

Incorporating Resilience Concepts and Strategies in Transportation Planning

Project Background and Objective

Transportation systems are vulnerable to natural and human-caused disasters such as extreme weather, climate change, and cyberattacks. These events and trends can result in unanticipated disruptions and increasing constraints on existing infrastructure.

Given the increasing frequency of these disasters, it is critical to design for and modify existing systems to be adaptive. Investing in strategic resilience planning and implementation is the first step toward mitigating the risk associated with these events.

Federal policies, such as Federal Highway Administration (FHWA) Order 5520 and the Infrastructure Investment and Jobs Act (IIJA), have emphasized preparedness and resilience to climate change, extreme weather, and other disasters.

While state departments of transportation (DOT) and metropolitan planning organizations (MPO) have made considerable progress in incorporating resilience concepts into transportation planning processes and policies, there is a need for new methodologies, tools, data, metrics, frameworks, and funding to support these efforts.

Consequently, NCHRP Project 08-129 developed a guide to help state DOTs and other transportation agencies integrate resilience concepts into all levels of transportation planning.

How DOTs Will Benefit from this Guidebook

- Assist state DOTs in meeting Infrastructure Investment and Jobs Act (IIJA) requirements.
- Accelerate the resilience learning curve for DOT staff.
- Become familiar with resilience practices from peer agencies.
- Transform organizational resilience practices from reactive to proactive.

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Research Findings

Key Lessons

Eleven quick scan and four deep-dive case studies —included eight state DOTs, an MPO, a transit agency, and an international transportation agency —offered the following key lessons to drive the successful integration of resilience concepts into transportation planning.

- Develop/adopt a standard definition and understanding of resilience.
- Establish/use state and federal regulations and policies.
- Garner leadership support for a dedicated resilience staff or working group.
- Collaborate with internal and external partners.
- Dedicate funds to train staff, collect better data, and improve models and tools.
- Develop resilience metrics and conduct routine, quantitative risk and resilience assessments.

Key Gaps

Case studies and review of over 200 relevant publications revealed gaps in the state of practice. These gaps form the basis for Key Building Blocks for agencies to improve their resilience capabilities.

- 1 Policies, definitions, leadership, and communication
- 2 Data, metrics, methodologies, and tools
- 3 Multi-discipline and cross-sector system approach
- 4 Agency resources and funding
- 5 Transportation plans

GUIDE ON INTEGRATING RESILIENCE CONCEPTS AND STRATEGIES INTO TRANSPORTATION PLANNING

The Guide consists of three primary components to assist agencies in incorporating resilience concepts and strategies into transportation planning:



Key Building Blocks



Capability Maturity Framework



Roadmap

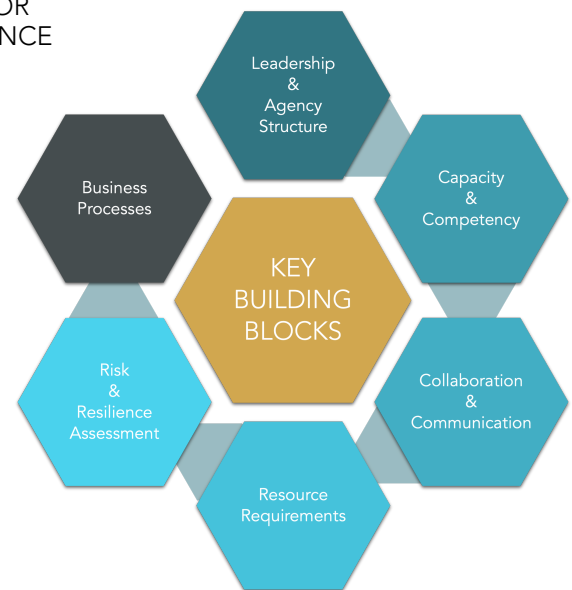
Key Building Blocks

Six Key Building Blocks or strategies are presented, along with 27 recommended actions for transportation agencies to incorporate resilience concepts and initiatives into transportation planning.

These strategies and actions were validated by state DOT representatives, including planners, engineers, asset managers, operations and maintenance staff, and safety professionals.

Example action: Identify and assign champions to lead resilience efforts.

KEY BUILDING BLOCKS FOR INCORPORATING RESILIENCE INTO PLANNING



Capability Maturity Framework

A Capability Maturity Framework (CMF) is provided to help agencies establish their current level of maturity, as well as to provide information on how to advance their capabilities.

THE SIX MATURITY LEVELS OF THE CMF

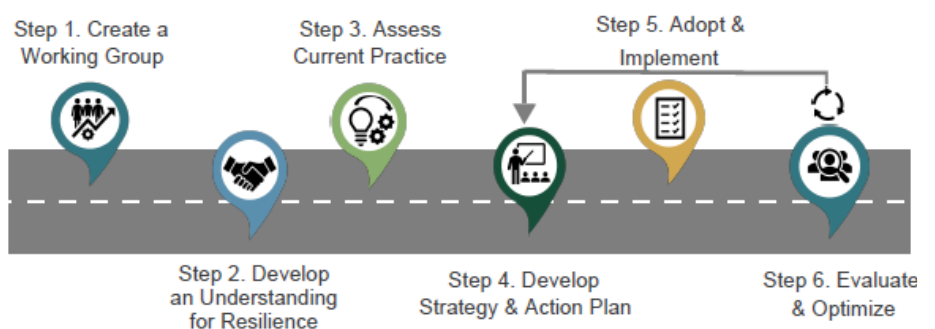
- Level 0** — Pre-initiation
- Level 1** — Initiating
- Level 2** — Defining
- Level 3** — Implementing
- Level 4** — Measuring
- Level 5** — Optimization

Roadmap

A multi-modal roadmap lays out six milestones to assist agencies in taking positive steps toward incorporating resilience into transportation planning.

The roadmap applies to agencies at different points—whether just beginning to develop a resiliency program or already incorporating resilience at some level—in conjunction with the Key Building Blocks, which can help agencies move in the right direction.

ROADMAP FOR RESILIENCE IN TRANSPORTATION PLANNING



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