STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Barton Village BO 1449(33)

TOWN HIGHWAY 4, Bridge 58 OVER THE BARTON RIVER

July 8, 2013

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I. Site Information

Bridge 58 is located in a rural area along Roaring Brook Road (TH 4) at the intersection with VT 16. There are field drives on both sides of the road on the western end of the bridge. There are no houses located in the immediate vicinity 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 Minor Collector (Class 2)
Bridge Type	3 Span Concrete Slab Bridge
Bridge Span	48 feet long (Max Span: 15 feet)
Year Built	1956
Ownership	Village of Barton

Need

Bridge 58 is in Fair to Poor condition and is considered structurally deficient. The following is a list of the deficiencies of Bridge 58 and TH 4 in this location.

1. The deck and superstructure are in poor condition with the bridge having an overall Federal Sufficiency Rating of 52.7. Multiple holes have been patched in the deck soffit, and the riding surface of the bridge shows evidence of the deteriorating deck/superstructure.

2. The bridge and approach rail do not meet the current standard.

3. The existing bridge does not have adequate hydraulic capacity. It is grossly undersized, only passing the $Q_{2.33}$ design flood. Additionally, the existing bridge constricts the natural channel width and has an unknown scour potential.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2016 and 2026.

TRAFFIC DATA	2016	2026
ADT	1,100	1,200
DHV	120	140
ADTT	30	40
%T	2.7	3.1
%D	64	64

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 1200 and a design speed of 20 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	9'/3' (24')	9'/3' (24')	
Bridge Lane and Shoulder Widths	VSS Table 5.3	9'/3' (24')	9'/3' (24')	
Clear Zone Distance	VSS Table 5.5		12' fill, 10' cut (1:3)	
Banking	VSS Section 5.13	Normal Crown	6% Max	
Speed	VSS Section 5.3	30 mph (Posted)	20 mph (Design)	Stopped Condition
Horizontal Alignment	AASHTO Green Book Table 3-10b	R=2600' (Western Approach) , Bridge located on a straight tangent	R=231' @ 6% R=3130' @ NC	
Vertical Grade	VSS Table 5.6	Bridge located on -0.8557% grade to -0.7017% grade	8% (max) for level terrain	
K Values for Vertical Curves	VSS Table 5.1	Bridge located on crest (K = 45), Approach located on sag (K=42)	30 crest / 40 sag	
Vertical Clearance Issues	VSS Section 5.8	None Noted	14'-0" (min)	
Stopping Sight Distance	VSS Table 5.1	652'	200'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	3'	3' Shoulder	
Bridge Railing	Structures Manual Section 13	Steel Beam on Concrete Post	TL-2	Substandard
Hydraulics	VTrans Hydraulics Section	Passes $Q_{2.33}$ storm event	Pass Q_{25} storm event with 1.0' of freeboard	Substandard
Structural Capacity	SM, Ch. 3.4.1	Unknown	Design Live Load: HL-93	Substandard

Inspection Report Summary

Deck Rating	4 Poor
Superstructure Rating	4 Poor
Substructure Rating	5 Fair
Channel Rating	5 Fair

04/25/2012 – Channel banks have been repaired with stone riprap and concrete blocks. ~FRE/DCP

09/09/2011 – Irene inspection, no significant changes noticed. ~MJK/JM

06/04/2010 – Bank protection should be added. Structure should be repaired or replaced in the near future. Structure should be monitored after all high water events. ~FE/DS

Hydraulics
From preliminary hydraulics report:

Most of the calculated flows do not pass through the existing structure, except the $Q_{2.33}$ event. Additionally, the existing bridge is overtopped below the Q_{10} event. Therefore, the existing bridge is grossly undersized and does not have adequate hydraulic capacity for the design flow (Q_{25}) event based on an analysis of the existing conditions. Furthermore, the existing bridge constricts the natural channel width.

Recommendations
It is recommended that a new bridge should have a 64-foot clear span normal to the stream channel (between the abutment faces) with a low beam elevation at or above 854.9 feet. While this bridge is still not hydraulically adequate because it does not provide 1' of freeboard at Q25, the roadway overtopping flow at Q100 will be reduced by approximately 400 cfs. Water surface elevations will remain approximately the same for the proposed bridge as they are for the existing bridge; the proposed bridge will still be overtopped below the Q_{10} event.

Utilities

Underground:
There is a water main which runs along the east side VT Route 16 (TH 2); there are hydrants and gate valves to indicate the location of this water main. On the east side of VT Route 16, adjacent to the Roaring Brook Road intersection, there is a water manhole; from this manhole a water main passes under VT Route 16 and continues along the north side of TH 4 (Roaring Brook Road) to the Fairgrounds. This water main is not attached to Bridge 58 but crosses under the stream just downstream from the existing bridge.

The Village of Barton also has a force sewer main which travels along the east side of VT Route 16 (TH 2) and crosses to the west side approximately 100 feet beyond the end of existing guardrail extending onto Roaring Brook Road.

Aerial:
There are aerial lines which run along the east side of Vt. Route 16 (TH 2) and along the south of Roaring Brook Road.

There is an aerial electric line crossing Roaring Brook Road (from a small sub-station) just to the west of the existing bridge.

The existing underground and aerial utilities are shown on the Existing Conditions Layout Sheet.

Right Of Way

The existing Right-of-Way is shown on the Layout sheet. The southeast wingwall of the bridge is located outside of the existing Right-of-Way. It is anticipated that Right-of-Way will need to be acquired for all alternatives, except the "No Action" alternative.

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

Biological:
The Barton River is the only regulated natural resource in the immediate area of Bridge 58.

Wetlands

There are no wetlands within the project area.

Wildlife Habitat

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 according to latest GIS information available.

Agricultural

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 known hazardous materials in the project area.

Historic:
Per the resource ID, the bridge and adjacent properties are not historic.

Archaeological:
Archaeologically sensitive areas have been identified in three areas of the project site. These areas are shown on the Existing Conditions Layout Sheet.

Stormwater:
The Barton River is not listed as an impaired waterway according to the Vermont Department of Environmental Conservation, Water Quality Division.

II. Maintenance of Traffic

The Vermont Agency of Transportation has created 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

Initial investigations indicate that a temporary bridge could be located either upstream or downstream of the existing structure. Both the upstream and downstream areas are relatively flat and open, and from a constructability standpoint, they are essentially the same. Both an upstream and a downstream temporary bridge would require Right-of-Way acquisition, and would have a slight impact to adjacent field drives. An upstream temporary bridge would have a slight impact to a potentially archaeologically sensitive area.

A one-way temporary bridge without traffic signals would be appropriate based on the daily traffic volumes. However due to the proximity of the bridge to the intersection with VT Route 16, a two-way temporary bridge would be more appropriate in order to minimize traffic disturbance on VT Route 16. See the Temporary Bridge Layout Sheets in the appendix.

Advantages: Traffic flow can be maintained along the TH-4 corridor.

Disadvantages: This option would require Right of Way acquisition and would be relatively high in cost. An upstream temporary bridge would have impacts to archeological resources in the vicinity of the bridge and would require an archaeological study. Also, a temporary bridge either upstream or downstream would require overhead utilities to be relocated.

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 environmental resources and adjacent property owners.

Based on traffic volumes it is reasonable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal. However, due to the site layout, it would be difficult to reduce traffic down to one lane. Since the bridge is located at the intersection with VT Route 16, two-way traffic would be more appropriate in order to minimize traffic disturbance on VT Route 16.

Advantages: This option would keep the corridor open to traffic and 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 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: 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 Village of Barton to choose the preferred detour route, and to sign it according to the MUTCD manual.

There is an obvious detour that would be appropriate for this site. This route has an end-to-end distance of 1.2 miles, and adds approximately 0.8 miles to travel distance. The detour route is as follows:

1. Roaring Brook Road (class 2), to Park Street (class 3), Elm Street (class 2), Glover Road (TH 2 – Over Bridge 20), back to Roaring Brook Road (1.2 mi end-to-end)

A map of the detour route 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 the project at the construction phase of the project.

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

III. Alternatives Discussion

The existing roadway and bridge geometry meet the current Vermont State Standards. Deficiencies of the existing bridge include the approach, transition, and bridge rails, the hydraulics through the bridge area, and the deteriorating structural condition of the bridge components.

No Action

This alternative is not recommended. The deck and superstructure are in poor condition, and the substructure is only in fair condition, so something will have to be done to improve this bridge in the near future. Although the bridge does not appear to be in imminent danger of collapse, it will eventually be posted for lower traffic loads if no action is taken. 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.

Alternative 1: Rehabilitation

This Alternative would include removal of the existing concrete slabs and intermediate piers, and replacement with a new precast superstructure, and some minor substructure repair. Any voids in the existing loose laid granite abutments would be filled in by smaller stones, and then repointed. Additionally, new bridge seats would need to be re-poured, adjusting the elevation for a new superstructure.

The existing bridge width meets the current standards, and a superstructure replacement would meet all geometric requirements as set forth in the Vermont State Standards. However, the bridge is extremely undersized for hydraulics, and this option would only slightly rectify the hydraulic

opening. The foundation also has an unknown scour potential, and would likely need to be monitored at all high water events.

Since the existing substructure is only in fair condition, it can be assumed that this option could add approximately 25 years to the remaining service life of this bridge, at which point, the entire structure would need to be replaced. It does not make economic sense to replace the slabs while leaving a hydraulically inadequate substructure in fair condition, which would need to be replaced in under 30 years.

Alternative 2: New Structure

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

Hydraulics has recommended a clear span of 64 feet, which is 20 feet longer than the existing structure. If a new structure is constructed, the bridge span can be lengthened to match the existing channel width.

a. Roadway Alignment

The existing roadway alignment meets current minimum standards. TH 4 currently intersects VT Route 16 at a 65 degree angle. This meets the minimum of 60 degrees as set forth by the AASHTO Green Book. However, the most desirable two road intersection angle is 90 degrees. As such, both an on-alignment, and off-alignment option will be considered for this alternative. An off-alignment bridge would be placed upstream of the existing structure and meet VT Route 16 at a 90 degree angle.

b. Bridge Width

The current rail to rail width is 24 feet. This meets the minimum standard of 24 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A rail to rail width of 24’ will be proposed. This will allow for two 9 foot lanes, with three foot shoulders.

c. Bridge Length and Skew

The existing bridge is 44 feet long with two stone piers, and with no skew. This does not match the existing channel width or meet the Q_{25} design storm. The VTrans hydraulics section has recommended that a new bridge should have a single clear span of 64 feet to match bank full width. The bridge will have a span of 70 feet to meet the 64 foot clear span recommendation. The bridge will have no skew for ease of construction and to match the existing skew of the channel.

d. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The possible 70' span length bridge types that are most commonly used in Vermont, are steel and composite concrete deck and NEXT beams. The superstructure depth is critical for meeting hydraulic recommendations, so the superstructure type shall be chosen as the shallowest possible.

Superstructure Type	Depth Calculation	Total Depth
L70 PBU (W30x99)	30" (Beam) + 1" (Haunch) + 9" (Deck)	40"
NEXT 32D	**32" (Beam) + 3" (Wearing Surface)**	**35"**
NEXT 28F	28" (Beam) + 8" (CIP Deck) + 3" (Wearing Surface)	39"

The NEXT D Beam yields the shallowest superstructure depth, and will be the assumed superstructure type for this alternative.

e. Substructure Type

There is no visible bedrock in the location of the project. Available information from nearby borings suggests that either shallow bedrock or sandy/silty soils could be encountered at this site. Borings should be taken at the project site, to determine if the subsurface conditions at this location. Possible foundation options here are pile caps on a single row of H-Piles or reinforced concrete abutments on spread footings.

f. Maintenance of Traffic

Either a temporary bridge or an off-site detour would be appropriate measures for traffic control for the on-alignment option. Traffic could be maintained on the existing bridge or on an off-site detour for the off-alignment option.

Advantages: This alternative would be a new structure with an estimated life span of 80 years. The increased bridge span would match the bank full width, making the bridge more suitable from a hydraulic standpoint. If the bridge is placed off-alignment, the intersection of Roaring Brook Road and VT Route 16 will be reconfigured to have an improved turning radius.

Disadvantages: Both the on-alignment, and off-alignment option will require Right-of-Way acquisition, which is time consuming and costly. If a temporary bridge is utilized for traffic control or if the new bridge is placed off-alignment, there will be impacts to potential archaeological resources.

IV. Alternatives Summary

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

Alternative 1a: New Structure On Alignment with Traffic Maintained on Offsite Detour
Alternative 1b: New Structure On Alignment with Traffic Maintained on Temporary Bridge
Alternative 2a: New Structure Off Alignment with Traffic Maintained on Offsite Detour
Alternative 2b: New Structure Off Alignment with Traffic Maintained on Existing Bridge

V. Cost Matrix[1]

Barton Village BO 1449(33)		Do Nothing	Complete Replacement On Alignment		Complete Replacement Off Alignment	
			Alt 1a	**Alt 1b**	**Alt 2a**	**Alt 2b**
			Offsite Detour	Temporary Bridge	Offsite Detour	Maintain Traffic on Existing Bridge
COST	Bridge Cost	$0	$547,000	$547,000	$547,000	$547,000
	Removal of Structure	$0	$40,000	$40,000	$40,000	$40,000
	Roadway	$0	$125,000	$172,000	$173,000	$172,000
	Maintenance of Traffic	$0	$22,000	$97,000	$34,000	$65,000
	Construction Costs	$0	$734,000	$856,000	$794,000	$824,000
	Construction Engineering + Contingencies	$0	$221,000	$257,000	$239,000	$248,000
	Total Construction Costs w CEC	**$0**	**$954,200**	**$1,112,800**	**$1,032,200**	**$1,071,200**
	Preliminary Engineering[2]	**$0**	**$146,800**	**$171,200**	**$158,800**	**$164,800**
	Right of Way	**$0**	**$36,700**	**$85,600**	**$95,000**	**$95,000**
	Total Project Costs	$0	$1,137,700	$1,369,600	$1,286,000	$1,331,000
TOWN SHARE			$57,000 (5%)	$137,000 (10%)	$64,000 (5%)	$133,000 (10%)
SCHEDULING	Project Development Duration		>4 years	>4 years	>4 years	>4 years
	Construction Duration		4 months	18 months	6 months	6 months
	Closure Duration (If Applicable)		6 weeks	N/A	6 weeks	N/A
ENGINEERING	Typical Section - Roadway (feet)	24'	24'	24'	24'	24'
	Typical Section - Bridge (feet)	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3
	Geometric Design Criteria	No Change	Meets Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	Traffic Safety	No Change	Improved	Improved	Improved	Improved
	Alignment Change	No	No	No	Yes	Yes
	Bicycle Access	No Change	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	Improved	Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	No Change	No Change	No Change
	Utility	No Change	Relocation	Relocation	Relocation	Relocation
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes
	Road Closure	No	Yes	No	Yes	No
	Design Life	<10 years	80 years	80 years	80 years	80 years

[1] Costs are estimates only, used for comparison purposes.
[2] 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 structure off-alignment while maintaining traffic on an offsite detour.

Structure:
Since the substructure is rated as fair, it is reasonable to assume that it would only have 25 years of life remaining with rehabilitation. Additionally, the only design flow that currently passes under the existing structure is $Q_{2.33}$, making the existing structure extremely inadequate hydraulically. Because of these reasons, a full structure replacement is warranted at this location.

The new structure will be comprised of prefabricated NEXT D Beams, and have a span of 70 feet. This type of superstructure provides the shallowest depth for improved hydraulics. Borings will need to be drilled in order to determine the most appropriate substructure type at this site.

The off-alignment option is more expensive, due to extended project limits and more extensive Right-of-Way acquisition. However, by realigning the intersection of Roaring Brook Road and VT Route 16 to a 90 degree angle, truck traffic can be better accommodated. Therefore, the off-alignment alternative is recommended, due to improved geometry.

Traffic Control:
The recommended method of traffic control is to close the bridge for 6 weeks, and maintain traffic on an offsite detour. The most appropriate detour for this project location would add approximately 0.8 miles to the through route, and have an end-to-end distance of 1.2 miles.

The option to close the road will have smaller impacts to adjacent properties and resources compared to other traffic maintenance options. Additionally the option to close the road is the least expensive and the safest option.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archaeology Memo
- Historic Memo
- Resource ID Completion Memo
- Local Input
- Detour Route
- Plans
    - Existing Conditions
    - Typical Sections
    - On Alignment Layout and Profile
    - Off Alignment Layout and Profile
    - Upstream and Downstream Temporary Bridge Layouts

Looking West (After the bridge)

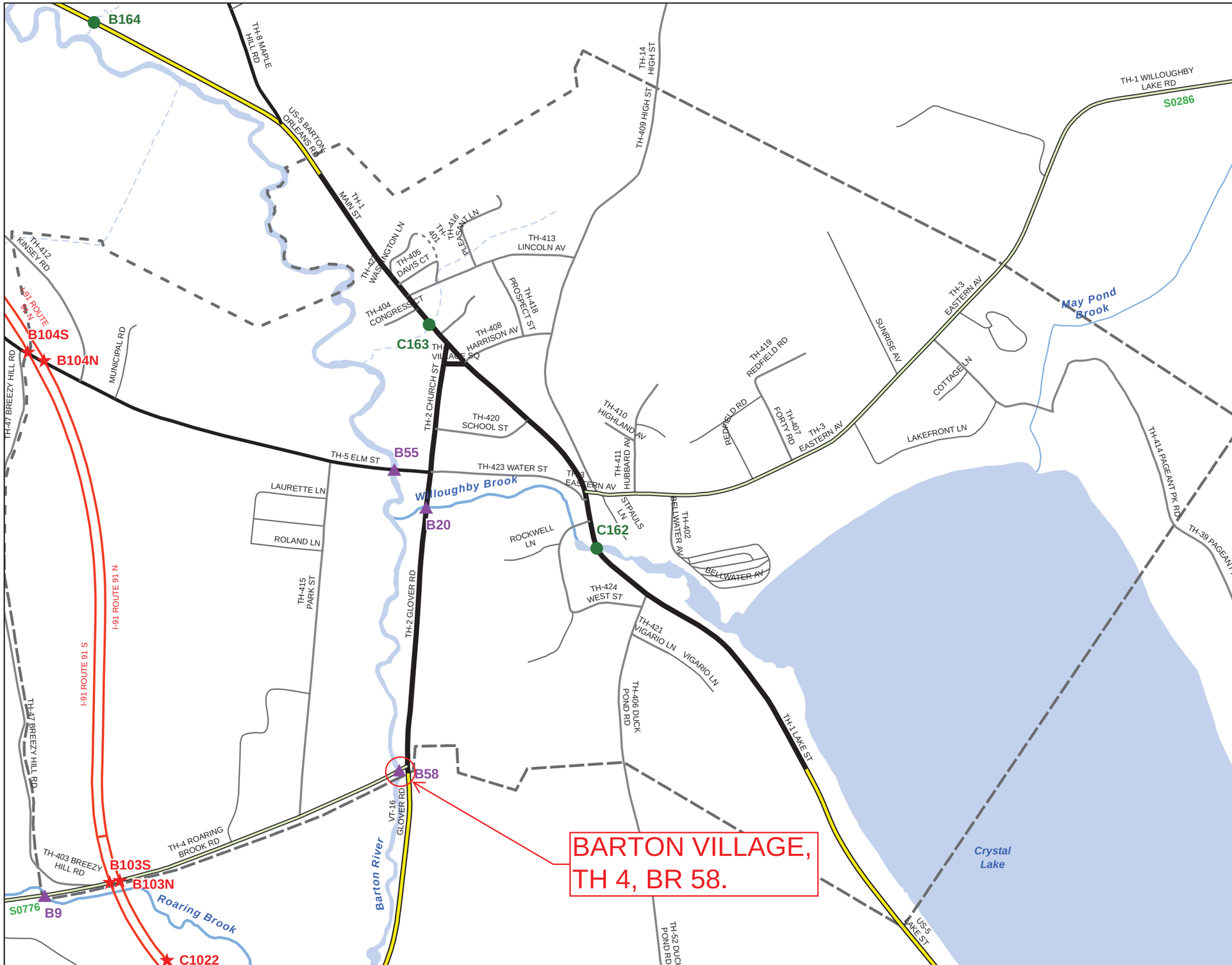
Looking East (Over the bridge)

Looking Upstream

Looking Downstream

Deck soffit, bridge seat, and abutment (note patched deterioration on soffit, and efflorescence on bridge seat due to leakage)

Laid up stone abutment

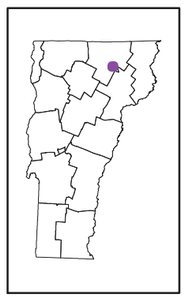


Scale 1:8,783

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



BARTON VILLAGE
ORLEANS COUNTY
DISTRICT # 9

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for BARTON VILLAGE **bridge no.:** 00058 **District:** 9

Located on: C2004 **over** BARTON RIVER **approximately** @ JCT OF VT16 & CL2 TH **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 4 POOR

Substructure Rating: 5 FAIR

Channel Rating: 5 FAIR

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 101002005810021

Federal Sufficiency Rating: 052.7

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1956 **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): 01

ADT: 001500 **% Truck ADT:** 03

Year of ADT: 2008

GEOMETRIC DATA

Length of Maximum Span (ft): 0015

Structure Length (ft): 000048

Lt Curb/Sidewalk Width (ft): 0.6

Rt Curb/Sidewalk Width (ft): 0.6

Bridge Rdwy Width Curb-to-Curb (ft): 24

Deck Width Out-to-Out (ft): 27.3

Appr. Roadway Width (ft): 028

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: 3 SP CONCRETE SLAB

Number of Approach Spans: 0000 **Number of Main Spans:** 003

Kind of Material and/or Design: 1 CONCRETE

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: 4 MEETS MINIMUM TOLERABLE CRITERIA

Deck Geometry: 4 MEETS MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 6 OCCASIONAL OVERTOPPING OF ROADWAY WITH INSIGNIFICANT TRAFFIC DELAYS

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: U UNKNOWN FOUNDATION

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 5 NO RATING ANALYSIS PERFORMED

Posting Status: P POSTED FOR LOAD

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 02 BRIDGE IS LEGALLY LOAD POSTED AT BOTH ENDS

Posted Vehicle: 6 GROSS LOAD ONLY

Posted Weight (tons): 12

Design Load: 0 OTHER OR UNKNOWN

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 042012 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

4/25/2012 Channel banks have been repaired with stone riprap and concrete blocks. ~FRE/DCP

09/09/11 Irene inspection, no significant changes noticed. MJK JM

06/04/2010 - Bank protection should be added. Structure should be repaired or replaced in the near future. Structure should be monitored after all high water events. ~ FE/DS

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Leslie Russell, P.E., Hydraulics Engineer

DATE: 30 May 2013

SUBJECT: Barton Village – BO-1449(33) – TH 4 BR 58 over the Barton River

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

Existing Bridge Information

The original bridge was constructed in 1956 based on available information. The bridge is owned by the Town. The original bridge is a 3-span 2-lane concrete slab bridge. It has a width of approximately 27 feet. The perpendicular clear span between the abutment faces is approximately 44 feet with vertical stone abutments with concrete caps. The piers are stone. The approximate height to the bottom of the superstructure over the streambed is approximately 10 feet. The bridge is located at the intersection of TH 4 with VT 16. There is an almost 90 degree bend into the bridge and the channel goes straight through the bridge.

Most of the calculated flows do not pass through the existing structure, except the $Q_{2.33}$ event. Therefore, the existing bridge is grossly undersized and does not have adequate hydraulic capacity for the design flow (Q_{25}) event based on our analysis of the existing conditions. Furthermore, the existing bridge appears to constrict the channel. The inspection report states that the foundations are unknown. We did not evaluate the scour for the existing or proposed bridge configurations as part of the preliminary design. Scour calculations will be performed during final hydraulics.

Recommendations

Based on the information provided by the Structures Group, it was determined that the existing bridge will be totally replaced with a new bridge that will be located in the existing alignment. It is anticipated that the proposed bridge deck will also be approximately 27 feet wide to meet the VTrans local road design standards. We have anticipated that the proposed abutments will be vertical face concrete abutments with stone fill scour protection.

Based on our analysis, the primary recommendation will be for a bridge having a 64-foot clear span normal to the stream channel (between the abutment faces) with a low beam elevation at or above 854.9 feet and stone fill protection. This wider structure will not constrict the stream channel width as significantly as the existing condition bridge, even with the additional stone fill used for scour protection. It is noted that with the proposed low beam elevation, it has been assumed that the roadway elevations will not be raised from the existing grades (i.e. existing top of bridge grade at the edges is approximately 857.3 feet). While this bridge is still not hydraulically adequate because it does not provide 1' of freeboard at Q25, the roadway overtopping flow at Q100 will be reduced by approximately 400 cfs. Water surface elevations will remain approximately the same for the proposed bridge as they are for the existing bridge.

As noted above, scour was not reviewed during the preliminary design. However based on the velocities from the analyses and evidence from the site, it is anticipated that Type 3 Stone Fill will

be necessary for armoring the channel banks near the replacement structure.

Temporary Bridge

Based on the information provided by the Structures Group, it is anticipated that an off-site detour will be used during the construction of the new 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

MLM CCB

From: Marcy Meyers, Geotechnical Engineer, via Christopher C. Benda, P.E., Soils and Foundations Engineer

Date: June 7th, 2013

Subject: Barton Village BO 1449(33) – BR #58 Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge #58 on TH 4 (Roaring Brook Road) crossing over the Barton River, located in Barton Village, VT. The subject project consists of replacing the existing 3-span, concrete slab bridge. This report documents our initial search of historical information to determine the characteristics of the site. A number of materials were reviewed including: VTrans boring files and record plans, Agency of Natural Resources (ANR) Natural Resources Atlas, USDA Surficial Geologic maps and VTrans Bridge Inspection Photos.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

According to the Structure's Inspection Report dated April 2012, the subject bridge was constructed in 1956 and has not been reconstructed since then. No record plans were found for the project bridge. Additional project information was searched for in the Soils & Foundations' GIS based historical record of subsurface investigations which contains electronic records for the majority of borings completed in the past 10 years. An exploration of this map revealed no previous borings in Barton Village; however further investigation into our project history revealed borings were drilled for the Barton STP 0113(58)S project in November 1999 to March 2000 (located approximately 1.25 miles from the subject project). Information from these borings suggests the possibility of encountering both shallow bedrock as well as sandy/silty soils for this project.

2.2 Water Well Logs & USDA Soil Survey

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 mix of sand, silt, and gravel.

Figure 1 contains the project, surrounding well locations, and Barton STP 0113(58)S project used to estimate general soil strata characteristics. The specific wells used to gain information on the subsurface conditions are highlighted by a red box. Three water wells within a 1350 ft radius were used to get an estimate of the depth to bedrock and types of soils likely to be encountered on the project.

Figure 1. Highlighted Well Locations and Referenced Project near Bridge #58

Table 1 lists the well sites used in gathering the surrounding information and includes the approximate distance from the bridge project, depth to bedrock, and overburden material.

Table 1. Depths to Bedrock and Subsurface Strata of Surrounding Sites

Well Number	Approximate Distance From Project (feet)	Depth To Bedrock (feet)	Overburden Material[1]
45697	520	95	Buckland Fine Sandy Loam
239	970	1	Moosilauke Very Fine Sandy Loam
10866	1350	50	Moosilauke Very Fine Sandy Loam

It should be noted that the depth to bedrock varies considerably between the three wells. Well No. 239 was drilled to a total depth of 125 feet, and although the overburden thickness is noted as 1 foot on the ANR Natural Resource Atlas, this value should be used with caution since no additional bedrock outcrops were visible in the area. Borings drilled from the Barton STP 0113(58)S project encountered bedrock from around 12' –

[1] Overburden material information was taken from the USDA Soil Map. Such information is a broad assumption and is subject to change at individual boring locations.

54'. As a result, it should be noted that bedrock in the area various significantly. Information about the bedrock, taken from the ANR Natural Resource Atlas, indicates "dark-gray to silvery-gray, lustrous, carbonaceous muscovite-biotite-quartz (+/- garnet) phyllite containing abundant bends of pinky-brown-weathering, dark-bluish-gray micaceous quartz-rich limestone in beds ranging from 10 cm to 10 m thick". Based on the USDA Soil Map, the soils to be encountered at the project location are classified as Rumney fine sandy loam, which is poorly draining and has a depth to water table of around 0 to 12 inches. It should also be noted that this is a frequently flooded area with 0 to 2 percent slopes.

2.4 Bridge Inspection Photos

Based on the latest bridge inspection photos from September 2008, it appears that an area of erosion is evident along the northeast side of the bridge as seen in Figure 2. However, from the latest site visit, it appears that area has been repaired as evident in Figure 3.

Figure 2. Erosion near Northeast Corner of Bridge

Figure 3. Erosion Repair with Rip Rap

Other than a few minor erosion areas, no significant undermining and erosion were evident along the abutments.

3.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on June 5th, 2013 to determine possible obstructions inhibiting boring operations and other site information pertaining to various construction considerations. Information from this visit indicated power transmission lines with overhead powerlines located with close proximity to the bridge, as seen in Figure 4. Other than overhead powerlines, no additional obstructions were visible.

Figure 4. Power Transmission Lines Located Close to Bridge

No visible bedrock outcrops were seen in the area however, some gravel and cobbles were evident in the streambed as seen in Figure 5. There was also some erosion along the stream bank as seen in Figure 6.

Figure 5. Gravel and Cobbles in Stream

Figure 6. Stream Bank Erosion

4.0 RECOMMENDATIONS

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

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

We recommend a minimum of 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, groundwater conditions, and depth to 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.

5.0 CONCLUSION

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-6911.

cc: WEA/Read File
CCB/Project File
MLM

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: Jeff Ramsey, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: April 29, 2013

SUBJECT: BARTON B_O 1449 (33)
Town Highway # 4, Bridge 58
Natural Resource ID & Comments

The initial resource identification for this project was conducted on April 25, 2013 and based on that, which included a site visit, I have concluded that the only regulated natural resource in the immediate area of Bridge 58 is the Barton River itself. This structure was reviewed in 2010 for a deck replacement, and more recently for D9 to perform a repair on the upstream retaining wall.

Bridge 10 is in a highly confined channel in this location (retaining walls) and is surrounded by urbanized development. If the hydraulic opening remains equal to or greater than the existing structure, I don't see any concerns for natural resources. As for a temporary bridge, if one is needed, placing it on either side of the existing structure would not be an issue, as long as it spans the limits of Ordinary High Water in entirety.

If you have any questions about this, call me at 828-3963.

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, VTrans Environmental Specialist

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

Date: 4/29/2013

Subject: Barton Village BO 1449(33) – Archaeological Resource ID

Jeff,

A field resource identification was conducted on 4/25/2013 as part of the 2013 PIIT project package. Bridge 58 is located on Roaring Brook Road in Barton Village, Orleans County, Vermont. I was able to identify a few areas of archaeological sensitivity in the project area based on existing environmental factors. The archaeological resources of the Northeast Kingdom are not as well documented as Chittenden or Addison Counties and there is a dearth of known archaeological sites in the area.

I've mapped sensitive areas in three of the four quadrants, although not all likely to be impacted by bridge work. Please find a visual map of the areas attached to this resource memo. As always, feel free to contact me with questions or concerns.

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
Brennan.Gauthier@state.vt.us

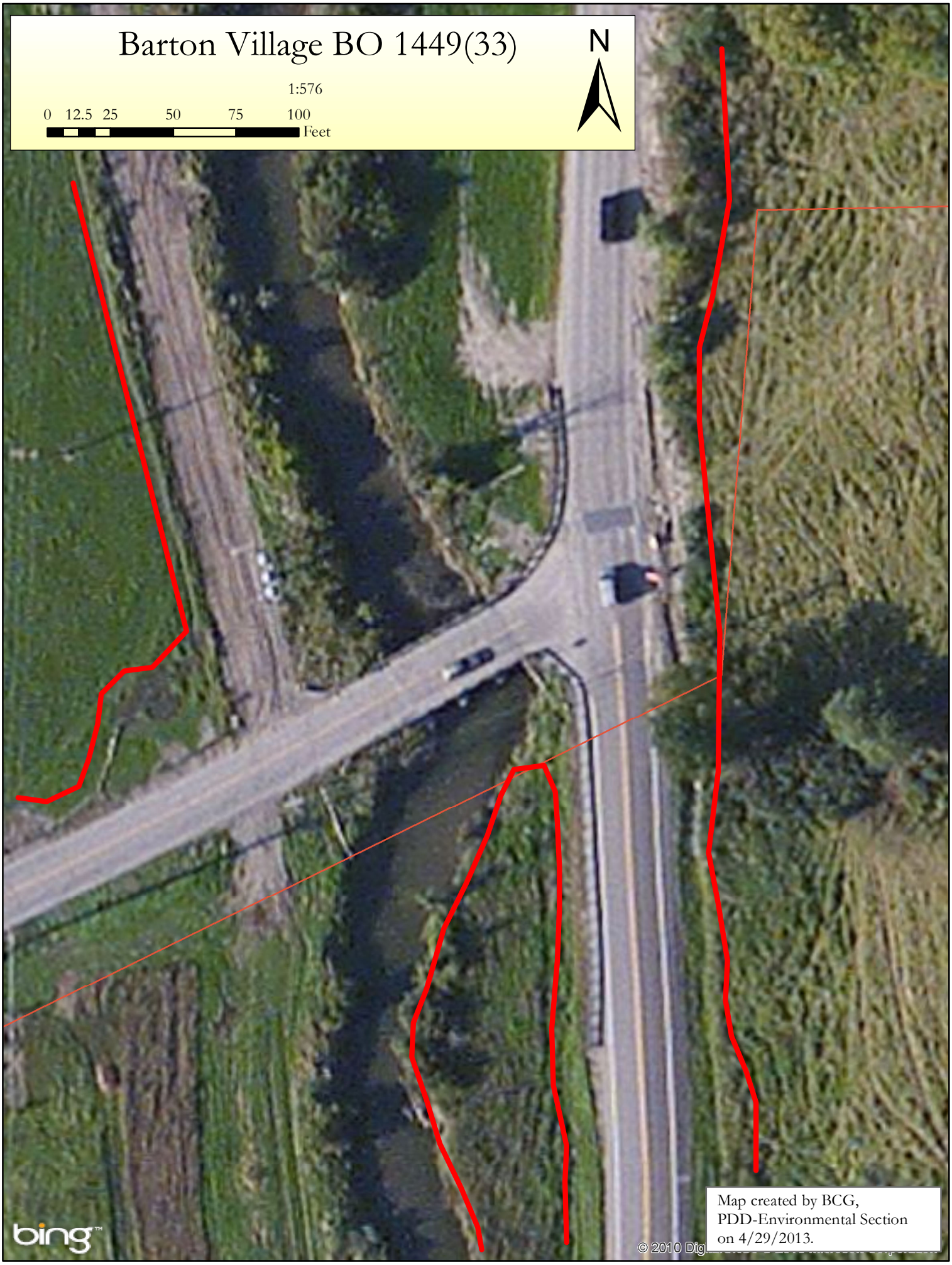
VTrans Working to Get You There
Vermont Agency of Transportation

Barton Village BO 1449(33)

1:576

0 12.5 25 50 75 100 Feet

N



Map created by BCG, PDD-Environmental Section on 4/29/2013.

Ramsey, Jeff

From: Newman, Scott
Sent: Monday, May 13, 2013 7:57 PM
To: Ramsey, Jeff
Cc: Williams, Chris; O'Shea, Kaitlin
Subject: Barton BO 1449(33) Resource ID
Attachments: image.jpeg

Jeff,

This is an old and interesting bridge, but neither it, nor anything else in the project area is a qualifying historic or 4(f) resource.

Thanks,
Scott

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Jeff Ramsey, Environmental Specialist
DATE: May 16, 2013
PIN: 13J078

Project: BARTON VILLAGE BO 1449 (33)

ENVIRONMENTAL RESOURCES:

Wetlands:	___	Yes	X	No
Historic/Historic District:	___	Yes	X	No
Archaeological Site:	X	Yes	___	No three of four quadrants
4(f) Property:	___	Yes	X	No
6(f) Property:	___	Yes	X	No
Agricultural Land:	X	Yes	___	No statewide (b) on both sides
Fish & Wildlife Habitat:	X	Yes	___	No the Barton River
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

Community Considerations

1. Are there any scheduled public events in the community that will generate increased traffic, or may be difficult to stage if the bridge is closed during construction? Examples include: a bike race, festivals, cultural events, farmers market, concerts, etc. that could be impacted? If yes, please provide date, location and event organizers' contact info.

   Town Wide Yard Sale – last Saturday in June – Rich Royer 525-0084
   Fourth of July Parade – David Claeys 525-4138
   Orleans County – Mid August/5 Days – Harvey Cleveland 525-3555
   Trapper Rendezvous – October first part – Held at the Fairgrounds
   Annual Turkey Trot – Thanksgiving Day – Contact the Village Offices

2. Is there a "slow season" or period of time from May through October where traffic is less?

   May to the last weekend of June

3. Please describe the location of emergency responders (fire, police, ambulance) and emergency response routes.

   See Map

4. Where are the schools in your community and what are their schedules?

   See Map – School out 6/11 about, back in the last week in August.

5. Is the proposed project on an established school or public transit bus route(s)?

   School Bus Route

6. Are there any businesses (including agricultural operations) that would be adversely impacted either by a detour or due to work zone proximity?

   Parson's Corner Restaurant and Barton One Stop (Mini Mart)

7. Are there any important public buildings (town hall or community center) or community facilities (recreational fields or library) in close proximity to the proposed project?

   Barton Baptist Church

8. Are there any town highways that might be adversely impacted by traffic bypassing the construction on another local road?

   Park Street, traffic would be detoured to Park Street.

9. Are there any other municipal operations that could be adversely impacted if the bridge is closed during construction? If yes, please explain.

It would interfere with plow route, but should be done before snow flies.

10. Please identify any local communication channels that are available—e.g. weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM.

    Chronicle (newspaper), Moo 92 (radio), Orleans Record (newspaper)

11. Is there a local business association, chamber of commerce or other downtown group that we should be working with?

    Chamber of Commerce

Bridge Design Considerations

1. Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of?

   Bridge would have to be re-aligned to accommodate trucks.

2. Are there any concerns with the width of the existing bridge?

   Bridge is too narrow.

3. If a sidewalk is present on the existing bridge, should the new structure have one?

   Not much in the way of pedestrian or bicycle traffic.

4. Is there a need for a sidewalk if one does not currently exist? Please explain.

   Wider shoulders would help, present bridge basically has none.

5. Does the bridge provide an important link in the town's pedestrian network such that pedestrian traffic should be accommodated during construction?

   Wider shoulders would help with pedestrian and bicycle traffic during events in the village.

6. Is bicycle traffic common on the bridge?

   No

7. Are there any special aesthetic considerations we should be aware of?

   No.

8. Are there any traffic, pedestrian or bicycle safety concerns associated with the current bridge? If yes, please explain.

The bridge is too narrow. That alone is a safety issue.

9. Does the location have a history of flooding? If yes, please explain.

   During heavy rainfall the bridge is kind of a bottleneck; State drainage is always a problem.

10. Are you aware of any nearby Hazardous Material Sites?

    No.

11. Are you aware of any historic and/or other environmental resource issues?

    No.

12. Are there any other comments you feel are important for us to consider that we have not mentioned yet?

    8" water main is in close proximity to the bridge.

Land Use and Transit Considerations

1. Does your municipal land use plan reference the bridge in question? If so please provide a copy of the applicable section or sections of the plan.

   No.

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

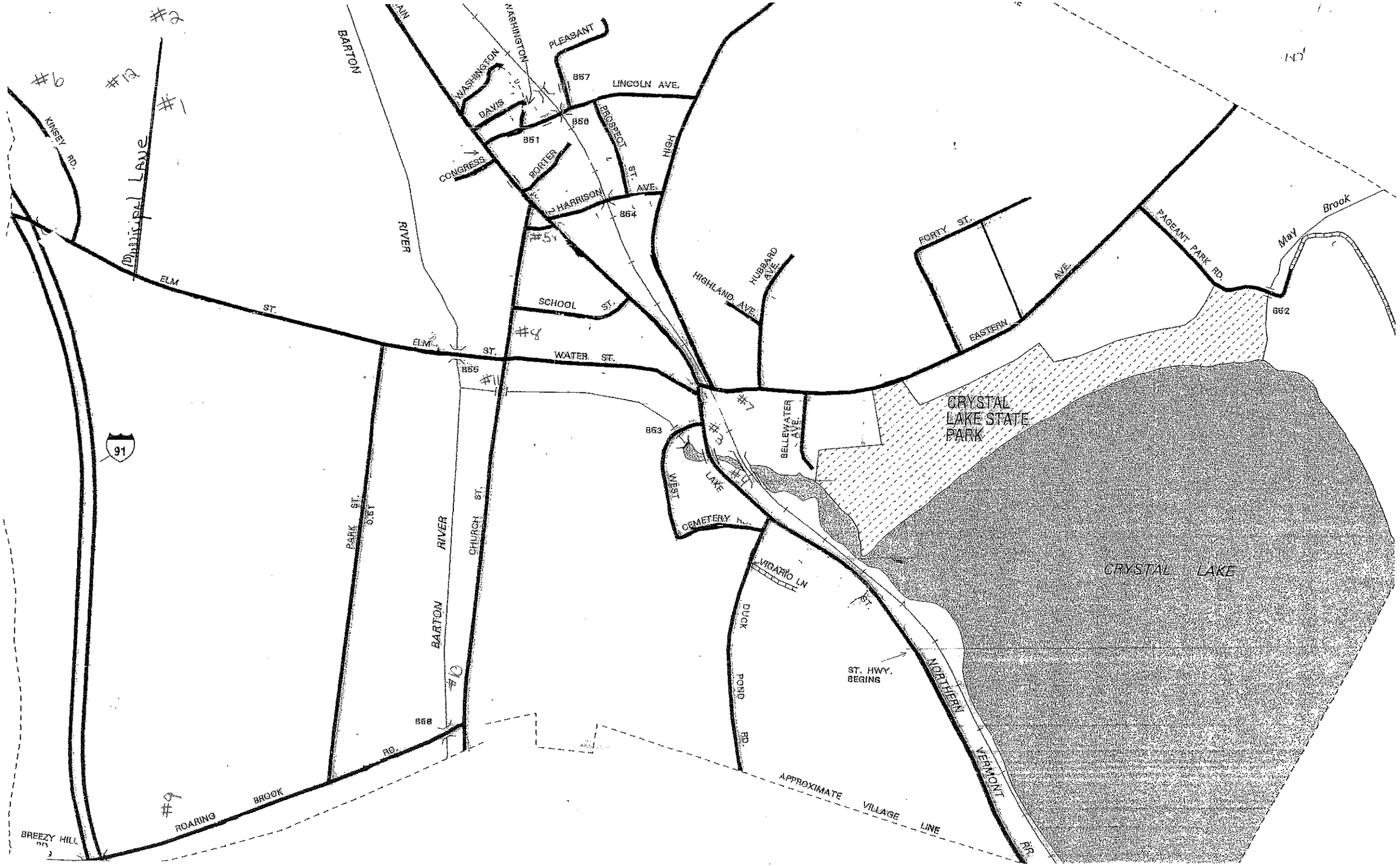
   No.

3. Are there any existing, pending, or planned development proposals that would impact future transportation patterns near the bridge? If so, please explain.

   No.

4. Is there any planned expansion of public transit service in the project area? If not known please contact your Regional Public Transit Provider.

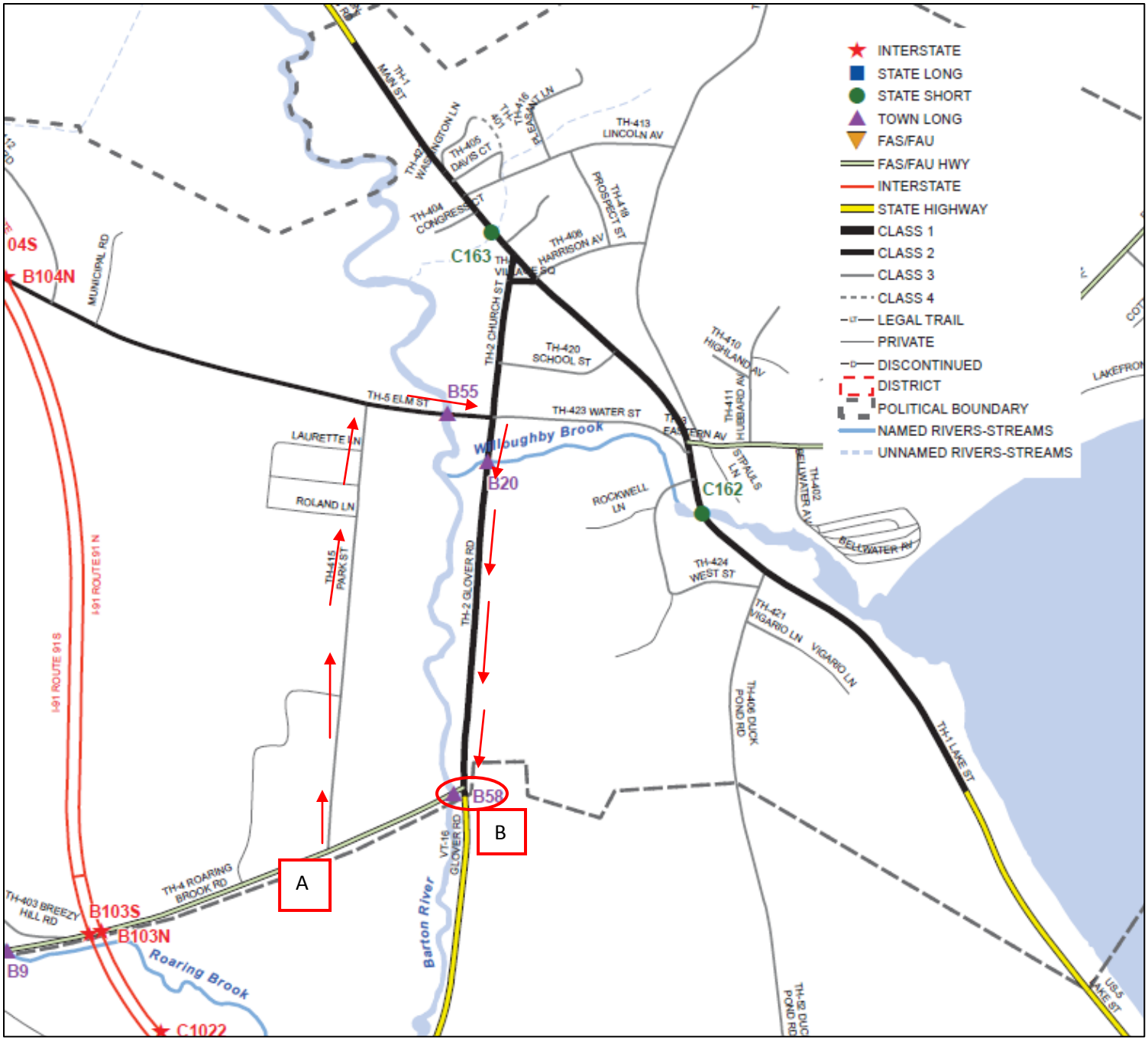
   No.



#2
#6
#12
#1
Municipal Lane
KINSEY RD.
BARTON
RIVER
WASHINGTON
PLEASANT
WASHINGTON
DAVIS
B57
LINCOLN AVE.
B56
B51
PROSPECT ST.
HIGH
CONGRESS
PORTER
HARRISON AVE.
B64
#5
ELM ST.
SCHOOL ST.
HIGHLAND AVE.
HUBBARD AVE.
FORTY ST.
EASTERN AVE.
PAGEANT PARK RD.
May Brook
B62
#8
ELM ST.
WATER ST.
B55
#11
#7
CRYSTAL LAKE STATE PARK
BELLEWATER AVE.
B63
#3
#4
WEST LAKE
CEMETERY RD.
91
PARK ST.
0.61
BARTON RIVER
CHURCH ST.
VIGARIO LN
DUCK POND RD.
CRYSTAL LAKE
ST. HWY. BEGINS
NORTHERN VERMONT RR.
#10
B68
RD.
ROARING BROOK
#9
APPROXIMATE VILLAGE LINE
BREEZY HILL RD.

Map

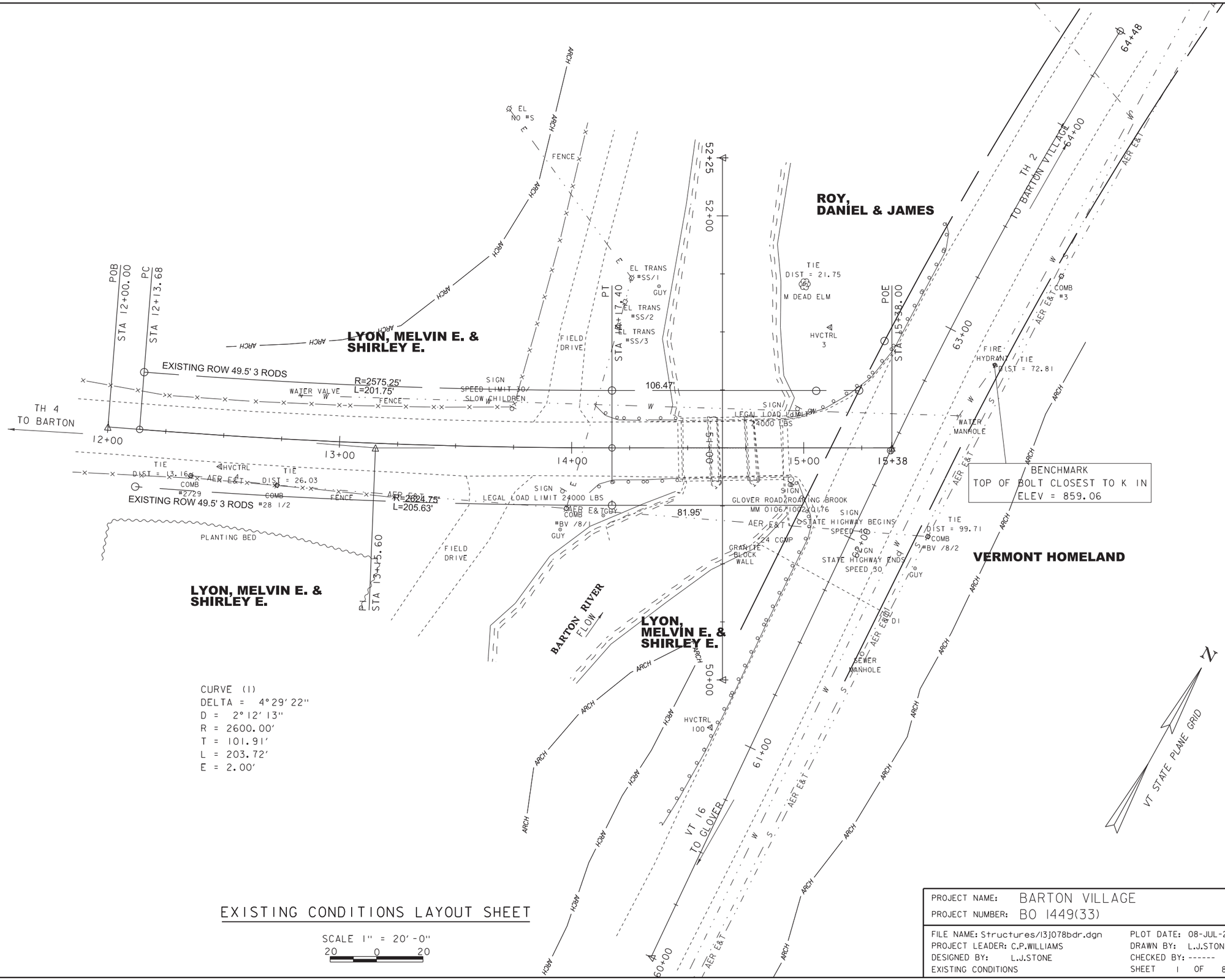
#1. Barton Ambulance Squad	525-3637
#2. Barton Waste Water Plant	525-3219
#3. Barton Fire Department	525-3700
#4. Barton Town Clerk	525-6222
#5. Barton Village Office	525-4747
#6. Orleans Central Supervisory Union	525-6253
#7. St. Paul's School	525-3117
#8. Barton Academy	525-3636
#9. Orleans County Fair Association	525-3585
#10. Barton One Stop	525-3333
#11. Parson's Corner	525-4500
#12. Barton Village Municipal Garage	525-1212



Detour Route

Roaring Brook Road, to Park Street, to Elm Street, to Glover Road (TH 2), back to Roaring Brook Road

A – B Through Route: 0.2 Miles
A – B Detour Route: 1.0 Miles
Added Miles: 0.8 Miles
End-End Distance: 1.2 Miles



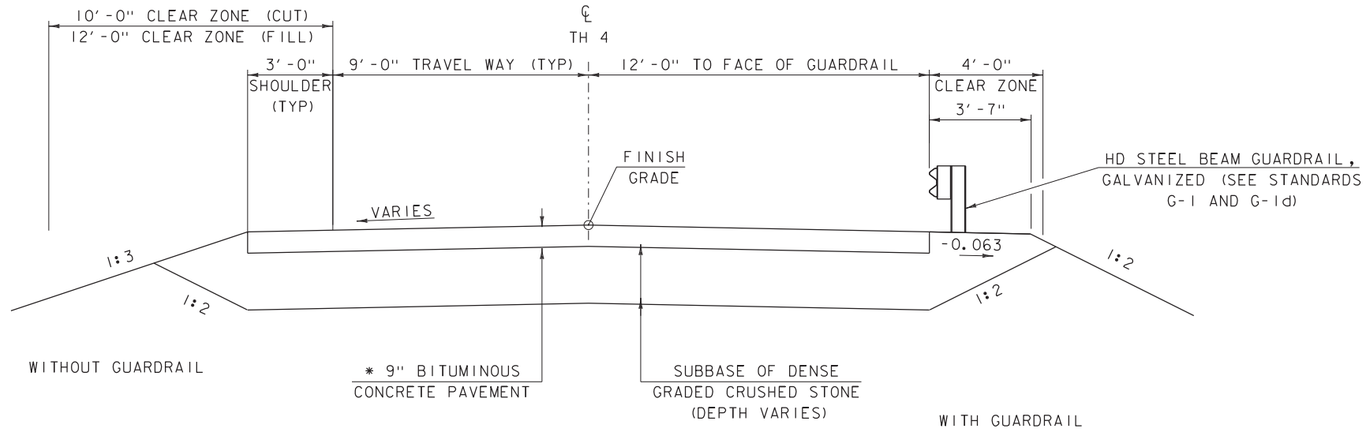
CURVE (1)
DELTA = 4°29'22"
D = 2°12'13"
R = 2600.00'
T = 101.91'
L = 203.72'
E = 2.00'

EXISTING BRIDGE DATA
3 SPAN CONCRETE SLAB
BRIDGE BUILT IN 1956
BRIDGE LENGTH = 48 FT.
WATERWAY AREA = xx SF

EXISTING CONDITIONS LAYOUT SHEET

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

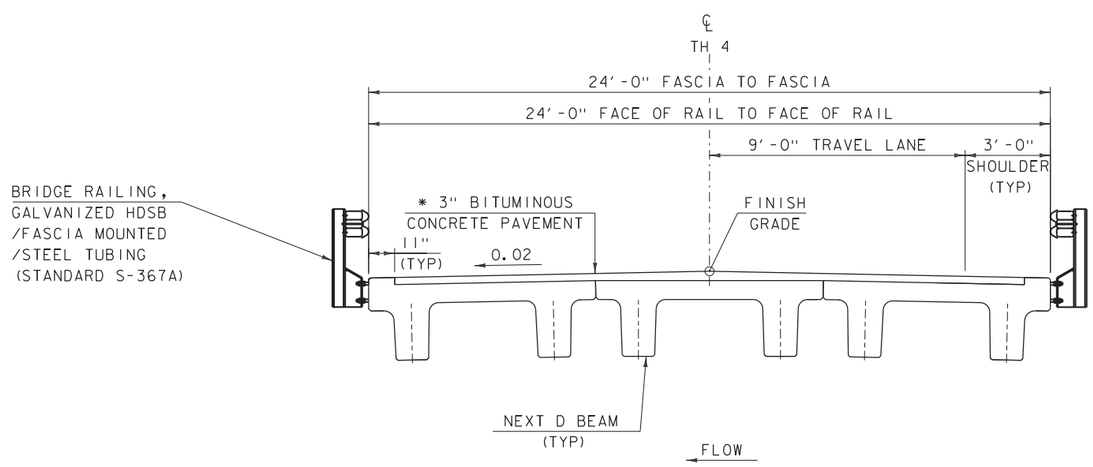
PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13j078bdr.dgn	PLOT DATE: 08-JUL-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
EXISTING CONDITIONS	SHEET 1 OF 8



TH 4 ROADWAY TYPICAL SECTION

SCALE: 3/8" = 1'-0"

* 1 1/2" TYPE IVS OVER
1 1/2" TYPE IVS OVER
3" TYPE IIS OVER
3" TYPE IIS



* 1 1/2" TYPE IVS OVER
1 1/2" TYPE IVS

BRIDGE TYPICAL SECTION

SCALE: 3/8" = 1'-0"

MATERIAL TOLERANCES

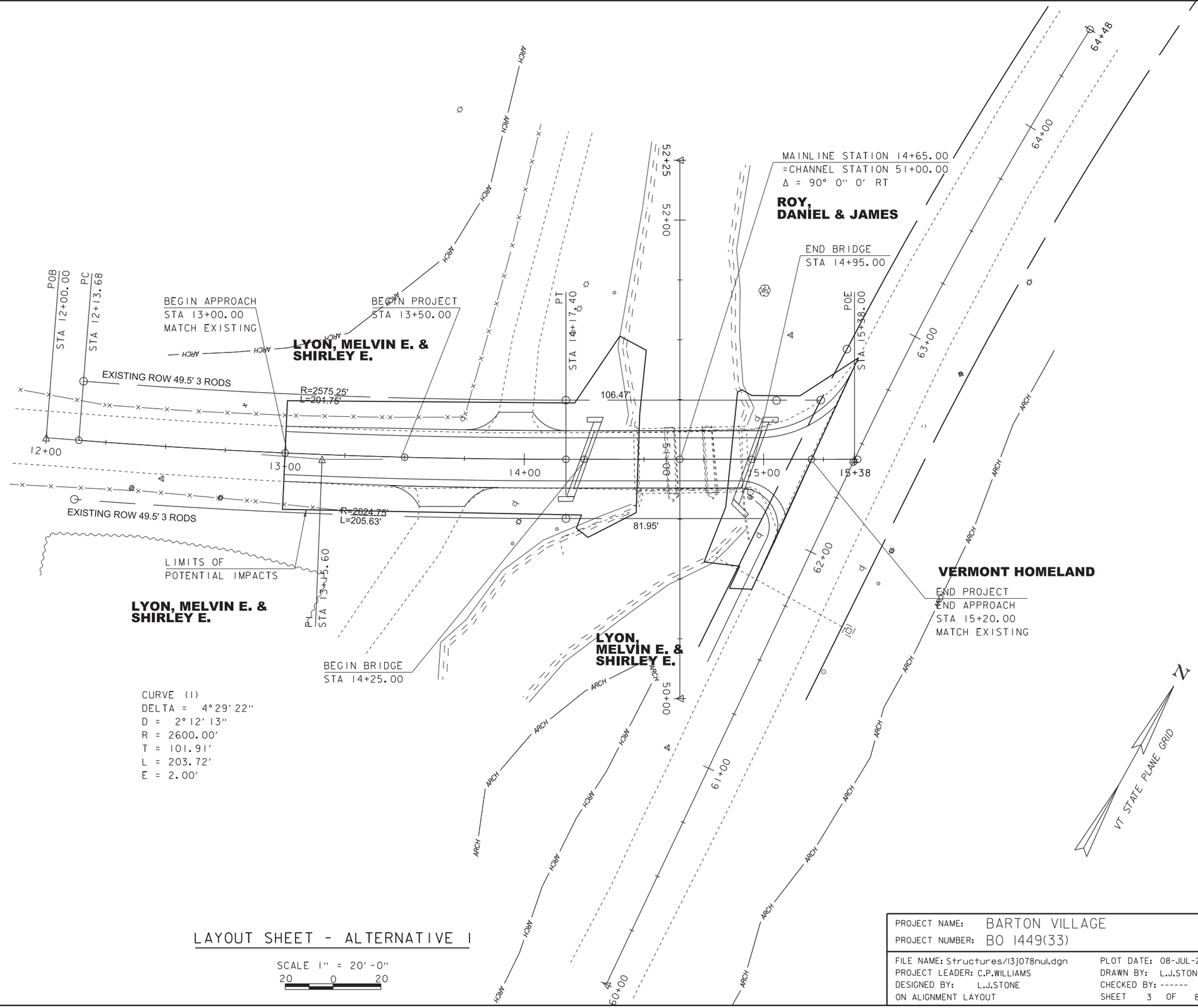
(IF USED ON PROJECT)

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

PROJECT NAME: BARTON VILLAGE
PROJECT NUMBER: BO 1449(33)

FILE NAME: Structures/13j078typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 08-JUL-2013
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 2 OF 8



CURVE (1)
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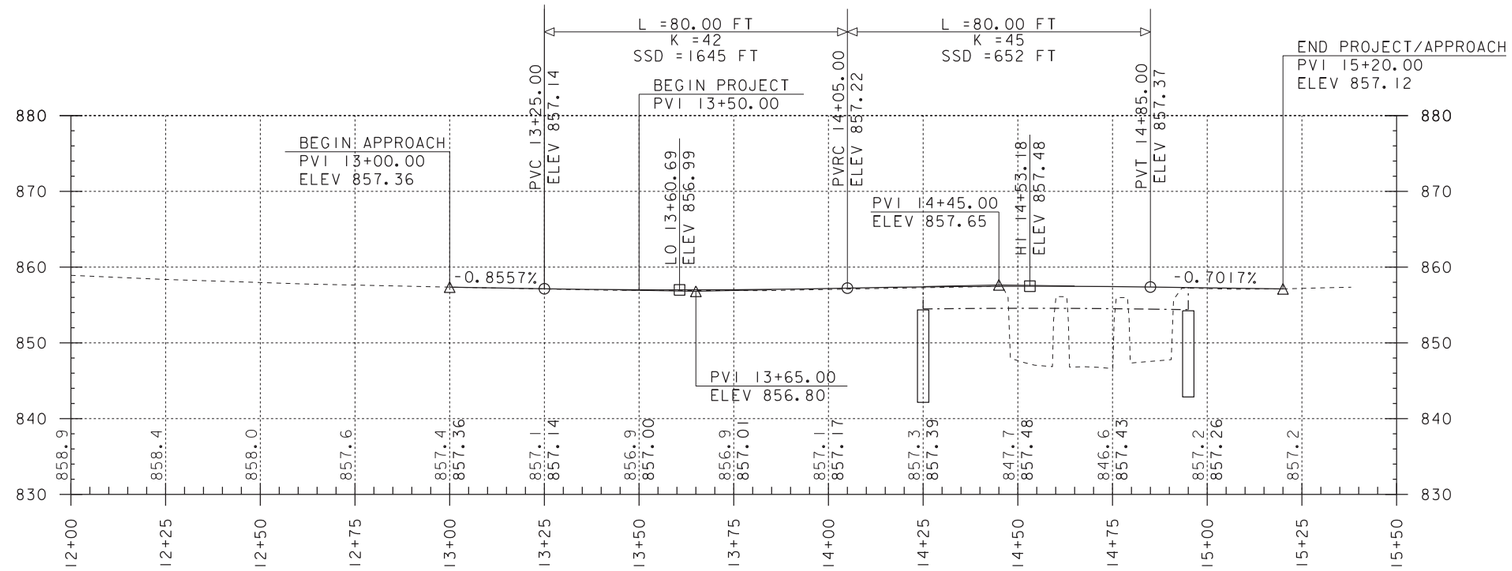
D = 2°12'13"
R = 2600.00'
T = 101.91'
L = 203.72'
E = 2.00'

LAYOUT SHEET - ALTERNATIVE 1

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

PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13j078nul.dgn	PLOT DATE: 08-JUL-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
ON ALIGNMENT LAYOUT	SHEET 3 OF 8



TH 4 PROFILE - ON ALIGNMENT

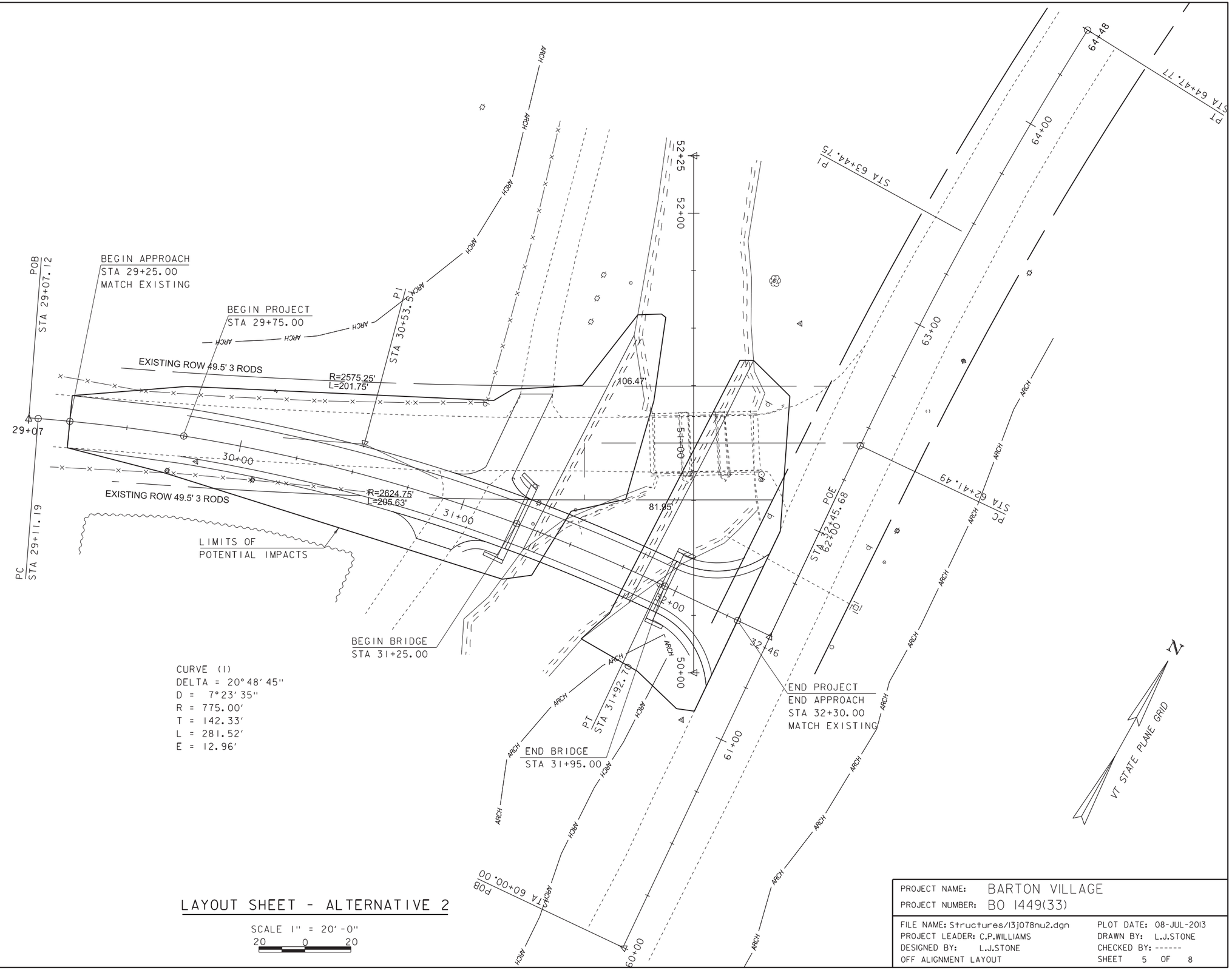
SCALE: HORIZONTAL: 1"=20'
VERTICAL: 1'=10'

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13j078pro.dgn	PLOT DATE: 08-JUL-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
PROFILE SHEET - ON ALIGNMENT	SHEET 4 OF 8



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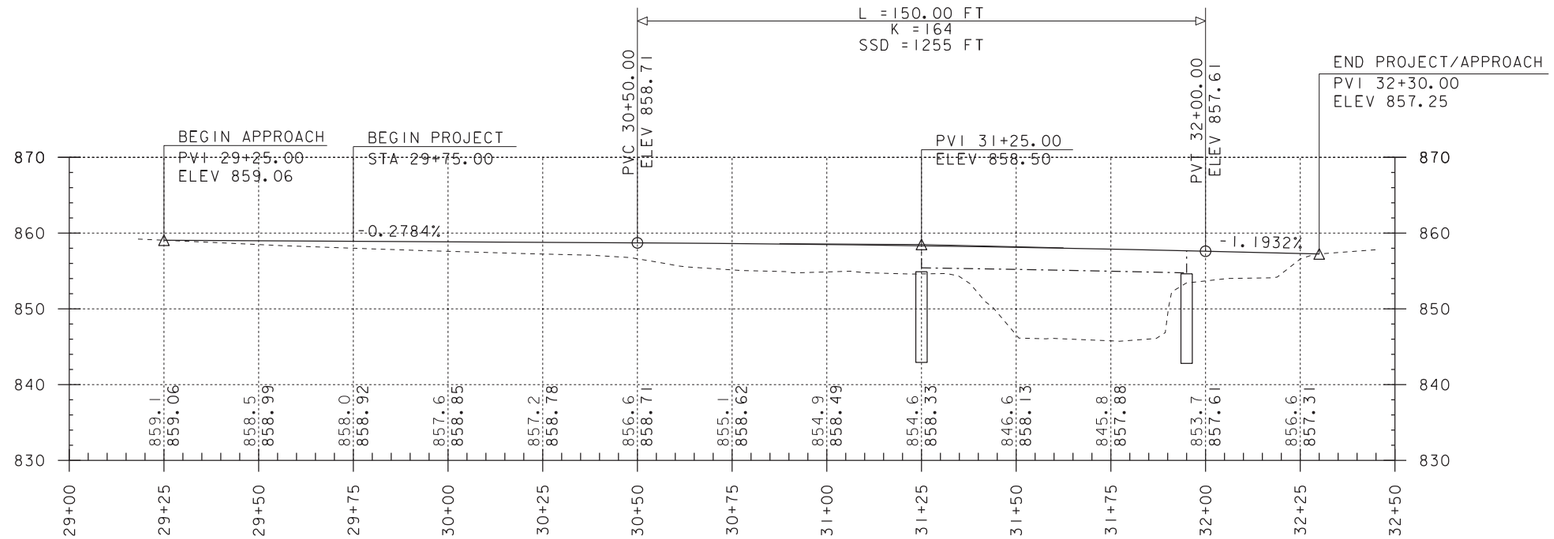
R = 775.00′
T = 142.33′
L = 281.52′
E = 12.96′

LAYOUT SHEET - ALTERNATIVE 2

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13j078nu2.dgn	PLOT DATE: 08-JUL-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
OFF ALIGNMENT LAYOUT	SHEET 5 OF 8



TH 4 PROFILE - OFF ALIGNMENT

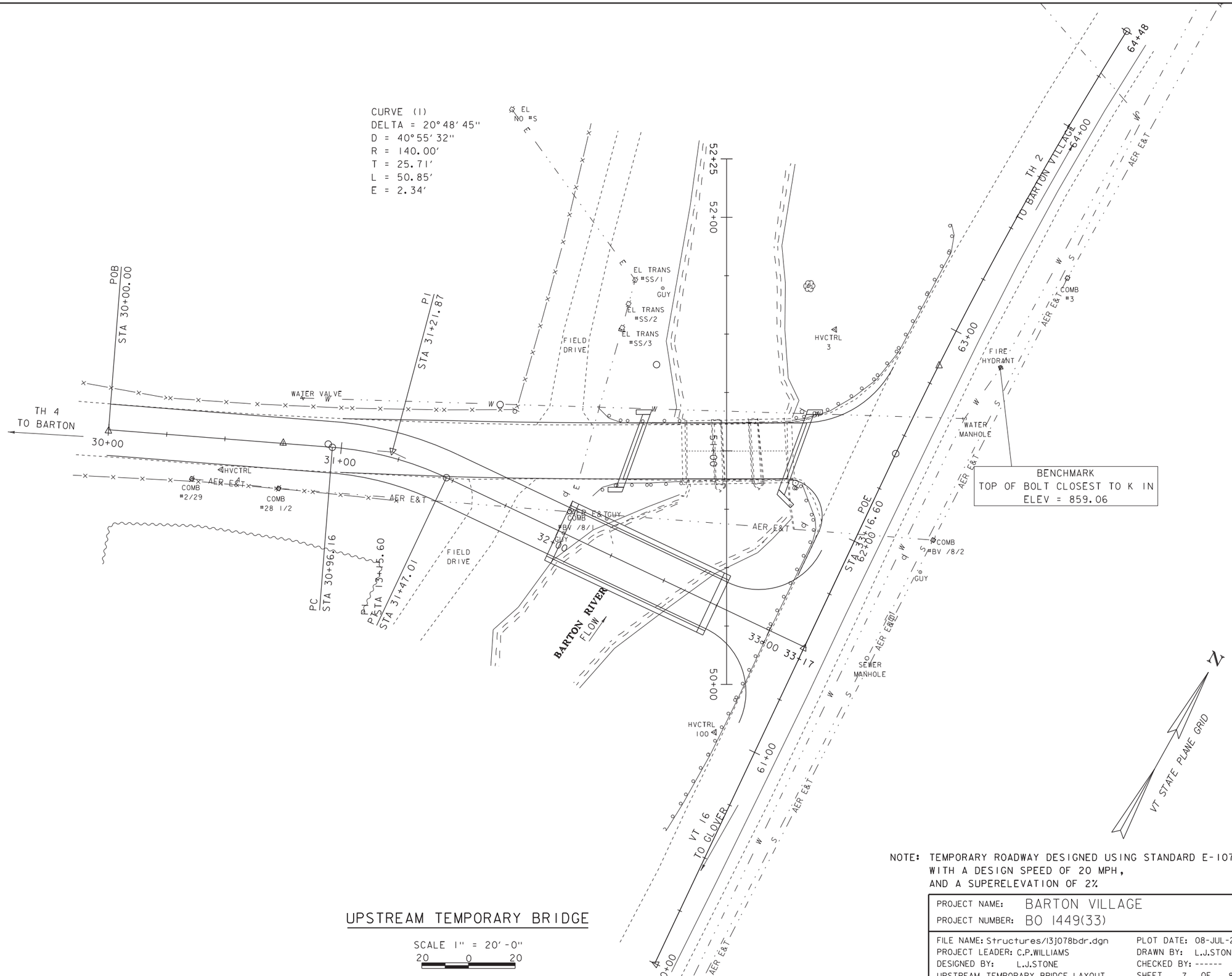
SCALE: HORIZONTAL: 1"=20'
VERTICAL: 1'=10'

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13j078nu2.dgn	PLOT DATE: 08-JUL-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
PROFILE SHEET - OFF ALIGNMENT	SHEET 6 OF 8



BENCHMARK
TOP OF BOLT CLOSEST TO K IN
ELEV = 859.06

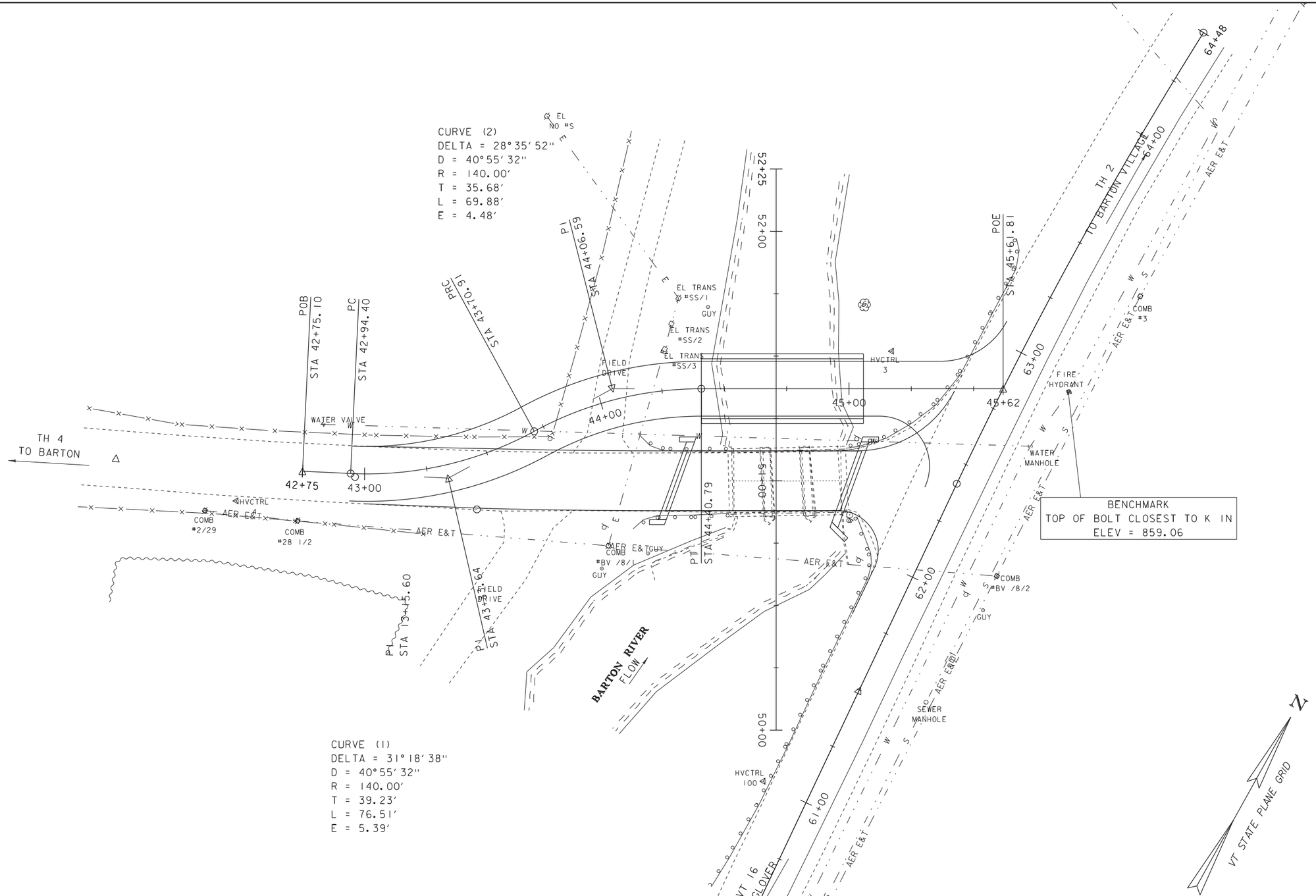
NOTE: TEMPORARY ROADWAY DESIGNED USING STANDARD E-107
WITH A DESIGN SPEED OF 20 MPH,
AND A SUPERELEVATION OF 2%

EXISTING BRIDGE DATA
3 SPAN CONCRETE SLAB
BRIDGE BUILT IN 1956
BRIDGE LENGTH = 48 FT.
WATERWAY AREA = xx SF

UPSTREAM TEMPORARY BRIDGE

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

PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13j078bdr.dgn	PLOT DATE: 08-JUL-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
UPSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 7 OF 8



NOTE: TEMPORARY ROADWAY DESIGNED USING STANDARD E-107
WITH A DESIGN SPEED OF 20 MPH,
AND A SUPERELEVATION OF 2%

EXISTING BRIDGE DATA
3 SPAN CONCRETE SLAB
BRIDGE BUILT IN 1956
BRIDGE LENGTH = 48 FT.
WATERWAY AREA = xx SF

DOWNSTREAM TEMPORARY BRIDGE

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

PROJECT NAME: BARTON VILLAGE	
PROJECT NUMBER: BO 1449(33)	
FILE NAME: Structures/13J078bdr.dgn	PLOT DATE: 08-JUL-2013
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DOWNSTREAM TEMPORARY BRIDGE LAYOUT	SHEET 8 OF 8