STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Bristol BF 021-1(33)

VT Route 116, BRIDGE 12 OVER BALDWIN CREEK

February 24, 2015

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I. Site Information

Bridge 12 is a State owned bridge located on VT Route 116 approximately 0.1 miles north of the junction with VT Route 17 (Drake Woods Road). The bridge is surrounded by three quadrants of archaeologically sensitive areas. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Minor Arterial
Bridge Type	Steel Beam Bridge
Bridge Length	89 feet
Year Built	1955
Ownership	State of Vermont

Need

Bridge 12 carries VT Route 116 across Baldwin Creek. The following is a list of deficiencies of Bridge 12 and VT Route 116 at this location:

1. Bridge 12 is Structurally Deficient.

2. The existing concrete deck is in poor condition. There have been pop-outs in the past, and future deck pop-outs are possible at any time. Many of the deck bays continue to deteriorate, with large areas of delaminations and fully exposed reinforcing steel. The shoulders on the bridge are too narrow, and the bridge railing is substandard.

3. The existing bridge is too narrow for the roadway classification and traffic volumes.

4. The roadway is not banked sufficiently for the horizontal curve present.

5. The existing bridge railing is not crash tested. The concrete bridge railing posts are deteriorated with exposed reinforcing steel throughout.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2017 and 2037.

TRAFFIC DATA	2017	2037
AADT	2,700	2,800
DHV	300	320
ADTT	320	480
%T	10.7	15.7
%D	59	59

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on an ADT of 2,800, a DHV of 320, and a design speed of 50 mph for a Minor Arterial.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 4.3	12'/6' (36')	11'/4' (30')	
Bridge Lane and Shoulder Widths	VSS Section 4.7	11'/4' (30')	11'/5' (32')	Substandard
Clear Zone Distance	VSS Table 4.4	No Issues Noted	20' fill / 12' cut (1:3 slopes) 14' cut (1:4 slopes)	
Banking	VSS Section 4.13	e_{left} = -6.0% e_{right} = +3.7%	8% (max)	
Speed		50 mph (Posted)	50 mph (design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 1,430	R_{min} = 1,400' @ e = 6.4%	Substandard
Vertical Grade	VSS Table 4.5	2.346% (max)	4% (max) for level terrain	
K Values for Vertical Curves	VSS Table 4.1	K_{crest} = 135, K_{sag} = 131	110 crest / 90 sag	
Vertical Clearance	VSS Section 4.8	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 4.1	592'	400'	
Bicycle/Pedestrian Criteria	VSS Table 4.7	4' shoulder	5' Shoulder	Substandard
Bridge Railing	Structures Design Manual Section 13	Steel Beam Railing mounted on Concrete posts	TL-4	Substandard
Hydraulics	VTrans Hydraulics Section	1. Passes Q_{50} storm event with 1.5' of freeboard 2. Clearspan = 62'	1. Pass Q_{50} storm event with 1.0' of freeboard 2. $BFW_{calculated}$ = 39'	
Structural Capacity	SM, Ch. 3.4.1	Structurally Deficient	Design Live Load: HL-93	Substandard

Inspection Report Summary

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

05/08/2013 – The concrete deck does have some significant deterioration along the underside. Bridge is an excellent candidate for rehabilitation with a new concrete deck and general abutment reconditioning. ~ MJ/JS

04/11/2011 – Deck has heavy deterioration with large spalls forming along the underside and substantial structural cracking with extensive delaminations. Bridge is a good candidate for reconstruction with a new deck. Plans should be made to replace this deck in the next 5 to 10 years. Abutment #2 could use some minor concrete repair work. ~MJ/DK

04/15/09 – The deck is in poor condition and full depth holes could occur any time, any place. The new membrane and pavement may help to slow the deterioration down some. There is spalling in the abutment 2 bridge seat, up to the bearing of beam 1. This area needs to be repaired. ~DCP

Hydraulics

The existing structure meets the current standards of the VTrans Hydraulic Manual. The standard is to pass a Q_{50} design storm event with 1 foot of free board. The Q_{50} storm currently passes under the structure with 1.5' of freeboard. Additionally, the existing clearspan of 62' meets the minimum calculated bankfull width of 39'.

The VTrans Hydraulics Section has made recommendations for either a rehabilitation project or a replacement project. It is recommended that the existing waterway area is not reduced regardless of the scope. These recommendations can be found in the preliminary hydraulics report in the Appendix.

Utilities

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

Municipal Utilities

- There are no municipal water or sewer mains in this vicinity of the bridge. There is, however, a municipally owned dry fire hydrant near the southeast corner of the bridge.

Public Utilities (Aerial)

- The primary aerial electric transmission lines (Single phase) and communication cables approach the project from the south, along the easterly side of VT Route 116. From pole #71/34/88 in the southeast quadrant of the VT 116/VT 17 intersection a single phase electric line and one communication cable (Comcast) crosses VT 17 to Mary's Restaurant; from this same pole a single phase electric line and two communication cables (Waitsfield Champlain Valley Telecom and Comcast) cross diagonally to the west side of VT 116, passing diagonally over Bridge 12.

Public Utilities (Underground)

- There are buried utilities (telephone cable and electric service lines) which begin at pole #33/87 (see Existing Conditions Layout Sheet) and extend along the easterly side of VT 116 to the intersection with VT 17. The buried cable and conduit the travels along the southern edge of VT 17, ending approximately 230' from pole #71/34/88.

It is anticipated that relocation of utilities will be necessary for construction.

Right-Of-Way

The existing Right-of-Way is plotted on the Existing Conditions Layout Sheet. The existing bridge is located well within the Right-of-Way and it is anticipated that additional rights would only be needed for placement of a temporary bridge.

Resources

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

Biological:

Wetlands/Watercourses

There are no apparent wetlands within the project area.

Baldwin Creek flows through the project area. This brook supports a variety of aquatic organisms including wild brook trout. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water.

Wildlife Habitat

The project corridor ranks as in the range of 5 out of 5 on the wildlife habitat regional linkage analysis. This indicates that the area is of highest importance to wildlife movement. Traffic in this area is moderate. The riparian zone along Baldwin Creek would serve as a corridor for a variety of wildlife species. Consideration should be made to provide some sort of wildlife shelf within the existing crossing. This would consist of having a minor shelf that does not have riprap on the surface. This shelf can be overtopped during higher flows and could be incorporated into the design fairly easily.

Baldwin Creek supports a variety of aquatic organisms including wild brook trout. The design of the new structure will need to accommodate aquatic organism passage (AOP) in accordance to the VT Fish and Wildlife AOP guidelines. As the design moves forward it would be beneficial to receive feedback from the fisheries biologist.

Rare, Threatened and Endangered Species

There are no mapped federally or State listed rare, threatened or endangered species within the project area according to latest GIS information available.

Agricultural Soils / Floodplains

There are no prime agricultural soils within the project area.

Hazardous Materials:

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

Historic:

Bridge 12 is not a historic bridge and there are no historic properties within the project area.

Archaeological:

Three quadrants of archaeological sensitivity have been located based on known site location and a high predictive model score based on known environmental factors. VT-AD-483 is a historic site in close proximity to the project. Additional components of this site and possibly other historic sites may be located in the project area. Subsurface testing will be needed to confirm.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

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

Option 1: Off-Site Detour

This option would close the bridge to traffic during construction and reroute traffic from VT Route 116, to US Route 2, US Route 7, VT Route 17, back to VT Route 116. The official detour is appropriate for and chosen based on the volume and type of traffic which will be diverted during construction and the currently existing traffic volumes and composition. The detour has an end-to-end distance of 61.3 miles, takes approximately 1 hour, 35 minutes to drive, and has an additional travel distance of 12.8 miles for through traffic.

There is essentially one local bypass route that avoids the construction site if VT 116 is closed to through traffic. Local bypass routes are not signed, or official, detour routes and are not necessarily appropriate for all traffic that needs to detour around a site. Because local bypass routes are comprised of public roads that circumvent the road closure in a shorter distance than the official detour, they may see an increase in traffic from passenger cars as locals use them during the closure.

The local bypass in this location entails taking VT Route 116, to Meehan Road, Upper Meehan Road, Dan Sargent Road, and VT Route 17, back to VT Route 116. The end-to-end distance is 6.0 miles and the additional through distance is 4.0 miles. This local bypass route has dirt roads with sharp turns and steep grades, and as such is not appropriate for trucks.

A map of the detour route and local bypass route can be found in the Appendix.

Advantages: Utilizing an off-site detour would eliminate the need to use a temporary bridge or phase construction to maintain traffic. This would decrease the cost and amount of time required to construct a project in this location. The impacts and amount of temporary rights required to

construct a project in this location would also be reduced for this option. Many times by decreasing the impacts and area of additional right of way required, the length of time to develop the project can be decreased. The safety of both construction workers and the travelling public will be improved by removing traffic from the construction site.

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

Option 2: Phased Construction

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

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

Based on the current traffic volumes, it is acceptable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal. Additionally, based on the existing bridge width, it is possible to phase traffic without widening the bridge beyond the standard or shifting the horizontal alignment. See the Appendix for the recommended phasing layout plans.

Advantages: Traffic flow would be maintained through the project corridor during construction. Also, this option would have minimal impacts to adjacent properties. Right-of-Way would not need to be obtained for this option.

Disadvantages: Phased construction generally involves higher costs and complexity of construction. Costs are usually higher and construction duration is longer, since many construction activities have to be performed two times. Additionally, since cars are traveling near construction activity, there is decreased safety. There would be some delays and disruption to traffic, since the road would be reduced to one-way traffic.

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed either upstream or downstream of the existing structure. An upstream temporary bridge would interfere with the dry hydrant discussed above in the utilities section. Additionally, both an upstream and a downstream temporary bridge would have adverse impacts to archaeologically sensitive resources located in the project area; a downstream temporary bridge would have a greater impact area to these resources. Both an upstream and downstream temporary bridge alignment would have limits outside the existing Right-of-Way.

Additional costs would be incurred to use a temporary bridge, including the cost of the bridge itself, installation and removal, restoration of the disturbed area, and the time and money associated with

the temporary Right-of-Way. Additional studies would be triggered by the impacts to archaeologically sensitive areas.

A one-way temporary bridge with a signal would be preferred based on the daily traffic volumes. See the Temporary Bridge Layout Sheet in the Appendix.

Advantages: Traffic flow can be maintained along the VT Route 116 corridor.

Disadvantages: This option would require some Right-of-Way acquisition, which would lengthen the project development phase by a minimum of two years. This option would have adverse impacts to surrounding resources. There would be decreased safety to the workers and to vehicular traffic, because of cars driving near the construction site, and construction vehicles entering and exiting the construction site. This traffic control option would be costly, and time consuming, as construction activities would take a second construction season, in order to set up the temporary bridge.

III. Alternatives Discussion

Bridge 12 is considered structurally deficient, due to the poor deck rating. Many of the deck bays continue to deteriorate, with large areas of delaminations and fully exposed reinforcing steel. The shoulders on the bridge are too narrow, and the bridge railing is substandard.

No Action

This alternative would involve leaving the bridge in its current condition. The superstructure and substructure are in good and satisfactory condition respectively, however, the deck is in poor condition, so something will have to be done to improve the deck, at a minimum, in the near future. Although the bridge is not in imminent danger of collapse, it will eventually be posted for lower traffic loads. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Bridge Rehabilitation

The deck is the bridge component that will require work within the next 10 years. Thus, the primary goal of a rehabilitation option will be to rectify the deck issues. There are two types of deck rehabilitation options available for concrete structures: concrete patching and deck replacement.

Alternative 1: Deck Patching

Patching involves removing the deteriorated and loose concrete from the structure. Then forms are constructed such that a thin layer of new concrete can be placed to replace this removed concrete. There are several disadvantages with this method of rehabilitation in this situation. The first is that most of the patching is overhead; this requires the work to take place in difficult circumstances, where the work is taking place in the river. The concrete must be removed without spoiling the river and the new concrete must be placed from underneath the bridge. Second, having newer non-chloride laced concrete adjacent to the existing concrete usually exacerbates the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 15 years with the addition of sacrificial anodes into the patched structure.

Alternative 2: Deck Replacement

This alternative would involve removing the existing deck in its entirety and placing a new deck on the existing steel beams. The advantage to performing a complete deck replacement over patching in this situation is that the lifespan of all new concrete would be much greater than patching. There is some rust and exposed rebar on the abutments at the bridge seats. These areas would be cleaned and repaired as necessary. Additionally there would be repairs as follows:

- There is chloride attack along the abutment at the bridge seats as evident by spalling concrete and efflorescence. This is due to leaky bridge joints. This can be mitigated with concrete repair of the bridge seats, and new bridge joints.

- The existing concrete and steel beam bridge rail would be replaced in its entirety with a new railing.

The existing substructure is in satisfactory condition, and it is reasonable to assume that it can safely carry anticipated traffic loads for an additional 40 years. With the exception of bridge seat patching, no repairs would be recommended to the existing substructure. Additionally, there is adequate stone fill in front of the abutments for scour protection.

The existing lane widths and shoulders on the bridge are 11 feet wide and 4 feet wide respectively; this does not meet the minimum standard of 11 feet and 5 feet respectively. The deck replacement option would provide 5 foot shoulders to meet the standard.

Advantages: This alternative would address the structural deficiencies of the existing bridge, with minimum upfront costs. This option would have minimal impacts to adjacent properties and resources. The substandard bridge width would be rectified for the deck replacement option (Alternative 2).

Disadvantages: The deck patching option (Alternative 1) would match the existing bridge width, which is substandard.

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

Full Bridge Replacement On Alignment

The current alignment does not meet current standards; however, it can be brought up to standards with adjustment of the roadway banking. Therefore, any new structure will be placed on the existing horizontal alignment in order to minimize project limits and impacts to adjacent properties and environmental resources.

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

a. Bridge Width

The existing lane widths and shoulders on the bridge are 11 feet wide and 4 feet wide respectively; this does not meet the minimum standard of 11 feet and 5 feet respectively. Since a new 80+ year

bridge is being proposed, the bridge geometry should meet the minimum standards. A 32 foot width bridge will be proposed.

b. Bridge Length and Skew

The existing bridge is 89 feet long with a skew of 45 degrees. This provides a clearspan normal to the channel of approximately 62 feet. The calculated bankfull width is 39 feet. A 45 degree skew matches the existing channel, but is outside the preferred limit of 20 degrees for integral abutments. The preferred substructure type is an integral abutment for scour protection. Based on the layout procedures for integral abutments and hydraulic requirements, the appropriate span for a 20 degree skew at this location is 100 feet. The bridge would have a 20 degree skew, and a span of 100 feet. This configuration would not decrease the existing hydraulic opening.

c. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The possible 100' length bridge types that can accommodate a 20 degree skew, that are most commonly used in Vermont are box beams with a structural overlay, and steel beams with a composite concrete deck (Prefabricated Bridge Units). The superstructure depth is critical for hydraulics; therefore, the shallowest beam available should be chosen to maximize the hydraulic performance.

d. Substructure Type

Preliminary borings have shown the presence of overburden material to depths greater than 50 feet, therefore abutments supported on piles appear to be feasible. Therefore integral abutments with short pile caps supported on a single row of piles are preferred. This type of substructure provides the best scour protection. It is recommended that two additional borings be completed during the design phase to determine depth of bedrock, which will aid in determination of estimated pile lengths for construction. Any rapid construction alternative should have sufficient subsurface information to verify the in-situ conditions. In order to reduce construction time, precast abutment components may be used where possible. The preliminary geotechnical report can be found in the Appendix.

e. Maintenance of Traffic:

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

IV. Alternatives Summary

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

Alternative 1: Deck Patching with Traffic Maintained with Short Term Lane Closures
Alternative 2a: Deck Replacement with Traffic Maintained on Off-Site Detour
Alternative 2b: Deck Replacement with Traffic Maintained with Phased Construction
Alternative 3a: Full Bridge Replacement with Traffic Maintained on Off-Site Detour
Alternative 3b: Full Bridge Replacement with Traffic Maintained with Phased Construction
Alternative 3c: Full Bridge Replacement with Traffic Maintained on Temporary Bridge

V. Cost Matrix[1]

Bristol BF 021-1(33)		Do Nothing	Alt 1	Alt 2a	Alt 2b	Alt 3a	Alt 3b	Alt 3c
			Deck Patching	Deck Replacement		Full Bridge Replacement		
			Short Term Lane Closures	Offsite Detour	Phasing	Offsite Detour	Phasing	Temporary Bridge
COST	Bridge Cost	$0	$155,000	$324,000	$388,800	$1,367,000	$1,435,350	$1,367,000
	Removal of Structure	$0	$0	$46,000	$82,800	$122,000	$146,400	$122,000
	Roadway	$0	$121,000	$224,000	$246,400	$305,000	$335,500	$305,000
	Maintenance of Traffic	$0	$85,000	$59,000	$177,000	$76,000	$228,000	$232,000
	Construction Costs	$0	$361,000	$653,000	$895,000	$1,870,000	$2,146,000	$2,026,000
	Construction Engineering + Contingencies	$0	$109,000	$196,000	$269,000	$561,000	$644,000	$608,000
	Total Construction Costs w CEC	**$0**	**$469,300**	**$848,900**	**$1,163,500**	**$2,431,000**	**$2,789,800**	**$2,633,800**
	Preliminary Engineering[2]	**$0**	**$162,450**	**$228,550**	**$268,500**	**$374,000**	**$429,200**	**$405,200**
	Right of Way	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$78,200**
	Total Project Costs	$0	$631,750	$1,077,450	$1,432,000	$2,805,000	$3,219,000	$3,120,040
	Annualized Costs	$0	$42,200	$27,000	$35,800	$35,100	$40,300	$39,100
SCHEDULING	Project Development Duration[3]		2 years	2 years	2 years	2 years	2 years	4 years
	Construction Duration		3 months	3 months	8 months	6 months	9 months	18 months
	Closure Duration (If Applicable)		N/A	10 days	N/A	4 weeks	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	32'	32'	32'	32'	32'	32'	32'
	Typical Section - Bridge (feet)	4-11-11-4	4-11-11-4	5-11-11-5	5-11-11-5	5-11-11-5	5-11-11-5	5-11-11-5
	Geometric Design Criteria	Substandard width	Substandard width	Meets Criteria	Meets Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No	No	Slight vertical raise	Slight vertical raise	No	No	No
	Bicycle Access	No Change	No Change	Improved	Improved	Improved	Improved	Improved
	Hydraulic Performance	Substandard	Meets Criteria	Meet Criteria	Meet Criteria	Meet Criteria	Meet Criteria	Meet Criteria
	Pedestrian Access	No Change	No Change	Improved	Improved	Improved	Improved	Improved
	Utility	No Change	No Change	Relocation	Relocation	Relocation	Relocation	Relocation
OTHER	ROW Acquisition	No	No	No	No	No	No	Yes
	Road Closure	No	No	Yes	No	Yes	No	No
	Design Life	<10 years	15 Years	40 years	40 years	80 years	80 Years	80 Years

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

VI. Conclusion

We recommend **Alternative 2b**; to replace the existing deck while maintaining traffic with phasing.

Structure:
While the deck patching option has the lowest upfront costs, a deck replacement has a lower per year cost based on a 40 year design life compared to a 15 year design life. The existing substructures are in good condition, and it is reasonable to assume that they can last another 40 years.

The proposed structure will match the existing geometry in regards to width, vertical, and horizontal alignment. The railing detail will allow for an extra 1 foot to be added to the shoulders to meet the minimum standard.

Traffic Control:
The recommended method of traffic control is to phase construction. This was chosen as the most appropriate means of maintaining traffic due to the length of the detour and the volume of traffic on the existing bridge. The ADT on VT Route 116 through the project area is 2,700 with over 10% trucks, which is somewhat high. The detour for this project location would have an end-to-end distance of 61 miles and would take approximately 1 hour, 35 minutes to drive. The local bypass route is not appropriate for trucks, so it is not appropriate to detour that volume of traffic for an extended amount of time.

Additional Right-of-Way will not be needed for phased construction. Constructing a temporary bridge at this location would require additional right-of-way, and would have impacts to archaeological resources present in three quadrants. The development and construction time and costs would increase for temporary bridge as well. Thus, the use of a temporary bridge has been discounted, over phased construction.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archeology Memo
- Historic Memo
- Local Input
- Local Bypass
- Detour Map
- Plans
    - Existing Conditions
    - Existing Plan Sheets
    - Proposed Typical Sections, Layouts, and Profiles
    - Traffic Control Sheets

Looking North over Bridge 12

Looking South over Bridge 12

Exposed reinforcing steel on underside of deck


Bridge Seat Deterioration

Bridge Railing Deterioration

Looking Downstream

Looking Upstream

Spalling concrete and Exposed Reinforcing steel on underside of deck

Scale 1:65,499

N

INTERSTATE
STATE LONG
STATE SHORT
TOWN LONG
FAS/FAU
FAS/FAU HWY
INTERSTATE
STATE HIGHWAY
CLASS 1
CLASS 2
CLASS 3
CLASS 4
LEGAL TRAIL
PRIVATE
DISCONTINUED
DISTRICT
POLITICAL BOUNDARY
NAMED RIVERS-STREAMS
UNNAMED RIVERS-STREAMS

BRISTOL BR 12
BF 021-1(33)

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011

BRISTOL
ADDISON COUNTY
DISTRICT # 5

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for BRISTOL **bridge no.:** 00012 **District:** 5

Located on: VT 00116 ML **over** BALDWIN CREEK **approximately** 0.1 MI N JCT. VT.17 E **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 7 GOOD

Substructure Rating: 6 SATISFACTORY

Channel Rating: 7 GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200021001201032

Federal Sufficiency Rating: 074.7

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1955 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 25

ADT: 002300 **% Truck ADT:** 09

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0086

Structure Length (ft): 000089

Lt Curb/Sidewalk Width (ft): 0.3

Rt Curb/Sidewalk Width (ft): 0.3

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

Deck Width Out-to-Out (ft): 33.3

Appr. Roadway Width (ft): 036

Skew: 45

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: STEEL BEAM

Number of Approach Spans 0000 **Number of Main Spans:** 001

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 2 PREFORMED FABRIC

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 4 MEETS MINIMUM TOLERABLE 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: 4 H 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 052014 **Insp. Freq. (months)** 12 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

05/16/2014 - Deck underside has some large popouts extending for several feet of the beam bays with exposed rusted rebar. No full depth hole concern though. Beams are in very good shape and abutments need only patch repair. Bridge is an excellent candidate for rehabilitation with a new concrete deck and general abutment reconditioning~ MJ/JS

*05/08/2013 - * The concrete deck does have some significant deterioration along the underside. Bridge is an excellent candidate for rehabilitation with a new concrete deck and general abutment reconditioning. ~ MJ/JS*

*04/11/2011 - * Deck has heavy deterioration with large spalls forming along the underside and substantial structural cracking with extensive delaminations. Bridge is a good candidate for reconstruction with a new deck. Plans should be made to replace this deck in the next 5 to 10 years. Abutment #2 could use some minor concrete repair work. ~ MJ/DK*

04/15/09 The deck is in poor condition and full depth holes could occur any time, any place. The new membrane and pavement may help to slow the deterioration down some. There is spalling in the abutment 2 bridge seat, up to the bearing of beam 1. This area needs to be repaired. DCP

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Leslie Russell, P.E., Hydraulics Project Supervisor

DATE: 20 March 2014

SUBJECT: Bristol BF 021-1(33) VT 116 BR 12 over Baldwin Creek

---

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

Existing Conditions

The existing structure was built in 1955. It is a steel beam bridge with concrete deck. It is on a large skew. The inspection report states that the skew is 45 degrees. The bridge measures about 87' along the roadway. It has a clear span length of approximately 62', with a clear height of about 8', providing a waterway opening of 320 sq. ft. The bridge has concrete abutments on spread footings.

The upstream average low beam elevation is approximately 640.6'. With a Q50 water surface elevation of 639.1', there is 1.5' of freeboard at Q50. Therefore, this bridge is hydraulically adequate.

It appears that the channel has been stable for scour.

Recommendations

In sizing a new structure we attempt to select structures that meet the hydraulic standards, fit the natural channel width, the roadway grade and other site conditions. The bankfull width varies through the reach from about 35' to 40'. The Agency of Natural Resources VT Regional Hydraulic Geometry Curve gives a bank full width of 39' for this size drainage area. With a 62' clear span, the bridge does not constrict the channel. Based on our calculations and the information available, we recommend any of the following structures as a replacement at this site:

1. If it is determined that the foundations are structurally sound and in satisfactory condition, it is acceptable to replace the concrete deck and superstructure.

2. A new bridge can be constructed, if needed. Since there is developed property upstream, water surface elevations should not be raised. Therefore, a bridge with a 62' clear span with an average low beam elevation of 640.6' can be built. The beams shouldn't be lowered because lowering the beams will raise the Q100 water surface elevation and flood upstream property more frequently. This bridge should provide 320 sq. ft. of waterway area. Therefore, any new bridge should have the same span, height and waterway area as the existing.

3. Any similar structure with a minimum clear span of 62' and at least 320 sq. ft. of waterway area, that fits the site conditions, could be considered.

General Comments

If a new bridge is installed, the bottom of abutment footings should be at least six feet below the channel bottom, or to ledge, to prevent undermining. Abutments on piles should be designed to be free standing for a scour depth at least 6' below channel bottom.

It is always desirable for a new structure of this size to have flared wingwalls at the inlet and outlet, to smoothly transition flow through the structure, and to protect the structure and roadway approaches from erosion. The wingwalls should match into the channel banks.

Stone Fill, Type III should be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet, up to a height of at least one-foot above the top of the opening. The stone fill should not constrict the channel or structure opening. Bottom width of stone fill should remain the same – approximately 35' wide from toe to toe – through the bridge.

Please contact us if you have any questions or if we may be of further assistance.

LGR

cc: Hydraulics Project File via NJW
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, P.E., Structures Project Manager

From: Callie Ewald, P.E., Geotechnical Engineer via Christopher C. Benda, P.E., Soils and Foundations Engineer

Date: May 7th, 2014

Subject: Bristol BF 021-1(33) – Subsurface Investigation

1.0 INTRODUCTION

We have completed our geological and geotechnical subsurface investigation for the proposed replacement of Bridge No. 12 located on VT Route 116 in Bristol, Vermont. The proposed project includes the replacement of the existing bridge with a new structure, with related channel and approach work. Contained herein are the results of field sampling and testing, laboratory analyses of soil and rock samples, as well as boring logs.

2.0 FIELD INVESTIGATION

The field investigation was conducted between April 8th and 21st, 2014. Two standard penetration borings were drilled to determine the existing subsurface stratum. A summary of the location of each boring and corresponding ground surface elevation can be found in Table 1. The values for the Northings and Eastings are based on the Vermont State Plane Grid Coordinate System NAD 83, and were located by a handheld GPS.

Table 1: Boring Locations and Elevations

Boring Number	Easting (ft)	Northing (ft)	Station (ft)	Offset (ft)	Ground Elevation (ft)
B – 101	1497217.74	603043.93	42+76	-10.7	642.3
B – 102	1497192.96	603167.73	44+01	8.8	645.3

During the boring operations, split spoon samples and standard penetration tests (SPT) were taken continuously to twenty feet and every five feet thereafter until 52 feet. Bedrock was not encountered in either of the borings. Possible cobbles and very dense material were encountered in both borings. The notation 'NXDC' found on the boring logs signifies that the core barrel was used to core around what was previously sampled or core ahead through a boulder, cobble, or very dense material. For each boring, soil samples were visually identified and SPT blow counts were recorded on the boring logs.

3.0 FIELD AND LABORATORY TESTING

The standard penetration resistance of the in-situ soil is determined by the number of blows required to drive a 2 inch OD split barrel sampler into the soil with a 140 pound hammer dropped from a height of 30 inches, in accordance with procedures specified in AASHTO T206. During the standard penetration test (SPT), the sampler is driven for a total length of 2 feet, while counting the blows for each 6 inch increment. The SPT N-value, which is defined as the sum of the number of blows required to drive the

sampler through the second and third increments, is commonly used with established correlations to estimate a number of soil parameters, particularly the shear strength and density of cohesionless soils. The N values provided on the boring logs are raw values and have not been corrected for energy, borehole diameter, rod length or overburden pressure. The VT Agency of Transportation has determined a hammer correction value, C_E, to account for the efficiency of the SPT hammer on the drill rig. For this project, a CME 45C Skid Rig was used, with a hammer energy correction factor of 1.33. This value, included on the boring logs, should be used in calculations to determine soil parameters. Laboratory tests were conducted on all samples to evaluate grain size, moisture content, and percent finer than No. 200 sieve. This testing was conducted on all of the soil samples and results can be found on the attached boring logs.

4.0 FOUNDATION RECOMMENDATIONS

Based on a preliminary look at the subsurface investigation results and the presence of overburden material to depths greater than 50 feet, abutments supported on piles appear to be feasible. We recommend two additional borings be completed during final design to determine depth of bedrock, which will aid in determination of estimated pile lengths for construction.

5.0 CONCLUSION

Once further information becomes available, we would be happy to assist in the analysis and design of components of the substructure. If you have any questions, or you would like to discuss this report, please contact us at (802) 828-2561. The boring logs are attached as available in the M:Projects\13B256\MaterialsResearch folder.

Enclosures: Boring Logs – 4 pages

cc: Electronic Read File/WEA
Project File/CCB
CEE

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

BRISTOL
BF 021-1(33)
VT-116 BR-12

Boring No.: **B-101**
Page No.: 1 of 2
Pin No.: 13B256
Checked By: CEE

Boring Crew: JUDKINS, GARROW
Date Started: 4/16/14 Date Finished: 4/21/14
VTSPG NAD83: N 603043.93 ft E 1497217.74 ft
Station: 42+76 Offset: -10.70
Ground Elevation: 642.3 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/17/14	10.3	Casing at 10.3'
04/18/14	10.5	Casing at 10.5'
04/21/14	35.9	With casing & rod.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Asphalt Pavement, 0.0 ft - 0.65 ft					
		Field Note:, No Recovery	R@2.5" (R)				
		A-1-a, SaGr, brn, Moist, Rec. = 0.7 ft, NXDC, Cleaned out casing.	6-5-13-18 (18)	7.3	61.2	26.8	12.0
5		A-1-b, SaGr, grn-brn, Moist, Rec. = 1.0 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	25-35-R@6.0" (R)	9.7	52.6	29.8	17.6
		A-1-a, SaGr, brn, Moist, Rec. = 0.5 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	15-R@5.0" (R)	12.9	53.6	31.3	15.1
10		A-1-a, SaGr, brn, Moist, Rec. = 0.6 ft, NXDC, Cleaned out casing. Lab Note: Mostly Broken Rock with sand.	18-29-20-18 (49)	17.4	56.3	32.4	11.3
		A-1-b, SaGr, red-brn, Moist, Rec. = 0.8 ft, NXDC, Cleaned out casing.	11-13-9-10 (22)	16.0	49.9	35.4	14.7
		A-1-a, SaGr, gry, Moist, Rec. = 0.4 ft, NXDC, Cleaned out casing. Lab Note: Lots of Broken Rock was within sample.	R@6.0" (R)	12.1	69.8	22.3	7.9
15		A-4, SaSi, brn, Moist, Rec. = 0.7 ft, Changed bit and sleeved down to 3 inch casing.	5-3-1-2 (4)	29.9	5.1	42.7	52.2
		A-4, GrSiSa, brn, MTW, Rec. = 0.8 ft	3-3-1-1 (4)	24.4	22.9	40.8	36.3
20		Field Note:, No Recovery	7-2-3-4 (5)				
25		A-1-a, SaGr, brn, Moist, Rec. = 0.8 ft, Lab Note: Broken Rock was within sample.	21-18-30-R@5.0" (48)	9.3	59.2	27.5	13.3
		Field Note:, NXDC, Cleaned out casing.					

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

BRISTOL
BF 021-1(33)
VT-116 BR-12

Boring No.: **B-101**
Page No.: 2 of 2
Pin No.: 13B256
Checked By: CEE

Boring Crew: JUDKINS, GARROW
Date Started: 4/16/14 Date Finished: 4/21/14
VTSPG NAD83: N 603043.93 ft E 1497217.74 ft
Station: 42+76 Offset: -10.70
Ground Elevation: 642.3 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_F = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/17/14	10.3	Casing at 10.3'
04/18/14	10.5	Casing at 10.5'
04/21/14	35.9	With casing & rod.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		A-1-b, SaGr, brn, Moist, Rec. = 1.1 ft	7-15-18-21 (33)	10.5	43.9	40.8	15.3
		Field Note:, NXDC, Cleaned out casing.					
35		A-1-a, SaGr, brn, Moist, Rec. = 0.8 ft, Lost Water return at 30 feet.	5-2-5-23 (7)	10.9	60.2	26.2	13.6
		Field Note:, NXDC, Cleaned out casing.					
40		A-1-a, SaGr, brn, Moist, Rec. = 0.7 ft, Water return came back at 40 feet.	8-11-4-9 (15)	9.7	65.0	27.7	7.3
		Field Note:, NXDC, Cleaned out casing.					
45		A-1-a, Gr, grn, Moist, Rec. = 0.6 ft, Lab Note: Mostly Broken Rock.	16-10-12-17 (22)	7.7	78.6	16.9	4.5
		Field Note:, NXDC, Cleaned out casing.					
50		A-1-b, SaGr, red-brn, Moist, Rec. = 0.7 ft, Lab Note: Broken Rock was within sample.	2-5-4-9 (9)	12.4	48.9	40.1	11.0
		Hole stopped @ 52.0 ft					
55		Remarks: 1. Hole collapsed at 12.5 ft.					

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 BRISTOL BF 021-1(33).GPJ VERMONT AOT.GDT 5/5/14

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

BRISTOL
BF 021-1(33)
VT-116 BR-12

Boring No.: **B-102**
Page No.: 1 of 2
Pin No.: 13B256
Checked By: CEE

Boring Crew: JUDKINS, GARROW, NIETO
Date Started: 4/08/14 Date Finished: 4/16/14
VTSPG NAD83: N 603167.73 ft E 1497192.96 ft
Station: 44+01 Offset: 8.80
Ground Elevation: 645.3 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_E = 1.33

Groundwater Observations

Date	Depth (ft)	Notes
04/09/14		No water to depth.
04/16/14	47.4	While drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		Asphalt Pavement, 0.0 ft - 0.57 ft					
		A-1-b, SiSaGr, Lt/brn, MTW, Rec. = 0.7 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	18-32-25-18 (57)	8.7	43.4	36.2	20.4
		Visual Description:, Broken Rock with sand, brn, MTW, Rec. = 0.1 ft, Insufficient sample for testing.	8-8-7-9 (15)				
5		A-1-b, SiSaGr, brn-Lt/gry, Moist, Rec. = 1.1 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	37-29-30-R@1.0" (59)	7.6	47.4	31.0	21.6
		A-1-b, SaGr, brn-gry, Moist, Rec. = 1.1 ft, Lab Note: Broken Rock was within sample.	24-27-22-9 (49)	11.6	49.4	32.1	18.5
10		A-1-b, SaGr, brn-gry, Moist, Rec. = 0.7 ft, Lab Note: Broken Rock was within sample.	8-7-10-12 (17)	14.4	43.4	39.0	17.6
		A-1-b, GrSa, brn, Moist, Rec. = 0.4 ft, NXDC, Cleaned out casing.	11-9-16-23 (25)	15.5	34.2	61.5	4.3
		A-1-b, GrSa, Lt/gry, Moist, Rec. = 0.3 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	11-12-9-9 (21)	12.7	43.9	44.8	11.3
15		A-1-b, GrSa, brn, Wet, Rec. = 0.5 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	6-3-22-23 (25)	14.6	39.3	43.1	17.6
		A-1-b, SiSaGr, brn-Lt/gry, Wet, Rec. = 0.6 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	38-22-18-10 (40)	12.1	39.6	38.5	21.9
		Visual Description:, Broken Rock with sand, brn-gry, Wet, Rec. = 0.1 ft, Insufficient sample for testing.	8-4-4-3 (8)	14.3			
20							
25		A-2-4, SiSa, gry-Lt/brn, MTW, Rec. = 0.6 ft, NXDC, Cleaned out casing. Lab Note: Broken Rock was within sample.	9-12-17-12 (29)	18.1	19.6	58.0	22.4
		Field Note:, NXDC, Cleaned out casing.					

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 BRISTOL BF 021-1(33).GPJ VERMONT AOT.GDT 5/5/14

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION
SUBSURFACE INFORMATION

BORING LOG

BRISTOL
BF 021-1(33)
VT-116 BR-12

Boring No.: **B-102**
Page No.: 2 of 2
Pin No.: 13B256
Checked By: CEE

Boring Crew: JUDKINS, GARROW, NIETO
Date Started: 4/08/14 Date Finished: 4/16/14
VTSPG NAD83: N 603167.73 ft E 1497192.96 ft
Station: 44+01 Offset: 8.80
Ground Elevation: 645.3 ft

	Casing	Sampler
Type:	WB	SS
I.D.:	4 in	1.5 in
Hammer Wt:	N.A.	140 lb.
Hammer Fall:	N.A.	30 in.
Hammer/Rod Type:	Auto/AWJ	
Rig:	CME 45C SKID	C_F = 1.33

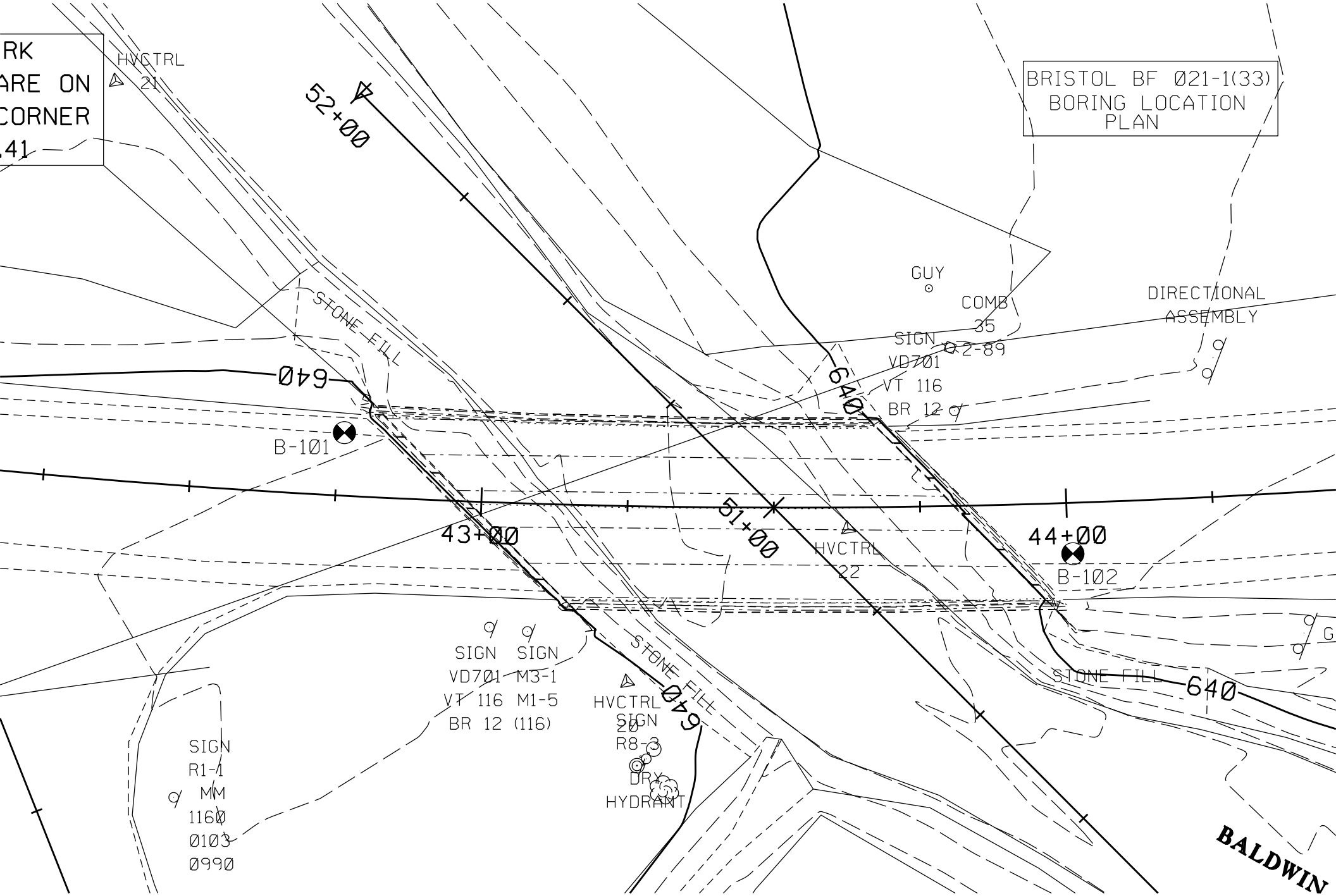
Groundwater Observations

Date	Depth (ft)	Notes
04/09/14		No water to depth.
04/16/14	47.4	While drilling.

Depth (ft)	Strata (1)	CLASSIFICATION OF MATERIALS (Description)	Blows/6" (N Value)	Moisture Content %	Gravel %	Sand %	Fines %
		A-2-4, SiSa, Lt/brn, MTW, Rec. = 1.2 ft, Lab Note: Broken Rock was within sample.	12-12-11-13 (23)	19.7	16.1	60.5	23.4
35		A-1-b, GrSa, Lt/brn, MTW, Rec. = 0.3 ft, Lab Note: Broken Rock was within sample.	47-22-16-13 (38)	11.4	34.3	50.5	15.2
		Visual Description:, Broken Rock with sand, gry, MTW, Rec. = 0.1 ft, Insufficient sample for testing.					
		Field Note:, NXDC, Cleaned out casing.					
40		A-2-4, SiGrSa, Lt/gry, MTW, Rec. = 0.6 ft, Lab Note: Broken Rock was within sample.	14-14-10-5 (24)	14.0	24.1	53.7	22.2
45		A-1-b, GrSa, Lt/brn, Moist, Rec. = 0.7 ft, Lab Note: Broken Rock was within sample.	6-14-15-11 (29)	10.3	39.9	44.0	16.1
50		A-1-b, SiSaGr, brn, Moist, Rec. = 0.6 ft, Lab Note: Broken Rock was within sample.	13-13-16-13 (29)	9.8	43.3	35.0	21.7
		Hole stopped @ 52.0 ft					
55		Remarks: 1. Hole collapsed at 7.6 ft.					

Notes:
1. Stratification lines represent approximate boundary between material types. Transition may be gradual.
2. N Values have not been corrected for hammer energy. C_E is the hammer energy correction factor.
3. Water level readings have been made at times and under conditions stated. Fluctuations may occur due to other factors than those present at the time measurements were made.

BORING LOG 2 BRISTOL BF 021-1(33).GPJ VERMONT AOT.GDT 5/5/14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HVCTRL
20
SIGN
R8-3
DRY
HYDRANT
SIGN
R1-1
MM
1160
0103
0990
STONE FILL
640
BALDWIN

VERMONT

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

Agency of Transportation

[phone] 802-828-3979
[fax] 802-828-2334
[ttd] 800-253-0191

To: James Brady, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 1/29/2014

Subject: Bristol BF 021-1(33) - Natural Resource ID

I have completed my natural resource scoping review for the above referenced project. My evaluation has included the following resources: wetlands, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed all existing mapped information and other information in the project file. A site visit has not been completed although I will be conducting a site visit at some point when in the area.

Wetlands/Watercourses
There are no apparent wetlands within the project area.

Baldwin Creek flows through the project area. This brook supports a variety of aquatic organisms including wild brook trout. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

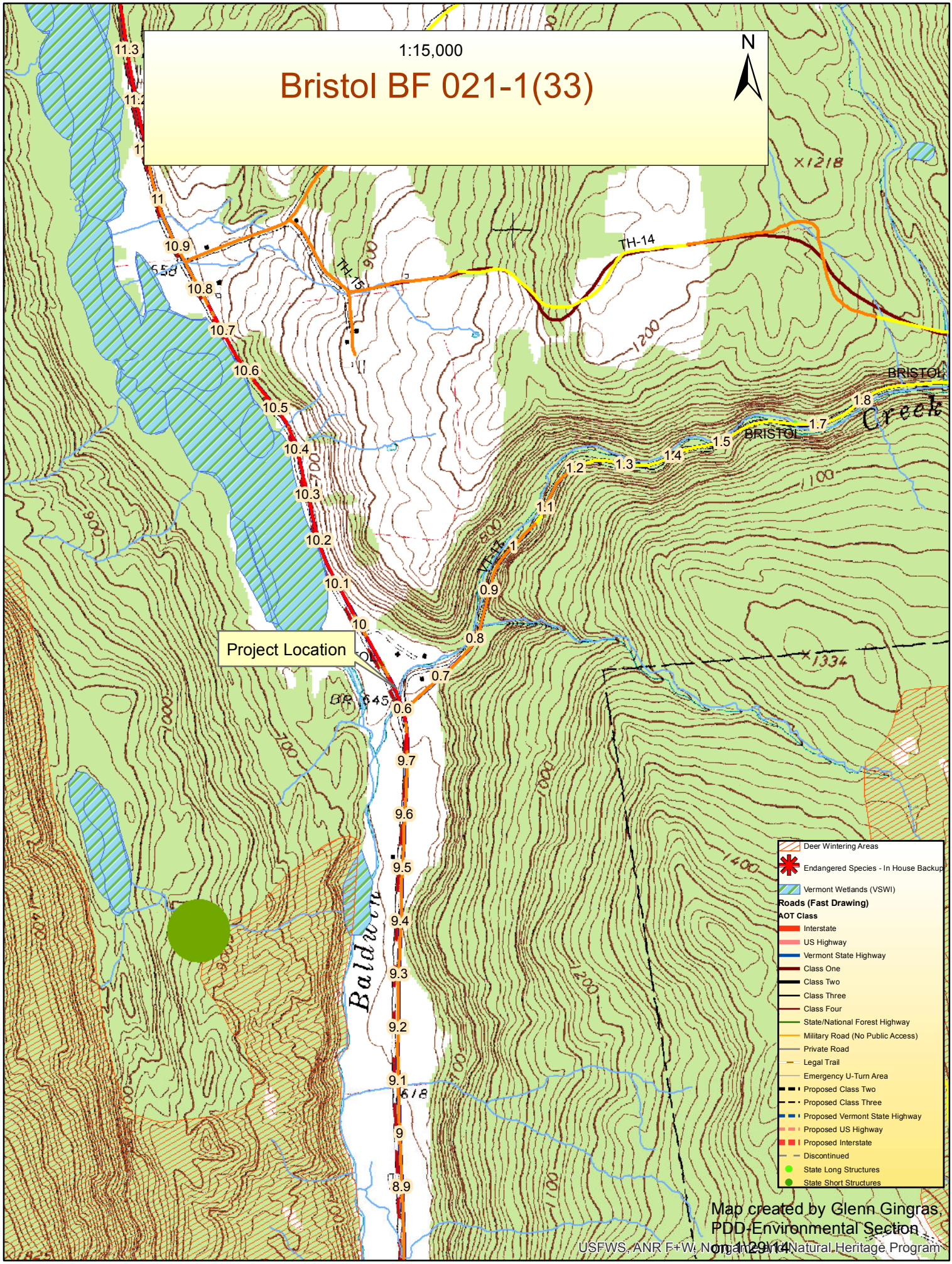
The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water.

Wildlife Habitat
The project corridor ranks as in the range of 5 on the wildlife habitat regional linkage analysis. This indicates that the area is of highest importance to wildlife movement. Traffic in this area is moderate. The riparian zone along Baldwin Creek would serve as a corridor for a variety of wildlife species. Consideration should be made to provide some sort of wildlife shelf within the existing crossing. This would consist of having a minor shelf that does not have riprap on the surface. This shelf can be overtopped during higher flows and could be incorporated into the design fairly easily.

Baldwin Creek supports a variety of aquatic organisms including wild brook trout. The design of the new structure will need to accommodate aquatic organism passage (AOP) in accordance to the VT Fish and Wildlife AOP guidelines. As the design moves forward it would be beneficial to receive feedback from the fisheries biologist.

Rare, Threatened and Endangered Species
There are no mapped federally or State listed rare, threatened or endangered species within the project area according to latest GIS information available.

Agricultural Soils
There are no prime agricultural soils within the project area.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Bristol BF 021-1(33)
N
Project Location
TH-14
TH-15
TH-1
BRISTOL
Creek
Baldwin
BR 645
Deer Wintering Areas
Endangered Species - In House Backup
Vermont Wetlands (VSWI)
Roads (Fast Drawing)
AOT Class
Interstate
US Highway
Vermont State Highway
Class One
Class Two
Class Three
Class Four
State/National Forest Highway
Military Road (No Public Access)
Private Road
Legal Trail
Emergency U-Turn Area
Proposed Class Two
Proposed Class Three
Proposed Vermont State Highway
Proposed US Highway
Proposed Interstate
Discontinued
State Long Structures
State Short Structures
Map created by Glenn Gingras,
PDD-Environmental Section
on 1/29/14
USFWS, ANR F+W, Nongame & Natural Heritage Program

VERMONT

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

Agency of Transportation

[phone] 802-828-3981
[fax] 802-828-2334
[ttd] 800-253-0191

To: James Brady, VTrans Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer
via Brennan Gauthier, VTrans Archaeologist

Date: 4/28/2014

Subject: Bristol Bridge 12, VT 17/116 – Archaeological Resource ID

James,

A field resource identification has been completed for Bridge 12 on VT 116 over Baldwin Creek in the town of Bristol, Addison County, Vermont. This bridge is located slightly north of the intersection of VT 17 and 116. Three quadrants of archaeological sensitivity have been located based on known site location and a high predictive model score based on known environmental factors. VT-AD-483 is a historic site in close proximity to the project. Additional components of this site, and possibly other historic sites may be located in the project APE. Subsurface testing will be needed to confirm.

Please feel free to contact me with any questions or concerns that may arise as part of this project. I've included historic maps and a visual illustration of the archaeology geodatabase sensitivity.

Sincerely,

Brennan

Brennan Gauthier
VTrans Archaeologist
Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-3965
fax. 802-828-2334
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation

Figure 1: Location Map

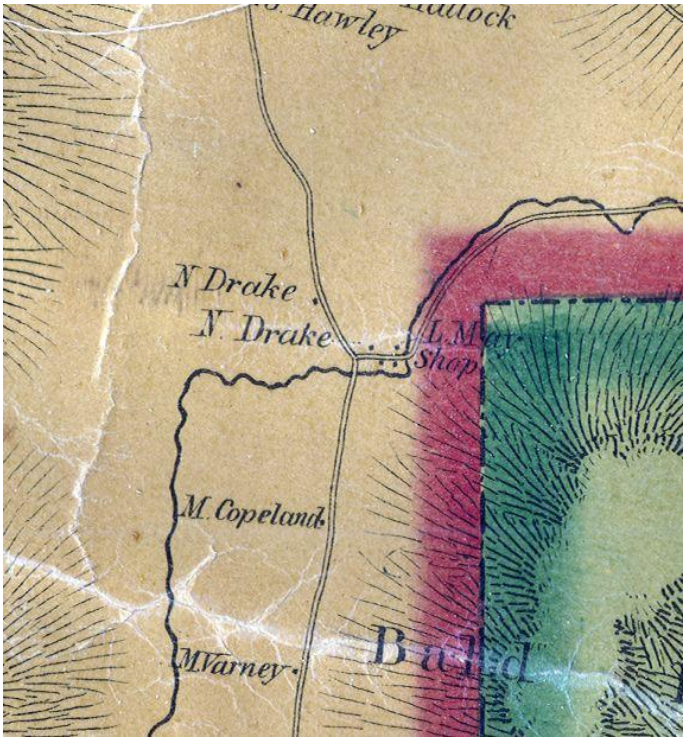


Figure 2: 1850s Map Showing Crossing Location

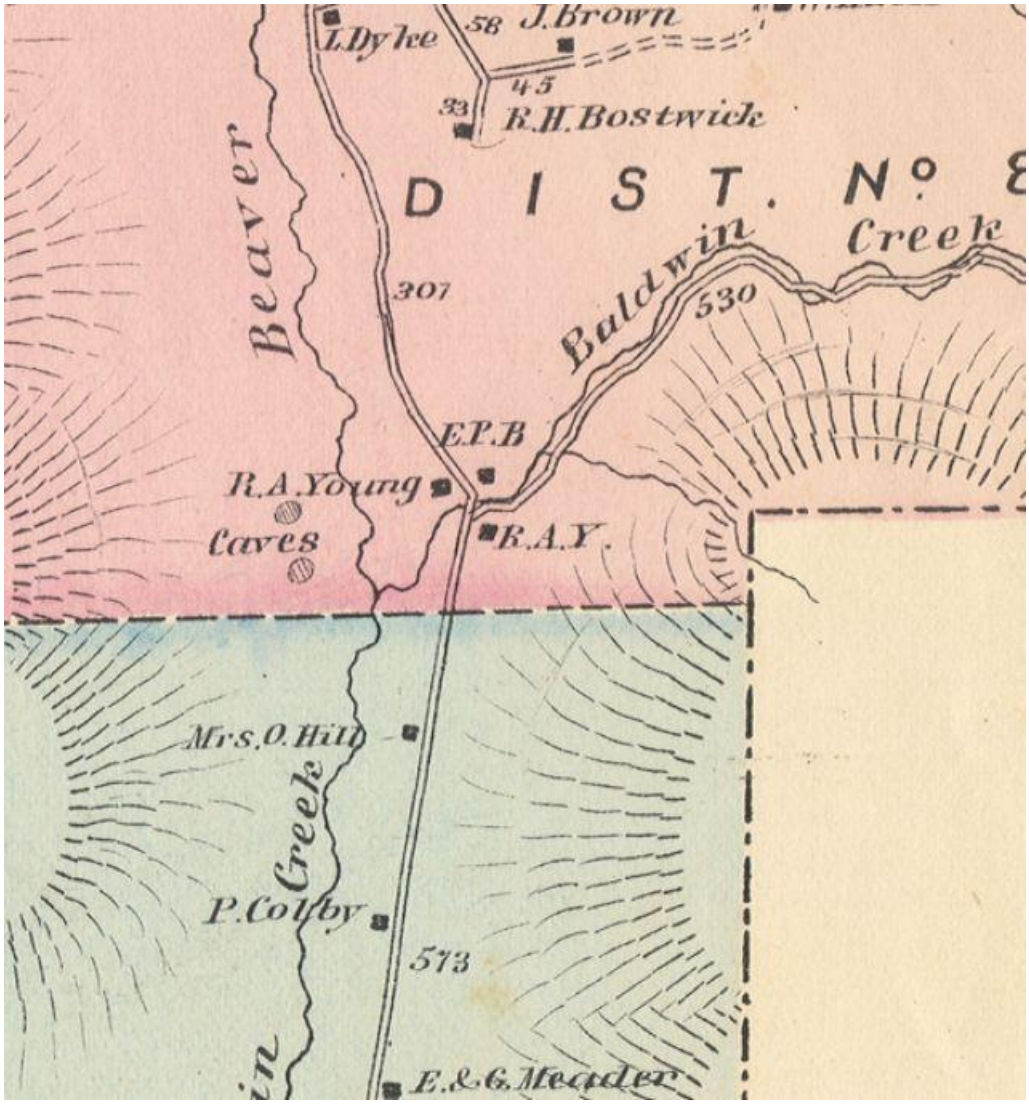
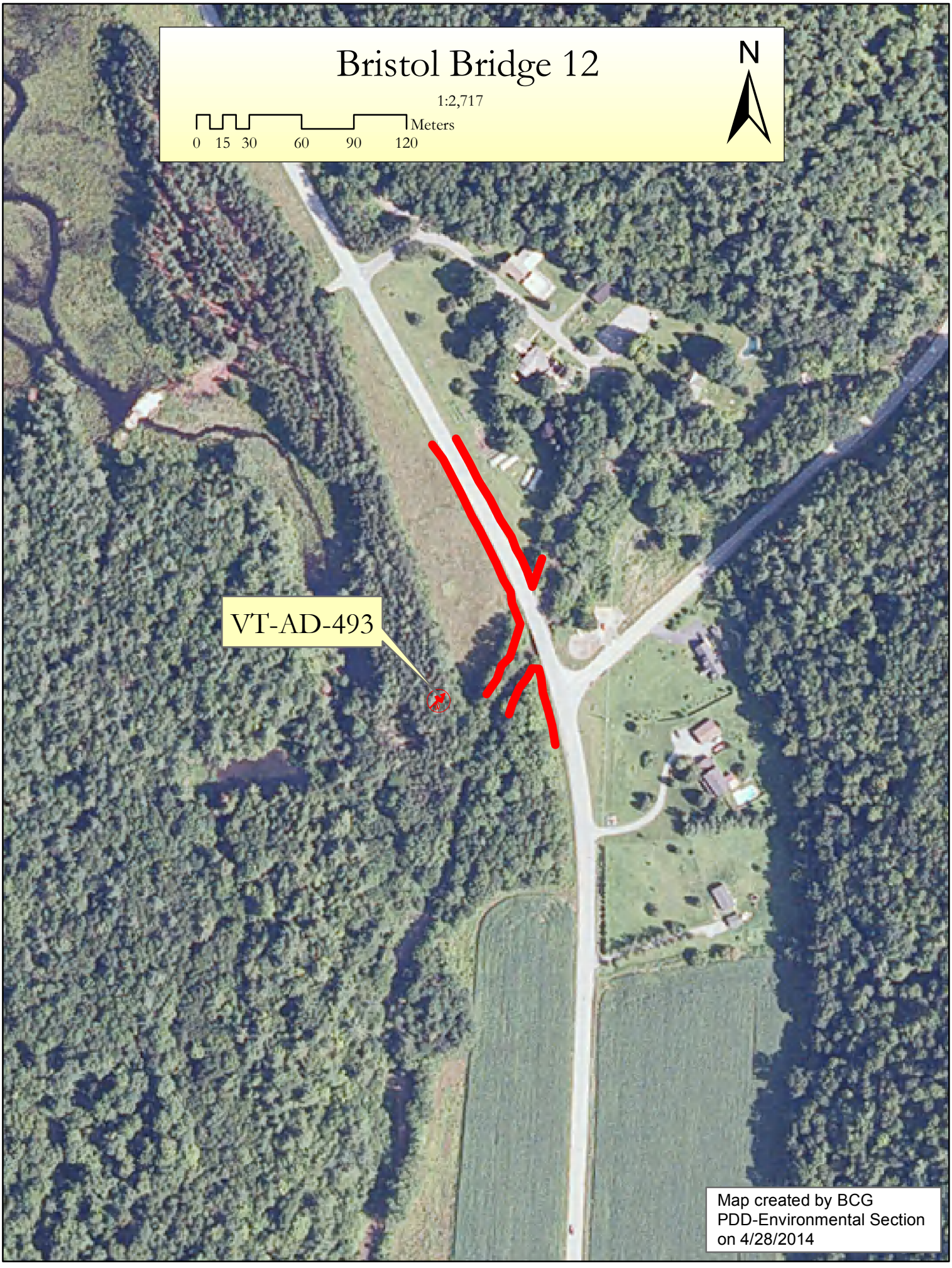


Figure 3: 1860s Map


Bristol Bridge 12
1:2,717
0 15 30 60 90 120
Meters
N
VT-AD-493
Map created by BCG
PDD-Environmental Section
on 4/28/2014

Stone, Laura

From: O'Shea, Kaitlin
Sent: Tuesday, March 25, 2014 12:37 PM
To: Brady, James
Cc: Williams, Chris; Newman, Scott
Subject: RE: Bristol BF 021-1(33) Resource ID

Hi James,

I have completed the historic resource ID for this project. Bridge 12 is not a historic bridge and there are no historic properties within the APE.

Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

802-828-3962
Kaitlin.O'Shea@state.vt.us

From: Brady, James
Sent: Tuesday, January 28, 2014 8:26 AM
To: Armstrong, Jon; Brown, Jane; Gingras, Glenn; Russell, Jeannine; Gauthier, Brennan; Newman, Scott; O'Shea, Kaitlin
Cc: Williams, Chris
Subject: Bristol BF 021-1(33) Resource ID

From: James Brady, Environmental Specialist
Date: January 28, 2014
Project: Bristol BF 021-1(33)
PIN: 13B256 **EA**: 0211033 001

Project Manager: Chris Williams
Link to Project Folder: Z:\PDD\EnvironmentalHydraulics\EnvironmentalSpecialists\Projects\Bristol\BristolBF021-1(33)
Location: http://maps.google.com/maps?q=44.1533,+-73.0456+(Town BRISTOL, Route VT116, Bridge 00012)&iwloc=A&hl=en

Hello All,

Please provide a resource ID for this structure. Bridge No. 12 is located on VT Route 116 in Bristol over Baldwin Creek. This bridge is approximately 100 feet north of the intersection of VT Route 17 and VT Route 116, on VT Route 116.

Project Scope:
The existing structure is a 1-span rolled beam structure approximately 89' long. The scope of the project and method of traffic maintenance will be determined after resources have been identified and we complete the Scoping Report.

If you have any questions or need additional information please let me know.
Thank you,

James

James Brady
Environmental Specialist
Vermont Agency of Transportation
One National Life Drive
Montpelier, VT 05633-5001
Office: (802) 828-3978

Town of Bristol
Therese Kirby
Town Clerk & Treasurer
P.O. Box 249
Bristol, VT 05443
(802) 453-2410

May 7, 2014

State of Vermont
Structures Design Section
Chris Williams
One National Life Drive
Montpelier, VT 05633-5001

Re: Bristol BF 021-1 (33) VT 116, Bridge 12 over Baldwin Creek

Dear Chris,

The Selectboard reviewed your letter requesting input on the above noted project. They request that you contact Linda Harmon and Doug Mack at 1868 North 116 Road regarding this project, as it will directly input their business, Mary's at Baldwin Creek. Just some of the events they host are a Shakespeare series, Senior Meals and weddings. I have listed below some of the other issues that you may face with this project:

- The Green Mountain Stage Race and other bike races use this route.
- The Town of Bristol travels over this bridge to reach Town roads we need to plow and maintain.
- Local farmers travel over this bridge to maintain their fields.
- School bus routes.
- Route 116 corridor commuter bus route.
- Popular route for commuters to Chittenden County and to Montpelier & Waterbury: RT. 116 to Rt. 17.
- Bristol Fire Department utilizes a dry hydrant adjacent to the bridge.
- Recently approved five lot planned residential development on Purinton Road.

At this time, the Selectboard did not have any design considerations; however, they would like more information on this project as it develops. For local communication channels, there is the Addison

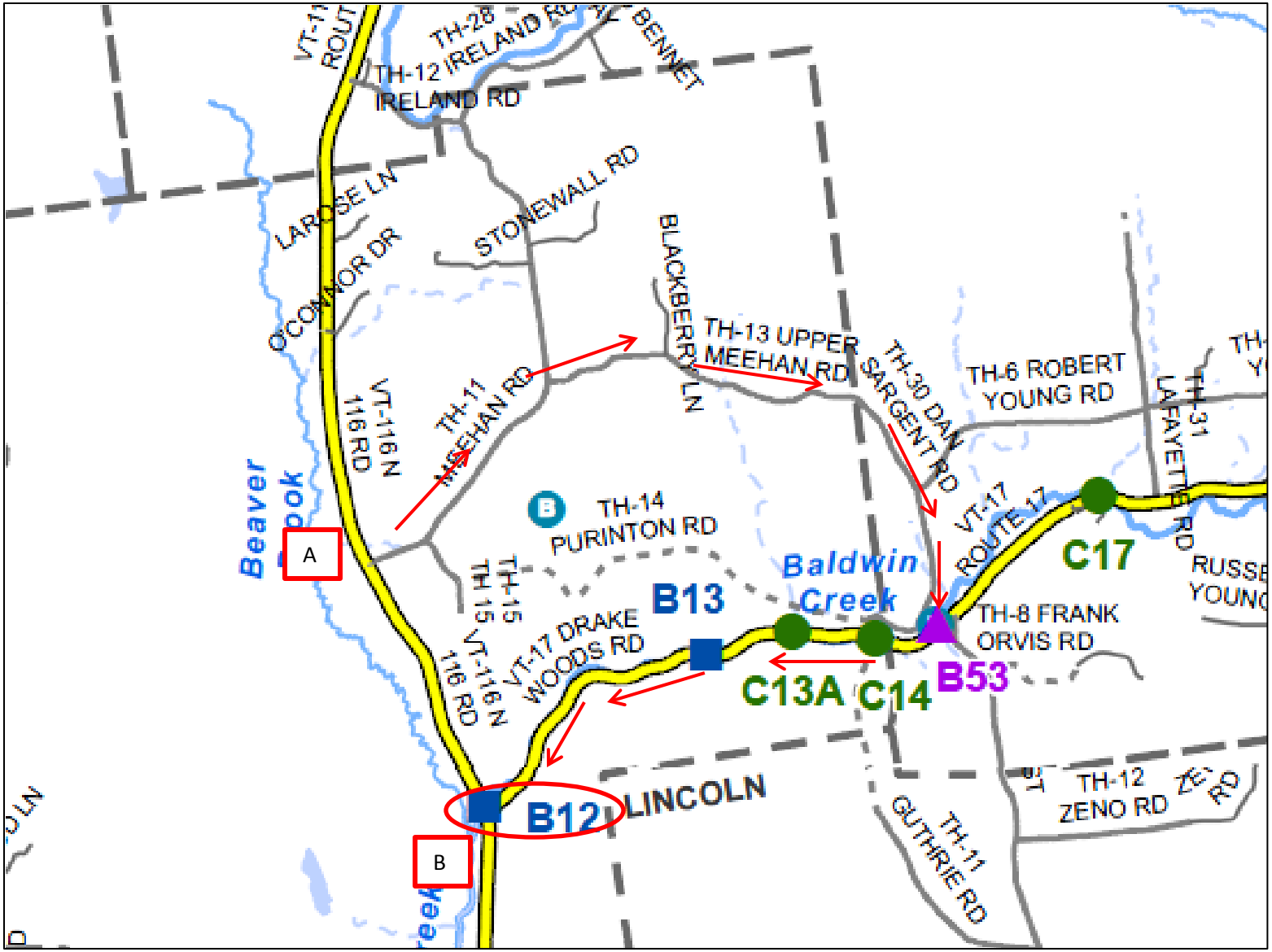
Independent and Addison Eagle for newspapers, 92.1 and 98.9 for radio stations and Bristol does have Front Porch Forum, a local list serve.

If you have any questions regarding this letter or I can be of further assistance, please call me at 453-2410.

Sincerely,

Therese Kirby
Treasurer/Clerk
Interim Town Administrator

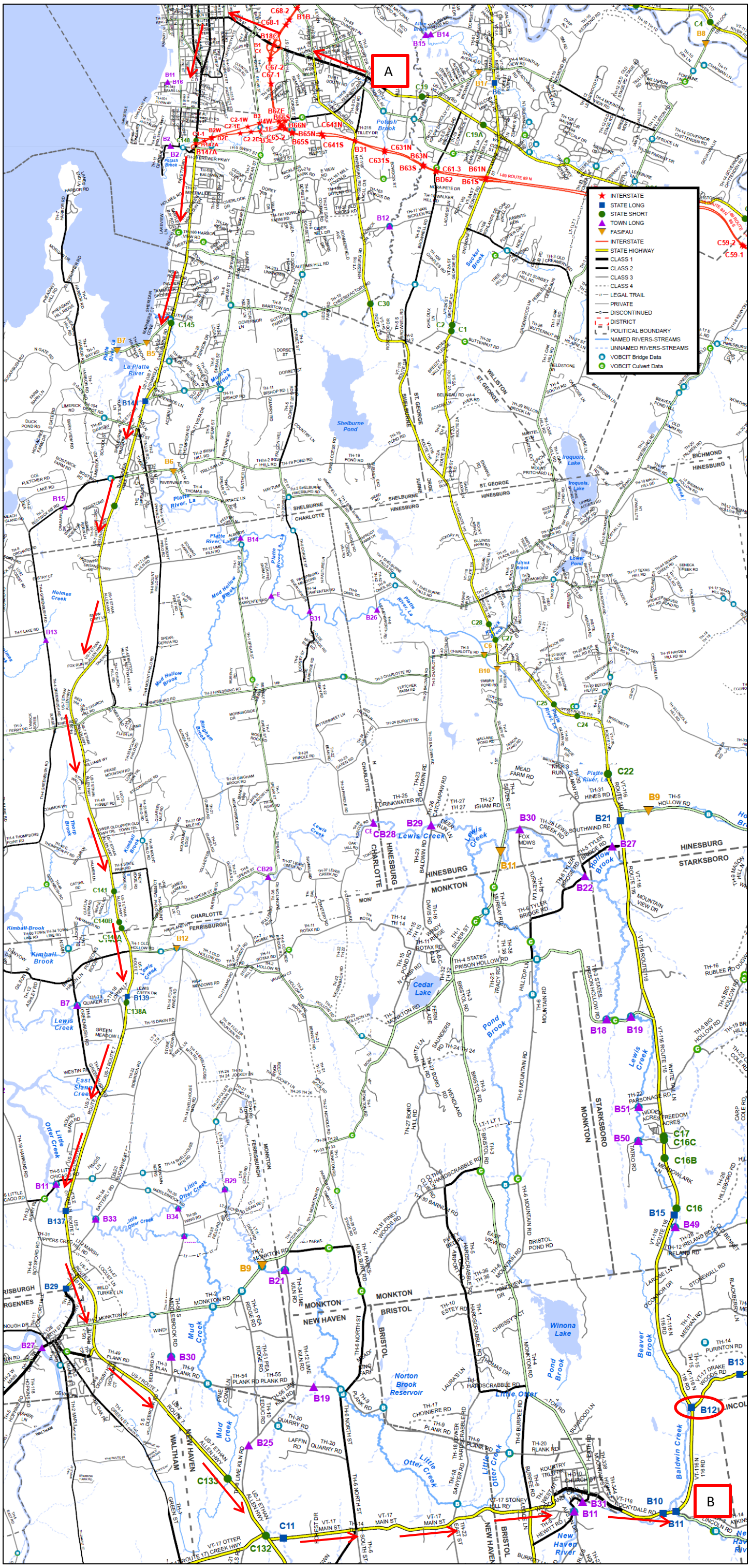
Cc: file



1. Local Bypass Route

VT Route 116, to Meehan Road, Upper Meehan Road, Dan Sargent Road, and VT Route 17, back to VT Route 116

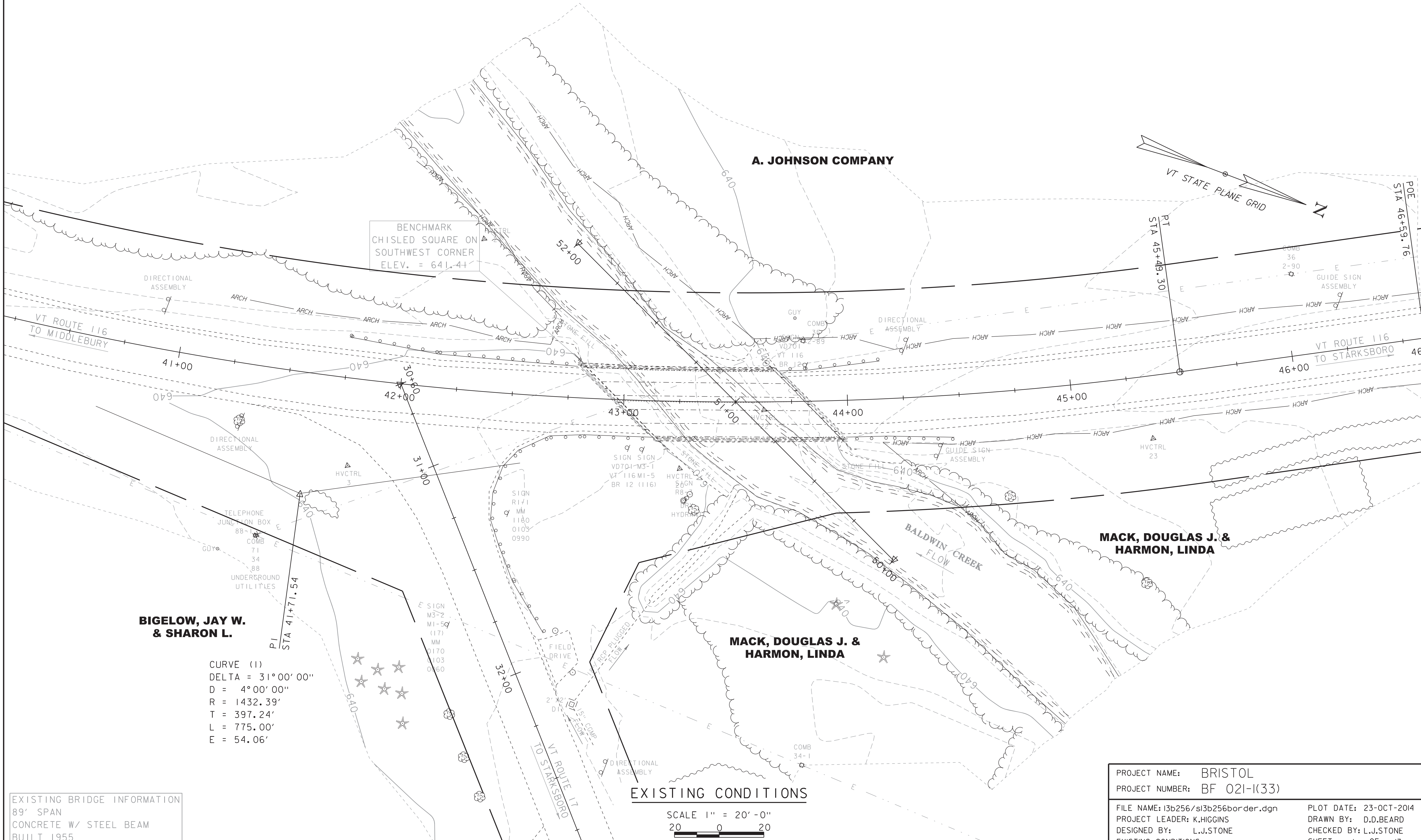
A – B Through Route: 1.0 Miles
A – B Detour Route: 5.0 Miles
Added Miles: 4.0 Miles
End-End Distance: 6.0 Miles



2. Regional Detour Route

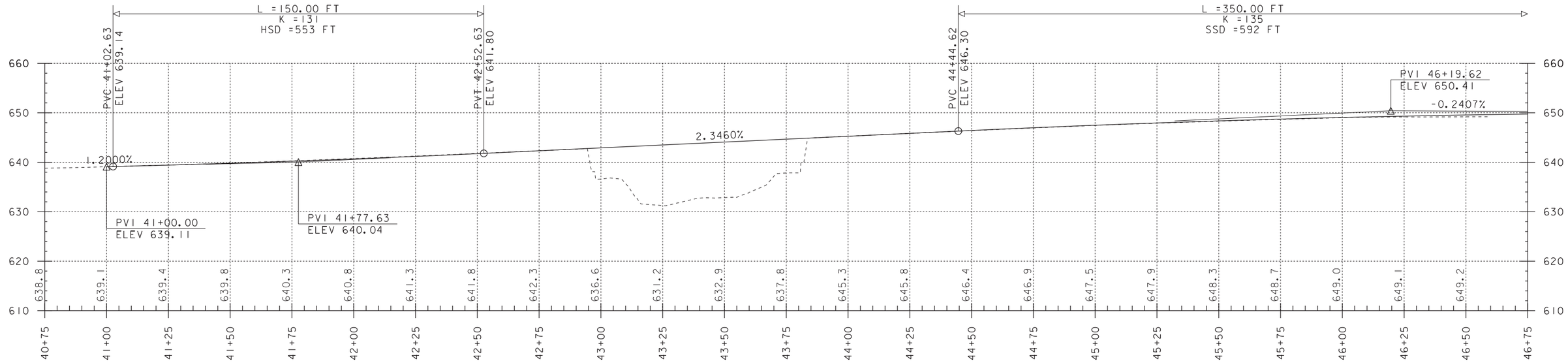
VT Route 116, to US Route 2, US Route 7, VT Route 17, back to VT Route 116

A – B Through Route: 24.3 Miles
A – B Detour Route: 37.1 Miles
Added Miles: 12.8 Miles
End-End Distance: 61.3 Miles



PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)

FILE NAME: 13b256/sl3b256border.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING CONDITIONS	SHEET 1 OF 13



VT 116 EXISTING PROFILE

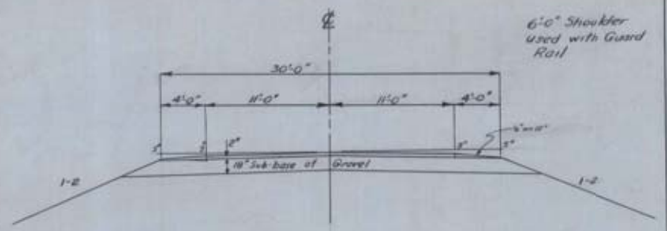
SCALE: HORIZONTAL 1"=20'
VERTICAL 1"=10'

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

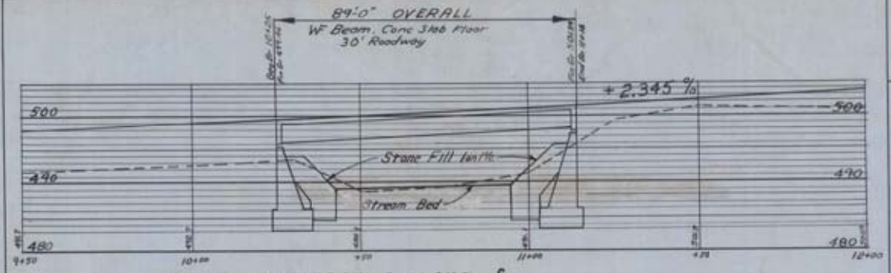
PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: 13b256/sl3b256profile.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PROFILE SHEET	SHEET 2 OF 13



6'-0" Shoulder used with Guard Rail

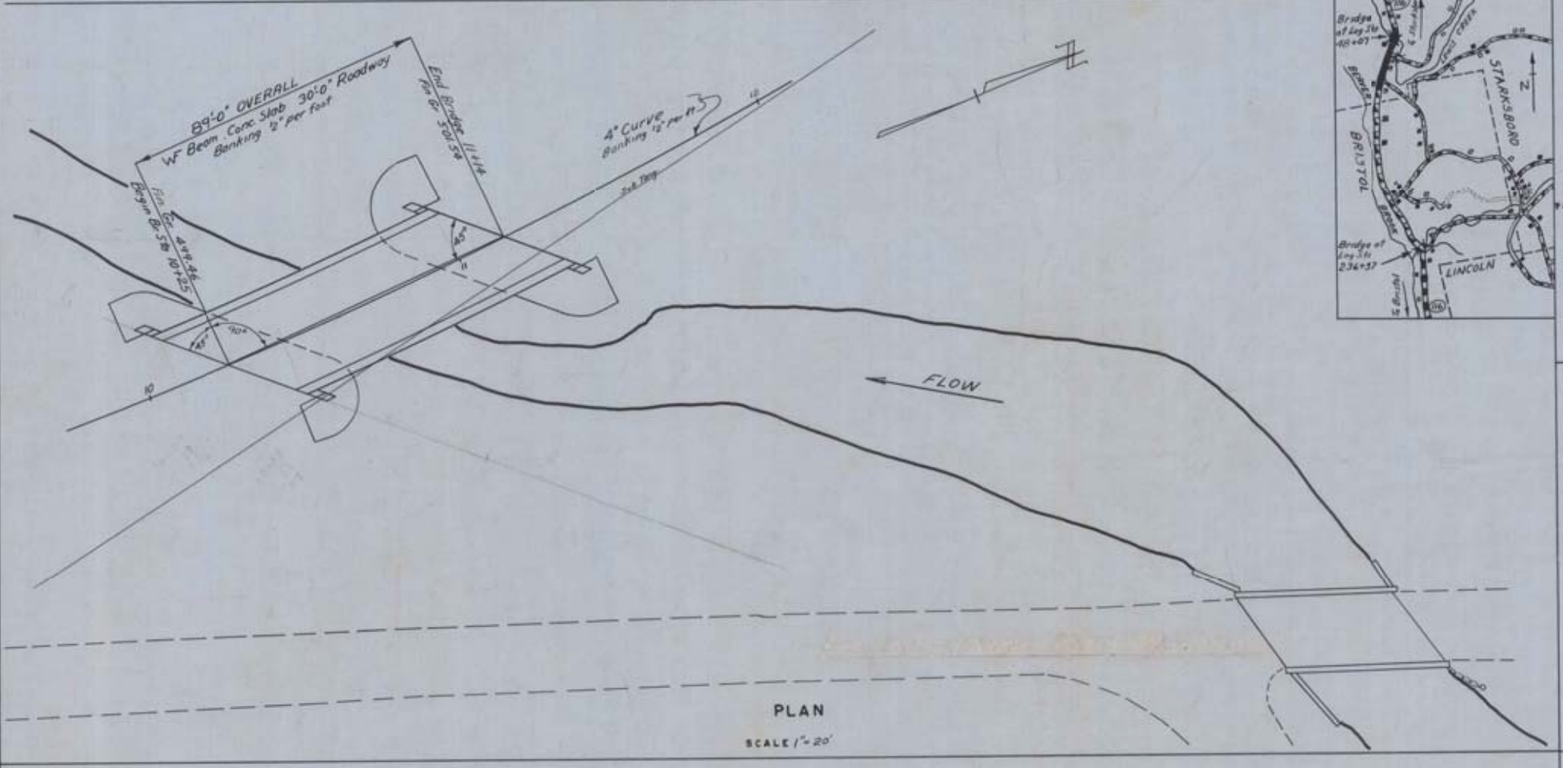
NEW HIGHWAY SECT. STA. TO STA.

SCALE 1" = 3'-0"



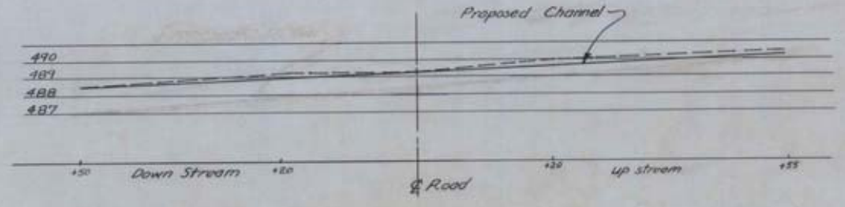
NEW HIGHWAY PROFILE ALONG ℄

SCALE 1"-20'



PLAN

SCALE 1"=20'



PROFILE OF PROPOSED STREAM CHANNEL

SCALE 1"=10'

Highway No. Vt 116 Name of Highway NONE
Structure No. 3 County Addison Town BRISTOL
Approved Date
Bridge Engineer, Dist. No. 9

EXISTING STRUCTURE

1. Posted loading of existing structure not posted
2. Location and type of existing structure 300' up stream Concrete T Beam
3. Underclearance elevation of existing structure 6.0'
4. What disposition should be made of the existing structure and probable cost of removal none
5. Should existing structure be utilized to maintain traffic during construction of new structure Yes
6. Should new temporary structure be built No
7. Ordinary high water surface elevation at existing structure or structures up or down stream 495
8. Extreme high water of existing structure 497
* 9. Span and waterway area below ordinary high water surface elevation of existing structure or structures up or down stream Span 45' Waterway 134ft² (existing structure)
10. Type of foundation under existing abutments Gravel
11. If existing structure is to be widened or extended, attach sketch containing complete data to prepare plans for widening or extending and to determine safe loading capacity, substructure, and superstructure

NEW STRUCTURE

1. Recommended type of structure WF Beam with Concrete Slab on buried Meklen Abutments
2. Recommended clear span or spans
   Measured parallel to ℄ new highway 83.4'
   Measured at right angles to ℄ stream 59.0'
3. Are there objections to a pier in the stream, answer yes or no Yes
4. Ordinary high water elevation at new structure 492.5
5. Ordinary elevation of water at new structure 491
6. Extreme high water elevation at new structure 493.5
7. Does stream reach its maximum high water elevation rapidly Yes Is ordinary rise rapid Yes
8. Low water elevation at new structure 490
9. Drainage area in acres above structure 7600 Character of terraine Hilly
10. Is stream ever dry No
11. Velocity of stream at high water stage 15'/sec
* 12. ~~Recommended~~ total waterway Area measured at ℄ to ℄ of stream 318
13. Does erosion occur No
14. Does stream carry light, medium or heavy drift and ice Medium
15. Should roadway be banked ? If so how much per foot Yes 1/2" / ft
16. Are sidewalks required ? If so, on what side none Both sides ? none
17. Recommended type of pavement Bituminous Concrete
18. Traffic to be maintained under what item no. 109 One or two ways ? Two Probable cost 100.—
19. Probable cost of clearing and grubbing stream channel at structure site
20. Should provisions be made for public utilities No
21. Estimated allowable load on foundations Should piles be used ? No Est lgth

FOUNDATION INFORMATION

Foundation information obtained for design purposes only, and the State assumes no responsibility whatsoever for the sufficiency or accuracy of the information shown. Boulders may be encounted at any pier or abutment location.

FOR BORING SEE PLAN & PROFILE SHEET STA. 10+50 *

* Bridge down Stream not on same Stream. Bridge up Stream, "96"3 Total Waterway "300ft²

** For run-off factor of 0.5 with 2" rainfall per hour, Waterway req'd 210ft²

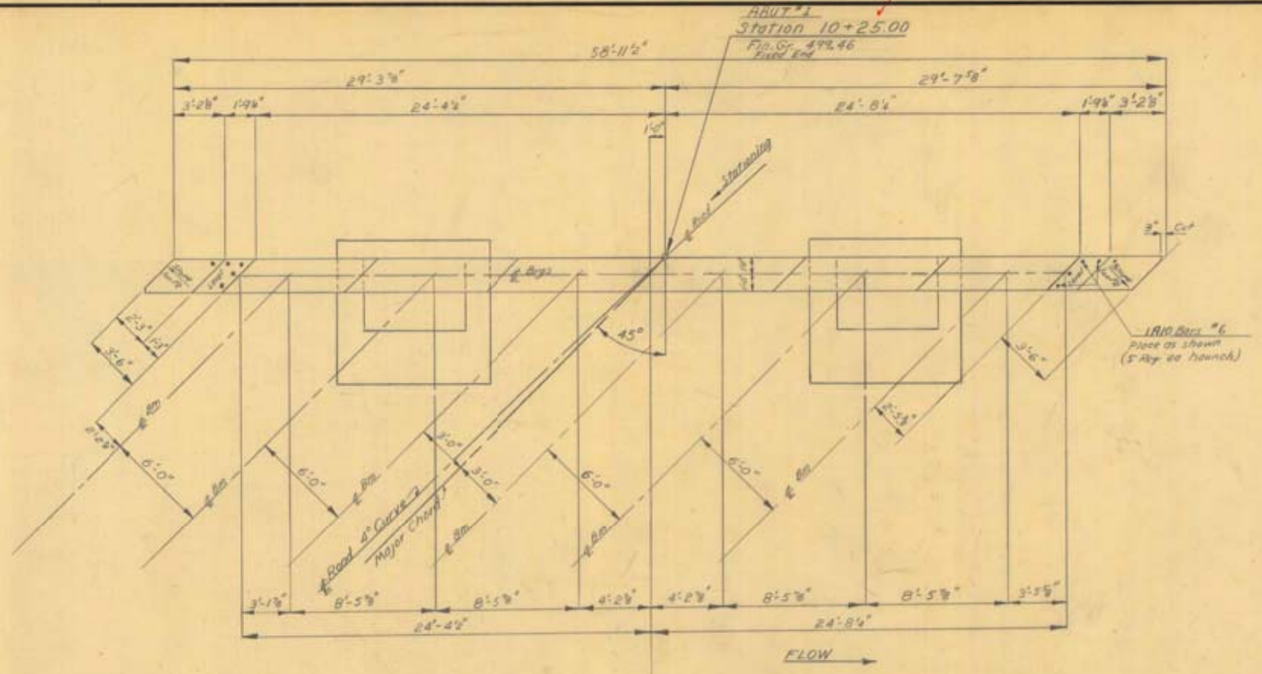
STATE OF VERMONT
DEPT. OF HIGHWAYS

DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS
RECOMMENDED FOR APPROVAL:
DISTRICT ENGINEER DATE
APPROVED:
DIVISION ENGINEER DATE
DARTA

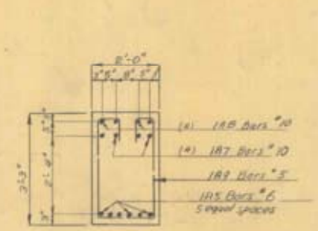
CORRECT AUGUST 10, 1953
A. D. Sinclair
BRIDGE ENGINEER

APPROVED AUGUST 13, 1953
H. E. Talcott
CHIEF ENGINEER

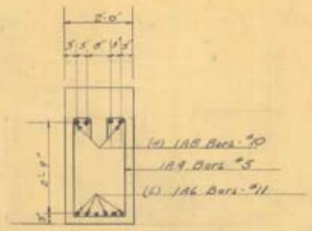
PROJECT F NH 171 (6)
SHEET 14 OF 110



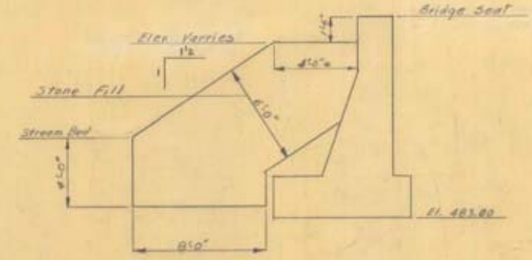
PLAN



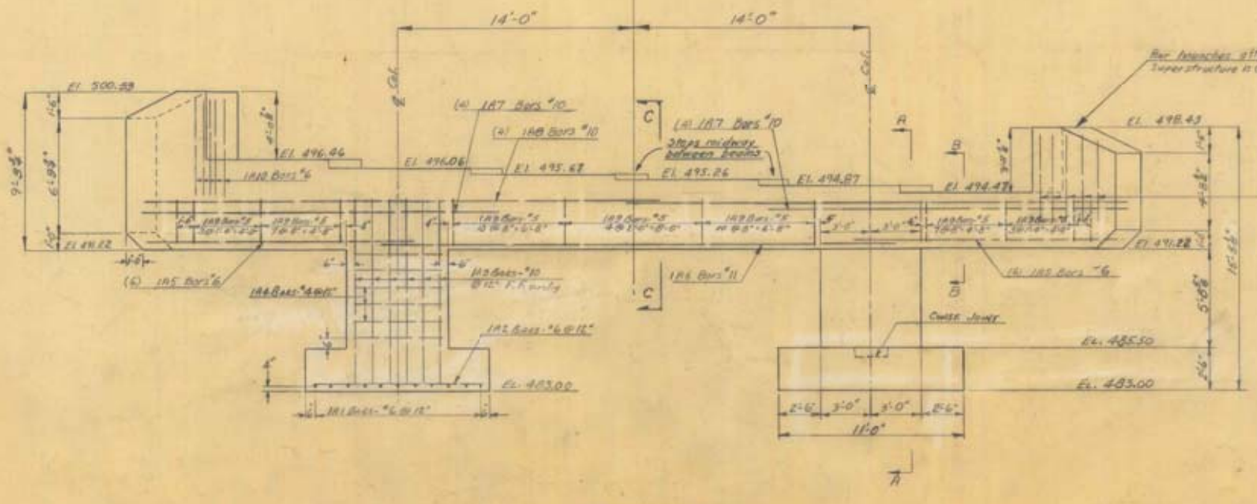
SECTION B-B
Scale ½"=1'0"



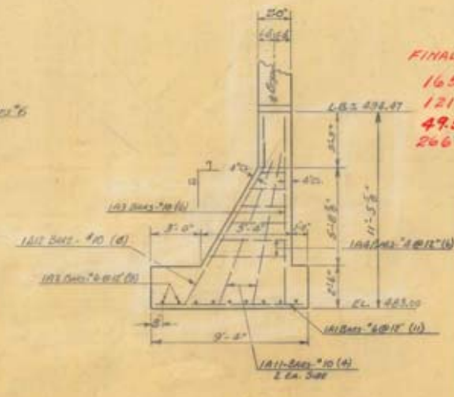
SECTION C-C
Scale ½"=1'0"



TYPICAL SECTION



ELEVATION



SECTION A-A

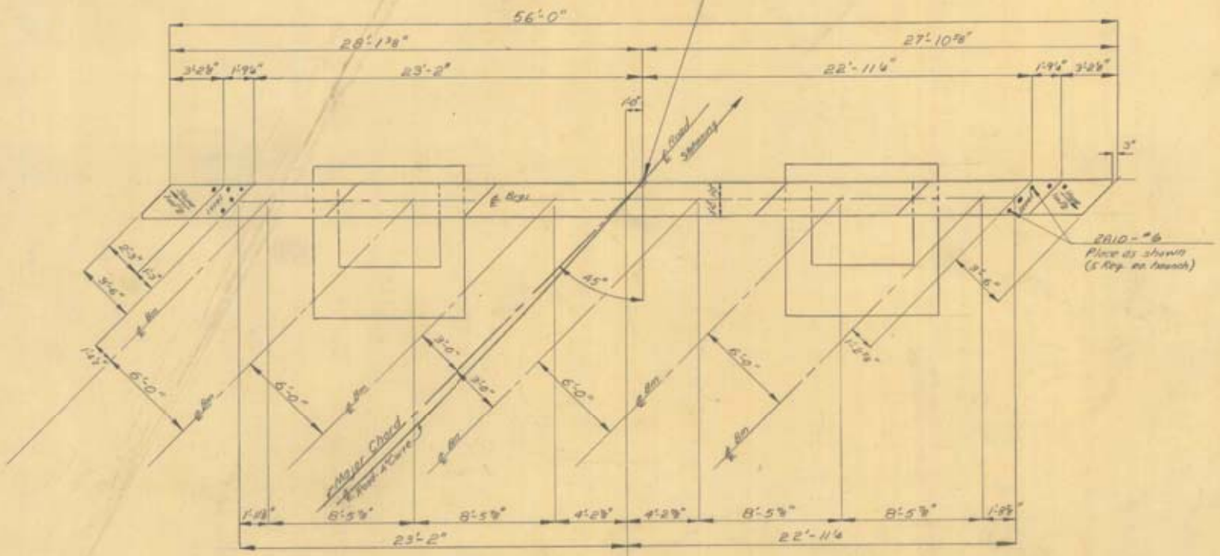
FINAL	ESTIMATED QUANTITIES		
165	106A Channel Excavation of Earth	869	C.Y.
121	107 Structure Excavation (Mod.)	125	C.Y.
49.5	401B Concrete Class B (Mod.)	50	C.Y.
266	511 Stone Fill	295	C.Y.

STATE OF VERMONT
DEPARTMENT OF HIGHWAYS

TOWN OF BRISTOL - STARKSBORO
ROUTE NO. VT 116 LOG STA 236+57

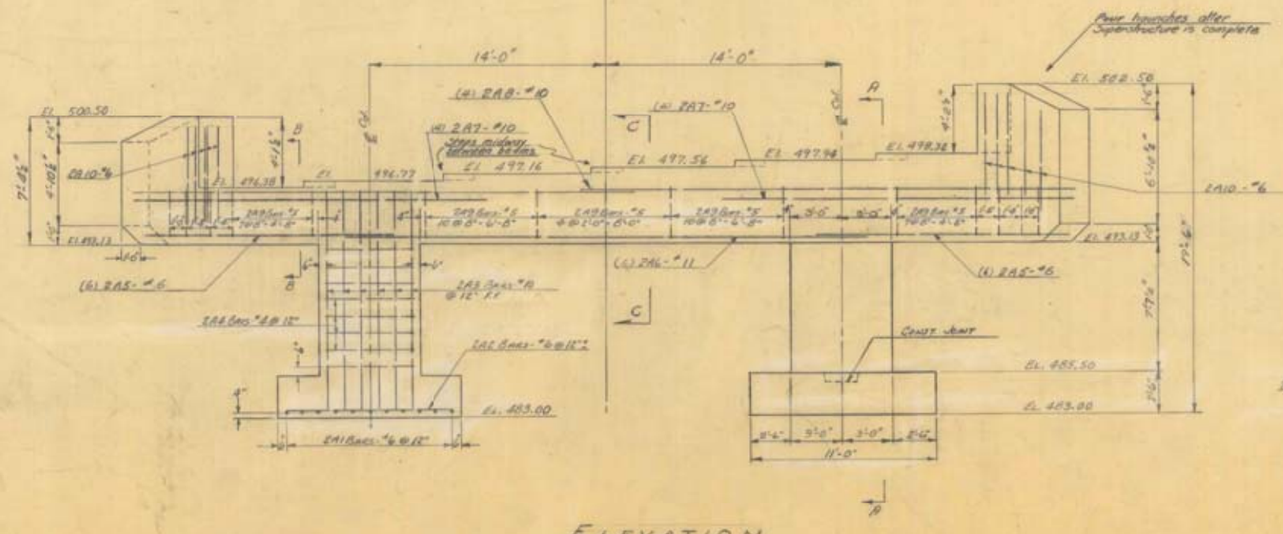
Details of Abutment #1
SCALE 4"=1'0" & as noted
SURVEYED BY Foster
DRAWN BY C.F.H. CHECKED BY R.T.A.
PROJECT NO. F-171(6)
SHEET 35 OF 110

ABUT # 2
Station 11+14.00
Fin. Gr. 501.54
Exp. Joint

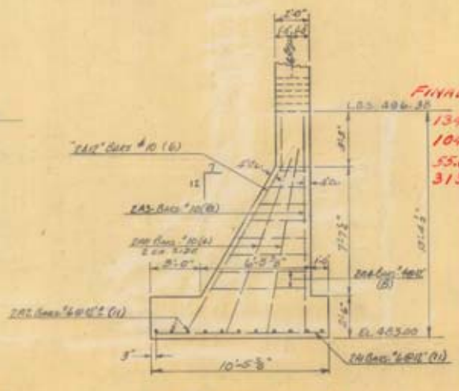


FLOW

PLAN



ELEVATION



SECTION A-A

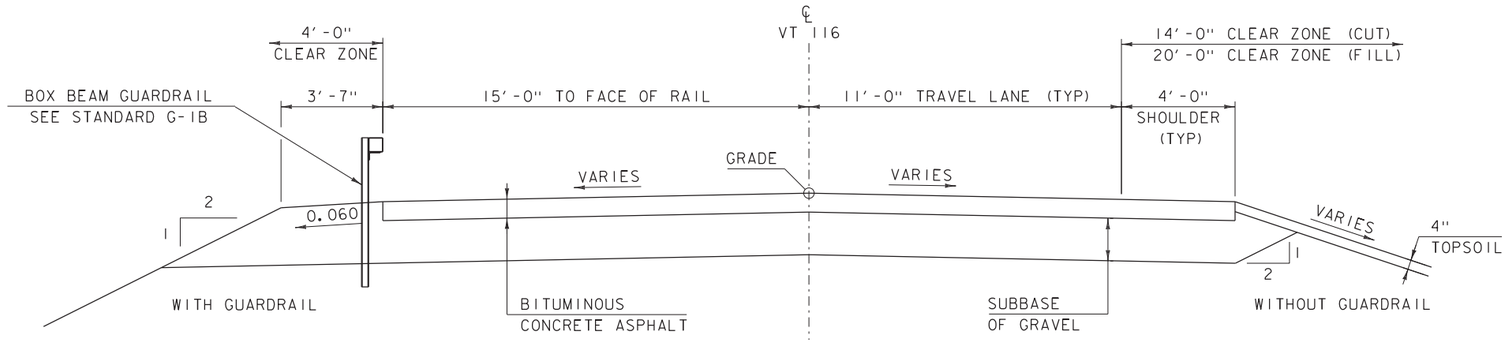
Arrangement of Reinforcing Bars 2A5, 2A6, 2A7, 2A8 & 2A9 similar to arrangement of 1A Bars as shown in Sections B-B & C-C on Details of Abutment #1, Sheet #7
Stone Fill around Abutment N° 2 to be as shown by TYPICAL SECTION on Details of Abutment #1

FINAL		ESTIMATED QUANTITIES		
134	106A	Channel Excavation of Earth	296	C.Y.
104	107	Structure Excavation (Mod.)	118	C.Y.
55.6	401-B	Concrete Class B (Mod.)	56	C.Y.
313	521	Stone Fill	350	C.Y.

STATE OF VERMONT
DEPARTMENT OF HIGHWAYS

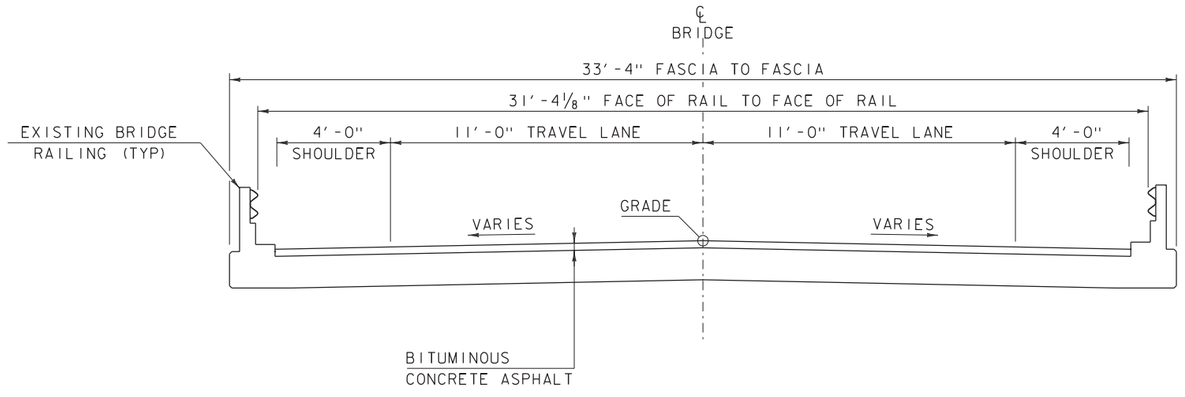
TOWN OF BRISTOL - STARKSBORO
ROUTE NO. VT 116 LOG STA. 236+57

DETAILS OF ABUTMENT N°2
SCALE 1/4" = 1'-0"
SURVEYED BY FOSTER
DRAWN BY CFH CHECKED BY A.T.B.
PROJECT NO. F 171 (6)
SHEET 36 OF 110



PROPOSED VT 116 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

ALTERNATIVE 1 BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES (IF USED ON PROJECT)	
SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: BRISTOL
PROJECT NUMBER: BF 021-1(33)

FILE NAME: 13b256\sl3b256typical.dgn
PROJECT LEADER: K.HIGGINS
DESIGNED BY: L.J.STONE
ALTERNATIVE 1 TYPICAL SECTIONS

PLOT DATE: 23-OCT-2014
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 3 OF 13

BEGIN APPROACH
STA 41+50.00

BEGIN PROJECT
STA 42+00.00

END PROJECT
STA 44+50.00

END APPROACH
STA 45+00.00

PT
STA 45+49.30

POE
STA 46+59.76

VT STATE PLANE GRID

N

BENCHMARK
CHISLED SQUARE ON
SOUTHWEST CORNER
ELEV. = 641.41

VT ROUTE 116
TO MIDDLEBURY

VT ROUTE 116
TO STARKSBORO

VT ROUTE 17
TO STARKSBORO

41+00
42+00
43+00
44+00
45+00
46+00
46+6
30+00
31+00
32+00
51+00
52+00
50+00

DIRECTIONAL
ASSEMBLY

GUIDE SIGN
ASSEMBLY

SIGN
VD701 M3-1
VT 116 M1-5
BR 12 (116)

SIGN
R1-1
MM
1160
0103
0990

HVCTRL
3

HVCTRL
23

HVCTRL
SIGN
R8-3

HYDRO

TELEPHONE
JUNCTION BOX
88-1

COMB
71
34
88
UNDERGROUND
UTILITIES

COMB
36
2-90

COMB
34-1

GUY

SIGN
M3-2
M1-5
(17)
MM
0170
0103
0960

STONE FILL

ARCH

BALDWIN CREEK
FLOW

FIELD
DRIVE

2'-6" RCP PLUGGED
FLOW

15" CSMP
FLOW

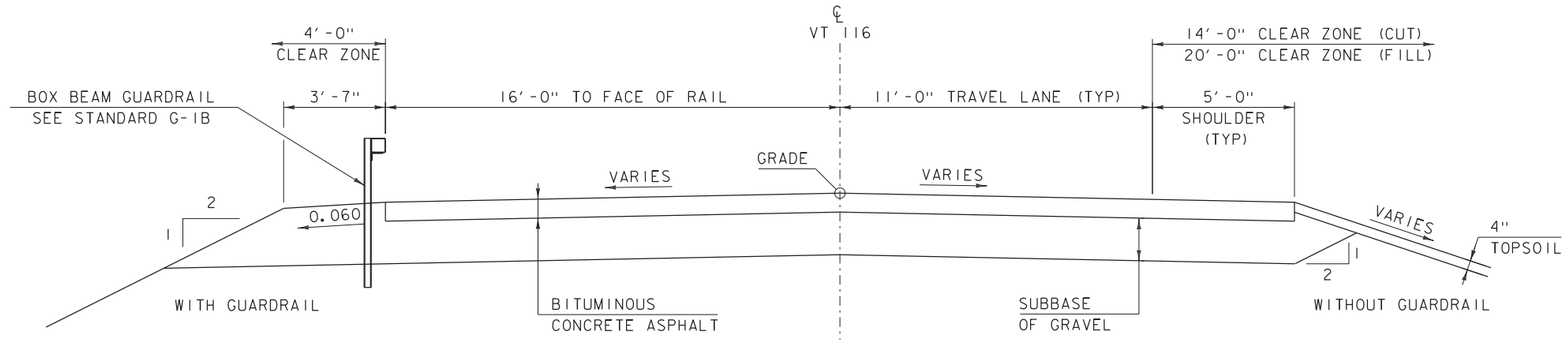
PI
STA 41+71.54

EXISTING BRIDGE INFORMATION
89' SPAN
CONCRETE W/ STEEL BEAM
BUILT 1955

ALTERNATIVE I

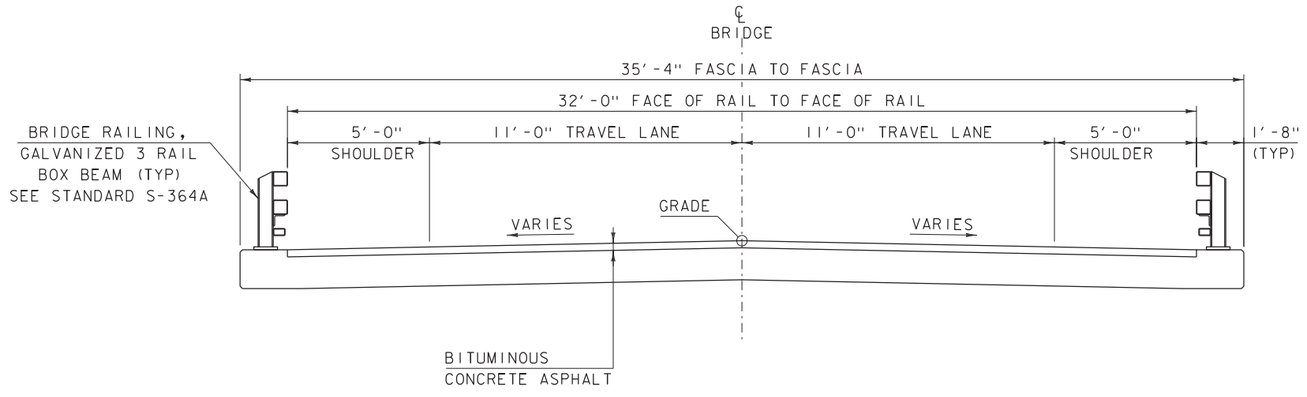
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: l3b256/sl3b256border.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE I LAYOUT	SHEET 4 OF 13



PROPOSED VT 116 TYPICAL SECTION

SCALE 3/8" = 1'-0"



ALTERNATIVE 2 & 3 BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES (IF USED ON PROJECT)	
SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: BRISTOL
PROJECT NUMBER: BF 021-1(33)

FILE NAME: 13b256\sl3b256typical.dgn
PROJECT LEADER: K.HIGGINS
DESIGNED BY: L.J.STONE
ALTERNATIVE 2 & 3 TYPICAL SECTIONS

PLOT DATE: 23-OCT-2014
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 5 OF 13

BEGIN APPROACH
STA 41+50.00

BEGIN PROJECT
STA 42+00.00

END PROJECT
STA 44+50.00

END APPROACH
STA 45+00.00

PT
STA 45+49.30

POE
STA 46+59.76

VT STATE PLANE GRID

N

BENCHMARK
CHISLED SQUARE ON
SOUTHWEST CORNER
ELEV. = 641.41

VT ROUTE 116
TO MIDDLEBURY

VT ROUTE 116
TO STARKSBORO

VT ROUTE 17
TO STARKSBORO

41+00
42+00
43+00
44+00
45+00
46+00
30+60
31+00
32+00
50+00
51+00
52+00

DIRECTIONAL ASSEMBLY
GUIDE SIGN ASSEMBLY
HVCTRL 3
HVCTRL 23
HVCTRL SIGN RB
HYDRANT
GUY
TELEPHONE JUNCTION BOX 88-1
COMB 71 34 88 UNDERGROUND UTILITIES
COMB 36 2-90
COMB 34-1
SIGN R1-1 MM 1160 0103 0990
SIGN SIGN VD701 M3-1 VT 116 M1-5 BR 12 (116)
SIGN M3-2 M1-5 (17) MM 0170 0103 0960
STONE FILL
ARCH
FIELD DRIVE
15" RCP PLUGGED
15" CCMP FLOW
BALDWIN CREEK
FLOW

PI
STA 41+71.54

ALTERNATIVE 2

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

EXISTING BRIDGE INFORMATION
89' SPAN
CONCRETE W/ STEEL BEAM
BUILT 1955

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: l3b256/sl3b256border.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 2 LAYOUT	SHEET 6 OF 13

BEGIN APPROACH
STA 41+50.00

BEGIN PROJECT
STA 42+00.00

END PROJECT
STA 44+50.00

END APPROACH
STA 45+00.00

PT
STA 45+49.30

POE
STA 46+59.76

VT STATE PLANE GRID

N

BENCHMARK
CHISLED SQUARE ON
SOUTHWEST CORNER
ELEV. = 641.41

VT ROUTE 116
TO MIDDLEBURY

VT ROUTE 116
TO STARKSBORO

VT ROUTE 17
TO STARKSBORO

41+00
42+00
43+00
44+00
45+00
46+00
30+60
31+00
32+00
51+00
52+00
50+00

DIRECTIONAL ASSEMBLY
GUIDE SIGN ASSEMBLY
HVCTRL 3
HVCTRL 23
HVCTRL SIGN RB
HYDRANT
GUY
COMB 71 34 88 UNDERGROUND UTILITIES
COMB 36 2-90
COMB 34-1
TELEPHONE JUNCTION BOX 88-1
SIGN VD701 M3-1
SIGN VT 116 M1-5
SIGN BR 12 (116)
SIGN R1-1 MM 1160 0103 0990
E SIGN M3-2 M1-5 (17) MM 0170 0103 0960
ARCH
STONE FILL
FIELD DRIVE
24" RCP PLUGGED
2' x 2' DI
15" CSMP FLOW
BALDWIN CREEK
FLOW
PI
STA 41+71.54

EXISTING BRIDGE INFORMATION
89' SPAN
CONCRETE W/ STEEL BEAM
BUILT 1955

ALTERNATIVE 3

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

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: l3b256/sl3b256border.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 3 LAYOUT	SHEET 7 OF 13

A. JOHNSON COMPANY

VT STATE PLANE GRID

N

BENCHMARK
CHISLED SQUARE ON
SOUTHWEST CORNER
ELEV. = 641.44

VT ROUTE 116
TO MIDDLEBURY

VT ROUTE 17
TO STARKSBORO

40+00
41+00
42+00
43+00
44+00
45+00
50+00
51+00
52+00
30+60
31+00
32+00

PT
STA 45+49.30

PI
STA 41+71.54

BALDWIN CREEK
FLOW

**BIGELOW, JAY W.
& SHARON L.**

**MACK, DOUGLAS J. &
HARMON, LINDA**

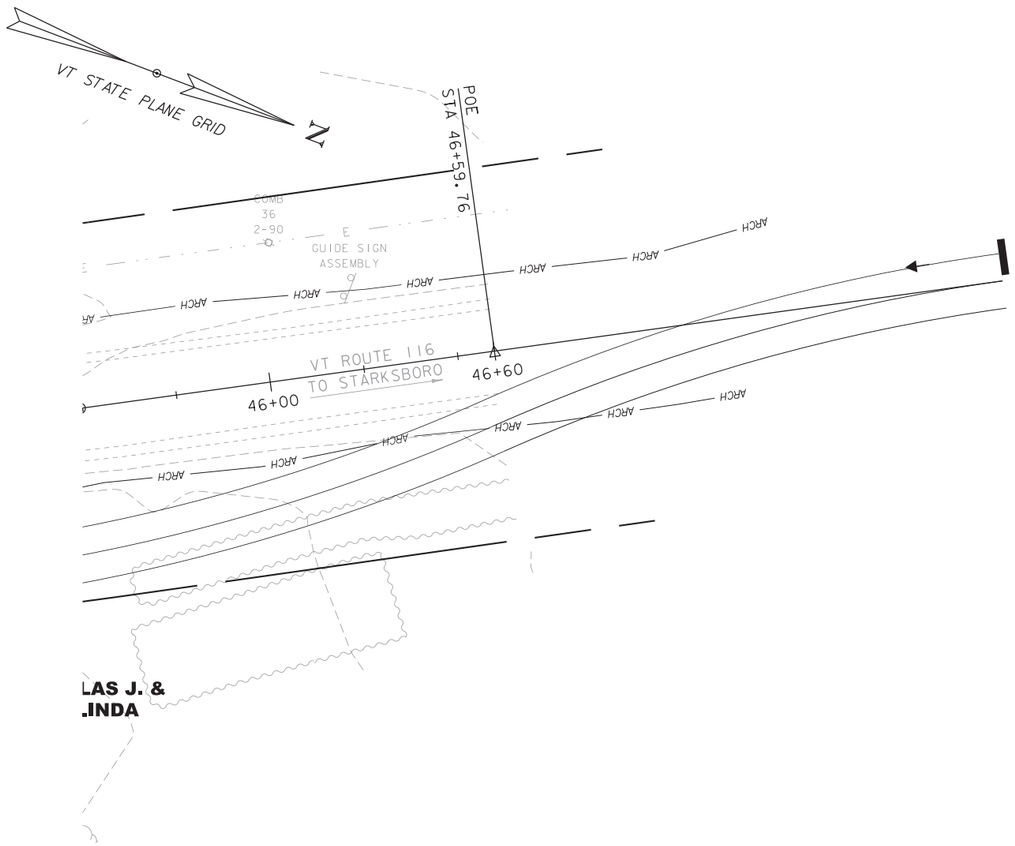
**MACK, DOUGL
HARMON, L**

UPSTREAM TEMP BRIDGE

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

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)

FILE NAME: 13b256/sl3b256TCborder.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
UPSTREAM TEMPORARY BRIDGE LAYOUT 1	SHEET 8 OF 13

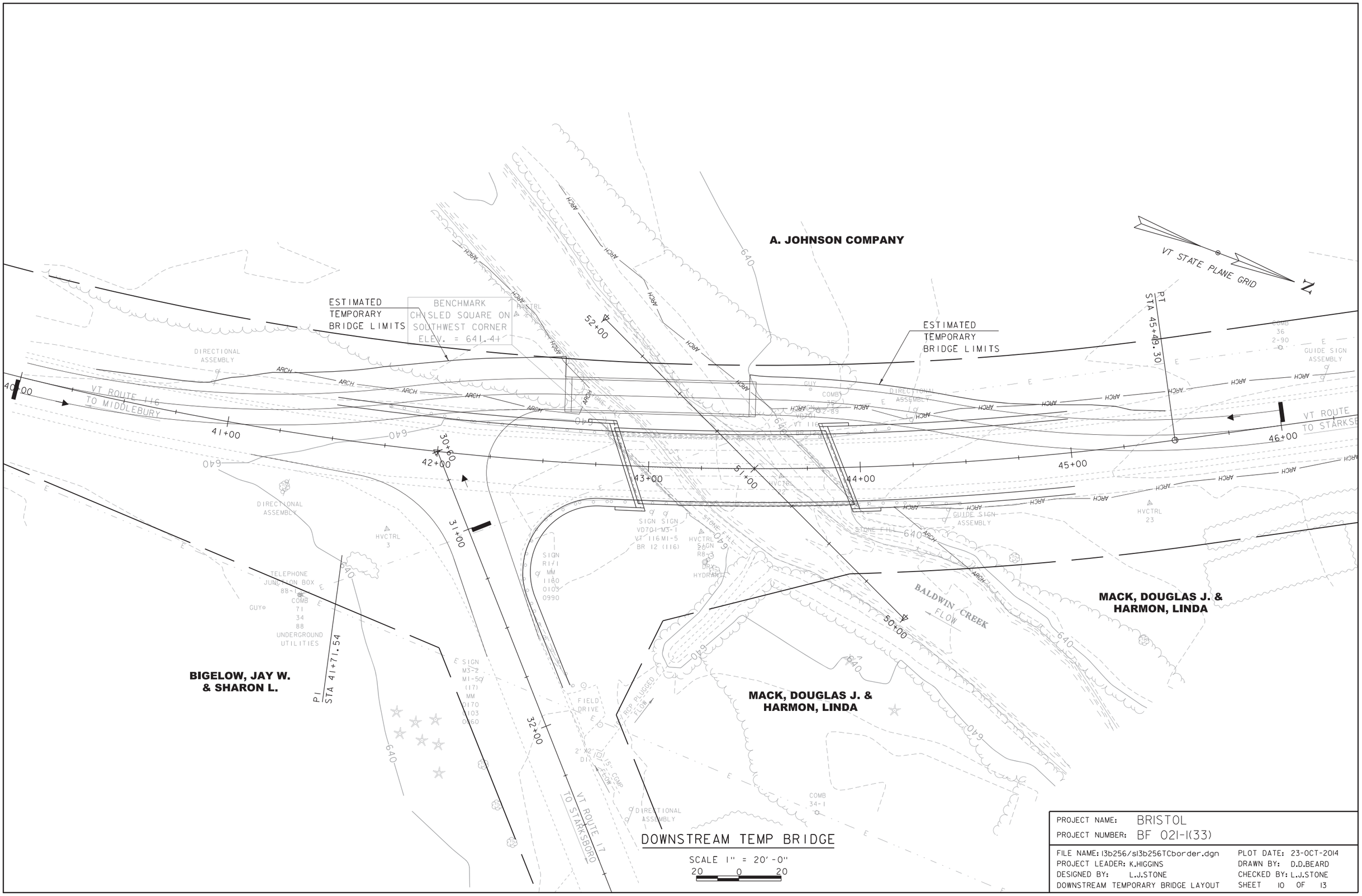


UPSTREAM TEMP BRIDGE

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: l3b256/sl3b256TCborder.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
UPSTREAM TEMPORARY BRIDGE LAYOUT 2	SHEET 9 OF 13

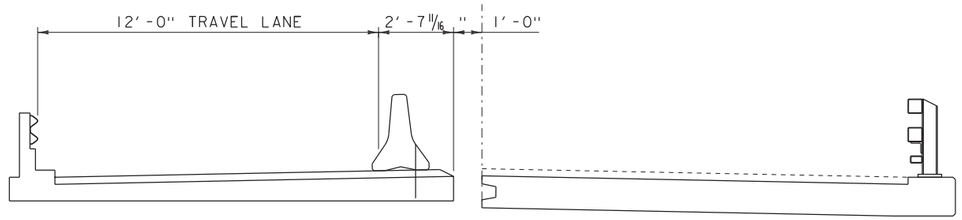


DOWNSTREAM TEMP BRIDGE

SCALE 1" = 20'-0"

20 0 20

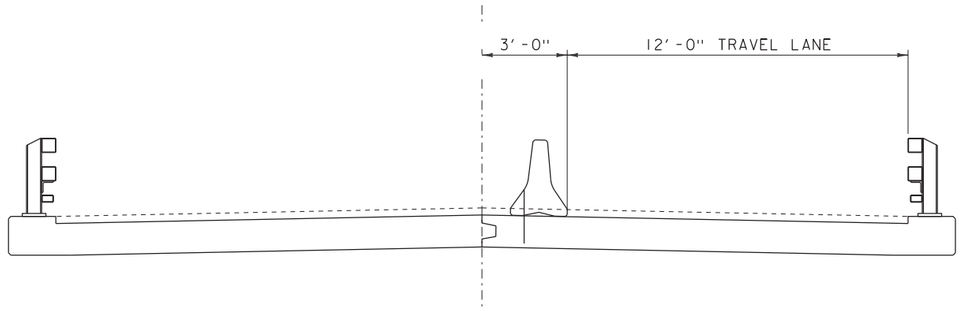
PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: l3b256/sl3b256TCborder.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
DOWNSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 10 OF 13



FLOW

PHASE #1 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

PHASE #2 TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: 13b256\sl3b256phasing.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASING TYPICAL SECTIONS	SHEET 11 OF 13

BENCHMARK
CHISLED SQUARE ON
SOUTHWEST CORNER
ELEV. = 641.41

VT STATE PLANE GRID

N

VT ROUTE 116
TO MIDDLEBURY

VT ROUTE 116
TO STARKSBORO

VT ROUTE 17
TO STARKSBORO

BALDWIN CREEK
FLOW

41+00
42+00
43+00
44+00
45+00
46+00
30+60
31+00
32+00
50+00
52+00

PT
STA 45+48.30

POE
STA 46+59.76

PI
STA 41+71.54

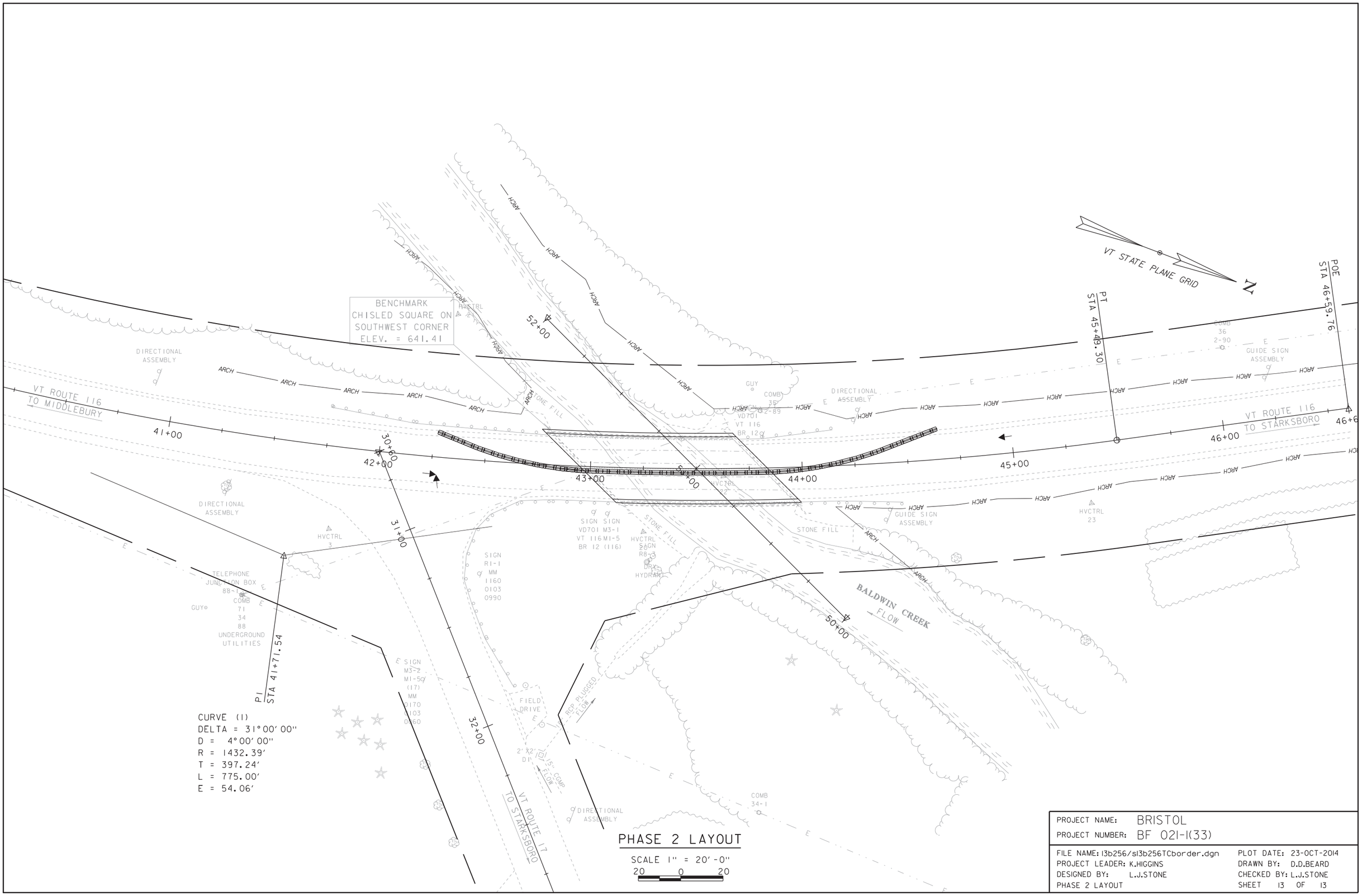
CURVE (1)
DELTA = 31°00'00"
D = 4°00'00"
R = 1432.39'
T = 397.24'
L = 775.00'
E = 54.06'

DIRECTIONAL ASSEMBLY
GUIDE SIGN ASSEMBLY
HVCTRL
SIGN SIGN VD701 M3-1 VT 116M1-5 BR 12 (116)
SIGN R1-1 MM 1160 0103 0990
SIGN M3-2 M1-5 (17) MM 0170 0103 0960
TELEPHONE JUNCTION BOX 88-1
GUY
COMB 71 34 88 UNDERGROUND UTILITIES
COMB 36 2-90
COMB 34-1
HYDRANT
STONE FILL
ARCH
RCP PLUGGED
FIELD DRIVE
2' X2' CB
15" COMP FLOW

PHASE I LAYOUT

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

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)
FILE NAME: I3b256/sI3b256TCborder.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE I LAYOUT	SHEET 12 OF 13



CURVE (1)
DELTA = 31°00′00″
D = 4°00′00″
R = 1432.39′
T = 397.24′
L = 775.00′
E = 54.06′

PHASE 2 LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME:	BRISTOL
PROJECT NUMBER:	BF 021-1(33)

FILE NAME: l3b256/sl3b256TCborder.dgn	PLOT DATE: 23-OCT-2014
PROJECT LEADER: K.HIGGINS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE 2 LAYOUT	SHEET 13 OF 13