STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Barre Town BF 0169(12)

VT Route 110, BRIDGE 21 Over Jail Brook

December 6, 2019

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I. Site Information

Bridge 21 is a State-owned bridge located on VT Route 110 over Jail Brook in Barre Town. The Bridge is located approximately 0.1 miles south of the junction of VT Route 110 and US Route 302. There is a round-about on the northern approach to the bridge and a mis-aligned 5-way intersection on the southern approach to the bridge. The existing conditions were gathered from a combination of a site visit, the Bridge Inspection Report, the Route Log and the existing survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Major Collector
Bridge Type	Single Span Concrete T-Beam Bridge
Bridge Length	44 feet
Bridge Skew	No Skew
Year Built	1930, Reconstructed (Widened) in 1959
Ownership	State of Vermont

Need

Bridge 21 carries VT Route 110 across Jail Brook. The following is a list of deficiencies of Bridge 21 at this location:

- The existing T-Beams are in fair condition, however, have the following maintenance issues:
  - Wearing Surface: There is transverse and longitudinal cracking in the wearing surface mainly in the south bound lane due to a potential full depth failure of the deck.
  - Deck: There are areas of heavy saturation, cracking, delaminations and staining in the deck. Bay 2 has heavy saturation and a full depth failure is eminent at any time.
  - Beams: There are nine T-Beams. Beams 5, 6, 8, and 9 have spalling and beams 5 and 6 are abutted up next to each other with rusted rebar exposed and minor section loss in the reinforcing bars. The remaining T-beams have cracking and some saturation at their ends.

- The substructures are in satisfactory condition, with the following maintenance needs:
  - Backwall: There is some cracking and areas of saturation and moderate to heavier scaling where the drainage pipe comes through.
  - Abutment 1: Abutment 1 has some minor to moderate distress. The laid-up stone portion has minor voids, and the concrete portion has minor cracks and scaling. The scaling along the downstream end at the base is fairly deep.
  - Abutment 2: Abutment 2 has some minor to moderate distress with minor cracks in the concrete portion and voids in the laid-up stone portion.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2023 and 2043.

Traffic Data	2023	2043
AADT	4,800	5,200
DHV	550	600
ADTT	300	490
%T	1.3	2.0
%D	53	53

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 5200, a DHV of 600, and a design speed of 35 mph for a Major Collector, VT Route 110 is considered a Low Use/Priority bicycle route at this area.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	12'/8' (40')	11'/3' (28')	
Bridge Lane and Shoulder Widths	VSS Table 5.3	12'/8' with 5.5' sidewalk (40')	11'/3' (28')	
Clear Zone Distance	VSS Table 5.5	No Issues Noted	14'fill / 12'cut	
Banking	VSS Section 5.13	NC	8% (max)	
Speed	VSS Section 5.3	35 mph (round about warned for 20 mph)	35 mph (Design)	
Horizontal Alignment	AASHTO Green Book, Table 3.10b	R = ∞ over bridge R = 200' (Southern Approach – just off bridge)	R = 314' @ e=8%	Substandard at approach
Vertical Grade	VSS Table 576	-10.1% (max – Southern approach) -0.55% over bridge	11% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 5.1	K_{sag} = 13	40 crest / 50 sag	Substandard
Vertical Clearance	VSS Section 5.8	No Issues Noted	14'-3"	
Stopping Sight Distance	VSS Table 5.1	90'	225'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 5.8	8' Shoulder on bridge	4' Shoulder	
Bridge Railing	Structures Design Manual Section 13	Curb Mounted Steel Pipe with Spindles	TL-2	Not Crash Tested
Hydraulics	VTrans Hydraulics Manual, Table 6.1	Passes 2% AEP storm event with 7.4' of freeboard Clearspan: 37'	Passes 2% AEP storm (Q_{50}) event with 1' of freeboard Bank Full Width: 42'	Substandard Bank Full Width
Structural Capacity	Structures Design Manual, Ch. 3.4.1	Approaching Structural Deficiency	Design Live Load: HL-93	

Inspection Report Summary

The ratings provided below are from the most recent inspection performed on July 9, 2019. The bridge is on a 24-month inspection frequency.

Deck Rating	5 Fair
Superstructure Rating	5 Fair
Substructure Rating	6 Satisfactory
Channel Rating	8 Very Good

From the Structure Inspection, Inventory, and Appraisal Sheet:

7/9/2019 – Deck soffit and T beams continue to deteriorate and recon or replacement should be considered. Southwest corner wing parapet is ready to fail and has been for a while now. West side bridge rail post cracked through some years ago and steel plates were installed vertically in front and bolted (substandard repairs). ~MJK/MJ

7/10/2017 – Deck is advancing to poor with full depth failure pending in bay 2. T-beams continue to deteriorate. Structure needs extensive reconstruction or replacement. ~MJK/AC

06/11/2015 – Bridge is in fair condition and should be considered for a major reconstruction with new deck and superstructure. Potential full depth holes through the deteriorated deck could start to form in a few years. Abutments are quite sound and could be retained. ~MJ/JS/TB

07/30/2013 – Deck and superstructure have some advanced deterioration. Bridge should be scheduled for reconstruction within the next 5 to 10 years. *Aluminum simple span tubing bridge rail is substandard and should be upgraded, at least along the downstream side. ~MJ/JS

Hydraulics

The existing structure passes the design flow of a 2% AEP (Q_{50}) with 7.4 feet of freeboard, which meets the current standards of the VTrans Hydraulic Manual. No bank full width (BFW) was measured in the field, but the Vermont BFW regression equation provides a BFW of 42 feet. The VTrans Hydraulics Section advises that either a rehabilitation or replacement option would be acceptable. See the preliminary hydraulics report in Appendix D for additional information.

Utilities

The VTrans Utilities Coordination unit investigated the existing utility within the project limits. The existing utilities identified are shown on the Existing Conditions Layout Sheet, and are as follows:

<u>Municipal Utilities</u>

- Water and sewer are in the area of proposed construction but do not cross the river in the area of the bridge. The Town of Barre has recently submitted a permit request to install a new waterline which would cross the river to the north of the bridge and be carried on a utility/sidewalk bridge.

<u>Aerial Utilities</u>

- As depicted on the existing conditions layout sheet the existing pole at the intersection of VT Route 110 and Mill Street will be removed as part of the relocation associated with the Barre Town STP HES 0169(8) project.

<u>Underground Utilities</u>

- Consolidated Communications has an extensive communications site to the Northwest of the bridge, this site has underground running to it form the existing pole in that quadrant. This site includes several above ground cabinets as well as buried communications cables. This site needs to be avoided as relocating this infrastructure would be very expensive and time consuming. This is also located within an easement controlled by CCI. As such, the cost to relocate would be part of the project.

Right-Of-Way
The existing Right-Of-Way (ROW) is shown on the Existing Conditions Layout sheet in Appendix O. It is anticipated that additional ROW will be required for the project.

Resources
The resources present at this project are shown on the Existing Conditions Layout Sheet and are based on information provided by VTrans, and are as follows:

Biological:

Wetlands/Watercourses
The bridge crosses the Jail Branch at this location. This river is a direct tributary to the Winooski River and flows northwesterly through the project area. The river is regulated by the US COE and the VT ANR. The ordinary high water mark is the regulatory boundary.

There are no wetlands in the project area.

Wildlife Habitat
Terrestrial and aquatic habitat are likely to pass within the stream and the riparian corridor through the project area. The banks of the stream have been armored with granite blocks through this project area confining the stream. Limited opportunities exist for terrestrial species due to site constraints; aquatic wildlife could potentially move upstream along this corridor although they are limited as well, as there is a dam obstructing movement roughly 50 feet downstream of the existing structure.

Rare, Threatened and Endangered Species
According to the ANR Natural Resource mapping there are no known occurrences of rare, threatened or endangered species within proximity of the project study area.

The project is within the northern long-eared bat, Myotis septentrionalis (state endangered, federally T) range. No documented roosts or hibernacula are within 1 mile of the project area. Potential suitable habitat for this species varies. Typically, suitable habitat consists of trees (dead or alive) ≥ 3" dbh that exhibit cracking, peeling bark, holes, crevices, and bridges, etc. There is adjacent potential suitable habitat along the riparian corridor. The bridge itself did not have many opportunities for roosting bats. Once project plans are developed, and the amount of tree cutting is determined the VTrans biologist will further assess what needs to be completed for studies to determine effect on this species.

Agricultural
According to NRCS soils mapping on the ANR Natural Resource Atlas, Buckland loam are mapped which are prime agricultural soils. Much of the area that is mapped has been developed by commercial/residential properties.

Historic:
Bridge 21 is not considered historic.

There is one historic resource located within the project area. The barn/storage building located along the upstream southern bank of Jail Branch. Impacts to this resource should be avoided. See the Historic Resource Memo in Appendix I for additional information.

Archaeological:
There are mill remains located along the banks north of Bridge 21. These are located far enough from the Bridge that impacts to these resources can be avoided. See the Archaeology Memo in Appendix H for additional information.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there are There are three hazardous waste sites within 0.5 miles of the project area and two hazardous waste generating sites. See the figure to the right for a map of Hazardous Sites. See Section 2.3 in Appendix E for additional information.

Stormwater:

The project site area is adjacent to the existing operational stormwater permit for the Barre Town HES 026-1(38) project. The permit number is 4969-9010. The project area is within a semi-developed portion of Barre where runoff is predominantly collected by curbing and closed drainage which ultimately outfalls into the Jail Branch. Any opportunity to incorporate disconnection or infiltration into the design would improve water quality. See the Stormwater Memo in Appendix J for additional information.

II. Safety

There have been 9 crashes located along VT Route 110 in Barre Town within the last 5-year period. Four of these crashes are located within anticipated project limits.

There are no High Crash Location segments located within the project area.

III. Upcoming/Current Projects in The Project Area

There are several other projects going on within the project area and along potential detour routes. These projects along with the anticipated construction schedule are as follows:

- Roadway Project: BARRE CITY-BARRE TOWN MEGC M 6000(11): Reconstruction or relocation of the VT Route 14/Quarry Street intersection and Quarry Hill Road. Anticipated construction schedule: 2021 – 2022

- Enhancement Project: BARRE TOWN STP EH06(19) WEBSTERVILLE RD/MILL ST: Construction of 657 linear feet of sidewalk along Websterville Road and Mill Street in East Barre. Anticipated construction schedule: 2019

- Traffic and Safety Project: BARRE TOWN STP HES 0169(8): Geometric improvements to the VT Route 110/Mill Street (TH-2)/Bianchi Street (TH-84)/Old US Route 302 (TH-125) in Barre Town. Anticipated construction schedule: 2019

Coordination with these projects should take place early in the design process.

IV. Community Needs and Considerations

A community questionnaire was sent to the Town and Regional Planning Commission to fill out. Responses to the questionnaire can be found in Appendix K. The following needs and considerations were gathered from the Town's responses:

- The Town has indicated that there is a fair amount of pedestrian traffic and pedestrian generators. The East Barre village is developed, and many residents walk to the Jiffy Mart. Additionally, pedestrian traffic is generated from homes on the north side of US Route 302 traveling to the village area.

- The community feels that there is a need for a sidewalk over the bridge. There is sidewalk on the north side of the bridge and new sidewalk was just constructed in the village. An AOT project starting next year will construct more sidewalk on the south side. The Town needs to build a new 8" water line across the Jail Branch. The current plan is to construct a structure for pedestrians with the water pipe underneath walkway. The structure would be near the bridge on the downstream side.

- The Town has indicated that there are several businesses in the immediate area of the bridge that would be impacted by the bridge project: Crossway Motors is located adjacent to the bridge and Jiffy-Mart is located on US Route 302 a short distance away. Additionally, several businesses (including the East Barre Antique Mall and Vermont Flannel Company) are located along Mill Street in the heart of East Barre village and have customers that turn off VT Route 302.

- The are several important public buildings and community facilities in close proximity to Bridge 21. The Town's East Barre Park is located approximately 300 yards away from Bridge 21 on the southside of Jail Branch. The Town's East Barre Fire Station is in close proximity to the bridge. That station has primary coverage responsibilities in the northeast quadrant of Barre Town and for parts of Orange closes to US Route 302. The Aldrich Library-York Branch (East Barre Library) is located about 300 yards away from Bridge 21.

- School bus routes: There are four schools in Barre Town. The Barre Town Middle and Elementary School is located on Websterville Road. The Websterville Baptist School is located on Church Hill Road on the south side of the south side of Jail Branch. The Choice Academy is located on VT Route 14 in South Barre. The Montessori School of Central Vermont is on Pine Hill Road in the northwest quadrant of Barre Town. School buses use the bridge to reach the north side of Town. The school bus routes rely on the same two points to cross the Jail Branch. Several bus routes cross the bridge and then US Route 302.

V. Maintenance of Traffic

The Vermont Agency of Transportation reviews each new project to determine suitability for the Accelerated Bridge Program which focuses on faster delivery of construction plans, permitting and Right-of-Way, as well as faster construction of projects in the field. One practice that will help in this endeavor is closing bridges for portions of the construction period, rather than maintaining traffic on a portion of the existing bridge during construction or providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with faster construction techniques and incentives to contractors to complete projects sooner. The Agency will consider the closure option on most projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will also expedite construction schedules. This can apply to decks, superstructures and substructures. Accelerated Construction provides enhanced safety for the workers and the traveling public while maintaining project quality.

Off-Site Detour

This option would close the bridge and reroute traffic onto VT Route 14, and US Route 302, back to VT Route 110. This regional detour has an end-to-end distance of 63.3 miles. This detour adds approximately 9.1 miles to travel distance. Since the bridge is located on a State Route, it would be the responsibility of the Vermont Agency of Transportation to choose the preferred detour route, and to sign it according to the MUTCD manual.

The detour on state roads is quite long but there are local roads that could accommodate the volume of detoured traffic. The possible bypass routes using local roads would be:

1. VT Route 110, to US Route 302, and Old Route 302 (class 3 – gravel), back to VT Route 110 (1.1 miles end-to-end)

2. VT Route 110, to Websterville Road (class 2 – paved), Quarry Hill Road (class 2 – paved), Quarry Street (class 2 – paved), South Main Street (VT Route 14), and US Route 302, back to VT Route 110 (8.6 miles end-to-end)

From a geometric standpoint, local bypass 2 would be considered the most acceptable route for a signed detour route. Since these routes include locally owned roads, permission would be needed from the Town of Barre in order to sign either of these either routes as an official detour route.

In addition to the Old Route 302 bypass and the Quarry Hill Road bypass, there are numerous local roads around the bridge that may see an increase in traffic from local passenger cars.

A map of the possible regional and local detour routes can be found in Appendix N.

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. This option would have the least impact to adjacent properties and archeological resources. This option reduces the time and cost of the project both at the development stage and construction. This is the safest traffic control option since the traveling public is removed from the construction site.

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

Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed on either the upstream or downstream side. A temporary bridge on the downstream side would have greater impacts to utilities and would require the relocation of aerial utilities and would require additional tree clearing. Additionally, there is an extensive communications site on the downstream side that would interfere with temporary bridge placement. A temporary bridge on the upstream side would have impacts to the adjacent parking lot for Crossway Motors. Additionally, this site is considered a hazardous waste Generator and soil disturbance on this side of the bridge should be limited.

If a temporary bridge is utilized, borings should be drilled at the temporary abutment locations.

Based on the daily traffic volumes and length of the bridge, a two-way temporary bridge would be recommended. A layout of the temporary bridge can be seen in the scoping plan set in Appendix O.

Advantages: A temporary bridge will maintain traffic flow through the project corridor during construction.

Disadvantages: This traffic control option would be costly and time consuming, as construction activities could require a second construction season in order to construct the temporary bridge and approaches. There would be decreased safety for workers and vehicular traffic because of cars driving near the construction site and construction vehicles entering and exiting the construction site.

Phased Construction

Another method of maintaining traffic along the corridor during construction is to build a new structure one lane at a time, or in phases. Construction activities could be phased but would have significant impacts to traffic particularly for the phase of work that requires the contractor to maintain traffic on each side of their construction operations. A bridge with an AADT of 4,800, and a DHV of 550 would require two lanes available to maintain satisfactory traffic flow. With the proposed phasing options two lanes of traffic could be maintained at all times however the bridge would need to be constructed in three phases. Additionally, the bridge would need to be 8-feet wider than needed in order to provide enough width for phased construction.

Advantages: This would maintain traffic along the existing corridor during construction.

Disadvantages: The time required to construct a phased construction project is longer than a project constructed without phasing, because some of the construction tasks have to be performed multiple times and cannot be performed concurrently. The costs of construction also increase over un-phased work because of this increase in the length of time, the additional inconvenience of working around traffic, and the effort involved in coordinating the joints between the phases. Once again, while the corridor will be open to traffic during construction, traffic will still be delayed and disrupted by the shifting of lanes and by construction vehicles and equipment entering and exiting the site. The construction workers and equipment will still be in close proximity to vehicular traffic increasing the probability of crashes and injures.

VI. Alternatives Discussion

No Action

This alternative would involve leaving the bridge in its current condition. A good rule of thumb for the "No Action" alternative is whether the bridge can stay in place without any work being performed on the bridge in the next 10 years. The existing bridge is approaching structural deficiency. The existing concrete T-Beams are soon to be in poor condition, with several of the beams having severely exposed rebar and concrete spalling. The older section of the reinforced concrete deck has cracks, leaks, and some heavy stains. In the interest of safety to the traveling public, the No Action alternative is not recommended. A cost estimate has not been provided for this alternative since there are no immediate costs.

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 would be removed and replaced.

After removing the deteriorated and loose concrete from the structure, patching materials can be placed to replace the removed concrete. A disadvantage with this method of rehabilitation in this situation, is that having newer non-chloride laced materials adjacent to the existing concrete can exacerbate the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 15 years with the addition of sacrificial anodes into the repaired structure.

Any bridge seat repairs and substructure repairs would be included for this alternative as well. All of the bridge deck 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 VT Route 110. Individual lanes may need to be closed during replacement of the joints and while a membrane and pave is occurring. Due to the high volume of traffic, lane closures would need to occur outside of the peak hour traffic.

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

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 substructure repairs as follows:

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

- 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 existing substructures are in Satisfactory condition, and it is reasonable to assume that with the repairs listed above, the existing substructure can safely carry anticipated traffic loads for an additional 40 years.

The existing lane widths and shoulders on the bridge are 12 feet and 8 feet wide respectively. This meets the minimum standard of 28 feet for safety and service and provides the minimum shoulder of 4-feet required for shared use. It is proposed that the new deck geometry matches the existing configuration for this alternative.
Advantages: This alternative would address the immediate concerns of the deck condition and would eliminate maintenance concerns with minimal cost. The effects on the adjacent properties and resources would be minimal.

Disadvantages: 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: Traffic could be maintained on an offsite detour, a temporary bridge, or with phased construction.

Alternative 3: Full Bridge Replacement ON-Alignment

A full bridge replacement would include replacing all bridge components: the deck, superstructure, railing, and substructure at the existing location and provides the full 75-year service life estimated for new bridge construction. The various considerations for this option include the roadway alignment, bridge width and length, skew, superstructure type and substructure type.

a. Alignment

The bridge is located on a straight tangent along VT Route 110. While the southern approach curve is substandard, there is a house located in close proximity to the road on the inside of the curve. Flattening the curve to meet the minimum standard at the approach would require removal of that house, and as such will not be explored further. Therefore, it is recommended that the horizontal alignment matches existing.

b. Bridge Width

The current rail to rail width is 40 feet. This exceeds the minimum standard of 28 feet. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards and match the corridor width. A rail-to-rail width of 40 feet to match the existing conditions will be proposed. This will allow for two 12-foot lanes, with 8-foot shoulders. A 5-foot sidewalk is also recommended on the south side of the bridge to match the existing configuration and future sidewalk plans.

c. Bridge Length and Skew

The existing single-span bridge has a span of 42-feet with no skew. The current bridge provides a hydraulic clearspan of approximately 37 feet. This clearspan does not meet the minimum bankfull width required for hydraulics. If a new bridge is constructed is recommended that it meet the minimum hydraulic standard and provide a minimum clear span of 42 feet. A single span bridge with an approximate 50-foot length is recommended. In order to match the existing conditions of the channel, the new bridge would not have a skew.

d. Superstructure Type

Based on the span length and skew, a Cast-in-Place concrete deck on steel beams or a new prefabricated structure could be constructed at this site. The most common prefabricated superstructure types for this span length are solid slabs, Prefabricated Bridge Units, or NEXT-beams. The superstructure type will be determined by the Design Project Manager.

e. Substructure Type

The existing abutments are spread footings bearing directly on bedrock. Additionally, bedrock is visible in the channel both upstream and downstream of the existing bridge. Based on previous projects and water well logs, identified in the geotechnical report, shallow bedrock will likely be encountered. Based on available subsurface information, the abutments will likely be spread footings bearing on bedrock. The geotechnical report recommends obtaining borings at each abutment corner if a full bridge replacement is recommended. Borings should be taken early in design stage to determine the most appropriate substructure type for the conditions present.

f. Maintenance of Traffic

The possible options for this alternative are an offsite detour, a temporary bridge, or phased construction.

V. Alternatives Summary

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

- Alternative 1a: Minor Rehabilitation with Traffic Maintained on an Offsite Detour
- Alternative 1b: Minor Rehabilitation with Traffic Maintained on a Temporary Bridge
- Alternative 1c: Minor Rehabilitation with Traffic Maintained with Phased Construction
- Alternative 2a: Superstructure Replacement with Traffic Maintained on an Offsite Detour
- Alternative 2b: Superstructure Replacement with Traffic Maintained on a Temporary Bridge
- Alternative 2c: Superstructure Replacement with Traffic Maintained with Phased Construction
- Alternative 3a: Full Bridge Replacement with Traffic Maintained on an Offsite Detour
- Alternative 3b: Full Bridge Replacement with Traffic Maintained on a Temporary Bridge
- Alternative 3c: Full Bridge Replacement with Traffic Maintained with Phased Construction

VI. Cost Matrix[1]

Barre Town BF 0169(12)		Do Nothing	Alternative 1			Alternative 2			Alternative 3		
			Minor Rehabilitation			Superstructure Replacement			Full Bridge Replacement		
			a. Offsite Detour	b. Temporary Bridge	c. Phased Construction	a. Offsite Detour	b. Temporary Bridge	c. Phased Construction	a. Offsite Detour	b. Temporary Bridge	c. Phased Construction
COST	Bridge Cost	$0	300,800	300,800	345,900	606,600	381,100	697,500	1,320,900	1,075,900	1,519,000
	Removal of Structure	$0	0	0	0	88,000	88,000	101,200	165,000	165,000	189,750
	Roadway	$0	47,000	47,000	67,000	200,000	185,000	287,000	252,000	230,000	362,000
	Maintenance of Traffic	$0	115,300	354,040	296,600	115,300	354,040	296,600	115,300	354,040	296,600
	Construction Costs	$0	463,100	701,840	709,500	1,009,900	1,008,140	1,382,300	1,853,200	1,824,940	2,367,350
	Construction Engineering & Contingencies	$0	138,930	210,552	212,850	151,485	151,221	207,345	426,236	456,235	710,205
	Accelerated Premium	$0	0	0	0	70,693	0	0	129,724	0	0
	Total Construction Costs w CEC	$0	602,030	912,392	922,350	1,232,078	1,159,361	1,589,645	2,409,160	2,281,175	3,077,555
	Preliminary Engineering[2]	$0	138,930	175,460	212,850	201,980	201,628	276,460	277,980	364,988	473,470
	Right of Way	$0	10,000	50,000	10,000	15,000	50,000	15,000	25,000	60,000	25,000
	Total Project Costs	$0	750,960	1,137,852	1,145,200	1,449,058	1,410,989	1,881,105	2,712,140	2,706,163	3,576,025
	Annualized Costs	$0	50,064	75,857	76,347	36,226	35,275	47,028	36,162	36,082	47,680
TOWN SHARE		$0	0	0	0	0	0	0	0	0	0
TOWN %		$0	0	0	0	0	0	0	0	0	0
SCHEDULEING	Project Development Duration[3]	N/A	4 years	4 years	4 years	4 years	4 years	4 years	4 years	4 years	4 years
	Construction Duration	N/A	3 months	8 months	8 months	4 months	8 months	8 months	6 months	8 months	8 months
	Closure Duration (If Applicable)	N/A	30 days	N/A	N/A	45 days	N/A	N/A	60 days	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	30'	30'	30'	30'	30'	30'	30'	30'	30'	30'
	Typical Section - Bridge (feet)	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk	12'/8' with 5.5' sidewalk
	Geometric Design Criteria	Meets Minimum Standards	Meets Minimum Standards			Meets Minimum Standards			Meets Minimum Standards		
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No	No	No	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	No Change	No Change
	Pedestrian Access	No Change	No Change	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	Substandard BFW	Substandard BFW	Meets Standard	Meets Standard	Meets Standard
	Utilities	No Change	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation	Aerial Utility Relocation
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	Yes	No	No	Yes	No	No	Yes	No	No
	Design Life[4]	<10 years	15	15	15	40	40	40	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.
[4] A design life of 40 years will be assumed for the superstructure replacement options based on the existing substructure rating of "Satisfactory". A design life of 75 years will be assumed for the Full Bridge Replacement Options.

VII. Conclusion

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

Structure:
While the substructures are in satisfactory condition, the bridge is almost 90 years old which exceeds the expected design life. Additionally, map cracking typical of alkali silica reaction (ASR) has been observed on the abutments. This type of concrete reaction is will result in a decreased design life. Additionally, the bridge does not meet the minimum standard for Bank Full Width. While the rehabilitation options have a lower upfront cost, the full bridge replacement option has a comparable annualized cost. The full bridge replacement option will address the condition of the superstructure and provide a new 75-year structure.

A new bridge would have a design life of 75 years. The proposed structure would have two 12-foot travel lanes, and 8-foot shoulders to match the existing bridge configuration. A sidewalk would also be constructed on the south side of the bridge to match existing conditions and provide continuous service linking the existing and planned sidewalk networks on either end of the bridge. This width exceeds the minimum standards for width as set forth by the Vermont State Standards. Geotechnical borings should be requested early on in the design phase to verify the substructure type. Spread Footing bearing directly on bedrock have been assumed. A minimum bank full width of 42' is required.

Traffic Maintenance:
The recommended method of traffic control is to close the bridge for 60 days and maintain traffic on an offsite detour. The official state detour route has an end-to-end distance of 63.3 miles, which is relatively long for the amount of traffic that would be detoured at this site. The Average Daily Traffic volume is 4,800 vehicles per day. It does not seem reasonable to send that volume of traffic around a detour of that length for 60 days. However, the Local Bypass Routes, as described in Appendix N could be appropriate for a signed detour route, if the Town give their permission to do so.

Local Bypass Route 1 is as follows: VT Route 110, to US Route 302, and Old Route 302 (class 3 – gravel), back to VT Route 110. This local bypass route has an end-to-end distance of 1.1 miles.

Local Bypass Route 2 is as follows: VT Route 110, to Websterville Road (class 2 – paved), Quarry Hill Road (class 2 – paved), Quarry Street (class 2 – paved), South Main Street (VT Route 14), and US Route 302, back to VT Route 110. This local bypass route has an end-to-end distance of 8.6 miles is considered appropriate for a signed detour route.

From a geometric standpoint, Local Bypass Route 2 could be considered an acceptable signed detour, pending the Town's approval. It is important that Local Bypass Route 1 remains open throughout construction for emergency services.

If the Town of Barre does not wish to have the Local Bypass Route signed, then a temporary bridge will be recommended.

The temporary bridge option with conventional construction methods only adds a 5% premium, which is relatively inexpensive. This is due to the increased costs of a pre-fabricated bridge. Additional Right-of-Way would need to be obtained in order to construct a temporary bridge.

There would be extensive impacts to utilities for construction of a downstream temporary bridge or impacts to a hazardous waste site for construction of an upstream temporary bridge. An upstream temporary bridge would also have impacts to the parking lot for Crossway Motors.

Additional Considerations:

Utilities:
Overhead and underground utilities may need to be relocated; coordination should take place early in the design phase.

Stormwater:
The project area is within a semi-developed portion of Barre where runoff is predominantly collected by curbing and closed drainage which ultimately outfalls into the Jail Branch. Any opportunity to incorporate disconnection or infiltration into the design would improve water quality.

Coordination with other projects:
There are several projects currently being developed or under construction within the project area. Coordination with the project managers of these projects should take place early on in the design phase. The projects are as follows:

- Roadway Project: BARRE CITY-BARRE TOWN MEGC M 6000(11): Reconstruction or relocation of the VT Route 14/Quarry Street intersection and Quarry Hill Road.

- Enhancement Project: BARRE TOWN STP EH06(19) WEBSTERVILLE RD/MILL ST: Construction of 657 linear feet of sidewalk along Websterville Road and Mill Street in East Barre.

- Traffic and Safety Project: BARRE TOWN STP HES 0169(8): Geometric improvements to the VT Route 110/Bianchi Street (TH-84)/Old US Route 302 (TH-125) in Barre Town.

VIII. Appendices

- A: Site Photos
- B: Town Map
- C: Bridge Inspection Report
- D: Preliminary Hydraulics Report
- E: Preliminary Geotechnical Report
- F: Resource ID Completion Memo
- G: Natural Resources Memo
- H: Archeological Memo
- I: Historic Memo
- J: Stormwater Memo
- K: Community Input
- L: Operations Input
- M: Crash Data
- N: Utility Resource Identification
- O: Detour Routes
- P: Plans

Appendix A: Site Photos

Photo 1: Looking North over Bridge 21

Photo 2: Looking South over Bridge 21

Photo 3: Looking Downstream from Bridge 21

Photo 4: Typical Concrete T-Beam Condition

Photo 5: Southern Abutment

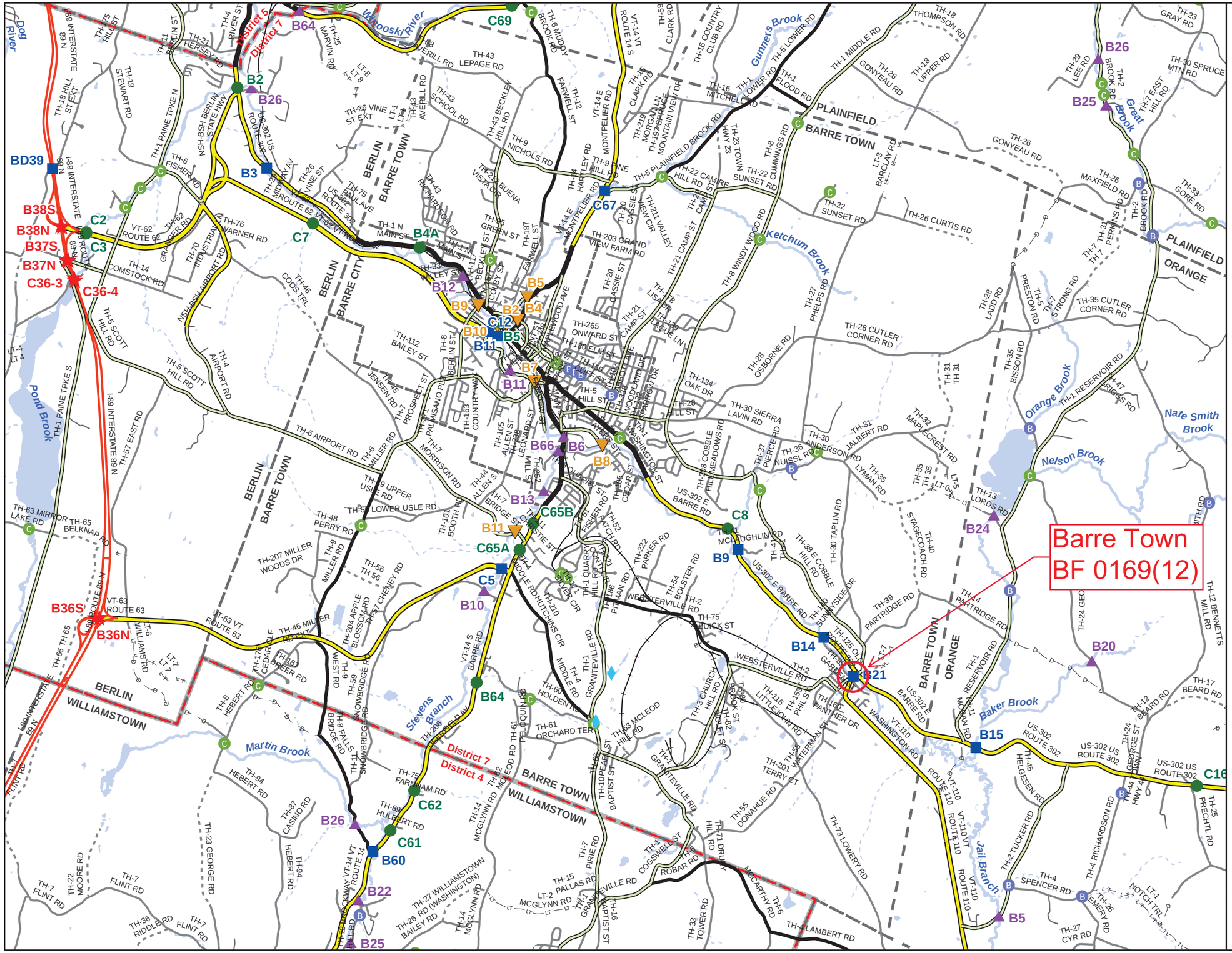
Photo 6: Northern Abutment

Photo 7: Drainage Pipe in Wingwall and Fascia Deterioration

Photo 8: Drainage Pipe in Backwall

Photo 9: T-Beam Condition at Widened Section

Appendix B: Town Map



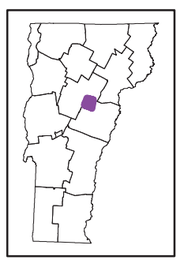
N

Scale: 1:50,670

- 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



BARRE

COUNTY-TOWN CODE: **1202-0**
WASHINGTON COUNTY
DISTRICT # 7
District Long Name: St. Johnsbury District
VTrans Four Region: Northeast

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 BARRE TOWN **bridge no.:** 00021 **District:** 7

Located on: VT 00110 ML **over** JAIL BROOK **approximately** 0.1 MI S JCT. U.S.302 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 5 FAIR

Substructure Rating: 6 SATISFACTORY

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200169002112022

Federal Sufficiency Rating: 073.2

Deficiency Status of Structure: ND

AGE and SERVICE

Year Built: 1930 **Year Reconstructed:** 1959

Service On: 5 HIGHWAY-PEDESTRIAN

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 35

ADT: 003000 **% Truck ADT:** 06

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0042

Structure Length (ft): 000044

Lt Curb/Sidewalk Width (ft): 1.5

Rt Curb/Sidewalk Width (ft): 5.5

Bridge Rdwy Width Curb-to-Curb (ft): 47.5

Deck Width Out-to-Out (ft): 50

Appr. Roadway Width (ft): 043

Skew: 06

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 CRITERIA

Deck Geometry: 9 SUPERIOR TO DESIRABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 7 SLIGHT CHANCE OF OVERTOPPING BRIDGE & ROADWAY

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 072019 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

7/9/2019 Deck soffit and T beams continue to deteriorate and recon or replacement should be considered. Southwest corner wing parapet is ready to fail and has been for a while now. West side bridge rail post cracked through some years ago and steel plates were installed vertically in front and bolted (substandard repairs). MJK MJ

7/10/2017 Deck is advancing to poor with full depth failure pending in bay 2. T beams continue to deteriorate. Structure needs extensive recon or replacement. MJK AC

06/30/2017 - Bridge will be inspected in July to optimize scheduling sequence with other bridges on same route. ~ MJ

06/11/2015 - Bridge is in fair condition and should be considered for a major reconstruction with new deck and superstructure. Potential full depth holes thru the deteriorated deck could start to form in a few years. Abutments are quite sound and could be retained. ~ MJ/JS/TB

07/30/2013 - Deck and superstructure have some advanced deterioration. Bridge should be scheduled for reconstruction within the next 5 to 10 years. *

Appendix D: Preliminary Hydraulics Report

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

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

Agency of Transportation

TO: Laura Stone, Structures, Scoping Engineer

CC: Nick Wark, Hydraulics Engineer

FROM: Jeff DeGraff, Hydraulics Project Engineer

DATE: October 1, 2019

SUBJECT: Barre Town BF 0169(12), pin #12c576
Barre Town, VT-110 Br21, over Jail Branch
Site location: Barre Town,VT-110, Washington Road, MM 1.08
Coordinates: 44.160590, -72.449063

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

Aquaveo's Surface-water Modeling System (SMS) in conjunction with United States Bureau of Reclamation's (USBR) Two-Dimensional Hydrodynamic Model, SRH-2D was utilized for hydraulic modeling.

Design Storm Flow is 2% AEP (Q50).

All freeboard reported within this memo used an average low beam elevation of 1083.6 feet. Note that the freeboard reported within this memo should be used for general purposes. The superstructure's depth for each alternative may change with respect to structure type, abutment skew, pier configuration and etc.

The following option was analyzed:

Option 1: 37-foot Clear Span (Similar to Existing)

- There is approximately 7.4-feet of freeboard at the design AEP
- Does not increase the 100-year base flood elevations
- Assumes no changes to the substructure, such as abutment skew

The existing abutments appears to be casted on ledge and doesn't appear to be erodible. With that said, scour is not a concern for this site at this time. If the subsurface conditions appear to have significantly changed due to abutment skew and location. Coordinate with the Hydraulics Unit to perform a detailed scour analysis during final hydraulics.

The Jail Branch VT-100 Crossing is located within a FEMA Special Flood Hazard Area (SFHA) Zone AE with Base Flood Elevations.

Currently, Option 1 does not encroach the existing floodplain, but this option does not account for proposed fill slopes and/or roadway realignment. A Flood Hazard Area & River Corridor Rule (FHA&RC) General Permit may be required depending final design. Furthermore, this analysis did include any temporary impacts associated with construction fill and/or a temporary bridge.

Bankfull width requirements at this site have not been confirmed with ANR. A slightly longer span may be required. If a longer span is required, we estimate it would be approximately 42 feet. We recommend that the east abutment to be relocated while maintaining the west abutment's existing location.

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

Appendix E: Preliminary Geotechnical Report

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

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

KBY IPD

From: Kara Yelinek, Geotechnical Engineer, via Ian Donovan, Senior Geotechnical Engineer

Date: October 5, 2018

Subject: Barre Town BF 0169(12) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the subject project at Bridge No. 21 on VT Route 110 in Barre Town, VT, which crosses over the Jail Brook. The existing structure is a single span, concrete T-beam bridge. The potential scope of the subject project includes replacement or major rehabilitation of the superstructure as well as a full bridge replacement. This review included the examination of as-built record plans, historical in-house bridge boring files, water well logs and hazardous site information on file at the Vermont Agency of Natural Resources (ANR), published surficial and bedrock geologic maps, and observations made during a site visit.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Original construction of the bridge occurred in 1930, followed by additional construction to widen the bridge in 1959. A review of as-built plans showed that during the 1930 construction, the new concrete block abutments and wingwalls were matched into existing masonry wingwalls. Remnants of these original walls are still present in the project area. In 1959 during bridge widening, as-built plans show that new concrete abutments were matched into the existing granite masonry abutments. No boring logs were found for either project at this location.

New reinforced concrete footings were poured for the original granite masonry abutments when the bridge was widened. The footings bear directly on bedrock with bottom elevations (El.) ranging from El. 1075.5 feet (ft) to 1071.5 ft. The spread footings on the new abutments constructed in 1959 also bear directly on bedrock and have bottom elevations ranging from 1072.5 ft to 1071.5 ft. The ground surface elevation was provided as based on a 126.5 datum line per the 1959 record plans.

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. This database contains no recent borings within an informative radius from the subject project.

2.2 Water Well Logs

The ANR documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, these logs may provide general characteristics of soil strata in the area. The closest recorded water well is located approximately 290 ft south of the bridge location and the well report listed a depth to bedrock of approximately 39 ft.

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Natural Resource Atlas also maps the location and information of known hazardous waste sites and underground storage tanks. There are three hazardous waste sites within 0.5 miles of the project area and two hazardous waste generating sites (Figure 2.1). Two parcels of land to the northwest of this project site are hazardous waste sites (Site 1 and 2). Sources of contamination are gasoline, waste oil, and other petroleum from former and existing gas stations. There are also three active underground storage tanks at the Citgo/Jiffy Mart to the Northwest of the bridge that contain diesel, gasoline, and kerosene (Site 1). This parcel is also classified as a Hazardous Waste Generator.

A third contaminated site south of the bridge on VT-110N, the Town of Barre Fire Department Solomon Station (former Whitcomb garage), also has gasoline contaminated soils present. (*Note:* The UST shown at site 3 is located incorrectly on the Atlas, per VT DEC 9/7/18 and its true location is not adjacent to this project.) The tank shown immediately to the south of the bridge has been pulled and is no longer present at the site according the VT DEC.

Site 4 is a Hazardous Waste Generator site located about 600 ft south on VT 110 from Bridge 21.

2.4 Published Geoglogic Data

Mapping conducted in 1970 for the Surficial Geologic map of Vermont shows that the project area consists of glacial till (Doll, 1970).

According to the 2012 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project site is underlain with phyllite, limestone, and quartzite of the Waits River Formation (Ratliffe, et. al, 2011).

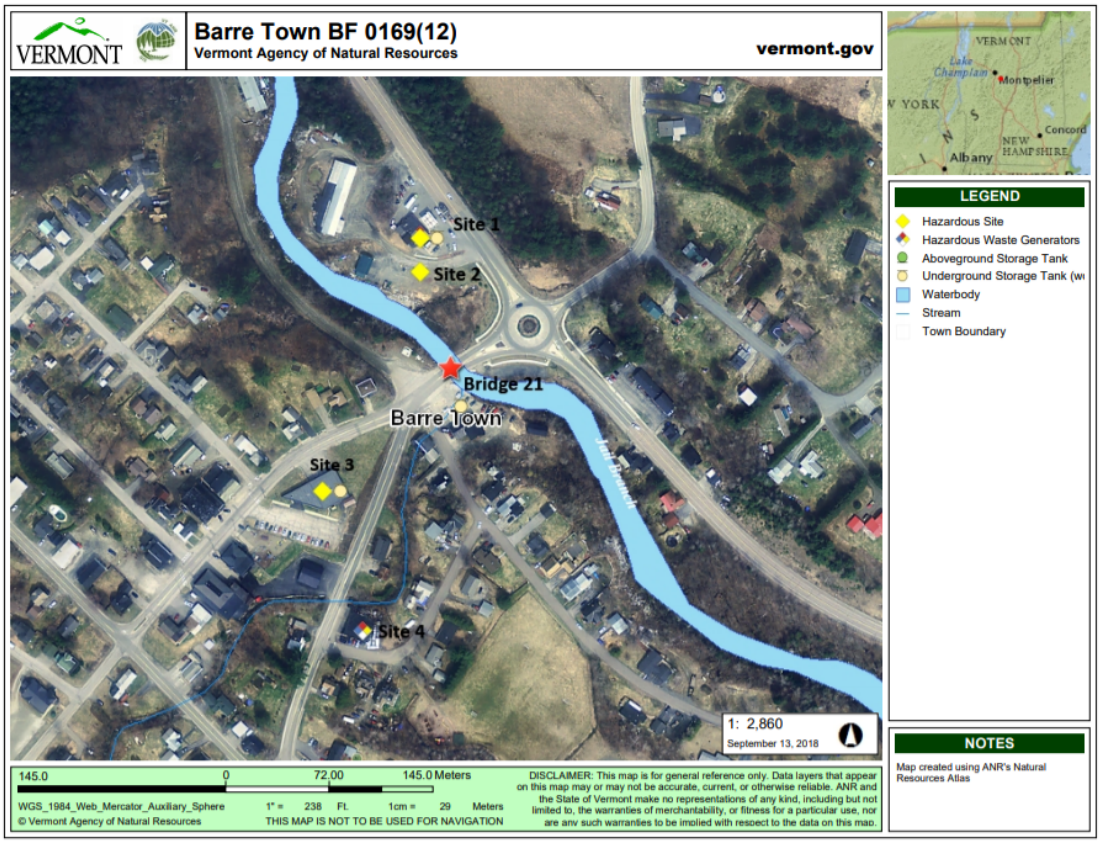


Figure 2.1: Map displaying hazardous waste sites near Bridge 21.

3.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on September 18, 2018 to assess possible obstructions inhibiting boring operations and to make any other pertinent observations about the project. The bridge rests on a combination of abutments consisting of cement block and concrete founded on spread footings.

Both abutments appear to be on spread footings founded on bedrock. The eastern abutment and its foundation can be seen in Figure 3.1. There was no apparent scour or undermining at either abutment. Figure 3.2 shows the original abutments from initial construction and later widening.

There are large boulders and exposed bedrock in the brook which can be seen in Figure 3.3. There are overhead utilities on the west (downstream) side of the bridge, as well as a fire hydrant in the southwest corner of the project area. These are shown in Figure 3.4. There are two storm drains in the shoulder of the northbound lane near the northeast corner of the bridge shown in Figure 3.5. Record plans from 1959 indicate a water main crossed beneath the bridge in what is now the southbound lane toward East Barre. The location of this pipe should be verified and considered when selecting boring locations. VT-110 enters a roundabout at US Route 302 approximately 100 ft north of the bridge. Due to proximity to US-302 and the roundabout, traffic control will be required during drilling.

Figure 3.1. Northern abutment of the bridge founded on bedrock. No undermining or significant scour was observed.

Figure 3.2: View of southern abutment. Abutments constructed in 1930 and 1959 are founded on spread footings. The abutment consisting of granite block is the original 1930s construction, the leftmost portion of the abutment in this photo.

Figure 3.3: View of downstream. Bedrock is visible in streambed both upstream and downstream.

Figure 3.4: Fire hydrant and utility poles and boxes at the southwest corner of the bridge. Inset photo provides closer look at hydrant location.

Figure 3.5: Storm drains in northbound shoulder approaching the roundabout.

4.0 PRELIMINARY FOUNDATION ALTERNATIVES

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

- Reinforced concrete abutments on spread footings
- Integral and/or semi-integral abutments founded on spread footings
- Reinforced concrete box culvert with new headwalls and wingwalls

5.0 PROPOSED SUBSURFACE INVESTIGATION

Once a preliminary alignment for the replacement bridge is chosen, we recommend a minimum of one boring be taken for each abutment to more fully assess the subsurface conditions at the site including, but not limited to, bedrock conditions, the soil properties, and groundwater conditions. If the depth to bedrock varies across either abutment, additional borings may be required to better profile the bedrock surface.

6.0 CLOSING

When a design alternative and a preliminary alignment has been chosen, the Geotechnical Engineering Section should be contacted to help design an appropriate subsurface investigation for the proposed alignment and foundation type.

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

7.0 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 9/14/2017.

cc: Electronic Read File
Project File/CEE
KBY

Appendix F: Resource ID Completion Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Nick Wark, Project Manager
FROM: Julie Ann Held, Environmental Specialist (802)917-4319
DATE: October 22, 2018
Project: **Barre Town BF 0169(12)**

ENVIRONMENTAL RESOURCES:

Archaeological Site:	X Yes	____ No	See Archaeological Resource ID Memo Issued: 10/08/2018
Historic/Historic District:	X Yes	____ No	See Historic Resource ID Memo Issued: 10/22/2018
4(f) Property:	X Yes	____ No	
Wetlands:	____ Yes	X No	See Natural Resource ID Memo Issued: 10/01/2018
Agricultural Land:	____ Yes	X No	
Fish & Wildlife Habitat:	____ Yes	X No	
Wildlife Habitat Connectivity:	____ Yes	X No	
Endangered Species:	X Yes	____ No	northern long-eared bat; See Natural Resource ID Memo Issued: 10/01/2018
Stormwater:	____ Yes	X No	
6(f) Property:	____ Yes	X No	
Hazardous Waste:	____ Yes	X No	Per ANR Atlas Mapping on 08/17/2018
Contaminated Soils:	X Yes	____ No	This project is located within a designated Urban Soils Background Area, Contaminated soils may be present. Coordination with Andy Shively is recommended.
USDA-Forest Service Lands:	____ Yes	X No	
Scenic Highway/Byway:	____ Yes	X No	
Act 250 Permits:	____ Yes	X No	ANR Atlas Mapped 08/17/2018
FEMA Floodplains:	X Yes	____ No	
Flood Hazard Area/ River Corridor:	X Yes	____ No	This project is within a Type A Flood Hazard area, and a River Corridor, depending on the scope of work a FHARC Permit may be required.
US Coast Guard:	____ Yes	X No	
Lakes and Ponds:	____ Yes	X No	
Environmental Justice:	____ Yes	X No	
303D List/ Class A Water/ Outstanding Resource Water:	____ Yes	X No	ANR Atlas Mapped 08/17/2018
Source Protection Area:	____ Yes	X No	
Public Water Sources/ Private Wells:	____ Yes	X No	
Other:	X Yes	____ No	Natural resource permitting that may be required, depending on scope, are USCOE and ANR Water Quality related permits.

cc:
Project File

Appendix G: Natural Resources Memo

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

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

Agency of Transportation

To: Julie Ann Held, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Senior Biologist

Date: 10/1/2018

Subject: Barre Town 0169 (12) - Natural Resource ID

I have reviewed the project area for Barre Town 0169 (12), bridge 21 on VT 110, for presence of natural resources (figure 1). My review encompasses 100 feet on the approaches and 50 feet upstream and downstream of the existing bridge location. My evaluation has included the following resources: wetlands and waterways, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed existing mapping (ANR Natural Resource Atlas and NRCS Soils), and imagery to capture natural resource presence. I have completed a field visit for reconnaissance.

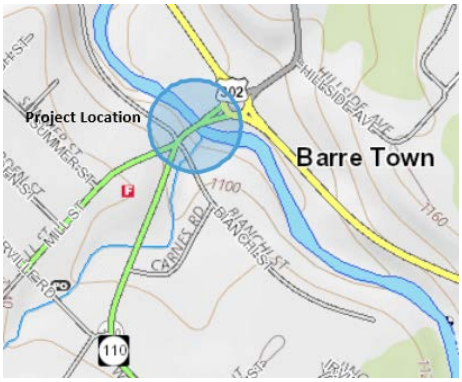


Figure 1Project Location

Wetlands
I have reviewed the project area for wetland presence by examining soils, vegetation and hydrology indicators according to US COE Methodologies. No wetlands were discovered.

Watercourses

Figure 2 Jail Branch downstream of bridge

The bridge crosses the Jail Branch at this location (figure 2). This river is a direct tributary to the Winooski River and flows northwesterly through the project area. The river is regulated by the US COE and the VT ANR. The ordinary high water mark is the regulatory boundary.

Wildlife Habitat
Terrestrial and aquatic habitat are likely to pass within the stream and the riparian corridor through the project area. The banks of the stream have been armoured with granite blocks through this project area confining the stream. Limited oppurtunities exist for terrestrial species due to site constraints; aquatic wildlife could potentially move upstream along this corridor although they are limited as well, as there is a dam obstructing movent roughly 50 feet downstream of the existing structure.

Rare, Threatened and Endangered Species (R/T/E):
According to the ANR Natural Resource mapping there are no known occurrences of rare, threatened or endangered species within proximity of the project study area.

The project is within the northern long-eared bat, *Myotis septentrionalis* (state endangered, federally T) range. No documented roosts or hibernacula are within 1 mile of the project area. Potential suitable habitat for this species varies. Typically, suitable habitat consists of trees (dead or alive) ≥ 3” dbh that exhibit cracking,

peeling bark, holes, crevices, and bridges, etc. There is adjacent potential suitable habitat along the riparian corridor. The bridge itself did not have many opportunities for roosting bats. Once project plans are developed and the amount of tree cutting is determined we can further assess what needs to be completed for studies to determine effect on this species.

Agricultural Soils
According to NRCS soils mapping on the ANR Natural Resource Atlas, Buckland loam are mapped which are prime agricultural soils. Much of the area that is mapped has been developed by commercial/residential properties.

Summary
In summary, this project area has a regulated waterway, and the project is within northern long-eared bat habitat range. Natural resource permitting that may be required, depending on scope are USCOE and ANR Water Quality related permits.

Cc

Natural Resource Environmental File

Barre Town 0169(12)

Vermont Agency of Natural Resources

vermont.gov

LEGEND

- Wetland Projects
- Wetland - VSWI
  - Class 1 Wetland
  - Class 2 Wetland
  - Buffer
- Wetlands Advisory Layer
- Hazard Class
  - High Hazard Potential
  - Significant Hazard Potential
  - Low Hazard Potential
  - Undetermined Hazard Potential
- Historical Dam Location
- Roads
  - Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Stream
- Town Boundary

NOTES

Wetlands\Watercourse
Dams

261.0 0 130.00 261.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 428 Ft. 1cm = 51 Meters

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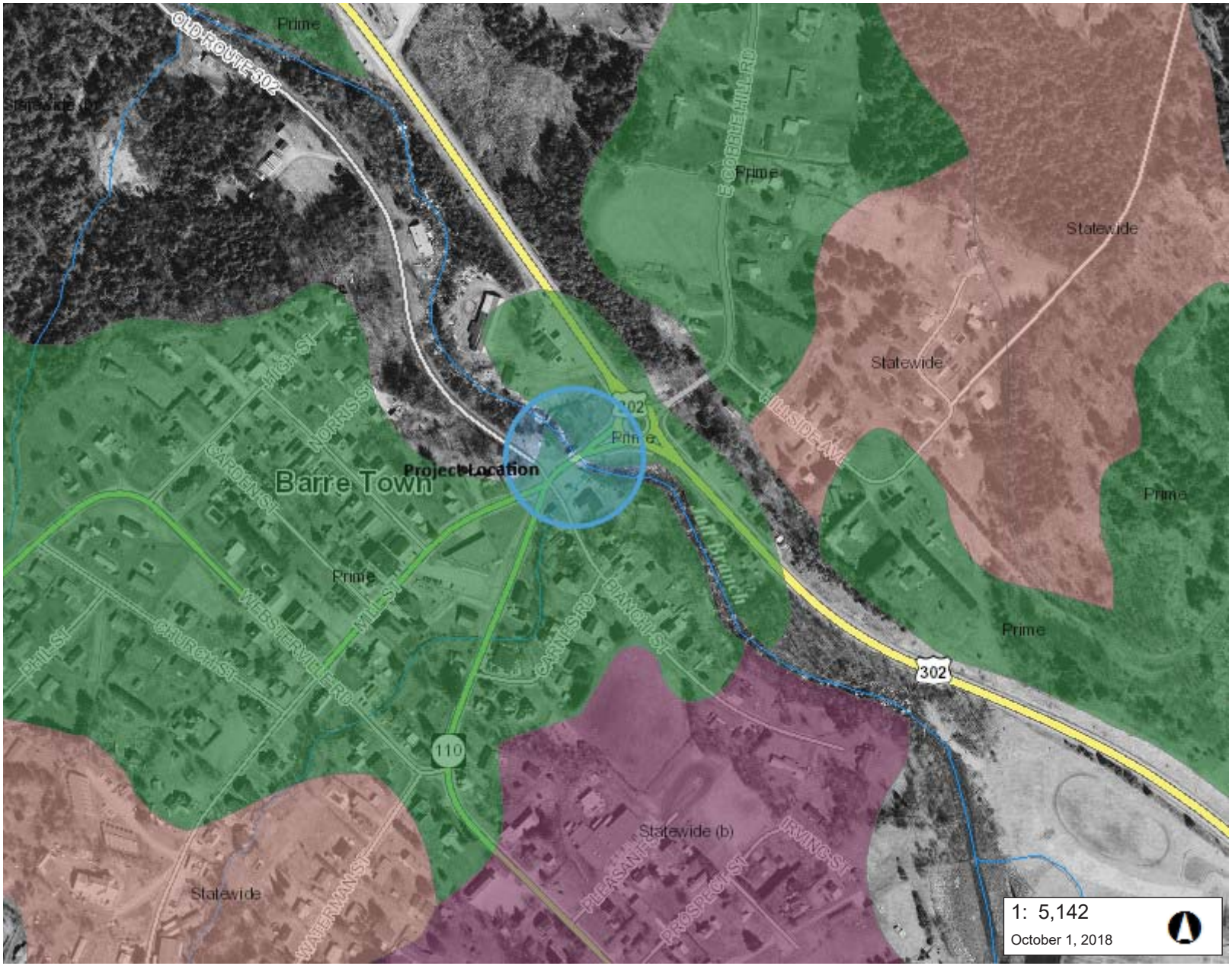
Barre Town 0169(12)

Vermont Agency of Natural Resources

vermont.gov



LEGEND

Soils - Prime Agricultural

- Local
- Local (b)
- Not rated
- Prime
- Prime (b)
- Prime (f)
- Statewide
- Statewide (a)
- Statewide (b)
- Statewide (c)

Roads

- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification S

Stream

Town Boundary

NOTES

Prime AG Soils

261.0 0 130.00 261.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 428 Ft. 1cm = 51 Meters

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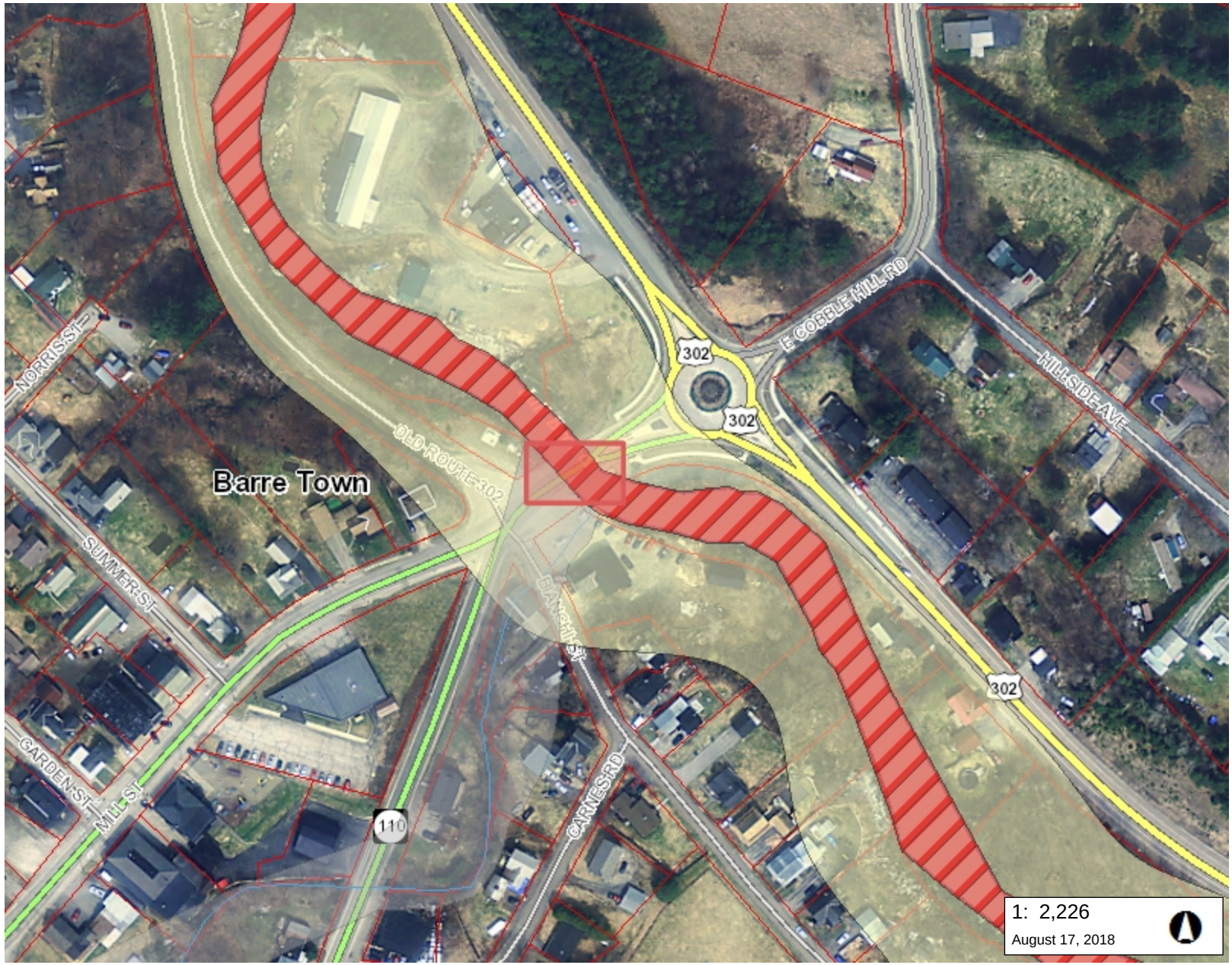
Floodway/Flood Hazard Area

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- DFIRM Floodways
- Flood Hazard Areas (Only FEM
  - AE (1-percent annual chance floodp
  - A (1-percent annual chance floodpl
  - AO (1-percent annual chance zone feet)
  - 0.2-percent annual chance flood ha
- River Corridors (Jan 2, 2015)
- Parcels (Standardized)
- Roads
  - Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Waterbody
- Stream
- Parcels (Non-Standardized)
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

113.0 0 56.00 113.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 186 Ft. 1cm = 22 Meters

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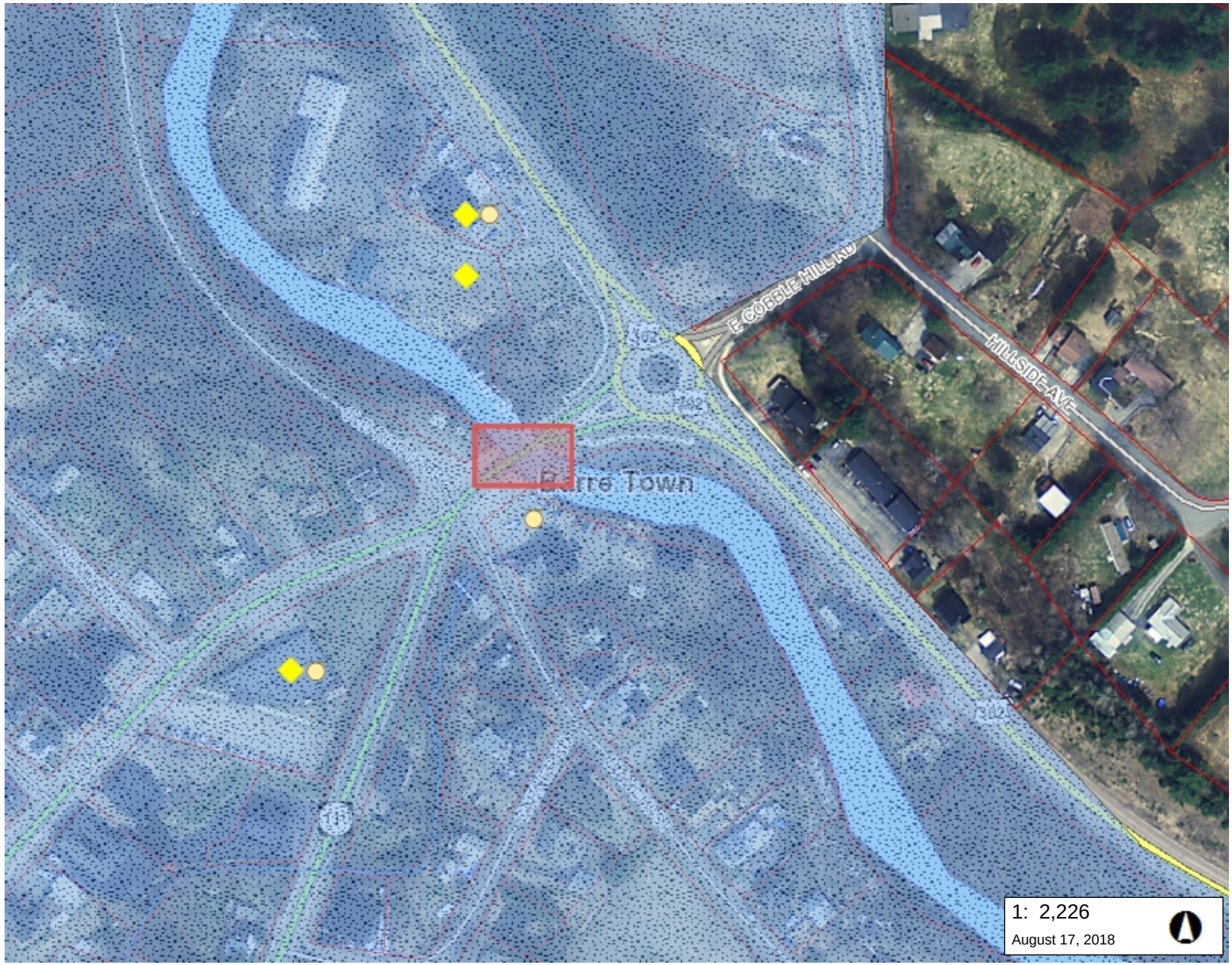
Urban Background Soils

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- Hazardous Site
- Brownfields
- Aboveground Storage Tank
- Underground Storage Tank (w
- Urban Soil Background Areas
- Parcels (Standardized)
- Roads
  - Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Waterbody
- Stream
- Parcels (Non-Standardized)
- Downtown District Boundaries
- Neighborhood Development Ar
- Growth Center Boundaries
- Village Boundaries
- New Town Center Boundaries
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

113.0 0 56.00 113.0 Meters

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Appendix H: Archeological Memo

VERMONT

Jeannine Russell
VTrans Archaeology Officer
State of Vermont
Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
802-477-3460 phone
Jeannine.russell@vermont.gov

Agency of Transportation

To: JulieAnn Held, Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer

Date: October 8, 2018

Subject: Barre Town BF 0169(12) – Archaeological Resource ID

VTrans has requested a resource ID for Bridge 21 in Barre Town located on VT 110 at the intersection of VT 110 and US 302. The scope is yet to be defined so the VTrans Archaeology Officer conducted background research and a site visit and considered an area approximately 200 feet in circumference around the existing bridge considering that as the preliminary area of potential effect for the purposes of the resource ID.

The project area sits at the confluence of an unnamed stream and Jail Branch which turns into Stevens Branch as it heads north toward Barre City. There is a large wetland complex approximately ½ mile east of the project location and this location can also be considered a natural travel corridor. These indicators would suggest that this location is sensitive for Native American sites. However, the immediate project area consists of steep slopes on all sides where the area has been built up since the 1800's. Saw mills were located directly adjacent to the bridge as indicated on the attached Beers map. Other historic structures are also noted within the general project area.

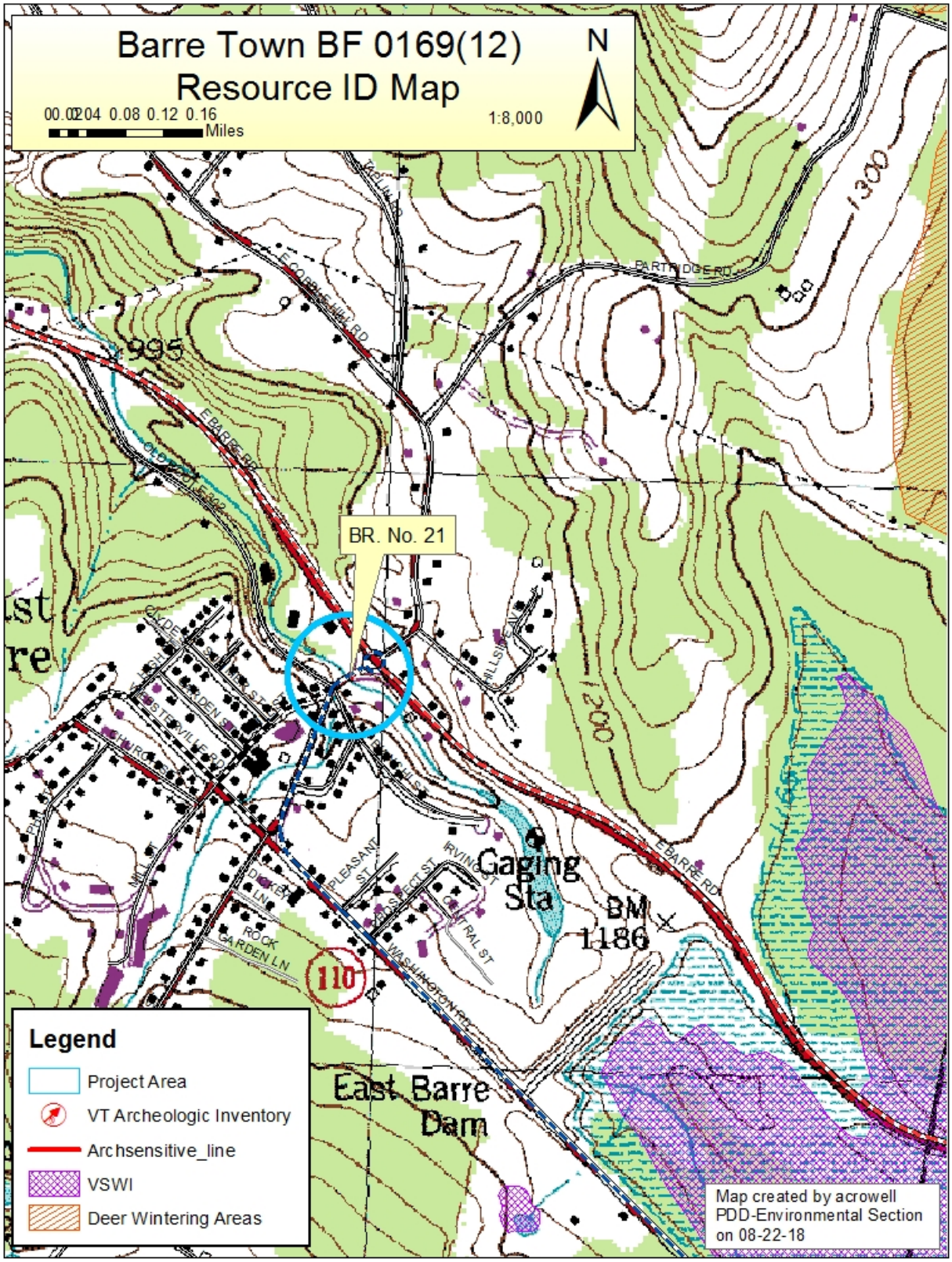
The Vtrans Archaeology Officer conducted a site visit on 9-13-18 and noted that the southwestern quadrant consists of commercial development and fill along the river's edge. A retaining wall exists along the bank. The southeastern quadrant consists of a pull-off and steep bank between the recently constructed roundabout and US 302 heading east. The northwestern quadrant that contained the mill now consists of fill along a steep bank with an electrical station. Mill remains are noted further to the north and it is likely these will be outside the project area but are noted as areas to avoid. Mill remains are also noted in the northeastern quadrant as are dam remains. Again, the mill remains are further to the north and should be able to be easily avoided during the project depending on the scope but have been noted as areas to avoid.

Please let me know if you have any questions and a formal review under Section 106 will take place once plans are ready.

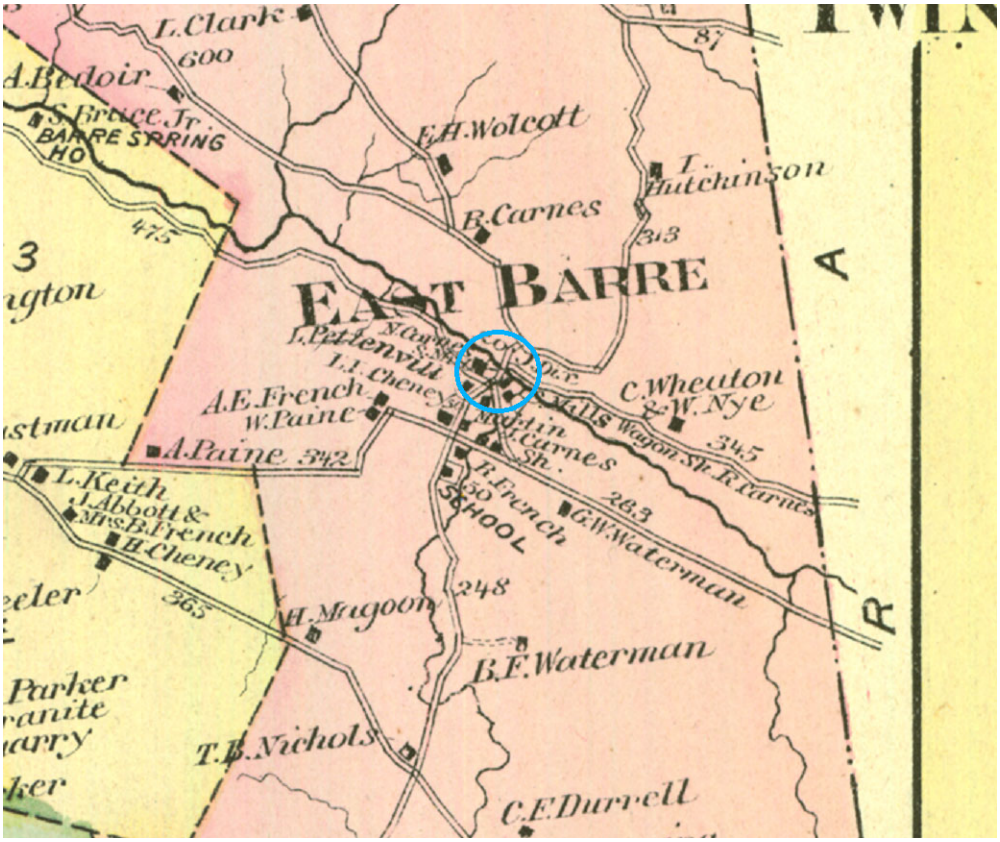
J Russell

Thank you,
Jen Russell
VTrans Archaeology Officer

VTrans Working to Get You There
Vermont Agency of Transportation



Project Location

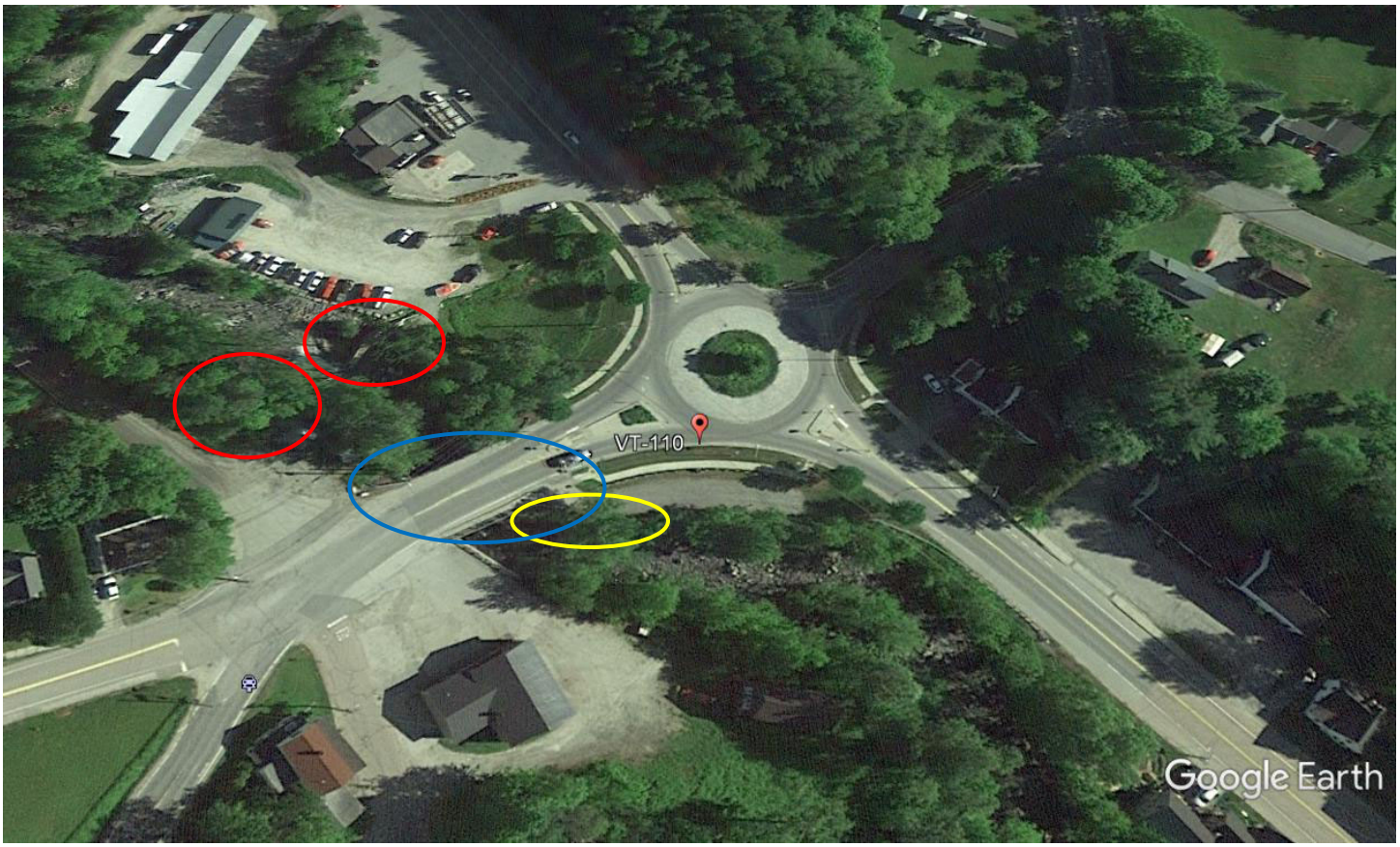


Beers map showing project location and adjacent mill sites and other historic development

Mill remains in northeastern quadrant (note dam remains also)

Image showing stone retaining wall along southeastern quadrant.

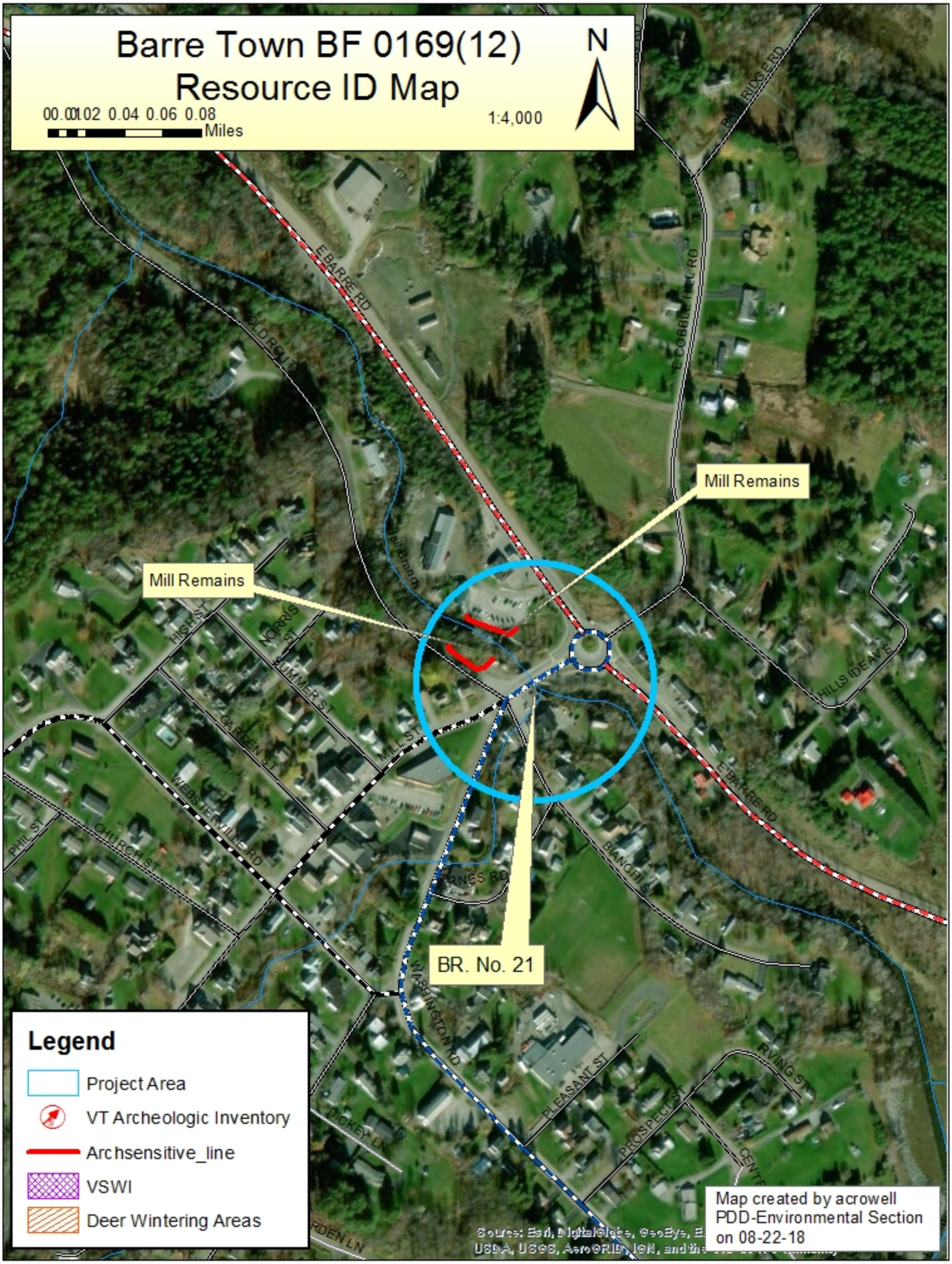
Mill remains in northwest quadrant



Google aerial image of project area. Mill remains in red, stone retaining wall in yellow, bridge in blue.

Google street view facing east. Note disturbance to the left and disturbance on the right from gas station.

Google image facing west. Note parking area far left.


Barre Town BF 0169(12)
Resource ID Map
N
0 0.01 0.02 0.04 0.06 0.08
Miles
1:4,000
Mill Remains
Mill Remains
BR. No. 21
E BARRE RD
OLD ROUTE
E COBBLE HILL RD
PINE RIDGE RD
HIGH ST
NORRIS ST
SUMMER ST
GARDEN ST
MILL ST
WEBSTERVILLE RD
CHURCH ST
PHIL ST
HILLSIDE AVE
BLANCHARD
WASHINGTON RD
PLEASANT ST
PROSPECT ST
IRVING ST
DICKEY LN
Legend
Project Area
VT Archeologic Inventory
Archsensitive_line
VSWI
Deer Wintering Areas
Map created by acrowell
PDD-Environmental Section
on 08-22-18

Appendix I: Historic Memo

VERMONT

Vermont Agency of Transportation
Project Delivery Bureau - Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
Tel: 802.828.1708

To: JulieAnn Held, Environmental Specialist Supervisor

From: Judith Williams Ehrlich, VTrans Historic Preservation Officer

Date: October 22, 2018

Subject: Historic Resource Identification for Barre Town BF 1069(12)

I have completed a resource identification (ID) for Barre Town BF 0169(12). At this time, the project is expected to include the replacement of Bridge No. 21 on VT 110. The full project scope has yet to be defined.

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.

VTrans Historic Preservation Staff conducted background and desk review to assess the project's historic sensitivity by consulting VTrans records and the Vermont Division for Historic Preservation Online Resource Center. According to the Vermont Bridge Inspection Reports, a crossing in the location of Bridge No. 21 was first established in 1930 and the current bridge was constructed in 1959. The design of the original bridge built is unknown. The extant bridge is a 44-foot long, single span, Concrete T-Beam bridge with a cast-in-place concrete deck located at the intersection of VT Rt. 302 and VT Rt. 110. The bridge carries VT 110 over Jail Branch, which confluences with an intermittent stream to the south of the project. Steel-tube bridge railings are installed on either side of the bridge, with W-beam approach railings in quadrants A-C (see below). W-beam runs parallel to the river in quadrant D. There is one sidewalk on the north side of the bridge. The abutments appear to be a mix of the original 1930 stone abutments surrounded and surmounted by concrete for the larger 1959/extant bridge. There is an outlet of a corrugated metal pipe drainage culvert in the wingwall at quadrant A that drains into the river (see below).

VTrans identified four structures and/or buildings within the preliminary Area of Potential Effect:

1. Bridge No. 21:
   VTrans reviewed the Registration Requirements listed in the draft *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820 – 1978* and determined that Bridge No. 21 does not meet the requirements listed therein to be considered historic. VTrans therefore determined that Bridge No. 21 in East Barre is not eligible for listing on the National Register of Historic Places under Criteria for Evaluation A or C per the Registration Requirements detailed below:

   - Criteria A:
     1. Bridge No. 21 is not the first bridge at this location;

2. Did not establish a new transportation corridor nor was the direct cause of significant development or changes in land use; and
3. Was not built as part of a major state highway project or bridge building initiative, and does not possess special characteristics, associates, or integrity that distinguishes it as an exceptional representative of a type.

- Criteria C:
  1. Bridge No. 21 is not an early example of a Simple Span Concrete Bridge;
  2. Is not a rare survivor of this type of bridge;
  3. Is not an exceptional example of work;
  4. Is not an innovative design;
  5. Is not considered to be an exceptional length; and
  6. Is not considered aesthetically important.

The project is in the northeastern section of the East Barre Historic District, which was listed on the Vermont State Register in 1990 (see below). Bridge No. 21 is not discussed in the description of the district. There are no buildings in project quadrants A, B and C (see below). After reviewing the National and State Registers of Historic Places, VTrans Historic Preservation Staff have determined the following regarding buildings located in quadrant D (see below):

2. Residential building built in 1890 with minimal surrounding property. It lies 70m from project location. This is resource #93 in the 1986 Historic Sites and Structures Survey ("survey") and the related survey form for the building notes, " 1%-story, 2-bay small scale, square structure with mansard roof; 2-story wing with entry bay (c.1930); small structure squeezed onto a small lot; heavily altered fenestration; Non-contributing due to alteration."

   VTrans has determined that the building has changed minimally since 1980 and is still not considered historic.

3. A1 ½ story gable barn/storage built in 1900 with a gable roof and clapboard exterior. It lies 57m. from project location. This is resource #94 in the 1986 survey and the related survey form for the building notes, "1%-story, 1 x 3 bay, vernacular gable front barn; gable roof, granite foundation and clapboard exterior; 1/1 and 6/6 sash with plain surrounds and drip molds; four section folding door with four lights above 2 vertical panels; plain frieze, corner boards with molding; 2 sash windows in gable."

   VTrans has determined that the building has changed minimally since 1980 and is still considered historic.

4. Modern service station built in 1960. This station has extended to include Crossway Auto Center since the State Register census of Barre in 1985. This is resource #94A in the 1986 survey and the related form for the building notes, "Modern service station; built 1960; Non-contributing due to age. Barn formerly used as storage."

   VTrans evaluated whether the service station is eligible for listing on the National Register of Historic Places as it is now over fifty years of age. The service station is a contemporary wood-frame building with a gable-front garage bay and ell that contains the main entrance to the building along the front facing eaves side. The building is covered in T1-11 siding and has fixed storefront windows and a standing seam metal roof. As the building displays common materials, design, and construction, VTrans has determined that is not historic as it does not possess any qualities of significance necessary for inclusion in the National Register of Historic Places individually or as a contributing resource to an existing or potential historic district under any applicable evaluation criteria.

Conclusion:
The four buildings and/or structures in the preliminary Area of Potential Effect and their historic determination are noted below:

1. **Bridge No. 21 – Not Historic**
2. **Residential Building #93 – Not Historic**
3. **Barn/Storage Building #94 – Historic**
4. **Service Station #94A – Not Historic**

The Barn/Storage Building should be avoided during construction.

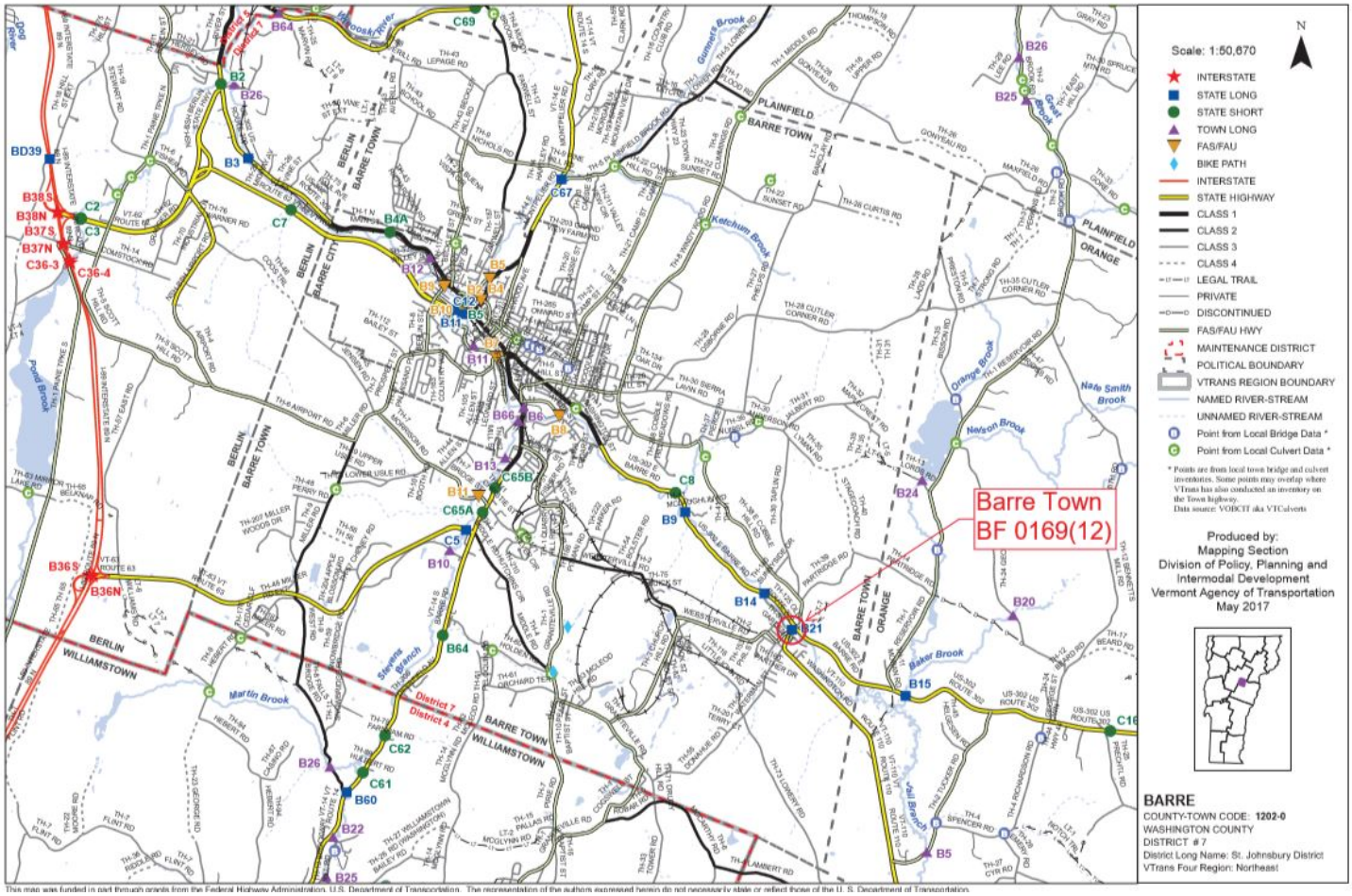
If the project area expands from what was evaluated for this resource ID, please contact me so I can evaluate any additional buildings in the expanded Area of Potential Effect.

Alexandria Crowell assisted with research for this resource identification effort.

Please do not hesitate to contact me should you require additional information.

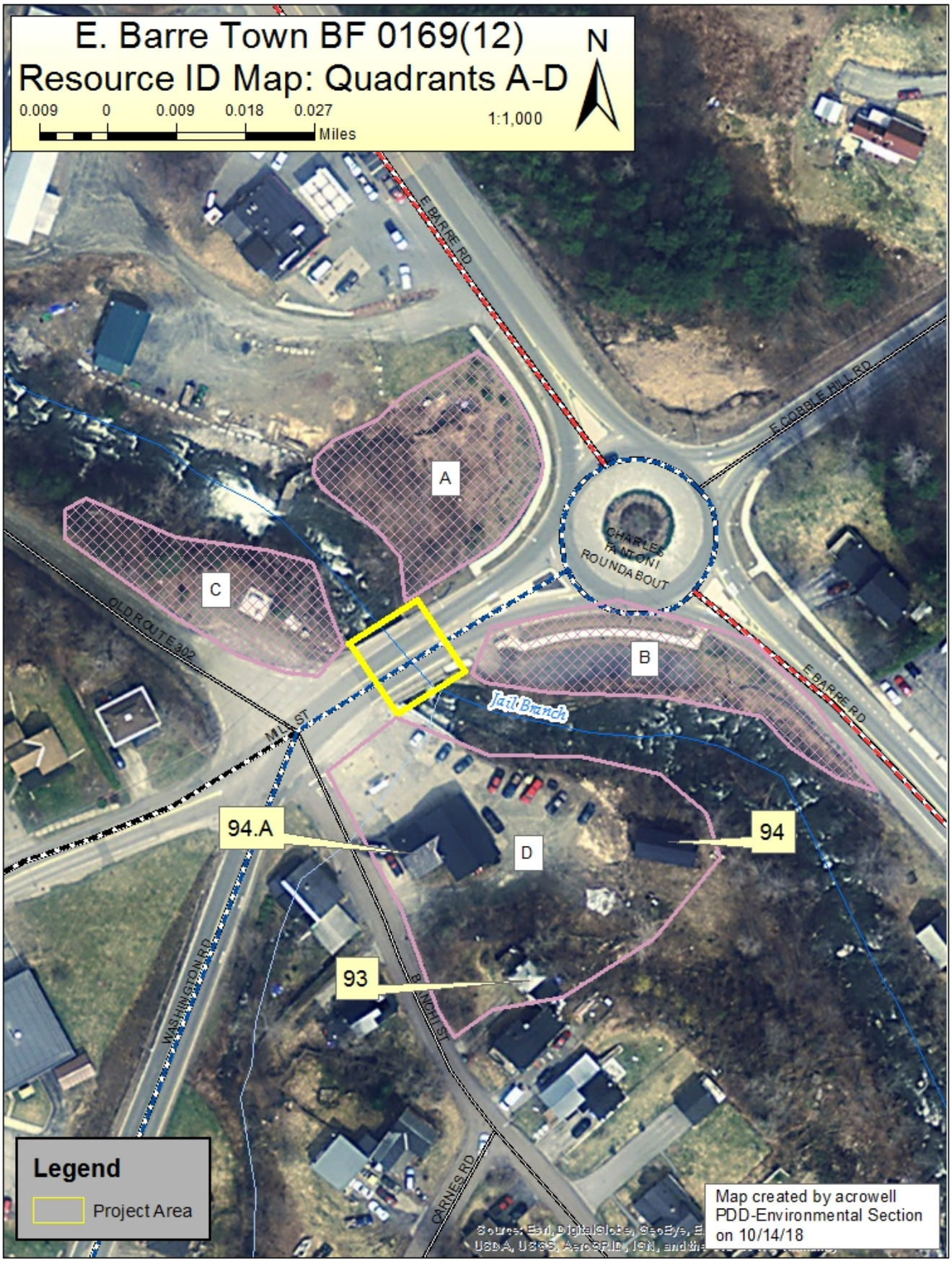
Attachments—

- Map
- Site Plan
- Photos

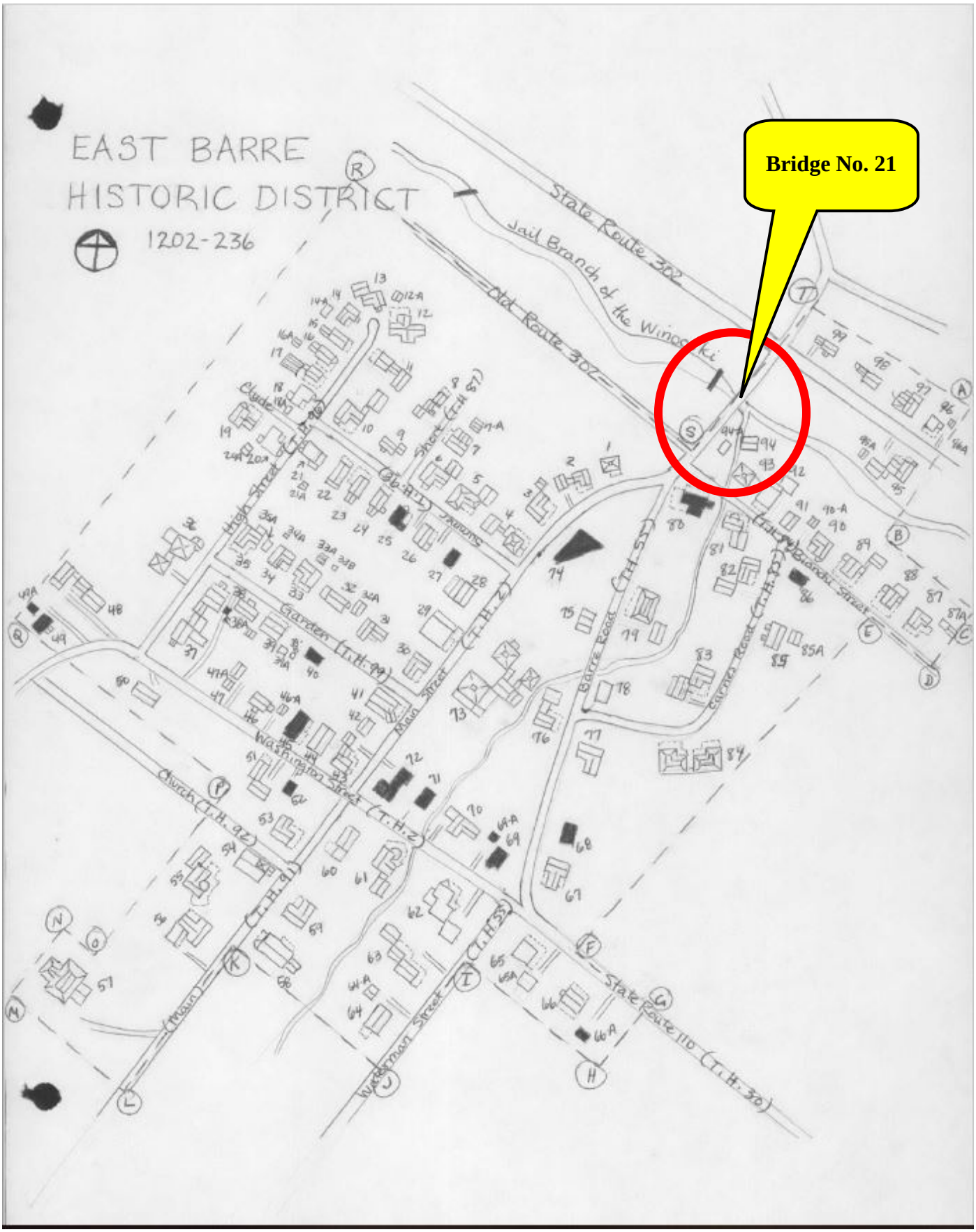


Project location.

Detailed view of surrounding area and project proximity to Barre Town and Orange Town border.



Resource ID Map illustrating project location, quadrants A-D, and HSSS properties 93, 94, & 94.A as described in the State Register of Historic Places.



Map of East Barre Historic District, 1986. Preliminary Area of Potential Effect noted in red.

Project location noted in blue and historic properties #93, 94 & 94.A according to the East Barre Historic District State Register listing.

Image of bridge no. 12 facing northwest towards Rt. 302. Guardrails and W-beams visible.

Image of bridge no. 12 facing southeast down Rt. 110. Bridge and approach railings visible.

Bridge abutment

Image of drainage culvert and concrete deterioration on bridge..

Survey property #93 (at rear). Image from Google Earth.

Image of survey property #94 from entrance at Bianchi Street.

Image of rear elevation of Survey Property #94 from Rt. 302.

Image of Survey property #94.A from intersection of VT Rt. 110 and Bianchi Street.

Appendix J: Stormwater Memo

State of Vermont
Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

Agency of Transportation

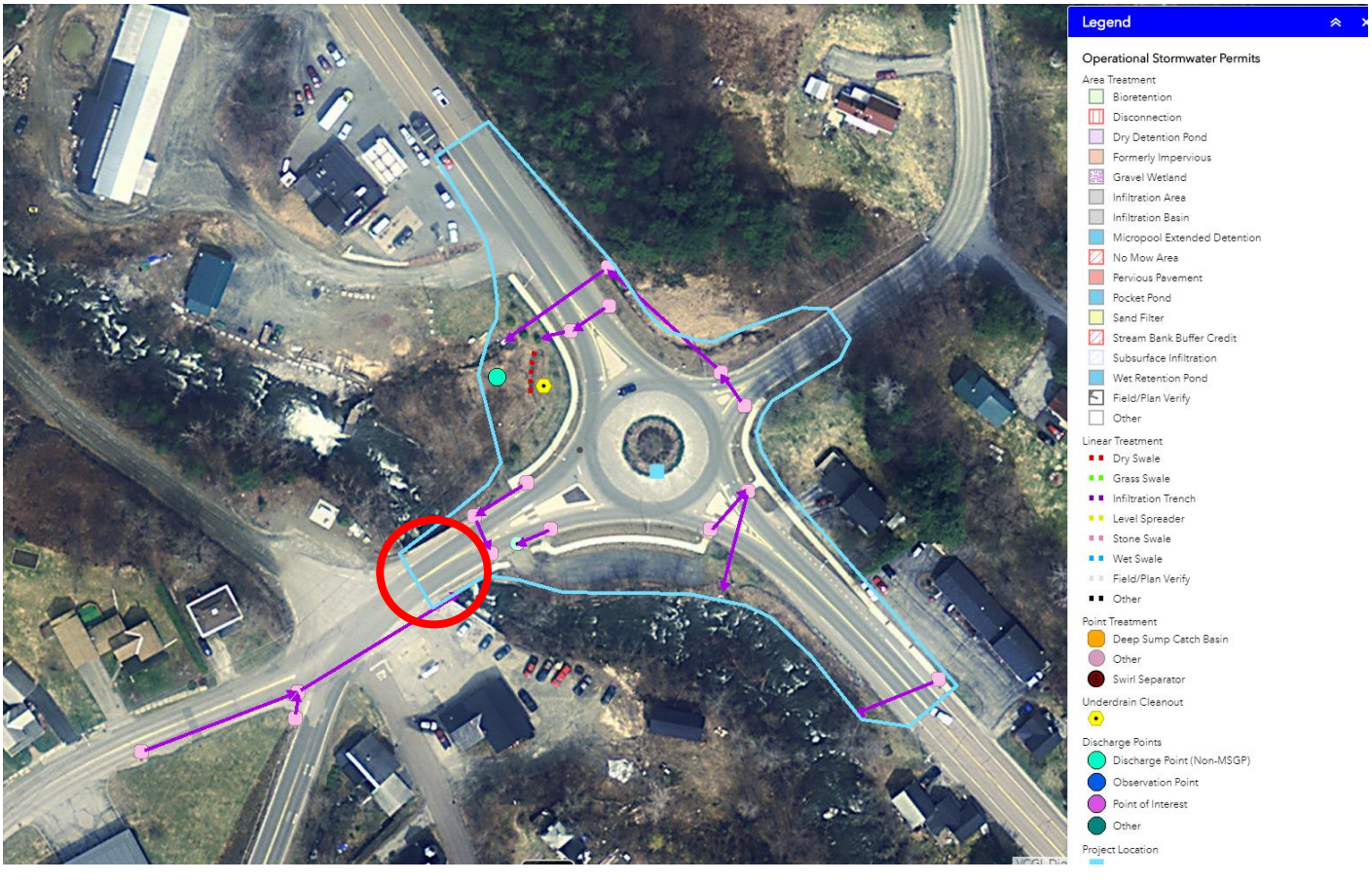
[phone] 802-279-0583
[fax] 802-828-2334
[ttd] 800-253-0191

To: Julie Ann Held, VTrans Environmental Specialist
From: Emily Peck, VTrans Assistant Stormwater Management Engineer
Date: October 10th, 2018
Subject: Barre Town BF 0169 (12) - Stormwater Resource ID Review

Project Description: I have reviewed the project area for Barre Town BF 0169 (12) for stormwater related regulatory and water quality concerns. The project will involve bridge deck and associated work on B21 on VT 110 in Barre, VT. My evaluation has included the review of existing imagery and mapping (ANR Natural Resource Atlas, VTrans Operational Stormwater Permits & VTrans Corridor Needs) to capture existing stormwater features and existing drainage. I have completed a field visit on 10/9/18 for reconnaissance.

Regulatory Considerations

The project site area is adjacent to the existing operational stormwater permit for the Barre Town HES 026-1(38) project. The permit number is 4969-9010.



This project site is not within an MS4 area.
This project site is not within a designated public water supply source protection area.
The project site does not include an impaired (303(d) list) or stressed waters.

Existing Drainage

The project area is within a semi-developed portion of Barre where runoff is predominantly collected by curbing and closed drainage which ultimately outfalls into the Jail Branch. Any opportunity to incorporate disconnection or infiltration into the design would improve water quality.

Appendix K: Community Input Questionnaire

September 25, 2018 – Response from the Town of Barre, Carl Rogers, Town Manager

Project Summary

This project, BF 0169(12), focuses on VT Route 110, Bridge 21 in Barre Town, 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 deck replacement, deck and superstructure (existing concrete beams) replacement, and full bridge replacement. 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 bridge is closed during construction? Examples include annual bike races, festivals, parades, cultural events, weekly farmers market, concerts, etc. that could be impacted? If yes, please provide approximate date, location and event organizers' contact info.
   No.
2. Is there a "slow season" or period of time from May through October where traffic is less, or no events are scheduled?
   There is less traffic when school is closed.

3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response routes that might be affected by the closure of the bridge, one-way traffic, or lane closures; and provide contact information (names, address, email addresses, and phone numbers.
   The Town of Barre is divided east to west by a deep river valley (Jail Branch). US Route 302 follows the Jail Branch. There are two routes from the north side of town (large population area) to the south side, site of the town offices, public works garage and town school. The Rte. 110 bridge over the Jail Branch is part of one of those north-south routes. However, Old Route 302 offers a ready-made detour of about one (1) mile.
   DPW Garage – Is about 2 miles from the bridge. Snow plow trucks that plow north of 302 use the bridge.
   EMS Station – Is about 2 miles west on Route 302. Barre Town EMS serves the towns of Orange and Washington and normally would use the bridge to travel south on Rte. 110 to reach Washington and parts of Orange. Old Rte. 302 provides a direct route to Rte. 110.
   Fire Station – The Town's East Barre Fire Station is a stone's throw from the bridge. That station has primary coverage responsibilities in the northeast quadrant of Barre Town and for parts of Orange closes to Rte. 302. The closed bridge and Old Rte. 302 detour would add time to the fire department's response to those areas. The bridge project would not affect response to calls south of Rte. 302.
   Police Station – The police department is housed in the Municipal Building at 149 Websterville Road, about 2 miles from the bridge. If an officer was dispatched to an emergency in the northeast quadrant and if the officer was responding from the station and the bridge was closed, the Old Rte. 302 detour would add a couple minutes to the response time.
   Contact Information
   DPW – Superintendent Richard Tetreault, 476-3522, rtetreault@barretown.org
   EMS – Director Christopher LaMonda, 476-3147, clamonda@barretown.org

Fire – Chief Christopher Violette, 479-2595, cviolette@barretown.org
Police – Chief Bill Dodge, 479-0509, william.dodge@vermont.gov

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, two businesses: Crossway Motors located adjacent to the bridge and Jiffy-Mart located on Rte. 302 a short distance away. Several businesses (especially the East Barre Antique Mall and Vermont Flannel Company) are located along Mill Street in the heart of East Barre village and have customers that turn off Rte. 302.

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?
   Yes. All of the following are on the south side of the Jail Branch: Town's East Barre Park (approx.. 300 yards away), Fire Station (see #4), and Aldrich Library-York Branch (aka East Barre Library about 300 yards away).

6. What other municipal operations could be adversely affected by a road/bridge closure or detour?
   No other municipal operations, but the school bus routes rely on the same two points to cross the Jail Branch. Several bus routes cross the bridge and then Rte. 302.

7. Are there any town highways that might be adversely impacted by traffic bypassing the construction on other local roads? Please indicate which roads may be affected and their condition (paved/unpaved, narrow, weight-limited bridges, etc), including those that may be or go into other towns.
   Traffic will by-pass the bridge construction zone, whether a detour is set up or not, using Old 302. It is a gravel road. Visibility at the Old Rt. 302/Rte. 302 intersection should be checked. Heavy traffic during mud season (March, April) could cause rutting or worse. The other route south to north involves Quarry Hill Road (a major class 2 road) and Barre City streets.

8. Is there a local business association, chamber of commerce, regional development corporation, or any other group that we should be working with? If known, please provide name, organization, email, and phone number.
   None.

9. Are there any public transit services or stops that use the bridge or transit routes in the vicinity that may be affected if they become the detour route?
   No.

Schools

1. Where are the schools in your community and what are their schedules?
   There are four (4) schools in Barre Town. The Barre Town Middle and Elementary School is located on Websterville Road. The Websterville Baptist School (grads 1-12) is located on Church Hill Road on the south side. The Choice Academy is located on Rte. 14 in South Barre. The Montessori School of Central Vermont is on Pine Hill Road in the northwest quadrant.

2. Is this project on specific routes that school buses or students use to walk to and from school?
   School buses use the bridge to reach the north side. No children cross the bridge to walk to School.

3. Are there recreational facilities associated with the schools nearby (other than at the school)?
   No.

Pedestrians and Bicyclists

1. What is the current level of bicycle and pedestrian use on the bridge?
   Fair amount of pedestrian traffic due to the residents of the village, walking to the Jiffy Mart. Very little bicycle traffic.

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

3. Does the community feel there is a need for a sidewalk or bike lane on the bridge?
   Yes. There is sidewalk on the north side of the bridge and new sidewalk was just constructed in the village. An AOT project starting next year will construct more sidewalk on the south side. The Town needs to build a new 8" water line across the Jail Branch. The current plan is to construct a structure for pedestrians with the water pipe underneath walkway. The structure would be near the bridge on the downstream side.

4. Is pedestrian and bicycle traffic heavy enough that it should be accommodated during construction?
   If the Town has its structure in place (the hope is to build it in 2019 or 2020) pedestrians could cross the Jail Branch. Cyclists could walk their bikes across.

5. Does the Town have plans to construct either pedestrian or bicycle facilities leading up to the bridge? Please provide any planning documents demonstrating this (scoping study, master plan, corridor study, town or regional plan).
   Sidewalks, yes. See #3.

6. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling?
   East Barre village is developed. As stated above residents walk to the Jiffy Mart. There is some pedestrian traffic from homes on the north side of Rte. 302 to the village area (post office, for instance).

Communications

1. Please identify any local communication channels that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM.
   Weekly paper – The World

Daily paper – The Times Argus
Public access tv – Yes, contact CVTV at Video vision, 476-4160
Front Porch Forum – Yes
Etc. – Town quarterly newsletter, Town website, and Town Facebook pages

Design Considerations

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

2. Are there any concerns with the width of the existing bridge?
   No, except accommodations for bicycles.

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. A flood control dam is located one mile upstream.

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

6. Are there any known historic, archeological and/or other environmental resource issues near the project site?
   No known sites, but a river powered mill was located down stream 20-30 yards. Remnants are visible.

7. Are there any utilities (water, sewer, communications, power) attached to, or leading up to the existing bridge? Please provide any available documentation.
   No sewer. No water attached now. See #3 under Pedestrian and Bicyclists for water. Telecommunication cabinets are located nearby on south side between Jail Branch and Old Rte. 302.

8. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc.) near the project that should be considered?
   Yes, the water crossing.

9. Are there any other issues that are important for us to understand and consider?
   Traffic passing through the Rte. 302/110 roundabout should be considered because it is so close to the bridge. As stated above (regarding sidewalks) AOT plans to start an intersection re-alignment project in 2019. The intersection of Mill Street/Rte. 110 will be re-aligned.

Land Use & Zoning

1. Please provide a copy of your existing and future land use map or zoning map, if applicable.
   Contact zoning administrator Chris Violette. He also is the fire chief. Contact information is provided above.

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

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

Communications

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

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?
   Barre Town Middle and Elementary School transportation coordinator. School number is 476-6617. Businesses along Rt. 110 and Mill Street. Currently 6 in all. Several were named above.

Appendix L: Operations Input Questionnaire

Bridge Scoping Project Barre Town BF 0169(12)
Operations Input Questionnaire

The Structures Section has begun the scoping process for BF 0169(12), VT Route 110, Bridge 21, over the Jail Brook. This is a concrete T-beam bridge constructed in 1930 and reconstructed in 1959. The Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the deck as 5 (fair), the superstructure as 5 (fair), and the substructures as 6 (satisfactory). We are interested in hearing your thoughts regarding the items listed below. Leave it blank if you don't wish to comment on a particular item.

1. What are your thoughts on the general condition of this bridge and the general maintenance effort required to keep it in service? The bridge rail has been an issue due to the condition of the fascia. The bridge crew has been out there a few times with our North Montpelier garage crew to make the bridge rail repairs.

2. What are your comments on the current geometry and alignment of the bridge (curve, sag, banking, sight distance)? The district has not had any issues with the current geometry or alignment.

3. Do you feel that the posted speed limit is appropriate? Yes

4. Is the current bridge and approach roadway width adequate for winter maintenance including snow plowing? The district has no issues with plowing across this bridge.

5. Are the joints salvageable or would you recommend replacement? If this bridge is being rehabbed, then the joints should be too. Historically trying to salvage joints has led to increased construction costs. However, with that said, the joints are in good condition.

6. Are the railings constantly in need of repair or replacement? Yes. What type of railing works best for your district? (We are recommending more and more box beam guardrail on our bridges because of crash-worthiness and compatibility with accelerated projects). This bridge does have a pedestrian walkway (sidewalk) on it, but if possible, box beam would be nice.

7. Are you aware of any unpermitted driveways within close proximity to the bridge? We frequently encounter driveways that prevent us from meeting railing and safety standards. Not aware of any unpermitted drives but the garage adjacent to the bridge is wide and may be grandfathered.

8. Are you aware of abutting property owners that are likely to need special attention during the planning and construction phases? These could be people with disabilities, elderly, or simply folks who feel they have been unfairly treated in the past. We are not aware of any abutting property owner issues.

9. Do you find that extra effort is required to keep the slopes and river banks around the bridge in a stable condition? No problems. Is there frequent flood damage that requires repair? No.

10. Does this bridge seem to catch an unusual amount of debris from the waterway? No

11. Are you familiar with traffic volumes in the area of this project? No traffic issues – there is a morning and evening commute but there are no problems.

12. Do you think a closure with off-site detour and accelerated construction would be appropriate? Yes, very easy to do in this case. Do you have any opinion about a possible detour route, assuming that we use State route for State projects and any route for Town projects? May be possible to use old US 302 – not sure if the state relinquished it or not. Are there locations on a potential detour that are already congested that we should consider avoiding? No.

13. Please describe any larger projects that you have completed that may not be reflected on the attached Appraisal sheet, such as deck patches, paving patches, railing replacement with new type, steel coating, etc. Only have done bridge rail repairs to this bridge.

14. If there is a sidewalk on this bridge, how effective are the Town's efforts to keep it free of snow and ice? There is a sidewalk. The town does maintain the sidewalk in the winter; however there is speculation that the bridge rail repairs that we had to do were a result of winter maintenance to the sidewalk.

15. Are there any drainage issues that we should address on this project? No.

16. Are you aware of any complaints that the public has about issues that we can address on this project? No.

17. Is there anything else we should be aware of? There is a stormwater permit for the Barre roundabout. Work done to the approach end of the bridge closes to the roundabout may be impacted by the stormwater permit.

Appendix M: Crash Data

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

WHERE Year of Crash >= 2012 AND Year of Crash <= 2016

*	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
	VTVSP1200/14A303705	Orange	1.46	08/25/2014	18:27	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP1200/14A300945	Orange	1.48	02/27/2014	20:43	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP1200/12A300682	Orange	1.62	02/13/2012	08:40	Snow	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	SH
	VT0120500/12BT03029	Barre Town	0.48	11/08/2012	22:54	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	SH
	VT0120500/12BT02196	Barre Town	0.55	08/11/2012	20:05	Cloudy	Failure to keep in proper lane, Unknown, Under the influence of medication/drugs/alcohol	Head On	2	0	0	S, N	SH
	VT0120500/14BT004096	Barre Town	0.79	11/02/2014	01:46	Rain	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Driving too fast for conditions	Single Vehicle Crash	1	0	0	E	SH
	VT0120500/14BT002989	Barre Town	0.88	08/16/2014	00:55	Rain	Exceeded authorized speed limit, Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Single Vehicle Crash	0	0	0	N	SH
	VT0120500/13BT03562	Barre Town	0.90	11/27/2013	14:50	Clear	Disregarded traffic signs, signals, markings, No improper driving	No Turns, Thru moves only, Broadside ^<	1	0	0	E, S	SH
	VT0120500/16BT002052	Barre Town	0.98	05/07/2016	03:17	Clear	Fatigued, asleep	Other - Explain in Narrative	1	0	0	N, P	SH State Owned
	VT0120500/13BT00173	Barre Town	1.06	01/22/2013	08:11	Snow		Rear End	0	0	0	W	SH
	VT0120500/13BT02910	Barre Town	1.06	10/04/2013	20:50	Cloudy	Followed too closely, No improper driving	Rear End	0	0	0	W	SH
	VT0120500/16BT000248	Barre Town	1.08	01/18/2016	13:38	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	S	SH State Owned
Route: VT-111													
	VTVSP0800/12B200466	Derby	0.00	02/21/2012	07:29	Clear	Failed to yield right of way, Followed too closely, No improper driving	Rear End	0	0	0	W	SH
	VTVSP0800/13B203929	Derby	1.33	11/16/2013	17:50	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0800/16B204429	Derby	1.33	11/20/2016	12:45	Rain	Other improper action	Single Vehicle Crash	1	0	0	E	SH State Owned
	VTVSP0800/16B200439	Derby	1.70	02/09/2016	07:23	Clear	Driving too fast for conditions	Single Vehicle Crash	2	0	0	W	SH State Owned
	VTVSP0800/16B204611	Derby	1.72	12/05/2016	09:09	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	SH State Owned
	VTVSP0800/14B201079	Derby	1.87	04/08/2014	13:55	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0800/13B203514	Derby	2.19	10/10/2013	20:17	Clear	Exceeded authorized speed limit, Failure to keep in proper lane	Single Vehicle Crash	2	0	0	W	SH
	VTVSP0800/13B201012	Derby	2.22	04/05/2013	20:33	Snow	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	SH
	VTVSP0800/14B204252	Derby	2.29	12/27/2014	07:31	Clear	Driving too fast for conditions	Single Vehicle Crash	1	0	0	W	SH
	VTVSP0800/12B202902	Derby	2.44	08/27/2012	19:55	Clear		Single Vehicle Crash	0	0	0	E	SH

**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.*

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

Appendix N: Utility Resource Identification

Existing utilities investigation Barre Town BF 0169(12)

Aerial:

Green Mountain Power

Charter Communications

Consolidated Communications

As depicted on the updated existing conditions sheet the existing pole at the intersection of VT110 and Mill Street will be removed as part of the relocation associated with the Barre Town STP HES 0169(8) project.

Underground utilities:

Consolidated Communications

Consolidated has an extensive communications site to the Northeast of the bridge, this site has underground running to it form the existing pole.

Town of Barre Water

Town of Barre Sewer

Water and sewer are in the area of proposed construction but do not cross the river in the area of the bridge. The Town of Barre has recently submitted a permit request to install a new waterline which would cross the river to the north of the bridge and be carried on a utility/sidewalk bridge.

This is an extensive communications site with cabinets and underground running from the Pole.

Pole will be removed for Highway project

Aerial
Green Mountain Power
Charter
Consolidated
Underground
Town water
Town sewer

VT STATE PLANE GRID

4"X4" CONCRETE BOUNDRY MARKER VTHD TIPPED

IRON ROD W/ CAP OTTERMAN LS 580

IRON ROD W/ CAP OTTERMAN LS 580

BENCHMARK
CHISLED SQUARE ON GRANITE CURB
ELEV. = 1089.07

STA 57+18.00 =
CHA 10+75.00
Δ=93°56' 16" LT

VT-110 CURVE 1
DELTA = 37°30' 11"
D = 28°38' 52"
R = 200.00'
T = 67.90'
L = 130.91'
E = 11.21'

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

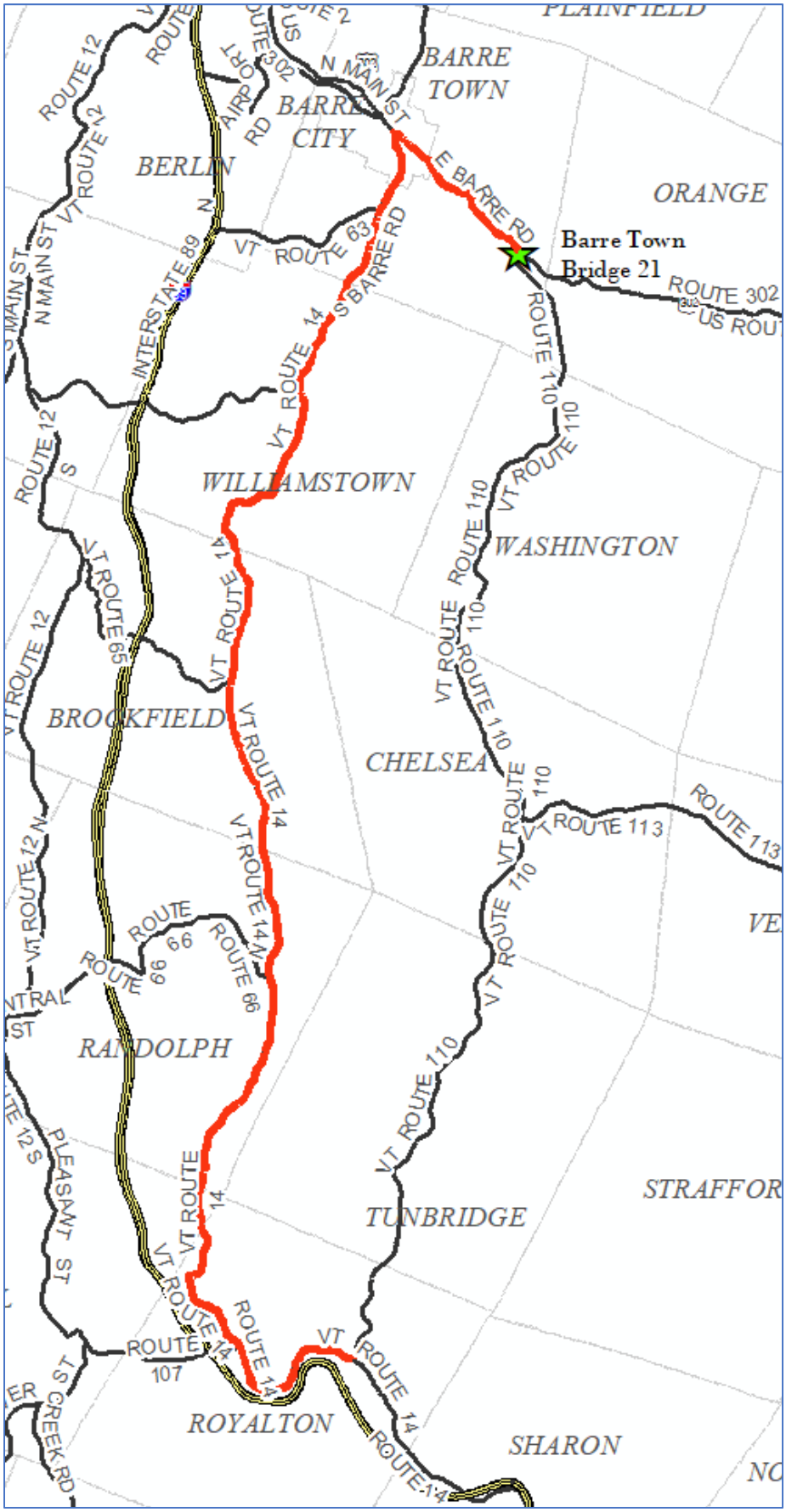
EXISTING CONDITIONS

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

PROJECT NAME:	BARRE TOWN
PROJECT NUMBER:	BF 0169(12)

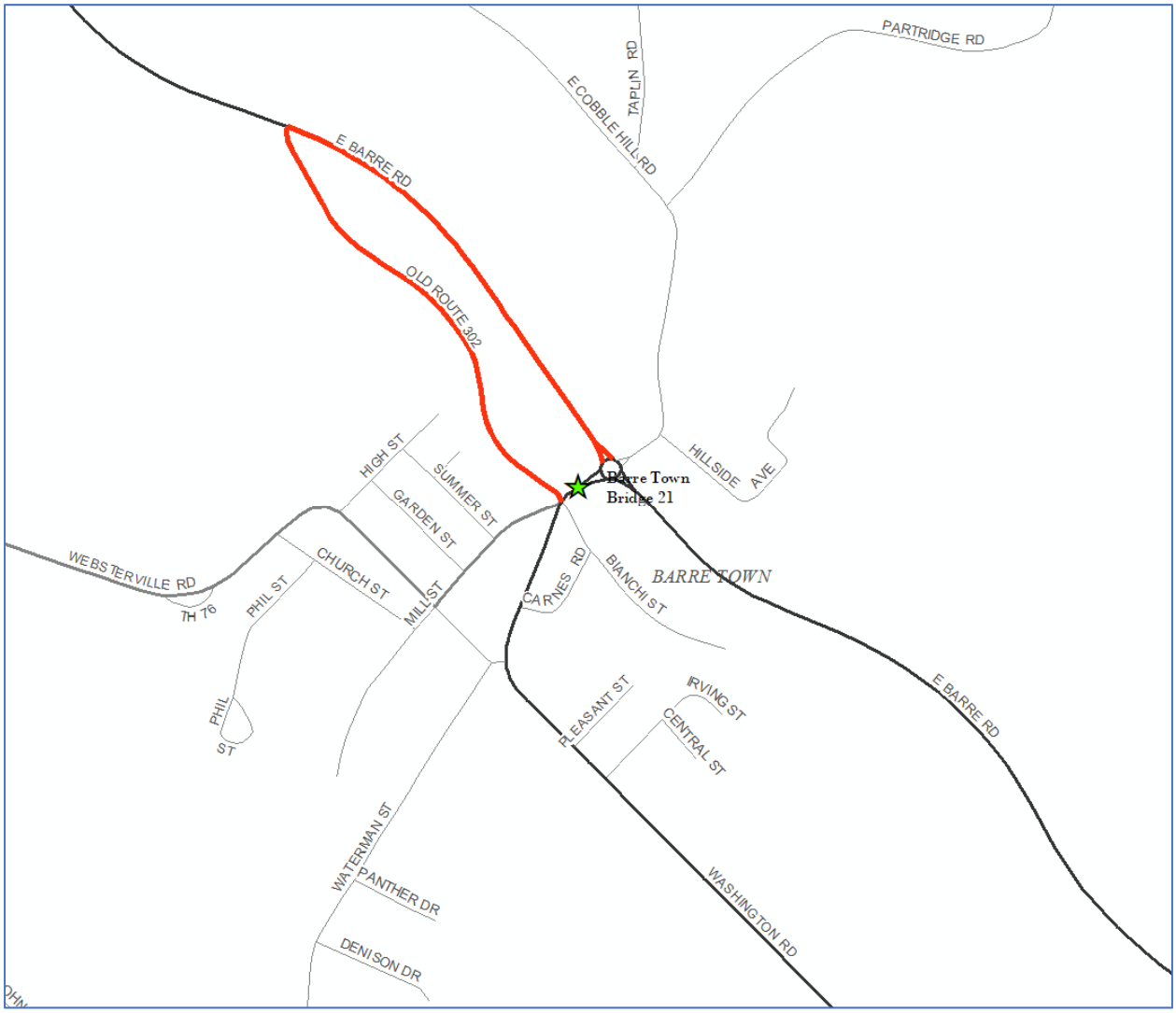
FILE NAME: 12c576/sl2c576bdr.dgn	PLOT DATE: 18-OCT-2018
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING CONDITIONS	SHEET 1 OF 8

Appendix O: Detour Routes



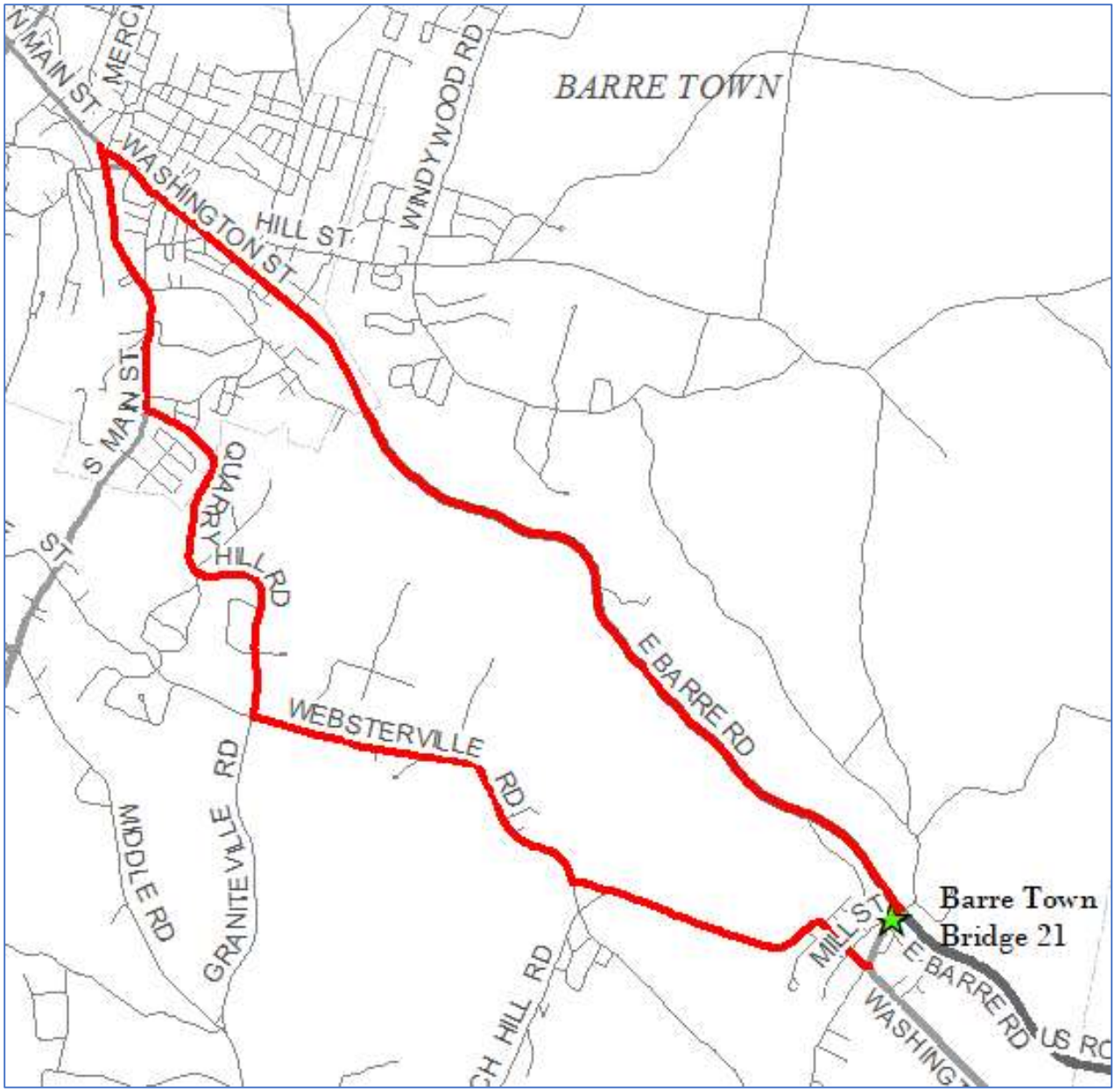
Regional Detour Route: VT Route 110, to US Route 302, and VT Route 12, back to VT Route 110

Through Route: 27.1 miles
Detour Route: 36.2 miles
Added Distance: 9.1 miles
End-to-End Distance: 63.3 miles



Local Bypass Route 1: VT Route 110, to US Route 302 (E Barre Road), and Old Route 302, back to VT Route 110

Through Route: 0.1 miles
Detour Route: 1.0 miles
Added Distance: 0.9 miles
End-to-End Distance: 1.1 miles



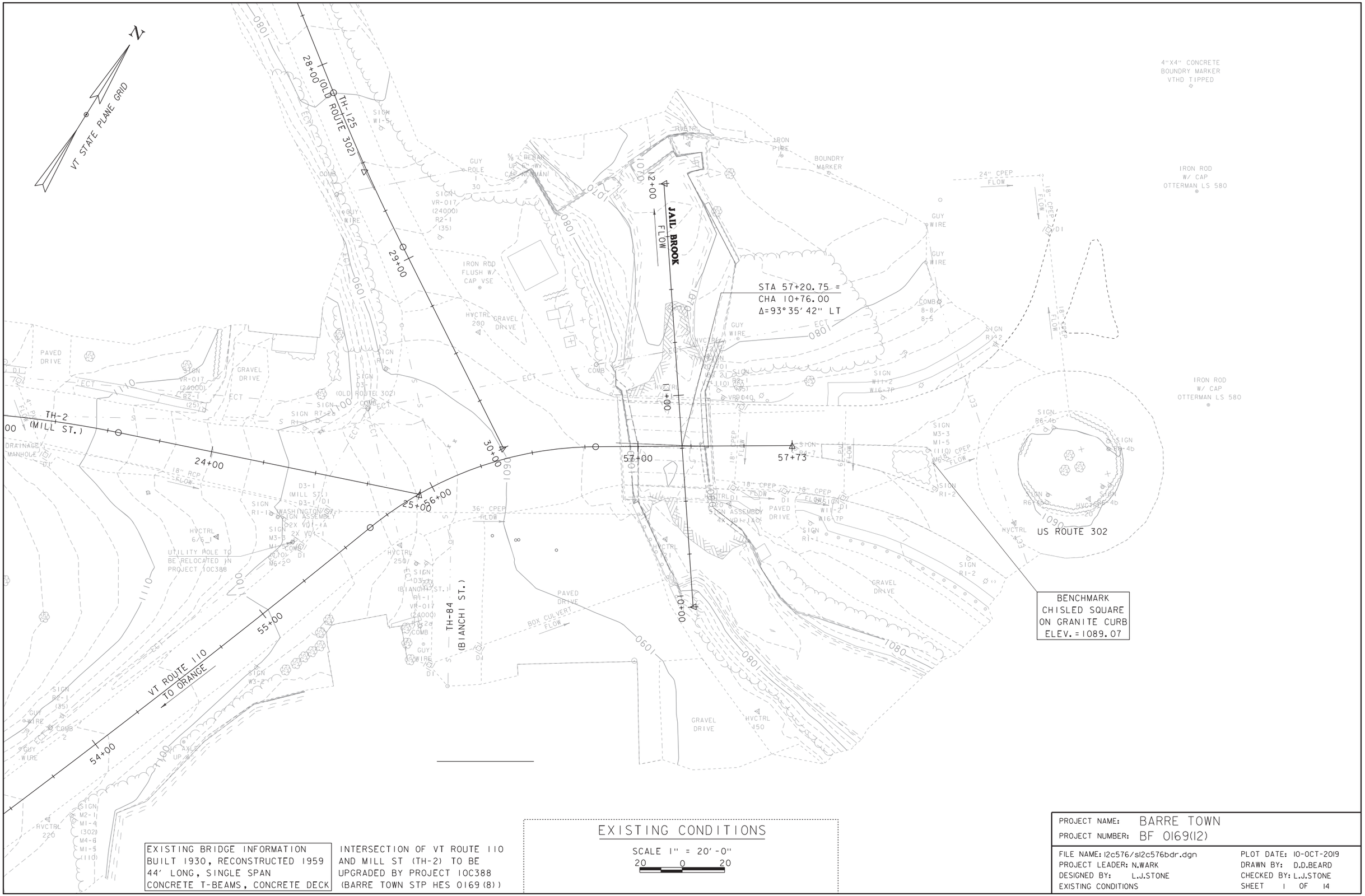
Local Bypass Route 2: VT Route 110, to Websterville Road, Quarry Hill Road, Quarry Street, South Main Street (VT Route 14), and US Route 302, back to VT Route 110

Through Route: 0.2 miles
Detour Route: 8.4 miles
Added Distance: 8.2 miles
End-to-End Distance: 8.6 miles

Appendix P: Plans

INDEX OF SHEETS

SHEET NO.	SHEET DESCRIPTION
1	Existing Conditions Layout Sheet
2	Existing Conditions Profile
3	Existing Typical Section
4	Superstructure Replacement Typical Section
5	Superstructure Replacement Layout
6	Full Bridge Replacement Typical Section
7	Full Bridge Replacement Layout
8	Upstream Temporary Bridge Layout
9	Downstream Temporary Bridge Layout
10	Phasing Typical Sections
11-12	Phasing Layouts



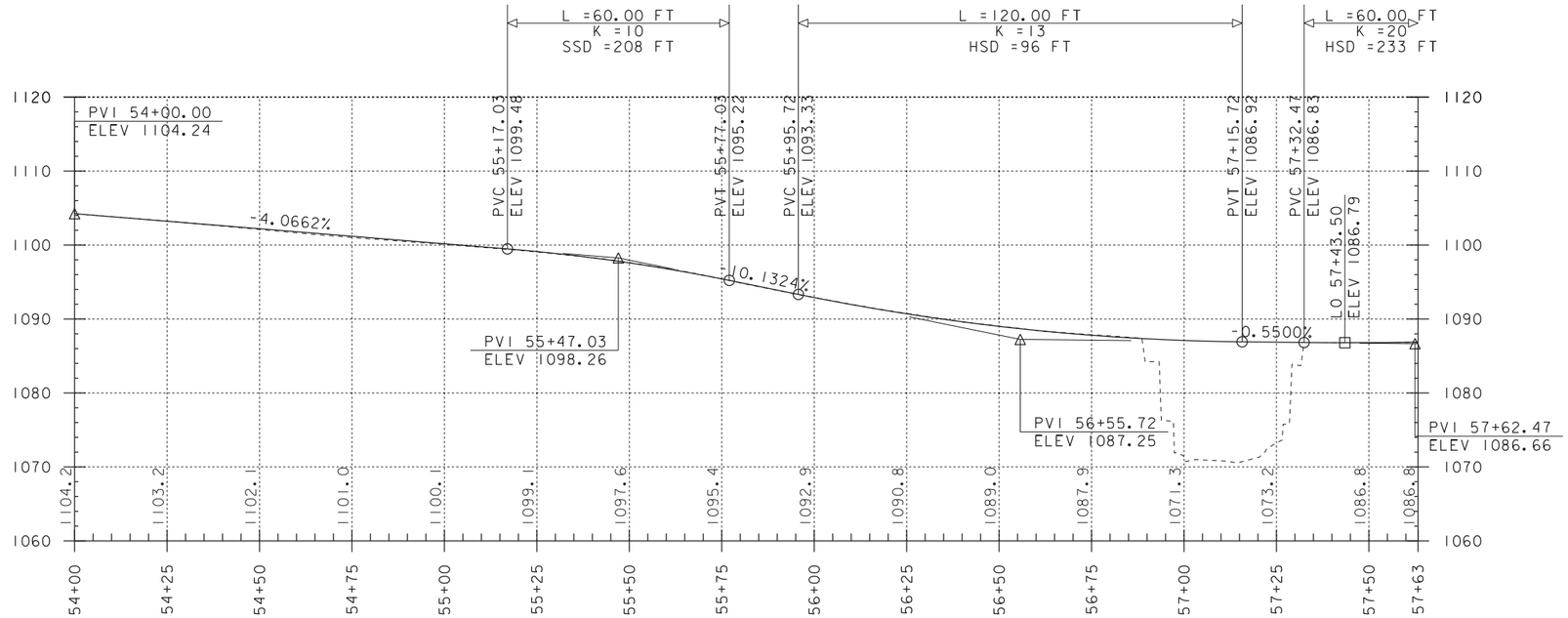
EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

EXISTING CONDITIONS

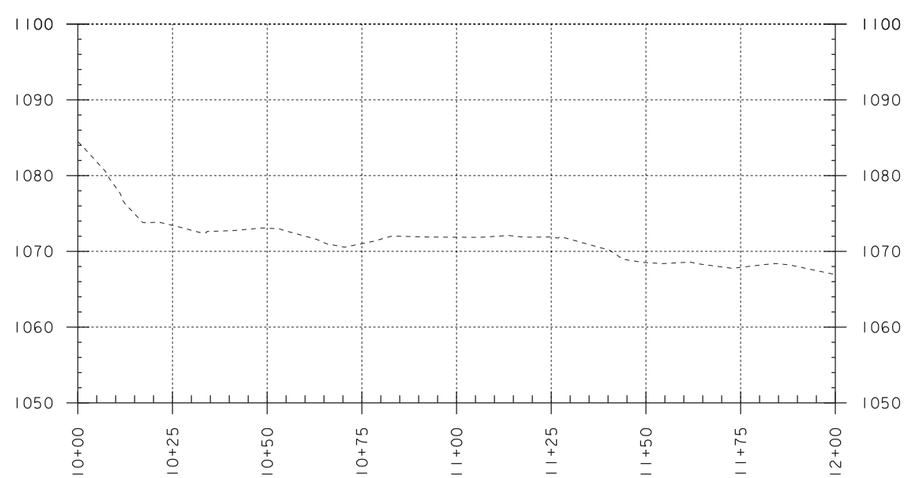
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/sl2c576bdr.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING CONDITIONS	SHEET 1 OF 14



VT ROUTE 110 PROFILE

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

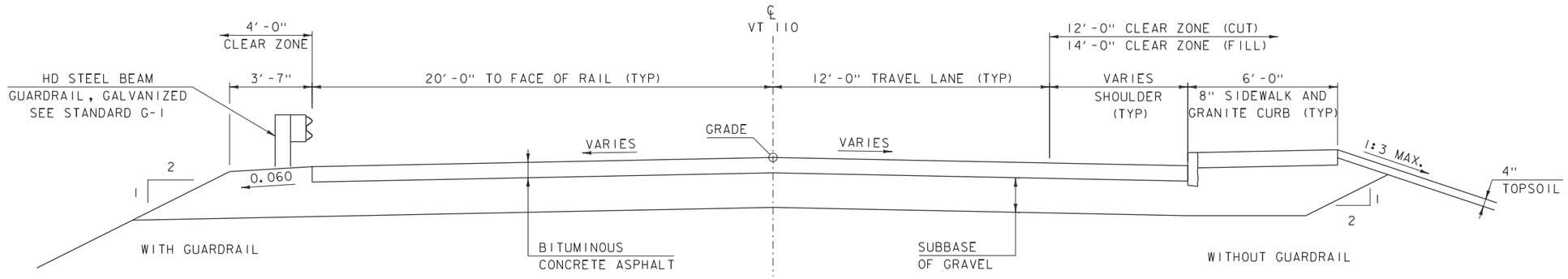


JAIL BRANCH PROFILE

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

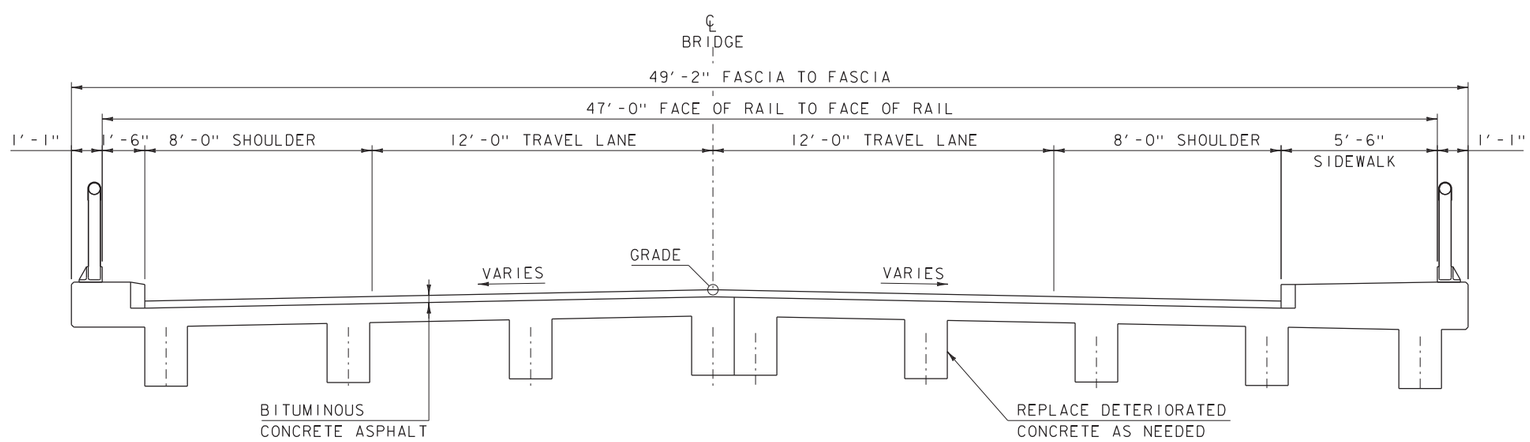
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/sl2c576profile.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PROFILE SHEET	SHEET 2 OF 14



PROPOSED VT 110 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE REHABILITATION TYPICAL SECTION

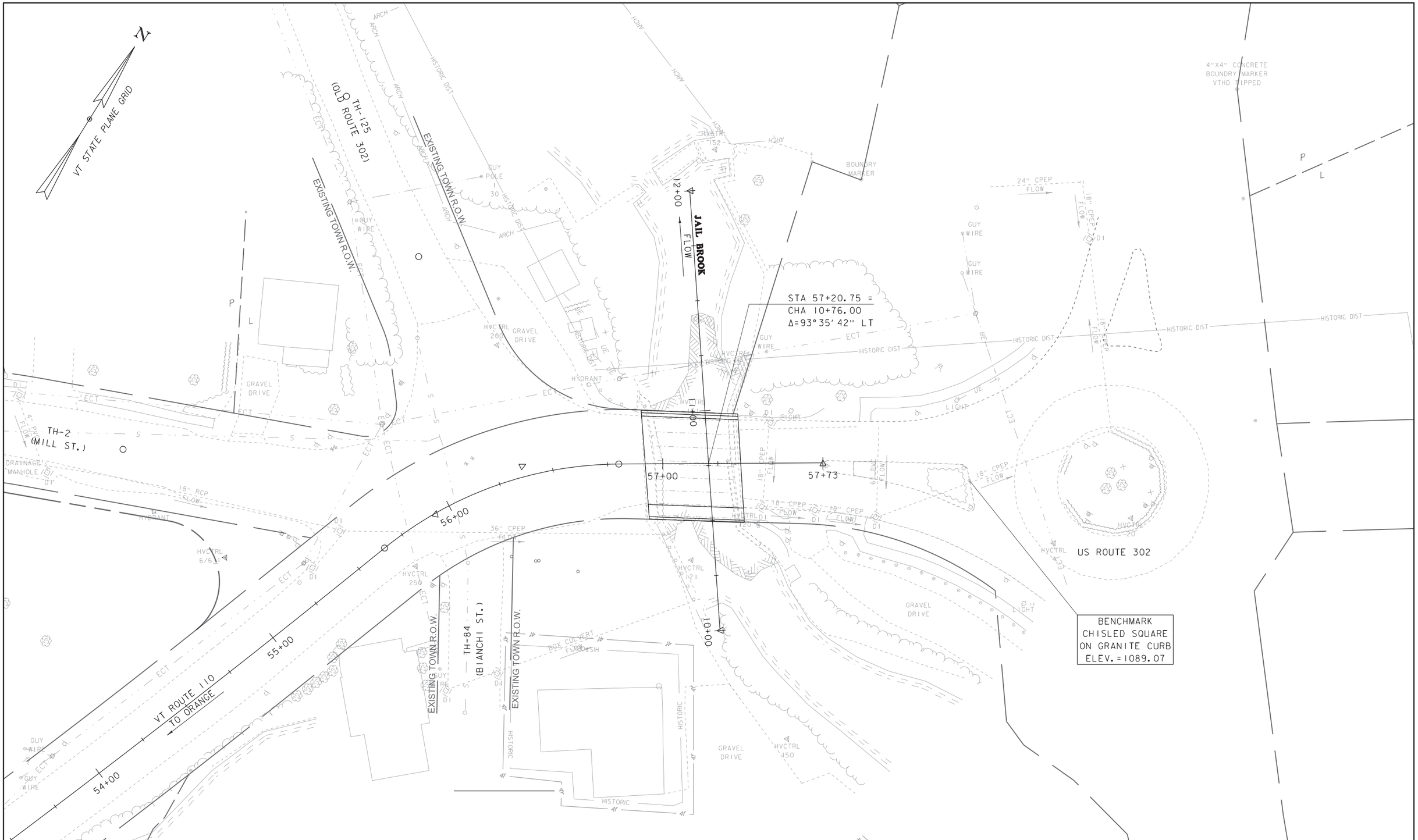
SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

(IF USED ON PROJECT)

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

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576\s12c576typical.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
REHABILITATION TYPICAL SECTIONS	SHEET 3 OF 14



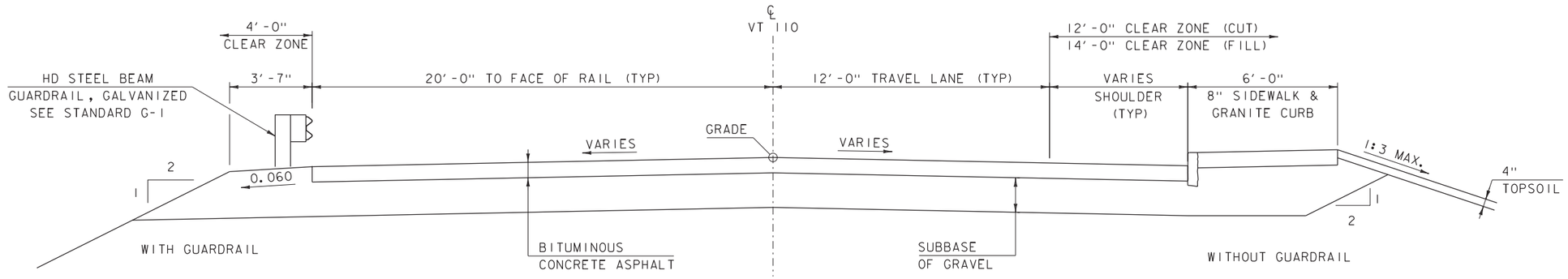
BRIDGE REHABILITATION LAYOUT

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

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

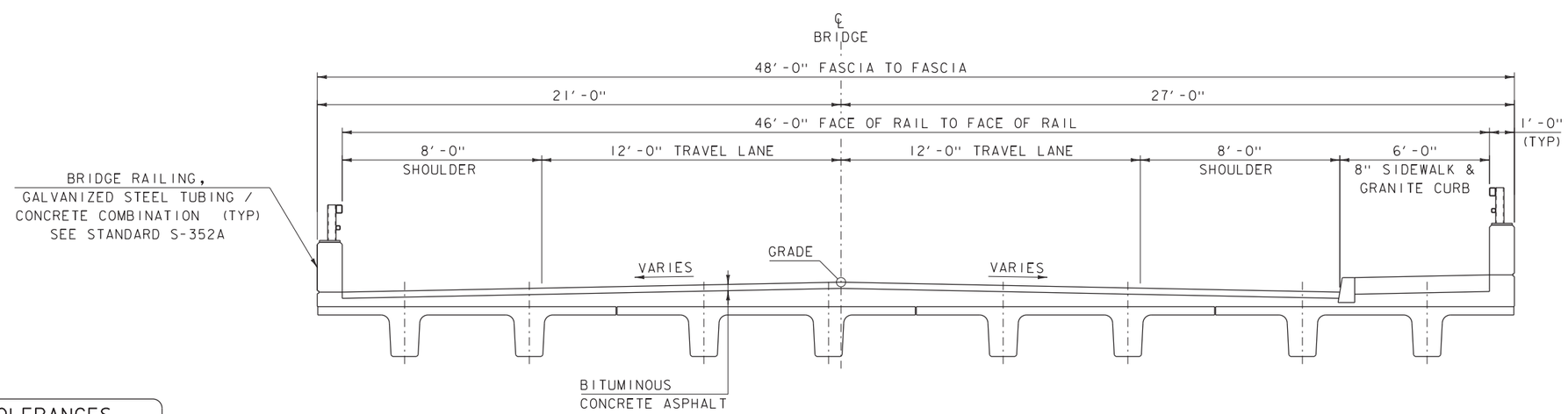
INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/s12c576bdr.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BRIDGE REHABILITATION LAYOUT SHEET	SHEET 4 OF 14



PROPOSED VT 110 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

PROPOSED SUPERSTRUCTURE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

NEXT F BEAMS SHOWN FOR EXAMPLE

MATERIAL TOLERANCES

(IF USED ON PROJECT)

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

PROJECT NAME: BARRE TOWN

PROJECT NUMBER: BF 0169(12)

FILE NAME: 12c576\s12c576typical.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: L.J.STONE
SUPER REPLACEMENT TYPICAL SECTIONS

PLOT DATE: 10-OCT-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 5 OF 14

N

VT STATE PLANE GRID

TH-125 (OLD ROUTE 302)

EXISTING TOWN R.O.W.

EXISTING TOWN R.O.W.

JAIL BROOK

FLOW

12+00

STA 57+20.75 =
CHA 10+76.00
Δ=93°35'42" LT

57+00

57+73

56+00

55+00

54+00

00+01

TH-2 (MILL ST.)

TH-84 (BIANCHI ST.)

EXISTING TOWN R.O.W.

EXISTING TOWN R.O.W.

VT ROUTE 110
TO ORANGE

US ROUTE 302

4"X4" CONCRETE BOUNDRY MARKER VTHD TIPPED

BENCHMARK
CHISLED SQUARE
ON GRANITE CURB
ELEV. = 1089.07

GRAVEL DRIVE

HISTORIC DIST

BOX CULVERT
FLOW

HISTORIC

DRAINAGE MANHOLE

18" RCP FLOW

36" CPEP FLOW

24" CPEP FLOW

18" CPEP FLOW

HYDRANT

GUY POLE

GUY WIRE

HVCTRL

ECT

UE

LIGHT

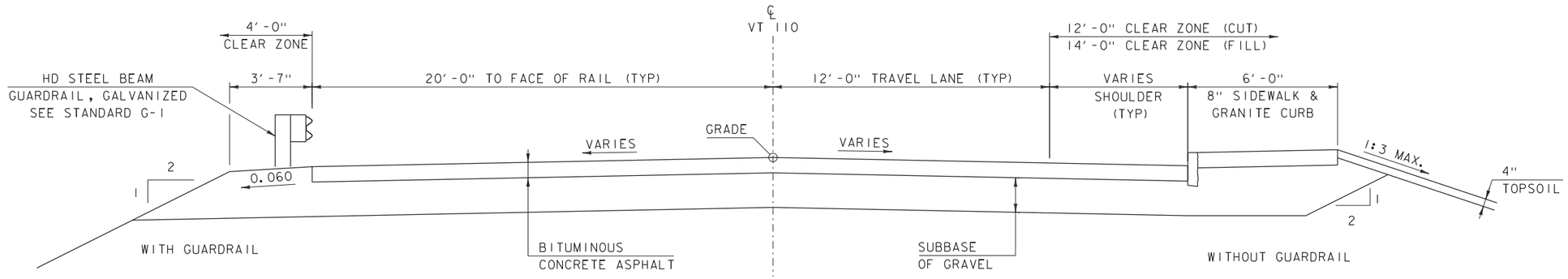
SUPERSTRUCTURE REPLACEMENT LAYOUT

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

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

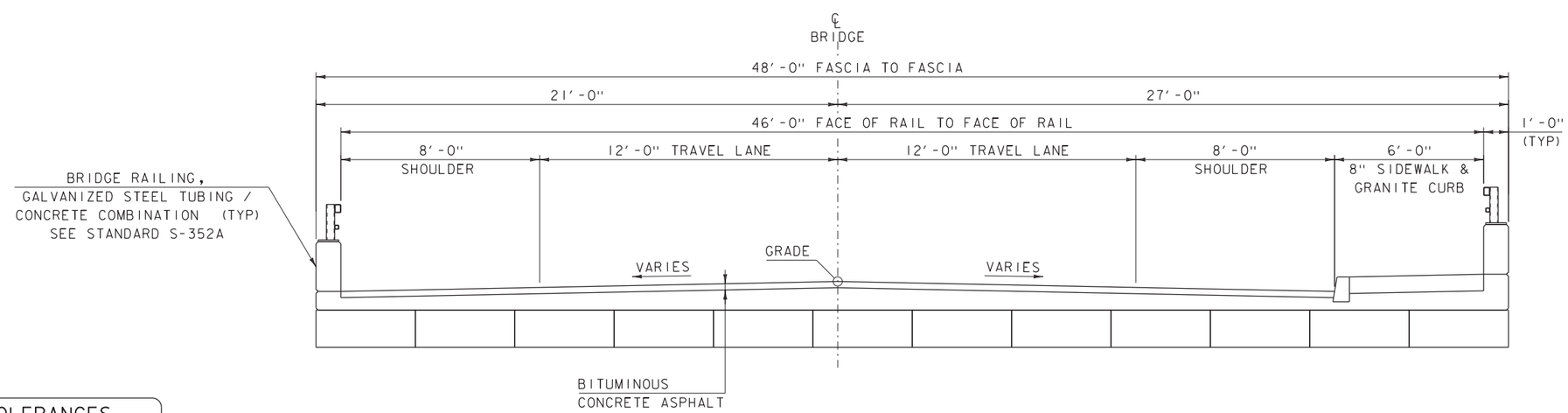
INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/s12c576bdr.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
SUPER REPLACEMENT LAYOUT SHEET	SHEET 6 OF 14



PROPOSED VT 110 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

PROPOSED BRIDGE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

SOLID SLABS SHOWN FOR EXAMPLE

MATERIAL TOLERANCES

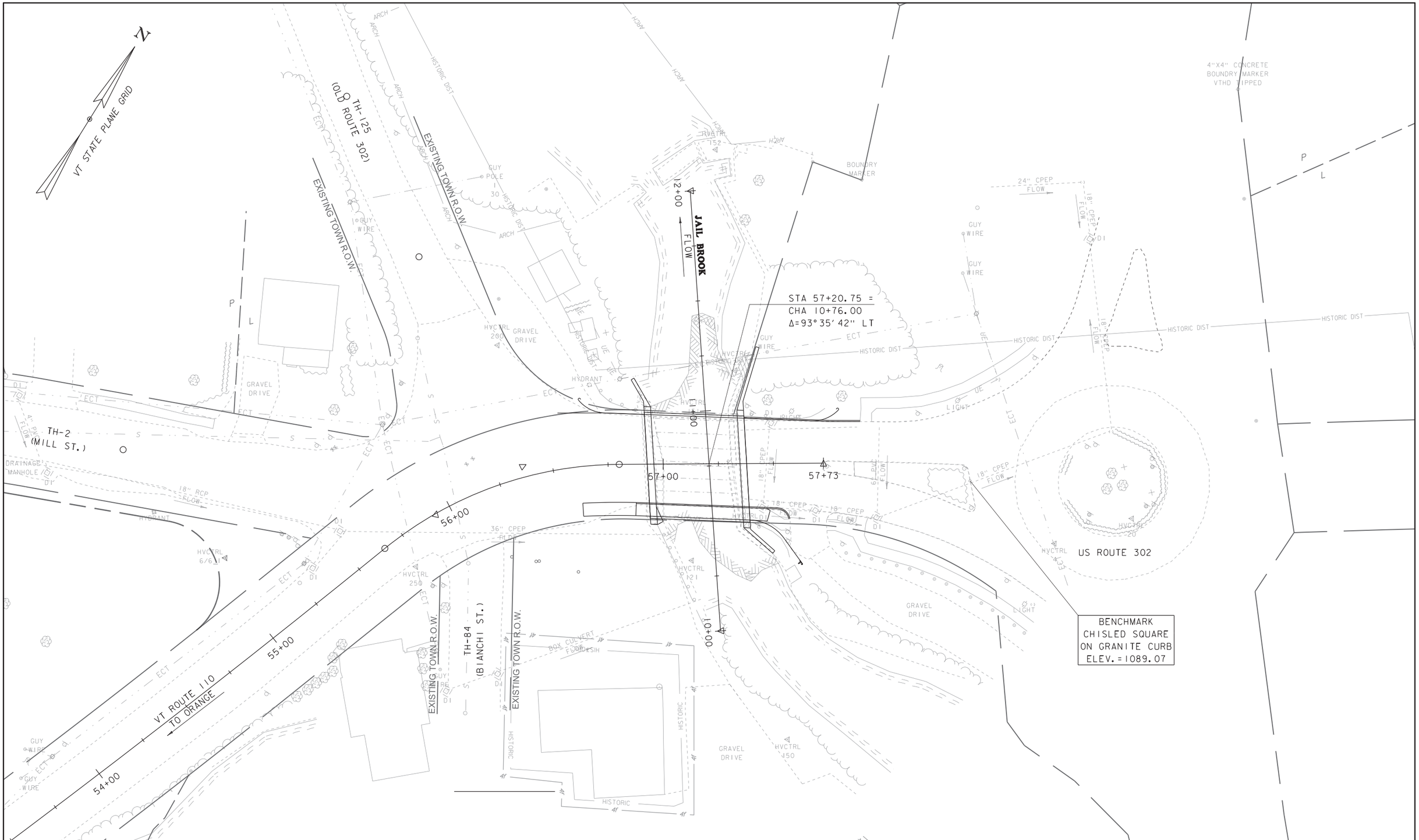
(IF USED ON PROJECT)

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

PROJECT NAME: BARRE TOWN
PROJECT NUMBER: BF 0169(12)

FILE NAME: 12c576\s12c576typical.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: L.J.STONE
REPLACEMENT TYPICAL SECTIONS

PLOT DATE: 10-OCT-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 7 OF 14



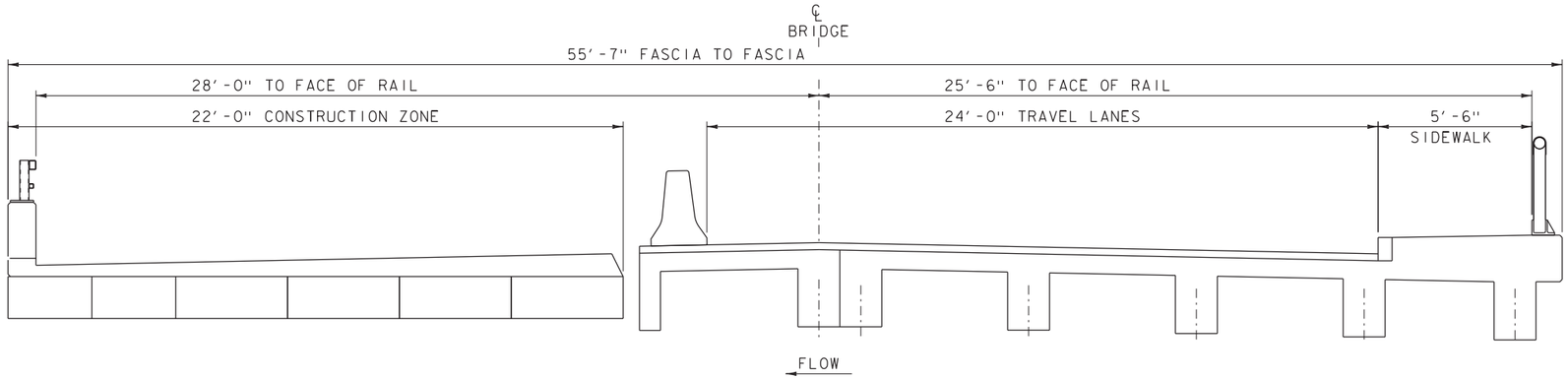
BRIDGE REPLACEMENT LAYOUT

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

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

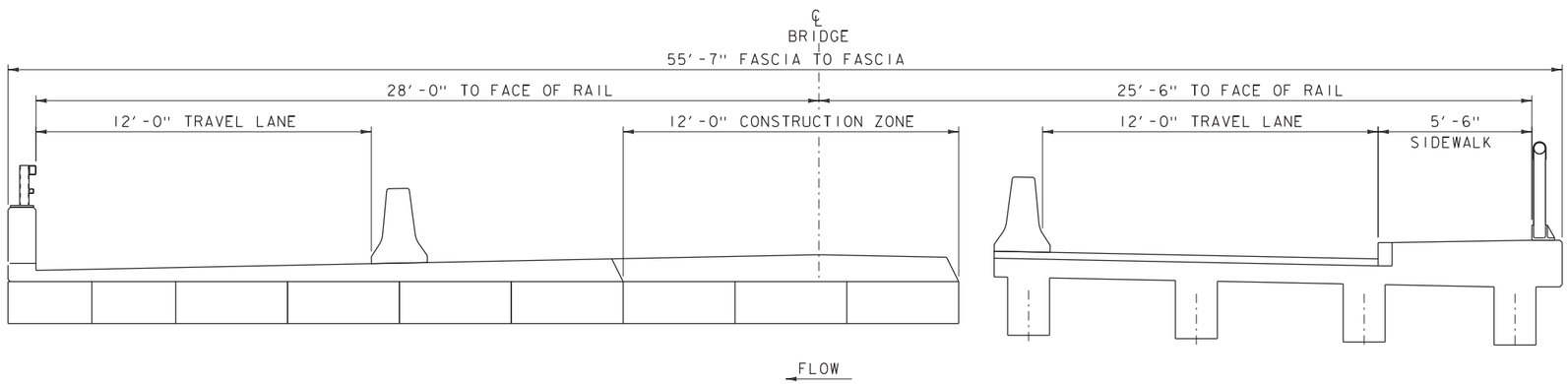
INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/sl2c576bdr.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BRIDGE REPLACEMENT LAYOUT SHEET	SHEET 8 OF 14



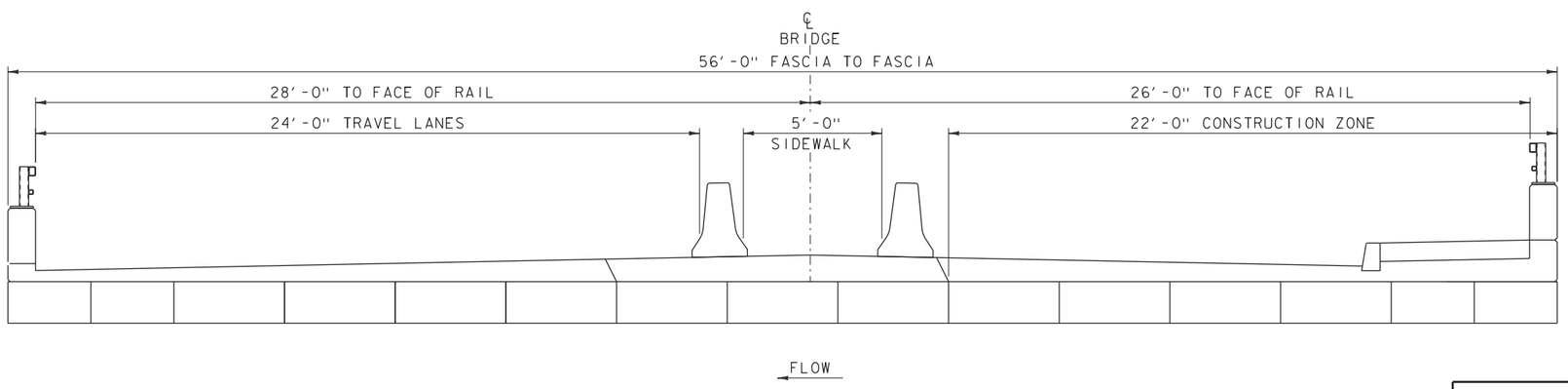
PHASE 1 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PHASE 2 TYPICAL SECTION

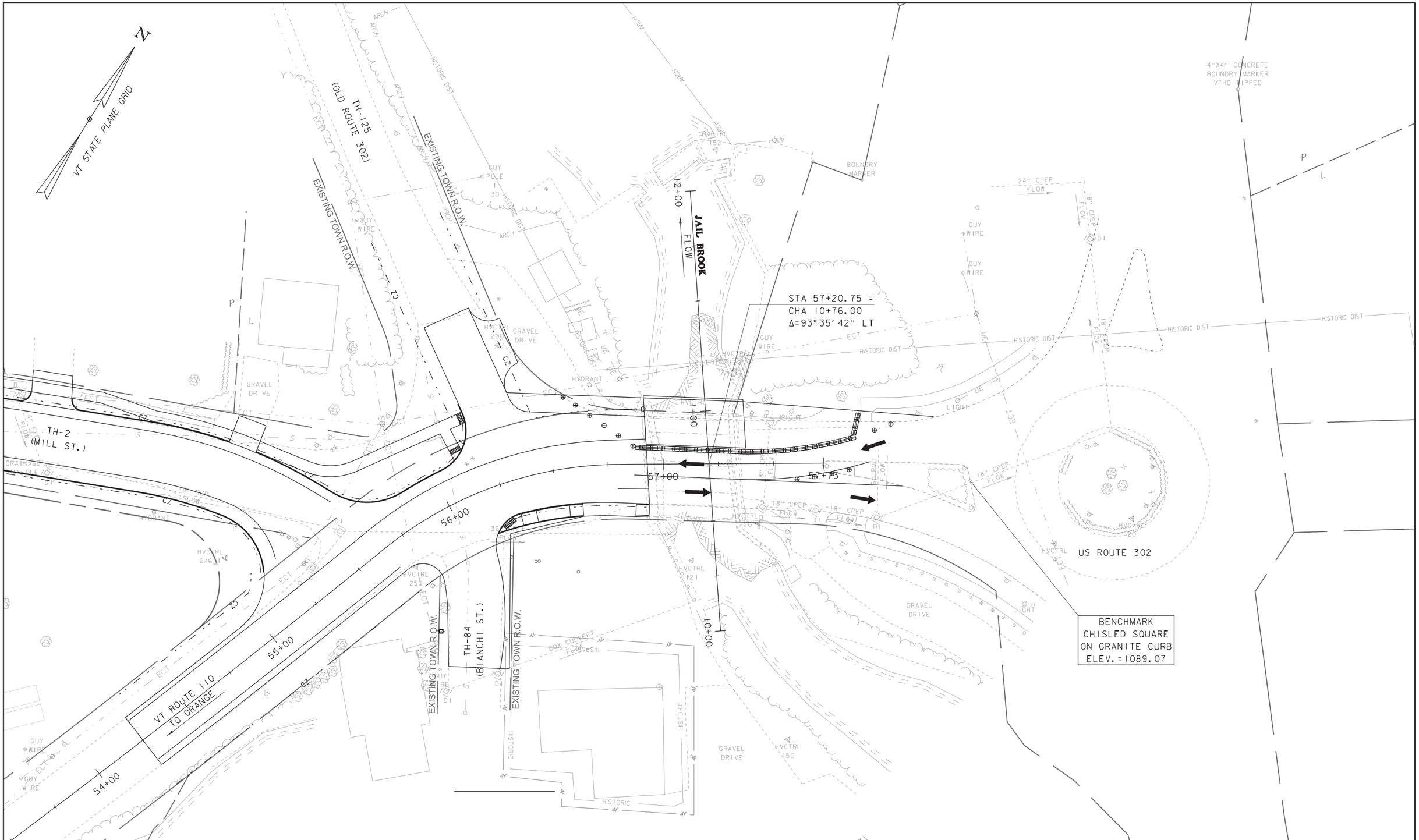
SCALE 3/8" = 1'-0"



PHASE 3 TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576\s12c576phasing.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASING TYPICAL SECTIONS	SHEET 9 OF 14



EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PHASE 1 LAYOUT

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

PROJECT NAME:	BARRE TOWN
PROJECT NUMBER:	BF 0169(12)

FILE NAME: 12c576/sl2c576TCborder.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE 1 LAYOUT SHEET	SHEET 10 OF 14

N

VT STATE PLANE GRID

TH-125
(OLD ROUTE 302)

EXISTING TOWN R.O.W.

EXISTING TOWN R.O.W.

JAIL BROOK

FLOW

12+00

STA 57+20.75 =
CHA 10+76.00
Δ=93° 35' 42" LT

57+73

56+00

55+00

54+00

TH-2
(MILL ST.)

TH-84
(BIANCHI ST.)

EXISTING TOWN R.O.W.

EXISTING TOWN R.O.W.

10+01

VT ROUTE 110
TO ORANGE

US ROUTE 302

BENCHMARK
CHISLED SQUARE
ON GRANITE CURB
ELEV. = 1089.07

4"X4" CONCRETE
BOUNDRY MARKER
VTHD TIPPED

GRAVEL DRIVE

HISTORIC DIST

BOX CULVERT
FLOODWISH

HISTORIC

PHASE 2 LAYOUT

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

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PROJECT NAME:	BARRE TOWN
PROJECT NUMBER:	BF 0169(12)

FILE NAME: 12c576/sl2c576TCborder.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE 2 LAYOUT SHEET	SHEET 11 OF 14

N

VT STATE PLANE GRID

TH-125
(OLD ROUTE 302)

EXISTING TOWN R.O.W.

EXISTING TOWN R.O.W.

JAIL BROOK

FLOW

12+00

STA 57+20.75 =
CHA 10+76.00
Δ=93°35'42" LT

57+00

57+73

56+00

55+00

54+00

10+00

TH-2
(MILL ST.)

TH-84
(BIANCHI ST.)

EXISTING TOWN R.O.W.

EXISTING TOWN R.O.W.

VT ROUTE 110
TO ORANGE

US ROUTE 302

BENCHMARK
CHISLED SQUARE
ON GRANITE CURB
ELEV. = 1089.07

4"X4" CONCRETE
BOUNDRY MARKER
VTHD TIPPED

GRAVEL DRIVE

HISTORIC DIST

BOX CULVERT
FLOODWISH

HISTORIC

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

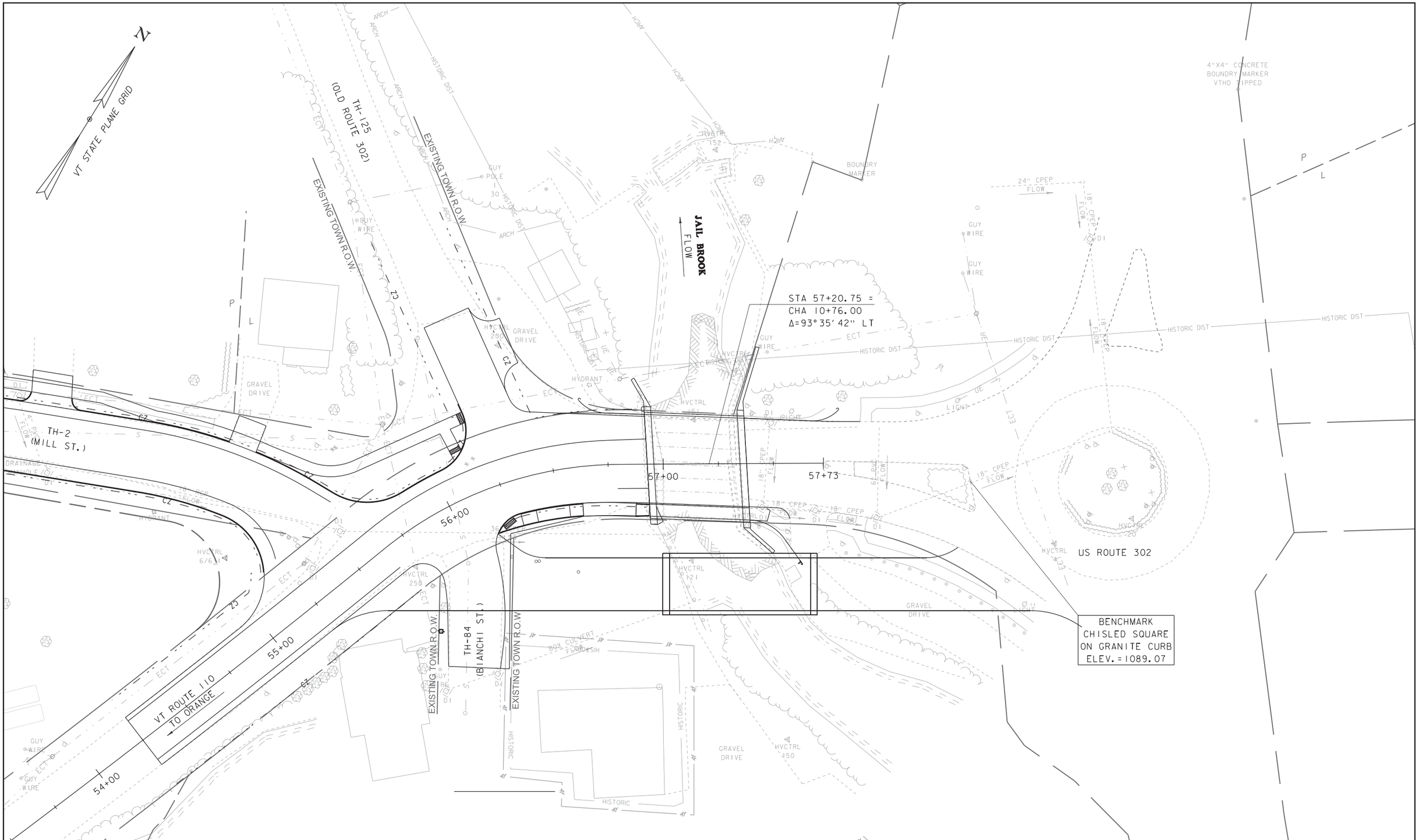
INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PHASE 3 LAYOUT

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

PROJECT NAME:	BARRE TOWN
PROJECT NUMBER:	BF 0169(12)

FILE NAME: 12c576/sl2c576TCborder.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE 3 LAYOUT SHEET	SHEET 12 OF 14



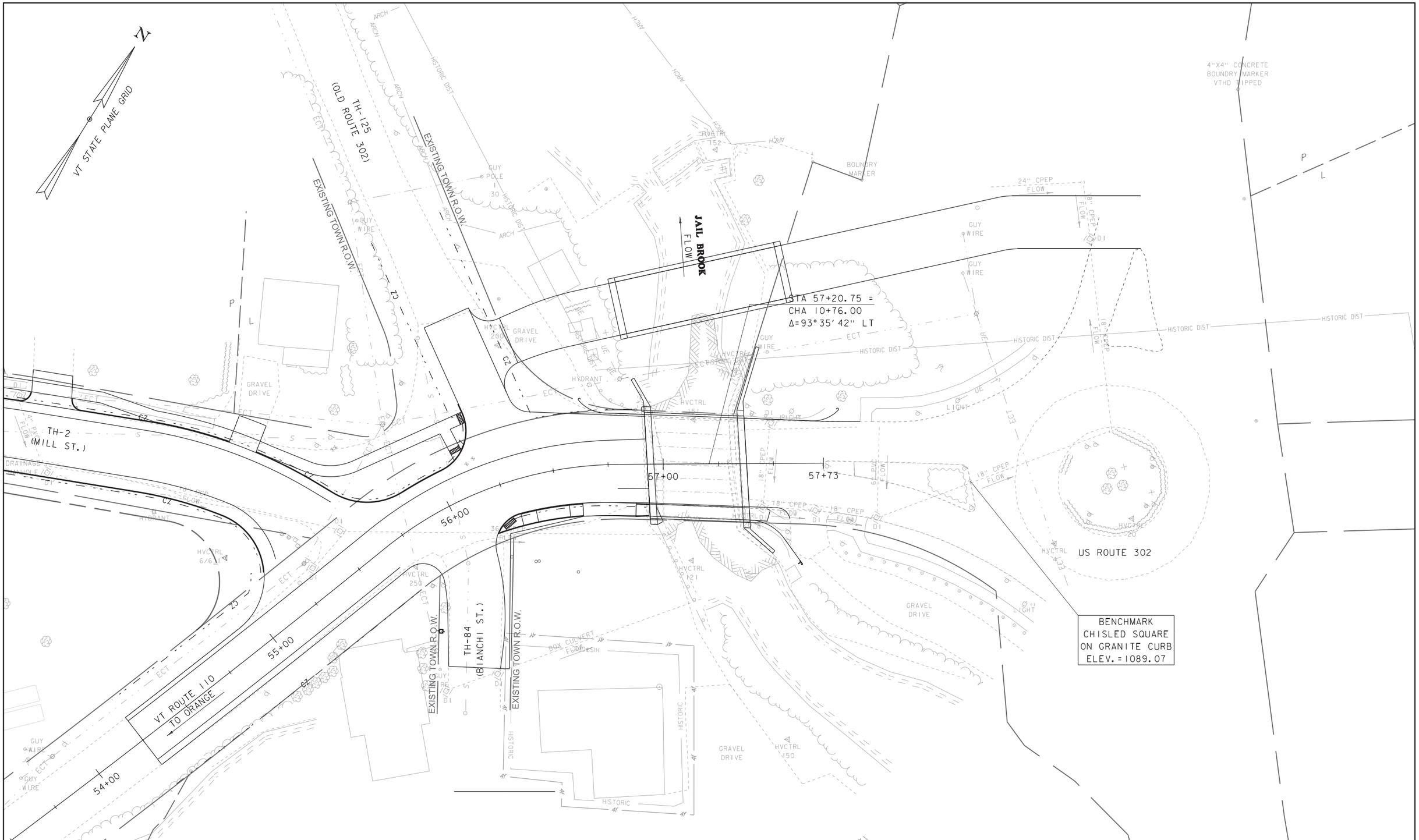
UPSTREAM TEMPORARY BRIDGE

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

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/sl2c576TCborder.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
UPSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 13 OF 14



BENCHMARK
CHISLED SQUARE
ON GRANITE CURB
ELEV. = 1089.07

EXISTING BRIDGE INFORMATION
BUILT 1930, RECONSTRUCTED 1959
44' LONG, SINGLE SPAN
CONCRETE T-BEAMS, CONCRETE DECK

INTERSECTION OF VT ROUTE 110
AND MILL ST (TH-2) TO BE
UPGRADED BY PROJECT 10C388
(BARRE TOWN STP HES 0169(8))

DOWNSTREAM TEMPORARY BRIDGE

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

PROJECT NAME: BARRE TOWN	
PROJECT NUMBER: BF 0169(12)	
FILE NAME: 12c576/s12c576TCborder.dgn	PLOT DATE: 10-OCT-2019
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
DOWNSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 14 OF 14