls Brook
Trout River
B15
C2
B29
CB32
C28
ENOSBURG
MONTGOMERY
WESTFIELD
South Branch Trout River
Jay Brook
Wade Brook

Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for MONTGOMERY | *bridge no.: 00019* | *District: 8*

Located on: VT 00118 ML ove TROUT RIVER | *approximately 2.7 MI N JCT. VT.242* | *Owner: 01 STATE-OWNED*

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 7 GOOD

Substructure Rating: 6 SATISFACTORY

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200283001906102

Federal Sufficiency Rating: 078.3

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1953 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): 28

ADT: 001800 % Truck ADT: 06

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0057

Structure Length (ft): 000177

Lt Curb/Sidewalk Width (ft): 1.5

Rt Curb/Sidewalk Width (ft): 1.5

Bridge Rdwy Width Curb-to-Curb (ft): 30

Deck Width Out-to-Out (ft): 35.2

Appr. Roadway Width (ft): 031

Skew: 30

Bridge Median: 0 NO MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3 SP ROLLED BEAM

Number of Approach Spans 0000 | *Number of Main Spans: 003*

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 4 OCCASIONAL OVERTOPPING OF BRIDGE & ROADWAY WITH SIGNIFICANT TRAFFIC DELAYS

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 4 H 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 082014 | *Insp. Freq. (months) 12* | *X-Ref. BrNum:*

INSPECTION SUMMARY and NEEDS

08/27/2014 - 12 month inspection of poor deck. No significant changes since the last inspection. Beam bays 2 and 3 have the most progressive deterioration in spans 1 and 2. Hot spots for full depth failure is in beam bay #3 (just left of centerline heading northward) in span #2. Bridge would benefit greatly from reconstruction with a continuous new deck. – MJ/JS

08/28/2013 - The deck is now rated as poor and has the potential for full depth holes to form along beam bays 2 and 3. Bridge is a good candidate for reconstruction with a: new continuous deck, bridge rail upgrade, channel diaphragms addition at beam ends; along with pier seat patching and beam painting. – MJ/JS

10/27/2011 - Bridge would benefit greatly from a reconstruction project with deck replacement and joint elimination such as was done to bridge (21), just northward. All joints, save a plug at each end, should be eliminated with a continuous deck pour and the bridge rail upgraded with NETC type. – MJ/DK