STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Addison BF 0172(9)

VT ROUTE 125, BRIDGE 1 over WARDS CREEK

Revised March 26, 2017

I. Contents

I. Site Information

The culvert is located in a rural area along VT Route 125 in the Town of Addison approximately 1.3 miles east of the intersection with VT Route 17. The culvert is located on a straight segment of VT Route 125 at approximately mile marker 1.22. The depth of cover over the top of the culvert is approximately 2 ft. 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. The culvert is referred to in the Inspection Report as carrying VT Route 125 over Wards Creek. It is also described as carrying Wards Creek in the Hydraulic Report. For the purposes of this report (with the exception of the Hydraulic section) the waterway will be referred to as Wards Creek.

Roadway Classification	Rural Major Collector
Culvert Type	Multi-Plate Pipe
Culvert Span	9 ft.
Culvert Length	33 ft.
Year Built	1936
Ownership	State of Vermont

Need

The following is a list of the deficiencies of Bridge 1 and VT Route 125 in this location.

1. This culvert has a rating of 3 "Serious" and has waterline perforations throughout the inlet/outlet regions that are larger than 2".

2. There are signs of erosion along the roadway shoulders in areas over the pipe causing pavement undermining.

3. Guardrail is not present over the culvert.

4. Pavement width does not meet the minimum standard.

5. The clear zone does not meet the minimum standard.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2017 and 2037.

TRAFFIC DATA	2017	2037
AADT	1,400	1,400
DHV	190	190
ADTT	140	180
%T	11.4	15.2
%D	51	51

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on an ADT of 1400 and a design speed of 40 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	10'/1' (22')	10'/4' (28')	Substandard
Bridge Lane and Shoulder Widths	VSS Table 5.3	10'/1' (22')	10'/4' (28')	Substandard
Clear Zone Distance	VSS Table 5.5	Unshielded: Trees at 2' Top of unrecoverable slope at 2'.	12' fill / 10' cut (1:3), 10' cut (1:4)	Substandard
Banking	VSS Section 5.13	Normal Crown	8% (max), 6% at side roads	
Speed	VSS Section 5.3	40 mph (Posted)	40 mph (Design)	
Horizontal Alignment	AASHTO Green Book 6th Edition, 2011, Section 3.3.3	Roadway is on a tangent at the bridge		
Vertical Grade	VSS Table 5.6	Bridge located on a tangent with a 1.6% slope.	6% (max) for level terrain	
K Values for Vertical Curves	VSS Table 5.1	Bridge not located on a vertical curve.	60 crest / 60 sag	
Vertical Clearance Issues	VSS Section 5.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	NA – no vertical curve	275'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	1' Shoulder	3' Shoulder	Substandard
Bridge Railing	Structures Manual Section 13	Unshielded	Steel Beam Guardrail	Substandard
Hydraulics	VTrans Hydraulics Section	Passes Q_{50} storm event with headwater elev. 95.5	Maintain existing	
Structural Capacity	SM, Ch. 3.4.1	Unknown	Design Live Load: HL-93	

Inspection Report Summary

Culvert Rating 3 Serious
Channel Rating 6 Satisfactory

11/9/2015 – Culvert will need replacement in the near future. Guardrail should be added. Erosion should be repaired. FRE/TJB

10/24/2014 – Culvert will need replacement soon. Erosion on the banks over the pipe should be repaired. Guardrail should be installed. FRE/TJB

10/29/2013 – Culvert will need to be replaced in the near future. Guardrail should be installed on both ends. FRE/MJK

9/24/2008 - Culvert is in fair condition in what can be seen due to high water depth. Guardrail should be installed as the drop off the pavement is a safety concern. Inspected 9-24-08. MK

Hydraulics[1]

"The existing CMP appears to be slightly deformed with a span of approximately 9' and a height of approximately 8'. This structure is located between Lake Champlain and Wards Creek in an area of primarily standing water. The water surface elevations at the structure and in Wards Creek are generally driven by the water surface elevations in the lake. When this structure is modeled using the average lake elevation of 95.5', it is well within state hydraulic standards (HW/D ≈ 0.7) at the 2% AEP design storm. When the structure is modeled with Lake Champlain at flood stage, 100', water does not overtop the road at the design storm."

<u>Recommendations</u>

"[VTrans] Hydraulics [staff] contacted state regulators for preliminary input on the sizing of this structure. [VTrans Hydraulics staff] were concerned with flow, sediment/agricultural runoff, recreational use, etc. These emails are all saved in the hydraulics folder. Most responses were vague, but there was an indication that VTrans should replace the structure in-kind to limit possible impacts. Given the regulatory feedback and the function of the existing structure we recommend the following similarly sized structures: an 8.5' diameter CMP or an 8' by 8' concrete box. Both of these options will meet hydraulic standards based on our approximate model and hopefully satisfy regulatory requirements."

Utilities

<u>Underground:</u>

There is an 8" water main that runs in Wards Creek from approximately 25 feet left of station 60+50 to an existing gate valve even farther from the roadway at approximately station 66+75. The water main approaches the roadway and continues upstation near the edge of pavement. The water main is not expected to impact the project.

There is a ¾" water service connection that crosses VT125 at approximately station 67+20. This is not expected to impact the project.

There is a communications cable that goes underground near the edge of pavement at approximately station 66+75 and continues upstation. This is not expected to impact the project.

<u>Aerial:</u>

There are three overhead utility wires running roughly parallel to VT Route 125, located approximately 40 ft. east of the edge of road. Relocation is not likely to be required.

[1] Per Preliminary Hydraulic Study Memo from Hydraulics Engineer, Nick Wark, dated September 1, 2016.

Right Of Way

The existing Right-of-Way is shown on the Layout sheet. The width of the Right-of-Way at the project site is 66 ft. with the roadway located approximately in middle. Temporary Right-of-Way is anticipated with a pipe lining and temporary bridge alternatives.

Resources

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

Biological:

Wards Creek runs westerly through the culvert and contains a fish and wildlife habitat. Wetlands are present on the banks of the causeway approaches and an aquatic organism passage (AOP) should be included in all alternatives.

<u>Wetlands</u>[2]

"Wetlands do exist at the toe of slope on all 4 quadrants of the causeway approaches. The wetlands will not likely be within the proposed project area as the culvert is in the middle of the causeway. The wetlands are basically the same wetland complex and the boundaries are fairly abrupt with the toe of slope of VT 125. The areas hydrology is directly influenced by Lake Champlain and most of the wetlands are inundated most of the growing season. Several hydrology indicators were observed during the site visit. Dominant vegetation within the wetland is: silver maple and willow and an understory of dogwood, elm, jewelweed and sedges. Soils within the wetland exhibit hydric characteristics in the form of a depleted matrix. All wetlands adjacent to the causeway would be Class II wetlands and would have a regulated 50' buffer."

<u>Wildlife Habitat</u>[2]

"There are several migratory bird species that have habitat (nesting, feeding opportunities) within the project vicinity. Aquatic species are abundant within the project area. An AOP should be included in any design alternative."

<u>Rare, Threatened and Endangered Species</u>[2]

"The project area is within the range of two federally listed species:

"Indiana Bat, Myotis sodalist (federally E, state E) and Northern Long-eared Bat, Myotis septentrionalis (federally T, state Endangered). The project area has large mature trees that potentially could serve as roost trees. Avoidance minimization measures for these species would be clearing trees (if need be) between SEPT1 and APR15 unless an acoustic survey is completed and presence is not detected.

"There are rare occurrences in the project area as well: natural community (Sand over Clay Floodplain Forest) and a rare migratory bird species (American Bittern)."

<u>Agricultural</u>

There are no prime agricultural soils mapped within the project area.

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[2] Per Natural Resource Identification Memo from VTrans Environmental Biologist, Glenn Gingras, dated November 5, 2015.

Archaeological:

No specific archaeological resources have been identified at the site, but it is located in an area of archaeological sensitivity.

Historic:

No historically significant resources have been identified at the site.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there are no known active hazardous sites in the project area.

Stormwater:

There are no stormwater concerns for this project.

II. Safety

The project area is not a high crash area. There have been only three reported crashes in the five year period ending 12/31/14. The existing conditions within the project area are considered adequate for the purposes of safety with the exception of the existing culvert, the shoulder widths, the clear zone and the bridge rail, which are substandard.

In order to improve the substandard shoulder widths and bridge rail, the slopes along the causeway on both sides of the roadway would require improvement. Improving the slopes would allow the shoulders to be widened and W beam guardrail to be added along both sides of the roadway, which would significantly improve the safety of the roadway along the causeway.

The work involved with improving the shoulders and bridge rail would include tree removal, adding fill along the slopes on both sides of the roadway, adding additional pavement along the shoulders and installing W beam guardrail. This work would also include obtaining permits and possible water control for the slope work which would extend into the water on both sides of the roadway and may impact the wetlands at the approaches to the causeway, if extended along the entire causeway. Depending on the widened slope configuration, guardrail may be required to prevent errant vehicles from entering the lake.

Concerns associated with performing the shoulder and bridge rail improvements may include environmental permitting, slopes encroaching into the waterway and the overall cost of the work. As estimated the cost of this improvement work would be greater than the bridge costs. A future concern would also be the possible settlement of the bank or shoulder due to the decomposition of the tree roots, which are to be removed. It is assumed that the trees will be removed to a certain depth below ground. Stump removal would be considered too invasive and would significantly increase the cost.

III. Alternatives Discussion

The existing roadway at the culvert location is substandard in terms of shoulder width, clear zone distance, and bridge railing. The project site is not a high crash location. Thus, the alternatives presented here are based on improvement of the condition of the culvert and channel.

No Action

This alternative would involve leaving the culvert in its current condition. A good rule of thumb for the "No Action" alternative is to determine whether the existing structure can stay in place without any work being performed on it during the next 10 years. Given the serious rating on this culvert, it will require work within the next 10 years. It is also the intent of VTrans to remove all elements rated 4 or lower from the State system. In the interest of safety to the traveling public, the No Action alternative is not recommended.

Alternative 1: Rehabilitation

Rehabilitation options include:

a: Invert Repair
b: Pipe Liner
c: Cured In Place Pipe
d: Spray-on Liner

All rehabilitation options would employ the use of hydroblasting or hydrodemolition to appropriately clean the existing pipe interior prior to rehabilitation. In addition to cleaning, some grouting would be needed to plug holes in the pipe and fill all voids on the outside of the pipe. Curing in dry conditions would be required in most cases, necessitating a re-routing of the flow during the work and for a prescribed curing period (usually 24 hours). A new headwall with beveled inlets would be required for all rehabilitation alternatives. A service life of approximately 30 years can be expected if the pipe is rehabilitated.

a. Invert Repair

In many cases, invert repair is used to rehabilitate reinforced concrete pipe where the invert has eroded. Invert repair can be utilized on corrugated steel pipe, but typically consists of paving the invert, which is most effective where no structural capacity needs to be replaced. The culvert on this project is rated 3 (Serious). Therefore, a solution including some structural enhancement is desired, in addition to measures restoring the invert. Invert Repair alone will not be evaluated further in this report.

b. Pipe Liner

Adding a pipe liner, also called sliplining, consists of pulling a complete new pipe into the existing culvert, then grouting the space between the two. Sliplining can be done using several different types of pipe material including corrugated steel, reinforced concrete, and polyethylene, and can restore the structural integrity of the culvert. There are two drawbacks to sliplining: the waterway area is always reduced when sliplining is done; and, it can be difficult to get the new liner installed, especially if there is distortion of the original host pipe. Crucial to the success of this method would be surveying the interior of the existing CMP to insure that a rigid liner can be installed in the pipe. Temporary right-of- way would need to be acquired to provide a staging area at each end to accomplish this alternative.

c. CIPP (Cured In Place Pipe)

CIPP is another way of providing a new lining to the interior of an existing pipe. A resin-saturated felt or fiber tube is inserted into the pipe in a folded configuration, and is then expanded to be in contact with the entire interior surface of the existing culvert. Curing takes place by heating the resin using hot water, steam, or UV light. This method of culvert repair is not considered further in this report because a literature search on the subject yields no data on CIPP over the size of 8' diameter. There are also environmental concerns with this method of repair, which is under review by various parties within VTrans. Therefore, although it is expected that this method of culvert repair will be used in the future in Vermont, it is not considered to be a feasible solution for this project.

d. Spray-On Liner

Spray-On liners provide a new rigid interior surface for the pipe and use either cementitious materials (polymer-enhanced cement mortar) or polyurea. These liners are spray applied either by hand or machine, although some users have had better quality control with hand-applied methods. Cementitious liners installed by these methods can provide full structural support, depending on thickness applied. Proper curing is essential to using spray-on liners to avoid bond failures. There are water quality impacts associated with the application of these liners, their degree of impact related to selection of materials. Literature indicates that the State of California has effectively banned the use of spray-on products using polyurea due to the toxic effects of isocyanate materials on the environment and on workers installing the material.

Advantages: A repair alternative would address the structural deficiencies of the existing culvert pipes without affecting traffic flow, with minimum upfront costs. It would have minimal impacts on resources. Very minimal impacts on traffic flow would be expected.

Disadvantages: A remaining service life of approximately 30 years would be gained, and slight temporary water quality impacts may be seen. Aquatic Organism Passage and wildlife connectivity would not be improved.

Alternative 2: Structure Replacement Using Trenchless Methods

A replacement of the existing culvert adjacent to the current location could be accomplished. Although conventional jack-and-bore or pipe ramming methods would be likely to succeed on this project, a 12' diameter jack and bore would probably not be practical. Pipes as large as 12' diameter have been installed using trenchless technology, but the equipment and expertise for this size project may be unavailable or prohibitively expensive in Vermont.

Alternative 2 could include the installation of a new 8' pipe inside of the existing pipe and the installation of one new 8' pipe adjacent to the existing pipe. However, dual culvert installations such as this are not favored hydraulically. It is not efficient, creates additional turbulence, is more prone to debris clogging, and causes more impacts when directing the stream into the second pipe.

Due to the reasons above, a jack-and-bore alternative is not recommended for this project and will not be evaluated further in this report.

Alternative 3: Structure Replacement Using Open Cut

Culvert replacement using an open cut was considered. The new culvert would either be an 8.5' diameter multi-plate pipe, an 8' wide by 8' high precast concrete box, or any other shape meeting the waterway requirements. It would be approximately 65' long with no skew. If a 3-sided box is used, it would be founded at least 6' below the channel bottom and would have full headwalls. A 4-sided box could be used as well, and would be scour resistant. Traffic would need to be maintained either by off-site detour or temporary bridge.

IV. Maintenance of Traffic

The Vermont Agency of Transportation has created an Accelerated Bridge Program, which focuses on faster delivery of construction plans, permitting, and Right-of-Way, as well as faster construction of projects in the field. One practice that will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with faster construction techniques and incentives to contractors to complete projects early. The Agency will consider the closure option on projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements and systems for new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Bridge Construction should provide enhanced safety for the workers and the traveling public while maintaining project quality. The following options have been considered:

Option 1: Off-Site Detour

This option would close the bridge and reroute traffic onto an official, signed State detour, which detours traffic east on VT 17, then south on VT 22A into the town of Bridport, and back to VT 125.

Thru distance:	7.0 miles	9 min.
Detour distance:	14.7 miles	18 min.
Added distance for thru traffic:	7.7 miles	9 min.
End to end distance:	21.7 miles	27 min.

There are several local bypass routes that may see an increase in traffic from local passenger cars. These routes vary in end-to-end distance from 9.3 miles to 11.4 miles. It is likely that any of these routes could see increased traffic if VT Route 125 was closed during construction, but they are not appropriate for all truck traffic. The possible local bypass routes are as follows:

1. East on VT 17, then east on TH-32, Church Street, Class 3 paved, then south on TH-2 Jersey Street South/Basin Harbor Road, Class 2, into the town of Bridport, and back to VT 125 with total end-to-end distance of 11.4 miles.

2. East on VT 17, then east on TH-32, Church Street, Class 3 paved, then south on TH-2 Jersey Street South, Class 2, then west on TH-24, Town Line Road, Class 3 paved, and back to VT 125 with total end-to-end distance of 9.3 miles.

Other bypass routes may be available. Access to driveways would be maintained. A map of the detour route and possible local bypass routes, which could see an increase in traffic, can be found in the appendix.

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

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

Option 2: Temporary Bridge

Initial investigations indicate that a temporary bridge could be located upstream or downstream of the existing structure. A temporary bridge upstream or downstream would require the removal of many trees and a large volume of temporary fill or sheet piling to construct the approaches. Overhead utility lines are located upstream of the bridge and would need to be relocated for a temporary bridge on this side. Wetlands are present on both the upstream and downstream banks.

A one lane temporary bridge with traffic signals would be appropriate based on the daily traffic volumes. A temporary bridge would require temporary Right-of-Way acquisition. See the Temporary Bridge Layout Sheet in the appendix.

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

Disadvantages: This option would require the acquisition of additional temporary rights-of-way, and would be relatively high in cost. There would be some delays and disruption to traffic, since the road would be reduced to one-way traffic, and the speed limit reduced. There would be significant environmental impacts to the wetlands on either side of the existing culvert if a temporary bridge is built.

Option 3: Phased Construction

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

Based on traffic volumes and the existing roadway width, it would be reasonable to close one lane of traffic, and maintain one lane of alternating traffic, with traffic signals. However, the excavation to replace the culvert would be approximately 15’-18’ deep. Phasing would require a fairly deep braced excavation immediately adjacent to a live traffic lane while the work was performed. Early geotechnical information suggests that bedrock is deep and there is soft clay and uniform material in the area of the proposed culvert. This would allow for the installation of sheet piles. Contingent upon the findings of the geotechnical analysis, the excavation may be braced using sheet piles. Due to the narrow width of the roadway, temporary fill would be required to widen the road in order to maintain traffic safety and to provide room for the sheet pile installation and traffic barriers on both sides of the travel way. The widening would impact the wetlands and require tree removal on the approach roadways.

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

Disadvantages: This option would be relatively high in cost. There would be some delays and disruption to traffic, since the road would be reduced to one-way traffic, and the speed limit reduced. Periodic lane closures will still be necessary. There would also be impacts to the wetlands and tree removal in order to accommodate the widening of the roadway for a phased construction.

V. Alternatives Summary

Based on the existing site conditions, culvert condition, and recommendations from hydraulics and others, the following alternatives are offered:

Alternative 1a: Culvert Rehabilitation Using Pipe Liner with Traffic Maintained with Minor, Occasional Interruption.

Alternative 1b: Culvert Rehabilitation Using Spray-On Liner with Traffic Maintained with Minor, Occasional Interruption.

Alternative 2a: Culvert Replacement with Traffic Maintained on Offsite Detour.

Alternative 2b: Culvert Replacement with Traffic Maintained on Temporary Bridge.

Alternative 2c: Culvert Replacement with Traffic Maintained using Phased Construction.

VI. Cost Matrix[1]

ADDISION BF 0172(9)		No Action	Alt 1a	Alt 1b	Alt 2a	Alt 2b	Alt 2c
			Culvert Rehab using Pipe Liner	Culvert Rehab using Spray-On Liner	Culvert Replacement Open Cut		
			No/Minor Traffic Impact		Offsite Detour	Temporary Bridge	Phased Construction
COST	Bridge Cost	$0	$84,000	$90,000	$275,000	$275,000	$300,000
	Removal of Structure	$0	$0	$0	$10,000	$10,000	$10,000
	Roadway	$0	$40,000	$43,000	$105,000	$105,000	$105,000
	Shoulder & Guardrail Improvements[2]	$0	$0	$0	$75,000	$75,000	$75,000
	Control of Water[3]	$0	$11,000	$50,000	$45,000	$45,000	$50,000
	Maintenance of Traffic	$0	$10,000	$10,000	$40,000	$120,000	$100,000
	Construction Cost	$0	$145,000	$193,000	$550,000	$630,000	$640,000
	Construction Engineering & Contingencies	$0	$42,000	$56,000	$160,000	$183,000	$186,000
	Total Construction Costs w CEC	**$0**	**$187,000**	**$249,000**	**$710,000**	**$813,000**	**$826,000**
	Preliminary Engineering[4]	**$0**	**$51,000**	**$68,000**	**$193,000**	**$221,000**	**$224,000**
	Right of Way	**$0**	**$14,000**	**$14,000**	**$14,000**	**$38,000**	**$14,000**
	Total Project Costs	$0	$252,000	$331,000	$917,000	$1,072,000	$1,064,000
SCHEDULING	Project Development Duration[5]	NA	2 years	2 years	4 years	4 years	4 years
	Construction Duration	NA	2 months	2 months	2 months	4 months	4 months
	Closure Duration (If Applicable)	NA	NA	NA	21 days	NA	NA
ENGINEERING	Typical Section - Roadway (feet)	22'	22'	22'	22'	22'	22'
	Typical Section - Bridge (feet)	1-10-10-1	1-10-10-1	1-10-10-1	4-10-10-4	4-10-10-4	4-10-10-4
	Geometric Design Criteria	No Change	No Change	No Change	No Change	No Change	No Change
	Traffic Safety	No Change	No Change	No Change	Improved[6]	Improved[6]	Improved[6]
	Alignment Change	No	No	No	No	No	No
	Bicycle Access	No Change	No Change	No Change	Improved[6]	Improved[6]	Improved[6]
	Hydraulic Performance	Meets Standards	Reduced Opening	Meets Standards	Meets Standards	Meets Standards	Meets Standards
	Pedestrian Access	No Change	No Change	No Change	Improved[6]	Improved[6]	Improved[6]
	Utility	No Change	No Change	No Change	No Change	No Change	No Change
OTHER	ROW Acquisition	No	Yes (temporary)	Yes (temporary)	Yes (temporary)	Yes (temporary)	Yes (temporary)
	Road Closure	No	No	No	Yes	No	No
	Design Life	<10 years	50 years	30 years	75 years	75 years	75 years

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

[2] Shoulder and guardrail costs are estimated on a $750 per foot basis, which includes slope work, shoulder widening, guardrail installation, tree removal and permitting for the area at the culvert only.

[3] Control of water costs are estimated on a $250 per square yard basis.

[4] Preliminary Engineering costs are estimated starting from the end of the Project Definition Phase.
[5] Project Development Durations are starting from the end of the Project Definition Phase.
[6] At culvert location only.

VII. Conclusion

Alternative 2a is recommended; replace the existing culvert while maintaining traffic on an offsite detour. An 8’ high by 8’ wide precast concrete box culvert is proposed. Cover depth would be expected to be approximately 2 ft. to 3 ft. AOP and wildlife connectivity remain consistent with the existing structure. The roadway profile will remain unchanged, however, it is recommended to increase the shoulder widths to 4’ and add guardrails to improve safety in the vicinity of the bridge only.

Structure:

The initial cost for replacement of the culvert is higher than repairing it, but the total cost spread out over the expected service life is less. It seems reasonable to provide an 75 year fix for less money over the long run.

The recommended alternative would not rectify the substandard shoulder widths, clear zone distances, or lack of guardrail on the approaches to the bridge. In order to rectify these substandard issues, the project limits would need to be significantly extended.

Traffic Control:

The recommended method of traffic control is to close the bridge for up to 21 days, and maintain traffic on an offsite detour. The detour appropriate for trucks would add approximately 7.7 miles to the through route, and have an end-to-end distance of 21.7 miles. There are a couple of local bypass routes which, although not appropriate for all trucks, would most likely be used by local traffic. These routes are shorter, ranging from 9.3 miles to 11.4 miles end-to-end.

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

Appendix A: Site Pictures


VT Route 125, Looking North


VT Route 125, Looking South


Looking East Upstream


Looking West Downstream

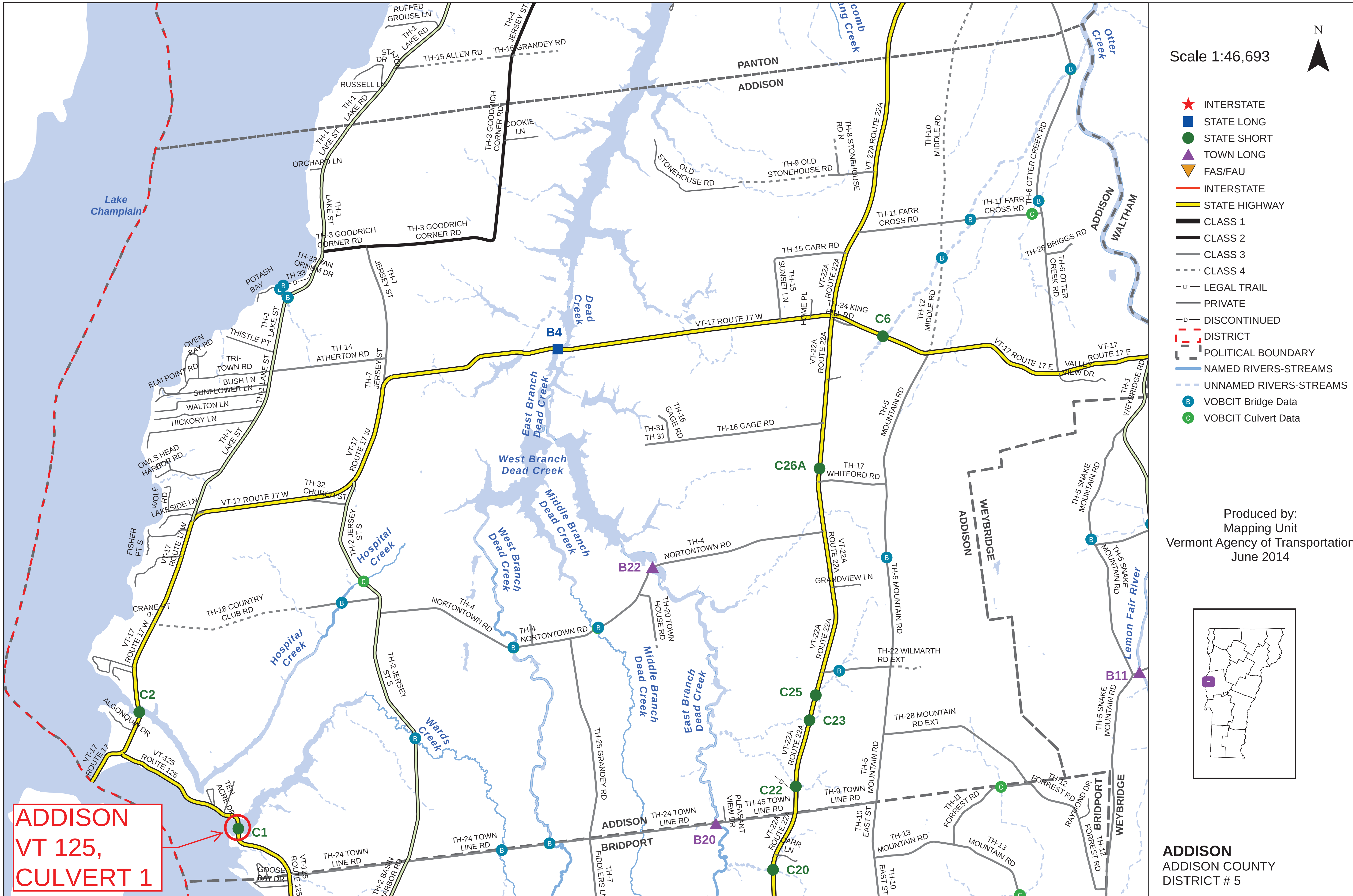

Culvert East Upstream End


Culvert West Downstream End


Looking West Downstream Through Culvert


Typical Culvert Deterioration at Waterline

Appendix B: Town Map


ADDISON
VT 125,
CULVERT 1
Scale 1:46,693
N
INTERSTATE
STATE LONG
STATE SHORT
TOWN LONG
FAS/FAU
INTERSTATE
STATE HIGHWAY
CLASS 1
CLASS 2
CLASS 3
CLASS 4
LEGAL TRAIL
PRIVATE
DISCONTINUED
DISTRICT
POLITICAL BOUNDARY
NAMED RIVERS-STREAMS
UNNAMED RIVERS-STREAMS
VOBCIT Bridge Data
VOBCIT Culvert Data
Produced by:
Mapping Unit
Vermont Agency of Transportation
June 2014
ADDISON
ADDISON COUNTY
DISTRICT # 5
Lake Champlain
PANTON
ADDISON
BRIDPORT
WEYBRIDGE
WALTHAM
Dead Creek
East Branch Dead Creek
West Branch Dead Creek
Middle Branch Dead Creek
Hospital Creek
Wards Creek
Otter Creek
Lemon Fair River
VT-17 ROUTE 17 W
VT-17 ROUTE 17 E
VT-22A ROUTE 22A
VT-125 ROUTE 125
TH-4 NORTONTOWN RD
TH-24 TOWN LINE RD
TH-16 GAGE RD
TH-17 WHITFORD RD
TH-5 MOUNTAIN RD
TH-28 MOUNTAIN RD EXT
TH-3 GOODRICH CORNER RD
TH-1 LAKE ST
TH-7 JERSEY ST
TH-2 JERSEY ST S
TH-14 ATHERTON RD
TH-18 COUNTRY CLUB RD
TH-9 OLD STONEHOUSE RD
TH-15 CARR RD
TH-11 FARR CROSS RD
TH-26 BRIGGS RD
TH-6 OTTER CREEK RD
TH-10 MIDDLE RD
TH-12 FORREST RD
TH-13 MOUNTAIN RD
TH-25 GRANDEY RD
TH-20 TOWN HOUSE RD
TH-22 WILMARTH RD EXT
TH-9 TOWN LINE RD
TH-45 TOWN LINE RD
GRANDVIEW LN
B4
B11
B20
B22
C1
C2
C6
C20
C22
C23
C25
C26A

Appendix C: Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for ADDISON | **bridge no.:** 0001 | **District:** 5

Located on: VT125 **over** TIMBER CREEK | **approximately** 1.3 MI E JCT VT 17 | **Maintained By:** STATE

CONDITION

Deck Rating: N NOT APPLICABLE
Superstructure Rating: N NOT APPLICABLE
Substructure Rating: N NOT APPLICABLE
Channel Rating: 6 SATISFACTORY
Culvert Rating: 3 SERIOUS
Federal Str. Number: 300172000101011

AGE and SERVICE

Year Built: 1936 **Year Reconstructed:** ____
Type of Service On: 1 HIGHWAY
Type of Service Under: 5 WATERWAY
Lanes On the Structure: 02
Lanes Under the Structure: 00
Bypass, Detour Length (miles): 0
ADT: 1200 **Year of ADT:** 1996

GEOMETRIC DATA

Length of Maximum Span (ft): 12
Structure Length (ft): 12
Lt Curb/Sidewalk Width (ft): 0
Rt Curb/Sidewalk Width (ft): 0
Bridge Rdwy Width Curb-to-Curb (ft): 0
Deck Width Out-to-Out (ft): 0
Appr. Roadway Width (ft): 22
Skew: 0
Bridge Median: 0 NO MEDIAN
Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD
Min Vertical Underclr (ft): 11 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: MULTI PLATE PIPE
Number of Main Spans: 1
Kind of Material and/or Design: 3 STEEL
Deck Structure Type: N NOT APPLICABLE
Type of Wearing Surface: N NOT APPLICABLE
Type of Membrane: N NOT APPLICABLE
Deck Protection: N NOT APPLICABLE

CULVERT GEOMETRIC DATA and INDICATORS

Culvert Barrel Length (ft): 33
Average Cover Over Culvert (ft): 02
Waterway Area Through Culvert (sq.ft.): 123
Culvert Wing/Header Rating: N NOT APPLICABLE
Steel Culvert Corrosion Indicator: 3 PERFORATIONS > 2" INLET/OUTLET ONLY
Multi Plate Culvert Bolt Line Crack Indicator: 0 NO BOLT LINE CRACKS PRESENT

APPRAISAL

Appr. Rdwy. Alignment: 8 EQUAL TO DESIRABLE CRITERIA

INSPECTION

Inspection Date: 112015 **Inspection Frequency (months):** 12

INSPECTION SUMMARY and NEEDS

11/9/2015 Culvert will need replacement in the near future. Guard rail should be added. Erosion should be repaired. ~FRE/TJB

10/24/2014 Culvert will need replacement soon. Erosion on the banks over the pipe should be repaired. Guard rail should be installed. ~FRE/TJB

10/29/2013 Culvert will need to be replaced in the near future. Guard rail should be installed on both ends. ~FRE/MJK

Culvert is in fair condition in what can be seen due to high water depth. Guardrail should be installed as the drop off the pavement is a safety concern. Inspected 9-24-08 ~MK

Appendix D: Preliminary Hydraulics Memo

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Jennifer Fitch, Structures Project Manager

FROM: Nick Wark, P.E., Hydraulics Engineer

DATE: September 1, 2016

SUBJECT: Addison BF 0172(9)
VT125 Br1 over Wards Creek
Preliminary Hydraulics

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

Existing Bridge Information

The existing CMP appears to be slightly deformed with a span of approximately 9' and a height of approximately 8'. This structure is located between Lake Champlain and Wards Creek in an area of primarily standing water. The water surface elevations at the structure and in Wards Creek are generally driven by the water surface elevations in the lake. When this structure is modeled using the average lake elevation of 95.5', it is well within state hydraulic standards (HW/D ≈ 0.7) at the 2% AEP design storm. When the structure is modeled with Lake Champlain at flood stage, 100', water does not overtop the road at the design storm.

Recommendations

Hydraulics contacted regulators for preliminary input on the sizing of this structure. We were concerned with flow, sediment/agricultural runoff, recreational use, etc. These emails are all saved in the hydraulics folder. Most responses were vague, but there was an indication that VTrans should replace the structure in-kind to limit possible impacts.

Given the regulatory feedback and the function of the existing structure we recommend the following similarly sized structures, an **8.5' diameter CMP** or an **8' by 8' concrete box**. Both of these options will meet hydraulic standards based on our approximate model and hopefully satisfy regulatory requirements. There may be a lot of flexibility here, so if there are other options you wish to consider, please let us know.

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

NJW

cc: Hydraulics Project File

Appendix E: Preliminary Geotechnical Report

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Jennifer Fitch, P.E., Structures Project Manager

MRG CEE

From: Matthew Gardner, Geotechnical Engineer, via Callie Ewald, P.E., Senior Geotechnical Engineer

Date: November 17th, 2015

Subject: Addison BF 0172(9) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge #1 on VT Route 125 over Lake Champlain in the town of Addison, VT. BR #1 is located approximately 1.2 miles east of the intersection of VT Route 125 and VT Route 17. The subject project consists of rehabilitating or replacing the existing multi plate pipe culvert. This review included the examination of as-built record plans, historical in-house bridge boring files, water well logs and hazardous site information on-file at the Agency of Natural Resources, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps, and observations made during a site visit.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Record plans were not found for the project and there is no boring data for this project. The Geotechnical Engineering Section maintains a GIS based historical record of subsurface investigations, which contains electronic records for the majority of borings completed in the past 10 years. An exploration of this database revealed one nearby project, Addison District #5 Slide approximately 1,000 feet away. Information from this project (2 borings drilled between July 25th, 2011 and July 28th, 2011) indicated loose sandy silt and sandy gravel for the first 10 feet, followed by loose to very loose clay from 10 feet to the depth of the hole. The boreholes stopped at 40 and 48 feet and no bedrock was encountered.

2.2 Water Well Logs

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, these logs can be used to determine general characteristics of the 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. Figure 1 contains the subject project as well as surrounding well locations found using the ANR Natural Resources Atlas. One water well within an approximate 8,000 foot radius of the project was used to get an estimate of the depth to bedrock likely to be encountered for Bridge #1 and is highlighted below by a red box.

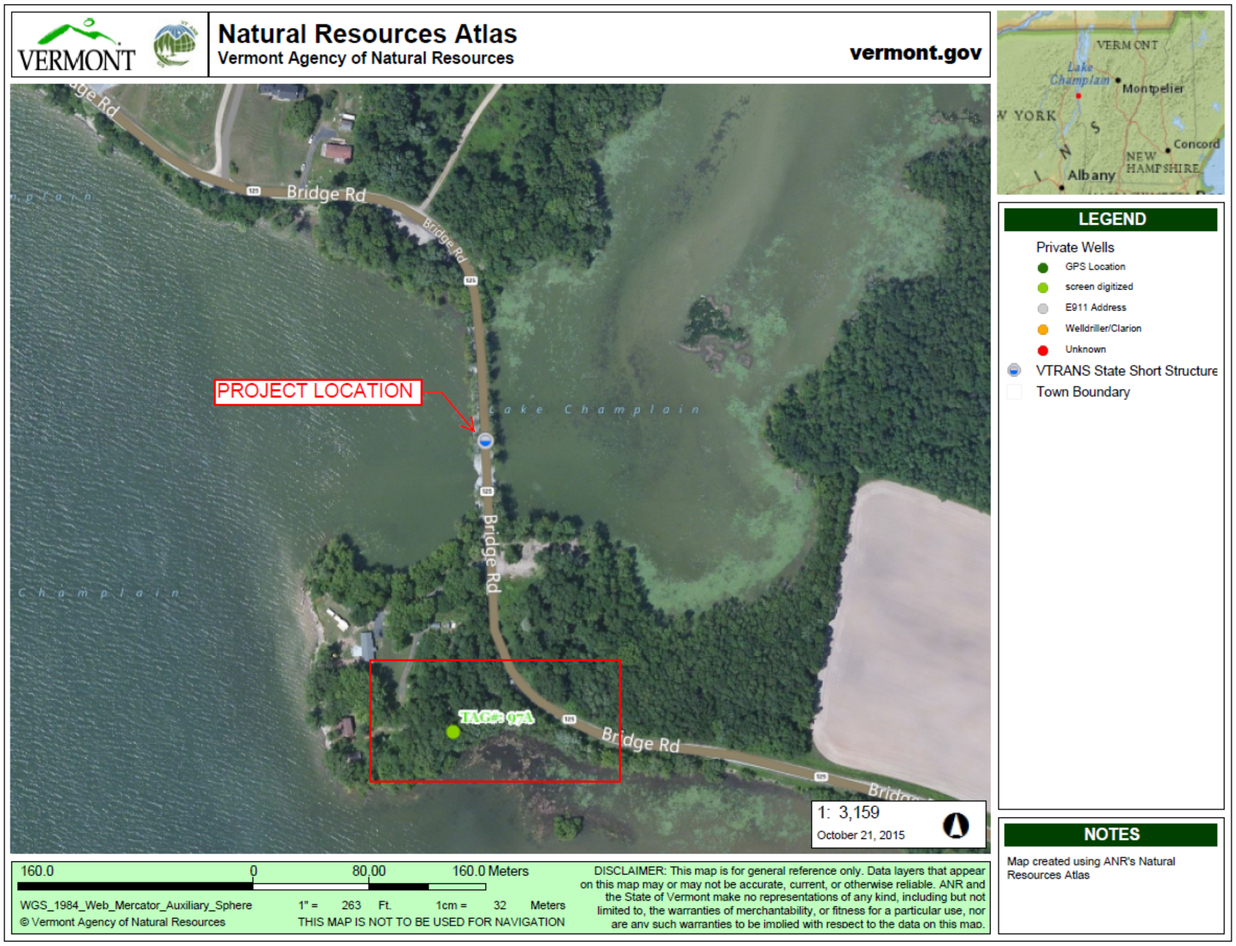


Figure 1: Culvert and Nearby Well Location

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

Table 1: Well Information from Wells Illustrated in Figure 1

Well ID	Approx. Distance From Project (feet)	Approx. Depth To Bedrock (feet)	Overburden Material
97A	673	181	Clay/Gravel

2.3 Hazard Waste Sites and Underground Storage Tanks

The ANR Natural Resource Atlas also maps the location and information of known hazardous waste sites and underground storage tanks. The location of this project is not on the Hazardous Site List and no impact from other hazardous waste sites is anticipated. The closest location of an underground storage tank was the Champlain Bridge Marina, approximately 1.2 miles away.

2.4 USDA Soil Survey

The United States Department of Agriculture (USDA) maintains an online surficial geology map of the US. According to the Web Soil Survey, the stratum directly underlying the project site consists of clay at depths ranging from 0 to 65 inches below the ground surface. Slopes of 2-6% can be found within the soil stratum. This soil is classified by the USDA soil survey as moderately well drained with a depth to bedrock of greater than 80 inches and a depth to groundwater of 12 to 36 inches.

2.5 Geologic Maps of Vermont

Mapping conducted in 1970 for the Surficial Geologic Map of Vermont shows that the project area consists of glaciolacustrine lake bottom sediments comprised of silt, silty clay, and/or clay containing ice rafted boulders. According to the 2011 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project site is underlain with dark-gray calcareous shale with beds of bluish-gray limestone.

3.0 BRIDGE INSPECTION

Based on the latest bridge inspection report from October 2014, the culvert is in serious condition and will need to be replaced soon. From the inspection, it was indicated that the material over the pipe has eroded and needs to be repaired as shown in Figure 2. It was also recommended that a guardrail be installed.

Figure 2: Erosion on the Bank above the Inlet

The inspection also indicated that there were perforations greater than 2 inches, due to corrosion, at the inlet and outlet as shown in Figure 3.

Figure 3: Inlet Corrosion

4.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on November 6th, 2015 to determine possible obstructions inhibiting boring operations and to make any other pertinent observations about the project area. Overhead power lines run along the east side of the existing culvert as shown in Figure 4. The culvert's approximate location is inside the red lines in Figure 4.

Figure 4: View at Culvert Location Looking North

No visible bedrock was seen in the vicinity of the project during the site visit. Large stacked stone was used as make-shift wing walls to build up the roadway embankment on either side of the pipe. This stone exists around both the inlet and the outlet of the culvert. Smaller stone was used on top of the culvert inlet and outlet and appeared to exhibit erosion as seen in Figures 5 and 6.

Figure 5: Large Stone Surrounding Culvert Outlet and Erosion above the Culvert

Figure 6: Large Stone Partially Surrounding the Culvert Inlet

The shoulder of the roadway above the inlet of the culvert appeared to have been rehabilitated recently as seen in Figure 7. It is expected that as the smaller stone and gravel erodes here, it leaves the pavement undermined causing the shoulder support to severely decrease.

Figure 7: Shoulder Rehab for Erosion Located above the Culvert Inlet

5.0 RECOMMENDATIONS

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

- Precast or steel arch bridge with spread footings founded on rock or soil
- Reinforced concrete box culvert with headwalls and wingwalls

We recommend a minimum of two borings taken with one located at the inlet and one located at the outlet 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 applicable). Due to the limited shoulder room, and overhead utilities, we recommend drilling both borings on either side of the pipe in the roadway.

6.0 CONCLUSION

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

cc: Project File/CEE
MRG

Z:\Highways\ConstructionMaterials\GeotechEngineering\Projects\Addison BF 0173(9)\REPORTS\Addison BF 0173(9) Preliminary Geotechnical Information.docx

Appendix F: Natural Resources Memo

VERMONT

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

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

Agency of Transportation

To: Jeff Ramsey, VTrans Environmental Specialist Supervisor

From: Glenn Gingras, VTrans Environmental Biologist

Date: 11/5/15

Subject: Addison BF 0172 (9) [15b092]
Natural Resource Identification

I have reviewed the above referenced project area for potential natural resource involvement. I have reviewed existing mapping, performed a site visit and have started early coordination with resource agencies.

The project involves scoping of Bridge 1 on VT 125 in the town of Addison, VT. Various alternatives will be evaluated to determine which alternative best meets the projects purpose and need.

Wetlands and Waterways:
I evaluated the entire causeway area within the project area. Wetlands do exist at the toe of slope on all 4 quadrants of the causeway approaches. The wetlands will not likely be within the proposed project area as the culvert is in the middle of the causeway. The wetlands are basically the same wetland complex and the boundaries are fairly abrupt with the toe of slope of VT 125. The areas hydrology is directly influenced by Lake Champlain and most of the wetlands are inundated most of the growing season. Several hydrology indicators where observed during the site visit. Dominant vegetation within the wetland is: silver maple and willow and an understory of dogwood, elm, jewelweed and sedges. Soils within the wetland exhibit hydric characteristics in the form of a depleted matrix. All wetlands adjacent to the causeway would be Class II wetlands and would have a regulated 50' buffer.

Wards Creek flows westerly through the culvert. Water elevations within the project area are directly influenced by Lake Champlain elevations. The ordinary high water elevation of Lake Champlain is 98.0'.

Wetlands and waterbodies within the project area are regulated by the US Corps of Engineers and the Department of Environmental Conservation.

Rare, Threatened and Endangered Species:
The project area is within the range of two federally listed species:

Indiana Bat, *Myotis sodalist* (federally E, state E) and Northern Long-eared Bat, *Myotis septentrionalis* (federally T, state Endangered). The project area has large mature trees that potentially could serve as roost trees. Avoidance minimization measures for these species would be clearing trees (if need be) between SEPT1 and APR15 unless an acoustic survey is completed and presence is not detected.

There are rare occurrences in the project area as well: natural community (Sand over Clay Floodplain Forest) and a rare migratory bird species (American Bittern).

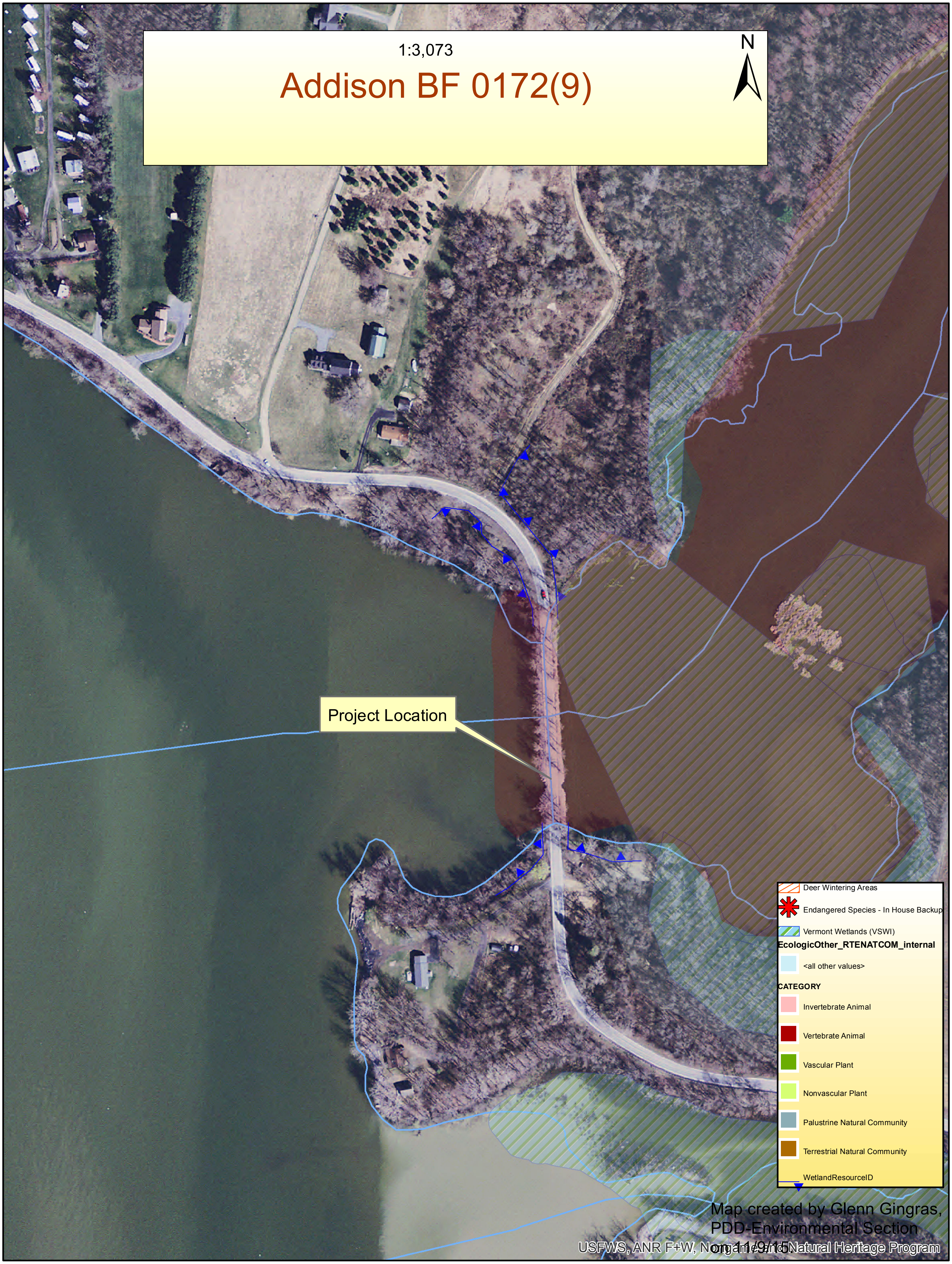
I have reached out to VT Fish and Wildlife regarding any other known occurrences and have not heard back from them.

Wildlife Habitat:
There are several migratory bird species that have habitat (nesting, feeding opportunities) within the project vicinity. Aquatic species are abundant within the project area. Aquatic organism passage should be included in any design alternative.

Agricultural Soils:
No prime agricultural soils are mapped within the project area.

Summary:
In summary, the project vicinity is adjacent to several regulated natural resources. Most of the resources will likely be avoided due to the location of the culvert, which is in the middle of the causeway. Avoidance and minimization efforts will need to be explored during the alternatives evaluation.

Cc: Natural Resource project file
Jennifer Fitch, VTrans Project Manager



1:3,073
Addison BF 0172(9)
N
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 11/9/15
USFWS, ANR F+W, Nongame and Natural Heritage Program

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
PHONE: (603)223-2541 FAX: (603)223-0104
URL: www.fws.gov/newengland

Consultation Code: 05E1NE00-2016-SLI-0245 November 06, 2015
Event Code: 05E1NE00-2016-E-00315
Project Name: Addison BF 0172 (9)

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

Official Species List

Provided by:

New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
(603) 223-2541
http://www.fws.gov/newengland

Consultation Code: 05E1NE00-2016-SLI-0245
Event Code: 05E1NE00-2016-E-00315

Project Type: TRANSPORTATION

Project Name: Addison BF 0172 (9)
Project Description: Project is currently in scoping. The project will involve rehabilitation or replacement of Bridge 2 on VT 125 in the town of Addison, VT. The current structure is a culvert. Large mature Cottonwoods are adjacent to the causeway and could potentially serve as roost trees. Culvert likely could be replaced without tree clearing.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:

Project Coordinates: MULTIPOLYGON (((-73.39888572692871 44.028016368309686, -73.39879989624023 44.026982678797346, -73.39922904968262 44.02687468034554, -73.39927658931629 44.02808632709091, -73.39892864227295 44.028078080546166, -73.39888572692871 44.028016368309686)))

Project Counties: Addison, VT

Endangered Species Act Species List

There are a total of 2 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	**Status**	**Has Critical Habitat**	**Condition(s)**
Indiana bat *(Myotis sodalis)* Population: Entire	Endangered		
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Addison BF 0172(9)

Vertmont Agency of Natural Resources

vermont.gov

LEGEND

Wetlands - VSWI
- Class 1 Wetland
- Class 2 Wetland

Stream Crossings
- Fully Passable
- Reduced Passage
- Impassable except for Adult Trout
- Impassable
- Bridge/Arch (Fully Passable)

Rare Threatened Endangered
- Threatened or Endangered
- Rare

Significant Natural Community

Town Boundary

642.0 0 321.00 642.0 Meters

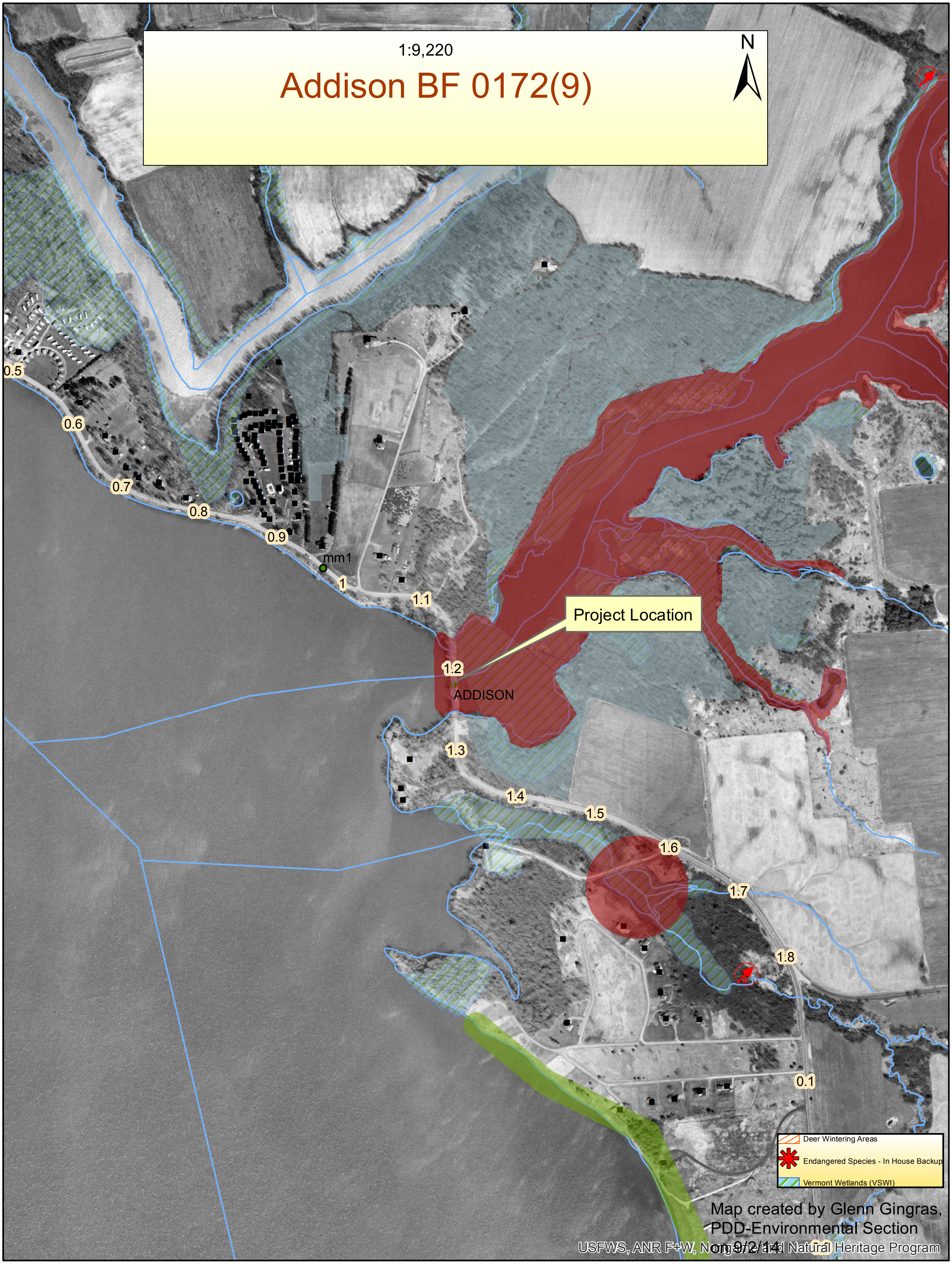
WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 1053 Ft. 1cm = 126 Meters

© Vermont Agency of Natural Resources THIS MAP IS NOT TO BE USED FOR NAVIGATION

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

NOTES

Map created using ANR's Natural Resources Atlas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Deer Wintering Areas
Endangered Species - In House Backup
Vermont Wetlands (VSWI)
Map created by Glenn Gingras,
PDD-Environmental Section
on 9/2/14.
USFWS, ANR F+W, Nongame and Natural Heritage Program

Appendix G: Resource ID Completion Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Jennifer Fitch, Project Manager
FROM: Jeff Ramsey, Environmental Specialist Supervisor
DATE: September 24, 2015
PIN: 15B092

Project: ADDISON BF 0172 (9)

ENVIRONMENTAL RESOURCES:

	Yes	No	
Wetlands:	X		Wetlands do exist at the toe of slope on all 4 quadrants of the causeway approaches
Historic/Historic District:		X	
Archaeological Site:	X		areas of arch sensitivity
4(f) Property:		X	
6(f) Property:		X	
Agricultural Land:	X		No prime agricultural soils are mapped within the project area
Fish & Wildlife Habitat:	X		Wards Creek flows westerly through the culvert
Endangered Species:	X		The project area is within the range of two federally listed species
Hazardous Waste:		X	
Contaminated Soils:		X	
Stormwater:		X	
USDA-Forest Service Lands:		X	
Wildlife Habitat Connectivity:	X		Aquatic organism passage should be included in any design alternative
Scenic Highway/ Byway:		X	
Act 250 Permits:			unknown, but unlikely
Floodplains:	X		
Flood Hazard Area/ River Corridor:	X		mapped river corridor
Invasive Species:			unknown, but likely
Coast Guard:		X	
Landscaping:		X	
Environmental Justice:		X	
Source Protection Area:		X	
Other:		X	

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

cc:
Project File

Appendix H: Historic Memo

VERMONT

Judith Williams Ehrlich
VTrans Historic Preservation Officer

judith.ehrlich@vermont.gov
802.828.1708
www.vtrans.vermont.gov

Vermont Agency of Transportation
Project Delivery Bureau - Environmental Section

One National Life Drive
Montpelier, VT 05633-5001

To: **James Brady, Environmental Specialist**

Date: **December 2, 2015**

Subject: **Historic Resource Identification for Addison BF 0172(9)**

I have completed a resource identification (ID) for Addison BF 0172(9).

Constructed in 1936, Culvert No. 1 on VT 125 is a 33' long multi-plate steel culvert located approximately 1.3 miles east of the junction with VT 17. Culvert No. 1 carries VT 125 over Timber Creek.

Based on available information, I have determined that Culvert No. 1 does not possess the exceptional historic or architectural significance required for inclusion in the National Register of Historic Places either individually or as a contributing historic resource to an existing or potential historic district.

Please do not hesitate to contact me should you require additional information.

Appendix I: Local Input

The Structures Section has begun the scoping process for BF 0172(9), Vt Route 125, Culvert 1, over the Timber Creek. This is a Multi-Plate pipe constructed in 1936. The Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the culvert as 3(Serious). We are interested in hearing your thoughts regarding the items listed below. Leave it blank if you don't wish to comment on a particular item.

1. Your thoughts on the general condition of this bridge and the general maintenance effort required to keep it in service. This is a metal culvert that needs to be replaced. It is too short and in poor condition

2. Any comments on the geometry of the bridge (curve, sag, banking, sight distance)? The new structure has to be wide/long enough to allow for two 11-12' lanes and two 4' shoulders.

3. Do you feel the posted speed limit is appropriate? Speed limit should be reduced as there are many fisherman using the causeway to fish.

4. Is the width adequate for snow plowing? NO

5. Are the railings constantly in need of repair or replacement? What type of railing works best for your district? (We are recommending more and more box beam guardrail on our bridges because of crash-worthiness and compatibility with accelerated projects). No Guardrail on causeway. This project needs to widen causeway and raise it 6 inches to prevent spring flooding and install guardrail on both sides.

6. Are you aware of any unpermitted driveways within the likely project limits? We frequently encounter driveways that prevent us from meeting railing standards and then discover them to be illegal. There are unpermitted drives on both ends of the causeway

7. Are you aware of abutting property owners that are likely to need special attention during the planning and construction phases? These could be people with disabilities, elderly, or simply folks who feel they have been unfairly treated in the past. This is a fisherman's paradise and accommodations will need to be made for them

8. Do you find that extra effort is required to keep the slopes and river banks around the bridge in a stable condition? Is there frequent flood damage that demands repair? Since we raised the causeway we have not experienced annual spring flooding at the rate we use to. It did top over when Lake Champlain was at it highest a few years ago.

9. Does this bridge seem to pick up an unusual amount of debris from the waterway? At times there is debris from Lake Champlain at the outlet end.

10. Do you think a closure with off-site detour and accelerated construction would be appropriate? What should we consider for a detour route, assuming that we use State route for State projects and any route for Town projects? Yes. It would be the same detour that was used this summer for the Bridport box culvert installation.

11. Please describe any larger projects that you have completed that may not be reflected on the attached Appraisal sheet, such as deck patches, paving patches, railing replacement with new type, steel coating, etc. N/A

12. If there is a sidewalk on this bridge, how effective are the Town's efforts to keep it snow and ice free? N/A

13. Are there any drainage issues that we should address on this project? Grade needs to be high enough to proven overtopping when Lake Champlain rises in the spring.

14. Are you aware of any complaints that the public has about issues that we can address on this project? Fishermen complain there is not room to safely fish.

15. Anything else?

The Structures Section has begun the scoping process for BF 0172(9), Vt Route 125, Culvert 1, over the Timber Creek. This is a Multi-Plate pipe constructed in 1936. The Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the culvert as 3(Serious). We are interested in hearing your thoughts regarding the items listed below. Leave it blank if you don't wish to comment on a particular item.

1. Your thoughts on the general condition of this bridge and the general maintenance effort required to keep it in service.

2. Any comments on the geometry of the bridge (curve, sag, banking, sight distance)?

3. Do you feel the posted speed limit is appropriate?
   I think the speed limit in this area should be reduced to 35 mph. Many people fish on both sides of the road through this stretch, making 50 mph too dangerous of a speed.

4. Is the width adequate for snow plowing?
   The road is very narrow and should be widened

5. Are the railings constantly in need of repair or replacement? What type of railing works best for your district? (We are recommending more and more box beam guardrail on our bridges because of crash-worthiness and compatibility with accelerated projects).
   No guardrail exists now; however, box beam guardrail should be put in place.

6. Are you aware of any unpermitted driveways within the likely project limits? We frequently encounter driveways that prevent us from meeting railing standards and then discover them to be illegal.
   Fishing access on left side heading east is possibly unpermitted

7. Are you aware of abutting property owners that are likely to need special attention during the planning and construction phases? These could be people with disabilities, elderly, or simply folks who feel they have been unfairly treated in the past.

8. Do you find that extra effort is required to keep the slopes and river banks around the bridge in a stable condition? Is there frequent flood damage that demands repair?
   Flooding has been an issue here in previous years. Bank stabilization as well as building up the road should be looked into!

9. Does this bridge seem to pick up an unusual amount of debris from the waterway?

10. Do you think a closure with off-site detour and accelerated construction would be appropriate? What should we consider for a detour route, assuming that we use State route for State projects and any route for Town projects?
    The only detour route would be to use route 17 and 22a. This detour would be very lengthy. Many New York residents that work in Middlebury use VT 125 in their commute. Also, during the summer months this route sees a lot of tourism. Traffic accommodations would be dependent on the extent of project.

11. Please describe any larger projects that you have completed that may not be reflected on the attached Appraisal sheet, such as deck patches, paving patches, railing replacement with new type, steel coating, etc.

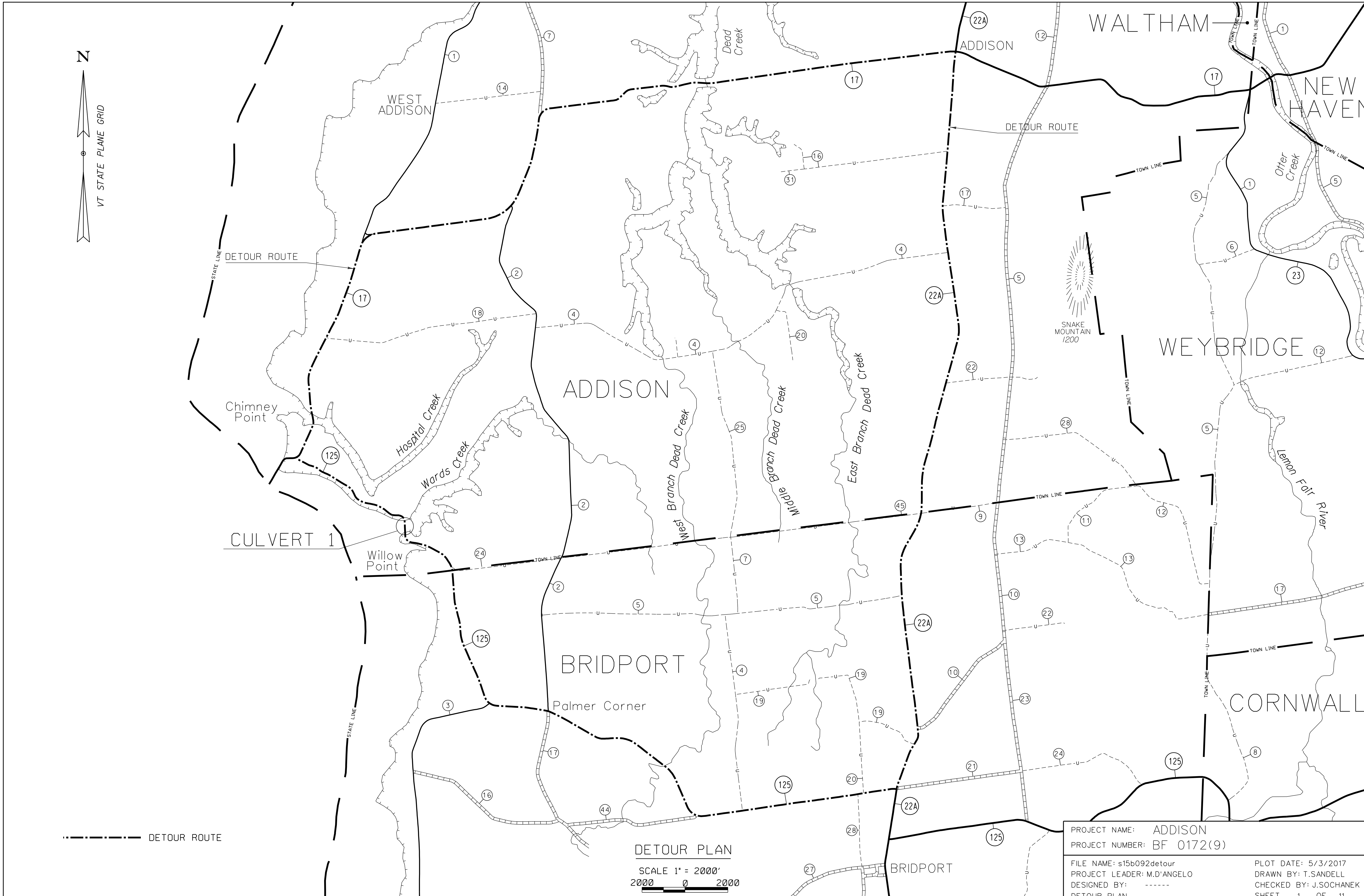
12. If there is a sidewalk on this bridge, how effective are the Town's efforts to keep it snow and ice free?
    There are no sidewalks present

13. Are there any drainage issues that we should address on this project?

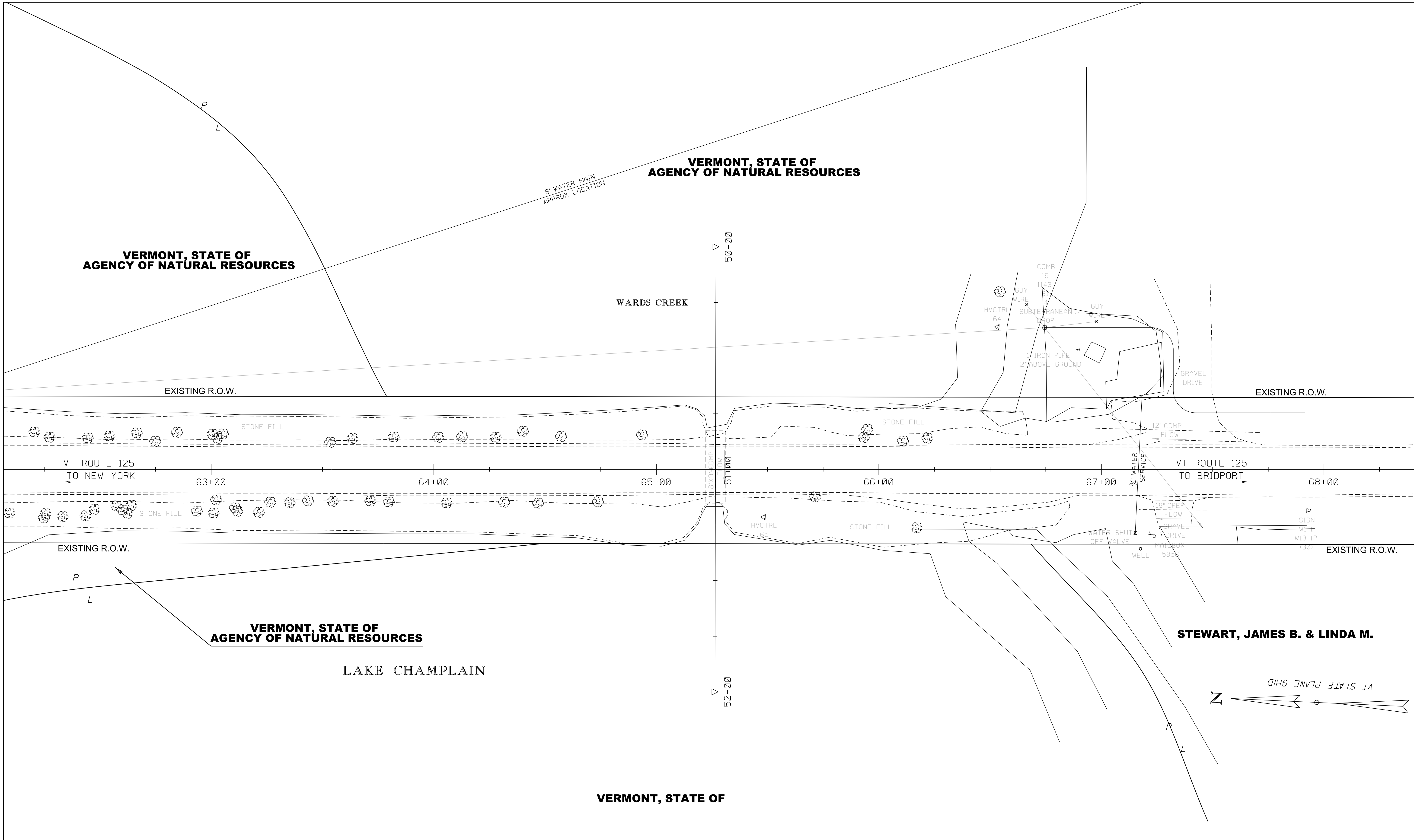
14. Are you aware of any complaints that the public has about issues that we can address on this project?
    Limited/ dangerous fishing access has been an issue. Both sides of the road are used as a fishing access most the year. If guardrail was placed throughout this stretch, and a landing area on the other side of the guardrail to protect fishers I think the safety issue would be addressed.

15. Anything else?

Appendix J: Detour Route


N
VT STATE PLANE GRID
WALTHAM
ADDISON
NEW HAVEN
WEST ADDISON
DETOUR ROUTE
Dead Creek
SNAKE MOUNTAIN 1200
WEYBRIDGE
Otter Creek
Chimney Point
Hospital Creek
Wards Creek
ADDISON
West Branch Dead Creek
Middle Branch Dead Creek
East Branch Dead Creek
Lemon Fair River
CULVERT 1
Willow Point
STATE LINE
TOWN LINE
BRIDPORT
Palmer Corner
CORNWALL
BRIDPORT
DETOUR ROUTE
DETOUR PLAN
SCALE 1" = 2000'
2000 0 2000
PROJECT NAME: ADDISON
PROJECT NUMBER: BF 0172(9)
FILE NAME: s15b092detour
PROJECT LEADER: M.D'ANGELO
DESIGNED BY: ------
DETOUR PLAN
PLOT DATE: 5/3/2017
DRAWN BY: T.SANDELL
CHECKED BY: J.SOCHANEK
SHEET 1 OF 11

Appendix K: Plans

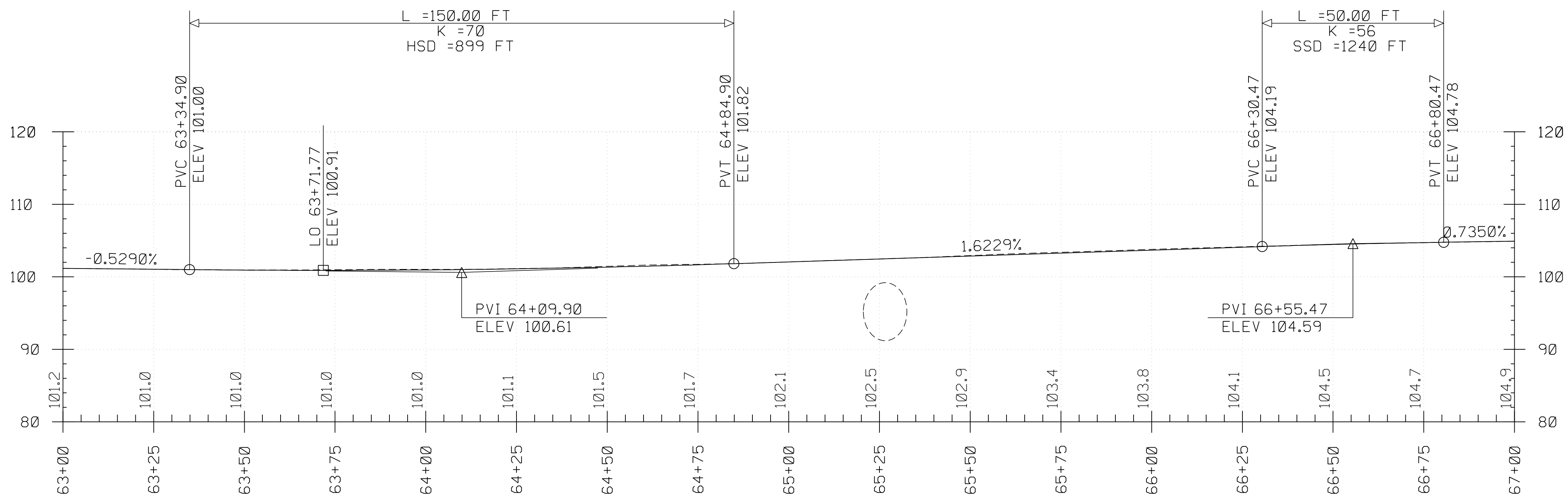


EXISTING BRIDGE INFORMATION
8'X9' CGMPP, 33' LONG
BUILT 1936
123 SQFT THROUGH CULVERT
2' AVERAGE COVER OVER PIPE

EXISTING CONDITIONS

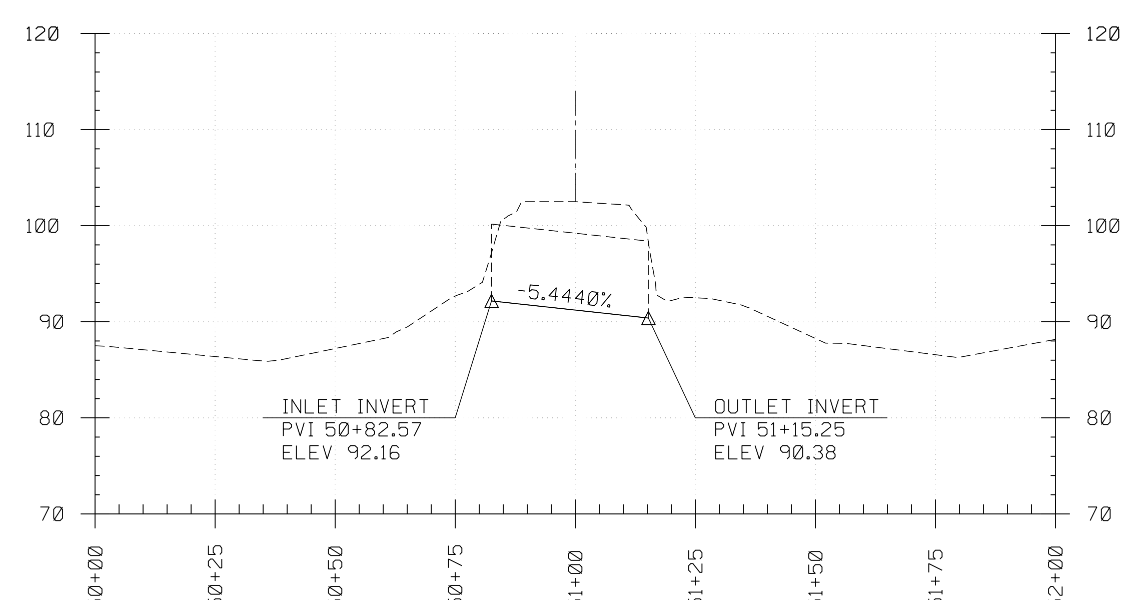
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092border	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
RESOURCE SITE PLAN	SHEET 2 OF 11



VT ROUTE 125 EXISTING PROFILE

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

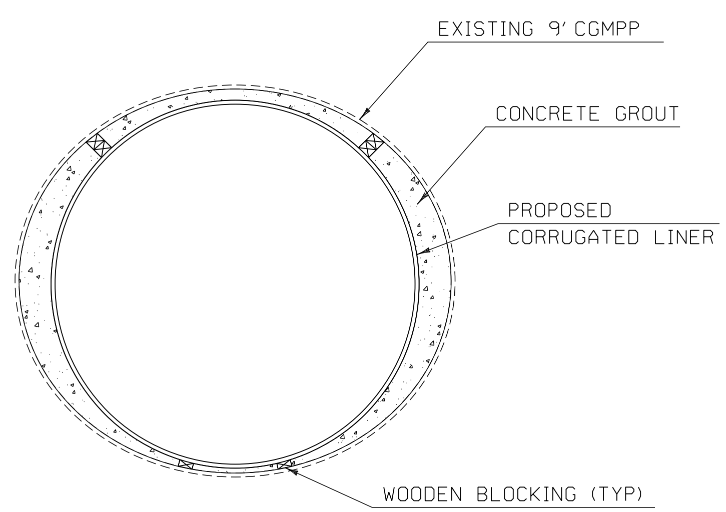


CULVERT 1 EXISTING PROFILE

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

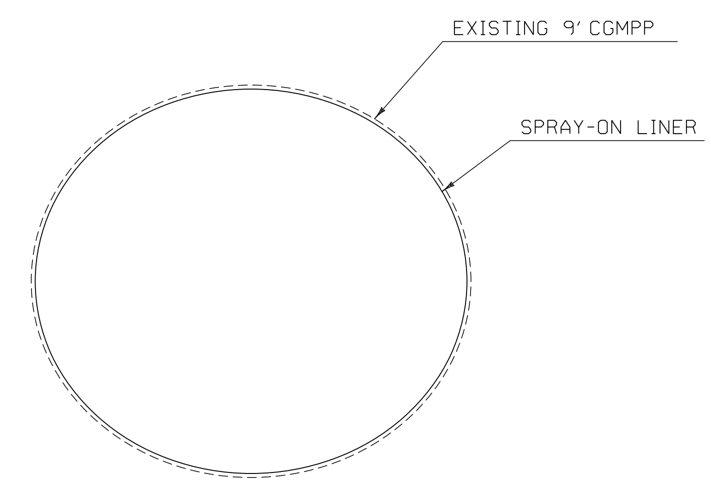
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092profile	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
PROFILE SHEET	SHEET 3 OF 11



ALTERNATIVE 1A TYPICAL SECTION

SCALE ½" = 1'-0"

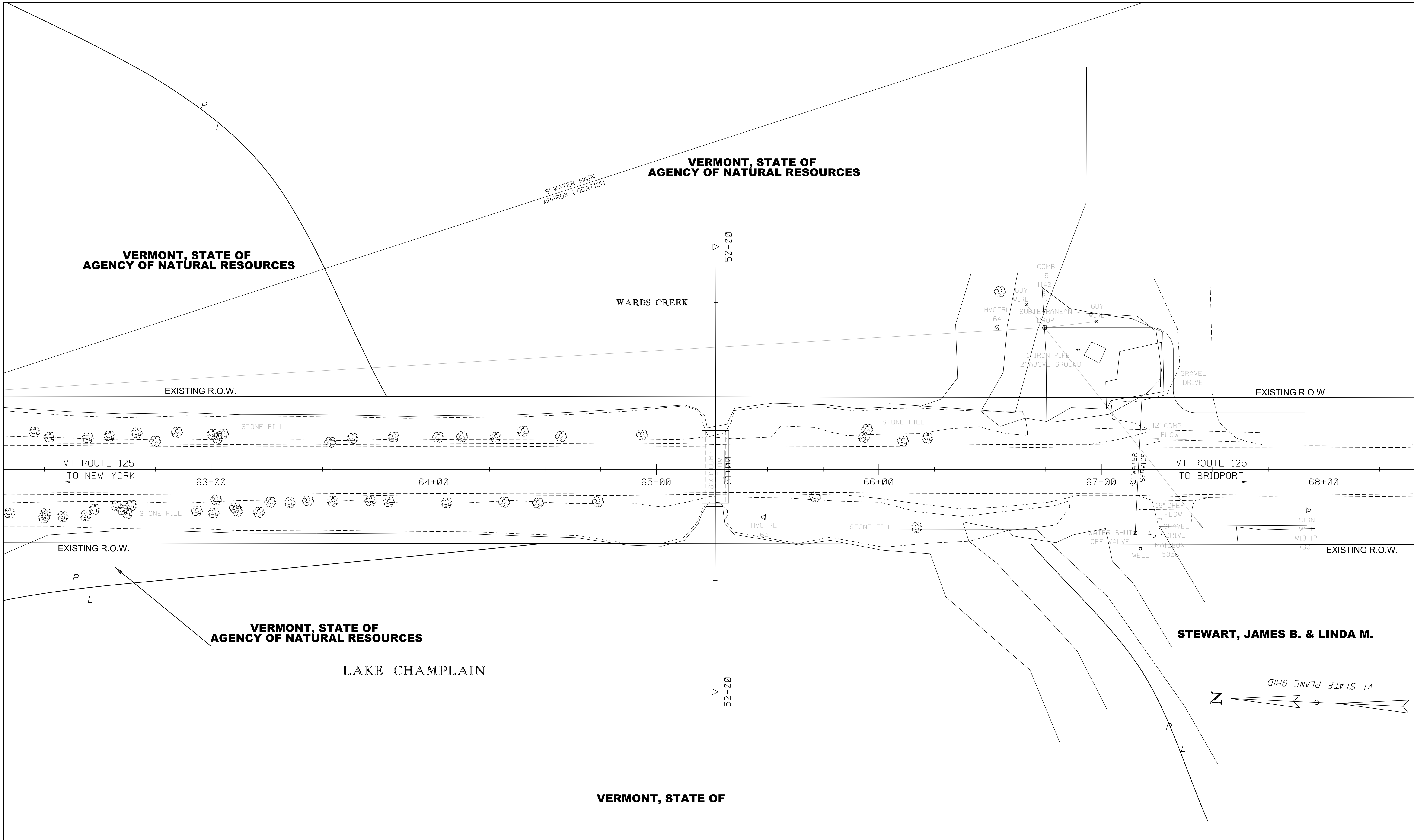


ALTERNATIVE 1B TYPICAL SECTION

SCALE ½" = 1'-0"

PROJECT NAME: ADDISON
PROJECT NUMBER: BR 0172(9)

FILE NAME: s15b092typical1	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
ALTERNATIVE 1 TYPICAL SECTIONS	SHEET 4 OF 11



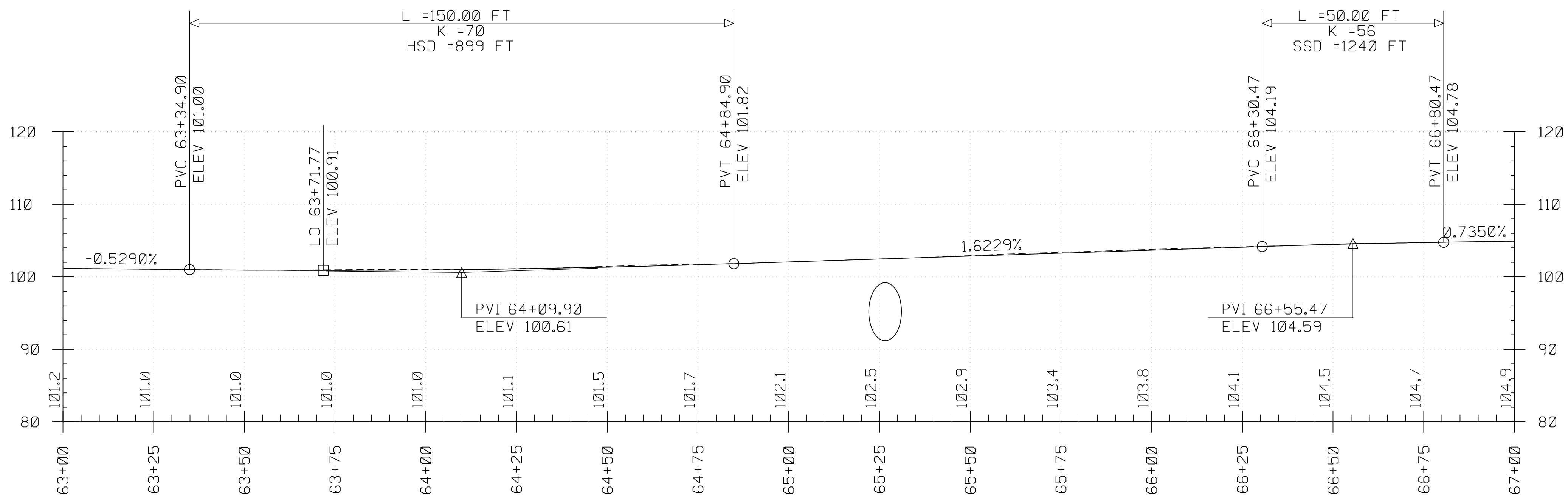
EXISTING BRIDGE INFORMATION
8'X9' CGMPP, 33' LONG
BUILT 1936
123 SQFT THROUGH CULVERT
2' AVERAGE COVER OVER PIPE

ALTERNATIVE 1 LAYOUT

SCALE 1" = 20'-0"

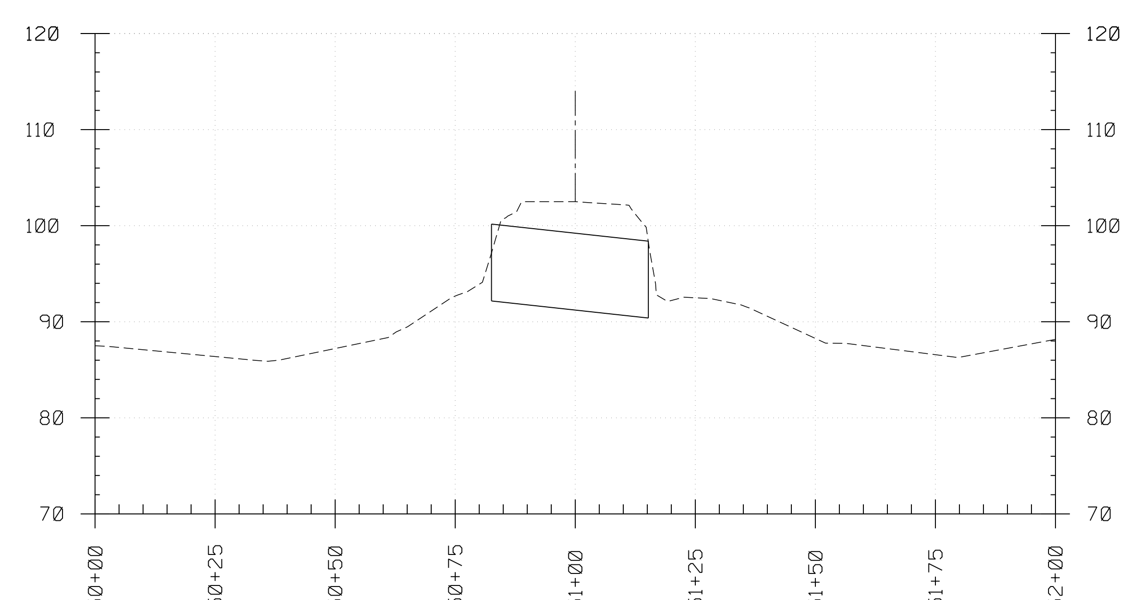
20 0 20

PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092border1	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
RESOURCE SITE PLAN	SHEET 5 OF 11



ALTERNATIVE 1 VT ROUTE 125 PROFILE

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

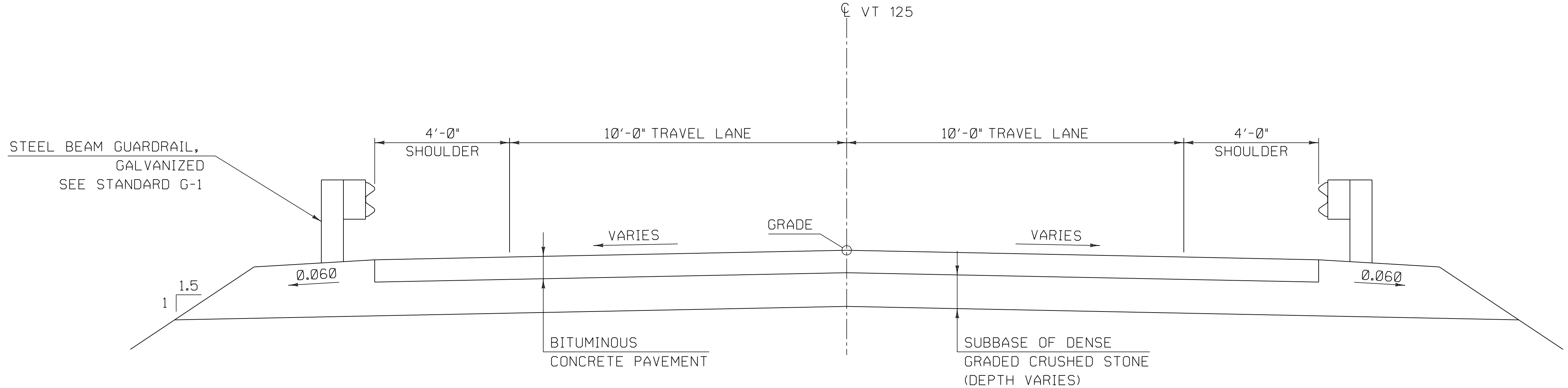


ALTERNATIVE 1 CULVERT 1 PROFILE

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

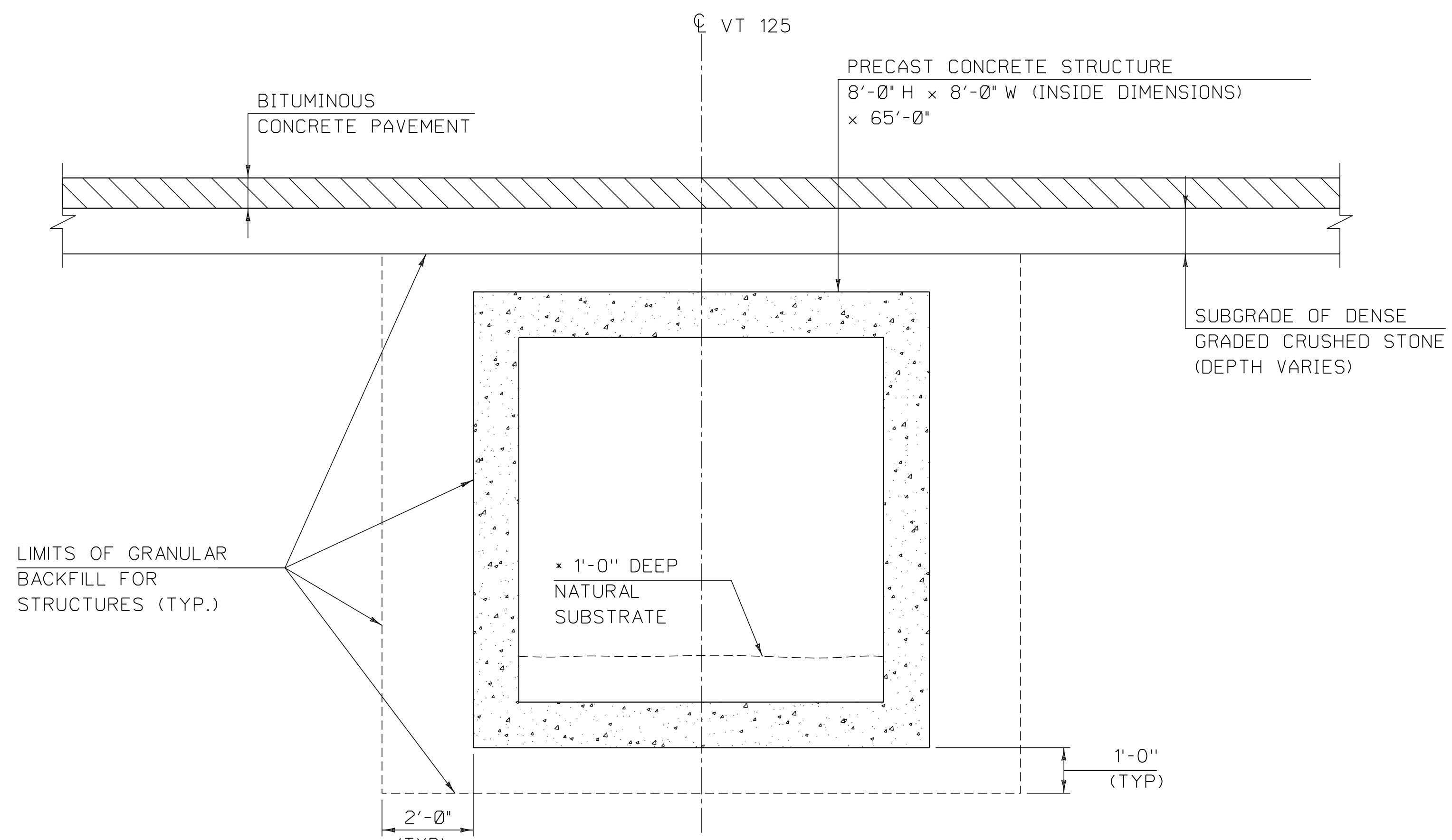
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG L^C
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG L^C

PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092profile1	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
ALTERNATIVE 1 PROFILE SHEET	SHEET 6 OF 11



PROPOSED VT 125 TYPICAL SECTION

SCALE ½" = 1'-0"

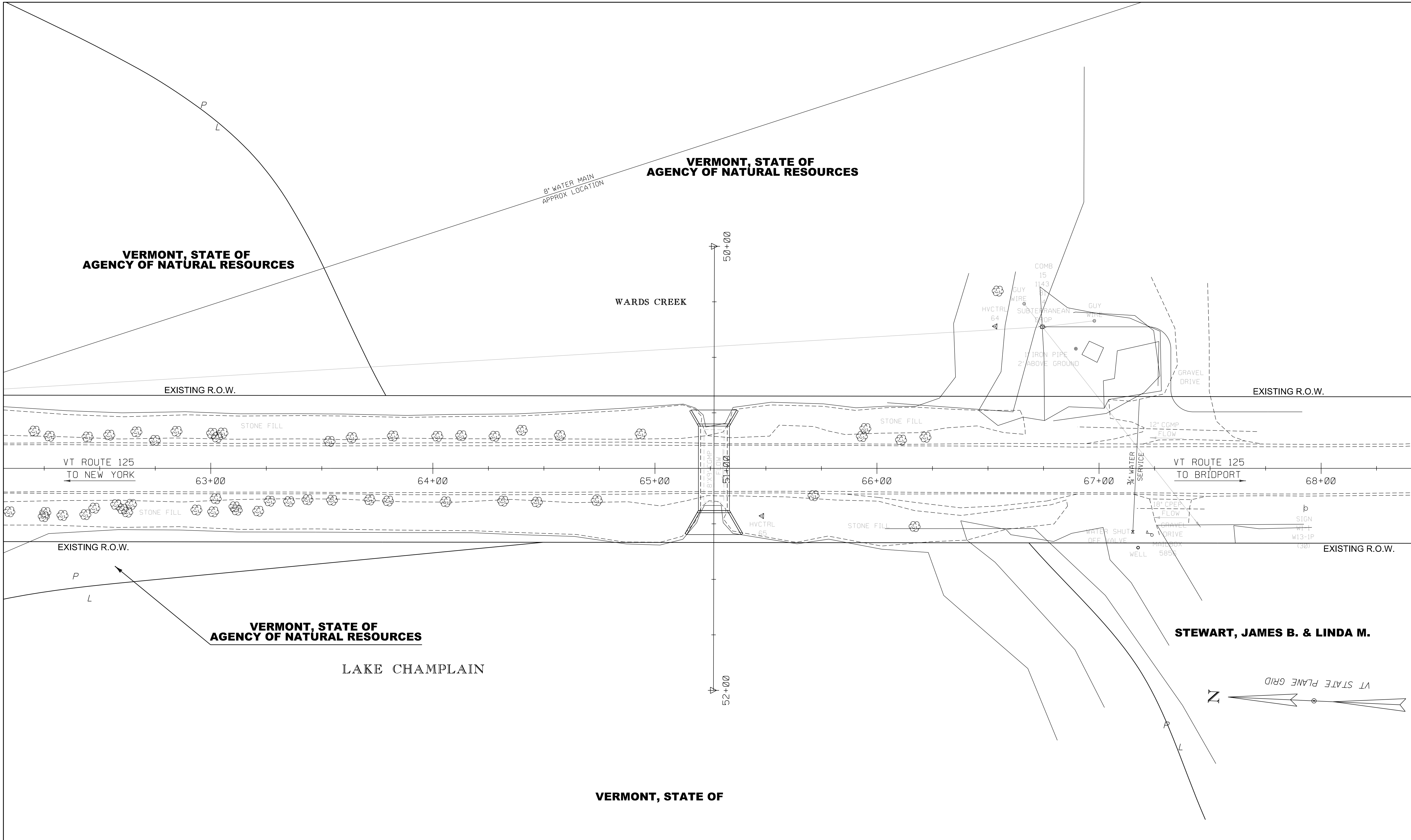


ALTERNATIVE 2 TYPICAL SECTION

SCALE ½" = 1'-0"

* MATERIAL SPECIFICIATION TO BE COORDINATED
WITH VERMONT AGENCY OF TRANSPORTATION

PROJECT NAME: ADDISON	
PROJECT NUMBER: BR 0172(9)	
FILE NAME: s15b092typical2	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
ALTERNATIVE 2 TYPICAL SECTIONS	SHEET 7 OF 11

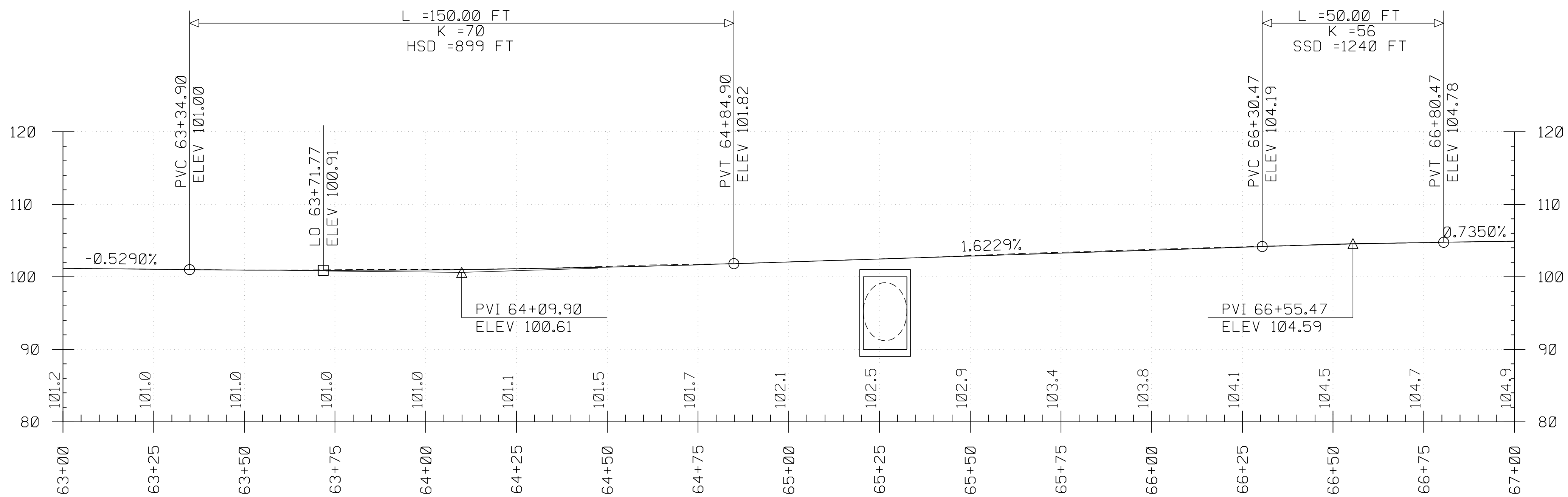


EXISTING BRIDGE INFORMATION
8'X9' CGMPP, 33' LONG
BUILT 1936
123 SQFT THROUGH CULVERT
2' AVERAGE COVER OVER PIPE

ALTERNATIVE 2 LAYOUT

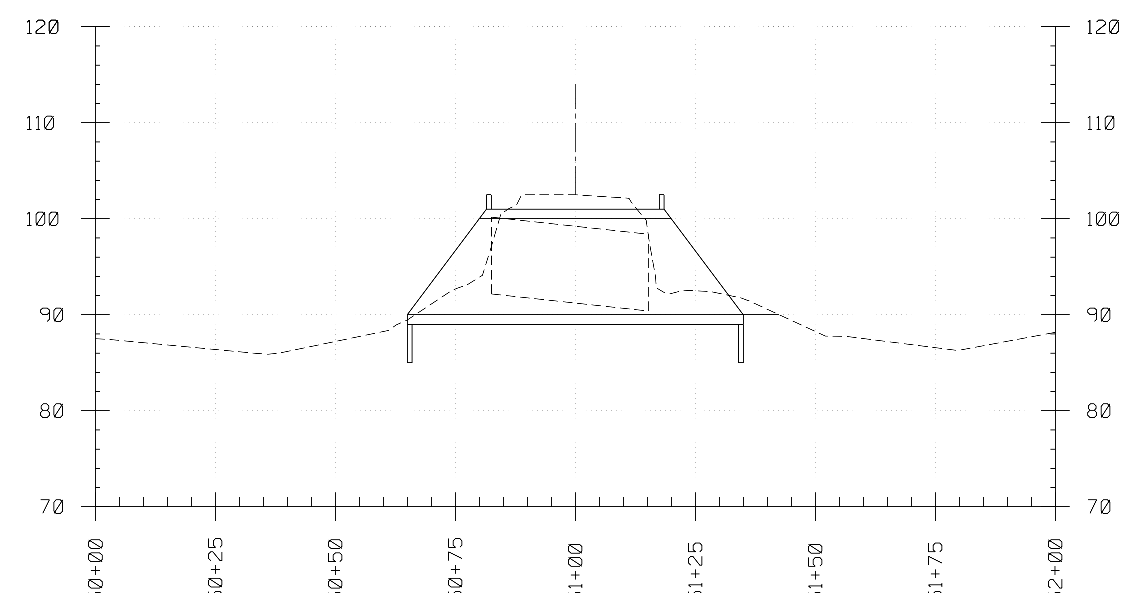
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092border2	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
RESOURCE SITE PLAN	SHEET 8 OF 11



ALTERNATIVE 2 VT ROUTE 125 PROFILE

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



ALTERNATIVE 2 CULVERT 1 PROFILE

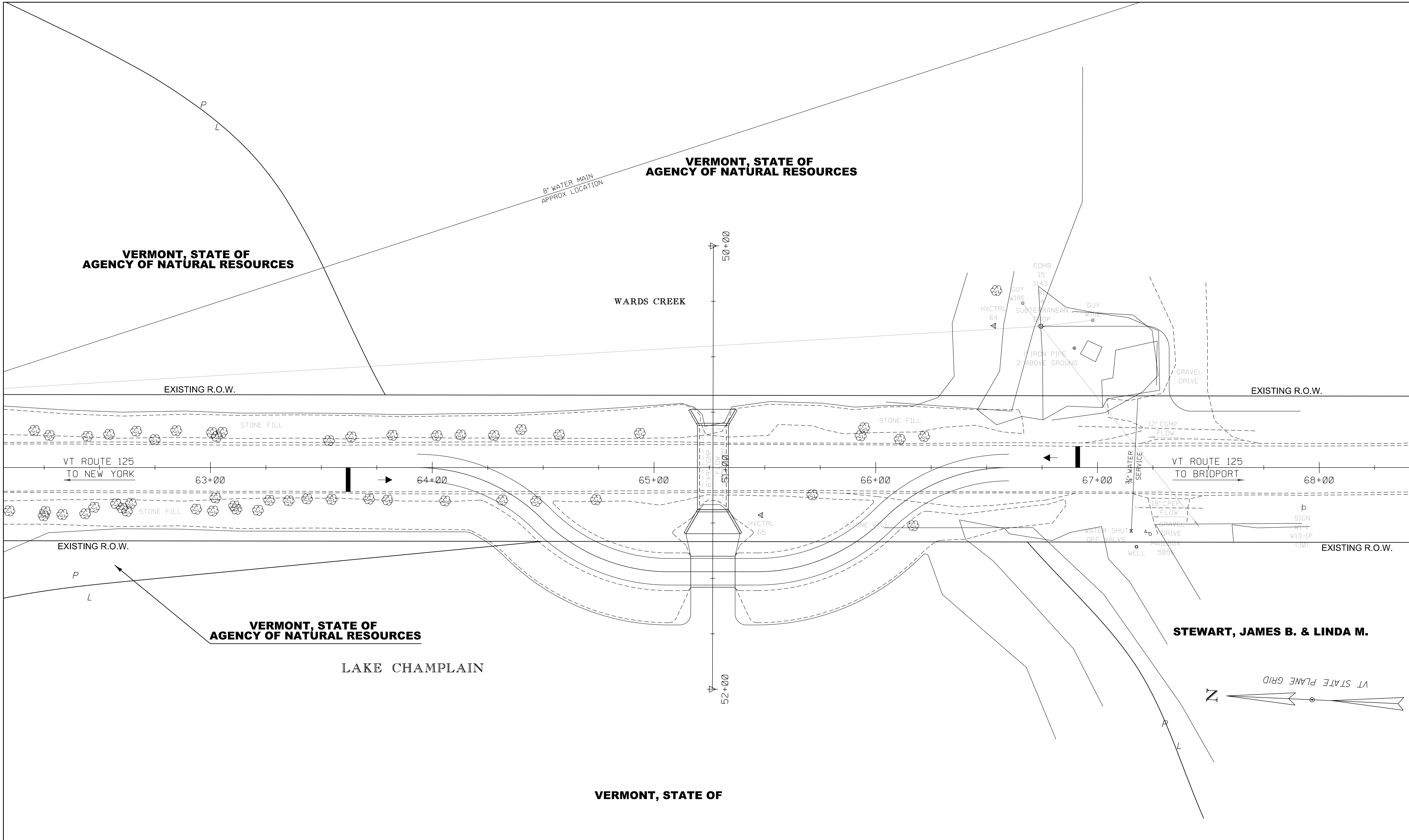
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: ADDISON
PROJECT NUMBER: BF 0172(9)

FILE NAME: s15b092profile2
PROJECT LEADER: M.D'ANGELO
DESIGNED BY: ------
PROFILE SHEET

PLOT DATE: 5/8/2017
DRAWN BY: C.JACOB
CHECKED BY: J.SOCHANEK
SHEET 9 OF 11

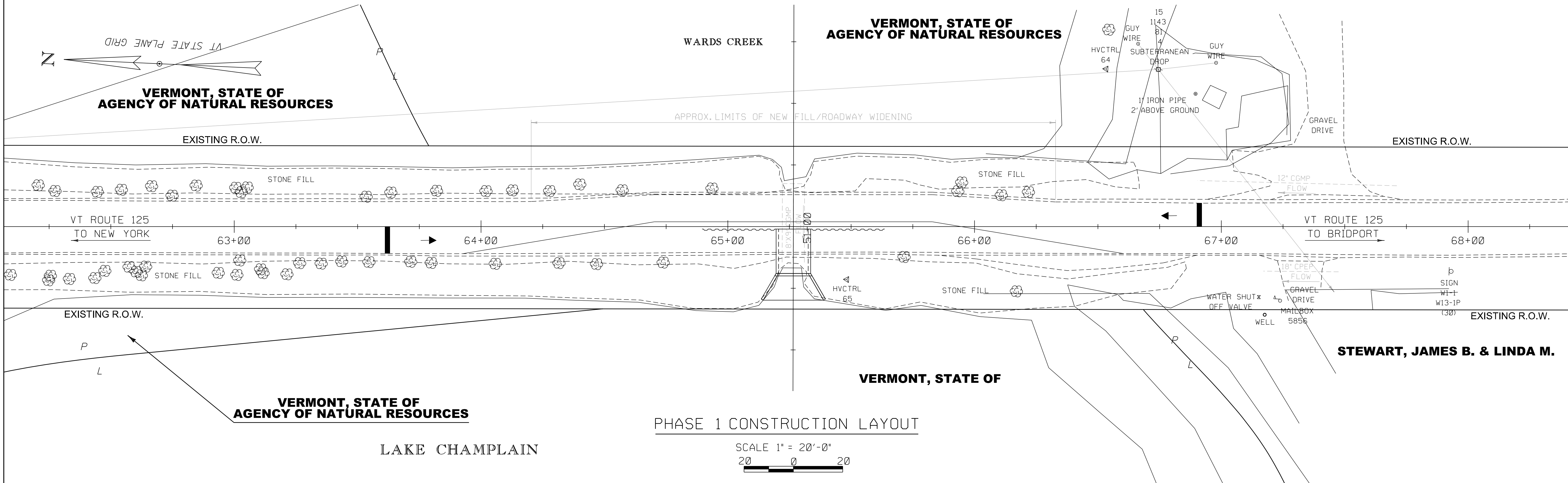


EXISTING BRIDGE INFORMATION
8'X9' CGMPP, 33' LONG
BUILT 1936
123 SQFT THROUGH CULVERT
2' AVERAGE COVER OVER PIPE

ALTERNATIVE 2 LAYOUT

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

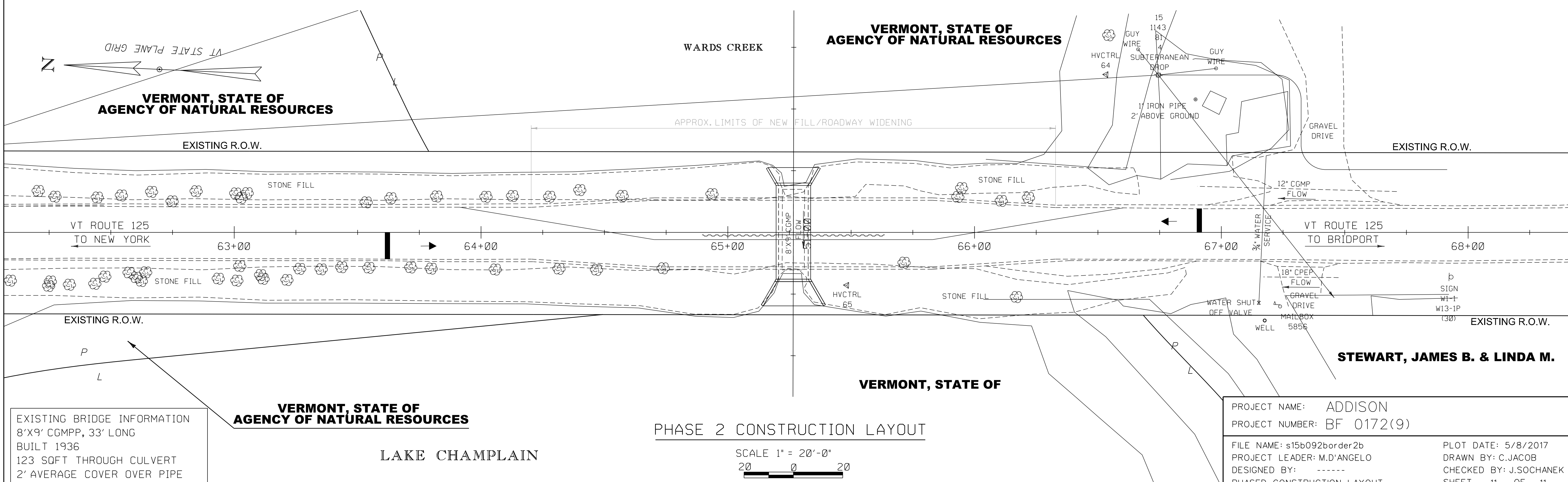
PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092border2a	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
RESOURCE SITE PLAN	SHEET 10 OF 11



PHASE 1 CONSTRUCTION LAYOUT

SCALE 1" = 20'-0"

20 0 20



PHASE 2 CONSTRUCTION LAYOUT

SCALE 1" = 20'-0"

20 0 20

EXISTING BRIDGE INFORMATION
8'X9' CGMPP, 33' LONG
BUILT 1936
123 SQFT THROUGH CULVERT
2' AVERAGE COVER OVER PIPE

PROJECT NAME: ADDISON	
PROJECT NUMBER: BF 0172(9)	
FILE NAME: s15b092border2b	PLOT DATE: 5/8/2017
PROJECT LEADER: M.D'ANGELO	DRAWN BY: C.JACOB
DESIGNED BY: ------	CHECKED BY: J.SOCHANEK
PHASED CONSTRUCTION LAYOUT	SHEET 11 OF 11