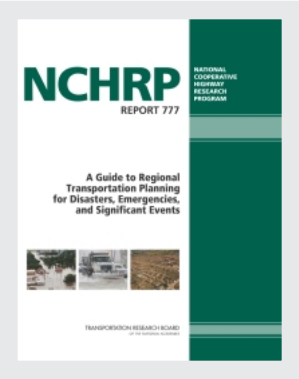

A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP REPORT 777

A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events

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TRANSPORTATION RESEARCH BOARD

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

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The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and the Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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We thank all those who generously gave of their time and knowledge to participate in our interviews, survey, and webinar. Much of the information included in the case studies draws on content from the interviews along with basic information made available on relevant websites. Special thanks go to John Contestabile, who shared the incident scale of public preparedness and intergovernmental, multijurisdictional involvement (Figure 2 in this document) that he developed while with the Maryland Department of Transportation. Thanks, too, to Elizabeth Fischer, who developed Table 1, "Connections between transportation systems and operations planning guidance and emergency operations and recovery planning guidance," and to all those who contributed to the development of the case studies.

FOREWORD

By Stephan A. Parker
Staff Officer
Transportation Research Board

NCHRP Report 777: A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events helps transportation stakeholders in the public and private sectors, as well as non-transportation stakeholders, such as emergency managers and first responders, better understand transportation's important role in planning for multijurisdictional disasters, emergencies, and major events. The guide sets out foundational planning principles and uses examples, case studies, tips, tools, and suggested strategies to illustrate their implementation.

The research (literature review, survey, and interviews) discovered multijurisdictional transportation planning for disasters, emergencies, and significant events taking place in many locations across the country, in many different institutional frameworks. Such planning shares precepts of communication and collaboration, supported by eight basic principles that enable communities to better recover after a major disruption. Effective planning is comprehensive, cooperative, informative, coordinated, inclusive, exercised, flexible, and continuous. These principles connect the many disciplines, levels of government, and private, nonprofit, and public-sector agencies that contribute to a good community plan. They provide a shared vocabulary for a collaborative effort that promises sound preparation, effective response, and rapid recovery.

The Louis Berger Group led a team that prepared *NCHRP Report 777* under NCHRP Project 20-59(42). They were tasked to develop a guide with principles and resources for facilitating regional transportation planning, coordination, and operations across all modes for disasters, emergencies, and significant events. Four key components comprise the research that led to the guide: a literature review; a national survey; follow-up telephone interviews with key stakeholders who had first-hand experience and knowledge of planning for disasters, emergencies, and significant events; and two webinars to review the draft guide, one with the study panel and one with key stakeholders. The research discovered multijurisdictional transportation planning for disasters, emergencies, and significant events crossing the thresholds between long range emergency mitigation planning, land use planning and transportation planning, as well as tactical emergency and transportation operations planning, in diverse planning and operations organizations as well as nonprofit agencies. The guide's examples and case studies focus on the positive applications of the principles of multijurisdictional transportation planning for disasters, emergencies, and significant events, including lessons observed, rather than emphasizing failures in planning.

In addition to the guide, a research report and a PowerPoint presentation describing the entire project can be accessed on the TRB website at www.trb.org by searching for "NCHRP Report 777".

CONTENTS

SECTION 4 Tools

SECTION 5 Additional Information

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

SUMMARY

A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events

A product of the research for NCHRP Project 20–59, Task 42, "A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events," *NCHRP Report 777* has been developed to help transportation and non-transportation stakeholders, such as emergency managers and first responders, better understand transportation's important role in building resilient communities.

Transportation planning for disasters and emergencies is essential to community readiness, response, and resilience for several important reasons:

- Transportation links communities, counties, states, and countries.
- Transportation is one of several critical infrastructure components of a community and region.
- Transportation systems and assets (roads, railways, waterways, airways, and transit lines) are required every day to move goods and people into, out of, and around an area.
- Transportation systems provide daily support to emergency services; public safety; public health; delivery of goods and services; business continuity; and public access to work, education, commerce, and recreation.
- Transportation involves fixed assets, such as roads, rails, signals, signs, bridges, tunnels, airports and waterways, and moveable resources, such as ships, planes, buses, ambulances, trains, traffic control devices, barriers and signs, tow trucks, delivery trucks, heavy equipment, and personnel.
- Transportation involves information on traffic congestion, traffic incidents, roadways, rail lines, waterways, and air traffic conditions.
- The material, human, and information resources that are involved in transportation can facilitate planning for, responding to, and recovering from a disaster or significant event, and incorporating transportation assets improves and leverages effective mitigation planning before and after a disaster.
- Events—whether caused by nature or by human activities and whether intentional or unintentional—can damage or destroy transportation assets.
- Transportation assets also can be the source or conduit of a disaster (e.g., 9/11/2001; the 1995 Murrah Federal Building bombing in Oklahoma; or a major train derailment, multi-vehicle accident, or hazmat spill).
- Damage to transportation assets often must be overcome or worked around to respond to emergencies, carry out rescues, restore power, and begin recovery.

The bottom line is that transportation is critical to communities' response and recovery in disasters, emergencies, and significant events. Planning for these incidents is as necessary to transportation agencies as planning for rush hours and snow removal. It is more challenging, however, because it requires a much greater emphasis on communication and collaboration with a broader-than-usual range of stakeholders and across a broader geography. Planning for

2 A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events

disasters, emergencies, and significant events is a whole-community, multi-faceted, multijurisdictional planning effort that establishes a process that brings transportation considerations into the emergency planning cycle and brings emergency planning considerations into the transportation planning cycle.

Emergency management organizations often head up the emergency planning and operations aspects of this work. However, transportation managers and planners provide critical leadership to:

- Plan, exercise, and manage transportation operations roles for emergencies;
- Ensure that the "big picture" multijurisdictional framework, perspectives, and stakeholders are included in planning and exercises;
- Ensure that essential security and hazard mitigation features are considered and perpetuated from transportation project inception to completion; and
- Ensure that transportation assets and projects are fully considered and included in long-range hazard mitigation planning.

A true partnership among transportation, emergency management, and other key stakeholders (including public, private, and nonprofit entities) is essential to improve communities' resilience and speed recovery from disasters.

NCHRP Report 777 has been developed to help transportation stakeholders in the public and private sector, as well as non-transportation stakeholders, such as emergency managers and first responders, better understand transportation's important role in planning for multijurisdictional disasters, emergencies, and major events. The guide sets out foundational planning principles and uses examples, case studies, tips, tools, and suggested strategies to illustrate their implementation.

Research for this study discovered multijurisdictional transportation planning for disasters, emergencies, and significant events taking place in many locations across the country, in many different institutional frameworks and settings. Basic **principles** undergird all such planning.

Two precepts—**communication** and **collaboration**—bind the principles together. Eight associated principles (Comprehensive, Cooperative, Informative, Coordinated, Inclusive, Exercised, Flexible, and Continuous/Iterative) make up the components of any specific plan. The eight principles are interconnected and interdependent, and will yield strategies or tactics for use in building readiness and resilience in the particular communities doing the planning. All of the principles contribute to the common goal of multijurisdictional resilience.

"Resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events."

—National Research Council (NRC), Disaster Resilience: A National Imperative, 2012

These principles connect the many disciplines, levels of government, and private, nonprofit, and public-sector agencies that contribute to a good community plan. They provide a shared vocabulary for a collaborative effort that promises sound preparation, effective response, and rapid recovery. Resilient communities weave social, economic, and infrastructure elements into a strong community fabric. Planning that is collaborative and communicative provides the foundation for building such resilience; the eight principles provide the building blocks.

Usually some or all of these principles are observable in institutionalized transportation planning, in emergency operations planning as part of the emergency planning cycle, and in long-range hazard mitigation planning. Sometimes they appear under other labels, or even as simply intuitive approaches; however, multijurisdictional disaster, emergency, and significant event planning will be most effective if the proponents consciously agree to adhere to the two precepts and eight principles as they shape their process. A cooperative planning process that incorporates these precepts and principles will support greater **resilience** in the community.

SECTION 1

Background

Introduction

Large, multijurisdictional disasters and emergencies occurring more frequently in the United States and internationally have ignited changes in how communities think about standing ready. As a result, a considerable body of planning knowledge has developed in the last 10 to 15 years around planning for disasters, emergencies, and significant events.

Running through most regional transportation planning for everyday mobility is a set of common principles that can be scaled up when planning for extraordinary transportation requirements that come from a disaster, emergency, or major event. This guide is designed to help transportation agencies make disaster preparation integral to their regular planning processes and encourage stakeholders outside transportation to bring transportation to the table. It also provides tools to help transportation managers take leading roles in initiating or reinvigorating collaborative work that integrates transportation into emergency readiness, response, and recovery planning.

Foundational Principles

Foundational principles work in community planning anywhere. They create a planning structure and help planners shape messages, methods, and means suitable for their location, agency, jurisdictional level, and event scenario.

These principles can be visualized as a planning circle or wheel (Figure 1). The wedges, or spokes, of the wheel (the principles) are joined at a hub (resilience) and held together by a rim (communication and collaboration). The image of the circle of planning principles that appears throughout this guide may be used to further categorize the foundational principles as applied to the planning process (coordinated, continuous/iterative); the plan itself (comprehensive, exercised, flexible); or the planning team (inclusive, cooperative, and informative). The principles are interdependent, as indicated in the figure by the dotted lines that separate them.

The two **precepts** that hold together all the principles are **communication** and **collaboration.** Without these precepts, no other part of a multijurisdictional planning process can be functional.

Categories of Communication

1. **Communication for the planning process** or related to the resulting plan (such as the work of developing the plan, sharing, and implementing the plan once it is complete).
2. **Risk communications,** which are discussions about "what could happen and what might we do about it" that can be the impetus for planning as well as one of the outcomes of a plan.
3. **Emergency communications** before, during, and after a disaster, emergency, or major event.

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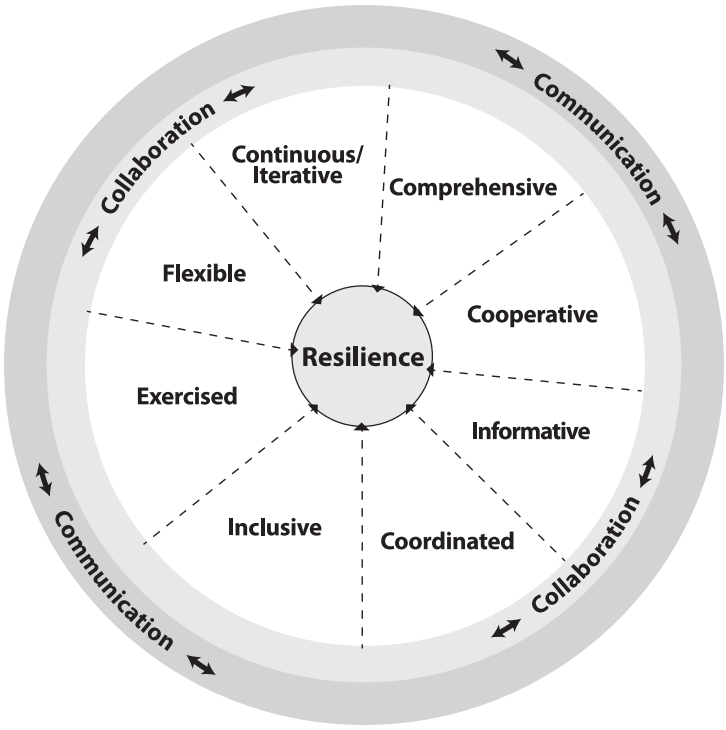

Figure 1. Circle of principles.

Each communication category has requirements for intra-agency and key stakeholder communication, but also for communication with the general public. Transportation planners have specialized knowledge and capabilities that are important to each communication category.

1. In **communication for the planning process,** it is important that transportation agencies identify communication capacity, constraints, and interdependencies to limit the potential for double counting or having multiple organizations think they have first or exclusive claim to a limited resource (e.g., dynamic messaging signage and ambulances or paratransit vehicles, which may be in demand by several entities).
2. In **risk communications,** transportation professionals must identify risks on two levels:
   a. Risks that come *from* the transportation sector (e.g., trucks or trains carrying hazardous materials subject to accident or derailment, or possible use of vehicles to carry out terrorist incidents).
   b. Risks *to* the transportation sector (e.g., bridges or tunnels susceptible to earthquakes or flooding), and the implications of such risk to multijurisdictional movement and response capabilities.
3. In **emergency communications,** transportation must provide a plan with a catalog of the kinds of emergency transportation-related guidance critical to decision-makers and travelers (e.g., communication and feedback on the condition and operations of public and private transportation infrastructure and interdependent systems).

"Collaboration: A purposeful process of working together to plan, to create, and to solve problems and/or manage activities."

—Campbell et al. (2005)

Cornerstones of Collaboration

Collaboration is the cornerstone of many types of activities, especially those requiring high levels of interaction for mutual gain and high levels of trust of others. For example, the first step in the planning process outlined in the *Comprehensive Preparedness Guide (CPG) 101*, Version 2.0, prepared by the Federal Emergency Management Agency (FEMA) is to "form a collaborative planning team (FEMA November 2010)."

Collaboration delivers the following direct benefits to regional transportation planning for disasters, emergencies, and significant events:

- Responding to public needs that require multimodal or multijurisdictional strategies.
- Using new technologies to integrate system and traveler information that crosses modal and jurisdictional boundaries.
- Improving the probability of securing new funding for a particular region or organization (by expanding the constituency base for the proposal).
- Preparing for both planned and unexpected events (such as freeway reconstruction and natural disasters) that could disrupt the transportation system (Campbell et al. 2005).

This guide provides some suggestions for fostering collaboration, and comprehensive information is found in these specific resources:

- TCRP Report 106/NCHRP Report 536: From Handshake to Compact: Guidance to Foster Collaborative, Multimodal Decision Making (Campbell et al. 2005).
- NCHRP Report 690: A Guidebook for Successful Communication, Cooperation, and Coordination Strategies Between Transportation Agencies and Tribal Communities (ATR Institute et al. 2011).
- Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security (FHWA 2003).

All three resources provide suggestions, tools, and practical applications for collaboration from varied perspectives.

Communication and collaboration provide the framework that holds the other principles together. These principles are introduced briefly in this section and described in detail in Section 2.

Planning Principles

Comprehensive: Regional transportation planning for disasters, emergencies, and significant events looks at the full range of potential events with widespread impact that could conceivably affect the region and considers all possible stresses on the transportation system, including interdependencies with other critical infrastructure systems. Planning develops, examines, and tests a range of solutions to address the resulting impacts on critical services, constituents, response capabilities, and the short- and long-range recovery of the community and the region.

Cooperative: The regional transportation planning process is cooperative, not top-down or single-government-agency driven. The process seeks, values, and uses input, suggestions, concerns, insights, and critiques from all public, private, and nonprofit stakeholders.

Informative: Regional transportation planning encompasses data acquisition, analysis, decision making, guidance development, and the transfer of information in a timely, accurate, clear, simple, and useful way to travelers, first responders, and other stakeholders. This principle guides action-oriented plans for specific communication messages, methods of presentation, and means of delivery.

Coordinated: Regional transportation planning establishes a coordinated system that identifies both problems and possible solutions. It takes into account the needs and capabilities of all relevant stakeholders.

Inclusive: Regional transportation planning for disasters, emergencies, and significant events includes services, entities responsible for providing them, material requirements, and persons to be served. It includes every relevant transportation mode; public and private stakeholders, including emergency managers, businesses, owners and operators of critical infrastructure,

Plan for the Maximum

FEMA Administrator Craig Fugate urges communities to "plan for the maximum of maximums." These are not just the expected events or recognized past events, but extreme conditions that could occur despite the probability being quite low.

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layers of government, and community organizations that work with people with access and functional needs and transportation-disadvantaged populations.

Exercised: Regional transportation plans for emergencies, disasters, and significant events are exercised regularly to improve planning and operations. Some of this planning and exercising can take place concurrently with planning for significant events.

Flexible: Regional transportation planning incorporates flexibility, adaptability, and the ability to make rapid decisions in times of uncertainty. It also aims at restoring transportation systems and the communities they serve to normal operations as quickly as possible.

Continuous/Iterative: Ideally, regional transportation planning is ongoing and regular. For readiness and resilience, planning for disasters are essential parts of usual transportation project plans and updates, but this requires long-term commitments to participation in emergency planning activities. Readiness and preparedness need a body of knowledge and set of relationships that develop without interruption over time. Regular assessments, plan updates, and regionally effective approaches to building community-wide networks continuously strengthen the level of communication and collaboration that are required in response to disasters, and these activities maintain critical relationships. This process also helps to ensure the continuous transfer of knowledge from one generation of personnel to the next and among agencies as roles and responsibilities emerge or change over time.

All incidents are generally first and best managed at the grassroots level of government. Tribal, municipal, and county police, fire, medical, and emergency management entities are responsible for handling incidents that affect their communities, consistent with the philosophy of the National Incident Management System (NIMS). When an incident exceeds local jurisdictions' capabilities and resources, regional partners and state agencies assist whenever and wherever necessary; this is often when transportation becomes a more critical part of the equation.

Most of the guide's focus is on transportation planning for disasters and emergencies because they present the most urgent challenges for multijurisdictional coordination.

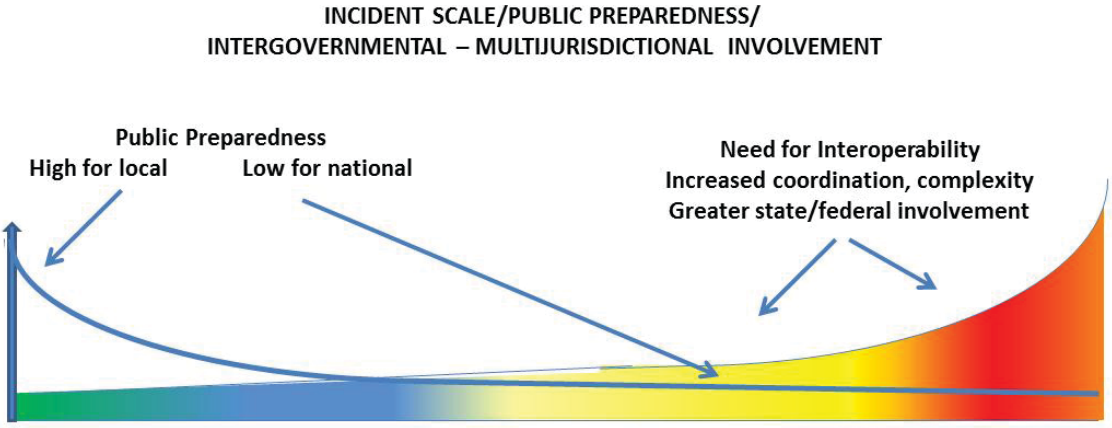
In addition to principles, the guide includes examples and case studies in which integrated planning has made a difference. Emergency managers and first responders in law enforcement, fire, and emergency medical services regularly interact with transportation incident-response personnel. In some cases, the tools and practices developed to respond to routine incidents can be scaled up through forecasting and practice. Likewise, relationships, strategies, and protocols that are developed to address large-scale significant events, such as a major sporting, entertainment, or political events, can also be useful in planning for and responding to major events such as hurricanes, flooding, wildfires, or terrorism.

Basic differences and similarities between disaster and emergency planning for planned special events are summarized in Appendix A.

Figure 2 illustrates the types of regional and national incidents that require multijurisdictional coordination. Incidents become less frequent proceeding from the local to national scale. As a result, public preparedness decreases as incidents increase in scale, moving from left to right. Conversely, the complexity of coordination—across jurisdictions, agencies, and private and nonprofit organizations, and through levels of government and chains of command—increases dramatically as scale of the incident increases. The time required to resolve an incident also increases with the scope and scale of the incident.

Connections Between Emergency Management and Transportation Planning

Table 1 summarizes and compares transportation and emergency management planning and operations frameworks that encompass transportation planning for disasters, emergencies, and significant events. It identifies areas in which transportation and emergency management



Classification	LOCAL	REGIONAL	STATE	NATIONAL
Examples	• Minor traffic incidents • Vehicle fires • Minor train/bus accidents • Accidents w/ injuries but no fatalities	• Train derailment • Major bus/rail transit accidents • Major truck accidents • Multi-vehicle crashes • Hazmat spills • Injuries & fatalities	• Train crashes • Airplane crashes • Hazmat incidents • Multi-vehicle accidents • Tunnel fires • Multiple injuries & fatalities • Port/airport incidents • Large building fire or explosion • Industrial incidents • Major tunnel/ bridge closure	• Terrorist attack/WMD • Floods, blizzards, tornadoes • Transportation infrastructure collapse • Extended power/ water outage • Riots • Mass casualties
Expected Duration	0-2 HOURS	2-24 HOURS	DAYS	WEEKS

Source: Graphic courtesy of John Contestabile, formerly of the Maryland Department of Transportation. Graphic used with permission; previously published in *CIO Leadership for Public Safety Communications—Emerging Trends and Practices* (Shark 2012).

Figure 2. Incident scale, public preparedness, and intergovernmental, multijurisdictional involvement.

can leverage mutual interests and resources to improve community and regional resilience and outcomes. Appendix B provides additional detail.

These connections are now working in many places throughout the nation. For example:

- Information sharing about transportation takes place every day on a regional basis, demonstrating its value to response agencies and the general public for small incidents, with even greater value for large events (see Section 3, Case Study 9).
- Transportation and emergency operations and recovery planning have successfully integrated private and nonprofit sectors into their planning, sometimes using novel non-governmental frameworks to accomplish that integration (see Section 2, Principle 2: Cooperative, and Section 3, Case Studies 1 and 3).
- Transportation and emergency management effectively collaborate to plan for major special events and use that information and collaboration to improve emergency operations planning (see examples in Section 2, Principle 6: Exercised, and Section 3, Case Studies 1 and 6).
- Long-term transportation planning and major transportation project planning explicitly incorporate and preserve security and hazard mitigation measures throughout the project design and implementation cycle. (See the Washington State Department of Transportation [Washington State DOT] example in Section 2, Principle 1: Comprehensive.).
- Hazard-mitigation planning clearly incorporates transportation infrastructure. (See the Fort Collins example in Section 2, Principle 5: Inclusive, and Section 3, Case Study 5.)

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Table 1. Connections between transportation systems and operations planning guidance and emergency operations and recovery planning guidance (Fischer 2012).

	Planning	Operations
TRANSPORTATION	**Transport Systems Planning**	**Transport Operations/Operations Planning**
	Transportation systems' long-range transportation plans link with community and land use plans. These long-term (20+ years) strategic and policy plans are updated every 5 years. They are required at the state and MPO level (23 CFR 450). Planning tools and resources that can be used under emergency management as well as transport operation are data and geographic information systems (GIS). Climate adaptation planning ties well to mitigation planning.	Planning addresses day-to-day management of transportation facilities, equipment, and systems (roads, bridges, intelligent transportation systems (ITS), bike/pedestrian paths, transit, etc.). Planning focuses on the system or specific aspects of the overall transportation system.
Links	• FHWA Planning: *http://www.fhwa.dot.gov/planning/* • The Briefing Book (Planning 101): *http://www.planning.dot.gov/documents/briefingbook/bbook.htm* • Planning for Operations: *http://plan4operations.dot.gov/*	• Planning for Operations: *http://plan4operations.dot.gov/* • FHWA Operations: *http://ops.fhwa.dot.gov/aboutus/aboutus.htm* • Asset Management: *http://www.fhwa.dot.gov/asset/*
EMERGENCY MANAGEMENT	**Recovery & Mitigation Planning**	**Emergency Operations Planning**
	Coordinated support for community recovery from the long-term impacts of major disasters. The mid-range (3–5 years). State multi-hazard mitigation plans are updated triennially. They are required at the state, local, and Tribal level (44 CFR 201). These plans are a perfect feed into transportation plans. HAZUS®, a GIS-based natural hazard loss estimation software package, provides data that could aid transportation decision making.	Tactical planning with repetitive training and exercises. All-hazards preparedness and response to no-notice (weather, earthquakes, human-caused) and planned events (sports, inaugurations). Short timeframes.
Links	• National Response Framework: *http://www.fema.gov/national-response-framework* (ESF14 Long-Term Community Recovery) • Mitigation: *http://www.fema.gov/what-mitigation* • *HAZUS®:* *http://www.fema.gov/hazus/hazus-mitigation-recovery-planning* • State Mitigation Planning "Blue Book": *http://www.fema.gov/library/viewRecord.do?id=3115*	• National Response Framework (NRF): *http://www.fema.gov/national-response-framework* (ESFs 1-13,15) • NIMS: *http://www.fema.gov/national-incident-management-system* • Comprehensive Preparedness Guide (Support Tool): *http://www.fema.gov/pdf/about/divisions/npd/CPG_101_v2_past.pdf* • FHWA Emergency Transport Operations: *http://www.ops.fhwa.dot.gov/eto_tim_pse/index.htm*
Time Scale	**Years to decades plus**	**Minutes to months**

Sources: Fischer, E., RLA, ASLA, APA, IAEM. 2012. U.S. DOT, FHWA, Hawaii. Developed for this project.

Worth the Effort

With regard to disasters and emergencies, many communities do not yet have effective multijurisdictional transportation planning that coordinates seamlessly with emergency management and other stakeholders. Working together would require a substantial investment of time for all entities to develop and carry out realistic exercises, coordinate and improve operating

plans and procedures for emergency events, and prioritize regional investments to improve regional security and resilience. However, the effort is worth it.

- The cost of building security and resilience measures into a major project, such as a bridge or tunnel, from the beginning is far lower than the cost of retrofitting later for security and/or hazard mitigation.
- The cost is also much lower than the costs to the community of losing access to and use of the asset and rebuilding after a disaster.
- Rebuilding after a disaster to reduce future risks, such as hardening structures or relocating homes, businesses, and infrastructure away from persistent hazards, reduces future reinvestments in disaster recovery.
- Investing in the social structures that build resilience, such as relationships with other agencies, jurisdictions, and nonprofit and for-profit organizations as demonstrated throughout the guide, helps communities rebuild more quickly after an emergency.

No single entity—including any federal or state agency—has all the resources needed to mitigate, respond to, and recover from all incidents of regional scale. Disasters demand coordination of resources among the public, private, and nonprofit sectors. This guide presents examples of where and how such coordination has developed and been most effective, highlighting the underlying and interrelated principles that foster success.

What This Guide Provides

This guide provides principles of planning; basic tools and resources; examples of many notable successes (and lessons learned from failures); and case studies about effective multijurisdictional transportation planning for disasters, emergencies, or significant planned events.

This guide does not frame multijurisdictional transportation planning inside transportation or emergency management planning definitions or tie it to specific planning cycles for emergency management, transportation, or municipal planning. It also does not prescribe standard operating procedures; suggested strategies are suggestions, not instructions.

In some cases, recommendations developed through a planning process have been translated into projects in a transportation improvement program or under an Urban Area Security Initiative Grant (UASIG). Such prioritization and implementation processes are recommended, but are inherently local and therefore are not treated in this guide.

The National Academy of Sciences report, *Disaster Resilience: A National Imperative* puts forth a vision of the characteristics of a resilient nation in the year 2030:

The characteristics describe a more resilient nation in which

- Every individual and community in the nation has access to the risk and vulnerability information they need to make their communities more resilient;
- All levels of government, communities, and the private sector have designed resilience strategies and operation plans based on this information;
- Proactive investments and policy decisions have reduced loss of lives, costs, and socioeconomic impacts of future disasters;

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- Community coalitions are widely organized, recognized, and supported to provide essential services before and after disasters occur;
- Recovery after disasters is rapid and the per capita federal cost of responding to disasters has been declining for a decade; and
- Nationwide, the public is universally safer, healthier, and better educated (National Resource Council 2012).

Figure 3 illustrates the interconnectedness of social, economic, infrastructure, and land use choices, overlapping the emergency planning cycle of mitigation, preparedness, response, and recovery. Investments in all the systems and emergency phases are necessary to achieve resiliency.

- Transportation is a critical component of land use and development. Transportation decisions and investments or disinvestments strongly influence development, and vice versa; together, these decisions and investments also foster or undermine mitigation efforts.
- Transportation is essential to social systems, providing access to jobs, services, education, and recreation.
- Transportation is a major sector of the economy in and of itself, and it supports every other aspect of the economy, directly or indirectly. The ability of a community or region to restore its businesses and economy quickly after an event will depend to some degree on outside support as well as internal resources.
- A functioning transportation system is required to bring in resources and access locations that need help; response and recovery efforts rely on transportation infrastructure.

This guide provides examples of effective planning in a variety of planning frameworks and institutional settings. The processes and outcomes, based on the application of the guide's eight principles, suggest a robust but flexible planning framework that any region will be able

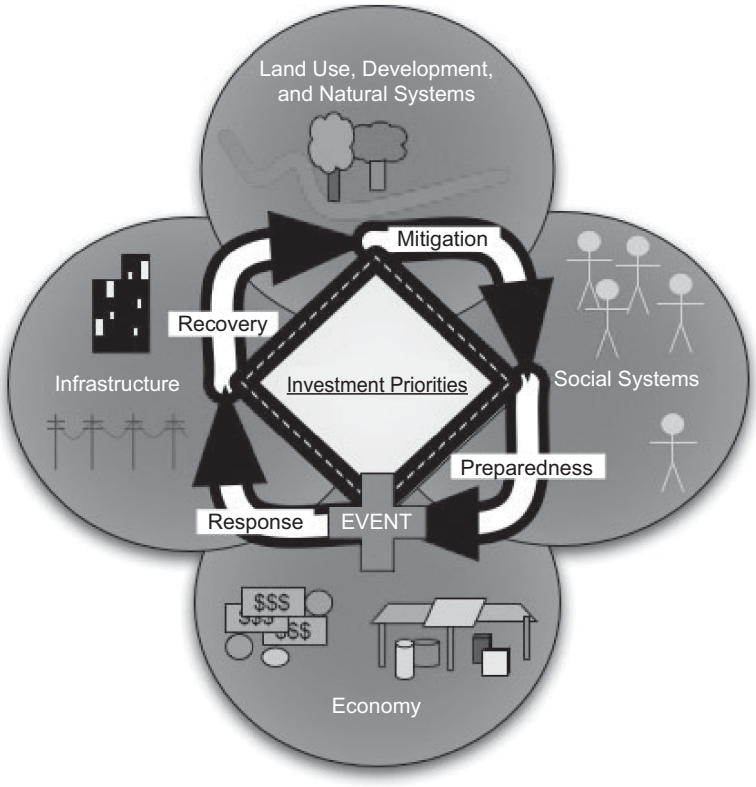

Figure 3. Interrelationships (LeDuc et al. 2009).

to adapt to its particular circumstances. Resilience is an achievable goal when multijurisdictional, multidisciplinary relationships, communication, and planning are in place prior to an emergency. The principles in this guide foster such relationship building and planning.

Objectives of the Guide

The key outcome of embracing and applying the eight planning principles is a more resilient community. The major objectives of *NCHRP Report 777: A Guide to Regional Transportation Planning for Disasters, Emergencies, and Significant Events* are to

- Raise the level of visibility and relevance in transportation planning for emergencies, disasters, and significant events;
- Increase awareness of public and private assets and capabilities that may be available to support response efforts locally, county-wide, statewide, regionally, nationally, and internationally;
- Improve resilience to withstand changing environments and more quickly restore normal operations;
- Facilitate informed dialogues and planning between transportation stakeholders and other major stakeholders for emergency planning;
- Help establish grassroots collaborative networks to help plan ways to mitigate, respond to, and recover from emergencies, disasters, or significant events; and
- Identify common causes that can benefit from shared resources.

Users of the Guide

This guide is designed to assist professionals in the transportation sector (all modes, and across the public, private, and nonprofit sectors) as well as in the non-transportation community in making the most effective community use of transportation's vital role in emergency planning, response, recovery, and mitigation efforts. It specifies advance planning and collaboration principles that can identify risks and hazards and unlock a wealth of potential transportation assets and capabilities. Transportation brings many kinds of assets to the table and carries vital interdependencies with other key sectors and functions such as utilities and communications. Many of these capabilities and interdependencies may not be familiar to emergency management and other public stakeholders.

How to Use the Guide

NCHRP Report 777 is organized around key planning principles identified through the research.

The principles make up the chapters of Section 2. For each principle, an overarching statement is given that summarizes the principle, followed by discussion of the characteristics of the principle, strategies and tips to implement it, examples of successful application of the principle, and cross-references to tools and case studies that further illustrate and support the principle.

Section 3 of the guide presents nine longer case studies that illustrate, in greater depth, how agencies and organizations have developed multijurisdictional planning for disasters, emergencies, and significant events, effectively applying most or all of the principles. This section also includes descriptions of entities that have developed and evolved to work out the frameworks and the details of multijurisdictional, multi-agency, private- and public-sector coordination (including transportation) for mitigation of, response to, and recovery from disasters and emergencies. Some of the case studies include information about entities that have employed established relationships to develop breakthrough strategies for dealing with planned events of national significance as well as emergencies.

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The case studies are designed to serve as guides and, as examples, they can be scaled up or down based on the specific needs of each community. Users are encouraged first to review the principles, refer to the tools, and delve into the case studies for more real-life examples, then to refer to the resources in Section 5 for further information.

Section 4 of the guide provides eight tools that support the principles. The tools include checklists, tables, and discussion guides.

Section 5 of the guide provides a glossary, an annotated list of resources that support the principles and action steps, and a list of references. Some resources are discussed in the text of the guide to better document the principles they support; however, the important information is repeated in Section 5 for ease of reference.

This guide is written for transportation planners, but it includes readily usable information for planners in other sectors, especially first responders, utilities, and, in particular, emergency managers.

Assumptions and Caveats

In most regions, emergency management carries primary responsibility for response and recovery planning and implementation during disasters and emergencies. Emergency management plans must integrate transportation systems and operations to ensure transportation for emergency response and mobility.

- In the National Response Framework (NRF), Emergency Support Function 1 (ESF 1) covers transportation. Ideally, all modes and facets of transportation are represented at the table during emergency planning to ensure that their perspectives are heard, their resources are acknowledged, and their concerns and potential limitations on responses are addressed.
- Agencies and organizations that participate in planning will vary by location; planning will reflect the particular geographic, environmental, demographic, and transportation system characteristics in each region.
- Regions will be at various points in the planning process. Some regions that may not have considered the multijurisdictional aspects of transportation planning for disasters, emergencies, and significant events will find this guide helpful. Other regions, with integrated, tested regional emergency transportation plans already in place, may find this guide useful in evaluating their plans and operations as they look for opportunities to improve.
- This guide frequently mentions metropolitan planning organizations (MPOs). Some MPOs are active in emergency planning and in coordination that includes transportation services. Many MPOs do not have an active role in such planning, however; rather, they provide supporting information such as mapping, demographics, or modeling. Other MPOs have more active roles in coordination, such as regional situational awareness and data sharing. Participation of these MPOs with regard to transportation planning for emergencies and significant events has been shown to have value in some communities, as highlighted in the examples and case studies in this guide.
- The examples and case studies provided are illustrative, not exhaustive. They are intended to represent promising practices or lessons learned based on the interviews and research conducted in NCHRP Project 20-59(42); many other excellent examples undoubtedly exist.

SECTION 2

Principles

PRINCIPLE 1

Comprehensive

Comprehensive regional transportation planning for disasters, emergencies, and significant events is a process by which a region sets forth a vision, goals, and objectives across multiple jurisdictions, stakeholders, modes, and communities to prepare for, respond to, and mitigate against such events.

Comprehensive regional transportation planning is all-inclusive geographically and functionally and considers all types of disasters, emergencies, and significant events that could occur in the area covered by the plan. It covers broad categories and seeks coordination "with the needs of all levels of governments, semipublic and private agencies and the citizens . . ." (Portland 2011). **Effective comprehensive planning establishes and maintains a continuous, effective, and iterative process that integrates transportation and emergency planning considerations into their respective partner's planning cycle.**

Characteristics of Comprehensive Planning

At a fundamental level, comprehensive planning includes all modes; considers the abilities and needs of all travelers; collaborates with all involved stakeholders; and takes into account the range of potential events, threats, and conditions that may occur at various scales. Comprehensive planning encompasses short-range response actions and longer-range projects and actions that can mitigate the most severe consequences and enable a faster recovery. A solid comprehensive plan sets parameters for the general policy that governs the more detailed, specific plans.

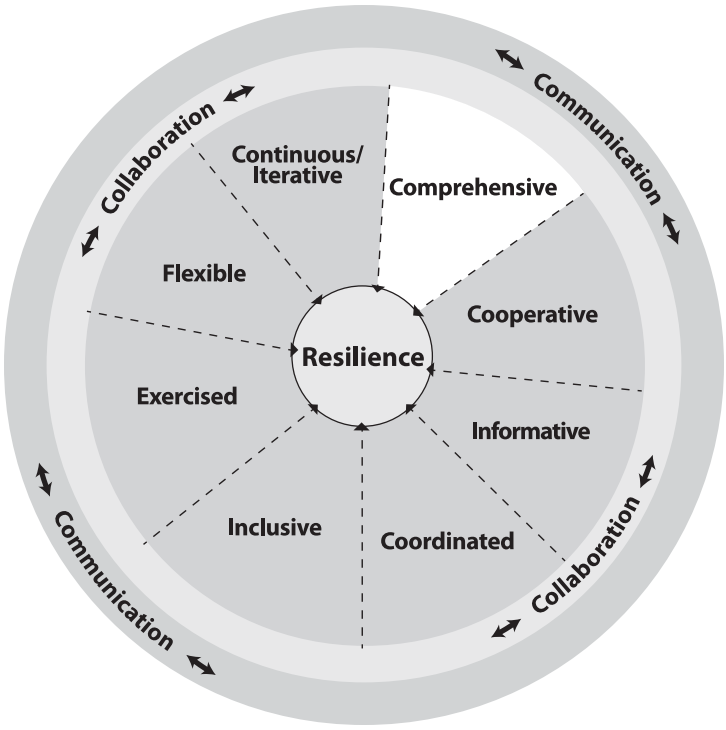
Strategies

In both planning and operations, situational awareness is a key to successful outcomes. This awareness includes assessing the transit and transportation infrastructure and systems, critical systems, existing security and emergency management features, and interdependencies with utilities and other systems. The following strategies can help planners develop comprehensive regional transportation planning:

- **Assess the multijurisdictional transportation situation.**
  - Where are people working, living, visiting, or recreating?
  - Where and how are people moving in and through the region?
  - Where are goods located and where are they moving in and through the region?
  - How do surface, air, and water transportation systems support and integrate with one another?
  - What is and is not included in the inventory of transportation infrastructure and assets for all modes of travel?
  - Who are the key stakeholders, including leadership and staff within regional transportation, emergency management, non-governmental organizations (NGOs), private industry, elected officials, and the local citizenry?

Principles

- **Comprehensive**
- Cooperative
- Informative
- Coordinated
- Inclusive
- Exercised
- Flexible
- Continuous/ Iterative



  - What land uses are currently located in the most high-risk areas in the multijurisdictional area; and what measures are in place to protect them, to encourage them to relocate, or to discourage further development? What are the possible stresses on transportation infrastructure and resources in an emergency?
- **Consider the interdependencies, priorities, and contingency plans that are needed when multiple systems fail simultaneously.**
  - Identify, chart, and map interdependencies between power, communication, highway and transit systems, and other transportation infrastructure.
  - Develop an action strategy.
    - Will this information change utility company priorities for restoration of power, or transportation priorities for opening roads in an emergency event?
    - Will this information lead to new priorities for infrastructure investment or retrofits to protect critical assets?
    - Will it lead to mitigation efforts such as zoning or other restrictions on new development or on rebuilding after a disaster (e.g., in a flood plain or in an area subject to wildfires or landslides)?

Tohoku Earthquake Example

The March 11, 2011 Tohoku earthquake, resulting tsunami, and subsequent nuclear disaster in Japan were an example of what can happen when multiple "failsafe" systems fail. More recently, in 2012 Hurricane Sandy demonstrated the fragility and interdependence of power, communication, highway, and transit systems. When tunnels flooded, both communications and transportation were shut down or severely limited. Flooding also severely damaged or destroyed power infrastructure such as substations and generators.

- **Evaluate the hazards and risks pertinent to the region, even those that may be relatively rare but still pose a risk.**
  - Review the list of hazards with planning partners.
  - Ensure coordination and collaboration with private-sector partners that can aid in assessing and mitigating risks and hazards.
  - Update hazard assessments to account for ongoing changes in
    - Land use (new houses or businesses developed in flood plains or wildfire threat areas, threatened uses in land areas removed from danger);
    - Climate (rising sea levels, drought, greater flood risk or weather volatility); and
    - Risk, such as the addition or removal of chemical plants, power plants, pipelines, hazardous materials carried on rail lines or trucks, and similar factors.
  - Use hazard and risk assessments to inform decisions about priorities, programs, and funding to reduce risks.
  - Invest in mitigation measures for risks that are geographically predictable, such as reinforcing or otherwise protecting a bridge or tunnel subject to earthquake; and
  - Develop preventive and reactive strategies to deal with non-geographically specific threats, such as a hazardous spill or explosion.

Tools

The following tools, which are detailed in Section 4, can help planners incorporate some of the strategies that have been discussed in this section:

- Tool 1: Checklist of Potential Stakeholders
- Tool 2: Checklist of Potential Transportation Assets (High Level)
- Tool 3: Transportation Resources (Detailed Checklist)
- Tool 4: Sample Transportation Security and Hazard Mitigation Strategies for Various Project Modes and Types
- Tool 5: Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies
- Tool 6: Key Steps to Effective Collaboration
- Tool 7: Questions for Collaborative Partners and Other Stakeholders to Ask Each Other
- Tool 8: Strategies to Exercise a Regional Transportation Plan for Disasters, Emergencies, and Significant Events

Tips

- Any hazard assessment tool is no replacement for serious, in-depth conversations and investigations among multijurisdictional stakeholders. These conversations and investigations can provide surprising and very important information; for example, a nuclear power plant operator reported that losing access to diesel fuel would critically impact its operations given the plant's limited fuel storage and constant need. Similarly, water supply plants may need near-constant renewal of chlorine or other chemicals. Manufacturing plants that provide critically needed supplies likely rely on just-in-time delivery; if even one or two elements are disrupted by a major event, ripple effects will be felt, as was noted after the 2011 Tohoku earthquake (Carafano 2011).
- Regional transportation assets must be inventoried. The numbers and relative importance of each type of infrastructure will vary for each region. In 2003, Homeland Security Presidential Directive-7 (HSPD-7) established a national policy for federal departments and agencies to identify and prioritize U.S. critical infrastructure and key resources and to protect them from terrorist attack. HSPD-7 identified 17 critical infrastructure sectors that

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require protective actions to prepare for, protect against, or mitigate a terrorist attack or other hazard (National Infrastructure Protection Plan [NIPP] website 2012). Transportation is one of those critical infrastructure sectors. Tool 2 in Section 4 provides a high-level overview of critical transportation infrastructure that can be useful to taking inventory of transportation assets.

- FEMA's Full-Risk System Knowledgebase provides a starting point for reviewing different types of risks and hazards and interdependencies (such as those between transportation and various utilities) and assessing consequences and mitigation approaches.

Examples

- **Adams County, Colorado,** is currently incorporating hazard identification, the county's land use plan, and their transportation plan into one document. The county is attempting to develop policies and goals that help bring these three areas together. For example, a policy might be to prohibit development and road construction in an area known to have a high flood risk. As another example, they might have land use restrictions for locating non-natural hazards. The document generated by this new effort will be used by public works and planning officials.
- **On the West Coast,** the San Francisco Bay Area Rapid Transit District (BART) can now automatically brake its trains when earthquakes threaten the region, allowing time for trains to slow down before the ground starts to shake (Passenger Transport 2012). BART worked with seismologists from the University of California, Berkeley, to activate this early warning system. BART is also retrofitting the BART Transbay Tube and elevated BART track structures for seismic safety as part of the Multijurisdictional Local Hazard Mitigation Plan for the San Francisco Bay area. This regional effort has been led by the Association of Bay Area Governments (ABAG).
- The **Washington State Department of Transportation** (Washington State DOT) has incorporated security and emergency mitigation into recent mega-projects. These measures include seismic retrofits for bridges and tunnels that also improve stand-off distances for possible explosions. Other measures include security cameras and intrusion detection devices for hatches and other entrances. This has been achieved through the determination and persistence of DOT personnel with security and emergency planning expertise.

Case Studies

The following excerpts from the case studies in Section 3 provide more detailed examples of current comprehensive regional planning initiatives. See the full case studies for more information.

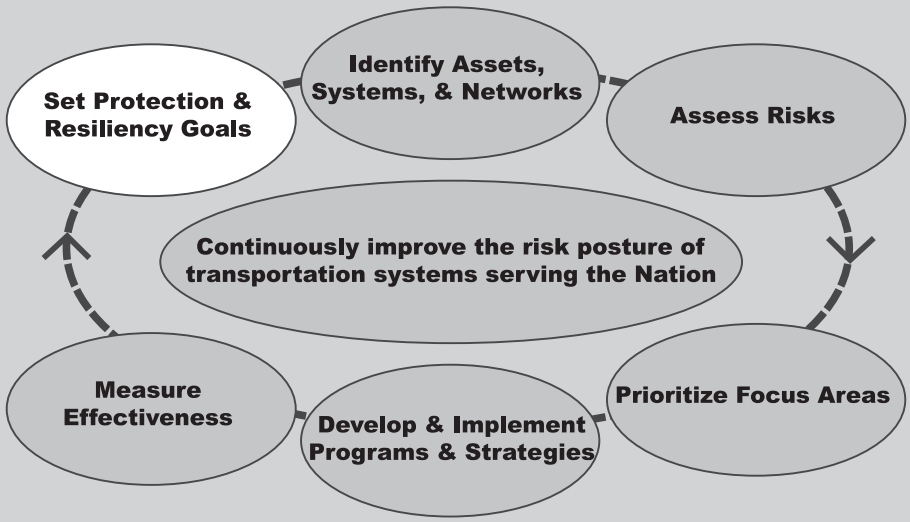
- **Case Study 1: Pacific Northwest Economic Region (PNWER) and the Center for Regional Disaster Resilience (RDR).** Established as a nonprofit agency in 1991, PNWER fosters cross-border economic coordination in the Pacific Northwest with public-sector and private-sector partners. The RDR was established by the PNWER in 2000. RDR working groups plan and conduct private-sector-driven exercises that do not end with the exercise, but rather lead to a Regional Action Plan with identified projects and actions. Action plans include: interdependencies, coordination, roles and responsibilities, response, critical resource logistics and distribution, information sharing, economic continuity and recovery, public information, and training and education.
- **Case Study 3: All Hazards Consortium (AHC).** AHC is a nonprofit organization guided by states in the eastern United States to facilitate multi-state collaboration efforts. The

multi-stakeholder focus of the consortium has yielded effective working relationships and strengthened emergency readiness and response capabilities between government, transportation entities, and the private sector, as demonstrated with Hurricane Sandy.

- **Case Study 5: The Association of Bay Area Governments (ABAG).** ABAG led and coordinated the development of the Multijurisdictional Local Hazard Mitigation Plan (MJ-LHMP) for the San Francisco Bay area. The plan includes extensive discussion and diagrams describing the interconnectivity among utilities, transportation, and communications. The plan is comprehensive, also covering health risks, such as a pandemic, which is typically under the purview of the Centers for Disease Control and Prevention (CDC).

Evaluating and Managing Risk

The 2010 Transportation Systems Sector-Specific Plan (SSP) is an annex to the National Infrastructure Protection Plan (NIPP). The SSP is the strategic plan for fulfilling the requirements of Homeland Security Presidential Directive 7 (HSPD-7): Critical Infrastructure Identification, Prioritization, and Protection and other requirements. The SSP describes a process to encourage wider participation in risk reduction decision-making activities and build a set of programs and initiatives that reduce the most significant risks to the transportation sector. This illustration from the SSP shows a framework for managing sector risk. Chapters 2 through 6 of the SSP describe the framework.



Source: NIPP-TSSP

The Transportation Systems Sector Risk Management Framework.

PRINCIPLE 2

Cooperative

Shared Responsibility

"Effective response to an incident is a shared responsibility of governments at all levels, the private sector, and NGOs, and individual citizens."

—National Response Framework 2012

Cooperation is the act of working with others voluntarily to obtain a mutual benefit. It requires multi-stakeholder decision making and interaction over the long term (Lanka, Wiek, and Ries 2009). Cooperation among regional stakeholders is key to promoting and enhancing regional resilience and protection, as emphasized by the Regional Consortium Coordinating Council (RCCC) study with the Department of Homeland Security Office of Infrastructure (RCCC 2011). Cooperation and collaboration both undergird the entire transportation planning process, creating a foundation for structure, resources, and operations, and serving as a means to achieve shared goals.

For disasters and emergencies, cooperation requires individual authorities and organizations to look beyond their own needs for safety and security. They must work as a team with their counterparts in other jurisdictions to ensure that disaster workers, equipment, and supplies can reach the incident site rapidly and quickly restore transportation services and systems within the region to normal operations. Advance, cooperative planning can make a difference in successful outcomes when emergency events quickly overwhelm the emergency management and transportation resources of a single local jurisdiction or even multiple adjacent jurisdictions.

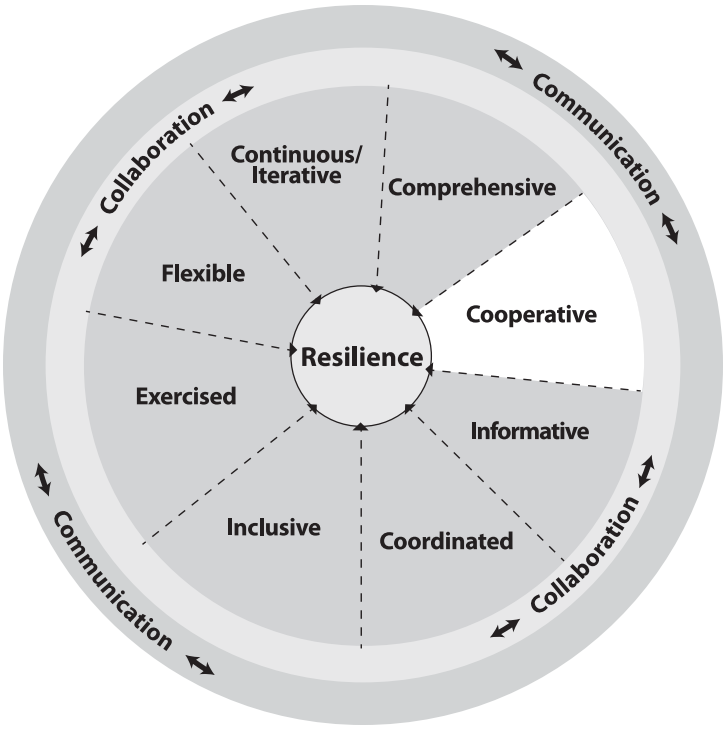
Characteristics of Cooperative Planning

Cooperation depends on building relationships, and the communication needed to establish and sustain those relationships ranges from less formal communication to more formal and interdependent communication (as might be seen with intergovernmental relationships). Successful cooperative planning relationships often develop from ongoing collaboration that incorporates the full range from informal to formal communication.

Cooperation builds partnerships among various transportation modes and systems, utilities, public and private stakeholders, layers of governments within the region, and interdependent internal and external communications systems. It requires planning partners to share information, identify interdependencies, train together, and incorporate regional emergency response and recovery planning and operations into their individual strategies (RCCC 2011).

Partners in the emergency transportation planning process can include

- Federal, state, regional, Tribal, and local agencies
- School districts
- Private-sector businesses
- NGOs, nonprofits, and other community and faith-based organizations that provide services to vulnerable populations
- Members of the general public



These partnerships continue through development and analysis of plans, policy and decision making, implementation and operations, and recovery and restoration.

Strategies

Identifying and responding to a shared and compelling transportation need that transcends jurisdictional boundaries can be best addressed through regional collaboration. Strategies to build and enhance cooperation in regional transportation planning for disasters, emergencies, and significant events include the following:

- Identify the common issues or needs that are perceived to be mutual problems and opportunities.
- Build a case for a joint solution to a common problem. How will this make the job easier? How can cooperation minimize problems and expenses, or leverage support for a mutually beneficial investment?
- Name the benefits of cooperation, such as improved response, resilience, and enhanced regional and national safety, security, and preparedness.
- Identify existing networks or groups within the region that are already engaged in transportation planning and could be broadened for emergency planning.
- Build and maintain relationships with key stakeholders.
- Identify complementary roles, responsibilities, and functions between regional transportation and emergency management plans and operations (see Table 1 and Figure 1).
- Integrate private, business, and community resources into plans and operations.
- Discuss planning partners' goals and objectives, and determine how they relate to one another (see Tool 7 in Section 4 for questions that can guide these discussions).
- Form workgroups to address specific areas of response and recovery.

Principles

- Comprehensive
- **Cooperative**
- Informative
- Coordinated
- Inclusive
- Exercised
- Flexible
- Continuous/ Iterative

Cooperation Provides a Framework

Cooperation provides *"a framework to exchange ideas and best practices; facilitate planning and allocation of resources; establish effective coordinating structures among partners; enhance coordination with the international community; and build public awareness."*

—NIPP 2009.

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Tools

The following tools, which are detailed in Section 4, support cooperative planning efforts:

- Tool 1: Checklist of Potential Stakeholders
- Tool 4: Sample Transportation Security and Hazard Mitigation Strategies for Various Project Modes and Types
- Tool 6: Key Steps to Effective Collaboration
- Tool 7: Questions for Collaborative Partners and Other Stakeholders to Ask Each Other
- Tool 8: Strategies to Exercise a Regional Transportation Plan for Disasters, Emergencies and Significant Events

Tips

- Some communities, particularly in metropolitan areas, have well-established interagency partnerships to plan for regional transportation needs and emergency response and recovery. In some cases, long-range transportation plans (LRTPs) call for cooperation with emergency management in addressing security needs of the transportation system. One common approach to cooperative planning is working through the metropolitan planning organization (MPO), council of governments (COG), or rural planning organization (RPO) to develop an emergency transportation planning process that includes both transportation and emergency management.
- Establishing sound working relationships and plans also pays off in day-to-day operations, in planning for large special events, and in ensuring that major transportation programs and projects incorporate appropriate security and hazard mitigation features.

Examples

- The **Louisiana Business Emergency Operations Center (LA BEOC)** was established through a partnership among the Louisiana Economic Development Agency, Governor's Office of Homeland Security and Emergency Preparedness (GOHSEP), Louisiana State University's Stephenson Disaster Management Institute and the National Incident Management Systems and Advanced Technologies Institute at University of Louisiana at Lafayette. The LA BEOC includes up to 40 representatives from the business community, industry trade associations, universities, volunteer organizations, and state government.
- The LA BEOC is virtually connected to the state's emergency operations center (EOC) and can efficiently and economically access private-sector resources and the critical infrastructures that support their supply chains and assist in matching volunteer and nonprofit needs with donations made by the private sector.
- The LA BEOC was activated during responses to the Deepwater Horizon oil spill in 2010 and Mississippi River flooding in 2011 to provide economic impact analysis and manage offers, vendor proposals, and response suggestions from the private sector. The LA BEOC also helped create technical interfaces with Deepwater Horizon responders and coordinated the scientific review panel to review proposed technical solutions. FEMA has recognized the LA BEOC as a collaborative model for public-private partnership.
- **The Houston–Galveston Area Council (HGAC)** has a cooperative planning process for regional emergency management. The HGAC has a working committee that includes transportation entities, representatives from emergency management offices in Galveston and Houston, and representatives from various counties, mayors' offices, city of Galveston agencies, the Houston transit agency (METRO), housing authorities, and school districts. The

committee meets regularly to brainstorm issues around disaster response and recovery. During Hurricane Ike in 2008, the HGAC assisted with contraflow, collaborating with sheriffs' departments, state police, and counties in the region.

- When planning and conducting full-scale exercises, the **Houston METRO** also works with individuals with disabilities and their advocacy organizations. Through this type of planning, specific needs have been recognized, such as time required to load buses and to accommodate various support equipment.
- In some regions, an agency other than the MPO assumes leadership for long-range emergency hazard mitigation planning for transportation and other critical infrastructure. In the San Francisco Bay area, for example, **ABAG** is primarily responsible for coordinated land use planning, but also has taken ownership of mitigation planning. ABAG works closely with the **Metropolitan Transportation Commission (MTC),** the designated MPO for the area.
- Some regions have established dedicated nonprofit organizations to maintain collaboration among public-sector and private-sector agencies, including public and private transportation, utilities, and multiple levels of government. Examples include the **PNWER** (and **RDR**), encompassing British Columbia, Alberta, Saskatchewan, the Yukon, the Northwest Territories, Alaska, Washington, Idaho, Montana, and Oregon, and the AHC, encompassing North Carolina, the District of Columbia, Maryland, Virginia, West Virginia, Delaware, Pennsylvania, New Jersey and New York State, along with the urban areas of New York City, Newark, New Jersey, Philadelphia, Pennsylvania, and the National Capital Region surrounding Washington D.C. For more information about these nonprofit organizations, see Section 3.
- Federal transportation legislation, such as ISTEA, TEA-21, SAFETEA-LU, and MAP-21, provided the impetus for states and agencies to come together to study and solve common problems through multi-state transportation operation programs (MSTOPs). One of the earliest MSTOPs is the **Transportation Operations Coordinating Committee (TRANSCOM),** created in 1986 for a regional collaborative approach to transportation management. TRANSCOM is an independent, nonprofit legal entity set up as a technical services group to monitor construction activity and management and disseminate information about incidents in the New York City area.

Case Studies

The following excerpts from the case studies in Section 3 provide examples of cooperative planning efforts. See the full case studies for more information.

- **Case Study 3: All Hazards Consortium (AHC).** After Hurricane Sandy, convoys of utility trucks and response vehicles encountered bottlenecks at tolling stations around the region. The AHC, through its established network of private-sector utility partners and government agencies, was able to obtain quick and widespread agreement on a workaround for expedited passage for relief vehicles to eliminate the bottlenecks.
- **Case Study 4: Southwest Missouri Council of Governments (SMCOG).** SMCOG provides planning services to 10 counties, most rural, in and around Springfield, Missouri. SMCOG serves as a convener for regional matters extending well beyond traditional transportation planning; e.g., the state emergency management agency (SEMA) relies on SMCOG to help local jurisdictions develop county-wide multijurisdictional, multi-hazard mitigation plans. SMCOG also works with rural cooperatives on developing local hazard mitigation plans. In 2003, the Missouri Department of Transportation (Missouri DOT) initiated a new planning framework to expand public participation in planning the future transportation network

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in the state using collaborations with local officials around the state, including SMCOG, to determine regional priorities for transportation.

- **Case Study 8: Hurricane Sandy.** The New York Metropolitan Transit Commission (NYMTC) has partnered with the FHWA, the North New Jersey Transportation Planning Authority, the South Western Regional Planning Agency, and the Greater Bridgeport Regional Council along with the New York, Connecticut, and New Jersey DOTs on a project to assess the effects of Hurricane Sandy and other past weather events and to analyze adaptation strategies for critical infrastructure. The study area will consist of the planning areas of the partner MPOs. The project will assess the vulnerability of transportation assets to the impacts of extreme weather and the possible future impacts of climate change, and it will identify adaptation strategies to increase resilience of the regional transportation system.

PRINCIPLE 3

Informative

Effective and informed communications are essential in carrying out each of the other principles in regional transportation planning for disasters, emergencies, and significant events. Informative communication implies accurate, timely messages dispersed, received, and understood across multiple channels and media. Information flows in multiple directions: back and forth between parties; up and down levels of governments, agencies, organizations and chains of command; and across boundaries of jurisdictions and public, private, and nonprofit sector partners, and the general public.

Characteristics of Informative Planning

Effective informative planning ensures that people who are working together on plans understand each other's needs, expectations, and available resources. Effective two-way and multi-stakeholder communication during planning stages brings new ideas, perspectives, and information to the process. It illuminates additional community strengths and resources and unforeseen or underestimated risks, hazards, and vulnerabilities.

Before, during, and after an event, informative messages also let the public know where to go to access help, water, food, or fuel; connect with family and friends; and begin the process of rebuilding their communities. After an event, timely information helps direct recovery efforts and resources to the most needed places, and helps reduce or eliminate bottlenecks that disrupt the flow of recovery resources to the region.

Strategies

Addressing the following facets of communication is critical to implementing effective, informative communications in emergencies, disasters, and significant events:

- Regional transportation communications
- Situational awareness
- External communications to the public, including people with access and functional needs

Regional Transportation

Strategies to improve regional transportation communications include the following:

- Identify information resources used by transportation, emergency management, and other responders for delivering critical and routine messages.
- Determine interoperability of communications systems and channels among planning partners, particularly those outside the emergency response sector.

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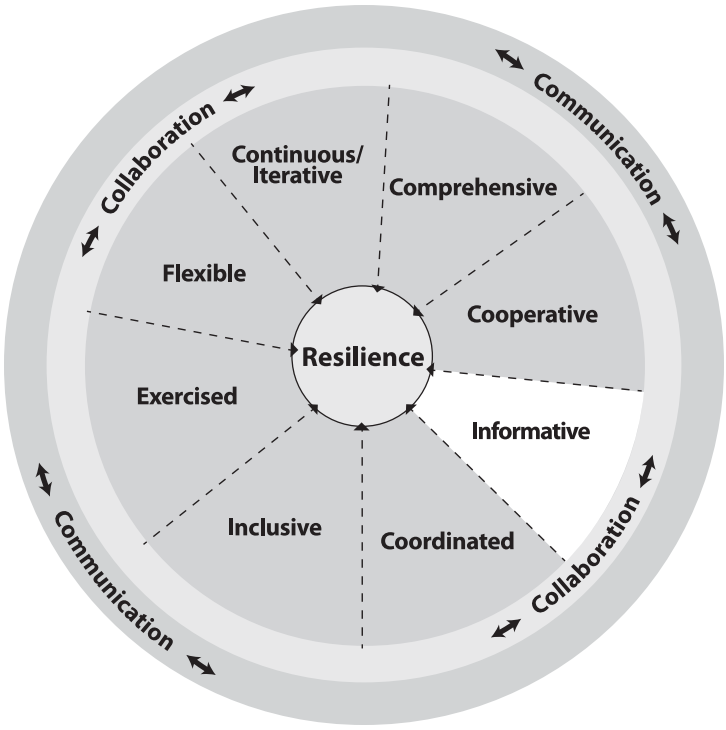
Principles

- Comprehensive
- Cooperative
- **Informative**
- Coordinated
- Inclusive
- Exercised
- Flexible
- Continuous/ Iterative



- Determine the robustness and redundancies of information exchange.
- Develop contingencies for alternate information sharing resources during a massive communications outage.

Situational Awareness

Situational awareness is knowing and understanding what is happening and predicting how it might change with time. As was discussed under the comprehensive principle, situational awareness in both planning and operations can be improved by using the following strategies:

- Assess transit and transportation infrastructure and other critical systems and possible stresses.
- Know existing security and emergency management features.

San Francisco Area MTC

An example of situational awareness in planning comes from the San Francisco Area MTC, an operating agency and a planning and coordination agency. The MTC operates the 511 call service, providing multimodal transportation information that includes bike information, traffic information, and more. Together with the California Department of Transportation (Caltrans) and the California Highway Patrol, MTC operates the phone center and freeway service response center.

Under the Regional Transportation Emergency Management Plan (RTEMP), MTC serves as a public information clearinghouse during a disaster. This role gives MTC a good perspective on emergency preparedness issues related to transportation operations, which feeds back into transportation planning.

- Understand the interdependencies between transportation, utilities, communications, and other systems and priorities for restoration of services.
- Additional strategies for situational awareness include the following:
  - Identify mechanisms for regular data collection and exchanges with stakeholders about essential services.
  - Know how people and goods are moving in and through the region and potential impacts.

Tools for establishing situational awareness can include flow maps for traffic capacity and time; GIS maps; laser imaging and radar mapping (Lidar) systems; traffic management centers; security cameras for critical infrastructure; and others. See Tool 3 in Section 4 for more information.

External Communication

The following strategies can improve external communication planning and implementation:

- Establish and practice multijurisdictional coordination in messages and information sharing. In advance, determine the types of messages that should be consistent across the region and how multijurisdictional message coordination will take place horizontally and vertically.
- To guide information sharing, address such questions as "How will information coming from the public be monitored and acted on?" and "If social media are being used, how will the streams of information coming from many individuals and locations be monitored and acted on?"
- Identify available methods or channels of public outreach within the region, such as television, radio, websites, social media, text alerts, phone alerts, sirens, bullhorns, door-to-door alerts, paper flyers, and newspapers.
- Establish and publicize backup methods for communications in case of loss of power or networks, deciding in advance what to do if cell towers are down, communications lines are knocked out, and electrical power is out for an extended period.
- Determine how external messaging will be coordinated horizontally and vertically.
- Establish a communication network for disseminating routine and critical information about access to transportation for people with access and functional needs and carless populations (*TCRP Report 150* outlines how to establish a communication network).

Tools

The following tools, which are detailed in Section 4, can be used to identify planning partners and resources needed to achieve informative planning:

- Tool 1: Checklist of Potential Stakeholders
- Tool 2: Checklist of Potential Transportation Assets (High Level)
- Tool 3: Transportation Resources (Detailed Checklist)
- Tool 4: Sample Transportation Security and Hazard Mitigation Strategies for Various Project Modes and Types

Tips

- Many agencies have found that the information and data sharing for a planned significant event can be used to help prepare for a disaster. For example, procedures and protocols for interoperable communications across jurisdictions and across agencies can be tested and practiced for a significant planned event, such as a large Fourth of July celebration or a major sporting event or concert. Likewise, various means of communicating with the public, such as variable message signs, public alerts, and text or email alerts, can also be tested to evaluate their effectiveness.

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- For both planning and events, bringing media in early is important because the media have a different and unique perspective on the region. The news goes on all the time—will transportation and emergency management be there to shape the story or not? Listen to media representatives to understand their approach. Share information and always follow through in order to build good working relationships with the media. To get over the fear of working with the media, it is helpful to go to basic and advanced media training to learn the language, what drives the media, how to develop messages, and how to respond during an emergency or other significant event.

Examples

- Informative regional transportation communication typically builds from a platform of routine communications that also support emergency operations. The **Metropolitan Washington Council of Governments (MWCOG)** implemented the Metropolitan Area Transportation Operations Coordination (MATOC) program. For many years, MATOC has provided situational awareness for the public and agencies, coordinating and disseminating information from and among transportation and transit agencies in Maryland, Virginia, and the District of Columbia for the National Capital Region (NCR). MATOC was modeled on TRANSCOM, the longstanding MSTOP in the greater New York area. In turn, MATOC provided the impetus for the Regional Integrated Transportation Information System (RITIS) profiled in Case Study 9.
- The **Michigan DOT** is responsible for numerous international crossing points between Canada and the United States. In addition to tourist and commuter traffic, many of these locations also serve as vital links for commercial shipping traffic, particularly traffic associated with the automotive industry that closely links both countries. Accordingly, the Michigan DOT maintains close relationships with transportation officials in Ontario, Canada, mostly related to bridges and tunnels in the state. These long-term relationships spread to states that share borders with Michigan. When major snowstorms have affected areas of Ontario and closed freeways in Canada, Michigan DOT officials have changed information on variable message signs throughout the state and, in particular, near Interstate crossings into Michigan from the border states of Ohio, Indiana, and Wisconsin to inform automobile and commercial traffic of these border link closures and suggest alternative routing.
- Hurricane Sandy highlighted the need for cross-agency coordination and regular information sharing and data exchanges between **New York City** and relevant agencies to drive allocation and distribution of emergency resources. After the hurricane, the ability to collect and synthesize accurate data was critical to addressing the city's most urgent needs, such as power, water, fuel (e.g., fuel availability in a gas station with access to power), and communications. Following Hurricane Sandy, New York City Mayor Michael Bloomberg created an **Office of Data Analytics** and appointed a chief data analytics officer to improve the city's collection and synthesis of data on the city's essential services. Engagement with private and utility sectors—power, gas, telecommunications, and others—also is an important part of this effort.
- The **Alaska Department of Transportation and Public Facilities** (Alaska DOT) developed a Field Operation Guide specifically for its transportation divisions that includes information about responding to various types of incidents, such as earthquakes and floods. For example, a 5.2 earthquake triggers operations and maintenance officials to assess effects on infrastructure. The Field Operation Guide addresses how to assess post-disaster impact. This multifaceted document includes a small, removable pocket guide with checklists about what to do in different emergencies/disasters.

In the back of the Alaska guide is a CD-ROM with Incident Command System (ICS) forms and an electronic version of the guide and other resources. The CD-ROM also has various emergency

plans shared by other agencies and references to other plans. The Alaska DOT also manages an internal website with 10 training modules that accompany the guide. The Field Operations Guide addresses the National Response Framework (NRF) under continuity of government planning and deals with resilience in how to keep transportation going and infrastructure working.

Communicating Informatively with Diverse Populations in Disasters, Emergencies, and Significant Events: Lessons Learned

In Kentucky, public health has led the way in outreach to vulnerable and at-risk populations for both routine and crisis communications. One of the best examples comes from the **Northern Kentucky Health Department.** This department established a regional version of the statewide Kentucky Outreach and Information Network (KOIN), recognized nationally as a model program. Like its parent network, the Northern Kentucky KOIN is a network of local agencies, community organizations, and other groups who have volunteered to be conduits of information about public health impacts from disasters and emergencies. Through the KOIN, the health department holds train-the-trainer sessions for the people it serves. For example, the health department conducted shelter-in-place trainings to give volunteers additional information to pass along about where to get immunizations, hygiene measures, and other information.

The KOIN is also helpful in addressing bigger problems. Volunteers are asked to keep the health department informed about population changes that will have an impact on planning and response. If a client group depends on oxygen tanks and there is a power outage, the health department knows where those people are located and can plan/respond to those needs. The KOIN has also been effective in delivering crucial messages during ice storms, hurricanes, and disease outbreaks throughout the commonwealth.

The health department uses some GIS data and census data, but also relies on people, such as emergency managers and medical providers, to gather population data. The health department looks for ways to incorporate that data into a better resource and plans to build its own database because the tools available do not fit its needs. It is also finding better ways to acquire information such as how many people are on prescription medications and other personal medical information.

Emergency managers and transportation managers and planners may find that many of the important connections they need for informative planning are already available through a partner agency.

Case Studies

The following excerpts from the case studies in Section 3 demonstrate informative planning for disasters, emergencies, and significant events:

- **Case Study 2: Anchorage, Alaska.** The Anchorage Emergency Management Agency (Anchorage EMA) has incorporated the needs of access and functional needs populations in several emergency planning initiatives, resulting in improved communication products

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and planning documents. The EMA formed a functional needs support services working group to review sections of the mass-sheltering annex of the emergency operations plan. The EMA also worked collaboratively with several planning partners to develop a disaster registry application and brochure that would meet the communication needs of target end users.

- **Case Study 3: All Hazards Consortium (AHC).** In 2004, the AHC hosted an All-Hazards Forum around the concept of interoperable communications, bringing together first responders from many jurisdictions across Maryland, along with vendors and universities that showcased the latest tools and technologies. A lesson learned from the forum was that, while technology was important to all-hazards planning and response/recovery, people must also come together to develop consensus on exactly what is needed to address problems, including the application of technology.
- **Case Study 9: Regional Integrated Transportation Information System (RITIS).** RITIS is an automated data sharing, fusion, dissemination, and archiving system for operational data. It includes many performance measure, dashboard, and visual analytics tools that provide real-time information to help agencies gain situational awareness and measure performance. It does this by compiling transportation data from each participating agency, standardizing it, and making it available to other participating agencies through each agency's existing transportation management systems. RITIS also communicates information between agencies and to the public. This improved real-time information is crucial for effective management of the region's transportation system and related emergency preparedness. Managers and policymakers from transportation, transit, and public safety agencies can also use real-time RITIS data to monitor their agencies' incident responses.

PRINCIPLE 4

Coordinated

Regional transportation planning establishes a coordinated system for identifying problems and solutions that cross jurisdictional boundaries and involve multiple agencies. A coordinated planning approach for disasters, emergencies, and significant events fosters a more cohesive interaction between and within agencies, throughout all levels, and across hierarchical political and jurisdictional boundaries.

Coordination shapes and guides the planning process. Similarly to Principle 2: Cooperative, Principle 4: Coordinated aims to establish a set of regional policies and protocols that ensure the involvement of all local municipalities, agencies, modes, and communities. Coordinated planning can result in a more informed, robust plan that enables a region to draw on its resources and capabilities in situations that warrant multijurisdictional emergency response and recovery.

Characteristics of Coordinated Planning

Coordinated planning initiates and maintains working relationships and communication channels with planning partners long before disasters, emergencies, and significant events occur. It identifies the needs, capabilities, and available resources in the region so that personnel and resources can be moved into immediate action when needed.

Coordination among agencies can be informed or solidified in formal, institutionalized agreements such as Memoranda of Understanding (MOUs) or Memoranda of Agreement (MOAs). These compacts typically are put in place to support neighboring jurisdictions when they exhaust available resources in responding to an event. For example

- MOU relationships were used extensively during the California wildfires of 2005 and 2008 when neighboring counties and cities around the state dispatched fire crews to assist local crews.
- State police officers from Michigan and New York supported fellow law enforcement personnel in various locations in Louisiana after Hurricane Katrina in 2005.
- Such agreements are also common in the private sector where electrical power companies support one another during hurricanes in the southeastern and gulf coastal areas of the United States and during tornadoes and ice and snow storms in states farther north and west.

Templates for MOUs can be found online or in *NCHRP Report 740: A Transportation Guide for All-Hazards Emergency Evacuation* (Matherly et al. 2013).

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Principles

- Comprehensive
- Cooperative
- Informative
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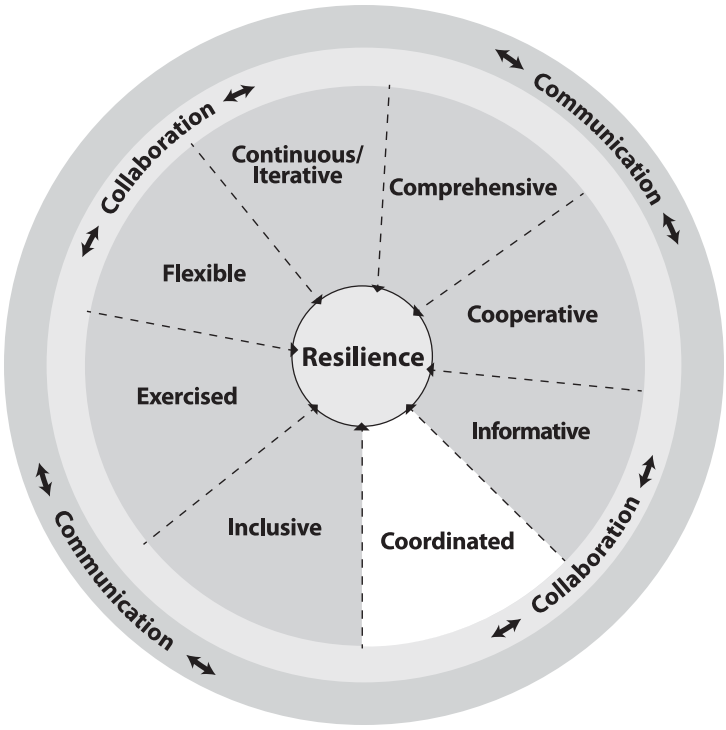
- Flexible
- Continuous/ Iterative



Strategies

Strategies to coordinate regional transportation planning efforts for disasters, emergencies, and significant events include the following:

- Use planned events to bring key stakeholders to the planning table, and leverage those relationships and resources for regional transportation planning for disasters and emergencies.
- Focus on what is required to get started to meet regional emergency transportation needs.
- Share emergency plans, and consider how they can be integrated. Be prepared to discuss
  - Assumptions upon which those plans were built.
  - Transportation assets and resources and how they will be used. Are there wrong assumptions about how/when transportation assets would be used and by whom?
  - Critical transportation services that will need to be restored and maintained.
- Consider ways to establish more formalized partnerships through MOUs and other agreements as planning progresses.

Tools

All eight tools included in this guide can be useful for coordinating regional planning efforts with key stakeholders and partners. These tools are available in Section 4.

- Tool 1: Checklist of Potential Stakeholders
- Tool 2: Checklist of Potential Transportation Assets (High Level)
- Tool 3: Transportation Resources (Detailed Checklist)
- Tool 4: Sample Transportation Security and Hazard Mitigation Strategies for Various Project Modes and Types
- Tool 5: Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies

- Tool 6: Key Steps to Effective Collaboration
- Tool 7: Questions for Collaborative Partners and Other Stakeholders to Ask Each Other
- Tool 8: Strategies to Exercise a Regional Transportation Plan for Disasters, Emergencies and Significant Events

Tips

- One of the most common forms of coordination is to convene planning meetings at regularly scheduled intervals, which can be as often as monthly or as infrequent as once a year. In practice, these meetings include planning and carrying out exercises to test assumptions and readiness.
- After an event, coordinated planning and operations restore order and help communities recover. Coordination also is required when evaluating the performance of the operations through after-action reporting and plan revisions.
- Obtaining mutual aid for planned events is a good precursor to moving into more formal mutual aid agreements for emergency planning and response. Planned events are opportunities to bring together many agencies and organizations to discuss available resources and develop good working relationships that can be leveraged for subsequent emergency planning and mutual aid agreements.

Examples

- The **MTC's** emergency planning committee (closest forum to operations) includes the 10 largest transit properties, the California Emergency Agency (Cal EMA), Caltrans District 4, and others. The committee helped develop the regional mitigation plan and was able to get the transit agencies to buy into the process by explaining the financial benefits that accrue to a jurisdiction or region that has an approved mitigation plan in place. In particular, if a state declaration is made and state disaster funds become available, jurisdictions with a state/federal-approved LHMP are eligible to apply for these funds. Also, these jurisdictions are eligible to apply for pre-disaster mitigation (PDM) funds.
- MTC officials developed the RTEMP as a counterpart of the Regional Emergency Coordination Plan (RECP). One of the subsidiary plans of the RECP is the Transportation Coordination and Response Plan, which addresses such emergency functions as transportation of first responders and disaster service workers, delivery of emergency equipment and supplies, and evacuation.
- Whereas the Transportation Coordination and Response Plan focuses on coordination of transportation assets to enable emergency response, the RTEMP focuses on restoration of basic transportation services to the general public. The two plans function in concert to ensure transportation capacity for emergency response and for basic mobility.
- The **Lifelines Council** was established by ABAG several years ago as an advisory group to get input for developing a MJ-LHMP for the San Francisco Bay region. The council also served as advisor to several planning studies, such as ABAG's Regional Disaster Resiliency Initiative and its current Bay Area Airport Disaster Recovery Study.
- In **Washington, D.C.,** federal, state, and local agencies in the District of Columbia, Maryland, and Virginia coordinate with the Military District of Washington on an ongoing basis, especially for security events, such as presidential inaugurations or the World Bank G-20 and similar meetings with heads of state from around the world. Airports are located in Virginia and Maryland, so cross-border security coordination is essential. The military sometimes supports ESF 13, Law Enforcement, in perimeter and crowd control, and supports ESF 1, Transportation, in traffic control.

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- Regular, continuing coordination with law enforcement, health, transportation, and fire and rescue occurs across state and city borders. This includes law enforcement pursuing suspects; transportation of patients to hospitals across borders; and fire and rescue services responding to incidents across borders as needed.
- In **New York State,** biannual coordination meetings bring together the emergency liaisons for all state-level agencies. At these meetings, issues are discussed at the regional level. Upon returning to their respective agencies, coordinators work through their agency's chain of command to ensure that subordinate managers receive information. Each district, regional, or local coordinator is then expected to conduct similar coordination with the corresponding agency counterparts (e.g., district DOT emergency transportation coordinator with the county and city emergency managers, police, etc.).
- In **Memphis, Tennessee,** hazards that impact the region tend to be large in scale, and this necessitates that the Memphis-area MPO be able to interact across political boundaries and jurisdictions. A recent example was a flooding disaster that crossed into many different jurisdictions. Because of long-term planning and coordination interactions with all of these communities and the bordering state of Arkansas, the role of the MPO was described as "the glue that holds the separate cities together."

Case Studies

The following excerpts from the case studies in Section 3 exemplify coordinated regional planning. See the full case studies for more information.

- **Case Study 1: Pacific Northwest Economic Region (PNWER) and the Center for Regional Disaster Resilience (RDR).** PNWER helped facilitate cross-international-border planning for the 2010 Winter Olympics in Vancouver, Canada, leading to longer-range improvements in balancing efficient border crossings and security. PNWER also established a Border Solutions Coordination Council to work on border issues in advance of the Olympics and develop recommendations and strategies to facilitate travel. Specific strategies implemented during the Olympics were subsequently adopted as improved modes of operations. This case study offers a good example of multijurisdictional coordination for planned events contributing to everyday improvements.
- **Case Study 6: City of Craig, Alaska.** The political situation in Alaska is unique. In Alaska, boroughization is optional; more than half of Alaska's land area is part of the larger Unorganized Borough. Prince of Wales Island is not within an organized borough, so the communities on the island are politically separate. Each community owns its own resources and is responsible for its own emergency planning and response. Advisory groups exist, but no specific political group can mandate regional transportation planning. One key to overcoming political challenges has been communities working together to match resources and responsibilities and forming mutual aid agreements to share resources. Routine, day-to-day occurrences, such as dispatch of fire departments from one community to another, require communities to work together and share resources, which builds a sense of community regionally and an awareness of available resources.
- **Case Study 7: Marathon Bombing Medical Care—Boston Bombings.** The International Association of Emergency Managers published an article on LinkedIn following the explosion of two pressure cooker bombs at the Boston Marathon in April 2013. The article highlighted factors that contributed to coordinated response efforts after the attack, including adequate numbers of trained medical staff; logically placed and well-controlled medical treatment areas with adequate access and egress; patient movement devices and tracking; effective incident command; and all-encompassing communications (Reiter 2013).

PRINCIPLE 5

Inclusive

Inclusive regional transportation planning for disasters, emergencies, and significant events creates an equitable transportation system that addresses the needs of all people.

Inclusive planning affords opportunities for involvement and representation of all people affected by the plan. This includes people with or without automobiles as well as individuals and organizations that represent populations likely to be marginalized from mainstream emergency communications and response (e.g., transit-dependent populations and people with access and functional needs).

Characteristics of Inclusive Planning

Inclusive regional transportation planning

- Builds a comprehensive understanding of the region's demographics
- Identifies and locates population segments that will be more adversely impacted than the general public by disasters, emergencies, and significant events
- Collaborates with partners who represent these population segments and can serve as trusted intermediaries in reaching them

Inclusive planning also takes into account changing demographics and the significant implications posed by such changes for emergency planning and response from a regional perspective. Key population trends show growth in both numbers and diversity. This means emergency response agencies increasingly will have to plan for the needs of an aging and ethnically diverse population. Population growth is also increasing in coastal regions and flood-prone areas, leading to greater population density along the nation's coastline, with more people susceptible to sea-level rise and other hazards related to climate change.

In many communities, the poorest and most vulnerable populations are located in areas with disproportionate risks and hazards (e.g., in low-lying areas subject to floods; near industrial sites or transportation facilities subject to more air pollution and releases of hazardous materials or emissions; or living in structures such as mobile homes that cannot withstand extreme weather events like hurricanes or tornadoes).

Strategies

TCRP Report 150 outlines a complete process for inclusive planning that accounts for the needs of people with access and functional needs (Matherly et al. 2011). Key strategies from the report include the following:

- Understand the demographics of the region.
- Build a network of key leadership and staff within the regional transportation and emergency management planning communities to leaders within non-governmental organizations

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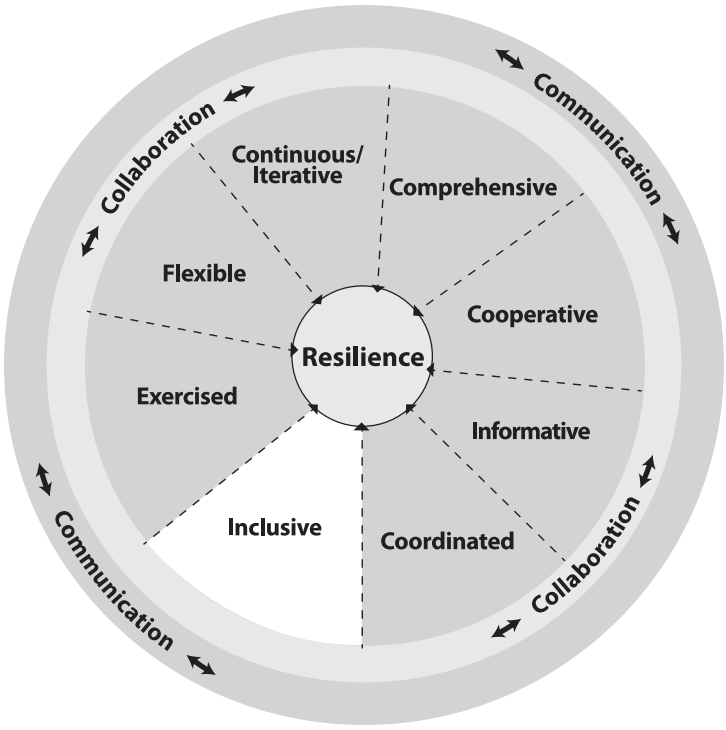

(NGOs) and other agencies that understand the needs of people with access and functional needs and transit-dependent populations.
  - Are needs and resources aligned on a multijurisdictional basis (e.g., how many ambulance and paratransit vehicles are available in the region)?
  - Do hospitals, nursing homes, and emergency responders in multiple jurisdictions each think they have "first call" on ambulance or paratransit resources?
  - What is the capacity of vehicles that will be used for emergency response? How will capacity be impacted by people who have durable medical equipment?
  - Are policies, such as no-pets rules, flexible in emergencies? How flexible are they?
- Plan for the needs of people without automobiles.
  - Are alternatives to privately owned vehicles readily available and accessible?
  - Do people know how and where to secure transportation assistance?
- Understand community partners' emergency plans and how they can be integrated into regional plans. Be prepared to discuss the assumptions on which the plans were built.
  - How will transportation assets and resources be used?
  - Are there wrong assumptions about how and when transportation assets will be used?

Tools

The following tools, which are detailed in Section 4, can help planners conducting inclusive regional transportation planning:

- Tool 1: Checklist of Potential Stakeholders
- Tool 5: Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies
- Tool 6: Key Steps to Effective Collaboration
- Tool 7: Questions for Collaborative Partners and Other Stakeholders to Ask Each Other
- Tool 8: Strategies to Exercise a Regional Transportation Plan for Disasters, Emergencies and Significant Events

Tips

- *TCRP Report 150* provides a comprehensive, step-by-step toolkit for building inclusive grassroots networks of people and organizations to support emergency transportation planning and response. It describes a proven approach for how to build an association of agencies and organizations that understand the transportation needs of drivers and non-drivers, including the region's most vulnerable citizens (Matherly et al. 2011).
- Inclusive planning is the law. Federal legislation mandates inclusive planning and requires addressing the needs of vulnerable groups in all phases of emergencies from planning to recovery. See Appendix B for examples of applicable federal legislation.

Examples

- The **City of New Orleans** demonstrates one approach to inclusive planning. Historically, wrong assumptions about how, when, and by whom transportation assets would be used had come to light after several disasters were followed by emergency responses in which organizations and agencies laid claim to the same transit or paratransit vehicles and drivers. Recognizing this, the city established different types of classifications for individuals who utilize the City Assisted Evacuation Plan (CAEP), including tourists, residents without cars who need a ride during an emergency, and people who need specific medical resources. Development of the CAEP involved a significant amount of planning and collaboration, and the strategy was effectively deployed to meet the emergency needs of the most vulnerable people during Hurricane Gustav in 2008. The **Louisiana Nursing Home Association (LANHA)** also responded to the challenge of inclusive planning by developing a best practice for transportation buses. Following Hurricane Katrina in 2005, the LANHA established a desk at the state EOC and helped coordinate ESF 1 with respect to the evacuation of nursing homes. Furthermore, the **Louisiana Department of Health and Hospitals** assigned a staff member to double check the nursing home contracts each year to see if the bus companies have the actual buses.

  When Hurricane Gustav struck in 2008, the state worked with the federal government to ensure that buses were available. Unlike the response to Hurricane Katrina, during which most of the bus contracts were not honored, 95 percent of the contracts were honored following Hurricane Gustav, and the nursing homes knew that the contracts were not just "ink on paper."
- **San Diego** experiences wildfires in heavily populated areas. The regional community has learned valuable lessons about evacuating vulnerable populations, and the experiences are featured in a case study in *NCHRP Research Results Digest 333/TCRP Research Results Digest 90: Guide to Planning Resources on Transportation and Hazards* (LeDuc et al. 2009). As noted in an excerpt from the digest, communities in Southern California have learned that evacuations run more smoothly if the following strategies are employed:
  - Isolated communities involve local law enforcement in traffic management during an evacuation.
  - Evacuation plans consider the need to educate tourists as well as locals.
  - Hospitals have their own evacuation plans for patient relocation that are coordinated with community evacuation plans.
  - MOUs are kept active and current and backup plans are in place in case these fail.
  - Plans for resource coordination among retirement homes assure availability of transport and shelter in an evacuation.
  - Service providers are involved directly in planning for evacuation.
- **Fort Collins, Colorado,** experiences periodic severe, sudden flooding. Planners have coordinated stormwater management, transportation, and recreation investments to achieve mitigation goals. Among other strategies, they have acquired and relocated vulnerable facilities to move them away from the flood plain. Although it was controversial at the time, stormwater planners insisted on relocating a nursing home that was situated in the flood plain, along

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with mobile homes, residences, and businesses. The purchases and relocations are credited with saving an estimated 100 lives during a major 1997 flood. After the flood, stormwater utility staff received a call of thanks from the retirement community (LeDuc et al. 2009).

- The **Northern Kentucky Health Department** has established a regional outreach and information network of agencies and organizations that serve as conduits of public health information to people with access and functional needs. The network relays routine information as well as emergency alerts such as disease outbreaks and alerts to help the public stay safe during catastrophic natural disasters. The health department hosts an annual luncheon with network partners to keep them engaged, stay connected, and share information.

Case Studies

The following excerpts from the case studies in Section 3 provide more detailed examples of inclusive planning. See the full case studies for more information.

- **Case Study 2: Anchorage, Alaska.** The Anchorage EMA has incorporated the needs of access and functional needs populations in several emergency planning initiatives, resulting in improved communication products and planning documents. The EMA formed a functional needs support services working group to review sections of the mass-sheltering annex of the Emergency Operations Plan. The EMA also worked collaboratively with several planning partners to develop a disaster registry application and brochure that would meet the communication needs of target end users.
- **Case Study 6: City of Craig, Alaska.** Tribal organizations are a part of the Craig local emergency planning committee (LEPC) and have been involved in the emergency planning process. Most Tribes have environmental planners responsible for emergency planning and response. The emergency planning process has helped to identify and better understand the differences in cultural priorities. The Craig planning director's approach has been to draw on those cultural priorities to benefit the overall emergency planning process.

  The **Craig Tribes** culturally have a focus on elders and their members, and Tribal representatives want to be sure they are taken care of through the planning process. The Craig planning director can contact the Tribal Administrator and request assistance with notifying their elders and members with critical information. Through regular engagement with the Tribes, the city understands what is important to the Tribes and how to engage them in a way that helps them meet their cultural priorities while also meeting emergency planning and response priorities.

PRINCIPLE 6

Exercised

In most regions, transportation operations, law enforcement, and emergency response personnel interact daily to handle small and large incidents on highways, transit and rail systems, waterways, and airports. Gaining experience for much larger multijurisdictional events usually requires a formally planned exercise, coordination of a large, planned event, or a combination of the two. The Department of Homeland Security (DHS) and FEMA provide funding, resources, and protocols for many different types of training.

An important consideration in the planning process for regional-level disasters and emergencies is the reality that these types of events occur infrequently—or may never occur. Such events have high consequence despite their low probability, however, so regional-level disaster and emergency plans must be carefully tested and evaluated. Testing—through planned exercises—identifies shortcomings and limitations and familiarizes stakeholders with implementation and management of transportation systems and resources. Evaluation of the exercised plan allows planners and responders to consider the preferred outcome of an event before they decide how best to respond.

High-Consequence Risks and Hazards

Some regions face high-consequence risks and hazards frequently. For example, California faces earthquakes and wildfires; wildfires occur in most western states. Floods occur virtually everywhere in the United States. Hurricanes often make landfall along the Gulf Coast or Atlantic Coast, snow and ice storms bring power failures in northern regions, and tornados sweep across many areas, particularly in the Midwest. Most regions have the potential for more than one type of high-consequence risk for which they may be unprepared, and which could severely test their planning and their resilience.

Characteristics of Exercised Planning

The most realistic, effective exercises (tests) are those that include everyone affected by the plan. Important groups to participate in exercises include: transportation agencies, emergency management agencies, transit authorities, first responders (police, fire, and ambulance), community advocacy groups, and private-sector stakeholders (manufacturers, distributors, major employers including universities and hospitals, and communication, power, and water utilities). For more details, see Tool 1: Checklist of Potential Stakeholders in Section 4: Tools.

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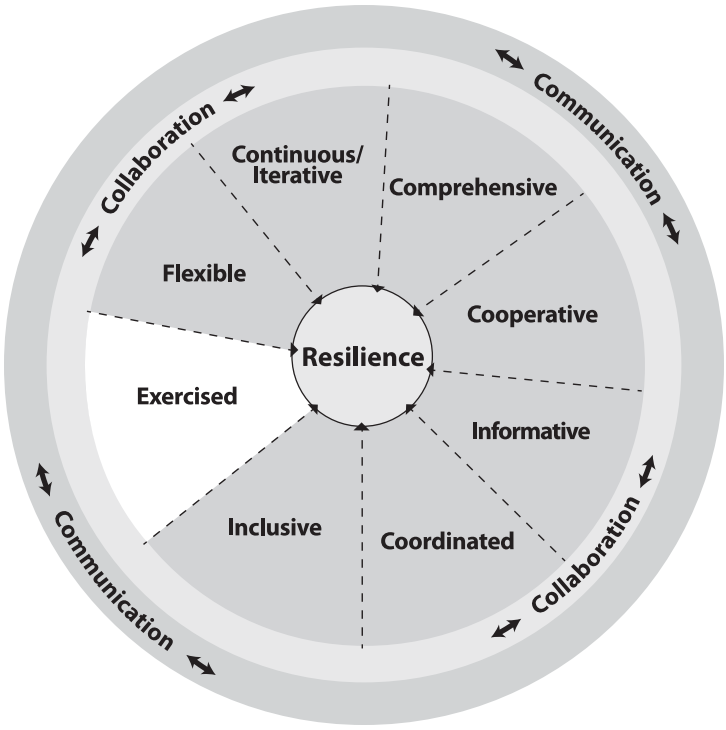
Principles

- Comprehensive
- Cooperative
- Informative
- Coordinated
- Inclusive
- **Exercised**
- Flexible
- Continuous/ Iterative



Because results, findings, and lessons learned from exercises can help shape and guide the planning process, exercises should be conducted soon after the development of initial plans. Doing this may permit modifications to counter shortcomings and problems before they are actually experienced under emergency conditions. Testing and drills also can be effective after an event. Observations of real-life processes that were not previously anticipated can be incorporated into later testing and used to make incremental improvements of plans.

Strategies

Plan for high-probability and low-probability events. The strategies, tips, and examples provided in Principle 7: Flexible also are relevant to Principle 6: Exercised.

The following strategies are taken from Tool 8: Strategies to Exercise Regional Transportation Plans for Disasters, Emergencies, and Significant Events in Section 4: Tools.

- Initiate exercised planning by developing and executing an exercise (test) program that includes
  - Planned exercises on specific dates
  - Individual exercises
  - Improvement tracking
- For each type of exercise to be conducted, develop specific documentation, consisting of (for example)
  - Situation manual
  - Exercise plan
  - Controller evaluator handbook
  - Master scenario events list
  - Exercise evaluation guides
- Decide which type of exercise should be used to test the plan.

- Determine which target groups will be included.
- Design the exercise format.
- Develop a structured testing schedule.
- Develop the evaluation of the exercise to assess performance.

Tools

The following tools, which are detailed in Section 4, provide resources for testing/exercising regional transportation plans and identifying the right partners to include.

- Tool 1: Checklist of Potential Stakeholders
- Tool 2: Checklist of Potential Transportation Assets (High Level)
- Tool 3: Transportation Resources (Detailed Checklist)
- Tool 5: Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies
- Tool 8: Strategies to Exercise Regional Transportation Plan for Disasters, Emergencies and Significant Events

Tips

- Transportation planning agencies are often involved in testing because of their strengths and capabilities in GIS mapping and transportation and geographical information databases in particular. MPOs work with and connect agencies across numerous governmental and jurisdictional levels and across state boundaries. They know the roles, responsibilities, capabilities, and resources of most, if not all, transportation agencies in the region.
- Exercised planning occupies its own unique niche within the FEMA Preparedness Planning Cycle (see Glossary). The preparedness planning cycle is a subset of the emergency planning cycle. Most training should be undertaken and accomplished according to NIMS principles. Two resources are particularly relevant to exercises: (1) *The Simplified Guide to the Incident Command System (ICS) for Transportation Professionals* (FHWA 2006) (listed under The Big Picture), and Volume 9, *Guidelines for Transportation Emergency Training Exercises* in the *NCHRP Report 525: Surface Transportation Security*, *TCRP Report 86: Public Transportation Security* series (TRB 2006) (see "Exercise Resources").
- The Homeland Security Exercise and Evaluation Program (HSEEP) offers a capabilities and performance-based exercise program that provides a standardized policy, methodology, and terminology for exercise design, development, conduct, evaluation, and improvement planning (HSEEP website 2012).
- Simplicity works when it comes to planning and conducting exercises. A scenario can be as simple as "a fuel truck has spilled." Discussion questions can be as simple as "Who would you call?" "Do you have their phone numbers?" "What questions do you have?" State agencies can also be good resources for developing exercise scenarios, messages, and other items to use in exercises.
- Not all exercises have to be sink-or-swim activities. One emergency manager recommended making exercises a learning activity as well as a testing activity, saying "Apocalyptic scenarios don't allow people to learn when they are afraid of their failures. The exercise has to be small enough that it is a learning experience but not a pass/fail test."
- Some exercises should be for catastrophic events. FEMA Administrator Craig Fugate has advocated planning for the "maximum of maximums." Cascading and interrelated disasters like the 2011 Japan earthquake, tsunami, and nuclear plant failures demonstrate the danger of comfortable assumptions.
- Plan for both *notice* and *no notice* events.

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Examples

Full-scale drills and tabletop exercises are standard methods to test regional emergency transportation plans.

- Each year, the **Alabama Emergency Management Agency (Alabama EMA)** works collaboratively with the state police to test the state's Contraflow Evacuation Plan on Interstate 65 between Mobile and Montgomery. While contraflow operations are not actually initiated during these drills, all personnel, vehicles, and control devices (signs, barricades, etc.) required to do so are transported to their field locations. This testing permits personnel new to the process a learning opportunity and gives field crews and police officers the opportunity to practice the process.
- Jointly created by the TSA and the U.S. Coast Guard, the **Port Security Training Exercise Programs (PortSTEP™)** executed 40 port security drills between 2005 and 2007. Ports connect multiple modes for movement of goods as well as people. Ports are vulnerable to security risks and human-made hazards as well as natural disasters. The PortSTEP™ exercises engaged a broad range of port and regional stakeholders in tabletop drills. "The PortSTEP drills successfully emphasized the interconnected and interdependent relationships between maritime and surface transportation response and reaction" (LeDuc et al. 2009).

Several notable examples illustrate the use of significant events to test or exercise regional transportation emergency plans.

- The **Washington Metropolitan Area Transit Authority (WMATA)** uses the annual Fourth of July fireworks on the national mall to assess the movement process of drivers and riders during a compressed duration of time and expanse of area. The Washington, D.C., Virginia, and Maryland transportation and traffic authorities also modify traffic signal timings and limit some turning movements to facilitate the movement of traffic during non-event periods. This tests movement away from a threat area in a preferred direction during an emergency, and also tests communications and coordination among the jurisdictions.
- When the **City of Tampa, Florida,** was awarded Super Bowl XLIII in March 2005, the city held a full-scale exercise in accordance with NIMS. The exercise was conducted during the Outback Bowl college game, which gave the City of Tampa Office of Emergency Management practice during a real-time event to prepare for the Super Bowl event. The exercise allowed agencies to test the unified command, coordination, and communication plans for Super Bowl XLIII, designated a Level 1 event by DHS. The Outback Bowl exercise revealed that each agency used its own system to track event information, which resulted in poor information sharing among agencies. To resolve this, each agency deployed liaisons to the operations centers of other agencies, thus increasing the communication among all participants.
- In the **Kansas City metropolitan area,** special event planning involves a bi-state region (Kansas and Missouri). Transportation and emergency management planners in Kansas City and Jackson County, Missouri, benefit from their regular management of Royals baseball and Chiefs football games, while those in the Unified Government of Kansas City and Wyandotte County, Kansas, benefit from managing NASCAR race events and Sporting Kansas City soccer games. These experiences helped position the metro area to plan effectively for the All Star Baseball game in July 2012 and the All Star Major League Soccer game in July 2013.
- Like many other areas, the Kansas City metropolitan area also uses **traffic simulation modeling** to develop and test regional plans. Traffic simulation modeling can be a valuable way to test theories and strategies prior to implementation.
- Microscopic traffic simulation modeling was used to develop the New Orleans Contraflow Evacuation Plan. **Louisiana DOTD** officials evaluated the effect of contraflow loading options to increase the outbound flow and decrease the evacuation clearance time for the metropolitan area. Later iterations of the model were also used to evaluate various alternatives and conditions associated with the area's CAEP, in which buses would be circulated around the

city and suburbs to pick up people with mobility limitations, then transfer them to regional coach buses for transport out of the city.

- Traffic simulation for evacuation modeling was applied to a large commercial shopping area around the Northwest Arkansas Mall and Spring Creek Centre in **Fayetteville, Arkansas.** The simulation area covered more than 3 square miles and included more than 8,000 parking spaces. Planners used the simulation to evaluate traffic movements to safe zones during a terrorist attack. The simulation examined the advantages that could be gained from providing guidance and direction to inbound and outbound traffic based on time, risk, and cost. The results of the research suggested that additional planning into the location of shelter destinations for evacuations can have beneficial impacts to the overall clearance of the network. On a theoretical level, the simulations showed that an optimized safe zone assignment model in which evacuees must travel to a specified destination based on their point of origin yielded significant benefits. In a real-world application of this concept, vehicles from specific areas or locations could be encouraged or required to follow routes that keep traffic flowing in optimal directions instead of overlapping and/or crossing one another.
- A variation on this idea has been used in the **New Orleans** region where, once contraflow is initiated, evacuees are "forced" to move in certain directions along certain routes. Maps showing which routes lead where are widely disseminated using various means and are reinforced annually through special media coverage at the start of each hurricane season. Although most routes are kept open, some segments of major Interstate routes are closed during evacuations to prevent downstream confluence congestion.

Case Studies

The following excerpts from the case studies in Section 3 provide information about exercises that test regional planning efforts. See the full case studies for more information.

- **Case Study 1: Pacific Northwest Economic Region (PNWER) and the Center for Regional Disaster Resilience (RDR).** RDR organizes Blue Cascades exercises to bring public- and private-sector partners together to explore problems in planning and preparedness. The exercises have proven worthwhile for identifying and addressing problems and establishing sound relationships across disciplines and state and national boundaries, and among private- and public-sector partners. A PNWER tabletop exercise, Blue Cascades III, posed an earthquake and tsunami with subsequent power outages, traffic gridlock, and damage to the power, transportation, water and sewer, and natural gas and fuel transmission infrastructures to representatives of five states and three Canadian jurisdictions.
- **Case Study 6: City of Craig, Alaska.** The Craig planning director builds on relationships developed through inclusive LEPC meetings and exercises to identify resources and enter into formal agreements with other agencies and organizations. Experience obtaining mutual aid for managing scheduled events has been a good lead-in to forming larger mutual aid agreements with other entities. For example, the City of Craig hosted a regional development meeting for approximately 300 attendees. The event required planning for housing, food, and transportation for the attendees. The Craig planning director served as the transportation lead for the event, which required determining where people would stay and designing a public transportation system. Bringing many people and agencies to the planning table has been a way to gather information about transportation resources and capabilities in the region. The event planning led to discussions about how to leverage this experience for emergency planning and for establishing more formal mutual aid agreements among partners in the future.

PRINCIPLE 7

Flexible

Flexible regional transportation planning for disasters, emergencies, and significant events builds resilience, which can be defined as "a system's ability to accommodate variable and expected conditions without catastrophic failure" and to restore normal operations quickly. Flexible planning includes planning for circumstances that may be unlikely but could cause significant harm if not considered beforehand (Litman 2006).

Flexibility is an important consideration at the beginning of the planning process. Once the baseline conditions have been established for a regular day and scenario development begins, flexible planning has a role.

Characteristics of Flexible Planning

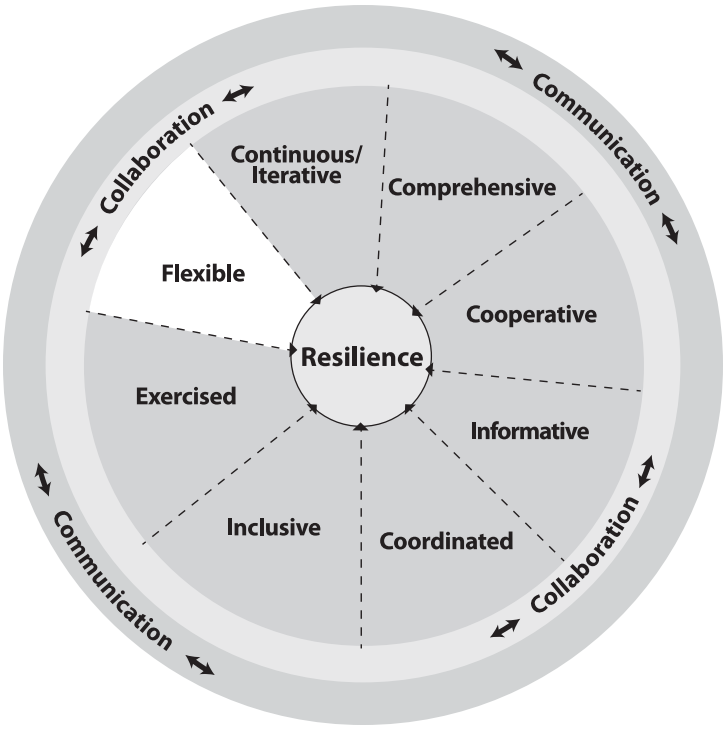
Flexible planning engages a diverse team of stakeholders to develop a broad range of event, impact, and response scenarios and identify possible flexible uses of the transportation system. Suggestions for the team include but are not limited to

- Emergency management agencies
- State and local DOTs
- Transportation service providers
- Utility providers
- Departments of public works
- Police departments
- Fire departments
- Emergency medical service providers
- Hazardous materials response teams
- Special facilities (hospitals, nursing homes, prisons, schools)
- Local industries that may pose a threat and/or may have a role in response

Flexible planning incorporates high- and low-probability scenarios and considers a range of resulting conditions, such as variations in the event characteristics, infrastructure condition, and citizen response (Murray-Tuite and Wolshon 2013). It also addresses failures in supporting infrastructure such as electric power and considers possible flexible uses of the transportation system.

Strategies

Strategies for incorporating flexibility into regional transportation planning include but are not limited to the following.



Principles

- Comprehensive
- Cooperative
- Informative
- Coordinated
- Inclusive
- Exercised
- **Flexible**
- Continuous/ Iterative

- Plan for a wide range of possible conditions and scenarios.
  - High-probability and low-probability events
  - A variety of event characteristics
  - Infrastructure conditions
  - Citizen responses
- Engage a diverse team to develop event, impact, and response scenarios and identify possible flexible uses of the transportation system.
  - How flexible and redundant is the transportation system (e.g., to accommodate and adapt to changing demands and patterns)?
  - How will impacts to capacity, level of service, and level of demand affect system performance?
  - How will impacts to supporting infrastructure, such as electric power, natural gas pipelines, communications, and water and sewer services, be addressed?
  - How will serious interruptions in the supply chain be addressed?
  - When evaluating responses to the scenarios, consider: What are the possible flexible uses of the transportation system?
- Work with planning partners to identify the following:
  - How critical information will be collected and distributed under extreme conditions
  - Chain of authority if/when a particular decision-maker is unavailable
  - Most effective ways to prioritize resources, including traffic management and accessible transportation options
  - Mobility options and needs for all travelers, taking into account the needs of disadvantaged populations
- Create a process for ongoing evaluation of transportation systems to detect possible problems and inefficiencies.
  - Can transportation facilities withstand extreme conditions?
  - Are there sufficient redundancies in the transportation system—parallel or alternate routes, bridges, and/or modes of transportation—to deal with catastrophic loss of one or more major assets?

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  - How resilient is the system? How quickly can the transportation network adapt to changing circumstances and return to normal operations?
- Identify interdependencies and weak points.
  - Look for weak and single/limited points-of-failure.
  - Identify critical links in transportation routes and alternates that are in the plan.
  - Look at interdependencies and restoration of activities among the region's other infrastructure elements (such as electric power, water, and gas utilities).
  - Examine assumptions about the region's telecommunications capabilities and dependence on electric power.
- Gather data and information through regular exchanges with planning partners, GIS tools, and other resources.
- Follow NIMS principles. The NIMS organizing principles of Unified Command and the ESFs for planning and response of the National Response Framework (NRF) are intended to be scalable and applicable to all incidents. For detailed information about NIMS, see the FHWA "Simplified Guide to the Incident Command System (ICS) for Transportation Professionals" (FHWA February 2006).

Tools

The tools listed below provide resources for incorporating flexibility into regional transportation planning.

- Tool 1: Checklist of Potential Stakeholders
- Tool 5: Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies
- Tool 6: Key Steps to Effective Collaboration
- Tool 7: Questions for Collaborative Partners and Other Stakeholders to Ask Each Other
- Tool 8: Strategies to Exercise a Regional Transportation Plan for Disasters, Emergencies and Significant Events

Tips

- Planning for low-probability events may reveal previously overlooked weaknesses in plans for higher-probability events. Even the higher-probability events and resulting impacts cannot be precisely predicted. Overall, plans should not be rigidly designed for the highest-probability events with a single estimate of the impacts, but rather include a broad spectrum that allows for the development of flexible plans that can be adapted to the actual situation that arises.
- Redundancy of transportation infrastructure (such as availability of alternate routes, bridges, and modes of transportation) and resiliency go hand in hand.
- No one ever knows what information may be important. It is vital to have rich and deep information sources through use of GIS and other data sources. One 2001 incident illustrates this: A flatbed tractor-trailer carrying eight Navy missiles from St. Louis, Missouri, to New Jersey hit a concrete barrier, slid down an embankment, and overturned outside Frederick, Maryland. Military personnel advised minimizing the movement of the damaged missiles and recommended detonating them at a safe site. Who could predict that knowing the location of a quarry near I-70 near Frederick, Maryland, would be essential information?

Examples

- In 2008, an ice storm in **New Hampshire** left approximately 63 percent of the population without power for up to 2 weeks (New Hampshire Public Utilities Commission 2009). The response to the ice storm provides an example of inability to collect critical information

under extreme conditions and highlights the need for redundancies. A key deficiency was a lack of real-time information with mapping capabilities that showed which roads were closed statewide. The extended period without power also suggests that, because digital maps and plans may not be available in all situations, paper copies should be made available.

- In 2005, the impact of **Hurricane Rita** in Houston provides an example of actual conditions not matching anticipated scenarios and emphasizes why plans should be flexible. Officials planned for hundreds of thousands of people to evacuate, but the actual numbers were much higher—more than 1 million, including many who did not need to leave. The high numbers led to traffic bottlenecks out of the city and people were stranded for hours in extreme temperatures.
- Also in 2005, some evacuees from Hurricane Katrina (in August) were housed in nursing homes and other medical facilities in Houston. A month later, when Hurricane Rita approached, these evacuees—plus many more frail and elderly patients—had to be moved out of harm's way, requiring extensive coordination and flexibility.
- **MWCOG** established one full-time position that is co-located with the District of Columbia's Homeland Security Emergency Management Agency (DCHSEMA) and serves as a regional coordinator for emergency response. DCHSEMA's EOC is co-located with one of the District Department of Transportation's (DC DOT's) Traffic Management Centers (TMCs) and with the regional Fusion Center. A liaison from the National Guard, who serves as a conduit to the Military District of Washington, is located at DCHSEMA. Liaisons from the Metropolitan Police Department and from D.C. Public Schools also are located at DCHSEMA. It houses the 911 call center and the 311 call center in the Office of Unified Communications. When the 911 system in Fairfax County failed in a 2012 power outage, many 911 calls were routed to the District.
- In 1994, the Northridge Earthquake in California caused significant damage to the transportation infrastructure and tested Caltrans' readiness for outages in other infrastructures. **Caltrans' Transportation Management Center** had backup power generators and landlines for telecommunications. Pagers, fax machines, and electronic data sharing via computer were used extensively in the response to the earthquake, especially while the landline system was temporarily disrupted (DeBlasio et al. 2002).

Case Studies

The following excerpts from the case studies in Section 3 demonstrate ways in which flexibility has been incorporated into regional transportation planning and response operations. See the full case studies for more information.

- **Case Study 1: Pacific Northwest Economic Region (PNWER) and the Center for Regional Disaster Resilience (RDR).** PNWER established a Border Solutions Coordination Council to work on border issues in advance of the 2010 Winter Olympics, resulting in strategies that were implemented to facilitate travel during the Olympics and then later established to improve operations. Strategies included an advanced passenger manifest clearance project for common carriers and a Washington State Freight Mobility Plan to assess freight for priority status in case of a border closure or major highway disruption.
- **Case Study 3: All Hazards Consortium (AHC).** The AHC has an enabling framework that allows various stakeholders to come together on specific projects and issues, often resulting in unique benefits to each group. Hurricane Sandy generated major power outages throughout the region. Knowing who had power and communications capabilities was important for prioritizing recovery operations. One of the AHC's private-sector partners with satellite communication capabilities provided the AHC with "off and on" alerts throughout the region, which the AHC then provided to utilities and government officials with appropriate disclaimers.

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- **Case Study 8: Hurricane Sandy.** Transportation agencies' abilities to modify services and restore operations during Hurricane Sandy recovery provide insights into key considerations for building flexibility into regional plans. Recovery efforts point to key partnerships and to collaboration and coordination between transportation agencies that helped to provide alternative, multimodal transportation services and transportation access to residents within days after the storm. Subsequent planning efforts by various agencies also illustrate ways to incorporate flexibility into regional planning, such as by increasing transportation options and assessing and improving the physical conditions of infrastructure.

PRINCIPLE 8

Continuous/Iterative

Regional transportation planning must be ongoing and regular. For readiness and resilience, planning for disasters requires a different focus in terms of longevity. Ongoing readiness and pervasive preparedness require a body of knowledge and set of relationships that increase without interruption over time. Figure 3 and Figure 7 illustrate the cyclical nature and continual learning emphasis of the emergency planning cycle.

Sustaining investment and participation in regional transportation planning for disasters, emergencies, and significant events comes from the willingness of partners to meet challenges as they arise. Regional transportation planning is continuous and iterative because it demonstrates ongoing benefits to planning partners and the people and communities they serve.

Characteristics of Continuous/Iterative Planning

Regional planning that is continuous and iterative has an established framework or structure for regional coordination and collaboration and a core group of planning partners. It continues no matter what happens to funding sources and no matter who rotates in and out of the planning process.

Continuous and iterative planning is strategic and guided by fundamental goals, objectives, strategies, and tactics for achieving regional coordination and cooperation. It puts into place resources, such as staffing plans, program plans, agreements, and reporting mechanisms, to document the evolution of planning efforts over time and ensure organizational memory.

Continuous and iterative planning

- Maintains and sustains relationships through ongoing interaction and engagement with planning partners and stakeholders
- Finds opportunities for strategic growth and refinement and looks for ways to engage new partners who are critical to regional cooperation and coordination
- Adopts policies and practices for institutionalizing planning efforts to ensure the continuous transfer of knowledge from one generation of personnel to the next and as partners' roles and responsibilities change over time
- Moves from informal handshakes to more formal agreements to solidify partners' commitments to and roles in regional cooperation and collaboration

Continuous and iterative planning establishes procedures for both the planning and operational aspects of regional coordination and cooperation. It ensures that those procedures are regularly evaluated and improved by incorporating regular assessments and improvement planning after any event, whether the event was planned or unplanned.

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Principles

- Comprehensive
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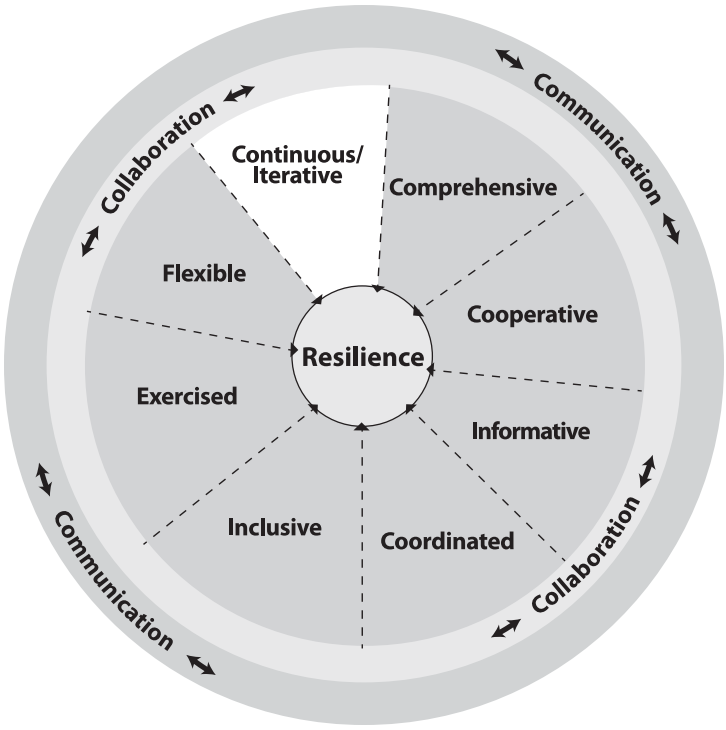
- **Continuous/ Iterative**



Strategies

The following strategies can support efforts to sustain regional transportation planning for disasters, emergencies, and significant events.

- Set goals, objectives, and milestones.
- Conduct regular meetings of core team members to maintain momentum and keep the multijurisdictional perspective active. Team meetings are planned around substantive topics that
  - Offer succinct and repeated messages about the value of partnerships and working together
  - Incorporate outside resources
  - Tie the meetings to things that are happening in the region
  - Engage partners in ways that help them meet their priorities
  - Use training to lure new people and get them engaged, then turn the focus to relationship building
- Invite key stakeholders, including representatives of community groups and businesses, to participate in after-action reports to discuss and document what went well and what did not go well in exercises, planned special events, and actual disasters or emergencies.
- Use the after-action reports and lessons learned from an event to improve procedures, communications, inclusion, and whatever shortfalls were uncovered in the exercise or event.
- Evaluate the multijurisdictional planning group's organizational structure and whether a more formal structure is needed. The U.S. DOT's Regional *Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security* provides suggestions and working steps (FHWA Office of Travel Management 2003).
- Document all planning activities. Ensure that data collection and documentation procedures are in place to
  - Keep track of meetings with planning partners, decisions, agreements, and action plans
  - Catalog available resources and assets

  - Identify gaps in transportation services
  - Record, investigate, and learn from demonstrated problems
  - Facilitate continual evaluation and improvement
- Be sure there is always a successor in line to lead the regional planning efforts.

Tools

The tools listed here (all the tools, in this case) can be helpful to sustaining regional transportation planning efforts.

- Tool 1: Checklist of Potential Stakeholders
- Tool 2: Checklist of Potential Transportation Assets (High Level)
- Tool 3: Transportation Resources (Detailed Checklist)
- Tool 4: Sample Transportation Security and Hazard Mitigation Strategies for Various Project Modes and Types
- Tool 5: Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies
- Tool 6: Key Steps to Effective Collaboration
- Tool 7: Questions for Collaborative Partners and Other Stakeholders to Ask Each Other
- Tool 8: Strategies to Exercise a Regional Transportation Plan for Disasters, Emergencies and Significant Events

Tips

- Continuous regional transportation planning requires having the right convener. The right convener understands the goals; can speak the language of different disciplines; knows (or can learn) NIMS and ICS language; and has the interest in and ability to build bridges between people.
- Conveners allow the goals to drive the regional planning effort and provide the necessary tools to accomplish them. Effective leadership is a three-legged stool that requires social skills (communication, listening, conflict management and resolution, negotiation, and steadiness); technical knowledge (for credibility); and the ability to lead by example.
- A convener's job is never done, and turnover will be a constant challenge. The key is always to be looking for a successor and to ensure that succeeding generations of staff and planning partners receive the same level of training as those before them. Training new or younger staff can encourage them to challenge the way things have always been done.
- Another key to continuous, iterative regional transportation planning is finding the right partners—that is, knowing who they are and doing everything possible to find out what they need and help them get it. Real partners speak up, act, support, and encourage others to act. It is the convener's job to reinforce, support, and reward their partners.
- The most common mistakes in multijurisdictional transportation planning are not having the right person or entity as the convener, not taking the time to figure out what the goals really are, and not knowing when to go slow or go fast.

Examples

- **Kansas City Scout** is a bi-state traffic management system designed by the Missouri and Kansas DOTs to lessen traffic jams by improving rush-hour speeds, increase safety by decreasing the number of rush-hour accidents, and improve the emergency response to traffic situations. In 2006, the DOTs decided to hire an incident management coordinator

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to direct motorist assist services and bring more people together to handle road incidents. As work to detect and mitigate incidents continued, the incident management coordinator realized more could be done to improve incident management in the region.

- The coordinator's approach was to get out in the field, see what was happening, and get to know people to have a better understanding of what the issues were and what did and did not work well. The coordinator first called in all of the big users of incident management among the local municipalities in the bi-state region. Media also were included right from the beginning. The coordinator stated the goals very simply: (1) to make a huge step forward for incident management and do it better and (2) to understand how Kansas City Scout could help participants do their jobs better.
- Initially, eight to nine people attended meetings to discuss how to improve incident management within the region. Eventually the meetings attracted more than 75 participants and were standing room only. Now the meetings happen three times a year and alternate between locations in Missouri and Kansas. Kansas City Scout has also hosted two symposia with more than 300 people in attendance from around the nation. Lessons learned about convening people include the following:
  - Always feed them.
  - Say "Thank you."
  - Give them a toy or token. The incident management coordinator has given attendees low-cost, often low-tech, but thoughtful tokens of appreciation, such as traffic wands, pop-up traffic cones, portable speed bumps, and laminated cards with important phone numbers and contact information sized for the car visor.
  - Be prepared to go back into difficult conversations when harsh words have been exchanged and there are bad feelings.

Case Studies

The following excerpts from the case studies in Section 3 are examples of continuous, iterative regional transportation planning initiatives that have been sustained over the long term. See the full case studies for more information.

- **Case Study 1: Pacific Northwest Economic Region (PNWER) and the Center for Regional Disaster Resilience (RDR).** This planning initiative has been sustainable for more than 16 years because of its governance structure and authorizations; full membership, active participation of stakeholders, and the development of a culture of trust; regular improvement planning from the learning that takes place in exercises and other events; and demonstrating value to its members through improved operations.
- **Case Study 3: All Hazards Consortium (AHC).** What started with a trade show in 2004 has become a nonprofit organization involving eight states and several urban areas to facilitate multi-state collaboration efforts that result in coordinated planning, investments, research, projects and the creation of new partnerships and resources for members. AHC's regular engagement with members and key stakeholders, and AHC's ability to collaborate on common initiatives that result in unique benefits to each group both have been important to continuity.
- **Case Study 4: Southwest Missouri Council of Governments (SMCOG).** SMCOG provides transportation and land use planning to its member counties and cities. A key component of SMCOG's success has been collaborating with a range of entities on emergency planning initiatives. In addition to serving as a convener around transportation planning, SMCOG collaborates with other agencies and organizations, including another regional MPO that covers two portions of SMCOG counties, to address coordination of major thoroughfares

that run through both jurisdictions. SMCOG also helps local jurisdictions develop countywide, multijurisdictional, multi-hazard mitigation plans and helps electric cooperatives develop local hazard mitigation plans.

- **Case Study 5: The Association of Bay Area Governments (ABAG).** ABAG is primarily responsible for land use planning but has been involved in earthquake mitigation and planning for some time. ABAG has been a major leader in helping local jurisdictions and partner agencies complete individual emergency plans and identify interdependencies among different systems to improve regional planning. ABAG developed a template and database of hazards for local jurisdictions and partner agencies to follow in an effort to encourage consistent, coordinated planning across the region.

SECTION 3

Case Studies

CASE STUDY 1

Pacific Northwest Economic Region and the Center for Regional Disaster Resilience

Background

PNWER was established in 1991 as a nonprofit, 501(c)(3), agency to foster cross-border economic coordination in the Pacific Northwest. Public-sector and private-sector partners come from the states of Alaska, Idaho, Montana, Oregon, and Washington in the United States, and from the provinces of British Columbia and Alberta in Canada. The initial partnership was later expanded to include Saskatchewan Province and the Yukon and Northwest Territories. In 2000, PNWER established the Center for Regional Disaster Resilience (RDR). RDR's initial impetus was the risk posed by impending energy brownouts across the regional grid, a risk that was later exacerbated by the Enron scandal. RDR succeeded in gathering private-sector and public agencies to take a regional look at energy choke points, congestion points, and interdependencies. After September 11, 2001 (9/11), state and provincial elected officials were largely preoccupied with ramping up emergency management, homeland security, and first responder capabilities, and effectively delegated the responsibility to RDR to work with private-sector partners responsible for critical infrastructure.

RDR began organizing the Blue Cascades exercises, bringing public and private-sector partners together to explore problems and identify gaps in the plans (see the section on Process Highlights). The Blue Cascades exercises have proven to be worthwhile to the participants and to the region, both for identifying and addressing problems, and for establishing and building sound relationships across disciplines and across state and national boundaries.

Structure/Characteristics

The PNWER governance structure and authorizations are well described in the "About Us/Background" portion of the organization's webpage, which can be accessed online at http://www.pnwer.org/. PNWER was established through legislation passed in each jurisdiction. The executive committee consists of one legislator and one private-sector board chair from each jurisdiction, four governors/premiers (or their designees), and an executive director. There also are a delegate council, a private-sector council, and many official working groups. This structure also provides the foundation for the RDR and its working groups.

Process Highlights

Full membership and active participation of private-sector members, cross-border perspectives, and recognized interdependencies have steadily increased the visibility and recognized accomplishments of PNWER and RDR. PNWER and RDR have developed a culture of trust over the past 15 years.

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Blue Cascade Exercises

When planning each signature Blue Cascade exercise, RDR asks the private-sector participants what they are really worried about (rather than issuing a government mandate that "this is what we will test"). The private-sector working group participants are involved in the scenario designs from the earliest planning stages. They hash through issues, come up with exercise injects (inputs, or challenges, that can be included as part of the exercise), and then are active owners and participants in the exercise. Most private-sector participants are involved with or responsible for their company's Continuity of Operations Plan (COOP). Their focus, consistent with PNWER's and RDR's mission, is geared to resilience and recovery more than to immediate response.

Exercise Sequence

The sequence for most exercises goes from concept to workshop, development of materials and scenarios, the tabletop exercise, an after-action conference, and a final report. For each exercise, these elements were merged into a Regional Action Plan with identified projects and actions in the following areas:

- Interdependencies
- Coordination
- Roles and responsibilities
- Response
- Critical resource logistics and distribution
- Information sharing
- Economic continuity and recovery
- Public information
- Training and education

Accomplishments

The 2006 Blue Cascade Exercise III identified gaps in plans for recovery and restoration that clearly needed more work (see Table 2). Exercise V in 2008 focused on supply chain resilience.

Table 2. Blue Cascades exercises.

Exercise	Year	Focus
I	2002	Physical disruptions to the energy grid
II	2004	Cyber/physical disruptions
III	2006	Recovery and restoration after major earthquake
IV	2007	Critical infrastructure and pandemic preparedness
V	2008	Critical supply chains: food, fuel and water after major earthquake
VI	2010	Floods and H1N1 pandemic
	2012	Maritime commerce resilience
I	2002	Physical disruptions to the energy grid
II	2004	Cyber/physical disruptions
III	2006	Recovery and restoration after major earthquake
IV	2007	Critical infrastructure and pandemic preparedness
V	2008	Critical supply chains: food, fuel and water after major earthquake
VI	2010	Floods and H1N1 pandemic
	2012	Maritime commerce resilience

The exercise stakeholders developed recommendations and the state, city of Seattle, and private-sector participants have been moving the recommendations forward into specific projects within the Seattle region. The projects are included as part of the regional Threat and Hazard Identification and Risk Assessment (THIRA). The RDR serves as both a catalyst and a stimulus to specific actions and progress.

2010 Winter Olympics

PNWER helped facilitate cross-border planning for the 2010 Winter Olympics, which led to longer-range improvements in balancing efficient border crossings and security. This effort provides a good example of multijurisdictional coordination for planned events contributing to everyday improvements and coordination for disasters and emergencies.

PNWER established a Border Solutions Coordination Council with the support of the state and provincial governments to work on border issues in advance of the 2010 Winter Olympics. The council's objectives were to

- Ensure a secure, convenient, and welcoming border crossing experience for the 2010 Olympics
- Reduce congestion and streamline flows of legitimate trade and travel
- Increase outreach and expansion of frequent border crossing programs to improve security by focusing on higher risk traffic

The council was charged to

- Provide consistent input on regional priorities from governments, stakeholders, and border communities in the Pacific Northwest
- Help shape border security policy and implementation strategies
- Connect the federal governments in a systematic way with the local impacts of border decisions

The Border Solutions Coordination Council convened regularly and developed recommendations and strategies. Many of the recommendations were adopted before the Olympic Games. Specific strategies to facilitate travel during the Olympics and then established as an improved mode of operations included: an advance passenger manifest clearance project for common carriers and first responder NEXUS (a separate, expedited lane for trusted travelers), and a Washington State Freight Mobility Plan (available online at: http://www.wsdot.wa.gov/Freight/freightmobilityplan) that assesses freight for priority status in case of a border closure or a major highway disruption.

PNWER also hosted a border conference during the Olympic Games. The conference focused on a 10-year vision for the U.S.–Canada border and was attended by both ambassadors, three premiers, and many stakeholders. Results of the meeting contributed to a joint declaration by U.S. President Barack Obama and Canadian Prime Minister Stephen Harper on February 4, 2011, "Beyond the Border: A Shared Vision for Perimeter Security and Economic Competitiveness."

Lessons Learned

In 2003 and 2004, Canada's approach to private-sector integration and threat levels relied on self-organization and sector-specific/geographic-specific inventories of critical infrastructure (national, provincial, and local assets). Canada developed risk assessments, strategies, and best practices for dealing with each level of threat for each sector at each geographic level. This was in marked contrast to the United States DHS' issuance of a universal threat level. Individual stakeholders found the sector-specific, geographically scaled approach to be more useful in developing response and recovery plans than the DHS universal threat level approach.

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PNWER was instrumental in sharing the Canadian model with the states in its region, and this led to a dialogue with DHS on the subject of "What is criticality?" The region's experience with the Blue Cascades exercises made clear that criticality is dynamic, changing often in the course of any incident, and that a thorough understanding of interdependencies—especially of critical infrastructures—is important.

The National Infrastructure Protection Plan (NIPP) references PNWER as the model for bringing the public and private sectors together to address critical infrastructure protection issues (NIPP 2009). PNWER also is listed as a model of best practice for working with other states and provinces to address critical infrastructure security issues in *A Governor's Guide to Homeland Security* (NGA 2007).

CASE STUDY 2

Anchorage, Alaska

Background

The emergency management agency (EMA) in Anchorage, Alaska, has incorporated inclusive planning for people with access and functional needs into several emergency planning initiatives. The EMA worked with Access Alaska, the largest center in the state for independent living, on planning for access and functional needs populations. The EMA is forming agreements with Access Alaska for using resources, staff, and durable medical equipment for emergency response.

Access Alaska also helped the EMA form a functional needs support services working group with additional agencies. The working group reviewed various sections of the mass-sheltering annex and helped to identify planning gaps. The EMA updates points of contact for agencies in the working group every 3 months by sending an email to confirm contact information.

In addition, the Anchorage EMA revised the literacy level of the disaster registry brochure it was developing to enable use by more population groups, including people who had partial or total hearing loss. The EMA tested the brochure with members of target populations section-by-section and page-by-page and incorporated their suggestions into subsequent revisions. Suggestions included adding photos and using small words and bullet points rather than paragraphs.

The EMA also developed an application for the disaster registry program in collaboration with the American Red Cross, paratransit partners, the state DOT, police, and other agencies to identify information they needed to collect on the application. The Anchorage EMA found that most of the population groups targeted for the disaster registry did not use the Internet and would not sign up for the registry online. Thus, trusted intermediaries, such as medical professionals and service providers, were used to distribute the disaster registry applications and the brochure to the target populations.

CASE STUDY 3

All Hazards Consortium

Background

The All Hazards Consortium (AHC) is a regional nonprofit organization, guided by Delaware, Maryland, New Jersey, New York, Pennsylvania, North Carolina, Virginia, and West Virginia, and the District of Columbia, and the urban areas of New York City, New York, Newark, New Jersey, and Philadelphia, Pennsylvania. The role of the AHC is to "facilitate multi-state collaboration efforts that result in coordinated planning, investments, research, projects, and the creation of new partnerships and resources for member states and UASIs (urban areas that are part of the Urban Area Security Initiative (UASI) grant program from DHS)" (RCCC 2011).

AHC Overview

The AHC started out with the All-Hazards Forum, a 2004 trade show conceived by John Contestabile of the Maryland DOT, and Dennis Schrader, Maryland Homeland Security advisor, organized around the concept of interoperable communications, and carried out through a network of partners. The forum brought together transportation, emergency managers, and first responders from many jurisdictions and across the state of Maryland with vendors and universities to showcase the latest tools and technologies and discuss how to work effectively together. It included an exhibit hall and a technical program with panel discussions across multiple tracks. Each panel included representatives from the federal government, industry, academia, and state and local governments. Exhibitors' fees covered the costs of the program. The 2004 forum brought together 354 participants from 19 states and the 2005 forum included 670 participants from 31 states and four foreign countries.

The forums uncovered a thirst to collaborate on problems across jurisdictions, agencies, and disciplines. Attendees recognized that an ongoing dialogue must include both private-sector and public-sector participants. In discussing the potential structure of that ongoing collaboration, they realized a government entity would probably encounter too many constraints (e.g., ethical, procurement, legal). It might also be perceived as jurisdictionally biased, whereas a private commercial entity would probably discourage government participation. A university entity might be too academic. Therefore, in 2005, a 501(c)(3) nonprofit entity was established as the neutral third party and was named the AHC, with Tom Moran named as director.

AHC Structure and Functional Framework

The nonprofit consortium—limited to nine states by choice to maintain a regional scope—has a governing body of the nine participating states. It serves as an impartial arbiter. It has a staff of three full-time people with additional limited part-time support. The majority of its

work is conducted by volunteer state and operator working groups. The staff typically help get a working group started, ensuring that the group's mission and objectives are clear, arbitrate conflicts, and then step back. Funding is provided by corporate sponsors and grants. AHC is looking to expand its funding base and sustainability by marketing its membership program to the owners and operators of critical infrastructure (e.g., finance, power, transportation, retail, and others).

Serving state and local governments and private-sector infrastructure owners and operators, AHC provides an enabling framework that allows various stakeholders to come together on specific projects and issues, sometimes with competing or overlapping interests, to collaborate on common initiatives that result in unique benefits to each group. Such initiatives may include the following:

- Integrate planning efforts on specific topics
- Identify interdependencies and common vulnerabilities
- Develop pre-event resiliency projects and initiatives
- Adopt common standards and best practices
- Develop plans and agreements
- Conduct joint exercises to identify joint gaps, projects, plans, agreements
- Improve business operations and reduce risk (AHC website 2012)

Effective Collaborations and Practical Successes Foster Continued and Expanded Collaborations

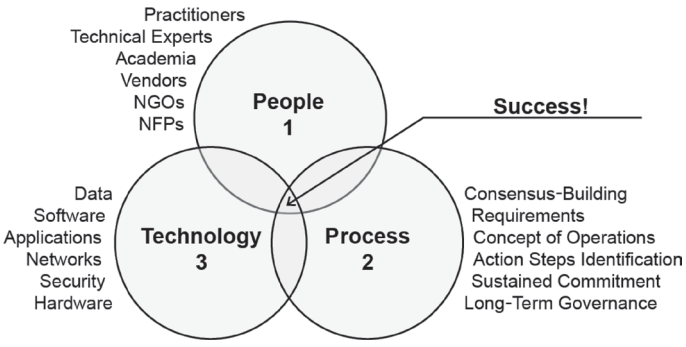
The collaboration and effective working relationships between the private sector and the public sector, and among public-sector agencies, continue to yield great value and unexpected opportunities to make things work better in an emergency. In turn, the bonds between people and agencies and among people's commitments to keeping the consortium going are strengthened.

AHC Helps

The AHC helps governments work across geographic and agency boundaries with critical infrastructure owners and operators to get businesses back faster after an event.

Process Highlights

One lesson learned by hosting the forums in 2004 and 2005 was that there are necessary precursors to applying the technology used in planning for, responding to, and recovering from hazards. The people who "own the problem" must come together and develop consensus on exactly what is needed to address the problem, including application of technology. Historically, the people and process components are often overlooked, and the AHC found its role facilitating these aspects, illustrated in Figure 4.



Source: Figure courtesy of John Contestabile.

Figure 4. People, process, and technology alignment.

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Building on its success with governmental entities, the AHC has expanded its private-sector outreach within the past few years to apply this model to operators of critical infrastructure, in particular the lifeline sectors. For example, a national firm with satellite communications can identify if a ground link is up or down. Knowing this is extremely useful in plotting power outages after a disaster. The firm provides the information to the consortium, AHC provides the translation role, adds disclaimers (this is private information, no warranty implied, etc.), and distributes the information to government agencies that identify who might need assistance and to utilities to help prioritize deployments.

In December 2011, the AHC and others sponsored a workshop to discuss transit of response crews and provision of mutual assistance across state lines. A key finding was that owner-operators from the energy, communications, transportation, banking and finance, and commercial facilities sectors have generally good knowledge of the protocols within their home states and immediate surrounding states, but are often not cognizant of protocols in more distant states to which they may lend assistance.

The AHC established a multi-state fleet response initiative working group to address this issue. The working group developed goals and objectives, desired outcomes, and products (including a regional directory of pertinent public and private-sector entities involved in permitting and facilitating the response).

The AHC, its working groups, and its partners' groundwork proved their value during and after Hurricane Sandy. One of many AHC success stories from the superstorm occurred in the power sector, when out-of-state utility trucks were tied up at toll stations in New Jersey. By facilitating the connection of several people in New Jersey with the power sector, the New Jersey Toll Administration helped develop a workaround process, agreed to within a few hours, that was circulated to the private sector within 8 hours. This simple workaround had a dramatic impact on the flow of trucks through toll gates, not just in New Jersey but also in Delaware and other surrounding states. People were connected quickly via telephone, text message, or email—and knowing the right people to connect in government and the private sector was critical to the success of this workaround (AHC website 2012). Working group members represent the following sectors:

- Power
- Retail
- Gas and oil
- Electric
- Chemical
- Telecommunications
- Water
- Transportation
- Banking and finance
- Rail and roadways
- Ports
- Information technology
- Food and supply chain
- State and local government
  - Homeland security
  - Emergency management
  - Transportation
  - Health
  - Boards of public utilities
  - Public utility commissions

  - Revenues and tolls
  - Parks and planning
  - General services
- Federal government
  - DHS infrastructure protection
  - DHS science and technology
  - FEMA
  - U.S. DOT
  - Department of Energy
  - Department of Commerce
  - Department of Justice
  - U.S. Navy
  - National Guard
  - U.S. Secret Service

Other AHC capabilities and services that emerged during Hurricane Sandy included locating citizen and worker housing, enhancing citizen protection via social media, fostering regional rail security, developing and disseminating private-sector resource data for fuel, food, pharmacy, and hotel availability, and expediting the connection of people to resolve issues.

Plan in Advance

Advance identification of a need, and identification and connections among key stakeholders, facilitated rapid resolution of problems that could have delayed response to the storm by days.

CASE STUDY 4

Southwest Missouri Council of Governments

Background

The Southwest Missouri Council of Governments (SMCOG) provides planning services to 10 mostly rural counties in and around Springfield, Missouri. SMCOG's stated purpose is "to promote area-wide dissemination of information regarding issues and problems and to provide technical and advisory services" (SMCOG 2012).

SMCOG was formed in 1989 through a state statute that authorized the creation of a regional planning commission (RPC) for 10 counties in southwestern Missouri. SMCOG did some preliminary work on regional transportation activities but did not fully participate in the early phase of state transportation planning. After some restructuring during the mid-1990s, the Missouri Department of Transportation (Missouri DOT) included RPCs in needs evaluation and project prioritization. RPCs received increased funding and responsibilities, including a process of evaluation of transportation needs, a public involvement process, development of regional data, and professional staff development. SMCOG began full participation in 1996.

The Missouri Association of Councils of Governments (MACOG) formed a working group to develop a common outline for this state plan. The content of the plan was developed over the course of several meetings and conference calls. SMCOG staff then compared these elements with plans from other regional planning organizations across the country, and further developed the outline for a regional transportation plan in the SMCOG region.

In 2003, the Missouri DOT initiated a new planning framework to expand public participation in planning the future transportation network in the state using collaborations with local officials to determine regional priorities for transportation.

How SMCOG Works

SMCOG provides transportation and land use planning services to its member counties and cities, many of which are dealing with significant development. It also provides comprehensive planning, zoning, subdivision regulation services; specialized planning studies; economic development planning; funding searches and grant writing and administration services; a census data center and a data-gathering and specialized research planning library; workshops and seminars; mapping services; community surveys and hazard mitigation.

SMCOG prepared the Southwest Missouri Regional Transportation Plan (RTP) (published in March 2009), a comprehensive, performance-based, multimodal and coordinated regional plan to guide future transportation improvements. The RTP covered all modes of transportation from a regional perspective, including freeways/highways, streets, public mass transit, airports, bicycle and pedestrian facilities, goods movement and special needs transportation.

In addition, the RTP addressed key transportation-related activities, such as transportation demand management, transportation management systems, safety, environmental justice, and equity issues between disparate social groups. The RTP became part of the State Transportation Improvement Program (STIP) and the state's Long-Range Transportation Plan (LRTP).

SMCOG also has assisted its member counties with developing and updating hazard mitigation plans. The state emergency management agency (SEMA) contracts with councils of governments and RPCs throughout Missouri to prepare updates to multijurisdictional natural hazard mitigation plans.

SMCOG also is the lead RPC in Region D, one of nine regions designated to have regional homeland security oversight committees. One SMCOG member, Taney County, participated in the multijurisdictional response and recovery to the Category 5 tornado that damaged Joplin, Missouri, in 2011.

SMCOG regularly schedules public meetings within each county to discuss transportation plan updates, natural hazard mitigation planning, and other local issues. It sponsors workshops and seminars on a variety of topics for local government officials, administrative staff, and other agencies that serve the public.

Collaboration Success

- SMCOG is administered and operated through the Center for Resource Planning and Management at Missouri State University in Springfield, Missouri. Of 17 regional councils in Missouri, SMCOG is the only one affiliated with a university. Through this unique partnership, SMCOG has access to a wide variety of resources and technical assistance.
- Membership in SMCOG is open to civic and development organizations, educational, community-based, and faith-based organizations, quasi-governmental entities, and other local organizations.
- SMCOG not only serves as a convener around transportation planning in southwestern Missouri, it also collaborates with diverse agencies and community entities to coordinate regional services ranging from recreation to emergency services to services for aging populations; coordinates with community-based organizations for Hispanic and African-American communities; and coordinates services to colleges, universities, private businesses, and utilities.
- The Ozark Transportation Planning Organization (OTO) is the MPO that covers portions of two counties in which Springfield is located. SMCOG does not make recommendations for areas within the OTO's boundaries, but collaborates with the MPO with regard to regional transportation planning. The SMCOG addresses the coordination of major thoroughfares that run through both jurisdictions and the transportation needs in outlying areas.
- The SEMA relies on SMCOG to help local jurisdictions develop county-wide, multijurisdictional, multi-hazard mitigation plans. SMCOG assisted many counties with developing their first hazard mitigation plans and is now in the process of updating those plans.
- SMCOG also works with rural electrical cooperatives to help the coops develop local hazard mitigation plans.

CASE STUDY 5

The Association of Bay Area Governments

Background

The Association of Bay Area Governments (ABAG), in the area of San Francisco, California, is primarily responsible for land use planning but has been involved in earthquake mitigation and planning at least since the 1989 Loma Prieta earthquake.

ABAG led and coordinated the development of the Multijurisdictional Local Hazard Mitigation Plan (MJ-LHMP) for the San Francisco Bay area. The plan explicitly includes transportation and other infrastructure. Examples of transportation mitigation projects include the San Francisco–Oakland Bay Bridge, which was replaced and retrofitted for seismic safety; retrofitting the Bay Area Rapid Transit District (BART) Transbay Tube, and elevating BART track structures for seismic safety.

The MJ-LHMP includes extensive discussion and diagrams describing the interconnectivity between utilities, transportation, and communications. The plan includes all hazards, including wildfires and human-made events.

The plan also includes health risks, such as a pandemic. Normally the purview of the Centers for Disease Control and Prevention (CDC), health risks were included by the Bay area planners to ensure that the MJ-LHMP was comprehensive.

Process Highlights

ABAG developed a detailed template and underlying database of hazards and other information for local jurisdictions and partner agencies (such as water districts and power plants). They worked diligently to encourage and assist local jurisdictions and partner agencies to complete their individual plans. They also emphasized the need to identify interdependencies among different systems (see Transportation and Infrastructure System Interdependencies in box). This is one of many interdependency diagrams in their plan.

FEMA did not give ABAG extra credit for this comprehensive approach; in fact, ABAG had a difficult time getting FEMA to approve the plans because ABAG did not use a "check box" approach. FEMA expressed concern that ABAG in essence did "too much hand holding" with partner agencies. ABAG was eventually able to obtain approvals after convincing FEMA that most jurisdictions and agencies would not have completed the plans on their own.

Transportation and Infrastructure System Interdependencies*

Regional transportation systems are both supplied by and supply services to major infrastructure systems, essentially creating a mutually supportive—and dependent—ecosystem. Recognizing these interdependencies is acutely important when planning regional responses to disasters, emergencies, and significant events.

Transportation systems operate in conjunction with other systems such as water and wastewater systems, telecommunications systems, and/or electric, petroleum, and natural gas systems. Important interdependencies between transportation systems and other community systems include the following:

- Transportation systems conduct workers to and from homes and workplaces, allowing workers access and the ability to deliver necessary fuel, materials, and equipment to conduct operations, respond to emergencies, and/or make repairs.
- Water and wastewater systems receive workers via transportation systems and provide water to transportation systems as necessary (e.g., for concrete construction and dust control).
- Electric, petroleum, and natural gas systems are supplied with workers, fuel, and vehicles via transportation systems and, in turn, supply the fuels needed for repair vehicles and worker transport; back-up generators; lubricants; and power for rail systems, control systems, gas station pumps, and even credit card machines.
- Telecommunications systems likewise are supplied with workers, repair vehicles, and necessary equipment, in turn facilitating systems control, process control, emergency communications, and communication with drivers and repair crews.

Adapted from information in Taming Natural Disasters: Multi-Jurisdictional Local Hazard Mitigation Plan for the San Francisco Bay Area, 2010 Update of 2005 Plan (2010, 1-16). The full document is available using online links available at http://quake.abag.ca.gov/mitigation.

CASE STUDY 6

City of Craig, Alaska

Background

The City of Craig, Alaska, population approximately 1,200, is located in the southernmost region of Prince of Wales Island, one of a chain of islands in the Alaskan panhandle and the fourth largest island in North America. The island runs along the coast of British Columbia. Craig is the largest community on the island. The population in Craig doubles in the summer because the city attracts seasonal residents for tourism and recreational activities.

Prince of Wales Island is fairly isolated from other communities. A daily ferry service is offered to Ketchikan Island, where most medical services are located. There is a paved air strip in the community of Klawock, but the airport does not have general aviation or TSA personnel. Two carriers provide small passenger air service to two other communities. Craig and other communities are serviced by float plane carriers.

The political situation in Alaska is unique as compared to most places in the United States. In Alaska, boroughization is optional; more than half of Alaska's land area is part of the larger Unorganized Borough. Prince of Wales Island is not within an organized borough, so the communities on the island are politically separate. Each community owns its own resources and is responsible for its own emergency planning and response. Advisory groups exist, but no political group can mandate regional transportation planning.

Regional Emergency Planning

Most emergency planning for the region happens within the local emergency planning committee (LEPC). Regional emergency planning is the responsibility of Craig's city planning director. The LEPC meets monthly but has no political authority to institute emergency plans, so the LEPC works cooperatively with communities on what plans might work or how to tackle problems. It is up to individual communities to adopt the plans. Most emergency plans are perpetually in draft form because it can be difficult to get communities to sign on to a single plan. Emergency plans are more like operating frameworks rather than plans with any authority behind them.

One key to overcoming political challenges has been the constant process of communities working together to match resources and responsibilities and forming mutual aid agreements to share resources. Routine and day-to-day occurrences, such as dispatch of fire departments from one community to another, require communities to work together and share resources, which builds a sense of regional community and an awareness of available resources.

To keep planning partners engaged, the Craig city planning director works to make the LEPC meetings meaningful and applicable to the communities that participants represent and tries

to provide access to outside resources. It is common practice, for example, to invite representatives from the tsunami warning center, the American Red Cross, and other entities to LEPC meetings and tie the programming into regional events and issues.

Leveraging Special Event Planning to Form Agreements

The Craig city planning director builds on relationships developed through inclusive LEPC meetings and exercises to identify resources and enter into formal agreements with other agencies and organizations. Over the last few years, the City of Craig has been working on establishing a no-cost mutual aid agreement with the U.S. Forest Service. The Forest Service has fire resources, many personnel, and Incident Command System (ICS) experts on staff, equipment, vehicles, and communications capabilities, all of which are resources the city has reached agreement on with the Forest Service.

There has been great value in starting with informal mutual aid agreements before moving into agreements that are more formal. If the city provides informal fire assistance to a community and a formal agreement is necessary, the city planning director builds on the established working relationships to enter into the necessary agreements.

Experience obtaining mutual aid on scheduled events also has been a good lead into forming larger mutual aid agreements. For example, the City of Craig hosted a regional development meeting for approximately 300 attendees to come to the island. The event required planning for housing, food, and transportation. The Craig city planning director served as the transportation lead for the event, which required determining where people would stay and designing a public transportation system to service the event. Bringing many people and agencies to the planning table was a way to gather information about transportation resources and capabilities in the region. The event planning has led to discussions about how to leverage this experience for emergency planning and for establishing more formal mutual aid agreements among partners in the future.

The City of Craig also has totem raising events that double the community's population for a week at a time. All emergency-related logistics come into play when a city is responsible for sheltering, feeding, and moving an influx of people. Knowing leaders in the various communities and not being afraid to reach out to ask for help have been keys to using such major events to precipitate a move to multijurisdictional emergency transportation planning.

Small-Scale Exercises Can Be Effective Tests

Getting the right people to the table is where regional transportation planning starts. Exercises are important opportunities to engage planning partners and test plans. The Craig city planning director stressed the importance of keeping exercises simple. The planning director led a tabletop exercise based on a fuel truck accident scenario with fuel truck operators, community leaders, and personnel representing fire and the state Department of Conservation. A map and a sequence of mass events were provided, along with information about "fancy" terms people would use. The planning director kept the scenario simple and let participants talk through it: "A fuel truck has spilled. What questions do you have?"

The Craig city planning director also speaks at conferences and talks about small community planning. He asks communities questions like the following:

- If something happened today, such as a fuel tank rupture, who would you call?
- Do you have their phone numbers?
- What if you make a list of those numbers?

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Small, discussion-based exercises can be effective starting points for smaller communities. He has also relied on the state emergency management agency (SEMA) to support training and exercise initiatives, and the state has been responsive by providing exercise scenarios, photos, mock messages, and other resources to use in exercises.

Inclusive Planning and Coordination with Tribes

Tribal organizations are a part of the Craig LEPC and have been involved in the emergency planning process. Most Tribes have environmental planners who are responsible for emergency planning and response. The emergency planning process has helped to identify and better understand differences in cultural priorities. The Craig city planning director's approach has been to draw on those cultural priorities to benefit the overall emergency planning process. For example, the weakest link in emergency response is the city's public warning system. Craig does not have an operational siren system, community radio, or television station, so all public warning or public information attempts are piecemeal and rely on key agencies to communicate information to their constituents. Information can be sent to the local cable station, but the information will only reach those segments of the population watching the public access channel. City officials can also call the public radio station in another community to disseminate information.

Culturally, the Craig Tribe has a focus on elders and their members, and Tribal representatives want to be sure they are taken care of through the planning process. The Craig city planning director can contact the Tribal Administrator and request assistance with notifying their elders and members of critical information. Through regular engagement with the Tribes, the city planner understands what is important to the Tribes and how to engage them in a way that helps them meet their cultural priorities, while also meeting emergency planning and response priorities.

CASE STUDY 7

Marathon Bombing Medical Care: Boston Bombings

"Marathon Bombing Medical Care" by Noah Reiter (IAEM)[1]

Despite the devastation caused by the blasts at the Boston Marathon in 2013, the difference between a single-digit death count and one that was far higher was a tribute to the city's preparedness; first-class police, fire, and emergency medical services (EMS) agencies; and arguably its unparalleled medical infrastructure. Highlights of the most significant contributing factors to the effective response include:

Preparedness: Few events require more medical planning than a road race with tens of thousands of runners and spectators, whether in Boston, New York City, or Atlanta, Georgia. Successfully covering such an event from a medical perspective will include the following important elements:

- Adequate numbers of trained medical staff
- Logically placed and well-controlled medical treatment areas with sufficient access and egress
- Patient movement devices (e.g., wheelchairs, backboards, and stretchers) and people to move individuals to treatment areas
- Patient tracking
- Effective incident command (A command structure is needed that controls everything from response to movement of patients to safety and public information.)
- Communications that are all-encompassing, to include medical responders, other public safety agencies, volunteers, area hospitals, and both high-tech (public safety radio) and low-tech (verbal and mobile phone) communications technologies

Rapid transportation and surgical intervention (the "golden hour"): The reality is that, after correcting immediate life-threats, such as a compromised airway or severe hemorrhage, the victim of significant trauma needs surgery from the most skilled teams.

Many news outlets have reported on the so-called "golden hour" in trauma care, learned from battlefield medicine. Specifically, a complex trauma patient's chance of survival drops dramatically if they are not in an operating room within an hour of sustaining their injuries. With six of the highest level (Level 1) trauma centers within such a small geographic area, Boston is uniquely positioned to provide outstanding care to a large number of victims.

Distribution of patients to receiving facilities: No matter how capable or large a hospital is, there is a point of saturation for all of them. Nearly 200 patients, several dozen of whom sustained critical injuries, were moved quickly to hospitals without overwhelming any hospital. This was due to planning, available patient movement and transportation resources,

[1]Article lightly edited from Reiter, N. 2013. "Key Success Factors for Marathon Bombing Medical Care." *The Safety Blog* (blog), Rave Mobile Safety. Used with permission of Noah Reiter (Reiter 2013).

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coordination, and highly skilled and professional responders and civilians. Area trauma centers each received more or less equal numbers of patients. This demonstrated coordination, command and control, discipline, and professionalism of the highest order.

People: The successful response to this horrific incident boiled down to outstanding people—police officers, EMTs and paramedics, firefighters, nurses, surgeons, and other physicians (both on the street and in the receiving trauma centers), race volunteers, and bystanders.

There was a well-coordinated response that quickly moved nearly 200 patients—several dozen of whom were critically injured—to capable hospitals. This was due to planning, available patient movement and transportation resources, coordination, and highly skilled and professional responders and civilians.

CASE STUDY 8

Hurricane Sandy

New York Metropolitan Transportation Council and Hurricane Sandy Response and Recovery

The New York Metropolitan Transportation Council (NYMTC) is a regional council of governments (COG) that provides a collaborative planning forum to address transportation-related issues from a regional perspective. NYMTC acts as the MPO for New York City, Long Island, and the lower Hudson Valley. NYMTC members work together to develop regional plans and make decisions on use of federal funds. NYMTC also collaborates with neighboring MPOs to coordinate planning activities in the New York, New Jersey, and Connecticut metropolitan region.

NYMTC Structure and Operations

Voting and advisory members that represent local, regional, state, and federal transportation agencies make up NYMTC. Representatives of the principal and advisory member organizations also serve on the Program, Finance, and Administration Committee (PFAC), which is responsible for overseeing NYMTC's day-to-day activities.

NYMTC comprises three standing subregional Transportation Coordinating Committees (TCCs) that respond to local needs and ensure coordination and consistency with formal requirements. NYMTC also has a central staff that coordinates regional activities to support PFAC and council responsibilities and the development of the mandated planning products. Additional, smaller staff groups support the TCCs.

Successes and Lessons Learned from Hurricane Sandy

Impacts to the Region's Transportation System

When Hurricane Sandy ravaged the East Coast of the United States in October 2012, it left behind unprecedented damage to the regional transportation system, estimated in billions of dollars, and paralyzed entire sections of the NYMTC planning region. Extreme flooding closed roadways and tunnels; subway service was completely shut down; infrastructure, such as roadways, bridges, and rail lines, was severely damaged; railroad power lines were destroyed; and electrical, lighting, and communications systems were ruined. The result was a drastic reduction in the regional transportation system's capacity and an urgent need to restore transportation operations as quickly as possible.

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Transportation Response and Recovery Efforts Were Flexible and Coordinated

NYMTC's member organizations demonstrated a flexible and coordinated approach to Hurricane Sandy recovery and restoration of the transportation system. Transportation agencies modified transportation operations and offered customers alternative services and travel modes. Coordination among transportation and government agencies of all levels, utilities, and other responders resulted in transportation operations resuming just days after the storm.

NYMTC's flexible and coordinated recovery efforts included the following:

- The Long Island Railroad operated under modified schedules and offered bus service from major stations while Amtrak repaired flooded tunnels. In one instance, the waiting room of a major railroad station was turned into a comfort station that offered heat, water, restrooms, and a charging station for electronic devices.
- The Metropolitan Transportation Authority (MTA) set up a "Bus Bridge" for 3 days, using more than 300 buses to connect approximately 200,000 daily riders to functioning subways on both sides of the East River. Within a week after the storm, most subway service was restored.
- The Port Authority of New York and New Jersey worked with New Jersey Transit and other agencies to provide a combination of alternative transportation services, including bus, ferry, and rail.
- The New York City DOT coordinated with New York Water Taxi to operate a temporary ferry service serving various Staten Island communities to provide transportation access to residents.
- Rockland County teamed with MTA to offer free rides on the county's express bus. Rockland's bus services were functioning just 1 day after the storm.
- Westchester County restored its Bee-Line System bus service within days after the storm by working with utility companies and local, county, and state road crews to remove debris from blocked streets.
- Rockland County used an interactive GIS mapping tool to provide a common operating picture for response agencies at the local, county, and state levels, including fire, police, utility, Red Cross, and other emergency personnel. The tool allowed response agencies to share information on road obstructions and closures. The county used the mapping information to organize, prioritize, and direct efforts to clear major highways and roads and to route emergency vehicles and evacuations. The tool was also used to update information on changing road conditions, restore power, manage cleanup and detours, reopen schools and businesses, and restore the transportation system.
- The New York State DOT implemented Incident Command System (ICS) protocols to stage staff and equipment at strategic locations, ready to be deployed.
- Contractor staff provided additional staff to clean up and repair storm damage, resulting in more than 35,000 hours of work in the hardest hit counties.

Post-Hurricane Sandy Regional Transportation Planning

Hurricane Sandy was yet another reminder of regional transportation system vulnerability to extreme weather and other emergencies. The event brought into focus a number of issues to be factored into subsequent regional transportation planning efforts to improve transportation infrastructure resilience. Transportation system resiliency and risks associated with climate change and extreme weather are areas of focus for long-term planning.

NYMTC and its member organizations have numerous planning initiatives under way to apply lessons learned from the Hurricane Sandy recovery. NYMTC is partnering with FHWA, the North New Jersey Transportation Planning Authority, South Western Regional Planning Agency, and the Greater Bridgeport Regional Council, along with the New York, Connecticut, and New Jersey DOTs on a pilot program to assess the vulnerabilities of transportation

infrastructure and analyze adaptation strategies for critical infrastructure. Sponsored by FHWA, the vulnerability assessment will

- Assess the impacts of Hurricane Sandy, and to a lesser extent preceding weather events, on the transportation assets within the region
- Assess the vulnerability of those assets to the impacts of extreme weather events and possible future impacts of climate change
- Identify adaptation strategies to increase the resilience of the transportation system

The initiative will result in a series of deliverables and a final report highlighting the region's most vulnerable transportation assets and analyzing the adaptation measures available.

Regionally, NYMTC's metropolitan planning process is considering the potential impacts of climate change on the transportation system in the 2014–2040 RTP. The draft plan, which was under public review and comment at the time this guide was written, includes a strategic regional policy guideline to incorporate climate change and carbon reduction considerations into regional "green transportation policies." The draft plan includes a section dedicated to resiliency and climate adaptation strategies, which outlines related state, regional, county, and local initiatives underway.

According to the RTP

- The Regional Plan Association and Clean Air-Cool Planet partnered to develop the *New Jersey Climate Adaptation Directory*, a resource that brings together data, models, existing and proposed policy, and other tools to be shared and applied by various practitioners across a range of fields. The directory is designed for New Jersey but can be used by other states and regions.
- PlaNYC, New York City's long-range sustainability plan, includes forward-looking resiliency initiatives and recommendations to address challenges brought on by climate change. Recommendations include increasing transportation options, measures to address congestion, and maintaining and improving the physical conditions of infrastructure and the transit system to accommodate more users safely.
- After Hurricane Sandy, New York City formed the Special Initiative for Rebuilding and Resiliency, charged with producing a plan to provide additional protection for the city's infrastructure, buildings, and communities from the impacts of climate change. The resulting roadmap for creating "a stronger, more resilient New York" identifies future climate risks to the city's transportation network, such as storm surge and high winds, and strategies and initiatives to mitigate the impacts of climate change and increase resiliency.
- Westchester County is working to adapt services and infrastructure to the increasing severity and frequency of storms, such as Hurricane Sandy, including identifying detours for bus routes and developing flood mitigation plans to minimize roadway closures.
- Planning is underway in Rockland County to pursue more direct communication links among transportation agencies, responders, and utilities to establish an organized approach to restoring transportation infrastructure in a timely manner. Plans to improve response and recovery time include encouraging main power lines to be secured underground and more vigorous tree monitoring programs; defining more specific staging areas, establishing more widespread power redundancies; and continuing to call for all service stations and food stores to have generators.
- Suffolk County is pursuing a "Connect Long Island" initiative through Bus Rapid Transit (BRT) to help reduce automobile dependency. The county is also expanding hazard mitigation plans to create comprehensive, state-of-the-art flood protection systems that balance buildings, roads, wastewater infrastructure, and power grids with natural water systems.
- Statewide plans created by the State Climate Action Council seek to build all new transportation infrastructure inland from or above rising water levels and to use heat-resistant construction materials that can withstand higher temperatures.

CASE STUDY 9

Regional Integrated Transportation Information System

Background

The Regional Integrated Transportation Information System (RITIS) was conceptualized in 2001 by the National Capitol Region Transportation Planning Board and developed by the University of Maryland Center for Advanced Transportation Technology. It is the primary source of information for the information sharing and operations coordination activities of the Metropolitan Area Transportation Operations Coordination Program (MATOC). MATOC is a coordinated partnership among transportation agencies in the District of Columbia, Maryland, and Virginia.

RITIS is an automated data sharing, fusion, dissemination, and archiving system for operational data. It includes many performance measure, dashboard, and visual analytics tools with real-time information to help agencies gain situational awareness and measure performance. RITIS does this through compiling transportation data from each participating agency, standardizing it, and making it available to other participating agencies through each agency's existing transportation management systems (see Figure 5). RITIS also communicates information between different agencies and to the public. This improved, real-time information is crucial for effective management of the region's transportation system and related emergency preparedness. Managers and policy makers from transportation, transit, and public safety agencies can also use real-time RITIS data to monitor their agencies' incident response.

The RITIS website allows authorized users with appropriate credentials to interact with live events, incidents, weather sensors, radio scanners, and other data sources in map, list, and graphic format. Users can even apply filters, access contact information, and set up alerts.

This data fusion and dissemination system increases the regional situational awareness of operations staff from each agency by complementing the agency's own transportation management system and the direct interpersonal communications that take place among traffic management centers (TMCs) from different jurisdictions. During a regional emergency, transportation and public safety agencies can use RITIS' real-time operational data to adjust traffic or transit operating conditions to support emergency management efforts and lessen the travel demand on affected transportation sectors.

RITIS users include staff in the traffic and transit operations centers of the participating agencies, field staff from traffic and transit agencies, public safety personnel and other emergency responders, information service providers, agency public affairs personnel responsible for giving the public accurate and comprehensive information, and the traveling public. Additionally, there are archived data users who include researchers, transportation planners, other transportation agency staff, and consultants.

Similar systems have been developed in other regions of the country, such as greater Philadelphia.

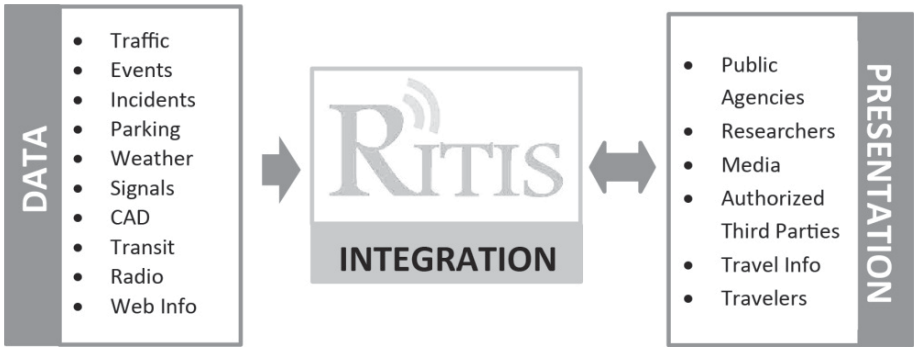

Figure 5. RITIS structure.

SECTION 4

Tools

TOOL 1

Checklist of Potential Stakeholders

How to use: Identify stakeholders pertinent to the region that may collaborate in planning for, responding to or recovering from a disaster or provide support for a major planned event. Identify local contacts for applicable stakeholder groups.

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Federal Stakeholders				
U.S. DOT				
FHWA				
FTA				
FAA				
FRA				
Maritime Administration (MARAD)				
Pipeline and Hazardous Materials Safety Administration (PHMSA)				
FMCSA				
Other U.S. DOT modal administrations as appropriate				
NTSB				
Amtrak				
DHS				
FEMA				
TSA				
U.S. Coast Guard				
U.S. Customs and Border Protection				
Science and technology federal research agencies and national laboratories				
U.S. Secret Service				
Health and Human Services (HHS)				
Centers for Disease Control and Prevention (CDC)				
Administration on Aging (AoA)				
Agency for Toxic Substances and Disease Registry (ATSDR)				

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Tool 1. (Continued).

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Indian Health Service (IHS)				
EPA				
Regional offices				
Department of Commerce (DOC)				
National Oceanic and Atmospheric Administration—Catch Sharing Plan				
DOC-Interstate Commerce—Permitting for utility workers and equipment to traverse non-impacted states				
Department of Defense (DOD)				
All branches				
Department of Justice				
Federal Bureau of Investigation				
ADA enforcement				
National Organizations				
AASHTO				
AASHTO Special Committee on Transportation Security and Emergency Management (SCOTSEM)				
APTA				
Association of Metropolitan Planning Associations (AMPO)				
American Planning Association (APA), Transportation Subgroup				
Business Civic Leadership Center (BCLC) (Affiliate of U.S. Chamber of Commerce focused on business-government partnerships for emergencies)				
Business Executives for National Security (BENS)				
National Association of Regional Councils (NARC)				

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
National Association of Development Organizations (NADO) (rural focus)				
National Traffic Incident Management Coalition (NTIMC)				
National Motor Freight Association (NMFA)				
National Freight Transportation Association (NFTA)				
Freight forwarders associations (e.g., Air Freight Forwarders Association [AFFA])				
American Association of Port Authorities (AAPA)				
Association of American Railroads (AAR)				
Shortline Railroad Associations (SRA)				
American Bus Association (ABA)				
ATA				
American Waterways Operators (AWO)				
Inland Rivers, Ports and Terminals Association (IRPTA)				
Gulf Intracoastal Canal Association (GICA)				
Retail Industry Leaders Association (RILA)				
National Emergency Management Organizations				
International Association of Emergency Managers (IAEM)				
Disaster training schools and consortia, such as Emergency Management Institute (EMI), National Disaster Preparedness Training Center (NDPTC), and Texas Engineering Extension Service (TEEX)				
National Emergency Management Association (NEMA)				
National Fire Protection Association (NFPA)				

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Tool 1. (Continued).

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
National Emergency Medical Services Association (NEMSA)				
National Alliance for State Animal and Agricultural Emergency Programs (NASAAEP)				
National Non-Governmental Organizations (NGOs) (with local chapters)				
American Red Cross				
United Way (211 services)				
Assisted Living Federation of America (ALFA)				
Independent Living Centers				
AARP				
Faith-Based Organizations (e.g., Salvation Army, Catholic Charities)				
Nonprofit organizations with a niche focus on emergency management [e.g., Easter Seals (persons with disabilities); Save the Children (caring for children in emergency situations]				
National Animal Rescue and Sheltering Coalition (NARSC)				
American Veterinary Medical Association (AVMA)				
Agencies that provide services to people who have impaired or no vision or impaired or no hearing; who have mobility, sensory, or cognitive limitations; who have limited or no English proficiency; who have low income; and who are very young or very old				
State Stakeholders				
State DOTs				
Transportation agencies (highway, airport, transit, freight, maritime, rail)				
Territorial equivalents of transportation agencies				

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Traffic operations offices/intelligent transportation systems (ITS) sections				
Maintenance offices				
Planning offices (metropolitan, rural, and statewide)				
Safety offices				
Other State Agencies				
Departments of Environmental Protection (DEPs)				
Other state, territorial, and Tribal agencies (including statewide authorities)				
Department of Health				
Law Enforcement/ Emergency Services				
State emergency management offices/ Emergency Management Assistance Compact (EMAC) partners				
Emergency Operations Centers (EOCs)/Joint Telecommunications Centers (JTCs)				
State patrols				
National Guard				
State Associations				
State rail associations (members of the American Association of Railroads])				
State Trucking Associations (STA) (part of ATA)				
Regional Government/ Agencies				
Metropolitan Planning Organizations (MPOs) and Regional Planning Commissions(RPCs)				
Rural Planning Organizations (RPOs)				
Tribal Planning Organizations (Tribal Transportation Planning Organizations, often part of state DOTs)				
Traffic Management Centers (TMCs)				
Fusion Centers				

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Tool 1. (Continued).

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
EOCs (state, regional, and/or local)				
Bi-state authorities (e.g., Expressway authorities)				
Local Government Stakeholders				
City and County				
Public works departments				
Traffic engineering departments				
Planning, land use, and transport (through MPOs)				
Transit agencies, both public and private, including school buses				
Law Enforcement/ Emergency Services				
Law enforcement (Police and Sheriffs)				
Fire and rescue				
Emergency medical services (EMS)				
Medical examiners/ coroners				
Hazmat services				
Dispatch services				
Public health				
Utilities				
Water departments				
Wastewater departments				
Gas and electric power companies				
Communications companies				
Private Companies				
Towing and recovery operators				
Towing and barge owners and operators				
Heavy equipment owners and operators				
Hazardous Materials (Hazmat) contractors				
Motor carrier companies				
Insurance companies				
Traffic media				
Livery (rail and freight)				
Paratransit service providers				
Air freight/air charter				

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Other Local Community Organizations				
Community Emergency Response Teams (CERTs)				
Volunteer Organizations Active in Disasters (VOAD)				
United We Ride (UWR) (mandated collaboration for transportation services between social service providers)				
(Local) chambers of commerce				
Citizens' and neighborhood groups				
Local livestock associations (e.g., cattlemen's associations)				
Local animal rescue/shelter organizations				
Community-based organizations (CBOs) (e.g., food banks, multi-cultural chambers of commerce, and community centers)				
Transportation Sector				
Trucking associations				
Freight rail operators				
Technical Societies (e.g., ITS state chapters, state sections; Institute of Transportation Engineers [ITE])				
Automobile associations				
Event/Sports Venues				
Venues				
Arenas				
Stadiums				
NASCAR and other racing venues				
Field sports (e.g., soccer, baseball) complexes				
Golf courses				
Designated Venues				
Major League Baseball playoffs, World Series, All Star games				
National Football League Super Bowl				

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Tool 1. (Continued).

Stakeholders	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Professional Golf Association and Ladies Professional Golf Association, major tournaments (e.g., the U.S. Open)				
NASCAR races				
Operation Sail				
Major League Soccer Championships				
National-level political and other conventions				

TOOL 2

Checklist of Potential Transportation Assets (High Level)

How to use: Wherever possible, inventory assets, especially those that will be critical to address in disasters and emergencies, such as the number of local bridges. In most cases, transportation asset management systems will have good records of locations and conditions of transportation assets.

Potential Assets	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Aviation					
Aircraft					
Air Traffic Control Systems					
Airports					
Commercial					
Military					
Other					
Highway Infrastructure and Motor Carrier					
Bridges					
Tunnels					
Roadways					
Bike Paths					
Sidewalks					
Vehicles					
Automobiles					
Trucks carrying hazardous materials					
Other commercial freight vehicles					
Motorcycles					
Motor coaches					
School buses					
Bicycles					
Maritime					
Ports					
Ferries					
Waterways					
Coastline					
Intermodal Landside Connection Facilities					

TOOL 3

Transportation Resources (Detailed Checklist)

How to use: In advance, tally the numbers of each resource that could be available for a disaster, emergency, or significant event. Use the comments column to note any concerns about accessing the resource, confirmed availability, additional needs, and so forth.

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Department of Transportation					
Equipment and Assets					
Barricades					
Emergency Management Agency (EMA) units for inter-operable communication					
Fixed traffic cameras that feed into the emergency operations center (EOC)					
Installations at selected sites that can be activated as needed					
Laptops to control fixed camera tilt, zoom, and timing					
Mobile units to cover dead zones					
Portable units for network operations					
Real-time traffic counters					

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Reflector cones					
Traffic control equipment					
Variable message signs (VMS) (permanent and portable)					
Situational Awareness					
Flow maps for traffic capacity and time					
GIS maps					
Lidar					
Traffic management centers (TMCs)					
Security cameras for critical infrastructure					
Intrusion detection systems for critical infrastructure (e.g., bridges, hatches, control centers)					
Management					
Communication –Intra-agency, –Interagency and external with the public –Web-based EOC or similar software program –Website and other electronic communication –Satellite phones					
Evacuation maps (updated annually)					

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Strategies like toll waive policy, reverse lanes, traffic management (e.g., turn prohibitions)					
Personnel					
ICS training					
NIMS compliance					
First responder standard identification					
Maintenance personnel					
Mid-level staff or administrative staff to sit in the EOC					
National Guard to assist with traffic control, security, crowd control					
Operations personnel in the EOC					
People at barricades					
Person(s) in the field to assess actual conditions and remain in contact with the EOC					
Traffic officers at key inter-sections					
Routes					
Arterial roads					
Freeways					
Highways (Interstate, federal, state, and county)					
Bridges					
Tunnels					
Rail lines					
Waterways					

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Vehicles					
DOT and police sport-utility vehicles with cameras					
Heavy equipment [e.g., earth movers, backhoes, bulldozers (may be through contractors); debris removal, reconstruction]					
Mobile command centers					
Police helicopters with cameras					
Snow plows, other snow removal equipment					
Trucks equipped with radios					
Vehicles equipped with reflector cones and VMS in the field					
Emergency Management					
Equipment and Assets					
NTAS/ Reverse 9-1-1® emergency alert notification					
Event radio channels to communicate with people in the field					
Hardwired, secure telephone lines with direct links to regional municipalities					

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Voice Interoperable Program for Emergency Response (VIPER) on mobile phones on same frequency					
Situational Awareness					
Satellite phones					
Critical infrastructure adjacent to facilities					
Threats to special events					
Maps of hurricane and surge zones, flood zones, wildfire areas, etc.					
Possibly a registry listing populations with access and functional needs, medical or other special needs, or pets or livestock (updated every 2 years)					
State Medical Asset Resource and Tracking Tool—a Web-based tool to track hospital bed count daily					
Trigger points and evacuation timeline					
Management					
Web EOC, E-team					

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Annual county inventory of medical special needs/fragile populations and available ambulances					
Annual inventory of resources in counties not at risk					
Clearly defined roles and responsibilities for all agencies participating in the evacuation					
Gap analysis (between number of vehicles available and number needed for evacuation)					
List of vehicles in county available for evacuation					
Private Assets and Logistics Management System (PALMS)—Tool to manage private-sector assets that can be accessed during an evacuation					
Standard Operating Guidelines (SOG), updated every 2 years					
Statewide mutual aid agreements for ambulances					
Web-based EOC					

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Personnel					
ICS training					
NIMS compliance					
First responder standard ID					
Contacts in other agencies for real-time information					
Emergency medical personnel in EOC with decision-making authority					
State incident management team available to help counties with evacuation					
Logistics staff to coordinate resources and resource requests					
Personnel to update registry information					
Vehicles					
Ambulances (basic life support, advanced life support, bariatric), private and public					
Paratransit vehicles					
Emergency medical vehicles					
Fire department vehicles					
School buses (areas without mass transit)					

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Metropolitan Planning Organization/ Council of Governments (MPO/COG)					
Situational Awareness/Data					
511 service operated by state to provide updates on state and Interstate highways					
211/311 non-emergency numbers					
Digital warehouse (demographic, land use, traffic data)					
GIS maps					
Mapping tool to provide information to evaluate placement of law enforcement and equipment					
Weather information					
Hurricane tracking					
Traffic flow information, including contra flow map					
Modeling capabilities					
Evacuation models by zip code, traffic analysis zone/ neighborhood, city, county, or state					
Hurricane models					

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Monitoring of blue tooth numbers/other probe data to monitor traffic flow					
Reliable data from traffic cameras					
Management					
Centralized Traffic Operations Center (TOC)					
Convening leaders of different agencies to discuss evacuation plans					
Funding coordination					
Study to help public information officers reach populations with access and functional needs					
Personnel					
Staff support to committees for planning and after-action reviews					
GIS staff					
Transit Agency and Other Transportation Providers					
Equipment and Assets					
Evacuation route signage					
Generators at transit facilities					
GPS on buses					

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Meters in stations to count number of people allowed into stations					
Parking lots where stalled vehicles can be towed					
Queue ropes					
Radios on buses					
Subway stations (both non-accessible and ADA accessible)					
Situational Awareness					
Assessment to identify number of people who need assistance to evacuate from special facilities, their physical characteristics (e.g., ambulatory, able to transfer from wheelchair to bus seat, needs wheelchair, needs stretcher) and the type of vehicle they need					
Estimates of time required to load and unload buses, drive to destination, and return					
Hyper-alert application for mobile phones to alert staff and operators					
Drivers/operators as real-time view of roadway status, people's status and needs					

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Joint Rail Control Center					
Maps for drivers (e.g., to off-site bus storage areas, pickup, transfer, and drop off points)					
Management					
3-1-1 system to coordinate requests for evacuation transportation					
Communication – Internal, interagency, and external – Employee preparedness letters – Social media – Subscription service – Website					
Credentials/ identification for all personnel					
Designated pickup and transfer points					
Documents to track assets and operators' hours					
Off-site vehicle storage					
Registry (2-1-1, access and functional needs, medical needs, special needs)					
Shelter for transit facility personnel					
Signal systems					
Software that integrates resource requests with reimbursement					

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Transportation resources database to track vehicle status					
Web-based EOC					
Personnel					
ICS training					
NIMS compliance					
First responder standard ID					
Dispatcher					
Drivers					
Law Enforcement					
Transit personnel assigned to EOC					
Transit personnel to track vehicles and number of evacuees (if an evacuation event)					
Key Infrastructure					
Arterial roads					
Freeways					
Highways-Interstate, federal, state, and county					
Bridges					
Tunnels					
Rail lines					
Waterways					
Vehicles					
Buses – Numbers – Sizes – Capacities (in passenger seats; in wheelchairs) – Lift-equipped – Axle height (for flooding)					

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Buses, *continued* – Turning radius (for suitability in neighbor-hoods) – Fuel type (e.g., natural gas buses will have limited range outside normal fueling radius)					
Paratransit vehicles – Number, – Capacity (in wheelchairs) – Capacity (in passenger seats)					
Rail vehicles – Subway (capacity, constraints, e.g., cannot operate if power is out) – Street cars (capacity, constraints, similar to subways) – Commuter rail (capacity, constraints, similar to subways and street cars) – Dual power?					
Private-Sector Partners: Business, Utilities, Communications, Owners, and Operators of Critical Infrastructure					
Equipment and Assets					
Situational Awareness/ Intelligence					

(continued on next page)

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Tool 3. (Continued).

Resources	Number	Emergency/ Disaster	Planned Event	Does Not Apply	Comments/ Contact Information
Management					
Personnel					
Routes					
Community-Based/Faith-Based Organizations (CBOs/FBOs)					
Equipment and Assets					
Situational Awareness/ Intelligence					
Management					
Personnel					
Routes					

TOOL 4

Sample Transportation Security and Hazard Mitigation Strategies for Various Project Modes and Types

How to use: Review the types of projects and sample strategies. Select those most appropriate for the region, and determine whether they are being applied.

Type of Project	Sample Strategies (Consider as Appropriate)
All Types	Planning and coordinating to prepare for natural or human-made disasters at site-specific and regional levels in terms of physical and electronic infrastructure. Conducting vulnerability assessments and, if appropriate, participating in exercises.[a] Maintaining security during construction or maintenance. Enhancing communication between security planners and other project participants and regional entities. Providing signage and information for the public regarding any specifics of what to do in an emergency.[g]
Road Projects	Coordinating with security planners, which can include: preventing incidents by limiting access to sensitive areas, planning for redundancy with extra consideration of how to get emergency vehicles to priority sites, and considering evacuation needs and any role the facility might have in recovery efforts such as for freight movement.[a, b] Coordinating with ITS and operations planning, including how the facility would be used for the general public in an emergency.[g] Taking an all-hazards approach to planning for the facility.
Bus and Train Projects (including both passenger trains and freight trains)	Considering a range of security issues in selecting infrastructure, such as rail cars or buses.[d] Continuing to maintain security at sensitive locations for passengers and for operations. Further training a wide range of staff to be ready for an incident on a vehicle or a major event, including the front-line staff who would be at stations and on vehicles.[c] Further coordinating planning of how to help move people and goods in the event of a regional emergency.

(continued on next page)

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Tool 4. (Continued).

Type of Project	Sample Strategies (Consider as Appropriate)
Bridges and Tunnels	Restricting public access to sensitive areas, such as by means of fencing, setbacks and/or shielding.[a, e] Monitoring access, such as by protective lighting or cameras.[a] Designing for access by various emergency personnel. Coordinated site-specific and regional planning if the bridge may be used as a detour or for evacuation.
ITS and Operations	Safeguarding infrastructure in disasters, which can include planning for backup power for traffic signals. Integrating various ways to protect information in system (also known as cyber-security) and other recommended information technology security practices. Coordinating how transportation and communications infrastructure can be used in various types of emergencies.[g] This may include overcoming matters of who paid for different elements of the ITS system. Participating in TMCs that can manage the flow of traffic on highways and provide a coordinated response for emergencies statewide, and training for their use in emergency management situations. Participating in ways to communicate transportation information in emergency situations. This can include how 511 traveler information systems can be used to broadcast information and encouraging use of subscriber emergency systems and text alert systems that send alert messages to cell phones and other hand-held devices.
Bicycling and Walking Facilities	Addressing security as well as crime-prevention techniques, such as lighting and restricting access from paths or other facilities to sensitive infrastructure.[e] Addressing the role of walking or bicycling facilities in the event of a major evacuation. Research indicates that in a major event, such as that experienced on 9/11, many people may choose to walk even when distances were substantial.[f] Considering how to communicate closures before people have traveled a long way and/or safe directions to proceed in cases of major events.[f, g] Considering how to coordinate bicycle and walking facilities with recreational facilities in flood-prone areas to assist with flood mitigation.
Site Design and Buildings	Applying security elements or Crime Prevention Through Environmental Design (CPTED), including site design and more usual features such as security lighting.[e] Coordinating with municipal or other security planning for natural or human-made events. Integrating the ability to communicate in an emergency in the design and engineering of sites. This includes how to leave the site (not just the building) and in what directions it may be safe to proceed.[f]
Land Use and Development Planning	Including reference to security planning in master plans and other plans; including general contacts or references may be useful because this can be a confusing field. Coordinating with security planners on how staging and logistics would work in an emergency so long-term land use and transportation decisions can be coordinated with potential immediate transportation needs during an event.[a, b, d]

(continued on next page)

Type of Project	Sample Strategies (Consider as Appropriate)
Land Use and Development Planning (cont.)	Considering restrictions to land use based on hazards (e.g., in fire-prone areas, require extensive clear zones [clear of fuel for fires]; in flood zones, relocate structures and substitute recreation areas or other low-intensity use where possible).
Environmental Planning	Considering human-made and natural event security planning is useful in designing parks and other open facilities, in addition to crime-prevention planning.[e] Including hazard mitigation planning, such as preventing mud slides and other proactive approaches. Seeking opportunities for environmental planners and transportation planners to work together on minimizing environmental effects of events on the transportation network.
Economic Development Planning	In addition to usual planning for continuity at individual private or nonprofit organizations, considering continuity of broader matters such as transportation. Planning by business districts or similar organizations of many entities on how to deal with major events, specifically including transportation elements.

Source: Adapted with minor modifications from DVRPC (2010) "Fitting the Pieces Together- Improving Transportation Security Planning in the Delaware Valley." Used with permission.

References:

a. *NCHRP Report 525, Volume 14: Security 101: A Physical Security Primer for Transportation Agencies* (TRB 2009).

b. *NCHRP Synthesis 320: Integrating Freight Facilities and Operations with Community Goals* (TRB 2003).

c. Safety Action Plan for the Delaware Valley (Philadelphia, Pennsylvania: DVRPC, 2009) and

TCRP Report 86, Volume 5: Security-Related Customer Communications and Training for Public Transportation Providers (TRB 2004).

d. *TCRP Synthesis 80: Transit Security Update* (TRB 2009).

e. Using Crime Prevention Through Environmental Design in Problem-Solving. (U.S. Department of Justice 2007).

f. Managing Pedestrians During Evacuations of Metropolitan Areas (FHWA, 2007).

g. *Communicating with the Public Using ATIS During Disasters: A Guide for Practitioners* (FHWA 2007).

TOOL 5

Checklist for Emergency Events Affecting Multiple Jurisdictions, Transportation, and Interdependencies

How to use:

1. Review and discuss events that could impact the region. Indicate likelihood and consequences, and note if an event or impact absolutely does not apply to the region. Review and discuss the transportation consequences of any event that does apply, along with potential ripple effects.
2. Review and update the checklist throughout the planning process with planning partners. Use the tool to trigger thinking about consequences to infrastructure and people, what responses might be required, and additional partners who may be needed.
3. Review and discuss whether a planned special event would be a good test of the types of coordination, communication, and operational strategies that would be needed in an emergency event (i.e., could a planned special event become an exercise for planning this type of event?)
4. Review and discuss whether such an event would be more likely in tandem with a planned special event (e.g., human-caused institutional acts) or have a greater consequence if it were to coincide with a planned special event.
5. Review and discuss when planning regional exercises—tabletop to full-scale—to identify scenarios.

Resources may include:

1. Local emergency plans
2. FEMA HAZUS® Software (a method for estimating losses from disasters)
3. FEMA flood zone maps
4. Urban Area Security Initiative (UASI)/other risk assessments
5. Sea Lake and Overland Surges from Hurricanes (SLOSH)(an estimate/model of storm surge heights from the National Hurricane Center)
6. Local nuclear power plant emergency plans

Tool 5. (Continued).

Potential Hazards	Likelihood (High/ Medium/ Low)	Consequence (High/ Medium/ Low)	Potential Regional Transportation Impact (High/ Medium/ Low)	Does Not Apply	Can Be Exercised with Planned Special Event? (Y/N)	Greater Likelihood or Consequence with Planned Special Event? (Y/N)	Comments
Natural							
Earthquake							
Flood							
Storm surge							
Hurricane/typhoon							
Ice storms							
Snow storm/ blizzard							
Landslide/mudslide							
Naturally occurring epidemic/pandemic							
Tornadoes							
Tsunamis							
Volcanic eruptions							
Wildfires							
Human-Caused/ Intentional							
Bomb threat/other threat of violence							
Fire/arson							
Riot/civil disorder							
Sabotage (external and/or internal actors)							
Security breach							
Cyber attack							
Terrorist assault using explosives, firearms, or conventional weapons							
War							
Workplace violence							

Potential Hazards	Likelihood (High/ Medium/ Low)	Consequence (High/ Medium/ Low)	Potential Regional Transportation Impact (High/ Medium/ Low)	Does Not Apply	Can Be Exercised with Planned Special Event? (Y/N)	Greater Likelihood or Consequence with Planned Special Event? (Y/N)	Comments
Human-Caused/ Unintentional							
Accidental contamination or hazardous materials spills							
Accidental damage to or destruction of physical plant and asset(s)							
Accident that affects transportation system							
Gas outage							
HVAC system failure or malfunction							
Inappropriate training on emergency procedures							
Power outage							
Software/hardware failure or malfunction							
Unavailability of key personnel							
Uninterruptible power supply (UPS) failure or malfunction							
Voice and data telecommunications failure or malfunction							
Water outage							

TOOL 6

Key Steps to Effective Collaboration

How to use: A shared and compelling transportation need transcends jurisdictional boundaries and can best be addressed through regional collaboration. The following steps can aid planners in identifying and responding to transportation needs.

Step 1. Describe the geographic area in the region: populations; geography, transportation resources and assets; hazards and potential significant events; and communication assets and needs.

Step 2. Identify the common issues or needs that are perceived to be mutual problems and opportunities in planning for disasters, emergencies, and significant events, such as the following:

- Information sharing
- Compatible technologies systems
- Movement of people and goods
- Safety
- Response to incidents, human-made and natural
- Homeland security programs, including evacuations
- Transport of hazardous materials
- Economic
- Recovery and restoration of normal operations
- Leverage multiple funding sources
- Resource sharing across agencies and jurisdictions

Step 3. Identify existing networks or groups within the region that are engaged in transportation planning, such as the following:

- State departments of transportation (state DOTs)
- Metropolitan planning organizations (MPOs) and regional planning commissions (RPCs)
- Traffic management centers (TMCs)
- United We Ride
- Direct service providers who provide or use paratransit

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Identify agencies and stakeholders involved in emergency planning, such as emergency managers. Identify stakeholders who may not currently be involved in emergency planning but who need to be, such as businesses, utilities, and representatives of community groups who may require transportation services.

Step 4. Use existing address books or contact lists to identify potential collaborators.

Step 5. Call or email key contacts to schedule a meeting, or ask to be invited to a meeting with these agencies and others that are engaged in emergency management planning.

- Think about the key message before the call. What is the purpose of creating or joining a collaborative network? What are the benefits?
- Use hazard vulnerability assessments in emergency operation plans as conversation starters.

Step 6. Secure support from the leadership of these organizations.

Source: Adapted from *TCRP Report 150.* (2011).

TOOL 7

Questions for Collaborative Partners and Other Stakeholders to Ask Each Other

How to use: To develop a comprehensive plan built on the principles in this guide, planners and all vested stakeholder organizations must ask and be prepared to answer these important questions. These questions are conversation starters, and the answers can help lead to other questions that draw out information about specific details that apply to each region.

1. What disasters, emergencies, and significant events do you plan for?
2. What low-probability events should be planned for that are not currently considered?
3. How well prepared are you for disasters and emergencies?
4. How do you view your role in these atypical events?
   - What are your responsibilities?
   - What are your priorities?
   - How are the roles and responsibilities incorporated into your regional planning?
   - What capabilities and resources can you provide?
   - What transportation infrastructure/services do you need access to? Do you have a priority list?
   - How can you better integrate security, emergency management and mitigation planning into your regular practices?
5. Where do you fit into your regional planning efforts?
6. Who are the key people you need to talk to?
7. What is the best way to communicate and share information with each other . . .
   - Before an atypical event?
   - During such an event?
   - After an atypical event?
8. What is the chain of authority if/when a particular decision-maker is unavailable?
9. What is your restoration process? How are locations prioritized for restoration?
10. How can other regional stakeholders and the public participate and contribute to the planning?
11. What long-term goals and objectives that address disasters, emergencies, and significant events can be accomplished through our regional collaboration?

TOOL 8

Strategies to Exercise Regional Transportation Plan for Disasters, Emergencies, and Significant Events

How to use: In conjunction with other training materials (see the section on Exercise Resources) use this tool as a high-level checklist to carry out the exercise program.

Resources:

1. *NCHRP Report 525/TCRP Report 86, Volume 9: Guidelines for Transportation Emergency Training Exercises* (TRB 2006).
2. *Homeland Security Exercise Evaluation Program* (HSEEP) (FEMA Training).

STRATEGIES	STATUS
Initiate exercise program management by developing and executing an exercise program. 1. Multi-year training and exercise program planning. (planned exercises on specific dates). 2. Planning and executing individual exercises. 3. Tracking improvements.	
Develop exercise documentation. Exercise documents are the most tangible elements of design and development. Different exercise types require different documentation. They may range from simple sign-in sheets to media releases and exercise evaluation guides. 1. **Situation manual.** A situation manual (SITMAN) is the participant handbook for discussion-based exercises. It provides background information on the scope, schedule, and objectives for the exercise. It also presents the scenario narrative for participant discussions during the exercise. 2. **Exercise plan.** The exercise plan (EXPLAN) is the participant handbook for operations-based exercises. The EXPLAN provides controllers, evaluators, players, and observers with information such as the exercise purpose, scope, objectives, and logistical information.	

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Tool 8. (Continued).

3. **Controller evaluator handbook.** Controller evaluator (C/E) handbooks supplement EXPLANs for operations-based exercises. The C/E handbook contains information in more detail about the exercise scenario and guides controllers and evaluators in their roles and responsibilities. 4. **Master scenario events list.** The master scenario events list contains a chronological listing of the events and injects that drive operations-based exercise play. 5. **Exercise evaluation guides.** Exercise evaluation guides (EEGs) provide evaluators with a checklist of critical tasks to be completed by participants during an exercise. EEGs contain the information to be discussed by participants, space to record evaluator observations, and questions to consider after the exercise.	
Develop the evaluation of the exercise that assesses its performance on three levels: 1. **Task level.** Assesses the ability of individual players or teams to perform a required task during an exercise. 2. **Organization level.** Assesses the ability of an organization, discipline, or function to perform its role in responding to an event. 3. **Mission level.** Assesses the ability of the intergovernmental community, as a whole, within the region to achieve expected outcomes in responding to an event.	
Develop a structured testing schedule. Testing should occur at least annually for an entire organization. All new/incoming employees should be briefed on the plan, or take full training if they will be directly involved in emergency events.	
Determine which target groups will be included in the testing of plans. • First responders • Emergency management personnel • New hire employees • Existing employees • General public • Private-sector representatives	

Decide which type of exercise should be used to test the plan. • Discussion-based exercise? (Centers on participant discussion.) • Operations-based exercise? (Focuses on action-oriented activities such as deployment of resources and personnel.)	
Design the format of the exercise. • *Seminar:* An informal discussion-based exercise led by a presenter or facilitator, used to teach or orient participants. • *Workshop:* A formal discussion-based exercise led by a facilitator or presenter, used to build or achieve a product. • *Tabletop exercise:* This type involves senior staff, elected or appointed officials, or other key personnel in an informal group discussion centered on a hypothetical scenario. • *Game:* A simulation of operations using rules, data, and procedures designed to depict an actual or assumed real-life situation. • *Drill:* A supervised activity that tests a specific operation or function of a single agency. • *Functional exercise:* A single or multi-agency activity designed to evaluate capabilities and multiple functions using simulated response. • *Full-scale exercise:* A high-stress multi-agency, multijurisdictional activity involving actual deployment of resources in a coordinated response, as if a real incident had occurred.	

SECTION 5

Additional Information

Glossary

A

Access and Functional Needs Populations: Populations whose members may have additional needs before, during, and after an incident with regard to functional areas, including but not limited to maintaining independence, communication, transportation, supervision, and medical care. Individuals in need of additional response assistance may include persons with disabilities; persons living in institutional settings; elderly persons; children; persons from diverse cultures; persons with limited English proficiency or who are non-English-speaking; or transportation-disadvantaged persons.

C

Council of Governments (COG): A voluntary association of local governments that operates as a planning body. The COG collects and disseminates information, reviews applications for funding, and provides services for its member governments.

Cognitive Disabilities and Developmental Disabilities: Disabilities that may affect a person's ability to listen, think, speak, read, write, do math, or follow instructions.

Critical Infrastructure: Assets and services "so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters" (USA Patriot Act 2001).

D

Department of Homeland Security (DHS): A federal agency that leads the unified national effort to secure the United States, preserve citizens' freedoms, and prepare for and respond to all hazards and disasters.

Disaster: A large-scale adverse event that overwhelms the resources of the affected community. The Stafford Act defines a federally declared major disaster as "any natural catastrophe . . . or, regardless of cause, any fire, flood, or explosion" which causes damage of sufficient severity to warrant disaster assistance to supplement resources of states, local governments, and disaster relief organizations (Stafford Act, PL 100–707).

Note: Many of the definitions that appear in the glossary are used or adapted from copy in *NCHRP Report 740.*

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Disaster Planning Cycle: A cycle consisting of phases of activity related to emergency management, including mitigation, preparedness, response, and recovery.

Dynamic Message Sign (DMS): A traffic control device used in conjunction with traffic management systems to communicate real-time traffic information about roadway or adverse weather conditions and special events. Also called a variable message sign (VMS), a changeable message sign (CMS), or an electronic message sign.

E

Emergency: Usually an adverse event that can be handled with existing community resources. The Stafford Act defines a federally declared emergency as "any occasion or instance for which . . . federal assistance is needed to supplement state, Tribal, and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe" (Stafford Act, PL 100–707).

Emergency Management: The discipline of dealing with and avoiding both natural and human-made disasters. It involves preparedness, response, and recovery in order to lessen the impact of disasters. It deals with the processes used to protect populations or organizations from the consequences of disasters, wars, and acts of terrorism. Emergency management does not necessarily avert or eliminate the threats themselves, although the study and prediction of the threats is an important part of the field. Emergency response is a subset of emergency management.

Emergency Management Agency (EMA): A state or local government agency that provides support to the local community in response to an emergency situation. May also be called an Office of Emergency Management (OEM), an Office of Emergency Services (OES), or another similar name.

Emergency Operations Center (EOC): An established location or facility in which local and state staff and officials can receive information pertaining to an incident and from which they can provide centralized management, direction, coordination, and support to emergency operations when a major emergency or disaster strikes.

Figure 6. Emergency planning cycle.

Emergency Planning Cycle: A planning cycle made up of four basic elements—(1) response, (2) recovery, (3) mitigation, and (4) preparedness—bracketing a disaster as illustrated in: Figure 6. The preparedness planning cycle is a subset of the emergency planning cycle.

Emergency Support Function (ESF): An organizational designation that helps provide the greatest possible access to federal departmental and agency resources, regardless of which agency has those resources. ESFs align categories of resources and provide strategic objectives for their use. ESFs use standardized resource management concepts. Support agencies are assigned based on the availability of resources in a given functional area.

Environmental Justice: The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Events of National Significance: These events include a Presidential Decision Directive and are events such as the Super Bowl, the Republican and Democratic National Conventions, presidential inaugurations, Operation Sail 2000, the Olympics, and other major events of national interest.

F

Federal Emergency Management Agency (FEMA): A part of the DHS, the federal agency charged with building and supporting the nation's emergency management system. FEMA's mission is to support U.S. citizens and first responders to ensure that local and state agencies, and public and private-sector entities, work together to build, sustain, and improve capability to prepare for, protect against, respond to, recover from, and mitigate hazards.

First Responder: The first responding unit to arrive at an incident scene. Traditionally, this term describes public safety emergency responders, but it includes transportation agencies responding to traffic incidents.

Functional Needs: Needs that include communication, transportation, medical, independence, and supervision needs. For example, functional communication needs are experienced by people who have low literacy, speak English as a second language or not at all, have limited or no eyesight, or have impaired or no hearing. Functional transportation needs are experienced by people who are elderly, disabled, or carless.

Fusion Center: A local, regional, or state communications and analysis center organized to assemble, assess, and disseminate threat- and risk-related information from federal, regional, and local sources that include other state, local, Tribal, territorial, and private-sector entities.

H

Hazard Mitigation Planning: Planning aimed at identifying hazards and risks within communities and developing ways and means of reducing potentially disastrous losses of life and property. Longer-range planning in the emergency management field is exemplified in hazard mitigation planning.

I

Incident: In a transportation context, an event that has the potential to result in unintended harm or damage.

International Association of Emergency Managers (IAEM): A nonprofit professional organization that provides information, networking and opportunities to its members and advances the emergency management profession.

L

Long-Range Transportation Plan (LRTP): A jurisdiction's way of looking at the needs of its transportation system over a period of time. The LRTP is updated every 5 years, but looks ahead 25 years or longer. Projects can range from simple highway landscaping to billion-dollar highway and transit projects. Variations of the LRTP include the Constrained Long-Range Plan (CLRP), a long-range transportation plan that identifies projects and programs in a region over a 25-year period. The Financially Constrained Long-Range Transportation Plan (FCLRP) identifies all regionally significant transportation projects and programs that are planned in a metropolitan area. A major plan update is required every 4 years; however some metropolitan planning organizations (MPOs) update their CLRP every year.

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M

Major Disaster: "[A]ny natural catastrophe (including any hurricane, tornado, storm, high water, wind driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood, or explosion, in any part of the U.S. which in the determination of the president causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby" (Stafford Act).

Memorandum of Understanding (MOU)/Memorandum of Agreement (MOA): Documents that outline the intentions of two or more different agencies or jurisdictions to work together on a continuing and lasting basis, toward maximum cooperation and mutual assistance. In the context of readiness and response, MOUs and MOAs typically confirm a mutual aid agreement for reciprocal emergency aid in case of emergencies too extensive to be dealt with effectively unassisted. MOUs and MOAs are also developed between a local agency and outside organizations or private companies to ensure that the necessary resources are available in the event of an emergency.

Legal Background: MOU with DHS

In 2007, the U.S. DOT and DHS entered into a MOU that gives DHS primary responsibility for transportation emergency preparedness and response, and the DOT a supporting role of technical assistance. FEMA's roles now include pre-positioning commodity transportation assets; moving commodities, goods, equipment, and emergency response personnel; and planning and coordinating the evacuation of persons, including accounting for the needs of individuals with household pets and service animals before, during, and after an evacuation. The U.S. DOT's supporting (technical assistance) roles include reporting damage to transportation infrastructure, coordinating alternate transportation services, and coordinating the restoration and recovery of the transportation infrastructure.

N

National Disaster Preparedness Training Center (NDPTC): A member of the National Domestic Preparedness Consortium that works collaboratively to develop and deliver training and education in the areas of disaster preparedness, response, and recovery.

National Emergency Management Association (NEMA): A nonprofit professional association for emergency management directors from 50 U.S. states, eight U.S. territories, and the District of Columbia.

National Emergency Medical Services Association (NEMSA): A registered labor union and nonprofit mutual benefit corporation that specializes in the labor representation of pre-hospital emergency medical services professionals.

National Fire Protection Association (NFPA): An international nonprofit organization that is the leading advocate of fire prevention and an authoritative source on public safety. NFPA publishes more than 300 codes and standards intended to mitigate fire and other risks.

National Incident Management System (NIMS): A system used to coordinate emergency preparedness and incident management among various federal, state, Tribal, territorial, and local agencies. NIMS provides the template for the management of incidents.

National Infrastructure Protection Plan (NIPP): A plan that provides the framework to guide the integration of efforts to promote the safety and security of the nations' critical infrastructure. NIPP integrates the concepts of resilience and protection within an all-hazards environment.

National Oceanic and Atmospheric Administration (NOAA): A federal agency that provides, among other services, daily weather forecasts, severe storm warnings, and climate monitoring.

Network: A representation of the interconnection of organizations and their components showing how they work together to solve problems they cannot address on their own.

Non-Governmental Organization (NGO): A nonprofit entity formed as an association based on the interests of members, individuals or institutions and that is not created by a government. It may work cooperatively with governments serving a public purpose.

O

Operations: As used in this guide, the management and operational strategies and technologies used in the performance of surface, rail, air, and marine transportation systems, and emergency management.

P

Paratransit: The family of transportation services that falls between the single-occupant automobile and fixed-route transit. Examples include taxis, carpools, vanpools, minibuses, jitneys, demand-responsive bus services, and specialized bus services for persons who have mobility impairments or who are transportation disadvantaged.

Planning: For emergency management, a key component of the emergency preparedness cycle, accomplished according to NIMS principles. Planning, however, can mean different things to different people even within the same organizations, and it becomes even more complicated when bridging disciplines, such as emergency management and transportation. Transportation also has several different contexts for planning: short-range operations planning (including event planning) and longer-range capital planning. (See Appendix B for more information about emergency management and transportation planning.)

Planned Special Event: An emergency transportation operations term that applies to advance planning and coordination to develop and deploy the operational strategies,

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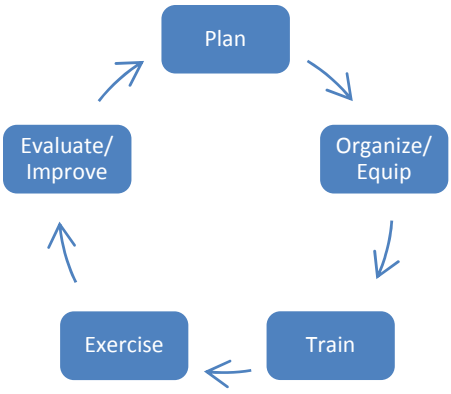

Figure 7. FEMA preparedness planning cycle.

traffic control plans, protocols, procedures, and technologies needed to control traffic and share real-time information with travelers and other stakeholders on the day of the planned event (U.S. DOT 2012).

Preparedness Planning Cycle: A subset of the FEMA emergency planning cycle, by which preparedness is achieved and maintained through a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective action. Ongoing preparedness efforts among all those involved in emergency management and incident-response activities ensure coordination during times of crisis. Moreover, preparedness facilitates efficient and effective emergency management and incident-response activities. The cycle involves several phases, as illustrated in Figure 7. See also *Emergency Planning Cycle.*

R

Resource: An asset or reference that can be employed on an as-needed basis.

S

Stakeholder: A person or an organization that has a direct interest (a stake) in the outcome of a course of action.

Significant Events: Non-recurring or infrequent events that place an unpredictable but significant demand on the transportation system and require collaboration among agencies that do not routinely work together. (See also Events of National Significance.)

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq., also called Public Law 100–707) establishes the authority for the federal government to respond to disasters in support of state and local governments; defined two levels of adverse events, emergency and major disaster; and provided for the Federal Disaster Relief Fund. FEMA coordinates the response.

T

Texas Engineering Extension Service (TEEX): Texas A&M University's national emergency response and rescue training center, operated to enhance the capabilities of emergency responders and local officials to prepare for, respond to, and recover from catastrophic events.

Threat and Hazard Identification and Risk Assessment (THIRA): A FEMA mandated self-evaluative risk analysis process designed to identify significant event core capability impacts, the ability of the state to meet the needs associated with those impacts, and the desired state level for the core capability. Development of the THIRA incorporates a five-step process as follows:

1. Identify the threats and hazards of concern.
2. Give the threats and hazards context (i.e., describe them in ways that will be meaningful).
3. Examine core capabilities using threats and hazards. Explore desired outcomes.
4. Set capabilities targets.
5. Apply the results. The THIRA is intended to be scalable, actionable, and useful.

Traffic Management Center (TMC): The hub of a transportation management system, where information about the transportation network is collected and combined with other operational and control data to manage the transportation network and produce traveler information. The TMC is the focal point for communicating transportation-related information to media and the motoring public.

Transit: The overall category of transportation modes that are operated by a service provider and transports users, generally more than one. Users are charged a fee for use of the transportation service (e.g., bus, train).

Transportation Improvement Program (TIP): A 6-year regional financial program that describes the schedule for obligating federal funds to state and local projects. The TIP contains funding information for all modes of transportation including highways and high occupancy vehicle (HOV) facilities as well as transit capital and operating costs.

Transportation Planning: A field involved with the evaluation, assessment, design, and siting of transportation facilities (generally streets, highways, footpaths, bike lanes and public transport lines).

Transportation System: A system for moving persons or goods, consisting of three components: the vehicle, the guideway (or infrastructure), and the operations plan (or procedures and schedules).

Transportation-Disadvantaged Populations: Groups of people who do not have access to personal transportation for reasons of health, disability, income, geographic location (e.g., within large metropolitan areas or in large rural areas with little or infrequent service), or personal preference. Transportation-disadvantaged populations generally rely on public transportation on a frequent or near-daily basis.

U

U.S. DOT: A federal agency whose mission includes keeping members of the traveling public safe and secure, increasing their mobility, and having the U.S. transportation system contribute to the nation's economic growth. The U.S. DOT is made up of 12 operating administrations and bureaus.

Unified Planning Work Program (UPWP): A program prepared each year by MPOs, in cooperation with member agencies, to describe the transportation planning process and transportation-related activities anticipated within the region during the year. The program documents each project's funding by source (federal, state, and local), explains how funds will be expended (type of project), and assigns responsibility for each work task.

V

Vulnerable Populations: A term meant to include people who, because of access and functional needs, may require additional assistance in the event of an emergency. Vulnerable populations include people who are especially vulnerable because of their financial circumstances, place of residence, health, age, functional or developmental status, ability to communicate effectively, or presence of chronic illness or disability. These populations' existing vulnerabilities (age, poverty, disability, language, or mobility) are exacerbated in times of emergencies or disasters.

Abbreviations

ABAG	Association of Bay Area Governments
AHC	All Hazards Consortium
AMPO	Association of Metropolitan Planning Organizations
AoA	Administration on Aging
BART	Bay Area Rapid Transit District
BCLC	Business Civic Leadership Center (an affiliate of the U.S. Chamber of Commerce
BENS	Business Executives for National Security
BRT	Bus Rapid Transit
C/E	Controller Evaluator
CAEP	City Assisted Evacuation Plan
CDC	Centers for Disease Control and Prevention
CERT	Community Emergency Response Teams
CDL	Commercial Driver's License
CLRP	Constrained Long-range Plan
CMS	Changeable Message Sign
COG	Council of Governments
COOP	Continuity of Operations Plan
CPTED	Crime Prevention Through Environmental Design
DCHSEMA	DC Homeland Security Emergency Management Agency
DC DOT	District of Columbia Department of Transportation
DMS	Dynamic Message Sign
DOT	Department of Transportation
EEG	Exercise Evaluation Guide
EM	Emergency Management
EMA	Emergency Management Agency
EMAC	Emergency Management Assistance Compact
EMI	Emergency Management Institute
EOC	Emergency Operations Center
ESF	Emergency Support Function
EXPLAN	Exercise Plan
FCLRP	Financially Constrained Long-Range Plan
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GOHSEP	Governor's Office of Homeland Security and Emergency Preparedness
Hazmat	Hazardous Materials
HGAC	Houston–Galveston Area Council
HHS	Health and Human Services

HOV	High Occupancy Vehicle
HSEEP	Homeland Security Exercise and Evaluation Program
HSPD	Homeland Security Presidential Directive
IAEM	International Association of Emergency Managers
ICS	Incident Command System
IPS	Integrated Planning System
ITS	Intelligent Transportation Systems
KOIN	Kentucky Outreach and Information Network
LA BEOC	Louisiana Business Emergency Operations Center
LANHA	Louisiana Nursing Home Association
LEPC	Local Emergency Planning Committee
LHMP	Local Hazard Mitigation Plan
LIDAR	Laser Imaging Defining Radar
LRTP	Long-Range Transportation Plan
MACOG	Missouri Association of Councils of Government
MARAD	Maritime Administration
MATOC	Metropolitan Area Transportation Operations Coordination
Michigan DOT	Michigan Department of Transportation
MJ-LHMP	Multijurisdictional Local Hazard Mitigation Plan
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
MSTOP	Multi-State Transportation Operation Program
MTA	Metropolitan Transportation Authority
MTC	Metropolitan Transportation Commission
MWCOG	Metropolitan Washington Council of Governments
NADO	National Association of Development Organizations
NARC	National Association of Regional Councils
NASAAEP	National Alliance for State Animal and Agricultural Emergency Programs
NCR	National Capital Region
NDPTC	National Disaster Preparedness Training Center
NEMA	National Emergency Management Association
NEMSA	National Emergency Medical Services Association
NFPA	National Fire Protection Association
NGO	Non-Governmental Organization
NIMS	National Incident Management System
NIPP	National Infrastructure Protection Plan
NOAA	National Oceanic and Atmospheric Administration
NPO	Nonprofit Organization
NRF	National Response Framework
NTAS	National Terrorism Advisory System
NYMTC	New York Metropolitan Transit Council
OEM	Office of Emergency Management
OES	Office of Emergency Services
PALMS	Private Assets Logistics Management System
PDM	Pre-Disaster Mitigation
PFAC	Program, Finance, and Administrative Committee
PNWER	Pacific Northwest Economic Region
PortSTEP™	Port Security Training and Exercise Program
RCCC	Regional Consortium Coordinating Council
RDD	Radiological Dispersion Device

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RDR	Center for Regional Disaster Resilience
RECP	Regional Emergency Coordination Plan
R.E.S.C.U.M.E.	Response, Emergency Staging, Communications, Uniform Management, and Evacuation
RITIS	Regional Integrated Transportation Information System
RPC	Regional Planning Commission
RPO	Rural Planning Organization or Regional Planning Organization
RTP	Regional Transportation Plan
SCOTSEM	Special Committee on Transportation Security and Emergency Management
SEMA	State Emergency Management Agency
SITMAN	Situation Manual
SMCOG	Southwest Missouri Council of Governments
SOG	Standard Operating Guidelines
STA	State Trucking Associations
STIP	State Transportation Improvement Program
TCC	Transportation Coordinating Committee
TEEX	Texas Engineering Extension Service
THIRA	Threat and Hazard Identification and Risk Assessment
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TRANSCOM	Transportation Operations Coordinating Committee
TSSP	Transportation Sector Specific Plan
UASI	Urban Area Security Initiative
VIPER	Voice Interoperable Program for Emergency Response
VMS	Variable Message Sign
VOAD	Volunteer Organizations Active in Disasters
WMATA	Washington Metropolitan Area Transit Authority

Resources

Manuals and Guides

Information about accessing guides is provided in the Reference section.

The Big Picture

- ***NCHRP RRD 333/TCRP RRD 90: A Guide to Planning Resources on Transportation and Hazards* (2009),** which presents *Natural Hazards Informer* (No. 4, September 2009), examines the interconnected aspects of economy, people, infrastructure, and land, development, and natural systems, as they relate to disaster preparedness and transportation planning, in a very brief guide (44 pages, including case studies and references).
- ***NCHRP Report 525, Vol. 16: A Guide to Emergency Response Planning at State Transportation Agencies* (2010)** provides step-by-step information and associated tools and resources to support the development and coordination of all transportation-related elements of emergency response including evacuation and reentry planning.
- ***Simplified Guide to the Incident Command System (ICS) for Transportation Professionals* (2006),** from FHWA, distills the fundamentals of the ICS and NIMS into a brief guide (less than 100 pages) using clear language and diagrams.

Collaboration and Outreach

- ***TCRP Report 150: Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit* (2011)** outlines a step-by-step process for creating a multiagency network to plan for the communication needs of vulnerable populations, regarding their transportation options in emergencies. This toolkit provides a guiding framework and tools for constructing a scalable, adaptable communication process built on a network of agencies from the public, private, and nonprofit sectors.
- ***Comprehensive Preparedness Guide 101: Version 2.0: Emergency Management Planning Guide for Special Needs Populations: Developing and Maintaining Emergency Operations Plans* (2010),** from FEMA and the DHS Office for Civil Rights and Liberties, contains basic guidance.
- ***Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability and Security,*** from the FHWA Office of Travel Management, Office of Operations, identifies the benefits and process of developing collaboration on regional transportation operations. It also includes a self-assessment and examples of regions that are already benefitting from this type of collaboration.
- ***Considering Security and Emergency Management in the Planning of Transportation Projects—A Guide for Planners of New Transportation Projects* (2012),** also from FHWA,

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provides an excellent beginning reference for collaboration around this crucial topic in a succinct guide (15 pages plus brief appendices). It addresses the following four questions: (1) Why should project planners consider security and emergency management measures in the project planning process? (2) Who are potential partners in the project planning process? (3) What are some examples of security and emergency management measures project planners can consider? (4) When should project planners incorporate security and emergency management considerations during planning?

- ***TCRP Report 106/NCHRP Report 536: Practitioner's Handbook: From Handshake to Compact: Guidance to Foster Collaborative, Multimodal Decision Making*** **(2005)** provides guidance to achieve different levels and formality of collaborative agreement, including checklists and assessment forms.
- ***NCHRP Report 690: A Guidebook for Successful Communication, Cooperation and Coordination Strategies Between Transportation Agencies and Tribal Communities*** **(2011)** provides essential information and guidance for any entity working with Tribal communities, including background on sovereign nations, with implications for transportation projects, suggestions for working through cultural issues and concerns, and self-assessment checklists.

Transportation Operations and Asset Management Related to Planning for Disasters, Emergencies and Significant Events

- ***NCHRP Report 740: A Transportation Guide for All-Hazards Emergency Evacuation*** **(2013)** was developed for management and emergency response planners at state transportation agencies as they and their local/regional counterparts assess their emergency response plans and identify areas needing improvement. The report includes a step-by-step process for planning, consistent with FEMA's *Comprehensive Preparedness Guide 101* and includes checklists, templates, and a workshop-in-a-box guide to planning, carrying out, and documenting meetings, in particular for coordinating transportation and other agencies and jurisdictions.
- ***NCHRP Report 525: Surface Transportation Security, Volume 6: Guide for Emergency Transportation Operations*** **(2005)** focuses on an enhanced role for state departments of transportation (state DOTs) as participants with the public safety community in an interagency process, coordinating activities with law enforcement, fire service, and emergency management.
- ***Response, Emergency Staging, Communications, Uniform Management, and Evacuation (R.E.S.C.U.M.E.): Concept of Operations*** **(2012),** from FHWA, discusses the user-oriented Concept of Operations document that describes quantitative and qualitative system characteristics for a proposed system. The R.E.S.C.U.M.E. bundle includes four applications: Advanced Automatic Crash Notification Relay, Incident Scene Pre-Arrival Staging Guidance for Emergency Responders, Incident Scene Work Zone Alerts for Drivers and Workers, and Emergency Communication for Evacuation.

  The U.S. DOT Office of Emergency Transportation Operations maintains scores of online documents covering the range of policies, practices, and guidance related to traffic incident management, traffic management related to planned special events, and emergency transportation operations for disasters. Examples of relevant publications from other FHWA include the following:

  – ***Risk-Based Transportation Asset Management: Building Resilience into Transportation Assets Report 5: Managing External Threats Through Risk-Based Asset Management*** **(2013),** the final report in this FHWA series, focuses on "black swan" events, and how the three *Rs*—redundancy, robustness, and resiliency—when integrated into asset management practices, can help agencies more ably cope with a wide and unpredictable range of threats.

Report 5 discusses climate change adaptation, geologic hazards, scour hazard programs and more, including lessons from Hurricane Irene and Hurricane Sandy. This report can be accessed online at: http://www.fhwa.dot.gov/asset/pubs/hif13018.pdf.

– **Designing for Transportation Management and Operations—A Primer (2013),** an FHWA publication that includes designing for natural hazards and security from the earliest stages of project development. The primer can be accessed online at: http://222.ops.fhwa.dot.gov/publications/fhwahop13013/fhwahop13013.pdf.

Exercise Resources

- ***NCHRP Report 525 / TCRP Report 86, Volume 9: Guidelines for Transportation Emergency Training Exercises*** **(TRB 2006)** Assists transportation agencies in developing drills and exercises in alignment with the National Incident Management System (NIMS).
- FEMA has vast resources on hazard identification and disaster preparedness, including exercises, response and mitigation.

Policy Recommendations

- ***Disaster Resilience: A National Imperative*** **(2012),** a National Research Council report that explains the research, findings, and recommendations the nation can take to bolster its resilience to natural and human-induced disasters. *Disaster Resilience* also offers examples of communities that have shown resilience in the face of disaster.
- ***Response and Recovery for Declared Emergencies and Disasters: A Resource Document for Transit Agencies*** **(2012),** updated by the FTA to address transit response, recovery, and funding in response to declared emergencies and disasters, provides best practices in emergency preparedness and disaster response and recovery.

Policy News Article

- **"Everyday Armageddon,"** ***Newsweek*** **(December 3, 2012)** talks about how, in a post-Hurricane Sandy New York City, it is a cardinal political move to invest in the nation's outdated public and corporate infrastructure. The article highlights the importance of preventive work and investment instead of sinking money on remediation post-disaster.

Case Studies

- **"Bringing Down Barriers to Ensure Seamless Travel Across State Lines—Southern Traffic Incident eXchange (STIX) Program" (2012),** by the I-95 Corridor Coalition, goes into detail about the STIX Program, which was created to enable Interstate and interregional incident notification, information sharing, and coordination among the states of Georgia, Florida, North Carolina, and South Carolina.
- ***Planning for Resiliency: Adapting the Transportation System to Emerging Vulnerabilities*** **(2013),** the 2013 annual report of the NYMTC, looks into the impacts that Hurricane Sandy had on New York City when it hit in October 2012 and highlights the process of restoration that followed and how planning changed in the aftermath of the hurricane.
- ***Regional Partnerships: Enabling Regional Critical Infrastructure Resilience*** **(2011),** a study by DHS, looks into the critical role partnerships play in promoting and enhancing regional resilience, focusing particularly on the specific nature of these regional critical infrastructure partnerships through case studies. This report serves as a guide for newly developing and mature regional critical infrastructure partnerships.

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- ***The Role of Business in Disaster Response* (2012),** by the Business Civic Leadership Center (associated with the U.S. Chamber of Commerce), presents case studies of businesses providing leadership and community support in areas of preparedness, public-private partnerships, logistics, food, information technology, insurance, infrastructure, and debris removal.
- ***Transportation During and After Hurricane Sandy* (2012),** from the Rudin Center for Transportation Policy and Management at the Robert F. Wagner Graduate School of Public Service at New York University (NYU), looks at New York City's preparations before Hurricane Sandy and how the hurricane demonstrated the strengths and limits of the city's transportation infrastructure. This report looks into the key investments and policies that should be considered to assure the viability of our infrastructure during future disasters.

Evolving Information

- ***Holistic Coasts: Adaptive Management of Changing Hazards: A Summary Report Based on the 4th Assembly of the Gilbert F. White National Flood Policy Forum (2013)***, which addressed "Human Adjustments in Coasts—Adaptive Management in Response to Changing Hazards, Risks, and Ecosystems." At the forum, 100 invited experts on flood policy, law, governance, engineering practice, biological sciences, transecting disciplines, sectors, landscapes, and US regions spent a day and a half developing recommendations on approaches the nation can use to adjust human occupancies and management of the coasts. The published report is available online at: http://www.asfpmfoundation.org/pdf_ppt/ASFPM-Foundation_HolisticCoasts_Forum2013_Web_Version.pdf.

References

American Public Transportation Association. November 30, 2012. "BART Teams with UC Berkeley to Adopt Earthquake Early Warning System." *Passenger Transport.* Available online at: http://newsmanager.commpartners.com/aptapt/issues/2012-11-30/10.html.

Atkinson, J., J. Bauer, K. Hunt, K. Mullins, M. Myers, E. Rensel, M. Swisher, and R. Taylor. February 2013. *Designing for Transportation Management and Operations—A Primer.* FHWA. Accessed 7/20/2013. Available online at: http://222.ops.fhwa.dot.gov/publications/fhwahop13013/fhwahop13013.pdf.

ATR Institute, G. C. Migliaccio, G. Knoebel, R. Martinez, D. Albert, and J. Hurd. 2011. *NCHRP Report 690: A Guidebook for Successful Communication, Cooperation, and Coordination Strategies Between Transportation Agencies and Tribal Communities.* Transportation Research Board of the National Academies, Washington, D.C.

Business Civic Leadership Center. (2012). The Role of Business in Disaster Response. Accessed online 2/10/2013. Available online at: http://bclc.uschamber.com/document/role-business-disaster-response-report.

Campbell, S., D. Leach, K. Valentine, M. Coogan, M. Meyer, and C. Casgar. 2005. *TCRP Report 106/NCHRP Report 536: Practitioner's Handbook: From Handshake to Compact: Guidance to Foster Collaborative, Multimodal Decision Making.* Transportation Research Board of the National Academies, Washington, D.C.

City of Portland, Oregon. 2011. Comprehensive Plan. Available online at: http://www.portlandoregon.gov/bps/34249.

Clift, W. August 31, 2009. *National Capital Region 2009 Presidential Inauguration Regional After-Action Report Summary.* DCHSEMA. Available online at: http://mwcog.org/.

Delaware Valley Regional Planning Commission (DVRPC). March, 2010. Fitting the Pieces Together—Improving Transportation Security Planning in the Delaware Valley. Accessed online 9/25/2013. Available online at: http://www.dvrpc.org/asp/pubs/publicationabstract.asp?pub_id=09018.

DeBlasio, A. J., A. Zamora, et al. 2002. Effects of Catastrophic Events on Transportation System Management and Operations, Northridge Earthquake–January 17, 1994. Volpe National Transportation Systems Center, U.S. Department of Transportatino, ITS Joint Program Office.

Federal Emergency Management Agency. 2011. *Strategic Foresight Initiative: U.S. Demographic Shifts.* Accessed online, March 27, 2013. Available online at: http://www.fema.gov/library/viewRecord.do?id=6022.

Federal Emergency Management Agency. Web pages addressing disaster mitigation, preparedness, response, recovery, education, and references. Available online at: http://www.fema.gov/.

Federal Emergency Management Agency. 2010. *Comprehensive Preparedness Guide 101: Developing and Maintaining Emergency Operations Plans, Version 2.0, November 2010, p. 4-2.*

Federal Emergency Management Agency and the Department of Homeland Security Office for Civil Rights and Civil Liberties. 2010. *Comprehensive Preparedness Guide 301: Emergency Management Planning Guide for Special Needs Populations.*

Federal Emergency Management Agency. 2012. National Response Framework (NRF). The NRF is updated periodically and information on the most current version of the NRF is available online at: http://www.fema.gov/national-response-framework.

Federal Emergency Management Agency. Full Risk System Knowledgebase. Information available at: https://www.fema.gov/office-national-capital-region-coordination-0/full-spectrum-risk-knowledgebase.

Federal Highway Administration. February 2006. *Simplified Guide to the Incident Command System (ICS) for Transportation Professionals.* U.S. Department of Transportation. Available online at: http://ops.fhwa.dot.gov/publications/ics_guide/.

Federal Highway Administration. 2007. *Managing Pedestrians During Evacuations of Metropolitan Areas.* U.S. Department of Transportation. FHWA-HOP-07-066.

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Federal Highway Administration. 2007. *Communicating with the Public Using ATIS During Disasters: A Guide for Practitioners.* U.S. Department of Transportation. FHWA-HOP-07-068.

Federal Highway Administration. May 2012. *Considering Security and Emergency Management in the Planning of Transportation Projects–A Guide for Planners of New Transportation Projects.* U. S. Department of Transportation. FHWA-HEP-12-040.

Federal Highway Administration. 2007. *Managing Pedestrians During Evacuations of Metropolitan Areas.* U.S. Department of Transportation. FHWA-HOP-07-066.

Fischer, E., RLA, ASLA, APA, IAEM. 2012. Table 1: Introduction Connections Between Transportation Systems Planning and Operations Planning Guidance and Emergency Operations Planning and Recovery Planning Guidance. Developed for this project. USDOT, FHWA, Hawaii.

Foster, H. D. 1997. The Ozymandias Principles: Thirty-one Strategies for Surviving Change. Victoria, British Columbia: Southdowne Press.

HAZUS®. Information about this software is available at: http://www.fema.gov/hazus/hazus-mitigation-recovery-planning.

Lanka, T., A. Wiek, and R. Ries. 2009. Environmental Decision Making in Multi-Stakeholder Contexts: Applicability of Life Cycle Thinking in Development Planning and Implementation. *Journal of Cleaner Production*, Vol. 17 No. 1, pp. 67–76.

LeDuc, A., L. Juntunen, E. Stocker. 2009. *NCHRP RRD 333/TCRP RRD 90* and *Natural Hazards Informer Number 4: A Guide to Planning Resources on Transportation and Hazards.* Transportation Research Board of the National Academies, Washington, D.C.

Litman, T. 2006. 'Lessons from Katrina and Rita: What Major Disasters can Teach Transportation Planners. *Journal of Transportation Engineering*, Vol. 132, pp. 11–18. Available online at: www.vtpi.org/katrina.pdf.

Matherly, D., et al. 2011. *TCRP Report 150: Communication with Vulnerable Populations: A Transportation and Emergency Management Toolkit.* Transportation Research Board of the National Academies, Washington, D.C.

Matherly, D., et al. 2013. *TCRP Report 740: A Transportation Guide for All-Hazards Emergency Evacuation.* Transportation Research Board of the National Academies, Washington, D.C.

McCormick Taylor, Inc. 2006. *NCHRP Report 525/TCRP Report 86: Transportation Security, Volume 9: Guidelines for Transportation Emergency Training Exercises.* Transportation Research Board of the National Academies, Washington, D.C. Available online at: http://www.trb.org/Main/Public/Blurbs/157158.aspx.

Murray-Tuite, P. M., and R. Bhatkoti. (In Press). Increasing Transportation Network Resilience. In *Dynamic Route Guidance and Traffic Control.*

Murray-Tuite, P., and B. Wolshon. (2013). Assumptions and Processes for the Development of No-Notice Evacuation Scenarios for Transportation Simulations. *International Journal of Mass Emergencies and Disasters.*

National Governors Association. 2007. *A Governor's Guide to Homeland Security.* NGA Center for Best Practices, Washington, D.C.

National Research Council. *Disaster Resilience: A National Imperative.* Washington, DC: The National Academies Press, 2012.

New Hampshire Public Utilities Commission. 2009. After Action Review: December '08 Ice Storm Final Report.

Regional Consortium Coordinating Council. 2011. Regional Partnerships: Enabling Regional Critical Infrastructure Resilience, p. 5.

Reiter, N. 2013. "Key Success Factors for Marathon Bombing Medical Care." *The Safety Blog* (blog), Rave Mobile Safety. Available online at: http://www.ravemobilesafety.com/key-success-factors-for-marathon-bombing-medical-care/.

Transportation Research Board. April 2013. SHRP 2 Renewal Project Brief: Managing Utility Conflicts to Achieve the 3 Cs: Communication, Coordination, and Cooperation. Available online at: http://www.trb.org/Main/Blurbs/168885.aspx.

United States Department of Homeland Security. 2009. National Infrastructure Protection Plan. Available online at: http://www.dhs.gov/xlibrary/assets/NIPP_Plan.pdf.

United States Department of Homeland Security. 2012. National Response Framework. Available online at: www.fema.gove/national-response-framework.

United States Department of Justice. 2007. Using Crime Prevention Through Environmental Design in Problem-Solving. U.S. DOT Problem-Oriented Guides for Police Problem-Solving Tools, Series No. 8. Madison: University of Wisconsin Law School Center for Problem-Oriented Policing, 2007.

United States Department of Transportation. N.D. *Regional Transportation Operations Collaboration and Coordination: A Primer for Working Together to Improve Transportation Safety, Reliability, and Security.* FHWA, Office of Travel Management, Office of Operations. Available online at: http://ntl/bts.gov/lib/jpoddocs/repts_te/13686/13686.pdf.

United States Department of Transportation. 2012. Response and Recovery for Declared Emergencies and Disasters: A Resource Document for Transit Agencies. Federal Transit Administration, Washington, D.C.

Wilson, C. December 12, 2012. "U.S. Will Have a Majority-Minority Population by 2043, Census Predicts." The Lookout (blog), Available online at: http://news.yahoo.com/blogs/lookout/u-majority-minority-population-2043-census-predicts-164735561.html.

Wlaschin, B. March 2013. *Risk-Based Transportation Asset Management: Building Resilience into Transportation Assets. Report 5: Managing External Threats Through Risk-Based Asset Management.* FHWA. Available online at http://www.fhwa.dot.gov/asset/pubs/hig13018.pdf.

APPENDIX A

Summary Comparison Between Disaster and Emergency Planning and Significant Event Planning

	Disaster/Emergency	Significant Event
Key Differences		
Presidential Declaration	Yes(Under the Stafford Act)	Yes for event of national significance; No for other major events that still warrant multijurisdictional coordination
Location	Not known in advance	Known
Date/Time	Not known in advance	Known
Size/Scale	Not known in advance	Approximate size usually known in advance
Notice	Days to minutes to no notice, depending on type of event	Usually months to prepare
Impact on Transportation Infrastructure	Varies depending on event, damage and impacts can be severe and long-lasting	Short-term significant traffic congestion usually present; Planning, communications, and intermodal coordination can mitigate worst effects
Recovery Period	Usually long-term days or months to years	Usually not applicable; Minor or major short-term clean up
Lead Agency for Planning and Coordination	Usually emergency management	Varies depending on event; often event sponsor with support from government and non-government stakeholders
Planning Goal	Resilience	A smooth, successful event

(continued on next page)

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Appendix A. (Continued).

	Disaster/Emergency	Significant Event
Key Similarities in Requirements for Multijurisdictional Planning		
Communication	Among stakeholders & with public	Among stakeholders, with potential attendees and general public
Collaboration	Among public, private, and nonprofit stakeholders	Among event planners and multijurisdictional stakeholders
Comprehensive	Examine broad range of potential disasters, consequences, and responses	Prepare for the expected event, plan for contingencies, the unexpected, "What If"
Coordinated	Understand national DHS guidance and local participants in the ICS, NIMS, and potential roles	Develop a structure and organized plan for action
Inclusive	Engage diverse advocates or representatives of the whole community in planning, including people with access and functional needs; Disasters hit everyone	Engage diverse advocates or representatives of the whole community in planning, including people with access and functional needs; Attendees likely to be diverse
Flexible	Disasters don't follow scripts	Planned events rarely follow prescribed scripts "to the letter"
Exercised	Exercises (of many different types and scales) help work out potential problems prior to a full-scale disaster	"Dry runs" help improve plans; Practicing procedures at a smaller real event helps; A major planned event also can be used to test elements of a disaster plan response
Continuous/Iterative	Circular nature of emergency planning cycle fosters continuous improvement; Most multijurisdictional transportation planning for disasters and emergencies can benefit from adopting cyclic planning, whether or not a multijurisdictional emergency management framework exists	Planning can be continuous (lessons learned from one large event can be applied to a subsequent event); Procedures and relationships also may help deal with smaller events and day-to-day activities

APPENDIX B

Emergency Management and Transportation Planning

Emergency Management Planning

In January 2009, DHS published the Integrated Planning System (IPS), which established a standardized and national approach to emergency planning. The IPS laid out a planning process for federal departments and agencies to use in the development of emergency planning documents. This process has assisted in the development of plans that are more consistent with their state, regional, and local emergency management counterparts and has enabled better coordination and collaboration at all levels of interaction. Planning is an essential element for training and for incident response. FEMA developed the Planning "P" as simple guidance. See http://training.fema.gov/EMIWeb/IS/ICSResource/assets/PlanningP.pdf

Hazard Mitigation Planning

Longer-range planning in the emergency management field is exemplified in hazard mitigation planning. State, Tribal, and local officials develop and adopt mitigation plans to meet the requirements of the Stafford Act. These must be updated every 3 years (for states) or 5 years (for local and Tribal communities). Emergency managers often lead this effort. The multijurisdictional hazard mitigation planning guidance provides the official guidance on these requirements and procedures for approval of hazard mitigation plans. Regulations and guidance on state, local, and Tribal mitigation planning can be found on the FEMA website. See http://www.fema.gov/mitigation-planning-laws-regulations-guidance

Threat and Hazard Identification and Risk Assessment (THIRA)

All 50 states and six territories and all Urban Area Security Initiative (UASI) grant recipients were required to submit their first annual THIRA to FEMA by December 31, 2012. FEMA has defined a five-step process intended to broaden discussion on risk assessments to include the full community in a region or a state in a conversation about hazards, desired outcomes, capabilities, and priorities. Some emergency managers and planners see promise in the process but anticipate that it will take several years to realize its full potential. The five steps are:

1. Identify the threats and hazards of concern.
2. Give the threats and hazards context (describe them in ways that will be meaningful to people).
3. Examine core capabilities using threats and hazards. Explore desired outcomes.
4. Set capabilities targets.
5. Apply the results. It is intended to be scalable, actionable and useful.

The THIRA does not replace the 3-year or 5-year hazard mitigation planning requirement as described above, but if done well it could substitute for the Multijurisdictional Hazard

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Mitigation Plan (MJ-LHMP). This is a requirement for receiving FEMA grants. Complete, current information about the THIRA can be found at the FEMA website (http://www.fema.gov/threat-and-hazard-identification-and-risk-assessment).

Transportation's Role in THIRA

Transportation infrastructure is specifically identified in the guidance. Transportation personnel should be at the table and ask about the THIRA plan status if they have not been asked to participate, especially after the first-year hurdle is overcome.

Transportation Planning

Short-range operations planning, including event planning, usually occurs in close coordination with emergency management and law enforcement, following NIMS and ICS protocols. Different agencies may take the lead depending on the type of event. For example, emergency managers would not typically be the lead in planning for a planned special event or event of national significance, but would actively participate.

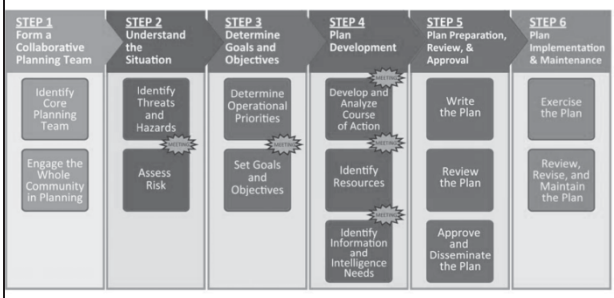
Some of the projects will be completed in the near future, while others will be only in the initial planning stage. Projects must be included in both the Constrained Long-Range Plan (CLRP) and the Transportation Improvement Program (TIP) to be eligible for FHWA or FTA funding. Grants often require consideration of security issues, among other conditions. Building security and hazard mitigation measures into a project from the very early design stages is much less costly than retrofitting a project or having to replace it prematurely because of a foreseeable threat or hazard. Long-range planning staff should consult with or include staff knowledgeable about security, hazards, risk analysis and mitigation.

A TIP is a 6-year financial program that describes the schedule for obligating federal funds to state and local projects. The TIP contains funding information for all modes of transportation, including highways and high occupancy vehicle (HOV) facilities, as well as transit capital and operating costs. The TIP represents an agency's intent to construct or implement a specific project and the anticipated flow of federal funds and matching state or local contributions. State, regional, and local transportation agencies update the TIP each year (or at least every 2 years) to reflect priority projects in the CLRP. Designs, project costs, and potential funding sources and amounts typically become more precise and refined as projects get closer to implementation. As projects proceed, it is important to continue to include knowledgeable security, hazards, risk analysis, and mitigation staff so as not to overlook the long-term value of investments in security and mitigation. Expert staff also may be able to advise on new technologies or techniques that will reduce costs or multiply benefits. In many cases, measures that improve security and reduce potential effects from a terrorist act also reduce risk from natural hazards or human-caused accidents.

Each year, metropolitan planning organizations (MPOs) are required to prepare a Unified Planning Work Program (UPWP) in cooperation with member agencies. The UPWP describes all metropolitan transportation and transportation-related air quality planning activities anticipated within the region during the year. Given that the UPWP essentially serves as the master regional transportation planning funding application, it particularly emphasizes documentation of planning activities to be performed with funds provided to MPOs by the FHWA and the FTA. The UPWP is an integrated document that includes the work of member agencies, consultants, and MPO staff.

Table 3 provides sample graphics for the transportation and emergency management planning processes described in this appendix. The tables below the graphics demonstrate the commonality of planning steps among the different planning processes.

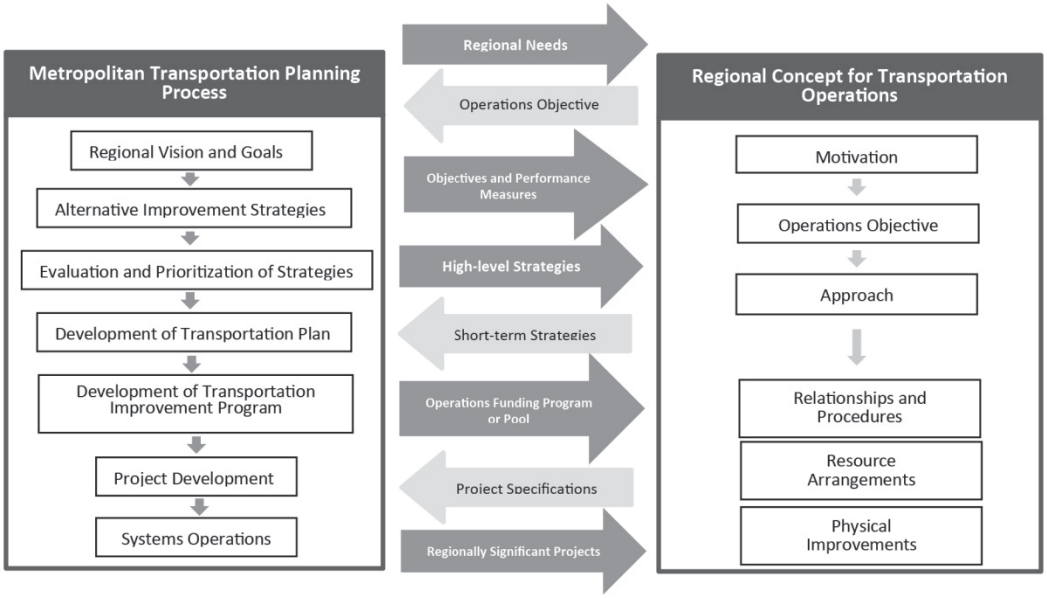
Table 3. Similarities in steps among different planning processes.*

Emergency Management and Mitigation Planning Processes		
Diagram	**Multi-Hazard Mitigation Planning Guidance (FEMA)** http://www.fema.gov/hazard-mitigation-planning-overview 	**Comprehensive Preparedness Guide (CPG) 101 Version 2.0** http://www.fema.gov/pdf/about/divisions/npd/CPG_101_V2.pdf  *Figure 4.1: Steps in the Planning Process*
Goals	Step 1: Organize Resources • Identify Resources • Identify and Organize Interested Members of Community and Technical Expertise	Step 3: Determine Goals and Objectives • Determine Operational Priorities • Set Goals and Objectives
Analysis	Step 2: Assess Risks • Identify Characteristics and Potential Consequences of Hazards	Step 2: Understand the Situation • Identify Threats and Hazards • Assess Risk
Development	Step 3: Develop Mitigation Plan • Determine Priorities • Identify Strategy to Minimize Undesired Effects	Step 4: Plan Development • Develop and Analyze Course of Action • Identify Resources • Identify Information and Intelligence Needs Step 5: Plan Preparation, Review, and Approval • Write the Plan • Review the Plan • Approve and Disseminate the Plan
Implementation	Step 4: Implement Plan and Monitor Progress • Maintain Community Involvement • Carry out Periodic Evaluations and Revisions to Keep the Plan Relevant	Step 6: Plan Implementation and Maintenance • Exercise the Plan • Review, Revise, and Maintain the Plan
Collaborative Planning	*(Occurs as part of Step 1 and is therefore not a distinctive/standalone step within the planning process)*	Step 1: Form a Collaborative Planning Team • Identify Core Planning Team • Engage the Whole Community in Planning

*Steps in the table are aligned by content; non-sequential numbering reflects the fact that the steps may occur in varying order in different planning procedures.

(continued on next page)

Table 3. (Continued).

Transportation Planning and Operations Processes		
Diagram	**Regional Concept for Transportation Operations (RCTO)** http://ops.fhwa.dot.gov/publications/moguidebook/chap_3.htm  	
Goals	Step 1: Regional vision and goals Step 3: Evaluation and prioritization of strategies	Step 1: Motivation
Analysis	Step 2: Alternative improvement strategies • Operations • Capital	Step 2: Operations objective
Development	Step 4: Development of Transportation Plan • Long-range planning (LRP)	Step 3: Approach
	Step 5: Development of Transportation Improvement Program • State Transportation Improvement Plan (S/TIP)	Step 4: Relationships and procedures
	Step 6: Project Development	Step 5: Resource arrangements
Implementation	Step 7: Systems operations • Implementation • Monitor system performance • Data	Step 6: Physical improvements
Collaborative Planning	*(Occurs as part of the critical factors and input not as a distinctive/standalone step within the planning process)*	Step 4: Relationships and procedures

Abbreviations and acronyms used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation