

Training Session

Vermont Local Roads, Rigid Roadways Workshop

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What is
roadway
rigidity?

Why does it
matter?

What can we
do?

Introduction

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Roadway Rigidity (resilience) refers to the ability of a road network to withstand, absorb, and recover from natural disasters and other disruptions.





Why does this matter?

Impacts of Road Failures



ECONOMIC 💰



SAFETY 🚨



MOBILITY 🚦

Risks & Vulnerabilities



Extreme weather



Flooding



Aging
infrastructure



Increasing
demand



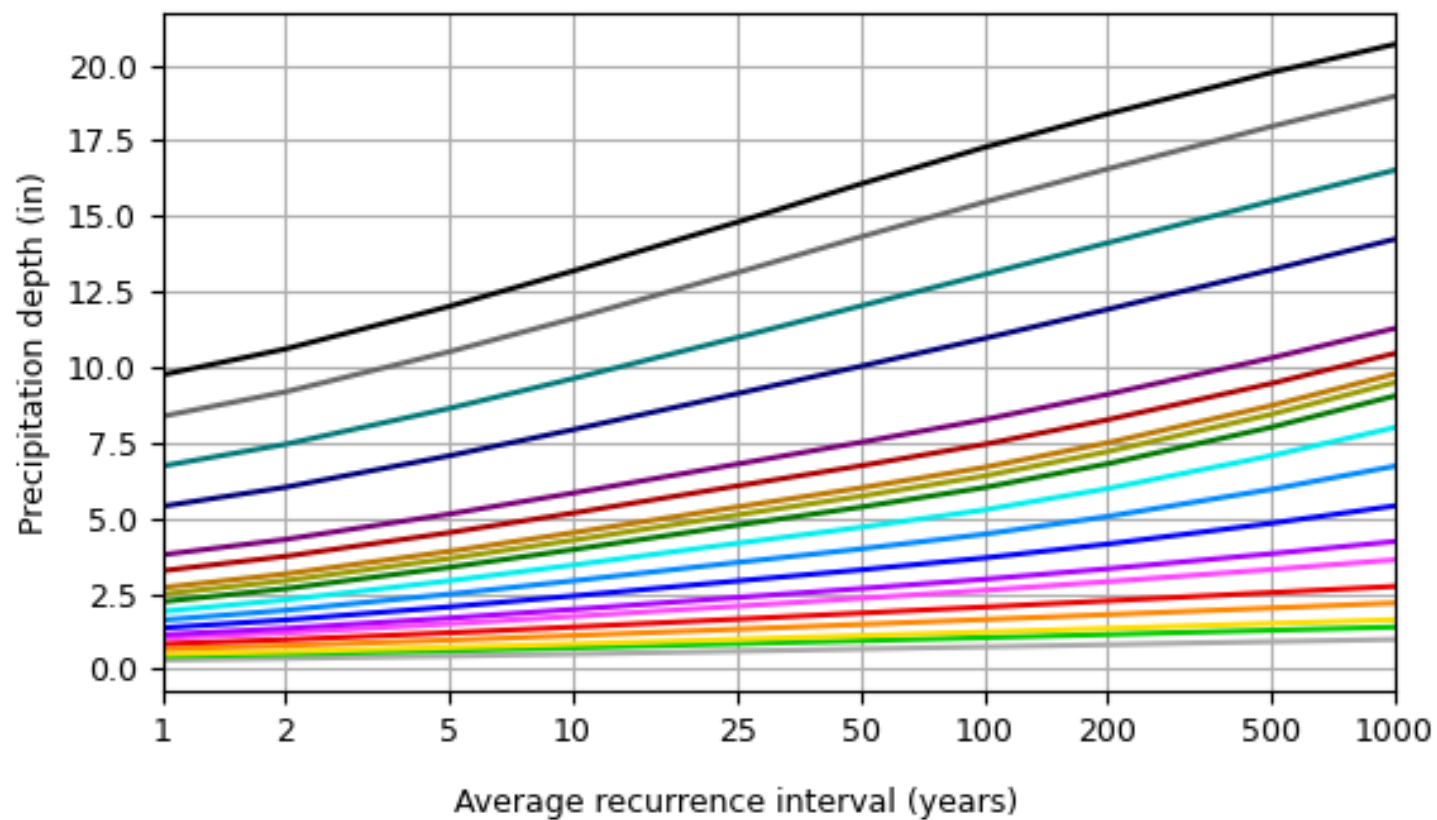
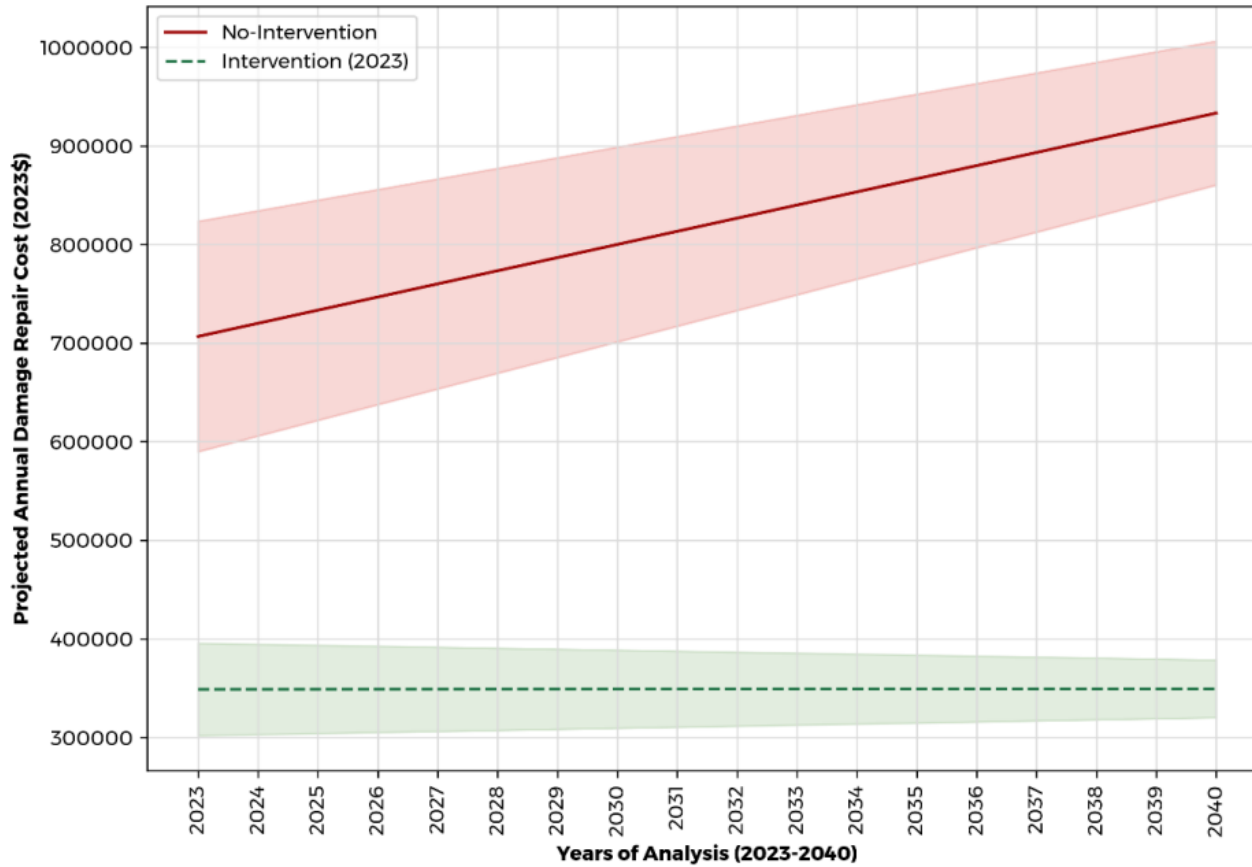


Figure 4-4: Projected Annual Damage Repair Cost for Assets with and without Past Intervention



Source: FHWA

Table 4-1: Benefit-Cost Analysis Summary

Scenarios	Baseline	Sensitivity Analysis (SD-)	Sensitivity Analysis (SD+)
Damage Repair Cost 2023-2040 (No Intervention)	\$12,432,835	\$10,959,228	\$13,906,441
Damage Repair Cost 2023-2040 (Intervention)	\$5,336,401	\$4,744,964	\$5,927,837
Maintenance Intervention Benefit (in 2023 US Dollars*)	\$7,096,434	\$6,214,264	\$7,978,604
Maintenance Intervention Cost (in 2023 US Dollars)	\$226,500	\$226,500	\$226,500
NPV	\$6,869,934	\$5,987,764	\$7,752,104
BCR	31.33	27.44	35.23

Note: * Discount Rate: 2 percent

Key: BCR = Benefit cost ratio; NPV = Net present value; SD- = One standard deviation minus; SD+ = One standard deviation plus

Key Principles of Rigidity

Robustness 

Redundancy 

Resourcefulness 

Rapid Recovery 

Risk Assessment Framework



Exposure



Sensitivity



Adaptive capacity

Tools for Risk Assessment

FEMA flood
maps




Hazard
overlays

Climate
projections



Lifeline
routes

Freight
corridors 

Evacuation
routes 

Identifying Critical Assets

Engineering Solutions

Elevated roadways

Retaining walls

Drainage systems

Vegetative
buffers 

Permeable
surfaces 

Green
infrastructure

Nature- Based Solutions



Resilience in
design
standards

Emergency
management
coordination

Land use
integration

Policy & Planning Approaches

Operations & Maintenance



REGULAR
INSPECTIONS 



ADAPTIVE
SCHEDULES



MONITORING
SYSTEMS 

Key Takeaways

Resilience is proactive

Requires engineering +
policy + maintenance

Supports safety,
economy, and mobility

Discussion and participant
questions

Q&A



Thanks!!!

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