STATE OF VERMONT
AGENCY OF TRANSPORTATION

Structure Type Study

FOR

Readsboro BF 0102(16)

VT ROUTE 100, BRIDGE 25 OVER THE DEERFIELD RIVER

September 4, 2014

Table of Contents

I. Preface

A scoping report was completed for this bridge in October of 2013. A Regional Concerns meeting was held in Readsboro on December 10, 2013 where the information from that original scoping report was presented. The original proposal was to replace the existing deck and superstructure with prefabricated elements and included minor substructure repairs and stone fill protection of the substructures. A 3 week closure was proposed using an off-site detour for traffic management during the construction phase. Concern was expressed by those present at the meeting over the length of the detour, which was to be approximately 32 miles on State highway. Based on extensive feedback, it was decided that the scoping report would be modified to eliminate the plan for an off-site detour and utilize an on-site temporary bridge. The scope of construction would be modified to include a full replacement. This report is a result of that effort.

II. Site Information

Bridge 25 is located on VT Route 100 just as it enters the center of town. It is approximately 0.1 miles east of the junction with TH-2, Tunnel St. Most of the bridge is on a tangent with a curve at the east end and the west approach is fairly straight with good sight distance. The east approach is on a curve, but sight distance is fairly good. There are Town Roads near each end of the bridge. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Major Collector (State Highway)
Bridge Type	3 span, continuous 2 girder, with cast-in-place deck Cast-in-place concrete abutments and piers.
Bridge Length	340 feet, with two 105 ft. spans and a 130 ft. span.
Year Built	1954
Ownership	State of Vermont

Need

Bridge 25 carries VT Route 100 across the Deerfield River. The following is a list of deficiencies of Bridge 25:

1. The bridge is rated as structurally deficient.

2. The deck rating is 3 (Serious) and the Superstructure rating is 4 (Poor). A critical maintenance report has been made for this bridge, identifying the poor condition of the deck and superstructure (see Appendix).

3. The existing bridge railing and transitions are rated as 0 (Does Not Meet Current Standard).

4. The roadway alignment east of the bridge is substandard due to K value, sight distance, and horizontal geometry. On the west side, K value on the approach is substandard.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2016 and 2036.

TRAFFIC DATA	2016	2036
AADT	1000	1100
DHV	110	120
ADTT	140	200
%T	16.3	21.2
%D	52	52

Design Speed

The current design speed on the bridge and east of the bridge is 40 mph. The speed changes to 25 mph at the west end of the bridge. The Town has indicated that some discussion has occurred regarding a speed reduction to 25 mph on the bridge. VTrans has a process for speed limit changes that includes a traffic engineering study for reviewing the current speeds being driven and an analysis of crash data, existing geometry and character of the area, among other criteria. At this time, the design speed is 40 mph.

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on ADT of 1,100 and a design speed of 40 mph for a Rural Major Collector.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	11'/4' (30')	10'/4' (28')[1]	
Bridge Lane and Shoulder Widths	VSS Section 5.7	11'/3.25' (28.5'), plus sidewalk	4'/10'/10'/4' (28')[1]	
Clear Zone Distance	VSS Table 5.5	No known issues in project area	12' fill 10' cut	
Banking	VSS Section 5.13	Varies, < 7% at curve, east end	8% (max) 6% max. at side road	Substandard
Speed		40 mph	40 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 11,500' (West approach), R = 715' (East approach)	For R=715', bank req'd would be 7.0%	Substandard Curve, East Approach
Vertical Grade	VSS Table 5.6	Max. 3% on west approach, max. 1.67% on east approach.	10% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 5.1	Crest curve on bridge K=561. Sag curve on west approach K=473, sag curve on east approach K=52	60 crest / 60 sag	Substandard. 50' Sag curve on east approach
Vertical Clearance Issues	VSS Section 5.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	1309' on bridge 473' on west approach 262' on east approach	275'	Substandard, east approach
Bicycle/Pedestrian Criteria	VSS Table 5.8	2.5' – 3' shoulder	3' Shoulder	Existing 5' sidewalk on south side
Bridge Railing	Structures Design Manual Section 13	Inspector's rating is "0", indicating not meeting current standards.	TL-4	Substandard
Hydraulics	VTrans Hydraulics Section	Meets standard	Pass Q_{50} Flood with 1.0 ft. freeboard	
Structural Capacity	Structures Manual, Chapter 3.4.1	Structurally Deficient	HL-93	Substandard

1. The Vermont State Standards call for a 9/2 width for this project. A 10/4 width will be used because it is required for shared bicycle use with >10% truck traffic (Table 5.8) and it is required to meet Highway Safety and Design Engineering Instruction HSDEI 11-004 for minimum width.

Inspection Report Summary

Deck Rating	3 Serious
Superstructure Rating	4 Poor
Substructure Rating	6 Satisfactory
Channel Rating	8 Very Good
Deficiency Status of Structure	SD Structurally Deficient
Scour Condition:	8 Stable for Scour

4/17/2014 The structure needs to have a rehabilitation project in the near future. There needs to be a full deck replacement with new joints installed that provide a drainage system to protect the beam ends. The beams need to be cleaned and painted. The guardrail system needs to be replaced. And the abutments should have patching repairs to the backwalls and bridge seats. ~JWW/JDM

5/14/2013 The structure is in need of a rehabilitation project. With a deck replacement and new joints installed over the abutments. The guardrails need to be replaced and deteriorated areas in the superstructure repaired along the fascias and under the joint areas at the abutments. The cracked through backwall of abutment 2 should be repaired to prevent saturation and filtration of backfill from coming through. ~JWW/JDM

04/16/2012 This inspection is a Servi-lift inspection (fracture critical inspection) that was postponed due to Tropical Storm Irene during 2011. Please refer to the inspection report dated on 06/08/2011 for other information missing from this report. Stringer beams 1-3 of span No.3 are in need of web reinforcement. Floor beam #7 needs repair to a crack on south end connection plate. The south end connection plate of floor beam No.1 of span No.1 needs repair to a vertical crack. Local failures may occur anytime and anywhere along both sides of the centerline of all three span areas (especially bays 2 and 3) without notice. Please refer to Critical Maintenance Report dated on 04/16/2012. ~PLB

06/08/2011 The deck is in need of full replacement. The bridge guard rails on both sides are in need of painting and repairs. Miscellaneous steel repairs are needed on a few members throughout. ~PLB

Hydraulics

A Preliminary Hydraulics Report was done for this project and can be seen in the Appendix. The existing bridge meets the hydraulic standard of passing the 50 year storm event (Q_{50}) with one foot of freeboard below the low beam elevation of the bridge. In fact, there would be nearly 30 feet of freeboard during the 500 year event. The preliminary hydraulics report recommends, if a full bridge replacement is chosen, that a clear span normal to the river of at least 130 feet be provided to satisfy the Vermont ANR's Bank Full Width criteria.

Utilities

The only aerial electric lines over the bridge are lines that supply power to the lights on the bridge. There are, however, aerial utilities near both ends of the existing bridge, including 3-phase power near the east end. Due to the length of the span at this location, these lines will need to be relocated to accommodate cranes during the construction phase.

There are also municipal wastewater lines near each end of the bridge, but they do not cross the bridge. Further review of the impact on these lines will occur to determine whether they will be impacted by the project.

The Town of Readsboro is currently in the process of replacing an existing 6 inch diameter water line with a new 12 inch line attached to the north side of the bridge. The Town is aware of the bridge project being planned and that the water line will need to be relocated during the bridge project.

Known utilities are shown on drawings in the appendix.

Right Of Way

The existing 6-Rod Right-of-Way is plotted on the Layout Sheet. It appears that all existing elements of the bridge are within the Right-of-Way.

Resources

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

Biological:

The initial resource identification indicates that the river is the only regulated natural resource in the immediate project area.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there have been a number of hazardous waste sites in the community, but only two that have not been closed by VANR. They are not in the project vicinity and are not expected to impact the project.

Historic:

From the initial historic resources identification: "Bridge 25 is a historic bridge, significant for its 1954 metal tube railing. It also serves as a gateway to a historic village, with an abutting historic property at the NW corner of the bridge. These properties also qualify as Section 4(f) resources."

Archeological:

There are areas of archeological sensitivity present in the northeast quadrant of Bridge 25. These areas are shown in the appendix and on the drawings and need to be avoided. The resources include the remains of a granite foundation, sluice way, and wooden crib dam.

IV. Structure Type Discussion

Bridge 25 is structurally deficient with undesirable deck and superstructure ratings and substandard railings. Due to a lack of Traffic Control options, it was determined that a temporary bridge will be utilized. The most appropriate structure layouts here would be a shortened single span bridge, or a three span bridge similar in length to the existing. The bridge width and alignment would be the same for each of the options.

Structure Type 1: New Single Span Structure

This alternative considers the replacement of all bridge components; substructure, superstructure, deck, sidewalk, and railing; resolves all substandard issues concerning the bridge; and provides the full 80 year service life estimated for new bridge construction.

a. Alignment

The horizontal alignment is straight on the bridge and on the western approach. The east approach is substandard. It has a horizontal curve with a 715 foot radius and very slight banking where banking of approximately 7% would be required to meet standard for the current speed limit. A 7% bank would exceed the maximum banking allowed at the two side roads.

The vertical alignment on the bridge and approaches meet the standard within the project limits.

b. Bridge Width

The new bridge width would have lanes and shoulders of 4-10-10-4 with a 5'-6" raised sidewalk on the south side. This width meets the Vermont State Standards and would be approximately the same as the existing.

c. Bridge Length and Skew

The existing bridge is 340 feet long with three spans; the center span being 130 feet. The Preliminary Hydraulics Report indicates that the bridge meets the hydraulic standard and any new single span bridge would require a clearspan of 130 feet perpendicular to the river to provide an adequate bank full width as determined by the ANR model. A design span of 197.5 feet and a skew of 45 degrees would meet the clearspan requirements.

By reducing the overall span of the bridge, taller substructure units are necessary. A cost effective method for reducing the amount of concrete required is using MSE walls to hold back fill, along with shorter abutments supported by these walls. A new single span bridge with a design span of 197.5 feet and skew of 45 degrees on the existing alignment is recommended for this option to match the natural channel skew.

d. Superstructure

The existing structure has over 35 feet of freeboard at the 50 year flood event, so there will be no hydraulic constraints on superstructure depth. Due to the span, the typical Prefabricated Precast Bridge Units (PBUs) and NEXT beams will not be used on this project. Deeper concrete or steel girders will be appropriate. A multiple-member configuration should be used to provide redundancy. The type and configuration of superstructure will be determined later.

e. Substructure

In order to reduce the amount of concrete needed in the abutments and accelerate construction, mechanically stabilized earth (MSE) walls would be appropriate in this location. The MSE walls would be approximately 35 feet tall. Shorter abutments could then be supported by these retaining walls. Piles would not be required.

f. Maintenance of Traffic

It has been determined that a temporary bridge will be utilized due to the length of the detour and inability to phase construction.

Structure Type 2: New 3-Span Cantilevered Structure

This alternative considers the replacement of all bridge components; substructure, superstructure, deck, sidewalk, and railing; resolves all substandard issues concerning the bridge; and provides the full 80 year service life estimated for new bridge construction. A cantilever bridge is a bridge comprised of cantilevers built outwards from the piers.

a. Alignment

The horizontal alignment is straight and ideal on the bridge and on the western approach. The east approach is substandard; It has a horizontal curve with a 715 ft. radius and very slight banking where banking of approximately 7% would be required to meet standard for the current speed limit. A 7% bank would exceed the maximum banking allowed at the two side roads.

The vertical alignment on the bridge and west of the bridge meets the standard. K values and sight distance on a very short vertical curve on the east approach are substandard.

b. Bridge Width

The new bridge width would have lanes and shoulders of 4-10-10-4 with a 5'-6" raised sidewalk on the south side. This width meets the Vermont State Standards and would be approximately the same as the existing.

c. Bridge Length and Skew

The existing bridge is 340 feet long with three spans; the center span being 130 ft. This option will look at a 3-span cantilevered bridge. It is proposed that the new piers are set back from the bank. The Preliminary Hydraulics Report indicates that a clearspan of 130 feet perpendicular to the river would provide an adequate bank full width as determined by the ANR model. A center span of 200 feet along the centerline of the roadway will accomplish this. In order to reduce moments, a span ratio of 1:5:1 is recommended. Therefore, the outer spans would be 40 feet each, resulting in a total bridge span of 280 feet.

It is proposed that the skew is eliminated for this option since the abutments will provide the necessary clearspan with no skew and each pier will have one cylindrical shaft to eliminate turbulence due to stream flow.

d. Superstructure

The existing structure has over 35 feet of freeboard at the 50 year flood event, so there will be no hydraulic constraints on superstructure depth. Due to the span, the typical Prefabricated Precast Bridge Units (PBUs) and NEXT beams will not be used on this project. Deeper concrete or steel girders will be appropriate. A multiple-member configuration should be used to provide redundancy. The type and configuration of superstructure will be determined later.

e. Substructure

The intermediate piers would be pier columns supported on one cylindrical drilled shaft. Based on available subsurface information, the drilled shafts would likely be founded in rock. These types of piers are preferred since using a single cylinder at stream level allows for the bridge skew to be eliminated without constricting the channel or creating turbulence that results from a traditional solid wall pier stem. Based on the findings, the abutments could be reinforced concrete abutments on spread footings or pile caps supported on piles. The moments at the anchor arm supports would be minimal for this configuration bridge, so the abutments could be less robust than that of a single span bridge. Borings should be taken prior to design of the substructures at each foundation location.

f. Maintenance of Traffic

It has been determined that a temporary bridge will be utilized due to the length of the detour and inability to phase construction.

V. Structure Type Summary

Based on the existing site conditions and recommendations from hydraulics, there are two structure types being considered:

Structure Type 1: New Single Span Structure On-Alignment Utilizing Mechanically Stabilized Earth Walls with Traffic Maintained on a Temporary Bridge

Structure Type 2: New Three Span Cantilevered Structure On-Alignment Utilizing Drilled Shaft Piers into Rock with Traffic Maintained on a Temporary Bridge

VI. Cost Matrix[1]

Readsboro BF 0102(16)		Structure Type 1 New One Span Structure with Temporary Bridge	Structure Type 2 New Three Span Structure with Temporary Bridge
COST	Bridge Cost	$3,587,600	$4,548,800
	Removal of Structure	$526,400	$526,400
	Roadway	$518,100	$608,400
	Maintenance of Traffic	$971,600	$971,600
	Construction Costs	$5,603,700	$6,655,200
	Construction Engineering + Contingencies	$1,401,000	$1,663,800
	Total Construction Costs w CEC	**$7,004,700**	**$8,319,000**
	Preliminary Engineering[2]	**$1,400,930**	**$1,663,800**
	Right of Way	**$350,000**	**$350,000**
	Total Project Costs	$8,755,630	$10,332,800
	Annualized Costs	109,500	$129,200
SCHEDULING	Project Development Duration[3]	4 years	4 years
	Construction Duration	3 years	3 years
	Closure Duration (If Applicable)	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	30'	30’
	Typical Section - Bridge (feet)	4-10-10-4-5.5	4-10-10-4-5.5
	Geometric Design Criteria	Substandard Approaches	Substandard Approaches
	Traffic Safety	Improved	Improved
	Alignment Change	No	No
	Bicycle Access	No Change	No Change
	Hydraulic Performance	No Change	No Change
	Pedestrian Access	No Change	No Change
	Utility	Relocation	Relocation
OTHER	ROW Acquisition	Yes	Yes
	Road Closure	No	No
	Design Life	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 starting from the end of the Project Definition Phase.

VII. Conclusion

Structure Type 1 is recommended; a single span bridge with MSE walls and traffic maintained on a temporary bridge.

Discussion

The annualized cost for a single span structure utilizing mechanically stabilized earth walls is slightly less than for a three span cantilevered structure with drilled shaft piers. Additionally a single span structure will not have intermediate piers that would require future maintenance.

The proposed structure will have a span of 195 feet and a skew of 45 degrees, and utilize MSE walls that are approximately 35 feet tall. This will allow for shorter abutments behind the walls, which presents cost savings in concrete. This structure will meet the hydraulic standard regarding design flood and bank full width requirements.

Community Concerns

The Town offered a detailed and thorough response to the Community Input Questionnaire. Items to consider and coordinate are as follows:

- *"The Town would like to review guardrail styles available to them."* In regard to the guardrail styles available, there are few bridge rail styles available for a historic situation. The most likely rail to be used is Standard S-352A, Bridge Railing, Galvanized Steel Tubing/Concrete Combination.
- *"Keep streetlights and use oversize conduit for feed-lines. The Town would like to review light fixture styles available to them."* It is the policy of the State that lights, fixtures, conduit, and all associated costs including power costs are provided by the Town, starting at the electrical pole. The State reserves the right to review the lighting system for compliance with safety standards. A maintenance agreement will be required with the Town for maintenance and costs of power, etc.
- *"Add brackets to the guardrail such that the Town may install planters."* Due to safety concerns, brackets will not be allowed.
- It is understood that the Town has expressed verbally and in the Town Plan a desire to reduce speed on the bridge. At this time, it is the intent of the design to meet standards for 40 mph wherever possible. (Not all standards can be met for 40 mph on the roadway approaches off the ends of the bridge). If a speed reduction is felt to be appropriate, a traffic engineering study should be coordinated with VTrans Highway Safety and Design. This can and should take place outside of this bridge project.
- The Town will need to make arrangements during construction to accommodate the Town water main that is on the bridge. The Town should be directed to complete the permit process with the permits and utilities section of VTrans.

IX. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Critical Maintenance Report - 2012
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources ID
- Archeology Memo
- Historic Memo
- Detour Map
- Community Input
- Plans
    - Existing Conditions
    - Proposed Typical Sections
    - Proposed Layouts
    - Proposed Profiles
    - Downstream Temporary Bridge

Bridge 25 Looking West

Bridge 25 Looking East

Delaminating Deck


Secondary Member Crack

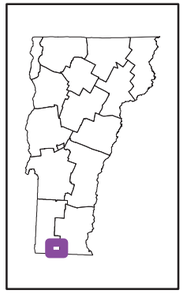
Scale 1:52,598

N

- INTERSTATE
- STATE LONG
- STATE SHORT
- TOWN LONG
- FAS/FAU
- FAS/FAU HWY
- INTERSTATE
- STATE HIGHWAY
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL
- PRIVATE
- DISCONTINUED
- DISTRICT
- POLITICAL BOUNDARY
- NAMED RIVERS-STREAMS
- UNNAMED RIVERS-STREAMS

READSBORO, VT 100, BR 25

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011



READSBORO
BENNINGTON COUNTY
DISTRICT # 1

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for READSBORO **bridge no.:** 00025 **District:** 1

Located on: VT 00100 ML **over** W BRANCH DEERFIEL **approximately** 5.2 MI N JCT. VT.8 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 3 SERIOUS

Superstructure Rating: 4 POOR

Substructure Rating: 6 SATISFACTORY

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200102002502092

Federal Sufficiency Rating: 056.8

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1954 **Year Reconstructed:** 0000

Service On: 5 HIGHWAY-PEDESTRIAN

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 05

ADT: 000990 **% Truck ADT:** 06

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0130

Structure Length (ft): 000340

Lt Curb/Sidewalk Width (ft): 2

Rt Curb/Sidewalk Width (ft): 5.8

Bridge Rdwy Width Curb-to-Curb (ft): 28.6

Deck Width Out-to-Out (ft): 38.7

Appr. Roadway Width (ft): 030

Skew: 45

Bridge Median: 0 NO MEDIAN

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

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3 SPN CONT RIV 2 GIR

Number of Approach Spans: 0000 **Number of Main Spans:** 003

Kind of Material and/or Design: 4 STEEL CONTINUOUS

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 0 NOT APPLICABLE

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA

Deck Geometry: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 8 SLIGHT CHANCE OF OVERTOPPING ROADWAY

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 4 H 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 062011 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

04/16/2012 This inspection is a Servi-Lift inspection (fracture critical inspection) that was postponed due to Tropical Storm Irene during 2011. Please refer to the inspection report dated on 06/08/2011 for other information missing from this report. Stringer beams 1-3 of span No.3 are in need of web reinforcement. Floor beam #7 needs repair to a crack on south end connection plate. The south end connection plate of floor beam No.1 of span No.1 needs repair to a vertical crack. Local failures may occur anytime and anywhere along both sides of the centerline of all three span areas (especially bays 2 and 3) without notice. Please refer to Critical Maintenance Report dated on 04/16/2012. PLB

06/08/2011 The deck is in need of full replacement. The bridge guard rails on both sides are in need of painting and repairs. Miscellaneous steel repairs are needed on a few members throughout. PLB

BRIDGE INSPECTION - CRITICAL MAINTENANCE REPORT

READSBORO	VT 100	25	1	W. BR.DEERFIELD RIV.	3 SP RIVETED GRD
TOWN	ROUTE	BRIDGE	DISTRICT	FEATURE CROSSED	TYPE OF STRUCTURE

PROBLEMS FOUND:

DECK

ACTION TAKEN:

1. Deck Repair Needed — **Large and thick delams w/ broken rebar**
   Location: — **Bays 2 and 3 of spans 2 and 3.**
   Est. quantity — **2 areas**
   Urgency of repair coding: — **Critical**

_____

_____

_____

_____

_____

_____

DTA's INITIALS & DATE _____

SUPERSTRUCTURE

ACTION TAKEN:

1. Repair Stringer Beam — **Holes in lower web.**
   Location: — **1-3 of span No.3**
   Est. Quantity — **3**
   Urgency of Repair Coding: — **Semi-Critical**

2. Repair — **Connection plates**
   Location: — **So. side of end flr. beams in spans 1 & 3**
   Est. quantity - Each: — **2**
   Urgency of Repair Coding: — **Semi-Critical**

_____

_____

_____

_____

_____

_____

DTA's INITIALS & DATE _____

BRIDGE INSPECTION - CRITICAL MAINTENANCE REPORT

READSBORO	VT 100	25	1	W. BR.DEERFIELD RIV.	3 SP RIVETED GRD
TOWN	ROUTE	BRIDGE	DISTRICT	FEATURE CROSSED	TYPE OF STRUCTURE

Note: **Critical** (Immediate action required) **Semi-Critical** (Timely action required) **Needs to be Addressed**

Inspector(s) : **Peter Bergeron and Justin White**
Inspection Date : **04/16/12**

Inspector(s) Comments :

Large delaminations in bays 2 or 3 of spans 2 and 3 are in need of added support to prevent local break through. Stringer beams 1 thru 3 of span 3 are in need of reinforcement along the lower web areas. Connection plates on the south side of the both end floor beams are in need of repairs.

Return a copy of this form to Structures Section and Director of Operations after repairs have been completed.

Signature: _____

Structures Program Manager Date

Bill Sargent, OPS District 6
Tod Kimball, FHWA
NBIS File via PMT and Inspector

VTrans
Bridge Management Inspection Unit

Printed on 9/18/2013

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Jake San Antonio, Hydraulics Project Engineer (VHB)
via Nick Wark, VTrans Hydraulic Engineer

DATE: June 13, 2012

SUBJECT: READSBORO - BF-0102(16), VT 100 BR 25 over the DEERFIELD RIVER

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

Existing Bridge Information

The original bridge was constructed in 1954 based on available information. The bridge is a 2-lane 3-span continuous rivet 2 girder bridge. The total width of bridge is approximately 37 feet normal to the roadway. The total span for the structure between the abutment faces is approximately 340 feet, normal to the roadway. The clear spans between the piers and abutment faces are approximately 102 (normal to roadway) feet, and the clear span between piers is approximately 129 feet (normal to roadway). The existing bridge has a skew of approximately 42 degrees to the river at this location. The total existing superstructure depth is approximately 12.5 feet based on record plans. The existing abutments and piers were constructed of concrete with unknown foundations. These abutments and piers are orientated parallel with the stream channel at this location. The approximate maximum height to the bottom of the superstructure to the streambed varies but is approximately 55 feet on the upstream side. The structure is located on an incised channel having a sandy-gravelly streambed with large boulders. The bridge is located on the Deerfield River approximately 700 feet upstream of the confluence with the West Branch of the Deerfield River. The bridge will pass the Q_{50} storm event and all larger events based on our preliminary project HEC-RAS model. The existing bridge meets the hydraulic standard. We did not evaluate the scour for the existing conditions or any proposed bridge configurations as part of the preliminary design. Scour calculations will be performed during final hydraulics.

Recommendations

The bridge option selection criteria should be to provide a bridge opening that does not restrict the bank full width, nor provide an unrealistic widening, of the existing channel, or create any worse backwater flooding conditions than the existing conditions. The VANR Bank Full Width (BFW) equation estimates the width to be approximately 132 feet, but the actual field conditions have varying bank full stream widths within the study reach between 80 to 90 feet.

It has been assumed that if the existing bridge is replaced a replacement structure will be located in the existing roadway alignment having the same basic surface geometry based on the site constraints. For a replacement structure, we have anticipated that the proposed abutments will be vertical face concrete abutments with 3H:2V sloped stone fill scour protection placed in front of the abutments.

Based on our analysis, the designer has flexibility on the bridge design to meet eh hydraulic standards. One option would be to use a replacement bridge having a single 175-foot clear span (130-feet normal to the stream channel) between the abutment faces. For this option with a low

beam elevation of 1215.4, this analysis predicted a freeboard of 29.8 for the Q_{500} event. The designer would have flexibility on the low beam elevation given the significant freeboard. The proposed opening is narrower than the existing structure but has a wider center clear span and will not constrict the stream channel's bank full width based on the current BFW conditions. This proposed structure option will also provide approximately 37.0 feet of freeboard at the Q_{50} design storm event and meet the hydraulic design standard.

Another option would be to keep the bridge as a 3 span structure. For this option we would recommend that the pier placement not encroach any further on the channel, and that the piers not get any wider unless they are placed above the floodplain. The piers should also be aligned parallel with the river channel. This proposed structure will also provide approximately 36.3 feet of freeboard at the Q_{50} design storm event and meet the hydraulic design standard. Figure 2, attached depicts this option.

As noted above, scour was not reviewed during the preliminary design. However based on the velocities from the analyses, it is anticipated that Type 4 Stone Fill will be necessary for armoring the abutments and disturbed channel banks near the replacement structure. Stone fill sizing will be verified during final hydraulic design.

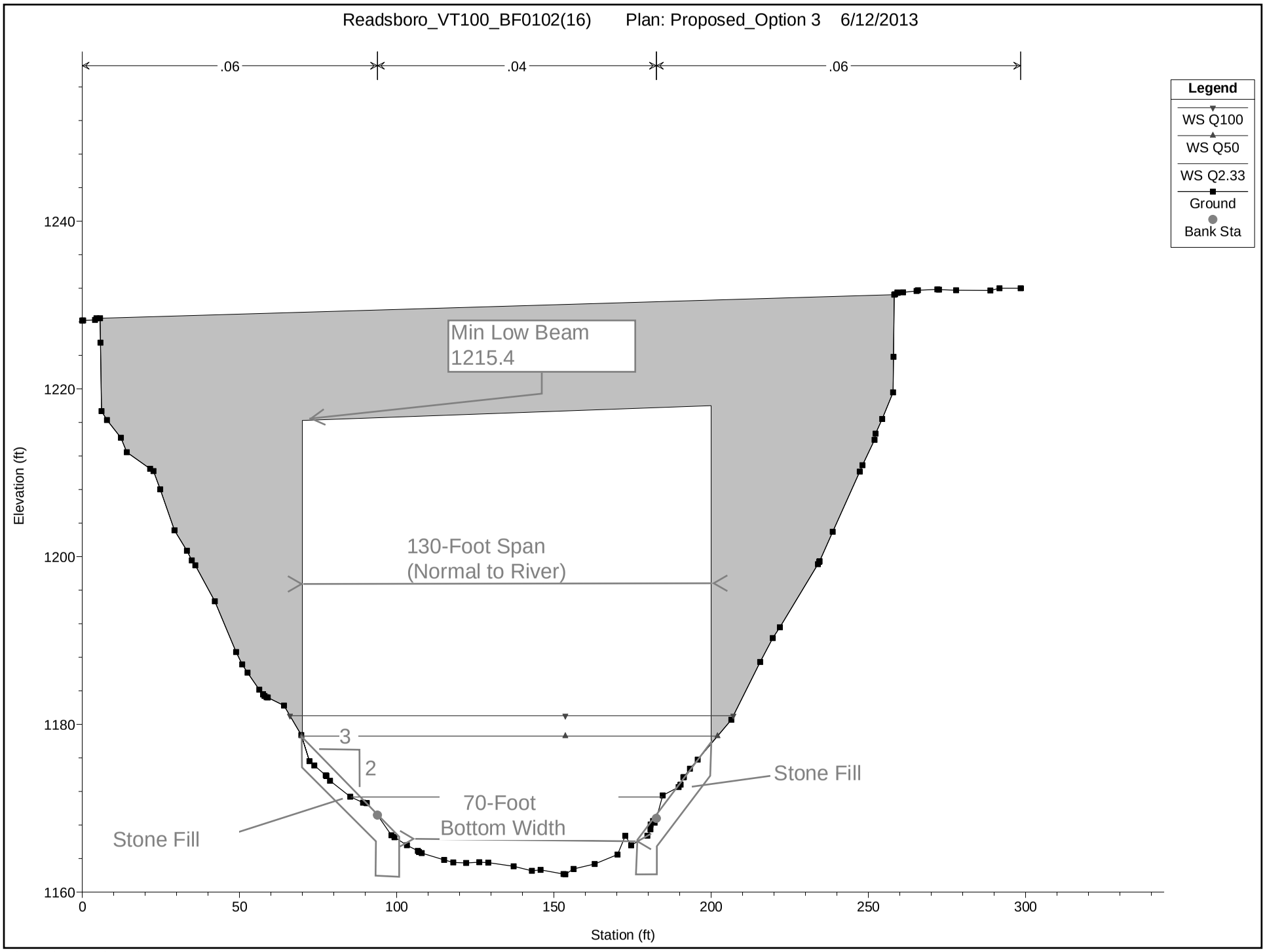
Temporary Bridge

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

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

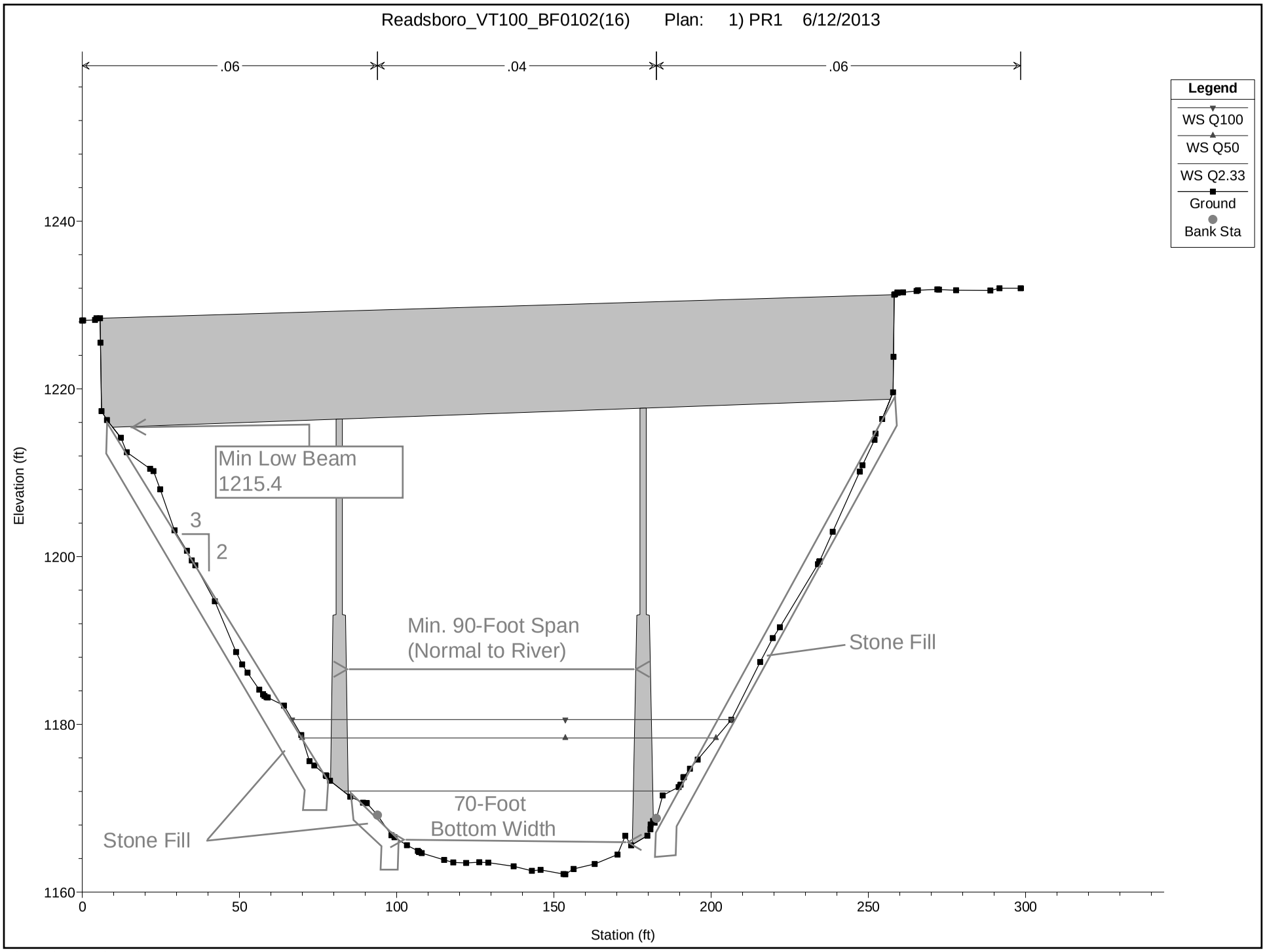
cc: Hydraulics Project File via NJW
Hydraulics Chrono File

Figure 1: 175-Foot Singe Span Normal to Road (130-feet Normal to River)



1 in Horiz. = 40 ft 1 in Vert. = 15 ft

Figure 2: 340-Foot Three Span normal to road (250-feet normal to Rr)iver



1 in Horiz. = 40 ft 1 in Vert. = 15 ft

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

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

From: Nicholas S. Meltzer, P.E., Geotechnical Engineer, via Christopher C. Benda P. E., Soils and Foundations Engineer

Date: July 24, 2013

Subject: Readsboro BF 0102(16) Preliminary Geotechnical Information

In an effort to assist the Structures Section with their bridge type study, the Soils and Foundations Unit within the Materials and Research Section has completed a review of available geological data for Bridge 25 on Vermont 100 in Readsboro, which flows over the west branch of the Deerfield River. This review included, a site visit, our in-house bridge boring files, record plans, USDA Natural Resources Conservation soil survey records, surficial geology and bedrock maps of the State and the Agency of Natural Resources Well logs.

Previous Projects

Record plans were found for the project, which shows Abutment 1, Pier 1, and Pier 2 supported on spread footings. Pier 1 and 2 and both founded on bedrock, which is shown on the plans. Abutment 2 is supported on driven steel piles. No additional soil information was available. The Soils and Foundations Unit 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 map revealed no borings in proximity to the project.

A nearby town bridge, located on Tunnel Street and approximately 750 feet as the crow flies from the subject bridge, is currently under construction. As part of a bridge replacement due to Tropical Storm Irene, borings were taken in 2011. One abutment consisted of glacial till to depths of 13 feet below the bottom of footing, underlain by bedrock, while the other abutment consisted of glacial till to depths of 100 feet.

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, 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. No water well information was located near the project area.

USDA Soil Survey

The United States Department of Agriculture Natural Resources Conservation Service maintains a surficial geology map of the United States, which is available online.

According to the Web Soil Survey, the strata directly underlying the project site consists of a combination of sandy soils and rocky complexes. Colton gravelly loamy sand and Berkshire fine sandy loam compromise the course grained strata, while the Tunbridge-Berkshire complex and Tunbridge-Lyman complex make up the rocky strata.

A site visit was conducted to determine potential issues with boring operations, and to make any other pertinent observations about the project. Figure 1 was taken on July 17, 2013.

Figure 1. Looking North on VT-100

Overhead power is non-existent on the bridge, and will not interfere with boring operations. For borings completed on and through the bridge deck, the wide sidewalk allows for more width to locate the drilling rigs while maintaining one-way traffic.

Figure 2 shows visible bedrock upstream of the bridge; however it should be noted the bedrock elevation at this site is variable. Based on the existing plans, and nearby borings, although bedrock is visible up and downstream of the bridge, it could be vary significantly across the width of the bridge. Additionally, large boulders in the area can be misleading as to the presence of bedrock.

Figure 2. Bedrock visible upstream

Figure 3 shows the tall piers, steep banks, and presence of cobbles and boulders, all of which contribute to difficult boring operations. With the large size and scope of this project, an in-depth geotechnical investigation is necessary. Two borings should be completed at each abutment, and due to the irregularities in bedrock elevation, a minimum of two at each additional substructure unit. With bedrock visible in the river, the subsurface exploration could be done in phases to help gain more information for design decisions. A series of hand steel soundings could be conducted near existing piers as well, to help ascertain the bedrock profile.

Figure 3. Upstream side of the bridge, looking North on VT-100

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

- Piers
  - Spread footings founded directly on bedrock
  - Spread footings supported on micropiles
  - Pier column supported on one drilled shaft
- Abutments
  - Pile caps on a single row of H-Piles
  - Reinforced concrete abutments on spread footings
  - Reinforced concrete abutments supported on driven piles

We recommend a minimum of two borings be taken at each abutment and a minimum of two at each additional substructure, 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 drilled shafts are contemplated, final borings should be aligned with the shaft location(s).

Based on existing plans, any pier substructure will be founded on bedrock, and the abutments will be either shallow foundations on soil, or deep foundations founded on bedrock. Recent Agency projects have shown advances in drilled shaft construction, and the ease of construction that can be obtained when one shaft is transitioned directly into a pier column.

When a preliminary alignment has been chosen, the Soils and Foundations Unit 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
NSM

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: James Brady, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: May 21, 2013

SUBJECT: Readsboro B_F 0102 (16)
VT 100, Bridge 25 over West Branch of Deerfield River
Natural Resource ID & Comments

The initial resource identification for this project was conducted on 20-MAY-2013 and based on that, which included a site visit, I have concluded that the only regulated natural resource in the immediate area of Bridge 25 is the West Branch of the Deerfield River itself. The existing structure is a long three-span bridge that spans a very steep sided (and deep) gorge.

Given the length of the structure and the height above the stream channel, it doesn't appear feasible to put in a temporary bridge in this location, but if one was needed, either side would be acceptable from an natural resources perspective, yet challenging from an engineering one. Phased construction is likely going to be needed in this location due to the long length of detours in the area.

If the project includes pier replacement, I recommend that the piers be placed outside of the limits of OHW, although the current pier doesn't seem to be problematic.

If you have any questions about this, call me at 828-3963.

VERMONT

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

Agency of Transportation

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

To: James Brady, Vtrans Environmental Specialist

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

Date: 5/30/2013

Subject: Readsboro BF 0102(16) – Archaeological Resource ID

James,

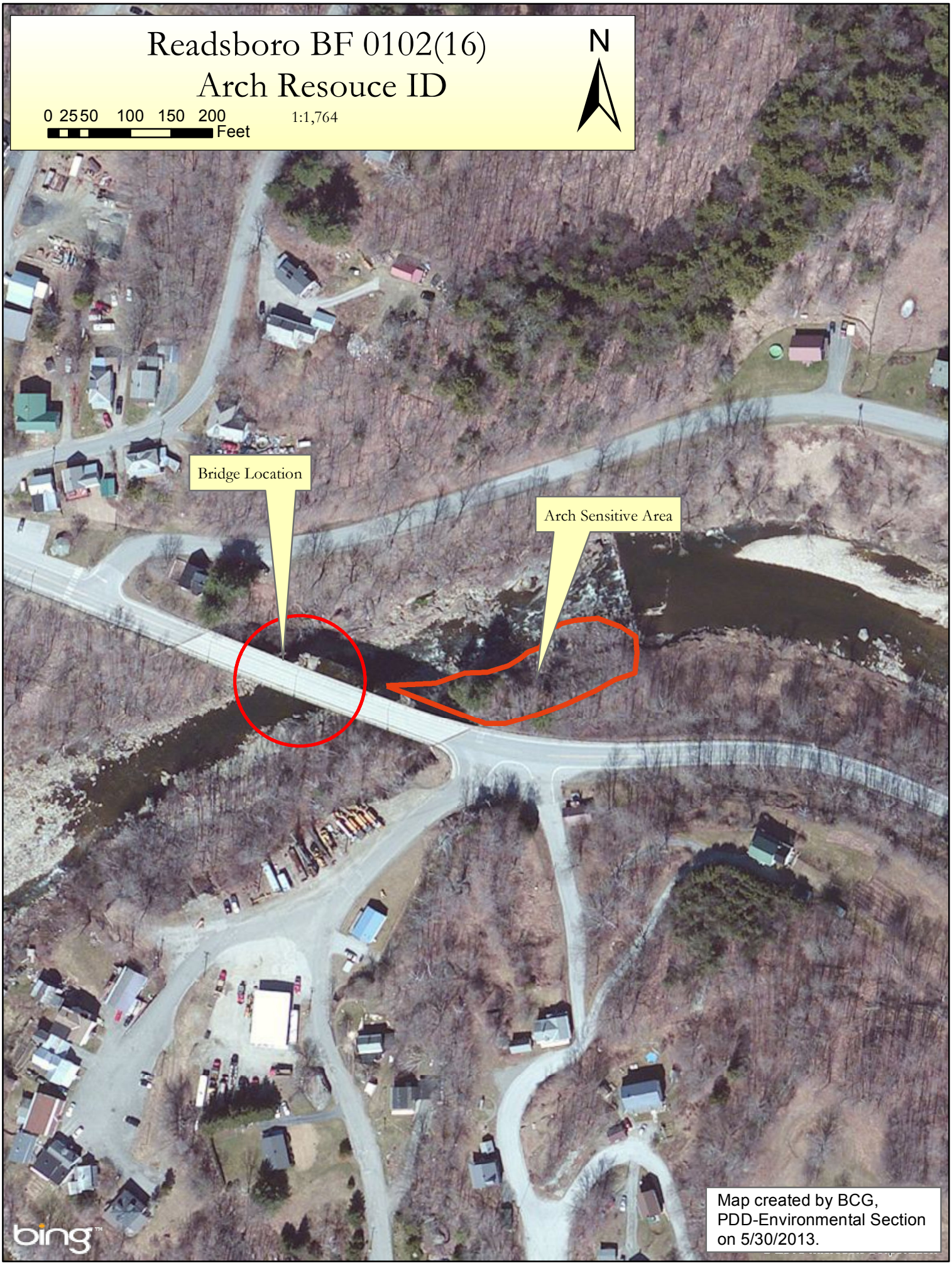
A field visit to Readsboro Bridge 25 on VT100 over the West Branch of the Deerfield River was adequate to identify potential archaeological resources in the project area. Through historical background research and field verification, I've been able to identify a series of mill foundation remains in the SE quadrant of the project area. The granite foundation, sluice way, and wooden crib dam are visible on site and should be avoided during construction. I've mapped the resources into the archaeology geodatabase for inclusion in the project DGN file.

Sincerely,

Brennan

Brennan Gauthier
VTrans Archaeologist
Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-3965
fax. 802-828-2334
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation


Readsboro BF 0102(16)
Arch Resouce ID
0 25 50 100 150 200
Feet
1:1,764
N
Bridge Location
Arch Sensitive Area
bing
Map created by BCG,
PDD-Environmental Section
on 5/30/2013.

Brady, James

From: O'Shea, Kaitlin
Sent: Tuesday, May 14, 2013 8:58 PM
To: Brady, James
Cc: Newman, Scott; Williams, Chris
Subject: Readsboro BF 0102(16) Historic Resource ID

Hi James,

The historic resource ID is complete for Readsboro BF 0102(16). Bridge 25 is a historic bridge, significant for its 1954 metal tube railing. It also serves as a gateway to a historic village, with an abutting historic property at the NE corner of the bridge. These properties also qualify as Section 4(f) resources.

This project has been mapped in Arcmap and bookmarked under the project name.

Let me know if you have any questions.

Thanks,
Kaitlin

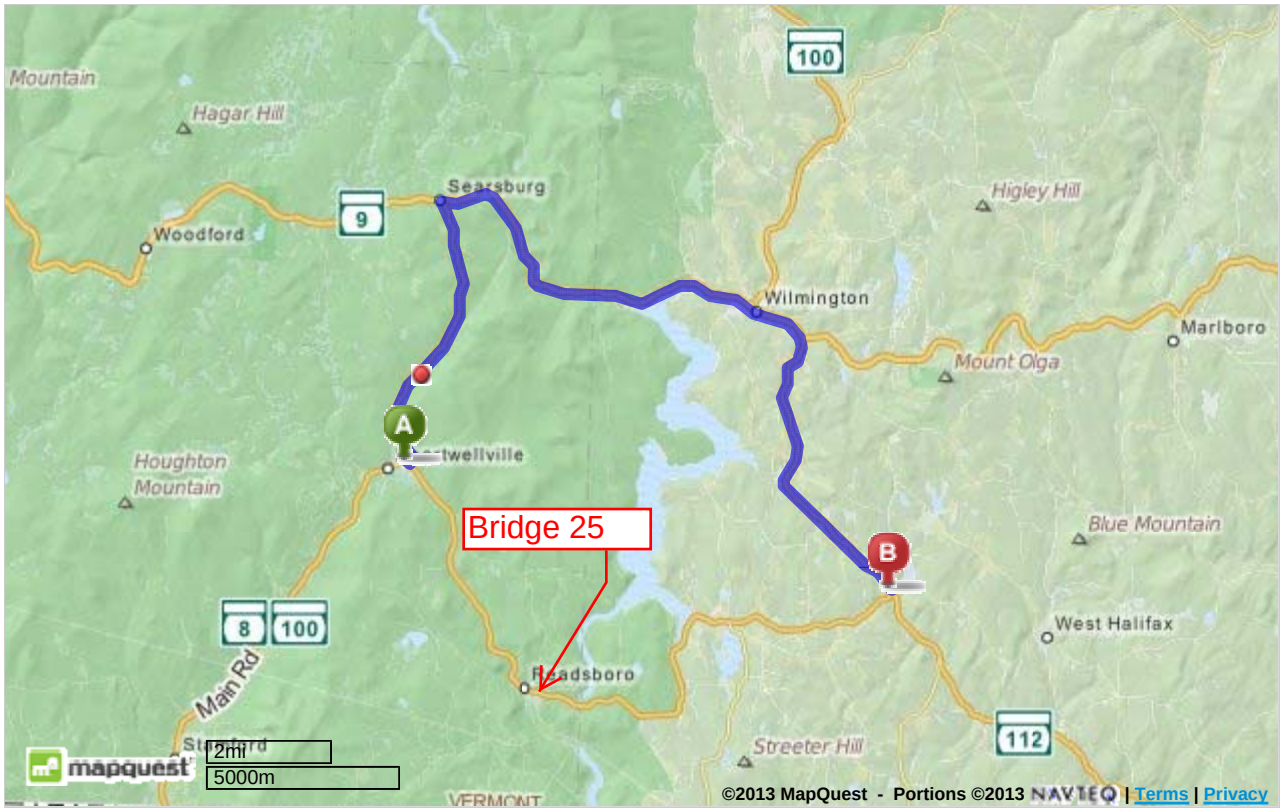
Kaitlin O'Shea
Historic Preservation Specialist
Program Development - Environmental Section Vermont Agency of Transportation

One National Life Drive
Montpelier VT 05633

office: 802-828-3962
fax: 802-828-2334

Kaitlin.O'Shea@state.vt.us

Total Travel Estimate: **18.62 miles - about 27 minutes**



Detour Route: From Readsboro west on VT 100, north on VT 8, east on VT 9 to Wilmington, south and west on VT 100 through Jacksonville and Whitingham to Readsboro.

A-B on through route:	13.5 miles
A-B on detour route:	18.6 miles
Added miles:	5.1 miles
End to End distance:	32.2 miles

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: a bike race, festivals, cultural events, farmers market, concerts, etc. that could be impacted? If yes, please provide date, location and event organizers' contact info.

   Independence Day and Memorial Day parade and celebrations occur annually – Contact Readsboro Selectboard.

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

   In between holiday weekends

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

   Fire Department - 102 School Street
   Police - State Police – Shaftsbury, Vt

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

   Readsboro Central School (Elementary School) – 301 Phelps Lane

5. Is the proposed project on an established or planned school bus or public transit route(s)?

   Yes, Twin Valley MOVER

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

   Yes, this is the main entrance to the Town; it will impact Schools, Fire, Inn's and all businesses.

7. Are there any important public buildings (town hall or community center) or community facilities (recreational fields or library) in close proximity to the proposed project?

   No

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

   Yes, Depot Road and Railroad Ally.

9. Are there any other municipal operations that could be adversely impacted if the bridge is closed during construction? If yes, please explain.

   Yes, the water department, it will shut down the public water supply to the town.

10. Please identify any local communication channels that are available—e.g. weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM.

    Deerfield Valley News (Weekly publication), Town website.

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

    Planning Commission, Home Town Redevelopment.

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? **N/A**
2. Are there any concerns with the width of the existing bridge? **No**
3. What is the current level of bicycle and pedestrian use on the bridge? **Daily light traffic**
4. If a sidewalk or wide shoulder is present on the existing bridge, should the new structure have one? **Yes**
5. Is there a need for a sidewalk or widened shoulder if one does not currently exist? Please explain. **N/A**
6. Does the bridge provide an important link in the town or statewide bicycle or pedestrian network such that bicycle and pedestrian traffic should be accommodated during construction?

   Yes, Children use to go to school.

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

   We would like to keep the Veterans Signage

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

   No

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

   No

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

    No

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

    No

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

- **The Town would like to review guardrail styles available to them.**
- **Remove trees around abutments.**
- **Use methods to minimize exposure and transfer of Japanese knotweed.**
- **Keep streetlights and use over size conduit for feed-lines. The Town would like to review light fixture styles available to them.**
- **Keep the sidewalk.**
- **Add brackets to the guardrail such that the Town may install planters.**
- **Any metal free concrete may be trucked to the Towns gravel pit.**
- **The Town request salvage rights to the present guardrails that were installed by the Town (located at the approaches of each end).**

Land Use & Public Transit Considerations – to be filled out by the municipality or RPC.

1. Does your municipal land use plan reference the bridge in question? If so please provide a copy of the applicable section or sections of the plan. **The Town Plan (2010) references the priorities to the town transportation system including: preserving and maintaining the existing road infrastructure, safety improvements and enhancements, and capacity enhancements. It also references the speed limit of 40mph of this bridge, needs to be reduced.**

2. Please provide a copy of your existing and future land use map, if applicable.
   - Existing Land Use - **file:///U:/GIS/Maps/Towns/Readsboro/2010%20Town%20Plan%20Maps/Existing%20Land%20Use%20color.pdf**
   - **Future Land Use – file:///U:/GIS/Maps/Towns/Readsboro/2010%20Town%20Plan%20Maps/Future%20land%20use%20color.pdf**
3. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so please explain. **It's my understanding there are none at this time.**

4. Is there any planned expansion of public transit service in the project area? If not known please contact your Regional Public Transit Provider. **No expanded transit is being proposed at this time.**

EXISTING CURVE 1
DELTA = 1°03'30"
D = 0°29'54"
R = 11500.00'
T = 106.21'
L = 212.42'
E = 0.49'

POB STA 40+00.00
PC STA 40+74.72
PI STA 41+80.93
PT STA 42+87.14
MATCH LINE STA 15+50.00

VT 100 TO STAMFORD

PHELPS LANE TH 22

VT STATE PLANE GRID

BENCH MARK
VTHD SURVEY DISK G33
RESET 1965
ELEV. = 1232.83

DEERFIELD RIVER FLOW

EXISTING BRIDGE DATA
3 SPAN CONTINUOUS RIVET 2 GIRDERS
BUILT 1954, MAX SPAN 130', LENGTH 340'
45° SKEW

EXISTING CONDITIONS 1

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

PROJECT NAME:	READSBORO
PROJECT NUMBER:	BF 0102(16)
FILE NAME:	13c068/sl3c068border.dgn
PROJECT LEADER:	C.P.WILLIAMS
DESIGNED BY:	G.SWEENY
LAYOUT SHEET	1
PLOT DATE:	04-SEP-2014
DRAWN BY:	D.D.BEARD
CHECKED BY:	G.SWEENY
SHEET	1 OF 9

N

VT STATE PLANE GRID

MATCH LINE
STA 15+50.00

DEERFIELD RIVER
FLOW

51+00

50+00

PC
STA 45+72.56

PT
STA 48+63.35

POE
STA 49+27.97

46+00

47+00

48+00

49+00

49+28

VT 100
TO WHITINGHAM

DEPOT STREET
TH 4

TH 46

STONE FILL

ARCH

HISTORIC DIST

GUY

ELECTRIC

SIGN

ELECTRICAL METER BOX

W16-9P

GATE VALVE

MANHOLE
SEWER

SIDEWALK

TY. SIGN
2X D3-1
(MAIN ST)
(DEPOT ST)

SIGN
R2-1
(25)

SIGN
VD-017
(24K)

HYDRANT

12" COMP
FAIR
FLOW

TELEPHONE
60
GUYPOLE

BENCH MARK
CHISLED SQUARE
IN LEDGE
ELEV. = 1225.94

PI
STA 47+19.99

GRAVEL
DRIVE

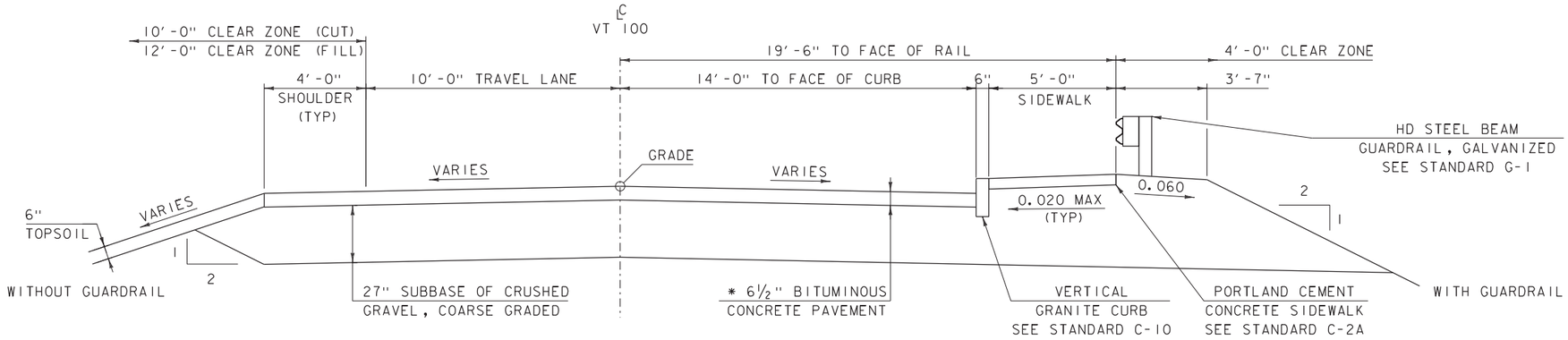
COMB
B4
2
50T
160
530
UNDERGROUND

EXISTING CURVE 2
DELTA = 23°18'08"
D = 8°00'48"
R = 715.00'
T = 147.43'
L = 290.79'
E = 15.04'

EXISTING CONDITIONS

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

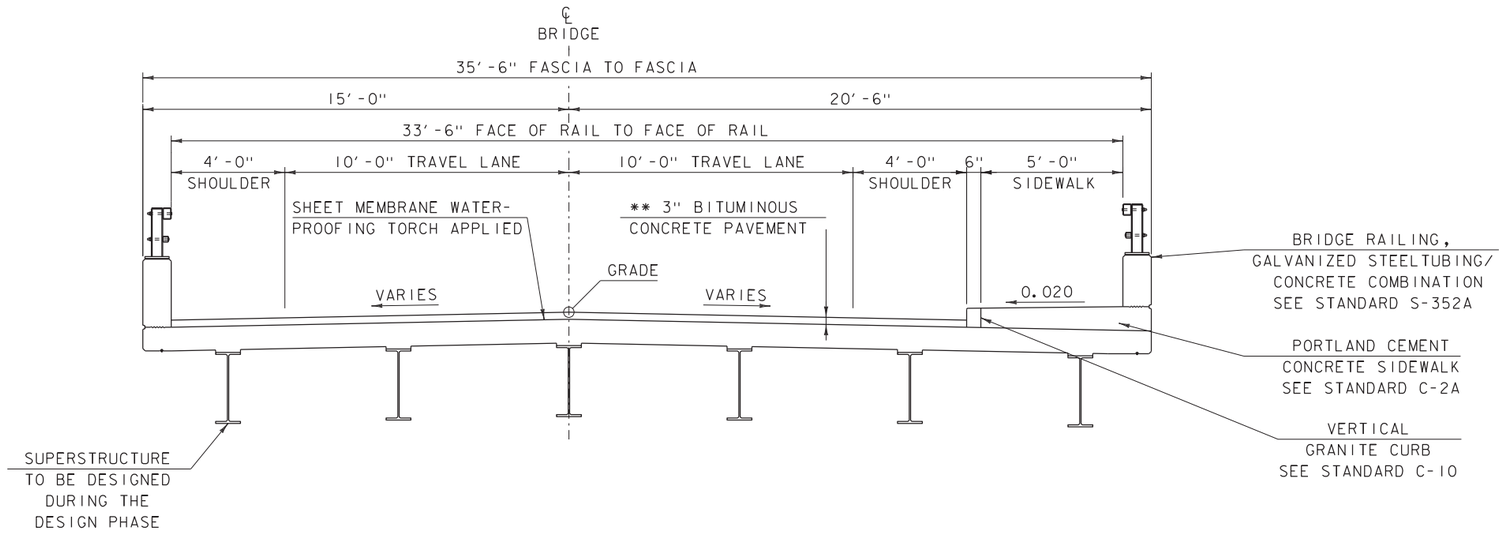
PROJECT NAME:	READSBORO
PROJECT NUMBER:	BF 0102(16)
FILE NAME: l3c068/sl3c068border.dgn	PLOT DATE: 04-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
LAYOUT SHEET 2	SHEET 2 OF 9



PROPOSED VT 100 TYPICAL SECTION

SCALE ⅜" = 1'-0"

* 1½" TYPE IVS OVER
1½" TYPE IVS OVER
3½" TYPE IIS



FLOW

PROPOSED BRIDGE TYPICAL SECTION

SCALE ⅜" = 1'-0"

** 1½" TYPE IVS OVER
1½" TYPE IVS

MATERIAL TOLERANCES

(IF USED ON PROJECT)

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

PROJECT NAME: READSBORO
PROJECT NUMBER: BF 0102(16)

FILE NAME: 13j068\sl3c068typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ----------
TYPICAL SECTIONS

PLOT DATE: 04-SEP-2014
DRAWN BY: O.M.DARISSE
CHECKED BY: ------

N

VT STATE PLANE GRID

℄ BEARING
ABUTMENT #1
STA 13+82.50

℄ BEARING
ABUTMENT #2
STA 15+80.00

END PROJECT
STA 18+00.00

PC
STA 16+03.69

PI
STA 17+44.85

STA 14+75.00=
CHAN 52+00.00
Δ = 40° 0' 0" RT

PROPOSED CURVE 1
DELTA = 22° 14' 38"
D = 8° 00' 48"
R = 715.00'
T = 140.56'
L = 277.58'
E = 13.69'

BENCH MARK
VTHD SURVEY DISK G33
RESET 1965
ELEV. = 1232.83

IRON PIPE
1" DIA
5" ABOVE GROUND SURFACE

PHELPS LANE
TH 22

DEPOT STREET
TH 4

DEERFIELD RIVER
FLOW

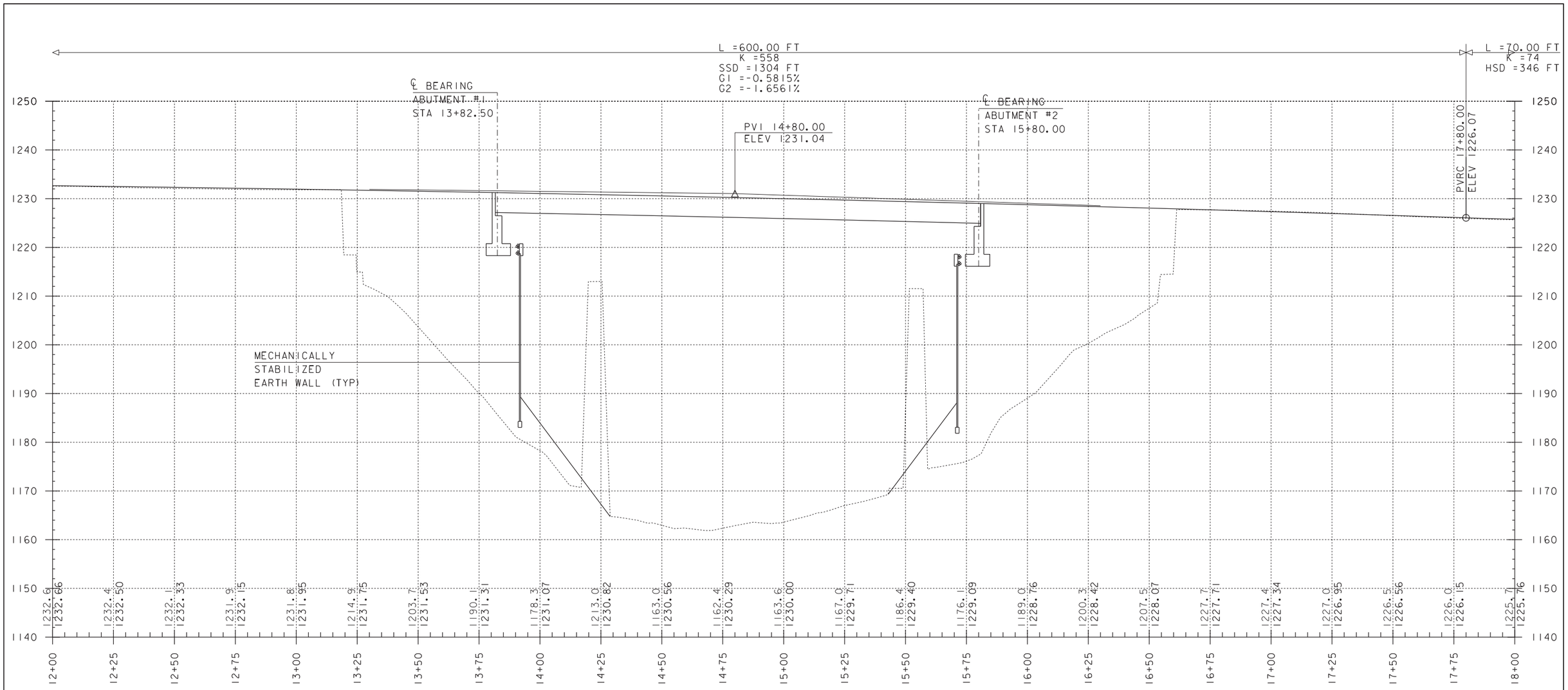
12+00 13+00 14+00 15+00 16+00 17+00

50+00 51+00 52+00 53+00 54+00

45° ASKEW 45° ASKEW

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

PROJECT NAME:	READSBORO
PROJECT NUMBER:	BF 0102(16)
FILE NAME:	I3c068/sl3c068border.dgn
PROJECT LEADER:	C.P.WILLIAMS
DESIGNED BY:	L.J.STONE
SINGLE SPAN LAYOUT	
PLOT DATE:	04-SEP-2014
DRAWN BY:	D.D.BEARD
CHECKED BY:	C.P.WILLIAMS
SHEET	4 OF 9



VT 100 PROFILE - SINGLE SPAN BRIDGE

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

NOTE:

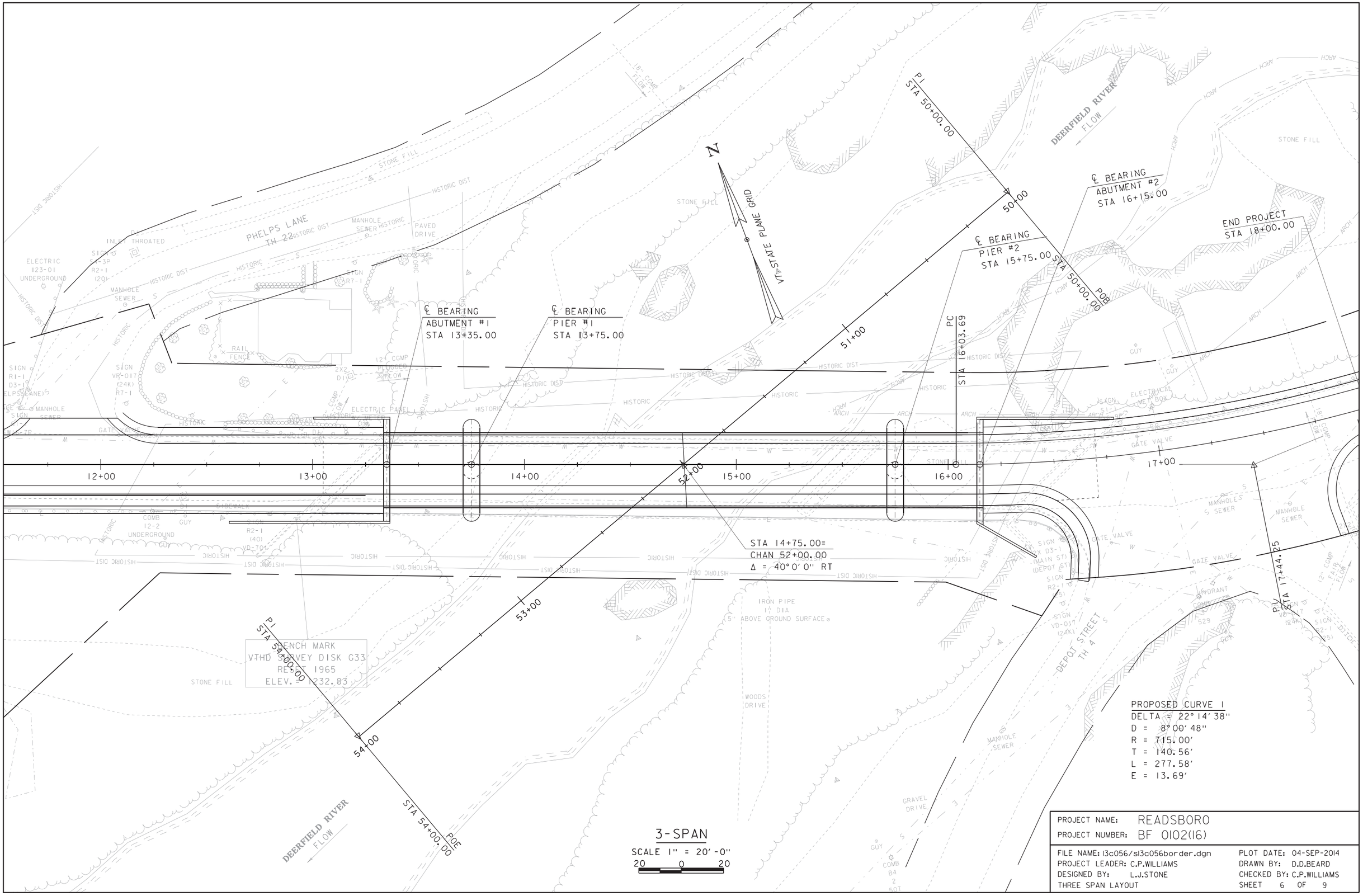
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

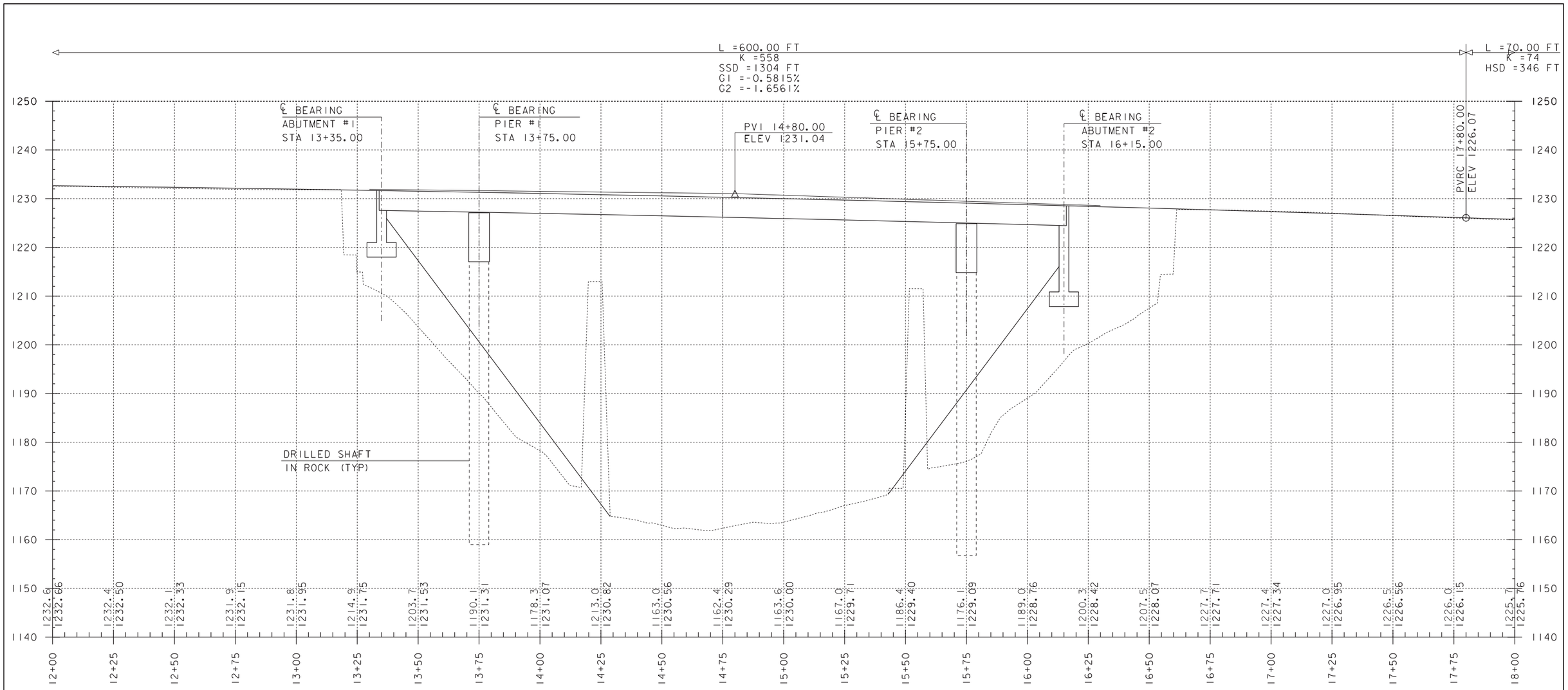
PROJECT NAME: READSBORO
PROJECT NUMBER: BO 0102(16)

FILE NAME: l3c068/sl3c068profile.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: G.SWEENY
PROFILE SHEET 1

PLOT DATE: 04-SEP-2014
DRAWN BY: D.D.BEARD
CHECKED BY: G.SWEENY
SHEET 5 OF 9



PROJECT NAME:	READSBORO
PROJECT NUMBER:	BF 0102(16)
FILE NAME: l3c056/sl3c056border.dgn	PLOT DATE: 04-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: C.P.WILLIAMS
THREE SPAN LAYOUT	SHEET 6 OF 9



VT 100 PROFILE - 3 SPAN BRIDGE

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

NOTE:

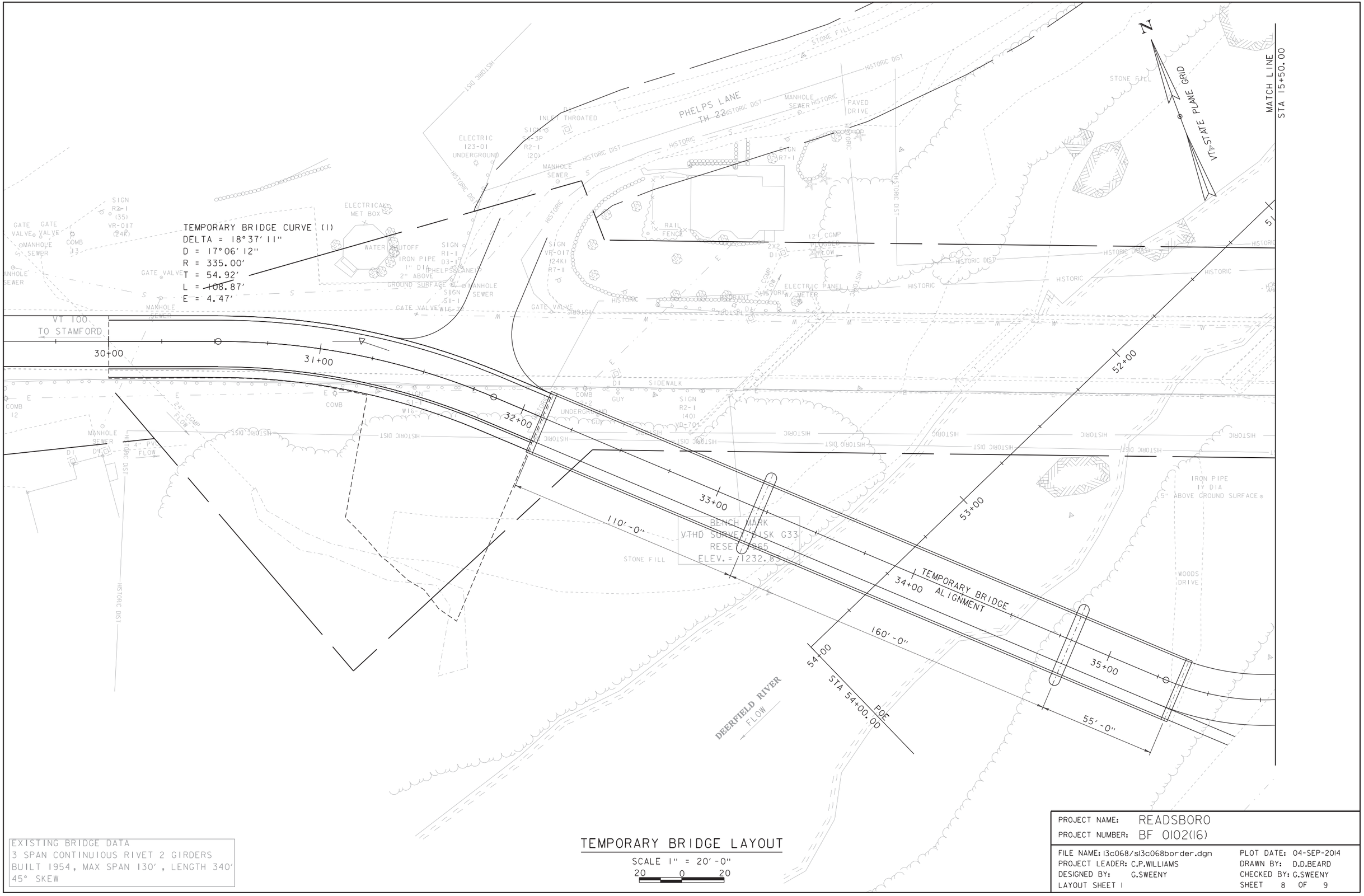
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: READSBORO
PROJECT NUMBER: BO 0102(16)

FILE NAME: 13c068/sl3c068profile.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: G.SWEENY
PROFILE SHEET 1

PLOT DATE: 04-SEP-2014
DRAWN BY: D.D.BEARD
CHECKED BY: G.SWEENY
SHEET 7 OF 9



EXISTING BRIDGE DATA
3 SPAN CONTINUOUS RIVET 2 GIRDERS
BUILT 1954, MAX SPAN 130', LENGTH 340'
45° SKEW

TEMPORARY BRIDGE LAYOUT

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

PROJECT NAME:	READSBORO
PROJECT NUMBER:	BF 0102(16)
FILE NAME: l3c068/sl3c068border.dgn	PLOT DATE: 04-SEP-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
LAYOUT SHEET 1	SHEET 8 OF 9

N

VT STATE PLANE GRID

MATCH LINE
STA 15+50.00

DEERFIELD RIVER
FLOW

50+00

STA 50+00.00
POB

40+00

TEMPORARY BRIDGE CURVE (3)
DELTA = 34°01'21"
D = 17°06'12"
R = 335.00'
T = 102.49'
L = 198.92'
E = 15.33'

TEMPORARY BRIDGE CURVE (2)
DELTA = 74°53'09"
D = 47°44'47"
R = 120.00'
T = 91.89'
L = 156.84'
E = 31.14'

STONE FILL

ARCH

HISTORIC DIST

GUY

ELECTRIC

SIGN
W16-9P

ELECTRICAL METER BOX

STONE FILL

40+32

40+00
TO WHITINGHAM
VT 100

39+00

SIGN
M1-5
(VT 100)
M3-1

SIGN
2X D3-1
(MAIN ST)
(DEPOT ST)

SIGN
R2-1
(25)

SIGN
VD-01
(24)

38+00

GATE VALVE

MANHOLE
SEWER

HYDRANT

529

SIGN
VD-017
(24)

SIGN
22-1
(25)

12" CSMP
FAIR
FLOW

MANHOLE
SEWER

TELEPHONE
60
GUYPOLE

BENCH MARK
CHISLED SQUARE
IN LEDGE
ELEV. = 1225.94

DEPOT STREET

TH 4

37+00

TEMPORARY BRIDGE
ALIGNMENT

36+00

SOMB
B4
2
50T
160
530
UNDERGROUND

TH 46

TEMPORARY BRIDGE LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	READSBORO
PROJECT NUMBER:	BF 0102(16)
FILE NAME:	13c068/sl3c068border.dgn
PROJECT LEADER:	C.P.WILLIAMS
DESIGNED BY:	G.SWEENY
LAYOUT SHEET 2	
PLOT DATE:	04-SEP-2014
DRAWN BY:	D.D.BEARD
CHECKED BY:	G.SWEENY
SHEET	9 OF 9