

Quechee Gorge Bridge Safety Issues Suicide Prevention Alternatives Report

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Vermont House Transportation Committee

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About this study

Initiated by VTrans based on legislation passed in 2016 (Act 158):

AOT is required to:

...thoroughly review suicide prevention as well as pedestrian, first responder, and other safety measures that could be taken, and the merits of taking such measures, at the Quechee Gorge Bridge. The review will identify:

- 1) short- and long-term suicide prevention as well as pedestrian, first responder, and other safety measures for all users that could be taken, including:
 - a) providing information and resources, including emergency contact information and means of emergency communication; and*
 - b) physical improvements to the bridge structure and the surrounding area;**
- 2) estimated costs and benefits and an expected timeline associated with implementing the measures identified*
- 3) economic, community, and tourism concerns associated with implementing the measures identified in subdivision (1) of this subsection.*

QUECHEE GORGE STATE PARK



Parking



Visitor Center



Restrooms



Picnic area



Wheelchair accessible



Trail



Pets allowed on leash



Campground



Cliff



4

to VMS Nature Cent



Dewey's Mill Rd



Quechee Gorge Bridge

Ottawaquechee River



Quechee Gorge Trail



only

How many visit the gorge?

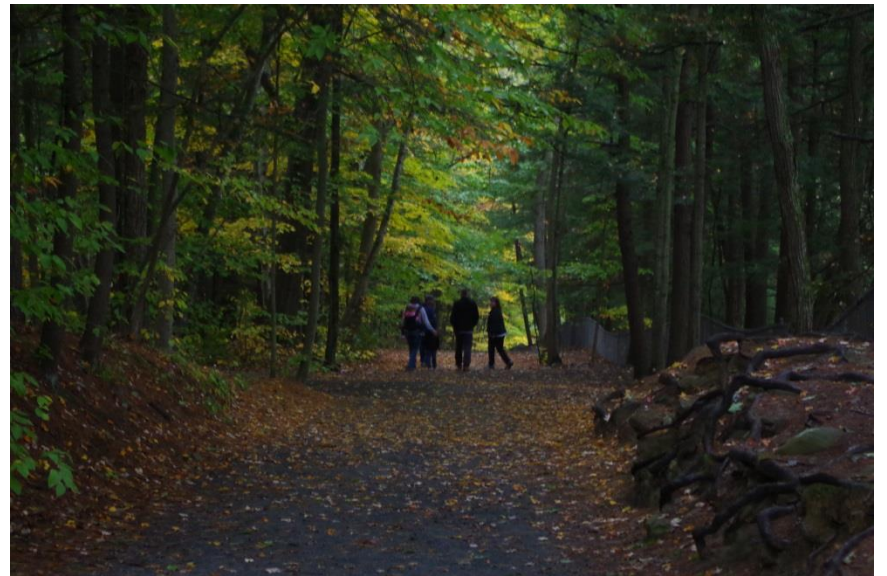
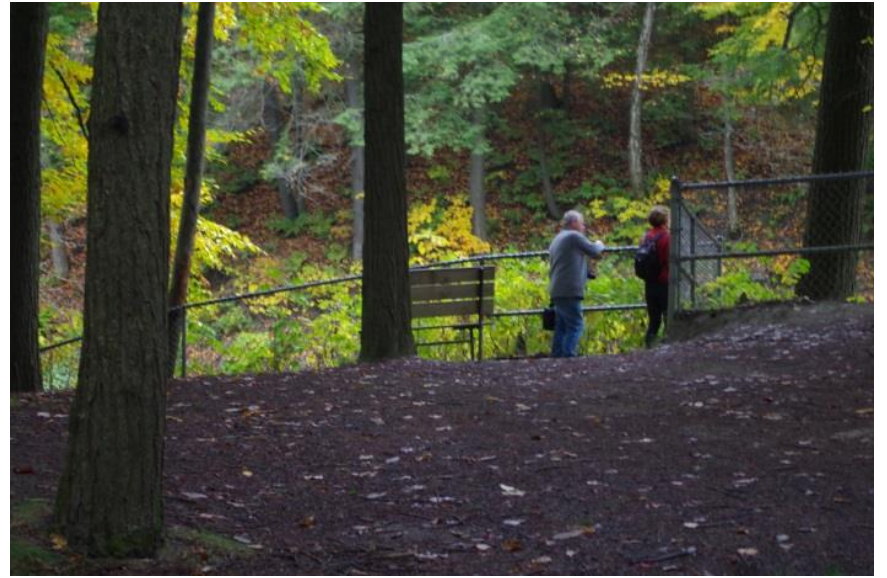
- Visitor Center has over 100,000 visits per year
- By far the highest day use compared to other state parks
- Hub of economic activity

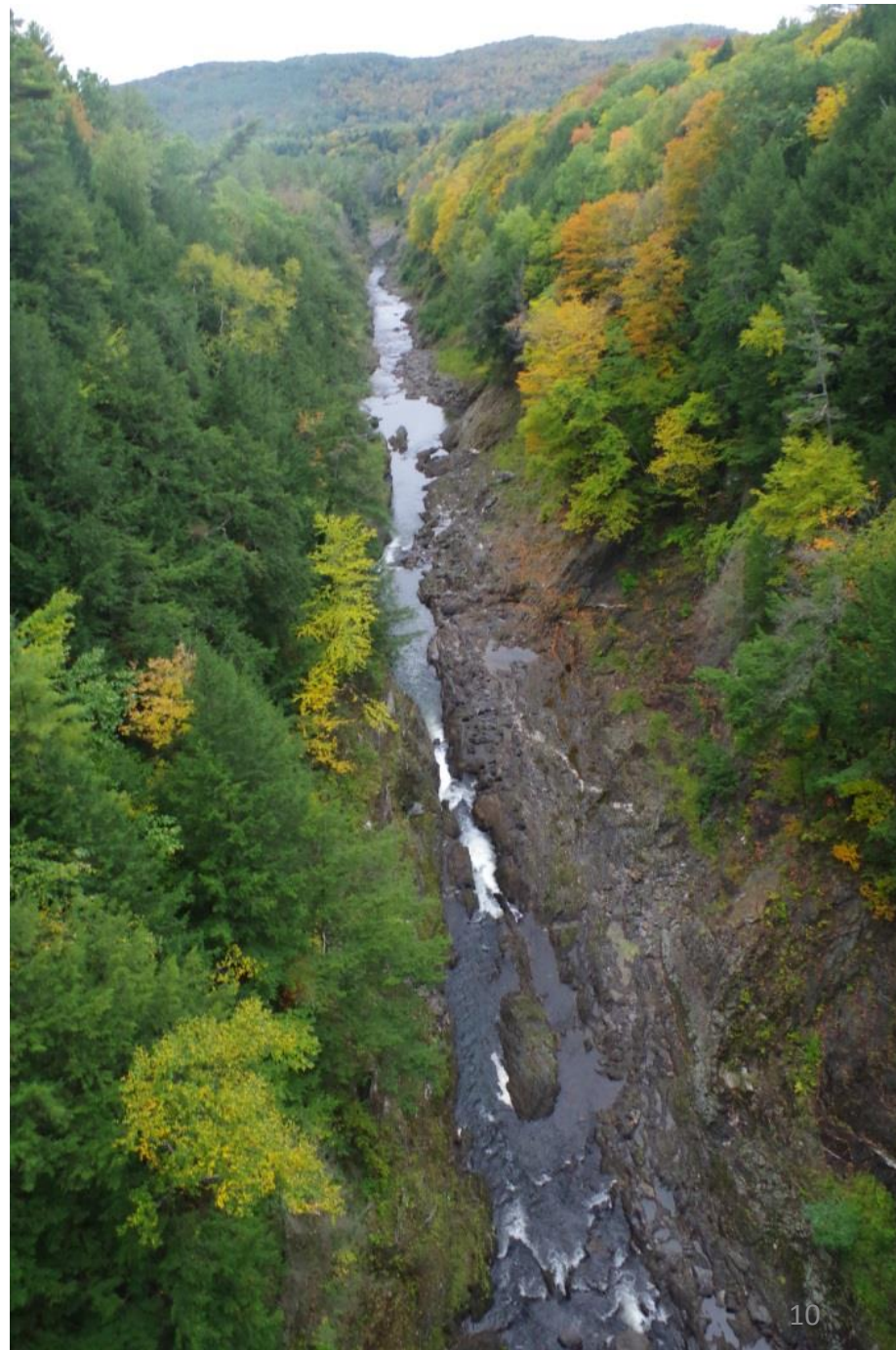
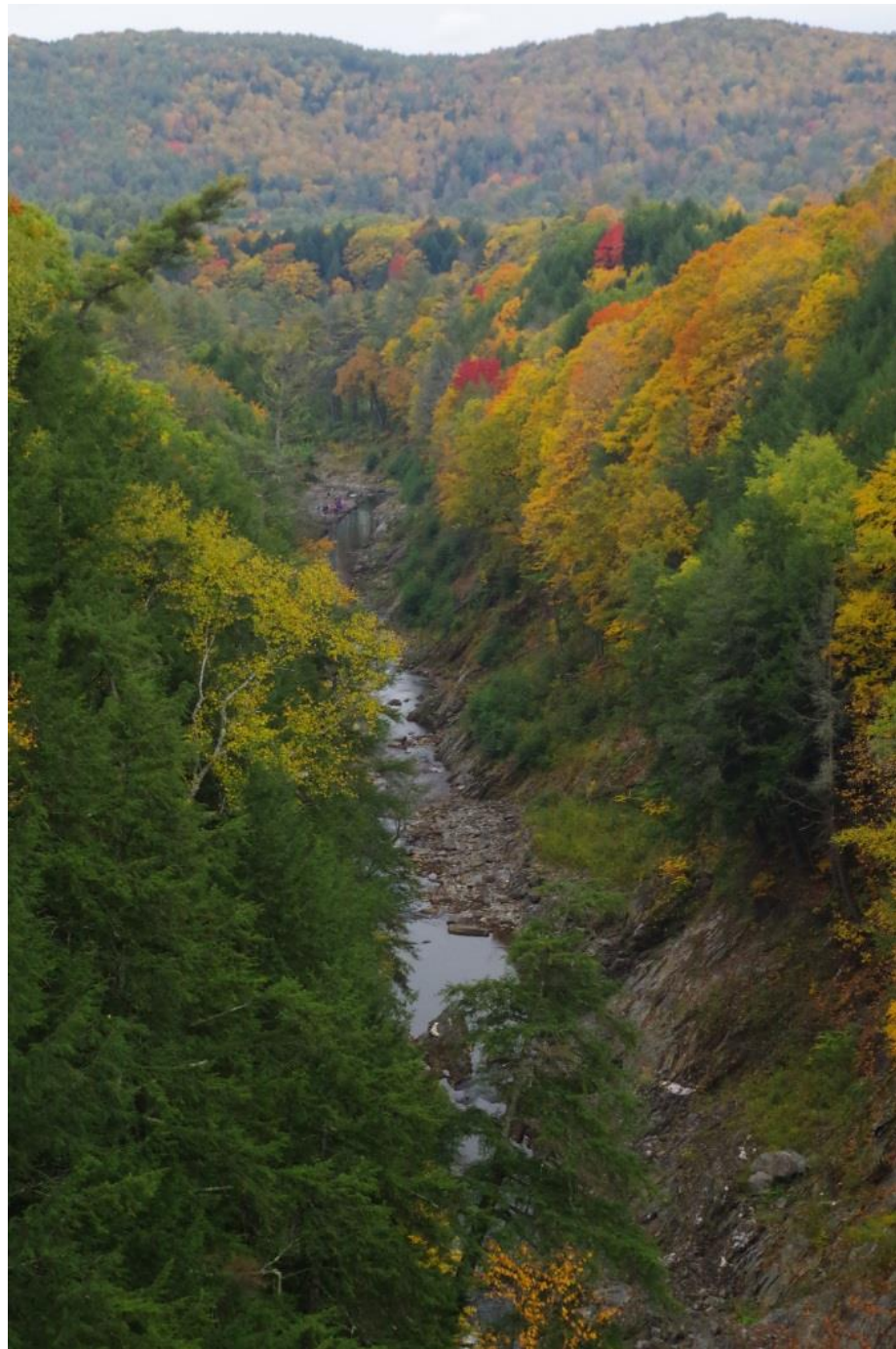






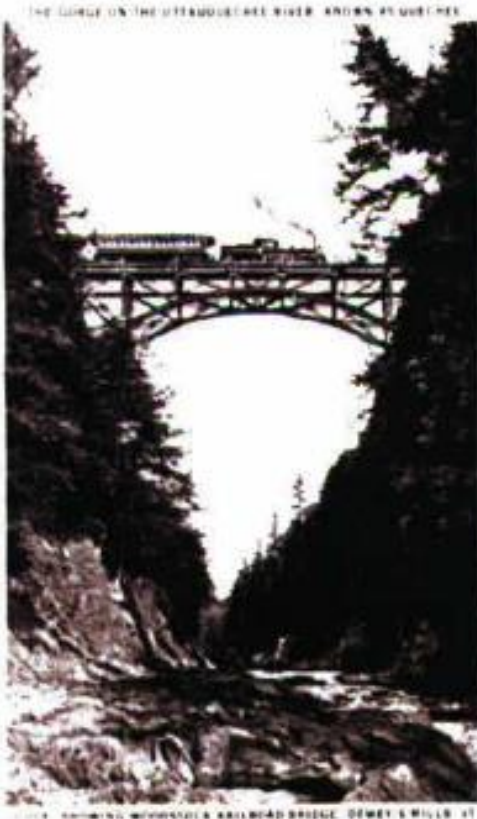






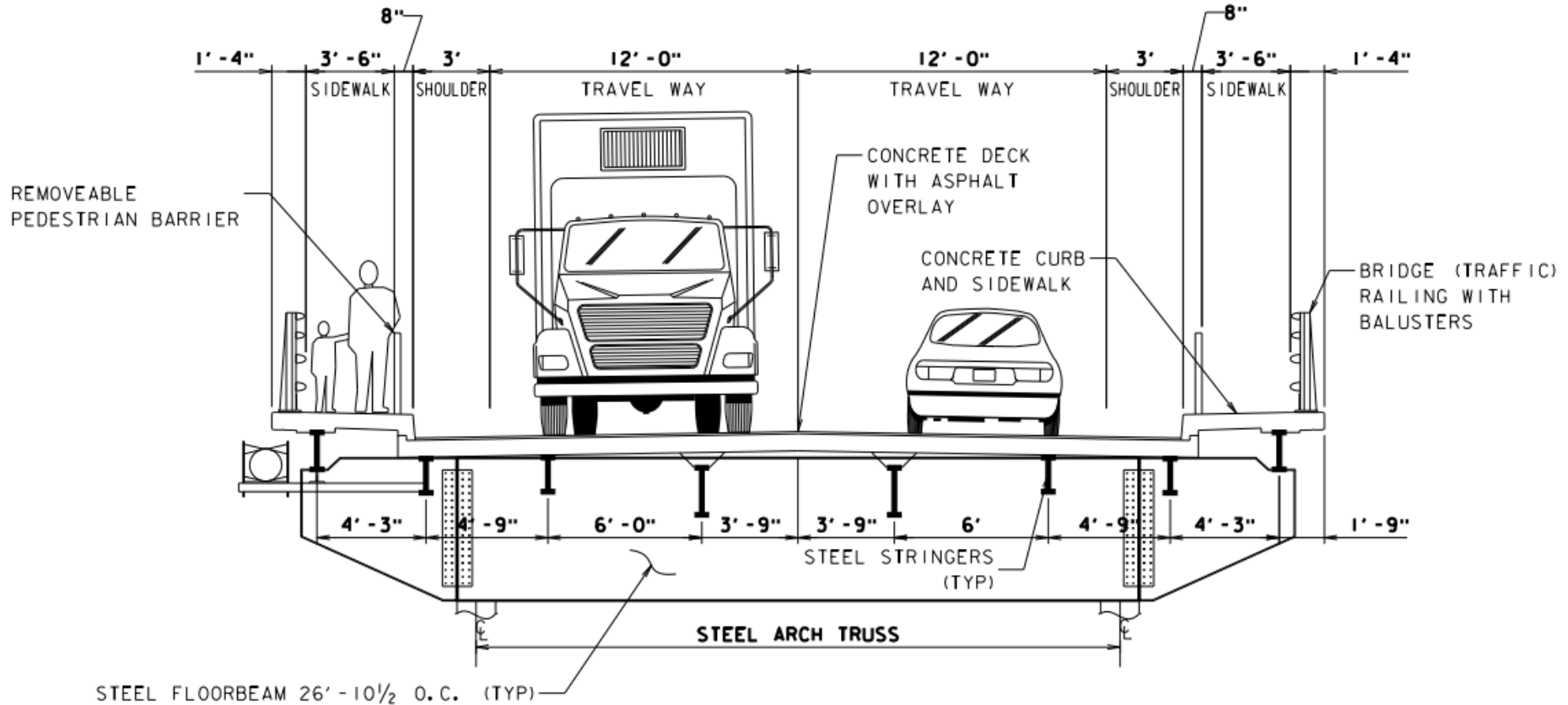
QUECHEE GORGE BRIDGE

Quechee Gorge Bridge



- Historic steel arch bridge
 - Built in 1911 for the Woodstock Railroad
 - Listed on the National Register of Historic Places
- Length = 285 ft; Depth of Gorge = 165 ft
- Traffic Volume = 9,000 vehicles per day
- Traveled Way Width
 - 12 ft lanes
 - 3 ft shoulders
- Sidewalk:
 - 3.5 ft, removable barrier at curb
 - Does not meet ADA guidelines

Bridge Cross Section-Existing



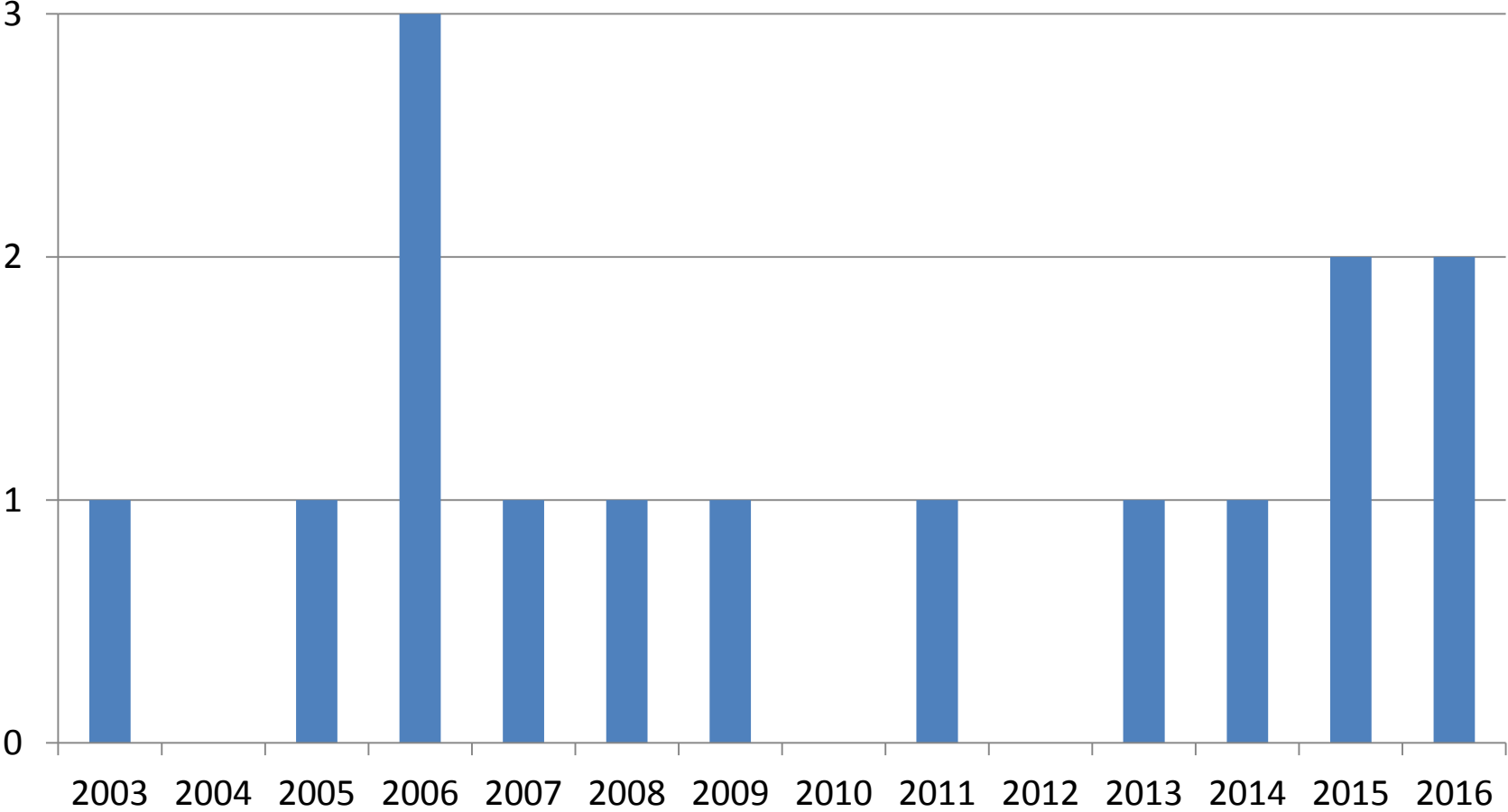
Crashes

- 33 crashes on bridge 2010 to 2016
- Many rear enders, few injuries



Quechee Gorge Suicides

Since 2003



Means Restriction for Bridges

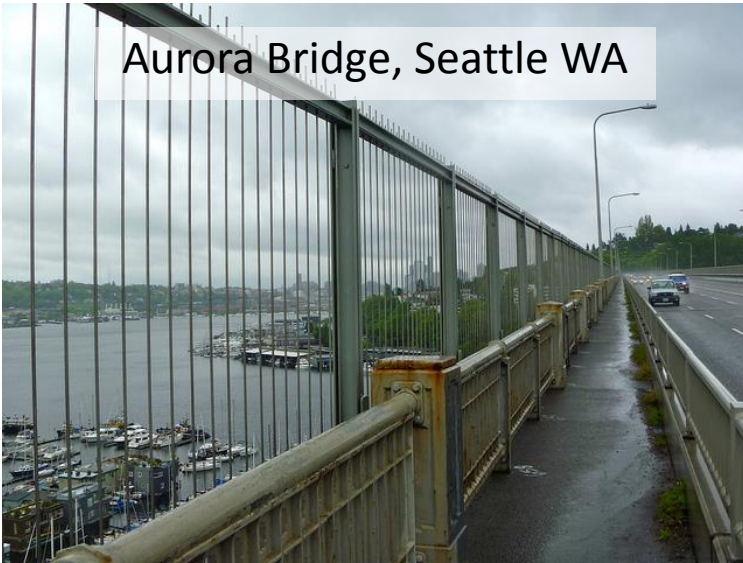
DATA AND CASE STUDIES

Barriers or “Means Restriction” has been widely researched

Table 3. Reductions in suicides following installation of barriers

Site	Outcome	Reference
Sydney Harbor Bridge	Barriers reduced the incidence of suicides to 1% of the original level	Harvey and Solomons (1983) ⁸⁷
Empire State Building	Fenced the 86 th floor observation platform after 16 suicides between 1931 and 1947; number of suicides reduced since. The nearby Chrysler Building and Rockefeller Centre had no increases in suicides as possible alternative sites.	Seiden and Spence (1982) ⁹²
Adelaide multistory car park - prominent jumping site	Safety grilles reduced incidence of jumping suicides to 0; no other car parks became alternative sites.	Pounder, 1985 ¹⁴¹ Goldney, 1986 ¹⁴²
Gateway Bridge, Brisbane	Barriers reduced number of suicides. No increases in jumping suicides from nearby Storey Bridge (possible alternative site).	Cantor and Hill, 1990 ¹⁴³
Mt Muhara, Japan	Barriers reduced number of suicides.	Ellis and Allen, 1961 ¹⁴⁴
Eiffel Tower, Paris	Barriers reduced the number of suicides.	Derobert et al, 1965 ¹⁴⁵
Arroya Seco Bridge, Pasadena, California	Barriers reduced the number of suicides.	McWilliams, 1936 ¹⁴⁶

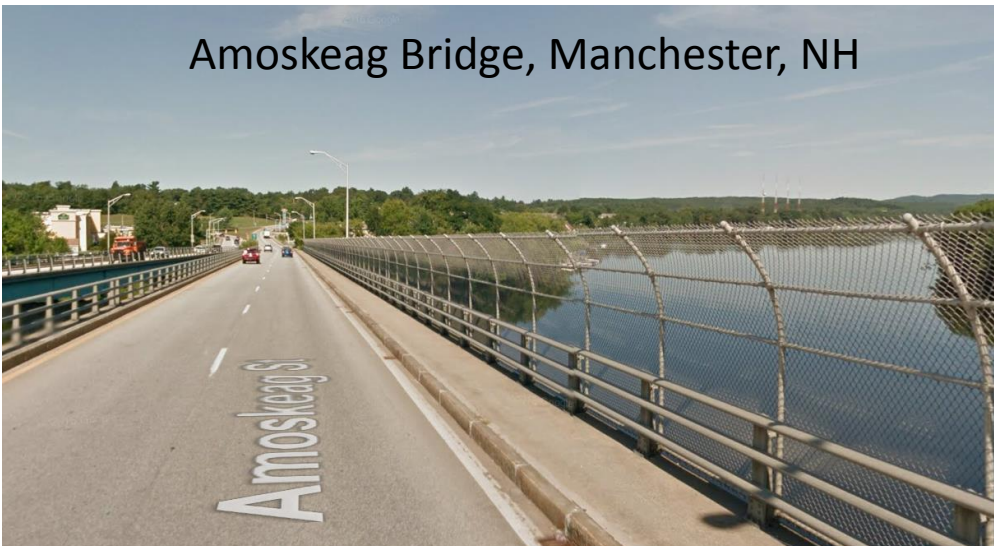
Aurora Bridge, Seattle WA



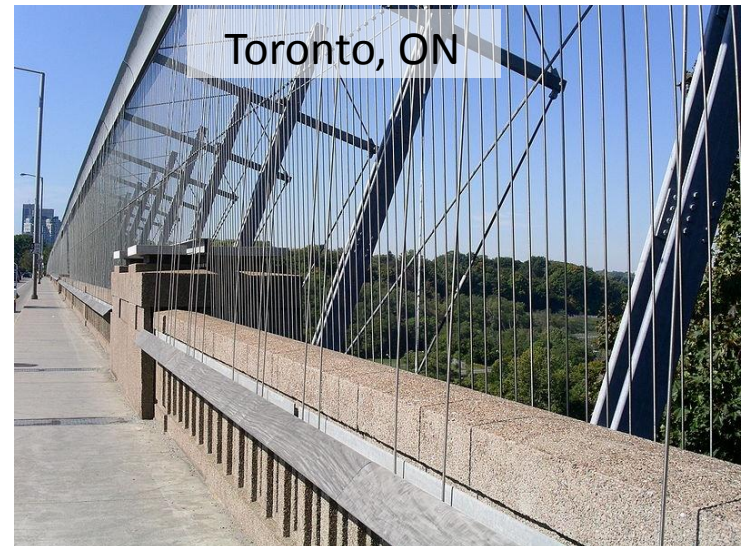
Vancouver, BC



Amoskeag Bridge, Manchester, NH



Toronto, ON



Chain Link



Plexiglass



Steel Mesh



Steel Balusters



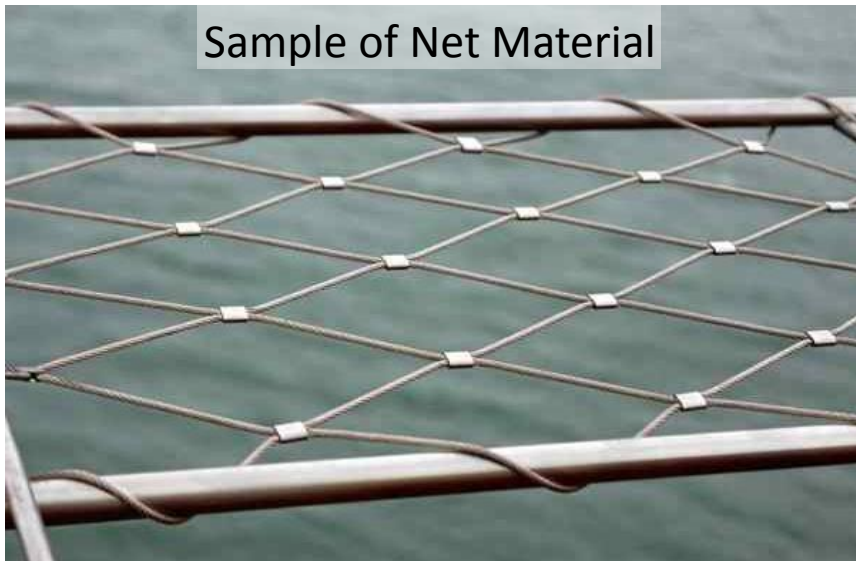
Ithaca, NY



Bern, Switzerland



Sample of Net Material



Golden Gate Bridge



Summary

- Bridge barriers have been proven to be highly effective in preventing suicides and save lives.
- By deterring an attempt, the person in crisis is given more time to seek help.
- Suicide barriers cost a fraction of other highway safety projects considering the costs and benefits.

ALTERNATIVES

Alternatives

1) Non-means restriction options

- Signage
- Call Towers
- Lighting

2) Suicide Prevention Barrier

- Includes reconstruction of sidewalk to meet ADA

3) Suicide Prevention Nets

- Nets do not require ADA upgrade to sidewalks

4) Temporary Prevention Barrier

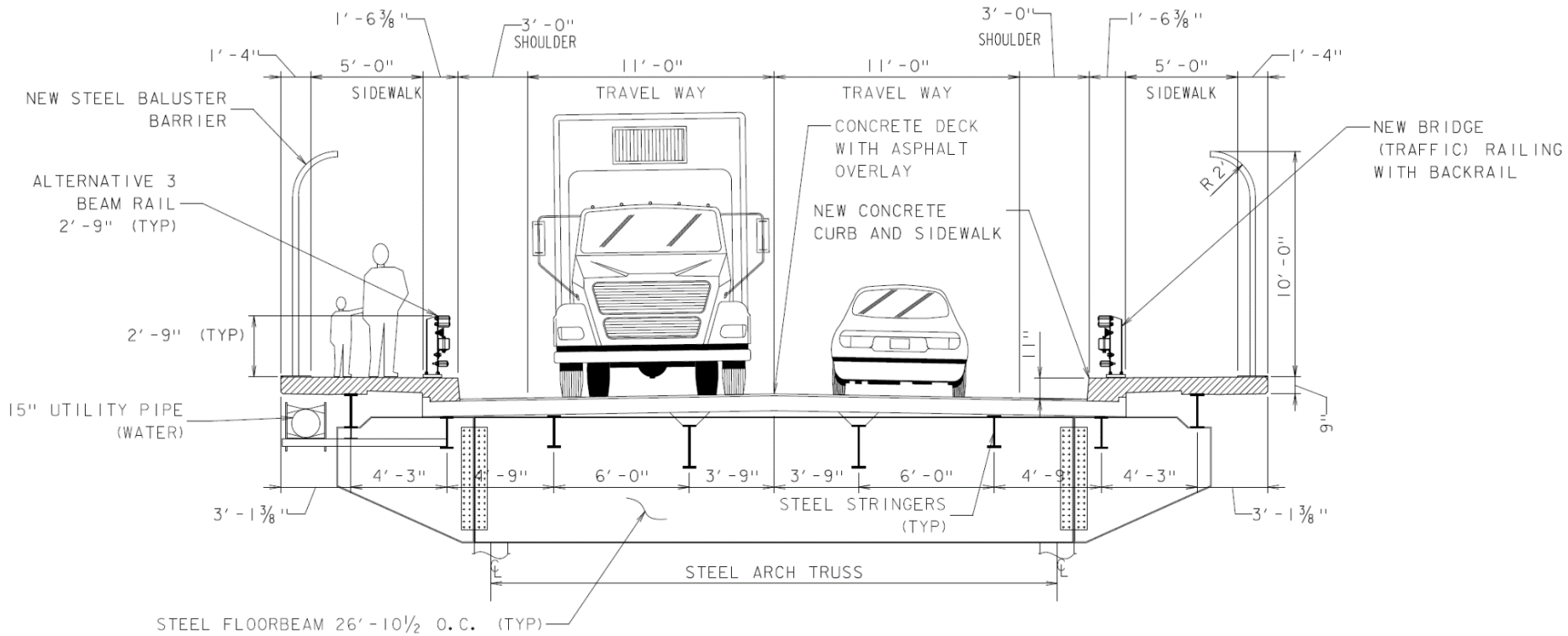
- Light weight mesh fencing

1) Non-means restriction options

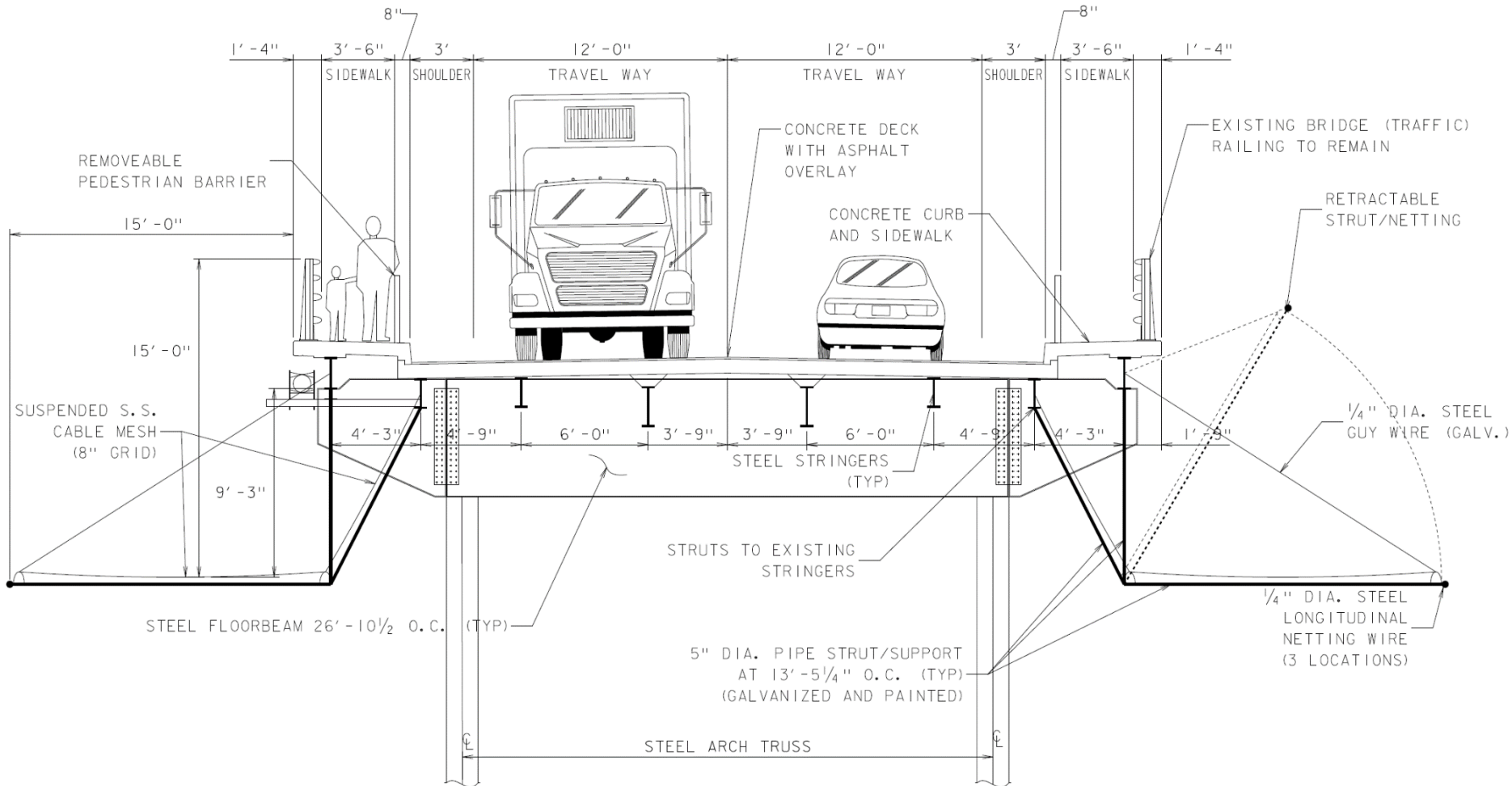


Call Boxes and signs installed January 2017
Consider street lights along bridge and at parking areas

2) Suicide Prevention Barrier



3) Suicide Prevention Net



4) Temporary Barrier



VISUAL IMPACTS

Visual Impact: User Perspectives

- From automobile
- From sidewalk
- From railing
- From trails









Pedestrian view from sidewalk









View from Railing



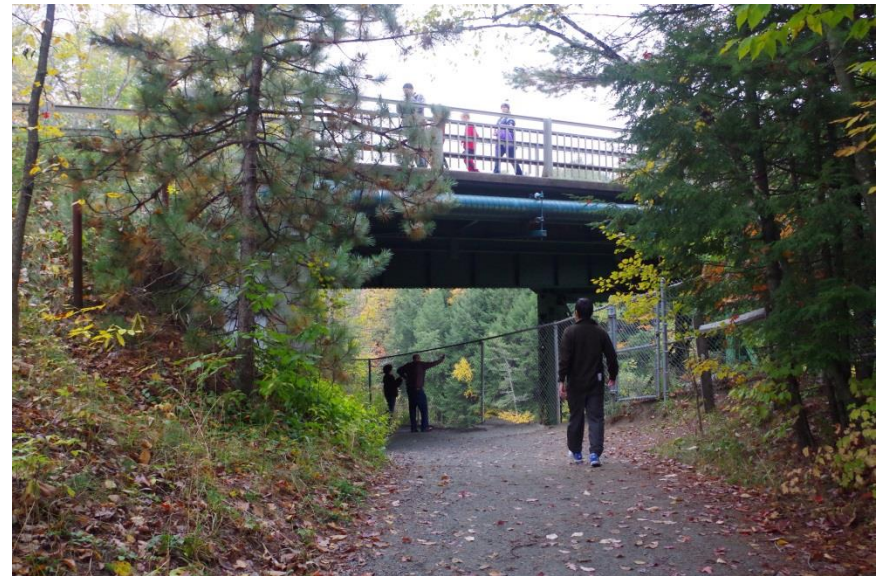








View from Trails















COST ESTIMATES

Suicide Prevention Alternative

Preliminary Construction Costs

Subject to revision

Alternative	Barrier	Netting	Temporary Wire Mesh
Construction Cost <i>(Construction + Contingency+ Construction Inspection)</i>	\$ 1,335,000	\$ 1,470,000	\$ 240,000
Engineering <i>(Study + Design + Bidding)</i>	\$ 375,000	\$ 450,000	\$ 50,000
TOTAL PROJECT	\$ 1,710,000	\$ 1,920,000	\$ 290,000

Suicide Prevention Alternative

*Annual Maintenance, Operations, & Inspection Costs to VTrans
Subject to revision*

Item	Barrier	Netting	Temporary
Pedestrian Fence <i>(Install/Remove)</i>	\$0	\$ 5,000	\$ 5,000
Sweeping	\$ 700	\$ 700	\$ 700
Washing <i>(assume cost increases from \$2,500 to \$5,000 due to required change in bridge washing practices)</i>	\$5,000	\$5,000	\$5,000
Inspection <i>(assume bi-annual cost of \$40,000 per inspection as placeholder cost for inspection by team of licensed climbers; \$20,000 per year)</i>	\$20,000	\$20,000	\$2,000
Net inspection and repair <i>(estimated from actual net inspection costs in Ithaca)</i>	\$0	\$20,000	\$0
Snow removal	\$0	\$3,600	\$3,600
TOTAL PROJECT	\$ 25,700	\$ 54,300	\$16,300

Cost – Benefit Analysis

- VSL most recent USDOT calculation is \$9.4 million (\$5.2 to \$13 million range).
- Benefit of preventing a single death at the Quechee Gorge Bridge far outweighs the costs of all alternatives.



Maintenance and Operations

- No Build
 - Likely continuation of 1 to 2 suicides per year resulting in costs to town, state and others:
 - ✓ Death of loved one
 - ✓ Cost of recovery operations (estimated \$20,000)
 - Risk of injury to responders
 - Special equipment requirements
 - ✓ Costs for medical examiner, police social worker and police investigation
 - ✓ Trauma for witnesses and visitors
 - ✓ Economic impact to local businesses

Maintenance Assumptions

- Barrier
 - VTrans will maintain barriers
 - Barrier may require change to bridge inspection and washing practices, likely adding costs.
 - Town of Hartford will maintain sidewalk

Maintenance Assumptions

- Nets
 - VTrans would maintain nets
 - ✓ Annual inspections and repairs estimated to be \$20,000 per year by contractor
 - ✓ Occasional debris removal
 - Nets will require change to bridge inspection and washing practices, likely adding costs.
 - Detection system (Motion sensor and IR camera)
 - ✓ VTrans – System maintenance
 - ✓ Town of Hartford – Responds to detector incidents

Proposed Evaluation Criteria

- Effectiveness in suicide prevention
- Impact on the community
 - Appearance of barrier while driving or walking
 - Transparency/Compatibility with viewing gorge
- Impact on bridge structure
- Emergency response considerations
- Maintenance requirements and costs
- Construction Cost
- Public & Community Support
- Improve area programming for users

Decision Matrix

	Construction Cost	Annual Cost to VTrans	Annual Cost to Hartford	Suicide Prevention Effect	Visual Impact	Public Support	Improve pedestrian facilities	Considerations for State (VTrans and FPR)	Considerations for Town of Hartford	Considerations for public and local businesses
No Build/ Do Nothing	\$0	\$11,800 Maintenance \$2,000 inspection	\$20,000 per recovery* unknown costs to local businesses	None	No	No – Action is desired	No	Continued need to coordinate with town on investigations or emergency response; Impact to visitors of Quechee Gorge State Park.	Emergency responders cost and risk; social workers responding for interventions; police investigation of deaths	Witness trauma; disruption of visitors, US 4 traffic and businesses.
Non-Means Restriction (e.g. Signage)	Less than \$0.01 million	\$11,800 Maintenance \$2,000 inspection	\$20,000 per recovery unknown costs to local businesses	Unclear; likely none	No	No – community desires a proven means	No	Continued need to coordinate with town on investigations or emergency response. Impact to visitors of Quechee Gorge State Park.	Emergency responders cost and risk; social workers responding for interventions; police investigation of deaths	Witness trauma; disruption of visitors, US 4 traffic and businesses.
Suicide Prevention Barrier	\$1.7 million	\$5,700 Maintenance \$20,000 inspection	Recovery costs expected to be \$0 Maintenance of sidewalk \$5,000	Yes	Severe	Mixed – due to visual impact	Yes	Additional maintenance and inspection costs assumed due to barrier restricting access under bridge; Barriers will require inspection and painting; Safety of VTrans maintenance and inspection staff also to be considered.	Rescue/recovery methods and equipment will have to be altered. High effectiveness for suicide prevention will reduce recovery and intervention costs.	High visual intrusion will change Quechee Gorge experience.
Suicide Prevention Net	\$1.9 million	\$24,300 Maintenance \$20,000 inspection	Recovery costs expected to be \$0	Yes	Moderate	Yes	No	Additional maintenance and inspection costs assumed due to barrier restricting access under bridge; Net and camera/detector maintenance needed; Safety of VTrans maintenance and inspection staff also to be considered.	Town will monitor infrared cameras and investigate incidents on nets. High effectiveness for suicide prevention will reduce recovery and intervention costs.	Nets will have relatively low impact on visitor experience.
Temporary Wire Mesh Barrier	\$0.3 million	\$11,800 Maintenance \$2,000 inspection	Recovery costs expected to be \$0	Yes	Moderate-Severe	Unknown	No	Mesh would be removable to allow for inspections, washing, etc. Safety of VTrans maintenance and inspection staff also to be considered.	Mesh will be removable to allow access to gorge for incident response.	High visual intrusion will change Quechee Gorge experience. Holes could be cut into fence for viewing.

THANK YOU