Plymouth BF 013-3(13)

Public Presentation

Vermont Route 100 – Culvert 115 over Reservoir Brook

August 7, 2017

Introductions

Elizabeth Richards – VTrans Scoping Engineer

Jonathan Griffin, PE – VTrans Scoping Engineer

Rob Young, PE – VTrans Project Manager

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Purpose of Meeting

- Provide an understanding of our approach to the project
- Provide an overview of project constraints
- Discuss alternatives that we considered
- Discuss our recommended alternative
- Provide an opportunity to ask questions and provide input

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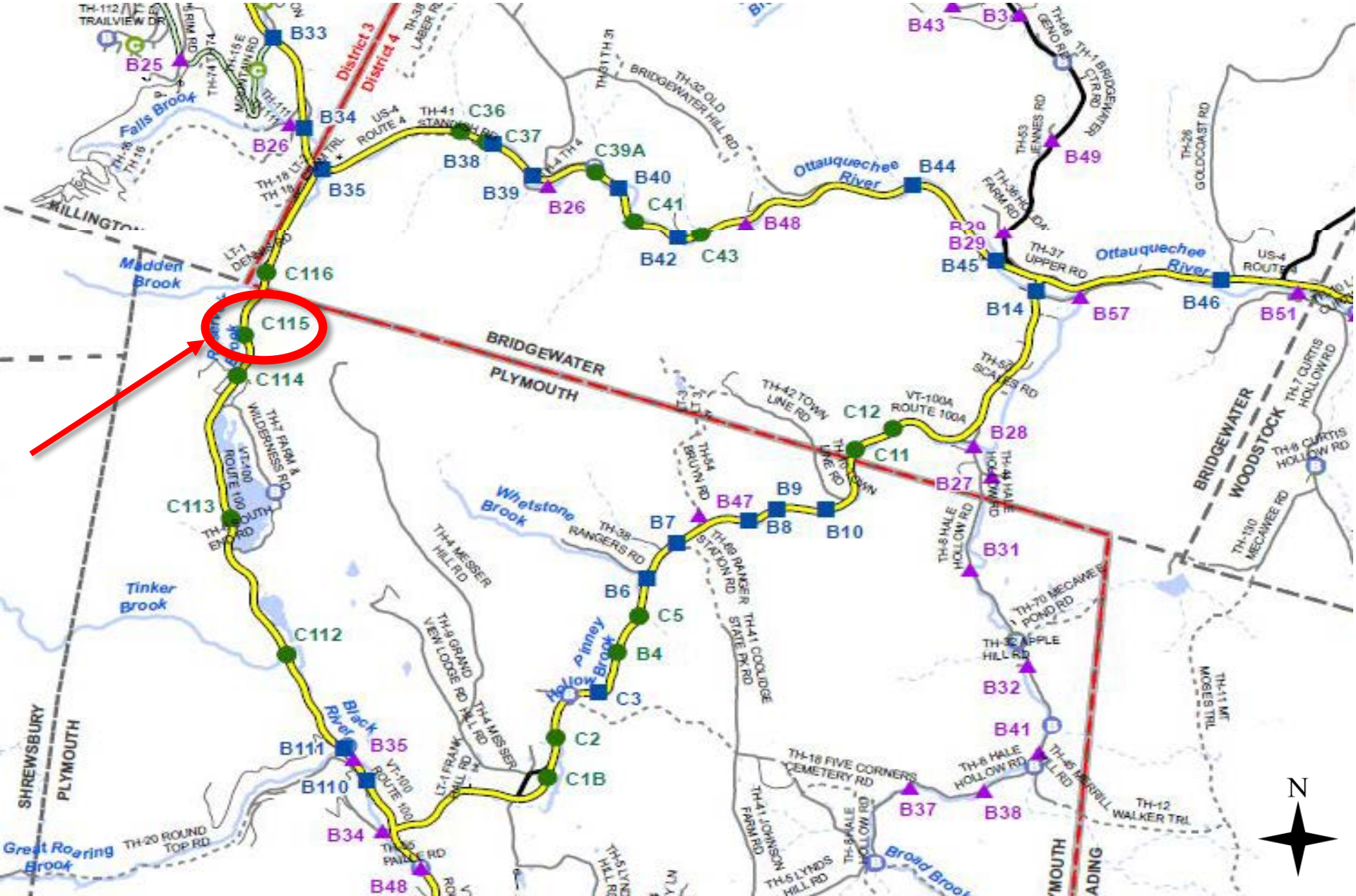
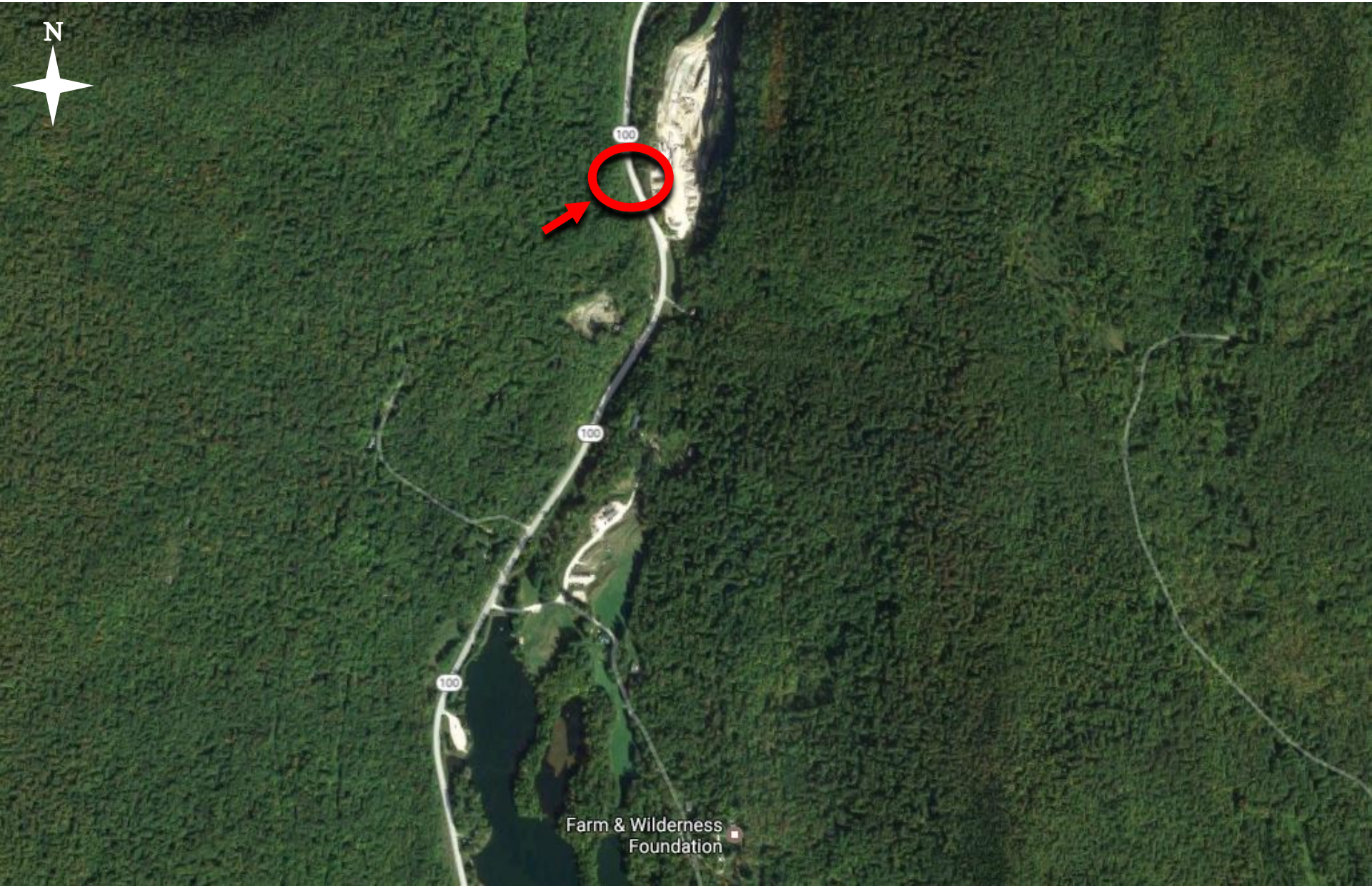
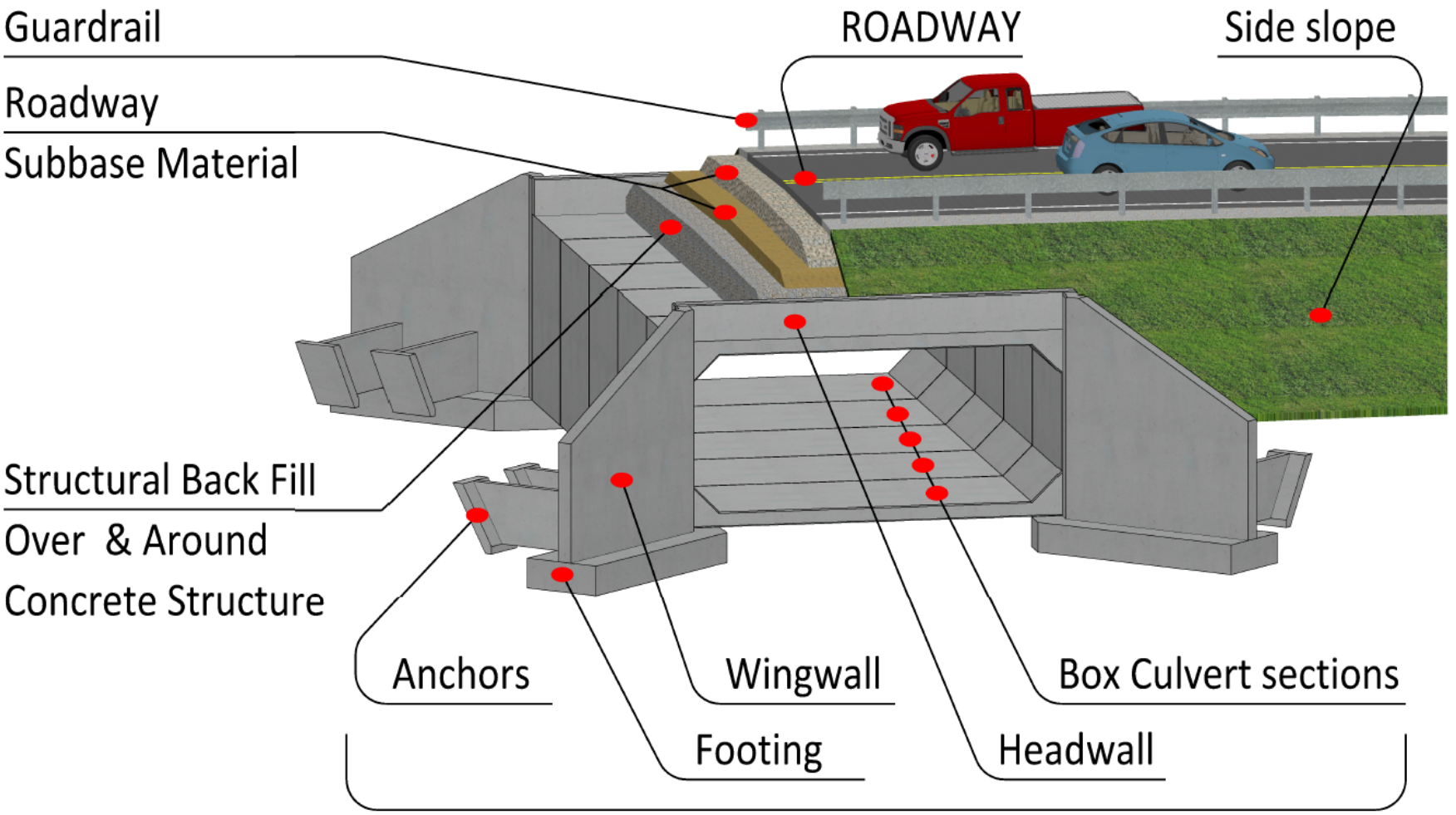
Location Map – Culvert 115



Orthographic Map – Culvert 115



Description of Terms Used



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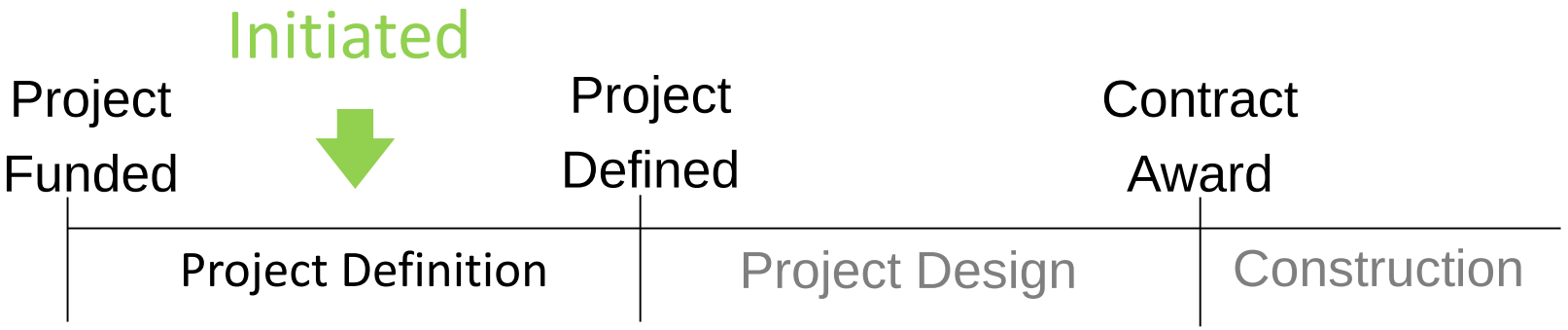
VTrans Project Development Process



- Identify resources & constraints
- Evaluate alternatives
- Public participation
- Build Consensus

- Quantify areas of impact
- Environmental permits
- Develop plans, estimate and specifications
- Right-of-Way Process (if needed)

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Project Overview

- Site Information
- Existing Conditions
- Design Criteria and Conditions
- Alternatives Considered
- Recommended Alternative

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Site Information

- Roadway Classification: Minor Arterial
- Culvert Type: Corrugated Galvanized Metal Plate Pipe
- Culvert Span: 8 Feet
- Constructed in 1971
- Ownership: State of Vermont

Existing Conditions

- This culvert has a rating of 4, “Poor”
- There are large perforations through the entire length of the culvert.
- The existing culvert does not meet hydraulic standards.

Looking south over the culvert

Existing Conditions

- Approach and bridge lane and shoulder widths are substandard.

Design Criteria and Considerations

- Average daily traffic of 940 vehicles
- Design hourly volume of 130 vehicles
- Design speed of 50 mph
- Utility locations
- Substandard Features:
  - Lane and shoulder width – approach and bridge
  - Hydraulics

Close proximity of Killington water pipe

Exposed bedrock

Alternatives Considered

- **No Action**
  - Not recommended because of limited service life under 10 years.
- **Rehabilitation**
  - Not recommended because of hydraulic inadequacy.
- **Structure Replacement – Buried w/ Natural Streambed**
  - Precast three-sided rigid frame or concrete arch
  - Metal arch
- **Structure Replacement – Four-Sided Structure**
  - Not recommended because of observed high levels of bedrock.
- **Structure Replacement – New Bridge**
  - New 50-foot span bridge with skew of 20°
  - Clear height of 7 feet above the channel

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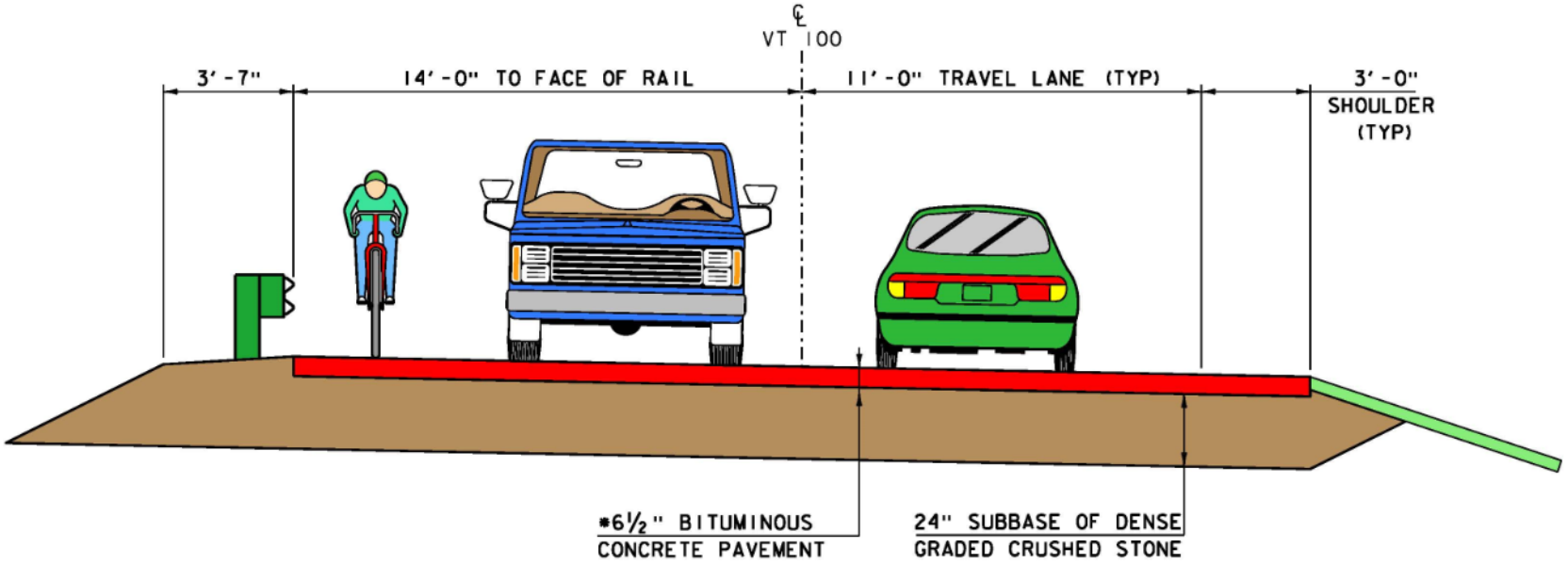
Recommended Alternative

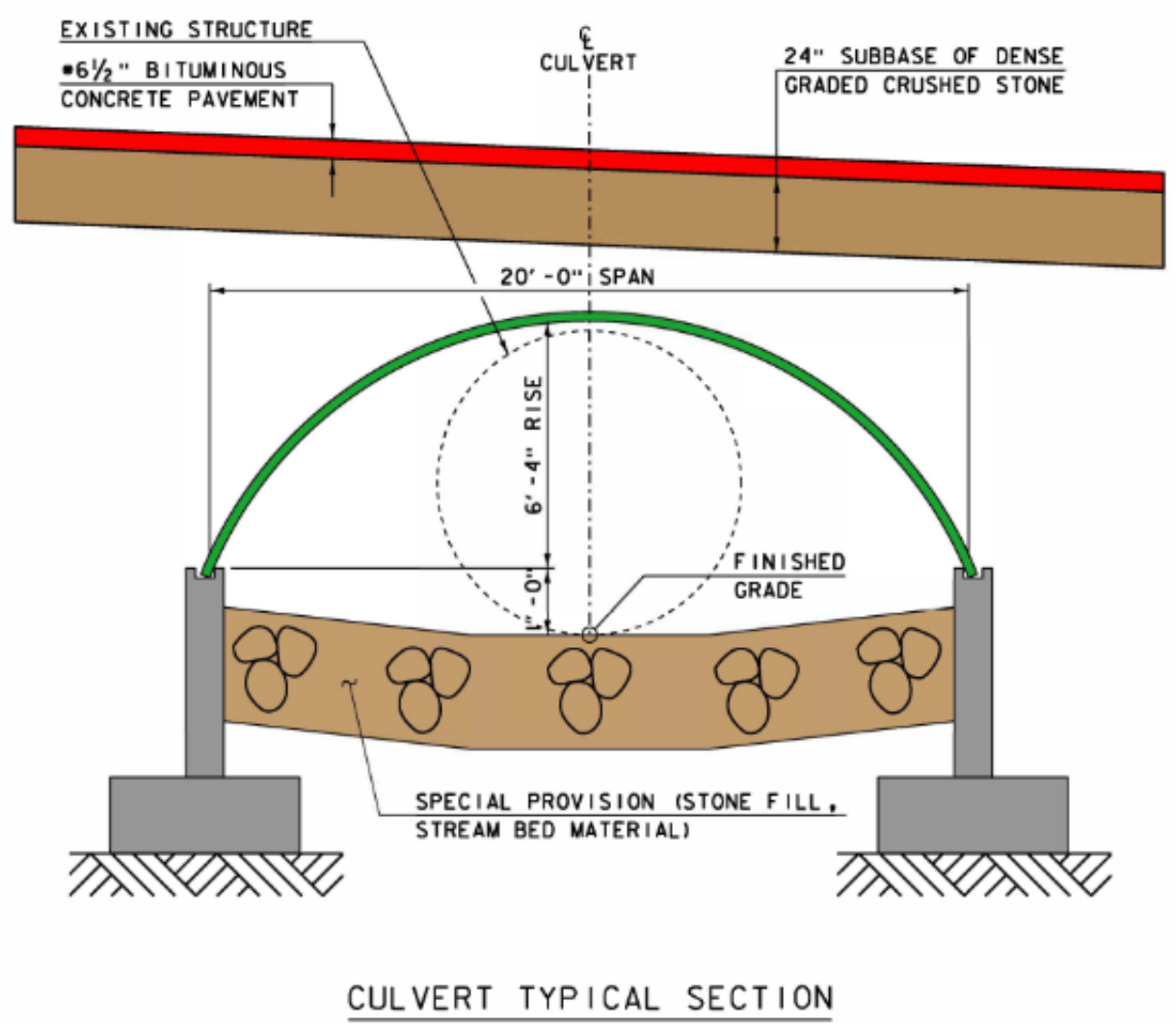
- New Metal Arch Concrete Pedestal Combination Structure
  - 20′ span arch, 6′-4″ height, 45° skew to roadway
  - Concrete pedestals founded on bedrock
  - Lowest up front and annualized cost
  - 75 year design life
  - Improved aquatic organism passage
  - Shorter construction schedule

Proposed Roadway Typical Sections

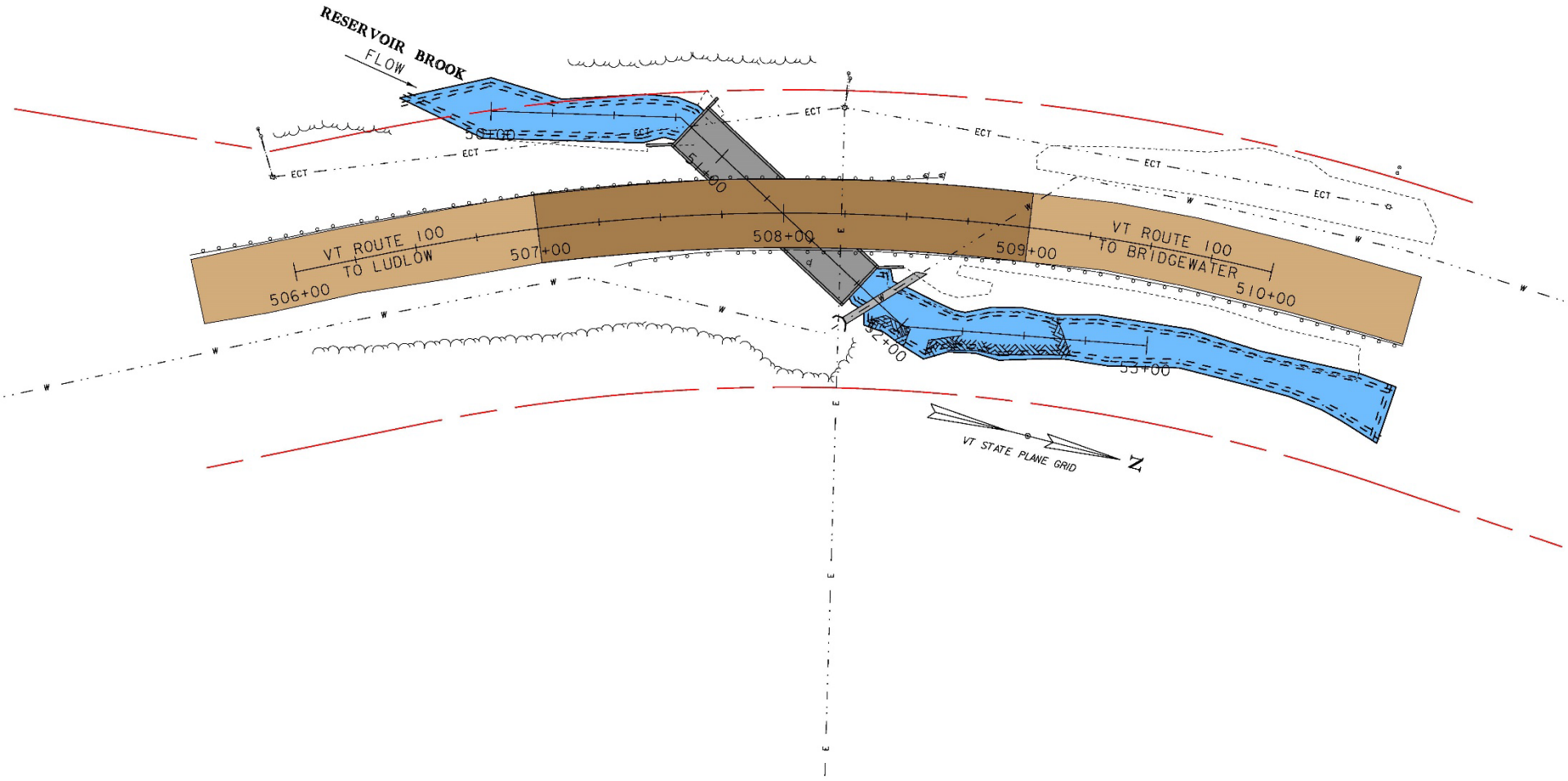


PROPOSED VT 100 TYPICAL SECTION

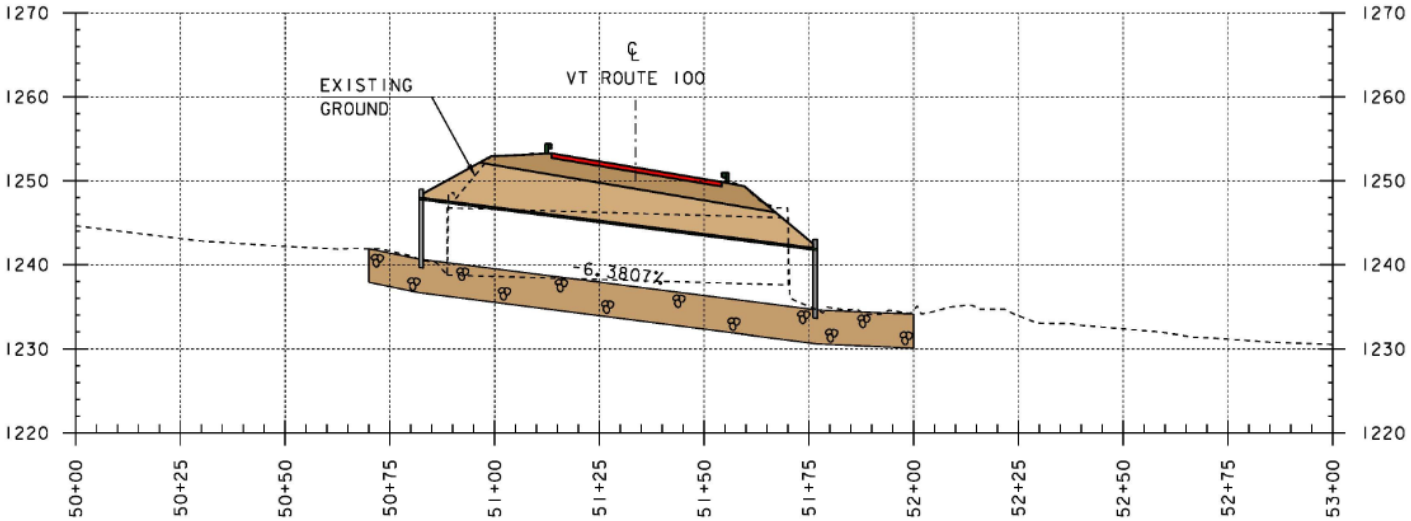
Proposed Culvert Typical Sections



Proposed Layout

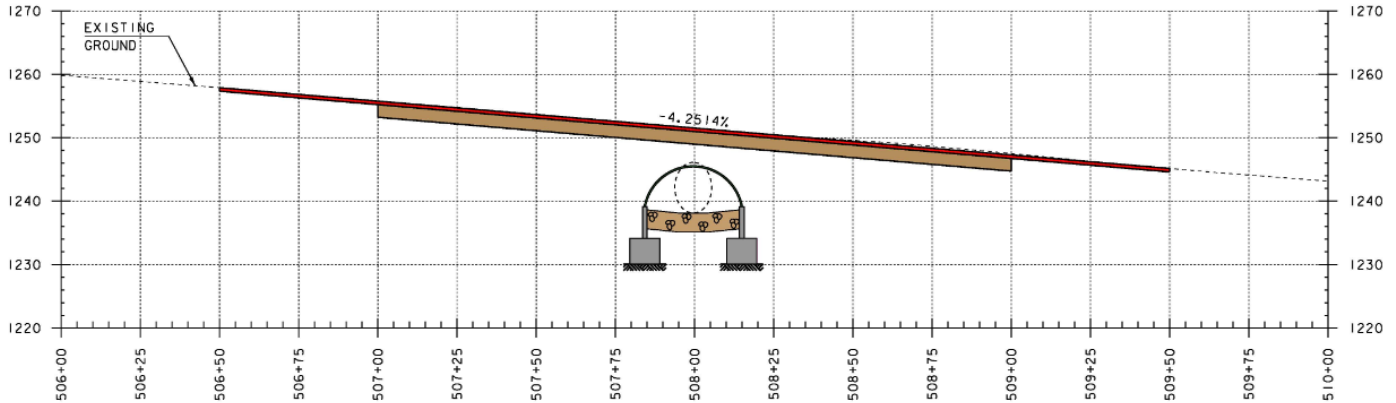


Proposed Profile



CULVERT 115 PROFILE

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



VT ROUTE 100 PROFILE

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

Example of Proposed Alternative

Maintenance of Traffic Options Considered

- Temporary Bridge
  - Close proximity of river
  - No cost-effective option for upstream or downstream bridge
- Phased Construction
  - Traditional sheet piles cannot get enough embedment to retain fill due to shallow depth of bedrock.
  - Braced excavation would increase costs
- Short Term Road Closure with Off-Site Detour
  - Recommended Maintenance of traffic option
  - Through distance: 5.4 miles, 7 min
  - Detour distance: 12.6 miles, 17 min

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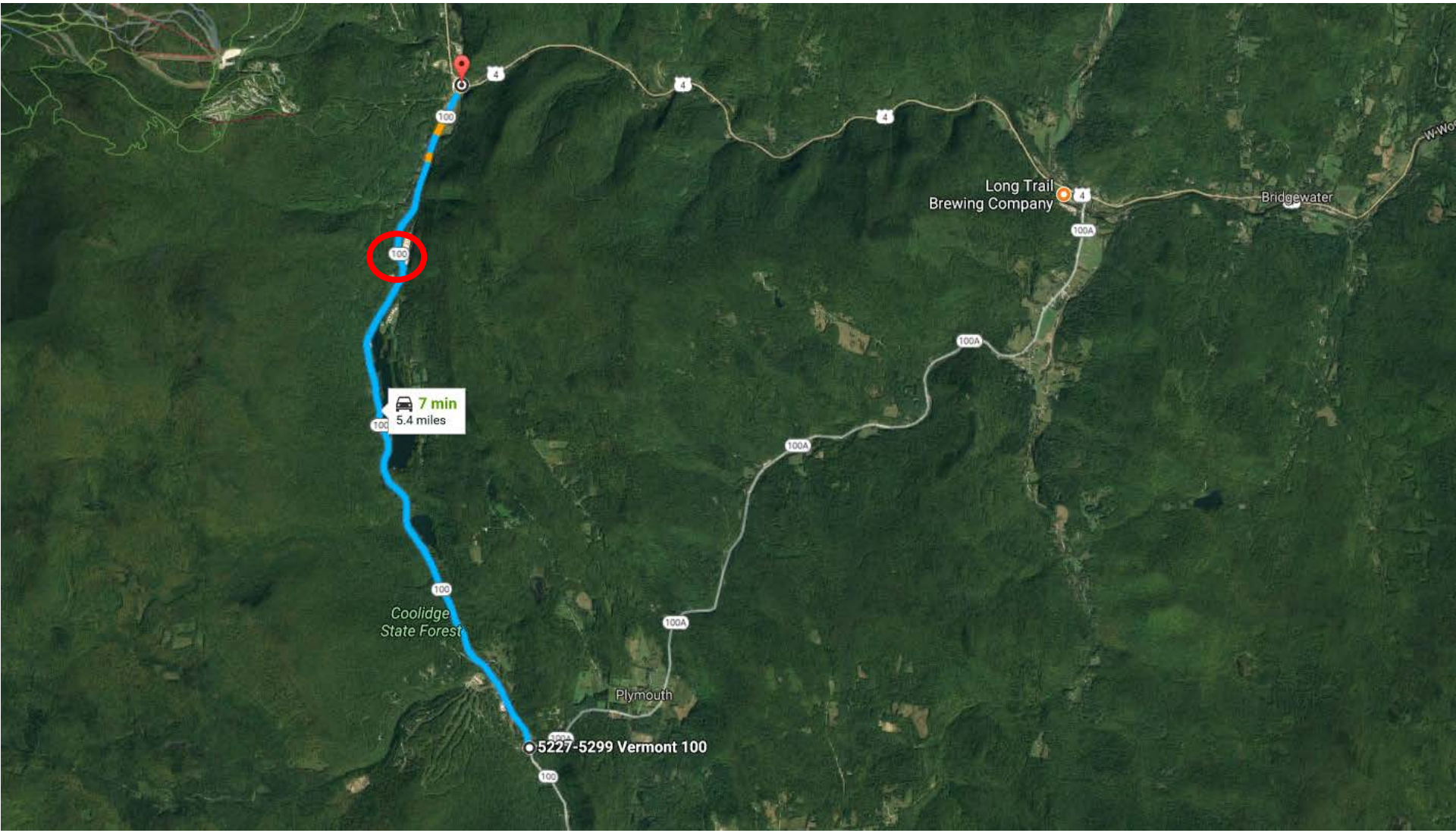
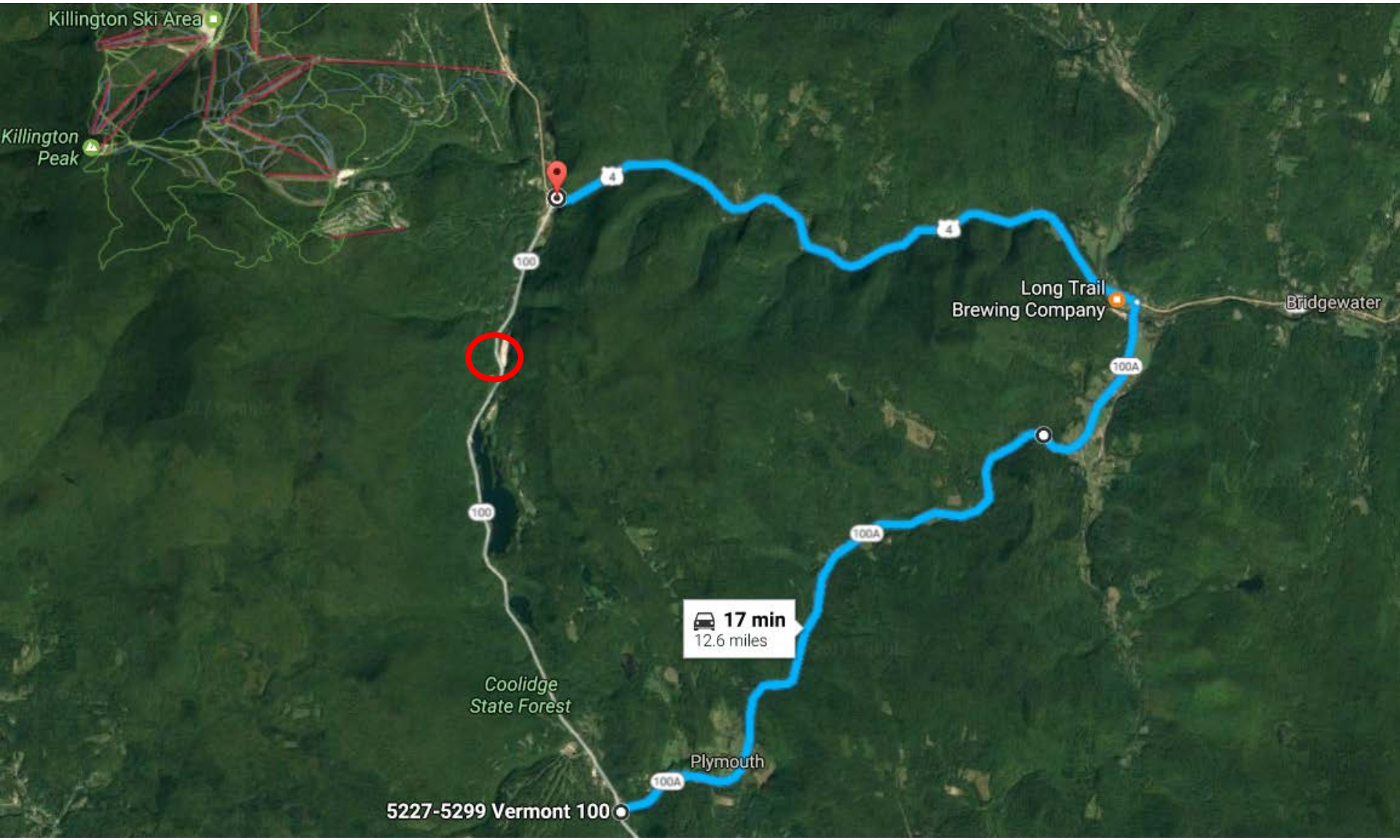
Offsite Detour – Road Closure

- 3 week closure
- Detour:
  - Through distance: 5.4 miles 7 min
  - Detour distance: 12.6 miles 17 min
  - Added distance: 7.2 miles 10 min
  - End to end distance: 18 miles 24 min
- No local bypasses

Through Distance



Detour Distance



Alternatives Matrix

Plymouth BF 013-3(13)	No Action	**Alternative 1:** Full Replacement with Rigid Concrete Frame		**Alternative 2:** Full Replacement with Metal Arch on Concrete Pedestals		**Alternative 3:** Full Replacement with Integral Abutment Bridge		**Alternative 4:** Full Replacement with Vertical Abutment Bridge	
		Detour	Phasing	Detour	Phasing	Detour	Phasing	Detour	Phasing
Total Project Costs	$0	$1,694,000	$2,266,000	$1,088,000	$1,510,000	$1,942,000	$2,578,000	$1,314,000	$1,793,000
Project Development Duration	N/A	2 years	2 years	2 years	2 years	2 years	2 years	2 years	2 years
Closure Duration	N/A	3 weeks	N/A	3 weeks	N/A	3 weeks	N/A	6 weeks	N/A
Construction Duration	N/A	3 months	8 months	3 months	8 months	3 months	8 months	6 months	8 months
Design Life	< 10 years	100 years	100 years	75 years	75 years	75 years	75 years	75 years	75 years
Annualized Project Cost	$0	$16,900	$22,700	$14,500	$20,100	$25,900	$34,400	$17,500	$23,900

Combination Recommended Alternative

Project Summary

- Replace entire structure with a new metal arch concrete pedestal combination structure:
  - Traffic maintained on offsite detour during 3 week closure
  - Meets hydraulic standards
    - AOP compliant
  - 20’ span arch, 6’ – 4” height, 45° skew to roadway
  - No utility relocation anticipated
  - ROW needed
  - Expected construction year: 2020

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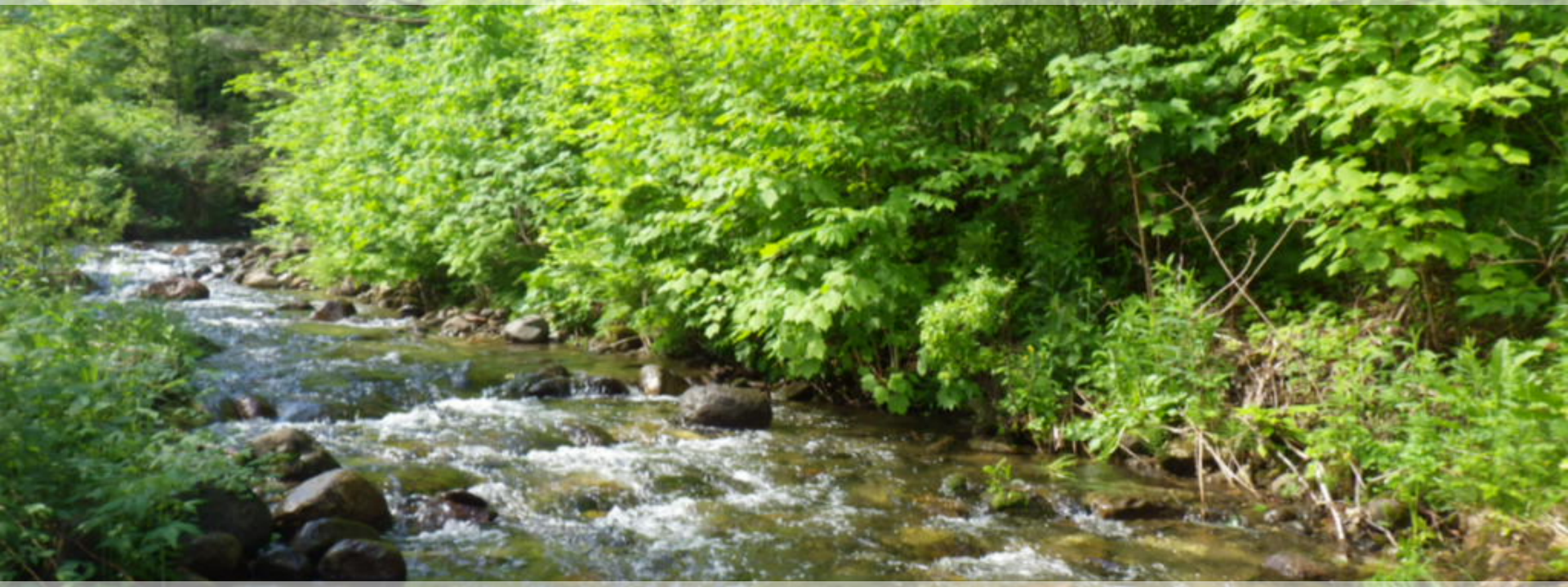
For more information:
https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/12b596



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Questions and Comments

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