STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Johnson BF 0248(7)

VT ROUTE 100C, BRIDGE 4 over UNNAMED BROOK

December 4, 2015

I. Contents

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I. Site Information

Bridge 4 is a culvert located in a rural area along VT Route 100C approximately 3.8 miles east of the intersection of VT Route 100 and VT Route 100C. The culvert is located on a curved segment of VT 100C at approximately mile marker 3.785. The depth of cover over the top of the culvert is approximately 20'. The existing conditions were gathered from a combination of the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Major Collector, FAS 0248
Culvert Type	ACCGMP
Culvert Span	6 feet
Culvert Length	166 ft.
Skew	50 degrees
Year Built	1951
Ownership	State of Vermont
County	Lamoille
VTrans District	8

Need

The following is a list of the deficiencies of Bridge 24 and VT Route 11 in this location.

1. This culvert has a rating of 4 "Poor" and has bolt line cracking.

2. The culvert has fairly large holes scattered throughout the length, which is causing undermining of the embankments, primarily on the downstream side of the highway. The pipe barrel is deforming downward.

3. The roadway K value is slightly substandard.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2015 and 2035.

TRAFFIC DATA	2015	2035
AADT	2700	2800
DHV	300	320
ADTT	210	300
%T	6.8	9.3
%D	61	61

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Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997 for rural major collectors. Minimum standards are based on an ADT > 2000 and a design speed of 50 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	30'	11'/3' (28')[1]	
Bridge Lane and Shoulder Widths	VSS Table 5.3	30'	11'/3' (28')	
Clear Zone Distance	VSS Table 5.5	Shielded	20' fill / 12' cut (1:3), 14' cut (1:4)	
Banking	VSS Section 5.13	8-9%	8% (max), 6% at side roads	
Speed	VSS Section 5.3	50 mph (Unposted)	50 mph (Design)	
Horizontal Alignment	2011 AASHTO Green Book Exhibit 3-10b	R=775'	R_{min}=758' at e= 8%	
Vertical Grade	VSS Table 5.6	Roadway centerline slopes at 2.2% max.	7% (max) for rolling terrain, 9% (max) for mountainous	
K Values for Vertical Curves	VSS Table 5.1	Sag curve K=77	110 crest / 90 sag	substandard
Vertical Clearance Issues	VSS Section 5.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	407'	400'	
Bicycle/Pedestrian Criteria	VSS Table 5.8	2' Shoulder	3' Shoulder[1]	substandard
Bridge Railing	Structures Manual Section 13	Steel Beam Guardrail	Steel Beam Guardrail	
Hydraulics	VTrans Hydraulics Section	Does not pass the Q_{50} storm event and does not meet the ANR standard for full bank width.	Pass Q_{50} storm event without exceeding 1.2X diameter, and Q_{100} without exceeding 1.5X diameter	
Structural Capacity	SM, Ch. 3.4.1	Unknown	Design Live Load: HL-93	

[1] Table 5.8 of the Vermont State Standards requires an additional foot of shoulder for shared use on bridges. If a complete bridge replacement was chosen and a non-buried structure installed, lane and shoulder widths then would be 11'/4'.

Inspection Report Summary

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Culvert Rating	4 Poor
Channel Rating	4 Poor

11/3/14 This culvert needs to be replaced. There are two large sink holes in the downstream embankment, one about 10' deep. The barrel of the pipe is squashed about 8" towards the outlet end. The Downstream end of the pipe is riddled with holes ranging from 1" to 6" in size. The holes are allowing the stream to wash away the fines around the pipe causing sink holes, squashing, and undermine the pipe. (CM sent) JM JW

9/12/2013 Large perforations are scattered throughout the invert allowing for undermining in some areas, mostly in the downstream end. Approximately 1/3 of the pipe at the outlet end is deformed w/1'+/- of downward settlement in the top of the pipe, causing the sides of the pipe to bow outwards. The culvert is in need of full replacement and the surrounding embankment needs to have anti-erosion protection installed. JWW/JDM

Hydraulics

The existing 6' diameter culvert configuration does not meet the hydraulic standard or the ANR defined Bank Full Width (BFW). The waterway available from this culvert is 28.3 sf, and the Preliminary Hydraulics Memo (see Appendix) calls for 80 sf minimum. Therefore, during the 50 year design event, and presumably during some smaller events, the existing culvert would surcharge in violation of the State hydraulics standard. Rehabilitation of this culvert will not be an option for this project.

Recommendations

The Preliminary Hydraulics Report makes recommendations for culvert replacement as follows:

An open bottom arch with a 16' minimum clear span and 7'-1" clear height with 86 sf waterway area;

A concrete box with a 16' wide x 5' high clear opening and bed retention sills;

Any similar structure with a minimum clear span of 16' and at least 80 sf of waterway opening.

The Preliminary Hydraulics Report can be seen in Appendix D.

Utilities

Underground:

There are no known buried utilities at the bridge site.

Aerial:

There are no overhead utility lines passing over the culvert.

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Right Of Way

The existing Right-of-Way is shown on the Layout sheet. At the project site, the Right-of-Way is not uniform. The roadway approaching form the west seems to be approximately 3.5 rods wide (57.75'), but in the project area is variable and generally more than 3.5 rods. It is anticipated that additional Right-of-Way will be required for all options considered except the Do-Nothing alternative.

Resources

Please refer to the Appendix for detailed descriptions of resources. A summary of key findings is below:

Biological:

Detailed descriptions of biological resources can be found in the Resource ID Memo in the Appendix. Wetlands features are also shown on the Existing Conditions Layout Sheet.

This unnamed tributary of the Gihon River falls under the jurisdiction of the US Army Corps of Engineers and the Vermont Agency of Natural Resources. This brook would support a variety of aquatic organisms. Any replacement alternative would need to consider passage of aquatic organisms.

Terrestrial wildlife habitat is present as forested blocks of habitat exist on each side of the culvert. The VT Fish and Wildlife habitat value scoring ranks this site as moderate habitat value. There are no mapped deer wintering areas within the project area.

Wetlands

There are significant wetlands located in close proximity to the culvert. Wetlands have been delineated in accordance with the latest COE technologies. Most wetlands within the project area occur to the north of VT 100C. Discussions of wetlands impacts will need to continue into the design phase.

Rare, Threatened and Endangered Species; Natural Communities

According to the most recent GIS mapping database managed by the Vermont Fish and Wildlife Diversity Program there are no documented mapped rare, threatened, or endangered state listed species within the area.

USFWS mapping indicates the presence of the Northern Long Eared Bat (NLEB) which is listed threatened statewide. Summer roosting habitat for NLEBs is suitable where there are trees (typically >/= 3"dbh) which exhibit cavities, crevices, hollows, or exfoliating bark of both live and dead trees. Summer habitat exists within the project area as there are forested areas with trees >/= 3" dbh that exhibit roosting potential. No known wintering caves or mines are located near the project (> 1 mile).

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Agricultural Soils

There are no mapped prime agricultural soils within the project area. Agricultural soils are mapped as Colton-Duxbury Soils which are statewide significant.

Archaeological:

No Archaeological Resources have been identified at the site.

Historic:

The initial input from VTrans Historic staff indicated that no eligible historic resources are believed to be 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 in a high crash area. The existing conditions within the project area are considered adequate for the purposes of safety with the exception of the existing culvert.

III. Alternatives Discussion

The existing roadway at the culvert location is substandard for shoulder width and K values. If a replacement alternative is selected that involves open cutting, shoulder improvements on the existing roadway would be improved to provide a 3' shoulder to match an upcoming paving project. The project site is not a high crash location. 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 poor rating on this culvert, it will likely require work within the next 10 years. In the interest of safety to the traveling public, the No Action alternative is not recommended.

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Rehabilitation

Rehabilitation is always initially considered for any culvert project. It is quickly discounted here however due to the hydraulic conditions at this site. The current 6' diameter pipe is substantially undersized and constricts the stream. Therefore, rehabilitating this culvert alone is not considered feasible and will not be considered further in this report.

Alternative 1: Structure Replacement Using Trenchless Methods

A replacement of the existing culvert by trenchless methods could be accomplished. A single 10' inside diameter culvert could be installed adjacent to the existing one to achieve the recommended waterway area of 80 sf, which would provide an avenue for maintaining steam flow during construction.

A variation of the concept was considered, where rehabilitation of the existing culvert would be done and another new culvert installed adjacent to it to provide the recommended waterway area, the goal being to install a smaller new culvert using trenchless methods. However, the condition of the existing culvert is poor, and extensive grouting of the surrounding soils would likely be required before the pipe was improved (as evidenced by the voids and signs of instability of the embankment). The existing pipe is also significantly distorted and out of round, so a much smaller rehabilitated pipe would be assumed. If it is assumed that we could end up with a rehabilitated culvert of 4.5' diameter, we would still need a new culvert of approximately 9' diameter. Since the difference is so small, it does not make sense to consider repairing or lining the existing culvert and installing a second one using trenchless methods.

Two 7' diameter culverts could be installed side by side, but again, the cost of installing two 7' culverts would equal or exceed the cost of one 10' culvert. Only one 10' diameter culvert will be considered in this report.

Methodologies to install new culverts using trenchless technology include pipe jacking, pipe ramming, microtunneling, and others. Steel or concrete pipe would be necessary to use any of these methods. These are techniques that have been used in other states for the pipe size and length being discussed. Vermont, however has limited or no experience in these methods. This project may be appropriate for discussion as a pilot project for these trenchless techniques.

It is assumed that culvert replacement using trenchless technology would require some re-grading at each end to direct water flow into and out of the pipes because the new culvert would be slightly out of the current alignment. New headwalls or wingwalls would be required for hydraulic efficiency. This solution would provide for a typical service life for culverts of approximately 60 years. It is assumed that temporary Right of Way will be necessary for the equipment used in these methods. Any new culvert installed should have length sufficient to accommodate an 11'/4' lane and shoulder width.

Traffic for this alternative would be maintained as normal flow through the work zone with minor impacts due to construction vehicles entering and leaving the site.

Advantages: This alternative would be a new structure with an estimated life span of 60 years. Traffic would be maintained through the work area with minor impacts.

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Disadvantages: The location of the culvert and a small length of the stream on each end would be slightly modified, to direct flow into both the new and existing pipe. This alternative has high initial costs and some temporary impacts to resources.

Alternative 2: Structure Replacement Using Open Cut

Culvert replacement using an open cut was considered. The preliminary hydraulics report suggests several possible configurations for a new structure, including an open bottom precast concrete arch or frame, or a new box culvert. The configuration could be as follows:

- A prefabricated open bottom concrete arch or frame with a 16' minimum clear span and a 7'-1" minimum clear height, providing at least 86 sf of waterway area. These dimensions are from standard proprietary arch shapes offered by various venders. Full height concrete headwalls are recommended. The bottom of abutment footings for an open bottom configuration would have to be at least 6' below the channel bottom or to ledge.
- A prefabricated open bottom rigid concrete frame with a 16' minimum clear span and a 5' minimum vertical clearance in a rectangular shape, providing a minimum of 80 sf. The same conditions noted above for the arch for headwalls and depth of bury apply.
- A prefabricated concrete box with a 16' minimum clear span and a 5' clear vertical opening, providing at least 80 sf of waterway area. The box would need to have a 9' interior clearance so that it could be buried 4' below the streambed elevation. Bed retention sills would be required to maintain stability under the high velocities expected in this location.
- Any other similar structure meeting the minimum requirements of the Preliminary Hydraulics Report.

A new bridge with spill through abutments was considered, but discarded because this concept would result in a bridge with a span of at least 80 ft, which would seem to be a dramatic change to the landscape.

Any new structure should be long enough to accommodate an 11'/4' lane and shoulder width.

It is probable that a small amount of Right-of-Way will be required for this alternative, especially if the stream alignment is slightly modified to maintain flow during the project.

Traffic would be maintained either by off-site detour or temporary bridge. Phasing was not considered due to the depth of excavation that would have to be retained during each half of the construction. AOP should be provided.

Advantages: This alternative would provide a waterway that fully meets the Hydraulic Standard. AOP would be met. The new structure would provide an 80 year service life.

Disadvantages: This would be an expensive alternative, as construction would include a large excavation. Traffic would likely not be maintained through the project area.

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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 accelerated construction techniques and incentives to contractors to complete projects early. The Agency will consider the closure option on most projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures of conventional bridges, and to buried structures such as culverts as well. 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: Off-Site Detour

This option would close the bridge and reroute traffic onto an official, signed State detour, which detours traffic north to VT 100, south on VT 100, west on VT 15, and back to VT 100C.

Thru distance:	4.5 miles	6 minutes
Detour distance:	9.6 miles	12 minutes
Added distance for Thru Traffic:	5.1 miles	6 minutes
End to end distance:	14.1 miles	18 minutes

There are a couple of possible local bypass routes that may see an increase in traffic from local passenger cars. These routes vary in end-to-end distance from 1.5 miles to 3.0 miles. It is likely that any of these routes could see increased traffic if VT 100C was closed during construction, but since they are town highways and don't necessarily meet State Standards, they are not appropriate for truck traffic. The possible local bypass routes are as follows:

1. From VT 100C, TH-6 (Wilson Rd, Class 3), which is paved for a short distance, then TH-29, (Spitzer Rd, Class 3 unpaved) into the Town of Hyde Park. Then, TH-61 (Whitaker Rd, Class 3, unpaved), which then becomes TH-6 (still Whitaker Rd, Class 3 unpaved), ending at VT 100. This route then goes north on VT 100 to VT 100C. This bypass has an end to end distance of about 4.4 miles.

2. From VT 100C, north on TH-26 (Ober Hill Rd, Class 3 unpaved) into the Town of Eden. Continue on TH-5 (Ober Hill Rd, Class 3 unpaved) to VT 100. This bypass is approximately 5.7 miles long, end to end.

Other bypass routes may be available. Access to driveways and town highways would be maintained. A map of the detour route can be found in the appendix.

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

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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: Phased Construction

Phasing will not be considered on this project due to the excessive depth of braced excavation required to build this project one half at a time.

Option 3: Temporary Bridge

A review of the topography of the site indicates that a temporary bridge could be used. On the upstream side, there are buildings near both ends of the bridge, but a temporary bridge could be installed. Class II and III wetlands would be impacted. A temporary bridge on the downstream side would require either a longer span or a greater volume of earthwork to construct the temporary approaches. Class II wetlands would probably be impacted. A temporary bridge on either side would require the removal of trees.

A one lane temporary bridge with temporary traffic signals would be appropriate based on the daily traffic volumes. It could be argued that this option would have the smallest impacts to the traveling public, but the duration of time that traffic would be using a temporary bridge would be longer than the duration of a closure and off-site detour. A temporary bridge upstream or downstream would require temporary Right-of-Way acquisition. See the Temporary Bridge Layout 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, 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.

V. Alternatives Summary

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

Alternative 1: Culvert Replacement Using Trenchless Technology with Traffic Maintained with Minor, Occasional Interruption.

Alternative 2a: New Rigid Frame or Box Culvert using Open Cut with Traffic Maintained on an Offsite Detour.

Alternative 2b: New Rigid Frame or Box Culvert using Open Cut with Traffic Maintained on a Temporary Bridge.

VI. Cost Matrix[1]

Johnson BF 0248(7)		Do Nothing	Alt 1 Culvert Replacement using Trenchless Technology No/Minor Traffic Impact	Alt 2a Culvert Replacement using Open Cut Offsite Detour	Alt 2b Culvert Replacement using Open Cut Upstream Temporary Bridge
COST	Bridge Cost	$0	$960,000	$922,000	$922,000
	Removal of Structure	$0	$43,000 (flowable fill)	$4000	$4000
	Roadway	$0	$125,000	$117,000	$117,000
	Maintenance of Traffic	$0	$22,000	$20,000	$200,000
	Construction Costs	$0	$1,150,000	$1,065,000	$1,245,000
	Construction Engineering + Contingencies	$0	$334,000	$310,000	$360,000
	Total Construction Costs w CEC	**$0**	**$1,484,000**	**$1,375,000**	**$1,605,000**
	Preliminary Engineering[2]	**$0**	**$288,000**	**$267,000**	**$311,000**
	Right of Way	**$0**	**$35,000**	**$25,000**	**$105,000**
	Total Project Construction Costs	$0	$1,807,000	$1,667,000	$2,021,000
	Amortized annual cost	NA	$80,700	$56,200	$67,900
SCHEDULING	Project Development Duration[3]	NA	2 years	2 years	2 years
	Construction Duration	NA	3 months	3 months	15 months
	Closure Duration (If Applicable)	NA	NA	14 days	NA
ENGINEERING	Typical Section - Roadway (feet)	26'	26’	26’	26’
	Typical Section - Bridge (feet)	26’	26’	26’	26’
	Geometric Design Criteria	No Change	No Change	No Change	No Change
	Traffic Safety	No Change	Improved	Improved	Improved
	Alignment Change	No	No	No	No
	Bicycle Access	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	Meets Standard	Meets Standard	Meets Standard
	Pedestrian Access	No Change	No Change	No Change	No Change
	Utility	No Change	No Change	No Change	No Change
OTHER	ROW Acquisition	No	Yes	Yes	Yes
	Road Closure	No	No	Yes	No
	Design Life	<10 years	60 years	80 years	80 years

[1] Costs are estimates only, used for comparison purposes.
[2] Preliminary Engineering costs are estimated starting from the end of the Project Definition Phase.
[3] Project Development Durations are staring from the end of the Project Definition Phase.

VII. Conclusion

Alternative 2a is recommended; replace the existing culvert using an open cut and off-site detour. A 16' wide structure is recommended by hydraulics, with vertical height to be determined by the shape of the structure. A rectangular structure would require a minimum of 5' clear (80 sf minimum) and bed retention sills to retain 4' of natural streambed material. The design project manager will make the final determination between precast 4-sided box and precast arch when the geotechnical investigations are complete.

Arguments in favor of Alternative 2a over Alternatives 1 and 2b are:

- The initial construction costs are estimated to be the least for Alternative 2a. In addition, when future maintenance and replacement costs are considered and factored for the cost of money over time, Alternative 2a is still the most cost-effective alternative.
- The initial construction cost for Alternative 1, installation of a new pipe using trenchless technology, is pretty close to that of Alternative 2a. Nonetheless, Vermont has little experience with pipe ramming or jacking, and no experience with replacing pipes this size by these methods. The confidence level in the initial cost estimate is less for Alternative 1, and do not reflect the increased risk factor associated with forcing pipe through unknown subsurface materials.
- There is a reasonable detour that could be used for this project, which would allow for an accelerated approach to this project.
- This alternative provides a new condition which offers a service life of at least 80 years.
- This alternative offers the least amount of disruption to resources, primarily wetlands, surrounding the project.
- Unlike Alternative 1, Alternative 2a accommodates Aquatic Organism Passage and a natural stream bottom. Alternative 1 does not meet Bank Full Width as identified by the ANR model.
- No change in roadway alignment or geometry is proposed, but the new structure should be long enough to accommodate an 11'/4' lane and shoulder width.

<u>Traffic Control:</u>

The recommended method of traffic control is to close VT 100C during this work and maintain traffic on an off-site detour. The official signed detour that would be proposed is approximately 14 miles end to end, all on State routes, and adds approximately 5 miles to the normal through route. There are local bypasses that may be utilized by local traffic. The depth and size of excavation is too large to consider phasing this project. The off-site detour option of maintaining traffic has the least impacts to Right of Way and resources, and is the most cost-effective.

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VIII. Appendices

- A. Site Pictures
- B. Town Map
- C. Bridge Inspection Report
- D. Preliminary Hydraulics Memo
- E. Preliminary Geotechnical Report
- F. Natural Resources Memo
- G. Resource ID Completion Memo
- H. Archaeology Memo
- I. Historic Memo
- J. Local Input
- K. Detour
- L. Plans

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Appendix A: Site Pictures


11/03/2014


09/11/2013


07/27/2012

Appendix B: Location Map

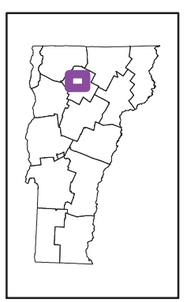
JOHNSON
VT 100C
CULVERT 4

Scale 1:62,139

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



JOHNSON
LAMOILLE COUNTY
DISTRICT # 8

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 JOHNSON | **bridge no.:** 0004 | **District:** 8

Located on: VT100C **over** BROOK | **approximately** 3.8 MI E JCT VT 15 | **Maintained By:** STATE

CONDITION

Deck Rating: N NOT APPLICABLE

Superstructure Rating: N NOT APPLICABLE

Substructure Rating: N NOT APPLICABLE

Channel Rating: 4 POOR

Culvert Rating: 4 POOR

Federal Str. Number: 300248000408061

AGE and SERVICE

Year Built: 1951 **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): 4

ADT: 2300 **Year of ADT:** 1996

GEOMETRIC DATA

Length of Maximum Span (ft): 6

Structure Length (ft): 6

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): 26

Skew: 51

Bridge Median: 0 NO MEDIAN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 06 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: ACCGMP

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): 166

Average Cover Over Culvert (ft): 18

Waterway Area Through Culvert (sq.ft.): 28

Culvert Wing/Header Rating: 2 CRITICAL CONDITION

Steel Culvert Corrosion Indicator: 2 PERFORATIONS > 2" THROUGHOUT, CULVERT

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: 112014 **Inspection Frequency (months):** 12

INSPECTION SUMMARY and NEEDS

11/3/14 This culvert needs to be replaced. There are two large sink holes in the downstream embankment, one about 10' deep. The barrel of the pipe is squashed about 8" towards the outlet end. The Downstream half of the pipe is riddled with holes ranging from 1" to 6" in size. The holes are allowing the stream to wash away the fines around the pipe cause sink holes, squashing, and undermine the pipe. (CM SENT) JM JW

9/12/2013 Large perforations are scattered throughout the invert allowing for undermining in some areas, mostly in the downstream end. Approximately 1/3 of the pipe at the outlet end is deformed w/ 1' +/- of downward settlement in the top of the pipe, causing the sides of the pipe to bow outwards. The culvert is in need of full replacement and the surrounding embankments need to have anti erosion protection installed. JWW/JDM

Appendix D: Preliminary Hydraulics Memo

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Jennifer Fitch, Structures Project Manager

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

DATE: 4 November 2015

SUBJECT: Johnson BF 0248(7) VT 100C BR 4 over unnamed brook
Preliminary Hydraulics

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

Existing Conditions

The existing structure was built in 1951. It is a 6' ACCGMP that provides 28.3 sq. ft. of waterway area. There is a drop into a scour pool at the outlet. It is under about 20' of fill. The pipe is deteriorating under the road. There are sink holes in the downstream embankment and holes throughout the invert. The pipe is squashed on the outlet end and is no longer round on the inlet end.

Ledge was seen in the channel.

Our calculations, field observations and measurements indicate the existing structure does not meet the current standards of the VTrans Hydraulic Manual nor does the existing structure meet state stream equilibrium standards for bankfull width (span length). The existing structure constricts the channel width, resulting in an increased potential for debris and ice blockage. Headwater to depth ratios exceed allowable values established in the current VTrans Hydraulics Manual.

Liner Comments

The request states that a liner is a consideration here. With the distortion in the pipe and the pipe not being hydraulically adequate, we do not recommend a liner here. Therefore, a liner was not analyzed as one of the options for this site.

Replacement Recommendations

In sizing a new structure we attempt to select structures that meet both the current VTrans hydraulic standards, state environmental standards with regard to span length and opening height, and allow for roadway grade and other site constraints.

Velocity controls this site due to the steep slope of the structure. In order to control velocities, we suggest a wide structure.

Based on the above considerations and the information available, we recommend any of the following structures as a replacement at this site:

1. An open bottom arch with a 16' minimum clear span and 7' – 1" minimum clear height, providing at least 86 sq. ft. of waterway area.

2. A concrete box with a 16' wide by 9' high inside opening. The box invert should be buried 4'. That will result in a 16' wide by 5' high waterway opening above streambed, providing 80 sq. ft.

of waterway area. Bed retention sills should be added in the bottom. Sills should be 12" high across the full width of the box. So the top of the sills will be buried 36" and not be visible. Sills should be spaced no more than 8'-0" apart throughout the structure with one sill placed at the inlet and one at the outlet. The box should be filled up to the stream bed level with Stone Fill Type E4 as specified by the Agency of Natural Resources.

3. Any similar structure with a minimum clear span of 16' and at least 80 sq. ft. of waterway area, that fits the site conditions, could be considered. Any structure with a closed bottom should have bed retention sills and a buried invert as described above.

General Comments

If the open bottom arch option is installed, we recommend full height concrete headwalls be constructed at the inlet and outlet. The bottom of abutment footings under the arch should be at least six feet below the channel bottom, or to ledge, to prevent undermining. Pipe manufactures can provide specific recommendations for minimum and maximum fill heights and required pipe thickness. All structures are required to handle public highway loading. The channel through the open bottom structure should be built with Stone Fill Type E3 as specified by the Agency of Natural Resources.

If a new box is installed, we recommend it have full headwalls at the inlet and outlet. The headwalls should extend at least four feet below the channel bottom, or to ledge, to act as cutoff walls and prevent undermining.

It is always desirable for a new structure of this size to have flared wingwalls at the inlet and outlet, to smoothly transition flow through the structure, and to protect the structure and roadway approaches from erosion. The wingwalls should match into the channel banks. Any new structure should be properly aligned with the channel, and constructed on a grade that matches the channel. A new structure should span the natural channel width.

Stone Fill, Type IV should be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet, up to a height of at least one-foot above the top of the opening. The stone fill should not constrict the channel or structure opening.

Please contact us if you have any questions or if you would like us to analyze other options.

LGR

cc: Hydraulics Project File via NJW

Appendix E: Preliminary Geotechnical Report

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

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

From: Randall Massey, Technician Apprentice IV, via Callie Ewald, P.E., Senior Geotechnical Engineer

Date: August 21, 2015

Subject: Johnson BF 0248(7) - Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of VT Route 100C Br 4 (Culvert) located 3.8 miles east of the intersection of VT Route 15 and VT Route 100C. The existing culvert allows flow beneath the roadway of an unnamed brook adjacent to Wild Brook. The existing structure is a six foot span corrugated metal plate pipe culvert constructed in 1951. This review included observations made during a site visit, the examination of historical in-house bridge boring files, as-built record plans, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps, and water well logs on-file at the Agency of Natural Resources.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Record plans were found for the project, but boring data was not included. 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, Johnson BF 0248(4) approximately 2.6 miles away. Borings were completed to 9.5 and 11.3 feet below ground surface elevation where bedrock was encountered. Coring's were taken and uniaxial compressive strengths >5000 psi were determined within the lab. Boring logs indicated sands and gravels with some to little silt.

2.2 Water Well Logs

Figure 1 contains the subject project as well as surrounding well locations found using the ANR Natural Resources Atlas. Published online, the 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. Seven water wells within an approximate 600 foot radius of the project were used to get an estimate of the depth to bedrock likely to be encountered for Bridge 3. The specific wells used to gain information on the subsurface conditions are highlighted below by red boxes.

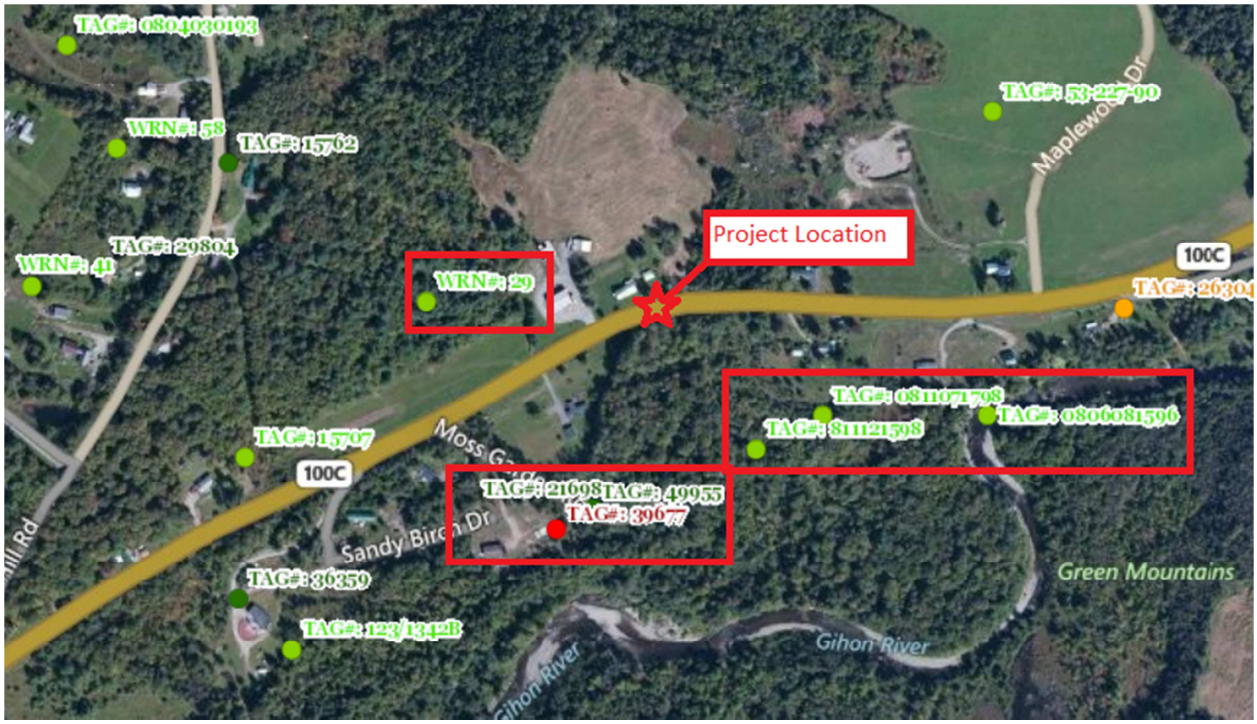


Figure 1. Highlighted well locations near subject project

Table 1 lists the well sites used in gathering the surrounding information. Wells are listed with the approximate distance from the bridge project, depth to bedrock, and overlying soils encountered.

Table 1. Depths to bedrock of surrounding wells

Well ID	Distance From Project (feet)	Depth To Bedrock (feet)	Overlying Strata
29	375	24	Gravel
21698	300	90	Hardpan/Gravel & Sand w/ Cobbles
39677	400	25	Sand
49955	275	101	Hardpan/Gravel & Sand
811121598	325	124	Not Specified
0811071798	350	65	Not Specified
0806081596	600	137	Hardpan/Sand & Clay

2.3 USDA Soil Survey

The United States Department of Agriculture Natural Resources Conservation Service maintains an online surficial geology map of the United States. According to the Web Soil Survey, the strata directly underlying the project site consists of gravelly loamy sand from 0 to 27 inches and very gravelly sand from 27 to 60 inches, with 15-35% slopes. The depth to bedrock is noted as >80 inches and depth to groundwater of >80 inches.

2.4 Geologic Maps of Vermont

Mapping conducted in 1970 for the Surficial Geologic map of Vermont shows that the project area is underlain by the Colton-Duxbury complex. The parent material is extensively well draining and consists of coarse-loamy glaciofluvial deposits along with sandy and gravelly glaciofluvial deposits. Depth to a root restrictive layer is greater than 60 inches.

According to the 2011 Bedrock Map of Vermont, the project site is underlain with the Carbonaceous phyllite member. Predominantly dark-gray to black, carbonaceous to highly graphitic, fine-grained sulfidic biotite-muscovite-quartz phyllite having silicic laminae. Includes black quartzites.

3.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on August 20, 2015 to determine possible obstructions inhibiting boring operations and to make any other pertinent observations about the project. Sight distance seemed to be the only complication for borings as there were no overhead power lines near the culvert. As shown in Figure 2 and Figure 3.

Figure 2: View Above Culvert Looking Northeast

Figure 3: View Above Culvert Looking Southwest

The inlet of the existing culvert was in unsatisfactory condition, as seen in Figure 4. The water seems to be undermining the culvert as stone blocks were the only attempt as scour prevention. It can be seen in Figure 5 that there is very little flow of water that is exiting. There were many holes seen that would allow water to leak out, along with the possible piping effects throughout. Bedrock was visible at the downstream side of the culvert. The soils at the surface were determined to be loamy sandy gravels with cobbles.

Figure 4: Inlet of Culvert

Figure 5: Exit of Culvert

4.0 RECOMMENDATIONS

Based on the site visit, the existing culvert appears to be in unsatisfactory condition. For this reason, a replacement of the culvert should be considered. If this is not the preferred option, possible foundation alternatives for a bridge replacement include the following:

- Reinforced concrete box culvert
- Reinforced concrete abutments on spread footings
- Reinforced concrete abutments founded on micropiles drilled into bedrock

We recommend borings be taken at either side of the culvert in order to more fully assess the subsurface conditions at the site including, but not limited to, the soil properties, ground water conditions and depth to bedrock. If shallow bedrock or problematic soils are encountered, additional borings should be completed.

When a preliminary alignment has been chosen, the Geotechnical Engineering Section should be contacted to help determine a subsurface investigation that efficiently gathers the most information.

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-6910, or via email at chris.benda@state.vt.us.

cc: Project File/CCB
RDM

Z:\Highways\ConstructionMaterials\GeotechEngineering\Projects\Berlin BF 026-1(43)\REPORTS\Berlin BF 026-1(43) Preliminary Geotechnical Information.docx

Appendix F: Natural Resources Memo

VERMONT

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

Agency of Transportation

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

Memorandum

To: Jeff Ramsey, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 9/10/15

Subject: Johnson BF 0248 (7)
Natural Resource Identification

I have reviewed existing mapped resources and performed a site visit to evaluate natural resources within the project area. My review consisted of reviewing for wetlands, threatened and endangered species, agricultural soils, fish and wildlife habitat.

The project area is located in a rural area on VT 100C at culvert "C4" in the town of Johnson. The immediate area has a mix of upland, wetland and riparian communities. The project area is within a filled narrow valley. There are also residential properties in close proximity of the project area.

Wetlands and Waterways
There are wetlands located in close proximity to the culvert. I have delineated the wetlands in accordance to the latest COE methodologies. Most wetlands within the project area occur to the north of VT 100C.

Wetland 1
The northeast quadrant (wetland 1) vegetation is dominated by a mix of spruce, aspen, red maple, sensitive fern, asters, ostrich fern and jewelweed. The soils are mapped as Fragiaquepts and Haplaquepts which are hydric and poorly drained. Field indicators indicated low chroma colors with redox features typical of hydric conditions. Several hydrology indicators were met such as: saturation, geomorphic position and water stained leaves. The following function and values are present: flood flow alteration, fish habitat, sediment/toxicant retention, nutrient removal/retention/transformation, ground water protection, shoreline stabilization, and wildlife habitat. This wetland would likely meet significance criteria to be class II.

Wetland 2
The northwest quadrant has a small depression area that would likely be classified as a class III wetland due to the size, limited function and value, and lack of connectivity to mapped class II wetlands. This wetland is dominated by mostly red maple, choke cherry, ash, meadowsweet, jewelweed, sedges and goldenrod. Soils exhibited hydric characteristics with low chorma colors with redox features.

Wetland 3
The southwest quadrant has a wetland that is roughly 75' downstream of the culvert and will likely be outside the project area. This wetland would likely be class II due to its position in the landscape and moderate function and values. The wetland is located in a depressional area at the toe of a large vegetated slope. Ground water seepage flows from the hill slope. Dominant vegetation is a mix of herbaceous plants: sensitive fern golden rod and jewelweed. The soils are mucky and have low chroma colors with redox features. Function and values present: groundwater protection, flood flow alteration, fish habitat and sediment/toxicant retention.

Waterway
An unnamed tributary of the Gihon River flows southerly through the project area. The structure at the site appears to not pass debris as there were large amounts of debris at the inlet of the pipe. The VTrans Hydraulics Unit has calculated a 1.3 sq. mi. drainage area and determined the culvert to be inadequate hydraulically. The culvert does not seem to match existing channel dimensions to reach equilibrium standards.

Permitting Requirements
The stream and wetlands at this site would fall under jurisdiction of the US Corps of Engineers and the Agency of Natural Resources.

Threatened, Endangered and Rare species; Natural Communities
According to the most recent GIS mapping database managed by the VT Fish and Wildlife-Wildlife Diversity Program there are no documented mapped rare, threatened or endangered state listed species within the area.

USFWS mapping indicates presence of the Northern Long Eared Bat (NLEB) which is listed threatened statewide. Summer roosting habitat for NLEBs is suitable where there are trees (typically ≥ 3" dbh) which exhibit cavities, crevices, hollows or exfoliating bark of both live and dead trees. Wintering habitat is typically within caves or mines. Summer habitat exists within the project area as there are forested areas with trees ≥ 3" dbh that exhibit roosting potential. No known wintering caves or mines are located near the project (> 1 mile).

Once the project limits are defined we can complete a summer habitat assessment and determine if trees within the project area are suitable roosts. At this point we are just noting there is potential suitable habitat.

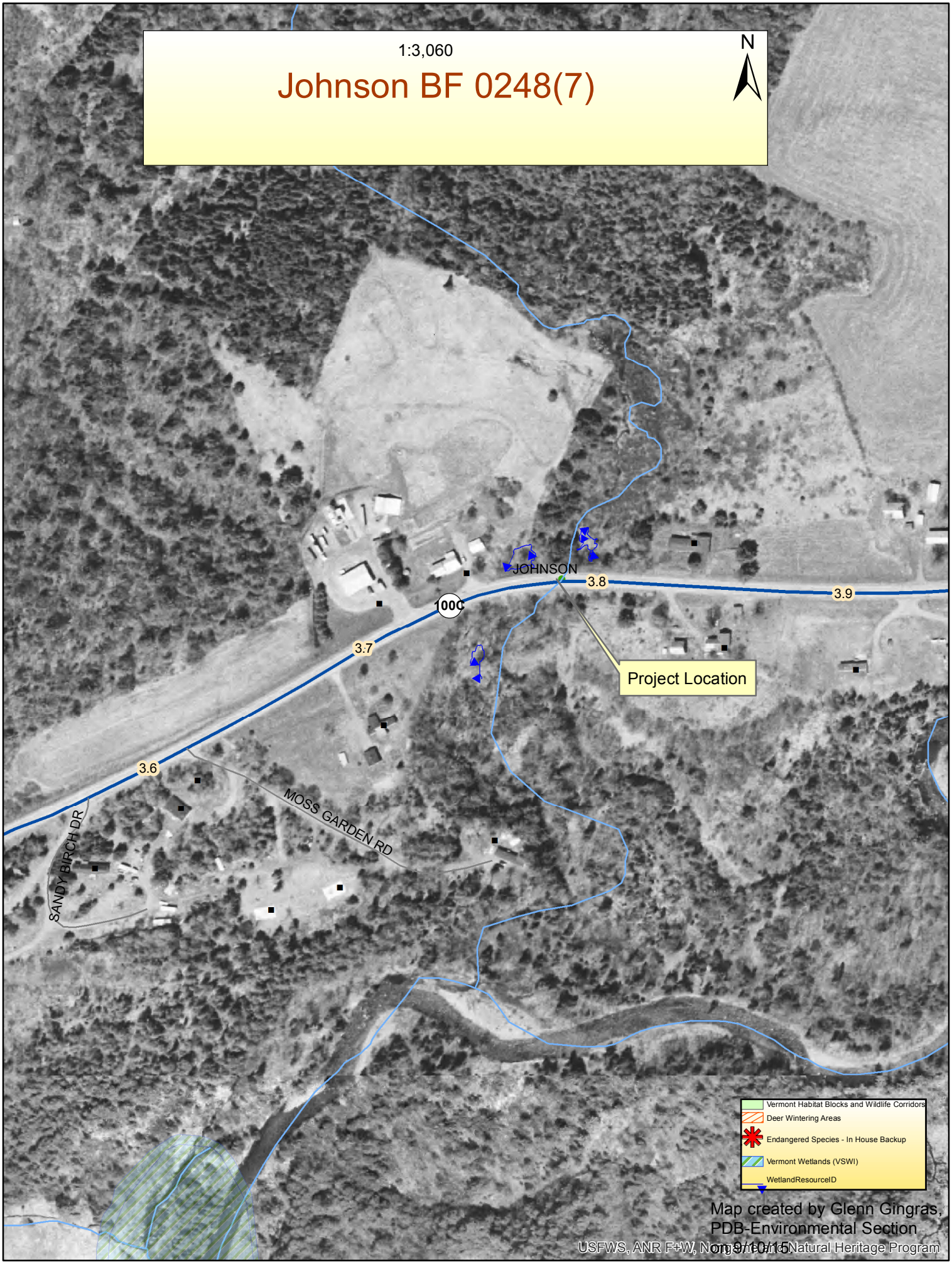
Wildlife Habitat
This brook would support a variety of aquatic organisms. Any replacement alternative would need to consider passage of aquatic organisms.

Terrestrial wildlife habitat is present as forested blocks of habitat exist on each side of the culvert. The VT Fish and Wildlife habitat value scoring ranks this site as moderate habitat value.

There are no mapped deer wintering areas within the project area.

Agricultural Soils
There are no mapped prime agricultural soils within the project area. Agricultural soils are mapped as Colton-Duxbury Soils which are statewide significant.

cc.
Jennifer Fitch, VTrans Project Manager
Natural Resource Files


1:3,060
Johnson BF 0248(7)
N
JOHNSON
3.8
3.9
100C
3.7
3.6
Project Location
MOSS GARDEN RD
SANDY BIRCH DR
Vermont Habitat Blocks and Wildlife Corridors
Deer Wintering Areas
Endangered Species - In House Backup
Vermont Wetlands (VSWI)
WetlandResourceID
Map created by Glenn Gingras,
PDB-Environmental Section
9/10/15
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: 05E1NE00-2015-SLI-1968 September 10, 2015
Event Code: 05E1NE00-2015-E-02468
Project Name: Johnson BF 0248(7)

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

United States Department of Interior
Fish and Wildlife Service

Project name: Johnson BF 0248(7)

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: 05E1NE00-2015-SLI-1968
Event Code: 05E1NE00-2015-E-02468

Project Type: TRANSPORTATION

Project Name: Johnson BF 0248(7)
Project Description: The project area is located in a rural area on VT 100C at culvert âC4â in the town of Johnson. The project involves replacement of an existing culvert and associated channel work. The immediate area has a mix of upland, wetland and riparian communities. The project area is within a filled narrow valley. There are also residential properties in close proximity of the project area.

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 (((-72.61932849884033 44.66326571577763, -72.61947870254517 44.66276970594574, -72.62006878852844 44.662861277311045, -72.61983275413513 44.66329051615782, -72.61932849884033 44.66326571577763)))

Project Counties: Lamoille, VT

United States Department of Interior
Fish and Wildlife Service

Project name: Johnson BF 0248(7)

Endangered Species Act Species List

There are a total of 1 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)**
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Appendix G: Archaeological Memo

VERMONT

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

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

Agency of Transportation

To: Jeff Ramsey, Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer

Date: November 6, 2015

Subject: Johnson BF0248(7) Culvert #4 – Archaeological Resource ID

The scope for this project has not yet been fully defined. We have been asked to identify archaeological resources within the vicinity of Culvert #4 on VT 100C in Johnson, VT.

The VTrans Archaeology Officer visited the site on 11-4-15. The immediate project area sloped steeply to the base of the inlet and outlet ends of the culvert. Wetlands were present but there were no areas of archaeological sensitivity. Structures exist within all four quadrants of the project area but areas along the roadway and in the potential project access area showed evidence of disturbance and earthmoving from landscaping. There are no known sites in the vicinity. There are no archaeologically sensitive areas within the project area. There is one small area of moderate sensitivity along the watercourse behind the property in the NW quad as marked on the adjacent ArcMap attachment. This is plotted in the geodatabase but is likely to be outside the Area of Potential Effect for the project.

The VTrans Archaeology Officer will issue a formal Section 106 when plans are available.

Please contact me if you have any questions.

Thank you,
Jen Russell
VTrans Archaeology Officer

VTrans Working to Get You There
Vermont Agency of Transportation


Johnson BF 0248(7)
Culvert 4
0 0.002 0.004 0.009 0.013 0.018
Miles
1:928
N
Johnson BF 0248(7)
Culvert #4
ROUTE 100C VT-100C
100C
VT Archeologic Inventory
Archsensitive_line
Floodplain
VSWI
Deer Wintering Areas
WCV
WCV
10
9
8
7
6
5
World Imagery
Low Resolution 15m Imagery
High Resolution 60cm Imagery
High Resolution 30cm Imagery
Citations
Source: Esri, DigitalGlobe, GeoEye, Ea
USDA, USGS, AEX, Getmapping, Aero
User Community
Map created by J. Russell
PDD-Environmental Section
on 11-6-15

Appendix H: Historic Memo

Ramsey, Jeff

From: Ehrlich, Judith
Sent: Friday, October 30, 2015 9:40 AM
To: Ramsey, Jeff
Cc: Fitch, Jennifer; Obenauer, Kyle
Subject: RE: JOHNSON BF 0248 (7) Resource ID request

Hi Jeff—

I have reviewed the information provided for this project and learned that the structure being affected is a corrugated metal culvert and the railing is comprised of w-beam. It is my opinion that the neither the culvert nor railing is historic and therefore the structure is not eligible for listing on the National Register of Historic Places.

Please let me know if you need any clarification on any of the above information.

Thank you—
Judith

Judith Williams Ehrlich, VTrans Historic Preservation Officer
Vermont Agency of Transportation
(802) 828-1708
judith.ehrlich@vermont.gov

State email addresses have changed as of July 27, 2015. Please note my new address above.

From: Ramsey, Jeff
Sent: Tuesday, October 20, 2015 9:59 AM
To: Fitch, Jennifer
Cc: Ehrlich, Judith; Obenauer, Kyle
Subject: RE: JOHNSON BF 0248 (7) Resource ID request

Hi Jennifer,
I still need the Historic ID. I've cc-ed them for comment.
Thanks,
Jeff

Jeff Ramsey
Environmental Specialist Supervisor
Vermont Agency of Transportation
Environmental Section
1 National Life Drive
Montpelier, VT 05633
(802) 828-1278
jeff.ramsey@vermont.gov
VTrans Environmental Section Website

Appendix I: Local Input

Community Considerations

1. Are there any scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include bike races, festivals, parades, cultural events, farmers market, concerts, etc. that could be impacted? If yes, please provide date, location and event organizers' contact info.

The only major event is the Lamoille County Field days (July 23?). This should be avoided like the plague as the volume of traffic is gigantic. There are no others that I am aware of. Also avoid tourism season in general (summer-fall) to reduce the impact on local businesses and cyclists groups that frequent route 100c.

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

LCFD is the only non-slow season as far as I can tell. Popular bike seasons such as summer and fall should be avoided.

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

The Village of Johnson is located on Main Street in downtown Johnson. Ambulance (Northern Emergency Medical Services) is located just south of the bridge at the intersection of 100C and Wilson Road. NEMS provides Ambulance services to 5 towns, Johnson, Hyde Park, Eden, Waterville and Belvedere. The Village of Johnson Fire Department providers service for the Town of Johnson, Waterville and Belvedere. Both the fire department and the ambulance use 100C to respond to emergency calls. That said, Town highways Wilson Rd and Ober Hill Rd can be used as local detour or alternate routes.

4. Are there businesses (including agricultural operations) that would be adversely impacted either by a detour or due to work zone proximity?

Maplewoods Campground is located nearby on Route 100 C.

5. Are there important public buildings (town hall, community center, senior center, library) or community facilities (recreational fields, town green, etc.) close to the project?

Lamoille Regional Solid Waste Management District operates a transfer station at the former Johnson landfill on Wilson Rd. days of operation are Friday and Saturday.

6. What other municipal operations could be adversely affected by a road/bridge closure or detour?

None.

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

Closing the bridge would probably mean that the traffic would have to be rerouted through Ober Hill Road or Wilson Road.

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

There is Johnson Works Community Organization but I am not sure how relevant it is to include them in this project.

Schools

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

Johnson Elementary School and Johnson State College are in the village. There is one bus route that uses 100c I think. Ask Johnson Elementary School about this. Schedules are standard. You might also want to consult with Lamoille Union Middle and High School in Hyde Park about their schedules.

2. Is this project on the specific routes that students use to walk to and from school?

No.

3. Are there recreational fields associated with the schools (other than at the school)?

No

Pedestrians and Bicyclists

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

Probably minimal pedestrian activity and some level of bicycling activity. Route 100 C is a popular bike route.

2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use?

Overall, 100 C between North Hyde Park and Johnson seems to have an adequate bicycle shoulder width; I am not sure about the specific location of the bridge.

3. Does the community feel there is a need for a sidewalk on the bridge?

No.

4. Is pedestrian and bicycle traffic heavy enough that it should be accommodated during construction?

I don't believe so.

5. Does the Town have plans to construct either pedestrian or bicycle facilities leading up to the bridge? Please provide a planning document demonstrating this (scoping study, master plan, corridor study, town plan).

No.

6. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling?

No.

Communications

1. Please identify any local communication channels that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM.

Front Porch Forum, News & Citizen, WDEV radio station; Town of Johnson web page, Friends of Johnson Electronic Newsletter.

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?

Not that I am aware of.

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

3. Not that I am aware of.

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

Not that I am aware of.

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

6. Not that I am aware of.

7. Are there any known Hazardous Material Sites near the project site?

8. Not that I am aware of.

9. Are there any known historic, archeological and/or other environmental resource issues near the project site?

Not that I am aware of.

10. Are there any other comments that are important for us to consider?

No

Land Use & Zoning (to be filled out by the municipality or RPC).

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

Johnson does not have zoning.

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

No.

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

I am not aware of any planned expansion of public transit.

Appendix J: Detour Maps

Total Travel Estimate: **4.50 miles - about 6 minutes**

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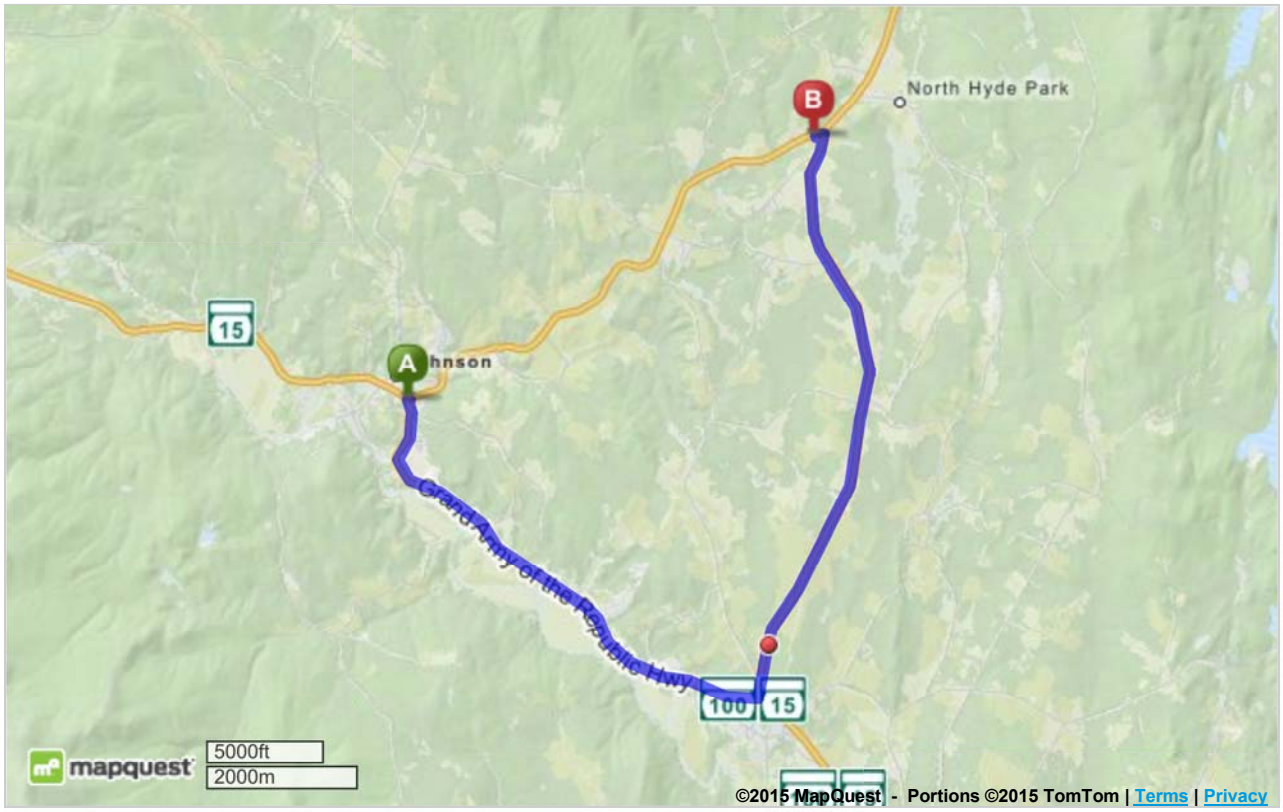
Total Travel Estimate: **9.63 miles - about 12 minutes**



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Appendix K: Plans

N

VT STATE PLANE GRID

EXISTING CURVE I
DELTA = 33°21'49"
D = 7°23'35"
R = 775.00'
T = 232.24'
L = 451.29'
E = 34.05'

BENCHMARK 5
CHISLED SQUARE IN
CONCRETE PORCH DECK
ELEV = 862.09

PI
STA 185+01.06

K.A. HARVEY'S MANUFACTURED HOUSING, INC.

PERMANENT CHANNEL RIGHT
BOOK 35, PAGE 210-211

BROOK FLOW

MBING AND HEATING, INC.

EXISTING R.O.W.

VT ROUTE 100C
TO VT ROUTE 15

VT ROUTE 100C
TO HYDE PARK

S 86°49'28.03" E

PT
STA 187+20.10

NS, RANDY L.
AND
NS, SCOTT H.

LATTIMORE, RICHARD J.
AND
KATHERINE KILLAM

MANTURUK, CHRISTOPHER A.

GOV

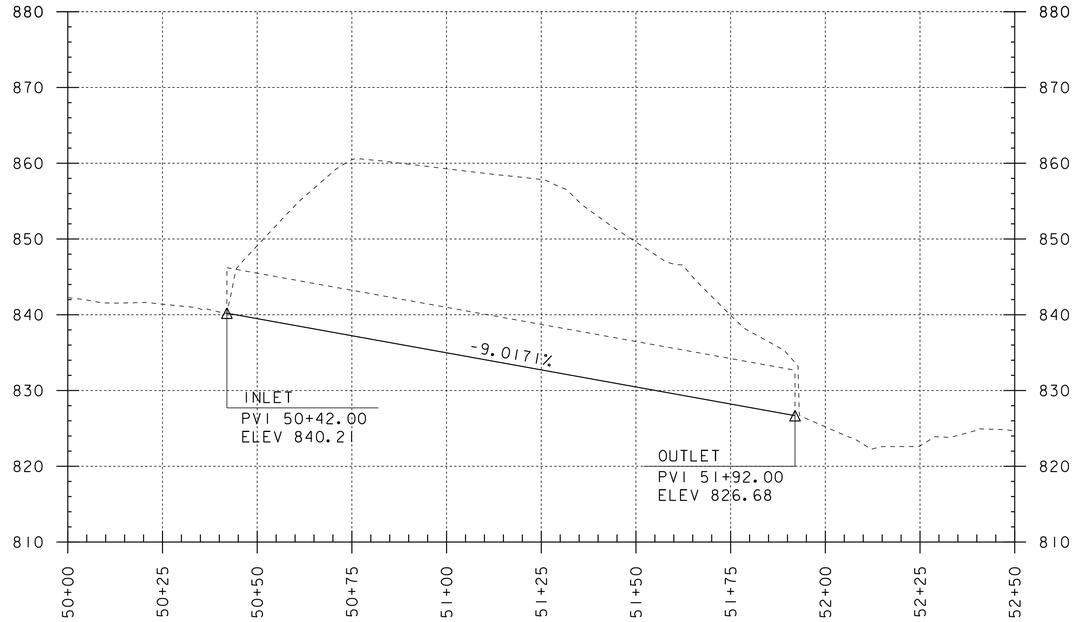
STA 182+68.

EXISTING BRIDGE INFORMATION
BUILT 1951
166' LONG 6' DIA CGMP (DEFORMED)
AVERAGE COVER: 18'
28 SQFT WATERWAY AREA

RESOURCE SITE PLAN

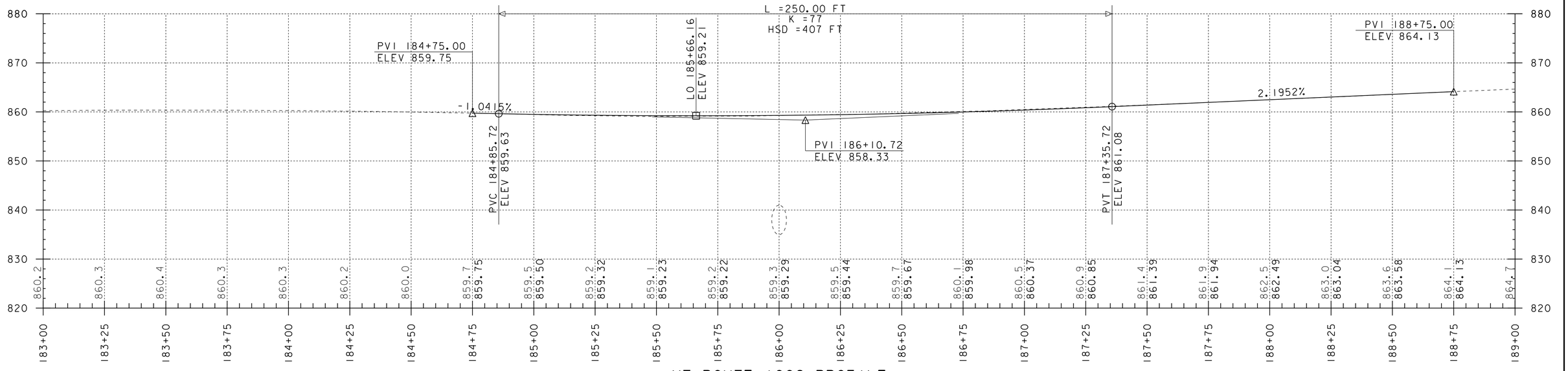
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME: I2c590/sI2c590border.dgn	PLOT DATE: 20-NOV-2015
PROJECT LEADER: J.FITCH	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
RESOURCE SITE PLAN	SHEET 1 OF 9



CULVERT 4 PROFILE

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

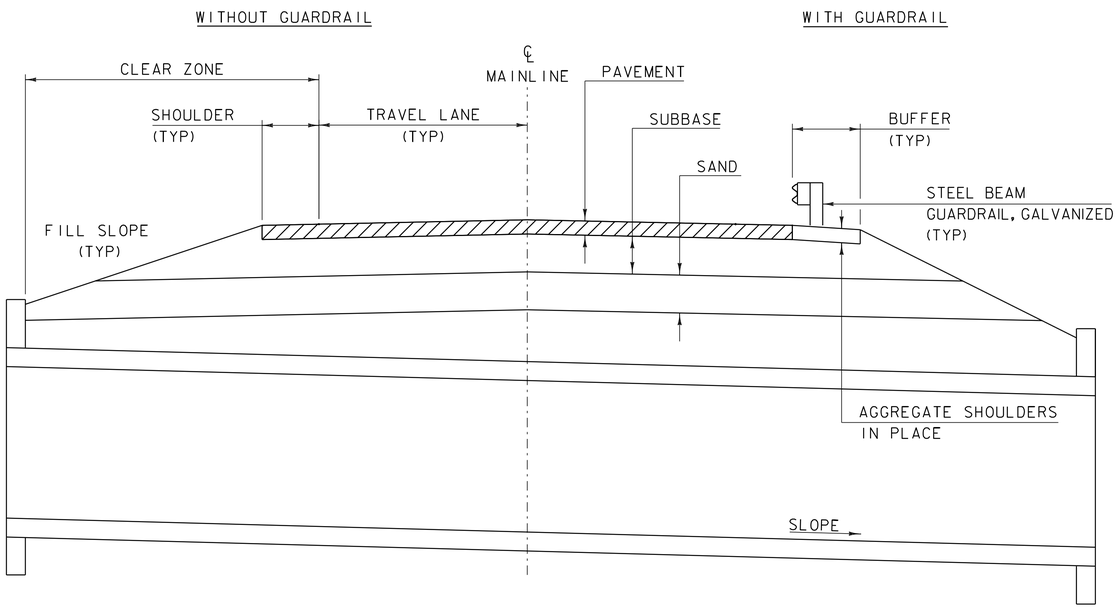


VT ROUTE 100C PROFILE

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:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME: 12c590/sl2c590profile.dgn	PLOT DATE: 20-NOV-2015
PROJECT LEADER: J.FITCH	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
EXISTING PROFILE SHEET	SHEET 2 OF 9



CULVERT ELEVATION VIEW

NOT TO SCALE

MATERIAL INFORMATION

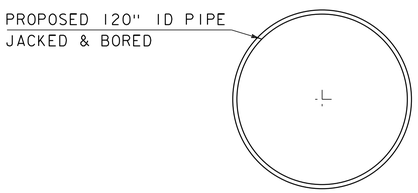
	THICKNESS	TYPE
WEARING COURSE	1½"	BITUMINOUS CONCRETE PAVEMENT TYPE IV
BINDER COURSE	1½"	BITUMINOUS CONCRETE PAVEMENT TYPE IV
BASE COURSE #2	3"	BITUMINOUS CONCRETE PAVEMENT TYPE II
BASE COURSE #1	3"	BITUMINOUS CONCRETE PAVEMENT TYPE II
SUBBASE	18"	SUBBASE OF DENSE GRADED CRUSHED STONE
SAND	15"	SAND BORROW
STONE FILL	N/A	N/A

ROAD TYPICAL INFORMATION

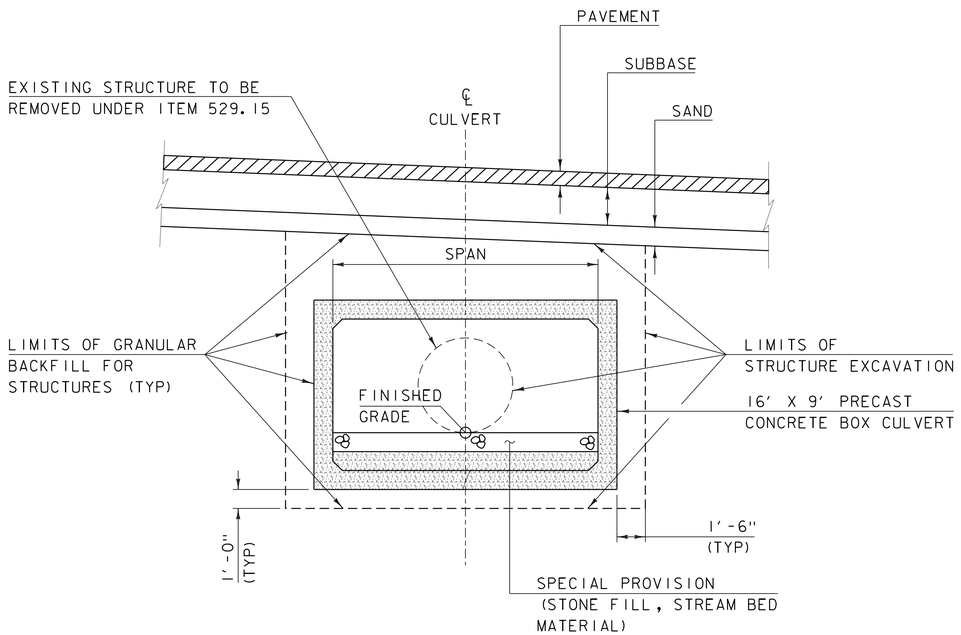
	LEFT LANE		RIGHT LANE	
	WIDTH	SLOPE	WIDTH	SLOPE
TRAVEL LANE	11'-0"	VARIES	11'-0"	VARIES
SHOULDER	3'-0"	VARIES	3'-0"	VARIES
BUFFER	3'-7"	6.00%	3'-7"	6.00%
FILL SLOPE		1:2.0		1:2.0

CLEAR ZONES

FILL SLOPES	20'-0"
CUT SLOPES	12'-0"
BEHIND GUARDRAIL	4'-0"



ALTERNATIVE 1 TYPICAL SECTION



ALTERNATIVE 2 & 3 CULVERT TYPICAL SECTION

NOT TO SCALE

MATERIAL TOLERANCES

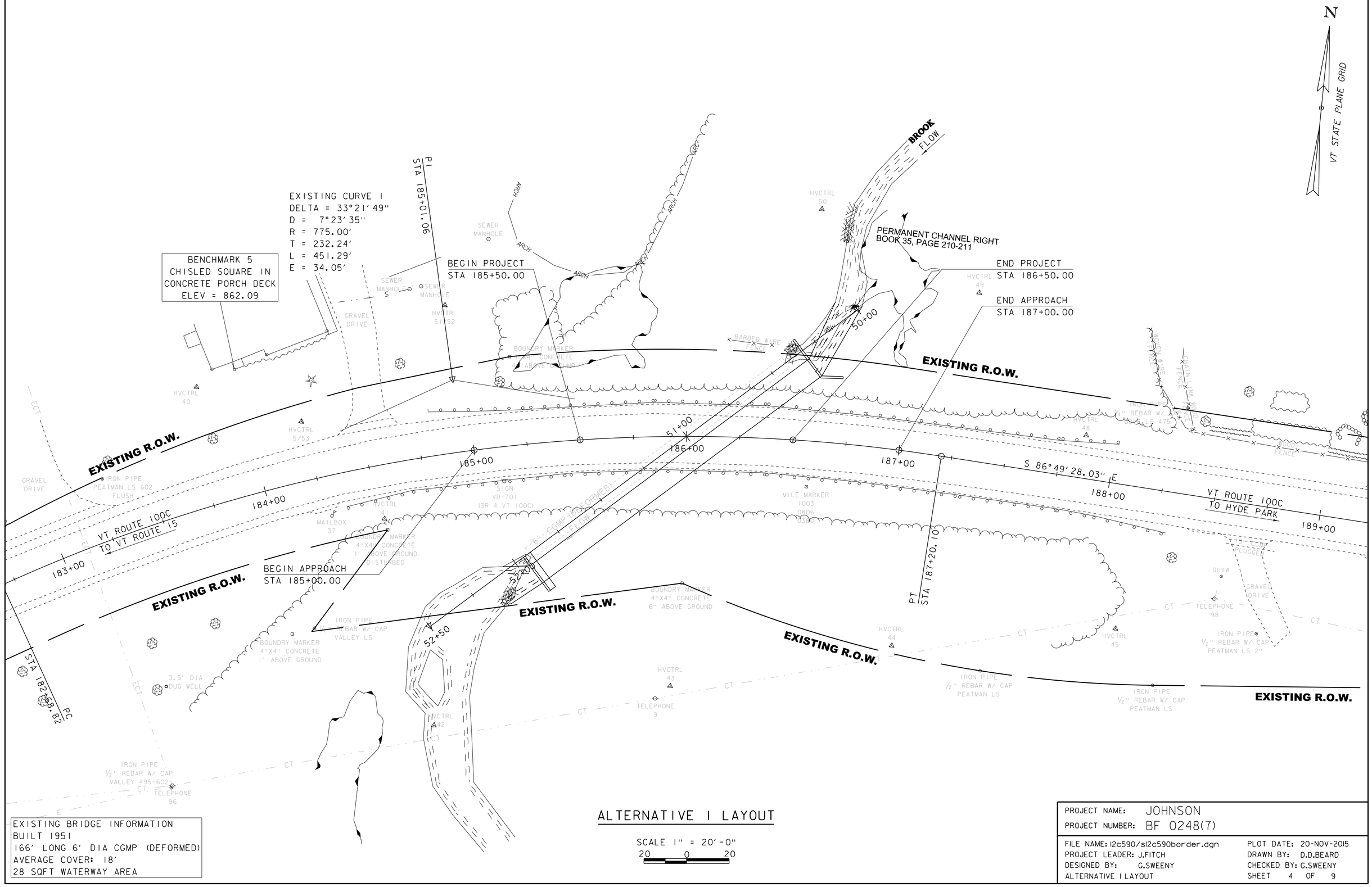
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- ¼"
- AGGREGATE SURFACE COURSE	+/- ½"
SUBBASE	+/- 1"
SAND BORROWS	+/- 1"

PROJECT NAME: JOHNSON
PROJECT NUMBER: BF 0248(7)

FILE NAME: 12c590/sl2c590typical.dgn
PROJECT LEADER: J.FITCH
DESIGNED BY: G.SWEENY
TYPICAL SECTIONS

PLOT DATE: 20-NOV-2015
DRAWN BY: D.D.BEARD
CHECKED BY: G.SWEENY
SHEET 3 OF 9

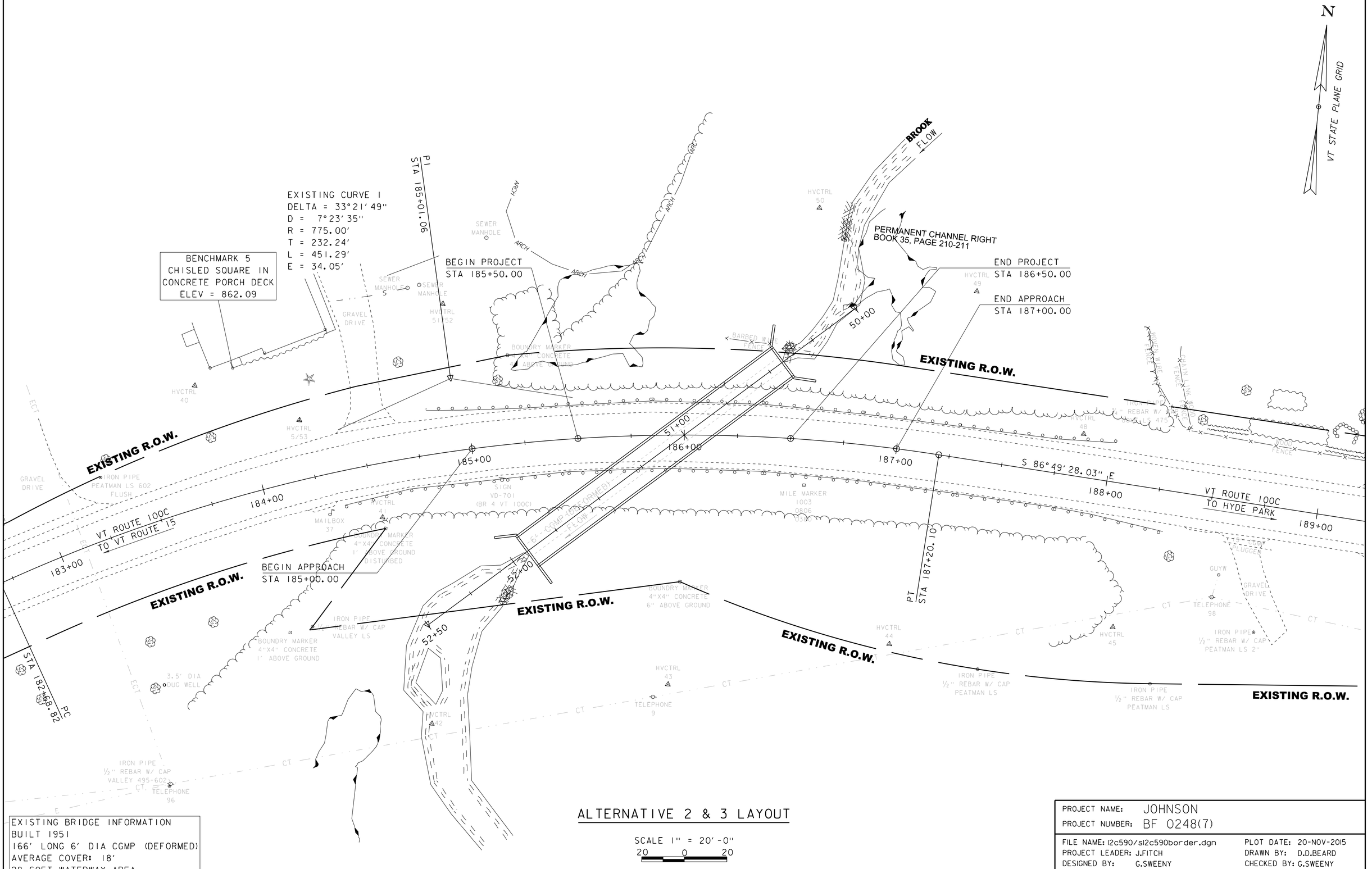


EXISTING BRIDGE INFORMATION
BUILT 1951
166' LONG 6' DIA CGMP (DEFORMED)
AVERAGE COVER: 18'
28 SQFT WATERWAY AREA

ALTERNATIVE 1 LAYOUT

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

PROJECT NAME:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME:	l2c590/sl2c590border.dgn
PROJECT LEADER:	J.FITCH
DESIGNED BY:	G.SWEENY
ALTERNATIVE 1 LAYOUT	
PLOT DATE:	20-NOV-2015
DRAWN BY:	D.D.BEARD
CHECKED BY:	G.SWEENY
SHEET	4 OF 9

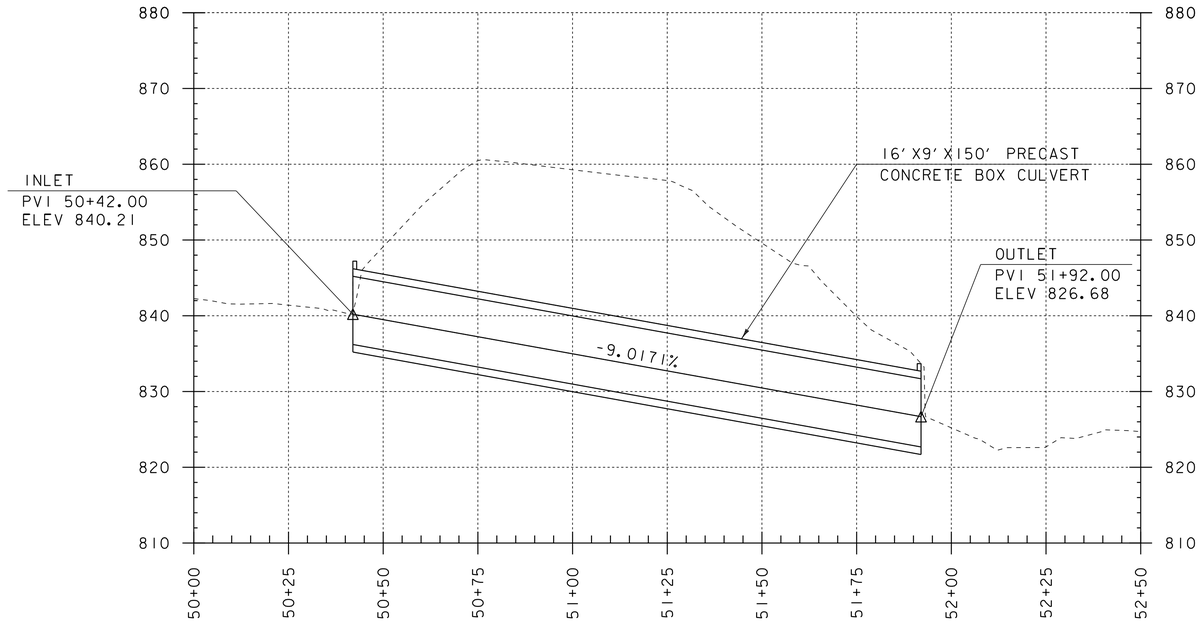


ALTERNATIVE 2 & 3 LAYOUT

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

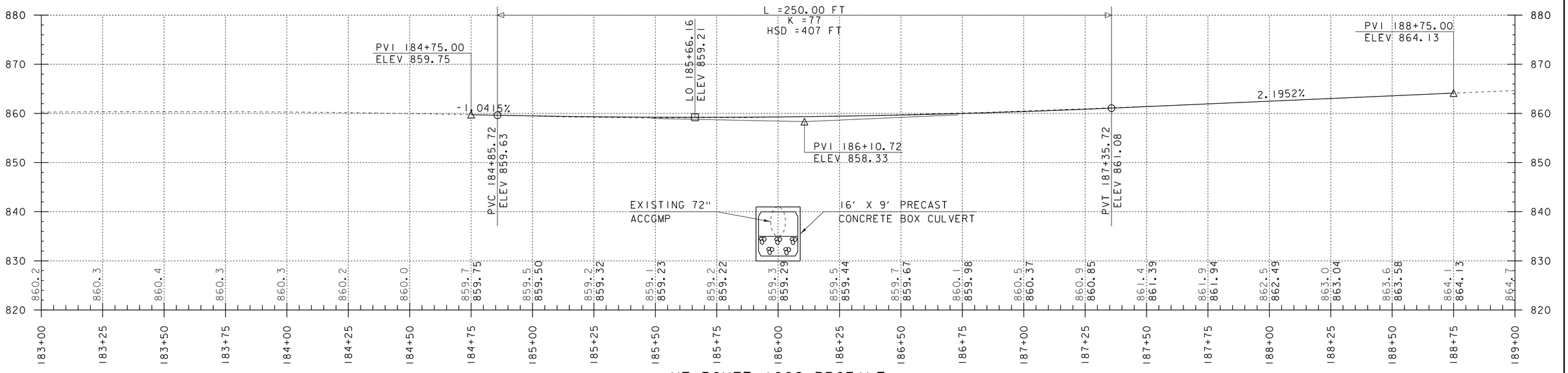
EXISTING BRIDGE INFORMATION
BUILT 1951
166' LONG 6' DIA CGMP (DEFORMED)
AVERAGE COVER: 18'
28 SQFT WATERWAY AREA

PROJECT NAME:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME:	I2c590/sI2c590border.dgn
PROJECT LEADER:	J.FITCH
DESIGNED BY:	G.SWEENY
ALTERNATIVES 2 & 3 LAYOUT	
PLOT DATE:	20-NOV-2015
DRAWN BY:	D.D.BEARD
CHECKED BY:	G.SWEENY
SHEET	5 OF 9



CULVERT 4 ALTERNATIVE 2 PROFILE

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



VT ROUTE 100C 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: JOHNSON
PROJECT NUMBER: BF 0248(7)

FILE NAME: 12c590/sl2c590profile.dgn
PROJECT LEADER: J.FITCH
DESIGNED BY: G.SWEENY
ALTERNATIVE 2 PROFILE SHEET

PLOT DATE: 20-NOV-2015
DRAWN BY: D.D.BEARD
CHECKED BY: G.SWEENY
SHEET 6 OF 9

N

VT STATE PLANE GRID

EXISTING CURVE 1
DELTA = 33°21'49"
D = 7°23'35"
R = 775.00'
T = 232.24'
L = 451.29'
E = 34.05'

BENCHMARK 5
CHISLED SQUARE IN
CONCRETE PORCH DECK
ELEV = 862.09

BROOK
FLOW

ARCH

50+00

51+00

52+00

52+50

184+00

185+00

186+00

187+00

188+00

189+00

S 86°49'28.03" E

PT
STA 187+20.10

VT ROUTE 100C
TO VT ROUTE 15

VT ROUTE 100C
TO HYDE PARK

181+00

STA 182+68.82
PC

STA 183+75.00
MATCH LINE

3.5" DIA
DUG WELL

TELEPHONE
96

TELEPHONE
19

TELEPHONE
98

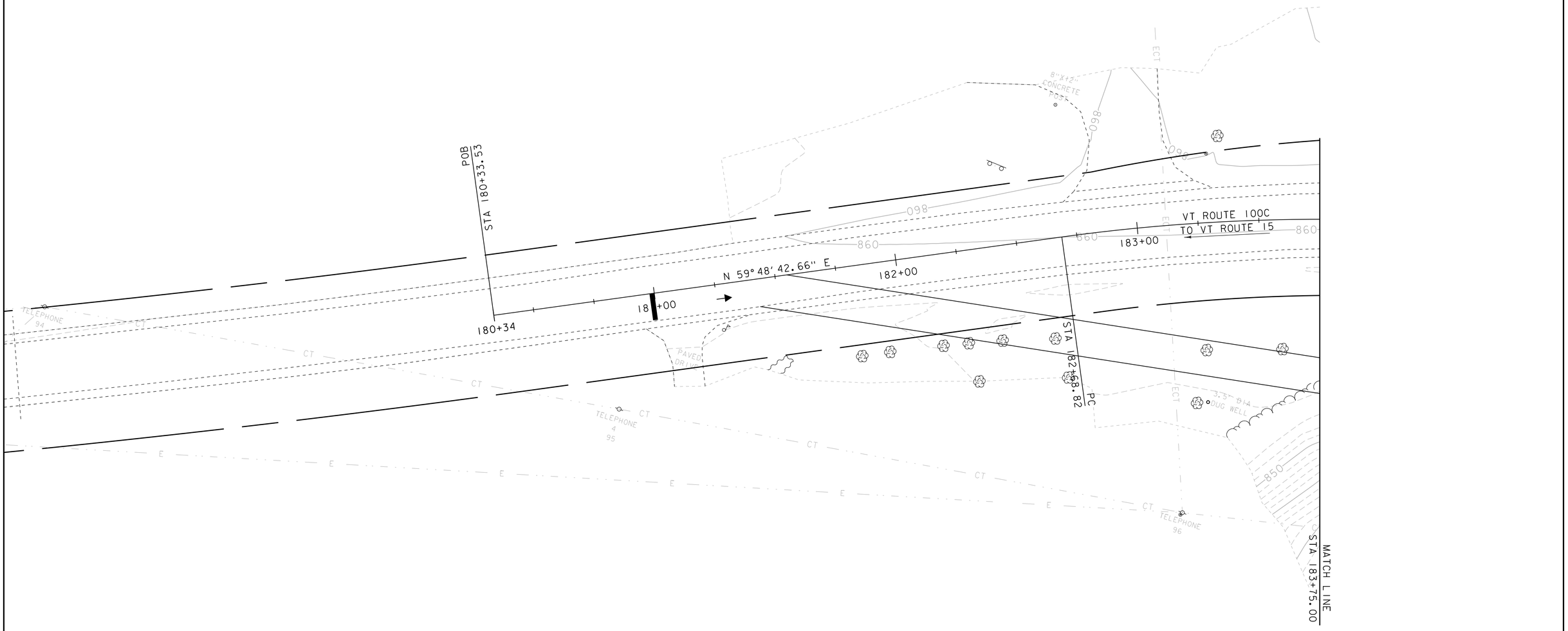
GUYW

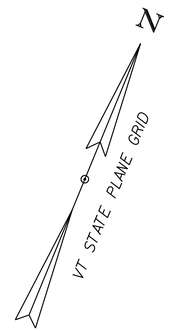
ECT
CT
E

UPSTREAM TEMPORARY BRIDGE

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

PROJECT NAME:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME:	I2c590/sI2c590TCborder.dgn
PROJECT LEADER:	J.FITCH
DESIGNED BY:	G.SWEENY
UPSTREAM TEMPORARY BRIDGE	
PLOT DATE:	20-NOV-2015
DRAWN BY:	D.D.BEARD
CHECKED BY:	G.SWEENY
SHEET	7 OF 9

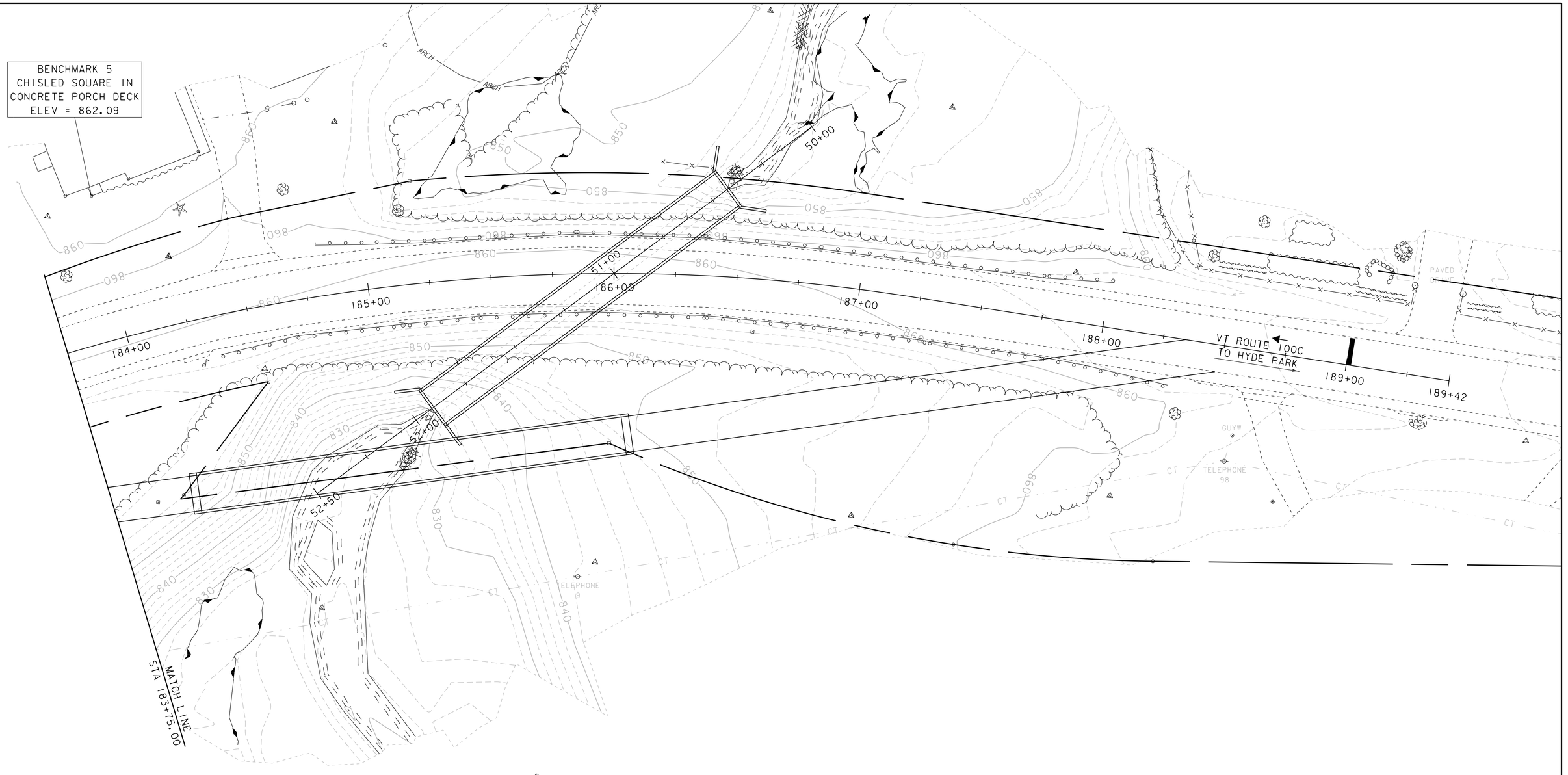




DOWNSTREAM TEMPORARY BRIDGE 1

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

PROJECT NAME:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME: 12c590/sl2c590TCborder.dgn	PLOT DATE: 20-NOV-2015
PROJECT LEADER: J.FITCH	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
DOWNSTREAM TEMPORARY BRIDGE LAYOUT 1	SHEET 8 OF 9



N

VT STATE PLANE GRID

DOWNSTREAM TEMPORARY BRIDGE 2

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

PROJECT NAME:	JOHNSON
PROJECT NUMBER:	BF 0248(7)
FILE NAME: l2c590/sl2c590TCborder.dgn	PLOT DATE: 20-NOV-2015
PROJECT LEADER: J.FITCH	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
DOWNSTREAM TEMPORARY BRIDGE LAYOUT 2	SHEET 9 OF 9