USING HIGHWAYS FOR NO-NOTICE EVACUATIONS

Routes to Effective Evacuation Planning Primer Series

U.S. Department of Transportation
Federal Highway Administration

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16. Abstract

The focus of this primer is no-notice events. These no-notice incidents occur for many reasons, such as forest fires, major storms, chemical spills, or terrorist acts. Their common denominator is that they occur with little or no warning, which presents unique challenges for the safe and secure movement of people and goods. With limited time and information available to make decisions about evacuations, agencies' efforts at planning ahead of time are essential.

This primer is directed toward transportation officials, first responders, and emergency managers who will plan and execute evacuation efforts. Sections of the document include a discussion of the planning process used to develop an evacuation plan; explanation of no-notice incidents and their likely scale and consequences; considerations of the unique aspects of no-notice incidents and the need for different transportation strategies and tactics; discussion of evacuation planning issues and how the planning process needs to account for the no-notice factor; and a checklist that planners can use in preparing a plan for a no-notice evacuation, whether natural or man-made. This document is one of several primers intended as tools to aid local and state planners in maximizing the use of the highway network in the development and execution of evacuation plans for their communities, states, or regions.

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U.S. Department
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**Federal Highway
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December 2007

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Dear Colleague:

Evacuations may involve hundreds or hundreds of thousands of people. Regardless of the numbers, in every instance, the transportation network plays a key role in evacuating people out of harm's way. Over the past two decades, the transportation community's ability to manage and operate the transportation network has improved considerably. Recognizing the unique challenges posed by the disaster environment on mobility and the safe and secure movement of people and goods, the U.S. Department of Transportation's Federal Highway Administration (FHWA) seeks to improve evacuation planning and implementation, by bringing new ways of better using the transportation network, before and during evacuations, to the emergency management community.

The focus of this primer is ***no-notice*** evacuations. In late October 2007, as this primer was being completed, we were reminded once again about the reality of evacuations. We are only now learning about the breadth and damage of the wildfires in California, which have led to the largest evacuation on California history, and the ripple effect including numerous road closures that those evacuations have caused.

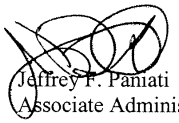
These no-notice incidents occur for many reasons, such as forest fires, major storms, chemical spills, or terrorist acts. Their common denominator is that they occur with little or no warning, which presents unique challenges for the safe and secure movement of people and goods. With limited time and information available to make decisions about evacuations, agencies' efforts at planning ahead of time are essential.

This document is one in a series of the FHWA-produced primer series and covers the use of the highway system during evacuation operations when no advance planning is possible. This primer is directed toward transportation officials, first responders, and emergency managers who will plan and execute evacuation efforts. The document includes a discussion of the planning process used to develop an evacuation plan; explanation of no-notice incidents and their likely scale and consequences; considerations of the unique aspects of no-notice incidents and the need for different transportation strategies and tactics; discussion of evacuation planning issues, how the planning process needs to account for the no-notice factor; and a checklist that planners can use in preparing a plan for a no-notice evacuation, whether natural or man-made.

Evacuation operations are conducted under the authority of, and based on decisions by, local and State authorities. This primer is intended as a tool to aid local and State planners in maximizing the use of the highway network in the development and execution of evacuation plans for their

communities, States, or regions. We encourage readers to contact FHWA's Office of Operations at ETO@dot.gov and comment on this document, to share experiences, and to offer suggestions to improve this primer and its companions.

Sincerely,



Jeffrey F. Paniati
Associate Administrator for Operations

ACRONYMS

ATIS	Advanced Traveler Information System
CBRNE	Chemical, Biological, Radiological, Nuclear, and Explosive
CONOPS	Concept of Operations
DHS	Department of Homeland Security
DMS	Dynamic Message Sign
DOT	Department of Transportation
EOC	Emergency Operations Center
ETO	Emergency Transportation Operations
FHWA	Federal Highway Administration
ICS	Incident Command System
ITS	Intelligent Transportation System
JIC	Joint Information Center
NIMS	National Incident Management System
NRC	Nuclear Regulatory Commission
NRF	National Response Framework
SOP	Standard Operating Procedure
TMC	Transportation Management Center
TOC	Transportation Operations Center
USDOT	U.S. Department of Transportation

FOREWORD

Evacuations may involve hundreds or hundreds of thousands of people. Regardless of the numbers, in every instance, the transportation network plays a key role in evacuating people out of harm's way. Over the past two decades, the transportation community has improved its ability to manage and operate the transportation network. The U.S. Department of Transportation's Federal Highway Administration (FHWA) recognizes the unique challenges posed by the disaster environment on mobility and the safe and secure movement of people and goods. As a result, FHWA seeks to improve evacuation planning and implementation by bringing new ways of more effectively using the transportation network, before and during evacuations, to the emergency management community.

This document constitutes one volume of the *Routes to Effective Evacuation Planning* primer series, and covers the use of the highway system during evacuation operations when no advance planning is possible. The primer series, as a whole, captures and catalogues transportation

The ***Routes to Effective Evacuation Planning Primer Series*** will include:

Title	Content
Overview: Routes to Effective Evacuation Planning	This is an executive-level summary that covers the five evacuation primers. The summary focuses on the need to include transportation professionals in planning for evacuations; the importance of regional and corridor planning; the integration of transportation in mass care; and health and medical, security, and other emergency support function coordination. It also highlights best practices that have emerged from actual evacuations and tools available to local and state authorities in planning for and executing evacuations.
Using Highways During Evacuation Operations for Events with Advance Notice	This is a basic-level guide on conducting planning activities for evacuations that are primarily road-based when advanced notice of the need to evacuate is available. The guide is more detailed than the overview and includes transportation elements that should be considered by local, state, and regional planning groups. (Published December 2006)
Using Highways During Evacuation Operations for Events with No Notice	This guide covers spontaneous or no-notice evacuations that are primarily road-based. It considers the security environment that comes into play during a biological, chemical, terrorist, or malevolent event, as well as no-notice natural events such as earthquakes or tornadoes. This guide also addresses evacuation considerations versus shelter-in-place orders. (This document)
Evacuating Populations with Special Mobility Requirements	This primer summarizes information in the other primers that touches on moving populations with special needs. It provides findings, lessons learned, and best practices that aid in developing evacuation plans for people with special movement requirements, including the elderly, those with medical conditions, and transit-dependent populations.

management and operations advancements that can improve evacuation planning and operations. These primers may undergo adjustment based on new information, findings, lessons learned, best practices, and tools that local jurisdictions and states use and share as experience in conducting evacuations increases and the concept of disaster support evolves.

Evacuation operations are conducted under the authority of, and are based on decisions by, local and state authorities. This primer is intended as a tool to aid local and state planners in maximizing the use of the highway network in the development and execution of evacuation plans for their communities, states, or regions. We encourage readers to contact FHWA's Office of Operations to comment on this document, to share experiences, and to offer suggestions to improve this primer and its companions.

The U.S. Department of Transportation, Federal Highway Administration (FHWA) has four levels of operational guidance for use by local, State, and Federal planners to develop evacuation plans for personnel involved in conducting or supporting disaster operations. This document corresponds to Level 1.

Level 1	Overview and Primers	A brief concept summary of a function, team, or capability.
Level 2	Standard Operating Procedure (SOP) or Operations Manual	A complete reference document, detailing the procedures for performing a single function (SOP), or a number of interdependent functions (Operations Manual).
Level 3	Field Operations Guide (FOG) or Handbook	A durable pocket or desk guide, containing essential nuts-and-bolts information needed to perform specific assignments or functions.
Level 4	Job Aid	A checklist or other aid for job performance or job training

This document is consistent with and supports the Emergency Support Function #1/Transportation doctrine developed to support the National Response Plan for implementation of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. § 5121, et seq., as well as Homeland Security Presidential Directive 8, Domestic Incident Management.

The most current copy of this document, including any change pages, is available through the FHWA Emergency Transportation Operations Evacuation Planning Knowledge Management Center webpage at www.ops.fhwa.dot.gov/opssecurity.

Inquiries, information, suggested improvements, and requests for additional copies are encouraged and should be directed in writing to the U.S. Department of Transportation, Federal Highway Administration, Office of Operations, Emergency Transportation Operations Team, 400 7th Street, SW, Washington, DC 20590, or via email to ETO@dot.gov. For an electronic version of this document or other evacuation planning tools, please visit the Evacuation Planning Knowledge Management Center at the Emergency Transportation Operations website: www.ops.fhwa.dot.gov/opssecurity and the DHS Lessons Learned Information System Content Specific page on Mass Evacuations and the Emergency Transportation Operations Special Interest Page at www.llis.gov.

J. Richard Capka
Administrator, Federal Highway Administration
October 2007


STOP

1 INTRODUCTION

Evacuations occur for countless reasons under many different circumstances. A jurisdiction may need to evacuate one block of office buildings (water-main break), a neighborhood (forest fire), a major portion of the downtown area (terrorist attack), or even an entire city (earthquake or hurricane). While successful evacuations are always difficult to execute due to the level of coordination required among agencies and jurisdictions, this challenge becomes magnified during a little- or no-notice evacuation. No-notice incidents can be either small-scale or wide-scale and can happen anywhere at any time. After a no-notice incident, responders will have a very limited window of opportunity to prepare before an evacuation begins.

A U.S. Nuclear Regulatory Commission (NRC) study[1] concluded that evacuations of 1,000 or more people occur approximately every two to three weeks. Focusing on a 12-year period, the study determined that most evacuations resulted from natural disasters (58%), particularly wildfire threats to populated areas; technical disasters (36%), including fixed site and transportation-related industrial accidents; and malevolent acts (6%), including terrorist attacks. Combine these larger-scale evacuations with much more frequent small-scale ones, and it becomes clear that evacuations, varying in scope and probability, occur on an almost-daily basis. As such, experience and expertise in evacuations occur not primarily at the Federal or State levels of government, but at the local level, as shown in Figure 1.1.

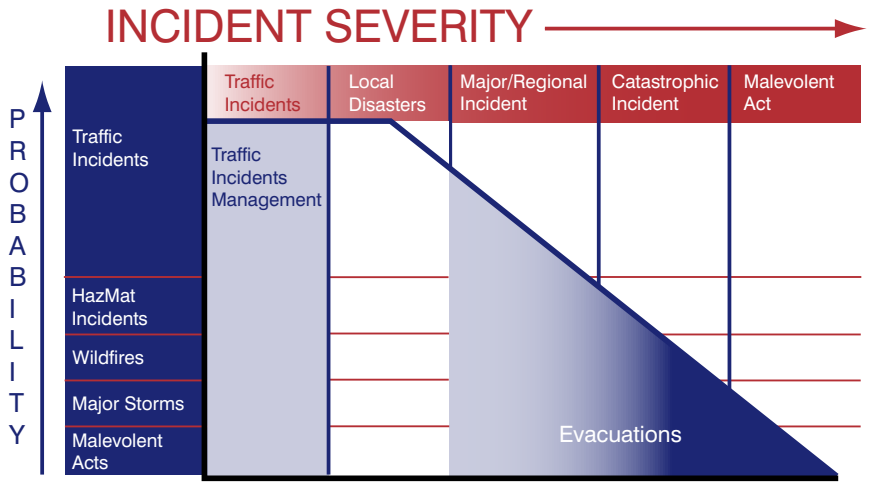


Figure 1.1. Probability of and Severity Associated with Types of Incidents.

[1]Sandia National Laboratories, U.S. Nuclear Regulatory Commission; "Identification and Analysis of Factors Affecting Emergency Evacuations: Main Report;" NUREG/CR-6864, Vol. 1 / SAND2004-5901.

To be prepared for evacuations in this environment, transportation agencies must work with emergency management officials on evacuation planning efforts. This coordination must occur during the planning phase since there will be little time to plan for a response in the little- or no-notice environment. Any type of incident resulting in an evacuation will both rely on and have an impact on the transportation system and resources of jurisdictions. Except for rare instances when citizens are advised to shelter in place, affected populations may have to be moved out of harm's way to a safer location following a little- or no-notice incident. Whether this movement is done by foot, public transportation, or via personal vehicles, the transportation infrastructure will play a critical role during the evacuation. In addition, first responders must maintain the ability to respond to the incident and to transport the ill and injured to medical facilities; this capability relies in large part on the availability of the transportation network. Regardless of the reason for or scale of the evacuation, an effective evacuation depends upon the capacity of the transportation network and the cooperation of transportation agencies' management and staff.

PURPOSE

The *Routes to Effective Evacuation Planning* Primer series seeks to improve transportation officials' knowledge and capabilities with regard to evacuation planning and execution. By using these Primers, transportation officials and their staffs will be better prepared to participate with other agencies in the evacuation planning process, will have a clearer understanding of their roles during an evacuation, and will be able to support an evacuation more effectively.

This Primer provides ideas and considerations for transportation officials that are applicable across the scale of little- or no-notice evacuation incidents. It addresses the use of the highway system during evacuation operations following an incident that gives little to no warning and that allows for no advance planning. It provides information about planning techniques, strategies, and tactics that will prepare transportation agencies and their jurisdictions to respond effectively by implementing an evacuation on extremely short notice.

The contents of this Primer are based on the findings from numerous studies following major or catastrophic incidents where evacuations were ordered. The Primer identifies transportation technologies avail-

able to aid evacuation planners and operations staff in their attempts to make maximum use of the transportation network during emergencies. In addition, the Primer demonstrates ways to develop better evacuation plans through integration of transportation professionals in the process.

This Primer takes an "all-hazards" approach to evacuation planning. The concepts identified in the Primer series are applicable when dealing with both small and large evacuation incidents, regardless of the trigger that prompts the evacuation. The Primer should be one of many resources that officials use to build the best possible evacuation strategy for their jurisdictions.

INTENDED AUDIENCE

The information contained within this Primer is directed toward transportation officials, first responders, and emergency managers who will plan and execute evacuation efforts. Transportation agencies will have an integral role during an evacuation by acting in a support capacity to the comprehensive response coordinated by emergency management agencies and executed by first responders. Transportation officials, first responders, and emergency managers will benefit from a better understanding of what roles the transportation agencies, networks, and infrastructure can play during an evacuation. This understanding, combined with knowledge of particular transportation systems and resources, will enable officials to take a more proactive, participatory role during the planning process and to represent their agencies more effectively. The information in this Primer will also help transportation agencies' staffs identify the issues and challenges they should address during both the planning process and the execution of an evacuation.

Emergency management officials will also benefit from the information in this Primer. As the lead officials in coordinating evacuation planning and execution, emergency managers will rely in large part on transportation networks and operating systems. By gaining a better understanding of transportation-related issues, tools, and capabilities, emergency managers and their staffs will be able to better anticipate the benefits transportation systems are able to provide during an evacuation, as well as the transportation-specific issues that will need to be re-

solved. They will also gain an understanding of how to leverage investments that have already been made by transportation agencies (e.g., Intelligent Transportation Systems [ITSs] and Transportation Management Centers [TMCs]) to manage and mitigate congestion, which provide almost-real-time information and communication exchanges.

As those responsible for the execution of evacuations, first responders will gain an understanding of the support that transportation operations staff and capabilities can provide. First responders in many major urban areas are aware of the Department of Transportation (DOT) full-function service patrols[2] used for incident management, but may not envision a role for them during evacuation operations. Service patrols, TMCs, and other transportation capabilities and assets can aid in making evacuations more efficient and safe, while helping safeguard firefighters and police involved in moving people out of harm's way. They can aid motorists who run out of gas or have mechanical problems, set up safety cones, provide information from traffic cameras, provide traveler information using the 511 system or dynamic message signs (DMSs) along the highway, and use traffic counters to monitor traffic flows on highways.

Freeway Service Patrol tow drivers Jessie Galicia, Larry Miller, and Louis Ray pose with tools of their trade. (Photo: John Blaustein. Available at http://www.mtc.ca.gov/news/transactions/ta04-0503/fsp.htm.)

[2]Also known as service patrols and by other names in various jurisdictions.

NO-NOTICE EVACUATIONS

This Primer focuses on performing evacuation operations with little or no advance warning. Examples of incidents that might cause a no-notice evacuation include a hazardous materials spill due to a vehicular or train accident, an explosion at a chemical plant, a terrorist attack on some aspect of a jurisdiction's infrastructure, a flashflood, or even an earthquake.

Responses to an evacuation are organized by evacuation phases. The first Primer in this series, *Using Highways During Evacuation Operations for Events with Advance Notice*, outlines the phases for an advance notice evacuation: Readiness, Activation, Operations (two-tiered), and Return-to-Readiness, as shown in Figure 1.2.1. Figure 1.2.2 illustrates the operations cycle for a no-notice evacuation. While the phases remain the same, for no-notice evacuations there is either a very limited or a non-existent Readiness Phase.

Figure 1.2.1. Phases of Advance-Notice Evacuation Operations.

Figure 1.2.2. Phases of No-Notice Evacuation Operations.

A no-notice incident creates particularly challenging circumstances in which to carry out an evacuation. With an advance-notice evacuation, information becomes available during the Readiness Phase regarding the incident that has occurred and the factors that may require an evacuation. Decision makers have time to collect the information they

need to determine whether an evacuation should be ordered and, if so, the best way to carry it out. With a no-notice incident, sufficient information is likely to be unavailable to decision makers before a determination has to be made on whether to order an evacuation. Instead, incomplete, imperfect, and, at times, contradictory information about the incident is arriving, if at all, at the same time decisions need to be made. This means decision makers must be prepared to act on limited information, and agency staff – particularly individuals located in TMCs and in the field – must be trained so that they can effectively respond rapidly and with imperfect information.

Imperfect information is problematic under normal circumstances. This is the case even more so with no-notice evacuations due to the quick response time required. In advance-notice evacuations, jurisdictions make decisions regarding the implementation of an evacuation to prevent lives from being put in imminent danger; in a no-notice scenario, citizens are usually already at risk. Decision makers have little or no time to wait for additional or better information in a no-notice scenario because any delay will likely have a significant effect on the safety of their citizens; they must be willing to make decisions with whatever information is available at the time.

An advance-notice evacuation is really a preventative course of action while a no-notice evacuation is a response activity.

What does this mean for transportation officials? From a transportation standpoint, during a no-notice evacuation transportation agencies will have to be in close contact with decision makers about which evacuation routes and traffic management tactics should be used. Decisions on which roads to use will be based on the capacity, safety, and potential chokepoints of those roads, among other factors described in this Primer. However, there is insufficient time during a no-notice incident to determine the capacity, safety, and potential chokepoints of all roadways under a transportation agency's jurisdiction; such information should already have been compiled and prepared for use. Preplanning, computer modeling, and responder training and exercising, all critical aspects, will be discussed in depth throughout the other sections of this Primer.

PREPLANNING VS. ADVANCE PLANNING

For any agency/organization/jurisdiction that will have a role in a no-notice evacuation, preplanning is a necessary undertaking. It must not be done only once; the process and the findings need to be updated

regularly. A general rule is to update plans on at least an annual basis. Plan reviews may also be required due to any changes in Federal, State, or local regulations that stipulate new or revised practices. As such, it is essential that the focus of a jurisdiction's evacuation plan is on preparedness and planning activities.

The most significant challenge posed by little- or no-notice evacuations is that they do not provide emergency managers, first-responders, and transportation personnel with the opportunity to prepare once it is known that an incident is impending but before the incident occurs. Focusing on what can be done ahead of time to prepare for a no-notice evacuation will mitigate the effects of not having a Readiness Phase or having an extremely limited Readiness Phase.

It is important to note the distinction between preplanning and advance planning. ***Preplanning*** refers to planning efforts undertaken by jurisdictions or agencies before they are aware that they need the information to make an operational decision. It is considered preplanning if transportation officials determine the capacity, safety and potential chokepoints of their transportation infrastructure so that if an incident ever occurs the information will be on hand to aid decision makers. Preplanning also includes periodic training for all levels of staff that would be involved in a response.

Jurisdictions accomplish ***advance planning*** during the Readiness Phase based on event- or incident-specific information. For example, a jurisdiction learns that there is the potential for a wildfire to break a fire line and move toward populated areas. Based on the incident, the geography and demographics of the area that might be affected, and other relevant factors such as the weather and location of roadways, a jurisdiction will do advance planning to determine the best course of action (shelter in place, evacuate, etc.). Much of the time, preplanning information will be used during the advance planning process.

PRIMER ORGANIZATION

This Primer is organized into six sections.

- *Section1: Introduction*
- *Section 2: Planning Process* – Focuses on the overall process used to

PREPLANNING

Planning efforts taken by an entity before it is aware that the information is required to make an operational decision

ADVANCE PLANNING

Planning done during the Readiness Phase based on incident-specific information

develop an evacuation plan. Because many of the elements of creating an evacuation plan are covered in detail in the first Primer, Section 2 briefly touches upon these elements, concentrating on the critical role transportation officials will play.

- *Section 3: Explanation of No-Notice Incidents* – Defines no-notice incidents, describes the likely scales and consequences of the incidents, and provides examples.

- *Section 4: Considerations in a No-Notice Context* – Focuses on the unique issues and problems associated with no-notice incidents. This section highlights how and why no-notice evacuations require different strategies and tactics than an event with advance notice and demonstrates how these differences will affect transportation officials as they respond to a no-notice evacuation.

- *Section 5: Planning Considerations* – Lists the issues that need to be addressed as part of an evacuation plan capable of an effective response to a no-notice incident. Rather than describing each of the considerations (as covered in the first Primer on advance notice evacuations), this section explains how these factors will be affected by a little- or no-notice scenario and how the planning process should be modified to compensate for the no-notice factor.

- *Section 6: Plan Elements* – Provides checklists that are important to consider when preparing a plan for a no-notice evacuation. The checklists adopt an all-hazards approach and can be applied to any type of no-notice incident, whether natural or man-made.

INCIDENT

An incident is an unexpected occurrence, caused by either human or natural phenomena, that requires response actions to prevent or minimize loss of life, or damage to property/the environment.

EVENT

An event is a planned, non-emergency activity, such as a parade, concert, or sporting event, which will include the activation of an ICS organization.


Caltrans Advanced Transportation Management System

2 PLANNING PROCESS

Local and State agencies routinely handle evacuations from many incidents, including wildfires, floods, tornadoes, hazardous material accidents, and significant transportation accidents. To be able to successfully respond to no-notice incidents and the resulting evacuations, jurisdictions must develop comprehensive evacuation plans. The process through which plans are developed should involve representatives from all the agencies that will be involved in supporting evacuation efforts, including those responsible for transportation.

The first Primer in this series, *Using Highways During Evacuation Operations for Events with Advance Notice*, presents a comprehensive description of the process for developing an evacuation plan. This section provides a brief overview of some of the key issues that will influence the planning process, particularly with regard to the challenges of preparing for a no-notice evacuation, including:

- Planning context
- All-hazards approach
- Command structure
- Stakeholders
- Role of transportation
- Evacuation phases

Understanding these elements will better prepare transportation officials for participating in the development of an evacuation plan that is consistent with the National Response Framework (NRF) and the National Incident Management System (NIMS).

PLANNING CONTEXT

Transportation planners should have an understanding of the intended scope of the evacuation plan. This will establish the basic parameters for geographic area and population that the plan will serve. This definition of scope will help identify a number of other elements that will affect the final plan, including:

- Applicable transportation modes
- Elements of the transportation network
- General population size and characteristics
- Agencies that will be involved in the evacuation effort (see "Stakeholders," later in this section)

- Potential hazards to consider in light of location (e.g., coastal storms, seismic activity, industrial facilities, nuclear power plants, etc.)
- Types and quantities of resources available to support an evacuation (i.e., staff, vehicles, intelligence transportation systems equipment, traffic management centers, and communications systems)

One of the underlying assumptions of an evacuation plan is that preplanning is one of the most important factors in minimizing the effects of no-notice incidents. Preplanning, which spans all aspects of preparedness, addresses the hurdles posed by a lack of a Readiness Phase; responders will be forced to rely on their existing capabilities, experience, and level of preparation when responding to a no-notice incident. As part of preplanning:

- Plans, policies, and procedures must be developed and responders must be identified and trained to manage the evacuation. Once a no-notice incident occurs, planners will have insufficient time to tailor their response to the particular incident but must be able to act quickly to mitigate its effects.

- Transportation operations members, including full-function service patrols and staff members from TMCs and Traffic Operations Centers (TOCs), must be involved in planning and should be trained and exercised in Incident Command System (ICS) principles. They may be integrated into or co-located with Emergency Operations Centers (EOCs) to enhance real-time information on the roadways or to ensure the availability of technical experts to interpret data or order resources.

- Communications systems and protocols must be established. Agencies will not have the opportunity to select or clarify these before an evacuation begins. Transportation communications systems, including 511 traveler information systems, New Generation 911, and ITS equipment (such as cameras and DMSs) should be part of communication plans.

- Evacuation plans must incorporate multiple modes, often used in atypical ways, to evacuate entire populations, including those dependent upon public transit, those with special mobility needs, and transient populations. Shuttles between assembly areas and

TRAFFIC MANAGEMENT CENTERS

Traffic Management Centers (TMCs) – Also called Traffic Operations Centers (TOCs), these facilities are typically run by a jurisdiction's DOT and are used on a day-to-day basis to monitor and manage elements of the transportation network. Within a given region, different transportation agencies may operate separate TMCs (e.g., one TMC operated by the transit agency to oversee subway and bus operations, and a second TMC operated by the state DOT to monitor state highways). In some instances, states have created TMCs which combine staff from emergency management and transportation agencies to enhance cooperation and incident response.

transportation (buses, ferries, air, rail) that will take individuals to shelters or other locations should be considered. (Refer to *Evacuating Populations with Special Mobility Needs* for more information on this topic.)

- Mutual aid agreements with neighboring jurisdictions and stand-by agreements with vendors or private-sector organizations should be completed in advance and ready to implement because procuring and deploying additional resources in a timely manner will be extremely difficult after a no-notice incident.

- Contingency plans should compensate for damaged evacuation infrastructure (e.g., roads, tunnels, and bridges), assets, and resources (including human resources), as well as address particular hazards in the evacuation area. If such preplanning is not performed, emergency managers may be forced to improvise with an evacuation plan that is no longer viable due to insufficiency of resources.

ALL-HAZARDS APPROACH

An effective evacuation plan should adopt an all-hazards approach to preparing for an incident, which entails developing a response and recovery plan that is functional regardless of the incident that causes the evacuation; it is designed to achieve the core mission of life saving/protecting, rather than focusing on responding to the particular type of incident. This provides the flexibility required to respond to any type of incident, including terrorist attacks, technological accidents, and natural disasters, regardless of size or location.

This approach is particularly appropriate for no-notice evacuation planning. Transportation agencies and other stakeholders will need a plan that can be implemented quickly and with limited information. If the plan requires knowledge of the precipitating incident, implementation will likely be delayed by the lack of necessary information. Because evacuation plans focus primarily on moving people away from a particular location or area, they can be implemented regardless of the reason for evacuation. It should be noted, however, that some types of situations will mandate particular evacuation response activities, as is the case with pre-transport victim decontamination in the event of a toxic release.

EMERGENCY OPERATIONS CENTERS

These facilities are usually operated by a jurisdiction's emergency management department. An EOC is the location from which a multi-agency emergency response is coordinated, and is staffed with representatives from all relevant response and support agencies. EOCs are often in "standby" mode, and are not fully activated and staffed unless there is a specific need for them. Additionally, a single agency may have an individual EOC from which it coordinates its own response activities; in such cases, coordination and communication among multiple EOCs is essential for an effective overall response.

Source: FEMA/Liz Roll.

Source: NASA.
Available at http://rst.gsfc.nasa.gov/Sect4/Sect4_2.html.

COMMAND STRUCTURE

A successful no-notice evacuation relies on an effective command structure that can be assembled quickly and efficiently. The command structure generates an effective overall response effort by establishing a framework within which the resources and activities of numerous response agencies are coordinated. While the specific components of the command structure will vary among jurisdictions due to the involvement of different agencies, there are several overarching standards that will apply.

National Incident Management System – NIMS was created in 2003 by a Presidential Directive. It establishes a comprehensive, national approach to incident management. Two key concepts of NIMS are: (1) that it provides a flexible framework for managing incidents; and (2) that it standardizes structures and requirements for responding to incidents. NIMS is applicable at all levels of government and across functional disciplines, including transportation.

Incident Command System – ICS is part of one of the operational components of NIMS and provides a framework that allows numerous agencies and jurisdictions to work together in response to any type of incident (all-hazards approach). While ICS operates on the basic principle that the majority of incidents are going to be handled at the local level, the ICS mold is flexible enough to provide a framework for effectively responding to incidents that require a multi-agency or multi-jurisdictional response.

Regardless of how many agencies or jurisdictions are involved in an evacuation effort, the same guiding principles will be used for the response. Part of a successful evacuation plan will be the utilization of ICS during an evacuation, which requires all relevant agencies and stakeholders to be familiar with and trained in ICS principles. Historically, transportation officials have less experience with ICS principles than emergency management officials; therefore, due to the integral role transportation officials play during no-notice evacuations, every effort should be made to train them in ICS.

To increase transportation officials' knowledge of ICS, FHWA created the *Simplified Guide to the Incident Command System for Transportation Professionals*. This document, available on FHWA's Web site, introduces ICS to stakeholders who may be called upon to provide specific expertise, assistance, or material during highway incidents, but who may be largely unfamiliar with ICS operations. It may also be beneficial to public safety professionals familiar with ICS who may not fully understand how ICS concepts are applicable to transportation agencies. In addition, FHWA will release a booklet that describes NIMS compliance for transportation organizations. This will be posted on the ETO Special Interest Page (www.llis.gov and www.fhwa.dot.gov/opssecurity) by December 2007.

IDENTIFY STAKEHOLDERS

Personnel from numerous agencies will be involved in supporting an evacuation, and are likely to represent many disciplines, span different jurisdictions and levels of government, and include private organizations and companies. Effective evacuation planning requires a partnership among these stakeholders, shown in Figure 2.1, all of whom should be involved in the planning process. Gathering together these partners and stakeholders is a critical part of developing an evacuation plan and is essential to considering all factors specific to an individual jurisdiction or region. This planning process should aid jurisdictions in bringing the right partners – including the appropriate members of the transportation community – to the table.

Evacuation planning at the local, regional, and State levels should involve representatives of all departments and organizations that will have a role in an evacuation. This includes transportation and transit organizations including service patrols and other highway operations and infrastructure staff, public schools, city planners, chambers of commerce, advocates for special needs populations, and adjacent jurisdictions that may be affected by an evacuation.

For more information on NIMS, compliance requirements, and course offerings, please refer to the Federal Emergency Management Agency's (FEMA's) NIMS Integration Center Web site.

http://www.fema.gov/emergency/nims/index.shtm

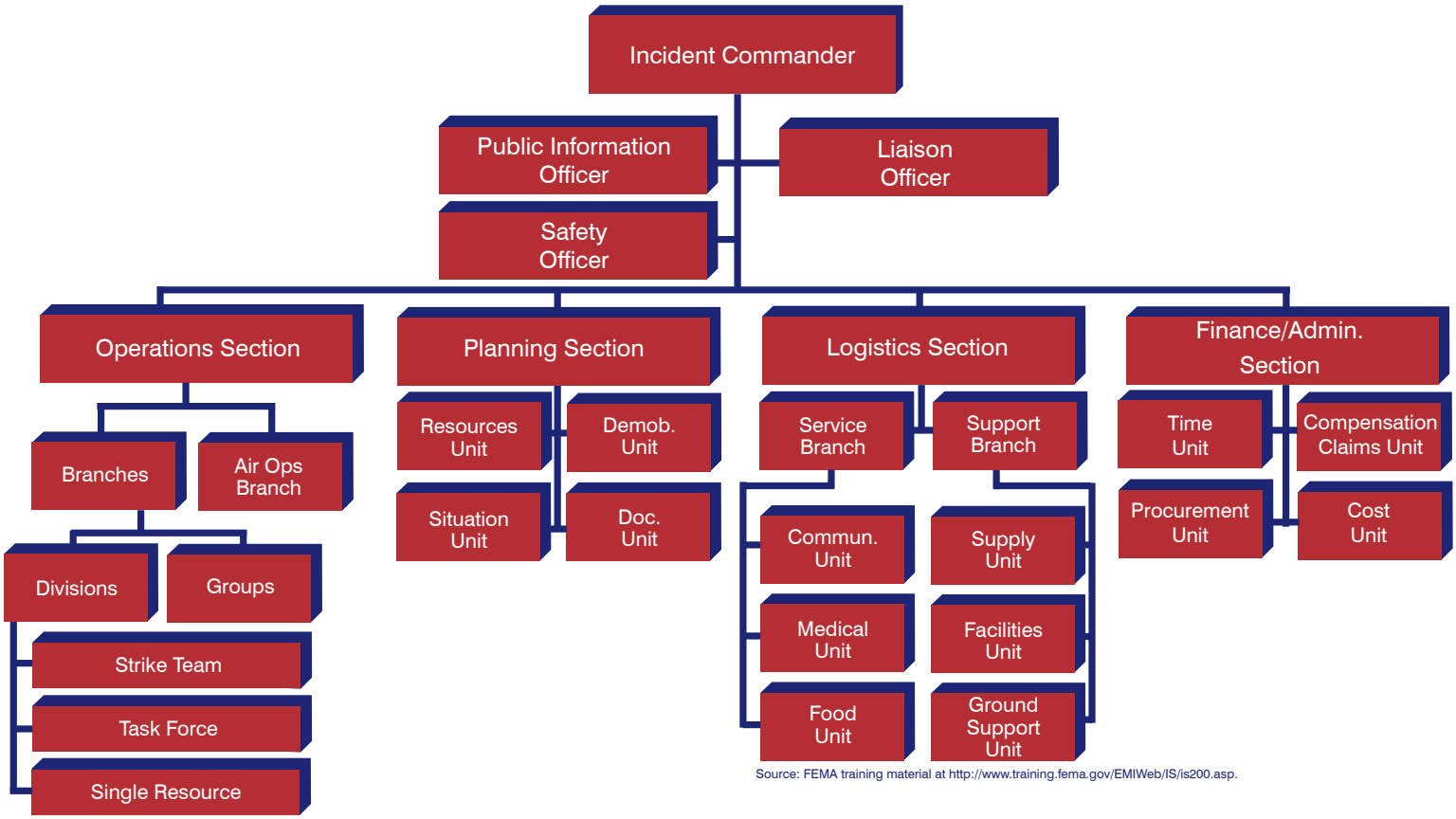


Figure 2.1. ICS Organization Chart.

While a no-notice incident and the resulting evacuation will likely involve a delay before State and Federal officials arrive on-scene, awareness of which agencies may be involved and the potential resources they can provide is very important. Local agencies should be prepared to act on their own without State and Federal resources in the immediate aftermath of a no-notice incident, especially during large-scale evacuations that involve more than one jurisdiction.

In instances where local resources are overtaxed and State and Federal resources are not immediately available, local agencies may have to turn to neighboring jurisdictions and the private sector for support. Affected jurisdictions can reach out to neighboring jurisdictions and private-sector organizations through previously established mutual aid

agreements or stand-by contracts. In the immediate aftermath of a no-notice incident that affects another jurisdiction, assisting jurisdictions should be prepared to act and provide the necessary resources.

With locally based private sector resources and private volunteer agencies, the resources required may already be located somewhere in the affected jurisdiction. For example, transportation departments might reach out to private sector companies, including highway contractors and bus companies, for evacuation support services through existing emergency contracts. The importance of already having existing mutual aid agreements and contracts in place in regards to no-notice evacuations is discussed further in upcoming sections.

Figure 2.2 summarizes the potential roles of some of the key stakeholders in evacuation operations and illustrates the potential for officials from three levels of government (local, State, and Federal) and the private sector to be involved in an evacuation effort.

ROLE OF TRANSPORTATION

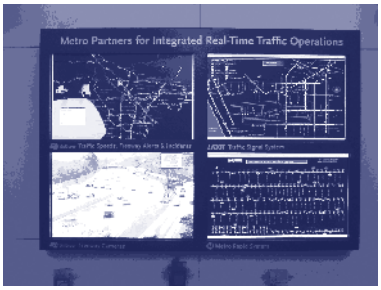
Transportation officials and agencies play key roles during an evacuation and, therefore, should play an active role in the planning process. Emergency management agencies usually lead the evacuation planning process, but transportation agencies have a broad range of knowledge and expertise that will affect the final plan. Transportation professionals can provide a wealth of information to support evacuation planning such as traffic counts, maps, and information on roadway capacity, planned highway construction, railroad crossings, and other such data necessary for the development of a good plan. Transportation officials also have access to a wide variety of tools for planning, initiating, and managing evacuations along roadways. One such transportation tool is traffic simulation modeling, which can provide insight into intersection performance and identify other potential impedances.

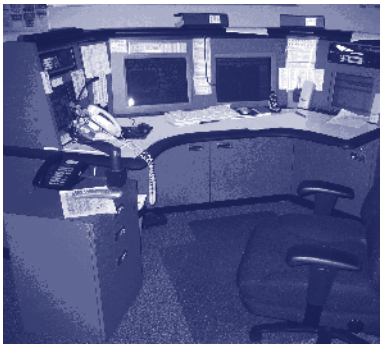
It is important that the DOT staff members who participate in planning forums have a comprehensive knowledge of programs and assets that may be used in an emergency. These individuals should engage internal DOT resources as necessary to ensure that the DOTs are prepared to provide multi-modal staff, resources, information, planning tools, and other assets as required to prepare a thorough and integrated emergency plan.

Category	Description	Location of Operations	Role During Evacuation Operations
On-Scene Operational and Tactical Response Resources			
Emergency managers lead and supports, including transportation (ESF #1)	Local and State professional staff	EOCs	• Gather key players • Collect and analyze information • Recommend actions • Order and provide resources for emergency operations
Transportation Officials	Local DOTs	DOT Offices; TMCs and TOCs; Local EOCs	• Collect, analyze, and report traffic information • Provide evacuation route plans • Conduct traffic incident management with first responders and local law enforcement • Order and provide traffic operations resources to support evacuation and other movement coordination operations • Provide information to the Public Information Officer at the EOC or Joint Information Center (JIC)
Decision Makers	Mayors, County Commissioners, etc., and their staffs; Governors for State assistance	City Hall; County; Commission Chambers; EOC	• Collect information and expert recommendations about whether to order an evacuation, what type to order, when to order one, and how large an area to evacuate • Order evacuations • Request assistance from neighbors and State and Federal governments through mutual-aid agreements or other prescribed methods
First Responders	Police, Fire, Rescue, Emergency Medical, Evacuation Operations Team	Incident Command Post; On-scene	• First line of response that may coordinate volunteers • Provide knowledge of local area • Provide on-ground damage information and identification of needed resources • Provide security for homes/businesses once evacuees leave
Volunteer Organizations (including Federal capabilities that serve as local assets during disasters)	American Red Cross, Salvation Army, Local charities, AmeriCorps, Citizens Corps	Shelters, Comfort Stations, Mobile Feeding Units, On-scene	• Provide relief services. • Provide support services to those evacuating along highways, including comfort stations • Open and staff shelters

Private Sector Partners	Highway Contractors, Trucking Industry, Towing Industry, Gasoline Suppliers, Traffic Engineers, Medical facilities, Hotel/Motel Associations	EOCs and Business Locations, On-scene	• Provide personnel, technical assistance, equipment, and supplies • Provide information on available transportation units, gas, food, or other commodities • Provide private health and medical care facilities • Assess and detail facility capabilities and whether they need additional assistance in evacuating patients
State Operational and Support Response Resources			
Private Sector Partners	State DOTs	State EOC, State DOT Offices, TMCs/TOCs	• Collect, analyze, and report traffic information and provide evacuation route plans • Conduct traffic incident management with first responders and local law enforcement • Order and provide traffic operations resources to support evacuation and other movement coordination operations • Provide information to FHWA and other impacted State DOT s as necessary
First Responder Support	National Guard	On-scene	• Supplement first responders • Supply transportation services, people, food, temporary sheltering, communications, medical services, clerical services, security, etc.
Volunteer Organizations	Animal Shelters, Humane Society	On-scene	• Coordinate the transportation and sheltering of animals
Volunteer Support	National Voluntary Organizations Active in Disasters (NVOAD)	National office in Washington, DC	• Provide referral services and support to volunteer organizations • Can comprise many volunteer organizations that can support relief efforts depending on the type of disaster
National First Response Teams	Urban Search and Rescue Teams, DMATs, Debris Removal	On-scene	• Supplement first responders • Supply transportation services, people, food, temporary sheltering, communications, medical services, clerical services, security, etc.
National Support Capabilities	Evacuation Liaison Team	FEMA Atlanta Office	• Provide technical advice on organizing, conducting, and managing evacuations

Figure 2.2. Key Stakeholders in Evacuation Planning.





During an evacuation, EOC officials will call on transportation representatives to provide critical data. Transportation agencies can provide experts in many areas, including planning, transit, traffic engineering, highway construction, and maintenance. As an example, maintenance personnel or contractors can provide supplies *en route* or at rest areas and can assist with debris removal, roving highway incident responders can aid stranded motorists to clear lanes, and construction staff or contractors can assist with controlling traffic by managing the ingress to and egress from designated evacuation routes. Traffic engineering staff can provide information on the condition of the roads and potential infrastructure-related impedances, supply ITS resources, time traffic signals, and provide traffic control devices such as cones, barriers, and signs to assist in directing traffic during the evacuation.

As part of these activities, transportation agencies will need to maintain frequent communication with the emergency management agency and other entities involved in the evacuation. At the same time an EOC is activated, transportation agencies may have a TMC activated as well, and staffed with individuals trained in monitoring roadway conditions. Ideally, the EOC would be linked electronically with the TMC so that the same information can be viewed at all locations, allowing transportation staff to interpret information quickly and order assets needed by the emergency managers. In addition, particularly in cases where electronic linkages are not feasible, the relevant transportation agencies should send representatives to help staff the EOC, collect situation status information, provide technical advice on what assets the DOTs may provide, and order items. This communication strategy will allow transportation agencies both to maintain better awareness of the overall situation and to ensure that they are providing critical information to the command structure.

EVACUATION PHASES

The first Primer in this series, *Using Highways During Evacuation Operations for Events with Advance Notice*, describes in detail the phases of an evacuation. The phases are summarized here to provide readers with a clear high-level understanding of the types of activities – before, during, and after an evacuation – which an effective evacuation plan will address.

Readiness Phase – The Readiness Phase does not always occur dur-

ing a little- or no-notice evacuation. If it does occur, it will be brief and minimal in scope. This is the time when information about an incident becomes available, and decision makers use this information to determine whether an evacuation is necessary. After a no-notice incident there is usually a delay in the flow of information to decision makers; evacuation decisions will likely need to be made before a complete picture of the situation is available.

The numerous challenges related to an incident with a nonexistent or minimal Readiness Phase should prompt an emphasis on transportation preplanning efforts. As discussed further in later sections of this Primer, transportation officials should do as much preplanning as feasible on all aspects of their transportation infrastructure, including but

not limited to possible evacuation routes; the capacity, safety, and potential chokepoints of those routes; redundant transportation capacity in case of roadway damage; locations of evacuation routes in relation to potential sheltering destinations; contra flow plans and other traffic management tactics; and up-to-date inventories of available resources.

Activation Phase – The Activation Phase encompasses everything leading up to the actual evacuation of citizens. During this phase, relevant transportation officials and agencies should be made aware that an evacuation is taking place, a command structure should be established based on ICS principles, TMCs should be activated, transportation

representatives should be dispatched to the EOC, evacuation routes should be decided upon, and a determination should be made about which transportation resources will be needed. Service patrols and highway engineers may be deployed or staged along evacuation routes to aid in the evacuation.

Tier 1 Operations: Evacuating People from Harm's Way – This phase involves the actual evacuation of citizens from the affected area. While there are many aspects to this phase, transportation officials should be most concerned about traffic control and traffic incident management. These issues are discussed in detail in Section 5, Planning Considerations.

Tier 2 Operations: Evacuee Re-Entry – This phase focuses on the re-entry of citizens back into the once-evacuated area. Because the Evacuee Re-Entry Phase is the same for no-notice evacuations as it is for advance notice evacuations, this Primer does not specifically address this phase. See the first Primer, *Using Highways During Evacuation Operations for Events with Advance Notice*, for additional information.

Return to Readiness Phase – The Return to Readiness Phase is a transition between being operational and returning to a state of planning and preparedness. Lessons learned from the evacuation should be incorporated into existing plans so that, during the next incident requiring an evacuation, the same mistakes are avoided and best practices are utilized. Because the Return to Readiness Phase is the same for no-notice evacuations as it is for advance notice evacuations, this Primer does not specifically address this phase. See the first Primer, *Using Highways During Evacuation Operations for Events with Advance Notice*, for additional information.

TRANSPORTATION THEMES

The FHWA studied several emergencies: the September 11, 2001, terrorist attacks; and natural disasters including hurricanes Katrina, Rita, and Floyd. The following common transportation themes emerged:

- All types of security incidents have transportation impacts.
- Traffic impacts occur outside of the incident scene and can become a

separate 'incident.'

- State, local, and regional emergency management plans do not fully integrate transportation agencies in their emergency planning.
- Transportation responders are often ***not***:
  - Linked fully with emergency managers.
  - Trained to work with other responders under the ICS.
  - Prepared with equipment and knowledge to deal with terrorist threats.

By keeping these transportation issues in mind during the development of an evacuation plan, plan organizers can design an evacuation in such a way as to alleviate the current disconnect between the transportation and emergency management communities. As there are always going to be incidents that cause evacuations of all types and magnitudes, the sooner transportation officials are brought into the fold, the better the coordination will be between agencies, leading to a stronger evacuation plan. The stronger the evacuation plan, the more likely it is to hold up under the stresses inherent in no-notice incidents.

3 EXPLANATION OF NO-NOTICE INCIDENTS

A little- or no-notice incident is one that occurs unexpectedly or with minimal warning. The lack of warning and the quick response time required introduce distinct challenges for evacuating at-risk populations. No-notice incidents do not provide emergency responders sufficient time to prepare for a specific incident. This greatly affects agencies' abilities to pre-activate emergency protocols, pre-position needed assets, and warn and direct the public. No-notice evacuations require a significantly different approach to planning than advance-notice evacuations because they will be based on a set of capabilities and strategies that will likely be more limited in the time and resources available for implementation. This section provides a general overview of the likely scales and consequences of no-notice incidents and also provides examples of such incidents. The unique issues and problems associated with no-notice incidents are discussed in Section 4, Considerations in a No-Notice Context.

DEFINITION

No-notice incidents may be natural or manmade, can be localized or widespread, and have a variety of primary and secondary consequences. Some examples of no-notice incidents include earthquakes, tsunamis, chemical spills and explosions, blackouts, and terrorist attacks. It is also possible that incidents with typically predictable patterns can become no-notice incidents when their behavior differs from what is expected. An example is a wildfire that breaks a fire line and moves toward a populated area.

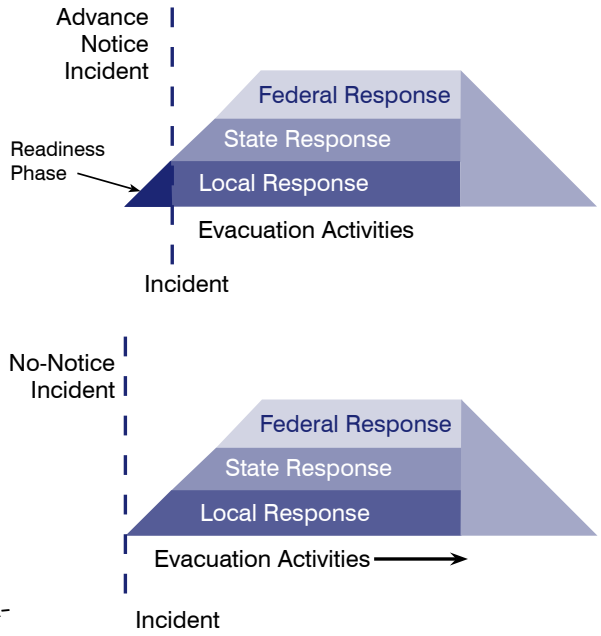


Figure 3.1. Advance Notice Versus No-Notice Activities.

Due to the nature of no-notice incidents, rapid assessment and response to the incident is critical to successful evacuation operations. As Figure 3.1 shows, no-notice evacuation

decisions follow the onset of the precipitating incident and require quick activation of support activities, regardless of the type or scale of incident.

LOCALIZED INCIDENTS

The majority of incidents that precipitate a no-notice evacuation occur within a very local area. These are typically manmade, whether accidental or intentional, and occur most often in urbanized locations. Examples of such incidents include structure fires, gas leaks, chemical spills, transportation accidents, and terrorist attacks involving conventional explosives. Some natural incidents, such as sinkholes, tornadoes, and flashfloods, also affect only a small area.

Evacuations from a localized area are, by nature, smaller in scope. This may be limited to the population of a single building (in which case centralized coordination of an evacuation is likely unnecessary) or range up to the evacuation of an area of 10-15 city blocks. Usually, at-risk populations are smaller, and evacuees typically need to be moved only a short distance to be safeguarded against the precipitating hazard. Evacuation routes, assembly areas for evacuees, and sheltering facilities are also smaller and less resource-intensive than in a wide-scale evacuation. Localized evacuations typically have certain characteristics that should be considered during preplanning and preparation.

The types of localized incidents that precipitate an evacuation will almost always involve on-scene activity by emergency response personnel, separate from any efforts underway to execute an evacuation. Whether extinguishing a fire or containing a hazardous leak or spill, personnel from fire, law enforcement, and other response agencies will respond to the precipitating incident. Because of the nature of a localized incident, first responders will often have to gain entry into the site from which citizens are being evacuated. The need of first responders to gain access to the site with vehicles and equipment, and to move freely as they operate on-site to eliminate the hazard, may complicate or interfere with the management of the evacuation.

WIDE-SCALE INCIDENTS

Larger incidents may affect an entire city or region. These can be either natural or manmade and have a variety of primary, and often secondary, consequences. Examples of wide-scale, no-notice incidents

that would likely require a sizeable evacuation include earthquakes, tsunamis, chemical releases that result in a large moving toxic cloud (plume), explosions at specialized sites such as liquid natural gas facilities, and terrorist attacks using unconventional explosives (e.g., radiological dispersal devices).

Evacuations that result from such incidents will likely involve a tremendous number of evacuees, possibly from more than one jurisdiction, who need to move from the at-risk area(s). This will require intensive efforts on the part of emergency managers, first responders, volunteer staff, and transportation personnel to coordinate, transport, and shelter the affected populations, and therefore will place great demands on staff and resources. Some local agencies may not be adequately prepared with sufficient resources to address a wide-scale no-notice situation. Moreover, the emergency response staff may be among those directly affected by the incident and may be unavailable to assume their duties.

With wide-scale incidents, first responders will likely be spread out through the entire affected area, even if large portions of available first responders are focused on specific problems (such as collapsed buildings) or large numbers of injured people who need immediate medical attention. As such, even though first responders are likely to be working at one or more critical locations and their localized activity should not directly hinder the corresponding wide-scale evacuation, they may not be available to help support the actual evacuation effort. This element will vary greatly, depending on the nature and severity of the precipitating incident. Furthermore, first responders' primary role is life saving/sustaining activities; as a result, transportation operations staff – including full-function service patrols – may be handling first-response-type activities at highway incident scenes until additional support resources arrive.

Large incidents that precipitate a wide-scale evacuation typically cause widespread damage (through both primary and secondary effects) and are therefore more likely to compromise critical infrastructure in a manner that hampers evacuation movement. Particular elements of the transportation system, such as bridges and tunnels or even the highway or subway systems, are more vulnerable to damage from seismic and explosive incidents, rendering them unsafe for use. If these

POTENTIAL NO-NOTICE EVACUATION TRIGGERS

- Earthquake
- Tsunami
- Tornado
- Train Derailment
- Structure Fire
- Gas Leaks
- Terrorist Attacks
- Hazardous Materials Spill

sites are located on evacuation routes, those routes may be unavailable, and alternatives will need to be identified using preplanning data and incident-specific information. In cases where the transportation network is severely restricted by such damage, sheltering in place may be a better short-term alternative for at-risk populations until evacuation routes can be restored for use. During the response, highway engineers and highway operations personnel will likely perform a wide range of activities, such as structural integrity assessments, situation assessments, debris clearance, traffic incident management, etc.

Localized Incidents	Wide-Scale Incidents
Affect small area	Affect city or region, widespread damage
Localized evacuation	Large-scale evacuation
Smaller, less resource-intensive evacuation effort	Resource intensive, likely will involve multi-jurisdictional response
Structure fires, gas leaks, vehicular accidents, flashfloods	Earthquakes, radiological dispersal devices, chemical releases involving a plume

PRECIPITATING INCIDENTS AND ASSOCIATED ISSUES

The types of incidents that result in no-notice evacuations often have certain characteristics that may complicate the execution of an evacuation. Some of the following elements have been introduced above, but it is important to highlight these individually.

- Details as simple as the ***location and nature of an incident*** and the ***time of day*** in which it occurs could affect the size of the affected population greatly. In downtown areas of large cities with high-rise buildings, even an evacuation of only one or two blocks may involve the movement of thousands of people. In contrast, incidents in less densely populated areas or at remote locations will likely affect fewer people, therefore requiring a smaller response. Evacuation planners will need to anticipate the types of areas and populations affected by their plan.

- On-scene ***emergency responders*** may be present at a site from which at-risk people are being evacuated. These responders' ***primary function*** may be to address the ***life saving and sustaining missions*** caused by the precipitating incident, ***as opposed to directly supporting the evacuation***. They will often need access to the site for their equipment and vehicles. An inbound right-of-way needs to be established, running in opposition to the evacuees' direction of movement. Furthermore, the responders' presence and activities at the site may unintentionally obstruct or hinder the movement of evacuees away from the danger.

- The precipitating incident may create ***potential hazards to responders***, which ***prevent or delay them from assisting evacuees***. Threats such as toxic contamination, radiological exposure, and structural instability will require responders to implement specialized protective measures that slow and reduce the effectiveness of their activities. This will result in an evacuation effort that is more complicated and takes more time to execute, putting evacuees at greater risk.

- ***Contamination*** in the affected area may impose severe restrictions on the movements of evacuees and responders. People who have potentially been contaminated will need to be isolated from unaffected populations to avoid the spread of harmful agents. ***On-site mass decontamination units*** will likely be needed to screen victims (and exiting responders) before they can be transported and sheltered with the general population. Such activity will slow the movement of such victims from the at-risk area to shelter or care facilities.

- Large-scale incidents have potentially significant ***effects on the systems and infrastructure needed to coordinate and execute an evacuation***. These may affect transportation networks and responder resources, as well as command and communication facilities. Damaged bridges and tunnels may be rendered unusable, eliminating key evacuation routes. Shelters and other destinations for evacuees may be damaged or destroyed. ITS equipment such as traffic cameras and DMSs may be non-operable after sustaining damage during the incident. EOCs and TMCs are also susceptible to damage or to being rendered inoperable by the loss of power or communications systems. Communication networks may cease to function if key relay points are damaged.

SUMMARY

No-notice incidents can occur at any time under any circumstances, and can affect one block of or the entirety of a jurisdiction. Evacuation personnel will not have sufficient time to directly prepare for a specific incident due to limited warning; they must clearly understand the challenges posed by a no-notice incident and its resulting evacuation to best produce an effective response.

4 CONSIDERATIONS IN A NO-NOTICE CONTEXT

Little- or no-notice incidents and resulting evacuations produce a distinct set of challenges for those personnel involved in responding to the incidents or executing the evacuations. Transportation professionals, emergency managers, first responders, and local governmental decision makers must address these challenges in advance of needing to implement an evacuation. The focus of this section is to provide an understanding of the unique issues associated with no-notice incidents. Section 5 addresses the planning considerations that can be used by evacuation personnel to alleviate these challenges.

LIMITED READINESS PHASE

The most significant challenge posed by no-notice evacuations is that they do not provide emergency managers and transportation personnel with the opportunity to prepare in immediate advance of the incident. The limited amount of time between when the precipitating incident occurs and when a no-notice evacuation is initiated means that there will be little or no Readiness Phase. The lack of a Readiness Phase means that responders will be forced to rely on their existing capabilities, experience, and level of preparation.

Responders will be unable to pre-activate or pre-position resources in preparation for the specific situation mandating the evacuation. Government officials must weigh the costs and benefits of evacuating populations based on very limited information (damage and predictions for imminent secondary events, such as after-shocks). Preplanning activities, conducted as part of general operations well in advance of the need for an evacuation, are critical to a successful evacuation effort and are among the most important factors in minimizing the effects of no-notice incidents. These activities include planning, procurement, staff training, and public education efforts.

Due to the limited or non-existent Readiness Phase in a no-notice scenario, evacuation plans and any supporting protocols that require a significant "ramp-up" period will be rendered unusable or, at a minimum, greatly reduced in effectiveness. This applies to such elements as the establishment of a command structure, the activation of an operations center, or the tasking and distribution of personnel and resources to manage the evacuation.[3] Key decision makers will have little time

[3]Since 9/11, many local, State, and Federal governmental entities maintain a base 24-7 operation in their EOCs to ensure rapid command, control, and operations following quick-onset events, including terrorist events.

Source: FEMA/Jocelyn Augustino.

to assess the available information and make a decision about how to respond to the situation. They may be required to decide whether to declare an evacuation before they have all the necessary information to do so as planned.

Also, emergency responders will have no or limited time to familiarize themselves with the evacuation plan and consider its implementation after a no-notice incident. If critical staff have insufficient training and have not participated in exercises involving the plan, the plan's effectiveness will be greatly reduced. To increase the plan's effectiveness, it is essential that transportation operations personnel be included in exercises and training with other first responders.

LIMITED INFORMATION

After a no-notice incident, emergency managers will most likely work with limited information to assess the situation. There will be no time for a thorough assessment to take place before decision makers have to decide if and how they will implement an evacuation.

Emergency management and transportation officials will need to be prepared to act with imperfect situational awareness. This implies that they may not know the status of all components of the transportation network, including whether any critical sections are inoperable. Officials may also not have a full and accurate inventory of the personnel and resources available to support the evacuation effort. Decisions will most likely rely heavily on the estimates determined during preplanning, using the limited real-time information received as a guide. While the situational awareness deficiency may improve over time, officials will be forced to make the best decisions they can based on whatever information is available to them at the time.

This issue highlights the importance of two aspects of information management. First, information that is prepared and analyzed in advance becomes critical in a no-notice scenario; data such as population estimates (daytime and nighttime), locations of those with special needs, demographics on the number and location of individuals depending on transit, vulnerabilities in the transportation network, and resource inventories all help to improve the decision-making process during the evacuation. Second, effective and resilient information and communications systems and protocols will greatly improve the

availability of accurate real-time information after a no-notice incident. Agencies' abilities to improve overall situational awareness by collecting and sharing information quickly will enable better decisions.

Once a no-notice incident occurs, damage assessments will contribute to a more accurate operational picture, and tactical operations will have to be highly flexible in order to adjust. ITS tools used on a day-to-day basis may also be extremely useful for obtaining a rapid assessment of the transportation infrastructure after an incident. TMC staff should be tapped by the EOC to interpret and report on visuals from traffic cameras that are still operational throughout the area. These cameras, augmented with security cameras and immediate windshield surveys by first responders and full-function service patrols on the ground, are often overlooked resources, but may be critical to obtaining a rapid snapshot of ground conditions and infrastructure damage that will cause operations, including evacuation efforts, to change.

Source: FEMA/Jocelyn Augustino.

FLEXIBILITY AND COMPROMISE

In the immediate aftermath of a little- or no-notice incident, responders likely will need to conduct an evacuation under less than ideal circumstances due to the time criticality inherent to life saving/sustaining situations. This means that although officials will conduct the evacuation to the best of their abilities, it may still fall short of their expectations because of the challenges posed by no-notice evacuations. Flexibility, good information sharing, and quick decision making will be required to adapt to limitations imposed by the incident, and compromises will need to be made to support some of the evacuation's primary goals – particularly evacuating the at-risk population away from imminent danger.

Emergency managers, first responders, and transportation officials must be willing to use imperfect, short-term measures in the interest of timeliness. They may employ tactics that address an immediate need: the safety of evacuees may have to become the priority over their comfort, with the primary concern being the movement of evacuees from imminent danger. For example, evacuees in cars may need to be directed onto highways and other routes that will enable them to travel out of the at-risk area but then require them to spend a significant amount of time in gridlock, instead of being able to continue on to their destinations right away. While this may not be an ideal solution,

it accomplishes an evacuation's main goal of moving citizens out of an at-risk area.

In mounting a response that returns the transportation systems back to operational status as soon as possible, transportation agencies will need to have contracts in place with contractors and vendors that allow them to secure needed resources. Otherwise, there needs to be a willingness to enter "handshake" agreements that will result in actions to restore mobility and repair infrastructure damaged infrastructure as soon as possible.

Depending on the magnitude of the no-notice incident, evacuees may need to spend time at an interim destination in a safe location outside the at-risk area if long-term sheltering is not yet available. Interim sheltering sites may have insufficient food, water, and supplies to be much more than stations where people must spend a few hours before relocating to adequately equipped sheltering locations.

Emergency managers, first responders, and transportation officials will need to accept and implement a steeper triage curve in the assistance they provide to evacuees. Normal response agencies (fire, police, and emergency medical services) will likely need to respond to the precipitating incident and its aftermath, and may not be available to help support the evacuation effort. Limited response resources will have to be tasked in a manner that is most effective for those who require additional or specialized assistance. Some evacuee populations – such as healthy people who do not have access to a personal vehicle – who might have timely access to transportation services under an advance-notice scenario may need to be more self-reliant or endure a longer wait for transportation during a no-notice evacuation in which fewer vehicles are available to offer transport.

FEASIBILITY OF TACTICS

As part of the evacuation planning process, transportation officials – in consultation with emergency managers and first responders – will identify traffic management tactics for use during an evacuation to improve traffic flow and minimize congestion. These may involve a wide range of methods, particularly adjusting the timing of traffic signals, closing highway on-ramps and off-ramps in key locations, and insti-

tuting contra flow on some roadways. All of these tactics, however, require time, effort, and, in many cases, specialized systems and resources to implement, and may not be available to support an evacuation immediately following a no-notice incident. Some strategies, such as contra flow, require three to five hours to set up, and may not be a viable option. Many jurisdictions view extreme tactics, such as contra flow, as a last resort for this specific reason. Evacuation plans need to anticipate the unavailability of certain tactics in a no-notice scenario. Requirements for implementing traffic management strategies need to be well understood and actions to minimize these issues should be considered.

Source: FEMA/Dave Gatley.

Because some traffic management tactics may take too much time to implement in the immediate aftermath of a no-notice incident, other tactics will have to be utilized until the traffic management tactics are brought up and running. This limitation will vary greatly, depending on the specific tactics being considered and the circumstances of the incident that precipitates the evacuation.

For all intents and purposes, traffic management tactics that require substantial time or empty roads to implement are much less feasible options for no-notice evacuations. Because severe time constraints are inherent in a no-notice scenario, emergency managers and transportation officials cannot employ the tactics before evacuation traffic starts to load the transportation network.

There are also instances where the actions of evacuees might interfere with transportation's response. In some cases, individuals may initiate their own uncoordinated exodus before an evacuation is declared. This could be especially troublesome when a phased evacuation is identified as the best course of action. If evacuees flood the roadways and evacuation routes in a chaotic manner, this may lead to a further burden on an already overtaxed transportation system.

SHELTERING IN PLACE

Decision makers must recognize that there are situations in which the timeframes dictated by a no-notice incident do not allow for evacuations, or that evacuations may put the affected population at greater risk. They must weigh the dangers of telling populations to shelter in place against the known or unknown risks of moving in the immediate

aftermath of an incident. The nature and scope of the precipitating incident may generate hazards that pose a serious threat to the at-risk population if an evacuation occurred. Examples of such risks are compromised transportation infrastructure, impacts of aftershocks, the presence of toxic or radiological contaminants (particularly a plume), impending weather conditions, and secondary fires and explosions. In such situations, having at-risk populations shelter in place with basic protective measures may be a more viable and safer option.

The use of sheltering-in-place to reduce the number of people who become part of an evacuation stream or who need to be moved by public transportation is an option that emergency managers can consider, but only if the present location affords adequate protection against the particular incident. This decision may have unintended consequences and risks for those ordered to remain inside and for the decision makers. For example, a Louisiana nursing home staff's decision to shelter in place during Hurricane Katrina resulted in considerable loss of life among the residents when water filled the structure, and manslaughter charges were brought against the facility's owners.[4] The incident's influence on basic human necessities – such as potable water – must be considered when deciding whether citizens should evacuate or shelter in place.

The proportion of the at-risk population that will stay or evacuate is not easily predicted. Activities related to implementing an evacuation may need to be performed, even if sheltering in place is recommended or ordered, since spontaneous evacuations and changes in the threat situation may require reassessment of the protective action strategy. At-risk populations may also decide to disregard instructions to shelter in place, based on a mistaken belief that it is safer to evacuate.

Shelter-in-place activities can be short-term or long-term, depending on the particular circumstances of the incident, the degree of safety risks to the population associated with the incident, the resulting traffic congestions, and the resources available to support the shelter-in-place

[4]"Katrina Nursing Home Owners Acquitted in Patients' Deaths." http://www.cnn.com/2007/US/09/07/katrina.nursinghome.deaths.ap/index.html.

population. Those services that would be provided at a shelter should also be supplied to those sheltering in place. As such, service providers, including health care workers, feeding staff, etc., must be able to travel around the affected area safely.

Source: FEMA/Win Henderson.

CONSIDERATION OF CONTAMINANTS

Some incidents that lead to evacuation generate associated hazards that can contaminate people, vehicles, and structures. The nature of the contaminants will vary with the nature of the incident and its cause, and different contaminants may require different approaches to exposure, decontamination, and treatment. Of particular concern to emergency response personnel are terrorist attacks that involve chemical, biological, radiological, nuclear, or explosive (CBRNE) devices. Some of these attacks are designed to cause immediate casualties and damage as well as to disperse harmful substances that will continue to harm victims and prevent the use of the affected zone.

The presence of contaminants in an at-risk area will greatly complicate the execution of an evacuation. Evacuees will be limited in their ability to move through the affected area safely. Responders may not be able to enter the area without subjecting themselves to an unreasonable level of risk, or may need to wear and use specialized personal protective equipment to protect themselves. Potential evacuees may have no means of leaving their locations without becoming contaminated. In such scenarios, sheltering in place must be considered as a potential short-term strategy for minimizing casualties if the situation and available resources are appropriate.

Evacuees who may have been exposed to harmful substances will need to be quarantined to prevent the spread of contamination to unaffected locations and populations. Decontamination of evacuees, requiring specialized screening and cleaning resources and expertise, may be necessary before evacuees are transported to advanced care and sheltering facilities. The more the population is dispersed throughout a contaminated area, the more complex the decontamination operation and medical treatment and tracking systems will be when people are able to leave.

Evacuation managers also need to anticipate that some evacuees will disregard orders to shelter in place and will self-evacuate before the na-

Source: FEMA/Bob McMillan.

ture of the contaminant is known. Procedures will be needed to notify potentially contaminated evacuees, identify and locate them to the greatest extent possible, and quarantine them as soon as possible before they contaminate others.

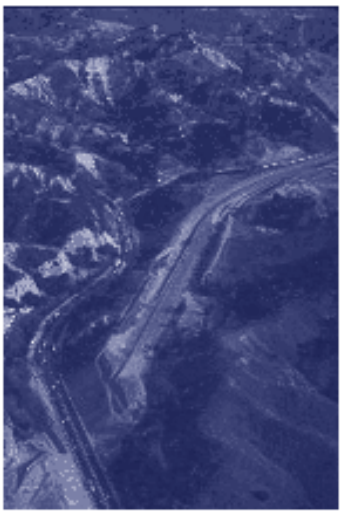
COMPROMISED INFRASTRUCTURE

Large-scale incidents may have significant impacts on critical infrastructure elements, rendering them damaged or otherwise unusable. Disaster scenarios such as severe earthquakes and major explosions involve large areas of destruction that may encompass the systems and resources needed to execute an evacuation. Vulnerable infrastructure often includes components of both the transportation network as well as assets that will be used to coordinate and manage the evacuation effort.

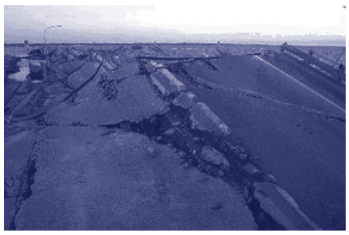
Certain precipitating incidents will likely cause significant damage to parts of the transportation network. Structures such as bridges and tunnels which are particularly susceptible, are at the same time critical links in a jurisdiction's network. The damage or destruction of these types of sites may prevent the use of certain evacuation routes until they can be repaired. Even if these sites are undamaged, they should not be used until their structural integrity has been verified through inspections conducted by qualified personnel. Transportation planners and emergency managers should be prepared to close hazardous or questionable routes, and will need to anticipate what routes are likely to be unavailable. While DOTs have in-house structural engineers that can validate the integrity of roads, bridges, or public transit networks, a significant amount of time may be required before such inspections can be completed and the routes can be approved for use because of the limited resources and staff available immediately following a no-notice incident.[5]

[5]Caltrans' response following the Northridge earthquake provides a best-practice model of an agency's quick response following a no-notice event, in terms of rebuilding the impacted highway infrastructure and providing mobility. On the same day that the event occurred, Caltrans demonstrated flexibility in its response and set a number of actions in place to begin repairing highway and bridge damage. Knowing that obstructions and debris must be cleared, damaged facilities shored, and detours established, Caltrans made "handshake" agreements with contractors on work assignments and tentative payment methods. By 7:00 p.m. the first night, the first contracts were in place and work had already begun on I-5 and I-10 demolition.

Critical emergency management and transportation operations assets, including ITS cameras, DMSs, etc., may also be damaged or destroyed during a large no-notice incident. This will greatly limit the capabilities of emergency responders to collect damage assessment and situational awareness information, to target and coordinate their response efforts, and to manage the evacuation. Planned sheltering sites and building may be destroyed or contaminated. Facilities such as EOCs and TMCs are vulnerable to the same threats as any other buildings and can be destroyed or rendered inoperable by loss of power or of the communications capabilities necessary for them to function as designed. The power grids, as well as many communications systems, rely on extensive networks of equipment, wiring, relay stations, and other resources. As past incidents have demonstrated, the loss of even minor nodes or equipment can disable an entire network. For this reason, many of these facilities and systems are designed to be more resilient through the use of redundant components; nonetheless, their loss can still occur. In addition, any continuity of operations plans must be coordinated with transportation agencies in consideration of the continuity of the transportation operations and infrastructure efforts, in case they are moved to alternate sites. More and more, many communities plan to use their TMCs as alternate EOCs, often because they are located outside of areas that are most likely to be impacted by an event, such as a terrorist attack or hazardous materials spill.



Source: FEMA News Photo.



Source: FEMA/Mark Wolfe.

Transportation and emergency managers will need to assess the infrastructure and systems on which they rely to identify and address critical vulnerabilities. Contingency plans should anticipate weak points in the transportation network and response infrastructure and include provisions for their possible loss.

LIMITED RESOURCES

The effective execution of an evacuation and sheltering effort requires a significant amount of diverse resources. Different assets and tools are needed at different stages of the operational phases, each with its particular role in the overall process. Examples of key resources include:

- Personnel with particular skills and knowledge, the ability to analyze information, and the ability to communicate situation status or needs
- Situational awareness tools to determine and monitor the status

of the transportation network, such as traffic counters and traffic cameras
- Command facilities such as EOCs and TMCs
- Decision support tools and models
- Communications systems for the sharing of information both within and between agencies and organizations
- Advance Traveler Information Systems (ATIS) for sharing information with the public, such as 511 systems, DMSs, and traffic and transit Web sites
- Vehicles to transport personnel, evacuees, and supplies
- Fuel, food, water, and other supplies to support evacuees
- Barriers, cones, and other devices to divert and direct traffic

An absence or shortage of these types of resources can significantly hinder certain phases of operations during an evacuation.

No-notice incidents and the need for immediate response activity, including evacuation, leave little time to procure and position needed support resources after the precipitating incident occurs. For the early phases of response, if not for significantly longer periods of time, emergency managers and transportation officials will have to rely on the assets and resources at hand, namely those that are used in their daily operations or are pre-positioned on a more or less permanent basis. Since many assets, such as vehicles and specialized equipment, are often stored in remote locations or assigned elsewhere during normal operations, they may not be available right after an incident occurs. The limited immediate availability of personnel and equipment to support the evacuation effort emphasizes the importance of identifying needed resources in advance and planning for their availability through procurement and logical pre-positioning.

The emergency management structure will likely face the same types of challenges for staffing. Many personnel may be off-duty and located outside the area at the time the precipitating incident occurs. These people may be unable to report to their duty assignments for a variety of reasons: they may be prevented from traveling into the affected area to reach the management facilities due to travel restrictions imposed as part of the emergency response; they may have been injured in the pre-

cipitating incident; or they may be trying to meet their personal needs by protecting their own families and property. These limitations will apply to all levels of personnel, from field workers up to command-level staff persons.

Planners and response personnel need to anticipate that their resources will likely be limited to "everyday" staffing and supply levels. As a consequence, plans must be structured in a way that minimizes the reliance on particular individuals, facilities, and specialized equipment.

BEHAVIORAL ISSUES

Evacuees and responders will likely behave differently in a no-notice incident scenario than they would after an incident with advance notice. Anxiety and confusion will be generated by the uncertainty of the situation, the sense of acute risk, and the need to react quickly to developing incidents. Planners need to anticipate that responders' and evacuees' behaviors will impede the smooth execution of the evacuation plan.

Some portion of the population will likely undertake a self-initiated evacuation before receiving an evacuation order if they believe they are or will be at risk. This means that many people who are not at risk may evacuate even though they do not need to, potentially placing themselves at risk and increasing the size of the evacuation population, thus contributing to overall congestion in the transportation network.

There will also be self-motivated actions that conflict with the evacuation plan. Some percentage of the at-risk population will likely attempt to travel in a direction or manner that does not conform to the evacuation plan's intended traffic flows: parents will attempt to retrieve their children from schools or home-bound relatives in other parts of the affected area; people will generally try to head to their homes or those of friends, even if they are in the "wrong" direction; and people may try to use modes of transportation that are intended to be limited to certain routes or locations. This will generate some level of traffic that crosses or conflicts with evacuation routes.

There may be a refusal to follow a 'phased evacuation,' in which smaller

EXAMPLES OF TRANSPORTATION RESOURCES USED

- Personnel
- Buses
- Construction Equipment
- Cones
- Tow Trucks
- DMS
- Traffic Control Devices
- Barricades

zones of the at-risk region are evacuated sequentially to minimize traffic congestion. Many people, due to an acute sense of personal risk, may not wait for their turn to evacuate even if it would be safer or more effective for them to do so.

In addition to self-evacuations, there are some portions of the at-risk population who may refuse to evacuate at all, even after being ordered to do so.[6] A 2007 study, conducted by the Harvard University School of Public Health among residents in high-risk hurricane areas, found that 31% of people surveyed may not evacuate even when told to do so. The reasons for not doing so were varied: belief that they would be safe at home; desire to protect their property; uncertainty that they will be able to travel safely; or a lack of confidence that they will be able to be sheltered elsewhere. Some portion of the at-risk population may procrastinate until it is unsafe to evacuate. People may judge the threat to be less severe than it is, or may be worried that evacuating poses more of a risk or inconvenience to them than staying in place. As the situation escalates, however, they may decide later to evacuate, even though it has become much more dangerous to do so. Their delayed attempts at evacuation may also place the first responders who assist them in greater danger as well by prolonging their time in the at-risk area. Plans for evacuations that are deemed mandatory by officials will need to incorporate a means of sweeping the affected area and of enforcing the evacuation order.

First responders and emergency personnel might also be affected behaviorally by a no-notice incident. Responders' private considerations may interfere with the performance of their duties. They may live in the affected area and have family members, friends, and property they feel compelled to assist and protect. Their sense of personal duty and concerns about personal matters may interfere with their ability to carry out their professional responsibilities as part of the overall evacuation effort.

[6]For study overview information and links to data, see www.hsph.harvard.edu/news/press-releases/2007-releases/press07242007.html.

There are many unique issues associated with no-notice incidents. These challenges must be considered before an incident occurs in order to enable a response in the most effective manner. Section 5 provides planning suggestions that can be used by evacuation personnel and transportation officials to alleviate the unique challenges posed by a no-notice incident and its resulting evacuation.

5 PLANNING CONSIDERATIONS

By preplanning and resolving issues ahead of time, officials can ensure that the resulting plan is more likely to be actionable and successful under a broader range of no-notice evacuation scenarios.

CONCEPT OF OPERATIONS

In the planning process, the concept of operations (CONOPS) is the set of guiding principles that establishes an operational framework for the evacuation plan. It is intended to address high-level issues such as the command structure, the respective roles of participating agencies, and the approach to communications and situational awareness that will enable coordinated response activity.[7] In most jurisdictions, emergency management agencies have developed a CONOPS for emergency response, and transportation planners should work with those agencies to understand the local approach to CONOPS and use it as a foundation for the evacuation plan.

Today's CONOPS must be cast within the framework of NIMS and the NRF. While the emergency management and first responder communities are accustomed to using NIMS precepts and terminology, the transportation operations community is new to the world of NIMS. There are many tools available from both FHWA and the Department of Homeland Security that may aid transportation staff in understanding NIMS and the NRF.[8]

For an effective evacuation plan, the CONOPS needs to be structured in a way that will support evacuation managers while taking into consideration the limitations imposed by a no-notice scenario. Most CONOPS are designed to be simple and adaptable to facilitate implementation in response to a wide variety of precipitating incidents. Simplicity and adaptability are of critical importance in the success of a no-notice evacuation. The CONOPS will need to anticipate many of the limitations detailed in Section 4, Considerations in a No-Notice Context, in this Primer. It should provide for immediate activation and expedited decision making with imperfect information and limited operational resources.

[7]See p. 23 of *Using Highways During Evacuation Operations for Events with Advance Notice* from this Primer series for additional information about CONOPS development.

[8]See ops.fhwa.dot.gov/publications/ics_guide/index.htm, www.fema.gov/emergency/nims, and www.fema.gov/emergency/nrf/.

Evacuation planners must ensure that the CONOPS focuses on the transportation elements of an evacuation. In most cases, emergency management CONOPS are primarily concerned with first responder and law enforcement activity. Given the significance of transportation to an evacuation effort, this approach may need to be modified. To become more engaged in the planning process, transportation planners knowledgeable of transportation operations must establish a dialogue with the first responder communities (police, fire, and emergency medical) to expand their perspective on the role of transportation and must ensure that evacuation transportation is developed beyond its typical role as a conduit simply for the movement of people. Certain components are viewed as part of the first responder communities (e.g., service patrols used in Traffic Incident Management operations) and transportation agencies have made considerable investments in communication and information transfer technologies and systems. Therefore, an understanding must be reached among these agencies that will lead to joint planning and leverage technological, infrastructure, and staffing investments made by the transportation community to more effectively manage traffic, congestion, and incidents via the collection and distribution of real-time information. As part of developing (or rethinking) the CONOPS, invested parties need to consider the availability of transportation resources so that the CONOPS reflects the full capabilities – including those available through the DOTs – that may be used to support an evacuation. Planning conversations need to stress integration of the information and communication systems of transportation, first-responder, emergency management, and even homeland security, as well as those of TMCs and EOCs, and the importance of creating redundant or shared systems for maintaining lines of communication and situational awareness.

Flexibility is critical to successful evacuation efforts. The CONOPS should be designed to compensate for critical gaps in the preparation process resulting from the minimal or non-existent Readiness Phase of operations after a no-notice incident. Where possible, redundant measures and resources should be implemented to compensate for likely shortfalls of staff, equipment, or resources. No resource should be included in the plan without validation of its availability from the parent organization. In some cases, memoranda of understanding or mutual aid agreements may need to be established to ensure rapid access to external resources supporting the evacuation operations team.

The CONOPS sets the tone for the entire evacuation plan and should emphasize how the process it establishes can be successfully activated in response to a no-notice incident.

Source: FEMA/Greg Henshall.

COMMAND STRUCTURE

A robust command structure greatly improves the response capabilities of emergency management agencies to all kinds of incidents. It facilitates centralized decision through review of current information, coordinated response activities among multiple agencies at different levels of government, and the flexibility necessary for adapting to changing circumstances.

In a no-notice evacuation scenario, evacuation managers need to rapidly establish an appropriate command structure that will enable an effective response to identify, move, and safeguard the at-risk population. This is much more likely to occur successfully if a jurisdiction has established a clear set of protocols and procedures with regard to how an emergency response command structure will be initiated, organized, and implemented across multiple agencies and jurisdictions.

The transportation community should not expect to play a lead role in establishing and managing a command structure; however, it needs to be familiar with how the structure works, the hierarchy that will be followed by first responders, and the protocols and standard operating procedures that will be employed. It may be called upon to serve a role in a Multi-Agency Coordination Group, as defined by NIMS and depending upon the importance of transportation to the evacuation process. Many instances exist in which transportation staff, particularly highway incident response and maintenance crews and transportation management staff, are the first to detect and respond to an incident. They need to be able to provide valuable, real-time situation status and damage reports, assess conditions and needs, and make decisions that will trigger a local or regional notification process. This requires that transportation and first responder staffs be familiar with their roles and responsibilities in an evacuation, how best to engage one another during an incident, and how to support interoperable communications. TMCs, such as Houston Transtar and those operated by Caltrans, are examples of successful endeavors to integrate and cross-train members of these disciplines. Transportation personnel who need to understand the incident command structure and engage with first respond-

ers include transportation planners and operations staff, district and county engineers, transportation management staff, dispatchers, and roadway crews. This requires defining methods for coordination and communication with emergency management staff and first responders and becoming familiar with NIMS, communication protocols, and standard operating procedures.

The following actions should be considered for inclusion in the plan development process, to ensure that the command structure used during an evacuation will be prepared to support the operational requirements of a no-notice evacuation:

Identify all entities – The command structure will, by necessity, depend on the agencies and organizations that it oversees. Many emergency management and law enforcement entities have already established command protocols that work well for them during emergencies. An evacuation, however, will involve a broader range of participants, some of whom will likely not be experienced with formal command structures in an emergency context. Evacuations require a diverse set of resources that will require the involvement of entities such as transportation agencies (public and private), public works departments, schools, hospitals, towing companies, and other service providers. The overarching command structure should be compatible with the respective command structures and operating procedures of all entities to ensure their full involvement. In most cases, the overall command structure will follow the guidance set forth in the jurisdiction's Emergency Management Plan, and will likely be coordinated through the emergency management department.

Pre-determine authorities – Every jurisdiction has its own enabling legislation regarding the authority of different parties in emergency situations. Evacuation planners should clarify and document these as part of the command structure development and include them in the CONOPS.

- Which officials/agencies have the authority to declare an evacuation within a given jurisdiction?
- Does an agency's or official's authority vary depending on the scope, location, or circumstances of the precipitating incident?
- Are there requirements regarding a Declaration of Emergency, before a wide-scale evacuation can be initiated?

- Which officials and agencies are given the authority to coordinate an emergency response, including an evacuation?
- What authorities and powers do the transportation agencies have?
- How can these be used to expedite an evacuation?
- What procurement authorities exist and how do they differ under emergency circumstances? For example, can the acquisition process be streamlined during exigent situations?
- Will mutual aid or other resource support agreements be activated? If so, how will this be accomplished and how will the resources be used in the command structure?

Resolving these questions before an incident occurs will allow a jurisdiction to respond immediately without having to wait for a legal interpretation on which individuals/agencies have the authority to make such decisions. This is especially important because, with a no-notice incident, an immediate response could be the difference between lives saved and lives lost. No decision maker wants inaction to be a contributing factor to the loss of life of citizens; addressing issues of authority in the preplanning process will mitigate this possibility.

Identify levels of command – The command structure may need to accommodate multiple levels of command depending on local practices. Many jurisdictions employ a multi-tiered structure to facilitate overall coordination at a city- or jurisdiction-wide level while also using on-site command to coordinate emergency response activities. The command structure of the evacuation plan should be consistent with, or at least compatible with, established protocols in this regard. The plan should consider how transportation agencies will fit into this structure and how the activities which they will be conducting during an evacuation correspond to the different levels of command.

Establish command transfer protocols – Over the course of a large-scale emergency, particularly one affecting multiple jurisdictions, it is likely that overall command of the evacuation management will transfer between agencies over time so that command and management activities are always conducted by the agency with the proper authority, expertise, and resources for the given circumstances. Evacuation planners can set parameters to determine which agency will be in command of an evacuation under each set of conditions or circumstances; relevant factors include the geographic scope of the evacuation and the types of staff and resources involved in the response. This will help

In most jurisdictions, the local emergency management agency or department has the authority to coordinate an emergency response, including an evacuation, but the legislation may vary. Some locales assign this authority to the mayor or City Hall, some delegate this authority to an emergency management agency.

establish a clear protocol which agencies can use during an evacuation to understand how and why command will be transferred, thus maintaining a clear hierarchy within the overall command structure. Procedures for transferring command should also be prepared; these will enable incoming commanders to quickly get a full understanding of the situation and the response efforts to date.

Adhere to the NIMS – NIMS is a comprehensive national approach to incident management, applicable at all jurisdictional levels and across functional disciplines, which improves the effectiveness of emergency response. It comprises a set of operating principles and guidelines designed to provide a consistent approach to incident response management and improve the ability of agencies to work together effectively and efficiently. It is recommended that the evacuation plan be developed in accordance with NIMS principles and protocols. Of particular importance is ICS, which establishes a standard organizational structure for incident management and which is particularly important during an evacuation involving many different types of agencies with varying levels of experience in emergency management and response. NIMS and ICS will help foster better coordination among such agencies.

Establish situational awareness and communications protocols – It is critically important that the agencies and officials in command roles during an evacuation have access to data about the current state of events, as well as the ability to communicate that information and operational orders to the other agencies and organizations under their command. Collection, processing, and sharing of data on a rapid, real-time basis should be integrated as key activities of the overall command structure, and the CONOPS should be designed to support these goals. This will include the status of the transportation network and the systems and resources supporting it, meaning that transportation agencies need to consider how they can contribute to overall situational awareness and communications capabilities, as well as what their needs will be during an evacuation.

STAKEHOLDERS

A large-scale evacuation is a highly resource-intensive undertaking. It requires significant staffing, facilities, and equipment to collect and

coordinate information, establish a management structure, coordinate evacuation activity in the field, and activate and operate sheltering facilities. Evacuation planners will benefit greatly from leveraging all of the available resources within their service area during an evacuation. The majority of these resources will be provided by specific agencies, organizations, and private-sector entities, all of whom will be participating in the evacuation effort in one way or another. Through the involvment of all relevant agencies in the planning process, it will become apparent which agencies are best equipped to handle different aspects of the evacuation.

In a no-notice evacuation, time will be of the essence in mobilizing the agencies, organizations, and other stakeholders who will support the management of the evacuation. The mobilization process can be streamlined considerably if prior work has been done to identify the stakeholders who will be involved in an evacuation and to ensure that they understand their respective roles and responsibilities within the context of the overall evacuation effort.

Emergency management and first responder agencies traditionally have conducted the planning process for evacuations and other emergency incidents. One of the challenges facing some stakeholders is that emergency management planners may not fully understand what transportation agencies and other specialized organizations can contribute to the planning and operations phases of an evacuation. These specialized entities need to take an active role in the planning process to ensure that their capabilities are understood and accounted for properly, and that their input is incorporated into the plan. Transportation agencies should be involved in the planning process from the beginning and actively include themselves in all planning phases and activities of the process. This will ensure that their capabilities are leveraged effectively and that there are no false expectations about what they will or will not be able to do during an evacuation.

The planning process should take into account and involve all agencies and entities that will participate in declaring, executing, and supporting evacuation and sheltering efforts. This should encompass all levels of involvement: local, regional, State, Federal, non-profit, and private. Planners should consider multiple categories of involvement, including:

- **Executive government** – Mayor and city hall, county administrators, and the governor.
- **Emergency responders** – Emergency management agencies, fire and rescue agencies, law enforcement agencies, and some components of transportation agencies (e.g., full-function service patrols and TMCs).
- **Transportation management** – City transportation departments, state transportation agencies, and county and MPO agencies.
- **Transportation providers** – Transit authorities, Amtrak and commuter rail operators, local transit providers, private bus companies, taxi companies, and trucking companies.
- **Public works agencies** – Public works, water, and power; environmental agencies; and agencies that provide debris clearance services (e.g., DOTs).
- **Emergency care providers** – Public health, hospitals and medical facilities, American Red Cross, and sheltering site operators.
- **Communications providers** – Telephone companies, mobile phone service providers, broadband and Internet service providers, and State DOT managers of the 511 system.
- **Media** – Television and radio stations.
- **Private services providers** – Towing companies, service stations and fuel companies, and food and dry goods retailers.

By involving these stakeholders in the process from an early stage, planners can help ensure a common understanding among all involved parties regarding operational goals, command structure, roles and responsibilities, and respective capabilities. Participants will also be able to inform the planning process by providing information about their operational resources and limitations, as well as specialized knowledge of the transportation network, sheltering facilities, and support infrastructure. All of this information will ideally be factored into the development of the evacuation plan.

It is also important to consider integrating neighboring jurisdictions, regional planning organizations, and State and Federal resources into the plan, either by including them at the table or ensuring that plans are coordinated with any entity that may be called upon for support. Emergency managers and evacuation planners should address in advance any needed mechanisms for cooperation and support among the

stakeholders. These can include memoranda of understanding, mutual aid agreements, and contract provisions to help clarify respective roles and resources.[9] This process can be particularly important for private sector companies who do not assume that they automatically have responsibility during an emergency, but who sometimes have the ability to provide critical services and support resources for evacuation and sheltering activities.

The success of a no-notice evacuation will be improved if all participating stakeholders are prepared to perform their respective roles. Once the planning process has been completed, all stakeholders should be encouraged to undertake their own respective advanced planning and preparedness activities. These will ideally include staff training and exercises for the plan, identification of internal staff and resources to participate in evacuation support, resource inventory and management, internal contingency planning, and preparation of continuity of operations activities. In many cases, agencies should conduct meetings and joint training efforts with each other to improve their ability to coordinate effectively during an evacuation. By helping stakeholders become better prepared to support an evacuation, emergency managers will benefit from improved capabilities and response during an actual no-notice incident. Neighboring jurisdictions and the State should be invited to participate in drills and training as appropriate.

For transportation agencies to become more fully engaged in the planning and the execution of an evacuation, they must be perceived as stakeholders. Transportation agencies should integrate evacuation planning and emergency management services into their core operations by identifying and committing staff and defining staff roles and responsibilities for interacting with State, regional, and local emergency management staff. This may require an organizational shift and willingness on the part of agency management to shift financial resources and commit staff.

Individuals who understand travel demand, roadway capacity, and traffic management need to be engaged in evacuation planning and to be perceived by the outside world as credible evacuation planners. These individuals are most prepared to identify and assess transportation-re-

[9]All States are signatories of the Emergency Management Assistance Compact, which comprises a State-to-State mutual aid agreement for resources and services.

lated strategies and tactics, demonstrate the value of employing transportation simulation modeling and geographical information systems, and secure the adoption of the use of these tools by emergency management staff and first responders. For transportation representatives to be most effective in the planning phases, they must be fully knowledgeable of the capabilities – infrastructure, operations, maintenance, information management, etc. – which the DOT and its contractors bring to the table. Most importantly, the representative must have the authority to commit the DOT resources to any plan and must be a vocal, active partner in the process.

OPERATIONS

The stakeholders identified in the evacuation plan, shown in Figure 5.1, will each have a number of responsibilities and sets of activities to perform during an evacuation. These should be established as part of the overall plan development process to ensure that all aspects of evacuation support are addressed adequately. Planners should make sure that the distribution of responsibilities is a logical one, given the differing expertise, capabilities, and resources of an agency or organization.

In a no-notice context, it is critical that each agency and organization be prepared to conduct its activities properly in order to effectively support the overall evacuation effort. An agency needs to assess its own resources and capabilities to make a realistic determination of what it will be able to do during a no-notice incident. These capabilities often vary according to time of day and other circumstances. Many transportation agencies, for example, have varying levels of staff on duty over a 24-hour cycle; during a low-staff period, a transportation agency may be much more limited in the level of support it can provide. Some capabilities, particularly those involving specialized systems, may need to be operated by staff with particular training or expertise; if those people are unable to report to duty, those systems will be unavailable for use. The assessment should also be sensitive to the need for immediate activation and implementation in a no-notice scenario.

Within a transportation agency, a range of technical specialists needs to be prepared to contribute to the operational aspects of an evacuation. Policies and procedures for activating these resources must be

established and staff must be trained on how their areas of expertise are applicable to incident detection and incident response and recovery. Dedicating the right staff to supporting an emergency response is dependent upon their knowledge of roadway conditions and equipment, congestion and incident management technological deployments, and information system applications. They must also have the capacity to

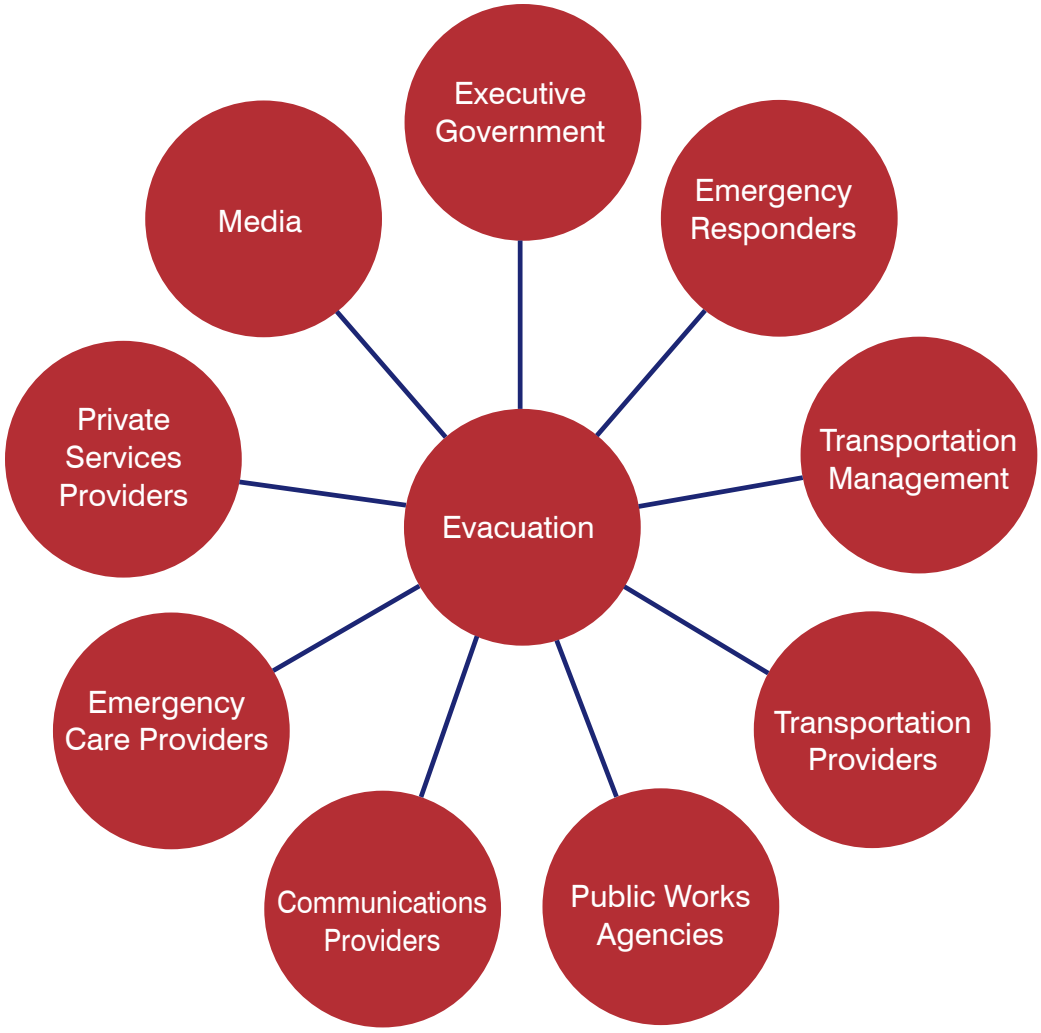


Figure 5.1. Stakeholders Involved in Evacuation.

rapidly synthesize information that is being gathered and transmitted for decision making purposes. Evacuation planning, particularly for no-notice incidents, requires integrating roles, responsibilities, and functions along with technologies and systems similar to those in many of the country's TMCs. Once integration has occurred, agencies can identify the worst case no-notice scenario and test the capability limitations of their staffs and supporting information systems. They can then take steps to mitigate those limitations through additional staff training and resource procurement to achieve enhanced staff coordination and establish a level of redundancy for critical systems and operations.

The emergence of TMCs is dependent upon systems integration and interoperability to provide real-time information. In order for evacuation planning to translate into action once an incident occurs, systems integration and interoperability limitations need to be identified and addressed beforehand. This requires securing technology and developing systems that meet industry standards and that can be integrated with those that are being deployed by the emergency management community.

FORECASTING EVACUEE STATISTICS

The most critical element of an evacuation is the population of evacuees. All activities and efforts should be focused on moving these people from the at-risk area to places of safety. The size and characteristics of this population are, of course, significant factors in determining how an evacuation will be executed.

Evacuation planners must understand the people who are likely to be evacuated before they can make key decisions about transportation modes, route selections, sheltering destinations, and the many other elements of an evacuation effort designed to support the safe and efficient movement of evacuees.

Demographic forecasting drives transportation planning, specifically determining the impact of the evacuation on a corridor or system and estimating existing and future travel demand between origination and destination zones. Transportation agency planners need to play a contributing and sometimes a leading role in the identification and movement of population groups. The availability of data maintained

by the DOTs, along with an understanding of region-wide vulnerabilities, provides a basis for establishing actionable strategies in advance of an incident. Population data and demographic information regarding automobile ownership and transit dependency may be included in regional DOT-managed travel demand models. These models also provide a framework for improving preparedness; they can be used to evaluate staging locations, determine final destinations, and test the ramifications of releasing evacuees onto a transportation network during peak and non-peak periods. This requires engaging the staffs of metropolitan planning organizations that have played a historic role in the development and application of regional transportation models. As domain experts, they are some of the most qualified individuals in any metropolitan area who can prepare geographically based demographic forecasts. Critical factors to consider include the following:

- **Number of evacuees** – How many people are likely to be involved in the evacuation? Is the population of the at-risk area relatively constant, or does it change significantly based on factors such as time of day, work populations, or seasonal considerations such as tourism or presence of college students?

DOT Functions Relevant to Evacuation Planning and Management

- Infrastructure maintenance and restoration, including road weather management
- Transportation planning, including evacuation planning, planning for special events, and route planning
- Debris removal from highways, bridges, rail lines, etc.
- Traffic incident management, including service patrols and supplies for stranded motorists (safety equipment, signs, tire repair, gasoline, etc.)
- Information collection, analysis, and processing (traffic counters, cameras, etc.)
- Public communication (511, messaging systems)
- Work zone management
- Freight management
- Personnel trained and experienced in emergency operations

- **Location and distribution of evacuees** – How are residents, employees, and other people distributed within the at-risk area? Are there concentrations of people in particular locations (such as large employment centers) that should be anticipated as part of the plan? What are the likely areas of traffic congestion that correspond to high population densities?
- **Modes of transportation available to evacuees** – How are evacuees likely to travel during an evacuation? What number and what types of private vehicles will probably be used during an evacuation, and therefore contribute to traffic congestion? How are those vehicles distributed within the at-risk area? How many evacuees have personal cars available to them? Are there significant numbers of car owners who commute by transit and therefore may not have immediate access to their cars during the daytime? How many people are likely to use alternative modes such as bicycles and walking during an evacuation?
- **Evacuees' likely desired direction(s) of travel** – In what directions will significant numbers of evacuees want to travel during an evacuation? Where do people live and work in geographic relation to the at-risk area, and in what directions will they likely try to travel? What are the aggregate numbers of evacuees by travel direction?
- **Mobility restrictions** – What portion of the evacuees will face mobility challenges? Do a significant number have limited transportation options available to them? Are there many evacuees who will be limited by factors such as lack of personal transportation, limited financial resources, unfamiliarity with the area and its road network, and other challenges such as language barriers?
- **Special populations who may require specialized or additional assistance** – What population groups will need special assistance during an evacuation? What types of assistance will be required in terms of expertise and specialized equipment? Will these people require specialized support at sheltering locations as well? How are these population groups distributed within the at-risk area? Are there particular population concentrations or facilities for such people (such as hospitals, schools, and prisons) that deserve special attention during the planning process?[10] Figure 5.2 explores additional steps for evacuation of special needs populations in greater detail.

[10]See "Evacuating Populations with Special Mobility Needs" from this Primer series for additional information about special needs populations.

Disability/Special Need	Additional Steps
Visually impaired	May be extremely reluctant to leave familiar surroundings when the request for evacuation comes from a stranger. A guide dog could become confused or disoriented in a disaster. People who are blind or partially sighted may have to depend on others to lead them, as well as their dogs, to safety during a disaster.
Hearing impaired	May need to make special arrangements to receive warnings.
Mobility impaired	May need special assistance such as paratransit to get to a shelter.
Single working parent	May need help to plan for disasters and emergencies about location and safety of a child.
Non-English-speaking persons	May need assistance planning for and responding to emergencies. Community and cultural groups may be able to help keep people informed.
People without vehicles	Need to have information about public transit routes and services, as well as other private sector transit services.
People with special dietary needs	Should take special precautions to have an adequate emergency food supply.
People with medical conditions	Should know the location and availability of more than one facility if dependent on a dialysis machine or other life-sustaining equipment or treatment.
People with mental retardation	May need help responding to emergencies and getting to a shelter.
People with dementia	Should be registered in the Alzheimer's Association Safe Return Program.

Figure 5.2. Special Needs Populations.

Evacuation planners can use readily available demographic data to answer many of the questions posed here. Federal census data provide a detailed overview regarding population sizes and distribution, as well as other statistics such as income level, work location, and car ownership. Planners can also work with specialized organizations such as hospitals, medical associations, public service organizations, school districts, universities, and tourism bureaus to identify relevant population segments, their characteristics, and the types of assistance they will need.

Geographic information systems can be used to analyze available data, to highlight key aspects of the potential evacuation populations. Sites such as population centers, critical facilities and special needs population locations can be mapped in juxtaposition to the transportation network, travel corridors, and sheltering locations. Doing so enables evacuation planners to better anticipate how evacuees can be moved most effectively during a no-notice evacuation scenario, and immediate access to this information directly after a precipitating incident will significantly improve evacuation management.

ANTICIPATING AT-RISK AREAS

A key aspect of projecting evacuation population sizes is anticipating which geographic areas are likely to be involved in a no-notice evacuation. Although many precipitating incidents occur without warning, the locations or sources of certain types of localized incidents can be anticipated in advance, as can the areas that will require the most coordination for an evacuation. Advanced planning for evacuations can identify locations and areas where a coordinated evacuation effort is most likely to be needed.

Most large cities have identifiable population centers (both residential populations and daytime work populations) that will generate high numbers of evacuees if placed at risk after an event. In addition, many of these areas are – by virtue of their high profile or proximity to high-profile sites – potential targets for terrorist attacks that may also cause people to be evacuated. These locations can be mapped against population distributions to determine the potential number of evacuees resulting from an incident in a given location.

Jurisdictions may also have specific sites or facilities that pose potential hazards and that may be responsible for generating an evacuation. These include power plants, fuel processing/storage sites, laboratories, or other research facilities working with hazardous materials, and manufacturing plants with large quantities of on-site chemicals. In addition, major transportation routes, such as trucking corridors, freight rail lines, waterways, or even pipelines that are used to ship materials, could carry hazardous materials through jurisdictions and could be the

site of an incident that forces the evacuation of population centers.[11] If an incident occurs at one of these sites, it may generate a hazard of sufficient size and severity to warrant an evacuation. Such facilities can be identified through existing community hazard and vulnerability assessment results, and those that are of particular concern should be analyzed further to determine the likelihood and consequences of a mishap. Planners can then use demographics data and geographic information system tools to develop projections of the at-risk populations based on the nature of the facility and the presumed hazard.

Evacuation planners should engage local staff to identify locations of potential evacuations. They can then map significant evacuee populations against the proposed evacuation transportation and sheltering network to determine projected demand levels on their chosen travel routes and corridors. Emergency management agencies typically take the lead in such efforts, but transportation agencies can play a key supporting role by providing information about transportation routes and modes.

ANTICPATING AT-RISK INFRASTRUCTURE

The transportation infrastructure – including roads, highways, bridges, waterways, rail lines, and pipelines – constitutes a critical component of a successful evacuation; however, it is highly vulnerable. The transportation network poses a potentially attractive target for terrorist attacks. It can also be weakened during natural incidents such as earthquakes, floods, or volcanic eruptions. Transportation/evacuation planners must be able to identify critical infrastructure components and consider the consequences of failure before or during an evacuation. This planning requires knowing where redundant transportation capacity exists within the roadway system so that flows of evacuees can be redirected around vulnerable or damaged infrastructure, and being able to communicate this knowledge to emergency managers who are coordinating field operations. In some cases, alternate routes may lie within neighboring jurisdictions or states, necessitating coordination with partner agencies outside the affected jurisdiction. Other modes (transit, boats, etc.) can also be considered to establish redundancy, assuming they are not already being used to transport evacuees. De-

[11]DOT and the National Response Center – a consortium of Federal Agencies that manages hazardous materials incidents and collects statistics on incidents. These statistics provide communities with information for identifying community risk levels of in-transit accidents.

bris-clearing capabilities among support agencies (DOT, public works, etc.) can also help to maintain the viability of primary routes even after some degree of damage has occurred.

Transportation planners should create geographically based databases that profile critical infrastructure and consider strategies for how to shift evacuees in the event of infrastructure failure. The databases and the potential strategies should be shared with emergency management and first responder staff and then tested as part of tabletop exercises.

DETERMINING TRANSPORTATION CAPACITY

Once planners have determined the number and geographic distribution of potential evacuees, these statistics can be analyzed against the transportation network that will be used to conduct the evacuation. It is important to note that while this Primer focuses on issues associated with highway use during an evacuation, in many places other transportation modes and routes will likely be employed. The term "transportation network" is intended to refer to all the modes used during an evacuation, although roads and highways will likely carry the majority of evacuation traffic in most locations and will be the focus of capacity analysis. An evacuation is also likely to include large numbers of pedestrians traveling on the road network; this traffic needs to be factored into the overall capacity analysis as well.

In most evacuation scenarios, and particularly those in a no-notice context, the agencies managing an evacuation will need to rely on the existing transportation network to carry evacuees to safety from at-risk areas. Identifying and analyzing all the components of the transportation network is an important element of evacuation planning. Each component should be reviewed to determine critical characteristics, including:

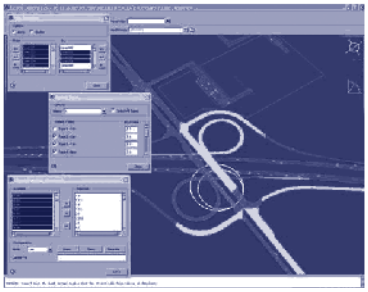
- Carrying capacity (number of vehicles/passengers per hour)
- Potential choke points (lane reductions, interchanges, etc.)
- Potential vulnerabilities (bridges or tunnels)
- Sensitivity to seasonal considerations such as snow, fog, and flooding
- Location respective to evacuation population distribution
- Location respective to potential sheltering and care destinations
- Proximity to alternate, parallel routes
- Location of ITS to obtain real-time information on the infrastructure and flows and to communicate with travelers

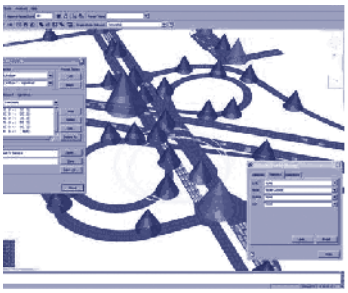
Transportation agencies are critical to this process because they have the knowledge and expertise to generate the needed data. Most already have existing transportation studies and analyses with information about traffic capacities; many agencies also have the specialized tools (such as modeling software) to generate data relevant to evacuation preparation.

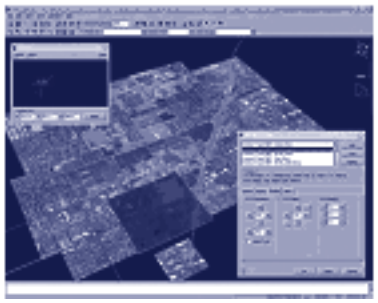
When planning an evacuation, transportation managers should consider all transportation options, including all modes, as viable alternatives. Although roadway and highway networks will be principal conduits for moving a large number of people, the nature and consequences of a range of events will dictate which transportation options are best. The consideration of an evacuation, particularly one that requires mass movement of people, requires identifying the transportation options available within pre-defined, sub-regional corridors. With the foreknowledge of capacity and availability of transportation resources – roadway and fixed guideway transit, pedestrians, bicycles and waterways – decisions can be made as to how to distribute evacuees among modes, and whether or not additional transit and alternative high-occupancy vehicles should be deployed.

Major interdependencies exist in major metropolitan areas that are served by multiple modes of transportation. Transit systems and commuter rail systems operate in densely traveled corridors that are also served by those highways that will be identified as evacuation routes. Highway connectivity is essential for moving people onto or collecting individuals at transit and rail stations and termini, or to ferries and ports of call, such as cruise ship terminals. Evacuation planners need to consider how to maximize the capacity of each component of the transportation network as an integrated whole. This also includes consideration the types of roadway vehicles that should be operating in conjunction with transit and rail operations as well as feasible maritime resources.

After a no-notice incident, movement by foot will be the first and sometimes the only choice for many evacuees. Even once an incident command is established to manage the incident, pedestrian movement could be the best and most efficient method of evacuation, at least from those areas closest to the site of the incident. Evacuation planning should address how to gather and protect pedestrians at or near







Source: Quadstone Paramics. Reproduced with permission.

the location of the incident and how to support those with limited mobility, and should establish tactics for emergency management staff and first responders. Transportation planners should establish a regional pedestrian network that is consistent with the roadway and highway systems, and develop geographically based databases displaying pedestrian paths. This planning requires identifying sidewalks and trails, crosswalks, intersections, bridges and tunnels, and other possible barriers that impede pedestrian movement.

Once the components of the transportation network have been identified and profiled, the data can be used to develop a comprehensive understanding of the transportation network. This network can be considered within the context of a no-notice evacuation to determine traffic loads and congestion in relation to factors such as projected at-risk areas, vehicle and evacuee numbers, likely directions of travel, and destinations.

In support of this endeavor, planners should employ transportation demand models to determine how best to manage system-wide capacity under different scenarios, including no-notice incidents. These models are typically suited to testing and decision making regarding roadway capacity; however, they include limited capabilities for estimating modal diversions. Key factors such as the size of an evacuation and the time of day will drive capacity utilization. In turn, this will affect decisions on staging and how to best move evacuees. All too frequently during the course of the day, major metropolitan areas are already operating at close to capacity. The consequence of an evacuation requiring the movement of a great number of additional people could result in gridlock unless traffic operations professionals, traffic incident managers, full-function service patrols, emergency managers, and first responders are prepared to implement a range of alternative transportation tactics.

If feasible, jurisdictions can incorporate these data into a traffic modeling framework that will allow further analysis of traffic routes, traffic loads, and congestion management tactics. This work would support the selection of appropriate evacuation routes and strategies to be incorporated into the overall planning process. This will enable evacuation managers to make better decisions during a no-notice evacuation because they will have a good knowledge of how evacuees should be distributed within the transportation network.

TRAFFIC MANAGEMENT

Source: FEMA/Greg Henshall.

The efficient and expeditious flow of evacuation traffic is the most critical element in a successful evacuation and, at the same time, the most challenging, especially in a no-notice environment. The viability of the traffic management plan employed during an evacuation will directly influence the safety and comfort of the evacuees.

As the subject matter experts, local transportation planners play a vital role in developing the traffic management strategies and tactics included in the evacuation plan. They have the comprehensive understanding of the regional transportation network necessary to identify ways to improve the carrying capacity of roadways and transit systems in a safe manner, while taking into consideration the likely constraints of a no-notice context incident. Planners will enable decision makers to determine:

- What the pre-event condition of the road system is, including where active work zones are established, where ITS equipment is stationed, where traffic incidents are being managed, etc.
- How to shift roadway utilization among a region's interstates and primary and secondary roadways
- What routes are available for the most expedient movement of at-risk populations to the highway network
- How to deliver evacuees to final destinations
- How to assign lane usage on interstates and other primary highways
- How to stage evacuations so that roadway congestion is minimized
- Whether to dedicate lanes for high occupancy vehicles and any others required to move certain population groups

Planners have a wide range of traffic management options from which to choose, as illustrated in Figure 5.3. Examples include implementing contraflow; waiving tolls on bridges, tunnels, and transit; blocking on-ramps and off-ramps in relevant locations; and adjusting timing of traffic signals on key routes. The challenge is to identify those strategies that provide the greatest increase in carrying capacity while imposing realistic time and resource requirements for implementation.

There is no universal answer for the question of which tactics should be selected. The best choices will be driven by the unique characteristics of each region's transportation network and emergency management structure, and determined through traffic simulation testing.

Tactic	Description
No changes to normal roadway operations	No implementation of any specialized traffic management tactics.
Phased releases of outbound vehicles through timed control of major parking centers	Coordinated release of parking facilities would theoretically reduce congestion on evacuation routes. To accomplish implementation of this tactic, parking facilities would be inventoried and categorized according to size, location, or other relevant factors. A phased release protocol would be developed that would provide for gradual release of privately owned vehicles from downtown parking facilities. This would theoretically modulate vehicular congestion on designated evacuation routes.
Reduction of outbound vehicles through closure of major parking centers (i.e., forcing car owners to evacuate via walking transit)	Long-term closure of major parking facilities during an evacuation event would reduce the number of vehicles on evacuation routes and thus would theoretically improve travel times on these routes during an evacuation.
Closure of inbound lanes on selected roads and highways	Closure of inbound lanes on highways utilized for evacuation routes would prevent motorists on these routes from entering the city while the evacuation is underway.
Closure of outbound off-ramps on limited-access roads and highways	Closure of outbound off-ramps on highways utilized for evacuation routes would keep evacuees on these routes until they reached planned evacuation destinations.
Closure of outbound on-ramps on limited-access roads and highways	This tactic would involve closure of outbound on-ramps on designated evacuation routes to reduce congestion on these roadways due to traffic originating at intermediate locations between evacuation origins and destinations.
Limited contra flow on selected limited-access roads and highways (e.g., one lane for bus convoys, etc.)	Limited contra flow on selected roads is a tactic by which one or more lanes of highway are reversed to accommodate an increased flow of traffic in one direction. Contra flow has been implemented as a component of hurricane evacuation planning in certain southern and southeastern states, but is not a common feature of many disaster evacuation plans because of the need for a long lead time prior to the evacuation event during which the contra flow can be established.
Unlimited contra flow on selected limited-access roads and highways with all normally inbound lanes used for outbound traffic	An unlimited contra flow tactic would include redirection of all lanes of a designated evacuation route to accommodate rapid evacuation from a city or region. This is a tactic that lends itself primarily to limited access roadways.
Limited/unlimited contra flow on selected unlimited-access arterials	Temporary closure of inbound travel lanes on selected unlimited-access arterial roadways (such as parkways and boulevards) allows outbound traffic to utilize these lanes during an evacuation.
Traffic control points	Traffic control points are locations along designated evacuation routes which are staffed by emergency management personnel and utilized to maintain a greater degree of evacuation management. Traffic control points can enhance the efficiency of an evacuation, reduce public confusion during an evacuation, and allow increased operational flexibility during an evacuation.
Segregation of pedestrian and vehicle traffic	Certain urban roadways would be designated for use by pedestrians. This would provide separation between vehicles and pedestrians during an evacuation, thus reducing confusion and increasing the efficiency of evacuation from densely populated areas.

Figure 5.3. Traffic Management Tactics.

Planners will need to consider many factors during the planning process:

- Recognize that a region's highway network typically provides the greatest opportunities for moving large numbers of people. Beyond understanding highway capacity, there needs to be consideration of the highways' proximities to at-risk populations and their connectivity with local street networks.
- Ensure that strategies expedite the movement of people who are most at risk. Pre-identification of those groups, if possible, enables planners to prioritize routes and zones that will support those with the greatest need for movement. Planners should also consider provisions for implementing a phased evacuation; this not only prioritizes the evacuees with the greatest risk, but also improves overall traffic flow by preventing overloading of the transportation network.
- Conduct and enable pre-identification and dynamic identification of routes between facilities, residents, and shelters to ensure that predefined routes are safe in light of the specific threat (some routes may be more protective than others) and to maximize the capacity of available transportation assets.
- Identify secondary and alternate routes that can be used if primary routes become overwhelmed or unavailable. Determine how alternate routes will affect the overall capacity of the network and make contingency plans accordingly.
- Recognize that responders and their equipment and relief supplies will be moving toward the area while locals are being evacuated from it, and that responder entry must be considered in determining outbound evacuation routes.
- Factor in any limitations regarding the particular resources available during a no-notice evacuation scenario. Ensure that the selected tactics can be implemented with limited time, personnel, and equipment.

If possible, transportation planners should employ traffic modeling to test the routes and tactics to be included in the evacuation plan. This will provide data to help quantify the benefits of different strategies and support an informed decision as to the best strategies for the particular region and transportation network.[12]

[12]For more information, refer to USDOT's *Inventory and Assessment of Transportation Modeling Tools and their Applicability for Evacuation Modeling* report.

DESTINATIONS AND SHELTERING

Evacuation planners do not need only to enable the movement of at-risk populations to areas of safety; they need to arrange care and sheltering for those populations as well. While the elements involved in selecting and preparing sheltering facilities for an evacuation are beyond the scope of this document, there are some issues associated with shelters that should be addressed as part of the planning considerations.

The most important issue is that sheltering facilities must be identified, assessed, and prepared in advance of being needed to be able to support a no-notice evacuation. A no-notice scenario will not provide sufficient time to provision facilities and train their staffs; these activities must be done ahead of time to ensure readiness.

Evacuation planners should pre-identify sheltering facilities in order to evaluate their locations in relation to proposed evacuation routes and other components of the transportation network. Planners should assess shelters' locations, as well as their capacities, facilities, and resources, in relation to how evacuee traffic will be routed. If, for example, the major evacuation routes run north-to-south from a city but the viable shelters are east and west of the city, route evaluation needs to be undertaken during the route selection process. Transportation planners should coordinate with emergency managers, the American Red Cross, and other stakeholders responsible for mass care to understand which shelters can be used and make determinations about how to direct evacuation traffic to those destinations. In some cases, certain shelters may be poor candidates for use due to poor connections with the transportation network; transportation planners need to communicate this information to the stakeholders responsible for establishing the shelters. Most critically, it is important that the jurisdictions where the shelters are pre-identified know about these plans and concur. During past disasters there have been instances where jurisdictions have denied entry to evacuees and refused to allow trains and buses to off-load at the shelters.

For large-scale, medium- and long-term evacuations, transportation planners need to assess the transportation network's ability to enable re-supply and provisioning of the sheltering locations. Some facilities

may be easily accessible by air or water that, while being impractical for mass evacuee movement, may be very practical for bringing in food and supplies. This will factor into evaluation and selection of sheltering locations.

The selection and preparation of shelters needs to include consideration of the populations they will be used to protect. The many groups who will require specialized facilities and services during sheltering include evacuees from hospitals and nursing homes who will need medical facilities; people with vision, hearing, or mobility impairment who need special provisions; and pet owners who need places to shelter their animals as well as themselves. Sheltering facilities will be able to accommodate such special needs groups to varying degrees, depending on their facilities. Evacuation planners should determine whether such special needs groups should be routed to particular shelters and how to incorporate such specialized direction into the evacuation plan.[13]

In some cases, transportation planners may need to identify short-term interim sheltering locations as part of the evacuation transportation plan. These can serve as collection points for evacuees who have walked or ridden transit from the at-risk area, and who now must wait for secondary transport (buses, etc.) to longer-term sheltering facilities. As with the long-term shelters, these short-term options need to be pre-identified in relation to the transportation network and evacuation routes so that they can be incorporated into the evacuation plan and be prepared in advance to support a no-notice evacuation.

SITUATIONAL AWARENESS

Situational awareness is critical to the successful execution of an evacuation. After a no-notice incident, evacuation managers need accurate, up-to-date information in order to make quick and effective decisions regarding evacuation tactics and the deployment of resources. Key factors of which they need to be aware include:

- Nature of the precipitating incident and its associated hazards
- Geographic location and scope of at-risk area
- Current size and location of at-risk population

[13]See the *Evacuation Populations with Special Mobility Needs* Primer in this Primer series for additional information.

Source: Massachusetts Highway Department.

- Condition of transportation network infrastructure, including locations of impediments such as work zones and traffic incidents
- Congestion levels in the transportation network (initial and ongoing)
- Response agencies' level of readiness and availability
- Contact information for response agencies
- Response agencies' deployment locations and activity
- Availability and location of material and resources to support evacuation efforts
- State of readiness and occupancy levels of sheltering locations

The evacuation plan should specify how coordinating and participating agencies will collect, analyze and share relevant information quickly after a precipitating incident. Planners need to determine the key topics on which to focus during initial time period, how to collect that information, and how to transmit the information to a range of stakeholders.

As part of this determination, each stakeholder should identify the systems and methods they have for collecting and providing critical information. Transportation agencies in particular are well-positioned to compile some of the information listed above. Through resources such as embedded road sensors, traffic cameras, and other ITS components, they can rapidly determine the state of the transportation network. More importantly, they can typically process this information rapidly at specialized facilities such as local and regional TMCs.

Transportation agencies can improve the evacuation planning and preparedness process through two activities. First, determine the specific information collection capabilities provided by their systems and staff, identify where vulnerabilities might exist, and communicate these capabilities and vulnerabilities to the evacuation planners. This will ensure that the plan leverages the available information while retaining realistic expectations for information availability. Second, transportation agencies should train their staff and prepare their systems to maximize their information collection capabilities, particularly on short notice for no-notice scenarios. These activities may include training additional staff to operate ITS systems, augmenting systems to expand their capabilities, reinforcing system hardware and networks to ensure continued operations during adverse conditions, and performing planning duties at the EOC as a technical expert.

A final consideration is how to share the information collected by transportation agencies systems and TMCs with other agencies and emergency management facilities.

COMMUNICATIONS

During an evacuation or other large-scale emergency response, two types of communication take place: (1) communications among entities involved in the management of the response and (2) communication between the emergency management structure and the general public. Each of these levels of communication can involve different goals, tools, and challenges.

An effective evacuation plan will describe how information will be shared among agencies and organizations involved in the response effort. These entities must be able to communicate in order to promote situational awareness at all levels and to ensure a reliable command structure and need to be able to share the following types of information:

- Notification of declaration of emergency and situation status report
- Notification of declaration and type of evacuation order
- Size of evacuation area and anticipated evacuation population
- Duty assignments for different agencies and staff
- Evacuation strategies and tactics being employed
- Activation orders for different activities and facilities
- Changes in command and reporting structures
- Updates on duty assignments and activity orders
- Stand-down/recall order at end of evacuation

These communications will rely on the agencies' existing communications systems and protocols because a no-notice incident will not provide enough time to establish evacuation-specific hardware and routines before they are needed. Additionally, a no-notice scenario will place greater demands on the communications network because all participating agencies act simultaneously while requiring information and instructions from other agencies. Moreover, the normal communication network may be saturated with the general public making a high volume of calls, emergency responders reporting on situation status, agencies coordinating with each other, and disaster welfare

inquiries initiated from out of the area. As a result, plans should address alternate means of communicating during the initial activation period.

All of these issues mean that agencies involved in the evacuation management need to prepare their communications capabilities in advance. Each needs to ensure the reliability and compatibility of its systems and procedures with the overall command structure. One of the most common challenges facing multi-agency coordination is a lack of compatibility among communications systems. Agencies, including transportation departments, need to test their equipment on a regular basis for interoperability with other agencies' equipment. Any incompatibilities in the communications network need to be identified and resolved to prevent a potentially significant communications gap during an emergency. This is typically most applicable to wireless communications systems such as radios used by field staff; differing systems protocols and operating frequencies often prevent field staff from different agencies from communicating directly with each other. In the best-case scenario, transportation first responders, such as full-function service patrols, work crews, or maintenance staff, will have communication equipment that is tested and found to be interoperable with local police and fire departments. If not, frequency managers should ensure that these transportation entities have access to emergency frequencies and that these are known in advance during planning.

Transportation agencies face an additional interoperability challenge. As the primary collectors of information about the transportation network, they need to ensure that they can achieve data communications interoperability with other agencies and facilities. They should evaluate their TMCs to determine how the traffic information can be formatted and transmitted in a way that makes it accessible at other sites, such as EOCs, where evacuation managers will need to obtain and make use of it. This may require the presence of specialized staff, hardware or software at the other sites to receive and present the information to EOC staff.

Communications plans need to anticipate the contingencies that will arise during a no-notice evacuation. One way to prepare is to have tested intra- and inter-agency plans and procedures in advance. Plans must recognize that field staff from transportation agencies and other entities may be working out of range of their base communications network and should provide for an alternate means of communication. Likewise, plans should anticipate that one or more primary communications systems may be rendered inoperable during a wide-scale incident and should identify alternate systems and protocols.

Evacuation managers must also be able to communicate with the general public. Planners need to ensure that the agencies can provide clear, consistent messages to the public regarding information such as the declaration of evacuation, status of precipitating incident, directions for evacuation and sheltering, updates on transportation and sheltering options, and re-entry after the evacuation. Much of this communication will rely on traditional methods such as broadcast media (television and radio), Web sites, and localized announcements through public address systems.

Transportation agencies can contribute to public communication, particularly with regard to providing updates to evacuees who are traveling within the transportation network. Evacuees will both want and need updated information to guide their actions, but this can be challenging while they are in motion. Many agencies can use traveler-oriented information systems to provide transportation-specific information. Likely options include both fixed and mobile variable message signs on the highways; highway advisory radio broadcasts; and 511 Traveler Information Systems accessible by phone. To expedite and improve the use of these systems during a no-notice scenario, transportation agencies should work with evacuation planners to identify likely communications needs and then prepare internal procedures, preformatted messages, and interagency procedures to ensure that useful and accurate information is provided to the public.

PUBLIC EDUCATION

Emergency management and response agencies need to prepare the public for a potential evacuation in advance. An evacuation – particularly in a no-notice context – can be executed much more smoothly if the public is properly prepared. Ensuring that evacuees, who are the largest stakeholder group in an evacuation, know terminology, what to do, and where to go will greatly assist emergency managers during an evacuation. Members of the public need to know the following:

- The meaning of different types of evacuation orders
- What preparations to carry out in advance (emergency go kits, family evacuation plans)
- How an evacuation will be declared
- Where to get information once an evacuation is declared
- What transportation options will likely to be available
- What evacuation routes are likely to be used
- What support services are likely to be offered to evacuees
- Where planned shelters may be established
- Where and how to get updated information once an evacuation is underway
- What services they should expect roadside or at the shelters

A no-notice evacuation scenario highlights the need for evacuees to be as self-reliant as possible. Emergency responders will mobilize to the best of their ability but their capabilities will likely be more limited than during an advance-notice scenario due to limited staffing, responders who have become victims themselves, and a limited period of preparedness. When the public has a better understanding of what to expect during an evacuation and how to prepare themselves, they will be able to be more self-reliant during the actual evacuation: have a personal emergency preparedness kit, bring sufficient food and water, understand where they should go and how to get there, and know where to obtain information being broadcast to the public. This will lessen the burden on emergency responders and enable them to focus on those segments of the evacuation population who require the most assistance.

Emergency planners should implement mechanisms to inform the public of how to prepare for an evacuation and educate them on the different protective action options for various types of scenarios. Suc-

cessful past efforts for public education include community seminars and preparedness pamphlets distributed to residents and businesses. Information can also be posted on agency Web sites.

Transportation agencies should consider what information they need the public to understand in advance of an evacuation. What will better prepare evacuees to anticipate and understand how an evacuation will progress? Transportation planners should consider how they will want evacuees to use the transportation network. Is it worthwhile to distribute a map of likely evacuation routes in advance, with route-specific information such as the fact that bridge tolls will be waived on a given route, or that another route will have limited availability of gasoline for automobile refueling? Do planners want to encourage carpooling to reduce overall congestion on the network? The specific circumstances will vary for each region; local planners should determine what information will be most beneficial in helping the public prepare and should ensure that information is included in the public education process.

RESOURCE MANAGEMENT

Evacuations are extremely resource-intensive events that require significant personnel, facilities, and equipment to implement successfully. As part of the planning and preparation process, agencies need to determine what resources they will have available as well as what resources they will need to perform their allotted roles during an evacuation. In many cases, there may be a gap between what is needed and what is available, in which case an agency or jurisdiction may need to coordinate with other agencies to establish sharing and mutual aid agreements. This situation will likely be exacerbated during a no-notice incident, when the agencies will have less time to identify, obtain, and position resources.

No-notice evacuations have implications for resource availability. Reliance on locally available or pre-positioned equipment will be essential. No-notice incidents preclude the advance movement of local, State, and Federal assets closer to the incident. Moving at-risk populations who require assistance after a no-notice incident is done in an urgent life safety response mode and will, to a large extent, rely on local support capabilities.

During the planning process, each agency should clarify its roles and responsibilities in an evacuation and then determine what assets it will require to perform those duties. These requirements will vary greatly depending on the type of agency, its mission during an emergency, and the anticipated scope of its activities. In the case of transportation agencies, they are likely to need some combination of the following resources:

- Staff personnel (variety of roles and expertise) available and on-site
- Facilities (administration offices, TMCs, TOCs)
- Information systems (ITS, computer networks, software, ancillary hardware such as cameras and road sensor loops)
- Communications systems (landline telephone, mobile phones, radio system, e-mail)
- Vehicles (staff transport, transit vehicles, heavy equipment)
- Miscellaneous material (Jersey barriers, traffic cones)

Any resource management that can be done in advance of an evacuation will enable agencies to respond more effectively and efficiently when an incident occurs. Each agency should create and maintain an inventory of its assets, so it can better understand its level of preparedness and potential gaps related to its activities during an evacuation. This inventory needs to include information about type of asset, quantity, condition, operational deployment status, location, and resource-ordering information, such as an emergency call number for immediate access. By analyzing the inventory, transportation agencies can make better decisions about which traffic management tactics to employ, recognizing that some tactics may be unrealistic in a no-notice context because the necessary resources would not be immediately available. In other cases, the agency may have the resources, but their location and disruption to the transportation network would make rapid acquisition difficult. In these cases, the agency may consider relocating or pre-positioning its mobile assets in locations that will better support emergency activity.

Where critical resource gaps are identified, agencies should determine the best way to obtain the missing items. This may involve the procurement of additional assets or coordination with other entities to determine where surplus inventories exist and can be shared. In some

cases, resources can be expected from State and Federal agencies; local agencies should make this determination while factoring in the expected time delay between a no-notice evacuation and when these assets will be on-site. In many cases, public agencies can make arrangements (or rely on pre-existing contracts) with private vendors and service providers; on-call contractors can fill vital resource gaps during evacuation activities.

Transportation agencies should work with other entities involved in the evacuation response to determine common needs and potential additional resources. It may be that another agency has necessary equipment and material and is better positioned to support the needs of transportation agencies. These arrangements should be made as explicit as possible through the use of memoranda of understanding, mutual aid agreements, and other documents that can serve as guides during an emergency.

Transportation agencies should also look to the private sector to expand their resource base. Private service companies, such as bus operators, ambulance operators, and towing companies, can provide critical additional assets during an evacuation. Many of their capabilities are ones that may not even exist within the public agencies. Evacuation planners should work with these companies to clarify what will be expected of them during an evacuation and to ensure that their services and resources will be available.

6 PLANNING FOR A NO-NOTICE EVACUATION

OVERVIEW

Evacuations are incredibly resource-intensive events that require significant personnel, facilities, and equipment to implement. The nature and size of an incident that precipitates an evacuation will largely determine the response needed, including which stakeholders will be involved, their respective roles, and the resources required to successfully complete the evacuation. The details of the response will vary from one situation to the next, requiring agencies to be ready to undertake different types of responses for each evacuation.

The purpose of this section is to help transportation agencies and other stakeholders prepare themselves for meaningful participation in an evacuation effort by gaining a better understanding of the challenges they should be prepared to address. It presents a series of lists detailing issues that will arise during an evacuation. The list items are intended to help planners identify the types of information and decisions required during the planning process in order to develop an actionable evacuation plan. It should be noted that, while the lists provided will guide planners to much of the information that should be included in an evacuation plan and should be used to stimulate discussion during the planning process, they are not intended to constitute a comprehensive planning process.

The first Primer in this series, *Using Highways During Evacuation Operations for Events with Advance Notice*, identified the following six phases of evacuation operations:

- Planning and Preparedness
- Readiness
- Activation
- Tier 1 Operations
- Tier 2 Operations
- Return to Readiness

To promote consistency among the primers, the same phase structure is used in this Primer as well. The lists in this section are grouped by operational phase, identifying the issues relevant to each set of activities. To provide a clearer approach for planners, the lists are further divided by functional type of activity (e.g., command and control, communications, etc.) for each phase; this will assist readers with

correlating the specific questions posed here with the issues presented in earlier sections of this Primer.

Please note that, as the purpose of this Primer is to address the issues specific to no-notice scenarios, the final two phases – Tier 2 Operations and Return to Readiness – are not covered here because their activities would be handled identically for both advance-notice and no-notice evacuations. For information about these phases, please refer to the "Components of an Effective Evacuation Plan" chapter in the Advance Notice Primer.

An additional distinction between the planning approaches presented here and in the first Primer is that this approach puts a stronger emphasis on the Planning and Preparedness Phase. Unlike an advance-notice evacuation, in which much of the necessary information becomes available to decision makers during the Readiness Phase, a no-notice evacuation will have either a very minimal or a non-existent Readiness Phase. It is essential, therefore, that preparedness is one of the main focuses of an evacuation plan capable of dealing with a no-notice scenario, and that planning activities take place well before the evacuation plan needs to be used. Identifying what can be done ahead of time to prepare for a no-notice evacuation will mitigate the effects of the lack of a Readiness Phase or of an extremely limited Readiness Phase.

PLANNING AND PREPAREDNESS PHASE

This phase encompasses the general planning activities that take place as part of everyday preparations for the possibility of an evacuation. Although particular scenarios may be considered during the planning process (in relation to identified likely causes for an evacuation), this phase differs from the other phases in that it is not conducted in response to a specific situation or occurrence. Planning and preparedness work is of particular importance for no-notice scenarios because it enables transportation agencies and other stakeholders to respond quickly and effectively when an evacuation does occur, without the need for significant additional planning work immediately preceding the evacuation.

1.0	Planning and Preparedness	Notes
	COMMAND AND CONTROL *For information on command and control issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 2: Command Structure; Identify Stakeholders* ■ *Section 5: Concept of Operations; Command Structure; Stakeholders; Operations*	
	Which agencies will have responsibilities during an evacuation, especially those with a transportation role? How have all of these agencies been involved in the evacuation plan's development?	
	Which agencies and lead staff are involved in declaring an evacuation, executing and supporting the evacuation, and organizing sheltering efforts? How have all of these agencies been identified in the evacuation plan?	
	What specific roles and responsibilities do agencies and lead staff have with regard to declaring and supporting evacuation and sheltering efforts? How have these roles been clearly defined and delineated in the evacuation plan for each position and agency?	

	How can transportation agencies best contribute to an evacuation effort, based on their skills, resources, and expertise? How has this information been incorporated into the planning process with regard to these agencies' placement in the overall command structure?	
	How have stakeholders, particularly transportation officials, been made familiar with the National Incident Management System (NIMS)?	
	How have stakeholders, particularly transportation officials, been trained in Incident Command System (ICS) protocols?	
	What protocols or procedures will be used to establish an emergency response command structure in a timely fashion? How are these protocols stated clearly in the evacuation plan?	
	How does the plan document mutual aid agreements with neighboring jurisdictions and outside agencies?	
	How does the plan document mutual aid agreements with the private sector, including those for the use of public transit vehicles, school buses, paratransit vehicles, and non-government agency vehicles such as church buses and volunteer group vehicles? What issues with regard to these other entities need to be addressed to bring them into the command structure?	
	How does the plan address the inclusion of neighboring jurisdictions into the command structure with regard to these jurisdictions providing sheltering and support services?	
	What provisions in neighboring jurisdictions' plans enable effective coordination under the command structure with regard to sheltering and support activities?	
1.2	RESOURCE MANAGEMENT *For information on resource management issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 2: Planning Context; Identify Stakeholders* ■ *Section 4: Limited Resources* ■ *Section 5: Resources*	

	How does the evacuation plan identify organizations and individuals (by position) responsible for directing the staff and resources needed to execute an evacuation order?	
	What resources will be needed by each agency with a role in a no-notice evacuation to support their response during an evacuation? How has each agency determined its needs and identified the corresponding resources?	
	How has each agency determined the resources it has available in-house in relation to its identified needs? What are the gaps between need and availability within each agency?	
	How have agencies worked to address their resource gaps? Have mutual aid agreements been established with neighboring jurisdictions, outside agencies, and the private sector for additional resources an agency requires in order to respond to a no-notice evacuation?	
1.3	PLANNING *For information on planning issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 1: Preplanning vs. Advance Planning* ■ *Section 2: Planning Context; Identify Stakeholders; Role of Transportation* ■ *Section 4: Limited Readiness Phase; Limited Information; Limited Resources* ■ *Section 5: Forecasting Evacuee Statistics; Anticipating At-Risk Areas; Anticipating At-Risk Infrastructure; Determining Transportation Capacity*	
	What geographic and demographic data are needed to identify the following: potential number of evacuees; the location/distribution of evacuees; the modes of transportation available to evacuees; the likely direction of travel of evacuees; and the number of evacuees that will require transportation assistance? Does the planning process include provisions for obtaining this information? How is this information incorporated into the evacuation plan?	
	What demographic data are available to identify the location of special needs populations, including those in hospitals; those in nursing homes; those in assisted care facilities; hearing-, language- or vision-impaired individuals; incarcerated residents; transient populations; and people in schools and daycares.	

	What demographic data are available to identify the numbers and locations of animals requiring evacuation (e.g., animals in farms, kennels, veterinary hospitals, zoos, theme parks, pet stores, and university laboratories)?	
	How does the plan identify or address the specific catastrophic hazards that could cause a large-scale evacuation in a certain jurisdiction or region? Are scenario-specific plans appropriate for particular hazards?	
	Based on the catastrophic hazards, what are the appropriate decision points/triggers for deciding to declare an evacuation?	
	Based on the identified catastrophic hazards, does the plan identify and prioritize the communities that should be evacuated by virtue of their locations in relation to hazard sources?	
	Based on the identified catastrophic hazards, does the plan identify the number of people and vehicles to be evacuated?	
	What are the best methods for notifying citizens who live/work in likely evacuation zones of the evacuation routes they should use and the locations of nearby shelters when an evacuation occurs?	
	Based on the identified catastrophic hazards, what are the distances evacuees must travel from the hazard source to ensure their safety?	
	Based on the projected evacuation characteristics for identified hazards, what is the estimated time needed to complete the evacuation? Is this factored into the plans of highway, law enforcement, and transit agencies?	
	Based on the identified catastrophic hazards, what is the estimated amount of time that publicly sheltered evacuees will need support?	
	What potential variations in direction and control for different types of catastrophic events that require evacuation should be identified in the evacuation plan?	
	How should the evacuation plan address provisions for transporting evacuees to pick-up/assembly points?	

	What provisions should the evacuation plan include for evacuating special needs populations, including coordination with the most appropriate community outreach agencies to transport these populations?	
	What provisions should the evacuation plan include for movement of required assist devices such as wheelchairs, life support systems, service animals, and communication equipment? What policies are needed with respect to bringing these items on board transit vehicles, planes, helicopters, etc.?	
	How does the plan identify accommodations for the transport of luggage, etc.? What size or quantity limitations are established, and how are evacuees informed of these restrictions?	
	What provisions does the evacuation plan make for training personnel in evacuation procedures and for exercising the plan?	
1.4	TRANSPORTATION *For information on transportation issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 2: Role of Transportation* ■ *Section 4: Feasibility of Tactics; Compromised Infrastructure* ■ *Section 5: Determining Transportation Capacity; Traffic Management; Situational Awareness*	
	How does the plan contain provisions for determining evacuation routes? What criteria will be used to select the routes and how will they be incorporated into the evacuation plan?	
	What safety considerations are relevant to the evacuation routes (e.g., roads, bridges, railways, waterways, and airstrips)? What potential vulnerabilities and choke points on the routes should be considered?	
	How will evacuation routes be designated, marked, and communicated to the public?	

1.5	COMMUNICATIONS *For information on communication issues for no-notice evacuations, refer to the following sections of this Primer:* • *Section 5: Communications; Public Education*	
	How does the plan document the communication methods used by each agency? How have the methods been evaluated to ensure compatibility among multiple agencies? What gaps or conflicts need to be addressed?	
	How will a public education campaign be structured to inform citizens of the steps they should take in advance of a no-notice incident, to better prepare themselves in case of an evacuation?	
	Which agency will establish a designated Public Information Officer to provide information to the media and public on all aspects of the evacuation?	
	What information does this person/agency need to ensure that they can provide information about the evacuation order, size of the evacuation, anticipated evacuation population, additional sources of information, destination of assembly points, alternate routes/transportation modes, and available services along evacuation routes and at shelters?	
	What contingency plans will be used if normal means of public communications are unavailable? How will all the relevant agencies be informed of these measures?	
	Does the plan identify sample/pre-scripted messages for use when communicating to the public via automated systems such as dynamic message signs and Reverse 911?	
	What provisions are included in the evacuation plan for communicating with special needs populations? What will be the most effective methods for each population group? What specialized agencies and organizations can assist in this process?	

1.6	SHELTERING/DESTINATION *For information on sheltering/destination issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 4: Sheltering in Place* ■ *Section 5: Destinations and Sheltering; Forecasting Evacuee Statistics*	
	What are the potential shelter locations that can be used? Where are these located in relation to possible evacuation routes? How are these mapped in the evacuation plan?	
	How much time will each shelter require before activation to prepare for receiving evacuees? Is this time accounted for in the plan?	
	Does the plan identify shelters with the capabilities to house special needs populations? What facilities do they provide? What are the total capacities of these shelters in comparison to the anticipated population sizes?	
	Have agreements been established with private facilities (hotels, universities, convention centers, etc.) to provide sufficient space to house the worst-case estimate for the number of evacuees needing shelter? What facilities should be included in this process?	
	Does the plan identify which shelters will accept service animals and pets? What are the total capacities of these shelters in comparison to the anticipated animal population?	
	Does the plan address shelter-in-place provisions if a full evacuation is not feasible? What provisions are identified and how will this information be shared with the public?	

READINESS PHASE

This phase of operations normally occurs when information is received about the likelihood of a specific incident that will lead to an evacuation. These activities are intended to occur after an evacuation becomes imminent but before the evacuation actually begins. In the case of a no-notice or minimal-notice incident and evacuation, the readiness phase will be extremely short or functionally non-existent.

2.0	Readiness *(If, due to the nature of the no-notice incident, a Readiness Phase is not feasible, then the following steps will take place, if necessary, during the Activation Phase.)*	Notes
2.1	SITUATIONAL AWARENESS *For information on sheltering/destination issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 4: Limited Information; Feasibility of Tactics* ■ *Section 5: Situational Awareness*	
	How will key officials be alerted of the possible need to evacuate? What information will be provided to them, and by which agencies and staff positions?	
	How will decision makers determine the size of the area to be evacuated and how many people are affected? What information sources are likely to make this possible in a rapid timeframe?	
	Does the plan document the decision criteria to be monitored and evaluated before determining whether to issue an evacuation order or to request that citizens shelter in place? How will these criteria vary for different scenarios?	

ACTIVATION PHASE

This operational phase involves activating all of the agencies and staff who will execute the evacuation plan and perform essential coordination with responders and impacted jurisdictions. In a no-notice scenario, these activities may be concurrent with the initial movement of evacuees.

3.0	Activation	Notes
3.1	COMMAND AND CONTROL *For information on command and control issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 2: Command Structure; Identify Stakeholders* ■ *Section 5: Concept of Operations; Command Structure; Stakeholders; Operations*	
	Who has the legal authority within the jurisdiction to declare an evacuation? Does the authority exist to mandate that residents evacuate?	
	Does the plan contain pre-approved drafts of executive orders for evacuations? What language and/or provisions should these contain?	
	How can evacuation orders be amended or revised as the situation develops? Who will have the authority to make amendments or revisions?	
	What agencies will report to the Emergency Operations Center (EOC) in the event of an evacuation? How will they be notified to report? Has the necessary contact information been collected and is it updated on a regular basis?	
	Will the Transportation Management Center (TMC) be activated in the event of an evacuation, if it is not already operational? Who will be expected to report to the TMC, and how will staff be notified?	
	What protocols are needed for notifying and coordinating with neighboring jurisdictions about what evacuation routes should be used and when?	

3.2	SITUATIONAL AWARENESS *For information on sheltering/destination issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 4: Limited Information; Feasibility of Tactics* ■ *Section 5: Situational Awareness*	
	Does the plan describe time phasing of evacuation execution (i.e., sequential and concurrent activities) for different levels of evacuation response? Which activities are most important and should receive priority in the event of limited staff or resources?	
	How long will it take to mobilize field personnel and equipment in support of the evacuation? What level of response can realistically be expected, and will this vary depending on time of day (during normal operations hours vs. nights or weekends)?	
3.3	COMMUNICATIONS *For information on communication issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 5: Communications; Public Education*	
	Does the plan include provisions for notification of evacuation personnel? How will this occur and what are some secondary notification methods that can be used if needed?	
	Will contact lists for evacuation personnel be maintained and updated on a regular basis? Who has responsibility for doing this, and how will updated information be distributed to all relevant agencies?	
	Does the plan assign a priority level to all evacuation agencies and personnel? In what order will personnel be contacted after a no-notice incident? What are the factors that will determine the hierarchy?	
	What provisions are needed to close schools and businesses in the at-risk area? How will these decisions be announced?	

3.4	SHELTERING/DESTINATION *For information on sheltering/destination issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 4: Sheltering in Place* ■ *Section 5: Destinations and Sheltering; Forecasting Evacuee Statistics*	
	How will the agencies coordinating the evacuation notify and coordinate with host jurisdictions, non-governmental organizations, and other at-risk jurisdictions to address shelter activation and operations?	

TIER 1 OPERATIONS PHASE

This phase encompasses all of the activity that supports the movement of the public from at-risk areas to locations of safety, as well as the support and sheltering of those people immediately following the evacuation. This phase typically occurs within the first six to 72 hours after an evacuation begins, although the timeframe will vary significantly depending on the circumstances of the evacuation. This phase is distinct from Tier 2 Operations, which involves the return of evacuees to their points of origin once it is safe to do so.

4.0	Tier 1 Operations: Evacuating People from Harm's Way	Notes
4.1	COMMAND AND CONTROL *For information on command and control issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 2: Command Structure; Identify Stakeholders* ■ *Section 5: Concept of Operations; Command Structure; Stakeholders; Operations*	
	Who will manage the evacuation's overall operations? How will this vary depending on the location or scope of the evacuation?	
	Who has the legal authority to authorize measures that will facilitate traffic movement (e.g., the suspension of toll collections, locking down drawbridges, etc.)? How will these people be notified and notify their field staffs?	
	How will critical operational changes be communicated to the Emergency Operations Center (EOC) and other components of the command structure?	
4.2	RESOURCE MANAGEMENT *For information on resource management issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 2: Planning Context; Identify Stakeholders* ■ *Section 4: Limited Resources* ■ *Section 5: Resources*	

	What resources are needed to support evacuation routes? How will these be listed in the evacuation plan, and what associated information (controlling agency, geographic location, etc.) will be included?	
	How are transportation resources obtained, managed, and coordinated? Which agencies are best positioned to accomplish this?	
	Do standby contracts exist with motor coach companies, paratransit providers, ambulance companies, railroads, air carriers, etc., to obtain operators and equipment to fill identified transportation shortfalls?	
	How will resource needs be communicated to higher levels of government (local-to-State and State-to-Federal) to ensure that unmet transportation resource needs are identified and requested to support evacuations?	
4.3	SITUATIONAL AWARENESS *For information on sheltering/destination issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 4: Limited Information; Feasibility of Tactics* ■ *Section 5: Situational Awareness*	
	What technology systems and protocols are available to monitor traffic conditions on the selected evacuation routes? How can transportation agencies share this information with other agencies?	
	If transportation is being provided to the public, how can transportation agencies determine the numbers and locations of available vehicles? How is this information factored into deployment decisions for those vehicles?	
	How will the availability of food, water, restrooms, fueling stations, and rest stations for evacuees along the evacuation routes, including those for special needs populations, be monitored over the course of the evacuation?	
	How will the availability of trained personnel to support the evacuation route (food, first aid, information, etc.) be determined at the time of evacuation declaration and on a periodic basis afterward?	

4.4	TRANSPORTATION	
	For information on transportation issues for no-notice evacuations, refer to the following sections of this Primer: ■ *Section 2: Role of Transportation* ■ *Section 4: Feasibility of Tactics; Compromised Infrastructure* ■ *Section 5: Determining Transportation Capacity; Traffic Management; Situational Awareness*	
	How will operational adjustments be used to maximize throughput on the evacuation routes?	
	What strategies and responsibilities should be identified for maintaining evacuation route capacity, particularly with regard to work zones, toll collection, vehicle incidents, etc.?	
	Does the plan identify provisions to control access to evacuation routes and manage traffic flow? Which traffic management tactics are appropriate for each evacuation route?	
	Does the plan identify support services that are available for those with special needs? What will these services be, how will they be made available, and what are the most appropriate locations for their deployment?	
	Has contra flow been considered as a tactic? Is it a viable option for one or more routes, given the configuration and resource requirements? If contra flow is to be used, has it been tested and practiced by all agencies involved in its implementation?	
	How will the public be informed about contra flow plans and the start and end times for contra flow operations?	
	Does the plan identify a system for communicating and coordinating contr flow operations with neighboring jurisdictions?	
	How will evacuation operations of motorized transport, rail, air, water, and other modes of transportation be monitored to determine the adequacy of available resources?	

	What contingency plans have been prepared to address significant changes in conditions during the course of an evacuation? Are particular issues likely to arise? If so, what are they, and what responses are appropriate?	
	What strategies are needed to ensure that emergency responders, transit vehicles, and other essential resources can move inbound against the predominant outbound flow?	
	How will agencies restrict access (and, ideally, provide some level of security patrol) to areas that have been evacuated? Will transportation agencies contribute to this effort in any manner?	
	What coordination is needed among agencies and jurisdictions to prevent over-tasking of transportation resources where neighboring jurisdictions require support from the same resource provider?	
4.5	COMMUNICATIONS *For information on communication issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 5: Communications; Public Education*	
	What information will be provided to the public to promote general evacuation preparedness as part of a public education effort (e.g., strategies for personal preparation, recommended supplies, sources of additional information, etc.)?	
	What information will be communicated to the public when the evacuation begins (e.g., affected areas, available transportation modes, destinations, etc.)?	
	What information will be communicated to the public on an ongoing basis over the course of the evacuation (e.g., evacuation route status, projected travel times, shelter status, changing traffic management tactics, etc.)?	
	What methods will be used to inform evacuees during evacuation activities? What potential obstacles need to be considered when developing communications plans (e.g., power outages, lack of access to certain media, non-English speakers, etc.)?	

	How does the plan address informing evacuees about when transportation assistance will begin and end and the frequency of departure at designated pick-up locations?	
	How does the plan address informing evacuees of their destination before they board public transport?	
	How does the plan address communicating security measures to the public so that they are not concerned about possessions left behind?	
	How does the plan identify established Web sites, hotlines, etc., where citizens can get answers to their questions/concerns?	
	How does the plan address providing the public with information about available services along evacuation routes and at shelters?	
	How does the plan address contingency plans that are in place if normal means of communication are unavailable?	
	What methods of communication will likely be most effective within the existing constraints of the no-notice incident?	
	How does the plan establish times for public officials to provide updates, and does the plan address informing the public of when to expect such updates?	
4.6	SHELTERING/DESTINATION *For information on sheltering/destination issues for no-notice evacuations, refer to the following sections of this Primer:* ■ *Section 4: Sheltering in Place* ■ *Section 5: Destinations and Sheltering; Forecasting Evacuee Statistics*	
	Will travel routes to the shelters, and the shelters themselves, be marked (e.g., with signs or by other means) to make them easily identifiable to the public?	
	Have provisions been established for keeping shelter operators informed of the locations and capabilities of alternate shelters?	

	Who needs to be notified to begin the shelter activation process?	
	What system will be used to maintain current information on a shelter's status and availability?	
	How will information be communicated to evacuees regarding the availability of public shelters, as well as non-public shelters such as hotels?	


EVACUATION
ROUTE

CONCLUSION

This Primer presents guidance that will assist transportation officials and other stakeholders in preparing evacuation plans capable of addressing little- and no-notice incidents. It is designed to present information and pose questions that will help transportation professionals identify and address many of the issues relevant to preparing for a no-notice evacuation. It highlights critical operational and logistical issues and is meant to stimulate discussion that will pinpoint concrete decisions relevant to evacuation preparation and response. By using this Primer to supplement their normal plan development process, agencies should be able to develop evacuation plans that are actionable and better able to effectively respond to the types of challenges that arise in a no-notice scenario.

The information presented in this Primer is intended to be one resource in a larger planning process. Transportation agencies should use the Primer to gain a better understanding of what is involved in a little- or no-notice evacuation, and how best to prepare for it. To gain a good overall understanding of evacuation planning, transportation professionals should refer to the other primers in this series, as well as the numerous documents and Web sites identified throughout the Primer. These will present a comprehensive view of all aspects of evacuation preparedness, including planning, command and control, strategies and tactics, and special considerations for vulnerable populations and other special needs groups.

This knowledge can be leveraged to achieve more meaningful participation in planning efforts conducted with other stakeholders. By bringing attention to transportation-specific issues involved in an evacuation, in terms of both the challenges facing the transportation network as well as the resources that can used, transportation agencies can advocate at the State, regional, and local levels for the proper roles and responsibilities during an evacuation.

Transportation agencies should also consider the roles and responsibilities of their staffs and equipment when planning for and responding to evacuations. In particular, transportation professionals offer the expertise and operational control of specialized information systems used primarily for congestion management purposes that can further the regional coordination and response of emergency management agencies and first responders. The capital investments in ITS architectures and

technology deployments provide an information-based infrastructure that can be used to enhance situational awareness and communication capabilities in real time. Information about these systems can be found in the first Primer of this series.

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