Huntington BRO 1445(35)

Scoping Report

Bridge #30

Town Highway 22

Over Brush Brook

August, 2012 Structures, ST4

Contents

Purpose and Need Statement

Purpose

The purpose of this project is to provide a safe and efficient crossing over Brush Brook.

Need

The existing structure is a timber deck on rolled steel beams. No original plans have been found, but the substructure consists of concrete abutments on shallow spread footings. There is evidence of scour at the abutments and the inspectors have noted that settlement has occurred in the past. The curb to curb width is 12.5 ft curb to curb, which is substandard. The deck is in need of replacement. The bridge is posted for 16,000 lbs.

Site Information

The existing conditions were gathered from a combination of Inspection Reports, the Route Log and record plans.

Existing Conditions

Year of Construction	1925, reconstructed in 2004 (new steel beams added to increase capacity).
Approach Travel Width	17 ft.
Approach Roadway Width	17 ft.
Speed Limit	20 mph
Horizontal Alignment	The alignment of Bridge 30 is straight, and in the middle of a horizontal S-curve. The existing curve radii for the

	two curves are 155 ft. for the curve south of the bridge, and 100 ft. for the curve to the north.
Vertical Alignment	Proceeding north on TH 22 south of the bridge, the roadway grade transitions from an upward slope of 13.9% to a negative slope of approximately 0.1%. This crest vertical curve has a K value of 7 and a stopping sight distance of 124 ft, and ends approximately 65 ft south of the bridge. At approximately 20 ft. south of the bridge, a sag vertical curve begins with a K value of 15 and stopping sight distance of 109 ft. The bridge is on a sag vertical curve which ends approximately 75 ft north of the bridge.
Vertical Clearance Issues	None
Bridge Type	Single span rolled beam with timber deck.
Span Length	27 ft.
Width of Bridge ft.	Bridge curb-curb width 12.5 ft, fascia to fascia width 16
Bridge Skew	10°
Bridge Railing	Very light wood rail on wood posts. Meets no standard.

Inspection Report Information

Structural Evaluation:	5 Better Than Minimum Tolerable
Channel Rating:	6 Satisfactory
Deck Geometry:	4 Meets Minimum Tolerable Criteria
Approach Roadway Alignment:	3 Intolerable, Corrective Action Needed
Scour Critical Bridges:	3 Scour Critical
Deck Rating:	4 Poor
Superstructure Rating:	7 Good
Substructure Rating:	5 Fair

Inspection Summary

"07/13/2011. This structure is in good to poor condition. The timber deck needs replacing in the near future. The void under abutment 2 should be filled in. Abutment 1 had settled in the past. The approach embankment at abutment 1 left side should be filled in…Poor approach alignment. DCP/FRE"

Crash Data

There are no HCL (High Crash Locations) listed on Town Highway 22, as of the 2003 – 2007 High Crash Location map.

Hydraulics

The preliminary hydraulics report indicates that the waterway at the existing bridge does have the capacity to pass flows in excess of Q25, but that the flow is constricted by the foundations. It is recommended that a clear span of approximately 30 ft. be provided (if the bridge is fully replaced) to avoid the present tendency of the stream to scour at the bridge location. Scour calculations will be performed during the final hydraulics report, but a pile foundation is recommended.

Geotechnical

The preliminary geotechnical report is attached. The report is based on nearby well information and geologic mapping as there are no records in the State database of previous borings or projects in the vicinity. The information observed was that the soils are expected to be extremely stony and dense, and the bedrock is expected to be at approximately 100 ft. below ground surface in the vicinity of the project. Borings should be performed as soon as possible to determine the feasibility of driving piles.

Utilities

There are no apparent overhead or buried utilities.

Stormwater

There are no existing stormwater facilities near the bridge. No unusual drainage features are anticipated.

Hazardous Waste Sites

There are no hazardous waste sites on TH 22, Camel's Hump Road.

Resources

Wetlands/Watercourses

There are potential Class III wetlands in the vicinity of the project, according to a preliminary review, but they are not expected to affect the project. The wetland size is on the order of 0.5 acres. The work is not expected to impact the wetland area.

Brush brook supports a variety of aquatic organisms, including wild brook trout. Aquatic organism passage is not expected to be a problem. The US Army Corps of Engineers and the Vermont Agency of Natural Resources will regulate all activities below ordinary low water and all activities in and around wetlands. Efforts to minimize water quality impacts during construction will be necessary and according to their regulation.

Habitat

There is good wildlife habitat in the surrounding area of the project, with large blocks of forested land on both sides of the road. Traffic is limited in this area and unlikely to be an issue for passing wildlife.

Species / Habitats of Special Concern

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

Agricultural Soils / Floodplains

There are no prime agricultural soils within the project area.

Archaeological Issues

A preliminary site visit by Vt. AOT archaeological staff has determined that there are no archaeological resources of concern directly adjacent to the project site. An 1850's era map shows a sawmill location nearby, but evidence of the structure is no longer present.

Historic Resources

A preliminary review has shown no historic resources likely to be affected by the project.

Design Criteria

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

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Functional Classification	VSS	Local		
Approach Lane and Shoulder Widths	VSS Table 6.3	17 ft.	9'/2' (22')	Substandard
Bridge Lane and Shoulder Widths	VSS Table 6.3 and 6.4	12.5 ft. One Lane	9'/2' (22')	Substandard
Clear Zone Distance	VSS Table 6.5	Unknown	7' fill / 7' cut (1:4), 7' cut (1:3)	
Banking	VSS Section 6.12	Minimal	6% (max)	Standard is for unpaved roads
Speed		20 mph	20 mph	
Horizontal Alignment	AASHTO Green Book Table 3-7	Bridge is straight, in middle of horizontal S-curve	R_{min}=81 ft.	Acceptable
Vertical Grade	VSS Table 6.6	Bridge located in transition from a (-)0.1% grade to a (+)8.5% grade	15% (max) for mountainous terrain	Acceptable at bridge
K Values for Vertical Curves	VSS Table 6.1	Bridge located on sag (K = 15)	20 crest / 30 sag	Grade such that bottom of sag is not on bridge
Vertical Clearance Issues	VSS Section 6.7	None noted	14'-3" (min)	Acceptable
Stopping Sight Distance	AASHTO Green Book, Table 3-7	109 ft	115 ft.	Acceptable
Bicycle/Pedestrian Criteria		No accommodation	None	No standard for rural unpaved roads
Bridge Railing	Vtrans Structures Design Man.	Wood timber	TL-2	substandard

Note: The speed limit on the existing bridge is 20 mph, as established by the Sign and Traffic Ordinance for Huntington, Vermont adopted October 14, 2002 (see excerpt in Appendix), for one lane bridges on Camels Hump Road. If this bridge becomes a two

lane bridge, the speed limit remains 20 mph by virtue of its location on a winding road section.

Traffic Data

Traffic

TRAFFIC DATA	2015	2035	2055
AADT	270	290	~
DHV	55	60	~
ADTT	10	15	~
%T	4.7	5.3	~
%D	55	55	~
FLEXIBLE ESALS:	~	2015-2035 39,000	2015-2055 74,000

Existing Deficiencies

The Deficiency status of the structure is noted in the latest inspection report as ND, not deficient (structurally). However, the existing bridge rails, transitions, approach rails, and rail ends do not meet current standards. Approach roadway alignment is also rated as 3, "intolerable, correction action needed". Bridge is listed as scour critical and is posted for 16,000 lbs. The bridge presently is a one lane bridge with a rail-to-rail width of approximately 12.5 ft. Table 6.4 of the Vermont State Standards states that bridges to remain in place need a minimum width of 18 ft. Therefore the existing width is substandard. Inspection summary: "07/13/11 This structure is in good to poor condition. The timber deck needs replacing in the near future. The void under abutment 2 should be filled in. Abutment 1 had settled in the past. The approach embankment at abutment 1 left side should be filled in. Poor approach alignment. DCP/FRE."

Alternatives

The alternatives considered for Huntington BRO 1445(35) are:

1. Do Nothing
2. Rehabilitation of Substructure, Superstructure, and Deck
3. Rehabilitation of Substructure, and Replacement of Superstructure, Deck, and Rails
4. Replace Entire Bridge

Traffic Control Options

Several traffic control options were considered. All of these options will cause some form of disruption to travel during the work period.

- Close Bridge using off-site detour.

  TH 22 in Huntington is a dead end town road with several residences and a popular hiking trail head beyond the bridge. There are no off-site detour options. During routine road and bridge maintenance operations, the Town maintains the movement of traffic, even though it frequently means temporarily stopping work to move equipment or personnel. Since this is a Town project, the Town has the option of closing the road, and would have the responsibility of providing signage and publicity if this option were chosen. For rehabilitation projects, the local share of the project is reduced from 5% to 2.5% where the road is closed for the duration of the project and a temporary bridge is not constructed. For reconstruction projects (new bridges), the local share is reduced from 10% to 5% where the road is closed and a temporary bridge is not constructed.

- On-Site Detour via Temporary Bridge.

  For the current ADT of 270 and a DHV of 55, the Vermont AOT Structures Process Manual indicates that a separate one way temporary bridge without traffic signals is appropriate. A temporary bridge provides the least disruption to the public travelling this route and allows the contractor to proceed with the work at his best pace, without need for day-to-day traffic control. Disadvantages include increased cost for the temporary bridge and

temporary Right of Way, and significantly more disturbance of the surrounding terrain. A number of mature trees would be lost making room for a temporary bridge.

- Phased Construction

  Phased construction consists of constructing a new bridge one half at a time, while maintaining traffic on the half not being worked on. In this case, there is an existing one lane bridge. If a new two lane bridge is proposed, one lane of the new bridge could be constructed on a slightly adjusted alignment while traffic uses the existing bridge. Traffic would then be shifted to the new lane while the old bridge is demolished and the rest of the new bridge constructed. During the work, traffic on the one lane would alternate in each direction.

Discussion of Alternatives

1. Alternative No. 1 - Do Nothing

Due to its deteriorated condition, the Town of Huntington plans to replace the existing timber deck this year as a maintenance action, regardless of long term plans for upgrade of the bridge. The superstructure could remain in place for a few more years with no action, but the substructure has some wide cracks, spalls, and general deterioration. Scour in the area of abutment 2 is apparent and settlement has apparently occurred. The bridge is posted for a reduced structural capacity. Under this alternative, the substandard geometric conditions and structural capacity would not be improved. The Do Nothing alternative is not recommended.

2. Alternative No. 2 - Rehabilitation of Substructure, Superstructure, and Deck

A rehabilitation project could be undertaken to replace the timber deck and make repairs to the superstructure and substructure in place. These improvements would increase the remaining life of the bridge, but does not correct several deficiencies, including substandard width, alignment, and scour tendencies. If this alternative were implemented, a temporary bridge would be required to provide an on-site detour. The Town could reclaim the timber deck for use elsewhere if desired.

3. Alternative No.3 - Rehabilitation of Substructure, and Replacement of Superstructure and Deck

Alternative No. 3 is the similar to Alternative No. 2 including repairs to the substructure, but the superstructure would be replaced with new a precast superstructure and concrete overlay. This would increase the remaining life of the bridge and eliminates the need to replace the timber deck every 7-8 years. Since the substructure would remain, the geometric deficiencies would not be corrected, and the bridge foundations would still be subject to possible scour. A temporary bridge would be required.

4. Alternative No. 4 - Full Bridge Replacement

All bridge elements would be replaced in this alternative. Lane and shoulder widths, foundation scour conditions, settlement characteristics, deteriorating structural elements, roadway geometry adjacent to the bridge, and bridge railing would all be improved or replaced. A few trees would be lost due to the new alignment. A two lane width of 2/9/9/2 and a length of approximately 38 ft are recommended. Traffic is proposed to be maintained on the existing structure while as much of the new bridge as possible is constructed. Replacing the bridge using a timber deck was considered, but this idea was discarded due to the maintenance requirements of timber decks, and the need to replace the decks every 5-7 years. Traffic delays and inconvenience during maintenance and replacement of timber decks was also a factor. Therefore, a two lane precast concrete superstructure without pavement is proposed. The first choice for foundation would be an integral abutment, although one predominant characteristic of the site is extremely stony and dense soils with many cobbles and boulders. If boulders prohibit efficient placement of piles, abutments on shallow footings would be necessary. Shallow foundations would require protection from scour. For cost comparison between alternatives using different traffic control methods, integral abutments were assumed. A TL-2 rail would be proposed.

Costs

As mentioned previously, the Do Nothing option is not being considered. All of the options being considered could be accomplished in one construction season and will require no utility relocation. Note that these cost projections are for comparison purposes. Conceptual estimates of costs were done for the following alternatives:

Alternative 2: Rehabilitation of Substructure, Superstructure, and Deck

Alternative 3: Rehabilitation of Substructure and Replacement of Superstructure and Deck

Alternative 4: Replace Bridge with 2 lane precast superstructure and integral abutments

The next page shows relative costs so that comparisons can be made between alternatives.

Huntington BRO 1445(35)		Alternative 2 Rehabilitate Substructure, Superstructure, and Deck	Alternative 3 Rehabilitate Substructure, Replace Superstructure Concrete Deck	Alternative 4 Replace Bridge With Two Lane Concrete Deck
COSTS	Roadway & Mobilization	$104,000	$145,000	$210,000
	Superstructure & Deck	$50,000	$120,000	$150,000
	Substructure	$25,000	$25,000	$136,000
	Temporary Bridge	$65,000	$65,000	$0
	Construction Costs	$244,000	$385,000	$496,000
	Preliminary Engineering	$41,000	$65,000	$114,000
	Right of Way	$40,000	$40,000	$50,000
	Construction Engineering	$44,000	$70,000	$119,000
	Contingencies	$5,000	$8,000	$24,000
	Total Initial Costs	$374,000	$568,000	$803,000
	Town Initial Share**	$18,700	$28,400	$80,300
	Premium Above Alt. 2	0%	152%	215%
	Design Life	15 years (except deck)*	30 years	80 years
	Avg. Annual Cost (unamortized)	$28,000	$19,000	$10,000
	Construction Duration	6 months	6 months	6-8 months
	Project Development Duration	3 years	3 years	3 years

Huntington BRO 1445(35)		Alternative 2	Alternative 3	Alternative 4
		Rehabilitate Substructure, Superstructure, and Deck	Rehabilitate Substructure, Replace Superstructure and Deck	Replace Bridge Phased Construction
ENGINEERING	Typical Section - Roadway (feet)	17'	17’	22'
	Typical Section - Bridge (feet)	12.5 ft. (one lane)	12.5 ft (one lane)	2-9-9-2
	Traffic Safety	No Change	No Change	Improved
	Alignment Change	No	No	Yes
	Bicycle Access	No Change	No Change	Improved
	Hydraulic Opening	No Change	No Change	Improved
	Pedestrian Access	No Change	No Change	Improved
	Utility	None	None	None
	ROW Acquisition	Temporary	Temporary	Yes
	Traffic Maintenance	Temporary Bridge	Temporary Bridge	Phased

*Note that for alternatives with timber decks, the average expected life of a timber deck is 7 years, so the cost of replacing the timber every 7 years is included in the annual cost.

**Town’s share of initial cost is 5% for rehabilitation costs and 10% for replacement costs, assuming the road is not closed during construction.

Conclusion

Alternative No. 4, Full Bridge Replacement, is recommended. This gives the opportunity to provide a completely new bridge and eliminate several existing deficiencies. Traffic would be maintained during the project, with some delays expected. **Alternative 4, the Full Bridge Replacement with a two lane prestressed superstructure and concrete overlay is recommended**. The preferred type of substructure is integral abutments; soil exploration should take place as soon as possible to determine the feasibility of driving piles on the site.

Alternatives 2 and 3 were developed so that the Town could see alternatives that add to the life of the bridge at a lesser initial cost than the full replacement alternatives. The alternatives with lower initial costs could have higher annual costs.

Appendices

Photos
Town Map
Bridge Inspection Report
Natural Resources Memos
Archaeological Memo
Historic Memo
Preliminary Hydraulics Report
Preliminary Geotechnical Report
Layout Plan
Profile
Typical Sections

Bridge 30, looking north

Bridge 30, looking north

Bridge 30, north abutment – note large cracks and boulder cast into abutment at lower left corner. At top, see deteriorating steel beams

Evidence of scour, north abutment

E 452 000 m | E 456 000 m | E 460 000 m | E 464 000 m | E 468 000 m | E 472 000 m | E 476 000 m

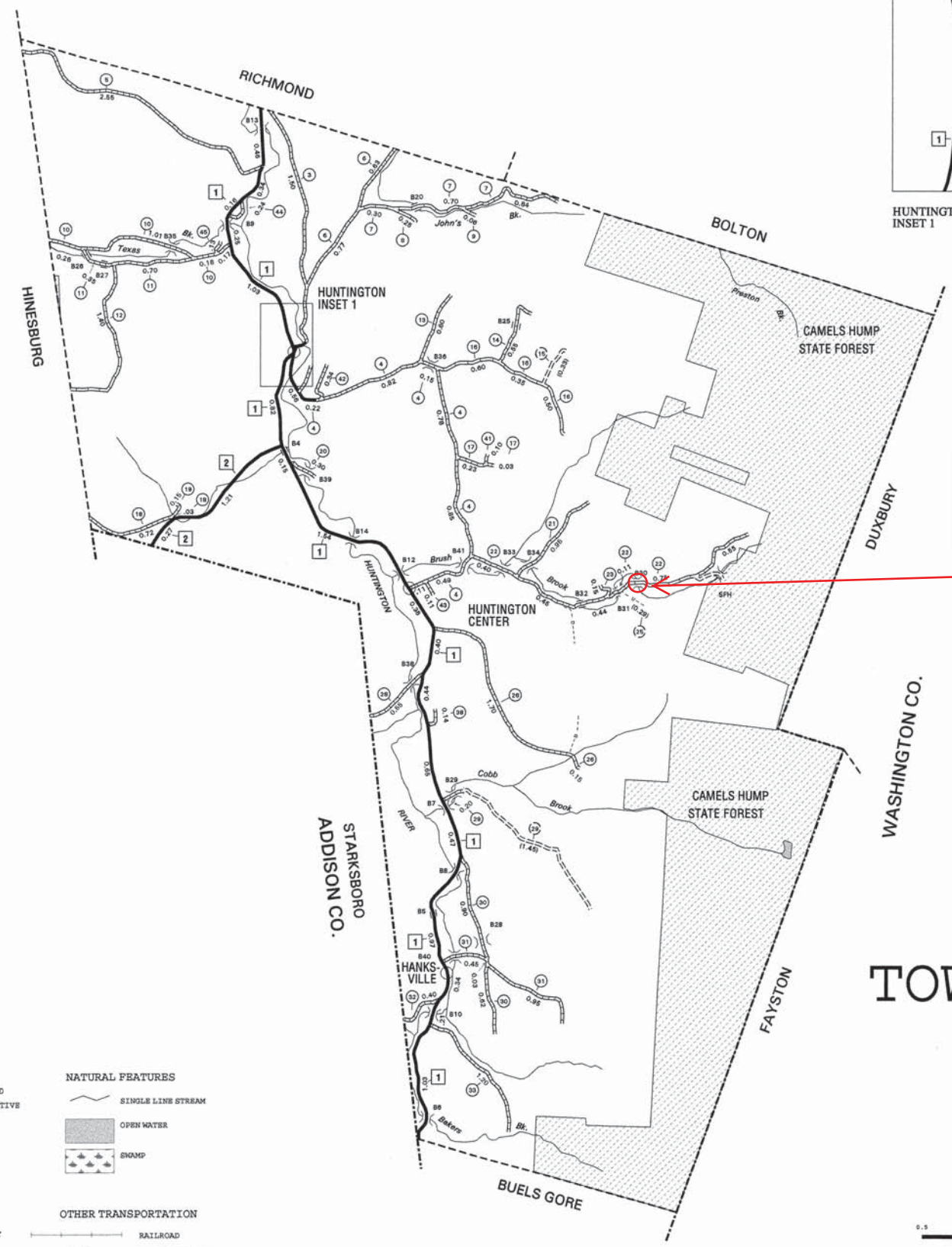
N 208 000 m | N 204 000 m | N 200 000 m | N 196 000 m | N 192 000 m

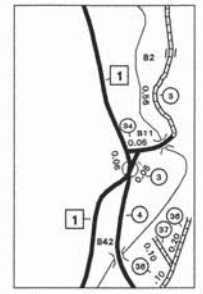
TOWN HWY NO.	LENGTH IN MILES CLASS 3	CLASS 4
3	2.110	
4	3.980	
5	2.550	
6	1.400	
7	1.840	
8	0.250	
9	0.050	
10	1.650	
11	1.050	
12	1.400	
13	0.600	
14	0.550	
* 15	0.000	(0.330)
16	1.450	
17	0.250	
18	0.750	
19	0.150	
20	0.300	
21	0.950	
22	2.700	
23	0.150	
25	0.000	(0.290)
26	1.850	
28	0.550	
29	0.200	(1.450)
30	1.550	
31	1.400	
32	0.400	
33	1.200	
34	0.050	
36	0.300	
37	0.100	
38	0.140	
41	0.100	
42	0.340	
43	0.110	
44	0.240	
45	0.130	
TOTAL	32.780	2.070

"* PORTION(S) OF THESE TOWN HIGHWAYS ARE CLASS 3, BUT ARE FUNCTIONALLY CLASS 4."

MILEAGE SUMMARY

CLASS 1 TOWN HIGHWAYS:			
TOTAL, CLASS 1 TOWN HWYS.		0.000	
CLASS 2 TOWN HIGHWAYS:			
NO. 1	9.700		
NO. 2	1.480		
TOTAL, CLASS 2 TOWN HWYS.		11.180	
CLASS 3 TOWN HIGHWAYS:			
TOTAL, CLASS 3 TOWN HWYS.		32.780	
TOTAL, TOWN HWYS.			43.960
STATE HIGHWAYS:			
INTERSTATE RAMPS	0.000		
TOTAL, INTERSTATE HWYS.		0.000	
TOTAL, NON-INTERSTATE HWYS.		0.000	
TOTAL, STATE HWYS.			0.000
TOTAL, TRAVELLED HWYS., FEB. 10, 2003 (EXCLUDES CLASS 4 MILEAGE)			43.960





Huntington, BRO 1445(35)

HIGHWAYS
- INTERSTATE
- STATE HIGHWAY SYSTEM
- TOWN HIGHWAY SYSTEM
- U IMPASSABLE OR UNTRAVELED
- D DISCONTINUED
- LT LEGAL TRAIL
- FT FOOT TRAIL
- 89 INTERSTATE ROUTE
- 2 U.S. NUMBERED ROUTE
- 3 STATE NUMBERED ROUTE
- 7 INTERCHANGE NUMBER
- 4 CLASS 1 TOWN HIGHWAY
- 2 CLASS 2 TOWN HIGHWAY
- 3 CLASS 3 TOWN HIGHWAY
- 6 CLASS 4 TOWN HIGHWAY
- NFR NATIONAL FOREST ROAD
- SFH STATE FOREST HIGHWAY
- BRIDGE OR CULVERT < 6'
- BRIDGE OR CULVERT 6'-20'
- BRIDGE GREATER THAN 20'
- CB COVERED BRIDGE

ROAD SURFACE TYPES
- STATE PAVED
- OTHER PAVED
- STATE GRAVEL
- OTHER GRAVEL
- GRADED AND DRAINED
- UNIMPROVED/PRIMITIVE

POLITICAL SUBDIVISIONS
- STATE BOUNDARY
- COUNTY BOUNDARY
- TOWN BOUNDARY
- CITY BOUNDARY
- VILLAGE BOUNDARY
- URBAN COMPACT BOUNDARY

MISCELLANEOUS
- DAM

NATURAL FEATURES
- SINGLE LINE STREAM
- OPEN WATER
- SWAMP

OTHER TRANSPORTATION
- RAILROAD
- AIRPORT TERMINAL

DISCLAIMER:
Highway and bridge data by Vermont Agency of Transportation, Division of Technical Services. All other data from Vermont Center for Geographic Information.

VERMONT
GENERAL HIGHWAY MAP
TOWN OF HUNTINGTON

PREPARED BY THE
VERMONT AGENCY OF TRANSPORTATION
PROGRAM DEVELOPMENT DIVISION
IN COOPERATION WITH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

SCALE 1:31680
1 0 0.5 1 1.5 2
MILES
SCALE 1:12000
0.5 0 0.5 1
MILES
SCALE FOR INSETS (UNLESS OTHERWISE NOTED)

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for HUNTINGTON **bridge no.:** 00030 **District:** 5

Located on: C3022 **over** BRUSH BROOK **approximately** 1.2 MI TO JCT W CL3 TH2 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 7 GOOD

Substructure Rating: 5 FAIR

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 100408003004081

Federal Sufficiency Rating: 18.9

Deficiency Status of Structure: ND

AGE and SERVICE

Year Built: 1925 **Year Reconstructed:** 2004

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 01

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 99

ADT: 000020 **% Truck ADT:** 02

Year of ADT: 2007

GEOMETRIC DATA

Length of Maximum Span (ft): 0027

Structure Length (ft): 000340

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 12.5

Deck Width Out-to-Out (ft): 16

Appr. Roadway Width (ft): 017

Skew: 10

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: ROLLED BM W TMBR DK

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

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 8 TIMBER

Type of Wearing Surface: 7 WOOD OR TIMBER

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: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Deck Geometry: 4 MEETS MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

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

Approach Roadway Alignment: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Scour Critical Bridges: 3 SCOUR CRITICAL

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: P POSTED FOR LOAD

Bridge Posting: 5 NO POSTING REQUIRED

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

Posted Vehicle: 6 GROSS LOAD ONLY

Posted Weight (tons): 08

Design Load: 9 HS 25

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 072011 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

07/13/11 This structure is in good to poor condition. The timber deck needs replacing in the near future. The void under abutment2 should be fill in. Abutment 1 had settled in the past. The approach embankment at abutment1 left side should be filled in.. Poor approach alignment. DCP / FRE

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: James Brady, Environmental Specialist
DATE: June 4, 2012

Project: Huntington BRO 1445(35)

ENVIRONMENTAL RESOURCES:

Wetlands:	X	Yes	____ No	See: HuntingtonBRO1445(35)-NR_ID and .dgn file
Historic/Historic District:	____	Yes	X No	See: HuntingtonBRO1445(35)Historic.pdf
Archaeological Site:	____	Yes	X No	See: HuntingtonBRO1445(35)ArchResourceID.doc
4(f) Property:	____	Yes	X No	
6(f) Property:	____	Yes	X No	
Agricultural Land:	____	Yes	X No	See: HuntingtonBRO1445(35)-NR_ID
Fish & Wildlife Habitat:	X	Yes	____ No	See: HuntingtonBRO1445(35)-NR_ID; stream is habitat
Endangered Species:	____	Yes	X No	See: HuntingtonBRO1445(35)-NR_ID
Hazardous Waste:	____	Yes	X No	ANR Environmental Interest Locator checked
Stormwater:	____	Yes	X No	
USDA-Forest Service Lands:	____	Yes	X No	
Wildlife Habitat Connectivity:	____	Yes	X No	See: HuntingtonBRO1445(35)-NR_ID
Scenic Highway/ Byway:	____	Yes	X No	
Act 250 Permits:	____	Yes	____ No	Unkown

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

James
cc:
Project File

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

Agency of Transportation

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

To: James Brady, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 4/23/2012

Subject: Huntington BRO 1445 (35) - Natural Resource ID

I have completed my natural resource scoping review for the above referenced project. My evaluation has included the following resources: wetlands, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed all existing mapped information and performed a site review of the project area.

Wetlands/Watercourses
There are wetlands within the project area. Formal wetland delineation according to US Army Corps of Engineers Wetland Delineation Manual was not completed and wetlands were identified using best professional judgment for resource identification/planning purposes. The wetland identified is a small wetland within the northeast quadrant of the project as depicted in the attached map. This seepage wetland is less than 0.5 acres and would likely be considered class III. A shape file with approximate wetland boundaries is available for reference.

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

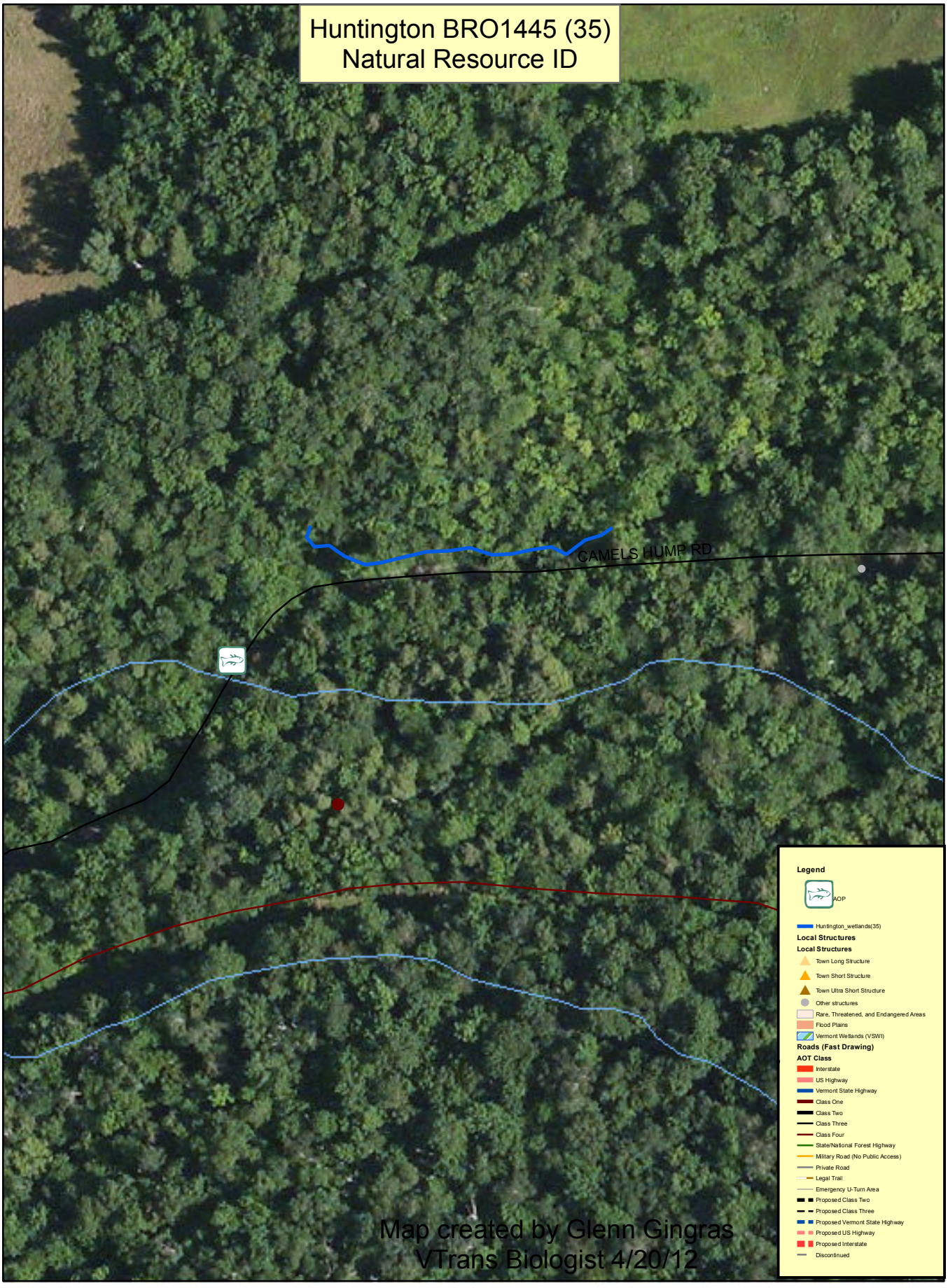
The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water and to wetlands.

Wildlife Habitat
Good Wildlife habitat exists within the surrounding area. There are large blocks of forested land on both sides of the road. Traffic within this stretch of town highway is limited and wildlife issues would not be an issue as passage would not be a problem.

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

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

Huntington BRO1445 (35)
Natural Resource ID



Map created by Glenn Gingras
VTrans Biologist 4/20/12

VERMONT

Jeannine Russell
VTrans Archaeology Officer
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Montpelier, VT 05633-5001
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Agency of Transportation

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

To: James Brady, VTrans Environmental Specialist

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

Date: 4/23/2012

Subject: Huntington BRO 1445(35) Bridge 30, TH22 Archaeological Resource Identification

James,

A site visit on 4/18/2012 was conducted as part of the 2012 "pilot program" in order to map archaeological resources using the new Trimble GPS unit. We found the general area around Bridge 30 on TH22 in Huntington to be rocky and steeply sloped; an unlikely place for precontact settlement. A 1850s map shows a saw mill in the general area of the bridge; evidence of this structure is no longer present on the landscape.

In conclusion, there are *no archaeological resources of concern* within the area directly adjacent to Bridge 30 on TH 22 in Huntington.

~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: Thursday, April 12, 2012 4:44 PM
To: Brady, James
Cc: Williams, Chris; Newman, Scott
Subject: Pilot Project - Huntington BRO 1445(35) Historic Resource ID

Good afternoon,

I have completed the historic resource ID for Huntington BRO 1445(35): Bridge 30 and the adjacent properties are not historic.

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

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

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

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

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

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Brian Bennett, Hydraulics Project Engineer (McFarland Johnson)
via Nick Wark, VTrans Hydraulic Engineer

DATE: June 6, 2012

SUBJECT: HUNTINGTON - BRO 1445(35) - TH 22 Bridge 30 over Brush Brook

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

Existing Bridge Information

The original bridge was constructed in 1925 based on available information. The bridge is owned by the Town. The original bridge is a single-lane single span having rolled beams with timber decking having a maximum width of approximately 16 feet. The perpendicular clear span between the abutment faces is approximately 25.3 feet at a location just below the bridge seats, but the abutment walls have a slight batter. There is also a large boulder which is integral to the lower half of the right abutment. The existing abutments appear to be cast-in-place concrete. The approximate height of the superstructure over the streambed is approximately 10 feet. The structure is slightly askew (i.e. 10%±) across Brush Brook and located less than 100 feet upstream of a bend. However, the abutments are basically parallel with the stream channel alignment at the current location.

Most of the calculated flows, except the Q_{500} event, pass through the existing structure. Therefore, the existing bridge has adequate hydraulic capacity for the design flow (Q_{25}) event based on our analysis of the existing conditions. However, the existing bridge appears to constrict the channel a little which has resulted in scour occurring downstream of the bridge and along the left abutment. We did not evaluate the scour for the existing or proposed bridge configurations as part of the preliminary design, but scour calculations will be performed during final hydraulics.

Recommendations

Based on initial discussions with the Structures Group, it was determined that the existing bridge will be totally replaced with a new bridge that will be located off alignment and just upstream of the existing bridge. It is anticipated the proposed deck will be 16 feet wide to meet the VTrans local road design standards. We have anticipated that the proposed abutments will be vertical face concrete abutments with stone fill scour protection, but we are unsure of the type of abutment foundations. If possible, the foundation should have piles as part of an integral abutment for scour protection. However, the large cobbles and boulders in this area may not allow piles to be driven and this option may not be realistic for this site. If spread footings are to be used, it is recommended that the depth of the foundations be at least 6 feet below the minimum streambed elevation in the vicinity of the proposed bridge.

Since our analysis indicated the existing bridge has adequate hydraulic capacity for the Q_{25} design storm event, it was anticipated that the replacement structure have at least the same hydraulic opening, but also allows for provisions of the placement of stone fill scour protection. Although a 25-foot clear span (between the abutment faces) with stone fill scour protection meets the hydraulic standard of passing the Q_{25} design storm event, the hydraulic opening is approximately 17% smaller

than the existing conditions bridge and we feel this span length will not be acceptable since it further constricts the channel from the existing condition's channel bank width.

Therefore, the primary recommendation will be for a bridge having a 30-foot clear span normal to the stream channel (between the abutment faces) with stone fill protection to allow for adequate hydraulic capacity for the Q_{25} design storm event and also will not constrict the stream channel width. Note as a comparison, the next bridge located just downstream of this location has a normal clear span of approximately 31 feet. This replacement bridge was analyzed at a location approximately 30 feet upstream of the existing bridge as shown on the attached alignment. The low beam elevation for this structure should be at or above 1084.2 feet.

As noted above, scour was not reviewed during the preliminary design. It is anticipated scour will be analyzed after the determination of the type of abutments to be used and scour calculation will be performed during final hydraulics. However based on the velocities from the analyses and evidence from the site, it is anticipated that Type 4 Stone Fill will be necessary for armoring the channel banks near the replacement structure.

Temporary Bridge

Based on the initial discussions with the Structures Group, it is anticipated that the existing bridge will be used during the construction of the new bridge.

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

BMB
cc: Hydraulics Project File via NJW
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

From: Thomas D. Eliassen, Transportation Geologist via Christopher C. Benda, Soils and Foundations Engineer

Date: June 21, 2012

Subject: Huntington BRO 1445(35) Bridge #30 Town Highway 22 Over Brush Brook Preliminary Geotechnical Information

In an effort to assist the Structures Section with their bridge type study, the Soils and Foundations Unit within the Materials and Research Section has completed a review of available geological data near Bridge No. 30 on Town Highway 22 which crosses over Brush Brook in Huntington, Vermont. Figure 1 shows the bridge and surrounding area.

Figure 1 Photograph of subject bridge taken during Structures field visit.

This review included the examination of possible 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.

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.

No As-Built Record Plans were identified in the VTrans digital print room.

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 Private Well Locator interactive map was reviewed for these purposes. Two private water wells are located approximately one-quarter mile west of the bridge. Well driller reports on file at the Vermont Agency of Natural Resources indicate that the top of bedrock is at depths of 70 to 85 feet (well records 18052 and 18051 respectively). Water well drilling records for water wells approximately one-half mile west indicated the top of bedrock at depths ranging from 20 to 27 feet. Well records one mile east of the subject bridge indicate top of bedrock at depths ranging from 90 to 160 feet below ground surface.

Overburden soils reported for well 18051 from ground surface to top of rock consist of boulders. Soils from well 18052 were reported as “dirt”. It should be noted that these logs were developed and provided by the well drilling companies whose employees may have had little to no formal training in identifying soil and rock.

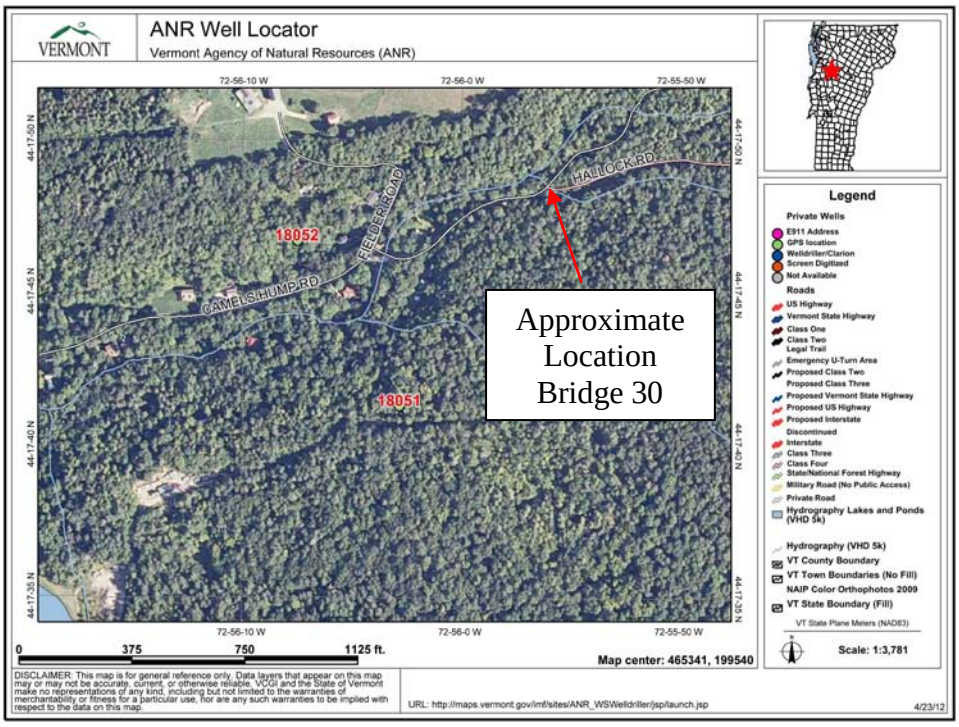

Figure 2 Private water wells in the vicinity of Bridge 30, Huntington.

Surficial mapping conducted for the 1970 Surficial Geologic Map of Vermont indicates that the subject area is underlain by glacial till. Glacial till is generally very dense and may contain varying amounts of gravel, cobbles and boulders in a silt to sandy silt matrix. A photograph

taken during the March 12, 2012 field trip (Figure 2) shows cobbles and large boulders all along the slopes adjacent to Brush Brook which flows under the subject bridge.

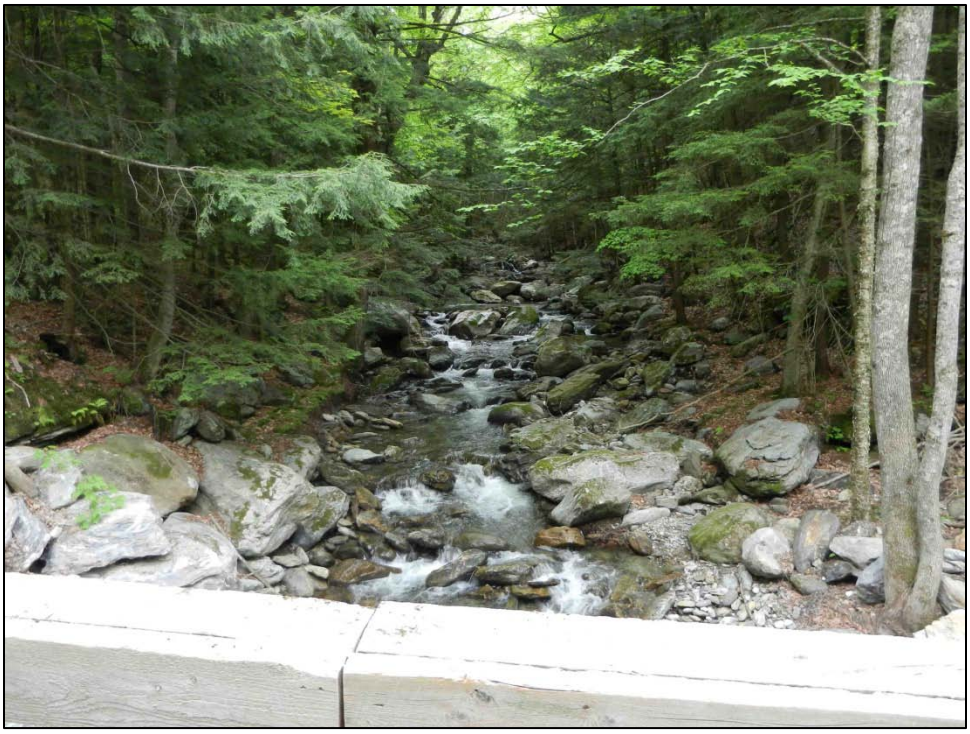

Figure 3 Photograph showing cobble to large boulder sized glacial deposits.

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 is the Hazens Notch Formation that is described as "Dark-rusty-brown graphitic biotite-muscovite-chlorite-quartz (+/-garnet) schist and gneiss, dark-albite porphyroblasts, large euhedral pyrite, and beds of dark-gray quartzite are common". According to private water well records in the area, it is expected that depth to bedrock at this location could be on the order of almost 100 feet below ground surface as the top of bedrock appears to deepen as one traverses west to east.

USDA Natural Resources Conservation soil survey records indicate that surficial soils in the area of the bridge consist of either PsC—Peru extremely stony loam, 0 to 20 percent slopes or MeE—Marlow extremely stony loam, 20 to 60 percent slopes.

No evidence of any utilities were observed at or near the bridge. Access for drilling borings appears fair to good.

Based on the information in this scoping report, possible foundation options for this bridge replacement project include the following:

- Reinforced concrete abutments on spread footings

- Precast arch supported on spread footings (may be a good site for the "Bridge in a Backpack structure http://www.maine.gov/mdot/tr/bridgebackpack.htm)

- Integral abutments if the boulders are shallow

Based on the lack of site specific information (no as-built plans, no boring records), we recommend the drilling of two borings. One at each opposite ends of the proposed bridge. Until these borings are conducted, it is premature to suggest a foundation design type.

If you have any questions, please feel free to contact us at 828-6916.

c: WEA/Read File
CCB/Project File

EXISTING CURVE 1 DATA
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D = 36°58′00″
R = 154.99′
T = 50.90′
L = 98.36′
E = 8.14′

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L = 84.50′
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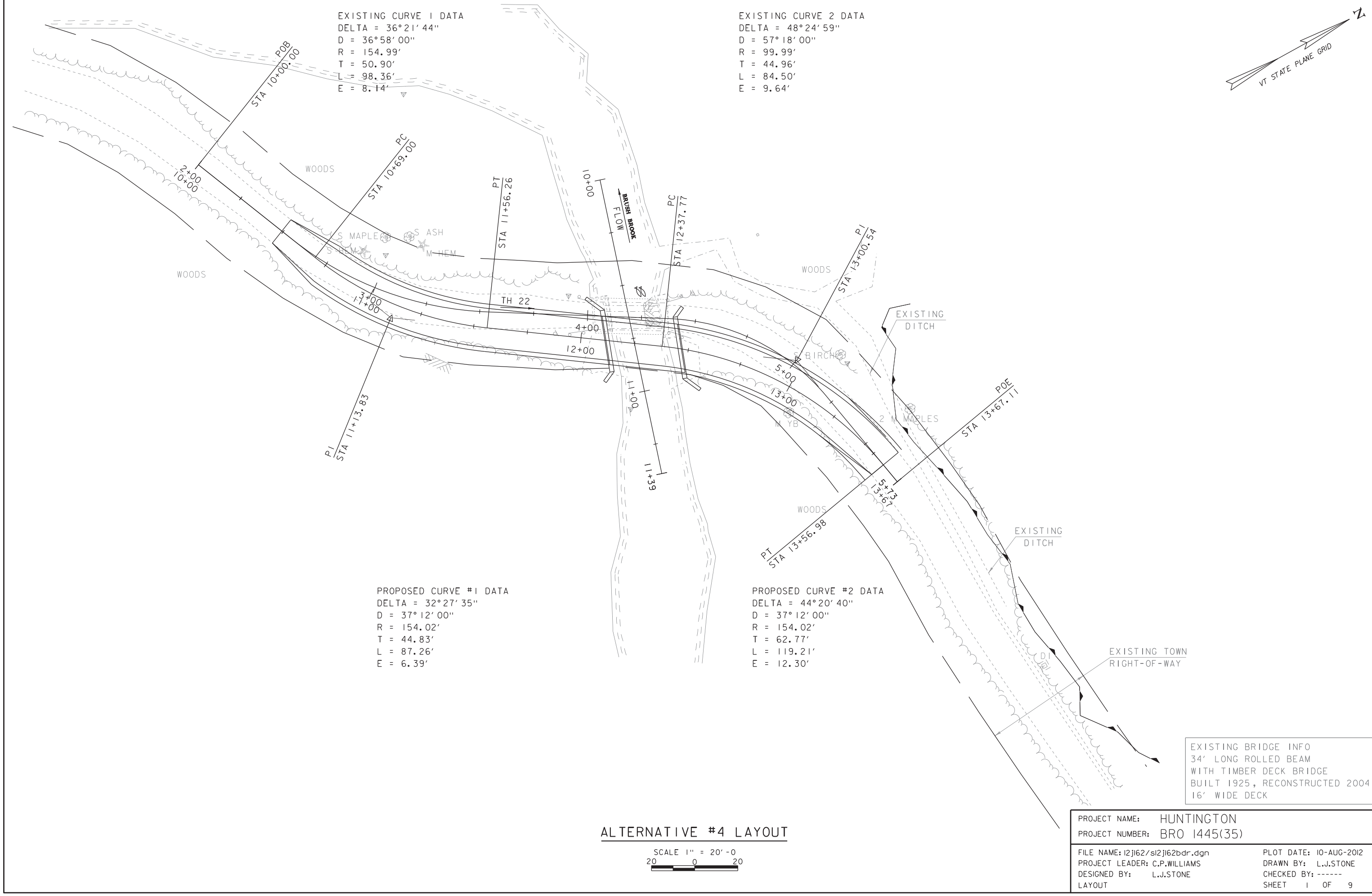

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R = 154.02′
T = 44.83′
L = 87.26′
E = 6.39′

PROPOSED CURVE #2 DATA
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D = 37°12′00″
R = 154.02′
T = 62.77′
L = 119.21′
E = 12.30′

EXISTING BRIDGE INFO
34′ LONG ROLLED BEAM
WITH TIMBER DECK BRIDGE
BUILT 1925, RECONSTRUCTED 2004
16′ WIDE DECK

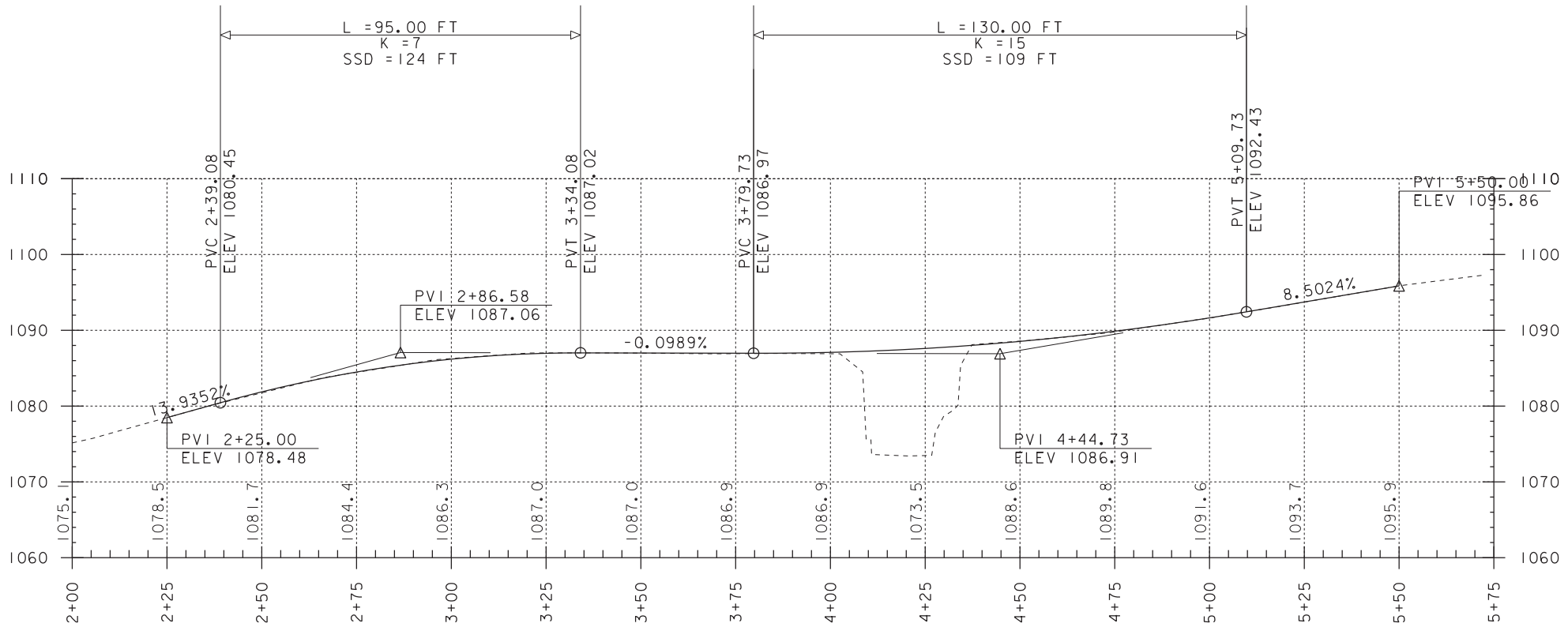
ALTERNATIVE #4 LAYOUT

SCALE 1″ = 20′-0
20 0 20

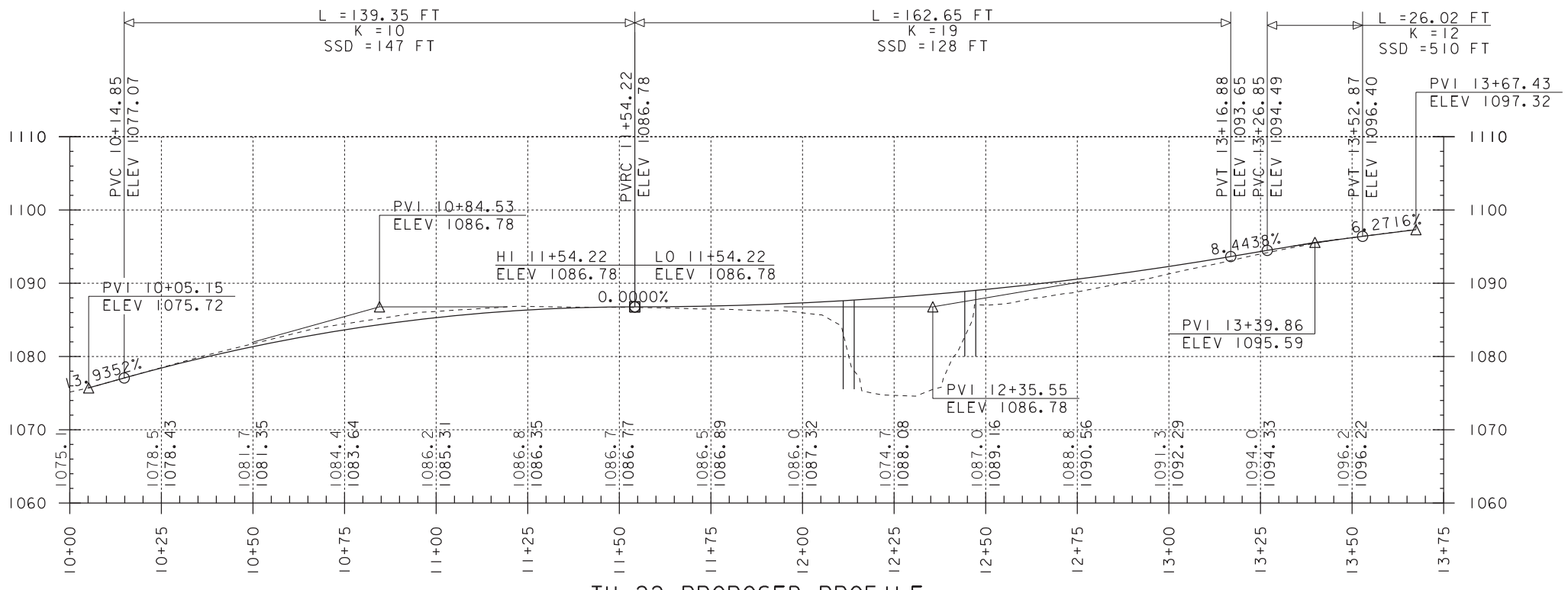
PROJECT NAME: HUNTINGTON
PROJECT NUMBER: BRO 1445(35)

FILE NAME: 12J162/sl2J162bdr.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
LAYOUT

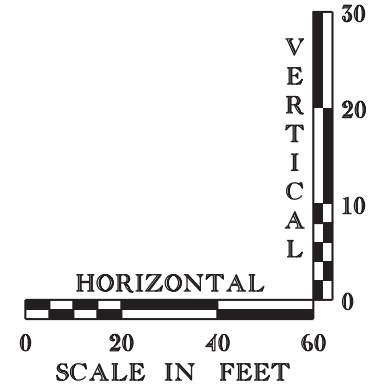
PLOT DATE: 10-AUG-2012
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 1 OF 9



TH 22 EXISTING PROFILE



TH 22 PROPOSED PROFILE

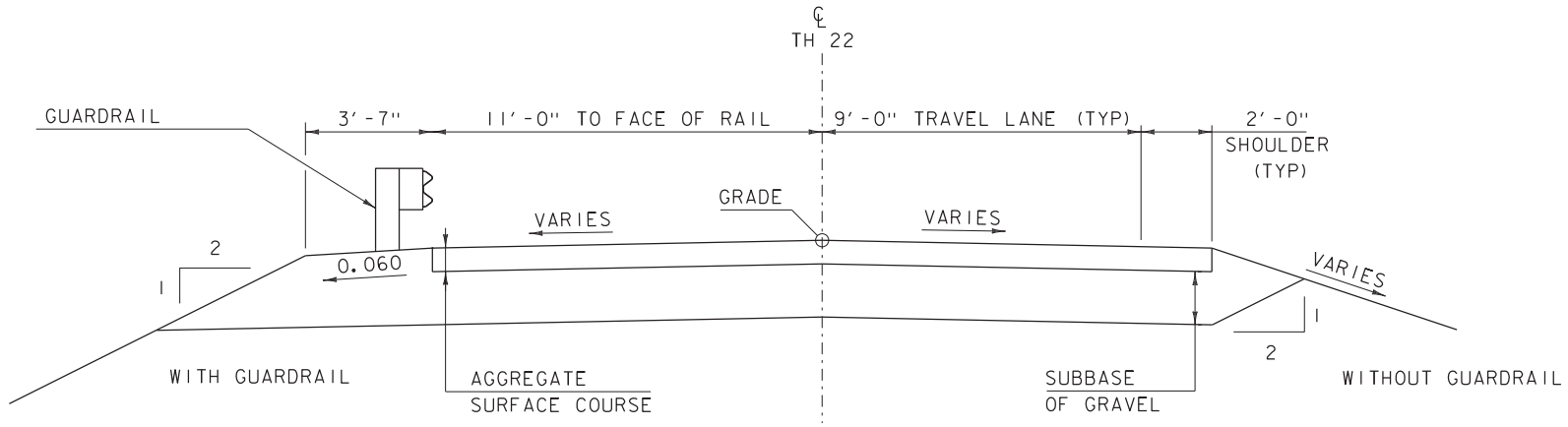


THE GRADES SHOWN TO THE NEAREST TENTH ARE THE OLD GROUND ALONG THE CENTERLINE. THE GRADES SHOWN TO THE NEAREST HUNDREDTH ARE THE PROPOSED FINISHED GRADE ALONG THE CENTERLINE.

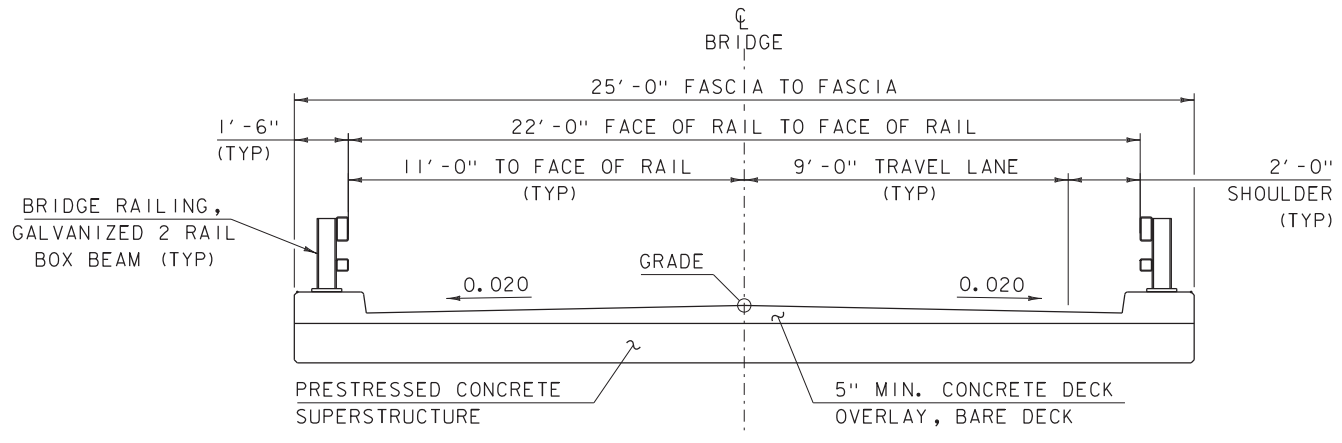
PROJECT NAME: HUNTINGTON
PROJECT NUMBER: BHO 1445(35)

FILE NAME: sl2jl62pro.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
PROFILE SHEET

PLOT DATE: 27-JUL-2012
DRAWN BY: L.J.STONE
CHECKED BY:
SHEET 3 OF 9



PROPOSED TH 22 TYPICAL SECTION



PROPOSED BRIDGE TYPICAL SECTION

PROJECT NAME:	HUNTINGTON
PROJECT NUMBER:	BRO 1445(35)
FILE NAME: sl2jl62typ.dgn	PLOT DATE: 27-JUL-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: ------
TYPICAL SECTIONS	SHEET 2 OF 9