VT AOT Resilience Planning, Standards, and Research

Otis Ellms-Munroe,
Environmental Planning Coordinator
Environmental Policy and Sustainability,
Vermont Agency of Transportation

VTrans RESILIENCE

"The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions" (FHWA Order 5520)

Emergency Response and Recovery

- COOP
- Preparedness
- Rapid Response

Planning and Programming

- Rivers and Roads Training
- Tool Development
- Resilience Improvement

Design and Engineering

- Design Standards Update
- Hydraulics Manual Update
- TH Road and Bridge Standards

Infrastructure Investments

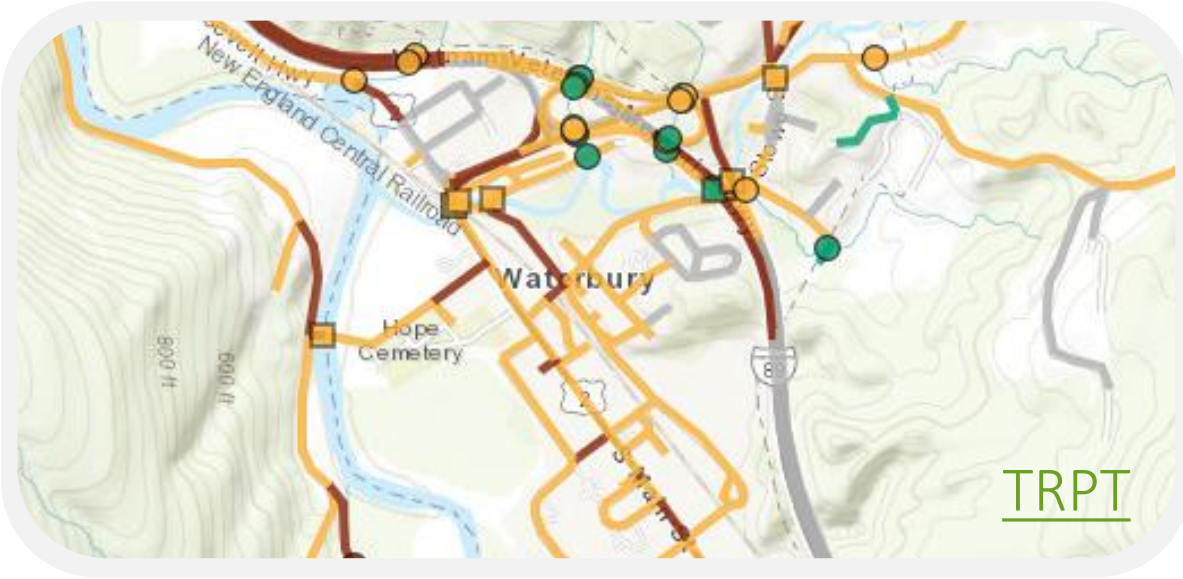
- Rail and Road Structures
- Slope Stability
- Nature Based Designs

Discussion

- Transportation Resilience Planning Tools
- Resilience Improvement Plan
- Design Standards
- Resilience Research

Resilience Planning

Tools



TRPT

Reducing Repeat Damage Tool

Vulnerability:

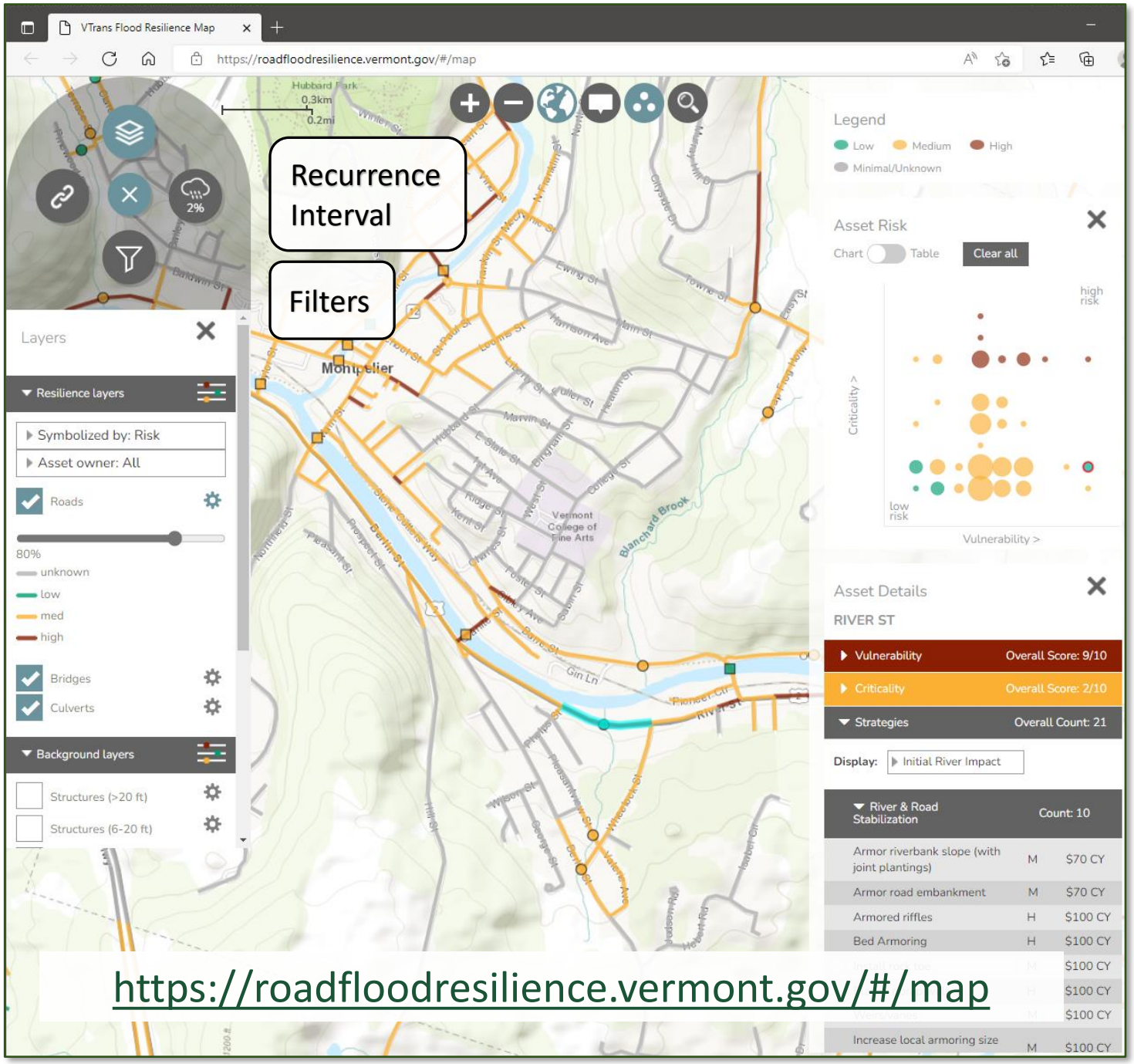
The extent that a transportation asset is exposed to a threat from inundation, erosion, or deposition from river processes.

Criticality:

How important is the transportation asset that dictates the consequence of the disruption to mobility due to damage.

Risk:

The combination of the probability of vulnerability and criticality.



TRPT as a Resource

- Resilience Improvement Plan (RIP)
- State and local hazard mitigation planning
- Project identification and prioritization
- Funding proposals

Website:

Transportation Resilience Planning Tool

- TRPT Web Application

- TRPT User Guide

- Training Videos and Slides

Resilience Improvement Plan (RIP)

GOALS

1. Less damage in the future.
2. Systems return to normal quickly.
3. Vermont is Resilient for all people.
4. Essential Freight moves.
5. Resilience efforts are coordinated.

Explore the VTrans RIP!

MEASURES

High TRPT Risk & Repeat Damage

Transit Resilience & TRPT

Social Vulnerability Index (SVI) & TRPT

Resilience for Commodities Distribution

Coordination with Other Plans

METRICS

Each measure has a metric—a definition of what counts as “high”

Locations where the measure is high get a point (or "flag")

Flags can then be viewed or summarized by road segment or structure

High Hazard Rock Slopes

Assessed and prioritized based on likelihood of occurrence and potential impact.

Factors considered include:

- Geometry of slope
- Ditch and roadway characteristics
- Moisture
- Geology
- Event history
- Roadway level of service
- Average vehicle risk
  - Combination of AADT, slope length & speed limit

RIP Priority Locations

Structure Flag

- 4
- 3
- 2

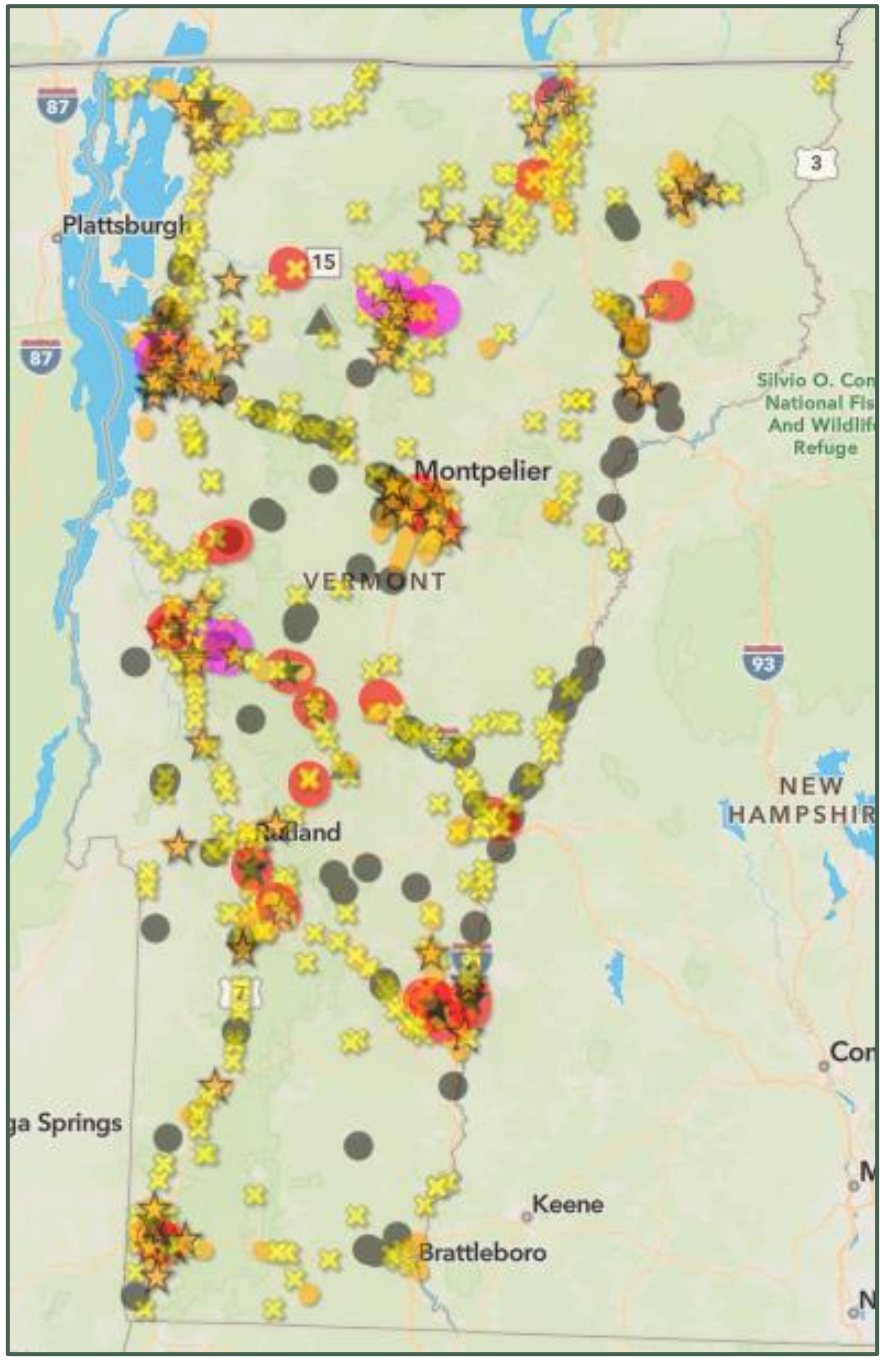
Road Flag

- 6
- 5
- 4
- 3

RIP Analysis - High Hazard Rock Slopes

Grades

- Rock: A
- Hybrid: A



Explore the web map

RIP Implementation and Next Steps

- Guide investment of IIJA PROTECT funds
- Inform project selection and prioritization
- Inform project design
- Refine RIP scoring
- Identify and track resilience metrics

Design Standards for Resilience

Design structures to satisfy the hydraulic performance criteria required for the roadway classification.

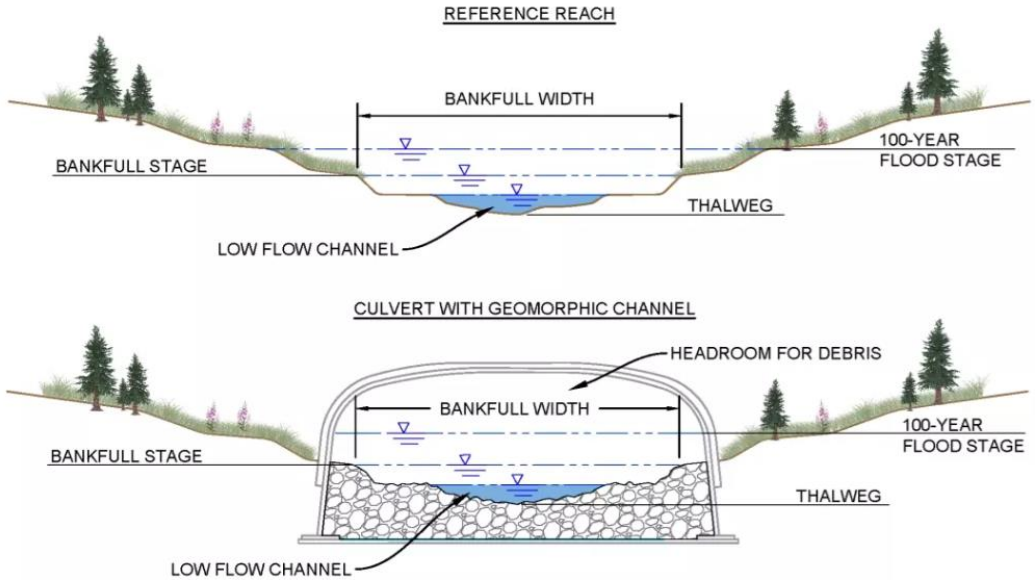
- **Interstate** = 100-yr flood event/200-yr flood check
- **State Highway** = 50-yr flood event/200-yr flood check
- **Local Road** = 25-yr flood event/100-yr flood check

Resources

VTrans Hydraulics Manual

Rivers and Roads Field Manual

VTrans Orange Book – Municipal Standards (optional)



Bankfull width structure sizing

Research Projects

Nature-Based Solutions (NBS)

- Compile catalog of NBS suitable to Vermont
- Map potential NBS project sites
- Incorporate NBS in VTrans project development

Landslide Hazard Identification and Monitoring

- Map areas near VTrans infrastructure with high landslide risk

MRGP Resilience Cost/Benefit

- Quantify resilience benefits of MRGP BMPs based on 2023 and 2024 storm damages

Restoration Project - West Branch White River

Questions

Otis Ellms-Munroe Environmental Planning Coordinator

Otis.EllmsMunroe@Vermont.Gov