Local Concerns Meeting

Town of Northfield- September 26th, 2023

Bridge 65 – Town Highway No. 57 over New England Central Railroad & Dog River

Northfield BO CVBR(4)

Stantec

VTrans Working to Get You There
Vermont Agency of Transportation

Introductions

Laura Stone, P.E.

VTrans Scoping Engineer

Judith Ehrlich,

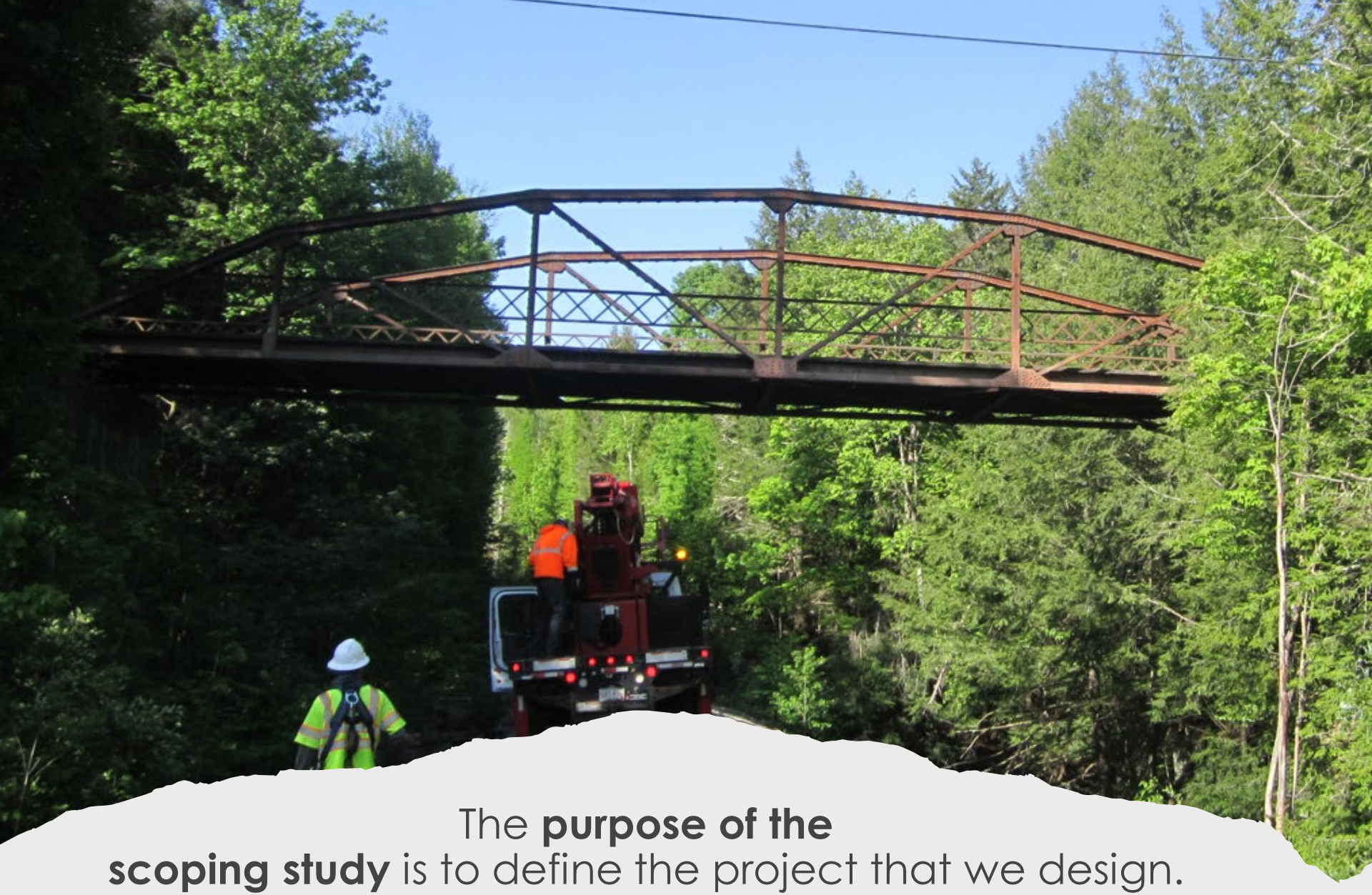
Historic Preservation Specialist

Tom Knight, P.E.

Stantec Project Manager

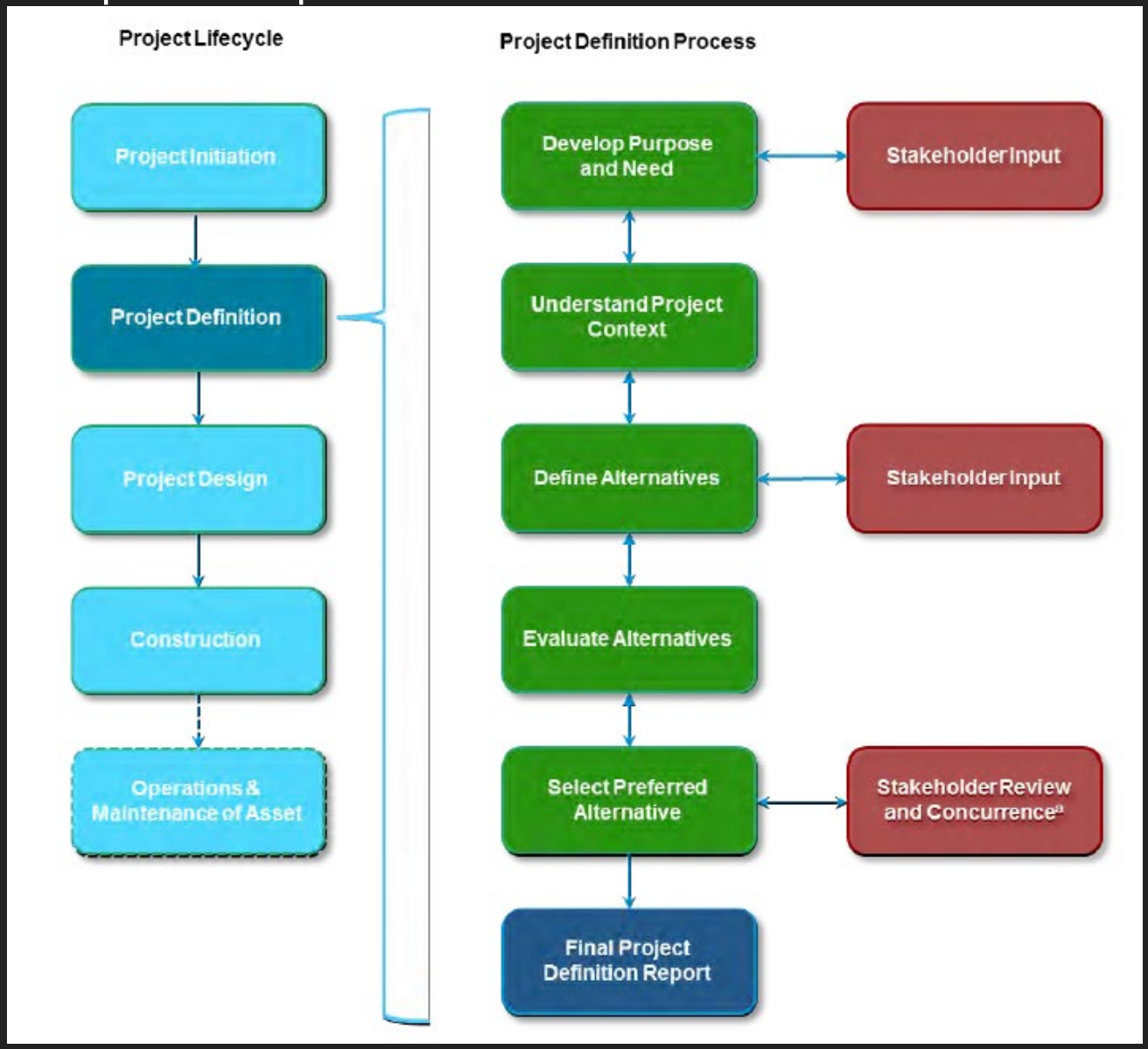
Agenda

1. Review project area and purpose of the meeting and where we are in the process
2. Background information (discussing the current conditions)
3. Discuss historic review process - feasible and prudent criteria 106 and 4(f)
4. Discuss feasibility of rehabilitation
5. Public input
6. Discuss next steps & questions



The **purpose of the scoping study** is to define the project that we design.

Where does this study fit in the project development process?



ACT 153 of the 2012 Legislative Session

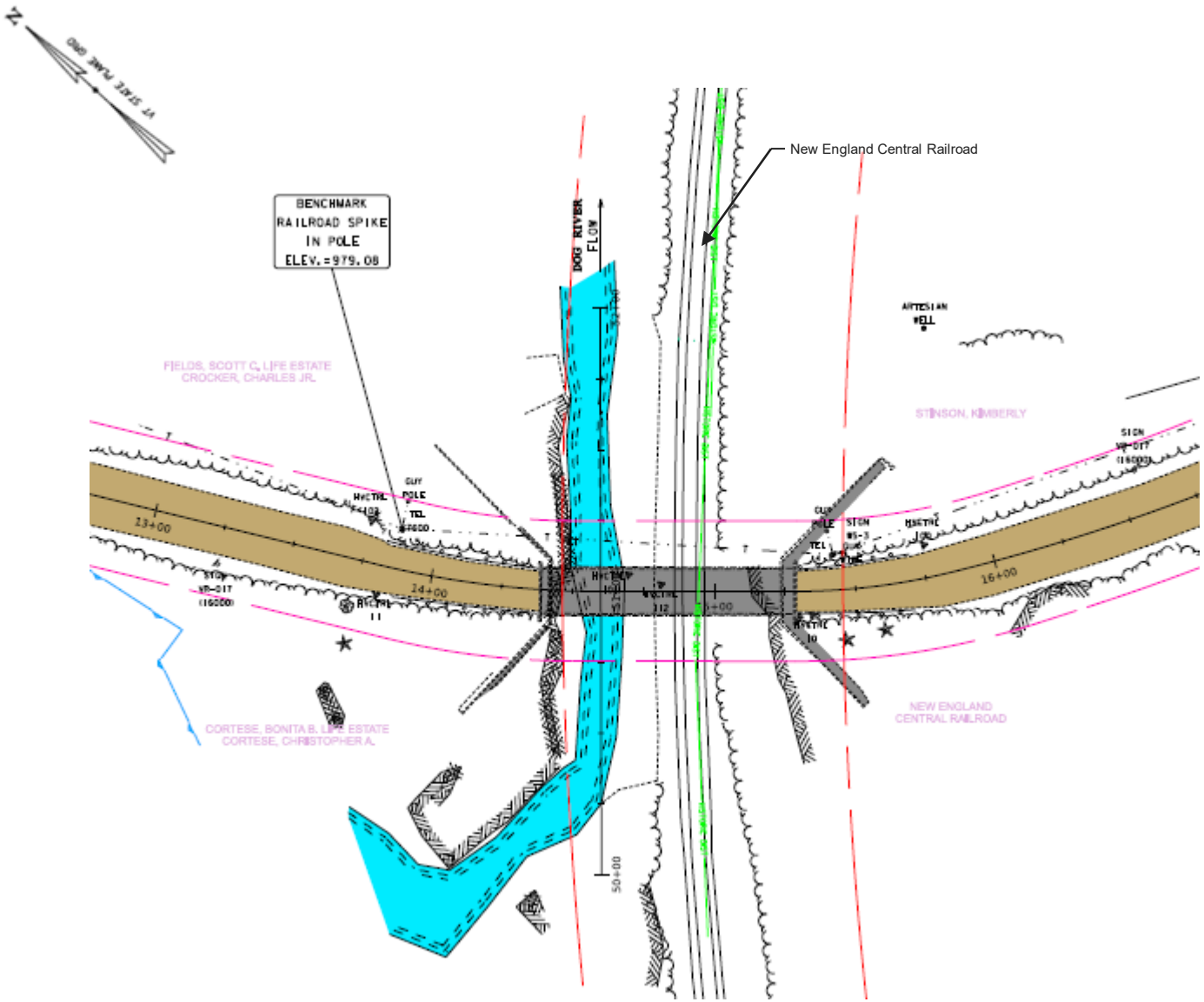
	Local Share	
	Road Closed During Construction	Road Open During Construction
Rehabilitation	2.5%	5%
Replacement	5%	10%

- Per Act 153, the local share is reduced by 50% for rehabilitating versus replacement
- Per Act 153, the local share is reduced by 50% for closing the road to traffic during construction

The project area & information needed

- Traffic
- Safety
- Crash history
- Environmental resources

- ROW / property owners
- Utility information
- Town facilities
- Parks / historic sites
- Survey
- Condition of the bridge
- Current and future use of the crossing



Existing Conditions

Existing Bridge Information

- **Features Crossed:** New England Central Railroad and Dog River
- **Ownership:** Town of Northfield
- **Constructed:** 1908 +/-
- **Rehabilitation:** 1986
- **Span:** 91 feet
- **Width:** 15’-5” Curb to Curb
- **Load Posting:** 16,000 lbs
- **Inventory Load Rating:** 8 tons
- **Vertical Clearance over Railroad:** 20’-5”
- **Average Annual Daily Traffic** = 153 Veh. Per Day
- **Bridge Condition (0-9):** Deck = 6 , Superstructure = 4 , Substructure = 5

Defining the need for the project and the visions for what take shape.

What are the design criteria?

&

What are the known deficiencies?

Bridge/Roadway Design Criteria

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	2-8.5-8.5-2	2-9-9-2	Substandard
Vertical Clearance	VSS Section 6.7	20'-5"	23'-0"	Substandard
Bridge Lane and Shoulder Widths	VSS Section 6.7	15'-5"	18 feet (Single Lane Bridge) 22 feet (Tow Lane Bridge)	Substandard
Stopping Site Distance	VSS Table 6.1	K = 11.4	K = 20	Substandard
Posted Speed Limit	VSS footnotes	30 MPH	Design Speed not required.	Built in exception for historic resources
Bicycle/Pedestrian Criteria	VSS Table 6.8	No shoulder	3' Shoulder	Substandard for Bicycles
Bridge Railing	Structures Design Manual Section 13	Metal Lattice Railing	TL-2	Substandard
Hydraulics	VTrans Hydraulics Section	Flow not restricted by waterway opening.	Pass Q25 storm event with 1.0' of freeboard	Current opening passed design storm but does not meet width.
Structural Capacity	SM, Ch. 3.4.1	16,000 lbs	Design Live Load: HS-15 (30,000 lbs)	Timber Deck Results in 16,000 load limit Structural Capacity of Truss is similar to this 16,000 lbs limit

The Vermont Statutes Online

Title 23 : Motor Vehicles

Chapter 013 : Operation Of Vehicles

Subchapter 015 : Weight, Size, Loads

(Cite as: 23 V.S.A. § 1392)

§ 1392. Gross weight limits on highways

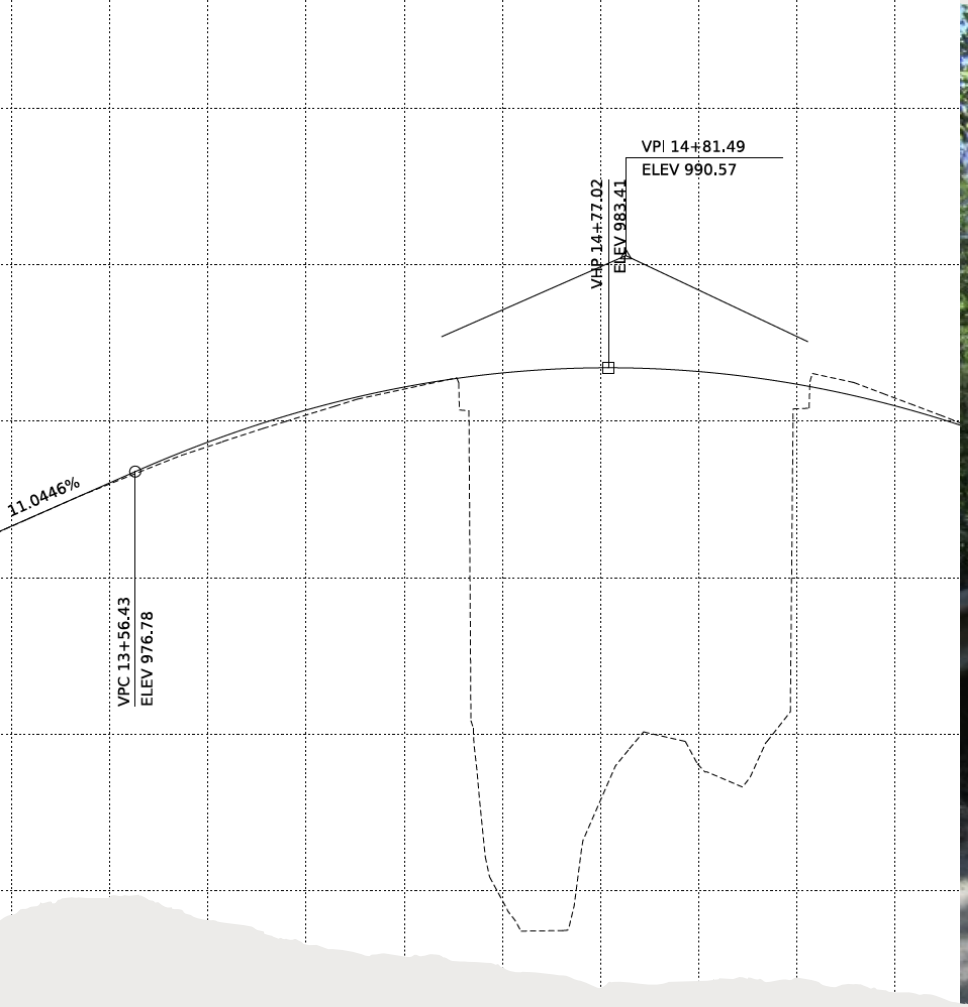
Except as provided in section 1400 of this title, a person or corporation shall not operate or cause to be operated a motor vehicle in excess of the total weight, including vehicle, object, or contrivance and load, of:

(1) 16,000 pounds upon any bridge with a wood floor, wood subfloor, or wood stringers on a class 3 or 4 town highway or 20,000 pounds on a bridge with wood floor, wood subfloor, or wood stringers on a class 1 or 2 town highway unless otherwise posted by the selectboard of such town.

(2) 24,000 pounds, upon a class 2, 3, or 4 town highway or bridge with other than wood floor, in any town or incorporated village.

(3) No vehicle may exceed a gross weight in excess of 80,000 pounds unless the operator or owner of the vehicle has complied with the provisions of section 1400 of this title or except as otherwise provided in this section.

(4) Subject to the limit upon the weight imposed upon the highway through any single or tandem axle as set forth in section 1391 of this title, the total gross weight of vehicle with load imposed upon the highway by all axles of a vehicle or combination of axles of a vehicle shall not be in excess of the value in pounds given for the respective distance between the first and last axle of the vehicle or combination of axle spacing for vehicles measured longitudinally to the nearest foot as set forth in the following table:

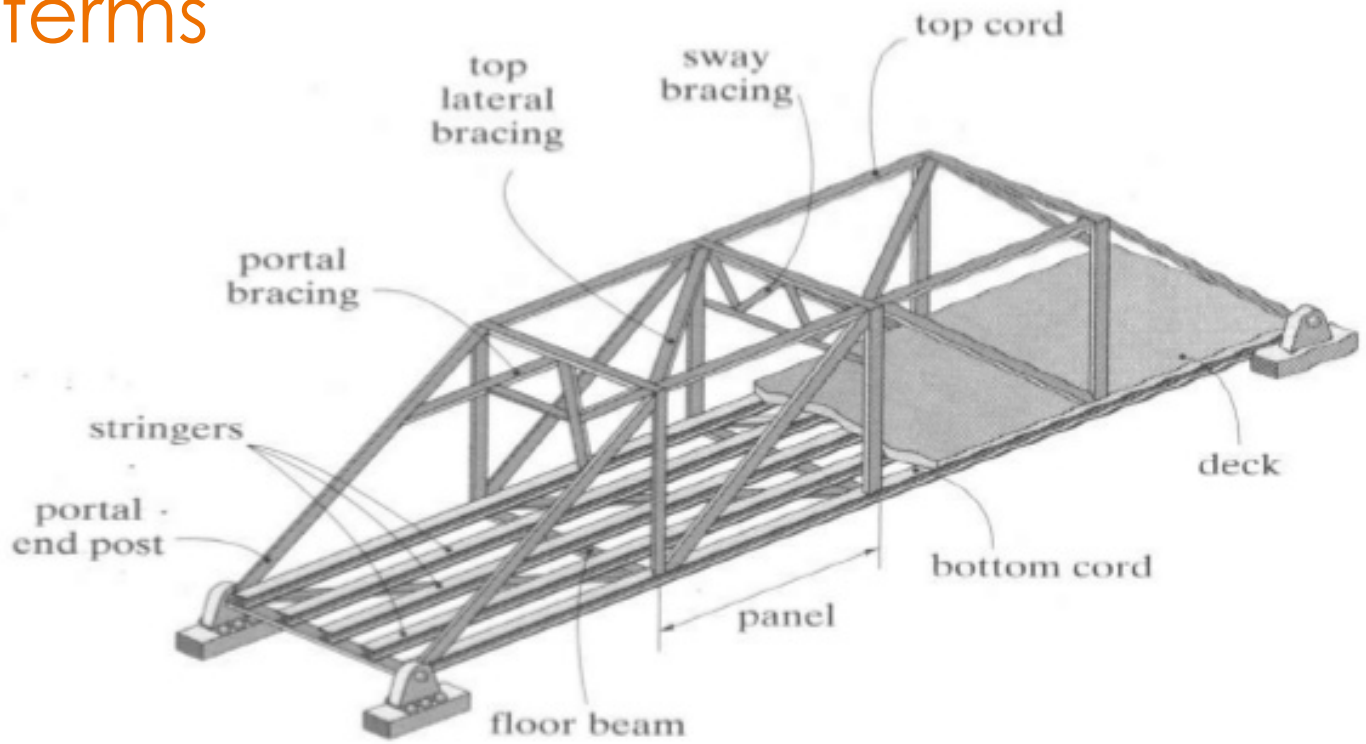


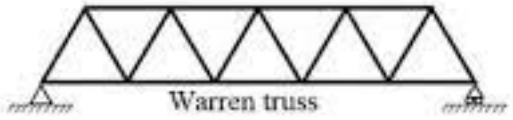
VERTICAL CURVE SITE DISTANCE – INADEQUATE FOR SPEED LIMIT

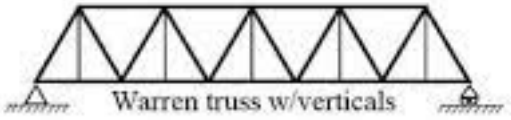
Bridge Rail

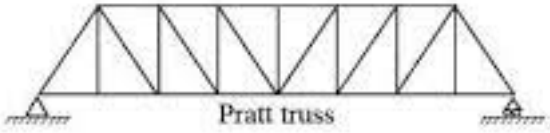
- TL-1 – Test Level One – taken to be generally acceptable for work zones with low posted speeds and very low volume, low speed local streets;
- TL-2 – Test Level Two – taken to be generally acceptable for work zones and most local and collector roads with favorable site conditions as well as where a small number of heavy vehicles is expected and posted speeds are reduced;
- TL-3 – Test Level Three – taken to be generally acceptable for a wide range of high speed arterial highways with very low mixtures of heavy vehicles and with favorable site conditions;
- TL-4 – Test Level Four – taken to be generally acceptable for the majority of applications on high speed highways, freeways, expressways, and Interstate highways with a mixture of trucks and heavy vehicles;
- TL-5 – Test Level Five – taken to be generally acceptable for the same applications as TL-4 and where large trucks make up a significant portion of the average daily traffic or when unfavorable site conditions justify a higher level of rail resistance; and
- TL-6 – Test Level Six – taken to be generally acceptable for applications where tanker type trucks or similar high center of gravity vehicles are anticipated, particularly along with unfavorable site conditions.

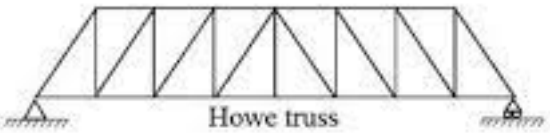
Truss terms

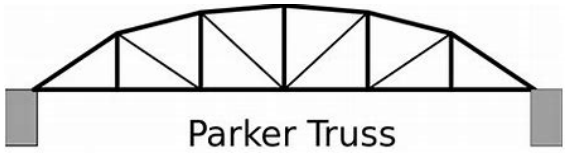

top cord
top lateral bracing
sway bracing
portal bracing
stringers
portal end post
deck
bottom cord
panel
floor beam


Warren truss

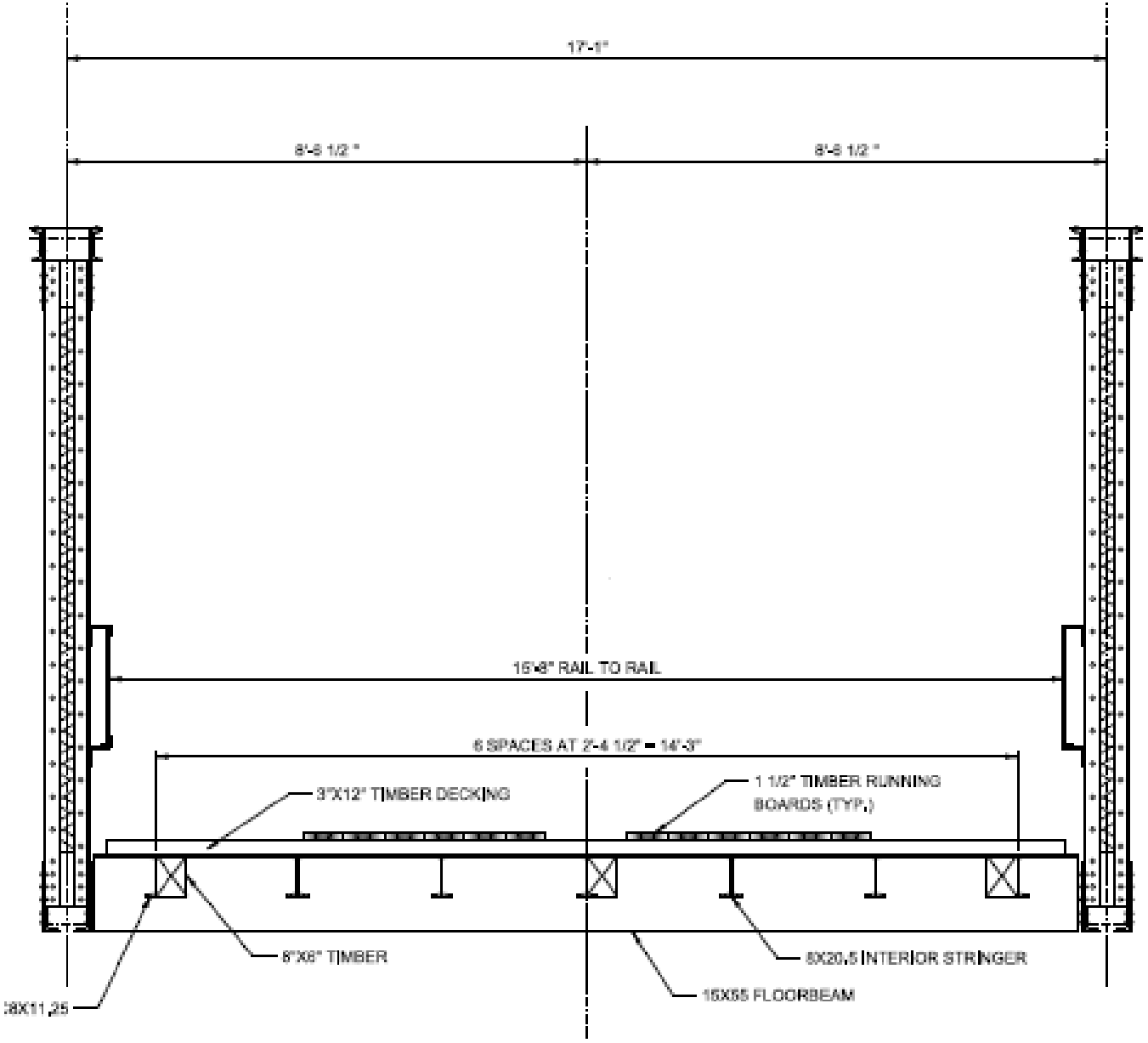

Warren truss w/verticals


Pratt truss


Howe truss


Parker Truss

“Pony Truss” Cross Section



The Trusses
(Pony Trusses)

Truss Members

The Deck and Floor Framing

Stringers and Floorbeams

Abutments

Resources and Opportunities for Preservation

Cultural and Historic Resources

- **Section 106 of the National Historic Preservation Act**
- **Section 4(f) of the Dept. of Transportation Act**
- **1998 Historic metal truss bridge preservation plan and programmatic agreement**

- **Natural Resources**
  - **Wetland**
  - **Rivers and Lakes**
  - **Rare Threatened and Endangered Species**

		Rehab Cost	New Bridge Cost
29.	Morristown, No. 8	$ 210,000	$ 830,000
30.	Morristown, No. 215 s	$ 330,000	$ 980,000
31.	Newfane, No 49	$ 390,000	$ 750,000
32.	New Haven, No. 26	$ 400,000	$ 700,000
33.	Northfield, No. 65	$ 170,000	$ 550,000

Resources and Opportunities for Preservation

Federal funding requires that rehabilitation is considered first.

A replacement can only be considered if there is no feasible or prudent rehabilitation alternative that meets the Purpose and Need of the project.

Feasibility of Rehabilitation

(Defining if it is possible, not if it is practical)

Yes, this is feasible.

Tension Capacity of Gusset

Along the top of bottom chord, the Inboard gusset has 1/4" loss (0.125" remaining) and the Outboard gusset has 1/8" loss (0.25" remaining). Assume half of effective Whitmore section includes section loss.

Average gusset plate thickness with loss between both inboard & outboard gussets calculated as:

t_{eq} = 0.281 in = [7.77"(0.125") + 7.77"(0.25") + 15.54"(0.375")] / 31.08

The factored tension resistance, P_r, of gusset plates at the strength limit state is taken as the smaller value based on block shear rupture, yielding on the Whitmore section, and net section fracture on the Whitmore section.

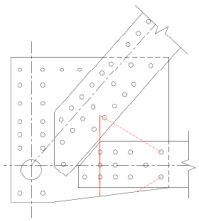
Block shear rupture does not govern, so it will be omitted.

The factored resistance for yielding on the Whitmore section is taken as:

$P_r = \varphi_y F_y A_g$ (Eqn 6A.6.12.6.8-2)

Resistance factor for yielding	φ_y =	0.95	
Yield strength of gusset plate	F_y =	30 ksi	
Reduced gusset plate thickness	t_{eq} =	***0.281 in***	
Length of effective Whitmore section	L_w =	15.54 in	
Gross area of eff. Whitmore section	A_g =	4.37 in²	$= L_w t_{eq}$

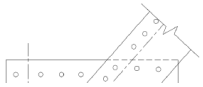
P_{r_yw} = 124.5 k



The factored resistance for net section fracture on the Whitmore section is taken as:

$P_r = \varphi_u F_u A_n R_p U$ (Eqn 6A.6.12.6.8-3)

Resistance factor for fracture	φ_u =	0.80
Tensile strength of gusset plate	F_u =	60 ksi
Reduced gusset plate thickness	t_{eq} =	***0.281 in***
Net length of effective Whitmore section	L_n =	13.10 in



Legal Pad — TOPS

SCOPE:

REPAIR ABUTMENT SEATS AND BACKWALLS

REPAIR ABUTMENT FACES (CONSIDER CONCRETE JACKET)

REPLACE STRINGERS

REPLACE DETERIORATED TRUSS MEMBERS

NEW BEARINGS

NEW BATTEN PLATES

REPLACE DECK

REPLACE (OR SUPPLEMENT) BRIDGE RAIL

PAINT

Input Needed from Survey of Public Officials

Town Garage and Fire Station Locations

Impacts of Bridge Closure:

- Road Maintenance
- Fire and Ambulance Service Impacts
- School Location and Dates

Pedestrian use?

Concerns about load capacity?

Concerns about width?

Purpose and Need (Draft)

Summarizes what the project is intending to accomplish and for what reasons.

Purpose: The purpose of the project is to provide a safe crossing over the New England Central Railroad and the Dog River for the traveling public, including pedestrians and bicyclists and to address the current structural deficiencies and ongoing deterioration of the bridge.

Need: Recognizing the importance of this route in the transportation system for the Town of Northfield and the surrounding communities, the following needs for the project have been identified:

Structural and Functional Needs:

- The paint system has failed.
- The railing and approach railing do not meet the current standard.
- The bridge load rating does not meet the current standards.
- Site distance is sub-standard
- Advanced Section Loss in structural steel including the bottom chord, gusset plates, bottom lateral bracing and bearings.

Community needs:

_____

_____

_____

_____

Feasibility of Rehabilitation

Yes, this is feasible.

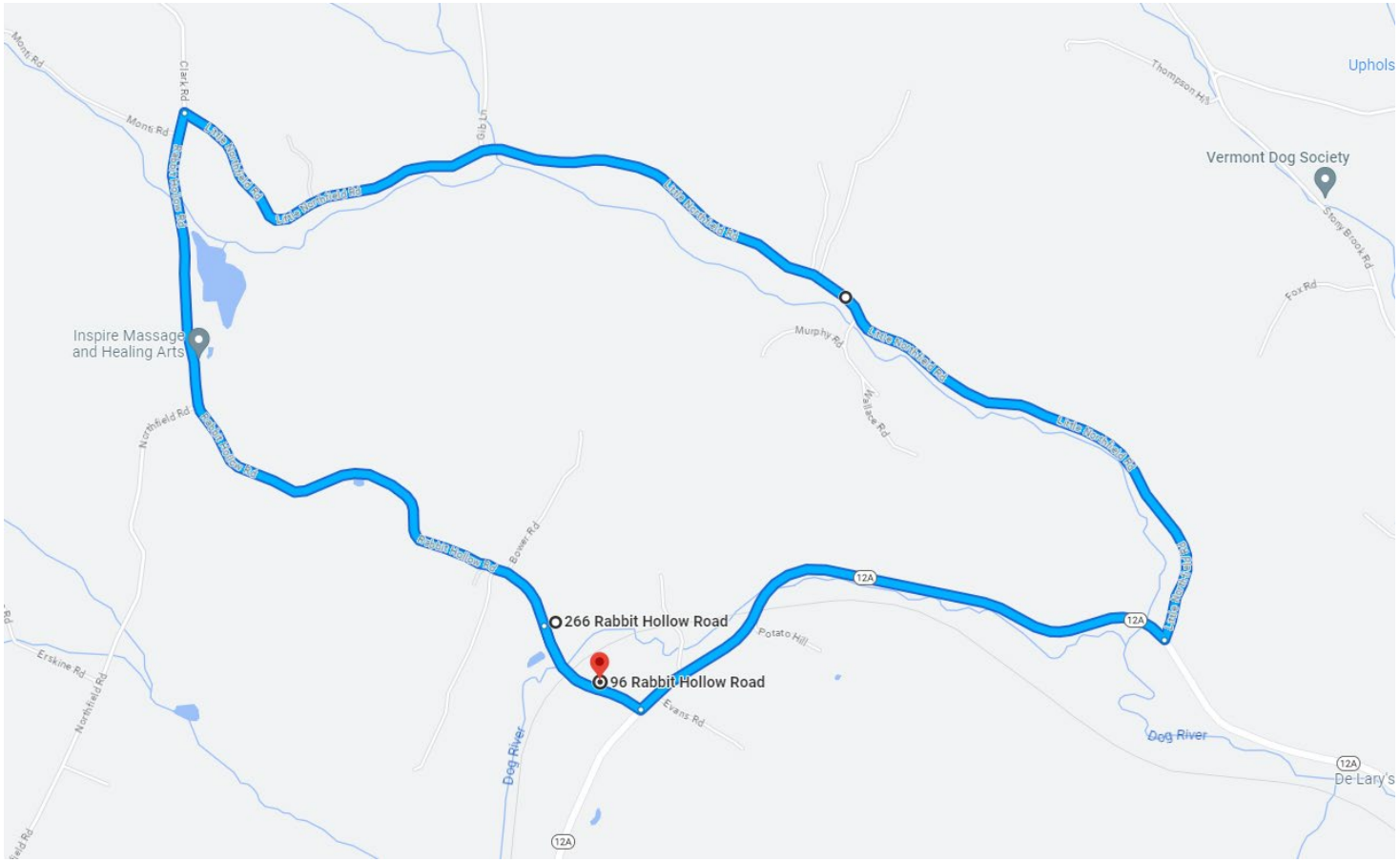
Results:

Width: Single Lane 15'-4" Rail to Rail
Load Posting: Town Decision
Inventory Load Rating: 8 tons
Height Restriction: None
Traffic management: Signage can remain unsigned
Maintenance: Painting Required
Service Life: 15 years until next rehab
Railing System: Service Level II

Detour Route

- 5.6 Miles End to End
- Additional Time Most Trips (15 Minutes)
- Combination of State Highway & Low volume dirt roads
- Spring travel difficult

Other routes to consider?



Local Input on Bridge Usage

- Pedestrians and Cyclists
- Truck Usage
- Emergency Vehicles
- Snow Removal Equipment
- Construction Vehicles
- Utility boom trucks/service Vehicles
- Stopping Sight Distance
- Opinions about width, traffic patterns
- Detour Routes

NEXT STEPS

Local Input on Bridge Usage

- Contact Information

- Tom.Knight@Stantec.com
- Laura.Stone@Vermont.gov