

**STATE OF VERMONT
AGENCY OF TRANSPORTATION**

**Scoping Report
FOR
Eden BO 1448(44)**

**TOWN HIGHWAY 13, BRIDGE 23 OVER THE WHITE BRANCH OF GIHON
RIVER**

October 23, 2017



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I. Site Information

Bridge 23 is a Town owned bridge located on Knowles Flat Road (Town Highway 13) approximately 0.6 miles north of the junction with VT Route 100 in the Town of Eden. The Eden Central School is located on Knowles Flat Road approximately 0.4 miles south of the bridge location. The existing bridge has failed, the twin culverts were removed and the roadway closed to traffic.

Roadway Classification Local Road (Class 3 Town Highway)
Ownership Town of Eden

The bridge has been removed. Prior to removal it had the following characteristics:

Bridge Type Twin Corrugated Galvanized Metal Plate Pipe Arches
Culvert Span 26-feet
Culvert Barrel Length Approximately 55-feet
Year Built 1976

Need

Bridge 23 carries Town Highway 13 (Knowles Flat Road) over the White Branch of Gihon River. The following is a list of deficiencies of Bridge 23 and Town Highway 13 in this location:

1. Bridge 12 is considered structurally deficient. The culverts have been rated a 0 “Failed” and the roadway has been closed to traffic. The twin pipes have been removed.
2. The removed twin culverts constricted the natural channel width.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2022 and 2042

Traffic Data	2022	2042
AADT	660	720
DHV	140	150
ADTT	60	85
%T	8.8	11.0
%D	63	63

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on an ADT between 400 and 1,500, and a design speed of 35 mph for a Local Road.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	9'4' (26')	9'2' (22')	
Bridge Lane and Shoulder Widths	VSS Section 6.7	9'4' (26')	9'2' (22')	
Clear Zone Distance	VSS Table 6.5	No Issues Noted	12' fill / 10' cut	
Banking	VSS Section 6.12		8% (max)	
Speed		35 mph (design)	35 mph (design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b		R = 4,260 @ NC	
Vertical Grade	VSS Table 6.6		10% for rolling terrain	
K Values for Vertical Curves	VSS Table 6.1		40 crest / 50 sag	
Vertical Clearance	VSS Section 6.7	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 6.1		225'	
Bicycle/Pedestrian Criteria	VSS Table 6.7	4' shoulder	2' Shoulder	
Bridge Railing	Structures Design Manual Section 13	N/A W-Beam railing along roadway	TL-2	
Hydraulics	VTrans Hydraulics Section	Previous Bridge: 2-12' spans		Assumed - Substandard Bank Full Width
Structural Capacity	SM, Ch. 3.4.1	N/A	Design Live Load: HL-93	No Bridge

Inspection Report Summary

Culvert Rating **0 FAILED**
 Channel Rating 6 Satisfactory

See the Appendix for a detailed bridge inspection report.

Utilities

Adjacent to the Town Highway there is an existing pole line containing a single phase electric line (owned by Vermont Electric Cooperative) and one communication cable (owned by C.T. Corporation Systems – formerly FairPoint); if necessary, relocation of these facilities should not be difficult.

There are no known buried communication cables along this section of Town Highway, although several utility poles have risers for underground electric/telephone service.

The Town of Eden has no municipal water or sewer mains along this section of Town Highway.

Near the northeast corner of the bridge there is also a dry hydrant owned by the Town of Eden; bridge construction may have no impact on this dry hydrant; but if impacts do occur than the relocation costs associated with this dry hydrant are eligible for project participation.

Right Of Way

An existing survey has been requested, once the survey is complete, the Vermont Agency of Transportation Right-of-Way section should be notified to plot the existing Right-of-Way.

Resources

The VTrans environmental specialist conducted a field visit on September 14, 2017.

Wetlands/Watercourses

A class II wetland complex comprises the majority of the project area. Wetlands were identified at a resource planning level using USCOE wetland indicators. The wetland complex was populated primarily with speckled alder, goldenrods and asters. Soils within the wetland are mapped as Histic Fluvaquents, a hydric soil. Field conditions confirmed this as the soils consisted of 15" of dark, organic soils with a mucky texture, underlain by grey silty loam. Several wetland hydrology indicators were met. The wetland is a large wetland complex (roughly 100 acres) that has several functions and values: flood storage; wildlife habitat; fisheries habitat; erosion control; water quality; education and research; recreation and open spaces.

The only waterway present is the White Branch of the Gihon River which flows southerly through the project area.

The wetlands and impacts below OHW to the White Branch of the Gihon River are both regulated by the COE. The wetlands are class II wetlands which have a regulated 50' upland buffer, both are regulated by the VT Wetlands Office.

Wildlife Habitat

Mid-level priority habitat blocks are mapped to the north and south of the project area. Typical terrestrial wildlife that would occur at this location are mink, otter, muskrat, and beaver. The area also is likely to support waterfowl and other migratory birds. Typical aquatic wildlife would consist of fish, amphibians and reptiles.

Rare, Threatened and Endangered Species (R/T/E)

According to the ANR Natural Resource mapping there are no known occurrences of rare, threatened, or endangered species within the project area. The northern long-eared bat, *Myotis septentrionalis* is federally listed threatened and a state endangered species statewide. No mapped hibernacula or known roost trees are mapped within 1-mile of the project area. Suitable habitat for northern long-eared bats consist of trees (dead or alive) $\geq 3"$ dbh that exhibit cracking, peeling bark, holes, crevices, etc. The project area does not have suitable habitat for roosting bats.

Agricultural Soils

Soils mapped within the project area are Histic Fluvaquents, a poorly drained soil that is neither prime nor statewide significant farmland soils.

II. 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 will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with faster

construction techniques and incentives to contractors to complete projects sooner. The Agency will consider the closure option 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

Bridge 23 has been closed to traffic since 2016 due to the pipe failure. This option would keep the bridge closed during construction and continue to reroute traffic onto an offsite detour. The detour route most likely being used since the closure is:

- Knowles Flat Road, to VT Route 100, and White Road, back to Knowles Flat Road (3.4 miles end-to-end)

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. This option reduces the time and cost of the project both at the development stage and construction.

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

Option 2: Phased Construction

Phased construction is the maintenance of traffic on the existing bridge while building one lane at a time of the proposed structure. This allows the road to be kept open during construction with minimal impacts to adjacent property owners and environmental resources.

Phased construction will not be considered for traffic control since the existing bridge has been removed.

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed either downstream or upstream of the existing bridge. Either option would have negative impacts to the Class II wetlands that are located around the bridge. Significant additional costs would be incurred to use a temporary bridge, including the cost of the bridge itself, installation and removal, restoration of the disturbed area, and the time and money associated with the temporary Right-of -Way.

The bridge has been closed to traffic since 2016 and a viable detour route exists. A temporary bridge would increase the amount of time to deliver the project, resulting in the bridge being closed longer than necessary, and as such is not being considered further.

III. Alternatives Discussion

No Action

This alternative would involve leaving the bridge in its current condition. A good rule of thumb for the “No Action” alternative is whether the bridge can stay in place without any work being performed on the bridge in the next 10 years. Bridge 23 has failed and the roadway has been closed; the No

Action alternative is not recommended. A cost estimate has not been provided for this alternative since there are no immediate costs.

Permanent Bridge Closure

This option would close the bridge to traffic permanently. Knowles Flat Road runs parallel to White Road and Belvidere Road, so through traffic would not be greatly impacted by keeping this section of road closed indefinitely. The traffic volume utilizing this stretch of road is relatively small and the lengths of the detours are relatively short as well.

The work required for a permanent closure would be as follows:

- Work would need to be performed to prevent the existing slopes from failing. The structure has already been removed, however further slope stabilization and erosion control may be necessary.
- The paved area on each end of the bridge would be expanded to allow for a turn around since both ends would be a dead end. A cul-de-sac could possibly be paved, but would most likely require permanent Right-of-Way from the adjacent land owners.
- Barrier or guardrail would be placed in the roadway approaches to eliminate a fall hazard.

This would provide the lowest cost solution to rectify the issues at this site. In addition, the future maintenance costs would be reduced because there would be no bridge to maintain and the section of Knowles Flat Road near the existing bridge would see much less traffic if the road were to remain closed.

Due to the close proximity to the Elementary school, there may be a desire to maintain pedestrian access. A pedestrian bridge could be added to the permanent bridge closure option for an additional \$150,000 to the total cost of the project. This would increase the Town share from 2.5% to 5%.

Bridge Rehabilitation

The existing structure has been removed due to a failure, as such a rehabilitation is not possible.

Full Bridge Replacement On-Alignment

This alternative would place a new bridge where the old bridge was located. The existing horizontal and vertical alignments would be matched.

a. Alignment

While the existing bridge is located in the middle of a very slight S-curve, any new bridge should be placed on the existing horizontal alignment to minimize impacts to wetlands.

b. Bridge Width

The existing lane widths and shoulders along the roadway through the project area are 9 feet wide and 4 feet wide respectively; this exceeds the minimum standard of 9 feet and 2 feet respectively. It is proposed that any new bridge match the roadway typical section of 26-foot edge of pavement to edge of pavement; two 9 foot travel lanes and 4 foot shoulders will be proposed.

c. Bridge Length and Skew

The existing bridge is a twin arch structure with two 12-foot spans totaling 26-feet and no skew. Hydraulics and Survey have not been completed yet for this structure, however, from orthophoto measurements, the White Branch of Gihon River appears to have a 38-foot to 40-foot bank width. It is expected that a new bridge would be approximately 40-feet long with no skew to match the existing site condition. Depending on geotechnical findings, a longer integral abutment bridge would also be a possibility.

d. Structure Type

A prefabricated structure will be the preferred choice, due to decreased design and construction time. Prefabricated abutments with a prefabricated superstructure (such as solid slabs, Precast Bridge Units, or NEXT Beams) could be used. A 3-Sided Arch structure such as a “bridge in a backpack” or a “Super Cor Arch” may also be a possibility. If an arch is chosen, the roadway may need to be slightly raised to meet the minimum cover depth. The structure type shall be chosen in design based on hydraulic and geotechnical recommendations. A geotechnical investigation has been requested. Once survey is complete, hydraulics will need to be requested.

e. Maintenance of Traffic:

As discussed in the Maintenance of Traffic Section, the bridge would remain closed during construction.

IV. Alternatives Summary

Based on the existing site conditions and bridge condition, there are three viable alternatives. The roadway would remain closed during construction for all alternatives considered:

Alternative 1: Permanent Bridge Closure

Alternative 2: Full Bridge Replacement – Precast Arch

Alternative 3: Full Bridge Replacement – Bridge

(65’ span integral abutment bridge assumed for estimating purposes)

V. Cost Matrix¹

Eden BO 1448(44)		Do Nothing	Alt 1	Alt 2	Alt 3
			Permanent Bridge Closure ²	Full Bridge Replacement - Arch	Full Bridge Replacement – Single Span Bridge
			Offsite Detour	Offsite Detour	Offsite Detour
COST	Bridge Cost	\$0	\$74,000	\$536,100	\$670,300
	Removal of Structure	\$0	\$0	\$0	\$0
	Roadway	\$0	\$120,000	\$125,000	\$161,000
	Maintenance of Traffic	\$0	\$30,000	\$30,000	\$30,000
	Construction Costs	\$0	\$224,000	\$691,100	\$861,300
	Construction Engineering + Contingencies	\$0	\$44,800	\$167,000	\$167,960
	Total Construction Costs w CEC	\$0	\$268,800	\$858,100	\$1,029,260
	Preliminary Engineering³	\$0	\$44,800	\$166,920	\$168,000
	Right of Way	\$0	\$20,000	\$20,000	\$0
	Total Project Costs	\$0	\$333,600	\$1,045,020	\$1,197,260
	Annualized Costs	\$0	N/A	\$13,062.75	\$14,966
TOWN SHARE			\$8,340 (2.5%)	\$52,251 (5%)	\$59,863 (5%)
SCHEDULING	Project Development Duration ⁴		3 years	3 years	3 years
	Construction Duration		3 months	4 months	4 months
	Closure Duration (If Applicable)		N/A	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	26'	26'	26'	26'
	Typical Section - Bridge (feet)	N/A	N/A	4-9-9-4	4-9-9-4
	Geometric Design Criteria	No Change	No Change	No Change	No Change
	Traffic Safety	No Change	Improved	Improved	Improved
	Alignment Change	No	No	No	No
	Bicycle Access	No Change	No Change	Improved	Improved
	Hydraulics	N/A	Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	Improved	Improved
Utility	No Change	No Change	Relocation	Relocation	
OTHER	ROW Acquisition	No	Unknown	Unknown	Unknown
	Road Closure	No	Yes	Yes	Yes
	Design Life	<10 years	∞	80 Years	80 Years

¹ Costs are estimates only, used for comparison purposes.

² A Pedestrian bridge could be added to this option for an additional \$150,000. This would increase the Town share to 5% (an estimated share of \$24,180).

³ Preliminary Engineering costs are estimated starting from the end of the Project Definition Phase.

⁴ Project Development Durations are starting from the end of the Project Definition Phase.

VI. Conclusion

We recommend **Alternative 2 or Alternative 3**; to replace the existing structure with either an arch or single span bridge.

Structure:

The proposed solution would include a completely new bridge placed back where the old structure was located prior to removal. Either a prefabricated arch or simple span bridge are possible at this location. The project manager shall determine the structure type based on hydraulic and geotechnical findings. The new structure should provide a 26-foot paved typical to match the existing roadway width.

Traffic Control:

The recommended method of traffic control is to keep the roadway closed to traffic during construction. The roadway has been closed since 2016, and the detour routes currently being utilized by traffic, will continue to be used during construction.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Natural Resource ID
- Geotechnical Report
- Local and Regional Input Questionnaire



Looking North Over Bridge



Looking South Over Bridge

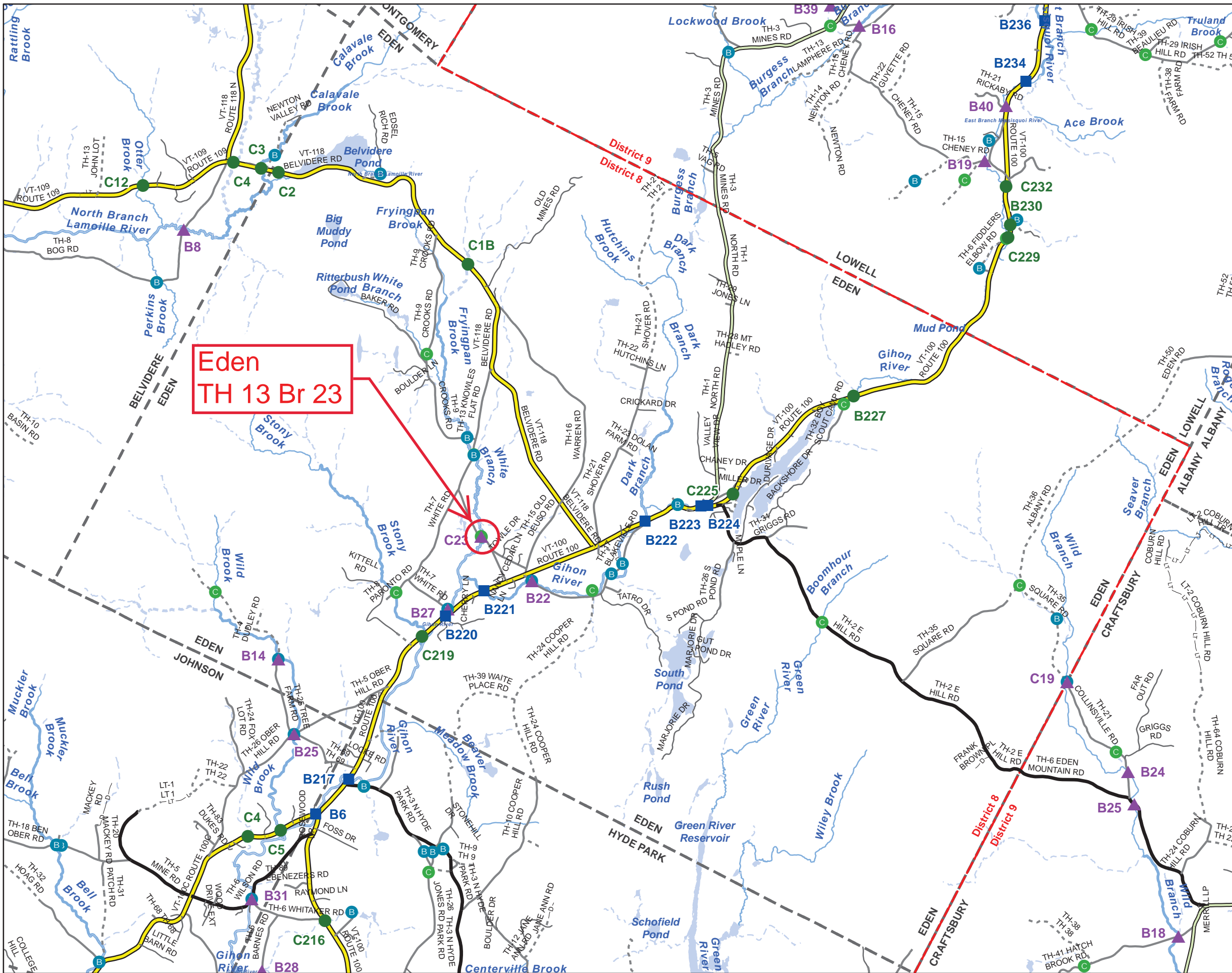


Looking East



Looking West



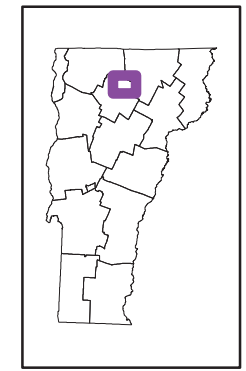


Scale 1:64,832



- ★ INTERSTATE
- STATE LONG
- STATE SHORT
- ▲ TOWN LONG
- ▼ FAS/FAU
- INTERSTATE
- STATE HIGHWAY
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- - - LEGAL TRAIL
- - - PRIVATE
- - - DISCONTINUED
- - - DISTRICT
- - - POLITICAL BOUNDARY
- NAMED RIVERS-STREAMS
- - - UNNAMED RIVERS-STREAMS
- VOBKIT Bridge Data
- VOBKIT Culvert Data

Produced by:
Mapping Unit
Vermont Agency of Transportation
June 2014



EDEN
LAMOILLE COUNTY
DISTRICT # 8

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for EDEN

bridge no.: 00023

District: 8

Located on: C3013

over WHITE BRANCH GIHO approximately 0.6 MI JCT TH 13 + VT100

Owner: 03 TOWN-OWNED

CONDITION

Deck Rating: N NOT APPLICABLE
Superstructure Rating: N NOT APPLICABLE
Substructure Rating: N NOT APPLICABLE
Channel Rating: 6 SATISFACTORY
Culvert Rating: 0 FAILED
Federal Str. Number: 100803002308031
Federal Sufficiency Rating: 036.7
Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1976 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): 04
ADT: 000250 % Truck ADT: 02
Year of ADT: 2007

GEOMETRIC DATA

Length of Maximum Span (ft): 0012
Structure Length (ft): 000026
Lt Curb/Sidewalk Width (ft): 0
Rt Curb/Sidewalk Width (ft): 0
Bridge Rdwy Width Curb-to-Curb (ft): 0
Deck Width Out-to-Out (ft): 0
Appr. Roadway Width (ft): 026
Skew: 00
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: TWIN CGMPPA
Number of Approach Spans 0000 Number of Main Spans: 002
Kind of Material and/or Design: 3 STEEL
Deck Structure Type: N NOT APPLICABLE
Type of Wearing Surface: N NOT APPLICABLE
Type of Membrane N NOT APPLICABLE
Deck Protection: N NOT APPLICABLE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: N SAFETY FEATURE NOT REQUIRED
Transitions: N SAFETY FEATURE NOT REQUIRED
Approach Guardrail N SAFETY FEATURE NOT REQUIRED
Approach Guardrail Ends: N SAFETY FEATURE NOT REQUIRED
Structural Evaluation: 0 BRIDGE CLOSED
Deck Geometry: N NOT APPLICABLE
Underclearances Vertical and Horizontal: 0 BRIDGE CLOSED
Waterway Adequacy: 0 BRIDGE CLOSED

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 0 NO RATING ANALYSIS PERFORMED
Posting Status: K CLOSED TO TRAFFIC
Bridge Posting: 5 NO POSTING REQUIRED
Load Posting: 06 BRIDGE CLOSED TO ALL TRAFFIC
Posted Vehicle: POSTING NOT REQUIRED
Posted Weight (tons):
Design Load: 5 HS 20

INSPECTION and CROSS REFERENCE X-Ref. Route:

Insp. Date: 042017 Insp. Freq. (months) 24 X-Ref. BrNum:

INSPECTION SUMMARY and NEEDS

04/19/2017 - Road closed and culverts have been removed. - MJ/AL

10/2016 Bridge Inspection has been notified that structure has failed and is closed. Town letter was sent in 04/2016 due to serious issues with pipes and no action was taken. MJK

04/20/16 Pipes are in poor condition and need replacement. Town should consider temporary measure till replacement is done as piping is occurring and sinkholes will develop and pipes have potential for failure. MJK

9/18/2015 These structures need to be replaced due to extensive section loss along the water line. JWW/JAS

9/18/2014 The culvert has rust staining throughout and is lined w/ large holes along the water line. These voids will continue to spread and longitudinal cracking will occur. These culverts will need to be replaced in the near future. JWW/JDM

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

[phone] 802-279-0583
[fax] 802-828-2334
[ttd] 800-253-0191

To: Jeff Ramsey, VTrans Environmental Specialist Supervisor
From: Glenn Gingras, VTrans Senior Biologist
Date: 9/15/2017
Subject: Eden BO 1448(44) - Natural Resource ID

I have reviewed the project area for natural resources. My evaluation has included the following resources: wetlands, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed existing mapping (ANR Natural Resource Atlas and NRCS Soils) and completed a field visit on September 14, 2017. The project area which was investigated is located on Town Highway 13 (Knowles Flat Road) in Eden, VT.

The project area involves Bridge 23, which crosses the Gihon River on Town Highway 13. The immediate area consists of scrub shrub wetland, residential homes and some small agricultural fields. The current bridge has been removed from the site. The existing road was built through the middle of the wetland.

Wetlands/Watercourses

A class II wetland complex (Figure 1) comprises the majority of the project area. Wetlands were identified at a resource planning level using USCOE wetland indicators. The wetland complex was populated primarily with speckled alder, goldenrods and asters. Soils within the wetland are mapped as Histic Fluvaquents, a hydric soil. Field conditions confirmed this as the soils consisted of 15" of dark, organic soils with a mucky texture, underlain by grey silty loam. Several wetland hydrology indicators were met. The wetland is a large wetland complex (roughly 100 acres) that has several functions and values: flood storage; wildlife habitat; fisheries habitat; erosion control; water quality; education and research; recreation and open spaces.



Figure 1 Wetland adjacent to White Branch of Gihon River

The only waterway present is the White Branch of the Gihon River which flows southerly through the project area.

The wetlands and impacts below OHW to the White Branch of the Gihon River are both regulated by the COE. The wetlands are class II wetlands which have a regulated 50' upland buffer, both are regulated by the VT Wetlands Office.

Wildlife Habitat

Mid-level priority habitat blocks are mapped to the north and south of the project area. Typical terrestrial wildlife that would occur at this location are mink, otter, muskrat, and beaver. The area also is likely to support waterfowl and other migratory birds. Typical aquatic wildlife would consist of fish, amphibians and reptiles.

Rare, Threatened and Endangered Species (R/T/E)

According to the ANR Natural Resource mapping there are no known occurrences of rare, threatened, or Endangered species within the project area. The northern long-eared bat, *Myotis septentrionalis* is federally listed threatened and a state endangered species statewide. No mapped hibernacula or known roost trees are mapped within 1-mile of the project area. Suitable habitat for northern long-eared bats consist of trees (dead or alive) $\geq 3''$ dbh that exhibit cracking, peeling bark, holes, crevices, etc. The project area does not have suitable habitat for roosting bats.

Agricultural Soils

Soils mapped within the project area are Histic Fluvaquents, a poorly drained soil that is neither prime nor statewide significant farmland soils.

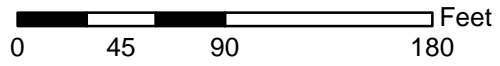
Conclusion

Natural resources that are present at this site are Class II Wetlands, the White Branch of the Gihon River and a variety of wildlife species. During project scoping, avoidance and minimization of impacts to these resources will need to be evaluated.

Cc

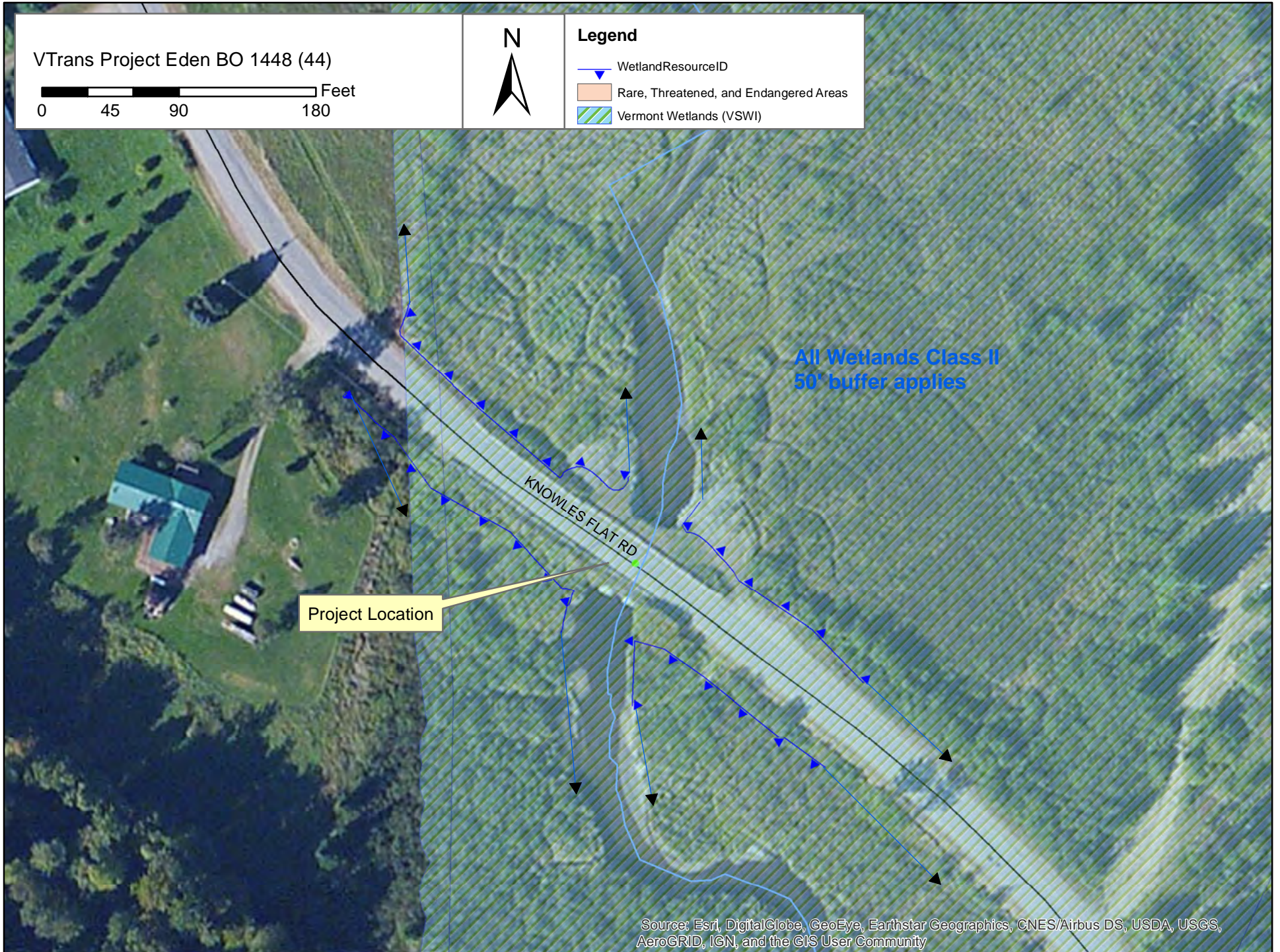
Nick Wark, VTrans Project Manager
Natural Resource Environmental File

VTrans Project Eden BO 1448 (44)



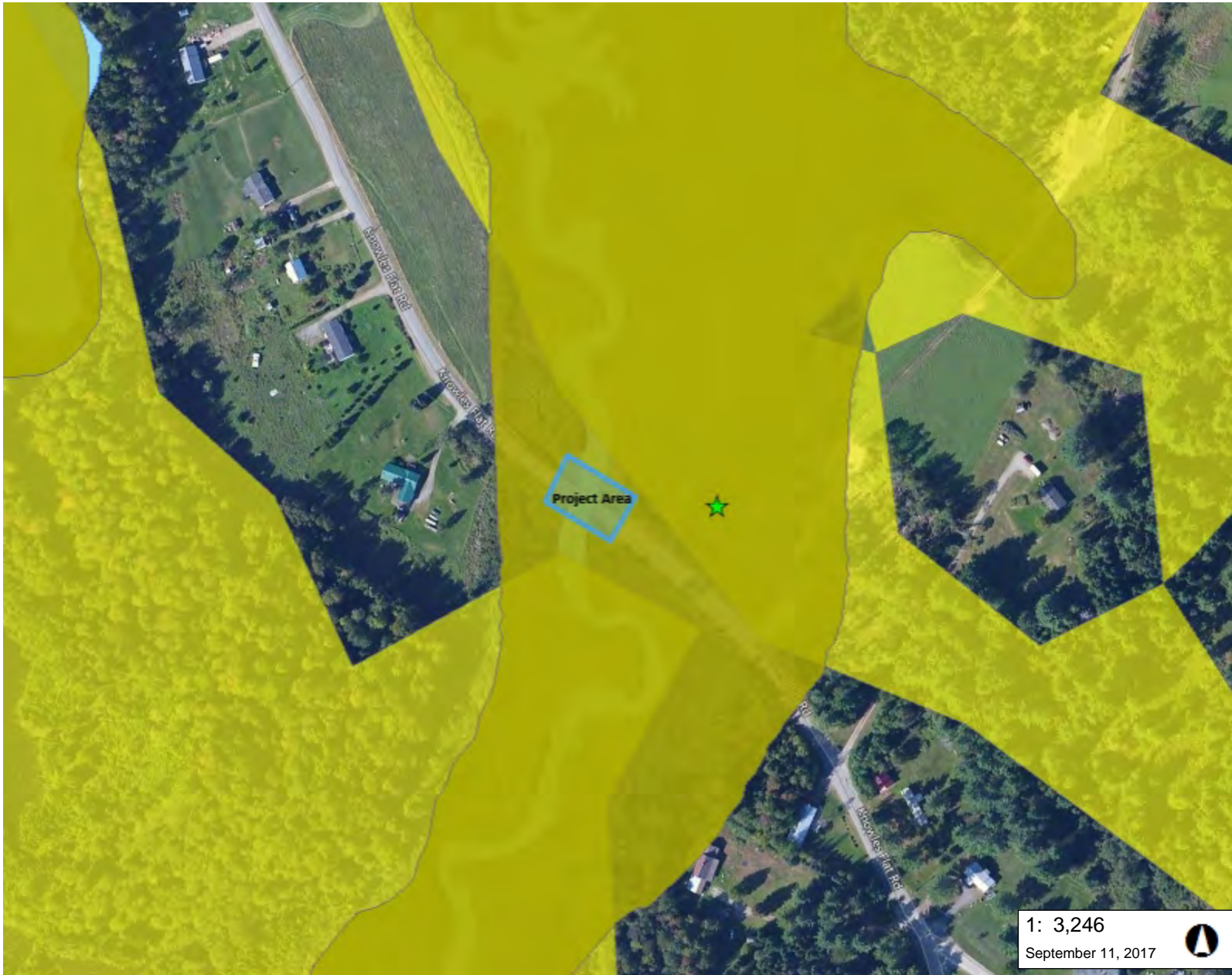
Legend

- WetlandResourceID
- Rare, Threatened, and Endangered Areas
- Vermont Wetlands (VSWI)



All Wetlands Class II
50' buffer applies

Project Location



LEGEND

- Vernal Pools Confirmed – AE/A
- Vernal Pools Unconfirmed – AI
- Wetland Projects
- Wetland - VSWI**
 - Class 1 Wetland
 - Class 2 Wetland
 - Buffer
- Rare Threatened Endangered**
 - Threatened or Endangered
 - Rare
- Habitat Blocks**
 - 10 - Higher Priority
 - 9
 - 8
 - 7
 - 6
 - 5
 - 4
 - 3
 - 2
 - 1 - Lower Priority
 - 0
- Indiana Bat Hibernacula
- Waterbody
- Town Boundary

1: 3,246
September 11, 2017

NOTES

Map created using ANR's Natural Resources Atlas

165.0 0 82.00 165.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 270 Ft. 1cm = 32 Meters

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LEGEND

- Soils - Hydric
- Soils - Prime Agricultural**
- Local
- Local (b)
- Not rated
- Prime
- Prime (b)
- Prime (f)
- Statewide
- Statewide (a)
- Statewide (b)
- Statewide (c)
- Waterbody
- Stream
- Town Boundary

1: 1,623

September 11, 2017



NOTES

Map created using ANR's Natural Resources Atlas

82.0 0 41.00 82.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 135 Ft. 1cm = 16 Meters
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To: Nick Wark, P.E., P.I.I.T. Program Manager
SPM MLM

From: Stephen Madden, Geotechnical Engineer, via Marcy Montague, P.E., Senior Geotechnical Engineer

Date: September 25th, 2017

Subject: Eden BO 1448(44) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge No. 23 on Town Highway 13 (Knowles Flat Road) over the White Branch of the Gihon River in the Town of Eden, VT. Bridge No. 23 is located approximately 0.6 miles north of the junction of Town Highway 13 and VT Route 100. The subject project consists of replacing the previously existing double barrel corrugated galvanized metal plate pipe (Twin CGMPP) culvert. This culvert has been removed and the road is currently closed. The project is currently in the scoping phase. This review included the examination of as-built record plans, historical in-house bridge boring files, water well logs and hazardous site information on-file at the Agency of Natural Resources, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps, and observations made during a site visit.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Record plans were available for this project from the construction in 1976. The plans included typical sections of the pipe arches, roadway, and channel and indicated that the culvert invert was approximately 11.0 feet below the former roadway surface elevation and was bearing on a 2-foot-thick layer of granular backfill for structures.

The Geotechnical Engineering Section maintains a GIS based historical record of subsurface investigations, which contains electronic records for the majority of borings completed in the past 10 years. An exploration of this database revealed no nearby projects within a 5-mile radius.

2.2 Water Well Logs

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, these logs can be used to determine general characteristics of the soil strata in the area. The soil description given on the logs is done in the field by unknown personnel, and as such, should only be used as an approximation. Figure 1 contains the subject project as well as surrounding well locations found using the ANR Natural Resources Atlas. Six water wells within an approximate 0.2-mile radius of the project were used to get an estimate of the depth to bedrock likely to be encountered for Bridge No. 23 and are highlighted within Figure 1 in red.

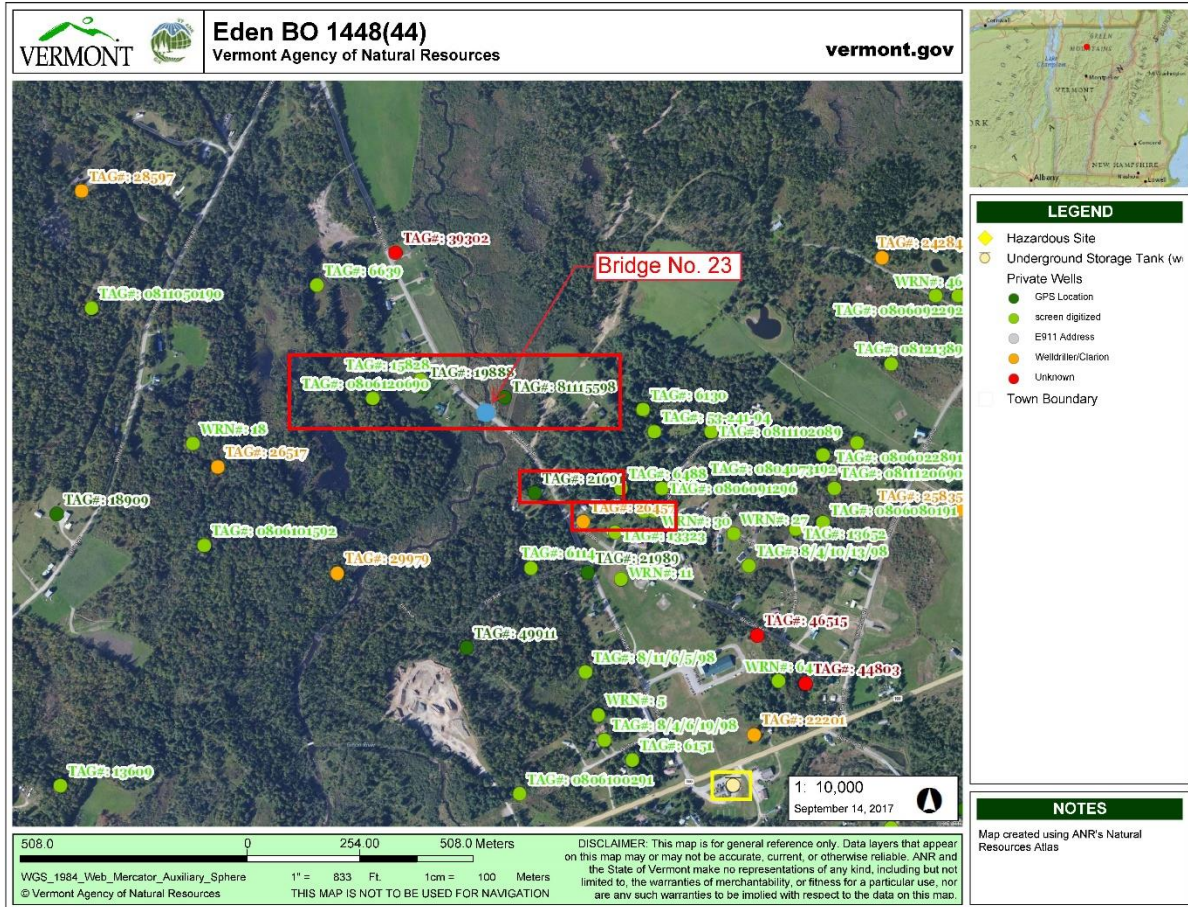


Figure 1: Highlighted well and underground storage tank locations near subject project.

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

Table 1: Depth to Bedrock of Surrounding Wells

Well ID	Approx. Distance From Project (feet)	Approx. Depth To Bedrock (feet)	Overburden Material
81115598	176	82	Not Reported
19888	467	62	Gravel and Sand, Till
15828	500	76	Dirt, Soil, Topsoil, Loam, Gravel, Sand, Hardpan
21691	643	128	Gravel, Clay, Hardpan
0806120690	782	52	Sand, Silty Sand
26457	1,004	155	Gravel, Boulders, Clay, Hardpan

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Natural Resource Atlas also maps the location and information of known hazardous waste sites and underground storage tanks. The location of this project is not on the Hazardous Site List. The project is located within 1.0 mile of an underground storage tank, highlighted within Figure 1 in yellow, and listed in Table 2 with the address, approximate distance in feet from the subject bridge, and the stored substance.

Table 2: Information for Nearby Underground Storage Tank

Tank Location	Approx. Distance From Project (feet)	Compartment Substance
2918 VT-100 (Eden Mini Mart)	3,040	Gasoline/Diesel

2.4 USDA Soil Survey

The United States Department of Agriculture Natural Resources Conservation Service maintains an online surficial geology map of the United States. According to the Web Soil Survey, the stratum directly underlying the project site consists of Histic Fluvaquents typically consisting of very poorly drained, fine, sandy loam with 0 to 3 percent slopes, depth to groundwater of 0 to 6 inches, and depth to bedrock of more than 80 inches.

2.5 Geologic Maps of Vermont

Mapping conducted in 1970 for the Surficial Geologic Map of Vermont shows that the project area consists of post glacial fluvial alluvial deposits.

According to the 2011 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project site is underlain with carbonaceous to highly graphitic, fine-grained sulfidic biotite-muscovite-quartz phyllite of the Ottauquechee Formation.

3.0 BRIDGE INSPECTION

The latest inspection summary update by the Bridge Management and Inspection unit from April 2017 noted that the bridge remained closed and the double barrel culvert has been removed. The Bridge Management and Inspection unit was notified in October 2016 that the structure had failed and was closed, and the bridge has not been fully inspected since at least April 2016. The April 2016 inspection notes stated that the pipes were in poor condition and needed replacement as piping was occurring and the pipes had potential for failure.

4.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on September 20th, 2017 to determine possible obstructions inhibiting boring operations and to make any other pertinent observations about the project. The road is currently closed and the previously existing structure has been removed, however some larger sized stone fill remains on the river banks, as seen in Figure 2. Overhead wires run along Knowles Flat Road in a northwest-southeast direction over the southern edge of the roadway and can be seen in Figure 2. There was no visible bedrock within the river but small cobbles were visible. The river banks are primarily vegetated in the upstream and downstream directions however cobbles and small sized boulders were visible along the river banks in the immediate vicinity of the former culvert location, as seen in Figures 3 and 4.



Figure 2: Looking northwest across river; visible are overhead wires running parallel to roadway and large stone fill on river bank.



Figure 3: Facing north; stone fill, cobbles, and small boulders visible on river banks on upstream side.



Figure 4: Facing south; cobbles and small boulders visible on river banks on downstream side.

5.0 RECOMMENDATIONS

Based on this information, possible foundation options for a bridge replacement include the following:

- Precast or steel arch bridge with spread footings founded on soil or bedrock
- Concrete rigid frame supported on H-piles, micro-piles, or spread footings
- Integral abutments supported on a single row of H-Piles

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

6.0 CONCLUSION

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

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

cc: Electronic Read File
Project File/MLM
SPM

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Local & Regional Input Questionnaire

This project, BO 1448(44), focuses on a culvert on Town Highway 13 (Knowles Flat Road) in Eden, Vermont. The culverts have deteriorated to the point of requiring closure, and is in need of replacement. Potential options being considered for this project include removal of the existing pipes and replacement with a new culvert(s) placed in the same location, removal of the existing pipes and replacement with a new bridge, or strategic disinvestment of the current structure. With the current culverts closed, VTTrans will recommend a road closure and detour traffic away from the project site for the duration of the work. **Structure collapsed on October 13, 2016. Road was and will remain closed and traffic detoured away from the project. Existing pipes have been removed.**

Community Considerations

1. Are there regularly scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include annual bike races, festivals, parades, cultural events, weekly farmers market, concerts, etc. that could be impacted? If yes, please provide approximate date, location and event organizers' contact info. **No public events scheduled.**
2. Is there a "slow season" or period of time from May through October where traffic is less or no events are scheduled? **Road has been closed to through traffic since collapse of twin culverts on October 13, 2016. If the road were opened, there would be less traffic in July & August due to school not being in session.**
3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response routes that might be affected by the closure of the bridge, one-way traffic, or lane closures and provide contact information (names, address, email addresses, and phone numbers).

Eden Town Garage
3625 VT RT 100
Eden Mills, VT 05653
Contact: Ricky Morin
802-635-2530
sbadmin@edenvt.org

NHP/Eden Fire Dept.
VT RT 100
North Hyde Park, VT 05665
Contact: Eric Aither, Chief
802-635-2607

Northern Emergency Medical Service (NEMS)
PO Box 911
Newport, VT 05855
Contact: Michael Paradis
802-334-2023
Michael.paradis@newportambulance.org

Lamoille County Sheriff's Dept.
PO Box 96
Hyde Park, VT 05655
Contact: Roger Marcoux, Sheriff
802-888-3502
Roger.Marcoux@LamoilleSheriff.org

Vermont State Police
Williston, VT
802-635-7036

Eden Central School (Eden Red Cross Emergency Shelter)
140 Knowles Flat Rd
Eden, VT 05652
Contact: Melinda Mascolino 802-635-6630
mmascolino@edenschool.net

Local & Regional Input Questionnaire

4. Are there businesses (including agricultural operations and industrial parks) or delivery services (fuel or goods) that would be adversely impacted either by a detour or due to work zone proximity? **Due to current road closure, most delivery services have already made modifications to their delivery routes. Eden does not have an industrial park, there are no gravel pits or large syrup producers in this area and local farmers affected by the road closure have also made modifications to get their supplies or harvest their crops.**
5. Are there important public buildings (town hall, community center, senior center, library) or community facilities (recreational fields, town green, etc.) close to the project? **Eden Central School and the Eden Recreational Fields are located approximately .3 miles from the intersection of RT100/Knowles Flat Road and approximately .4 miles from the bridge site. Eden Central School serves as Eden's primary Red Cross emergency shelter. Currently, it is only accessible via RT100, limiting access in an emergency.**
6. What other municipal operations could be adversely affected by a road/bridge closure or detour? **Highway municipal operations have adjusted their snow plow and annual maintenance procedure due to the closure in October, 2016**
7. Are there any town highways that might be adversely impacted by traffic bypassing the construction on other local roads? Please indicate which roads may be affected and their condition (paved/unpaved, narrow, weight-limited bridges, etc), including those that may be or go into other towns. **Due to the closure of Knowles Flat Rd in October, 2016, traffic has been redirected via: RT 100, RT118, paved, state weight limit restrictions; and White Rd, TH#7, Class 3, paved & unpaved, standard weight limits only per state statute, no special restrictions.**
8. Is there a local business association, chamber of commerce, regional development corporation, or other downtown group that we should be working with? If known, please provide name, organization, email, and phone number.
**Lamoille Champer of Commerce info@lamoillechamber.com
Lamoille Economic Development Corporation info@lamoilleecomony.org**
9. Are there any public transit services or stops that use the bridge or transit routes in the vicinity that may be affected if they become the detour route?
**Rural Community Transportation (RCT)
Sandy Thorpe
802-748-8170
sandyt@riderct.org**

Local & Regional Input Questionnaire

Schools

1. Where are the schools in your community and what are their schedules?
Eden Central School (ECS), part of Lamoille North Modified Unified Union School District (LNMUUSD). The school schedule can be seen at www.edenschool.net

Eden Central School 140 Knowles Flat Rd. PO Box 29 Eden, VT 05652 Contact: Melinda Mascolino 802-635-6630 mmascolino@edenschool.net	Lamoille North Modified Unified Union School District 95 Cricket Hill Rd Hyde Park, VT 05655 Contact: Catherine Gallagher, Superintendent 802-888-3142 cgallagher@lnsu.org
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2. Is this project on specific routes that school buses or students use to walk to and from school?
Yes, but school bus routes have been redirected since October, 2016 when the road was closed due to the collapse of the twin culverts. Alternate routes remain in place and will continue until the structure is replaced and opened to through traffic. Based upon information from ECS, there may be a few families who live closest to the school whose children walk to school, but the majority are delivered to and from school by either family or school bus.
3. Are there recreational facilities associated with the schools nearby (other than at the school)?
Eden Recreations Fields are located adjacent to ECS. Eden Youth Sports works with ECS with scheduling use of the fields. Same contact info as ECS.

Pedestrians and Bicyclists

1. What was the level of bicycle and pedestrian use on the bridge when it was open? **Minimal use by pedestrian and bicycles.**
2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use? **Yes. Replacement should comply with Eden Highway & Bridge Standards. A copy is attached.**
3. Does the community feel there is a need for a sidewalk or bike lane on the bridge? **Not if built to town standards.**
4. Does the Town have plans to construct either pedestrian or bicycle facilities leading up to the bridge? Please provide any planning documents demonstrating this (scoping study, master plan, corridor study, town or regional plan). **No plans to construct either pedestrian or bicycle facilities in this area. Road shoulder per town standards should provide adequate space for limited use by pedestrian or bicycles.**
5. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling? **Eden has no zoning and sees no significant increases in use anticipated from current land use patterns.**

Local & Regional Input Questionnaire

Design Considerations

1. Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of? **Previous pipes were between two slight curves with no issues of overflow or over topping during high water events. There were no accidents at this location (excluding the one vehicle during the collapse).**
2. Are there any concerns with the width of the existing bridge? **No, previous pipes were the full width of the roadway.**
3. Are there any special aesthetic considerations we should be aware of? **Eden has a functioning dry hydrant at this location on the east side.**
4. Does the location have a history of flooding? If yes, please explain. **No, this site does not experience issues with flooding such as overtopping given the direct access to the floodplain.**
5. Are there any known Hazardous Material Sites near the project site? **No hazardous material sites near this project.**
6. Are there any known historic, archeological and/or other environmental resource issues near the project site? **No historic or archeological issues near this project site. Wetlands exist both up and downstream from this site.**
7. Are there any utilities (water, sewer, communications, power) attached to the existing bridge? Please provide any available documentation. **No utilities were attached to the failed structure.**
8. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc. near the project that should be considered? **No municipal utility projects existing, pending or planned at this location.**
9. Would the town be interested in strategic disinvestment? (Removal of the existing structure, and not replacing it.) Or replacement with a pedestrian bridge? **No, this is a heavily traveled road used not only by residents who reside on Knowles Flat, but by others who use it as a short cut from RT118 to RT100.**
10. Are there any other issues that are important for us to understand and consider? **Not that we can think of at this time.**

Local & Regional Input Questionnaire

Land Use & Zoning

1. Please provide a copy of your existing and future land use map or zoning map, if applicable.
Eden has no zoning.
2. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so, please explain. **No**
3. Is there any planned expansion of public transit or intercity transit service in the project area? Please provide the name and contact information for the relevant public transit provider. **No**

Communications

1. Please identify any local communication outlets that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Facebook, Front Page Forum, etc. Also include any unconventional means such as local low-power FM.
Newspapers: News & Citizen, The Chronicle, The Burlington Free Press, County Courier
Eden Web page: edenvt.org
Radio: WLVB, WDEV, WOKO, WKOL
Front Porch Forum
2. Other than people/organizations already referenced in this questionnaire, are there any others who should be kept in the loop as the project moves forward?
Lamoille County Planning Commission (LCPC)
LCPC Transportation Advisory Committee
LEPC (Local Emergency Planning Committee)
All contact for above: Lamoille County Planning Commission
Attn: Rob Moore
PO Box 1637
Morrisville, VT 05661
802-888-4548 x106
rob@lpcvt.org