STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR
West Haven BO 1443(51)

Town Highway 3, BRIDGE 10 OVER THE POULTNEY RIVER

September 16, 2014

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I. Site Information

Bridge 10 is a locally owned bridge located on Book Road (TH 3) located on the New York State border at the intersection with Cogman Road. The surrounding area is rural farmland. There is a parking area for a snowmobile trail on the west end of the bridge. The original pony truss bridge has been topped with a one-lane temporary Mabey Bridge. The bridge is located on a vertical crest. Both approaches are curved, and the bridge is located on a straight tangent. 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 Local Road (Class 2)
Bridge Type	Pony Truss topped with Maybe Bridge
Bridge Length	89 feet
Year Built	1921
Ownership	Town of West Haven, Vermont / Washington County, New York

Need

Bridge 10 carries Book Road across the Poultney River and serves as a bridge between the State of Vermont and the State of New York. The following is a list of deficiencies of Bridge 10 and Book Road in this location:

1. The original pony truss is in poor condition and has been topped with a Maybe Bridge due to this condition. The original truss has seen severe section loss of the bottom chord, end posts, and floor beam to gusset connections, as well as stringers and lateral bracing. The Maybe Bridge is only for temporary use until the pony truss is rehabilitated or replaced.

2. The westbound approach is overtopped in the Q_{10} storm event.

3. The existing horizontal and vertical alignments through the project location do not meet the current standard.

4. The lane and shoulder widths of the bridge and approaches are too narrow for the traffic volume, design speed and roadway classification.

5. One or both of the abutments have moved or rotated toward the stream and, the condition of the abutment concrete is poor. Additionally, the current abutments do not span the bank full width.

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	95	100
DHV	25	25
ADTT	15	15
%T	31.3	34.7
%D	63	63

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997 and chapters 2 and 4 of the New York Highway Design Manual, dated November 21, 2013. Minimum standards are based on an ADT of 100, a DHV of 25, and a design speed of 30 mph for a Local Road.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	9'/1' (20')	9'/2 (22')	Substandard
Bridge Lane and Shoulder Widths	VSS Section 4.7	8'/0'-8" (17'-4")	9'/2 (22')	Substandard
Clear Zone Distance	VSS Table 6.5		7' fill / 7' cut	
Banking	VSS Section 6.12	Normal Crown	8% (max)	Substandard
Speed		30 mph Warning Sign for Northbound Approach curve, otherwise Not Posted (50 mph)	30 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 400' (Eastbound Approach), R = 500' (Westbound Approach)	R_{min} = 386 @ e=6.8%	Substandard
Vertical Grade	VSS Table 6.6	-10.33% max	14% (max) for mountainous terrain	
K Values for Vertical Curves	VSS Table 6.1	K_{sag} = 10 (Eastbound Approach), K_{crest} = 7 (Bridge), K_{sag} = 13 (Westbound Approach)	30 crest / 40 sag	Substandard
Vertical Clearance	VSS Section 6.7	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 6.1	83'	200'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 6.7	0' shoulder	2' Shoulder	Substandard
Bridge Railing	Structures Design Manual Section 13	Built up W-Beams	TL-2	Substandard
Hydraulics	VTrans Hydraulics Section	1) Passes Q_{25} storm event with 3.6' of freeboard 2) Bank full width = 83'	1) Pass Q_{25} storm event with 1.0' of freeboard 2) Bank full width ≥ 100'	Substandard
Structural Capacity	SM, Ch. 3.4.1	Structurally Deficient	Design Live Load: HL-93	Substandard

Inspection Report Summary

Deck Rating	6 Satisfactory
Superstructure Rating	4 Poor
Substructure Rating	5 Fair
Channel Rating	7 Good

05/16/2011 - Original pony truss bridge supplemented with temporary one lane panel bridge. The Mabey panel bridge carries all legal loading requirements as per Town highways. Missing paddleboards should be reinstalled. Approach rail system at the northwestern end could use improvement where the box beam has been detached and is loose. Note: Condition ratings are for the temporary bridge as the original defunct truss was not inspected. ~MJ/DK

05/21/09 Structure's original bridge is in poor condition and continues to deteriorate. Temporary structure is in relatively good condition however several panels are loose and need to be retightened. ~MJK

Hydraulics
The existing bridge currently passes a 25 year storm event with 3.6 feet of freeboard. This meets the hydraulic standard of passing the 25 year storm event (Q_{25}) with one foot of freeboard below the low beam elevation of the bridge. The hydraulic capacity is essentially independent of the bridge length. If a total bridge replacement is considered, there are several combinations of span and low beam elevations that would also meet the hydraulic standard. These options are outlined in the preliminary hydraulics report in the Appendix. The roadway on the Vermont side of the bridge is overtopped during the 10 year event, and this will not change for any of the options being considered. Consequently, even though the bridge meets hydraulic standards, it would be closed in a 10 year event.

Utilities
The existing utilities are shown on the Existing Conditions Layout Sheet, and are as follows:

Municipal Utilities

- There are no municipal water or sewer facilities within the project area on either side of the river.

Public Utilities

Underground:
- There are no known (or apparent) underground utilities within the project area (on either side of the river).

Aerial:
- There is an aerial telephone cable which approaches the existing bridge from the south along NY County Highway # 10, which terminates at an existing pole (Pole # 415/NYT/4/1) near the south east corner of the existing bridge. This aerial cable crosses from the east side to the west side of NY County Highway # 10 approximately 350 feet south of the bridge.

It is anticipated that overhead utilities will have to be relocated for construction.

Right Of Way
The existing Right-of-Way is plotted on the Existing Conditions Layout Sheet. Depending on the alternative selected, additional rights may be necessary.

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

Biological:

Wetlands/Watercourses

There are wetlands within the project area. The wetland present is located on the southwestern side of the existing bridge. The wetland is an emergent/scrub shrub forested wetland. The wetland identified is roughly 2-5 acres in size. During the site visit the wetland exhibited signs of wetland hydrology, vegetation and soils. Primary functions and values would be wildlife habitat,

flood control and erosion control. According to the NYDEC website, wetlands < 12.4 acres in size do not need a State Wetlands permit although it would be regulated by the USCOE. Avoidance alternatives should be examined to avoid this area. If avoidance cannot be achieved it will be likely that further evaluation of the wetland will be required. No wetlands were found on the VT side of the bridge.

The Poultney River flows northerly through the project area. The Poultney River has a 236 sq. mi watershed which is a tributary to Lake Champlain. The waterway is classified as a warm water fisheries according the VT Water Quality Standards. This waterway provides opportunity to the public for fishing, boating, and wildlife habitat. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

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

Wildlife Habitat

Good Wildlife habitat exists within the surrounding area as it is a mix of forested and agricultural areas. GIS modeling suggests this area as moderate for wildlife movement through this area. Traffic volumes within this area are low allowing for opportunities for movement of wildlife.

Rare, Threatened and Endangered Species

There multiple mapped State listed rare, threatened or endangered species within the project area. The following species are known to exist in the vicinity of the project, although exact locations have not been evaluated:

Percina copelandi, Channel Darter (T)
Necturus maculosus, Mudpuppy (R)
Leptodea fragilis, Fragile Papershell (E)
Ichthyomyzon unicuspis, Silver Lamprey (R)
Lampsilis ovate, Pocketbook (E)
Potamilus alatus, Pink Heelsplitter (Y)
Lasmigona compressa, Creek Heelsplitter (R)
Ammocrypta pellucid, Eastern Sand Darter (T)
Ligumia recta, Black Sandshell (T)
Anodontoides ferussacianus, Cylindrical Papershell (E)
Notropis bifrenatus, Bridle Shiner (R)
Pyganodon grandis, Giant Floater (Y)
Lasmigona costata, Fluted –shell (E)
Pantherophis alleghaniensis, Eastern Rat Snake (R)

VT species are mostly aquatic and are within the Poultney River. Any work that is proposed within the waterway (abutment repair, pier placements, cofferdams, temporary causeways) will need to be assessed further by a consultant that specializes in freshwater mussel habitats and other aquatic species.

Federally mapped species that have potential to exist within the project area include:

Myotis sodalist (Indiana bat)

Activities associated with clearing vegetation as well as the bridge itself may involve potential habitat associated with this species.

Consultation with VT Fish and Wildlife will be ongoing regarding these species as the project moves further into design.

Agricultural

Prime soils (Middlebury Silt Loam) occur on both sides of the roadway in VT.

Hazardous Materials:

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

Historic:

Bridge 10 is a historic metal truss bridge listed in the National Register of Historic Places, and protected by State and Federal historic preservation regulations. If public funds are utilized in a project to repair or replace bridge 10 then the project will require a Section 4(f) and a Section 106 evaluation. There are no other historic resources within the project area.

Archeological:

The site is sensitive for pre-contact archaeology given the proximity to a major travel corridor and river convergence, positive environmental factors, and known archaeological site density. The project is located on a flood plain of the Poultney River and the stratified soil profile has the potential for deeply buried cultural material related to the native occupation of the area. Higher-terrace Archaic sites have been identified several hundred yards from the project location. Some site disturbance is evident within a tight perimeter around the abutments.

A series of maps showing the archaeological sensitivity in the APE as well as a pair of historic 1850s and 1860s maps depicting the area throughout the past 150 years can be found in the appendix. It appears that this area has been used as a travel corridor continuously since the mid-1800s. A zoomed-out map showing the locations of four known archaeological sites in the general project area can also be found in the appendix.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation reviews each new project to determine suitability for the 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 sooner. The Agency will consider the closure option on most projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Construction should provide enhanced safety for the workers and the travelling public while maintaining project quality. The following options have been considered:

Option 1: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed on either the upstream or downstream side of the existing bridge. A downstream temporary bridge would have temporary impacts to the intersection with Cogman Road, and to the gravel drive located before the bridge. The intersection would need to be temporarily reconfigured during construction. Both an upstream or downstream temporary bridge would have impacts to archeologically sensitive areas, and would require an archeological assessment. Additionally, an upstream temporary bridge would have impacts to wetlands, and could have potential impacts to species that have been categorized as rare, threatened, or endangered. Both an upstream and downstream temporary bridge would require additional rights from adjacent property owners.

A one-way temporary bridge would be required based on the daily traffic volumes. See the Temporary Bridge Layout Sheets in the appendix.

Advantages: Traffic flow can be maintained through the project corridor during construction.

Disadvantages: This option would require additional Right-of-Way acquisition for placement of the temporary bridge. This option would have adverse impacts to adjacent properties and resources. There would be decreased safety to the workers and to vehicular traffic, because of cars driving near the construction site, and construction vehicles entering and exiting the construction site. This traffic control option would be costly, and time consuming, as construction activities would take a second construction season, in order to set up the temporary bridge.

Option 2: Phased Construction

Phased construction is the maintenance of one way alternating traffic on the existing bridge while building one lane at a time of the proposed structure. This allows keeping the road open during construction, while having minimal impacts to adjacent property owners and environmental resources.

Due to horizontal constraints, this option is not being considered. In order to keep one lane open to traffic, approximately 12 feet of the existing bridge width needs to remain for Phase 1. The existing temporary bridge is 16 feet wide, which does not provide enough of a working width to make this method advantageous. In some circumstances, phased construction can be

accomplished with a shift in alignment. Due to the type and condition of the existing bridge, this is not recommended. Additionally, this option would increase the design and construction costs.

Option 3: Off-Site Detour

This option would close the bridge and reroute traffic onto an offsite detour. Since the bridge is located on a class 2 Town Highway, it would be the responsibility of the Town of West Haven (Vermont) and the County of Washington (New York) to choose the preferred detour route, and to sign it if a signed detour was preferred.

There are a couple possible routes that would be appropriate for a detour at this site. These routes vary in end-to-end distance from 11.6 miles to 14.6 miles. Regardless of the route chosen, it is likely that any of these routes could see increased traffic if TH 3 were closed during construction. Some possible detour routes which the Town of West Haven may want to consider are as follows:

1. Book Road, to Cogman Road, Bay Road (into New York), Co Road 10, Scotia Road, back to Book Road (11.6 mi end-to-end)

2. Book Road, to Main Road, VT 22A S, US 4 W, Golf Course Road, Co Road 11, Abair Road, Co Road 10 back to Book Road (14.6 mi end-to-end)

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. This option would not require the need to obtain rights from adjacent property owners for a temporary bridge. Also, this option would have minimal impacts to wetlands, protected species, or archaeological resources adjacent to the bridge. This option reduces the time and cost of the project both at the development stage and construction. This is the safest traffic control option since the traveling public is removed from the construction site.

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

III. Alternatives Discussion

No Action

This alternative is not recommended. The bridge is in poor condition and will continue to deteriorate. Additionally, it has been determined that the existing bridge can no longer carry traffic safely, and as such, a temporary bridge has been put on top of the existing bridge in order to remain open to traffic. Something will have to be done to improve this bridge in the near future. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Alternative 1: Truss Rehabilitation

A truss rehabilitation would include repairs to the truss and replacement of the abutments, deck and floor system. The project would consist of the following:

- Removing the existing pony truss for cleaning, replacement of deteriorated members (10 of the 23 primary members), strengthening of members, and repainting. Containment of lead paint and environment protection would be required. See Figure 1 below for estimated members that would need replacement, as indicated in Stantec's Scoping Report.

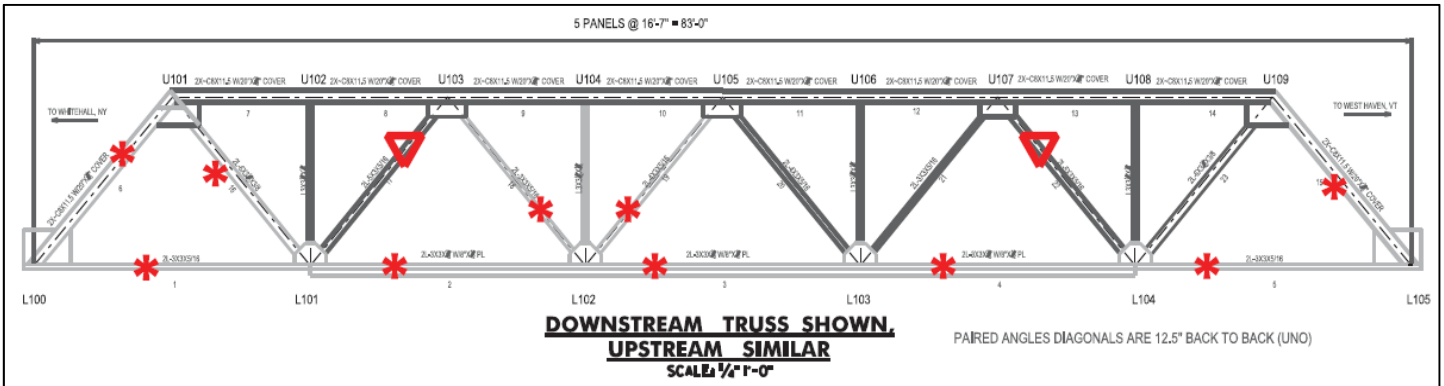


Figure 1: Estimated member replacement and repair.

[Image from Final Scoping Report "West Haven Bridge 10 (T.H.3 – Book Rd./Poultney River) Evaluation and Scoping" from Stantec (3/27/2012).]

- Replacing the existing abutments, and placing the rehabbed truss on new bearings on the new abutments

- Constructing a new floor system (floor beams, stringers, and lateral bracing), and deck (with a lightweight deck system such as a fiber reinforced polymer deck).

The existing lane widths and shoulders on the original bridge (prior to installation of the Maybe Panel Bridge) are 8 feet wide and 8 inches wide respectively. It is proposed that the new bridge would maintain the existing width to have 8 foot lanes with no shoulders. This does not meet the minimum standards as set forth by the Vermont State Standards. Widening the existing structure is not prudent since almost all truss members would need replacement.

The existing substructure is in unsatisfactory condition, and it is reasonable to assume that the existing substructure cannot safely carry anticipated traffic loads for an extended period of time. The abutments have moved or rotated toward the stream. Additionally, the existing concrete is in poor condition. As such, a full replacement of the existing abutments is warranted.

If shallow bedrock is encountered, the substructures will be spread footings on bedrock. Otherwise, the abutments will be spread footings founded on piles. In order to reduce construction time, precast abutments may be used.

Advantages: This alternative would address the structural deficiencies of the existing bridge, with minimum disruption to the historic value of this bridge. This option would have minimal impacts to adjacent properties, wetlands, and archeological resources.

Disadvantages: The current bridge does not meet the hydraulic bank full width of 100 feet, which this option does not improve. This option would require Right-of-Way acquisition. There would be long term maintenance requirements for cleaning and painting the truss steel.

Additionally, this option would not meet the minimum width requirements and would have a reduced loading capacity.

Maintenance of Traffic: Either a temporary bridge, or an offsite detour could be utilized for traffic control for this alternative.

Alternative 2: Full Bridge Replacement – 140' Span Steel Beam Bridge On-Alignment

This alternative would replace the existing bridge with a new economical superstructure as well as a new substructure at the existing location. Additionally, this option would have impacts to the snowmobile trail drive and would require Right-of-Way acquisition. The various considerations under this option include: the alignment, the bridge width and length, skew, superstructure type and substructure type.

a. Alignment

The existing alignment does not meet current standards. However, there are extensive archaeologically sensitive lands in the project area, and an off-alignment bridge would have negative impacts to these resources. An off-alignment bridge would also have more expensive roadway costs, as the project length would be extended to match back into the existing roadway. Additionally, an off-alignment bridge would require a curved superstructure.

Since the off-alignment option would be more expensive, due to extended project limits, a curved structure type, additional resource permitting, and more extensive Right-of-Way acquisition, a new bridge will only be evaluated on the existing alignment. Additionally, while an off alignment option would improve the substandard horizontal geometry, a design exception for the substandard vertical alignment would still be necessary; therefore, it is not advantageous to pursue an off-alignment alternative.

b. Bridge Width

The current rail to rail width is 17'-4". This does not meet the minimum standard of 22 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22 foot width (rail to rail) bridge will be proposed.

c. Bridge Length and Skew

The existing bridge has a span of 83 feet and no skew. An integral abutment would be appropriate for this site due to the soil types present. Based on integral abutment bridge layout, a 140 foot span bridge is appropriate. The natural channel is perpendicular to the bridge. Therefore it is proposed that any new bridge have no skew to match the existing site conditions.

d. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The most economical 140' span length bridge types that are most commonly used in Vermont are a composite steel with concrete deck superstructure (PBU's) or precast deck panels. Due to the span length, PBU's may need to have a splice for shipping. These types of superstructures would require very little long term maintenance. An on-alignment bridge would utilize straight beams.

e. Substructure Type

There is no visible bedrock in the location of the project. Additionally, the western bank has been subject to erosion. Based on available information on nearby water wells, the site may contain soils that are conducive to driving piles. Integral abutments on a single row of piles are recommended. Borings should be taken early in the design process to verify the in-situ conditions. In order to reduce construction time, precast abutments may be used.

Maintenance of Traffic:

Either a temporary bridge or an offsite detour could be utilized for traffic control at this site.

Alternative 3: Full Bridge Replacement – 100' Span Truss On-Alignment

The current alignment does not meet current standards, but from a constructability standpoint, a truss should be on a straight tangent. Therefore, any new structure will be evaluated only on the existing horizontal alignment. By placing a new bridge on the existing horizontal alignment, project limits and impacts to resources will also be minimized.

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

There are several stipulations set forth by the VTrans HPO regarding the construction of a new truss. They are as follows:

- The new truss shall be a warren pony truss with the following geometric properties, to be similar in proportion to the existing structure:
  - Span to be 83 feet to 100 feet to be similar to the existing 83 foot span
  - Depth of truss to be 10 to 13 feet to be similar to existing 10 foot deep truss
  - Width of roadway to be less than or equal to 22 foot rail to rail to be similar to the existing 17'-4" wide travel way
  - Member sizes to be in proportion to the existing structure and similar in type to the existing where possible, including matching webbing of members similar to existing where not detrimental to the structures' longevity
- Connections at gusset plates shall be bolted.
- Approach railing and bridge railing shall be tube type railing.
- Bridge railing shall be painted to match bridge elements.
- Bridge shall have concrete abutments with flared wingwalls similar in proportion to existing.
- Paint color shall be Black or Green; Color Galvanizing is OK, but weathering steel is not.

Figure 2: Historic Guidelines for New Bridge

[Figure from Final Scoping Report "West Haven Bridge 10 (T.H.3 – Book Rd./Poultney River) Evaluation and Scoping" from Stantec (3/27/2012).]

a. Bridge Width

The current rail to rail width is 17'-4". This does not meet the minimum standard of 22 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22 foot width (rail to rail) bridge will be proposed.

b. Bridge Length and Skew

The existing bridge has a span of 83 feet and no skew. If a new truss were constructed, a 100 foot span bridge would be proposed in order to match the characteristics of the existing historic bridge, to uphold the historic character. The natural channel is perpendicular to the bridge. Therefore it is proposed that any new bridge have no skew to match the existing site conditions.

c. Superstructure Type

This option would provide a new warren pony truss, similar to the existing truss. The truss should be constructed with galvanized steel for long term durability, and follow the stipulations set forth in Figure 2 above. The truss would require periodic maintenance for the cleaning and painting of steel members.

d. Substructure Type

There is no visible bedrock in the location of the project. Additionally, the western bank has been subject to erosion. Based on available information on nearby water wells, the site may contain soils that are conducive to driving piles. If shallow bedrock is encountered, the substructures will be spread footings on bedrock. Otherwise, the abutments will be spread footings founded on piles. In order to reduce construction time, precast abutments may be used.

Maintenance of Traffic:

Either a temporary bridge or an offsite detour could be utilized for traffic control.

Alternative 4: Existing Truss Used as Ornamental Fascia Treatment on New Bridge

This option would include repairs to the truss so that it can safely support its own dead load, replacement of all bridge components, and placement of the truss on the substructure, separate from the bridge, for ornamental purposes.

This alternative would replace the existing bridge with a new economical superstructure as well as a new substructure at the existing location. In order to use the existing straight pony truss portions as an ornamental treatment, the new bridge would need to be placed on alignment on the existing straight tangent. The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

a. Bridge Width

The current rail to rail width is 17'-4". This does not meet the minimum standard of 22 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22 foot width (rail to rail) bridge will be proposed.

b. Bridge Length and Skew

The existing bridge has a span of 83 feet and no skew. The proposed bridge span would need to match the existing span, in order to use the existing pony truss ornamentally. Therefore, an 83 foot span will be proposed. The natural channel is perpendicular to the bridge. Therefore it is proposed that any new bridge have no skew to match the existing site conditions. The current bridge does not meet the hydraulic bank full width of 100 feet, which this option does not improve.

c. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The most economical 83 foot span bridge type that is most commonly used in Vermont, is a composite steel with concrete deck superstructure. This type of superstructure would require very little long term maintenance.

d. Substructure Type

There is no visible bedrock in the location of the project. Additionally, the western bank has been subject to erosion. Based on available information on nearby water wells, the site may contain soils that are conducive to driving piles. If shallow bedrock is encountered, the substructures will be spread footings on bedrock. Otherwise, the abutments will be spread footings founded on piles. In order to reduce construction time, precast abutments may be used.

Maintenance of Traffic: Either a temporary bridge, or an offsite detour could be utilized for traffic control for this alternative.

Alternative 5: Full Bridge Replacement – 100' Span Steel Beam Bridge On-Alignment

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

a. Alignment

The existing alignment does not meet current standards. However, there are extensive archaeologically sensitive lands in the project area, and an off-alignment bridge would have negative impacts to these resources. An off-alignment bridge would also have more expensive roadway costs, as the project length would be extended to match back into the existing roadway. Additionally, an off-alignment bridge would require a curved superstructure.

Since the off-alignment option would be more expensive, due to extended project limits, a curved structure type, additional resource permitting, and more extensive Right-of-Way acquisition, a new bridge will only be evaluated on the existing alignment. Additionally, while an off alignment option would improve the substandard horizontal geometry, a design exception for the substandard vertical alignment would still be necessary; therefore, it is not advantageous to pursue an off-alignment alternative.

b. Bridge Width

The current rail to rail width is 17'-4". This does not meet the minimum standard of 22 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22 foot width (rail to rail) bridge will be proposed.

c. Bridge Length and Skew

The existing bridge has a span of 83 feet and no skew. Hydraulics has recommended a minimum bank full width of 100 feet. This alternative will satisfy the minimum span requirements for hydraulics by providing a 100 foot span. The natural channel is perpendicular to the bridge. Therefore it is proposed that any new bridge have no skew to match the existing site conditions.

d. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The most economical 100' span length bridge types that are most commonly used in Vermont are a composite steel with concrete deck superstructure (PBU's) or precast deck panels. These types of superstructures would require very little long term maintenance. An on-alignment bridge would utilize straight beams.

e. Substructure Type

There is no visible bedrock in the location of the project. Additionally, the western bank has been subject to erosion. Based on available information on nearby water wells, the site may contain soils that are conducive to driving piles. If shallow bedrock is encountered, the substructures will be spread footings on bedrock. Otherwise, the abutments will be spread footings founded on piles. In order to reduce construction time, precast abutments may be used. Integral abutments would not be recommended for a 100 foot span at this location, since the abutments would be taller than preferred for this type of design.

Maintenance of Traffic:

Either a temporary bridge or an offsite detour could be utilized for traffic control at this site.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, there are several viable alternatives. An offsite detour has been assumed as the preferred method of traffic control for comparison purposes. A temporary bridge would add approximately $175,000 to the total project cost, and would have additional impacts to adjacent properties and environmental resources. The alternatives considered are:

Alternative 1: Truss Rehabilitation
Alternative 2: Full Bridge Replacement On-Alignment with 140' Span Steel Beam Bridge
Alternative 3: Full Bridge Replacement On-Alignment with New 100' Span Warren Pony Truss
Alternative 4: Existing Truss Used as Ornamental Fascia Treatment on New 83' Span Steel Beam Bridge
Alternative 5: Full Bridge Replacement On-Alignment with 100' Span Steel Beam Bridge

V. Cost Matrix[1]

West Haven BO 1443(51)		Do Nothing	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
			Truss Rehabilitation with 83' Span on Spread Footings	Bridge Replacement with 140' Span Steel Beam Bridge on Integral Abutments	Bridge Replacement with 100' Span New Warren Pony Truss on Spread Footings	Ornamental Fascia Treatment on 83' Span Steel Beam Bridge on Spread Footings	Bridge Replacement with 100' Span Steel Beam Bridge on Spread Footings
			O F F S I T E D E T O U R				
COST	Bridge Cost	$0	$1,295,500	$947,200	$1,409,000	$1,185,500	$1,149,000
	Removal of Structure	$0	$80,000	$80,000	$80,000	$80,000	$80,000
	Roadway	$0	$313,800	$185,400	$230,400	$313,800	$230,400
	Maintenance of Traffic	$0	$60,000	$20,000	$40,000	$40,000	$40,000
	Construction Costs	$0	$1,749,300	$1,232,600	$1,759,400	$1,619,300	$1,499,400
	Construction Engineering + Contingencies	$0	$524,790	$369,780	$527,820	$485,790	$449,820
	Total Construction Costs w CEC	**$0**	**$2,274,090**	**$1,602,380**	**$2,287,220**	**$2,105,090**	**$1,949,220**
	Preliminary Engineering[2]	**$0**	**$433,325**	**$308,150**	**$351,880**	**$323,860**	**$299,880**
	Right of Way	**$0**	**$45,000**	**$45,000**	**$45,000**	**$45,000**	**$45,000**
	Total Project Costs[3]	$0	$2,756,415	$1,955,530	$2,684,100	$2,473,950	$2,294,100
	Annualized Costs	$0	$34,460	$24,450	$33,550	$30,920	$28,680
SCHEDULING	Project Development Duration[4]		4 years	4 years	4 years	4 years	4 years
	Construction Duration		8 months	8 months	8 months	8 months	8 months
	Closure Duration (If Applicable)		8 weeks	4 weeks	8 weeks	8 weeks	8 weeks
ENGINEERING	Typical Section - Roadway (feet)	22'	22'	22'	22'	22'	22'
	Typical Section - Bridge (feet)	0.667-8-8-0.667	0-8-8-0	2-9-9-2	2-9-9-2	2-9-9-2	2-9-9-2
	Geometric Design Criteria	Substandard width, horizontal and vertical curve	Substandard width, horizontal and vertical curve	Substandard horizontal and vertical curve	Substandard horizontal and vertical curve	Substandard horizontal and vertical curve	Substandard horizontal and vertical curve
	Traffic Safety	No Change	Posted for H-20	Improved	Improved	Improved	Improved
	Alignment Change	No	No	No	No	No	No
	Bicycle Access	No Change	No Change	Improved	Improved	Improved	Improved
	Hydraulic Performance	Does not meet bank full width requirements	Does not meet bank full width requirements	Meets Criteria	Meets Criteria	Does not meet bank full width requirements	Meets Criteria
	Pedestrian Access	No Change	No Change	Improved	Improved	Improved	Improved
	Utility	No Change	No Change	Relocation	No Change	No Change	No Change
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	Yes	Yes	Yes	Yes	Yes
	Design Life	<10 years	80 years[5]	80 years	80 years	80 years	80 years
	Meets Historic Requirements/Eligible for Federal Funding	Yes	Yes	No	Yes	No	Yes

[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] No local share for Vermont as per 19 V.S.A § 309a. (http://www.leg.state.vt.us/statutes/fullsection.cfm?Title=19&Chapter=003&Section=00309a).
[4] Project Development Durations are starting from the end of the Project Definition Phase.
[5] The costs of rehabilitation include a second project 40 years out, to replace the remaining primary members that were not replaced in this original project.

VI. Conclusion

We recommend a full bridge replacement on-alignment while maintaining traffic on an offsite detour with a 4 to 8 week bridge closure.

Structure Discussion:

Alternative 1: Truss Rehabilitation
The substructure is rated as fair, and inspections have revealed that the substructure concrete is in poor condition and full substructure replacement is warranted. The existing superstructure is rated as poor. As such a truss rehabilitation project would be costly as nearly half of the primary truss members would need to be replaced. Additionally, a truss rehabilitation would have a reduced loading capacity. The bridge is surrounded by agricultural land, and the bridge is used by heavy farm equipment, as such, a reduced loading capacity would not be ideal. Therefore, alternative 1 is not recommended.

There are several options available for a full bridge replacement, as detailed above in Alternatives 2 through 5. A new bridge will result in a brand new 80 year bridge, with minimal future maintenance requirements.

Alternative 2: 140' Span Steel Beam Bridge on Integral Abutments
This option is the least expensive due to the substructure type. The elimination of cofferdams from construction as well as a lower volume of substructure concrete drives down the price considerably. However, this alternative is least like the original truss in terms of span and superstructure type, and thus it may be more difficult to meet the necessary Section 4(f) and Section 106 historic permit requirements.

Alternative 3: 100' Span New Warren Pony Truss on Spread Footings
This alternative provides a new pony truss, similar to the existing in height, with a span of 100 feet to match the bank full width. The new truss would have bolted connections, similar to the existing truss and be painted either green or black. This alternative is the most expensive, but may be required in order to obtain necessary permitting for historic preservation.

Alternative 4: 83' Span Steel Beam Bridge with Ornamental Fascia Treatment on Spread Footings
Alternative 4 does not meet hydraulic requirements. Additionally, historic representatives have indicated that using the existing truss ornamentally does not offer historic value, but does increase the total cost of the project, and as such alternative 4 is not recommended.

Alternative 5: 100' Span Steel Beam Bridge on Spread Footings
Alternative 5 provides a shorter span steel beam bridge. Due to the shorter span, this alternative would utilize spread footings, making it more expensive than the 140' steel beam bridge option. A 100' span may be more beneficial from an environmental and historic standpoint since this span more closely matches the existing.

There are several parties involved in making the final decision on what should replace the existing historic warren pony truss. These parties include the Historic Preservation Officers for both New York and Vermont, environmental specialists from both New York and Vermont, and the local and state governments. Collaboration between these parties should take place in order to choose the recommended scope of work.

Traffic Maintenance:

The recommended method of traffic control is to close the bridge for 4 or 8 weeks (see the matrix for bridge closure duration associated with each alternative), and maintain traffic on an offsite detour. The most appropriate detour for this project location would add approximately 1.2 miles to the through route, and have an end-to-end distance of 11.6 miles.

This option will have smaller impacts to adjacent properties and surrounding environmental resources and will not require additional Right-of-Way acquisition for a temporary bridge. The ADT on TH 3 is 95, which is considered relatively low. Additionally, there are several reasonable detour routes that could be signed by the Towns of West Haven and Whitehall. Therefore, it is reasonable to close the road and reroute traffic while the new bridge is being constructed. By not providing a temporary bridge, the project cost is significantly reduced. Additionally the option to close the road is the safest option.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archeology Memo
- Historic Memo
- Local Input
- Detour
- Plans
    - Existing Conditions
    - Proposed Typical Sections
    - Alternative 1 Layout and Profile
    - Alternative 2 Layout and Profile
    - Alternative 3 Layout and Profile
    - Alternative 4 Layout and Profile
    - Alternative 5 Layout and Profile
    - Temporary Bridge Layout

Northbound Approach.

Southbound Approach.

Looking Upstream.

Looking Downstream.

Bridge Deck.

Floor beam deterioration.

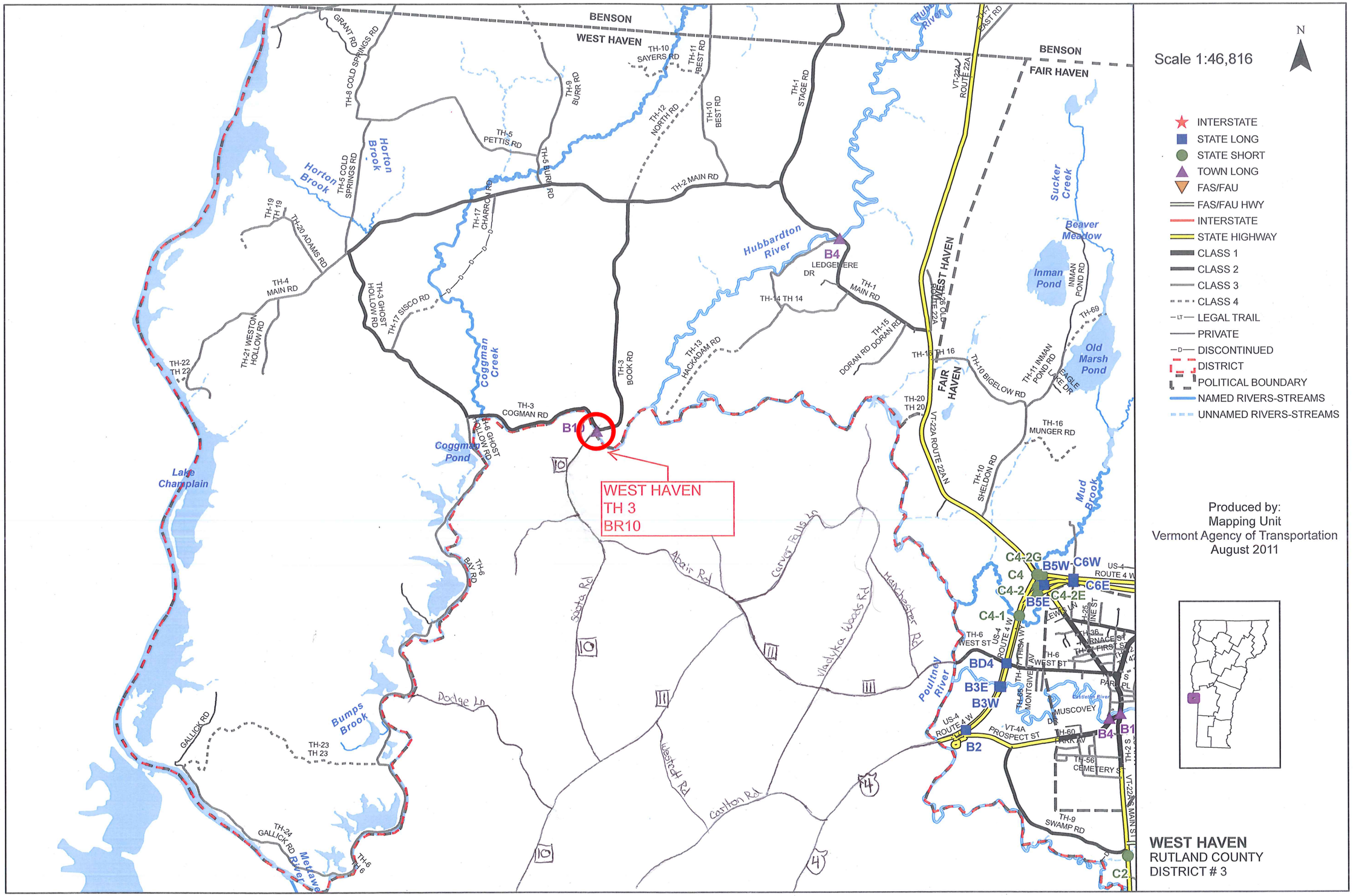
Gusset Plate distortion.

End post section loss (TYP).

Bearing at southwest corner.

Southern abutment.

Northern abutment.



New York roads are shown at approximate location

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for WEST HAVEN **bridge no.:** 00010 **District:** 3

Located on: C2003 **over** POULTNEY RIVER **approximately** 2.16 MI TO JCT W CL2 TH **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 6 SATISFACTORY

Superstructure Rating: 4 POOR

Substructure Rating: 5 FAIR

Channel Rating: 7 GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 101127001011271

Federal Sufficiency Rating: 038.7

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1921 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 12

ADT: 000100 **% Truck ADT:** 02

Year of ADT: 2007

GEOMETRIC DATA

Length of Maximum Span (ft): 0083

Structure Length (ft): 000089

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 18

Deck Width Out-to-Out (ft): 18.2

Appr. Roadway Width (ft): 020

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: MABEY BRIDGE

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: 6 BITUMINOUS

Type of Membrane: 2 PREFORMED FABRIC

Deck Protection: 7 CCA.CREOSOTED WOOD

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: 2 INTOLERABLE, REPLACEMENT NEEDED

Deck Geometry: 0 BRIDGE CLOSED

Underclearances Vertical and Horizontal: 0 BRIDGE CLOSED

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): 5 NO RATING ANALYSIS PERFORMED

Posting Status: E OPEN, TEMPORARY STRUCTURE

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: 102013 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

10/25/2013 - Mabey bridge is in satisfactory condition. The old truss continues to deteriorate. Remove from 12 month frequency. Recent survey in area for bridge upgrade. ~ MJ/JS

05/16/2011 - Original pony truss bridge supplemented with temporary one lane panel bridge. Mabey panel bridge carries all legal loading requirements as per Town highways. Missing paddleboards should be reinstalled. Approach rail system at the northwestern end could use improvement where the box beam has been detached and is loose. ~ MJ/DK

05/21/09 Structure's original bridge is in poor condition and continue to deteriorate. Temporary structure is in relatively good condition however several panels are loose and need to be retightened. ~MJK

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Ryan Lizewski, Hydraulics Project Engineer (VHB)
via Nick Wark, VTrans Hydraulic Engineer

DATE: November 14, 2013

SUBJECT: WEST HAVEN – BO 1443(51),
C2003 BR10 over the POULTNEY RIVER

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

Existing Bridge Information

The site is located on C2003 in the Town of West Haven, approximately 42,000 feet upstream of the confluence with Lake Champlain. There are record plans available. The original date of construction for the original bridge appears to be 1921 based on the Structure Inspection, Inventory. It is a single span mabey style bridge. The existing abutments are concrete with stone fill. Other properties of the bridge include:

Number of Lanes	2	
Number of Spans	1	
Bridge Skew Angle	0	deg
Abutment Skew Angle	0	deg
Width: Out to Out	18.2	ft
Approach Width	20	ft
Span	83	ft
Superstructure Depth	4.9	ft
Low Chord Elevation	116.9	ft (NAVD)
Opening Height	23.6	ft

The existing bridge meets the hydraulic standard. The bridge passes the Q_{25} storm (with 3.6 feet of freeboard). The standard requires a minimum of 1 foot of freeboard for the Q_{25} discharge for town routes. However, the approach road to the east is overtopped in the Q_{10} storm which may make the bridge impassible.

Recommendations

The bridge replacement option selection criteria should at a minimum meet the hydraulic standard and to the extent practicable provide a bridge opening that does not restrict the bank full width, nor provide an unrealistic widening of the existing channel, nor create any worse backwater flooding conditions than the existing conditions.

The Vermont Agency of Natural Resources (VANR) Bank Full Width (BFW) Equation estimates the BFW of Poultney River to be approximately 145 feet, but the estimated BFW width within the study reach area is approximately 100 feet based on actual field conditions. The existing bridge does

not currently span the BFW, the current span is approximately 78 feet between the abutments at the waterline.

It has been assumed that if the existing bridge is replaced, a replacement structure will be located in the existing roadway alignment having the same basic surface geometry based on the site constraints.

- The first option analyzed maintains the existing 83 foot clear span and increases the bridge width from 18.2 feet to 20 feet in order to match the roadway approach width. This option maintains the existing near vertical abutments with stone fill at the existing ground elevation; as shown in Figure 1. This option meets the VTrans hydraulic requirement to pass the Q25 flow with 1 foot of freeboard. The model predicts 3.6 feet of freeboard with a low chord elevation of 116.9 feet. The low chord elevation may be as low as 114.3 and meet the hydraulic standard without impacting the Q100 water surface elevation. This option does not span the BFW of 100 feet.

- A second option analyzed widens the existing bridge to a 100 foot clear span with vertical abutments and stone fill at ground elevation; as shown in Figure 2. This option assumes a 20 foot bridge width to match the roadway approach width. This option meets the VTrans hydraulic requirement to pass the Q_{25} flow with 1 foot of freeboard. The model predicts 3.8 feet of freeboard with a low chord elevation of 116.9 feet. The low chord elevation may be as low as 114.1 and meet the hydraulic standard without impacting the Q_{100} water surface elevation. This option spans the BFW of 100 feet.

- The third option assumes integral abutments with stone fill at a 1.5(h):1(v) slope; as shown in Figure 3. The integral abutments result in widening of the existing bridge to a 140 foot clear span in order to span the BFW at the waterline. This option meets the VTrans hydraulic requirement to pass the Q_{25} flow with 1 foot of freeboard. The model predicts 2.8 feet of freeboard with a low chord elevation of 115.7 feet. The low chord elevation may be as low as 113.9 and meet the hydraulic standard without impacting the Q_{100} water surface elevation. This option spans the BFW of 100 feet.

The approach roadway to the existing bridge is overtopped in the Q_{10} storm, which contributes significantly to flood conveyance of the Poultney River. Changing the approach roadway grades will have an impact on water surface elevations through the structure.

The modeling predicts no change in water surface elevations upstream or downstream from the bridge during the Q_{100} flow for all options analyzed.

Scour was not reviewed during the preliminary design. However based on the velocities from the analyses, it is anticipated that a minimum of Type III Stone Fill will be necessary for armoring the abutments and disturbed channel banks near the replacement structure. Stone fill sizing will be verified during final hydraulic design.

<u>Temporary Bridge</u>
As part of this analysis we did not size a temporary bridge. If a temporary bridge is determined to be necessary let us know and we will work with you to size one.

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

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

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

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

Date: October 24th, 2013

Subject: West Haven BO 1443(51) – BR # 10 Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge #10 on Town Highway 3 (Book Road) crossing over the Poultney River in the Town of West Haven, Vermont. The subject project consists of replacing the current temporary Mabey Bridge residing over the original pony truss bridge with a new permanent structure. This report documents our initial search of historical information to determine the characteristics of the site. A number of materials were reviewed including: VTrans boring files and record plans, Agency of Natural Resources (ANR) Natural Resources Atlas, USDA Surficial Geologic maps, and VTrans Bridge Inspection Photos.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

No record plans were found for the subject bridge, constructed in 1921, on the DPR website. Additional surrounding projects were searched for in the Soils & Foundations' GIS based historical record of subsurface investigations which contain electronic records for the majority of borings completed in the past 10 years. An exploration of this map revealed no recent projects drilled in the Town of West Haven.

Water Well Logs & USDA Soil Survey

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Based on subsurface information reported by well drilling reports on file at ANR and the USDA web soil survey, the surficial geology in the vicinity of the subject area is expected to consist of loamy alluvial deposits.

Figure 1 contains BR #10 for the subject project as well as a surrounding well found using the ANR Natural Resources Atlas. Published online, the well logs can be used to determine general characteristics of soil strata in the area. The soil description given on the logs is done in the field, by unknown personnel, and as such, should only be used as an approximation. The well used to gain information on the subsurface conditions is highlighted by a red box. One water well within an approximate 2,740 ft radius was used to estimate the depth to bedrock likely to be encountered for BR #10.

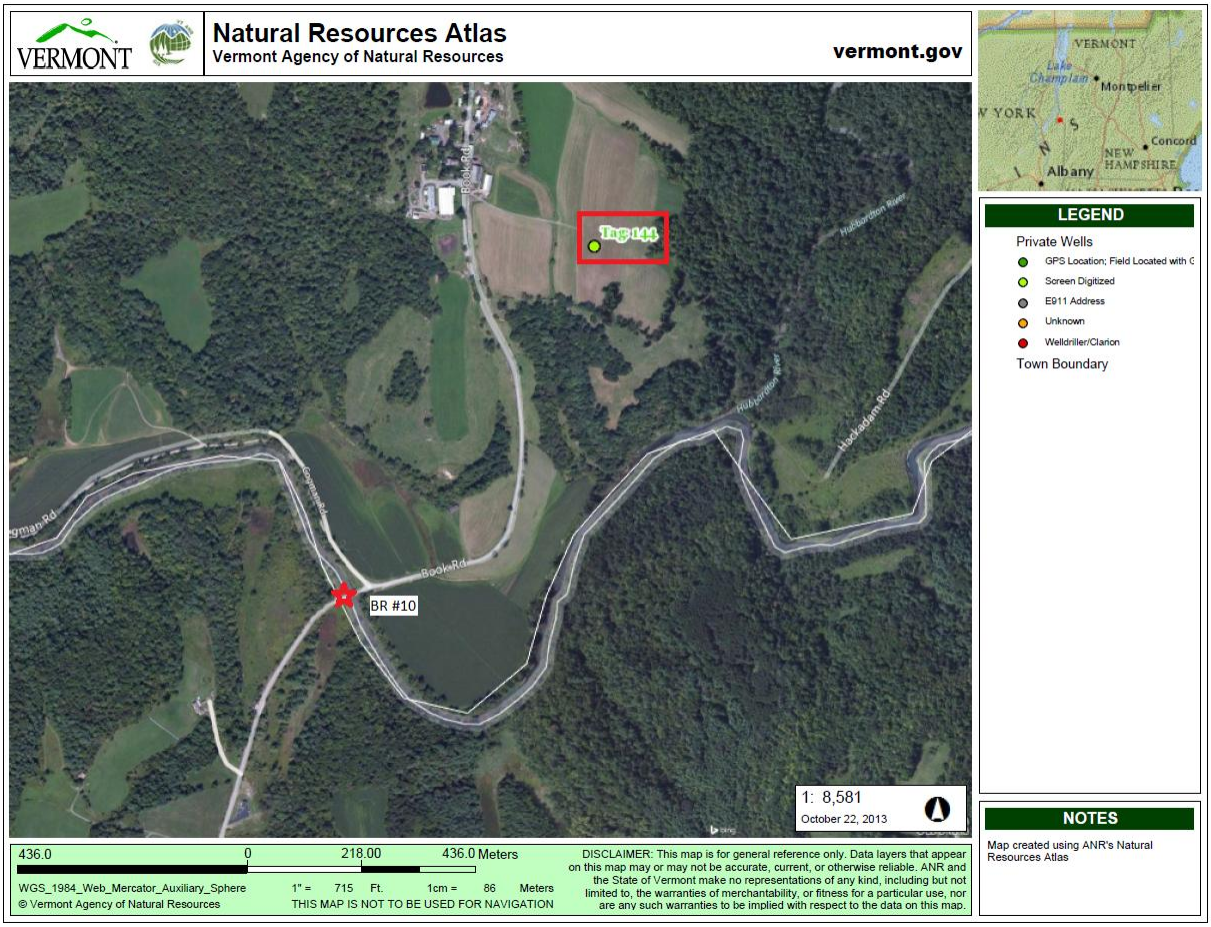


Figure 1. Highlighted Bridge and Well Location

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

Table 1. Well Information Including Depths to Bedrock

Well Number	Approximate Distance From Project (feet)	Approximate Depth To Bedrock (feet)
77	2,740	30

Information from this well suggests shallow bedrock may be encountered during drilling operations. However, due to the fact that only one well was present within a 3,000 ft radius, this information should be considered ancillary. Information about the bedrock, taken from the ANR Natural Resource Atlas, indicates "medium-to dark-gray and mottled, medium-to thick-bedded dolomitic limestone and buff weathering dolostone".

Based on the USDA Soil Map, the soils to be encountered on the Vermont side of the bridge are classified as Middlebury Loam and are moderately well drained with 0-2% slopes. The depth to bedrock is greater than 80 inches and the depth to groundwater is around 6-24 inches. These soils have occasional to no flooding. The soils on the New

York side of the bridge are classified as Hudson and Vergennes Soils, steep and very steep and are moderately well drained with 25-50% slopes. The depth to bedrock is greater than 80 inches and the depth to groundwater is around 18-24 inches. These soils are not prone to flooding.

2.4 Bridge Inspection Photos

Based on the bridge inspection photos from May 2005, the original pony truss bridge has failed and severely deteriorated as can be seen in Figure 2 below.

Figure 2. Truss Failure and Severe Rust Deterioration

Due to the failed bridge, a temporary Mabey Bridge was set in place over the existing pony truss bridge. The temporary bridge is restricted to single lane traffic and limited visibility is evident on both approaches. Figure 3 below shows a picture of the temporary bridge deck taken during the latest bridge inspection in May 2011. Based on the latest bridge inspection report, some of the deficiencies include missing paddleboards that need to be replaced and the approach rail system at the northwestern end needs some improvement where the box beam has become loose and detached.

Figure 3. Temporary Bridge – Deck View

3.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on October 23rd, 2013 to determine possible obstructions inhibiting boring operations and other site characteristics. Information from this visit indicated no above ground utilities located at the bridge. There are a few power lines along the southwest corner of the bridge but end around where the wingwall begins. The wingwalls on both abutments have bowed outward and the entire substructure should be replaced. There was stream bank erosion evident along the western bank just south of the bridge as seen in Figure 4. In addition, the water was very murky and no boulders or exposed bedrock were visible.

Figure 4. Stream Bank Erosion Just South of Bridge

One major point of concern noted during the site visit was the very poor approach visibility from both directions. Because the temporary bridge was placed directly over the existing bridge, the new elevation creates blind spots from both directions. Because it is a one-lane bridge, this creates a safety hazard for any oncoming traffic. The new bridge design should address this issue.

4.0 RECOMMENDATIONS

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

- Pile caps on a single row of H-Piles
- Reinforced concrete abutments on H-Piles

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

5.0 CONCLUSION

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

cc: WEA/Read File
CCB/Project File
MLM

G:\Soils and Foundations\Projects\West Haven BO 1443(51)\REPORTS\West Haven BO 1443(51) Preliminary Geotechnical Information.doc

VERMONT

State of Vermont *Agency of Transportation*
Program Development Division
One National Life Drive [phone] 802-828-3979
Montpelier, VT 05633-5001 [fax] 802-828-2334
www.aot.state.vt.us [ttd] 800-253-0191

To: James Brady, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 7/15/2013

Subject: West Haven BO 1443 (51) - 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. The wetland present is located on the southwestern side of the existing bridge. The wetland is an emergent/scrub shrub forested wetland. The wetland identified is roughly 2-5 acres in size. During the site visit the wetland exhibited signs of wetland hydrology, vegetation and soils. Primary functions and values would be wildlife habitat, flood control and erosion control. According to the NYDEC website, wetlands < 12.4 acres in size do not need a State Wetlands permit although it would be regulated by the USCOE. A shape file with wetland boundaries is available for reference and a "dgn" can be created from it. Avoidance alternatives should be examined to avoid this area. If avoidance cannot be achieved it will be likely that further evaluation of the wetland will be required. No wetlands were found on the VT side of the bridge.

The Poultney River flows northerly through the project area. The Poultney River has a 236 sq. mi watershed which is a tributary to Lake Champlain. The waterway is classified as a warm water fisheries according the VT Water Quality Standards. This waterway provides opportunity to the public for fishing, boating, and wildlife habitat. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

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

Wildlife Habitat
Good Wildlife habitat exists within the surrounding area as it is a mix of forested and agricultural areas. GIS modeling suggest this area as moderate for wildlife movement through this area. Traffic volumes within this area are low allowing for opportunities for movement of wildlife.

Rare, Threatened and Endangered Species
There multiple mapped State listed rare, threatened or endangered species within the project area. The following species are known to exist in the vicinity of the project, although exact locations have not been evaluated:

Percina copelandi, Channel Darter (T)
Necturus maculosus, Mudpuppy (R)
Leptodea fragilis, Fragile Papershell (E)
Ichthyomyzon unicuspis, Silver Lamprey (R)
Lampsilis ovate, Pocketbook (E)
Potamilus alatus, Pink Heelsplitter (Y)
Lasmigona compressa, Creek Heelsplitter (R)
Ammocrypta pellucid, Eastern Sand Darter (T)
Ligumia recta, Black Sandshell (T)
Anodontoides ferussacianus, Cylindrical Papershell (E)
Notropis bifrenatus, Bridle Shiner (R)
Pyganodon grandis, Giant Floater (Y)
Lasmigona costata, Fluted –shell (E)
Pantherophis alleghaniensis, Eastern Rat Snake (R)

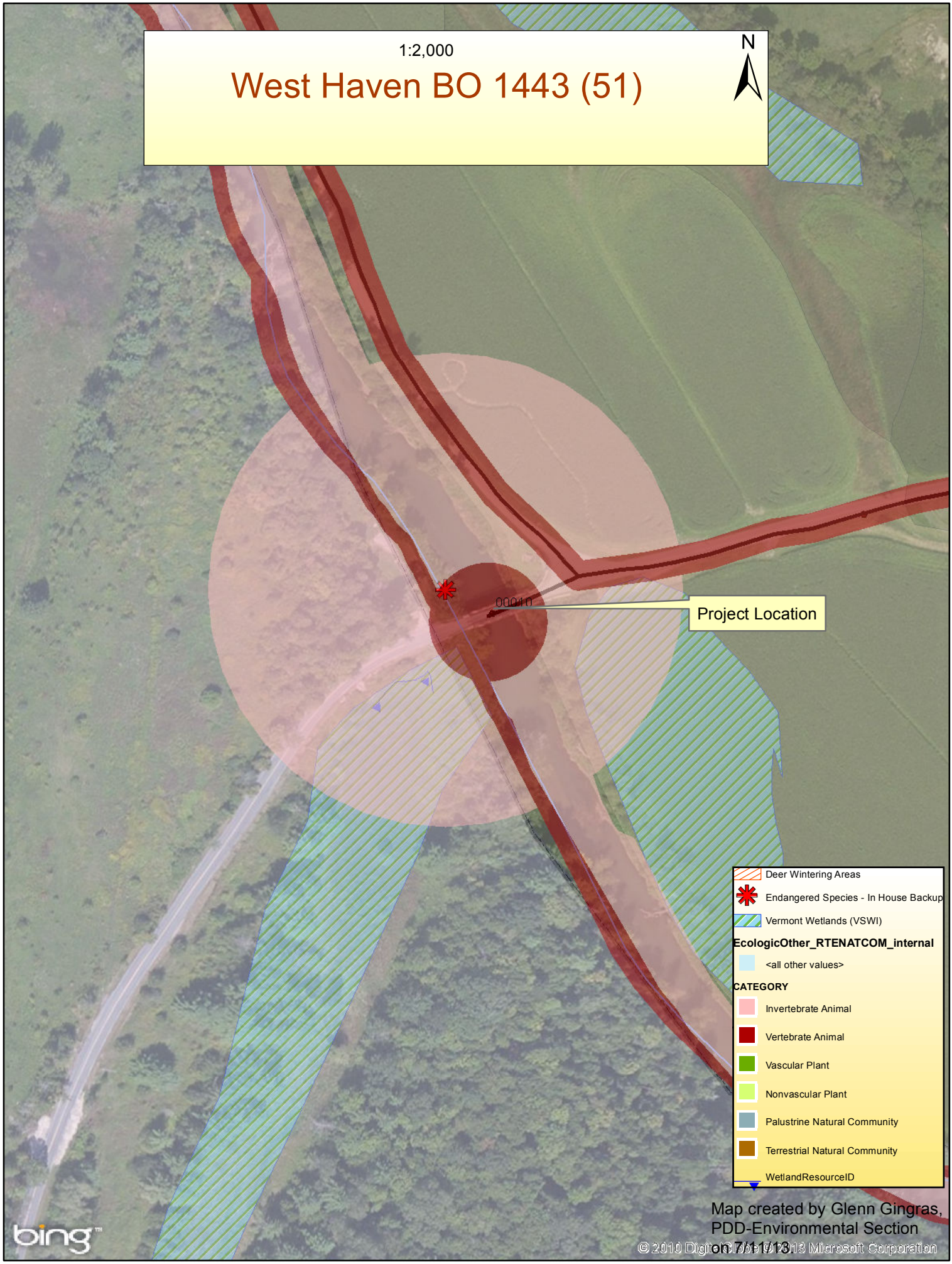
VT species are mostly aquatic and are within the Poultney River. Any work that is proposed within the waterway (abutment repair, pier placements, cofferdams, temporary causeways) will need to be assessed further by a consultant that specializes in freshwater mussel habitats and other aquatic species.

Federally mapped species that have potential to exist within the project area include:
Myotis sodalist (Indiana bat)

Activities associated with clearing vegetation as well as the bridge itself may involve potential habitat associated with this species.

Consultation with VT Fish and Wildlife will be ongoing regarding these species as the project moves further into design.

Agricultural Soils
Prime soils (Middlebury Silt Loam) occur on both sides of the roadway in VT.


1:2,000
West Haven BO 1443 (51)
N
00010
Project Location
Deer Wintering Areas
Endangered Species - In House Backup
Vermont Wetlands (VSWI)
EcologicOther_RTENATCOM_internal
<all other values>
CATEGORY
Invertebrate Animal
Vertebrate Animal
Vascular Plant
Nonvascular Plant
Palustrine Natural Community
Terrestrial Natural Community
WetlandResourceID
Map created by Glenn Gingras,
PDD-Environmental Section
on 7/1/2013.
bing
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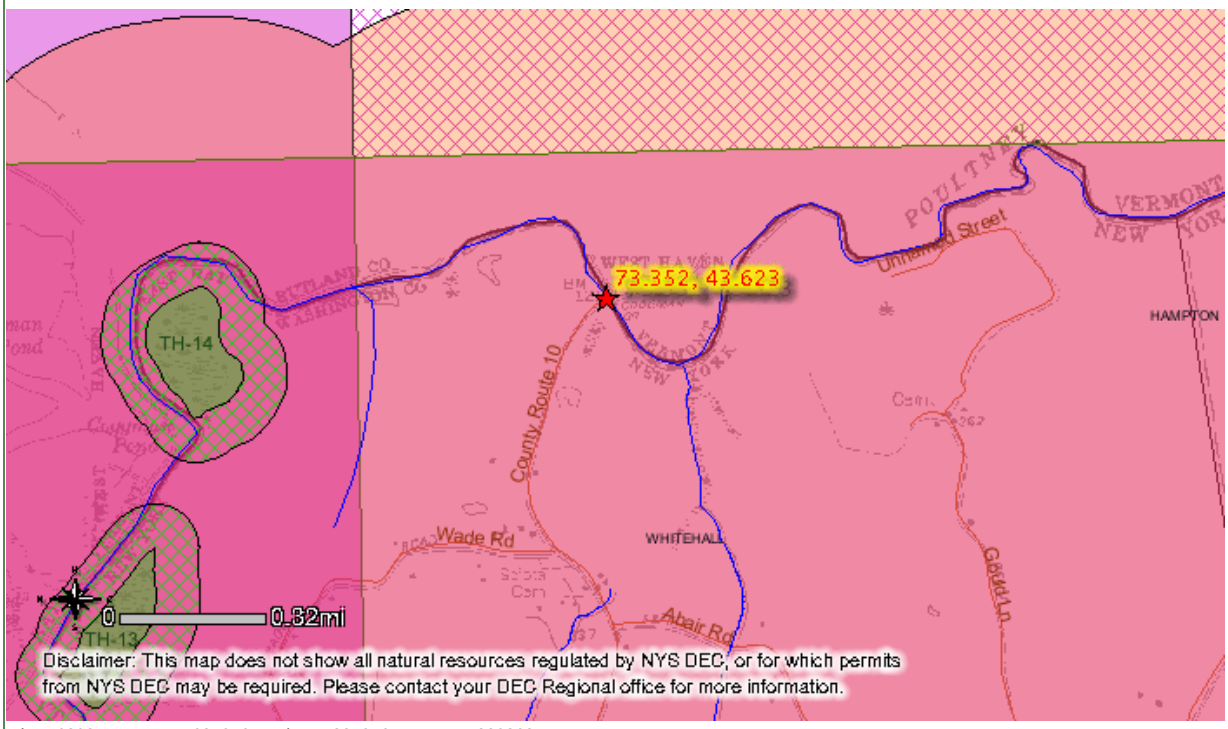
Please set your printer orientation to "Landscape".

West Haven BO 1443 (51)



MinX: 630871, MaxX: 635076, MinY: 4831946, MaxY: 4830368

Visible Layers

- Classified Streams
- Classified Ponds
- State-Regulated Freshwater Wetlands
- Wetland Checkzone
- State-Regulated Freshwater Wetlands
- Rare Plants and Rare Animals
- Significant Natural Communities Buffered
- Natural Communities Nearby
- Significant Natural Communities
- Interstate Highways
- Adirondack Park Boundary
- Counties

Disclaimer:This map was prepared by the New York State Department of Environmental Conservation using the most current data available. It is deemed accurate but is not guaranteed. NYS DEC is not responsible for any inaccuracies in the data and does not necessarily endorse any interpretations or products derived from the data.

[print page]
[close window]

The Coordinates of the point you clicked on are:

NYTM	E : 632943	Longitude/Latitude	W : 73.352
	N : 4831385		N : 43.623

Classified Streams

Regulation	Standard	Classification
830-532	C	C

Rare Plants and Rare Animals

This location is in the vicinity of one or more :
Rare Animals

Significant Natural Communities

Natural Community Name	Location	Ecological System
Floodplain forest	Poultney River	Freshwater Nontidal Wetlands

USGS Quadrangle

USGS Quadrangle Name
THORN HILL

If your project or action is within or near an area with a rare animal, a permit may be required if the species is listed as endangered or threatened and the department determines the action may be harmful to the species or its habitat.

If your project or action is within or near an area with rare plants and/or significant natural communities, the environmental impacts may need to be addressed.

The presence of a unique geological feature or landform near a project, unto itself, does not trigger a requirement for a NYS DEC permit. Readers are advised, however, that there is the chance that a unique feature may also show in another data layer (ie. a wetland) and thus be subject to permit jurisdiction.

Please refer to the "Need a Permit?" tab for permit information or other authorizations regarding these natural resources.

Disclaimer:If you are considering a project or action in, or near, a wetland or a stream, a NYS DEC permit may be required. The Environmental Resources Mapper does not show all natural resources which are regulated by NYS DEC, and for which permits from NYS DEC are required. For example, Regulated Tidal Wetlands, and Wild, Scenic, and Recreational Rivers, are currently not included on the maps.

VERMONT

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

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: 7/15/2013

Subject: West Haven BO 1443(51) – Archaeological Resource ID

James,

I've completed my background and field review of the proposed bridge replacement project spanning the Poultney River in West Haven, Rutland County, Vermont and Whitehall, Washington County, New York. The site is sensitive for precontact archaeology given the proximity to a major travel corridor and river converegance, positive environmental factors, and known archaeological site density.

The project is located on a flood plain of the Poultney River and the stratified soil profile has the potential for deeply buried cultural material related to the native occupation of the area. Higher-terrace Archaic sites have been identified several hundred yards from the project location. Some site disturbance is evident within a tight perimeter around the abutments.

I've attached a series of maps showing the archaeological sensitivity in the APE as well as a pair of historic 1850s and 1860s maps depicting the area throughout the past 150 years. It appears that this area has been used as a travel corridor continuously since the mid-1800s. I've also included a zoomed-out map showing the locations of four known archaeological sites in the general project area.

Feel free to contact me with any questions or concerns that may arise. Field photos can be produced upon request.

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


West Haven BO 1443(51)
Known Archaeological Sites
1:15,937
0 425 850 1,700 2,550 3,400
Feet
N
VT-RU-22
VT-RU-25
VT-RU-19
VT-RU-23
Project Area
bing
© 2010 DigitalGlobe Image courtesy
Map created by BCG
PDD-Environmental Section
on 7/15/2013


West Haven BO 1443(51)
Field Resource ID
1:807
0 20 40 80 120 160
Feet
N
Map created by BCG
PDD-Environmental Section
on 7/15/2013
bing

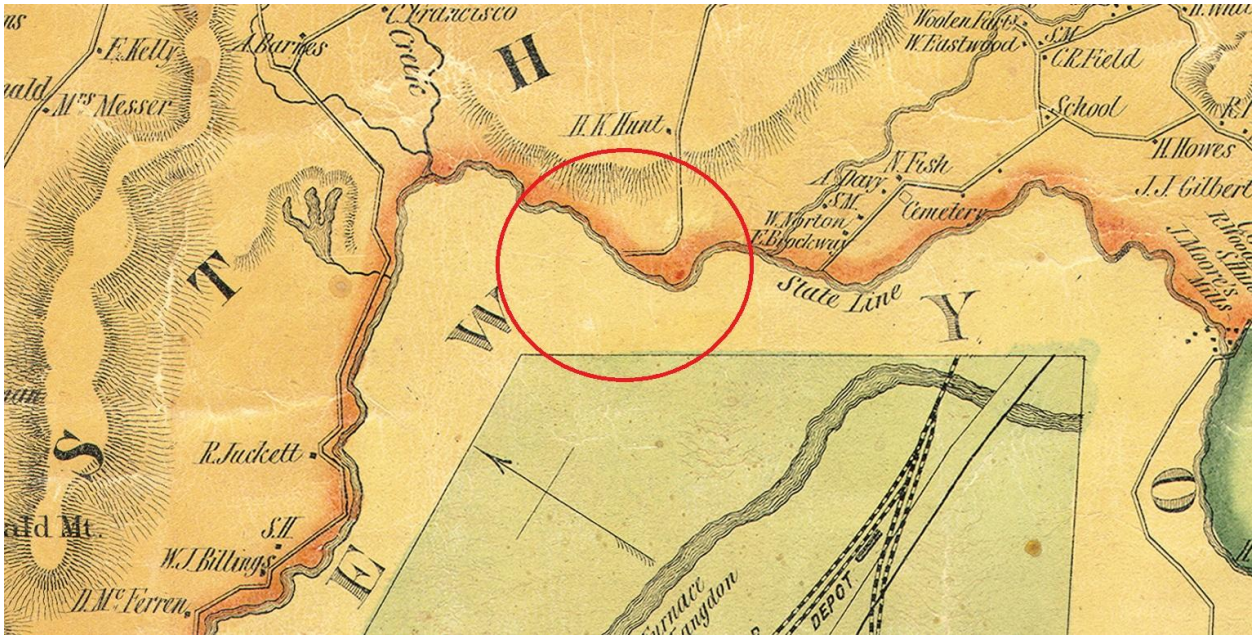


Figure 1: 1850s Map Showing Project Area

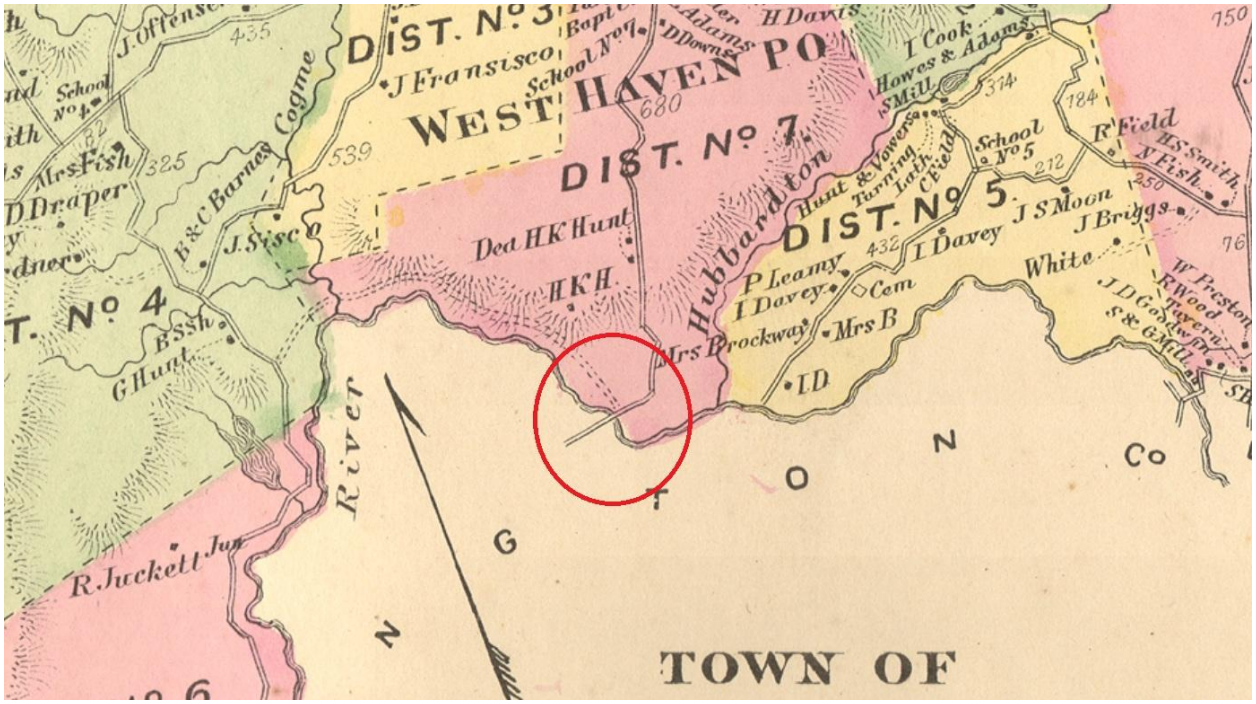


Figure 2: 1860s Map Showing Project Area

Stone, Laura

From: Brady, James
Sent: Monday, July 15, 2013 4:34 PM
To: Williams, Chris
Subject: FW: West Haven BO 1443(51) Resource ID

FYI, also, I am now realizing that the bridge is not marked in the resource database.

I'll check back.

James Brady
Environmental Specialist
Vermont Agency of Transportation
One National Life Drive
Montpelier, VT 05633-5001
Office: (802) 828-3978

From: O'Shea, Kaitlin
Sent: Wednesday, July 03, 2013 11:00 AM
To: Brady, James
Cc: Newman, Scott
Subject: RE: West Haven BO 1443(51) Resource ID

Hi James,

I have completed the historic resource ID for the West Haven BO 1443(51) project. Bridge 10 is a historic metal truss bridge. This project will require a Section 4(f) evaluation for use of the bridge. There are no other historic resources or Section 4(f) resources within the project area.

Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

802-828-3962
Kaitlin.O'Shea@state.vt.us

From: Brady, James
Sent: Thursday, June 27, 2013 3:26 PM
To: Gingras, Glenn; Armstrong, Jon; Brown, Jane; Russell, Jeannine; Gauthier, Brennan; O'Shea, Kaitlin; Newman, Scott
Cc: Williams, Chris
Subject: West Haven BO 1443(51) Resource ID

From: James Brady, Environmental Specialist
Date: June 27, 2013
Project: West Haven BO 1443(51)
PIN: 13J198 **EA**: 1443051 001

Project Manager: Chris Williams
Link to Project Folder: Z:\Projects-Engineering\WestHavenBO1443(51)13j198\Environmental

Hello All,

Please identify resources in proximity of bridge 10 on the border of VT and NY in West Haven on TH 3 over the Poultney River. There is a location map and bridge report in the plans/documents folder. There are bridge inspection photos and site visit photos in the structures folder.

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

James

James Brady
Environmental Specialist
Vermont Agency of Transportation
One National Life Drive
Montpelier, VT 05633-5001
Office: (802) 828-3978

Community Considerations

WH= West Haven's response
Whitehall,NY= Whitehall's response

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.
   WH- no
   Whitehall,NY-no

2. Is there a "slow season" or period of time from May through October where traffic is less?
   WH- July and August is slower due to crop harvesting in the other months. VT farmer harvests crops in NY.
   Whitehall,NY –July & August

3. Please describe the location of emergency responders (fire, police, ambulance) and emergency response routes.
   WH- Emergency response comes from local fire department and would not be affected by Book Rd bridge closure. Police and ambulance come from Fair Haven into WH from VT 22A. Very limited mutual aid to NY but Whitehall could provide emergency response to the western "boot' of WH via bridge from NY into east Bay Rd.
   Whitehall,NY – agree with WH comments

4. Where are the schools in your community and what are their schedules?
   WH- no schools
   Whitehall,NY – schools are 7 miles away. Bridge is not an issue

5. Is the proposed project on an established or planned school bus or public transit route(s)?
   WH- no
   Whitehall,NY - no

6. Are there any businesses (including agricultural operations) that would be adversely impacted either by a detour or due to work zone proximity?
   WH- yes – only Book Farm on Book Road
   Whitehall,NY – Only the Book farm, same as WH comments

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?
   WH- no
   Whitehall,NY - no

8. Are there any town highways that might be adversely impacted by traffic bypassing the construction on another local road?
   WH- no
   Whitehall,NY - no

9. Are there any other municipal operations that could be adversely impacted if the bridge is closed during construction? If yes, please explain.
   WH- no
   Whitehall,NY - no

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.
    WH- no local formal communication . Lakes Region Free Press and word of mouth are main communication channels for town.
    Whitehall,NY – Whitehall Times Newspaper, word of mouth

11. Is there a local business association, chamber of commerce or other downtown group that we should be working with?
    WH- no
    Whitehall,NY - no

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?
   WH- no . NY- road curves on the bridge approach.
   Whitehall,NY – no, (Washington Co – although the existing alignment has been adequate for the low volume of traffic, with the new structure/alignment, should have existing and future trafiic volumes taken into consideration.)

2. Are there any concerns with the width of the existing bridge?
   WH- no
   Whitehall,NY-no, (Washington Co. – existing bridge is narrow/non-standard. The new structure shall be designed to NYSDOT Standards for existing and future trafiic volumes as well as local delivery and winter snow removal operations considerations.)

3. What is the current level of bicycle and pedestrian use on the bridge?
   WH- unknown but low volume. Is identified as a Bikeways.
   Whitehall, NY- unknown, but very minimal

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

   WH- N/A
   Whitehall,NY- n/a

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

   WH- no, low volume of vehicular traffic
   Whitehall,NY- no, low volume

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?

   WH- no, alternatives exist
   Whitehall,NY-no

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

   WH- no
   Whitehall,NY-no

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

   WH- no
   Whitehall,NY- the approach to the bridge from both sides is such that it is difficult to see who is near the bridge attempting to go over it. Now it is potentially dangerous. Need to raise up the road near bridge on both sides. (Washington Co.- horizontal & vertical alignment of the existing roadway to be considered during design)

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

   WH- no
   Whitehall,NY- yes. Approach on the Vermont side (cornfields) often flood over in the spring. Road level should be raised. (Washington Co.- hydraulic analysis of the structure and approaches is required in the design process.)

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

    WH- no
    Whitehall,NY - no

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

    WH- yes, historic structure
    Whitehall,NY - no

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

WH- no
Whitehall,NY- see 8 & 9

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.

WH- no
Whitehall,NY -no

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

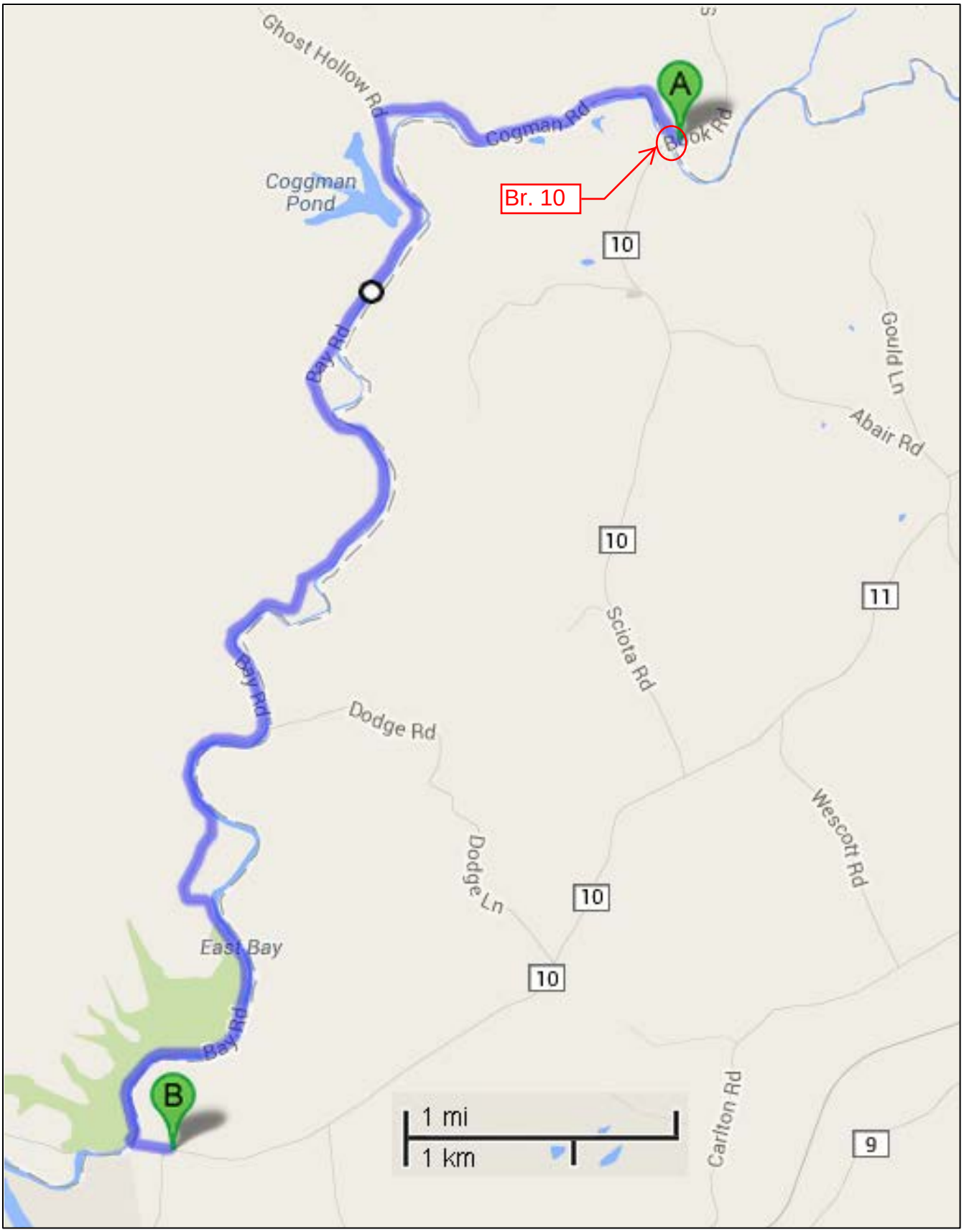
WH- N/A
Whitehall,NY- n/a

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

WH- no (just corn fileds)
Whitehall,NY- no, Nature Conservancy has a parking area on the south west side of bridge on NY side. If the approach is raised, it would impact the entrance to the seldom used parking area by making it steeper.

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

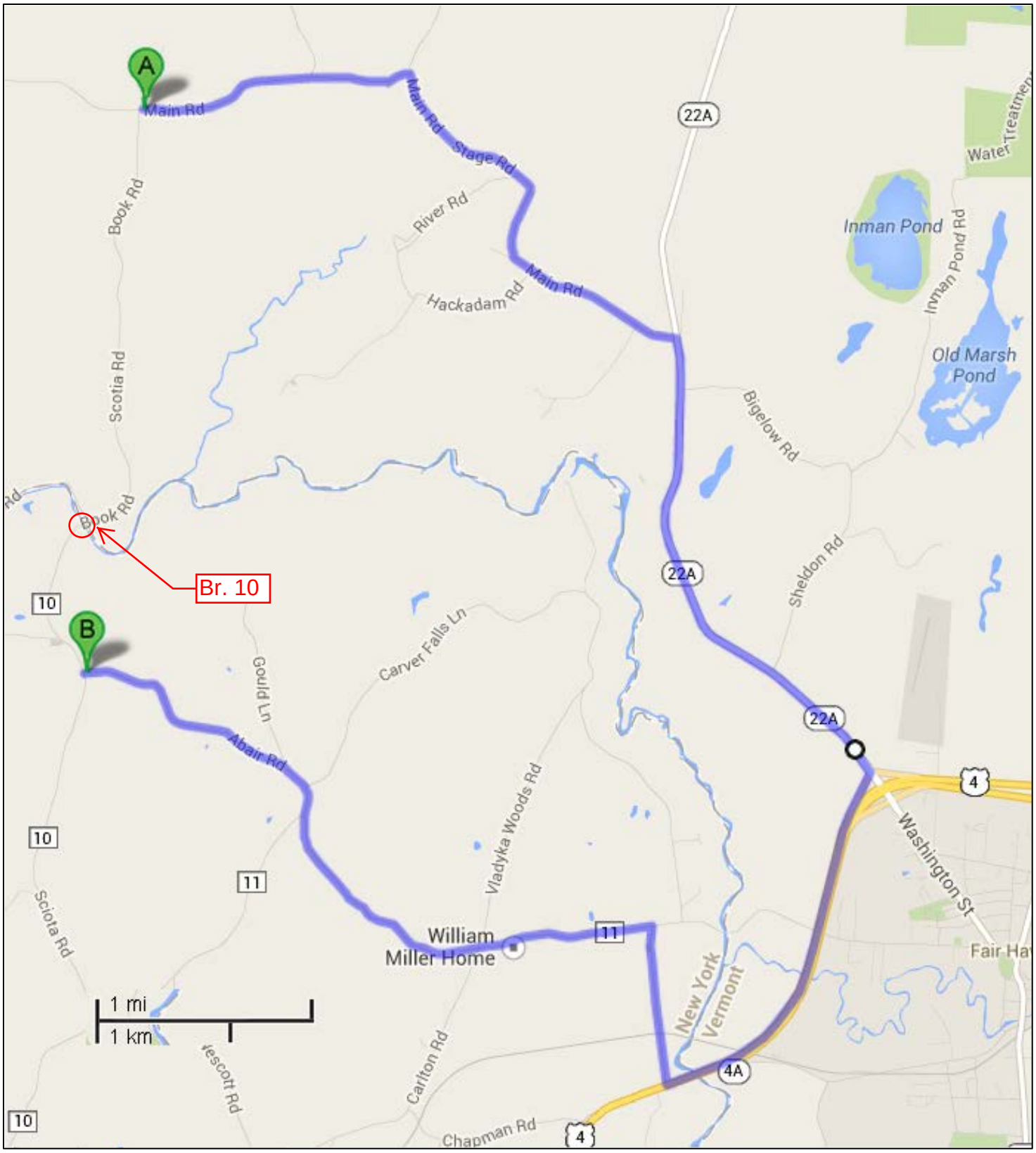
WH- no
Whitehall,NY - no



Detour Route

Book Road, to Cogman Road, Bay Road, Co Road 10, Scotia Road, back to Book Road

A – B Through Route: 5.2 Miles
A – B Detour Route: 6.5 Miles
Added Miles: 1.3 Miles
End-End Distance: 11.6 Miles



Detour Route

Book Road, to Main Road, VT 22A S, US 4 W, Golf Course Road, Co Road 11, Abair Road, Co Road 10 back to Book Road

A – B Through Route: 2.9 Miles
A – B Detour Route: 11.7 Miles
Added Miles: 8.8 Miles
End-End Distance: 14.6 Miles

N

VT STATE PLANE GRID

THE NATURE CONSERVANCY, INC

BOOK BROTHERS INC.

BOOK BROTHERS INC.

BELDEN, BOYD C.

BOOK BROTHERS INC.

POULTNEY RIVER
FLOW

GRAVEL
DRIVE

TH 3
(COGMAN RD)

TH 3
TO WEST HAVEN

NY TO
TO WHITEHALL

FIELD DRIVE

BARBED WIRE FENCE

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

PI STA 41+41.52

PC STA 40+34.69

PT STA 42+43.83

POB STA 50+00.00

PC STA 44+12.43

PT STA 44+81.92

PI STA 44+47.23

PC STA 45+68.06

PT STA 46+35.08

PI STA 46+01.58

STA 52+00.00

STA 50+00.00

HVCTRL 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

SIGN XX-X

HISTORIC

GUY

TEL NYT3

TEL 415 14

EXISTING BRIDGE DATA
SINGLE SPAN PONY TRUSS BRIDGE
SUPPLEMENTED WITH ONE-LANE
TEMPORARY MABEY PANEL BRIDGE
MAX. SPAN 83', LENGTH 89'
BUILT 1921

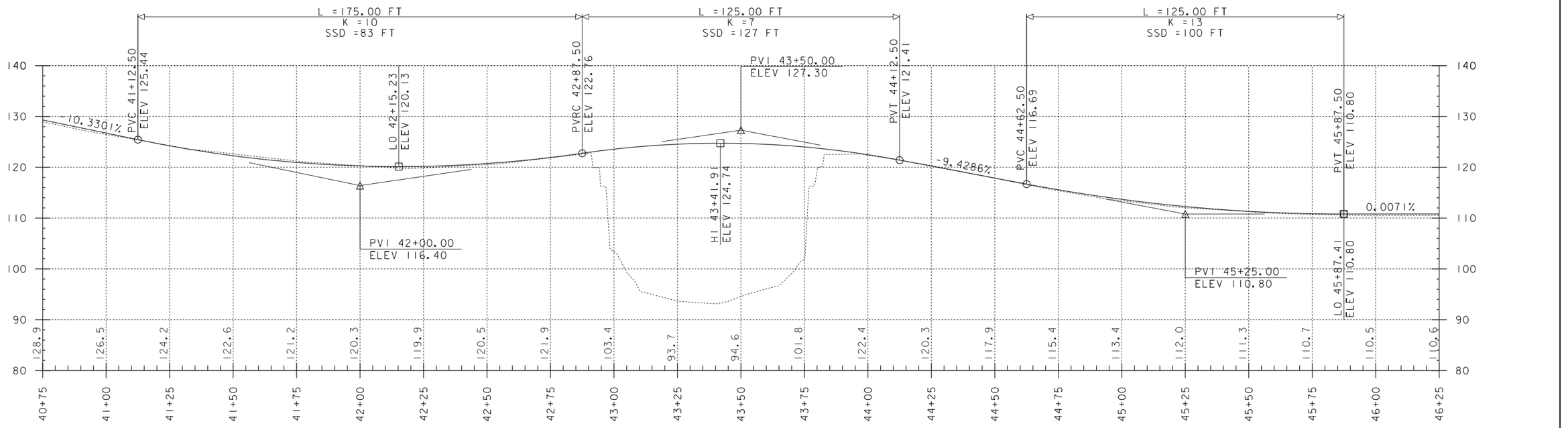
EXISTING CONDITIONS

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

PROJECT NAME: WEST HAVEN
PROJECT NUMBER: BO 1443 (51)

FILE NAME: 13J198/sl3J198border.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
EXISTING CONDITIONS

PLOT DATE: 16-SEP-2014
DRAWN BY: O.M.DARISSE
CHECKED BY: ------
SHEET 1 OF 18



TOWN HIGHWAY 3 PROFILE - EXISTING

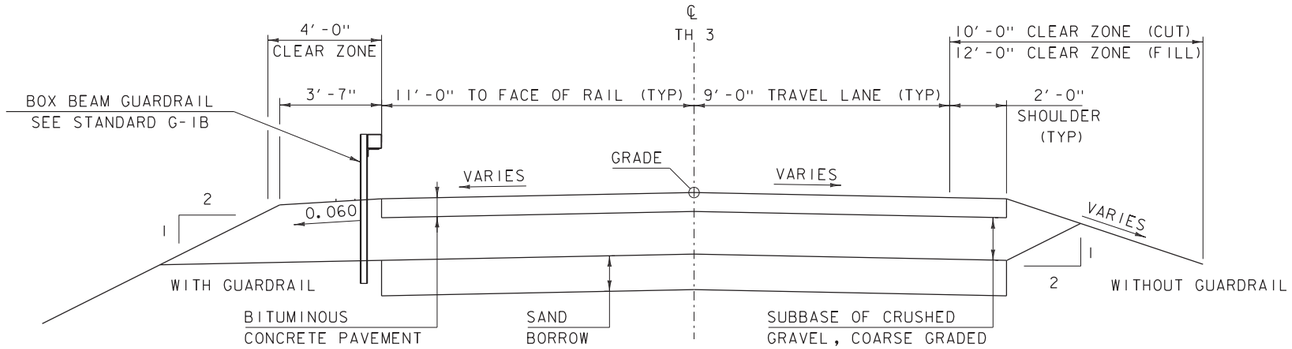
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/sl3J198profile.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: O.M.DARISSE
DESIGNED BY: ------	CHECKED BY: ------
PROFILE	SHEET 2 OF 18



PROPOSED TH 3 TYPICAL SECTION

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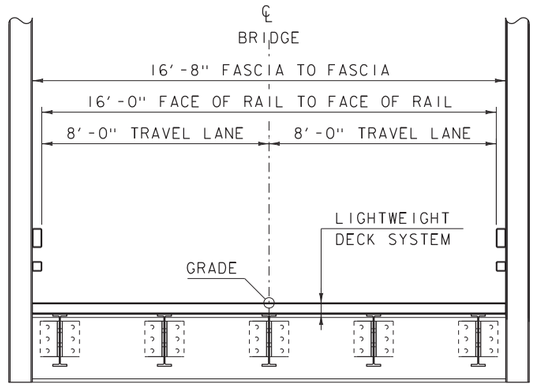


FLOW

PROPOSED BRIDGE TYPICAL SECTION (ALT 1)

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: WEST HAVEN
PROJECT NUMBER: BO 1443(51)

FILE NAME: Structures/sl3j198typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY:
ALT 1 TYPICAL SECTIONS

PLOT DATE: 16-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 3 OF 18

N

VT STATE PLANE GRID

THE NATURE CONSERVANCY, INC

BOOK BROTHERS INC.

BOOK BROTHERS INC.

BELDEN, BOYD C.

BOOK BROTHERS INC.

POULTNEY RIVER
FLOW

GRAVEL
DRIVE

TH 3
(COGMAN RD)

TH 3
TO WEST HAVEN

FIELD DRIVE

NY 10
TO WHITEHALL

BARBED WIRE FENCE

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

PI STA 41+41.52

PC STA 40+34.29

END APPROACH
BEGIN PROJECT
STA 42+50.00

BEGIN APPROACH
STA 42+00.00
MATCH EXISTING

PT STA 42+43.83

CL BEARING #
STA 42+95.50
F.G. =

CL BEARING #2
STA 43+78.50
F.G. =

PI STA 44+47.23

PC STA 44+12.43

PT STA 44+81.92

END PROJECT
BEGIN APPROACH
STA 44+50.00

END APPROACH
STA 45+00.00
MATCH EXISTING

PC STA 45+68.06

PT STA 46+35.08

PI STA 46+01.58

CONCEPTUAL
CONSTRUCTION LIMITS

HVCTRL 10
HVCTRL 12
HVCTRL 13
HVCTRL 14
HVCTRL 15
HVCTRL 3

TEL NYT3
TEL 415 14
GUY

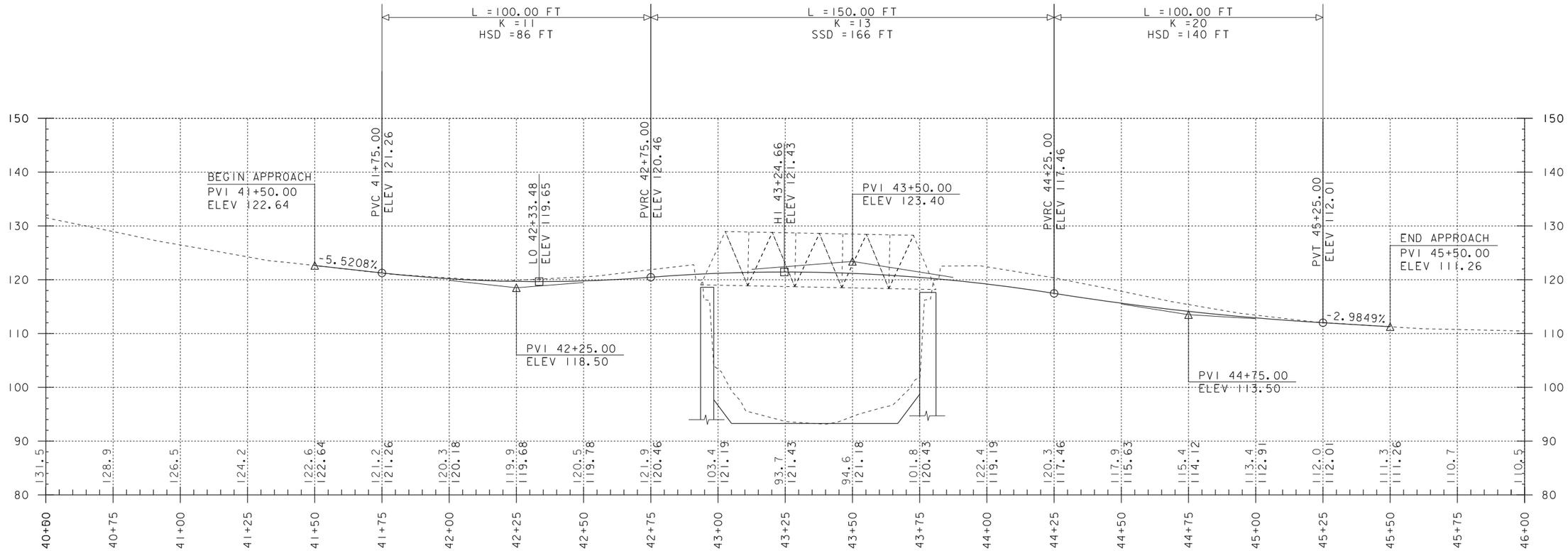
ARCH
HOAR
SIGN XX-X
HISTORIC

40+00
41+00
42+00
43+00
44+00
45+00
46+00
50+00
52+00

LAYOUT - ALTERNATIVE I

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

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/alternativela.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET - ALTERNATIVE I	SHEET 4 OF 18



TOWN HIGHWAY 3 PROFILE - ALTERNATIVE 1

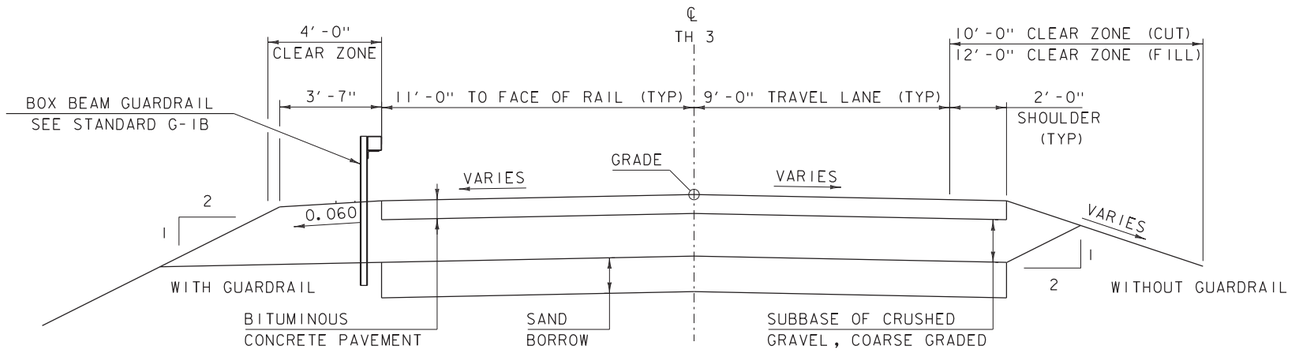
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

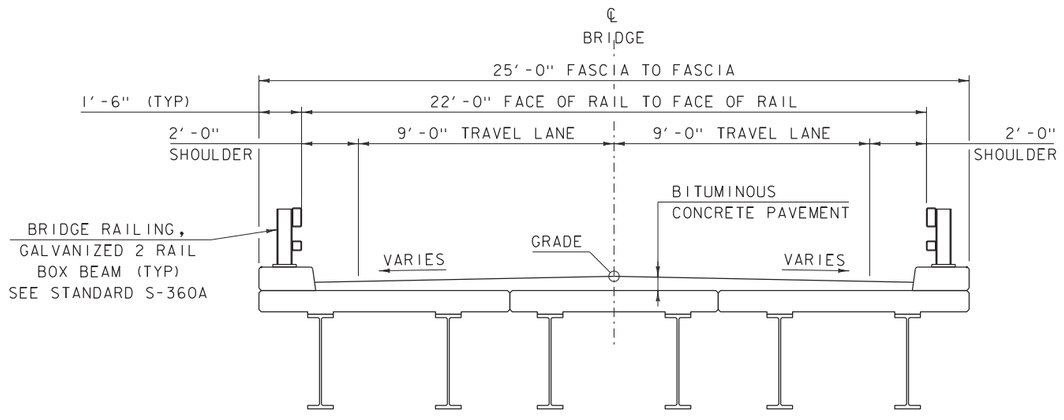
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13j198/sl3j198profile.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
ALT 1PROFILE	SHEET 5 OF 18



PROPOSED TH 3 TYPICAL SECTION

SCALE 3/8" = 1′-0"



PROPOSED BRIDGE TYPICAL SECTION (ALT 2)

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: WEST HAVEN
PROJECT NUMBER: BO 1443(51)

FILE NAME: Structures/sl3j198typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY:
ALT 2 TYPICAL SECTIONS

PLOT DATE: 16-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 6 OF 18

N

VT STATE PLANE GRID

THE NATURE CONSERVANCY, INC

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

GRAVEL DRIVE

POULTNEY RIVER
FLOW

BOOK BROTHERS INC.

CL BEARING #2
STA 44+08.00
F.G. =

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

BOOK BROTHERS INC.

END PROJECT
BEGIN APPROACH
STA 45+00.00

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

TH 3
(COGMAN RD)

PI
STA 44+47.23

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

PI
STA 41+41.52

END APPROACH
BEGIN PROJECT
STA 42+00.00

END APPROACH
STA 45+50.00
MATCH EXISTING

PC
STA 45+68.06

PT
STA 46+35.08

BARBED WIRE FENCE

HVCTRL 3

HVCTRL 15

HVCTRL 13

HVCTRL 10

HVCTRL 12

HVCTRL 14

HISTORIC SIGN XX-X

GUY

TEL 415

TEL NYT3

42+00

43+00

44+00

45+00

46+00

0+00

NY 10
TO WHITEHALL

TH 3
TO WEST HAVEN

FIELD DRIVE

PT
STA 42+43.83

CL BEARING #1
STA 42+66.00
F.G. =

BEGIN APPROACH
STA 41+50.00
MATCH EXISTING

BELDEN, BOYD C.

PC
STA 40+34.29

PC
STA 44+12.43

PT
STA 44+81.92

CONCEPTUAL
CONSTRUCTION LIMITS

BOOK BROTHERS INC.

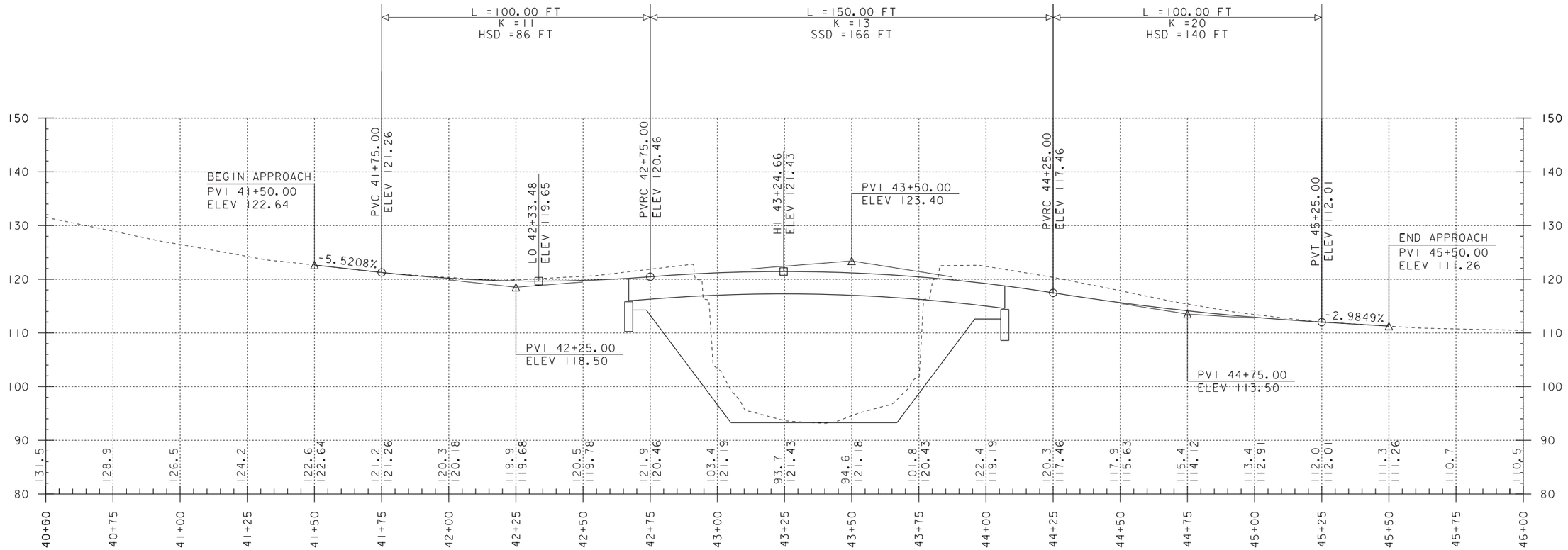
EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

PI
STA 46+01.58

LAYOUT - ALTERNATIVE 2

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

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/alternative2a.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET - ALTERNATIVE 2	SHEET 7 OF 18



TOWN HIGHWAY 3 PROFILE - ALTERNATIVE 2

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

NOTE:

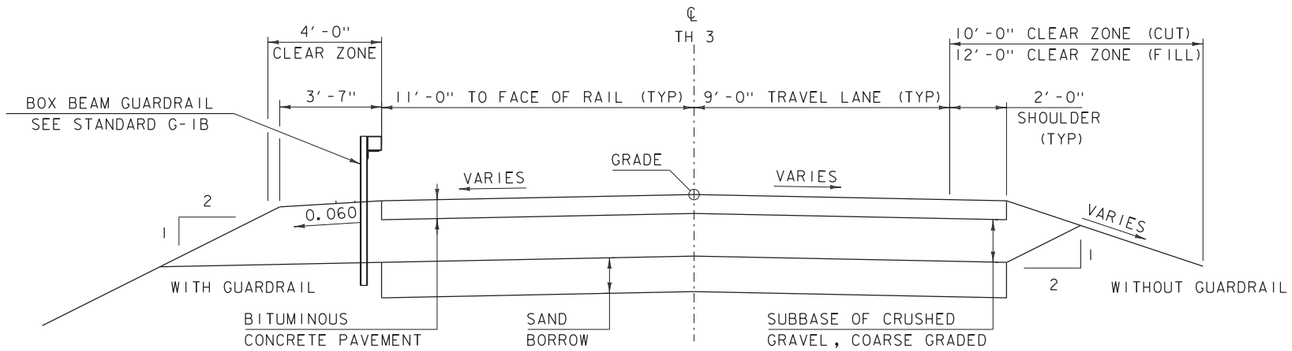
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: WEST HAVEN
PROJECT NUMBER: BO 1443 (51)

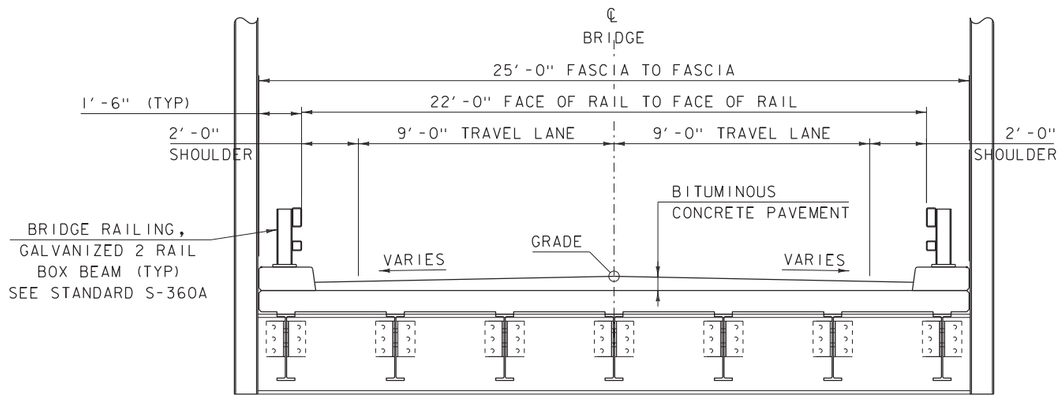
FILE NAME: 13j198/sl3j198profile.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
ALT 2 PROFILE

PLOT DATE: 16-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 8 OF 18



PROPOSED TH 3 TYPICAL SECTION

SCALE 3/8" = 1′-0"



PROPOSED BRIDGE TYPICAL SECTION (ALT 3)

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: WEST HAVEN
PROJECT NUMBER: BO 1443(51)

FILE NAME: Structures/sl3jl98typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY:
ALT 3 TYPICAL SECTIONS

PLOT DATE: 16-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 9 OF 18

N

VT STATE PLANE GRID

THE NATURE CONSERVANCY, INC

BOOK BROTHERS INC.

BOOK BROTHERS INC.

BELDEN, BOYD C.

BOOK BROTHERS INC.

POULTNEY RIVER
FLOW

GRAVEL
DRIVE

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

PI STA 41+41.52

PC STA 40+34.29

PT STA 42+43.83

PI STA 44+47.23

PT STA 44+81.92

PC STA 44+12.43

PC STA 45+68.06

PT STA 46+35.08

PI STA 46+01.58

END APPROACH
BEGIN PROJECT
STA 42+50.00

BEGIN APPROACH
STA 42+00.00
MATCH EXISTING

END APPROACH
STA 45+00.00
MATCH EXISTING

END PROJECT
BEGIN APPROACH
STA 44+50.00

CL BEARING #1
STA 42+82.50
F.G. =

CL BEARING #2
STA 43+82.50
F.G. =

CONCEPTUAL
CONSTRUCTION LIMITS

TH 3
(COGMAN RD)

TH 3
TO WEST HAVEN

NY 10
TO WHITEHALL

FIELD DRIVE

BARBED WIRE FENCE

HISTORIC SIGN XX-X

HVCTRL 3

HVCTRL 10

HVCTRL 12

HVCTRL 13

HVCTRL 15

TEL NYT3

TEL 415 14

GUY

40+00

41+00

42+00

43+00

44+00

45+00

46+00

50+00

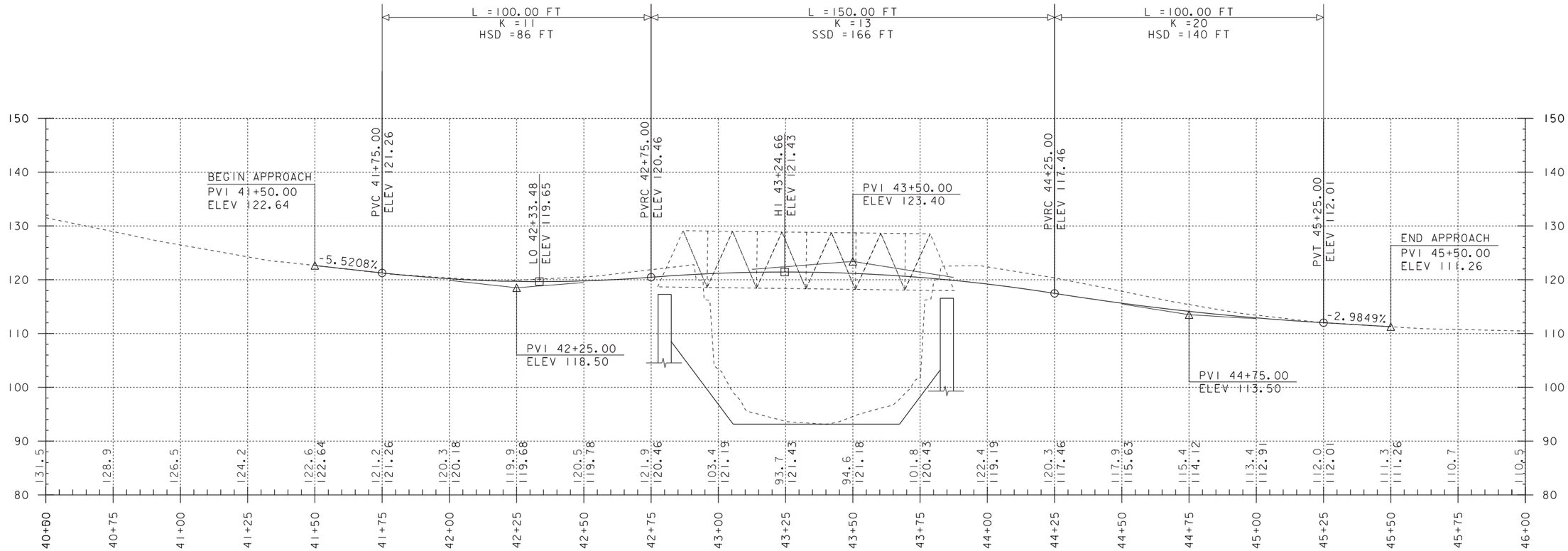
52+00

LAYOUT - ALTERNATIVE 3

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/alternative3a.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET - ALTERNATIVE 3	SHEET 10 OF 18



TOWN HIGHWAY 3 PROFILE - ALTERNATIVE 3

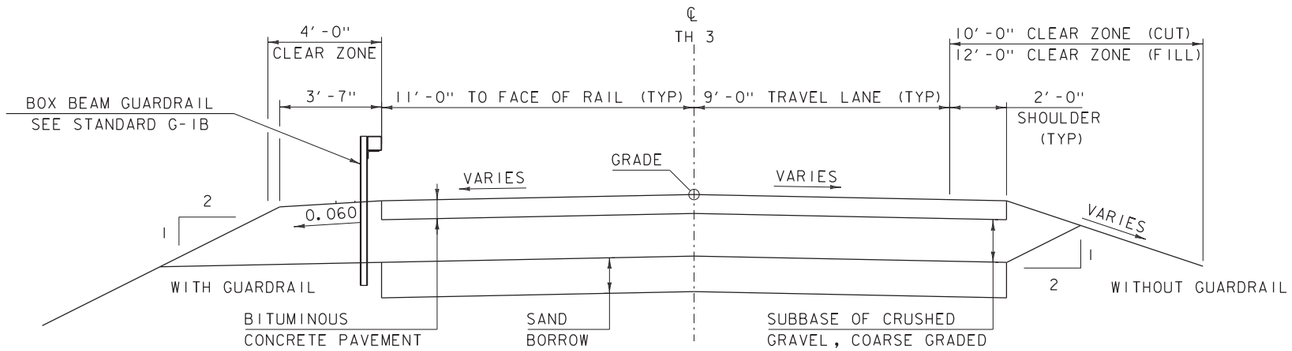
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

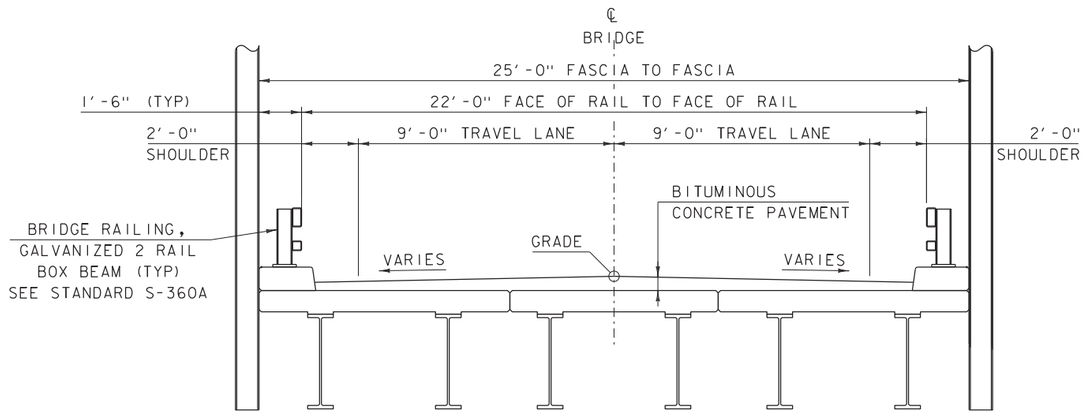
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13j198/sl3j198profile.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
ALT 3 PROFILE	SHEET 11 OF 18



PROPOSED TH 3 TYPICAL SECTION

SCALE 3/8" = 1′-0"



PROPOSED BRIDGE TYPICAL SECTION (ALT 4)

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: WEST HAVEN
PROJECT NUMBER: BO 1443(51)

FILE NAME: Structures/sl3j198typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY:
ALT 4 TYPICAL SECTIONS

PLOT DATE: 16-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 12 OF 18

N

VT STATE PLANE GRID

THE NATURE CONSERVANCY, INC

BOOK BROTHERS INC.

BOOK BROTHERS INC.

BELDEN, BOYD C.

BOOK BROTHERS INC.

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

POULTNEY RIVER
FLOW

GRAVEL
DRIVE

TH 3
(COGMAN RD)

TH 3
TO WEST HAVEN

NY 10
TO WHITEHALL

FIELD DRIVE

BARBED WIRE FENCE

END APPROACH
BEGIN PROJECT
STA 42+50.00

BEGIN APPROACH
STA 42+00.00
MATCH EXISTING

END APPROACH
STA 45+00.00
MATCH EXISTING

END PROJECT
BEGIN APPROACH
STA 44+50.00

CONCEPTUAL
CONSTRUCTION LIMITS

CL BEARING #2
STA 43+78.50
F.G. =

CL BEARING #
STA 42+95.50
F.G. =

PI STA 41+41.52

PC STA 40+34.29

PT STA 42+43.83

PC STA 44+12.43

PT STA 44+81.92

PC STA 45+68.06

PT STA 46+35.08

PI STA 46+01.58

PI STA 44+47.23

POB STA 50+00.00

HVCTRL 10

HVCTRL 12

HVCTRL 13

HVCTRL 14

HVCTRL 15

HVCTRL 3

TEL NYT3

TEL 415 14

GUY

SIGN XX-X

HISTORIC

ARCH

41+00

42+00

43+00

44+00

45+00

46+00

50+00

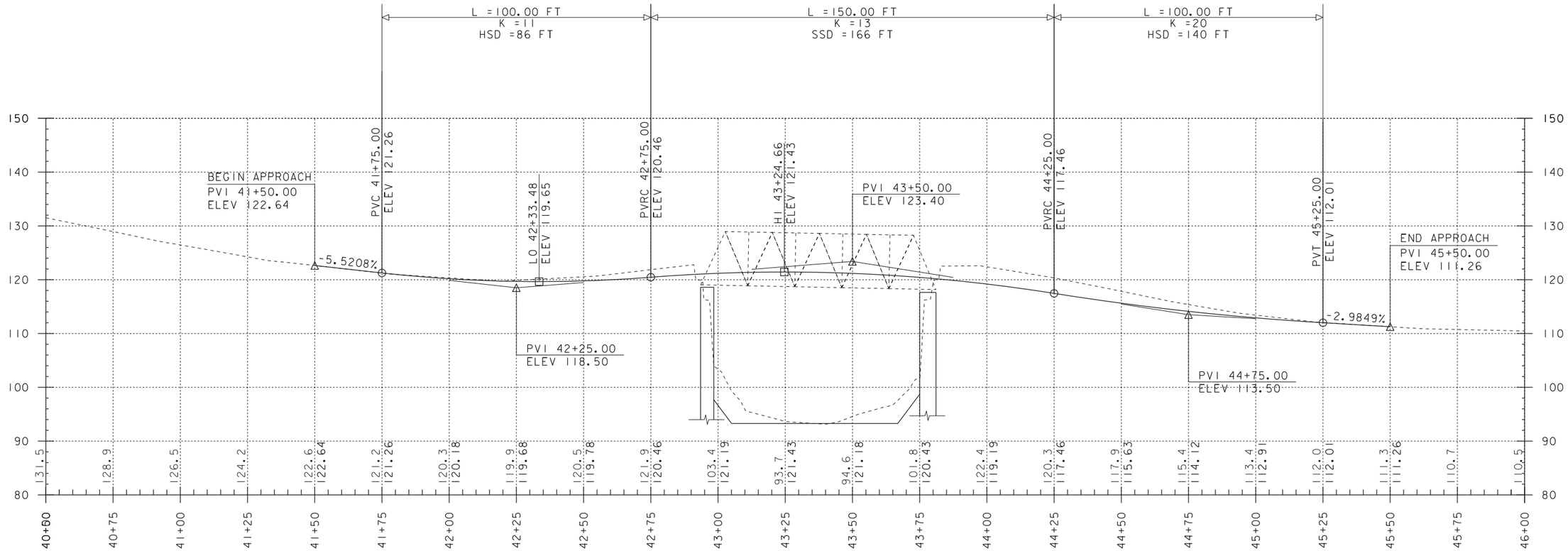
52+00

LAYOUT - ALTERNATIVE 4

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/alternative4a.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET - ALTERNATIVE 4	SHEET 13 OF 18



TOWN HIGHWAY 3 PROFILE - ALTERNATIVE 4

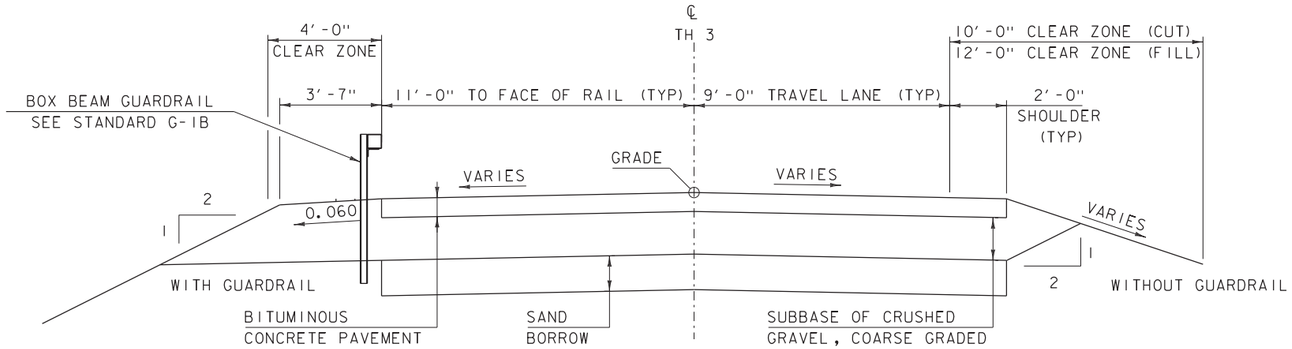
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

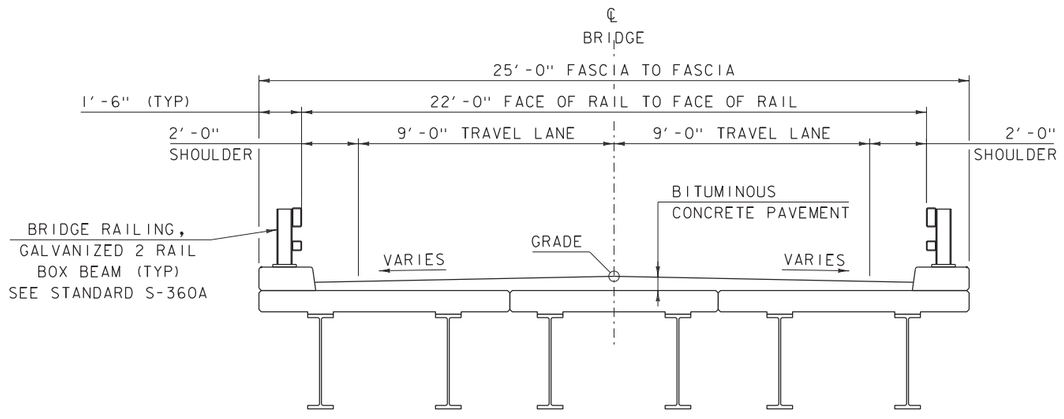
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13j198/sl3j198profile.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
ALT 4 PROFILE	SHEET 14 OF 18



PROPOSED TH 3 TYPICAL SECTION

SCALE 3/8" = 1′-0"



PROPOSED BRIDGE TYPICAL SECTION (ALT 5)

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: WEST HAVEN
PROJECT NUMBER: BO 1443(51)

FILE NAME: Structures/sl3j198typ.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY:
ALT 5 TYPICAL SECTIONS

PLOT DATE: 16-SEP-2014
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 15 OF 18

N

VT STATE PLANE GRID

THE NATURE CONSERVANCY, INC

BOOK BROTHERS INC.

BOOK BROTHERS INC.

BELDEN, BOYD C.

BOOK BROTHERS INC.

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

POULTNEY RIVER
FLOW

GRAVEL
DRIVE

TH 3
(COGMAN RD)

TH 3
TO WEST HAVEN

NY 10
TO WHITEHALL

FIELD DRIVE

BARBED WIRE FENCE

PI
STA 41+41.52

END APPROACH
BEGIN PROJECT
STA 42+50.00

CL BEARING #2
STA 43+82.50
F.G. =

PI
STA 44+47.23

END APPROACH
STA 45+00.00
MATCH EXISTING

PC
STA 45+68.06

PT
STA 46+35.08

PI
STA 46+01.58

CONCEPTUAL
CONSTRUCTION LIMITS

PT
STA 42+43.83

CL BEARING #1
STA 42+82.50
F.G. =

BEGIN APPROACH
STA 42+00.00
MATCH EXISTING

PC
STA 40+34.29

PT
STA 44+81.92

PC
STA 44+12.43

END PROJECT
BEGIN APPROACH
STA 44+50.00

0+00
41+00
42+00
43+00
44+00
45+00
46+00
50+00
51+00
52+00

HVCTRL 10
HVCTRL 12
HVCTRL 13
HVCTRL 14
HVCTRL 15
HVCTRL 3

TEL
NYT3

TEL
415
14

GUY

SIGN
XX-X

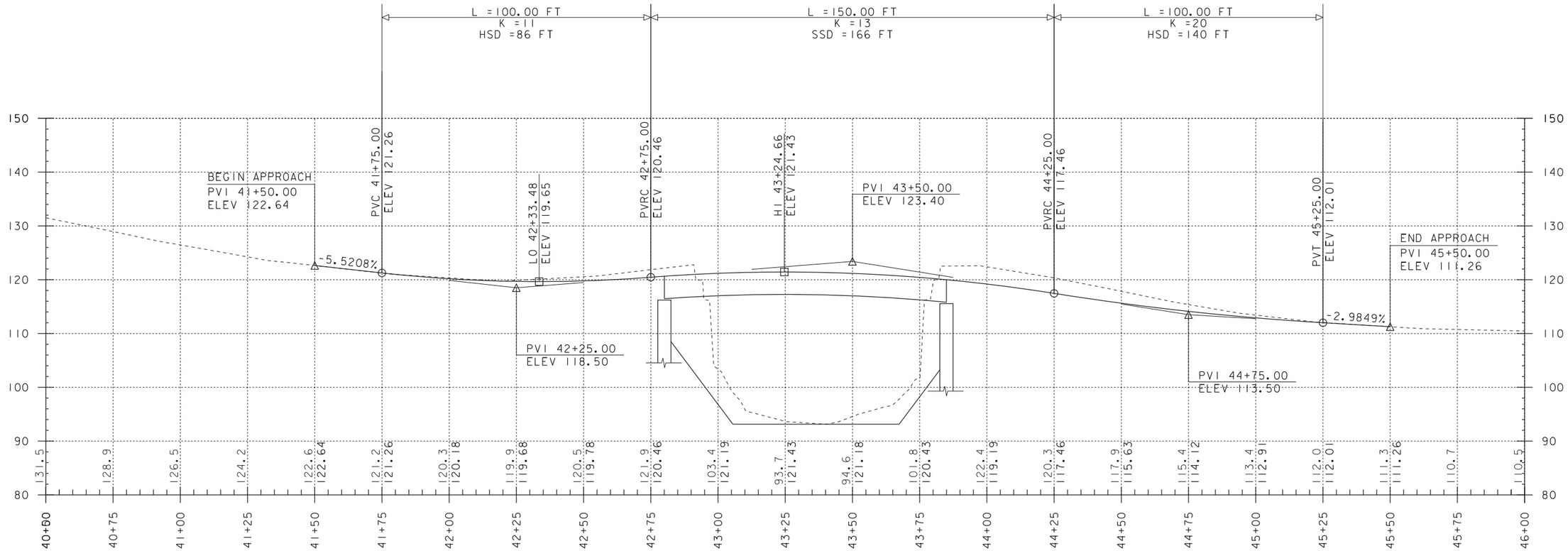
HISTORIC

ARCH

LAYOUT - ALTERNATIVE 5

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

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/alternative5.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT SHEET - ALTERNATIVE 5	SHEET 16 OF 18



TOWN HIGHWAY 3 PROFILE - ALTERNATIVE 5

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

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13j198/sl3j198profile.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
ALT 5 PROFILE	SHEET 17 OF 18

THE NATURE CONSERVANCY, INC

BOOK BROTHERS INC.

BOOK BROTHERS INC.

BELDEN, BOYD C.

BOOK BROTHERS INC.

POULTNEY RIVER
FLOW

GRAVEL DRIVE

TH 3 (COGMAN RD)

TH 3 TO WEST HAVEN

FIELD DRIVE

NY TO TO WHITEHALL

TEMP BRIDGE

TEMPORARY BRIDGE
CONSTRUCTION LIMITS

CONCEPTUAL
CONSTRUCTION LIMITS

BARBED WIRE FENCE

EXISTING CURVE 1
DELTA = 30°00'54"
D = 14°19'26"
R = 400.00'
T = 107.24'
L = 209.54'
E = 14.12'

EXISTING CURVE 2
DELTA = 7°57'47"
D = 11°27'33"
R = 500.00'
T = 34.80'
L = 69.49'
E = 1.21'

EXISTING CURVE 3
DELTA = 1°55'12"
D = 2°51'53"
R = 2000.00'
T = 33.51'
L = 67.02'
E = 0.28'

BENCHMARK
RAIL ROAD SPIKE
IN ROOT OF OAK
ELEV. = 129.87

BENCH MARK
VTSD "COGMAN 1992"
ELEV. = 110.10

PI STA 41+41.52

PC STA 40+34.29

PT STA 42+43.83

PC STA 44+12.43

PT STA 44+81.92

PI STA 44+47.23

PC STA 45+68.06

PT STA 46+35.08

PI STA 46+01.58

0+00

41+00

42+00

43+00

44+00

45+00

46+00

50+00

52+00

HVCTRL 3

HVCTRL 10

HVCTRL 12

HVCTRL 13

HVCTRL 14

HVCTRL 15

HVCTRL 16

TEL NYT3

TEL 415 14

GUY

SIGN XX-X

HISTORIC

ARCH

FLOW

TEMPORARY BRIDGE LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	WEST HAVEN
PROJECT NUMBER:	BO 1443 (51)
FILE NAME: 13J198/Temp Bridge.dgn	PLOT DATE: 16-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
TEMPORARY BRIDGE LAYOUT	SHEET 18 OF 18