STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Calais BHF 037-2(10)

VT ROUTE 14, Bridge 74 OVER PEKIN BROOK

December 4, 2012

Table of Contents

I. Site Information

The bridge is located in a rural area along VT Route 14 approximately 5.2 miles north of the junction with U.S. 2E. The bridge is located on a slightly curved segment of VT Route 14 just south of the intersection with Pekin Brook Road, which is a gravel road. There is one house located approximately 250 ft. north of the bridge on the eastern side of the road. 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 Minor Arterial (State Highway)
Year of Construction	1928; reconstruction in 1981 involving widening the bridge, installing new guardrails, and reconstructing the approaches
Bridge Type	Concrete T-Beam
Bridge Length	44’
Width of Bridge	34.8’
Width of Roadway Approach	30’
Ownership	State of Vermont

Need

The following is a list of the deficiencies of Bridge 74 and VT Route 14 in this location.

1. The original central bays of the deck are in poor condition and the original T-Beams show significant deterioration as well.

2. The existing bridge railing does not meet the current standard.

3. The approach guardrail ends do not meet the current standard.

4. The bridge is considered scour critical because of the shallow foundation.

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	2055
ADT	3,300	3,500	~
DHV	390	410	~
ADTT	190	270	~
%T	2.4	3.2	~
%D	76	76	~
FLEXIBLE ESAL	~	2015 ~ 2035	2015 ~ 2055
		2,411,000	5,686,000

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on an ADT > 2000, a DHV > 400, and a design speed of 50 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 4.3	12'/3' (30')	11'/5' (32')	Substandard
Bridge Lane and Shoulder Widths	VSS Table 4.3	12'/5' (34')	11'/5' (32')	
Clear Zone Distance	VSS Table 4.4	Utility pole 2' behind guardrail, Utility pole 13' offset from roadway	20' fill / 14' cut (1:4), 12' cut (1:4)	Substandard
Banking	VSS Section 4.13	2%	8% design with 6% max for intersection	
Speed		50 mph (Posted)	50 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R=2000'	R_{min}=758'	
Vertical Grade	VSS Table 4.5	Bridge located in transition from (-)1.1014% grade to (+)1.1189% grade	5% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 4.1	Bridge located on sag (K = 56)	110 crest / 90 sag	Substandard
Vertical Clearance Issues	VSS Section 4.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 4.1	720'	400'	
Bicycle/Pedestrian Criteria	VSS Table 4.7	3' to 6' shoulder	4' Shoulder	Adequate
Bridge Railing	Structures Design Manual Section 13	W rail mounted on fascia	TL-3	Substandard

Inspection Report Summary

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

7/18/2011 – Deck is rated as poor with heavy deterioration along the centerline bay especially. Original T beam superstructure also has some areas of advanced deterioration. Bridge should be scheduled for extensive reconstruction or full replacement within the next 10 years. ~ MJ/DK

4/14/2009 – This structure is in poor to good condition. The deck and superstructure continues to deteriorate. Could use a major rehab project to replace the deck and superstructure. Should upgrade the approach and bridge guardrail. The posts are quite short. There are Texas twists in the end of the guardrails which could launch a vehicle if hit just right. ~ DCP

Hydraulics
From preliminary hydraulics report:

Recommendations

It is desired that a new bridge be constructed due to the fact that the current bridge is scour critical, and if this option is chosen, the minimum clear span should be 60 ft. and the low beam elevation should be at least 716.4'. This would not provide 1 ft. of freeboard at Q50, but even a clear span of 70 ft. would not meet this requirement due to the channel being heavily incised with steep banks.

Utilities

There are overhead utility lines passing diagonally over the bridge for the entire length of the bridge. These utility lines would likely need to be rerouted for a construction project.

Right Of Way

The existing Right-of-Way is shown on the Layout sheet.

Environmental Resources

The environmental resources present at this project are shown on the layout sheets.

Agricultural:
No areas within 500 ft. of the site have been identified as containing agricultural soils.

Archaeological:
No Archaeological Resources have been identified at the site.

Biological:
Pekin Brook is not classified as Essential Fish Habitat, but it is known to host a variety of native fish species. Wetlands are present around the project area.

Wetlands

There are Class II wetlands located upstream and downstream of the project area.

Wildlife Habitat

There are no known species or habitats of concern within the potential limits of the project.

Rare, Threatened and Endangered Species

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

Agricultural

There are no prime agricultural soils within the project area.

Hazardous Materials:

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

Historic:

There are no historic resources located within the project area.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

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

Option 1: Temporary Bridge

The appropriate type of temporary bridge for this project would be a one-way temporary bridge with traffic signals. This is appropriate for the traffic and sight distance at this site. The terrain at the project site is also relatively flat, thus making this the appropriate option. A temporary bridge would allow for traffic to pass through the project site without the need for a detour.

Initial investigations report that it would be difficult to place a temporary bridge either upstream or downstream from the bridge for multiple reasons. Reports from Natural Resources indicate that there are Class II wetlands located both upstream and downstream from the bridge. Additionally, Pekin Brook Road intersects with VT Route 14 on the western side of the road just past the

northern end of the bridge. There is also a house located approximately 250 ft. north of the bridge on the eastern side of the road. The location of the intersection with Pekin Brook Road would cause difficulties with the construction of a temporary bridge in this location; thus it is recommended that if a temporary bridge is to be built, that it be located downstream of the existing bridge.

There are, however, issues that would be associated with the choice of a temporary bridge for this project. Temporary bridges cause increases in cost for multiple reasons. The temporary bridge itself costs approximately $150,000, and the need for additional Right-of-Way increases costs and length of time required to develop the project. The project would also take longer to construct since a second bridge would need to be built, causing the project to take place over two construction seasons. The temporary bridge would have impacts on the Class II wetlands located at the project site, which would require additional time and expenses for permitting. Lastly, a temporary bridge increases the risk of accidents by placing workers and the traveling public in close proximity during construction.

Option 2: Phased Construction

Phased construction is the maintenance of one lane of two-way traffic on the existing bridge while building one lane at a time of the proposed structure. This allows the road to be kept open during construction, while having minimal impacts to wetlands and adjacent property owners.

Based on traffic volumes, it is reasonable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal.

While the time required to develop a phased construction project would remain the same, the time required to complete a phased construction project increases because some of the construction tasks have to be performed multiple times. In addition to the increased construction costs mentioned above, the costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space. Phased construction is usually considered when the benefits include reduced impacts to resources and decreased costs and development time by not requiring the purchase of additional Right-of-Way.

As the existing bridge has a width of 34 ft. curb to curb, it would be possible to close one lane of traffic for construction purposes and still have enough road width left to allow traffic to pass through.

Option 3: Off-Site Detour

This option would close the bridge during construction and reroute traffic starting on VT 14 to VT 15 to US 2 and back to VT 14. This regional detour adds approximately 12.8 miles for through traffic and has an end-to-end distance of 45.9 miles. A map of this possible detour route is shown in the appendix.

There are also multiple local bypass routes that may be appropriate for non-truck traffic and which consequently may see increased traffic. Local bypass routes are not signed detours, but are available for usage by the traveling, non-truck public. Two obvious ones are:

1. VT 14 to Marshfield Road/Sa4 (TH-4), Luce Road (TH-37), Max Gray Road (TH-38), and back on VT 14. (1.0 mile added)

2. VT 14 to Moscow Woods Road (TH-5), Jack Hill Road (TH-33), Pekin Brook Road (TH-3), George Road (TH-50), Lightening Ridge Road (TH-7), and back to VT 14. (4.4 added miles)

This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. Additionally, the wetlands surrounding the project site would not be affected. This option would not require obtaining additional Right-of-Way, thus reducing the time and cost to develop the project. By removing most of the traffic from the project site during construction, a safer working environment is provided for the workers and the travelling public.

III. Alternatives Discussion

The existing bridge is in poor to good condition, with the recommendation from the bridge inspectors that, as a minimum, both the deck and the superstructure be replaced in the near future. The bridge is also prone to failure by scouring and does not have an adequate waterway opening.

None of the alternatives considered will address the substandard approach roadway width or the inadequate waterway opening. Fixing the roadway width further than 200' north and south of the bridge is outside the scope of a bridge project; that improvement will need to wait for a roadway corridor project. Because of the large floodplain in the vicinity of the bridge, the hydraulics section did not even recommend a waterway opening large enough to accommodate the design flows, so no hydraulically adequate waterway openings will be considered in this report.

Alternative 1: No Action

This alternative would involve leaving the bridge in its current condition. This alternative is not recommended. With the deck in its current condition, localized deck failures could occur without warning and need to be repaired or replaced. Therefore it is not in the interest of safety to the traveling public to choose this option. This alternative will not be considered further.

Alternative 2: Bridge Rehabilitation

There are several repair options available.

The options are as follows:

- Deck Replacement
- Superstructure Replacement
- Scour Mitigation

1. Deck Replacement
   This option would involve replacing the deck of the existing bridge. It would be difficult to replace just the deck since the concrete T-beams act integrally with the deck. Because the T-beams are in such bad shape, it would be difficult to determine where to stop removing the

deck and where to leave the T-beams. Removing concrete around the existing stirrups or trying to cut and splice on to the existing steel would be difficult at best. It would be cheaper and easier to replace the entire superstructure with new precast T-beams rather than rehabilitate the existing ones. This option will not be considered further.

2. Superstructure Replacement
   This option would involve replacing the existing superstructure. A precast concrete superstructure could be chosen to reduce construction time. This option would resolve the structural deficiencies of the existing bridge and extend the life of the bridge by approximately 40 years. It is assumed that a superstructure with a shallow depth would be chosen to attempt to provide a slightly larger waterway opening. The bridge width would not need to be adjusted, as the current geometry is to standard. However, this option would not address the scour issues.

3. Scour Mitigation
   This option involves scour mitigation for the existing structure. Mitigation would be accomplished by either structural mitigation techniques or through a scour plan of action. This option would only extend the life of the existing bridge by protecting against scour, whereas other existing problems would not be fixed, and thus would need to be considered along with one of the other rehabilitation options.

An option considering both a full superstructure replacement combined with structural scour mitigation will be considered further. It would address the structural issues with the bridge, the inadequate bridge railing, and rectify the scour issues. It would not provide an adequate hydraulic opening, but that concern cannot be met with a full bridge replacement either.

Alternative 3: Full Bridge Replacement

This option involves removing the existing bridge and replacing it with a completely new prefabricated superstructure with integral abutments on the existing horizontal alignment. In order to improve the hydraulic capacity of the new structure and meet the minimum roadway design K criteria, the vertical alignment would be raised slightly to a low beam elevation of 715.4 ft. This is below the low beam elevation of 716.4 ft. recommended by Hydraulics, as it would require much more time, work, and cost to raise the bridge the additional foot needed. To accomplish this, the roadway would need to be chased back nearly an additional hundred feet on the southern end of the bridge to match back into the existing roadway. Additionally, more land on either side of the roadway designated as wetlands would likely be affected. As raising the low beam elevation to 715.4’ already improves the hydraulic capacity of the bridge, raising it the additional foot was decided against in the interest of keeping this project focused on the bridge itself.

The new structure would be lengthened to have a total length of approximately 64 ft. The configuration of this new structure allows for the bridge to be longer, therefore increasing the hydraulic waterway opening.

This option would address the structural deficiencies, prevent the bridge from failing during a large scour event, and provide an improved hydraulic opening. It would also meet the minimum K value criteria.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, there are two viable alternatives: Superstructure Replacement with Scour mitigation and Full Bridge Replacement. Each of these alternatives will be considered with the three maintenance of traffic options: an offsite detour, a temporary bridge and phased construction.

A cost evaluation for each of the alternatives is shown below.

Calais BHF 037-2(10)		Do Nothing	Alt 1a	Alt 1b	Alt 1c	Alt 2a	Alt 2b	Alt 2c
			Superstructure Replacement			Complete Replacement		
			Offsite Detour	Temp Bridge	Phased	Offsite Detour	Temp Bridge	Phased
COST	Bridge Cost	$0	$272,000	$272,000	$300,000	$566,000	$566,000	$622,000
	Removal of Structure	$0	$23,000	$23,000	$26,000	$46,000	$46,000	$51,000
	Roadway	$0	$87,000	$100,000	$89,000	$366,000	$379,000	$368,000
	Maintenance of Traffic	$0	$15,000	$150,000	$40,000	$15,000	$150,000	$40,000
	Construction Costs	$0	$397,000	$545,000	$455,000	$993,000	$1,141,000	$1,081,000
	Construction Engineering + Contingencies	$0	$119,100	$163,500	$136,500	$297,900	$342,300	$324,300
	Total Construction Costs w CEC	$0	$516,100	$708,500	$591,500	$1,290,900	$1,483,300	$1,405,300
	Preliminary Engineering	$0	$99,300	$136,300	$113,800	$248,300	$285,300	$270,300
	Right of Way	$0	$0	$43,600	$0	$0	$43,600	$0
	Total Project Costs	$0	$615,400	$888,400	$705,300	$1,539,200	$1,812,200	$1,675,600
SCHEDULING	Project Development Duration		2 years	4 years	2 years	2 years	4 years	2 years
	Construction Duration		2 months	6 months	6 months	6 months	12 months	12 months
	Mobility Impacts		2 weeks	20 weeks	20 weeks	4 weeks	40 weeks	40 weeks
ENGINEERING	Typical Section - Roadway (feet)	30'	No Change	No Change	No Change	No Change	No Change	No Change
	Typical Section - Bridge (feet)	5-12-12-5	5-11-11-5	5-11-11-5	5-11-11-5	5-11-11-5	5-11-11-5	5-11-11-5
	Geometric Design Criteria	Substandard K	No Change	No Change	No Change	Meets Criteria	Meets Criteria	Meets Criteria
	Traffic Safety	No Change	New Guardrail	New Guardrail	New Guardrail	New Guardrail	New Guardrail	New Guardrail
	Alignment Change	No	No	No	No	Vertical	Vertical	Vertical
	Bicycle Access	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	No Change	No Change	No Change	Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Utility	No Change	Relocation	Relocation	Relocation	Relocation	Relocation	Relocation
OTHER	ROW Aquistion	No	No	Yes	No	No	Yes	No
	Road Closure	No	Yes	No	No	Yes	No	No
	Design Life	< 5 years	40 years	40 years	40 years	80 years	80 years	80 years

V. Conclusion

Alternative 2c, the alternative of a full bridge replacement with traffic maintained by phased construction, is recommended. This option addresses the issues with scour and improves the hydraulic capacity. It also fixes the structural deficiencies with the existing bridge and extends the lifetime to 80 years.

Phased construction was chosen as the means of maintaining traffic due to the amount of vehicles that make use of the bridge and the length of the proposed detour. This means of traffic maintenance was chosen for multiple reasons, the first of which being that the width of the existing structure allows for phased construction in the first place. Siting a temporary bridge at this location would be difficult because of the proximity of the intersection and house and the Class II wetlands surrounding the bridge. The development and construction time and costs would increase for temporary bridge as well. Thus, the use of a temporary bridge has been discounted. It was also decided that the detour length is relatively long. This, in combination with the relatively high traffic volume of 3,300 daily vehicles and the possible local bypass routes being narrow, steep, and often gravel roads, led to the conclusion that phased construction should be the recommended means of maintaining traffic. By using phased construction, there will be no impacts on the surrounding environment. Obtaining Right-of-Way will also not be necessary.

VI. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archaeology Memo
- Stormwater Memo
- Resource ID Completion Memo
- Local Input (if town bridge)
- Truck Detour Route
- Local Bypass Routes
- Plans
    - Proposal
        - Existing Conditions
        - Typical Sections
        - Layout
        - Profile
        - Phased Construction Layouts
        - Downstream Temporary Bridge Layout

Looking south along VT 14.

Looking north along VT 14.

Looking downstream, to the east.

Looking upstream, to the west.

Deteriorated concrete and exposed rebar on the T-beam superstructure.

Deterioration and cracking along the deck.

Vertical cracking in abutment.

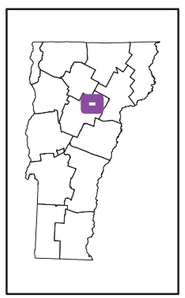
Scale 1:53,073

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

Bridge 74

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011



CALAIS
WASHINGTON COUNTY
DISTRICT # 6

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for CALAIS **bridge no.:** 00074 **District:** 6

Located on: VT 00014 ML **over** PEKIN BROOK **approximately** 5.2 MI N JCT. U.S.2 E **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 5 FAIR

Substructure Rating: 6 SATISFACTORY

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200037007412052

Federal Sufficiency Rating: 56.1

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1928 **Year Reconstructed:** 1981

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 15

ADT: 004100 **% Truck ADT:** 09

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0042

Structure Length (ft): 000044

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 34

Deck Width Out-to-Out (ft): 34.8

Appr. Roadway Width (ft): 030

Skew: 00

Bridge Median: 0 NO MEDIAN

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

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: CONCRETE T-BEAM

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

Kind of Material and/or Design: 1 CONCRETE

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Deck Geometry: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 5 OCCASIONAL OVERTOPPING OF BRIDGE & ROADWAY WITH SIGNIFICANT TRAFFIC DELAYS

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 1 LOAD FACTOR (LF)

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: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

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

INSPECTION SUMMARY and NEEDS

*07/18/2011 - * Deck is rated as poor with heavy deterioration along the centerline bay especially. Original T beam superstructure also has some areas of advanced deterioration. Bridge should be scheduled for extensive reconstruction or full replacement within the next 10 years. ~ MJ/DK*

04/14/09 This structure is in poor to good condition. The deck and superstructure continues to deteriorate. Could use a major rehab project to replace the deck and superstructure. Should up grade the approach and bridge guard rail. The posts are quite short. There are Texas twist in the ends of the guardrails which could launch a vehicle if hit just right. DCP

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

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

DATE: 23 July 2012

SUBJECT: Calais BHF 037 – 2(10) VT 14 BR 74 over Pekin Brook (12b144)

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

Existing Bridge Information

The existing bridge was built in 1928 and reconstructed in 1981. It is a single span concrete t-beam bridge. The abutments are concrete. The bridge has a clear span of approximately 40' and a clear height of about 7'. It provides approximately 208 sq. ft. of waterway area.

The spread footings are not 6' below streambed which makes them vulnerable to scour occurring through the bridge.

The stream enters the bridge on a fairly straight line and then curves as it exits the structure. The structure is deteriorating with rebar showing in some of the beams. There are some cracks in the substructure. The inspection report indicates that the deck has heavy deterioration.

The bridge is not hydraulically adequate as it does not have 1.0' of freeboard at Q50. Water is into the beams at the Q25 flow. At Q50, water overtops the roadway.

Recommendations

Based on initial discussions with the Structures Group, there are no recommendations for this site. The superstructure can be replaced as long as the waterway area is not smaller and there is no rise in the base flood elevation (Q100). This is not recommended because the footings are not the 6' recommended depth below stream bottom.

If a new bridge is constructed, it should have a minimum clear span of 60'. The average low beam elevation should be no lower than 716.4'. The roadway can be raised slightly through the project area to provide for this low beam elevation.

This bridge will still not provide 1.0' of freeboard at Q50. However, we tried bridges up to a clear span of 70' and could not obtain 1.0' of freeboard at Q50. We believe this is due to the heavily incised channel with steep banks. As a structure gets wider, it is not gaining much in waterway area.

In order to have 1' of freeboard at Q50, the low beam elevation can be no lower than 718.0'. The roadway would have to be raised approximately 3' to obtain this low beam elevation.

Scour was not reviewed at this time, but will be when we have more details on the proposed structure that will be designed for this site. However, due to the small grain size in this channel,

preliminary scour calculations indicate that there is a high scour potential here.

Stone Fill Type III should be used for any disturbed channel banks and should match into existing stream banks. It should not constrict the channel.

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. The new structure should be skewed more to the road to be better aligned with the channel, if possible.

Temporary Bridge

A temporary bridge was not analyzed as part of the preliminary hydraulics.

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

LGR

cc: Hydraulics Project File via NJW
Hydraulics Chrono File

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AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

From: Chad A. Allen, Geotechnical Engineer via Christopher C. Benda, Soils and Foundations Engineer

Date: June 4, 2012

Subject: Calais BHF 037-1(10) VT 14, Bridge 74 Geotechnical Scoping Report

1.0 Introduction

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 74 on VT 14. Bridge 74, see Figure 1, is a single span structure that crosses over Pekin Brook in Calais, VT. This scoping report includes a review of VTrans record plans, USDA Natural Resources Conservation soil survey records, surficial geology and bedrock maps of the State and the Agency of Natural Resources' water well logs.

Figure 1: VT 14, Bridge 74 over Pekin Brook

2.0 Surficial and Bedrock Geology

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 provided by field personnel with unknown qualifications, and as such, should only be used as an approximation. Surrounding well logs were examined for depths to bedrock and soil strata.

Well locations are shown in Figure 2 and a summary of the specific wells used to gain information on the subsurface conditions are presented in Table 1. The three closest wells, wells No. 20839, 307 and 269, are located between 210 and 1375 ft from the project location.

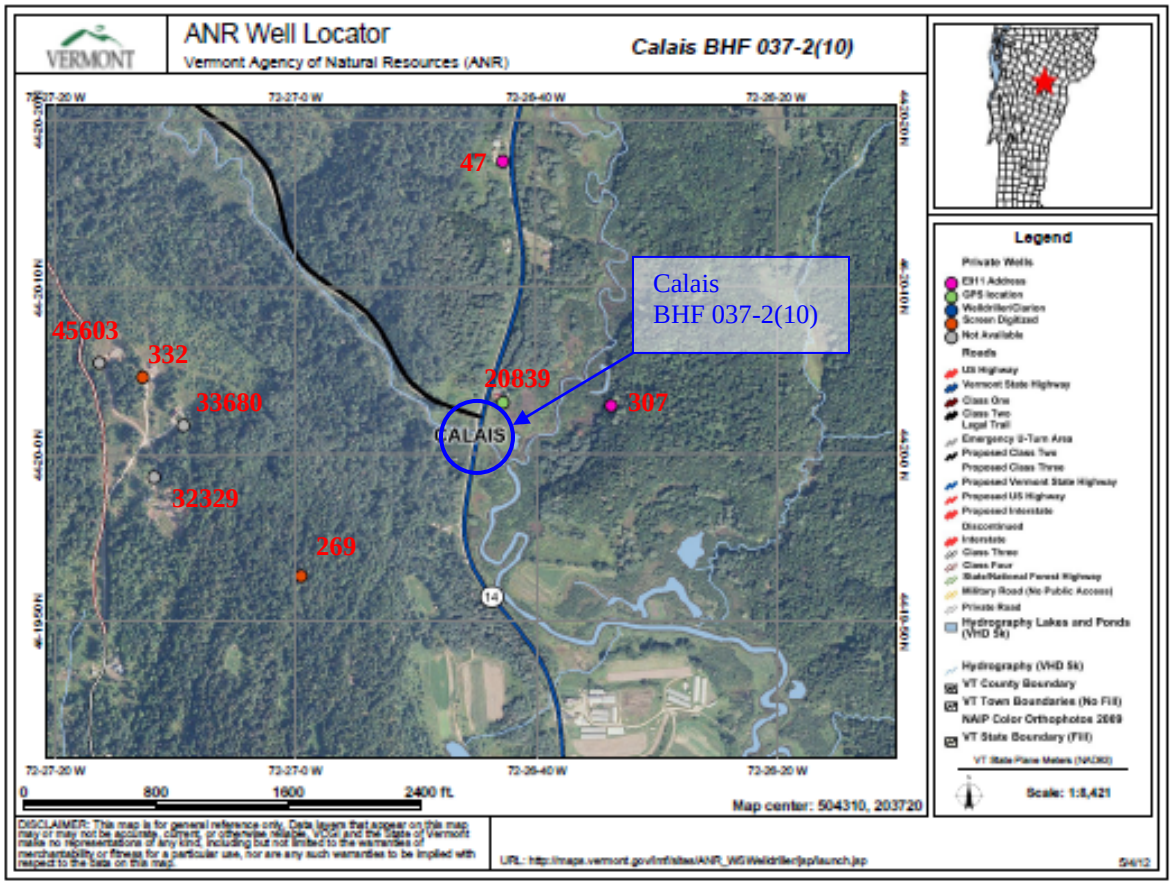


Figure 2: ANR Well Locations near Bridge 74 – VT 14 in Calais, VT

Well	Overburden Description	Overburden Thickness
47	Sand	100
269	Sand / Silt	80
307	Sand /Clay	83
20839	6’ fill followed by Clay	138
33680	Topsoil	3

Table 1: Summary of ANR Well Data & Well Driller Soil Stratigraphy Notes

The 1982 Calais BHF 037-3(2)S plans for Bridge 74 do not indicate the soil stratigraphy beneath the existing bridge but they do depict that the existing bridge was widened and that the widened structure was placed on spread footings lying above a bed of crushed stone subbase material. The footings for this bridge, including the footings supporting the widened structure appear to be performing well.

The 1970 Surficial Geologic Map of Vermont indicates that the Calais BHF 037-2(10) project site is located in an area classified as Sunny silt loam with 0 to 2% slopes and that the geological landform is likely a flood plain consisting of poorly drained soils. The geography of the area and

the silt laden streambed corroborate the information from the surficial geology map. Surficial bedrock maps of the area indicate that the existing bedrock deposit is of the Waits River formation (DSw) and likely consists of a combination of phyllite and limestone.

3.0 Utility / Construction Considerations

This bridge is in a high speed (50 mph) rural setting. There is a utility pole in the northwest corner with power and telephone lines running on a diagonal to the southeast corner. The intersection of Pekin Brook Rd and VT 14 lies to the north of the bridge and could impact the location of a temporary structure.

From a temporary structure perspective, there appears to be sufficient room (house located in northeast corner) to channel traffic to either side of the bridge, however, the east side may be more desirable as the terrain is flat and would not conflict with the current intersection.

4.0 Recommendations

The existing bridge is a 42 ft, straight, single span structure. The current grade difference between the abutments is negligible. The subsurface investigation should include, but not be limited to, a determination of the soil and bedrock properties (strength, material composition, RQD, etc), ground water conditions and the depth of bedrock. Two borings are recommended to be drilled to completely assess the subsurface conditions at this site. One boring should be located in the ROW at the NE and SW corners of the project site. These borings should be positioned a minimum of 10 feet away from any overhead power lines and far enough from the abutment to avoid drilling through the abutment footings. Final recommendations for boring locations can be provided once an alignment and preliminary structure type have been selected.

There does not appear to be any serious drilling equipment and/or access limitations, except for the overhead wires at this site. Wetlands exist on-site, particularly on the west side of the highway. Deep borings (100') are anticipated at this location; material is anticipated to be silty in nature but pockets of silty-clay and clay can be expected along with pockets of sand and gravelly-sand. Guard rail may need to be temporarily removed during drilling to facilitate boring placement. Temporary traffic control, including flaggers, may be necessary at this site to facillitate a safe work zone.

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

- Reinforced concrete abutments on spread footings, or
- Precast arch supported on spread footings (may be a good site for the "Bridge in a Backpack structure http://www.maine.gov/mdot/tr/bridgebackpack.htm), or an
- Integral abutment bridge on steel H-piles if the weak or soft geological deposits are encountered.

If you have any questions, please feel free to contact us at (802) 828-2561.

cc: WEA/Read File
CCB/Project File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: Jeff Ramsey, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: May 9, 2012

SUBJECT: CALAIS BHF 037-2 (10)
VT 14, BR 74 over Pekin Brook

The purpose of this memorandum is to let you know that I have completed the initial resource identification which included a site visit using GPS and ArcMap..

WETLANDS & FLOODPLAINS

Wetlands are located both upstream and downstream of the project area and were picked up using GPS. A temporary bridge on either side of this structure will trigger the need for both state and federal wetland permits as they are Class II, and include a 50' Buffer.

AGRICULTURAL SOILS

Prime agricultural soils are not present within 500 feet of the bridge.

SPECIES / HABITAT OF SPECIAL CONCERN

According to the Significant Habitat Map for the Town of Calais, there are no known species or habitats of special concern within the potential limits of the project.

FISHERIES

Pekin Brook is a cold-water stream known to host a variety of native fish species, and although it is not classified as *Essential Fish Habitat*, standard time-of-year restrictions will apply for all in-stream work.

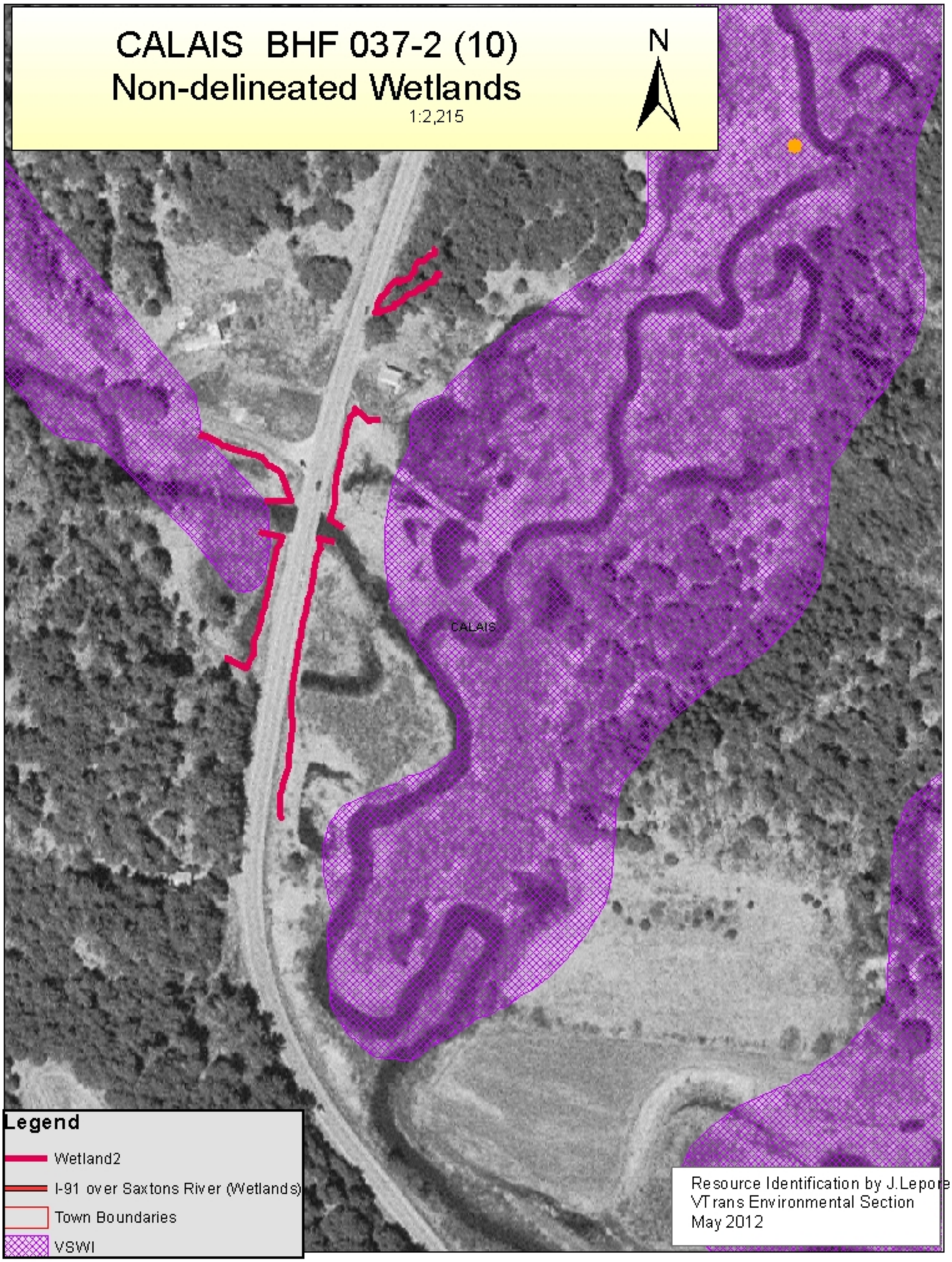
PERMITS

Pekin Brook is not classified as either a *Navigable Waterway* or *Essential Fish Habitat* but any in-stream impacts would need both state and federal permits. Any widening of the approaches, temporary bridges, or construction access pads will trigger additional permit concerns.

CALAIS BHF 037-2 (10)
Non-delineated Wetlands

1:2,215

N



Legend

- Wetland2
- I-91 over Saxtons River (Wetlands)
- Town Boundaries
- VSWI

Resource Identification by J.Lepore
VTrans Environmental Section
May 2012

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: Jeff Ramsey, VTrans Environmental Specialist

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

Date: 6/20/2012

Subject: Calais BHF 037-2(10) – Archaeological Resource ID

Jeff,

I've completed my initial resource identification for Calais BHF 037-2(10). A field visit conducted on 4/25/2012 as part of the 2012 GPS scoping initiative was adequate to identify potential resources in the project area. There are *no archaeological resources* present in the APE, and likewise no concerns for archaeology.

Please feel free to contact me with any questions or concerns.

~Brennan

Brennan Gauthier
VTrans Assistant Archaeologist
tel. 802-828-3965
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation

Ramsey, Jeff

From: Armstrong, Jon
Sent: Wednesday, May 23, 2012 11:01 AM
To: Ramsey, Jeff
Subject: RE: Environmental Request NOTIFICATION: CALAIS BHF 037-2(10)

Hi Jeff,
I have no stormwater related concerns of note to offer at this time for this project.

Jonathan B. Armstrong, PE
VTrans Stormwater Management Engineer
(802) 828-1332

"*We forget that the water cycle and the life cycle are one.*"
- Jacques Cousteau

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From: Ramsey, Jeff
Sent: Wednesday, March 28, 2012 7:46 AM
To: Armstrong, Jon; Gingras, Glenn; Gauthier, Brennan; O'Shea, Kaitlin
Cc: Williams, Chris
Subject: FW: Environmental Request NOTIFICATION: CALAIS BHF 037-2(10)

Hi all,
This project is one of the Chris Williams Pilot Projects. The entire pilot group will go out to visit a site to work through the process so they all know how to do it and what to look for. That visit will happen in the very near future.

Comments: The resource ID will be conducted by a pilot group under PDWP GIS/GPS work plan. This group is part of the GIS Experimental work plan and is researching innovative ways to streamline the ID process.

Folder Link:
Z:\Projects-Engineering\CalaisBHF037-2(10)12b144\Environmental\ResourceIDandClearances\ResourceID

Please let me know if you have any questions.
Thanks,
Jeff

Jeff Ramsey
Environmental Specialist - North Region
Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-1278
jeff.ramsey@state.vt.us

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Jeff Ramsey, Environmental Specialist
DATE: June 27, 2012

Project: Calais BHF 037-2 (10)

ENVIRONMENTAL RESOURCES:

Wetlands:	X	Yes	___ No	See Natural Resource ID Map and Natural Resource ID Memo
Historic/Historic District:	___	Yes	X No	
Archaeological Site:	___	Yes	X No	
4(f) Property:	___	Yes	X No	
6(f) Property:	___	Yes	X No	
Agricultural Land:	___	Yes	X No	
Fish & Wildlife Habitat:	X	Yes	___ No	Pekin Brook; See Natural Resource ID Memo
Endangered Species:	___	Yes	X No	
Hazardous Waste:	___	Yes	X No	
Stormwater:	___	Yes	X No	
USDA-Forest Service Lands:	___	Yes	X No	
Wildlife Habitat Connectivity:	___	Yes	X No	
Scenic Highway/ Byway:	___	Yes	X No	
Act 250 Permits:	___	Yes	X No	

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

cc:
Project File

Calais Community Considerations 2012

1. Are there any scheduled public events in the community that will generate increased traffic, 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.

   The Cross Vermont Trail has an a bicycle event sometime in June, see http://www.centralvtcyclingtour.org/ and Eric Scharnberg is the contact. 802-498-0079 ext. 1 eric@crossvermont.org

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

   No.

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

   The East Montpelier/Calais Fire and Ambulance service uses Route 14 coming from E. Mont. and Woodbury Fire Dept. uses Route 14 coming from Woodbury. This is a significant consideration as we need to have emergency services available to all residents.

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

   Calais Elementary School is located on Lightening Ridge Rd. and uses Route 14 for the buses – I am not sure of the bus route (check with school administrators). U32 buses also use Route 14 and other side roads – both schools operate under the normal school schedule.

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

   Yes, the school (E. Calais Elementary and U32) and GMTA buses use Route 14 on a daily basis.

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

   Legare Farm and Grand View Winery operate a business and would be affected by detours near the Pekin Brook Bridge. Going into E. Calais many businesses would be affected by detours in and around the E. Calais Village bridge the same is true for the bridge near Sand Hill Rd. which includes our town garage.

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?

   In E. Calais there is the Post Office and recreational field.

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

   Any detour or traffic diversion onto our already well traveled back roads would be impacted by detours that would create additional traffic. Additional traffic will create more maintenance to our roads and impact our already tight roads budget. We had this situation recently with work done on the "singing bridge" in N. Montpelier. Little was done by the State to avert or support our residents impacted by the additional traffic. **The Selectboard spent significant time and effort in trying to work with the State but repeated attempts offered little relief or respect for our needs.**

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

   Yes, to our residents and non-residents traveling to our Town Office and Town Hall via Pekin Brook Rd. or travelling south from Woodbury on Route 14.

   Our town road crew would be adversely impacted by construction on Sand Hill Rd. They would have to travel an alternate route up and over Balentine Rd. into Woodbury which would be 8-10 miles out of their way.

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.

    Calais is member of Front Porch Forum and word of mouth is powerful.

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

    Yes, the Calais Selectboard, Road Commissioner, Planning Commission, Conservation Commission and Town Clerk.

Bridge 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?

   The bridge on Sand Hill Rd. is on a corner and intersects w/ Hand Hill Rd. could the corner be straightened?

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

   Bicycle lanes.

3. If a sidewalk is present on the existing bridge, should the new structure have one?

Calais does not have any sidewalks.

4. Is there a need for a sidewalk if one does not currently exist? Please explain.

   No, a sidewalk does not currently exist.

5. Does the bridge provide an important link in the town's pedestrian network such that pedestrian traffic should be accommodated during construction?

   E. Calais Village has a considerable amount of pedestrians. The town in general has a significant amount of residents that walk, run and ride bicycles on all our roads therefore increased traffic via detours would be a safety concern.

6. Is bicycle traffic common on the bridge?

   Yes, on all 3 bridges proposed for maintenance.

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

   It would be important to maintain our rural character.

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

   The current bridges do not have an adequate or well maintained pedestrian/bicycle lane.

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

   Yes, quite often in the spring the Pekin Brook is often up to the top of the road near Route 14.

   The bridge below E. Calais Village has a history of ice jams with blocked culverts which create significant water running over the bridge onto Route 14.

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

    None that we are aware of at this time.

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

    Erosion and run off.

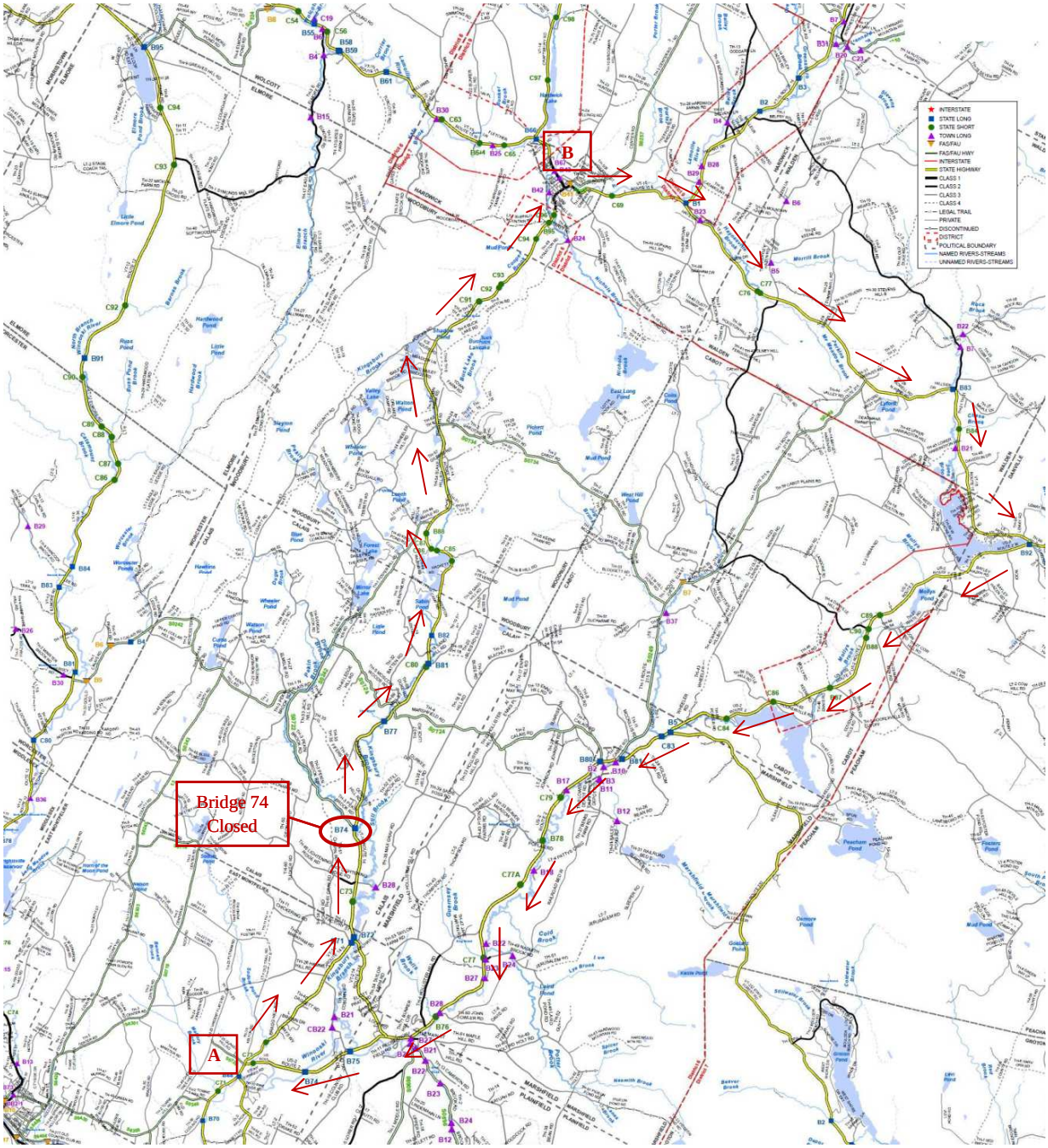
12. Are there any other comments you feel are important for us to consider that we have not mentioned yet?

Communication, communication and more communication – a well advertised public meeting to advise the residents and municipal officials of the construction schedule and to address concerns and a contact person that is readily available to address issues as they arise during the construction project.

Updated: 9/9/12 dw

C:\Selectboard\Roads\Bridges 2012.doc

Possible Detour:



Detour Route: VT 14 to VT 15 to US 2 to VT 14.

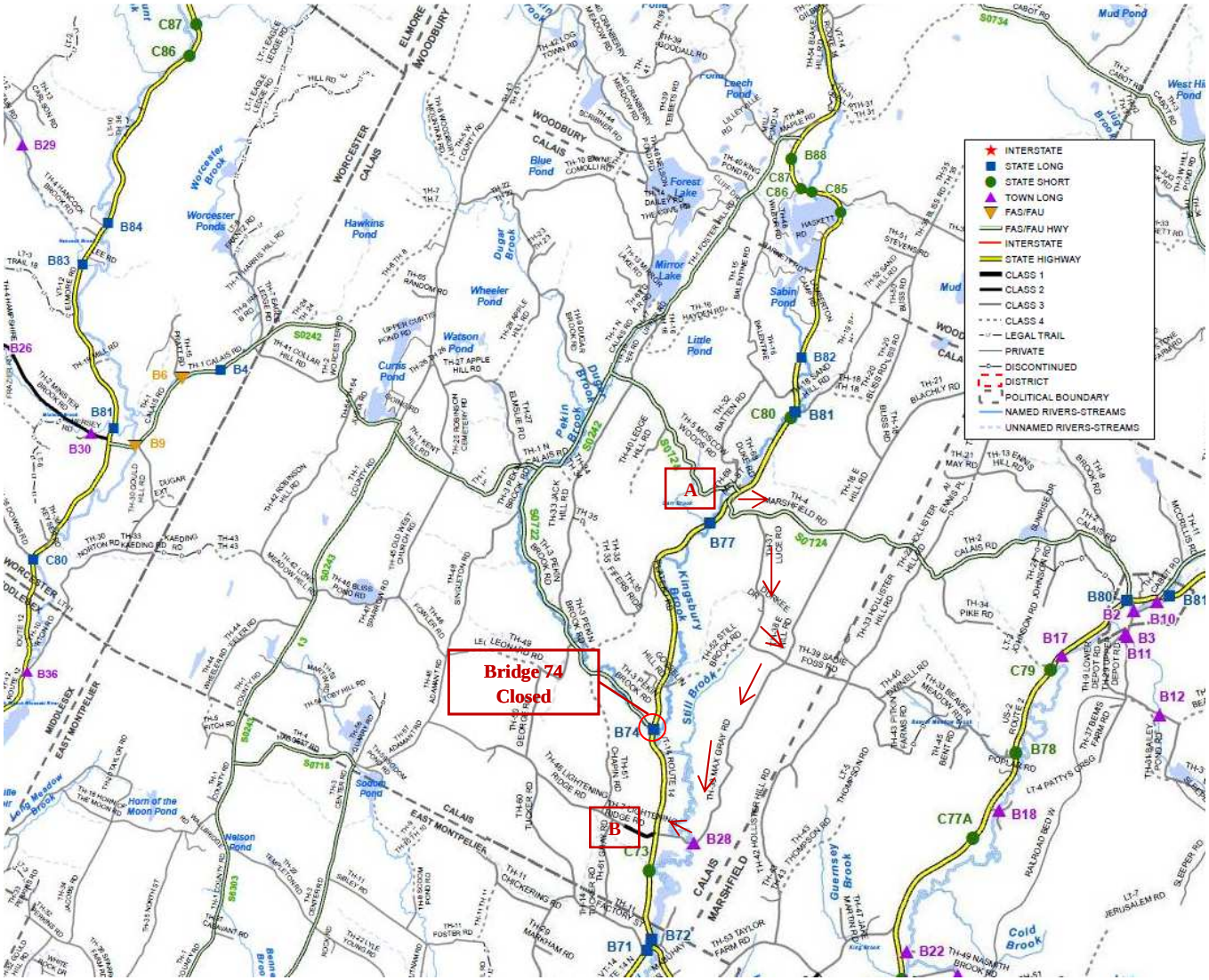
A-B Through Distance: 19.7 miles

A-B Detour Distance: 26.3 miles

Added Miles: 12.8 miles

End to End Distance: 45.9 mile

Local Bypass Route Option 1:



Bypass Route: VT 14 to Marshfield Road/Sa4 (TH-4) to Luce Road (TH-37) to Max Gray Road (TH-38) to VT 14.

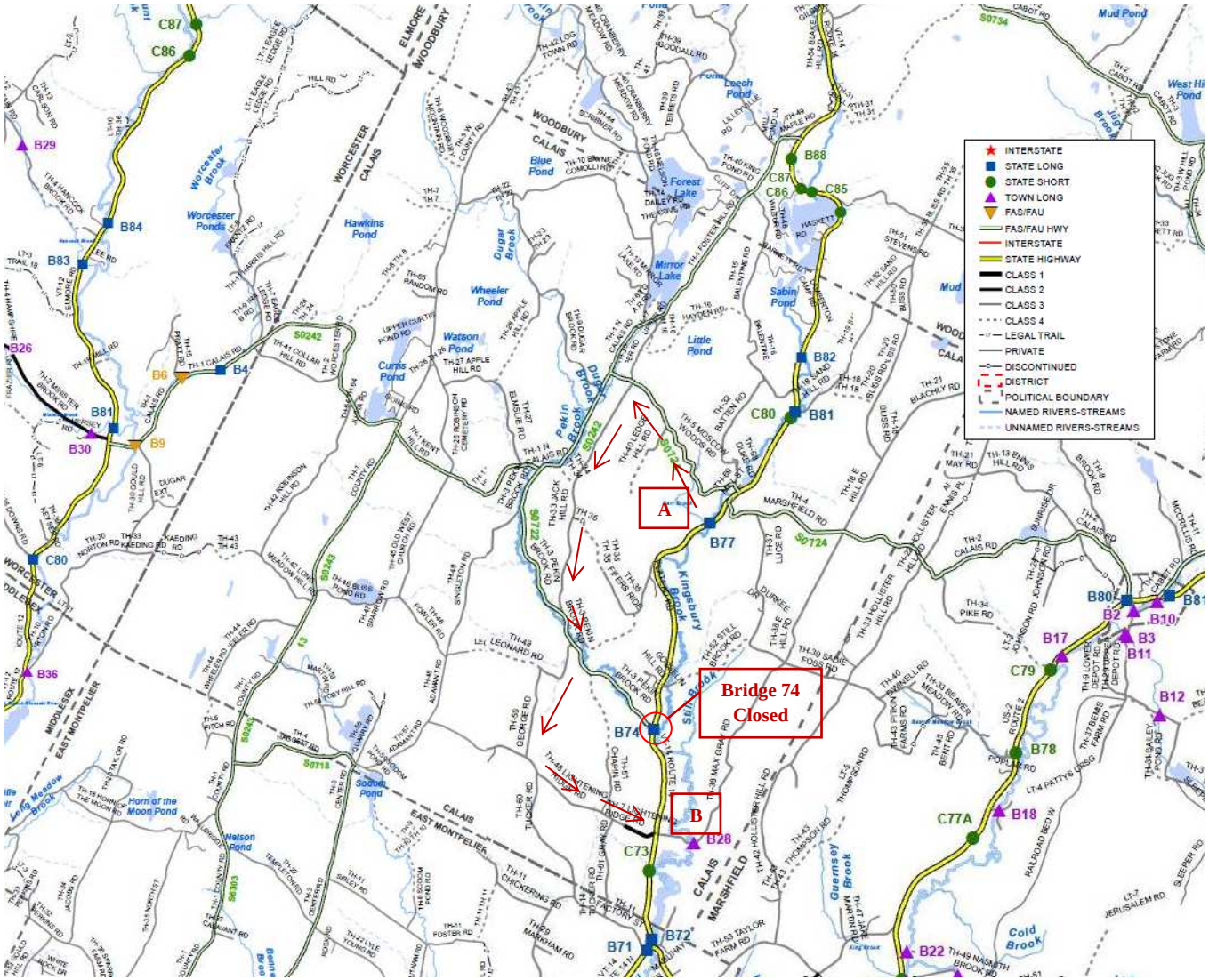
A-B Through Distance: 3.6 miles

A-B Bypass Distance: 4.6 miles

Added Miles: 1.0 mile

End to End Distance: 8.2 miles

Local Bypass Route Option 2:

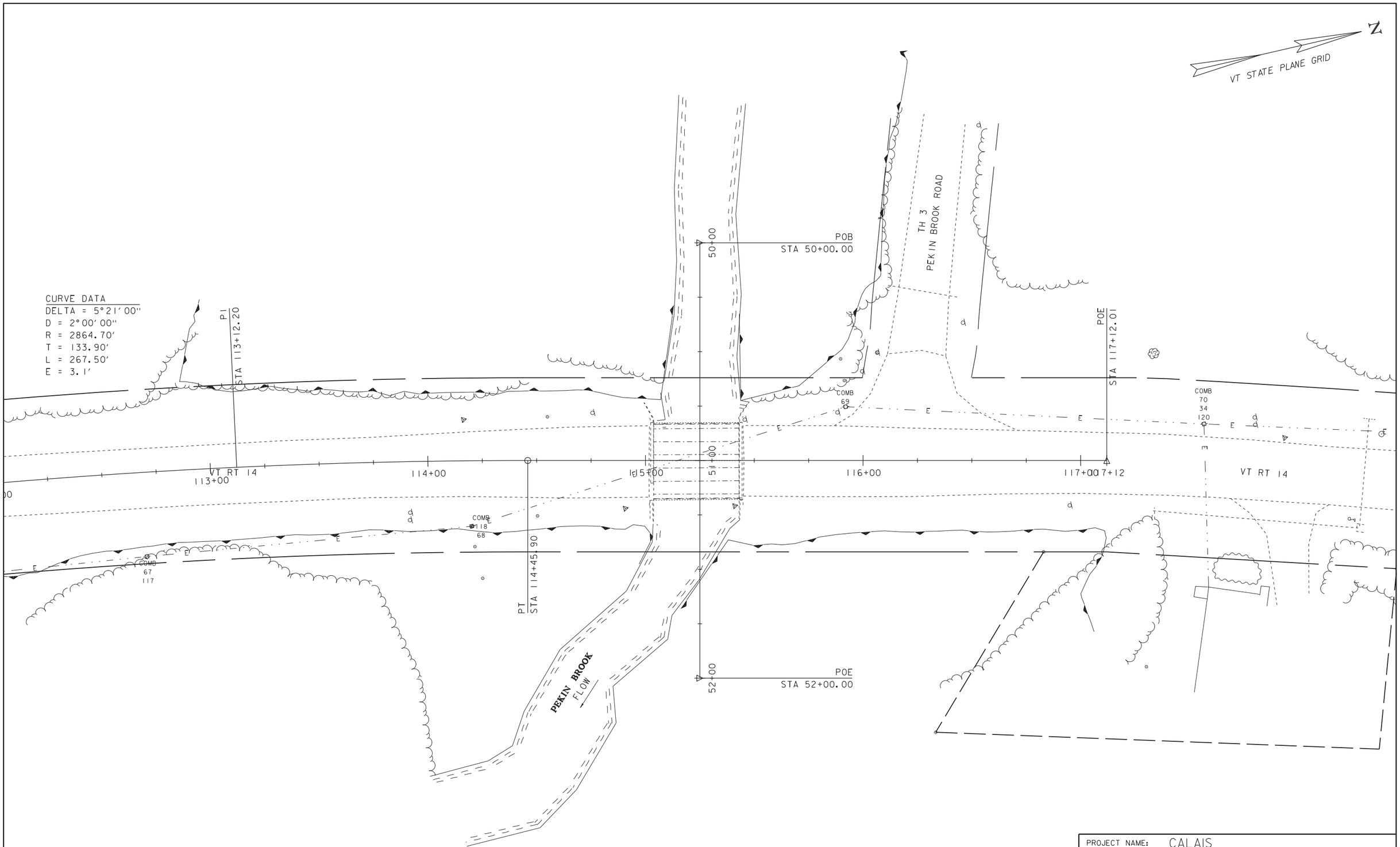


Bypass Route: VT 14 to Moscow Woods Road (TH-5) to Jack Hill Road (TH-37) to Pekin Brook Road (TH-3) to George Road (TH-49) to Lightening Ridge Road (TH-7) to VT 14.

A-B Through Distance: 3.8 miles

A-B Bypass Distance: 7.4 miles

Added Miles: 4.4 miles

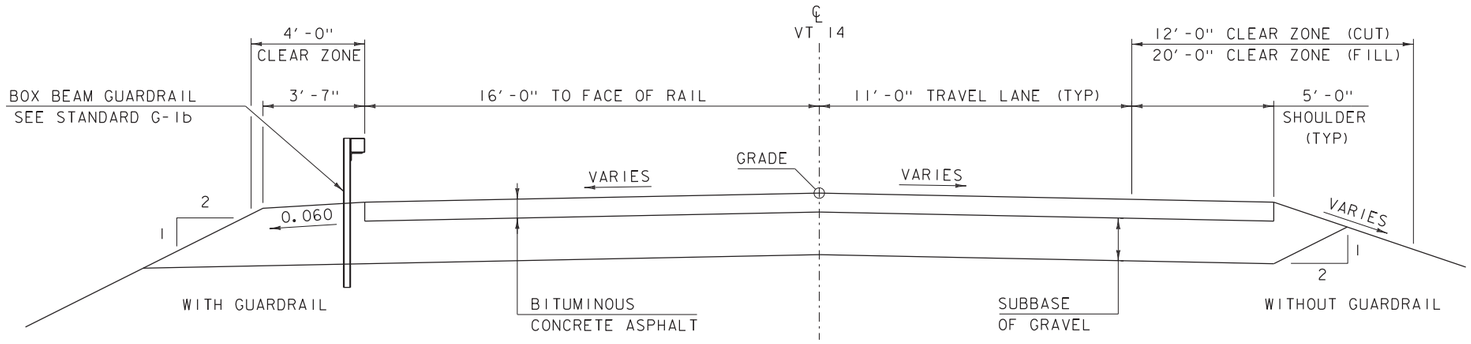


EXISTING CONDITIONS

SCALE 1" = 20'-0"

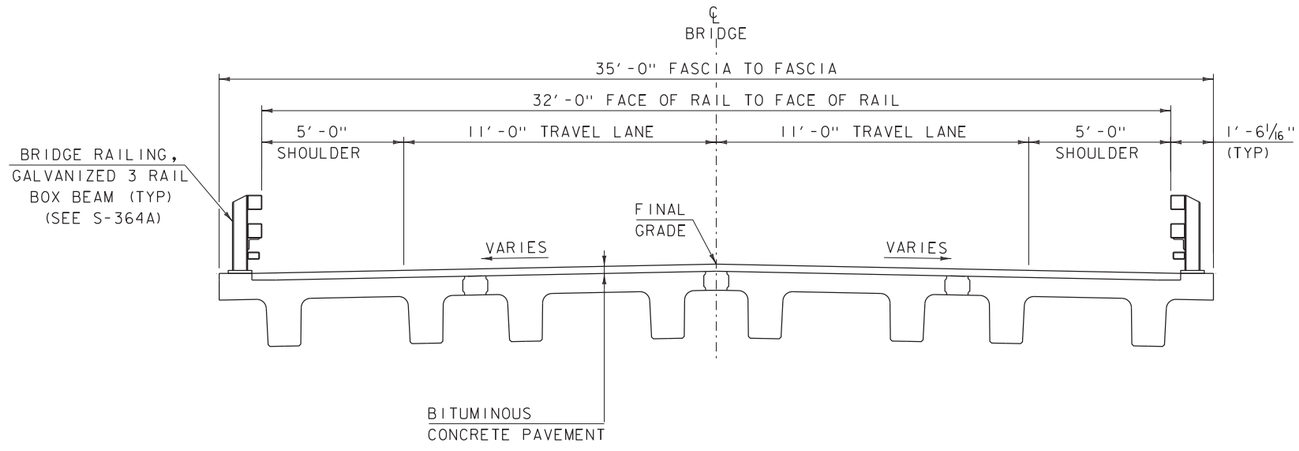
20 0 20

PROJECT NAME:	CALAIS
PROJECT NUMBER:	BHF 037-2(10)
FILE NAME: sl2bl44bdr.dgn	PLOT DATE: 04-DEC-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS SHEET	SHEET 1 OF 1



PROPOSED VT 14 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

NOTE: SUPERSTRUCTURE NOT DESIGNED.
NEXT D BEAMS SHOWN FOR EXAMPLE.

MATERIAL TOLERANCES

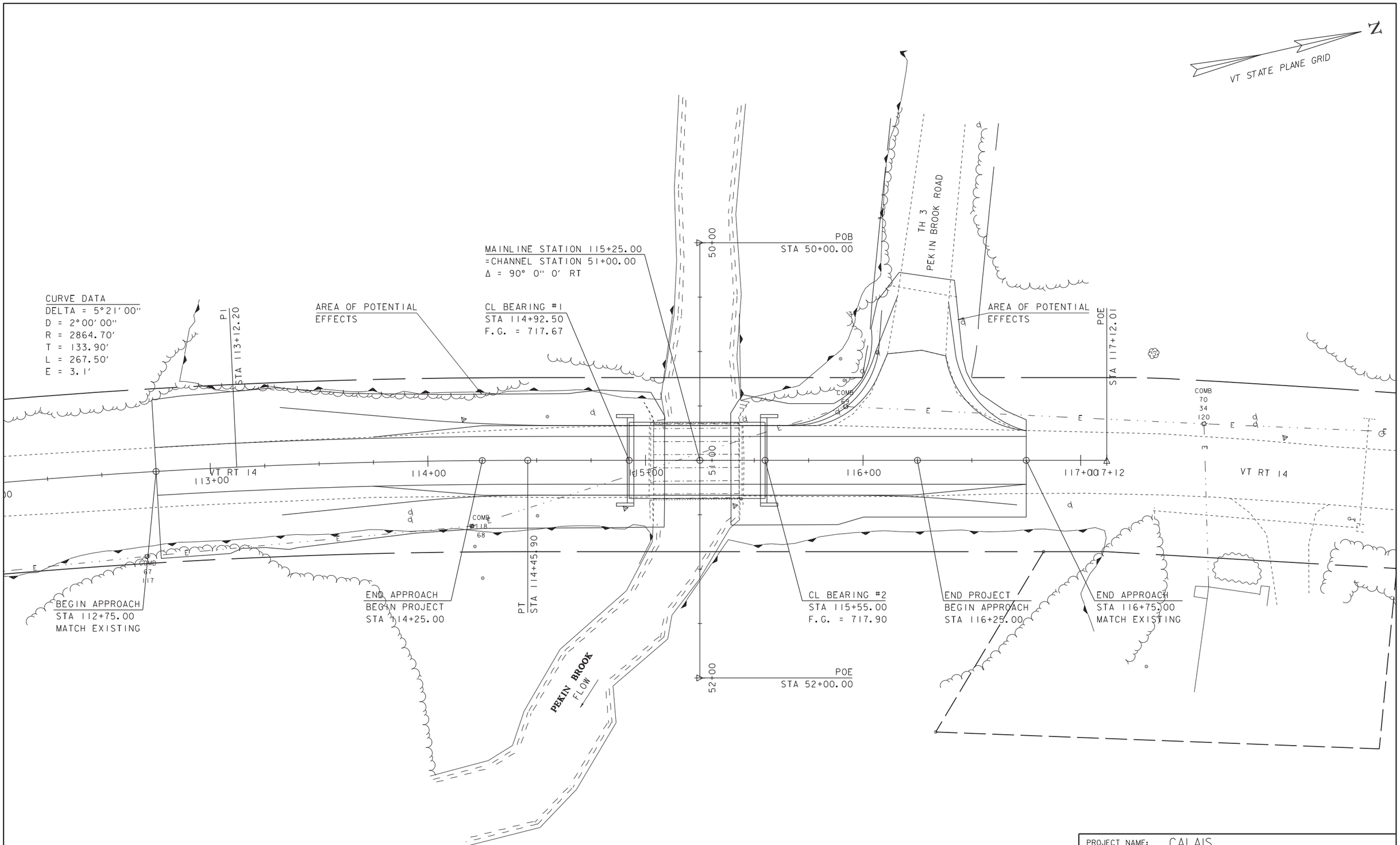
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: CALAIS BR74
PROJECT NUMBER: BHF 037-2(10)

FILE NAME: 12bl44/sl2bl44typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: T.FILLBACH
TYPICAL SECTIONS

PLOT DATE: 04-DEC-2012
DRAWN BY: D.D.BEARD
CHECKED BY: ------

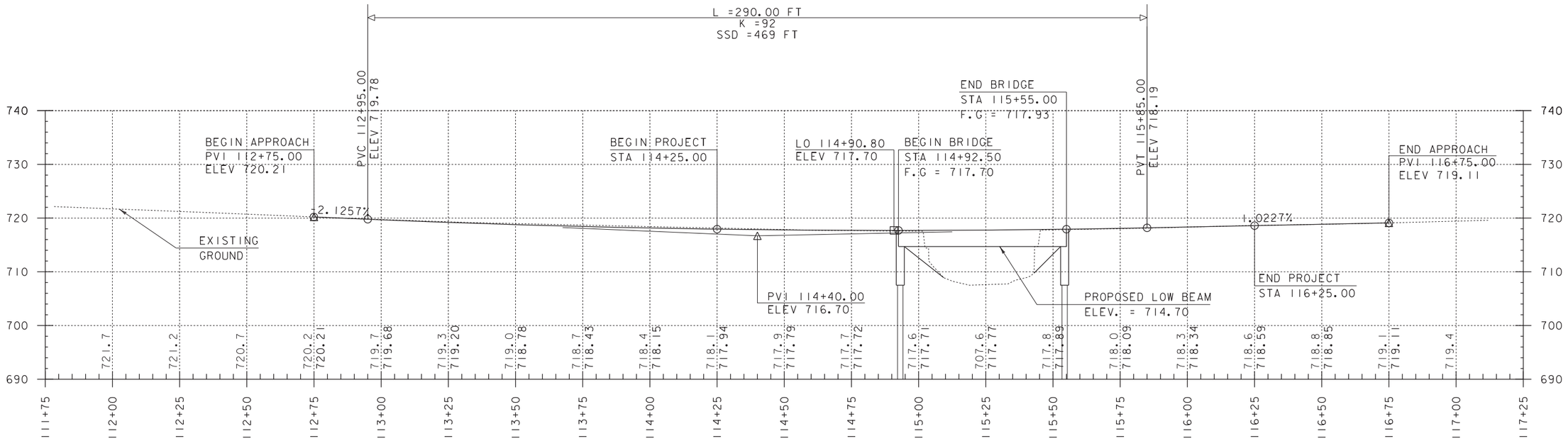


BRIDGE REPLACEMENT LAYOUT

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

NOTE: PROJECT LIMITS ARE ASSUMED AND MAY CHANGE AT LATER DESIGN STAGES.

PROJECT NAME: CALAIS	
PROJECT NUMBER: BHF 037-2(10)	
FILE NAME: sl2bl44bdr.dgn	PLOT DATE: 04-DEC-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE REPLACEMENT LAYOUT SHEET	SHEET 2 OF 7



VT ROUTE 14 PROFILE

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

NOTE:

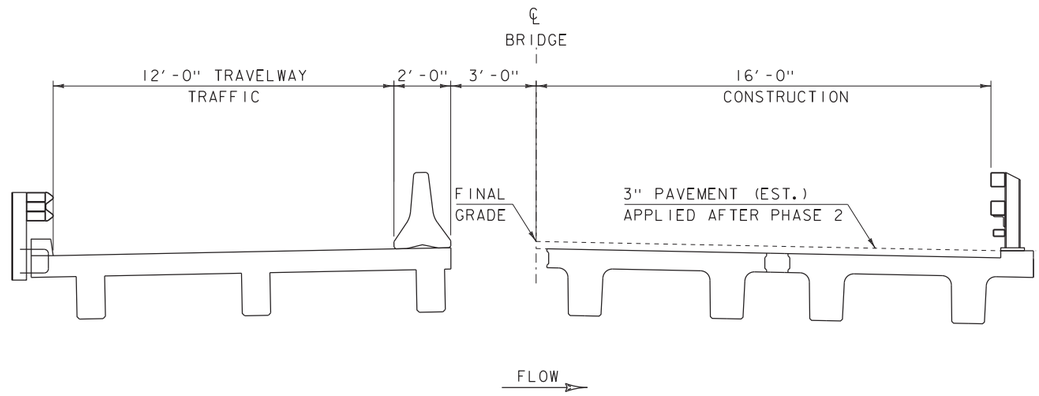
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: CALAIS
PROJECT NUMBER: BHF 037-2(10)

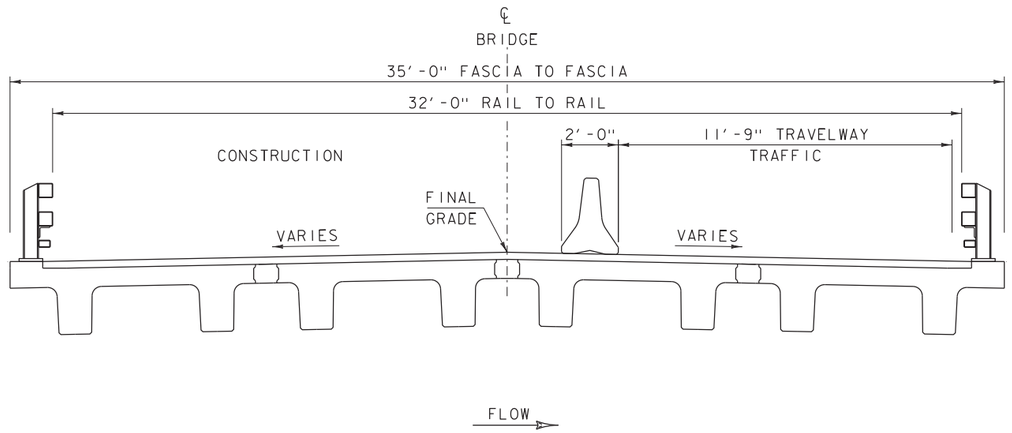
FILE NAME: sl2bl44profile.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
PROFILE

PLOT DATE: 04-DEC-2012
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 3 OF 7



BRIDGE REPLACEMENT PHASE #1 TYPICAL SECTION

SCALE 3/8" = 1′-0"



BRIDGE REPLACEMENT PHASE #2 TYPICAL SECTION

SCALE 3/8" = 1′-0"

PROJECT NAME: CALAIS	
PROJECT NUMBER: BHF 037-2(10)	
FILE NAME: 12bl44/sl2bl44typical.dgn	PLOT DATE: 04-DEC-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASING TYPICAL SECTIONS	SHEET 4 OF 7

N

VT STATE PLANE GRID

POB
STA 50+00.00

50+00

PI
STA 113+12.20

TH 3
PEKIN BROOK ROAD

POE
STA 117+12.01

COMB
69

COMB
70
34
120

VT RT 14
113+00

114+00

115+00

116+00

117+00

117+12

VT RT 14

COMB
68
118

COMB
67
117

PT
STA 114+45.90

GRAVEL
DRIVE

#1922

PEKIN BROOK
FLOW

52+00

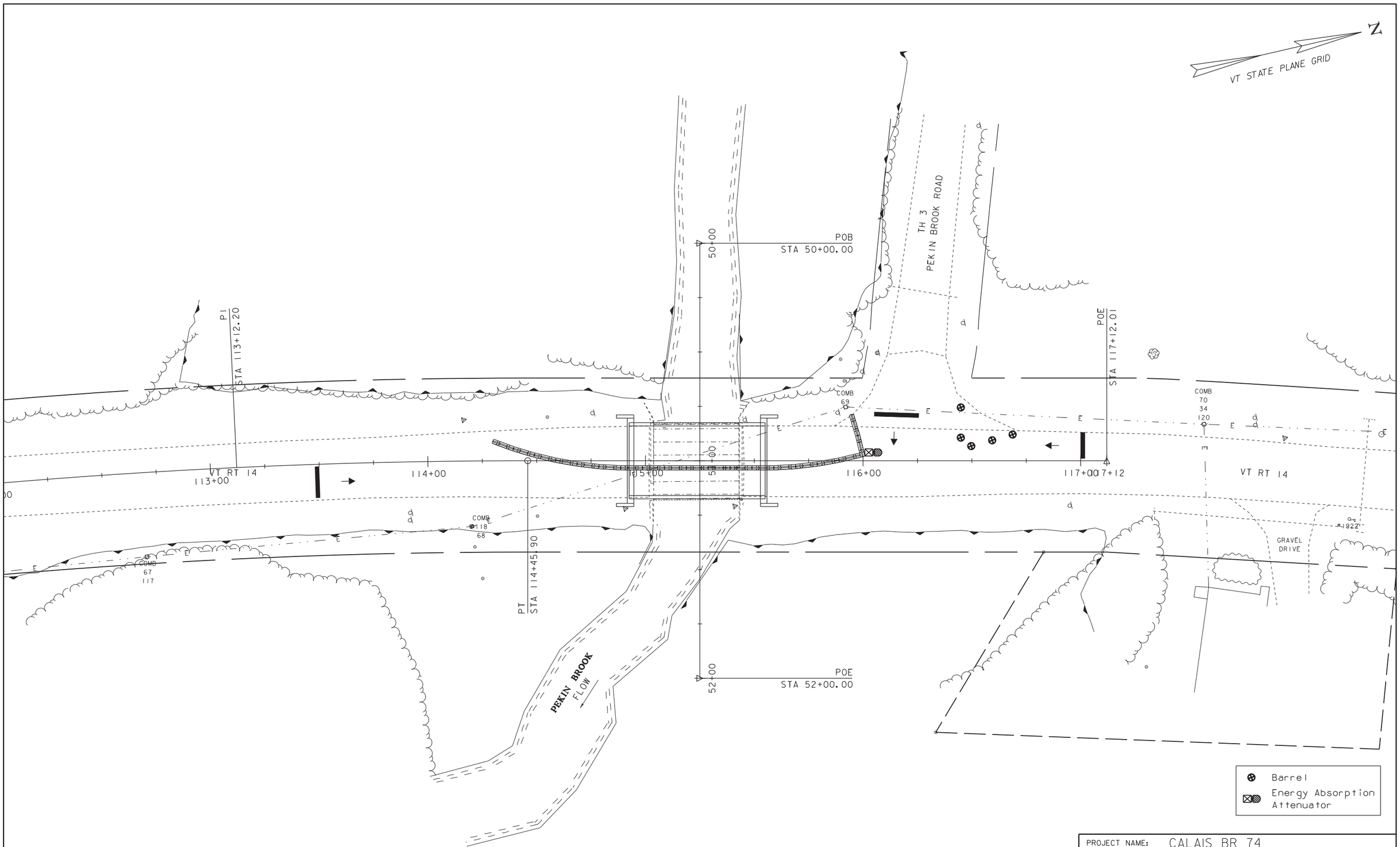
POE
STA 52+00.00

PHASE I LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	CALAIS BR 74
PROJECT NUMBER:	BHF 037-2(10)
FILE NAME: I2bl44/sl2bl44bdr.dgn	PLOT DATE: 04-DEC-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.E.GALIHER
DESIGNED BY: L.E.GALIHER	CHECKED BY: ------
PHASE I LAYOUT	SHEET 5 OF 7

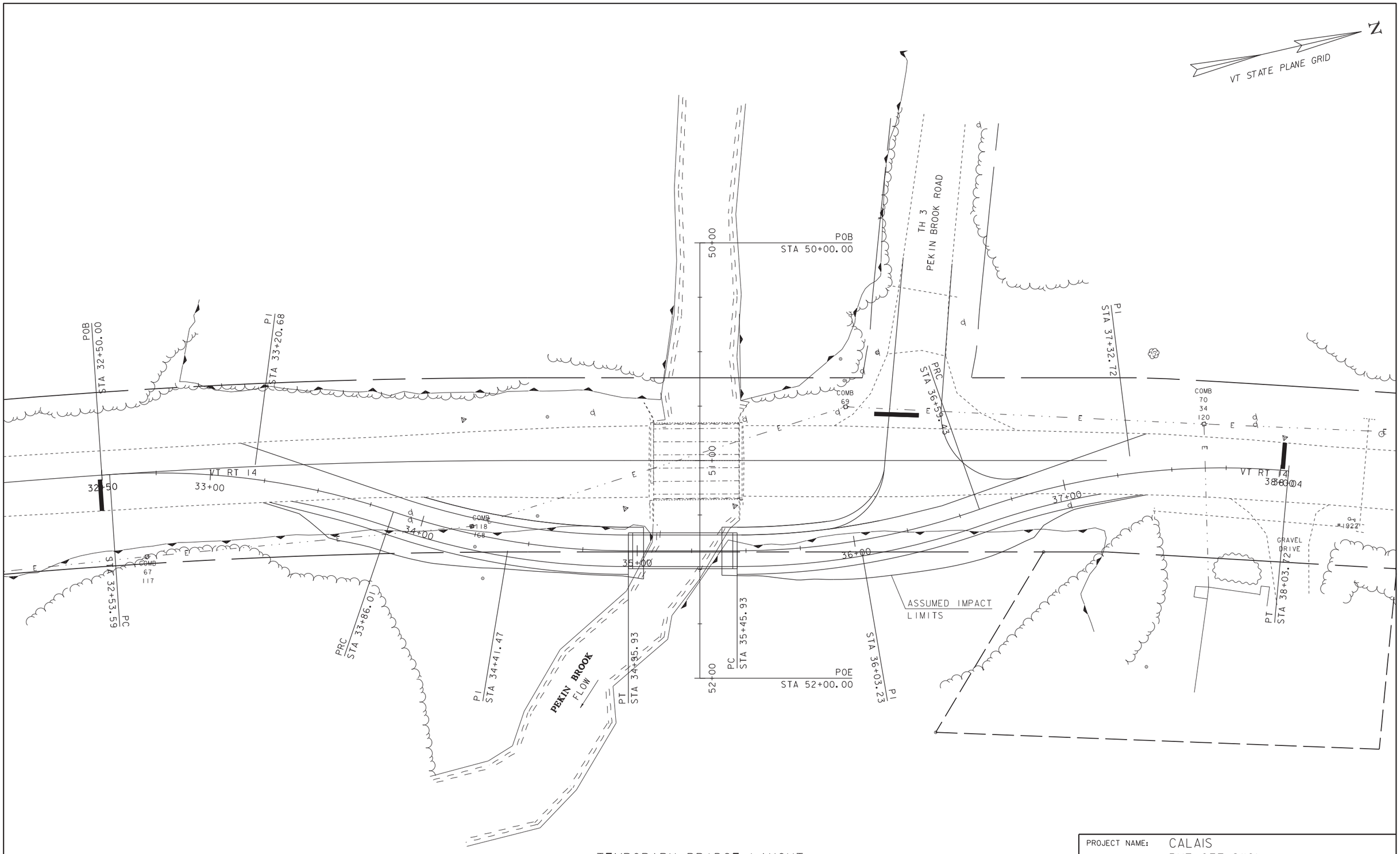


PHASE 2 LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	CALAIS BR 74
PROJECT NUMBER:	BHF 037-2(10)
FILE NAME: I2BI44/SI2bI44bdr.dgn	PLOT DATE: 04-DEC-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.E.GALIHER
DESIGNED BY: L.E.GALIHER	CHECKED BY: ------
PHASE 2 LAYOUT	SHEET 6 OF 7



TEMPORARY BRIDGE LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	CALAIS
PROJECT NUMBER:	BHF 037-2(10)
FILE NAME: s12b144bdr.dgn	PLOT DATE: 04-DEC-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.E.GALIHER	CHECKED BY: ------
TEMPORARY BRIDGE LAYOUT SHEET	SHEET 7 OF 7