STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Guilford BF 0113(68)

US Route 5, Bridge 5 Over Broad Brook

October 24, 2013

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I. Site Information

Bridge 5 is located along US 5 approximately 1.5 miles south of exit 1 on I-91 in Guilford. The bridge is located just south of Algiers Village where the speed limit drops to 35 mph. This area is mixed commercial and residential. Grist Mill Rd and Bee Barn Rd intersect US 5 about 100 ft north of the bridge and Melendy Hill Rd and Broad Brook Rd intersect US 5 about 100 ft south of the bridge. 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
Bridge Type	Concrete T-Beam
Bridge Span	53 feet long
Year Built	1925
Ownership	State of Vermont

Need

The following are needs of US 5 at the southern end of Algiers Village.

1. Bridge 5 is structurally deficient with both wing walls failing at abutment 1.

2. The approach rail and terminal sections are substandard surrounding the bridge.

3. The bridge is too narrow for the roadway classification considering the vehicle and pedestrian traffic anticipated at the river crossing.

4. The vertical and horizontal alignment of US 5 is substandard south of the bridge.

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 2036.

TRAFFIC DATA	2016	2036
AADT	2400	2600
DHV	290	310
ADTT	250	400
%T	10.3	15.0
%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 > 2000 and a design speed of 35 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	11'/4' (30')	11'/4' (30')[1]	
Bridge Lane and Shoulder Widths	VSS Table 5.3	10'/0.5' (21')	11'/4' (30')[1]	Substandard
Clear Zone Distance	VSS Table 5.5	none known	14' fill / 12' cut	
Banking	VSS Section 5.13	6.1%	8% (max)[2]	
Speed		35 mph (Posted)	35 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 320'	R_{min}=691' @ 6.1%	Substandard
Vertical Grade	VSS Table 5.6	5.86%	9% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 5.1	39 sag	40 crest / 50 sag	Substandard
Vertical Clearance Issues	VSS Section 5.8	none known	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	211'	225'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 5.8	4' Shoulder on Approach 0.5' on Bridge	4' Shoulder	Substandard on Bridge
Bridge Railing (and Approach Railing)	Structures Design Manual Section 13.2	Concrete Bridge Rail w/ w-beam approach	TL-4	Substandard approach
Hydraulics	VTrans Hydraulic Section	Meets standard	Pass Q_{50} storm event with 1.0' of freeboard	
Structural Capacity	S.M., Ch. 3.4.1	Structurally Deficient	Design Live Load: HL-93	Substandard

[1] - 1' added to shoulders to accommodate bicycles per VSS Section 5.14

[2] - This may be limited to 6% where a side road intersects the outside of a curve. However, the Melendy Hill Rd intersection does not preclude a superelevation above 6%.

Inspection Report Summary

Deck Rating	7 Good
Superstructure Rating	5 Fair
Substructure Rating	4 Poor
Channel Rating	8 Very Good

04/11/11 Abutment 1 downstream wing could fail at any time taking the embankment for the approach with it; and could undermine the approach. Both wings at abutment 1 need replacing. The tee Beams continue to deteriorate especially the downstream tee beam. ~ DCP & FRE

Hydraulics
From preliminary hydraulics report:

Recommendations

Based on our analysis, the designer has flexibility on the bridge design to meet the hydraulic standards. [A] 57 foot span option is recommended since it will span the BFW as required by ANR. BFW varies at this site and ANR may allow for a slightly shorter span.

The 57 foot option with a low beam elevation of 395.5 should provide a freeboard of 10.2 feet for the Q_{500} event.

Utilities

The utility information is shown in the Appendix.

Aerial utilities cross just south of the bridge (approximately 75' from the southern abutment), are adjacent to the bridge on the west side of U.S. Route 5, and cross just north of the bridge (approximately 50' from the northern abutment). These aerial facilities are owned by Green Mountain Power Corporation, Comcast, Sovernet, Level3 Communications and FairPoint Communications.

Part one of the municipal sewer system approaches from the south along the West side of U.S. Route 5. At the Melendy Hill intersection it crosses U.S. Route 5 (approximately 125' from the southerly abutment) and proceeds down Broad Brook Road. This sewer main is approximately 7' deep and is sleeved at the U.S. Route 5 crossing.

Part two of the municipal sewer system crosses U.S. Route 5 (in a sleeve) from Grist Mill Road down Bee Barn Road. Sewer lines extend along both sides of U.S. Route 5 to the north and connect to sewer manholes in both the Grist Mill Road and Bee Barn Road intersections. These sewer mains are all about 7' deep as well.

There are no sewer mains attached to the existing bridge and none cross the stream at the bridge location.

The municipal water main crosses U.S. Route 5 approximately 375' north of the existing bridge (sleeved crossing); the water main then travels behind the buildings on Main Street and turns down Bee Barn Road. This main should be well outside of the impact area for the bridge project.

Right Of Way

The existing Right-of-Way is shown on the Layout sheet. Although it appears that the existing structure is completely within the Right of Way, it is anticipated that additional temporary rights will need to be acquired to either provide for a temporary bridge or allow access to repair or replace the substructure components.

Resources

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

Archaeological:
There are some historic mill remains upstream and downstream of US 5 along the banks of the Broad Brook.

Historic:
The bridge is not historic, however, it is located within the Algiers Village Historic District and any replacement structure and railing will be of concern for historic preservation review.

Natural Resources:
In this location, Broad Brook is confined within a steep sided, natural channel which is characterized as cascades. Based on this, the only regulated natural resource in the immediate area of the bridge is Broad Brook.

Hazardous Materials:
There are underground storage tanks at the Guilford Country Store and Bernie Larock and Son, Inc. The Guilford Sewer Line is identified as a Brownfield and Hazardous Waste site in the Village. Richmond Auto Repair is listed as a Hazardous Waste Generator, and the Friends of Algiers owns a Hazardous Waste Site along Grist Mill Rd. These sites are shown in the Appendix.

Stormwater:
No known issues.

II. Maintenance of Traffic

The Vermont Agency of Transportation has developed 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

This location is less than ideal for a temporary bridge because there are historic properties, archaeologically sensitive areas, hazardous waste sites and buildings adjacent to the existing structure. The Broad Brook turns and almost parallels US 5 on the downstream side of the bridge. A temporary bridge on this side of the existing structure would need to turn rather sharply off US 5 and join Bee Barn Rd about 175 feet from the intersection of US 5. This route would require a fairly large amount of temporary rights to be acquired and the archaeologically sensitive area would have to be cleared for construction. The further reduction in sight distance created by placing the temporary bridge on the inside of an already tight curve would be less than ideal as well.

Upstream of the existing structure, one could place a single lane temporary bridge spanning from Melendy Rd to Grist Mill Rd. Rather than remove the adjacent building on Melendy Rd, the width of a temporary bridge should be kept to a single lane. The curves for the temporary detour would be extremely tight to avoid further impacts to the adjacent and historic properties. However, since the bridge would be a single lane traffic signals would be required to allow both directions of traffic to utilize the bridge; this means that the vehicles should be travelling from a stopped condition or something close when navigating the tight curves.

A 400 foot temporary alignment, from stop bar to stop bar, should be able to accommodate 4600 vehicles per day and maximum hourly volume of 600 vehicles without causing excessive delays. This does not mean that there will not be delays and inconvenience with this option, but it remains within reasonable bounds and can be considered further.

Based on the site constraints, if a temporary bridge is pursued it should be located upstream of the existing structure. This is the configuration that will be considered further in this report. The construction costs to maintain traffic in this manner would be around $250,000.

Advantages: This option would allow vehicular traffic to be maintained along the corridor during construction.

Disadvantages: This option would require the acquisition of additional temporary rights. There would be some delays and disruption to traffic, since the road would be reduced to alternating one-way traffic with reduced speeds to negotiate the curves. The overhead utilities would need to be moved more than they would just to accommodate work on the 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 one to maintain traffic along the corridor during construction while mitigating the extra expense and impacts required by a temporary bridge.

While the time required to develop a phased construction project would remain the same, the time required to complete a phased construction project would increase over that for one without phasing because some of the construction tasks have to be performed multiple times. The costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space. Phased construction is usually considered when the benefits include reduced impacts to resources and decreased costs and development time by not requiring the purchase of additional ROW.

As mentioned previously, the traffic volumes are low enough to accommodate alternating one-way traffic with traffic signals during construction. However, the existing bridge is not wide enough to accommodate a single lane without shifting the alignment of a new bridge or using some type of temporary structure in conjunction with the phasing to support traffic.

The existing horizontal curve on the south end of the bridge is very tight for the speed and could stand to be realigned. However, making the curve longer would push traffic closer to the Broad Brook on the downstream side and make the existing intersection with Broad Brook road even worse. Attempting to fix this modified intersection on a fairly steep hill would require extensive fill or retaining wall construction along with a large portion of roadway construction and paving. The costs for rectifying this intersection would probably exceed the construction costs of building a new bridge at this location. Moving the alignment to the west would make the existing horizontal curve even worse. Thus, a new alignment will not be considered to allow phasing in this location.

Using a temporary bridge with phasing is sometimes the best option. However, in this case, the problems associated with a temporary bridge such as the additional costs associated with construction and procuring Right-of-way, additional impacts and disruption would remain while adding the problems associated with constructing a structure in phases.

Because maintaining traffic by phasing construction will not decrease costs or reduce the need for additional Right-of-way acquisition in this location, it will not be considered further in this report.

Option 3: Off-Site Detour

This option would close the bridge to traffic during construction and reroute traffic on US 5 from exit 1 in Vermont to Exit 28 in Massachusetts on I-91. The official detour is appropriate for and chosen based on the volume and type of traffic which will be diverted during construction and the currently existing traffic volumes and composition. The detour has an end-to-end distance of 24.8 miles with no additional travel distance for through traffic. Since the vehicular traffic detour

includes a limited access highway, a separate detour route will be made available for bicycles that cannot take advantage of I-91 to get around a road closure at this site.

There is essentially one local bypass route that avoids the construction site if US 5 is closed to through traffic. Local bypass routes are not signed, or official, detour routes and are not necessarily appropriate for all traffic that needs to detour around a site. Because local bypass routes are comprised of public roads that circumvent the road closure in a shorter distance than the official detour, they may see an increase in traffic from passenger cars as locals use them during the closure.

Safety is a major concern that is considered during the development of a project. Not only the safety of the travelling public and construction workers affected by the construction activities, but also the ability of fire and rescue personnel to reach all areas of a town during construction. Thus, these bypass routes are also evaluated to determine if they may be used by service vehicles and first responders to respond to emergencies during a road closure.

The local bypass in this location entails taking Broad Brook Rd south of the existing bridge to VT 142 (Vernon St) to connect back with US 5 north of the bridge. The end-to-end distance is 6.9 miles and the additional through distance is 1.5 miles.

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

Advantages: Utilizing an off-site detour would eliminate the need to use a temporary bridge or phase construction to maintain traffic. This would decrease the cost and amount of time required to construct a project in this location. The impacts and amount of temporary rights required to construct a project in this location would also be reduced for this option. Many times by decreasing the impacts and area of additional right of way required, the length of time to develop the project can be decreased. The safety of both construction workers and the travelling public will be improved by removing traffic from the construction site.

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

III. Alternatives Discussion

Bridge 5 is structurally deficient with both wing walls failing at abutment 1, the travel way on the bridge is too narrow, the approach rail and terminal sections are substandard, and the vertical and horizontal alignment is substandard south of the bridge.

No Action

This alternative would involve leaving the bridge in its current condition. A good rule of thumb for the “No Action” alternative is whether the bridge can stay in place without any work being performed on the bridge in the next 10 years. Since both of the wing walls at abutment 1 are failing and they have already been reinforced with what appear to be steel tiebacks, it is unlikely that the bridge will last another 10 years without further reinforcing the wing walls. Thus, the No Action alternative will not be considered further in this report.

Alternative 1: Rehabilitation

The deck and channel are in good and very good condition, respectively. Therefore, it does not seem unreasonable that there is existing life left in some components of the structure and the failing components could be repaired or replaced. However, the failing portion of this bridge is the substructure. The wing walls have already been reinforced at one point in their life and after 80+ years, it would be more cost-effective to replace the existing wing walls rather than patch or repair them again. If the substructures are being replaced, one would need to temporarily support or remove and replace the superstructure while replacing the foundations for this bridge. Then an 88 year old superstructure, which is only rated as fair, would be placed back on brand new foundation units.

The new substructure units could be widened to accommodate a wider superstructure in the future. The abutments could also be moved horizontally and vertically to address the substandard horizontal and vertical alignment at this location. However the length of the bridge could not be modified to meet the bank full width criteria or decrease the height of the abutments to decrease the cost of constructing the abutments.

The costs associated with temporarily supporting or removing and replacing the superstructure while the substructures are replaced could easily cost more than half the cost of a replacement superstructure. Based on the geometric limitations, costs and age of the superstructure, no rehabilitation option will be considered further in this report.

Alternative 2: Complete Replacement

Thus, the only remaining option is to replace the entire bridge at this location. The different considerations that can be evaluated for a new structure in this location are listed below.

a. Alignment

There is a tight horizontal curve to the south of the bridge. As mentioned in the Phased Construction section, the costs and impacts associated with flattening the curve in this location exceed the scope of the project. Since the existing curve can meet the design standards for the posted speed with an appropriate superelevation, the proposed horizontal alignment will remain essentially the same as the existing.

The existing vertical alignment does not meet the design standards. However, the sag vertical curve could meet the standards by raising the grade by about one foot on the south end of the bridge and 6 inches on the north. Given the vehicular speeds through this stretch of road, the number of accidents in the vicinity and the relatively low cost of fixing the alignment, it makes sense to increase the stopping sight distance in this location while the bridge is being replaced.

b. Bridge Width

The current lane and shoulder widths are 10 and 0.5 feet, respectively. The Vermont State Design Standards request a minimum lane and shoulder width of 11 and 4 feet, respectively, for the traffic volume, speeds and roadway classification at this site. The AASHTO "Green Book" (A Policy on Geometric Design of Highways and Streets) recommends a minimum of 12 foot lanes

and 8 foot shoulders for this location. The Local and Regional Input requested that "any/all bridge designs include ample space for a sidewalk and a bicycle lane."

All of these factors indicate that a new structure should be wider than the existing structure. However, there are constraints that make widening this structure more difficult than widening some other structure. The existing Right of Way at this site is shown as 3 rods, or 49'-6", centered on the middle of the road. And as mentioned previously, the steep bank on the southeast side of the road makes widening the road in that direction very expensive and difficult. There are no existing sidewalks entering or exiting the current bridge.

The Algiers Triangle Master Plan includes sidewalks on both the north and south end of Bridge 5 on US 5. It also includes a "possible footbridge across [the] Broad Brook." It appears that the plan is currently being implemented with sidewalks on the corner of Guilford Center Rd and US 5 and the construction of a residential building in the triangle.

Based on this information, a reasonable typical roadway section between Melendy Rd and Grist Mill Rd would include an 5.5' sidewalk on the west side of US 5 with a roadway typical of 4'-11'-11'-4'. This would necessitate that a finance and maintenance agreement be signed requiring the Town to remove snow from the sidewalk. If no agreement with the Town can be reached, the sidewalk would be eliminated while the roadway typical section would remain the same with the assumption being that pedestrians walking in the shoulder before and after the bridge can be adequately accommodated in the shoulder on the bridge. In addition to any temporary rights which would need to be procured to gain access during construction, some slight permanent acquisitions would need to be made on the western side of the bridge to accommodate the extra width required by the sidewalk and shoulder. The eastern lane, shoulder and roadway fill would stay within a reasonable footprint while allowing the Broad Brook Rd intersection to remain untouched.

c. Bridge Type, Length and Skew

Based on the preliminary geotechnical evaluation, it is assumed that bedrock is shallow in this location and the suitable foundation types would include a spread footing on rock and dilled piles. The costs associated with excavating and supporting 30 feet of fill, constructing a cofferdam on the southern abutment and perhaps the northern abutment as well and then designing and constructing an earth and bridge retaining structure 30 feet high again is relatively substantial. The construction costs for 2 abutments of this size would be around $800,000. The cost for 2 pile supported caps on a single row of drilled piles would be around $350,000. The difference to extend the superstructure from 57 feet to 90 feet would be around $150,000. Thus, creating a longer superstructure on pile caps would still be approximately $300,000 cheaper than placing a shorter superstructure on a tall shallow foundation.

The recommendation is to create a 90+/- foot superstructure with no skew on pile caps with a single row of drilled piles. This span range is conducive to rolled beam and composite concrete deck superstructure or NEXT beams.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, the alternatives being considered are:

Alternative 2a: Complete Replacement with Traffic Maintained on a Temporary Bridge
Alternative 2b: Complete Replacement with Traffic Maintained on an Offsite Detour

V. Cost Matrix

Guilford BF 0113(68)		Do Nothing	Alt 2a	Alt 2b
			Complete Replacement	
			Temp Bridge	Offsite Detour
COST[1]	Bridge Cost	$0	$833,000	$833,000
	Removal of Structure	$0	$75,000	$75,000
	Roadway	$0	$336,000	$316,000
	Maintenance of Traffic	$0	$250,000	$50,000
	Construction Costs	$0	$1,494,000	$1,274,000
	Construction Engineering + Contingencies	$0	$373,500	$318,500
	Total Construction Costs w CEC	$0	$1,867,500	$1,592,500
	Preliminary Engineering[2]	$0	$373,500	$318,500
	Right of Way	$0	$150,000	$102,000
	Total Project Costs	$0	$2,391,000	$2,013,000
SCHEDULING	Project Development Duration[3]	N/A	4 years	4 years
	Construction Duration	N/A	18 months	6 months
	Closure Duration (If Applicable)	N/A	N/A	4 weeks
ENGINEERING	Typical Section - Roadway (feet)	4-11-11-4	5.5-4-11-11-4	5.5-4-11-11-4
	Typical Section - Bridge (feet)	0.5-10-10-0.5	5.5-4-11-11-4	5.5-4-11-11-4
	Geometric Design Criteria	No Change	Meets Criteria	Meets Criteria
	Traffic Safety	No Change	Improved	Improved
	Alignment Change	No	Slight	Slight
	Bicycle Access	No Change	Improved	Improved
	Hydraulic Performance	No Change	No Change	No Change
	Pedestrian Access	No Change	Improved	Improved
	Utility	No Change	Relocation	Relocation
OTHER	ROW Acquisition	No	Yes	Yes
	Road Closure	No	No	Yes
	Design Life	<10 years	80 years	80 years

[1] Costs are estimates only, used for comparison purposes.

[2] Preliminary Engineering Costs are estimated starting from the end of the Project Definition Phase.

[3] Project Development Durations start from the end of the Project Definition Phase.

VI. Conclusion

We recommend Alternative 2b: Complete Replacement with Traffic Maintained on an Offsite Detour.

Structure:
The substructure is in poor condition and needs to be repaired or replaced. The following issues are also substandard at this location. The lane and shoulder widths are too narrow on the bridge; the superelevation is substandard for the curve and speed; the K value and the headlight sight distance for the sag vertical curve is substandard; and the approach rail and terminal sections are substandard off the bridge. Based on economic factors, it is not prudent to replace the substructure and maintain the existing superstructure, so the entire bridge should be replaced. Once the entire bridge is being replaced, it makes sense to try and rectify as many substandard features as one can within the scope of a bridge replacement project. Because of the close proximity of the intersecting roads to US 5, the substandard approach and terminal sections off the bridge cannot be brought up to standard without closing or moving the roads. There is no easy or inexpensive way to wrap this into the scope of a bridge project, so the proposal is to leave it substandard.

By proposing to replace the existing bridge with a 90+/- foot superstructure with no skew on pile caps with a single row of drilled piles and a 5.5' sidewalk and a 4-11-11-4 typical section, all of the substandard issues at this location can be rectified, except the railing, in a tightly focused project.

Traffic Control:
There is a detour which is essentially the same distance as the through route distance. The end-to-end distance is 24.8 miles. The traffic volumes, closure duration and detour length keep this a viable alternative. By utilizing a detour instead of a temporary bridge, the impacts to the adjacent landowners and historic properties are minimized, while producing a safer, faster and cheaper project to construct.

Based on the local input received, there is a concern that bicycles are accommodated, the impact on local businesses are considered, and the access of first responders are evaluated for any option which includes a road closure at the Bridge 5 during construction. An unofficial local bypass is available at this site with an end-to-end distance of 6.9 miles. This bypass could accommodate bicycles and first responders during a closure. In addition, Guilford has mutual aid agreements with surrounding communities so that the surrounding fire departments may be able to assist the Guilford's volunteer fire department with any emergencies which may occur during the closure.

The general procedure used when roads are closed in a community is to provide the affected towns the opportunity to determine the best time for the closure. The traditional window for closures within which the towns are able to choose is between June 1 and September 1. This provides a high probability for success because of the long days, favorable weather, low water and lack of restrictions for in-stream work. Within that allowable period, the community can balance the impacts to schools and businesses and any other community events. This process has worked well at providing a high rate of success to allow the construction to be completed within the closure period and as well as providing the best outcomes for the towns based on their schedule and needs. It is anticipated that this same process will be utilized for this project.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Hazardous Waste Sites
- Archaeology Memo
- Historic Memo
- Utility Information
- Local Input
- Crash Data
- Traffic Study Information
- Algiers Triangle Master Plan
- Detour Route
- Plans
    - Existing Conditions
    - Proposal
        - Typical Sections
        - Layout
        - Profile
    - Temporary Bridge Layout

Abutment Retaining Wall Failure

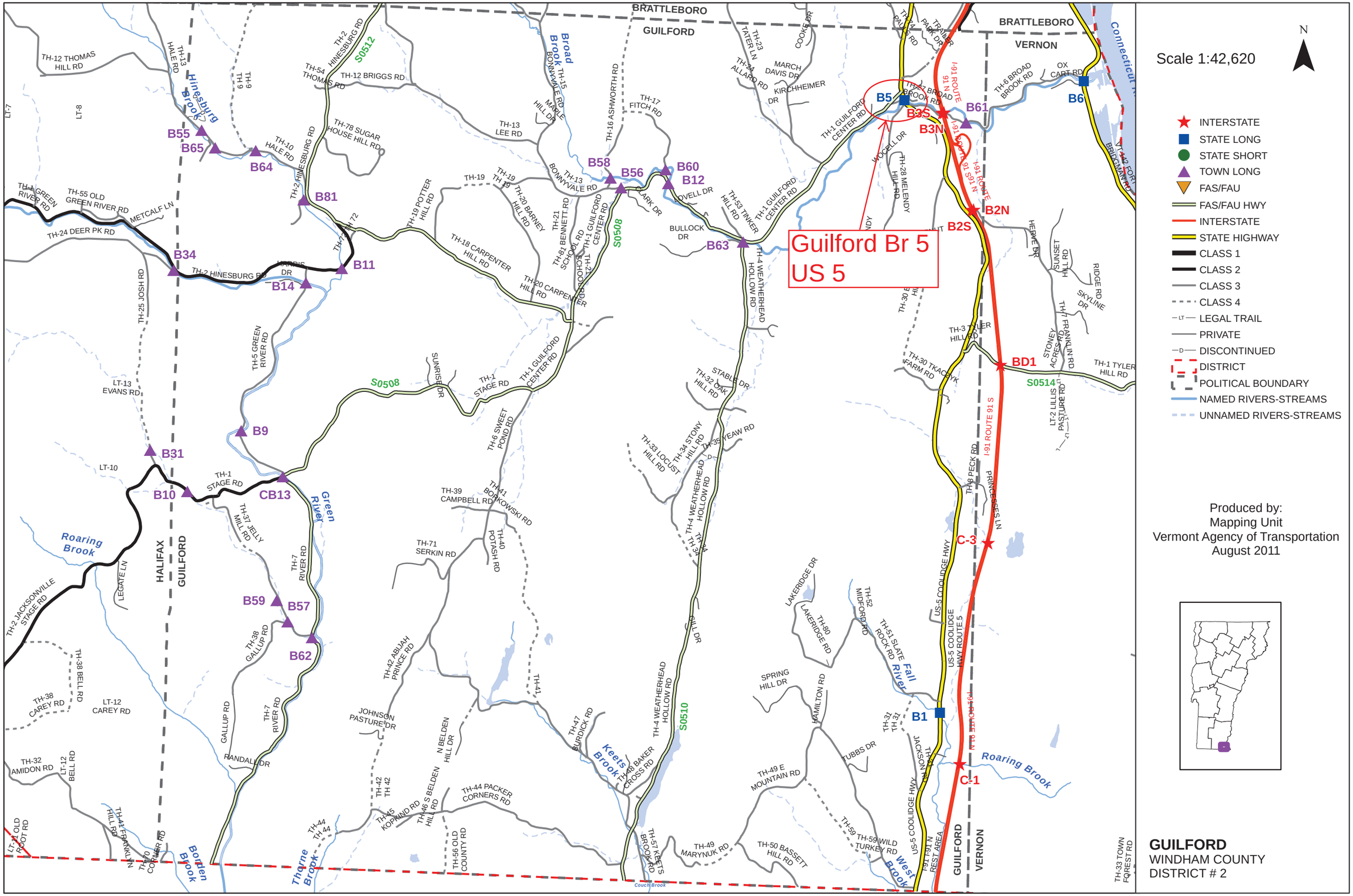
Superstructure deterioration

Potholes forming in Deck

Bridge rail deterioration and cracking, inadequate approach connection

Looking South showing narrow bridge, tight curve, and multiple intersections

Looking North over bridge into Algiers Village


Guilford Br 5
US 5
Scale 1:42,620
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
GUILFORD
WINDHAM COUNTY
DISTRICT # 2
BRATTLEBORO
GUILFORD
VERNON
HALIFAX
B5
B3S
B3N
B61
B6
B2N
B2S
BD1
C-3
C-1
B1
B55
B65
B64
B81
B34
B11
B14
B9
B31
B10
CB13
B59
B57
B62
B58
B56
B60
B12
B63
Hinesburg Brook
Broad Brook
Green River
Roaring Brook
Fall River
Keets Brook
Borden Brook
Thorne Brook
West Brook
Connecticut R
I-91 ROUTE
US-5 COOLIDGE HWY
S0512
S0508
S0510
S0514

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for GUILFORD **bridge no.:** 00005 **District:** 2

Located on: US 00005 ML **over** BROAD BROOK **approximately** 1.5 MI S I91 EXIT 1 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 7 GOOD

Superstructure Rating: 5 FAIR

Substructure Rating: 4 POOR

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200113000513072

Federal Sufficiency Rating: 025.3

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1925 **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): 00

ADT: 003100 **% Truck ADT:** 06

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0049

Structure Length (ft): 000053

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 21

Deck Width Out-to-Out (ft): 23.5

Appr. Roadway Width (ft): 030

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: 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: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 8 SLIGHT CHANCE OF OVERTOPPING ROADWAY

Approach Roadway Alignment: 6 EQUAL TO MINIMUM CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 042011 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

04/11/11 Abutment 1 dwnstream wing could fail at any time taking the embankment for the approach with it; and could undermine the approach. Both wings at abutment1 need replacing. The tee Beams continue to deteriorate especially the downstream tee beam. ~ DCP & FRE

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Jake San Antonio, Hydraulics Project Engineer (VHB)
via Nick Wark, VTrans Hydraulic Engineer

DATE: June 24, 2012

SUBJECT: GUILFORD - BF-0113(68), US 5 BR 5 over BROAD BROOK

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 1925 based on available information. The bridge is a 2-lane single span concrete T-beam bridge. The total span for the structure between the abutment faces is approximately 46.5 feet based on the site survey. The total existing superstructure depth is approximately 3.7 feet based on record plans. The existing abutments were constructed of concrete with unknown foundations. These abutments are orientated parallel with the stream channel at this location. The approximate maximum height to the bottom of the superstructure to the streambed varies but is approximately 24 feet on the upstream side. The structure is located on an incised channel having a ledge stream bed, overlain with gravel and large boulders. The bridge is located on Broad Brook approximately 1.8 miles upstream of the confluence with the Connecticut River. The bridge will pass the Q_{50} storm event and all larger events based on our preliminary project HEC-RAS model. The existing bridge encroaches slightly on the Bank Full Width (BFW), based on the VANR BFW equation. We did not evaluate the scour for the existing conditions or any proposed bridge configurations as part of the preliminary design. Scour calculations will be performed during final hydraulics.

Recommendations

The bridge option selection criteria should be to provide a bridge opening that does not restrict the BFW, nor provide an unrealistic widening, of the existing channel, or create any worse backwater flooding conditions than the existing conditions. The VANR BFW Equation estimates the width to be approximately 50 feet, but the actual field conditions have varying bank full stream widths within the study reach between 35 to 55 feet.

We assumed that if the existing bridge is replaced a replacement structure would be located in the existing roadway alignment with the same basic surface geometry based on the site constraints. For a replacement structure, we anticipate that the proposed abutments would be vertical face concrete abutments and that stone fill scour protection will not be required.

Based on our analysis, the designer has flexibility on the bridge design to meet the hydraulic standards. One option would be a replacement bridge with a single 57-foot clear span between the abutment faces. This option would shift the eastern abutment further east and the western abutment would remain in the same place. A low beam elevation of 395.5 was assumed for this option, and with that low beam this analysis predicts a freeboard of 10.2 feet for the Q_{500} event. The designer for the proposed bridge has flexibility on the low beam elevation. The hydraulic opening is wider than the existing structure and would not constrict the stream channel's bank full width. This proposed

structure would also provide approximately 13.0 feet of freeboard at the Q_{50} design storm event, not increase water surface elevations upstream during the Q_{100} design storm event, and meet the hydraulic design standard. Figure 1, attached, depicts this option.

Another option evaluated involved a replacement bridge with a single 44-foot clear span. This option would provide vertical abutments in approximately the same location as existing, but remove the batter which results in a slightly smaller clear span. The encroachment to the ANR BFW would remain approximately the same. A low beam elevation of 395.5 was assumed for this option, and with that low beam this analysis predicts a freeboard of 10.2 feet for the Q_{500} event. The designer for the proposed bridge would have flexibility on the low beam elevation. This proposed structure would also provide approximately 13.0 feet of freeboard at the Q_{50} design storm event, not increase water surface elevations upstream during the Q_{100} design storm event, but would encroach on the VANR BFW.

The 57 foot span option is recommended since it will span the BFW as required by ANR. BFW varies at this site and ANR may allow for a slightly shorter span. Any span longer than the existing (46.5 foot) could be considered. Ultimately ANR and the COE will sign off on the span length and we would recommend early coordination if anything less than the 57 foot span is selected. The hydraulic unit would be more than happy to facilitate a meeting to discuss this issue.

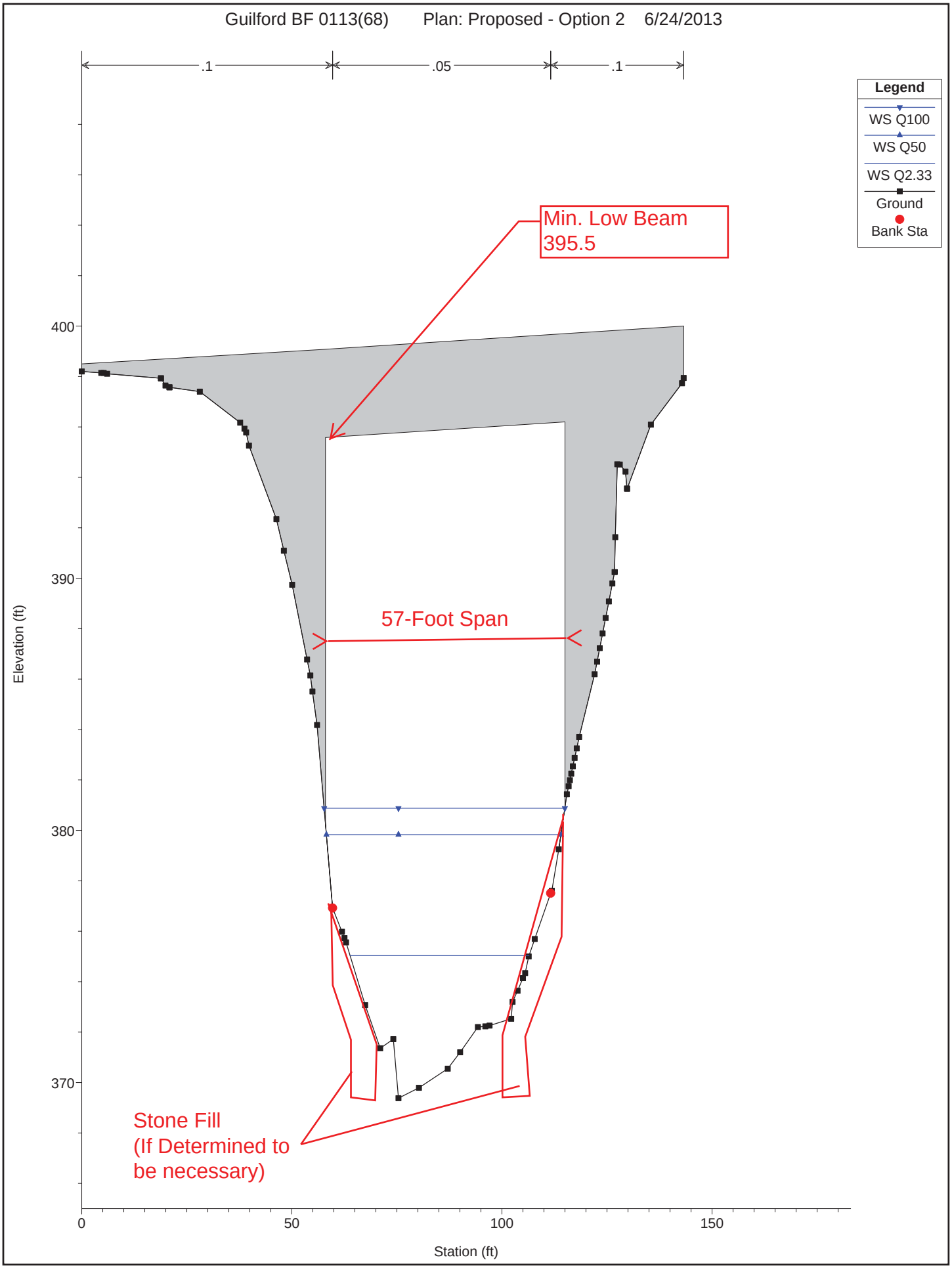
As noted above, scour was not reviewed during the preliminary design. However based on the record plans and a site visit the current abutments were constructed on ledge so stone fill would not be necessary for armoring the abutments. If stone fill is determined to be necessary during design, based on the modeled velocities a Type IV stone fill would be appropriate. Stone fill sizing, if specified, will be verified during final hydraulic design.

<u>Temporary Bridge/Detour</u>
As part of this analysis we did not size a temporary bridge. If a temporary bridge is expected, let us know and we can give sizing requirements.

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

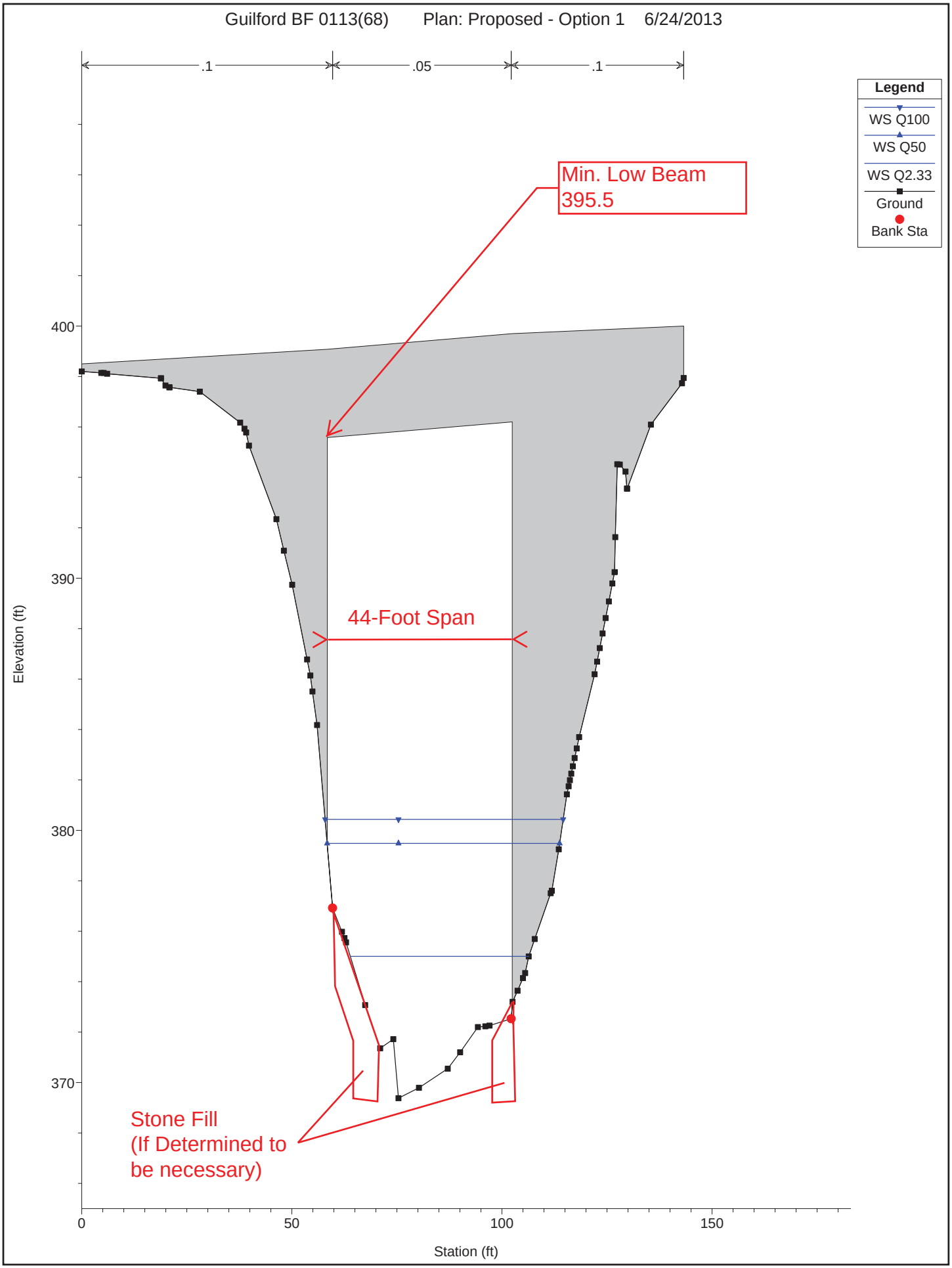
cc: Hydraulics Project File via NJW
Hydraulics Chrono File

Figure 1: 57-Foot Single Span



1 in Horiz. = 30 ft 1 in Vert. = 5 ft

Figure 2: 44-Foot Single Span



1 in Horiz. = 30 ft 1 in Vert. = 5 ft

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

CCB

From: Christopher C. Benda, Soils and Foundations Engineer

Date: May 31, 2013

Subject: Guildford BR 0113(68) - Preliminary Geotechnical Information Report

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 Bridge No. 5 on US 5 which crosses over Broad Brook in Guildford, Vermont. The southern approach of the existing bridge, looking north is shown in Figure 1.

Figure 1, US 5, Bridge 5 looking north

This review included the examination of historical in-house bridge boring files, as-built record plans, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps and water well logs on-file at the Agency of Natural Resources when applicable.

No pertinent boring log data was found in the Soils & Foundations project database or in-house historical boring log records. No boring logs or subsurface information was provided in the record plans dated 1925.

A site visit conducted on May 21, 2013 confirmed the presence of bedrock in the streambed and at both existing abutment locations. It was noted that the bedrock shown in Figure 2 at the south abutment is drawn on the existing conditions plan sheet dated 01-May-2013, but the elevation of the rock observed elsewhere during our site visit was not well depicted on the plans.

Figure 2, Bedrock outcrop on upstream side of existing bridge

Surficial mapping conducted for the 1970 Surficial Geologic Map of Vermont indicates that the subject area is underlain by well sorted lake sands and glacial till. Some gravel and cobble sized particles were evident in the streambed alongside the downstream side of the south abutment.

According to the 2011 bedrock map of Vermont, the project area overlies bedrock consisting of Gile Mountain Formation rocks described as “Dark-gray slate and phyllite containing sparse to moderately abundant beds of light-gray, fine-grained metasandstone and metasiltstone, 1 mm to 1 cm thick”.

USDA Natural Resources Conservation soil survey records indicate that surficial soils in the area of the bridge consist of “Quonset and Warwick” very gravelly loamy sand and very gravelly sand within the top 60 inches of the ground surface with 2 to 8 percent slopes north of the river and 15 to 25 percent slopes south of the river.

With the exception of overhead power/communications lines, no evidence of any utilities was observed at or near the bridge. Access for drilling borings appears favorable.

As a result of this background investigation, it is expected that bedrock will be shallow throughout the bridge project limits. We recommend the exposed bedrock throughout the project area be accurately surveyed and plotted to facilitate foundation design efforts. Standard geotechnical borings supplemented with a ground penetrating radar survey can be used to better define the bedrock profile at the proposed substructure locations.

Foundations consisting of spread footings on rock, shallow spread footings on micropiles and small diameter drilled shafts are possible options.

If you have any questions, please feel free to contact me at 828-6910.

c: CCB/Project File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: James Brady, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: April 29, 2013

SUBJECT: Guilford B_F 0113 (68)
US 5, Bridge 5
Natural Resource ID & Comments

The purpose of this memo is to let you know that I completed my initial resource identification for this project, which involves US 5 crossing Broad Brook. In this location, Broad Brook is confined within a steep sided, natural channel which is characterized as cascades. Based on this, the only regulated natural resource in the immediate area of the bridge is Broad Brook.

As for a temporary bridge, either side of the existing bridge would work for natural resources, although I sense that the resources and terrain in the area would force it to be on the upstream side. Given the steepness of the stream banks, it is conceivable that the new bridge could be constructed entirely outside of the limits of Ordinary High Water.

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

Natural Resources Atlas - Waste Sites

Vermont Agency of Natural Resources

vermont.gov

LEGEND

Landfills
- OPERATING
- CLOSED

Hazardous Waste Site

Hazardous Waste Generators

Brownfields

Underground Storage Tank (w

NOTES

Map created using ANR's Natural Resources Atlas

286.0 0 143.00 286.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 470 Ft. 1cm = 56 Meters

© Vermont Agency of Natural Resources

THIS MAP IS NOT TO BE USED FOR NAVIGATION

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

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: James Brady, VTrans Environmental Specialist

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

Date: 4/29/2013

Subject: Guilford BF 0113(68) – Archaeological Resource ID

James,

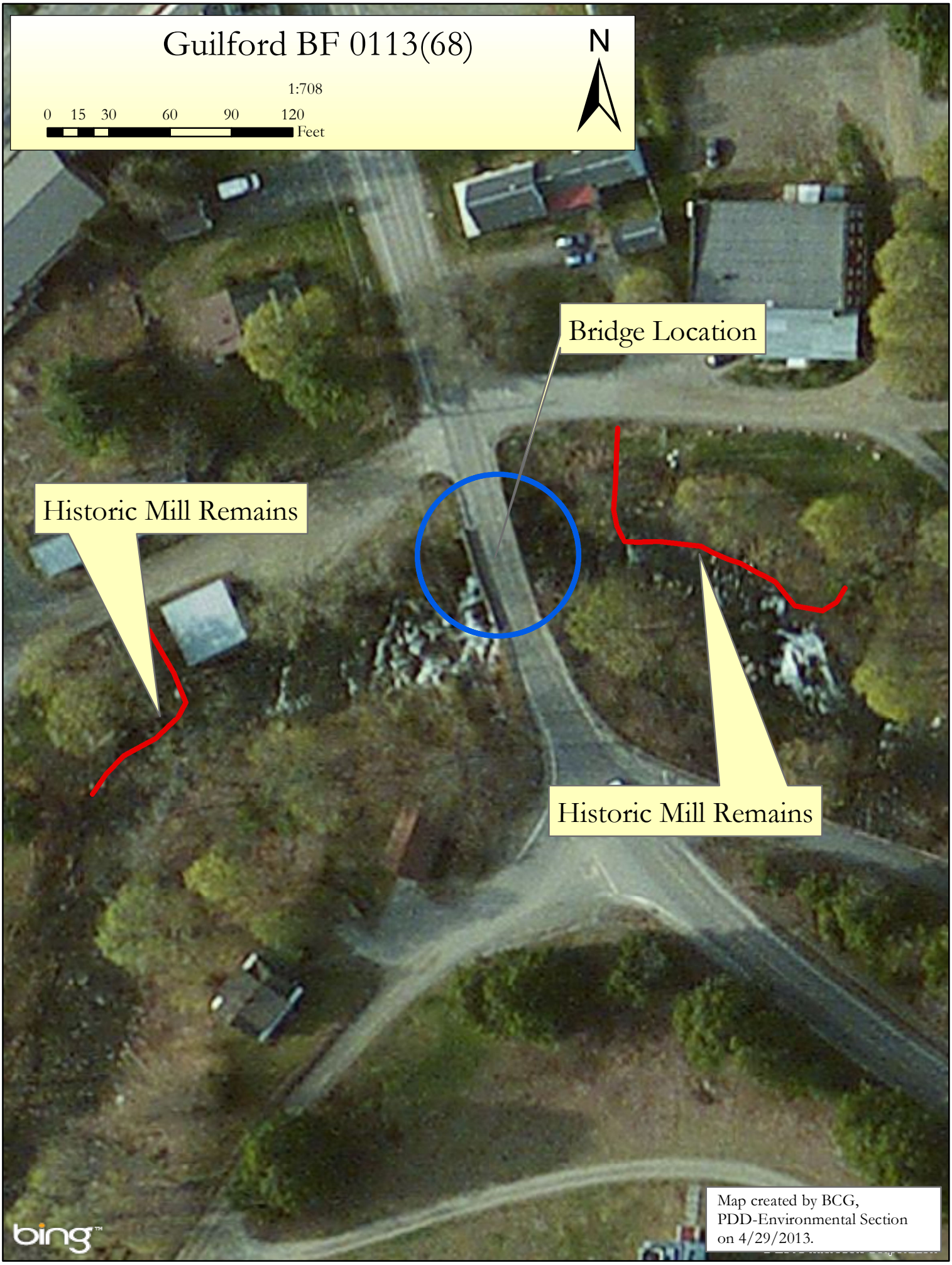
I've completed my resource identification for the Guilford BF 0113(68) bridge project along US5 over the Broad Brook in Guilford. I was able to identify a series of historic mills that were constructed at some point after the Civil War and existed until the early 1900s. Remains of mills are present on both sides of the bridge and have been documented in the attached map. A site visit was conducted on 4/24/2013 as part of the 2013 PIIT project packet. Please feel free to contact me with any questions or concerns that may arise.

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


Guilford BF 0113(68)
1:708
0 15 30 60 90 120
Feet
N
Bridge Location
Historic Mill Remains
Historic Mill Remains
bing
Map created by BCG,
PDD-Environmental Section
on 4/29/2013.

Brady, James

From: O'Shea, Kaitlin
Sent: Tuesday, May 14, 2013 8:59 PM
To: Brady, James
Cc: Newman, Scott; Williams, Chris
Subject: Guilford BF 0113(68) Historic Resource ID

Hi James,

The historic resource ID for Guilford BF 0113(68) is complete. Bridge 5, a 1925 concrete T beam bridge, is not a historic bridge, due to loss of integrity. However, it is located within the Algiers Village Historic District, serving as a gateway bridge. There are adjacent historic properties to the bridge, which have been bookmarked on Arcmap under the project name.

Questions for this project will include (1) Will there be a temporary bridge? (2) If so, what will permanent and temporary easements be from the adjacent historic properties. The replacement structure and railing will be of concern for historic preservation review.

Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Program Development - Environmental Section Vermont Agency of Transportation

One National Life Drive
Montpelier VT 05633

office: 802-828-3962
fax: 802-828-2334

Kaitlin.O'Shea@state.vt.us

Sewer

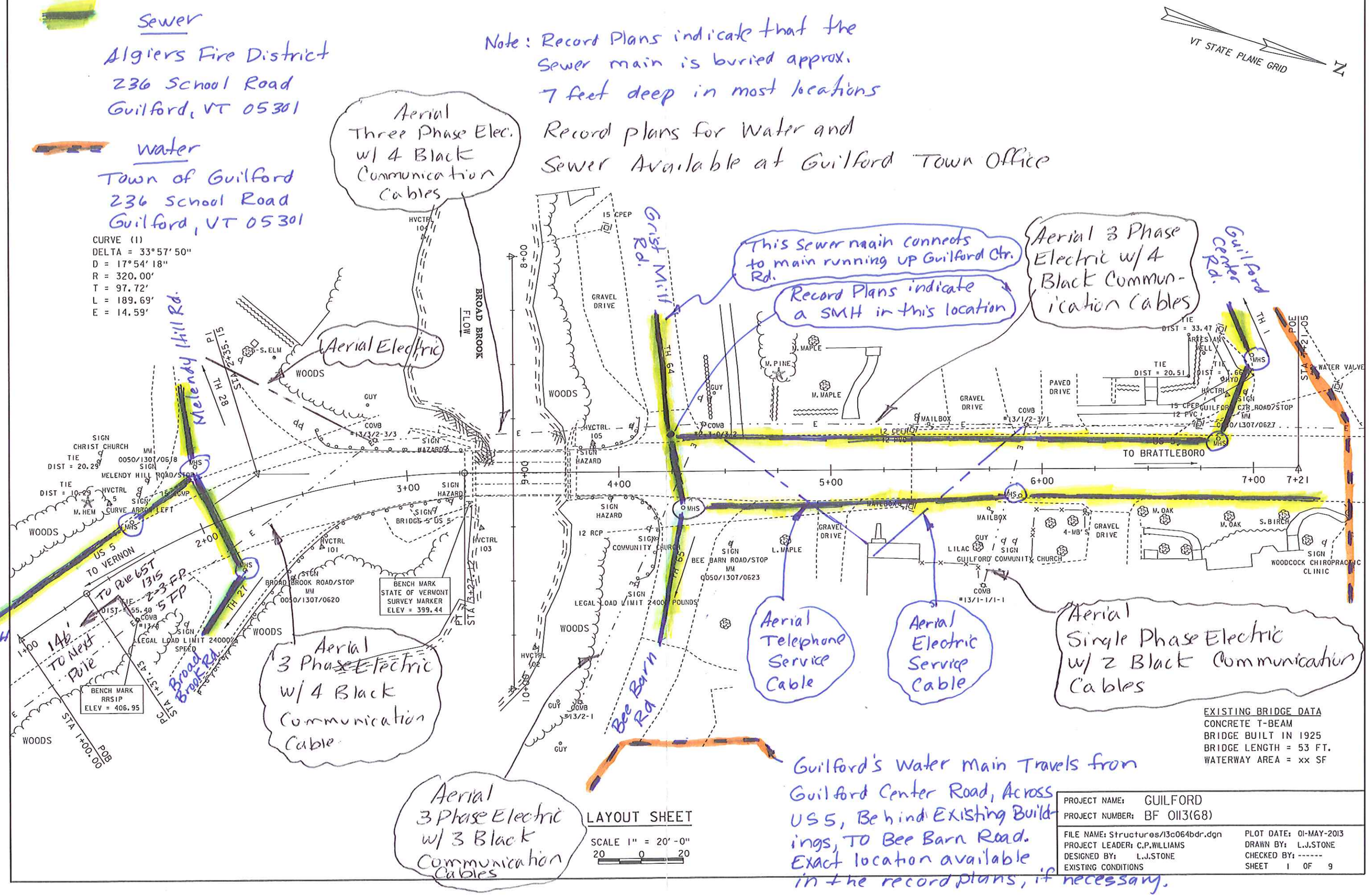
Algiers Fire District
236 School Road
Guilford, VT 05301

Water

Town of Guilford
236 School Road
Guilford, VT 05301

Note: Record Plans indicate that the Sewer main is buried approx. 7 feet deep in most locations

Record plans for Water and Sewer Available at Guilford Town Office



EXISTING BRIDGE DATA
CONCRETE T-BEAM
BRIDGE BUILT IN 1925
BRIDGE LENGTH = 53 FT.
WATERWAY AREA = xx SF

PROJECT NAME: GUILFORD	
PROJECT NUMBER: BF 0113(68)	
FILE NAME: Structures/13c064bdr.dgn	PLOT DATE: 01-MAY-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
EXISTING CONDITIONS	SHEET 1 OF 9

Community Considerations

1. Are there any scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include: 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.

   Not that we are aware of. In the past, the Strolling of the Heifers bike tour has started at Gaines Farm located south of the bridge on Route 5. If there is plenty of advance notice about a bridge closure it could be easily coordinated.

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

   No.

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

   Guilford's fire department (all volunteer, private non-profit) is located at 108 Guilford Center Road, just north of the bridge. Many of Guilford's emergency responders live south of the bridge, including both the Fire Chief and the Asst. Chief. In addition, they respond to many calls at the I-91 Welcome Center and calls on I-91 – both of which are accessed south of the bridge. The Fire Chief feels strongly that a temporary bridge will be necessary. We do have a mutual aid agreement with surrounding towns; coordinating with them during a closure period could be explored.

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

   There are three (3) schools to which Guilford students are sent: Guilford Central School, 8:15 a.m.-2:20 p.m., Brattleboro Area Middle School (BAMS) and Brattleboro Union High School (BUHS); both Brattleboro schools are 9:15 a.m.-3:20 p.m. The students for BAMS and BUHS are combined on buses so there are only two bus schedules for all three schools.

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

   Yes. It is on an established 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?

   Yes. There are some busy small businesses (general store/café, auto repair shops, tree removal/bark mulch business, surveyor, artist's gallery, chiropractor, dietician, storage units, etc.) that will be impacted by a lengthy detour.

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?

   All public buildings are located in Guilford Center; access to them is north of the bridge.

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

   Not really. The Town of Vernon may be impacted by a detour since travellers may need to reach Brattleboro using Vernon to skirt the construction.

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

   Town highway maintenance could be coordinated to take place before and/or after the construction periods.

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.

    The daily paper is the "Brattleboro Reformer" (www.reformer.com); the weekly paper is "The Commons" (www.commonsnews.org). The local radio station is 96.7 FM, WTSA (www.WTSA.net), soon-to-be Guilford Town website, Brattleboro Community Television.

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

    Friends of Algiers Village, Inc. should be a party to this discussion. They are a small, community based non-profit that formed to guide the thoughtful/responsible redevelopment of the Village in the absence of Town zoning.

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?

   The bridge is located just north of a dangerous curve that sits on a hill above it. Travellers turn the corner, crossing the bridge with increased speed as they enter the most densely populated area in the Village. Traffic calming measurers should be a part of this project.

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

   Yes. It is extremely narrow with no consideration for bike/pedestrian use. The Town will insist that any/all bridge designs include ample space for a sidewalk and a bicycle lane.

3. What is the current level of bicycle and pedestrian use on the bridge?

   High. US Route 5 north through the Village of Algiers is a frequently traveled route for cyclists. It connects many who travel from MA to either Brattleboro or west into the hills of Guilford. In addition, the bridge connects two vital sections of the Village, both of which contain businesses and residential housing. Pedestrian traffic is discouraged because of the unsafe design of the bridge.

4. If a sidewalk or wide shoulder is present on the existing bridge, should the new structure have one?

   There is no sidewalk at present nor is there even a significant shoulder.

5. Is there a need for a sidewalk or widened shoulder if one does not currently exist? Please explain.

   The bridge separates two vital sections of the historic Village. On one side is a newly opening Guilford Country Store and Café (only source of food access in Guilford), auto repair shop, Community Church, Fire Station, medical services, etc. and on the other are two historically significant structures, a cemetery, some small businesses, etc. Lack of a safe path for pedestrians prevents many from walking between the two parts of the Village because it is just too dangerous to do so.

6. Does the bridge provide an important link in the town or statewide bicycle or pedestrian network such that bicycle and pedestrian traffic should be accommodated during construction?

   US Route 5 is an important link to cyclists travelling to and from Vermont and Massachusetts. Alternate routes for these travellers will significantly impact their plans.

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

   Yes. A significant revitalization effort is underway in the Village of Algiers with a focus on preserving the historic integrity of the entire area, of which the bridge is a part. Two of the anchor properties are listed on the National Register of Historic Places. It is a designated Village Center by the Vermont Department of Housing and Community Development. Any/all designs should be sensitive to this and blend well into this traditional environment.

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

   Yes! The current bridge is extremely narrow with no shoulder at all and is very close to a dangerous curve; sight distances from the south are very poor. Any design for a new structure

must consider accommodations for pedestrian and bicycle traffic. As stated, Algiers is a designated Village Center with significant redevelopment in progress and on the horizon. Foot traffic will be on the rise as this happens, with a significant increase occurring this summer alone (2013). The goal is to have an economically vibrant and sustainable village center that bustles with activity – this means pedestrians moving freely throughout it to service their needs. If the Village is not safe for them, this will impact our businesses.

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

   No.

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

    Yes. There was Brownfield site just a few hundred feet from the bridge. It was cleaned up in 2011 (?) through EPA's Brownfield Program.

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

    Not sure. This may be a historically/archeologically "sensitive" area as described by the State. Algiers Village was identified as such during the planning process for the Algiers municipal waterline project; an archeological review was required.

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

    This bridge is an important element that connects two sections of a historic village center that is on the rise after a long period of decline. Constructing a bridge that not only encourages pedestrian traffic but also is aesthetically pleasing to blend with the historic character of the streetscape will only strengthen the economic vitality of the village.

Land Use & Public Transit Considerations – to be filled out by the municipality or RPC.

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.

   N/A

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

No known proposals at this time. There is no zoning in Guilford so the Town most often learns of projects if they have to apply for Wastewater Permitting through the State; this is closer to the construction phase than planning.

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

Not at this time.

Vermont Agency of Transportation

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

From 01/01/07 To 12/31/11 General Yearly Summaries Information

*	Reporting Agency/ Number	Town	Mile Marker	Date MM/DD/YY	Time	Weather	Contributing Circumstances	Direction Of Collision	Number Of Injuries	Number Of Fatalities	Direction	Road Group
Route: VT-4A Continued ...												
	VT0110000/09RUC 0077	West Rutland	2.68	01/16/2009	18:22	Cloudy	Inattention, Followed too closely, No improper driving	Rear End	0	0	W	SH
	VT0110000/10RUC 0593	West Rutland	2.68	04/26/2010	10:55	Cloudy	Made an improper turn	Left Turn and Thru, Angle Broadside -->v--	2	0	E	SH
Route: US-5												
	1302/1846-07	Guilford	0.91	01/23/2007	16:30	Cloudy	Failure to keep in proper lane	Other - Explain in Narrative	1	0		SH
	VTVSP1000/08D20 3628	Guilford	1.04	12/15/2008	23:20	Clear	No improper driving	Single Vehicle Crash	0	0	N	SH
	VTVSP1000/09D20 0735	Guilford	1.06	03/11/2009	17:52	Clear	Failure to keep in proper lane	Single Vehicle Crash	0	0	S	SH
	1302/11231-07	Guilford	1.07	07/19/2007	18:39	Cloudy	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	1	0	S	SH
	VTVSP1000/10D20 1832	Guilford	1.08	07/12/2010	18:03	Cloudy	Under the influence of medication/drugs/alcohol, Failure to keep in proper lane	Single Vehicle Crash	0	0	S	SH
	VTVSP1000/08D20 1889	Guilford	1.51	06/27/2008	22:13	Clear	Failure to keep in proper lane, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	S	SH
	VTVSP1000/10D20 1352	Guilford	1.59	05/27/2010	10:36	Clear	Distracted, No improper driving	Single Vehicle Crash	0	0	N	SH
	VTVSP1000/11D20 3014	Guilford	2.56	11/03/2011	18:55	Cloudy	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Failure to keep in proper lane	Single Vehicle Crash	0	0	S	SH
	VTVSP1000/11D20 1247	Guilford	3.1	05/01/2011	22:30	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Failure to keep in proper lane	Single Vehicle Crash	0	1	N	SH
	VTVSP1000/09D20 0273	Guilford	3.12	01/24/2009	22:56	Clear	Failure to keep in proper lane, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	1	0	N	SH
	VTVSP1000/11D20 3541	Guilford	3.24	12/28/2011	07:38	Rain	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	S	SH
	VTVSP1000/10D20 2554	Guilford	3.72	09/30/2010	21:24	Rain	Failure to keep in proper lane	Single Vehicle Crash	0	0		SH
	VTVSP1000/08D20 0885	Guilford	3.93	03/17/2008	10:29	Clear	No improper driving, Failed to yield right of way	Head On	0	0	N	SH
	VTVSP1000/09D20 1462	Guilford	4.51	06/05/2009	17:29		No improper driving	Single Vehicle Crash	0	0	N	SH
	VT0130600/11VN0 0490	Vernon	UNK	07/29/2011	22:55	Rain	Driving too fast for conditions	Single Vehicle Crash	0	0	N	SH
	VTVSP1000/08D20 0989	Guilford	5.3	03/28/2008	07:41	Snow	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	N	SH
	VTVSP1000/09D20 2799	Guilford	6	10/18/2009	04:03	Clear	Failure to keep in proper lane, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0		SH
	VTVSP1000/09D20 2907	Guilford	6	10/29/2009	07:39	Fog, Smog, Smoke	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, No improper driving	Other - Explain in Narrative	0	0	N	SH
	1302/6082-07	Guilford	6.179	04/09/2007	21:15	Clear	Under the influence of medication/drugs/alcohol, Failure to keep in proper lane	Single Vehicle Crash	0	0	S	SH
	VTVSP1000/08D20 0697	Guilford	6.2	02/28/2008	22:39	Clear	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	N	SH
	VTVSP1000/10D20 1262	Guilford	6.22	05/17/2010	10:00	Clear	Failed to yield right of way, No improper driving	Left Turn and Thru, Broadside v<--	1	0	N	SH
	VTVSP1000/08D20 0009	Guilford	6.27	01/01/2008	12:20	Snow	Driving too fast for conditions, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	E	SH
	VTVSP1000/08D20 1359	Guilford	6.27	05/05/2008	13:32	Clear	No improper driving	Single Vehicle Crash	1	0		SH

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

Vermont Agency of Transportation

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

From 01/01/07 To 12/31/11 General Yearly Summaries Information

*	Reporting Agency/ Number	Town	Mile Marker	Date MM/DD/YY	Time	Weather	Contributing Circumstances	Direction Of Collision	Number Of Injuries	Number Of Fatalities	Direction	Road Group
Route: US-5 Continued ...												
	VTVSP1000/10D202914	Guilford	6.27	11/09/2010	11:05	Cloudy	Failed to yield right of way, Visibility obstructed, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	E	SH
	VTVSP1000/11D200830	Guilford	6.39	03/17/2011	06:25	Clear	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	N	SH
	VTVSP1000/08D200665	Guilford	6.68	02/26/2008	16:15	Snow	No improper driving, Driving too fast for conditions, Failure to keep in proper lane	Right Turn and Thru, Broadside ^<--	0	0	E	SH
	1302/8637-07	Guilford	6.7	06/05/2007	16:25	Rain	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	N	SH
	VT0130200/08BB01289	Guilford	6.74	02/20/2008	22:55	Cloudy	Failure to keep in proper lane, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0	S	SH
	1302/6000-07	Brattleboro	0	03/12/2007	11:30	Clear	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	0	0	S	SH
	1302/11892-07	Brattleboro	0.02	09/08/2007	16:37	Cloudy	No improper driving, Failure to keep in proper lane	Opp Direction Sideswipe	1	0	N	SH
	VT0130200/11BB06757	Brattleboro	0.05	08/30/2011	09:04	Clear	Other improper action	Other - Explain in Narrative	0	0	S	SH
	VT0130200/08BB07964	Brattleboro	0.11	10/03/2008	13:14	Cloudy	Made an improper turn, Inattention	Same Direction Sideswipe	0	0	W	SH
	VT0130200/11BB04670	Brattleboro	0.2	06/24/2011	13:00				0	0		SH
	VT0130200/08BB00988	Brattleboro	0.35	02/09/2008	18:39	Snow	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Driving too fast for conditions	Single Vehicle Crash	1	0	S	SH
	VT0130200/09BB08068	Brattleboro	0.46	09/28/2009	07:59		Failure to keep in proper lane, Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	0	0	N	SH
	VT0130200/11BB08350	Brattleboro	0.48	10/29/2011	00:28	Clear	Under the influence of medication/drugs/alcohol, Failure to keep in proper lane	Single Vehicle Crash	1	0	N	SH
	VT0130200/11BB02561	Brattleboro	0.55	04/10/2011	18:26	Clear	Fatigued, asleep, Failure to keep in proper lane	Single Vehicle Crash	0	0	N	SH
	VT0130200/10BB01312	Brattleboro	0.59	02/21/2010	13:40	Clear	Visibility obstructed, No improper driving	Left Turns, Same Direction, Rear End v--v--	1	0	N	SH
	VT0130200/10BB04428	Brattleboro	0.7	06/17/2010	09:48	Cloudy	No improper driving	Other - Explain in Narrative	1	0	N	SH
	1302/9400-07	Brattleboro	0.73	06/15/2007	21:50	Clear	Unknown	Same Direction Sideswipe	0	0	S	SH
	VT0130200/09BB04655	Brattleboro	0.75	06/11/2009	02:47	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	0	0		SH
	VT0130200/11BB09530	Brattleboro	0.81	12/16/2011	17:14	Clear	Inattention	Rear End	0	0	N	SH
	VT0130200/11BB04103	Brattleboro	0.92	06/03/2011	16:45				0	0	N	SH
	VT0130200/11BB09248	Brattleboro	0.92	12/05/2011	18:24	Cloudy	No improper driving, Inattention	Rear End	0	0	S	SH
	VT0130200/10BB03539	Brattleboro	0.94	05/16/2010	07:41	Cloudy	Inattention, No improper driving	Same Direction Sideswipe	0	0	S	SH
	VT0130200/08BB08290	Brattleboro	0.96	10/16/2008	11:53		Inattention	Rear End	0	0	N	SH
	VT0130200/11BB05052	Brattleboro	0.96	07/06/2011	15:30				0	0	N	SH
	VT0130200/10BB08561	Brattleboro	0.98	11/11/2010	09:18	Clear			0	0	N	SH
	VT0130200/11BB01265	Brattleboro	0.98	02/18/2011	14:59	Clear	Failure to keep in proper lane, Inattention	Same Direction Sideswipe	0	0	E	SH
	VT0130200/08BB104	Brattleboro	1	01/04/2008	03:05	Clear	No improper driving, Failed to yield right of way, Visibility obstructed	Left Turn and Thru, Same Direction Sideswipe/Angle Crash vv--	0	0	S	SH

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

From:	Matt Mann
To:	Fillbach, Tim; mmann@windhamregional.org; Langham, Matthew
Cc:	Williams, Chris
Subject:	RE: Guilford BF 0113(68) - Traffic Calming Process
Date:	Tuesday, July 09, 2013 4:37:37 PM
Attachments:	GUILFORD_ROUTE5_speed.pdf

Hi Tim:

Attached is the most recent traffic study we did, north of this bridge, about .5mi. We are putting another counter out, south of this bridge on US5. I'll forward this study when the data is processed. The recent opening of the Guilford Country Store and the new development of 15 apartment units, all within a stones' throw of this bridge has put traffic calming solutions on the radar of the Selectboard. Aside from the continued functionality and safety of this bridge, the Town and WRC supports safe pedestrian movement over this bridge, via the inclusion of a sidewalk on the west side of the bridge. This sidewalk would connect to the existing sidewalk, General Store, Garage, Fire Station and would provide safe access to pedestrians traveling to their homes, just south of the bridge.

As this bridge is the gateway into the densely settled part of Algiers, this bridge should be as much about moving vehicles and pedestrians safely across Broad Brook as about acting as a traffic calming device, alerting drivers to the change in land use and the increase in pedestrian movement.

Matt

****

Matt Mann
Senior Transportation Planner
Windham Regional Commission
139 Main St., Suite 505
Brattleboro, VT 05301
phone - 802.257.4547, ext. 120
fax - 802.254.6383

WRC has a new website! Visit http://www.windhamregional.org

The WINDHAM REGIONAL PLAN Update

2014

Share Your Vision!

Windham Regional Planning Commission

Calvin Coolidge Highway, Route 5
Mon June 24th - Mon July 1st, 2013
Paved 35 mph
A tube closest to Guilford Center

139 Main St, Suite 505
Brattleboro, Vt 05301
(802) 257 4547
Fax: (802) 254 6383
http://windhamregional.org

Site Code: Guil0113
Station ID: Guilford
between Pauls Rd and Patridge Rd
approx. 1/8 mile North of Patridge Rd

Southbound

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
07/01/13	0	0	0	0	0	1	4	2	2	0	0	0	0	0	9
01:00	0	1	0	0	0	3	2	0	0	1	0	0	0	0	7
02:00	0	0	0	0	0	2	1	1	0	0	0	0	0	0	4
03:00	0	0	0	1	0	1	0	0	0	0	0	0	0	0	2
04:00	0	0	0	0	0	1	0	2	2	0	0	0	0	0	5
05:00	0	0	0	0	0	2	7	7	2	3	0	0	0	0	21
06:00	2	0	0	0	0	1	21	9	13	3	0	0	0	0	49
07:00	0	0	0	0	5	8	23	25	10	1	0	0	0	0	72
08:00	1	0	0	0	1	15	35	40	19	4	0	1	0	0	116
09:00	4	0	0	0	4	18	45	41	15	1	0	0	0	0	128
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
12 PM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
14:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
15:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
16:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
17:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
20:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
21:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
22:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
23:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	7	1	0	1	10	52	138	127	63	13	0	1	0	0	413

Daily Stats

15th Percentile : 38 MPH
50th Percentile : 44 MPH
85th Percentile : 51 MPH
95th Percentile : 54 MPH

Mean Speed(Average) : 45 MPH
10 MPH Pace Speed : 41-50 MPH
Percent in Pace : 58.8%

Total	340	4	4	24	383	2801	7014	5732	1972	403	73	10	4	6	18770

Week Stats

15th Percentile : 38 MPH
50th Percentile : 44 MPH
85th Percentile : 50 MPH
95th Percentile : 53 MPH

Mean Speed(Average) : 44 MPH
10 MPH Pace Speed : 40-49 MPH
Percent in Pace : 62.2%

ADT ADT 4,701 AADT 4,701

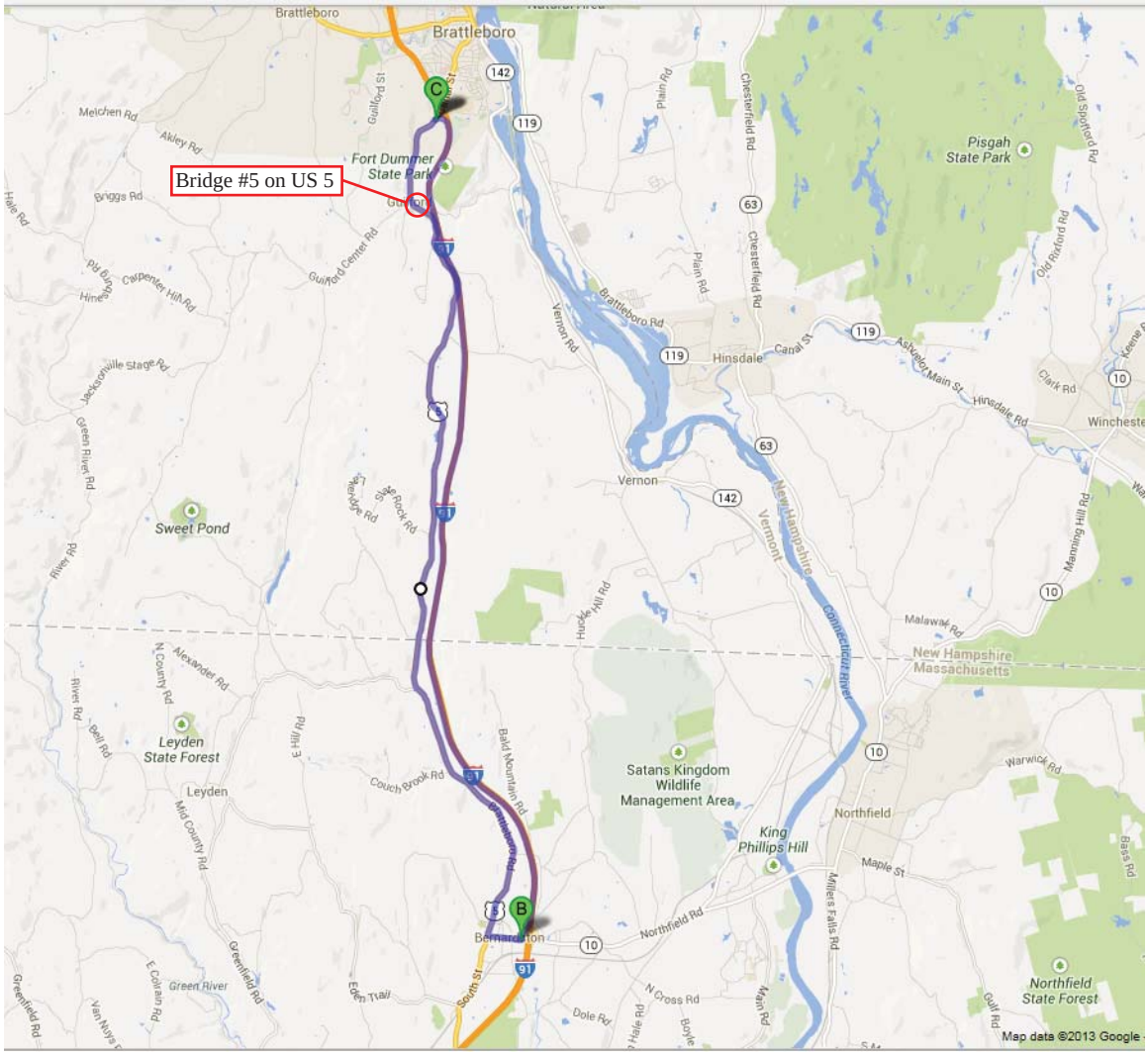
ALGIERS TRIANGLE MASTER PLAN

FOR:
FRIENDS OF ALGIERS VILLAGE
638 COOLIDGE HIGHWAY, GUILFORD, VT 05301
AND
BRATTLEBORO AREA COMMUNITY LAND TRUST
192 CANAL STREET, BRATTLEBORO, VT 05301:

SEPTEMBER 2006

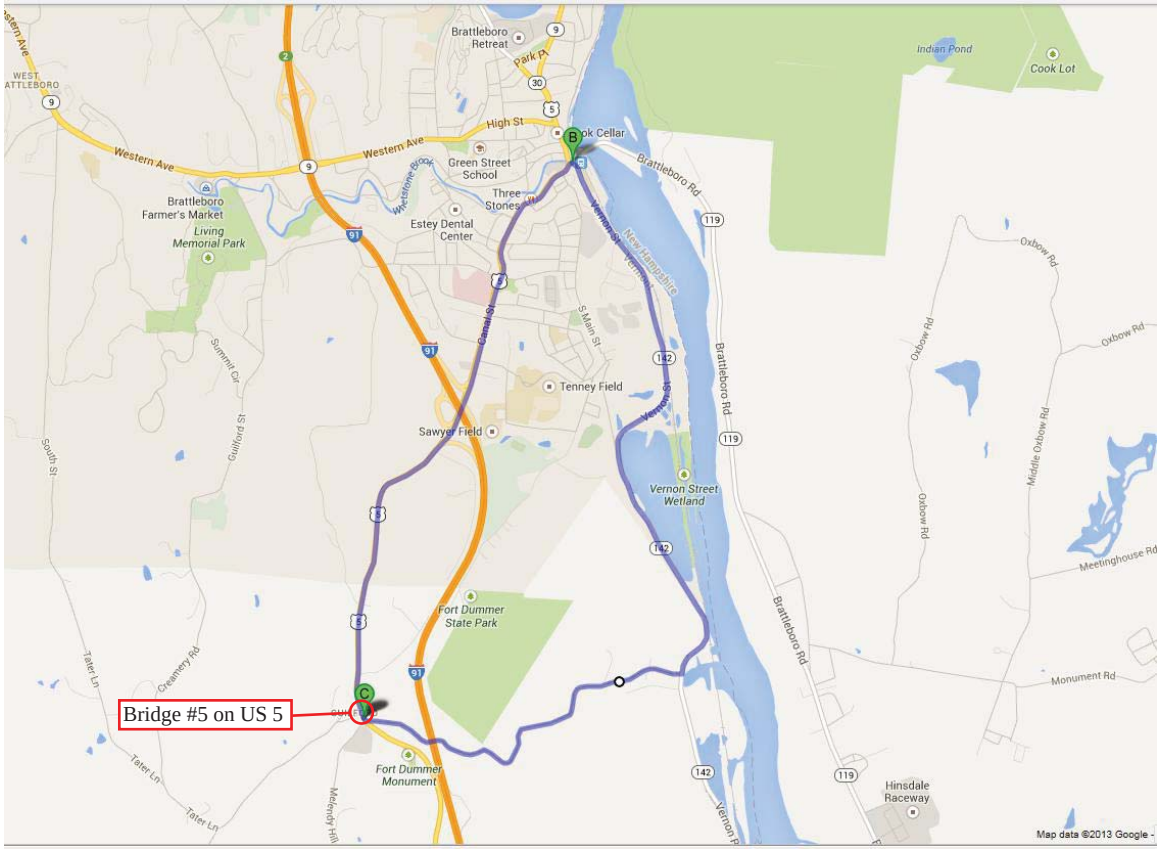
DWELLING UNITS:	20-25
COMMERCIAL SQUARE FEET	8800SF
OFF STREET PARKING SPACES	35
ON STREET PARKING SPACES	13

STEVENS & ASSOCIATES, P.C.
Consulting in the Design & Development of Livable Communities
ENGINEERS LANDSCAPE ARCHITECTS PLANNERS



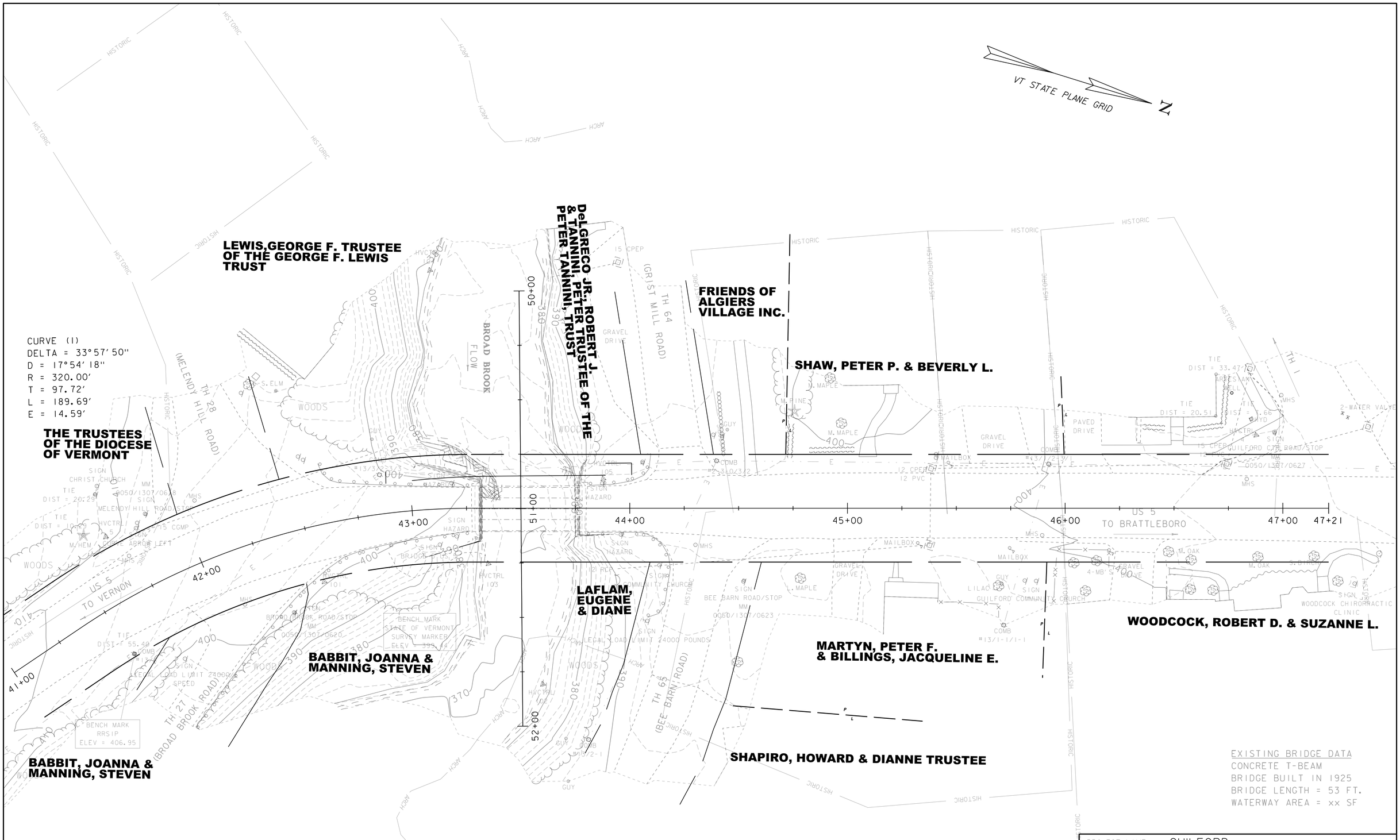
Detour Route – US 5 to I-91 at Exit 1 to MA 10 at Exit 28 in Massachusetts to US 5

B to C on Through Route: 12.4 Miles (about 16 minutes)
B to C on Detour Route: 12.4 Miles (about 11 minutes)
Added Miles: 0 Miles
End to End Distance: 24.8 Miles



<u>Local Bypass Route</u> – US 5 to Broad Brook Rd to Vernon St to Bridge St to US 5

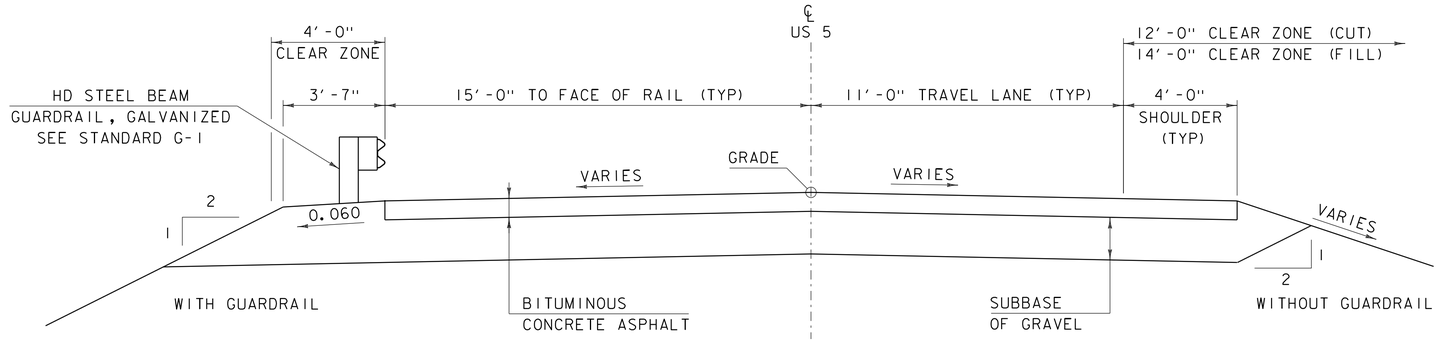
B to C on Through Route: 2.7 Miles (about 5 minutes)
B to C on Detour Route: 4.2 Miles (about 11 minutes)
Added Miles: 1.5 Miles (about 6 minutes)
End to End Distance: 6.9 Miles



EXISTING CONDTIONS

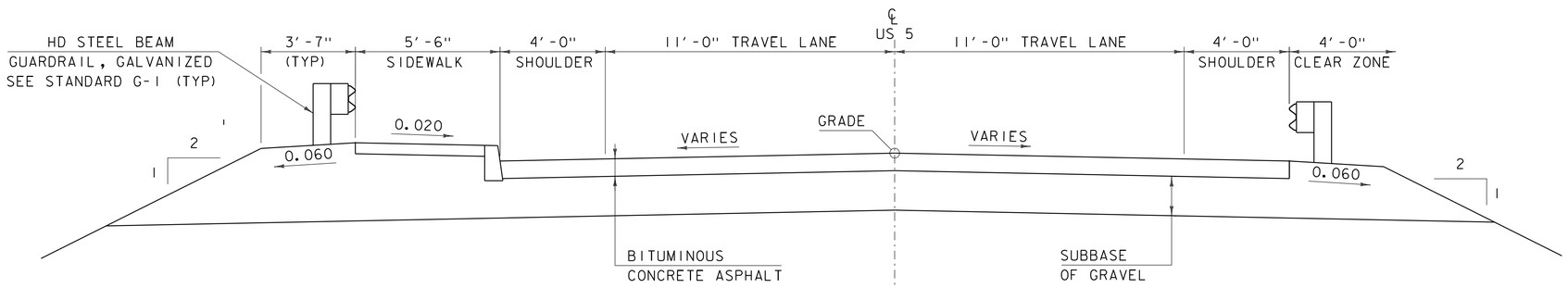
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: GUILFORD	
PROJECT NUMBER: BF 0113(68)	
FILE NAME: Structures/13c064bdr.dgn	PLOT DATE: 10-SEP-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
EXISTING CONDITIONS	SHEET 1 OF 12



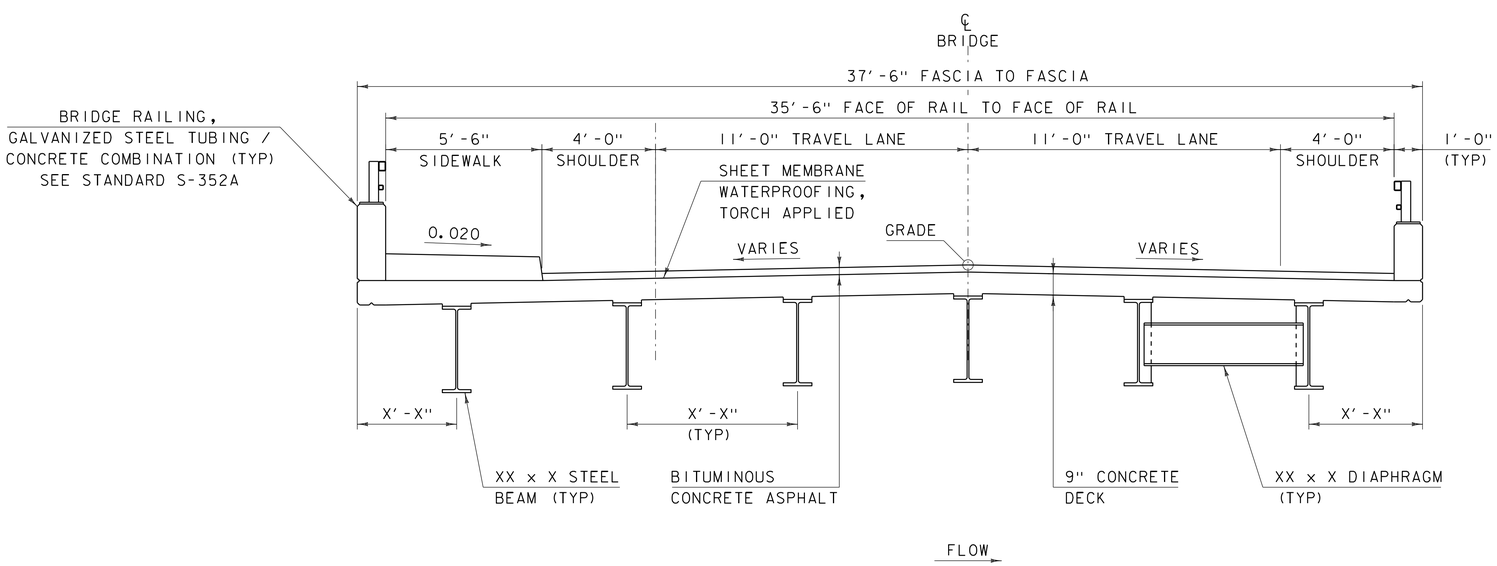
PROPOSED US 5 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED US 5 STA 11+50 - 13+25 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

(IF USED ON PROJECT)

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

PROJECT NAME: GUILFORD
PROJECT NUMBER: BF 0114(68)

FILE NAME: 13c064/sl3c064typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ----------
TYPICAL SECTIONS

PLOT DATE: 10-SEP-2013
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 2 OF 12

VT STATE PLANE GRID

N

BEGIN PROJECT
STA 11+50.00

END PROJECT
STA 13+00.00

POE
STA 15+15.45

CURVE (1)
DELTA = 38° 18' 36"
D = 15° 16' 44"
R = 375.00'
T = 130.26'
L = 250.74'
E = 21.98'

PI STA 11+16.04

CONCEPTUAL IMPACTS

BEGIN APPROACH
STA 10+00.00

BEGIN BRIDGE
STA 12+00.00

END BRIDGE
STA 12+90.00

END APPROACH
STA 14+50.00

PT STA 12+36.52

PC STA 9+85.78

N 56° 05' 32.99" W

N 72° 13' 03" E

N 17° 46' 57.41" W

8+00 10+00 11+00 12+00 13+00 14+00 15+00 15+15 50+00 51+00 52+00

TO VERNON

US 5 TO BRATTLEBORO

TH 28 (MELENDY HILL ROAD)

TH 27 (BROAD BROOK ROAD)

TH 64 (GRIST MILL ROAD)

TH 65 (BEE BARN ROAD)

BROAD BROOK FLOW

WOODS

GRAVEL DRIVE

PAVED DRIVE

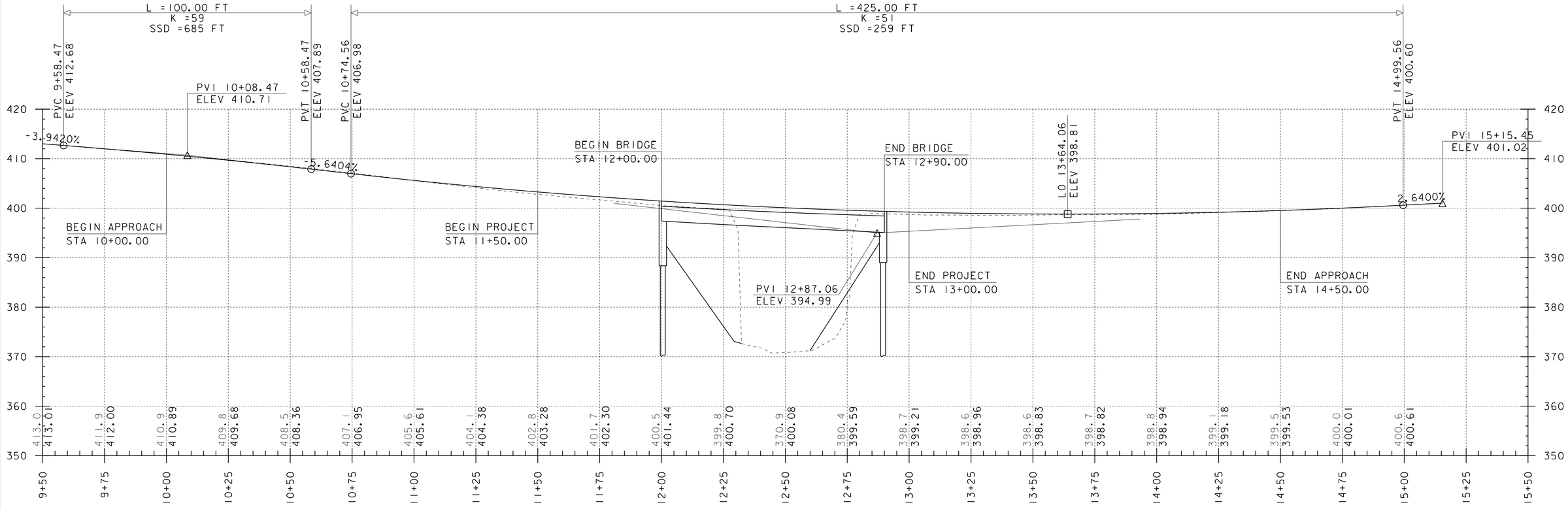
BENCH MARK STATE OF VERMONT SURVEY MARKER ELEV = 399.44

BENCH MARK RRSIP ELEV = 406.95

LAYOUT SHEET

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

PROJECT NAME: GUILFORD	
PROJECT NUMBER: BF 0113(68)	
FILE NAME: Structures/13c064bdr.dgn	PLOT DATE: 10-SEP-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: L.J.STONE	CHECKED BY: ------
LAYOUT SHEET	SHEET 3 OF 12



US 5 PROFILE

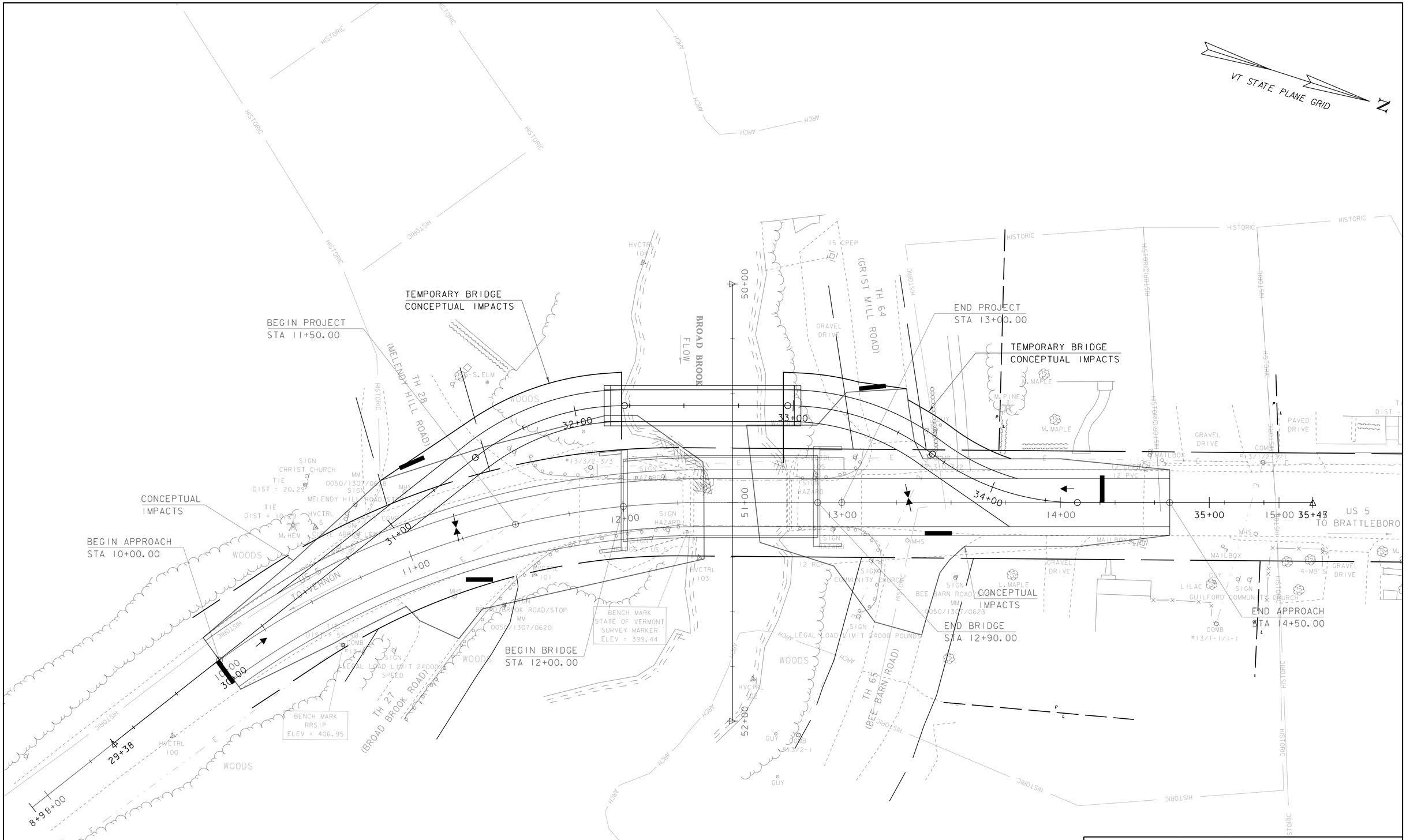
SCALE: HORIZONTAL 1"=20'
VERTICAL 1"=10'

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: GUILFORD	
PROJECT NUMBER: BF 0113(68)	
FILE NAME: Structures/13c064pro.dgn	PLOT DATE: 10-SEP-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: T.FILLBACH	CHECKED BY: ------
PROFILE SHEET	SHEET 4 OF 12



TEMPORARY BRIDGE LAYOUT

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

NOTE: TEMPORARY BRIDGE APPROACHES ARE DESIGNED TO MEET A 20 MPH DESIGN SPEED (DOWN FROM A POSTED 35 MPH) WITH BANKING OF 7.5%.

PROJECT NAME: GUILFORD	
PROJECT NUMBER: BF 0113(68)	
FILE NAME: Structures/13c064tempbridge.dgn	PLOT DATE: 10-SEP-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
TEMPORARY BRIDGE LAYOUT SHEET	SHEET 5 OF 12