STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Wilmington STP 013-1(14)

VT ROUTE 100, CULVERT 47 OVER UNNAMED BROOK

August 28,
2012

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I. Site Information

Culvert 47 is located in a rural area along VT Route 100 approximately 2.1 miles south of the junction with VT 9. Radar Road (TH 70) merges into VT 100 approximately 170 feet north of the culvert. 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
Culvert Type	CGMPPA (Corrugated Galvanized Metal Plate Pipe Arch)
Culvert Data:	
Length	68 feet long
Span	10’ 8”
Rise	6’ 11”
Year Built	1949

Need

Culvert 47 has a culvert rating of 3, which is considered serious. The following is a list of the deficiencies of the culvert.

1. The culvert has a Steel Culvert Corrosion Indicator of 2, which indicates that there are perforations throughout the culvert that are greater than 2 inches in width.

2. The bottom of the culvert is heavily rusted and severely rotted out.

3. The culvert alignment does not match the upstream and downstream alignment of the brook. The brook bends to get into the culvert and bends again at the outlet of the structure as the brook parallels the road. Additionally, the culvert constricts the natural channel width.

4. The ends of the culvert are mitered, which can lead to structural failure.

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	2,600	2,800	~
DHV	290	320	~
ADTT	210	370	~
%T	8.3	13.9	~
%D	60	60	~
FLEXIBLE ESAL	~	2015 ~ 2035	2035 ~ 2055
		809,000	1,930,000

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 2,800 and a design speed of 50 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 4.3	11'/4' (30')	11'/4' (30')	
Bridge Lane and Shoulder Widths	VSS Section 4.7	11'/4' (30')	11'/4' (30')	
Clear Zone Distance	VSS Table 4.4		20' fill / 12' cut (1:3) 14' cut (1:4)	
Banking			8% (max)	
Speed		50 mph (Posted)	50 mph (Design)	
Horizontal Alignment	AASHTO Green Book Exhibit 3-10b	R = 1145'	R_{min} = 758'	
Vertical Grade	VSS Table 4.5	(-)7.95% max	7% (max) for Mountainous terrain	Substandard
K Values for Vertical Curves	VSS Table 4.1	Bridge located on sag (K = 54)	110 crest / 90 sag	Substandard
Vertical Clearance Issues	VSS Section 4.8	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 4.1	268'	400'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 4.7	4' Shoulder	4' Shoulder	
Bridge Railing	Structures Design Manual Section 13	W-Beam	TL-4	

Inspection Report Summary

Channel Rating 4 Poor
Culvert Rating 3 Serious

09/04/2011 – This culvert should be replaced in the near future. ~JWW/PLB

Hydraulics

From preliminary hydraulics report, 6/7/2012:

If the proposed structure is to meet hydraulic standards, it will need to provide 1' of freeboard at Q50. A bridge or precast arch, such as a Conspan arch will have to have a 16' minimum clear span normal to the channel. If an arch is used, it can have a rise of 6'. If a bridge is built, average low beam elevation should be at least 1626.5'. These structures provide approximately 75 sq. ft. of waterway area and the required 1' of freeboard at Q50. Both these structures include stone fill to a height of 1623' on a 1 to 1.5 slope.

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.

Utilities
There are overhead utility lines passing over the culvert on the eastern side of the road. These utility lines remain on the eastern side of the road for the entirety of the project area and do not cross over the road at the project location.

Right Of Way
The existing Right-of-Way is plotted on the Layout Sheet. Depending on the alternate chosen, additional rights may need to be obtained.

Resources
The environmental resources present at this project are shown on the Resource Layout Sheet.

Archaeological:
There are no archeological resources located in the project area.

Biological:
Wetlands

There are no mapped wetlands within the project area.

Wildlife Habitat

General Wildlife habitat exists within the surrounding area. This river would support a variety of aquatic organisms including brook trout.

There are no wildlife corridor issues within the project area.

Rare, Threatened and Endangered Species

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

Agricultural

There are no agricultural resources located in the project vicinity.

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

Historic:
Culvert 47 and the adjacent properties are not historic.

Stormwater:
There are no stormwater related concerns for this bridge.

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

Based on the daily traffic volumes, a one-way temporary bridge with traffic signals would be appropriate at this location. Due to the layout of the brook, a temporary bridge would be difficult to place. The brook bends to get into the culvert and bends again at the outlet of the structure as the brook mostly parallels the road. Additionally, the brook and the road are located in a relatively steep sided valley, and a temporary bridge would require a large amount of earthworks. Due to the layout of the brook and other site conditions, a 46 foot span temporary bridge would be required. The length of the temporary roadway would need to be approximately 600 feet in length, and a 30 mph speed limit would need to be enforced through the work zone. This option would nearly double the cost of the project, and require Right-of-Way to be acquired. See the appendix for the temporary bridge layout sheet.

Advantages: This option would have the smallest impact to traffic on VT RT 100.

Disadvantages: This option would require Right-of-Way acquisition and would be relatively high in cost. This option would have adverse impacts to surrounding wooded areas. There would be some delays and disruption to traffic, since the road would be reduced to one-way traffic, and the speed limit reduced to 30 mph. Also, at least one 3-Phase utility pole would have to be moved.

Option 2: Phased Construction

Phased construction is the maintenance of one lane of two-way traffic on the existing bridge while building one lane of the proposed structure. Since there is very little fill above the existing culvert, large amounts of fill retention would not be required for phased construction, making this a good candidate for phased construction. Additionally, the Right-of-Way is extended beyond the typical 3-rods at the culvert location and extending southward, thus making phased construction within the Right of Way possible. Based on the traffic volumes, it is reasonable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal.

The phasing for this site could be done with 3 phases. The layout of this phasing sequence can be found in the appendix. The following is a description of the phases:

- Phase 1: A single lane open to traffic over the existing culvert, with a traffic signal, on the downstream side. During this phase, five precast culvert sections would be installed on the upstream side of the road.

- Phase 2a: A single lane open to traffic, with a traffic signal, over the upstream side of the road over the new culvert sections. During this phase, six precast culvert sections would be installed on the downstream side of the road. The channel flow would be established in the new culvert at this time.

- Phase 2b: A single lane over the upstream side of the road will be maintained so that the existing culvert on the downstream side can be removed.

- Phase 3: A single lane open to traffic, with a traffic signal, over the downstream side as in Phase 1, will be maintained in order to remove the existing culvert portion from the upstream side.

Advantages: This option would not require Right-of-Way acquisition. As a result, there are decreased costs and development time, by not having to go through the Right-of-Way process. Additionally, this option will have minimal impacts to the surrounding wooded area.

Disadvantages: Phased construction generally involves higher costs and complexity of construction. Costs are usually higher and construction duration is longer, since many construction activities have to be performed two times. Additionally, since cars are traveling near construction activity, there is decreased safety. There would be some delays and disruption to traffic, since the road would be reduced to one-way traffic. Also, at least one 3-Phase utility pole would have to be moved.

Option 3: Off-Site Detour

This option would close the bridge and reroute traffic onto VT RT 9, and VT RT 8, back to VT RT 100. This regional detour would utilize state routes only, and has an end to end distance of 32 miles, and a through distance of 26 miles. The additional distance added to the through route is 19 miles. There are local roads which bypass the bridge. It is likely that these roads would see increased traffic if VT 100 were closed during construction. The local bypass has an end to end distance of 11 miles, and would not add any distance to the through route.

Advantages: This option would eliminate the need for a temporary bridge, which would decrease cost and time of the project, both at the development stage and the construction stage. This option would not require the need to obtain rights from adjacent property owners.

Disadvantages: This option would have the largest impact to traffic on VT RT 100 and local traffic. The end to end detour would take approximately 50 minutes to drive, which is relatively long. Also, at least one 3-Phase utility pole would have to be moved.

III. Alternatives Discussion

No Action

This alternative is not recommended. The culvert was given a culvert rating of “serious”. In addition to the structural deficiencies of the culvert, there are issues with scour and channel alignment as well. Although the culvert is not in imminent danger of collapse, it will eventually not be able to safely support all associated loads. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Rehabilitation
This alternative involves the rehabilitation of the existing culvert.

Rehabilitation work for culverts generally involves an invert repair, or a culvert liner. Both of these options are considered to be preventative maintenance, and are used in order to extend the remaining life of the structure. In this case, there is no remaining life left to this culvert. This culvert is over 60 years old and in poor condition. Neither an invert repair nor a culvert liner would address the diminished structural capacity due to corrosion. Additionally, this option would not address the poor channel alignment. Therefore, due to the current condition of the culvert, the rehabilitation option will not be considered any further.

New Structure
This option involves removing the old culvert and replacing it with a new 16 foot x 6 foot precast structure. A new box could be built next to the existing structure, so that the stream could be maintained through the old structure during construction. A new culvert could be constructed at a slightly greater skew to the roadway, to improve the alignment of the channel. Since there is only approximately 3 feet of fill above the existing culvert, there would not have to be an extremely large amount of earthwork, making this a good site for a precast buried structure. Based on the current condition of the culvert, a full replacement is warranted. Any new structure should have flared wingwalls at the inlet and outlet to make a smooth transition between the channel and the culvert.

The 16 foot x 6 foot precast structure could either be a 4-sided closed box structure, or a 3-sided open bottom structure. The 3-sided structure would take approximately 4 weeks to construct, since footings would need to be placed 6 feet below stream bottom to prevent undermining. This is a long duration for the off-site detour, and thus, a 3-sided structure would only be appropriate for phased construction. On the other hand, a 4-sided box culvert would take approximately 2 weeks to construct. There would be less excavation involved for the box culvert since undermining of the culvert would not be an issue. Therefore, if a road closure is the preferred alternate, a 4-sided box should be chosen, because of the shorter construction duration.

Advantages: This alternative would be a new structure with an estimated life span of 80 years. The hydraulic capacity of the structure would be significantly improved, and the stream alignment through the structure would be slightly improved.

Disadvantages: This option would be costly compared to a rehabilitation option, and would have the greatest impacts to traffic and adjacent properties. The project delivery time would also be increased. At least one 3-phase utility pole would have to be relocated for the alternative.

Maintenance of Traffic: This alternative could utilize phased construction, or an offsite detour. Due to the layout of the channel, and the steep site conditions, a temporary bridge is impractical here, as it would nearly double the cost of the project.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, there are three viable alternatives:

Alternative 1: New Precast Box Culvert with Traffic Maintained on Offsite Detour
Alternative 2: New Precast 3-Sided Structure with Traffic Maintained with Phased Construction
Alternative 3: New Structure with Traffic Maintained on a Temporary Bridge

V. Cost Matrix

Wilmington STP 013-1(14)		Do Nothing	Alt 1 Precast Box with Traffic Maintained on Offsite Detour	Alt 2 Precast 3-sided Structure with Traffic Maintained with Phased Construction	Alt 3 New Structure with Traffic Maintained on a Temporary Bridge
COST	Culvert Cost	$0	$163,600	$224,700	$163,600
	Removal of Structure	$0	$10,000	$10,000	$10,000
	Channel Work	$0	$8,000	$8,000	$8,000
	Roadway	$0	$93,827	$110,647	$159,565
	Erosion Control	$0	$15,000	$15,000	$25,000
	Temporary Bridge	$0	$0	$0	$150,000
	Total Construction Costs	$0	$290,427	$368,347	$516,165
	Construction Duration		3 months, with 2 week closure	7 months	18 months
	Preliminary Engineering	**$0**	**$101,649 (35%)**	**$110,504 (30%)**	**$129,041 (25%)**
	Right of Way	**$0**	**$0**	**$0**	**$56,778**
	Construction Costs + Construction Engineering + Contingencies	**$0**	**$377,555**	**$478,850**	**$671,014**
	Project Development Duration		2 years	2 years	3 years
	Total Costs	$0	$479,205	$589,354	$856,833
	Premium		0%	23.0%	78.8%
	Design Life		80 years	80 years	80 years
ENGINEERING					
	Typical Section - Roadway (feet)	30'	30'	30'	30'
	Typical Section - Bridge (feet)	4 - 11 - 11 - 4	4 - 11 - 11 - 4	4 - 11 - 11 - 4	4 - 11 - 11 – 4
	Geometric Design Criteria	Meets Criteria	Meets Criteria	Meets Criteria	Meets Criteria
	Traffic Safety	No Change	Improved	Improved	Improved
	Alignment Change	No	No	No	No
	Bicycle Access	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	No Change	No Change
	Utility	No Change	Relocation	Relocation	Relocation
OTHER	ROW Acquisition	No	No	No	Yes
	Road Closure	No	Yes	One Lane	One Lane

VI. Conclusion

Structure

We recommend Alternative 1; to replace the existing culvert with a 16 foot x 6 foot precast concrete box culvert. The new culvert will be constructed next to the existing culvert, so that the stream can be maintained in the existing culvert during construction and then rerouted into the new structure once it is in place. By constructing the new culvert next to the existing culvert, the alignment of the culvert can be improved by increasing its skew to the road. The new precast box will have bed retention sills, to allow for a natural channel bottom to form, accommodating aquatic organism passage. Since the precast culvert will have a closed bottom, it will be protected from scour. In order to satisfy the AOP needs, stone may need to be placed along the length of the channel bottom through the culvert.

Traffic Control

The recommended method of traffic control is to close the culvert for two weeks, and maintain traffic on an offsite detour. The detour for this project location would add approximately 19 miles to the through route, and have an end-to-end distance of 32 miles. There is a local bypass route which would most likely be used by local traffic. This route adds no distance to the through route, and has an end-to-end distance of 11 miles.

The option to close the road will have smaller impacts to the site compared to the phased option, since a shorter length structure can be used. Additionally the option to close the road is the least expensive and the safest option. It seems reasonable to close the road since the benefits outweigh the temporary inconvenience.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archaeology Memo
- Historic Memo
- Stormwater Memo
- Resource ID Completion Memo
- Detour Information
- Plans
    - Proposal
        - Existing Conditions
        - Typical Sections
        - Layout
        - Profile
        - Phasing Plans
        - Temporary Bridge Layout

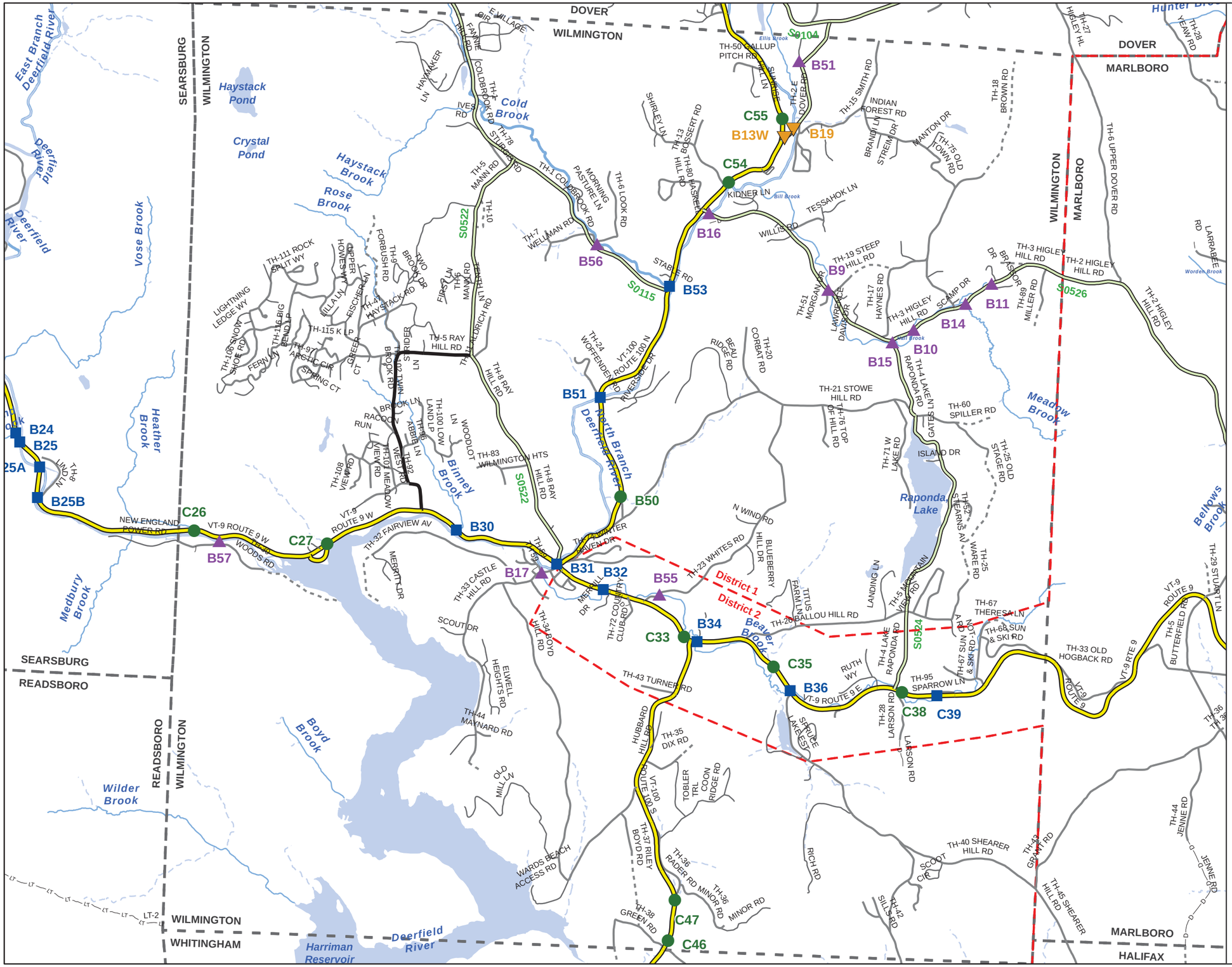
Picture 1: Looking southbound

Picture 2: Looking northbound

Picture 3: Looking Upstream

Picture 4: Looking Downstream

Picture 5: Rust in culvert



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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

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011

WILMINGTON
WINDHAM COUNTY
DISTRICT # 1

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for WILMINGTON **bridge no.:** 0047 **District:** 1

Located on: VT100 **over** BROOK **approximately** 2.1 MI S JCT VT 9 **Maintained By:** STATE

CONDITION

Deck Rating: N NOT APPLICABLE

Superstructure Rating: N NOT APPLICABLE

Substructure Rating: N NOT APPLICABLE

Channel Rating: 4 POOR

Culvert Rating: 3 SERIOUS

Federal Str. Number: 300013004713221

AGE and SERVICE

Year Built: 1950 **Year Reconstructed:** ____

Type of Service On: 1 HIGHWAY

Type of Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 21

ADT: 2900 **Year of ADT:** 1996

GEOMETRIC DATA

Length of Maximum Span (ft): 11

Structure Length (ft): 11

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 0

Deck Width Out-to-Out (ft): 0

Appr. Roadway Width (ft): 26

Skew: 30

Bridge Median: 0 NO MEDIAN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 07 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: CGMPPA

Number of Main Spans: 1

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: N NOT APPLICABLE

Type of Wearing Surface: N NOT APPLICABLE

Type of Membrane: N NOT APPLICABLE

Deck Protection: N NOT APPLICABLE

CULVERT GEOMETRIC DATA and INDICATORS

Culvert Barrel Length (ft): 68

Average Cover Over Culvert (ft): 3

Waterway Area Through Culvert (sq.ft.): 62

Culvert Wing/Header Rating: N NOT APPLICABLE

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

Multi Plate Culvert Bolt Line Crack Indicator: 0 NO BOLT LINE CRACKS PRESENT

APPRAISAL

Appr. Rdwy. Alignment: 8 EQUAL TO DESIRABLE CRITERIA

INSPECTION

Inspection Date: 072011 **Inspection Frequency (months):** 12

INSPECTION SUMMARY and NEEDS

7/7/2011 This culvert should be replaced in the near future. JWW/PLB

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

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

DATE: 7 June 2012

SUBJECT: Wilmington STP 013-1(14) – VT 100 BR 47 over unnamed brook – updated memo

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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 culvert was originally constructed in 1950 based on available information. It is a corrugated metal pipe arch that has a span of 10'- 8" and a rise of 6' – 11". It provides 58 sq. ft. of waterway area. It is on a skew to the roadway and constricts the natural channel width, but so does the roadway fill. The brook bends to get into the culvert and bends again at the outlet of the structure as the brook mostly parallels the road. There is a scour hole at the outlet of the structure. There are holes in the pipe. The ends of the pipe are mitered.

This pipe is hydraulically adequate because headwater to depth ratios are within acceptable limits and there is no roadway overtopping up to the design Q50 flow.

Recommendations

Based on initial discussions with the Structures Group, it was determined that the proposed bridge will be constructed to the south of the existing pipe. It will be a 3-sided open bottom structure. The vertical alignment will stay the same. We agree with using a 3-sided structure due to help with fish passage at this site and better match the channel width.

Three sided structures require there to be a minimum 1' of freeboard at the design flow. For a state structure, the design flow is Q50.

If the proposed structure is to meet hydraulic standards, it will need to provide 1' of freeboard at Q50. A bridge or precast arch, such as a Conspan arch will have to have a 16' minimum clear span normal to the channel. If an arch is used, it can have a rise of 6'. If a bridge is built, average low beam elevation should be at least 1626.5'. These structures provide approximately 75 sq. ft. of waterway area and the required 1' of freeboard at Q50. Both these structures include stone fill to a height of 1623' on a 1 to 1.5 slope.

Footings for any structure placed here should be placed 6' below channel bottom, or to ledge, to prevent undermining. If integral abutments are used, plies should be designed to be freestanding to 6' below channel bottom.

Stone fill type III should be used on this project. Stone fill placed in front of the abutments should match into the upstream and downstream channel banks and 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

No temporary bridge should be needed as structures indicated that construction will be phased and one lane of traffic will be open at all times. The existing pipe will be used to convey flows through the project site during construction.

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, P.E., Structures Project Manager

NSM CCB

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

Date: May 29, 2012

Subject: Wilmington STP 013-1(14) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Culvert #47 on VT-100, in the town of Wilmington, VT. Located approximately 2.1 miles south of the junction with VT-9, the subject project consists of replacing the existing corrugated metal culvert. This report documents our initial search of historical information and field observations to determine the characteristics of the site. A number of materials were reviewed including: VTrans boring files and record plans, Agency of Natural Resources (ANR) water well logs, USDA Surficial Geologic maps and VTrans Bridge Inspection Photos.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Historical plans for the project were found from when the road was constructed and the culvert installed in 1949. A 2.0 foot layer of rip rap was placed on both the inlet and outlet banks of the culvert, which could interfere with construction and boring operations.

2.2 Water Well Logs

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, 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. Three surrounding well logs were examined for depths to bedrock and soil strata.

Figure 1 contains the project and surrounding well locations. The specific wells used to gain information on the subsurface conditions are highlighted by a red box. The three closest wells were used to get an estimate of the depth to bedrock and types of soils likely to be encountered on the project.

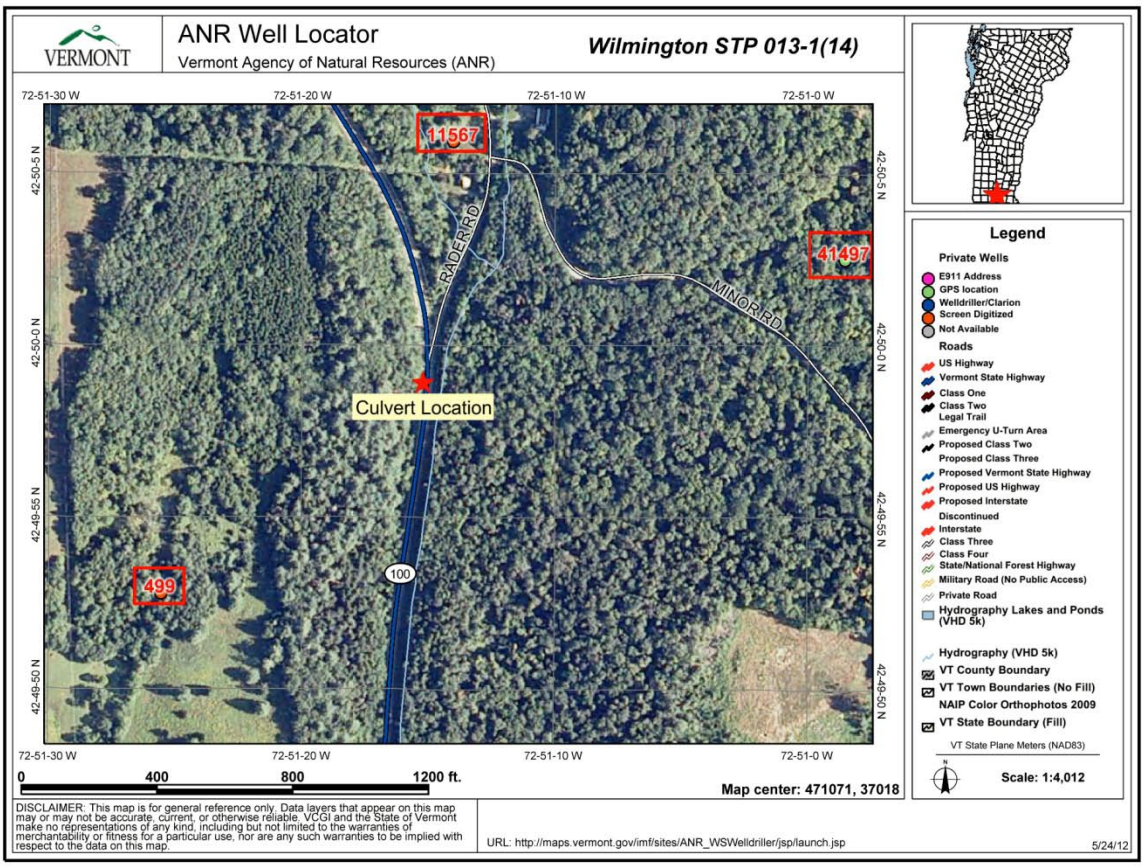

Figure 1. Highlighted well locations near subject project

Table 1 lists the well sites used in gathering the surrounding information. Four water wells are listed with the distance from the bridge project, depth to bedrock, and type of soils encountered.

Table 1. Depths to bedrock and subsurface strata of surrounding sites

Well Number	Distance From Project (feet)	Depth To Bedrock (feet)	Overburden Material
499	750	15	Till and sand
11567	1000	6	Gravel
41497	1200	27	Till

2.3 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 Worden loam with boulders and Mundal fine sandy loam with cobbles. It has a water table between 12 and 18 inches below the surface.

3.0 FIELD OBSERVATIONS

A site visit was conducted to determine potential issues with boring operations, and to make any other pertinent observations about the project. Figure 2 was taken on May 10, 2012.

Figure 2. View of bridge, looking south (flow is from left to right)

4.0 RECOMMENDATIONS

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

- A precast arch or reinforced concrete abutment supported on spread footings

A minimum of two borings should be completed to ascertain the soil conditions for design and construction of the replacement structure.

5.0 CONCLUSION

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-6911, or via email at Nick.Meltzer@state.vt.us.

cc: Project File/CCB
NSM

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: Lee Goldstein, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: April 2, 2012

SUBJECT: Wilmington STP 013-1 (14)

I have completed my initial review of this project and concluded that the only regulated natural resource in the area is Ryder Brook itself. In this location, the brook and road are in a relatively steep sided valley.

The alignment of the current structure is less than desirable, but it appears capable of passing fish under most cases, and trout were observed during my site visit in the area.

This structure is not in a deep fill area and would be a perfect candidate for a large box culvert with bed retention sills.

Phased construction or a temporary road closure is encouraged in this location due to the lack of an on-site detour.

If you have any questions, come see me…

~ John ~

VERMONT

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www.aot.state.vt.us

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

Agency of Transportation

To: Lee Goldstein, VTrans Environmental Specialist

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

Date: 6/18/2012

Subject: Wilmington STP 013-1(14) – Archaeological Resource ID

I have completed my initial resource identification for Wilmington STP 013-1(14). A desk review conducted on 6/14/2012 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

Goldstein, Lee

From: O'Shea, Kaitlin
Sent: Friday, April 13, 2012 9:21 AM
To: Goldstein, Lee
Cc: Williams, Chris; Newman, Scott
Subject: Pilot Project - Wilmington STP 013-1(14) Historic Resource ID

Good morning,

I have completed the historic resource ID for Wilmington STP 013-1(14): Bridge 47 (metal tube culvert) and the adjacent properties are not historic.

This resource ID is part of the GPS/GIS Pilot Project. As discussed, initial review for historic resources is completed via desk review (maps, bridge inspection photos, Google Earth) and can be determined to have no historic resources without site visits. Other projects will require a site visit in order to determine if there are historic resources located within the project area. Historic resources will continue to be identified on a map and scanned for the project files. When appropriate, historic resources will be mapped by the GPS in order to compare and contrast the effectiveness and application of these resource ID procedures.

I am keeping a spreadsheet for these pilot projects which outlines review methods, resource notes, resource ID and how the ID is submitted (GPS data, email memo, resource map, etc.) I'll bring this to the next project meeting.

Let me know if you have any questions.
Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

802-279-0869
Kaitlin.O'Shea@state.vt.us

Goldstein, Lee

From: Armstrong, Jon
Sent: Wednesday, May 23, 2012 10:45 AM
To: Goldstein, Lee
Subject: RE: Environmental Request NOTIFICATION: WILMINGTON STP 013-1(14)

Hi Lee,
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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·.¸.,..´`·.. ><((((º>`·.¸¸.·´`·.¸.·´¯`·...><((((º>
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From: Goldstein, Lee
Sent: Tuesday, March 27, 2012 4:55 PM
To: Gingras, Glenn; Armstrong, Jon; O'Shea, Kaitlin; Gauthier, Brennan
Subject: FW: Environmental Request NOTIFICATION: WILMINGTON STP 013-1(14)

Hi pilot team—resource ID requested!
Thanks…
Lee

Lee D.R. Goldstein, MLA
Environmental Specialist, SE Region
VTrans PDD, Environmental Section
Vermont Agency of Transportation
1 National Life Drive--Drawer 33
Montpelier, VT 05633
e-mail: lee.goldstein@state.vt.us
Tel.: 802-828-3985 Fax: 802-828-2334

From: EnterpriseSQL@state.vt.us [mailto:EnterpriseSQL@state.vt.us]
Sent: Tuesday, March 27, 2012 12:59 PM
To: Goldstein, Lee; Narowski, John; Ramsey, Jeff; Slesar, Chris
Cc: Magnan, Steph; Spencer, Lisa
Subject: Environmental Request NOTIFICATION: WILMINGTON STP 013-1(14)

Please do not reply to this email.

NOTIFICATION EMAIL

The following Environmental\Hydraulic Request has been successfully submitted:

Date Requested: Mar 27 2012 12:58PM
Project Request Type: Capital Program
Pin: 00B252

Project Name and Number: WILMINGTON STP 013-1(14)

Request Activity: Arch\Hist\Bio Resource Identification

Other Request Activity Description: N/A

Proposed Due Date: May 2 2012 12:00AM

File(s): Z:\Projects-Engineering\WilmingtonSTP013-1(14)00b252\Structures\Memos\2012\WILMINGTON_Town_Map.pdf

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.

Contact Information:

Name: WILLIAMS, CHRISTOPHER (Structures)

Phone Number: (802) 828-0051

Email: chris.williams@state.vt.us;

Additional Contact(s): gary.sweeny@state.vt.us;

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Lee Goldstein, Environmental Specialist
DATE: April 17, 2012

Project: **Wilmington STP 013-1(14)-VT Route 100, Culvert 47 @ Ryder Brook**

ENVIRONMENTAL RESOURCES:

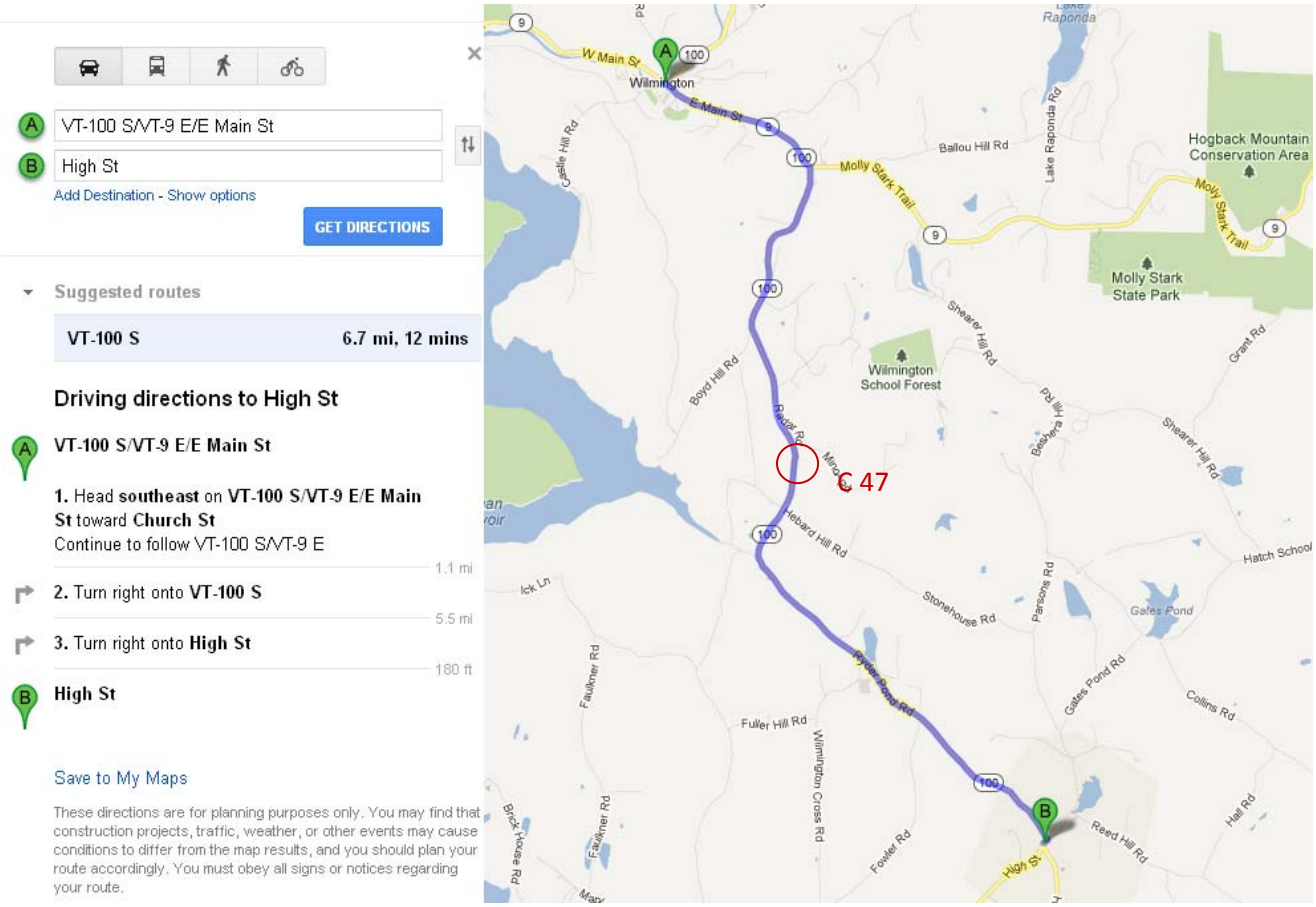
Wetlands:	____ Yes	X No	
Historic/Historic District:	____ Yes	X No	
Archaeological Site:	____ Yes	X No	
4(f) Property:	____ Yes	X No	
6(f) Property:	____ Yes	X No	
Agricultural Land:	____ Yes	X No	
Fish & Wildlife Habitat:	X Yes	____ No	
Endangered Species:	____ Yes	X No	
Hazardous Waste:	____ Yes	X No	
Stormwater:	____ Yes	X No	unlikely--TBD
USDA-Forest Service Lands:	____ Yes	X No	
Wildlife Habitat Connectivity:	X Yes	____ No	
Scenic Highway/ Byway:	X Yes	____ No	Molly Stark Byway
Act 250 Permits:	____ Yes	X No	

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

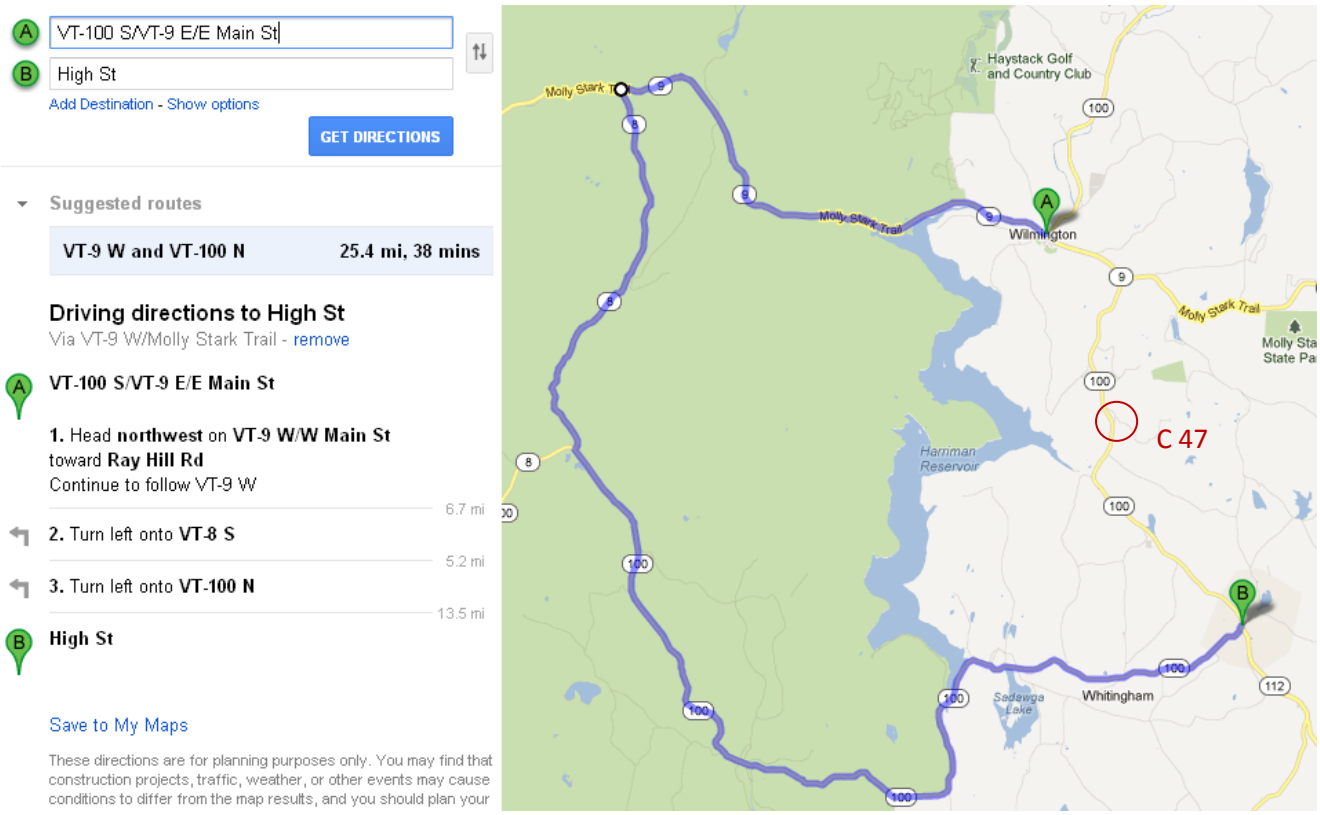
cc:
Project File

Wilmington Detour Information

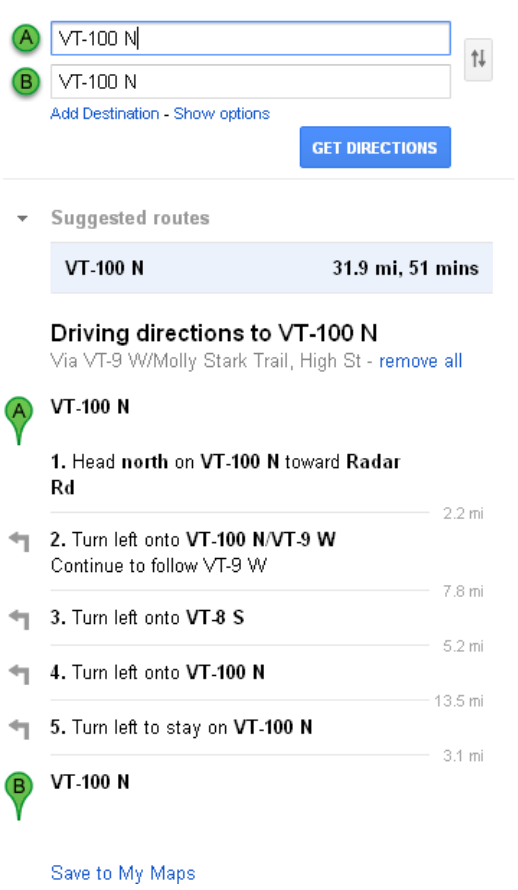
Through Distance with No Detour:

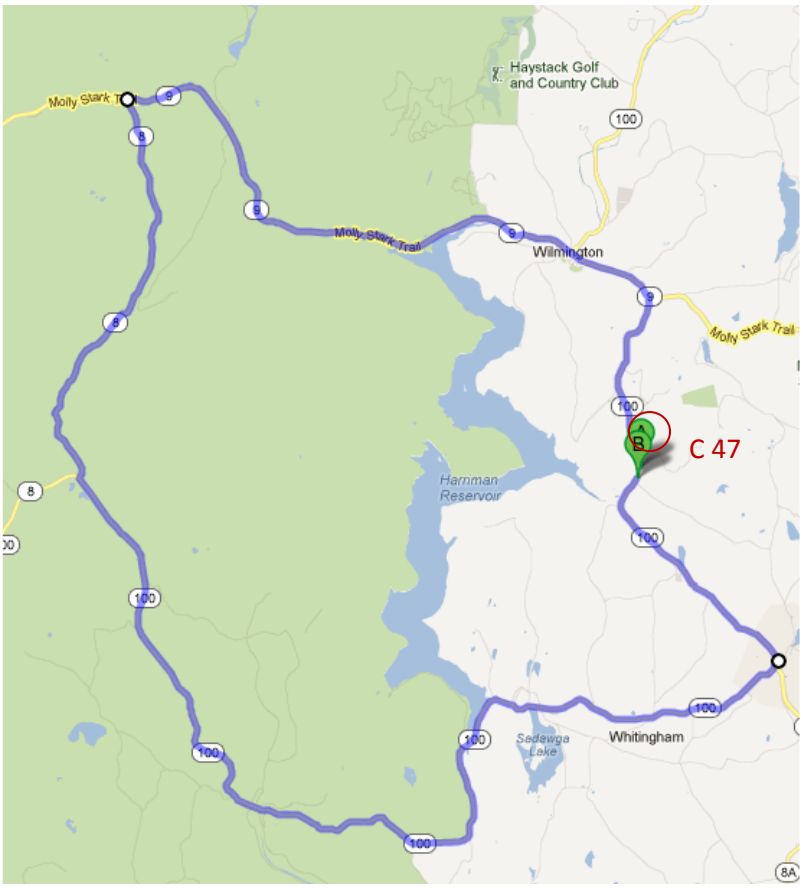


Through Detour Distance:



End to End Detour Distance:





State Through Route Length: 6.7 Miles (12 min)
State Detour Route Length: 25.4 Miles (38 min)
State Route Additional Distance = 18.7 Miles (26 min)
State Route End to End Distance = 31.9 Miles (51 min)

All times approximate.

Local Bypass Route

A VT-100 S/VT-9 E/E Main St

B High St

Add Destination - Show options

GET DIRECTIONS

Suggested routes

VT-9 E and Parsons Rd	6.8 mi, 18 mins

Driving directions to High St

Via Beshera Hill Rd/Parsons Rd - remove

A **VT-100 S/VT-9 E/E Main St**

1. Head **southeast** on **VT-100 S/VT-9 E/E Main St** toward **Church St**
Continue to follow VT-9 E

2.1 mi

2. Turn right onto **Shearer Hill Rd**

1.5 mi

3. Slight right onto **Beshera Hill Rd/Parsons Rd**
Continue to follow Parsons Rd

1.7 mi

4. Turn left to stay on **Parsons Rd**

0.7 mi

5. Continue onto **Gates Pond Rd**

0.8 mi

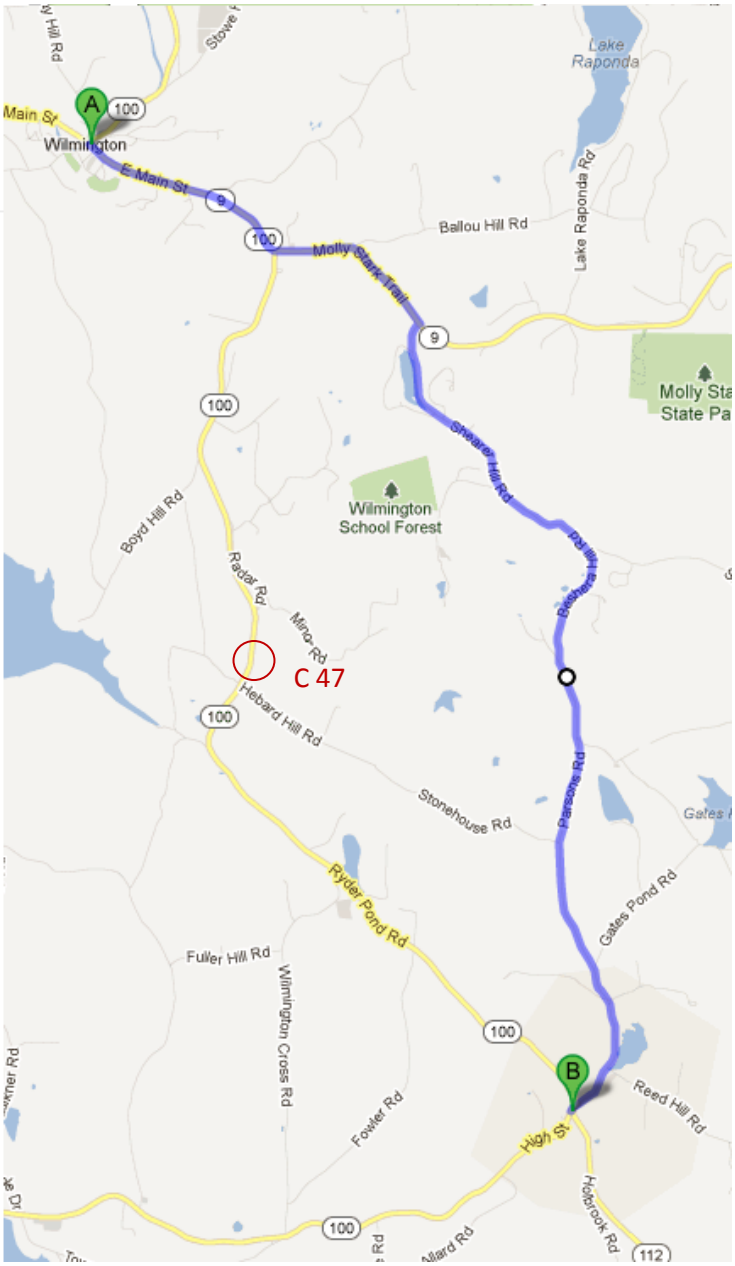
6. Continue onto **High St**

285 ft

B **High St**

Save to My Maps

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you



Local Through Route Length: 5.6 Miles (8 min)
Local Detour Route Length: 5.7 Miles (13 min)
Local Route Additional Distance = 0.1 Miles (5 min)
Local Route End to End Distance = 11.3 Miles (21 min)

BALLANTINE,
NORMAN JR. & SALLIE

POB
STA 11+33.62

PC
STA 13+79.93

PT
STA 17+36.55

UNNAMED BROOK
FLOW

VT 100

18" RCP
POOR CONDITION
FLOW

6'-9" X 10'-6"
CGMP
FLOW

11+34
12+00
13+00
14+00
15+00
16+00
17+00
17+37

MILE MARKER
1000
1322
0040
SIGN
RI-1
VR017 (XXK)

TH 70

COMB
69

COMB
68

COMB
67

GUY

GUY

GUY

E

PI
STA 15+59.70

APPROX. EASEMENT TO
MAINTAIN CHANNEL 1949

CURVE (1)
DELTA = 17°50'44"
D = 5°00'14"
R = 1145.00'
T = 179.77'
L = 356.63'
E = 14.03'

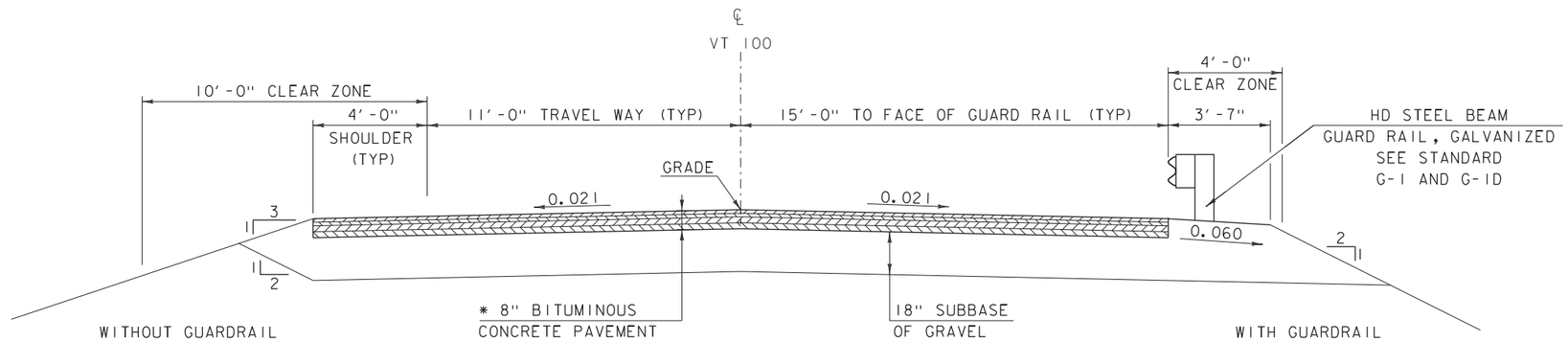
WEBER, IRVING

N
VT STATE PLANE GRID

EXISTING CONDITIONS

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

PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS	SHEET 1 OF 9



* 1½ TYPE III OR IV OVER
1½ TYPE III OR IV OVER
2½ TYPE I OR II OVER
2½ TYPE I OR II

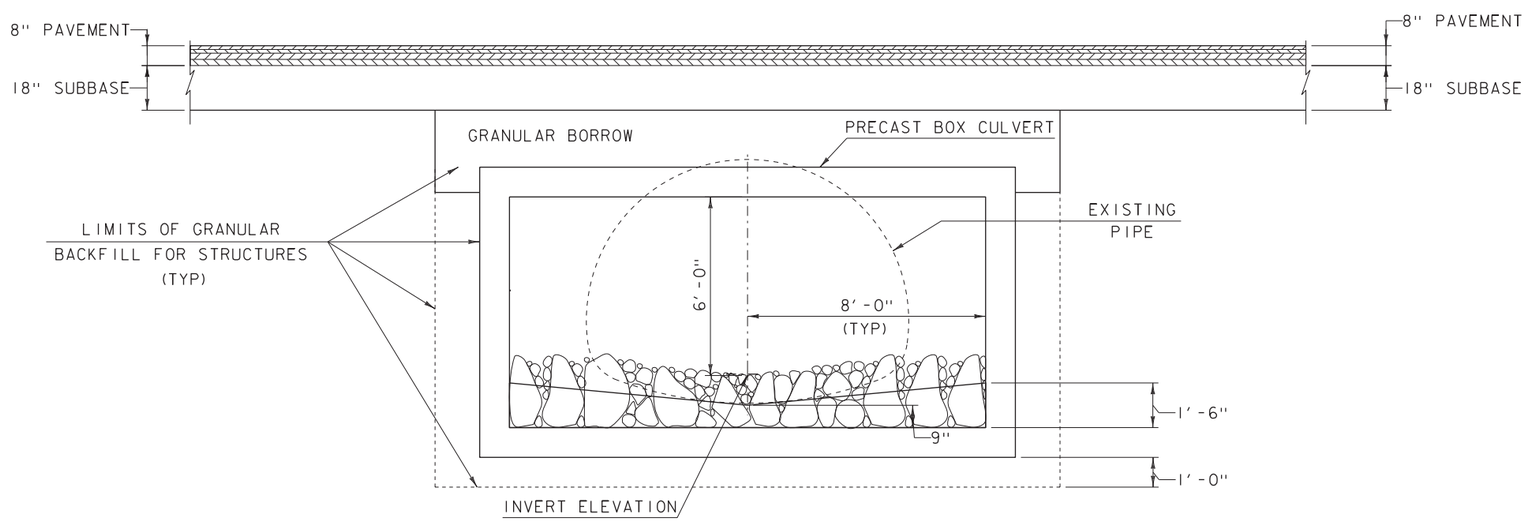
VT ROUTE 100 TYPICAL ROADWAY SECTION

SCALE ⅜" = 1'-0"

MATERIAL TOLERANCES

(IF USED ON PROJECT)

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



TYPICAL PRECAST BOX CULVERT

SCALE ⅜" = 1'-0"

PROJECT NAME:	WILMINGTON
PROJECT NUMBER:	STP 013-1(14)

FILE NAME: 00b252\s00b252typ.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.E.GALIHER
DESIGNED BY: L.J.STONE	CHECKED BY: D.D.BEARD
TYPICAL SECTIONS	SHEET 2 OF 9

BALLANTINE,
NORMAN JR. & SALLIE

POB
STA 11+33.62

PC
STA 13+79.93

POE
STA 51+50.00

PT
STA 17+36.55

UNNAMED BROOK
FLOW

18" RCP
POOR CONDITION
FLOW

VT 100

11+34
12+00
13+00
14+00
15+00
16+00
17+00
17+37

51+00
6'-9" x 10'-6"
CGMP
FLOW

COMB
69

COMB
68

COMB
67

GUY

MILE MARKER
1000
1322
0040
SIGN
RI-1
VR017 (XXX)

TH 70

POB
STA 50+00.00

50+00

PI
STA 115+59.70

APPROX. EASEMENT TO
MAINTAIN CHANNEL 1949

CURVE (1)
DELTA = 17°50'44"
D = 5°00'14"
R = 1145.00'
T = 179.77'
L = 356.63'
E = 14.03'

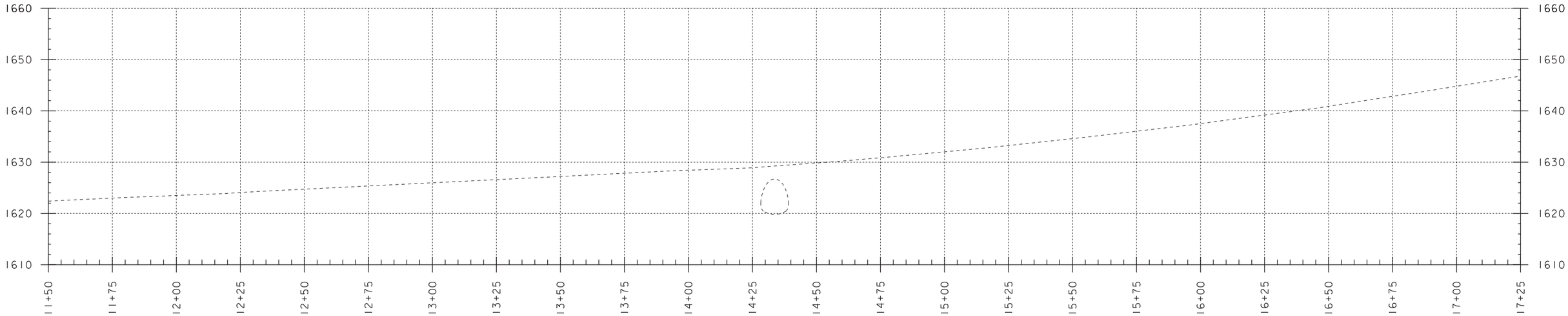
WEBER, IRVING

VT STATE PLANE GRID
N

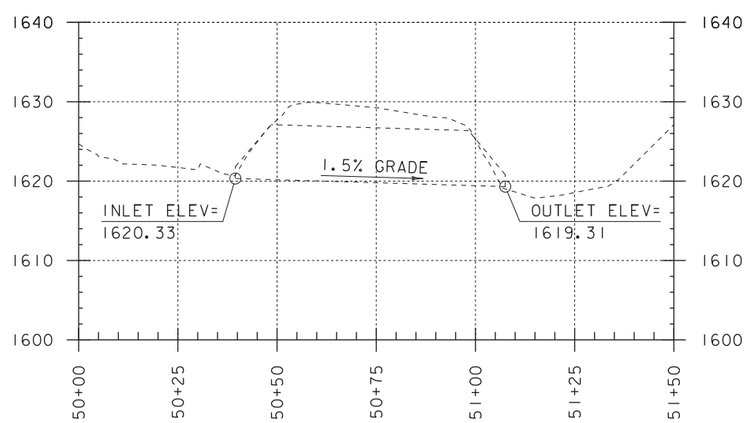
ALTERNATIVE 1

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

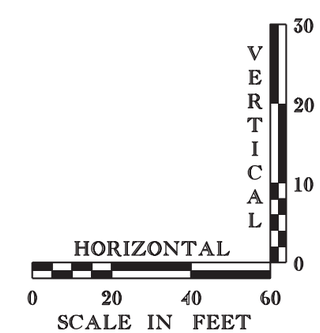
PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
LAYOUT	SHEET 3 OF 9



VT RT 100 PROFILE



VT RT 100 CULVERT 47 PROFILE

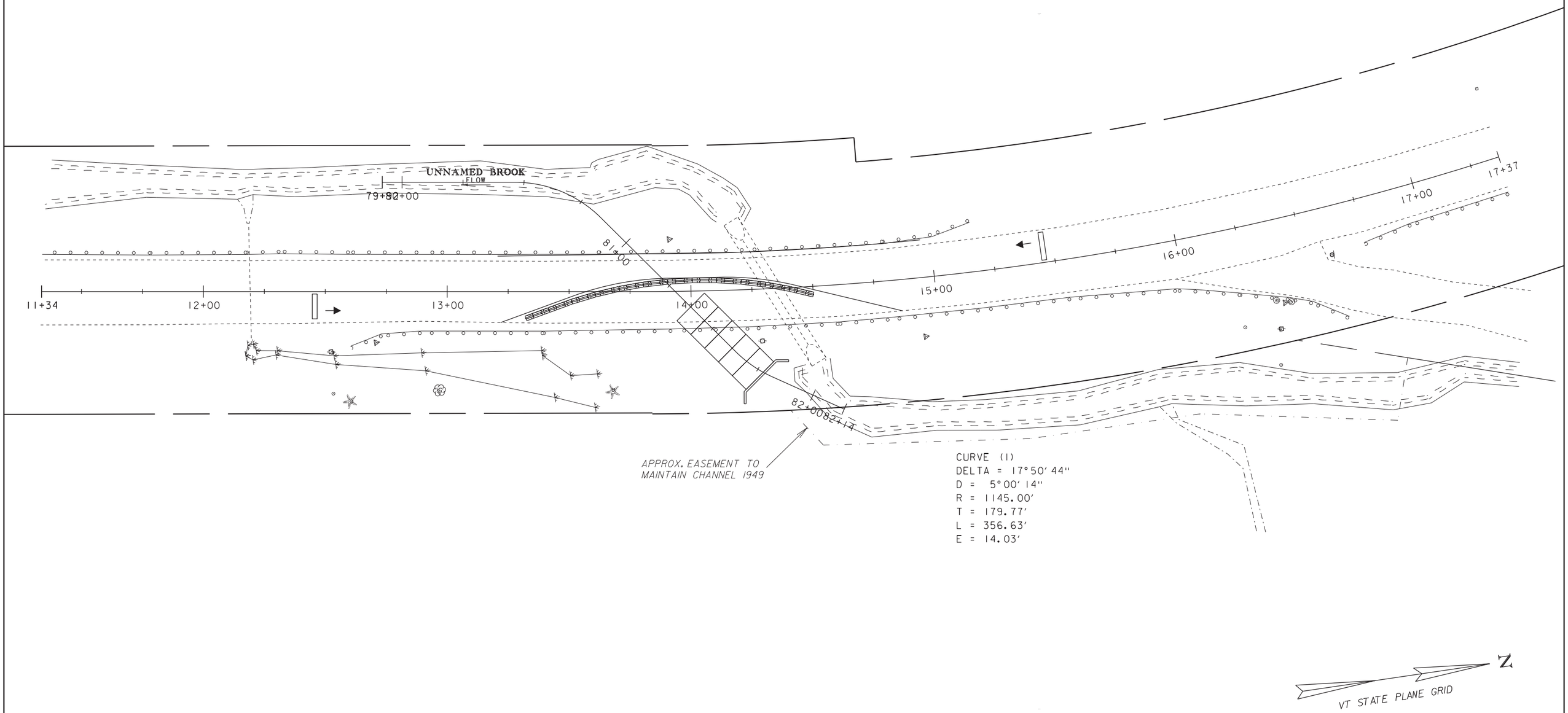


NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

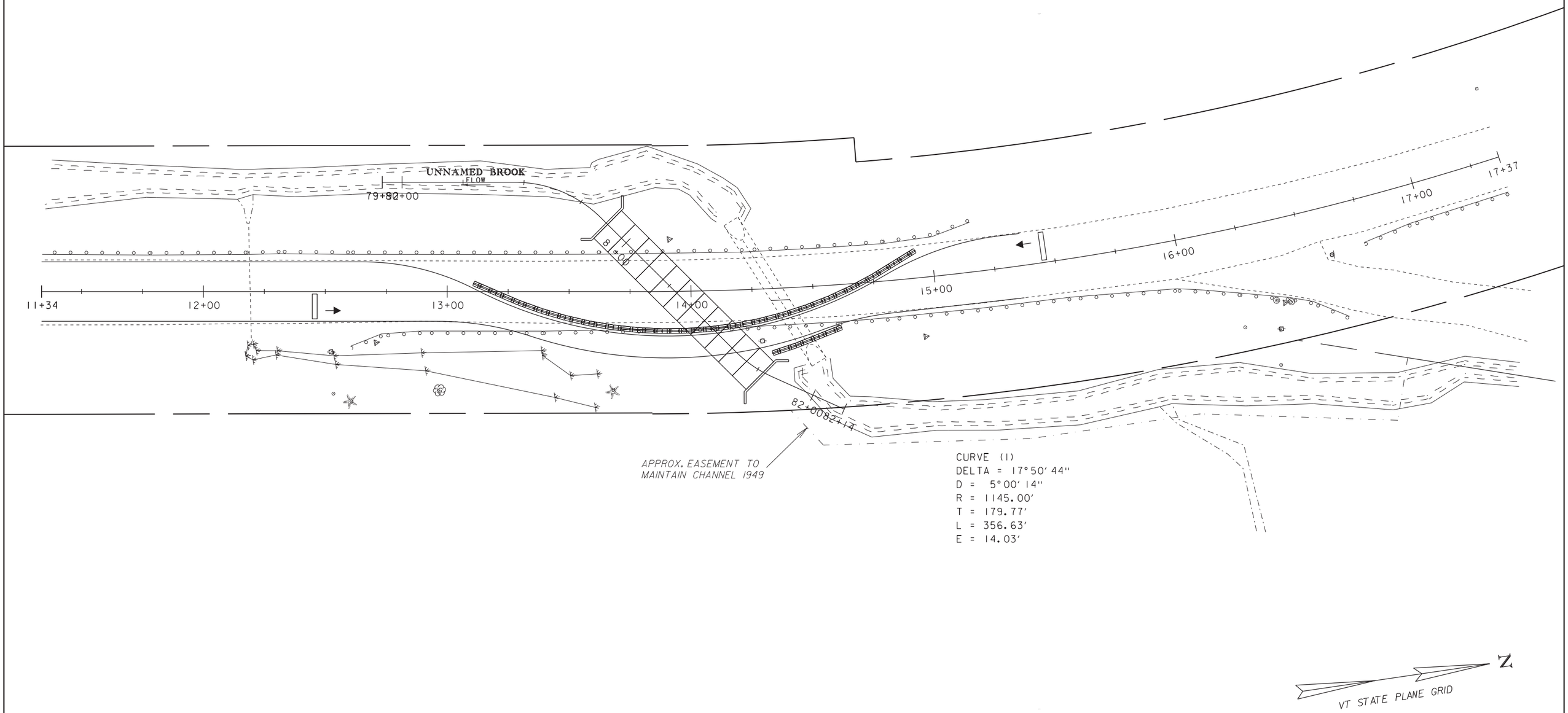
PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252profile.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 4 OF 9



PHASE 1 LAYOUT

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

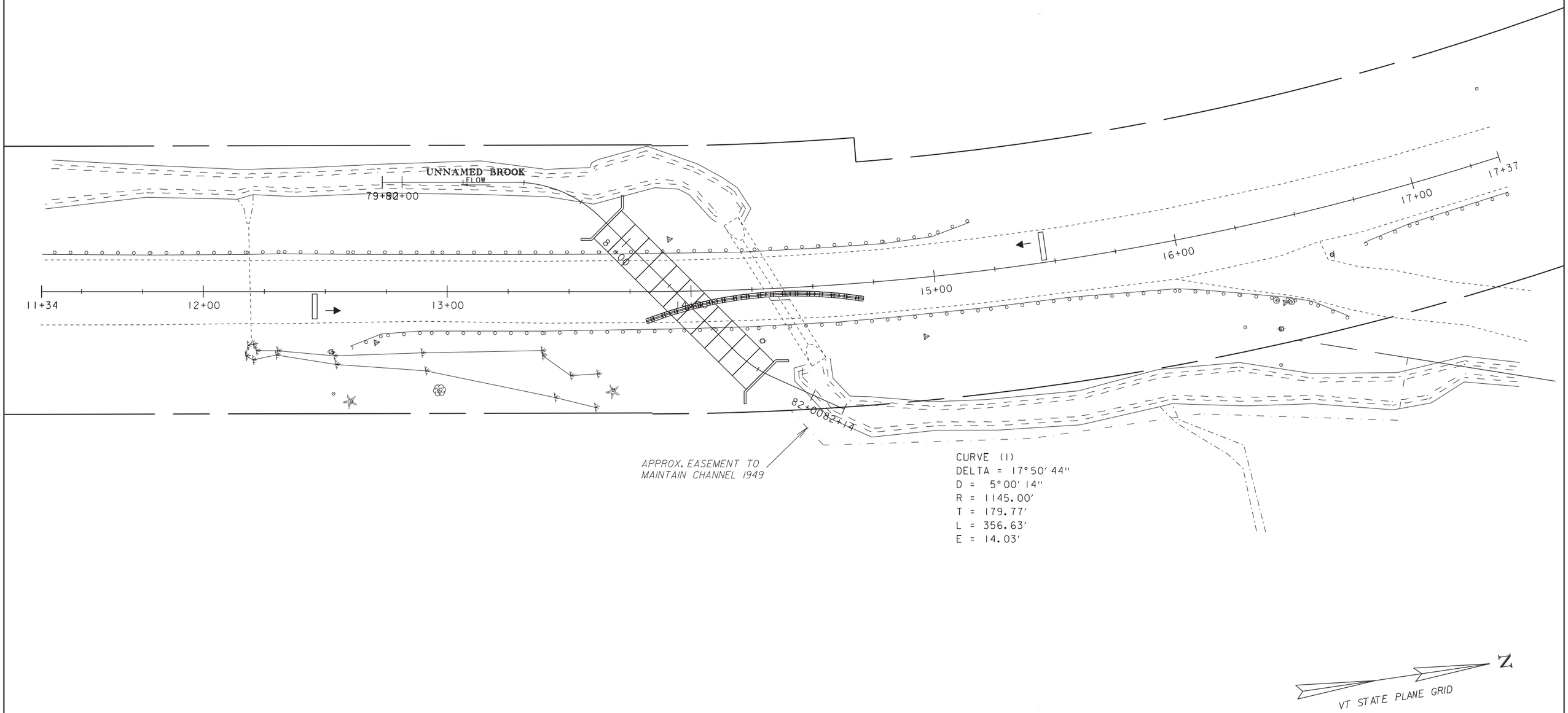
PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASE 1LAYOUT	SHEET 5 OF 9



PHASE 2 LAYOUT

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

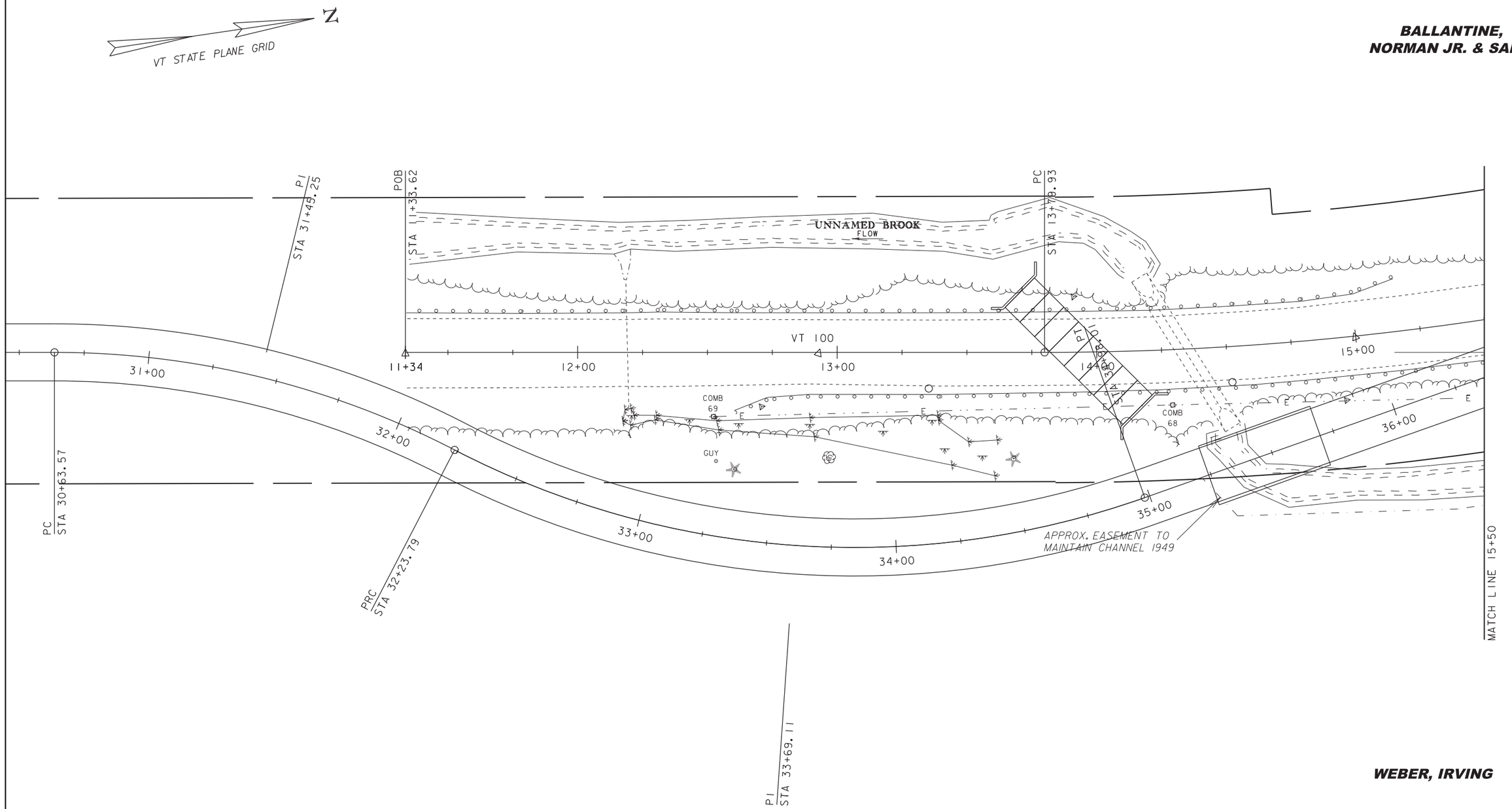
PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASE 2 LAYOUT	SHEET 6 OF 9



PHASE 3 LAYOUT

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

PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASE 3 LAYOUT	SHEET 7 OF 9



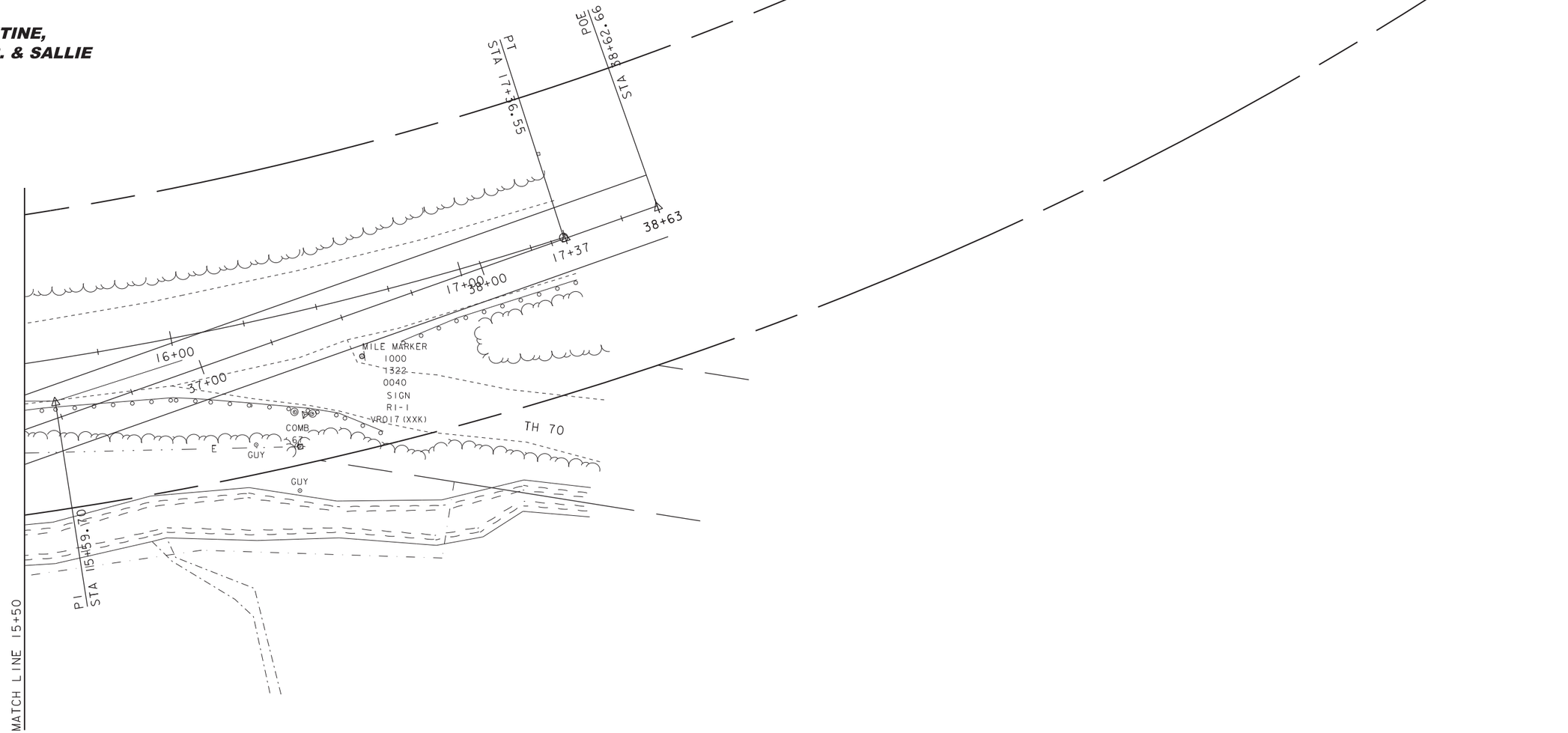
NOTE: TEMPORARY ALIGNMENT IS BASED ON
A 30 MPH DESIGN SPEED WITH
2% SUPERELEVATION (STANDARD E-107)

TEMPORARY BRIDGE LAYOUT #1

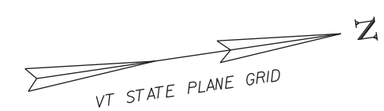
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: ------
TEMPORARY BRIDGE LAYOUT 1	SHEET 8 OF 9

BALLANTINE,
NORMAN JR. & SALLIE



WEBER, IRVING



NOTE: TEMPORARY ALIGNMENT IS BASED ON
A 30 MPH DESIGN SPEED WITH
2% SUPERELEVATION (STANDARD E-107)

TEMPORARY BRIDGE LAYOUT #2

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

PROJECT NAME: WILMINGTON	
PROJECT NUMBER: STP 013-1(14)	
FILE NAME: s00b252bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: ------
TEMPORARY BRIDGE LAYOUT 2	SHEET 9 OF 9