Scoping Study

Jamaica BO 1442(42)
Depot Street Truss
Town Highway 19
Bridge 32 over West River

Prepared for:
Vermont Agency of Transportation

Hoyle, Tanner & Associates, Inc.
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May 2021

TITLE SHEET

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TABLE OF CONTENTS

APPENDICES

1 SITE INFORMATION

Bridge 32 is a Town-owned bridge located on TH-19 (Depot Street) over the West River in Jamaica. The bridge is located approximately 0.4 miles northeast of the intersection with VT Route 100. Depot Street is a dead-end road and provides the only access across the West River to the Jamaica State Park and several residential homes. The existing bridge conditions were gathered from a combination of a site visit, Lidar scanning, the 2019 VTrans Inspection Report and the existing survey. See correspondence in the Appendices for more detailed information.

Roadway Classification	Class 3 Town Highway, No Functional Class Assigned
Bridge Type	Steel Pratt Through-Truss, Single span
Bridge Length	172' – 0"
Bridge Span	165' – 0"
Feature Spanned	West River
Year Built	1926
County	Windham
Ownership	Town of Jamaica

Bridge 32 meets the requirements for inclusion in the National Register of Historic Places and retains nearly all its original members with the exception of the wood deck. It was also previously documented as part of the 1998 VTrans Historic Bridge Programmatic Agreement within Category A, whose rehabilitation for limited highway use was determined to be both feasible and prudent. A different use for this bridge would require a project-specific Memorandum of Agreement, in addition to review under Section 106, Section 4(f) and other applicable laws.

1.1 Need

Bridge 32 carries Town Highway 19 (Depot Road) across West River. Depot Street is a dead-end road and Bridge 32 provides the sole access to Jamaica State Park as well as several residences. The following is a list of deficiencies of Bridge 32 and Depot Street in this location:

1. The deck is in Satisfactory condition, there are several maintenance needs. The needs of the deck are as follows:

    - Runners: Multiple wood runners are no longer secured to the deck and have splitting, punky areas, gouges and chunks missing. A few sections of runners are missing.
    - Bridge Rail: The rail has light rusting and paint failure throughout. There are some minor bends in the L-angles that connect the rail to the bottom chord of the truss.

- Timber Deck: A few of the pressure treated members are staring to transition towards the downstream side and are no longer touching stringer 1. A few other various members have areas of rot and are punky. The timber deck also has mildew and fungus growth.

2. While the superstructure is in Satisfactory condition, there are several maintenance needs. The needs of the superstructure are as follows:
   - Verticals/diagonals: All members have some light pitting and areas of light rust scaling around connections focused mainly along the lower sections. Diagonal 1 on the downstream side has been replaced due to previous impact damage.
   - Top Chords: The built-up steel plate with steel c-channels and lattice style bars are in satisfactory condition. The lattice style bars along the diagonal sections at the ends of the truss have some heavier rust scaling and some section loss forming. Some small sections of light rusting are present along the top portions of truss system.
   - Bottom Chords: The built-up L-angles with steel plates riveted together bottom chord have areas of light section loss, minor pitting and rust scaling around the connections of the gusset plates. There are areas of light rusting throughout.
   - Gussets: The steel gussets have some light rust scale forming around the outer edges of the plates and have some light pitting.
   - Lateral Bracing: The steel L-Angles riveted to the lower chord gussets have areas of minor rust scaling and pitting along the connections. There are built up L-angles along the top chord that have some light rusting. One small section has a bent L-angle on the lower cross bracing over abutment 2.
   - Floor Beams: The w-shape members have areas of light rust scaling along the ends near the connections of the lower chords and other various light rusting along the beams. Near the connections of the lower chord, there are areas of minor to moderate pitting.
   - Stringers: The rolled beams are in fair condition having some measurable section loss along the top flanges in bay 1 near abutment 1. The stringers in other bays have various areas with some lighter section loss along the top flanges. The stringers have minor rust scaling and pitting along the lower flanges and along some of the lower portions of the webs with paint starting to fail.
   - Paint: The paint system has moderate distress throughout with paint peeling and flaking with steel starting to corrode and rust below.

3. While the substructure is in Satisfactory condition, there are several maintenance needs. The needs of the substructure are as follows:

   - Backwalls: The reinforced concrete backwalls have areas of minor scaling and honeycombing present. Light cracking is present in various areas with some light efflorescence leakage outside of structure.

- Abutments: The laid-up stone abutments have no mortar present. Voids are present between laid up stone with some going as deep as three to five feet. Multiple stones have shear cracks through stones from movement.

4. The bridge and roadway approaches are too narrow for the speed and traffic volumes present.

5. Community Needs and Considerations:

   - The alignment of the bridge should be so that long and large campers and fuel trucks can make the turn to get into the state park.
   - There are many pedestrian generators in the immediate vicinity of the bridge including the Jamaica State Park and the Jamaica elementary school which lead to heavy pedestrian activity over the bridge. Scheduled dam releases bridge additional pedestrians to the area. The horizontal clearance is not adequate for pedestrians and vehicles to use the bridge at the same time.
   - The existing bridge does not meet the needed load carrying capacity for the following parties:
     - The Jamaica Fire Department has two fire trucks that presently are not allowed to cross the bridge due to weight restrictions. The mini-pumper firetruck has a capacity of 300 gals of water with a Gross Vehicle Weight Rating (GVWR) of approximately 11 tons, the other, a pumper/tanker has a capacity of 1500 gals of water with a GVWR of 20 tons. For the Fire Department to provide emergency services to the residence & State Park officials on the other side of Bridge 32, they need to lay their largest water supply hose that has a 4-inch diameter to a total length of 1200 LF. The Fire Department has expressed concern that the distance is too great to provide enough water pressure to the fire scene.
     - Tree removal services and future logging operations are currently prohibited by the structural configuration and capacity of Bridge 32.
     - Cota and Cota fuel has expressed concern on being able to provide uninterrupted deliveries of home heating fuel and propane gas to residents on the other side of Bridge 32.
     - The Jamaica State Park has concerns that the capacity of the bridge does not allow for the necessary operation of the state park. The park has put several infrastructure and forest management projects on hold due to the limited capacity of Bridge 32. Difficult and substantial changes to basic park functions such as trash removal, firewood delivery, and septic tank pumping have been made due to the limited capacity of Bridge 32.
     - The army Corps of engineers has expressed concern that that Bridge 32 is the sole 'practical' access to the toe of the Ball Mountain Dam (aka West River Dam) since access to the base of the dam from the top is very steep. In the event that emergency repairs are needed, the ACOE has requested a bridge that can carry a minimum HS-20 load. They are also concerned about the ability to utilize the bridge for possible construction loads for their Ball Mountain Dam project.

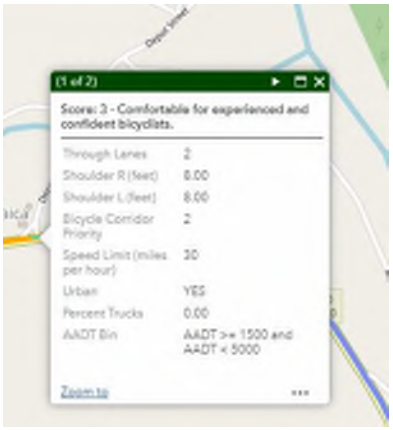
1.2 Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2023, 2043, and 2063 and presented in Table 1.1.

Table 1.1 Traffic Data

Traffic Data	2023	2043	2063
AADT	260	280	~
DHV	70	75	~
ADTT	15	25	~
%T	5.8	8.6	~
%D	58	58	~
FLEXIBLE ESAL	~	**2023 ~ 2043** 27,000	**2023 ~ 2063** 59,000

1.3 Bicycle Usage



Vermont TH-19 (Depot Street) does not appear on the VTrans Bicycle Corridor Priority Map as it is not a state road, nor does it have an assigned functional class. However, the intersection of VT Route 100 and Depot Street scores as a 3 on the VTrans Bicycle Level of Comfort Map, which indicates only experienced riders will feel comfortable at this segment of roadway. Currently, the bridge does not have a sidewalk or an adequate pedestrian rail, making it inappropriate for use by cyclists. Pedestrians do access the bridge from the campground on their way to or from the Town.

1.4 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 of 280, a DHV of 75, and a design speed of 25 mph and are summarized in Table 1.2.

Table 1.2 – Vermont Design Standards

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	19’-0”	9’/2’ (22’)	Substandard
Bridge Lane and Shoulder Widths	VSS Table 6.3	13’-6” Rail-to-rail	9’/2’ (22’)	Substandard

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Clear Zone Distance	VSS Table 6.5	No issues noted.	7' fill, 7' cut	
Banking	VSS Section 6.12	None.	8% (max, paved road)	
Speed	VSS Table 6.3	Unknown	25 mph (Design)	
Horizontal Alignment	AASHTO Green Book, Table 3.10	R = 60.0' (east) R = 1,341' (West)	R_{min} = 2,370' @ e = 8%	Substandard
Vertical Grade	VSS Table 6.6	6.77%	7% (max) for level terrain	
K Values for Vertical Curves	VSS Table 6.1	No vertical curve over bridge K_{sag} = 40 (west) K_{sag} = 09 (east)	20 crest / 30 sag	Substandard
Vertical Clearance	VSS Section 6.7	14'-7"	14'-3"	
Headlight Sight Distance	VSS Table 6.1	79'	150'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 6.7	None	1' Shoulder	Substandard
Bridge Railing	Structures Design Manual, Section 13.2	3 HSS 2.50 x 0.25	TL-2	Substandard
Hydraulics	VTrans Hydraulics Manual Table 6.1	7.2' of Freeboard at design AEP (Q_{25}) and 6.2' at the 1% AEP (Q_{100})	Pass 4% AEP (Q_{25}) storm event with 1' of freeboard, 142' span.	Exceeds hydraulic requirements
Structural Capacity (Rehabilitation)	VSS Table 6.4	H 7.8	H-15	Substandard
Structural Capacity (New Bridge)	Structures Design Manual, Ch. 3.4.1	H 7.8	Design Live Load: HL-93	Substandard

1.5 Inspection Report Summary

The ratings provided below are from the most recent inspection performed by VTrans in October 2019. The bridge is on a 24-month frequency.

Deck Rating	6 Satisfactory
Superstructure Rating	6 Satisfactory
Substructure Rating	6 Satisfactory

Channel Rating 8 Very Good

The following is from the Structure Inspection, Inventory and Appraisal Sheet:

10/01/2019 – Stringers have measurable section loss with the worst being in bay #1 near abutment #1. Lower sections of verticals, diagonals and the bottom chord have pitting and rust scaling around connections. Timber deck is showing signs of decay and movement and should have restraint system installed to prevent deck from translating downstream. Runners have heavy breakup with multiple boards being loose and damaged and need to be replaced. Bridge seats and lower sections of truss system need to be cleaned off from sediment build up. Pain system has failed along truss system and should be cleaned and repainted. Abutments have large voids present and should be filled. ~ SMP/SEP

10/11/2017 – Structure is in fair condition. Bearing area on both abutments have a sand buildup and should be cleaned off. Voids in the abutments should be repaired. Town should consider full width runners to help stop the sand from reaching the top flanges of the stringers and floorbeam. Steel could use painting. ~ FRE & JAS

10/20/2015 – Structure is in fair condition. The bearing area on both abutments should be washed off. Both abutments have areas of voids and should be chinked with smaller stone. Town should consider adding full width runners to help stop some of the sand from setting on the top flange of the stringers

1.6 Hoyle, Tanner Field Observations

On September 17, 2020 a four-person inspection team from Hoyle, Tanner visited the bridge to perform field measurements and gather field data for this Scoping Report. Representative portions of the upper and lower portions of the trusses were accessed by ladder while other measurements were taken from the deck and ground level.

1.6.1 Trusses

Bridge 32 is constructed from two, steel single span Pratt Trusses. The truss top chord consists of a riveted built-up section with a plate on the top face that extends down the end diagonals and lacing bars on the bottom face while the bottom chord consists of two angle sections. The truss verticals consist of four angles with lacing bars while the diagonal members consist of two angle sections with a flat plate connecting the two angles at a set spacing. All truss members are connected at panel points with steel gusset plates. There is extensive 'x-frame' bracing between the truss vertical members and at the portal ends consisting of angle sections. The angle sections vary in thickness from ¼" to ⅜" thick with the leg widths varying from 2" to 5".

The truss members are in satisfactory condition with light rusting and coating failure throughout with the orange (likely lead based) primer exposed. The lower portions of the truss have light section loss

and pitting, primarily at the bearings and interior panel points. The east portal framing has light impact damage as does member U8-L7 on the upstream truss. There is heavy sand build up on the interior lower chord connection plates and at the truss bearings.

1.6.2 Deck

The deck consists of partial width, 1-½" wide longitudinal wood runners on 5-½" thick transverse wood members with a wood curb at the deck edge. The wood deck is supported by longitudinal stringers spaced at 2'-8" on center. The stringers are S10x25.4 members supported on transverse S15x42.9 floor beams which are located at each panel point (approximately 18'-4" on center). There is a positive (bolted) connection between the stringer bottom flange and the floor beam. The floor beams are connected to the truss through riveted angles at the panel points. The bridge railing consists of three pipe sections that are attached to the truss at truss members and in between with a vertical member framing into the lower chord.

The deck is in fair condition with loose running boards and isolated section of rot. The transverse deck members do not have a positive connection to the stringers and there are small gaps at the edge of the deck due to short length boards. The stringers and floor beams both exhibit coating loss throughout and section loss and pitting to varying degrees with the stringers in a more deteriorated condition.

1.6.3 Substructure

The substructure consists of dry laid stone masonry blocks with a concrete cap and backwall. The outside top edges of the abutments and wingwalls are covered with soil and vegetative growth. The abutments are in satisfactory condition with no bulging or evidence of settlement or scour at the base noted. The concrete cap and backwall are in poor to serious condition with many sections disintegrating or cracked. The end of the wood deck abuts the concrete backwall and allows sand and debris to fall through the joint onto the end floor beam and bearings which have a large amount of sand build up.

1.6.4 Approaches

Both approaches to the bridge are paved and in poor condition near the ends of the bridge and in satisfactory condition further away from the bridge. The roadway cross section has a slight normal crown with no drainage structures present within the bridge vicinity. The west approach to the bridge has a slight horizontal curve and sag profile near the bridge with the low point approximately 90' from the end of the bridge. The east approach has a steep (7.7%) grade coming off the bridge with the low point approximately 35' from the end of the bridge. This sag curve is combined with a 60-degree horizontal curve for those going to the state park entrance. Several vehicles towing campers were observed to 'bottom out' while exiting the bridge on the east end. There is heavy tree overgrowth on the downstream end of the bridge that extends into the roadway section.

The approach railing consists of wood posts and three rows of steel cable guardrail on each bridge quadrant. The condition of the railing varies with some sections having been replaced in the recent past. The approach railing is connected to the end diagonals and passes through the member before terminating with an end cap.

1.7 Hydraulics

Bridge 32 crosses over the West River which flows primarily northwest to southeast at the bridge site. A hydraulic study at this location was completed on November 10, 2020 by the VTrans Structures and Hydraulics Section. The study indicates that under the current conditions, there is 7.2 feet and 6.2 feet of freeboard during the 4% (25-year flood event) and 1% (100-year flood event) storm event, respectively. The 100-year storm event is defined as a flood having a one percent (1%) chance of being met or exceeded in any given year (base flood designation Q_{100}). The existing bridge opening has sufficient hydraulic capacity to pass the 1% storm event flow with adequate freeboard. The existing condition meets the current standards of the VTrans Hydraulic Manual. See the preliminary hydraulics report in Appendix D for additional information.

1.8 Utilities

The existing utilities are described in the Existing Utility Report in Appendix K, and are as follows:

Municipal Utilities: There are no municipal water or sewer facilities in the project area.

Public Utilities

Underground: There are no underground utilities in the project area.

Aerial: Green Mountain Power (single phase), Consolidated Communications, and Comcast.

- There is a main utility line that crosses over the West River to the north of the bridge. The line contains single phase power as well as 2 communication lines.
- The relocation of aerial utilities will likely be necessary for construction.

1.9 Right of Way

The existing Right-of-Way (ROW) is shown on the Existing Conditions Layout sheet in Appendix M. There is a 3-rod ROW centered on TH-19 through the project area. The land in the northwest quadrant of the bridge is owned by the Town of Jamaica while the northeast parcel is owned by The Vermont State Agency of Natural Resources. Additional research is needed, however on the east end of the bridge to better define the Town's ROW as it relates to the continuation of Depot Street labeled as a Private Road as well as state park entrance road which is shown beyond the Town's ROW.

Based upon the initial right-of-way depicted on the Existing Conditions Layout Sheet, it is anticipated that easements will be required for all build alternatives. For the rehabilitation alternatives, easements or agreements will be required for the east approach roadway and guardrail work that extends outside the Town's ROW as well as for installation of the temporary bridge and approaches. The temporary bridge and approaches would be located in approximately the same location as the new bridge depicted as part of the adaptive reuse alternative. For the adaptive reuse option, permanent easements will be required for the construction of the new bridge as well as temporary easements for the state park road beyond the Town's ROW.

1.10 Resources

The environmental resources present within the study area are shown on the Existing Conditions Layout Sheet in Appendix M and described in more detail in the Resource Identification Report in Appendix G prepared by others. A brief summary of the resources identified by others is included below.

1.10.1 Biological

Wetlands

A total of four wetlands areas were delineated within the study area. Most of these wetlands are associated with the West River and its floodplain. The locations of delineated wetlands are shown on Figure 2 of Appendix G: VTrans Natural Resource Identification.

The study area also includes one perennial stream, the West River, and two intermittent streams. All three are regulated by the US Army Corps of Engineers.

Wildlife Habitat

The West River and surrounding forested areas provide valuable terrestrial and aquatic habitat for fish and wildlife. The West River provides a riparian corridor potentially linking habitats to the south and east with habitat blocks to the north and west. A VTANR Deer Wintering Area is also mapped in the forested area east of the West River.

Wildlife observed during the field review included green frogs, black-nosed dace, and crawfish. The stone bridge abutments could provide potential bat roosting habitat. However, the abutments were visually inspected during the field review and no guano staining or droppings were observed.

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

Both state and federally listed rare, threatened, and endangered species were documented in the

project area or have been identified within the surrounding area and have the potential to occur within the project area. These species are presented below in Tables 1.3 and 1.4:

Table 1.3 - Federally Listed Species

Common Name	Scientific Name	Type	State Protection Status	Federal Protection Status	Suitable Habitat in Study Area
Northern Long-Eared Bat	*Myotis septentrionalis*	Mammal	E	T	YES

Source: USFWS IPaC.
T=Threatened; E=Endangered

Table 1.4 – State Listed Species

Common Name	Scientific Name	Type	EO ID	State Rank	State Protection Status	Federal Protection Status	Observed During 2019 Field Review
Eastern Pearlshell	*Margaritifera margaritifera*	Freshwater Mussel	5783	S2	T	N/A	No
Tubercled Orchid	*Platanthera flava var. herbiola*	Vascular Plant	556	S2	T	N/A	No
Canada Burnet	*Sanguisorba canadensis*	Vascular Plant	2065	S2	N/A	N/A	**Yes**
Brook Floater	*Alasmidonta varicosa*	Freshwater Mussel	191	S1	T	N/A	No
Boulder-Beach Tiger Beetle	*Cicindela ancocisconensis*	Beetle	3909	S1	N/A	N/A	No
Creeper	*Strophitus undulatus*	Freshwater Mussel	N/A	S3	N/A	N/A	No

Source: Vermont Natural Heritage Inventory.
S1=Very Rare; S2=Rare; S3=Uncommon
T=Threatened; E=Endangered

Agricultural

Parts of the study area are mapped as statewide significant agricultural soils. Houghtonville fine sandy loam, 3 to 8 percent slopes and Colton loamy fine sand, 2 to 8 percent slopes are identified as Farmland of Statewide Importance in Vermont. These soil units are mapped on the west side of the West River in the southwest bridge quadrant and along the western edge of the study area in Appendix G: VTrans Natural Resource Identification.

Invasive Species

Overall, the site was dominated by a mix of native vegetation and relatively free from invasive species. However, there were individual purple loosestrife, Japanese barberry and Japanese Knotweed noted in adjacent wetland areas.

1.10.2 Hazardous Materials

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there are no hazardous waste sites located within close proximity to the project.

1.10.3 Historic

An evaluation of Bridge No. 32 indicates that the meets the registration requirements for inclusion in the National Register of Historic Places (NRHP). Bridge No. 32 has been previously documented as part of the 1998 VTrans Historic Bridge Programmatic agreement's corresponding Historic Metal Truss Preservation Plan (VHBPA). A different use of this bridge would require a project-specific Memorandum of Agreement, in addition review under Section 106, Section 4(f) and/or any other applicable laws.

The Jamaica State Park and Green Mountain National Forest, both 4(f) protected resources, are located on both sides of the bridge and would be impacted by all but the "Do Nothing" alternative discussed in this study. Therefore Section 4(f) review will be required.

Hartgen Archaeological Associates, Inc. (Hartgen) completed a historic document review for the bridge and while they were unable to locate plans for the bridge, they were able to locate additional historic information regarding the bridge.

See Appendix I: VTrans Historic Preservation Resource Identification Memo and Hartgen Bridge Research Memo for more information.

1.10.4 Archaeological

The West River in this project area is a well-known Native American travel corridor and fishing area. All four quadrants that reside out of the bridge footprint area are considered archaeologically sensitive and will require Phase I testing for the rehabilitation and alternative reuse alternatives discussed in this study.

A large multi-component Native American archaeological site is located slightly north of the bridge location. This area is also posited to be the likely location of a massacre during the 1748 King George's War. See Appendix H: VTrans Archaeological Resource Identification for more information.

2 SAFETY

Crash data is not available for the study area however no concerns related to accidents at the bridge have been brought forth by the Town or discussed at the Local Concerns Meeting.

3 LOCAL CONCERNS

A Local Concerns Questionnaire was completed by the Town of Jamaica, in addition to a Local Concerns Meeting (LCM) held virtually via Zoom on 12/14/2020. The following comments were received:

- The bridge provides the only access to 5 residences and Jamaica State Park, which hosts many scheduled events throughout the year. Public Safety and Public Works could not provide service to these residents without the bridge.
- The Jamaica Village School is approximately 500 feet from the bridge. Residents on the opposite side of the West River need a bridge to get their children to school from their homes (the school operates from the end of August to mid-June).
- The bridge is often used by pedestrians and cyclists, cars often wait for pedestrians and cyclists to exit the bridge before driving over it.
- Proponents of bridge rehabilitation and adaptive reuse with a new bridge upstream spoke at the LCM.
- Concern was raised during the LCM regarding the live load posting for the bridge of 8 tons. It was noted that this precluded fuel, fire, septic and logging trucks from using the bridge.
- A representative of the US Army Corps of Engineers stated that they are required to complete maintenance for the base of the Ball Mountain Dam which needs to be accessed utilizing the bridge. A HL-93 or HS-20 live load capacity is desired for this work.
- An Alternatives Presentation Meeting will be held in the spring of 2021.

4 MAINTENANCE OF TRAFFIC

In accordance with Vermont Agency of Transportation (Agency) guidance this project was reviewed 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. In addition to cost savings, the intention is to minimize the closure period with faster construction techniques and incentives for contractors to complete projects sooner. Due to the location of the bridge on a dead end road and the narrow width and configuration of the bridge, the use of accelerated bridge techniques were not deemed feasible for the project.

4.1 Off-Site Detour or Phased Construction

Depot Street is a dead-end road and the only nearby access to the east side of the West River. An off-site detour is not a feasible alternative for this project. Due to the narrow width of the bridge and

anticipated construction activities, phased construction of the bridge rehabilitation is also not a feasible alternative for this project.

4.2 Temporary Bridge

If rehabilitation of the bridge is the preferred alternative, a temporary bridge will be required to maintain traffic across the West River. From a constructability standpoint, a temporary bridge could be placed on either the upstream or downstream side of the bridge. From a natural, historic and archaeological standpoint, all four corners of the bridge are sensitive and therefore neither upstream or downstream of the bridge presents a strong advantage. There is an access drive located on the northeast quadrant of the bridge that would be very difficult to access should the temporary bridge be located downstream. In addition, locating a bridge on the upstream side of the existing bridge would allow for better a tie-in with the continuation of the road and park entrance to the north. For these reasons, an upstream temporary bridge is recommended for the rehabilitation alternatives.

Advantages: Traffic flow can be maintained along Depot Street across the West River. Upon completion of the project, the area used for the temporary bridge would be returned to its pre-construction condition.

Disadvantages: This alternative would require additional right-of-way acquisition and will require additional permitting and investigation due to the nearby archaeologically sensitive areas. Trees would likely need to be removed to accommodate the new bridge.

4.3 Maintaining Traffic on the Existing Bridge While a New Bridge is Constructed Off-Alignment

Should adaptive reuse be the preferred alternative, it is recommended that the new bridge be located upstream of the existing bridge for the reasons stated above. For this alternative, the existing bridge would be used to maintain traffic across the West River until such time that the new bridge is completed. Traffic would then be transferred to the new bridge and the required repairs would be made to the existing truss bridge.

Advantages: Traffic flow can be maintained along Depot Street across the West River.

Disadvantages: This alternative would require additional right-of-way acquisition and will require additional permitting and investigation due to the nearby archaeologically sensitive areas. Trees would likely need to be removed to accommodate the temporary bridge. This alternative would require permanent impacts to archaeologically and environmentally sensitive areas.

5 ALTERNATIVES DISCUSSION

5.1 Load Rating Summary

A structural analysis and load rating was performed for all primary live load carrying members of the bridge. The Service Load (Allowable Stress) Rating method was used for all members in accordance with the provisions of the American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Highway Bridges, 17th Edition, AASHTO Manual for Bridge Evaluation Third Edition with 2019 Interim Revisions (MBE), and the 2010 VTrans Structures Design Manual. Allowable stress values for the timber deck was obtained from the 2018 National Design Specification for Wood Construction and Supplement (NDS). The species and grade assigned to the wood deck was based on a visual examination of knots, checks, slope of grain of the wood and growth rate characteristics of the wood.

Per the scope of services, the bridge was rated for four AASHTO live loads; H8 (8 tons), H12 (12 tons), H15 (15 tons) and H20 (20 tons). All structural members were rated for single lane loading configurations. The controlling live load force effect for each AASHTO live load was taken as the maximum of the design truck or the lane load for the trusses and as the design truck for the deck, stringers and floor beams. Excel spreadsheets, MathCAD computer program, and hand calculations were utilized to calculate the as-inspected section properties, capacities, and load rating values. BAR7 computer program was used to perform the structural analysis of the Pratt Through-Truss and to determine the truss and member forces. See the Table 5-1 below for a summary of all members rated. All members were rated using the properties of an AASHTO H-20 vehicle.

The load rating was performed for all members considering their 'as-built' condition recognizing that some members exhibit section loss of varying degrees. Section loss was measured in select areas of the truss and representative values utilized in preparing the alternative recommendations, however they are not reflected in the ratings below.

Table 5.1 – Bridge Members Rating Summary[1]

Member	Member Size	Inventory Load Rating	Operating Load Rating
Timber Deck	5½" x 5½"	H 12.8	H 17.0
Longitudinal Stringer	S10 x 25.4	H 7.8	H 11.0
Transverse Floor beam	S15 x 42.9	H 10.0	H 14.6
End Diagonal	2 – C9 x 13.4 w/ PL$^{5}/_{16}$" x 16 ¼"	H 33.5	H 45.5

Upper Chord	2 – C9x13.4 w/ PL$^{5}/_{16}$" x 16 ¼"	H 21.5	H 30.9
Lower Chord at Ends	2 – L4 x 4 x $^{3}/_{8}$	H 36.0	H 55.0
Lower Chord at Midspan	2 – L6 x 4 x $^{1}/_{2}$	H 19.2	H 32.5
First Vertical from End	2 – L5 x 3 x $^{5}/_{16}$	H 48.5	H 67.6
Interior Vertical	4 – L5 x 3 x $^{5}/_{16}$	H 56.3	H 73.4
First Diagonal	2 – L5 x 3$^{1}/_{2}$ x $^{3}/_{8}$	H 24.8	H 38.8
Second Diagonal	2 – L4x 3 x $^{5}/_{16}$	H 21.7	H 33.9
Counter Diagonals	2 – L3 x 2$^{1}/_{2}$ x$^{5}/_{16}$	H 26.4	H 38.9
Gusset Plates	----------	H 22.5	H 33.9

1. The controlling floor system member rating is the stringers, the controlling truss member rating is the lower chord at midspan (nodes L4 to L5).

5.2 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. The existing bridge superstructure is considered to be in satisfactory condition with the portions of the deck and many of the stringers in fair to poor condition requiring some action. As this alternative does not meet the projects Purpose and Need, the No Action alternative is not recommended. A cost estimate has not been provided for this alternative since there are no immediate costs.

5.3 Rehabilitation

Rehabilitation of the existing bridge is considered viable with three alternatives considered in more detail. As previously noted, four live load levels were initially evaluated, however after completion of the bridge load rating, it was determined that the same level of rehabilitation for the H12 live load would also be sufficient for the H15 live load level and they were therefore combined into a single alternative. This combination of live load levels is discussed in more detail below.

The rehabilitation alternatives considered are based on the following desired postings:

a. H8 (8 Tons)
b. H12 and H15 (12 and 15 Tons)

c. H20 (20 Tons)

All rehabilitation options would include the following major work items:

- Removal and replacement of the wood decking. Solid sawn decking and runners are included in the H8 alternative while a glulam deck with solid sawn runners is included in all other alternatives. A steel grid deck with lightweight concrete was also evaluated but not pursued due to it's higher weight when compared to timber which would potentially require additional truss member replacements and larger floor member sizes to accommodate the higher weight.
- Installation of a timber curb at the edge of the deck.
- Removal and replacement of all existing stringers. While the existing stringers have a live load rating of H7.8 tons which is reasonably close to H8, this capacity does not take into account the condition of the stringers. Taking condition into account, the majority of the stringers rate lower than H7.8 and therefore require replacement.
- Repair or replacement of miscellaneous damaged members such as portal bracing or bridge railing.
- Installation of a temporary road and bridge upstream of the existing bridge for maintenance of traffic during rehabilitation.
- Cleaning and painting of all remaining bridge members.
- Removal and replacement of all approach guardrail.
- Milling of the approach roadway pavement and repaving the approaches.
- Concrete repairs and replacement of portions of the abutment cap and backwall.
- Chinking the faces of each abutment.

a. H8 (8 Tons)

This alternative retains the existing load rating of 8 tons and includes the major work items listed above. The major changes to the bridge for this alternative include replacement of the longitudinal stringers due to a lack of capacity when considering their current condition and replacement of the deck due to condition and the need to access the stringers for replacement. The stringers are replaced with an A709 Grade 36 W10x26 with a capacity of H9.6. Of all the build alternatives evaluated, it would require the least work to the bridge.

b. H12 and H 15 (12 and 15 Tons)

For the purposes of the conceptual level Scoping Study, the 12 and 15-ton live load alternatives were combined since there was little difference in the number of improvements required when comparing the two alternates. While all truss components rate above the H15 level, the transverse floor beam do not have sufficient capacity with a rating of H10.0 and therefore require replacement for both the H12 and H15 alternatives. Replacement of the floor beams with an equivalent modern section provides over an H15 rating due to the increase in strength achieved with modern steel. Due to the bridge

geometry and available modern member sizes available, there would not be any appreciable cost savings when comparing the floor beam required for an H12 and H15 rating which is the primary reason these alternatives were combined.

The H12 and H15 alternative includes all major work items included in the H8 alternative with the following additions or changes:

- Remove and replace all stringers with an A709 Grade 50 W10x26 or S10x35 section with a live load capacity of H19.0 and H19.9 respectively when braced at midspan.
- Remove and replace all floor beams with A709 Grade 36 W16x40 beam (16.2-ton rating).

c. H20 (20 Tons)

The H20 alternative provides the highest live load capacity of the rehabilitation alternatives considered and requires the most work to the truss. Importantly, in addition to floor member replacements, this alternative also requires replacement of a portion of the truss bottom chord to meet the H20 rating. Replacement of the bottom chord section requires temporary shoring of the trusses which accounts for the majority of the cost difference between this and the H12 and H15 alternative.

The H20 alternative includes all major work items included in the H12 and H15 alternative with the following additions or changes:

- Remove and replace all stringers with an A709 Grade 50 W10x30 section with a live load capacity of H22.2 when braced at midspan.
- Remove and replace all floor beams with A709 Grade 50 W16x40 beam (H 23.8-ton capacity).
- Remove and replace a portion of the truss lower chord at midspan to meet the H20 live load capacity.

An HS20 design vehicle has a total weight of 72,000 lbs (36 tons) which significantly more than the H20 (20 ton) alternative. As such, the HS20 alternative would require additional lower chord and truss web member replacement and was therefore not considered further due to the extensive member replacement that would be required.

5.4 Adaptive Reuse with New Bridge Off Alignment

This alternative includes retaining the existing truss bridge in its current location for continued use by pedestrians and installation of a new roadway bridge upstream as shown on Sheets 8 and 9 in Appendix M. The truss work would be limited to those items required to allow for use of the bridge by pedestrians and as needed to preserve the historic truss. A Memorandum of Agreement is required for this alternative since it would change the use of the bridge which is included in the Historic Metal Truss Preservation Plan (see Appendix I for more details).

For the adaptive reuse alternative, the major work items for the existing truss bridge include the

following:

- Cleaning and painting of all steel members.
- Removing the existing wooden runners and replacing with new, full-width runners to provide an even walking surface.
- Rail modifications for pedestrian use including installation of vertical balusters to meet code requirements.
- Installation of a wood curb along the edges of the deck.
- Removal of approach pavement and guardrail and installation of pavement for pedestrian use (10' wide) and limited approach railing at each corner of the bridge.
- Concrete repairs to the abutment caps and backwall.

As part of the adaptive reuse alternative, a new bridge is constructed upstream of the existing truss on a new alignment. The bridge provides a 75-year service life estimate for new construction. The various considerations for this option include the roadway alignment, bridge geometry, superstructure type and substructure type.

a. Alignment

To avoid impact to the school driveway on the northwest approach to the bridge, two horizontal curves are used on the west approach with a third horizontal curve on the east approach to tie into the existing roadway intersection and locate the new bridge upstream of the existing. The approach roadways include two, 9' wide lanes and two, 2' wide shoulders and standard w-beam guardrail. The new roadway meets state standards with the exception of the radius of the horizontal alignment which is limited by geometric constraints associated with tying into the existing road network. If this alternative is selected, then additional study of the turning movements on the approaches to the bridge will be required. As currently envisioned, the alignment appears adequate for anticipated turning movements however some may require temporarily crossing into the adjacent lane which would be acceptable due to the low volume of traffic and sufficient sight distance on the approaches.

b. Bridge Geometry

The centerline of the new, single-span bridge is located approximately 50' upstream of the existing which provides approximately 25' clear between the fascias of the bridges. This provides sufficient clearance between the new bridges during construction of the new bridge and would keep salt-laden snow from the new bridge from being placed on the existing bridge during snow removal operations. The bridge includes two, 9' wide lanes and two, 2' wide shoulders.

The clear span of the bridge is 142' which was deemed acceptable based on hydraulic considerations (see Appendix D). The low chord of the new bridge is conceptually set 1' above the Q_{100} flood elevation.

c. Superstructure Type

Prefabricated structure elements are limited for this span given the weight and shipping lengths. Additionally, since traffic will be maintained on the existing truss bridge, there is no need to accelerate construction and conventional construction will be used. The most economical structure for this span length that is commonly used in Vermont is a steel beam bridge.

d. Substructure Type

The subsurface conditions at the existing and new bridge locations are unknown and therefore borings will be required to determine subsurface conditions at the new bridge site. Possible substructure types include reinforced concrete abutments supported on piles or spread footings (See Appendix E).

e. Maintenance of Traffic

Traffic would be maintained on the existing truss bridge during construction of the new bridge upstream.

5.5 Pedestrian Bridge Installation

A dedicated pedestrian bridge may be installed upstream of the existing bridge to separate the pedestrian and vehicular traffic across the West River on Depot Street. This alternative would cost approximately $500,000 and would not increase the live load capacity of the existing bridge. While this alternative meets pedestrian needs for the crossing, it does not meet vehicular live load needs and was not evaluated further.

6 ALTERNATIVES SUMMARY

Based on the existing site conditions, bridge condition and recommendations from hydraulics, the following are viable alternatives:

- Alternative 1 . Rehabilitation for H8 (8 ton) loading.
- Alternative 2. Rehabilitation for H15 (15 ton) loading.
- Alternative 3. Rehabilitation for H20 (20 ton) loading.
- Alternative 4. Adaptive Reuse with New Bridge Off-Alignment.

7 COST MATRIX[1]

Jamaica BO 1442(42)		Do Nothing	Alternative 1 Rehabilitation for H8 (8-ton) Loading	Alternative 2[3] Rehabilitation for H15 (15-ton) Loading	Alternative 3 Rehabilitation for H20 (20-ton) Loading	Alternative 4 Adaptive Reuse with New Bridge Off-Alignment
COST	Bridge Cost	$0	$950,577	$1,123,817	$1,307,217	$2,177,000
	Removal of Structure	$0	$31,560	$66,520	$74,000	$17,000
	Roadway	$0	$249,622	$240,483	$256,989	$702,000
	Maintenance of Traffic	$0	$413,075	$413,075	$413,075	$20,000
	Construction Costs	$0	$1,613,274	$1,843,895	$2,051,281	$2,916,000
	Construction Engineering & Contingencies	$0	$483,982	$553,169	$615,384	$729,000
	Accelerated Premium	$0	$0	$0	$0	$0
	Total Construction Costs w CEC	$0	$2,097,256	$2,397,064	$2,666,665	$3,644,000
	Preliminary Engineering	$0	$161,327	$360,000	$205,128	$583,000
	Right of Way	$0	$5,000	$5,000	$5,000	$5,000
	Total Project Costs	$0	$2,422,256	$2,397,064	$3,081,665	$4,233,000
	Annualized Costs	$0	$60,556	$69,052	$77,042	$56,434
TOWN SHARE		$0	$121,113	$138,103	$154,083	$423,300
TOWN %		0%	5%	5%	5%	10%
SCHEDULING	Project Development Duration	N/A	4 Years	4 Years	4 Years	4 Years
	Construction Duration	N/A	4 months	7 months	7 months	9 months
	Closure Duration (If Applicable)	N/A	N/A	N/A	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	19'	19'	19'	19'	19'
	Typical Section - Bridge (feet)	13’-5”	13’-5”	13’-5”	13’-5”	22’-0”
	Geometric Design Criteria	Substandard Width	Substandard Width	Substandard Width	Substandard Width	Meets Standard
	Traffic Safety	No Change	No Change	No Change	No Change	No Change
	Alignment Change	No Change	No Change	No Change	No Change	No Change
	Bicycle Access	Substandard	Substandard	Substandard	Substandard	Improved
	Pedestrian Access	Substandard	Substandard	Substandard	Substandard	Meets Standard
	Hydraulics	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard	Meets Minimum Standard
	Utilities	No Change	No Change	No Change	No Change	Relocation – Aerial Only
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes
	Road Closure	No	No	No	No	No
	Design Life (years)[1]	<10	40	40	40	75

[1] Costs are estimates only, used for comparison purposes.
[2] A design life of 40 years will be assumed for the deck and superstructure rehabilitation options based on the existing substructure rating of “Good” condition.
[3] Please note that the 12-ton alternative is identical in scope to the 15-ton alternative, therefore only the 15-ton alternative is provided since it has a higher live load rating.

8 CONCLUSION

Alternative 3, rehabilitation for H-20 (20-ton) loading is recommended while maintaining traffic on an upstream temporary bridge.

Discussion:

Bridge 32 meets the requirements for inclusion in the National Register of Historic Places and was previously documented as part of the 1998 VTrans Historic Bridge Programmatic Agreement within Category A, whose rehabilitation for limited highway use was determined to be both feasible and prudent. The 165'-0" span steel Pratt through-truss is posted for 8 tons, retains nearly all it's original members and is in satisfactory condition. The bridge is however in need of maintenance repairs to address deterioration of portions of the timber deck, rusting of steel members and deterioration of portions of the abutments. In addition to the maintenance needs of the bridge, the current 8 ton posting does not allow for fire trucks to cross the bridge which increases emergency response time and also does easily allow for fuel delivery.

Alternative 3 would allow for use of the bridge by the Town's fire trucks and fuel oil deliveries and would address all current maintenance needs of the bridge while maintaining an historic structure. The alternative includes replacement of the floor system with new steel floor beams and stringers and new glulam deck to accommodate the higher live load capacity, cleaning, painting and repairs to truss members, substructure concrete repair and approach roadway improvements. Alternative 3 would not have the permanent archaeological and environmental impacts of Alternative 4 Adaptive Reuse with New Bridge Off Alignment and the estimated cost is $1.15M less than Alternative 4.

Traffic Control:

Traffic will be maintained on the existing bridge while a new, temporary bridge is installed upstream. Traffic will be transferred to the temporary bridge will repairs are made to Bridge 32 and once completed, traffic will be returned to truss bridge and the temporary bridge removed.

APPENDIX A

Site Photographs

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Photo 1: Looking West over Bridge 32 from East Approach

Photo 2: Looking East over Bridge 32 from Bridge Deck

Photo 3: Looking Upstream from Bridge 32

Photo 4: Looking Downstream from Bridge 32

Photo 5: Looking East at Floor System from West Abutment

Photo 6: Face of West Abutment

Photo 7: Looking West at Bridge 32 from East Approach

Photo 8: Looking East at Bridge 32 from West Approach

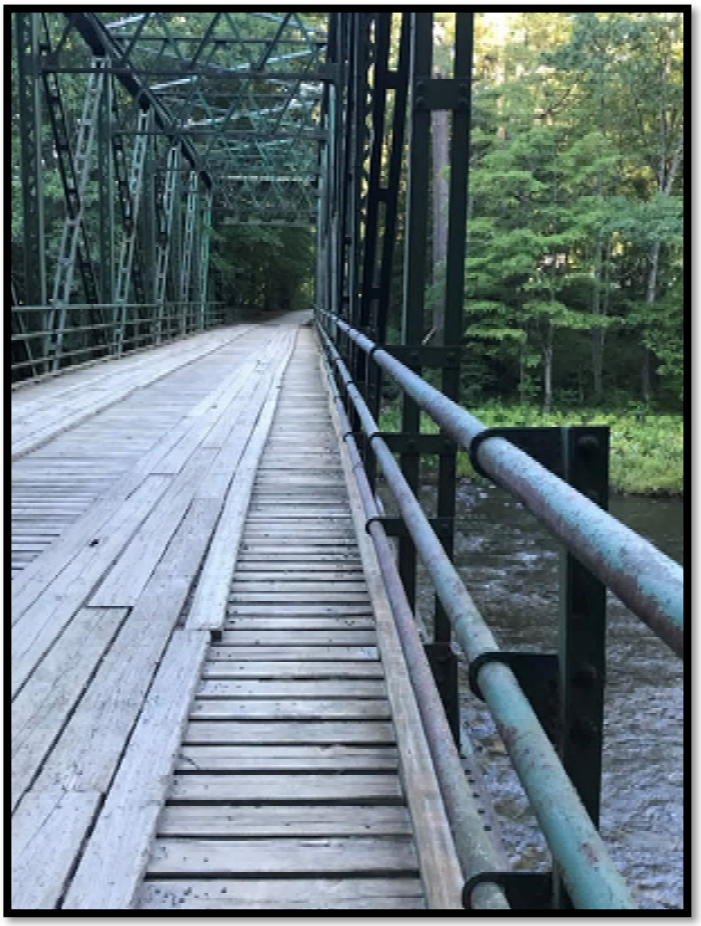


Photo 9: Looking West on Bridge 32

APPENDIX B

Town Map

County-Town Code: 1309

JAMAICA, WINDHAM COUNTY - 2020

TOWN HWY. No.	LENGTH IN MILES CLASS 3	CLASS 4
4	1.07	
5	0.96	
6	1.37	
7	0.15	
8	0.02	
9	0.59	
10	0.90	
11	0.30	
12	0.57	
13	0.78	
14	0.68	
15	2.83	
16	0.15	
17	0.92	
18	0.34	
19	0.65	
20	3.94	
21	0.28	
22	0.58	
23	0.30	
24	0.94	
25	0.12	
26	0.20	
27	0.70	
28	0.41	
29		(0.15)
30	5.12	
31	0.06	(0.34)
32		(0.38)
34	0.10	
35	3.89	
36	1.03	
37	0.25	
38	0.08	
39	0.56	
41	1.40	
42	0.83	
43	0.27	
44	0.77	
45	0.06	
46	0.03	(0.02)
47	0.45	(0.14)
49	0.14	
50	0.08	
51	0.64	
52	0.07	
53	0.14	
54	0.05	
55	0.27	
56	0.90	
57	0.11	(1.52)
58		(0.05)
60		(0.15)
62	0.06	
63	1.42	
64	0.43	
65	0.42	
66	0.11	(0.06)
67	0.52	
68	0.13	
69	0.40	
70	0.04	
85	0.48	
86	0.34	
87	0.39	
88	0.27	
89	0.09	
92	0.07	
93	0.30	
94	0.50	
95		(0.07)
TOTAL	**43.02**	**2.88**

LEGAL TRAIL No.	LENGTH IN MILES LEGAL TRAIL
1	(0.65)
2	(0.75)
3	(0.08)
4	(0.80)
5	(0.15)
6	(1.00)
7	(0.40)
8	(1.10)
9	(0.20)
10	(0.85)
11	(2.10)
12	(0.30)
13	(0.74)
14	(0.45)
15	(0.74)
16	(0.95)
17	(1.10)
18	(0.30)
19	(0.42)
20	(1.00)
21	(1.00)
22	(2.04)
23	(1.35)
24	(0.40)
25	(0.70)
26	(0.04)
TOTAL	**19.61**

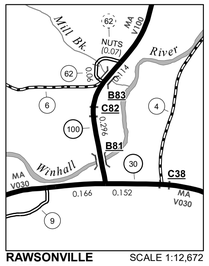
TOWN HWY. No.	LENGTH IN MILES "NOT UP TO STANDARD"
62	(0.07)
TOTAL	**0.07**

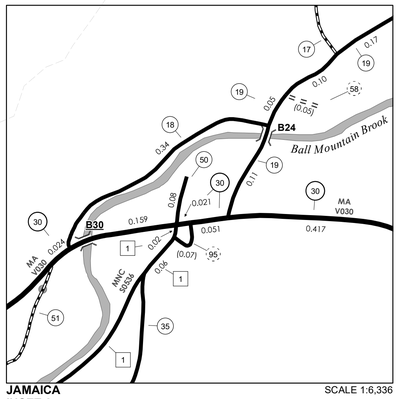
* The sections of the town highways listed above are legally Class 3, but have been deemed "Not Up To Standard" and are functionally Class 4 Town Highways

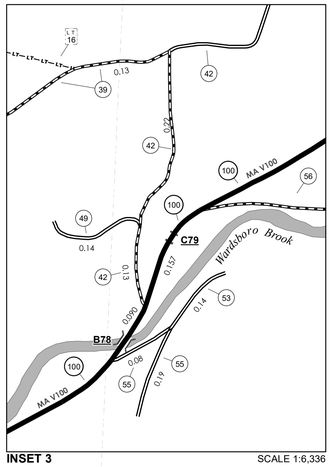
MILEAGE SUMMARY

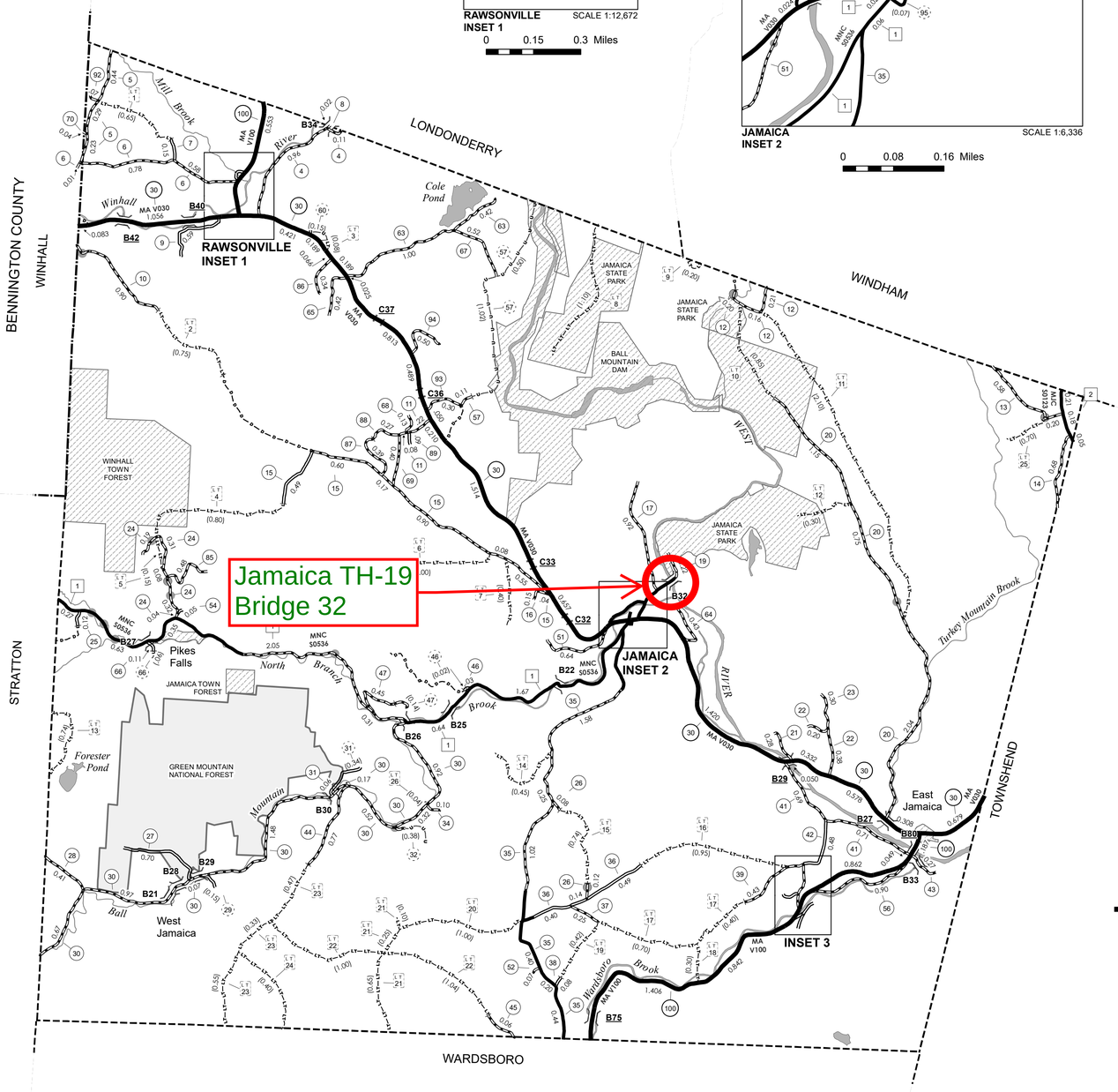
CLASS 2		
TH-1	6.000	
TH-2	0.440	
	TOTAL CLASS 2	6.440
CLASS 3		
	TOTAL CLASS 3	43.02
	TOTAL TOWN	**49.460**
STATE HIGHWAY		
VT-30	10.119	
VT-100	4.556	
	TOTAL STATE HIGHWAY	14.675
	TOTAL STATE	**14.675**

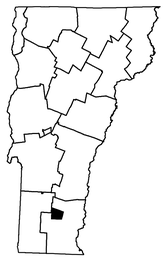
TOTAL, TRAVELED HIGHWAYS, FEB. 10, 2020: 64.135
(Excludes Class 4 and Legal Trail Mileage)











VERMONT
GENERAL HIGHWAY MAP

Town of Jamaica

WINDHAM COUNTY

Transportation District #2

Prepared by the
Vermont Agency of Transportation
Division of Policy, Planning and Intermodal Development
in cooperation with
U.S. Department of Transportation
Federal Highway Administration

Mileage as of February 10, 2020
Map prepared July 24, 2020

SCALE 1:31,680

0.5 0 0.5 1 1.5 2
Miles
0.5 0 0.5 1 1.5 2
Kilometers

HIGHWAYS
- INTERSTATE
- U.S. ROUTE
- STATE ROUTE
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL
- P PARK AND RIDE

- INTERSTATE OR DIVIDED HIGHWAY
- STATE - HARD SURFACE OR PAVED
- TOWN - HARD SURFACE OR PAVED
- GRAVEL
- SOIL OR GRADED AND DRAINED EARTH
- UNIMPROVED OR PRIMITIVE
- IMPASSABLE OR UNTRAVELED
- LEGAL TRAIL
- DISCONTINUED
- HIGHWAY CLASS CHANGE
- RAILROAD
- INACTIVE RAILROAD
- PUBLIC LAND - NATIONAL FOREST
- PUBLIC LAND - STATE/MUNICIPAL
- NFR NATIONAL FOREST ROAD
- SFH STATE FOREST HIGHWAY

POLITICAL SUBDIVISIONS
- STATE BOUNDARY
- COUNTY BOUNDARY
- TOWN BOUNDARY
- VILLAGE BOUNDARY
- URBAN COMPACT BOUNDARY
- WATER BODY
- STREAM OR BROOK

BRIDGE OR CULVERT
- BRIDGE OR CULVERT > 20'
- BRIDGE OR CULVERT 6' - 20'
- BIKE PATH STRUCTURE
- VTCULVERTS BRIDGE
- VTCULVERTS CULVERT > 6'
- B34 / C34 STATE BRIDGE OR CULVERT IDENTIFIER
- B34 / C34 TOWN BRIDGE OR CULVERT IDENTIFIER

FEDERAL CLASSIFICATION IDENTIFIER
- MA MINOR ARTERIAL
- MJC MAJOR COLLECTOR
- MNC MINOR COLLECTOR
- PA PRINCIPAL ARTERIAL

DISCLAIMER:
The untraveled highways (laid-out town highways), discontinued highways, and legal trails hereon are those of which the Agency of Transportation has record; others may exist.

Highway and bridge data by the Agency of Transportation. Town short structures drawn from the VTCULVERTS (formerly VOBCIT) online database. All other data from the Vermont Open Geodata Portal. Only named streams shown.

Vermont State Plane Coordinate System
North American Datum of 1983
SPCS_Zone_Identifier: 4400
Geodetic Reference System 80
4,000-meter grid, Easting - Northing

464,000 468,000 472,000 476,000 480,000 484,000 488,000
76,000 72,000 68,000 64,000 60,000

For more information contact: Vermont Agency of Transportation, Division of Policy, Planning & Intermodal Development - Mapping Section, 219 North Main Street, Barre, VT 05641 Telephone: 802-828-2600.

This map was funded in part through grants from the Federal Highway Administration, U.S. Department of Transportation. The representation of the authors expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

APPENDIX C

Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for JAMAICA **bridge no.:** 00032 **District:** 2

Located on: C3019 **over** WEST RIVER **approximately** 0.1 MI JCT TH 17 & TH 19 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 6 SATISFACTORY

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 101309003213091

Federal Sufficiency Rating: 043.1

Deficiency Status of Structure: FD

AGE and SERVICE

Year Built: 1926 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 01

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 99

ADT: 000160 **% Truck ADT:** 02

Year of ADT: 2007

GEOMETRIC DATA

Length of Maximum Span (ft): 0165

Structure Length (ft): 000172

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 13.5

Deck Width Out-to-Out (ft): 14

Appr. Roadway Width (ft): 019

Skew: 00

Bridge Median: 0 NO MEDIAN

Min Vertical Clr Over (ft): 14 FT 07 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: 8 TIMBER

Type of Wearing Surface: 7 WOOD OR TIMBER

Type of Membrane: 0 NONE

Deck Protection: 7 CCA.CREOSOTED WOOD

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 7 SLIGHT CHANCE OF OVERTOPPING BRIDGE & ROADWAY

Approach Roadway Alignment: 6 EQUAL TO MINIMUM CRITERIA

Scour Critical Bridges: U UNKNOWN FOUNDATION

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

Posting Status: P POSTED FOR LOAD

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 03 BRIDGE IS LEGALLY LOAD POSTED AT ONE END ONLY

Posted Vehicle: 6 GROSS LOAD ONLY

Posted Weight (tons): 08

Design Load: 0 OTHER OR UNKNOWN

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 102019 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

10/1/2019 Stringers have measurable section loss with the worst being in bay #1 near abutment #1. Lower sections of verticals, diagonals and the bottom chord have pitting and rust scaling around connections. Timber deck is showing signs of decay and movement and should have restraint system installed to prevent deck from translating downstream. Runners have heavy breakup with multiple boards being loose and damaged and need to be replaced. Bridge seats and lower sections of truss system need to be cleaned off from sediment build up. Paint system has failed along truss system and should be cleaned and repainted. Abutments have large voids present and should be filled. SMP & SEP

10/11/2017 Structure is in fair condition. Bearing area on both abutments have a sand buildup and should be cleaned off. Voids in the abutments should be repaired. Town should consider full width runners to help stop the sand from reaching the top flanges of the stringers and floor beam. Steel could use painting. ~FRE/JAS

10/20/2015 Structure is in fair condition. The bearing area on both abutments should be washed off. Both abutments have areas of voids and should be chinked with smaller stone. Town should consider adding full width runners to help stop some of the sand from setting on the top flange of the stringers and floor beams. Structure should be cleaned and painted soon. ~FRE/TJB

APPENDIX D

Preliminary Hydraulics

State of Vermont
Structures and Hydraulics Section
One National Life Drive
Montpelier, Vermont 05633-5001
vtrans.vermont.gov

[phone] 802-371-7326
[fax] 802-828-3566
[ttd] 800-253-0191

Agency of Transportation

TO: Laura Stone, Structures, Scoping Engineer

CC: Nick Wark, Hydraulics Engineer

FROM: Christian Boisvert, Hydraulics Project Engineer

DATE: November 10, 2020

SUBJECT: Jamaica BO 1442(42), pin#19J226
Jamaica, TH-19, Bridge 32 over West River
Site location: 0.1 miles southwest of TH-17 and TH-19 intersection
Coordinates: 43.104511, -72.773017

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

On 10/20/2020 we met with ANR at the site. We (Scott Jenson, Keith Friedland and I) agreed that the span between existing abutment faces (158') meets current state environmental standards with regard to span length and opening height. Keith confirmed this in an email on 11/5/2020. Scott Jensen also noted the minimum allowable span for a new structure could be within 10% of the existing span (approximately 142 feet) if circumstances made a shorter span favorable to designers.

TH-19 is a Local Road. Therefore, Design Storm Flow is 4% AEP (Q25).

The following was analyzed:

Existing Conditions:

- Single span through-truss steel bridge
- 158-foot clear span with a low beam elevation of 669.4 feet
- Provides 7.2 feet of freeboard at the design AEP and 6.2 feet of freeboard at the 1% AEP
- The Existing Conditions meets current hydraulic standards

Option 1: Similar sized structure

Stone Fill, Type IV is to be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet. A final scour countermeasure design will be performed during final design.

A preliminary scour analysis was performed as part of this study assuming a D50 of 10 mm (gravel). Preliminary scour calculations provide a value of 'zero' for a contraction scour depth. 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 additional analyses.

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

APPENDIX E

Preliminary Geotechnical Information

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Nick Wark, P.E., P.I.I.T. Program Manager

From: August Arles, Geotechnical Engineer, via Callie Ewald, P.E., Geotechnical Engineering Manager

Date: February 24th, 2020

Subject: Jamaica BO 1442(42) Preliminary Geotechnical Information

1.0 INTRODUCTION

As requested, we have conducted our preliminary geotechnical investigation of Bridge No. 32 on Town Highway 19 (Depot St.) over the West River in the town of Jamaica, VT. Bridge No. 32 is located approximately 0.4 miles from the intersection of Depot St. and VT Route 30. The subject project consists of replacing or rehabilitating the existing single span, steel bridge. This review included the examination of as-built record plans, historical in-house boring logs, water well logs and hazardous site information on file at the Vermont Agency of Natural Resources (ANR), as well as published surficial and bedrock geologic maps. A site visit was not conducted by Geotechnical Section staff however photos from bridge inspection reports and available satellite imagery were reviewed as part of this preliminary investigation.

2.0 SUBSURFACE INFORMATION

2.1 Published Geologic Data

Mapping conducted in 1970 for the Surficial Geologic Map of Vermont shows that the project area consists of postglacial fluvial deposits, primarily consisting of sand and gravel deposits (Doll, 1970).

According to the 2011 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project site is on the border of two bedrock formations and is underlain with quartzite of the Dalton Formation and gneiss of the Biotite-quartz-plagioclase gneiss Formation (Ratliffe, et. al, 2011).

The Geotechnical Engineering Section maintains a GIS based historical record of subsurface investigations, which contains electronic records for the majority borings completed in the past 10 years. An exploration of this database revealed no nearby projects within a 0.5-mile radius of the project site.

2.2 Water Well Logs

The Vermont ANR documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, these logs may provide general characteristics of the soil strata and depth to bedrock in the area. The three closest recorded water wells were TAG 22602, TAG 23689, and WRN 170. TAG 22602 is located approximately 591 feet from the project site, TAG 23689 is located approximately 694 feet away, and WRN 170 is located approximately 702 feet away. Bedrock was reported at a depth of 4 feet, 0

feet (at ground surface elevation), and 67 feet for wells TAG 22602, TAG 23689, and WRN 170, respectively.

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Natural Resources Atlas also maps the location and information of known hazardous waste sites and underground tanks. The project site location is not listed on the Hazardous Site List, however, there is one underground storage tank approximately 550 feet away at the Jamaica Village School.

2.4 Record Plans

There were no record plans, foundation information, or subsurface information available for this project.

3.0 FIELD OBSERVATIONS

A site investigation was not conducted by the Geotechnical Section staff, however, photos from bridge inspection reports and satellite imagery were reviewed to evaluate feasibility of boring operations and assess general site conditions as they relate to the proposed project.

Bedrock outcrops were not observed in the vicinity of the existing bridge however cobbles and boulders were present throughout the riverbed and along the banks of the West River, as shown in Figures 3.2 through 3.4. Both banks are highly vegetated with shrubs and trees visible throughout.

Overhead utilities are present running parallel to the upstream face of the bridge, as seen in Figure 3.1. We do not anticipate that these overhead utilities will restrict boring operations, however, a minimum safe distance from the drilling equipment will be required to be maintained during drilling operations. Bridge No. 32 has a weight capacity of 8 tons, as noted in Figure 3.7, this may impact our ability to access the eastern side of the bridge for boring explorations due to the weight of our drilling equipment.

Figure 3.1 *Looking west at bridge; note overhead utilities on the upstream face of the bridge. [Inspection photo dated 2017].*

Figure 3.2 *Looking upstream at bridge; note cobbles and boulders located in riverbed. [Inspection photo dated 2019].*

Figure 3.3 *Underneath the western abutment looking across the West River; note boulders along riverbed and along bank. [Inspection photo dated 2019]*

Figure 3.4 *Abutment of the western approach of the bridge. [Inspection photo dated 2019]*

Figure 3.5 *Abutment of the western approach of the bridge; note boulders. [Inspection photo dated 2019]*

Figure 3.6 *Abutment of the western approach of the bridge; note boulders. [Inspection photo dated 2019]*

Figure 3.7 *Posted sign designating the weight limit of Bridge No. 32. [Inspection photo dated 2019]*

4.0 RECOMMENDATIONS

4.1 Preliminary Foundation Alternatives

Based on the preliminary information review during this investigation, if a full bridge replacement option is chosen as the preferred alternative, foundation options for a replacement structure include the following:

- Reinforced concrete abutments supported on piles or spread footings

4.2 Proposed Subsurface Investigation

Once a proposed alignment for the replacement bridge is chosen, we recommend advancing a minimum of one test boring at each abutment location on opposite sides of the roadway at 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.

5.0 CLOSING

When a design alternative as well as a preliminary alignment has been chosen, the Geotechnical Engineering Section can assist in designing 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.

6.0 REFERENCES

Doll, C. G., 1970, Surficial Geologic Map of Vermont, Vermont Geological Survey, Montpelier, VT.

Ratcliffe, N. M., Stanley, R. S., Gale, M. H., Thompson, P. J., Walsh, G. J., 2011, Bedrock Geologic Map of Vermont, Vermont Geological Survey, Montpelier, VT.

Vermont Agency of Natural Resources Department of Environmental Conservation, Natural Resources Atlas, www.anr.vermont.gov/maps/nr-atlas%20, accessed 2/06/2020.

cc: Laura Stone, P.E., P.I.I.T. Project Manager
Electronic Read File
Project File/CEE
AJA

Z:\Highways\CMB\GeotechEngineering\Projects\Jamaica BO 1442(42)\REPORTS\Jamaica BO 1442(42) Preliminary Geotechnical Information.docx

APPENDIX F

Traffic Memo

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

HIGHWAY DIVISION
TRAFFIC RESEARCH

TO: Daniel Beard, Technician

FROM: Maureen Carr, Traffic Analysis Engineer mcc Write for Maureen Carr
Colin Philbrook, Traffic Analysis Technician CCP

DATE: August 27, 2019

RE: Jamaica BO 1442(42)
TH 19 (Depot St.)- BR #32

As requested on July 16, 2019, please find complete estimated traffic data on the above project in the town of Jamaica. The data for the years 2023, 2043 and 2063 is included in the table below.

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

TRAFFIC DATA	2023	2043	2063
AADT	260	280	~
DHV	70	75	~
ADTT	15	25	~
%T	5.8	8.6	~
%D	58	58	~
FLEXIBLE ESAL	~	**2023 ~ 2043** 27,000	**2023 ~ 2063** 59,000

CC: Data Analysis Files

APPENDIX G

Natural Resources ID

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
vtrans.vermont.gov

Agency of Transportation

[phone] 802-279-2562
[fax] 802-828-2334
[ttd] 800-253-0191

To: Project File

From: James Brady, VTrans Environmental Biologist

Date: November 7, 2019

Subject: Jamaica BO 1442 (42) - Natural Resource ID

I have completed my natural resource report for the above referenced project. My evaluation has included wetlands, wildlife habitat, agricultural soils and rare, threatened and endangered species.

Wetlands/Watercourses
There are mapped wetlands in all four quadrants of the project area.

The review area includes one perennial stream, the West River and two intermittent streams. All three are regulated by the US Army Corps of Engineers.

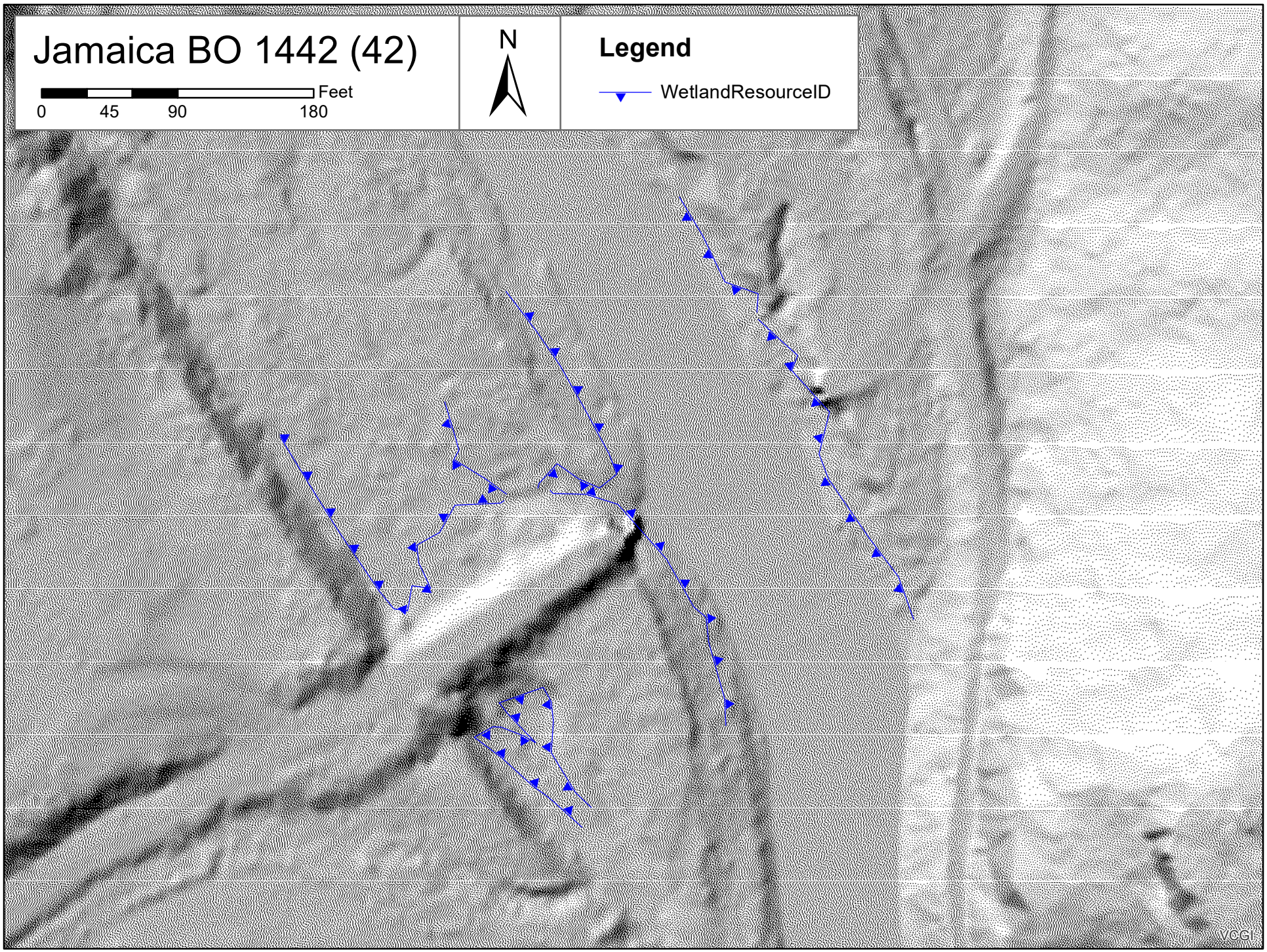
See attached report from Stantec for more detail.

Wildlife Habitat
See attached Stantec for detail.

Rare, Threatened and Endangered Species
See attached report for detail.

Agricultural Soils
See attached report for detail.

Invasive Species
Invasive species were also mapped as a part of Stantec's scope of work, see attached.


Jamaica BO 1442 (42)
Feet
0
45
90
180
N
Legend
WetlandResourceID
VCGI

VTRANS SOUTH STRUCTURES RESOURCE ID

Jamaica BO 1442 (42): TH 19 - Bridge 32

OCTOBER 2019

VTrans Working to Get You There
Vermont Agency of Transportation

One National Life Drive
Montpelier, VT 05633

McFarland Johnson

620 Hinesburg Road, Suite 230
South Burlington, VT 05403

VTRANS SOUTH STRUCTURES RESOURCE IDENTIFICATION

JAMAICA BO 1442 (42): DEPOT STREET (TH-19) BRIDGE 32

OCTOBER 2019

Contents

Attachments:

Figure 1 – Location Map

Figure 2 – Wetland and Surface Water Delineation

Figure 3 – Existing Natural Resource Mapping

Photolog

Wetland Data Forms

USFWS Offical Species List

Vermont Natural Heritage Inventory Report

INTRODUCTION

The Vermont Agency of Transportation (VTrans) secured the services of McFarland Johnson, Inc. (MJ) to complete natural resource identification review for Bridge 32 carrying Depot Street (TH-19) over the West River in Jamaica, Windham County, Vermont, see **Figure 1**, Location Map. Potential natural resources evaluated in the review include: wetlands; surface waters; floodplains; wildlife habitat; rare, threatened, and endangered species; soils; and invasive species.

The following report describes the methods and results of the resource identification review completed for the Bridge 32 site.

METHODS

STUDY AREA

The Study Area extends approximately 100 feet upstream and downstream from the structure, plus approximately 200 feet along each approach, and approximately 50 feet from the edge of pavement on the approaches. This area is intended to cover all land that could potentially be disturbed by the proposed project. These dimensions were buffered by an additional 50 feet in order to account for the wetland buffer zone associated with Vermont Class II wetlands potentially located outside the Study Area. A Study Area shapefile was created in ArcGIS based on these dimensions. The Study Area was then loaded as a background file on a Trimble Geo7X GPS unit to assist with navigating in the field and to ensure that the entire Study Area was reviewed. The Study Area is approximately 500 feet long by 260 feet wide and approximately three acres in size.

DESKTOP REVIEW

Desktop review included compiling available GIS data and mapping provided by VTrans. GIS data obtained included the following: VSWI Wetlands Advisory Layer (VTANR); VSWI Wetlands Class Layer (VTANR); VT National Wetlands Inventory Map Data (VCGI); VT Hydrography Dataset (VCGI); The Federal Emergency Management Agency (FEMA) National Flood Hazard Layer (NFHL); Rare, Threatened, and Endangered Species (VTANR); Significant Natural Communities (VTANR); Habitat Blocks and Wildlife Corridors (VTANR); Deer Wintering Areas (VTANR); VT Protected Lands (VCGI); NRCS Soil Survey Units (VCGI); Agriculturally Important Soils (VCGI); 2013-2017 Contours (1ft), and orthoimages. The project Study Area was overlaid onto the existing resource mapping consisting of the above GIS data.

FIELD REVIEW

The field review was conducted on September 19, 2019.

The wetland delineation was completed in accordance with the 1987 *US Army Corps of Engineers Wetlands Delineation Manual* and the 2012 *Regional Supplement to the Corps Wetland Delineation Manual: Northcentral and Northeast Region*.

Wetland boundaries and the ordinary high water mark (OHWM) of surface waters were demarcated in the field using pink flagging, labeled *Wetland Delineation*, tied to vegetation and labeled with a unique identifier and sequentially numbered. The locations of wetland and OHWM flags were located using a Trimble Geo 7X GPS unit with sub-meter accuracy. GPS data were post-processed to improve accuracy using differential correction and manual editing.

Data on wetland vegetation, soils, hydrology, and other characteristics were collected. Photographs of wetlands, streams, and structures were taken. MJ documented the delineation with Army Corps Wetland Determination Data Forms at representative wetland and upland locations.

MJ collected data on the stream channel characteristics including: existing crossing structure; bankfull width, depth, and flood-prone width; substrate type; evidence of erosion and aggradation; crossing structure characteristics (i.e. plunge pools, perched outlets); and the structures ability to provide aquatic organism passage.

MJ documented the various habitat types, general habitat condition, and dominant plant cover types during the field reviews. MJ also documented wildlife observations and evidence that were present during the field reviews.

MJ noted the approximate locations of state and federal listed plant and/or animal species observed during the field review.

Invasive species, identified by the Vermont Agency of Agriculture, Food and Markets, located within the Study Area were identified during these field reviews and their approximate locations and extents were also collected with the GPS.

JAMAICA: DEPOT STREET (TH-19) – BRIDGE 32

The following sections provide a description of the Jamaica, VT Bridge 32 Study Area; the results of the wetland and surface water delineation and field review; and a discussion of the environmental/natural resources identified during the review. Potential resources include: wetlands; surface waters; floodplains; wildlife habitat; rare, threatened, and endangered species; soils; and invasive species. **Table 1** below provides an overview of natural resources that have been identified within the Study Area. **Figure 2** illustrates data collected during the field review and **Figure 3** illustrates the existing natural resource mapping collected during the desktop review.

Photo 1: Bridge 32 over the West River, Jamaica, Vermont, facing upstream (Photo Direction: North) 09/19/2019

Table 1. Resource ID Summary Table

TOWN	STRUCTURE ID	WETLANDS	SURFACE WATERS	FLOODPLAIN / FLOODWAY	SIGNIFICANT HABITAT	RTE SPECIES	FARMLAND SOILS	INVASIVE SPECIES
JAMAICA	BRIDGE 32	X	X	X	X	X	X	X

General Site Description

Bridge 32 is located in the Town of Jamaica, Windham County, Vermont, approximately 0.5 mile northeast of the town center, and carries Depot Street (TH-19) over the West River. Jamaica is located in southcentral Vermont, in the Southern Green Mountains biophysical region. Salmon Hole Lane is located northeast of Bridge 32 and serves as the main entrance to Jamaica State Park. Jamaica State Park offers camping, hiking, swimming, and fishing opportunities to the public. The Study Area is located in a rural area containing primarily forested habitat. There is relatively sparse residential development located along Depot Street to the northeast and southwest. The western half of the Study Area consists primarily of relatively flat, lower lying floodplain forests and wetland areas. The banks along the eastern side of the West River are steeper and higher. There is a relatively flat, forested upland terrace above the West River along the eastern side of the Study Area, and a steep hillslope in the easternmost corner of the Study Area.

Wetlands

A total of four (4) wetland areas were delineated within the Study Area. Most of these wetlands are associated with the West River and its floodplain. The locations of delineated wetlands are shown on **Figure 2** and photographs of each area are included in the attached Photolog.

Wetland 1 (JW01)

Wetland 1, flagged as JW01, is primarily a palustrine emergent wetland (PEM) located along the western bank of the West River. The fringe wetland ranges from approximately 6-18 feet wide along most of its length within the Study Area. The wetland continues outside the Study Area to the south.

Dominant vegetation in Wetland 1 included twisted sedge (*Carex torta*), sensitive fern (*Onoclea sensibilis*), spotted Joe-pye weed (*Eutrochium maculatum*), bluejoint (*Calamagrostis canadensis*), and tall white-aster (*Doellingeria umbellata*). Trees and shrubs along the edge of the wetland area included willows (*Salix spp.*), witch hazel (*Hamamelis virginiana*), red maple (*Acer rubrum*), and yellow birch (*Betula alleghaniensis*).

Functions and values provided by Wetland 1 include: wildlife habitat; rare, threatened, and endangered species habitat; and erosion control.

WETLAND 2 (JW02)

Wetland 2, flagged as JW02, is located in the northwest bridge quadrant and includes a large palustrine forested (PFO) area within the floodplain of the West River and a palustrine emergent (PEM) fringe wetland along the western shore of the West River. The two areas are separated by a natural berm along the bank of the river but are hydrologically connected via Stream 2, an intermittent stream and tributary to the West River that flows from the northwest through Wetland 2. Both the forested and emergent wetland areas continue outside the Study Area to the north.

The PFO portion of Wetland 2 is located in a broad, flat depression. Dominant herbaceous vegetation in this area included sensitive fern, rough goldenrod (*Solidago rugosa*), and tall meadow-rue (*Thalictrum pubescens*). Dominant tree species included red maple, green ash (*Fraxinus pennsylvanica*), and yellow birch.

The PEM portion of Wetland 2 is relatively similar to that of Wetland 1, with slightly less vegetation species diversity. Twisted sedge is the most dominant species in Wetland 2, forming a dense mat of vegetation with joe-pye weed and bluejoint interspersed throughout.

Wetland 2 provides the following wetland functions and values: wildlife habitat; rare, threatened, and endangered species habitat; exemplary natural communities (Rocky Cobble Shore); and erosion control.

WETLAND 3 (JW03)

Wetland 3, flagged as JW03, is a PFO depression in the southwest bridge quadrant. The area appears to be a relic stream channel in the historic floodplain of the West River that has since been abandoned and/or possibly anthropogenically excavated and modified by prior roadway construction activities. It is a relatively deep area, approximately 26-28 feet below the surface of the roadway. Large boulders have been placed along the slope leading up to Depot Street.

Vegetation in Wetland 3 was relatively sparse, particularly in the lower lying areas. Herbaceous vegetation was dominated by sensitive fern, small-spiked false nettle (*Boehmeria cylindrica*), and poison ivy (*Toxicodendron radicans*). Tree species in Wetland 3 included green ash and American elm (*Ulmus americana*).

Function and values provided by Wetland 3 include: water storage, water quality protection, and wildlife habitat.

WETLAND 4 (JW04)

Wetland 4, flagged as JW04, is a PEM fringe wetland located along the eastern bank of the West River. The wetland area is very similar to Wetland 1 and the PEM portion of Wetland 2. Wetland 4 continues outside the Study Area to both the north and south.

Dominant vegetation in Wetland 4 included twisted sedge, sensitive fern, spotted joe-pye weed, bluejoint, and tall white-aster. Purple loosestrife, a Vermont Agency of Agriculture, Food and Markets Class B Noxious Weed, was interspersed throughout this wetland.

Functions and values provided by Wetland 1 include: wildlife habitat; rare, threatened, and endangered species habitat; exemplary natural communities; and erosion control.

SURFACE WATERS

A total of three (3) surface waters were delineated within the Study Area, including a perennial river and two smaller intermittent streams. The locations of delineated surface waters are shown on **Figure 2** and photographs of each area are included in the attached Photolog.

STREAM 1 (JST01)

Stream 1, flagged as JST01, includes the delineated portion of the West River, a perennial stream, and the most prominent surface water in the Study Area. The West River flows from north to south through the Study Area. At the location of the Depot Street Bridge, the West River has a watershed size of approximately 178 square miles. The Ball Mountain Dam is located approximately three miles upstream from the Depot Street Bridge and provides flood control for the West River. The average bankfull width of the West River within the Study Area was approximately 150 feet.

The substrate of the West River consists of primarily cobbles with a few scattered boulders. Wetlands 1, 2, and 4 are fringe PEM wetlands located along the banks of the West River throughout the Study Area.

Aquatic organisms observed in the West River included green frogs, black-nosed dace, and crawfish.

STREAM 2 (JST02)

Stream 2, flagged as JST012, is an unnamed intermittent stream located in the northwest bridge quadrant. The stream is a tributary to the West River and originates outside the Study Area, flowing from the northwest, east through the Study Area and through Wetland 2 before the confluence with the West River in the northwest bridge quadrant. Stream 2 has a total watershed size of approximately 0.04 square miles (27 acres).

During the field review the stream did not have flow, however surface water was present in some deeper pools and between some of the cobbles. The dominant substrate was cobble with areas of silt/clay. The average bankfull width of Stream 2 was approximately 6 feet. Vegetation along

the banks of Stream 2 included sensitive fern, spinulose wood fern (*Dryopteris Carthusiana*), witch hazel, American hornbeam (*Carpinus caroliniana*), and false spiraea (*Sorbaria sorbifolia*).

STREAM 3 (JST03)

Stream 3, flagged as JST03, is an unnamed intermittent stream located in the northeast bridge quadrant. Stream 3 has a total watershed size of approximately 0.17 square miles (109 acres). The stream flows out of a stone box culvert located under Salmon Hole Lane and flows southwest for approximately 130 feet to its confluence with the West River. The box culvert inlet is located approximately 100 feet northeast, along the northeastern edge of the Study Area. Immediately upstream from the box culvert inlet is a 24-inch corrugated metal pipe located underneath a driveway.

Stream 3 had an average bankfull width of approximately 6 feet in the Study Area. The substrate was primarily silt/clay and sand. There was approximately 1-2 inches of water in the stream during the field review.

FLOODPLAINS

Based on a review of the existing FEMA NFHL maps (FIRM Panel 50025C0182E eff. 9/28/2007) the West River has a 100-Year Floodplain mapped within the Study Area. There is no Regulatory Floodway within the Study Area, and Base Flood Elevations are not available.

WILDLIFE HABITAT

The West River and surrounding forested areas provide valuable terrestrial and aquatic habitat for fish and wildlife. The existing structure spans the full width of the West River and provides vegetated banks along both sides of the structure. Bridge 32 does not provide a significant barrier to terrestrial and/or aquatic organism passage.

The upland forested areas contained a mix of tree species but was dominated by sugar maple, white pine (*Pinus strobus*), red oak (*Quercus rubra*), eastern hemlock (*Tsuga canadensis*), witch hazel, and American hornbeam. There are relatively large blocks of contiguous forested habitat located in the vicinity of the bridge. The West River provides a riparian corridor potentially linking habitats to the south and east with habitat blocks to the north and west. A VTANR Deer Wintering Area is also mapped in the forested area east of the West River.

Wildlife observed during the field review included green frogs, black-nosed dace, and crawfish. The stone bridge abutments could provide potential bat roosting habitat. However, the abutments were visually inspected during the field review and no guano staining or droppings were observed.

SIGNIFICANT NATURAL COMMUNITIES

The Vermont Nongame and Natural Heritage Program has identified a Significant Natural Community (EO ID 2507) associated with the West River north (upstream) of the Depot Street

Bridge. This area is identified as a River Cobble Shore Community and it is ranked as S2, or rare in Vermont.

According to the publication *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont* (Thompson and Sorenson), "The River Cobble Shore Community occurs along high energy rivers and streams. The cobble substrate is unstable and is sparsely vegetated with twisted sedge, Indian hemp, grass-leaved goldenrod, Joe-pye weed, reed canary grass, bluejoint grass, and willows."

Photo 2: West River upstream from Bridge 32 showing River Cobble Shore Community (09/19/2019)

Photo 3: River Cobble Shore Community in NW Bridge Quadrant (09/19/2019)

The above description is fairly consistent with the conditions observed during the field review. The cobble bars along the banks in the Study Area are densely vegetated by tussock forming twisted sedge, growing in a dense mat. The substrate is dominated by cobbles and small boulders with finer gravel and sands mixed in. The best example of this community within the Study Area is located along the western shore of the West River, north of Bridge 32.

Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont also identifies several rare and uncommon species of plants associated with this community including: northern tubercled bog-orchid (*Platanthera flava*); obedient false dragonhead (*Physostegia virginiana*); dwarf sand plum (*Prunus pumila*); lake shore sedge (*Carex lenticularis*); and Canada burnet

(*Sanguisorba canadensis*). Rare, threatened, and endangered species are discussed in greater detail in the following section.

RARE, THREATENED, AND ENDANGERED SPECIES

The following sections describe the results of both state and federal rare species database queries identifying potential uncommon, rare, threatened, and endangered species located in the vicinity of the Study Area, as well as species documented within the Study Area during the September 2019 field review.

STATE-LISTED SPECIES

During the field review MJ documented the occurrence of Canada burnet (*Sanguisorba canadensis*), a Vermont State Ranked S2 Rare Plant species. The species was observed in the northwest bridge quadrant along the bank of the West River within Wetland 2.

Photo 4: Canada burnet (Sanguisorba canadensis) Leaf and Flower Structure (09/19/2019)

*Photo 5: Canada burnet (*Sanguisorba canadensis*) Flower Structures (09/19/2019)*

Due to a lack of cellular data service at the bridge site, a positive identification of this species was not made until after leaving the site and returning to the office. Therefore, the approximate limits of the population were not mapped in the field. An additional rare plant survey is recommended to determine the exact extent of this population.

In addition, a VTANR mapped Rare, Threatened, and Endangered Species polygon (EO ID 5783) associated with the West River is located within the Study Area, just south of the Depot Street Bridge extending downstream for approximately 1,000 feet. The Vermont Natural Heritage Inventory was contacted for additional information regarding EO ID 5783 as well as other potential rare, threatened, and endangered species occurrences documented in the vicinity of the Study Area.

Based on the Vermont Natural Heritage Inventory Report (see attached), EO ID 5783 is associated with a State Ranked S2 Rare species of freshwater mussel, the eastern pearlshell (*Margaritifera*

margaritifera). This species was documented in the West River in the vicinity of Bridge 32, in 1996, 2004, and again in 2011. This species has the potential to occur within the Study Area. No mussels were observed during the field review. However, a formal mussel survey would be required to confirm presence/absence of this species.

The Vermont Natural Heritage Inventory also identified additional uncommon, rare, threatened, and endangered species that have been documented in the surrounding area and have the potential to occur within the Study Area. These species are summarized in **Table 2** below.

Table 2. State-Listed Species

Common Name	Scientific Name	Type	EO ID	State Rank	State Protection Status	Federal Protection Status	Observed During 2019 Field Review
Eastern Pearlshell	*Margaritifera margaritifera*	Freshwater Mussel	5783	S2	T	N/A	No
Tubercled Orchid	*Platanthera flava var. herbiola*	Vascular Plant	556	S2	T	N/A	No
Canada Burnet	*Sanguisorba canadensis*	Vascular Plant	2065	S2	N/A	N/A	**Yes**
Brook Floater	*Alasmidonta varicosa*	Freshwater Mussel	191	S1	T	N/A	No
Boulder-Beach Tiger Beetle	*Cicindela ancocisconensis*	Beetle	3909	S1	N/A	N/A	No
Creeper	*Strophitus undulatus*	Freshwater Mussel	N/A	S3	N/A	N/A	No

Source: Vermont Natural Heritage Inventory.
S1=Very Rare; S2=Rare; S3=Uncommon
T=Threatened; E=Endangered

The West River provides potential suitable habitat for the eastern pearlshell, brook floater, and creeper mussels. As aforementioned, Canada burnet was documented in the northwest bridge quadrant, and suitable habitat exists throughout the Study Area. The River Cobble Shore also provides potential habitat for the tubercled orchid and boulder-beach tiger beetle in the Study Area. Of the species identified by the Vermont Natural Heritage Inventory, Canada burnet was the only one identified during the September 2019 field review.

FEDERALLY-LISTED SPECIES

The United States Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System (IPaC) web tool was accessed on October 25, 2019 and an Official Species List (see attached) was generated in order to determine if any Federally-listed species have the potential to occur within the vicinity of the Study Area. According to the Official Species List, the Federally-threatened and state-endangered northern long-eared bat (*Myotis septentrionalis*) (NLEB) could potentially occur in the Study Area. **Table 3** below summarizes the species identified on the USFWS Official Species List. No critical habitat has been designated for NLEB.

Table 3. Federally-Listed Species

Common Name	Scientific Name	Type	State Protection Status	Federal Protection Status	Suitable Habitat in Study Area
Northern Long-Eared Bat	*Myotis septentrionalis*	Mammal	E	T	YES

Source: USFWS IPaC.
T=Threatened; E=Endangered

According to the USFWS, suitable summer habitat for NLEB bat consists of a variety of forested habitats. The NLEB generally prefers closed canopy forest with an open understory. Potential roost trees include live trees or snags, at least 3" in diameter, with exfoliating bark, cracks, crevices, or cavities.

Suitable summer habitat for NLEB exists within the forested portions of the Study Area. As discussed above, the existing bridge stone abutments could also provide potential roosting habitat. However, the bridge abutments were visually inspected during the field review and no guano staining or droppings were observed.

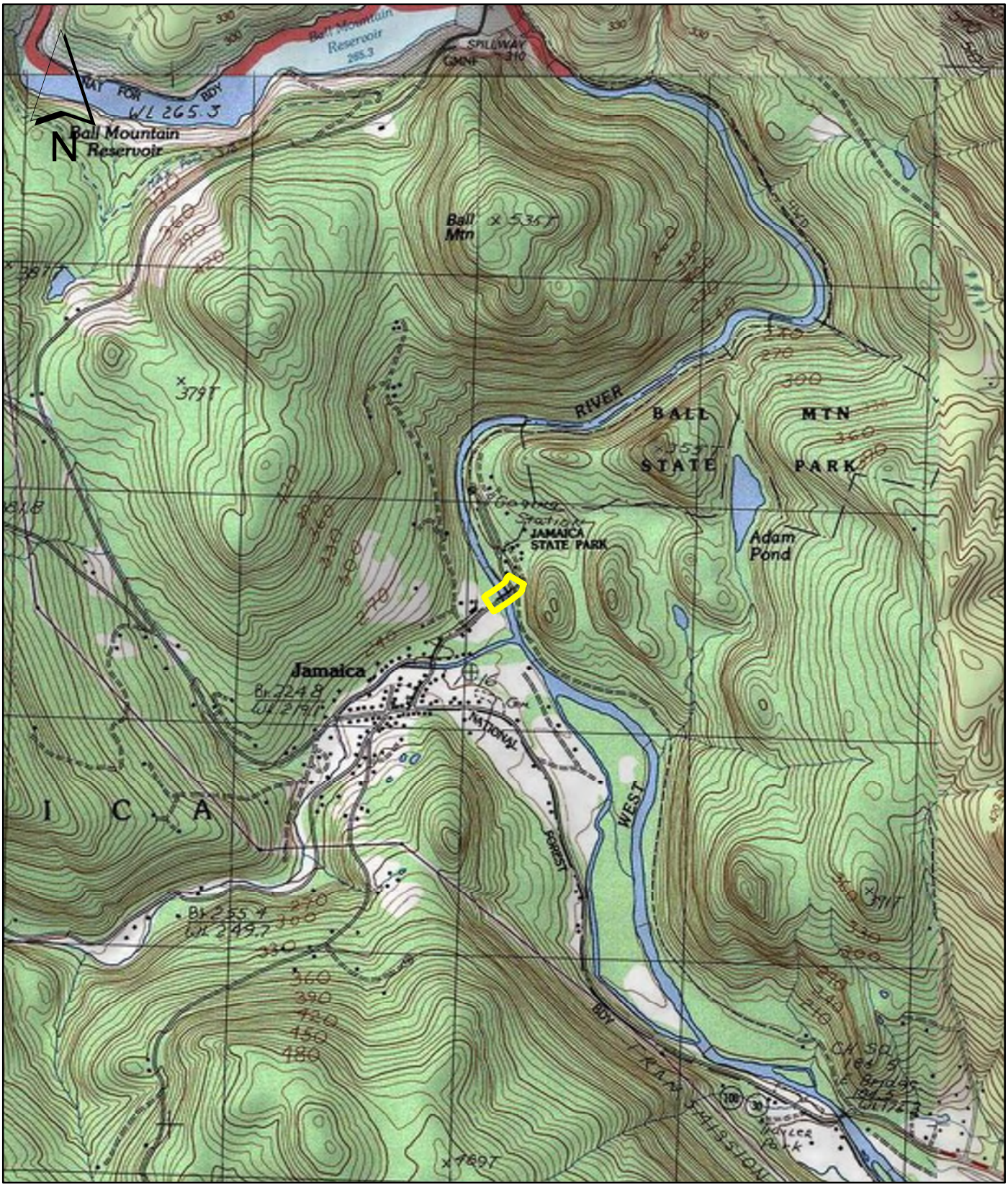
SOILS

NRCS mapped soil units in the Study Area consist of: Monadnock fine sandy loam, 0 to 8 percent slopes, very stony; Colton loamy fine sand, 2 to 8 percent slopes; Worden loam, 3 to 8 percent slopes, very bouldery; Houghtonville-Rawsonville fine sandy loams, 25 to 50 percent slopes, very boulder; Houghtonville fine sandy loam, 3 to 8 percent slopes; Houghtonville fine sandy loam, 3 to 8 percent slopes, very stony; and Water.

Houghtonville fine sandy loam, 3 to 8 percent slopes and Colton loamy fine sand, 2 to 8 percent slopes are identified as Farmland of Statewide Importance in Vermont. These soil units are mapped on the west side of the West River in the southwest bridge quadrant and along the western edge of the Study Area.

INVASIVE SPECIES

Overall the site was dominated by a mix of native vegetation and was relatively free from invasive species. However, there were several individual purple loosestrife (*Lythrum salicaria*) plants interspersed throughout Wetlands 2 and 4 adjacent to the West River. There was a single Japanese barberry (*Berberis thunbergii*) bush located in the northwest bridge quadrant in the forested upland area near Wetland 2. In addition, there was a clump of Japanese knotweed (*Fallopia japonica*) located just south of the Study Area in the southwest bridge quadrant. The approximate locations and extents of invasive species populations are shown on **Figure 2**.



VTRANS SOUTH STRUCTURES

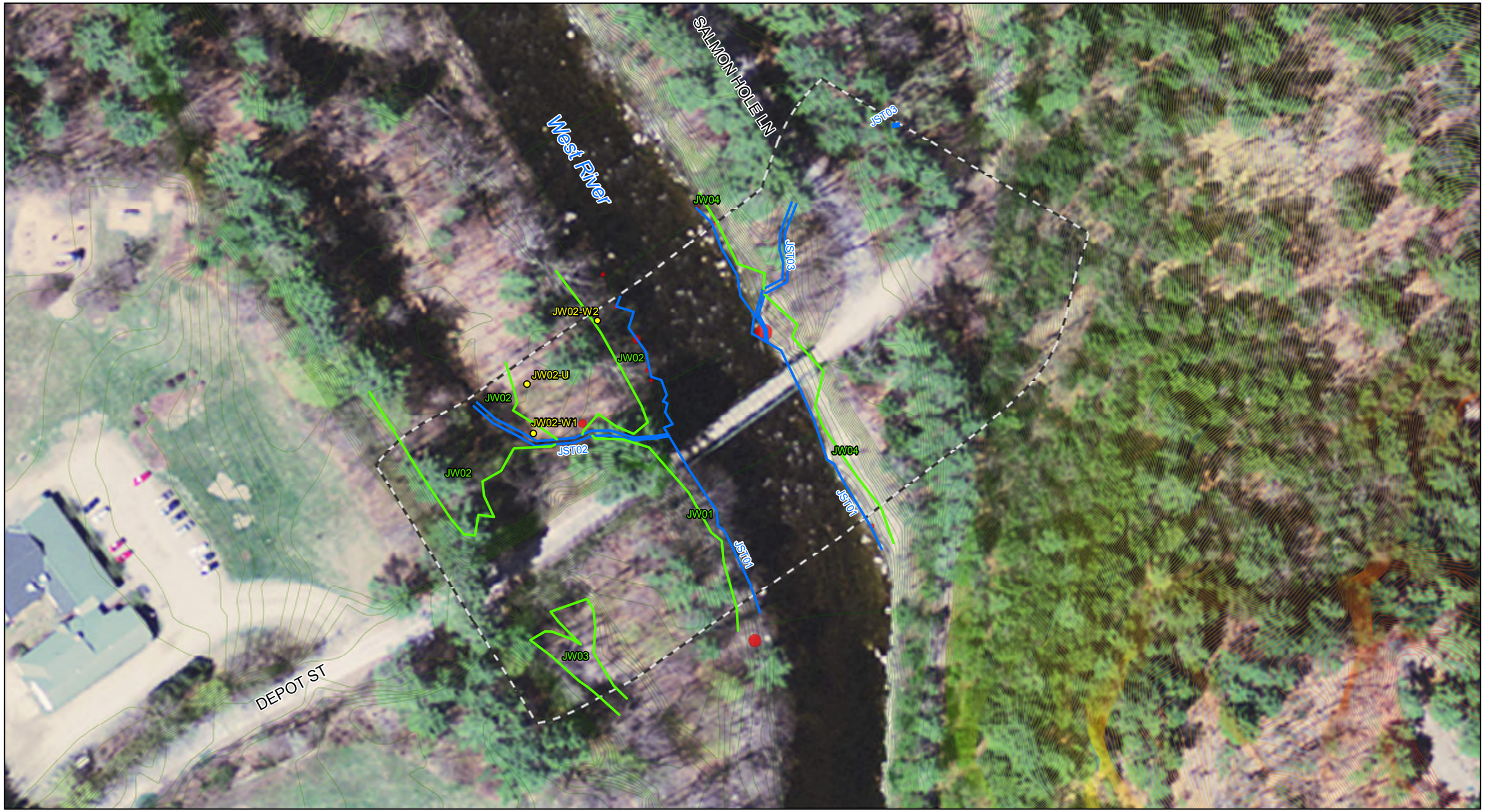
JAMAICA BO 1442 (42): DEPOT STREET (TH-19) – BRIDGE 32

LOCATION MAP

SCALE :	DATE :	FIGURE :
1 in = 2,000 feet	OCTOBER 2019	1

McFarland Johnson

M:\18509.02 VTrans South Structures\Draw\GIS\Figure 1 - 01 Jamaica-Bridge 32.mxd



Study Area
VTrans Bridges Wetland Lines
VTrans Bridges OHW Lines
VTrans Bridges Invasive Species
Wetland Data Points

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

TOWN: JAMAICA, VT
STRUCTURE ID: BRIDGE 32

0 75 150
Feet

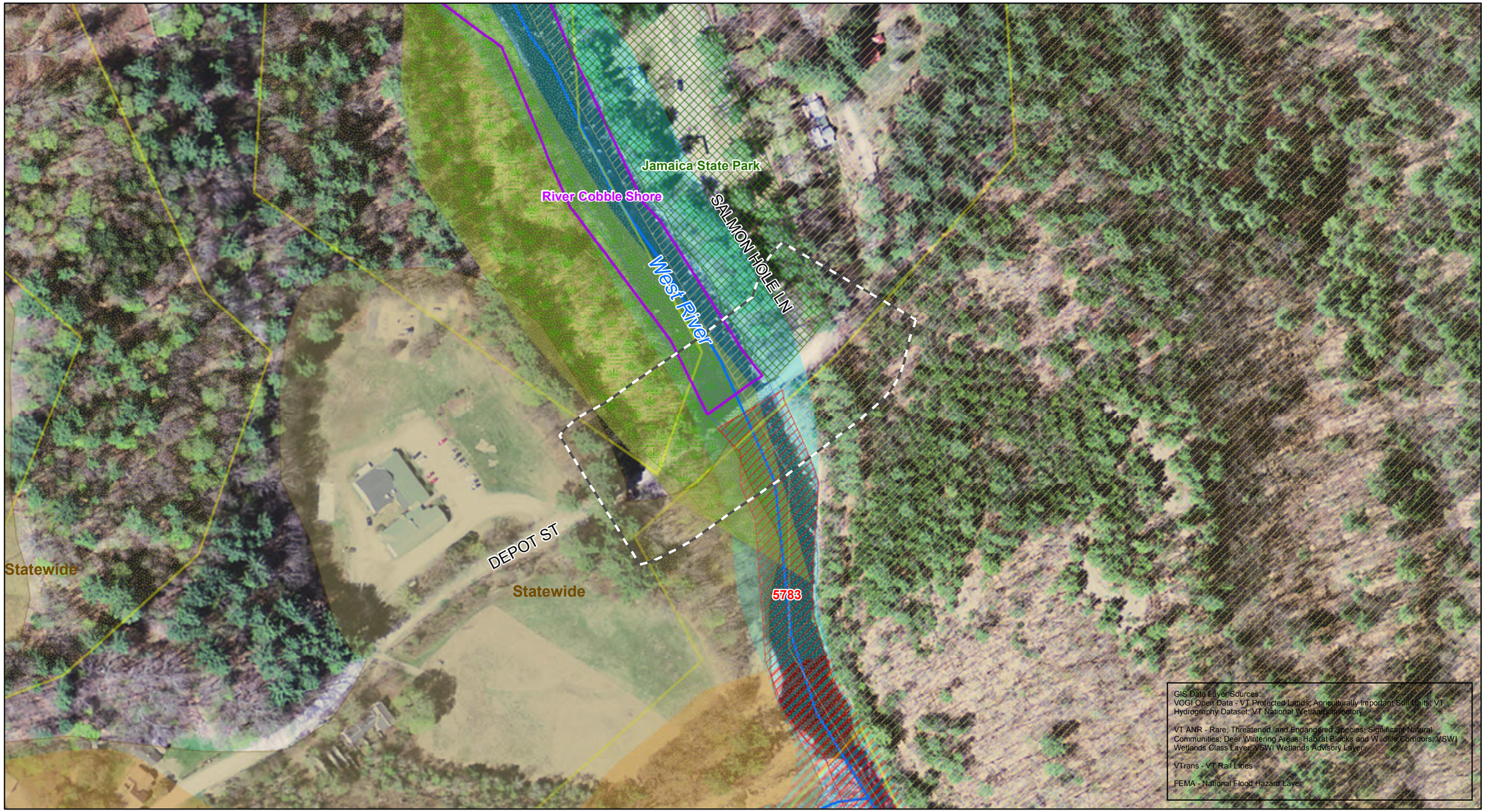
VTRANS SOUTH STRUCTURES
JAMAICA BO 1442 (42): DEPOT STREET (TH-19) – BRIDGE 32

WETLAND & SURFACE WATER DELINEATION

SCALE :	DATE :	FIGURE :
1 inch = 75 feet	OCTOBER 2019	2

McFarland Johnson

M:\18509.02 VTrans South Structures\Draw\GIS\Figure 2 - 01 Jamaica-Bridge 32.mxd



Study Area
Railroads

VT Hydrography Dataset (Lines)
VT Hydrography Dataset (Polygons)

National Wetland Inventory
- Palustrine Emergent
- Palustrine Scrub-Shrub
- Palustrine Forested
- Riverine
- Lacustrine
- Other

VSWI Wetlands Class Layer
- Class 1
- Class 2
- Buffer
- VSWI Wetlands Advisory Layer

Flood Hazard Zones
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard

- Rare, Threatened, and Endangered Species
- Significant Natural Communities
- Deer Wintering Areas
- Habitat Blocks and Wildlife Corridors
- VT Protected Lands Database

Agriculturally Important Soil Units
- Prime
- Prime (b)
- Prime (f)
- Statewide
- Statewide (a)
- Statewide (b)

TOWN: JAMAICA, VT
STRUCTURE ID: BRIDGE 32

0 150 300
Feet

VTRANS SOUTH STRUCTURES

JAMAICA BO 1442 (42): DEPOT STREET (TH-19) – BRIDGE 32

EXISTING NATURAL RESOURCE MAPPING

SCALE :	DATE :	FIGURE :
1 inch = 150 feet	OCTOBER 2019	3

McFarland Johnson

M:\18509.02 VTrans South Structures\Draw\GIS\Figure 3 - 01 Jamaica-Bridge 32.mxd

Photo 1: JST01 – West River Upstream from Bridge 32

Photo 2: JST01 – West River from Bridge 32 Facing Downstream

Photo 3: JST01 – West River Channel Underneath Bridge 32

Photo 4: JST02 Unnamed Intermittent Stream Facing Upstream

Photo 5: JST03 Unnamed Intermittent Stream Facing Downstream

Photo 6: JST03 Unnamed Intermittent Stream Stone Box Culvert Outlet

Photo 7: JW01 PEM Fringe along West River

Photo 8: JW02 PFO Wetland

Photo 9: JW02 PEM Wetland Along Western Bank of the West River

Photo 10: JW03 PFO Wetland

Photo 11: JW04 PEM Wetland Along Eastern Bank of the West River

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: South Structures - Bridge 32 City/County: Jamaica / Windham Sampling Date: 09/19/2019

Applicant/Owner: Vermont Agency of Transportation (VTrans) State: VT Sampling Point: JW02-W1

Investigator(s): SH, AR Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain / Depression Local relief (concave, convex, none): Concave Slope %: 1-2

Subregion (LRR or MLRA): LRR R Lat: 43.1044411° Long: -72.7736589° Datum: NAD83

Soil Map Unit Name: Houghtonville fine sandy loam, 3 to 8 percent slopes, very stony NWI classification: PFO1E

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 ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: Wetland 2 (PFO)

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

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: JW02-W1

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus pennsylvanica*	25	Yes	FACW
2. *Acer rubrum*	25	Yes	FAC
3. *Betula alleghaniensis*	10	No	FAC
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Fraxinus pennsylvanica*	15	Yes	FACW
2. *Acer rubrum*	10	Yes	FAC
3. *Sorbaria sorbifolia*	5	No	UPL
4. *Acer saccharum*	3	No	FACU
5.			
6.			
7.			
	33	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	40	Yes	FACW
2. *Solidago rugosa*	15	Yes	FAC
3. *Thalictrum pubescens*	10	No	FACW
4. *Cinna arundinacea*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70	=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: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (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	95	x 2 =	190
FAC species	60	x 3 =	180
FACU species	3	x 4 =	12
UPL species	5	x 5 =	25
Column Totals:	163 (A)		407 (B)

Prevalence Index = B/A = 2.50

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 JW02-W1

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 3/2	97	7.5YR 3/4	3	C	M	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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)
- X 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 (F22)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if observed):

Type: Bedrock

Depth (inches): 8

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

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: South Structures - Bridge 32 City/County: Jamaica / Windham Sampling Date: 09/19/2019

Applicant/Owner: Vermont Agency of Transportation (VTrans) State: VT Sampling Point: JW02-W2

Investigator(s): SH, AR Section, Township, Range:

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave Slope %: 1-2

Subregion (LRR or MLRA): LRR R Lat: 43.1046892° Long: -72.7734678° Datum: NAD83

Soil Map Unit Name: Houghtonville fine sandy loam, 3 to 8 percent slopes, very stony NWI classification: PEM1E

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 ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: Wetland 2 (PEM)

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 ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

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: JW02-W2

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. *Carex torta*	80	Yes	OBL
2. *Eutrochium maculatum*	15	No	OBL
3. *Calamagrostis canadensis*	10	No	OBL
4. *Symphyotrichum novae-angliae*	5	No	FACW
5. *Onoclea sensibilis*	3	No	FACW
6. *Doellingeria umbellata*	3	No	FACW
7. *Osmundastrum cinnamomeum*	2	No	FACW
8. *Persicaria virginiana*	2	No	FAC
9. *Solidago rugosa*	1	No	FAC
10.			
11.			
12.			
	121 =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	105	x 1 =	105
FACW species	13	x 2 =	26
FAC species	3	x 3 =	9
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	121 (A)		140 (B)

Prevalence Index = B/A = 1.16

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 JW02-W2

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
0-7	10YR 3/1	80	7.5YR 3/4	20	C		Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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)
- X 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 (F22)
- ___ 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 include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Stoney soils, could not get below 7"

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: South Structures - Bridge 32 City/County: Jamaica / Windham Sampling Date: 09/19/2019

Applicant/Owner: Vermont Agency of Transportation (VTrans) State: VT Sampling Point: JW02-U

Investigator(s): SH, AR Section, Township, Range:

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope %: 2-3

Subregion (LRR or MLRA): LRR R Lat: 43.1045495° Long: -72.7736793° Datum: NAD83

Soil Map Unit Name: Houghtonville fine sandy loam, 3 to 8 percent slopes, very stony NWI classification: UPL

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	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	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 ____	Depth (inches): ____
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

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: JW02-U

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharum*	25	Yes	FACU
2. *Betula alleghaniensis*	25	Yes	FAC
3. *Quercus rubra*	20	Yes	FACU
4. *Pinus strobus*	15	No	FACU
5.			
6.			
7.			
	85	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Fagus grandifolia*	15	Yes	FACU
2. *Acer saccharum*	10	Yes	FACU
3. *Betula alleghaniensis*	10	Yes	FAC
4. *Tsuga canadensis*	3	No	FACU
5.			
6.			
7.			
	38	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Cinna arundinacea*	10	Yes	FACW
2. *Onoclea sensibilis*	10	Yes	FACW
3. *Fraxinus pennsylvanica*	7	Yes	FACW
4. *Eurybia divaricata*	7	Yes	UPL
5. *Maianthemum canadense*	5	No	FACU
6. *Toxicodendron radicans*	5	No	FAC
7.			
8.			
9.			
10.			
11.			
12.			
	44	=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: 5 (A)

Total Number of Dominant Species Across All Strata: 10 (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	27	x 2 =	54
FAC species	40	x 3 =	120
FACU species	93	x 4 =	372
UPL species	7	x 5 =	35
Column Totals:	167 (A)		581 (B)

Prevalence Index = B/A = 3.48

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 JW02-U

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
0-5	2.5Y 3/1	100					Loamy/Clayey	
5-9	2.5Y 4/3	100					Loamy/Clayey	Stone at 9"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked 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 (F22)
- ___ 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 include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Stone at 9", could not obtain soil profile past 9".

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To: October 25, 2019
Consultation Code: 05E1NE00-2020-SLI-0252
Event Code: 05E1NE00-2020-E-00735
Project Name: JAMAICA BO 1442 (42): DEPOT STREET (TH-19) – BRIDGE 32

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2020-SLI-0252

Event Code: 05E1NE00-2020-E-00735

Project Name: JAMAICA BO 1442 (42): DEPOT STREET (TH-19) – BRIDGE 32

Project Type: TRANSPORTATION

Project Description: The proposed project involves repairs, rehabilitation, and/or reconstruction of Bridge 32, located in the Town of Jamaica, Windham County, Vermont. Bridge 32 carries Depot Street (TH-19) over the West River. The purpose of this review is to identify Federally-listed species that have the potential to occur in the vicinity of the proposed project area. The exact size, scope, and timing of this project have not been determined at this phase.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/43.104513670719015N72.77304520076783W

Counties: Windham, VT

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Vermont Natural Heritage Inventory
Vermont Fish & Wildlife Department
Element Occurrence Report

River Cobble Shore

EO ID 2507
Global Rank GNR

State Rank S2

ID Confirmed? Y

WEST RIVER-JAMAICA STATE PARK

County
Windham

Town
Jamaica

Topo Quad 4307217
4307227

Latitude (DD) 43.1154

Longitude (DD) -72.7609

Directions
Along West River above bridge from village to state campground, up to Ball Mountain dam. Driest example occurs on west side of river at second major (90 + degrees) bend in river above campground.

General Description
1995: Along high-gradient stretch of West River with boulder and cobble bed. Natural community is lushly vegetated, river cobble shore , which appears as a constricted rivershore meadow, sometimes sparsely vegetated. The river is sandwiched between mountains and has very stable channel which becomes major whitewater river during spring and fall dam releases. Site is downstream from Ball Mountain dam. Area subjected to flooding and ice-scour.

Minimum Elevation (ft) 680 **Maximum Elevation (ft)** 750

Last Survey 1995-10-10 **Last Observation Date** 1995-10-10 **First Observation Date** 1995

EO Data
1995: While the high, dry and sparsely-vegetated cobble bars occur in only a couple restricted locations, this approximately 2 mile stretch of river might be considered "river cobble shore community". It is all part of a high-energy rivershore system dominated by cobble and boulder substrate. Typically, a lush shrub (predominately Salix sericea and S. eriocephala) and tall herb/graminoid zone 5-10m wide, occurs on the outermost and highest sides of the river channel, while a largely shrub-less and more sparsely vegetated zone, ±5m wide, occurs closest and lowest to the river itself (at low water). The lowest portion of the highly-vegetated zone is dominated the tussock forming Carex torta. The sparsely-vegetated low cobble shores are widest on more or less defined point-bar deposits, and much narrow to non-existent along straights. They are less than 3dm above low water. The highly-vegetated zone can go from low water's edge up to 2m above low water, or to the edge of the entire flood channel. Soil in this community goes from pebble-cobble-boulder substrate in the exposed cobble shore; to pebble-cobble-boulder with sand, silt and organics packed between in the mid-zone; to sandy alluvium over cobble in the highest zone. Rare and uncommon plants associated with this rivershore environment include Platanthera flava, Sanguisorba canadensis, Vaccinium cespitosum, and Alnus viridis. The one dry cobble bar I visited was about 100m long x 10m wide (maximum). At approximately 1m above low water, it has a substrate of dry, cobble-small boulder stone with pockets of coarse sand and gravel. Vegetation cover is 30-50%, composed of low shrubs (primarily Prunus pumila var. depressa and Salix sericea) with herbs and grasses, primarily Apocynum, Potentilla simplex, a trailing blackberry (Rubus sp.), and Andropogon gerardii. The Prunus pumila var. depressa is an uncommon species often associated with exposed cobble shores. Other inclusions within this overall cobble shore community include: spring-run, graminoid wetland, and riversideoutcrop.

EO Rank A **EO Rank Date** 2012-12-18

Size	A	Very extensive. Note that the polygon includes open water as well so area covered is less than 37 acres as mapped - but still is over 2.5 miles of river.
Condition	B	Hydrology altered by dam just upstream, otherwise good example.
Landscape Context	A	Very good landscape context in large forest block, but a large dam occurs just upstream and a settlement downstream, and state park infastructure is present in the south.

General Comments
2012: Mapping updated based on aerial photos and EO description.
1995: Area also botanically surveyed by Zika and Jenkins in 1988.

Management Comments
1995 Engstrom: Latest dam release left a considerable layer of silt on shore and in pools. This likely has a deleterious effect on invertebrates and fish. Summer dam releases negatively impact rare plants.

Protection Comments

J. Raymond should be contacted concerning ecological value of rivershore community and rare plants.

Reference Code	Citation
F95ENG02VTUS	Engstrom, Brett. 1995. Field survey of Jamaica State Park on 13 July 1995.
U96ENG01VTUS	Engstrom, B.E. and Thompson, E.H. 1996. West River Watershed Inventory. Unpublished Report by the Vermont Nongame and Natural Heritage Progaram prepared for the U.S. EPA.

Vermont Natural Heritage Inventory
Vermont Fish & Wildlife Department
Element Occurrence Report

Platanthera flava var. herbiola

Tubercled Orchid

Link to NatureServe Explorer

EO ID 556
Global Rank G4?T4Q **Federal Protection Status**

State Rank S2 **State Protection Status** T

ID Confirmed? Y

WEST RIVER-JAMAICA STATE PARK

County
Windham

Town
Jamaica

Topo Quad 4307217 **Latitude (DD)** 43.1115 **Longitude (DD)** -72.7701

Directions
2010: 1st site seems equivalent of "south shore colonies". 2nd site is approx 1 mile upstream, near junction of hiking trail and West River Trail. There is a large outcrop on north shore of river. 2005 [South shore colonies?]: From parking lot by playground go down to the river bank and walk up 1/4 ["-1.2" crossed out] mile sporadic colonies along the way. 1995: Two colonies in this West River area: one on the north side, upstream from major river bend up from state park campground, and the second on the south side, downstream from the "Dumplings" (famous whitewater stretch with huge boulders in river channel). North shore colony 40m NW of huge (7m long, 4m wide, and 3m high) block on south side of stream channel. Largest boulder on this side of channel along this straight stretch of river. Along edge of small wet depression between three boulders (2.5x1.5x1.5m high) on vegetated edge of river channel. South shore colony 50-75m SW of North shore colony, on W. side of roundish 2+m diam., 1+m high gneiss/schistose boulder with very convolusted grain on edge of river channel. 280 degrees true and 25-30m from very strongly bowed hemlock leaning over river channel.

General Description
1995 or 1996: Along high-gradient stretch of West River with boulder and cobble bed. Natural community is lushly vegetated, river cobble shore, which appears as a constricted rivershore meadow, sometimes sparsely vegetated. The river is sandwiched between mountains and has a very stable channel which becomes a major whitewater river during spring and fall dam releases. Site is roughly two miles downstream from Ball Mountain dam. Area subjected to flooding and ice-scour. Growing in full sun, in dense, tall graminoid-herb-fern rivershore meadow , ca. 5-10 m wide. Soil equals saturated sand and organics among boulders. At time of survey, when river was very low, E.O.'s ca. 8-10dm above river water level.

Minimum Elevation (ft) 690 **Maximum Elevation (ft)** 690

Last Survey 2010-07-13 **Last Observation Date** 2010-07-13 **First Observation Date** 1995-07-13

EO Data
2010: Found at two points along SE shoreline, 1st site [same as "south shore colonies"?] 2 flowering stems in 0.3 sq m. 2nd site (approx 1 mile upstream) 7 flowering stems in 1 sq meter. 2005 [South shore colonies only?]: Approximately 25 genets on 9 July. Plants were in flower. Sporadic healthy communities tucked away up along river, most often in thick vegetation. 2004: No plants located on north or south side of river, despite two trips to the site by two volunteers. 1995 North shore colony: 16 flowering stems and 14 vegetative plants in 10 square meter area. 1995 South shore colony: 3 flowering stalks and 6 vegetative plants in 1 sq. m.

EO Rank CD **EO Rank Date** 1995-01-01

General Comments
2005: Rembisz noted that sporadic colonies up the stream are growing well in thick and open areas. 1995: Associate spp. are Iris versicolor, Aster umbellatus, Onoclea, Osmunda reginae, Salix spp., Carex stricta, C. torta, Calamagrostis canadensis, Hydrocotyle americana, Apios americana, Eupatorium maculatum. 2004: Cooper et al. noted a platform located below 'dumplings' built since last survey-heavy use area may have influenced population. 1910: Platanthera flava, collected from somewhere in Jamaica in 1910 (sourcecode S10WHEBCVTUS). J. Jenkins in The Outstanding Rivers and Streams of Vermont, part 2 (ANR 1988 report) has the species somewhere below the Jamaica bridge, presumably in the town of Jamaica....South side colony on state land.

Management Comments
Because plants are below high water mark, not likely to be disturbed by any development. Not in areas with heavy foot traffic (too bouldery). Likely influenced by releases of Ball Mtn. Dam just upstream.

Managed Area	EO Contained?
JAMAICA STATE PARK	Y

Reference Code	Citation
F95ENG02VTUS	Engstrom, Brett. 1995. Field survey of Jamaica State Park on 13 July 1995.
U96ENG01VTUS	Engstrom, B.E. and Thompson, E.H. 1996. West River Watershed Inventory. Unpublished Report by the Vermont Nongame and Natural Heritage Progaram prepared for the U.S. EPA.
U05REM02VTUS	Rembisz, R. 2005. PCV rare plant form for Platanthera flava at Jamaica State Park in Jamaica Vermont, on 9 July 2005. Vermont Nongame and Natural Heritage Program.
U04COO03VTUS	Cooper, E. and M. Whittlesey. 2004. PCV rare plant form for Platanthera flava at Jamaica State Park in Jamaica Vermont, on two unspecified days in 2004. Vermont Nongame and Natural Heritage Program.
PNDZAI01VTUS	Zaino, R. State Lands Ecologist. Vermont Natural Heritage Information Project (formerly the Vermont Nongame and Natural Heritage Program).

Specimens

Engstrom, F.B. () 1995.

Vermont Natural Heritage Inventory
Vermont Fish & Wildlife Department
Element Occurrence Report

Sanguisorba canadensis

Canada Burnet

Link to NatureServe Explorer

EO ID 2065
Global Rank G5 **Federal Protection Status**

State Rank S2 **State Protection Status**

ID Confirmed? Y

WEST RIVER-JAMAICA STATE PARK

County
Windham

Town
Jamaica

Topo Quad 4307217 **Latitude (DD)** 43.1115 **Longitude (DD)** -72.7701

Directions
Both shores of West River from Jamaica State Park campground up to at least major riverbend east southeast of Ball Mtn.

General Description
Along high-gradient stretch of West River with boulder and cobble bed. Natural community is lushly vegetated, river cobble shore which appears as a constricted rivershore meadow, sometimes sparsely vegetated. The river is sandwiched between mountains and has a very stable channel which becomes a major whitewater river during spring and fall dam releases. Site is roughly two miles downstream from Ball Mountain dam. Area subjected to flooding and ice-scour.

Minimum Elevation (ft) 680 **Maximum Elevation (ft)** 720

Last Survey 2010-07-13 **Last Observation Date** 2010-07-13 **First Observation Date** 1995

EO Data
2010: Found in abundance at multiple locations along shoreline in Jamaica SP. 1995: Found occasionally to commonly in the lush tall herb/graminoid zone of river shore. On the east shore of the river, north of the day-use parking lot, counted 25 vigorous plants along a 50-75m stretch.

EO Rank A **EO Rank Date** 1996-01-08

General Comments
Curiously not collected from Jamaica prior to this summer. Not reported from this stretch of river in either of Jenkin's river reports (1988 & 1989)

Management Comments
1995 Engstrom: Because plants are below high water mark, not likely to be disturbed by any development. Not in areas with heavy foot traffic (too bouldery). Likely influenced by releases of Ball Mountain Dam just upstream.

Reference Code	Citation
F95ENG02VTUS	Engstrom, Brett. 1995. Field survey of Jamaica State Park on 13 July 1995.
U96ENG01VTUS	Engstrom, B.E. and Thompson, E.H. 1996. West River Watershed Inventory. Unpublished Report by the Vermont Nongame and Natural Heritage Progaram prepared for the U.S. EPA.
PNDZAI01VTUS	Zaino, R. State Lands Ecologist. Vermont Natural Heritage Information Project (formerly the Vermont Nongame and Natural Heritage Program).

Specimens
Engstrom, F.B. () 1995.

Vermont Natural Heritage Inventory
Vermont Fish & Wildlife Department
Element Occurrence Report

Alasmidonta varicosa

Brook Floater

Link to NatureServe Explorer

EO ID 191
Global Rank G3 **Federal Protection Status**

State Rank S1 **State Protection Status** T, RE

ID Confirmed? Y

WEST RIVER-ROUTES 100 AND 30
WEST RIVER-ABOVE TOWNSHEND DAM

County
Windham

Town
Jamaica
Townshend

Topo Quad 4307216
4307217

Latitude (DD) 43.0724 **Longitude (DD)** -72.7302

Directions
WEST RIVER. ROUTES 100 AND 30: JUST S OF JCT. VT RTES. 100 AND 30 AT VT RTE. 100 OVERPASS IN EAST JAMAICA, 4.5 KM SE OF JAMAICA. In 2011, 15 stretches, totalling 1495 feet, between Ball Mountain Dam and Townshend Dam were surveyed. The species was found at the following sites: Site 8: 100-meter stretch, approximately 1 river mile downstream of Depot Street bridge (Jamaica State Park Bridge, where Ball Mountain Brook enters West River) and 2 miles upstream of Routes 100 and 30 Bridge. Site 10: 150-meter stretch just below Route 30 bridge at Gilfeather Lane. Site 11: 150-meter stretch about 1/3 mile above Route 100 and 30 Bridge, ending roughly even with the intersection of River Road and Halls Farm Lane to the south.

General Description
Routes 100 and 30 Bridge: Medium sized river with cobble, gravel, sand substrate. 2004, Routes 100 and 30 Bridge: Most of the area surveyed was consolidated coarse sand/gravel/cobble/bounder. This species was found along the slope of the river where the current was slow.

Minimum Elevation (ft) 550 **Maximum Elevation (ft)**

Last Survey 2011 **Last Observation Date** 2011 **First Observation Date** 1979

EO Data
2011: Site 8 (about 1 mile below Jamaica State Park/Depot Street bridge): Two found in 100-meter stretch on 19 July. Site 10 (Below Route 30 bridge at Gilfeather Lane): Three found in 150-meter stretch on 19 July. Site 11: Three found in 150-meter stretch just above Route 100 and 30 Bridge on 26 May. 2004: Routes 100 and 30 Bridge: Six brook floaters were found in 4.5 person-hour search of 250-300 feet of river. Five of the six were found in the lower end of the survey area, ~200 feet below the bridge. One of the mussels was in the bridge replacement project area and was moved to ~150 feet upstream of the bridge site. 1994: Routes 100 and 30 Bridge: 10 live mussels observed in an area of approx. 3000 ft in 34 observer-minutes. 1993: Routes 100 and 30 Bridge: No brook floaters observed. 1992: Routes 100 and 30 Bridge: 17 live mussels in an off-channel section of run. 1979: Routes 100 and 30 Bridge: ONE SPECIMEN COLLECTED.

EO Rank C **EO Rank Date** 1995-02-22

General Comments
2004, Routes 100 and 30 Bridge: The bridge is planned to be replaced. Mussels found in the 25 feet around the direct area of impact were relocated to similar habitat approximately 150 feet upstream of the bridge site. The bridge replacement project does not seem to pose a direct threat to mussels located downstream. Most of the brook floaters found in the downstream site were on the south side of the river, the opposite side from the bank disturbance. 1993, Routes 100 and 30 Bridge: Two accidental water releases from Ball Mountain Dam in spring 1993 dumped large quantities of silt between the two dams. Silt covered this entire bed; silt 3 in. deep in places. Seven Margaritifera also observed.

Management Comments
Preventative measures by the Army Corps of Engineers are needed to avoid future degradation of habitats of mussels and other aquatic species between Ball Mountain and Townshend Dams.

Reference Code	Citation
U92FIC02VTUS	Fichtel. Christopher. 1992. Status of the Brook Floater in Vermont; 1992 Performance Report. Prepared for the USFWS Reg. 5 Office.
U94FIC04VTUS	Fichtel, Christopher. 1994. Status of the Brook Floater in Vermont; 1994 Performance Report. Prepared for the USFWS Reg. 5 Office.
U93FIC01VTUS	Fichtel. Christopher. 1993. Status of the Brook Floater in Vermont; 1993 Performance Report. Prepared for the USFWS Reg. 5 Office.
A82SMI01VTUS	SMITH, D.G. 1982. THE ZOOGEOGRAPHY OF THE FRESHWATER MUSSELS OF THE TACONIC AND SOUTHERN GREEN MOUNTAIN REGION OF NORTH- EASTERN NORTH AMERICA. (MOLLUSCA:PELECYPODA:UNIONACEA). CANADIAN JOURNAL OF ZOOLOGY. 60(2):261-267.
U04OBR01VTUS	O'Brien, C. 2004. Survey and relocation of the Brook Floater and Eastern Pearlshell at the Vt. Rte 100 bridge replacement project in E. Jamaica, Vermont. A report for McFarland-Johnson, Inc.
F94FIC13VTUS	Fichtel, C. 1994. Field survey of Alasmidonta varicosa in the West River of 06 June 1994.
U14BIO01VTUS	Biodrawversity LLC. 2014. Brook Floater (Alasmidonta varicosa) in the West River in Vermont. A report prepared for Vermont Fish and Wildlife, Wildlife Diversity Program, Montpelier, Vermont. December 2014. 21pp.

Vermont Natural Heritage Inventory
Vermont Fish & Wildlife Department
Element Occurrence Report

Cicindela ancocisconensis

Boulder-beach Tiger Beetle

Link to NatureServe Explorer

EO ID 3909
Global Rank G3 **Federal Protection Status**

State Rank S1 **State Protection Status**

WEST RIVER-SALMON HOLE

County Windham
Town Jamaica

Topo Quad 4307217 **Latitude (DD)** 43.1084 **Longitude (DD)** -72.7751

Directions
FROM RTE 30 (IN JAMAICA) FOLLOW RD TO JAMAICA STATE PARK ENTRANCE. CONT. TO SALMON HOLE PARKING LOT. SITE IS ADJACENT TO WEST RIVER IMMEDIATELY BELOW THE PARKING LOT.

General Description
1996: The Salmon Hole area has short, narrow sand beach patches that lead to the cobble substrate of the riverbed. The fine substrate in this area is probably supplied by the steep soil slope located farther up the bank, which is naturally eroding over time. 1986: FLOOD STAGE ALLUVIAL BEACH, DOTTED W/NUMEROUS BOULDERS.

Minimum Elevation (ft) 700 **Maximum Elevation (ft)**

Last Survey 1996-09-24 **Last Observation Date** 1986-06-04 **First Observation Date** 1970

EO Data
1996: Surveys were conducted at the site on 28 July and 24 September. None were observed. 1986: 2 MALES AND 1 FEMALE OBSERVED. DIFFICULT TO SPOT. TEND TO BE FOUND HUNTING IN SMALL OPEN SAND PATCHES AMONGST VEGETATION ALONG UPPER MARGIN OF BEACH. SLOW FLYING AND DISTINCTLY CHOCOLATE COLORED.

EO Rank D **EO Rank Date** 1995-02-22

General Comments
NATURALLY OCCURRING SAND BEACHES ARE UNCOMMON, OPTIMUM CONDITIONS ARE IMPORTANT FOR LOCATING DURING JUNE & JULY.

Management Comments
1996: The small size of the sand beach at Salmon Hole makes it particularly vulnerable to disturbance by foot traffic, flooding, and sediment releases, as occurred in 1993. Mechanisms to prevent future sediment releases should be employed by the Army Corps of Engineers. Park trails should not lead to the beach area, as the beach use may interrupt breeding and destroy larvae of the boulder-beach tiger beetle.

Managed Area JAMAICA STATE PARK
EO Contained? ?

Reference Code	Citation
F86NOT02VTUS	Field Survey (temporary placeholder citation)
U96FER02VTUS	Ferguson, Mark. 1996. Field Inventory of West River in 1996. Nongame and Natural Heritage Program.
U96ENG01VTUS	Engstrom, B.E. and Thompson, E.H. 1996. West River Watershed Inventory. Unpublished Report by the Vermont Nongame and Natural Heritage Progaram prepared for the U.S. EPA.
F86NOT01VTUS	NOTHNAGLE, P. AND M. DESMEUSLES. 1986. FIELD SURVEY TO SALMON HOLE OF JUNE 4.

Vermont Natural Heritage Inventory
Vermont Fish & Wildlife Department
Element Occurrence Report

Margaritifera margaritifera

Eastern Pearlshell

Link to NatureServe Explorer

EO ID 5783
Global Rank G4 **Federal Protection Status**
State Rank S2 **State Protection Status** T
ID Confirmed? Y

WEST RIVER-ROUTES 100 AND 30
WEST RIVER-JAMAICA STATE PARK
WEST RIVER-ABOVE TOWNSHEND DAM

County
Windham

Town
Jamaica

Topo Quad 4307216
4307217

Latitude (DD) 43.0919 **Longitude (DD)** -72.7658

Directions
WEST RIVER. ROUTES 100 AND 30: 4.5 KM SE JAMAICA; VT 100 OVERPASS, JUST S OF JCT VTS. 100 AND 30. ABOVE AND BELOW BRIDGE. 2004: Surveyed from 50 feet above bridge replacement project area to 200 feet below. JAMAICA STATE PARK BRIDGE: At least 300 feet downstream of bridge has been surveyed. In 2011, 15 stretches, totalling 1495 feet, between Ball Mountain Dam and Townshend Dam were surveyed. The species was found at the following sites: Site 1: 70-meter stretch downstream of big bend around Ball Mountain, at north end of Jamaica State Park. Site 2: 50-meter stretch south of Ball Mountain, northwest border of Jamaica State Park, below particularly rocky stretch. Site 4: 100-meter stretch at north end of Salmon Hold Lane. Site 5: 125-meter stretch below Jamaica State Park Bridge (Depot Street). Site 6: 100-meter stretch of main (east) channel, starting 1/4 mile below Ball Mountain Brook. Site 8: 100-meter stretch starting 6/10 mile below end of Site 6. Site 9: 100-meter stretch about 1/3 mile above Route 30 bridge at Gilfeather Lane. Site 10: 150-meter stretch just below Route 30 bridge at Gilfeather Lane. Site 11: 150-meter stretch about 1/3 mile above Route 100 and 30 Bridge, ending roughly even with the intersection of River Road and Halls Farm Lane to the south.

General Description
Routes 100 and 30: Weak current reach of stream slightly away from the main current; firm to loose sand, gravel, and cobble substrate. 2004: Most of the area surveyed was consolidated coarse sand/gravel/cobble/bounder. This species was found along the slope and middle of the river. 1996: Most were found in a calm, shallow pool below a set of riffles, in patches of clean sand (no silt) surrounded by cobbles and boulders. A few in other areas of river, sometimes wedged between large stones; but almost always in clean substrate, with stones embedded in sand and gravel. Most of the substrate in areas with slow to moderate current were covered with algae and at least a thin layer of silt. Areas with clean, unsilted bottoms were uncommon. Jamaica State Park: The stream below the bridge is characterized by swift riffles and runs, and slower glides. Shallow water (<0.5m) is most common near the shores. The streambed is dominated by large cobble and boulder.

Minimum Elevation (ft) 550 **Maximum Elevation (ft)**

Last Survey 2011 **Last Observation Date** 2011 **First Observation Date** 1979

EO Data
2011: Site 1: Five found in 70-meter stretch on 26 May. Site 2: 13 found in 50-meter stretch on 26 May. Site 4: Two found in 100-meter stretch on 26 May. Jamaica State Park Bridge (Site 5): 8 found in 125-meter stretch on 26 May. Site 6: One found in 100-meter stretch on 19 July. Site 8: Found 9 in 100-meter stretch on 19 July. Site 9: Found 2 in 100-meter stretch on 19 July. Site 10 (Below Route 30 bridge at Gilfeather Lane): Found 15 in 150-meter stretch on 19 July. Site 11: Found 2 in 150-meter stretch on 26 May. 2004: Routes 100 and 30: Sixteen were found in 4.5 person-hour search of 250-300 feet of river. Thirteen of the 16 were found in the lower end of the survey area and were not relocated; 3 were in the bridge replacement project area and were moved to ~150 feet upstream of the bridge site. 1996: Routes 100 and 30: 27 individuals were found in a 3 man-hour search. Almost all were upstream of bridge, with a few elsewhere. Jamaica State Park: One shell was found. No live mussels were located 0.75 hour search of 300 meters of river. 1993: Routes 100 and 30: 7 live Margaritifera (river bottom completely covered by silt; in places silt is 2-3" deep). 1992: Routes 100 and 30: 1 live. 1979: Routes 100 and 30: ONE SPECIMEN COLLECTED.

EO Rank E **EO Rank Date** 2011-07-19

General Comments
2004: Routes 100 and 30: The bridge is planned to be replaced. Mussels found in the 25 feet around the direct area of impact were relocated

to similar habitat approximately 150 feet upstream of the bridge site. The bridge replacement project does not seem to pose a direct threat to mussels located downstream. 1993: Routes 100 and 30: There were two accidental and massive silt releases from Ball Mt. Dam upstream from this site.

Management Comments

Efforts to prevent habitat degredation (e.g. siltation) would benefit this species. 1996: Routes 100 and 30: This area was inundated by several inches of silt after two accidental sediment discharges from Ball Mountain Dam in 1993. This silt has apparently been swept from the area since then, as no thick silt layer was observed during the 1996 inventory.

Reference Code	Citation
PNDFIC01VTUS	Fichtel. Christopher C. Vermont Nongame and Natural Heritage Program.
A82SMI01VTUS	SMITH, D.G. 1982. THE ZOOGEOGRAPHY OF THE FRESHWATER MUSSELS OF THE TACONIC AND SOUTHERN GREEN MOUNTAIN REGION OF NORTH- EASTERN NORTH AMERICA. (MOLLUSCA:PELECYPODA:UNIONACEA). CANADIAN JOURNAL OF ZOOLOGY. 60(2):261-267.
U96FER02VTUS	Ferguson, Mark. 1996. Field Inventory of West River in 1996. Nongame and Natural Heritage Program.
U96ENG01VTUS	Engstrom, B.E. and Thompson, E.H. 1996. West River Watershed Inventory. Unpublished Report by the Vermont Nongame and Natural Heritage Progaram prepared for the U.S. EPA.
F93FIC11VTUS	Fichtel, C. 1993. Field survey of the West River on 18 July 1993.
S79SMIMAVTUS	Specimen (temporary placeholder citation)
U04OBR01VTUS	O'Brien, C. 2004. Survey and relocation of the Brook Floater and Eastern Pearlshell at the Vt. Rte 100 bridge replacement project in E. Jamaica, Vermont. A report for McFarland-Johnson, Inc.
U14BIO01VTUS	Biodrawversity LLC. 2014. Brook Floater (Alasmidonta varicosa) in the West River in Vermont. A report prepared for Vermont Fish and Wildlife, Wildlife Diversity Program, Montpelier, Vermont. December 2014. 21pp.

Strophitus undulatus

Creeper

Link to Species Report in NatureServe Explorer

Global Rank	G5	**Federal Protection Status**	
State Rank	S3	**State Protection Status**	
Track EOs?	W		

County	**Town**
WINDHAM	JAMAICA

Source Feature Descriptor West River-Jamaica 2014 report, Site 8

Observations (this source feature only)

Observer	**Date**	**Observation Data**
Jeffrey Cole and assistant	2011-07-19	Two found in 100-meter stretch during semi-quantitative survey.

Source Feature ID: 26493 **EO ID:** **Parent EO#:** **Sub EO#(s):**

APPENDIX H

Archaeology Memo

VERMONT

Brennan Gauthier
VTrans Senior Archaeologist
Vermont Agency of Transportation
Project Delivery Bureau
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-279-1460
Brennan.Gauthier@Vermont.gov

To: Lee Goldstein, VTrans Environmental Specialist
From: Brennan Gauthier, VTrans Senior Archaeologist
Date: 9/3/2019
Subject: Jamaica BO 1442(42) Archaeological Resource Identification

Julie Ann,

I have completed my background research and field investigation of the currently unscoped bridge rehabilitation/replacement project located on Town Highway 19 (TH19) in the town of Jamaica, Windham County, Vermont. Bridge 32 is a 165' long steel Pratt truss that carries TH19 over the West River in order to allow access to several homes and Jamaica State Park. Built in 1926 by the Berlin Construction Company, this bridge is a classic example of 1920s bridge engineering with a unique use of riveted truss members vs. rolled I-beams.

The West River in this particular area is a well-known Native American travel corridor and fishing area and all four quadrants that reside outside of the bridge footprint area considered archaeologically sensitive and will require Phase I testing if any project-related construction activities are planned to occur. Please see ***Figure 4*** for a map showing sensitive areas. Of note, VT-WD-0002, a large multi-component Native American archaeological site is located slightly north of the bridge location. This area is also posited to be the likely location of a massacre during the 1748 King George's War.

As always, please feel free to reach out with any questions or concerns that may arise as part of this process. The archaeologically sensitivity lines have been added to the archaeology geodatabase for inclusion in future plan sets.

Sincerely,

Brennan

VTrans Working to Get You There
Vermont Agency of Transportation

Images and Illustrations

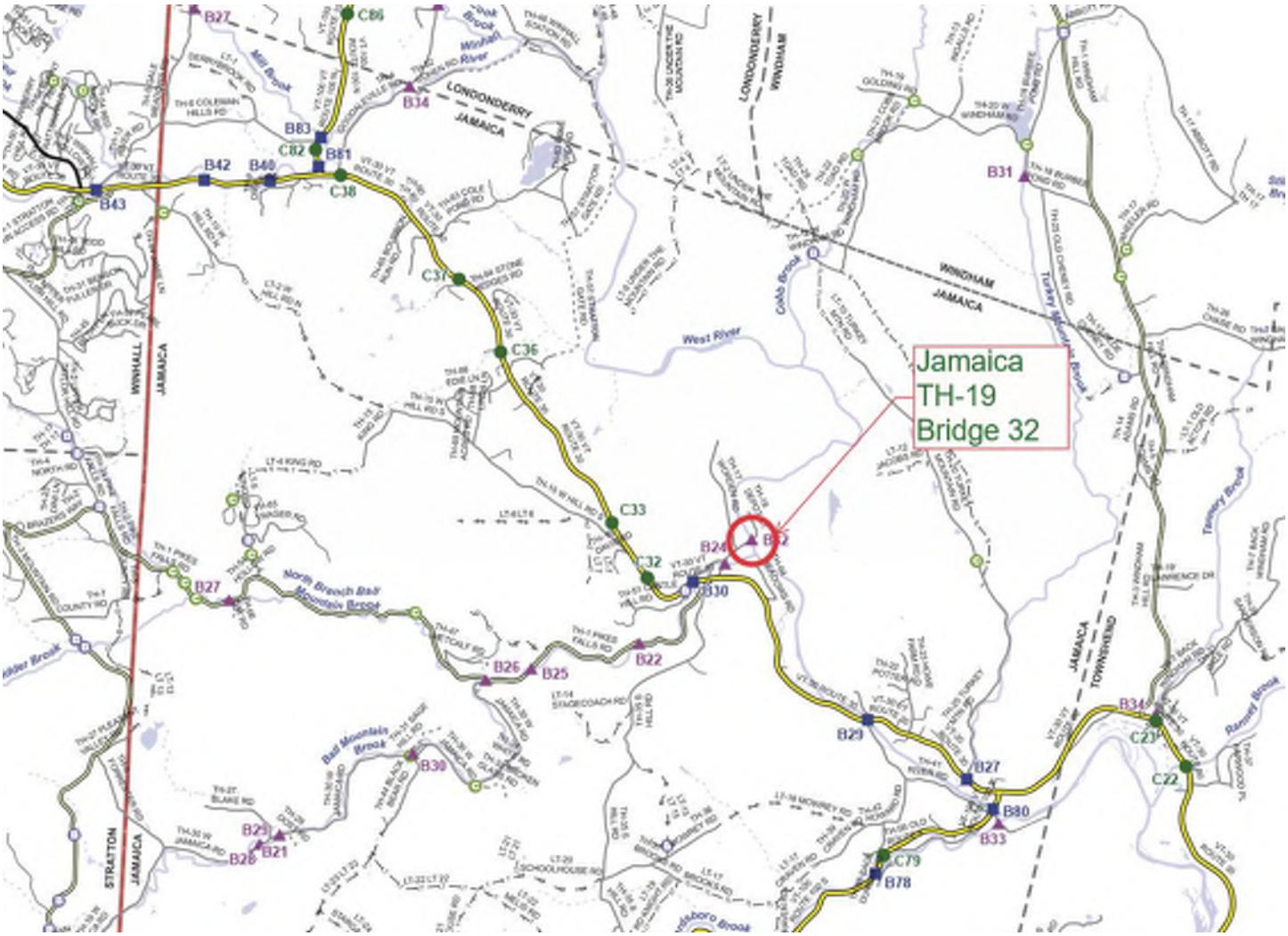

Figure 1: Bridge 32 Location.

Figure 2: Bridge 32 Location ca. 2016.

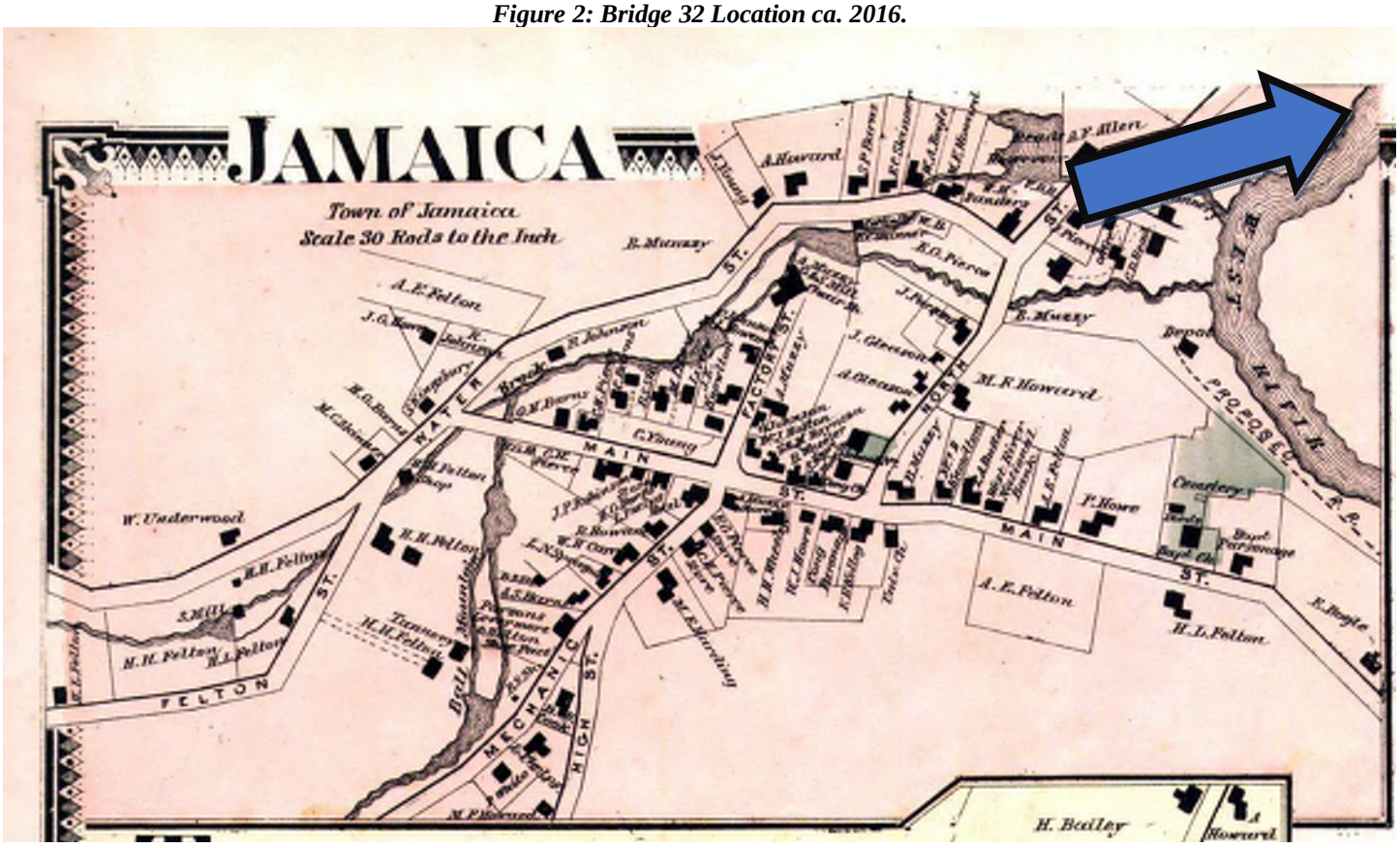

Figure 3: Bridge Location ca. 1870.

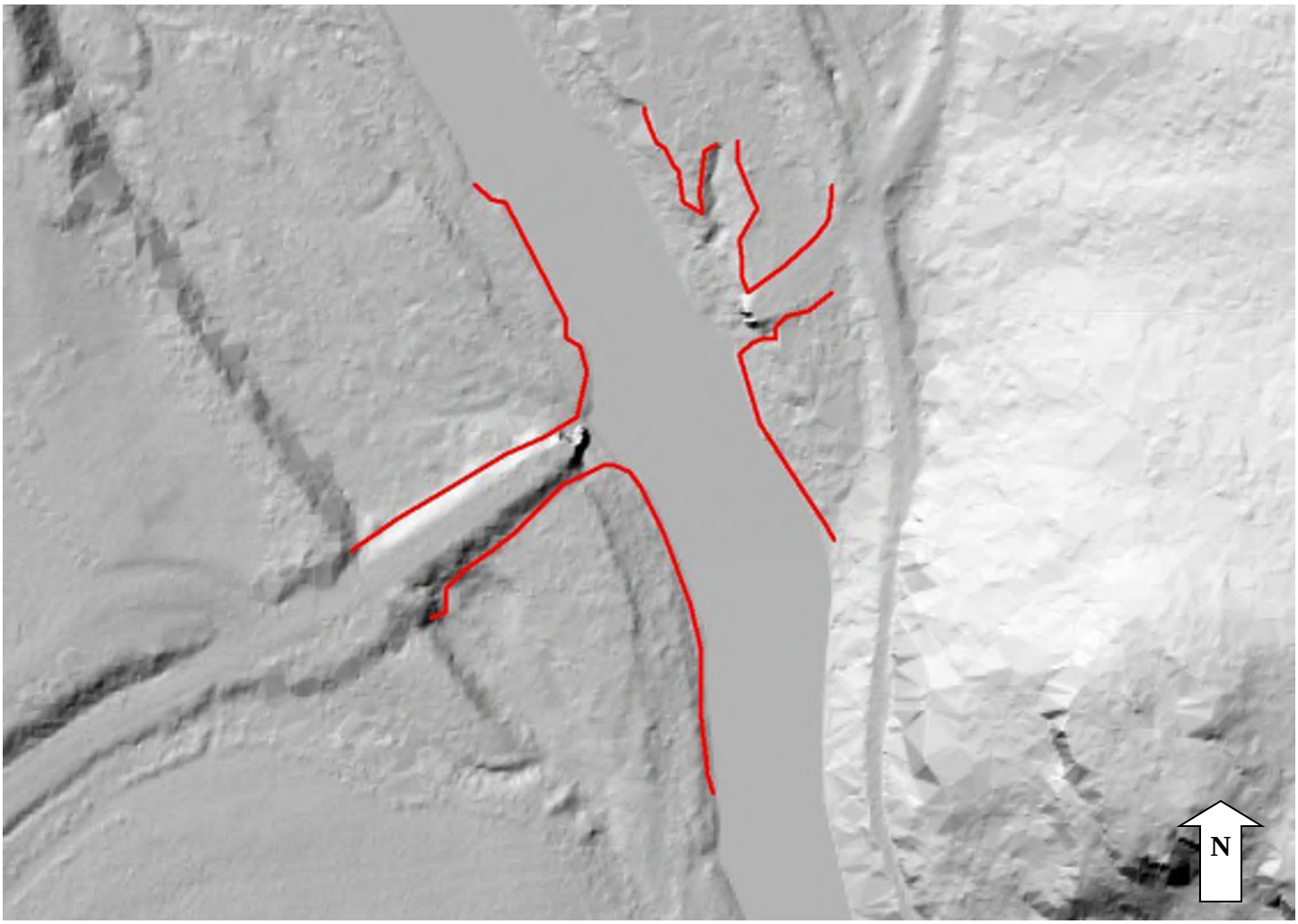

Figure 4: Archaeological Sensitivity w/ LiDAR Overlay.

Figure 5: Bridge Approach View East.

Figure 6: Bridge View West.

APPENDIX I

Historic Memo

Kyle Obenauer
Historic Preservation Specialist

Vermont Agency of Transportation

Project Delivery Bureau - Environmental Section
One National Life Drive
Montpelier, VT 05633-5001

kyle.obenauer@vermont.gov
(802) 279-7040
www.vtrans.vermont.gov

Historic Preservation Resource Identification Memo

To: Lee Goldstein, VTrans Environmental Specialist
Cc: Brennan Gauthier, VTrans Archaeologist

Date: 10/1/2019

Subject: Jamaica BO 1442(42)

Lee,

This Resource Identification effort is being undertaken to identify cultural resources within a broad preliminary survey area that could possibly be impacted by a future project at Bridge No. 32, which carries Depot Street (TH 19) over the West River in Jamaica, Windham County, Vermont (F*igures 1-2)*. Once a project has been defined at the conceptual design phase, VTrans Cultural Resources staff will be able to determine a formal APE for purposes of Section 106 and 22 VSA § 14.

Constructed in 1926, Bridge No. 32 is a riveted Pratt Truss with a single 165 ft. (approximately) span fabricated by the Berlin Construction Company, with Kittredge Bridge Company as the contractor *(Figures 3-5)*. An increasingly rare pre-1927 truss, Bridge No. 32 retains a high degree of historic integrity. As a precursor to largely standardized Pratt Trusses deployed in statewide post-1927 recovery efforts, Bridge No. 32 uses built up members rather than the later, more common rolled I-beams. Another refinement principally absent from post-1927 Pratt Trusses is the graduation in size of the diagonals to reflect stresses toward the ends of the bridge.

Bridge No. 32 meets the registration requirements for inclusion in the National Register of Historic Places (NRHP) defined in the NRHP-listed *Metal Truss, Masonry, and Concrete Bridges in Vermont: 1820-1940*, Multiple Property Documentation Form (as amended, 2018) individually under Criterion C [type 310], as a rare survivor of a once common type.

Furthermore, Bridge No. 32 has been previously-documented as part of the 1998 VTrans Historic Bridge Programmatic Agreement's corresponding Historic Metal Truss Preservation Plan (VHBPA) within Category A, a class of significant historic bridges in Vermont whose rehabilitation for limited highway use was determined to be

both feasible and prudent.[1] A different use for this bridge would require a project-specific Memorandum of Agreement (MOA), in addition to review under Section 106, Section 4(f), and/or any other applicable laws. Preservation through rehabilitation should be a primary alternative consideration.

Section 4(f) Properties

The Jamaica State Park and Green Mountain National Forest stand on both sides of Bridge No. 32 *(Figure 6)*. If a future project at Bridge No. 32 requires temporary or permanent impacts to either of these publicly owned areas, Section 4(f) review will be required.

Please, let me know if there are any questions.

Images

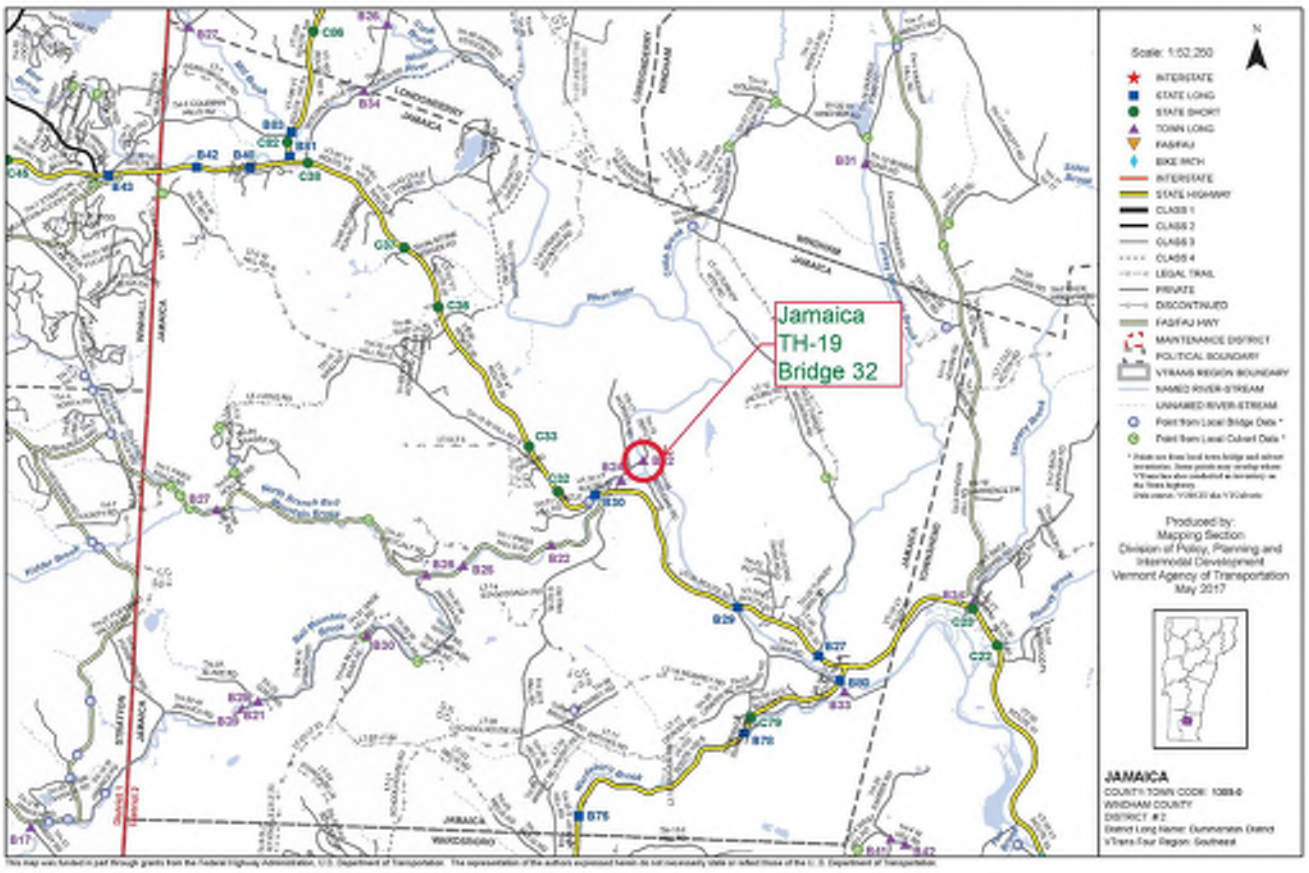

Figure 1. Bridge No. 32 Location

[1] Known as the Vermont Historic Bridge Programmatic Agreement (VHBPA): July 7, 1998; PROGRAMMATIC AGREEMENT AMONG THE FEDERAL HIGHWAY ADMINISTRATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, THE VERMONT AGENCY OF TRANSPORTATION, THE VERMONT STATE HISTORIC PRESERVATION OFFICER, THE VERMONT AGENCY OF NATURAL RESOURCES, AND THE VERMONT AGENCY OF COMMERCE AND COMMUNITY DEVELOPMENT REGARDING IMPLEMENTATION OF A PROGRAM FOR PROJECTS INVOLVING HISTORIC BRIDGES.

Figure 2. Preliminary Survey Area

Figure 3. Bridge No. 32

Figure 4. Bridge No. 32

Figure 5. Bridge No. 32, looking towards Jamaica State Park.

Figure 6. Section 4(f) properties near Bridge No. 32 at Jamaica State Park and Green Mountain National Forest.

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16 April 2021

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Sean T. James, PE
Senior Vice President
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125 College Street, 4th floor, Burlington, VT 05401
p. 603-460-5175
e. sjames@hoyletanner.com

Subject: 904229.02 VTrans Depot Street Bridge - Jamaica Bridge Research

Greetings Sean,

Per our contract I have undertaken research to attempt to locate original drawings for the construction of the Jamaica bridge, and additionally, any information that may be available regarding its construction history, modifications, etc.

With respect to the search for original drawings, I was unsuccessful. I attempted contact with the town Commissioner on a few occasions, but did not get a response. I called the Berlin Construction Company, descendant corporation of the original fabricators, on several occasions. I was able to speak with a person only this week, and was told that they did not retain fabrication documents for old projects in their archives. And so it appears that drawings for the bridge may not be able to be located.

With respect to the history of the structure and the site, I was able to find a small amount of information.

A 160-foot long wood covered bridge formerly spanned the river at this location. It was constructed for the West River Railroad, which was chartered in 1867 (Biennial Report 1880:6). The bridge, which appears to have been a Town Patent lattice truss bridge, was completed in late 1870 and "the road leading to it [and] the expenses of it are about two thousand five hundred dollars" (Vermont Chronicle 1870). That bridge was "blown down by a hurricane" (other reports say it was "blown into West River" and "completely flattened out") on 16 July 1925. It had been "built and maintained by the Central Vermont Railroad Company" who claimed at that time that "the railroad is not obliged to rebuild it" (St. Albans Daily Messenger 1925; Caledonian Record 1926a).

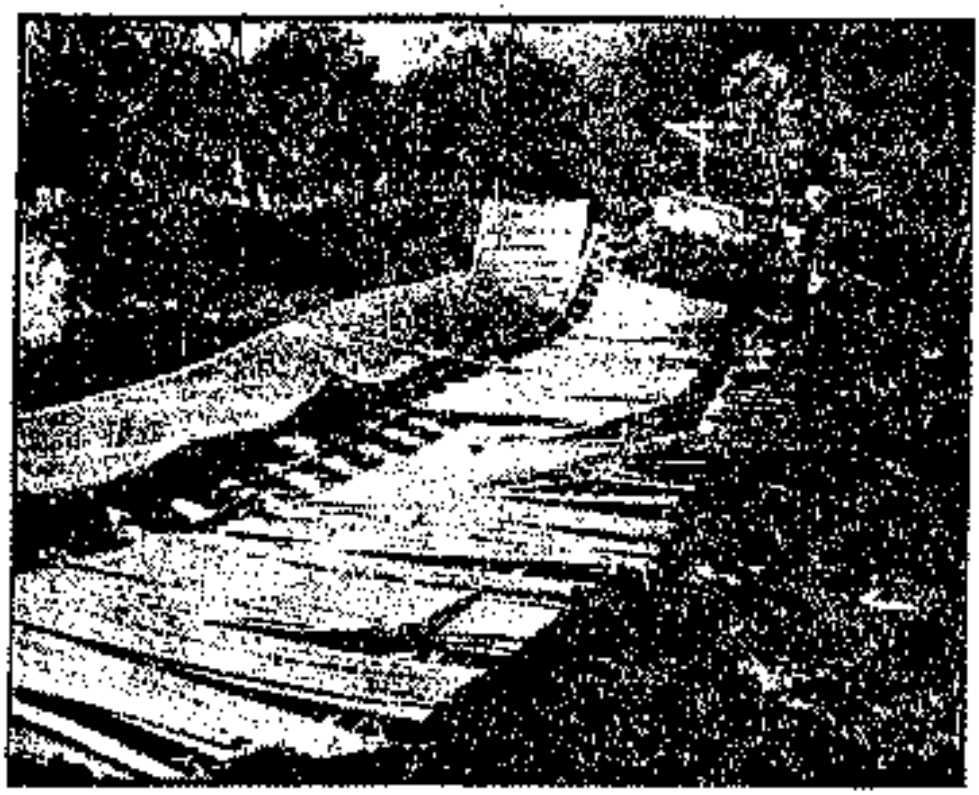


Figure 1. View of the wrecked span (Springfield Republican 1925).

It was estimated in March 1926 that a new span would cost $13,000.00 to construct, and the railroad agreed to pay half of this amount. A town meeting was held on 29 March 1926 to discuss the proposal (Caledonian Record 1926a). The proposal appears to have included the retention of the stone abutments from the earlier span.

The construction of the new bridge was approved, and it was built in 1926 by the Kittridge Bridge Company of Concord, NH, a company that was active in the 1920s and 1930s and which was headed by Arthur H. Kittredge (Bridgehunter 2021a). The bridge was designed by the Berlin Construction Company, successor to the Berlin Iron Bridge Company, founded in 1877. The company remains in business, and is today known as Berlin Steel Construction Co., and is located in Kensington, CT.

Bibliography

Biennial Report
1880 *Biennial Report of the Railroad Commissioner of the State of Vermont, for 1879-80*. Montpelier, VT: Freeman Steam Printing House and Bindery.

Bridgehunter
2021a "Kittridge Bridge Co.," www.Bridgehunter.com, accessed 22 January 2021.
2021b "Berlin Construction Co.," www.Bridgehunter.com, accessed 22 January 2021.

Caledonian Record
1926a "Jamaica, VT., Voters Will Act on Bridge," *Caledonian Record* (St. Johnsbury, VT), 29 March, 5.

St. Albans Daily Messenger
1925 "100-Foot [*sic*] Covered Bridge At Jamaica, Vt., Is Blown A Wreck Into West River," *St. Albans Daily Messenger*, 17 July, 1.

Springfield Republican
1925 "West River Bridge Blown From Piers By a Cyclone at Jamaica, Vt., Last Week," *The Springfield Daily Republican* (Springfield, MA), 20 July, 3.

Vermont Chronicle
1870 "Jamaica," *Vermont Chronicle* (Bellows Falls, VT), 3 December 1870, 8.

Regards,

Walter R. Wheeler

Walter R. Wheeler
Senior Architectural Historian

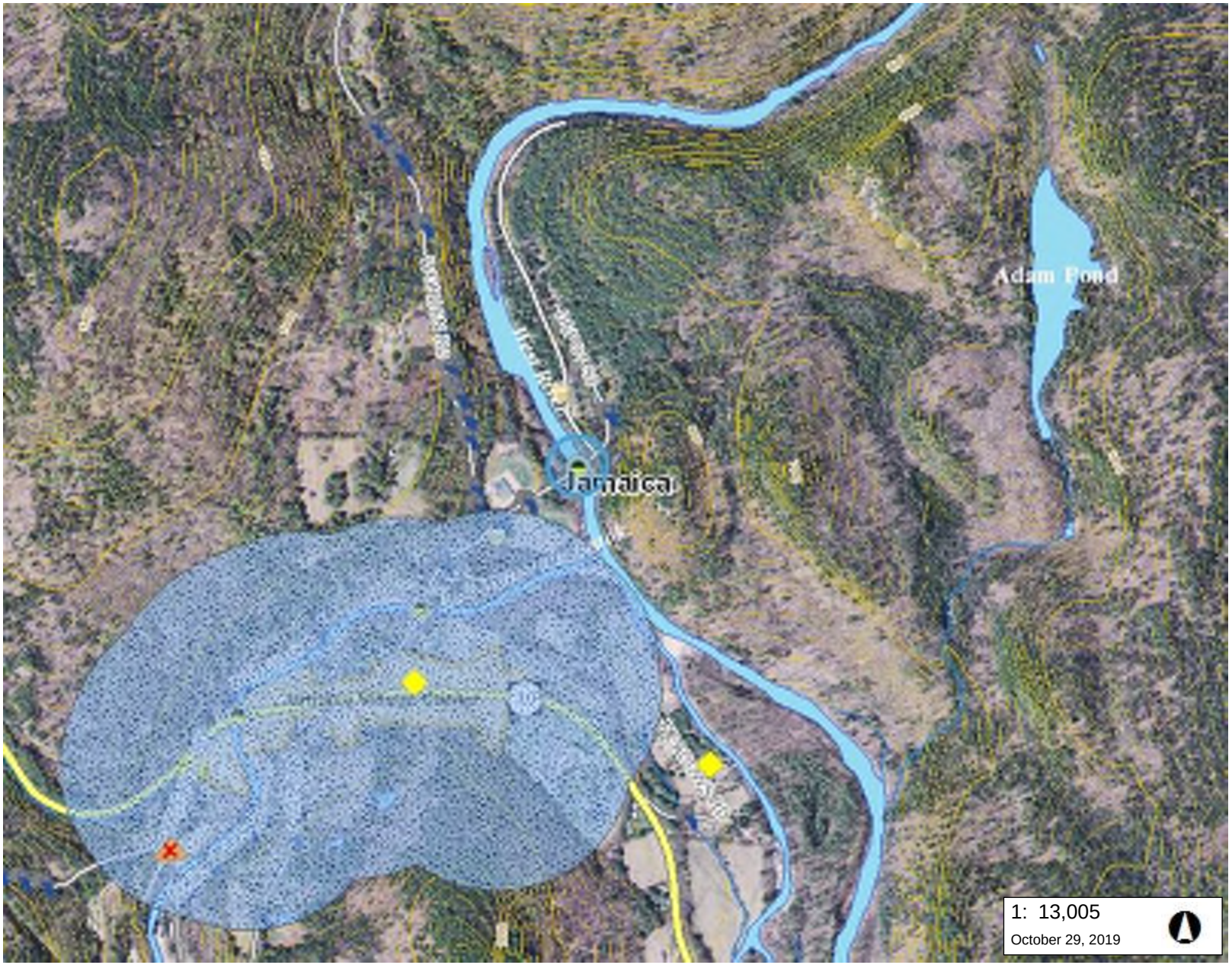
APPENDIX J

Hazardous Site Map

Natural Resources Atlas

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
- Urban Soil Background Areas
- Congressional Areas (GMNF)
  - National Recreation Area
  - Wilderness
- Green Mountain National Fore
- Act250 Permits **INCOMPLET
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Railroads
- Roads

1: 13,005

October 29, 2019

661.0 0 330.00 661.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 1084 Ft. 1cm = 130 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

NOTES

Jamaica BO 1442(42)-No HazMat sites or UBS in project area. Map created 10/29/2019 using ANR's Natural Resources Atlas.

APPENDIX K

Existing Utility Report

Jamaica BO 1442(42)

Existing Utilities within Project Limits

Bridge 32, Jamaica

Depot St, Town Highway 19

Aerial Utilities

Green Mountain Power (single phase), Consolidated Communications, and Southern Vermont Cable.

There is a main utility line that crosses over the river to the north of the bridge. The line contains single phase power as well as 2 communication lines.

A utility relocation may be needed and will be determined once design plans are available.

Underground Utilities

None

APPENDIX L

Community Input

Local & Regional Input Questionnaire

Project Summary

This project, BO 1442(42), focuses on truss bridge 32 on town highway 19 (Depot St.) in Jamaica, Vermont. The bridge is in need of either a major maintenance action or replacement. Potential options being considered for this project include a rehabilitation and painting, replacement with a new bridge on the existing alignment, or replacement with a new bridge on a new alignment. Due to the narrow width and fact that there are no alternative routes, a temporary bridge will be required.

The document was compiled from the input of multiple sources who are stakeholders in this project, including, but not limited to, the Jamaica Fire Department, Cota & Cota Oil, Rescue Inc Ambulance Corps, The US Army Corps of Engineers, The Jamaica State Park and local residents.

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. The bridge is the only access to Jamaica State Park (https://www.vtstateparks.com/jamaica.html), which has many scheduled events throughout the year. The bridge provides access to 4 or 5 residence houses of Jamaica. Without this bridge, these residents would not have access to their homes and Public Safety and Public Works couldn't provide services to these residents.

2. Is there a "slow season" or period of time from May through October where traffic is less or no events are scheduled? Winter months, or when the park is closed (Park open 1st Friday in May to 2nd Monday in October). The Bridge provides access to the Jamaica State Park which provides the town of Jamaica with a source of good revenue thru Tourism for local businesses and vendors. The park brings visitors to Jamaica to stay and spend their money locally boosting the economy. Without the bridge, no park. No park, Local economy suffers greatly. Vast portions of undeveloped land that would not be accessible to anyone for development or recreations. No potential new homes. No new Tax revenue. No growth for the Town.

3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response and provide contact information (names, address, email addresses, and phone numbers. The town garage is located less than a mile away (32 Town Shed Road). The Fire department is located less than a mile away (4017 VT Route 30). Town Garage (802) 874-4265 jamaicaroads@svcable.net, Jamaica Volunteer Fire Department (802) 874-4393, This bridge provides access to Public Safety to this area. There is no logical alternative route except on foot overland. In this day and age that would be pathetic.

4. Are there businesses (including agricultural operations and industrial parks) or delivery services (fuel or goods) that would be adversely impacted due to work zone proximity? Cota & Cota Inc

(heating fuel) are concerned about being able to deliver across the current bridge. The USACE is deeply concerned about the ability to utilize the bridge for possible construction loads for their Ball Mountain Dam project. Delivery services are basically impossible. Homes cannot get anything shipped to them because of the current state of the bridge. Contractors that homeowners hire have smaller trucks they use. Every Delivery, FedEx, UPS, Ambulance, Fire Truck.

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? The Jamaica Village School is approximately 500' from the bridge (without having to cross the bridge). Salmon Hole is a popular swimming and location at the Jamaica State Park. Close to the project are the Town Hall, Library, Soccer fields, Churches, and Businesses. This bridge provides access to our school for those residents who live on the other side.

6. What other municipal operations could be adversely affected by the work zone at this bridge? This bridge is the only way into this part of Jamaica. Unless someone wishes to walk several miles thru the woods and over the hills, this is the only way into the park and to those five residences. Ambulance and Fire Truck Services would be affected.

7. 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. Town of Jamaica. This bridge provides access to Historic Battlefield within the state park.

8. 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? No public transit, just the state park will be affected.

Schools

1. Where are the schools in your community and what are their yearly schedules (example: first week in September to third week in June)? The Jamaica Village School is next to the bridge. Schedule appears to be the last Wednesday in August to the second week in June. Residents need a bridge to get their children to schools from their homes.

2. Is this project on specific routes that school buses or students use to walk to and from school? This bridge is the only route for the 5 houses on Depot St. to get to the school.

3. Are there recreational facilities associated with the schools nearby (other than at the school)? Recreational facilities would be across from the school.

Pedestrians and Bicyclists

1. What is the current level of bicycle and pedestrian use on the bridge? The bridge is often used by bikers and hikers and people walking to the park. The bridge is the main entrance to the state park.

2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use? The current width of the bridge is fine. Cars and trucks take care when passing pedestrians and only one at a time can pass if a biker is riding. It is really only a one-lane bridge. Cars often wait for pedestrians to get off the bridge before going on it.

3. Does the community feel there is a need for a sidewalk or bike lane on the bridge? It would be nice to have a two lane bridge with a sidewalk. A bike lane or pedestrian sidewalk would be nice but not necessary.

4. Is pedestrian and bicycle traffic heavy enough that it should be accommodated during construction? Bike and pedestrian passing should definitely be accommodated during construction.

5. 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). Not that I am aware of, the town would have those answers.

6. 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? There are homeowners who have the right of ways to large areas of land and could at some point develop.

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? The alignment of the bridge should be so that long and large campers can make that turn to get into the state park. As well as fuel trucks.

2. Are there any concerns with the width of the existing bridge? It would be nice to have a two lane bridge with a sidewalk, one lane with sidewalk could be an alternative.

   The width is fine in my opinion. Cars and trucks and camper need to pass one at a time. The bridge needs to be strong enough to handle Public Safety, Public Works, and commercial heavy equipment.

3. Are there any special aesthetic considerations we should be aware of? Keep the history of the bridge intact related to the history of the town which is rich.

4. Does the location have a history of flooding? If yes, please explain. Flooding? YES! Seet own for history, Irene took 3 houses down ball mt/pikes falls brook! The West River is dam controlled

but the dam is also leaking! See the Army Corp for details on flooding. Strong enough to handle flood waters and designed to take floodwaters on.

5. Are there any known Hazardous Material Sites near the project site? Not that I know of.

6. Are there any known historic, archeological and/or other environmental resource issues near the project site? Not that I know of.

7. Are there any utilities (water, sewer, communications, power) attached to the existing bridge? Please provide any available documentation. Not that I know of.

8. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc.) near the project that should be considered? The town should be consulted and the Army Corps.

9. Are there any other issues that are important for us to understand and consider? This bridge needs replacement! It's going to be a huge inconvenience, but it must be done. We will need to be sure that emergency vehicles can get to our houses. I hope to be included in the discussion and the plans. All need to be well informed of the timeline.

Land Use & Zoning

1. Please provide a copy of your existing and future land use map or zoning map, if applicable. I will work on getting a copy of my property and the rights of ways around me.

2. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so, please explain. I have no personal planned development that would impact the bridge. The failure to have proper repair / replacement of the bridge and the resulting weight restrictions have injured us by denying the ability among the many other restrictions to; Economically harvest and transport timber off of the property, bring equipment to site to further proper forest management, and to transport equipment and materials to construct private homes on site.

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. Public transit expansion I do not know of.

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. Local communications would be the Town Offices in Jamaica, the

Jamaica Market and Karen Ameden, Facebook
https://www.facebook.com/JamaicaVermont05343/ , Vermont Public Radio, WEQX.

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? Include Army Corp of Engineers, Town Selectmen, Road Commissioners.

Adams Pond VT LLC 2
C/O J. B. Miller
President & CEO
Empire Entertainment, Inc.
100 Crosby Street, Suite 202
New York, NY 10012
O: 212-343-1645 X225
E: jbmiller@empireentertainment.com
www.empireentertainment.com

August 19, 2019

Joel Bluming
Town of Jamaica Vermont
Windham Regional Transportation Committee Commissioner
C/O Town Clerk
28 Town Office Road
PO Box 173
Jamaica, VT 05343
Via; Email jamaicatownclerk@svcable.net
Via: Fax 802-874-4558

Dear Mr. Bluming,

We are owners for close to 50 years of 556 acres of forest timberland on the East side of the West River Jamaica Vermont.

The property is accessible only via the Depot Street Bridge.

Failure to have proper repair/replacement of the bridge and the resulting weight restrictions have injured us by denying the ability among the many other restrictions to,

- **Economically harvest and transport timber off of the property,**
- **Bring equipment to site to further proper forest management,**
- **Transport equipment and materials to construct private homes on site,**

Respectfully

A Charles Miller

Cota & Cota

Cota & Cota, Inc.
4 Green Street, Bellows Falls, VT 05101
PHONE (802) 463-0000
FAX (802) 460-3429
INFO@COTAOIL.COM WWW.COTAOIL.COM

August 26th, 2019

Dear Jamaica Select Board,

We have serious concerns on being able to provide uninterrupted deliveries of home heating fuel and propane gas to residents on the other side of the bridge. This may be impossible unless the bridge is brought up to code. We will not have the means to provide the necessary heating fuel for them to survive the harsh winters of Vermont. We are extremely concerned for the health and well-being if our fellow Vermonters. We are asking that an immediate resolution to this dire situation happens sooner rather than later so that our residents and customers can continue to get the service that they need to survive.

Warm Regards,

Casey Cota

President
Cota & Cota
802-874-4921

Gmail **Joel Bluming <vermont9@gmail.com>**

Depot Street Bridge: USACE Load Rating (UNCLASSIFIED)

Stewart, Adam T CIV USARMY CENAE (US) Mon, Mar 18, 2019
<Adam.T.Stewart@usace.army.mil> at 5:47 AM
To: "Vermont9@gmail.com" <Vermont9@gmail.com>
Cc: "Berkness, Dale H CIV USARMY CENAE (US)" <Dale.H.Berkness@usace.army.mil>, "Paolino, Jason A CIV USARMY CENAE (US)" <Jason.A.Paolino@usace.army.mil>, "Kedzierski, John H CIV USARMY CENAE (US)" <John.H.Kedzierski@usace.army.mil>

CLASSIFICATION: UNCLASSIFIED

Mr. Bluming,

Dale Berkness passed along your request for additional information on the Depot Street Bridge. I understand that you are working to raise the priority of this bridge with the Windham Regional Commission, and we would certainly like to support that effort in any way we can, as it has the potential to impact our ability to maintain and operate Ball Mountain Dam.

I have attached the 2015 Bridge Load Rating performed by engineers in the New England District Structural Engineering Section. This load rating was only performed on the stringers, as they are the governing member. For additional context, I have also included two excerpts below from our previous correspondence with the state.

"Mr. Bruso,

Thank you very much for meeting yesterday with Messrs. Kedzierski, Nguyen and Madison at the Depot St. Bridge. As was discussed with you and Mr. Hazard, our preliminary analysis of the structure for potential USACE use has caused us deep concern. In the course of our investigations to analyze the bridge for possible construction loads for our project at Ball Mtn. Dam, we have uncovered some issues which warrant your taking action. At a minimum, we believe that the town should contact the VT AOT and have a load rating performed for the bridge in its current condition. We would be happy to meet again to discuss our findings to date with representatives of the Town and State.

Our initial results indicate that this structure, presently posted for 8T, may not be adequate for our anticipated construction loads, and, in fact, may not be adequate for current traffic. We realize that this directly conflicts with the structural analyses you have received in recent years. We believe some previous key assumptions regarding stringer bracing and conditional assessment do not reflect the current configuration and condition of the bridge. "

"Pam,

USACE bridge inspectors were on-site last week to perform a cursory inspection as part of our efforts to find a suitable means of access for a future construction project at the downstream toe of the USACE Ball Mountain flood control dam. While we realize that the bridge is currently posted for 8 Tons, our intent was to gather enough data and information to see if using the

Depot Street bridge is sufficient for possible construction loads (dump trucks, other construction equipment, etc.).

An inspection of the stringers and floorbeams was performed, assuming these are the limiting factors as the present timber deck could either be replaced or rehabilitated for heavier loadings.

What we have found is extensive section loss along the top flange of many of the stringers. Even accounting for no section loss, the top flange of the stringers is unbraced as they are not attached to the timber deck. Our preliminary analysis of these stringers indicates they have very low capacity for lateral buckling of the top flange given their unbraced length (the span between the floorbeams). In addition, while we did not inspect the entire bridge, there are isolated instances where the bolted stringer connection to the floorbeams is compromised because the bolt heads are have completely corroded off. The floorbeam at PP1 (counting from the west abutment) also has section loss of the top flange and at least one area where there is a notch in the top flange. We have not fully inspected all of the other floorbeams for further deterioration.

All of our specific measurements were taken under the first bay from the west end of the bridge (between panel points 0 and 1). A visual examination from the streambed appears to indicate that similar conditions may exist in other bays as well, but this can only be confirmed with a hands-on inspection of the stringers in these other bays.

USACE believes that these conditions warrant further efforts and inspections to verify the condition and the load carrying capacity of this bridge. Please feel free to contact either myself or Mr. Jason Paolino, Chief Structural Engineering Section if you have any questions or need to discuss."

Respectfully,

Adam Stewart, P.E.
Structural Engineer
NAE Design Branch, Structural Section
Phone: 978-318-8631

CLASSIFICATION: UNCLASSIFIED

Depot Bridge Load Rating - Stringers.pdf
182K

Depot Rd Bridge Load Rating Summary

Prepared by: TPN
Checked by: ___

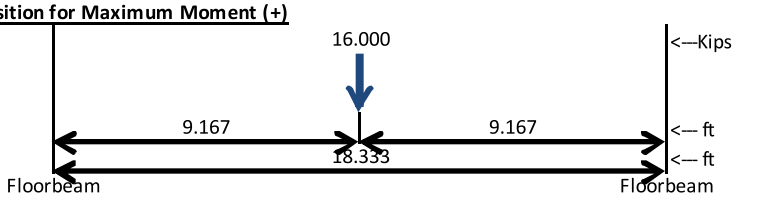
Date: 02/03/15
Date: _____

LOAD RATING SUMMARY
(Section Loss Included)

LIVE LOAD	RATING TYPE	γ_{DL}	DL	γ_{LL+IM}	LL+IM	C	RF	RL
		---	kip.ft	---	kip.ft	kip.ft	---	TONS
HL-93 (TRUCK)	INV	1.25	4.61	1.75	57.04	10.19	0.04	1.11
	OPR	1.25	4.61	1.35	57.04	10.19	0.06	1.44
HL-93 (TANDEM)	INV	1.25	4.61	1.75	72.73	10.19	0.03	0.87
	OPR	1.25	4.61	1.35	72.73	10.19	0.05	1.13
3S2	LEGAL	1.25	4.61	1.30	49.48	10.19	0.07	2.48
6-AXLE	LEGAL	1.25	4.61	1.30	86.15	10.19	0.04	2.61
3-AXLE	LEGAL	1.25	4.61	1.30	70.15	10.19	0.05	1.46
4-AXLE	LEGAL	1.25	4.61	1.30	69.90	10.19	0.05	1.68
5-AXLE	LEGAL	1.25	4.61	1.30	52.06	10.19	0.07	2.49

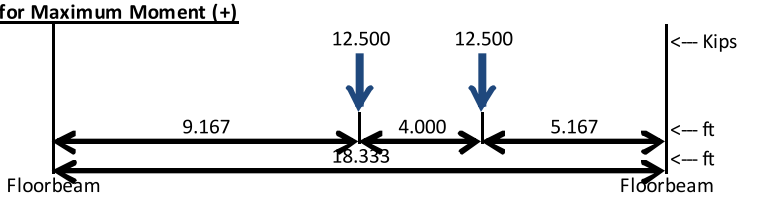
STRINGER LOAD RATING:

HL93 Truck position for Maximum Moment (+)



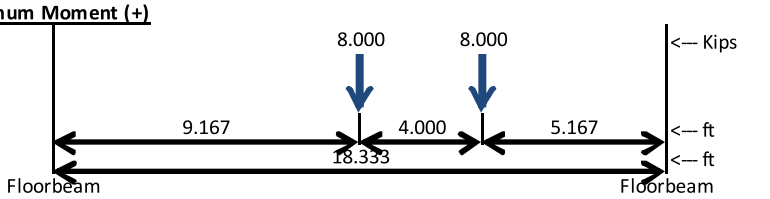
M = 73.333 Kip.ft P = 8.000 Kips

HL93 Tandem for Maximum Moment (+)



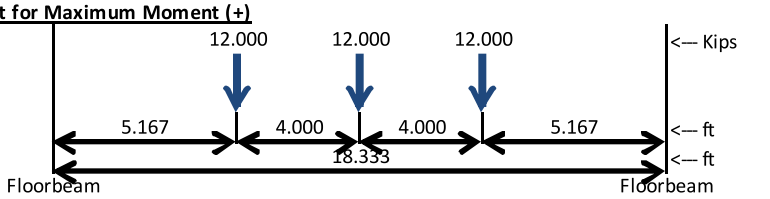
M = 96.875 Kip.ft P = 16.023 Kips

3S2 for Maximum Moment (+)



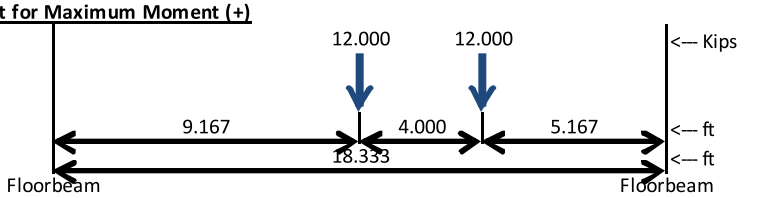
M = 62.000 Kip.ft P = 10.255 Kips

6-Axle Straight for Maximum Moment (+)



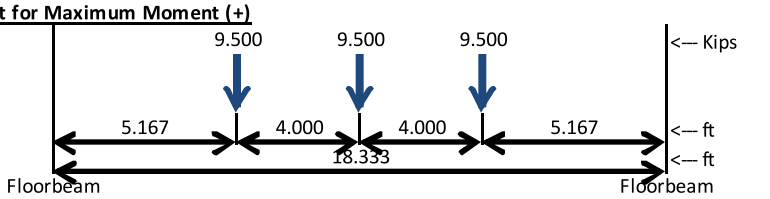
M = 117.000 Kip.ft P = 18.000 Kips

3-Axle Straight for Maximum Moment (+)



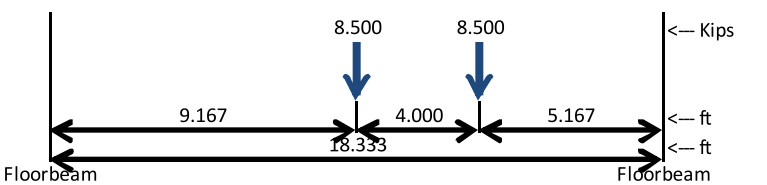
M = 93.000 Kip.ft P = 15.382 Kips

4-Axle Straight for Maximum Moment (+)



M = 92.625 Kip.ft P = 14.250 Kips

5-Axle Straight for Maximum Moment (+)



M = 65.875 Kip.ft P = 10.895 Kips

STRINGER LOAD RATING:

Span Length - L =	18.333	ft
Number of Lanes - N_L =	1.000	---
Beam Spacing - S =	2.667	ft
Number of Beams - N_b =	6.000	---

LIVE LOAD

DF_{INT} = S/8.8 =	0.303	Lanes	Table 4.6.2.2.2a-1
$DF_{EXT\ (INCLUDING\ LANE\ FACTOR\ OF\ 1.2)}$ =1.2* 0.5(S-1.5)/S =	0.263	Lanes	
DF =	0.303	Lanes	**<--- Controls**
Dynamic Load Alowance - IM =	0.100	---	Slow Traffic

HL93 TRUCK

$M_{MIDSPAN}$ due to 1 Lane Load = $WL^2/8$ - M_{LANE} =	26.889	kip.ft/lane
and		
$M_{MIDSPAN}$ due to 1 Truck Load - M_{TRUCK} =	146.667	kip.ft/lane
$M_{MIDSPAN}$ Total per Stringer - M_{LL+IM} =	**57.037**	**kip.ft**

DEAD LOAD

Wood Density - γw =	0.050	kcf
Curb Height - h_c =	2.000	in
Curb Width - w_c =	4.000	in
Curb Weight per Stringer- W_c =	0.001	klf
Depth of Deck - h_d =	7.500	in
Width of Deck per Stringer - w_d =	2.667	ft
Deck Weight per Stringer- W_d =	0.083	klf
Stringer Weight - W_S =	0.025	klf
Total Dead Load - W_{DD} =	0.110	klf
$M_{MIDSPAN}$ Total per Stringer = (1/8)*WL^2 - M_{DD} =	**4.610**	**kip.ft**

CAPACITY

Note: ***Existing S12x25 for Stringers, Noncompostie Section (6.10.8)***

MEMBER PROPERTIES:

E_s =	27000.000	ksi	
$F_{ft} = F_{yc} = F_y$ =	30.000	ksi	
$0.7*F_{yc} = F_{yr}$ =	21.000	ksi	
R_b =	1.000	---	
R_h =	1.000	---	
b_{fc} =	4.194	in	(Assumed 10% Loss)
t_{fc} =	0.392	in	(Assumed 20% Loss)
d_w =	10.000	in	
t_w =	0.310	in	
b_{ft} =	4.660	in	
t_{ft} =	0.490	in	
D_c =	5.026		
t_c =	5.418		
t_t =	4.582		
A =	6.754	in^2	
I =	108.048	in^4	

Element	b	t	A	dt	A*dt	dn	In
---	in	in	in^2	in	in^3	in	in^4
fc	4.194	0.392	1.644	9.804	16.118	5.222	44.848
w	0.310	9.118	2.827	5.049	14.271	0.467	20.199
ft	4.660	0.490	2.283	0.245	0.559	-4.337	43.002
Total	---	10.000	6.754	---	30.949	---	108.048

COMPRESSION-FLANGE FLEXURAL RESISTANCE (6.10.8.2)

Fnc =	6.133	ksi	(See Cals below)
Nominal Moment Capacity: $F_{nc}*I/t_c = Mn_c$ =	10.193	kip.ft	**<---Controlls**

Local Buclking Resistance: **6.10.8.2.2**

Controlling F_{nc} = 30.000 ksi

IF $\lambda_f \leq \lambda_{fp}$ *, then:*

$R_b*R_h*F_y = F_{nc}$ =	30.000	ksi	TRUE

IF $\lambda_f < \lambda_{fp}$ *, then:*

$[1-(1-F_{yr}/R_h/F_{yc})(\lambda_f-\lambda_{pf})/(\lambda_{rf}-\lambda_{pf})]*R_b*R_h*F_y = F_{nc}$ =	-23.530	ksi	FALSE

Slend. Ratio for Comp. Flange: $0.5*b_f/t_f = \lambda_f$ =	5.349	---
Compact Limit. Slender. Ratio: $0.38*(E_s/f_y) = \lambda_{pf}$ =	11.400	
Noncomp. Limit. Slender. Ratio: $0.56*(E_s/f_y) = \lambda_{rf}$ =	16.800	

Lateral Torsional Buclking Resistance: **6.10.8.2.2**

Controlling F_{nc} = 6.133 ksi <---Controlls

If $L_b \leq L_p$ *, then:*

$R_b*R_h*F_y = F_{nc}$ =	30.000	ksi	FALSE

If $L_p < L_b \leq L_r$ *, then:*

$C_b[1-(1-F_{yr}/R_h/F_{yc})(L_b-L_p)/(L_r-L_p)]*R_b*R_h*F_y = F_{nc}$ =	5.003	ksi	FALSE

If $L_r < L_b$ *, then:*

$C_b*R_b*\pi^2*E/(L_b/r_t)^2 = F_{cr} = F_{nc}$ =	6.133	ksi	TRUE

Unbracing Length: L_b =	220.000	in
Limit. Unbraced Length: $r_t*(E/F_{yc})^{0.5} = L_p$ =	31.663	in
Limit. Unbraced Length: $\pi*r_t*(E/F_{yc})^{0.5} = L_r$ =	99.472	in
Moment Gradient Modifier: C_b =	1.000	---
$b_{fc}/(12(1+(D_c t_w)/(3b_{fc}t_{fc})))^{0.5} = r_t$ =	1.055	in

TENSION-FLANGE FLEXURAL RESISTANCE (6.10.8.3)

$R_h*F_{yt} = F_{nt}$ =	30.000	ksi
Nominal Moment Capacity: $F_{nt}*I/t_t = Mn_t$ =	58.948	kip.ft

FLEXURAL RESISTANCE

Nominal Moment Capacity: Mn =	**10.193**	**kip.ft**	
LRFD Resistance Factor - ϕ =	1.000	---	(6.5.4.2)
Condition Factor - ϕ_c =	1.000	---	Table 6A.4.2.3-1
System Factor - ϕ_s =	1.000	---	Table 6A.4.2.4-1
Capacity: C = $\phi*\phi_c*\phi_s*R_n$ =	**10.193**	**kip.ft**	**(6A.4.2.1-2)**

LOAD RATING

(Table Table 6A.4.2.2-1)

LIVE LOAD	RATING TYPE	γ_{DL}	DL	γ_{LL+IM}	LL+IM	C	RF
		---	kip.ft	---	kip.ft	kip.ft	---
HL-93 (TRUCK)	INV	1.250	4.610	1.750	57.037	10.193	0.044
	OPR	1.250	4.610	1.350	57.037	10.193	0.058

VERMONT

State of Vermont
Department of Forests, Parks & Recreation
100 Mineral Street, Suite 304 [cell] 802-777-0388
Springfield, VT 05156-3168 [fax] 802-885-8890
fpr.vermont.gov [email] ethan.phelps@vermont.gov
www.vtstateparks.com

Agency of Natural Resources

August 30, 2019

Joel Bluming
Town of Jamaica Representative to Windham Regional Planning Commission Transportation Committee
Via Email

Dear Mr. Bluming:

I am writing in response to your request for a letter to support a project to rehabilitate Bridge #32 on Town Highway 19 (Depot Street) in Jamaica, Vermont.

Depot Street, a public highway owned and maintained by the Town of Jamaica, serves several private residents and properties and Jamaica State Park. Depot Street, and Bridge 32, is the only means to access the state park. The park, one of Vermont's busiest with annual visitation in excess of 30,000 people, is open from about May 1 to October 15 annually.

The current condition and documented decline of Bridge 32 has long been on FPR's watch list and we grow increasingly concern about its capacity to safely pass traffic necessary for the operation of the state park. We have many infrastructure and forest management projects that have been on hold, some more than 20 years, due to the limited and decreasing weight capacity of the bridge. Most recently we have had to make very difficult and substantive changes to basic park functions like trash removal, firewood delivery and septic tank pumping to accommodate the limits of the bridge.

The Department of Forests, Parks and Recreation fully supports a project to rehabilitate the bridge to a state where it can adequately convey traffic necessary for the operation and maintenance of the state park in a time frame that does not impede its operation. Any closure of the bridge, even temporarily, is not feasible during the park operating season.

Thank you for working on this issue.

Ethan Phelps

Ethan Phelps, CPRP
Parks Regional Manager

FORESTS, PARKS & RECREATION
VERMONT

Here is the info that I have discovered regarding the Jamaica State Park bridge (#32):

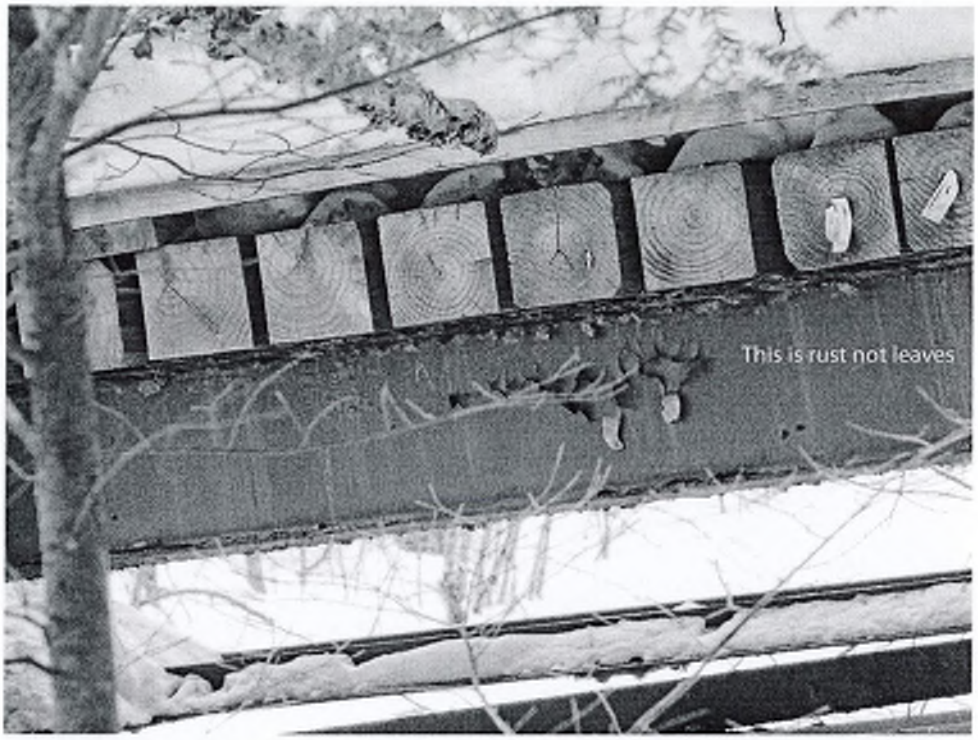
The bridge is a landmark bridge built in 1926. It is the only access to the Jamaica State Park which is the most popular state park in Vermont. One must reserve a weekend site one year in advance or a weekday site six months in advance. I have been told that the state park gross revenue is about 2.2 million dollars per year. I do not have the source of this information yet.

Due to the condition of the bridge, the state park cannot bring in full truckloads of firewood. There are four houses in the area past the bridge and one piece of property which, I am told, can't be logged or developed, in part due to the fragility of the bridge. Oil delivery is difficult due to the weight limitation of the bridge and , according to Cota & Cota fuel, oil trucks go in "light". The current posted weight limit is 16,000 pounds. However, the Army Corps of Engineers claims that it may be unsafe for current traffic (see attached documents).

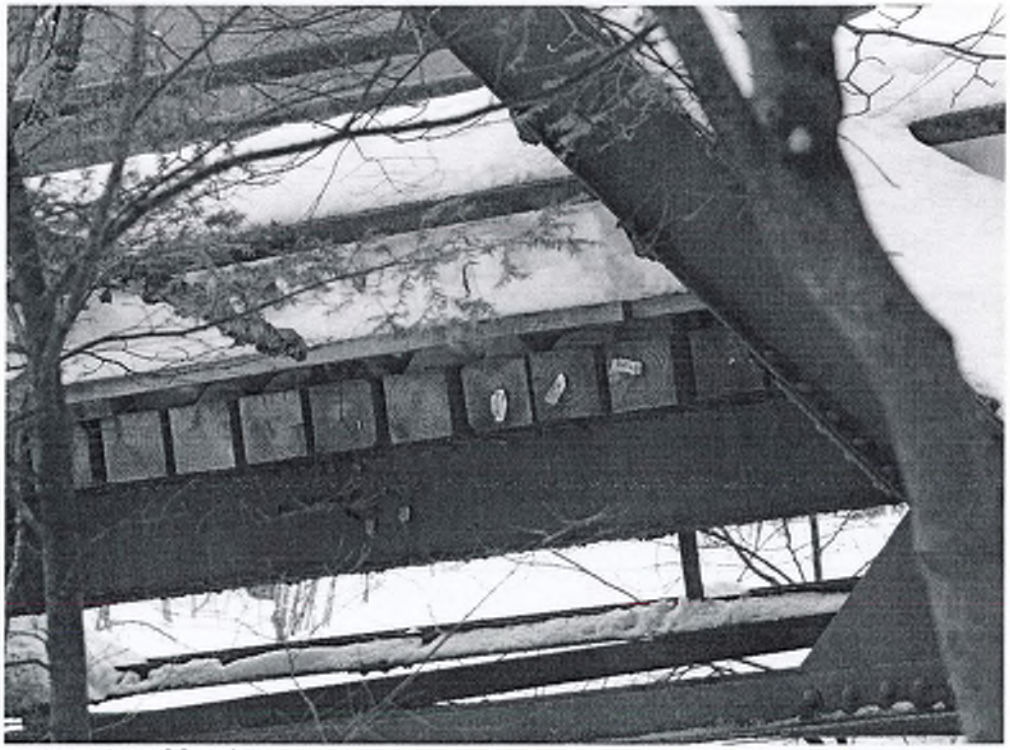
The Army corps of Engineers is responsible for the maintenance of the Ball Mountain Dam. This bridge is the only access to this dam. The Corps plans to build a road to directly access the dam but cannot gain access for heavy equipment or gravel for this road due to the weight limit. There is seepage at the toe of the Ball Mountain Dam which must be repaired by the Army Corps. The toe of the dam is in the Jamaica State Park.

Fire trucks must pass over this bridge to gain access to the private properties and the state park. The Jamaica Fire Chief, Dana West, will not take larger trucks or their tanker truck over the bridge for fear of losing a truck and its crew, if the bridge were to collapse. There is no other vehicular access to the road over the bridge, to the state park, or to the residences up-road from the bridge.

While the bridge is on the VTrans candidate Capitalization Program, I'm told that this could take 5-10 years. Though I am not an engineer, I don't think it will last that long. I am enclosing photographs to show that the supporting I-beams have rusted severely. The construction of the bridge is steel I-beams supporting pressure-treated 4x4s covered by pressure-treated 2x12 decking. The top flanges of the I-beams seem to have completely rusted away. This is confirmed in the enclosed Army Corps report. The bottom flanges of the I-beams also seem to be severely rusted.



This is a view of the underside of the bridge, lateral view. Please note that the orange-ish material underneath the 4X4s is rust, not leaves.



This is a more overall view

Also the abutment stones are loose

I have enclosed a PDF of the engineer's report dated 10/20/2017. This report does not seem to take into consideration the rust on both the top and bottom flanges of the two I-beams which are the stringers supporting the bridge span. As you can see in the photographs above, they seem to be extremely rusted, which, I would think, would weaken them sèverely. I believe the recommendation to paint the steel would only serve to hide the issues, and delay the repair or replacement. Also, sweeping sand off the bridge, as suggested by the engineer's report, would pollute the river and kill the fish. I have been assured by some people involved that, if the bridge fell in the river, its replacement would be assured. I think this is quite cynical.

This bridge is more than just a town bridge. It is access to the most popular state park in Vermont. And its failure would severely impact the residents on the other side for a long period of time. Any help in getting this bridge rebuilt would be appreciated. If you need more info, please contact me.

Thank you.
Joel Bluming

Depot Street Bridge: USACE Load Rating (UNCLASSIFIED)
Inbox
x
Stewart, Adam T CIV USARMY CENAE (US) <Adam.T.Stewart@usace.army.mil>

Attachments5:48 AM (9 hours ago)

to Vermont9@gmail.com, Dale, Jason, John
CLASSIFICATION: UNCLASSIFIED

Mr. Bluming,

Dale Berkness passed along your request for additional information on the Depot Street Bridge. I understand that you are working to raise the priority of this bridge with the Windham Regional Commission, and we would certainly like to support that effort in any way we can, as it has the potential to impact our ability to maintain and operate Ball Mountain Dam.

I have attached the 2015 Bridge Load Rating performed by engineers in the New England District Structural Engineering Section. This load rating was only performed on the stringers, as they are the governing member. For additional context, I have also included two excerpts below from our previous correspondence with the state.

"Mr. Bruso,

Thank you very much for meeting yesterday with Messrs. Kedzierski, Nguyen and Madison at the Depot St. Bridge. As was discussed with you and Mr. Hazard, our preliminary analysis of the structure for potential USACE use has caused us deep concern. In the course of our investigations to analyze the bridge for possible construction loads for our project at Ball Mtn. Dam, we have uncovered some issues which warrant your taking action. At a minimum, we believe that the town should contact the VT AOT and have a load rating performed for the bridge in its current condition. We would be happy to meet again to discuss our findings to date with representatives of the Town and State.

Our initial results indicate that this structure, presently posted for 8T, may not be adequate for our anticipated construction loads, and, in fact, may not be adequate for current traffic. We realize that this directly conflicts with the structural analyses you have received in recent years. We believe some previous key assumptions regarding stringer bracing and conditional assessment do not reflect the current configuration and condition of the bridge. "

"Pam,

USACE bridge inspectors were on-site last week to perform a cursory inspection as part of our efforts to find a suitable means of access for a future construction project at the downstream toe of the USACE Ball Mountain flood control dam. While we realize that the bridge is currently posted for 8 Tons, our intent was to gather enough data and information to see if using the Depot Street bridge is sufficient for possible construction loads (dump trucks, other construction equipment, etc.).

An inspection of the stringers and floorbeams was performed, assuming these are the

limiting factors as the present timber deck could either be replaced or rehabilitated for heavier loadings.

What we have found is extensive section loss along the top flange of many of the stringers. Even accounting for no section loss, the top flange of the stringers is unbraced as they are not attached to the timber deck. Our preliminary analysis of these stringers indicates they have very low capacity for lateral buckling of the top flange given their unbraced length (the span between the floorbeams). In addition, while we did not inspect the entire bridge, there are isolated instances where the bolted stringer connection to the floorbeams is compromised because the bolt heads are have completely corroded off. The floorbeam at PP1 (counting from the west abutment) also has section loss of the top flange and at least one area where there is a notch in the top flange. We have not fully inspected all of the other floorbeams for further deterioration.

All of our specific measurements were taken under the first bay from the west end of the bridge (between panel points 0 and 1). A visual examination from the streambed appears to indicate that similar conditions may exist in other bays as well, but this can only be confirmed with a hands-on inspection of the stringers in these other bays.

USACE believes that these conditions warrant further efforts and inspections to verify the condition and the load carrying capacity of this bridge. Please feel free to contact either myself or Mr. Jason Paolino, Chief Structural Engineering Section if you have any questions or need to discuss."

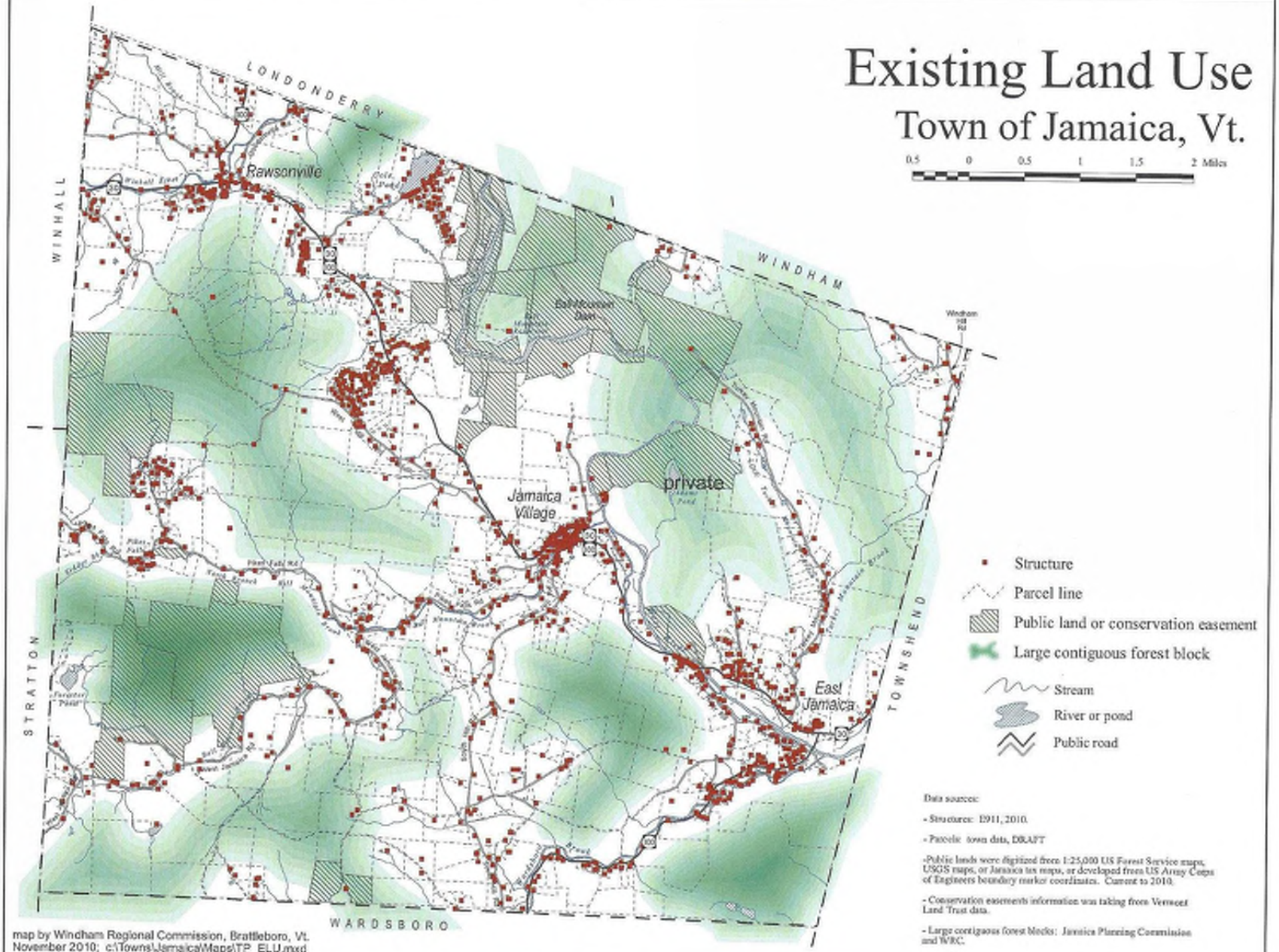
Respectfully,

Adam Stewart, P.E.
Structural Engineer
NAE Design Branch, Structural Section
Phone: 978-318-8631

CLASSIFICATION: UNCLASSIFIED

Existing Land Use

Town of Jamaica, Vt.



Data sources:

- Structures: E911, 2010.

- Parcels: town data, DRAFT

-Public lands were digitized from 1:25,000 US Forest Service maps, USGS maps, or Jamaica tax maps, or developed from US Army Corps of Engineers boundary marker coordinates. Current to 2010.

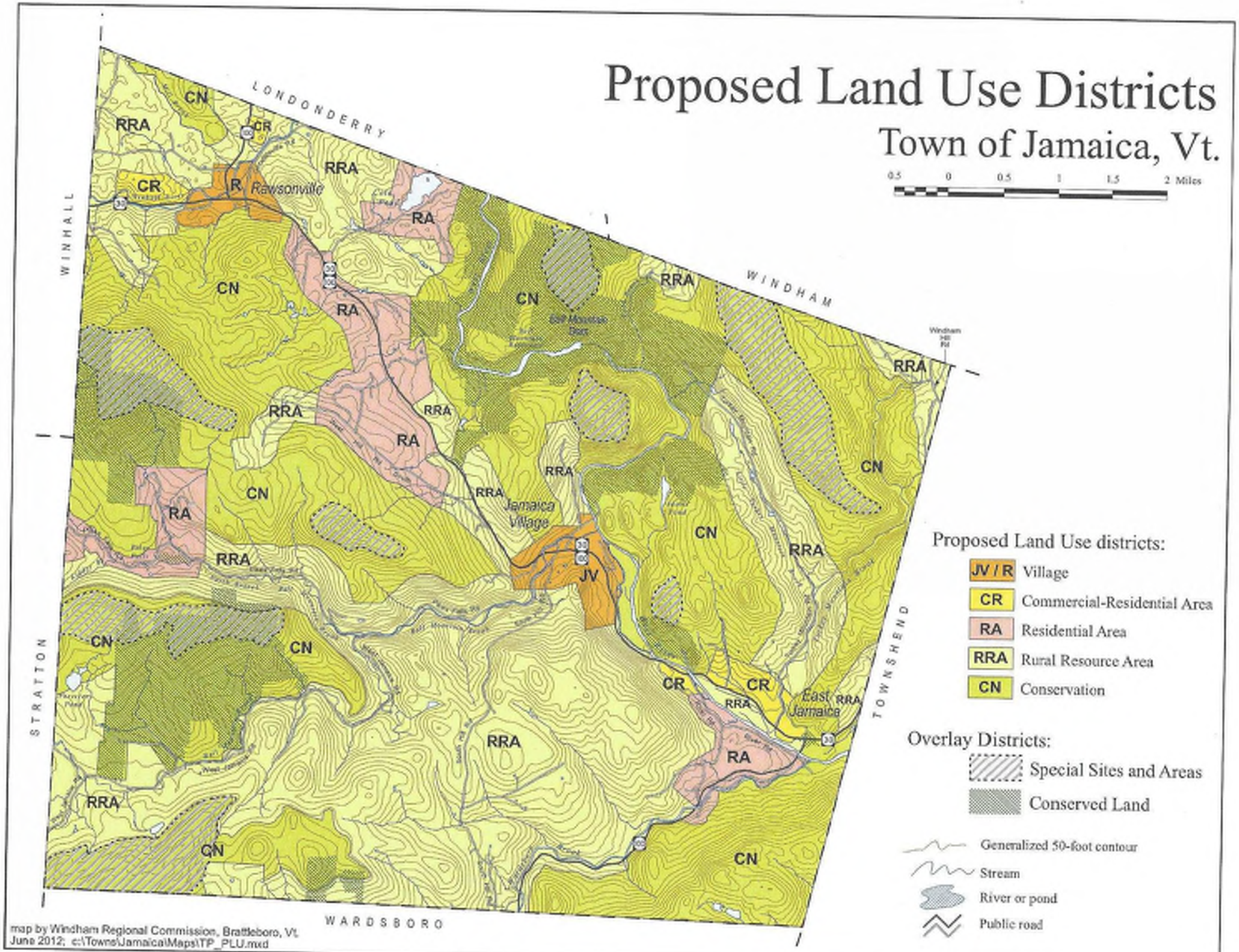
- Conservation easements information was taking from Vermont Land Trust data.

- Large contiguous forest blocks: Jamaica Planning Commission and WRC.

map by Windham Regional Commission, Brattleboro, Vt.
November 2010; c:\Towns\Jamaica\Maps\TP_ELU.mxd

Proposed Land Use Districts

Town of Jamaica, Vt.



map by Windham Regional Commission, Brattleboro, Vt.
June 2012; c:\Towns\Jamaica\Maps\TP_PLU.mxd

Here is the info on the Jamaica State Park bridge (#32):

The bridge is a landmark bridge built in 1926. It is the only access to the State park which is the most popular state park in Vermont. One must reserve a weekend site 1 year in advance or a weekday site 6 months in advance.
Due to the condition of the bridge, the state park can not bring in loads of firewood.

There are four houses in the area past the bridge and one piece of property which can't be logged or developed due to the fragility of the bridge. Oil delivery is difficult due to the weight limitation of the bridge and oil trucks must go in almost empty. The current weight limit is 16,000 pounds and the Army Corps of Engineers rates it at only 8,000 pounds. The town has severely reduced the issuance of over-weight permits. There is seepage at the toe of the Ball Mountain Dam which must be repaired by the Army Corps. The toe of the dam is in the Jamaica State Park. Fire trucks must pass over this bridge to gain access to the private properties and the state park.

While the bridge is on the VTrans candidate Capitalization Program, I'm told that this could take 2-5 years. Though I am not an engineer I don't think this will last that long. I am enclosing photographs to show that the supporting I-beams have rusted severely. The construction of the bridge is steel I beams supporting pressure treated 4x4s covered by pressure treated 2x12 decking. The tops of the the I-beams seem to have completely rusted away. The underside of the IBeams are also severely rusted.

This is a view of the underside of the bridge, lateral view.

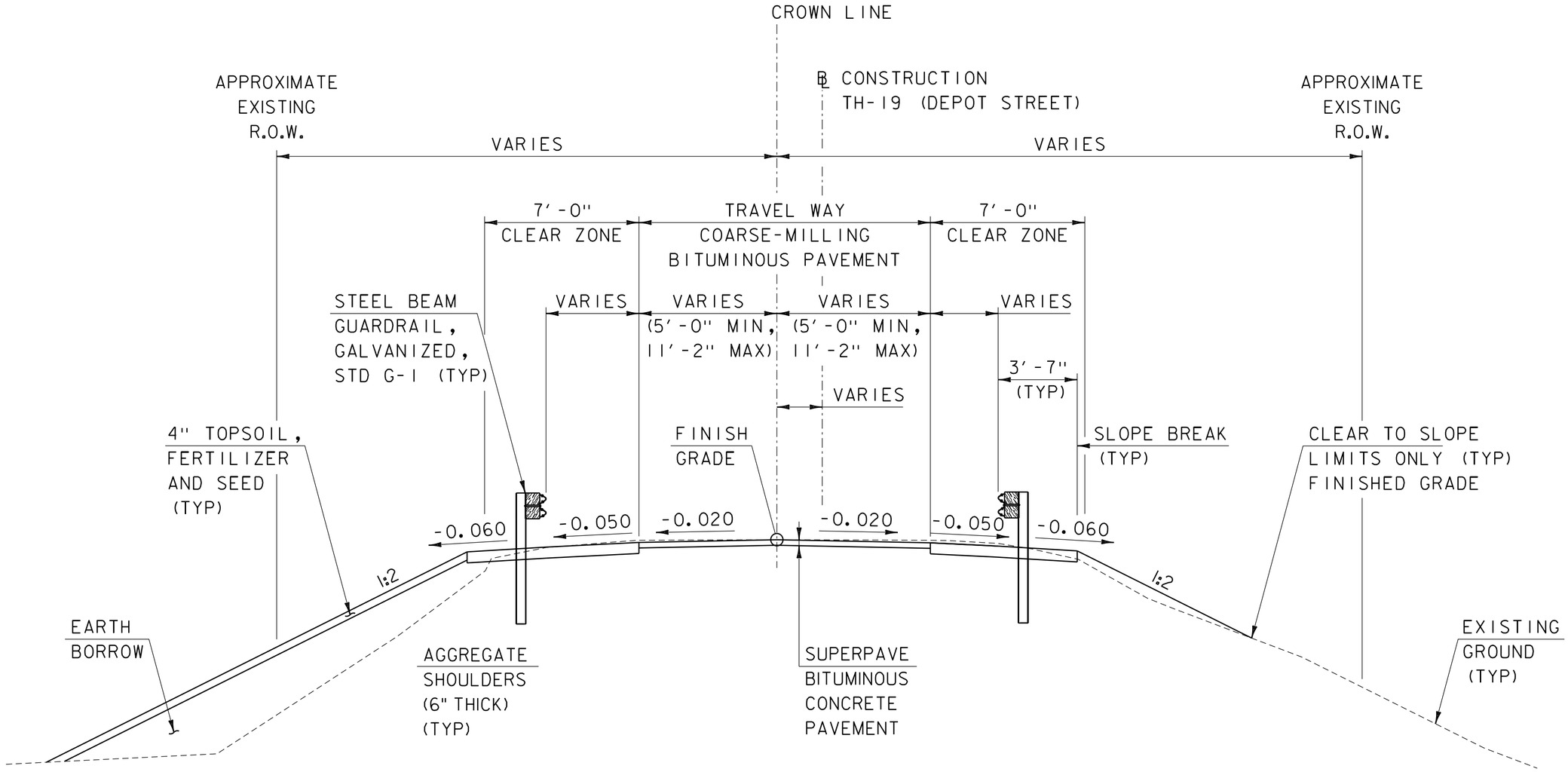
This is a more overall view

Also the abutments stones are loose

Any help in getting this bridge rebuilt would be appreciated. If you need more info, please contact me.
Thank you.
Joel Bluming
Jamaica Selectperson and Jamaica WRC commisioner

APPENDIX M

Plans



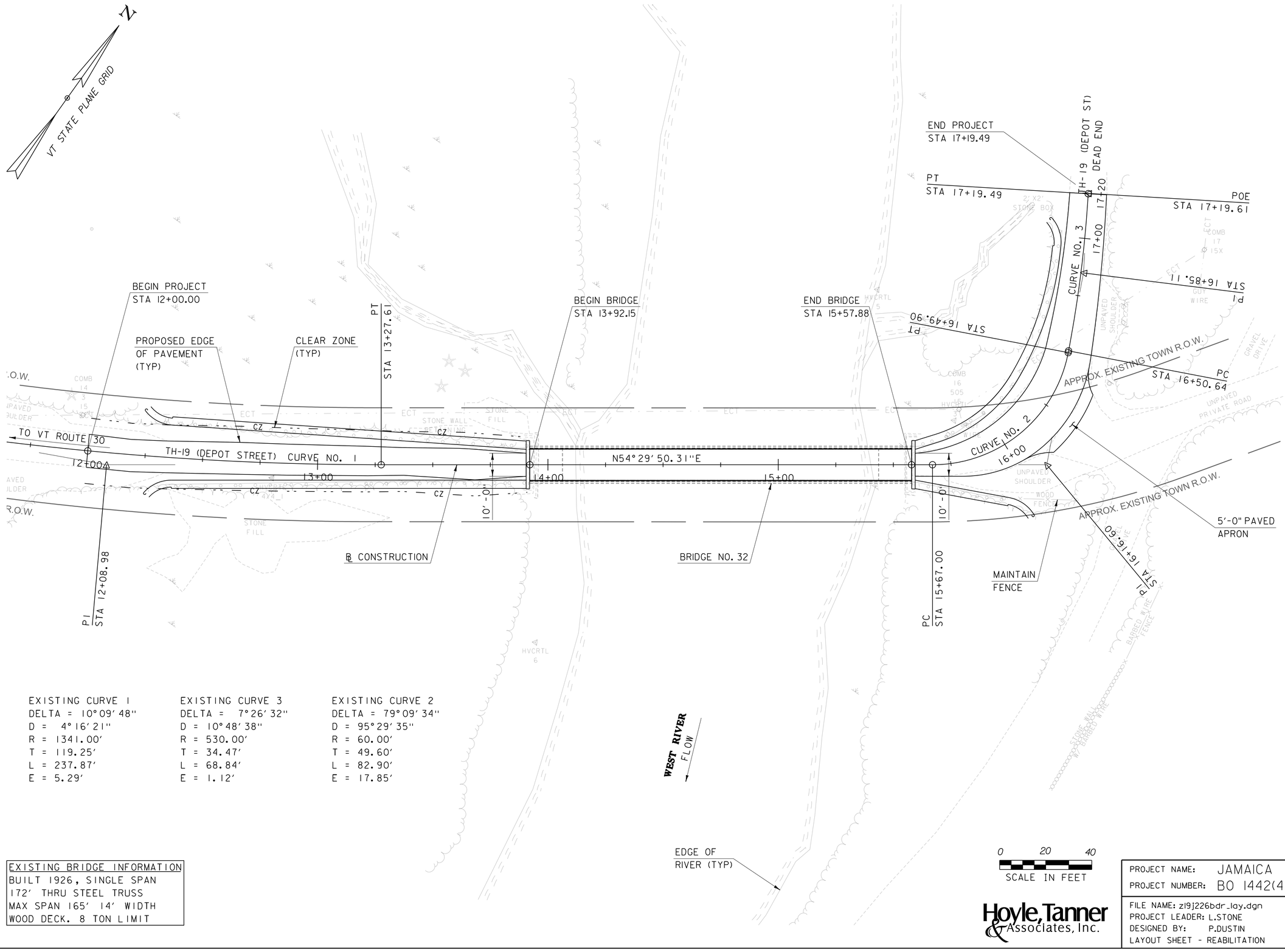
ROADWAY TYPICAL SECTION

STA 12+00.00 - STA 13+90.56
STA 15+59.46 - STA 17+19.49
NOT TO SCALE

Hoyle, Tanner & Associates, Inc.

PROJECT NAME:	JAMAICA
PROJECT NUMBER:	BO 1442(42)

FILE NAME: z19j226typ.dgn	PLOT DATE: 1/29/2021
PROJECT LEADER: L.STONE	DRAWN BY: P.DUSTIN
DESIGNED BY: P.DUSTIN	CHECKED BY: T. CLARK
ROADWAY TYPICAL SECTION	SHEET 1 OF 10



EXISTING CURVE 1
DELTA = 10°09'48"
D = 4°16'21"
R = 1341.00'
T = 119.25'
L = 237.87'
E = 5.29'

EXISTING CURVE 3
DELTA = 7°26'32"
D = 10°48'38"
R = 530.00'
T = 34.47'
L = 68.84'
E = 1.12'

EXISTING CURVE 2
DELTA = 79°09'34"
D = 95°29'35"
R = 60.00'
T = 49.60'
L = 82.90'
E = 17.85'

EXISTING BRIDGE INFORMATION
BUILT 1926, SINGLE SPAN
172' THRU STEEL TRUSS
MAX SPAN 165' 14' WIDTH
WOOD DECK. 8 TON LIMIT

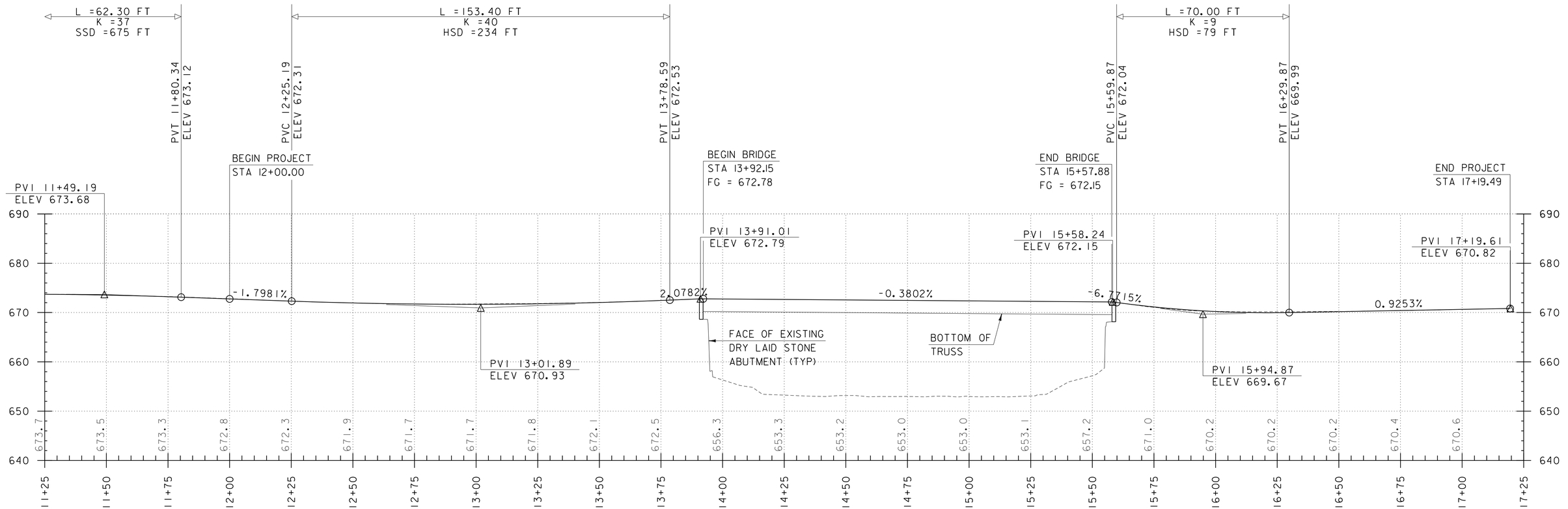
0 20 40
SCALE IN FEET

Hoyle, Tanner & Associates, Inc.

PROJECT NAME: JAMAICA
PROJECT NUMBER: BO 1442(42)

FILE NAME: z19j226bdr_lay.dgn
PROJECT LEADER: L.STONE
DESIGNED BY: P.DUSTIN
LAYOUT SHEET - REABILITATION

PLOT DATE: 1/29/2021
DRAWN BY: P.DUSTIN
CHECKED BY: T. CLARK
SHEET 2 OF 10



TOWN HIGHWAY 19 PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND

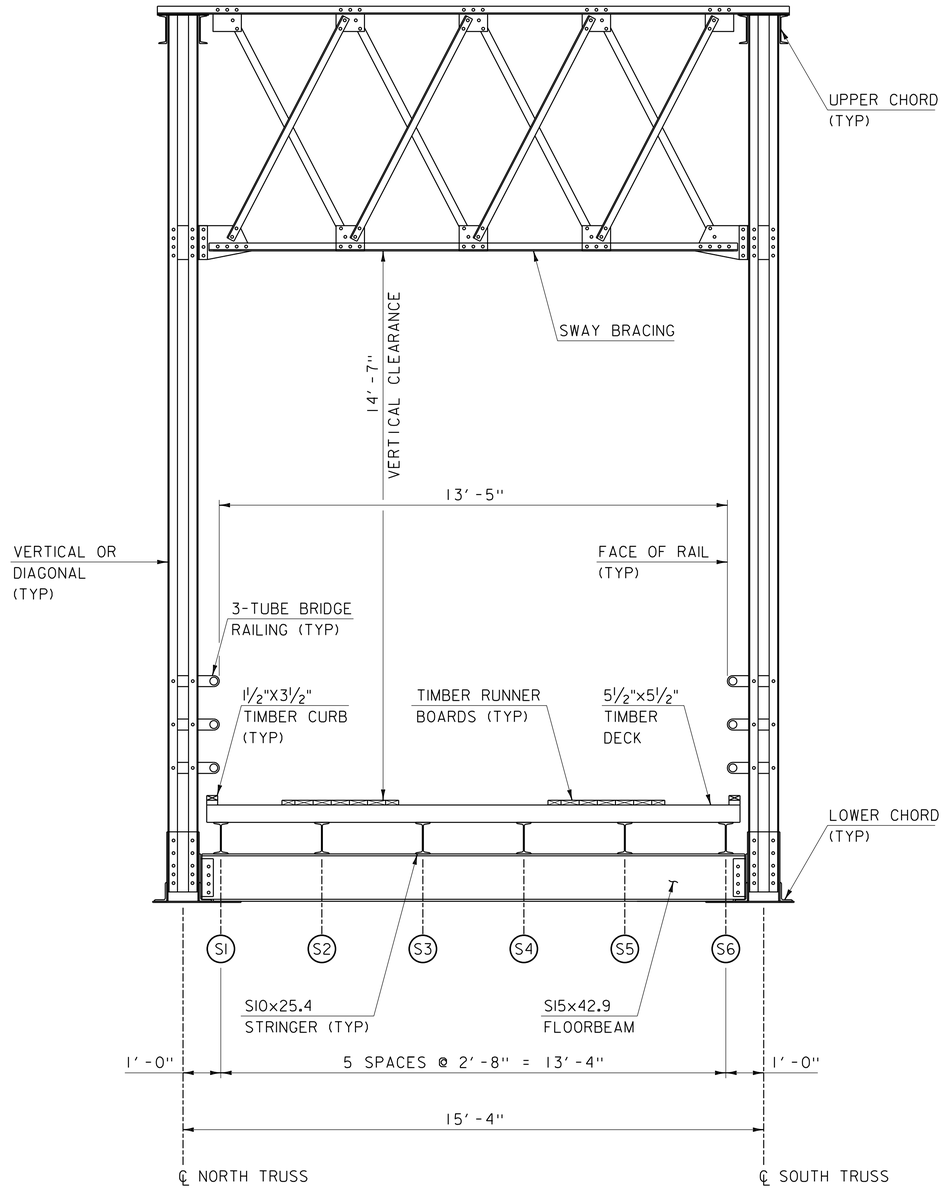
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE

Hoyle, Tanner & Associates, Inc.

PROJECT NAME: JAMAICA
PROJECT NUMBER: BO 1442(42)

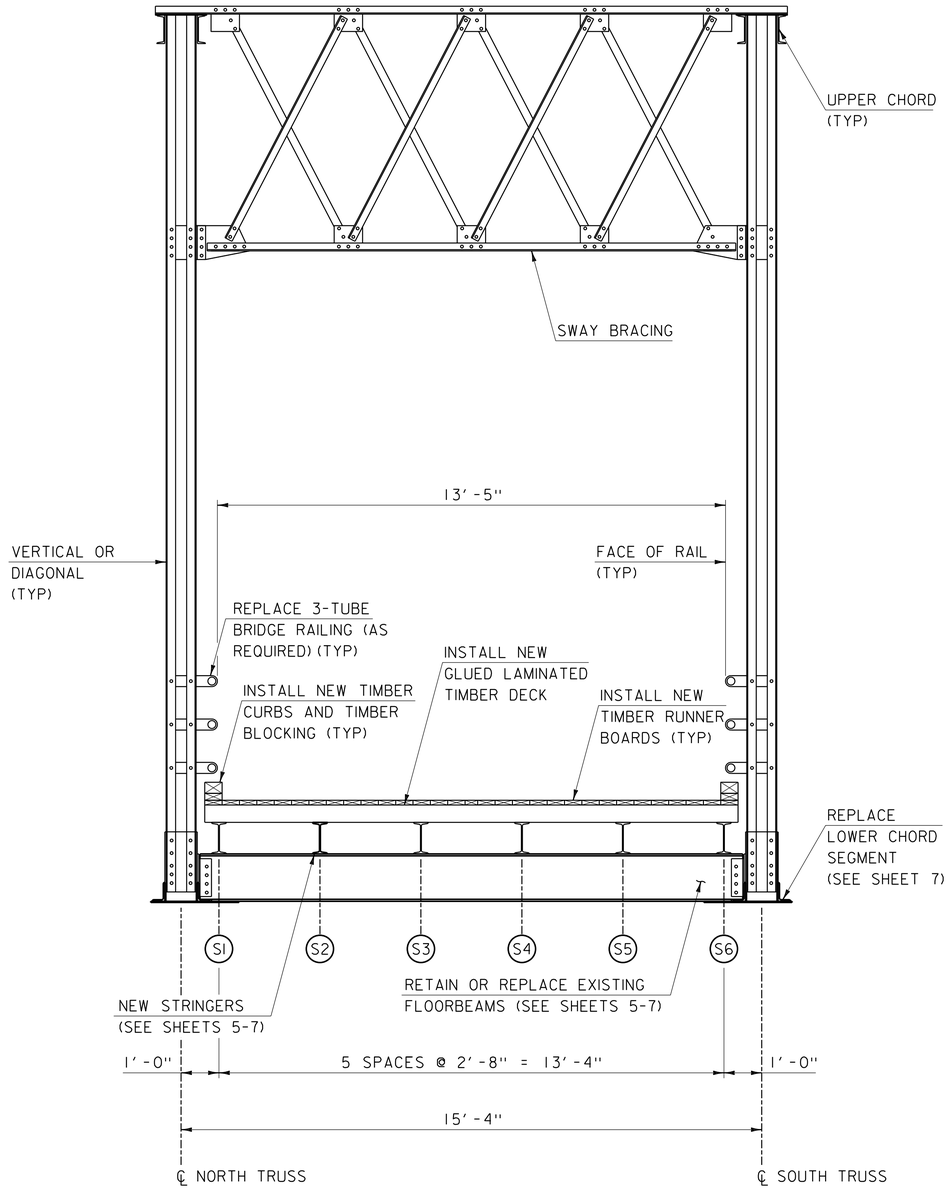
FILE NAME: z19j226pro.dgn
PROJECT LEADER: L.STONE
DESIGNED BY: VTRANS
PROFILE SHEET - REHABILITATION

PLOT DATE: 1/29/2021
DRAWN BY: P.DUSTIN
CHECKED BY: T.CLARK
SHEET 3 OF 10



EXISTING BRIDGE SECTION

SCALE: ½" = 1'-0"

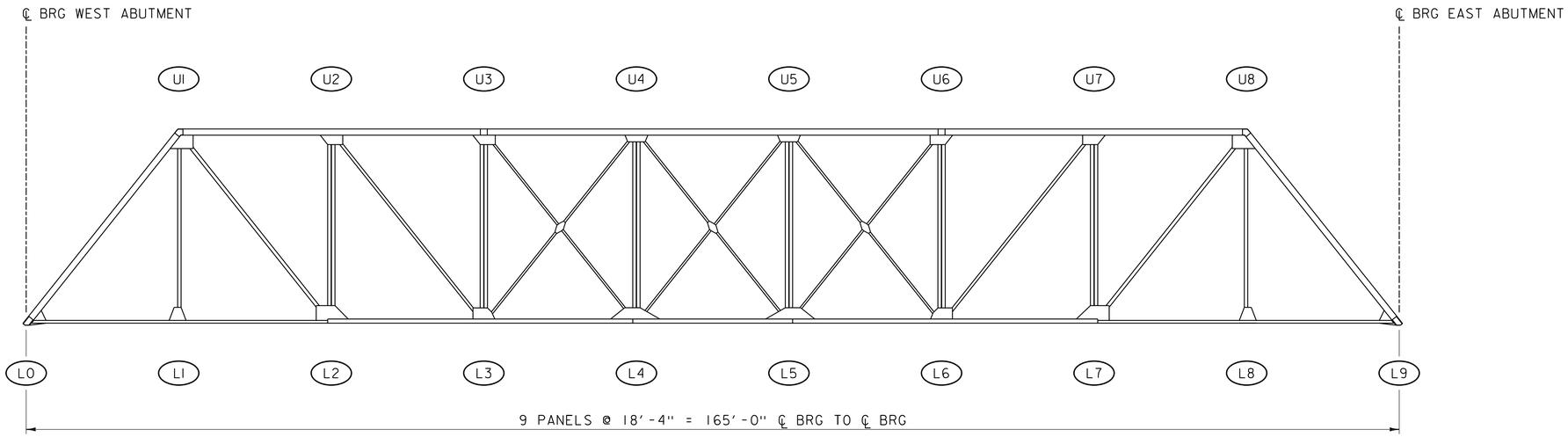


PROPOSED BRIDGE SECTION

SCALE: ½" = 1'-0"

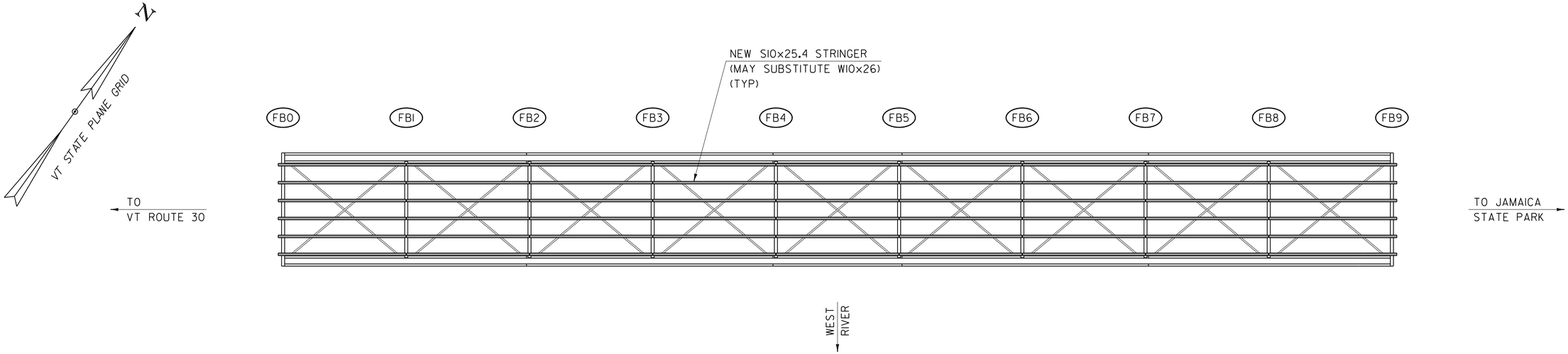
PROJECT NAME:	JAMAICA
PROJECT NUMBER:	BO 1442(42)
FILE NAME: z19j226supl.dgn	PLOT DATE: 1/29/2021
PROJECT LEADER: L.STONE	DRAWN BY: P.DUSTIN
DESIGNED BY: B.SCHORN	CHECKED BY: R.WOOD
TYPICAL BRIDGE SECTIONS	SHEET 4 OF 10

Hoyle, Tanner & Associates, Inc.



TRUSS ELEVATION

SCALE: 1/8" = 1'-0"



FLOOR FRAMING PLAN

SCALE: 1/8" = 1'-0"

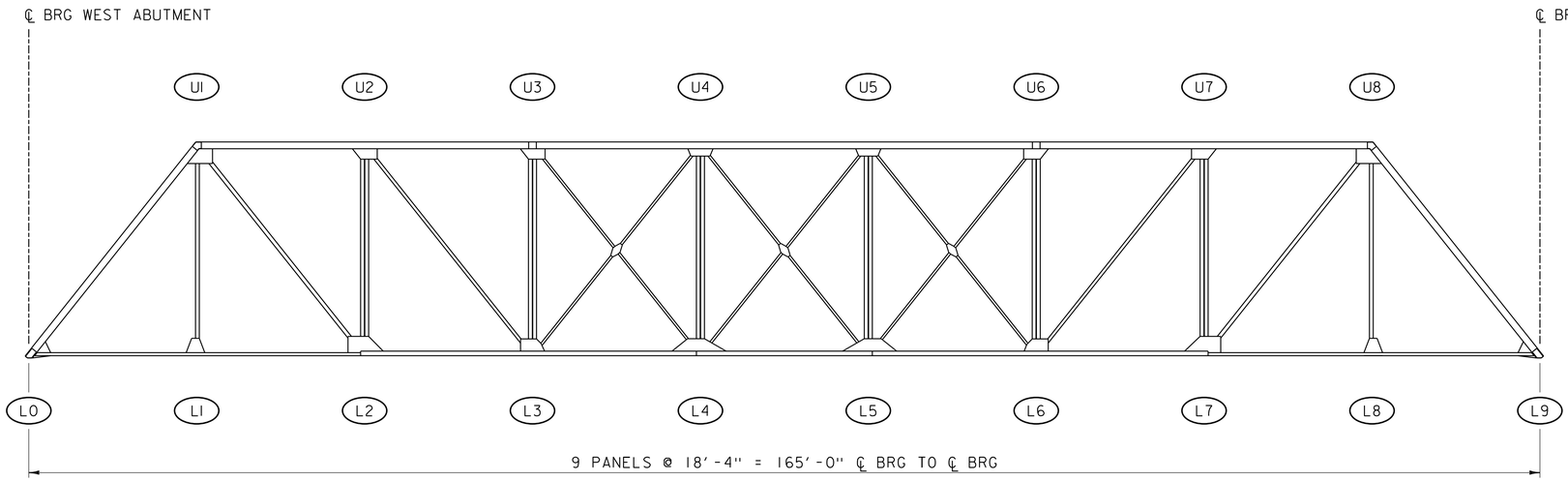
LEGEND

- MEMBER TO BE REPLACED
- (XX) TRUSS NODE LOCATION
- (FBX) FLOOR BEAM LOCATION

Hoyle, Tanner & Associates, Inc.

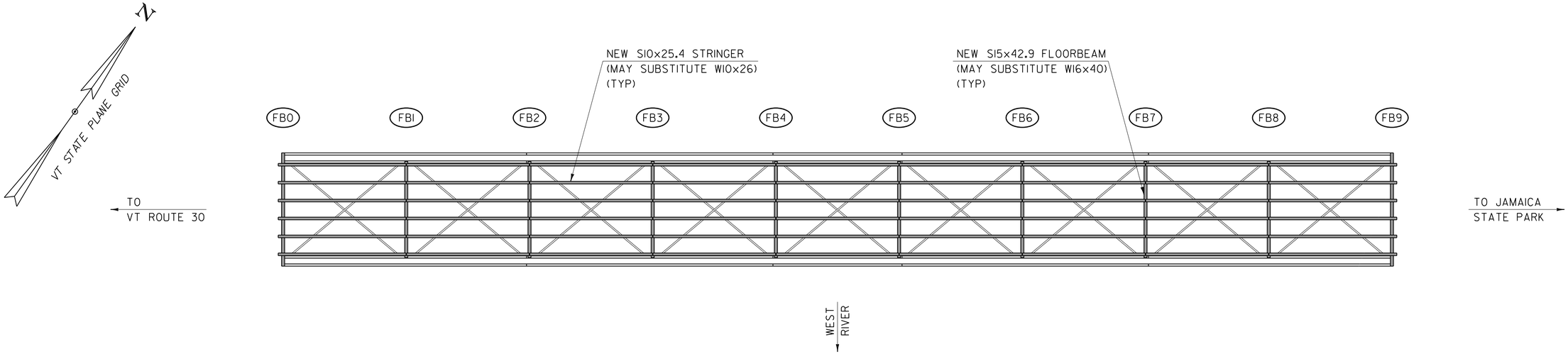
PROJECT NAME:	JAMAICA
PROJECT NUMBER:	BO 1442(42)

FILE NAME: z19j226sup2.dgn	PLOT DATE: 1/29/2021
PROJECT LEADER: L.STONE	DRAWN BY: P.DUSTIN
DESIGNED BY: B.SCHORN	CHECKED BY: R.WOOD
TRUSS H8 LIVE LOADING	SHEET 5 OF 10



TRUSS ELEVATION

SCALE: 1/8" = 1'-0"



FLOOR FRAMING PLAN

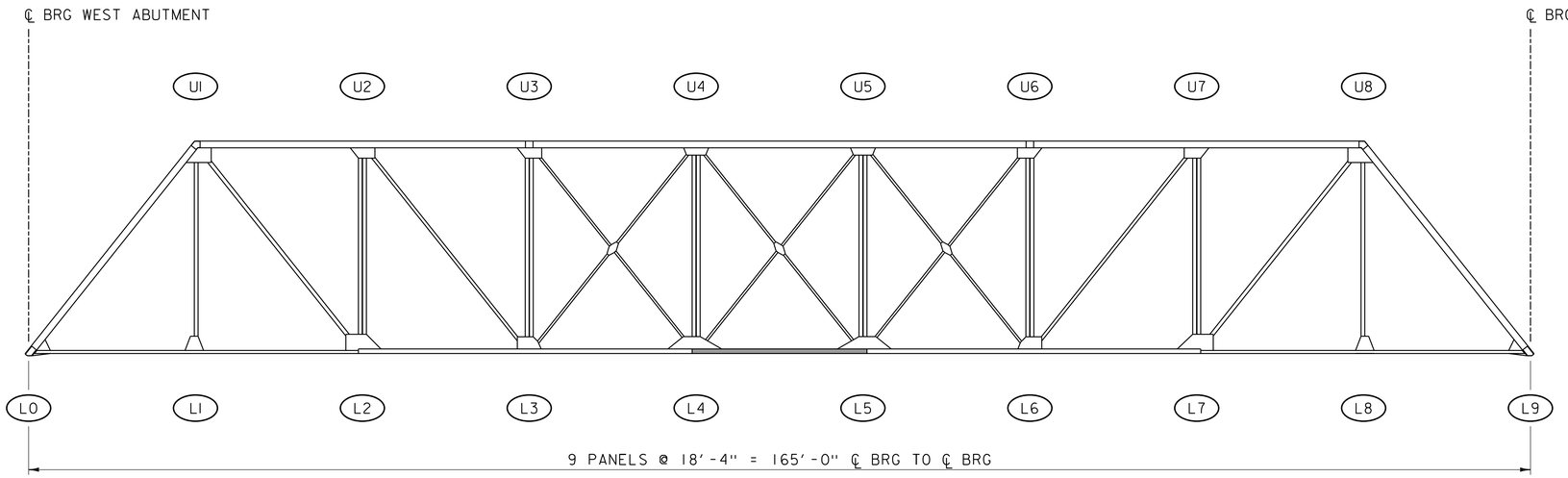
SCALE: 1/8" = 1'-0"

LEGEND

- MEMBER TO BE REPLACED
- (XX) TRUSS NODE LOCATION
- (FBX) FLOOR BEAM LOCATION

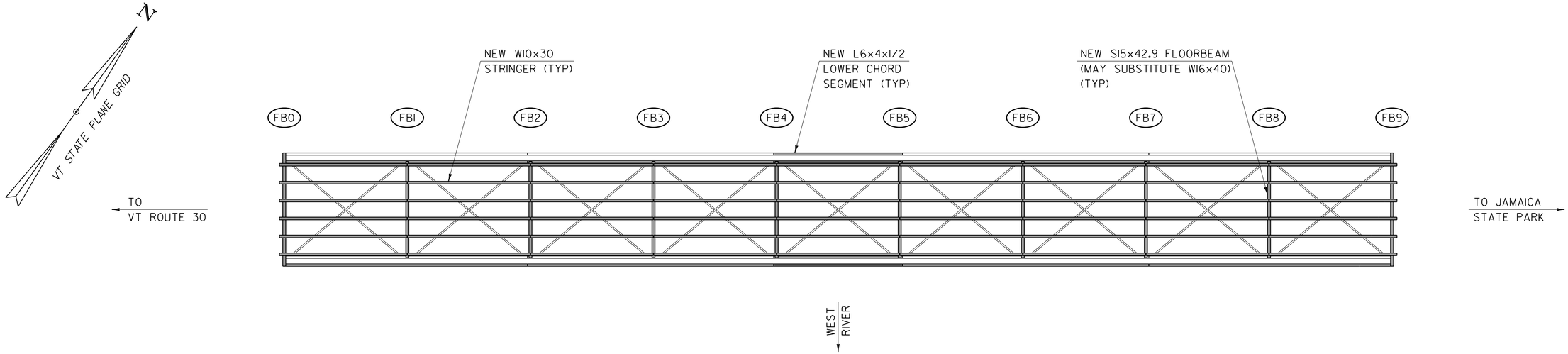
Hoyle, Tanner & Associates, Inc.

PROJECT NAME: JAMAICA	
PROJECT NUMBER: BO 1442(42)	
FILE NAME: z19j226sup2.dgn	PLOT DATE: 1/29/2021
PROJECT LEADER: L.STONE	DRAWN BY: P.DUSTIN
DESIGNED BY: B.SCHORN	CHECKED BY: R.WOOD
TRUSS HI5 LIVE LOADING	SHEET 6 OF 10



TRUSS ELEVATION

SCALE: 1/8" = 1'-0"



FLOOR FRAMING PLAN

SCALE: 1/8" = 1'-0"

LEGEND

- MEMBER TO BE REPLACED
- (XX) TRUSS NODE LOCATION
- (FBX) FLOOR BEAM LOCATION

Hoyle, Tanner & Associates, Inc.

PROJECT NAME:	JAMAICA
PROJECT NUMBER:	BO 1442(42)
FILE NAME: z19j226sup2.dgn	PLOT DATE: 1/29/2021
PROJECT LEADER: L.STONE	DRAWN BY: P.DUSTIN
DESIGNED BY: B.SCHORN	CHECKED BY: R.WOOD
TRUSS H20 LIVE LOADING	SHEET 7 OF 10

N

VT STATE PLANE GRID

℄ BRG ABUTMENT NO. 1

℄ BRG ABUTMENT NO. 2

145'-0"

142'-0"
CLEAR SPAN

BEGIN BRIDGE
STA 2+22.50

END BRIDGE
STA 3+74.17

℄ CONSTRUCTION

N54°29'50"E

BEGIN APPROACH
STA 0+00.00

BEGIN PROJECT
STA 0+25.00

POB
STA 0+00.66

STA 0+06.77

MATCH
EXISTING

PRC
STA 1+16.57

PI
STA 1+62.50

20'-0" (TYP)

CURVE NO. 1

CURVE NO. 2

CURVE NO. 3

cz

2+00

3+00

4+00

0+00

TO VT ROUTE 30

TH-19 (DEPOT STREET)

PROPOSED
BRIDGE

PT
STA 2+06.83

PI
STA 0+63.13

PROPOSED EDGE
OF PAVEMENT
(TYP)

BRIDGE NO. 32
(TO REMAIN)

END APPROACH
STA 4+97.00

TH-19 (DEPOT ST)
DEAD END

MATCH
EXISTING

POE
STA 4+97.07

4+97

PC
STA 3+91.06

PT
STA 4+79.79

END PROJECT
STA 4+72.00

5'-0" PAVED
APRON

APPROX. EXISTING TOWN R.O.W.

PC
STA 4+45.78

RE-GRADED PORTION
OF PRIVATE GRAVEL
ROAD

WEST RIVER
FLOW

EDGE OF
RIVER (TYP)

STONE WALL
RETAINING

STONE
FILL

UNPAVED
SHOULDER

UNPAVED
PRIVATE ROAD

GRAVEL
DRIVE

WOOD
FENCE

BARBED WIRE
FENCE

STONE WALL
W/ BARBED WIRE

HVCRTL
6

ECT

COMB
17
15X

BODY
WIRE

CURVE (1)
DELTA = 31°46'24"
D = 28°56'14"
R = 198.00'
T = 56.35'
L = 109.80'
E = 7.86'

CURVE (2)
DELTA = 26°07'07"
D = 28°56'14"
R = 198.00'
T = 45.93'
L = 90.26'
E = 5.26'

CURVE (3)
DELTA = 84°44'05"
D = 95°29'35"
R = 60.00'
T = 54.72'
L = 88.73'
E = 21.21'

EXISTING BRIDGE INFORMATION
BUILT 1926, SINGLE SPAN
172' THRU STEEL TRUSS
MAX SPAN 165' 14' WIDTH
WOOD DECK. 8 TON LIMIT

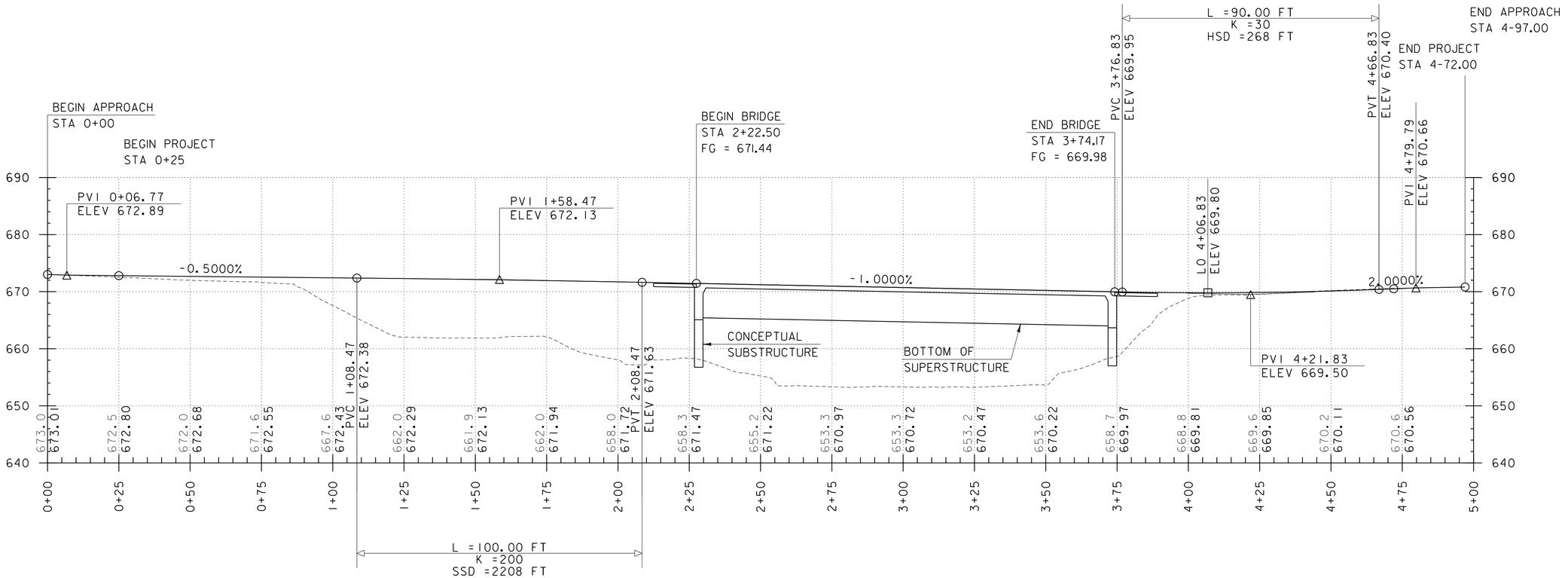
0 20 40
SCALE IN FEET

Hoyle, Tanner & Associates, Inc.

PROJECT NAME: JAMAICA
PROJECT NUMBER: BO 1442(42)

FILE NAME: z19j226bdr_lay.dgn
PROJECT LEADER: L.STONE
DESIGNED BY: P.DUSTIN
LAYOUT SHEET - ADAPTIVE REUSE

PLOT DATE: 1/29/2021
DRAWN BY: P.DUSTIN
CHECKED BY: T. CLARK
SHEET 8 OF 10



ADAPTIVE REUSE ALIGNMENT PROFILE

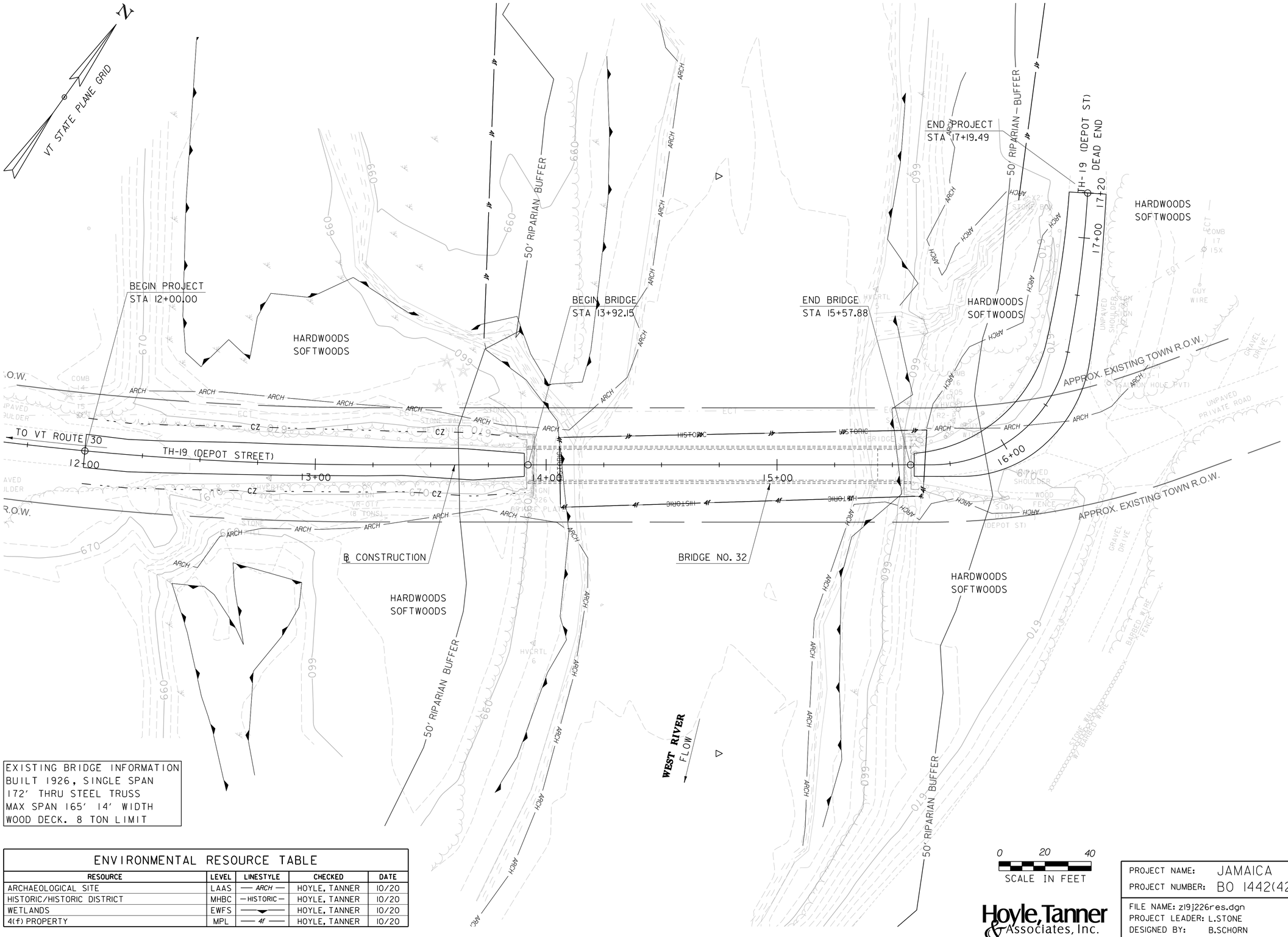
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE

Hoyle, Tanner & Associates, Inc.

PROJECT NAME: JAMAICA	
PROJECT NUMBER: BO 1442(42)	
FILE NAME: z19j226pro.dgn	PLOT DATE: 1/29/2021
PROJECT LEADER: L.STONE	DRAWN BY: P.DUSTIN
DESIGNED BY: VTRANS	CHECKED BY: T. CLARK
PROFILE SHEET - ADAPTIVE REUSE	SHEET 9 OF 10



EXISTING BRIDGE INFORMATION
BUILT 1926, SINGLE SPAN
172' THRU STEEL TRUSS
MAX SPAN 165' 14' WIDTH
WOOD DECK. 8 TON LIMIT

ENVIRONMENTAL RESOURCE TABLE

RESOURCE	LEVEL	LINESTYLE	CHECKED	DATE
ARCHAEOLOGICAL SITE	LAAS	— ARCH —	HOYLE, TANNER	10/20
HISTORIC/HISTORIC DISTRICT	MHBC	— HISTORIC —	HOYLE, TANNER	10/20
WETLANDS	EWFS	——▼——	HOYLE, TANNER	10/20
4(f) PROPERTY	MPL	— 4f —	HOYLE, TANNER	10/20

0 20 40
SCALE IN FEET

Hoyle, Tanner & Associates, Inc.

PROJECT NAME: JAMAICA
PROJECT NUMBER: BO 1442(42)

FILE NAME: z19j226res.dgn
PROJECT LEADER: L.STONE
DESIGNED BY: B.SCHORN
RESOURCE SITE PLAN

PLOT DATE: 1/29/2021
DRAWN BY: P.DUSTIN
CHECKED BY: R.WOOD
SHEET 10 OF 10

CORPORATE HEADQUARTERS

150 Dow Street
Manchester, NH 03101

BRANCH OFFICES

Pease International Tradeport
100 International Drive, Suite 360
Portsmouth, NH 03801

50 High Street, 4th Floor, Suite 49
North Andover, MA 01845

106 Lafayette Street, Unit 2D
Yarmouth, ME 04096

125 College Street, 4th Floor
Burlington, VT 05401

95 E. Mitchell Hammock Road, Suite 200
Oviedo, FL 32765