STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Clarendon BRO 1443(48)

Bridge 11 on Walker Mountain Road (TH 3)
Over the Clarendon River

August 9, 2012

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I. Site Information

The bridge is located on Walker Mountain Road approximately 1 mile east of the intersection of VT 133 and Walker Mountain Road. There are private drives intersecting Walker Mountain Road within 150 ft of all four corners 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 Minor Collector
Existing Structure	30' Concrete T-Beam Bridge

Traffic

Traffic Data	2015	2035	2055
AADT	700	750	~
DHV	100	110	~
ADTT	40	50	~
%T	5.3	6.1	~
%D	54	54	~
Flexible ESAL	~	2015 ~ 2035 188,000	2015 ~ 2055 407,000

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997[1].

Design Criteria	Source	Existing Condition	Minimum Standard[2]	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	9'/2' (22')	9'/2' (22')	
Bridge Lane and Shoulder Widths	VSS Table 5.3	9'/1' (20')	9'/2' (22')	Substandard
Clear Zone Distance	VSS Table 5.5		12' fill / 10' cut	
Banking	VSS 5.13		8% (max)	
Speed		35 mph (Posted)	35 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10	R=6500'	Normal crown	
Vertical Grade	VSS Table 5.6	2%	9% (max) for rolling terrain	
Vertical Clearance Issues	VSS Section 5.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	438'	225'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	1' Paved Shoulder	2' Paved Shoulder	Substandard
Bridge Railing	Structures Policy	Decorative Concrete Rail	TL-2	Unknown capacity

[1] http://www.aot.state.vt.us/progdev/standards/05collect.htm

[2] Minimum Standards are based on a design speed of 35 mph and an ADT of 750.

Inspection Report

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

Inspection Summary

06/14/10 Fair to poor condition due to deck deterioration and breaking down of the t-beams, deep scour runs in front of each abutment and structure should be monitored during high water events. Structure should have extensive rehab or full replacement in near future. ~ MJK/FRE

Hydraulics

From preliminary hydraulics report: "If the proposed bridge is to meet hydraulic standards, it will need to be larger to provide 1' of freeboard at Q25. A bridge with a 70' clear span with an average low beam elevation of 644.1' will provide 1.0' of freeboard at Q25. Water can still overtop the roadway at elevation 643.0', but it is considerably less than with the existing bridge."

Utilities

There are overhead utilities passing over the western wingwalls of the bridge. This information has been plotted on the Layout Sheet.

Right Of Way

The existing Right of Way on Walker Mountain Road is listed as 3 rods on the town tax map in the vicinity of the bridge. This information has been plotted on the Layout Sheet.

Environmental Resources

The environmental resources present at this project are shown on the Layout Sheet.

Agricultural:

None identified.

Archaeological:

There are no archaeological resources present in the APE, and likewise no concerns for archaeology.

Wetlands:

Wetlands were identified on all corners of the bridge except the NW quadrant.

Hazardous Materials:

"Not Applicable: There is an SMAC Site further south on Walker Mountain Road (Site # 20093941), north of the Walker/Teer intersection."

Historic:

"Bridge 11 is a historic concrete 1927 bridge and it is located in the viewshed of the Clarendon Springs Historic District. It also serves as a gateway to the district."

Rare, Threatened and Endangered Species

None identified.

Stormwater:

There are no noteworthy stormwater related concerns for the subject project at this stage.

II. Maintenance of Traffic

The Vermont Agency of Transportation is in the process of finalizing an Accelerated Bridge Program, which focuses on faster delivery of construction plans, permitting, and Right of Way, as well as faster construction of projects in the field. One practice that will help in this endeavor is closing bridges for the duration 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: Road Closure (Off-Project Detour)

This option entails utilizing accelerated construction materials and methods to reduce the length of construction to one construction season and reduce the length of time that the road is closed to a 4 week period. Based on input from the Town, the optimal time for a 4 week closure period would be between the middle of June and the end of August. An official detour would be determined by the Town, who would also be responsible for installing, maintaining and paying for all necessary signing and traffic control. One possible detour route would send Walker Mountain Road traffic to VT 133 to US 4 to US 7 to Middle Road and back to Walker Mountain Road for an end to end distance of 18 miles. Several local roads could be affected by increases in local traffic, including Teer Road, Schoolhouse Hill Road and Quarterline Road.

Option 2: Temporary Bridge

For the speed, sight distance and traffic volumes found at this site, a one-lane temporary bridge without traffic signals would be adequate for this location. There would be insufficient benefit for the additional costs and environmental impacts of a two-lane temporary bridge or the installation of traffic signals, so those options will not be considered further in this report.

Brush and trees would have to be cleared, wetlands impacted and Right of Way purchased for a temporary bridge on either side of the existing structure. On a relatively straight alignment there is only a slight advantage to placing a temporary bridge on the outside of the curve. However, the location of the overhead utilities on the inside of the curve at this site suggests that the best location for a temporary bridge would be on the northeast side of this structure. Thus, any further discussion of a temporary bridge will assume a one-lane structure on the northeast side of Walker Mountain Road.

Option 3: Maintain Traffic on Existing Alignment and Building on a New Alignment

The existing horizontal alignment is relatively straight in this location, and building a new structure off-alignment would not improve the alignment in this location. Any new alignment would adversely impact the wetlands surrounding the existing bridge and would require the acquisition of permanent Right of Way for one or more adjacent property owners. In addition, shifting the horizontal alignment would increase the design and construction costs by requiring additional earth and road construction. This option presents no advantages over a temporary bridge at this location and will not be considered further in this report.

Option 4: Phased Construction

Another method of keeping the road open during construction with minimal impact to the wetlands and adjacent property owners is to build the new structure one lane at a time, or in phases. In general this would work, but because the existing structure is so narrow and any proposed structure would not be sufficiently wider, replacing or rehabilitating the center portion of the bridge would still require a shifted horizontal alignment, additional expenses for a partial width temporary bridge or short duration road closures.

While the time required to develop a phased construction project would remain the same, the time required to complete a phased construction project increases because some of the construction tasks have to be performed multiple times. In addition to the increased design and construction costs mentioned above, the costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space. Since phased construction would result in a longer, more expensive, and less safe construction project, it will not be considered further.

III. Alternatives Discussion

Geometrically, there is very little wrong with the existing structure. The horizontal and vertical alignment meet standards and this site has not been identified as a high crash location. The only substandard geometric consideration is the shoulders, which are one foot too narrow. However, structurally the 85 year old superstructure is in poor condition and needs to be extensively repaired or replaced in the near future. Other existing deficiencies include the insufficient length and stiffness of the bridge approach railing and the hydraulically inadequate waterway opening, which is also evident from the visible scour occurring in the channel.

Substructure Considerations

Structurally, the abutments are in decent condition. They have minor spalling throughout, a separation crack between the north abutment and the upstream wingwall and the end of the northwest wingwall requires patching. These issues could be left in their current condition to continue deteriorating. Or, a preferable option, would be to perform surficial concrete repair on the identified problems to slow the deterioration of the structure. These deficiencies, by themselves, would be insufficient to consider complete substructure replacement.

However, this is complicated by the hydraulic inadequacy of the existing abutment. A 25 year storm event should raise the elevation of the Clarendon River enough to hit the T-beams. The hydraulic pressure created by this scenario would be sufficient to cause scour at the toe of the abutment. Scour in addition to that already visible at this location could cause the abutments to be undermined and fail. The latest inspection report indicates that this structure should be monitored during high water events.

The following are three options available to deal with the substructure deficiencies.

Do Nothing – Create or update the Scour Plan of Action (POA)

This option would require no structural rehabilitation. One of various scour monitoring systems could be installed or other acceptable action steps could be taken to close the bridge during high probability scour events. After an event, the bridge could be re-opened to traffic if the structure is stable. If the structure fails during a storm event, the bridge could be replaced at that time.

POA with Minor Concrete Repair

Any option that does not eliminate the potential for collapse due to scour requires a Scour Plan of Action, as mentioned above. However, this option acknowledges that this structure survived Thunderstorm Irene and all other storm events since 1927 without failing and may last another 25+ years without succumbing to a scour failure. Unfortunately, the substructure will fail structurally within the next 25 years if the concrete repairs mentioned previously are not performed; thus this option would incorporate those repairs, in addition to the POA.

Complete replacement

This option would create a new substructure with a 70 foot span providing an adequate hydraulic opening. The foundation would be designed to withstand large storm events with the cumulative effects of scour; thus no monitoring or POA would be required. This is the only option that would rectify all of the substructure and hydraulic deficiencies.

Superstructure Considerations

Both deck fascias have cracked and spalled concrete. Large portions of the deck between the beams are showing signs of deterioration, with spalls, cracks and remnants of leakage throughout. While the T beams are in a better condition than the deck, they are still rated as in poor condition and every beam is showing signs of leakage, chloride or silica reactivity, cracking and deterioration.

The following options could be considered to address the superstructure deficiencies.

Do Nothing

Given the current state of deterioration, some work should be done on the superstructure in the next 5 to 10 years to prevent a deck failure from occurring. Deck failures occur suddenly and without warning and create an unsafe condition for the travelling public. Thus, doing nothing is not a feasible option for this bridge.

Superstructure Rehabilitation

For this option, all of the cracked, spalled and deteriorated concrete would be removed; the reinforcing steel would be ground to remove corrosion or replaced; and new concrete would be installed. While this would address the immediate concerns, it would not address the substandard bridge width.

Superstructure Replacement

This option would completely replace the existing superstructure with a new simple span bridge designed to last 80 years. A new superstructure could meet the standard width requirements and include new crash-tested bridge and approach rail suitable for this location. This is the only option that would rectify all of the superstructure deficiencies.

Alternative Combinations

Several of the combinations of the three substructure treatments and two remaining superstructure treatments can be further ruled out. It does not make sense to place a completely new superstructure on a scour susceptible substructure which has not been rehabilitated. It is impossible to rehabilitate the existing superstructure on a new substructure with a wider waterway opening.

Do Nothing

This alternative includes verifying that the Scour Plan of Action is up-to-date and doing no other work on the bridge.

All of the following alternatives can be constructed with a short term road closure or with the construction of a temporary bridge. Both of these options for each alternative will be considered below.

POA with Superstructure Rehabilitation

This alternative includes verifying that the Scour Plan of Action is up-to-date to address the substructure concerns and patching the deck and T beams to address the superstructure issues.

POA with Substructure and Superstructure Rehabilitation

This alternative also includes verifying that the Scour Plan of Action is up-to-date and performing minor concrete repair to address the substructure concerns and patching the deck and T beams to address the superstructure issues.

POA with Substructure Repair and Superstructure Replacement

This alternative also includes verifying that the Scour Plan of Action is up-to-date and performing minor concrete repair to address the substructure concerns with the addition of a new wider superstructure meeting the structural and geometric criteria for this site.

Complete Bridge Replacement

This alternative includes a new substructure with a 70 foot span providing an adequate hydraulic opening to address the substructure concerns and a new wider superstructure to address the superstructure issues.

IV. Alternatives Summary

The following table lists the remaining alternatives still under consideration.

Clarendon BRO 1443(48)		Alt 1	Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4A	Alt 4B	Alt 5A	Alt 5B
			POA w/ Super Rehab		POA w/ Sub & Super Rehab		POA w/ Sub Rehab & Super Replace		Complete Replacement	
		Do Nothing	Road Closure	Temp Bridge	Road Closure	Temp Bridge	Road Closure	Temp Bridge	Road Closure	Temp Bridge
COST	Superstructure Costs	$0	$50,000	$50,000	$50,000	$50,000	$100,000	$100,000	$225,000	$225,000
	Substructure Costs	$0	$0	$0	$125,000	$125,000	$125,000	$125,000	$200,000	$200,000
	Removal of Structure	$0	$0	$0	$0	$0	$20,000	$20,000	$50,000	$50,000
	Roadway	$0	$40,000	$40,000	$50,000	$50,000	$50,000	$50,000	$150,000	$150,000
	Temporary Bridge	$0	$0	$150,000	$0	$150,000	$0	$150,000	$0	$150,000
	Construction Costs	$0	$90,000	$240,000	$225,000	$375,000	$295,000	$445,000	$625,000	$775,000
	Construction Engineering & Contingencies	$0	$27,000	$72,000	$67,500	$112,500	$88,500	$133,500	$187,500	$232,500
	Total Construction Costs w/ CEC	$0	$117,000	$312,000	$292,500	$487,500	$383,500	$578,500	$812,500	$1,007,500
	Scour Plan of Action	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$0	$0
	Preliminary Engineering	$0	$22,500	$60,000	$56,250	$93,750	$73,750	$111,250	$156,250	$193,750
	Right of Way	$0	$0	$50,000	$25,000	$50,000	$25,000	$50,000	$25,000	$50,000
	Total Costs	$50,000	$189,500	$472,000	$423,750	$681,250	$532,250	$789,750	$993,750	$1,251,250
	Local Share	$1,250	$4,738	$23,600	$10,594	$34,063	$13,306	$39,488	$49,688	$125,125
ENGINEERING	Typical Section - Roadway (feet)	22'	22'	22'	22'	22'	22'	22'	22'	22'
	Typical Section - Bridge (feet)	1-9-9-1	1-9-9-1	1-9-9-1	1-9-9-1	1-9-9-1	2-9-9-2	2-9-9-2	2-9-9-2	2-9-9-2
	Traffic Safety	No Change	No Change	No Change	No Change	No Change	Improvement	Improvement	Improvement	Improvement
	Alignment Change	No	No	No	No	No	No	No	No	No
	Bicycle Access	No	No	No	No	No	Yes	Yes	Yes	Yes
	Hydraulic Opening	Substandard	Substandard	Substandard	Substandard	Substandard	Adequate	Adequate	Adequate	Adequate
	Pedestrian Access	No	No	No	No	No	None required	None required	None required	None required
	Utility	No Change	No Change	No Change	No Change	No Change	No Change	No Change	Relocation	Relocation
SCHEDULING	Project Development Duration	1/2 year	1 year	4 years	3 years[3]	4 years	3 years[3]	4 years	3 years[3]	4 years
	Construction Duration	0 months	3 months	6 months	3 months	6 months	3 months	6 months	3 months	15 months
	Mobility Impact Duration	0 weeks	1 week	4 weeks	1 week	8 weeks	1 week	8 weeks	4 weeks	36 weeks
OTHER	ROW Acquisition	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	Yes	No	Yes	No	Yes	No	Yes	No
	Design Life	5-10 years	15 years	15 years	20 years	20 years	30 years	30 years	80 years	80 years
	Annualized Cost (Total Cost/Design Life)	$5,000	$12,633	$31,467	$21,188	$34,063	$17,742	$26,325	$12,422	$15,641

[3] The project would be entered into the Accelerated Bridge Program (ABP) with the stated goal of completing the Project Development process in 2 years.

V. Conclusion

Alternative 5A, completely replacing the existing bridge with a 22 foot wide travel way and 70 foot long span founded on piles during a 4 week closure is the recommended alternative. It rectifies all of the known deficiencies and provides the lowest annualized cost other than doing nothing.

VI. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Geotechnical Report
- Natural Resources Memo
- Archeology Memo
- Historic Memo
- Plans
    - Proposed
        - Typical Sections
        - Layout
        - Profile
    - Temporary Bridge
        - Layout
        - Profile

Looking South along TH3 (Walker Mountain Road)

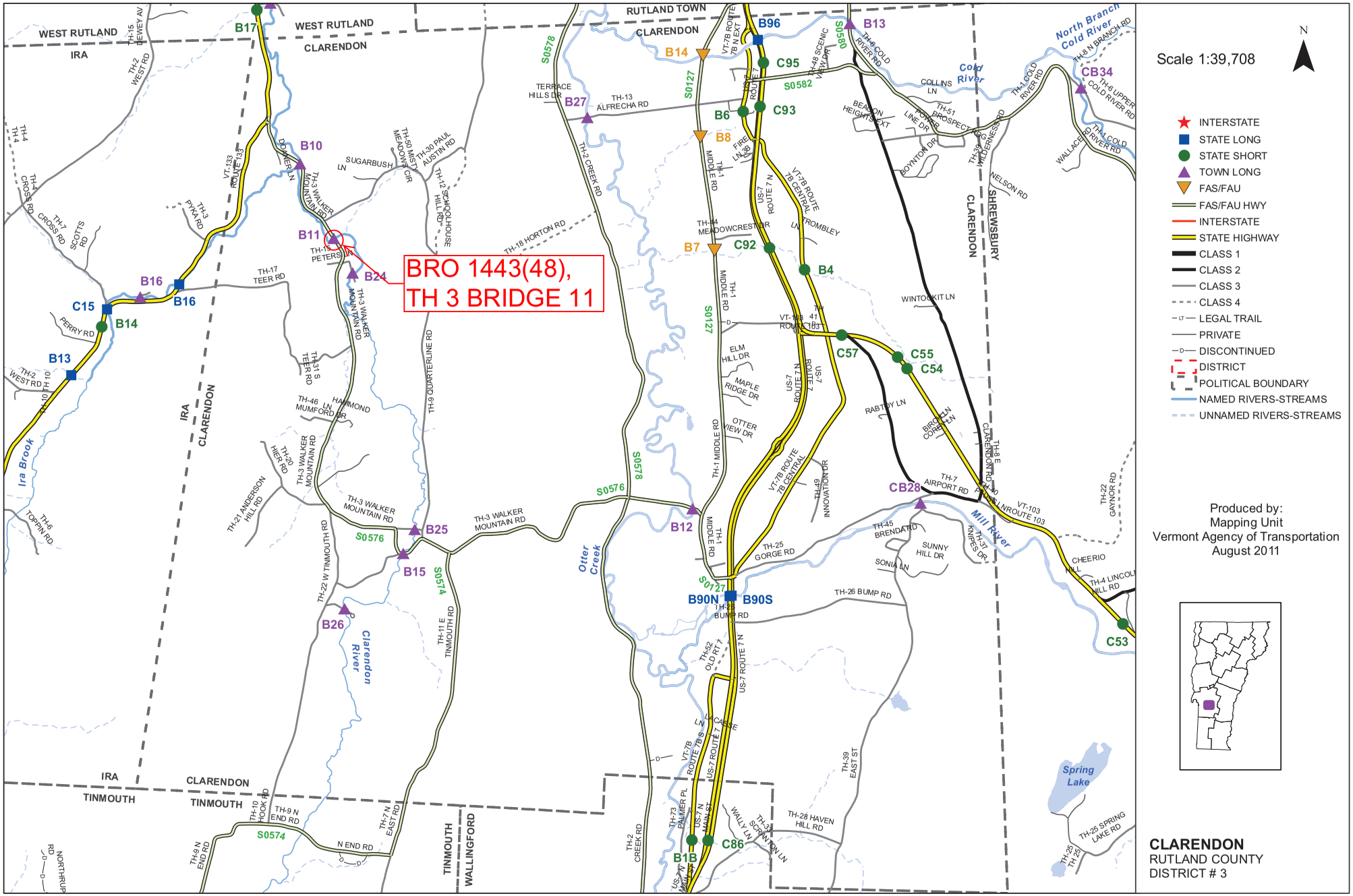
Typical fascia degradation

Separation of wing wall from abutment and typical degradation of abutment.

End of wing wall and typical degradation of abutment.

Typical degradation of concrete deck

Typical degradation concrete T beams


BRO 1443(48),
TH 3 BRIDGE 11
Scale 1:39,708
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
CLARENDON
RUTLAND COUNTY
DISTRICT # 3
WEST RUTLAND
IRA
CLARENDON
RUTLAND TOWN
SHREWSBURY
TINMOUTH
WALLINGFORD
Ira Brook
Otter Creek
Clarendon River
Cold River
North Branch Cold River
Mill River
Spring Lake
B17
B10
B11
B24
B16
C15
B14
B13
B27
B6
B8
B7
B96
C95
C93
C92
B4
C57
C55
C54
CB34
CB28
C53
B12
B25
B15
B26
B90N
B90S
B1B
C86

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for CLARENDON **bridge no.:** 00011 **District:** 3

Located on: C2003 **over** CLARENDON RIVER **approximately** 0.15 MI TO JCT W C3 TH1 **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: 101105001111051

Federal Sufficiency Rating: 45.7

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1927 **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): 06

ADT: 001000 **% Truck ADT:** 03

Year of ADT: 2008

GEOMETRIC DATA

Length of Maximum Span (ft): 0029

Structure Length (ft): 000031

Lt Curb/Sidewalk Width (ft): 0.2

Rt Curb/Sidewalk Width (ft): 0.2

Bridge Rdwy Width Curb-to-Curb (ft): 20.2

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

Appr. Roadway Width (ft): 022

Skew: 00

Bridge Median: 0 NO MEDIAN

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

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: CONCRETE T-BEAM

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

Kind of Material and/or Design: 1 CONCRETE

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA

Deck Geometry: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

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: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

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: 0 OTHER OR UNKNOWN

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 062010 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

06/14/10 Fair to poor condition due to deck deterioration and breaking down of the t-beams, deep scour runs in front of each abutment and structure should be monitored during high water events. Structure should have extensive rehab or full replacement in near future. ~ MJK/FRE

09/03/2008 The overall condition of this bridge is becoming poor due to continuous deterioration of the concrete deck soffit area and T-beams. The channel is degradating heavily which threatens and increases the future potential for undermining under both abutments. This bridge should be monitored after high water or flooding conditions. PLB

08/03/2006 The overall condition of this bridge is becoming poor due to the continuous deterioration of the concrete deck soffit and T-beams. The channel is degradating heavily which threatens and increases the potential for undermining under both abutments. This bridge should be monitored after high water or flooding conditions. PLB

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

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

DATE: 22 May 2012

SUBJECT: Clarendon BRO 1443(48) - TH 3 Bridge 11 over Clarendon 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 existing bridge was originally constructed in 1927 based on available information. The bridge is a single span concrete t-beam bridge having an approximate clear span of 26' and an approximate clear height of 9.5'. The abutments are concrete. The river flows almost straight through the bridge. The bridge constricts the channel and there is deep scour along the abutments.

Water is into the beams at Q25. Therefore, the existing bridge is not hydraulically adequate. There is some scour through the bridge.

Recommendations

Based on initial discussions with the Structures Group, it was determined that the proposed bridge will stay on this alignment – both horizontal, as well as, vertical. New abutments should be better aligned with the channel. If integral abutments are used here, they should not have to be skewed more than 20 degrees to better align with the channel.

If the proposed bridge is to meet hydraulic standards, it will need to be larger to provide 1' of freeboard at Q25. A bridge with a 70' clear span with an average low beam elevation of 644.1' will provide 1.0' of freeboard at Q25. Water can still overtop the roadway at elevation 643.0', but it is considerably less than with the existing bridge.

Footings for this bridge should be placed approximately 8' below channel bottom, or to ledge, to prevent undermining. If integral abutments are used, plies should be designed to be freestanding to 8' below channel bottom.

Stone fill type III should be used on this project. Stone fill placed in front of the abutments should match into the upstream and downstream channel banks and should not constrict the channel.

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

Temporary Bridge

No temporary bridge should be needed as structures indicated the road can be closed during construction and traffic detoured around the site.

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

M:\Projects\12j160\Hydraulics\Clarendon BRO 1443(48) prel hyd memo.docx

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

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

LAR CCB

From: Laura Ripley, Geotechnical Intern, via Christopher C. Benda P. E., Soils and Foundations Engineer

Date: June 21, 2012

Subject: Clarendon BRO 1443(48) TH 3 Bridge No. 11 Preliminary Geotechnical Information

1.0 INTRODUCTION

The Soils and Foundations Unit within the Materials and Research Section has performed a preliminary geotechnical investigation for Bridge No. 11, located on TH 3 in the town of Clarendon, VT. This structure is located about 1.0 mile south of the junction with VT 133. This report includes a review of available historical subsurface data and field observations made during a recent site visit. The materials referenced in this investigation include: VTrans boring files and record plans, Agency of Natural Resources (ANR) water well logs, ANR Environmental Interest Locator, USDA Natural Resources Conservation soil survey records and USGS bedrock and Vermont Geological Survey surficial geologic maps.

2.0 HISTORICAL SUBSURFACE INFORMATION

2.1 Previous Projects

No record plans were recovered for Bridge No. 11. It was noted during the bridge inspection to be a single span, concrete deck structure that has a date stamp which marks construction in 1927. No boring log data were found in the Soils & Foundations project database or in-house historical boring log records in the vicinity of this bridge.

2.2 ANR Water Well Logs

Drilling logs from private drinking water wells in the area of a project can be helpful in anticipating what may be encountered in the subsurface. The Agency of Natural Resources (ANR) Private Well Locator interactive map was reviewed for these purposes. The data provided estimated for the depth to bedrock and expected soils types encountered on the site. It should be noted that these logs were developed and provided by well drilling companies whose employees may have had little to no formal training in identifying soil and rock. Water wells within approximately 1,000 feet of the subject bridge are highlighted in Figure 1.

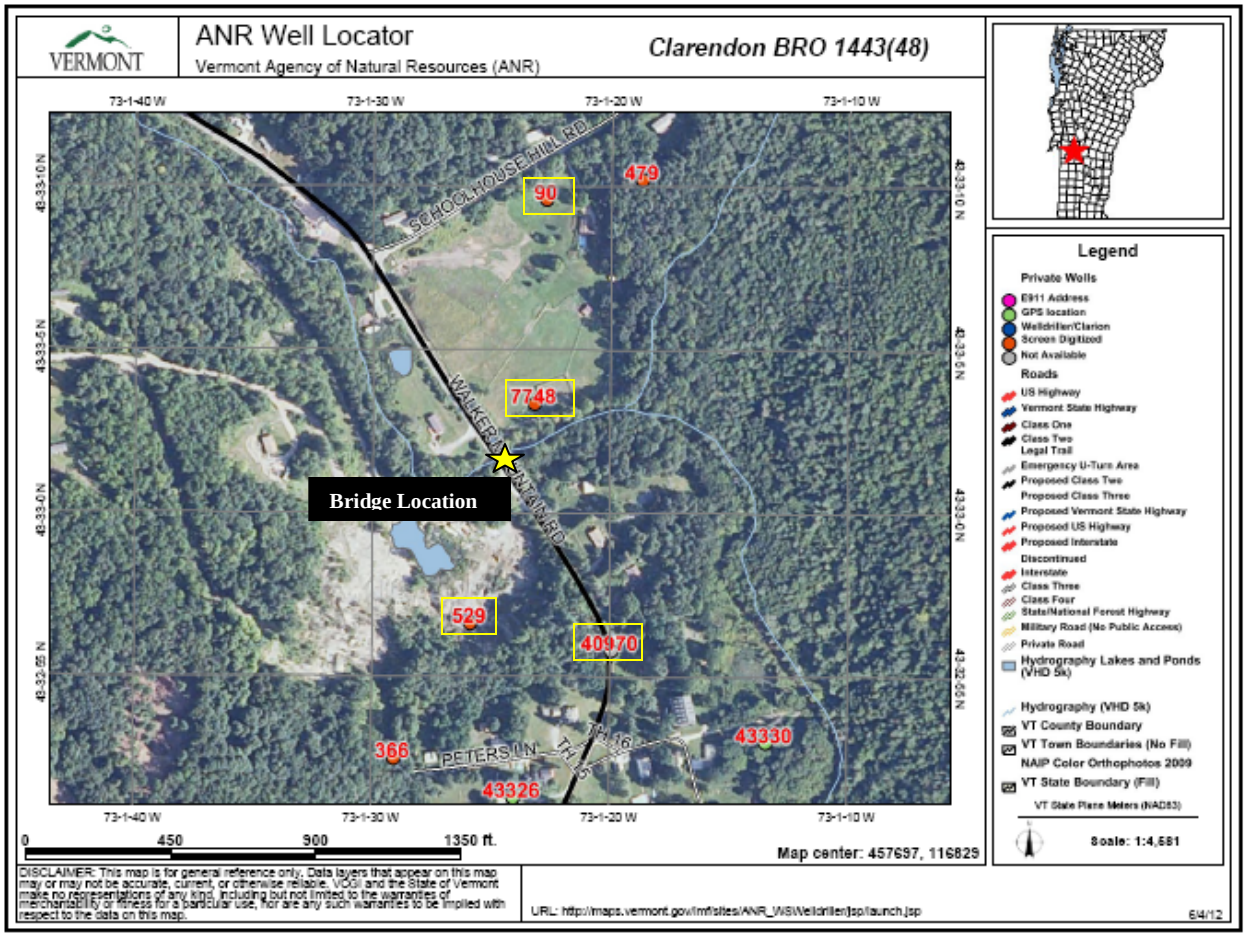


Figure 1. Site map with well locations.

Four wells were identified within the 1,000 foot radius, and the information for each is listed in Table 1.

Table 1. Well log descriptions of surrounding sites.

Well Number	Distance From Project (feet)	Depth to Bedrock (feet)	Overburden Material
7748	200	45	gravel
529	500	50	Boulders/sand
40970	700	34	Unknown
90	820	9	Clay

2.3 USDA Environmental Interest Locator

The U.S. Department of Agriculture (USDA) provides online maps with data locating potential environmental hazards. The area in Figure 2 hatched in yellow indicates Class II wetlands, while the area shaded in brown indicates hydric soils. The proximity and

severity of these wetlands to the project site may cause complications during both drilling and construction.

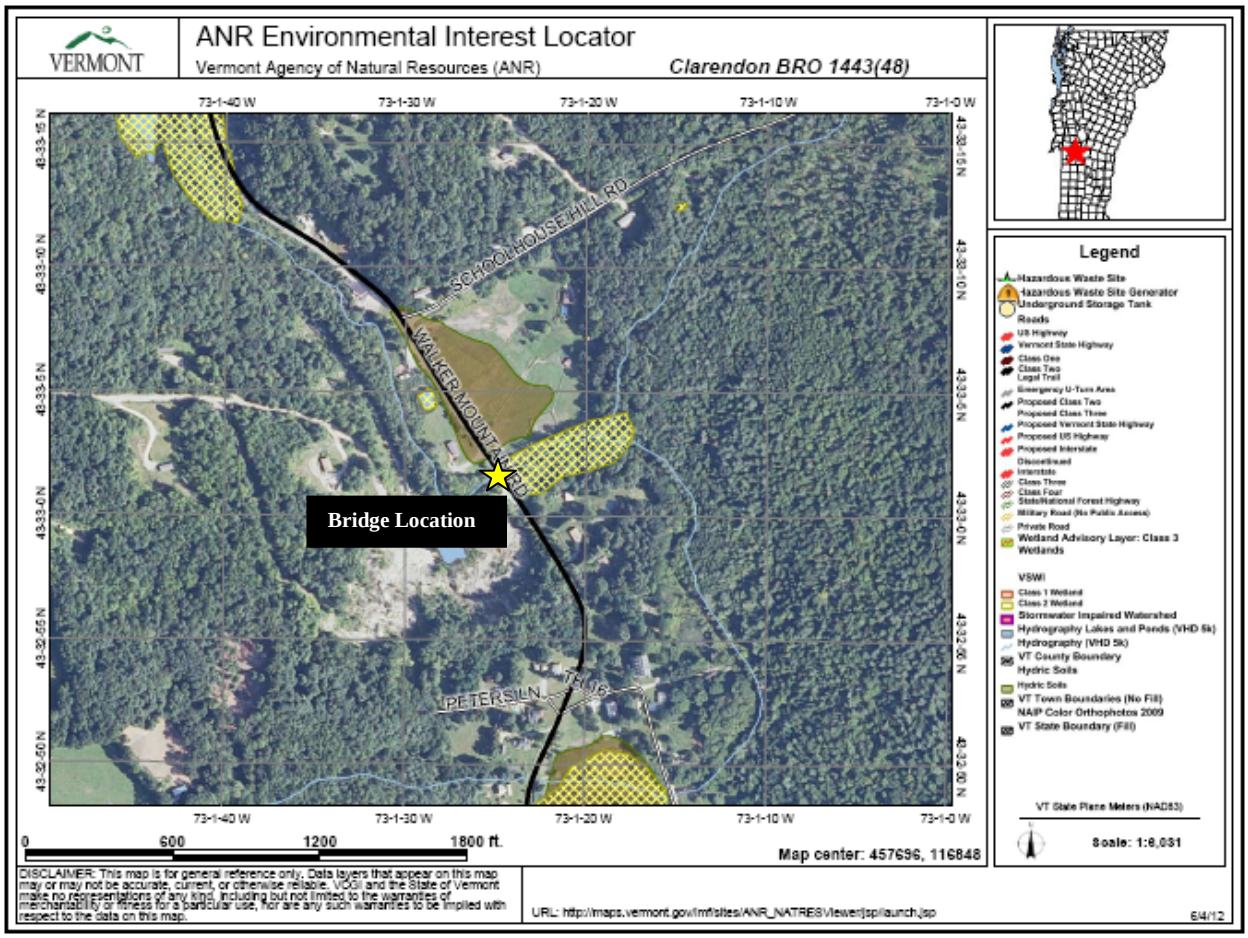


Figure 2. Wetland classification sites around project location.

2.4 USDA Soil Survey

The U.S. Department of Agriculture (USDA) Natural Resources Conservation (NRC) soil survey records provide online published soil data. These indicated that the existing soils at the project site consist of nearly level udifluvents and fluvaquents. These soils are moderately well to excessively draining, with a water table around 0.5 – 6.0 feet. They are also subject to flooding during high rainfall events.

2.5 USGS Bedrock Maps

Based on recent bedrock mapping for the 2011 State bedrock geologic map (Ratcliffe, N.M., Stanley, R.S, Gale, M.H., Thompson, P.J., and Walsh, G.J., 2011, Bedrock Geologic Map of Vermont: U.S. Geological Survey Scientific Investigations Map 3184, 3 sheets, scale 1:100,000), the rock type underlying this area consists of "*Steel-gray-*

weathering, light-gray, massive calcitic dolostone grading upward into darker, more fissile calcitic dolostone containing white quartz knots near top." There were no bedrock outcroppings observed in the vicinity of the bridge.

2.6 Vermont Geological Survey Maps

Surficial mapping conducted for the 1970 Surficial Geologic Map of Vermont indicates that the subject area is underlain by recent alluvium which overlies Kame Terrace and Glacial Till deposits. Kame Terrace deposits consist of sand, gravel and some cobble sized material. Glacial till is generally very dense and may contain varying amounts of gravel, cobbles and boulders in a silt to sandy silt matrix. An old depleted sand and gravel pit was noted immediately west of the bridge location.

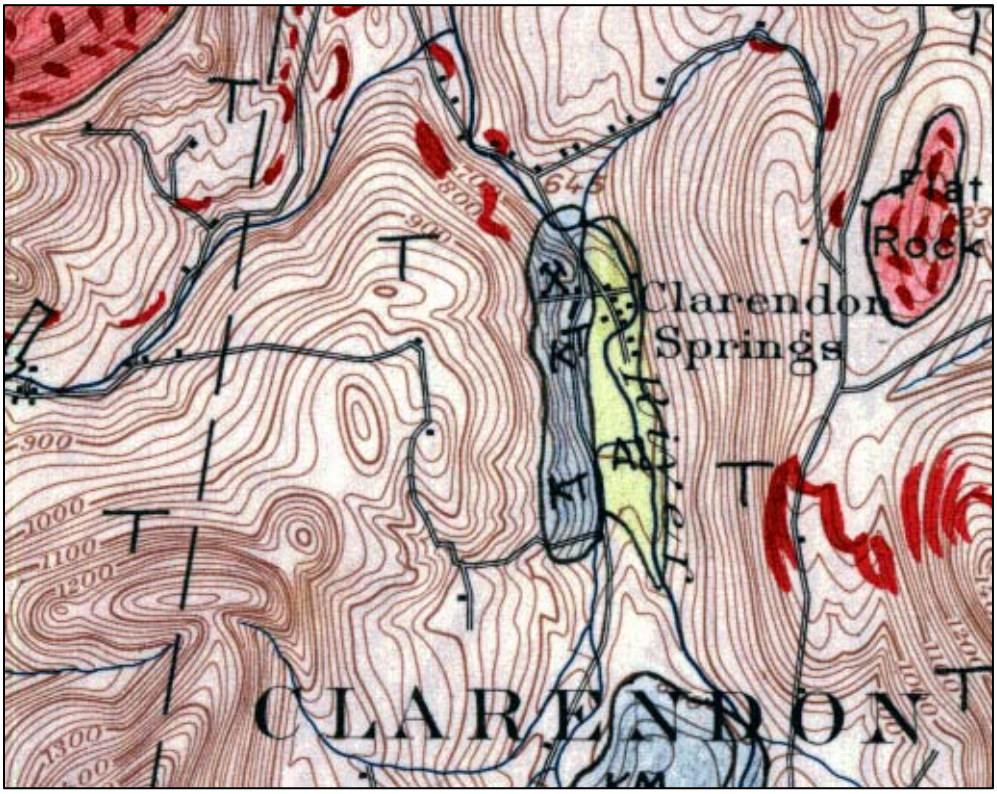


Figure 3. Surficial geologic map of project area. T=Glacial Till, KT=Kame Terrace, AL=Recent alluvium.

3.0 FIELD OBSERVATIONS

Pertinent information was gathered in order to determine any potential issues with boring observations or design considerations.

Figure 3. View of existing bridge, roadway and surrounding land. Photograph was taken facing north.

Figure 3 was taken on June 18, 2012. Overhead utilities were noted on the west side of the road. This bridge is located near several residential homes nearby houses, which could pose a potential issue during construction and drilling, as adequate access must be maintained.

4.0 RECOMMENDATIONS

Based on the limited information gathered during this investigation, possible options for a bridge replacement include the following:

- Cantilevered stemwall on spread footings
- Pile caps on a single row of H-piles (Integral Abutments)
- Stub abutment on MSE walls

It is recommended that a minimum of two borings be drilled to bedrock at opposite ends of the bridge be taken in order to assess the subsurface conditions. If any variable conditions are noted, the recommendations should be reevaluated.

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

cc: Project File/CCB

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: James Brady, Environmental Specialist
DATE: June 1, 2012

Project: Clarendon BRO 1443(48)

ENVIRONMENTAL RESOURCES:

Wetlands:	X Yes	____ No	See .dgn file
Historic/Historic District:	X Yes	____ No	See .dgn file and ClarendonBRO1443(48)Hist.pdf
Archaeological Site:	____ Yes	X No	See: ClarendonBRO1443(48)ArchaeologyResourceID.doc
4(f) Property:	____ Yes	X No	
6(f) Property:	____ Yes	X No	
Agricultural Land:	____ Yes	X No	
Fish & Wildlife Habitat:	X Yes	____ No	The stream is considered habitat
Endangered Species:	____ Yes	X No	
Hazardous Waste:	____ Yes	X No	ANR Environmental Interest Locator checked
Stormwater:	____ Yes	X No	See: ClarendonBRO1443(48)SW.pdf
USDA-Forest Service Lands:	____ Yes	X No	
Wildlife Habitat Connectivity:	____ Yes	X No	
Scenic Highway/ Byway:	____ Yes	X No	
Act 250 Permits:	____ Yes	____ No	Unknown

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

James
cc:
Project File

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

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

Date: 4/20/2012

Subject: Clarendon BRO 1443(48) Bridge 11 Archaeological Resource Identification

James,

I have completed my initial resource identification for Clarendon BRO 1443(48). A field visit conducted on 4/18/2012 as part of the 2012 GPS scoping initiative was adequate to identify potential resources in the project area. There are *no archaeological resources* present in the APE, and likewise no concerns for archaeology.

Please feel free to contact me with any questions or concerns.

~Brennan

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

VTrans Working to Get You There
Vermont Agency of Transportation

Brady, James

From: O'Shea, Kaitlin
Sent: Tuesday, May 15, 2012 3:44 PM
To: Williams, Chris
Cc: Newman, Scott; Brady, James
Subject: Clarendon BRO 1443(48) - Historic Resource ID

Follow Up Flag: Follow up
Flag Status: Completed

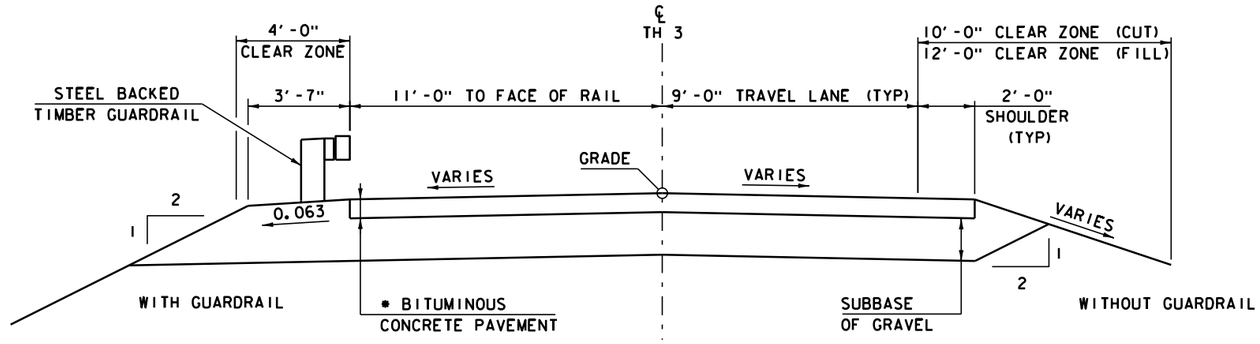
Hi Chris,

Scott and I visited Bridge BR11 in Clarendon last week. The concern for the scope of this project relates to the replacement bridge. Bridge 11 is a historic concrete 1927 bridge and it is located in the viewshed of the Clarendon Springs Historic District. It also serves as a gateway to the district. For this location, an appropriate railing type would be steel backed timber (as railing and as guardrail) across the span.

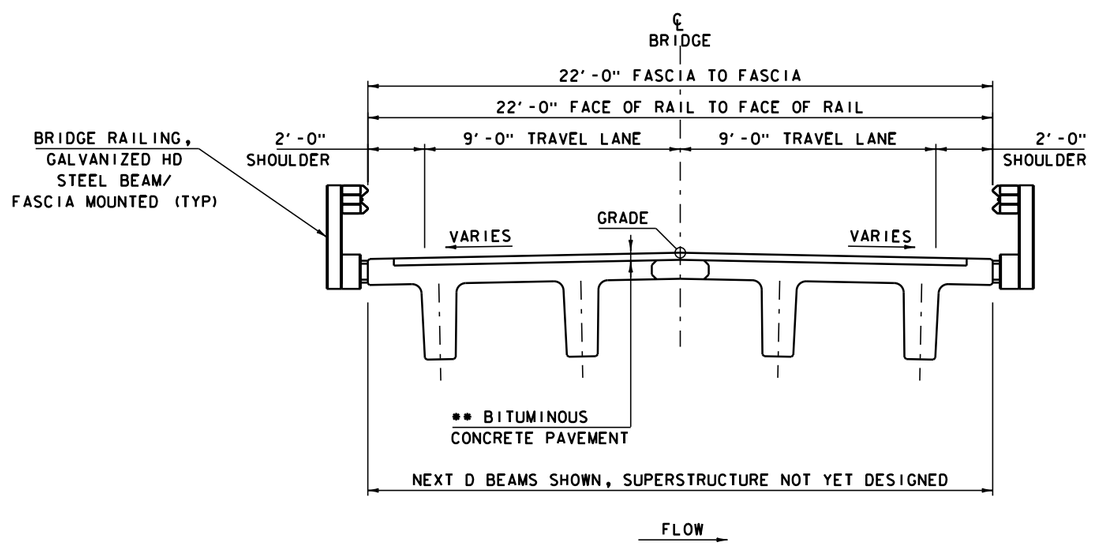
Let me know if you have any questions.
Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

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



PROPOSED TH 3 TYPICAL SECTION



PROPOSED BRIDGE TYPICAL SECTION

MATERIAL TOLERANCES

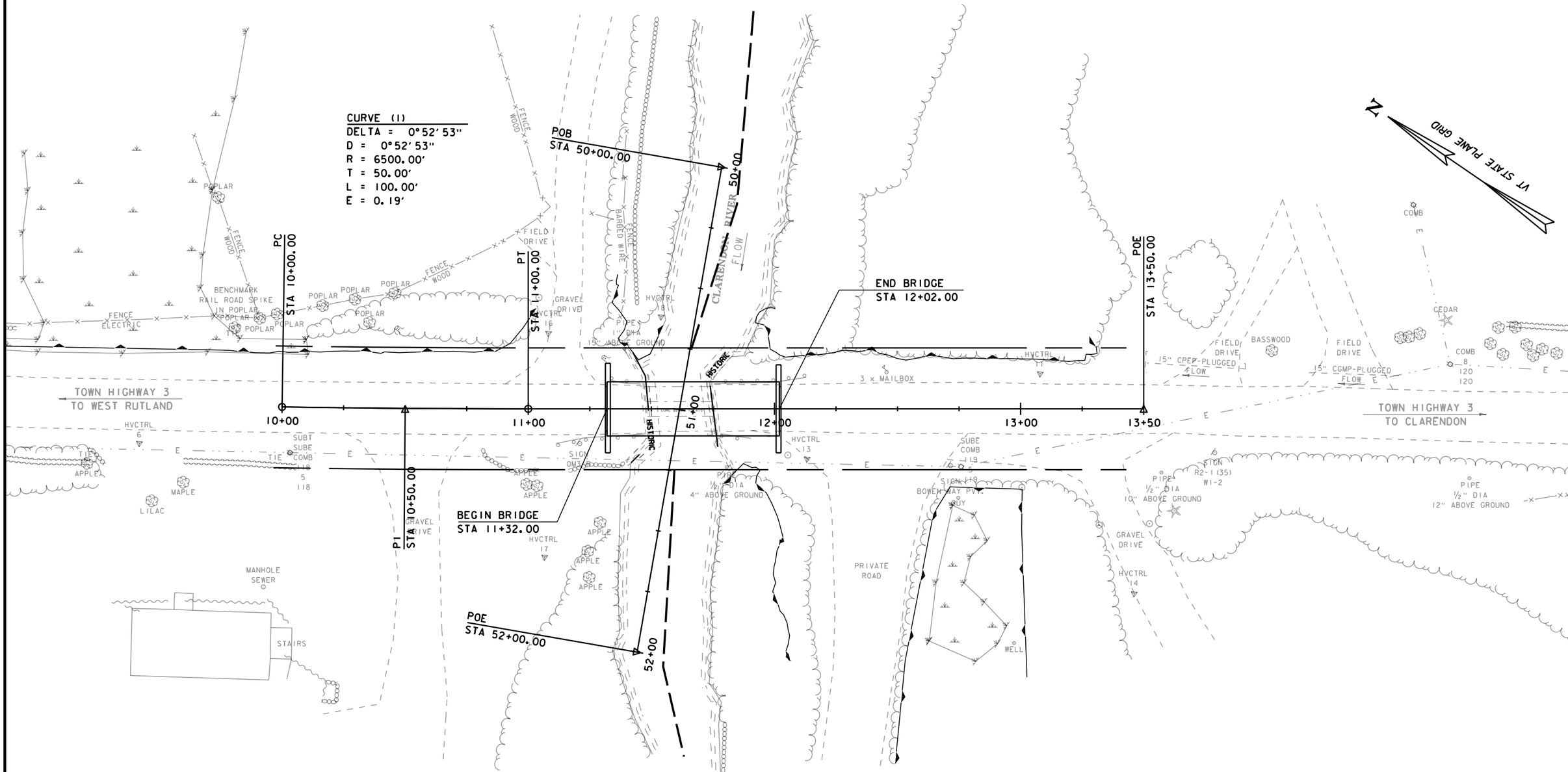
(IF USED ON PROJECT)

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

PROJECT NAME: CLARENDON
PROJECT NUMBER: BRO 1443(48)

FILE NAME: 12J160\si2J160typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ----------
TYPICAL SECTIONS

PLOT DATE: 20-JUL-2012
DRAWN BY: D.D.BEARD
CHECKED BY: T.FILLBACH
SHEET 3 OF 10

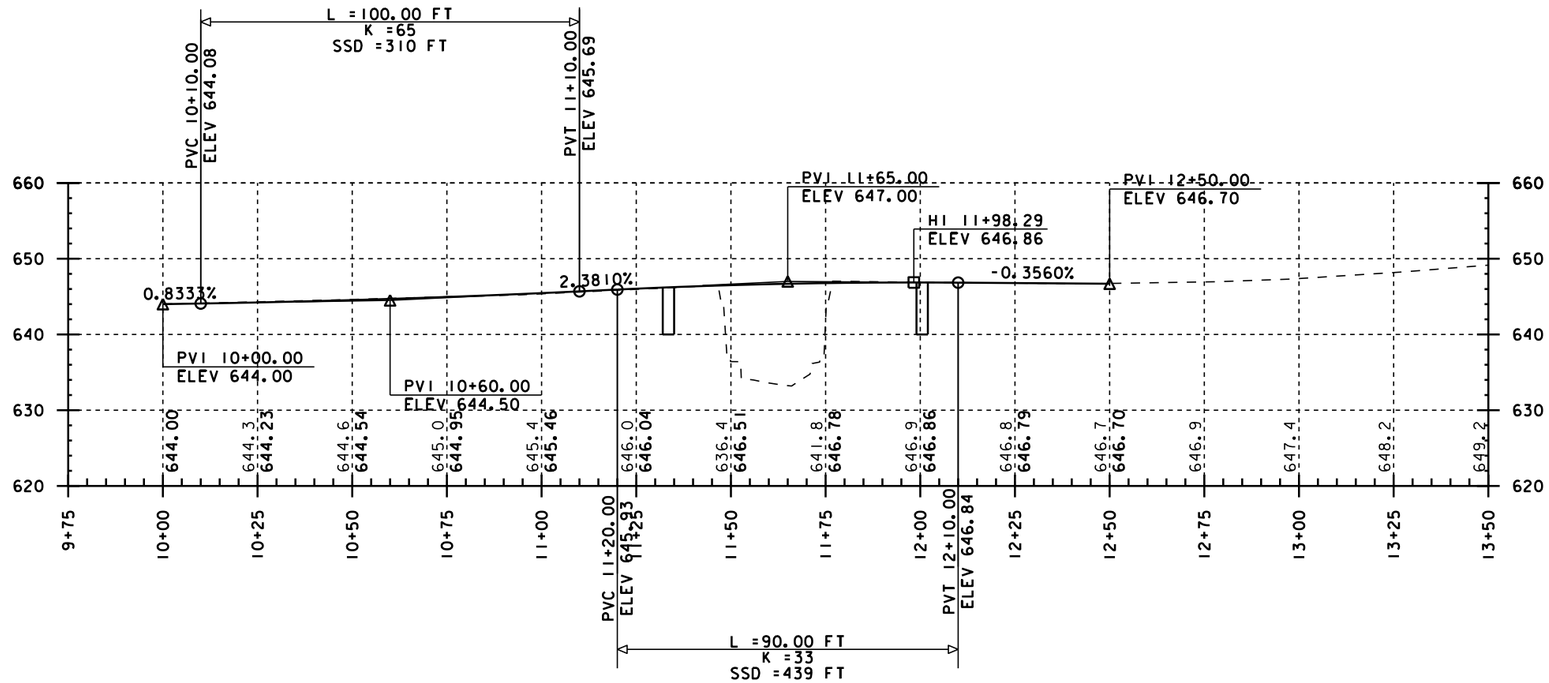


LAYOUT

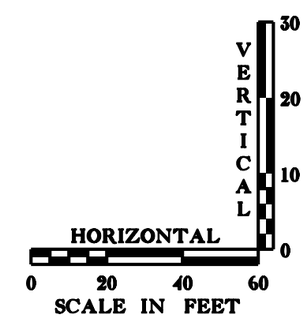
SCALE 1" = 20'-0"

20 0 20

PROJECT NAME: CLARENDON	
PROJECT NUMBER: BRO 1443(48)	
FILE NAME: s12j160bdr.dgn	PLOT DATE: 19-JUL-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: T.FILLBACH
LAYOUT SHEET	SHEET 2 OF 10



TH 47 PROFILE

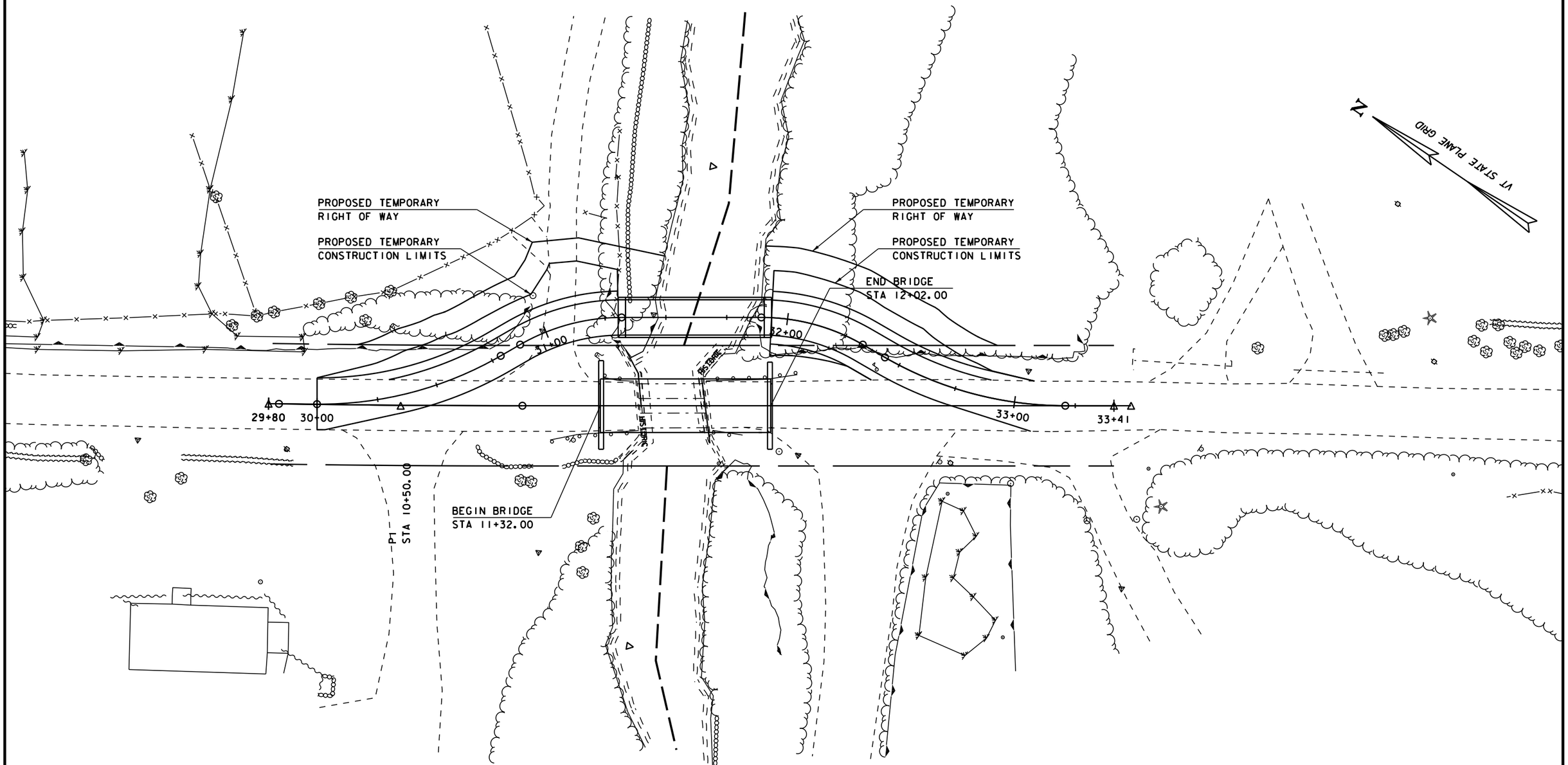


NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

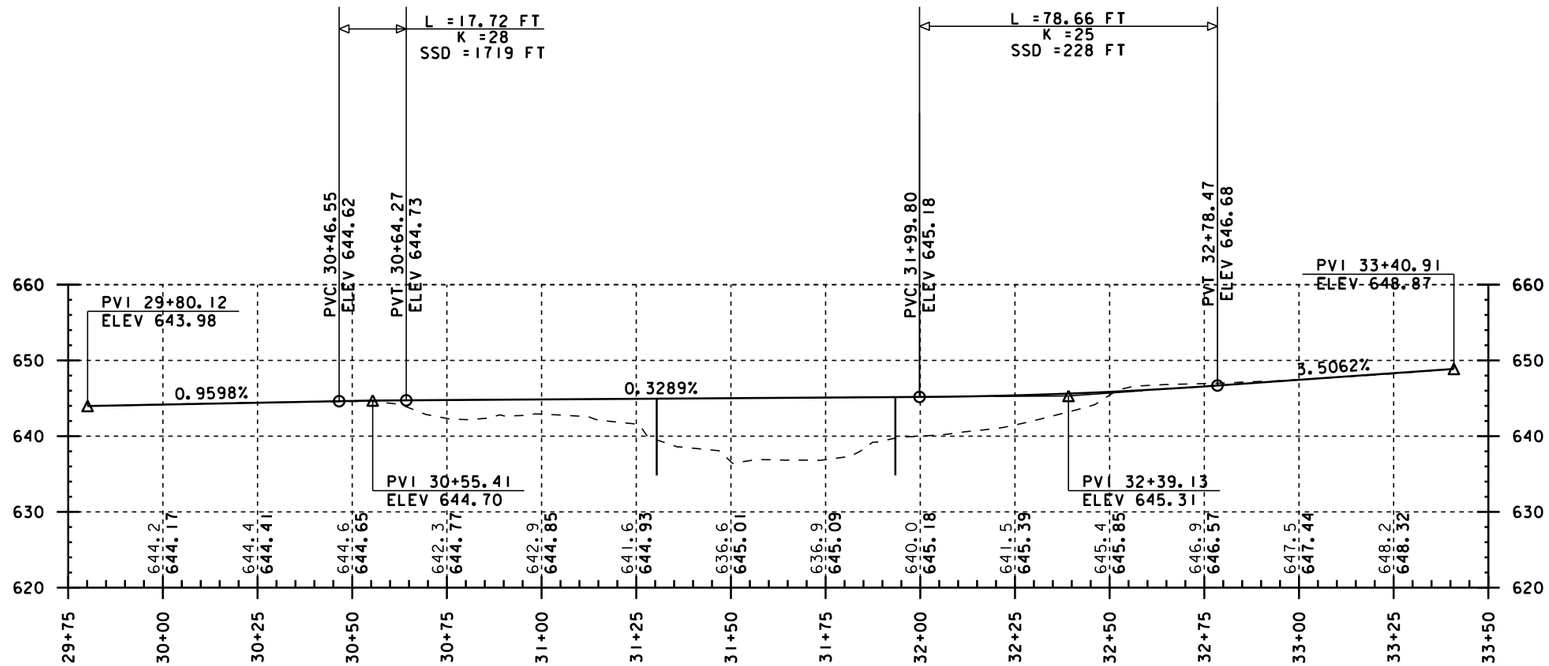
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: CLARENDON	
PROJECT NUMBER: BRO 1443(48)	
FILE NAME: s12j160profile.dgn	PLOT DATE: 19-JUL-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: T.FILLBACH
PROFILE	SHEET 4 OF 10

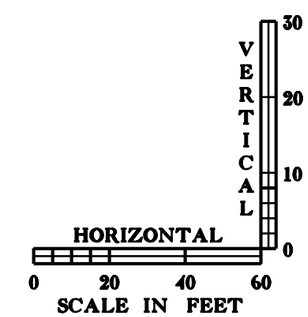


PROJECT NAME:	CLARENDON
PROJECT NUMBER:	BRO 1443(48)

FILE NAME: 12J160\s12J160tempbridge.dgn	PLOT DATE: 19-JUL-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: T.FILLBACH	CHECKED BY: T.FILLBACH
TEMPORARY BRIDGE LAYOUT SHEET	SHEET 1 OF 2



TEMPORARY BRIDGE PROFILE



NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: CLARENDON	
PROJECT NUMBER: BRO 1443(48)	
FILE NAME: 12J160\s12J160tempbridge.dgn	PLOT DATE: 19-JUL-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: T.FILLBACH
TEMPORARY BRIDGE PROFILE	SHEET 2 OF 2