



Danby BF 0130(4)

Project Update – Scope Re-Evaluation

FAS Route 130 (TH 1/Brook Road) – Bridge 7 over Mill Brook

April 11, 2024

Introductions

Andrew Lemieux, P.E.

VTrans Lead Design Engineer

Adam Goudreau, P.E.

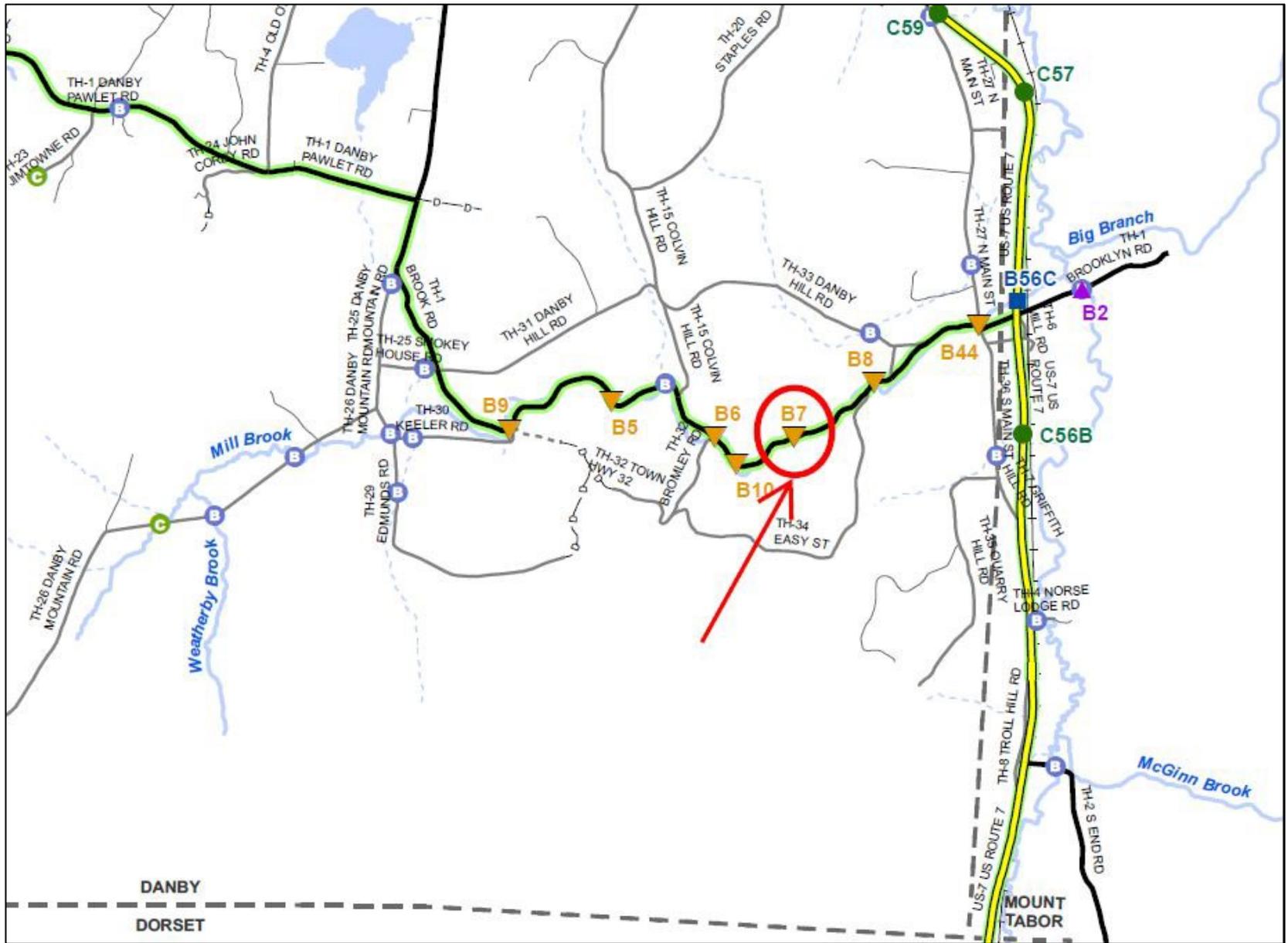
VTrans Project Manager

Purpose of Meeting

- Review current scope
- Present bridge replacement recommendation
- Provide an opportunity to ask questions and voice concerns
- Achieve consensus on scope

Meeting Overview

- Project Overview & Existing Conditions
- Scour Concern
- Current Project Scope vs Bridge Replacement Recommendation
- Scope Change Implications
- Next Steps
- Questions



Location Map

Bridge 7
Project Location



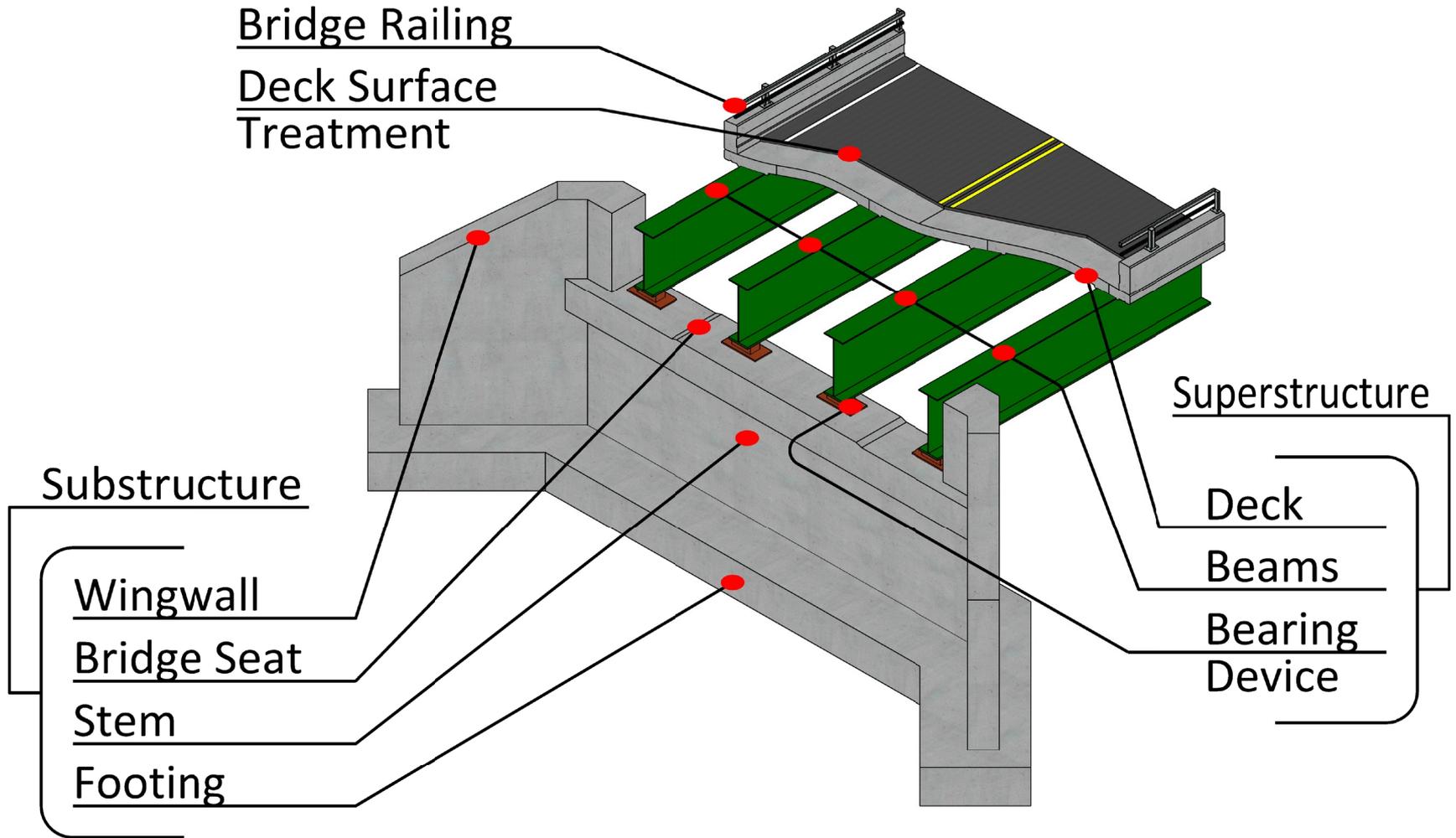
Brook Rd

Brook Rd

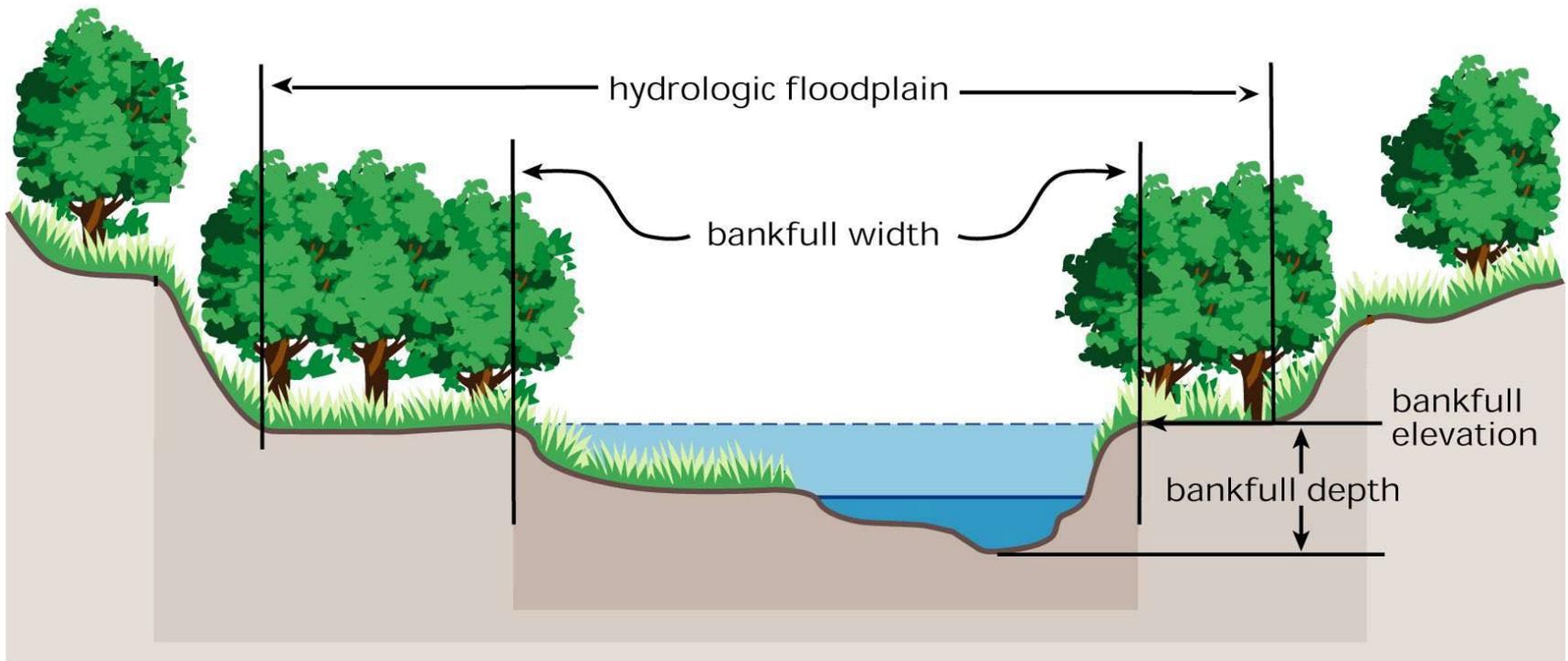
Brook Rd

Mill Brook

Description of Terms Used



Description of Terms Used



Looking West over Bridge 7



Existing Conditions – Bridge #7

- Roadway Classification – Rural Major Collector
- Bridge Type – 40' Span Concrete T-Beam
- Ownership – Town of Danby
- Constructed in 1928

Existing Site Conditions – Bridge #7

- The existing concrete T-beams have patched areas throughout, pop-outs, scaling and areas of spalling with exposed reinforcing.
- The substructures are in good condition with some minor deterioration, including:
 - Some cracking with efflorescence staining around the bridge seat.
 - Full-height vertical cracks present in a couple of locations.
- The existing bridge width is narrow for the roadway classification and traffic volumes. There is not adequate shoulder space for shared use.
- The horizontal and vertical curves through the project area are substandard.
- The bridge does not meet current hydraulic standards and the minimum bankfull width requirements.

Bridge Inspection Report Ratings



Existing Conditions - Bridge #7

- Deck Rating 5 (Fair)
- Superstructure Rating 5 (Fair)
- Substructure Rating 7 (Good)

Typical Abutment & Wingwall Condition



Wingwall 2



Abutment 2

Existing Conditions - Bridge #7

Full-Height Vertical Cracking



Wingwall 4



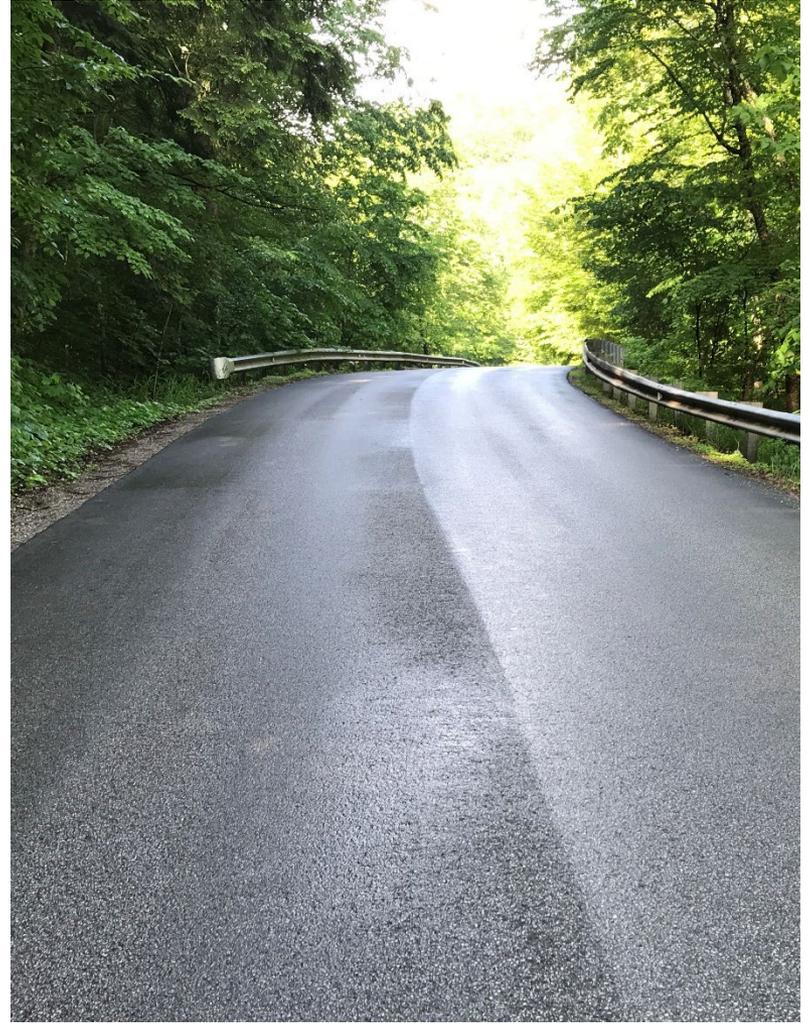
Abutment 1

Existing Conditions - Bridge #7

Substandard Roadway Geometry



West Approach



East Approach

Existing Conditions - Bridge #7

Project Development Timeline

- Project Programmed in 2012
- Project Scoping Started: February 2021
- Alternatives Presentation to Town: May 2022
- Project Design Started: February 2023
- Currently Progressing through Preliminary Design
 - Identified presence of a scour concern, warranting reconsideration of project scope

What is Scour?

Local Pier Scour



Local Abutment Scour



Scour In Vermont



Top Left: Observed Scour –
Huntington, VT

Top Right: Complete Failure –
Rochester, VT

Bottom Left: Stable –
Braintree, VT

Scour Concerns - Bridge #7

- Top of footing observed October 2022
- Bridge inspection records note various amounts of scour to the beginning of records.
- Hydraulic calculations predict scour depth ~1.3ft below bottom of footing during the design flood.
- Elimination of or protection from this hazard must be included in the project design.

Original Scope – Bridge #7

- Rehabilitation (Superstructure Replacement)
 - New deck, railings, and shallow superstructure
 - Widen to meet minimum standard bridge width (3'-9'-9'-3')
 - 50-year design life*
 - Accept substandard bankfull width and hydraulic capacity
 - Accept substandard roadway geometry
 - Maintain bridge rail type (fascia-mounted)
- Scour protection by armoring would be required
 - Replace top two feet of streambed with stone fill to armor streambed
 - Would extend at a minimum to the upstream and downstream extents of wingwalls
 - If damage occurs to the armoring in a flooding event, the town may be responsible for repairs to ensure continued protection

*As originally presented. At this time, we are anticipating a 40-year design life due to scour risk and observed substructure cracking.

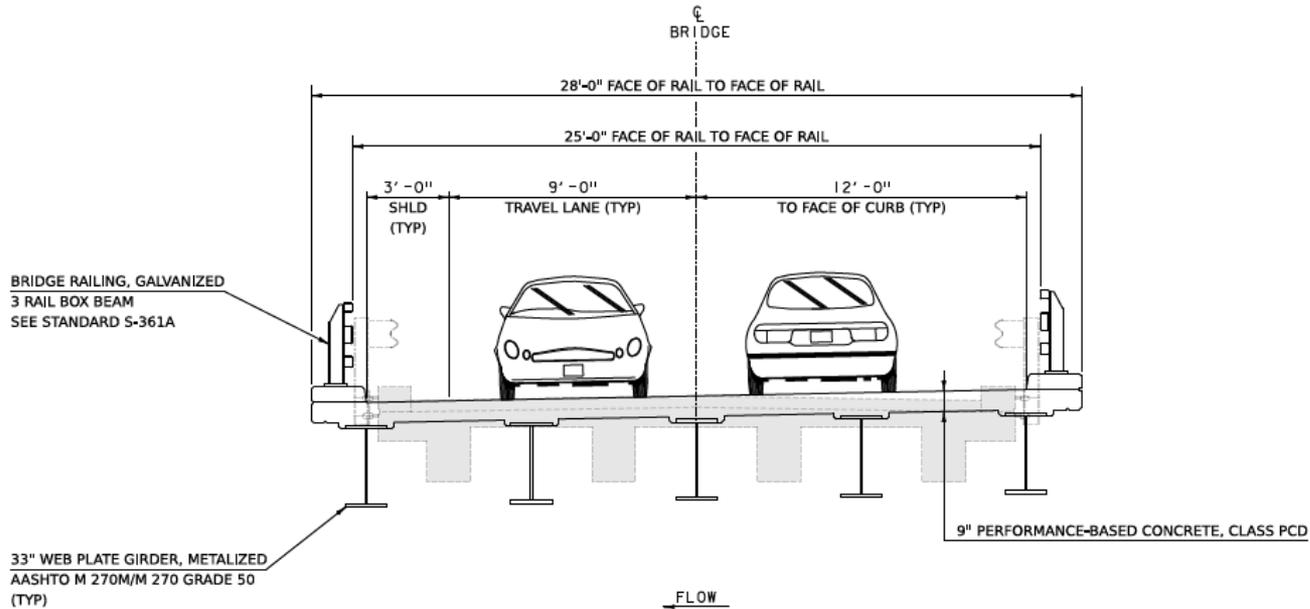
Recommended Scope Revision – Bridge #7

- Full Bridge Replacement
 - New deep foundations and substructure
 - 85' Span plate girder superstructure
 - Widen to meet minimum standard bridge width (3'-9'-9'-3')
 - 75-year design life
 - Meet bankfull width requirement and hydraulic standard
 - Improve roadway geometry
 - Improve bridge railing
- Eliminate scour hazard through foundation design
 - Increase corridor resiliency
 - Driven steel piling designed to withstand the anticipated scour if it were to occur
 - Front of abutments will be protected with stone fill (will not be placed across whole channel)

Project Alternative Comparisons

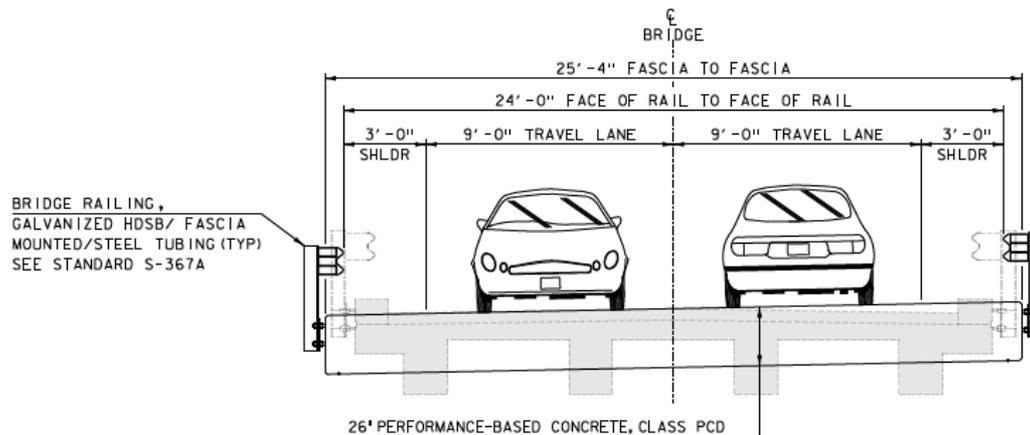
- Roadway Width
- Bridge Rail
- Extent of Substructure Modifications
- Roadway Alignment
- Service Life

Bridge Typical Section Comparison



PROPOSED FULL REPLACEMENT TYPICAL SECTION

SCALE $\frac{3}{8}$ " = 1'-0"



PROPOSED SUPERSTRUCTURE REPLACEMENT TYPICAL SECTION

SCALE $\frac{3}{8}$ " = 1'-0"

Bridge Rail Type



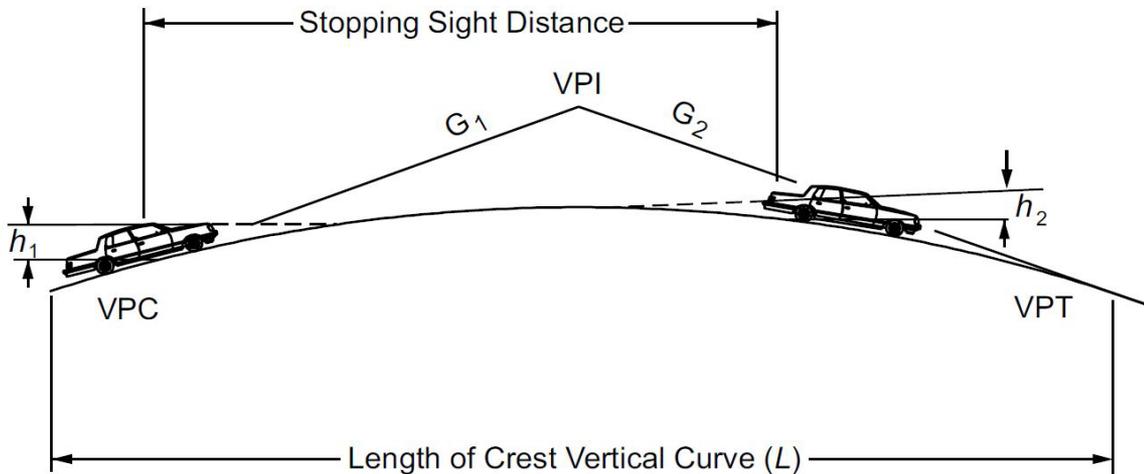
Top Left: Fascia-Mounted

Top Right: 3-Rail Box Beam

Bottom Left: 2-Rail Box Beam

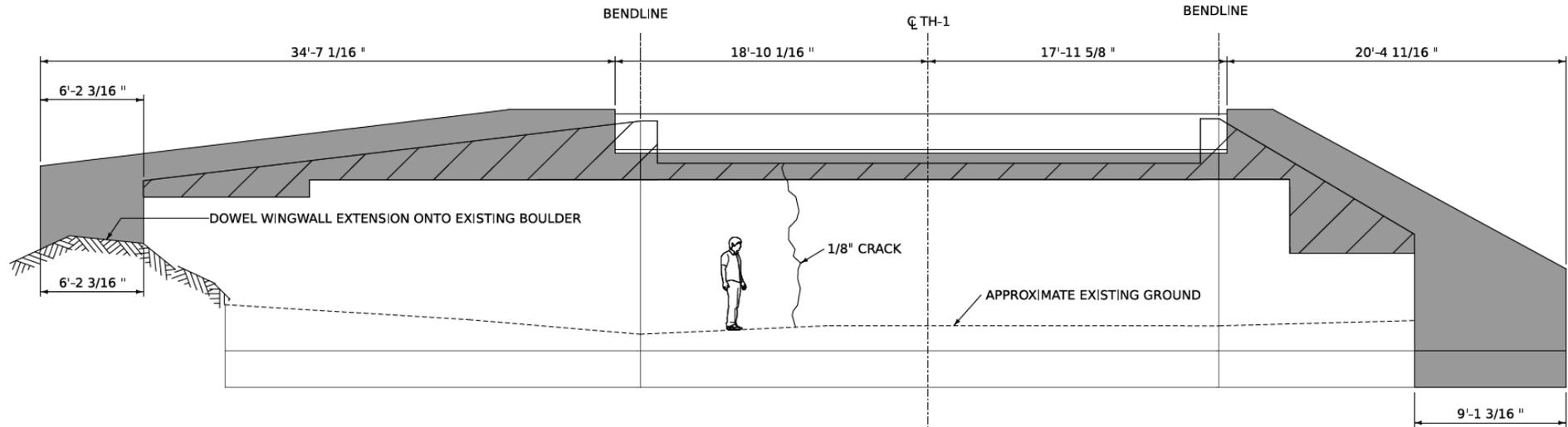
Roadway Alignment

Alternative	Stopping Sight Distance (feet)	Curve Parameter "K"*
Minimum Standard	200	19
Existing Conditions	184	13
Superstructure Replacement	209	17
Full Replacement	246	25



*"K" is a measure of vertical curve sharpness, larger numbers are more gentle.

Original Scope – Abutment 1 Modifications



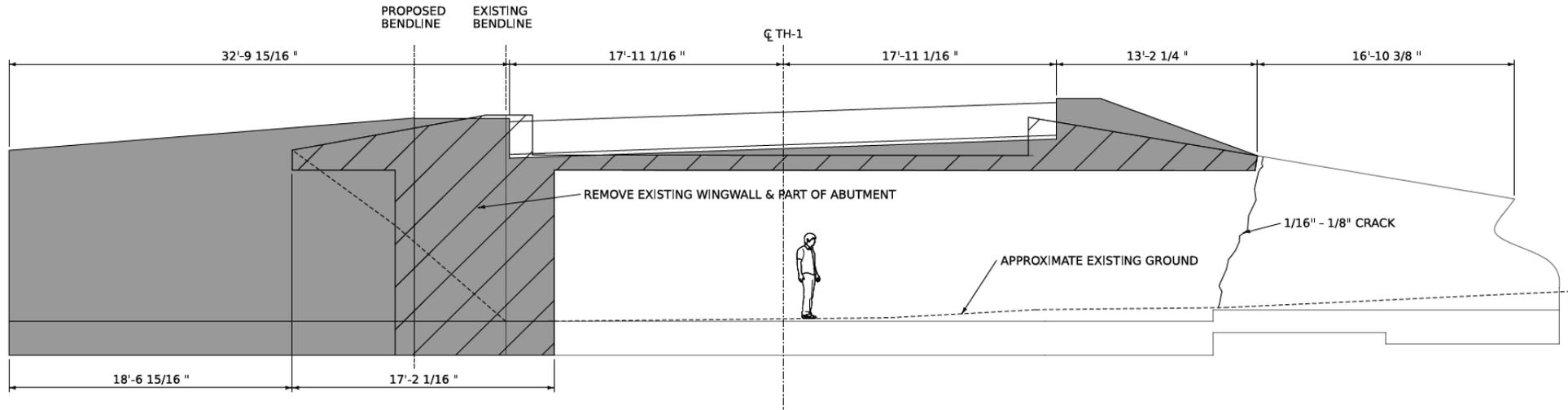
- = NEW CONCRETE
- ▨ = EXISTING CONCRETE TO BE REMOVED

ABUTMENT 1 ELEVATION

SCALE: 1/4" = 1' - 0"



Original Scope – Abutment 2 Modifications



ABUTMENT 2 ELEVATION

SCALE: 1/4" = 1' - 0"

- = NEW CONCRETE
- = EXISTING CONCRETE TO BE REMOVED

PROJECT NAME:	DANBY
PROJECT NUMBER:	BF 0130(4)
FILE NAME:	FileName



Looking Downstream - Appearance Will Remain Similar



Rehabilitation - Superstructure Replacement

Looking Downstream – Conceptual Rendering



Full Bridge Replacement

Scope Change – Construction Schedule Implications

- Original scope and agreement with Town provided for 60 Day bridge closure period
 - Traffic maintained on offsite detour selected and signed by Town
 - Full bridge replacement while maintaining traffic on an offsite detour
- With extent of substructure work identified in rehabilitation, is an aggressive timeline
 - Risk of increased bid prices if not extended
- Full bridge replacement will require longer closure
- Conceptual construction schedules have not been developed at this time

Scope Change - Cost Implications

	Rehabilitation	Replacement
Total Project Cost	\$2.5 Million	\$5.0 Million
Town Share (%)	\$62,500 (2.5%)	\$250,000 (5.0%)
Design Life (YR)	40	75
Annualized Cost	\$1,600	\$3,300

- Design life reduced for rehabilitation
 - Maintenance of scour protection may be necessary during service life
- Increased service life for replacement
 - Bridge joint may be present, which would require maintenance over service life.
- Full bridge replacement would increase Town share from 2.5% to 5%

Project Schedule

- Preliminary Design
 - 75% Complete for Superstructure Replacement
 - 6 Months additional design time for full replacement (does not impact year of construction)
- Anticipated Construction Start – 2027

Next Steps – Bridge #7

General list of key upcoming activities, not a complete list of project tasks

- ➔ Wait for Town response to recommended scope change
- Complete preliminary plans and distribute for comment
 - Re-Process Finance & Maintenance Agreement if changing scope
 - Right-of-Way process
 - Updates on project plans and estimates at Final Design

For more information:

- <https://outside.vermont.gov/agency/vtrans/external/Projects/Structures/12J618>



Danby BF 0130(4)

Questions and Comments

FAS Route 130 (TH 1/Brook Road) – Bridge 7 over Mill Brook

May 12, 2022