STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Jericho BF 0209(10)

FAS ROUTE 209 (TH 4/BROWNS TRACE), BRIDGE 15 OVER MILL BROOK

December 13, 2021

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I. Site Information

Bridge 15 is a Town owned bridge located on FAS Route 209 (TH 4/Browns Trace Road) approximately 3.3 miles north of the junction with US Route 2. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Minor Arterial
Bridge Type	Concrete T-Beam Bridge
Bridge Span	38 feet
Year Built	1927, Reconstructed in 1962
Ownership	Town of Jericho

Need

Bridge 15 carries FAS Route 209 across Mill Brook. The following is a list of deficiencies of Bridge 15 and FAS Route 209 in this location:

1. The deck is in satisfactory condition. The bays on the western side of the bridge have some hairline cracking and small areas of honeycombing present. Additionally, the concrete fascias are in fair condition with some minor cracking, light scaling and efflorescence leakage along the downstream side.

2. The Concrete T-beams are in fair condition. The western beams have hairline cracking with some light scaling surrounding areas of honeycombing. The middle sistered-up beams have heavy spalling, and the stirrups are rusted through. The longitudinal steel reinforcing of the sistered beams is thinning with heavy rust scaling present.

3. The substructures are in fair condition overall, with poorly rated wingwalls and footings.

    a. Northern Abutment: The northern abutment is in satisfactory condition with some areas minor scaling along the downstream portions of abutment stem surrounding abutment drains. A few small vertical cracks with efflorescence leakage and saturation are present in older section. Newer widened abutment along the upstream side has minor abrasion along the lower portions.

    b. Southern Abutment: The southern abutment is in fair to poor condition with severe spalling and scaling along the downstream portion of abutment stem wall. There is a ¼-inch full height vertical crack with surrounding areas of scaling. The lower portions of the abutment stem have severe scaling along the mid portions, 1 to 2-feet in height and 2-feet deep. Various map cracking with efflorescence leakage is present along the downstream portions of the stem. The footing has severe scaling and breakup with vertical cracks and deep voids forming in the lower portions of the abutment.

    c. Wingwalls: The downstream wingwalls are in poor condition. The wingwall along the southern side has map cracking with efflorescence leakage and scaling along the outer portions with severe scaling present at the abutment/wingwall joint exposing steel reinforcing. The wingwall along the northern side has heavy efflorescence leakage along map cracking and heavy scaling along the end of wingwall and various lighter scaling along face of wing. Concrete wingwalls along the upstream side are in fairly good condition having some minor abrasion along the lower portions.

4. The sag vertical curve and stopping sight distance through the project area are substandard.

5. The bridge does not meet the minimum bank full width requirements.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2025 and 2045.

TRAFFIC DATA	2025	2045
AADT	3,200	3,500
DHV	480	520
ADTT	210	360
%T	5.2	8.3
%D	59	59

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 3,500, a DHV of 520, and a design speed of 35 mph for a Minor Arterial.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 4.3	11'/2.5' (27')	11'/5' (32')	Substandard
Bridge Lane and Shoulder Widths	VSS Section 4.3	11'/5' (32')	11'/5' (32')	
Clear Zone Distance	VSS Table 4.4	No Issues Noted	14' fill / 12' cut	
Banking	VSS Section 4.13	Varies	8% (max)	
Speed		35 mph (Posted)	35 mph (design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 640' (southern approach)	R_{min} = 628' @ e = 6.4%	
Vertical Grade	VSS Table 4.5	11.65% (northern approach)	9% (max) for mountainous terrain	Substandard
K Values for Vertical Curves	VSS Table 4.1	K_{sag} = 21	40 crest / 50 sag	Substandard
Vertical Clearance	VSS Section 5.8	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 4.1	136'	225'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 4.7	• 5' shoulder over bridge • 2.5' shoulder on approach	4' Shoulder	Substandard on approach
Bridge Railing	Structures Design Manual Section 13	Triple clear view steel rail with Pedestal mounted cast iron steel posts	TL-2	Not Crash Tested - Substandard
Hydraulics	VTrans Hydraulics Section	1. Passes Q_{50} storm event with approximately 3.5' of freeboard 2. 30' clear span	1. Pass Q_{50} storm event with 1.0' of freeboard 2. 40'(min) Bank full width	Substandard BFW
`	SM, Ch. 3.4.1	Not Structurally Deficient	Design Live Load: HL-93	

Inspection Report Summary

Deck Rating	6 Satisfactory
Superstructure Rating	5 Fair
Substructure Rating	5 Fair
Channel Rating	6 Satisfactory

8/18/2020 – Structure is in need of major rehab in coming years. Sistered up concrete t-beams #3 and #4 have severe spalling with rusted through stirrups and rust scaling along longitudinal reinforcing and should be cleaned and patched. Abutment #2 has ~1/4" wide full height vertical crack below beam #6 and heavy scaling with large voids along footing / kneewall and lower portions of abutment stem. Kneewall should be replaced and voids in abutment stem should be cleaned and patched. Downstream wings should be replaced due to heavy scaling and map cracking present. ~SMP/SEP

8/14/2018 – Saturation along the base of the south abutment continues due to ground water w/ deep spalling that penetrates as much as 20" near the center of the stemwall. Spalling has caused the failure of the stubwall w/ fractured segments leaning towards the channel. Spalling continues to penetrate vertically along the downstream wingwall of the south abutment due to the open joint adjacent to the curb, spalling penetrates as much as 12". Concrete repairs are needed in the near future as spalling could soon penetrate to the backfill. Consider installing buried drainage pipe behind the south abutment, extending out through the downstream wingwall to help divert groundwater away from the substructure. ~JW/MC

8/11/2016 – This structure needs to have extensive concrete repairs made along the south abutment and to the downstream wingwalls. Spalling has led to the detachment of the stubwall footing of the south abutment, with loose granular concrete throughout. Sistered up tee beams 3 and 4 have extensive spalling and delams throughout due to heavy saturation. The beams need to have concrete repairs made from above and below. The wearing surface should be stripped and re-applied with a membrane installed to better protect the beams. ~JW/AC

08/21/2014 – Sistered concrete T-beams need extensive cleaning and patch repair. Both abutments, especially the south abutment, also need concrete repair work to correct heavy scaling. Southeast end damaged steel beam approach rail needs repair. ~MJ/JS

08/03/2012 – Corroded box beam clear view bridge rail has been repaired since the last inspection with new box rail sections. T beams 3 and 4 which are sistered, have heavy concrete deterioration and need extensive cleaning and patch repair work. Abutment #2 has some heavy and deep abrasion along the concrete and also needs repair. ~MJ/DK

Hydraulics

The existing structure meets the current standards of the VTrans Hydraulic Manual; however, with a clear span of 30-feet, it does not meet the stream equilibrium standards for bank full width. The VTrans hydraulics section has recommended moving the northern abutment back to meet the minimum bank full width requirement of 40-feet. Currently, the structure has approximately 3.5-feet of freeboard at the 2% Annual Exceedance Probability (AEP) (Q_{50} design flow) and 2.8-feet of freeboard at the 1% AEP (Q_{100}). The VTrans Hydraulics Section has made recommendations for a new structure that can be found in the preliminary hydraulics report in Appendix D.

Utilities

The existing utilities are shown on the Existing Conditions Layout Sheet, and are as follows:

Municipal Utilities

- There are no municipal water or sewer mains in the project area.

Public Utilities

Underground:

- There are underground utilities owned by Consolidated Communications in the project area.

Aerial:

- There are aerial utilities in the project area owned by Vermont Electric Cooperative, Consolidated Communications, and Comcast.

Depending on the scope of the project, there may be necessary adjustments to underground utilities' locations, pole relocations, manholes, and valves.

Right Of Way

There is an existing 4-rod Right-of-Way (ROW) centered on TH 4. The wingwalls in the northwest and southeast quadrant are located just outside and just inside the existing ROW, so some minimal rights are expected to be needed for all construction alternatives. The existing ROW is plotted on the Existing Conditions Layout Sheet.

Resources

The environmental resources present at this project are shown on the Existing Conditions Layout Sheet, and are as follows:

Biological:

Wetlands/Watercourses

There are three wetland areas within the project area. They are all located to the south of the bridge. See the Natural Resource ID in Appendix G for additional information.

Mill Brook flows southwesterly through the project site. The brook substrate consists of cobble and has a 12.54 sq. mi. watershed according to the ANR Natural Resource Atlas. There is an ephemeral stream that flows off the eastern hillside and enters wetland A and B then eventually flows into Mill Brook.

Wildlife Habitat

There is a large, mapped deer wintering area along the eastern portion of the project. According to the ANR BioFinder habitat mapping the project area is within "highest priority" habitat blocks (figure 2) that are of the greatest importance to wildlife movement and genetic exchange. Movement of terrestrial animals move along riparian zones of the Mill Brook and there is active wildlife crossing at this site south of the bridge structure. Numerous game trails were observed in the field and a dead fisher was also found in the roadway.

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

Two RTE species are located downstream of the site. The occurrences were the Wood Turtle (S3, uncommon and a candidate species for federal listing) and the Smooth Green Snake (S3, uncommon).

The project area is within the range of the northern long-eared bat. Suitable habitat consists of forested areas with suitable roost trees that exhibit peeling bark, cracks, crevices, and holes. This species is also known to roost on bridge structures. An acoustic survey is planned for the summer of 2021 to determine absence/presence of northern long-eared bats.

Agricultural

Soils within the northeast quadrant are mapped as Agawam fine sandy loam, which are classified as Prime Agricultural soils. No active farming occurs within the immediate area of the project.

Hazardous Materials:

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

Historic:

Bridge 15 is not historic, and there are no above-ground historic properties in the project area.

Archaeological:

There are no areas of archaeological sensitivity within the project limits.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation developed an Accelerated Bridge Program in 2012, which focuses on expedited delivery of construction plans, permitting, and Right-of-Way, as well as accelerated construction of projects in the field. One practice that will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with accelerated construction techniques and incentives to encourage contractors to complete projects early. The Agency will consider the closure option on projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements and systems for new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Bridge Construction should provide enhanced safety for the workers and the travelling public while maintaining project quality. The following options have been considered:

Option 1: Off-Site Detour

This option would close the bridge and reroute traffic onto an offsite detour. It would be the responsibility of the Town of Jericho to choose the preferred detour route, and design and manage the traffic control plan. The Town would also be responsible for management of emergency services

throughout the closure period. The shortest detour route that may be considered by the Town is as follows:

> **Detour Route 1:** Browns Trace Road (FAS 209/TH 4), to Fitzsimonds Road and Barber Farm Road, back to Browns Trace Road (3.7 mi end-to-end)

The Town has noted that Fitzsimonds Road is a narrow gravel road that may not be ideal for a signed detour route. The detour on Governor Peck Hwy and VT Route 117 is paved and may be preferred as a signed detour route. The route is as follows:

> **Detour Route 2:** Browns Trace Road (FAS 209/TH 4), to Barber Farm Road, VT Route 117, and Governor Peck Hwy, back to Browns Trace Road (9.0 mi end-to-end)

An 11-11 permit would be required for the Town to install detour signs in the State's Right-of-Way along VT Route 117.

A map of the detour routes can be found in Appendix N.

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease project costs and construction duration. This option would not require the need to obtain rights from adjacent property owners for a temporary bridge. This option reduces the time and cost of the project both at the development stage and construction. Additionally, the local share would be reduced by 50% if the Town decides to close the bridge during construction.

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

Option 2: Phased Construction

Standard phased bridge construction builds one-half of the structure and then the other half while maintaining traffic on one lane of the bridge structure. This allows keeping the road open during construction, while having minimal impacts to adjacent property owners and environmental resources.

While the time required to develop a phased construction project would remain the same, the time required to complete a phased construction project increases because some of the construction tasks have to be performed multiple times. In addition to the increased design and construction costs mentioned above, the costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space. Phased construction is usually considered when the benefits include reduced impacts to resources and decreased costs and development time by not requiring the purchase of additional ROW.

Based on the current traffic volumes, it is acceptable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal. The existing bridge is 32 feet wide, which provides ample room to provide enough of a working width to make this method possible.

Advantages: Traffic flow can be maintained through the project corridor during construction with minimal impacts to adjacent properties or wetlands.

Disadvantages: This option would increase the design and construction costs. Additionally, phased construction would result in a longer, more expensive, and less safe construction project since vehicles would be driving through an active construction site.

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed on either side of Browns Trace Road. A temporary bridge on either side would require additional rights from adjacent property owners and would require a significant amount of tree clearing. A temporary bridge on the upstream side would have impacts to wetlands.

A one-lane alternating temporary bridge would be adequate based on the daily traffic volumes. A one-lane temporary bridge would need to be signalized. See the Temporary Bridge Layout Sheets in Appendix O.

Advantages: Traffic flow can be maintained through the project corridor during construction.

Disadvantages: This option would require additional Right-of-Way acquisition for placement of the temporary bridge. There would be decreased safety to the workers and to vehicular traffic, because of cars driving near the construction site, and construction vehicles entering and exiting the construction site. This traffic control option would be costly, and time consuming, as construction activities would take a second construction season, in order to set up the temporary bridge. This option has more extensive ecological impacts on riparian and wetland areas.

III. Alternatives Discussion

Bridge 15 is not considered structurally deficient; however, the existing sistered-up middle T-beams have severe spalling with rusted reinforcement. Additionally, the southern abutment has a full height vertical crack and heavy spalling with large voids in the stemwall at the footing.

No Action

This alternative would involve leaving the bridge in its current condition. Bridge 15 is not considered structurally deficient; however, the existing T-beams and substructure are only in fair condition and continue to deteriorate, with a considerable amount of deterioration and patches with exposed rebar at the center beams as well as large voids in the stem walls. Additionally, the hydraulic clearspan is substandard. Although the bridge is not in imminent danger of collapse, it will eventually be posted for lower traffic loads. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Structure Rehabilitation

While there are many substandard features associated with this stretch of Browns Trace Road, such as approach shoulder widths, clear span, vertical alignment, and bicycle accommodations at the approaches, the superstructure and stem wall are the items that will require work within the next 10 years. Thus, the primary goal of a rehabilitation option will be to rectify the superstructure and abutment issues. There are two types of superstructure rehabilitation options available for concrete structures: minor rehabilitation and superstructure replacement.

Alternative 1: Minor Rehabilitation

This rehabilitation option includes the minimal amount of work necessary to extend the useful life of the bridge. Any loose concrete on the underside of the beams and deck is removed from the structure. Then forms are constructed such that a thin layer of new concrete can be placed to replace this removed concrete. This repair would be concentrated at the sistered-up T-beams. There are several disadvantages with this method of rehabilitation in this situation. The first is that most of the patching is overhead; this requires the work to take place in difficult circumstances, where the work is taking place in the river. The concrete must be removed without spoiling the river and the new concrete must be placed from underneath the bridge. Second, having newer non-chloride laced concrete adjacent to the existing concrete usually exacerbates the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 20 years with the addition of sacrificial anodes into the patched structure.

Any bridge seat and substructure repairs would be included for this alternative as well. Due to the location of spalling and voids in the abutment, cofferdams would likely be needed to work in the dry. Both bridge joints would be replaced with flexible joint material. Bearings would be evaluated and replaced as necessary.

Most of this work can be accomplished without impacting traffic on Browns Trace Road. Individual lanes may need to be closed during replacement of the joints and while a membrane and pave is occurring.

This alternative would address the deterioration issues of the existing bridge. However, the bank full width would not be addressed. This option would also not address the substandard bridge railing.

Alternative 2: Superstructure Replacement

Since the existing T-beams are integral with the deck, replacement of the deck only is not recommended. A superstructure replacement option for this bridge would include a new deck, railings, and superstructure, with repairs as follows:

- The existing concrete T-Beams would be removed, and a new precast or cast-in-place deck/superstructure would be constructed.

- The existing bridge seats would be cut down and new bridge seats would be poured to accommodate the new superstructure. This would include replacing the backwalls at each of the abutments. A silane application should be applied to all exposed substructure concrete as part of the project.

- The voids in the southern stem wall would either be repaired, or the stem wall would be fully replaced.

The existing substructure is in fair condition, and it is reasonable to assume that the existing substructure can safely carry anticipated traffic loads for an additional 30 years with repairs listed above.

The existing lane widths and shoulders on the bridge are 11 feet wide and 5 feet wide respectively; this meets the minimum standard. It is proposed that the current typical section is maintained for this alternative.

Advantages: This alternative would address the deterioration issues of the existing bridge, with minimal upfront costs. This option would have minimal impacts to adjacent properties and resources.

Disadvantages: This option would match the existing horizontal and vertical alignments, which are substandard. The new superstructure would have a design life greater than that of the remaining substructures. This option would not address the substandard bank full width.

Maintenance of Traffic: The possible options here would be either an offsite detour, phased construction, or a temporary bridge.

Alternative 3: Full Bridge Replacement On-Alignment

This alternative would replace the existing bridge with a new superstructure as well as a new substructure at the existing location. The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

a. Bridge Width

The current curb to curb width is approximately 32 feet, which meets the minimum standard. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 32-foot width bridge will be proposed.

b. Bridge Length and Skew

The existing bridge has a single span of 38-feet with a 30-degree skew. This provides a clearspan normal to the channel of approximately 30 feet. This clearspan does not meet the ANR bank full width requirement of 40 feet. In order to meet the minimum hydraulic and stream equilibrium standards with reinforced concrete abutments on spread footings, a span length of approximately 50 feet with a 30-degree skew to match site conditions would be needed. In order to reduce the skew to 20-degrees for accelerated construction with integral abutments, a span length of 65-feet would be needed.

c. Superstructure Type

The possible 50' to 65' length bridge types that are most commonly used in Vermont, are a cast-in-place or precast steel and composite concrete deck, and NEXT beams. A precast structure may be the preferred choice if the road is closed during construction due to decreased construction time. The superstructure depth is not critical for meeting hydraulic standards, so the superstructure type shall be determined during the design phase.

d. Substructure Type

The VTrans geotechnical section conducted a field investigation between July 7th, 2021, and July 17th, 2021. Two standard penetration borings were advanced in the roadway near the abutments on either side of the bridge. Bedrock was encountered at a depth of 110 feet below ground surface (bgs) and 120 feet bgs. Any new foundation would likely be either reinforced concrete abutments founded on spread footings or integral abutments supported on piles. The preliminary geotechnical report can be found in Appendix E.

e. Maintenance of Traffic:

Either a temporary bridge, phased construction, or an offsite detour could be utilized for traffic control at this site.

IV. Alternatives Summary

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

Alternative 1: Minor Rehabilitation with Minimal Impacts to Traffic
Alternative 2a: Superstructure Replacement with Traffic Maintained on Off-Site Detour
Alternative 2b: Superstructure Replacement with Traffic Maintained via Phased Construction
Alternative 2c: Superstructure Replacement with Traffic Maintained on a Temporary Bridge
Alternative 3a: Full Bridge Replacement with Traffic Maintained on Off-Site Detour
Alternative 3b: Full Bridge Replacement with Traffic Maintained via Phased Construction
Alternative 3c: Full Bridge Replacement with Traffic Maintained on Temporary Bridge

V. Cost Matrix[1]

Jericho BF 0209(10)		Do Nothing	Alt 1a	Alt 2a	Alt 2b	Alt 2c	Alt 3a	Alt 3b	Alt 3c
			Minor Rehabilitation	Superstructure Replacement			Full Bridge Replacement On-Alignment		
			Temporary Lane Closures	a. Offsite Detour	b. Phased Construction	c. Temporary Bridge	a. Offsite Detour	b. Phased Construction	c. Temporary Bridge
COST	Bridge Cost	$0	540,400	517,800	684,800	595,500	946,700	1,279,000	1,112,100
	Removal of Structure	$0	0	51,200	58,880	51,200	96,000	110,400	96,000
	Roadway	$0	96,000	199,000	329,000	229,000	325,000	445,000	310,000
	Maintenance of Traffic	$0	19,040	77,300	196,600	244,040	108,300	271,600	274,040
	Construction Costs	$0	655,440	845,300	1,269,280	1,119,740	1,476,000	2,106,000	1,792,140
	Construction Engineering & Contingencies	$0	196,632	169,060	190,392	167,961	339,480	631,800	448,035
	Accelerated Premium	$0	0	59,171	0	0	103,320	0	0
	Total Construction Costs w CEC	$0	852,072	1,073,531	1,459,672	1,287,701	1,918,800	2,737,800	2,240,175
	Preliminary Engineering[2]	$0	196,632	295,855	253,856	223,948	221,400	421,200	358,428
	Right of Way	$0	5,000	5,000	25,000	25,000	5,000	25,000	25,000
	Total Project Costs	$0	1,053,704	1,374,386	1,738,528	1,536,649	2,145,200	3,184,000	2,623,603
	Annualized Costs	$0	52,685	45,813	57,951	51,222	28,603	42,453	34,981
TOWN SHARE			52,685	34,360	86,926	76,832	107,260	318,400	262,360
TOWN %			5%	2.5%	5%	5%	5%	10%	10%
SCHEDULEING	Project Development Duration[3]	NA	4 Years	4 Years	4 years	4 Years	4 years	4 years	4 years
	Construction Duration	NA	3 months	4 months	9 months	18 months	6 months	9 months	18 months
	Closure Duration (If Applicable)	NA	NA	45 days	NA	NA	60 days	NA	NA
ENGINEERING	Typical Section - Roadway (feet)	27	27	32	32	32	32	32	32
	Typical Section - Bridge (feet)	11/5 (32)	11/5 (32)	11/5 (32)	11/5 (32)	11/5 (32)	11/5 (32)	11/5 (32)	11/5 (32)
	Geometric Design Criteria	Substandard vertical alignment	Substandard vertical alignment	Substandard vertical alignment	Substandard vertical alignment	Substandard vertical alignment	Substandard vertical alignment	Substandard vertical alignment	Substandard vertical alignment
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No Change	No	No	No	No	No	No	No
	Bicycle Access	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Pedestrian Access	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Hydraulics	Substandard BFW	Substandard BFW	Substandard BFW	Substandard BFW	Substandard BFW	Meets minimum standards	Meets minimum standards	Meets minimum standards
	Utilities	NA	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	No	Yes	No	No	Yes	No	No
	Design Life	10	20	30	30	30	75	75	75

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

VI. Conclusion

We recommend **Alternative 3a**; a full bridge replacement while maintaining traffic on an offsite detour.

Structure:
The existing substructures are only in fair condition. Additionally, the bridge is over 90 years old and has exceeded its expected design life. While the bridge rehabilitation options have the lowest upfront costs, the full bridge replacement option has a lower annualized cost. The southern abutment has severe spalling and deep voids in the lower portion necessitating a significant rehabilitation or replacement of the abutment. This makes the rehabilitation option not as cost effective as the full bridge replacement option. Additionally, the minimum bank full width standard can only be met with a full bridge replacement.

Preliminary borings have found that bedrock lies approximately 110 to 120-feet below ground surface making this a good candidate for an integral abutment bridge. This type of structure will provide superior scour protection and can be constructed more quickly. An integral abutment bridge at this location will have an approximate 65-foot span with a 20-degree skew to meet the minimum bank full width.

The proposed structure will have two 11-foot travel lanes with 5-foot shoulders to meet the minimum standard as set forth in the Vermont State Standards.

Traffic Control:
The recommended method of traffic control is to close the bridge for 60 days and maintain traffic on an offsite detour. This option will have minimal impacts to adjacent properties and will not require additional Right-of-Way acquisition for placement of a temporary bridge. Additionally, there are several reasonable detour routes that could be signed by the Town of Jericho. The shortest detour route available has an end-to-end distance of 3.7 miles and adds 0.3 miles to the through route. By not providing a temporary bridge, both the project development time and the project cost are significantly reduced. By closing the bridge to traffic during construction, the local share is reduced by 50%.

VII. Appendices

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Appendix A: Site Pictures

Looking south over Bridge 15

Looking north over Bridge 15

Looking upstream from Bridge 15

Looking downstream from Bridge 15

Upstream Fascia

Upstream Fascia

Southeast wingwall

Northeast wingwall

Southern Abutment

Sistered-up T-beams

Sistered-up T-beams

Southern Abutment

Voids at southern abutment footing

Full height vertical crack at southern abutment

Spalling at southwest wingwall

Voids at southern abutment footing

Northern abutment

Looking upstream from under Bridge 15

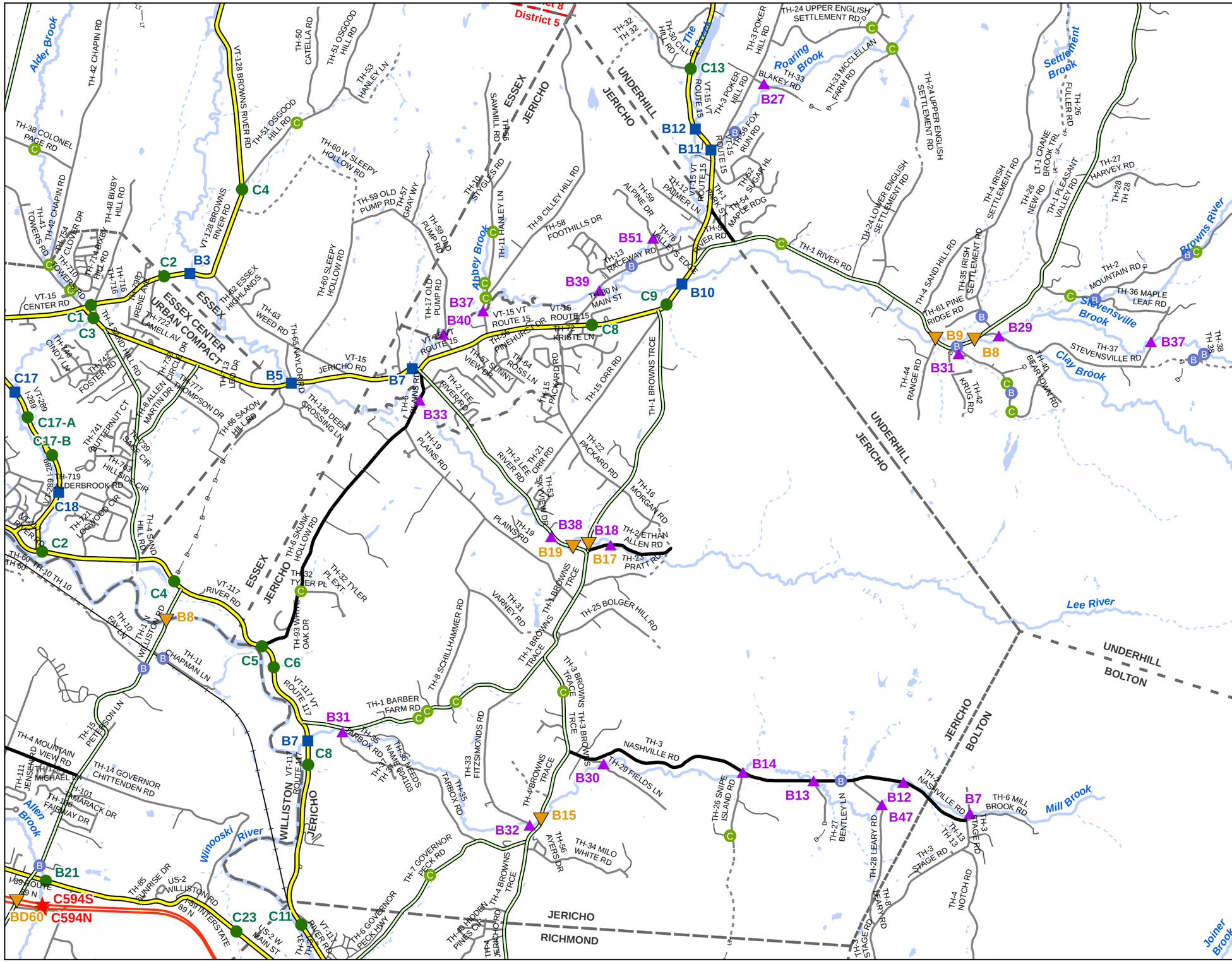
Looking downstream from under Bridge 15

18” CPEP at northwest wingwall

Downstream fascia

Southwest wingwall

Appendix B: Town Map



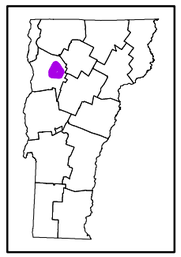
Scale: 1:54,680

N

- INTERSTATE
- STATE LONG
- STATE SHORT
- TOWN LONG
- FAS/FAU
- BIKE PATH
- INTERSTATE
- STATE HIGHWAY
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL
- PRIVATE
- DISCONTINUED
- FAS/FAU HWY
- MAINTENANCE DISTRICT
- POLITICAL BOUNDARY
- VTRANS REGION BOUNDARY
- NAMED RIVER-STREAM
- UNNAMED RIVER-STREAM
- Point from Local Bridge Data *
- Point from Local Culvert Data *

* Points are from local town bridge and culvert inventories. Some points may overlap where VTrans has also conducted an inventory on the Town highway.
Data source: VOBCIT aka VTCulverts

Produced by:
Mapping Section
Division of Policy, Planning and Intermodal Development
Vermont Agency of Transportation
May 2017



JERICHO

COUNTY-TOWN CODE: **0409-0**
CHITTENDEN COUNTY
DISTRICT # 5
District Long Name: Colchester District
VTrans Four Region: Northwest

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 : JERICHO **Bridge No.:** 00015 **District:** 5

Located on: TR 04 **over** MILL BROOK **approximately** 3.3 MI N JCT. U.S.2 **Owner:** TOWN-OWNED

CONDITION

Deck Rating: 6 SATISFACTORY
Superstructure Rating: 5 FAIR
Substructure Rating: 5 FAIR
Channel Rating: 6 SATISFACTORY
Culvert Rating: N NOT APPLICABLE
Federal Str. Number: 200209001504092
Federal Sufficiency Rating: 82.5
Deficiency Status of Structure: ND

AGE and SERVICE

Year Built: 1927 **Year Reconstructed:** 1962
Service On: 1 HIGHWAY
Service Under: 5 WATERWAY
Lanes On the Structure: 02
Lanes Under the Structure: 00
Bypass, Detour Length (miles): 13
ADT: 001300 **% Truck ADT:** 06
Year of ADT: 2017

GEOMETRIC DATA

Length of Maximum Span (ft): 0038
Structure Length (ft): 000039
Lt Curb/Sidewalk Width (ft): 1
Rt Curb/Sidewalk Width (ft): 1.5
Bridge Rdwy Width Curb-to-Curb (ft): 31.9
Deck Width Out-to-Out (ft): 35
Appr. Roadway Width (ft): 027
Skew: 30
Bridge Median: 0 NO MEDIAN
Min Vertical Clr Over (ft): 99 FT 99 IN
Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD
Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: CONCRETE T-BEAM
Number of Approach Spans: 0000 **Number of Main Spans:** 001
Kind of Material and/or Design: 1 CONCRETE
Deck Structure Type: 1 CONCRETE CIP
Type of Wearing Surface: 6 BITUMINOUS
Type of Membrane: 0 NONE
Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD
Transitions: 0 DOES NOT MEET CURRENT STANDARD
Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD
Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD
Structural Evaluation: 5 BETTER THAN MINIMUM TOLERABLE
Deck Geometry: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA
Underclearances Vertical and Horizontal: N NOT APPLICABLE
Waterway Adequacy: 5 OCCASIONAL OVERTOPPING OF BRIDGE & ROADWAY WITH SIGNIFICANT TRAFFIC DELAYS
Approach Roadway Alignment: 7 BETTER THAN MINIMUM CRITERIA
Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS(AS)
Posting Status: A OPEN, NO RESTRICTION
Bridge Posting: 5 NO POSTING REQUIRED
Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED
Posted Vehicle: POSTING NOT REQUIRED
Posted Weight (tons):
Design Load: 2 H 15

INSPECTION

Insp. Date: 082020 **Insp. Freq. (months):** 24 **X-Ref. Route:** **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

8/18/2020 Structure is in need of major rehab in coming years. Sistered up concrete t-beams #3 and #4 have severe spalling with rusted through stirrups and rust scaling along longitudinal reinforcing and should be cleaned and patched. Abutment #2 has ~1/4" wide full height vertical crack below beam #6 and heavy scaling with large voids along footing / kneewall and lower portions of abutment stem. Kneewall should be replaced and voids in abutment stem should be cleaned and patched. Downstream wings should be replaced due to heavy scaling and map cracking present. SMP & SEP

8/14/2018 Saturation along the base of the south abutment continues due to ground water w/ deep spalling that penetrates as much as 20" near the center of the stemwall. Spalling has caused the failure of the stubwall w/ fractured segments leaning towards the channel. Spalling continues to penetrate vertically along the downstream wingwall of the south abutment due to the open joint adjacent to the curb, spalling penetrates as much as 12". Concrete repairs are needed in the near future as spalling could soon penetrate to the backfill. Consider installing buried drainage pipe behind the south abutment, extending out through the downstream wingwall to help divert groundwater away from the substructure. JW/MC

8/11/2016 This structure needs to have extensive concrete repairs made along the south abutment and to the downstream wingwalls. Spalling has led to the detachment of the stubwall footing of the south abutment, with loose granular concrete throughout. Sistered up tee beams 3 and 4 have extensive spalling and delams throughout due to heavy saturation. The beams need to have concrete repairs made from above and below. The wearing surface should be stripped and re-applied with a membrane installed to better protect the beams. JW/AC

08/21/2014 - Sistered concrete T-beams need extensive cleaning and patch repair. Both abutments, especially the south abutment, also need concrete repair work to correct heavy scaling. Southeast end damaged steel beam approach rail needs repair.~ MJ/JS

08/03/2012 - Corroded box beam clear view bridge rail has been repaired since the last inspection with new box rail sections. T beams 3 and 4 which are sistered, have heavy concrete deterioration and need extensive cleaning and patch repair work. Abutment #2 has some heavy and deep abrasion along the concrete and also needs repair. ~ MJ/DK

The bridge guard rail does not meet standards and should be repaired correctly. The spalling in abutment 2 along the bottom at the concrete footing should be repaired along with the downstream end and the wings. The sistered up tee beams continue to deteriorate. DCP

Appendix D: Hydraulics Memo

State of Vermont
Structures and Hydraulics Section
Barre City Place
219 North Main Street, Barre, VT 05641
vtrans.vermont.gov

[phone] 802-595-6493

Agency of Transportation

TO: Laura Stone, Structures, Scoping Engineer

CC: Nick Wark, Hydraulics Engineer

FROM: Christian Boisvert, Hydraulics Project Engineer

DATE: October 21, 2021

SUBJECT: Jericho BF 0209(10), pin#12J634
Jericho TH-4, Br15, over Mill Brook
Coordinates: 44.445380, -72.975324

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

VTrans Hydraulics Unit met with ANR at the site on 10/21/2021, field measurements of bankfull width varied from 36 to 42 ft. ANR indicated a minimum span of 40 feet should be used to span the bankfull width (BFW) and the northern abutment should be moved back to meet this requirement, if feasible.

Bridge 15 is located within a FEMA Special Flood Hazard Area (SFHA) Zone A without Base Flood Elevations.

TH-4 is a Minor Arterial. The Design Storm Flow is 2% AEP (Q50).

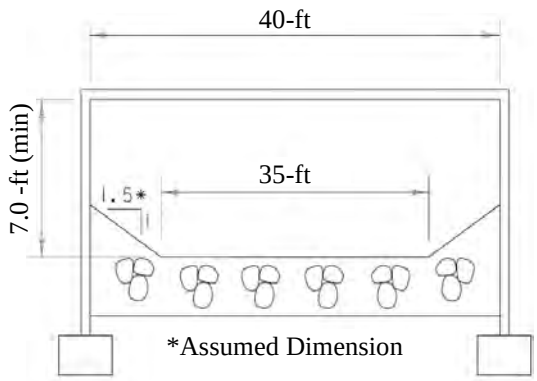
The following was analyzed:

Existing Conditions: Single Span Concrete T-beam Bridge

- 30-foot hydraulic clear span with a low chord elevation of 586.05 feet
- There is approximately 3.5 feet of freeboard at the 2% AEP and 2.8 feet of freeboard at the 1% AEP.
- The existing structure does meet current standards of the VTrans Hydraulic Manual but does not meet state stream equilibrium standards for bankfull width.

Proposed Bridge Replacement: Single Span Bridge

- 40-foot hydraulic clear span with sloping stone fill
- A minimum required low beam elevation of 582.5 feet
- There is approximately 1.0 feet of freeboard at the 2% AEP and 0.6 feet of freeboard at the 1% AEP.
- Does not increase the 100-year base flood elevations
- Assumes no changes to the existing structure alignment/skew



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 using a D50 of 320 mm or 1.05 ft which was determined using available phase 2 geomorphic assessments. Preliminary scour calculations provide a value of ‘zero’ for a contraction scour depth. For preliminary design and estimation only 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.

We recommend verifying the structure span with ANR prior to developing preliminary plans. We will continue trying to coordinate with ANR. If we do not get a confirmation, the project manager should coordinate with ANR during the design phase.

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

Appendix E: Preliminary Geotechnical Information

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Laura Stone, P.E., Scoping Engineer

AJA

From: August Arles, Geotechnical Engineer

Date: August 20th, 2021

Subject: Jericho BF 0209(10) Preliminary Geotechnical Information

1.0 INTRODUCTION

As requested, we have completed our preliminary geotechnical investigation of Bridge 15 on FAS Route 209 (Browns Trace Rd) over Mill Brook in the Town of Jericho. Bridge 15 is a single span concrete bridge, located approximately 0.1 miles north of the intersection of Browns Trace Rd and Fitzsimmons Rd. This review included a subsurface investigation, the examination of well log data, hazardous site information on file at the Vermont Agency of Natural Resources (ANR), as well as published geologic maps relating to surficial and bedrock data. This project is currently in the scoping phase.

2.0 SUBSURFACE INFORMATION

2.1 Published Geologic Data

Mapping conducted in 1970 for the Surficial Geologic Map of Vermont shows the project site consists of glaciofluvial deposits of kame terrace (Doll, 1970).

According to the Bedrock Map of Vermont from 2011, published by the USGS and State of Vermont, the project site is underlain with bedrock consisting of schist and metawacke of the Pinnacle 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 of borings completed in the past 10 years. Research for this project showed that there were no nearby projects within 0.5-miles of the project site.

2.2 Water Well Logs

The Vermont ANR maintains a record of private and public wells drilled in their Atlas database. Published online, these logs may provide general characteristics of the soil strata and depth to bedrock in the area. The three closest logs of wells WRN 264, WRN 279, and TAG 21524 were located approximately 315 feet (ft), 440 ft, and 488 ft from the project site and reported bedrock in WRN 264 and TAG 21524 at a depth of 150 ft and 18 ft, respectively. Bedrock was not encountered in WRN 279 to a reported depth of 139 ft.

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Atlas also maintains a database of all known hazardous waste sites and underground storage tanks. According to their published data there is one site within a 0.5-mile radius, consisting of one hazardous waste generator and one underground storage

tank. The project itself does not lie on a hazardous site, and there is no anticipated impact from the surrounding sites on the project.

2.4 Record Plans

A review of record plans was also a part of this investigation; however, no record plans were available for this project.

3.0 FIELD INVESTIGATION

A field investigation was conducted between July 7th, 201 and July 17th, 2021. Two standard penetration borings were advanced in the roadway near the abutments on either side of the bridge to evaluate the subsurface profile and aid in design and construction of a replacement structure. During drilling operations, split spoon samples and standard penetration tests (SPT) were taken every 5 ft until 50 ft below ground surface (bgs), and then at 10 ft intervals until bedrock. Bedrock was encountered at a depth of 110 ft bgs in B-101 and 120 ft bgs in B-102, corresponding to an approximate bedrock elevation of 479 ft and 469 ft, respectively. 10 ft NXMDC cores were taken in both borings to confirm.

4.0 SOIL PROFILE

The field investigation indicates that the soil strata of the project site generally consist of medium dense gravelly sand to a depth of 10 ft in B-101 and 30 ft in B-102 and medium dense to very dense silts overlying bedrock.

5.0 RECOMMENDATIONS

4.1 Preliminary Foundation Alternatives

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

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

When a design alternative, as well as a preliminary alignment has been chosen, the Geotechnical Engineering Section can review the preferred alternative and assist with any further geotechnical analyses and review of foundation elements required.

If you have any questions or would like to discuss this report, please contact us via email.

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 7/30/2021.

Reviewed by: Stephen Madden, Geotechnical Engineer SPM

cc: Electronic Read File/MG
Project File/CEE
AJA

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Appendix F: Resource ID Completion Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Laura Stone, Project Manager
FROM: Julie Ann Held, Environmental Specialist
DATE: August 5, 2021
Project: Jericho BF 0209(10)

ENVIRONMENTAL RESOURCES:

Archaeological Resources:	___	Yes	X	No	See Archaeological Resource ID Memo
Historic Resources:	___	Yes	X	No	See Historic Resource ID Memo
Wetlands:	X	Yes	___	No	See Natural Resource ID Memo
Aquatic Organism Passage:	X	Yes	___	No	See Natural Resource ID Memo
Agricultural Soils:	X	Yes	___	No	See Natural Resource ID Memo
Wildlife Habitat:	X	Yes	___	No	See Natural Resource ID Memo
Endangered Species:	X	Yes	___	No	See Natural Resource ID Memo
Stormwater Considerations:	___	Yes	X	No	See Stormwater Resource ID Memo-See Design Considerations
6(f) Properties:	___	Yes	X	No	
Hazardous Waste:	___	Yes	X	No	
Urban Background Area:	___	Yes	X	No	
Wild Scenic Rivers:	___	Yes	X	No	
Act 250 Permits:	___	Yes	X	No	
FEMA Floodplains:	X	Yes	___	No	This project is located in a Type A FEMA Flood Hazard area
Flood Hazard Area:	X	Yes	___	No	This project is located in a Type A Flood Hazard area, depending on the scope of work a FHARC permit may be required.
River Corridor:	X	Yes	___	No	This project is located along Mill Brook. Any work in the stream or along with banks will require a RME coordination.
US Coast Guard:	___	Yes	X	No	
Lakes and Ponds:	___	Yes	X	No	
Other:	___	Yes	X	No	

cc:
Project File

Appendix G: Natural Resources Memo

VERMONT

State of Vermont
Highways-PDB-Environmental
219 N. Main Street
www.aot.state.vt.us

Agency of Transportation

To: Julie Ann Held, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 6/23/2021

Subject: Jericho BF 0209(10)- Natural Resource ID

I have completed my natural resource identification for the above referenced project. My evaluation has included a remote sensing landscape analysis and field assessment (5/20/2021) of wetlands, wildlife habitat, agricultural soils, and rare, threatened, and endangered species.

The study area consists of a site on TH 4, BR 15 (figure 1) in the town of Jericho. The site consists of naturally vegetated forested areas with Mill Brook flowing to the southwest through the project area. There are some residential homes in the vicinity of the project area although most of the area is forested.

Wetlands

Wetlands within the project area were delineated in accordance to the US Corps of Engineers (COE) wetland delineation methodology and regional supplements. The VT Wetlands Office confirmed the wetland boundaries on June 10, 2021. Three wetlands were identified and delineated:

Wetland A & B

This wetland occurs on the south-east side (figure 1) of the study area adjacent to TH 4 and is approximated 1.3 acres in size. This wetland is hydraulically connected to Wetland B (figure 2) through a culvert beneath TH 4. This wetland is on the hill side sloping down to the roadway embankment a few small ephemeral streams also come down the hillside. The wetland is classified as a Palustrine forested/scrub shrub wetland. The main source of hydrology (Indicators: A1-Surface water, A2- high water table, A3-Saturation, B10-Drainage Patterns, D1-Stunted or stressed plants, D2-Geomorphic Position, D4-Microtopographic Relief and D5-FAC-neutral test) at this site is in the form of groundwater seepage which have saturated the soils. Dominate wetland vegetation in this wetland consists of white pine, red maple, speckled alder, sensitive fern, jewelweed, goldenrod, and field horsetail. Soils consisted of poorly drained,

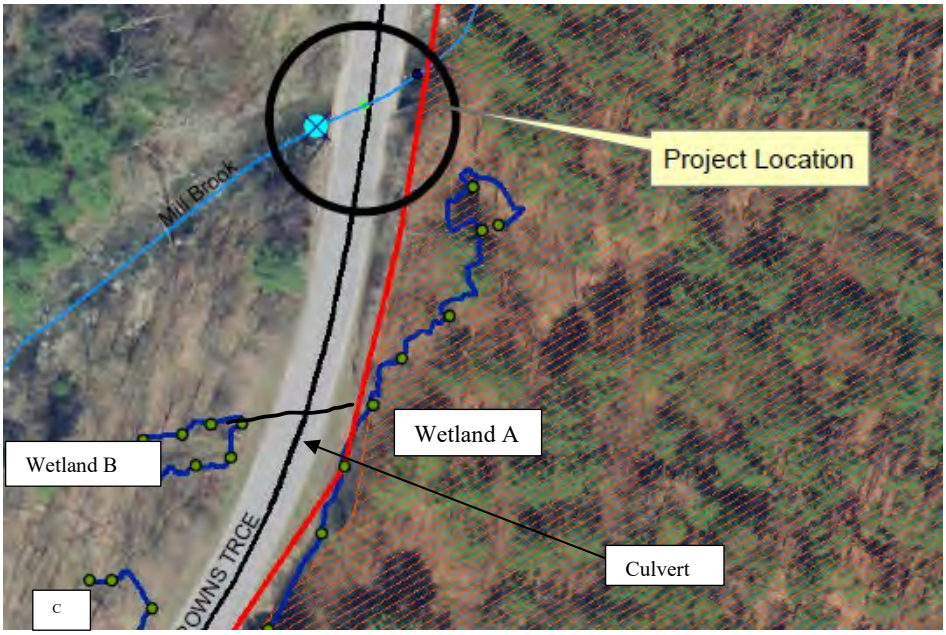


Figure 1 Approximate location of wetlands

mucky to loamy soils that met hydric soil indicators (A2) and(A3). Primary functions and values of the wetland A & B include Water Storage for Flood Water and Storm Water Runoff, Surface and Ground Water Protection, Fish Habitat, Wildlife habitat, Recreational Value and Economic Benefits and Erosion Control through Binding and Stabilizing the soil.

Wetland C

Wetland C is located within the southwestern portion of the project area. The wetland is small, approximately 0.1 acres in size. No sign of drainage structure exists connecting wetland A & C, although seepage could be flowing through the roadbed based on observations at the site.

The wetland is classified as a Palustrine forested/emergent wetland. The main source of hydrology is groundwater seepage: (Indicators: A1-Surface water, A2- high water table, A3-Saturation, B5-Iron Deposits, B8 Sparsely Vegetated Concave Surface, B9-Water-stained leaves, B10-Drainage Patterns, D1-Stunted or stressed plants, and D2-Geomorphic Position). Soils in the wetland consist of saturated soils meeting hydric soil indicator Sandy Much Mineral (B1). Dominant vegetation consisted of Red Maple, Green Ash, Speckled Alder, Bush Honeysuckle, sensitive fern, and horsetail. Primary functions and values of wetland C include Water Storage for Flood Water and Storm Water Runoff, Surface and Ground Water Protection, and Wildlife Habitat (Low).

Impacts to wetlands should be avoided and minimized to the maximum extent during the development of alternatives for this project.

Watercourse

Mill Brook flows southwesterly through the project site. The brook substrate consists of cobble and has a 12.54 sq. mi. watershed according to the ANR Natural Resource Atlas. There is an ephemeral stream that flows off the eastern hillside and enters wetland A and B then eventually flows into Mill Brook.

Wildlife Habitat

There is a large, mapped deer wintering area along the eastern portion of the project. According to the ANR BioFinder habitat mapping the project area is within "highest priority" habitat blocks (figure 2) that are of the greatest importance to wildlife movement and genetic exchange. Movement of terrestrial animals move along riparian zones of the Mill Brook and there is active wildlife crossing at this site south of the bridge structure. Numerous game trails were observed in the field and a dead fisher was also found in the roadway.

Rare, Threatened and Endangered Species (RTE)

I have queried the ANR Natural Resource database and two RTE species are located downstream of the site. The occurrences were the Wood Turtle (S3, uncommon and a candidate species for federal listing) and the Smooth Green Snake (S3, uncommon).

The project area is within the range of the northern long-eared bat. Suitable habitat consists of forested areas with suitable roost trees that exhibit peeling bark, cracks, crevices, and holes. This species is also known to roost on bridge structures. An acoustic survey is planned for the summer of 2021 to determine absence/presence of northern long-eared bats.

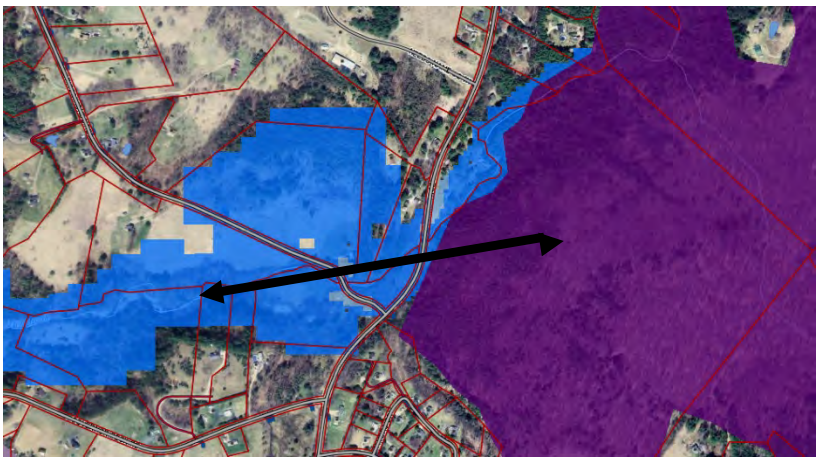


Figure 2-Wildlife habitat blocks. ANR BioFinder Mapping

Agricultural Soils:
Soils within the northeast quadrant are mapped as Agawam fine sandy loam, which are classified as Prime Agricultural soils. No active farming occurs within the immediate area of the project.

Invasive Species:
I did not observe any invasive plant species within the project area. The area is mapped within the known infestation area/buffer of the emerald ash borer. Several ash trees were observed along the approaches to this bridge project. Ash trees are considered a hazard tree when they can potentially fall on the road or clear zone. Once trees are infested with EAB they become extremely brittle and difficult to cut down. Ash trees within the project area should be removed, if possible.

References:
U.S. Army Corps of Engineers. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. Available at: https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7640

Vermont Agency of Natural Resources (VANR). 2018. Department of Environmental Conservation, Watershed Management Division – Wetlands Program. Guidance for Determining Wetland Jurisdiction. Available at: http://dec.vermont.gov/sites/dec/files/wsm/wetlands/docs/wl_ClassificationGuidance.pdf

Vermont Agency of Natural Resources (VANR). 2021. BioFinder Mapping Tool. Available at: https://anrmaps.vermont.gov/websites/BioFinder/

Vermont Agency of Natural Resources (VANR). 2021. Natural Resources Atlas. Available at: http://anrmaps.vermont.gov/websites/anra5/

Jericho BF 0209(10) Photo Log

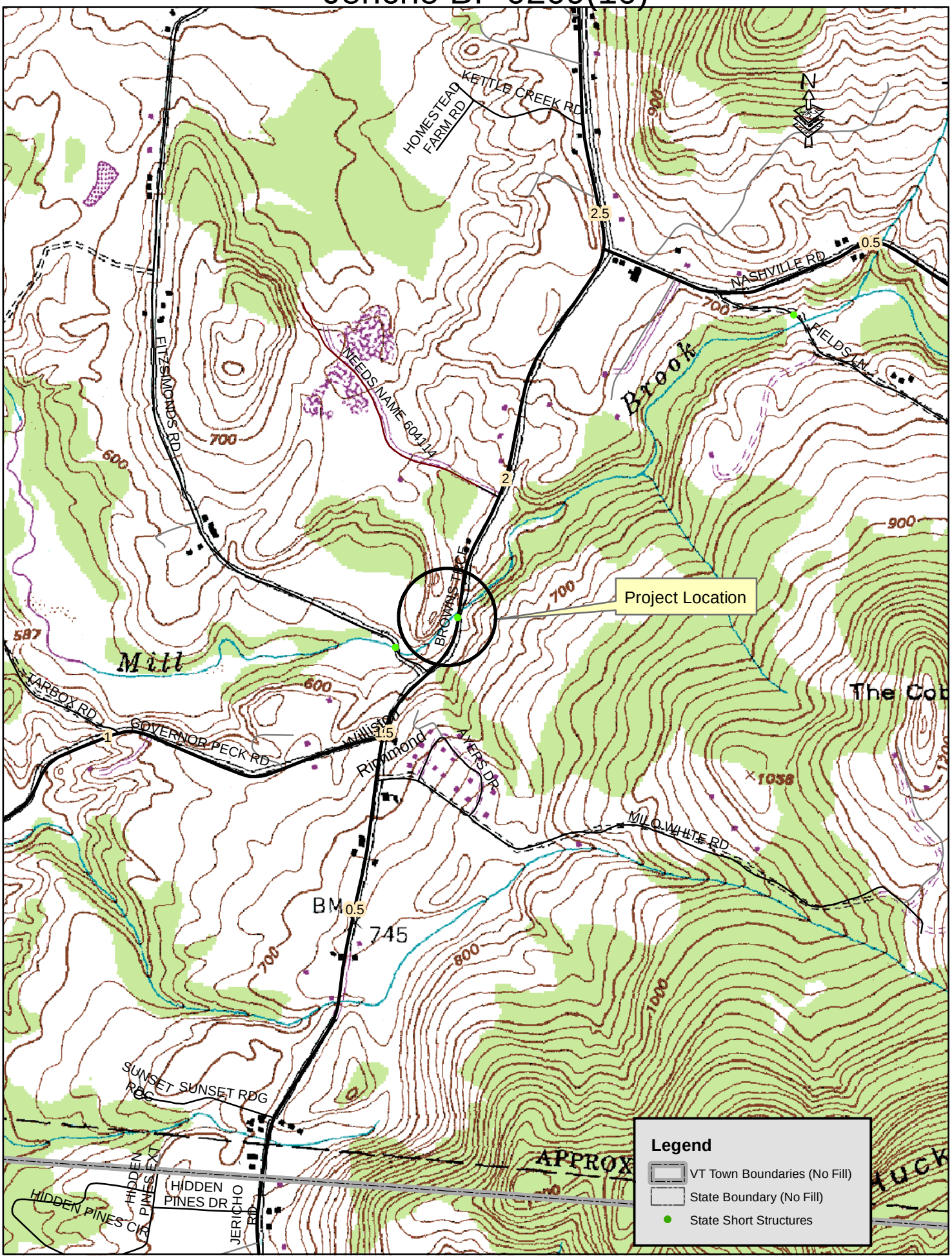
Wetland A- abruptly meets ditch.

Wetland B-Cross culvert connects A & B

Wetland C

Mill Brook- TH 4 BR15 crossing

Jericho BF 0209(10)



Jericho BF 0209(10)

VERMONT WETLAND EVALUATION FORM

Wetland ID#:_____ Project #:_____

Date: _____ Investigator:_____

SUMMARY OF FUNCTIONAL EVALUATION:
Each function gets a score of 0= not present; L = Low; P = Present; or H = High.

1. Water Storage for Flood Water and Storm Runoff ☐	**6. Rare, Threatened, and Endangered Species Habitat** ☐
2. Surface & Ground Water Protection ☐	**7. Education and Research in Natural Sciences** ☐
3. Fish Habitat ☐	**8. Recreational Value and Economic Benefits** ☐
4. Wildlife Habitat ☐	**9. Open Space and Aesthetics** ☐
5. Exemplary Wetland Natural Community ☐	**10. Erosion Control through Binding and Stabilizing the Soil** ☐

Note:

- ***When to use this form:*** This is a field form to help you compile data needed to evaluate the 10 possible functions and values of a wetland as described in the Vermont Wetland Rules. All information in this form is replicated in the applications for both wetland determinations and wetland permits.
- ***Both a desktop review and field examination*** should be employed to accurately determine surrounding land use, hydrology, hydroperiod, vegetation, position in the landscape, and physical attributes.
- ***The entire wetland or wetland complex*** in question must be evaluated to determine the level of function in all ten (10) categories for accurate classification. A wetland complex can be defined as a series of interconnected wetland types.
- ***The surrounding upland and outflow area*** of the wetland should be examined to determine land use, development, nearby natural resources, and hydrology. The surrounding land use, previous development, and cumulative impacts may play a role in the current function of the wetland. For best results please read all descriptions prior to scoring activity.
- ***Evaluation***: The first portion in each section determines whether the wetland does or does not provide the function. If none of the conditions listed in the first section are met, proceed

to the next section. If any of these conditions are met, determine if the wetland provides this function at a higher or lower level based on the information listed in the subsequent sections.

- ***Presumptions:*** Please note that many wetlands are already presumed to be significant under the Vermont Wetland Rules. A wetland is presumed to be significant if:
    - The wetland is mapped on the VSWI map
    - The wetland is contiguous to a VSWI mapped wetland
    - The wetland meets the presumptions of significance under Section 4.6
    - The wetland has a preliminary determination that it is Class II

1. Water Storage for Flood Water and Storm Runoff

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Constricted outlet or no outlet and an unconstricted inlet.
- ☐ Physical space for floodwater expansion and dense, persistent, emergent vegetation or dense woody vegetation that slows down flood waters or stormwater runoff during peak flows and facilitates water removal by evaporation and transpiration.
- ☐ If a stream is present, its course is sinuous and there is sufficient woody vegetation to intercept surface flows in the portion of the wetland that floods.
- ☐ Physical evidence of seasonal flooding or ponding such as water stained leaves, water marks on trees, drift rows, debris deposits, or standing water.
- ☐ Hydrologic or hydraulic study indicates wetland attenuates flooding.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level:

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ Significant flood storage capacity upstream of the wetland, and the wetland in question provides this function at a negligible level in comparison to upstream storage (unless the upstream storage is temporary such as a beaver impoundment).
- ☐ Wetland is contiguous to a major lake or pond that provides storage benefits independently of the wetland.
- ☐ Wetland's storage capacity is created primarily by recent beaver dams or other temporary structures.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ History of downstream flood damage to public or private property.
- ☐ Any of the following conditions present downstream of the wetland, but upstream of a major lake or pond, could be impacted by a loss or reduction of the water storage function.
  - ☐ 1. Developed public or private property.
  - ☐ 2. Stream banks susceptible to scouring and erosion.
  - ☐ 3. Important habitat for aquatic life.
- ☐ The wetland is large in size and naturally vegetated.

☐ Any of the following conditions present upstream of the wetland may indicate a large volume of runoff may reach the wetland.

☐ 1. A large amount of impervious surface in urbanized areas.

☐ 2. Relatively impervious soils.

☐ 3. Steep slopes in the adjacent areas.

2. Surface and Ground Water Protection

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Constricted or no outlets.

☐ Low water velocity through dense, persistent vegetation.

☐ Hydroperiod permanently flooded or saturated.

☐ Wetlands in depositional environments with persistent vegetation wider than 20 feet.

☐ Wetlands with persistent vegetation comprising a defined delta, island, bar or peninsula.

☐ Presence of seeps or springs.

☐ Wetland contains a high amount of microtopography that helps slow and filter surface water.

☐ Position in the landscape indicates the wetland is a headwaters area.

☐ Wetland is adjacent to surface waters.

☐ Wetland recharges a drinking water source.

☐ Water sampling indicates removal of pollutants or nutrients.

☐ Water sampling indicates retention of sediments or organic matter.

☐ Fine mineral soils and alkalinity not low.

☐ The wetland provides an obvious filter between surface water or ground water and land uses that may contribute point or nonpoint sources of sediments, toxic substances or nutrients to the wetland, such as: steep erodible slopes; row crops; dumps; areas of pesticide, herbicide or fertilizer application; feed lots; parking lots or heavily traveled road; and septic systems.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

☐ Presence of dead forest or shrub areas in sufficient amounts to result in diminished

nutrient uptake.

- ☐ Presence of ditches or channels that confine water and restrict contact of water with vegetation.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.
- ☐ Current use in the wetland results in disturbance that compromises this function.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The wetland is adjacent to a well head or source protection area, and provides ground water recharge.
- ☐ The wetland provides flows to Class A surface waters.
- ☐ The wetland contributes to the protection or improvement of water quality of any impaired waters.
- ☐ The wetland is large in size and naturally vegetated.

3. Fish Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Contains woody vegetation that overhangs the banks of a stream or river and provides any of the following: shading that controls summer water temperature; cover including refuges created by overhanging branches or undercut banks; source of terrestrial insects as fish food; or streambank stability.
- ☐ Provides spawning, nursery, feeding or cover habitat for fish (documented or professionally judged). Common habitat includes deep marsh and shallow marsh associates with lakes and streams, and seasonally flooded wetlands associated with streams and rivers.
- ☐ Documented or professionally judged spawning habitat for northern pike.
- ☐ Provides cold spring discharge that lowers the temperature of receiving waters and creates summer habitat for salmonoid species.
- ☐ The wetland is located along a tributary that does not support fish, but contributes to a larger body of water that does support fish. The tributary supports downstream fish by providing cooler water, and food sources.

4. Wildlife Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Provides resting, feeding staging or roosting habitat to support waterfowl migration, and feeding habitat for wading birds. Good habitats for these species include open water wetlands.
- ☐ Habitat to support one or more breeding pairs or broods of waterfowl including all species of ducks, geese, and swans. Good habitats for these species include open water habitats adjacent shallow marsh, deep marsh, shrub wetland, forested wetland, or naturally vegetated buffer zone.
- ☐ Provides a nest site, a buffer for a nest site or feeding habitat for wading birds including but not limited to: great blue heron, black-crowned night heron, green-backed heron, cattle egret, or snowy egret. Good habitats for these species include open water or deep marsh adjacent to forested wetlands, or standing dead trees.
- ☐ Supports or has the habitat to support one or more breeding pairs of any migratory bird that requires wetland habitat for breeding, nesting, rearing of young, feeding, staging roosting, or migration, including: Virginia rail, common snipe, marsh wren, American bittern, northern water thrush, northern harrier, spruce grouse, Cerulean warbler, and common loon.
- ☐ Supports winter habitat for white-tailed deer. Good habitats for these species include softwood swamps. Evidence of use includes deer browsing, bark stripping, worn trails, or pellet piles.
- ☐ Provides important feeding habitat for black bear, bobcat, or moose based on an assessment of use. Good habitat for these types of species includes wetlands located in a forested mosaic.
- ☐ Has the habitat to support muskrat, otter or mink. Good habitats for these species include deep marshes, wetlands adjacent to bodies of water including lakes, ponds, rivers and streams.
- ☐ Supports an active beaver dam, one or more lodges, or evidence of use in two or more consecutive years by an adult beaver population.
- ☐ Provides the following habitats that support the reproduction of Uncommon Vermont amphibian species including:
  - ☐ 1. Wood Frog, Jefferson Salamander, Blue-spotted Salamander, or Spotted Salamander. Breeding habitat for these species includes vernal pools and small ponds.
  - ☐ 2. Northern Dusky Salamander and the Spring Salamander. Habitat for these species includes headwater seeps, springs, and streams.
  - ☐ 3. The Four-toed salamander; Fowler's Toad; Western or Boreal Chorus frog, or other amphibians found in Vermont of similar significance.

- ☐ Supports or has the habitat to support significant populations of Vermont amphibian species including, but not limited to Pickerel Frog, Northern Leopard Frog, Mink Frog, and others found in Vermont of similar significance. Good habitat for these types of species includes large marsh systems with open water components.
- ☐ Supports or has the habitat to support populations of uncommon Vermont reptile species including: Wood Turtle, Northern Map Turtle, Eastern Musk Turtle, Spotted Turtle, Spiny Softshell, Eastern Ribbonsnake, Northern Watersnake, and others found in Vermont of similar significance.
- ☐ Supports or has the habitat to support significant populations of Vermont reptile species, including Smooth Greensnake, DeKay's Brownsnake, or other more common wetland-associated species.
- ☐ Meets four or more of the following conditions indicative of wildlife habitat diversity:
  - ☐ 1. Three or more wetland vegetation classes (greater than 1/2 acre) present including but not limited to: open water contiguous to, but not necessarily part of, the wetland, deep marsh, shallow marsh, shrub swamp, forested swamp, fen, or bog;
  - ☐ 2. The dominant vegetation class is one of the following types: deep marsh, shallow marsh, shrub swamp or, forested swamp;
  - ☐ 3. Located adjacent to a lake, pond, river or stream;
  - ☐ 4. Fifty percent or more of surrounding habitat type is one or more of the following: forest, agricultural land, old field or open land;
  - ☐ 5. Emergent or woody vegetation occupies 26 to 75 percent of wetland, the rest is open water;
  - ☐ 6. One of the following:
    - ☐ i. hydrologically connected to other wetlands of different dominant classes or open water within 1 mile;
    - ☐ ii. hydrologically connected to other wetlands of same dominant class within 1/2 mile;
    - ☐ iii. within 1/4 mile of other wetlands of different dominant classes or open water, but not hydrologically connected;
- ☐ Wetland or wetland complex is owned in whole or in part by state or federal government and managed for wildlife and habitat conservation; and
- ☐ Contains evidence that it is used by wetland dependent wildlife species.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ The wetland is small in size for its type and does not represent fugitive habitat in

developed areas (vernal pools and seeps are generally small in size, so this does not apply).

- ☐ The surrounding land use is densely developed enough to limit use by wildlife species (with the exception of wetlands with open water habitat). Can be negated by evidence of use.
- ☐ The current use in the wetland results in frequent cutting, mowing or other disturbance.
- ☐ The wetland hydrology and character is at a drier end of the scale and does not support wetland dependent species.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The wetland complex is large in size and high in quality.
- ☐ The habitat has the potential to support several species based on the assessment above.
- ☐ Wetland is associated with an important wildlife corridor.
- ☐ The wetland has been identified by ANR-F&W as important habitat.

5. Exemplary Wetland Natural Community

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Wetlands that are identified as high quality examples of Vermont's natural community types recognized by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department, including rare types such as dwarf shrub bogs, rich fens, alpine peatlands, red maple-black gum swamps and the more common types including deep bulrush marshes, cattail marshes, northern white cedar swamps, spruce-fir-tamarack swamps, and red maple-black ash seepage swamps are automatically significant for this function.

The wetland is also likely to be significant if any of the following conditions are met:

- ☐ Is an example of a wetland natural community type that has been identified and mapped by, or meets the ranking and mapping standards of, the Natural Heritage Information Project of the Vermont Fish and Wildlife Department.
- ☐ Contains ecological features that contribute to Vermont's natural heritage, including, but not limited to:
  - ☐ Deep peat accumulation reflecting a long history of wetland formation;
  - ☐ Forested wetlands displaying very old trees and other old growth characteristics;
  - ☐ A wetland natural community that is at the edge of the normal range for that type;

- ☐ A wetland mosaic containing examples of several to many wetland community types; or
- ☐ A large wetland complex with examples of several wetland community types.

6. Rare, Threatened, and Endangered Species Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Wetlands that contain one or more species on the federal or state threatened or endangered lists, as well as species that are rare in Vermont, are automatically significant for this function.

The wetland is also likely to be significant if any of the following apply:

- ☐ There is creditable documentation that the wetland provides important habitat for any species on the federal or state threatened or endangered species lists;
- ☐ There is creditable documentation that threatened or endangered species have been present in past 10 years;
- ☐ There is creditable documentation that the wetland provides important habitat for any species listed as rare in Vermont (S1 or S2 ranks), state historic (SH rank), or rare to uncommon globally (G1, G2, or G3 ranks) by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department;
- ☐ There is creditable documentation that the wetland provides habitat for multiple uncommon species of plants or animals (S3 rank).

List name of species and ranking:

7. Education and Research in Natural Sciences

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

- ☐ Owned by or leased to a public entity dedicated to education or research.
- ☐ History of use for education or research.
- ☐ Has one or more characteristics making it valuable for education or research.

8. Recreational Value and Economic Benefits

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

- ☐ Used for, or contributes to, recreational activities.
- ☐ Provides economic benefits.
- ☐ Provides important habitat for fish or wildlife which can be fished, hunted or trapped under applicable state law.
- ☐ Used for harvesting of wild foods.

Comments:

9. Open Space and Aesthetics

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Can be readily observed by the public; and
  - ☐ Possesses special or unique aesthetic qualities; or
  - ☐ Has prominence as a distinct feature in the surrounding landscape;
- ☐ Has been identified as important open space in a municipal, regional or state plan.

10. Erosion Control through Binding and Stabilizing the Soil

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Erosive forces such as wave or current energy are present and any of the following are present as well:
  - ☐ Dense, persistent vegetation along a shoreline or stream bank that reduces an adjacent erosive force.
  - ☐ Good interspersion of persistent emergent vegetation and water along course of water flow.
  - ☐ Studies show that wetlands of similar size, vegetation type, and hydrology are important for erosion control.

What type of erosive forces are present?

- ☐ Lake fetch and waves
- ☐ High current velocities
- ☐ Water level influenced by upstream impoundment

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ The stream is artificially channelized and/or lacks vegetation that contributes to controlling the erosive force.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The stream contains high sinuosity.
- ☐ Has been identified through fluvial geomorphic assessment to be important in maintaining the natural condition of the stream or river corridor.

VERMONT WETLAND EVALUATION FORM

Wetland ID#:_____ Project #:_____

Date: _____ Investigator:_____

SUMMARY OF FUNCTIONAL EVALUATION:
Each function gets a score of 0= not present; L = Low; P = Present; or H = High.

1. Water Storage for Flood Water and Storm Runoff ☐	**6. Rare, Threatened, and Endangered Species Habitat** ☐
2. Surface & Ground Water Protection ☐	**7. Education and Research in Natural Sciences** ☐
3. Fish Habitat ☐	**8. Recreational Value and Economic Benefits** ☐
4. Wildlife Habitat ☐	**9. Open Space and Aesthetics** ☐
5. Exemplary Wetland Natural Community ☐	**10. Erosion Control through Binding and Stabilizing the Soil** ☐

Note:

- ***When to use this form:*** This is a field form to help you compile data needed to evaluate the 10 possible functions and values of a wetland as described in the Vermont Wetland Rules. All information in this form is replicated in the applications for both wetland determinations and wetland permits.
- ***Both a desktop review and field examination*** should be employed to accurately determine surrounding land use, hydrology, hydroperiod, vegetation, position in the landscape, and physical attributes.
- ***The entire wetland or wetland complex*** in question must be evaluated to determine the level of function in all ten (10) categories for accurate classification. A wetland complex can be defined as a series of interconnected wetland types.
- ***The surrounding upland and outflow area*** of the wetland should be examined to determine land use, development, nearby natural resources, and hydrology. The surrounding land use, previous development, and cumulative impacts may play a role in the current function of the wetland. For best results please read all descriptions prior to scoring activity.
- ***Evaluation***: The first portion in each section determines whether the wetland does or does not provide the function. If none of the conditions listed in the first section are met, proceed

to the next section. If any of these conditions are met, determine if the wetland provides this function at a higher or lower level based on the information listed in the subsequent sections.

- ***Presumptions:*** Please note that many wetlands are already presumed to be significant under the Vermont Wetland Rules. A wetland is presumed to be significant if:
    - The wetland is mapped on the VSWI map
    - The wetland is contiguous to a VSWI mapped wetland
    - The wetland meets the presumptions of significance under Section 4.6
    - The wetland has a preliminary determination that it is Class II

1. Water Storage for Flood Water and Storm Runoff

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Constricted outlet or no outlet and an unconstricted inlet.
- ☐ Physical space for floodwater expansion and dense, persistent, emergent vegetation or dense woody vegetation that slows down flood waters or stormwater runoff during peak flows and facilitates water removal by evaporation and transpiration.
- ☐ If a stream is present, its course is sinuous and there is sufficient woody vegetation to intercept surface flows in the portion of the wetland that floods.
- ☐ Physical evidence of seasonal flooding or ponding such as water stained leaves, water marks on trees, drift rows, debris deposits, or standing water.
- ☐ Hydrologic or hydraulic study indicates wetland attenuates flooding.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level:

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ Significant flood storage capacity upstream of the wetland, and the wetland in question provides this function at a negligible level in comparison to upstream storage (unless the upstream storage is temporary such as a beaver impoundment).
- ☐ Wetland is contiguous to a major lake or pond that provides storage benefits independently of the wetland.
- ☐ Wetland's storage capacity is created primarily by recent beaver dams or other temporary structures.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ History of downstream flood damage to public or private property.
- ☐ Any of the following conditions present downstream of the wetland, but upstream of a major lake or pond, could be impacted by a loss or reduction of the water storage function.
  - ☐ 1. Developed public or private property.
  - ☐ 2. Stream banks susceptible to scouring and erosion.
  - ☐ 3. Important habitat for aquatic life.
- ☐ The wetland is large in size and naturally vegetated.

☐ Any of the following conditions present upstream of the wetland may indicate a large volume of runoff may reach the wetland.

☐ 1. A large amount of impervious surface in urbanized areas.

☐ 2. Relatively impervious soils.

☐ 3. Steep slopes in the adjacent areas.

2. Surface and Ground Water Protection

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

☐ Constricted or no outlets.

☐ Low water velocity through dense, persistent vegetation.

☐ Hydroperiod permanently flooded or saturated.

☐ Wetlands in depositional environments with persistent vegetation wider than 20 feet.

☐ Wetlands with persistent vegetation comprising a defined delta, island, bar or peninsula.

☐ Presence of seeps or springs.

☐ Wetland contains a high amount of microtopography that helps slow and filter surface water.

☐ Position in the landscape indicates the wetland is a headwaters area.

☐ Wetland is adjacent to surface waters.

☐ Wetland recharges a drinking water source.

☐ Water sampling indicates removal of pollutants or nutrients.

☐ Water sampling indicates retention of sediments or organic matter.

☐ Fine mineral soils and alkalinity not low.

☐ The wetland provides an obvious filter between surface water or ground water and land uses that may contribute point or nonpoint sources of sediments, toxic substances or nutrients to the wetland, such as: steep erodible slopes; row crops; dumps; areas of pesticide, herbicide or fertilizer application; feed lots; parking lots or heavily traveled road; and septic systems.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

☐ Presence of dead forest or shrub areas in sufficient amounts to result in diminished

nutrient uptake.

- ☐ Presence of ditches or channels that confine water and restrict contact of water with vegetation.
- ☐ Wetland is very small in size, not contiguous to a stream, and not part of a collection of small wetlands in the landscape that provide this function cumulatively.
- ☐ Current use in the wetland results in disturbance that compromises this function.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The wetland is adjacent to a well head or source protection area, and provides ground water recharge.
- ☐ The wetland provides flows to Class A surface waters.
- ☐ The wetland contributes to the protection or improvement of water quality of any impaired waters.
- ☐ The wetland is large in size and naturally vegetated.

3. Fish Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Contains woody vegetation that overhangs the banks of a stream or river and provides any of the following: shading that controls summer water temperature; cover including refuges created by overhanging branches or undercut banks; source of terrestrial insects as fish food; or streambank stability.
- ☐ Provides spawning, nursery, feeding or cover habitat for fish (documented or professionally judged). Common habitat includes deep marsh and shallow marsh associates with lakes and streams, and seasonally flooded wetlands associated with streams and rivers.
- ☐ Documented or professionally judged spawning habitat for northern pike.
- ☐ Provides cold spring discharge that lowers the temperature of receiving waters and creates summer habitat for salmonoid species.
- ☐ The wetland is located along a tributary that does not support fish, but contributes to a larger body of water that does support fish. The tributary supports downstream fish by providing cooler water, and food sources.

4. Wildlife Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Provides resting, feeding staging or roosting habitat to support waterfowl migration, and feeding habitat for wading birds. Good habitats for these species include open water wetlands.
- ☐ Habitat to support one or more breeding pairs or broods of waterfowl including all species of ducks, geese, and swans. Good habitats for these species include open water habitats adjacent shallow marsh, deep marsh, shrub wetland, forested wetland, or naturally vegetated buffer zone.
- ☐ Provides a nest site, a buffer for a nest site or feeding habitat for wading birds including but not limited to: great blue heron, black-crowned night heron, green-backed heron, cattle egret, or snowy egret. Good habitats for these species include open water or deep marsh adjacent to forested wetlands, or standing dead trees.
- ☐ Supports or has the habitat to support one or more breeding pairs of any migratory bird that requires wetland habitat for breeding, nesting, rearing of young, feeding, staging roosting, or migration, including: Virginia rail, common snipe, marsh wren, American bittern, northern water thrush, northern harrier, spruce grouse, Cerulean warbler, and common loon.
- ☐ Supports winter habitat for white-tailed deer. Good habitats for these species include softwood swamps. Evidence of use includes deer browsing, bark stripping, worn trails, or pellet piles.
- ☐ Provides important feeding habitat for black bear, bobcat, or moose based on an assessment of use. Good habitat for these types of species includes wetlands located in a forested mosaic.
- ☐ Has the habitat to support muskrat, otter or mink. Good habitats for these species include deep marshes, wetlands adjacent to bodies of water including lakes, ponds, rivers and streams.
- ☐ Supports an active beaver dam, one or more lodges, or evidence of use in two or more consecutive years by an adult beaver population.
- ☐ Provides the following habitats that support the reproduction of Uncommon Vermont amphibian species including:
  - ☐ 1. Wood Frog, Jefferson Salamander, Blue-spotted Salamander, or Spotted Salamander. Breeding habitat for these species includes vernal pools and small ponds.
  - ☐ 2. Northern Dusky Salamander and the Spring Salamander. Habitat for these species includes headwater seeps, springs, and streams.
  - ☐ 3. The Four-toed salamander; Fowler's Toad; Western or Boreal Chorus frog, or other amphibians found in Vermont of similar significance.

- ☐ Supports or has the habitat to support significant populations of Vermont amphibian species including, but not limited to Pickerel Frog, Northern Leopard Frog, Mink Frog, and others found in Vermont of similar significance. Good habitat for these types of species includes large marsh systems with open water components.
- ☐ Supports or has the habitat to support populations of uncommon Vermont reptile species including: Wood Turtle, Northern Map Turtle, Eastern Musk Turtle, Spotted Turtle, Spiny Softshell, Eastern Ribbonsnake, Northern Watersnake, and others found in Vermont of similar significance.
- ☐ Supports or has the habitat to support significant populations of Vermont reptile species, including Smooth Greensnake, DeKay's Brownsnake, or other more common wetland-associated species.
- ☐ Meets four or more of the following conditions indicative of wildlife habitat diversity:
  - ☐ 1. Three or more wetland vegetation classes (greater than 1/2 acre) present including but not limited to: open water contiguous to, but not necessarily part of, the wetland, deep marsh, shallow marsh, shrub swamp, forested swamp, fen, or bog;
  - ☐ 2. The dominant vegetation class is one of the following types: deep marsh, shallow marsh, shrub swamp or, forested swamp;
  - ☐ 3. Located adjacent to a lake, pond, river or stream;
  - ☐ 4. Fifty percent or more of surrounding habitat type is one or more of the following: forest, agricultural land, old field or open land;
  - ☐ 5. Emergent or woody vegetation occupies 26 to 75 percent of wetland, the rest is open water;
  - ☐ 6. One of the following:
    - ☐ i. hydrologically connected to other wetlands of different dominant classes or open water within 1 mile;
    - ☐ ii. hydrologically connected to other wetlands of same dominant class within 1/2 mile;
    - ☐ iii. within 1/4 mile of other wetlands of different dominant classes or open water, but not hydrologically connected;
- ☐ Wetland or wetland complex is owned in whole or in part by state or federal government and managed for wildlife and habitat conservation; and
- ☐ Contains evidence that it is used by wetland dependent wildlife species.

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ The wetland is small in size for its type and does not represent fugitive habitat in

developed areas (vernal pools and seeps are generally small in size, so this does not apply).

- ☐ The surrounding land use is densely developed enough to limit use by wildlife species (with the exception of wetlands with open water habitat). Can be negated by evidence of use.
- ☐ The current use in the wetland results in frequent cutting, mowing or other disturbance.
- ☐ The wetland hydrology and character is at a drier end of the scale and does not support wetland dependent species.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The wetland complex is large in size and high in quality.
- ☐ The habitat has the potential to support several species based on the assessment above.
- ☐ Wetland is associated with an important wildlife corridor.
- ☐ The wetland has been identified by ANR-F&W as important habitat.

5. Exemplary Wetland Natural Community

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Wetlands that are identified as high quality examples of Vermont's natural community types recognized by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department, including rare types such as dwarf shrub bogs, rich fens, alpine peatlands, red maple-black gum swamps and the more common types including deep bulrush marshes, cattail marshes, northern white cedar swamps, spruce-fir-tamarack swamps, and red maple-black ash seepage swamps are automatically significant for this function.

The wetland is also likely to be significant if any of the following conditions are met:

- ☐ Is an example of a wetland natural community type that has been identified and mapped by, or meets the ranking and mapping standards of, the Natural Heritage Information Project of the Vermont Fish and Wildlife Department.
- ☐ Contains ecological features that contribute to Vermont's natural heritage, including, but not limited to:
  - ☐ Deep peat accumulation reflecting a long history of wetland formation;
  - ☐ Forested wetlands displaying very old trees and other old growth characteristics;
  - ☐ A wetland natural community that is at the edge of the normal range for that type;

- ☐ A wetland mosaic containing examples of several to many wetland community types; or
- ☐ A large wetland complex with examples of several wetland community types.

6. Rare, Threatened, and Endangered Species Habitat

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Wetlands that contain one or more species on the federal or state threatened or endangered lists, as well as species that are rare in Vermont, are automatically significant for this function.

The wetland is also likely to be significant if any of the following apply:

- ☐ There is creditable documentation that the wetland provides important habitat for any species on the federal or state threatened or endangered species lists;
- ☐ There is creditable documentation that threatened or endangered species have been present in past 10 years;
- ☐ There is creditable documentation that the wetland provides important habitat for any species listed as rare in Vermont (S1 or S2 ranks), state historic (SH rank), or rare to uncommon globally (G1, G2, or G3 ranks) by the Natural Heritage Information Project of the Vermont Fish and Wildlife Department;
- ☐ There is creditable documentation that the wetland provides habitat for multiple uncommon species of plants or animals (S3 rank).

List name of species and ranking:

7. Education and Research in Natural Sciences

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

- ☐ Owned by or leased to a public entity dedicated to education or research.
- ☐ History of use for education or research.
- ☐ Has one or more characteristics making it valuable for education or research.

8. Recreational Value and Economic Benefits

☐ Function is present and likely to be significant: Any of the following characteristics indicate the wetland provides this function.

- ☐ Used for, or contributes to, recreational activities.
- ☐ Provides economic benefits.
- ☐ Provides important habitat for fish or wildlife which can be fished, hunted or trapped under applicable state law.
- ☐ Used for harvesting of wild foods.

Comments:

9. Open Space and Aesthetics

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Can be readily observed by the public; and
  - ☐ Possesses special or unique aesthetic qualities; or
  - ☐ Has prominence as a distinct feature in the surrounding landscape;
- ☐ Has been identified as important open space in a municipal, regional or state plan.

10. Erosion Control through Binding and Stabilizing the Soil

☐ Function is present and likely to be significant: Any of the following physical and vegetative characteristics indicate the wetland provides this function.

- ☐ Erosive forces such as wave or current energy are present and any of the following are present as well:
  - ☐ Dense, persistent vegetation along a shoreline or stream bank that reduces an adjacent erosive force.
  - ☐ Good interspersion of persistent emergent vegetation and water along course of water flow.
  - ☐ Studies show that wetlands of similar size, vegetation type, and hydrology are important for erosion control.

What type of erosive forces are present?

- ☐ Lake fetch and waves
- ☐ High current velocities
- ☐ Water level influenced by upstream impoundment

If any of the above boxes are checked, the wetland provides this function. Complete the following to determine if the wetland provides this function above or below a moderate level.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *lower* level.

- ☐ The stream is artificially channelized and/or lacks vegetation that contributes to controlling the erosive force.

☐ Check box if any of the following conditions apply that may indicate the wetland provides this function at a *higher* level.

- ☐ The stream contains high sinuosity.
- ☐ Has been identified through fluvial geomorphic assessment to be important in maintaining the natural condition of the stream or river corridor.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Jericho BF 0209(10) City/County: Jericho/Chittenden Sampling Date: 5/20/2021

Applicant/Owner: Vtrans State: VT Sampling Point: Wetland A

Investigator(s): Glenn Gingras/ Meg Lout Section, Township, Range: _____

Landform (hillside, terrace, etc.): Seepage hillside Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR or MLRA): LRR R Lat: 44.44509 N Long: 72.97521 W Datum: _____

Soil Map Unit Name: Colton and Stetson soils NWI classification: PSS/FO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes X	No _____	

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)

- X Surface Water (A1)
- X High Water Table (A2)
- X 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)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No _____	Depth (inches): 0"
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes X	No _____	Depth (inches): 1"

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: Wetland A

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	10	Yes	FACU
2. *Acer rubrum*	15	Yes	FAC
3. *Ulmus americana*	5	No	FACW
4. *Fraxinus pennsylvanica*	5	No	FACW
5.			
6.			
7.			
	35	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Alnus incana*	75	Yes	FACW
2. *Pinus strobus*	5	No	FACU
3. *Fraxinus pennsylvanica*	5	No	FACW
4.			
5.			
6.			
7.			
	85	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Onoclea sensibilis*	15	Yes	FACW
2. *Solidago spp*	5	Yes	
3. *Impatiens capensis*	5	Yes	FACW
4. *Galium boreale*	1	No	FAC
5. *Deparia acrostichoides*	5	Yes	FAC
6. *Equisetum arvense*	5	Yes	FAC
7.			
8.			
9.			
10.			
11.			
12.			
	36	=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: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	110	x 2 =	220
FAC species	26	x 3 =	78
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	151 (A)		358 (B)

Prevalence Index = B/A = 2.37

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.)
No woody vines observed.

SOIL

Sampling Point: Wetland A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 2/1	100					Muck	
9-18	10YR 3/1	60	10YR 4/1	40	D	M	Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- X Histic Epipedon (A2)
- X 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 (TF12)
- ___ 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 reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Jericho BF 0209(10) City/County: Jericho/Chittenden Sampling Date: 5/20/2021

Applicant/Owner: Vtrans State: VT Sampling Point: upland A

Investigator(s): Glenn Gingras/ Meg Lout Section, Township, Range: _____

Landform (hillside, terrace, etc.): Seepage hillside Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR or MLRA): LRR R Lat: 44.44509 N Long: 72.97521 W Datum: _____

Soil Map Unit Name: Roadfill NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____	No X	

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 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** _____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: upland A

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Alnus incana*	40	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	40	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Onoclea sensibilis*	10	No	FACW
2. *Solidago rugosa*	20	Yes	FAC
3. *Dactylis glomerata*	40	Yes	FACU
4. *Equisetum arvense*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75	=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: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (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	50	x 2 =	100
FAC species	25	x 3 =	75
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	125 (A)		375 (B)

Prevalence Index = B/A = 3.00

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.)
No woody vines observed.

SOIL

Sampling Point: upland A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/3	90	10YR 5/4	10	C	M	Loamy/Clayey	Faint redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated 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 (TF12)
- ___ 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 reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Jericho BF 0209(10) City/County: Jericho/Chittenden Sampling Date: 5/20/2021

Applicant/Owner: Vtrans State: VT Sampling Point: wetland B

Investigator(s): Glenn Gingras/ Meg Lout Section, Township, Range: _____

Landform (hillside, terrace, etc.): drainage way Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR or MLRA): LRR R Lat: 44.44487 N Long: 72.97567 W Datum: _____

Soil Map Unit Name: Colton and Stetson soils NWI classification: PFO/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes X	No _____	

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)

- x Surface Water (A1)
- ___ High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- x 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)
- x 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)
- x 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)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes _____	No x	Depth (inches): _____
Water Table Present?	Yes _____	No _____	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes x	No _____	Depth (inches): 3"

Wetland Hydrology Present? **Yes** X **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
This is a drainageway that comes from Wetland A on the east side of road. The drainage way has a small fringe of wetlands adjacent to the drainage.

VEGETATION – Use scientific names of plants.

Sampling Point: wetland B

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharum*	45	Yes	FACU
2. *Fraxinus pennsylvanica*	15	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	60	=Total Cover	

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Herb Stratum (Plot size: 5')			
1. *Deparia acrostichoides*	15	Yes	FAC
2. *Onoclea sensibilis*	10	Yes	FACW
3. *Prunus serrulata*	10	Yes	UPL
4. *Solidago*	5	No	
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	=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: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	15	x 3 =	45
FACU species	45	x 4 =	180
UPL species	10	x 5 =	50
Column Totals:	95 (A)		325 (B)
Prevalence Index = B/A =			3.42

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 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** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
No woody vines observed.

SOIL

Sampling Point: wetland B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					Sandy	
3-9	10YR 2/1	100					Loamy/Clayey	
9-20	2.5YR 4/1	95	10YR 4/4	2	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated 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)
- X 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 (TF12)
- ___ 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 reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Jericho BF 0209(10) City/County: Jericho/Chittenden Sampling Date: 5/20/2021

Applicant/Owner: Vtrans State: VT Sampling Point: upland B

Investigator(s): Glenn Gingras/ Meg Lout Section, Township, Range: _____

Landform (hillside, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR or MLRA): LRR R Lat: 44.44487 N Long: 72.97567 W Datum: _____

Soil Map Unit Name: Colton and Stetson soils NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____	No X	

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: upland B

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer saccharum*	75	Yes	FACU
2. *Fraxinus pennsylvanica*	15	No	FACW
3. *Tilia americana*	15	No	FACU
4.			
5.			
6.			
7.			
	105	=Total Cover	

Sapling/Shrub Stratum (Plot size: 15')			
1. *Acer saccharum*	20	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	

Herb Stratum (Plot size: 5')			
1. *Arctium*	10	Yes	
2. *Fraxinus pennsylvanica*	5	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	15	=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: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	110	x 4 =	440
UPL species	0	x 5 =	0
Column Totals:	130 (A)		480 (B)
Prevalence Index = B/A =			3.69

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.)
No woody vines observed.

SOIL

Sampling Point: upland B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 4/3						Loamy/Clayey	
13-19	10YR 4/2		10YR 5/1		D	M	Loamy/Clayey	
			10YR 3/6		C	M		Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated 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 (TF12)
- ___ 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 reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx) f

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Jericho BF 0209(10) City/County: Jericho/Chittenden Sampling Date: 5/20/2021

Applicant/Owner: Vtrans State: VT Sampling Point: wetland C

Investigator(s): Glenn Gingras/ Meg Lout Section, Township, Range: _____

Landform (hillside, terrace, etc.): seepage area Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR or MLRA): LRR R Lat: 44.44442 N Long: 72.97604 W Datum: _____

Soil Map Unit Name: Colton and Stetson soils NWI classification: PFO/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 within a Wetland?** **Yes** X **No** _____
Hydric Soil Present?	Yes X	No _____	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes X	No _____	

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)

- x Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- x Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- x Sparsely Vegetated Concave Surface (B8)
- x 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)
- x Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Stunted or Stressed Plants (D1)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes x	No _____	Depth (inches): 0"
Water Table Present?	Yes _____	No x	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes x	No _____	Depth (inches): 1"

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: wetland C

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	45	Yes	FAC
2. *Fraxinus pennsylvanica*	35	Yes	FACW
3. *Malus*	5	No	
4. *Acer negundo*	5	No	FAC
5.			
6.			
7.			
	90	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15')			
1. *Alnus incana*	10	Yes	FACW
2. *Lonicera*	15	Yes	
3. *Spiraea latifolia*	5	No	FACW
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5')			
1. *Onoclea sensibilis*	20	Yes	FACW
2. *Equisetum*	20	Yes	
3. *Equisetum hyemale*	10	No	FAC
4. *Impatiens capensis*	5	No	FACW
5. *Poa pratensis*	10	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65	=Total Cover	
Woody Vine Stratum (Plot size: 30')			
1. *Vitis riparia*	10	Yes	FAC
2.			
3.			
4.			
	10	=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: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 71.4% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	70	x 3 =	210
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	155 (A)		400 (B)

Prevalence Index = B/A = 2.58

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: wetland C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-20	10YR 2/1	100					Mucky Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated 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)
- X 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 (TF12)
- ___ 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 reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Jericho BF 0209(10) City/County: Jericho/Chittenden Sampling Date: 5/20/2021

Applicant/Owner: Vtrans State: VT Sampling Point: upland C

Investigator(s): Glenn Gingras/ Meg Lout Section, Township, Range: _____

Landform (hillside, terrace, etc.): roadway slope Local relief (concave, convex, none): concave Slope (%): _____

Subregion (LRR or MLRA): LRR R Lat: 44.44442 N Long: 72.97604 W Datum: _____

Soil Map Unit Name: Colton and Stetson soils NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ 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 within a Wetland?** **Yes** _____ **No** X
Hydric Soil Present?	Yes _____	No X	If yes, optional Wetland Site ID: _____
Wetland Hydrology Present?	Yes _____	No X	

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: upland C

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30	Yes	FAC
2. *Ulmus americana*	10	Yes	FACW
3. *Prunus serotina*	5	No	FACU
4.			
5.			
6.			
7.			
	45	=Total Cover	

Sapling/Shrub Stratum (Plot size: 15')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Herb Stratum (Plot size: 5')			
1. *Onoclea sensibilis*	10	No	FACW
2. *Taraxacum officinale*	15	Yes	FACU
3. *Solidago canadensis*	25	Yes	FACU
4. *Phleum pratense*	10	No	FACU
5. *Dactylis glomerata*	15	Yes	FACU
6. *Rubus*	15	Yes	
7. *Fragaria*	5	No	
8.			
9.			
10.			
11.			
12.			
	95	=Total Cover	

Woody Vine Stratum (Plot size: 30')			
1. *Vitis riparia*	5	Yes	FAC
2.			
3.			
4.			
	5	=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 42.9% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	35	x 3 =	105
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals:	125 (A)		425 (B)

Prevalence Index = B/A = 3.40

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: upland C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/3	100					Sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated 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 (TF12)
- ___ 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 reflect the NRCS Field Indicators of Hydric Soils version 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Appendix H: Archeology Memo

Archaeological Resource Assessment
Jericho Bridge No. 15, TR 4
BF-0209(10)

Town of Jericho, Chittenden County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

June 18, 2021

Archaeological Resource Assessment
Jericho Bridge No. 15, TR 4
BF-0209(10)

Town of Jericho, Chittenden County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

Jessica Vavrasek and Marlis Muschal

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

June 18, 2021

Abstract

On behalf of the Vermont Agency of Transportation (VTrans), WSP USA Inc. (WSP) of Troy, New York, completed an archaeological resource assessment (ARA) for the proposed improvements to Jericho Bridge No. 15, TR 4, Chittenden County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to consider the potential effects of site access, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The archaeological area of potential effect (APE) extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches.

The goal of the ARA was to survey the entire APE to determine if any archaeologically sensitive areas are present. The ARA consisted of background research as well as field inspection, which was conducted on April 8, 2021. The ARA determined the project APE's sensitivity for archaeological resources based on the potential for intact subsurface soils, the APE's relationship to nearby known archaeological sites and historic structures, and other criteria, including soils, topography, and proximity to water. WSP used the Vermont Division for Historic Preservation's *Environmental Predictive Model for Locating Precontact Archaeological Sites* and the Vermont Online Resource Center to inform its assessment.

Background research determined that there was no precontact archaeological sites and no historic archaeological sites within 1.6 kilometers (1 mile) of the APE. No precontact or historic sites were identified during the ARA. Given the lack of positive environmental factors combined with evidence of disturbance documented throughout the surrounding area, the APE is not sensitive for archaeological resources. Any subsurface disruption in the assumed APE has little potential for disturbing buried cultural deposits.

It is WSP's opinion that any future development carried out within the APE will have no impacts on any significant archaeological resources and would not have an adverse effect on archaeological sites that are eligible for or listed in the National Register of Historic Places. Additional archaeological investigation of the APE is not necessary; however, should project activities be expanded and the APE changed, further investigation may be warranted.

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Appendix A: Environmental Predictive Model Checklist A-1

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I. Introduction

A. Project Description

On behalf of the Vermont Agency of Transportation (VTrans), WSP USA Inc. (WSP) of Troy, New York, completed an archaeological resource assessment (ARA) for the proposed improvements to Jericho Bridge No. 15, TR 4, Chittenden County (Figure 1). The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to consider the potential effect of site access, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The archaeological area of potential effect (APE) extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches (Figure 2).

B. Scope of Services

The goal of the ARA was to survey the entire APE to determine if any archaeological sensitive areas are present. This will allow VTrans maximum flexibility in avoiding sites that are eligible for the National Register of Historic Places (NRHP). For the ARA, WSP conducted background research and a field inspection, and evaluated the location using the Vermont Department of Historic Preservation (VDHP) *Environmental Predictive Model for Locating Precontact Archaeological Sites* (VDHP 2015) (see Appendix A), the Vermont Online Resource Center (ORC) map tool (VDHP 2021), historical maps, and local histories (see Chapter IV.A).

All archaeological investigations were conducted in accordance with guidelines established by VTrans and the Programmatic Agreement (PA) among VTrans, the Federal Highway Administration, the VDHP, and the Advisory Council on Historic Preservation, which guides the administration and review process of archaeological projects. That PA and the accompanying *Manual of Standards and Guidelines* (VTrans 2000) provide the framework for the conduct of archaeological investigations for VTrans projects.

All cultural resource services were performed using the professional guidelines and standards in *Procedures for the Protection of Historic and Cultural Properties* (36 CFR 800) and *Procedures for Determining Site Eligibility for the National Register of Historic Places* (36 CFR 60 and 63). This investigation also conformed to the Secretary of the Interior's Standards for Archaeology and Historic Preservation (48 *Federal Register* 44716) (United States Department of the Interior 1983), and *Guidelines for Conducting Archaeology in Vermont* (VDHP 2002). The cultural resource specialists who performed this work satisfy the Secretary of the Interior's Professional Qualifications standards as specified in 36 CFR 66.3(6)(2).

This report has been organized into six chapters. After the introduction in Chapter I, Chapter II describes the environmental setting of the APE. Chapter III discusses the cultural context for the APE, briefly outlining the 11,000-year history of the region and summarizing previous archaeological investigations in the vicinity. Chapter IV presents the methods and results of the ARA, and Chapter V contains the conclusions. Chapter VI lists the references cited. The Environmental Predictive Model Checklists are provided in Appendix A.

This investigation was conducted under the direction and supervision of WSP Senior Vice President Hope Luhman, PhD (Register of Professional Archaeologists [RPA 10505]). WSP Historic Preservation Manager Camilla McDonald served as the project manager. Archaeologist Jessica Vavrasek, PhD (RPA 989768) conducted the field inspection. Dr. Vavrasek completed the background research and wrote the report with assistance from Archaeologist Marlis Muschal (RPA 34344474). Principal Draftsperson Jacqueline L. Horsford prepared the graphics. Principal Editor Anne Moiseev supervised the editing and production of the report.

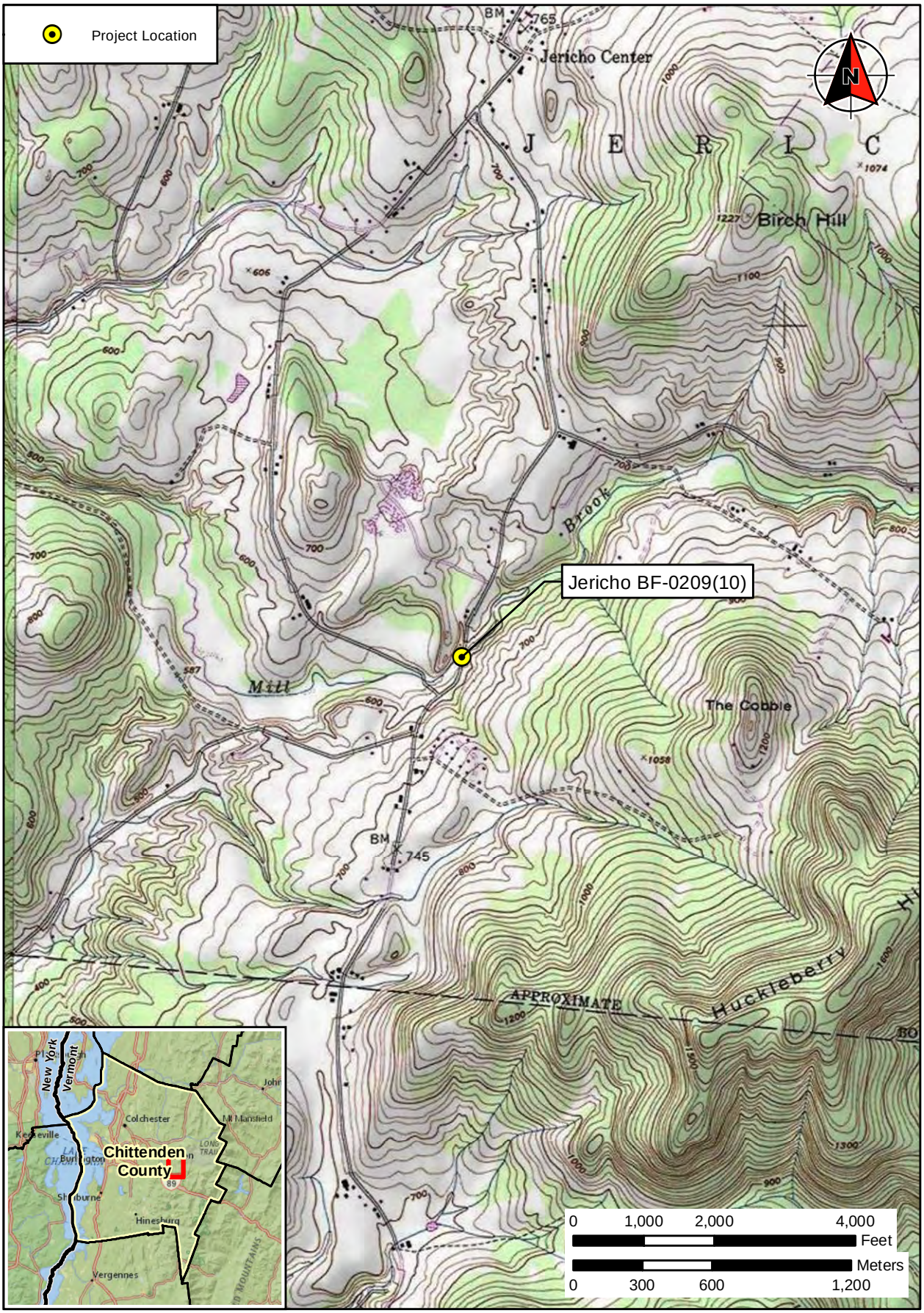

FIGURE 1: Location of Project BF 0209(10) (ESRI USA Topo Maps 2019)

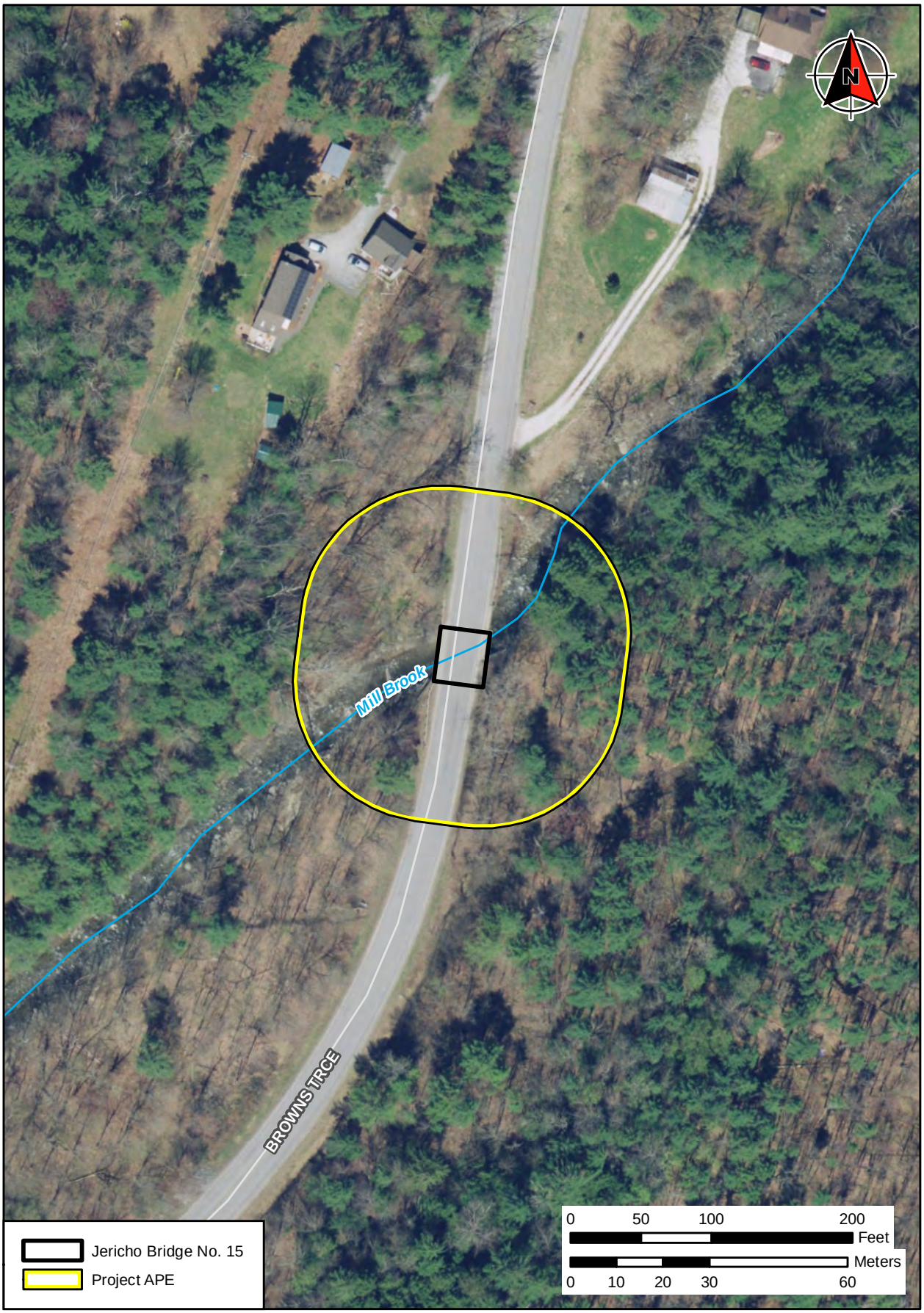

FIGURE 2: Project APE (VCGI 2018)

II. Environmental Setting

A. General Setting

The APE is located along TR 4/Brown's Trace Road at the Mill Brook crossing, south of Jericho Center, Chittenden County (see Figure 2). The APE is located in the Green Mountains physiographic region of northwestern Vermont. The northern part of the Green Mountain physiographic region contains an assortment of mountain peaks with deeply incised valleys carved by both the Winooski and Lamoille rivers. The mountains are 400 million years old. The glaciated terrain once reached elevations of as much as 2,438 meters (8,000 feet) in excess of the state's current highest elevation of 1,139 meters (4,393 feet) (Mount Mansfield). The landscape is not well suited for agriculture, and farmland is more often used as pasture. The area also receives a high amount of precipitation, partly because of its location relative to Lake Champlain (Vermont Fish & Wildlife Department 2018).

The region's dominant water source is Lake Champlain. The major rivers of western Vermont drain the region, including Otter Creek and the Winooski, Lamoille, and Missisquoi rivers. The APE is in the Winooski River watershed (United States Geological Survey [USGS] 2018). Limestones, dolomites, and shales are found throughout the region, with sedimentary rocks in several places metamorphosed to quartzites, marbles, and slates. Rocks of Lower Cambrian and Lower Ordovician age lie throughout the Lowlands, which are part of a trough, or downfold, located between the Champlain and Hinesburg Thrusts (Ratcliffe et al. 2011).

The landscape in the APE includes a combination of forested land, residential properties, and roadside modifications, including drainage ditches and built-up road berms.

B. Soils in the APE

The APE contains primarily Colton soils, which are very deep and excessively drained, formed in glaciofluvial deposits on eskers, kames, outwash plains, and terraces (United States Department of Agriculture-Natural Resources Conservation Service [USDA-NRCS] 2019) (Figure 3; Table 1).

TABLE 1: SOILS IN PROJECT APE

SERIES NAME	SOIL HORIZON	DEPTH	COLOR	TEXTURE, INCLUSIONS	SLOPE	DRAINAGE	LANDFORM
Colton soils (CsE)	Ap	0-18 cm (0-7 in)	Gr Brn	Gvl Lo Sa	CsE (30-60%)	Excessively Well Drained	Terraces, kames, eskers and outwash plains
	E	18-20 cm (7-9 in)	Pink Gr	Gvl Lo Sa			
	Bhs	20-28 cm (9-11 in)	Dr Rd Br	Gvl Lo Sa			
	Bs	28-41 cm (11-16 in)	Rd Brn	Gvl Lo Sa			
	BC	41-56 cm (16-22 in)	Yl Brn	Vr Gvl Sa			
	C	56-183 cm (22-72 in)	Pa Brn	Gvl Sa			

KEY: Shade: Lt – Light, Dk – Dark, V – Very, St – Strong
Color: Brn – Brown, Blk – Black, Gry – Gray, GBrn – Grayish Brown, StrBrn – Strong Brown, RBrn – Reddish Brown, YBrn – Yellowish Brown, OlBrn – Olive Brown, Wh – White, Ol – Olive, PlBrn-Pale Brown, Brn Yl-Brownish Yellow, YRd-Yellowish Red
Soils: Cl – Clay, Lo – Loam, Si – Silt, Sa – Sand
Other: / - Mottled, Grl – Gravel, Cbs – Cobbles, Pbs – Pebbles, Rts – Roots, C – Coarse, Ch - Channery, F – Fine, V-Very, E- Extremely, Dec OM – Decomposed organic matter, S- Stratified USDA-NRCS 2019

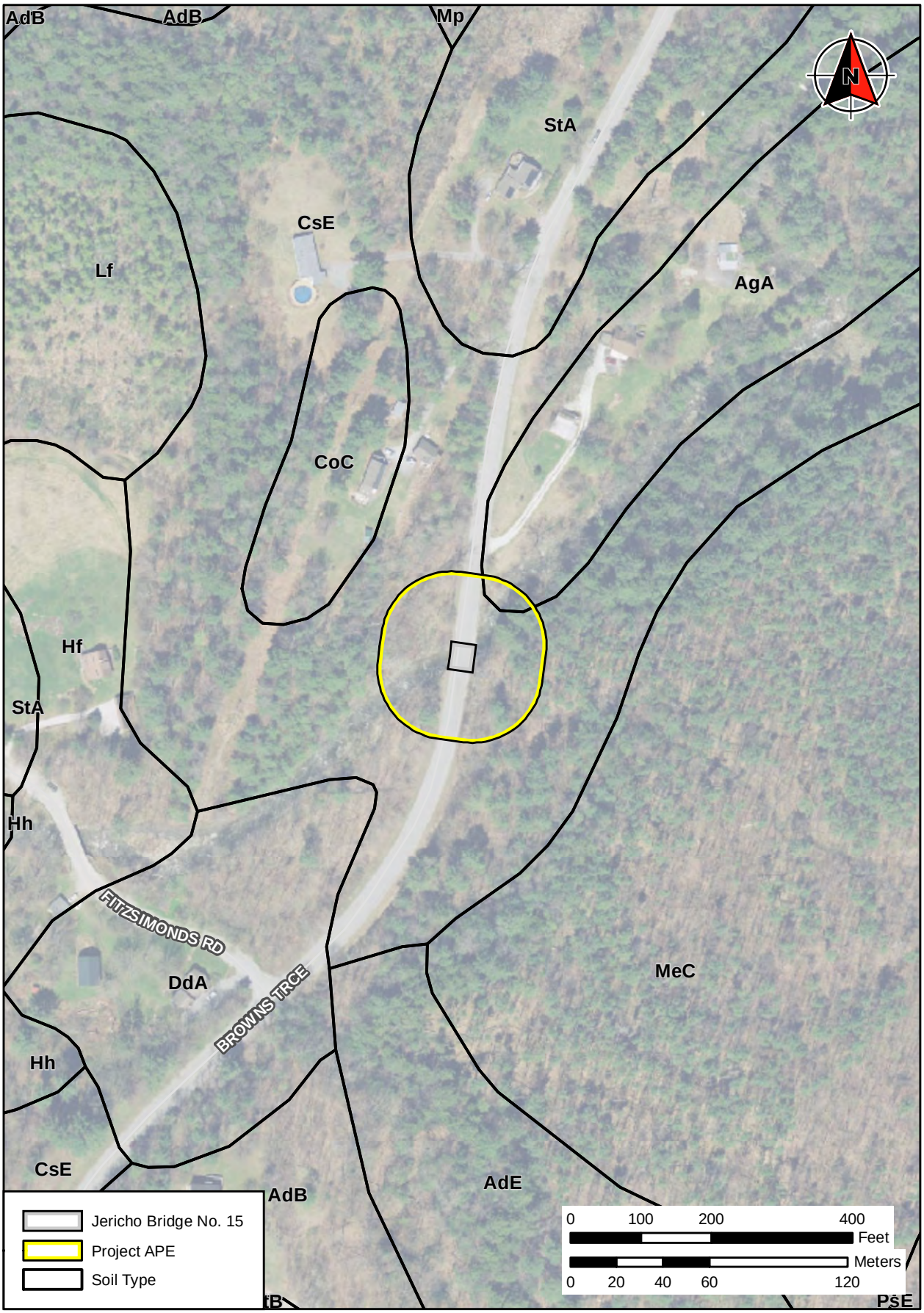

FIGURE 3: Soils in Project APE (USDA-NRCS 2019; VCGI 2018)

C. Environmental History of Northern Vermont

Paleoecologists have constructed the environmental history of Vermont from a variety of sources, including pollen cores, sedimentation histories, and faunal collections. The ruggedness of Vermont and the pronounced differences in elevation across its landscape have resulted in regional contrasts in vegetation, creating a "patchy" landscape. Today it is possible to find tundra at a few thousand feet on the highest peaks of the Green Mountains in contrast to the deciduous and coniferous vegetation in lowlands to the east and west (Thomas 1991).

Before 13,500 years before present (BP), most of present-day Vermont was covered with glacial ice. Within a thousand years the glaciers had moved north of the St. Lawrence lowland, and in their wake grew a landscape of moss, lichens, and stunted shrubs. A frigid arctic climate prevailed, leaving the ground frozen for most of year. By about 12,000 BP most of Vermont was within an herb-to-spruce zone, with higher elevations following suit about 500 to 1,000 years later. Fauna during that period likely included wooly mammoth, mastodon, moose, elk, caribou, and musk ox, as well as smaller arctic animals such as ptarmigan, arctic shrews, and lemmings. By 11,000 BP a subarctic climate dominated the region. Before the end of the eleventh millennium BP, the Champlain Sea had drained. This sea once covered an area about twice the size of present-day Vermont and may have provided Vermont's earliest human settlers with many resources.

With the close of the Pleistocene, an open park-like woodland of largely spruce, fir, and birch moved into Vermont's lowlands, and into the mountains by the following millennium. Evidence exists of larch and alder in wet lowlands and beech, oak, ash, and maple in the better drained bottomland and low hills of the Champlain and Connecticut valleys. These changes led to growth in the populations of many animals that today live in Vermont, including moose, beaver, lynx, porcupine, snowshoe rabbit, spruce grouse, mice, voles, and other animals that likely came in from the south.

Pollen cores indicate a sharp increase by 9000 BP in the amount of white pine, hemlock, oak, poplar, elm, ash, sweet gale, and ferns throughout Vermont. Pine pollen takes up 50 percent of pollen diagrams for that period. The presence of pine-dominated forests indicates a warming trend, and thin alluvial beds on floodplains from the period suggest low precipitation (Thomas and Dillon 1983). Pollen cores illustrate a drop in the rates of various pine pollen and a rise in the amount of oak, beech, birch, sugar maple, elm, and ash pollen within a thousand years, indicating the beginning of a Temperate Oak Forest (Thomas 1991:2-4).

Different strands of evidence from the Upper Midwest and the Northeast reveal that between 7500 and 5300 BP, precipitation was higher than today, and the climate was fairly warm. Evidence of rapid sedimentation and increased channel migration along the Missisquoi River between 6500 and 5400 BP indicates a higher level of rainfall. Other evidence of a wetter environment includes high rates of hemlock and beech pollen deposition, as well as beech, cedar, maple, and hemlock logs found along the Missisquoi floodplain and dating to that time period (Brakenridge 1988; COHMAP Members 1988; Thomas and Dillon 1983).

After 6500 BP the mixed deciduous-coniferous forest in the lowlands of eastern and western Vermont provided good habitat for deer, bear, wolf, raccoon, otter, fox, gray squirrel, wild turkey, and passenger pigeon. In the higher, mountainous elevations of central Vermont, spruce-fir-northern hardwood forests were home to moose, elk, and possibly small herds of woodland caribou (Thomas 1991:2-10).

After 5000 BP hemlock steeply declined and oak and hickory increased (Whitehead and Bentley 1963), possibly indicating the onset of drier conditions. Other evidence of drier conditions includes the entrenchment and infrequent river flooding in the upper Midwest (Thompson and Bettis 1982), a lack of substantial alluvial deposits along floodplains of the Missisquoi River (Brakenridge 1988; Thomas and Dillon 1983), and an apparent drop in the water table of Shelburne Pond in the Champlain Lowlands of Vermont (Carr et al. 1977). The climate was probably between 2 and 4 degrees centigrade warmer than

today (Dincauze 1989). Chestnut appeared after about 2000 BP. Oak continues to dominate in Vermont's forests today.

Temperatures likely became cooler after about 2800 BP, and precipitation increased until about AD 270. These changes led to greater quantities of spruce and fir at higher elevations and a general increase in pine in the lowlands (Bernabo and Webb 1977; Whitehead and Bentley 1963). Warmer temperatures then returned during the first millennium AD, with a rise in precipitation after about AD 750 (Swain 1978). After AD 1050 drought conditions and higher temperatures prevailed. Evidence of lower water tables, a decrease in stream flow and frequency, and the duration of flooding demonstrate that the period between AD 1000 and 1200 may have been the warmest in Vermont in over 2,000 years. After AD 1550 cooler and moister conditions came with the beginning of the so-called "Little Ice Age" (Thomas 1991:2-9), extending into the mid-nineteenth century.

III. Cultural Context

A. Precontact Background

1. Paleoindian Period (11,000 to 10,000 BP)

The earliest known archaeological remains in Vermont date to the Paleoindian period. These sites were created by small groups of hunter-gatherers who colonized the recently deglaciated sections of the state and the surrounding region sometime before the eleventh millennium BP. Data on the specific nature of Paleoindian adaptations in Vermont remains limited. Although sites of this time period have been found in the state (Loring 1980; Ritchie 1953), none have been subject to excavation. Nevertheless, some aspects of Paleoindian adaptations can be inferred by reference to investigated Paleoindian sites in the neighboring areas of New York State, New England, and the Canadian Maritimes (e.g., Deller and Ellis 1992; Ellis and Deller 2000; Ellis and Lothrop 1989; Lothrop 1989; Meltzer 1984; Stork 1997, 2004).

Assemblages from these sites indicate three consistent attributes of Paleoindian technology that were probably also true for groups in Vermont. First, in addition to fluted points, the stone technologies of these groups consisted of a flake-based toolkit with general categories of wide- and narrow-bit unifacial tools, unifacial gravers, utilized flakes, bipolar artifacts, and large bifaces. Second, people during the Paleoindian period in the Northeast probably preferred bedrock lithic sources as opposed to secondary cobble, and lithic procurement strategy may have been driven, in part, by the design requirements of their transported stone toolkits. Finally, locations of raw material sources for Paleoindian stone toolkits are often many kilometers distant from the sites where these tools are recovered. These distances indicate that people in the Northeast traveled far to collect stone for toolmaking, either during their seasonal movements or as part of trips made specifically to gather new supplies of lithic materials (Seeman 1994).

Disagreement exists over whether people at the end of the Pleistocene in the Northeast were specialists following herds of caribou, or generalists living off a diverse environment, collecting and hunting a wide range of resources (Dincauze and Curran 1983; Pelletier and Robinson 2005). More than likely, the reality varied over time and across space, and was a question not of specialist versus generalist but rather of degree and scale (Thomas 1991:3-7). As specialists, people likely gathered in larger, multifamily settlements at key times of year along strategic intercept points to hunt caribou. These larger aggregations then split up into smaller groups and moved widely across the landscape. As generalists, the people of the Paleoindian period may have moved in small family-sized groups, mapping their movements to the availability of resources.

Archaeologists know of substantial Paleoindian sites south of the present APE in the Connecticut River Valley, including the Whipple Site just off the Ashuelot River in New Hampshire (Curran 1984), the DEDIC Site on the Connecticut River in Deerfield, Massachusetts (Chilton et al. 2005), and the Turner's Falls Site on the Connecticut River in Turner's Falls, Massachusetts (Binzen 2005). In northwestern Vermont Loring (1980) documented the recovery of fluted points on and below Champlain Sea beach deposits from adjacent interior lowlands and from higher-elevation settings in the western foothills of the Green Mountains. Several sites in northwestern Vermont with evidence of Paleoindian occupations have been found in the Champlain Basin (Robinson et al. 2017).

2. Archaic Period (10,000 to 3000 BP)

Archaeologists call the period beginning 10,000 years ago following the end of the Pleistocene and the beginning of the Holocene, the Archaic period. They further subdivide the Archaic into at least three

subperiods, the Early (10,000 to 7500 BP), Middle (7500 to 6000 BP), and Late Archaic (6000 to 3000 BP). These subperiods are largely demarcated by changes in projectile point styles.

Earlier archaeologists generalized the environment of the early Holocene (Early and Middle Archaic) in the Northeast as closed woodlands dominated by conifers (Dincauze and Mulholland 1977; Fitting 1968; Ritchie 1980). Since a low carrying capacity characterizes such an environment, they hypothesized that there was a low population until about 6,000 years ago, which resulted in low site density for the period. More recently, archaeologists have questioned this understanding. Nicholas (1991a, 1991b, 1998) cites evidence that the landscape in the early Holocene was far more diverse, supporting a broader resource base than that characterized by a closed conifer forest environment. According to Nicholas's "glacial lake basin mosaic model" (Nicholas 1991a, 1991b, 1998), people took advantage of a highly productive ecosystem that contained a complex system of lakes, ponds, and wetlands. Robinson and Petersen (1993) cite the problems encountered with trying to attach changing demographics to known frequencies of temporally diagnostic projectile points. Since earlier archaeologists did not find many sites with temporally diagnostic points in early Holocene contexts, they assumed that the region was fairly uninhabited. Robinson and Petersen (1993), however, write that the lithic technology recovered from known early Holocene components is typically very expedient, resulting in the production of few temporally diagnostic formal artifacts such as projectile points. Rather, assemblages from these sites consist mostly of flake assemblages, and therefore many of the components dating to this time period have likely gone unrecognized. Furthermore, it is possible that many sites from the Early and Middle Archaic now lie deep beneath river floodplains (Thomas 1991:5-1).

In southern Vermont the transition to the Early Archaic was contemporaneous with the continued warming trend in the early Holocene and the replacement of spruce and fir by pine as the dominant tree species (Carr et al. 1977) (see Chapter II.C). The combination of environmental and technological changes during the transition to the Early Archaic may indicate an increase in the importance of plant foods and shifts in the exploitation of certain terrestrial fauna, such as the hunting of deer rather than caribou. As opposed to Paleoindian use of high-quality cherts brought long distances before discard, evidence from early Holocene sites indicates a switch to the use of local chert, quartzite, and quartz during the Early Archaic. The change is likely the result of people living in far more restricted areas than their Paleoindian ancestors as well as a lack of widespread external contacts (Thomas 1991:5-6). Archaeologists have long thought that people remained within these territories, spending portions of the year in larger base camps and then moving to smaller, more task-specific camps in the surrounding area (Snow 1980:171).

The number of known sites and diagnostic artifact types and projectile points dating to the Late Archaic (6000 to 3000 BP) is far greater throughout the Northeast and Vermont than for any of the preceding periods. There is also evidence of the development of mortuary ceremonialism. Archaeologists have traditionally characterized the Late Archaic in the Northeast and Vermont into three basic traditions based on these numerous changing artifact types. The Laurentian tradition is thought to date to between about 5600 and 4400 BP and is known from sites in western Vermont as well as elsewhere throughout the Northeast, including New York, southern Ontario, southern Quebec, and northern New England. The Narrow Point tradition follows the Laurentian and dates roughly between 4400 and 3600 BP. Archaeologists have found artifacts associated with this tradition up and down the East Coast from as far south as North Carolina and as far north as the Upper St. Lawrence River. The Susquehanna tradition is later, dating to between about 3800 and 1800 BP. Traits associated with this tradition are thought to have moved north from the Southeastern Piedmont to as far north as Maine and the Upper St. Lawrence.

These traditions differ from each other based largely on changing artifact traits; however, Dean Snow (1980) and others (e.g., Braun and Braun 1994) geographically split the Northeast during the Late Archaic into three very general sections. They base these divisions on broad generalizations about adaptations to major regional environments. The Maritime Archaic lay in the coastal regions of northern New England

and the Canadian Maritimes and is defined as an adaptation based on the resources of the ocean. The Lake Forest Archaic stretched from the Eastern Great Lakes across northern New England. Snow (1980) believes the people of the Lake Forest Archaic lived around the many lakes and rivers found in the region. The Mast Forest Archaic ran from the coastal plains of southern New England into the oak forests of the interior. Here people are thought to have made use of the abundant nut-bearing deciduous trees in the region. Although these models are useful in a very general sense, they are also problematic because they are so general and mask much of the potential for variation across the Northeast.

Our understanding of the lives people led in the Northeast is largely shaped by where the vast majority of archaeologists have worked along the great rivers of the region, including the Connecticut, the Hudson, and the Merrimack. Thousands of years ago people migrated to these rivers each spring to take advantage of the abundant annual migrations of anadromous fish. Each spring around April these fish swam far up the rivers and their tributaries to spawn until stopped by falls. They created a plentiful food resource for people at the leanest time of year when the winter stocks were empty. These large groups likely stayed together throughout much of the warm-weather months, splintering off periodically to hunt, gather different food, and collect other needed resources. There is ample archaeological evidence along the floodplains of large rivers in much of the Northeast of these large gatherings at so-called "base camps." With the onset of the cold weather, people are thought to have splintered into smaller groups, likely extended families, and moved inland away from the rivers. This pattern of small groups of hunter-gatherers aggregating during the spring and then splintering in the fall has been defined as the "central-based wandering pattern" (Ritchie and Funk 1973:340).

There is ample archaeological evidence along the floodplains of large rivers in much of the Northeast of large gatherings at so-called "base camps." These large groups likely stayed together throughout much of the warm-weather months, splintering off periodically to hunt, gather different food, and collect other needed resources. With the onset of the cold weather, people are thought to have splintered into smaller groups, likely extended families, and moved inland away from the rivers. This pattern of small groups of hunter-gatherers aggregating during the spring and then splintering in the fall has been defined as the "central-based wandering pattern" (Ritchie and Funk 1973:340).

The problem with applying these interpretations to northwestern Vermont is the lack of anadromous fish coming up the Connecticut River beyond Bellows Falls. Ohl (1994:55) comments on the lack of known sites dating to the Middle Archaic north of the falls, although sites dating to this period are known south of the falls up the West River and Ashuelot River in New Hampshire. Site VT-WD-0003 lies just south of the confluence of the West and Connecticut rivers and may have been the location of a large, warm-weather group aggregation. Elsewhere in eastern Vermont, however, since the major impetus for large gatherings appears to have been absent north of Bellows Falls, the lives people lived in this region were likely very different from elsewhere in the Northeast.

3. Woodland Period (3000 BP to AD 1600)

The Woodland period is marked by the introduction of ceramic technology about 3,000 years ago. This new technology allowed the production of containers that could withstand cooking with direct heat. This new capability likely affected nutrition and therefore population dynamics. Ceramics also enhanced the capability to store food, which by offsetting seasonal changes in the availability of different foods made it possible for people to become more sedentary. Despite the possibilities presented by this new technology, there is little evidence of any profound changes in life across Vermont. In addition, the elaborate ceremonialism represented by the rich grave-good assemblages found at Early Woodland (3000 to 2000 BP) and Middle Woodland (2000 to 1000 BP) sites, such as Swanton, Boucher, East Creek, and Bennett (Loring 1985; Thomas 1991:9-9), indicate continuity with the burial ceremonialism of the Late Archaic.

There is little archaeological evidence of the Early Woodland in eastern Vermont, and much of what we know about the Early to Middle Woodland comes from sites located in the Connecticut Valley. Two notable sites are the Canaan Site (VT-ES-2) in Canaan, Vermont, and the Skitchewaug Site (VT-WN-41) in southeastern Vermont (Bolian and Gengras 1994; Heckenberger et al. 1992). Middle Woodland sites in western Vermont, such as the Winooski (Power et al. 1980) and McNeil Generating Station sites (Thomas 1980), illustrate the use of areas along the lower reaches of rivers flowing into Lake Champlain. These sites indicate the presence of large gatherings of people who fished, harvested nuts, and hunted.

At Middle Woodland sites like Winooski and McNeil, lithic artifacts are mostly made of non-local cherts. By the Late Woodland (AD 1000 to 1600), however, people were using local cherts, perhaps suggesting changes in and an end to the long-distance trade and political relationships that had existed during the Middle and perhaps Early Woodland periods (Haviland and Power 1982:132-133; Thomas 1991:9-9). The ceramics at Winooski are "related to ceramics from the Lake Forest Middle Woodland 'cultural complex' of the Great Lakes-St. Lawrence drainage" (Petersen and Power 1983:142), whereas later ceramic assemblages "seem more clearly related to other local assemblages within the Lake Champlain drainage basin" (Petersen and Power 1983:143). Ceramics recovered from the Canaan and Skitchewaug sites are consistent with contemporaneous types found elsewhere in Vermont.

Throughout the Northeast the Late Woodland period is associated with the introduction of horticulture, particularly the importation of domesticated maize; however, it is more than likely that maize did not appear in New England until after about AD 1300 (Chilton 2006), several centuries after the Iroquois to the west had adopted it. In New York maize became a key component in the development of large permanent villages. Although maize was adopted throughout New England, there is little evidence of the development of large sedentary villages based on maize horticulture (c.f., Petersen and Cowie 2002). Rather, archaeological evidence indicates that people remained mobile hunter-gatherers who only used maize as a dietary supplement. These people therefore become what Elizabeth Chilton (2002) has called mobile farmers because although they planted, they did not become sedentary farmers like the Iroquois.

4. Contact Period (ca. AD 1600 to 1750)

At the time of European contact in the seventeenth century, the descendants of Late Woodland groups inhabiting the Connecticut Valley of Vermont included the Western Abenaki. By that time sedentary village life was a major aspect of their adaptation. The Western Abenaki were organized into several major bands or organizations, each occupying its own village site. Subsistence strategies alternated between the village setting, where crops were grown and surplus foodstuffs stored, and periodic dispersion into smaller groups that traveled to other locations, primarily to hunt (Haviland and Power 1982).

The coming of Europeans to New England in the seventeenth century brought immense and catastrophic changes to the Native peoples of the region—changes that we are only beginning to understand today. The Native inhabitants of Vermont, the Abenaki, experienced severe population loss to European diseases. Their traditional lifeways were forever changed by Europeans who took their lands, refugee populations of American Indians who moved in from elsewhere in New England, and involvement in European wars and European demand for trade goods, such as beaver pelts. The Abenaki, who call their homeland Ndakinna, meaning "our land," received tribal recognition from the State of Vermont in 2006. They are still seeking federal recognition and are referred to as the St. Francis/Sokoki Band of the Abenaki Nation of Missisquoi (Abenaki Nation 2010). Today, the St. Francis/Sokoki Band of the Abenaki Nation of Missisquoi live in northwestern Vermont (Abenaki Nation 2007).

B. Historical Overview

1. Historic Context for Northern Vermont

The first Euro-Americans to venture into the region that would become Vermont in the eighteenth century were trappers and hunters. Access to much of this area was impeded by mountains, and colonization was slow because the political situation was unsettled. Recurring hostilities between the British and French authorities initially inhibited settlers from making Vermont their home; however, even before the final surrender of the French at Quebec in 1760, applications for land grants were being made by many parties.

The colony of Connecticut made the first land grants within what is now Vermont in the early eighteenth century, after Massachusetts, which had erroneously granted its own citizens 436 square kilometers (172 square miles) within the borders of Connecticut, transferred these land grants (the "equivalent lands") to Connecticut. Connecticut immediately sold these lands to people from both Connecticut and Massachusetts, who in turn sold the land to prospective settlers at a profit. After the final resolution of the Massachusetts-New Hampshire territorial disputes in 1740, these lands became New Hampshire territory. Nevertheless, most of the region's settlers continued to come from Connecticut and Massachusetts (Tosi 1948:48-49). European settlement was slow in all parts of today's Vermont until 1761, when Benning Wentworth, governor of New Hampshire, claimed the lands for New Hampshire and began establishing illegal land grants. These territories became the State of Vermont in 1791.

Prior to 1830, subsistence farming was the dominant economic activity. The earliest economic activity outside the household was the sale of potash and lumber obtained from land clearing. Potash, owing to its high market value and use in the production of glass, became the only inspected product in Vermont at that time (Elliott 1977:18). Small manufacturers, including gristmills and sawmills, sprang up throughout the region to process locally grown materials. Distilleries (using rye and corn) and starch factories (using potatoes) also developed. Taverns and general stores opened to cater to the local populace in nearly every town. By 1830 the region's agricultural economy was concentrated on the cultivation of potatoes and grains, some of which was shipped to Eastern and Southern markets. Wheat was initially an important crop, so much so that it was used as money by the earliest settlers. As transportation increased to wider markets, farmers focused more on a smaller number of specialized products.

Apple growing became an important part of the Vermont economy. John McIntosh, born in 1776, eventually began selling his apple seedlings to settlers, and the McIntosh apple became the dominant apple in Vermont because of its acclimation to cool nights and warm, sunny days. In 1899 Vermont boasted 1,675,131 apple trees and produced 1,176,822 bushels of apples. Commercial apple production in Vermont continued into the twentieth century but declined owing to the lack of modernized facilities. The introduction of the automobile boosted apple production again; in 1955 Vermont produced over 1,100,000 bushels, and in the 1980s roughly 79 commercial growers on 3,500 bearing acres of land produced roughly 1.25 million bushels annually (VDHP 1990).

By the late eighteenth century some industry had begun to develop in Vermont. Lumbering in the oak forests brought much-needed money into the state and cleared land for farming (Stratton 1980:250). Large fallen trees were ideal for making masts for ships and were usually shipped to Quebec. Production of hats was also an early trade, which used local wool and beaver hides from trappers. Other early businesses included blacksmithing, brick making, and dyeing.

The developing livestock industry rapidly took over in Vermont as both cattle and horses thrived on the local grasslands and climate (Bearse 1968; Tosi 1948:58-59; VDHP 1990). During the early nineteenth century the Spanish Merino sheep, an outstanding wool producer easily adapted to rugged terrain and climate, arrived in Vermont. The self-sufficiency of the Vermont farmers diminished considerably as many

turned to sheep farming for an alternative source of income, almost to the complete exclusion of other agricultural products. The improved machinery and larger woolen mills that were introduced around 1830 permitted Vermont farmers to produce more wool, and 33 wool factories were built in Vermont during that period. In addition to wool, raw cotton was imported into Vermont mills for processing (Meeks 1986; Tosi 1948:62).

Although some textile production occurred in fulling and cleansing mills, and later also carding mills, the production of textiles remained a household activity until about 1820. After about 1820 factories took over the production of textiles, and the number of fulling and carding mills increased by 200 percent (from 136 to 273) and 275 percent (from 87 to 234), respectively. By 1830 the home manufacture of textiles was almost non-existent. Since a typical textile mill required the labor of about nine or so workers, the mills typically sprang up where the workers lived. In many cases the wool factories were an outgrowth of earlier textile mills as the mills became suppliers for developing wool factories (Meeks 1986; Steponaitis 1975:43-50).

The breeding of wool sheep reached its peak in Vermont in the early 1840s, but by the end of the decade, the industry had begun to decline, partly the result of lower protective tariffs on imported wool and partly the result of competition from the West with its larger pastures, less costly grain, and better transportation following the opening of the Ohio and Pennsylvania canal systems (Tosi 1948:59-60; VDHP 1989b). The number of wool factories in Vermont decreased from 97 in the mid-1840s to 89 a decade later. In addition, the number of textile concerns in Vermont began to drop as the industry consolidated into fewer, larger firms using more efficient machinery and located along more traveled transportation routes. The number of mills fell from a peak of over 400 in the 1820s to only 75 in the early 1850s. The sheep industry revived briefly in the 1860s and immediately afterward, as the Civil War prompted a greater demand and higher prices for wool products because of the low availability of Southern cotton as well as the imposition of higher tariffs (Steponaitis 1975:60-67).

With the initial decline of the sheep and woolen industry in the late 1840s, many farmers returned to breeding cattle, although not before mutton sheep slowly infiltrated many farms formerly devoted to wool-bearing sheep (VDHP 1989a:2). Dairy farming in Vermont and elsewhere in New England had been introduced by the 1840s (Barron 1980; Russell 1982). Dairying proved to be a protection against the fluctuating price of wool and allowed farmers to take advantage of expanding urban markets to the south. The introduction of dairy breeds to replace beef cattle was a slow and intermittent process. Barron (1980) believes that one reason farmers in Vermont were slow to switch from wool to dairy was problems with labor. The young of Vermont were moving out West and to the big cities, depopulating the countryside during the second half of the nineteenth century (discussed further below). Because sheep farming was far less labor-intensive, it remained a more efficient use of resources during this period even as prices for wool dropped. Dairy farming, on the other hand, was becoming more labor-intensive, and Barron (1980:333) estimates that because of technological changes, the labor demand for cows grew by 68 percent per cow between 1850 and 1910. As a result, since the available pool of labor was declining after the mid-nineteenth century, farmers were hesitant to make the switch from wool to dairy even though the wool market was unstable. It was not until the market for wool completely collapsed at the end of the century that the switch from sheep to cows became complete.

Up until the 1850s, only private dairying took place. As the industry became more widespread, cheese factories, and later creameries, were built to service entire dairying communities. The three staple crops for the mid-nineteenth century Vermont farmer became wool, butter, and maple sugar, and after the Civil War dairy farming dominated the agriculture of eastern Vermont (Bremer 1929:587; Tosi 1948:63). Butter and cheese were manufactured in centrally located factories, although up until 1900 almost 40 percent of manufactured dairy products were produced privately in the home for sale to a private clientele. The number of dairy cows in some Vermont counties reached a peak in 1900. By the close of the nineteenth century,

however, the Vermont dairy farmer faced direct competition from the dairy industries of Ohio and Wisconsin, for whom the transport of perishable goods did not pose as great an obstacle after development of the railroads connected these states with the East. Dairying declined slowly until 1920, then rose sharply until 1930 (Tosi 1948:62-64). By the end of the twentieth century, however, the need for expensive equipment had put many small hill-country farmers out of business (VDHP 1989a).

The woolen industry in Vermont changed in the late nineteenth century with the emergence of large town-based manufacturing firms (those employing more than 100 employees) in places such as Bennington, Winooski, Rutland, Johnson, and Fair Haven. Vermont still enjoyed prominence in the manufacture of woolen and knit goods during the 1880s; however, the state's industry declined steadily through the first half of the twentieth century despite a brief rise during the World War II years (Steponaitis 1975:118; VDHP 1991:10-11). Mills gradually closed after the end of the nineteenth century as they became unable to compete with mills and factories in the South (Barron 1980:326).

The population decline during the second half of the nineteenth century is perhaps one of the greatest historical impacts on the landscape. As the United States expanded, new opportunities arose, and young people moved to the West. Many of the Vermont's rural youth left for jobs in the growing big cities. Barron (1980) describes contemporary writing of abandoned farms as "hyperbole," writing that agriculture in New England did not collapse after the Civil War but only experienced stagnation. He points out that throughout Vermont two-thirds of male household heads remained farmers/farm laborers throughout the second half of the nineteenth century, 90 percent of farms were family-owned, and that two-thirds of the land remained agricultural land. In short, the number, size, and location of farms throughout Vermont remained stable. In addition, the output of wool, butter, and maple sugar from these farms remained constant into the late 1890s. The number of tradesmen also remained constant, although several mills and factories were replaced because they could not compete with those in the South (Barron 1980:326). Vermont farmers may have been able to survive the slow attrition of labor throughout the second half of the nineteenth century, but the lack of available labor ultimately prevented them from adapting to more economically advantageous forms of farming.

2. Historic Context for Chittenden County

a. County Formation

The French, the first Europeans to settle in the Champlain Valley, came to present-day Vermont in the seventeenth century. It was not until the end of the French and Indian War (1756-1763), almost 150 years later, that people of English descent began to settle along the western reaches of the Winooski River in present-day Burlington, South Burlington, Williston, and Essex under grants issued by the English governor of New Hampshire. The first proprietors met to establish a new township in 1774, when the Onion River Land Company was formed in Connecticut with members including Ethan Allen, Ira Allen, Remember Baker, and Tom Chittenden. Many of these early settlers left the Winooski Valley with the outbreak of the American Revolution, fearing an attack from the British, and moved south (Rann 1886).

Tom Chittenden settled with his family along the banks of the Winooski in Williston and went on to become the first Governor of the New Republic of Vermont in 1778, serving until his death in 1797. Others also soon settled along the Winooski, taking advantage of the fertile farmland and building farms along the river, near the Winooski Falls (Hemenway 1867; Rann 1886; Swift 1996). Ira Allen began milling grain and sawing lumber in 1772 at the Falls, and he and Remember Baker built Fort Frederick nearby for protection from the Abenaki. The small community that developed around the falls, the mills, and the fort became known as Allen's Settlement.

Since the earliest settlers placed their first farms on the arable land they found along the Winooski River and its tributaries, these lowland areas have the oldest place names. The more upland and mountainous

sections of the valley were settled later and have more descriptive names (Swift 1996:159). Apparently, the name Winooski has its roots in the Abenaki words for "the wild onion place"; *Winooskitook* means "the wild onion river." The French took the name and spelled it Ouinoustick and Ouinouski. It is possible that the Allens and other early settlers of English descent changed the name to the Onion River (subsequently forming the Onion River Company to settle the land) to remove any trace of French or Abenaki claims to what is today Williston, Burlington, and South Burlington (Swift 1996:159).

b. Town of Jericho

Settlement in Jericho Center began during the late eighteenth century. In 1795 the town was created by taking 5,000 acres from the Town of Richmond. The town was home to a small milling industry during the nineteenth century, maintaining sawmills, gristmills, and wool mills (Bathory-Kitsz 2013:163). In 1802 the town voted to establish seven school districts, reflecting more progressive attitudes toward the necessity of formal education for area children (Hayden et al. 1916:126-129). With settlement increasing, an additional nine school districts were added by about 1830; at that time the population of the town had reached 1,654 (Hayden et al. 1916:154). The main population centers of the town were Jericho Corners on the Browns River and Jericho Center. The fertile valleys of the Winooski River, Browns River, Lee River, and Mill Brook supported growth of diverse agricultural products, including corn, grains, hay, potatoes, and dairy products such as milk and cheese. Maple trees were also plentiful and supported a large maple sugar industry, with 14,225 pounds of sugar produced in 1860 (Ritter 2010).

Around 1840 the selectmen of the Town of Jericho voted to spend $200 to construct a county road in the town that ran from the Richmond town line through Jericho Center to the Underhill town line at Underhill Flats (Hayden et al. 1916:138). The Central Vermont Railroad was completed to Burlington by December 1849, with a depot in Richmond to the south and North Williston to the southwest. In 1876 the Lamoille Valley Railroad extended service to Jericho Center (Hayden et al. 1916:140).

The town road between Jericho Center and Richmond was well developed with farms, shops, and one school, School No. 6, by 1869. School No. 9, a blacksmith shop, and approximately eight residences were located at the intersection of the town road, also known as Brown's Trace, and Nashville Road. A cooper shop and four residences were located on either side of Mill Brook on the town road (Figure 4) (Beers 1869).

At the beginning of the twentieth century, the population of the town fell to 1,373. Dairying was the principal agricultural pursuit of the region with more than 100 dairies in the town (Hayden 1916:154). In 1940 little in the area around Mill Brook had changed. Census enumeration maps of Jericho show the same number of residences (United States Census Bureau [U.S. Census] 1940); however, the map shows a mill in the vicinity of Brown's Trace and Mill Brook, apparently built by Ansel Nash in 1870 (Child 1882:226).

After a population low of 1,077 in 1940, the number of residents slowly grew until the 1960s, when the population increased by over 25 percent. Today Jericho maintains a rural character, and several historic homes are still extant. According to the 2010 census, the town is home to just over 5,000 residents (U.S. Census 2010).[1]

[1] Sources on the history of Jericho in the twentieth century are limited.

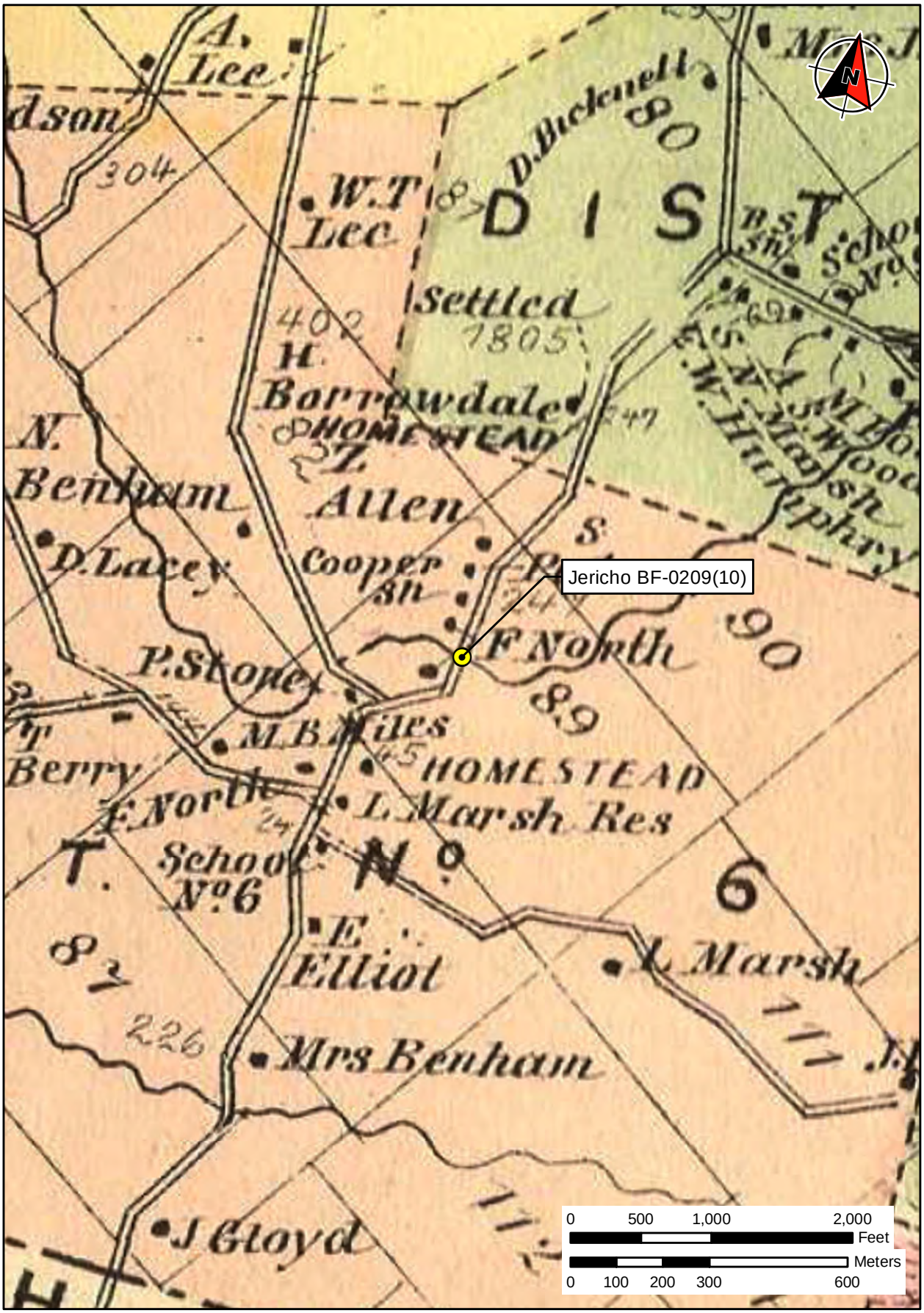

FIGURE 4: Map of Jericho, 1869 (Beers 1869)

C. Historical Map Review

The earliest map of Chittenden County dates to 1857 (Walling 1857) (Figure 5). The map shows a moderately dense settlement with properties located along local roads. The Beers (1869) Chittenden County atlas shows an increased density of private properties and roads in the area. The georeferenced map of the Beers (1869) atlas available on the ORC (VDHP 2021) shows that TR 4/Brown's Trace Road was not an early turnpike, post office route, or military road. The road was probably constructed to provide a direct route to the Central Vermont Railroad at Richmond (see Figure 4).

Topographic maps from the 1920s to the 1980s show no development in the APE vicinity. Dispersed private properties are located along TR 4 and other local roads, but no structures are located in or adjacent to the APE (Nationwide Environmental Title Research [NETR] 2021).

D. Previous Cultural Resource Management Projects and Known Sites

1. Previous Cultural Resource Management Studies in Vicinity of APE

WSP's background research included examination of the VDHP's ORC files to identify known sites and the results of previously conducted cultural resource management surveys in the vicinity. No cultural resource surveys have been conducted within 1.6 kilometers (1 mile) of the APE.

2. Precontact Archaeological Sites in Vicinity of APE

No archaeological sites have been previously recorded within 1.6 kilometers (1 mile) of the APE. The closest archaeological site, VT-CH-1173, located 1.12 miles to the southwest, is a precontact site that consists of a single chert flake.

3. Historic Archaeological Sites in Vicinity of APE

No archaeological sites have been previously recorded within 1.6 kilometers (1 mile) of the APE. The closest archaeological site, VT-CH-0785, is located 1.7 miles to the northeast and consists of a historic farmstead.

FIGURE 5: Project APE in 1857 (Walling 1857)

IV. Archaeological Assessment

A. Methods

WSP's goal for the ARA was to assess and survey the entire APE to identify archaeologically sensitive areas. This will allow VTrans maximum flexibility in avoiding sites that are eligible for listing in the NRHP. To derive this assessment, WSP conducted background research, field inspection, and analysis of the APE using the *Environmental Predictive Model for Locating Precontact Archaeological Sites* (VDHP 2015)

1. Background Research

The background research included use of the Vermont ORC map tool (VDHP 2021), a review of site files from sites located within 1.6 kilometers (1 mile) of the APE, reports from projects conducted within the Town of Jericho, historical maps, and local histories.

2. Determination of Archaeologically Sensitive Areas

WSP's archaeological assessment followed several stages. WSP first reviewed the APE using the VDHP ORC online map tool (2021) and the *Environmental Predictive Model for Locating Precontact Archaeological Sites* (VDHP 2015; see Appendix A) to identify the distribution of key environmental criteria possibly affecting the location of precontact archaeological sites. The environmental criteria listed in these two predictive tools are summarized below.

Proximity to a:

- Permanent Stream/River
- Waterbody
- Wetlands
- Stream/Waterbody Confluence
- Head of Drainage
- Stream Confluence
- Waterfalls

The presence of:

- Glacial Lake Shore Line
- Glacial Outwash and Kame Terrace
- Floodplain Soils
- Level Terrain
- Significantly Sloped Terrain

For the seven criteria defined by proximity, the radius of proximity defined as significant is typically 180 meters (590 feet). The value attached to proximity was refined according to the Environmental Predictive Model, with a higher significance and greater score given to areas within 90 meters (295 feet) of a particular environmental criterion, versus a lower significance and half the score given to locations between 90 and 180 meters (295 and 590 feet) of the same criterion. The other five criteria are based on presence/absence (i.e., presence on level terrain versus presence on significantly sloped terrain) and not on varying levels of proximity. The Environmental Predictive Model attaches scores to each of these criteria as well as other criteria, including the presence of burials and known archaeological sites.

WSP determined sensitivity for the possibility of historic archaeological sites through an analysis of historical maps (see Figures 4 and 5) of the APE as well as regional histories. These historical maps are useful sources of information about old roads as well as the location of historic-era structures and other features. WSP also researched the VDHP site and report files available through the ORC as well as in-house resources to identify known sites and the results of previously conducted cultural resource management surveys surrounding the project, as described in Chapter III. Familiarity with known sites is useful both for understanding where sites might be located and for interpreting what is found and assessing its potential significance.

WSP consulted the Historic Front Yards study (Louis Berger 2005) to provide a context for identification of archaeological sensitivity in areas of historic building-road space. That study provides a guideline for assessing archaeological sensitivity and making recommendations for additional work. This includes identification of historic building-road spaces, eliminating historic building-road spaces that have been obviously and significantly disturbed, evaluating the archaeological sensitivity of each historic building-road space, and determining the setting and context of the space. The space and context setting variables are summarized below.

Space Setting

- Age of adjoining road compared to the adjoining historic building.
- Historical function of the building or building complex adjoining space and type of associated below-grade infrastructure to support the functions of the associated building.
- Overall general historical setting of the space.
- Distance of the historic building from the road and evidence of changing distance since the building was originally erected.
- Known previous buildings erected nearby or in the location of the historic building.
- Historical orientation of the historic building relative to the space.
- Historical functions of the historic building-road space.
- Evidence of archaeological features or deposits.

Context Setting

- Ability to pose research issues that might be investigated on the property where the historic building-road space is located, based on documentary research and field reconnaissance.
- Presence of pertinent historical themes or associations that the property might illustrate.
- The potential for the historic building-road space to contribute substantively to the possible overall significance of the property.

B. Results

1. Field Inspection

The results from the field inspection, in combination with the background research, indicate that the APE contains no areas of archaeological concern. The existing bridge has been built into the banks of the river, and the roadway leading up to the bridge has been elevated to make a level road surface (Plates 1-3), resulting in large areas of built-up or disturbed soils in the APE. What appears to be an old roadbed leads down into the river on the west side of the bridge, long out of use and overgrown (Plate 4). If this is an old roadway, it further disturbed the existing soils in the area. The removal and/or replacement of the bridge will probably not impact any possibly intact culturally sensitive soils because of these disturbances.

PLATE 1: View of South Abutment of Bridge Cutting into Riverbank, View South

PLATE 2: View of North Abutment of Bridge Cutting into Riverbank, View North

PLATE 3: View of Built-up Roadway Leading up to Bridge, View North

PLATE 4: View of Possible Roadway into River on West Side of Bridge, View North

2. Analysis

The VDHP (2015) predictive model for precontact archaeological sites relies mainly on ecological variables, including distance to water, particular types of landforms, and slope, as well as possible archival or oral traditions and the known presence of sites and burials. Scoring according to this model is not meant to be taken rigidly, but rather as a guide to review possible environmental variables. The primary environmental variable related to precontact sites that applies to the APE is water sources. Elevated landforms are located too far from water sources to yield cumulative scores of 32 on the predictive model. The previous bridge and road construction operations have also resulted in surface and limited subsurface disturbances, that when combined with a lack of suitable intact landforms such as alluvial or outwash deposits, results in a negative score. Given the lack of positive environmental factors, the existing disturbance, and the generally low-density distribution of precontact sites in the vicinity, the APE is considered to have a low to very low sensitivity for precontact archaeological resources. Based on the predictive model, no portion of the APE scored 32 or higher, with a minimum score of 32 required to indicate archaeological sensitivity.

Application of criteria in Louis Berger's (2005) Historic Front Yards study showed that there is a low historic archaeological sensitivity within the APE. Although historical maps of the area depicted some historical activities in the general area of the APE, there were none that fell within the APE of the bridge itself. In addition, the roadway leading up to the bridge shows evidence of having been repaved several times since its installation, causing changes to the historic road space of the APE.

V. Conclusions

On behalf of VTrans, WSP completed an ARA for the proposed improvements to Jericho Bridge No. 15, TR 4, Chittenden County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to consider the potential effects of site access, approach work, staging, bridge installation, and other potential project activities associated with improvements at the site of the bridge. The APE extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches. The goal of the survey was to identify archaeologically sensitive areas in the project APE. The survey included background research, field inspection conducted April 8, 2021, and application of the predictive model.

No previously recorded archaeological sites are present in the APE. No archaeological sites are located within 1.6 kilometers (1 mile) of the APE. No other archaeological sites were identified during the ARA. Given the lack of positive environmental factors combined with evidence of disturbance documented throughout the surrounding area, it is WSP's opinion that the APE is not sensitive for archaeological resources. Any subsurface disruption in the assumed APE has little potential for disturbing buried cultural deposits.

It is WSP's opinion that any future development carried out in the APE will have no impacts on any significant archaeological resources and would not have an adverse effect on archaeological sites that are eligible for or listed in the NRHP. WSP's s opinion is that additional archaeological investigation of the APE is not necessary; however, should project activities be expanded and the APE changed, further investigation may be warranted.

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Appendix A: Environmental Predictive Model Checklist

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name **County** **Town**
DHP No. **Map No.** **Staff Init.** **Date**

Additional Information

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m 90- 180 m	12 6	
2) Distance to Intermittent Stream	0- 90 m 90-180 m	8 4	
3) Confluence of River/River or River/Stream	0-90 m 90 –180 m	12 6	
4) Confluence of Intermittent Streams	0 – 90 m 90 – 180 m	8 4	
5) Falls or Rapids	0 – 90 m 90 – 180 m	8 4	
6) Head of Draw	0 – 90 m 90 – 180 m	8 4	
7) Major Floodplain/Alluvial Terrace		32	
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m 90 -180 m	12 6	
11) Confluence of River or Stream	0-90 m 90 –180 m	12 6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m 90 -180 m	12 6	
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	

17) Marine/Lake Delta Complex**		12	
18) Champlain Sea or Glacial Lake Shore Line**		32	
E. OTHER ENVIRONMENTAL FACTORS:			
19) Caves /Rockshelters		32	
20) [ ] Natural Travel Corridor [ ] Sole or important access to another drainage [ ] Drainage divide		12	
21) Existing or Relict Spring	0 – 90 m 90 – 180 m	8 4	
22) Potential or Apparent Prehistoric Quarry for stone procurement	0 – 180 m	32	
23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)		32	
F. OTHER HIGH SENSITIVITY FACTORS:			
24) High Likelihood of Burials		32	
25) High Recorded Site Density		32	
26) High likelihood of containing significant site based on recorded or archival data or oral tradition		32	
G. NEGATIVE FACTORS:			
27) Excessive Slope (>15%) or Steep Erosional Slope (>20)		- 32	
28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		- 32	
**** refer to 1970 Surficial Geological Map of Vermont**			
		Total Score:	
Other Comments :			
0- 31 = Archeologically Non- Sensitive **32+ = Archeologically Sensitive**			

wsp

Appendix I: Historic Memo

VERMONT

Vermont Agency of Transportation
Project Delivery Bureau - Environmental Section
219 North Main Street
Barre, VT 05641

To: JulieAnn Held, Environmental Specialist

From: Judith Williams Ehrlich, VTrans Historic Preservation Officer

Date: July 21, 2021

Subject: Historic Resource Identification for Jericho BF 0209(10) 12J634

I have completed a resource identification (ID) for Jericho BF 0209(10). At this time, the project is expected to include repairs to the existing Bridge No. 15, but the full scope of the project has not been determined.

This Resource Identification effort is being undertaken to provide information to the VTrans designers working on a proposed improvement project. Toward that end, VTrans Cultural Resources staff have identified potential resources within a broad preliminary Area of Potential Effect to ensure the designers are aware of all cultural resources that could possibly be affected by a project. Once the project is defined at the Conceptual Design phase, Cultural Resources staff will be able to determine a formal Area of Potential Effect for purposes of Section 106 and 22 VSA § 14.

I requested WSP USA Inc. complete a Resource Identification of Bridge No. 15 on Town Road 4 in Jericho. The consultant recommended that the bridge is not historic, and I concur with this recommendation. WSP also determined that there are no other structures in the project area and no 4(f) resources.

Please see the full report titled, “Architectural Resource Identification Survey Jericho Bridge No. 15, TR 4, BF 0209(10)” and dated May 26, 2021.

Architectural Resource Identification Survey
Jericho Bridge No. 15, TR 4
BF 0209(10)

Jericho, Chittenden County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

May 26, 2021

Architectural Resource Identification Survey
Jericho Bridge No. 15, TR 4
BF 0209(10)

Jericho, Chittenden County, Vermont

Prepared for:

Vermont Agency of Transportation
219 North Main Street
Barre, Vermont 05641

Prepared by:

Camilla McDonald

WSP USA Inc.
433 River Street, 7th Floor
Troy, New York 12180

May 26, 2021

Abstract

On behalf of the Vermont Agency of Transportation (VTrans), Montpelier, WSP USA Inc. (WSP), of Troy, New York, completed a historic architectural resource identification survey and effects assessment for the proposed improvements to Jericho Bridge No. 15, TR 4, Chittenden County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to take into account the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The area of potential effect (APE) for the architectural survey and effects assessment extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches.

The goal of the survey was to identify (1) historic architectural resources (properties) in the APE previously listed in the Vermont State Register of Historic Places/National Register of Historic Places (SRHP/NRHP) (the criteria for both are identical), and (2) previously unsurveyed historic architectural resources in the APE that may be eligible for listing in the SRHP/NRHP. The survey also evaluated the potential effects of the project on viewsheds associated with any properties listed in or eligible for the SRHP/NRHP. As the project is still in the planning stages and may take several years to be implemented, WSP identified properties that meet the 45-year age mark for NRHP evaluation. The investigation included background research and fieldwork. Fieldwork took place in April 2021. The historic architectural investigations were undertaken in accordance with Act 250 (Title 10 of Vermont Statutes Annotated [VSA], Chapter 151); and Title 30, VSA Chapter 5, Section 248 (Public Service Board's Certificate of Public Good).

WSP identified one property in the APE that is older than 45 years, a previously unsurveyed resource, which is the subject property, Jericho Bridge No. 15 over Mill Brook and TR 4. It is WSP's opinion that the bridge is not eligible for the SRHP/NRHP. No other architectural resources and no Section 4(f) resources were located in the APE.

It is WSP's opinion that no intensive survey is required at this time. Should project activities expand beyond the current project APE, a supplemental survey may be warranted to identify all issues that may arise and to establish mitigation efforts that can be put in place to ensure the protection of resources. This will allow VTrans to consider historic resources in planning the improvements to Jericho Bridge No. 15.

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I. Introduction

A. Project Description

On behalf of the Vermont Agency of Transportation (VTrans), Montpelier, WSP USA Inc. (WSP), of Troy, New York, completed a historic architectural resource identification survey and effects assessment for the proposed improvements to Jericho Bridge No. 15, TR 4, Chittenden County. The scope for the project has yet to be defined; WSP therefore conducted this survey and resource assessment to take into account the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge.

The project is located along TR 4 in the Town of Jericho, Chittenden County (Figure 1). The area of potential effect (APE) for the architectural survey and effects assessment extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches (Figure 2).

B. Objectives

The goal of the survey was to identify (1) historic architectural resources (properties) in the APE previously listed in the Vermont State Register of Historic Places/National Register of Historic Places (SRHP/NRHP) (the criteria for both are identical), and (2) previously unsurveyed historic architectural resources in the APE that may be eligible for listing in the SRHP/NRHP. The survey also evaluated the potential effects of the project on viewsheds associated with any historic resources listed in or eligible for the SRHP/NRHP. The investigation included background research and fieldwork. Fieldwork took place in August 2020.

Determinations of eligibility for the NRHP followed the guidelines and criteria established by the National Park Service (36 CFR 60.4). In 2001 the Vermont Division for Historic Preservation (VDHP) changed the Vermont SRHP criteria to be identical to the NRHP criteria, and all resources then listed in the Vermont SRHP were deemed eligible for the NRHP, creating a single class of historic properties and thereby streamlining the historic preservation permitting process in Vermont. As the project is still in the planning stages and may take several years to be implemented, WSP identified properties that meet the 45-year age mark for evaluation for the NRHP. The historic architectural investigations were undertaken in accordance with Act 250 (Title 10 of Vermont Statutes Annotated [VSA], Chapter 151); and Title 30 VSA Chapter 5, Section 248 (Public Service Board's Certificate of Public Good), and followed VTrans (2000) guidelines.

This report contains six chapters. Following the introduction in Chapter I, Chapter II describes the survey's methodology. Chapter III provides the historic context for the project vicinity. Chapter IV describes the survey results, and the conclusions appear in Chapter V. Chapter VI contains the references cited.

This investigation was conducted under the direction and supervision of WSP Senior Vice President Hope Luhman, PhD. Director of Historic Preservation Steven Bedford, PhD supervised the QA/QC process. WSP Historic Preservation Manager Camilla McDonald conducted research and wrote the report, and Archaeologist Jessica Vavrasek conducted the fieldwork. Principal Draftsperson Jacqueline L. Horsford prepared the graphics. Principal Editor Anne Moiseev edited the report.

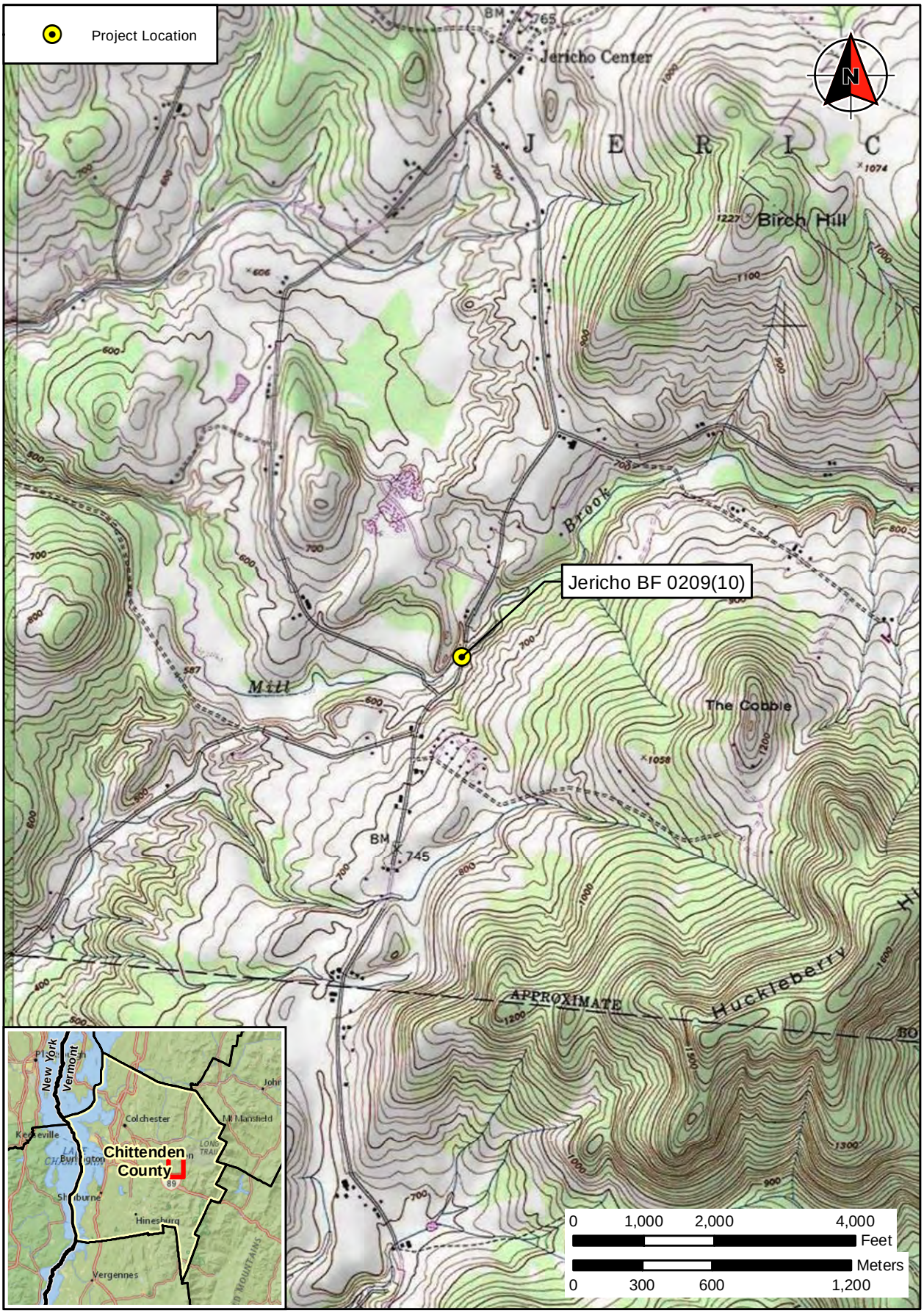

FIGURE 1: Location of Project BF 0209(10) (ESRI USA Topo Maps 2019)

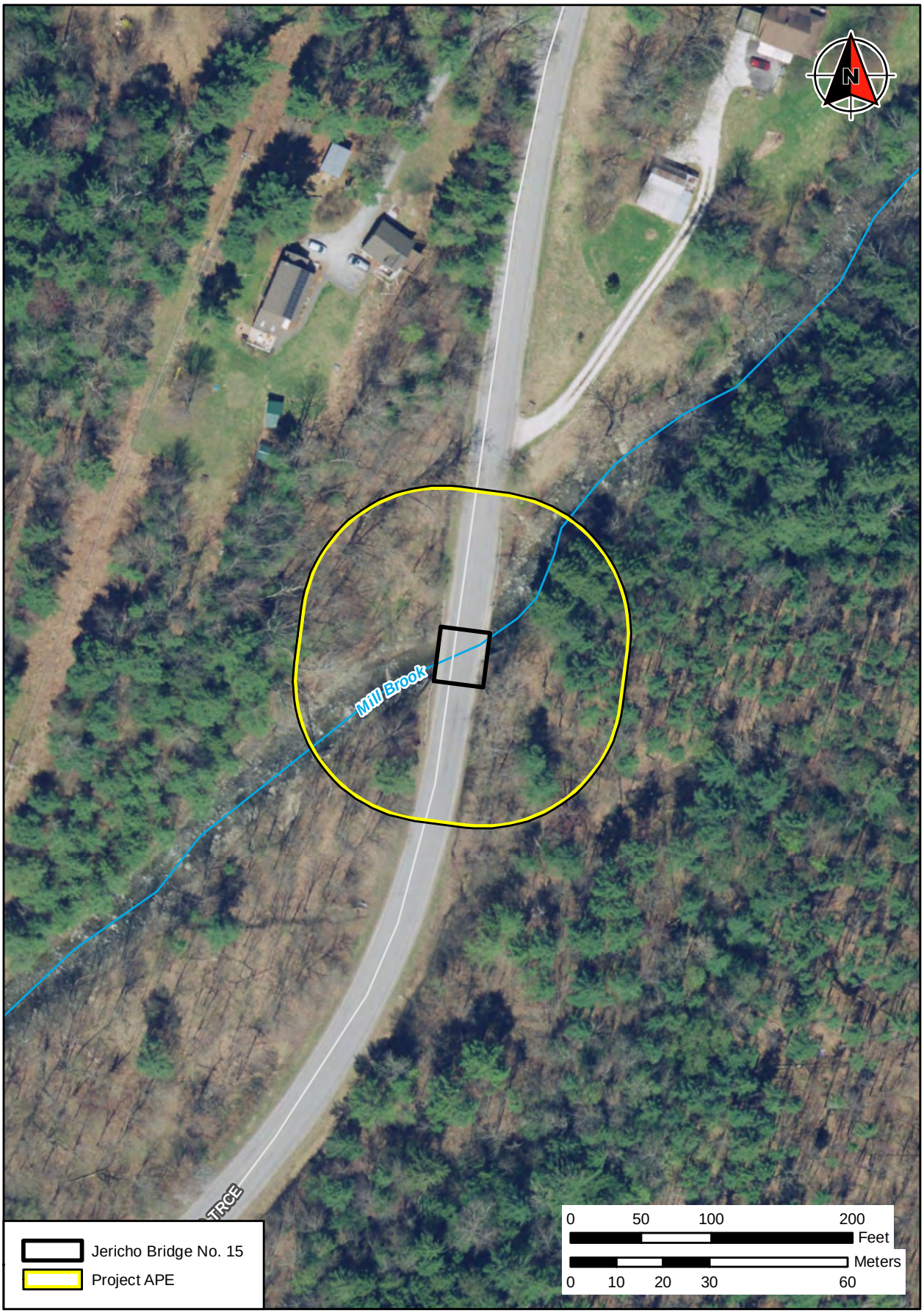

FIGURE 2: Project APE (VCGI 2018)

II. Methodology

WSP's primary task in the architectural resource identification survey and effects assessment was to identify historic architectural resources (properties) in the APE listed in or eligible for listing in the SRHP/NRHP. WSP reviewed site files at the VDHP, identifying documented resources in the APE that are already either listed in or eligible for listing. Location information on the identified properties was mapped, and nomination forms and eligibility determination data were copied for comparison against current conditions during the field survey. Available historic context data on the development of the community in the APE were gathered from VDHP files and other sources to assist in the evaluation of additional historical resources identified during the field survey.

During fieldwork WSP staff checked the current status of the historic properties identified during the site file check and previously surveyed properties that meet the 45-year age mark. WSP collected information on each property's architectural and historical integrity and eligibility for listing in the SRHP/NRHP. Each resource in the APE was documented through digital photographs and narrative field notes. Properties not visible from the right-of-way were examined through historical and current aerial photographs to determine their age. Results of the background research and field survey were analyzed to determine the NRHP eligibility of each architectural resource, whether previously recorded or newly identified.

According to the NRHP criteria for evaluation, properties may be eligible for the NRHP if:

A. they are associated with events that have made a significant contribution to the broad patterns of our history; or

B. they are associated with the lives of significant persons in our past; or

C. they embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. they have yielded or may be likely to yield, information important in history or prehistory (National Park Service 2002:7).

WSP's assessments of eligibility were further guided by *Multiple Property Documentation for Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978* (Louis Berger 2018), which establishes standards of integrity for listing bridges in Vermont in the SRHP/NRHP.

III. Historic Context

A. Historical Overview of Northern Vermont

The first Euro-Americans to venture into the region that would become Vermont were trappers and hunters in the eighteenth century. Access to much of this area was impeded by mountains, and colonization was slow because the political situation was unsettled. Recurring hostilities between the British and French authorities initially inhibited settlers from making Vermont their home; however, even before the final surrender of the French to the British at Quebec in 1760, applications for land grants were being made by many parties.

The colony of Connecticut made the first land grants within what is now Vermont in the early eighteenth century, after Massachusetts, which had erroneously granted its own citizens 436 square kilometers (172 square miles) within the borders of Connecticut, transferred these land grants (the "equivalent lands") to Connecticut. Connecticut immediately sold these lands to people from both Connecticut and Massachusetts, who in turn sold the land to prospective settlers at a profit. After the final resolution of the Massachusetts-New Hampshire territorial disputes in 1740, these lands became New Hampshire territory. Nevertheless, most of the region's settlers continued to come from Connecticut and Massachusetts (Tosi 1948:48-49). European settlement was slow in all parts of today's Vermont until 1761, when Benning Wentworth, governor of New Hampshire, claimed the lands for New Hampshire and began establishing illegal land grants. These territories became the State of Vermont in 1791.

Prior to 1830, subsistence farming was the dominant economic activity. The earliest economic activity outside the household was the sale of potash and lumber obtained from land clearing. Potash, owing to its high market value and use in the production of glass, became the only inspected product in Vermont at that time (Elliott 1977:18). Small manufacturers, including gristmills and sawmills, sprang up throughout the region to process locally grown materials. Distilleries (using rye and corn) and starch factories (using potatoes) also developed. Taverns and general stores opened to cater to the local populace in nearly every town. By 1830 the region's agricultural economy was concentrated on the cultivation of potatoes and grains, some of which was shipped to Eastern and Southern markets. Wheat was initially an important crop, so much so that it was used as money by the earliest settlers. As transportation increased to wider markets, farmers focused more on a smaller number of specialized products.

Apple growing in particular became an important part of the Vermont economy. John McIntosh, born in 1776, eventually began selling his apple seedlings to settlers, and the McIntosh apple became the dominant apple in Vermont because of its acclimation to cool nights and warm, sunny days. In 1899 Vermont boasted 1,675,131 apple trees and produced 1,176,822 bushels of apples. Commercial apple production in Vermont continued into the twentieth century but declined owing to the lack of modernized facilities. The introduction of the automobile boosted apple production again; in 1955 Vermont produced over 1,100,000 bushels, and in the 1980s roughly 79 commercial growers on 3,500 bearing acres of land produced roughly 1.25 million bushels annually (VDHP 1990).

By the late eighteenth century some industry had begun to develop in Vermont. Lumbering in the oak forests brought much-needed money into the state and also cleared land for farming (Stratton 1980:250). Large fallen trees were ideal for making masts for ships and were usually shipped to Quebec. Production of hats was also an early trade, which used local wool and beaver hides from trappers. Other early businesses included blacksmithing, brick making, and dyeing.

The developing livestock industry rapidly took over in Vermont as both cattle and horses thrived on the local grasslands and climate (Bearse 1968; Tosi 1948:58-59; VDHP 1990). During the early nineteenth century the Spanish Merino sheep, an outstanding wool producer easily adapted to rugged terrain and

climate, arrived in Vermont. The self-sufficiency of the Vermont farmers diminished considerably as many turned to sheep farming for an alternative source of income almost to the complete exclusion of other agricultural products. The improved machinery and larger wool mills that were introduced around 1830 permitted Vermont farmers to produce more wool, and 33 wool factories were built in Vermont during that period. In addition to wool, raw cotton was imported into Vermont mills for processing (Meeks 1986; Tosi 1948:62).

Although some textile production occurred in fulling and cleansing mills, and later also carding mills, the production of textiles remained a household activity until about 1820. After about 1820 factories took over the production of textiles, and the number of fulling and carding mills increased by 200 percent (from 136 to 273) and 275 percent (from 87 to 234), respectively. By 1830 the home manufacture of textiles was almost non-existent. Since a typical textile mill required the labor of about nine or so workers, the mills typically sprang up where the workers lived. In many cases the wool factories were an outgrowth of earlier textile mills as the mills became suppliers for developing wool factories (Meeks 1986; Steponaitis 1975:43-50).

The breeding of wool sheep reached its peak in Vermont in the early 1840s, but by the end of the decade, the industry had begun to decline, partly the result of lower protective tariffs on imported wool and partly the result of competition from the West with its larger pastures, less costly grain, and better transportation following the opening of the Ohio and Pennsylvania canal systems (Tosi 1948:59-60; VDHP 1989b). The number of wool factories in Vermont decreased from 97 in the mid-1840s to 89 a decade later. In addition, the number of textile concerns in Vermont began to drop as the industry consolidated into fewer, larger firms using more efficient machinery and located along more traveled transportation routes. The number of mills fell from a peak of over 400 in the 1820s to only 75 in the early 1850s. The sheep industry revived briefly in the 1860s and immediately afterward, as the Civil War prompted a greater demand and higher prices for wool products because of the low availability of Southern cotton as well as the imposition of higher tariffs (Steponaitis 1975:60-67).

With the initial decline of the sheep and wool industry in the late 1840s, many farmers returned to breeding cattle, although not before mutton sheep slowly infiltrated many farms formerly devoted to wool-bearing sheep (VDHP 1989a:2). Dairy farming in Vermont and elsewhere in New England had been introduced by the 1840s (Barron 1980; Russell 1982). Dairying proved to be a protection against the fluctuating price of wool and allowed farmers to take advantage of expanding urban markets to the south. The introduction of dairy breeds to replace beef cattle was a slow and intermittent process. Barron (1980) believes that one reason farmers in Vermont were slow to switch from wool to dairy was problems with labor. The young of Vermont were moving out West and to the big cities, depopulating the countryside during the second half of the nineteenth century (discussed further below). Because sheep farming was far less labor-intensive, it remained a more efficient use of resources during this period even as prices for wool dropped. Dairy farming, on the other hand, was becoming more labor-intensive, and Barron (1980:333) estimates that because of technological changes, the labor demand for cows grew by 68 percent per cow between 1850 and 1910. As a result, since the available pool of labor was declining after the mid-nineteenth century, farmers were hesitant to make the switch from wool to dairy even though the wool market was unstable. It was not until the market for wool completely collapsed at the end of the century that the switch from sheep to cows became complete.

Up until the 1850s, only private dairying took place. As the industry became more widespread, cheese factories, and later creameries, were built to service entire dairying communities. The three staple crops for the mid-nineteenth century Vermont farmer became wool, butter, and maple sugar, and dairy farming dominated the agriculture of eastern Vermont after the Civil War (Bremer 1929:587; Tosi 1948:63). Butter and cheese were manufactured in centrally located factories, although up until 1900 almost 40 percent of manufactured dairy products were produced privately in the home for sale to a private clientele. The number of dairy cows in some Vermont counties reached a peak in 1900. By the close of the nineteenth century,

however, the Vermont dairy farmer faced direct competition from the dairy industries of Ohio and Wisconsin, for whom the transport of perishable goods did not pose as great an obstacle after development of the railroads connected these states with the East. Dairying declined slowly until 1920, then rose sharply until 1930 (Tosi 1948:62-64). By the end of the twentieth century, however, the need for expensive equipment had put many small hill-country farmers out of business (VDHP 1989a).

The wool industry in Vermont changed in the late nineteenth century with the emergence of large town-based manufacturing firms (those employing more than 100 employees) in places such as Bennington, Winooski, Rutland, Johnson, and Fair Haven. Vermont still enjoyed prominence in the manufacture of wool and knit goods during the 1880s; however, the state's industry declined steadily through the first half of the twentieth century despite a brief rise during the World War II years (Steponaitis 1975:118; VDHP 1991:10-11). Mills gradually closed after the end of the nineteenth century as they became unable to compete with mills and factories in the South (Barron 1980:326).

The population decline during the second half of the nineteenth century produced one of the greatest historical effects on the landscape. As the United States expanded, new opportunities arose and young people moved to the West. Many of the Vermont's rural youth left for jobs in the growing big cities, although Barron (1980) describes contemporary writing of abandoned farms as "hyperbole," writing that agriculture in New England did not collapse after the Civil War but only experienced stagnation. He points out that throughout Vermont two-thirds of male household heads remained farmers/farm laborers throughout the second half of the nineteenth century, 90 percent of farms were family-owned, and two-thirds of the land remained agricultural land. In short, the number, size, and location of farms throughout Vermont remained stable. In addition, the output of wool, butter, and maple sugar from these farms remained constant into the late 1890s. The number of tradesmen also remained constant, although a number of mills and factories were replaced because they could not compete with those in the South (Barron 1980:326). Vermont farmers may have been able to survive the slow attrition of labor throughout the second half of the nineteenth century, but the lack of available labor ultimately prevented them from adapting to more economically advantageous forms of farming.

B. Town of Jericho

Settlement in Jericho Center began during the late eighteenth century. In 1795 the town was created by taking 5,000 acres from the Town of Richmond. The town was home to a small milling industry during the nineteenth century, maintaining sawmills, gristmills, and wool mills (Bathory-Kitsz 2013:163). In 1802 the town voted to establish seven school districts, reflecting more progressive attitudes toward the necessity of formal and well-rounded education for area children (Hayden et al. 1916:126-129). With settlement increasing, an additional nine school districts were added by about 1830; at that time the population of the town had reached 1,654 (Hayden et al. 1916:154). The main population centers of the town were Jericho Corners on the Browns River and Jericho Center. The fertile valleys of the Winooski River, Browns River, Lee River, and Mill Brook supported growth of diverse agricultural products, including corn, grains, hay, potatoes, and dairy products such as milk and cheese. Maple trees were also plentiful and supported a large maple sugar industry, with 14,225 pounds of sugar produced in 1860 (Ritter 2010).

Around 1840 the selectmen of the Town of Jericho voted to spend $200 to construct a county road in the town that ran from the Richmond town line through Jericho Center to the Underhill town line at Underhill Flats (Hayden et al. 1916:138). The Central Vermont Railroad was completed to Burlington by December 1849, with a depot in Richmond to the south and North Williston to the southwest. In 1876 the Lamoille Valley railroad extended service to Jericho Center (Hayden et al. 1916:140).

The town road between Jericho Center and Richmond was well developed with farms, shops, and one school, School No. 6, by 1869. School No. 9, a blacksmith shop, a rake factory and approximately eight residences were located at the intersection of the town road, also known as Brown's Trace, and Nashville

Road. A cooper shop and four residences were located on either side of Mill Brook on the town road (Figure 3) (Beers 1869).

At the beginning of the twentieth century, the population of the town fell to 1,373. Dairying was the principal agricultural pursuit of the region with more than 100 dairies in the town of varying sizes (Hayden 1916:154). In 1940 little in the area around Mill Brook had changed. Census enumeration maps of Jericho show the same number of residences (United States Census Bureau 1940); however, the map shows a mill in the vicinity of Brown's Trace and Mill Brook, apparently built by Ansel Nash in 1870 (Child 1882:226).

After a population low of 1,077 in 1940, the number of residents slowly grew until the 1960s, when the population increased by over 25 percent. Today Jericho maintains a rural character, and several historic homes are still extant. According to the 2010 census, the town is home to just over 5,000 residents (United States Census Bureau 2010).[1]

[1] Sources on the history of Jericho in the twentieth century are limited.

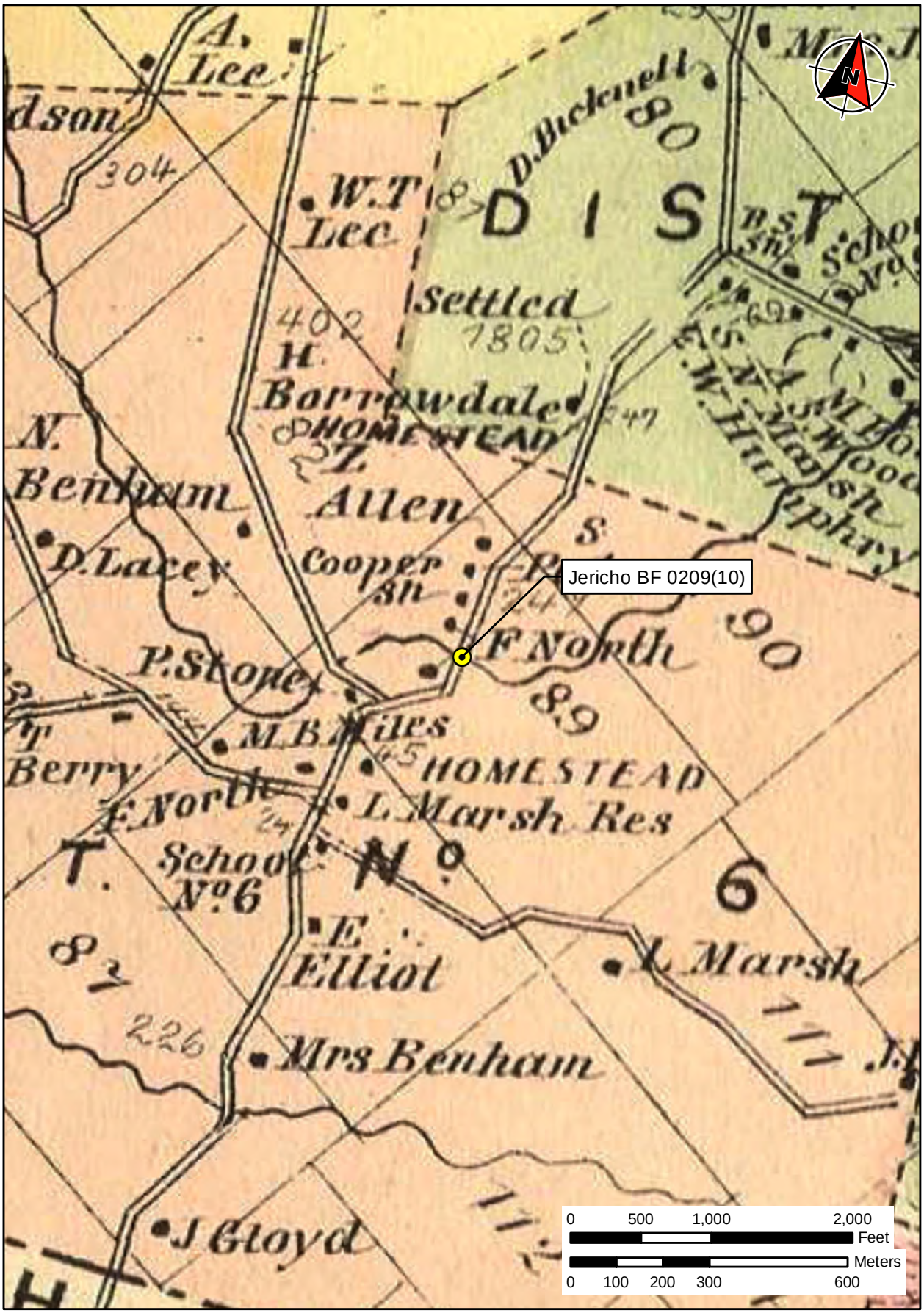

FIGURE 3: Map of Jericho, 1869 (Beers 1869)

IV. Survey Results

The APE for the architectural survey and effects assessment extends 30.5 meters (100 feet) from either end of the bridge, including all four quadrants of the bridge approaches.

The APE contains one structure, Jericho Bridge No 15 (Figure 4; Table 1). No other properties are located in the APE. A gravel driveway for the property near the northeast corner of the bridge (521 Browns Trace) was constructed sometime after 2004. The buildings on the property before that time were accessed from the north.

Jericho Bridge No. 15 had not been previously surveyed. WSP found this resource not eligible for the SRHP/NRHP as it does not meet the registration requirements outlined in the Multiple Property Documentation Form (MPD), *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978* (Louis Berger 2018:F70-F72).

TABLE 1: NEWLY IDENTIFIED HISTORIC ARCHITECTURAL RESOURCES IN THE APE

ID No.	NRHP ELIGIBILITY	NAME	ADDRESS
Jericho-1	Not Eligible	Jericho Bridge No. 15 over Mill Brook	TR 4, Jericho

A. Vermont SRHP/NRHP-Listed Properties

No Vermont SRHP/NRHP-listed properties are located in or adjacent to the project APE.

B. Newly Surveyed Properties

1. Jericho-1

Jericho Bridge No. 15 over Mill Brook, TR 4; constructed 1927 (Plates 1-3)

The single-span concrete T-beam bridge is 39 feet long with a 35-foot-wide deck. Set at a 30-degree skew, the bridge has six reinforced concrete T-beams set on poured concrete abutments and wingwalls. One of the center beams has spalled concrete, which has exposed the steel rebar and caused significant corrosion. The bridge was reconstructed in 1962, which included replacement of the original railing with the current Type 9 railing consisting of decorative concrete end walls with a three-pipe railing. The Type 9 railing appears to have been the standard railing for concrete and steel beam bridges constructed from 1958 (e.g., Cambridge Bridge 17 on VT Route 108) to 1966 and older bridges reconstructed during that same timeframe.

The bridge was constructed according to standard plans, which were created by the Highway Commission as early as 1907. The Commission alleviated the possible lack of engineering talent in a town by drawing up standard plans for concrete spans and offering them free of charge to the towns. Plans for standard bridges were available in 1915 and continue to be available today. The standard designs are revised as roadway design and construction methods have changed over time. The cost advantage of concrete over stone was not lost on the towns and cities that undertook their own improvements during this period. As a result of its reasonable cost and ease of construction, concrete bridges are widespread across the state.

Review of historical maps and data from the VDHP Online Resource Center indicates that TR 4 (also known as Brown’s Trace) was an early nineteenth-century town-funded road that ran from Richmond to Underhill

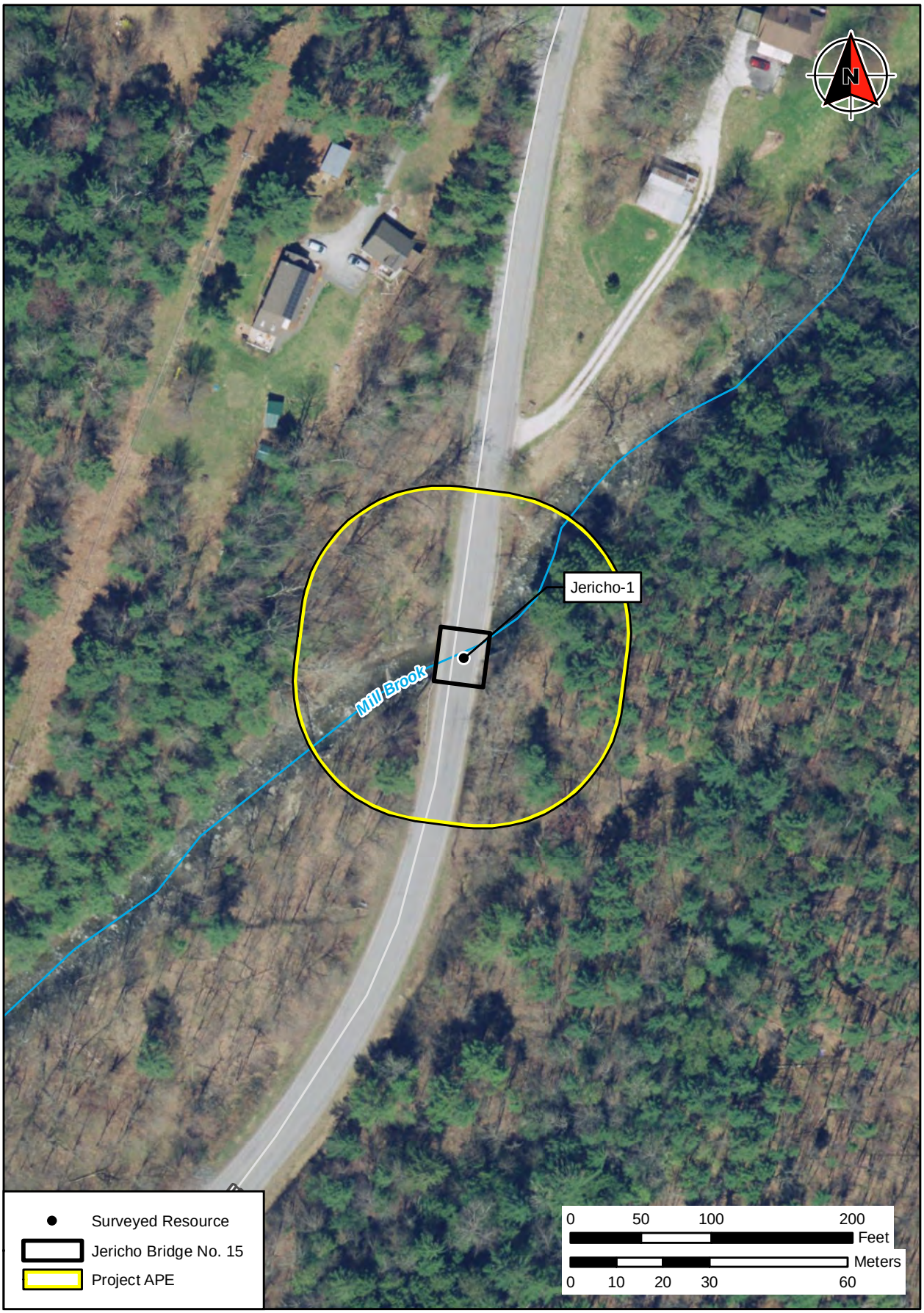

FIGURE 4: Location of Surveyed Resources in APE (VCGI 2018)

PLATE 1: Jericho Bridge No. 15, Facing Northeast

PLATE 2: Jericho Bridge No. 15, Facing North

PLATE 3: Jericho Bridge No. 15, Beams and South Abutment, Facing South

Flats and was the principal north-south road in the Town of Jericho. The road, which provided a direct route to the Central Vermont Railroad at Richmond, is depicted on the Beers (1869) map (see Figure 3).

The Jericho Bridge No. 15 over Mill Brook does not meet registration requirements outlined in the MPD, *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978* (Louis Berger 2018:F70-F72). Under NRHP Criterion A, the bridge is not associated with a crossing of a major waterway, part of a new transportation corridor or part of a major highway project or bridge-building initiative, or a bridge that is an exceptional representative of the type. As TR 4/Brown's Trace was constructed in 1840, the current (1927) bridge was likely a replacement for an earlier structure. The bridge was constructed before the flood of early November 1927 and thus is not associated with that bridge-building initiative. The structure does not meet any NRHP Criterion C registration requirements as it is a common bridge type that has been altered from its original design with replacement of the original railing in 1962 and replacement of sections of corroded box rail in 2012. It is WSP's opinion that Jericho Bridge No. 15 is not eligible for listing in the SRHP/NRHP.

C. Section 4(f) Resources

No Section 4(f) resources were identified in or adjacent to the project APE.

V. Conclusions

On behalf of VTrans, WSP completed a historic architectural resource identification survey and effects assessment for the proposed improvements to Jericho Bridge No. 15, TR 4, Chittenden County. WSP conducted this survey and resource assessment to take into account the potential effects of site access, temporary bridge construction, approach work, staging, and other potential project activities associated with improvements at the site of the bridge. The APE for the survey extends 30.5 meters (100 feet) from either end of the bridge to include all four quadrants of the bridge approaches (see Figure 2).

The goal of the survey was to identify (1) historical architectural resources (properties) in the APE previously listed in the SRHP/NRHP (the criteria for both are identical), and (2) previously unsurveyed historical architectural resources in the APE that may be eligible for listing in the SRHP/NRHP. As the project is still in the planning stages and may take several years to be put into action, WSP identified properties that meet the 45-year age mark for NRHP evaluation. Fieldwork took place in April 2021.

WSP identified one historic resource over 45 years old in the APE, the subject property, Jericho Bridge No. 15 over Mill Brook and TR 4. It is WSP's opinion that this resource is not eligible for the SRHP/NRHP as it does not meet registration requirements outlined in the MPD, *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820-1978* (Louis Berger 2018:F70-F72). No other architectural resources were identified in the APE. No Section 4(f) resources are located in the project APE.

It is WSP's opinion that an intensive survey is not warranted at this time. Should project activities expand beyond the current project APE, a supplemental survey may be warranted to identify and fully evaluate adjacent resources with respect to NRHP criteria, identify all issues that may arise, and establish mitigation efforts that can be put in place to ensure the protection of resources. This will allow VTrans to consider historic resources in planning the improvements to Jericho Bridge No. 15.

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wsp

Appendix J: Hazardous Sites Map

Hazardous Waste Urban Soils Map

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
- Underground Storage Tank (w
- Dry Cleaner
- Urban Soil Background Areas
- Parcels (standardized)
- River Area
- Act250 Permits **INCOMPLET
- Railroads

Roads
- Interstate
- US Highway; 1
- State Highway
- Town Highway (Class 1)

NOTES

Map created using ANR's Natural Resources Atlas

165.0 0 82.00 165.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 271 Ft. 1cm = 33 Meters

© Vermont Agency of Natural Resources

THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

Appendix K: Stormwater Resource ID

State of Vermont
Environmental Section
219 North Main Street
Barre, Vermont 05641
Vtrans.vermont.gov

Agency of Transportation

[phone] 802-595-9143

To: Julie Ann Held, VTrans Environmental Specialist
From: Jon Armstrong, Stormwater Management Engineer
Date: August 4, 2021
Subject: Jericho BF 0209(10) Stormwater Resource ID Review

Project Description: I have reviewed the project area for stormwater related regulatory and water quality concerns. This project involves Br15 over Mill Brook on TH4 (Brown's Trace Rd, a class 2 town highway) in the town of Jericho, VT. The full scope of the project has not yet been determined.

My evaluation has included the review of existing imagery and mapping (ANR Natural Resource Atlas, VTrans Operational Stormwater Permits) to capture existing stormwater features and existing drainage.

Regulatory Considerations
It is not anticipated that an Operational Stormwater permit will be required for this project.

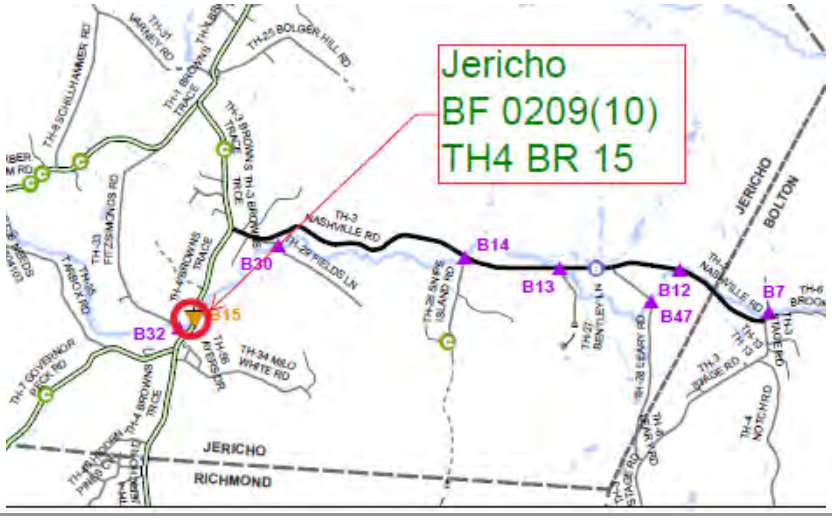
There are no existing stormwater permits near the site area. No formal stormwater treatment is located within the ROW. This project site is not within a designated groundwater public water supply source protection area.

The project site is not located within a stormwater impaired (303(d) list) watershed.

This segment of road is listed as Hydrologically connected by direct surface drainage and therefore subject to Municipal Road General Permit requirements.

Existing Drainage
The project area largely consists of sheet flow from the road through vegetation with some roadside ditches draining to the brook. There doesn't appear to be any closed drainage system.

Design Considerations
To the extent feasible, sheet flow through vegetation should be encouraged with the design. Soils in the project area are shown as hydrologic soil group A, which are generally well suited for infiltration practices.



Appendix L: Community Input

Project Summary

This project, BF 0209(10), focuses on Bridge 15 on TH 4 in Jericho, Vermont. The bridge is deteriorating and is in need of either a major maintenance action or replacement. Potential options being considered for this project include a superstructure and/or deck replacement, or a new bridge to be placed on the existing alignment or an improved alignment. It is possible that VTrans will recommend a road closure and detour traffic away from the project site for the duration of the work. Efforts will be made to limit the detour to State roads.

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 culvert is closed during construction? Examples include annual bike races, festivals, parades, cultural events, weekly farmers market, concerts, etc. that could be impacted? If yes, please provide approximate date, location and event organizers' contact info. No

2. Is there a "slow season" or period of time from May through October where traffic is less or no events are scheduled? No

3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response routes that might be affected by the closure of the culvert, one-way traffic, or lane closures and provide contact information (names, address, email addresses, and phone numbers. This will affect all operations for the highway department as we use this road to haul our summer materials. Also if this was close it would cut off some of the town for services

   Adam Magee Road Foreman 510 Browns Trace Road 899-3180 jerichohighway@jerichovt.gov
   Matt Champlin Fire Chief mjchmp1996@gmail.com
4. Are there businesses (including agricultural operations and industrial parks) or delivery services (fuel or goods) that would be adversely impacted either by a detour or due to work zone proximity? Yes. Browns Trace is commonly used as a cut through from Route 2 and Route 15

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? There is a hiking trail called Mobbs at 508 Browns Trave road

6. What other municipal operations could be adversely affected by a road/culvert closure or detour? Emergency services, and Highway would be the ones effected.

7. Are there any town highways that might be adversely impacted by traffic bypassing the construction on other local roads? Please indicate which roads may be affected and their condition (paved/unpaved, narrow, weight-limited culverts, etc), including those that may be or go into other towns. Fitzsimonds Road is a gravel road that is very narrow. Governor Peck is a paved road that is winding road.

8. Is there a local business association, chamber of commerce, regional development corporation, or other downtown group that we should be working with? If known, please provide name, organization, email, and phone number. No

9. Are there any public transit services or stops that use the culvert or transit routes in the vicinity that may be affected if they become the detour route? I don't think so.

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)? MMU is on Browns Trace road it runs almost year round with bus transportation for summer school and programs.

2. Is this project on specific routes that school buses or students use to walk to and from school? Yes MMU services 5 towns which almost all the busses coming from them use this section of Browns Trace.

3. Are there recreational facilities associated with the schools nearby (other than at the school)? I don't think so.

Pedestrians and Bicyclists

1. What is the current level of bicycle and pedestrian use on the culvert? Medium.

2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use? No

3. Does the community feel there is a need for a sidewalk or bike lane over the culvert? I would say a bike lane would add some safety.

4. Is pedestrian and bicycle traffic heavy enough that it should be accommodated during construction? Yes for bikes

5. Does the Town have plans to construct either pedestrian or bicycle facilities leading up to the culvert? Please provide any planning documents demonstrating this (scoping study, master plan, corridor study, town or regional plan). No

6. In the vicinity of the culvert, 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? No

Design Considerations

1. Are there any concerns with the alignment of the existing culvert? For example, if the culvert is located on a curve, has this created any problems that we should be aware of? No

2. Are there any concerns with the width of the existing culvert? No

3. Are there any special aesthetic considerations we should be aware of? No

4. Does the location have a history of flooding? If yes, please explain. No

5. Are there any known Hazardous Material Sites near the project site? No

6. Are there any known historic, archeological and/or other environmental resource issues near the project site? No

7. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc.) near the project that should be considered? No

8. Are there any other issues that are important for us to understand and consider? No

Land Use & Zoning

1. Please provide a copy of your existing and future land use map or zoning map, if applicable.

2. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the culvert? If so, please explain. No

3. Is there any planned expansion of public transit or intercity transit service in the project area? Please provide the name and contact information for the relevant public transit provider. No

Communications

1. Please identify any local communication outlets that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Facebook, Front Page Forum, etc. Also include any unconventional means such as local low-power FM. We use Front Page Forum and the towns website.

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? No

Appendix M: Crash Data

Vermont Agency of Transportation

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

*	Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
													(FAS)
	VT0041200/15HB00096	Hinesburg	1.21	01/30/2015	16:00	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/15HB00445	Hinesburg	1.21	04/17/2015	07:50	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VT0041200/17HB01438	Hinesburg	1.21	12/12/2017	07:57	Snow	Driving too fast for conditions	Rear End	0	0	0	N	MC (FAS)
	VT0041200/15HB00039	Hinesburg	1.47	01/10/2015	21:46	Cloudy		Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/15HB00013	Hinesburg	1.50	01/03/2015	17:55	Sleet, Hail (Freezing Rain or Drizzle)	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0041200/16HB00112	Hinesburg	1.50	01/27/2016	08:00	Cloudy	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0041200/14HB00331	Hinesburg	1.82	03/14/2014	15:15	Cloudy	No improper driving	Opp Direction Sideswipe	0	0	0	W, S	MC (FAS)
	VT0041200/14HB00736	Hinesburg	1.95	06/01/2014	21:07	Clear	No improper driving	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/15HB00656	Hinesburg	2.52	06/09/2015	19:50	Rain	Other improper action, No improper driving	Other - Explain in Narrative	0	0	0	S, E	MC (FAS)

Route: FAS 0209

	VT0041200/14HB00012	Hinesburg	0.00	01/02/2014	16:00	Snow	Driving too fast for conditions, No improper driving	Right Turn and Thru, Head On v^--	0	0	0	E, W	MC (FAS)
	VT0041200/18HB00149	Hinesburg	0.00	02/06/2018	15:40	Cloudy	Followed too closely, Not Distracted, No improper driving	Same Direction Sideswipe	0	0	0	E	MC (FAS)
	VT0041200/15HB01411	Hinesburg	0.25	11/25/2015	11:14	Clear	Failed to yield right of way, Inattention, Exceeded authorized speed limit	No Turns, Thru moves only, Broadside ^<	2	0	0	W, S	MC (FAS)
	VT0041200/18HB00101	Hinesburg	0.25	01/20/2018	13:00	Clear	Inattention, Other Inside Vehicle, No improper driving, Not Distracted	Left Turn and Thru, Broadside v<--	0	0	0	W, S	MC (FAS)
	VT0041200/18HB00533	Hinesburg	0.31	05/20/2018	01:44	Clear	Fatigued, asleep	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0041200/18HB00603	Hinesburg	0.38	06/05/2018	08:00	Clear	Fatigued, asleep, Failure to keep in proper lane, No improper driving	Head On	1	0	0	S, N	MC (FAS)
	VT0041200/15HB00866	Hinesburg	0.91	07/28/2015	15:20	Clear	Failure to keep in proper lane, Inattention, No improper driving	Left Turn and Thru, Head On ^v--	0	0	0	S, N	MC (FAS)
	VT0041200/15HB00600	Hinesburg	1.00	05/27/2015	21:30	Clear	Under the influence of medication/drugs/alcohol, No improper driving	Opp Direction Sideswipe	1	0	0	E, N	MC (FAS)
	VT0041200/15HB00635	Hinesburg	1.00	06/04/2015	15:32	Clear	Failed to yield right of way, No improper driving	Left Turn and Thru, Broadside v<--	1	0	0	W, E	MC (FAS)
	VT0041200/15HB01157	Hinesburg	1.00	09/26/2015	16:49	Clear	Other Inside Vehicle	Single Vehicle Crash	1	0	0	W	MC (FAS)
	VT0041200/16HB01103	Hinesburg	1.00	09/18/2016	14:58	Clear	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	E, N	MC (FAS)
	VT0041200/16HB00609	Hinesburg	1.12	05/30/2016	00:15	Rain	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)

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	VT0041200/14HB01222	Hinesburg	1.16	09/10/2014	14:03	Clear	Failure to keep in proper lane	Single Vehicle Crash	1	0	0	N	MC (FAS)
	VT0041200/15HB00982	Hinesburg	1.38	08/19/2015	18:20	Clear	Followed too closely, Not Distracted, No improper driving	Opp Direction Sideswipe	1	0	0	W, E	MC (FAS)
	VT0041200/16HB00291	Hinesburg	1.54	03/11/2016	20:05	Clear	Under the influence of medication/drugs/alcohol, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	W	MC (FAS)
	VT0041200/16HB00228	Hinesburg	1.59	02/23/2016	16:58	Clear	Failed to yield right of way, Not Distracted, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	N, W	MC (FAS)
	VT0041200/14HB01585	Hinesburg	1.75	11/26/2014	15:20	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/15HB00549	Hinesburg	1.75	05/14/2015	08:50	Clear	Followed too closely, Manually Operating an Electronic Communications Device (texting, typing, dialing)	Rear End	2	0	0	W	MC (FAS)
	VT0041200/17HB00403	Hinesburg	1.79	04/11/2017	21:40	Fog, Smog, Smoke	No improper driving, Not Distracted	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/14HB01627	Hinesburg	1.88	12/04/2014	23:30	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0041200/14HB01622	Hinesburg	1.92	12/04/2014	08:40	Cloudy	Other improper action, No improper driving	Other - Explain in Narrative	0	0	0	N, W	MC (FAS)
	VT0041200/16HB00517	Hinesburg	2.05	05/10/2016	07:50	Clear	Driving too fast for conditions, Inattention	Rear End	0	0	0	W	MC (FAS)
	VT0041200/14HB01261	Hinesburg	2.20	09/17/2014	15:45	Clear	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	S, W	MC (FAS)
	VT0041200/15HB01197	Hinesburg	2.27	10/03/2015	22:40	Clear	Disregarded traffic signs, signals, markings, Manually Operating an Electronic Communications Device (texting, typing, dialing), No improper driving	Head On	1	0	0	W, N	MC (FAS)
	VT0041200/15HB00186	Hinesburg	2.39	02/15/2015	12:15	Snow	Failed to yield right of way, No improper driving	[No Direction of Collision]	0	0	0	S, N	MC (FAS)
	VT0041200/17HB00905	Hinesburg	2.39	07/31/2017	09:03	Clear	Failed to yield right of way, No improper driving	Left Turn and Thru, Angle Broadside -->v--	0	0	0	S, N	MC (FAS)
	VT0041200/16HB00810	Hinesburg	2.42	07/12/2016	12:14	Clear	Inattention, Failure to keep in proper lane, No improper driving	Other - Explain in Narrative	0	0	0	S, N	MC (FAS)
	VT0041200/15HB00088	Hinesburg	3.33	01/27/2015	22:10	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0041200/15HB01523	Hinesburg	3.38	12/24/2015	20:47	Clear	Not Distracted	Single Vehicle Crash	2	0	0	N	MC (FAS)
	VT0041200/16HB00428	Hinesburg	3.44	04/19/2016	00:30	Rain	Driving too fast for conditions, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0041200/15HB00634	Hinesburg	3.45	06/04/2015	07:59	Clear	Followed too closely	Rear End	0	0	0	W	MC (FAS)
	VT0041200/15HB00985	Hinesburg	3.45	08/20/2015	18:40	Clear	Disregarded traffic signs, signals, markings, No improper driving	No Turns, Thru moves only, Broadside ^<	3	0	0	E, S	MC (FAS)
	VT0041200/18HB00632	Hinesburg	3.45	06/09/2018	14:45	Clear	Disregarded traffic signs, signals, markings, No improper driving	No Turns, Thru moves only, Broadside ^<	2	0	0	S, E	MC (FAS)
	VT0040800/17RM01154	Richmond	0.40	11/11/2017	13:53	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	MC (FAS)

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	VT0040800/17RM00111	Richmond	0.57	02/03/2017	20:24	Snow	Driving too fast for conditions, Not Distracted	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/14RM00711	Richmond	1.02	07/14/2014	17:11	Cloudy	Failure to keep in proper lane, Inattention	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/16RM01231	Richmond	1.03	11/19/2016	10:29	Clear	Driving too fast for conditions, Other Inside Vehicle	Single Vehicle Crash	1	0	0	S	MC (FAS)
	VT0040800/15RM00708	Richmond	1.06	07/20/2015	14:06	Clear	Under the influence of medication/drugs/alcohol, Not Distracted, No improper driving	Rear End	0	0	0	N	MC (FAS)
	VT0040800/16RM00228	Richmond	1.60	03/07/2016	10:34	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/15RM00401	Richmond	1.62	05/01/2015	11:25	Cloudy		Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/15RM00011	Richmond	1.72	01/04/2015	21:23	Cloudy	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/15RM00082	Richmond	1.72	01/30/2015	09:55	Snow	Made an improper turn, No improper driving	Opp Direction Sideswipe	0	0	0	N, S	MC (FAS)
	VT0040800/15RM00237	Richmond	1.72	03/15/2015	18:42	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/17RM00228	Richmond	1.72	03/09/2017	07:00	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/17RM00271	Richmond	2.00	03/22/2017	11:28	Cloudy	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/16RM00555	Richmond	2.30	05/29/2016	15:50	Rain	Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VTVSP0100/18A102971	Richmond	2.53	06/29/2018	20:11	Clear		Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0040800/16RM01257	Richmond	3.28	11/24/2016	11:15	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0040800/18RM00816	Richmond	3.60	08/28/2018	07:18	Clear	Inattention	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0040800/17RM01230	Richmond	3.80	12/04/2017	14:53	Clear	Other improper action, No improper driving	Other - Explain in Narrative	0	0	0	W, E	MC (FAS)
	VT0040800/17RM00765	Richmond	3.91	07/26/2017	12:35	Clear	Unknown	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/14RM00185	Richmond	3.92	03/04/2014	21:22	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0040800/14RM00125	Richmond	3.93	02/13/2014	20:39	Snow	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0040800/17RM00171	Richmond	3.94	02/20/2017	09:22	Clear	No improper driving	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/16RM01302	Richmond	3.99	12/08/2016	10:17	Cloudy	Under the influence of medication/drugs/alcohol, Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/14RM01305	Richmond	4.04	12/10/2014	18:47	Snow		Single Vehicle Crash	2	0	0	E	MC (FAS)
	VT0040800/17RM00938	Richmond	4.17	09/25/2017	19:45	Clear	Exceeded authorized speed limit, Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Single Vehicle Crash	1	0	0	W	MC (FAS)

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	VT0040800/18RM01050	Richmond	4.27	11/20/2018	04:14	Snow	No improper driving	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0040800/16RM01307	Richmond	4.37	12/09/2016	18:52	Snow	No improper driving, Not Distracted	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0040800/17RM00027	Richmond	4.51	01/08/2017	02:25	Clear	Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/16RM01077	Richmond	4.60	09/30/2016	17:27	Cloudy	Disregarded traffic signs, signals, markings, Not Distracted, No improper driving	Opp Direction Sideswipe	0	0	0	N, S	MC (FAS)
	VT0040800/15RM00098	Richmond	4.77	02/02/2015	08:51	Snow	Driving too fast for conditions, No improper driving	Opp Direction Sideswipe	0	0	0	S, N	MC (FAS)
	VT0040800/15RM00568	Richmond	4.86	06/17/2015	19:53	Clear	Inattention	Single Vehicle Crash	0	0	0	E, N	MC (FAS)
	VT0040800/18RM00216	Richmond	4.87	03/08/2018	08:41	Snow	Disregarded traffic signs, signals, markings	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/14RM01178	Richmond	4.94	11/14/2014	16:00	Unknown	Inattention	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0040800/15RN99931	Richmond	4.94	01/16/2015	14:15	Cloudy	Inattention, No improper driving	Rear-to-rear	0	0	0	E, S	MC (FAS)
	VT0040800/14RM00057	Richmond	4.97	01/20/2014	13:17	Snow	Driving too fast for conditions, Under the influence of medication/drugs/alcohol, No improper driving	Rear End	1	0	0	S	MC (FAS)
	VT0040800/15RM01121	Richmond	5.02	11/09/2015	19:47	Clear	No improper driving, Not Distracted	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	1	0	0	E	MC (FAS)
	VT0040800/14RM00131	Richmond	5.08	02/14/2014	19:18	Clear	Failure to keep in proper lane	Other - Explain in Narrative	0	0	0	S, W	MC (FAS)
	VT0040800/14RM01329	Richmond	5.08	12/17/2014	14:30	Rain	Made an improper turn	Same Direction Sideswipe	0	0	0	S	MC (FAS)
	VT0040800/17RM01137	Richmond	5.08	11/07/2017	07:28	Clear	Followed too closely	Rear End	1	0	0	N	MC (FAS)
	VT0040800/15RM01259	Richmond	5.09	12/10/2015	09:00	Unknown	Inattention	Other - Explain in Narrative	0	0	0	W	MC (FAS)
	VT0040800/17RM00947	Richmond	5.09	09/14/2017	15:30	Cloudy	Inattention, No improper driving	Other - Explain in Narrative	0	0	0	S, W	MC (FAS)
	VT0040800/14RM01085	Richmond	5.12	10/17/2014	08:45	Clear	Inattention	Rear-to-rear	0	0	0	S	MC (FAS)
	VT0040800/15RM00419	Richmond	5.12	05/05/2015	15:05	Clear	Followed too closely, No improper driving	Rear End	0	0	0	S	MC (FAS)
	VT0040800/17RM00327	Richmond	5.14	04/07/2017	11:23	Other - Explain in Narrative	Failed to yield right of way, No improper driving	Left Turn and Thru, Angle Broadside -->v--	0	0	0	N, S	MC (FAS)
	VT0040800/14RM01132	Richmond	5.15	11/01/2014	09:12	Clear	Inattention, No improper driving	Rear End	0	0	0	N, E	MC (FAS)
	VT0040800/15RM00539	Richmond	5.15	06/10/2015	15:45	Clear	Followed too closely, No improper driving	Rear End	0	0	0	S	MC (FAS)
	VT0040800/15RM01318	Richmond	5.15	12/30/2015	18:56	Cloudy	Failed to yield right of way, Not Distracted, No improper driving	Right Turn and Thru, Same Direction Sideswipe/Angle Crash ^^--	0	0	0	W, N	MC (FAS)

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	VT0040800/18RM00468	Richmond	5.15	05/15/2018	08:41	Rain	Inattention, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	E	MC (FAS)
	VT0040800/16RM00615	Richmond	5.80	06/13/2016	11:07	Clear	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VT0040800/14RM00087	Richmond	6.07	02/01/2014	22:10	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/15RM01294	Richmond	6.07	12/22/2015	15:30	Rain	Driving too fast for conditions, No improper driving	Rear End	0	0	0	S	MC (FAS)
	VT0040800/17RM00168	Richmond	6.44	02/17/2017	08:15	Cloudy	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/18RM00299	Richmond	6.91	03/28/2018	17:21	Clear	No improper driving, Followed too closely, Not Distracted	Rear End	0	0	0	S	MC (FAS)
	VT0040800/15RM00303	Richmond	7.14	04/06/2015	07:40	Clear	No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	N	MC (FAS)
	VT0040800/18RM00555	Richmond	7.29	06/05/2018	08:01	Cloudy	Followed too closely	Rear End	0	0	0	N	MC (FAS)
	VT0040800/15RM00106	Richmond	7.37	02/05/2015	10:20	Cloudy	Inattention, Followed too closely, No improper driving	Same Direction Sideswipe	0	0	0	N	MC (FAS)
	VT0040800/16RM01101	Richmond	7.42	10/07/2016	07:13	Clear	Failure to keep in proper lane, Inattention	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VT0040800/18RM00227	Jericho	0.16	03/10/2018	22:03	Snow	Driving too fast for conditions, Not Distracted	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0100/15A105020	Jericho	0.80	09/27/2015	15:05	Clear	Followed too closely, Inattention, No improper driving	Single Vehicle Crash	1	0	0	N	MC (FAS)
	VTVSP0100/16A104462	Jericho	0.94	08/29/2016	13:56	Clear	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VTVSP0100/16A100896	Jericho	1.08	02/20/2016	07:50	[No Weather]	Driving too fast for conditions	Single Vehicle Crash	1	0	0	N	MC (FAS)
	VTVSP0100/17A102564	Jericho	1.16	06/08/2017	11:19	Clear	Operating defective equipment, Driving too fast for conditions, Visibility obstructed	Rear End	1	0	0	N	MC (FAS)
	VTVSP0100/14A101347	Jericho	1.18	03/20/2014	09:28	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0100/15A101082	Jericho	1.75	02/23/2015	12:30	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VT0040800/17RM00021	Jericho	1.92	01/06/2017	13:17	Clear	Followed too closely, No improper driving	Rear End	0	0	0	N	MC (FAS)
	VTVSP0100/15A106453	Jericho	2.64	12/22/2015	17:06	Rain	Disregarded traffic signs, signals, markings	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VTVSP0100/17A100667	Jericho	2.64	02/11/2017	01:31	Snow	Other Outside Vehicle, No improper driving	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0100/15A102845	Jericho	2.91	06/06/2015	15:20	Clear	Followed too closely, Inattention, No improper driving	Rear End	1	0	0	E	MC (FAS)
	VTVSP0100/16A103799	Jericho	2.92	07/28/2016	14:20	[No Weather]	Failed to yield right of way	[No Direction of Collision]	1	0	0	N	MC (FAS)
	VTVSP0100/17A100868	Jericho	3.20	02/20/2017	19:13	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0100/15A104924	Jericho	3.52	09/20/2015	21:54	Clear	Under the influence of medication/drugs/alcohol, Fatigued, asleep	Single Vehicle Crash	0	0	0	S	MC (FAS)

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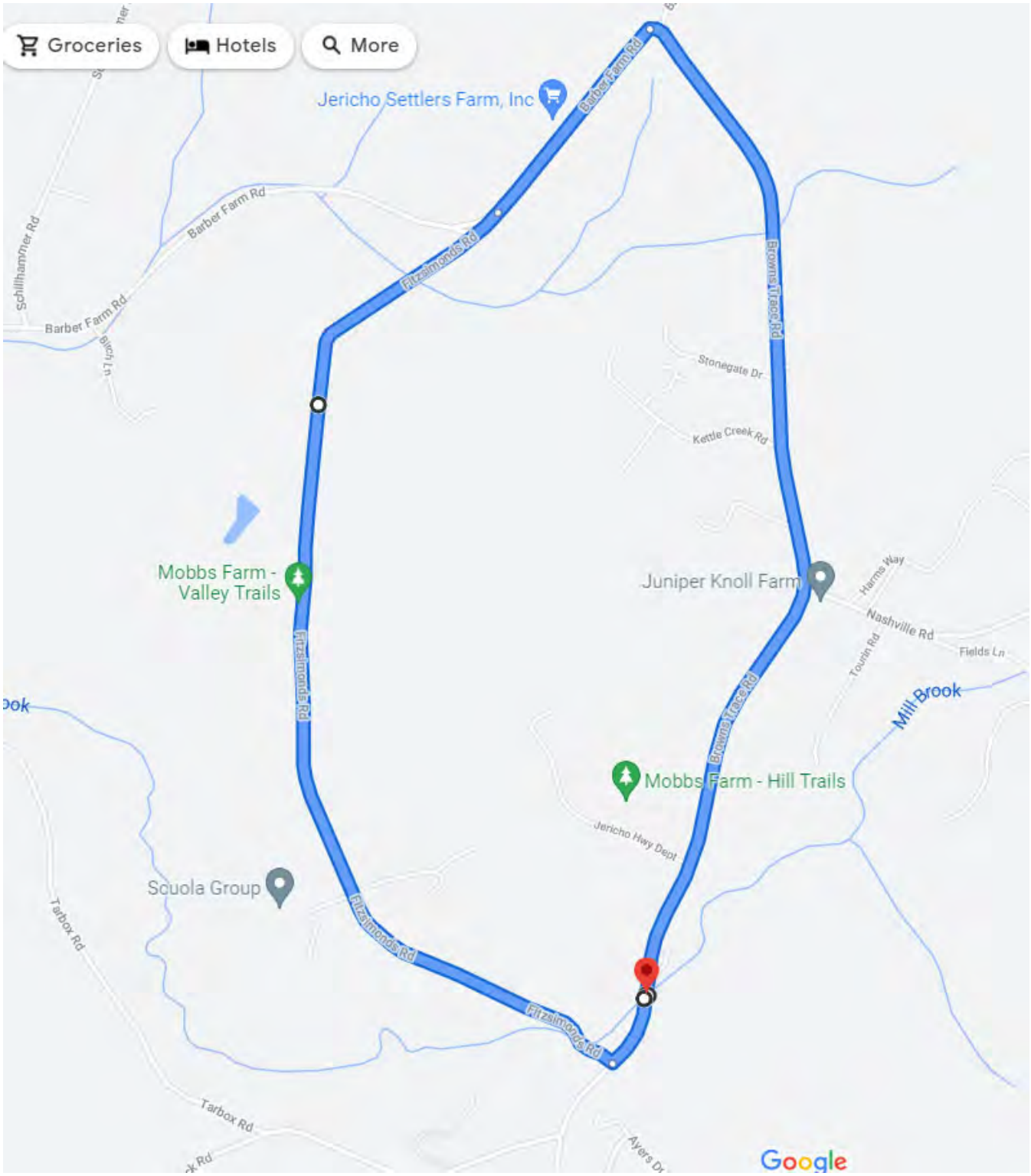
	VTVSP0100/14A101209	Jericho	3.67	03/13/2014	21:57	Clear	Made an improper turn	Left Turn and Thru, Angle Broadside -->v--	0	0	0	N, E	MC (FAS)
	VTVSP0100/16A105521	Jericho	3.67	10/30/2016	18:47	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0100/15A101221	Jericho	3.69	03/05/2015	08:21	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0100/16A102172	Jericho	3.74	05/08/2016	01:24	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0100/15A103484	Jericho	4.36	07/07/2015	07:28	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0100/17A103097	Jericho	5.21	07/09/2017	00:20	Cloudy	Failure to keep in proper lane	Single Vehicle Crash	1	0	0	N	MC (FAS)
	VTVSP0100/17A105225	Jericho	5.27	11/13/2017	21:11	Clear	Exceeded authorized speed limit	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VTVSP0100/16A106527	Jericho	UNK	12/22/2016	17:39	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
Route: FAS 0210													
	VT0041200/17HB00431	Hinesburg	0.31	04/19/2017	21:10	Clear	No improper driving, Not Distracted	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VT0041200/16HB01089	Hinesburg	0.54	09/15/2016	08:54	Clear	Followed too closely, Inattention	Rear End	0	0	0	W	MC (FAS)
	VT0041200/14HB00085	Hinesburg	0.57	01/17/2014	11:25	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	0	0	S, E	MC (FAS)
	VT0041200/14HB00184	Hinesburg	0.96	02/10/2014	07:35	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0041200/15HB00129	Hinesburg	0.96	02/04/2015	18:40	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0041200/15HB00063	Hinesburg	1.33	01/19/2015	08:50	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0041200/16HB00833	Hinesburg	1.51	07/18/2016	06:10	Clear	Fatigued, asleep, Not Distracted	Single Vehicle Crash	1	0	0	W	MC (FAS)
	VT0041200/15HB00749	Hinesburg	1.73	07/04/2015	12:40	Cloudy	Followed too closely, No improper driving	Rear End	0	0	0	W	MC (FAS)
	VT0041200/17HB00142	Hinesburg	1.73	02/07/2017	07:55	Cloudy	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/16HB00086	Hinesburg	1.97	01/21/2016	09:00	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Not Distracted	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VT0041200/15HB00075	Hinesburg	1.98	01/22/2015	08:49	Clear	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VT0041200/15HB00209	Hinesburg	2.22	02/21/2015	14:36	Snow	Driving too fast for conditions, No improper driving	Other - Explain in Narrative	0	0	0	W, E	MC (FAS)
	VT0040700/14SH01389	Hinesburg	2.23	05/31/2014	05:50	[No Weather]		[No Direction of Collision]	0	0	0	E	MC (FAS)
	VT0041200/16HB01296	Hinesburg	2.40	11/01/2016	15:29	Clear	Unknown	Single Vehicle Crash	0	0	0	E	MC (FAS)

THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409.

**Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.*

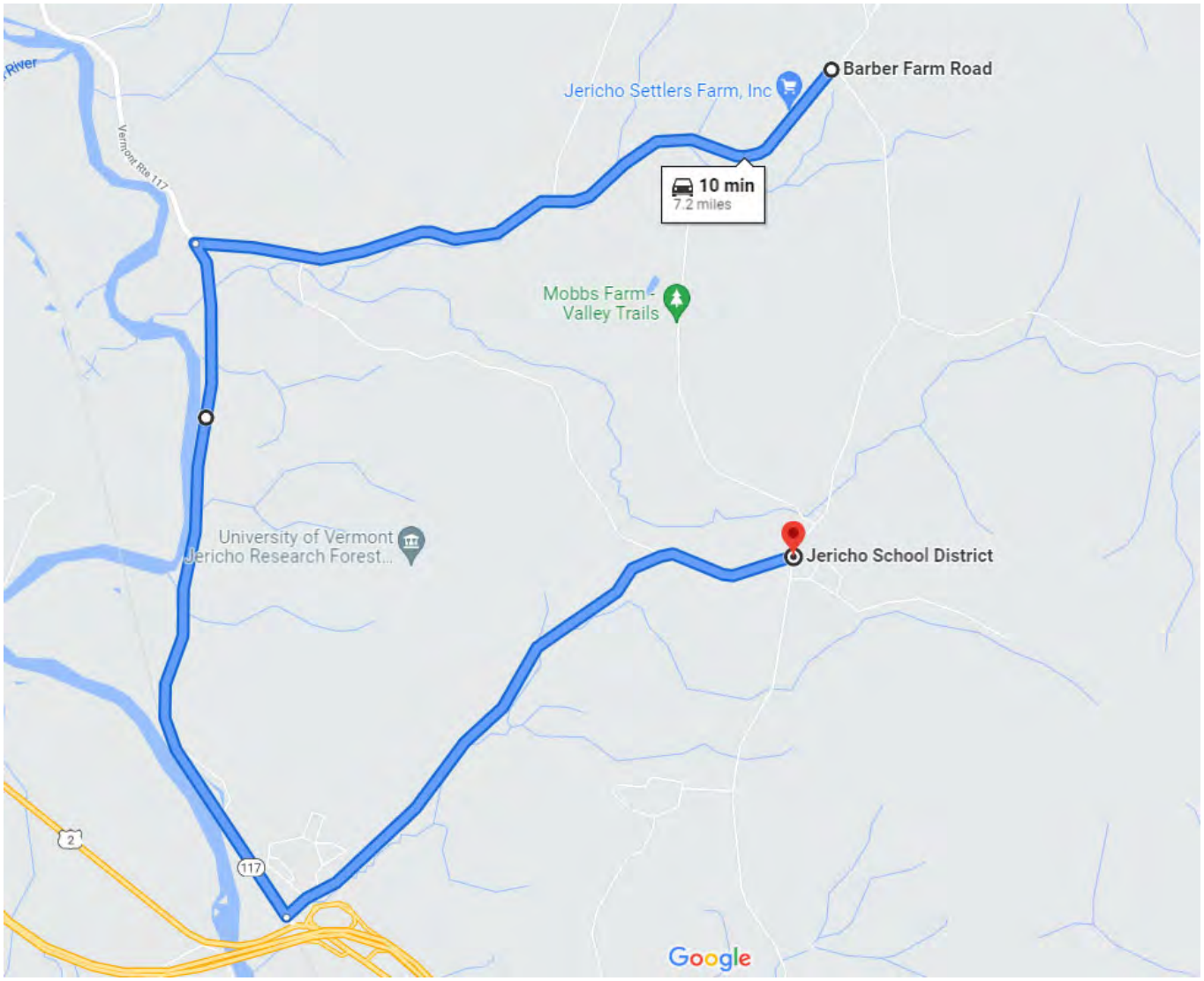
Appendix N: Detour Routes



Detour Route 1: Browns Trace Road (FAS 209/TH 4), to Fitzsimonds Road and Barber Farm Road, back to Browns Trace Road (3.7 mi end-to-end)

$

Detour Distance: 2.0 miles
Thru Route: 1.7 miles
End-to-End Distance: 3.7 miles
Added Distance: 0.3 miles



Detour Route 2: Browns Trace Road (FAS 209/TH 4), to Barber Farm Road, VT Route 117, and Governor Peck Hwy, back to Browns Trace Road (9.0 mi end-to-end)

$

Detour Distance: 7.2 miles
Thru Route: 1.8 miles
End-to-End Distance: 9.0 miles
Added Distance: 5.4 miles

Appendix O: Plans

N/F
MUNNS, MARY H. &
MATTHEW E.

N/F
DOWIE, GRAHAM &
UNDERCOFFLER, MARY P.

N/F
BERNSTEIN, RICHARD A. &
ELIZEBETH R.

N/F
GARNER, BRETT A.

FAS 209
TO RICHMOND

FAS 209
TO VT ROUTE 15

APPROX. EXISTING TOWN R.O.W.

PT 91+39.15

POB 53+00.00

POB 50+00.00

PC 94+96.09

N07°53'25"E

89+00
90+00
91+00
92+00
93+00
94+00
95+00

Mainline8

BENCHMARK
RAILROAD SPIKE
IN ROOT
ELEV. =592.69

4X4 CONCRETE
BOUNDRY MARKER
UP 2.0'

MILL BROOK
FLOW

GRAVEL
DRIVE

MAILBOX
521

TELEPHONE
PEDESTAL

SIGN
WT-TO
WUC-RP
(FITZSIMMONS RD)

SIGN
ONE WAY

HVCTRL
101

HVCTRL
102

HVCTRL
104

B-101

B-102

CURVE (x)
DELTA = 38°53'20"
D = 08°57'09"
R = 640.00'
T = 225.94'
L = 434.39'
e = 38.71'

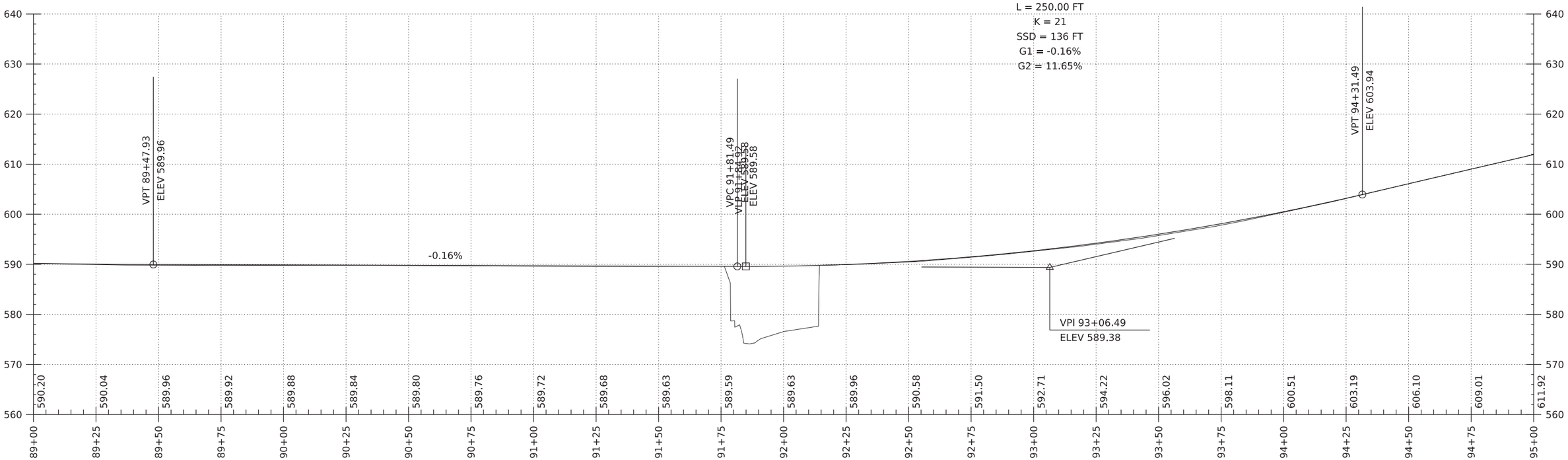
STA 91+97.15=
CHAN 51+50.00
Δ= 120° 00' 00"LT

VT STATE PLANE GRID

SCALE 1" = 20'-0"
20 0 20

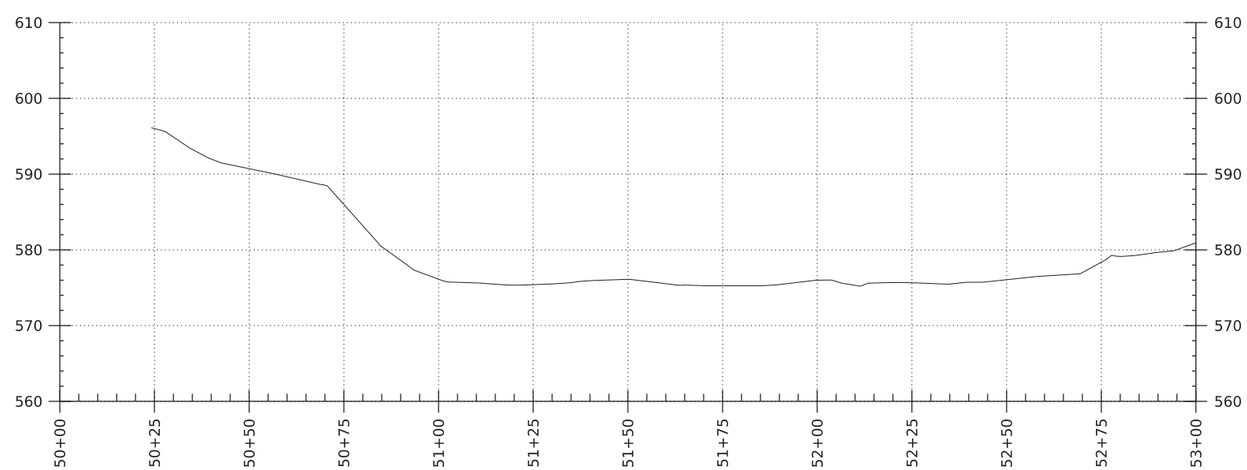
EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Existing.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS LAYOUT	SHEET 1 OF 16



FAS ROUTE 209 PROFILE

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

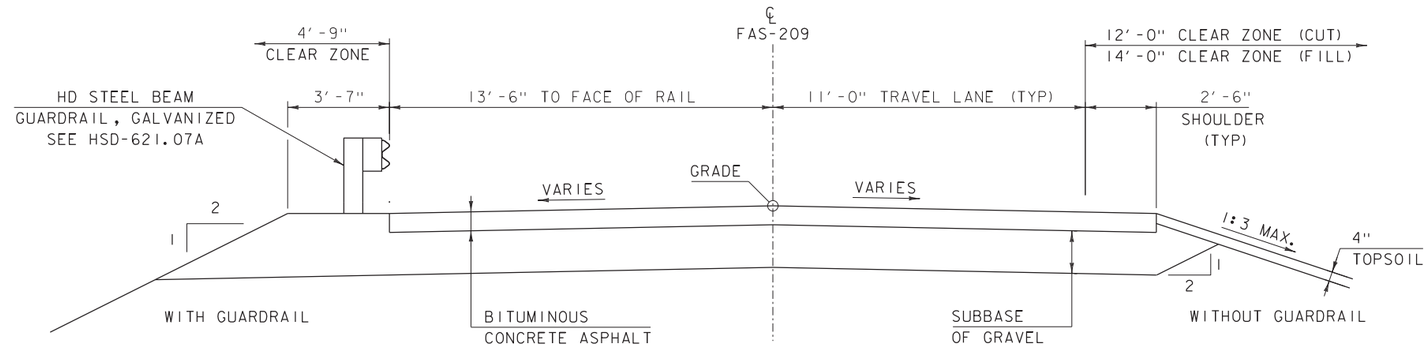


CHANNEL PROFILE

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

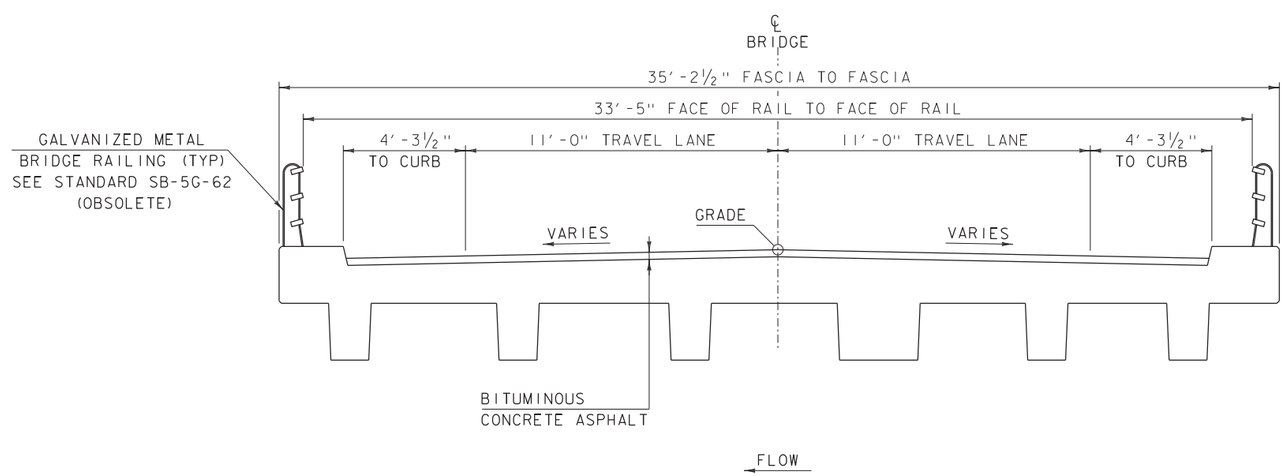
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634profile.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 2 OF 16



EXISTING FAS-209 TYPICAL SECTION

SCALE 3/8" = 1'-0"



EXISTING BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

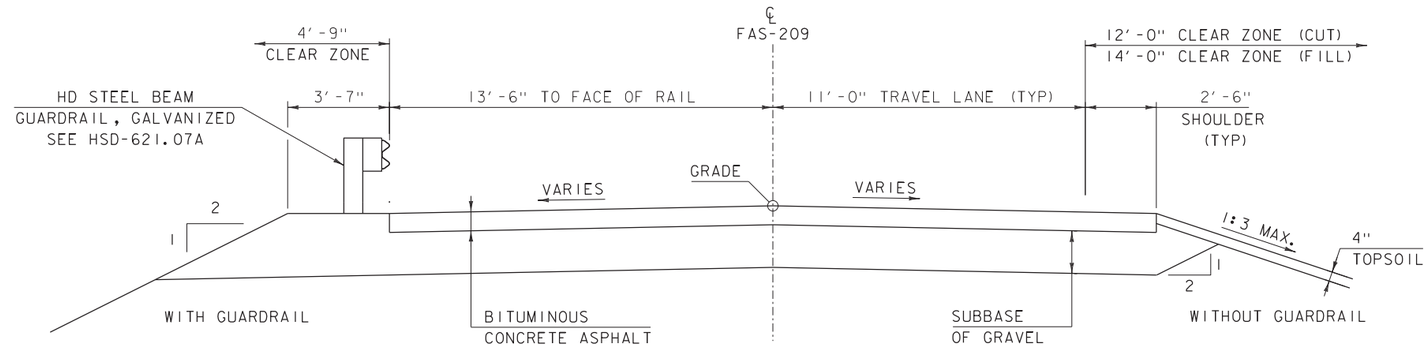
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: JERICHO
PROJECT NUMBER: BF 0209(10)

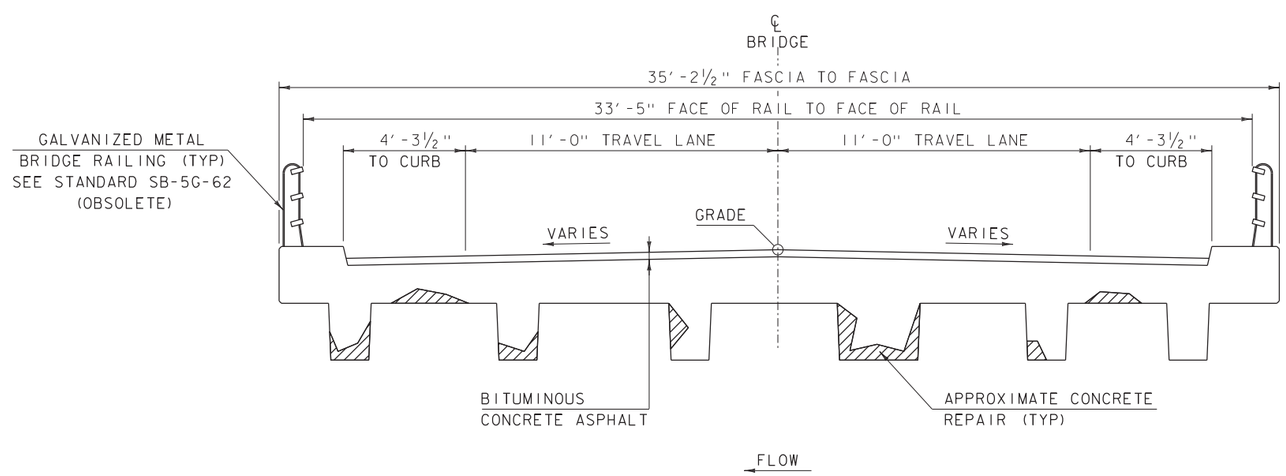
FILE NAME: 12j634\sl2j634typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
EXISTING TYPICAL SECTIONS

PLOT DATE: 8-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 3 OF 16



EXISTING FAS-209 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

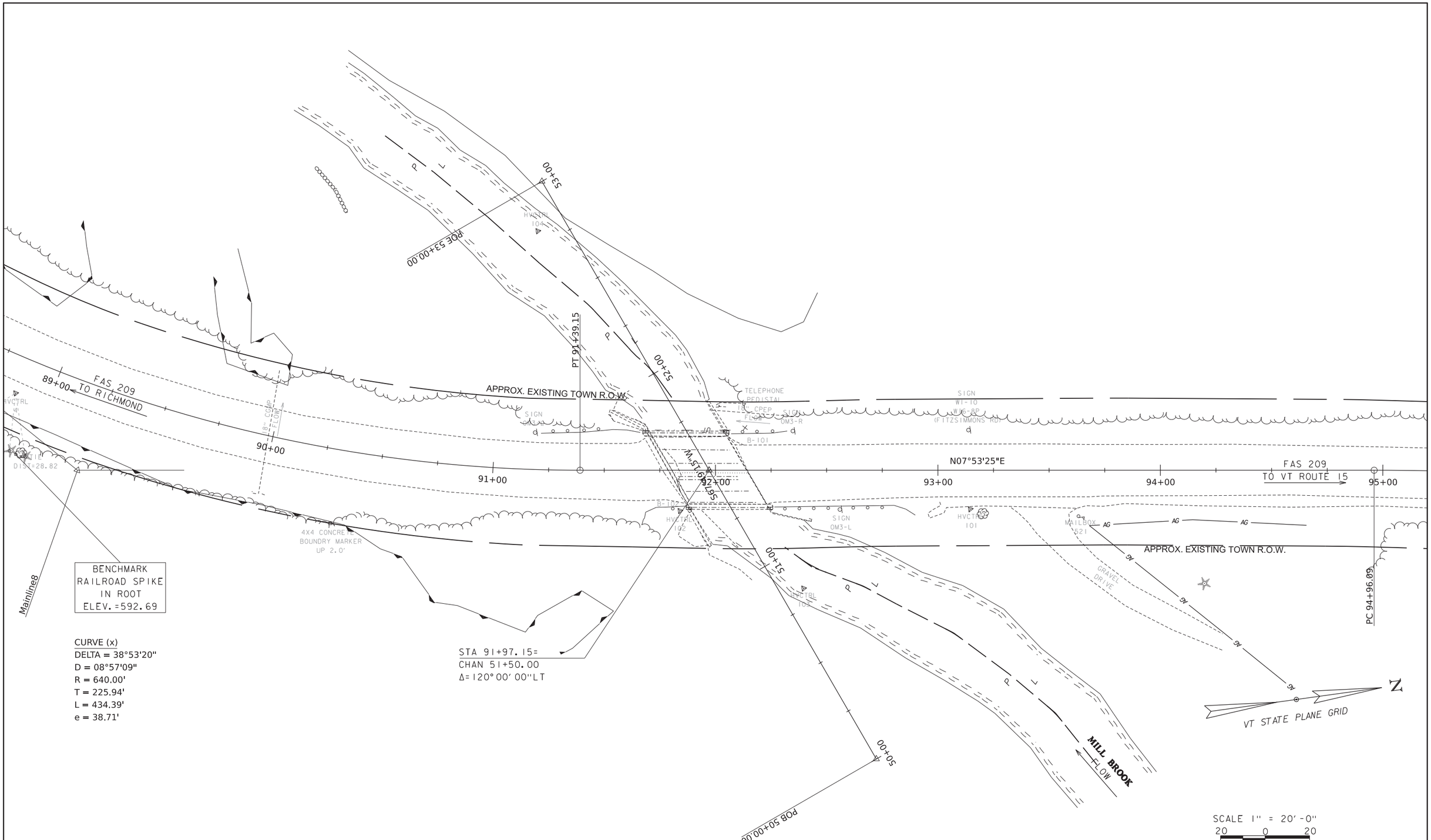
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: JERICHO
PROJECT NUMBER: BF 0209(10)

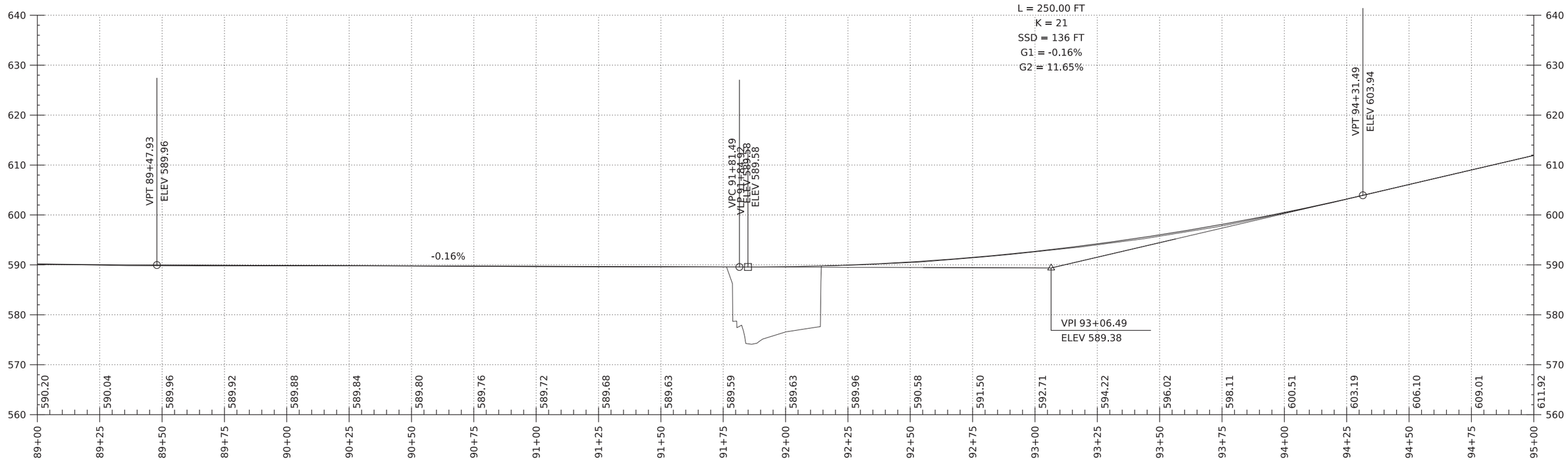
FILE NAME: 12j634\sl2j634typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
REHABILITATION TYPICAL SECTIONS

PLOT DATE: 8-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 4 OF 16



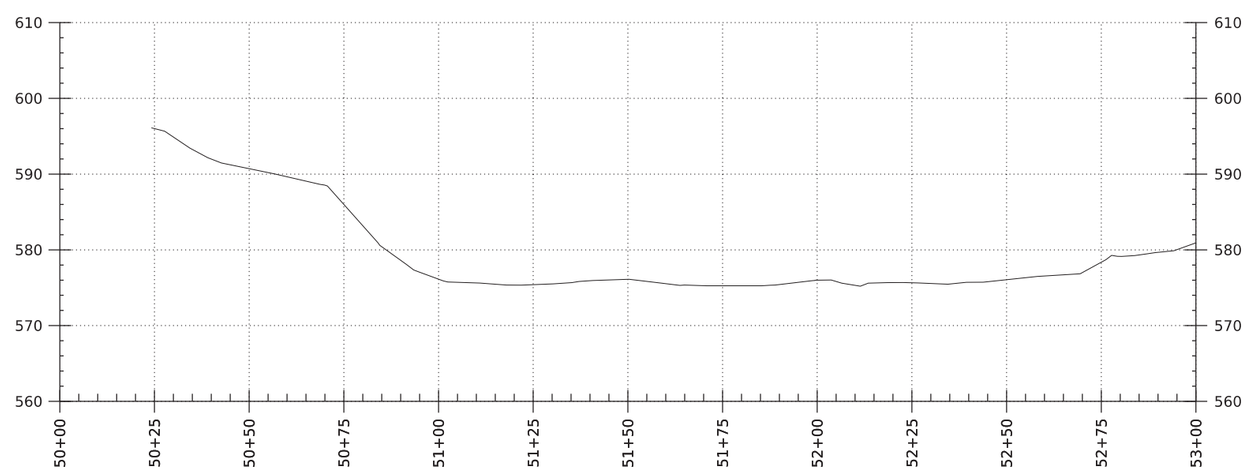
EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Alternative 1.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
REHABILITATION LAYOUT	SHEET 5 OF 16



FAS ROUTE 209 PROFILE

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

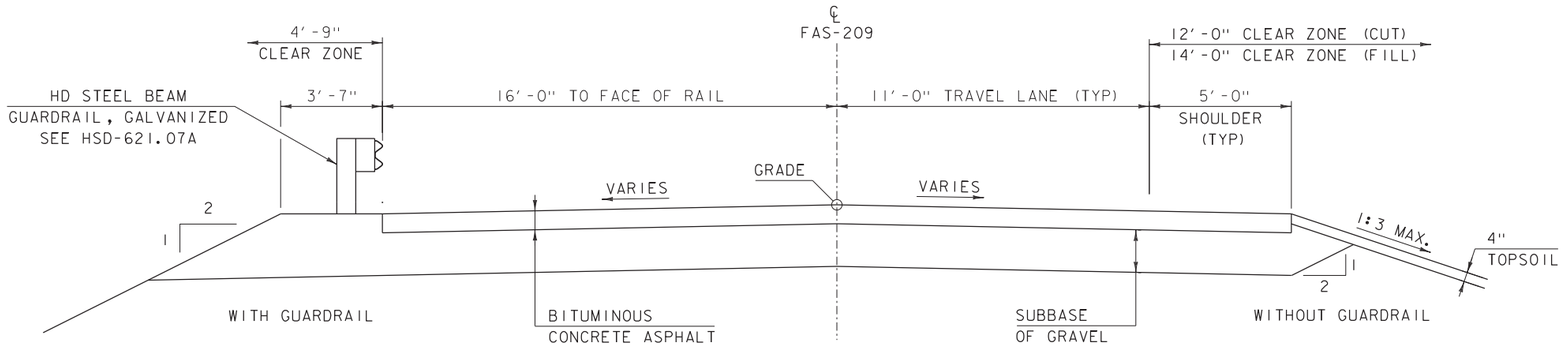


CHANNEL PROFILE

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

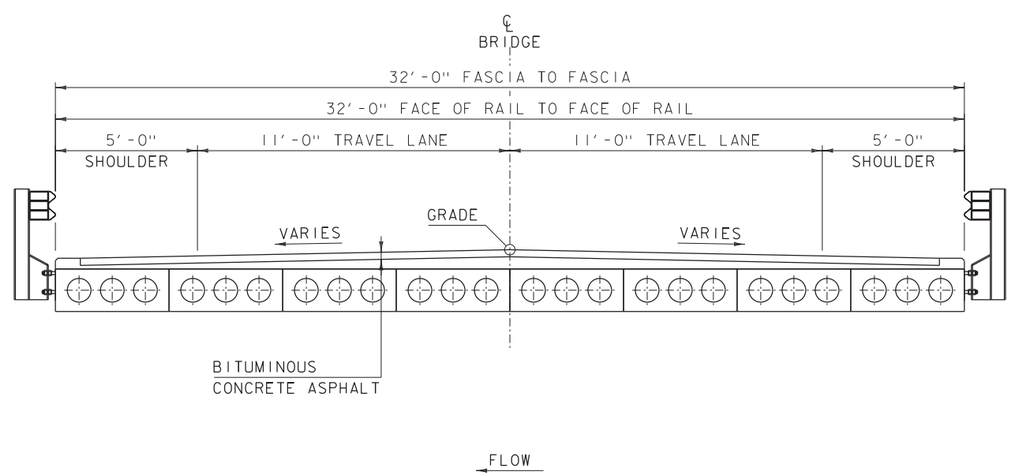
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634profile.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
REHABILITATION PROFILE SHEET	SHEET 6 OF 16



PROPOSED FAS-209 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED SUPERSTRUCTURE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

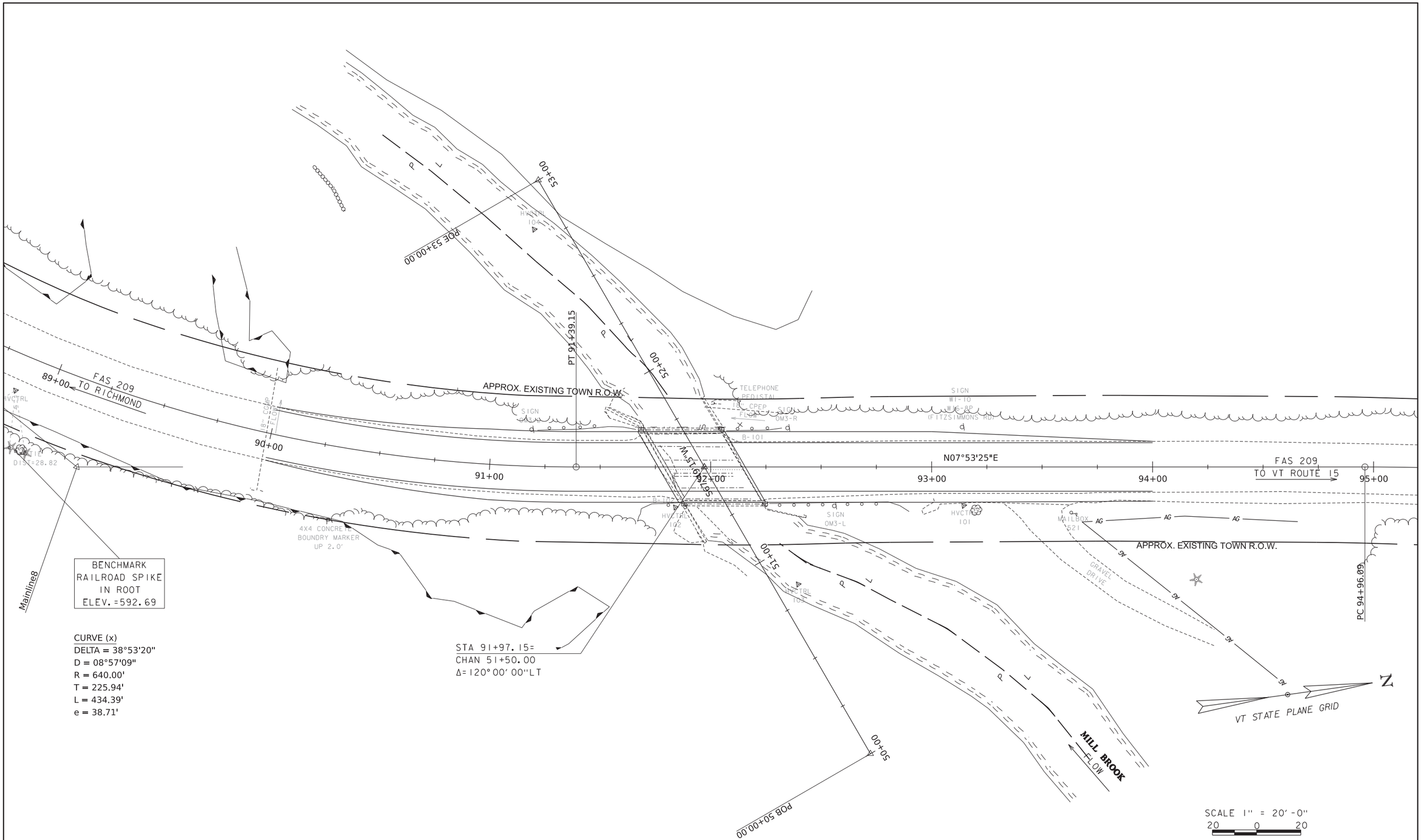
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: JERICHO
PROJECT NUMBER: BF 0209(10)

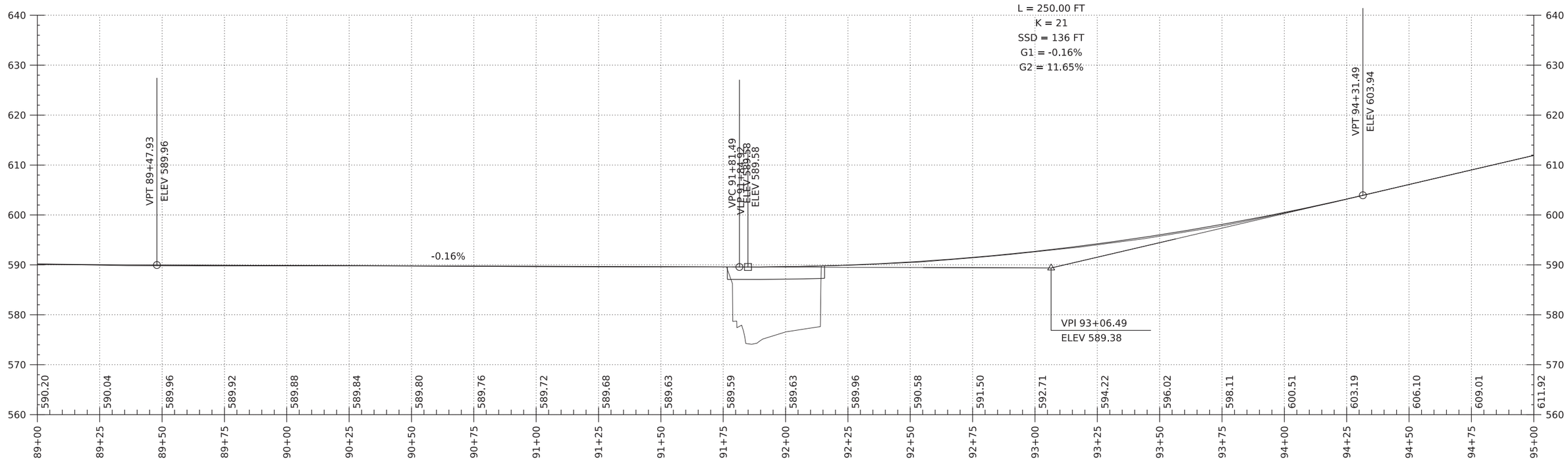
FILE NAME: 12j634\sl2j634typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
SUPER REPLACEMENT TYPICAL SECTIONS

PLOT DATE: 8-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 7 OF 16



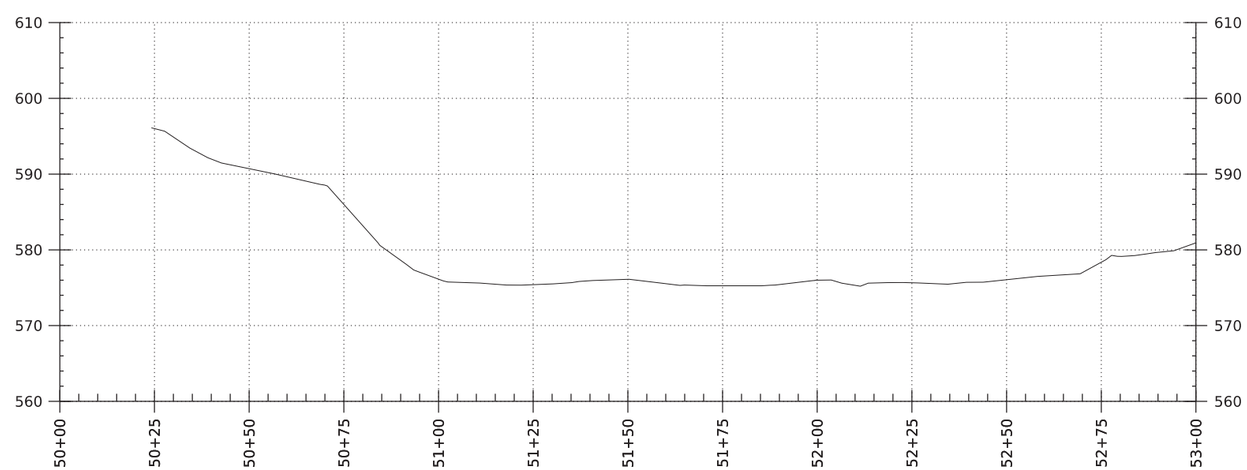
EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Alternatve 2.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
SUPERSTRUCTURE REPLACEMENT LAYOUT	SHEET 8 OF 16



FAS ROUTE 209 SUPERSTRUCTURE REPLACEMENT PROFILE

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

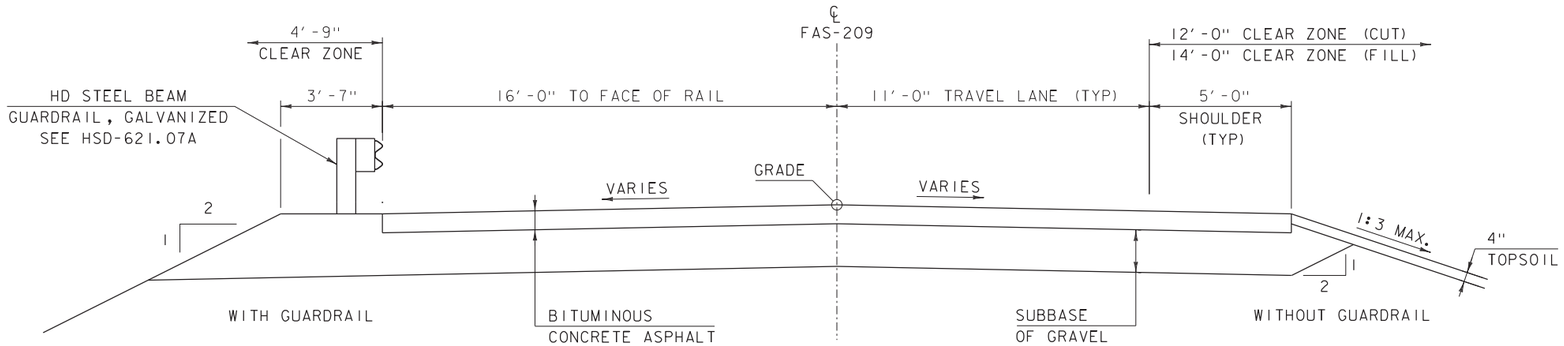


CHANNEL PROFILE

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

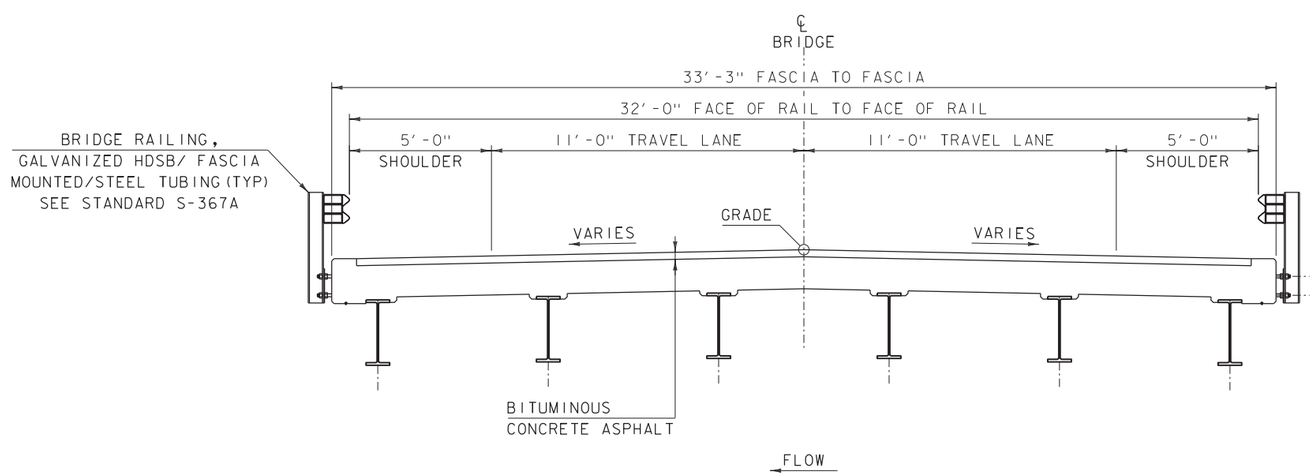
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634profile.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
NEW SUPERSTRUCTURE PROFILE SHEET	SHEET 9 OF 16



PROPOSED FAS-209 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

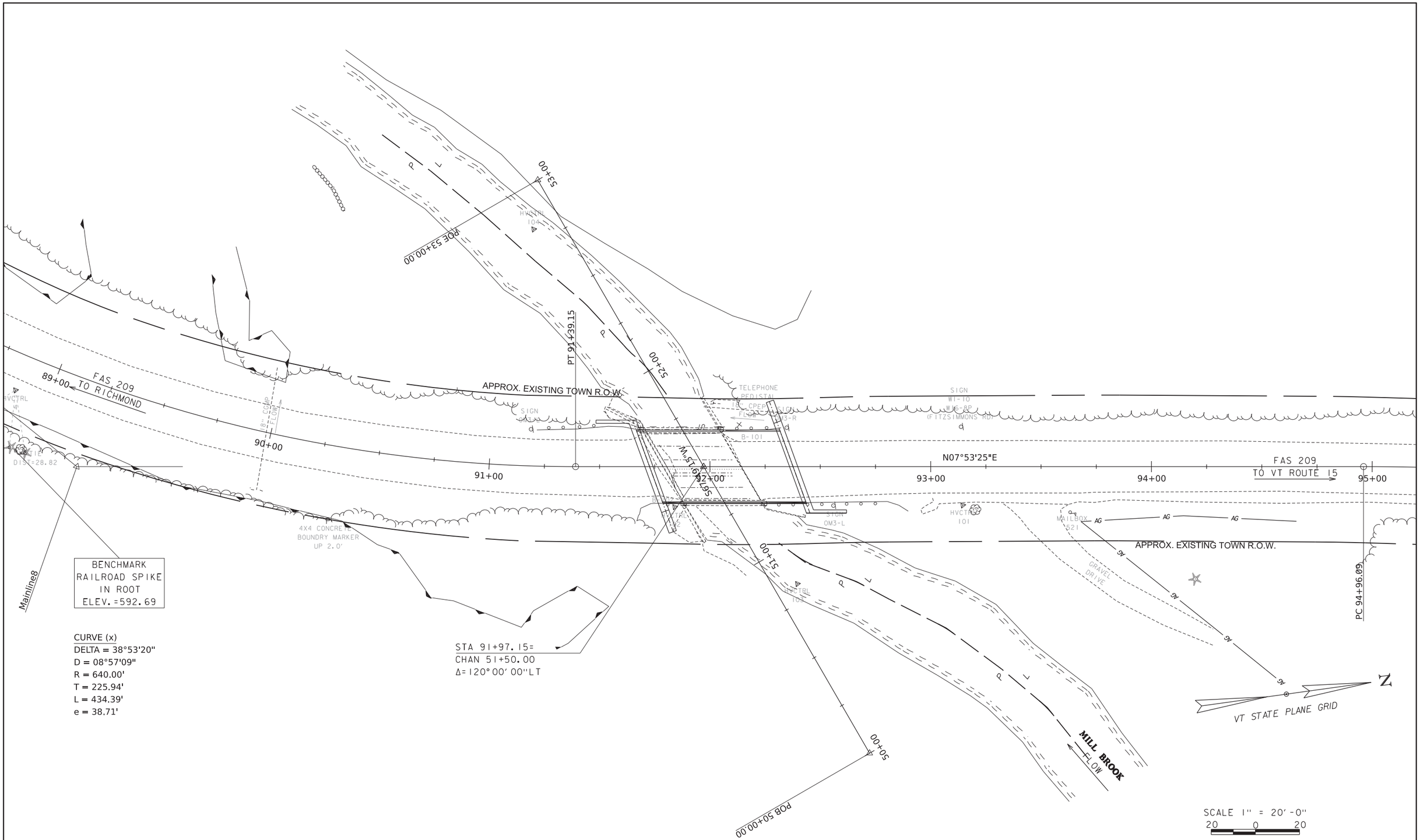
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: JERICHO
PROJECT NUMBER: BF 0209(10)

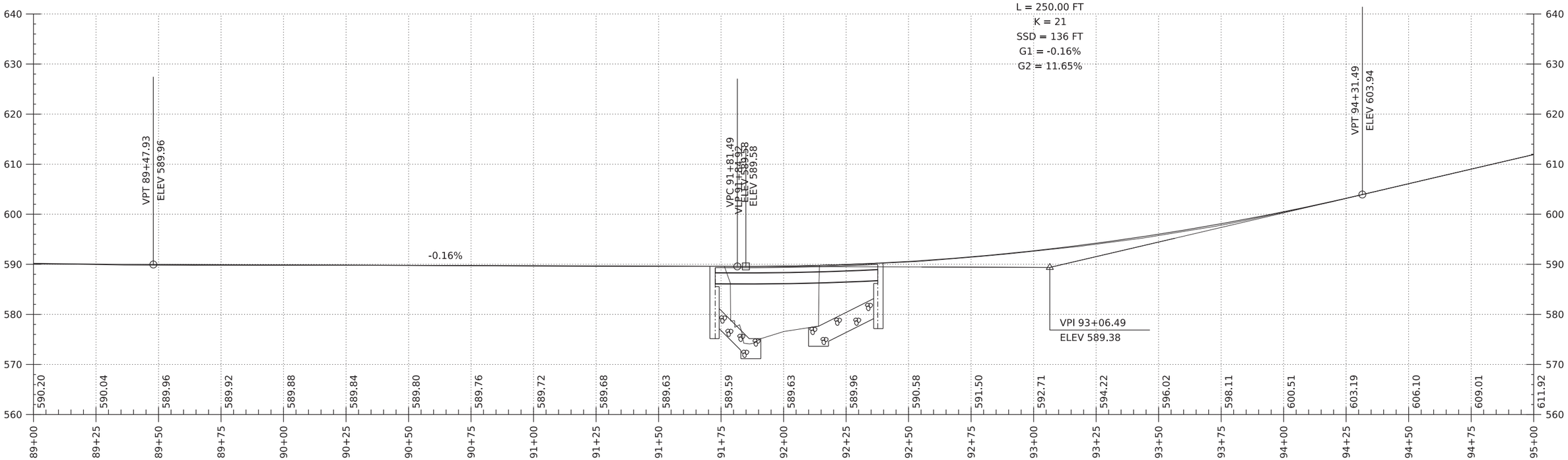
FILE NAME: 12j634\sl2j634typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
BRIDGE REPLACEMENT TYPICAL SECTIONS

PLOT DATE: 8-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 10 OF 16



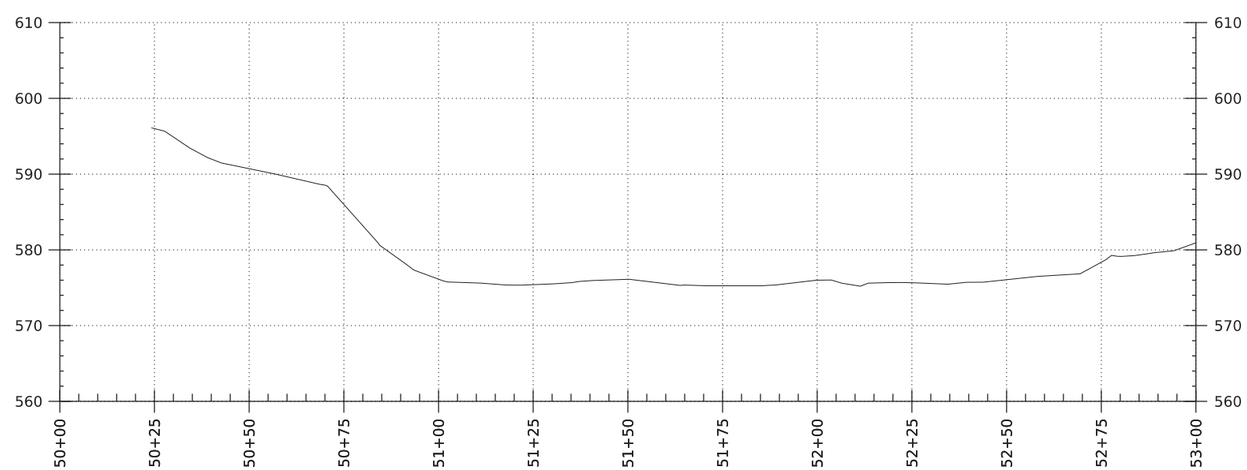
EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Alternative 3.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
NEW BRIDGE LAYOUT	SHEET 11 OF 16



FAS ROUTE 209 NEW BRIDGE PROFILE

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

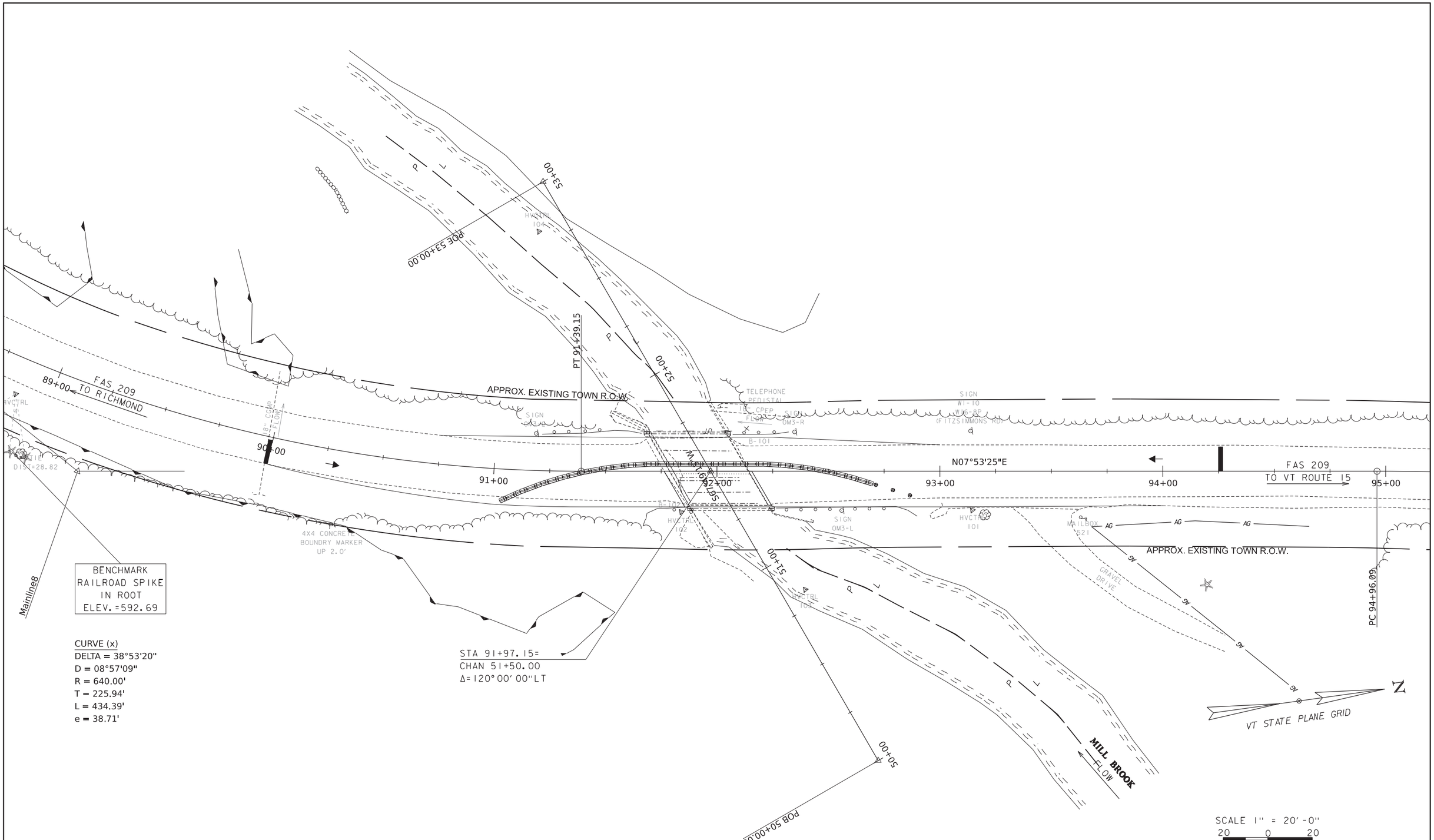


CHANNEL PROFILE

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

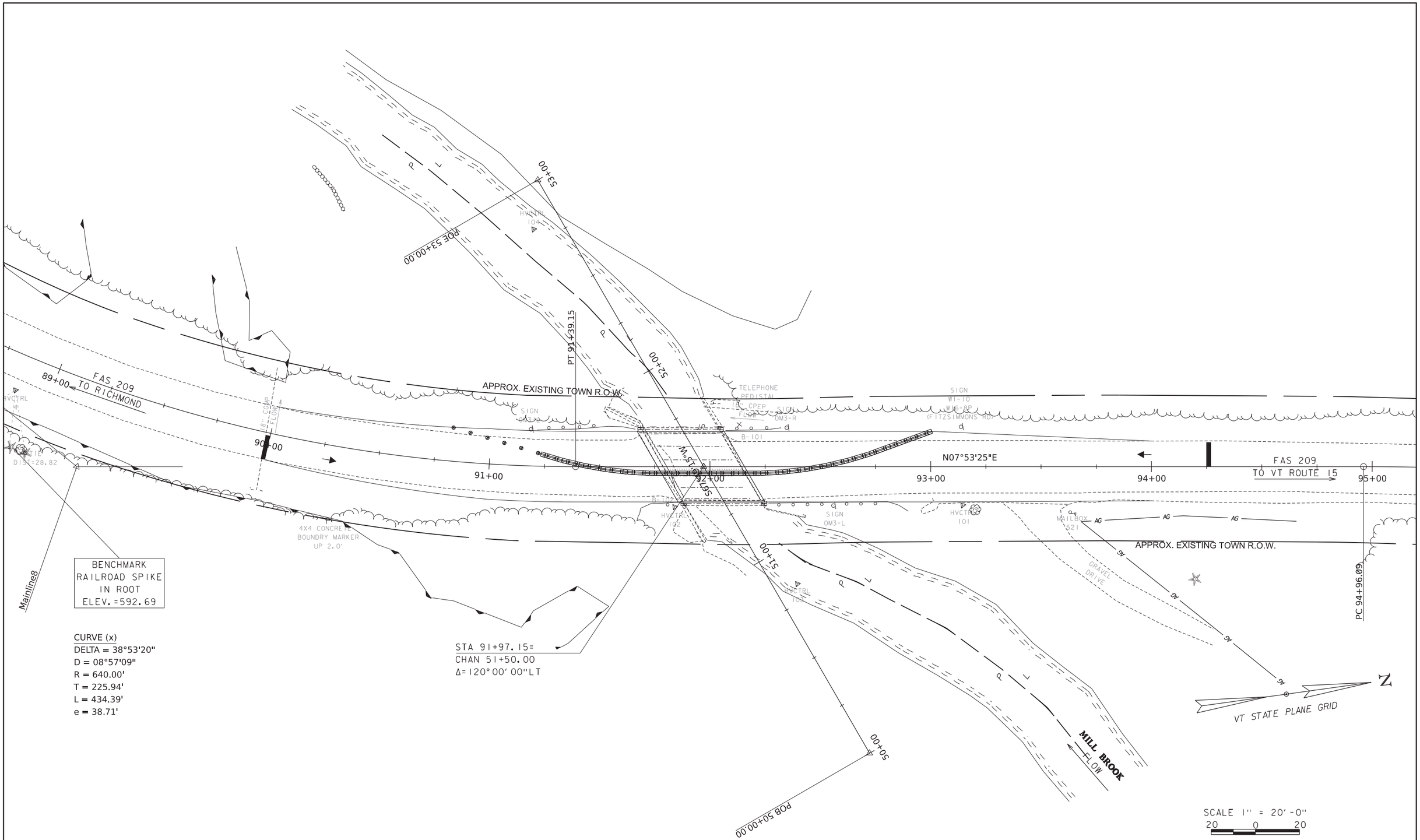
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634profile.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
NEW BRIDGE PROFILE SHEET	SHEET 12 OF 16



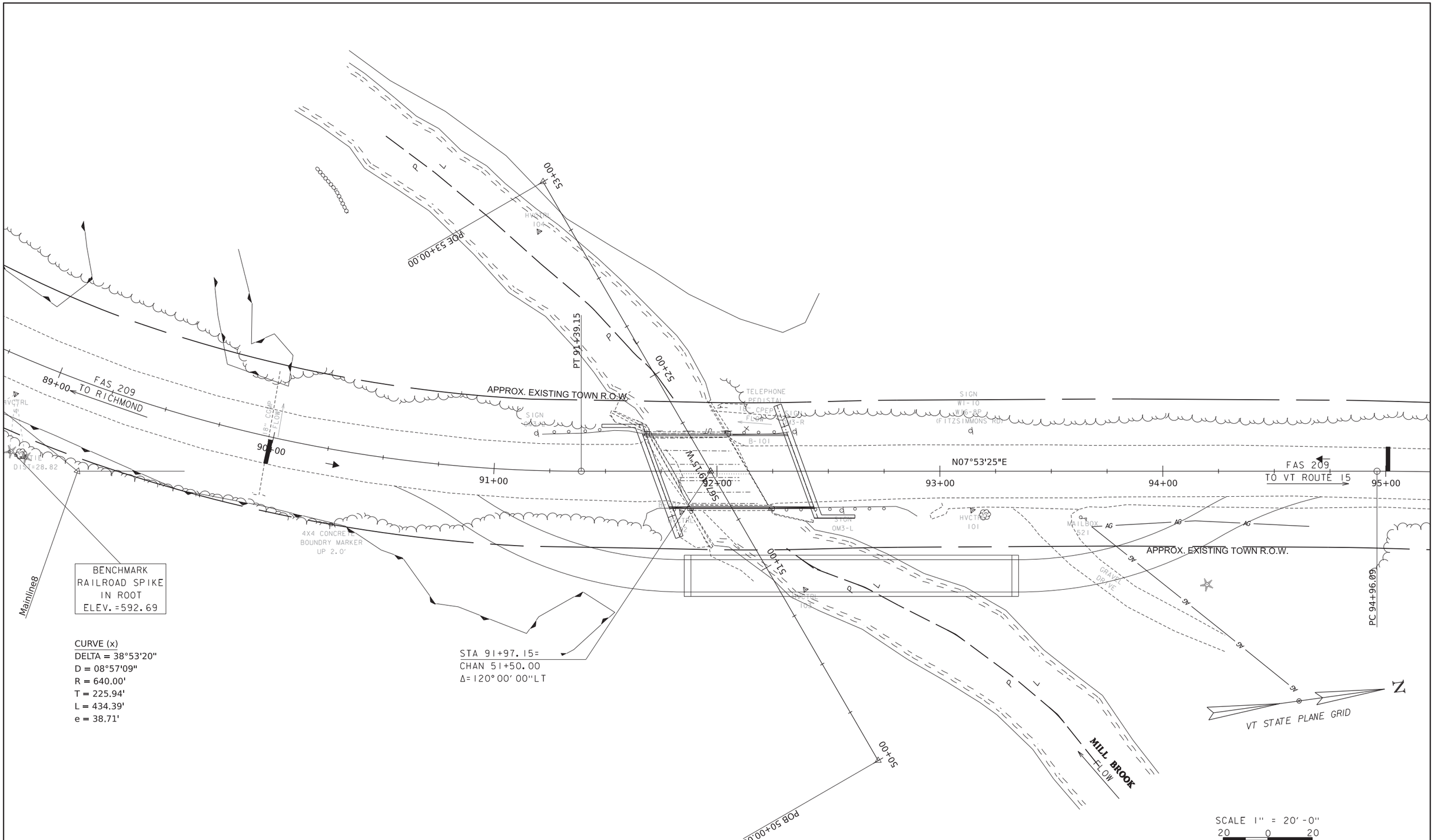
EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Phase 1 Layout.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASE 1 LAYOUT	SHEET 13 OF 16



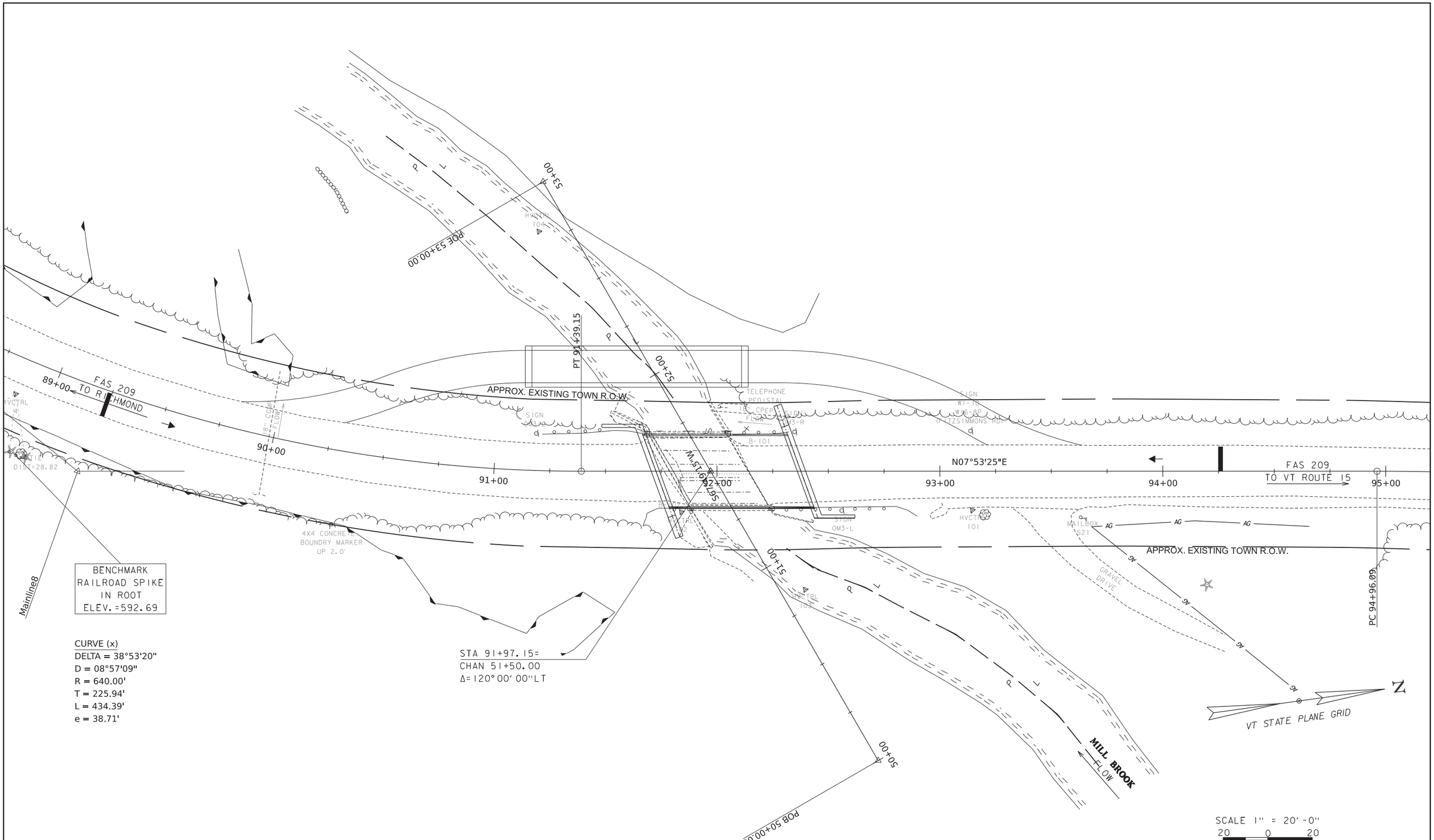
EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Phase 2 Layout.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASE 2 LAYOUT	SHEET 14 OF 16



EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Upstream Temp Bridge.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
UPSTREAM TEMP BRIDGE LAYOUT	SHEET 15 OF 16



EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1927, RECONSTRUCTED 1962
MAX SPAN = 38'

PROJECT NAME: JERICHO	
PROJECT NUMBER: BF 0209(10)	
FILE NAME: s12j634BDR_Downstream Temp Bridge.dgn	PLOT DATE: 8-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
DOWNSTREAM TEMP BRIDGE LAYOUT	SHEET 16 OF 16