STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Richford BRF 0302(29)

FAS 0302 (TH 3), Bridge 6 OVER BERRY BROOK

February 26, 2013

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I. Site Information

The bridge is located in a rural area along N Branch Road (TH 3) approximately 1.2 miles west of the junction with VT 105. There are two residences located in the northeast quadrant of the project. 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 Major Collector (Class 2 Town Highway)
Bridge Type	Concrete T-Beam
Bridge Span	24 feet long
Year Built	1900
Ownership	Town of Richford

Need

The following is a list of the deficiencies of Bridge 6 and TH 3 in this location.

1. The bridge is listed as scour critical. The abutments have some spalling and hairline cracking as well as minor settlement. There has been scour issues along abutment 1, with considerable undermining. Short term scour and undermining repairs have been made.

2. The lane and shoulder widths of both the bridge and approaches are substandard.

3. The North Approach radius does not meet current standards for horizontal curves.

4. The bridge and approach rail do not meet standards.

5. The bridge does not meet hydraulic requirements.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2015 and 2035.

TRAFFIC DATA	2015	2035
AADT	830	880
DHV	120	120
ADTT	120	160
%T	13.9	17.5
%D	56	56

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 880 and a design speed of 50 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	0-9.5-9.5-0 (19')	10'/3' (26')	Substandard
Bridge Lane and Shoulder Widths	VSS Table 5.3	0.3-10-10-0.3 (20.6')	10'/3' (26')[1]	Substandard
Clear Zone Distance	VSS Table 5.5		16' fill / 10' cut (1:3) , 12' cut (1:4)	
Banking		3.6% (North Approach)	8% (max)	
Speed		Not Posted	50 mph (Design)	
Horizontal Alignment	AASHTO Green Book Exhibit 3-10b	R=6,500' (South Approach), bridge located on straight segment, R=2,600' (North Approach)	R_{min}=3,090 @ 3.6%	Substandard
Vertical Grade	VSS Table 5.6	Bridge located in transition from (-)0.0465% grade to (+)1.0698% grade	6% (max) for level terrain	
K Values for Vertical Curves	VSS Table 5.1	Bridge located on sag (K = 195)	110 crest / 90 sag	
Vertical Clearance Issues	VSS Section 5.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	784'	400'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	0.3' Shoulder	3' Shoulder (%T > 10%)	Substandard
Bridge Railing	SM Ch. 13	Concrete Rail	TL-3	Substandard

Inspection Report Summary

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

09/11/2012 – Guard rail system needs improvement. Blunt ends of the bridge rail and lack of approach rail is a traffic safety hazard. Bridge has a significant amount of wearing surface overburden but shows no indication of overstress. The abutments have evidence of only minor settlement. The bridge otherwise, considering its age, is in fairly good condition. CM sent ~MJ/DK

04/19/2012 – Quality control check. A regular inspection will be performed this summer. Waterway has had scour and undermining repairs and countermeasures the last few years. Riprap for instance, was added in 2009. Each abutment has experienced only some very minor

[1] 3 foot shoulder required for bicycle and pedestrian criteria.

settlement below centerline of roadway. The bridge, though quite old and narrow, is in fairly good condition. Substructure and superstructure will be raised to a satisfactory rating. ~MJ

05/17/2010 – A missing paddle board occurs on the right side of approach No.2 and needs to be added. No undermining is seen at this time of inspection. ~PLB

9/10/2008 – This structure is in poor to good condition. There is deep scour along Abutment 1 with some deep undermining of the stem and wingwalls. The undermining goes under the toe of the stem and footing about 3 feet and is about 3 feet deep. This undermining should be filled in and the abutment protected with some means of scour protection. ~DCP

Hydraulics

From preliminary hydraulics report:

The existing bridge does not meet hydraulics standards. Q25 passes under the existing structure with approx 0.6' of freeboard; Q50 is into the beams. Hydraulics recommends maintaining the existing span and alignment. Low beam should be raised to 434.0' in order to meet hydraulic standards for 1 foot of freeboard at Q50. Additionally, vertical abutments with no stone fill are recommended as there are no real channel banks to tie into.

Utilities

There are overhead utility lines that parallel TH 3 on both the upstream and downstream side of the bridge. These lines do not cross over the roadway at the project location. It is anticipated that the overhead utility lines will need to be relocated for a bridge replacement. The existing utility lines are shown on the layout sheets.

Right Of Way

There is an existing 4-rod Right of Way though the project area. The existing Right-of-Way is shown on the Layout sheet.

Resources

The resources present at this project are shown on the layout sheets.

Agricultural:

No areas at the site have been identified as containing prime agricultural soils.

Archaeological:

A site visit on 4/10/2012 was conducted as part of the 2012 "pilot program" in order to map archaeological resources using the new Trimble GPS unit. The NE quadrant was mapped as archaeologically sensitive after careful evaluation in the field.

The NE section of the project area is located on a portion of sloping bluff overlooking the confluence the Missisquoi and a small tributary in Richford. A number of known precontact sites

are in the *general* area, and this landscape feature rates high for archaeological sensitivity. Field data was collected and manipulated in the office. See the existing conditions layout sheet for a plot of the archaeological resources present.

Biological:

Wetlands/Watercourses

There are wetlands within the project area. Formal wetland delineation according to US Army Corps of Engineers Wetland Delineation Manual was not completed and wetlands were identified using best professional judgment for resource identification/planning purposes. The wetlands are located in all quadrants of the project except the NE. Wetlands in the project area are emergent wetlands adjacent to the unnamed tributary within the project area. See the existing conditions layout sheet for a plot of the wetland resources present.

There is an unnamed tributary to the Mississiquoi River which flows southeasterly through the project area. This river would support 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.

Berry Brook is an impaired waterway.

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

General Wildlife habitat exists within the surrounding area. The project area consists of agricultural lands.

There are no wildlife corridor issues within the project area.

Rare, Threatened and Endangered Species

There are no mapped rare, threatened or endangered species within the project area.

Hazardous Materials:

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

Historic:

Per the resource ID, bridge 6 is not historic. The adjacent properties are not historic.

Stormwater:

There are no stormwater related concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation is in the process of finalizing an 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 early. The Agency will consider the closure option on most projects where rapid reconstruction or rehabilitation is feasible. The use of precast 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: Temporary Bridge

From a constructability standpoint, a temporary bridge could be constructed either upstream or downstream from the existing structure. There are resources present on both the upstream and downstream side. On the upstream side, there are wetland resources, and on the downstream side, there are both wetland resources and archaeological resources. Additionally, an upstream temporary bridge would require a significantly longer span due to the layout of the channel.

Based on the daily traffic volumes and site layout, a one-way temporary bridge without traffic signals would be appropriate. Both an upstream and downstream temporary bridge alignment would require acquiring temporary rights from adjacent property owners. Utilities would likely be temporarily relocated to the temporary bridge. See the Temporary Bridge Layout Sheets in the appendix.

Advantages: Traffic flow can be maintained along the TH 3 corridor.

Disadvantages: This option would have adverse impacts to adjacent wetlands, archeological resources, and properties. 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.

Option 2: Phased Construction

Phased construction is the maintenance of one lane of two-way 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. Based on traffic volumes at this site, it is reasonable to close one lane of traffic, and maintain one lane of traffic, both ways, without a traffic signal.

Due to horizontal constraints of the existing bridge, phasing traffic is not possible without shifting the alignment of the bridge, or unnecessarily widening the bridge.

Advantages: This option would not require a temporary bridge. As a result, there are decreased costs at both the development and construction stages of the project.

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

Option 3: Off-Site Detour

This option would close the bridge and reroute traffic onto an offsite detour. Since the bridge is located on a class 2 Town Highway, it would be the responsibility of the Town of Richford to choose the preferred detour route, and to sign it according to the MUTCD manual. If the preferred detour route goes though an adjacent town, it will be the responsibility of the Town of Richford to coordinate with that town.

There are several possible routes that would be appropriate for a detour at this site. These routes vary in end-to-end distance from 5.1 miles to 14.3 miles. Regardless of the route chosen, it is likely that any of these routes could see increased traffic if TH 3 were closed during construction. Some possible detour routes which the Town of Richford may want to choose are as follows:

1. Branch Road, to Pinnacle Road, Berry Road, Pleasant View Road, Richford Road, back to Branch Road (5.1 mi end-to-end)

2. Branch Road, to River Street, VT 105, Marvin Road, back to Branch Road (7.5 mi end-to-end)

3. Branch Road, to River Street, VT 105, VT 118, Richford Road, back to Branch Road (14.3 mi end-to-end) – Paved Route

A map of possible detour routes can be found in the appendix.

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. This option would not require the need to obtain rights from adjacent property owners for a temporary bridge. Also, this option would not have impacts to wetlands or archaeological resources adjacent to the bridge. This option reduces the time and cost of the project both at the development stage and construction.

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

III. Alternatives Discussion

No Action

This alternative is not recommended. The bridge is scour critical, and should be replaced or rehabilitated in the near future. Although the bridge is not in imminent danger of collapse, it will continue to scour out until a long term repair is made. In the interest of safety to the traveling public, the No Action alternative is not recommended.

Alternative 1: Preventative Maintenance

This alternative involves scour mitigation for the existing substructure. The substructure was rated a 4(poor) in 2010 due to scour. The rating has since been raised to a 6(satisfactory) due to scour and undermining countermeasures. These countermeasures however are not an adequate long term solution. Since the superstructure and deck are in satisfactory to good condition, it is possible to extend the life of the existing structure 20 years, with a more permanent scour mitigation repair. Mitigation would consist of temporarily diverting the stream, and pouring a concrete apron along the footings to four feet below the stream bed. The mitigation would need to be monitored for the life of the existing structure, as this would be a scour critical fix.

Advantages: This option would have the lowest upfront costs.

Disadvantages: This option would not address the substandard hydraulic capacity of the existing bridge. This alternative would require future monitoring for scour. Additionally, the existing bridge width is substandard by 5.4 feet, which would not be addressed by this option.

Alternative 2: New Structure

In order to bring the North approach radius up to current standards, the project limits would need to extend beyond what is considered reasonable for a bridge project. Therefore, no off-alignment options will be considered because of the additional expense and impacts associated with realigning a roadway. The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

This option would be a brand new bridge that addresses both the current structural, geometric, and hydraulic deficiencies of the existing bridge.

a. Bridge Width

The current rail to rail width is 20.6 feet. This does not meet the minimum standard of 26 feet. Since a new 80+ year bridge is being proposed in this location, the bridge geometry should meet the minimum standards. A 26 foot width bridge will be proposed.

b. Bridge Length and Skew

The existing bridge has a clear span of 21.3 feet with no skew and the hydraulics section has recommended maintaining that clear span. The channel is at a skew to the existing square bridge. However, since the channel is naturally meandering, it does not make sense to skew the bridge to match the natural channel skew. A clear span of 26 feet with no skew will be chosen.

c. Superstructure/Substructure Type

The most economical solution for a possible 26' span length bridge is a precast arch or 3-sided frame. Since there is no need to match into upstream and downstream channel banks, extending the length of the superstructure in order to provide stone fill is not necessary. Therefore, hydraulics has recommended vertical abutments with no stone fill.

There is a visible bedrock outcrop in the vicinity of the project, and available subsurface information indicates that shallow bedrock may be encountered. As such, spread footings placed six feet below the stream bottom, or to bedrock are appropriate at this site. Any rapid construction alternative should have sufficient subsurface information to verify the in-situ conditions.

d. Maintenance of Traffic

Either a temporary bridge or a road closure would be appropriate measures for traffic control at this site. If the road is closed during construction, the local share of funds will be reduced by 50%.

Advantages: This alternative would be a new structure with an estimated life span of 80 years. The increased bridge width would meet Vermont State Standards, and would also make the bridge crossing safer for bikes and pedestrians. This option would also meet hydraulic standards.

Disadvantages: This alternative would have the highest upfront costs.

IV. Alternatives Summary

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

Alternative 1: Preventative Maintenance: Concrete Apron for Scour Mitigation
Alternative 2a: New Precast Frame or Arch with Traffic Maintained on an Offsite Detour
Alternative 2b: New Precast Frame or Arch with Traffic Maintained on a Temporary Bridge

V. Cost Matrix[2]

Richford BRF 0302(29)		Do Nothing	Alt 1	Alt 2a	Alt 2b
			Preventative Maintenance: Concrete Apron	Complete Replacement with Precast 3-sided Frame or Arch	
			Temporary Lane Closures	Offsite Detour	Temporary Bridge
COST	Bridge Cost	$0	$74,030	$148,800	$148,800
	Removal of Structure	$0	$0	$75,000	$75,000
	Roadway	$0	$21,313	$190,994	$243,494
	Maintenance of Traffic	$0	$31,000	$105,000	$245,000
	Erosion Control	$0	$5,000	$20,000	$30,000
	Construction Costs	$0	$131,343	$539,794	$742,294
	Construction Engineering + Contingencies	$0	$39,403	$161,938	$222,688
	Total Construction Costs w CEC	**$0**	**$170,745**	**$701,732**	**$964,982**
	Preliminary Engineering[3]	**$0**	**$52,537**	**$188,928**	**$222,688**
	Right of Way	**$0**	**$0**	**$0**	**$89,075**
	Total Project Costs	$0	$223,300	$890,700	$1,276,700
	Annualized Cost		$11,170	$11,130	$15,960
TOWN SHARE	Total Cost for Town		$11,200 (5%)	$44,500 (5%)	$127,700 (10%)
SCHEDULING	Project Development Duration[2]		1 year	2 years	>4 years
	Construction Duration		2 months	3 months	18 months
	Closure Duration (If Applicable)		N/A	4 weeks	N/A
ENGINEERING	Typical Section - Roadway (feet)	19'	19'	26'	26'
	Typical Section - Bridge (feet)	0.3-10-10-0.3	0.3-10-10-0.3	3-10-10-3	3-10-10-3
	Geometric Design Criteria	No Change	Substandard Bridge and Roadway Width, Substandard Approach Radius	Meets Criteria	Meets Criteria
	Traffic Safety	No Change	Slightly Improved	Improved	Improved
	Alignment Change	No	No	No	No
	Bicycle Access	No Change	No Change	Improved	Improved
	Hydraulic Performance	No Change	Slightly Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	Improved	Improved
	Utility	No Change	No Change	Relocation	Relocation
OTHER	ROW Acquisition	No	No	No	Yes
	Road Closure	No	No	Yes	No
	Design Life	<10 years	20 years	80 years	80 years

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

VI. Conclusion

We recommend **Alternative 2a**; to replace the existing bridge while maintaining traffic on an offsite detour.

Structure:
The annualized total cost for a complete replacement is less expensive than the preventative maintenance option, since the existing substructures would require costly repairs to gain only an additional 20 years of service. The preventative maintenance option would still be considered scour critical and would require scour monitoring for the duration of the bridge's remaining life. Additionally, constructing a new bridge is the only way to improve the substandard width of the bridge.

The proposed structure will have two 10 foot travel lanes with 3 foot shoulders. The proposed structure is a precast 3-sided frame. This is the most economical structure type for a 26 foot span.

Traffic Control
It is recommended that traffic be maintained on an offsite detour. This option will not have permanent impacts to surrounding environmental resources and will not require Right-of-Way acquisition. The ADT on TH 3 is 830, which is considered relatively low. Additionally, there are several available detour routes that could be signed by the Town of Richford. By not providing a temporary bridge, both the project development time and the project cost are significantly reduced.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- 2012 Critical Maintenance Letter to Town
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archaeology Memo
- Historic Memo
- Stormwater Memo
- Resource ID Completion Memo
- Detour Information
- Plans
  - Existing Conditions
  - Typical Sections
  - Layout
  - Profile
  - Temporary Bridge Layouts

Northbound Approach

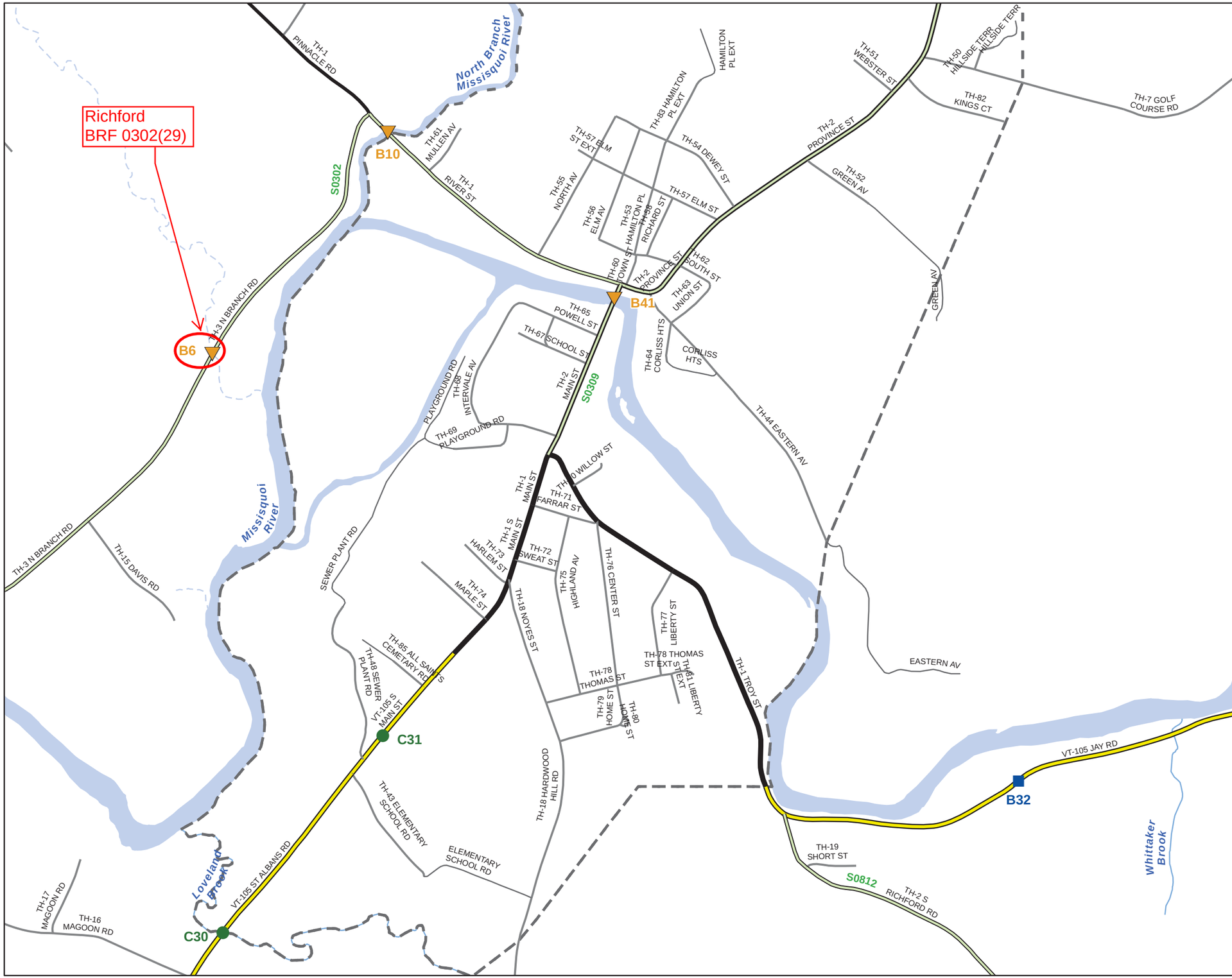
Southbound Approach

Looking Downstream

Looking Upstream

Superstructure Deterioration

Upstream Bridge Fascia and South Abutment

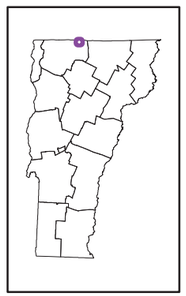


Scale 1:9,670

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

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011



RICHFORD U.C.
FRANKLIN COUNTY
DISTRICT # 8

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for RICHFORD **bridge no.:** 00006 **District:** 8

Located on: TR 03 FAS 302 **over** BROOK **approximately** 1.2 MI W JCT. VT.105 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 7 GOOD

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200302000606112

Federal Sufficiency Rating: 45.9

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1900 **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): 12

ADT: 000840 **% Truck ADT:** 06

Year of ADT: 1995

GEOMETRIC DATA

Length of Maximum Span (ft): 0024

Structure Length (ft): 000026

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 20.6

Deck Width Out-to-Out (ft): 23.4

Appr. Roadway Width (ft): 019

Skew: 00

Bridge Median: 0 NO MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 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: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 5 OCCASIONAL OVERTOPPING OF BRIDGE & ROADWAY WITH SIGNIFICANT TRAFFIC DELAYS

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 3 SCOUR CRITICAL

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: 1 H 10

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 092012 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

09/11/2012 - Guard rail system needs improvement. Blunt ends of the bridge rail and the lack of approach rail is a traffic saftey hazard. Bridge has a significant amount of wearing surface overburden but shows no indication of overstress. The abutments have evidence of only minor settlement. The bridge otherwise, considering it's age, is in fairly good condition. CM sent. ~ MJ/DK

04/19/2012 - Quality control check. A regular inspection will be performed this summer. Waterway has had scour and undermining repairs and countermeasures the last few years. Riprap for instance, was added in 2009. Each abutment has experienced only some very minor settlement below centerline of roadway. The bridge, though quite old and narrow, is in fairly good condition. Substructure and superstructure will be raised to a satisfactory rating. ~ MJ

05/17/10 A missing paddle board occurs on the right side of approach No.2 and needs to be added. No undermining is seen at this time of inspection. PLB

VERMONT

State of Vermont
Program Development - Structures Section
One National Life Drive [phone] 802-828-2621
Montpelier, VT 05633-5001 [fax] 802-828-3566
www.aot.state.vt.us [ttd] 800-253-0191

Agency of Transportation

September 25, 2012

Ms. Linda Collins, Selectboard Chair
Town of Richford, Vermont
c/o Mr. Allan Fletcher, Town Clerk
P.O. Box 236, 94 Main st.
Richford, VT 05476

RE: Richford, Bridge #6 on FAS 302 (TR 3) over a brook

Dear Ms. Collins:

The Federal National Bridge Inspection Standards require inspection of all publicly owned bridges over 20 feet in length on a 24 month cycle. A two-member team performs the inspection, with at least one member specially trained for this work. The Agency of Transportation provides this inspection in the interest of public safety and as a service to the municipalities with the cost shared between the Federal government and the State.

The above referenced structure is a concrete T-beam spanning a brook. During a recent inspection, the following problems were noted which are in need of attention.

- **There is no approach rail system and the blunt ends of the concrete parapet bridge rail are a traffic safety hazard.**

Based on these findings, we recommend that rail of adequate size and strength which meets current standards be installed with adequate bridge rail transition. The bridge is quite narrow and when the rail is upgraded, newer standard paddle boards should also be installed.

This structure is owned by the town and as such is the responsibility of the town. **Failure to comply with the recommendations may compromise public safety, result in additional damage, and/or substantially reduce the service life of the structure**.

VTrans Working to Get You There
Vermont Agency of Transportation

Even though a bridge is recommended for repair due to deterioration by the State, the decision to properly respond to the recommendations is the responsibility of municipal officials. However, it is in the best interest of the municipality to address these recommendations. A failure to address potential bridge hazards may result in tort liability claims.

Please send WRITTEN notification of your intent to comply with, your compliance with, or reasons for non-compliance with these recommendations within 60 days from receipt of this letter. We are required by the Federal Highway Administration to report to them when the recommended posting, closure, and/or safety repairs have been implemented. A response form has been provided for your use.

If you have any questions concerning the matter, please contact your local District Transportation Administrator, David Blackmore 527-5500 or VTrans' Bridge Management and Inspection Engineer, Pamela M. Thurber at 828-0041. A representative from the Bridge Management and Inspection Unit would be willing to meet with you at the site to discuss the contents of this letter.

Sincerely,

Wm. Michael Hedges, P.E.
Structures Program Manager

WMH: PMT: *mlj*
cc: David Blackmore, DTA District #8
NBIS Inspection Files PMT&MLJ
Tod Kimball, FHWA Engineer

VTrans Working to Get You There
Vermont Agency of Transportation

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

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

FROM: Nick Wark, P.E., CFM, Hydraulics Enginner

DATE: Feb 12, 2013

SUBJECT: Richford BRF 0302(29) – TH3 Br6
Berkshire Rd over Berry Brook

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

TH3 is a federal aid road and a major collector road, so the hydraulics manual states it should be designed to the 50 year event.

The existing concrete t-beam was built in 1900. It has a clear span of 21.3', abutment to abutment. It does not provide 1' of freeboard at Q50 and therefore does not meet hydraulics standards.

The channel in the area of the bridge has been modified. Livestock and farm equipment have worn down the natural channel banks and caused a much wider flow area than upstream and downstream. Because of this "unnatural" state there are less design constraints and more options regarding span and alignment.

We recommend the new bridge have a clear span of 24' with a rectangular waterway opening with no stone fill in front of the abutments. Low beam should be 433.5'. This option is slightly longer than the existing span. It will decrease velocities which may currently be causing erosion on the downstream banks. It also lowers headwater depths closer to what they would be in the natural channel.

A second option is to maintain the existing span (21.4'), with a rectangular waterway opening with low beam at 434.0'. This option has higher headwater depths and velocities than the option above, but would meet hydraulic standards as the low beam is being raised relative to the existing structure.

If stone fill is used in front of the abutments and anything other than a rectangular waterway opening is used, we will need to increase the span length. Please contact us with any proposed internal bridge cross sections and we can work with you to make sure they will meet standards.

If spread footings are used, they should be founded below the scour depth calculated at final hydraulics which at a minimum is 6' below the channel. The existing bridge has experienced scour as evident by the exposed footings and stone fill.

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

NJW

cc: Hydraulics Project File via NJW
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

CEE CCB

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

Date: May 29th, 2012

Subject: Richford BRF 0302(29) – TH 3, BR 6 Preliminary Geotechnical Information

In an effort to assist the Structures Section with their bridge type study, the Soils and Foundations Unit within the Materials and Research Section has completed a review of available geological data near TH 3 (North Branch Rd) crossing over Berry Brook in Richford, Vermont. This review included our in-house bridge boring files, record plans, USDA Natural Resources Conservation soil survey records, surficial geology and bedrock maps of the State and the Agency of Natural Resources Well logs.

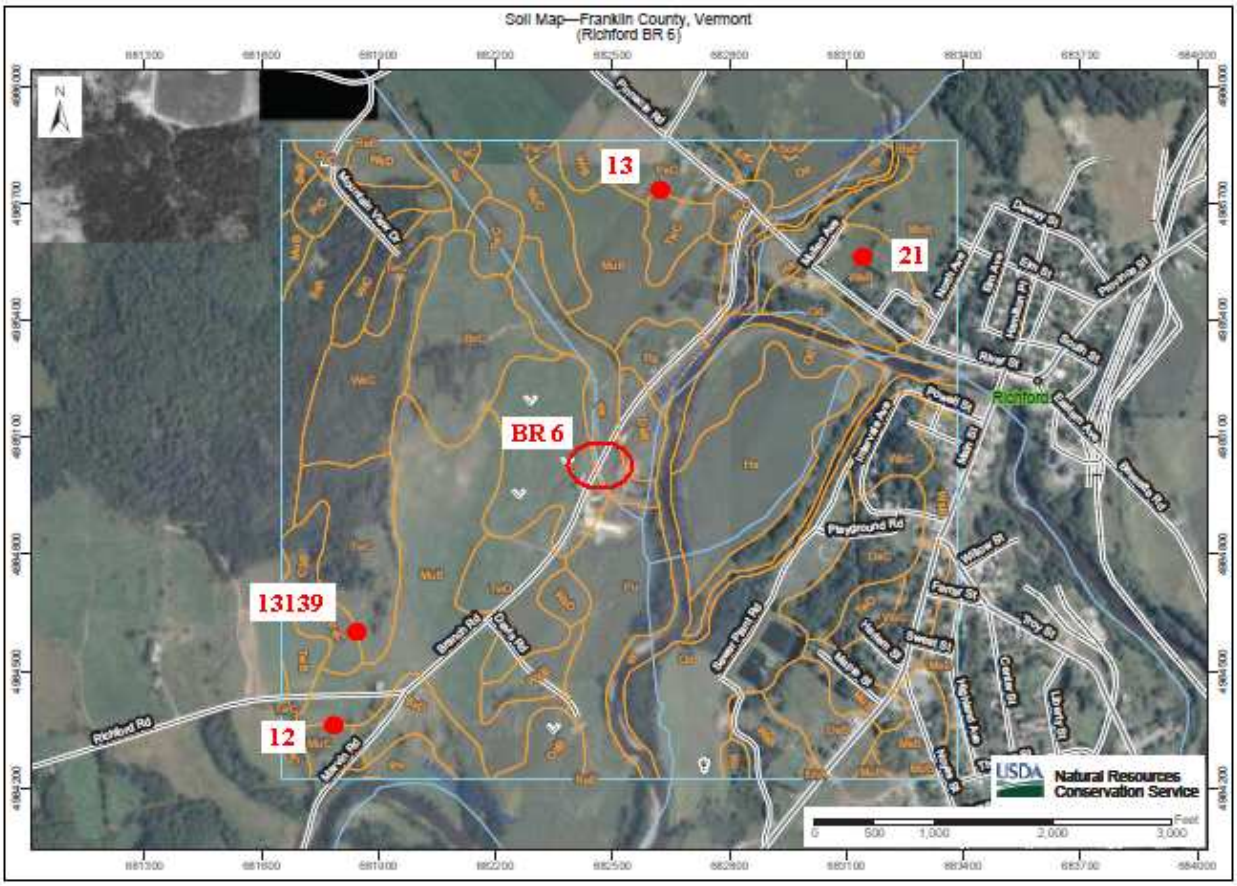


Figure 1, USDA Soil Survey and ANR Well Data near Bridge 6

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, the logs can be used to determine general characteristics of soil strata in the area. The soil description given on the logs is done in the field, by unknown personnel, and as such, should only be used as an approximation. Based on subsurface information reported by well drilling reports on file at ANR and the USDA web soil survey, the surficial geology in the vicinity of the subject area is expected to consist of a mixture of clay, sand, gravel, and hardpan. USDA soil descriptions and four well locations within three quarters of a mile are shown in Figure 1 and summarized in Table 1.

Table 1, Well Log and USDA Soil Survey Descriptions

Well Number/ Map Symbol	Overburden Description/ Map Unit Name	Depth to Bedrock (ft)
Pa	Peacham Stony Soils	N/A
13	Sand and Gravel	26
21	Clay	5
12	Hardpan	180
13139	Clay and Hardpan	122

The Natural Resources Conservation Service USDA soil descriptions from Figure 1 indicate that the subject area is classified as Peacham stone soils. These deposits are typically silts and gravels found in geologic depressions and are evidenced in the water well records nearby and the 1970 Surficial Geologic Map of Vermont. Bedrock in the area is expected to be foliated schist and phyllite according to the new 2012 Bedrock Map of Vermont. A potential bedrock outcropping was seen just west approximately 100 ft from the bridge location (see Figure 2).

Figure 2, Possible bedrock outcrop in field approx. 100 ft from Bridge 6

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

- Reinforced concrete abutments on spread footings
- Pile caps on a single row of H-Piles (integral abutment or pinned superstructure)
- Stub abutments with spread footings founded on mechanically stabilized earth (MSE) walls.

When considering MSE Walls, please recognize that open graded backfill should be used below the flood elevation to limit the possibility of excess pore pressure build up behind the walls. Also, the addition of steel sheeting for scour protection should be evaluated.

We recommend two borings be taken at opposite corners of the proposed bridge, in order to more fully assess the subsurface conditions at the site including, but not limited to, the soil properties, ground water conditions and depth of bedrock. If shallow bedrock is present, borings should be performed at all four corners of the bridge to get an idea of the bedrock profile across the abutment.

Figure 3, Bridge 6 Looking Southwest away from Richford

Borings in opposite corners within the roadway appear to be feasible (see Figure 3). Borings outside the roadway will be potentially difficult due to both power lines and electrical fence lining the roadway. However, final recommendations for borings can be provided once an alignment and preliminary structure type have been selected.

If you have any questions, please feel free to call us at 828-1235.

c: WEA/Read File
CCB/Project File
CEE

VERMONT

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[ttd] 800-253-0191

Agency of Transportation

To: Jeff Ramsey, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 4/13/2012

Subject: Richford 0302(29) - 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 performed a site review of the project area.

Wetlands/Watercourses
There are wetlands within the project area. Formal wetland delineation according to US Army Corps of Engineers Wetland Delineation Manual was not completed and wetlands were identified using best professional judgment for resource identification/planning purposes. The wetlands are located in all quadrants of the project except the NE. Wetlands in the project area are emergent wetlands adjacent to the unnamed tributary within the project area. A shape file with approximate wetland boundaries is available for reference.

There is an unnamed tributary to the Mississiquoi River which flows southeasterly through the project area. This river would support 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
General Wildlife habitat exists within the surrounding area. The project area consists of agricultural lands. There are no wildlife corridor issues within the project area.

Rare, Threatened and Endangered Species
There are no mapped rare, threatened or endangered species within the project area.

Agricultural Soils
There are no mapped prime agricultural soils within the project area.

Richford BRF 0302(29)--Natural Resource ID

Map created by Glenn Gingras
VTrans Biologist 4/13/12

VERMONT

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

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

Agency of Transportation

To: Jeff Ramsey

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

Date: 4/16/2012

Subject: Richford BRF 0302(29) Bridge 6 Archaeological Resource Identification

Jeff,

A site visit on 4/10/2012 was conducted as part of the 2012 "pilot program" in order to map archaeological resources using the new Trimble GPS unit. The NE quadrant was mapped as archaeologically sensitive after careful evaluation in the field.

The NE section of the project area is located on a portion of sloping bluff overlooking the confluence the Missisquoi and a small tributary in Richford. A number of known precontact sites are in the *general* area, and this landscape feature rates high for archaeological sensitivity. Field data was collected and manipulated in the office to create the attached map.

~Brennan

Brennan Gauthier
VTrans Assistant Archaeologist
tel. 802-828-3965
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation

Richford BRF 0302(29)
Bridge 6 Archaeological Sensitivity

Richford BRF 0302(29)
Map Created By: Brennan G.
4/16/2012

Ramsey, Jeff

From: O'Shea, Kaitlin
Sent: Friday, April 13, 2012 9:14 AM
To: Ramsey, Jeff
Cc: Williams, Chris; Newman, Scott
Subject: Pilot Project - Richford BRF 0302(29) Historic Resource ID

Good morning,

I have completed the historic resource ID for Richford BRF 0302(29): Bridge 6 and the adjacent properties are not historic.

This resource ID is part of the GPS/GIS Pilot Project. As discussed, initial review for historic resources is completed via desk review (maps, bridge inspection photos, Google Earth) and can be determined to have no historic resources without site visits. Other projects will require a site visit in order to determine if there are historic resources located within the project area. Historic resources will continue to be identified on a map and scanned for the project files. When appropriate, historic resources will be mapped by the GPS in order to compare and contrast the effectiveness and application of these resource ID procedures.

I am keeping a spreadsheet for these pilot projects which outlines review methods, resource notes, resource ID and how the ID is submitted (GPS data, email memo, resource map, etc.) I'll bring this to the next project meeting.

Let me know if you have any questions.
Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

802-279-0869
Kaitlin.O'Shea@state.vt.us

Ramsey, Jeff

From: Armstrong, Jon
Sent: Wednesday, May 23, 2012 12:56 PM
To: Ramsey, Jeff
Subject: RE: Environmental Request NOTIFICATION: RICHFORD BRF 0302(29)

Hi Jeff,
I have no stormwater related concerns of note to offer at this time for this project.

Jonathan B. Armstrong, PE
VTrans Stormwater Management Engineer
(802) 828-1332

"*We forget that the water cycle and the life cycle are one*."
- Jacques Cousteau

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From: Ramsey, Jeff
Sent: Wednesday, March 28, 2012 4:34 PM
To: Armstrong, Jon; Gingras, Glenn; Gauthier, Brennan; O'Shea, Kaitlin
Cc: Williams, Chris
Subject: FW: Environmental Request NOTIFICATION: RICHFORD BRF 0302(29)

Hi all,
This project is one of the Chris Williams Pilot Projects. The entire pilot group will go out to visit a site to work through the process so they all know how to do it and what to look for. That visit will happen in the very near future.

Comments: The resource ID will be conducted by a pilot group under PDWP GIS/GPS work plan. This group is part of the GIS Experimental work plan and is researching innovative ways to streamline the ID process.

Folder Link:
Z:\Projects-Engineering\RichfordBRF0302(29)12j158\Environmental\ResourceIDandClearances\ResourceID

Please let me know if you have any questions.
Thanks,
Jeff

Jeff Ramsey
Environmental Specialist - North Region
Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-1278
jeff.ramsey@state.vt.us

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Jeff Ramsey, Environmental Specialist
DATE: June 4, 2012

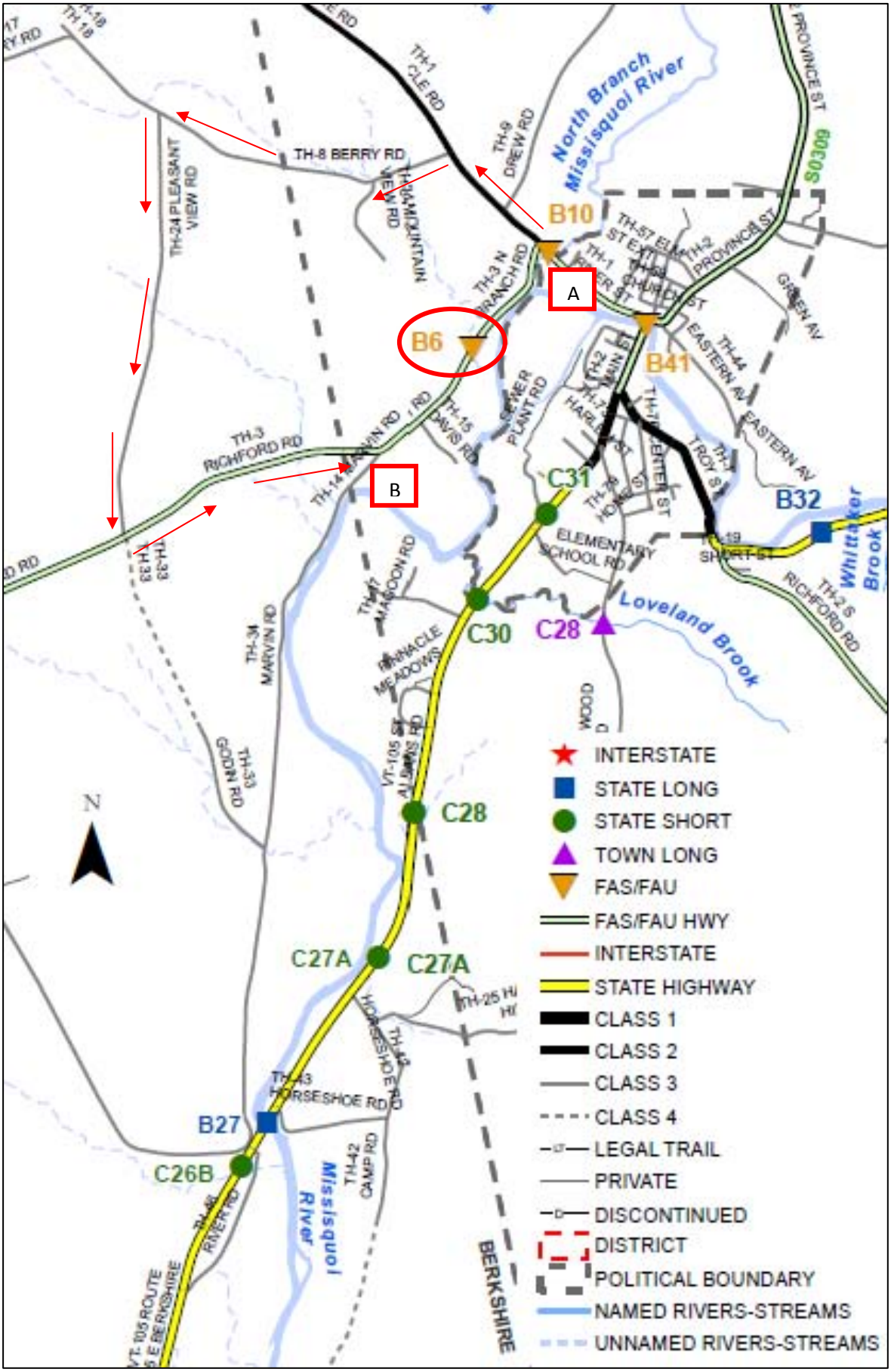
Project: Richford BRF 0302 (29)

ENVIRONMENTAL RESOURCES: **sent out 03/28/12**

Wetlands:	X	Yes	____ No	See natural resource report
Historic/Historic District:	____	Yes	X No	
Archaeological Site:	X	Yes	____ No	NE Quadrant; See Richford BRF 0302(29) ARA and Richford BRF 0302(29) Arch Sensitivity
4(f) Property:	____	Yes	X No	
6(f) Property:	____	Yes	X No	
Agricultural Land:	____	Yes	X No	
Fish & Wildlife Habitat:	X	Yes	____ No	See natural resource report
Endangered Species:	____	Yes	X No	
Hazardous Waste:	____	Yes	X No	
Stormwater:	____	Yes	X No	
USDA-Forest Service Lands:	____	Yes	X No	
Wildlife Habitat Connectivity:	____	Yes	X No	
Scenic Highway/ Byway:	____	Yes	X No	
Act 250 Permits:	____	Yes	X No	

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

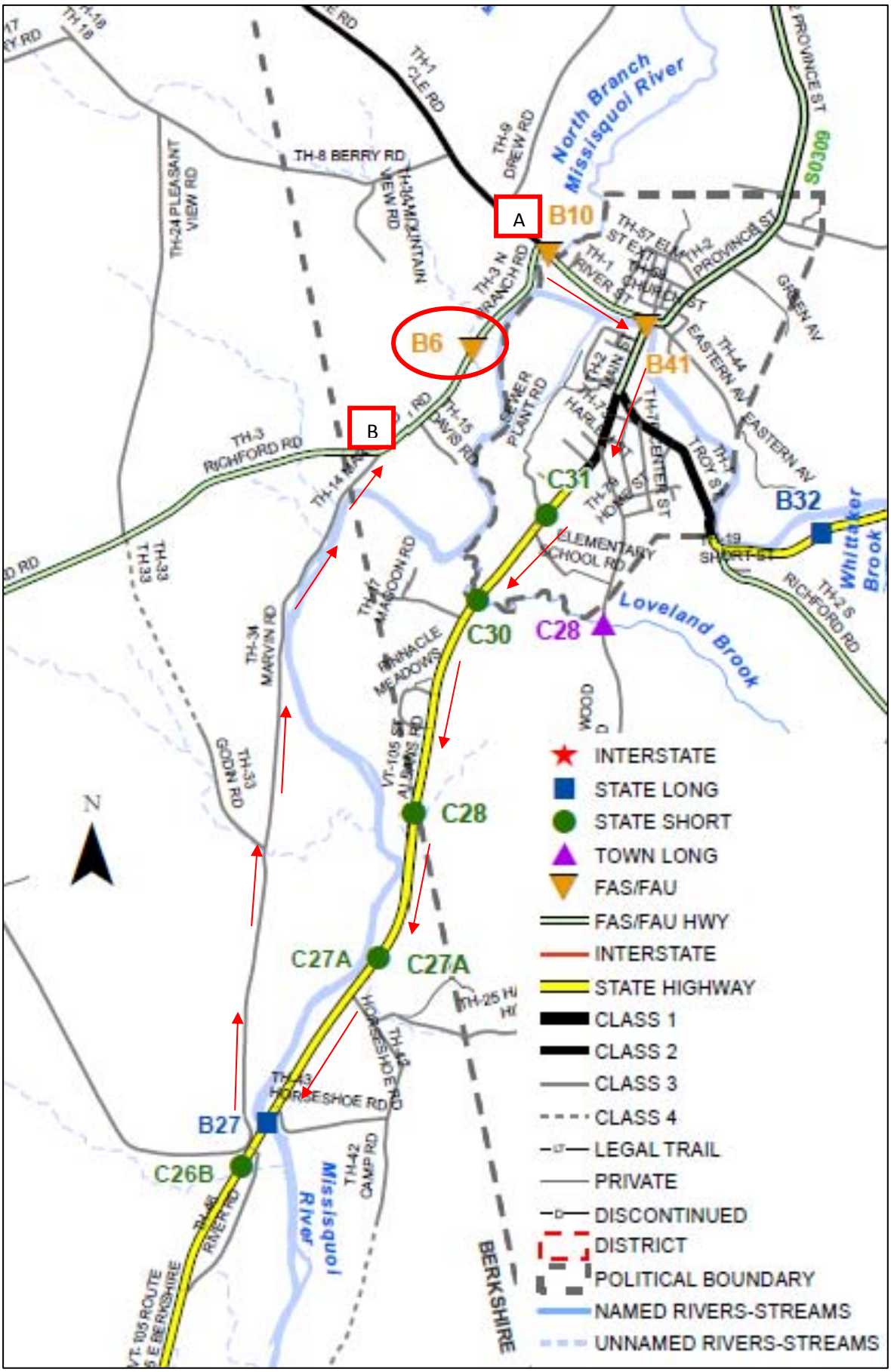
cc:
Project File



Detour Route 1

N Branch Road, to Pinnacle Road, Berry Road, Pleasant View Road, Richford Road, back to N Branch Road

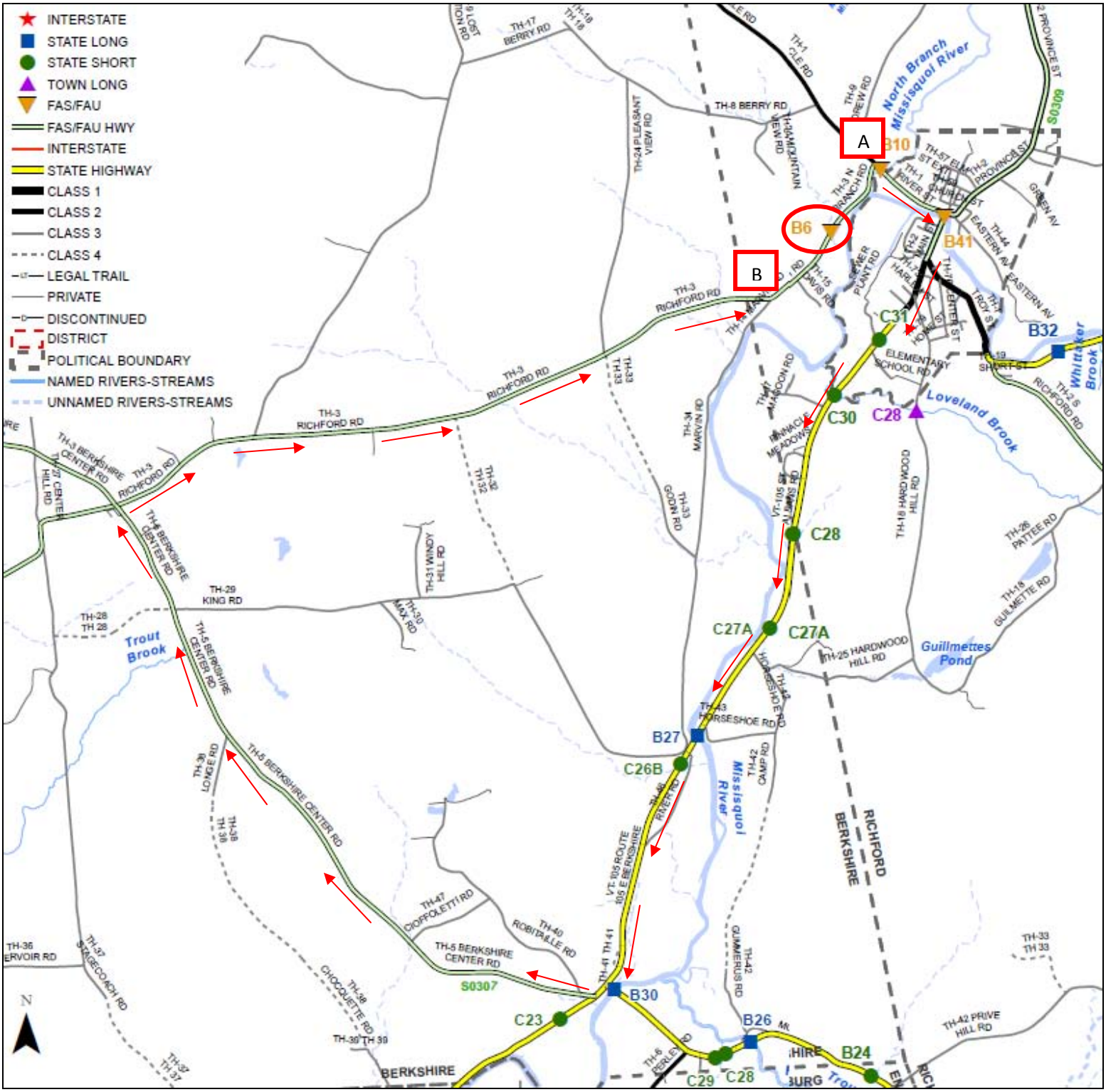
A – B Thru Route: 1.0 Miles
A – B Detour Route: 4.2 Miles
Added Miles: 3.2 Miles
End-End Distance: 5.1 Miles



Detour Route 2

N Branch Road, to River Street, VT 105, Marvin Road, back to N Branch Road

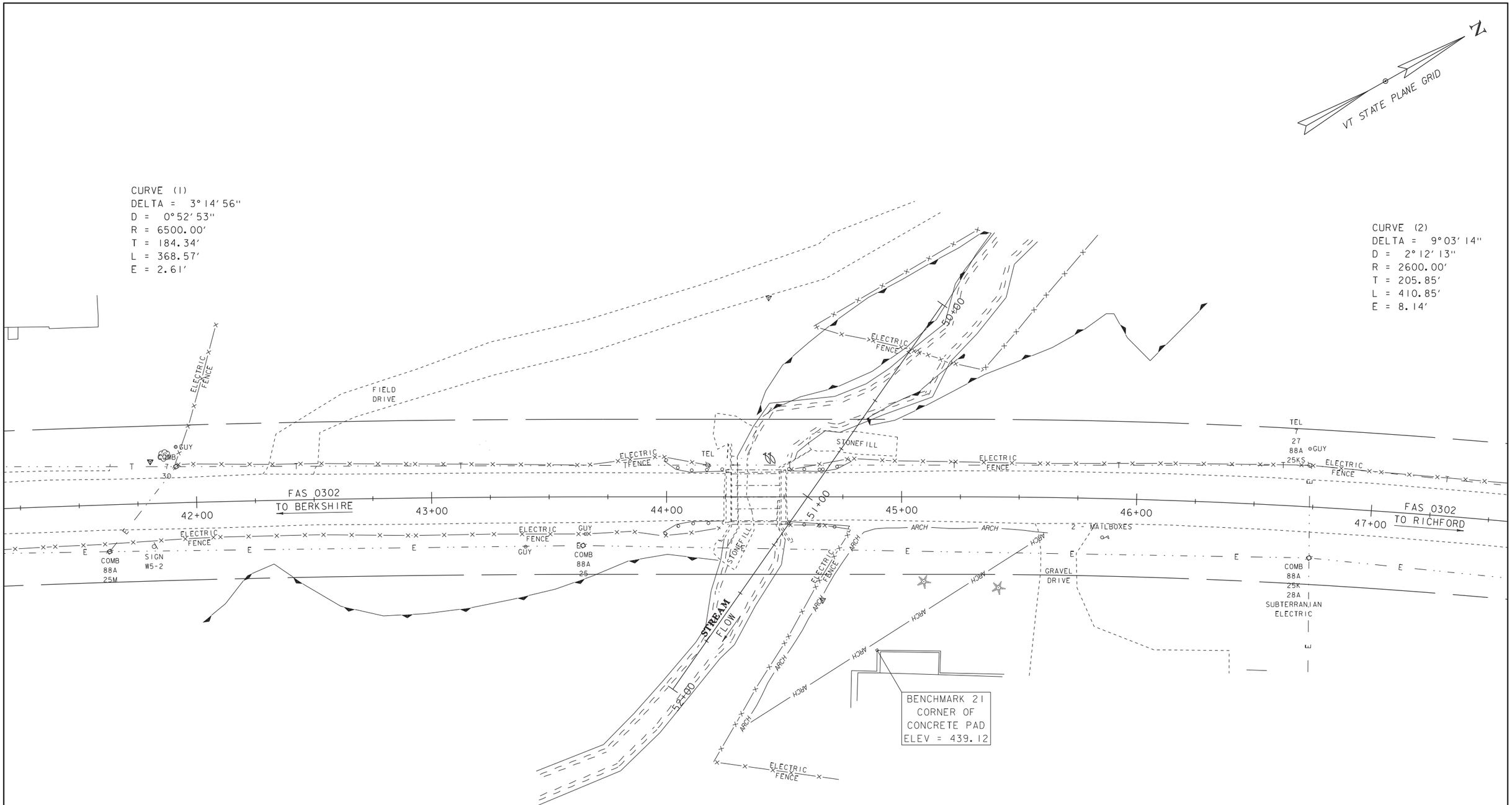
A – B Thru Route: 1.0 Miles
A – B Detour Route: 6.6 Miles
Added Miles: 5.6 Miles
End-End Distance: 7.6Miles



Detour Route 3

N Branch Road, to River Street, VT 105, VT 118, Richford Road, back to N Branch Road

A – B Thru Route: 1.0 Miles
A – B Detour Route: 13.4 Miles
Added Miles: 12.4 Miles
End-End Distance: 14.4 Miles



EXISTING CONDITIONS

SCALE 1" = 20'-0"
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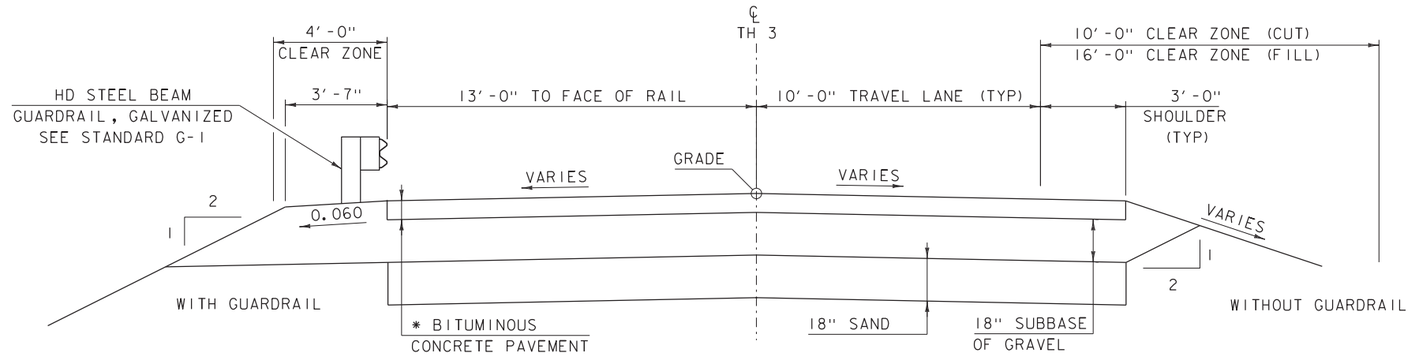
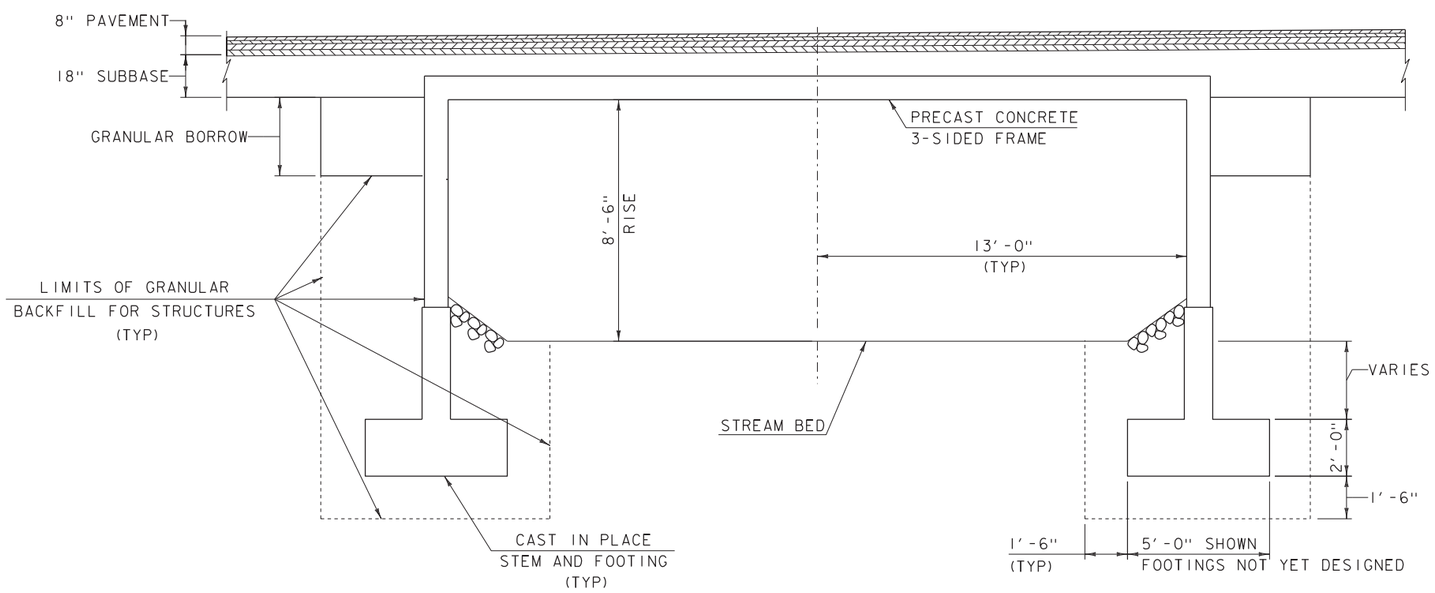
PROJECT NAME: RICHFORD	
PROJECT NUMBER: BRF 0302(29)	
FILE NAME: 12J158/s12J158bdr.dgn	PLOT DATE: 21-FEB-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS SHEET	SHEET 1 OF 6



PROPOSED FAS 0302 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED CULVERT TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

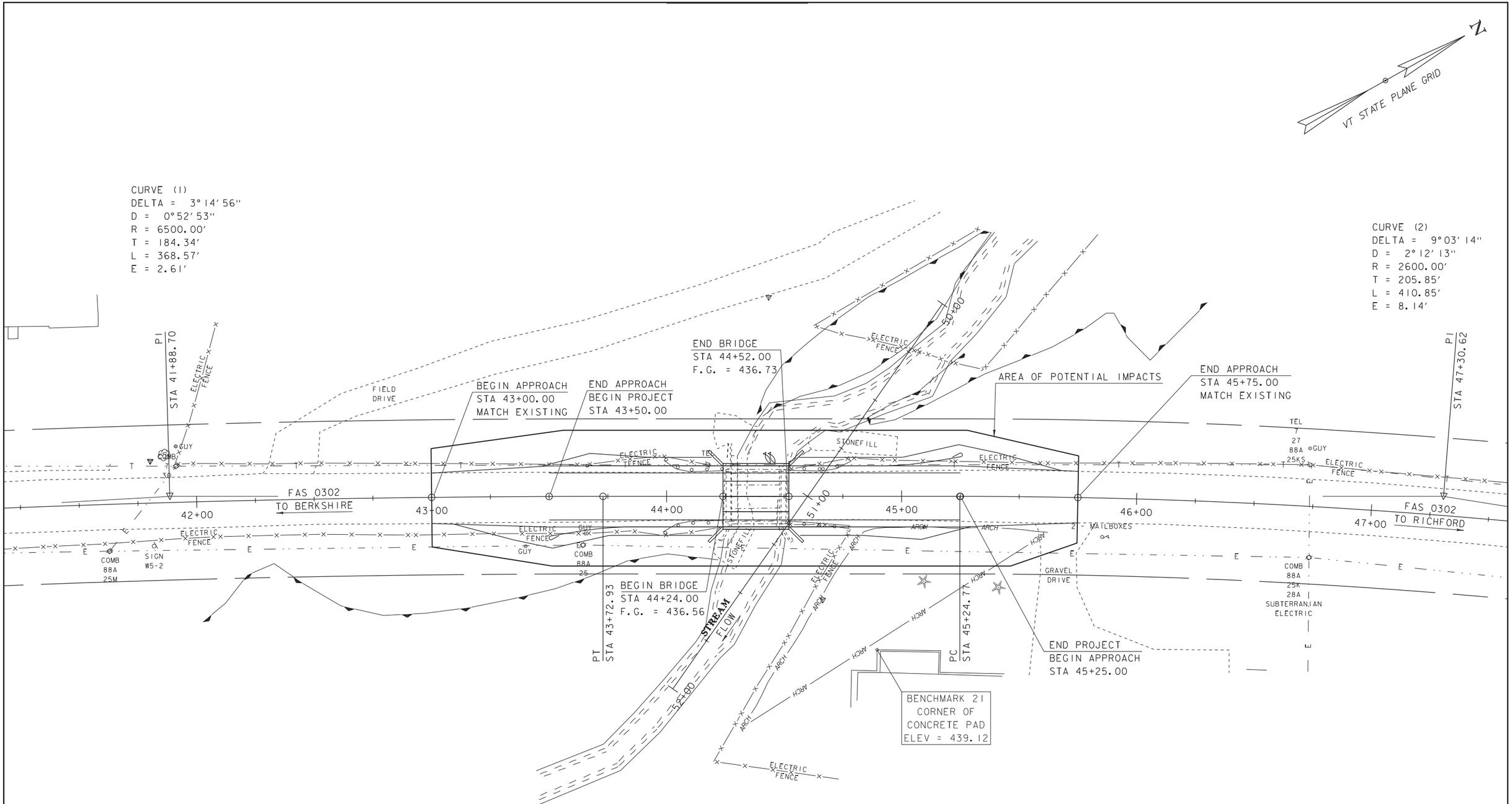
(IF USED ON PROJECT)

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

PROJECT NAME: RICHFORD
PROJECT NUMBER: BRF 0302(29)

FILE NAME: 12j158\s12j158typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 21-FEB-2013
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 2 OF 6



LAYOUT SHEET

SCALE 1" = 20'-0"
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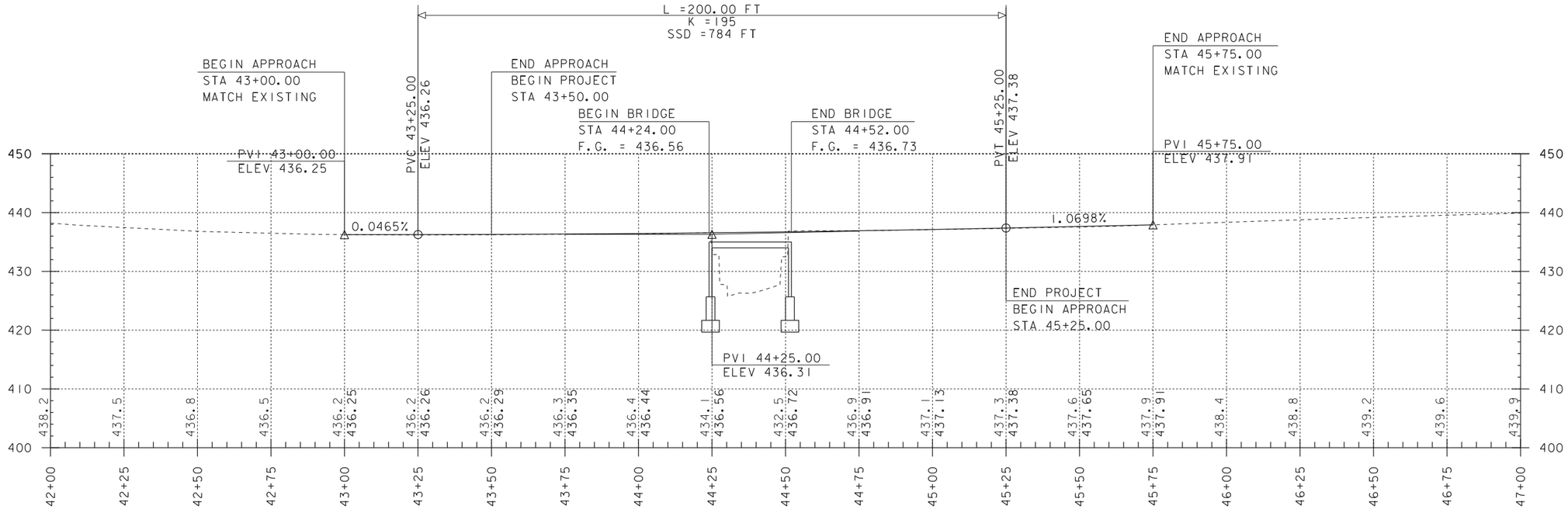
PROJECT NAME: RICHFORD	
PROJECT NUMBER: BRF 0302(29)	
FILE NAME: 12J158/sl2J158bdr.dgn	PLOT DATE: 21-FEB-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET	SHEET 3 OF 6



FAS ROUTE 0302 PROFILE

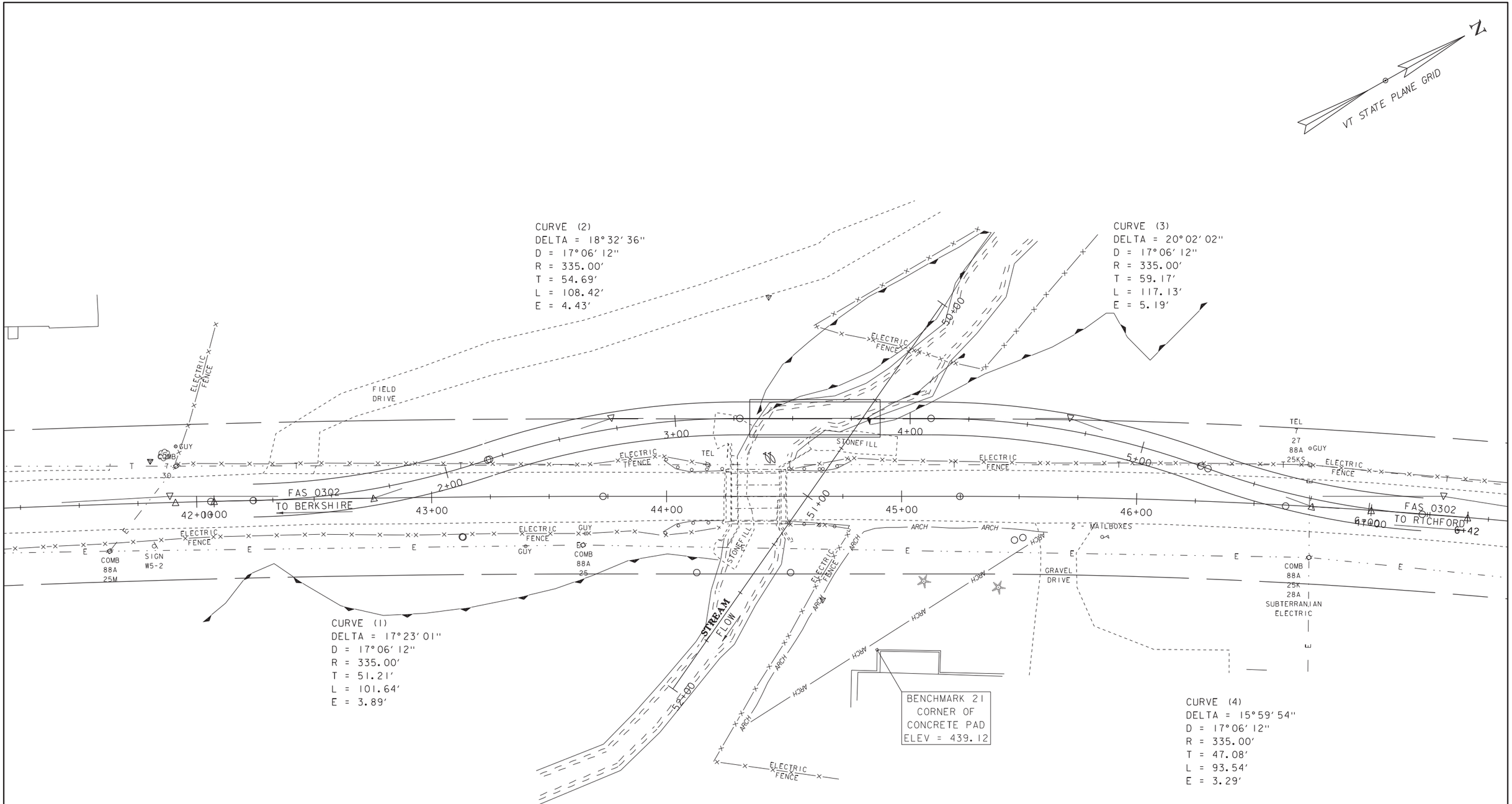
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: RICHFORD	
PROJECT NUMBER: BRF 0302(29)	
FILE NAME: 12J158/s12J158profile.dgn	PLOT DATE: 21-FEB-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
PROFILE	SHEET 4 OF 6

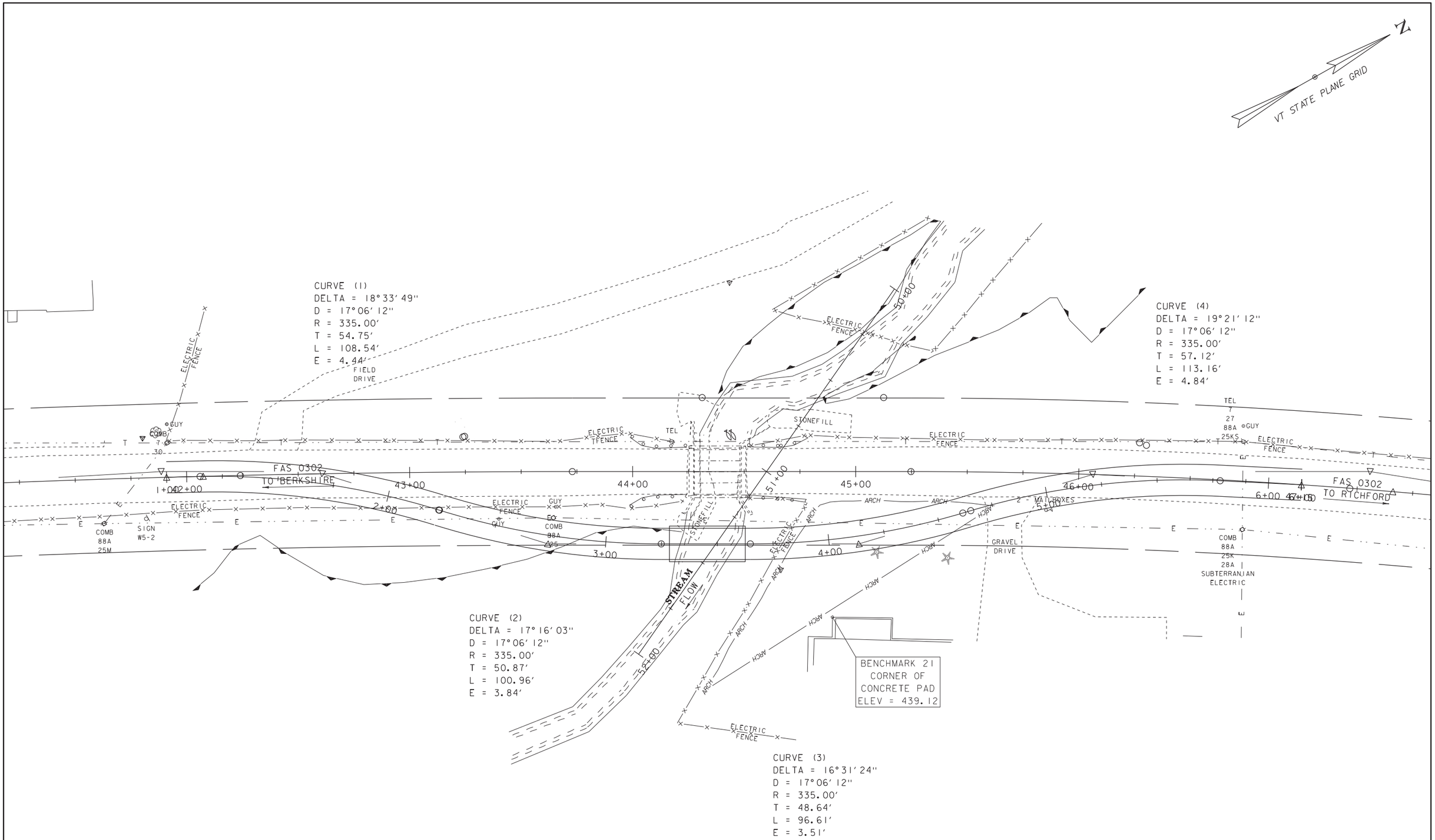


UPSTREAM TEMPORARY BRIDGE

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME: RICHFORD	
PROJECT NUMBER: BRF 0302(29)	
FILE NAME: 12J158/s12J158bdr.dgn	PLOT DATE: 21-FEB-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
UPSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 5 OF 6



DOWNSTREAM TEMPORARY BRIDGE

SCALE 1" = 20'-0"
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PROJECT NAME: RICHFORD	
PROJECT NUMBER: BRF 0302(29)	
FILE NAME: 12J158/S12J158bdr.dgn	PLOT DATE: 21-FEB-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
DOWNSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 6 OF 6